

N-Channel Enhancement Mode Power MOSFET

Description

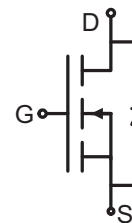
The RM2302 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

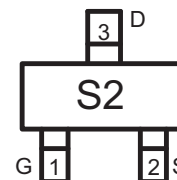
- $V_{DS} = 20V, I_D = 4A$
 $R_{DS(ON)} < 59m\Omega @ V_{GS}=2.5V$
 $R_{DS(ON)} < 45m\Omega @ V_{GS}=4.5V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

Application

- Battery protection
- Load switch
- Power management



Schematic diagram



Marking and pin assignment



SOT-23 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
S2	RM2302	SOT-23	Ø180mm	8 mm	3000 units

Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	I_D	4	A
Drain Current-Pulsed (Note 1)	I_{DM}	10	A
Maximum Power Dissipation	P_D	1	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

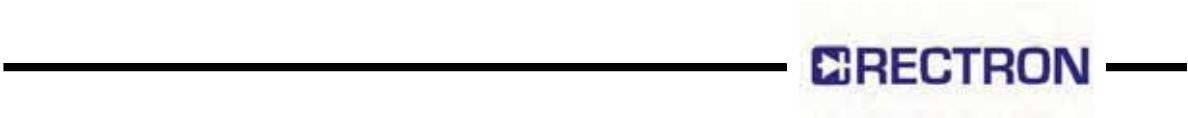
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	125	$^\circ\text{C/W}$
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Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	20	22	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=20V, V_{GS}=0V$	-	-	1	μA

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±12V,V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	0.5	0.85	1.2	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =2.5V, I _D =2.5A	-	37	59	mΩ
		V _{GS} =4.5V, I _D =2.9A	-	30	45	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =2.9A	-	8	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{ISS}	V _{DS} =10V,V _{GS} =0V, F=1.0MHz	-	300	-	PF
Output Capacitance	C _{OSS}		-	120	-	PF
Reverse Transfer Capacitance	C _{rss}		-	80	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =10V,I _D =2.9A V _{GS} =4.5V,R _{GEN} =6Ω	-	10	15	nS
Turn-on Rise Time	t _r		-	50	85	nS
Turn-Off Delay Time	t _{d(off)}		-	17	45	nS
Turn-Off Fall Time	t _f		-	10	20	nS
Total Gate Charge	Q _g	V _{DS} =10V,I _D =2.9A, V _{GS} =4.5V	-	4.0	10	nC
Gate-Source Charge	Q _{gs}		-	0.65	-	nC
Gate-Drain Charge	Q _{gd}		-	1.2	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V,I _S =2.9A	-	0.75	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	4	A

- 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



RATING AND CHARACTERISTICS CURVES (RM2302)

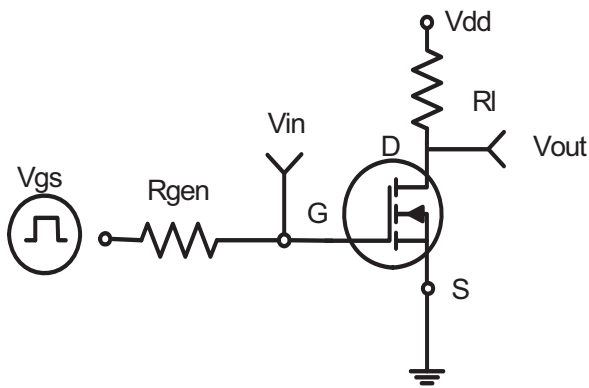


Figure 1: Switching Test Circuit

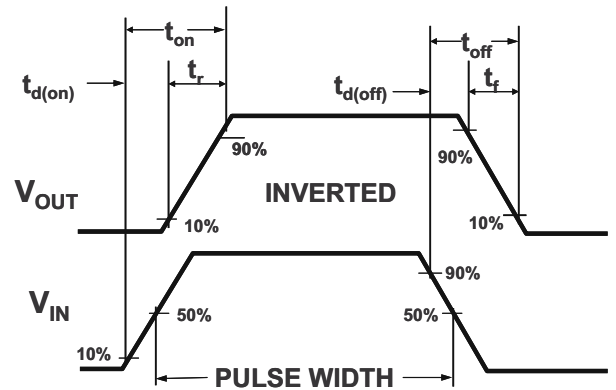


Figure 2: Switching Waveforms

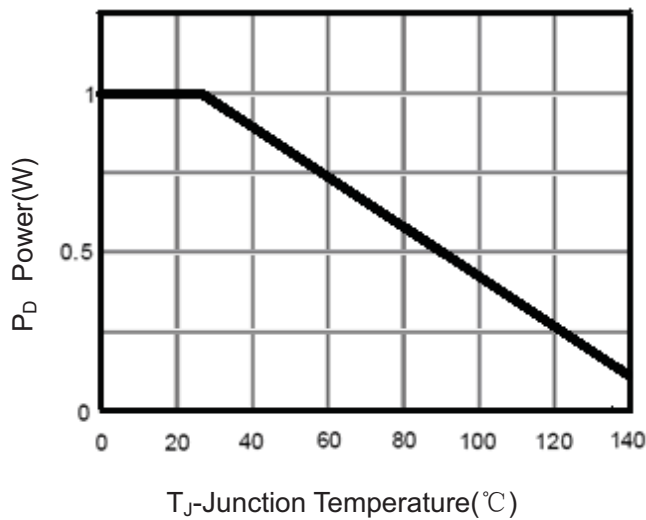


Figure 3 Power Dissipation

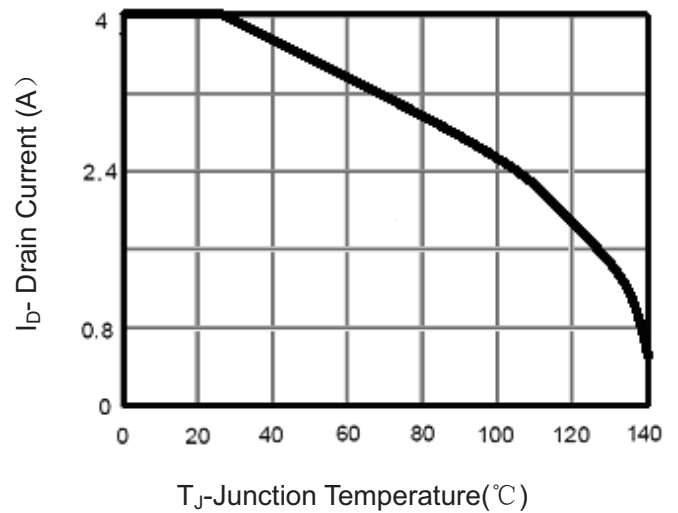


Figure 4 Drain Current

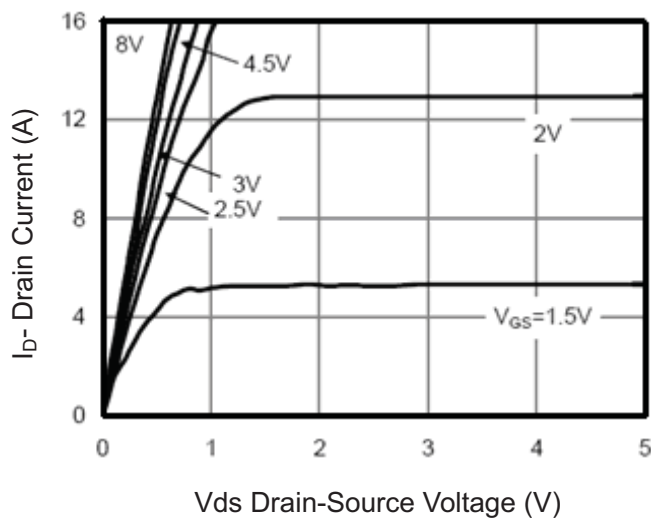


Figure 5 Output Characteristics

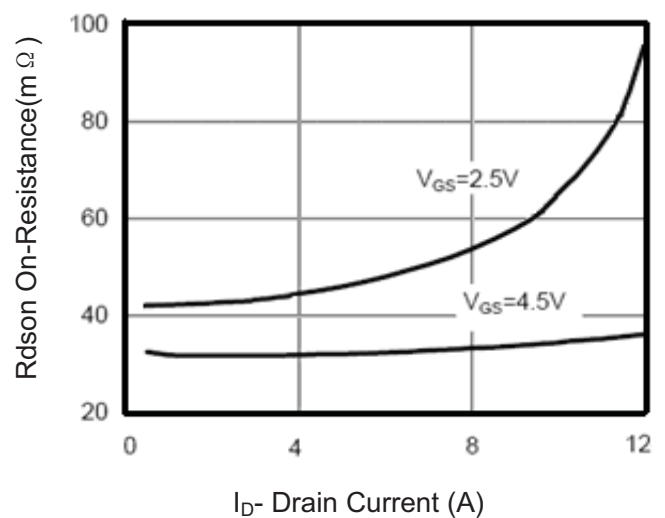


Figure 6 Drain-Source On-Resistance

RATING AND CHARACTERISTICS CURVES (RM2302)

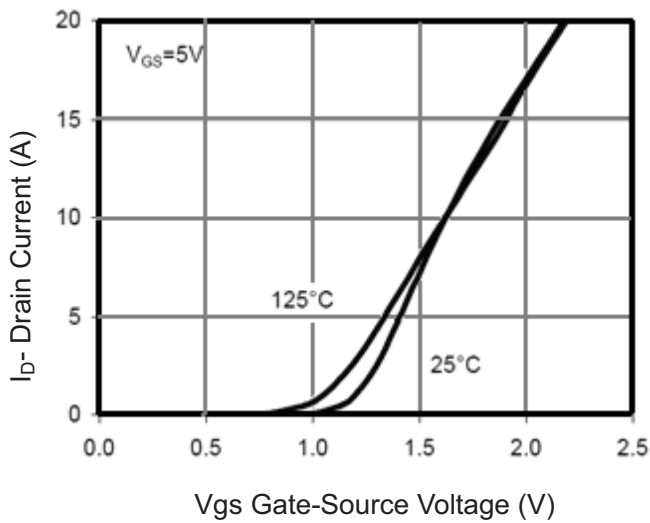


Figure 7 Transfer Characteristics

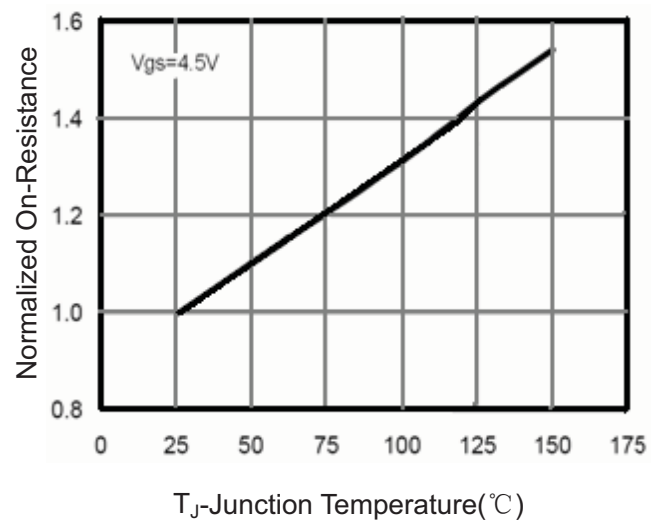


Figure 8 Drain-Source On-Resistance

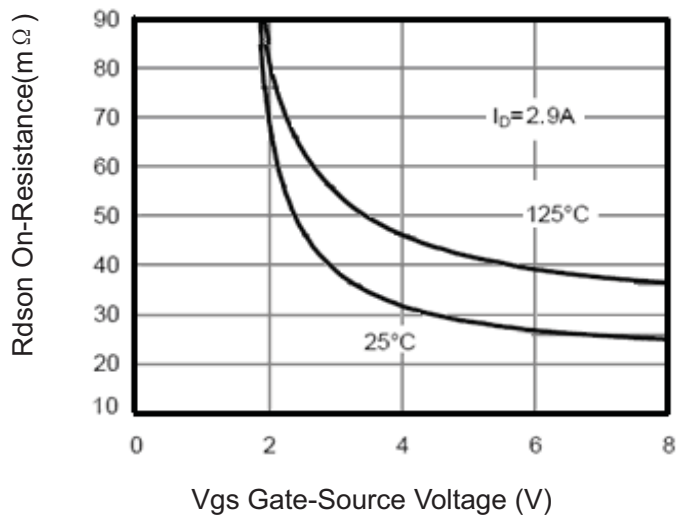


Figure 9 $R_{DS(on)}$ vs V_{GS}

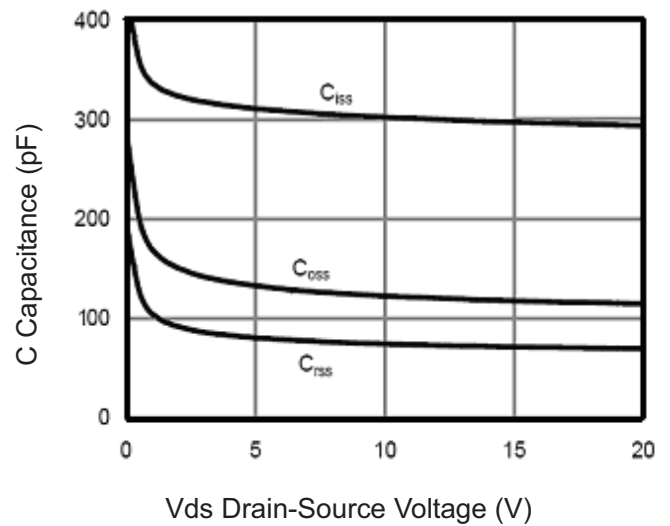


Figure 10 Capacitance vs V_{DS}

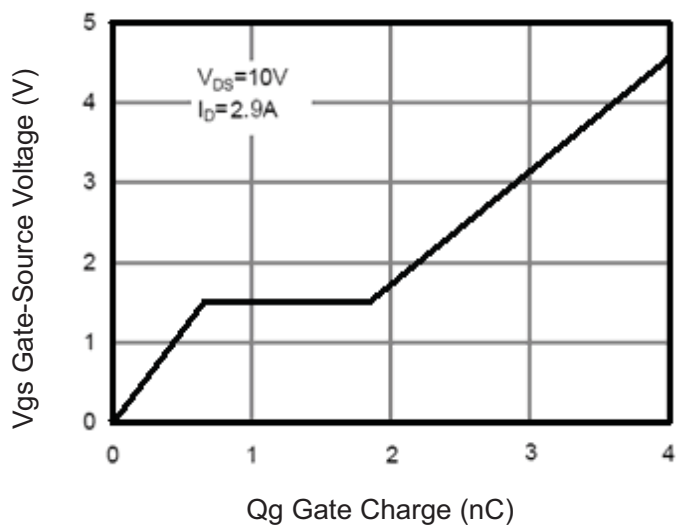


Figure 11 Gate Charge

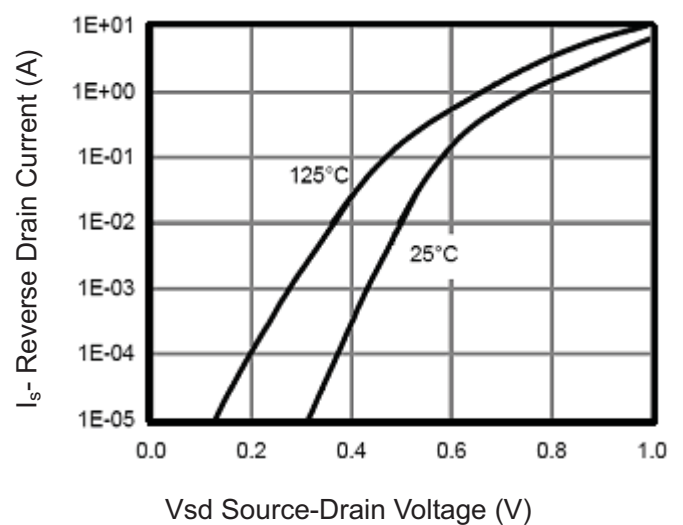


Figure 12 Source- Drain Diode Forward

RATING AND CHARACTERISTICS CURVES (RM2302)

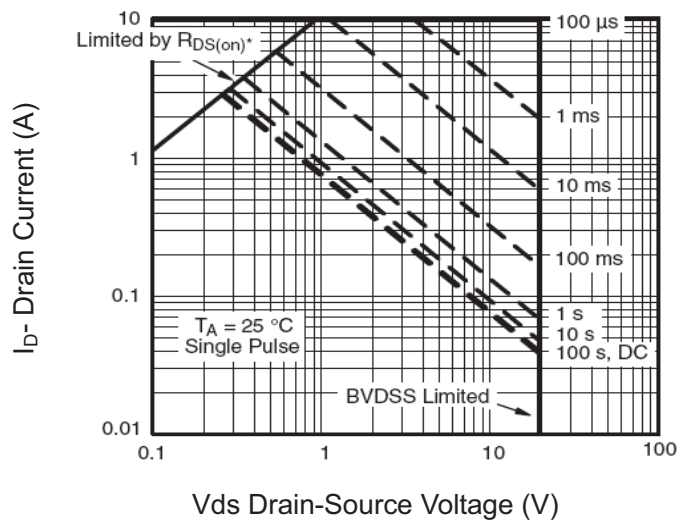


Figure 13 Safe Operation Area

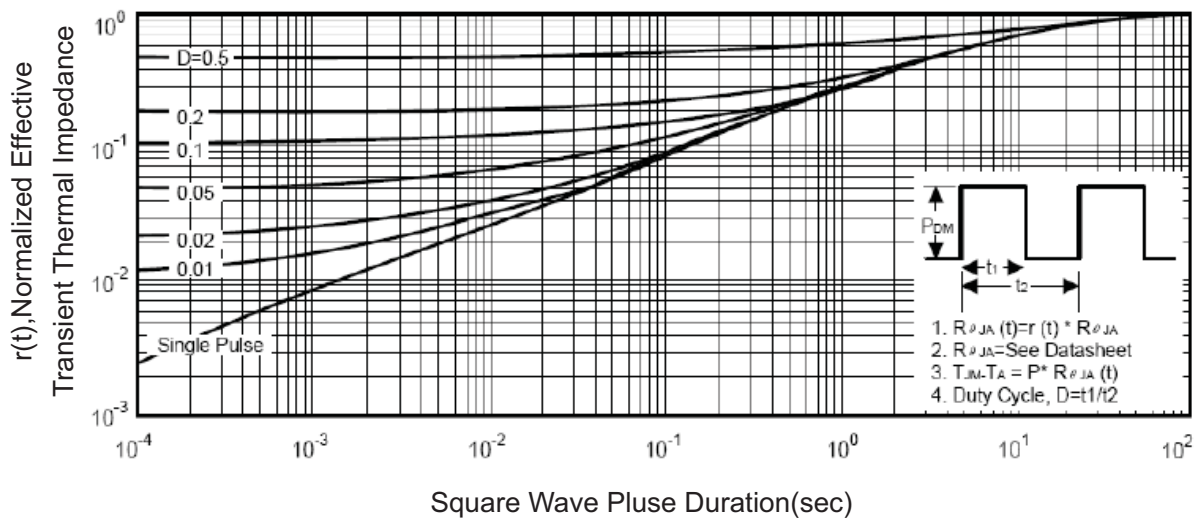
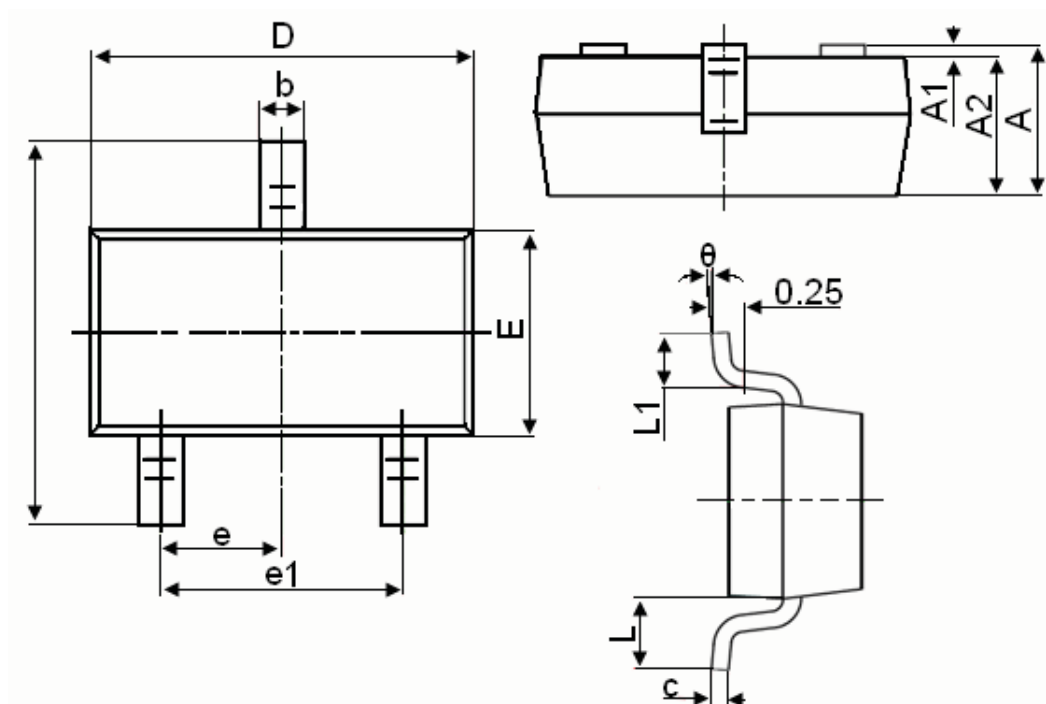


Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-23 Package Information



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

Notes

1. All dimensions are in millimeters.
2. Tolerance $\pm 0.10\text{mm}$ (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

	Package	Tube (pcs/tube)	Tube (pcs/inner box)	Tube (pcs/cartoon)	Tape&Reel (pcs/reel)	Tape&Reel (pcs/inner box)	Tape&Reel (pcs/cartoon)
	DFN	100	10,000	100,000	2,500	5,000	40,000
	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
	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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