

P-Channel Enhancement Mode Power MOSFET

Description

The RM42P30DN uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

- $V_{DS} = -30V, I_D = -42A$
 $R_{DS(ON)} < 14m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 22m\Omega @ V_{GS} = -4.5V$
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

Application

- Secondary side synchronous rectifier
- High side switch in POL DC/DC converter
- Halogen-free

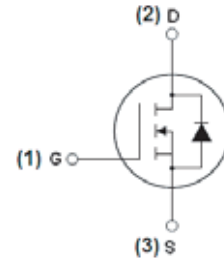
100% UIS TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
B3105	RM42P30DN	DFN 3x3 EP	-	-	-

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

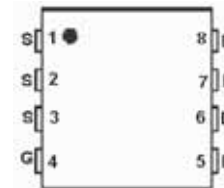
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-42	A
Pulsed Drain Current	I_{DM}	-130	A
Maximum Power Dissipation	P_D	37	W
Derating factor		0.28	W/ $^\circ C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	125	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$



Schematic diagram



Marking and pin assignment



DFN 3x3 EP top view

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	3.36	°C/W
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Electrical Characteristics (TC=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	-30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-24V, V_{GS}=0V$	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	-1.2	-	-2.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-30A$	-	-	14	m Ω
		$V_{GS}=4.5V, I_D=-15A$	-	-	22	
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-30A$	-	30	-	S
Dynamic Characteristics ^(Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=-15V, V_{GS}=0V,$ $F=1.0MHz$	-	2215	-	PF
Output Capacitance	C_{oss}		-	310	-	PF
Reverse Transfer Capacitance	C_{rss}		-	237	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, I_D=-15A$ $V_{GS}=-10V, R_{GEN}=3.3 \Omega$	-	8	-	nS
Turn-on Rise Time	t_r		-	73.7	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	61.8	-	nS
Turn-Off Fall Time	t_f		-	24.4	-	nS
Total Gate Charge	Q_g	$V_{DS}=-15V, I_D=-15A,$ $V_{GS}=-4.5V$	-	22	-	nC
Gate-Source Charge	Q_{gs}		-	8.7	-	nC
Gate-Drain Charge	Q_{gd}		-	7.2	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V_{SD}	$V_{GS}=0V, I_S=-1A$	-	-	-1	V
Diode Forward Current ^(Note 2)	I_S	$V_G=V_D=0V, \text{Force current}$	-	-	-42	A
Reverse Recovery Time	t_{rr}	$T_J=25^\circ C, I_F=-15A$	-	19	-	nS
Reverse Recovery Charge	Q_{rr}	$di/dt=100A/\mu s(\text{Note 3})$	-	9	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition: $T_J=25^\circ C, V_{DD}=15V, V_G=10V, L=0.1mH, R_g=25\Omega$

RATING AND CHARACTERISTICS CURVES (RM42P30DN)

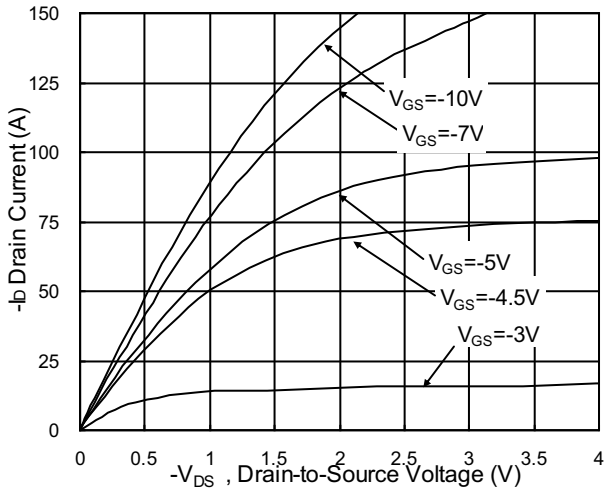


Fig.1 Typical Output Characteristics

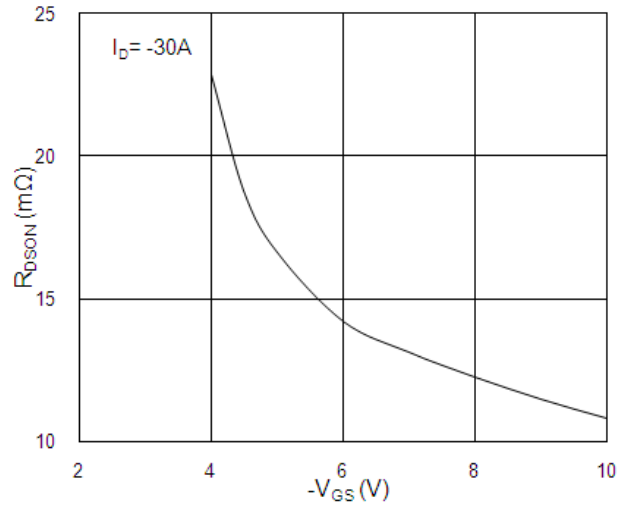


Fig.2 On-Resistance vs. G-S Voltage

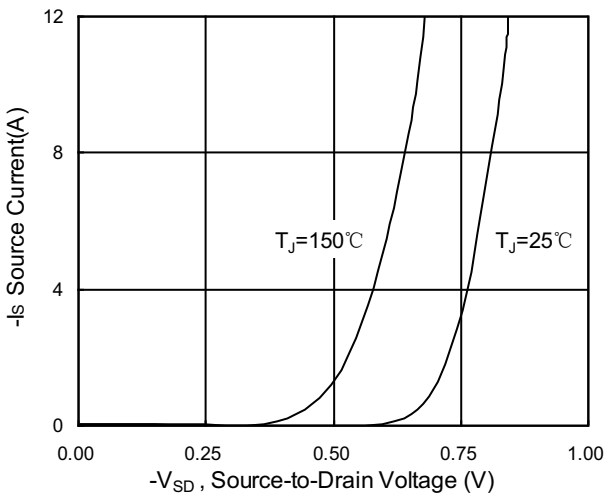


Fig.3 Forward Characteristics of Reverse

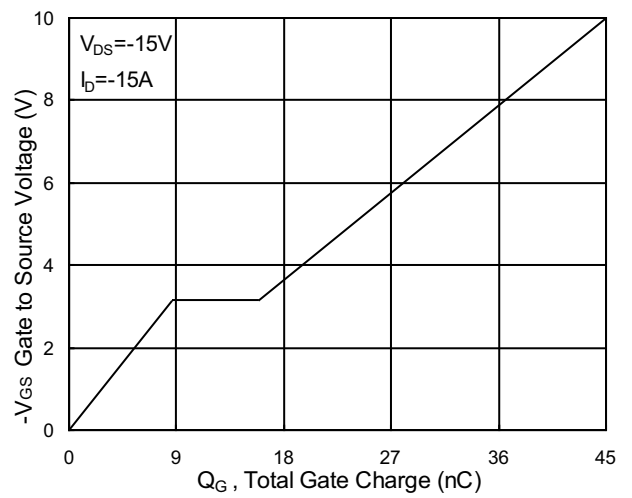


Fig.4 Gate-Charge Characteristics

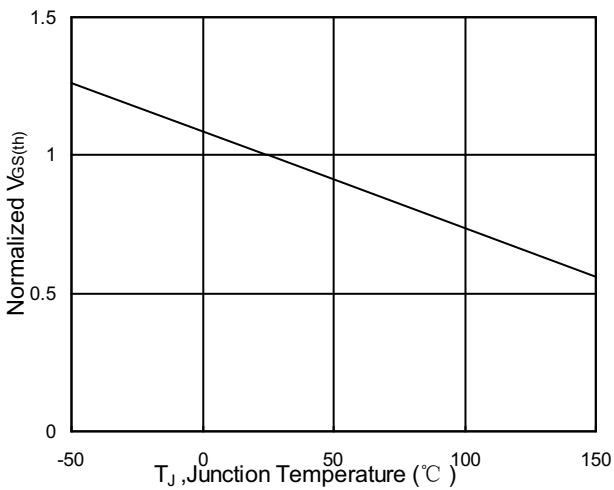


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

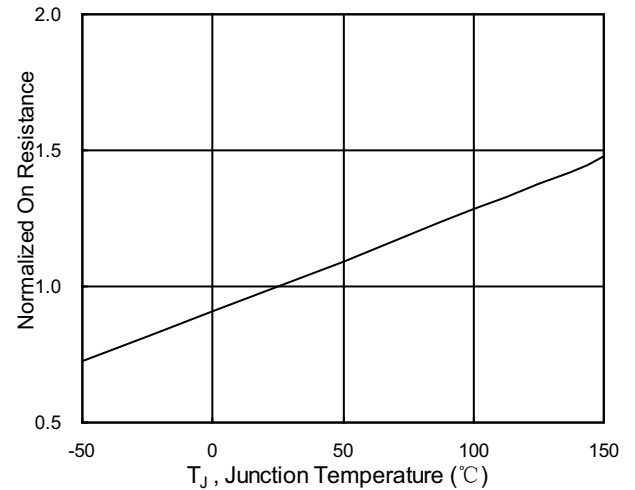


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

RATING AND CHARACTERISTICS CURVES (RM42P30DN)

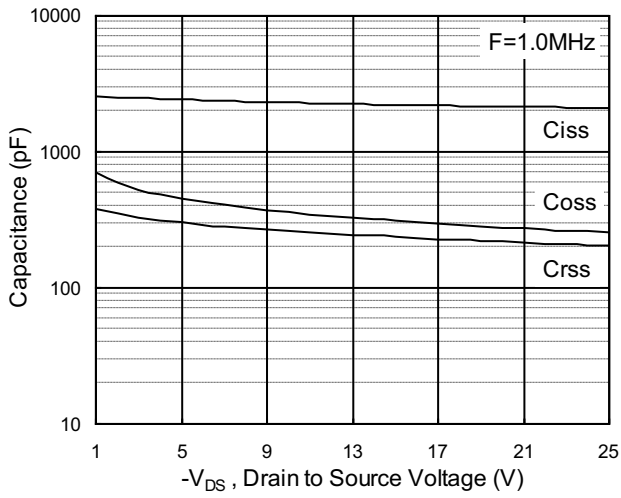


Fig.7 Capacitance

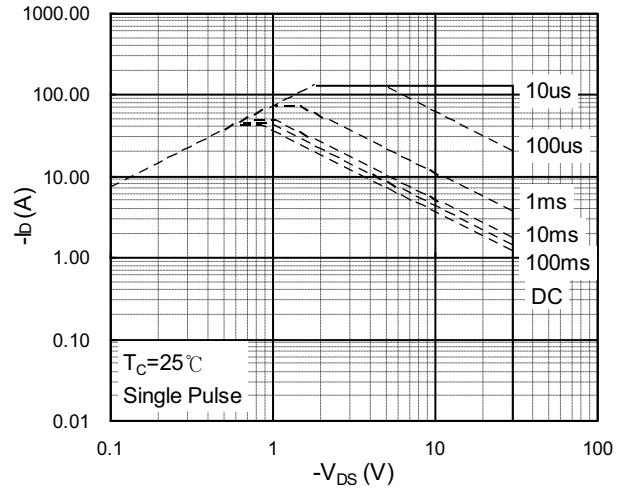


Fig.8 Safe Operating Area

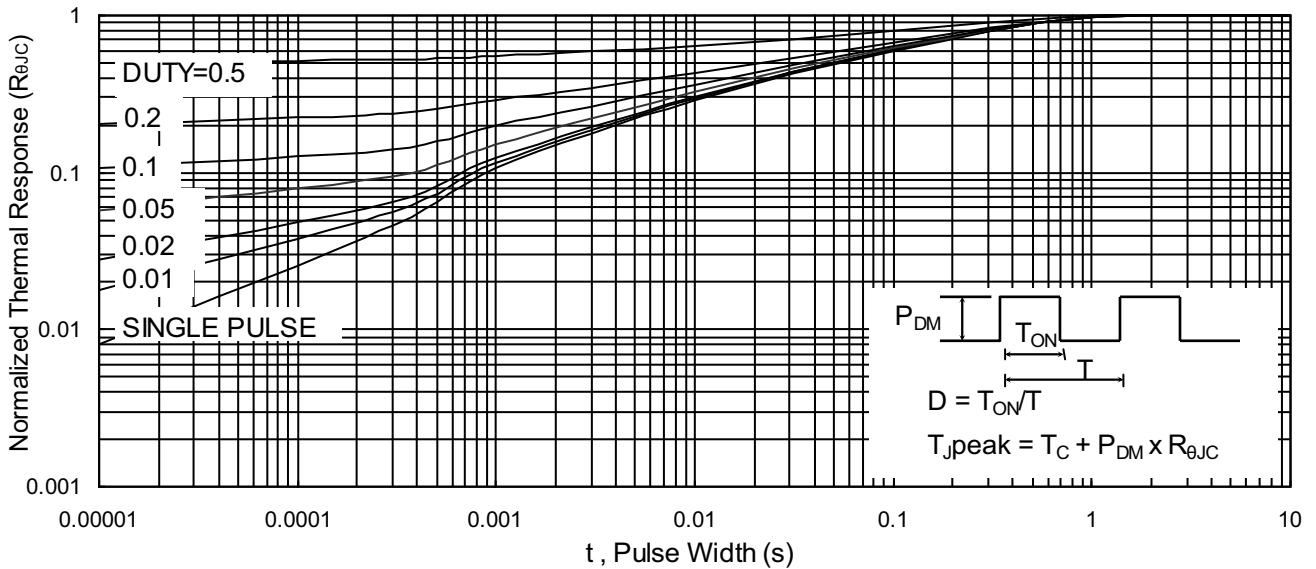


Fig.9 Normalized Maximum Transient Thermal Impedance

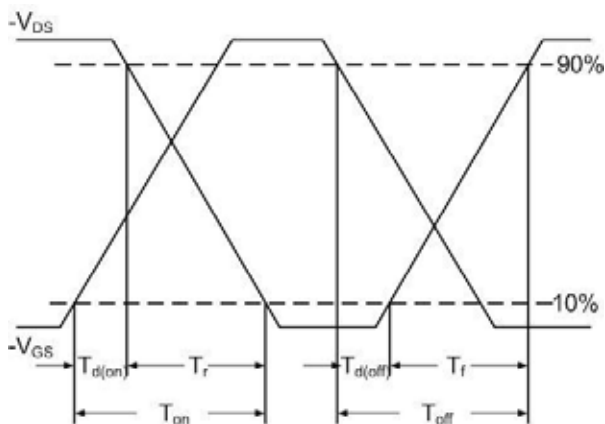


Fig.10 Switching Time Waveform

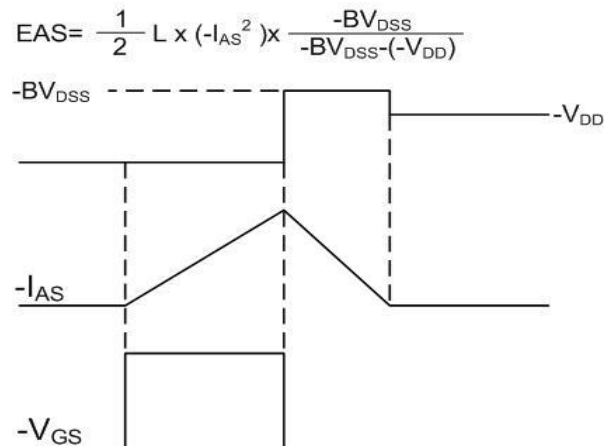
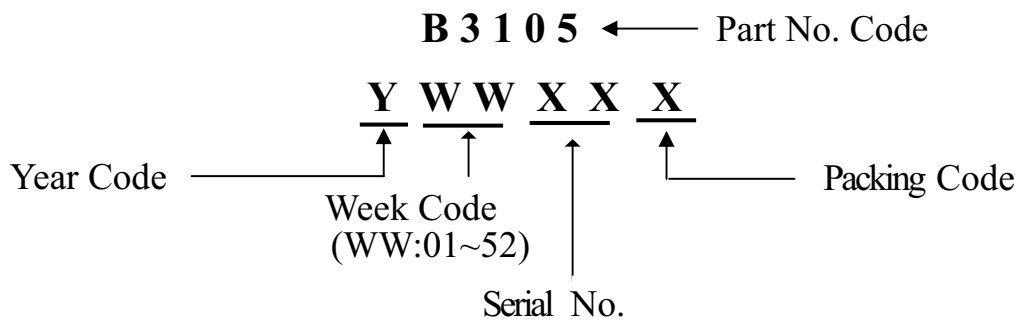


Fig.11 Unclamped Inductive Switching Waveform

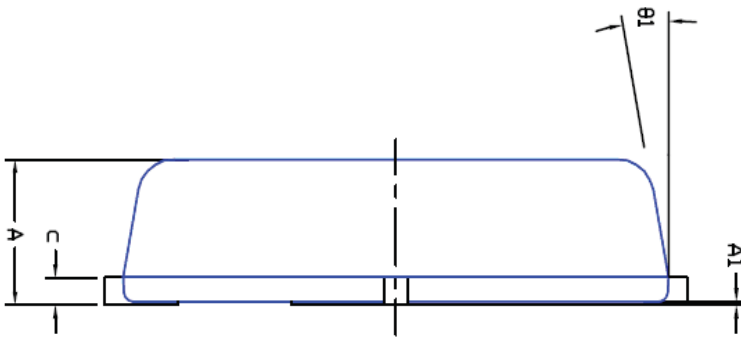
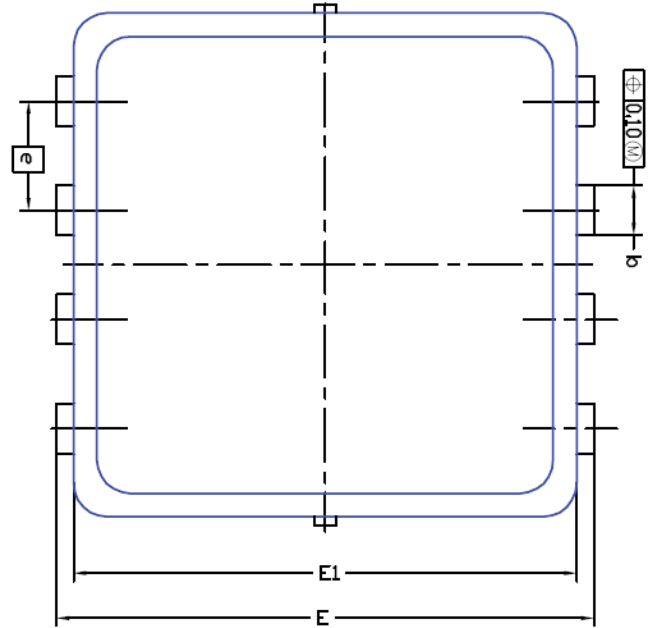
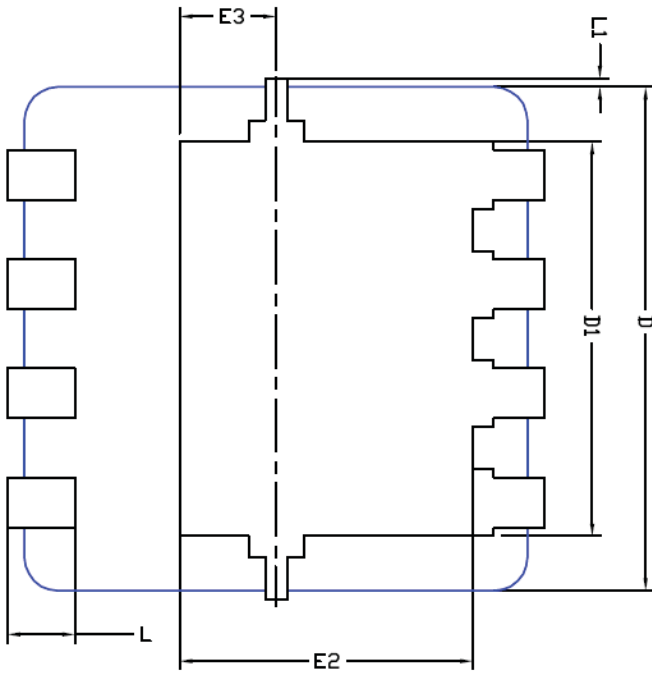


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Marking on the body



DFN3X3 EP Package Information



DIM.	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.700	0.80	0.900	0.0276	0.0315	0.0354
A1	0.00	---	0.05	0.000	---	0.002
b	0.24	0.30	0.35	0.009	0.012	0.014
c	0.10	0.152	0.25	0.004	0.006	0.010
D	3.00 BSC			0.118 BSC		
D1	2.35 BSC			0.093 BSC		
E	3.20 BSC			0.126 BSC		
E1	3.00 BSC			0.118 BSC		
E2	1.75 BSC			0.069 BSC		
E3	0.575 BSC			0.023 BSC		
e	0.65 BSC			0.026 BSC		
L	0.30	0.40	0.50	0.0118	0.0157	0.0197
L1	0	---	0.100	0	---	0.004
θ1	0°	10°	12°	0°	10°	12°

Package	Tube (pcs/tube)	Tube (pcs/inner box)	Tube (pcs/cartoon)	Tape&Reel (pcs/reel)	Tape&Reel (pcs/inner box)	Tape&Reel (pcs/cartoon)
DFN5x6/DFN3x3	100	10,000	100,000	2,500	5,000	40,000
DFN1006	—	—	—	10,000	10,000	400,000
SOP-8	100	10,000	100,000	4,000	4,000	20,000
TSSOP-8	100	32,000	128,000	3,000	6,000	48,000
SOT-23-3L	—	—	—	3,000	30,000	120,000
SOT-23-6L	—	—	—	3,000	30,000	120,000
SOT-23(6R)	—	—	—	3,000	30,000	120,000
SOT-363	—	—	—	3,000	30,000	120,000
SOT-523	—	—	—	3,000	30,000	120,000
SOT223	—	—	—	2,500	2,500	20,000
TO-220	50	1,000	5,000	—	—	—
TO-220F	50	1,000	10,000	—	—	—
TO-247	30	300	1,200	—	—	—
TO-251	80	4,000	40,000	—	—	—
TO-251S(4R)	80	4,000	40,000	—	—	—
TO-252-2L(4R)	80	4,000	40,000	2,500	2,500	25,000
TO-263-2L	50	1,000	10,000	800	800	8,000
TO-3P	30	300	3,000	—	—	—
TO-92	—	—	—	1,000(袋装)	10,000	100,000

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