ROHM
SEMICONDUCTOR

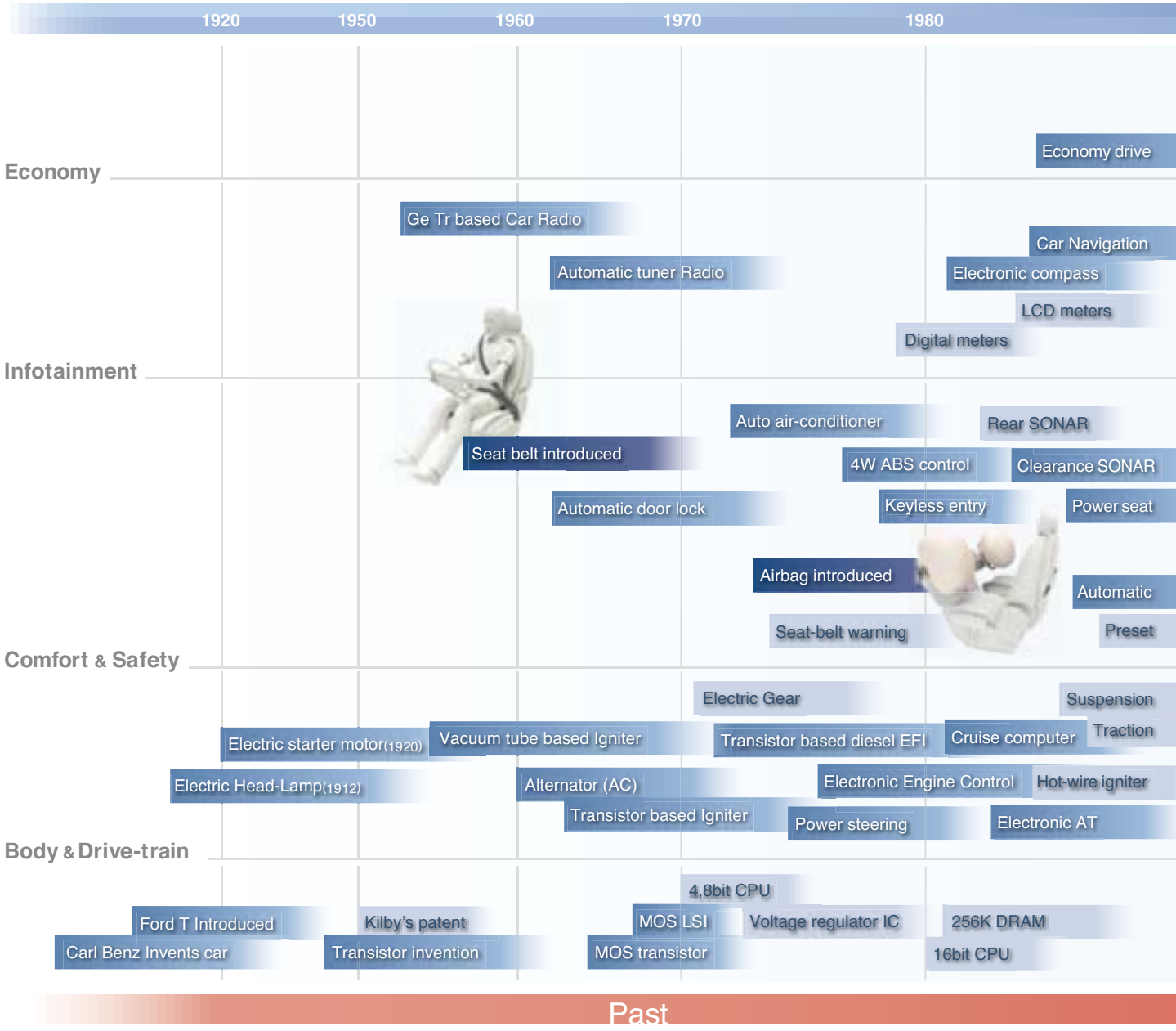
Creating the future of Automobiles

AUTOMOTIVE

PRODUCT CATALOGUE **Ver.2.1**

Creating the future of Automobiles

Automotive evolution



Integrated, in-house production, along with a comprehensive BCM system, allow ROHM to continue product development to meet customer and market needs.

Next-Generation Power Devices

New device development (i.e. SiC, GaN) yields breakthrough efficiency, heat resistance, and miniaturization

Body

- Low quiescent current LDOs, DC/DC
- LED lamp drivers
- LF antenna drivers for smart keys
- High efficiency motor drivers

Powertrain

- Ultra-low quiescent current LDOs
- Intelligent power switches
- I/F ASICs
- Communication ICs
- Sensor signal processing ASICs

HEV/EV

- High-speed isolators
- Isolated gate drivers
- IGBT temperature monitors

Next-Generation Commuter

Expanding technology cultivated in the consumer electronics sector to automotive systems contributes to increased safety, security, comfort, and miniaturization.

Car Audio/ Navigation

- LDOs, DC/DC
- System power supplies
- Sound processors
- Audio decoders

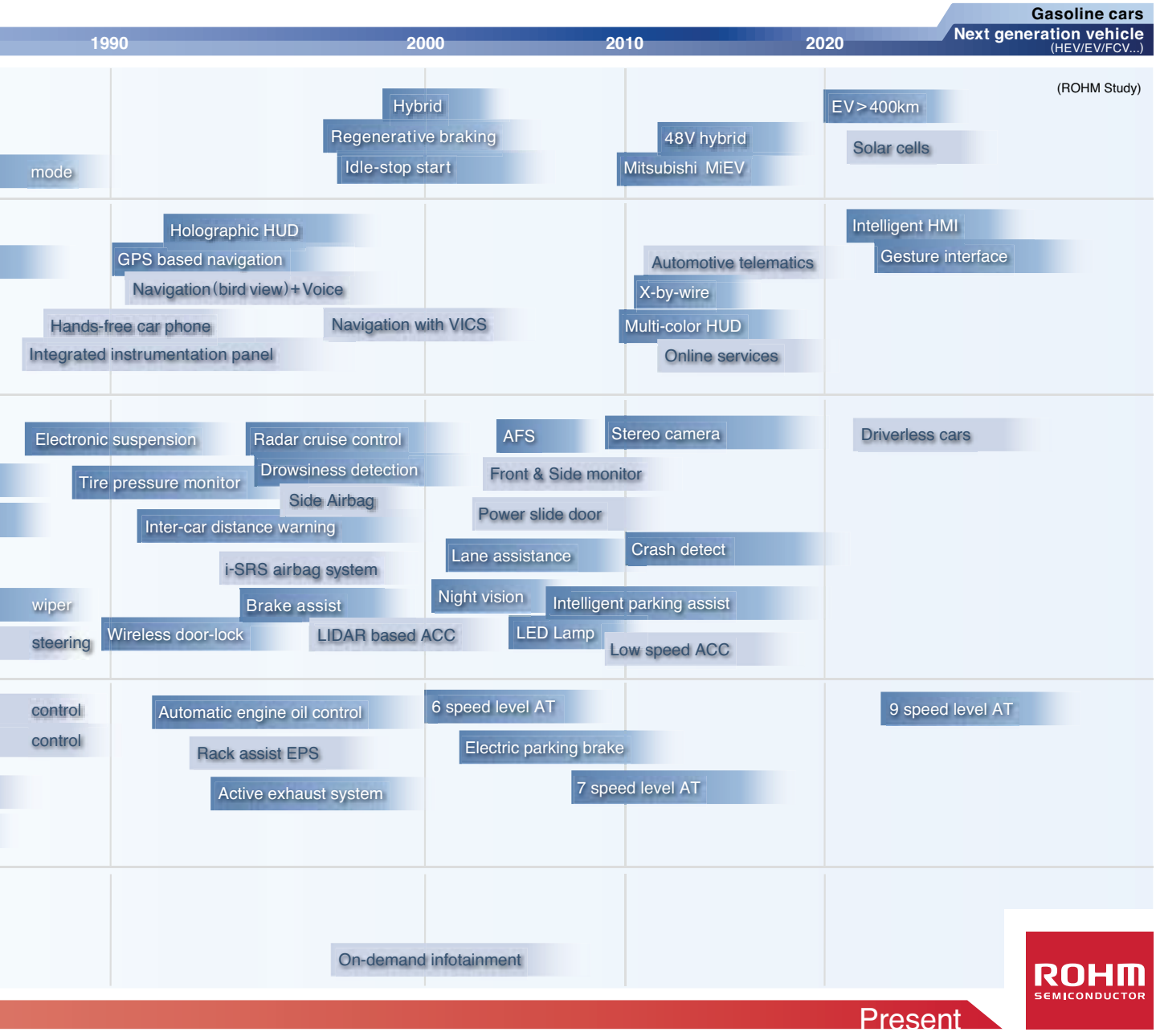
Car Multimedia

- Backlight LED drivers
- Segment drivers

ITS

- LVDS
- Bluetooth®

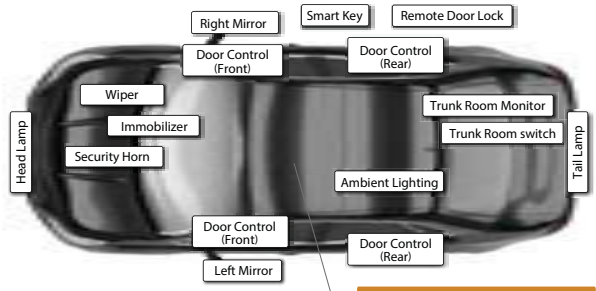
ROHM, which offers a variety of car audio ICs and discrete solutions, is expanding its product lineup to meet the needs of new and emerging applications in the automotive industry, including for car navigation and multimedia systems. In addition, following the increased digitization of vehicles and ITS, ROHM is developing ICs and discretes for body and powertrain systems. And as vehicles become increasingly safe, comfortable, and more efficient ROHM will continue to bring new products and devices to market.

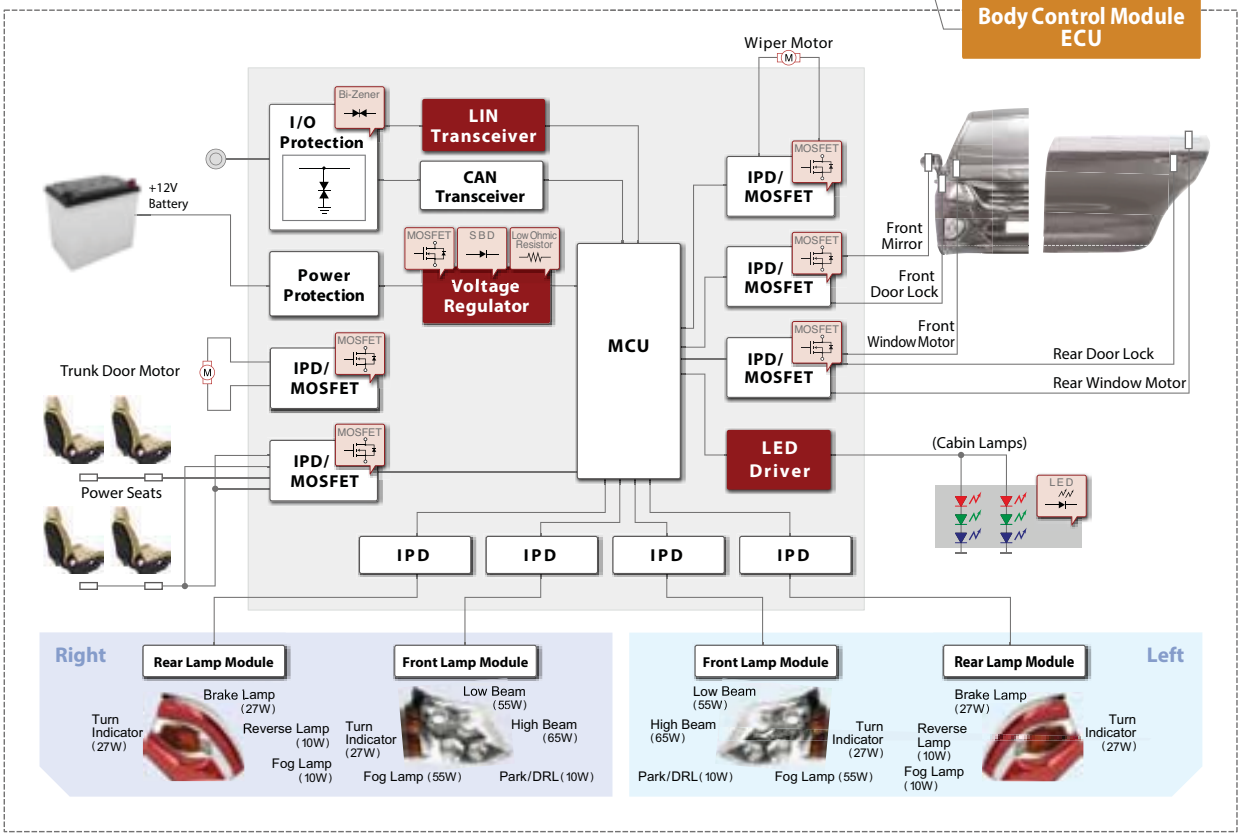


Contents

BODY CONTROL MODULE

The Body Control Module (BCM) ECU, provides centralized control of all body systems, from interior/exterior lighting, HVAC, doors and mirrors, windows, and wipers. BCM functionality is rapidly expanding as vehicle manufacturers transition to electronic systems and control to provide greater comfort, fuel economy, safety, and entertainment features.
However, with this comes increased weight due to the greater number of wiring harnesses needed.
To minimize this added weight, communication such as LIN and CAN are often adopted.





Memory | Op.Amps Comparators | Voltage Detectors (Reset ICs)

BODY CONTROL MODULE Products

LIN Transceiver — BD41020FJ-C

Complies with the automotive local network standard LIN Ver. 2.1.


SOP-J8

・・・P.27

RGB LED Driver — BD2808MUV-M

Integrated 8bit dimming function and 6bit current DAC for RGB make it possible to produce a broad range of colors.


VQFN48MCV070

・・・P.24

MOSFET — 60V Series / 100V Series

Suitable for a variety of drive circuits (i.e. LEDs). Advanced processes provide low ON resistances.


SOP8

・・・P.47, P.54 to 55

Schottky Barrier Diodes — Ultra Low I_R Series / Low V_F Series

Select from among 4 different series to meet application requirements for V_F and I_R.


PMDU

・・・P.48 to 50, P.60 to 64

Bi-Directional Zener Diode — RSB Series

Bi-Directional Zener Diode series optimized for LIN & CAN.


UMD2

・・・P.68 to 70

High power Low Ohmic Chip Shunt Resistors — GMR Series (Under development)

Adopting a new structure results in high heat dissipation and superior temperature characteristics. 3W rated power guaranteed in a compact 6432 size.

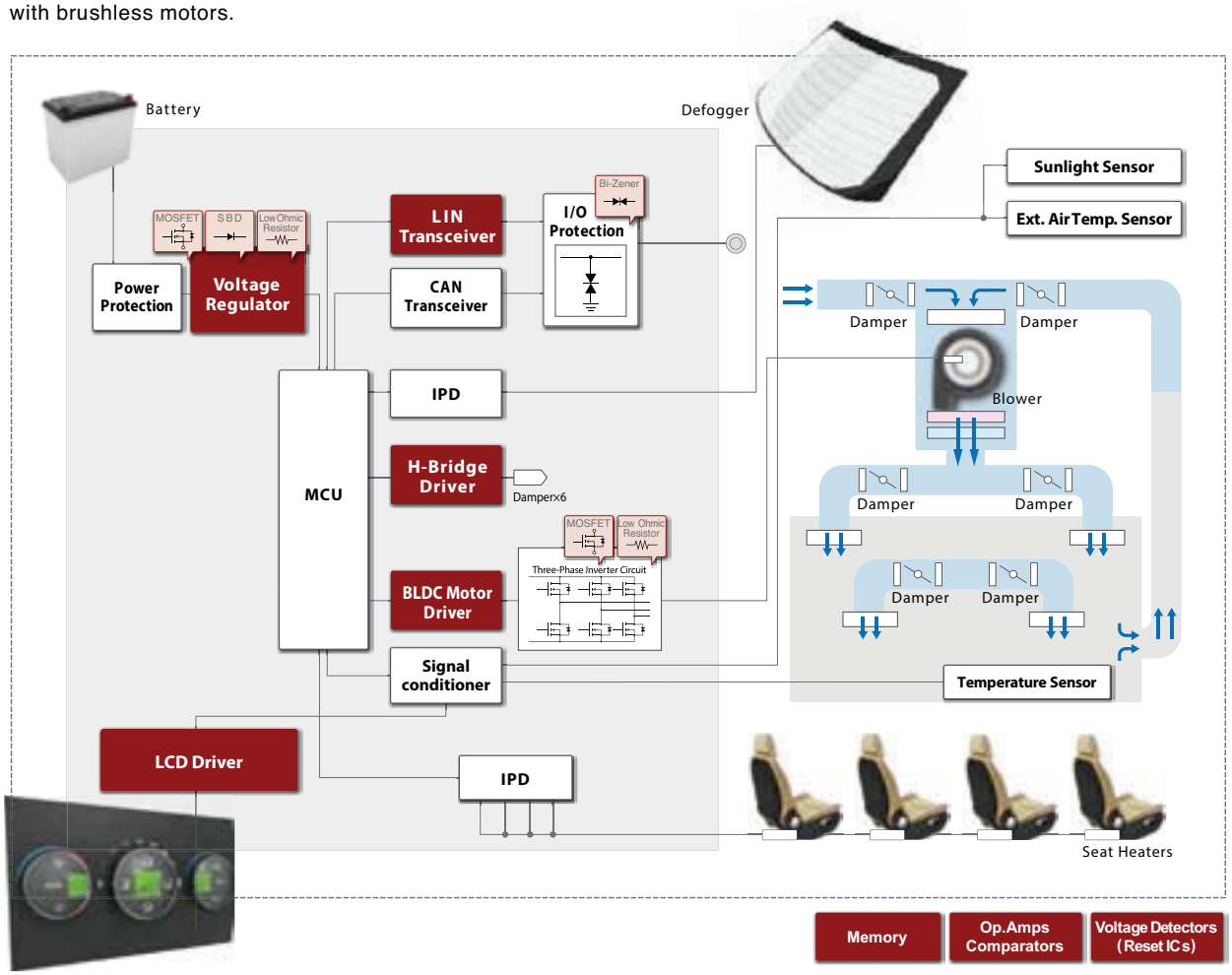

GMR100

・・・P.81

HVAC CONTROL MODULE

The HVAC (Heating Ventilation and Air Conditioning) system cools the interior using the refrigeration cycle using a compressor and warms by extracting the engine's waste heat from the coolant. It often includes a manual mode for operating the fan and adjusting the percentage of warm and cold air mixture, and an automatic mode that adjusts the temperature and air flow rate based on a preset temperature.

The following figure shows the block diagram of a typical HVAC system. Switching the power source from the gas engine in conventional vehicles to the electric motor in HEVs and EVs results in a much quieter cabin, which can make the blower noise from the AC or seat heating/cooling fan motor's noise particularly noticeable. Therefore, to minimize this noise and improve thermal efficiency, it is customary to replace the conventional brushed DC motors used for blower and fan motors with brushless motors.



HVAC CONTROL MODULE Products

LCD Driver — BU97530KVT-M

Includes all functions required for panel operation, such as LCD control, button detection, and LED dimming.

TQFP100V

・・・P.26

LCD Driver — ML94xx Series

Broad lineup offered, supports a wide range of needs, from high reliability types and EMS-tolerant units to highly integrated models that minimize board space by minimizing the external parts.

QFP100

・・・P.26

BLDC Motor Driver — BD16805FV-M

180° commutation reduces noise and improves efficiency through advance control.

SSOP-B40

・・・P.25

H-Bridge Driver — BD16936EFV-M

Built-in low ON resistance MOSFET improves efficiency while reducing heatgeneration.

HTSSOP-B28

・・・P.25

MOSFET — 40V Series / 60V Series

Optimized for a variety of drive circuits (i.e. motor drive). Advanced processes provide low ON resistances.

DPAK

・・・P.47, P.54 to 55

Schottky Barrier Diodes — Ultra Low I_R Series / Low V_F Series

Select from among 4 different series to meet application requirements for V_F and I_R.

PMDU

・・・P.48 to 50, P.60 to 64

High power Ultra Low Ohmic Chip Shunt Resistors — PSR Series

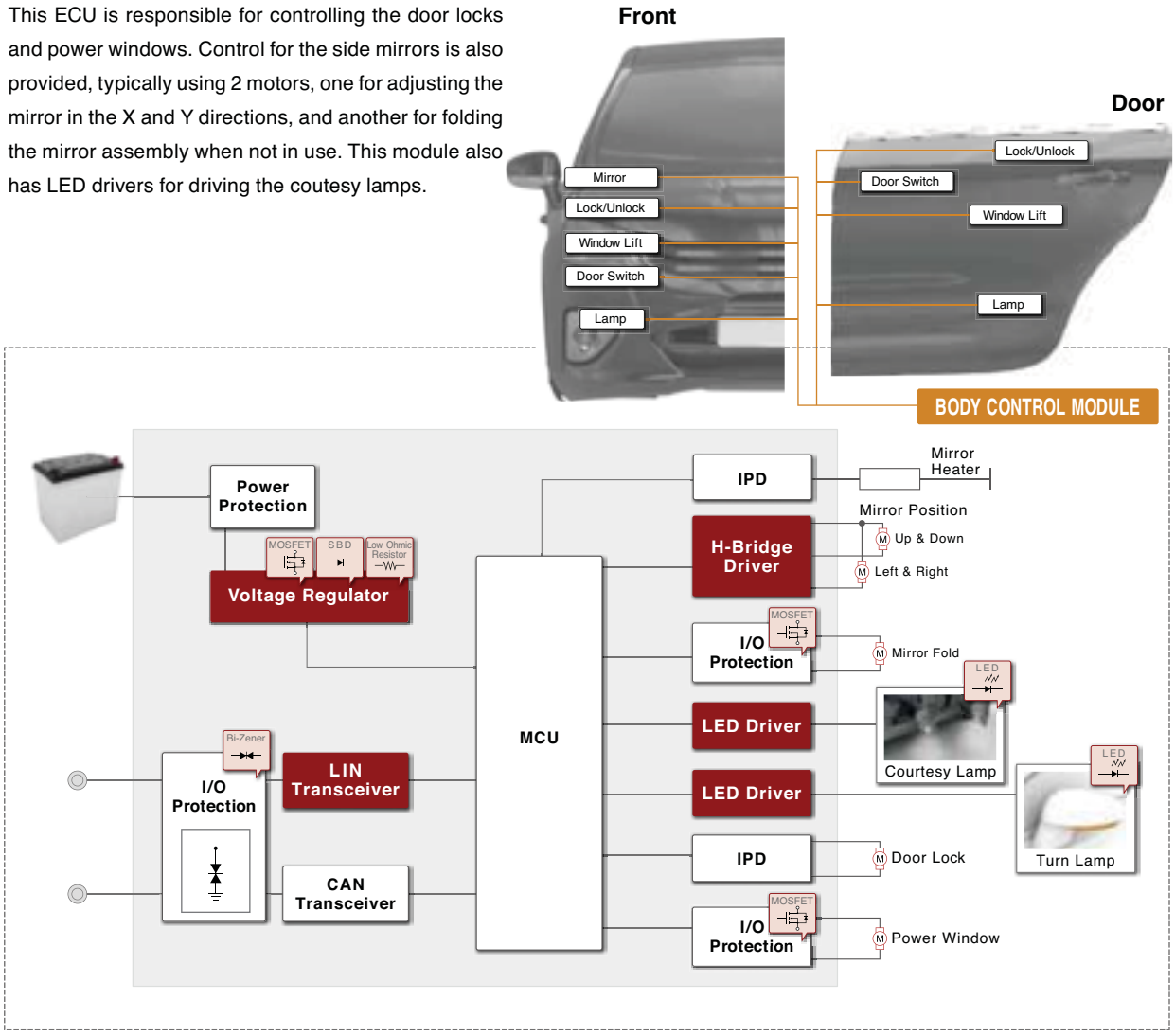
5W rated power guaranteed in the ultra-low-resistance region from 0.2mΩ.

PSR500

・・・P.81

DOOR & MIRROR CONTROL MODULE

This ECU is responsible for controlling the door locks and power windows. Control for the side mirrors is also provided, typically using 2 motors, one for adjusting the mirror in the X and Y directions, and another for folding the mirror assembly when not in use. This module also has LED drivers for driving the coutesy lamps.



DOOR & MIRROR CONTROL MODULE Products

LIN Transceiver — BD41020FJ-C

Complies with LIN Ver. 2.1, the standard for automotive local networks.

SOP-J8

• • • P.27

H-Bridge Driver — BD16936EFV-M

Built-in low ON resistance MOSFET improves efficiency while reducing heat generation.

HTSSOP-B28

• • • P.25

MOSFET — 40V Series, 60V Series

Supports a variety of drive circuits (i.e. motors). Advanced processes provide low ON resistances.

DPAK

• • • P.47, P.54 to 55

Schottky Barrier Diodes — Ultra Low I_R Series, Low V_F Series

Select from among 4 different series to meet application requirements for V_F and I_R.

PMDU

• • • P.48 to 50, P.60 to 64

Low Ohmic Chip Resistors — LTR Series, PMR Series

Broad lineup of high power high reliability low ohmic resistors offered in a range of sizes (1005 to 6432).

LTR18

• • • P.79 to 80

Bi-Directional Zener Diode — RSB Series

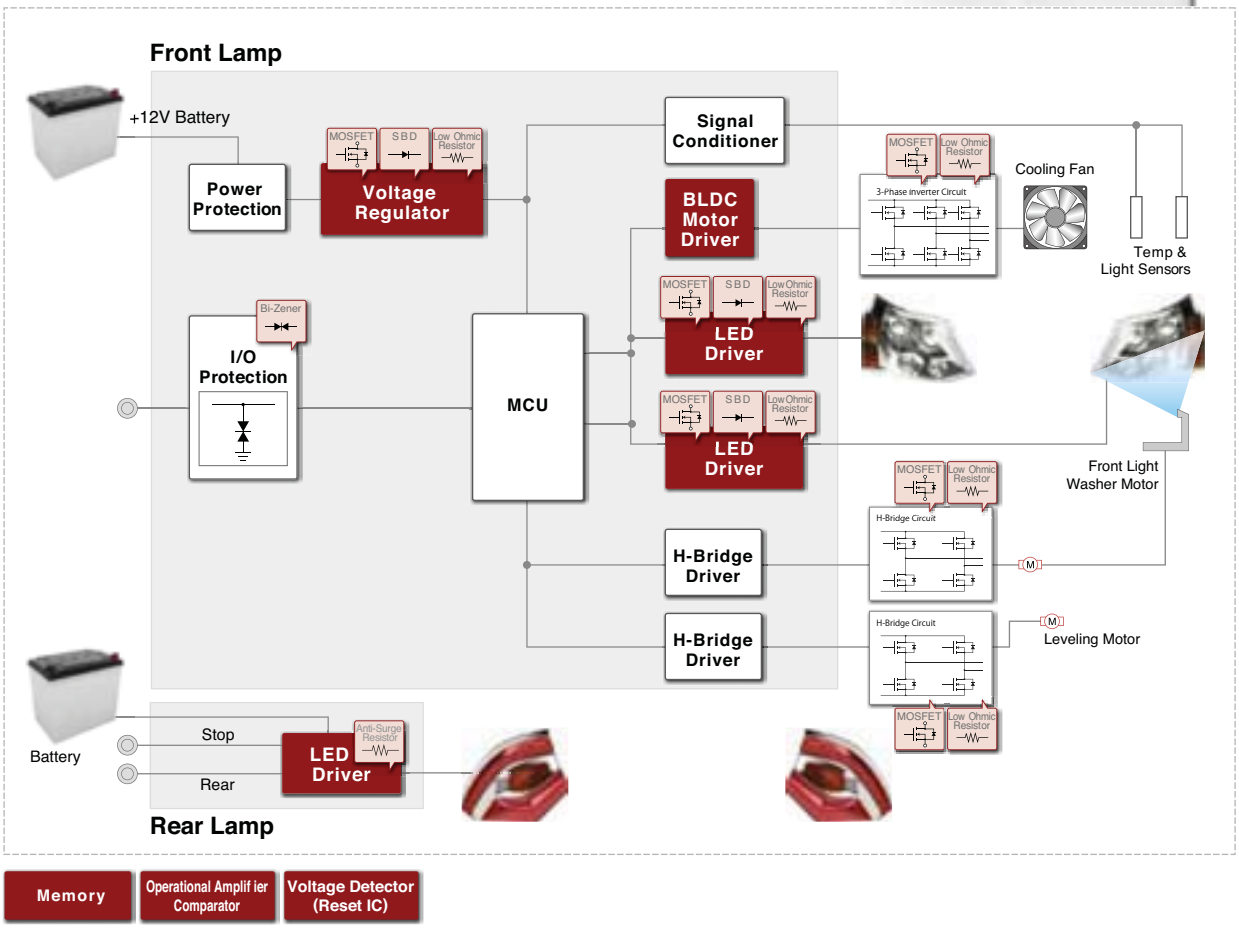
Bi-directional Zener diode series optimized for LIN & CAN.

UMD2

• • • P.68 to 70

LAMP MODULE

Automotive exterior lamps, can be broadly classified into head and rear lamps. These lamps are increasingly transitioning to the use of LEDs, which feature lower power consumption and longer life besides providing a greater design flexibility.
One of the biggest drawback of LEDs, is that they generate a relatively large amount of heat, and therefore require cooling, sometimes using fans, particularly for the high and low beam lamps (see block diagram below).
Fan speed is adjusted based on the amount of heat generated by the LEDs.
Many newer vehicles also integrate a self-leveling headlight function that determines if the car is tilted forward or back and adjusts the headlights accordingly to ensure they are pointed at road at all times no matter the position of the car in order to prevent blinding oncoming drivers. This functionality is called levelling. ROHM offers a wide range of dedicated LED drivers optimized for automotive LED applications.



LAMP MODULE Products

LED Driver (For Headlights) — BD8381AEFV-M

Built-in boost-buck switching regulator supports a variety of LED configurations, while an internal PWM dimming function enables control without an MCU.


HTSSOP-B28

・・・P.24

LED Drivers (For Rear Lamps) — BD8374EFJ-M, BD8374HFP-M

Integrated high-performance constant current circuit ensures an LED current accuracy of ±3%. Multiple protection functions also included (e.g. open/short detection).


HTSOP-J8


HRP7

・・・P47, P54 to 55

MOSFET — 60V Series, 100V Series

Supports a variety of drive circuits (i.e. LEDs). Advanced processes provide low ON resistances.


DPAK

・・・P.47, P.54 to 55

Schottky Barrier Diodes — Ultra Low I_R Series, Low V_F Series

Select from among 4 different series to meet application requirements for V_F and I_R.


PMDU

・・・P.48 to 50, P.60 to 64

Low Ohmic Chip Resistors — LTR Series, PMR Series

Broad lineup of high power high reliability low ohmic resistors offered in a range of sizes (1005 to 6432).


LTR18

・・・P.79 to 81

Bi-Directional Zener Diode — RSB Series

Bi-Directional Zener Diode series optimized for LIN & CAN.

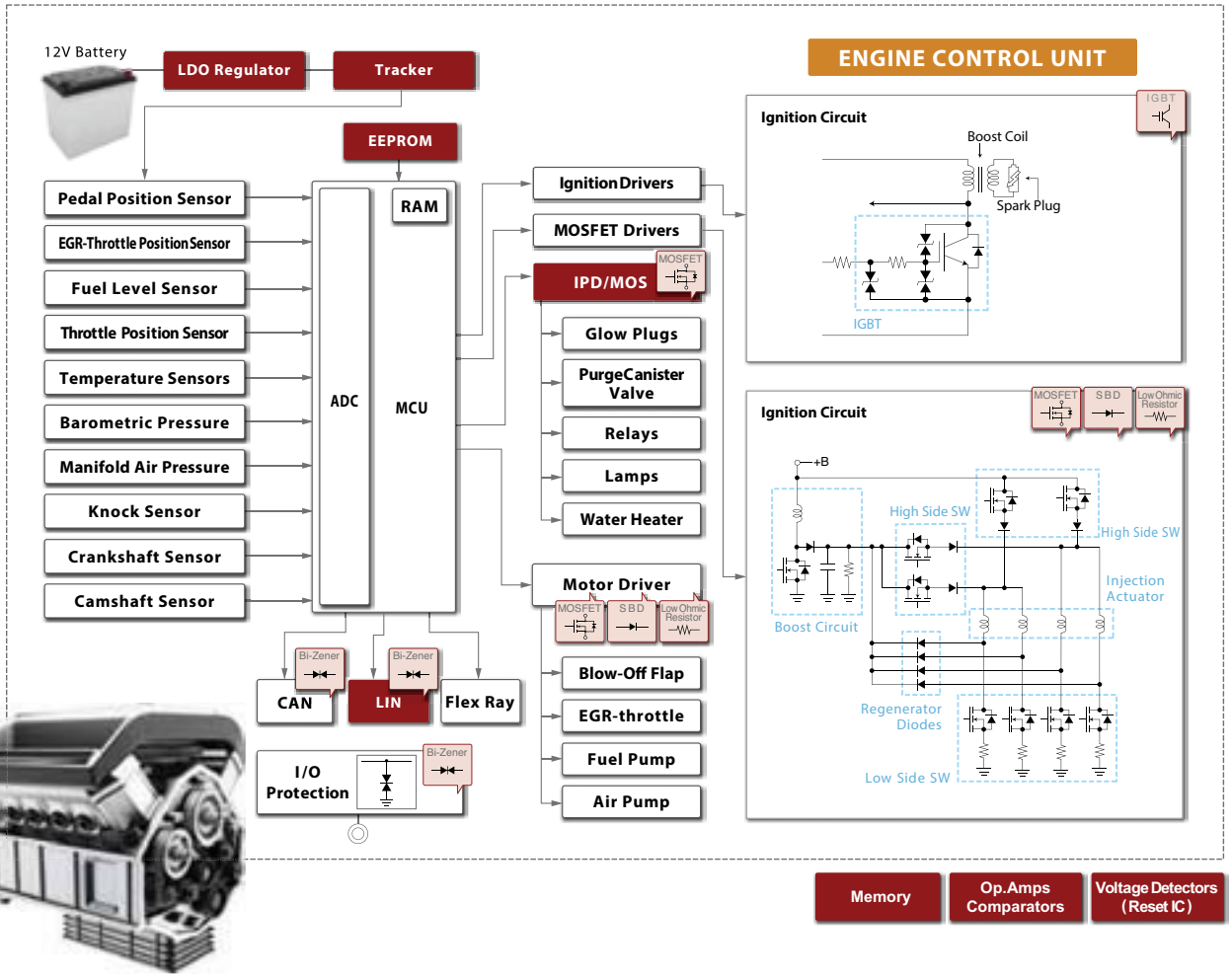

UMD2

・・・P68 to 70

ENGINE CONTROL UNIT

With an emphasis on reducing emissions and increasing fuel economy, there is a race on increasing the engine efficiency . The purpose of the engine control unit is to sense the status of the engine and the surrounding systems and control the engine, especially the ignition.

Sensor and driver accuracy play a large role in engine efficiency. This applies to power supplies as well. ROHM offers a wide lineup of power supplies that contribute to greater energy savings, miniaturization, and performance in ECUs of all types. ROHM has also developed a broad portfolio of automotive-grade discrete products, including IGBTs for ignition control.



ENGINE CONTROL UNIT Products

Voltage Trackers — BD3925FP-C BD3925HFP-C

500mA output and a circuit current of only 45μA make them ideal for battery connected constant current systems.

・・・P.22

LIN Transceiver — BD41020FJ-C

Complies with LIN Ver. 2.1, the standard for automotive local networks.

・・・P.27

MOSFET — 60V/100V/200V/250V Series

Supports a variety of drive circuits (i.e. actuators). Advanced processes provide low ON resistances.

・・・P.47, P.54 to 55

LDO Regulator ・・・P.18
Memory ・・・P.32
Operational Amplifier Comparator ・・・P.34
Voltage Detector (Reset ICs) ・・・P.35

Schottky Barrier Diodes — Ultra Low I_R Series Low V_F Series

Select from among 4 different series to meet application requirements for V_F and I_R.

・・・P.48 to 50, P.60 to 64

Anti-surge Chip Resistors — PMR Series LTR Series

Newly developed lineup features improved surge resistance, contributing to greater reliability.

・・・P.77

Bi-Directional Zener Diode — RSB Series

Bi-Directional Zener Diode series optimized for LIN & CAN.

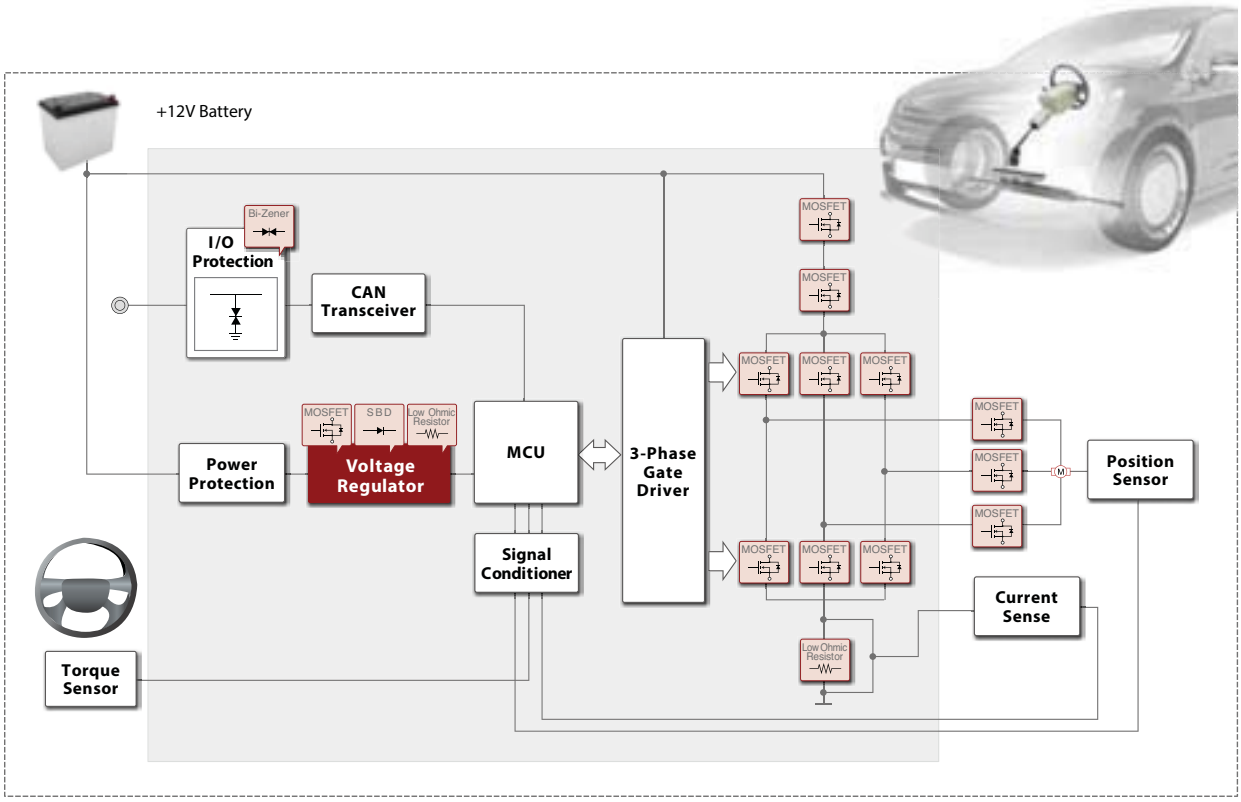
・・・P.68 to 70

ELECTRONIC POWER STEERING (EPS)

Electronic Power Steering (EPS) has seen increased adoption over hydraulic power steering in recent years, with most new cars now being equipped with EPS. Shifting towards electrification eliminates the need for a power steering pump, reducing the weight and reducing the overall fuel consumption by around 3%.

EPS also provides better driveability and performance by adjusting the torque via software based on vehicle speed, generating active torque when needed to improve vehicle safety. And additional driver support features such as lane and parking assist are possible by expanding the EPS functionality.

EPS is achieved by detecting the steering position via a torque sensor, and the with motor is driven using a gate driver and power transistor combination (see block diagram below). For controlling, motor feedback is used, the position and torque output of the motor are adjusted based on the supply current to the motor.



Memory | Op.Amps Comparators

ELECTRONIC POWER STEERING (EPS) Products

MOSFET — 40V Series, 60V Series

Supports a variety of drive circuits (i.e. motors). Advanced processes provide low ON resistances.


DPAK

・・・P.47, P.54 to 55

High power Ultra Low Ohmic Chip Shunt Resistors — PSR Series

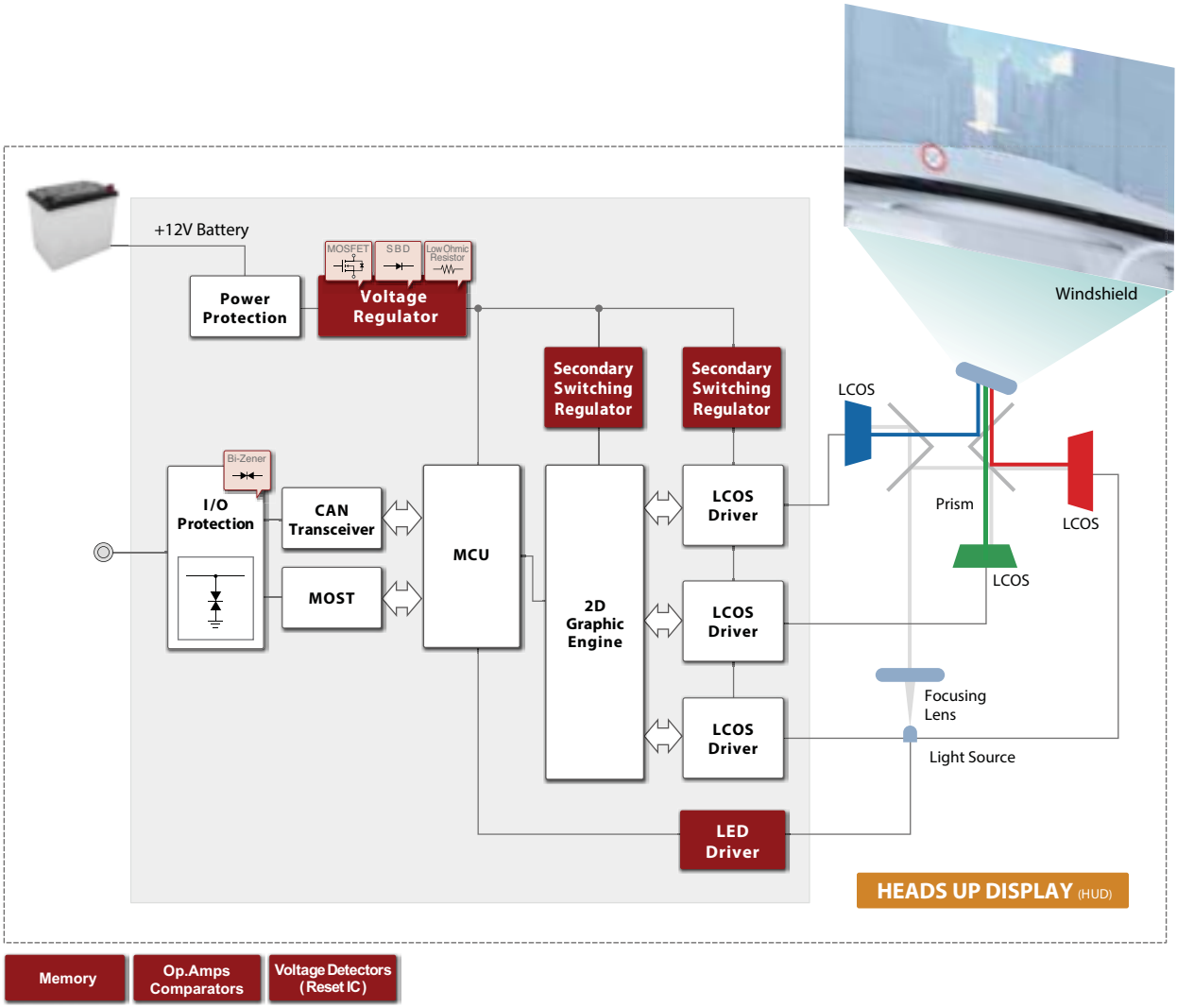
5W rated power guaranteed in the ultra-low-resistance region from 0.2mΩ.


PSR500

・・・P.81

HEAD UP DISPLAY (HUD)

Head-Up Display (HUD) systems in cars are normally mounted on or near the windshield to present useful information to driver. This technology, first introduced in fighter planes, is getting adopted in the automotive industry for improving the safety by enabling drivers to view relevant data, such as time, vehicle speed, and navigation information, without having to take their eyes off the road. The block diagram below shows a sample HUD solution, in which the relevant information is first processed and divided into RGB pixels, then displayed using LCOS (Liquid Crystal On Silicon).



Memory | Op.Amps Comparators | Voltage Detectors (Reset IC)

HEAD UP DISPLAY Products

LED Driver (For Backlighting) — BD81A44EFV-M, BD81A44MUV-M

Built-in boost-buck switching regulator ensures stable operation even during battery fluctuations.

・・・P.24

MOSFET — 40V Series, 60V Series

Optimized for a variety of drive circuits (i.e. switching power supply). Advanced processes provide low ON resistances.

・・・P.47, P.54 to 55

Schottky Barrier Diodes — Ultra Low I_R Series, Low V_F Series

Select from among 4 different series to meet application requirements for V_F and I_R.

・・・P.48 to 50, P.60 to 64

Low Ohmic Chip Resistors — PMR Series, LTR Series

Broad lineup of high power high reliability low ohmic resistors offered in a range of sizes (1005 to 6432).

・・・P.79 to P.80

Bi-Directional Zener Diode — RSB Series

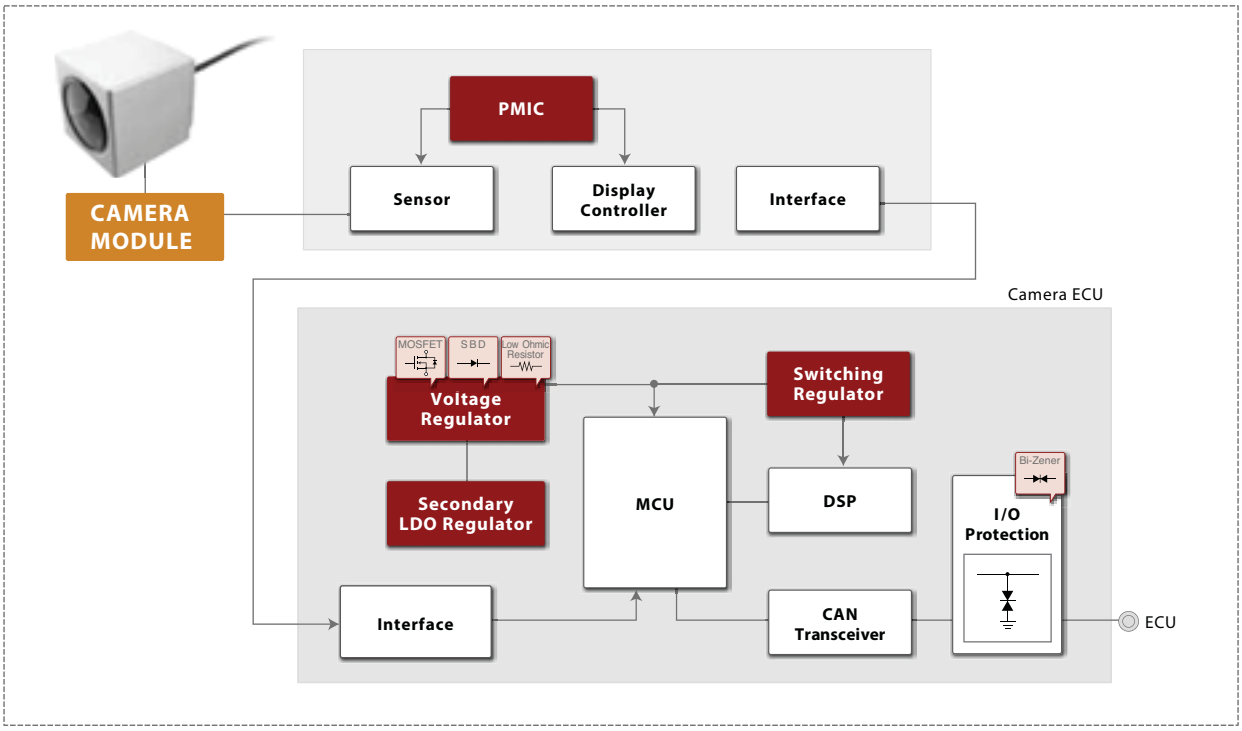
Bi-Directional Zener Diode series optimized for LIN & CAN.

・・・P.68 to 70

CAMERA MODULE/ECU for ADAS

Broad lineup supports a wide range of needs for greater miniaturization, larger currents, multiple outputs, hybrid configurations, and more

Following on the heels of legislation enacted in the US approving the use of cameras to improve vehicle and driver safety, the number of camera-equipped vehicles has risen dramatically. However, mounting cameras on vehicles without sacrificing design poses several challenges, requiring that the camera module and PMIC be as small as possible and the number of external components kept to a minimum. Information on surrounding objects is obtained by the camera module, millimeter-wave radar, or other source and processed by the camera ECU, which then transmits signals and commands to other ECUs for controlling the steering and brakes to improve driver safety. Power supplies for the high-performance MCUs (or DSPs) used in camera ECUs require large current-handling capability, high efficiency, reduced voltage operation, and other key characteristics. ROHM offers an extensive lineup of high-voltage/secondary LDOs and switching regulators compatible with direct battery connection as well as system power supplies (PMICs) optimized for camera ECUs.



Memory | Op.Amps Comparators | Voltage Detectors (Reset IC)

CAMERA MODULE/ECU for ADAS Products

PMIC for Automotive Camera Modules — BD8682MUV

Multi-channel PMIC integrated into a compact form factor. Broad lineup compatible with CMOS and CCD sensors.

VQFN32SV5050

• • • P.23

MOSFET — 40V Series, 60V Series

Optimized for a variety of drive circuits (i.e. switching power supply). Advanced processes provide low ON resistances.

SOP8

• • • P.47, P.54 to 55

Schottky Barrier Diodes — Ultra Low I_R Series, Low V_F Series

Select from among 4 different series to meet application requirements for V_F and I_R.

PMDU

• • • P.48 to 50, P60 to 64

Low Ohmic Chip Resistors — UCR Series

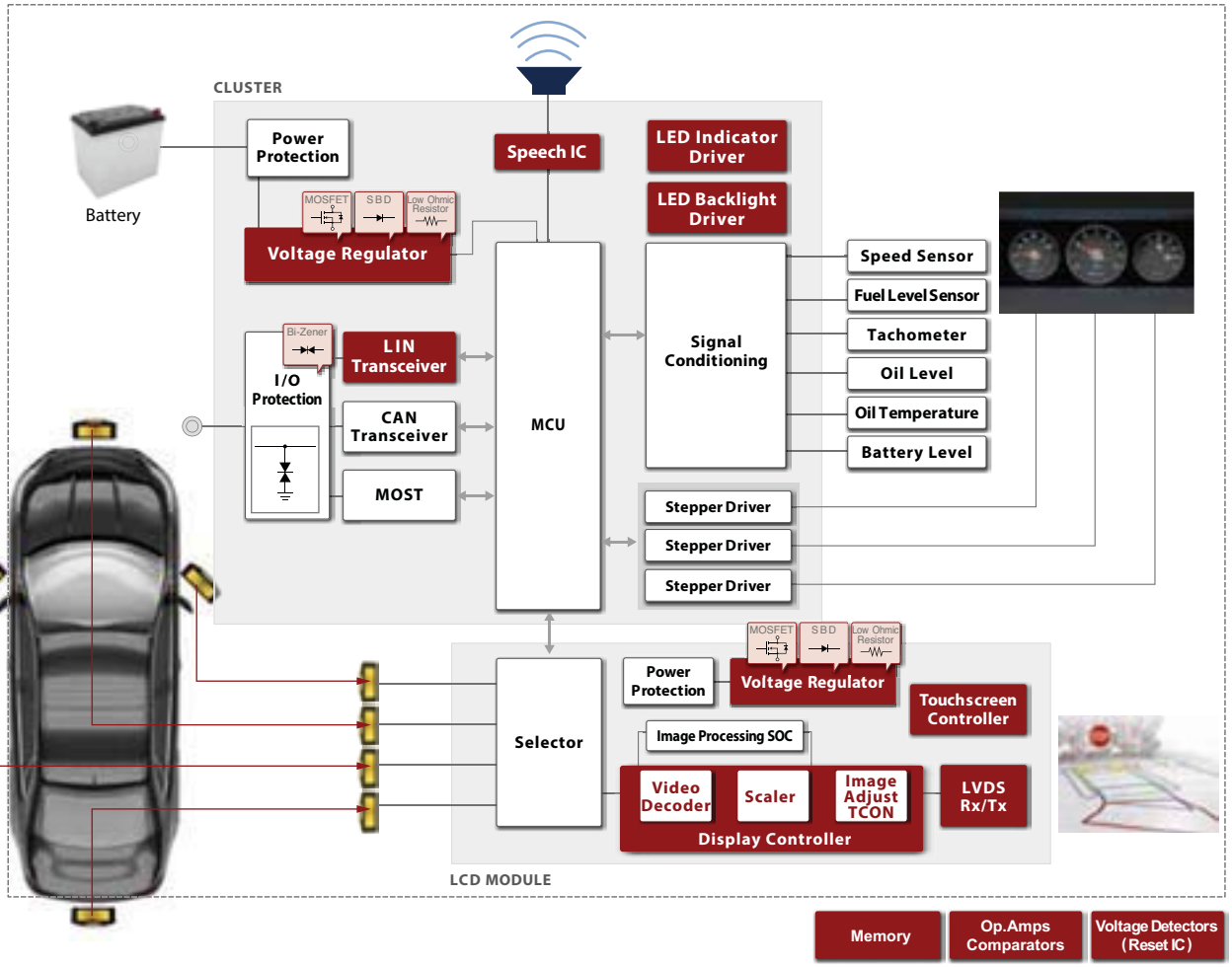
Compact, high heat resistance low-ohmic lineup delivers superior rated power in a variety of sizes, from 0603 to 3216.

UCR006

• • • P.79

AUTOMOTIVE CLUSTER & LCD MONITOR

The instrument cluster (or dashboard) refers to the group of meters and indicators that provides the driver with information about the engine and other parameters like vehicle speed, fuel level, and engine oil level.
Along with the computerization of cars and emergence of Advanced Driver Assist Systems (ADAS), conventional meters are being replaced with LCD panels for displaying detailed information using rich graphics. ROHM contributes to greater energy conservation with a broad array of switching and linear regulators for automotive clusters.



AUTOMOTIVE CLUSTER & LCD MONITOR Products

LED Drivers (For Backlighting) — BD81A44EFV-M, BD81A44MUV-M

Built-in boost-buck switching regulator ensures stable operation even during battery fluctuations.

・・・P.24

LVDS Interface ICs — BU17101AKV, BU17102AKV

Capable of single-pair transmission of 24bit parallel data at 1.63Gbps with a clock speed of 30 to 50 MHz.

・・・P.27

Touch Screen Controller — BU21024FV-M

Enables 2-point touch detection in 4-wire resistive touchscreens.

・・・P.27

LED Drivers (For Indicators) — BD8378FV-M, BD8379FV-M

Compact packages contribute to increased space savings. Supports cascade connections for efficient driving of multiple LEDs.

・・・P.24

Video Decoder — ML86101A, ML86V7675

Compatible with the 3 major global standards (NTSC/PAL/SECAM), making them suitable for video devices worldwide.

・・・P.30

Speech LSI — ML22(Q)xxx

Features include 4ch mixing, built-in speaker amp, guaranteed operation up to +105°C, and multiple fail-safe functions required by automotive applications.

・・・P.32

MOSFET — 40V Series, 60V Series

Supports a variety of drive circuits (i.e. switching power supply). Advanced processes provide low ON resistances.

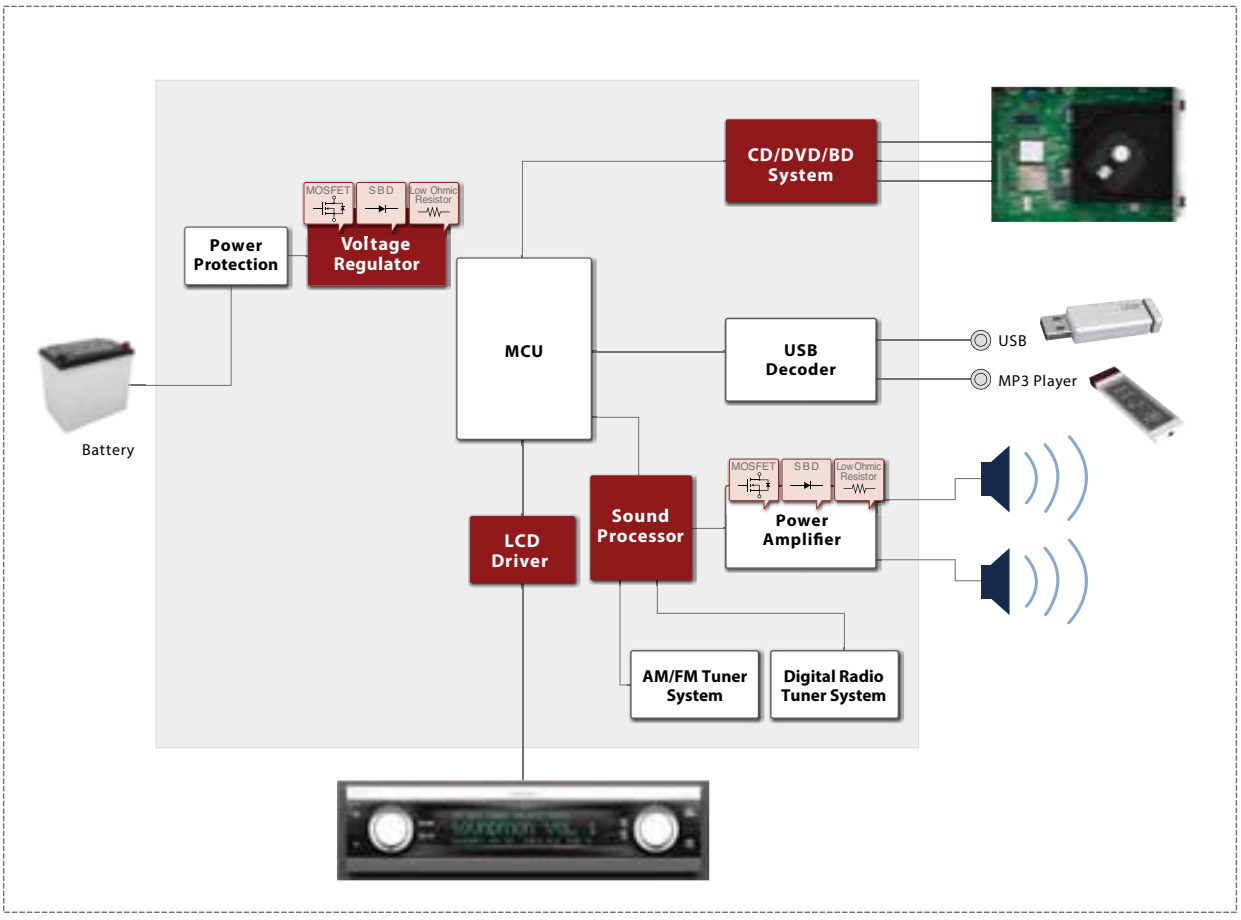
・・・P47, P.54 to 55

Memory ・・・P.32
Operational Amplifier Comparator ・・・P.34
Voltage Detector(Reset ICs) ・・・P.35
Display Controller ・・・P.31
Schottky Barrier Diodes ・・・P.48 to 50, P.60 to 64
High Power Chip Resistors (Wide terminal type) ・・・P.77
Bi-Directional Zener Diode ・・・P.68 to 70

CAR AUDIO

Providing greater comfort through high fidelity audio

Car audio is becoming indispensible for not only creating a comfortable space for the driver and passengers through music, but for providing useful information as well. Recent years have also seen the rapid proliferation of new audio sources such as MP3 players and USB flash memory.
ROHM provides products designed for both conventional music sources such as CDs and radio, and also easy-to-use solutions that enable plug-and-play connectivity for the latest USB and MP3 players.
In addition, ROHM brings in analog technology that matured over many years of experience to develop high fidelity sound processors that significantly improve the listening experience by reducing noise at low frequencies optimized for high resolution audio sources as well as HEVs and EVs with quieter interiors that demand superior audio quality.



Memory | Op.Amps Comparators | Voltage Detectors (Reset IC)

CAR AUDIO Products

Sound Processor — BD37033FV, BD37034FV

Leveraging market-leading analog technology, matured over the years, and that has allowed ROHM to integrate an RF noise removal function that cuts RF noise interference in audio equipment due to mobile phone calls. ・・・P.29


SSOP-B28

System Motor Driver for ODD — BD8266EFV, BD8255MUV

Hall-equipped driver enables ultra-quiet operation while the custom built protection functions provide superior reliability. ・・・P.25


HTSSOP-B24
VQFN48SV7070

LCD Driver — BU97530KVT-M

Includes all functions required for panel operation, such as LCD control, button press detection, and LED dimming. ・・・P.26


TQFP100V

MOSFET — 40V Series, 60V Series

Supports a variety of drive circuits (i.e. switching power supply). Advanced processes provide low ON resistances. ・・・P.47, P.54 to 55


SOP8

Schottky Barrier Diodes — Ultra Low I_R Series, Low V_F Series

Select from among 4 different series to meet application requirements for V_F and I_R. ・・・P.48 to 50, P.60 to 64


PMDU

Low Ohmic Chip Resistors — UCR Series

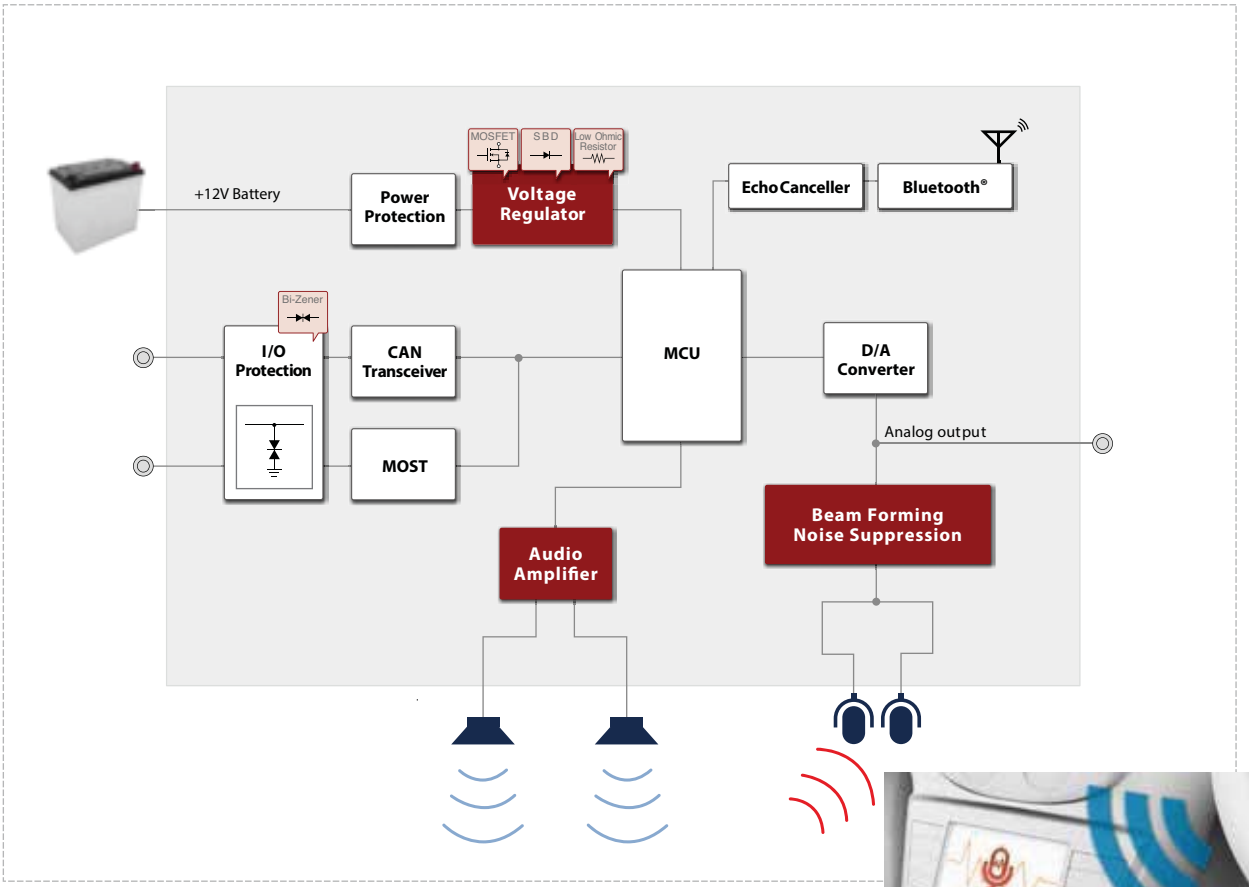
Compact, high heat resistance low-ohmic lineup delivers superior rated power in a variety of sizes, from 0603 to 3216. ・・・P.79


UCR10

VOICE INTERFACE

Supports hands-free operation for safer driving

Voice control functionality is seeing increased adoption in vehicles in order to prevent driver distractions by enabling hands-free operation. However, as the vehicles are operate in noisy environments, noise reduction is essential for implementing voice I/F in automotive. One method of sensing only the intended sounds is to use beamforming technology, which typically utilizes 2 phase shifted microphones to sense the distance and direction of the sound source. For example, in a car the microphone array can be configured to isolate voice only from the direction of the driver, and treat sounds from all other directions as noise.
Connecting the ECU to the HVAC and cluster makes it possible to perform a variety of operations via voice control, such as temperature adjustment, changing/selecting songs, and attending telephone-calls.



Memory | Op.Amps Comparators | Voltage Detectors (Reset IC)

VOICE INTERFACE Products

Beam forming — BU8332KV-M

Sharp directivity is enabled using 2 omnidirectional mics, while a noise suppression function improves voice quality.

・・・P.29


VQFP48

Audio Amplifier — BH7824FVM

Provides clear audio playback in a compact, space-saving form factor.

・・・P.29


MSOP8

MOSFET — 40V Series / 60V Series

Supports a variety of drive circuits (i.e. switching power supply). Advanced processes provide low ON resistances.

・・・P.47, P.54 to 55


SOP8

Schottky Barrier Diodes — Ultra Low I_R Series / Low V_F Series

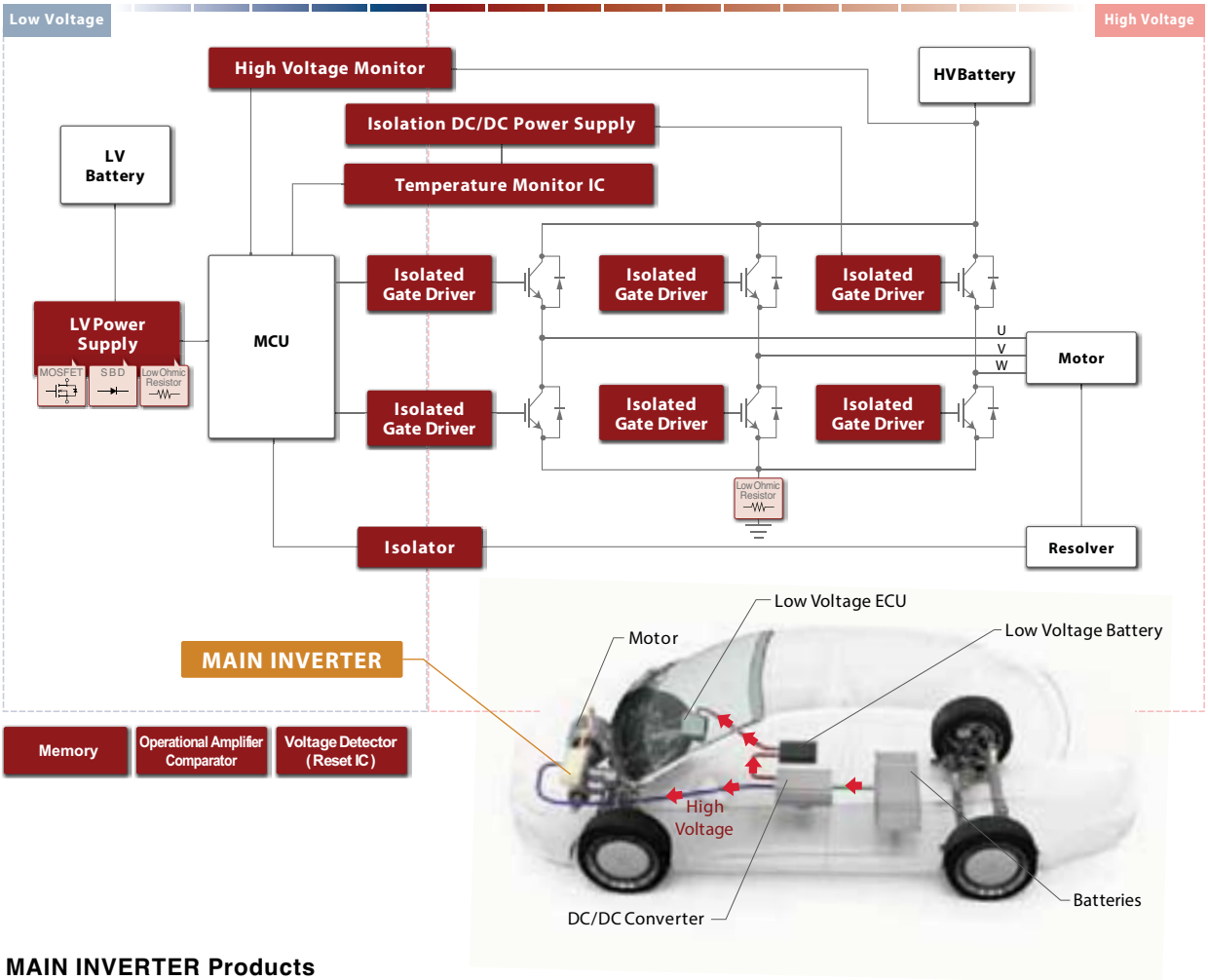
Select from among 4 different series to meet application requirements for V_F and I_R.

・・・P.48 to 50, P.60 to 64


PMDU

MAIN INVERTER

The main inverter converts the constant DC voltage from the battery into a 3-phase AC voltage to drive the motors.
ROHM is developing a wide variety of high reliability isolated gate drivers optimized for the main inverters.
And although power devices such as IGBTs with integrated protection diodes are commonly used, SiC MOSFETs and SiC SBDs is seeing greater adoption due to their lower RDS(ON) and the resulting switching losses.
ROHM, a pioneer in SiC devices, also offers products designed for industrial and automotive applications that demand extreme reliability. In addition, ROHM utilizes on-chip transformer technology to design gate drivers that feature built-in isolation, contributing to greater miniaturization and longer life.



MAIN INVERTER Products

Isolated Gate Driver BM6104FV-C
Integrates isolation and gate driver functions into a compact SSOP-B20W package.

SSOP-B20W
・・・P.31

Isolators BM67220FV-C BM67221FV-C
Isolates the high and low-voltage sides, enabling fast, safe signal transmission.

SSOP-B20W
・・・P.32

Temperature Monitor BM66002FV-C
Monitors the temperature of the IGBT, SiC and Power MOSFET.

SSOP-B20W
・・・P.31

High Voltage Monitor BM67290FV-C
Protects the IGBT by sending voltage data to the MCU to prevent excessive IGBT drive voltage.

SSOP-B20W
・・・P.31

Power Supply IC BD9031FV-C
Isolated boost-buck power supply IC that provides regulated power to the MCU.

SSOP-B16
・・・P.23

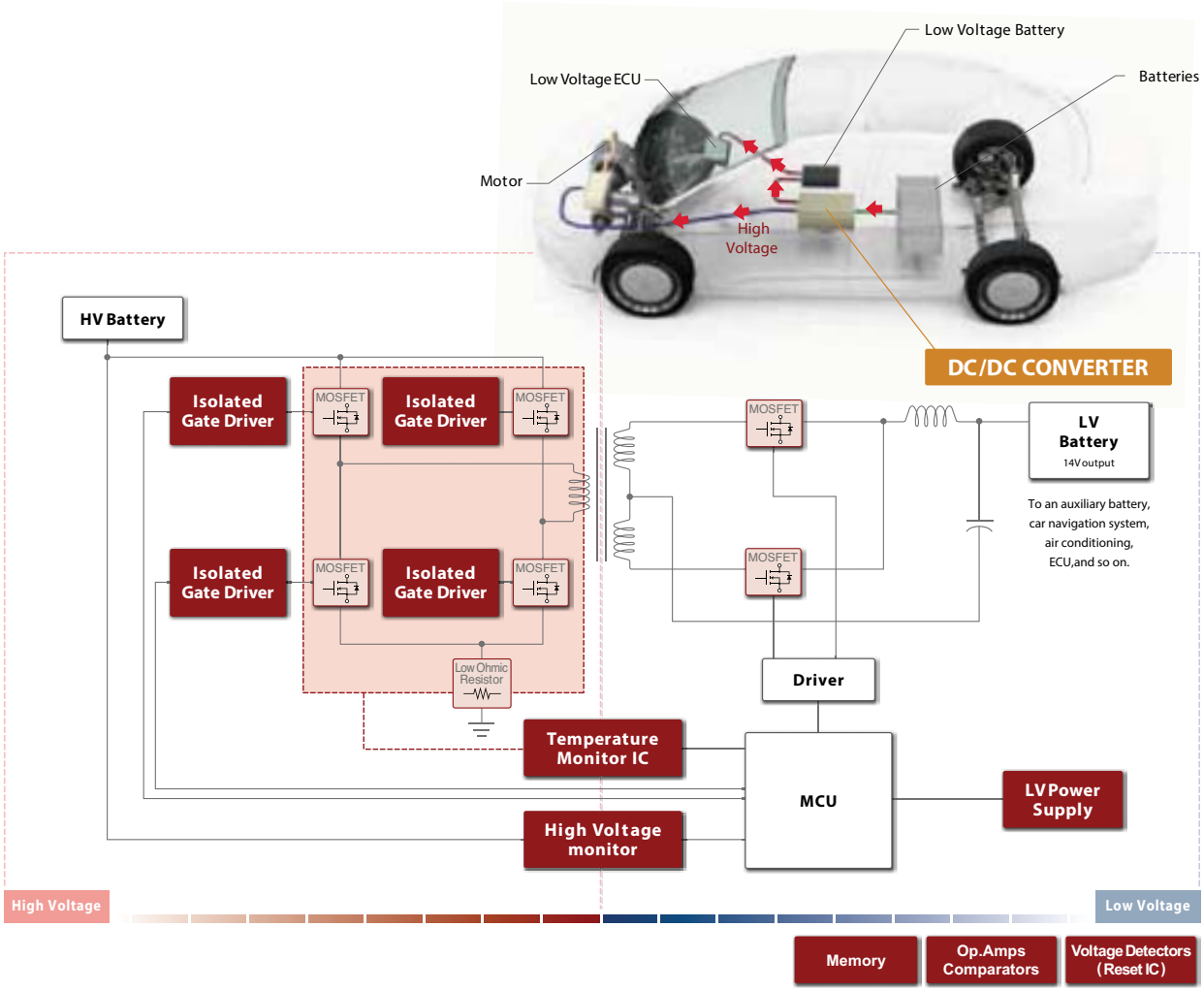
High power Ultra Low Ohmic Chip Shunt Resistors PSR Series
5W rated power guaranteed in the ultra-low-resistance region from 0.2mΩ.

PSR500
・・・P.81

DC/DC CONVERTER

In HEVs and EVs, where the engine frequently stops and starts while driving, DC/DC converters are proving to be more efficient than conventional alternator at supplying power to the engine under all operating conditions. DC/DC converters work by converting the high battery voltage to 14V DC using a power element and transformer to perform high-frequency switching and voltage conversion in order to charge the low-voltage battery.

In addition, isolator ICs are required to electrically isolate all signals as well as ground between the low voltage and high voltage boards in order to prevent possible electrical shock and fire. ROHM is currently developing robust isolator ICs that feature greater compactness and longer life.



DC/DC CONVERTER Products

Isolated Gate Driver BM6104FV-C

Integrates isolation and gate driver functions into a compact SSOP-B20W package.

SSOP-B20W

・・・P.31

Isolators BM67220FV-C BM67221FV-C

Isolates the high and low-voltage sides, enabling fast, safe signal transmission.

SSOP-B20W

・・・P.32

Temperature Monitor BM66002FV-C

Monitors the temperature of the IGBT, SiC and Power MOSFET.

SSOP-B20W

・・・P.31

High Voltage Monitor BM67290

Sends voltage data to the MCU to protect the power MOSFET and other components.

SSOP-B20W

・・・P.31

Power Supply IC BD9031FV-C

Isolated boost-buck power supply IC that provides regulated power to the MCU.

SSOP-B16

・・・P.23

High power Ultra Low Ohmic Chip Shunt Resistors PSR Series

5W rated power guaranteed in the ultra-low-resistance region from 0.2mΩ.

PSR500

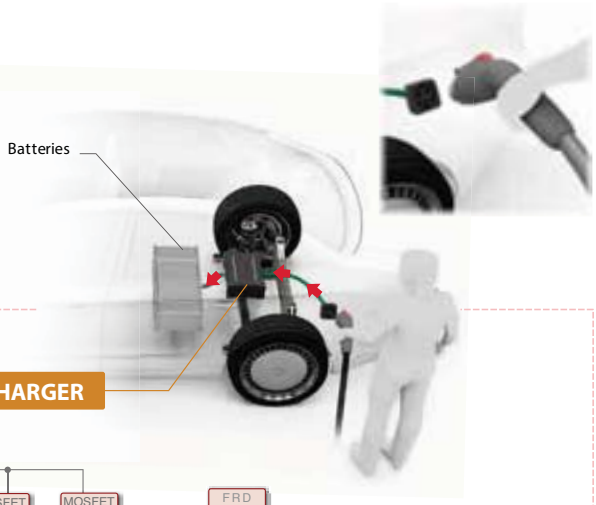
・・・P.81

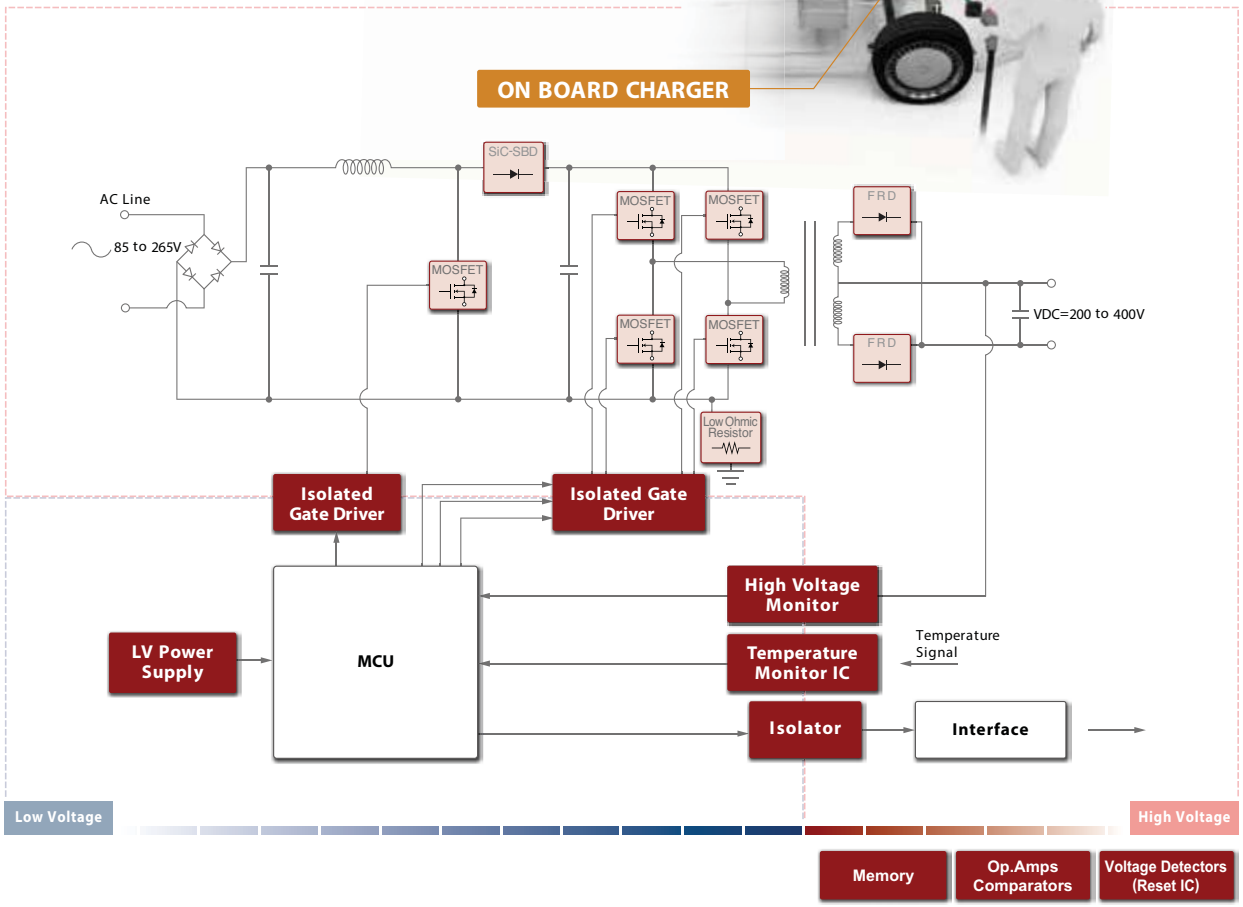
Memory ・・・P.32
Operational Amplifier Comparator ・・・P.34
Voltage Detector (Reset ICs) ・・・P.35

ON BOARD CHARGER

Automotive (onboard) chargers are AC/DC converters that convert the household AC (100V to 240V) supply to DC in order to charge the high voltage battery array. To ensure universal compatibility, most onboard chargers support a wide voltage range, usually between 85V and 265V. However, due to input voltage fluctuations, safer and more efficient devices are required.

In addition to isolator ICs, ROHM offers a broad range of power devices, including SiC SBDs.





ONBOARD CHARGER Products

Isolated Gate Driver BM6104FV-C

Integrates isolation and gate driver functions into a compact SSOP-B20W package.

SSOP-B20W

・・・P.31

Isolators BM67220FV-C BM67221FV-C

Isolates the high and low-voltage sides, enabling fast, safe signal transmission.

SSOP-B20W

・・・P.32

Temperature Monitor BM66002FV-C

Monitors the temperature of the IGBT, SiC and Power MOSFET.

SSOP-B20W

・・・P.31

High Voltage Monitor BM67290FV-C

Monitors the output voltage of the DC/DC converter.

SSOP-B20W

・・・P.31

Power Supply IC BD9031FV-C

Isolated boost-buck power supply IC that provides regulated power to the MCU.

SSOP-B16

・・・P.23

SiC-SBD SiC-SBD Series

Industry-low VF provides unmatched circuit efficiency.

TO-220AC (2pin)

・・・P.45

High power Ultra Low Ohmic Chip Shunt Resistors PSR Series

5W rated power guaranteed in the ultra-low-resistance region from 0.2mΩ.

PSR500

・・・P.81

IC

Automotive

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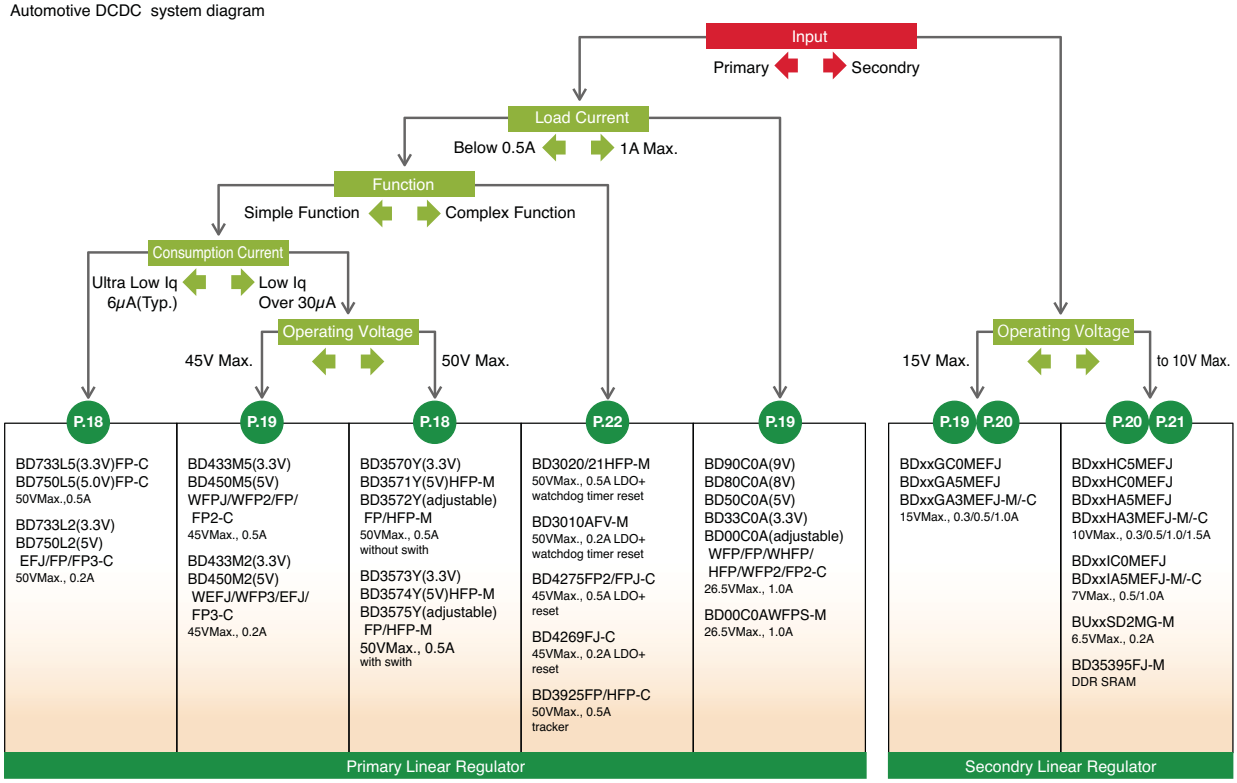
Power Management

Linear Regulators

Automotive DCDC system diagram



Single-Output LDO Regulators

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision(%)	Output Current (A)	Saturation Voltage : Io=200mA(V)	Circuit Current (μA)	Operating Temperature (°C)	Shutdown Switch	Protection Circuit	Package
50V Resistance Output 500mA LDO Regulators										
BD3570YFP-M	4.5 to 36.0	3.3	±2 (Ta=−40 to +125°C)	0.5	—	30	−40 to +125	—	Over-Current / Temperature	TO252-3
BD3570YHFP-M										HRP5
BD3571YFP-M	5.5 to 36.0	5.0			0.25					TO252-3
BD3571YHFP-M										HRP5
BD3572YFP-M	4.5 to 36.0	Variable 2.8 to 12.0								TO252-5
BD3572YHFP-M										HRP5
BD3573YFP-M		3.3			—			✓		TO252-5
BD3573YHFP-M										HRP5
BD3574YFP-M	5.5 to 36.0	5.0			0.25					TO252-5
BD3574YHFP-M										HRP5
BD3575YFP-M	4.5 to 36.0	Variable 2.8 to 12.0								TO252-5
BD3575YHFP-M										HRP5
50V Resistance Output Low quiescent current 200mA LDO Regulators (AEC-Q100)										
New **BD733L2EFJ-C**	4.37 to 45.0	3.3	±2 (Ta=−40 to +125°C)	0.2	0.6	6.0	−40 to +125	–	Over-Current / Temperature	HTSOP-J8
New **BD750L2EFJ-C**	5.8 to 45.0	5.0			0.4			–		HTSOP-J8
New **BD733L2FP-C**	4.37 to 45.0	3.3			0.6			–		TO252-3
New **BD733L2FP3-C**								–		SOT223-4
New **BD750L2FP-C**	5.8 to 45.0	5.0			0.4			–		TO252-3
New **BD750L2FP3-C**								–		SOT223-4
50V Resistance Output Low quiescent current 500mA LDO Regulators (AEC-Q100)										
New **BD733L5FP-C**	4.17 to 45.0	3.3	±2 (Ta=−40 to +125°C)	0.5	0.4	6.0	−40 to +125	–	Over-Current / Temperature	TO252-3
New **BD750L5FP-C**	5.6 to 45.0	5.0			0.25			–		TO252-3

Single-Output LDO Regulators

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

45V Resistance Output Low quiescent current 500mA LDO Regulators (AEC-Q100)

Type	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	I/O Voltage Difference (V)	Circuit Current (μA)	Operating Temperature (Tj)	Shutdown Switch	Protection Circuit	Package Part No. TO252-3	TO263-3	TO263-5	TO252-J5
New BD433M5	4.0 to 42.0	3.3	±2 (Tj = −40 ~ +150°C)	0.5	0.25 (Io=300mA)	38	−40 ~ +150°C	–	Over-Current / Temperature	BD433M5FP-C	BD433M5FP2-C	–	–
New BD450M5	5.5 to 42.0	5.0			0.2 (Io=300mA)			–		BD450M5FP-C	BD450M5FP2-C	–	–
New BD433M5W	4.0 to 42.0	3.3			0.25 (Io=300mA)			✓		–	–	BD433M5WFP2-C	BD433M5WFPJ-C
New BD450M5W	5.5 to 42.0	5.0			0.2 (Io=300mA)			✓		–	–	BD450M5WFP2-C	BD450M5WFPJ-C

45V Resistance Output Low quiescent current 200mA LDO Regulators (AEC-Q100)

Type	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	I/O Voltage Difference(V)	Circuit Current (μA)	Operating Temperature (Tj)	Shutdown Switch	Protection Circuit	Package Part No. HTSOP-J8	SOT223-4
New BD433M2	3.9 to 42.0	3.3	±2 (Tj = −40 to +150°C)	0.2	0.2 (Io=100mA)	40	−40 to +150°C	–	Over-Current / Temperature	BD433M2EFJ-C	BD433M2FP3-C
New BD450M2	5.5 to 42.0	5.0			0.16 (Io=100mA)			–		BD450M2EFJ-C	BD450M2FP3-C
New BD433M2W	3.9 to 42.0	3.3			0.2 (Io=100mA)			✓		BD433M2WEFJ-C	BD433M2WFP3-C
New BD450M2W	5.5 to 42.0	5.0			0.16 (Io=100mA)			✓		BD450M2WEFJ-C	BD450M2WFP3-C

36V Resistance Output 300mA LDO Regulator (AEC-Q100)

Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	I/O Voltage Difference (V)	Circuit Current (mA)	Operating Temperature (°C)	Protection Circuit	Package
BD3650FP-M	5.6 to 30.0	5.0	±2 (Ta=−40 to +125°C)	0.3	0.2 (Io=200mA)	0.5	−40 to +125	Over-Current / Temperature	TO252-3

35V Voltage Resistance 1A LDO Regulators (AEC-Q100)

35V Voltage Resistance 1A LDO Regulators (AEC-Q100) : ✻ Vo is Output voltage / Unit : V

Type	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	I/O Voltage Difference (V)	Ripple Rejection (dB)	Load Regulation (V)	Protection Circuit	Package Part No. TO252-3	HRP5	TO263-3
BD33C0A	4.3 to 26.5	3.3	±3.0% (Ta=−40 to +125°C)	1.0	0.5	0.4 (Io=500mA)	55	✻ Vo×0.01 (Io=5mA to 1A)	Over-Current / Temperature	BD33C0AFP-C	BD33C0AHFP-C	BD33C0AFP2-C
BD50C0A	6.0 to 26.5	5.0				0.3 (Io=500mA)				BD50C0AFP-C	BD50C0AHFP-C	BD50C0AFP2-C
BD80C0A	9.0 to 26.5	8.0					50			BD80C0AFP-C	BD80C0AHFP-C	BD80C0AFP2-C
BD90C0A	10.0 to 26.5	9.0								BD90C0AFP-C	BD90C0AHFP-C	BD90C0AFP2-C

35V Voltage Resistance 1A LDO Regulators with Shutdown Switch (AEC-Q100)

Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (V)	Circuit Current (mA)	Operating Temperature (°C)	Protection Circuit	Package
BD00C0AWFPS-M	4.0 to 26.5	Variable 3.0 to 15.0	±3 (Ta=−40 to +105°C)	1.0	0.3 (Io=500mA)	0.5	−40 to +105	Over-Current/ Temperature	TO252S-5

Type	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	I/O Voltage Difference (V)	Ripple Rejection (dB)	Load Regulation (V)	Protection Circuit	Package Part No. TO252-5	HRP5	TO263-5
BD00C0AW	4.0 to 26.5	Variable 1.0 to 15.0	±3.0 (Ta=−40 to +125°C)	1.0	0.5	0.3 (Io=500mA)	55	Vo×0.01 (Io=5mA to 1A)	Over-Current/ Temperature	BD00C0AWFP-C	BD00C0AWHFP-C	BD00C0AWFP2-C
BD33C0AW	4.3 to 26.5	3.3				–				BD33C0AWFP-C	BD33C0AWHFP-C	BD33C0AWFP2-C
BD50C0AW	6.0 to 26.5	5.0				0.3 (Io=500mA)				BD50C0AWFP-C	BD50C0AWHFP-C	BD50C0AWFP2-C
BD80C0AW	9.0 to 26.5	8.0					50			BD80C0AWFP-C	BD80C0AWHFP-C	BD80C0AWFP2-C
BD90C0AW	10.0 to 26.5	9.0								BD90C0AWFP-C	BD90C0AWHFP-C	BD90C0AWFP2-C

15V Voltage Resistance 1A LDO Regulators with Shutdown Switch (AEC-Q100)

Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	I/O Voltage Difference (V)	Ripple Rejection (dB)	Load Regulation (mV)	Input Capacitor (μF)	Output Capacitor (μF)	Shutdown Switch	Protection Circuit	Package
BD00GC0MEFJ-M	4.5 to 14.0	Variable 1.5 to 13.0	±1.0 / ±3.0 (Ta= −40 to +105°C) <AEC-Q100>	1.0	0.6	0.6 (Io=1A)	60 (f=100Hz, 50mVpp, Io=0A)	25 (Io=0 to 1A)	1.0	1.0	✓	Over-Current/ Temperature	HTSOP-J8
BD15GC0MEFJ-M		1.5											HTSOP-J8
BD18GC0MEFJ-M		1.8											HTSOP-J8
BD25GC0MEFJ-M		2.5											HTSOP-J8
BD30GC0MEFJ-M		3.0											HTSOP-J8
BD33GC0MEFJ-M		3.3											HTSOP-J8
BD50GC0MEFJ-M		5.0											HTSOP-J8
BD60GC0MEFJ-M		6.0											HTSOP-J8
BD70GC0MEFJ-M		7.0											HTSOP-J8
BD80GC0MEFJ-M		8.0											HTSOP-J8
BD90GC0MEFJ-M		9.0											HTSOP-J8
BDJ0GC0MEFJ-M		10.0											HTSOP-J8
BDJ2GC0MEFJ-M		12.0											HTSOP-J8

Single-Output LDO Regulators

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

15V Voltage Resistance 500mA LDO Regulators with Shutdown Switch (AEC-Q100)

Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	I/O Voltage Difference (V)	Ripple Rejection (dB)	Load Regulation (mV)	Input Capacitor (μF)	Output Capacitor (μF)	Shutdown Switch	Protection Circuit	Package
BD00GA5MEFJ-M	4.5 to 14.0	Variable 1.5 to 13.0	±1.0 / ±3.0 (Ta= −40 to +105°C) <AEC-Q100>	0.5	0.6	0.6 (Io=500mA)	60 (f=100Hz, 50mVpp, Io=0A)	25 (Io=0 to 500mA)	1.0	1.0	✓	Over-Current/ Temperature	HTSOP-J8
BD15GA5MEFJ-M		1.5											HTSOP-J8
BD18GA5MEFJ-M		1.8											HTSOP-J8
BD25GA5MEFJ-M		2.5											HTSOP-J8
BD30GA5MEFJ-M		3.0											HTSOP-J8
BD33GA5MEFJ-M		3.3											HTSOP-J8
BD50GA5MEFJ-M		5.0											HTSOP-J8
BD60GA5MEFJ-M		6.0											HTSOP-J8
BD70GA5MEFJ-M		7.0											HTSOP-J8
BD80GA5MEFJ-M		8.0											HTSOP-J8
BD90GA5MEFJ-M		9.0											HTSOP-J8
BDJ0GA5MEFJ-M		10.0											HTSOP-J8
BDJ2GA5MEFJ-M		12.0											HTSOP-J8

15V Voltage Resistance 300mA LDO Regulators with Shutdown Switch (AEC-Q100)

BD00GA3MEFJ-M	4.5 to 14.0	Variable 1.5 to 13.0	±3.0 (Ta= −40 to +105°C) <AEC-Q100>	0.3	0.6	0.6 (Io=300mA)	60 (f=100Hz, 50mVpp, Io=0A)	25 (Io=0 to 300mA	1.0	1.0	✓	Over-Current/ Temperature	HTSOP-J8
BD15GA3MEFJ-M		1.5											HTSOP-J8
BD18GA3MEFJ-M		1.8											HTSOP-J8
BD25GA3MEFJ-M		2.5											HTSOP-J8
BD30GA3MEFJ-M		3.0											HTSOP-J8
BD33GA3MEFJ-M		3.3											HTSOP-J8
BD50GA3MEFJ-M		5.0											HTSOP-J8
BD60GA3MEFJ-M		6.0											HTSOP-J8
BD70GA3MEFJ-M		7.0											HTSOP-J8
BD80GA3MEFJ-M		8.0											HTSOP-J8
BD90GA3MEFJ-M		9.0											HTSOP-J8
BDJ0GA3MEFJ-M		10.0											HTSOP-J8
BDJ2GA3MEFJ-M		12.0											HTSOP-J8

10V Voltage Resistance 1.5A LDO Regulators with Shutdown Switch (AEC-Q100)

Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	I/O Voltage Difference (V)	Ripple Rejection (dB)	Load Regulation (mV)	Input Capacitor (μF)	Output Capacitor (μF)	Shutdown Switch	Protection Circuit	Package
BD00HC5MEFJ-M	4.5 to 8.0	Variable 1.5 to 7.0	±1.0 / ±3.0 (Ta= −40 to +105°C) <AEC-Q100>	1.5	0.6	0.6 (Io=1.5A)	60 (f=100Hz, 50mVpp, Io=0A)	25 (Io=0 to 1.5A)	1.0	1.0	✓	Over-Current/ Temperature	HTSOP-J8
BD15HC5MEFJ-M		1.5											HTSOP-J8
BD18HC5MEFJ-M		1.8											HTSOP-J8
BD25HC5MEFJ-M		2.5											HTSOP-J8
BD30HC5MEFJ-M		3.0											HTSOP-J8
BD33HC5MEFJ-M		3.3											HTSOP-J8
BD50HC5MEFJ-M		5.0											HTSOP-J8
BD60HC5MEFJ-M		6.0											HTSOP-J8
BD70HC5MEFJ-M		7.0											HTSOP-J8

10V Voltage Resistance 1A LDO Regulators with Shutdown Switch (AEC-Q100)

BD00HC0MEFJ-M	4.5 to 8.0	Variable 0.8 to 7.0 (AEC-Q100 Variable 1.5 to 7.0)	±1.0 / ±3.0 (Ta= −40 to +105°C) <AEC-Q100>	1.0	0.6	0.6 (Io=1A)	60 (f=100Hz, 50mVpp, Io=0A)	25 (Io=0 to 1A)	1.0	1.0	✓	Over-Current/ Temperature	HTSOP-J8
BD15HC0MEFJ-M		1.5											HTSOP-J8
BD18HC0MEFJ-M		1.8											HTSOP-J8
BD25HC0MEFJ-M		2.5											HTSOP-J8
BD30HC0MEFJ-M		3.0											HTSOP-J8
BD33HC0MEFJ-M		3.3											HTSOP-J8
BD50HC0MEFJ-M		5.0											HTSOP-J8
BD60HC0MEFJ-M		6.0											HTSOP-J8
BD70HC0MEFJ-M		7.0											HTSOP-J8

Single-Output LDO Regulators

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

10V Voltage Resistance 500mA LDO Regulators with Shutdown Switch (AEC-Q100)

Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	I/O Voltage Difference (V)	Ripple Rejection (dB)	Load Regulation (mV)	Input Capacitor (μF)	Output Capacitor (μF)	Shutdown Switch	Protection Circuit	Package
BD00HA5MEFJ-M	4.5 to 8.0	Variable 1.5 to 7.0	±1.0 / ±3.0 (Ta= −40 to +105°C) <AEC-Q100>	0.5	0.6	0.6 (Io=500mA)	60 (f=100Hz, 50mVpp, Io=0A)	25 (Io=0 to 500mA)	1.0	1.0	✓	Over-Current/ Temperature	HTSOP-J8
BD15HA5MEFJ-M		1.5											HTSOP-J8
BD18HA5MEFJ-M		1.8											HTSOP-J8
BD25HA5MEFJ-M		2.5											HTSOP-J8
BD30HA5MEFJ-M		3.0											HTSOP-J8
BD33HA5MEFJ-M		3.3											HTSOP-J8
BD50HA5MEFJ-M		5.0											HTSOP-J8
BD60HA5MEFJ-M		6.0											HTSOP-J8
BD70HA5MEFJ-M		7.0											HTSOP-J8

10V Voltage Resistance 300mA LDO Regulators with Shutdown Switch (AEC-Q100)

BD00HA3MEFJ-M	4.5 to 8.0	Variable 1.5 to 7.0	±1.0 / ±3.0 (Ta= −40 to +105°C) <AEC-Q100>	0.3	0.6	0.6 (Io=300mA)	60 (f=100Hz, 50mVpp, Io=0A)	25 (Io=0 to 300mA)	1.0	1.0	✓	Over-Current/ Temperature	HTSOP-J8
BD15HA3MEFJ-M		1.5											HTSOP-J8
BD18HA3MEFJ-M		1.8											HTSOP-J8
BD25HA3MEFJ-M		2.5											HTSOP-J8
BD30HA3MEFJ-M		3.0											HTSOP-J8
BD33HA3MEFJ-M		3.3											HTSOP-J8
BD50HA3MEFJ-M		5.0											HTSOP-J8
BD60HA3MEFJ-M		6.0											HTSOP-J8
BD70HA3MEFJ-M		7.0											HTSOP-J8

7V Voltage Resistance 1A LDO Regulators with Shutdown Switch (AEC-Q100)

BD00IC0MEFJ-M	2.3 to 5.5	Variable 0.8 to 4.5	±3.0 (Ta=−40 to +105°C)	1.0	0.3	0.4 (Io=1A)	60 (f=100Hz, 50mVpp, Io=0A)	25 (Io=0 to 1A)	1.0	1.0	✓	Over-Current/ Temperature	HTSOP-J8
BD10IC0MEFJ-M	2.4 to 5.5	1.0											HTSOP-J8
BD12IC0MEFJ-M		1.2											HTSOP-J8
BD15IC0MEFJ-M		1.5											HTSOP-J8
BD18IC0MEFJ-M		1.8											HTSOP-J8
BD25IC0MEFJ-M		2.5											HTSOP-J8
BD30IC0MEFJ-M		3.0											HTSOP-J8
BD33IC0MEFJ-M		3.3											HTSOP-J8

7V Voltage Resistance 500mA LDO Regulators with Shutdown Switch (AEC-Q100)

Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	I/O Voltage Difference (V)	Ripple Rejection (dB)	Load Regulation (mV)	Input Capacitor (μF)	Output Capacitor (μF)	Shutdown Switch	Protection Circuit	Package
BD00IA5MEFJ-M	2.3 to 5.5	Variable 0.8 to 4.5	±1.0 / ±3.0 (Ta= −40 to +105°C) <AEC-Q100>	0.5	0.25	0.4 (Io=500mA)	60 (f=100Hz, 50mVpp, Io=0A)	25 (Io=0 to 500mA)	1.0	1.0	✓	Over-Current/ Temperature	HTSOP-J8
BD10IA5MEFJ-M		1.0											HTSOP-J8
BD12IA5MEFJ-M		1.2											HTSOP-J8
BD15IA5MEFJ-M		1.5											HTSOP-J8
BD18IA5MEFJ-M		1.8											HTSOP-J8
BD25IA5MEFJ-M		2.5											HTSOP-J8
BD30IA5MEFJ-M		3.0											HTSOP-J8
BD33IA5MEFJ-M		3.3											HTSOP-J8

200mA CMOS LDO Regulators with Shutdown Switch (AEC-Q100)

Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Vsat (mV)	Ripple Rejection (dB)	Load Regulation (mV)	Circuit Current (μA)	Output Short Current (mA)	Input Capacitor (μF)	Output Capacitor (μF)	Shut Down Switch	Over Current Protection	Temperature Protection	Discharge Function	Package
BU12SD2MG-M	1.7 to 6.0	1.20	±2 (Ta=−40°C to +105°C)	0.2	400 (Io=100mA)	68	1 (Io=1mA to 200mA)	33	100	1.0	1.0	✓	✓	✓	–	SSOP5
BU15SD2MG-M		1.50			280 (Io=100mA)											SSOP5
BU18SD2MG-M		1.80			150 (Io=100mA)											SSOP5
BU25SD2MG-M		2.50			100 (Io=100mA)											SSOP5
BU28SD2MG-M		2.80			85 (Io=100mA)											SSOP5
BU30SD2MG-M		3.00														SSOP5
BU33SD2MG-M		3.30														SSOP5

LDO Regulators with Voltage Detector and Watchdog Timer

500mA Output LDO Regulators with Voltage Detector and Watchdog Timer

Part No.	Input Voltage (V)	LDO				Voltage Detector			Circuit current (μA)	Operating Temperature (°C)	Package
		Output Voltage(V)	Output Voltage Precision (%)	Output Current (A)	I/O Voltage Difference (V)	Detection Voltage (V)	Voltage Detection Precision (%)	Function			
BD3021HFP-M	5.6 to 36.0	5	±2 (Ta=−40 to +125°C)	0.5	0.3 (Io=200mA)	4.5	±2	4.5V Voltage Detector+WDT (Active switch)	80	−40 to +125	HRP7
BD3020HFP-M						Variable (at Vs open : 4.1V)		Adjustable Voltage Detector+WDT			HRP7

200mA Output LDO Regulators with Voltage Detector and Watchdog Timer

Part No.	Input Voltage (V)	LDO				Voltage Detector			Circuit current (μA)	Operating Temperature (°C)	Package
		Output Voltage(V)	Output Voltage Precision (%)	Output Current (A)	I/O Voltage Difference (V)	Detection Voltage (V)	Voltage Detection Precision (%)	Function			
BD3010AFV-M	5.6 to 36.0	5	±2 (Ta=−40 to +125°C)	0.2	0.25 (Io=150mA)	Variable (RADJ open : 4.25V)	±3	Adjustable Voltage Detector+WDT	80	−40 to +125	SSOP-B20

LDO Regulators with Voltage Detector

500mA Output LDO Regulators with Voltage Detector (AEC-Q100)

Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage precision (%)	Output Current (A)	I/O Voltage Difference (V)	Circuit Current (μA)	Operating Temperature (Tj)	Shutdown Switch	Package
New BD4275-C series	5.5 to 45.0	5	±2 (Tj=−40 to +150°C)	0.5	0.25 (Io=300mA)	65	−40 to +150°C	–	TO252-J5
									TO263-5

150mA Output LDO Regulator with Voltage Detector (AEC-Q100)

Part No.	Input Voltage (V)	LDO				Voltage detector		Battery Voltage Detector	Circuit Current (μA)	Operating Temperature (Tj)	Package
		Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	I/O Voltage Difference (V)	Detection Voltage (V)	Voltage Detection Precision (%)	Detection Voltage (V)			
New BD4269FJ-C	5.5 to 45.0	5	±2 (Tj=−40 to +150°C)	0.2	0.25 (Io=100mA)	Variable (at RADJ open : 4.62V)	±2.6	Variable	70	−40 to +150°C	SOP-J8

Voltage Tracker

500mA Voltage Tracker

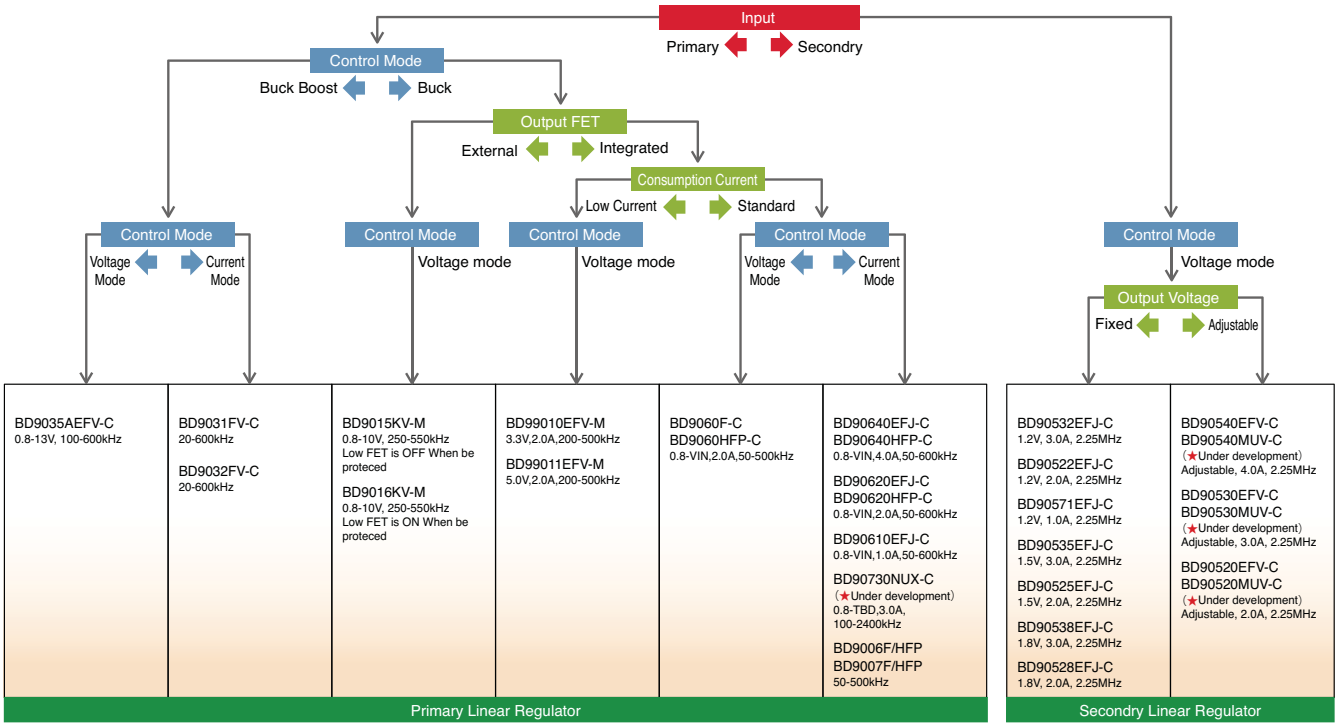
Part No.	Input Voltage (V)	Output Current (A)	Offset Voltage (mV)	Circuit Current (μA)	Operating Temperature (°C)	Package
BD3925FP-C	4.5 to 36.0	0.5	±10 (Ta=−40 to +125°C, V_{CC}=6 to 36V, Io=5 to 200mA)	45	−40 to +125	TO252-5
BD3925HFP-C						HRP5

Linear Regulators for DDR SDRAM

Termination Regulators for DDR SDRAM (AEC-Q100)

Part No.	Input Voltage (V)	Output Voltage (V)	Voltage Precision (mV)	V_{TT} Output Current (A)	V_{REF} Output Current (mA)	Soft Start	Thermal Shut Down	Output Ceramic Capacitors	Package
New BD35395FJ-M	2.5 to 5.5	0.5 to 1.375	±13.5	±1.0	None	✓	Recovery	✓	SOP-J8

Switching Regulators



For Automotive

Switching Regulators (Integrated Switch) Single Output 1A Output (AEC-Q100)

Part No.	Input Voltage Maximum Rating (V)	Supply Voltage (V)	Output Current (A)	Output Voltage (V)	Reference Voltage Accuracy (%)	Operating Temperature (°C)	Operating Frequency (kHz)	Frequency Accuracy (%)	Oscillation Circuit	Control Mode	Package
New BD90610EFJ-C	42	3.5 to 36.0	1.25 (Isw)	Variable (0.8 to V_{IN})	±2.0	−40 to +125	50 to 600	±10	Self-oscillation/ External synchronization	PWM	HTSOP-J8
BD90201FV-M	36	7.0 to 33.0	1.75 (Isw)	Variable (1.145 to Vccx0.643)	±2.0	−40 to +105	500 to 2300	±10	Self-oscillation	PWM	SSOP-B20W

For Automotive

Switching Regulators (Integrated Switch) Single Output 2A Output (AEC-Q100)

Part No.	Input Voltage Maximum Rating (V)	Supply Voltage (V)	Output Current (A)	Output Voltage (V)	Reference Voltage Accuracy (%)	Operating Temperature (°C)	Operating Frequency (kHz)	Frequency Accuracy (%)	Oscillation Circuit	Control Mode	Package
New BD90620EFJ-C	42	3.5 to 36.0	2.5 (Isw)	Variable (0.8 to V_{IN})	±2.0	−40 to +125	50 to 600	±10	Self-oscillation/ External synchronization	PWM	HTSOP-J8
New BD90620HFP-C	42	3.5 to 36.0	2.5 (Isw)	Variable (0.8 to V_{IN})	±2.0	−40 to +125	50 to 600	±10	Self-oscillation/ External synchronization	PWM	HRP7
BD9060HFP-C	36	5.0 to 35.0	2.0 (Isw)	Variable (0.8 to V_{IN})	±2.0	−40 to +125	50 to 500	±5	Self-oscillation/ External synchronization	PWM	HRP7
BD9060F-C	36	5.0 to 35.0	2.0 (Isw)	Variable (0.8 to V_{IN})	±2.0	−40 to +125	50 to 500	±5	Self-oscillation/ External synchronization	PWM	SOP8
BD9006F	36	7.0 to 35.0	2.0 (Isw)	Variable (0.8 to V_{IN})	±2.0	−40 to +105	50 to 500	±5	Self-oscillation/ External synchronization	PWM	SOP8
BD9006HFP	36	7.0 to 35.0	2.0 (Isw)	Variable (0.8 to V_{IN})	±2.0	−40 to +105	50 to 500	±5	Self-oscillation/ External synchronization	PWM	HRP7
BD9007F	36	7.0 to 35.0	2.0 (Isw)	Variable (0.8 to V_{IN})	±2.0	−40 to +105	50 to 500	±20	Self-oscillation/ External synchronization	PWM	SOP8
BD9007HFP	36	7.0 to 35.0	2.0 (Isw)	Variable (0.8 to V_{IN})	±2.0	−40 to +105	50 to 500	±20	Self-oscillation/ External synchronization	PWM	HRP7
BD90010F	50	7.0 to 48.0	2.0 (Isw)	Variable (1 to V_{IN})	±2.0	−40 to +95	50 to 300	±20	Self-oscillation	PWM	SOP8

Switching Regulators (Integrated Switch) Single Output 4A Output (AEC-Q100)

Part No.	Input Voltage Maximum Rating (V)	Supply Voltage (V)	Output Current (A)	Output Voltage (V)	Reference Voltage Accuracy (%)	Operating Temperature (°C)	Operating Frequency (kHz)	Frequency Accuracy (%)	Oscillation Circuit	Control Mode	Package
New BD90640EFJ-C	42	3.5 to 36.0	4 (Isw)	Variable (0.8 to V_{IN})	±2.0	−40 to +125	50 to 600	±10	Self-oscillation/ External synchronization	PWM	HTSOP-J8
New BD90640HFP-C	42	3.5 to 36.0	4 (Isw)	Variable (0.8 to V_{IN})	±2.0	−40 to +125	50 to 600	±10	Self-oscillation/ External synchronization	PWM	HRP7
BD9781HFP	36	7.0 to 35.0	4 (Isw)	Variable (1 to V_{IN})	±2.0	−40 to +125	50 to 500	±20	Self-oscillation/ External synchronization	PWM	HRP7

Switching Regulators (Integrated Switch) Ultra Low Quiescent Current / Synchronous Rectification (AEC-Q100)

Part No.	Input Voltage Maximum Rating (V)	Supply Voltage (V)	Output Current (A)	Output Voltage (V)	Output Voltage Accuracy (%)	Operating Temperature (°C)	Operating Frequency (kHz)	Frequency Accuracy (%)	Oscillation Circuit	Control Mode	Package
BD99010EFV-M	42	3.6 to 35.0	2 (Isw)	3.3	±2.0	−40 to +105	200 to 500	±20	Self-oscillation	Light load mode/PWM	HTSSOP-B24
BD99011EFV-M	42	3.6 to 35.0	2 (Isw)	5	±2.0	−40 to +105	200 to 500	±20	Self-oscillation	Light load mode/PWM	HTSSOP-B24

Secondary Switching Regulators (Integrated Switch) Single Output 1A Output (AEC-Q100)

Part No.	Input Voltage Maximum Rating (V)	Supply Voltage (V)	Output Current (A)	Output Voltage (V)	Output Voltage Accuracy (%)	Operating Temperature (°C)	Operating Frequency (kHz)	Frequency Accuracy (%)	Oscillation Circuit	Control Mode	Package
BD90571EFJ-C	7	2.69 to 5.5	1.0	1.2	±2.0	−40 to +125	2250	±20	Self-oscillation	Light load mode/PWM	HTSOP-J8

Secondary Switching Regulators (Integrated Switch) Single Output 2A Output (AEC-Q100)

Part No.	Input Voltage Maximum Rating (V)	Supply Voltage (V)	Output Current (A)	Output Voltage (V)	Output Voltage Accuracy (%)	Operating Temperature (°C)	Operating Frequency (kHz)	Frequency Accuracy (%)	Oscillation Circuit	Control Mode	Package
BD90522EFJ-C	7	2.69 to 5.5	2.0	1.2	±2.0	−40 to +125	2250	±20	Self-oscillation	Light load mode/PWM	HTSOP-J8
BD90525EFJ-C	7	2.69 to 5.5	2.0	1.5	±2.0	−40 to +125	2250	±20	Self-oscillation	Light load mode/PWM	HTSOP-J8
BD90528EFJ-C	7	2.69 to 5.5	2.0	1.8	±2.0	−40 to +125	2250	±20	Self-oscillation	Light load mode/PWM	HTSOP-J8

Secondary Switching Regulators (Integrated Switch) Single Output 3A Output (AEC-Q100)

Part No.	Input Voltage Maximum Rating (V)	Supply Voltage (V)	Output Current (A)	Output Voltage (V)	Output Voltage Accuracy (%)	Operating Temperature (°C)	Operating Frequency (kHz)	Frequency Accuracy (%)	Oscillation Circuit	Control Mode	Package
BD90532EFJ-C	7	2.69 to 5.5	3.0	1.2	±2.0	−40 to +125	2250	±20	Self-oscillation	Light load mode/PWM	HTSOP-J8
BD90535EFJ-C	7	2.69 to 5.5	3.0	1.5	±2.0	−40 to +125	2250	±20	Self-oscillation	Light load mode/PWM	HTSOP-J8
BD90538EFJ-C	7	2.69 to 5.5	3.0	1.8	±2.0	−40 to +125	2250	±20	Self-oscillation	Light load mode/PWM	HTSOP-J8

Switching Controllers (External Switch) Single Output Isolated / Boost Converters (AEC-Q100)

Part No.	Input Voltage Maximum Rating (V)	Power Supply Voltage (V)	Output Type	Reference Voltage Accuracy (%)	Operating Temperature (°C)	Operating Frequency (kHz)	Package
BD9031FV-C	35	4.5 to 30.0	Push Pull	±1.5	−40 to +125	20 to 600	SSOP-B16
BD9032FV-C	40	3.5 to 35.0	Push Pull	±1.5	−40 to +125	20 to 600	SSOP-B16

Switching Controllers (External Switch) Dual Output Buck / Boost Converters (AEC-Q100)

Part No.	Input Voltage Maximum Rating (V)	Power Supply Voltage (V)	Output Type	Reference Voltage Accuracy (%)	Operating Temperature (°C)	Operating Frequency (kHz)	Overvoltage Protection is Detected	Package
BD9015KV-M	35	3.9 to 30.0	Push Pull	±1.5 (−40 to +105°C)	−40 to +105	250 to 550	L-side FET OFF	VQFP48C
BD9016KV-M	35	3.9 to 30.0	Push Pull	±1.5 (−40 to +105°C)	−40 to +105	250 to 550	L-side FET OFF	VQFP48C

Switching Controllers (External Switch) Single Output Buck / Boost (AEC-Q100)

Part No.	Input Voltage Maximum Rating (V)	Power Supply Voltage (V)	Output Type	Reference Voltage Accuracy (%)	Operating Temperature (°C)	Operating Frequency (kHz)	Overvoltage Protection is Detected	Package
New BD9035AEFV-C	35	3.8 to 30	Push Pull	±1.5 (−40 to +125°C)	−40 to +125	100 to 600	Automatic switchover	HTSSOP-B24

Switching Regulators (Power Management IC for System)

Power Management ICs for Automotive Camera Modules

for CCD Sensor

Part No.	Supply Voltage (V)	Functions			Output Voltage (V)	Output Current Capacity (A)	Reset Voltage (V)	Operating Frequency (kHz)	Standby Current (μA) (Typ.)	Package
BD8671KN	4.5 to 9.0	Step-down DC/DC	ch1	DSP	3.3	0.15	–	500 to 1200	0	VQFN28
		Step-up DC/DC	ch2	sensor	12.0	0.02	–			
		Reverse Charge pump	ch3		−5.0	0.005	–	250 to 600*1		
BD8676KN	4.5 to 9.0	Step-down DC/DC	ch1	DSP analog	3.3	0.15	2.7	500 to 1200	0	VQFN36
			ch2	DSP Core	1.2		–			
		Step-up DC/DC+LDO	ch3	sensor	15.0	0.02	–			
		Reverse Charge pump	ch4		−5.5	0.005	–			

*1 : 1/2 of DC/DC

Power Management ICs for Automotive Camera Modules

for CMOS Sensor

Part No.	Supply Voltage (V)	Functions			Output Voltage (V)	Output Current Capacity (A)	Reset Voltage (V)	Operating Frequency (kHz)	Standby Current (μA) (Typ.)	Package
BD8674KN	4.5 to 9.0	Step-down DC/DC	ch1	DSP	3.3	0.25	2.75	500 to 1200	0	VQFN28
		Step-up Charge pump+LDO	ch2	Sensor	5.0	0.03	–	640		
BD8678AMUV	4.5 to 9.0	LDO	ch1	Sensor	2.8	0.06	2.4	800 to 1200	0	VQFN020V4040
		Step-down DC/DC	ch2	DSP	1.5	0.15	–			
BD8682MUV*1	5.9 to 18.0	High Voltage Step-down DC/DC	ch1	–	Variable	0.5	–	500	0	VQFN32SV5050
		LDO	ch2	Sensor	2.8V/3.3V	0.13	V_O2×0.86	–		
		LDO	ch3		1.8V/OFF	0.06	–	–		
		Step-down DC/DC	ch4	DSP	1.2V/1.5V/1.8V	0.25	–	1000		

*1 : (AEC-Q100)

Isolated / No Isolated Power Supply

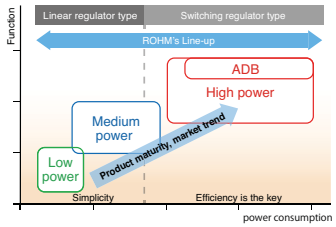
DC/DC Controller (AEC-Q100)

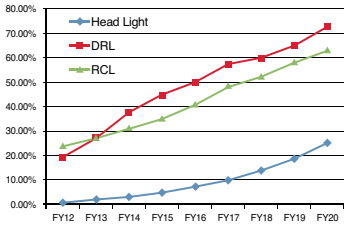
Part No.	Topology	Primary/Secondary	Supply Voltage (V)	Switching Frequency (kHz)	Frequency Synchronization	I/F	Package
BD8325FVT-M	Active Clamp Forward	Primary IC	9 to 18	50 to 500	✓	–	TSSOP-B30

LED Drivers

LED Drivers

Exterior

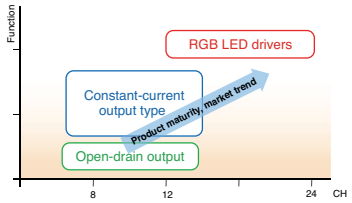




Automotive LED driver market is picking up with DRL, CHMSL, leading the way and very mature. Owing to the design flexibility of LEDs, RCL, turn Indicator Lamps are also starting to go LED way. Heat-dissipation is the key issue preventing Low/ High beam implementation, but with the advent of ADB (Adaptive Driving Beam), LED will be the key.

ROHM's Line-up	Linear Type		Switching Type	
	2W	4W	2W	4W
Fog/ Position/ Daytime Running Light	✓	✓	–	✓
	BD8374/BD8372			BD8381
Front/ Side/ Rear turn Indicator	✓	✓	–	
	BD8374/BD8372			
Rear Combination Lamp (RCL)	✓	✓	–	
	BD8374/BD8372			
Center High Mounted Stop Light (CHMSL)	–	✓	–	
		BD8374/BD8372		
Head Light (Low Beam)	✓	–	✓	✓
	BD8374/BD8372		BD8381	
Head Light (High Beam)	–		✓	–
			BD8381	

Interior



Dashboard lights, Ambient lighting, Dome and Map lighting, Center stack lighting, and others make-up the Automotive interior lighting. Heads-up display also uses LEDs lights, as shown in the block diagram in Page 9. In interior lighting, the number of channels, control interface, and to some extent the output type (open-drain, constant-current, etc.) is the key.

	Open-drain	Const Current	RGB LED driver
Dashboard backlight	✓	✓	✓
	BD8378/BD8379	BD18377	BD2808
Ambient lighting	✓	✓	✓
	BD8378/BD8379	BD18377	BD2808
Dome and map lighting	–	✓	–
		BD18377	
Mood lighting	–	–	✓
			BD2808
LCD backlighting	✓	✓	△
	BD8378/BD8379	BD18377	BD2808

Buck-Boost LED Drivers

White LED Drivers (AEC-Q100)

Part No.	Power Supply (V)	Boost FET	Number of Channel (ch)	Output Voltage (V)	Output Current (mA)	Switching Frequency (MHz)	Brightness Control	Operating Temperature (°C)	Package
☆**BD81A44EFV-M**	4.5 to 35.0	External	4	35Max.	120Max./ch	0.2 to 2.2	PWM	–40 to +125	HTSSOP-B28
☆**BD81A44MUV-M**	4.5 to 35.0	External	4	35Max.	120Max./ch	0.2 to 2.2	PWM	–40 to +125	VQFN28SV5050

White LED Drivers for Head Light (AEC-Q100)

Part No.	Power Supply (V)	Application	Number of Channel (ch)	Maximum Input Voltage (V)	Drive Current	Dimmer Mode	DC/DC	Operation Temperature (°C)	Package
BD8381AEFV-M	5.0 to 30.0	Head Lamp/DRL	1	50	Depend on Extra parts	PWM/DC	Buck-Boost, Boost, Buck	–40 to +125	HTSSOP-B28

☆ : Under development

Constant Current / Serial-in Parallel-out LED Drivers

Parallel-out LED Drivers (AEC-Q100)

Part No.	Supply Voltage (V)	Output Voltage (V)	No. of Output (ch)	Output Method	Max. LED Current	Each Output Format	Other	Control Method	Max. Clock Frequency	Package
New **BD8378FV-M**	3.0 to 5.5	35	8	Open Drain	50mA/ch	ON/OFF	–	Shift Resister Latch	1.25MHz	SSOP-B16
New **BD8379FV-M**	3.0 to 5.5	35	12	Open Drain	50mA/ch	ON/OFF	–	Shift Resister Latch	1.25MHz	SSOP-B20
BD18377EFV-M	3.0 to 5.5	10	12	Constant Current	50mA/ch	Built-in 64-step current DAC	PWM control for all channel	SPI	1.25MHz	HTSSOP-B20
☆**BD2808MUV-M**	3.0 to 5.5	20	RGB×8 (24ch)	Constant Current	50mA/ch	Built-in 64-step current DAC for RGB	Built-in 256-step PWM control for all channel	2-Wire Serial	1.0MHz	VQFN48MCV070

☆ : Under development

Constant Current / Serial-in Parallel-out LED Drivers

LED Source Drivers (AEC-Q100)

Part No.	Power Supply (V)	Application	Number of Channel (ch)	Maximum Input Voltage (V)	Maximum Current (mA)	Dimmer Mode	Accuracy of Current	Operating Temperature (°C)	Package
BD8372EFJ-M	5.5 to 40.0	DRL/Turn/Rear	1	50	200	High Current/ Low Current	±3%(Ta=25°C)	–40 to +125	HTSOP-J8
BD8372HFP-M	5.5 to 40.0	DRL/Turn/Rear	1	50	200	High Current/ Low Current	±3%(Ta=25°C)	–40 to +125	HRP7
BD8374EFJ-M	4.5 to 42.0	DRL/Turn/Rear	1	50	500	PWM	±3%(Ta=25°C)	–40 to +125	HTSOP-J8
BD8374HFP-M	4.5 to 42.0	DRL/Turn/Rear	1	50	500	PWM	±3%(Ta=25°C)	–40 to +125	HRP7

Motor Drivers

3-Phase Brushless Motor Drivers

3-Phase Brushless Motor Pre-Driver (AEC-Q100)

Part No.	Max. Voltage (V)	Supply Voltage (V)	Operating Temperature (°C)	Circuit Current (mA)	Input Threshold Voltage		External FET Drive Voltage		PWM Frequency (kHz)	Package
					H Level (V)	L Level (V)	Upper (V)	Lower (V)		
BD16805FV-M	60	8 to 18	−40 to +110	50	3.0	1.0	2×V_{CC}−0.5	11.5	25	SSOP-B40

H-Bridge Motor Driver

6ch Half H-Bridge Motor Driver (AEC-Q100)

Part No.	Voltage Ratings (V)	CH (ch)	Output ON Resistance (upper+lower) (Ω/Typ.)	Operating temperature (°C)	Package
BD16936EFV-M	60	6ch half	3.3	−40 to +110	HTSSOP-B28

Driver for ODD

4ch System Motor Driver IC (AEC-Q100)

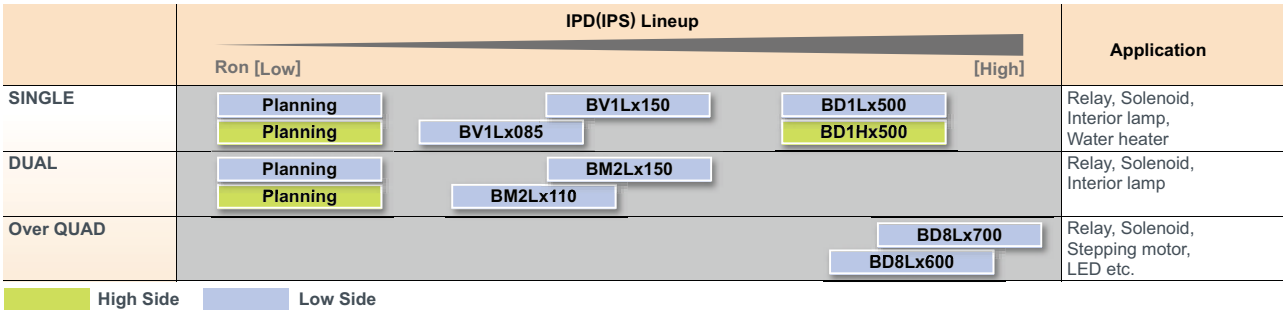
Part No.	Power Supply (V)	I/F	Focus Tilt	Tracking	Sled	Loading	Spindle	Short Circuit Protection for Loading	Protect for Pickup	Regulator	Reset	Package
BD8266EFV-M	4.5 to 10.0	Analog & PWM	1ch	1ch	DC Select input		DC	–	Self off	–	–	HTSSOP-B24

6ch to 9ch System Motor Driver ICs (AEC-Q100)

Part No.	Power Supply (V)	I/F	Focus Tilt	Tracking	Sled	Loading	Spindle	LVDS for SA	Short Circuit Protection for Loading	Protect for Pickup	Package
BD8255MUV-M	4.5 to 5.5	SPI	1ch	1ch	2ch Stteping	DC	3-Phase Brushless	–	✓	–	VQFN48SV7070
BD8256EFV-M	4.5 to 10.5	SPI	2ch	1ch	2ch Stteping	DC	3-Phase Brushless	2ch	✓	Self off	HTSSOP-B54

IPD(IPS)

High Side/Low Side Switch



High Side/Low Side Switch (AEC-Q100)

Part No.	Power Supply (V)	VDS (Max.) [V]	Hi/Lo	CH (ch)	Iocp(min) [A]	ON Resistance [mΩ/typ.]	Package
New BV1LB085HFS-C	3.0 to 5.5V	42	Lo	1	13.0	90	HSON-A8
New BV1LB150HFS-C	3.0 to 5.5V	42	Lo	1	6.5	150	HSON-A8
BD1LB500EFJ/FVM-C	3.5 to 5.5V	42	Lo	1	0.8	350	HTSOP-J8/MSOP8
New BM2LB110FJ-C	3.0 to 5.5V	42	Lo	2	2.5	120	SOP-J8
New BM2LB150FJ-C	3.0 to 5.5V	42	Lo	2	5.5	150	SOP-J8
BD8LB600FS-C	3.0 to 5.5V(Digital) 4.0 to 5.5V(Analog)	45	Lo	8	1.0	600	SSOP-A24
New BD8LA700EFV-C	3.0 to 5.5V(Digital) 4.0 to 5.5V(Analog)	45	Lo	8	0.5	700	HTSSOP-B24
BD1HC500EFJ/FVM-C	4 to18V	44.5	Hi	1	0.8	500	HTSOP-J8/MSOP-8/HSON-8
BD1HD500EFJ/FVM-C	4 to18V	44.5	Hi	1	0.8	500	HTSOP-J8/MSOP-8/HSON-8

Power Management Switch

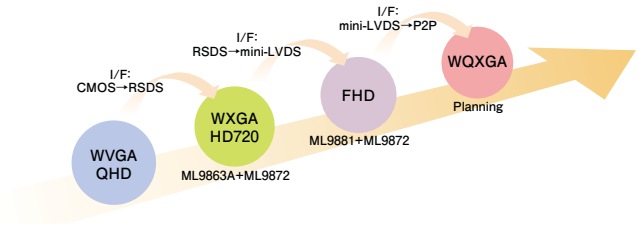
1 Channel Compact High Side Switch ICs (AEC-Q100)

Part No.	Power supply (V)	ON Resistance (mΩ)	Control Input logic	Output Current (A)	Over Current Detection (A) Min. / Typ. / Max.	Output Turn on Time (ms)	OCP	Thermal Shut Down	Flag Output Delay/ at Over Current (ms)	Discharge Resistance (Ω)	Package
New BD2262G-M	2.7 to 5.5	120	H Active	0.2	0.2/0.3/0.4	1.0	Recovery	Recovery	15	60	SSOP5
New BD2264G-M	2.7 to 5.5	120	H Active	0.5	0.63/0.765/0.9	1.0	Recovery	Recovery	15	60	SSOP5
New BD2265G-M	2.7 to 5.5	120	L Active	0.5	0.63/0.765/0.9	1.0	Recovery	Recovery	15	60	SSOP5
New BD2266G-M	2.7 to 5.5	120	H Active	0.75	0.82/0.97/1.12	1.0	Recovery	Recovery	15	60	SSOP5
New BD2267G-M	2.7 to 5.5	120	L Active	0.75	0.82/0.97/1.12	1.0	Recovery	Recovery	15	60	SSOP5
New BD2268G-M	2.7 to 5.5	110	H Active	1.0	1.15/1.275/1.4	1.0	Recovery	Recovery	15	60	SSOP5
New BD2269G-M	2.7 to 5.5	110	L Active	1.0	1.15/1.275/1.4	1.0	Recovery	Recovery	15	60	SSOP5
New BD2244G-M*	2.8 to 5.5	100	H Active	1.5	0.2 to 1.7 (adjustable)	0.6	Recovery	Recovery	7	60	SSOP6
New BD2245G-M*	2.8 to 5.5	100	L Active	1.5	0.2 to 1.7 (adjustable)	0.6	Recovery	Recovery	7	60	SSOP6

* UL approved File No. E243261

Display Drivers

TFT Driver Series



Panel resolution (Color TFT panel)		Number of chips		
		Source		Gate
		ML9863A (960ch)	ML9881 (1440ch)	ML9872 (540ch)
WVGA	800RGB×480	3	2	1
QHD	960RGB×540	3	2	1
WXGA	1280RGB×800	4	3	2
—	1280RGB×480	4	3	1
—	1440RGB×540	5	3	1
FHD	1920RGB×1080	6	4	2

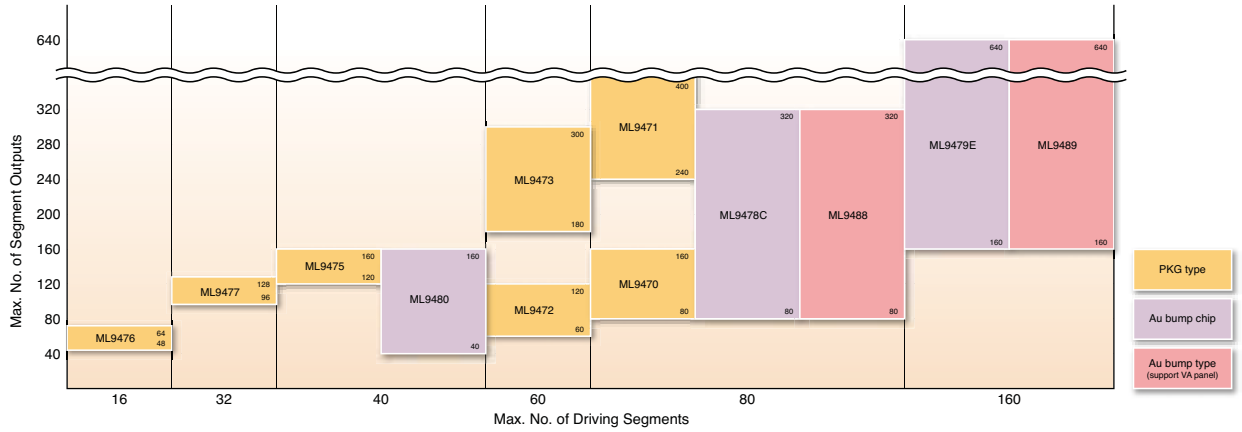
Drivers for small to medium LCD Panels

(LAPIS Semiconductor products)

TFT-LCD driver

Part No.	Logic Supply Voltage (V)	LCD Voltage (V)	Number of Driver Outputs	I/F	Operating Temperature (°C)	Package
ML9860B	2.1 to 3.6	10.0 to 14.6	480	RSDS	–40 to +95	Au bump chip
ML9863A	2.4 to 3.6	8.0 to 14.6	960/804/792/768	CMOS/RSDS	–40 to +95	Au bump chip
ML9872	2.7 to 3.6	to 40	540/480/400/384/360/300/240	CMOS	–40 to +95	Au bump chip
New **ML9881**	2.7 to 3.6	8.0 to 14.6	1440/1284/1278/1260/1200/1080/1026/1020	RSDS/mini-LVDS	–40 to +95	Au bump chip

TN/STN LCD Driver Series



Controller driver for low duty LCD

(LAPIS Semiconductor products)

LCD controller driver (Package product)

Part No.	Max. No. of Segment Outputs	Max. No. of Driving Segments					Internal Oscillation Frame Frequency (Hz)	Logic Supply Voltage (V)	Driver Supply Voltage (V)	Operating Temperature (°C)	Feature	Package
		static	1/2	1/3	1/4	1/5						
ML9470-12	80	80	160	—	—	—	—	3.0 to 5.5 (single)		–40 to +105	Supports external clock input	QFP100
ML9471	80	—	—	240	320	400	—	3.0 to 5.5 (single)		–40 to +105	Supports external clock input	TQFP100
ML9472	60	60	120	—	—	—	—	3.0 to 5.5 (single)		–40 to +105	Supports external clock input	P-TQFP80-1212-0.50
ML9473	60	—	—	180	240	300	—	3.0 to 5.5 (single)		–40 to +105	Supports external clock input	P-TQFP80-1212-0.50
ML9475	40	—	—	120	160	—	—	3V±10%/ 5V±10%	3.5 to 5.5	–40 to +105	Supports external clock input/ Bias generator built in/ EMS countermeasure built in	QFP56
ML9476	16	—	—	48	64	—	—	3V±10%/ 5V±10%	3.5 to 5.5	–40 to +105	Supports external clock input/ Bias generator built in/ EMS countermeasure built in	TQFP48
ML9477	32	—	—	96	128	—	—	3V±10%/ 5V±10%	3.5 to 5.5	–40 to +105	Supports external clock input/ Bias generator built in/ EMS countermeasure built in	TQFP48
New **ML9484**	50	50	100	150	200	—	—	2.7 to 5.5	4.5 to 5.5	–40 to +105	Supports external clock input/ Bias generator built in	TQFP64
LCD controller driver (Gold bump product)												
ML9480	40	40	80	120	160	—	65/75/85/95/ 130/150/170/190 command switching	2.7 to 5.5	4.5 to 5.5	–40 to +105	Supports external clock input/ Bias generator built in/ EMS countermeasure built in/ No external parts	Au bump chip
ML9478C	80	80	160	240	320	—	65/75/85/95 command switching	2.7 to 5.5	4.5 to 5.5	–40 to +105	Supports external clock input/ Bias generator built in/ EMS countermeasure built in/ No external parts	Au bump chip
ML9479E	160	160	320	480	640	—	65/75/85/95 command switching	2.7 to 5.5	4.5 to 5.5	–40 to +105	Supports external clock input/ Bias generator built in/ EMS countermeasure built in/ No external parts	Au bump chip
ML9488	80	80	160	240	320	—	130/150/170/190 command switching	2.7 to 5.5	4.5 to 5.5	–40 to +105	Supports external clock input/ Bias generator built in	Au bump chip
ML9489	160	160	320	480	640	—	130/150/170/190 command switching	2.7 to 5.5	4.5 to 5.5	–40 to +105	Supports external clock input/ Bias generator built in	Au bump chip

TN / STN LCD Driver Series

LCD Segment Drivers

Standard Segment Drivers

Part No.	Display (dots)	Outputs		Operating Voltage (V)		Duty	Bias	Interface	EVR	GPO	LED Dr	PWM Gen.	Keyscan	Package
		SEG	COM	I/F Power Supply (V_{DD})	LCD Power Supply (VLCD)									
BU9796AFS / BU9796AMUV	80	20	4	2.5 to 5.5		1/4	1/2,1/3	2wire	–	–	–	–	–	SSOPA–32 / VQFN024V4040
	48	12												
BU97600FV-M*1/ BU97600FUV –M*1	116	29	4	2.7 to 6.0		1/4, 1/3, 1/2, Static	1/2,1/3, Static	4wire	✓	16port (6ch PWM)	–	6ch 256step	4x5 Max 20Key	SSOP–B40 / TSSOP–C48V
	148	37												
BU9797FUV-M*1	144	36	4	2.5 to 5.5		1/4	1/3,1/2	2wire	–	–	–	–	–	TSSOP–C48V
BU97510CKV-M*1	216	54	4	2.7 to 6.0		1/4, 1/3	1/3,1/2	3wire	–	6port (6ch PWM)	–	6ch 64step	–	VQFP64
BU97520AKV-M*1	276	69	4	2.7 to 6.0		1/4, 1/3	1/3,1/2	4wire	–	6port (6ch PWM)	–	6ch 256step	5x6 Max 30Key	VQFP80
BU97530KVT-M*1	445	89	5	2.7 to 6.0		1/5, 1/4, 1/3, Static	1/3,1/2, Static	4wire	✓	9port (9ch PWM)	–	9ch 256step	5x6 Max 30Key	TQFP100V
BU6886KVT	13C x 1L 12C x 2L	Max 65	15/ 8	2.7 to 3.6	5.0 to 10.0	1/15, 1/8	1/4,1/5	3wire	✓	–	4port	–	4x16 Max 64Key	TQFP100V

*1 : (AEC-Q100)

Car Clock Drivers

(LAPIS Semiconductor products)

Car Clock

Part No.	Display Duty	VFD Driving Voltage(V)	Logic Supply Voltage(V)	Operating Temperature(°C)	Supply Current (Max.)	No. of Digit	Package
ML9298	1/2	4.0 to 18	No need	–40 to +85	0.6mA	4digits×1line and col.	SSOP32
ML9098B	Static, 1/2	3.0 to 5.5	3.0 to 5.5	–40 to +105	0.6mA	4digits×1line and col., AM, PM	TQFP48

Touch Screen Controller

Resistive type (AEC-Q100)

Part No.	Supply voltage (V)	MCU	Resolution	Touch detection	Stand-by current (μA)	Active current (mA)	Host I/F	Operating temperature (°C)	Package
BU21024FV-M	2.7 to 3.6	8bit	1024×1024	2 point/Single	60	4.0	I²C/SPI	–40 to +85	SSOP-B28

Car communication LSI

Transceiver

LIN Transceiver (AEC-Q100)

Part No.	Supply Voltage (V)	Absolute Maximum Input (V)	Baud Rates (kbps)	Type	Low Slope Mode	Dominant Time-out	Sleep Mode	Package
BD41020FJ-C	5.0 to 27.0	–27.0 to +40.0	20	LIN 2.1	✓	✓	✓	SOPJ-8

LVDS Interface ICs

Clockless-Link

Part No.	Type	Parallel Data	Serial Lane	Clock Frequency (MHz)	Supply Voltage (V)	Operating Temperature (°C)	Package
BU17101AKV	Transmitter	24bit	1lane	30 to 50	3.0 to 3.6	-40 to +85	VQFP48 7mm□
BU17102AKV	Receiver						

Car Access

Antenna Drivers (AEC-Q100)

Part No.	Power Supply (V)	Circuit Current(Standby) (μA)	Circuit Current (Operating mode) (mA)	Output ON Duty(%)			Operating Temperature Range (°C)	Package
				V_{CC}=3.5V	V_{CC}=4V	V_{CC}=7V		
BD6934FV	3.5 to 8.0	0	3.5	9.2	15	49	–40 to +85	SSOP-B16

Part No.	Power supply(V)		Channel(ch)		Output current(A)	Operating Temperature Range (°C)	Package
	Vcc	VS1,VS2	Full bridge	Half bridge			
BD6933FM-M	4.5 to 5.5	4.5 to 8.0	3	2	1.5	–40 to +85	HSOP-M28

Car communication LSI

FM data broadcast reception LSI

(LAPIS Semiconductor products)

Part No.	Feature	Supply Voltage (V)	Supply Current (Max.)	Operating Temperature (°C)	Package
FM data reception tuner					
☆**ML7174**	FM VICS®/DARC® tuner,FM multiplexing demodulate LSI for VICS®(DARC®), Built-in BPF, frame memory, and VICS® descrambler, Frames A,B,C,SPI slave	3.0 to 3.6	TBD	–40 to +85	WQFN64
☆**ML7183**	FM VICS®/DARC® tuner & Filter LSI,BPF, I²C slave	3.0 to 3.6	TBD	–40 to +85	WQFN64
FM multiplexing demodulate for VICS®					
New **ML7154**	VICS®(DARC®) compliant FM multiplexing demodulate LSI for VICS®(DARC®), Built-in BPF, frame memory, and VICS® descrambler, Frames A,B,C,SPI slave	3.0 to 3.6	28mA	–40 to +85	WQFN64
MSM9565[J]	FM multiplexing demodulate LSI for VICS®(DARC®),BPF&frame memory built-in VICS® descrambler,Frames A,B,C,8bit bus interface	3.0 to 3.6	28mA	–40 to +85	QFP44
ML9574[J]	FM multiplexing demodulate LSI for VICS®(DARC®),BPF&frame memory built-in VICS® descrambler,Frames A,B,C,16bit bus interface	3.0 to 3.6	35mA	–40 to +85	TQFP64
FM multiplexing demodulate for DARC®					
MSM9563	FM multiplexing demodulate LSI for DARC®,BPF&frame memory built-in, Frames A,B,C,8bit bus interface	3.0 to 3.6	28mA	–40 to +85	QFP44

[J]: This LSI is limited to the market in Japan. VICS® is a registered trademark of Vehicle Information and Communication System Center. DARC® is a registered trademark of NHK System, Inc. ☆ : Under development

Digital terrestrial broadcasting reception LSI

Japanese System (ISDB-T)

(LAPIS Semiconductor products)

Part No.	Transmission Standard	Feature	Supply Voltage (V)	Power Consumption	Operating Temperature (°C)	Package
RF tuner + OFDM demodulator for 1 segment digital terrestrial broadcasting						
ML7147	ISDB-T	Compliant to One-Seg broadcasting of ISDB-T (ARIB STD-B31) digital terrestrial television broadcasting. RF tuner, OFDM demodulate, error correction function. Serial, parallel TS output.	2.7 to 3.0 1.5 to 3.6 1.1 to 1.3	70mW (at 1seg reception, include RF)	–40 to +90	WQFN80
4 diversity/Full segment OFDM demodulation digital terrestrial broadcasting						
ML7138	ISDB-T	Compliant to Full-Seg and One-Seg broadcasting of ISDB-T (ARIB STD-B31) digital terrestrial television broadcasting. 4 diversity x 1CH or 2 diversity x 2CH reception. OFDM demodulate, error correction function. Serial, parallel TS output.	3.0 to 3.6 2.7 to 3.6 1.1 to 1.3	234mW (4 diversity full segment reception)	–40 to +85	TFBGA144

Chinese System (DTMB)

(LAPIS Semiconductor products)

Part No.	Transmission Standard	Feature	Supply Voltage (V)	Power Consumption	Operating Temperature (°C)	Package
RF tuner + OFDM demodulator for 1 segment digital terrestrial broadcasting						
ML7109S	GB20600-2006	China's national digital terrestrial broadcasting standard GB20600-2006 (DTMB) compliant demodulation. Built-in SDRAM for de-interleave. MPEG-2 serial/parallel TS output.	3.0 to 3.6 1.1 to 1.3	270mW (at reception)	–20 to +85	WQFN64

Monitoring ICs

Multiple Input Switch Monitor LSI

Part No.	Power supply (V)	Switch Input	Switch Input Voltage Range (V)	Wetting Current(mA)	Analog Output	Control I/F	Max. Operating Frequency (kHz)	Operating Temperature (°C)	Package
Multiple Input Switch Monitor LSI									
New **BD3350MUV-M**	8.0 to 26(VPWR) 3.1 to 5.25(VDD)	22	–14 to +40	2/7/15 (Pull up/Pull down)	✓	SPI	6	-40 to +125	VQFN48MCV070
☆**BD3370MUV-M**	8.0 to 26(VPUA/VPUB) 3.1 to 5.25(VDD)	22	–14 to +40	1/3/5/10/15 (Pull up/Pull down)	–	SPI	4.4	-40 to +125	VQFN48MCV070

☆ : Under Development

Audio & Video

Speech synthesis LSI for Automotive

(LAPIS Semiconductor products)

Part No.	Operating Voltage (V)	Operating Frequency	Operating Temperature (°C)	ROM Capacity (bit)	Number of Phrases	Maximum Playback Time (sec)	CPU I/F	SP Amp Output (W) /Class	Number of Mixing (Internal)	DAC	Others	Package
Support for 105°C / 4ch simultaneous playback / ML22594 Built-in Mask ROM + serial external memory												
ML22594	4.5 to 5.5	4.096MHz	–40 to +105	Mask 6M *4 External maximum 128M	1024 *5 (Built-in 512, External 512)	Built-in 303sec *1 External 109min *3	Clock synchronization Serial	1.0/ AB-class	4ch	16bit	Speaker terminal short circuit detection function	SSOP30
Support for 105°C / 4ch simultaneous playback / built-in Mask ROM												
ML22572	2.7 to 5.5	4.096MHz	–40 to +105	Mask 2M	1024	98 *1	Clock synchronization Serial	1.0/ AB-class	4ch	16bit	Fail safe	SSOP30
Support for 105°C / 4ch simultaneous playback/built-in Flash/Mask ROM												
ML22573/ ML22Q573	2.7 to 5.5	4.096MHz	–40 to +105	Mask/Flash 4M	1024	201 *1	Clock synchronization Serial	1.0/ AB-class	4ch	16bit	Fail safe	SSOP30
Support for 105°C / 4ch simultaneous playback/built-in Flash / Mask ROM												
ML22Q553	4.5 to 5.5	4.096MHz	–40 to +105	Flash 4M	1024	201 *1	Clock synchronization Serial	1.0/ AB-class	4ch	16bit	Speaker terminal short circuit detection function	SSOP30
Support for 85°C built-in Flash / Mask ROM												
ML22331/ ML22Q331	2.3 to 5.5	4.096MHz	–40 to +85	Mask/Flash 896K	30	43 *1	Clock synchronization Serial	1.0/ AB-class	1ch	16bit	Disconnection detection/ Temperature protection circuit	SSOP30
ML22321/ ML22Q321	2.3 to 5.5	4.096MHz	–40 to +85	Mask/Flash 896K	62	43 *1	Clock synchronization Serial	1.0/ AB-class	1ch	16bit	Disconnection detection/ Temperature protection circuit/ Analog volume control	SSOP30
ML22341/ ML22Q341	2.3 to 5.5	4.096MHz	–40 to +85	Mask/Flash 896K	30	43 *1	Stand alone	1.0/ AB-class	1ch	16bit	Disconnection detection/Temperature protection circuit	SSOP30
Support for 85°C built-in Flash ROM												
ML22Q374	2.0 to 5.5	4.096MHz (Built-in)	–40 to +85	Flash 692K	30	27 *2	Clock synchronization Serial	1.0/D-class	1ch	—	Disconnection/ Short circuit detection Built-in oscillator	SSOP16
ML22Q394	2.0 to 5.5	4.096MHz (Built-in)	–40 to +85	Flash 692K	30	27 *2	I²C	1.0/D-class	1ch	—	Disconnection/ Short circuit detection Built-in oscillator	SSOP16

*1 : Maximum playback time when the sampling frequency is 6.4kHz in HQ-ADPCM. *2 : Maximum playback time when the sampling frequency is 6.4kHz in ADPCM2.
*3 : With an external memory module (Max. 128Mbit). Maximum playback time when the sampling frequency is 6.4kHz in HQ-ADPCM.
*4 : Mask's built-in ROM is 6Mbit and an external memory module (Max. 128Mbit) can be connected.
*5 : Total of mask's internal 512 phrases and external memory's 512 phrases.

Audio Processors

Analog Audio Processors

Part No.	Supply voltage (V)	Current consumption (mA)	INPUT Selector Single	INPUT Selector ISO	Input Gain (dB)	Volume (dB)	Fader (Rear) (dB)	Fader (Rear) Outputs	Parametric EQ	Loudness	LPF/HPF for Sub Woofer	Mixing	Mixing Att	Level Meter	Option	Serial interface	Output noise voltage (μVrms)	Distortion (%)	Package
Sound Processors with Built-in 3-band Equalizer																			
New **BD37033FV**	7 to 9.5	31	3/5	2/1	0 to +16	+15 to –79 –∞	+15 to –79 –∞	6	✓	✓	LPF	✓	✓	✓	—	I²C	5.5	0.002	SSOP-B28
New **BD37034FV**	7 to 9.5 VccL to 13	36	3/5	2/1	0 to +16	+15 to –79 –∞	+15 to –79 –∞	6	✓	✓	LPF + HPF	✓	✓	✓	High Voltage output	I²C	6	0.002	SSOP-B28

Audio Amplifiers

Speaker Amplifiers

Part No.	Supply Voltage (V)	Power Dissipation (mW)	Quiescent Current (mA)	Standby Current (μA)	Voltage Gain (dB)	Output Power (R_L=8Ω, THD=10%) V_{CC}=3.6V	Output Power (R_L=8Ω, THD=10%) V_{CC}=5.0V	Distortion (%)	Output Noise Voltage (dBV)	Package
Portable Amplifiers 1.1W to 1.5W Monaural Speaker Amplifiers										
BH7824FVM	2.4 to 5.5	470	3.5	0	0 to 20	0.60W	1.1W	0.07	–94	MSOP8

Video Amplifiers

Part No.	Supply Voltage (V)	Circuits	Circuit Current (mA)	Input Type	voltage Gain (dB)	CMRR (dB)	Common-mode input Voltage Range (V) V_{CC}=5V	Max. Output Level (V_{PP})	Freq.chara (dB)	Input Register (kΩ)	Package
Isolation Amplifier											
BH7673G	4.5 to 5.5	1	4.8	Bias	0.0	60	5.2	3.8	0.0(f=10MHz)	150	SSOP5

Beamforming

Beamforming

Part No.	Supply Voltage (V)	Operating Temperature (°C)	Circuit Current (mA)	Sampling Frequency (kHz)	Number of Mic (pcs.)	Mic Pitch (mm)	Volume	Pattern	Package
Super unidirectional microphone signal processing IC									
BU8332KV-M	3.0 to 3.6	–40 to 85	15	16	2	10	Input volume : –20 to 30dB (2dB Step) Output volume : –25 to 16dB (1dB Step)	Cardioid Bi-directional Hyper-Cardioid	VQFP48

Audio Converters

High performance audio CODEC

(LAPIS Semiconductor products)

Part No.	Supply Voltage (V)	ADC		DAC		Full/ Half Duplex	Microphone Input		Speaker Output		Maximum Output	Line Output	Head phone Output	CPU I/F	Serial Audio I/F	Effect					Other Function	Operating Temperature (°C)	Package	Size (mm×mm)
		Number of Channels	S/N (dB)	Number of Channels	S/N (dB)		Type	Number of Inputs	Type	Monaural /Stereo						Loud Sound™	EQ	Wind Cut	Notch	ALC				
Monaural CODEC WCSP type with noise tolerance / LoudSound™																								
ML26125HB	2.7 to 3.6	1	92	1	95	Full	Single	1	Class AB	Monaural	500mW	Monaural	—	SPI	I²S, DSP, LJ, RJ, a-low, μ-low	✓	✓	✓	✓	✓	VIDEO LDO	−20 to +85	WCSP25	2.58×2.48
Monaural CODEC WCSP type with noise tolerance																								
ML26124-00HB	2.7 to 3.6	1	92	1	95	Full	Single	1	Class AB	Monaural	500mW	Monaural	—	SPI	I²S, DSP, LJ, RJ, a-low, μ-low	—	✓	✓	✓	✓	VIDEO LDO	−20 to +85	WCSP25	2.56×2.46
Monaural CODEC with noise tolerance																								
ML26124-02GD	2.7 to 3.6	1	92	1	95	Full	Single Differencial Digital	2	Class AB	Monaural	500mW	Monaural	—	I²C/ SPI	I²S, DSP, LJ, RJ, a-low, μ-low	—	✓	✓	✓	✓	VIDEO LDO	−20 to +85	WQFN32	5.0×5.0
Ultra compact monaural CODEC																								
ML2612GD	HVDD 2.7 to 3.6 LVDD 1.65 to 2.75	1	92	1	95	Half	Single Differencial	1	Class AB	Monaural	500mW	—	—	I²C/ SPI	I²S, DSP, LJ, RJ	—	✓	✓	✓	✓	—	−20 to +85	WQFN24	4.0×4.0
Ultra compact monaural CODEC WCSP type																								
ML2614HB	HVDD 2.7 to 3.6 LVDD 1.65 to 2.75	1	92	1	95	Half	Single	1	Class AB	Monaural	500mW	—	—	SPI	I²S, DSP, LJ, RJ	—	✓	✓	✓	✓	—	−20 to +85	WCSP20	2.46×1.96

Image Correction

Part No.	Power Supply Voltage (V)			Image Data Size	Control Interface	Input/Output Digital Interface	Image Adjustment	PWM Output	LVDS Transmitter	Package
	V_{DD} Core	V_{DD} I/O	V_{DD} LVDS							
Image Correction ICs for Panel										
BU1573KV	1.40 to 1.60	2.7 to 3.6	—	Supports up to WVGA + (864×480)	I²C BUS	18bitRGB Interface BUS Interface	—	✓	—	VQFP64
BU1523KV	1.65 to 1.95	3.0 to 3.6	3.0 to 3.6	Supports up to WVGA + (864×480)	I²C BUS	24bitRGB Interface 8bit YUV=4 : 2 : 2 ITU-R BT.656	✓	—	✓	VQFP100

Part No.	Power Supply Voltage (V)			Image Data size	Control Interface	Input/Output Digital Interface	Fog Reduction	Video Encoder	Package
	V_{DD} Core	V_{DD} I/O	AV_{DD}						
Video Encoders built-in Image Correction									
BU6521KV	1.40 to 1.60	2.7 to 3.6	2.7 to 3.6	ITU-R BT.656	I²C BUS Serial EEPROM interface	8bit YUV=4 : 2 : 2 ITU-R BT.656	✓	✓	VQFP48C

Video LSIs

Video Decoder series

(LAPIS Semiconductor products)

Part No.	Supply Voltage (V)	Input (Analog)		Output (LVTTL)	Pixel Frequency	Sampling Frequency	Crystal Oscillator supported	Feature	Operating Temperature (°C)	Package
		Terminal	Type							
CVBS / S-video										
ML86101A	3.3/1.5	CVBSx4 or CVBSx2 + S-videox1 or S-videox2	NTSC PAL SECAM	ITU-R BT.656 YCbCr 8bit	13.5MHz, 12.272727MHz, 14.75MHz, 14.318182MHz	27MHz, 24.545454MHz, 29.5MHz, 28.6363MHz	✓	Simple, small	−40 to +85	TQFP48
ML86V7668A	3.3/2.5	CVBSx4 or CVBSx1 + S-videox3	NTSC PAL SECAM	ITU-R BT.656 YCbCr 8/16bit RGB 18bit	13.5MHz, 12.272727MHz	27MHz, 24.545454MHz	—	CVBS4 input S-video3 input	−40 to +85	TQFP100
CVBS / S-video / Component / RGB										
ML86V7675	3.3/1.5	CVBSx4 +(Comp or S-video)x1 +Compx1	NTSC PAL SECAM	ITU-R BT.656 YCbCr 8bit	7.99300MHz to 33.333MHz	7.99300MHz to 33.333MHz	✓	WVGA, EGA analog RGB supported	−40 to +85	TQFP64

Video Encoder series

(LAPIS Semiconductor products)

Part No.	Supply Voltage (V)	Input (LVTTL)	Output (Analog)		Pixel Frequency	Sampling Frequency	Crystal Oscillator supported	Feature	Operating Temperature (°C)	Package
			Terminal	Type						
CVBS										
ML86V76580	3.3/1.8	ITU-R.BT.656 YCbCr 8bit	CVBS	NTSC PAL	13.5MHz, 12.272727MHz, 14.75MHz, 14.318182MHz	54MHz, 49.090908MHz, 59MHz, 57.272728MHz	—	No need of LPF	−40 to +85	TQFP48 WCSP25
CVBS / S-video / Component / RGB										
ML86V7655	3.3/2.5	ITU-R. BT.656 YCbCr 8/16/24bit RGB 24bit	CVBS S-video Component	NTSC PAL	13.5MHz, 12.272727MHz, 14.75MHz, 14.318182MHz, 18MHz	27MHz, 24.545454MHz, 29.5MHz, 28.6363MHz, 36MHz	—	I/P, P/I conversion	−40 to +85	TQFP100

Video LSIs

Display Controller Series for Small to Medium-Sized TFT LCD

(LAPIS Semiconductor products)

T-CON, Video decoder included

Part No.	Supply Voltage (V)	Input (Analog) Terminal	Input (Analog) Type	Input (LVTTL/LVDS)	Output (LVTTL/LVDS)	Resolution	OSD	MCU	Feature	Operating Temperature (°C)	Package
ML86V8201	3.3/1.5	CVBS×2 or S-video×1	NTSC PAL SECAM	ITU-R BT.656 YCbCr 8/16/24bit RGB 18/24bit	ITU-R BT.656 YCbCr 8bit RGB 18/24bit	QVGA to WVGA	Line	—	Rear camera function Image quality adjustment	–40 to +85	TQFP100
New **ML86203**	3.3/1.5	CVBS×1	NTSC PAL	ITU-R BT.656 YCbCr 8/16/24bit RGB 18/24bit	ITU-R BT.656 YCbCr 8bit LVDS 4Lane (RGB 18/24bit)	VGA to WXGA	—	—	Rear camera function WXGA panel support Image quality adjustment	–40 to +85	TQFP80
☆**ML86206**	3.3/1.5	CVBS×2	NTSC PAL	ITU-R BT.656 YCbCr 8/16/24bit RGB 18/24bit LVDS 4Lane (RGB 18/24bit)	ITU-R BT.656 YCbCr 8bit RGB 18/24bit LVDS 4Lane (RGB 18/24bit)	VGA to WXGA	Text Line	—	LVTTL/LVDS I/F WXGA panel support Image quality adjustment	–40 to +85	TQFP100
☆**ML86286**	3.3/1.5	CVBS×2	NTSC PAL	ITU-R BT.656 YCbCr 8/16/24bit RGB 18/24bit LVDS 4Lane (RGB 18/24bit)	ITU-R BT.656 YCbCr 8bit RGB 18/24bit LVDS 4Lane (RGB 18/24bit)	VGA to WXGA	Text Line	—	LVTTL/LVDS I/F WXGA panel support Picture in Picture Image quality adjustment	–40 to +85	TQFP128
ML86V8202C	3.3/1.8	CVBS×2 +(Comp or S-video)×1 +Comp×1	NTSC PAL SECAM	ITU-R BT.656 YCbCr 8/16/24bit RGB 18/24bit	ITU-R BT.656 style YCbCr 8/16/24bit RGB 18/24bit	QVGA to WVGA	—	—	Component video support Image quality adjustment	–40 to +85	TQFP100
☆**ML86240**	3.3/1.5	CVBS×4 or CVBS×2 +(Comp or S-video)×1 +Comp×1	NTSC PAL SECAM	ITU-R BT.656 YCbCr 8/16/24bit RGB 18/24bit 2ch	ITU-R BT.656 YCbCr 8bit RGB 18/24bit	QVGA to WVGA	Text Line	—	Component video support Digital video input ×2 Rear camera function Image quality adjustment	–40 to +85	BGA144

TCON, Image adjustment functions included

Part No.	Supply Voltage (V)	Input (Analog) Terminal	Input (Analog) Type	Input (LVTTL)	Output (LVTTL)	Resolution	OSD	MCU	Feature	Operating Temperature (°C)	Package
ML86V8101	3.3	—	—	RGB 18bit	RGB 18bit	QVGA to QHD	—	—	Built-in image quality adjustment function	–40 to +85	TQFP64
ML86V8102	3.3	—	—	RGB 18/24bit	RGB 18/24bit	QVGA to QHD	—	—	RGB 24 bits supported image quality adjustment function	–40 to +85	TQFP80

☆ : Under Development

EV/HEV

Gate Drivers

Isolated Gate Drivers

Isolated Gate Drivers (AEC-Q100)

Part No.	Input-side Supply Voltage (V)	Output-side Positive Supply Voltage (V)	Output-side Negative Supply Voltage (V)	Isolation Voltage (Vrms)	I/O Delay Time (ns)	Minimum Input Pulse Width (ns)	Maximum Output Current (A)	Operating Temperature range (°C)	Function	Package
BM6101FV-C	4.5 to 5.5	14 to 24	–12 to 0	2,500	350	180	3.0	–40 to +125	Miller Clamp / Fail Output / Built-in under voltage lock out circuit/ Thermal protection/ Short current protection /DESAT/ Soft turn-off function for short current protection	SSOP-B20W
BM6102FV-C	4.5 to 5.5	14 to 20	–	2,500	200	100	3.0	–40 to +125	Miller Clamp / Fail Output / Built-in under voltage lock out circuit/ Thermal protection/ Short current protection /DESAT/Soft turn-off function for short current protection	SSOP-B20W
BM6104FV-C	4.5 to 5.5	10 to 24	–12 to 0	2,500	150	90	3.0	–40 to +125	Miller Clamp / Fail Output / Built-in under voltage lock out circuit/Short current protection /DESAT/Soft turn-off function for short current protection	SSOP-B20W
New **BM60014FV-C**	4.5 to 5.5	10 to 24	–	2,500	120	70	3.0	–40 to +125	Miller Clamp / Fail Output / Built-in under voltage lock out circuit	SSOP-B20W

Isolated Gate Drivers with Flyback Controller (AEC-Q100)

Part No.	Input-side Supply Voltage (V)	Output-side Positive Supply Voltage (V)	Output-side Negative Supply Voltage (V)	Isolation Voltage (Vrms)	I/O Delay Time (ns)	Minimum Input Pulse Width (ns)	Maximum Output Current (A)	Operating Temperature range (°C)	Function	Package
New **BM60051FV-C**	4.5 to 24 4.5 to 5.5	9 to 24	–	2.500	260	180	5.0	–40 to +125	Miller Clamp / Fail Output /Built-in under voltage lock out circuit/Temperature Monitor/ Short current protection/Soft turn-off function for short current protection	SSOP-B28W

High Voltage Monitor

Isolated High Voltage Monitor (AEC-Q100)

Part No.	Supply Voltage 1 (V)	Supply Voltage 2 (V)	Isolation Voltage (Vrms)	Circuit Vurrent 1 (mA)	Circuit Vurrent 2 (mA)	Output Duty Accuracy (%)	Operating Temperature (°C)	Package
New **BM67290FV-C**	8.0 to 24.0	3.0 to 5.5	2,500	4.6	0.2	±3.5	–40 to +125	SSOP-B20W

Temperature Monitor

Isolated Temperature Monitor (AEC-Q100)

Part No.	Supply Voltage 1 (V)	Supply Voltage 2 (V)	Isolation Voltage (Vrms)	Circuit Current 1 (mA)	Circuit Current 2 (mA)	Input Voltage Range (V)	Output Current Accuracy (%)	Output Duty Accuracy (%)	Operating Temperature (°C)	Package
New **BM66002FV-C**	9.0 to 24.0	3.0 to 5.5	2,500	3.75	0.2	1.4 to 4.0	±2.0	±2.0	–40 to +125	SSOP-B20W

Isolators

2.5kVrms Isolators (AEC-Q100)

Part No.	Supply Voltage (V)	$V_{CC}1$ Supply Current 1@DC (mA)	$V_{CC}2$ Supply Current 2@DC (mA)	Channel Number (ch)	Max. Propagation Delay (ns)	Isolation Voltage (Vrms)	Operating Temperature Range (°C)	Package
BM67220FV-C	4.5 to 5.5	0.21	0.21	2	45	2.5k	−40 to +125	SSOP-B20W
BM67221FV-C	4.5 to 5.5	0.21	0.21	2	45	2.5k	−40 to +125	SSOP-B20W

Standards

DRAM

Legacy DRAM FP/EDO for Automotive

(LAPIS Semiconductor products)

Automotive

Part No.	Supply Voltage (V)	Density (bit)	Number of Data bits	Configuration (word×bit)	Circuit Function	Access Time (ns)	Refresh Cycle (cycles/ms)	Operating Temperature Ta (°C)	Package
MSM514400DP	5.0±0.5	4M	×4	1M×4	Fast Page Mode	60/70	1024/16	−40 to +85	TSOP(II)26/24Cu
MSM514400EP									
MSM514260EP			×16	256K×16		60/70	512/8		TSOP(II)44/40
MSM5118160FP		16M		1M×16		60	1024/16		TSOP(II)50/44
MSM5118165FP					EDO				
MSM51V4400EP	3.3±0.3	4M	×4	1M×4	Fast Page Mode	70/100	1024/16		TSOP(II)26/24Cu
MSM54V16258BP			×16	256K×16	EDO	40/45/50	512/64		TSOP(II)44/40
MSM51V4265EP						60/70	512/8		
MSM51V17400FP		16M	×4	4M×4	Fast Page Mode	60	2048/32		TSOP(II)26/24Cu
MSM51V18165FP			×16	1M×16	EDO	60	1024/16		

Legacy DRAM SDRAM for Automotive

(LAPIS Semiconductor products)

Automotive

Part No.	Data Rate Type	Supply Voltage (V)	Density (bit)	Number of Data Bits	Configuration (bank×word×bit)	Max.Operating Frequency (MHz)	Refresh Cycle (cycles/ms)	Cycle Time (ns)	Features	Operating Temperature Ta (°C)	Package
MSM56V16160FP	SDR	3.3±03	16M	×16	2×512K×16	100	4096/64	10	—	−40 to +85	TSOP(II)50
MSM56V16160KP						125		8/10	Drivability control		TSOP(II)50Cu
☆**MSM56V16161NP**						166		6/7/7.5/8/10	Drivability control		TSOP(II)50Cu
MD56V62160E-xxTAP			64M		4×1M×16	100		10	—	−40 to +85	TSOP(II)54
MD56V62160M-xxTAP						143		7/7.5/10	Drivability control		TSOP(II)54Cu
New **MD56V72160C-xxTAP**			128M		4×2M×16	166	4096/64	6/7/7.5/10	Drivability control	−40 to +85	TSOP(II)54Cu
New **MD56V82160A-xxTAP**			256M		4×4M×16	166	8192/64	6/7/7.5/10	Drivability control	−40 to +85	TSOP(II)54Cu

SDR : Single Data Rate Synchronous DRAM

☆ : Under Development

Video Memory for Automotive

(LAPIS Semiconductor products)

Automotive

Part No.	Supply Voltage (V)	Density (bit)	Configuration (word×bit)×port	Number of Data Bits	Max.Operating Frequency (MHz)	Access Time (ns)	Cycle Time (ns)	Power Consumption (mW)		Operating Temperature Ta (°C)	Package	Notes
								Operating	Standby			
MS81V04160AP	3.3±0.3	4M	(262,214×8)×2	×16	50	18/23	20/25	288	10.8	−40 to +85	QFP100	Asynchronous serial read/write, Write mask function, Output data control, Cascade, Two-port, 2 common WCLK ports.
MS81V26000-25TPZP3		26M	1,114,112×24	×24	40	12	25	576	18		TQFP100Cu	Asynchronous serial read/write, Write mask function, Output data control, Cascade, The top address can be specified

Serial EEPROM

Automotive EEPROM

105°C Operation I²C BUS EEPROM (2-Wire) BR24Axxxxxx-WM series (AEC-Q100)

Part No.	Package and suffix			Density (bit)	Bit format (word×bit)	Supply voltage range (V)	Current consumption (Max.)		Write cycle time (Max.) (ms)	Operating temperature range (°C)	Endurance (times)	Data retention (years)
	SOP8	SOP-J8	MSOP8				Operating (mA)	Standby (μA)				
BR24A01A	F-WM	FJ-WM	–	1K	128×8	2.5 to 5.5	2	2	5	−40 to +105	10^6	40
BR24A02	F-WM	FJ-WM	FVM-WM	2K	256×8	2.5 to 5.5	2	2	5			
BR24A04	F-WM	FJ-WM	–	4K	512×8	2.5 to 5.5	2	2	5			
BR24A08	F-WM	FJ-WM	–	8K	1K×8	2.5 to 5.5	2	2	5			
BR24A16	F-WM	FJ-WM	–	16K	2K×8	2.5 to 5.5	2	2	5			
BR24A32	F-WM	–	–	32K	4K×8	2.5 to 5.5	3	2	5			
BR24A64	F-WM	–	–	64K	8K×8	2.5 to 5.5	3	2	5			

125°C Operation Microwire BUS EEPROM (3-Wire) BR93Hxxxxxx-2C series (AEC-Q100)

Part No.	Package and suffix				Density (bit)	Bit format (word×bit)	Supply voltage range (V)	Current consumption (Max.)		Write cycle time (Max.) (ms)	Operating temperature range (°C)	Endurance (times)	Data retention (years)
	SOP8	SOP-J8	TSSOP-B8	MSOP8				Operating (mA)	Standby (μA)				
BR93H46	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C	1K	64×16	2.5 to 5.5	3	10	4	−40 to +125	10^6	100
BR93H56	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C	2K	128×16	2.5 to 5.5	3	10	4			
BR93H66	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C	4K	256×16	2.5 to 5.5	3	10	4			
BR93H76	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C	8K	512×16	2.5 to 5.5	3	10	4			
BR93H86	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C	16K	1K×16	2.5 to 5.5	3	10	4			

125°C Operation SPI BUS EEPROM BR25Hxxxxxx-2C series (AEC-Q100)

Part No.	Package and suffix				Density (bit)	Bit format (word×bit)	Supply voltage range (V)	Current consumption (Max.)		Write cycle time (Max.) (ms)	Operating temperature range (°C)	Endurance (times)	Data retention (years)
	SOP8	SOP-J8	TSSOP-B8	MSOP8				Operating (mA)	Standby (μA)				
BR25H010	F-2C	FJ-2C	FVT-2C	FVM-2C	1K	128×8	2.5 to 5.5	4	10	4	−40 to +125	10^6	100
BR25H020	F-2C	FJ-2C	FVT-2C	FVM-2C	2K	256×8	2.5 to 5.5	4	10	4			
BR25H040	F-2C	FJ-2C	FVT-2C	FVM-2C	4K	512×8	2.5 to 5.5	4	10	4			
BR25H080	F-2C	FJ-2C	FVT-2C	FVM-2C	8K	1K×8	2.5 to 5.5	4	10	4			
BR25H160	F-2C	FJ-2C	FVT-2C	FVM-2C	16K	2K×8	2.5 to 5.5	4	10	4			
BR25H320	F-2C	FJ-2C	FVT-2C	FVM-2C	32K	4K×8	2.5 to 5.5	4	10	4			
BR25H640	F-2C	FJ-2C	FVT-2C	–	64K	8K×8	2.5 to 5.5	5.5	10	4			
BR25H128	F-2C	FJ-2C	–	–	128K	16K×8	2.5 to 5.5	5.5	10	4			

125°C Operation SPI BUS EEPROM BR35Hxxxxxx-WC series (AEC-Q100)

Part No.	Package and suffix				Density (bit)	Bit format (word×bit)	Supply voltage range (V)	Current consumption (Max.)		Write cycle time (Max.) (ms)	Operating temperature range (°C)	Endurance (times)	Data retention (years)
	SOP8	SOP-J8	TSSOP-B8	MSOP8				Operating (mA)	Standby (μA)				
BR35H160	F-WC	FJ-WC	FVT-WC	FVM-WC	16K	2K×8	2.5 to 5.5	3	10	5	−40 to +125	10^6	40
BR35H320	F-WC	FJ-WC	FVT-WC	FVM-WC	32K	4K×8	2.5 to 5.5	3	10	5			
BR35H640	F-WC	FJ-WC	FVT-WC	–	64K	8K×8	2.5 to 5.5	5.5	10	5			
BR35H128	F-WC	FJ-WC	–	–	128K	16K×8	2.5 to 5.5	5.5	10	5			

FeRAM

Ferroelectric Memory

(LAPIS Semiconductor products)

Parallel BUS FeRAM MR48Vxxxx Series

Part No.	Memory Density (bit)	Configuration (word×bit)	Supply Voltage (V)	Operating speed	Read/Write Endurance	Data Retention	Operating Temperature Ta (°C)	Package
New MR48V256C	256K	32K×8	2.7 to 3.6	t_{RC}=150ns	10^{12} Times	10 years	−40 to +85	TSOP(I)28

I²C BUS FeRAM MR44Vxxxx Series

MR44V064A	64K	8K×8	2.5 to 3.6	f_{clk}=3.4MHz	10^{12} Times	10 years	−40 to +85	SOP8

SPI BUS FeRAM MR45Vxxxx Series

MR45V032A	32K	4K×8	2.7 to 3.6	f_{clk}=15MHz	10^{12} Times	10 years	−40 to +85	SOP8
MR45V256A	256K	32K×8	3.0 to 3.6	f_{clk}=15MHz				
New MR45V200A	2M	256K×8	2.7 to 3.6	f_{clk}=34MHz				DIP8

Operational Amplifiers

Standard

Ground Sense Operational Amplifiers (AEC-Q100)

Part No.	Product Grade	CH	Supply Voltage (V)	Circuit Current (mA)	Input Offset voltage (mV)	Input Bias current (nA)	Output Current (mA)	Input Voltage Range (V)	Output Voltage Range (V)	Voltage Gain (dB)	CMRR (dB)	PSRR (dB)	Slew Rate (V/μs)	Gain Bandwidth product (MHz)	Operating Temperature (°C)	Package
BA2904YF-C	●	2	3 to 36	0.5	2.0	20	30	VEE to VCC−1.5	VEE to VCC−1.5	100	80	100	0.2	0.5	−40 to +125	SOP8
BA2904YFV-C	●															SSOP-B8
BA2904YFVM-C	●															MSOP8
BA2902YF-C	●	4	3 to 36	0.7	2.0	20	30	VEE to VCC−1.5	VEE to VCC−1.5	100	80	100	0.2	0.5	−40 to +125	SOP14
BA2902YFV-C	●															SSOP-B14
BA2904YF-M	●	2	3 to 36	0.5	2.0	20	30	VEE to VCC−1.5	VEE to VCC−1.5	100	80	100	0.2	0.5	−40 to +125	SOP8
BA2904YFV-M	●															SSOP-B8
BA2904YFVM-M	●															MSOP8
BA2902YF-M	●	4	3 to 36	0.7	2.0	20	30	VEE to VCC−1.5	VEE to VCC−1.5	100	80	100	0.2	0.5	−40 to +125	SOP14
BA2902YFV-M	●															SSOP-B14

Product Grade : ●…Automotive

High Speed

Ground Sense Operational Amplifiers (AEC-Q100)

Part No.	Product Grade	CH	Supply Voltage (V)	Circuit Current (mA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Current (mA)	Input Voltage Range (V)	Output Voltage Range (V)	Voltage Gain (dB)	CMRR (dB)	PSRR (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package
BA3472YF-C	●	2	3 to 36	4.0	1.0	100	30	VEE to VCC−2.0	VEE+0.3 to VCC−1.0	100	97	97	10	4.0	−40 to +125	SOP8
BA3472YFV-C	●															SSOP-B8
BA3472YFVM-C	●															MSOP8
BA3474YFV-C	●	4	3 to 36	8.0	1.0	100	30	VEE to VCC−2.0	VEE+0.3 to VCC−1.0	100	97	97	10	4.0	−40 to +125	SSOP-B14
BA3472WFV-C	●	2	3 to 36	4.0	1.0	100	30	VEE to VCC−2.0	VEE+0.3 to VCC−1.0	100	97	97	10	4.0	−40 to +125	SSOP-B8
BA3474WFV-C	●	4	3 to 36	8.0	1.0	100	30	VEE to VCC−2.0	VEE+0.3 to VCC−1.0	100	97	97	10	4.0	−40 to +125	SSOP-B14

Product Grade : ●…Automotive

Low Noise

Operational Amplifier (AEC-Q100)

Part No.	Product Grade	CH	Supply Voltage (V)	Circuit Current (mA)	Input Offset voltage (mV)	Input Bias Current(nA)	Input Referred Noise Voltage (μVrms)	Input Voltage Range (V)	Output Voltage Range (V)	Voltage Gain (dB)	CMRR (dB)	PSRR (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package
BA4558YF-M	●	2	±4 to ±15	3.0	0.5	60	1.8	VEE+1.0 to VCC−1.0	VEE+1.0 to VCC−1.0	100	90	90	1.0	2.0	−40 to +105	SOP8
BA4558YFV-M	●															SSOP-B8
BA4558YFVM-M	●															MSOP8
BA4560YF-M	●	2	±4 to ±15	3.0	0.5	50	1.0	VEE+1.0 to VCC−1.0	VEE+1.0 to VCC−1.0	100	90	90	4.0	4.0	−40 to +105	SOP8
BA4560YFV-M	●															SSOP-B8
BA4560YFVM-M	●															MSOP8
BA4580YF-M	●	2	±2 to ±16	6.0	0.3	100	0.8	VEE+1.5 to VCC−1.5	VEE+1.5 to VCC−1.5	110	110	110	5.0	10.0	−40 to +105	SOP8
BA4580YFVM-M	●															MSOP8
BA4584YFV-M	●	4	±2 to ±16	11.0	0.3	100	0.8	VEE+1.5 to VCC−1.5	VEE+1.5-to VCC−1.5	110	110	110	5.0	10.0	−40 to +105	SSOP-B14

Product Grade : ●…Automotive

Comparators

Standard

Open-Collector Comparators (AEC-Q100)

Part No.	Product Grade	CH	Supply Voltage (V)	Circuit Current (mA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Current (mA)	Input Voltage Range (V)	Voltage Gain (dB)	Response Time (μs)	Operating Temperature (°C)	Package
BA2903YF-C	●	2	2 to 36	0.6	2	50	16	VEE to VCC−1.5	100	1.3	−40 to +125	SOP8
BA2903YFV-C	●											SSOP-B8
BA2903YFVM-C	●											MSOP8
BA2901YF-C	●	4	2 to 36	0.8	2	50	16	VEE to VCC−1.5	100	1.3	−40 to +125	SOP14
BA2901YFV-C	●											SSOP-B14
BA2903YF-M	●	2	2 to 36	0.6	2	50	16	VEE to VCC−1.5	100	1.3	−40 to +125	SOP8
BA2903YFV-M	●											SSOP-B8
BA2903YFVM-M	●											MSOP8
BA2901YF-M	●	4	2 to 36	0.8	2	50	16	VEE to VCC−1.5	100	1.3	−40 to +125	SOP14
BA2901YFV-M	●											SSOP-B14

Product Grade : ●…Automotive

Voltage Detectors (Reset ICs)

Standard Voltage Detectors

Voltage Detectors (AEC-Q100)

Part No.	Types	Voltage Detection Precision (%)	Voltage Detection (V)	RESET Active Voltage Range (V)	Detection Step (V)	Output Type	Circuit Current(μA)		Hysteresis Voltage (V)	*"L"Output Current(mA)		RESET Active Timeout Period (ms)	Delay Circuit Resistance (MΩ)	Package
							ON	OFF		VDD=1.2V	VDD=2.4V			
BD48ExxG-Mseries	0.1V step 38 type	±1	2.3 to 6.0	0.95 to 10.0	0.1	Open drain	0.60 (Vs=4.8V)	0.85 (Vs=4.8V)	Vs×0.05	1.0	4	–	–	SSOP5
BD49ExxG-Mseries	0.1V step 38 type	±1	2.3 to 6.0	0.95 to 10.0	0.1	CMOS						–	–	SSOP5
BD52ExxG-Mseries	0.1V step 38 type	±1	2.3 to 6.0	0.95 to 10.0	0.1	Open drain	0.90 (VDET=4.8V)	0.85 (VDET=4.8V)	VDET×0.05	1.2	5	Variable	9	SSOP5
BD53ExxG-Mseries	0.1V step 38 type	±1	2.3 to 6.0	0.95 to 10.0	0.1	CMOS						Variable	9	SSOP5
BD45Exx5G-Mseries	0.1V step 26 type	±1	2.3 to 4.8	0.95 to 10.0	0.1	Open drain	0.80 (VDET=4.8V)	0.85 (VDET=4.8V)	VDET×0.05	1.2	5	50	–	SSOP5
BD45Exx1G-Mseries	0.1V step 26 type	±1	2.3 to 4.8	0.95 to 10.0	0.1							100	–	SSOP5
BD45Exx2G-Mseries	0.1V step 26 type	±1	2.3 to 4.8	0.95 to 10.0	0.1							200	–	SSOP5
BD46Exx5G-Mseries	0.1V step 26 type	±1	2.3 to 4.8	0.95 to 10.0	0.1	CMOS						50	–	SSOP5
BD46Exx1G-Mseries	0.1V step 26 type	±1	2.3 to 4.8	0.95 to 10.0	0.1							100	–	SSOP5
BD46Exx2G-Mseries	0.1V step 26 type	±1	2.3 to 4.8	0.95 to 10.0	0.1							200	–	SSOP5

*Detection voltage is applied in the "xx" of part No.. Ex. : In case of 2.3V detection voltage in BD48ExxG-M series, Part No. is BD48E23G-M.

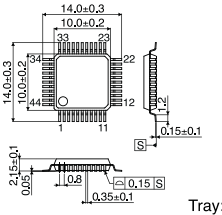
Please refer package from pae P40, for LAPIS Semiconductor products

QFP Packages

(Unit: mm)

QFP<Pin Pitch:0.8mm>

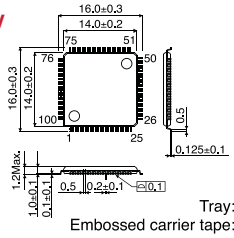
QFP44



Tray:1,000pcs
Embossed carrier tape:1,000pcs

TQFPV<Pin Pitch:0.5mm>

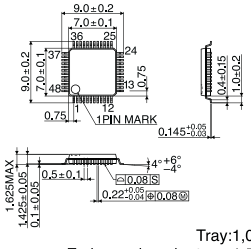
TQFP100V



Tray:500pcs
Embossed carrier tape:500pcs

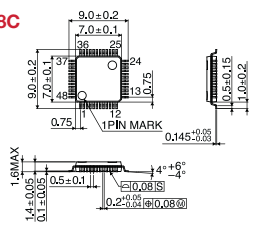
VQFP<Pin Pitch:0.5mm>

VQFP48



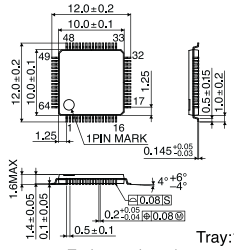
Tray:1,000pcs
Embossed carrier tape:1,500pcs

VQFP48C



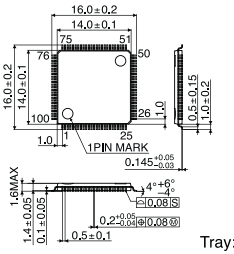
Tray:1,000pcs
Embossed carrier tape:1,500pcs

VQFP64



Tray:1,000pcs
Embossed carrier tape:1,000pcs

VQFP100



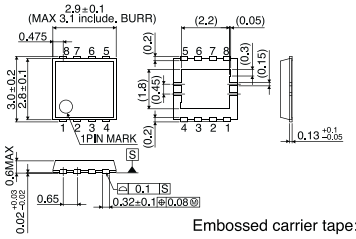
Tray:500pcs
Embossed carrier tape:500pcs

SON / QFN Packages

(Unit: mm)

HSON-8<Pin Pitch:0.65mm>

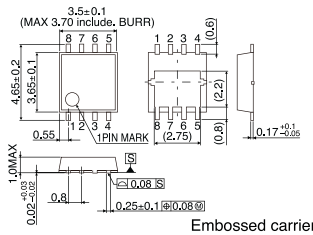
HSON-8



Embossed carrier tape:3,000pcs

HSON-A8<Pin Pitch:0.8mm>

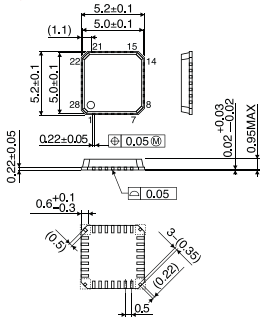
HSON-A8



Embossed carrier tape:2,500pcs

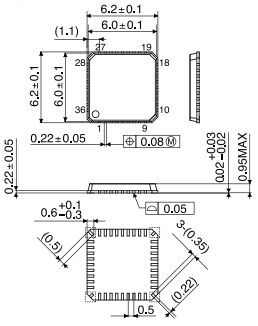
VQFN<Pin Pitch:0.5mm>

VQFN28



Embossed carrier tape:2,500pcs

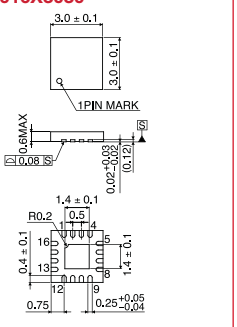
VQFN36



Embossed carrier tape:2,500pcs

VQFN-X<Pin Pitch:0.5mm>

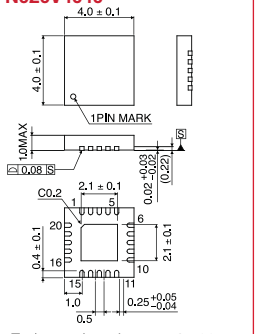
VQFN016X3030



Embossed carrier tape:3,000pcs

VQFN-V<Pin Pitch:0.5mm>

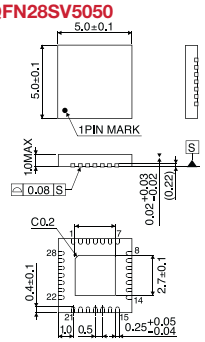
VQFN020V4040



Embossed carrier tape:2,500pcs

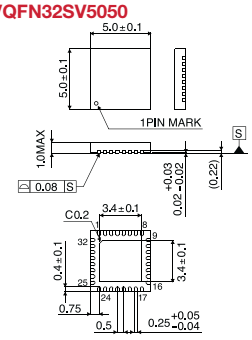
VQFN-SV<Pin Pitch:0.5mm>

VQFN28SV5050



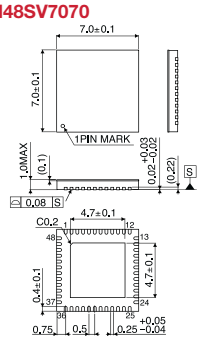
Embossed carrier tape:2,500pcs

VQFN32SV5050



Embossed carrier tape:2,500pcs

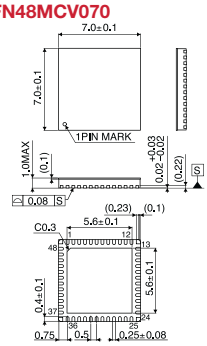
VQFN48SV7070



Embossed carrier tape:1,500pcs

VQFN-MCV<Pin Pitch:0.5mm>

VQFN48MCV070



Embossed carrier tape:1,500pcs

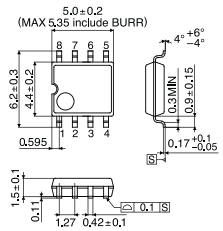
Please refer package from page 40, for LAPIS Semiconductor products

SOP Packages

(Unit: mm)

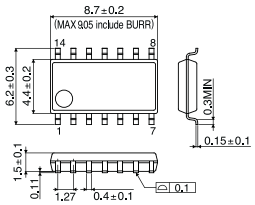
SOP<Pin Pitch:1.27mm>

SOP8



Embossed carrier tape:2,500pcs

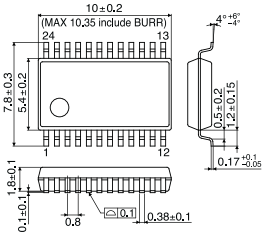
SOP14



Embossed carrier tape:2,500pcs

SSOP-A<Pin Pitch:0.8mm>

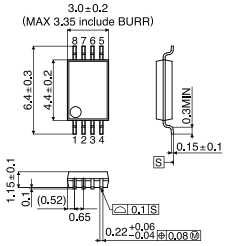
SSOP-A24



Embossed carrier tape:2,000pcs

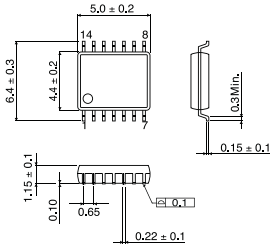
SSOP-B<Pin Pitch:0.65mm>

SSOP-B8



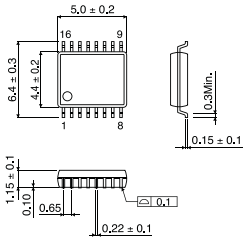
Embossed carrier tape:2,500pcs

SSOP-B14



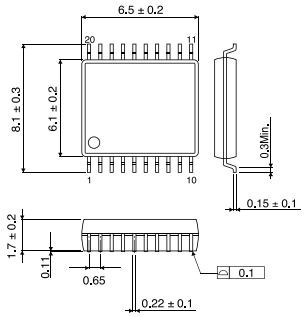
Embossed carrier tape:2,500pcs

SSOP-B16



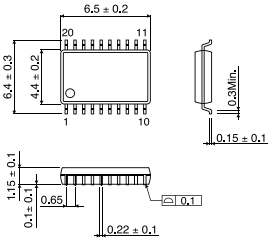
Embossed carrier tape:2,500pcs

SSOP-B20W



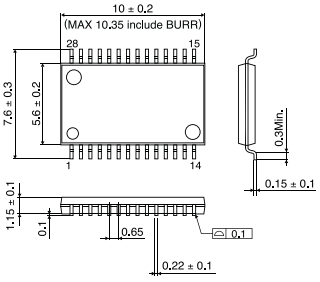
Embossed carrier tape:2,000pcs

SSOP-B20



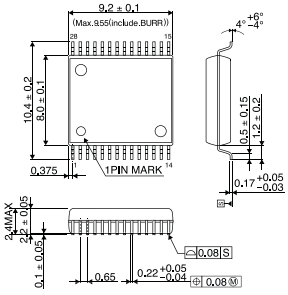
Embossed carrier tape:2,500pcs

SSOP-B28



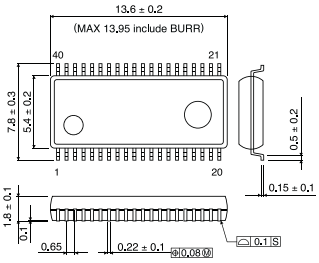
Embossed carrier tape:2,000pcs

SSOP-B28W



Embossed carrier tape:1,500pcs

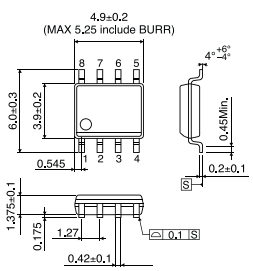
SSOP-B40



Embossed carrier tape:2,000pcs

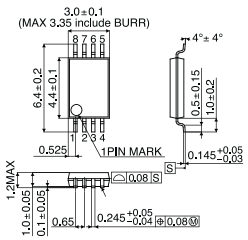
JEDEC<Pin Pitch:1.27mm/0.65mm/0.5mm>

SOP-J8



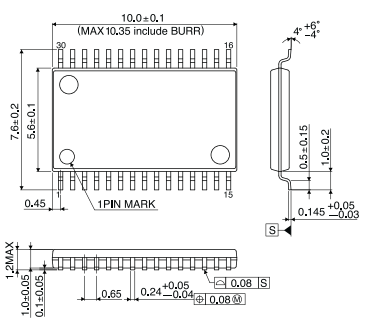
Embossed carrier tape:2,500pcs

TSSOP-B8



Embossed carrier tape:3,000pcs

TSSOP-B30



Embossed carrier tape:2,000pcs

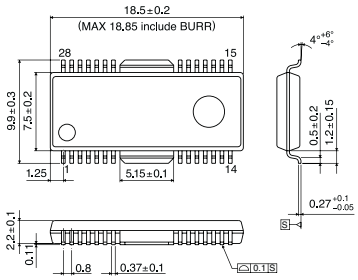
Please refer package from page 40, for LAPIS Semiconductor products

HSOP Packages

(Unit: mm)

HSOP<Pin Pitch:0.8mm>

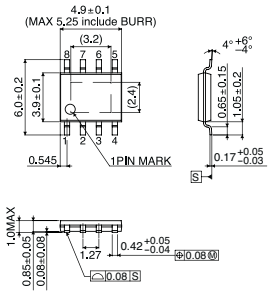
HSOP-M28



Embossed carrier tape:1,500pcs

HTSOP-J<Pin Pitch:1.27mm>

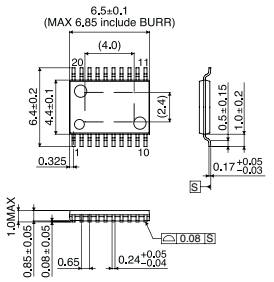
HTSOP-J8



Embossed carrier tape:2,500pcs

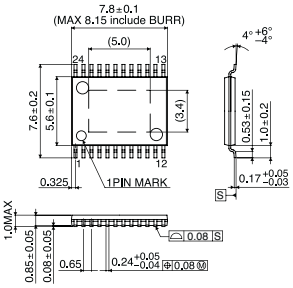
HTSSOP-B<Pin Pitch:0.65mm>

HTSSOP-B20



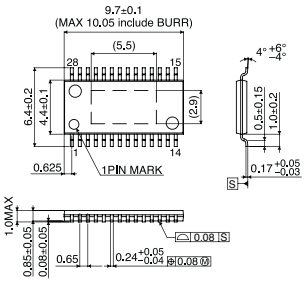
Embossed carrier tape:2,500pcs

HTSSOP-B24



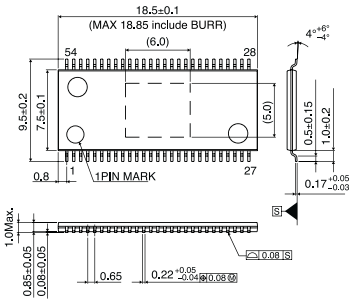
Embossed carrier tape:2,000pcs

HTSSOP-B28



Embossed carrier tape:2,500pcs

HTSSOP-B54



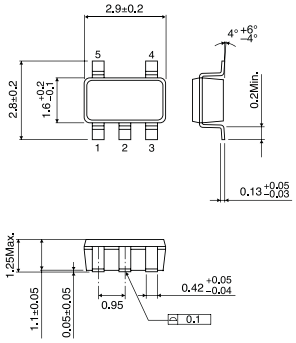
Embossed carrier tape:1,500pcs

Small Packages

(Unit: mm)

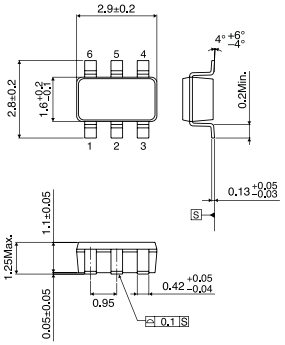
SOP Type

SSOP5



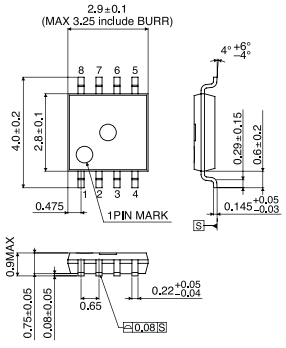
Embossed carrier tape:3,000pcs

SSOP6



Embossed carrier tape:3,000pcs

MSOP8



Embossed carrier tape:3,000pcs

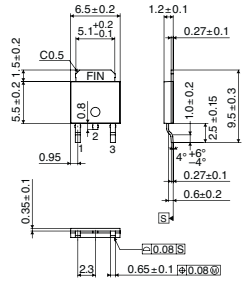
Please refer package from page 40, for LAPIS Semiconductor products

Power Packages

(Unit: mm)

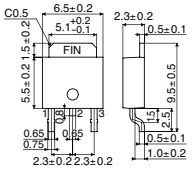
POWER-3PIN

TO252S-3



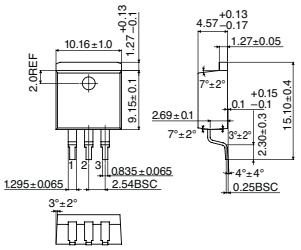
Embossed carrier tape:2,000pcs

TO252-3



Embossed carrier tape:2,000pcs

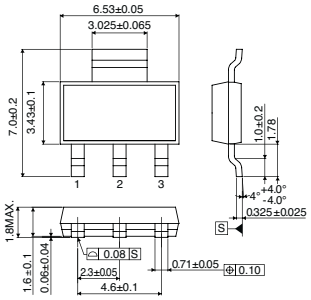
TO263-3



Embossed carrier tape:500pcs

POWER-4PIN

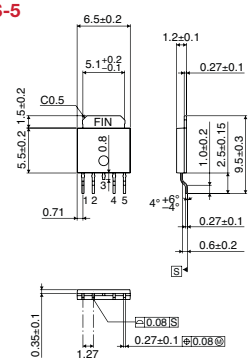
SOT223-4



Embossed carrier tape:2,000pcs

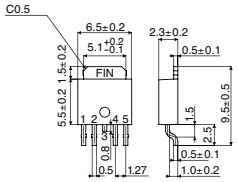
POWER-5PIN

TO252S-5



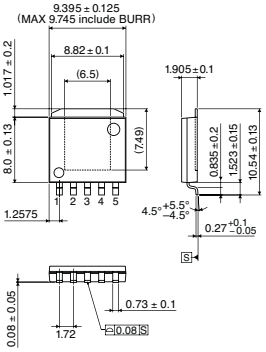
Embossed carrier tape:2,000pcs

TO252-5



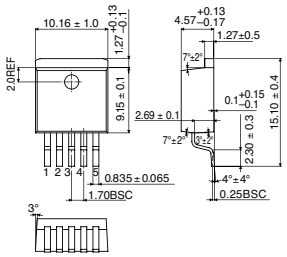
Embossed carrier tape:2,000pcs

HRP5



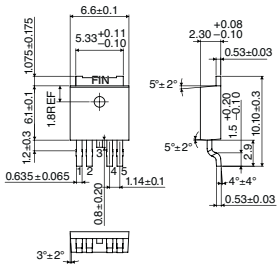
Embossed carrier tape:2,600pcs

TO263-5



Embossed carrier tape:500pcs

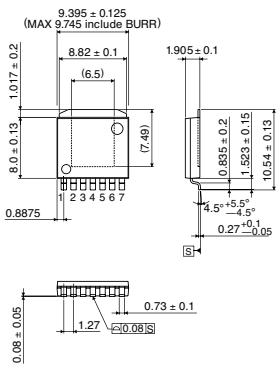
TO252-J5



Embossed carrier tape:2,000pcs

POWER-7PIN

HRP7



Embossed carrier tape:2,000pcs

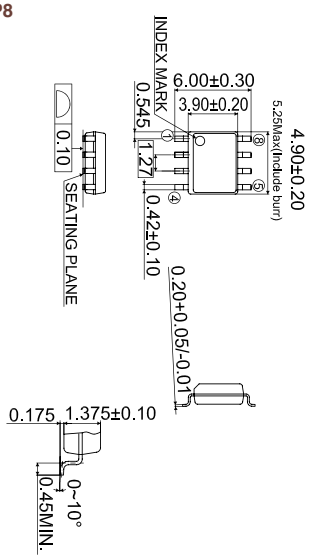
These package size are an example. For details, please inquire to the sales.

SOP Packages

(Unit: mm)

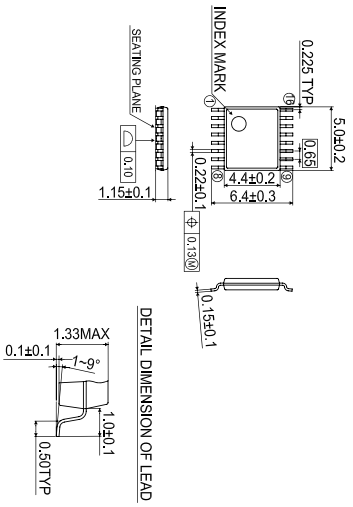
SOP

SOP8

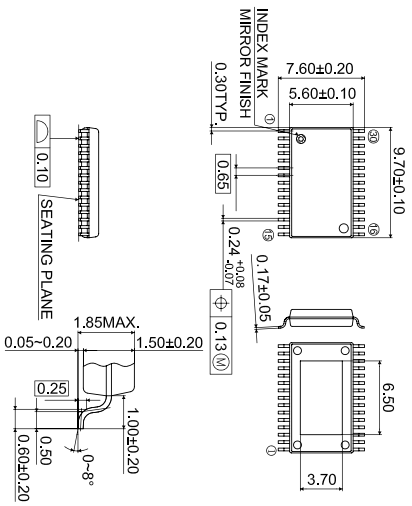


SSOP

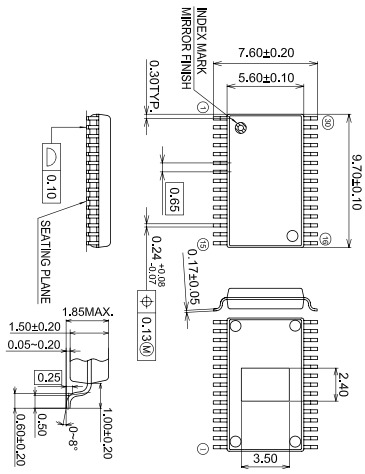
SSOP16



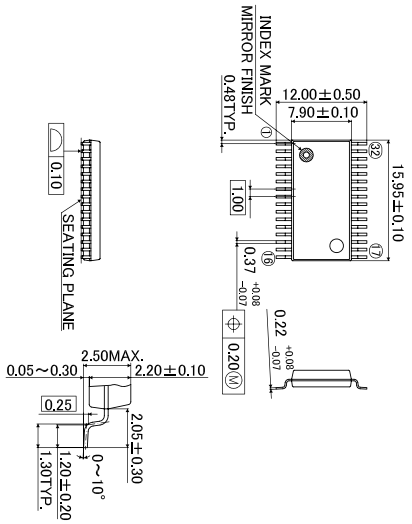
P-SSOP30-56-0.65-Z6K



P-SSOP30-56-0.65-Z6K9-MC

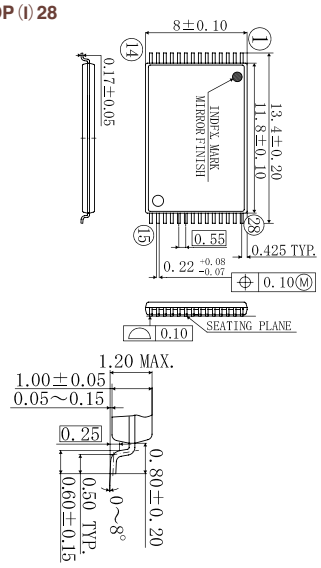


SSOP32



TSOP(Type I)

TSOP(I)28



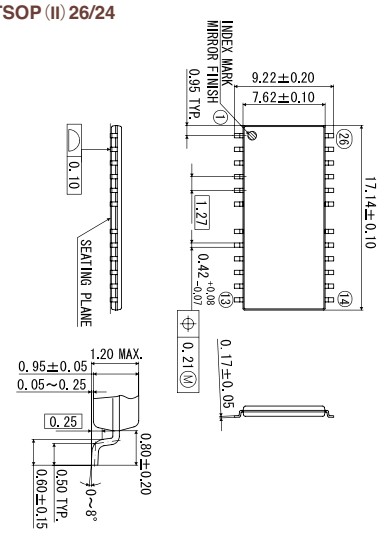
These package size are an example. For details, please inquire to the sales.

SOP Packages

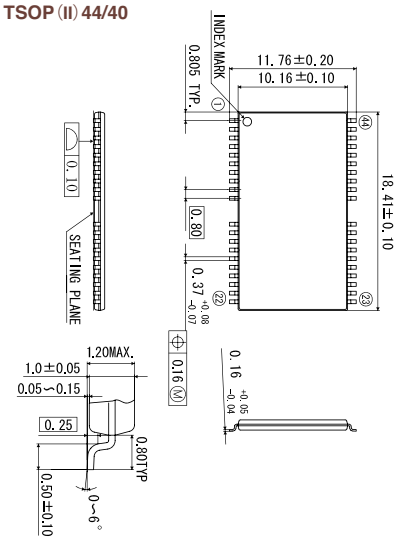
(Unit: mm)

TSOP(Type II)

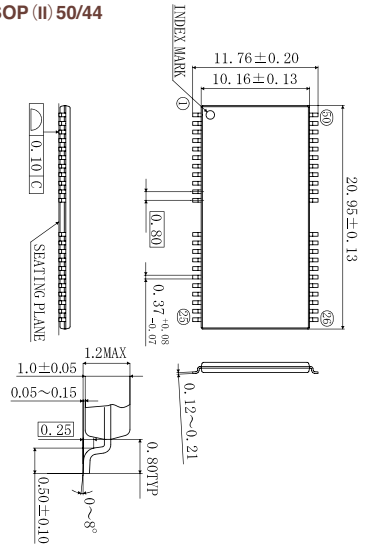
TSOP (II) 26/24



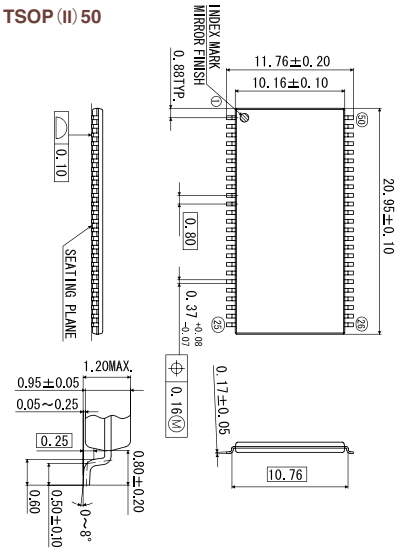
TSOP (II) 44/40



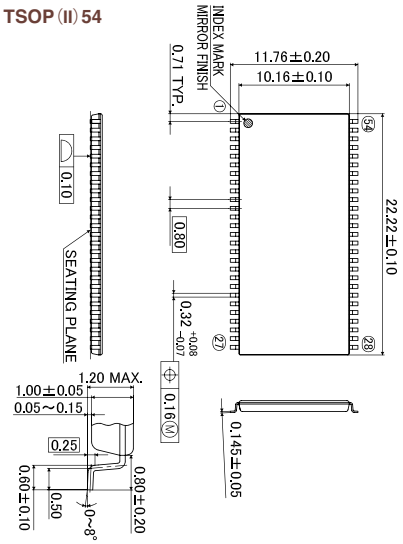
TSOP (II) 50/44



TSOP (II) 50



TSOP (II) 54

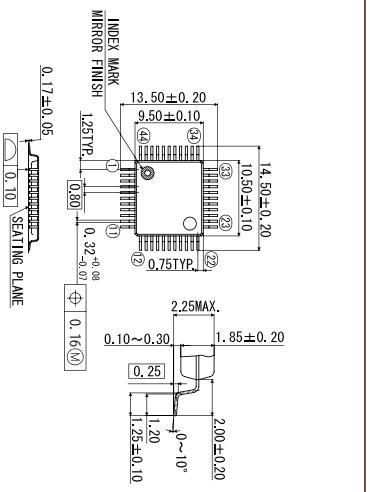


QFP Packages

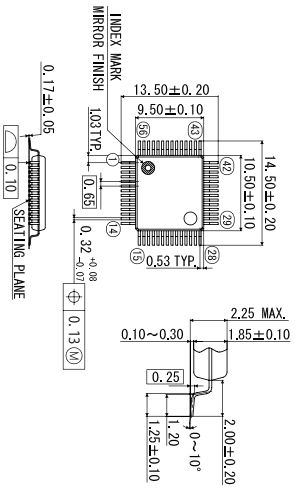
(Unit: mm)

QFP

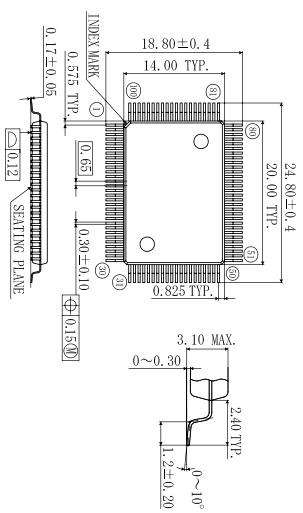
QFP44



QFP56



P-QFP100-1420-0.65-TK



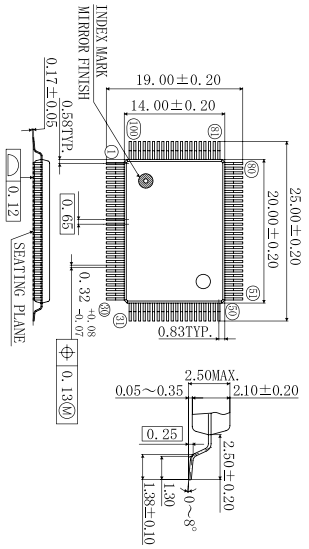
These package size are an example. For details, please inquire to the sales.

QFP Packages

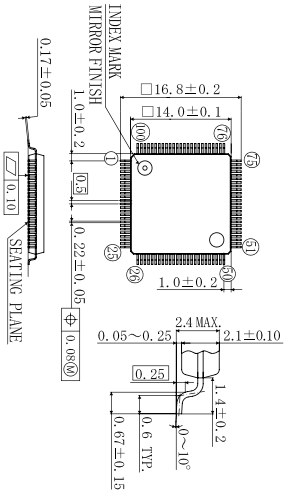
(Unit: mm)

QFP

QFP100-P-1420-0.65-BK

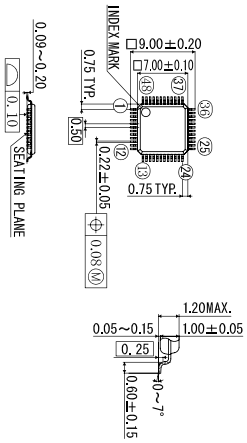


P-QFP100-1414-0.50-K

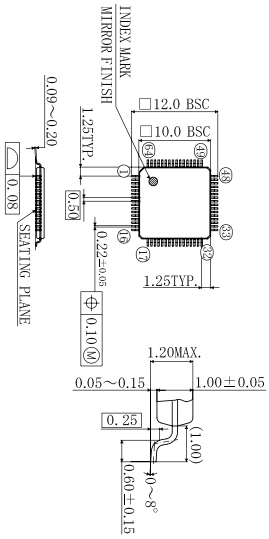


TQFP

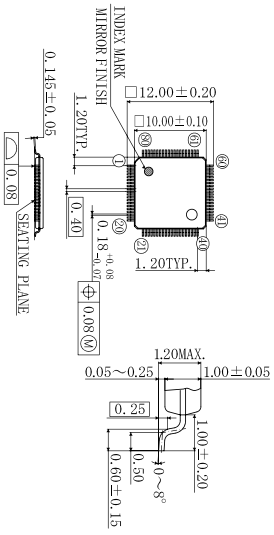
TQFP48



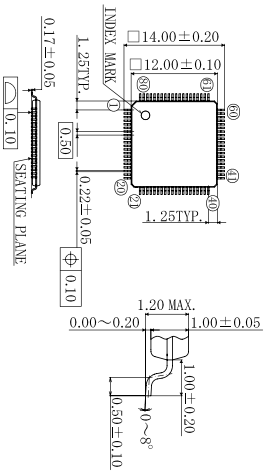
TQFP64



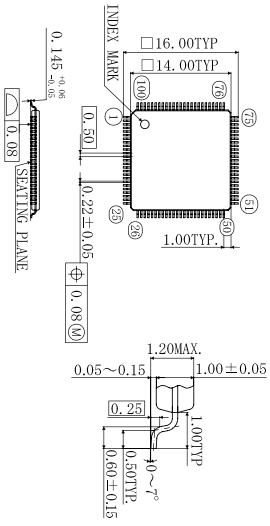
P-TQFP80-1010-0.40



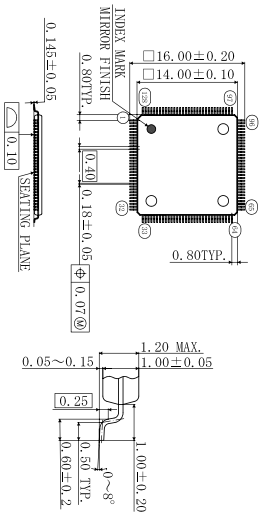
P-TQFP80-1212-0.50



TQFP100



TQFP128



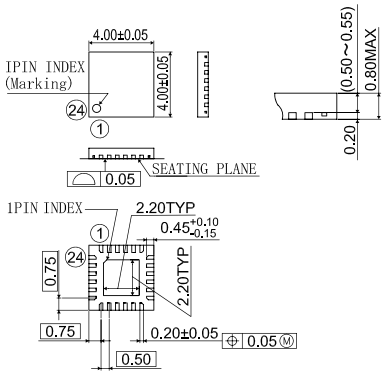
These package size are an example. For details, please inquire to the sales.

QFN Packages

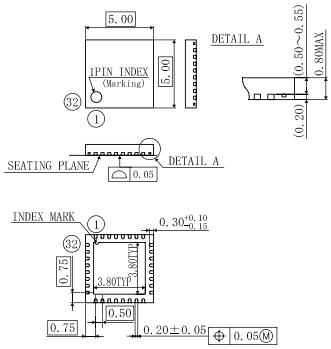
(Unit: mm)

WQFN

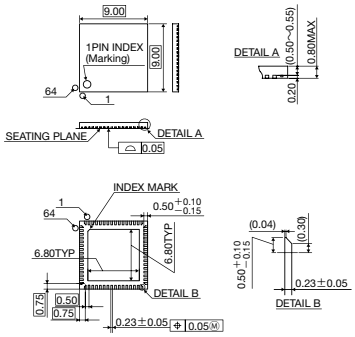
WQFN24



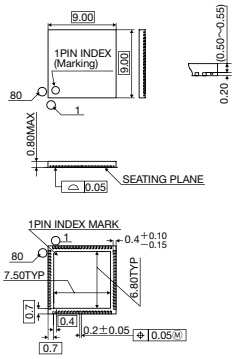
P-WQFN32-0505-0.50-A63



WQFN64



WQFN80

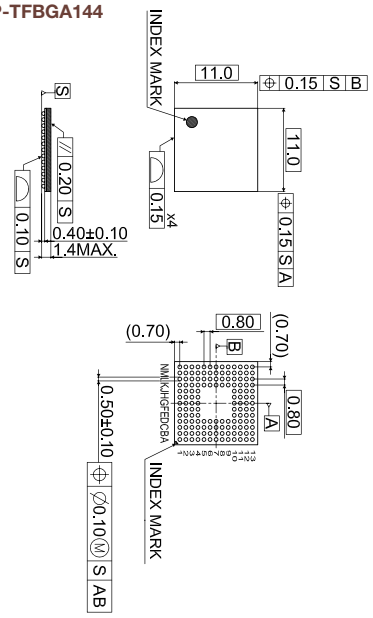


BGA Packages

(Unit: mm)

TFBGA

P-TFBGA144



SiC IGBT Tr Di R

Automotive

【Power Devices・Small Signal Devices・Passive Devices】
AEC-Q101
AEC-Q200

CONTENTS

SiC-Schottky Barrier Diodes

●Quick Reference for SiC-Schottky Barrier Diodes

V_{RM} (V)	I_F (A)	Leaded Type				Surface Mounted Type	
							
		TO-220AC〔2pin〕		TO-247〔3pin〕		LPTL〔4pin〕	
650	6	**SCS206AGHR**	7			☆**SCS206AJHR**	1
	8	**SCS208AGHR**	8			☆**SCS208AJHR**	2
	10	**SCS210AGHR**	9			☆**SCS210AJHR**	3
	12	**SCS212AGHR**	10			☆**SCS212AJHR**	4
	15	**SCS215AGHR**	11			☆**SCS215AJHR**	5
	20	**SCS220AGHR**	12	**SCS220AE2HR**	13	☆**SCS220AJHR**	6
	30			New **SCS230AE2HR**	14		
	40			New **SCS240AE2HR**	15		
1,200	5	**SCS205KGHR**	16				
	10	**SCS210KGHR**	17	New **SCS210KE2HR**	20		
	15	New **SCS215KGHR**	18				
	20	New **SCS220KGHR**	19	New **SCS220KE2HR**	21		

☆ : Under development

SiC-Schottky Barrier Diodes

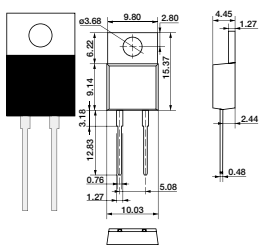
Quick Reference No.	Part No.	Absolute Maximum Ratings (Ta=25°C) V_{RM} (V)	V_R (V)	I_F (A)	I_{FSM} (A) 60Hz.1	Electrical Characteristics (Ta=25°C) V_F (V) Typ.	I_F (A)	I_R (μA) Max.	V_R (V)	Package	Equivalent Circuit Diagram
1	☆**SCS206AJHR**	650	650	6	24	1.35	6	120	600	LPTL [4pin]	
2	☆**SCS208AJHR**	650	650	8	31	1.35	8	160	600		
3	☆**SCS210AJHR**	650	650	10	40	1.35	10	200	600		
4	☆**SCS212AJHR**	650	650	12	45	1.35	12	240	600		
5	☆**SCS215AJHR**	650	650	15	55	1.35	15	300	600		
6	☆**SCS220AJHR**	650	650	20	71	1.35	20	400	600		
7	**SCS206AGHR**	650	650	6	24	1.35	6	120	600	TO-220AC [2pin]	
8	**SCS208AGHR**	650	650	8	31	1.35	8	160	600		
9	**SCS210AGHR**	650	650	10	40	1.35	10	200	600		
10	**SCS212AGHR**	650	650	12	45	1.35	12	240	600		
11	**SCS215AGHR**	650	650	15	55	1.35	15	300	600		
12	**SCS220AGHR**	650	650	20	71	1.35	20	400	600		
13	**SCS220AE2HR**	650	650	10/20*	40/80*	1.35	10	200	600	TO-247 [3pin]	
14	New **SCS230AE2HR**	650	650	15/30*	55/110*	1.35	15	300	600		
15	New **SCS240AE2HR**	650	650	20/40*	71/140*	1.35	20	400	600		
16	**SCS205KGHR**	1,200	1,200	5	23	1.4	5	100	1,200	TO-220AC [2pin]	
17	**SCS210KGHR**	1,200	1,200	10	45	1.4	10	200	1,200		
18	New **SCS215KGHR**	1,200	1,200	15	65	1.4	15	300	1,200		
19	New **SCS220KGHR**	1,200	1,200	20	82	1.4	20	400	1,200		
20	New **SCS210KE2HR**	1,200	1,200	5/10*	23/46*	1.4	5	100	1,200	TO-247 [3pin]	
21	New **SCS220KE2HR**	1,200	1,200	10/20*	44/88*	1.4	10	200	1,200		

☆ : Under development * (Per Leg/Device)

●Dimensions (Unit : mm)

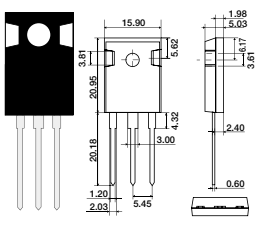
Leaded Type

TO-220AC (2pin)



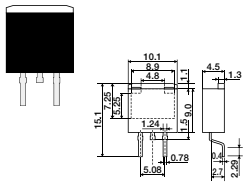
Each lead has same dimensions

TO-247 (3pin)



Each lead has same dimensions

LPT(L) (4pin)



Each lead has same dimensions

●Part No. Explanation

•Schottky Barrier Diode Part No.Explanation

S	C	S	2	0	6	A	G	H	R
①		②	③	④		⑤	⑥		⑦

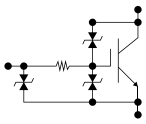
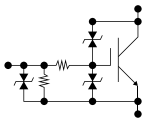
① SiC
② SBD
③ Generation
④ Current〔A〕
Example 05 → 5A
10 → 10A

⑤ Voltage
Example A → 650V
K → 1200V

⑥ Package
Example E → TO-247〔3pin〕
E2 → TO-247〔3pin〕(Dual chip)
G → TO-220AC〔2pin〕
J → LPT(L)〔4pin〕

⑦ Automotive Grade Available

Ignition IGBT

Ignition IGBT								
Part No.	V_{CES} (V)	V_{GE} (V)	Ic (A)	P_D (W)	Eas (mJ)	V_{CE} (sat) typ. (V)	Package	Equivalent Circuit Diagram
☆**RGPZ10BM40**	430±30	±10	10	107	250	1.6	TO-252	
☆**RGPR10BM40**	430±30	±10	10	107	250	1.6		

☆ : Under development

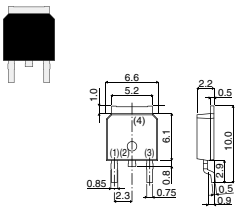
Part No. Explanation

R	G	P	Z	1	0	B	M	4	0
①		②		③		④		⑤	

① IGBT
② Series Name
③ IC <Tc=100°C >
ex. 10 → 10A
④ Package
ex. BM → TO-252
⑤ V_{CES}
ex. 40 → 430±30V

Dimensions (Unit : mm)

TO-252



Each lead has same dimensions

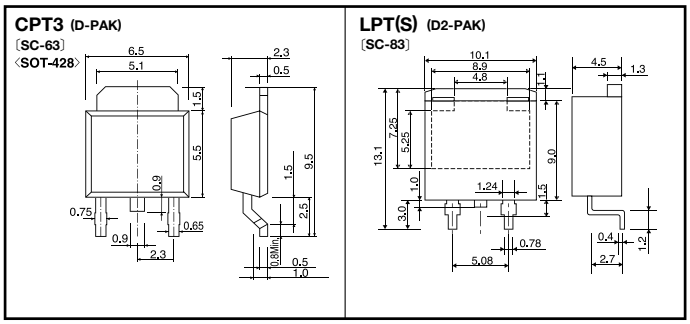
Selector Guide for Automotive Power MOSFETs (AEC-Q101)

Package (Dimension:mm)	Product No.			Single/ Dual	Polarity	Maximum Rating			R_{DS} (on) typ. (mΩ)				$V_{GS(th)}$ (V)		Qg typ.	C_{iss} typ.
						V_{DS} (V)	I_D (A)	V_{GS} (V)	V_{GS}= 10V	V_{GS}= 4.5V	V_{GS}= 2.5V	V_{GS}= 1.5V	min.	max.	V_{GS}=10V (nC)	V_{DS}=10V (pF)
 CPT3 (SC-63 / SOT-428) 9.5 × 6.5 × 2.3	**RSD200N05**	FRA	TL	Single	N	45	20	±20	20	25	—	—	1	2.5	12 *1	950
	RSD050N06	FRA	TL	Single	N	60	5	±20	78	94	—	—	1	3	8	290
	RSD080N06	FRA	TL	Single	N	60	8	±20	57	70	—	—	1	2.5	9.4	380
	RSD150N06	FRA	TL	Single	N	60	15	±20	28	33	—	—	1	3	18	930
	RSD221N06	FRA	TL	Single	N	60	22	±20	18	21	—	—	1	3	30	1500
	RSD050N10	FRA	TL	Single	N	100	5	±20	135	142	—	—	1	2.5	14	530 *2
	RSD100N10	FRA	TL	Single	N	100	10	±20	95	100	—	—	1	2.5	18	700 *2
	RSD175N10	FRA	TL	Single	N	100	17.5	±20	75	80	—	—	1	2.5	24	950
	RSD201N10	FRA	TL	Single	N	100	20	±20	33	36	—	—	1	2.5	55	2100
	New **R5205PND**	FRA	TL	Single	N	525	5	±30	1300	—	—	—	2.5	4.5	10.8	320 *2
	New **R6006PND**	FRA	TL	Single	N	600	6	±30	900	—	—	—	2.5	4.5	15	460 *2
	New **R6004PND**	FRA	TL	Single	N	600	4	±30	1400	—	—	—	2.5	4.5	11	280 *2
	RSD046P05	FRA	TL	Single	P	-45	-4.5	±20	110	160	—	—	-1	-3	12 *1	550
	RSD080P05	FRA	TL	Single	P	-45	-8	±20	65	95	—	—	-1	-3	9 *1	1000
	RSD160P05	FRA	TL	Single	P	-45	-16	±20	35	45	—	—	-1	-3	16 *1	2000
	RSD140P06	FRA	TL	Single	P	-60	-14	±20	60	73	—	—	-1	-3	27	1900
	RSD131P10	FRA	TL	Single	P	-100	-13	±20	135	150	—	—	-1	-2.5	40	2400
 LPTS(SC83) 13.1 × 10.1 × 4.5	**RSJ451N04**	FRA	TL	Single	N	45	45	±20	9.5	—	—	—	1.2	3	43	2400 *2
	RSJ400N06	FRA	TL	Single	N	60	40	±20	11	—	—	—	1	3	52	2400
	RSJ800N06	FRA	TL	Single	N	60	80	±20	4.5	5	—	—	1	2.5	130	6000
	RSJ400N10	FRA	TL	Single	N	100	40	±20	19	21	—	—	1	2.5	90	3600 *2
	RSJ550N10	FRA	TL	Single	N	100	55	±20	12	13.5	—	—	1	2.5	143	6150 *2
	RSJ650N10	FRA	TL	Single	N	100	65	±20	6.5	7	—	—	1	2.5	260	10780
	New **RJ1U330AA**	FRG	TL	Single	N	250	33	±30	77	—	—	—	3.0	5.0	80	4500 *2
	RSJ250P10	FRA	TL	Single	P	-100	-25	±20	45	48	—	—	-1	-2.5	60 *1	8000 *2

*1 V_{GS}=5V *2 V_{DS}=25V

Power Packages

●Dimensions (Unit : mm)



Notes: 1. Characters in [ ] under package designation denotes JEITA No. Characters in < > under package designation denotes Code No.
2. For details of dimensions, please refer to the technical specifications.

Power Schottky Barrier Diodes

●Quick Reference for Power Schottky Barrier Diodes

V_R (V)	Io (A)	Package							
									
		TO-252 (D-PAK)		LPDS (D2-PAK)		TO-220FN (3 pin)		TO-220FN (2 pin)	
30	5	RB078BM30S	112						
	6	RB095BM-30 New RB098BM-30	1 2						
	10	RB085BM-30 New RBR10BM30A New RB088BM-30	3 4 5	New RBR10NS30A New RB088NS-30	30 33	New RBR10T30A New RB088T-30	64 65		
	15	New RBR15BM30A	6						
	20	New RBR20BM30A	7	New RBR20NS30A New RB218NS-30	31 34	New RBR20T30A New RB218T-30	66 67		
	30			New RBR30NS30A New RB228NS-30	32 35	New RBR30T30A New RB228T-30	68 69		
	40			New RB238NS-30	36	New RB238T-30	70		
40/45	5	RB075BM40S	113						
	6	RB095BM-40 New RB098BM-40	8 9			RB095T-40	71		
	10	RB085BM-40 RBQ10BM45A New RBR10BM40A New RB088BM-40	10 15 11 12	RBQ10NS45A New RB088NS-40 New RBR10NS40A	45 37 38	RB085T-40 RBQ10T45A New RBR10T40A New RB088T-40	72 83 73 74		
	15	RBQ15BM45A New RBR15BM40A	16 13			RB205T-40	75		
	20	RBQ20BM45A New RBR20BM40A	17 14	RBQ20NS45A New RBR20NS40A New RB218NS-40	46 39 40	RB215T-40 RBQ20T45A New RBR20T40A New RB218T-40	76 84 77 78		
	30			RB225NS-40 RBQ30NS45A RBQ30NS45B New RBR30NS40A New RB228NS-40	41 47 113 42 43	RB225T-40 RBQ30T45A New RBR30T40A New RB228T-40	79 85 80 81	RBQ30TB45B	114
	40			New RB238NS-40	44	New RB238T-40	82		
60/65	6	RB095BM-60 New RB098BM-60	18 19			RB095T-60	86		
	10	RBQ10BM65A New RB088BM-60	21 20	RBQ10NS65A New RB088NS-60	52 48	RB085T-60 RBQ10T65A New RB088T-60	87 95 88		
	15	RBQ15BM65A	22			RB205T-60	89		
	20	RBQ20BM65A	23	RBQ20NS65A New RB218NS-60	53 49	RB215T-60 RBQ20T65A New RB218T-60	91 96 90		
	30			RBQ30NS65A New RB228NS-60	54 50	RB225T-60 RBQ30T65A New RB228T-60	93 97 92		
	40			New RB238NS-60	51	New RB238T-60	94		
90	6	RB095BM-90	24			RB095T-90	98		
	10	RB085BM-90	25			RB085T-90	99		
	15					RB205T-90	100		
	20					RB215T-90	101		
100	6	New RB098BM100	26						
	10	RB088BM100	27	New RB088NS100	55	New RB088T100	102		
	20			New RB218NS100	56	New RB218T100	103		
	30			RB228NS100 New RB298NS100	57 58	RB228T100 New RB298T100	104 105		
	40			RB238NS100	59	New RB238T100	106		
150	6	New RB098BM150	28						
	10	RB088BM150	29	RB088NS150	60	RB088T150	107		
	20			New RB218NS150	61	New RB218T150	108		
	30			New RB228NS150	62	New RB228T150	109		
	40			RB238NS150	63	New RB238T150	110		

Power Schottky Barrier Diodes

Power Schottky Barrier Diodes 1

Quick Reference No.	Product No.			Absolute Maximum Ratings (T_c=25°C)				Electrical Characteristics (T_j=25°C)*2				Package	Equivalent Circuit Diagram
				V_{RM} (V)	V_R (V)	I_O*1 (A)	I_{FSM} (A)*2 60Hz.1cyc	V_F(V) Max.	I_F (A)	I_R (mA) Max.	V_R (V)		
1	RB095BM-30	FH	TL	35	30	6	50	0.425	3	0.2	30	TO-252(D-PAK)	
2	New RB098BM-30	FH	TL	35	30	6	50	0.72	3	0.0015	30		
3	RB085BM-30	FH	TL	35	30	10	50	0.48	4	0.3	30		
4	New RBR10BM30A	FH	TL	30	30	10	50	0.55	5	0.1	30		
5	New RB088BM-30	FH	TL	35	30	10	100	0.72	5	0.003	30		
6	New RBR15BM30A	FH	TL	30	30	15	100	0.51	7.5	0.2	30		
7	New RBR20BM30A	FH	TL	30	30	20	100	0.51	10	0.3	30		
8	RB095BM-40	FH	TL	45	40	6	50	0.55	3	0.1	40		
9	New RB098BM-40	FH	TL	45	40	6	50	0.77	3	0.0015	40		
10	RB085BM-40	FH	TL	45	40	10	50	0.55	5	0.2	40		
11	New RBR10BM40A	FH	TL	40	40	10	50	0.62	5	0.12	40		
12	New RB088BM-40	FH	TL	45	40	10	100	0.77	5	0.003	40		
13	New RBR15BM40A	FH	TL	40	40	15	100	0.58	7.5	0.24	40		
14	New RBR20BM40A	FH	TL	40	40	20	100	0.58	10	0.36	40		
15	RBQ10BM45A	FH	TL	45	45	10	50	0.65	5	0.15	45		
16	RBQ15BM45A	FH	TL	45	45	15	100	0.59	7.5	0.3	45		
17	RBQ20BM45A	FH	TL	45	45	20	100	0.59	10	0.45	45		
18	RB095BM-60	FH	TL	60	60	6	50	0.58	3	0.3	60		
19	New RB098BM-60	FH	TL	60	60	6	50	0.83	3	0.0015	60		
20	New RB088BM-60	FH	TL	60	60	10	100	0.83	5	0.003	60		
21	RBQ10BM65A	FH	TL	65	65	10	50	0.69	5	0.15	65		
22	RBQ15BM65A	FH	TL	65	65	15	100	0.63	7.5	0.3	65		
23	RBQ20BM65A	FH	TL	65	65	20	100	0.63	10	0.45	65		
24	RB095BM-90	FH	TL	90	90	6	50	0.75	3	0.15	90		
25	RB085BM-90	FH	TL	90	90	10	50	0.83	5	0.15	90		
26	New RB098BM100	FH	TL	110	100	6	100	0.79	3	0.003	100		
27	RB088BM100	FH	TL	100	100	10	50	0.87	5	0.005	100		
28	New RB098BM150	FH	TL	150	150	6	100	0.88	3	0.007	150		
29	RB088BM150	FH	TL	150	150	10	50	0.88	5	0.015	150		
30	New RBR10NS30A	FH	TL	30	30	10	50	0.55	5	0.1	40	LPDS(D2-PAK)	
31	New RBR20NS30A	FH	TL	30	30	20	100	0.55	10	0.2	40		
32	New RBR30NS30A	FH	TL	30	30	30	100	0.55	15	0.3	40		
33	New RB088NS-30	FH	TL	35	30	10	100	0.72	5	0.003	30		
34	New RB218NS-30	FH	TL	35	30	20	100	0.72	10	0.005	30		
35	New RB228NS-30	FH	TL	35	30	30	100	0.75	15	0.008	30		
36	New RB238NS-30	FH	TL	35	30	40	100	0.75	20	0.012	30		
37	New RB088NS-40	FH	TL	45	40	10	100	0.77	5	0.003	40		
38	New RBR10NS40A	FH	TL	40	40	10	50	0.62	5	0.12	40		
39	New RBR20NS40A	FH	TL	40	40	20	100	0.62	10	0.24	40		
40	New RB218NS-40	FH	TL	45	40	20	100	0.77	10	0.005	40		
41	RB225NS-40	FH	TL	40	40	30	50	0.55	15	0.5	40		
42	New RBR30NS40A	FH	TL	40	40	30	100	0.62	15	0.36	40		
43	New RB228NS-40	FH	TL	45	40	30	100	0.80	15	0.008	40		
44	New RB238NS-40	FH	TL	45	40	40	100	0.80	20	0.012	40		
45	RBQ10NS45A	FH	TL	45	45	10	100	0.65	5	0.15	45		
46	RBQ20NS45A	FH	TL	45	45	20	100	0.65	10	0.3	45		
47	RBQ30NS45A	FH	TL	45	45	30	100	0.65	15	0.45	45		
48	New RB088NS-60	FH	TL	60	60	10	100	0.83	5	0.003	60		
49	New RB218NS-60	FH	TL	60	60	20	100	0.83	10	0.005	60		
50	New RB228NS-60	FH	TL	60	60	30	100	0.86	15	0.008	60		
51	New RB238NS-60	FH	TL	60	60	40	100	0.86	20	0.012	60		
52	RBQ10NS65A	FH	TL	65	65	10	100	0.69	5	0.15	65		
53	RBQ20NS65A	FH	TL	65	65	20	100	0.69	10	0.3	65		
54	RBQ30NS65A	FH	TL	65	65	30	100	0.69	15	0.45	65		
55	New RB088NS100	FH	TL	100	100	10	100	0.87	5	0.005	100		
56	New RB218NS100	FH	TL	100	100	20	100	0.87	10	0.007	100		
57	RB228NS100	FH	TL	110	100	30	100	0.87	5	0.005	100		
58	New RB298NS100	FH	TL	100	100	30	100	0.87	15	0.01	100		
59	RB238NS100	FH	TL	100	100	40	100	0.86	20	0.02	100		
60	RB088NS150	FH	TL	150	150	10	50	0.88	5	0.015	150		

*1 : Io : Average output current per chip. In case of 2 chip diodes. Io indicates average output current of 2 chips. *2 : Value / Chip

Power Schottky Barrier Diodes 2

Quick Reference No.	Product No.			Absolute Maximum Ratings(T_c=25°C) V_{RM} (V)	V_R (V)	I_O*1 (A)	I_{FSM}(A)*2 60Hz.1㏈	Electrical Characteristics(T_j=25°C)*2 V_F(V) Max.	I_F(A)	I_R(mA) Max.	V_R(V)	Package	Equivalent Circuit Diagram
61	New RB218NS150	FH	TL	150	150	20	100	0.88	20	0.02	150	LPDS(D2-PAK)	
62	New RB228NS150	FH	TL	150	150	30	100	0.88	15	0.025	150		
63	RB238NS150	FH	TL	150	150	40	100	0.87	20	0.03	150		
64	New RBR10T30A	FH	C9	30	30	10	50	0.55	5	0.1	30	TO-220FN (3 pin)	
65	New RB088T-30	FH	C9	35	30	10	100	0.72	5	0.003	30		
66	New RBR20T30A	FH	C9	30	30	20	100	0.55	10	0.2	30		
67	New RB218T-30	FH	C9	35	30	20	100	0.72	10	0.005	30		
68	New RBR30T30A	FH	C9	30	30	30	100	0.55	15	0.3	30		
69	New RB228T-30	FH	C9	35	30	30	100	0.75	15	0.008	30		
70	New RB238T-30	FH	C9	35	30	40	100	0.75	20	0.012	30		
71	RB095T-40	FH	C9	45	40	6	100	0.55	3	0.1	40		
72	RB085T-40	FH	C9	45	40	10	100	0.55	5	0.2	40		
73	New RBR10T40A	FH	C9	40	45	10	50	0.62	5	0.12	40		
74	New RB088T-40	FH	C9	45	40	10	100	0.77	5	0.003	40		
75	RB205T-40	FH	C9	45	40	15	100	0.55	7.5	0.3	40		
76	RB215T-40	FH	C9	45	40	20	100	0.55	10	0.5	40		
77	New RBR20T40A	FH	C9	40	45	20	100	0.62	10	0.24	40		
78	New RB218T-40	FH	C9	45	40	20	100	0.77	10	0.005	40		
79	RB225T-40	FH	C9	40	40	30	100	0.63	15	0.5	40		
80	New RBR30T40A	FH	C9	40	45	30	100	0.62	15	0.36	40		
81	New RB228T-40	FH	C9	45	40	30	100	0.80	15	0.008	40		
82	New RB238T-40	FH	C9	45	40	40	100	0.80	20	0.012	40		
83	RBQ10T45A	FH	C9	45	45	10	100	0.65	5	0.15	45		
84	RBQ20T45A	FH	C9	45	45	20	100	0.65	10	0.3	45		
85	RBQ30T45A	FH	C9	45	45	30	100	0.65	15	0.45	45		
86	RB095T-60	FH	C9	60	60	6	100	0.58	3	0.1	60		
87	RB085T-60	FH	C9	60	60	10	100	0.58	5	0.3	60		
88	New RB088T-60	FH	C9	60	60	10	100	0.83	5	0.003	60		
89	RB205T-60	FH	C9	60	60	15	100	0.58	7.5	0.6	60		
90	New RB218T-60	FH	C9	60	60	20	100	0.83	10	0.005	60		
91	RB215T-60	FH	C9	60	60	20	100	0.58	10	0.6	60		
92	New RB228T-60	FH	C9	60	60	30	100	0.86	15	0.008	60		
93	RB225T-60	FH	C9	60	60	30	100	0.63	15	0.6	60		
94	New RB238T-60	FH	C9	60	60	40	100	0.86	20	0.012	60		
95	RBQ10T65A	FH	C9	65	65	10	100	0.69	5	0.15	65		
96	RBQ20T65A	FH	C9	65	65	20	100	0.69	10	0.3	65		
97	RBQ30T65A	FH	C9	65	65	30	100	0.69	15	0.45	65		
98	RB095T-90	FH	C9	90	90	6	100	0.75	3	0.15	90		
99	RB085T-90	FH	C9	90	90	10	100	0.83	5	0.15	90		
100	RB205T-90	FH	C9	90	90	15	100	0.78	7.5	0.3	90		
101	RB215T-90	FH	C9	90	90	20	100	0.75	10	0.4	90		
102	New RB088T100	FH	C9	110	100	10	100	0.87	5	0.005	100		
103	New RB218T100	FH	C9	110	100	20	100	0.87	10	0.007	100		
104	RB228T100	FH	C9	110	100	30	100	0.87	5	0.005	100		
105	New RB298T100	FH	C9	110	100	30	100	0.87	15	0.01	100		
106	New RB238T100	FH	C9	110	100	40	100	0.86	20	0.02	100		
107	RB088T150	FH	C9	150	150	10	50	0.88	5	0.015	150		
108	New RB218T150	FH	C9	150	150	20	100	0.88	10	0.02	150		
109	New RB228T150	FH	C9	150	150	30	100	0.88	15	0.025	150		
110	New RB238T150	FH	C9	150	150	40	100	0.87	20	0.03	150		
111	RB078BM30S	FH	TL	35	30	5	50	0.72	5	0.005	30	TO-252 (D-PAK)	
112	RB075BM40S	FH	TL	40	40	5	50	0.75	5	0.005	40		
113	RBQ30NS45B	FH	TL	45	45	30	100	0.59	30	0.7	45	LPDS (D2-PAK)	
114	RBQ30TB45B	FH	C9	45	45	30	100	0.59	30	0.7	45	TO-220FN (2pin)	

*1 : Io : Average output current per chip. In case of 2 chip diodes. Io indicates average output current of 2 chips. *2 : Value / Chip

Power Fast Recovery Diodes

●Quick Reference for Power Fast Recovery Diodes

V_R (V)	I_O (A)	Surface Mount Type				Leaded Type									
															
		TO-252 (D-PAK)		LPDS (D2-PAK)		TO-220FN (2pin)		TO-220FN (3pin)		TO-220NFM (2pin)		TO-220NFM (3pin)		TO-247 (3pin)	
200	3	RF301BM2S RFN3BM2S	22 23												
	5	RF501BM2S RFN5BM2S	24 25												
	6	RF601BM2D RFN6BM2D	1 2					RF601T2D RFN6T2D	7 8						
	10			RF1001NS2D	3			RF1001T2D RFN10T2D	9 10						
	16			RF1601NS2D	4			RF1601T2D RFN16T2D	11 12						
	20			RF2001NS2D	5			RF2001T2D RFN20T2D	13 14						
	30													☆RFN30TS2D	16
300	20			RF2001NS3D RF1501NS3S	6 34			RF2001T3D	15	RF1501TF3S	61				
	30													☆RFN30TS3D	17
350	5	RFN5BM3S	26												
	10	RFN10BM3S	32	RFN10NS3S	35										
	20			RFN20NS3S RFUH20NS3S RFUH25NS3S	36 37 38	RFUH20TB3S RFUH25TB3S	55 56								
430	10			RFN10NS4S RFUH10NS4S	39 40	RFN10TB4S RFUH10TB4S	57 58			RFUS10TF4S	62				
	20			RFN20NS4S RFUS20NS4S RFUH20NS4S	41 42 43	RFN20TB4S RFUH20TB4S	59 60	RF2001T4S	49			RFUS20TM4S	50		
530	20											RFU20TM5S	51		
600	3	RF305BM6S RFN3BM6S	27 28												
	5	RF505BM6S RFN5BM6S New RFNL5BM6S	29 30 31							New RF505TF6S New RFN5TF6S RFU5TF6S New RFUH5TF6S	63 64 66 65				
	10	RFN10BM6S	33	RFN10NS6S RFUH10NS6S	44 45					RF1005TF6S RFN10TF6S RFX10TF6S RFUH10TF6S RFU10TF6S	67 68 69 70 71				
	20			RFN20NS6S RFUH20NS6S RFUS20NS6S	46 47 48					RFN20TF6S RFUH20TF6S RFUS20TF6S	72 73 74	RFUS20TM6S	52		
	30													RFN30TS6S RFUH30TS6S RFN30TS6D RFUH30TS6D	53 54 18 19
	60													RFN60TS6D RFUH60TS6D	20 21
800	5									RFN5TF8S	75				

☆ : Under Development

Power Fast Recovery Diodes

Power Fast Recovery Diodes

Quick Reference No.	Product No.			Absolute Maximum Ratings (T_C=25°C) V_{RM} (V)	V_R (V)	I_O (A)	I_{FSM}(A) 60Hz.1∿	Electrical Characteristics (T_j=25°C)*2 V_F(V) Max.	I_F(A)	I_R(μA) Max.	V_R(V)	trr(ns) Max.	I_F(A)	I_R(A)	Package	Equivalent Circuit Diagram
1	RF601BM2D	FH	TL	200	200	6*1	60	0.93	3	10	200	25	0.5	1	TO-252 (D-PAK)	
2	RFN6BM2D	FH	TL	200	200	6*1	40	0.98	3	10	200	25	0.5	1		
3	RF1001NS2D	FH	TL	200	200	10*1	80	0.93	5	10	200	25	0.5	1	LPDS (D2-PAK)	
4	RF1601NS2D	FH	TL	200	200	16*1	100	0.93	8	10	200	30	0.5	1		
5	RF2001NS2D	FH	TL	200	200	20*1	100	0.93	10	10	200	30	0.5	1		
6	RF2001NS3D	FH	TL	350	300	20*1	100	1.3	10	10	300	25	0.5	1		
7	RF601T2D	FH	—	200	200	6*1	60	0.93	3	10	200	25	0.5	1	TO-220FN (3pin)	
8	RFN6T2D	FH	—	200	200	6*1	40	0.98	3	10	200	25	0.5	1		
9	RF1001T2D	FH	—	200	200	10*1	80	0.93	5	10	200	30	0.5	1		
10	RFN10T2D	FH	—	200	200	10*1	80	0.98	5	10	200	25	0.5	1		
11	RF1601T2D	FH	—	200	200	16*1	100	0.93	8	10	200	30	0.5	1		
12	RFN16T2D	FH	—	200	200	16*1	100	0.98	8	10	200	30	0.5	1		
13	RF2001T2D	FH	—	200	200	20*1	100	0.93	10	10	200	30	0.5	1		
14	RFN20T2D	FH	—	200	200	20*1	100	0.98	10	10	200	30	0.5	1		
15	RF2001T3D	FH	—	350	300	20*1	100	1.3	10	10	300	25	0.5	1		
16	☆RFN30TS2D	FH	C11	200	200	30*1	150	0.98	15	10	200	30	0.5	1	TO-247	
17	☆RFN30TS3D	FH	C11	300	300	30*1	180	1.2	15	10	300	35	0.5	1		
18	RFN30TS6D	FH	C11	600	600	30*1	120	1.55	15	10	600	55	0.5	1		
19	RFUH30TS6D	FH	C11	600	600	30*1	80	2.8	15	10	600	30	0.5	1		
20	RFN60TS6D	FH	C11	600	600	60*1	180	1.55	30	10	600	60	0.5	1		
21	RFUH60TS6D	FH	C11	600	600	60*1	120	2.8	30	10	600	35	0.5	1		
22	RF301BM2S	FH	TL	200	200	3	40	0.93	3	10	200	25	0.5	1	TO-252 (D-PAK)	
23	RFN3BM2S	FH	TL	200	200	3	40	0.98	3	10	200	25	0.5	1		
24	RF501BM2S	FH	TL	200	200	5	40	0.92	5	10	200	25	0.5	1		
25	RFN5BM2S	FH	TL	200	200	5	40	0.98	5	10	200	25	0.5	1		
26	RFN5BM3S	FH	TL	350	350	5	50	1.5	5	10	350	30	0.5	1		
27	RF305BM6S	FH	TL	600	600	3	50	1.7	3	10	600	30	0.5	1		
28	RFN3BM6S	FH	TL	600	600	3	20	1.55	3	10	600	30	0.5	1		
29	RF505BM6S	FH	TL	600	600	5	50	1.7	5	10	600	30	0.5	1		
30	RFN5BM6S	FH	TL	600	600	5	30	1.55	5	10	600	50	0.5	1		
31	New RFNL5BM6S	FH	TL	600	600	5	50	1.3	5	10	600	60	0.5	1		
32	RFN10BM3S	FH	TL	350	350	10	80	1.5	10	10	350	30	0.5	1		
33	RFN10BM6S	FH	TL	600	600	10	100	1.55	10	10	600	50	0.5	1		
34	RF1501NS3S	FH	TL	350	300	20	100	1.5	20	10	300	30	0.5	1	LPDS (D2-PAK)	
35	RFN10NS3S	FH	TL	350	350	10	100	1.5	10	10	350	30	0.5	1		
36	RFN20NS3S	FH	TL	350	350	20	100	1.35	20	10	350	35	0.5	1		
37	RFUH20NS3S	FH	TL	350	350	20	100	1.5	20	10	350	25	0.5	1		
38	RFUH25NS3S	FH	TL	350	350	20	100	1.45	20	10	350	30	0.5	1		
39	RFN10NS4S	FH	TL	430	430	10	80	1.55	10	10	430	30	0.5	1		
40	RFUH10NS4S	FH	TL	430	430	10	80	1.7	10	10	430	25	0.5	1		
41	RFN20NS4S	FH	TL	430	430	20	100	1.55	20	10	430	30	0.5	1		
42	RFUS20NS4S	FH	TL	430	430	20	100	1.6	20	10	430	35	0.5	1		
43	RFUH20NS4S	FH	TL	430	430	20	100	1.7	20	10	430	25	0.5	1		
44	RFN10NS6S	FH	TL	600	600	10	100	1.55	10	10	600	50	0.5	1		
45	RFUH10NS6S	FH	TL	600	600	10	60	2.8	10	10	600	25	0.5	1		
46	RFN20NS6S	FH	TL	600	600	20	100	1.55	20	10	600	60	0.5	1		
47	RFUH20NS6S	FH	TL	600	600	20	100	2.8	20	10	600	35	0.5	1		
48	RFUS20NS6S	FH	TL	600	600	20	100	2.8	20	10	600	35	0.5	1		
49	RF2001T4S	FH	—	430	400	20	100	1.6	20	10	400	30	0.5	1	TO-220FN (3pin)	
50	RFUS20TM4S	FH	—	430	430	20	100	1.6	20	10	430	35	0.5	1	TO-220NFM (3pin)	
51	RFU20TM5S	FH	—	530	530	20	100	2	20	10	530	30	0.5	1		
52	RFUS20TM6S	FH	—	600	600	20	100	2.8	20	10	600	35	0.5	1		
53	RFN30TS6S	FH	C11	600	600	30	200	1.55	30	10	600	60	0.5	1	TO-247	
54	RFUH30TS6S	FH	C11	600	600	30	150	2.8	30	10	600	35	0.5	1		
55	RFUH20TB3S	FH	—	350	350	20	100	1.5	20	10	350	25	0.5	1	TO-220FN (2pin)	
56	RFUH25TB3S	FH	—	350	350	20	100	1.45	20	10	350	30	0.5	1		
57	RFN10TB4S	FH	—	430	430	10	80	1.55	10	10	430	30	0.5	1		
58	RFUH10TB4S	FH	—	430	430	10	80	1.7	10	10	430	25	0.5	1		
59	RFN20TB4S	FH	—	430	430	20	100	1.55	20	10	430	30	0.5	1		
60	RFUH20TB4S	FH	—	430	430	20	100	1.7	20	10	430	25	0.5	1		
61	RF1501TF3S	FH	—	350	300	20	100	1.5	20	10	300	30	0.5	1	TO-220NFM (2pin)	
62	RFUS10TF4S	FH	—	430	430	10	80	1.7	10	10	430	30	0.5	1		
63	RF505TF6S	FH	—	600	600	5	80	1.7	5	10	600	30	0.5	1		
64	RFN5TF6S	FH	—	600	600	5	30	1.55	5	10	600	50	0.5	1		
65	New RFUH5TF6S	FH	—	600	600	5	30	2.8	5	10	600	25	0.5	1		
66	RFU5TF6S	FH	—	600	600	5	60	2.8	5	10	600	25	0.5	1		
67	RF1005TF6S	FH	—	600	600	10	100	1.7	10	10	600	40	0.5	1		
68	RFN10TF6S	FH	—	600	600	10	100	1.55	10	10	600	50	0.5	1		
69	RFX10TF6S	FH	—	600	600	10	100	2.5	10	10	600	30	0.5	1		
70	RFUH10TF6S	FH	—	600	600	10	60	2.8	10	10	600	25	0.5	1		
71	RFU10TF6S	FH	—	600	600	10	100	2.8	10	10	600	25	0.5	1		
72	RFN20TF6S	FH	—	600	600	20	100	1.55	20	10	600	60	0.5	1		
73	RFUH20TF6S	FH	—	600	600	20	100	2.8	20	10	600	35	0.5	1		
74	RFUS20TF6S	FH	—	600	600	20	100	2.8	20	10	600	35	0.5	1		
75	RFN5TF8S	FH	—	800	800	5	60	2.1	5	10	800	40	0.5	1		

*1 : Io : Average output current per chip. In case of 2 chip diodes. Io indicates average output current of 2 chips. *2 : Value / Chip

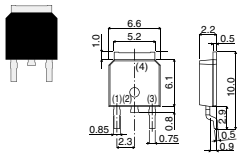
☆ : Under Development

Power Packages

●Dimensions (Unit : mm)

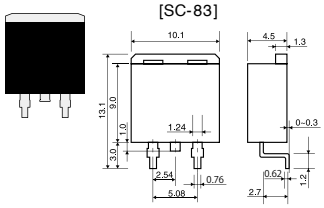
Surface Mount Type

TO-252 (D-PAK)



Each lead has same dimensions

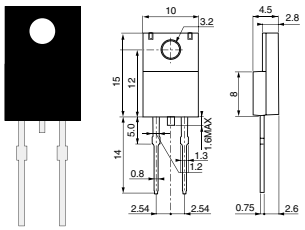
LPDS (D2-PAK) <TO-263> [SC-83]



Each lead has same dimensions

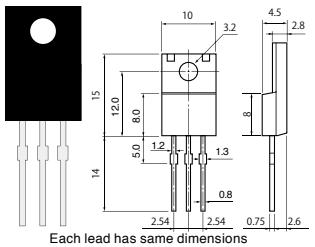
Leaded Type

TO-220FN (2pin)



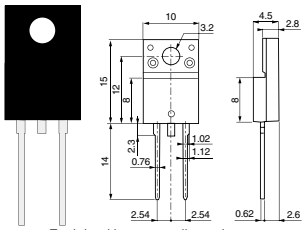
Each lead has same dimensions

TO-220FN (3pin)



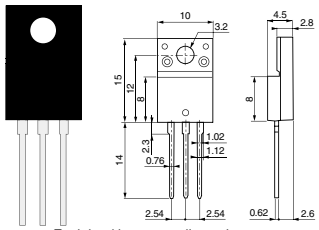
Each lead has same dimensions

TO-220NFM (2pin)



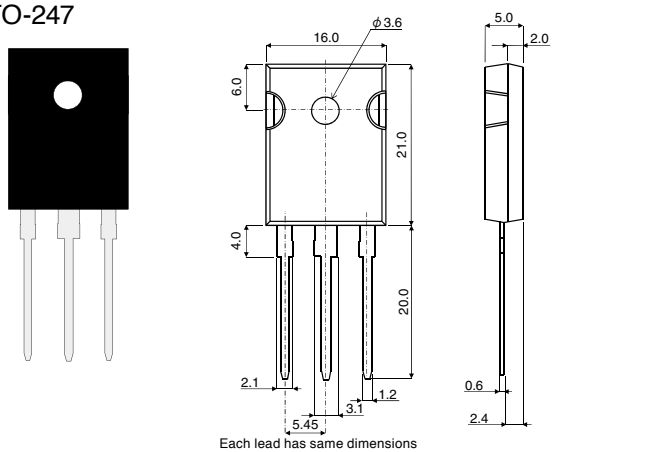
Each lead has same dimensions

TO-220NFM (3pin)



Each lead has same dimensions

TO-247



Each lead has same dimensions

< > : JEDEC Code, [ ] : JEITA Code

Part No. Explanation

- When ordering, specify the part number.
- Check each code against the tables shown below.
- Fill in from the left, leaving any extra boxes empty on the right.

Example:

R	F	N	L	5	B	M	6	S	T	L

Part No. — Taping Code

•Packaging type

Package	Code	Package style	Direction	Basic ordering unit (pcs)
TO-252	TL	Embossed tape	Fin on sprocket hole side	2,500
LPDS	TL	Embossed tape	Fin on sprocket hole side	1,000
TO-220FN(3pin)	C9	Stick	box	1,000
TO-220FN(2pin)	C9	Stick	box	1,000
TO-247	C11	Stick	box	450
TO-220NFM	C9	Stick	box	1,000

Selector Guide for Automotive MOSFETs

Selector Guide for Automotive MOSFETs 1

Package (Dimension:mm)	Product No.			Single/ Dual	Polarity	Maximum Rating			R_{DS} (on) Typ. (mΩ)				$V_{GS(th)}$ (V)		Qg typ.	Ciss typ.
						V_{DS} (V)	I_D (A)	V_{GS} (V)	V_{GS}=10V	V_{GS}=4.5V	V_{GS}=2.5V	V_{GS}=1.5V	min.	max.	V_{GS}=5V (nC)	V_{DS}=10V (pF)
 UMT3 (2021) (SC-70) <SOT-323>	**RJU003N03**	FRA	T106	Single	N	30	0.3	±12	—	800	1400	—	0.8	1.5	—	24
	RJU002N06	FRA	T106	Single	N	60	0.2	±12	—	1600	2200	—	0.5	1.5	—	18
	RHU003N03	FRA	T106	Single	N	30	0.3	±20	800	1200	—	—	1	2.5	—	20
	RHU002N06	FRA	T106	Single	N	60	0.25	±20	1700	2800	—	—	1	2.3	2.2 *1	15
 SMT3 (2928) (SC-59) <SOT-346>	**RJK005N03**	FRA	T146	Single	N	30	0.5	±12	—	400	650	—	0.8	1.5	2 *2	60
	RHK005N03	FRA	T146	Single	N	30	0.5	±20	350	510	—	—	1	2.5	—	45
	RHK003N06	FRA	T146	Single	N	60	0.3	±20	700	—	—	—	1	2.5	3 *1	33
 SST3 (2924) <SOT-23>	**RK7002A**	FRA	T116	Single	N	60	0.3	±20	700	1100 *4	—	—	1	2.5	3 *1	33
 TUMT3 (2021)	**RUF025N02**	FRA	TL	Single	N	20	2.5	±10	—	39	49	1.5	0.3	1.3	5 *2	370
	RTF025N03	FRA	TL	Single	N	30	2.5	±12	—	48	70	—	0.5	1.5	3.7 *2	270
	RTF016N05	FRA	TL	Single	N	45	1.6	±12	—	140	200	—	0.5	1.5	2.3 *2	150
	RSF015N06	FRA	TL	Single	N	60	1.5	±20	210	240	—	—	1	2.5	2	110
 TUMT6 (2021)	**RUL035N02**	FRA	TR	Single	N	20	3.5	±10	—	31	38	66	0.3	1	5.7 *2	460
	RTL035N03	FRA	TR	Single	N	30	3.5	±12	—	40	56	—	0.5	1.5	4.6 *2	350
	RTL020P02	FRA	TR	Single	P	20	2	±12	—	100	180	—	-0.7	-2	4.9 *2	430
	RSL020P03	FRA	TR	Single	P	30	2	±20	80	125	—	—	-1	-2.5	3.9	350
	RRL035P03	FRA	TR	Single	P	30	3.5	±20	36	52	—	—	-1	-2.5	8	800
 TSMT3 (2928) (SC-96)	**RUR040N02**	FRA	TL	Single	N	20	4	±10	—	25	33	55	0.3	1.3	8 *2	680
	RTR025N03	FRA	TL	Single	N	30	2.5	±12	—	66	95	—	0.5	1.5	3.3 *2	220
	RTR040N03	FRA	TL	Single	N	30	4	±12	—	34	47	—	0.5	1.5	5.9 *2	475
	RTR020N05	FRA	TL	Single	N	45	2	±12	—	130	180	—	0.5	1.5	2.9 *2	200
	RTR025N05	FRA	TL	Single	N	45	2.5	±12	—	95	125	—	0.5	1.5	3.2 *2	250
	RTR030N05	FRA	TL	Single	N	45	3	±12	—	48	68	—	0.5	1.5	6.2 *2	510
	RSR025N03	FRA	TL	Single	N	30	2.5	±20	50	74	—	—	1	2.5	2.9	165
	RSR025N05	FRA	TL	Single	N	45	2.5	±20	70	95	—	—	1	3	3.6	260
	RSR020N06	FRA	TL	Single	N	60	2	±20	120	140	—	—	1	2.5	2.7	180
	RSR030N06	FRA	TL	Single	N	60	3	±20	60	70	—	—	1	2.5	5	380
	RSR010N10	FRA	TL	Single	N	100	1	±20	370	400	—	—	1	2.5	3.5	140
	RTR020P02	FRA	TL	Single	P	-20	-2	±12	—	100	180	—	-0.7	-2	4.9 *2	430
	RTR025P02	FRA	TL	Single	P	-20	-2.5	±12	—	70	115	—	-0.7	-2	7 *2	630
	RTR030P02	FRA	TL	Single	P	-20	-3	±12	—	55	90	—	-0.7	-2	9.3 *2	840
	RSR025P03	FRA	TL	Single	P	-30	-2.5	±20	70	100	—	—	-1	-2.5	5.4	460
	RRR030P03	FRA	TL	Single	P	-30	-3	±20	55	85	—	—	-1	-2.5	5.2	480
	RRR040P03	FRA	TL	Single	P	-30	-4	±20	32	45	—	—	-1	-2.5	10.5	1000
	RSR020P05	FRA	TL	Single	P	-45	-2	±20	130	180	—	—	-1	-3	9.5 *1	500
	RSR015P06	FRA	TL	Single	P	-60	-1.5	±20	200	240	—	—	-1	-3	10 *1	500
 TSMT6 (2928) (SC-95)	**RUQ050N02**	FRA	TR	Single	N	20	5	±10	—	22	27	40	0.3	1	12 *2	900
	RTQ035N03	FRA	TR	Single	N	30	3.5	±12	—	38	55	—	0.5	1.5	4.6 *2	285
	RTQ045N03	FRA	TR	Single	N	30	4.5	±12	—	30	42	—	0.5	1.5	7.6 *2	540
	RTQ020N05	FRA	TR	Single	N	45	2	±12	—	140	200	—	0.5	1.5	2.3 *2	150
	RSQ020N03	FRA	TR	Single	N	30	2	±20	96	148	—	—	1	2.5	2.2	110
	RSQ035N03	FRA	TR	Single	N	30	3.5	±20	44	60	—	—	1	2.5	5.3	290
	RSQ045N03	FRA	TR	Single	N	30	4.5	±20	27	36	—	—	1	2.5	6.8	520
	RVQ040N05	FRA	TR	Single	N	45	4	±21	38	47	—	—	1	2.5	6.3	530
	RSQ015N06	FRA	TR	Single	N	60	1.5	±20	210	240	—	—	1	2.5	2	110
	RSQ035N06	FRA	TR	Single	N	60	3.5	±20	50	58	—	—	1	3	6.5	430
	RTQ025P02	FRA	TR	Single	P	-20	-2.5	±12	—	72	140	—	-0.7	-2	6.4 *2	580
	RTQ035P02	FRA	TR	Single	P	-20	-3.5	±12	—	50	80	—	-0.7	-2	10.5 *2	1200
	RSQ025P03	FRA	TR	Single	P	-30	-2.5	±20	80	120	—	—	-1	-2.5	4.4	320
	RRQ030P03	FRA	TR	Single	P	-30	-3	±20	55	85	—	—	-1	-2.5	5.2	480
	RSQ035P03	FRA	TR	Single	P	-30	-3.5	±20	45	65	—	—	-1	-2.5	9.2	780
	RRQ045P03	FRA	TR	Single	P	-30	-4.5	±20	25	34	—	—	-1	-2.5	14	1350
	RSQ015P10	FRA	TR	Single	P	-100	-1.5	±20	350	380	—	—	-1	-2.5	17	950
	QS6K1	FRA	TR	Dual	N+N	30	1	±12	—	170	260	—	0.5	1.5	1.7 *2	77
	QS6K21	FRA	TR	Dual	N+N	45	1	±12	—	300	415	—	0.5	1.5	1.5 *2	95
 TSMT8 (3028)	**RQ1C075UN**	FRA	TR	Single	N	20	7.5	±10	—	11	14	20	0.3	1	18 *2	1400
	RQ1A070ZP	FRA	TR	Single	P	-12	-7	±10	—	8	11	19	-0.3	-1	58 *2	7400 *4
	RQ1E050RP	FRA	TR	Single	P	-30	-5	±20	22	32	—	—	-1	-2.5	13	1300
	RQ1E070RP	FRA	TR	Single	P	-30	-7	±20	12	17	—	—	-1	-2.5	26	2700
	QS8K2	FRA	TR	Dual	N+N	30	3.5	±12	—	38	55	—	0.5	1.5	4.6 *2	285
	QS8J4	FRA	TR	Dual	P+P	-30	-4	±20	40	55	—	—	-1	-2.5	8.4	800
	QS8M51	FRA	TR	Dual	N+P	100	2	±20	240	250	—	—	1	2.5	4.7	290 *3
						-100	-1.5	±20	350	380	—	—	-1	-2.5	17	950 *3

*1 V_{GS}=10V *2 V_{GS}=4.5V *3 V_{DS}=25V *4 V_{DS}=6V

Selector Guide for Automotive MOSFETs 2

Package (Dimension:mm)	Product No.			Single/ Dual	Polarity	Maximum Rating			R_{DS}(on) Typ. (mΩ)				$V_{GS(th)}$ (V)		Qg typ.	Ciss typ.
						V_{DS} (V)	I_D (A)	V_{GS} (V)	V_{GS}=10V	V_{GS}=4.5V	V_{GS}=2.5V	V_{GS}=1.5V	min.	max.	V_{GS}=5V (nC)	V_{DS}=10V (pF)
 MPT3 (4540) (SC-62) <SOT-89>	**RJP020N06**	FRA	T100	Single	N	60	2	±12	—	165	210	—	0.8	1.5	5 *2	160
	RHP030N03	FRA	T100	Single	N	30	3	±20	90	160 *4	—	—	1	2.5	6.5 *1	160
	RHP020N06	FRA	T100	Single	N	60	2	±20	150	200	—	—	1	2.5	7 *1	140
 SOP8 (5060)	**RSS090N03**	FRA	TB	Single	N	30	9	±20	11	15	—	—	1	2.5	11	810
	RSS100N03	FRA	TB	Single	N	30	10	±20	9.5	12.5	—	—	1	2.5	14	1070
	RSS130N03	FRA	TB	Single	N	30	13	±20	5.9	7.4	—	—	1	2.5	25	2000
	RSS070N05	FRA	TB	Single	N	45	7	±20	18	23	—	—	1	2.5	12	1000
	RSS085N05	FRA	TB	Single	N	45	8.5	±20	13	16	—	—	1	2.5	15.3	1500
	RSS095N05	FRA	TB	Single	N	45	9.5	±20	11	14	—	—	1	2.5	18.9	1830
	RSS065N06	FRA	TB	Single	N	60	6.5	±20	24	28	—	—	1	2.5	11	900
	RRS040P03	FRA	TB	Single	P	-30	-4	±20	55	85	—	—	-1	-2.5	5.2	480
	RRS050P03	FRA	TB	Single	P	-30	-5	±20	36	52	—	—	-1	-2.5	9.2	850
	RRS075P03	FRA	TB	Single	P	-30	-7.5	±20	15	22	—	—	-1	-2.5	21	1900
	RRS090P03	FRA	TB	Single	P	-30	-9	±20	11	15	—	—	-1	-2.5	30	3000
	RRS100P03	FRA	TB	Single	P	-30	-10	±20	9	12.5	—	—	-1	-2.5	39	3600
	RRS140P03	FRA	TB	Single	P	-30	-14	±20	5	6.7	—	—	-1	-2.5	80	8000
	RSS060P05	FRA	TB	Single	P	-45	-6	±20	26	35	—	—	-1	-2.5	23	2700
	RSS070P05	FRA	TB	Single	P	-45	-7	±20	19	25	—	—	-1	-2.5	34	4100
	SP8K5	FRA	TB	Dual	N+N	30	3.5	±20	59	93	—	—	1	2.5	2.5	140
	SP8K1	FRA	TB	Dual	N+N	30	5	±20	36	52	—	—	1	2.5	3.9	230
	SP8K2	FRA	TB	Dual	N+N	30	6	±20	21	30	—	—	1	2.5	7.2	520
	SP8K3	FRA	TB	Dual	N+N	30	7	±20	17	23	—	—	1	2.5	8.4	600
	SP8K22	FRA	TB	Dual	N+N	45	4.5	±20	33	41	—	—	1	2.5	6.8	550
	SP8K23	FRA	TB	Dual	N+N	45	5	±20	26	33	—	—	1	2.5	8.6	700
	SP8K24	FRA	TB	Dual	N+N	45	6	±20	18	24	—	—	1	2.5	15.4	1400
	SP8K31	FRA	TB	Dual	N+N	60	3.5	±20	85	100	—	—	1	2.5	3.7	250
	SP8K32	FRA	TB	Dual	N+N	60	4.5	±20	46	52	—	—	1	2.5	7	500
	SP8K33	FRA	TB	Dual	N+N	60	5	±20	34	38	—	—	1	2.5	8	620
	SP8K52	FRA	TB	Dual	N+N	100	3	±20	120	130	—	—	1	2.5	8.5	610 *3
	SP8J5	FRA	TB	Dual	P+P	-30	-7	±20	20	25	—	—	1	2.5	2.5	2600
	SP8J66	FRA	TB	Dual	P+P	-30	-9	±20	13.5	17.5	—	—	-1	-2.5	35	3000
	SP8M1	FRA	TB	Dual	N+P	30	4	±20	36	52	—	—	1	2.5	3.9	230
						-30	-4	±20	40	57	—	—	-1	-2.5	8.5	850
	SP8M3	FRA	TB	Dual	N+P	30	5	±20	36	52	—	—	1	2.5	3.9	230
						-30	-4.5	±20	40	57	—	—	-1	-2.5	8.5	850
	SP8M4	FRA	TB	Dual	N+P	30	9	±20	12	16	—	—	1	2.5	15	1190
						-30	-7	±20	20	25	—	—	-1	-2.5	25	2600
	SP8M5	FRA	TB	Dual	N+P	30	6	±20	21	30	—	—	1	2.5	7.2	520
						-30	-7	±20	20	25	—	—	-1	-2.5	25	2600
	SP8M6	FRA	TB	Dual	N+P	30	5	±20	36	52	—	—	1	2.5	3.9	230
						-30	-3.5	±20	65	100	—	—	-1	-2.5	5.5	490
	SP8M8	FRA	TB	Dual	N+P	30	6	±20	21	30	—	—	1	2.5	7.2	520
						-30	-4.5	±20	40	57	—	—	-1	-2.5	8.5	850
	SP8M10	FRA	TB	Dual	N+P	30	7	±20	17	23	—	—	1	2.5	8.4	600
						-30	-4.5	±20	40	57	—	—	-1	-2.5	8.5	850
	SP8M21	FRA	TB	Dual	N+P	45	6	±20	18	24	—	—	1	2.5	15.4	1400
						-45	-4	±20	33	43	—	—	-1	-2.5	20	2400
	SP8M24	FRA	TB	Dual	N+P	45	4.5	±20	33	41	—	—	1	2.5	6.8	550
						-45	-3.5	±20	45	60	—	—	-1	-2.5	13	1700
	SP8M41	FRA	TB	Dual	N+P	80	3.4	±20	90	110	—	—	1	2.5	6.6	600
						-80	-2.6	±20	165	220	—	—	-1	-2.5	8.2	1000
	SP8M51	FRA	TB	Dual	N+P	100	3	±20	120	130	—	—	1	2.5	8.5	610
						-100	-2.5	±20	210	230	—	—	-1	-2.5	12.5	1550

*1 V_{GS}=10V *2 V_{GS}=4.5V *3 V_{DS}=25V *4 V_{DS}=6V

Bipolar Transistors (Surface mount type)

Bipolar Transistors (Surface mount type) 1

Package / Polarity / Application	**VMT3** (1212) (SC-105AA)		**EMT3F** (1616) (SC-89)		**EMT3** (1616) (SC-75A)<SOT-416>		V_{CEO} (V)	I_C (A)	h_{FE}*2
	 *1 P_D=0.15W		 *1 P_D=0.15W		 *1 P_D=0.15W				
	PNP	**NPN**	**PNP**	**NPN**	**PNP**	**NPN**			
General Purpose Amplification	**2SA2029FHAT2L**	**2SC5658FHAT2L**	**2SA1774EBHZGTL**	**2SC4617EBHZGT**	**2SA1774FRATL**	**2SC4617FRATL**	50	0.15	120 to 390

Notes : 1.*1 With reference land installed 2.*2 For h_{FE}, please see the technical specifications. 3.PNP (-)symbol omitted.

Bipolar Transistors (Surface mount type) 2

Package / Polarity / Application	**UMT3F** (2021) (SC-85)		**UMT3** (2021) (SC-70)<SOT-323>		**SMT3** (2928) (SC-59)<SOT-346>		V_{CEO} (V)	I_C (A)	h_{FE}*2
	 *1 P_D=0.2W		 *1 P_D=0.2W		 *1 P_D=0.2W				
	PNP	**NPN**	**PNP**	**NPN**	**PNP**	**NPN**			
General Purpose Amplification	**2SA1576UBHZGTL**	**2SC4081UBHZGTL**	**2SA1576AFRAT106**	**2SC4081FRAT106**	**2SA1037AKFRAT146**	**2SC2412KFRAT146**	50	0.15	120 to 390
	—	—	**2SA1579FRAT106**	**2SC4102FRAT106**	**2SA1514KFRAT146**	**2SC3906KFRAT146**	120	0.05	180 to 560
Low V_{CE} (sat)	—	—	**2SB1694FRAT106**	**2SD2656FRAT106**	—	—	30	1	270 to 680
Driver	—	—	—	—	**2SA1036KFRAT146**	**2SC2411KFRAT146**	32	0.5	120 to 390
	—	—	—	—	**2SB1197KFRAT146**	**2SD1781KFRAT146**	32	0.8	120 to 390
	—	—	—	—	—	**2SD1484KFRAT146**	50	0.5	120 to 390
	—	—	—	—	**2SB1198KFRAT146**	**2SD1782KFRAT146**	80	0.5	120 to 390
High speed SW	—	—	**2SA2088FRAT106**	**2SC5876FRAT106**	—	—	60	0.5	120 to 270 120 to 390

Notes : 1.*1 With reference land installed 2.*2 For h_{FE}, please see the technical specifications. 4.PNP (-)symbol omitted.

Bipolar Transistors (Surface mount type) 3

Package / Polarity / Application	**MPT3** (4540) (SC-62)<SOT-89>		**CPT3** (SC-63)<SOT-428>		**LPT** (SC-83)		V_{CEO} (V)	I_C (A)	h_{FE}*2
	 *1 P_D=0.5W		 *1 P_D=1W		 *4 P_D=30W				
	PNP	**NPN**	**PNP**	**NPN**	**PNP**	**NPN**			
Driver	**2SAR293PFRAT100**	**2SCR293PFRAT100**	—	—	—	—	30	1	270 to 680
	2SAR512PFRAT100	**2SCR512PFRAT100**	—	—	—	—	30	2	200 to 500
	2SAR552PFRAT100	**2SCR552PFRAT100**	—	—	—	—	30	3	200 to 500
	2SAR542PFRAT100	**2SCR542PFRAT100**	**2SAR572DFHGTL**	**2SCR572DFHGTL**	—	—	30	5	200 to 500
	2SAR513PFRAT100	**2SCR513PFRAT100**	—	—	—	—	50	1	180 to 450
	2SAR553PFRAT100	**2SCR553PFRAT100**	—	—	—	—	50	2	180 to 450
	2SAR533PFRAT100	**2SCR533PFRAT100**	**2SAR573DFHGTL**	**2SCR573DFFHGTL**	—	—	50	3	180 to 450
	2SAR514PFRAT100	**2SCR514PFRAT100**	—	—	—	—	80	0.7	120 to 390
	2SB1260FRAT100	**2SD1898FRAT100**	—	—	—	—	80	1	120 to 390
	2SAR554PFRAT100	**2SCR554PFRAT100**	—	—	—	—	80	1.5	120 to 390
	—	—	**2SAR574DFHGTL**	**2SCR574DFHGTL**	—	—	80	2	120 to 390
	2SAR544PFRAT100	**2SCR544PFRAT100**	—	—	—	—	80	2.5	120 to 390
	—	—	—	—	**2SB1644JFRATL**	—	80	4	100 to 320
	—	**2SCR372PFRAT100**	—	—	—	—	120	0.7	120 to 390
	—	**2SCR375PFRAT100**	—	—	—	—	120	1.5	120 to 390

Notes :1.*1 With reference land installed 2.*2 For h_{FE}, please see the technical specifications. 4.*4 TC=25°C 5.PNP (-) symbol omitted.

Complex Bipolar Transistors

Complex Bipolar Transistors

Configuration / Item / Application	Equivalent circuit diagram (TOP View)	EMT6 (1616) (SC-107C)	UMT6 (2021) (SC-88) <SOT-363>	SMT6 (2928) (SC-74) <SOT-457>	Equivalent element transistors	V_{CEO} (V)	I_C (mA)	h_{FE}
PNP×2 Pre Amp.		**EMT1FHAT2R**	**UMT1NFHATN**	**IMT1AFRAT08**	2SA1037AK×2	-50	-150	120 to
		—	—	**IMT4FRAT08**	2SA1514K×2	-120	-50	180 to
NPN×2 Pre Amp.		**EMX1FHAT2R**	**UMX1NFHATN**	**IMX1FRAT08**	2SC2412K×2	50	150	120 to
		—	—	**IMX8FRAT08**	2SC3906K×2	120	50	180 to
PNP + NPN Pre Amp.		**EMZ1FHAT2R**	**UMZ1NFHATR**	**IMZ1AFRAT08**	2SA1037AK 2SC2412K	-50 50	-150 150	120 to 120 to

No.1 Pin is located on the upper right of equivalent circuit diagram for VMT6, EMT5, EMT6, UMT5, UMT6, TUMT5, TUMT6, TSMT5 and TSMT6 packages.
No.1 Pin is located on the lower right of equivalent circuit diagram for SMT5 and SMT6 packages.

Digital Transistors

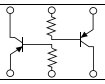
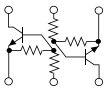
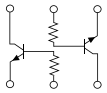
Digital Transistors

Specifications: Type / Item	Part No. PNP	Part No. NPN	R1 (kΩ)	R2 (kΩ)	Package: VMT3 (1212) (SC-105AA)	EMT3F (1616) (SC-89)	EMT3 (1616) (SC-75A) <SOT-416>	UMT3F (2021) (SC-85)	UMT3 (2021) (SC-70) <SOT-323>	SMT3 (2928) (SC-59) <SOT-346>	MPT3 (4540) (SC-62) <SOT-89>	V_{CC} (V_{CEO}) (V)	I_O (I_C) (mA)	GI (h_{FE})
					Pd=150mW			Pd=200mW			Pd=500mW			
R1=R2 Potential Divider Type / 100mA	**DTA123ExA※**	**DTC123ExA※**	2.2	2.2	●	—	●	—	●	●	—	50	100	20 to
	DTA143ExA※	**DTC143ExA※**	4.7	4.7	●	●	●	●	●	●	—	50	100	20 to
	DTA114ExA※	**DTC114ExA※**	10	10	●	●	●	●	●	●	—	50	50	30 to
	DTA124ExA※	**DTC124ExA※**	22	22	●	●	●	●	●	●	—	50	30	56 to
	DTA144ExA※	**DTC144ExA※**	47	47	●	●	●	●	●	●	—	50	30	68 to
R1 + R2 Leak Absorption Type / 100mA	**DTA113ZxA※**	**DTC113ZxA※**	1	10	—	—	DTA only	—	●	—	—	50	100	33 to
	DTA123YxA※	**DTC123YxA※**	2.2	10	—	—	●	—	●	—	—	50	100	33 to
	DTA123JxA※	**DTC123JxA※**	2.2	47	●	●	●	●	●	●	—	50	100	80 to
	DTA143XxA※	**DTC143XxA※**	4.7	10	●	●	●	●	●	●	—	50	100	30 to
	DTA143ZxA※	**DTC143ZxA※**	4.7	47	●	●	●	●	●	●	—	50	100	80 to
	DTA114YxA※	**DTC114YxA※**	10	47	●	●	●	●	●	●	—	50	70	68 to
	DTA124XxA※	**DTC124XxA※**	22	47	●	—	●	—	●	—	—	50	50	68 to
	1A —	**DTDG23YP※***	2.2	10	—	—	—	—	—	—	●	60±10	1000	300 to
Type using R1 alone as input Resistor / 100mA	**DTA143TxA※**	**DTC143TxA※**	4.7	—	●	●	●	●	●	—	—	50	100	100 to 600
	DTA114TxA※	**DTC114TxA※**	10	—	●	●	●	●	●	—	—	50	100	100 to 600
	DTA124TxA※	**DTC124TxA※**	22	—	●	—	●	—	●	—	—	50	100	100 to 600
	DTA144TxA※	**DTC144TxA※**	47	—	●	—	●	—	●	—	—	50	100	100 to 600
Type using R2 alone as Bleeder Resistor / 100mA	**DTA114GxA※**	**DTC114GxA※**	—	10	—	—	—	—	●	—	—	50	100	30 to
	DTA124GxA※	**DTC124GxA※**	—	22	—	—	—	—	DTC only	—	—	50	100	68 to
	DTA144GxA※	**DTC144GxA※**	—	47	—	—	—	—	●	—	—	50	100	68 to
	1A —	**DTDG14GP※***	—	10	—	—	—	—	—	—	●	60±10	1000	300 to
x :Packaging designation symbol					M	EB	E	UB	U	K	P			
※ :Specifications+ Packaging type					FHAT2L	HZGTL	FRATL	HZGTL	FRAT106	FRAT146	FRAT100			

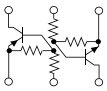
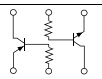
Notes : 1.*For internal circuit, please see the technical specifications. 2. VMT3, EMT3F,EMT3 and UMT3F without suffix A. 3. PNP (-) symbol omitted.

Complex Digital Transistors

Complex Digital Transistors 1

Configuration	Equivalent circuit diagram (TOP View)	EMT6 (1616) (SC-107C)	UMT6 (2021) (SC-88) <SOT-363>	SMT6 (2928) (SC-74) <SOT-457>	Equivalent element transistors	R1 (kΩ)	R2 (kΩ)
							
		Part No.					
PNP ×2 (100mA)		EMB10FHAT2R	UMB10NFHATN	IMB10AFRAT110	DTA123J×2	2.2	47
		EMB11FHAT2R	UMB11NFHATN	IMB11AFRAT110	DTA114E×2	10	10
		EMB2FHAT2R	UMB2NFHATN	IMB2AFRAT110	DTA144E×2	47	47
		EMB3FHAT2R	UMB3NFHATN	IMB3AFRAT110	DTA143T×2	4.7	—
		EMB4FHAT2R	UMB4NFHATN	—	DTA114T×2	10	—
NPN ×2 (100mA)		EMH10FHAT2R	UMB10NFHATN	—	DTC123J×2	2.2	47
		EMH25FHAT2R	—	—	DTC143Z×2	4.7	47
		EMH11FHAT2R	UMH11NFHATN	IMH11AFRAT110	DTC114E×2	10	10
		EMH9FHAT2R	UMH9NFHATN	IMH9AFRAT110	DTC114Y×2	10	47
		EMH1FHAT2R	UMH1NFHATN	IMH1AFRAT110	DTC124E×2	22	22
		EMH2FHAT2R	UMH2NFHATN	IMH2AFRAT110	DTC144E×2	47	47
		EMH3FHAT2R	UMH3NFHATN	IMH3AFRAT110	DTC143T×2	4.7	—
		EMH4FHAT2R	UMH4NFHATN	IMH4AFRAT110	DTC114T×2	10	—
		EMH15FHAT2R	—	IMH15AFRAT110	DTC144T×2	47	—

Complex Digital Transistors 2

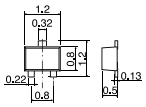
Configuration	Equivalent circuit diagram (TOP View)	EMT6 (1616) (SC-107C)	UMT6 (2021) (SC-88) <SOT-363>	SMT6 (2928) (SC-74) <SOT-457>	Equivalent element transistors	R1 (kΩ)	R2 (kΩ)
							
		Part No.					
PNP+NPN (100mA) complimentary		EMD22FHAT2R	UMD22NFHATR	—	DTA143Z DTC143Z	4.7 4.7	47 47
		EMD3FHAT2R	UMD3NFHATR	IMD3AFRAT108	DTA114E DTC114E	10 10	10 10
		EMD9FHAT2R	UUMD9NFHATR	IMD9AFRAT108	DTA114Y DTC114Y	10 10	47 47
		EMD2FHAT2R	UMD2NFHATR	IMD2AFRAT108	DTA124E DTC124E	22 22	22 22
		EMD12FHAT2R	UMD12NFHATR	—	DTA144E DTC144E	47 47	47 47
		EMD6FHAT2R	UMD6NFHATR	IMD6AFRAT108	DTA143T DTC143T	4.7 4.7	— —

No.1 Pin is located on the upper right of equivalent circuit diagram for EMT5, EMT6, UMT5 and UMT6 packages. No.1 Pin is located on the lower right of equivalent circuit diagram for SMT5 and SMT6 packages.

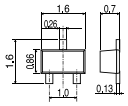
Packages

●Dimensions (Unit : mm)

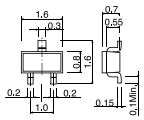
VMT3
〔SC-105AA〕



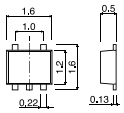
EMT3F
〔SC-89〕



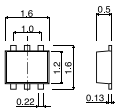
EMT3
〔SC-75A〕
〈SOT-416〉



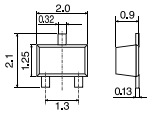
EMT5
〔SC-107BB〕



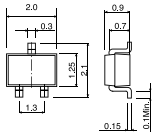
EMT6
〔SC-107C〕



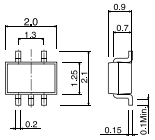
UMT3F
〔SC-85〕



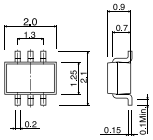
UMT3
〔SC-70〕
〈SOT-323〉



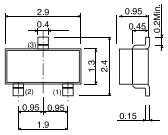
UMT5
〔SC-88A〕
〈SOT-353〉



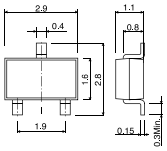
UMT6
〔SC-88〕
〈SOT-363〉



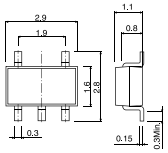
SST3
〈SOT-23〉



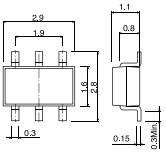
SMT3
〔SC-59〕
〈SOT-346〉



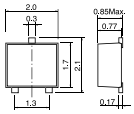
SMT5
〔SC-74A〕



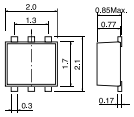
SMT6
〔SC-74〕
〈SOT-457〉



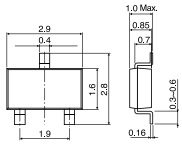
TUMT3



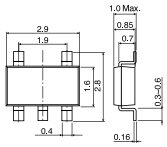
TUMT6



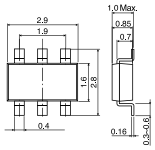
TSMT3
〔SC-96〕



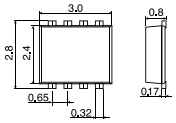
TSMT5



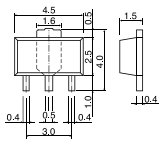
TSMT6
〔SC-95〕



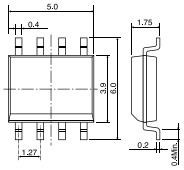
TSMT8



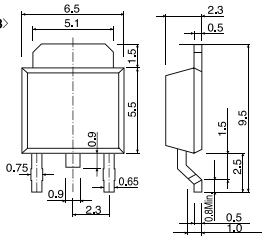
MPT3
〔SC-62〕
〈SOT-89〉



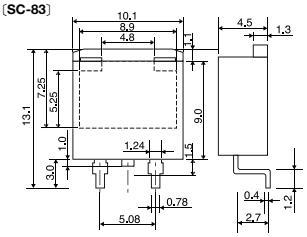
SOP8



CPT3 (D-PAK)
〔SC-63〕
〈SOT-428〉



LPT(S) (D2-PAK)
〔SC-83〕



Notes: 1. Characters in [ ] under package designation denotes JEITA No. Characters in < > under package designation denotes Code No. 2. For details of dimensions, please refer to the technical specifications.

Schottky Barrier Diodes

●Quick Reference for Small Signal Type Schottky Barrier Diodes

V_R (V)	I_O (mA)	Package											
		1006 Size		1406 Siz		1608 Siz		2512 Siz	
									
		VMN2 (SOD923)		VMD2 (SOD723)		EMD2 (SOD523)		UMD2 (SOD323F)	
30	30	**RB751CS-40**	1	**RB751G-40**	4	**RB751SM-40**	9	**RB751VM-40**	24
	100	**RB520CS-30** **RB521CS-30**	2 3	**RB520G-30** **RB521G-30**	5 6	New **RB510SM-30** New **RB511SM-30** New **RB500SM-30** New **RB501SM-30**	10 11 12 13	New **RB510VM-30** New **RB511VM-30** **RB530VM-30** New **RB531VM-30**	25 26 27 28
	200					**RB520SM-30** **RB521SM-30** New **RB530SM-30** New **RB531SM-30**	14 15 16 17	New **RB520VM-30** New **RB521VM-30** New **RB540VM-30** New **RB541VM-30**	29 30 31 32
	500							New **RB550VM-30**	33
40	100			New **RB520G-40** New **RB521G-40**	7 8	New **RB530SM-40** New **RB531SM-40**	18 19	**RB530VM-40** **RB531VM-40** New **RB500VM-40** **RB501VM-40**	34 35 36 37
	200					New **RB540SM-40** New **RB541SM-40** **RB520SM-40** **RB521SM-40**	20 21 22 23	New **RB540VM-40** New **RB541VM-40** New **RB520VM-40** New **RB521VM-40**	38 39 40 41

V_R (V)	I_O (mA)	Package									
		1212 Size		1616 Size		1616 Size		1616 Size		2120 Size	
											
		VMD3 (SOT723)		EMD3 (SOT523)		EMD3F (SOT490)		EMD4 (SOT543)		UMD3 (SOT323)	
30	100			**RB557W** **RB558W** **RB548W**	49 51 52	New **RB558WM**	54	**RB481Y** **RB480Y**	61 62		
40	30	**RB715Z**	42	**RB715W** **RB706W-40**	43 53						
	100									**RB715F** **RB717F** **RB706F-40**	44 50 55
	200							**RB481Y-40** **RB480Y-40**	63 64	**RB451F** **RB450F**	57 58
90	100							**RB481Y-90** **RB480Y-90**	65 66		

V_R (V)	I_O (mA)	Package											
		2120 Size		2120 Size		2120 Size		2928 Size		2928 Size		2928 Size	
													
		UMD3F (SOT323F)		UMD4 (SOT-343)		UMD6 (SOT363)		SMD3 (SOT346)		SMD5 (SOT25)		SMD6 (SOT457)	
25	400							**RB495D**	46				
30	30											**RB731U**	74
	100					**RB531XN** **RB530XN** **RB541XN**	70 71 72						
40	30			**RB481K**	67	**RB731XN**	73	**RB705D** **RB706D-40**	47 56				
	100	New **RB715UM**	45					**RB425D** **RB421D** **RB420D**	48 59 60	**RB471E**	69		
	200			**RB480K**	68								

●Quick Reference for Middle Power Schottky Barrier Diodes

V_R (V)	I_O (A)	Package: 2514 Size — TUMD2M		Package: 3516 Size — PMDU (SOD123)		Package: 5026 Size — PMDS (SOD106)	
30	1	New RB550VYM-30 New RSX101VYM30 New RB168VYM-30	1 2 3	New RB162MM-30 New RB160MM-30 New RSX101MM-30 New RBR1MM30A New RB168MM-30	14 15 16 17 18	New RBR1L30A New RB168L-30	50 51
	1.5	New RSX201VYM30	4	New RB070MM-30	19		
	2			New RB060MM-30 New RBR2MM30A New RBR2MM30B New RB068MM-30	20 21 22 24	RSX205L-30 RSX201L-30 New RBR2L30A New RB068L-30	52 53 54 55
	3			New RBR3MM30A	23	RSX301L-30 RB055L-30 New RBR3L30A New RBR3L30B New RB058L-30	56 57 58 59 60
	5					RB080L-30 New RBR5L30A New RBR5L30B	61 62 63
40	0.5	New RB400VYM-50	7				
	1	New RB160VYM-40 New RB168VYM-40	5 6	New RB162MM-40 New RB160MM-40 New RB168MM-40 New RBR1MM40A	25 26 27 28	RB162L-40 New RBR1L40A New RB168L-40	64 65 66
	2			New RB060MM-40 New RB068MM-40 New RBR2MM40A New RBR2MM40B New RBR2MM40C	29 30 31 32 33	RB060L-40 RB068L-40 New RBR2L40A	67 68 69
	3			New RBR3MM40A New RBR3MM40B	34 35	RB056L-40 RB055L-40 RB050L-40 RB058L-40 New RBR3L40A New RBR3L40B New RBR3L40C	70 71 72 73 74 75 76
	5					New RBR5L40A	77
60	1	New RB160VYM-60 New RB168VYM-60	8 9	New RB162MM-60 New RB160MM-60 New RBR1MM60A New RB168MM-60	36 37 38 39	RB162L-60 New RBR1L60A New RB168L-60	78 79 80
	2			New RB060MM-60 New RBR2MM60A New RBR2MM60B New RBR2MM60C New RB068MM-60	40 41 42 43 44	RB068L-60 New RBR2L60A New RBR2L60B	81 82 83
	3			New RBR3MM60A New RBR3MM60B	45 46	RB055L-60 RB050L-60 RB058L-60 New RBR3L60A New RBR3L60B	84 85 86 87 88
	5					New RBR5L60A	89
90	1			New RB160MM-90	47	RB160L-90	90
100	0.7	New RB578VYM100	10				
	1	New RB168VYM100	11	New RB168MM100	48	New RB168L100	91
	2					RB068L100	92
150	0.5	New RB558VYM150	12				
	1	New RB168VYM150	13	New RB168MM150	49	New RB168L150	93
	2					New RB068L150	94
	3					New RB058L150	95

V_R (V)	I_O (A)	Package: 2928 Size — SMD3 (SOT346)		Package: 2928 Size — TSMD5 (SOT23-5)	
20	0.5	RB411D	96		
30	0.1			RB552EA	98
	1.4			RB550EA	99
40	0.5	RB400D	97		

Schottky Barrier Diodes

Middle Power Schottky Barrier Diodes

Quick Reference No.	Product No.			Absolute Maximum Ratings (T_C=25°C)				Electrical Characteristics (T_j=25°C)*2				Package	Equivalent Circuit Diagram
				V_{RM} (V)	V_R (V)	I_O*1 (mA)	I_{FSM}(A)*2 60Hz.1cyc	V_F(V) Max.	I_F(mA)	I_R(μA) Max.	V_R(V)		
1	RB751CS-40	FH	T2RA	40	30	30	0.2	0.37	1	0.5	30	VMN2	
2	RB520CS-30	FH	T2RA	—	30	100	0.5	0.45	10	0.5	10		
3	RB521CS-30	FH	T2RA	—	30	100	0.5	0.35	10	10	10		
4	RB751G-40	FH	T2R	40	30	30	0.2	0.37	1	0.5	30	VMD2	
5	RB520G-30	FH	T2R	—	30	100	0.5	0.45	10	0.5	10		
6	RB521G-30	FH	T2R	—	30	100	0.5	0.35	10	10	10		
7	New RB520G-40	FH	T2R	40	40	100	0.5	0.71	100	15	40		
8	New RB521G-40	FH	T2R	40	40	100	0.5	0.61	100	100	40		
9	RB751SM-40	FH	T2R	40	30	30	0.2	0.37	1	0.5	30	EMD2	
10	New RB510SM-30	FH	T2R	30	30	100	0.5	0.46	10	0.3	10		
11	New RB511SM-30	FH	T2R	30	30	100	0.5	0.37	10	7	10		
12	New RB500SM-30	FH	T2R	30	30	100	0.5	0.45	10	0.5	10		
13	New RB501SM-30	FH	T2R	30	30	100	0.5	0.35	10	10	10		
14	RB520SM-30	FH	T2R	—	30	200	1	0.58	200	1	10		
15	RB521SM-30	FH	T2R	—	30	200	1	0.47	200	30	10		
16	New RB530SM-30	FH	T2R	30	30	200	1	0.45	10	0.5	10		
17	New RB531SM-30	FH	T2R	30	30	200	1	0.35	10	10	10		
18	New RB530SM-40	FH	T2R	40	40	100	0.5	0.71	100	15	40		
19	New RB531SM-40	FH	T2R	40	40	100	0.5	0.61	100	100	40		
20	New RB540SM-40	FH	T2R	40	40	200	0.5	0.71	100	15	40		
21	New RB541SM-40	FH	T2R	40	40	200	0.5	0.61	100	100	40		
22	RB520SM-40	FH	T2R	40	40	200	1	0.55	100	10	40		
23	RB521SM-40	FH	T2R	45	40	200	1	0.45	100	90	40		
24	RB751VM-40	FH	TE-17	40	30	30	0.2	0.37	1	0.5	30	UMD2	
25	New RB510VM-30	FH	TE-17	30	30	100	0.5	0.46	10	0.3	10		
26	New RB511VM-30	FH	TE-17	30	30	100	0.5	0.37	10	7	10		
27	RB530VM-30	FH	TE-17	30	30	100	0.5	0.45	10	0.5	10		
28	New RB531VM-30	FH	TE-17	30	30	100	0.5	0.35	10	10	10		
29	New RB520VM-30	FH	TE-17	30	30	200	1	0.58	200	1	10		
30	New RB521VM-30	FH	TE-17	30	30	200	1	0.47	200	30	10		
31	New RB540VM-30	FH	TE-17	30	30	200	0.5	0.45	10	0.5	10		
32	New RB541VM-30	FH	TE-17	30	30	200	0.5	0.35	10	30	10		
33	New RB550VM-30	FH	TE-17	30	30	500	1	0.59	500	30	30		
34	RB530VM-40	FH	TE-17	40	40	100	1	0.71	100	15	40		
35	RB531VM-40	FH	TE-17	40	40	100	1	0.61	100	100	40		
36	RB500VM-40	FH	TE-17	45	40	100	1	0.45	10	1	10		
37	RB501VM-40	FH	TE-17	45	40	100	1	0.55	100	30	10		
38	New RB540VM-40	FH	TE-17	40	40	200	0.5	0.71	100	15	40		
39	New RB541VM-40	FH	TE-17	40	40	200	0.5	0.61	100	100	40		
40	New RB520VM-40	FH	TE-17	40	40	200	1	0.55	100	10	40		
41	New RB521VM-40	FH	TE-17	40	40	200	1	0.45	100	90	40		
42	RB715Z	FH	T2L	40	40	30	0.2	0.37	1	1	10	VMD3	
43	RB715W	FH	TL	40	40	30	0.2	0.37	1	1	10	EMD3	
44	RB715F	FH	T106	40	40	30	0.2	0.37	1	1	10	UMD3	
45	New RB715UM	FH	TL	40	40	30	0.2	0.37	1	1	10	UMD3F	
46	RB495D	FH	T146	40	25	400	2	0.5	200	70	25	SMD3	
47	RB705D	FH	T146	40	40	30	0.2	0.37	1	1	10		
48	RB425D	FH	T146	40	40	100	1	0.55	100	30	10		
49	RB557W	FH	TL	—	30	100*2	0.5	0.35	10	10	10	EMD3	
50	RB717F	FH	T106	40	40	30*2	0.2	0.37	1	1	10	UMD3	
51	RB558W	FH	TL	—	30	100*2	0.5	0.35	10	10	10	EMD3	
52	RB548W	FH	TL	—	30	100*2	0.5	0.45	10	0.5	10		
53	RB706W-40	FH	TL	45	40	30	0.2	0.37	1	1	10		
54	New RB558WM	FH	TL	—	30	100*2	0.5	0.49	100	10	10	EMD3F	
55	RB706F-40	FH	T106	45	40	30*2	0.2	0.37	1	1	10	UMD3	
56	RB706D-40	FH	T146	45	40	30	0.2	0.37	1	1	10	SMD3	
57	RB451F	FH	TL	40	40	100	1	0.55	100	30	10	UMD3	
58	RB450F	FH	TL	45	40	100	1	0.45	10	1	10		
59	RB421D	FH	T146	40	40	100	1	0.55	100	30	10	SMD3	
60	RB420D	FH	T146	40	40	100	1	0.45	10	1	10		
61	RB481Y	FH	T2R	—	30	100*2	1	0.43	100	30	10	EMD4	
62	RB480Y	FH	T2R	—	30	100*2	1	0.53	100	1	10		
63	RB481Y-40	FH	T2R	40	40	200	1	0.45	100	90	40		
64	RB480Y-40	FH	T2R	40	40	200	1	0.55	100	10	40		
65	RB481Y-90	FH	T2R	90	90	100*2	1	0.61	100	100	90		
66	RB480Y-90	FH	T2R	90	90	100*2	1	0.69	100	5	90		
67	RB481K	FH	TL	30	30	200*2	1	0.5	200	30	10	UMD4	
68	RB480K	FH	TL	45	40	100*2	1	0.6	100	1	10		
69	RB471E	FH	T148	40	40	100*2	1	0.55	100	30	10	SMD5	
70	RB531XN	FH	TR	—	30	100*2	1	0.43	100	30	10	UMD6	
71	RB530XN	FH	TR	—	30	100*2	1	0.53	100	1	10		
72	RB541XN	FH	TR	—	30	100	0.5	0.35	10	10	10		
73	RB731XN	FH	TR	40	40	30	0.2	0.37	1	1	10		
74	RB731U	FH	TL	40	40	30	0.2	0.37	1	1	10	SMD6	

*1 : Io : Average output current per chip. In case of 1, 2 or 3 chip diodes. Io indicates average output current of 1, 2 or 3 chips.
*2 : Value / Chip

Schottky Barrier Diodes

Middle Power Schottky Barrier Diodes

Quick Reference No.	Product No.			Absolute Maximum Ratings (T_C=25°C) V_{RM} (V)	V_R (V)	I_O*1 (A)	I_{FSM}(A)*2 60Hz.1cyc	Electrical Characteristics (T_j=25°C)*2 V_F(V) Max.	I_F(A)	I_R(mA) Max.	V_R(V)	Package	Equivalent Circuit Diagram
1	New RB550VYM-30	FH	TR	30	30	1	3	0.52	1	0.03	10	TUMD2M	
2	New RSX101VYM30	FH	TR	30	30	1	5	0.47	1	0.2	30		
3	New RB168VYM-30	FH	TR	30	30	1	5	0.73	1	0.0003	30		
4	New RSX201VYM30	FH	TR	30	30	1.5	8	0.46	1.5	0.3	30		
5	New RB160VYM-40	FH	TR	40	40	1	5	0.55	0.7	0.05	40		
6	New RB168VYM-40	FH	TR	40	40	1	5	0.79	1	0.0005	40		
7	New RB400VYM-50	FH	TR	50	40	0.5	3	0.55	0.5	0.05	30		
8	New RB160VYM-60	FH	TR	60	60	1	3	0.67	1	0.4	60		
9	New RB168VYM-60	FH	TR	60	60	1	5	0.82	1	0.001	60		
10	New RB578VYM100	FH	TR	100	100	0.7	5	0.85	0.7	0.0002	100		
11	New RB168VYM100	FH	TR	100	100	1	5	0.84	1	0.0003	100		
12	New RB558VYM150	FH	TR	150	150	0.5	3	0.95	0.5	0.0005	150		
13	New RB168VYM150	FH	TR	150	150	1	5	0.89	1	0.001	150		
14	New RB162MM-30	TF	TR	30	30	1	30	0.52	1	0.1	30	PMDU (Wide)	
15	New RB160MM-30	TF	TR	30	30	1	30	0.48	1	0.05	30		
16	New RSX101MM-30	TF	TR	30	30	1	45	0.39	1	0.2	30		
17	New RBR1MM30A	TF	TR	30	30	1	30	0.48	1	0.05	30		
18	New RB168MM-30	TF	TR	30	30	1	20	0.69	1	0.0006	30		
19	New RB070MM-30	TF	TR	30	30	1.5	30	0.49	1.5	0.05	30		
20	New RB060MM-30	TF	TR	30	30	2	55	0.49	2	0.05	30		
21	New RBR2MM30A	TF	TR	30	30	2	30	0.53	2	0.05	30		
22	New RBR2MM30B	TF	TR	30	30	2	30	0.49	2	0.08	30		
23	New RBR3MM30A	TF	TR	30	30	3	30	0.51	3	0.1	30		
24	New RB068MM-30	TF	TR	30	30	2	30	0.70	2	0.0008	30		
25	New RB162MM-40	TF	TR	40	40	1	30	0.55	1	0.1	40		
26	New RB160MM-40	TF	TR	40	40	1	30	0.51	1	0.03	40		
27	New RB168MM-40	TF	TR	40	40	1	30	0.65	1	0.00055	40		
28	New RBR1MM40A	TF	TR	40	40	1	20	0.52	1	0.05	40		
29	New RB060MM-40	TF	TR	40	40	2	30	0.56	2	0.5	40		
30	New RB068MM-40	TF	TR	40	40	2	30	0.725	2	0.00055	40		
31	New RBR2MM40A	TF	TR	40	40	2	20	0.62	2	0.05	40		
32	New RBR2MM40B	TF	TR	40	40	2	30	0.56	2	0.08	40		
33	New RBR2MM40C	TF	TR	40	40	2	30	0.54	2	0.10	40		
34	New RBR3MM40A	TF	TR	40	40	3	30	0.62	3	0.08	40		
35	New RBR3MM40B	TF	TR	40	40	3	30	0.58	3	0.10	40		
36	New RB162MM-60	TF	TR	60	60	1	20	0.65	1	0.1	60		
37	New RB160MM-60	TF	TR	60	60	1	30	0.55	1	0.05	60		
38	New RBR1MM60A	TF	TR	60	60	1	20	0.53	1	0.075	60		
39	New RB168MM-60	TF	TR	60	60	1	30	0.68	1	0.0015	60		
40	New RB060MM-60	TF	TR	60	60	2	30	0.61	2	0.05	60		
41	New RBR2MM60A	TF	TR	60	60	2	20	0.65	2	0.075	60		
42	New RBR2MM60B	TF	TR	60	60	2	30	0.58	2	0.1	60		
43	New RBR2MM60C	TF	TR	60	60	2	30	0.55	2	0.12	60		
44	New RB068MM-60	TF	TR	60	60	2	30	0.765	2	0.0015	60		
45	New RBR3MM60A	TF	TR	60	60	3	30	0.66	3	0.1	60		
46	New RBR3MM60B	TF	TR	60	60	3	30	0.61	3	0.12	60		
47	New RB160MM-90	TF	TR	90	90	1	30	0.73	1	0.1	90		
48	New RB168MM100	TF	TR	100	100	1	30	0.81	1	0.0006	100		
49	New RB168MM150	TF	TR	150	150	1	30	0.84	1	0.004	150		

*1 : Io : Average output current per chip. In case of 2 chip diodes. Io indicates average output current of 2 chips. *2 : Value / Chip

Schottky Barrier Diodes

Middle Power Schottky Barrier Diodes

Quick Reference No.	Product No.			Absolute Maximum Ratings (T_C=25°C)				Electrical Characteristics (T_j=25°C)*2				Package	Equivalent Circuit Diagram
				V_{RM} (V)	V_R (V)	I_O*1 (A)	I_{FSM}(A)*2 60Hz.1cyc	V_F(V) Max.	I_F(A)	I_R(mA) Max.	V_R(V)		
50	New RBR1L30A	DD	TE25	30	30	1	30	0.48	1	0.05	30	PMDS	
51	New RB168L-30	TF	TE25	30	30	1	20	0.69	1	0.0006	30		
52	RSX205L-30	TF	TE25	30	30	2	60	0.49	2	0.2	30		
53	RSX201L-30	DD	TE25	30	30	2	60	0.44	2	0.15	30		
54	New RBR2L30A	DD	TE25	30	30	2	40	0.49	2	0.08	30		
55	New RB068L-30	DD	TE25	30	30	2	40	0.70	1	0.0008	30		
56	RSX301L-30	DD	TE25	30	30	3	70	0.42	3	0.2	30		
57	RB055L-30	DD	TE25	30	30	3	55	0.55	3	0.05	30		
58	New RBR3L30A	DD	TE25	30	30	3	30	0.58	3	0.05	30		
59	New RBR3L30B	DD	TE25	30	30	3	40	0.53	3	0.08	30		
60	New RB058L-30	DD	TE25	30	30	3	70	0.68	3	0.0025	30		
61	RB080L-30	DD	TE25	30	30	5	70	0.51	5	0.15	30		
62	New RBR5L30A	DD	TE25	30	30	5	50	0.54	5	0.1	30		
63	New RBR5L30B	DD	TE25	30	30	5	50	0.49	5	0.15	30		
64	RB162L-40	TF	TE25	40	40	1	20	0.55	1	0.5	40		
65	New RBR1L40A	DD	TE25	40	40	1	30	0.52	1	0.05	40		
66	New RB168L-40	TF	TE25	40	40	1	30	0.65	1	0.00055	40		
67	RB060L-40	DD	TE25	40	40	2	70	0.5	2	1	40		
68	RB068L-40	DD	TE25	40	40	2	40	0.69	2	0.001	40		
69	New RBR2L40A	DD	TE25	40	40	2	40	0.55	2	0.08	40		
70	RB056L-40	TF	TE25	40	40	3	70	0.67	3	0.05	40		
71	RB055L-40	DD	TE25	40	40	3	40	0.65	3	0.5	40		
72	RB050L-40	DD	TE25	40	40	3	70	0.55	3	1	40		
73	RB058L-40	DD	TE25	40	40	3	70	0.7	3	0.005	40		
74	New RBR3L40A	DD	TE25	40	40	3	30	0.69	3	0.05	40		
75	New RBR3L40B	DD	TE25	40	40	3	40	0.62	3	0.08	40		
76	New RBR3L40C	DD	TE25	40	40	3	50	0.55	3	0.1	40		
77	New RBR5L40A	DD	TE25	40	40	5	50	0.53	5	0.2	40		
78	RB162L-60	TF	TE25	60	60	1	20	0.65	1	0.1	60		
79	New RBR1L60A	DD	TE25	60	60	1	30	0.53	1	0.075	60		
80	New RB168L-60	DD	TE25	60	60	1	30	0.68	1	0.0015	60		
81	RB068L-60	DD	TE25	60	60	2	40	0.7	2	0.002	60		
82	New RBR2L60A	DD	TE25	60	60	2	30	0.65	2	0.075	60		
83	New RBR2L60B	DD	TE25	60	60	2	50	0.52	2	0.15	60		
84	RB055L-60	DD	TE25	60	60	3	70	0.68	3	0.07	60		
85	RB050L-60	DD	TE25	60	60	3	70	0.52	2	0.1	60		
86	RB058L-60	DD	TE25	60	60	3	70	0.64	3	0.004	60		
87	New RBR3L60A	DD	TE25	60	60	3	40	0.66	3	0.1	60		
88	New RBR3L60B	DD	TE25	60	60	3	50	0.56	3	0.15	60		
89	New RBR5L60A	DD	TE25	60	60	5	50	0.55	5	0.25	60		
90	RB160L-90	TF	TE25	95	90	1	30	0.73	1	0.1	90		
91	New RB168L100	DD	TE25	100	100	1	30	0.81	1	0.0006	100		
92	RB068L100	DD	TE25	100	100	2	60	0.79	2	0.015	100		
93	New RB168L150	DD	TE25	150	150	1	30	0.84	1	0.004	150		
94	RB068L150	DD	TE25	150	150	2	50	0.81	2	0.003	150		
95	RB058L150	DD	TE25	150	150	3	50	0.85	3	0.003	150		
96	RB411D	FH	T146	40	20	0.5	3	0.5	0.5	0.03	10	SMD3	
97	RB400D	FH	T146	40	40	0.5	3	0.55	0.5	0.05	30		
98	RB552EA	FH	TR	30	30	1	7	0.59	0.5	0.008	15	TSMD5	
99	RB550EA	FH	TR	30	30	1.4	15	0.49	0.7	0.05	30		

*1 : Io : Average output current per chip. In case of 2 chip diodes. Io indicates average output current of 2 chips. *2 : Value / Chip

Rectifier Diodes

●Quick Reference for Rectifier Diodes

	V_{RM} (V)	Io (A)	Surface Mount Type									
												
			2513 Size TUMD2S		2514 Size TUMD2SM		3516 Size PMDU (SOD123)		5026 Size PMDS (SOD106)		2928 Size TSMD5 (SOT23-5)	
General Purpose Rectifier Diodes	400	0.2	**RRE02VS4S**	1	New **RRE02VTM4S**	4						
		0.4									**RRE04EA4D**	14
		0.5									**RR274EA-400**	15
		0.7	**RRE07VS4S**	2	New **RRE07VTM4S**	5	**RR264M-400** New **RR264MM-400**	8 9				
		1							**1SR154-400**	10		
		2							**RR2L4S**	11		
	600	0.2	**RRE02VS6S**	3	New **RRE02VTM6S**	6						
		0.7			New **RRE07VTM6S**	7						
		1							**1SR154-600**	12		
		2							**RR2L6S**	13		
High-speed Rectifier Diodes	600	1							**1SR156-400**	16		

General Purpose Rectifier Diodes

Quick Reference No.	Product No.			Absolute Maximum Ratings (T_C=25°C)				Electrical Characteristics (T_j=25°C)*2							Package	Equivalent Circuit Diagram
				V_{RM} (V)	V_R (V)	Io (A)	I_{FSM}(A) 60Hz.1cyc	V_F(V) Max.	I_F(A)	I_R(μA) Max.	V_R(V)	trr(ns) Max.	I_F(mA)	I_R(mA)		
1	**RRE02VS4S**	FH	TR	400	400	0.2	1	1.1	0.2	1	400	—	—	—	TUMD2S	
2	**RRE07VS4S**	FH	TR	400	400	0.7	2	1.1	0.7	1	400	—	—	—		
3	**RRE02VS6S**	FH	TR	600	600	0.2	1	1.1	0.2	1	600	—	—	—		
4	New **RRE02VTM4S**	FH	TR	400	400	0.2	1	1.1	0.2	1	400	—	—	—	TUMD2SM	
5	New **RRE07VTM4S**	FH	TR	400	400	0.7	2	1.1	0.7	1	400	—	—	—		
6	New **RRE02VTM6S**	FH	TR	600	600	0.2	1	1.1	0.2	1	600	—	—	—		
7	New **RRE07VTM6S**	FH	TR	600	600	0.7	2	1.1	0.7	1	600	—	—	—		
8	**RR264M-400**	TF	TR	400	400	0.7	25	1.1	0.7	10	400	—	—	—	PMDU	
9	New **RR264MM-400**	TF	TR	400	400	0.7	25	1.1	0.7	10	400	—	—	—	PMDU (Wide)	
10	**1SR154-400**	TF	TE25	500	400	1	30	1.1	1	10	400	—	—	—	PMDS	
11	**RR2L4S**	DD	TE25	400	400	2	50	1.1	2	10	400	—	—	—		
12	**1SR154-600**	TF	TE25	750	600	1	30	1.1	1	10	600	—	—	—		
13	**RR2L6S**	DD	TE25	600	600	2	50	1.1	2	10	600	—	—	—		
14	**RRE04EA4D**	FH	TR	400	400	0.4*1	2	1.1	0.2	1	400	—	—	—	TSMD5	
15	**RR274EA-400**	FH	TR	400	400	1*1	8	1.1	0.5	10	400	—	—	—		
High-speed Rectifier Diodes																
16	**1SR156-400**	TF	TE25	500	400	1	20	1.3	0.8	10	400	400	10	10	PMDS	

*1 : Io : Average output current per chip. In case of 2 chip diodes. Io indicates average output current of 2 chips. *2 : Value / Chip

Fast Recovery Diodes

●Quick Reference for Fast Recovery Diodes

V_{RM} (V)	Io (A)	Surface Mount Type															
															
		1608 Size EMD2 (SOD523)		2512 Size UMD2 (SOD323F)		2513 Size TUMD2		2514 Size TUMD2M		3516 Size PMDU (SOD123)		5026 Size PMDS (SOD106)		2928 Size TSMD6 (SOT23-6)	
100	0.5					**RF05VA1S**	3	New **RF05VYM1S**	5						
200	0.1			**RF01VM2S**	2										
	0.4													**RF04UA2D**	21
	0.5					**RF05VA2S**	4	New **RF05VYM2S**	6						
	0.7									**RF071M2S**	7
										New **RF071MM2S**	8				
	0.8									**RF081M2S**	9
										New **RF081MM2S**	10				
	1											**RF101L2S**	11
												RF081L2S	12		
	2											**RF201L2S**	13		
400	0.7											**RF071L4S**	14		
	1											**RF101L4S**	15		
	1.5											**RF201L4S**	16
												RFN2L4S	17		
450	0.1	**RFU01SM4S**	1												
600	0.8											**RFN1L6S**	18		
	1.5											**RFN2L6S**	19		
700	0.8											**RFN1L7S**	20		

Fast Recovery Diodes

Quick Reference No.	Product No.			Absolute Maximum Ratings (T_C=25°C)				Electrical Characteristics (T_j=25°C)*2							Package	Equivalent Circuit Diagram
				V_{RM} (V)	V_R (V)	Io (A)	I_{FSM}(A) 60Hz.1cyc	V_F(V) Max.	I_F(A)	I_R(μA) Max.	V_R(V)	trr(ns) Max.	I_F(A)	I_R(A)		
1	**RFU01SM4S**	FH	T2R	450	450	0.1	1	1.8	0.1	10	450	35	0.1	0.1	EMD2	
2	**RF01VM2S**	FH	TE25	250	250	0.1	1	1.2	0.1	10	250	50	＊		UMD2	
3	**RF05VA1S**	FH	TR	100	100	0.5	6	0.98	0.5	10	100	25	0.5	1	TUMD2	
4	**RF05VA2S**	FH	TR	200	200	0.5	6	0.98	0.5	10	200	25	0.5	1		
5	New **RF05VYM1S**	FH	TR	100	100	0.5	6	0.98	0.5	10	100	25	0.5	1	TUMD2M	
6	New **RF05VYM2S**	FH	TR	200	200	0.5	6	0.98	0.5	10	200	25	0.5	1		
7	**RF071M2S**	DD	TR	200	200	0.7	15	0.85	0.7	10	200	25	0.5	1	PMDU	
8	**RF081M2S**	DD	TR	200	200	0.8	20	0.95	0.8	10	200	25	0.5	1		
9	New **RF071MM2S**	DD	TR	200	200	0.7	15	0.85	0.7	10	200	25	0.5	1	PMDU (Wide)	
10	New **RF081MM2S**	DD	TR	200	200	0.8	20	0.95	0.8	10	200	25	0.5	1		
11	**RF101L2S**	TF	TE25	200	200	1	20	0.87	1	10	200	25	0.5	1	PMDS	
12	**RF081L2S**	TF	TE25	200	200	1.1	25	0.98	1	10	200	25	0.5	1		
13	**RF201L2S**	TF	TE25	200	200	2	20	0.87	2	10	200	25	0.5	1		
14	**RF071L4S**	TF	TE25	400	400	1	15	1.25	0.7	10	400	25	0.5	1		
15	**RF101L4S**	TF	TE25	400	400	1	25	1.25	1	10	400	25	0.5	1		
16	**RF201L4S**	TF	TE25	400	400	1.5	50	1.2	1.5	1	400	30	0.5	1		
17	**RFN2L4S**	DD	TE25	400	400	1.5	50	1.2	1.5	1	400	30	0.5	1		
18	**RFN1L6S**	DD	TE25	600	600	0.8	15	1.45	0.8	1	600	35	0.5	1		
19	**RFN2L6S**	DD	TE25	600	600	1.5	40	1.55	1.5	1	600	35	0.5	1		
20	**RFN1L7S**	DD	TE25	700	700	0.8	15	1.5	0.8	1	700	80	0.5	1		
21	**RF04UA2D**	FH	TR	200	200	0.4*1	1	0.98	0.2	10	200	25	0.5	1	TSMD6	

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＊V_R=6V, I_F=10mA, Irr=0.1I_R

Zener Diodes (Including TVS)

2-Terminal (Single) 4-Terminal (Dual) Zener Diodes

Package	Surface Mount Type																	
	1006 Size VMN2 (SOD923)			1608 Size EMD2 (SOD523)			2512 Size UMD2 (SOD323F)			2513 Size TUMD2			2514 Size TUMD2M					
Equivalent Circuit Diagram																		
Series Name	CDZFH Series			EDZVFH Series			UDZVFH Series			TFZFH Series			New YFZVFH Series					
Power(mW)	100			150			200			500			500					
Taping Code	T2RA			T2R			TE-17			TR			TR					
Electrical Characteristics (Ta=25°C)	V_Z (V)		I_Z (mA)	V_Z (V)		I_Z (mA)	V_Z (V)		I_Z (mA)	V_Z (V)		I_Z (mA)	V_Z (V)		I_Z (mA)			
Voltage	2.0B	2.02 to 2.20	5	2.0B	2.02 to 2.20	5	2.0B	2.02 to 2.20	5	2.0B	2.02 to 2.20	20	—	—	—			
	2.2B	2.22 to 2.41	5	2.2B	2.22 to 2.41	5	2.2B	2.22 to 2.41	5	2.2B	2.22 to 2.41	20	—	—	—			
	2.4B	2.43 to 2.63	5	2.4B	2.43 to 2.63	5	2.4B	2.43 to 2.63	5	2.4B	2.43 to 2.63	20	—	—	—			
	2.7B	2.69 to 2.91	5	2.7B	2.69 to 2.91	5	2.7B	2.69 to 2.91	5	2.7B	2.69 to 2.91	20	—	—	—			
	3.0B	3.01 to 3.22	5	3.0B	3.01 to 3.22	5	3.0B	3.01 to 3.22	5	3.0B	3.01 to 3.22	20	—	—	—			
	3.3B	3.32 to 3.53	5	3.3B	3.32 to 3.53	5	3.3B	3.32 to 3.53	5	3.3B	3.32 to 3.53	20	—	—	—			
	3.6B	3.600 to 3.845	5	3.6B	3.600 to 3.845	5	3.6B	3.600 to 3.845	5	3.6B	3.600 to 3.845	20	3.6B	3.600 to 3.845	20			
	3.9B	3.89 to 4.16	5	3.9B	3.89 to 4.16	5	3.9B	3.89 to 4.16	5	3.9B	3.89 to 4.16	20	3.9B	3.89 to 4.16	20			
	4.3B	4.17 to 4.43	5	4.3B	4.17 to 4.43	5	4.3B	4.17 to 4.43	5	4.3B	4.17 to 4.43	20	4.3B	4.17 to 4.43	20			
	4.7B	4.55 to 4.75	5	4.7B	4.55 to 4.75	5	4.7B	4.55 to 4.75	5	4.7B	4.55 to 4.80	20	4.7B	4.55 to 4.80	20			
	5.1B	4.98 to 5.20	5	5.1B	4.98 to 5.20	5	5.1B	4.98 to 5.20	5	5.1B	4.94 to 5.20	20	5.1B	4.94 to 5.20	20			
	5.6B	5.49 to 5.73	5	5.6B	5.49 to 5.73	5	5.6B	5.49 to 5.73	5	5.6B	5.45 to 5.73	20	5.6B	5.45 to 5.73	20			
	6.2B	6.06 to 6.33	5	6.2B	6.06 to 6.33	5	6.2B	6.06 to 6.33	5	6.2B	5.96 to 6.27	20	6.2B	5.96 to 6.27	20			
	6.8B	6.65v to 6.93	5	6.8B	6.65 to 6.93	5	6.8B	6.65 to 6.93	5	6.8B	6.49 to 6.83	20	6.8B	6.49 to 6.83	20			
	7.5B	7.28 to 7.60	5	7.5B	7.28 to 7.60	5	7.5B	7.28 to 7.60	5	7.5B	7.07 to 7.45	20	7.5B	7.07 to 7.45	20			
	8.2B	8.02 to 8.36	5	8.2B	8.02 to 8.36	5	8.2B	8.02 to 8.36	5	8.2B	7.78 to 8.19	20	8.2B	7.78 to 8.19	20			
	9.1B	8.85 to 9.23	5	9.1B	8.85 to 9.23	5	9.1B	8.85 to 9.23	5	9.1B	8.57 to 9.01	20	9.1B	8.57 to 9.01	20			
	10B	9.77 to 10.21	5	10B	9.77 to 10.21	5	10B	9.77 to 10.21	5	10B	9.41 to 9.90	20	10B	9.41 to 9.90	20			
	11B	10.76 to 11.22	5	11B	10.76 to 11.22	5	11B	10.76 to 11.22	5	11B	10.50 to 11.05	10	11B	10.50 to 11.05	10			
	12B	11.74 to 12.24	5	12B	11.74 to 12.24	5	12B	11.74 to 12.24	5	12B	11.44 to 12.03	10	12B	11.44 to 12.03	10			
	13B	12.91 to 13.49	5	13B	12.91 to 13.49	5	13B	12.91 to 13.49	5	13B	12.55 to 13.21	10	13B	12.55 to 13.21	10			
	15B	14.34 to 14.98	5	15B	14.34 to 14.98	5	15B	14.34 to 14.98	5	15B	13.89 to 14.62	10	15B	13.89 to 14.62	10			
	16B	15.85 to 16.51	5	16B	15.85 to 16.51	5	16B	15.85 to 16.51	5	16B	15.25 to 16.04	10	16B	15.25 to 16.04	10			
	18B	17.56 to 18.35	2	18B	17.56 to 18.35	5	18B	17.56 to 18.35	5	18B	16.82 to 17.70	10	18B	16.82 to 17.70	10			
	20B	19.52 to 20.39	2	20B	19.52 to 20.39	5	20B	19.52 to 20.39	5	20B	18.63 to 19.59	10	20B	18.63 to 19.59	10			
	22B	21.54 to 22.47	2	22B	21.54 to 22.47	5	22B	21.54 to 22.47	5	22B	20.64 to 21.71	5	22B	20.64 to 21.71	5			
	24B	23.72 to 24.78	2	24B	23.72 to 24.78	5	24B	23.72 to 24.78	5	24B	22.61 to 23.77	5	24B	22.61 to 23.77	5			
	27B	26.19 to 27.53	2	27B	26.19 to 27.53	2	27B	26.19 to 27.53	5	27B	24.97 to 26.26	5	27B	24.97 to 26.26	5			
	30B	29.19 to 30.69	2	30B	29.19 to 30.69	2	30B	29.19 to 30.69	5	30B	27.70 to 29.13	5	30B	27.70 to 29.13	5			
	33B	32.15 to 33.79	2	33B	32.15 to 33.79	2	33B	32.15 to 33.79	5	33B	30.32 to 31.88	5	33B	30.32 to 31.88	5			
	36B	35.07 to 36.87	2	36B	35.07 to 36.87	2	36B	35.07 to 36.87	5	36B	32.79 to 34.49	5	36B	32.79 to 34.49	5			
	—	—	—	—	—	—	39B	38.02 to 39.98	2	39B	35.36 to 37.19	5	39B	35.36 to 37.19	5			
	—	—	—	—	—	—	UDZV43	40.00 to 45.00	2	—	—	—	—	—	—			
	—	—	—	—	—	—	UDZV47	44.00 to 49.00	2	—	—	—	—	—	—			

Package	Surface Mount Type																	
	3516 Size PMDU (SOD123)			3516 Size PMDU (SOD123)			5026 Size PMDS (SOD106)			2513 Size TUMD2			2120 Size UMD4 (SOT343)					
Equivalent Circuit Diagram																		
Series Name	KDZTF Size			New KDZVT Size			PTZTF Size			TDZFH Size			UMZKFH Size					
Power(mW)	1000			1000			1000			500			200					
Taping Code	TR			TR			TE25			TR			TL					
Electrical Characteristics (Ta=25°C)	V_Z (V)		I_Z (mA)	V_Z (V)		I_Z (mA)	V_Z (V)		I_Z (mA)	V_Z (V)		I_Z (mA)	V_Z (V)		I_Z (mA)			
Voltage	2.0B	2.00 to 2.24	40	2.0B	2.00 to 2.24	40	2.0B	2.00 to 2.24	40	—	—	—	—	—	—			
	2.2B	2.20 to 2.45	40	2.2B	2.20 to 2.45	40	2.2B	2.20 to 2.45	40	—	—	—	—	—	—			
	2.4B	2.40 to 2.70	40	2.4B	2.40 to 2.70	40	2.4B	2.40 to 2.70	40	—	—	—	—	—	—			
	2.7B	2.70 to 3.10	40	2.7B	2.70 to 3.10	40	2.7B	2.70 to 3.10	40	—	—	—	—	—	—			
	3.0B	3.00 to 3.40	40	3.0B	3.00 to 3.40	40	3.0B	3.00 to 3.40	40	—	—	—	—	—	—			
	3.3B	3.30 to 3.70	40	3.3B	3.30 to 3.70	40	3.3B	3.30 to 3.70	40	—	—	—	—	—	—			
	3.6B	3.60 to 4.00	40	3.6B	3.60 to 4.00	40	3.6B	3.60 to 4.00	40	—	—	—	3.6K	3.600 to 3.845	5			
	3.9B	3.90 to 4.40	40	3.9B	3.90 to 4.40	40	3.9B	3.90 to 4.40	40	—	—	—	3.9K	3.89 to 4.16	5			
	4.3B	4.30 to 4.80	40	4.3B	4.30 to 4.80	40	4.3B	4.30 to 4.80	40	—	—	—	4.3K	4.17 to 4.43	5			
	4.7B	4.70 to 5.20	40	4.7B	4.70 to 5.20	40	4.7B	4.70 to 5.20	40	—	—	—	4.7K	4.55 to 4.75	5			
	5.1B	5.10 to 5.70	40	5.1B	5.10 to 5.70	40	5.1B	5.10 to 5.70	40	5.1	4.60 to 5.60	10	5.1K	4.98 to 5.20	5			
	5.6B	5.60 to 6.30	40	5.6B	5.60 to 6.30	40	5.6B	5.60 to 6.30	40	5.6	5.10 to 6.10	10	5.6K	5.49 to 5.73	5			
	6.2B	6.20 to 7.00	40	6.2B	6.20 to 7.00	40	6.2B	6.20 to 7.00	40	6.2	5.60 to 6.80	10	6.2K	6.06 to 6.33	5			
	6.8B	6.80 to 7.70	40	6.8B	6.80 to 7.70	40	6.8B	6.80 to 7.70	40	6.8	6.20 to 7.40	10	6.8K	6.65 to 6.93	5			
	7.5B	7.50 to 8.40	40	7.5B	7.50 to 8.40	40	7.5B	7.50 to 8.40	40	7.5	6.80 to 8.30	10	7.5K	7.28 to 7.60	5			
	8.2B	8.20 to 9.30	40	8.2B	8.20 to 9.30	40	8.2B	8.20 to 9.30	40	8.2	7.40 to 9.00	10	8.2K	8.02 to 8.36	5			
	9.1B	9.10 to 10.20	40	9.1B	9.10 to 10.20	40	9.1B	9.10 to 10.20	40	9.1	8.20 to 10.00	10	9.1K	8.85 to 9.23	5			
	10B	10.00 to 11.20	40	10B	10.00 to 11.20	40	10B	10.00 to 11.20	40	10	9.00 to 11.00	10	10K	9.77 to 10.21	5			
	11B	11.00 to 12.30	20	11B	11.00 to 12.30	20	11B	11.00 to 12.30	20	11	9.90 to 12.10	10	11K	10.76 to 11.22	5			
	12B	12.00 to 13.50	20	12B	12.00 to 13.50	20	12B	12.00 to 13.50	20	12	10.80 to 13.20	10	12K	11.74 to 12.24	5			
	13B	13.30 to 15.00	20	13B	13.30 to 15.00	20	13B	13.30 to 15.00	20	13	11.70 to 14.30	10	13K	12.91 to 13.49	5			
	15B	14.70 to 16.50	20	15B	14.70 to 16.50	20	15B	14.70 to 16.50	20	15	13.50 to 16.50	10	15K	14.34 to 14.98	5			
	16B	16.20 to 18.30	20	16B	16.20 to 18.30	20	16B	16.20 to 18.30	20	16	14.40 to 17.60	10	16K	15.85 to 16.51	5			
	18B	18.00 to 20.30	20	18B	18.00 to 20.30	20	18B	18.00 to 20.30	20	18	16.20 to 19.80	10	18K	17.56 to 18.35	5			
	20B	20.00 to 22.40	20	20B	20.00 to 22.40	20	20B	20.00 to 22.40	20	20	18.00 to 22.00	10	20K	19.52 to 20.39	5			
	22B	22.00 to 24.50	10	22B	22.00 to 24.50	10	22B	22.00 to 24.50	10	22	19.80 to 24.20	10	22K	21.54 to 22.47	5			
	24B	24.00 to 27.60	10	24B	24.00 to 27.60	10	24B	24.00 to 27.60	10	24	21.60 to 26.40	10	24K	23.72 to 24.78	5			
	27B	27.00 to 30.80	10	27B	27.00 to 30.80	10	27B	27.00 to 30.80	10	27	24.30 to 29.70	10	27K	26.19 to 27.53	5			
	30B	30.00 to 34.00	10	30B	30.00 to 34.00	10	30B	30.00 to 34.00	10	30	27.00 to 33.00	10	30K	29.19 to 30.69	5			
	33B	33.00 to 37.00	10	33B	33.00 to 37.00	10	33B	33.00 to 37.00	10	—	—	—	33K	32.15 to 33.79	5			
	36B	36.00 to 40.00	10	36B	36.00 to 40.00	10	36B	36.00 to 40.00	10	—	—	—	36K	35.07 to 36.87	5			

Note : This table shows available voltages.

● Quick Reference for Protection Devices (TVS)【2-4 Elements】

V_Z (V)	Package															
	1212 Size		1616 Size		1616 Size		2120 Size		2120 Size		2928 Size		2928 Size	
														
	VMD3 (SOT723)		EMD3 (SOT523)		EMD5 (SOT553)		UMD3 (SOT323)		UMD5 (SOT353)		SMD3 (SOT346)		SMD5 (SOT25)	
4.3													**FTZ4.3E**	19
5.1							**UMZ5.1N**	5						
5.6											**STZ5.6N**	14	**FTZ5.6E**	20
6.2											**STZ6.2N**	15		
6.8	**VMZ6.8N**	3	**EMZ6.8N**	4	**EMZ6.8E**	17	**UMZ6.8N**	6	**UMZ6.8EN**	18	**STZ6.8T** **STZ6.8N**	2 16	**FTZ6.8E**	21
8.2							**UMZ8.2T** **UMZ8.2N**	1 7						
12							**UMZ12N**	8						
16							**UMZ16N**	9						
18							**UMZ18N**	10						
27							**UMZ27N**	11						
30							**UMZ30N**	12					**FTZ30E**	22
36							**UMZ36N**	13						

● Quick Reference for Low Capacitance Protection Devices (TVS)

V_Z (V)	Package																			
	1006 Size		1212 Size		1608 Size		1616 Size		1616 Size		1616 Size		2512 Size		2120 Size		2928 Size		2928 Size	
	VMN2 (SOD923)		VMD3 (SOT723)		EMD2 (SOD523)		EMD3 (SOT523)		EMD5 (SOT553)		EMD6 (SOT563)		UMD2 (SOD323F)		UMD3 (SOT323)		SMD3 (SOT346)		SMD5 (SOT25)	
5.6													**UDZU5.6B**	27						
6.2													New **UDZU6.2**	28	**UMZU6.2N**	23			**FTZU6.2E**	24
6.8	**CDZC6.8B**	25	**VMZT6.8N**	30	New **EDZCV6.8B**	26	**EMZC6.8N**	29	**EMZT6.8E**	35	**RSB6.8JS2**	36			**UMZC6.8N**	31	**STZC6.8N**	32		
12			**RSB12Z**	33			**RSB12W**	34			**RSB12JS2**	37								

● Quick Reference for ESD Protection Devices (TVS)

V_Z (V)	Package									
	1616 Size		2120 Size		3516 Size		2928 Size		5026 Size	
										
	EMD5 (SOT553)		UMD5 (SOT353)		PMDU (SOD123)		SMD6 (SOT457)		PMDS (SOD106)	
6	**RSA6.1J4**	1	**RSA6.1EN**	2	**RSA5M** **RSA5MM**	4 6	**RSA6.1U5**	3	**RSA5L**	8
12					**RSA12M** **RSA12MM**	5 7			**RSA12L**	9
30									**RSA30L**	10

● Quick Reference for Bi-Directional Zener Diodes

V_Z (V)	Package															
	1006 Size		1406 Size		1608 Size		2512 Size		2513 Size		2120 Size					
	VMN2 (SOD923)		VMD2 (SOD723)		EMD2 (SOD523)		UMD2 (SOD323F)		TUMD2		UMD3 (SOT323)		UMD4 (SOT343)		UMD6 (SOT363)	
5.6					**RSB5.6SM**	13										
6.8	**RSB6.8CS**	11	**RSB6.8G**	12	**RSB6.8SM**	14					**RSB6.8F2**	25				
12							**RSB12V**	15								
16							**RSB16V**	16	**RSB16VA**	22	**RSB16F2**	26			**RSB16X3N**	33
18							**RSB18V**	17	New **RSB18VA**	23	**RSB18F2**	27				
27							**RSB27V**	18	New **RSB27VA**	24	**RSB27F2**	28	**RSB27K2**	32		
29							**RSB33V**	19			**RSB33F2**	29				
32							**RSB36V**	20			**RSB36F2**	30				
35							**RSB39V**	21			**RSB39F2**	31				

● Quick Reference for Ultra Low Capacitance Bi-Directional Zener Diodes

V_Z (V)	Package	
	1006 Size	
	VMN2 (SOD923)	
6.8	**RSBC6.8CS**	34

Zener Diodes (Including TVS)

Protection Devices (TVS)【2-4 Elements】

Quick Reference No.	Product No.			Absolute Maximum Ratings (Ta=25°C) P (mW)	Electrical Characteristics (Ta=25°C) V_Z (V)	I_Z(mA)	Remarks	Package	Equivalent Circuit Diagram
1	**UMZ8.2T**	FH	T106	200	7.76 to 8.64	5		UMD3	
2	**STZ6.8T**	FH	T146	200	6.47 to 7.14	5		SMD3	
3	**VMZ6.8N**	FH	T2L	150	6.47 to 7.14	5		VMD3	
4	**EMZ6.8N**	FH	TL	150	6.47 to 7.14	5		EMD3	
5	**UMZ5.1N**	FH	T106	200	4.84 to 5.37	5		UMD3	
6	**UMZ6.8N**	FH	T106	200	6.47 to 7.14	5			
7	**UMZ8.2N**	FH	T106	200	7.76 to 8.64	5			
8	**UMZ12N**	FH	T106	200	11.0 to 13.0	5			
9	**UMZ16N**	FH	T106	200	15.85 to 16.51	5			
10	**UMZ18N**	FH	T106	200	17.56 to 18.35	5	IEC61000-4-2		
11	**UMZ27N**	FH	T106	200	26.19 to 27.53	5	150pF,330Ω		
12	**UMZ30N**	FH	T106	200	29.19 to 30.69	5	Contact 8kV		
13	**UMZ36N**	FH	T106	200	35.07 to 36.87	5	Air 15kV		
14	**STZ5.6N**	FH	T146	200	5.31 to 5.92	5		SMD3	
15	**STZ6.2N**	FH	T146	200	5.81 to 6.40	5			
16	**STZ6.8N**	FH	T146	200	6.47 to 7.14	5			
17	**EMZ6.8E**	FH	T2R	150	6.47 to 7.14	5		EMD5	
18	**UMZ6.8EN**	FH	T106	200	6.47 to 7.14	5		UMD5	
19	**FTZ4.3E**	FH	T148	200	4.04 to 4.57	5		SMD5	
20	**FTZ5.6E**	FH	T148	200	5.31 to 5.92	5			
21	**FTZ6.8E**	FH	T148	200	6.47 to 7.14	5			
22	**FTZ30E**	FH	T148	200	29.19 to 30.09	5			

Low Capacitance Protection Devices (TVS)

Quick Reference No.	Product No.			Absolute Maximum Ratings (Ta=25°C) P (mW)	Electrical Characteristics (Ta=25°C) V_Z (V)	I_Z(mA)	C_t (pF)	f(MHz)	V_R(V)	Package	Equivalent Circuit Diagram
23	**UMZU6.2N**	FH	T106	200	5.9 to 6.5	5	8	1	0	UMD3	
24	**FTZU6.2E**	FH	T148	200	5.9 to 6.5	5	8	1	0	SMD5	
25	**CDZC6.8B**	FH	T2RA	100	6.65 to 6.93	5	3	1	0	VMN2	
26 New	**EDZCV6.8B**	FH	T2R	150	6.65 to 6.93	5	3	1	0	EMD2	
27	**UDZU5.6B**	FH	TE-17	200	5.49 to 5.73	5	8	1	0	UMD2	
28 New	**UDZU6.2**	FH	TE-17	200	5.90 to 6.50	5	8	1	0		
29	**EMZC6.8N**	FH	TL	150	6.47 to 7.14	5	3	1	0	EMD3	
30	**VMZT6.8N**	FH	T2L	150	6.47 to 7.14	5	7	1	0	VMD3	
31	**UMZC6.8N**	FH	T106	200	6.47 to 7.14	5	3	1	0	UMD3	
32	**STZC6.8N**	FH	T146	200	6.47 to 7.14	5	3	1	0	SMD3	
33	**RSB12Z**	FH	TE-17	100	9.6 to 14.4	5	1	1	0	VMD3	
34	**RSB12W**	FH	TL	150	9.6 to 14.4	5	1	1	0	EMD3	
35	**EMZT6.8E**	FH	T2R	150	6.47 to 7.14	5	7	1	0	EMD5	
36	**RSB6.8JS2**	FH	T2R	150	6.0 to 8.0	5	1	1	0	EMD6	
37	**RSB12JS2**	FH	T2R	150	9.6 to 14.4	5	1	1	0		

* : (3),(6) pin must be open when using.

Zener Diodes (Including TVS)

ESD Protection Devices (TVS)

Quick Reference No.	Product No.			Absolute Maximum Ratings (Ta=25°C) P (mW)	Electrical Characteristics (Ta=25°C) V_Z (V)	I_Z(mA)	Peak Pulse Power (W) (tp=10×1000μs)	Package	Equivalent Circuit Diagram
1	**RSA6.1J4**	FH	T2R	150	6.10 to 7.20	1	10	EMD5	
2	**RSA6.1EN**	FH	TR	200	6.10 to 7.20	1	30	UMD5	
3	**RSA6.1U5**	FH	T110	200	6.10 to 7.20	1	30	SMD6	
4	**RSA5M**	TF	TR	700	6.4 to 7.0	10	200	PMDU	
5	**RSA12M**	TF	TR	700	13.3 to 14.7	1	200		
6	**RSA5MM**	DD	TR	1,000	6.4 to 7.0	10	200		
7	**RSA12MM**	DD	TR	1,000	13.3 to 14.7	1	200		
8	**RSA5L**	TF	TE25	1,000	6.45 to 7.14	10	600	PMDS	
9	**RSA12L**	TF	TE25	1,000	13.3 to 14.7	1	600		
10	**RSA30L**	TF	TE25	1,000	28.5 to 31.5	1	600		

Bi-Directional Zener Diodes

Quick Reference No.	Product No.			Absolute Maximum Ratings (Ta=25°C) P (mW)	Electrical Characteristics (Ta=25°C) V_Z (V)	I_Z(mA)	Remarks	Package	Equivalent Circuit Diagram
11	**RSB6.8CS**	FH	T2RA	100	5.78 to 7.82	1	IEC61000-4-2 150pF,330Ω Contact 8kV Air 15kV	VMN2	
12	**RSB6.8G**	FH	T2R	100	5.78 to 7.82	1		VMD2	
13	**RSB5.6SM**	FH	TE61	150	4.76 to 6.44	1		EMD2	
14	**RSB6.8SM**	FH	TE61	150	5.78 to 7.82	1			
15	**RSB12V**	FH	TE-17	200	10.8 to 13.2	1		UMD2	
16	**RSB16V**	FH	TE-17	200	14.4 to 17.6	1		UMD2	
17	**RSB18V**	FH	TE-17	200	16.2 to 19.8	1			
18	**RSB27V**	FH	TE-17	200	26.2 to 32.0	1			
19	**RSB33V**	FH	TE-17	200	29.7 to 36.3	1			
20	**RSB36V**	FH	TE-17	200	32.4 to 39.6	1			
21	**RSB39V**	FH	TE-17	200	35.1 to 42.9	1			
22	**RSB16VA**	FH	TR	500	14.4 to 17.6	1		TUMD2	
23	☆**RSB18VA**	FH	TR	500	16.2 to 19.8	1			
24	☆**RSB27VA**	FH	TR	500	26.2 to 32.0	1			
25	**RSB6.8F2**	FH	T106	200	5.78 to 7.82	1		UMD3	
26	**RSB16F2**	FH	T106	200	14.4 to 17.6	1			
27	**RSB18F2**	FH	T106	200	16.2 to 19.8	1			
28	**RSB27F2**	FH	T106	200	26.2 to 32.0	1			
29	**RSB33F2**	FH	T106	200	29.7 to 36.3	1			
30	**RSB36F2**	FH	T106	200	32.4 to 39.6	1			
31	**RSB39F2**	FH	T106	200	35.1 to 42.9	1			
32	**RSB27K2**	FH	TL	200	26.2 to 32.0	1		UMD4	
33	**RSB16X3N**	FH	TR	200	14.4 to 17.6	1		UMD6	

Ultra Low Capacitance Bi-Directional Zener Diodes

Quick Reference No.	Product No.			Absolute Maximum Ratings (Ta=25°C) P (mW)	Electrical Characteristics (Ta=25°C) V_Z (V)	I_Z(mA)	C_t (pF)	f(MHz)	V_R(V)	Package	Equivalent Circuit Diagram
34	**RSBC6.8CS**	FH	T2RA	100	6.62 to 7.24	5	1	1	0	VMN2	

☆ :Under development

Switching Diodes

●Quick Reference for Switching Diodes

V_R (V)	Package																	
	1006 Size	1406 Size	1212 Size	1608 Size	1616 Size		1616 Size		2512 Size	2120 Size					2928 Size		
																	
	VMN2 (SOD923)	VMD2 (SOD723)	VMD3 (SOT723)	EMD2 (SOD523)	EMD3 (SOT523)	EMD3F (SOT490)	EMD4 (SOT543)	EMD6 (SOT563)	UMD2 (SOD323F)	UMD3 (SOT323)	UMD3F	UMD4 (SOT343)	UMD5 (SOT353)	UMD6 (SOT363)	SMD3 (SOT346)	SMD5 (SOT25)	SMD6 (SOT457)
20			DA221M 17		DA221 18					DA204U 21					DA204K 27		
40									1SS380 44								
80 to 90	1SS400CS 1	1SS400G 2	DAN222M 5 DAP222M 11	1SS400SM 3	DAN217W 19 DAN222 6 DAP222 12 ☆DA228W 20	DAN222WM 7 DAP222WM 13	DA227Y 40	EMN11 32 EMP11 35	1SS355VM 4	DA228U 24 DAN202U 8 DAN217U 22 DAP202U 14 DA380U 45	DAN202UM 9 DAP202UM 15 DAN217UM 23	DA227 41	UMN1N 28 UMP1N 30	UMN10N 42 UMN11N 33 UMP11N 36 UMR11N 38 UMR12N 39 UMN20N 46	DA228K 26 DAN202K 10 DAN217 25 DAP202K 16	FMN1 29 FMP1 31	IMN10 43 IMN11 34 IMP11 37

☆ :Under Development

High-speed type

Quick Reference No.	Product No.			Absolute Maximum Ratings (Ta=25°C)*					Electrical Characteristics (Ta=25°C)*							Package	Equivalent Circuit Diagram
				V_{RM} (V)	V_R (V)	I_{FM} (mA)	I_O (mA)	Isurge (mA)	V_F(V) Max.	I_F(mA)	I_R(μA) Max.	V_R(V)	trr(ns) Max.	V_R(V)	I_F(mA)		
1	1SS400CS	FH	T2RA	90	80	—	100	500(1s)	1.2	100	0.1	80	4	6	10	VMN2	
2	1SS400G	FH	T2R	90	80	—	100	500(1s)	1.2	100	0.1	80	4	6	10	VMD2	
3	1SS400SM	FH	T2R	90	80	225	100	500(1s)	1.2	100	0.1	80	4	6	10	EMD2	
4	1SS355VM	FH	TE25	90	80	225	100	500(1s)	1.2	100	0.1	80	4	6	10	UMD2	
5	DAN222M	FH	T2L	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	VMD3	
6	DAN222	FH	TL	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	EMD3	
7	DAN222WM	FH	TL	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	EMD3F	
8	DAN202U	FH	T106	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	UMD3	
9	DAN202UM	FH	T106	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	UMD3F	
10	DAN202K	FH	T146	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	SMD3	
11	DAP222M	FH	T2L	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	VMD3	
12	DAP222	FH	TL	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	EMD3	
13	DAP222WM	FH	T2L	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	EMD3F	
14	DAP202U	FH	T106	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	UMD3	
15	DAP202UM	FH	TL	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	UMD3F	
16	DAP202K	FH	T146	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	SMD3	
17	DA221M	FH	T2L	20	20	200	100	300(1μs)	1	10	0.1	15	—	—	—	VMD3	
18	DA221	FH	TL	20	20	200	100	300(1μs)	1	10	0.1	15	—	—	—	EMD3	
19	DAN217W	FH	TL	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5		
20	☆DA228W	FH	TL	80	80	200	100	300(1μs)	1.2	100	0.1	80	—	—	—		
21	DA204U	FH	T106	20	20	200	100	300(1μs)	1	10	0.1	15	—	—	—	UMD3	
22	DAN217U	FH	T106	80	80	300	100	4000(1μs)	1.2	100	0.2	70	4	6	5		
23	DAN217UM	FH	T106	80	80	300	100	4000(1μs)	1.2	100	0.2	70	4	6	5	UMD3F	
24	DA228U	FH	T106	80	80	200	100	300(1μs)	1.2	100	0.1	80	—	—	—	UMD3	
25	DAN217	FH	T146	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	SMD3	
26	DA228K	FH	T146	80	80	200	100	300(1μs)	1.2	100	0.1	80	—	—	—		
27	DA204K	FH	T146	20	20	200	100	300(1μs)	1	10	0.1	15	—	—	—		
28	UMN1N	FH	TR	80	80	80	25	250(1μs)	0.9	5	0.1	70	4	6	5	UMD5	
29	FMN1	FH	T148	80	80	80	25	250(1μs)	0.9	5	0.1	70	4	6	5	SMD5	
30	UMP1N	FH	TR	80	80	80	25	250(1μs)	0.9	5	0.1	70	4	6	5	UMD5	
31	FMP1	FH	T148	80	80	80	25	250(1μs)	0.9	5	0.1	70	4	6	5	SMD5	
32	EMN11	FH	T2R	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	EMD6	
33	UMN11N	FH	TR	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	UMD6	
34	IMN11	FH	T110	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	SMD6	
35	EMP11	FH	T2R	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	EMD6	
36	UMP11N	FH	TR	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	UMD6	
37	IMP11	FH	T110	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	SMD6	
38	UMR11N	FH	TR	80	80	300	100	400(1μs)	1.2	100	0.1	70	4	6	5	UMD6	
39	UMR12N	FH	TR	80	80	200	100	300(1μs)	1.2	100	0.1	80	—	—	—	UMD6	
40	DA227Y	FH	TL	80	80	300	100	400(1μs)	1.2	100	0.1	70	4	6	5	EMD4	
41	DA227	FH	TL	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	UMD4	
42	UMN10N	FH	TR	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	UMD6	
43	IMN10	FH	T108	80	80	300	100	4000(1μs)	1.2	100	0.1	70	4	6	5	SMD6	

Low Leak type

Quick Reference No.	Product No.			Absolute Maximum Ratings (Ta=25°C)					Electrical Characteristics (Ta=25°C)							Package	Equivalent Circuit Diagram
				V_{RM} (V)	V_R (V)	I_{FM} (mA)	I_O (mA)	Isurge (mA)	V_F(V) Max.	I_F(mA)	I_R(μA) Max.	V_R(V)	trr(ns) Max.	V_R(V)	I_F(mA)		
44	1SS380	TF	TE-17	40	35	225	100	400(1s)	1.2	100	0.01	20	—	—	—	UMD2	
45	DA380U	FH	T106	80	80	225	100	400(1s)	1.2	100	0.01	20	—	—	—	UMD3	
46	UMN20N	FH	TR	80	80	225	100	400(1s)	1.2	100	0.01	20	—	—	—	UMD6	

* : Value / Chip

☆ :Under Development

High Frequency Diodes

●Quick Reference for High Frequency Diodes

	V_R (V)	Package									
		1608 Size		1616 Size		2512 Size		2120 Size		2928 Size	
											
		EMD2 (SOD523)		EMD3 (SOT523)		UMD2 (SOD323F)		UMD3 (SOT323)		SMD3 (SOT346)	
Band Switching Diodes	35	**1SS390**	1	**DAN235E**	3	**1SS356**	2	**DAN235U** **DAP236U**	4 5		
PIN Diodes	50					**RN731V** **RN771V**	6 7	**RN739F** **RN779F**	8 9	**RN779D**	10

Band Switching Diodes

Quick Reference No.	Product No.			Absolute Maximum Ratings (Ta=25°C)*			Electrical Characteristics(Ta=25°C)*						Package	Equivalent Circuit Diagram
				V_R (V)	Tj (°C)	Tstg (°C)	Ct(pF)Max.	V_R(V)	f(MHz)	rF(Ω)Max.	I_F(mA)	f(MHz)		
1	**1SS390**	FH	TE61	35	125	-55 to +125	1.2	6	1	0.9	2	100	EMD2	
2	**1SS356**	FH	TE-17	35	125	-55 to +125	1.2	6	1	0.9	2	100	UMD2	
3	**DAN235E**	FH	TL	35	125	-55 to +125	1.2	6	1	0.9	2	100	EMD3	
4	**DAN235U**	FH	T106	35	125	-55 to +125	1.2	6	1	0.9	2	100	UMD3	
5	**DAP236U**	FH	TR	35	125	-55 to +125	1.2	6	1	0.9	2	100	UMD3	

PIN Diodes

Quick Reference No.	Product No.			Absolute Maximum Ratings (Ta=25°C)*				Electrical Characteristics (Ta=25°C)*						Package	Equivalent Circuit Diagram
				V_R (V)	I_F (mA)	Tj (°C)	Tstg (°C)	Ct(pF)Max.	V_R(V)	f(MHz)	rF(Ω)Max.	I_F(mA)	f(MHz)		
6	**RN731V**	FH	TE-17	50	50	125	-55 to +150	0.4	35	1	7	10	100	UMD2	
7	**RN771V**	FH	TE-17	50	50	150	-55 to +150	0.9	35	1	7	10	100		
8	**RN739F**	FH	T106	50	50	125	-55 to +150	0.4	35	1	7	10	100	UMD3	
9	**RN779F**	FH	T106	50	50	150	-55 to +150	0.9	35	1	7	10	100		
10	**RN779D**	FH	T146	50	50	150	-55 to +150	0.9	35	1	7	10	100	SMD3	

* : Value / Chip

Packages

■Dimensions (Unit : mm)

Surface Mount Type

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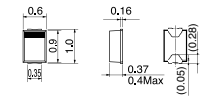

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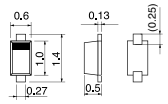

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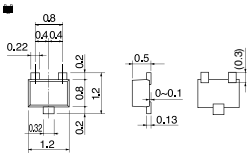

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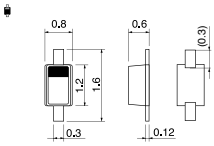

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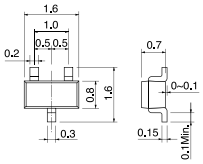

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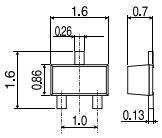

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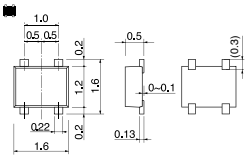

Each lead has same dimensions

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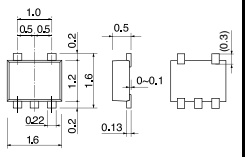

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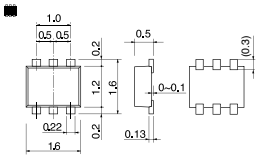
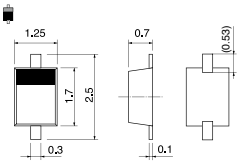


Each lead has same dimensions

UMD2<SOD323F> [SC-90/A]



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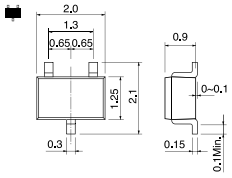

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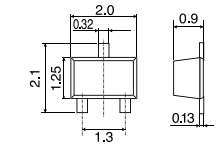

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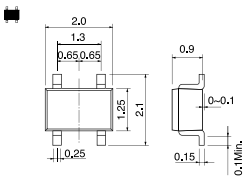

Each lead has same dimensions

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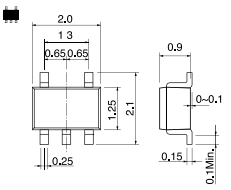

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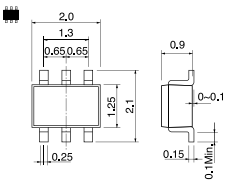

Each lead has same dimensions

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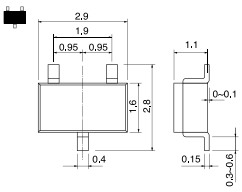

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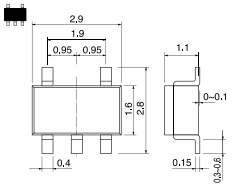

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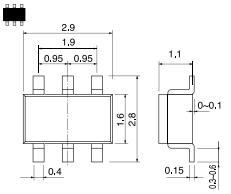

Each lead has same dimensions

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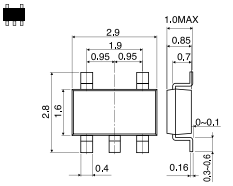

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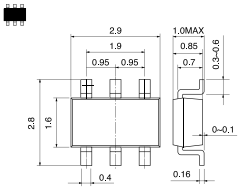

Each lead has same dimensions

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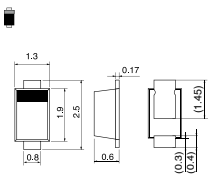

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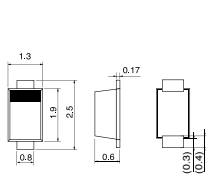

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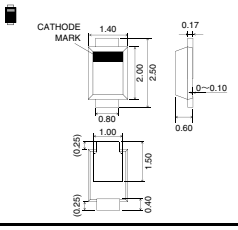

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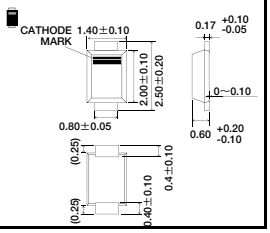

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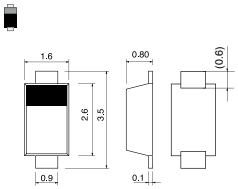

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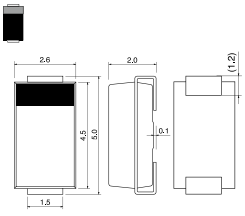


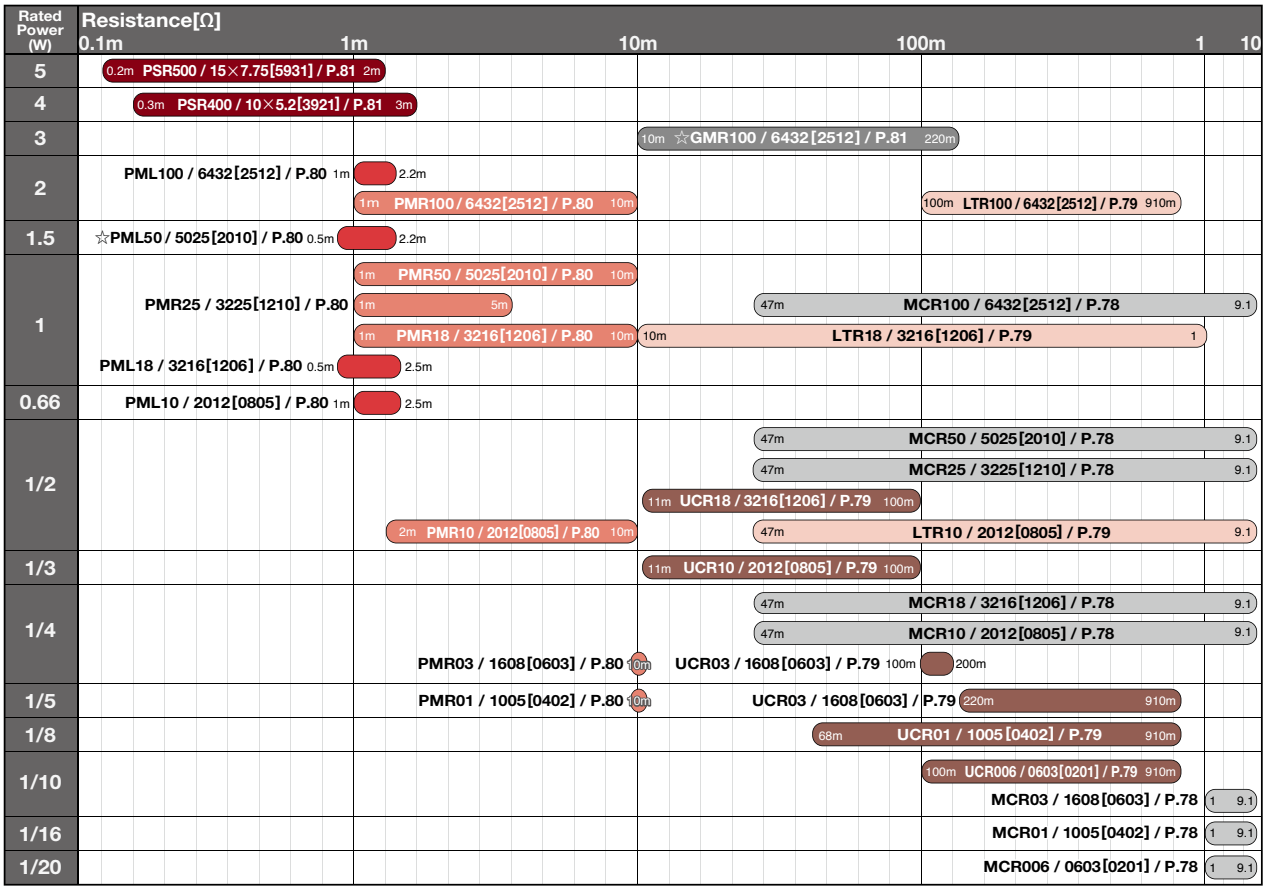
< > : JEDEC Code, [ ] : JEITA Code

Quick Reference of Resistance Range

Low Ohmic Resistor Lineup

Part No. / mm[inch] / Page

PSR GMR PML PMR Metal Strip　UCR LTR MCR Thick Film

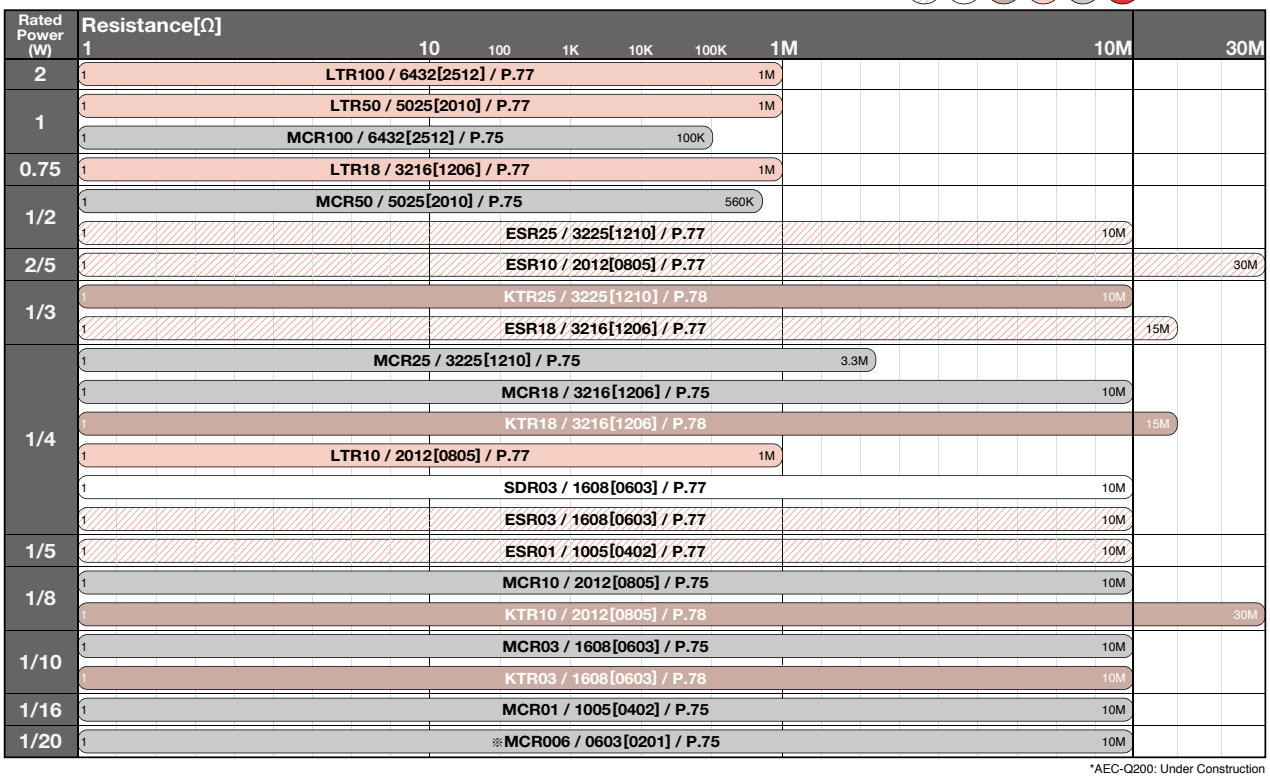


☆ : Under Development

1 Ω or more Resistor Lineup

Part No. / mm[inch] / Page

ESR SDR KTR LTR MCR SMR Thick Film



*AEC-Q200: Under Construction

Thick Film Chip Resistors (Standard series)
Compact Chip Resistors (MCR series <0201 to 0805>)

- High reliability chip resistors optimized for a variety of applications.
  - Nine package sizes, ranging from 0201 to 2512.
  - Market-proven reliability.

MCR series <0201 to 0805>

Part No.	Size code mm (inch)	Rated power (70°C)	Limiting element voltage (V)	Tolerance	Temperature coefficient (ppm / °C)	Resistance range	Operating temperature range (°C)	Automotive Grade Available
MCR006	0603 (0201)	1/20W (0.05W)	25	J (±5%)	+600/−200 ±250	1.0Ω to 9.1Ω (E24 Series) 10Ω to 10MΩ (E24 Series)	−55 to+125	Preparing
				F (±1%)	±250	10Ω to 10MΩ (E24,96 Series)		
				D (±0.5%)	±200 ±100	10Ω to 910Ω (E24,96 Series) 1kΩ to 1MΩ (E24,96 Series)		
MCR01	1005 (0402)	1/16W (0.063W)	50	J (±5%)	+500/−250 ±200	1.0Ω to 9.1Ω (E24 Series) 10Ω to 10MΩ (E24 Series)	−55 to+155	Yes
				F (±1%)	±100	10Ω to 2.2MΩ (E24,96 Series)		
				D (±0.5%)	±100 ±50	10Ω to 91Ω (E24,96 Series) 100Ω to 1MΩ (E24,96 Series)		
MCR03	1608 (0603)	1/10W (0.1W)	50	J (±5%)	±400 ±200	1.0Ω to 9.1Ω (E24 Series) 10Ω to 10MΩ (E24 Series)		Yes
				FX (±1%)	±100	10Ω to 10MΩ (E24,96 Series)		
				D (±0.5%)	±100 ±50	10Ω to 91Ω (E24,96 Series) 100Ω to 1MΩ (E24,96 Series)		
MCR10	2012 (0805)	1/8W (0.125W)	150	J (±5%)	±400 ±200	1.0Ω to 9.1Ω (E24 Series) 10Ω to 10MΩ (E24 Series)		Yes
				F (±1%)	±100	10Ω to 2.2MΩ (E24,96 Series)		
		1/10W (0.1W)		D (±0.5%)	±100 ±50	10Ω to 91Ω (E24,96 Series) 100Ω to 1MΩ (E24,96 Series)		

*E24 : Standard products E96 : Custom products

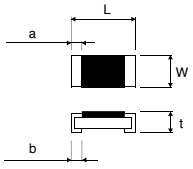
Jumper Type

Part No.	Size code mm (inch)	Rated current	Resistance	Temperature range (°C)	Automotive Grade Available
MCR006	0603 (0201)	0.5A	50mΩ Max.	−55 to +125	Preparing
MCR01	1005 (0402)	1A		−55 to +155	Yes
MCR03	1608 (0603)	1A			Yes
MCR10	2012 (0805)	2A			Yes

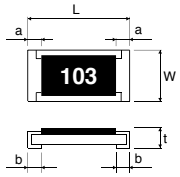
Dimensions (Unit : mm)

Part No.	Size code mm (inch)	L	W	t	a	b
MCR006	0603 (0201)	0.6±0.03	0.3±0.03	0.23±0.03	0.1±0.05	0.15±0.05
MCR01	1005 (0402)	1.0±0.05	0.5±0.05	0.35±0.05	0.2±0.1	0.25 +0.05 −0.10
MCR03	1608 (0603)	1.6±0.1	0.8±0.1	0.45±0.1	0.3±0.2	0.3±0.2
MCR10	2012 (0805)	2.0±0.1	1.25±0.1	0.55±0.1	0.4±0.2	0.4±0.2

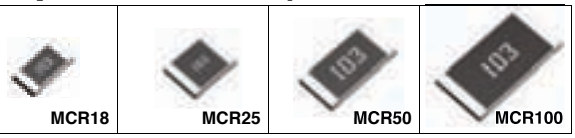
●MCR004/006/01
●MCR03 (Partially marked)



●MCR10



Thick Film Chip Resistors (Standard series)
Chip Resistors (MCR series <1206 to 2512>)



MCR series <1206 to 2512>

Part No.	Size code mm (inch)	Rated power (70°C)	Limiting element voltage (V)	Tolerance	Temperature coefficient (ppm / °C)	Resistance range	Operating temperature range (°C)	Automotive Grade Available
MCR18	3216 (1206)	1/4W (0.25W)	200	J (±5%)	±400 ±200	1.0Ω to 9.1Ω (E24 Series) 10Ω to 10MΩ (E24 Series)	−55 to +155	Yes
				F (±1%)	±100	10Ω to 2.2MΩ (E24,96 Series)		
		1/8W (0.125W)		D (±0.5%)	±100 ± 50	10Ω to 91Ω (E24,96 Series) 100Ω to 1MΩ (E24,96 Series)		
MCR25	3225 (1210)	1/4W (0.25W)	200	J (±5%)	500±350 ±500 ±200	1.0Ω to 2.0Ω (E24 Series) 2.2Ω to 5.1Ω (E24 Series) 5.6Ω to 3.3MΩ (E24 Series)		Yes
				F (±1%)	±100	10Ω to 1.0MΩ (E24,96 Series)		
MCR50	5025 (2010)	1/2W (0.5W)	200	J (±5%)	500±350 ±500 ±200 ±350	1.0Ω to 2.0Ω (E24 Series) 2.2Ω to 9.1Ω (E24 Series) 10Ω to 330kΩ (E24 Series) 360kΩ to 560kΩ (E24 Series)		Yes
				F (±1%)	±100	10Ω to 180kΩ (E24,96 Series)		
MCR100	6432 (2512)	1W	200	J (±5%)	500±350 ±500 ±350 ±200	1.0Ω to 2.0Ω (E24 Series) 2.2Ω to 9.1Ω (E24 Series) 10Ω to 22Ω (E24 Series) 24Ω to 100kΩ (E24 Series)	−55 to +125	Yes
				F (±1%)	±100	10Ω to 82kΩ (E24,96 Series)		

*E24 : Standard products E96 : Custom products

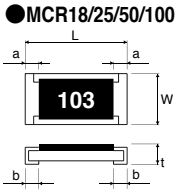
Jumper Type

Part No.	Size code mm (inch)	Rated current	Resistance	Temperature range (°C)	Automotive Grade Available
MCR18	3216 (1206)	2A	50mΩ Max.	−55 to +155	Yes
MCR25	3225 (1210)	2A			Yes
MCR50	5025 (2010)	3A			Yes
MCR100	6432 (2512)	4A		−55 to +125	Yes

Dimensions (Unit : mm)

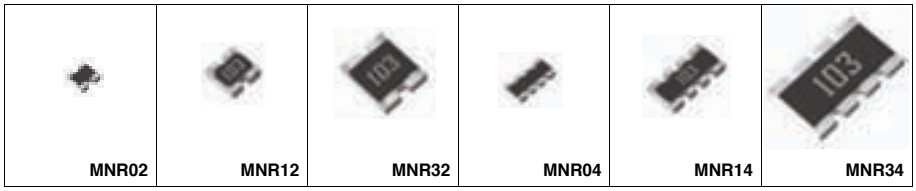
Part No.	Size code mm (inch)	L	W	t	a	b
MCR18	3216 (1206)	3.2±0.15	1.6±0.15	0.55±0.1	0.5±0.25	0.5±0.25
MCR25	3225 (1210)	3.2±0.15	2.5±0.15	0.55±0.15	0.5±0.25	0.5±0.25
MCR50	5025 (2010)	5.0±0.15	2.5±0.15	0.55±0.15	0.6±0.25	0.6±0.25
MCR100	6432 (2512)	6.3±0.15	3.2±0.15	0.55±0.15	0.6±0.25	0.6±0.25

●MCR18/25/50/100



Thick Film Chip Resistors (Standard series)
Compact Chip Resistor Networks (MNR series <0402×2 to 1206×4>)

- Reduces cost
  Use of chip networks reduces the number of components and saves mounting space.
- Easy fillet inspection
  Convex type electrodes facilitate visual inspection of fillets.
  Inspection can be performed with automatic inspection equipment.



MNR series <0402×2 to 1206×4>

Part No.	Size code mm (inch)	No. of terminals	No. of elements	Rated power (70°C)	Limiting element voltage (V)	Tolerance	Temperature coefficient (ppm/°C)	Resistance range	Operating temperature range (°C)	Automotive Grade Available
MNR02	1005 (0402) ×2	4	2	0.063W / Element	25	J (±5%)	±200	10Ω to 1MΩ (E24 Series)	−55 to +155	Yes
MNR12	1608 (0603) ×2	4	2	0.063W / Element	50	J (±5%)	±200	10Ω to 1MΩ (E24 Series)		Yes
						F (±1%)	±100			
MNR32	3216 (1206) ×2	4	2	0.063W / Element	200	J (±5%)	±200	10Ω to 1MΩ (E24 Series)	−55 to +125	Yes
MNR04	1005 (0402) ×4	8	4	0.063W / Element	25	J (±5%)	+500/−250 ±200	1Ω to 9.1Ω (E24 Series) 10Ω to 1MΩ (E24 Series)	−55 to +155	Yes
MNR14	1608 (0603) ×4	8	4	0.125W / Element	50	J (±5%)	±500 ±200	2.2Ω to 6.8Ω (E6 Series) 10Ω to 1MΩ (E24 Series)		Yes
						F (±1%)	±100	10Ω to 1MΩ (E24 Series)		
MNR34	3216 (1206) ×4	8	4	0.125W / Element	200	J (±5%)	±200	10Ω to 1MΩ (E24 Series)	−55 to +125	Yes

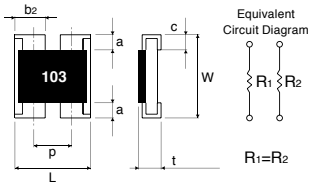
Jumper Type

Part No.	Size code mm (inch)	Rated current	Resistance	Temperature range	Automotive Grade Available
MNR02	1005×2	1A / Element	50mΩ Max.	−55 to +155°C	Yes
MNR12	1608×2	1A / Element	50mΩ Max.		Yes
MNR32	3216×2	2A / Element	50mΩ Max.	−55 to +125°C	Yes
MNR04	1005×4	1A / Element	50mΩ Max.	−55 to +155°C	Yes
MNR14	1608×4	1A / Element	50mΩ Max.		Yes
MNR34	3216×4	2A / Element	50mΩ Max.	−55 to +125°C	Yes

Dimensions (Unit : mm)

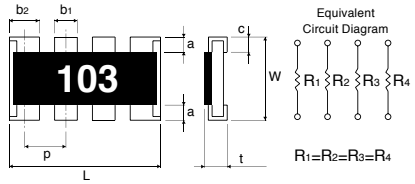
●MNR02 / MNR12 / MNR32
(Marked except MNR02)

Different marking system may apply to each product type.



●MNR04 / MNR14 / MNR34
(Marked except MNR04)

Different marking system may apply to each product type.

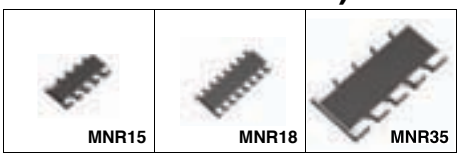


Part No.	L	W	t	a	b2	c	p
MNR02	1.0±0.1	1.0±0.1	0.35±0.1	0.2±0.1	$0.33^{+0.1}_{-0.05}$	0.25±0.1	0.68
MNR12	1.6±0.1	1.6±0.1	0.5±0.1	0.3±0.2	0.6±0.15	0.25±0.15	0.8
MNR32	2.6±0.2	3.1±0.2	0.55±0.1	0.5±0.3	1.0±0.2	0.5Max.	1.27

Part No.	L	W	t	a	b1	b2	c	p
MNR04	2.0±0.1	1.0±0.1	0.35±0.1	0.2±0.1	0.3±0.1	0.4±0.1	0.25±0.1	0.5
MNR14	3.2±0.1	1.6±0.1	0.5±0.1	0.3±0.2	0.4±0.15	0.6±0.15	0.25±0.15	0.8
MNR34	5.2±0.4	3.1±0.2	0.55±0.1	0.5±0.3	0.8±0.2	1.0±0.2	0.5Max.	1.27

Thick Film Chip Resistors (Standard series)
8-element Chip Resistor Networks (MNR series <0603×5 to 1206×5>)

- One package built in 8-element chip contributes to space-saving
- 8 resistor elements reduce mounting cost
- Convex type electrodes facilitate visual inspection of fillets.
  Inspection can be performed with automatic inspection equipment.
- Suitable for pull-up resistor, damping resistor
- No direction to be mounted



MNR series <0603×5 to 1206×5>

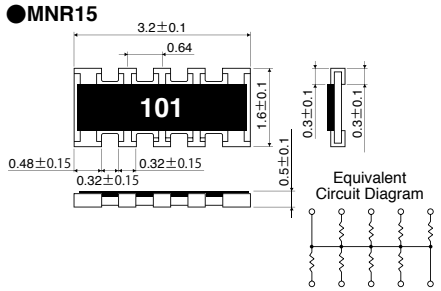
Part No.	Size code mm (inch)	No. of terminals	No. of elements	Rated power (70°C)	Limiting element voltage (V)	Tolerance	Temperature coefficient (ppm / °C)	Resistance range	Operating temperature range (°C)	Automotive Grade Available
MNR15	1608 (0603) ×5	10	8	0.031W / Element	12.5	J (±5%)	±200	56Ω to 100kΩ (E24 Series)	−55 to +125	Yes
MNR18	1605 (0602) ×8	16	8	0.063W / Element	25	J (±5%)	±200	56Ω to 100kΩ (E24 Series)		Yes
MNR35	3216 (1206) ×5	10	8	0.063W / Element	50	J (±5%)	±200	56Ω to 100kΩ (E12 Series)		Yes

Jumper Type

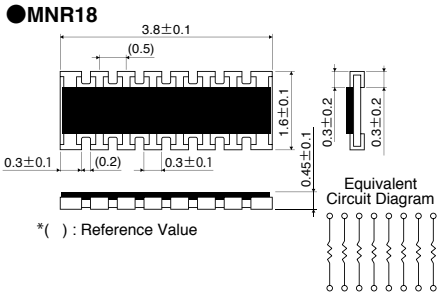
Part No.	Size code mm (inch)	Rated current	Resistance	Operating temperature range (°C)	Automotive Grade Available
MNR18	1605 (0602)×8	1A / Element	50mΩ Max.	−50 to +125°C	Yes

Dimensions (Unit : mm)

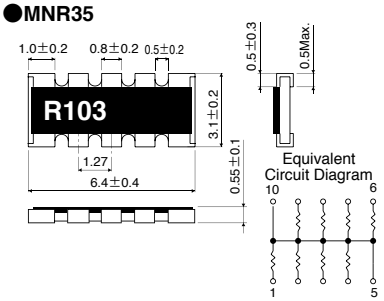
●MNR15



●MNR18

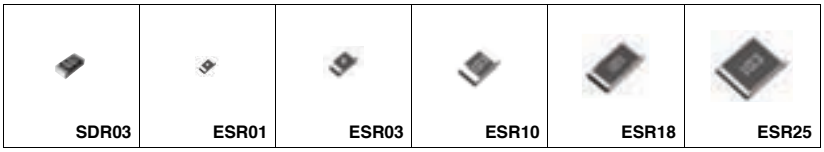


●MNR35



Thick Film Chip Resistors (High reliability series)
High Anti-surge Chip Resistors (SDR series)
Anti-surge Chip Resistors (ESR series)

- Exclusive resistive element pattern and laser trimming technology results in significantly improved surge resistance characteristics.
- Superior power ratings.



SDR series

Part No.	Size code mm (inch)	Rated power (70°C)	Limiting element voltage (V)	Tolerance	Temperature coefficient (ppm / °C)	Resistance range	Operating temperature range (°C)	Automotive Grade Available
New SDR03	1608 (0603)	1/4W (0.25W)	150	J (±5%)	±200	1Ω to 10MΩ (E24 Series)	−55 to +155	Yes
				F (±1%)	±200 ±100	1Ω to 9.76Ω (E24,96 Series) 10Ω to 10MΩ (E24,96 Series)		
				D (±0.5%)	±100	10Ω to 1MΩ (E24,96 Series)		

ESR series

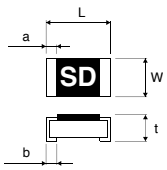
Part No.	Size code mm (inch)	Rated power (70°C)	Limiting element voltage (V)	Tolerance	Temperature coefficient (ppm / °C)	Resistance range	Operating temperature range (°C)	Automotive Grade Available
ESR01	1005 (0402)	1/5W (0.2W)	50	J (±5%)	+500/−250 ±200	1Ω to 9.1Ω (E24 Series) 10Ω to 10MΩ (E24 Series)	−55 to +155	Yes
				F (±1%)	±100	10Ω to 976kΩ (E24,96 Series) 1MΩ to 2.2MΩ (E24 Series)		
ESR03	1608 (0603)	1/4W (0.25W)	150	J (±5%)	±200	1Ω to 10MΩ (E24 Series)		Yes
				F (±1%)	±200 ±100	1Ω to 9.76Ω (E24,96 Series) 10Ω to 10MΩ (E24,96 Series)		
				D (±0.5%)	±100	10Ω to 1MΩ (E24,96 Series)		
ESR10	2012 (0805)	2/5W (0.4W)	150	J (±5%)	±200	1Ω to 30MΩ (E24 Series)		Yes
				F (±1%)	±100	1Ω to 10MΩ (E24,96 Series)		
				D (±0.5%)	±100	10Ω to 1MΩ (E24,96 Series)		
ESR18	3216 (1206)	1/3W*1 (0.33W)	200	J (±5%)	±200	1Ω to 15MΩ (E24 Series)		Yes
				F (±1%)	±100	1Ω to 10MΩ (E24,96 Series)		
				D (±0.5%)	±100	10Ω to 1MΩ (E24,96 Series)		
ESR25	3225 (1210)	1/2W*1 (0.5W)	200	J (±5%)	±200	1Ω to 10MΩ (E24 Series)		Yes
				F (±1%)	±100	1Ω to 10MΩ (E24,96 Series)		
				D (±0.5%)	±100	10Ω to 1MΩ (E24,96 Series)		

*1 Please contact us for the higher rated power. *E24 : Standard products E96 : Custom products

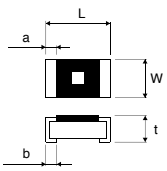
■Dimensions (Unit : mm)

Part No.	Size code mm (inch)	L	W	t	a	b
SDR03	1608 (0603)	1.6±0.1	0.8±0.1	0.45±0.1	0.25±0.1	0.25±0.1
ESR01	1005 (0402)	1.0±0.05	0.5±0.05	0.35±0.05	0.2±0.1	$0.25^{+0.05}_{-0.1}$
ESR03	1608 (0603)	1.6±0.1	0.8±0.1	0.45±0.1	0.3±0.2	0.3±0.2
ESR10	2012 (0805)	2.0±0.1	1.25±0.1	0.55±0.1	0.3±0.2	0.4±0.2
ESR18	3216 (1206)	3.2±0.15	1.6±0.15	0.55±0.1	0.3±0.25	0.5±0.25
ESR25	3225 (1210)	3.2±0.15	2.5±0.15	0.55±0.1	0.3±0.25	0.5±0.25

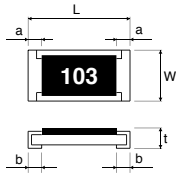
●SDR03



●ESR01/03



●ESR10/18/25



Thick Film Chip Resistors (High reliability series)
High Power Chip Resistors <Wide Terminal type> (LTR series)

- High joint reliability with long side terminations.
- Highest power ratings in their class.
- Guaranteed anti-surge characteristic in all series.

LTR series

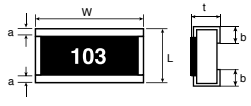
Part No.	Size code mm (inch)	Rated power (70°C)	Limiting element voltage (V)	Tolerance	Temperature coefficient (ppm / °C)	Resistance range	Operating temperature range (°C)	Automotive Grade Available
LTR10	2012 (0805)	1/4W (0.25W)	150	J (±5%)	±200	1Ω to 1MΩ (E24 Series)	−55 to +155	Yes
				F (±1%)	±100	1Ω to 1MΩ (E24,96 Series)		
				D (±0.5%)	±100	10Ω to 1MΩ (E24,96 Series)		
LTR18	3216 (1206)	3/4W (0.75W)	200	J (±5%)	±200	1Ω to 1MΩ (E24 Series)		Yes
				F (±1%)	±100	1Ω to 1MΩ (E24,96 Series)		
				D (±0.5%)	±100	10Ω to 1MΩ (E24,96 Series)		
LTR50	5025 (2010)	1W	200	J (±5%)	±200	1Ω to 1MΩ (E24 Series)		Yes
				F (±1%)	±100	1Ω to 1MΩ (E24,96 Series)		
				D (±0.5%)	±100	10Ω to 1MΩ (E24,96 Series)		
LTR100	6432 (2512)	2W	200	J (±5%)	±200	1Ω to 1MΩ (E24 Series)		Yes
				F (±1%)	±100	1Ω to 1MΩ (E24,96 Series)		
				D (±0.5%)	±100	10Ω to 1MΩ (E24,96 Series)		

*E24 : Standard products E96 : Custom products

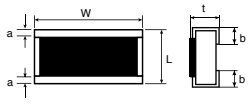
■Dimensions (Unit : mm)

Part No.	Size code mm (inch)	L	W	t	a	b
LTR10	2012 (0805)	1.2±0.1	2.0±0.1	0.55±0.1	0.25±0.1	0.35±0.2
LTR18	3216 (1206)	1.6±0.15	3.2±0.15	0.55±0.1	0.3±0.2	0.5±0.2
LTR50	5025 (2010)	2.5±0.15	5.0±0.15	0.55±0.1	0.38±0.2	0.9±0.2
LTR100	6432 (2512)	3.2±0.15	6.4±0.15	0.55±0.15	0.4±0.25	1.13±0.25

●LTR10/18/50

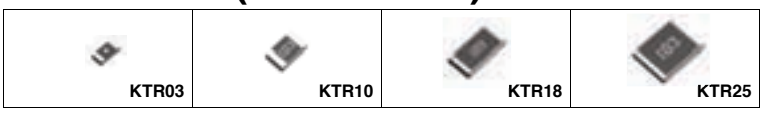


●LTR100



Thick Film Chip Resistors (High reliability series)
High Voltage Resistance Chip Resistors (KTR series)

- Twice the rated voltage of conventional products.
- Perfect for use in Camera Flash circuit, etc.



KTR series

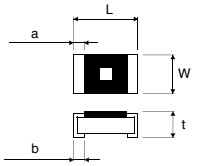
Part No.	Size code mm (inch)	Rated power (70°C)	Limiting element voltage (V)	Tolerance	Temperature coefficient (ppm / °C)	Resistance range	Operating temperature range (°C)	Automotive Grade Available
KTR03	1608 (0603)	1/10W (0.1W)	350	J (±5%)	±200	1Ω to 10MΩ (E24 Series)	−55 to +155	Yes
				F (±1%)	±100	1Ω to 10MΩ (E24,96 Series)		
KTR10	2012 (0805)	1/8W (0.125W)	400	J (±5%)	±200	1Ω to 30MΩ (E24 Series)		Yes
				F (±1%)	±100	1Ω to 10MΩ (E24,96 Series)		
KTR18	3216 (1206)	1/4W (0.25W)	500	J (±5%)	±200	1Ω to 15MΩ (E24 Series)		Yes
				F (±1%)	±100	1Ω to 10MΩ (E24,96 Series)		
KTR25	3225 (1210)	1/3W (0.33W)	600	J (±5%)	±200	1Ω to 10MΩ (E24 Series)		Yes
				F (±1%)	±100	1Ω to 10MΩ (E24,96 Series)		

*E24 : Standard products E96 : Custom products

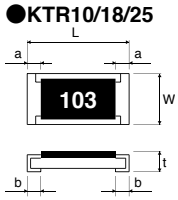
■Dimensions (Unit : mm)

Part No.	Size code mm (inch)	L	W	t	a	b
KTR03	1608 (0603)	1.6±0.1	0.8±0.1	0.45±0.1	0.3±0.2	0.3±0.2
KTR10	2012 (0805)	2.0±0.1	1.25±0.1	0.55±0.1	0.3±0.2	0.4±0.2
KTR18	3216 (1206)	3.2±0.15	1.6±0.15	0.55±0.1	0.3±0.25	0.5±0.25
KTR25	3225 (1210)	3.2±0.15	2.5±0.15	0.55±0.1	0.3±0.25	0.5±0.25

●KTR03



●KTR10/18/25



Thick Film Chip Resistors (Low Ohmic type)
Chip Resistors (Low Ohmic MCR series)

- Very-low ohmic resistance from 47m Ohm is in lineup by thick-film resistive element.
- High-reliability chip resistor employing metal glaze as resistive element.

Low Ohmic MCR series

Part No.	Size code mm (inch)	Rated power (70°C)	Tolerance	Temperature coefficient (ppm / °C)	Resistance range	Operating temperature range (°C)	Automotive Grade Available
MCR006	0603 (0201)	1/20W (0.05W)	F (±1%)	+600 / −200	1.0Ω to 9.1Ω (E24 Series)	−55 to +125	Preparing
MCR01	1005 (0402)	1/16W (0.063W)	F (±1%)	±400	1.0Ω to 9.1Ω (E24 Series)	−55 to +155	Yes
MCR03	1608 (0603)	1/10W (0.1W)	F (±1%)	±400	1.0Ω to 9.1Ω (E24 Series)		Yes
MCR10	2012 (0805)	1/4W (0.25W)	J (±5%)	*Table 1	0.047Ω to 0.91Ω (E24 Series)		Yes
			F (±1%)	*Table 1	0.047Ω to 9.1Ω (E24 Series)		
MCR18	3216 (1206)	1/4W (0.25W)	J (±5%)	*Table 1	0.047Ω to 0.91Ω (E24 Series)		Yes
			F (±1%)	*Table 1	0.047Ω to 9.1Ω (E24 Series)		
MCR25	3225 (1210)	1/2W (0.5W)	J (±5%)	300±300	0.047Ω to 0.091Ω (E24 Series)		Yes
				±200	0.1Ω to 0.91Ω (E24 Series)		
			F (±1%)	300±300	0.047Ω to 0.091Ω (E24 Series)		
				±200	0.1Ω to 9.1Ω (E24 Series)		
MCR50	5025 (2010)	1/2W (0.5W)	J (±5%)	*Table 1	0.047Ω to 0.91Ω (E24 Series)		Yes
			F (±1%)	*Table 1	0.047Ω to 9.1Ω (E24 Series)		
MCR100	6432	1W	J (±5%)	*Table1	0.047Ω to 0.91Ω (E24 Series)	−55 to +125	Yes
			F (±1%)	*Table1	0.047Ω to 9.1Ω (E24 Series)		

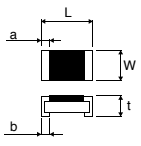
*Table 1

Tolerance	Temperature coefficient (ppm / °C)	Resistance range
J (±5%) F (±1%)	500±300	0.047Ω to 0.091Ω (E24 Series)
	400±200	0.1Ω to 0.13Ω (E24 Series)
	±250	0.15Ω to 9.1Ω (E24 Series)

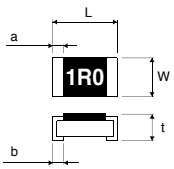
■Dimensions (Unit : mm)

Part No.	Size code mm (inch)	L	W	t	a	b
MCR006	0603 (0201)	0.6±0.03	0.3±0.03	0.23±0.03	0.1±0.05	0.15±0.05
MCR01	1005 (0402)	1.0±0.05	0.5±0.05	0.35±0.05	0.2±0.1	$0.25^{+0.05}_{-0.1}$
MCR03	1608 (0603)	1.6±0.1	0.8±0.1	0.45±0.1	0.3±0.2	0.3±0.2
MCR10	2012 (0805)	2.0±0.1	1.25±0.1	0.55±0.1	0.4±0.2	0.4±0.2
MCR18	3216 (1206)	3.2±0.15	1.6±0.15	0.55±0.1	0.5±0.25	0.5±0.25
MCR25	3225 (1210)	3.2±0.15	2.5±0.15	0.55±0.15	0.5±0.25	0.5±0.25
MCR50	5025 (2010)	5.0±0.15	2.5±0.15	0.55±0.15	0.6±0.25	0.6±0.25

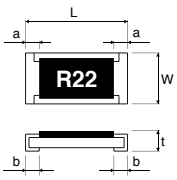
●MCR006/01



●MCR03

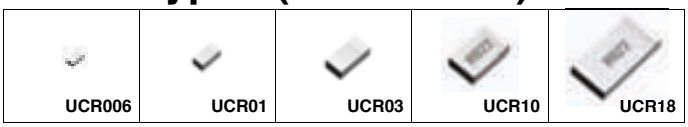


●MCR10/18/25/50/100



Thick Film Chip Resistors (Low Ohmic type)
Low Ohmic Chip Resistors <Face down type> (UCR series)

- Chip resistors for current detection. (11mΩ-)
- Resistive element is located at bottom side, which reduces the resistance shift during mounting process.
- ROHM's unique structure achieved improvement of heat.



UCR series

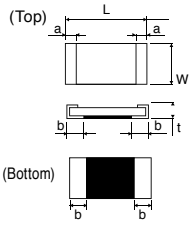
Part No.	Size code mm (inch)	Rated power (70°C)	Tolerance	Temperature coefficient (ppm / °C)	Resistance range	Operating temperature range (°C)	Automotive Grade Available
New UCR006	0603 (0201)	1/10W (0.1W)	J (±5%)	0 to 300	100mΩ to 910mΩ (E24 Series)	−55 to +155	Preparing
			F (±1%)				
UCR01	1005 (0402)	1/8W (0.125W)	J (±5%)	0 to 300	68mΩ to 91mΩ (E24 Series)		Yes
			F (±1%)	0 to 250	100mΩ to 200mΩ (E24 Series)		
				0 to 200	220mΩ to 910mΩ (E24 Series)		
UCR03	1608 (0603)	1/4W (0.25W)	J (±5%)	0 to 150	100mΩ to 200mΩ (E24 Series)		Yes
			F (±1%)				
		1/5W (0.2W)	J (±5%)	0 to 150	220mΩ to 910mΩ (E24 Series)		
			F (±1%)				
UCR10	2012 (0805)	1/3W (0.33W)	J (±5%)	250±200	11mΩ to 18mΩ (E24 Series)		Yes
				0 to 250	20mΩ to 47mΩ (E24 Series)		
				0 to 150	51mΩ to 100mΩ (E24 Series)		
			F (±1%)	0 to 250	11mΩ to 47mΩ (E24 Series)		
				0 to 150	51mΩ to 100mΩ (E24 Series)		
UCR18	3216 (1206)	1/2W* (0.5W)	J (±5%)	0 to 350	11mΩ to 18mΩ (E24 Series)		Yes
				0 to 200	20mΩ to 39mΩ (E24 Series)		
			F (±1%)	0 to 150	43mΩ to 100mΩ (E24 Series)		

* Please contact us for the higher rated power.

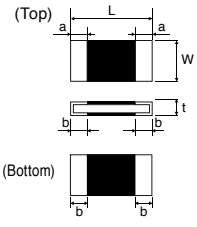
■Dimensions (Unit : mm)

Part No.	Size code mm (inch)	L	W	t	a	b
UCR006	0603 (0201)	0.64±0.05	0.34±0.05	0.28±0.05	0.16±0.1	0.22±0.1
UCR01	1005 (0402)	1.0±0.1	0.55±0.1	0.37±0.05	0.28±0.1	0.34±0.1
UCR03	1608 (0603)	1.6±0.1	0.87±0.1	0.5±0.1	0.45±0.2	0.45±0.2
UCR10	2012 (0805)	2.0±0.1	1.25±0.1	0.55±0.1	0.24±0.2	0.5±0.2
UCR18	3216 (1206)	3.2±0.15	1.6±0.15	0.55±0.1	0.3±0.2	0.9±0.25

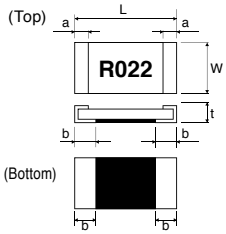
●UCR006/01
●UCR03
(50mΩ≦R≦910mΩ)



●UCR03
(20mΩ≦R<50mΩ)



●UCR10/18



Thick Film Chip Resistors (Low Ohmic type)
High Power Chip Resistors <Wide Terminal type> (Low Ohmic LTR series)

- Chip resistors for current detection. (10mΩ-)
- High joint reliability with long side terminations.
- Improvement of rated power enables to displace smaller size of resistors, and it contributes space savings in your set.

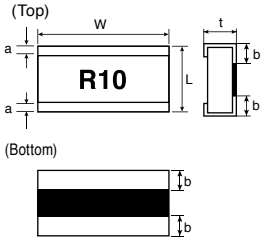
Low Ohmic LTR series

Part No.	Size code mm (inch)	Rated power (70°C)	Tolerance	Temperature coefficient (ppm / °C)	Resistance range	Operating temperature range (°C)	Automotive Grade Available
LTR10	2012 (0805)	1/2W (0.5W)	J (±5%)	±150	47mΩ to 9.1Ω (E24 Series)	−55 to +155	Yes
			F (±1%)				
LTR18	3216 (1206)	1W	J (±5%)	0 to 300	10mΩ to 18mΩ (E24 Series)		Yes
				0 to 200	20mΩ to 47mΩ (E24 Series)		
			F (±1%)	0 to 150	51mΩ to 470mΩ (E24 Series)		
				±100	510mΩ to 1Ω (E24 Series)		
LTR100	6432 (2512)	2W	J (±5%)	±200	100mΩ to 910mΩ (E24 Series)		Yes
			F (±1%)	0 to 150	100mΩ to 910mΩ (E24 Series)		

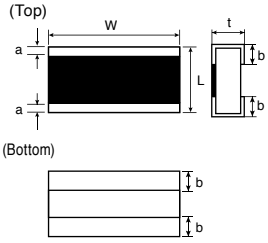
■Dimensions (Unit : mm)

Part No.	Size code mm (inch)	L	W	t	a	b
LTR10	2012 (0805)	1.2±0.1	2.0±0.1	0.55±0.1	0.3±0.2	0.35±0.2
LTR18	3216 (1206)	1.6±0.1	3.2±0.1	0.58±0.1	0.5±0.2	0.5±0.2
LTR100	6432 (2512)	3.2±0.15	6.4±0.15	0.55±0.15	0.4±0.25	1.13±0.25

●LTR10

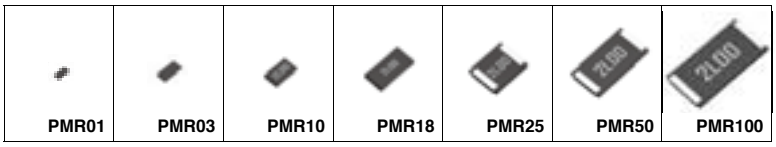


●LTR18/100 (No marking)



Chip Resistors for Current Detection (Metal plate type)
Ultra Low Ohmic Chip Shunt Resistors (PMR series)

- Ultra low-ohmic resistance range (1mΩ-)
- Improved current detection accuracy by trimming-less structure.
  Highly recommended for large current / High speed switching circuit.
- Special low resistance temperature coefficient (TCR) alloy utilized for the resistive element.



PMR series

Part No.	Size code mm (inch)	Rated power (70°C)	Tolerance	Temperature coefficient (ppm / °C)	Resistance value (mΩ)	Operating temperature range (°C)	Automotive Grade Available
New PMR01	1005 (0402)	1/5W (0.2W)	J (±5%)	0 to 200	10	−55 to +155	Yes
PMR03	1608 (0603)	1/4W (0.25W)	J (±5%) F (±1%)	0 to 150	10		Yes
PMR10	2012 (0805)	1/2W (0.5W)	J (±5%) F (±1%)	±150	2,3,4,5,6, 7,8,9,10		Yes
PMR18	3216 (1206)	1W	J (±5%) F (±1%)	±100	1,2,3,4,5,6, 7,8,9,10		Yes
PMR25	3225 (1210)	1W	J (±5%) F (±1%)	±100	1,2,3,4,5		Yes
PMR50	5025 (2010)	1W	J (±5%) F (±1%)	±100	1,2,3,4,5, 6,7,8,9,10		Yes
PMR100	6432 (2512)	2W*	J (±5%) F (±1%)	±150	1,2		Yes
				±100	3,4,5,6,7,8,9,10		

* Please contact us for the higher rated power

Large Current Jumper Type

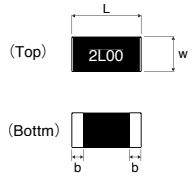
Part No.	Size code mm (inch)	Rated current	Resistance	Temperature range (°C)	Automotive Grade Available
PMR01	1005 (0402)	20.0A	0.5mΩ Max.	−55 to +155	Yes
PMR03	1608 (0603)	22.4A			Yes
PMR10	2012 (0805)	31.6A			Yes
PMR18	3216 (1206)	38.7A			Yes
PMR25	3225 (1210)	44.7A			Yes
PMR50	5025 (2010)	50.0A			Yes
PMR100	6432 (2512)	63.2A			Yes

Dimensions (Unit : mm)

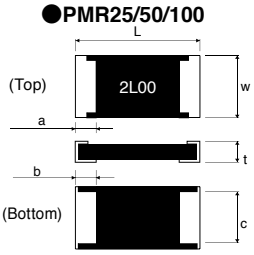
Part No.	Size code mm (inch)	L	W	t	a	b	c
PMR01	1005 (0402)	1.0±0.05	0.5±0.05	0.25±0.1	—	0.30±0.10	—
PMR03	1608 (0603)	1.6±0.15	0.8±0.15	0.25±0.1	—	0.35±0.15	—
PMR10	2012 (0805)	2.0±0.15	1.2±0.15	0.42 to 0.28*±0.15	—	0.75 to 0.35*±0.25	—
PMR18	3216 (1206)	3.2±0.15	1.6±0.15	0.42 to 0.28*±0.15	—	1.20 to 0.5* ±0.25	—
PMR25	3225 (1210)	3.2±0.2	2.5±0.2	0.52 to 0.32*±0.15	0.5±0.2	1.0 to 0.8* ±0.2	1.95±0.2
PMR50	5025 (2010)	5.0±0.2	2.5±0.2	0.52 to 0.32*±0.15	0.5±0.2	1.85 to 0.9* ±0.2	1.95±0.2
PMR100	6432 (2512)	6.4±0.25	3.2±0.25	0.52 to 0.32*±0.15	0.5±0.25	2.3 to 1.1* ±0.25	2.65±0.25

* Each value range varies with the resistance. Please contact a ROHM sales representative for further details.

●PMR01/03 (No marking)
●PMR10/18

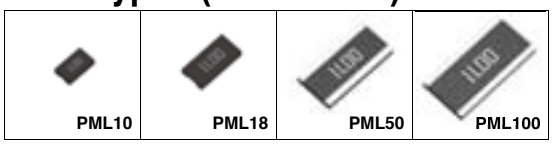


●PMR25/50/100



Chip Resistors for Current Detection (Metal plate type)
Ultra Low Ohmic Chip Shunt Resistors <Wide Terminal type> (PML series)

- Ultra-low resistance range (0.5mΩ-).
- Wide terminal configuration for high joint reliability.
- Improved current detection accuracy by trimming-less structure.



PML series

Part No.	Size code mm (inch)	Rated power (70°C)	Tolerance	Temperature coefficient (ppm / °C)	Resistance value (mΩ)	Operating temperature range (°C)	Automotive Grade Available
PML10	2012 (0805)	0.66W	J (±5%) G (±2%)	±200	1.0, 1.5, 2.0, 2.5	−55 to +155	Yes
PML18	3216 (1206)	1W	J (±5%) G (±2%)	±150	0.5, 1.0, 1.5, 2.0, 2.5		Yes
☆ PML50	5025 (2010)	1.5W (2W at 25°C)	J (±5%)	±200	0.5, 1.0, 1.5, 2.0, 2.2		Under development
PML100	6432 (2512)	2W (3W at 25°C)	J (±5%)	±100	1.0, 1.5, 2.0, 2.2		Yes
		2W		±150	0.5		

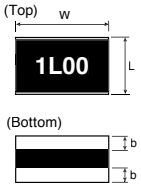
☆ : Under development (Development schedule will vary depending on resistance value. Please Contacts us.)

Dimensions (Unit : mm)

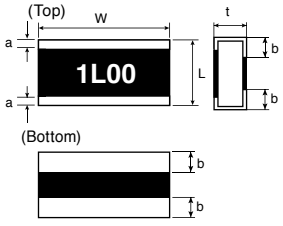
Part No	Size code mm (inch)	L	W	t	a	b
PML10	2012 (0805)	1.2±0.15	2.0±0.15	0.42±0.15	—	0.45 to 0.3* ±0.2
PML18	3216 (1206)	1.6±0.15	3.2±0.15	0.42 to 0.28* ±0.15	—	0.55 to 0.3* ±0.2
PML50	5025 (2010)	2.5±0.2	5.0±0.2	0.52 to 0.32* ±0.15	0.4±0.2	1.0 to 0.5* ±0.2
PML100	6432 (2512)	3.2±0.25	6.4±0.25	0.5 to 0.36* ±0.15	0.45±0.25	0.9 to 0.7* ±0.25

* Each value range varies with the resistance. Please contact a ROHM sales representative for further details.

●PML10/18

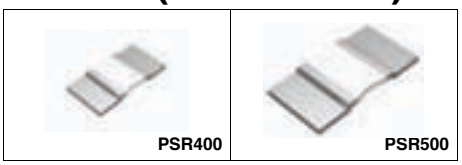


●PML50/100



Chip Resistors for Current Detection (Metal plate type)
High Power Ultra Low Ohmic Chip Shunt Resistors (PSR series)

- High power 4W to 5W
- Ultra low resistance rage (0.2mΩ-).
- Excellent TCR characterristics



PSR series

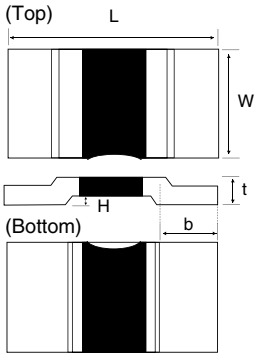
Part No.	Size code mm (inch)	Rated power (70°C)	Tolerance	Temperature *1 coefficient (ppm / °C)	Resistance range (mΩ)	Operating temperature range (°C)	Automotive Grade Available
New PSR400	10×5.2 (3921)	4W	J (±5%) G (±2%) F (±1%)	±175	0.3, 0.5	−55 to +170	Yes
				±75	1.0, 2.0, 3.0		
New PSR500	15×7.75 (5931)	5W	J (±5%) G (±2%) F (±1%)	±225	0.2, 0.3		Yes
				±175	0.4, 0.5		
				±75	1.0, 2.0		

*1 (+20°C to +125°C)

■Dimensions (Unit : mm)

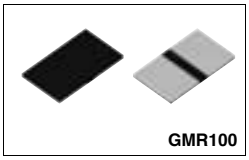
Part No.	Size code mm (inch)	L	W	t	H	b
PSR400	0.3mΩ	10±0.3	5.2±0.3	1.85±0.15	0.5±0.1	2.0±0.6
	0.5mΩ			1.3±0.15		
	1.0mΩ			0.9±0.15		
	2.0mΩ			1.1±0.15		
	3.0mΩ			0.9±0.15		
PSR500	0.2mΩ	15±0.3	7.75±0.3	1.85±0.15	0.5±0.1	4.0±0.6
	0.3mΩ			1.4±0.15		
	0.4mΩ			1.15±0.15		
	0.5mΩ			1.05±0.15		
	1.0mΩ			1.3±0.15		
	2.0mΩ			0.9±0.15		

●PSR400/500



Chip Resistors for Current Detection (Metal plate type)
High Power Low Ohmic Chip Shunt Resistors (GMR series)

- High power (3W)
- High heat dissipation
- Low ohmic (10mΩ to 220mΩ)



GMR series

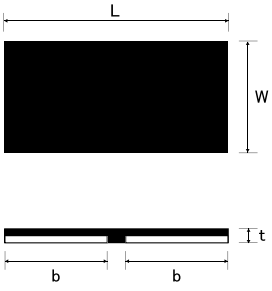
Part No.	Size code mm (inch)	Rated power (70°C)	Tolerance	Temperature *1 coefficient (ppm / °C)	Resistance range (mΩ)	Operating temperature range (°C)	Automotive Grade Available
☆GMR100	6432 (2512)	3W	J (±5%) F (±1%)	±25	10mΩ to 220mΩ (E6 Series*2)	−55 to +170	Under development

*1 (+25°C to +60°C)
*2 Please contact us for another standard nominal resistance values.
☆ : Under development (Development schedule will vary depending on resistance value. Please Contacts us.)

■Dimensions (Unit : mm)

Part No.	Size code mm (inch)	L	W	t	b
GMR100	6432 (2512)	6.40±0.25	3.20±0.25	0.40±0.15	2.75±0.25

●GMR100



Standard Nominal Resistance Values

E3	10				22						47						
E6	10		15		22		33		47		68						
E12	10	12	15	18	22	27	33	39	47	56	68	82					
E24	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47
	51	56	62	68	75	82	91										
E96	100	102	105	107	110	113	115	118	121	124	127	130	133	137	140	143	147
	150	154	158	162	165	169	174	178	182	187	191	196	200	205	210	215	221
	226	232	237	243	249	255	261	267	274	280	287	294	301	309	316	324	332
	340	348	357	365	374	383	392	402	412	422	432	442	453	464	475	487	499
	511	523	536	549	562	576	590	604	619	634	649	665	681	698	715	732	750
	768	787	806	825	845	866	887	909	931	953	976						

Nominal Resistance

Resistors of a series fall into one of nominal resistance ranges shown in the table above. Nominal resistance is determined by the common ratio shown right.

Resistance coding

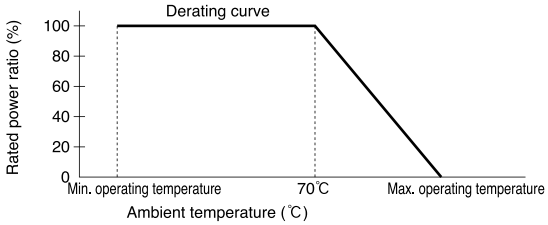
Nominal resistance is expressed in 3 digits when the resistance tolerance is ±5% and in 4 digits when ±1%.
The leading 2 or 3 digits indicate significant figure while the last digit indicates the number of zeros. The letter R denotes the decimal point if necessary.

EX1 22Ω→22×10^{0}Ω→220 (the last digit indicates the number "0" of a multiplier)
EX2 47kΩ→47×10^{3}Ω→473 (the last digit indicates the number "3" of a multiplier)
EX3 1.2MΩ→12×10^{5}Ω→125 (the last digit indicates the number "5" of a multiplier)
EX4 2.7Ω→2R7 (the decimal point indicate the letter R / the letter R apply to the low Resistance less than 10Ω)
EX5 1130Ω→113×10^{1}Ω→1131 (the last digit indicates the number "1" of a multiplier / Resistance Tolerance 1% (F) products)
EX6 0.10Ω→R10

Series	Common ratio	Remarks
E6	$\sqrt[6]{10}$≒1.46	Rounded off to a 2-digit figure.
E12	$\sqrt[12]{10}$≒1.21	
E24	$\sqrt[24]{10}$≒1.10	
E96	$\sqrt[96]{10}$≒1.02	Rounded off to a 3-digit figure.

Supplement of rated power

・When the ambient temperature exceeds the rated ambient temperature, derate the load power based on the derating curve.



For basic guidelines on using resistors, see the technical reports issued by Japan Electronics and Information Technology Industries Association. JEITA RCR-2121A.
"Guideline of notabilia for fixed resistors for use in electronic equipment (Safety Application Guide for fixed resistors for use in electronic equipment)"

Supplementary to notes

* 1 : When resistor is to be exposed to a transient load (excessive large load, such as pulse), mount the resistor on your product and check the condition and evaluate the result. Constant application of a voltage above the rated voltage will degrade the performance and reliability of the resistor.
Do not apply a voltage exceeding the rated voltage across any ROHM resistors.

* 2 : Rated voltage (V) =$\sqrt{\text{rated power (W)} \times \text{nominal resistance (Ω)}}$ or the limiting element voltage, whichever smaller, is the rated voltage.

High quality and stable supply enabled through a vertically integrated production system

High quality raw materials

Manufacturing wafers through silicon ingot pulling

Raw silicon

In-house photomask

Pursuing high quality through integrated quality control, from IC chip design layout to photomask production

Silicon Ingot

CAD

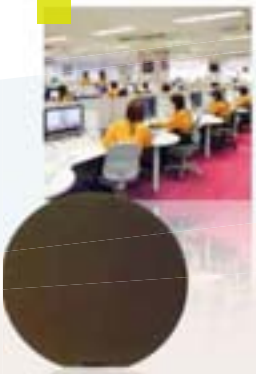
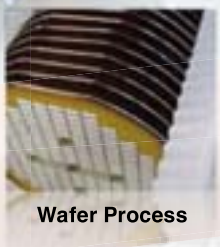


Photo Mask

Wafer



Wafer Process

Si Silicon

SiC Silicon carbide

Wafer

SiCrystal AG

SiCrystal AG is a German SiC single-crystal wafer manufacturer that joined the ROHM Group in 2009.

High quality

Achieving high quality in all processes

ROHM considers 'quality first' as its company objective and unwaveringly pursues this goal. All processes, from production, from development, design and wafer manufacturing to sales and service, are carried out within the group using a vertically integrated production system, and activities are implemented in each process to improve quality. This also results in excellent traceability and establishes a system that ensures worry-free use of our products.

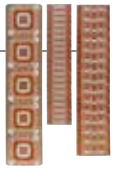
Stable supply

Fulfilling our commitment to ensure stable supply through the collective strength of the ROHM Group

The ROHM Group assesses market conditions to fulfill its commitment in supplying products that customers demand. All manufacturing processes are managed in-house using a vertically integrated production system. Compared to traditional manufacturers that do not own fabrication facilities or foundry manufacturers, our system is not as susceptible to external factors.
ROHM strives to ensure a stable supply to customers, for example by establishing a Business Continuity Management (BCM) system that includes multi-site production and maintenance of safety stock in order to flexibly respond to natural disasters and other unforeseen events.

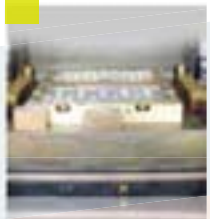
In-house dies and lead frames

To ensure quality manufacturing, all lead frame dies for lead frame punching and molding are created in-house

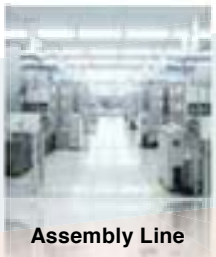


State-of-the-art packages

Utilizing the latest assembly technology for CSP, BGA, COC, COF and stacked packages

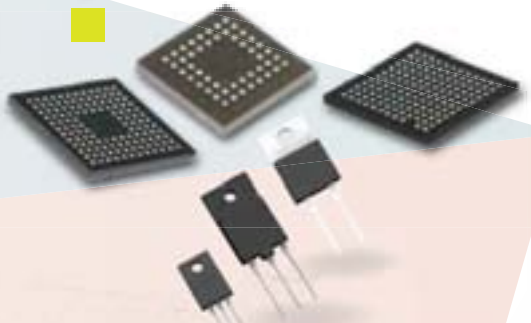


Frame



Assembly Line

Packaging



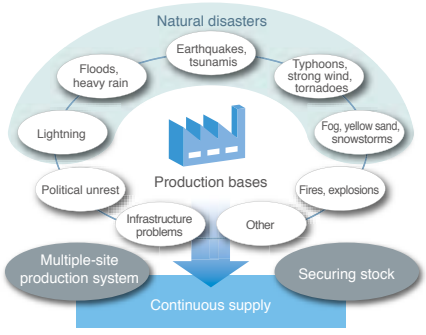
In-house production system

ROHM's production system is developed in-house to enable flexible, precise response to customer needs.

All production equipment are developed in-house

BCM System

ROHM continues to strengthen its BCM system based on risk evaluations conducted at all production bases.



ROHM Initiatives for Automotive-Grade Products

ROHM has set a corporate objective of 'Quality First' and pursues high quality, innovative manufacturing while providing greater security and peace of mind through stable, guaranteed delivery.
In addition, ROHM takes on supply responsibility by utilizing a vertically integrated production system and implements a variety of initiatives to ensure superior reliability.

Sample Initiatives

Real-Time Quality Checks

Screening methods are implemented at each process, from silicon ingot pulling and wafer production to testing, assembly, and shipment inspection in order to verify quality and workmanship.

Real-time verification in all processes

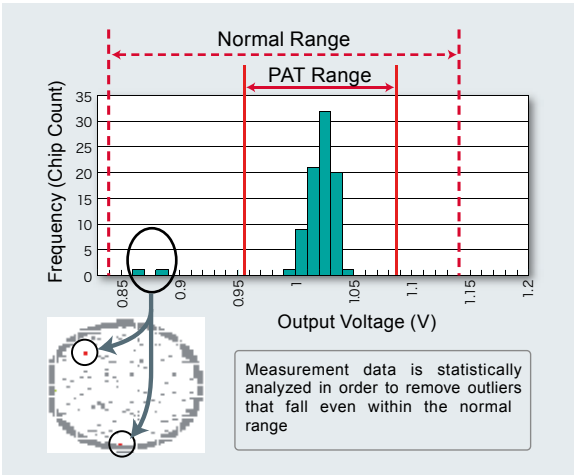
Workmanship verified during die bonding operation

Quality check during the wire bonding process

PAT System Implementation (AEC Compliance)

The PAT system is designed to remove outliers - even within the normal range - through statistical analysis of measurement data. As a result, even some products deemed to be good during testing and fall within the normal range but lie outside the lot distribution are removed due to potential characteristics that may cause them to fail prematurely in the future. This provides an additional measure to prevent defective products from escaping.

PAT System (PAT: Part Average Testing)



Measurement data is statistically analyzed in order to remove outliers that fall even within the normal range

Dedicated Automotive Lines

All automotive products are produced and processed on dedicated lines by certified operators that have undergone extensive training and testing. Focusing on machine and man makes it possible to establish a high-reliability, automotive-grade production environment.

Line Differentiation and 4M

ROHM manufactures automotive products on designated HR (High Reliability) lines, separate from standard lines used for general-purpose products

Certification Armband

Overview

Model Design	Model Testing Design	Model Certification Standards
Robust design/multiple protection circuits/ improved resistance to destruction/easier testability/threshold characteristics evaluation	High/ambient/low temperature measurement (all chips) • 100% HV stress testing/PAT system implementation	JEITA-based • JEDEC-/AEC-Q100-/AEC-Q101-compliant • Long-term reliability testing • Lifetime est. based on WLR data • ESD testing
Wafer Process Management	**Assembly Process Management**	**Traceability, Kept Samples, In-Process Failure Analysis, etc.**
SPC management/real-time monitoring/100% chip defect inspection	Main processing point real-time work and check/workmanship guarantee (i.e. internal X-ray inspection, reflow screening)/4M consolidation	Kept samples from all lots stored for 10 years (for important security applications)/in-process failure analysis of all lots, etc.

ROHM Group Locations (Japan)

Main Sales Offices

Kyoto	Nagoya	Matsumoto	Sendai
Tokyo	Fukuoka	Mito	Takasaki
Yokohama		Nishi-Tokyo	Utsunomiya

Manufacturing Facilities

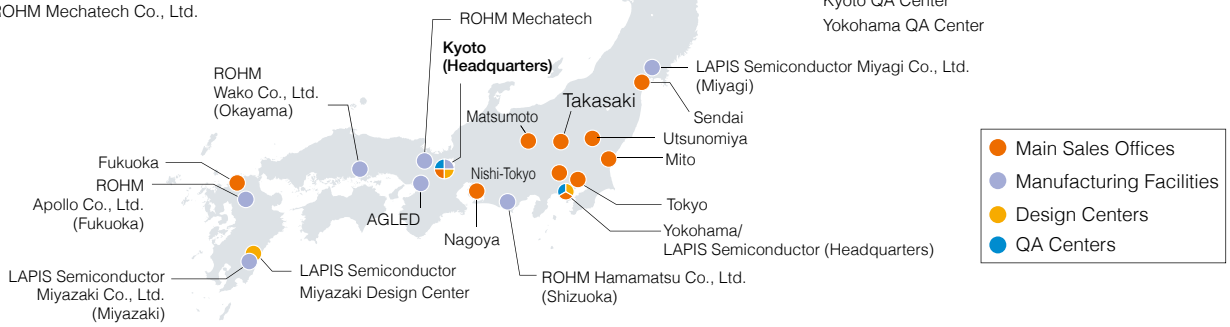
ROHM Hamamatsu Co., Ltd.
ROHM Wako Co., Ltd.
ROHM Apollo Co., Ltd.
ROHM Mechatech Co., Ltd.
LAPIS Semiconductor Miyagi Co., Ltd.
LAPIS Semiconductor Miyazaki Co., Ltd.
AGLED Co., Ltd.

Design Centers

Kyoto Technology Center (Head Office)
Kyoto Technology Center (Kyoto Ekimae)
Yokohama Technology Center
LAPIS Semiconductor Co., Ltd.(Shin-Yokohama)
LAPIS Semiconductor Co., Ltd. Miyazaki Design Center

QA Centers

Kyoto QA Center
Yokohama QA Center



ROHM Co.,Ltd.

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Headquarters / 21 Saiin Mizosaki-cho, Ukyo-ku,
Kyoto 615-8585 Japan
TEL: +81-75-311-2121 FAX: +81-75-315-0172
Date Established / September 17,1958
President / Satoshi Sawamura

ROHM Group Locations (Global)

Main Sales Offices

ASIA	ROHM Semiconductor Korea Corporation
	ROHM Semiconductor Trading (Dalian) Co., Ltd.
	ROHM Semiconductor (Shanghai) Co., Ltd.
	ROHM Semiconductor (Shenzhen) Co., Ltd.
	ROHM Semiconductor Hong Kong Co., Ltd.
	ROHM Semiconductor Taiwan Co., Ltd.
	ROHM Semiconductor Singapore Pte. Ltd.
	ROHM Semiconductor Philippines Corporation
	ROHM Semiconductor (Thailand) Co., Ltd.
	ROHM Semiconductor Malaysia Sdn. Bhd.
	ROHM Semiconductor India Pvt. Ltd.
AMERICA	ROHM Semiconductor U.S.A., LLC
	ROHM Semiconductor do Brasil Ltda.
EUROPE	ROHM Semiconductor GmbH

Manufacturing Facilities

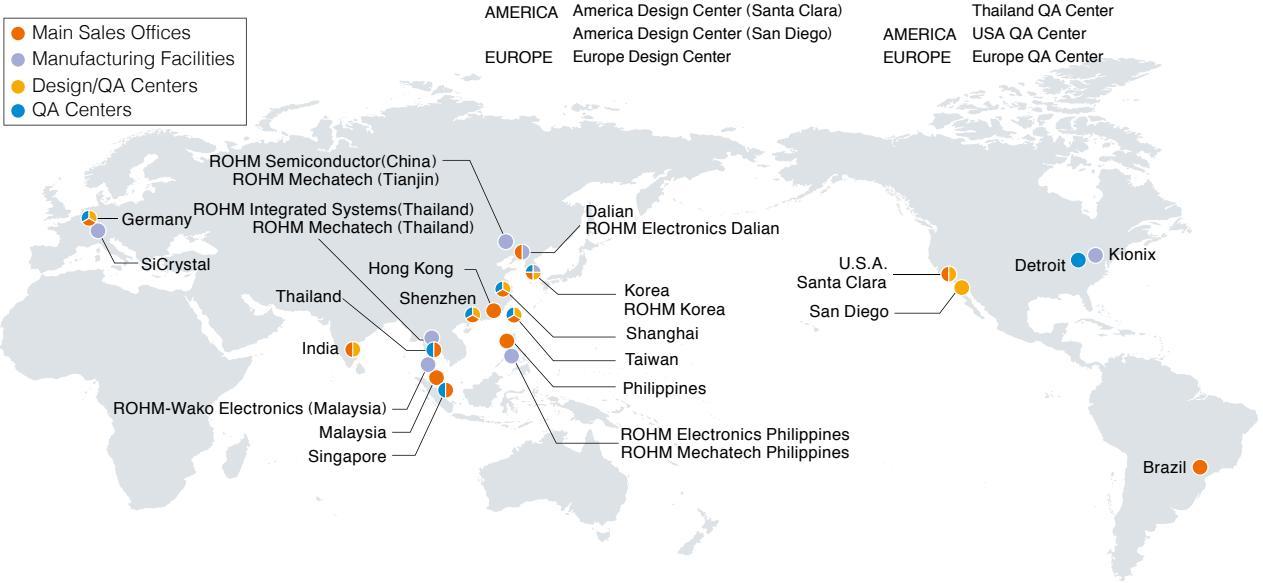
ASIA	ROHM Korea Corporation
	ROHM Electronics Philippines, Inc.
	ROHM Integrated Systems (Thailand) Co., Ltd.
	ROHM Semiconductor(China) Co., Ltd.
	ROHM Electronics Dalian Co., Ltd.
	ROHM-Wako Electronics (Malaysia) Sdn. Bhd.
	ROHM Mechatech Philippines, Inc.
	ROHM Mechatech (Thailand) Co., Ltd.
	ROHM Mechatech (Tianjin) Co., Ltd.
AMERICA	Kionix, Inc.
EUROPE	SiCrystal AG

Design Centers

ASIA	Korea Design Center
	Shanghai Design Center
	Shenzhen Design Center
	Taiwan Design Center
	India Design Center
AMERICA	America Design Center (Santa Clara)
	America Design Center (San Diego)
EUROPE	Europe Design Center

QA Centers

ASIA	Korea QA Center
	Shanghai QA Center
	Shenzhen QA Center
	Taiwan QA Center
	Singapore QA Center
	Thailand QA Center
AMERICA	USA QA Center
EUROPE	Europe QA Center



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2) The information contained herein is subject to change without notice. Before you use our Products, please contact our sales representative (as listed below) and verify the latest specifications.
3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors. Therefore, in order to prevent personal injury or fire arising from failure, please take safety measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures. ROHM shall have no responsibility for any damages arising out of the use of our Products beyond the rating specified by ROHM.
4) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products.The peripheral conditions must be taken into account when designing circuits for mass production.
5) The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM or any other parties. ROHM shall have no responsibility whatsoever for any dispute arising out of the use of such technical information.
6) The Products are intended for use in general electronic equipment (i.e. AV/OA devices, communication, consumer systems, gaming/entertainment sets) as well as the applications indicated in this document.
7) The Products specified in this document are not designed to be radiation tolerant.
8) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a ROHM representative: transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.
9) Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters.
10) ROHM shall have no responsibility for any damages or injury arising from non-compliance with the recommended usage conditions and specifications contained herein.
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ROHM Sales Offices

Contact us for further information about the products.

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Boston	+1-978-371-0382	**France**	+33 (0) 1 40 60 87 30	**Shenzhen**	+86-755-8307-3008	**Yokohama**	+81-45-476-2121
Chicago	+1-847-368-1006	**United Kingdom**	+44-1-908-272400	**Hong Kong**	+852-2740-6262		
Denver	+1-303-708-0908	**Oulu**	+358-400-726124	**Taiwan**	+886-2-2500-6956		
Detroit	+1-248-348-9920	**Spain**	+34-9375-24320	**Singapore**	+65-6436-5100		
San Diego	+1-858-625-3600	**Hungary**	+36-1-950-5859	**Philippines**	+63-2-807-6872		
Mexico	+52-33-3123-2001	**Russia**	+74 95 739 4174	**Thailand**	+66-2-254-4890		
Brazil	+55-11-3539-6320	**Seoul**	+82-2-8182-700	**Malaysia**	+60-3-7931-8155		

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