Everywhere you imagine. RENESAS

2007.12

Renesas Discrete

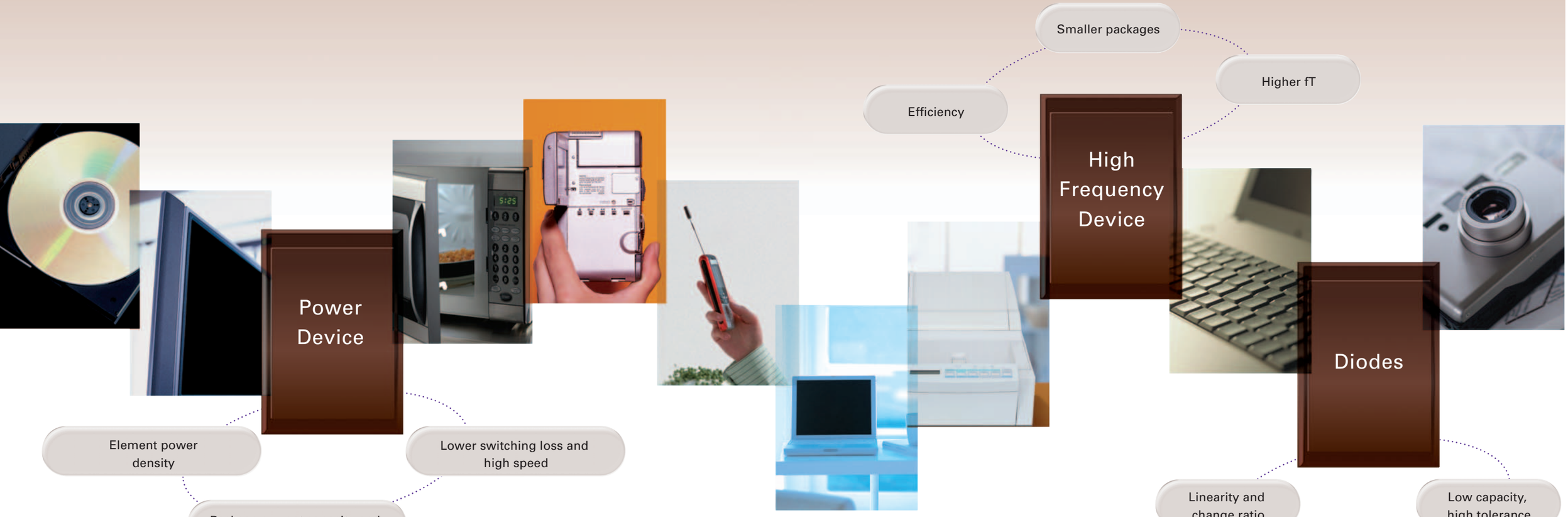
General Catalog

Transistor/Diode/Triac/Thyristor

Renesas Technology
www.renesas.com

Renesas discrete devices: extending the limits

Advanced electronic equipment requires larger data processing capacity and increased power handling. Renesas discrete devices deliver the utmost in cutting edge performance with low power consumption, cool operation, and compact size achieved through dramatically reduced power loss.



RENESAS'S DISCRETE SEMICONDUCTOR

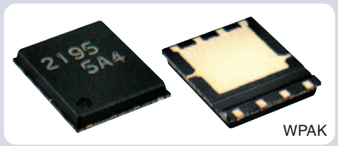
Power Transistor

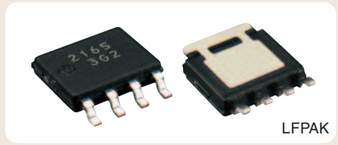
Renesas fabricates low-loss devices using advanced processes, and offers them in a variety of package types.
We support our customers' efforts to deliver eco-technology with an extensive lineup of products optimized for a range of applications, including compact mobile devices, automotive systems, power supplies, and electronic flash units.

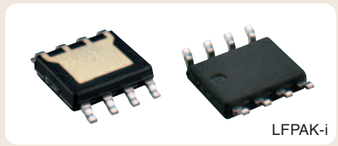
Low-voltage power MOSFET with SOP package

Our low-voltage power MOSFET devices use a trench structure to achieve the world's highest level of performance. The extensive product lineup for many applications extends from large-format packages for large-current handling to very compact packages. In particular, our selection SOP package products has a bonding-wire-less design for low loss.


SOP-8

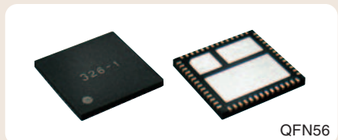

WPAK


LFPAK


LFPAK-i

SiP/Driver-MOSFETs

These devices combine a high-performance, low-voltage power MOSFET with a drive IC in a single package and have a bonding-wire-less design for extremely low loss.


QFN56

Low-Power Power MOSFETs

These devices consist of a high-performance, low-voltage power MOSFET in an extremely small package, making them ideal for use in compact systems.


CMFPAK-6

Medium/High-Voltage Power MOSFETs

We supply a selection of these devices in specialized versions for power supplies as well as other uses such as plasma display panels. A variety of packages are available and support is provided for both medium- and high-voltage applications.


TO-220C・FM


TO-3P

IGBT

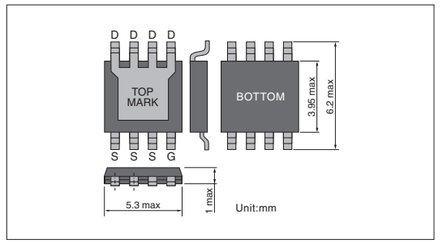
Our IGBT devices enables control of large currents using small control signals. A wide product selection is available, covering applications ranging from camera flash units, where compactness is essential, to plasma display panels, where high-speed operation is key.

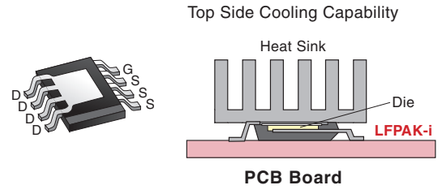

VSON-8

Bonding-wire-less design

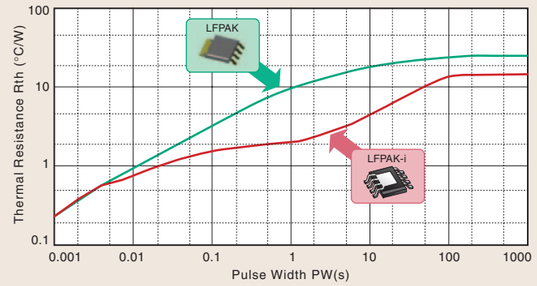
Power loss in a DC/DC converter is only partly due to the resistance of MOSFET devices. It is also largely dependent on factors such as the input charge value and series inductance. By using a connection method that eliminates bonding wires, we have reduced loss due to resistance and inductance to a bare minimum. Heat dispersion is also improved. The new LFPAK-i design improves heat dispersion by allowing heat to escape from both sides of the package.

Package Dimensions

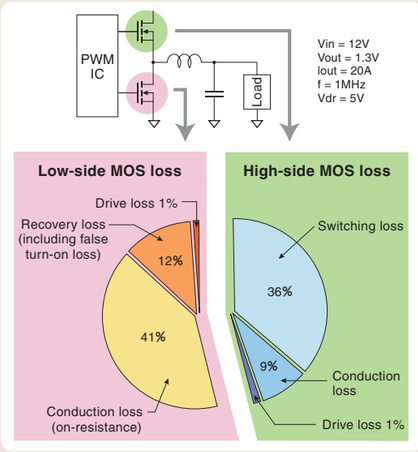




Comparisons Between LFPAK & LFPAK-i Rth



Buck converter internal loss breakdown



Power Transistor

Power MOSFET

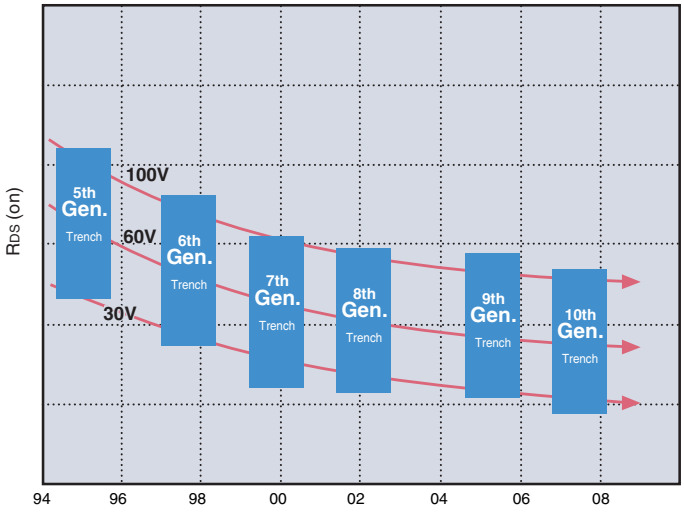
Low-Voltage Power MOSFETs

Low on-resistance, low gate charge, and low-voltage drive

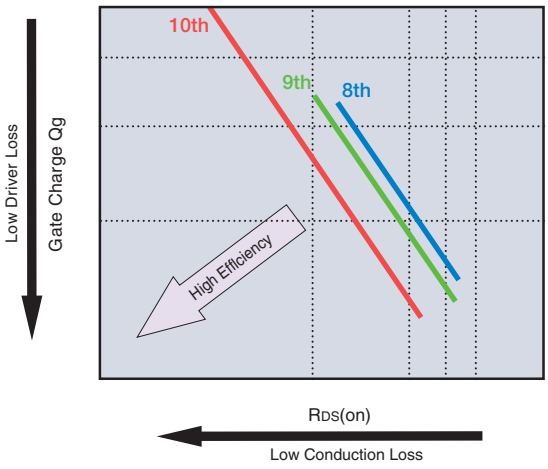
Features

- Low on-resistance by trench structure
- Low gate charge
- High-speed switching
- Wide range lineup in insertion-type, full-mold type, and surface-mount packages

Trend in Low-Voltage Power MOSFET On-Resistance Performance



On-Resistance vs. Gate Charge



LFPAK-i Products Lineup

*[ ]:VGS=8V ( ):VGS=7V

Part No.	Ratings		RDS(on)(mΩ)				Qg	Qgd
	VDSS	ID	VGS=4.5V*		VGS=10V		typ	typ
	(V)	(A)	typ	max	typ	max	(nC)	(nC)
HAT2165N	30	55	3.7	5.6	2.8	3.6	33	7.1
HAT2166N	30	45	4.3	6.4	3.2	4.1	27	5.9
HAT2168N	30	30	9.1	13.8	6.3	8.2	11	2.4
RJK0301DPC	30	60	3.3	4.3	2.6	3.1	32.3	7
RJK0302DPC	30	50	3.8	4.9	2.9	3.4	28.3	6
RJK0303DPC	30	40	4.6	5.9	3.4	4.0	23.3	5.2
RJK0304DPC	30	35	5.8	7.5	4.3	5.1	17.3	3.7
RJK0305DPC	30	30	10.3	13.3	7.0	8.3	8.3	1.5
HAT2172N	40	30	(6.9)	(9.5)	6.1	7.8	32	4
HAT2173N	100	25	[13.3]	[17.8]	12.3	15.3	61	14.5
HAT2174N	100	20	[22]	[30]	21	27	33.5	8.4
HAT2175N	100	15	[34]	[46]	33	42	21	4.5

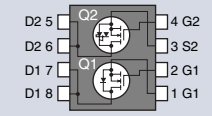
[Application Areas]
•VR of Sever(VoltageRegulator) •VR of High side to HAT2168N, Low side to HAT2165N/HAT2166N

High-Performance, Low–Withstand Voltage Power MOSFETs

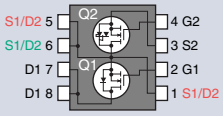
Part No.	Maximum Ratings				RDS(on)(mΩ)				Qg	Qgd※2	※1
	VDSS	VGSS	ID	Pch	VGS=4.5V(8V)		VGS=10V				
	(V)	(V)	(A)	(W)	typ	max	typ	max	(nC)	(nC)	
HAT2195R	30	±20	18	2.5	5.8	8.4	4.6	5.8	5.5	23※	A
HAT2197R			16	2.5	6.8	9.9	5.3	6.7	4.2	18※	A
HAT2198R			14	2.5	9.6	14	7.2	9	2.5	11※	A
HAT2199R			11	2	17	25	13	16.5	1.8	7.5※	A
HAT2208R			9	2	24	35	18	23	1.1	4.4※	A
HAT2209R			7	2	38	55	25	32	1.1	3※	A
HAT2200R	100		8	2.5	(23)	(33)	22	28	8	32※※	A
HAT2201R			6	2.5	(35)	(49)	34	43	5.2	21※※	A
HAT2210R (MOS2SBD)	30	±20	7.5	1.5	27	40	19	24	1.2	4.6	—
		±12	8	1.5	21	29	17	22	3.2	1.1	
HAT2218R (MOS2SBD)	30	±20	7.5	1.5	27	40	18	23	1.2	4.6	—
		±12	8	1.5	21	29	17	22	3.2	1.1	
HAT2219R (MOS2SBD)	30	±20	7.5	1.5	27	40	18	23	1.2	4.6	—
		±12	8	1.5	21	29	17	22	3.2	1.1	

Pin Arrangement

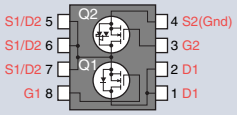
HAT2210R



HAT2218R



HAT2219R



※1 A Mark : Avalanche Rated. ※2 Qg test condition : ※ VGS=4.5V, ※※ VGS=10V

High-Performance, Low–Withstand Voltage Power MOSFETs

Part No.	Package	Maximum Ratings				VGS (OFF)	RDS(on)(mΩ)				Qg	Qgd	※1
		VDSS	VGSS	ID	Pch		VGS=4.5V(6V){7V}[8V]		VGS=10V				
		(V)	(V)	(A)	(W)	(V)	typ	max	typ	max	(nC)	(nC)	
HAT2160H	LFPAK	20	±20	60	30	0.8-2.3	2.8	4.1	2.1		14	54	A
HAT2164H		30		60	30	0.8-2.3	3	4.4	2.5	3.1	10	50	A
HAT2165H				55	30	1.0-2.5	3.4	5.3	2.5	3.3	7.1	33	A
HAT2265H				55	30	1.6-2.5	3.4	5.3	2.5	3.3	7.1	33	A
HAT2166H				45	25	1.0-2.5	4	6.1	2.9	3.8	5.9	27	A
HAT2261H				45	25	1.6-2.5	4	6.1	2.9	3.8	5.9	27	A
HAT2167H				40	20	1.0-2.5	6.1	9.3	4.2	5.5	3.7	17	A
HAT2168H				30	15	1.0-2.5	8.8	13.5	6	7.9	2.4	11	A
RJK0301DPB			+16/-12	60	65	1.2-2.5	3.0	4.0	2.3	2.8	32	7	A
RJK0302DPB				50	60	1.2-2.5	3.5	4.6	2.6	3.1	28	6	A
RJK0303DPB				40	55	1.2-2.5	4.3	5.6	3.1	3.7	23	5.2	A
RJK0304DPB				35	50	1.2-2.5	5.5	7.2	4.0	4.8	17	3.7	A
RJK0305DPB				30	45	1.2-2.5	10	13	6.7	8.0	8	1.5	A
HAT2169H		40	±20	50	50	1.0-2.5	4	6	2.8	3.5	10	45	A
HAT2170H				45	45	1.5-3.0	{3.7}	{5.0}	3.3	4.2	7	62	A
HAT2171H				40	40	1.5-3.0	{4.4}	{6.0}	3.8	4.8	6	52	A
HAT2172H				30	30	1.5-3.0	{6.6}	{9.2}	5.8	7.5	4	32	A
HAT2266H		60		30	23	1.0-2.5	(8.0)	(10)	10	13	7	40	A
HAT2267H		80		30	25	2.0-4.0	(17)	(22)	13	16	9	60	A
HAT2173H		100		25	30	4.0-6.0	[13]	[17.5]	12	15	14.5	61	A
HAT2174H				20	20	4.0-6.0	[22]	[30]	21	27	8.4	33.5	A
HAT2175H				15	15	4.0-6.0	[34]	[46]	33	42	4.5	21	A
HAT2195R	SOP-8	30	±20	18	2.5	1.0-2.5	5.8	8.4	4.6	5.8	5.5	23	A
HAT2197R				16	2.5	1.0-2.5	6.8	9.9	5.3	6.7	4.2	18	A
HAT2198R				14	2.5	1.0-2.5	9.6	14	7.2	9	2.5	11	A
HAT2199R				11	2	1.0-2.5	17	25	13	16.5	1.8	7.5	A
HAT2208R				9	2	1.0-2.5	24	35	19	24	1.1	4.5	A
HAT2209R				7	2	1.0-2.5	38	55	29	36	0.7	2.8	A
HAT2200R		100		8	2.5	4.0-6.0	[23]	[33]	22	28	14.5	34	A
HAT2201R				6	2.5	4.0-6.0	[35]	[49]	34	43	8.4	21	A
HAT2210R		30	±20	7.5	1.5	1.0-2.5	27	40	19	24	1.2	4.6	—
			±12	8	1.5	1.0-2.5	21	29	17	22	3.2	11	
H8N0801AB	TO-220AB	80	±20	60	80	4.0-6.0	9.5	13.8	8.4	10.5	12	74	A

※1 A Mark : Avalanche Rated.

[Application Areas]
•Notebook PCs •Communication Equipment •Servers •OA Equipment DC/DC Converters •Small Motor Drive •Automotive Equipment •Power Tools

Power Transistor

Power MOSFET

PWM Controller-MOSFET Integrated SiP* (*SiP : System in Package)

R2J20701NP

This device integrated a controller for a non-isolated DC/DC converter and two MOSFETs in a single package.
With the industry's highest output current and efficiency, it is ideal as a POL* converter for compact, high-density applications.

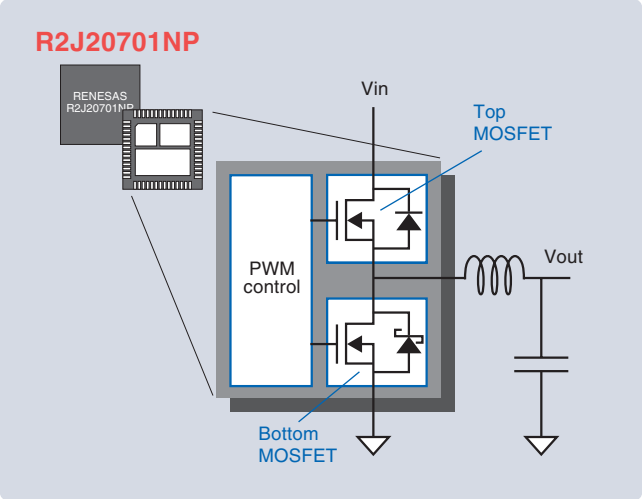
*POL (Point of Load)

Application fields

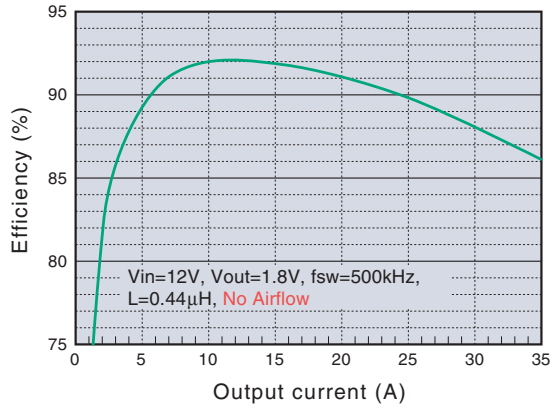
- Applications requiring compactness, low-voltage and large-current capabilities, and high-speed response
- FPGAs, high-performance DSPs
- Memory
- Graphic chipsets
- Servers, Network equipment
- General-purpose, large-current POL converters

Features

- Compact/reduced space requirements:
  QFN 56-pin (8 mm x 8 mm)
- Large-current capability, high efficiency:
  Output of 35 A and efficiency of 92% through use of advanced low-loss MOSFETs and optimized driver circuit (Vin = 12 V, Vout = 1.8 V, fsw = 500 kHz)
- High-speed load response: Employs current mode control
- Parallel operation: 2-phase operation, tracking start capability
- Simplifies construction of a high-performance DC/DC converter.
  Simply add a few passive parts.

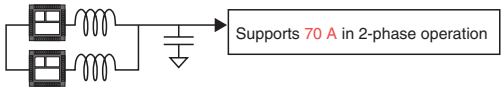


Large-current operation and high efficiency

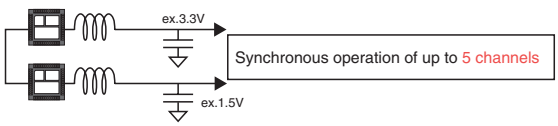


Supports various parallel operation configurations

(1) 2-phase operation (suitable for large currents)



(2) Multichannel operation (synchronous operation)



(3) Necessary functions for parallel operation on-chip
- Current share (on-chip sense function)
- Tracking start function

Lineup

Part No.	Function	Vin (V)	Vout (V)	Iout max. (A)	fsw max. (kHz)	Package
R2J20701NP	Controller-MOSFET integrated SiP	7.25 - 16	0.8 - 5.0	35	1000	QFN56

Driver-MOSFET Integrated Device

Integrated Driver-MOSFET = DrMOS*

(*DrMOS: Package specification advocated by Intel)

R2J20602NP

This device integrated a driver and two MOSFETs in a single package for CPU multiphase power supplies.

With the wire-bonding less package, it boosts efficiency dramatically (up 5.3%* compared with conventional product).

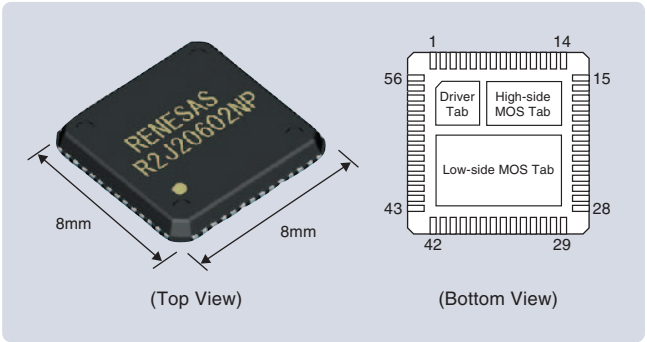
(* Vin = 12 V, Vo = 1.3 V, fsw = 1 MHz, Io = 35A)

Application fields

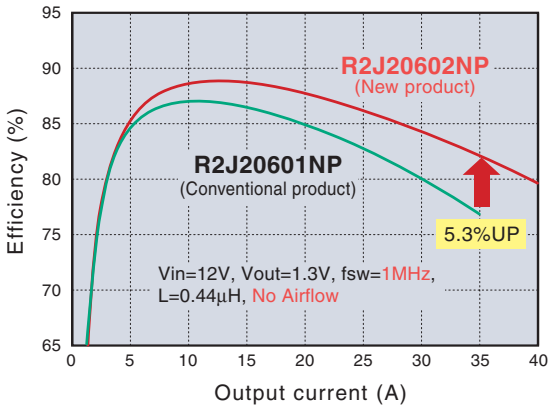
- Multiphase power supplies requiring compact size and large-current capability
- Servers, Network equipment
- Storage equipment
- Graphic chipsets

Features

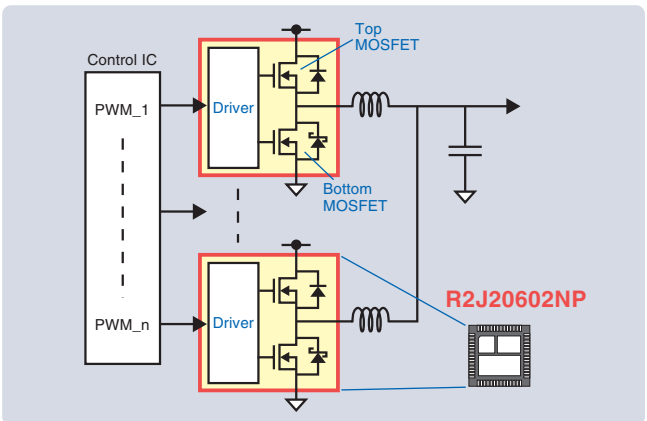
- Compact/reduced space requirements:
  QFN 56-pin (8 mm x 8 mm)
  Package footprint reduced to less than 50%
  (compared with discrete devices)
- Large-current capability: 40 A max. average current output
- Highly efficient, high-frequency operation:
  Maximum efficiency of 89% through use of low-loss MOSFETs, wireless package configuration, and optimized driver circuit (Vin = 12 V, Vout = 1.3 V, fsw = 1 MHz)
- On-chip bootstrap SBD (Schottky Barrier Diode)
- Remote on/off function



Highly efficient in high-frequency operation



Multiphase power supply configuration example



Lineup

Part No.	Function	Vin (V)	Vout (V)	Iout max. (A)	fsw max. (kHz)	Package
R2J20601NP	Integrated Driver-MOSFET	7.9 - 16	0.8 - 3.3	35	1000	QFN56
R2J20602NP	Integrated Driver-MOSFET	7.4 - 16	0.8 - 3.3	40	2000	QFN56

Power Transistor

Power MOSFET

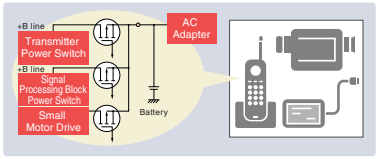
Small, Low-Loss, Low-Power Power MOSFET Series

For smaller, slimmer systems

Low-Power Power MOSFETs

- Small, thin package optimum for portable equipment as power management switch or DC/DC converter use.
- Despite the p-channel MOS FET in small package, achieved low loss performance by under 60mΩ (at 2.5 V) RDS.
- Lineup of 30V products of 4.5V drive and 20V products of 2.5V drive n-ch/p-ch models suitable for battery drive.

Energy-Saving Power Management Switches for Portable Devices



CMFPAK-6 Single type

Polarity	Part No.	Drive Voltage (V)	Maximum Ratings			Characteristics					Marking
			VDSS (V)	VGSS (V)	ID (A)(Note1)	RDS(on)(mΩ)				Ciss (pF)	
						VGS=10V	VGS=4.5V	VGS=2.5V	VGS=1.8V		
Pch	HAT1090C	2.5	-20	±12	-2.5	—	50/65	74/104	—	590	VJ-
	HAT1089C				-2	—	79/103	120/168	—	365	VK-
	HAT1091C				-1.5	—	134/175	205/287	—	200	VL-
	HAT1069C	1.8	-12	±8	-4	—	38/52	48/70	60/93	1380	VY-
	HAT1093C				-3	—	41/54	54/76	85/128	940	VM-
	HAT1094C				-2.5	—	67/88	90/126	128/192	530	VN-
	HAT1095C				-2	—	108/140	146/205	225/337	290	VP-
	HAT1096C	2.5	-20	±12	-1	—	225/293	380/530	—	155	VQ-
Nch	HAT2202C	2.5	20	±12	3	—	31/40	43/55	—	520	VR-
	HAT2196C				2.5	—	45/58	66/93	—	270	VS-
	HAT2203C				2	—	69/90	107/150	—	165	VT-
	HAT2204C	1.8	12	±8	3.5	—	26/34	34/44	45/69	770	VU-
	HAT2205C				3	—	38/50	48/67	65/97	430	VV-
	HAT2206C				2	—	65/85	81/114	113/170	260	VW-
	HAT2207C	2.5	20	±12	1.5	—	100/130	140/210	—	135	VX-
Pch	HAT1108C	4.5	-30	-20/+10	-1.5	155/194	245/356	—	—	160	VZ-
Nch	HAT2268C		30	+20/-10	4	27/34	37/54	—	—	440	UN-
	HAT2221C		30	+20/-10	1.5	120/150	160/235	—	—	110	UC-
Pch	HAT1111C	4.5	-60	-20/+10	-2	245/307	310/450	—	—	290	UA-
Nch	HAT2217C	4.5	60	+20/-10	3	105/132	126/183	—	—	275	UB-
	HAT2240C	2.5	60	±12	2.5	—	75/98	85/119	—	590	UK-
	HAT2281C				2	—	109/142	126/177	—	335	UH-
	HAT2282C				1.5	—	173/225	207/290	—	200	UJ-

CMFPAK-6 Dual type

Polarity	Part No.	Drive Voltage (V)	Maximum Ratings			Characteristics					Marking
			VDSS (V)	VGSS (V)	ID (A)(Note1)	RDS(on)(mΩ)				Ciss (pF)	
						VGS=10V	VGS=4.5V	VGS=2.5V	VGS=1.8V		
Pch	HAT1146C*	1.8	-12	±8	-1.2	—	265/315	400/535	625/930	123	US-
	HAT1147C*	2.5	-20	±12	-1.0	—	340/428	575/905	—	86	UT-
Nch	HAT2291C*	1.8	12	±8	1.8	—	150/186	200/256	265/400	95	UU-
	HAT2292C*	2.5	20	±12	1.5	—	165/205	255/370	—	70	UV-
	HAT2286C*		60		0.9	—	460/595	560/770	—	80	UY-
Nch	HAT3042C*	1.8	12	±8	1.8	—	150/186	200/256	265/400	95	UW-
Pch			-12		-1.2	—	265/315	400/535	625/930	123	
Nch	HAT3043C*	2.5	20	±12	1.5	—	165/205	255/370	—	70	UX-
Pch			-20		-1.0	—	340/428	545/905	—	86	

Note.1 RDS(on):typ./max.
Note.2 ⋆: Under development

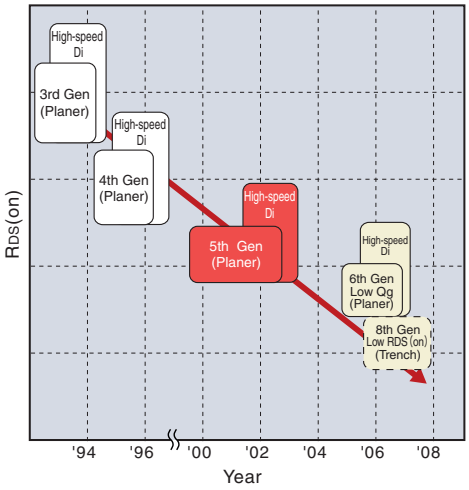
[Application Areas] • Portable Devices

Medium/High-Voltage Power MOSFETs

Features

- Lineup of low-on-resistance, large-current products
- Low gate charge (low Qg)
- Avalanche resistance guarantee
- High internal diode breakdown resistance
- High-speed internal diode series products available

Medium-Voltage Power MOSFET On-Resistance Performance Trend



Products Lineup

Part No.	Maximum Ratings			Electrical Characteristics			Package
	VDSS [V]	ID [A]	VGSS [V]	VGS(off) min - max [V]	RDS(on) max. [Ω]	Ciss [pF]	
RJK1525DPE	150	25	±30	3.0-4.5	0.11	680	LDPAK-S
RJK1535DPE	150	40	±30	3.0-4.5	0.052	1420	LDPAK-S
RJK1526DPE	150	50	±30	3.0-4.5	0.042	1800	LDPAK-S
RJK1529DPK	150	70	±30	3.0-4.5	0.025	2900	TO-3P
RJK2006DPE	200	40	±30	3.0-4.5	0.059	1800	LDPAK-S
RJK2009DPM	200	40	±30	3.0-4.5	0.036	2900	TO-3PFM
RJK2508DPK	250	50	±30	3.0-4.5	0.064	2600	TO-3P
RJK2511DPK	250	65	±30	3.0-4.5	0.034	4900	TO-3P
RJK3008DPK	300	40	±30	3.0-4.5	0.093	2600	TO-3P
RJK4006DPD	400	8	±30	3.0-4.5	0.8	620	MP-3A
RJK4007DPP	400	7.6	±30	3.0-4.0	0.55	850	TO-220FN
RJK4012DPE	400	15	±30	3.0-4.5	0.41	1100	LDPAK-S
RJK4012DPP	400	15	±30	3.0-4.5	0.41	1100	TO-220FP
RJK4013DPE	400	17	±30	3.0-4.5	0.30	1450	LDPAK-S
RJK4013DPP	400	17	±30	3.0-4.5	0.30	1450	TO-220FP
RJK4014DPP	400	24	±30	3.0-4.5	0.24	1800	TO-220FP
RJK4014DPK	400	24	±30	3.0-4.5	0.24	1800	TO-3P
RJK4015DPK	400	30	±30	3.0-4.5	0.165	2600	TO-3P
RJK4018DPK	400	43	±30	3.0-4.5	0.100	4100	TO-3P
RJK4512DPE	450	14	±30	3.0-4.5	0.51	1100	LDPAK-S
RJK4512DPP	450	14	±30	3.0-4.5	0.51	1100	TO-220FP
RJK4513DPE	450	16	±30	3.0-4.5	0.39	1450	LDPAK-S
RJK4513DPP	450	16	±30	3.0-4.5	0.38	1450	TO-220FP
RJK4514DPP	450	22	±30	3.0-4.5	0.30	1800	TO-220FP
RJK4514DPK	450	22	±30	3.0-4.5	0.30	1800	TO-3P
RJK4515DPK	450	27	±30	3.0-4.5	0.20	2600	TO-3P
RJK4518DPK	450	39	±30	3.0-4.5	0.13	4100	TO-3P
RJK5026DPE	500	6	±30	3.0-4.5	1.75	450	LDPAK-S
RJK5026DPP	500	6	±30	3.0-4.5	1.75	450	TO-220FN
RJK5003DPD	500	5	±30	3.0-4.0	1.5	550	MP-3A
RJK5006DPD	500	6	±30	3.0-4.5	1.3	600	MP-3A
RJK5012DPE	500	12	±30	3.0-4.5	0.62	1100	LDPAK-S
RJK5012DPP	500	12	±30	3.0-4.5	0.62	1100	TO-220FN
RJK5013DPE	500	14	±30	3.0-4.5	0.465	1450	LDPAK-S
RJK5013DPP	500	14	±30	3.0-4.5	0.465	1450	TO-220FN
RJK5013DPK	500	14	±30	3.0-4.5	0.465	1450	TO-3P
RJK5014DPP	500	19	±30	3.0-4.5	0.39	1800	TO-220FN
RJK5014DPK	500	19	±30	3.0-4.5	0.38	1800	TO-3P
RJK5009DPP	500	20	±30	3.0-4.5	0.325	2100	TO-220FN
RJK5015DPK	500	25	±30	3.0-4.5	0.24	2600	TO-3P
RJK5018DPK	500	35	±30	3.0-4.5	0.155	4100	TO-3P
RJK5020DPK	500	40	±30	3.0-4.5	0.118	5150	TO-3P
RJK6011DJE	600	0.1	±30	3.0-5.0	52	25	TO-92 Mod
RJK6022DJE	600	0.2	±30	3.0-5.0	15	84	TO-92 Mod
RJK6002DPD	600	2	±30	3.0-4.5	6.8	165	MP-3A
RJK6026DPE	600	5	±30	3.0-4.5	2.4	440	LDPAK-S
RJK6026DPP	600	5	±30	3.0-4.5	2.4	440	TO-220FN
RJK6012DPE	600	10	±30	3.0-4.5	0.92	1100	LDPAK-S
RJK6012DPP	600	10	±30	3.0-4.5	0.92	1100	TO-220FN
RJK6013DPE	600	11	±30	3.0-4.5	0.70	1450	LDPAK-S
RJK6013DPP	600	11	±30	3.0-4.5	0.70	1450	TO-220FN
RJK6014DPP	600	16	±30	3.0-4.5	0.575	1800	TO-220FN
RJK6014DPK	600	16	±30	3.0-4.5	0.575	1800	TO-3P
RJK6009DPP	600	18	±30	3.0-4.5	0.48	2100	TO-220FN
RJK6015DPK	600	21	±30	3.0-4.5	0.36	2600	TO-3P
RJK6018DPK	600	30	±30	3.0-4.5	0.235	4100	TO-3P
RJK6020DPK	600	32	±30	3.0-4.5	0.175	5150	TO-3P

Internal diode High-speed Series

Part No.	Maximum Ratings			Electrical Characteristics			Package
	VDSS [V]	ID [A]	VGSS [V]	VGS(off) min - max [V]	RDS(on) max. [Ω]	Ciss [pF]	
H5N2512FN	250	18	±30	1.5-4.0	0.105	2200	TO-220CFM
H5N2522FN	250	12	±30	1.5-4.0	0.21	TBD	TO-220FN
H5N2507P	250	50	±30	2.0-4.0	0.055	5000	TO-3P
H5N3007FN	300	15	±30	1.5-4.0	0.16	2180	TO-220CFM
H5N3008P	300	40	±30	2.0-4.0	0.069	5150	TO-3P
H5N5012P	500	25	±30	1.5-4.0	0.225	3600	TO-3P
H5N5015P	500	32	±30	1.5-4.0	0.17	4600	TO-3P
H5N5004PL	500	50	±30	2.0-4.0	0.11	7630	TO-PL
H5N5005PL	500	60	±30	2.0-4.0	0.085	10550	TO-PL
RJL5012DPP	500	12	±30	(1.5)-(4.0)	(0.73)	TBD	TO-220FN
RJL5013DPP	500	14	±30	(1.5)-(4.0)	(0.56)	TBD	TO-220FN
RJL5020DPK	500	38	±30	(1.5)-(4.0)	(0.14)	TBD	TO-3P
RJL6012DPP	600	10	±30	(1.5)-(4.0)	(1.1)	TBD	TO-220FN
RJL6013DPP	600	11	±30	(1.5)-(4.0)	(0.81)	TBD	TO-220FN
RJL6020DPK	600	30	±30	(1.5)-(4.0)	(0.21)	TBD	TO-3P

[Application Areas] • Network Servers • Workstations • Routers • RAID • PDP • Power Supplies for Base Stations, etc. • UPS (Uninterruptible Power Supplies) • Motor Drive • Home Appliances (Lighting Inverters, etc.) • Plasma display panels • Switching power supplies • Inverter lighting equipment

Power Transistor

Power MOSFET

Part No. Destination of Power TRS (Renesas)

WITH SOME EXCEPTIONS

R J K 04 01 J PE - 01 - J 4

- R: Renesas's Semiconductors (Fixed)
- J: Power transistor (Fixed)
- K: Product series (1 or 2-letters, See table-1.)
- 04: Voltage class (2-digit, See table-2.)
- 01: Serial number (2-digit)
- J: Quality characteristics (1 letter, See table-3.)
- PE: Package code (2-alphanumeric, See table-4.)
- 01: Special specification (2-alphanumeric)
- J: Packing specification (1 alphanumeric, See table-5.)
- 4: Lead-free (1 digit, See table-6.)

Table-1. Product series

Symbol	Productseries
E	MOS Pch w/ function
F	MOS Nch w/ function
G	MOS Pch and Nch w/ function
H	IGBT + Diode
J	Power MOS Pch
K	Power MOS Nch
L	Power MOS Nch (High-speed internal diode)
M	Power MOS Pch and Nch
P	IGBT
Q	IGBT w/ function
U	Diode (SFD, etc.)

Table-2. Voltage class

Symbol	Voltage(V)
01	10~19
02	20~29
03	30~39
:	:
:	:
99	990~999
1A	1000~1099
1B	1100~1199
1C	1200~1299
1D	1300~1399
1E	1400~1499
1F	1500-1599

* Set as necessary.

Table-3. Quality characteristics

Symbol	Quality characteristics
J	High reliability 1
P	High reliability 2
D	For industrial use, etc.
A	For consumer use
S	For special and custom use

Table-6. Lead-free

Full lead-free	0	w/o Bi
Full lead-free	1	w/ Bi
Pin lead-free	2	w/o Bi
Pin lead-free	3	w/ Bi
Leaded	4	

Table-5. Packing Specification

Symbol	Specification
0	Bulk (Plastic bag)
1	Bulk (Tray)
2	Bulk (Special case)
5	Radial taping (Reverse)
6	Radial taping (Forward)
H	Emboss taping (Left)
J	Emboss taping (Left) Large
K	Emboss taping (Left) Narrow pitch
L	Emboss taping (Left) Large, Narrow pitch
P	Emboss taping (Right)
Q	Emboss taping (Right) Large
R	Emboss taping (Right) Narrow pitch
S	Emboss taping (Right) Large, Narrow pitch
T	Tube
Z	Radial taping (TZ)
W	Wafer
X	Chip

Table-4. Package Code

Code	Package
JA	TO-92 (SC-43A)
JE	TO-92M (SC-51)
QS	UPAK (SC-62)
QM	CMFPAK-6
PA	WPAK
PB	LFPAK
PC	LFPAK-i
PD	DPAK-S (MP-3A)
PE	LDPAK-S1 (TO-220S)
PF	LDPAK-S2 (SOT-263)
PH	DPAK-L (MP-3)
PJ	LDPAK-L (TO-220C)
PK	TO-3P
PL	TO-3PL
PM	TO-3PFM
PN	TO-220AB
PP	TO-220FN
PQ	TO-220F
PR	TO-220FM
PS	TO-220CFM
SA	TSOP-8
SP	SOP-8
SC	HSOP-20
NP	QFN
NS	VSON-8
WA	Wafer
WT	Chip

Part No. Destination of Power TRS (JEITA)

WITH SOME EXCEPTIONS

2SK 1890 - 01 TZ - E

⑤ ① ② ③ ④

① Product number	Serial number from 11 or 1001 (JETIA registry number)
② Special specification	2 digits
③ Taping direction	TR, TL, TZ, UL, UR (* Please refer to the Data Book.)
④ Lead plating	-E (Lead-free), none (Leaded)
⑤ JEITA name	2SC****: High frequency use NPN bipolar transistor 2SD****: Low frequency use NPN bipolar transistor 2SA****: High frequency use PNP bipolar transistor 2SB****: Low frequency use PNP bipolar transistor 2SK****: Nch field-effect transistor (FET) 2SJ****: Pch field-effect transistor (FET)

Part No. Destination of Power TRS (House)

■ HAT Series, Thermal FET Series

HAT 2 064 R - EL - E

- HAT: Series name
- 2: N/P
- 064: Product number
- R: Package abbreviation
- EL: Taping direction
- E: Lead-free

N/P

1	P ch
2	N ch
3	N ch/Pch

Package abbreviation

H	LFPAK
N	LFPAK-I
T	TSSOP-8
R	SOP-8
RP	HSOP-11
M	TSOP-6
C	CMFPAK-6
G	CMPAK-6

HAF 1 001 - 91 - TL - E

- HAF: Thermal FET series
- 1: N/P
- 001: Product number
- 91: Special specification number (2 digits)
- TL: Taping direction
- E: Lead-free

N/P

1	P ch
2	N ch

■ H5N / H7N / H8N Series

WITH SOME EXCEPTIONS

H5 N 50 11 PL - E

- H5: Series name
- N: N/P
- 50: VDSS
- 11: Product number
- PL: Package abbreviation
- E: Lead-free

N/P

N	P ch
P	N ch

Series name

H5
H7
H8

Voltage VDSS=×10

50	500V
02	20V

Package abbreviation

PL	TO-3PL
P	TO-P
AB	TO-220AB
FM	TO-220FM
CFM	TO-220CFM
LD	LDPAK-L
DL	DPAK-L(1), (2)
PF	TO-3PFM
LS/LM	LDPAK-S(1)/S(2)
DS	DPAK-S

■ FS, FK, FX Series

FS 70 KM J - 06 F

- FS: Series name
- 70: Current
- KM: Package
- J: Driving voltage
- 06: Breakdown voltage
- F: Sub number

Package

AS	MP-3
UM	TO-220AB
KM	TO-220FN
VS	TO-220S
SM	TO-3P

Breakdown voltage

03	30V
06	60V
2	100V
3	150V
5	250V
6	300V
9	450V
10	500V
12	600V

Driving voltage

J	4V
–	10V

Series name

FS	N ch Power MOSFET
FK	N ch Power MOSFET (Built-in high speed reverse recovery diode)
FX	P ch Power MOSFET

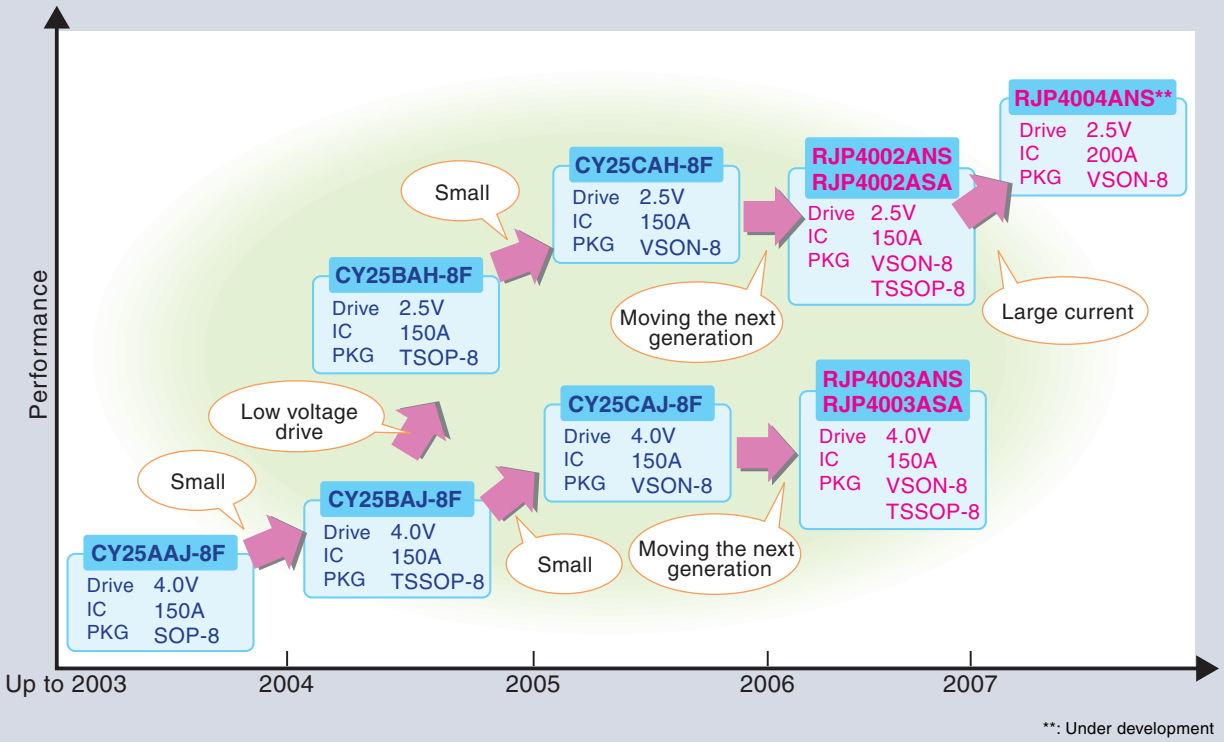
IGBTs for Strobe Use

Featuring small, thin packages and low-voltage drive

Features

- Large current (200A) control available with low voltage (2.5V)
- VSON-8 package
- High electrostatic resistance

Development Road Map



**: Under development

Lineup

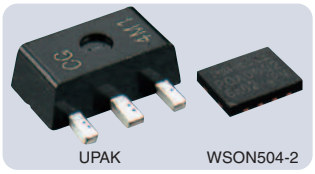
Part No.	Maximum Ratings			Package
	V_{CES} (V)	I_{CP} (A)	Drive (V)	
RJP4002ANS	400	150	2.5	VSON-8
RJP4002ASA	400	150	2.5	TSSOP-8
RJP4003ANS	400	150	4.0	VSON-8
RJP4003ASA	400	150	4.0	TSSOP-8
RJP4004ANS	400	200	2.5	VSON-8
RJP4301APP*	430	200	30	TO220FN
RJP5001APP*	500	300	14	TO220FN

*High frequency type

[Application Areas] • Digital still cameras • Compact cameras • Cameras with lenses • Digital video cameras • External strobes

Small-Signal Transistors

MOSFETs for high-frequency output



- High output, high gain, high efficiency.
- Extensive lineup available.
- Small, high-heat-dispersion package.

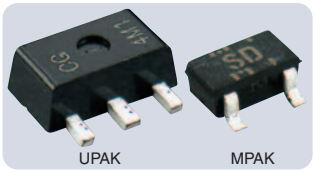
High-frequency small-signal FETs

- Low noise, low distortion
- Ultra-small surface-mount package: CMPAK-4
- Super Low noise

Dual-gate MOSFETs for tuners

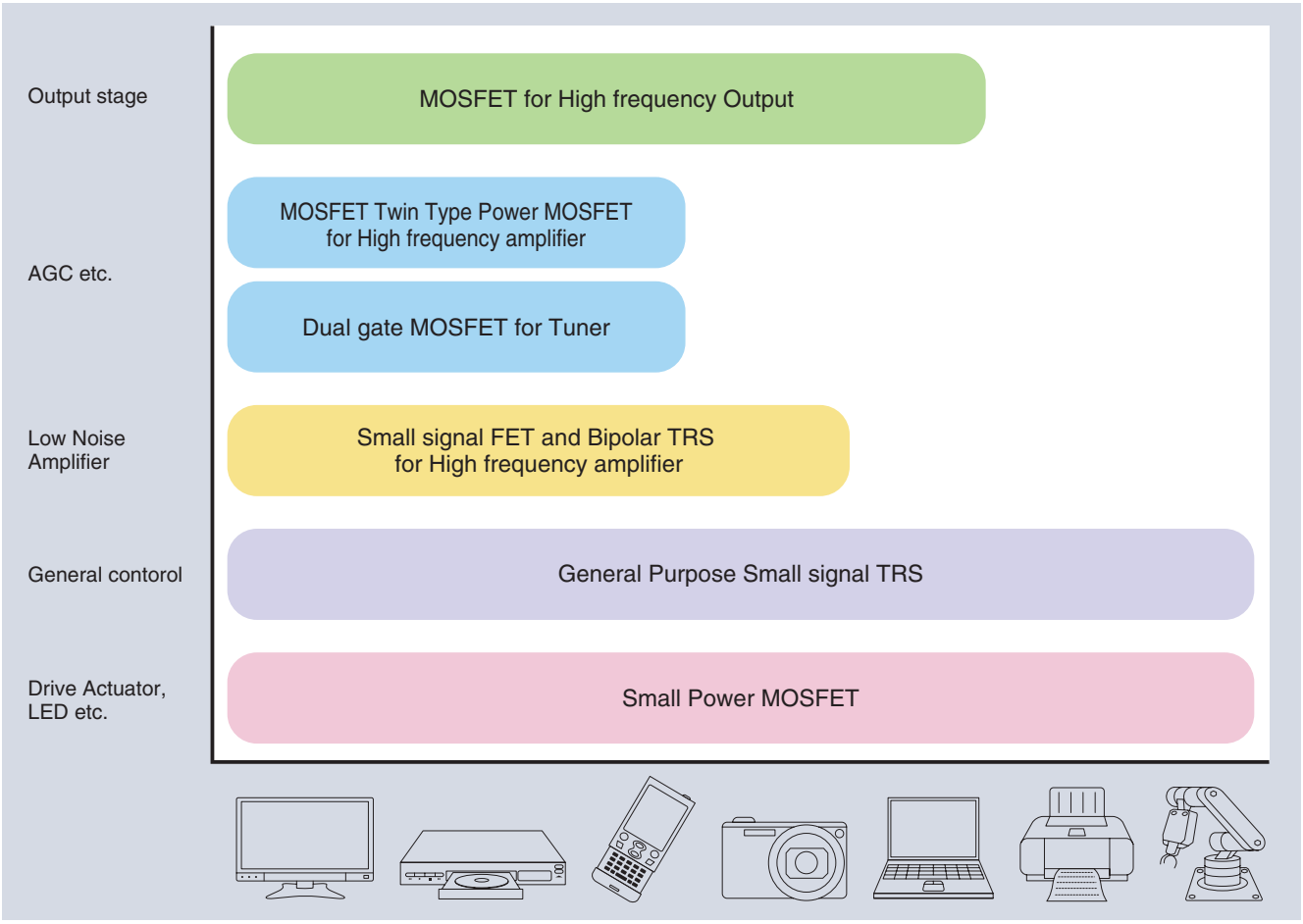
- 2-in-1 compact package (CMPAK-6 (2.0 x 1.25 x 0.9mm))
- Three types of lead connections available.
- High-gain, low-noise, and low-distortion characteristics.

Low-power MOSFETs



- Low on-resistance.
- 2.5 V drive version available.
- Two surface-mount packages available (UPAK (SC-62), MPAK (SC-59)).

Applications of Small signal TRS



Small-Signal Transistors

MOSFETs for High-Frequency Output

Features

- High output power,high gain,high efficiency
- Small outline package

Lineup

Part No.	Package	Pout (dBm)	PAE (%)	Test condition
RQA0001	WSON0303-2	+33	68	VDS=6V, f=520MHz, Pin=+20dBm
RQA0002	WSON0504-2	+39.6	68	VDS=7.5V, f=520MHz, Pin=+25dBm
RQA0003	WSON0303-2	+36	65	VDS=6V, f=520MHz, Pin=+20dBm
RQA0004	UPAK	+29	68	VDS=6V, f=520MHz, Pin=+13dBm
RQA0005	UPAK	+33	68	VDS=6V, f=520MHz, Pin=+20dBm
RQA0008	UPAK	+36	65	VDS=6V, f=520MHz, Pin=+20dBm
RQA0009	UPAK	+38	65	VDS=6V, f=520MHz, Pin=+25dBm

High-Frequency Small-Signal FETs

High gain, low noise, small packages

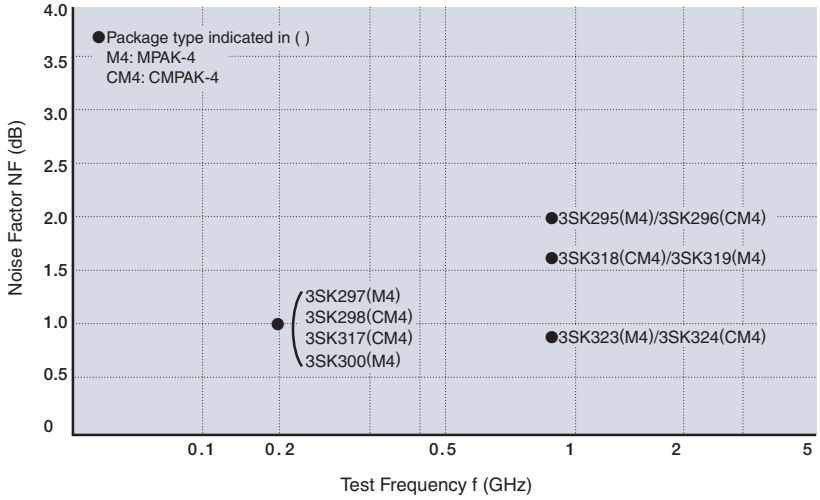
Low-Noise FETS

Si Dual-Gate MOSFETs

- Low noise, low distortion:
  SULFET, 3SK318, 3SK319
- Ultra-small surface-mount package:
  CMPAK-4
- Super Low noise: NF=0.9dB @900MHz

SULFET: Super Low Noise FET

Low-Noise MOSFET



[Application Areas] • Satellite Broadcast Receivers • Mobile Communications

Dual-gate MOSFETs for tuners

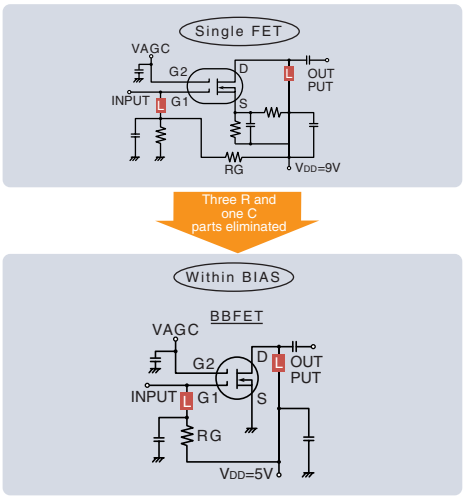
Support for more compact systems

BBFETs

- Built-in AGC biasing circuit enable reducing the number of parts used and the PC board mounting area.
- 5V and 9V power supply voltage models available, as well as a lineup of 5V / 9V compatible types.
- Excellent low-noise and intermodulation characteristics.
- Addition of 2-in-1 package products accelerate more smaller dimensions of your system.

Simplified RF high-frequency amplification circuit (BBFET/TBB Series)

Built-in biasing



BBFET FET Series Lineup

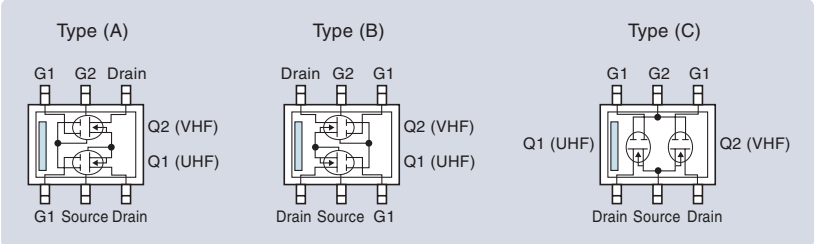
Application	Part No.	Package*1	Drive Power Supply Voltage	Main Electrical Characteristics					
				I_D(op)	|yfs|	PG*2	NF*2	Ciss	Coss
				(mA)	(mS)	(dB)	(dB)	(pF)	(pF)
UHF	BB101M	MPAK-4	5V	15	22	20	2.0	1.7	1.1
	BB101C	CMAK-4	5V	15	22	20	2.0	1.7	1.1
	BB501M	MPAK-4	5V	10	24	21.5	1.8	1.7	1.1
	BB501C	CMPAK-4	5V	10	24	21.5	1.8	1.7	1.1
	BB502M	MPAK-4	5V	11	25	22	1.6	1.7	1.1
	BB502C	CMPAK-4	5V	11	25	22	1.6	1.7	1.1
	BB503M	MPAK-4	5V	10	24	22	1.8	1.7	1.1
	BB503C	CMPAK-4	5V	10	24	22	1.8	1.7	1.1
	BB504M	MPAK-4	5V	16	29	22	1.75	2.1	1.4
	BB504C	CMPAK-4	5V	16	29	22	1.75	2.1	1.4
	BB505M	MPAK-4	5V	11	33	24	1.5	1.75	1.4
	BB505C	CMPAK-4	5V	11	33	24	1.5	1.75	1.4
	BB506C	CMPAK-4	5V	16	32	24	1.4	1.6	1.1
VHF	BB301M	MPAK-4	5V	10	24	22	1.8	1.7	1.1
	BB301C	CMPAK-4	5V	15	20	26	1.3	3.0	1.2
	BB302M	MPAK-4	9V	13	20	26	1.7	3.0	1.1
	BB304M	MPAK-4	(9V capability)	15	27	29	1.2	2.8	1.3
	BB304C	CMPAK-4	(9V capability)	15	27	29	1.2	2.8	1.3
	BB305M	MPAK-4	(9V capability)	15	28	28	1.4	2.8	1.5
	BB305C	CMPAK-4	(9V capability)	15	28	28	1.4	2.8	1.5
	BB504M	MPAK-4	5V	16	29	30	1.0	2.1	1.4
	BB504C	CMPAK-4	5V	16	29	30	1.0	2.1	1.4
VHF-UHF (2-in-1)	TBB1002	CMPAK-6(UHF)	5V	17	26	21	1.7	1.8	1.4
		CMPAK-6(VHF)	5V	18	25	27	1.2	2.6	1.6
	TBB1004	CMPAK-6(UHF)	5V	17	26	21	1.7	1.8	1.4
		CMPAK-6(VHF)	5V	20	32	29	1.2	2.7	1.8
	TBB1005	CMPAK-6(UHF)	5V	17	26	21	1.7	1.8	1.4
		CMPAK-6(VHF)	5V	18	25	27	1.2	2.6	1.6
	TBB1010	CMPAK-6(UHF)	5V	16	29	—	—	2.1	1.4
		CMPAK-6(VHF)	5V	16	29	30	1.1	2.1	1.4
	TBB1012	CMPAK-6(UHF)	5V	16	32	20.5	1.95	1.6	1.1
		CMPAK-6(VHF)	5V	17	30	29.5	0.95	2.7	1.3
	TBB1016	CMPAK-6(UHF)	5V	15	35	—	—	2.2	1.3
		CMPAK-6(VHF)	5V	15	35	32	1.0	2.2	1.3

*1: EIAJ packages: SC-61AA (MPAK-4), SC-82AB (CMPAK-4) *2: f = 900 MHz (UHF), f = 200 MHz (VHF)

TBB series (2 in 1) for TV tuners

Pin assignments

	TBB1002	TBB1004	TBB105	TBB1010	TBB1012	TBB1016
Q1: (UHF)	BB502	BB502	BB502	BB504	BB506	|yfs|=35mS
Q2: (VHF)	BB305	|yfs|=32mS	BB305	BB304	|yfs|=30mS	
Lead arrangement	(A)	(B)	(C)			



[Application Areas] • TVs • VCR Tuners • FM Tuners

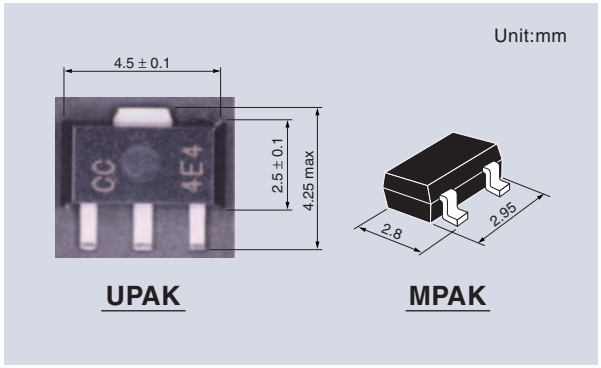
Small-Signal Transistors

Small Power MOSFET Series

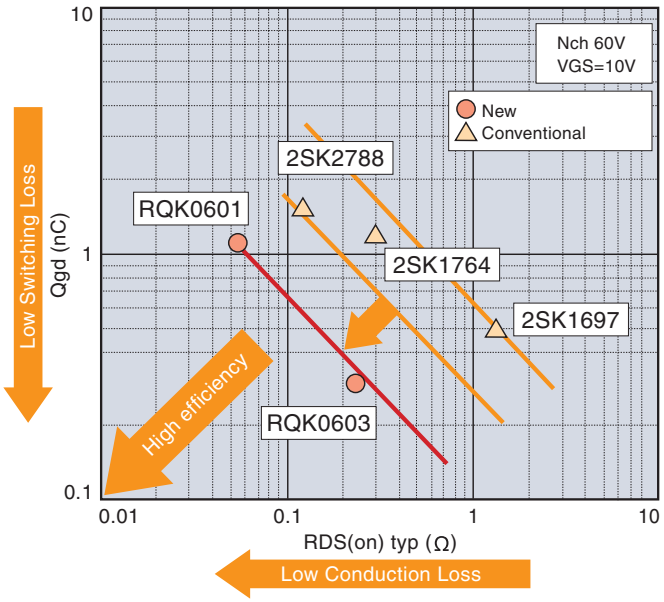
Features

- 40% improved of performance index by adopting trench process
- Small high Pc package

Package Dimensions



Comparison to conventional products



Lineup

Package	Part No.		Maximum Ratings			RDS(on)(mΩ)						Ciss (pF)	Mark
			VDSS (V)	VGSS (V)	ID (A)	VGS=10V		VGS=4.5V		VGS=2.5V			
						typ	max	typ	max	typ	max		
UPAK	RQK0601AGDQS	Single (Nch)	60	±20	5.0	56	70	65	91	–	–	540	AG
	RQK0603CGDQS				2.8	205	257	240	336	–	–	130	CG
	RQK0604IGDQS		60	±12	2.6	–	–	107	140	125	175	330	IG
	RQK0606KGDQS				2.0	–	–	173	225	207	290	200	KG
	RQJ0601DGDQS	Single (Pch)	-60	+10/-20	-2.8	124	155	150	210	–	–	590	DG
	RQJ0602EGDQS				-1.5	485	607	620	868	–	–	135	EG
	RQK0301FGDQS	Single (Nch)	30	±20	6.0	28	35	35	49	–	–	750	FG
	RQK0302GGDQS				3.8	81	102	107	150	–	–	170	GG
	RQJ0301HGDQS	Single(Pch)	-30	+10/-20	-5.2	38	48	56	79	–	–	845	HG
MPAK	RQK0605JGDQA	Single (Nch)	60	±20	3.1	82	103	93	131	–	–	405	JG
	RQK0603CGDQA				2.0	212	265	248	348	–	–	130	CG
	RQK0604IGDQA		60	±12	2.0	–	–	111	144	129	180	320	IG
	RQK0606KGDQA				1.5	–	–	173	225	207	290	200	KG
	RQJ0603LGDQA	Single (Pch)	-60	+10/-20	-1.8	158	198	196	275	–	–	440	LG
	RQJ0602EGDQA				-1.1	490	613	613	854	–	–	145	EG
	RQK0303MGDQA	Single (Nch)	30	±20	3.7	42	53	50	70	–	–	550	MG
	RQK0302GGDQA				2.7	92	115	122	171	–	–	175	GG
	RQJ0303PGDQA	Single (Pch)	-30	+10/-20	-3.3	54	68	76	107	–	–	625	PG
	RQJ0302NGDQA				-2.2	138	173	216	303	–	–	195	NG
	RQK0201QGDQA	Single (Nch)	20	±12	4.5	–	–	30	39	38	53	479	QG
	RQK0202RGDQA				3.8	–	–	42	55	62	85	293	RG
	RQK0203SGDQA				2.9	–	–	68	90	105	150	159	SG
	RQK0204TGDQA				2.3	–	–	100	130	146	204	127	TG
	RQJ0201UGDQA	Single (Pch)	-20	±12	-3.4	–	–	53	69	80	112	597	UG
	RQJ0202VGDQA				-2.7	–	–	83	105	124	170	365	VG
	RQJ0203WGDQA				-2.1	–	–	142	180	216	300	205	WG
	RQJ0204XGDQA				-1.6	–	–	219	280	363	510	153	XG

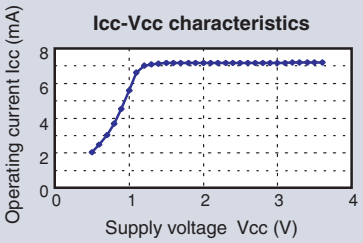
2.4/5.2GHz LNA MMIC HA31006

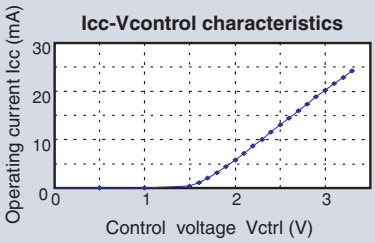
NEW
under development

Features

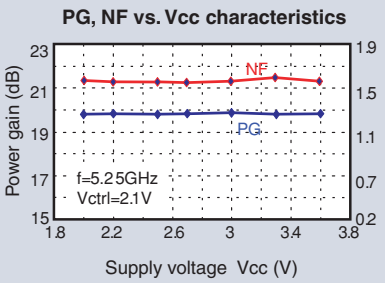
High bandwidth, High gain, Low noise: → Improved sensitivity of receiver
Gain=20dB, NF=1.6dB typ.@f=4.9～5.9GHz
Low power consumption: Vcc=3V, Iop=7mA
Small & low-height package: WQFN-8 [2mm × 2mm × 0.8mm]
Simplification of tuned circuit: Small number of external components

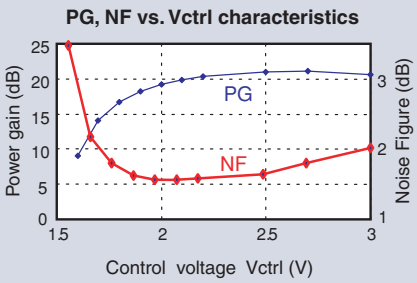
Dependence on supply voltage
a) Flat gain and noise factor (Vcc=2～3.6V)
b) Small fluctuations of Ic to Voc fluctuations





Dependence on control voltage
a) Vctrl can be used for ON/OFF control.
b) For example, if Vctrl is 0.5 V or less, it reverts to stand-by. If Vctrl becomes 2 V or more, it works as an amplifier.





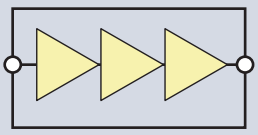
HA31005 PA for IEEE802.11a

NEW
Under development
(Tentative)

Features

High-performance SiGe HBT affords low power consumption, small footprint and low-height package WQFN-16 [3mm × 3mm × 0.8mm]

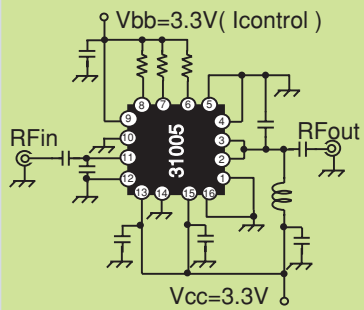
HA31005



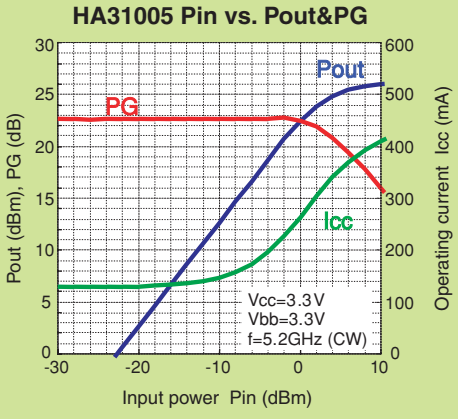
Measurement conditions

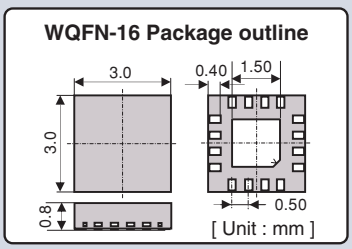
Vcc=3.3V
f=5.15 ～ 5.35GHz

Part No.	HA31005
Construction	SiGe HBT
Pout @ 1dB Gain compression	+23dBm
Power gain	22dB
@Po= +18dBm Operating current	180mA



HA31005 Evaluation board

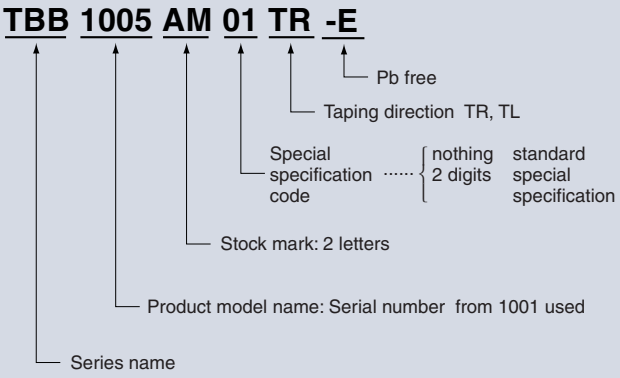




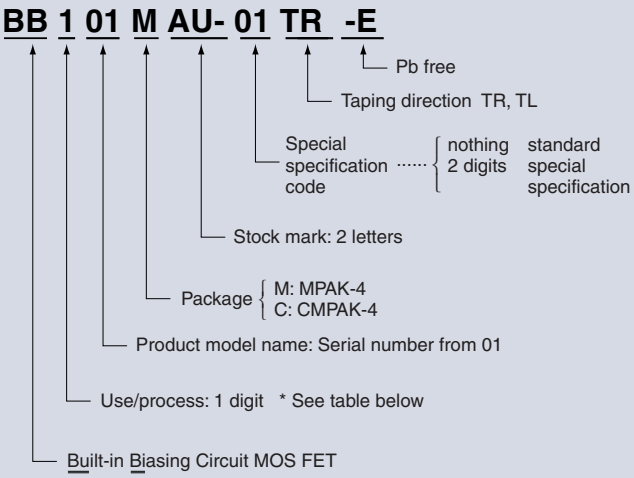
Small-Signal Transistors

Small-Signal Transistors Type No. designation

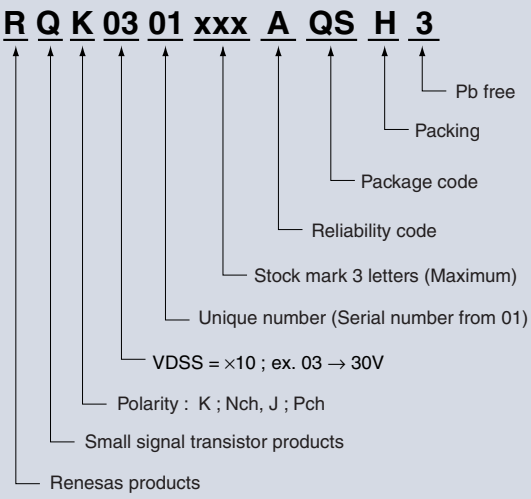
● Composite type (2-in-1) package products



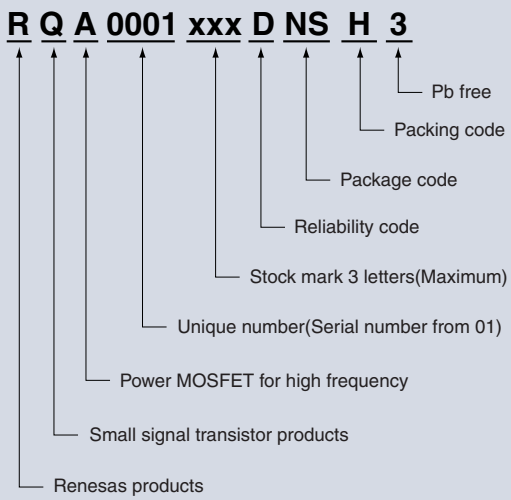
● Built-in bias type products



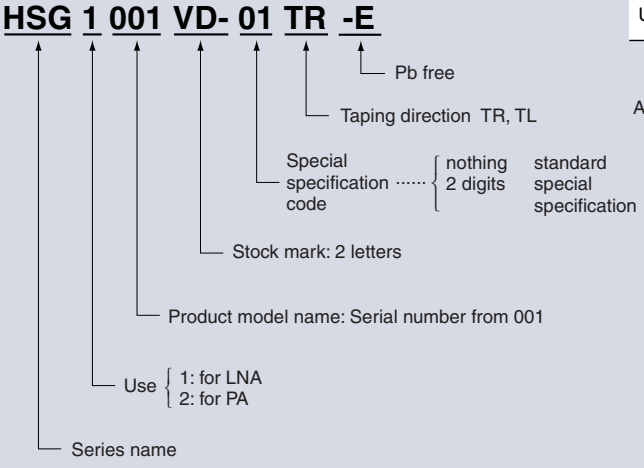
● Small Power MOSFET



● Power MOSFET for high frequency



● Silicon Germanium Bipolar Transistor HSG series



* Table: BBFET Use/process

1	3	5
UHF amplifier	VHF amplifier	UHF amplifier / VHF amplifier

Above former Part No.

- NPN: 2SCxxxx, 2SDxxxx
- PNP: 2SAxxxx, 2SBxxxx
- n-ch: 2SKxxxx, 3SKxxx
- p-ch: 2SJxxx

Triacs and Thyristors

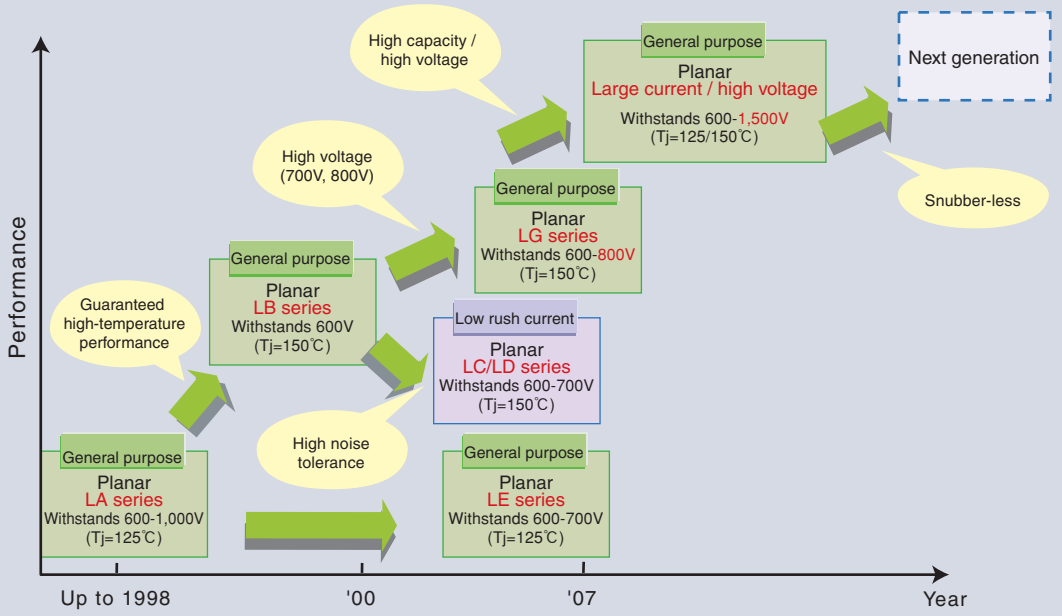
RENESAS Triacs and Thyristors are wide lined up with various Package and featured for various applications.
150 degree C junction tempreature guarantee is top feature of the market.

- Lineup of guaranteed 150°C junction temperature products
- Variety of product series
- Product groups matching for various application systems
- Comprehensive range of high-voltage products

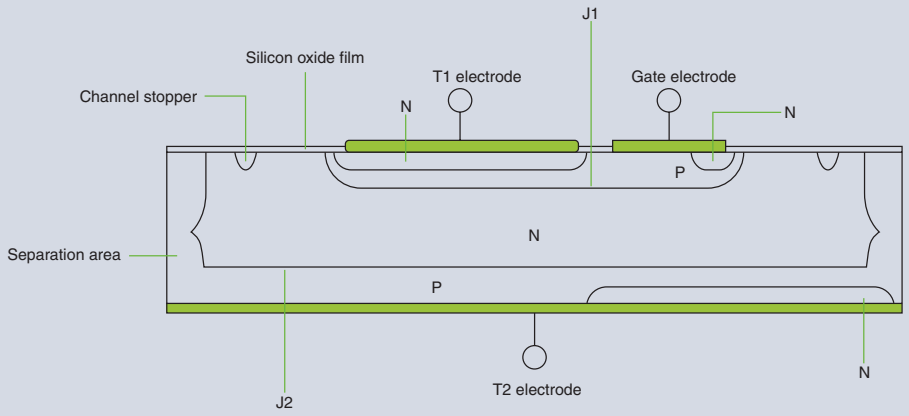
Category	Product Type				
				*150℃ guarantee	
Triacs	General-use insulation type	Type TO-220F	BCRxxPM-xx	2~16A, 600V	*
		Type TO-220FN	BCRxxKM-xx	3A~20A, 600V	*
	General-use non-insulation type	Type TO-220	BCRxxCM-xx	5A~20A, 600V	*
		Type TO-220S	Surface-mount BCRxxCS-xx	8A~16A, 600V	*
		Type MP-3A	Surface-mount BCRxxAS-xx	3A~5A, 600V	*
		Type TO-3P	BCR30AM-xx	30A, 600V	*
		Type TO-92	BCRxxAM-xx	0.8~1A, 400 to 600V	
	High-voltage insulation type	Type TO-220F	BCRxxPM-xx	3A~16A, 700V, 800V	*
		Type TO-220FN	BCRxxKM-xx	3A~12A, 700V, 800V, 1000V	
	High-voltage non-insulation type	Type TO-92FN	BCR08AM-14A	0.8A, 700V	*
	For heater control	Type TO-220FN	BCRxxKM-xx	3~5A, 600V	
		Type TO-220F	BCR2PM-12RE	2A, 600V	*
Thyristors	General-use insulation type	TO-220F	CRxxPM-xx	3A~12A, 600V	
		Type TO-220FN	CRxxKM-xx	3A~8A, 600V	
	General-use non-insulation type	Type TO-220	CR12CM-xx	12A, 600V	
		Type MP-3A	Surface-mount CR5AS-xx	5A, 600V	
		Type UPAK	Surface-mount CRxxAS-xx	0.5~0.8A, 400V to 600V	
		Type TO-92	CRxxAM-xx	0.3~0.4A, 400 to 600V	
	For ground-fault interrupter	Type TO-92	CRxxAM-xx	0.3A, 800V	
	For strobe	Type MPAK	Surface-mount CR05BS-8	0.5A, 400V	

[Application Areas] • Washing machines • Vacuum cleaners • Electric fans • Water-jet toilets • Dish washers • Fan heaters • Copying machine • Printers • Fax machines • Inverter lamps • Switching power supplies • General-purpose AC motors • Water heaters • Cameras • Various ignition devices

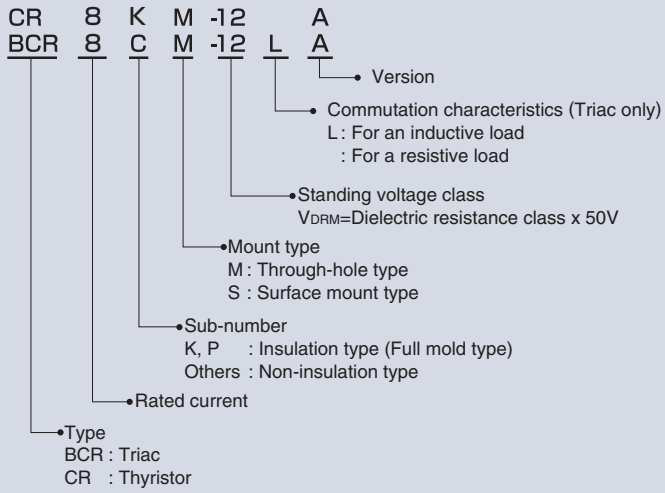
Renesas Triac Development Plan



Planar structure



Thyristor and triac Type No. designation



Development of 150°C Triac Series

Outline of functions

- Guaranty of rated junction temperature 150°C (conventionally, 125°C warranty)
- Expansion of current-carrying capacity by increase of rated temperature
- Adoption of planer structure

Product line

- LB Series : BCRxxxx-xxLB
- LC Series : BCRxxxx-xxLC
- LD Series : BCRxxPM-xxLD
- LG Series : BCRxxPM-xxLG
- BCR2PM-12RE/14LE
- BCR3KM/5KM-12RB

Selling point

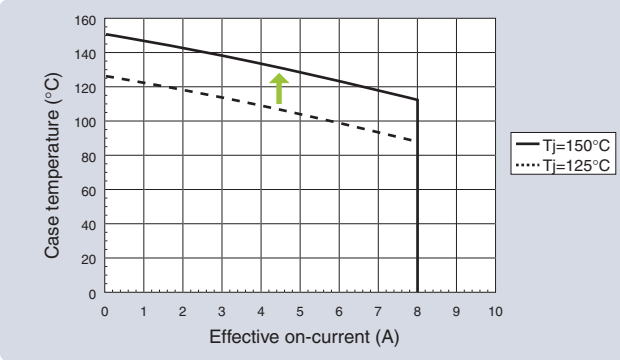
- **Small amount of OFF-current at a high temperature**

  Planer structure enables smaller off-current than glass structure.

- **Expansion of thermal design margin → Increase in easiness of design**

Ex.) At a design margin of 80%, Tj=150 × 80%=120°C
(Conventionally, Tj=125 × 80%=100°C. Therefore, increase by 20°C)

Expansion of current-carrying capacity (ex.BCR8KM-12L)



- **Size-reduction of radiating fin: Footprint is reduced to 1/4.**

Ex.) At BCR8KM Ta=60°C and IT(RMS)=8A, Rth(f-a)=4.8°C/W(50cm^2)
(Conventionally, Rth(f-a)=2.3°C/W(200cm2). Therefore, the footprint is reduced to 1/4.)

- **Radiating fin is not required.**

Ex.) When the heater is controlled at BCR3KM Ta = 80°C, and AC100V/140W, Tj=1.3W × 50°C/W+80°C=145°C.

- **High reliability**
- **Usable at a high temperature**

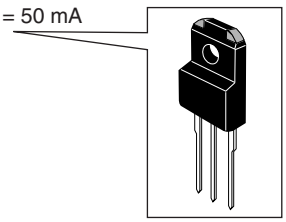
TO-220F Outline 150℃-assured triac

New Product **LD Series**

- **Outline**

  Optimal device for controlling heaters such as a ceramic heater and small motors which have a relatively small amount of incoming current, with the guaranteed junction temperature of 150°C realizing increased rated current compared with conventional products.

- **Features**
  - Adoption of insulation-type outline ➡ TO-220F (Dielectric strength: 2000 V assured)
  - Max junction temperature ➡ 150℃ assured
  - High-noise tolerance ➡ IGT = 50 mA



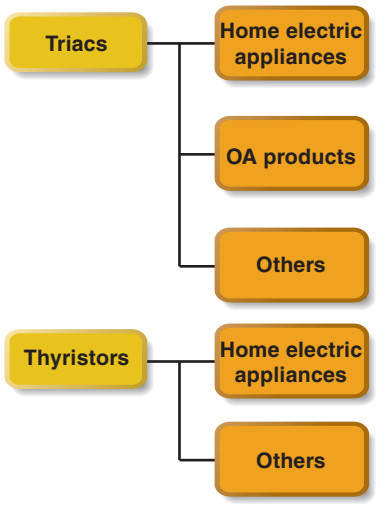
New Product **LG Series**

- **Outline**

  Triack (LG Series) is guaranteed junction temprature 150°C.
  This device is the optimal device that can respond to any uses.

- **Features**
  - ·Adoption of insulation-type outline ➡ TO-220F (Dielectric strength: 2000 V assured)
  - ·Max junction temperature ➡ 150°C assured
  - ·Abundant series ➡ 3A~16A 600V~800V

Triacs and Thyristors Application



Triacs

Home electric appliances
- Laundry machine (motor, valve, solenoid)
- Dish washing and drying machine (heater, valve)
- Electric blanket, carpet, kotatsu (heater)
- Vacuum cleaner, electric fan, range hood (motor)
- Rice cooker, electric pot, IH cooking heater (heater)
- Fan heater (igniter, heater, fan)

OA products
- Copying machine (lamp, halogen heater)
- Printer (halogen heater)
- FAX (lamp, halogen heater)

Others
- SW power (prevention of rush current)
- General-purpose AC (motor)
- Dimmer (lamp)
- Hot-water washing toilet seat (heater, valve)

Thyristors

Home electric appliances
- Fan heater, water heater (igniter)

Others
- SW power (prevention of rush current)
- Small engine ignition device (igniter)
- Camera (strobe)
- Ground-fault interrupter (solenoid)

Examples of triac devices applicable to cleaners

Supply voltage	Vacuum motor capacity	Vacuum motor	Electric brush motor
AC100V ~120V	500~1000W	BCR16CM-12LB	BCR3PM-12LG
	1000~1500W	BCR20AM-12LB	BCR3PM-12LG
		BCR20KM-12LB	
AC200V ~240V	500~1000W	BCR8CM-12LB	BCR3PM-12LG
	1000~1500W	BCR12CM-12LB	BCR3PM-12LG
		BCR12KM-12LB	

Examples of triac devices applicable to fans (as well as air cleaners)

Supply voltage	Fan motor	Horizontally oscillating fan	Oscillating fan
AC100V~120V	BCR1AM-12A	BCR1AM-12A	BCR1AM-12A
AC200V~240V	BCR08AM-12A	BCR08AM-12A	BCR08AM-12A

Examples of triac and thyristor devices applicable to a toilet bowl with a warm-water cleaner

Supply voltage	Load	Load capacity	Type No.
AC100V ~120V	Toilet bowl seat heater	60W	BCR1AM-12A
		120W	BCR2PM-12RE
	Water heater	400W	BCR8KM-12LA
	Air heater	600W	BCR12KM-12LA
	Water supply valve	60W	BCR1AM-12A
	Pressure valve	60W	BCR1AM-12A
	Earth leakage breaker	—	CR03AM-12
AC200V ~240V	Toilet bowl seat heater	120W	BCR1AM-12A
	Water heater	400W	BCR5KM-12LA
	Air heater	600W	BCR8KM-12LA
	Water supply valve	60W	BCR08AM-12A
	Pressure valve	60W	BCR08AM-12A
	Earth leakage breaker	—	CR03AM-12/16

Example of triac devices applicable to oil kerosene fan heater

Load	Part No.
Igniter	CR03AM-12
Oil heater	BCR6AM-12LA
	BCR5PM-12LG
Fan motor	BCR1AM-12A
Fuel valve	CR02AM-8

Maximum ratings of the thyristor device for an earth leakage breaker

Symbol	Item	CR03AM-12	CR03AM-16	Unit
V_{RRM}	Reverse peak-repetition voltage	600	800	V
V_{RSM}	Reverse peak-non-repetition voltage	720	960	V
V_{DRM}	Peak-repetition turn-off voltage	600	800	V
V_{DSM}	Peak-nonrepetition turn-off voltage	720	960	V
I_{TRM}	Surge turn-on current	20	20	A

Examples of thyristor devices applicable to small-size engine igniters

Mount type	Part No.
Through-hole type	CR5AS-12-A1
Surface-mount type	CR5AS-12
Surface-mount type (Taped product)	CR5AS-12-T1(T2)

Full mold type triacs for heater

Part No.	Tj (°C)	$I_{T(RMS)}$ (A)	I_{TSM} (A)	V_{DRM} (V)	V_{DSM} (V)	I_{GT} I G+ T2+	I_{GT} II G- T2+	I_{GT} III G- T2-	I_{GT} IV G+ T2-	(dv/dt)c (V/μS)	Package
BCR2PM-12RE	150	2	10	600	720	—	10*1 (5)	10*1 (5)	—	—	TO-220F**
BCR3KM-12RA/RB	125/150	3	30	600	720	15*1 (10)	15*1 (10)	15*1 (10)	—	—	Insulation type TO-220FN
BCR5KM-12RA/RB	125/150	5	50	600	720	15*1 (10)	15*1 (10)	15*1 (10)	—	—	

*1 : We also offer high sensitive products.

Lineup of Triac

1. High voltage Triac

Recommendation products

① Tj=150°C series: LD (TO-220F) series/
LC (TO-220F(2)) series/LG (TO-220F) series

② Tj=125°C series: LE (TO-220F(2)) series

Series	Package	Tj (°C)	Part No.	VDRM (V)	IT(RMS) (A)	ITSM (A)	IGT (mA)	Note
LA	TO-220F	125	BCRxxPM-14LA	700	3/5/8/12	IT (RMS) × 10	30	IGT High sensivity Avalable, Guaranteed voltage handling up to 800V possible
LA	TO-220F	125	BCR8PM-16LA	800	8	IT (RMS) × 10	30	
LA	TO-220F	125	BCR8PM-20LA	1,000	8	IT (RMS) × 10	30	
LA	TO-220FN	125	BCRxxKM-14LA	700	3/5/8/12	IT (RMS) × 10	30	IGT High sensivity Avalable, Guaranteed voltage handling up to 800V possible
LA	TO-220FN	125	BCR8KM-16LA	800	8	IT (RMS) × 10	30	
LA	TO-220FN	125	BCR8KM-20LA	1,000	8	IT (RMS) × 10	30	
LA	TO-3PFM	125	BCR20RM-30LA**	1,500	20	IT (RMS) × 10	50	
LC	TO-220FN	150	BCRxxKM-14LC	700	5/8	IT (RMS) × 6	50	
LD	TO-220F	150	BCRxxPM-14LD	700	5/8	IT (RMS) × 6	50	
LE	TO-220F (2)	125	BCR8PM-14LE BCR8PM-14LE	700	2 8	10 IT (RMS) × 10	30	
LG**	TO-220F	150	BCRxxPM-14LG	700	3/5/8/12/16**	IT (RMS) × 10	30	IGT High sensivity Avalable, Guaranteed voltage handling up to 800V possible (125°C)
A	TO-92	125	BCR08AM-14A	700	0.8	IT (RMS) × 10	5	
A	MP-3A	125	BCR05AS-14A	700	5	IT (RMS) × 10	30	

**: Under development

2. General Triac

Series	Package	Tj (°C)	Part No.	VDRM (V)	IT(RMS) (A)	ITSM (A)	IGT (mA)	Note
LA	TO-220F	125	BCRxxPM-12LA	600	3/5	IT (RMS) × 10	20	IGT High sensivity Avalable
LA	TO-220F	125	BCRxxPM-12LA	600	8/10/12/16	IT (RMS) × 10	30	
LA	TO-220FN	125	BCRxxKM-12LA	600	3/5	IT (RMS) × 10	20	IGT High sensivity Avalable
LA	TO-220FN	125	BCRxxKM-12LA	600	8/10/12/16/20	IT (RMS) × 10	30	
LA	TO-220AB	125	BCR5AM-12LA	600	5	IT (RMS) × 10	20	IGT High sensivity Avalable
LA	TO-220AB	125	BCRxxAM-12LA	600	6/20	IT (RMS) × 10	30	
LA	TO-220AB	125	BCRxxCM-12LA	600	8/10/12	IT (RMS) × 10	30	
LA	TO-220AB	125	BCR16CM-12LA	600	16	170	30	
LA	TO-3P	125	BCR30AM-12LA	600	30	IT (RMS) × 10	50	
LA	DPAK-L (3)	125	BCR3AS-12A-A1	600	3	IT (RMS) × 10	15	
LA	DPAK-L (3)	125	BCR5AS-12A-A1	600	5	IT (RMS) × 10	30	
LA	MP-3A	125	BCR3AS-12A	600	3	IT (RMS) × 10	15	
LA	MP-3A	125	BCR5AS-12A	600	5	IT (RMS) × 10	30	
LA	TO-220S	125	BCRxxCS-12LA	600	8/10/12	IT (RMS) × 10	30	IGT High sensivity Avalable
LA	TO-220S	125	BCR16CS-12LA	600	16	170	30	IGT High sensivity Avalable
LB	TO-220F	150	BCRxxPM-12LB	600	3/5	IT (RMS) × 10	20	IGT High sensivity Avalable
LB	TO-220F	150	BCRxxPM-12LB	600	8/10/12/16	IT (RMS) × 10	30	
LB	TO-220FN	150	BCRxxKM-12LB	600	3/5	IT (RMS) × 10	20	
LB	TO-220FN	150	BCRxxKM-12LB	600	8/10/12/16/20	IT (RMS) × 10	30	
LB	TO-220FN	150	BCR25KM-12LB**	600	25	IT (RMS) × 10	30	
LB	TO-220FN	150	BCR30KM-8LB**	400	30	IT (RMS) × 10	30	
LB	TO-220FN	150	BCR30KM-12LB**	600	30	IT (RMS) × 10	30	
LB	TO-220AB	150	BCR5AM-12LB	600	5	IT (RMS) × 10	20	IGT High sensivity Avalable
LB	TO-220AB	150	BCRxxAM-12LB	600	6/20	IT (RMS) × 10	30	
LB	TO-220AB	150	BCRxxCM-12LB	600	8/10/12	IT (RMS) × 10	30	
LB	TO-220AB	150	BCR16CM-12LB	600	16	170	30	
LB	TO-3P	150	BCR30AM-12LB	600	30	IT (RMS) × 10	50	
LB	DPAK-L (3)	150	BCR3AS-12A-A1	600	3	IT (RMS) × 10	15	
LB	DPAK-L (3)	150	BCR5AS-12A-A1	600	5	IT (RMS) × 10	30	
LB	MP-3A	150	BCR3AS-12B	600	3	IT (RMS) × 10	15	
LB	MP-3A	150	BCR5AS-12B	600	5	IT (RMS) × 10	30	
LB	TO-220S	150	BCRxxCS-12LB	600	8/10/12	IT (RMS) × 10	30	IGT High sensivity Avalable
LB	TO-220S	150	BCR16CS-12LB	600	16	170	30	
LB	TO-3PFM	150	BCR16RM-12LB**	600	16	IT (RMS) × 10	30	
LB	TO-3PFM	150	BCR25RM-12LB**	600	25	IT (RMS) × 10	30	
LC	TO-220F (2)	150	BCRxxPM-12LC	600	12/16	IT (RMS) × 6	50	
LC	TO-220FN	150	BCRxxKM-12LC	600	8/10/16	IT (RMS) × 6	50	
LD	TO-220F	150	BCRxxPM-12LD	600	8/10/16/12**	IT (RMS) × 6	50	
LE	TO-220F (2)	125	BCR8PM-12LE	600	8	IT (RMS) × 10	30	
LG	TO-220F	150	BCRxxPM-12LG	600	3/5/8/10/12/16	IT (RMS) × 10	30	IGT High sensivity Avalable
	TO-92	125	BCR08AM-12A	600	0.8	IT (RMS) × 10	5	
	TO-92	125	BCR1AM-8P	400	1	IT (RMS) × 10	5	IGT High sensivity Avalable
	TO-92	125	BCR1AM-12	600	1	IT (RMS) × 10	5	
	TO-92	125	BCR1AM-12A	600	1	IT (RMS) × 10	7	
	MPAK	125	BCR08AS-12	600	0.8	IT (RMS) × 10	5	

**: Under development

3. Triac for heater control

Series	Package	Tj (°C)	Part No.	VDRM (V)	IT(RMS) (A)	ITSM (A)	IGT (mA)	Note
A	TO-92	125	BCR1AM-12A	600	1	10	7	
RE	TO-220F (2)	150	BCR2PM-12RE	600	2	10	10 (5)	

4. General Triac (Surface Mount PKG)

Series	Package	Tj (°C)	Part No.	VDRM (V)	IT(RMS) (A)	ITSM (A)	IGT (mA)	Note
A	MP-3A	125	BCR3AS-12A	600	3	IT (RMS) × 10	15	
A	MP-3A	125	BCR5AS-12A	600	5	IT (RMS) × 10	30	
LA	TO-220S	125	BCR**CS-12LA	600	8/10/12	IT (RMS) × 10	30	IGT High sensivity Avalable
LA	TO-220S	125	BCR16CS-12LA	600	16	170	30	IGT High sensivity Avalable
LB	MP-3A	150	BCR3AS-12B	600	3	IT (RMS) × 10	15	
LB	MP-3A	150	BCR5AS-12B	600	5	IT (RMS) × 10	30	
LB	TO-220S	150	BCR**CS-12LB	600	8/10/12	IT (RMS) × 10	30	IGT High sensivity Avalable
LB	TO-220S	150	BCR16CS-12LB	600	16	170	30	
A	MPAK	125	BCR08AS-12A	600	0.8	IT (RMS) × 10	5	

Lineup of Thyristor

1. Small power Thyristor

Package	Tj (°C)	Part No.	VDRM (V)	IT(AV) (A)	ITSM (A)	IGT (mA)	
TO-92	125	CR02AM-8	400	0.3	10	0.1	
TO-92	110	CR03AM-12	600	0.3	20	0.1	
TO-92	110	CR05AM-12	600	0.3	10	0.1	
TO-92	110	CR03AM-16	800	0.3	20	0.1	
TO-92	110	CR05AM-16	800	0.3	10	0.1	
TO-92	125	CR04AM-12	600	0.4	10	0.1	
TO-92	125	CR05BM-12	600	0.5	8	0.1	
MPAK	125	CR05AS-8	400	0.5	10	0.1	
MPAK	125	CR08AS-12	600	0.8	10	0.1	
MPAK	125	CR05BS-8	400	0.1	10	0.1	

2. General Thyristor

Package	Tj (°C)	Part No.	VDRM (V)	IT(AV) (A)	ITSM (A)	IGT (mA)	Note
TO-220FN	125	CR3KM-12	600	3	70	0.1	
TO-220FN	125	CR6KM-12A	600	6	90	10	
TO-220FN	125	CR8KM-12A	600	8	120	15	
TO-220F	125	CR12PM-12A**	600	12	360	30	
TO-220F	125	CR3PM-12	600	3	70	0.1	
TO-220F	125	CR6PM-12A	600	6	90	10	
TO-220F	125	CR8PM-12A	600	8	120	15	
TO-220AB	125	CR6CM-12A**	600	6	90	10	
TO-220AB	125	CR8CM-12A**	600	8	120	15	
TO-220AB	125	CR12CM-12	600	12	360	30	
MP-3A	125	CR5AS-12	600	5	90	0.2	
MP-3A	125	CR5AS-12**	600	5	30	0.1	
MP-3A	125	CR5AS-12D**	600	5	20	0.1	
TO-3PFM	125	CR25RM-12D**	600	25	360	30	

**: Under development

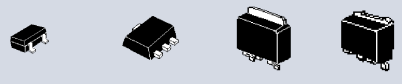
3. Surface Mount PKG Thyristors

Package	Tj (°C)	Part No.	VDRM (V)	IT(AV) (A)	ITSM (A)	IGT (mA)	Note
MP-3A	125	CR5AS-12	600	5	90	0.2	
MP-3A	125	CR5AS-12C**	600	5	30	0.1	
MP-3A	125	CR5AS-12D**	600	5	20	0.1	
MPAK	125	CR05AS-8	400	0.5	10	0.1	
MPAK	125	CR08AS-12	600	0.8	10	0.1	
MPAK	125	CR05BS-8	400	0.1	10	0.1	

**: Under development

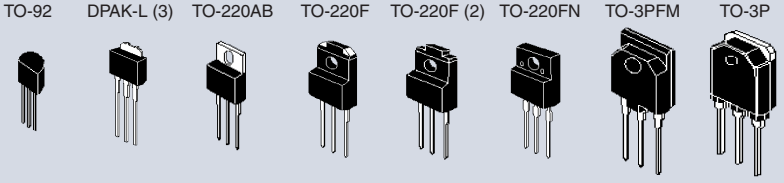
Surface Mount Type Package

MPAK MPAK MP-3 TO-220S



Through Hole Type Package

TO-92 DPAK-L (3) TO-220AB TO-220F TO-220F (2) TO-220FN TO-3PFM TO-3P



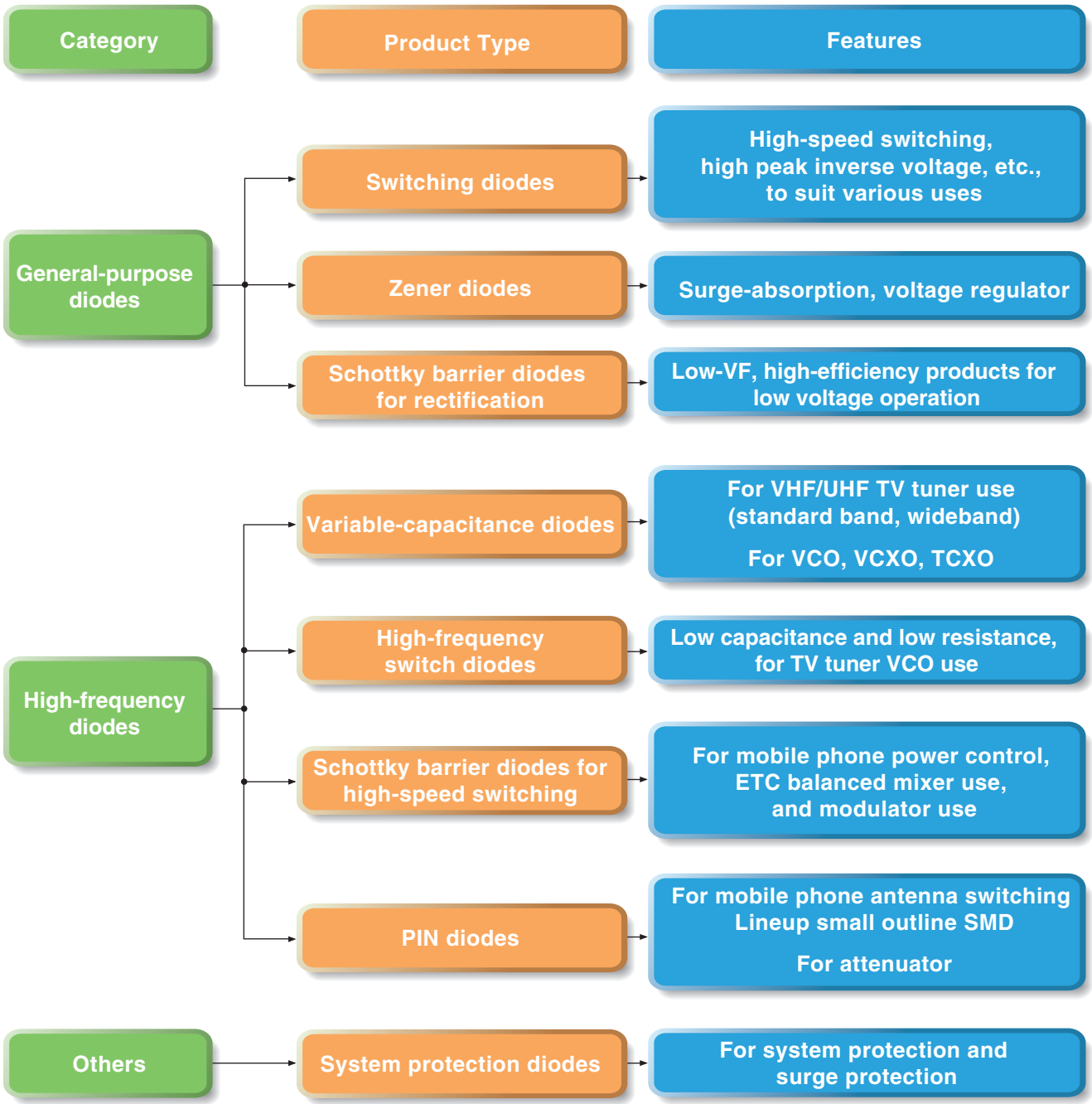
Diodes

Small size

A comprehensive lineup of small surface-mount packages is available, including URP, TURP, UFP, SFP (1006), EFP, and MP6(0603 Leadless) to meet the needs of smaller, lighter electronic products.

High performance

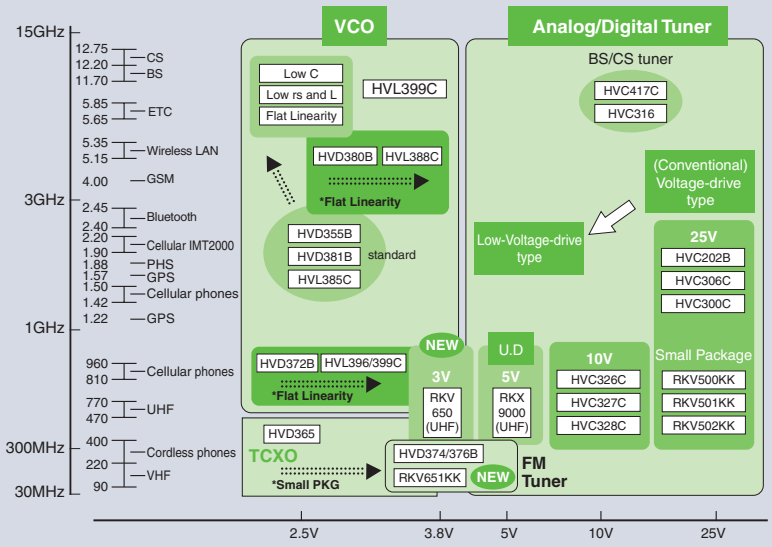
We continues to pursue performance suited to customers' applications, including a C version variable-capacitance diodes with an improved C-V characteristic, surge-absorption zener diodes, Schottky Barrier Diodes featuring low forward voltage and low capacitance.



Variable-Capacitance Diodes

Variable-capacitance diodes have a Linear voltage-capacitance characteristic (C-V characteristic) and a large capacitance variation ratio, enabling them to handle a wide band of receiving frequencies. They feature low series resistance and an excellent figure of merit.

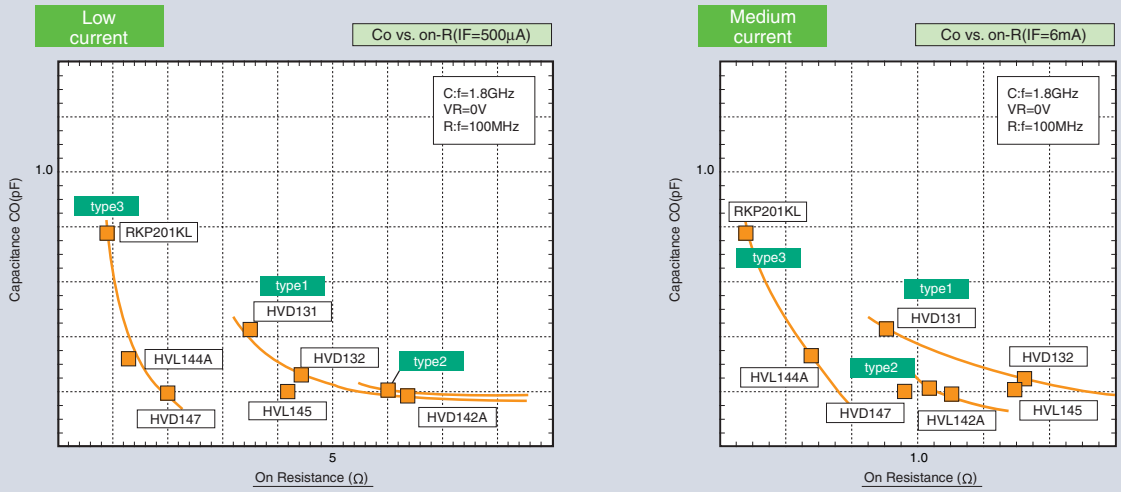
Examples of Variable-Capacitance Diode Applications Map by Frequency, and Applicable Product



PIN Diodes

PIN diodes that vary high-frequency series resistance are used for high-frequency switching, in AGC circuits for FM tuners, etc., and also in the mobile communications field. A lineup of ultra-small surface-mount packages (MP6) is also available.

Antenna Switching PIN Diode Capacitance vs. On-Resistance Map



Antenna Switch Design

Low current (IF=500μA); type 2, 3	Medium current (IF=6mA); type 1, 2, 3

VCO Switching and Tuner Band Switch Design

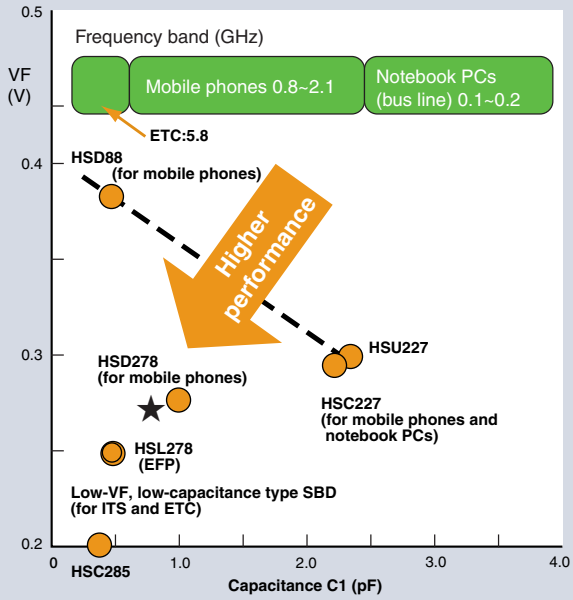
Low current to mediun current: type 2, 3

Diodes

Schottky Diodes

A variety of Schottky Diodes featuring a low forward voltage and low capacitance for Detector and Circuit-Protection.
Recently thin and small package(TURP) 1 ampere Schottky Diodes have been added to our product Lineup.

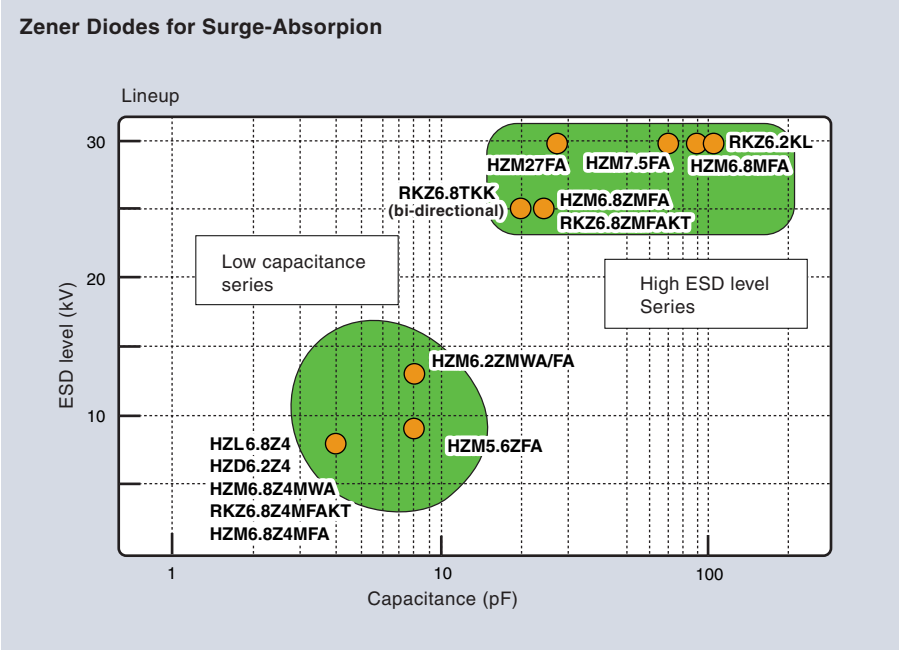
Detector Schottky Barrier Diode Characteristics Map



Zener Diodes

Zener diodes are useful for surge absorption as well as stabilization of small power supplies and reference voltage supply for constant voltage circuits.

Surge-Absorption Zener Diode Characteristics Map



Diode Part No. Destination (Renesas)

R K Z 6.8Z4 .... KL -1 R 1 Q

With Some Exceptions

- R — Renesas's Semiconductors (FIX)
- K — Diode (FIX)
- Z — Family Name
- 6.8Z4 — Unique number and Pin arrangement
- .... — Quality Level (omissible)
- KL — Package
- -1 — Special Specification Code (omissible)
- R — Packing
- 1 — Lead Free
- Q — Direct import

Packing

Resin Mold		
4mm	TR	P
	TL	H
	UR	Q
	UL	J
2mm	KR	R
	KL	K
	PR	S
	PL	L

Glass		
Bulk		0
52mm	TG	A
	TA	7
	TK	7
26mm	TE	8
	TJ	8
	TD	9
	TN	9
	TDX	B
Radial	RE/RX	6
	RF/RY	5

Family Name and Unique number

V	Vari-Cap	Tuner	500~599
		VCO	600~699
P	PIN Diodes	Antt.Sw	200~299
		Attenuator	300~399
S	Switching	Switching	100~149
		RF Switch	150~199
D	Schottky		700~799
R	Rect.Schottky	Depend on Io,VR(*1)	
Z	Zener	Depend on Vz, Cd (*) (*) 4pF : Z4 Low Cd (8~25pF) : Z others : none	
C (*2)	Compound Chips	more than 6pin	400~499

(*1) Refer to the another Table (Rectification schottky)
(*2) Depend on Family

Pin Arrangement

S	Series Connect
SR	Rev.Series.Connect
WK	Cathode Common
WA	Anode Common
WS	Series Connect(x2)
FA	Anode Common(x4)
FK	Cathode Common(x4)
YP	Parallel(x2)

Quality Level

J	Q1A/B
(omissible;D)	Q2
A	Q3

Package

KA	DO-35	KP	MP6		
KB	DO-41	KQ	(0402)		
KC	MHD	KR	MOP		
KD	LLD	KS	MFP12		
KE	MAP 系	KT	VSON-5		
KF	SRP	QA	MPAK		
KG	URP	QC	MPAK5		
KH	TURP	QE	CMPAK	WD	Wafer-4
KJ	UFP	QF	CMPAK4	WE	Wafer-5
KK	SFP	QK	MFPAK	WF	Wafer-6
KL	EFP	WA	Wafer-1	WT	Chip-1
KM	TEFP	WB	Wafer-2	WS	Chip-2
KN	MP8	WC	Wafer-3	WR	Chip-3

Lead Free

Full Pb Free	0	without Bi
Full Pb Free	1	with Bi
Terminal Pb Free	2	without Bi
Terminal Pb Free	3	with Bi
Pb	4	—

Diode Part No. Destination

● Glass (Inserting) Type [JEITA]

1 S S 270 A TD -E Q

- 1 — Indicates semiconductor element
- S — Product category
- S — Unique number(Serial)
- 270 — Grade
- A — Packing specifications
- TD — Pb free
- -E — Direct import
- Q

Product category

R	Recitification diode
S	Signal diode
V	Varicap/PIN diode
Z	Zener diode

Unique number

300~499	Varicap
10~229	Varicap/PIN
Vz center value integer	Zener
0103~0703	Rectification schottky (*See table)

Packing specifications

http://www.japan.renesas.com/diode
Please refer to Web-site concern to Diode

Rectification schottky (*See table)

HRW 05 03 A

- HRW — Rectification current
- 05 — Breakdown voltage
- 03 — Product category
- A

Current(A)	
01	0.1
02	0.2
03	0.3
05	0.5
07	0.7
1	1.0

Breakdown voltage(V)	
02	20
03	30
04	40

● Surface Mounting Type

With Some Exceptions

H S M 88 WA TR -E Q

- H — Series name
- S — Abbreviation indicating application
- M — Package abbreviation
- 88 — Unique number
- WA — Internal connection or improved products
- TR — Packing specifications
- -E — Pb free
- Q — Direct import

Abbreviation indicating application

S	For signal
V	Varicap/PIN
R	For rectifier
Z	Zener
C	Chip, Wafer

Package abbreviation

B	CMPAK, MOP	N	VSON-5
C	UFP	P	Do-41*
D	SFP	R	SRP
G	Do-35*	S	MHD*
K	LLD	T	(Temp. compen-sation zener) use URP
L	EFP	U	URP
M	MPAK, MPAK5	W	MPAK for rectifier

*: Glass (inserting) type.

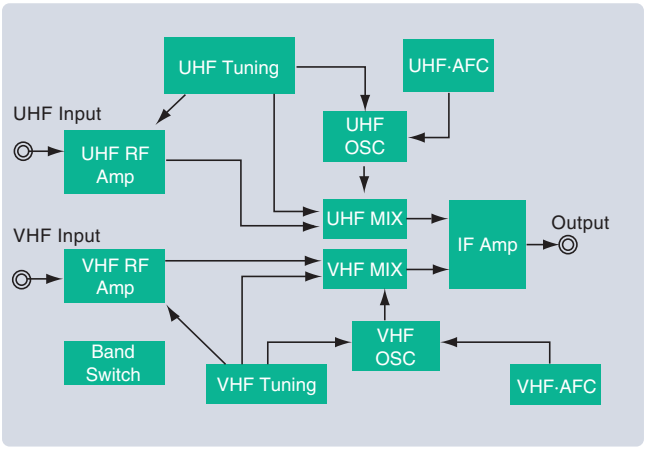
Internal connection

S	Series
SR	Reverse series
WK	Cathode common
WA	Anode common
WS	2 series connections
FA	4 elements anode comon
YP	2 elements parallel

Transistor / Diode Application Areas

High-Frequency Application Areas

UHF/VHF Tuners



UHF Tuner Transistor Lineup

Application		Package Code				
		MPAK	CMPAK	MPAK-4	CMPAK	CMPAK-6
RF	MOS				3SK318	
	BBFET TBB			3SK319	BB101C	
				BB101M		
				BB501M	BB501C	
				BB502M	BB502C	
				BB503M	BB503C	
				BB504M	BB504C	
				BB505M	BB505C	
					BB506C	TBB1002
						TBB1004
						TBB1005
						TBB1010
MIX	Bipolar	2SC4197				
OSC	Bipolar	2SC2734	2SC4262			
		2SC4196	2SC4261			

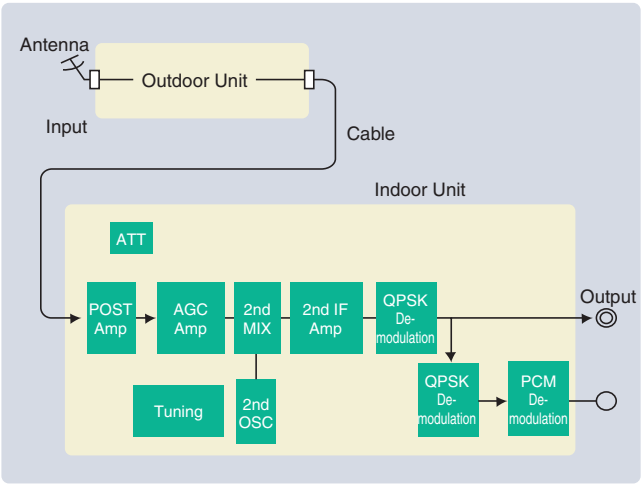
VHF Tuner Transistor Lineup

Application		Package Code				
		MPAK(T)	CMPAK	MPAK-4	CMPAK-4(T)	CMPAK-6
RF	MOS			3SK297	3SK298	
				3SK300	3SK317	
	BBFET			BB301M	BB301C	
				BB304M	BB304C	
				BB305M	BB305C	
						TBB1002
						TBB1004
						TBB1005
						TBB1010
MIX	Bipolar	2SC4197	2SC4260			
OSC	Bipolar	2SC4196	2SC4262			

UHF/VHF Tuner Diode Lineup

Application		Package Code				
		MPAK	URP	UFP	SFP	EFP
UHF	Tuning		HVU202B	HVC202B		
			RKV500KG	RKV500KJ	RKV500KK	
			HVU326C	HVC326C	HVD326C	
	MIX	HSM276AS	HSU276A	HSC276A	HSD276A	HSL276A
VHF	Tuning		HVU200A	HVC200A		
			HVU306C	HVC306C		
			RKV501KG	RKV501KJ	RKV501KK	
			HVU327C	HVC327C	HVD327C	
			HVU307			
			HVU300C	HVC300C		
			RKV502KG	RKV502KJ	RKV502KK	
			HVU363B	HVC363B		
			HVU328C	HVC328C	HVD328C	
	Band Switch		HSU277	HSC277	RKS150KK	
				RKS151KJ	RKS151KK	
		HSM2694				
UHF/VHF	AFC			HVC308A		

BS/CS Tuners



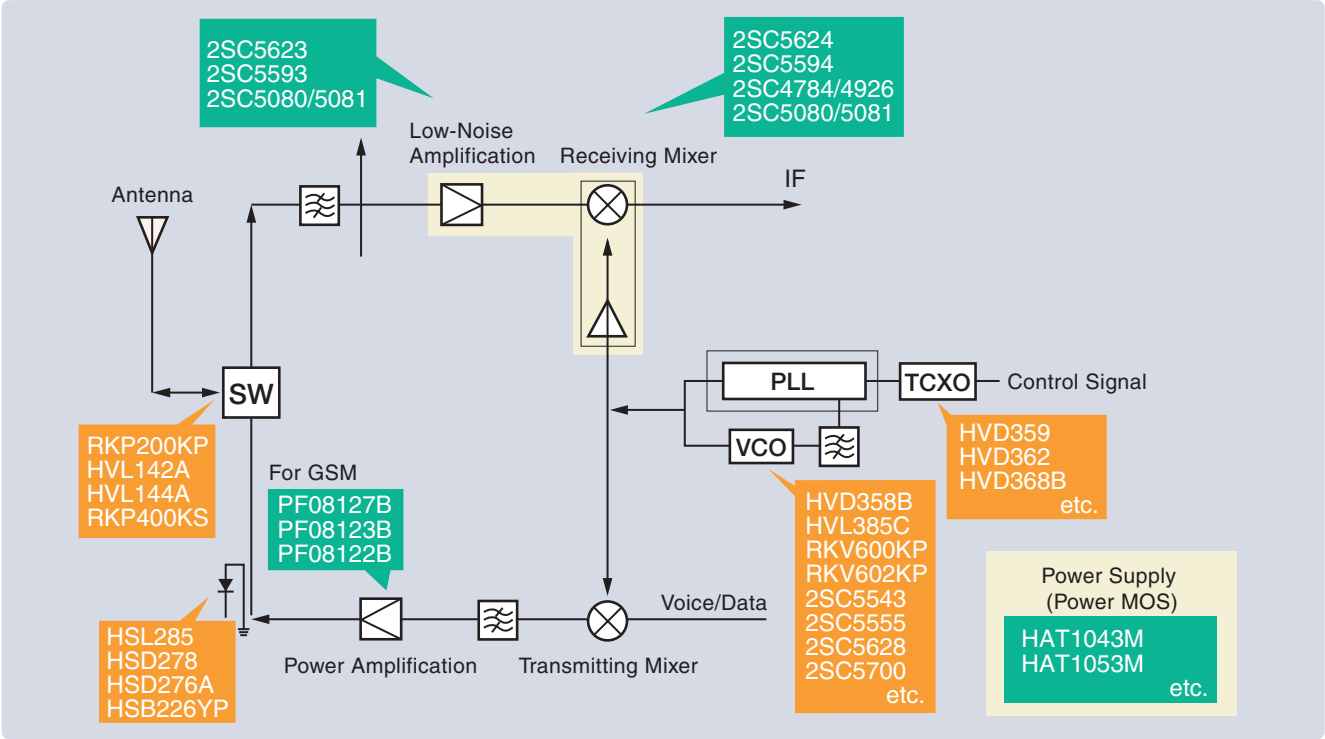
BS/CS Tuner Transistor Lineup

Application	Package Code			
	MPAK	MPAK-4	CMPAK	CMPAK-4(T)(UPAK)
Post-Amp	2SC4591			
			2SC4784	2SC5594
		2SC4926	2SC5051	
				2SC5624
		2SC5080		2SC4995
		2SC5545		
AGC Amp				2SC5081
2nd MIX 2nd IF Amp	2SC2734			
2nd IF Amp structuretr	2SC5890		2SC4901	
2nd OSC	2SC4591		2SC4901	

BS/CS Tuner Diode Lineup

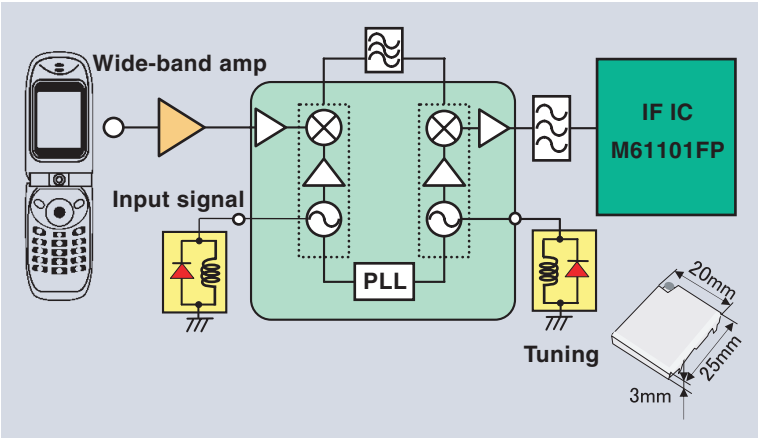
Application	Package Code					
	MPAK	CMPAK／-4	URP	UFP	SFP	EFP
2nd MIX	HSM276AS	HSB276AS	HSU276A	HSC276A	HSD276A	HSL276A
ATT	HVM14					
	HVM14S/SR	HVB14S				
	HVM187S	HVB187YP	HVU187			
	HVM189S					
	HVM187WK					
		HVB190S				
				HVC190		
					HVD191	
						HVL192
Tuning			HVU316	HVC316		
			HVU417C	HVC417C		
			HVU202B	HVC202B		
			RKV500KG	RKV500KJ	RKV500KK	

Digital Cellular Phones

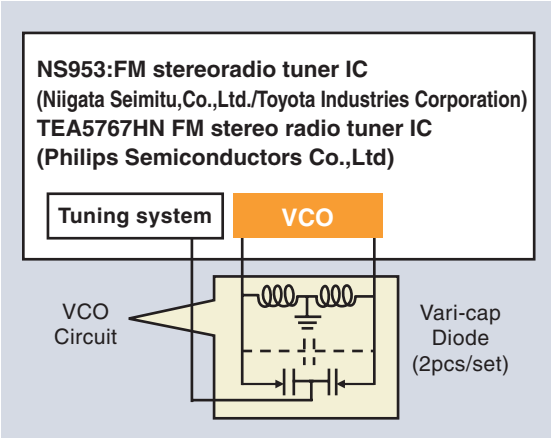


VCO Vari-Cap Diodes for Mobile TV and FM Radio

Analog TV Tuner for Mobile Phone



FM Tuner Module

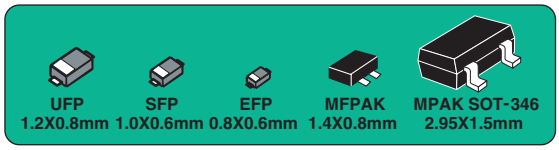


Vari-cap Diode for Mobile Low Voltage Tuner

Application	Part No.	Features	Packages
One SEG Mobile tuners	HVL355C	VT=~2.5V, C0.5/C2.5=2.1	EFP
	HVL385C	VT=~2.5V, C0.5/C2.5=2.5	
	RKV650KP	VT=~2.5V, C0.5/C2.5=3.5	MP6
	RKV652KP	VT=~2.5V, C0.5/C2.5=2.6	
FM radio tuners	HVD374B	VT=~4V, C1/C4=4.1	SFP
	HVD376B	VT=~4V, C1/C4=4.7	
	RKV651KJ/KK	VT=~2.3V, C0.2/C2.3>2.9 VT=~4.0V,C1/C4=3.6	UFP, SFP

Renesas transistors for wide-band amplifiers mounted on mobile phones

Application	Part No.	Packages	Features
Wide-band amplifiers	2SC5773	MPAK	Low distortion
	2SC5700	MFPAK	High fT=17GHz, small outline
	2SC4901	CMPAK	High fT=9GHz, small outline



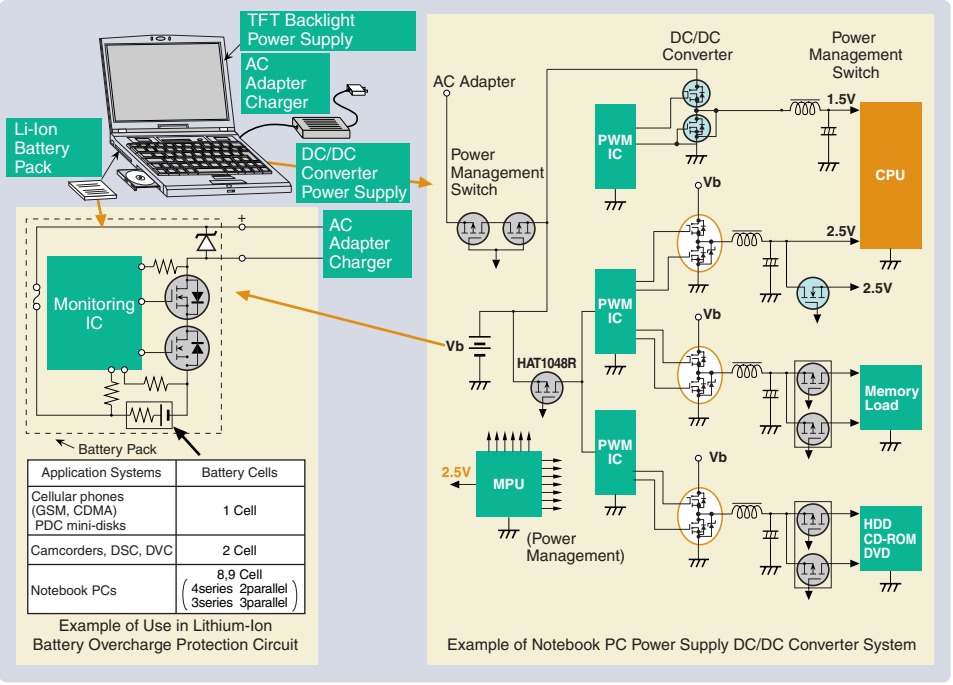
Transistor / Diode Application Areas

DC/DC Converters

Features and Merits

Features	Merits
Low on-resistance, high-speed switching, low Qg	Improved power supply efficiency (energy saving), fast response
Low-voltage drive (2.5, 4.0 V)	Allows direct drive by dedicated control IC
Small, thin package (SOP-8, TSSOP-8)	End-product can be made smaller and slimmer
SOP-8 package incorporating 2 chips	

Application Example (Notebook PC Lithium-Ion Battery Protection)



Application Systems	Battery Cells
Cellular phones (GSM, CDMA) PDC mini-disks	1 Cell
Camcorders, DSC, DVC	2 Cell
Notebook PCs	8,9 Cell (4series 2parallel 3series 3parallel)

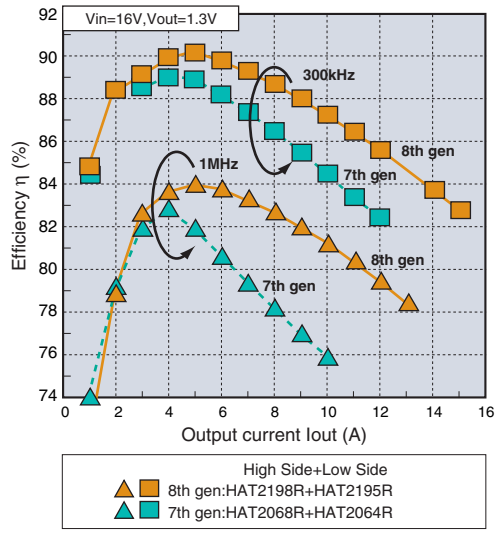
Example of Use in Lithium-Ion Battery Overcharge Protection Circuit

Example of Notebook PC Power Supply DC/DC Converter System

Li-Ion	DC/DC Converter	
2~4	DC/DC	Power Management Switch
	8~10	4~6

TFT Backlight Power Supply	Total Quantity Used
1~2	15~22

Synchronous Rectification Converter Power Supply Mounting Evaluation



Main Product Lineup

Application		Part No.	Package	VDSS (V)	ID (A)	10V RDS(on)(mΩ) typ	10V RDS(on)(mΩ) max	Qg (nC)*1	Die
DC/DC Converter	CPU Chip Set Memory	RJK0316DSP	SOP-8	30	16	5.3	6.4	13.8	Single
		RJK0317DSP		30	10	14	18	4.6	Single
		RJK0301DPB	LFPAK	30	60	2.3	2.8	32	Single
		RJK0303DPB		30	40	3.1	3.7	23	Single
		RJK0305DPB		30	30	6.7	8.0	8	Single
		HAT2285WP	WPAK	30/30	14/22	19/14	24/18	4.6/18	Dual
Power Management Switch		HAT1054R	SOP-8	-20	-6	(24)	(30)	—	Dual
		HAT1128R		-30	-16	6.0	7.5	—	Single
		HAT1125H	LFPAK	-30	-45	2.7	3.6	165	Single
TFT Backlight		HAT2028R	SOP-8	60	4	80	100	4.5	Dual
		HAT2114R		60	6	28	32	15	Dual

*:Low Side MOS FET+SBD ( ):VGS=4.5V *1:VDD=10V, VGS=5V

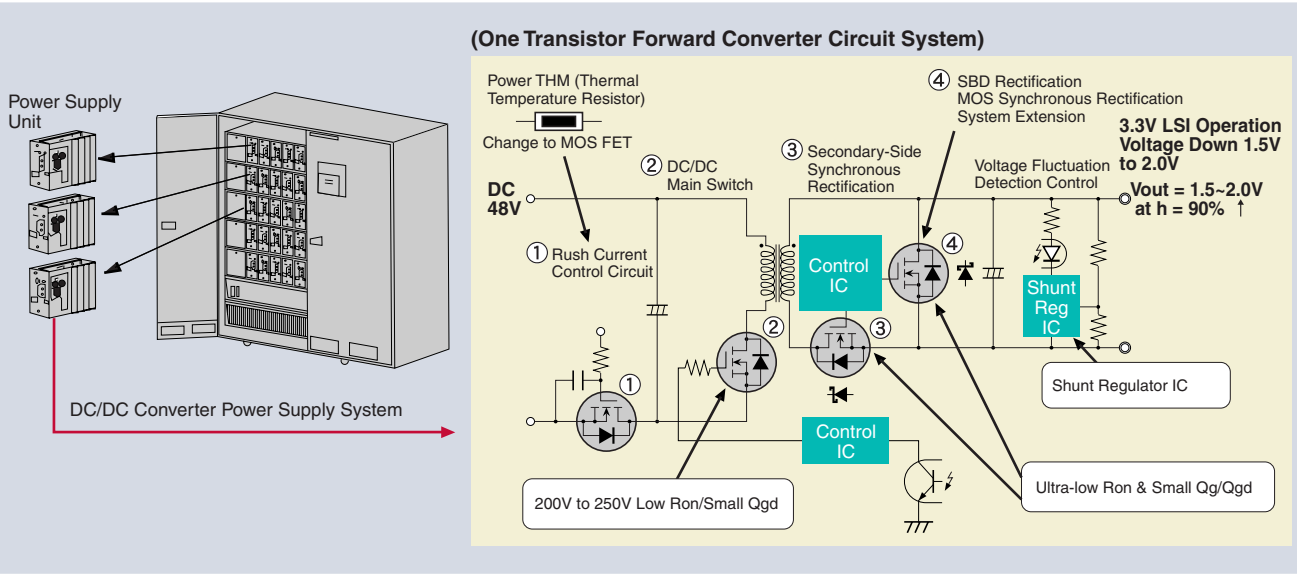
[Application Areas]
•Notebook PCs, VCR Camera Mobile Phones •On-Board Power Supply Secondary Side •Lithium-Ion Battery Pack Overcharge Protection Circuits

High-Efficiency DC/DC Converter Power Supplies
(For Communication Equipment)

Features and Merits

Features	Merits
Low on-resistance	Improved power supply efficiency
Low Qg, low Qgd	Low drive loss (energy saving in standby mode)
High-speed switching	Low switching loss
Small, thin package	Smaller end-product

48 V Input DC/DC Converter Power Supply Application Example



Lineup

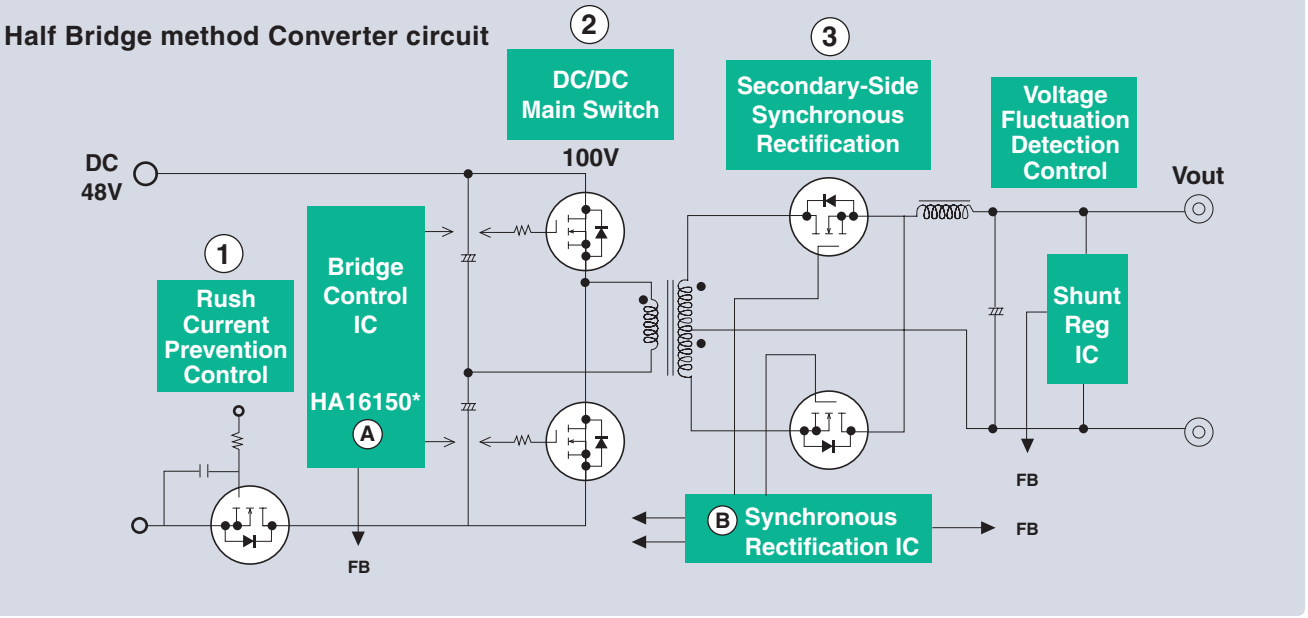
Application	Part No.	Configuration	Package	Maximum Ratings				RDS(on)(mΩ)	
				VDSS (V)	VGSS (V)	ID (A)	p-ch (W)	VGS=10V typ	VGS=10V max
①	HAT2058R	Nch*2	SOP-8	100	±20	4	2	120	145
②	HAT2119H	Nch	LFPAK	250	±30	4.5	15	480	630
	HAT2184WP	Nch	WPAK	150	±30	18	25	97	110
	HAT2187WP			200	±30	20	30	84	94
	HAT2188WP			200	±30	14	25	135	157
	HAT2191WP			250	±30	14	30	120	138
	HAT2192WP			250	±30	10	25	200	230
	HAT2193WP			250	±30	7	20	350	400
③ ④	HAT2195WP	Nch	WPAK	30	±20	40	25	4.2	5.3
	HAT2195R	Nch	SOP-8	30	±20	11	2	4.6	5.8
	HAT2166H	Nch	LFPAK	30	±20	45	25	2.9	3.8
	HAT2165H	Nch	LFPAK	30	±20	55	30	2.5	3.3

[Application Areas]
•Mobile Phones •Routers and Servers •Optical Communication Terminal Power Supplies, Switching Systems, ADSL

Transistor / Diode Application Areas

High-Efficiency DC/DC Converter Power Supplies
(For Communication Equipment)

48 V Input DC/DC Converter Power Supply Application Example



Lineup

Application	Part No.	Package	Maximum Ratings				RDS(on)(mΩ)	
			VDSS (V)	VGSS (V)	ID (A)	p-ch (W)	VGS=10V typ	VGS=10V max
①	HAT2201R	SOP-8	100	±20	6	2	34	43
	HAT2140H	LFPAK	100	±20	25	30	12.5	16
②	HAT2173H*	LFPAK	100	±20	25	30	12	15
	HAT2175H*	LFPAK	100	±20	15	15	33	42
	H7N1002LS/LM*	LDPAK	100	±20	75	100	8	10
③	HAT2195R*	SOP-8	30	±20	18	2.5	4.6	5.8
	HAT2168H*	LFPAK	30	±20	30	15	6.0	7.9
	HAT2167H*	LFPAK	30	±20	40	20	4.2	5.5
	HAT2165H*	LFPAK	30	±20	55	30	2.5	3.3

Bonding-wire-less package, small, thin

*Avalanche resistance guaranteed

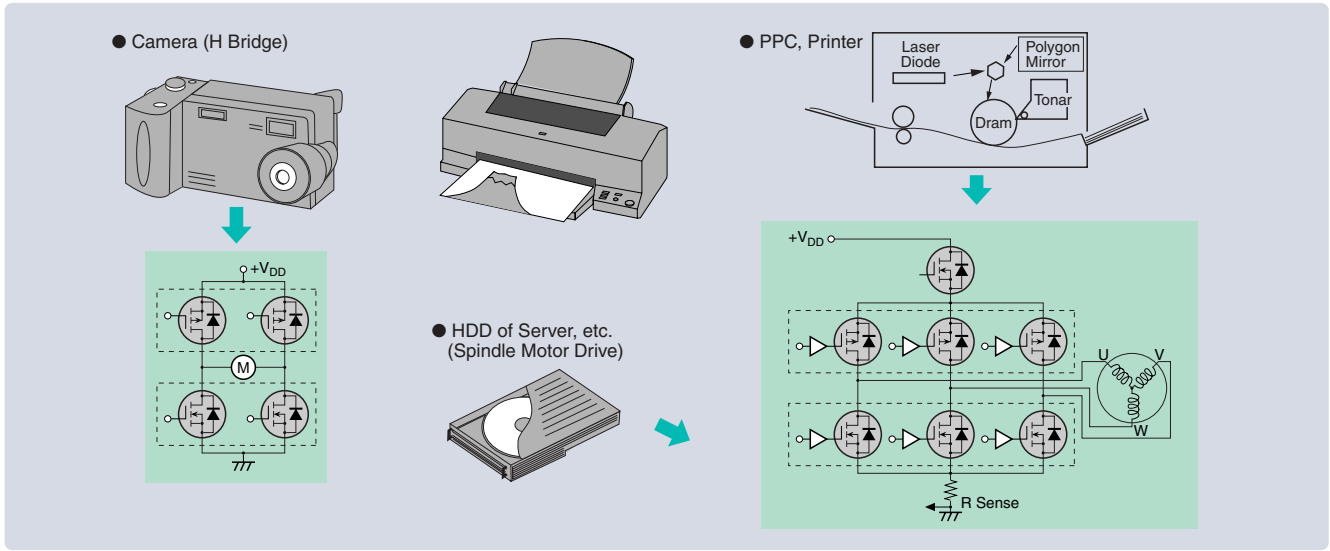
[Application Areas]
•Mobile Phones •Routers and Servers •Optical Communication Terminal Power Supplies, Switching Systems, ADSL

General Purpose Small Motor Drive

Features and Merits

Features	Merits
Low on-resistance	Low loss, high efficiency
Low-voltage (4 V) drive	Direct drive possible from logic, enabling number of parts to be reduced
Small package	High-density mounting available, enabling end-product to be made smaller
Built-in high-speed diode	Eliminates need for external diode

Applied products Example



Lineup

Package	Part No.		Maximum Ratings VDSS (V)	VGSS (V)	ID (A)	Pch (W)	RDS (on)(mΩ) VGS=10V typ	VGS=10V max	VGS=4.0V typ	VGS=4.0V max	trr (ns)
SOP-8	HAT3004R	Nch	30	±20	5.5	3	50	65	78	110	50
		Pch	-30	±20	-3.5		120	160	200	340	60
	HAT3006R	Nch	30	±20	6.5	3	30	45	60	80	45
		Pch	-30	±20	-4.5		70	90	110	180	60
	HAT3029R	Nch	30	±20	6.0	2	27	34	(40)	(58)	3
		Pch	-30	±20	-6.0		25	32	(36)	(53)	8
	HAT3008R	Nch	60	±20	5.0	3	43	58	56	84	40
		Pch	-60	±20	-3.5		120	150	160	230	70
	HAT3031R	Nch	60	±20	6.6	1.5	25	32	(29)	(43)	T.B.D
		Pch	-60	-20/10	-3.4		95	120	(120)	(175)	T.B.D
	HAT3019R	Nch	100	±20	3.5	2	90	115	120	160	35
		Pch	-100	±20	-2.3		240	300	300	500	
	HAT2093R	Nch x 2	30	±20	9	2	18	23	27	39	50
	HAT2103R	Nch x 2	30	±20	4.5	1.5	50	65	90	130	40
	HAT3037R	Nch	45	±20	5	2.3	48	60	(55)	(80)	30
		Pch	-45	-20/10	-4		70	88	(87)	(125)	35
	HAT3040R	Nch	60	±20	6.6	2.3	25	32	(29)	(43)	40
		Pch	-60	-20/10	-4.4		52	65	(65)	(95)	45
	HAT3032R	Nch	80	±20	4.4	1.5	66	70	(70)	(95)	40
		Pch	-80	±20	-3.0		145	147	(145)	(195)	40
	HAT3021R	Nch	80	±20	3.4	1.5	90	115	(100)	(145)	30
		Pch	-80	±20	-2.6		165	210	(200)	(290)	30
	HAT3038R	N	60	±20	5	1.5	48	60	(55)	(80)	40
		P	-60	-20/10	-4		70	88	(82)	(110)	40
	HAT3036R	N	30	±20	4.8	2.0	40	50	(60)	(87)	T.B.D
		P	-30	-20/10	-4.8		50	63	(75)	(109)	T.B.D

( ): VGS=4.5V

Part No.	Maximum Ratings VDSS (V)	ID (A)	VGSS (V)	Electrical Characteristics VGS(off) (V) min-max	RDS(on) (mΩ) typ/max	Ciss (pF) typ	Package
H5N5004PL	500	50	±30	2.0 - 4.0	90/110	7630	TO-3PL
H5N5015P	500	32	±30	1.5 - 4.0	140/170	4600	TO-3P
H5N5012P	500	25	±30	2.0 - 4.0	180/225	3600	TO-3P
H5N3008P	300	40	±30	2.0 - 4.0	58/69	5150	TO-3P
H5N3007FN	300	15	±30	1.5 - 4.0	120/160	2180	TO-220FN
H5N2507P	250	50	±30	1.5 - 4.0	40/55	5000	TO-3P
H5N2512FN	250	18	±30	1.5 - 4.0	82/105	2200	TO-220FN
H5N2522FN	250	12	±30	1.5 - 4.0	130/170	1300	TO-220FN

[Application Equipments] H Bridge : •HDDs (Voice Coil Motor) •Cameras •Electronic Throttles
Three-Phase : •HDDs (Spindle Motor) •PPCs •Printers (Paper Feed Motor, Polygonal Mirror)

Transistor / Diode Application Areas

AC/DC Converters, Synchronous Rectification

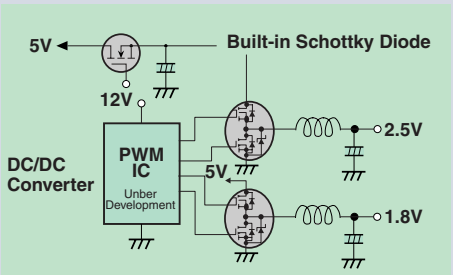
Features and Merits

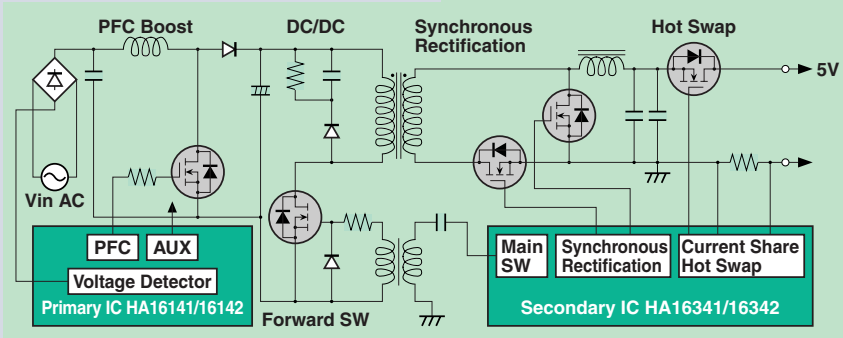
Features	Merits
Low on-resistance	Improved power supply efficiency Size reduction possible
Low input capacitance (low Qg)	
High avalanche breakdown resistance	Enables safe end-product design
High diode breakdown resistance	

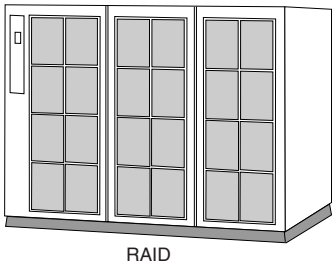
Application Example (WS, RAID, Server)

Application Blocks

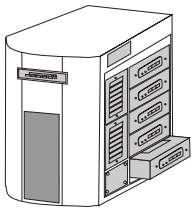
Application	MOS FET	Control IC
PFC	500 to 600V	HA16141 HA16142 HA16158
DC/DC	500V to 600V	HA16341 HA16342
Secondary Side Synchronous Rectification	30 to 60V	
Hot Swap	20 to 30V	
VRM	20 to 30V	—







RAID



Server (PC, Network)

Lineup

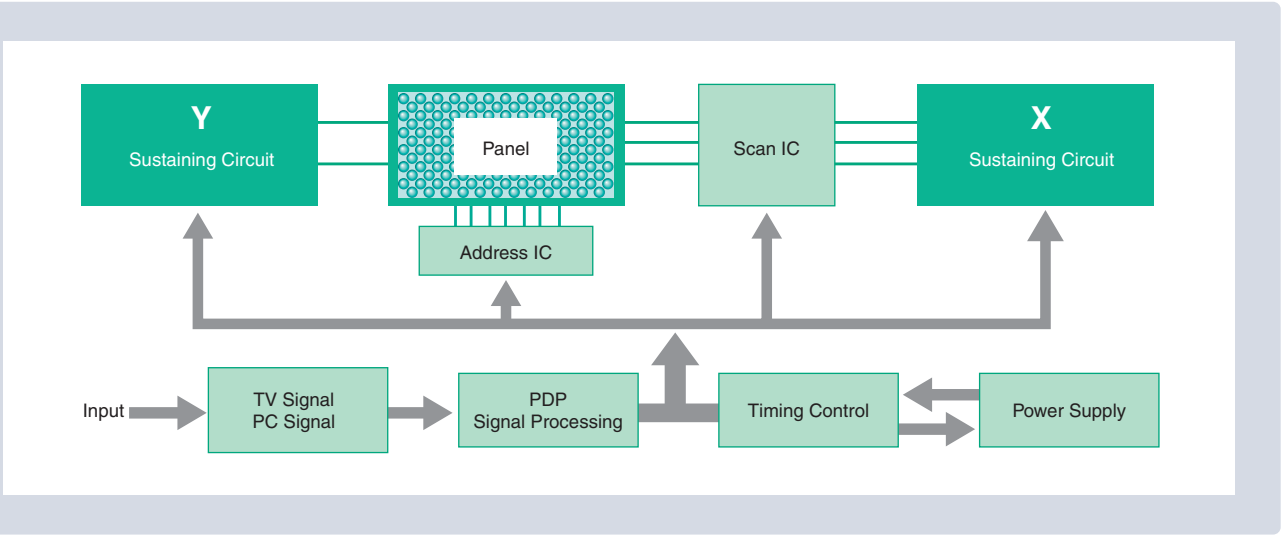
Application	Part No.	Package	Maximum Ratings				RDS(on)(mΩ)	
			VDSS (V)	VGSS (V)	ID (A)	p-ch (W)	VGS=10V typ	VGS=10V max
Startup SW	RJK6011DJE	TO-92M	600	±30	0.1	0.9	35	52
	RJK6022DJE	TO-92M	600	±30	0.2	0.9	13	15
PFC DC/DC	RJK6015DPK	TO-3P	600	±30	21	150	315	360
	RJK5020DPK	TO-3P	500	±30	40	200	103	115
Secondary-Side Synchronous Rectification	HAT2165H	LFPAK	30	±20	55	30	2.5	3.3
	HAT2170H		40	±20	45	30	3.3	4.2
	H7N0308LD	LDPAK	30	±20	70	100	3.8	4.8
	H7N0602LD		30	±20	85	100	4.1	5.2
Hot Swap	H7N0203AB	TO-220AB	20	±20	90	100	2.4	3
	HAT2160H	LFPAK	30	±20	85	125	2.6	3.3
DC/DC Converter	HAT2198R	SOP-8	30	±20	14	2.5	7.2	9
	HAT2195R		30	±20	18	2.5	4.6	5.8
	HAT2168H	LFPAK	30	±20	30	15	6.0	7.9
	RJK0305DPB		30	±20	30	45	6.7	8.0
	RJK0303DPB		30	±20	40	55	3.1	3.7

For PDP

Features

Power MOSFETs	IGBT
Low on-resistance, low Qg, high avalanche resistance	Low Vce(sat), high-speed switching

PDP System Configuration



Power MOSFETs

Part No.	Maximum Ratings			Electrical Characteristics		Package
	V_{DSS}(V)	I_D(A)	V_{GS}(V)	$V_{GS(off)}$ typ(V)	$R_{DS(on)}$ typ(mΩ)	
H7N1005LS	100	15	±20	2.0	85	LDPAK
H7N1004LS	100	30	±20	2.0	25	LDPAK
H5N2301PF	230	25	±30	3.5	65	TO-3PFM
H5N2306PF	230	30	±30	3.5	48	TO-3PFM
H5N2305PF	230	35	±30	3.5	30	TO-3PFM
H5N2509P	250	30	±30	3.5	53	TO-3PFM
H5N2503P	250	50	±30	3.5	40	TO-3P
H5N3004P	300	25	±30	3.5	75	TO-3P
H5N3007LS	300	25	±30	2.8	120	LDPAK
H5N3003P	300	40	±30	3.5	60	TO-3P
H5N3504P	350	20	±30	3.5	100	TO-3P

IGBT (High-Speed Type)

Part No.	Maximum Ratings			Electrical Characteristics		Package
	V_{CES}(V)	I_C(A)	V_{GE}(V)	$V_{CE(sat)}$ (V)typ	tf (μs) typ	
GN4030V5AB	400	30	±20	1.5	0.12	TO-220AB
GN6030V5AB	600	30	±20	1.7	0.12	TO-220AB
RJP3053DPP	300	30	±30	2.0	0.15	TO-220FN
RJP3063DPP	300	30	±30	1.7	0.30	TO-220FN
RJP3054DPP	300	35	±30	1.8	0.15	TO-220FN
RJP3064DPP	300	35	±30	1.5	0.30	TO-220FN
RJP3055DPP	300	40	±30	1.8	0.15	TO-220FN
RJP3065DPP	300	40	±30	1.5	0.3	TO-220FN
RJP4065DPP	400	40	±30	1.6	0.3	TO-220FN
RJP2557DPK	270	50	±30	1.6	0.15	TO-3P
RJP3056DPK	300	45	±30	1.6	0.15	TO-3P
RJP3057DPK	300	50	±30	1.6	0.15	TO-3P
RJP3066DPK	300	45	±30	1.4	0.3	TO-3P
RJP3067DPK	300	50	±30	1.4	0.3	TO-3P
RJP4067DPK	400	50	±30	1.7	0.35	TO-3P

Automotive Equipment

Power MOSFET with on-chip overheating protection circuit

Features

- On-chip overheating cutoff function (current cutoff at Tch = 150°C or above)
- Cutoff function self-maintenance (latch) and self-reset (temperature hysteresis) types
- Support for user-specified low-side/high-side drive

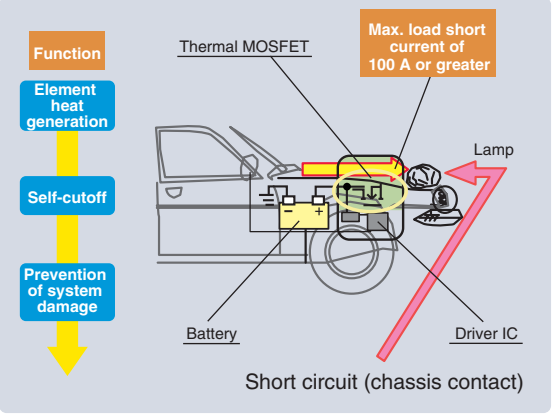
Main applications

- Electronic equipment for automobiles (lamp drive, replacements for relays, drive of various types of actuators)

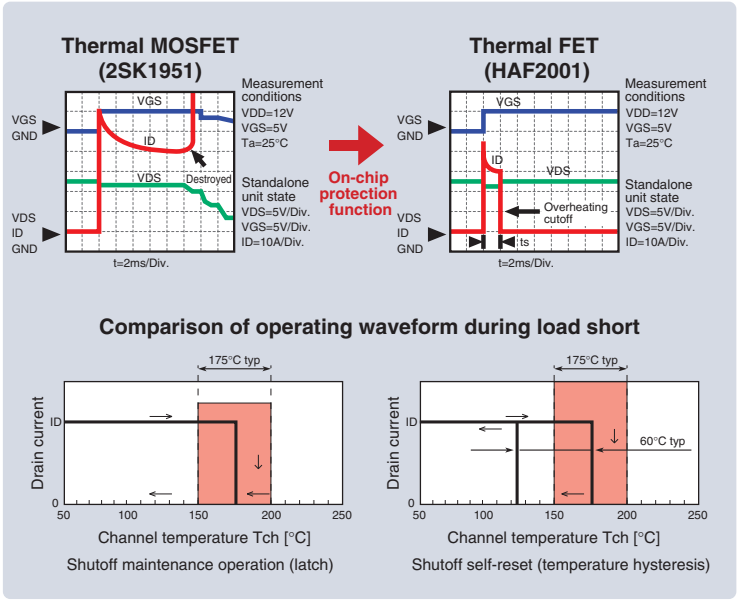
Advantages for users

- Prevents destruction of elements due to temporary load shorts.

Thermal FET functions



Thermal FET overheating cutoff characteristics



Thermal FET Development Lineup

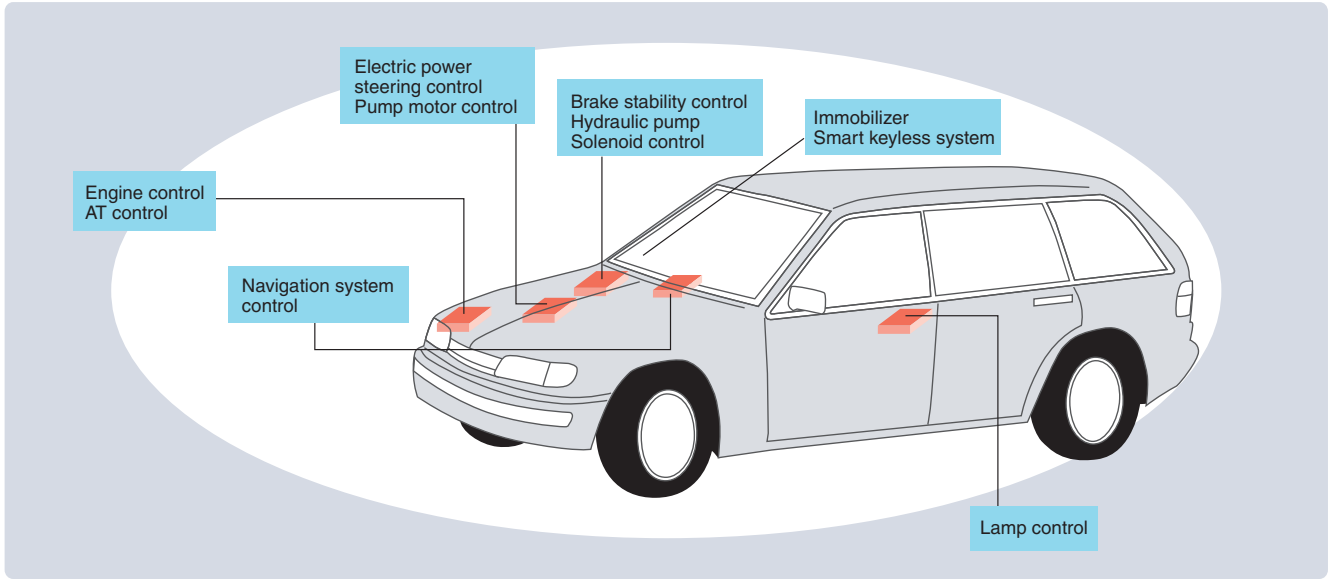
Polarity	Process Generation	Part No.	Maximum Rating				RDS(on)(mΩ)				Cutoff Temperature	★ Latch type ○ Hysteresis type	Schedule		
			VDSS (V)	VGSS (V)	ID (A)	p-ch (W)	VGS=4V [4.5V] (5V),(6V) typ.	VGS=4V [4.5V] (5V),(6V) max	VGS=10V typ.	VGS=10V max	typ.		WS	MP	
n-ch	1st generation	HAF2001	60	+16/-2.8	20	50	50	65	30	43	175°C	★	OK	OK	TO-220AB
		HAF2002	60	+16/-2.8	20	30	50	65	30	43	175°C	★	OK	OK	TO-220FM
		HAF2012	60	+16/-2.8	20	50	50	65	30	43	175°C	★	OK	OK	LDPAK
	2nd generation	HAF2017	60	+16/-2.5	20	50	[35]	[53]	27	43	175°C	★	OK	OK	
		HAF2005	60	+16/-2.5	40	30	25	33	15	20	175°C	★	OK	OK	TO-220FM
		HAF2011	60	+16/-2.5	40	50	25	33	15	20	175°C	★	OK	OK	LDPAK
		HAF2014	60	+16/-2.5	40	50	25	33	15	20	175°C	★	OK	OK	TO-220AB
		HAF2007	60	+16/-2.5	5	20	73	120	55	75	175°C	★	OK	OK	DPAK
		HAF2025	60	+16/-2.5	15	40	{41}	{60}	34	45	175°C	★	OK	OK	
		HAF2021	60	+16/-2.5	50	100	(9.5)	(15)	8	12	175°C	★	OK	OK	LDPAK
		HAF2015RJ	60	+16/-2.5	2	1.5	130	200	110	160	175°C	○	OK	OK	SOP-8
		HAF2026RJ	60	+16/-2.5	1	1.5	200	300	150	210	175°C	★	OK	OK	
p-ch	1st generation	HAF1001	-60	-16/+3.0	-15	50	100	130	70	90	175°C	★	OK	OK	TO-220AB
		HAF1002	-60	-16/+3.0	-15	50	100	130	70	90	175°C	★	OK	OK	LDPAK
	2nd generation	HAF1004	-60	-16/+2.5	-5	20	200	340	140	200	175°C	★	OK	OK	DPAK
		HAF1010RJ	-60	-16/+2.5	-5	2.5	200	340	140	200	175°C	★	OK	OK	SOP-8
		HAF1008	-60	-16/+2.5	-20	50	60	80	42	54	175°C	★	OK	OK	LDPAK
		HAF1009	-60	-16/+2.5	-40	50	33	50	22	27	175°C	★	OK	OK	

Power MOSFET

Features / Advantages for users

Feature		Advantage for users
Low on-resistance	→	Suitable for control of high-output equipment
Nch and Pch versions available	→	Support for user-specified low-side/high-side drive
Surface-mount package versions available	→	Ability to realize more compact equipment
High avalanche capability	→	Ability to reduce number of protective parts

Examples of units employing power MOSFET devices in automotive applications



POWER MOSFET Development Lineup

Application	Function	Part No.	Polarity	V_{DSS} (V)	I_D (A)	$R_{DS(on)}$ max (mΩ)	Notes	
Electric power steering control	Motor drive	RJK0406JPE★★	N	40	160	2		LDPAK
Engine control	Solenoid drive	HAF2015RJ	N	60	2	160		SOP-8
	Injector drive	H7N1005DS	N	100	10	120		DPAK
	Injector drive (Direct injection)	2SK3155	N	150	15	130		TO-220FM
		2SK3162	N	200	20	75		
		H7P1002DS	P	-100	-15	105		DPAK
AT control	Solenoid drive	RJJ0606JPD★★	P	-60	-30	30		
Pump motor control	3-phase brushless motor drive	RJM0602JSC★★	N	60	20	32		HSOP-20 (6in1) 3 elements each for N and P
			P	-60	-20	32		
		RJM0603JSC★★	N	60	20	21		
			P	-60	-20	42		
Brake stability control	Solenoid drive	HAT2114RJ	N	60	6	32		SOP-8 (2in1) 2 elements
	Hydraulic pump motor drive	RJK0629JPE★★	N	60	85	5		LDPAK
Lamp drive	Relay replacement	RJE0601JPE★★	P	-60	-40	25		
		HAF2021	N	60	50	12		
Smart keyless system	LF antenna drive	RJM0306JSP★★	N	30	3.5	65		SOP-8 (4in1) 2 elements each for N and P
			P	-30	-3.5	120		
Navigation	Synchronous rectifier DC/DC converter power supply	HAT2210RJ	N	30	7.5	24		SOP-8 (2in1) 2 elements
			N	30	8	22	On-chip SBD	
		RJK0318JPB★★	N	30	25	15		LFPAK
		RJK0319JPB★★	N	30	20	18	On-chip SBD	

★★ : Under development

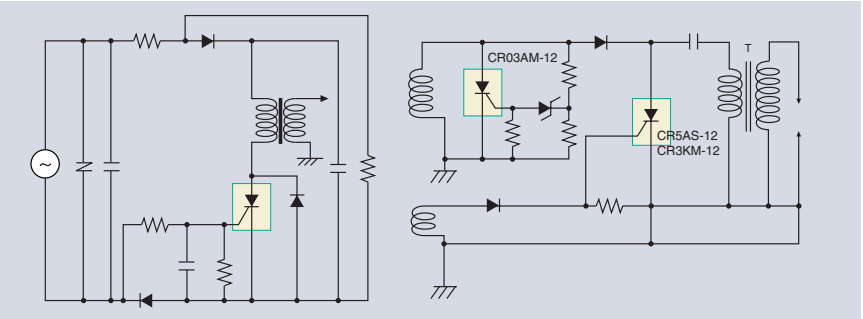
Transistor / Diode Application Areas

Igniter

■ Features and Merits

Feature	Merit
High pulse tolerance	High reliability
High withstand-voltage	

■ Sample application circuit



Example of fan heater, water heater, or oil ignition device

Example of motorcycle, motorboat, jet-ski, or lawn-mower

■ Lineup

Application	Thyristors	$I_{T(AV)}$ [A]	I_{TSM} [A]	V_{DRM} [V]	I_{GT} [A]	Package
Fan heater Hot water supply	CR02AM-8	0.3	10	400	100µA	TO-92*
	CR04AM-12	0.4	10	600	100µA	TO-92*
	CR03AM-12	0.3	20	600	100µA	TO-92*
Motorcycle Lawn mower	CR03AM-12	0.3	20	600	100µA	TO-92*
	CR5AS-12	5	90	600	100µA	MP-3A
	CR3KM-12 CR3PM-12	3	70	600	100µA	TO-220FN TO-220F

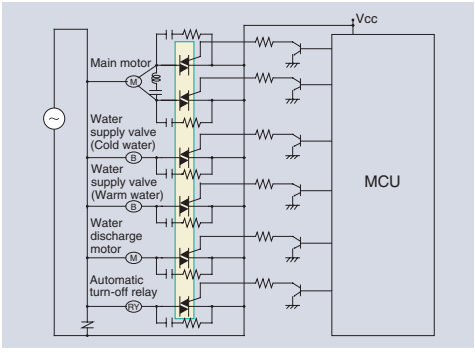
■ Application Products • Fan heaters • Oil supply devices • Oil ignition devices • Motorcycles • Motorboats • Lawn-mowers

Washing machine

■ Features and Merits

Feature	Merit
High current tolerance	High reliability in case of erroneous operation
DIP (16P4) use	Simplified assembly

■ Sample application circuit



■ Lineup

Input voltage	Capacity	Washing motor	Water supply valve	Water discharge motor	Automatic turn-off relay	Bath water pump
AC100V ~ 120V	~7kg	BCR8PM-12LG	BCR1AM-12A BCR1AM-12	BCR1AM-12A BCR1AM-12	BCR1AM-12A BCR1AM-12	BCR5PM-12LG
	~10kg	BCR10PM-12LG	BCR1AM-12A BCR1AM-12	BCR1AM-12A BCR1AM-12	BAR1AM-12A BCR1AM-12	BCR5PM-12LG
AC200V ~ 240V	~7kg	BCR8PM-14LG BCR8PM-16LG	BCR08AM-14A	BCR08AM-14A	BCR08AM-14A	BCR3PM-14G
	Compatible to AC100V/200	BCR12PM-14LG	BCR08AM-14A	BCR08AM-14A	BCR08AM-14A	BCR3PM-14G

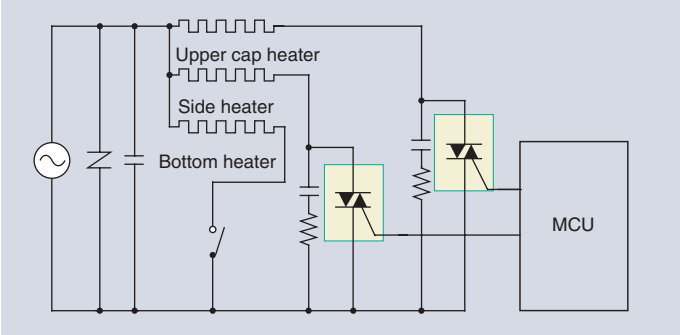
■ Application Products • Fully-automatic washing machines • Twin-tub washing machines

Rice cooker

■ Features and Merits

Feature	Merit
High current capability	High reliability

■ Sample application circuit



■ Lineup

Input voltage	Upper cap heater		Side heater	
AC100V~120V	~60W	BCR1AM-12A	~60W	BCR1AM-12A
	~120W	BCR2PM-12RE	~120W	BCR2PM-12RE
AC200V~240V	~80W	BCR08AM-12A	~80W	BCR08AM-12A
	~120W	BCR1AM-12A	~120W	BCR1AM-12A

■ Application Products

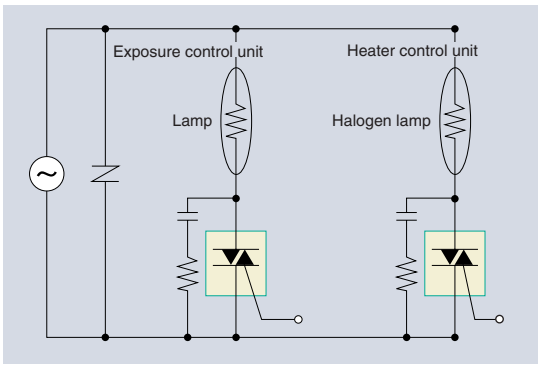
• Rice cookers • Hot-water pots

Printer

■ Features and Merits

Feature	Merit
High current tolerance, high inrush current tolerance	High reliability

■ Sample application circuit



■ Lineup

Unit for Exposure control unit

Input voltage	Capacity	Non-insulation type	Insulation type
AC100V~120V	200W	BCR5AM-12LA/LB	BCR5PM-12LA/LB/LG
	300W	BCR6AM-12LA/LB	BCR8PM-12LA/LB/LG
	400W	BCR8CM-12LA/LB	BCR8PM-12LA/LB/LG
AC200V~240V	200W	—	BCR3PM-12LA/LB/LG
	300W	—	BCR3PM-12LA/LB/LG
	400W	BCR5AM-12LA/LB	BCR5PM-12LA/LB/LG

Unit for Heater control unit

Input voltage	Capacity	Non-insulation type	Insulation type
AC100V~120V	400W	BCR8CM-12LA/LB	BCR8PM-12LA/LB/LG
	600W	BCR12CM-12LA/LB	BCR12PM-12LA/LB/LG
	800W	BCR16CM-12LA/LB	BCR16PM-12LA/LB/LG
	1000W	BCR30AM-12LA/LB	—
AC200V~240V	400W	BCR5AM-12LA/LB	BCR5PM-12LA/LB/LG
	600W	BCR6AM-12LA/LB	BCR8PM-12LA/LB/LG
	800W	BCR8CM-12LA/LB	BCR8PM-12LA/LB/LG
	1000W	BCR10CM-12LA/LB	BCR10PM-12LA/LB/LG

■ Application Products

• PPCs • LBPs • Fax machines

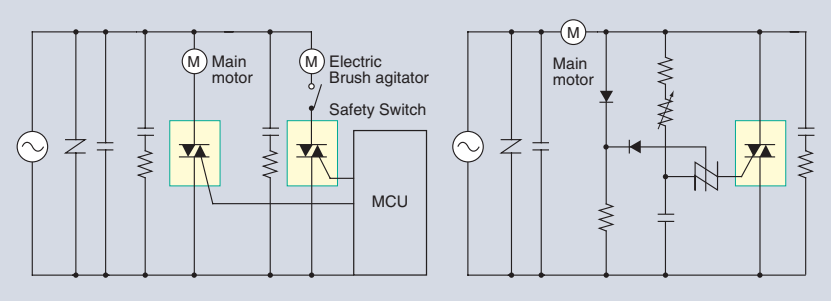
Transistor / Diode Application Areas

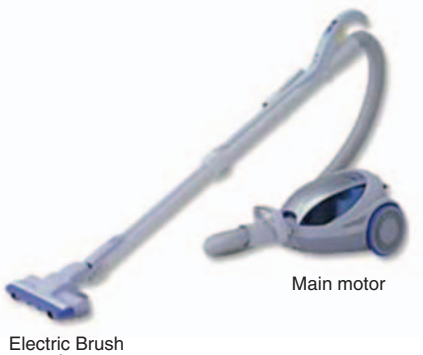
Vacuum cleaner

■ Features and Merits

Feature	Merit
High current tolerance	High reliability
High current capacity	High efficiency,High Vacuum force

■ Sample application circuit



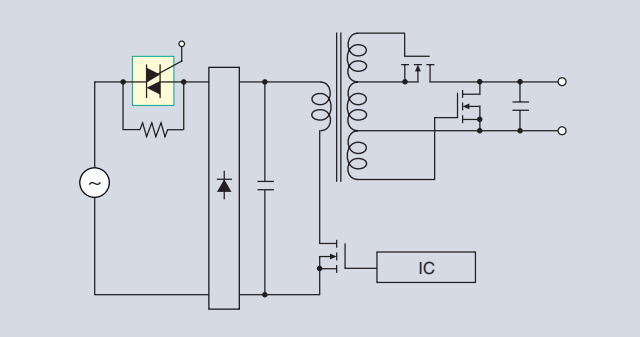


■ Lineup

Input voltage	Capacity	Vacuum Motor	Electric Brush agitator
AC100V ~ 120V	500 ~ 1000W	BCR16CM-12LA/LB BCR16PM-12LA/LB/LG	BCR2PM-12A BCR3PM-12LG
	1000 ~ 1500W	BCR20AM-12LA/LB BCR20KM-12LA/LB	BCR2PM-12A BCR3PM-12LG
AC200V ~ 240V	500 ~ 1000W	BCR8CM-12LA/LB BCR8PM-12LA/LB/LG	BCR2PM-12A BCR3PM-12LG
	1000 ~ 1500W	BCR12CM-12LA/LB BCR12PM-12LA/LB/LG	BCR2PM-12A BCR3PM-12LG

Voltage for Switching, Light for INV (Prevent rush current)

■ Sample application circuit



■ Lineup

Input voltage		Output Capacity		
		~ 300W	~ 500W	~ 750W
AC100V ~ 120V	Triacs	BCR5AS-12LA/LB BCR5AM-12A/LBL BCR5PM-12LG	BCR8CS-12LA/LB BCR8CM-12LA/LB BCR8PM-12LA/LB/LG	BCR12CS-12LA/LB BCR12CM-12LA/LB BCR12PM-12LA/LB/LG
	Thyristors	CR3AS-12A CR3KM-12A CR3PM-12A	CR5AS-12A CR6KM-12A CR6PM-12A	CR8KM-12A CR8PM-12A
AC200V ~ 240V	Triacs	BCR3AS-12LA/LB BCR3PM-12LG	BCR5AS-12LA/LB BCR5AM-12LA/LB BCR5PM-12LG	BCR8CS-12LA/LB BCR8CM-12LA/LB BCR8KM-12LA/LB/LG
	Thyristors	CR3AS-12A CR3KM-12 CR3PM-12	CR3KM-12 CR3PM-12	CR5AS-12A CR6KM-12A CR6PM-12A

Input voltage		Output Capacity		
		~ 1kW	~ 1.2kW	~ 1.5kW
AC100V ~ 120V	Triacs	BCR16CS-12LA/LB BCR8CM-12LA/LB BCR16PM-12LA/LB/LG	BCR20AM-12LA/LB BCR20KM-12LA/LB	BCR30AM-12LA/LB
	Thyristors	CR12CM-12A	CR12CM-12A	—
AC200V ~ 240V	Triacs	BCR8CS-12LA/LB BCR8CM-12LA/LB BCR8PM-12LA/LB/LG	BCR10CS-12LA/LB BCR10CM-12LA/LB BCR10PM-12LA/LB/LG	BCR12CS-12LA/LB BCR12CM-12LA/LB BCR12PM-12LA/LB/LG
	Thyristors	CR5AS-12A CR6KM-12A CR6PM-12A	CR5AS-12A CR6KM-12A CR6PM-12A	CR8KM-12A CR8PM-12A

The Application Field of Low & Medium Power Device for Camera and Strobe Flasher

Camera, digital still camera and strobe

Strobe section

No light adjustment Triggering thyristor
Light adjustment
Bypass type: Dedicated thyristor
Serial type: The IGBT device is used mainly.
External type: IGBT device dedicated to flat light generation

X contact section

Both polarities are covered by a triac device rated at 600V.

Application		Device used	Recommended Product
External strobe	High-performance strobe (Flat light emission)	Thyristor for triggering the IGBT device	RJP430/APP,RJP530/APP,CR05AS-8,CR05BS-8 etc.
Built-in strobe	Red eye reduction function	Thyristor for triggering the IGBT device	RJP4002ANS,RJP4004ANS,CR05AS-8,CR05BS-8 etc.
X-contact control	High-voltage and high-pulse-current controller	Triac device	BCR08AS-12A,BCR1AM-12A etc.

General-Purpose Devices for Camera Flash Units

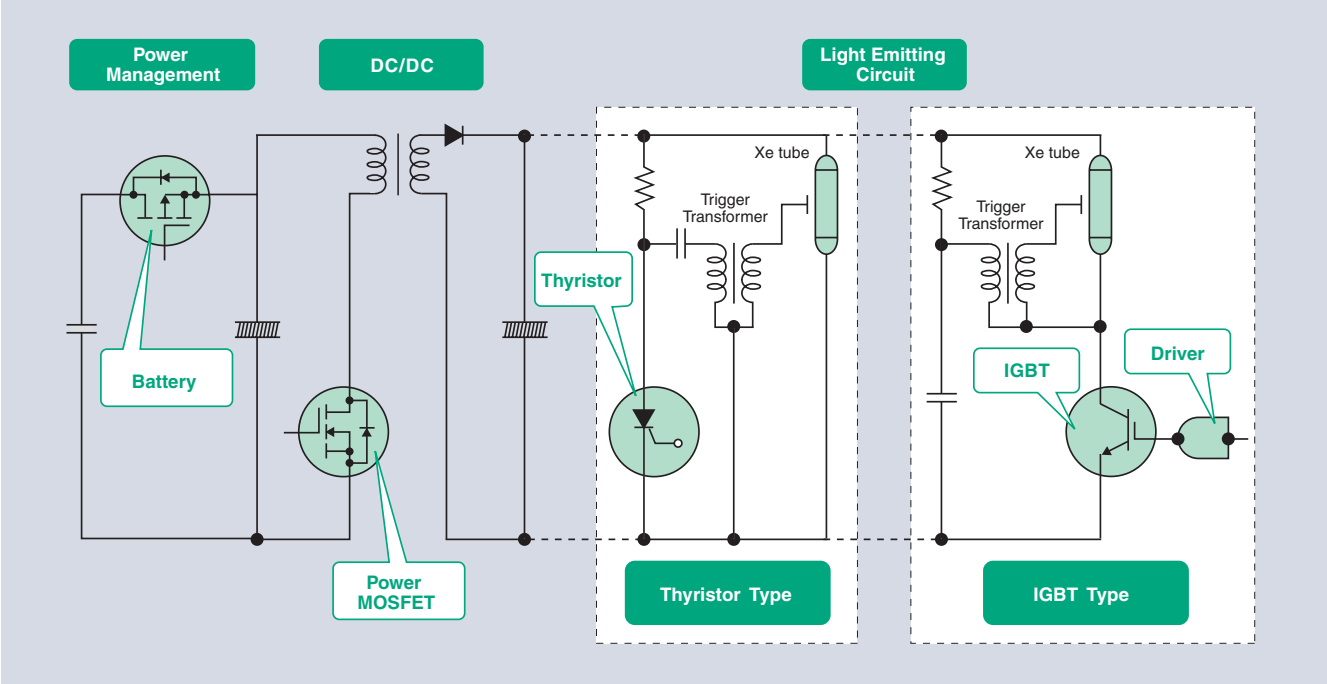
Making possible more compact and efficient cameras

Features and Merits

Family	Feature	Merit
Power MOSFET	Low on-resistance, high-speed switching, compact exterior dimensions	Improved efficiency, smaller size, simpler circuit design
Thyristor	Large-current control, compact exterior dimensions	Smaller size
IGBT	Low-voltage drive, large-current control, compact exterior dimensions	Simpler power supply circuit design, smaller size
Logic IC	Compact exterior dimensions	Simpler IGBT drive circuit design

Transistor / Diode Application Areas

Application Examples (Flash Circuit)



Product Lineup

Application	Family	Part No.	Characteristics	Package
Power management	Power MOSFET	HAT1069C	12V, 3A, 70mΩtyp※1, 1.8V drive	CMFPAK-6
		HAT1089C	20V, 2.5A, 103mΩtyp※1, 2.5V drive	
DC/DC		HAT2217C	60V, 3.0A, 126mΩtyp※2, 4.5V drive	
		HAT2240C*	60V, 2.5A, 62mΩtyp※2, 2.5V drive	
Light-emitting circuits	IGBT	RJP4004ANS	400V, 200A, 2.5V drive	VSON-8
		RJP4003ANS	400V, 150A, 4V drive	VSON-8
		RJP4003ASA	400V, 150A, 4V drive	TSSOP-8
		RJP4002ANS	400V, 150A, 2.5V drive	VSON-8
		RJP4002ASA	400V, 150A, 2.5V drive	TSSOP-8
	Thyristor	CR05BS-8	400V, 0.1A, I_{GT}=100μA	SC-59
		CR05AS-8	400V, 0.5A, I_{GT}=100μA	SOT-89
		CR08AS-12	600V, 0.8A, I_{GT}=100μA	SOT-89
	Driver	RD5CYD08	Vcc=4-6V, I_{OH}short=-100mA(@Vcc=5.0V)	CMPAK-5
		RD3CYD08	Vcc=2.5-3.6V, I_{OH}short=-100mA(@Vcc=3.3V)	
		RD5CYDT08	Vcc=4-6V, I_{OH}short=-100mA (@Vcc=5.0V) Logic level translate function (30V CMOS Logic → 5V CMOS Logic)	

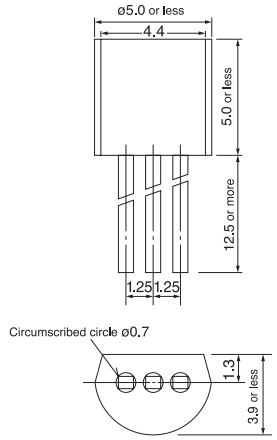
*: New product ※1. When VGS = 2.5V ※2. When VGS = 4.5V

Outline Drawings / Transistors

Package Name
Package Code

(Units : mm)

TO-92*
PRSS0003EA-A



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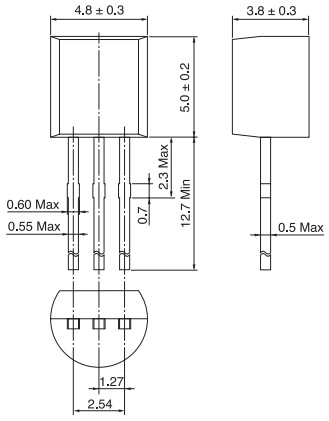
PRSS0003DA-A/PRSS0003DB-A



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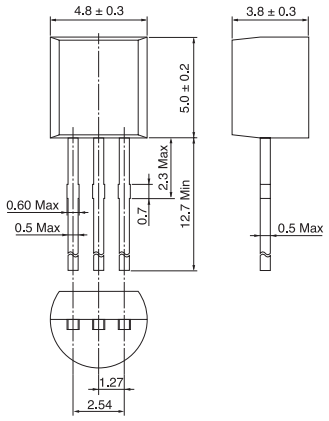

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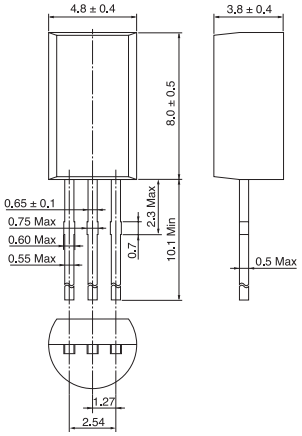

EMFPAK-6
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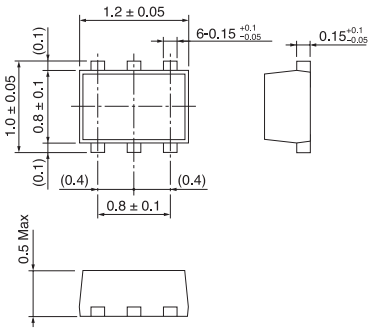

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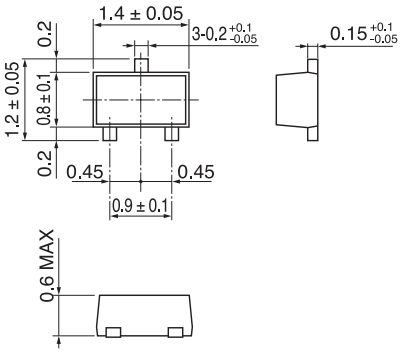

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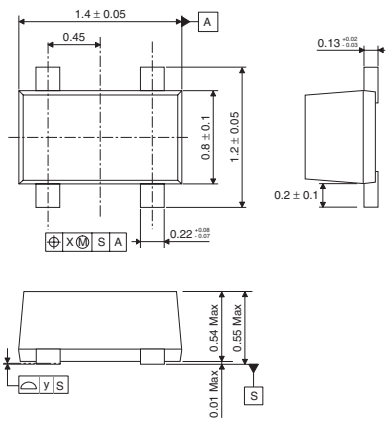

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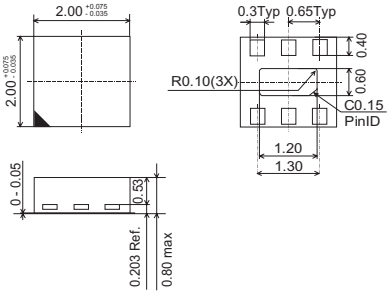

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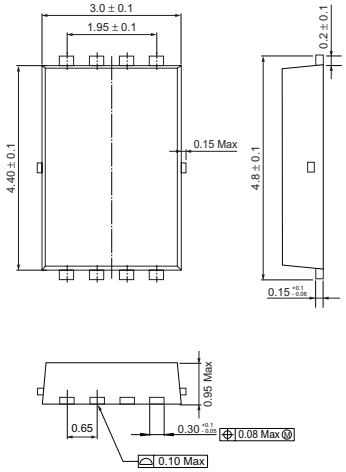


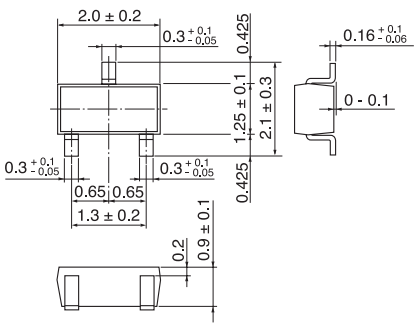
Outline Drawings

Outline Drawings / Transistors

Package Name
Package Code

(Units : mm)

CMPAK
PTSP0003ZA-A



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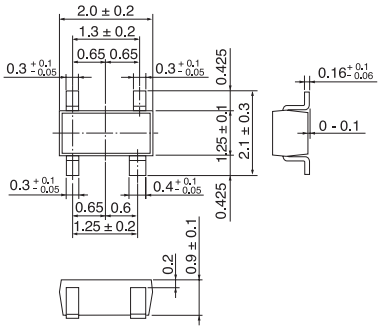

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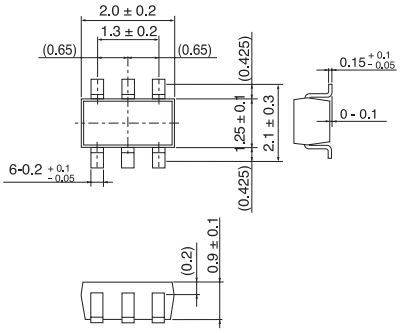

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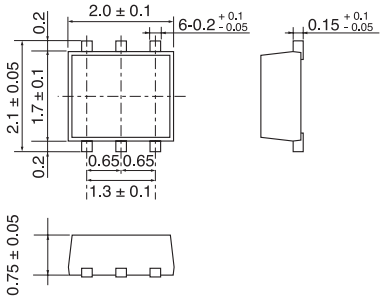

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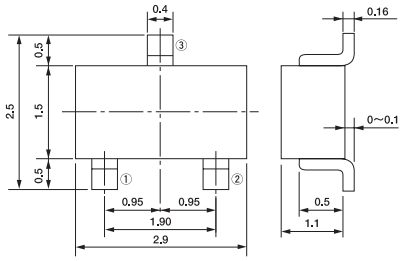

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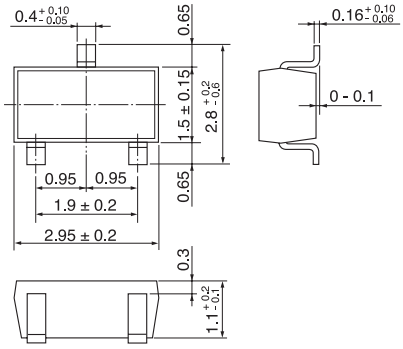

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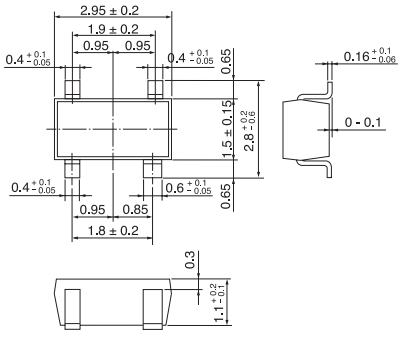

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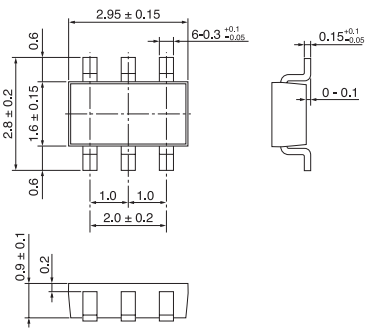
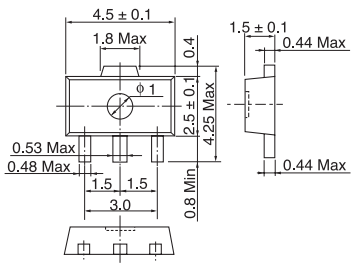


UPAK
PLZZ0004CA-A

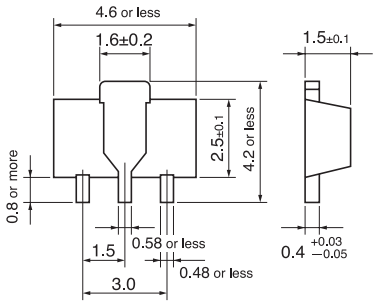


Outline Drawings

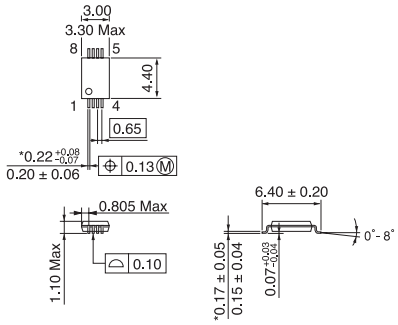
Package Name
Package Code

(Units : mm)

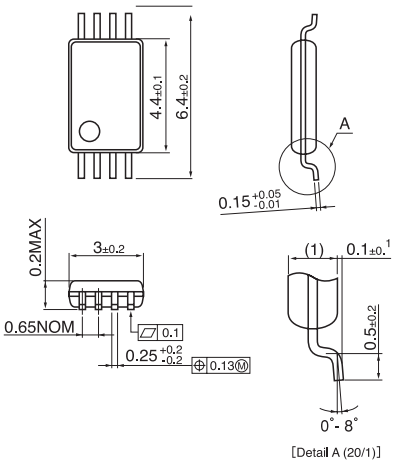
SOT-89
PLZZ0004CB-A



TTP-8D
PTSP0008JB-A

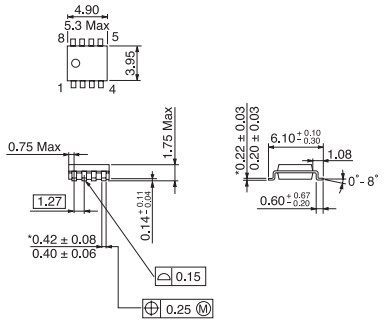


8P2J-A
PTSP0008JA-A

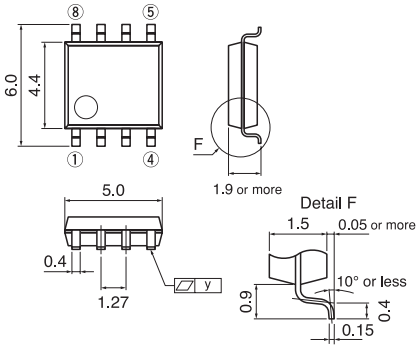


[Detail A (20/1)]

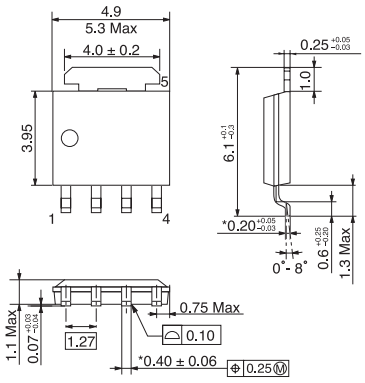
FP-8DA
PRSP0008DD-A



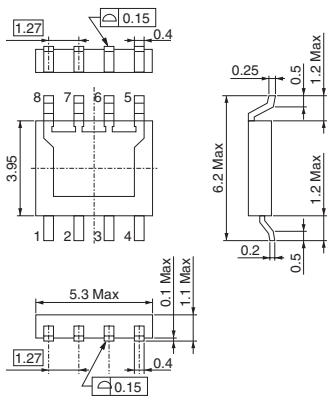
8P2S-A
PRSP0008DA-A



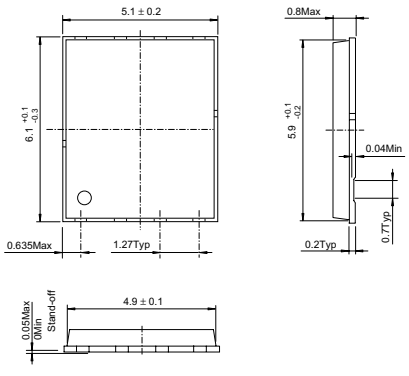
LFPAK
PTZZ0005DA-A



LFPAK-i
PTSP0008DC-A



WPAK
PWSN0008DA-A

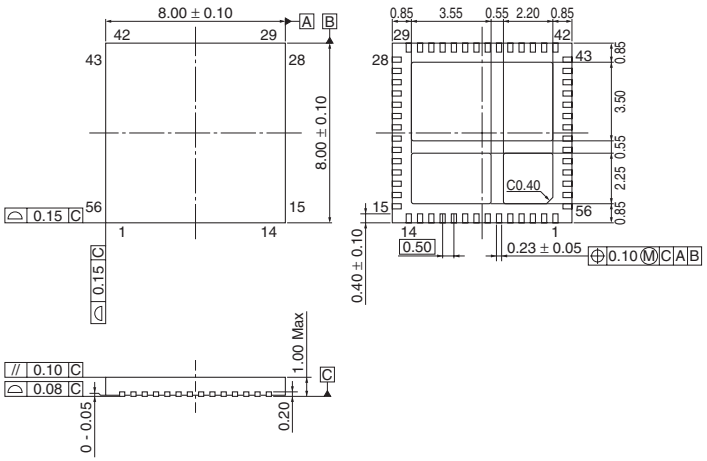


Outline Drawings / Transistors

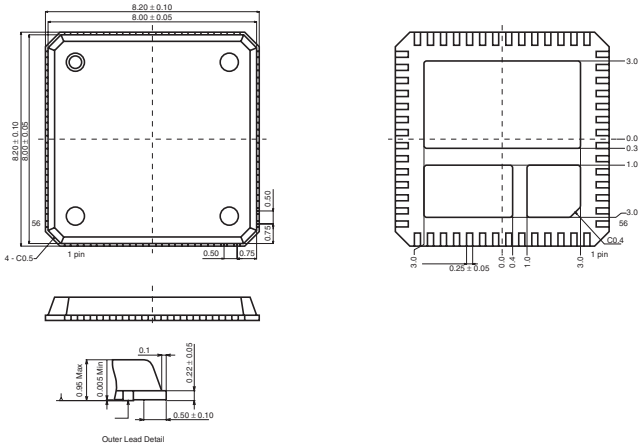
Package Name
Package Code

(Units : mm)

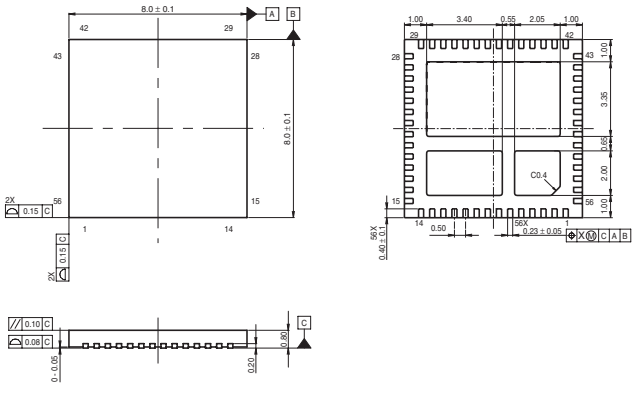
QFN56(1)
PWQN0056KA-A



QFN56(2)
PVQN0056KA-A



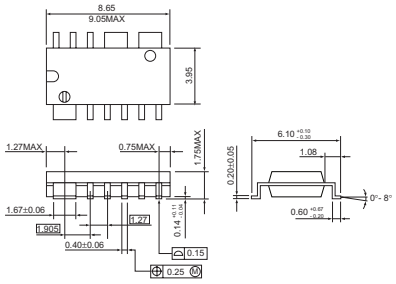
QFN56(3)
PWQN0056KB-A



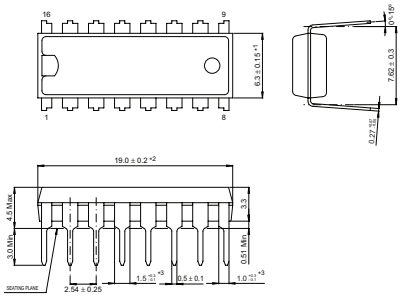
Package Name
Package Code

(Units : mm)

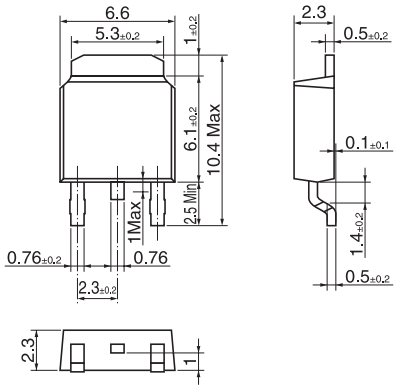
FP-11DTV
PRSP0014DE-B



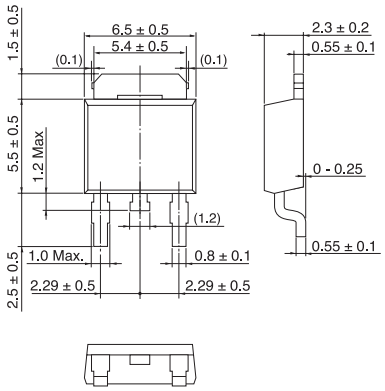
16P4
PRDP0016AA-A



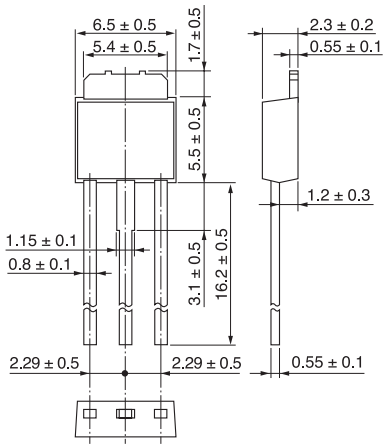
MP-3A
PRSS0004ZA-A



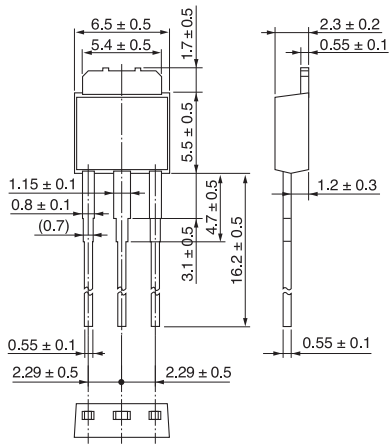
DPAK(S)
PRSS0004ZD-C



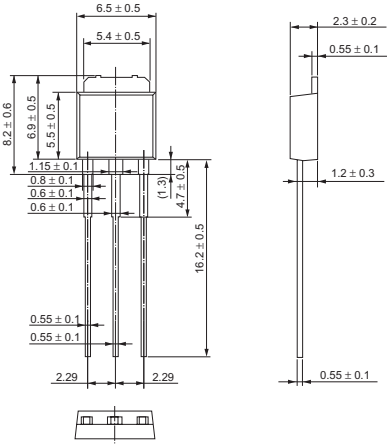
DPAK(L)-(1)
PRSS0004ZD-A



DPAK(L)-(2)
PRSS0004ZD-B



DPAK(L)-(3)
PRSS0004ZD-D



DP-8
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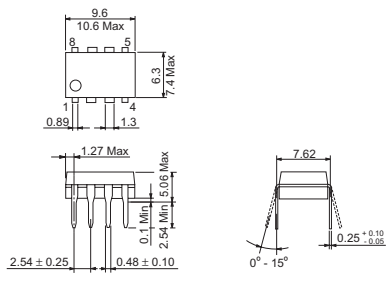
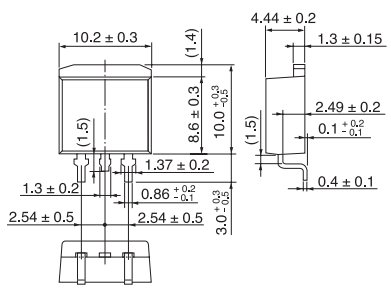


LDPAK(S)-(1)
PRSS0004AE-B

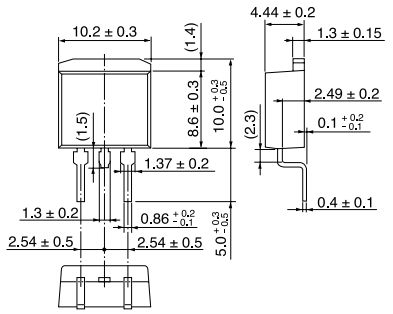


Outline Drawings / Transistors

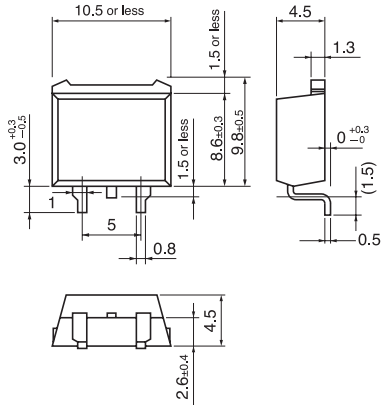
Package Name
Package Code

(Units : mm)

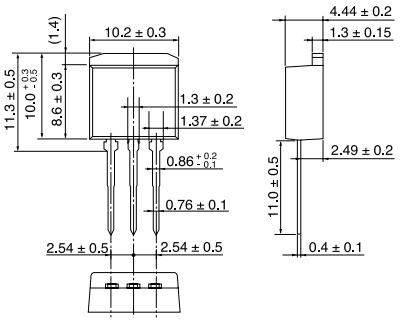
LDPAK(S)-(2)
PRSS0004AE-C



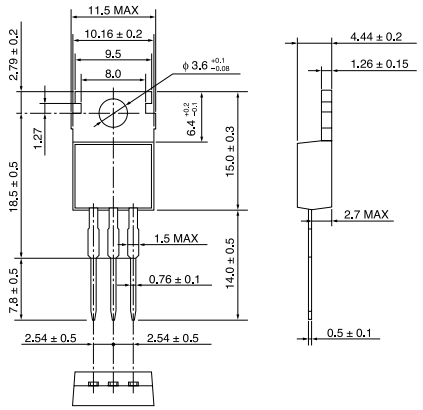
TO-220S
PRSS0004AB-A



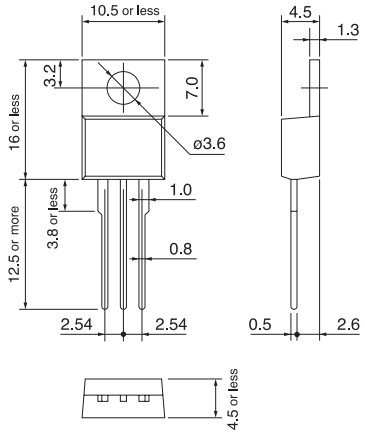
LDPAK(L)
PRSS0004AE-A



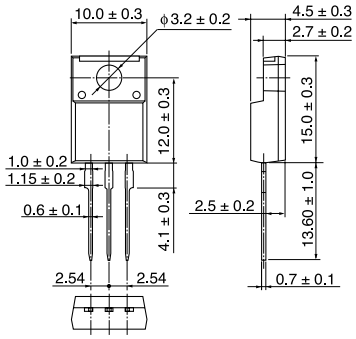
TO-220AB
PRSS0004AC-A



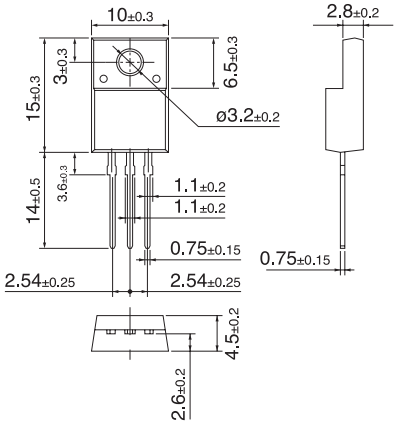
TO-220
PRSS0004AA-A



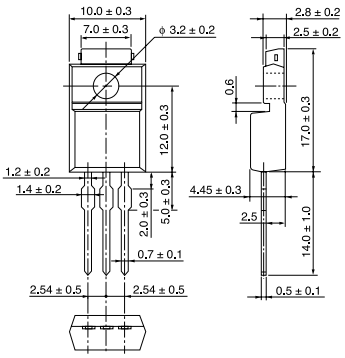
TO-220CFM
PRSS0003AE-A



TO-220FN
PRSS0003AB-A



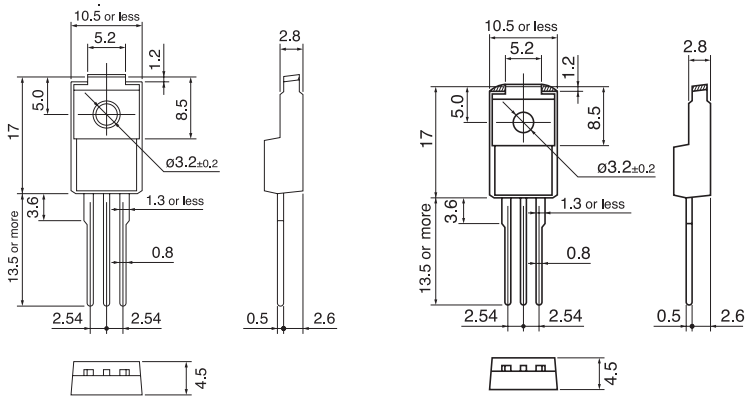
TO-220FM
PRSS0003AD-A



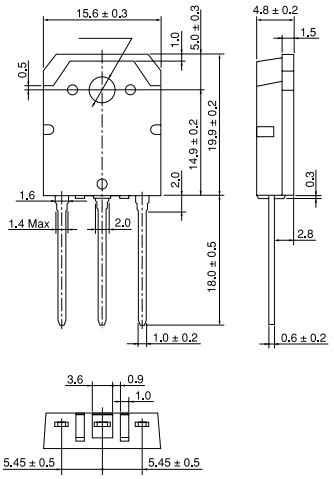
Package Name
Package Code

(Units : mm)

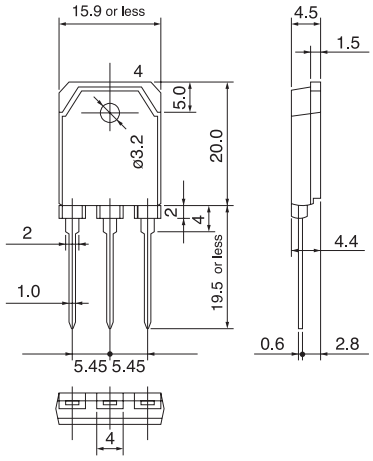
TO-220F*/TO-220F**
PRSS0003AA-A



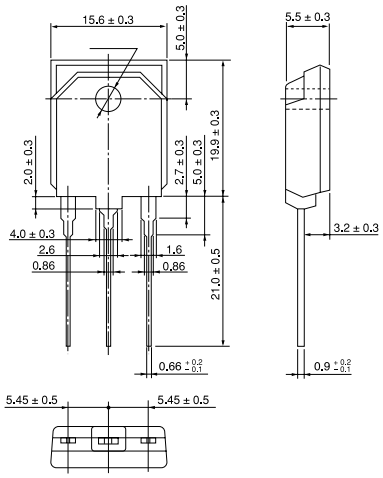
TO-3P
PRSS0004ZE-A



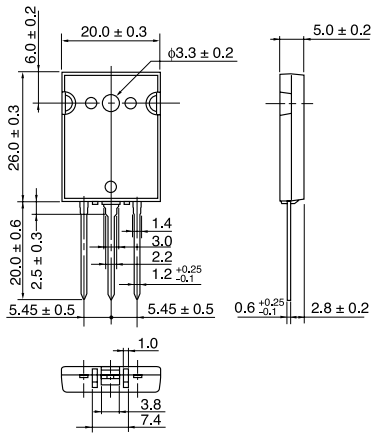
TO-3P*
PRSS0004ZB-A



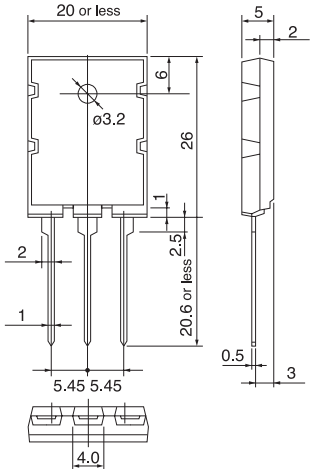
TO-3PFM
PRSS0003ZA-A



TO-3PL
PRSS0004ZF-A



TO-3PL*
PRSS0004ZC-A



RF-K-8
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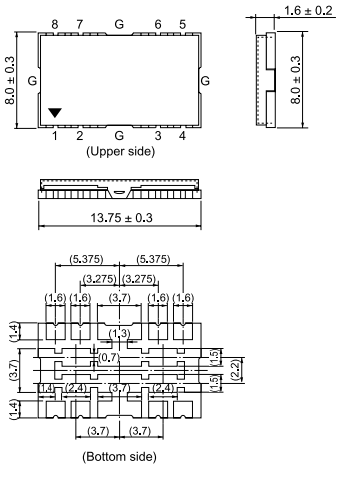
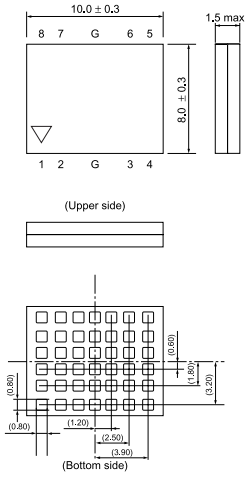


RF-Q-8
CLMR0022ZQ-A



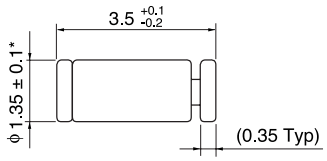
Outline Drawings

Outline Drawings / Diode

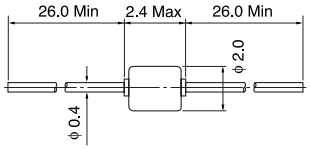
Package Name
Package Code

(Units : mm)

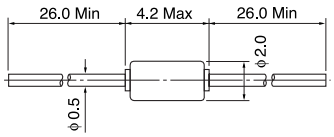
LLD
GLZZ0002ZA-A/GLZZ0002ZA-B



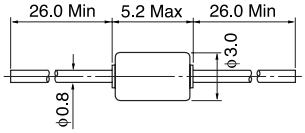
MHD
GRZZ0002ZC-A



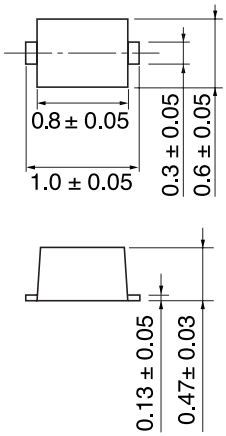
DO-35
GRZZ0002ZB-A



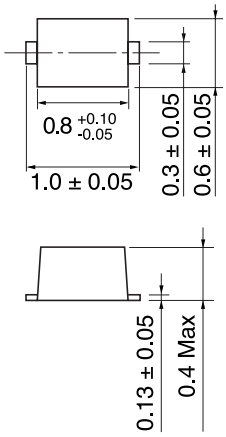
DO-41
GRZZ0002ZA-A



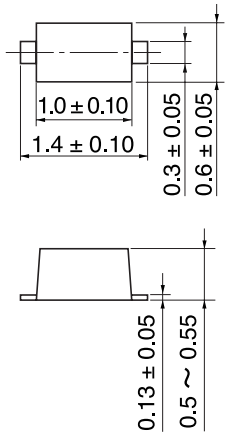
EFP
PXSF0002ZA-A



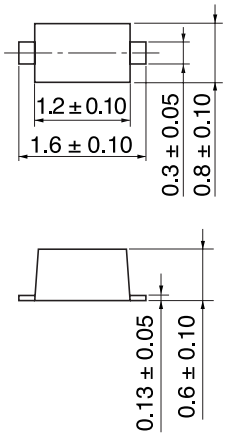
TEFP
PUSF0002ZA-A



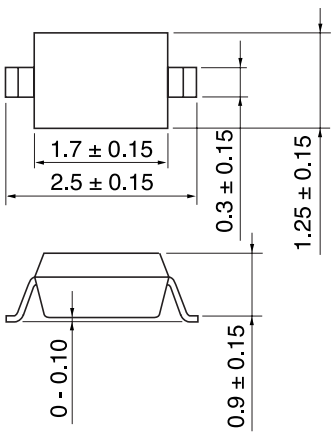
SFP
PUSF0002ZB-A



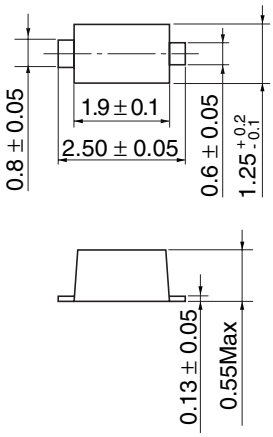
UFP
PWSF0002ZA-A



URP
PTSP0002ZA-A



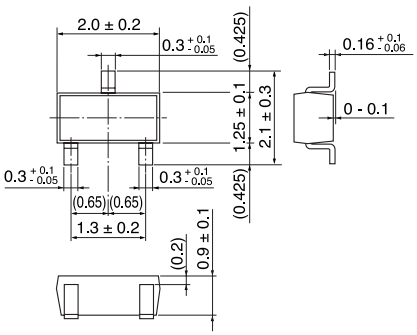
TURP
PUSF0002ZC-A



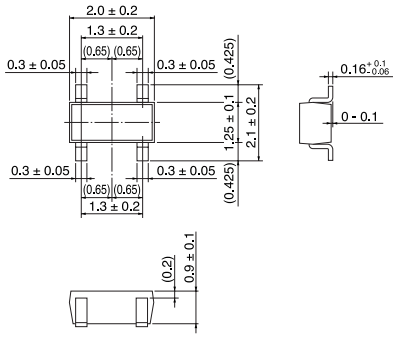
Package Name
Package Code

(Units : mm)

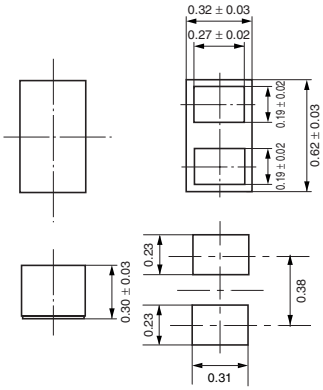
CMPAK
PTSP0003ZB-A



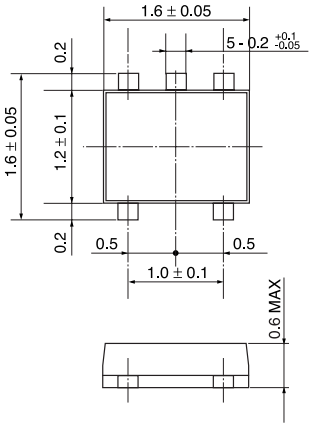
CMPAK-4
PTSP0004ZB-A



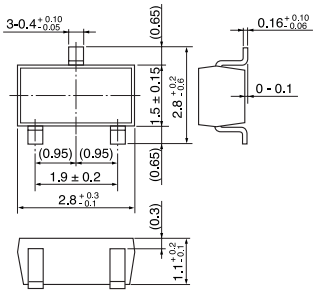
MP6
PXSN0002ZB-A



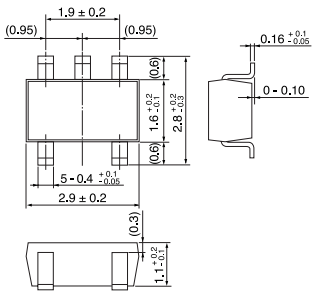
VSON-5
PUSN0005KA-A



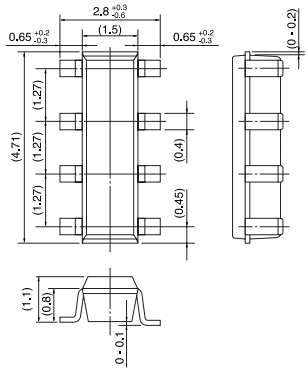
MPAK
PLSP0003ZC-A



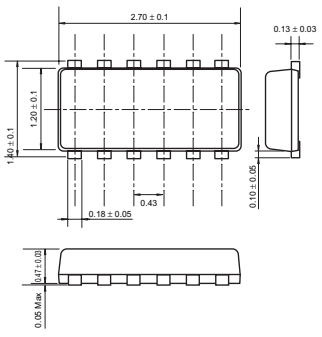
MPAK-5
PLSP0005ZC-A



MOP
PTSP0008DB-A



MFP12
PUSF0012ZA-A



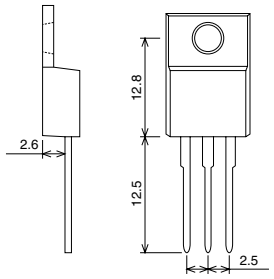
Outline Drawings

Lead Forming and Taping

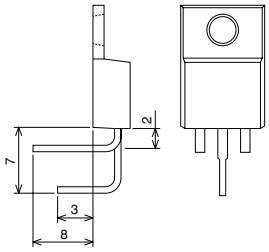
Forming

(Units : mm)

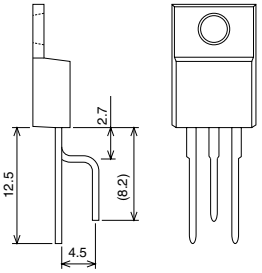
TO-220
(Standard package)



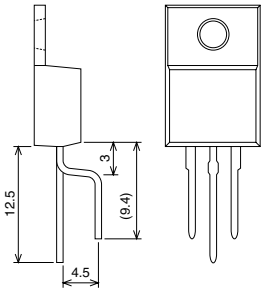
TO-220-A6



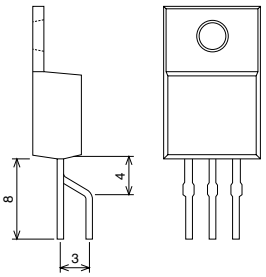
TO-220-A8



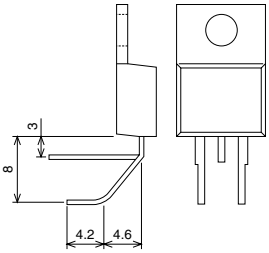
TO-220-AA



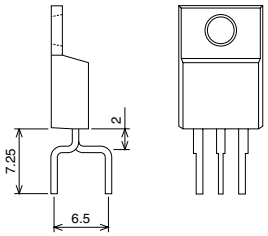
TO-220-AN



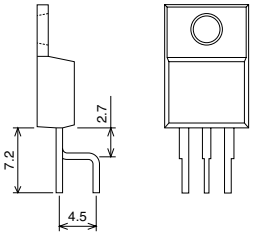
TO-220-AP



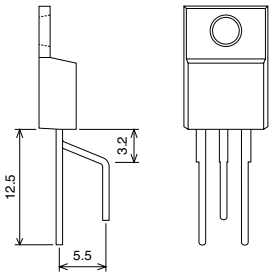
TO-220-AR



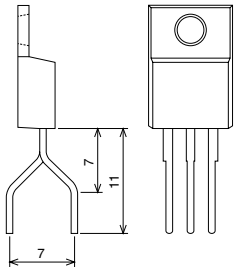
TO-220-AS



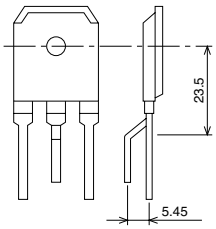
TO-220-AT



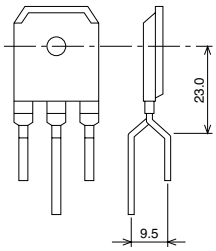
TO-220-AV



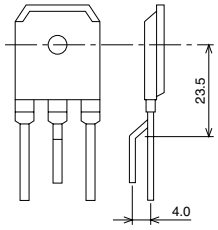
TO-3P-A8



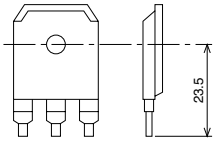
TO-3P-AB



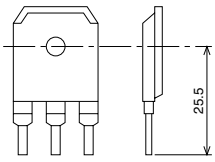
TO-3P-AN



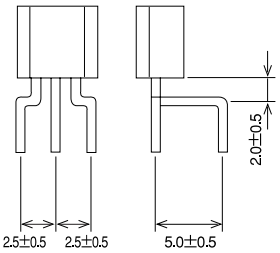
TO-3P-AV



TO-3P-AW

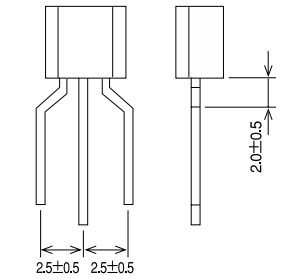


TO-92-A6
(Standard Forming package)

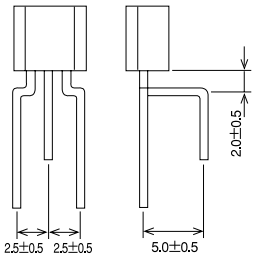


(Units : mm)

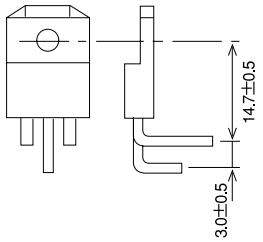
TO-92-A8
(Standard Forming package)



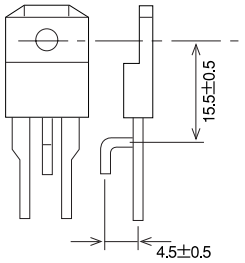
TO-92-AB
(Standard Forming package)



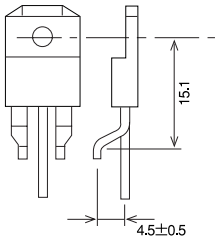
TO-220-A5
(Standard Forming package)



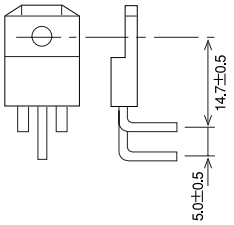
TO-220-A8
(Standard Forming package)



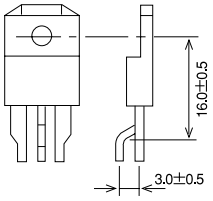
TO-220-AA
(Standard Forming package)



TO-220-AK
(Standard Forming package)



TO-220-AN
(Standard Forming package)



TO-220-AR
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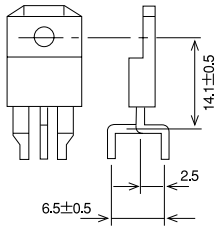
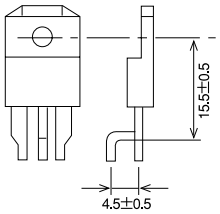
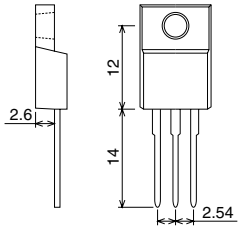


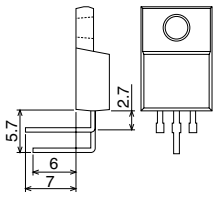
TO-220-AS
(Standard Forming package)



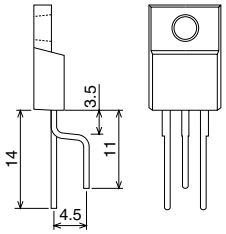
TO-220FN
(Standard package)



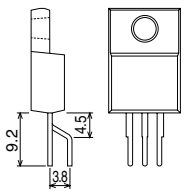
TO-220FN-A5



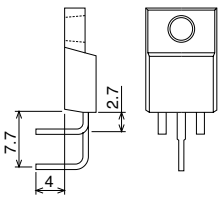
TO-220FN-A8



TO-220FN-AG



TO-220FN-AK



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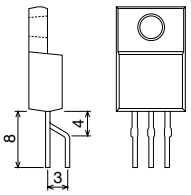
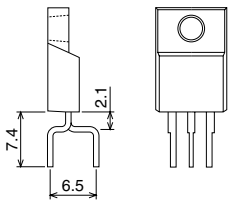
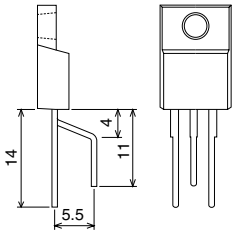


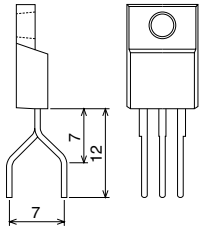
TO-220FN-AR



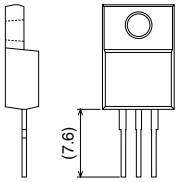
TO-220FN-AT



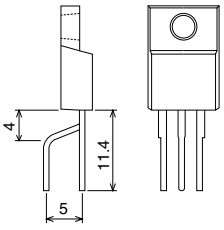
TO-220FN-AV



TO-220FN-AW



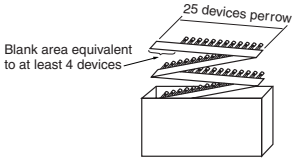
TO-220FN-AY



Lead Forming and Taping

Standard Taping Specifications

Designation	Part No. + TZ

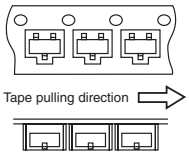


package	packing Unit	
TO-92 TO-92MOD	Zigzag box	2,500 Pcs/ Box
SPAK	Zigzag box	2,500 pcs/ Box

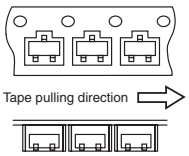
"R" of TR and UR is applied to those items which are packed face up with the marking surface positioned in the direction in which the tape can be pulled out so that the center terminal of CMPAK turns on the right side.

CMPAK / MPAK standard taping and packing specifications (Comform to JEITA standard RC-1009A)

Designation	Part No. + Mark + TR	3000 Pcs / Reel
	Part No. + Mark + UR	12000 Pcs / Reel

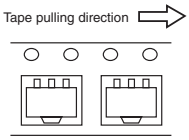


Designation	Part No. + Mark + TL	3000 Pcs / Reel
	Part No. + Mark + UL	12000 Pcs / Reel

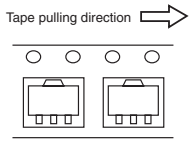


UPAK taping and packing specifications (Comform to JEITA standard RC-1009A)

Designation	Part No. + Mark + TR	1000 Pcs / Reel
	Part No. + Mark + UR	4000 Pcs / Reel

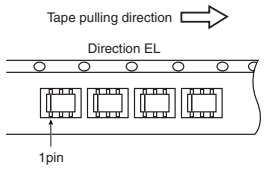


Designation	Part No. + Mark + TL	1000 Pcs / Reel
	Part No. + Mark + UL	4000 Pcs / Reel



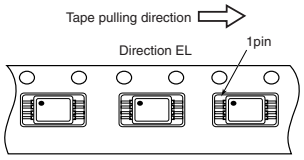
TSOP-6 taping and packing specifications

Designation	Part No. + EL	3000 Pcs / Reel



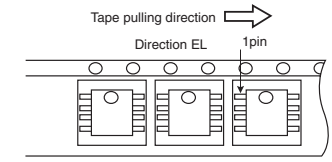
TSSOP-8 taping and packing specifications (Comform to JIS standard C0806)

Designation	Part No. + EL	3000 Pcs / Reel

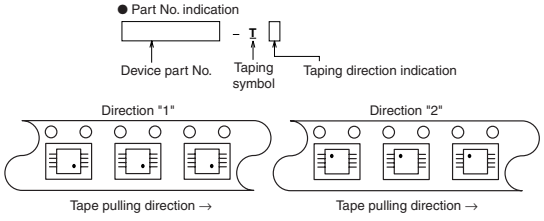


SOP-8 taping and packing specifications (Comform to JIS standard C0806)

Designation	Part No. + EL	2500 Pcs / Reel

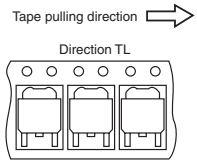


TSSOP-8 / SOP-8 (Packing Unit: 3000 Pcs/ Reel)

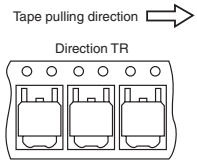


DPAK / LDPAK taping and packing specifications (Comfprm to JEITA standard RC-1009B)

Designation	Part No. + TL	DPAK : 3000 Pcs / Reel DPAK : 1000 Pcs / Reel

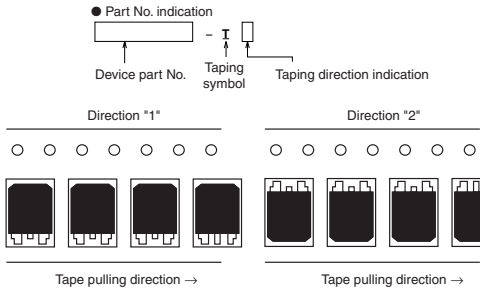


Designation	Part No. + TR	LDPAK : 3000 Pcs / Reel LDPAK : 1000 Pcs / Reel



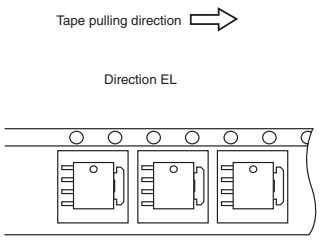
TLが標準仕様です。TRについてはご要望に応じて個別対応いたします。
TL is the standard spec. For TR, we will support individually if there is any request.

TO-220S (Packing Unit: 1000 Pcs/ Reel)



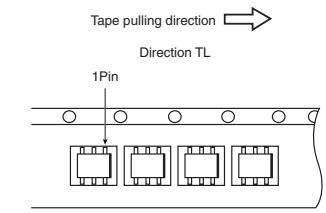
LFPAK taping and packing specifications

Designation	Part No. + EL	2500 Pcs / Reel

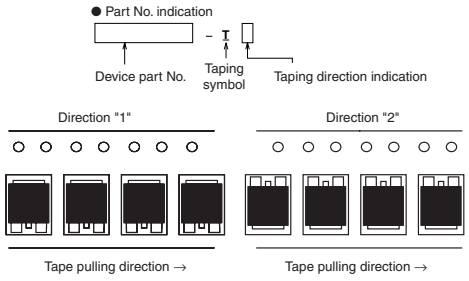


CMPAK-6 taping and packing specifications

Designation	Part No.+ TL(CMPAK-6)	3000Pcs / Reel
	Part No.+EL(CMFPAK-6)	



MP-3 (Packing Unit: 3000 Pcs/ Reel)



Standard Taping Specification

Emboss Taping Reel Pack

Package	Packing Unit	Name	Packing Configurations
URP	3,000	Part No.+TL[H]/TR[P]	Emboss TAPING REEL PACK (Conforming to JEITA standard RC-1009B) 8mm emboss tape (Tape equivalent to JEITA type TE84F)
MPAK CMPAK CMPAK-4	3,000	Part No.+TL[H]/TR[P]	
MPAK-5 VSON-5	3,000	Part No.+TL[H]/TR[P]	
LLD	2,500	Part No.+TL[H]/TR[P]	
UFP (TURP)	4mm pitch 4,000	Part No.+TR(TRF)[P]	
	2mm pitch 8,000	Part No.+KR(KRF)[R]	
SFP	2mm pitch 8,000	Part No.+KR[R]	
EFP MP6	2mm pitch 10,000	Part No.+KR[R]	
MFP12	4mm pitch 4,000	Part No.+TR[P]	
MOP	3,000	Part No.+TL[H]/TR[P]	12mm emboss tape

Note) TR is recommended for emboss taping and reel specification.
• Characters in [ ] in Name column are new codes.

Taping Pulling Direction

Package	Taping Code	Appearance
URP LLD MOP	TR[P] (Taping to Right)	TR Pulling direction →
UFP (TURP)	TR[P] (Taping to Right) (TRF)	TR Pulling direction →
	KR[R] (KRF)	KR Pulling direction →
SFP EFP MP6	KR[R]	KR Pulling direction → SFP/EFP MP6
MPAK CMPAK CMPAK-4 MPAK-5 MFPAK VSON-5	TR[P] (Taping to Right)	TR Pulling direction → MPAK/CMPAK/MFPAK CMPAK-4 MPAK-5/CMPAK-5/VSON-5
MFP12	TR[P] (Taping to Right)	TR Pulling direction →

Characters in [ ] in Taping Code column are new codes.

Taping of URP package takes the following symbols according to quantity in 1 reel, group, and other items.

Taping code	TRF[P]	TRU[P]	TRV[P]
Taping direction	TR[P]	TR[P]	TR[P]
Quantity of maximum category in 1 reel	—	4	
Quantity in 1 reel	3000 pcs		
Grouping	—	10 pcs or more	
End of group	—	4 spaces	Non-reflection tape on 1 space
Note	—	C.C system*	

*. Continuous Connected taping system of variable capacitance diode.
**. Please contact our sales office if you need the TL type.

Taping of UFP/SFP package takes the following symbols according to quantity in 1 reel, group, and other items. (SFP Package only KR※ taping)

Taping code	TRF[P]	TRU[P]	TRV[P]	KRF[R]	KRU[R]	KRV[R]
Taping direction	TR[P]			KR[R]		
Quantity of maximum category in 1 reel	—	5 max.		—	10 max.	
Quantity in 1 reel	4000 pcs			8000 pcs		
Grouping	—	10 pcs or more		—	10 pcs or more	
End of group	—	9 spaces	1space+ Non-reflection tape on 1space+1space	—	4 spaces	Non-reflection tape on 1 space
Note	—	C.C system*		—		C.C system*

*. Continuous Connected taping system of variable capacitance diode

Products Lineup / Transistors

Please check latest data by web site.

High Frequency Power MOS FET

High Frequency Power Amplification

Package	Part No.	Ratings		Characteristics			
		V_{DSS} (V)	I_D (A)	Pout (dBm) typ			
					f (MHz)	Pin (dBm)	V_{DD} (V)
UPAK	2SK2596	17	0.4	31.5	836.5	18	12
	2SK3391	17	0.3	33	836	14	13.7
	RQA0004	16	0.3	29.5	520	13	6
	RQA0005	16	0.8	33	520	20	6
	RQA0008	16	2.4	36	520	20	6
	RQA0009	16	3.1	38	520	25	6
RP8P	2SK2595	17	1.1	38.4	836.5	29.5	12
	2SK3390	17	1	38.7	836	21	13.7
WSON 0303-2	RQA0001	16	0.8	33	520	20	6.0
	RQA0003	16	2.4	35	520	20	6.0
WSON 0504-2	RQA0002	16	3.8	38.7	520	25	7.5

Small Signal FET

High Frequency Amplification (Twin BBFET)

Package	Part No.	Ratings		Characteristics (FET-1)				Characteristics (FET-2)			
		VDS (V)	ID (A)	Ciss (pF) typ	|yfs| (mS) typ	NF (dB) typ	f (GHz)	Ciss (pF) typ	|yfs| (mS) typ	NF (dB) typ	f (GHz)
CMPAK-6	TBB1002	6	30 m	1.8	26	1.7	0.9	2.6	25	1.2	0.2
	TBB1004	6	30 m	1.8	26	1.7	0.9	2.7	32	1.2	0.2
	TBB1005	6	30 m	1.8	26	1.7	0.9	2.6	25	1.2	0.2
	TBB1010	6	30 m	2.1	29	1.1	0.2	2.1	29	1.1	0.2
	TBB1012	6	30 m	1.6	32	1.95	0.9	2.7	30	0.95	0.2
	TBB1016	6	30 m	2.2	35	1	0.2	2.2	35	1	0.2

High Frequency Amplification

Package	Part No.	Ratings		Characteristics			
		VDS (V)	ID (A)	Ciss (pF) typ	PG (dB) typ	NF (dB) typ	f (GHz)
CMPAK	2SK1215	20	30 m	2.5	30	2.0	0.1
CMPAK-4	3SK318	6	20 m	1.6	21	1.4	0.9
	3SK324	6	20 m	1.2	24	0.9	0.9
	BB501C	6	20 m	1.7	21.5	1.8	0.9
	BB502C	6	20 m	1.7	22	1.6	0.9
	BB503C	6	20 m	1.7	22	1.8	0.9
	BB505C	6	30 m	1.75	24	1.5	0.9
	BB301C	6	25 m	3.0	26	1.3	0.2
	BB504C	6	30 m	2.1	22	1.75	0.9
	BB506C	6	30 m	1.5	24	1.3	0.9
	3SK296	12	25 m	1.5	19.5	2.0	0.9
	3SK298	12	25 m	2.9	25	1.0	0.2
	BB304C	12	25 m	2.8	29	1.2	0.2
	BB305C	12	25 m	2.8	28	1.3	0.2
	3SK317	14	25 m	3.1	27.6	1.0	0.2

Package	Part No.	Ratings		Characteristics			
		VDS (V)	ID (A)	Ciss (pF) typ	PG (dB) typ	NF (dB) typ	f (GHz)
MPAK	2SK360	20	30 m	2.5	30	2.0	0.1
MPAK-4	3SK319	6	20 m	1.6	21	1.4	0.9
	3SK323	6	20 m	1.2	24	0.9	0.9
	BB502M	6	20 m	1.7	22	1.6	0.9
	BB503M	6	20 m	1.7	22	1.8	0.9
	BB505M	6	30 m	1.75	24	1.5	0.9
	BB301M	6	25 m	3.0	26	1.3	0.2
	BB504M	6	30 m	2.1	22	1.75	0.9
	3SK295	12	25 m	1.5	19.5	2.0	0.9
	3SK297	12	25 m	2.9	25	1.0	0.2
	BB302M	12	25 m	3.0	26	1.7	0.2
	BB305M	12	25 m	2.8	28	1.4	0.2
	3SK300	14	25 m	3.1	27.6	1.0	0.2

Small Signal Transistors

High Frequency Amplification

Package	Part No.	Ratings		Characteristics			
		VCEO (V)	IC (A)	fT (GHz) typ	NF (dB) typ	NF (dB) f (GHz)	Cob (pF) max
TO-92(2)	2SC1906	19	50 m	1.0	—	—	2.0
	2SC1907	19	50 m	1.1	—	—	2.0
MFPAK (1408)	2SC5700	4	50 m	12	1.0	0.9	0.7
	2SC5543	8	20 m	8.5	1.1	0.9	0.9
	2SC5555	8	50 m	9	1.1	0.9	0.85
CMPAK	2SC4965	8.0	100 m	—	—	—	1.6
	2SC4901	9.0	50 m	9.0	1.2	0.9	1.4
	2SC4264	11	50 m	3.5	—	—	1.5
	2SC4537	11	50 m	6.0	1.6	0.9	1.5
	2SC4260	13	50 m	3.8	—	—	1.3
	2SC4261	15	50 m	2.4	—	—	1.0
	2SC4265	20	50 m	1.2	—	—	1.5
CMPAK-4	2SC5624	3.5	35 m	28	1.2	1.8	0.6
	2SC5820	4	35 m	20	1.2	1.8	0.6
	2SC5594	4.5	35 m	24	1.2	1.8	0.6
	2SC5081	8.0	50 m	13.5	1.1	0.9	0.75
MPAK	2SC5773	6	80 m	10.8	1.1	0.9	1.8
	2SC5772	9	75 m	9	1.1	0.9	1.5
	2SC2734	11	50 m	3.5	—	—	1.5
	2SC3127	12	50 m	4.5	2.2	0.9	1.5
	2SC5890	12	75 m	7.8	1.0	0.9	1.5
	2SC4197	13	50 m	3.8	—	—	1.3
	2SC2620	20	20 m	0.94	—	—	1.2
	2SC2735	20	50 m	1.2	—	—	1.5
MPAK-4	2SC5545	6.0	50 m	13	1.1	0.9	1.1
	2SC4926	8.0	50 m	11	1.1	0.9	1.1
UPAK	2SC5631	6.0	80 m	11	1.2	0.9	2.2
	2SC4988	9.0	100 m	8.5	1.3	0.9	1.6
	2SC4807	15	200 m	4.4	2.5	0.9	4.0

High Frequency Power Amplification

Package	Part No.	Ratings		Characteristics			
		VCEO (V)	IC (A)	Pout (dBm) typ			
					f (GHz)	Pin (dBm)	Vcc (V)
MPAK	2SC5998	5	500 m	29	0.5	16	3.6
TNP-6DTV	2SC5945	5	500 m	27	2.4	20	3.3

Small Signal Transistors

General Amplification (JFET)

Package	Part No.	Ratings			Characteristics	
		V_{DS} (V_{DSX}) (V)	V_{GSS} (V_{GSO}) (V)	I_D (I_G) (A)	|yfs| (mS) min	I_{DSS} (mA)
TO-92(2)	2SK435	22	—	0.1	20	6~40
MPAK	2SK1070	—	(-22)	50 m	20	6~40

μ-FET Series (Small Signal Switching)

Package	Part No.	V_{DSS} (V)	I_D (A)	R_{DS} (on) (Ω) V_{GS} = 10V typ	V_{GS} = 10V max	V_{GS} = 4V typ	V_{GS} = 4V max	V_{GS} = 2.5V typ	V_{GS} = 2.5V max	Ciss (pF)
MPAK	2SJ574	-30	-0.3	1.1	1.3	2.2	3.1	—	—	50
	2SK3288	30	0.1	2.7	3.5	4.7	7.0	—	—	3
	2SK3287	30	0.3	1.26	1.44	2.8	3.44	—	—	6
	2SK3290	30	0.5	0.46	0.525	0.9	1.25	—	—	5

Package	Part No.	V_{DSS} (V)	I_D (A)	R_{DS} (on) (Ω) V_{GS} = 10V typ	V_{GS} = 10V max	V_{GS} = 4V typ	V_{GS} = 4V max	V_{GS} = 2.5V typ	V_{GS} = 2.5V max	Ciss (pF)
CMPAK	2SJ586	-20	-0.1	—	—	4.1	5.0	6.0	8.5	28
	2SJ576	-30	-0.1	2.8	3.3	5.7	7.9	—	—	25
	2SK3348	20	0.1	—	—	1.6	1.9	2.2	3.2	18
	2SK3378	30	0.1	2.7	3.5	4.7	7.0	—	—	1.6
	2SK3289	30	0.3	1.26	1.44	2.8	3.44	—	—	6

General Amplification (Bip Transistor)

Package	Part No.	Ratings		Characteristics	
		V_{CEO} (V)	I_C (A)	h_{FE}	V_{CE} (sat) (V) max
UPAK	2SB1001	-16	-2.0	160~320	-0.3
	2SB1002	-50	-1.0	160~320	-0.6
	2SB1025	-80	-1.0	100~200	-1.0
	2SB1026	-100	-1.0	100~200	-1.0
	2SB1028	-160	-1.5	100~200	-1.0
	2SD1974	25	0.8	250~1200	0.4
	2SD1368	50	1.0	160~500	0.3
	2SD1418	80	1.0	60~200	1.0
	2SD1419	100	1.0	100~200	1.0
	2SD1421	160	1.5	60~120	1.0
	2SC3380	300	0.1	30~200	1.5
MPAK	2SB831	-20	-0.7	120~240	-0.5
	2SA1052	-30	-0.1	160~500	-0.2
	2SA1121	-35	-0.5	100~320	-0.6
	2SB1691	-50	-1	200~500	-0.3
	2SA1122	-55	-0.1	160~500	-0.5
	2SA1566	-120	-0.1	250~800	-0.15
	2SD1306	15	0.7	250~800	0.5
	2SC2618	35	0.5	100~320	0.6
	2SC2462	40	0.1	100~500	0.2
	2SC2463	50	0.1	400~800	0.5
	2SD2655	50	1	200~500	0.3
	2SC4050	120	0.1	250~800	0.1
	2SC4702	300	50 m	60~150	0.5
CMPAK	2SC5850	40	100 m	160~320	0.2

Package	Part No.	Ratings		Characteristics	
		V_{CEO} (V)	I_C (A)	h_{FE}	V_{CE} (sat) (V) max
TO-92(1)	2SA673	-35	-0.5	60~320	-0.6
	2SA673A	-50	-0.5	60~320	-0.6
	2SA1084	-90	-0.1	400~800	-0.2
	2SA1188	-90	-0.1	400~800	-0.15
	2SA1190	-90	-0.1	250~800	-0.15
	2SA1085	-120	-0.1	400~800	-0.2
	2SD655	15	0.7	250~1200	0.5
	2SD467	20	0.7	85~240	0.5
	2SC1213	35	0.5	100~320	0.6
	2SC1213A	50	0.5	60~320	0.6
	2SC1214	50	0.5	100~320	0.6
	2SC2545	60	0.1	400~1200	0.2
	2SC2546	90	0.1	600~1200	0.2
	2SC2853	90	0.1	400~800	0.1
	2SC2547	120	0.1	400~800	0.2
TO-92 MOD	2SB562	-20	-1.0	120~240	-0.5
	2SD468	20	1.0	120~240	0.5
	2SD789	50	1.0	160~800	0.3
	2SD974	60	1.0	150~	0.3
	2SD667	80	1.0	100~320	1.0
	2SD667A	100	1.0	60~200	1.0
	2SC2610	300	0.1	30~200	1.5

General Switching (Darlington Transistors)

Package	Part No.	Ratings		Characteristics	
		V_{CEO} (V)	I_C (A)	h_{FE}	toff (μs) typ
TO-92(1)	2SC1472(K)	30	0.3	2 k~100 k	0.8
TO-92 MOD	2SD1209(K)	60	1.0	4 k~	—

Package	Part No.	Ratings		Characteristics	
		V_{CEO} (V)	I_C (A)	h_{FE}	toff (μs) typ
UPAK	2SD1470	60	1.0	2 k~100 k	—
	2SD1472	120	1.5	2 k~30 k	2.0

Overseas Sales Only

General Amplification (Small Signal Transistors)

Package	Part No.	Ratings		Characteristics	
		V_{CEO} (V)	I_C (A)	h_{FE}	V_{CE} (sat) (V) max
TO-92(1)	H8550	-20	-0.7	60 to 240	-0.5
	HIT8550	-20	-0.7	60 to 240	-0.5
	H8050	20	0.7	20 to 240	0.5
	HIT8050	20	0.7	20 to 240	0.5
	H945	50	0.2	135 to 600	0.25

Package	Part No.	Ratings		Characteristics	
		V_{CEO} (V)	I_C (A)	h_{FE}	V_{CE} (sat) (V) max
TO-92 MOD	HIT5610	-20	-1.0	60 to 240	-0.5
	HIT5609	20	1.0	60 to 240	0.5
	HIT647	-120	-1.0	140 to 350	-0.5
	HIT667	120	1.0	140 to 330	0.5
	HIT562	-45	-1.0	85 to 330	-0.5
	HIT468	45	1.0	85 to 330	0.5

Power MOS FET

General Switching

Package	Part No.	Ratings		Characteristics		
		V_{DSS} (V)	I_D (A)	R_{DS} (on) (Ω) max 4 V (4.5V)	R_{DS} (on) (Ω) max 10 V (2.5V) [1.5V]	Ciss (pF) typ
TO-92(1)	2SK1336	60	0.3	2.5	1.7	33
	2SK1337	100	0.3	6.5	4.5	35
TO-92 MOD	2SJ386	-30	-3.0	0.8	0.4	177
	2SJ483	-30	-5.0	0.17	0.11	630
	2SJ496	-60	-5	0.24	0.16	600
	2SK975	60	1.5	0.55	0.4	140
	2SK2851	60	5	0.1	0.07	500
	2SK2085	100	1	1.35	0.9	130
MPAK	2SJ451	-20	-0.2	3.5	(9)	2.4
	RQJ0204XGDQA	-20	-1.6	(0.280)	(0.510)	150
	RQJ0203WGDQA	-20	-2.1	(0.180)	(0.300)	200
	RQJ0202VGDQA	-20	-2.7	(0.105)	(0.170)	350
	RQJ0201UGDQA	-20	-3.5	(0.065)	(0.105)	600
	2SJ399	-30	-0.2	5.0	3.0	1.1
	2SJ486	-30	-0.3	0.65	(1.2)	45
	RQJ0302NGDQA	-30	-2.2	(0.303)	0.173	195
	RQJ0303PGDQA	-30	-3.3	(0.107)	0.068	625
	RQJ0602EGDQA	-60	-1.1	(0.854)	0.613	145
	RQJ0603LGDQA	-60	-1.8	(0.275)	0.198	440
	2SK2570	20	0.2	1.1	(2.2)	45
	RQK0204TGDQA	20	2.3	(0.140)	(0.210)	140
	RQK0203SGDQA	20	2.9	(0.090)	(0.150)	160
	RQK0202RGDQA	20	3.8	(0.055)	(0.085)	300
	RQK0201QGDQA	20	4.7	(0.035)	(0.055)	500
	2SK2373	30	0.2	7.5	7	17.8
	2SK2980	30	1.0	0.28	(0.5)	155
	RQK0302GGDQA	30	2.7	(0.171)	0.115	175
	RQK0303MGDQA	30	3.7	(0.070)	0.053	550
	2SK3000	40	1	0.5	0.3	14
	2SK2569	50	0.2	2.6	(5)	14

Note) [D] : Dual chips included

Package	Part No.	Ratings		Characteristics		
		V_{DSS} (V)	I_D (A)	R_{DS} (on) (Ω) max 4 V (4.5V)	R_{DS} (on) (Ω) max 10 V (2.5V) [1.5V]	Ciss (pF) typ
MPAK	RQK0606KGDQA	60	1.5	(0.225)	(0.29)	200
	RQK0603CGDQA	60	2.0	(0.348)	0.265	130
	RQK0604IGDQA	60	2.0	(0.144)	(0.18)	320
	RQK0605JGDQA	60	3.1	(0.131)	0.103	405
UPAK	2SJ244	-12	-2.0	0.5*	(0.9)	130
	2SJ317	-12	-2.0	0.35	0.7 (-2.2V)	63
	2SJ517	-20	-2.0	0.24	(0.43)	320
	2SJ484	-30	-2.0	0.45	0.23	230
	RQJ0301HGDQS	-30	-5.2	(0.079)	0.048	845
	2SJ278	-60	-1.0	1.2	0.83	160
	RQJ0602EGDQS	-60	-1.5	(0.868)	0.607	135
	2SJ518	-60	-2.0	0.63	0.46	220
	RQJ0601DGDQS	-60	-2.8	(0.210)	0.155	590
	2SJ186	-200	-0.5	—	12	75
	2SK1579	12	2.0	0.35	0.7 (2.2V)	110
	2SK2978	20	2.5	0.12	(0.2)	260
	2SK1772	30	1.0	0.85	0.6	85
	RQK0302GGDQS	30	3.8	(0.150)	0.102	170
	RQK0301FGDQS	30	6.0	(0.049)	0.035	750
	2SK1697	60	0.5	2.5	1.7	33
	2SK1764	60	2.0	0.6	0.45	140
	2SK2315	60	2.0	0.45	0.6 (3V)	173
	2SK2788	60	2.0	0.25	0.16	180
	RQK0603CGDQS	60	2.8	(0.336)	0.257	130
	RQK0601AGDQS	60	5.0	(0.091)	0.070	540
	2SK1334	200	1.0	—	3.8	80
WSON 0303-6	RQM2201DNS [D]	60	2.0	(0.225)	(0.29)	200

Power MOS FET

General Switching

Package	Part No.	Ratings VDSS (V)	Ratings ID (A)	Charactristics RDS (on) (Ω) max 4 V (4.5V)	Charactristics RDS (on) (Ω) max 10 V (2.5V) [1.5V]	Charactristics Ciss (pF) typ
TO-92 MOD	H7P1001MD	-100	-1.1	1.1	-0.8	400
	H7P1006MD	-100	-1.8	(0.22)	0.18	2350
	H7N1009MD	100	2	(0.18)	0.13	820
	2SK3446	150	1	1.95	(2.5)	95
	2SK3447	150	1	2.5	1.95	85
	2SK4093	250	1	2.6	(2.7)	140
	RJK6011DJE	600	0.1	—	52	25
	RJK6022DJE	600	0.2	—	15	84
DPAK(L)-(1)/(S)	2SJ527(L)/(S)	-60	-5	0.8	0.4	220
	2SJ319(L)/(S)	-200	-3.0	—	2.3	330
	2SJ130(L)/(S)	-300	-1.0	—	8.5	235
	2SJ181(L)/(S)	-600	-0.5	—	25	220
	2SK2796(L)/(S)	60	5	0.25	0.16	180
	2SK1299(L)/(S)	100	3.0	0.45	0.35	400
	2SK1254(L)/(S)	120	3.0	0.55	0.4	420
	2SK1838(L)/(S)	250	1.0	—	8	60
	2SK1151(L)/(S)	450	1.5	—	5.5	160
	2SK1152(L)/(S)	500	1.5	—	6	160
	2SK1880(L)/(S)	600	1.5	—	8	250
DPAK(L)-(2)/(S)	2SJ387(L)/(S)	-20	-10	0.07	(0.10)	1170
	2SJ506(L)/(S)	-30	-10	0.18	0.085	630
	2SJ528(L)/(S)	-60	-7	0.37	0.22	400
	2SJ529(L)/(S)	-60	-10	0.24	0.16	580
	2SJ530(L)/(S)	-60	-15	0.16	0.1	850
	H7P0601DL/DS	-60	-20	(0.085)	0.05	2200
	H7P1002DL/DS	-100	-15	0.15	0.105	2600
	2SK2084(L)/(S)	20	7.0	0.075	0.053	800
	2SK2329(L)/(S)	30	10	0.04	(0.06)	1250
	2SK2735(L)/(S)	30	20	0.05	0.028	750
	2SK3274(L)/(S)	30	30	0.03	0.013	1500
	2SK2925(L)/(S)	60	10	0.16	0.08	350
	2SK2926(L)/(S)	60	15	0.11	0.055	500
	2SK2869(L)/(S)	60	20	0.07	0.045	740
	H7N0607DL/DS	60	20	(0.056)	0.034	1100
	H7N0603DL/DS	60	30	(0.022)	0.015	3200
	2SK3147(L)/(S)	100	5	0.18	0.13	420
	H7N1005DL/DS	100	12	(0.155)	0.11	830
	H7N1004DL/DS	100	25	(0.045)	0.035	2800
	H5N2005DL/DS	200	6	—	0.65	300
	H5N2004DL/DS	200	8	—	0.48	450
	H5N2505DL/DS	250	5	—	0.89	300
	H5N2510DL/DS	250	5	0.97	0.89	365
	H5N2504DL/DS	250	7	0.67	0.63	570
	H5N2508DL/DS	250	7	—	0.63	450
	H5N5006DL/DS	500	3	—	3.0	365
MP-3A	FX6ASJ-03	-30	-6	0.62	0.29	550
	FX20ASJ-03F	-30	-20	0.29	0.13	500
	FX30ASJ-03	-30	-30	0.12	0.061	2460
	FX6ASJ-06	-60	-6	0.37	0.21	1040
	FX20ASJ-06	-60	-20	0.166	0.097	2370
	FX6ASJ-2	-100	-6	0.72	0.58	1110
	FX20ASJ-2	-100	-20	0.32	0.26	2360
	FX3ASJ-3	-150	-3	1.32	1.2	1170
	FX6ASJ-3	-150	-6	0.59	0.53	2420
	FS50ASJ-03F	30	50	0.019	0.0122	2100
	FS5AS-06	60	5	—	0.16	280
	FS5ASJ-06F	60	5	0.19	0.14	340
	FS10AS-06	60	10	—	0.078	600
	FS10ASJ-06F	60	10	0.086	0.07	750
	FS30AS-06	60	30	—	0.03	1250
	FS30ASJ-06F	60	30	0.028	0.022	2600
	FS5AS-2	100	5	—	0.47	280
	FS5ASJ-2	100	5	0.46	0.4	360
	FS10AS-2	100	10	—	0.23	600
	FS10ASJ-2	100	10	0.21	0.19	800
	FS30AS-2	100	30	—	0.1	1250
	FS30ASJ-2	100	30	0.091	0.084	1800
	FS5ASJ-3	150	5	0.37	0.35	800
	FS10AS-3	150	10	—	0.17	1250
	FS10ASJ-3	150	10	0.165	0.16	1800
	RJK5003DPD	500	5	—	1.5	550
MP-3A	RJK6002DPD	600	2.0	—	6.8	165
TO-220 AB	2SJ539	-60	-10	0.36	0.21	400
	2SJ540	-60	-12	0.23	0.15	580
	2SJ541	-60	-15	0.155	0.095	850
	2SJ542	-60	-18	0.11	0.065	1300
	2SJ543	-60	-20	0.095	0.055	1750
	2SJ544	-60	-30	0.055	0.037	2500
	2SJ247	-100	-8.0	0.45	0.3	880
	2SJ221	-100	-20	0.22	0.16	1800
	H7N0203AB	20	90	0.0051	0.003	6800
	2SK2959	30	50	0.018	0.01	2000
	H7N0307AB	30	60	0.0115	0.0058	2500
	H7N0308AB	30	70	0.0085	0.0048	3350
	2SK3141	30	75	0.0085	0.005	6800
	H7N0312AB	30	85	0.0058	0.0033	6900
	2SK3136	40	75	0.010	0.0058	6800
	2SK2927	60	10	0.15	0.075	350
	2SK2928	60	15	0.105	0.052	500
	2SK2929	60	25	0.07	0.034	740
	2SK2930	60	35	0.05	0.026	1100
	2SK2800	60	40	0.04	0.02	1500
	2SK2931	60	45	0.025	0.013	2200
	H7N0608AB	60	70	(0.012)	0.008	6200
	2SK3069	60	75	0.012	0.0075	7100
	H7N0602AB	60	85	(0.009)	0.0052	9000
	2SK3418	60	85	0.009	0.0055	9770
	H8N0801AB	80	60	(0.0138)	0.0105	4750
	2SK3228	80	75	0.012	0.0075	9700
	2SK1300	100	10	0.35	0.25	525
	2SK1301	100	15	0.18	0.13	860
	2SK1302	100	20	0.12	0.085	1300
	2SK3149	100	20	0.085	0.060	840
	H7N1004AB	100	30	0.045	0.035	2800
	RJK1021DPN	100	70	—	0.020	2600
	2SK740	150	10	—	0.15	1200
	2SK3154	150	15	0.15	0.13	850
	2SK3156	150	20	0.08	0.07	1750
	2SK3158	150	30	0.063	0.045	2600
	RJK1536DPN	150	50	—	0.030	5000
	2SK3736	250	6	0.7	(0.8)	450
	2SK1667	250	7.0	—	0.55	690
	2SK1761	250	12	—	0.35	1100
	2SK1400A	350	7.0	—	0.8	635
	2SK1153	450	3.0	—	2.8	330
	2SK1155	450	5.0	—	1.4	640
	2SK1157	450	7.0	—	0.8	1050
	2SK1154	500	3.0	—	3	330
	2SK1156	500	5.0	—	1.5	640
	2SK1158	500	7.0	—	0.9	1050
	2SK2408▲	500	7	—	0.9	1100
	2SK1160	500	8.0	—	0.8	1150
	2SK1402A	650	4.0	—	2.6	600
	2SK1338	900	2.0	—	7	425
	2SK1807	900	4.0	—	4	740
TO-220	FS100UMJ-03F	30	100	0.0057	0.004	7600
	FS70UM-06	60	70	—	0.0075	6540
	FS70UMJ-06F	60	70	0.0083	0.007	8500
	FS70UM-2	100	70	—	0.02	6540
	FS70UMJ-2	100	70	0.018	0.017	8200
	FS50UM-3	150	50	—	0.031	6540
	FS50UMJ-3	150	50	0.031	0.03	8200
TO-220 C•FM	2SJ471	-30	-30	0.06	0.035	1700
	2SJ545	-60	-12	0.23	0.15	580
	2SJ546	-60	-15	0.155	0.095	850
	2SJ531	-60	-18	0.11	0.065	1300
	2SJ532	-60	-20	0.095	0.055	1750
	2SJ533	-60	-30	0.055	0.037	2500
	2SK2736	30	30	0.05	0.028	750
	2SK2737	30	45	0.025	0.014	1570
	2SK2956	30	50	0.018	0.01	2000
	2SK3142	30	60	0.0085	0.005	6800

Note) ▲ : Built-in high speed diode

Power MOS FET

General Switching

Package	Part No.	Ratings VDSS (V)	Ratings ID (A)	Characteristics RDS (on) (Ω) max 4 V (4.5V)	Characteristics RDS (on) (Ω) max 10 V (2.5V) [1.5V]	Ciss (pF) typ
TO-220 C•FM	H7N0308CF	30	60	0.0085	0.0048	3350
	2SK2932	60	10	0.15	0.075	350
	2SK2933	60	15	0.105	0.052	500
	2SK2934	60	25	0.07	0.034	740
	2SK2935	60	35	0.05	0.026	1100
	2SK2738	60	40	0.04	0.02	1500
	2SK2936	60	45	0.025	0.013	2200
	2SK2529	60	50	0.016	0.01	3550
	2SK3140	60	60	0.012	0.0075	7100
	2SK3229	80	60	0.012	0.0075	9800
	RJK1525DPS	150	17	—	0.11	680
	2SK2425	250	7	—	0.55	690
	H5N2502CF	250	18	—	0.105	2300
	H5N2512CF▲	250	18	—	0.105	2200
	H5N3007CF▲	300	15	—	0.16	2180
	2SK2114	450	5.0	—	1.4	640
TO-220 FM	2SJ547	-60	-10	0.36	0.21	400
	2SJ526	-60	-12	0.23	0.15	580
	2SJ548	-60	-15	0.155	0.095	850
	2SJ534	-60	-18	0.11	0.065	1300
	2SJ504	-60	-20	0.095	0.055	1750
	2SJ535	-60	-30	0.055	0.037	2500
	2SJ248	-100	-8.0	0.45	0.3	880
	2SJ222	-100	-20	0.22	0.16	1800
	2SJ350	-120	-6.0	0.9	0.7	900
	2SK2937	60	25	0.07	0.034	740
	H7N0608FM	60	50	(0.013)	0.0085	6200
	2SK3212	100	10	0.17	0.13	420
	2SK1305	100	10	0.35	0.25	525
	H7N1005FM	100	12	(0.155)	0.11	830
	2SK1306	100	15	0.18	0.13	860
	2SK1307	100	20	0.12	0.085	1300
	2SK3148	100	20	0.085	0.060	900
	H7N1004FM	100	25	(0.045)	0.035	2800
	2SK2202	120	7.0	0.55	0.4	420
	2SK3152	120	10	0.17	0.13	580
	2SK3153	120	15	0.11	0.085	860
	2SK1318	120	20	0.16	0.12	1300
	2SK3155	150	15	0.15	0.13	850
	2SK3157	150	20	0.08	0.07	1750
	2SK3209	150	25	0.063	0.045	2600
	2SK1957	200	7.0	—	0.45	700
	2SK3160	200	10	0.19	0.17	1100
	2SK3177	200	15	0.125	0.115	1600
	2SK3162	200	20	0.085	0.075	2420
	2SK1668	250	7.0	—	0.55	690
	2SK1762	250	12	—	0.35	1100
	2SK1626	450	5.0	—	1.4	640
	2SK1566	450	7.0	—	0.8	1050
	H5N5006FM	500	3	—	3.0	365
	2SK1567	500	7.0	—	0.9	1050
	2SK1637	600	4.0	—	2.4	600
	2SK1404	600	5.0	—	1.5	1000
	2SK1808	900	4.0	—	4	740
TO-220 FN	FX50KMJ-03	-30	-50	0.072	0.035	4270
	FX70KMJ-03	-30	-70	0.025	0.0123	11140
	FX20KMJ-06	-60	-20	0.166	0.097	2370
	FX30KMJ-06	-60	-30	0.092	0.054	4210
	FX50KMJ-06	-60	-50	0.032	0.0189	11610
	FX20KMJ-2	-100	-20	0.32	0.26	2360
	FX30KMJ-2	-100	-30	0.176	0.143	4450
	FX50KMJ-2	-100	-50	0.061	0.05	11130
	FX20KMJ-3	-150	-20	0.32	0.29	4470
	FX30KMJ-3	-150	-30	0.111	0.1	11430
	FS50KMJ-03F	30	50	0.019	0.0122	2100
	FS70KMJ-03F	30	70	0.012	0.008	3250
	FS100KMJ-03F	30	100	0.0057	0.004	7600
	FS30KMJ-06F	60	30	0.028	0.022	2600
	FS50KM-06	60	50	—	0.022	2300
	FS50KMJ-06F	60	50	0.018	0.014	3850

Package	Part No.	Ratings VDSS (V)	Ratings ID (A)	Characteristics RDS (on) (Ω) max 4 V (4.5V)	Characteristics RDS (on) (Ω) max 10 V (2.5V) [1.5V]	Ciss (pF) typ
TO-220 FN	FS70KM-06	60	70	—	0.0075	6540
	FS70KMJ-06F	60	70	0.0083	0.007	8500
	FS30KMJ-2	100	30	0.091	0.084	1800
	FS50KM-2	100	50	—	0.055	2300
	FS50KMJ-2	100	50	0.052	0.048	3000
	FS70KM-2	100	70	—	0.02	6540
	FS70KMJ-2	100	70	0.018	0.017	8200
	RJK1526DPP	150	27	—	0.042	1800
	FS30KM-3	150	30	—	0.092	2300
	FS30KMJ-3	150	30	0.09	0.086	3000
	FS50KM-3	150	50	—	0.031	6540
	FS50KMJ-3	150	50	0.031	0.03	8200
	H5N2007FN	200	25	—	0.047	2200
	H5N2517FN	250	20	—	0.072	2200
	H5N2901FN	290	18	—	0.091	2200
	RJK4007DPP	400	7.6	—	0.55	850
	RJK5012DPP	500	12	—	0.62	1100
	RJK5013DPP	500	14	—	0.465	1450
	RJK5014DPP	500	19	—	0.39	1800
	RJK6012DPP	600	10	—	0.92	1100
	RJK6013DPP	600	11	—	0.7	1450
	RJK6014DPP	600	16	—	0.575	1820
LDPAK(L)/ (S)-(1)	2SJ479(L)/(S)	-30	-30	0.06	0.035	1700
	2SJ549(L)/(S)	-60	-12	0.23	0.15	580
	2SJ550(L)/(S)	-60	-15	0.155	0.095	850
	2SJ551(L)/(S)	-60	-18	0.11	0.065	1300
	2SJ552(L)/(S)	-60	-20	0.095	0.055	1750
	2SJ553(L)/(S)	-60	-30	0.055	0.037	2500
	2SJ505(L)/(S)	-60	-50	0.036	0.022	4100
	2SK2684(L)/(S)	30	30	0.05	0.028	750
	2SK2958(L)/(S)	30	75	0.014	0.007	4100
	2SK3134(L)/(S)	30	75	0.010	0.005	6800
	2SK3070(L)/(S)	40	75	0.010	0.0058	6800
	2SK3082(L)/(S)	60	10	0.15	0.075	350
	2SK2938(L)/(S)	60	25	0.07	0.034	740
	2SK2939(L)/(S)	60	35	0.05	0.026	1100
	2SK2912(L)/(S)	60	40	0.04	0.02	1500
	2SK2940(L)/(S)	60	45	0.025	0.013	2200
	2SK2553(L)/(S)	60	50	0.016	0.01	3550
	2SK3135(L)/(S)	60	75	0.012	0.0075	7100
	2SK3461(L)/(S)	60	85	0.009	0.0055	9770
	2SK1623(L)/(S)	100	20	0.12	0.085	1300
	2SK3150(L)/(S)	100	20	0.085	0.060	900
	2SK1620(L)/(S)	150	10	—	0.15	1200
	2SK3210(L)/(S)	150	30	0.063	0.045	2600
	2SK3161(L)/(S)	200	15	0.125	0.115	1600
	2SK3211(L)/(S)	200	25	0.085	0.075	2420
	2SK1636(L)/(S)	250	15	—	0.27	1250
	2SK1313(L)/(S)	450	5.0	—	1.4	640
	2SK1540(L)/(S)	450	7.0	—	0.8	1050
	2SK1315(L)/(S)	450	8.0	—	0.7	1150
	2SK1314(L)/(S)	500	5.0	—	1.5	640
	2SK1316(L)/(S)	500	8.0	—	0.8	1150
	2SK1647(L)/(S)	900	2.0	—	7	425
	2SK1528(L)/(S)	900	4.0	—	4	740
LDPAK(L)/ (S)-(1)/ (S)-(2)	H5P2501LD/LS/LM	-250	-10	—	0.48	1500
	H7N0310LD/LS/LM	30	30	(0.019)	0.01	1400
	H7N0311LD/LS/LM	30	45	(0.016)	0.0088	1650
	H7N0307LD/LS/LM	30	60	0.0115	0.0058	2500
	H7N0308LD/LS/LM	30	70	0.0085	0.0048	3350
	H7N0312LD/LS/LM	30	85	0.0058	0.0033	6900
	H7N0401LD/LS/LM	40	95	(0.007)	0.0042	9300
	H7N0608LD/LS/LM	60	70	(0.012)	0.008	6200
	H7N0602LD/LS/LM	60	85	(0.009)	0.0052	9000
	H7N1005LD/LS/LM	100	15	(0.155)	0.11	830
	H7N1004LD/LS/LM	100	30	(0.045)	0.035	2800
	H7N1002LD/LS/LM	100	75	(0.015)	0.01	9700
	RJK1525DPJ/DPE/DPF	150	25	—	0.11	680
	H5N1501LD/LS/LM	150	30	—	0.085	1350
	RJK1535DPJ/DPE/DPF	150	40	—	0.052	1420

Note) ▲ : Built-in high speed diode

Power MOS FET

General Switching

Package	Part No.	Ratings VDSS (V)	Ratings ID (A)	Characteristics RDS (on) (Ω) max 4 V (4.5V)	Characteristics RDS (on) (Ω) max 10 V (2.5V) [1.5V]	Characteristics Ciss (pF) typ
LDPAK(L)/ (S)-(1)/ (S)-(2)	RJK1526DPJ/DPE/DPF	150	50	—	0.042	1800
	H5N2001LD/LS/LM	200	20	—	0.125	1350
	RJK2006DPJ/DPE/DPF	200	40	—	0.059	1800
	H5N2501LD/LS/LM	250	18	—	0.18	1350
	H5N3005LD/LS/LM	300	15	—	0.255	1300
	H5N5006LD/LS/LM	500	3.5	—	3.0	365
LDPAK(S)-(1)	RJK1021DPE	100	70	—	0.020	2600
	RJK1536DPE	150	50	—	0.030	5000
	RJK4013DPE	400	17	—	0.3	1450
	RJK4512DPE	450	14	—	0.51	1100
	RJK4513DPE	450	16	—	0.38	1450
	RJK5012DPE	500	12	—	0.62	1100
	RJK5013DPE	500	14	—	0.465	1450
	RJK6026DPE	600	5	—	2.4	440
	RJK6012DPE	600	10	—	0.92	1100
	RJK6013DPE	600	11	—	0.7	1450
TO-220S	FS100VSJ-03F	30	100	0.0057	0.004	7600
	FS70VSJ-06F	60	70	0.0083	0.007	8500
	FS50VSJ-2	100	50	0.052	0.048	3000
	FS30VSJ-3	150	30	0.09	0.086	3000
TO-3P	2SJ217	-60	-45	0.06	0.042	3800
	2SJ554	-60	-45	0.055	0.037	2500
	2SJ555	-60	-60	0.036	0.022	4100
	2SK2096	60	45	0.028	0.022	3530
	2SK2955	60	45	0.025	0.013	2200
	2SK2586	60	60	0.016	0.01	3550
	2SK2554	60	75	0.01	0.006	7700
	2SK3163	60	75	0.012	0.0075	7100
	2SK3419	60	90	0.009	0.0055	9770
	2SK1303	100	30	0.09	0.06	1750
	2SK1304	100	40	0.04	0.03	3500
	2SK3151	100	50	0.025	0.015	4000
	2SK3159	150	50	0.042	0.030	4000
	H5N1503P	150	70	—	0.027	5100
	RJK1529DPK	150	70	—	0.025	2900
	H5N1506P	150	98	—	0.016	4900
	H5N2003P	200	60	—	0.042	5150
	H5N2008P	200	96	—	0.023	4900
	H5N2305P	230	60	—	0.038	5200
	2SK2007▲	250	20	—	0.15	2340
	H5N2501P	250	20	—	0.18	1350
	2SK1669▲	250	30	—	0.095	3100
	2SK1671	250	30	—	0.095	3000
	H5N2509P	250	30	—	0.069	3600
	H5N2503P	250	50	—	0.055	5200
	H5N2507P▲	250	50	—	0.055	5000
	RJK2508DPK	250	50	—	0.064	2600
	H5N2515P	250	55	—	0.044	3800
	H5N2519P	250	65	—	0.035	4900
	RJK2511DPK	250	65	—	0.034	4900
	H5N2514P	250	70	—	0.03	5500
	H5N2802P	280	50	—	0.066	3600
	H5N2803P	280	55	—	0.047	5150
	H5N2801P	280	60	—	0.043	5400
	H5N3004P	300	25	—	0.093	3600
	H5N3003P	300	40	—	0.069	5150
	H5N3008P▲	300	40	—	0.069	5150
	RJK3008DPK	300	40	—	0.093	2600
	H5N3011P	300	88	—	0.048	5000
	2SK1401A	350	15	—	0.4	1250
	RJK4018DPK	400	43	—	0.1	4100
	2SK1161	450	10	—	0.8	1050
	2SK1515▲	450	10	—	0.8	1100
	2SK1165	450	12	—	0.55	1450
	2SK1167	450	15	—	0.36	2050
	2SK1169	450	20	—	0.25	2800
	2SK1517▲	450	20	—	0.25	3050
	RJK4514DPK	450	22	—	0.3	1800
	RJK4518DPK	450	39	—	0.13	4100
	2SK1162	500	10	—	0.9	1050

Package	Part No.	Ratings VDSS (V)	Ratings ID (A)	Characteristics RDS (on) (Ω) max 4 V (4.5V)	Characteristics RDS (on) (Ω) max 10 V (2.5V) [1.5V]	Characteristics Ciss (pF) typ
TO-3P	2SK1516▲	500	10	—	0.9	1100
	2SK2727	500	10	—	0.95	1100
	2SK1166	500	12	—	0.6	1450
	2SK2568	500	12	—	0.6	1560
	RJK5013DPK	500	14	—	0.465	1450
	2SK1168	500	15	—	0.4	2050
	2SK2728	500	18	—	0.45	2150
	RJK5014DPK	500	19	—	0.38	1800
	2SK1170	500	-20	—	0.27	3050
	2SK1518▲	500	20	—	0.27	2800
	2SK2729	500	20	—	0.29	3300
	2SK2730	500	25	—	0.24	3500
	H5N5007P	500	25	—	0.225	3900
	H5N5012P▲	500	25	—	0.225	3600
	RJK5015DPK	500	25	—	0.24	2600
	H5N5015P▲	500	32	—	0.17	4600
	RJK5018DPK	500	35	—	0.155	4100
	RJK5020DPK	500	40	—	0.118	5150
	2SK1968	600	12	—	0.88	1800
	2SK1573	600	15	—	0.5	3150
	RJK6014DPK	600	16	—	0.575	1800
	H5N6001P	600	20	—	0.38	4640
	RJK6015DPK	600	21	—	0.36	2600
	RJK6018DPK	600	30	—	0.235	4100
	RJK6020DPK	600	32	—	0.175	5150
	2SK1403A	650	8.0	—	1.4	1180
	2SK1339	900	3.0	—	7	425
	2SK1340	900	5.0	—	4	740
	2SK1341	900	6.0	—	3	980
	2SK1342	900	8.0	—	1.6	1730
	2SK1933	900	10	—	1.2	2620
	2SK1773	1000	5.0	—	2	1700
	2SK1934	1000	8.0	—	1.6	2690
	2SK1317	1500	2.5	—	12	990
	2SK1835	1500	4.0	—	7	1700
TO-3P*	FX70SMJ-03	-30	-70	0.025	0.0123	11140
	FX50SMJ-06	-60	-50	0.032	0.0189	11610
	FX50SMJ-2	-100	-50	0.061	0.05	11130
	FX30SMJ-3	-150	-30	0.111	0.1	11430
	FS70SM-06	60	70	—	0.0075	6540
	FS70SMJ-2	100	70	0.018	0.017	8200
	FS50SM-3	150	50	—	0.031	6540
	FS50SMJ-3	150	50	0.031	0.03	8200
TO-3P FM	2SJ216	-60	-35	0.09	0.06	2400
	2SJ218	-60	-45	0.06	0.042	3800
	2SK1298	60	40	0.025	0.018	3600
	RJK2009DPM	200	40	—	0.036	2900
	H5N2301PF	230	25	—	0.085	2250
	H5N2306PF	230	30	—	0.052	3500
	H5N2305PF	230	35	—	0.038	5200
	2SK2008▲	250	20	—	0.15	2340
	2SK1670▲	250	30	—	0.095	3100
	H5N2509PF	250	30	—	0.069	3600
	H5N2802PF	280	25	—	0.066	3600
	H5N2803PF	280	30	—	0.047	5150
	2SK1328	450	12	—	0.55	1450
	2SK1832	500	10	—	0.9	1050
	2SK1329	500	12	—	0.6	1450
	2SK1405▲	600	15	—	0.5	3150
	2SK1859	900	6.0	—	3	980
	2SK1775	900	8.0	—	1.6	1730
	2SK2225	1500	2.0	—	12	990
TO-3PL	2SK1947▲	250	50	—	0.06	5810
	2SK1948	250	50	—	0.06	5830
	H5N2513PL▲	250	100	—	0.026	9300
	H5N2801PL	280	70	—	0.043	5400
	2SK1519▲	450	30	—	0.15	5800
	2SK1628	450	30	—	0.25	2800
	2SK1526	450	40	—	0.15	5800
	2SK1521▲	450	50	—	0.1	8700

Note) ▲ : Built-in high speed diode

Power MOS FET

General Switching

Package	Part No.	Ratings VDSS (V)	Ratings ID (A)	Characteristics RDS (on) (Ω) max 4 V (4.5V)	Characteristics RDS (on) (Ω) max 10 V (2.5V) [1.5V]	Characteristics Ciss (pF) typ
TO-3PL	2SK1520▲	500	30	—	0.16	5800
	2SK1629	500	30	—	0.27	2800
	2SK1971	500	35	—	0.23	4320
	2SK1527	500	40	—	0.16	5800
	2SK1522▲	500	50	—	0.11	8700
	2SK1837	500	50	—	0.11	8150
	H5N5004PL▲	500	50	—	0.11	7630
	H5N5011PL	500	50	—	0.115	7700
	H5N5016PL▲	500	50	—	0.128	5300
	H5N5005PL▲	500	60	—	0.085	10550
	H5N6004PL	600	35	—	0.21	5700
	2SK2393	1500	8	—	2.8	4370
CMFPAK-6	HAT1146C [D]	-12	-1.2	(0.315)	(0.535)	123
	HAT1095C	-12	-2	(0.140)	(0.205)	290
	HAT1094C	-12	-2.5	(0.088)	(0.126)	500
	HAT1069C	-12	-4	(0.052)	(0.07)	1380
	HAT1093C	-12	-3	(0.054)	(0.076)	900
	HAT1096C	-20	-1	(0.293)	(0.530)	155
	HAT1147C [D]	-20	-1	(0.428)	(0.705)	86
	HAT1091C	-20	-1.5	(0.175)	(0.287)	205
	HAT1089C	-20	-2	(0.103)	(0.168)	365
	HAT1090C	-20	-2.5	(0.065)	(0.104)	590
	HAT1108C	-30	-1.5	(0.356)	0.194	160
	HAT1111C	-60	-2	(0.450)	0.306	295
	HAT1141C	-80	-0.8	(1.02)/ (1.38)	0.8/ 1.05	170
	HAT2291C [D]	12	1.8	(0.186)	(0.256)	95
	HAT2206C	12	2	(0.085)	(0.114)	260
	HAT2205C	12	3	(0.050)	(0.067)	430
	HAT2204C	12	3.5	(0.034)	(0.044)	770
	HAT2207C	20	1.5	(0.130)	(0.210)	135
	HAT2292C [D]	20	1.5	(0.205)	(0.37)	70
	HAT2203C	20	2	(0.090)	(0.150)	165
	HAT2196C	20	2.5	(0.058)	(0.093)	280
	HAT2202C	20	3	(0.040)	(0.055)	520
	HAT2221C	30	1.5	(0.305)	0.206	115
	HAT2268C	30	4	0.037/ 0.054	0.027/ 0.034	475
	HAT2286C [D]	60	0.9	(0.595)	(0.77)	80
	HAT2282C	60	1.5	(0.173)	(0.29)	200
	HAT2281C	60	2	(0.142)	(0.177)	335
	HAT2240C	60	2.5	0.075/ 0.098	0.085/ 0.119	580
	HAT2217C	60	3	(0.183)	0.133	280
	HAT3042C [D] (Nch/Pch)	12/ -12	1.8/ -1.2	(0.186)/ (0.315)	(0.256)/ (0.535)	95/ 123
	HAT3043C [D] (Nch/Pch)	20/ -20	1.5/ -1	(0.205)/ (0.428)	(0.37)/ (0.905)	70/ 86
TSOP-6	HAT1043M	-20	-4.4	(0.065)	(0.110)	750
	HAT1044M	-30	-4.5	(0.105)	0.060	600
	HAT2053M	20	6.1	(0.033)	(0.048)	570
	HAT2054M	30	6.3	(0.052)	0.021	620
FP-8DA (JEDEC: SOP-8)	HAT1025R [D]	-20	-4.5	0.095	(0.15)	860
	HAT1021R	-20	-5.5	0.06	(0.085)	1200
	HAT1054R [D]	-20	-6	(0.03)	(0.05)	1550
	HAT1023R	-20	-7	0.04	(0.06)	2250
	HAT1024R [D]	-30	-3.5	0.34	0.16	350
	HAT1016R [D]	-30	-4.5	0.18	0.09	660
	HAT1020R/RJ	-30	-5	0.13	0.07	860
	HAT1123R	-30	-6	(0.053)	0.032	1300
	HAT1026R	-30	-7	0.065	0.037	1700
	HAT1036R	-30	-12	0.034	0.014	4200
	HAT1047R/RJ	-30	-14	(0.025)	0.012	3500
	HAT1038R/RJ [D]	-60	-3.5	0.23	0.15	600
	HAT1055R/RJ [D]	-60	-5	(0.13)	0.076	1350
	HAT1097R/RJ	-60	-5	(0.13)	0.076	1350
	HAT1126R/RJ [D]	-60	6	(0.085)	0.05	2300
	HAT1035R [D]	-150	-0.25	7.5	6.2	92
	HAT1065R [D]	-200	-0.25	7.5	6.2	140
	HAT1064R	-350	-0.3	—	25	220

Package	Part No.	Ratings VDSS (V)	Ratings ID (A)	Characteristics RDS (on) (Ω) max 4 V (4.5V)	Characteristics RDS (on) (Ω) max 10 V (2.5V) [1.5V]	Characteristics Ciss (pF) typ
FP-8DA (JEDEC: SOP-8)	HAT2057RA [D]	20	4	0.033	[0.06]	1100
	HAT2027R [D]	20	7	0.038	(0.053)	720
	HAT2026R	20	11	0.015	(0.021)	1760
	RJK0202DSP	20	16	(0.0063)	(0.0087)	3650
	HAT2029R [D]	28	7.5	0.033	(0.043)	780
	HAT2108R [D]	28	11	0.015	(0.022)	2200
	HAT2103R [D]	30	4.5	(0.13)	0.065	220
	HAT2024R [D]	30	5.5	0.11	0.065	310
	HAT2280R [D]	30	6	(0.058)	0.034	410
	HAT2016R [D]	30	6.5	0.08	0.045	560
	HAT2209R	30	7	0.055	0.036	(365)
	HAT2276R [D]	30	7.5	(0.04)	0.024	630
	HAT2210R [D] (MOS1/ MOS2+SBD)	30/ 30	7.5/ 8.0	(0.038)/ (0.028)	0.024/ 0.023	630/ 1330
	HAT2218R [D] (MOS1/ MOS2+SBD)	30/ 30	7.5/ 8.0	(0.038)/ (0.028)	0.024/ 0.022	630/ 1330
	HAT2219R [D] (MOS1/ MOS2+SBD)	30/ 30	7.5/ 8.0	(0.038)/ (0.028)	0.024/ 0.022	630/ 1330
	HAT2019R	30	8	0.027	(0.037)	920
	HAT2020R	30	8	0.05	0.028	780
	HAT2025R	30	8	(0.05)	0.026	660
	HAT2043R [D]	30	8	0.029	0.022	1170
	HAT2093R [D]	30	9	(0.039)	0.023	750
	HAT2208R	30	9	0.035	0.024	(610)
	HAT2071R	30	10	(0.036)	0.020	740
	RJK0317DSP	30	10	(0.028)	0.018	640
	HAT2022R	30	11	0.025	0.015	1450
	HAT2092R [D]	30	11	(0.025)	0.016	1400
	HAT2199R	30	11	(0.025)	0.0165	1060
	HAT2036R	30	12	(0.03)	0.015	1200
	HAT2070R	30	12	(0.022)	0.014	1400
	HAT2068R	30	14	(0.016)	0.009	1650
	HAT2198R	30	14	(0.014)	0.009	1650
	HAT2040R	30	15	0.013	0.008	4400
	HAT2044R	30	15	(0.0095)	(0.013)	3420
	HAT2064R	30	16	(0.01)	0.0063	2200
	HAT2118R	30	16	(0.0125)	0.0069	2450
	HAT2197R	30	16	(0.0099)	0.0067	2650
	RJK0316DSP	30	16	(0.0094)	0.0064	2080
	HAT2195R	30	18	(0.0084)	0.0058	3400
	HAT2028R/RJ [D]	60	4	0.16	0.10	280
	HAT2038R/RJ [D]	60	5	0.084	0.058	520
	HAT2114R/RJ [D]	60	6	(0.05)	0.032	1000
	HAT2275R [D]	60	6.6	(0.043)	0.032	1210
	HAT2033R/RJ	60	7	0.053	0.038	740
	HAT2256R	60	8	(0.041)	0.03	1210
	HAT2215R [D]	80	3.4	(0.145)	0.115	400
	HAT2058R [D]	100	4	0.18	0.145	420
	HAT2201R	100	6	(0.049) (8V)	0.043	1450
	HAT2200R	100	8	(0.033) (8V)	0.028	2300
	HAT2035R [D]	150	0.5	2.7	2.2	95
	HAT2105R [D]	200	0.5	2.7	2.2	120
	HAT2085R	200	2	—	0.64	300
	HAT2088R	200	2	—	0.44	450
	HAT2077R	200	3	—	0.235	830
	HAT2080R	250	1.7	—	0.85	300
	HAT2089R	250	2	—	0.6	450
	HAT2087R	250	2.5	—	0.31	830
	HAT2131R	350	0.9	3.2	3	460
	HAT2226R	600	0.1	—	52	25
	HAT2179R	600	0.7	—	4.5	280
	HAT3004R (Nch/Pch)	30/ -30	5.5/ -3.5	0.11/ 0.34	0.065/ 0.16	310/ 350
	HAT3029R (Nch/Pch)	30/ -30	6/ -6	(0.058)/ (0.053)	0.034/ 0.032	410/ 1330
	HAT3006R (Nch/Pch)	30/ -30	6.5/ -4.5	0.08/ 0.18	0.045/ 0.09	560/ 660

Note) Samples of HAT series are available as type number, HATxxxxxWS.
Note) [D] : Dual chips included

Power MOS FET

General Switching

Package	Part No.	Ratings VDSS (V)	Ratings ID (A)	Characteristics RDS (on) (Ω) max 4 V (4.5V)	Characteristics RDS (on) (Ω) max 10 V (2.5V) [1.5V]	Characteristics Ciss (pF) typ
FP-8DA (JEDEC: SOP-8)	HAT3037R	45/ -45	5/ -4	(0.075)/ (0.125)	0.055/ 0.088	420/ 660
	HAT3008R/RJ (Nch/Pch)	60/ -60	5/ -3.5	0.084/ 0.23	0.058/ 0.15	520/ 600
	HAT3038R	60/ -60	5/ -4	(0.08)/ (0.11)	0.06/ 0.088	690/ 1350
	HAT3010R (Nch/Pch)	60/ -60	6/ -5	0.045/ 0.13	0.032/ 0.076	1050/ 1350
	HAT3018R/RJ (Nch/Pch)	60/ -60	6/ -5	(0.05)/ (0.13)	0.035/ 0.076	1000/ 1350
	HAT3031R (Nch/Pch)	60/ -60	6.6/ -3.4	(0.043)/ (0.175)	(0.032)/ (0.120)	1210/ 750
	HAT3040R	60/ -60	6.6/ -4.4	(0.043)/ (0.095)	0.032/ 0.065	1250/ 1300
	HAT3032R	80/ -80	4.4/ -3	(0.095)/ (0.195)	0.077/ 0.145	640/ 1290
	HAT3021R (Nch/Pch)	80/ -80	3.4/ -2.6	(0.145)/ (0.29)	0.115/ 0.21	400/ 930
	HAT3019R (Nch/Pch)	100/ -100	3.5/ -2.3	(0.16/ 0.50)	0.115/ 0.30	815/ 930
	HAT3005R (Nch/Pch)	150/ -150	0.5/ -0.25	2.7/ 7.5	2.2/ 6.2	95/ 92
	HAT3015R (Nch/Pch)	200/ -200	0.5/ -0.25	2.7/ 7.5	2.2/ 6.2	120/ 140
TTP-8DV (TSSOP-8)	HAT1065T [D]	-200	-0.25	7.5	6.2	140
	HAT2052T [D]	28	5	0.034	(0.044)	510
	HAT2050T [D]	100	1	1	0.75	90
	HAT2085T	200	1.4	—	0.64	300
	HAT2105T [D]	200	0.5	2.7	2.2	120
	HAT2080T	250	1.2	—	0.85	300
	HAT3015T (Nch/Pch)	200/ -200	0.5/ -0.25	2.7/ 7.5	2.2/ 6.2	120/ 140
	HAT2134H	20	60	(0.0058)	0.0029	4500
LFPAK	HAT2160H	20	60	(0.0041)	0.0026	7750
	HAT2168H	30	30	(0.0135)	0.0079	1780
	HAT2116H	30	30	(0.0153)	0.0082	1650
	RJK0305DPB	30	30	(0.013)	0.008	1250
	HAT2284H (MOS+SBD)	30	35	(0.0072)	0.0043	4000
	RJK0304DPB	30	35	(0.0072)	0.0048	2500
	HAT2096H	30	40	(0.010)	0.0053	2200
	HAT2143H	30	40	(0.015)	0.0061	2450
	HAT2167H	30	40	(0.0093)	0.0055	2800
	HAT2283H (MOS+SBD)	30	40	(0.0056)	0.0037	5100
	RJK0303DPB	30	40	(0.0056)	0.0037	3300
	HAT2166H	30	45	(0.0061)	0.0038	4200
	HAT2099H	30	50	(0.0073)	0.0037	4750
	HAT2270H (MOS+SBD)	30	50	(0.0049)	0.0039	7700
	RJK0302DPB	30	50	(0.0046)	0.0031	4200
	HAT2165H	30	55	(0.0053)	0.0033	5180
	HAT2164H	30	60	(0.0044)	0.0031	7600
	RJK0301DPB	30	60	(0.004)	0.0028	5000
	HAT2139H	40	20	—	0.0115	2000
	HAT2129H	40	30	—	0.0075	3200
	HAT2172H	40	30	—	0.0075	1445
	HAT2171H	40	40	—	0.0048	2280
	HAT2137H	40	45	—	0.0048	6200
	HAT2170H	40	45	—	0.0042	3600
	HAT2169H	40	50	(0.006)	0.0035	6650
	HAT2266H	60	30	(0.016)	0.012	3500
LFPAK	HAT2267H	80	25	—	0.016	2150
	HAT2279H	80	30	(0.015)	0.012	3520
	HAT2142H	100	10	—	0.044	2000
	HAT2141H	100	15	—	0.0275	3200
	HAT2175H	100	15	—	0.042	1445
	HAT2174H	100	20	—	0.027	2280
	HAT2140H	100	25	—	0.016	6350
	HAT2173H	100	25	—	0.015	4350
	HAT2132H	200	6	—	0.45	450
	HAT2119H	250	5	—	0.63	450
LFPAK-i	HAT2160N	20	60	(0.0044)	0.0029	7750
	HAT2168N	30	30	0.0138	0.0082	1780
	RJK0305DPC	30	30	(0.0133)	0.0083	1250
	HAT2284N (MOS+SBD)	30	35	(0.0075)	0.0046	4000
	RJK0304DPC	30	35	(0.0075)	0.0051	2500
	HAT2167N	30	40	(0.0096)	0.0058	2800
	HAT2283N (MOS+SBD)	30	40	(0.0059)	0.0040	5100
	RJK0303DPC	30	40	(0.0059)	0.004	3300
	HAT2166N	30	45	0.0064	0.0041	4200
	HAT2270N (MOS+SBD)	30	50	(0.0052)	0.0037	7700
	RJK0302DPC	30	50	(0.0049)	0.0034	4200
	HAT2165N	30	55	0.0056	0.0036	5180
	HAT2164N	30	60	(0.0047)	0.0034	7600
	RJK0301DPC	30	60	(0.0043)	0.0031	5000
	HAT2172N	40	30	—	0.0078	1445
	HAT2171N	40	40	—	0.0051	2280
	HAT2170N	40	45	—	0.0045	3600
	HAT2169N	40	50	(0.0063)	0.0038	6650
	HAT2279N	80	30	(0.0153)	0.0123	3520
	HAT2175N	100	15	—	0.042	1445
	HAT2174N	100	20	—	0.027	2280
	HAT2173N	100	25	—	0.0153	4350
WPAK	HAT2285WP (MOS1/ MOS2+SBD)	30/ 30	14/ 20	(0.04)/ (0.023)	0.024/ 0.018	630/ 1930
	HAT2199WP	30	15	(0.024)	0.016	1060
	HAT2198WP	30	25	(0.0134)	0.0085	1650
	HAT2197WP	30	35	(0.0093)	0.0062	2650
	HAT2195WP	30	40	(0.0079)	0.0053	3400
	HAT2244WP	80	30	(0.0155)	0.0125	3520
	HAT2201WP	100	15	0.049 (8V)	0.043	1450
	HAT2200WP	100	20	0.033 (8V)	0.028	2300
	HAT2185WP	150	10	—	0.19	430
	HAT2184WP	150	14	—	0.11	710
	HAT2299WP (VGS(off): 3V to 4V)	150	14	—	0.11	710
	HAT2183WP	150	20	—	0.064	1200
	HAT2189WP	200	8.5	—	0.27	430
	HAT2188WP	200	12	—	0.157	710
	HAT2187WP	200	17	—	0.094	1200
	HAT2287WP (VGS(off): 3V to 4V)	200	17	—	0.094	1200
	HAT2193WP	250	7	—	0.4	430
	HAT2192WP	250	10	—	0.23	710
	HAT2191WP	250	14	—	0.138	1200
HSOP-11	HAT2211RP (MOS1/ MOS2+SBD)	30/ 30	8.0/ 11.0	(0.040)/ (0.023)	0.023/ 0.018	630/ 1930
	HAT2180RP (MOS1/ MOS2+SBD)	30/ 30	10/ 16	(0.022)/ (0.0115)	0.015/ 0.0088	1090/ 3040

Note) Samples of HAT series are available as type number, HATxxxxxWS.
Note) [D] : Dual chips included

Power MOS FET

General Amplification

Package	Part No.	Ratings		Characteristics		
		VDSS (V)	ID (A)	|yfs| (S) typ	VDS(sat) (VDS(on)) (V) max	Ciss (pF) typ
TO-220 AB	2SJ76	(-140)	-0.5	0.035	-2	120
	2SJ77	(-160)	-0.5	0.035	-2	120
	2SJ78	(-180)	-0.5	0.035	-2	120
	2SJ79	(-200)	-0.5	0.035	-2	120
	2SK213	(140)	0.5	0.04	2	90
	2SK214	(160)	0.5	0.04	2	90
	2SK215	(180)	0.5	0.04	2	90
	2SK216	(200)	0.5	0.04	2	90
TO-3P	2SJ160	(-120)	-7	1.0	-12	900

Package	Part No.	Ratings		Characteristics		
		VDSS (V)	ID (A)	|yfs| (S) typ	VDS(sat) (VDS(on)) (V) max	Ciss (pF) typ
TO-3P	2SJ161	(-140)	-7	1.0	-12	900
	2SJ162	(-160)	-7	1.0	-12	900
	2SJ351	(-180)	-8	1.0	-12	800
	2SJ352	(-200)	-8	1.0	-12	800
	2SK1056	(120)	7	1.0	12	600
	2SK1057	(140)	7	1.0	12	600
	2SK1058	(160)	7	1.0	12	600
	2SK2220	(180)	8	1.0	12	600
	2SK2221	(200)	8	1.0	12	600

Thermal FET

Package	Part No.	Ratings		Characteristics		
		VDSS (V)	ID (A)	RDS (on) (Ω) max 4 V (5V) [6V]	RDS (on) (Ω) max 10 V	Tsd (°C) typ
TO-220 AB	HAF1001	-60	-15	0.13	0.09	175
	HAF2001	60	20	0.065	0.043	175
	HAF2014	60	40	0.033	0.02	175
TO-220 FM	HAF2002	60	20	0.065	0.043	175
	HAF2005	60	40	0.033	0.02	175
LDPAK(L)/ (S)-(1)	HAF1002(L)/(S)	-60	-15	0.13	0.09	175
	HAF1008(L)/(S)	-60	-20	0.08	0.054	175
	HAF1009(L)/(S)	-60	-40	0.05	0.027	175
	RJE0601JPE	-60	-40	[0.04]	0.027	175
	HAF2012(L)/(S)	60	20	0.065	0.043	175

Package	Part No.	Ratings		Characteristics		
		VDSS (V)	ID (A)	RDS (on) (Ω) max 4 V (5V) [6V]	RDS (on) (Ω) max 10 V	Tsd (°C) typ
LDPAK(L)/ (S)-(1)	HAF2017(L)/(S)	60	20	0.053	0.043	175
	HAF2011(L)/(S)	60	40	0.033	0.02	175
	HAF2021(L)/(S)	60	50	0.015 (6V)	0.012	175
DPAK(L)-(1)/ (S)	HAF1004(L)/(S)	-60	-5	0.34	0.2	175
	HAF2007(L)/(S)	60	5	0.12	0.075	175
FP-8DA	HAF1010RJ	-60	-5	0.34	0.2	175
	HAF2015RJ	60	2	(0.2)	0.16	175
	HAF2026RJ	60	(0.6)	(0.3)	0.21	175

DrMOS (Driver-2MOS FET Integrated SiP)

Package	Part No.	Vin (V)	Vout (V)	Iout (A)	f (Hz)
QFN56	R2J20601NP	7.9~16	0.8~3.3	35	~1M
	R2J20602NP	7.4~16	0.8~3.3	40	~2M
	R2J20701NP	7.25~16	0.8~5.0	35	~1M

PC/ Battery

Package	Part No.	Ratings		Characteristics		
		VDSS (V)	ID (A)	RDS (on) (Ω) max 4 V (4.5V)	RDS (on) (Ω) max 10 V (2.5V)[1.5V]	Ciss (pF) typ
FP-8DA (JEDEC: SOP-8)	HAT1132R	-30	-7	(0.04)	0.025	930
	HAT1131R	-30	-9	(0.031)	0.019	1350
	HAT1130R	-30	-10	(0.022)	0.014	1750
	HAT1129R	-30	-12	(0.018)	0.0105	2400
	HAT1128R	-30	-18	(0.0115)	0.0075	4500
LFPAK	HAT1139H [D] (1chip)	-30	-30	(0.0145)	0.009	3200
	HAT1127H	-30	-40	(0.0086)	0.0045	6200
	HAT1125H	-30	-45	(0.0059)	0.0036	7000

Note) [D] : Dual chips included

IGBT

Strobe flashers

Package	Part No.	Ratings VCES (V)	Ratings ICP (A)	Ratings Drive (V)
FP-8DA (JEDEC: SOP-8)	CY20AAJ-8	400	130	4
	CY20AAJ-8F	400	130	4
	CY20AAJ-8H	400	130	4
	CY25AAJ-8	400	150	4
	CY25AAJ-8F	400	150	4

Package	Part No.	Ratings VCES (V)	Ratings ICP (A)	Ratings Drive (V)
TTP-8DV	CY25BAH-8F	400	150	2.5
	CY25BAJ-8F	400	150	4
	RJP4002ASA	400	150	2.5
	RJP4003ASA	400	150	4
TO-220FN	CT40KM-8H	400	200	30
VSON-8	CY25CAH-8F	400	150	2.5
	CY25CAJ-8F	400	150	4
	RJP4002ANS	400	150	2.5
	RJP4003ANS	400	150	4

Igniter

Package	Part No.	Ratings VCES (V)	Ratings IC (A)	Characteristics VCE(sat) (V) typ	Characteristics tf (µs) typ
DPAK(S)	GN4008ZB4	400	8	1.5	5
LDPAK(S)	GN4014ZB4	400	14	1.6	5

Plasma Display Panel

Package	Part No.	Ratings VCES (V)	Ratings IC (A)	Ratings IC(Peak) (A)	Characteristics VCE(sat) (V) typ	Characteristics tf (µs) typ
TO-220AB	RJP3054DPN	300	35	140	1.8	0.12
	RJP3064DPN	320	35	180	1.5	0.3
	RJP3065DPN	320	40	200	1.5	0.3
	RJP6065DPN	630	40	200	1.8	0.45
TO-220FN	RJP3053DPP	300	30	120	2.0	0.12
	RJP3054DPP	300	35	140	1.8	0.12
	RJP3055DPP	300	40	160	1.8	0.15
	RJP3056DPP	300	45	180	1.6	0.15
	RJP3063DPP	320	30	160	1.7	0.3
	RJP3064DPP	320	35	180	1.5	0.3
	RJP3065DPP	320	40	200	1.5	0.3
	RJP3042DPP	330	25	120	2	0.15
	RJP3046DPP	330	45	230	1.5	0.15
	RJP4065DPP	400	40	200	1.6	0.3
	RJP6045DPP	630	40	200	2.3	0.15
	RJP6055DPP	630	40	160	2.3	0.15
	RJP6065DPP	630	40	200	1.8	0.45
	RJP6047DPP	630	50	250	2.2	0.15

Package	Part No.	Ratings VCES (V)	Ratings IC (A)	Ratings IC(Peak) (A)	Characteristics VCE(sat) (V) typ	Characteristics tf (µs) typ
TO-220	RJP3063DPP-C0	320	30	160	1.7	0.3
C•FM	RJP4065DPP-C0	430	40	200	1.6	0.3
TO-3P	RJP2557DPK	270	50	200	1.6	0.15
	RJP3056DPK	300	45	180	1.6	0.15
	RJP3057DPK	300	50	200	1.6	0.15
	RJP3066DPK	320	45	215	1.4	0.3
	RJP3067DPK	320	50	230	1.4	0.3
	RJP3069	320	65	300	1.3	0.3
	RJP3060DPK	320	75	350	1.3	0.3
	RJP3047DPK	330	50	250	1.5	0.15
	RJP3049	330	65	330	1.4	0.15
	RJP4067DPK	430	50	230	1.5	0.35

Plasma Display Panel (Build in Diode)

Package	Part No.	Ratings VCES (V)	Ratings IC (A)	Ratings IC(Peak) (A)	Characteristics VCE(sat) (V) typ	Characteristics tf (µs) typ	Characteristics trr (µs) typ
TO-3P (Co-pack)	RJH3077DPK	330	50	200	1.6	0.16	0.1
	RJH3047DPK	330	50	250	1.5	0.15	0.06

High Speed Switching (Active filter)

Package	Part No.	Ratings VCES (V)	Ratings IC (A)	Characteristics VCE(sat) (V) typ	Characteristics tf (µs) typ
LDPAK(S)	RJP6003DPE	600	20	1.7	0.15
TO-220AB	GN6030V5AB	600	30	1.7	0.12

Triacs

General Switching

Package	Part No.	Ratings Tj (°C)	VDRM (V)	IT(RMS) (A)	ITSM (A)	Characteristics IGT(max) (mA)
TO-92*	BCR08AM-12	125	600	0.8	8	(II, III) 5
	BCR1AM-12	125	600	1	10	5
	BCR1AM-12A	125	600	1	10	7
	BCR08AM-14	125	700	0.8	8	5
MP-3A	BCR3AS-12(A)	125	600	3	30	15
	BCR3AS-12(B)	150	600	3	30	15
	BCR5AS-12(A)	125	600	5	50	30
	BCR5AS-12(B)	150	600	5	50	30
	BCR5AS-14(A)	125	700	5	50	30
DPAK(L)-(3)	BCR3AS-12(A)	125	600	3	30	15
	BCR5AS-12(A)	125	600	5	50	30
UPAK / (SOT-89)**	BCR08AS-12	125	600	0.8	8	5
TO-220	BCR5AM-12L(A)	125	600	5	50	20
	BCR5AM-12L(B)	150	600	5	50	20
	BCR6AM-12L(A)	125	600	6	60	30
	BCR6AM-12L(B)	150	600	6	60	30
	BCR8CM-12L(A)	125	600	8	80	30
	BCR8CM-12L(B)	150	600	8	80	30
	BCR10CM-12L(A)	125	600	10	100	30
	BCR10CM-12L(B)	150	600	10	100	30
	BCR12CM-12L(A)	125	600	12	120	30
	BCR12CM-12L(B)	150	600	12	120	30
	BCR16CM-12L(A)	125	600	16	170	30
	BCR16CM-12L(B)	150	600	16	170	30
	BCR20AM-12L(A)	125	600	20	200	30
	BCR20AM-12L(B)	150	600	20	200	30
TO-220F (2)	BCR2PM-12RE	150	600	2	10	(II, III) 10
	BCR2PM-14LE	150	600	2	10	(II, III) 10
TO-220F (1)	BCR3PM-12L(A)	125	600	3	30	20
	BCR3PM-12L(B)	150	600	3	30	20
	BCR3PM-12LG	150	600	3	30	20
	BCR3PM-14LG	125/150	800/700	3	30	30
	BCR5PM-12L(A)	125	600	5	50	20
	BCR5PM-12L(B)	150	600	5	50	20
	BCR5PM-12LG	150	600	5	50	20
	BCR5PM-14L(A)	125	700	5	50	30
	BCR5PM-14LD	150	700	5	30	50
	BCR5PM-14LG	125/150	800/700	5	50	30
	BCR8PM-12L(A)	125	600	8	80	30
	BCR8PM-12L(B)	150	600	8	80	30
	BCR8PM-12LD	150	600	8	48	50
	BCR8PM-12LG	150	600	8	80	30
	BCR8PM-14L(A)	125	700	8	80	30
	BCR8PM-14LD	150	700	8	48	50
	BCR8PM-14LG	125/150	800/700	8	80	30
	BCR8PM-16L(A)	125	800	8	80	30
	BCR8PM-16LG	150	800	8	80	30
	BCR10PM-12L(A)	125	600	10	100	30
	BCR10PM-12L(B)	150	600	10	100	30
	BCR10PM-12LD	150	600	10	60	50
	BCR10PM-12LG	150	600	10	100	30

Package	Part No.	Ratings Tj (°C)	VDRM (V)	IT(RMS) (A)	ITSM (A)	Characteristics IGT(max) (mA)
TO-220F (1)	BCR12PM-12L(A)	125	600	12	120	30
	BCR12PM-12L(B)	150	600	12	120	30
	BCR12PM-12LD	150	600	12	72	50
	BCR12PM-12LG	150	600	12	120	30
	BCR12PM-14L(A)	125	700	12	120	30
	BCR12PM-14LG	150	700	12	120	30
	BCR16PM-12L(A)	125	600	16	160	30
	BCR16PM-12L(B)	150	600	16	160	30
	BCR16PM-12LD	150	600	16	96	50
	BCR16PM-12LG	150	600	16	160	30
TO-220FN	BCR3KM-12(RA)	125	600	3	30	15
	BCR3KM-12(RB)	150	600	3	30	15
	BCR3KM-12LA	125	600	3	30	20
	BCR3KM-12LB	150	600	3	30	20
	BCR3KM-14L	125	700	3	30	30
	BCR5KM-12(RA)	125	600	5	50	15
	BCR5KM-12(RB)	150	600	5	50	15
	BCR5KM-12LA	125	600	5	50	20
	BCR5KM-12LB	150	600	5	50	20
	BCR5KM-14LA	125	700	5	50	30
	BCR5KM-14LC	150	700	5	30	50
	BCR8KM-12LA	125	600	8	80	30
	BCR8KM-12LB	150	600	8	80	30
	BCR8KM-12LC	150	600	8	48	50
	BCR8KM-14LA	125	700	8	80	30
	BCR8KM-14LC	150	700	8	48	50
	BCR8KM-16LA	125	800	8	80	30
	BCR8KM-20LA	125	1000	8	80	30
	BCR10KM-12LA	125	600	10	100	30
	BCR10KM-12LB	150	600	10	100	30
	BCR10KM-12LC	150	600	10	60	50
	BCR12KM-12LA	125	600	12	120	30
	BCR12KM-12LB	150	600	12	120	30
	BCR12KM-14LA	125	700	12	120	30
	BCR16KM-12LA	125	600	16	160	30
	BCR16KM-12LB	150	600	16	160	30
	BCR16KM-12LC	150	600	16	96	50
	BCR20KM-12L(A)	125	600	20	200	30
	BCR20KM-12L(B)	150	600	20	200	30
	BCR25KM-12LA	125	600	25	250	30
	BCR25KM-12LB	150	600	25	250	30
	BCR30KM-8LA	125	400	30	300	30
	BCR30KM-8LB	150	400	30	300	30
TO-220S	BCR8CS-12L(A)	125	600	8	80	30
	BCR8CS-12L(B)	150	600	8	80	30
	BCR10CS-12L(A)	125	600	10	100	30
	BCR10CS-12L(B)	150	600	10	100	30
	BCR12CS-12L(A)	125	600	12	120	30
	BCR12CS-12L(B)	150	600	12	120	30
	BCR16CS-12L(A)	125	600	16	170	30
	BCR16CS-12L(B)	150	600	16	170	30
TO-3P*	BCR30AM-12L(A)	125	600	30	300	50
	BCR30AM-12L(B)	150	600	30	300	50
TO-3PFM	BCR20RM-30LA	125	1500	20	200	50

[Trigger mode]
I : G^+, $T2^+$
II : G^-, $T2^+$
III : G^-, $T2^-$
IV : G^+, $T2^-$

Thyristors

General Switching

Package	Part No.	Ratings Tj (°C)	VDRM (V)	IT(AV) (A)	ITSM (A)	Characteristics IGT(max) (mA)
MP-3A	CR5AS-12	125	600	5	90	0.1
DPAK(L)-(3)	CR5AS-12	125	600	5	90	0.1
MPAK/ (SC-59)**	CR05BS-8	125	400	0.1	10	0.1
UPAK/ (SOT-89)**	CR05AS-8	125	400	0.5	10	0.1
	CR08AS-12	125	600	0.8	10	0.1
TO-220	CR6CM-12A	125	600	6	90	10
	CR8CM-12A	125	600	8	120	15
	CR12CM-12A	125	600	12	360	30
TO-220F (1)	CR3PM-12	125	600	3	70	0.1
	CR6PM-12A	125	600	6	90	10

Package	Part No.	Ratings Tj (°C)	VDRM (V)	IT(AV) (A)	ITSM (A)	Characteristics IGT(max) (mA)
TO-220F (1)	CR8PM-12A	125	600	8	120	15
	CR12PM-12A	125	600	12	360	30
TO-92*/ TO-92(3)	CR02AM-8	125	400	0.3	10	0.1
	CR03AM-12	110	600	0.3	20	0.1
	CR05AM-12	110	600	0.3	10	0.1
	CR04AM-12	110	600	0.4	10	0.1
	CR05BM-12	125	600	0.5	8	0.1
	CR03AM-16	110	800	0.3	20	0.1
	CR05AM-16	110	800	0.3	10	0.1
TO-220FN	CR3KM-12	125	600	3	70	0.1
	CR6KM-12A	125	600	6	90	10
	CR8KM-12A	125	600	8	120	15

** : To be discontinued

Variable Capacitance Diodes for VCO

Application	Package	Part No.	Ratings	Characteristics			
			V_R (V)	C (pF)	n	C_{VR}/C_{VR}	rs (Ω) max
VCO	URP	HVU17	15	C1 = 50.00~85.00, C3 = 16.10~27.30, C4.5 = 5.23~8.84	5.6 min	1/4.5	—
		HVU350B	15	C1 = 15.5~17.0, C4 = 5.0~6.0	2.8 min	1/4	0.5
		HVU355B	15	C1 = 6.40~7.20, C4 = 2.55~2.95	2.2 min	1/4	0.6
		HVU359	15	C1 = 24.8~29.8, C4 = 6.0~8.3	3.0 min	1/4	1.5
		HVU362	15	C1 = 41.6~49.9, C4 = 10.1~14.8	3.0 min	1/4	2.00
		HVU383B	15	C1 = 19.0~21.0, C4 = 8.5~10.0, C7 = 4.5~5.5	2.0 min	1/4	0.5
					3.5 min	1/7	
	UFP	HVC350B	15	C1 = 15.5~17.0, C4 = 5.0~6.0	2.8 min	1/4	0.5
		HVC355B	15	C1 = 6.40~7.20, C4 = 2.55~2.95	2.2 min	1/4	0.6
		HVC358B	15	C1 = 19.5~21.0, C4 = 8.0~9.3	2.2 min	1/4	0.4
		HVC359	15	C1 = 24.8~29.8, C4 = 6.0~8.3	3.0 min	1/4	1.5
		HVC362	15	C1 = 41.6~49.9, C4 = 10.1~14.8	3.0 min	1/4	2.0
		HVC365	15	C1 = 27.05~28.55, C4 = 6.05~7.55	3.0 min	1/4	1.5
		HVC368B	10	C1 = 15.0~16.5, C2 = 9.0~10.2, C3 = 5.0~6.0	2.2 min	1/3	1.1
		HVC369B	15	C1 = 4.65~5.15, C4 = 1.85~2.15	2.3 min	1/4	0.5
		HVC372B	15	C1 = 15.0~17.0, C4 = 7.0~8.5	2.0 min	1/4	0.4
		HVC374B	10	C1 = 21.5~24.0, C2 = 12.5~14.5	1.68~1.75	1/2	1.2
		HVC375B	10	C1 = 15.0~16.5, C3 = 5.0~6.0, C4 = 3.3~4.0	4.0 min	1/4	1.1
		HVC376B	15	C0.2 = 39.5~44.5, C1 = 25.0~28.5, C2.3 = 8.75~12.05, C4 = 4.8~6.8	4.3 min	1/4	0.8
					3.55 min	0.2/2.3	
		HVC379B	10	C0.5 = 2.90~3.20, C2.5 = 1.25~1.53	1.8 min	0.5/2.5	1.0
		HVC380B	15	C1 = 2.880~3.120, C3 = 1.660~1.795, C4 = 1.360~1.471	1.7~1.84	1/3	0.8
					2.08~2.25	1/4	
		HVC381B	15	C1 = 10.0~11.0, C3 = 5.8~6.4	1.65 min	1/3	0.5
		HVC383B	15	C1 =19.0~21.0, C4 = 8.5~10.0, C7 = 4.5~5.5	2.0 min	1/4	0.5
					3.5 min	1/7	
		HVC385B	15	C0.5 = 7.2~7.7, C2.5 = 2.7~3.2	2.43~2.57	0.5/2.5	0.75
		HVC386B	15	C1 = 43.0~49.0, C4 = 18.5~25.5	1.80 min	1/4	0.85
		HVC397C	15	C1 = 27.0~28.5, C2 = 18.0~20.0, C4 = 6.8~8.5	1.3 min	1/2	1.2
					2.9 min	1/4	
	SFP	HVD350B	15	C1 = 15.5~17.0, C4 = 5.0~6.0	2.8 min	1/4	0.5
		HVD355B	15	C1 = 6.40~7.20, C4 = 2.55~2.95	2.2 min	1/4	0.6
		HVD358B	15	C1 = 19.5~21.0, C4 = 8.0~9.3	2.2 min	1/4	0.4
		HVD359	15	C1 = 24.8~29.8, C4 = 6.0~8.3	3.0 min	1/4	1.5
		HVD362	15	C1 = 41.6~49.9, C4 = 10.1~14.8	3.0 min	1/4	2.0
		HVD365	15	C1 = 27.05~28.55, C4 = 6.05~7.55	3.0 min	1/4	1.5
		HVD368B	10	C1 = 15.0~16.5, C2 = 9.0~10.2, C3 = 5.0~6.0	2.2 min	1/3	1.1
		HVD369B	15	C1 = 4.65~5.15, C4 = 1.85~2.15	2.3 min	1/4	0.5
		HVD372B	15	C1 = 15.0~17.0, C4 = 7.0~8.5	2.0 min	1/4	0.4
		HVD374B	10	C1 = 21.5~24.0, C2 = 12.5~14.5	1.68~1.75	1/2	1.2
		HVD376B	15	C0.2 = 39.5~44.5, C1 = 25.0~28.5, C2.3 = 8.75~12.05, C4 = 4.8~6.8	4.3 min	1/4	0.8
					3.55 min	0.2/2.3	
		HVD380B	15	C1 = 2.880~3.120, C3 = 1.660~1.795, C4 = 1.360~1.471	1.7~1.84	1/3	0.8
					2.08~2.25	1/4	
		HVD381B	15	C1 = 10.0~11.0, C3 = 5.8~6.4	1.65 min	1/3	0.5
		HVD385B	15	C0.5 = 7.2~7.7, C2.5 = 2.7~3.2	2.43~2.57	0.5/2.5	0.75
		HVD388C	15	C1 = 3.162~3.465, C3 = 1.570~1.720	1.88~2.15	1/3	0.75
		HVD396C	10	C1 = 14.6~15.8, C4 = 5.20~5.80	2.62 min	1/4	0.40
		HVD397C	15	C1 = 27.0~28.5, C2 = 18.0~20.0, C4 = 6.8~8.5	1.3 min	1/2	1.2
					2.9 min	1/4	
		HVD399C	10	C0.5 = 18.5~20.0, C2.5 = 7.3~8.6	2.30~2.46	0.5/2.5	0.4
		HVD400C	15	C1 = 2.05~2.24, C3 = 1.18~1.29	1.60~1.85	1/3	0.70
	EFP	HVL355C	15	C1 = 6.62~7.02, C4 = 2.60~2.95	2.35~2.55	1/4	0.60
		HVL358C	15	C1 = 19.50~20.90, C4 = 8.30~8.95	2.20~2.43	1/4	0.40
		HVL368C	10	C1 = 15.0~16.5, C2 = 9.0~10.2, C3 = 5.0~6.0	2.2 min	1/3	1.1
		HVL375C	10	C1 = 15.0~16.5, C3 = 5.0~6.0, C4 = 3.3~4.0	4.0 min	1/4	1.1
		HVL381C	15	C1 = 10.2~10.8, C3 = 5.90~6.35	1.650~1.785	1/3	0.50
		HVL385C	15	C0.5 = 7.30~7.70, C2.5 = 2.90~3.18	2.43~2.57	0.5/2.5	0.75
		HVL388C	15	C1 = 3.162~3.465, C3 = 1.570~1.720	1.88~2.15	1/3	0.75
		HVL396C	10	C1 = 14.6~15.8, C4 = 5.20~5.80	2.62 min	1/4	0.40
		HVL397C	15	C1 = 27.0~28.5, C2 = 18.0~20.0, C4 = 6.8~8.5	1.3 min	1/2	1.2
					2.9 min	1/4	
		HVL399C	10	C0.5 = 18.5~20.0, C2.5 = 7.3~8.6	2.30~2.46	0.5/2.5	0.4
		HVL400C	15	C1 = 2.05~2.24, C3 = 1.18~1.29	1.60~1.85	1/3	0.70
		RKV603KL	15	C0.5 = 7.38~7.92, C2.5 = 3.26~3.58	2.10~2.40	0.5/2.5	0.75
		RKV604KL	15	C1 = 2.35~2.70, C3 = 1.22~1.42	1.73~2.10	1/3	0.70
		RKV605KL	10	C0.5 = 18.5~20.0, C2.5 = 8.55~9.45	2.02~2.26	0.5/2.5	0.40
	MP6	RKV600KP	15	C1 = 6.62~7.02, C4 = 2.60~2.95	2.35~2.55	1/4	0.60
		RKV601KP	15	C0.5 = 7.30~7.70, C2.5 = 2.90~3.18	2.43~2.57	0.5/2.5	0.75
		RKV602KP	15	C1 = 2.05~2.24, C3 = 1.18~1.29	1.60~1.85	1/3	0.70
		RKV603KP	15	C0.5 = 7.38~7.92, C2.5 = 3.26~3.58	2.10~2.40	0.5/2.5	0.75
		RKV604KP	15	C1 = 2.35~2.70, C3 = 1.22~1.42	1.73~2.10	1/3	0.70
		RKV605KP	10	C0.5 = 18.5~20.0, C2.5 = 8.55~9.45	2.02~2.26	0.5/2.5	0.40
	CMPAK	HVB387BWK	15	C1 = 4.50~5.00, C3 = 1.85~2.80	1.8~2.6	1/3	1.20
	CMPAK-4	HVB350BYP	15	C1 = 15.5~17.0, C4 = 5.0~6.0	2.8 min	1/4	0.5

Variable Capacitance Diodes for Electronic Tuning

Application		Package	Part No.	Ratings	Characteristics			
				V_R (V)	C (pF)	n	C_{VR}/C_{VR}	rs (Ω) max
Digital audio		SFP	RKV651KK	15	C0.2 = 29.5~33.0, C2.3 = 7.80~10.7	2.90~4.10	0.2/2.3	0.6
		EFP	RKV650KL	15	C0.5 = 7.20~7.80, C2.5 = 2.05~2.35	3.25~3.70	0.5/2.5	0.75
			RKV651KL	15	C0.2 = 29.5~33.0, C2.3 = 7.80~10.7	2.90~4.10	0.2/2.3	0.6
			RKV652KL	10	C1 = 2.90~3.30, C3 = 1.12~1.30	2.28~2.90	1/3	1.1
			RKV653KL	10	C1 = 2.60~2.90, C3 = 0.97~1.08	2.40~3.05	1/3	1.8
		MP6	RKV650KP	15	C0.5 = 7.20~7.80, C2.5 = 2.05~2.35	3.25~3.70	0.5/2.5	0.75
			RKV652KP	10	C1 = 2.90~3.30, C3 = 1.12~1.30	2.28~2.90	1/3	1.1
			RKV653KP	10	C1 = 2.60~2.90, C3 = 0.97~1.08	2.40~3.05	1/3	1.8
BS/CS Tuner	Tuning	URP	HVU316	30	C1 = 5.16~7.22, C25 = 0.48~0.76	9.0 min	1/25	1.20
			HVU417C	30	C1 = 7.8~9.4, C25 = 0.5~0.6	13.0 min	1/25	1.50
		UFP	HVC316	30	C1 = 5.16~7.22, C25 = 0.48~0.76	9.0 min	1/25	2.20
			HVC417C	30	C1 = 7.8~9.4, C25 = 0.5~0.6	13.0min	1/25	1.50
		SFP	HVD316	30	C1 = 5.16~7.22, C25 = 0.48~0.76	9.0 min	1/25	2.20
TV Tuner	UHF Tuning	URP	HVU202A	34	C2 = 14.11~16.47, C25 = 2.06~2.35	6.2 min	2/25	0.57
			HVU202B	35^	C2 = 14.15~15.75, C25 = 2.06~2.35	6.3 min	2/25	0.57
			HVU326C	15	C1 = 13.0~16.0, C10 = 2.00~2.30	6.0 min	1/10	0.60
			RKV500KG	34	C2 = 14.15~15.75, C25 = 1.89~2.18	6.3 min	2/25	0.57
		UFP	HVC202A	34	C2 = 14.11~16.47, C25 = 2.06~2.35	6.2 min	2/25	0.57
			HVC202B	35^	C2 = 14.15~15.75, C25 = 2.06~2.35	6.3 min	2/25	0.57
			HVC326C	15	C1 = 13.0~16.0, C10 = 2.00~2.30	6.0 min	1/10	0.60
			RKV500KJ	34	C2 = 14.15~15.75, C25 = 1.89~2.18	6.3 min	2/25	0.57
		SFP	HVD326C	15	C1 = 13.0~16.0, C10 = 2.00~2.30	6.0 min	1/10	0.60
			RKV500KK	34	C2 = 14.15~15.75, C25 = 1.89~2.18	6.3 min	2/25	0.57
	VHF Tuning	URP	HVU200A	32	C2 = 27.7~31.8, C25 = 2.67~3.03	10.0 min	2/25	0.70
			HVU300B	34	C2 = 47.0~53.0, C25 = 2.65~3.00	17.0 min	2/25	1.10
			HVU300C	34	C2 = 39.5~47.0, C25 = 2.60~3.00	14.5 min	2/25	1.10
			HVU306B	34	C2 = 29.5~33.5, C25 = 2.60~2.90	11.0 min	2/25	0.75
			HVU306C	34	C2 = 29.5~34.0, C25 = 2.57~2.90	11.0 min	2/25	0.75
			HVU307	32	C2 = 32.20~37.50, C25 = 2.57~3.00	12.0 min	2/25	0.85
			HVU327C	15	C1 = 30.5~33.5, C10 = 2.60~2.90	11.0 min	1/10	0.80
			HVU328C	15	C1 = 41.0~45.0, C10 = 2.60~2.90	14.5 min	1/10	1.20
			HVU363A	32	C1 = 34.65~42.35, C28 = 2.361~2.754	13.5 min	1/28	0.75
			HVU363B	32	C1 = 36.0~42.0, C28 = 2.36~2.75	13.7 min	1/28	0.75
			RKV501KG	34	C2 = 29.5~34.0, C25 = 2.45~2.78	11.0 min	2/25	0.75
			RKV502KG	34	C2 = 41.5~47.0, C25 = 2.60~3.00	14.5 min	2/25	1.10
		UFP	HVC200A	32	C2 = 27.7~31.8, C25 = 2.67~3.03	10.0 min	2/25	0.70
			HVC300B	34	C2 = 47.0~53.0, C25 = 2.65~3.00	17.0 min	2/25	1.10
			HVC300C	34	C2 = 39.5~47.0, C25 = 2.60~3.00	14.5 min	2/25	1.10
			HVC306B	34	C2 = 29.5~33.5, C25 = 2.60~2.90	11.0 min	2/25	0.75
			HVC306C	34	C2 = 29.5~34.0, C25 = 2.57~2.90	11.0 min	2/25	0.75
			HVC307	32	C2 = 32.2~37.5, C25 = 2.57~3.00	12.0 min	2/25	0.85
			HVC327C	15	C1 = 30.5~33.5, C10 = 2.60~2.90	11.0 min	1/10	0.80
			HVC328C	15	C1 = 41.0~45.0, C10 = 2.60~2.90	14.5 min	1/10	1.20
			HVC363A	32	C1 = 34.65~42.35, C28 = 2.361~2.754	13.5 min	1/28	0.75
			HVC363B	32	C1 = 36.0~42.0, C28 = 2.36~2.75	13.7 min	1/28	0.75
			RKV501KJ	34	C2 = 29.5~34.0, C25 = 2.45~2.78	11.0 min	2/25	0.75
			RKV502KJ	34	C2 = 41.5~47.0, C25 = 2.60~3.00	14.5 min	2/25	1.1
		SFP	HVD327C	15	C1 = 30.5~33.5, C10 = 2.60~2.90	11.0 min	1/10	0.80
			HVD328C	15	C1 = 41.0~45.0, C10 = 2.60~2.90	14.5 min	1/10	1.20
			RKV501KK	34	C2 = 29.5~34.0, C25 = 2.45~2.78	11.0 min	2/25	0.75
			RKV502KK	34	C2 = 41.5~47.0, C25 = 2.60~3.00	14.5 min	2/25	1.1
	AFC	UFP	HVC308A	35	C2 = 13.7~15.9, C20 = 1.65~2.06	7.12 min	2/20	0.95
FM Tuner	Tuning	MPAK	HVM16	14	C2 = 43.0~48.1, C8 = 24.6~29.2	1.65~1.75	2/8	—
			HVM27WK	20	C1 = 52.0~62.0, C2 = 43.0~48.1, C8 = 24.0~28.0	1.8 min	1/8	0.40
						1.7 min	2/8	
		CMPAK	HVB27WK	15	C1 = 52.0~62.0, C2 = 43.0~48.0, C8 = 24.0~28.0	1.8 min	1/8	0.40
						1.7 min	2/8	

High Frequency Switching Diodes

Application	Package	Part No.	Ratings			Characteristics							
			V_R (V)	I_F (mA)	Pd (mW)	V_F (V) max.	I_F (mA)	C (pF) max.	V_R (V)	f (MHz)	rf (Ω) max.	I_F (mA)	f (MHz)
High frequency switching	MPAK	HSM2694	35	—	150	1.0	10	1.2	6	1	0.9	2	100
	URP	HSU277	35	—	150	1.0	10	1.2	6	1	0.7	2	100
	UFP	HSC277	35	—	150	1.0	10	1.2	6	1	0.7	2	100
		RKS151KJ	35	—	150	1.0	10	0.8	6	1	0.7	2	100
	SFP	RKS150KK	35	—	150	1.0	10	1.2	6	1	0.7	2	100
		RKS151KK	35	—	150	1.0	10	0.8	6	1	0.7	2	100

Notes) ^: VRM, R_L = 10 kΩ

PIN Diodes for Antenna Switch

Application	Package	Part No.	Ratings			Characteristics							
			V_R (V)	I_F (mA)	Pd (mW)	V_F (V) max.	I_F (mA)	C (pF) max.	V_R (V)	f (MHz)	rf (Ω) max.	I_F (mA)	f (MHz)
Antenna switching	URP	HVU131	60	100	150	1.0	10	0.8	1	1	1.0	10	100
		HVU133	30	—	150	0.85	2	1	1	1	0.7	2	100
		HVU145	60	50	150	0.9	2	0.45	1	1	1.8	10	100
	UFP	HVC131	60	100	150	1.0	10	0.8	1	1	1.0	10	100
		HVC132	60	100	150	1.0	10	0.5	1	1	2.0	10	100
		HVC142A	30	100	150	1.0	10	0.35	1	1	1.3	10	100
		HVC145	60	50	150	0.9	2	0.45	1	1	1.8	10	100
	SFP	HVD131	60	100	150	1.0	10	0.8	1	1	1.0	10	100
		HVD132	60	100	150	1.0	10	0.5	1	1	2.0	10	100
		HVD142A	30	100	150	1.0	10	0.35	1	1	1.3	10	100
		HVD144A	30	100	150	0.9	2	0.43	1	1	1.8	2	100
		HVD145	60	50	150	0.9	2	0.45	1	1	1.8	10	100
		HVD147	30	100	150	1.0	10	0.31	1	1	2.5 typ	2	100
											1.5	10	100
		RKP201KK	30	100	150	0.9	2	0.35	1	1	2.0	2	100
	EFP	HVL133A	30	—	100	0.85	2	1	1	1	0.7	2	100
		HVL138A	30	100	100	0.9	2	0.85	1	1	1.1	2	100
		HVL142A	30	100	100	1.0	10	0.35	1	1	1.3	10	100
		HVL144A	30	100	100	0.9	2	0.43	1	1	1.8	2	100
		HVL145	60	50	100	0.9	2	0.45	1	1	1.8	10	100
		HVL147	30	100	100	1.0	10	0.31	1	1	2.5 typ	2	100
											1.5	10	100
		RKP201KL	30	100	100	0.9	2	0.35	1	1	2.0	2	100
	MP6	RKP200KP	30	100	100	1.0	10	0.35	1	1	1.3	10	100
	MFP12	RKP400KS	30	100	100	1.0	10	0.35	1	1	1.3	10	100
											2.0	2	100
		RKP401KS	30	100	150	1.0	10	0.35	1	1	1.3	10	100
								0.31	1	1	2.5	2	
											1.5	10	
		RKP402KS	30	100	100	1.0	10	0.35	1	1	1.3	10	100
		RKP403KS	30	100	100	0.9	2	0.35	1	1	2.0	2	100
						1.0	10				1.3	10	
		RKP404KS	30	100	100	0.9	2	0.35	1	1	2.0	2	100
						1.0	10				1.3	10	
		★ RKP405KS	30	100	100	1.0	10	0.35	1	1	1.3	10	100
		★ RKP406KS	30	100	100	0.9	2	0.35	1	1	2.0	2	100
						1.0	10				1.3	10	
		★ RKP407KS	30	100	100	0.9	2	0.35	1	1	2.0	2	100
						1.0	10				1.3	10	
		★ RKP408KS	30	100	100	1.0	10	0.31	1	1	1.5	10	100
		★ RKP409KS	30	100	100	0.9	2	0.35	1	1	2.0	2	100
						1.0	10	0.31			1.5	10	
		★ RKP410KS	30	100	100	0.9	2	0.35	1	1	2.0	2	100
						1.0	10				1.3	10	
		★ RKP411KS	30	100	100	1.0	10	0.35	1	1	1.3	10	100

PIN Diodes for Attenuators

Application	Package	Part No.	Ratings			Characteristics							
			V_R (V)	I_F (mA)	Pd (mW)	V_F (V) max.	I_F (mA)	C (pF) max.	V_R (V)	f (MHz)	rf (Ω) max.	I_F (mA)	f (MHz)
Attenuator	MPAK	HVM14	50	50	100	1	50	0.25 typ	50	1	7	10	100
		HVM14S	50	50	100	1	50	0.25 typ	50	1	7	10	100
		HVM14SR	50	50	100	1	50	0.25 typ	50	1	7	10	100
		HVM187S	60	50	100	1	10	2.4	0	1	5.5	10	100
		HVM187WK	60	50	100	1	10	2.4	0	1	5.5	10	100
		HVM189S	60	50	100	1	10	1.8	0	1	5.5	10	100
	EFP	HVL192	30	50	100	1	10	0.3	1	1	3.2	10	100
		RKP300KL	30	50	100	1	10	0.25	1	1	3.7	10	100
	SFP	HVD191	30	100	150	1	10	0.37	1	1	2.5	10	100
	UFP	HVC190	50	50	150	1	50	0.35	50	1	5	10	100
	URP	HVU187	60	50	100	1	10	2.4	0	1	5.5	10	100
	CMPAK	HVB14S	50	50	100	1	50	0.25 typ	50	1	7	10	100
		HVB190S	50	50	100	1	50	0.35	50	1	5	10	100
	CMPAK-4	HVB187YP	60	50	100	1	10	2.4	0	1	5.5	10	100

Notes) ★: New product

Small Signal Diodes

Application	Package	Part No.	Ratings				Characteristics						
			V_R (V)	I_O (mA)	I_{FSM} (A)	Pd (mW)	V_F (V) max.	I_F (mA)	trr (ns) max.	I_F (mA)	C (pF) max.	V_R (V)	f (MHz)
High speed switching	DO-35	1N4148	75	150	1	500	1.0	10	4.0	10	4.0	0	1
		1S2074(H)	45	150	0.6	250	0.8	10	4.0	10	3.0	1	1
		1S2075(K)	30	100	0.6	250	0.8	10	8.0	10	3.5	1	1
		1S2076	30	150	1	250	0.8	10	8.0	10	3.0	1	1
		1S2076A	60	150	1	250	0.8	10	8.0	10	3.0	1	1
	MHD	1SS119	30	150	1	250	0.8	10	3.5	10	3.0	1	1
		1SS120	60	150	1	250	0.8	10	3.5	10	3.0	1	1
		1SS270	30	150	1	250	0.8	10	3.5	10	3.0	1	1
		1SS270A	60	150	1	250	0.8	10	3.5	10	3.0	1	1
		HSS104	35	110	0.4	300	1.2	100	3.0	10	3.0	0.5	1
		HSS4148	75	150	1	—	1.0	10	4.0	10	4.0	0	1
	LLD	HSK120	60	150	4	—	0.8	10	3.0	10	3.0	0	1
	MPAK	HSM123	80	100	4	—	1.2	100	3.0	10	4.0	0	1
		HSM124S	80	100	4	—	1.2	100	100	10	4.0	0	1
		HSM221C	80	100	4	—	1.2	100	3.0	10	2.0	0	1
		HSM223C	80	100	4	—	1.2	100	3.0	10	2.0	0	1
		HSM2836C	80	100	4	—	1.2	100	20	10	4.0	0	1
		HSM2838C	80	100	4	—	1.2	100	3.0	10	2.0	0	1
	URP	HSU119	80	100	4	—	1.2	100	3.0	10	2.0	0	1
	UFP	HSC119	80	100	4	—	1.2	100	3.0	10	2.0	0	1
	SFP	HSD119	80	100	4	—	1.2	100	3.0	10	2.0	0	1
	CMPAK	HSB123	80	100	4	—	1.2	100	3.0	10	2.0	0	1
		HSB124S	80	100	4	—	1.2	100	100	10	4.0	0	1
		HSB2836	80	100	4	—	1.2	100	20	10	4.0	0	1
		HSB2838	80	100	4	—	1.2	100	3.0	10	2.0	0	1
High voltage switching	DO-35	1SS81	150	200	1	400	1.0	100	100	30	1.5 typ	0	1
		1SS82	200	200	1	400	1.0	100	100	30	1.5 typ	0	1
		1SS83	250	200	1	400	1.0	100	100	30	1.5 typ	0	1
	MHD	HSS81	150	150	1	400	1.0	100	100	30	1.5 typ	0	1
		HSS82	200	150	1	400	1.0	100	100	30	1.5 typ	0	1
		HSS83	250	150	1	400	1.0	100	100	30	1.5 typ	0	1
	LLD	HSK83	250	150	1	—	1.0	100	100	30	1.5 typ	0	1
	MPAK	HSM83	250	100	2	—	1.2	100	100	30	3.0	0	1
		HSM122	400	150	1	150	1.2	100	20(μs)	30	10	0	1
	URP	HSU83	250	100	2	—	1.2	100	100	30	3.0	0	1
	CMPAK	HSB83	250	100	2	—	1.2	100	100	30	3.0	0	1
	CMPAK-4	HSB83YP	250	100	2	—	1.2	100	100	30	3.0	0	1

(H),(K) indicates high-reliability products.

Schottky Barrier Diodes for Detectors and Mixers

Application	Package	Part No.	Ratings		Characteristics						
			V_R [V_{RRM}] (V)	IO [I_F] (mA)	I_F (mA) min.	V_F (V)	V_F (V) max.	I_F (mA)	C (pF) max.	V_R (V)	f (MHz)
Detector and mixer	DO-35	1SS86	3	30	8	0.5	—	—	0.85	0.5	1
		1SS88	10	15	—	—	0.43	1	0.97	0	1
		1SS106	10	30	4.5	1.0	—	—	1.5	1	1
	MHD	1SS198	10	30	4.5	1.0	—	—	1.5	1	1
		1SS286	25	[35]	—	—	0.6	10	1.2	0	1
	URP	HSU88	10	15	—	—	0.42	1	0.8	0	1
		HSU226	[25]	[50]	—	—	0.33	1	2.80	1	1
		HSU227	[25]	50	—	—	0.35	1	3.0	1	1
		HSU276	3	30	35	0.5	—	—	0.85	0.5	1
		HSU276A	[5]	30	35	0.5	—	—	0.85	0.5	1
		HSU285	2	5	—	—	0.15	0.1	0.3 typ	0.5	1
	UFP	HSC88	10	15	—	—	0.42	1	0.8	0	1
		HSC226	[25]	[50]	—	—	0.33	1	2.8	1	1
		HSC276	3	30	35	0.5	—	—	0.85	0.5	1
		HSC276A	[5]	30	35	0.5	—	—	0.85	0.5	1
		HSC278	30	30	—	—	0.3	1	1.5	1	1
		HSC285	2	5	—	—	0.15	0.1	0.3 typ	0.5	1
		RKD700KJ	30	50	—	—	0.43	10	2.8	1	1
	SFP	HSD88	10	15	—	—	0.42	1	0.8	0	1
		HSD226	[25]	[50]	—	—	0.33	1	2.8	1	1
		HSD276A	[5]	30	35	0.5	—	—	0.85	0.5	1
		HSD278	30	30	—	—	0.3	1	1.5	1	1
		RKD700KK	30	50	—	—	0.43	10	2.8	1	1
	EFP	HSL226	[25]	[50]	—	—	0.33	1	2.80	1	1
		HSL276A	3	30	35	0.5	—	—	0.85	0.5	1
		HSL278	30	30	—	—	0.30	1	1.50	1	1
		HSL285	2	5	—	—	0.15	0.1	0.3 typ	0.5	1
		RKD700KL	30	50	—	—	0.43	10	2.8	1	1
	MP6	★ RKD702KP	[30]	[50]	—	—	0.35	1	2.50	1	1
		★ RKD750KP	2	5	—	—	0.15	0.1	0.3 typ	0.5	1
		★ RKD751KP	3	30	35	0.5	—	—	1.0	0.5	1
	MPAK	HSM88AS	10	15	—	—	0.42	1	0.85	0	1
		HSM88ASR	10	15	—	—	0.42	1	0.85	0	1
		HSM88WA	10	15	—	—	0.42	1	0.85	0	1
		HSM88WK	10	15	—	—	0.42	1	0.85	0	1
		HSM198S	10	30	4.5	1.0	1.1	5	1.5	1	1
		HSM226S	[25]	[50]	—	—	0.33	1	2.8	1	1
		HSM276AS	[5]	30	35	0.5	—	—	0.9	0.5	1
		HSM276ASR	[5]	30	35	0.5	—	—	0.9	0.5	1
		HSM276S	3	30	35	0.5	—	—	0.9	0.5	1
		HSM276SR	3	30	35	0.5	—	—	0.9	0.5	1
	CMPAK	HSB226S	[25]	[50]	—	—	0.33	1	2.8	1	1
		HSB226WK	[25]	[50]	—	—	0.33	1	2.8	1	1
		HSB276S	3	30	35	0.5	—	—	0.9	0.5	1
		HSB276AS	[5]	30	35	0.5	—	—	0.9	0.5	1
		HSB278S	30	30	—	—	0.3	1	1.5	1	1
		HSB285S	2	5	—	—	0.15	0.1	0.3 typ	0.5	1
		HSB88AS	10	15	—	—	0.42	1	0.8	0	1
		HSB88WA	10	15	—	—	0.42	1	0.8	0	1
		HSB88WK	10	15	—	—	0.42	1	0.8	0	1
	CMPAK-4	HSB226YP	[25]	[50]	—	—	0.33	1	2.8	1	1
		HSB88YP	10	15	—	—	0.42	1	0.8	0	1
		HSB276AYP	[5]	30	35	0.5	—	—	0.85	0.5	1
	MOP	HSB88WS	10	15	—	—	0.435	1	0.85	0	1

Notes) ★: New product

Schottky Barrier Diodes for High Speed Switching

Application	Package		Part No.	Elements S: Single D: Double	Ratings		Characteristics			
					V_{RRM} (V)	I_O [I_F] (A)	V_F (V) max.	I_F (A)	I_R (μA) max.	V_R (V)
High speed switching	MPAK	V	HRW0202A	D	20	0.2	0.40	0.1	50	20
		V	HRW0202B	D	20	0.2	0.42	0.1	10	20
			HRW0203A	S	30	0.2	0.50	0.2	50	30
			HRW0203B	S	30	0.2	0.50	0.2	50	30
		V	HRW0302A	S	20	0.3	0.40	0.3	100	20
		V	HRW0502A	S	20	0.5	0.40	0.5	200	20
			HRW0503A	S	30	0.5	0.55	0.5	50	30
			HRW0702A	S	20	[0.7]	0.43	0.7	200	20
			HRW0703A	S	30	[0.7]	0.50	0.7	100	30
	EFP	V	HRL0103C	S	30	0.1	0.60	0.1	0.1	5
	SFP		HRD0103C	S	30	0.1	0.60	0.1	0.1	5
			HRD0203C	S	30	0.2	0.45	0.2	30	10
	TURP	V	HRV103A	S	30	1	0.36	0.7	1000	30
			HRV103B	S	30	1	0.45	0.7	100	30
		★	RKR0505AKH	S	50	0.5	0.46	0.5	400	20
		★	RKR0505BKH	S	50	0.5	0.60	0.5	40	30
		★	RKR0703BKH	S	30	0.7	0.55	0.7	50	30
		★	RKR104BKH	S	40	1	0.55	0.7	50	40
	URP		HRU0103A	S	30	0.1	0.44	0.1	50	30
			HRU0203A	S	30	0.2	0.50	0.2	50	30
			HRU0302A	S	20	0.3	0.40	0.3	100	20
	UFP		HRC0103A	S	30	0.1	0.44	0.1	50	30
			HRC0103C	S	30	0.1	0.60	0.1	0.1	5
		V	HRC0201A	S	15	0.2	0.39	0.2	50	6
			HRC0203B	S	30	0.2	0.52	0.2	10	30
			HRC0203C	S	30	0.2	0.45	0.2	30	10
	CMPAK		HRB0103A	S	30	0.1	0.44	0.1	50	30
			HRB0103B	D	30	0.1	0.44	0.1	50	30
		V	HRB0502A	S	20	[0.5]	0.40	0.5	200	20
	CMPAK-4		HSB0104YP	D	40	[0.1]	0.58	0.1	50	40

Notes) ★: New product
V : Low-forward-voltage products

System Protection Diodes

Application	Package	Part No.	Ratings			Characteristics			
			V_R [V_{RRM}] (V)	I_O (mA)	I_{FSM} (A)	V_F (V) max.	I_F (mA)	I_R (mA) max.	V_R (V)
System protection	MPAK	HSM107S	8	50	0.5	0.3	10	30	5
		HSM126S	[20]	200	2	0.35	10	2	5

Zener Diodes for Surge Absorption

Application	Package		Part No.	Ratings Pd (mW)	Characteristics Vz (V)	Iz (mA)	C (pF) max.	VR (V)	ESD (kV) min.
Surge absorption	EFP	*	HZL6.2Z4	100	5.9~6.5	5	4.0	0	8
		*	HZL6.8Z4	100	6.47~7.0	5	4.0	0	8
			RKZ6.2KL	100	5.86~6.53	5	—	—	30
	SFP	*	HZD6.2Z4	150	5.90~6.50	5	4.0	0	8
		*	HZD6.8Z4	150	6.47~7.00	5	4.0	0	8
	UFP		HZC2.0	150	1.90~2.20	5	—	—	30
			HZC2.2	150	2.10~2.40	5	—	—	30
			HZC2.4	150	2.30~2.60	5	—	—	30
			HZC2.7	150	2.50~2.90	5	—	—	30
			HZC3.0	150	2.80~3.20	5	—	—	30
			HZC3.3	150	3.10~3.50	5	—	—	30
			HZC3.6	150	3.40~3.80	5	—	—	30
			HZC3.9	150	3.70~4.10	5	—	—	30
			HZC4.3	150	4.01~4.48	5	—	—	30
			HZC4.7	150	4.42~4.90	5	—	—	30
			HZC5.1	150	4.84~5.37	5	—	—	30
			HZC5.6	150	5.31~5.92	5	—	—	30
			HZC6.2	150	5.86~6.53	5	—	—	30
			HZC6.8	150	6.47~7.14	5	—	—	30
			HZC7.5	150	7.06~7.84	5	—	—	30
			HZC8.2	150	7.76~8.64	5	—	—	30
			HZC9.1	150	8.56~9.55	5	—	—	30
			HZC10	150	9.45~10.55	5	—	—	30
			HZC11	150	10.44~11.56	5	—	—	30
			HZC12	150	11.42~12.60	5	—	—	30
			HZC13	150	12.47~13.96	5	—	—	30
			HZC15	150	13.84~15.52	5	—	—	30
			HZC16	150	15.37~17.09	5	—	—	30
			HZC18	150	16.94~19.03	5	—	—	30
			HZC20	150	18.86~21.08	5	—	—	30
			HZC22	150	20.88~23.17	5	—	—	30
			HZC24	150	22.93~25.57	5	—	—	30
			HZC27	150	25.10~28.90	2	—	—	30
			HZC30	150	28.00~32.00	2	—	—	30
			HZC33	150	31.00~35.00	2	—	—	25
			HZC36	150	34.00~38.00	2	—	—	20
	URP	*	HZU5.6Z	200	5.31~5.92	5	8.5	0	8
		*	HZU6.2Z	200	5.9~6.5	5	8.5	0	—
			HZU6.8Z	200	6.47~7.0	5	25	0	20
			HZU5.1G	200	4.84~5.37	5	—	—	30
			HZU5.6G	200	5.31~5.92	5	—	—	30
			HZU6.2G	200	5.86~6.53	5	—	—	30
			HZU6.8G	200	6.47~7.14	5	—	—	30
			HZU7.5G	200	7.06~7.84	5	—	—	30
			HZU8.2G	200	7.76~8.64	5	—	—	30
			HZU9.1G	200	8.56~9.55	5	—	—	30
			HZU10G	200	9.45~10.55	5	—	—	30
			HZU12G	200	11.42~12.60	5	—	—	30
			HZU13G	200	12.47~13.96	5	—	—	30
	MPAK		HZM3.3WA	200	3.10~3.50	5	—	—	30
		*	HZM6.2ZMWA	200	5.9~6.5	5	8.5	0	13
		*	HZM6.2Z4MWA	200	5.9~6.5	5	(4)	0	8
			HZM6.8ZMWA	200	6.47~7.0	5	25	0	20
		*	HZM6.8Z4MWA	200	6.47~7.0	5	(4)	0	8
			HZM6.8MWA	200	6.47~7.0	5	130	0	30
			HZM27WA	200	25.1~28.9	2	(27)	0	30
	MPAK-5	*	HZM5.6ZFA	200	5.31~5.92	5	8.5	0	8
		*	HZM6.2ZMFA	200	5.9~6.5	5	8.5	0	13
		*	HZM6.2Z4MFA	200	5.9~6.5	5	(4)	0	8
			HZM6.8ZMFA	200	6.47~7.0	5	25	0	25
		*	HZM6.8Z4MFA	200	6.47~7.0	5	(4)	0	8
			HZM6.8MFA	200	6.47~7.0	5	130	0	30
			HZM27FA	200	25.1~28.9	2	(27)	0	30
	CMPAK		HZB6.8MWA	200	6.47~7.0	5	130	0	30
	VSON-5		RKZ6.2Z4MFAKT	150	5.90~6.50	5	(4.0)/4.5	0	8
			RKZ6.8ZMFAKT	150	6.47~7.0	5	25	0	25
			RKZ6.8Z4MFAKT	150	6.47~7.0	5	(4.0)/4.5	0	8
Bidirectional Surge absorption	SFP		RKZ6.8TKK	150	5.80~7.80	5	—	—	25
	UFP		RKZ6.8TKJ	150	5.80~7.80	5	—	—	25

( )Typ. Value Reference value

Notes) ★: New product
V: Low-forward-voltage products
*: Low capacitance version

Zener Diodes for Temperature Compensation

Application	Package	Part No.	Ratings		Characteristics				
			Pd (mW) Value at Ta=75°C	Topr (°C)	Vz (V)	Iz (mA)	γz (mv/°C) Typ.	Iz (mA)	Topr (°C)
Temperature compensation	DO-35	HZT33	200	-20~+75	31.0~35.0	5	1 (Absolute Value)	5	-20~+25~+75

Zener Diodes for Stabilized Power Supply

Application	Package	Part No.	Ratings Pd (mW)	Charactristics Vz (V)	Iz (mA)
General	DO-35	HZ Series	500	1.6~38.0	5~2
		HZ(H) Series	500	1.6~38.0	5~2
	MHD	HZS Series	400	1.6~38.0	5~2
		HZS-N Series	400	1.88~38.52	5
	LLD	HZK Series	500	1.9~38.0	5~2
	MPAK	HZM-N Series	200	1.9~38.0	5~2
	URP	HZU Series	200	1.9~38.0	5~2
		★ RKZ-KG Series	200	1.9~38.0	5~2
	SFP	★ RKZ-KK Series	150	1.9~38.0	5~2
	EFP	★ RKZ-KL Series	150	1.9~38.0	5~2

Application	Package	Part No.	Ratings Pd (mW)	Charactristics Vz (V)	Iz (mA)
Low noise	DO-35	HZ-L Series	400	5.2~38.0	0.5
		HZ-LL Series	250	1.6~5.3	0.5
	MHD	HZS-L Series	400	5.2~38.0	0.5
		HZS-LL Series	250	1.6~5.3	0.5
	LLD	HZK-L Series	400	5.2~38.0	0.5
		HZK-LL Series	250	1.6~5.3	0.5
	URP	HZU-L Series	150	5.2~14.3	0.5
		HZU-LL Series	150	1.6~5.3	0.5
High power	DO-41	HZ-P Series	1000	1.88~40.0	40-10

(H) indicates high-reliability products.

Note) ★: New product

Series		HZUxxLL		HZxxLL HZKxxLL HZSxxLL		HZSxx		HZxxL HZKxxL HZSxxL		HZU-xxL		HZxx HZxx(H) HZKxx HZK-Gxx	
Pd (mW)		150		250		400		400		150		500	
Classification	Grade	Spec. Vz (V) min	max	Spec. Vz (V) min	max	Spec. Vz (V) min	max	Spec. Vz (V) min	max	Spec. Vz (V) min	max	Spec. Vz (V) min	max
2	A	1.6	2.0	1.6	2.0	1.6	2.0	—	—	—	—	1.6	2.0
	B	1.9	2.3	1.9	2.3	1.9	2.3					1.9	2.3
	C	2.2	2.6	2.2	2.6	2.2	2.6					2.2	2.6
3	A	2.5	2.9	2.5	2.9	2.5	2.9	—	—	—	—	2.5	2.9
	B	2.8	3.2	2.8	3.2	2.8	3.2					2.8	3.2
	C	3.1	3.5	3.1	3.5	3.1	3.5					3.1	3.5
4	A	3.4	3.8	3.4	3.8	3.4	3.8	—	—	—	—	3.4	3.8
	B	3.7	4.1	3.7	4.1	3.7	4.1					3.7	4.1
	C	4.0	4.4	4.0	4.4	4.0	4.4					4.0	4.4
5	A	4.3	4.7	4.3	4.7	4.3	4.7	—	—	—	—	4.3	4.7
	B	4.6	5.0	4.6	5.0	4.6	5.0					4.6	5.0
	C	4.9	5.3	4.9	5.3	4.9	5.3					4.9	5.3
6	A	—	—	—	—	5.2	5.7	5.2	5.7	5.2	5.7	5.2	5.7
	B					5.5	6.0	5.5	6.0	5.5	6.0	5.5	6.0
	C					5.8	6.4	5.8	6.4	5.8	6.4	5.8	6.4
7	A	—	—	—	—	6.3	6.9	6.3	6.9	6.3	6.9	6.3	6.9
	B					6.7	7.3	6.7	7.3	6.7	7.3	6.7	7.3
	C					7.2	7.9	7.2	7.9	7.2	7.9	7.2	7.9
9	A	—	—	—	—	7.7	8.5	7.7	8.5	7.7	8.5	7.7	8.5
	B					8.3	9.1	8.3	9.1	8.3	9.1	8.3	9.1
	C					8.9	9.7	8.9	9.7	8.9	9.7	8.9	9.7
11	A	—	—	—	—	9.5	10.3	9.5	10.3	9.5	10.3	9.5	10.3
	B					10.2	11.1	10.2	11.1	10.2	11.1	10.2	11.1
	C					10.9	11.9	10.9	11.9	10.9	11.9	10.9	11.9
12	A	—	—	—	—	11.6	12.7	11.6	12.7	11.6	12.7	11.6	12.7
	B					12.4	13.4	12.4	13.4	12.4	13.4	12.4	13.4
	C					13.2	14.3	13.2	14.3	13.2	14.3	13.2	14.3
15	—	—	—	—	—	14.1	15.5	14.1	15.5	—	—	14.1	15.5
16	—	—	—	—	—	15.3	17.1	15.3	17.1	—	—	15.3	17.1
18	—	—	—	—	—	16.9	19.0	16.9	19.0	—	—	16.9	19.0
20	—	—	—	—	—	18.8	21.1	18.8	21.1	—	—	18.8	21.1
22	—	—	—	—	—	20.9	23.3	20.9	23.3	—	—	20.9	23.3
24	—	—	—	—	—	22.9	25.5	22.9	25.5	—	—	22.9	25.5
27	—	—	—	—	—	25.2	28.6	25.2	28.6	—	—	25.2	28.6
30	—	—	—	—	—	28.2	31.6	28.2	31.6	—	—	28.2	31.6
33	—	—	—	—	—	31.2	34.6	31.2	34.6	—	—	31.2	34.6
36	—	—	—	—	—	34.2	38.0	34.2	38.0	—	—	34.2	38.0

Zener diodes have grades sub divided by zener voltage.

Series	HZMxxN HZUxx		[RKZxxKG] RKZxxKK RKZxxKL		HZSxxN		HZxxP	
Pd (mW)	200		[200] 150		400		1000	
Classification	Spec. Vz (V) min	max	Spec. Vz (V) min	max	Spec. Vz (V) min	max	Spec. Vz (V) min	max
2.0	1.90	2.20	1.90	2.20	1.88	2.20	1.88	2.24
2.2	2.10	2.40	2.10	2.40	2.12	2.41	2.08	2.45
2.4	2.30	2.60	2.30	2.60	2.33	2.63	2.28	2.70
2.7	2.50	2.90	2.65	2.90	2.54	2.91	2.50	3.10
3.0	2.80	3.20	2.95	3.20	2.85	3.22	2.80	3.40
3.3	3.10	3.50	3.25	3.50	3.16	3.53	3.10	3.70
3.6	3.40	3.80	3.55	3.80	3.47	3.83	3.40	4.00
3.9	3.70	4.10	3.87	4.10	3.77	4.14	3.70	4.40
4.3	4.01	4.48	4.15	4.34	4.05	4.53	4.00	4.80
4.7	4.42	4.90	4.55	4.75	4.47	4.91	4.40	5.20
5.1	4.84	5.37	4.98	5.20	4.85	5.35	4.80	5.70
5.6	5.31	5.92	5.49	5.73	5.29	5.88	5.30	6.30
6.2	5.86	6.53	6.06	6.33	5.81	6.40	5.80	7.00
6.8	6.47	7.14	6.65	6.93	6.32	6.97	6.40	7.70
7.5	7.06	7.84	7.28	7.60	6.88	7.64	7.00	8.40
8.2	7.76	8.64	8.02	8.36	7.56	8.41	7.70	9.30
9.1	8.56	9.55	8.85	9.23	8.33	9.29	8.50	10.2
10	9.45	10.55	9.77	10.21	9.19	10.30	9.40	11.2
11	10.44	11.56	10.76	11.22	10.18	11.26	10.4	12.3
12	11.42	12.60	11.74	12.24	11.13	12.30	11.4	13.5
13	12.47	13.96	12.91	13.49	12.18	13.62	12.4	15.0
15	13.84	15.52	14.34	14.98	13.48	15.02	13.8	16.5
16	15.37	17.09	15.85	16.51	14.87	16.50	15.3	18.3
18	16.94	19.03	17.56	18.35	16.34	18.30	16.8	20.3
20	18.86	21.08	19.52	20.39	18.14	20.45	18.8	22.4
22	20.88	23.17	21.54	22.47	20.23	22.61	20.8	24.5
24	22.93	25.57	23.72	24.78	22.26	24.81	22.8	27.6
27	25.10	28.90	25.10	28.90	24.26	27.64	25.1	30.8
30	28.00	32.00	28.00	32.00	26.99	30.51	28.0	34.0
33	31.00	35.00	31.00	35.00	29.68	33.11	31.0	37.0
36	34.00	38.00	34.00	38.00	32.14	35.77	34.0	40.0
39	—	—	—	—	34.68	38.52	—	—

Zener Diodes for Stabilized Power Supply (Overseas sales only)

Application	Package	Part No.	Ratings Pd (mW)	Charactristics Vz (V)	Iz (mA)
General	DO-41	1N47xx Series	1000	3.3 ± 5 (%) ~36 ± 5 (%)	76~7.0
	DO-35	1N52xx Series	500	2.7 ± 5 (%) ~36 ± 5 (%)	20~3.4
	LLD	RKZ-KD Series	500	1.9~38.0	5~2

Part No.	Spec. Vz(V) Max.	Pd (mW)
1N4728A	3.3 ± 5 (%)	1000
1N4729A	3.6 ± 5 (%)	
1N4730A	3.9 ± 5 (%)	
1N4731A	4.3 ± 5 (%)	
1N4732A	4.7 ± 5 (%)	
1N4733A	5.1 ± 5 (%)	
1N4734A	5.6 ± 5 (%)	
1N4735A	6.2 ± 5 (%)	
1N4736A	6.8 ± 5 (%)	
1N4737A	7.5 ± 5 (%)	
1N4738A	8.2 ± 5 (%)	
1N4739A	9.1 ± 5 (%)	
1N4740A	10 ± 5 (%)	
1N4741A	11 ± 5 (%)	
1N4742A	12 ± 5 (%)	
1N4743A	13 ± 5 (%)	
1N4744A	15 ± 5 (%)	
1N4745A	16 ± 5 (%)	
1N4746A	18 ± 5 (%)	
1N4747A	20 ± 5 (%)	
1N4748A	22 ± 5 (%)	
1N4749A	24 ± 5 (%)	
1N4750A	27 ± 5 (%)	
1N4751A	30 ± 5 (%)	
1N4752A	33 ± 5 (%)	
1N4753A	36 ± 5 (%)	

Part No.	Spec. Vz(V) Max.	Pd (mW)
1N5223B	2.7 ± 5 (%)	500
1N5224B	2.8 ± 5 (%)	
1N5225B	3.0 ± 5 (%)	
1N5226B	3.3 ± 5 (%)	
1N5227B	3.6 ± 5 (%)	
1N5228B	3.9 ± 5 (%)	
1N5229B	4.3 ± 5 (%)	
1N5230B	4.7 ± 5 (%)	
1N5231B	5.1 ± 5 (%)	
1N5232B	5.6 ± 5 (%)	
1N5233B	6.0 ± 5 (%)	
1N5234B	6.2 ± 5 (%)	
1N5235B	6.8 ± 5 (%)	
1N5236B	7.5 ± 5 (%)	
1N5237B	8.2 ± 5 (%)	
1N5238B	8.7 ± 5 (%)	
1N5239B	9.1 ± 5 (%)	
1N5240B	10 ± 5 (%)	
1N5241B	11 ± 5 (%)	
1N5242B	12 ± 5 (%)	
1N5243B	13 ± 5 (%)	
1N5244B	14 ± 5 (%)	
1N5245B	15 ± 5 (%)	
1N5246B	16 ± 5 (%)	
1N5247B	17 ± 5 (%)	
1N5248B	18 ± 5 (%)	
1N5249B	19 ± 5 (%)	
1N5250B	20 ± 5 (%)	
1N5251B	22 ± 5 (%)	
1N5252B	24 ± 5 (%)	
1N5253B	25 ± 5 (%)	
1N5254B	27 ± 5 (%)	
1N5255B	28 ± 5 (%)	
1N5256B	30 ± 5 (%)	
1N5257B	33 ± 5 (%)	
1N5258B	36 ± 5 (%)	

Part No.	Spec. Vz(V) Min.	Spec. Vz(V) Max.	Pd (mW)
RKZ2BKD	1.9	2.3	500
RKZ2CKD	2.2	2.6	
RKZ3AKD	2.5	2.9	
RKZ3BKD	2.8	3.2	
RKZ3CKD	3.1	3.5	
RKZ4AKD	3.4	3.8	
RKZ4BKD	3.7	4.1	
RKZ4CKD	4.0	4.4	
RKZ5AKD	4.3	4.7	
RKZ5BKD	4.6	5.0	
RKZ5CKD	4.9	5.3	
RKZ6AKD	5.2	5.7	
RKZ6BKD	5.5	6.0	
RKZ6CKD	5.8	6.4	
RKZ7AKD	6.3	6.9	
RKZ7BKD	6.7	7.3	
RKZ7CKD	7.2	7.9	
RKZ9AKD	7.7	8.5	
RKZ9BKD	8.3	9.1	
RKZ9CKD	8.9	9.7	
RKZ11AKD	9.5	10.3	
RKZ11BKD	10.2	11.1	
RKZ11CKD	10.9	11.9	
RKZ12AKD	11.6	12.7	
RKZ12BKD	12.4	13.4	
RKZ12CKD	13.2	14.3	
RKZ15KD	14.1	15.5	
RKZ16KD	15.3	17.1	
RKZ18KD	16.9	19.0	
RKZ20KD	18.8	21.1	
RKZ22KD	20.9	23.3	
RKZ24KD	22.9	25.5	
RKZ27KD	25.2	28.6	
RKZ30KD	28.2	31.6	
RKZ33KD	31.2	34.6	
RKZ36KD	34.2	38.0	

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