

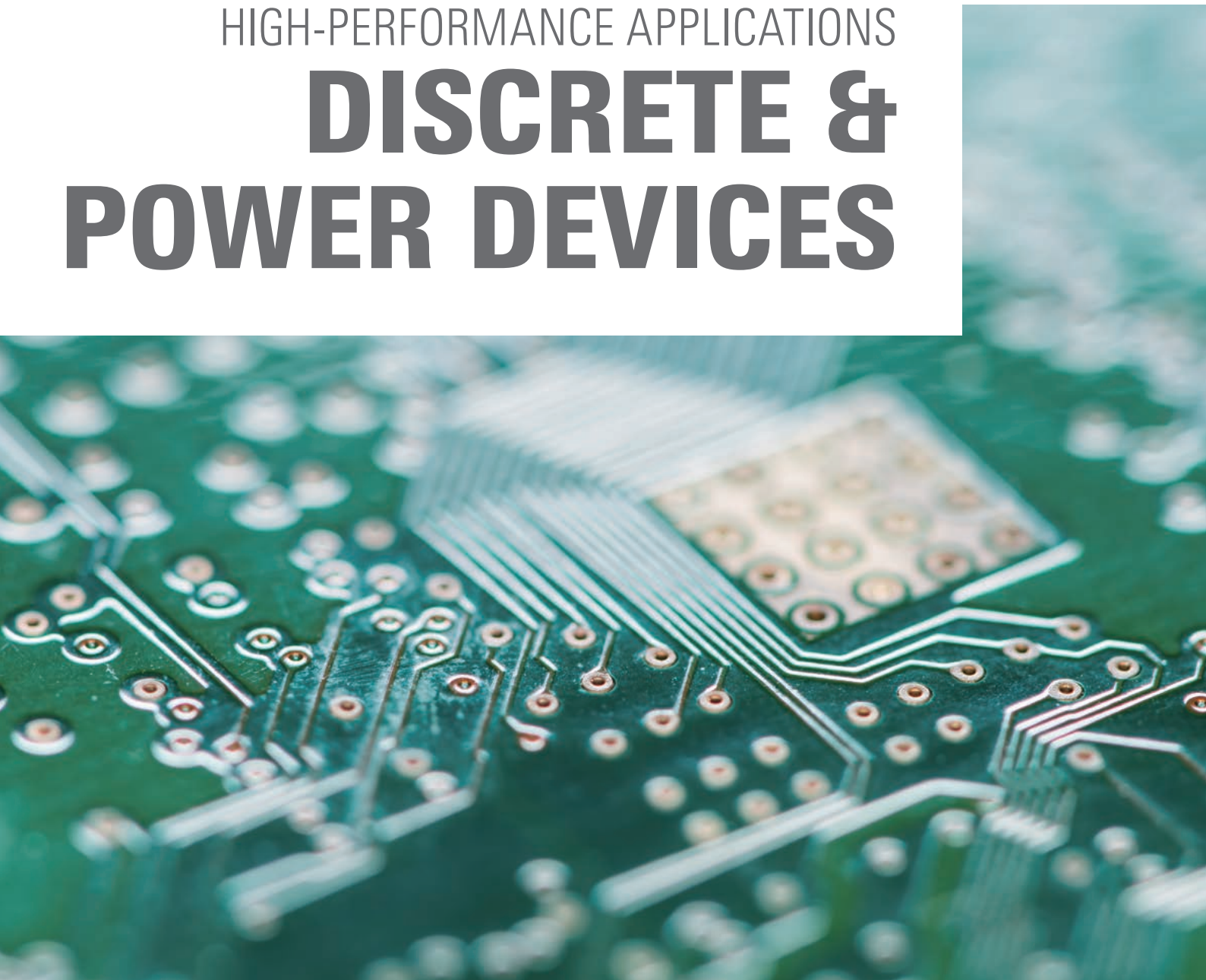
# DISCRETE & POWER DEVICES

Robust, reliable solutions for a wide array of high-performance applications



ROBUST, RELIABLE SOLUTIONS  
FOR A WIDE ARRAY OF  
HIGH-PERFORMANCE APPLICATIONS

# DISCRETE & POWER DEVICES



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Renesas discrete and power devices support a variety of applications. Our product lineup offers support for increasing the performance of and reducing the size and weight of your system.



# TRIACS/THYRISTORS



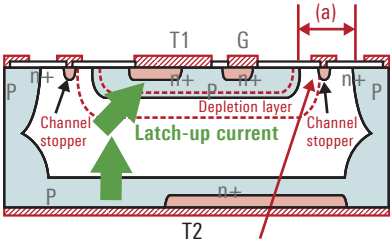
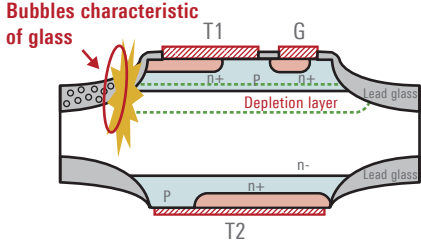
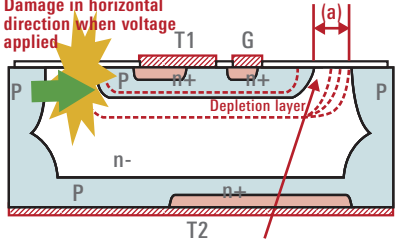
- Reliable Triacs/Thyristors with New Planar Structure

## Low Failure Rate

- Actual failure rate: 0.01ppm or less (long service life)

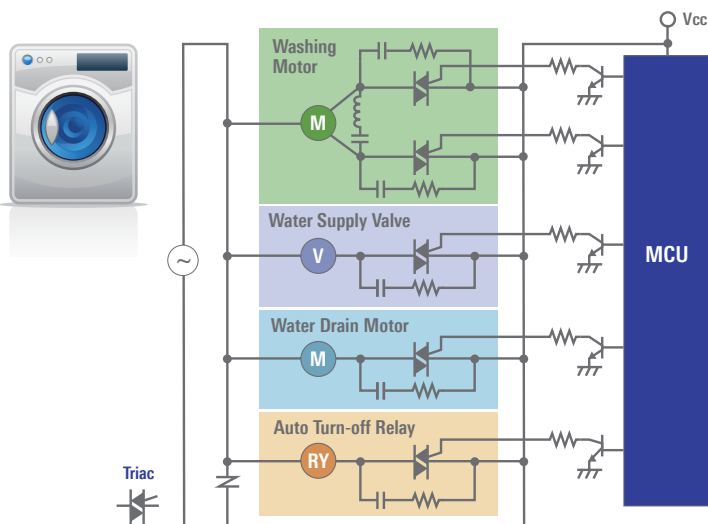
## Ability to Withstand Voltage Stress

- Channel stopper structure for stable performance and ability to withstand voltage stress

	Renesas Planar Structure	Old Structure from 1980s	Old Planar Structure
Structural Comparison	Planar structure Voltage tolerance to spare	Mesa glass structure	Planar structure Structure with no voltage tolerance to spare
	High quality and able to withstand voltage stress	Fragile glass structure	Inability to withstand voltage stress
Comparison Details	 <p>Channel stopper provides stable voltage tolerance (stable under high-temperature, high-voltage testing: high reliability). Distance (a), which determines voltage tolerance, is long (ability to withstand overvoltage: rugged).</p>	 <p>Application of foreign matter (lead glass) causes high off-current (current leakage) at high temperatures. The bubbles characteristic of glass reduce tolerance of physical stress and increase fragility (brittleness).</p>	 <p>Unstable voltage tolerance from lack of countermeasures (fails high-temperature, high-voltage testing: low reliability) Distance (a), which determines voltage tolerance, is short (ability to withstand overvoltage: poor, easily damaged).</p>
Voltage Stress	Lightning surge tests (3A version) No damage at 12kV	Lightning surge tests (3A version) No damage at 12kV	Lightning surge tests (3A version) Damage at 8kV

## Washer Example

## Triacs for Motors, Valves and Relays



## Triacs Part Numbers

	Main Voltage	
	AC100V ~ 120V	AC200V ~ 240V
■ Washing Motor	BCR8FM-14LJ BCR10FM-14LJ	BCR8FM-14LJ
■ Water Supply Valve	BCR1AM-12A BCR08DS-14A	BCR08AM-14A BCR08DS-14A
■ Drain Valve		
■ Turn-off Relay		
Bathwater Pump	BCR3FM-12RB BCR5FM-14LJ	BCR3FM-12RB BCR3FM-14LB BCR3AS-14B

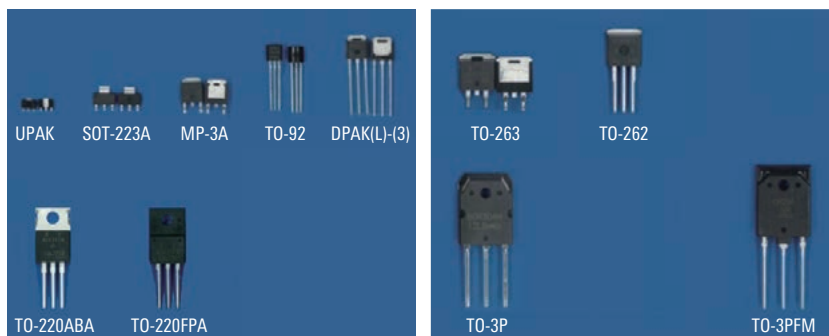
## Triac Product Lineup

Part No.	VDRM (V)	IT (RSM) (A)	ITSM (A)	IGT (mA)	Tj (°C)	Package
BCR08AS-12A	600	0.8	8	5	125	UPAK
BCR08AM-12A	600	0.8	8	5	125	TO-92
BCR1AM-12A	600	1	10	7	125	TO-92
BCR3AS-12B	600	3	30	15	150	MP-3A
BCR5AS-12B	600	5	50	30	150	MP-3A
BCR3FM-12LB	600	3	30	20(10)	150	TO-220FPA
BCR8FM-12LB	600	8	80	30(20)	150	TO-220FPA
BCR8CM-12LB	600	8	80	30(20)	150	TO-220ABA
BCR10FM-12LB	600	8	80	30(20)	150	TO-220FPA
BCR12FM-12LB	600	12	120	30(20)	150	TO-220FPA
BCR16FM-12LB	600	16	160	30(20)	150	TO-220FPA
BCR20FM-12LB	600	20	200	30(20)	150	TO-220FPA
BCR30AM-12LB	600	30	300	50	150	TO-3P
BCR40RM-12LB	600	40	400	50	150	TO-3PFM
BCR08AM-14A	700	0.8	8	5	125	TO-92
BCR3AS-14B	700	3	30	30	150	MP-3A
BCR5AS-14LJ	700	5	50	30	150	MP-3A
BCR8AS-14LJ	700	8	80	30	125	MP-3A
BCR5FM-14LJ	700	5	50	30	150	TO-220FPA
BCR8FM-14LJ	700	8	80	30	150	TO-220FPA
BCR10FM-14LJ	700	10	100	30	150	TO-220FPA
BCR12FM-14LJ	700	12	120	30	150	TO-220FPA
BCR16FM-14LJ	700	16	160	30	150	TO-220FPA
BCR20FM-14LJ	700	20	200	30	150	TO-220FPA
BCR25FM-14LJ	700	25	250	50	150	TO-220FPA
BCR8FM-16LB	800	8	80	30	150	TO-220FPA
BCR20RM-30LA	1500	20	200	50	125	TO-3PFM

## Thyristor Product Lineup

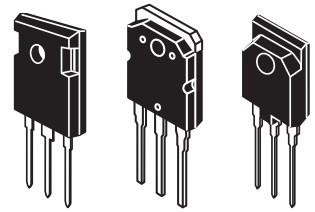
Part No.	VDRM (V)	IT (AV) (A)	ITSM (A)	IGT (mA)	Tj (°C)	Package
CR03AM-16A	800	0.3	20	0.1	125	TO-92
CR04AM-12A	600	0.4	10	0.1	125	TO-92
CR08AS-12A	600	0.8	10	0.1	125	UPAK
CR5AS-12A	600	5	90	0.1	125	MP-3A
CR3CS-12A	600	3	70	0.1	125	TO-262/TO-263
CR6FM-12B	600	6	90	10	150	TO-220FPA
CR8FM-12B	600	8	120	15	150	TO-220FPA
CR12FM-12B	600	12	360	30	150	TO-220FPA
CR6CM-12B	600	6	90	10	150	TO-220ABA
CR8CM-12B	600	8	120	15	150	TO-220ABA
CR12CM-12B	600	12	360	30	150	TO-220ABA
CR12CS-16B	800	12	360	30	150	TO-262/TO-263
CR25RM-12D	600	25	360	30	150	TO-3PFM

## Package Lineup



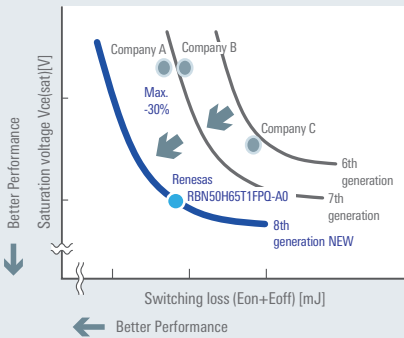
# IGBTs

Ultra-low loss technology with improved power efficiency and reduced heat generation.



## • Ultra-low Loss and Fast Switching

- New trench field stop structure IGBT<sup>1</sup> technology enables low loss and fast switching.
- Renesas keeps top performance by continuous improvement of wafer process.



Note: 1. An IGBT structure in which the gate is shaped like a channel in the wafer surface and an electric field relaxation structure is formed relative to the back side of the thin wafer.



## • Ultra-thin Wafer Technology

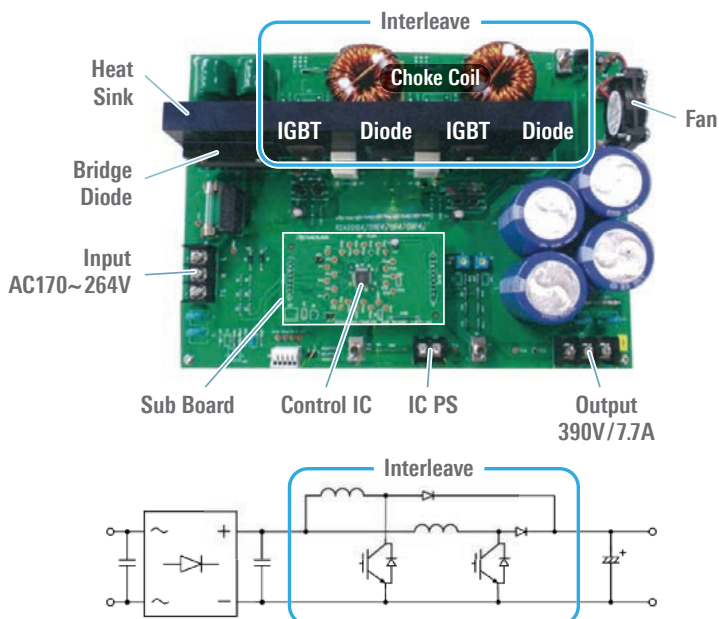
- Ultra-thin wafer reduces conduction loss.



## • Guaranteed Robustness for Reliable Application

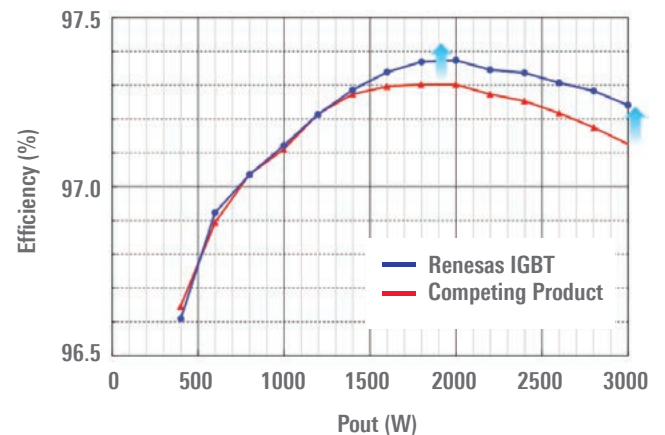
- Optimized cell & guard ring structure
- Various tsc for each application
- $T_j = 175$  deg. guarantee
- $V_{ge} = \pm 30V$  guarantee

## PFC Evaluation Board Populated with IGBTs



## Superior IGBT efficiency

- Renesas IGBTs provide higher efficiency than competing products in both peak and heavy-load conditions.



## IGBT Product Lineup

Gen.	Part No.	VCE (V)	VGE (V)	IC (A) @100°C	IF (A)	VCE(sat) (V)		VF (V)		Tsc (μs)	Tj max (°C)	Package	Application
						Typ	Max	Typ	Max				
G8H	RBN40H65T1FPQ-A0	650	±30	40	30	1.5	2	1.7	2.2	–	175	TO-247A	Inverter PFC
	RBN50H65T1FPQ-A0	650	±30	50	50	1.5	2	2	2.6	–	175	TO-247A	
	RBN75H65T1FPQ-A0	650	±30	75	50	1.5	2	1.7	2.2	–	175	TO-247A	
	RBN25H125S1FPQ-A0	1250	±30	25	15	1.8	2.34	2.9	3.77	10	175	TO-247A	
	RBN40H125S1FPQ-A0	1250	±30	40	25	1.8	2.34	2.8	3.64	10	175	TO-247A	
	RBN75H125S1FP4-A0	1250	±30	75	50	1.8	2.34	2.4	3.2	10	175	TO-247Plus	
G7H	RJP65T43DPM-00	650	±30	20	–	1.8	2.4	–	–	–	175	TO-3PFM	PFC
	RJH65T04BDPM-A0	650	±30	30	30	1.5	1.95	1.4	1.8	–	175	TO-3PFP	
	RJP65T54DPM-A0	650	±30	30	–	1.35	1.68	–	–	–	175	TO-3PFP	
	RJP65T43DPQ-A0	650	±30	30	–	1.8	2.4	–	–	–	175	TO-247A	
	RJH65T46DPQ-A0	650	±30	40	15	1.8	2.4	1.7	2.3	–	175	TO-247A	
	RJH60T04DPQ-A1	600	±30	30	20	1.5	1.95	1.2	1.6	–	150	TO-247A	IH
RJH65T14DPQ-A0	650	±30	50	20	1.45	1.75	1.2	1.6	–	175	TO-247A		



TO-3PFM



TO-247A



TO-247Plus

# POWER MOSFETs

Package	Part No.	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	Q <sub>G</sub> (nC) typ.	R <sub>DS(on)</sub> (Ω) max.			C <sub>iss</sub> (pF) typ.
					10V [8V]	4V [4.5V]	2.5V [1.8V]	
8-pin HVSON-3333	UPA2821T1L	30	26	51	0.0038	0.0105	–	2490
	UPA2822T1L	30	34	83	0.0026	0.0075	–	4660
	UPA2813T1L	-30	-27	80	0.0062	0.013	–	3130
	UPA2812T1L	-30	-30	100	0.0048	0.0099	–	3740
HSOON-8 dual	NP30N04QUK	40	30	27	0.008	–	–	1600
HWSON-8	UPA2826T1S	20	27	37	0.0043	0.0048	0.0099	3610
	UPA2820T1S	30	22	50	0.0053	0.014	–	2330
	RJK03M5DNS	30	25	10.4	0.0063	0.0084	–	1350
	RJK1028DNS	100	4	3.7	0.165	0.18	–	450
	UPA2816T1S	-30	-17	33.4	0.0155	0.045	–	1160
	UPA2815T1S	-30	-21	47	0.011	0.023	–	1760
	UPA2814T1S	-30	-24	74	0.0078	0.0145	–	2800
SOP8	RJK0354DSP	30	16	12	0.007	0.0105	–	1740
Power SOP8	UPA3753GR	60	5	13.4	0.056	0.072	–	640
	UPA2736GR	-30	-14	80	0.007	0.0135	–	3400
	UPA2735GR	-30	-16	195	0.005	0.0078	–	6250
WPAK	RJK03M5DPA	30	30	10.4	0.0065	0.0086	–	1350
	RJK0353DPA	30	35	14	0.0052	0.0076	–	2180
	RJK03M2DPA	30	45	21.2	0.0028	0.0037	–	2750
	RJK03M1DPA	30	50	25	0.0023	0.0031	–	3370
	RJK0346DPA	30	65	49	0.002	0.0027	–	7650
	RJK0658DPA	60	25	19.4	0.0111	–	–	1580
WPAK(3F)	RJK2075DPA	200	20	38	0.069	–	–	2200
LFPAK	RJK0332DPB-01	30	35	14	0.0047	0.007	–	2180
	RJK0330DPB-01	30	45	27	0.0027	0.0039	–	4300
	RJK0328DPB-01	30	60	42	0.0021	0.0029	–	6380
	RJK0451DPB	40	35	14	0.007	0.0096	–	2010
	RJK0454DPB	40	40	25	0.0049	–	–	2000
	RJK0452DPB	40	45	26	0.0035	0.0047	–	4030
	RJK0455DPB	40	45	34	0.0038	–	–	2550
	RJK0456DPB	40	50	39	0.0032	–	–	3000
	RJK0651DPB	60	25	15	0.014	0.018	–	2030
	RJK0654DPB	60	30	27	0.0083	–	–	2000
	RJK0652DPB	60	35	29	0.007	0.009	–	4100
	RJK0655DPB	60	35	35	0.0067	–	–	2550
	RJK0656DPB	60	40	40	0.0056	–	–	3000
	RJK0653DPB	60	45	42	0.0048	0.0061	–	6100
	RJK0851DPB	80	20	14	0.023	0.028	–	2050
	RJK0854DPB	80	25	27	0.013	–	–	2000
	RJK0852DPB	80	30	28	0.012	0.014	–	4150
	RJK0855DPB	80	30	35	0.011	–	–	2550
	RJK0856DPB	80	35	40	0.0089	–	–	3000
	RJK0853DPB	80	40	40	0.0080	0.0092	–	6170
	RJK1051DPB	100	15	15	0.039	0.046	–	2060
	RJK1054DPB	100	20	27	0.022	–	–	2000
	RJK1052DPB	100	20	29	0.020	0.022	–	4160
	RJK1055DPB	100	23	35	0.017	–	–	2550
	RJK1053DPB	100	25	43	0.013	0.015	–	6160
	RJK1056DPB	100	25	41	0.014	–	–	3000



Package	Part No.	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	QG (nC) typ.	R <sub>DS(on)</sub> (Ω) max.			C <sub>iss</sub> (pF) typ.
					10V [8V]	4V [4.5V]	2.5V [1.8V]	
MP-3ZP / TO-252	NP60N04VDK	40	60	42	0.00385	0.0086	–	2450
	NP75N04VDK	40	75	27	0.0057	0.0126	–	1630
	NP90N04VVK	40	90	68	0.0028	0.006	–	3800
	NP45N06VDK	60	45	25	0.0116	0.0196	–	1530
	NP90N06VDK	60	90	63	0.0053	0.0082	–	4000
MP-3Z / TO-252	2SK3814-Z	60	60	95	0.0087	0.0105	–	5450
MP-3ZK / TO-252	2SJ687-ZK	-20	-20	57	–	0.007	0.02	4400
	N0400P	-40	-15	16	–	0.04	0.073	1400
	2SJ598-ZK	-60	-12	15	0.13	0.19	–	720
	2SJ601-ZK	-60	-36	63	0.031	0.046	–	3300
TO-220	N0439N	40	90	68	0.0033	–	–	3900
	N0412N	40	100	100	0.0037	–	–	5550
	N0604N	60	82	75	0.0065	–	–	4150
	N0602N	60	100	133	0.0046	–	–	7730
TO-220FL	RJK5030DPP-M0	500	5	13	1.6	–	–	550
	RJK5033DPP-M0	500	6	-	1.3	–	–	600
TO-220FP	RJK0703DPP-A0	75	70	56	0.0067	–	–	4150
	RJK1003DPP-A0	100	50	59	0.011	–	–	4150
	RJK1002DPP-A0	100	70	94	0.0076	–	–	6450
	RJK1001DPP-A0	100	80	147	0.0055	–	–	10000
	RJK5035DPP-A0	500	10	23	0.85	–	–	765
	RJK6006DPP-A0	600	5	19	1.6	–	–	600
	RJK6035DPP-A0	600	6	20	1.37	–	–	765
TO-262	N0434N	40	100	100	0.0037	–	–	5550
	N0603N	60	100	133	0.0046	–	–	7730
TO-263	N0413N	40	100	100	0.0033	–	–	5550
	N0601N	60	100	133	0.0042	–	–	7730
MP-25ZP / TO-263	NP60N04PDK	40	60	42	0.00395	0.0088	–	2450
	NP89N04PDK	40	90	68	0.00295	0.0062	–	3900
	NP60N06PDK	60	60	37	0.0079	0.012	–	2400
	2SK3812-ZP	60	110	250	0.0028	0.0037	–	16800





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(Rev.5.0-1 October 2020)

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