

800V N-Channel POWER MOSFET

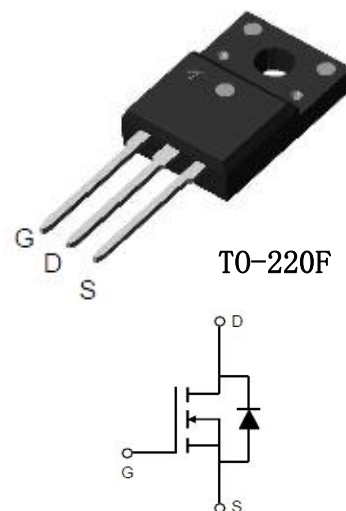
Features

- $V_{DSS}=800V$ $I_D=12A$
 $R_{DS(ON)}=0.8\Omega(\text{Max.})@V_{GS}=10V$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- Low ON Resistance

Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)

PIN DESCRIPTION



Part Number	Package	Marking	ROHS Status	Packing
SI12N80F	TO-220F	SI12N80F	Pb-Free	Box (Tube)

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

Symbol	Parameter	Typical	Unit
V_{DSS}	Drain-Source Voltage	800	V
V_{GSS}	Gate-Source Voltage	± 30	V
I_D	Continuous Drain Current	12	A
I_{DM}	Pulsed Drain Current	48	A
P_D	Power Dissipation ($T_C=25^\circ\text{C}$)	25	W
I_{AS}	Avalanche Current	9.6	A
E_{AS}	Single Pulse Avalanche Energy	460.8	mJ
E_{AR}	Repetitive Avalanche Energy	276.5	mJ
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Resistance

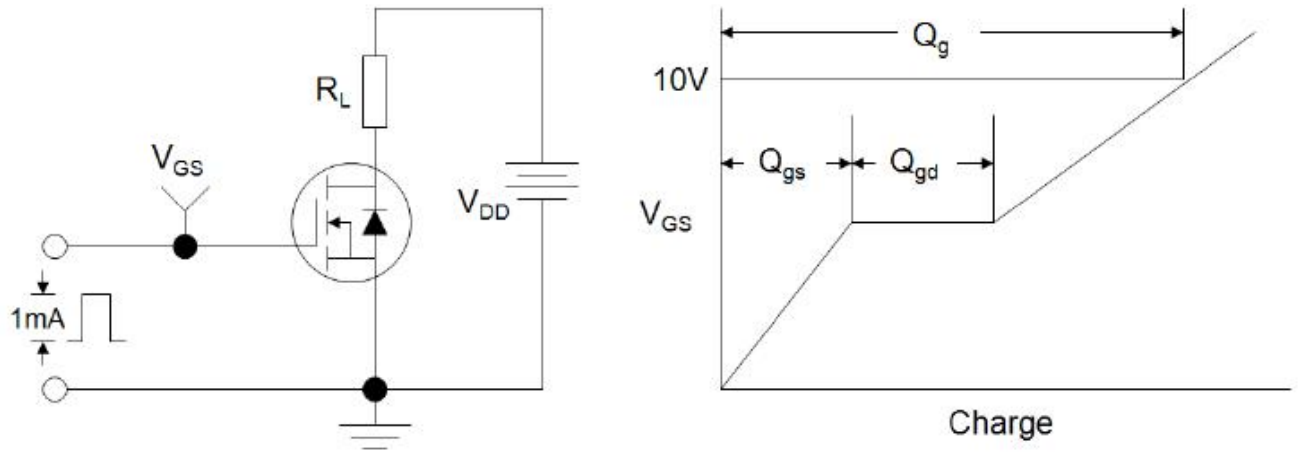
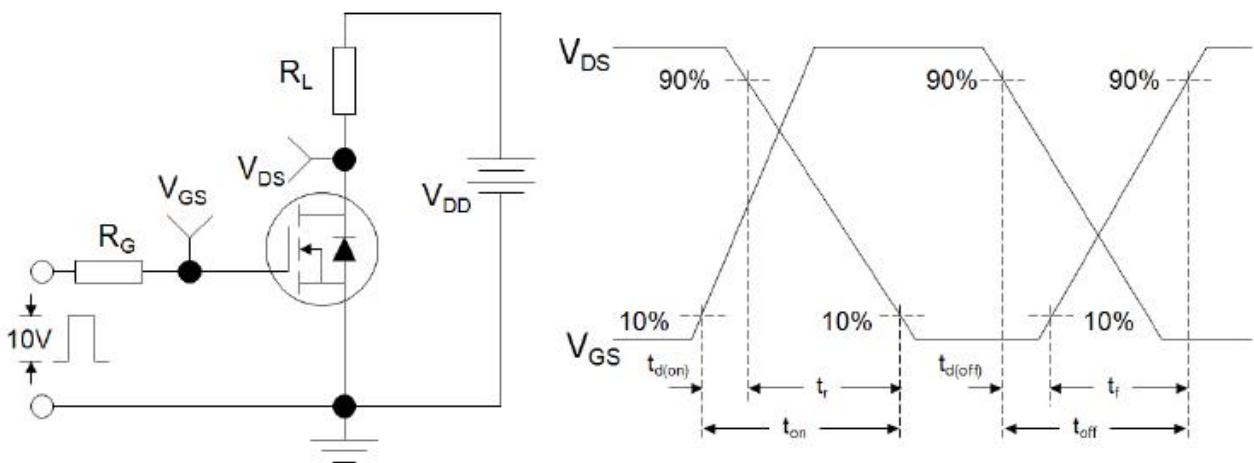
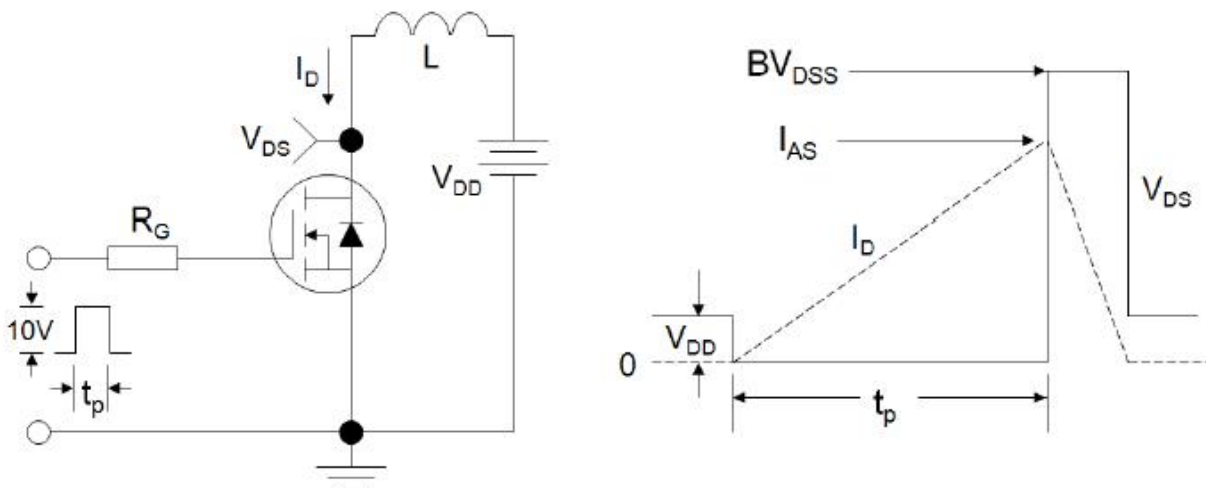
Parameter	Symbol	Value	Unit
Thermal resistance, Junction – Case.	R_{thJC}	5	K/W
Thermal resistance, Junction – Ambient.	R_{thJA}	62.5	

Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	TYP	Max	Unit
Static Characteristics						
BV_{DSS}	Drain-source breakdown voltage	$V_{GS}=0V, I_D=250\mu A$	800	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=800V, V_{GS}=0V$	-	-	1	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 30V$	-	-	± 100	nA
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	3.0	-	4.0	V
$R_{DS(on)}$	Drain-Source On-Resistance	$V_{GS}=10V, I_D=6A$	-	-	0.8	Ω
Dynamic Characteristic						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V,$ $f=1.0MHz$	-	2115	-	pF
C_{oss}	Output Capacitance		-	217	-	
C_{rss}	Reverse Transfer Capacitance		-	43	-	
Q_g	Gate Total Charge	$V_{DS}=640V, I_D=12A,$ $V_{GS}=10V,$	-	88	-	nC
Q_{gs}	Gate-Source charge		-	10	-	
Q_{gd}	Gate-Drain charge		-	49	-	
$t_{d(on)}$	Turn-on delay time	$V_{DD}=400V, I_D=12A,$ $R_G=25\Omega$	-	50	-	nS
t_r	Rise time		-	44	-	
$t_{d(off)}$	Turn-off delay time		-	362	-	
t_f	Fall time		-	80	-	
Drain-Source Body Diode Characteristics						
V_{SD}	Body Diode Forward Voltage	$V_{GS}=0V, I_{SD}=6A$	-	-	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS}=0V, I_S=12A,$ $di_F/dt=100A/\mu s$	-	639	-	nS
Q_{rr}	Reverse Recovery Charge		-	3	-	μC
I_S	Continuous Drain-Source Diode Forward Current		-	-	12	A
I_{SM}	Pulsed Drain-Source Diode Forward Current		-	-	48	A

Notes:

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=10mH, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^\circ$
- 3.Pulse Test: Pulse width $\leq 350\mu s$, Duty Cycle $\leq 1\%$

Switching Time Test Circuit and Wave forms
Figure A: Gate Charge Test Circuit and Waveform

Figure B: Resistive Switching Test Circuit and Waveform

Figure C: Unclamped Inductive Switching Test Circuit and Waveform


Typical Performance Characteristics

Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

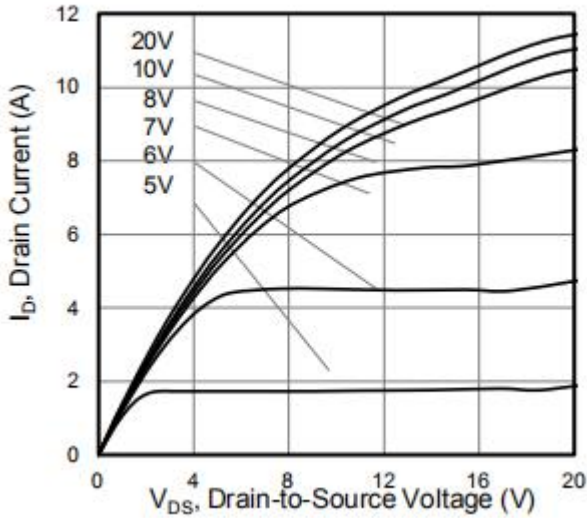


Figure 2. Body Diode Forward Voltage

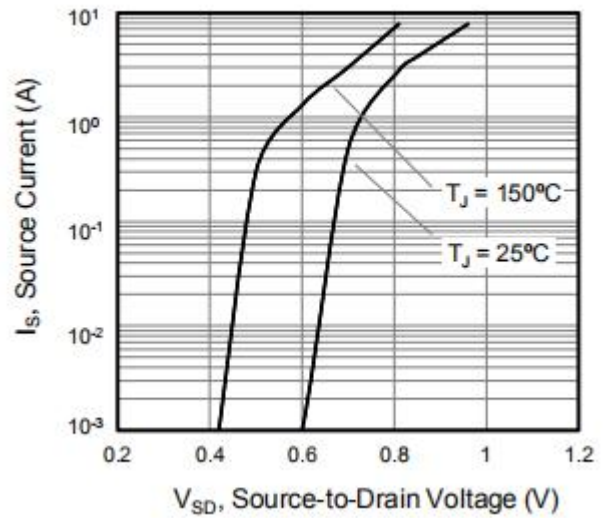


Figure 3. Drain Current vs. Temperature

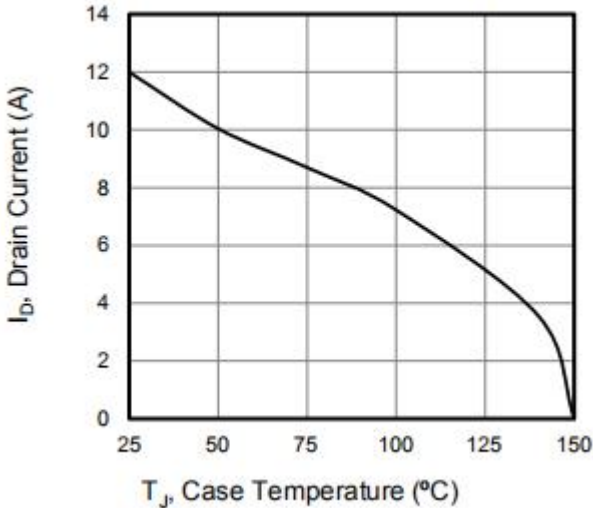


Figure 4. BV_{DSS} Variation vs. Temperature

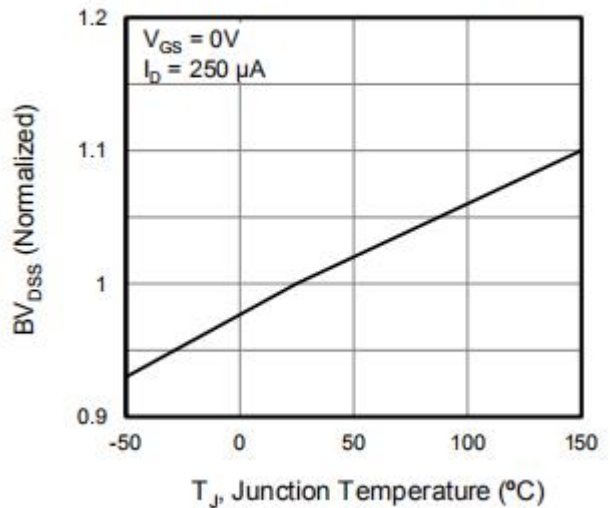


Figure 5. Transfer Characteristics

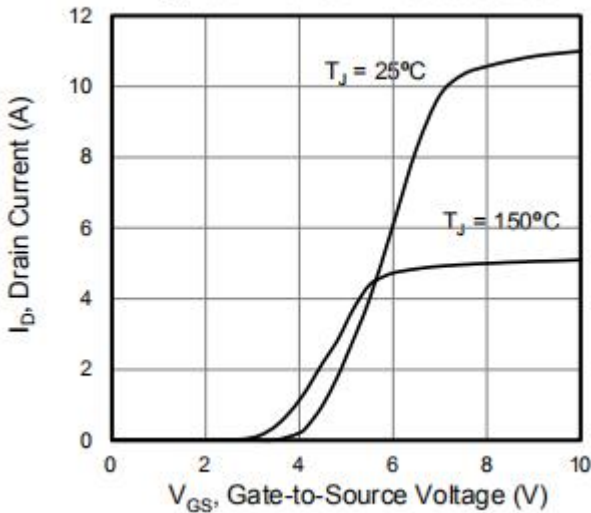
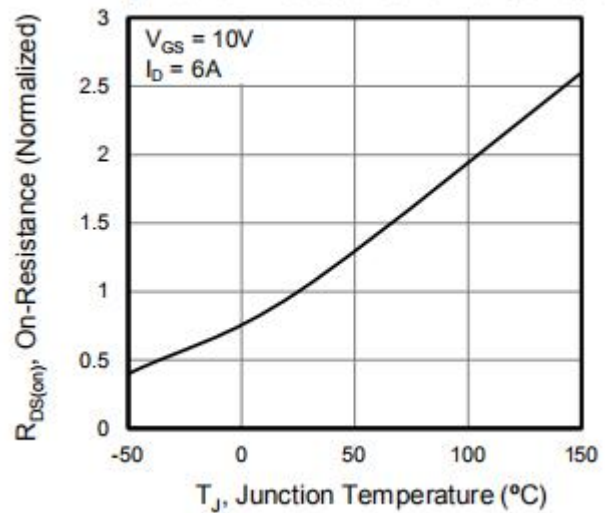
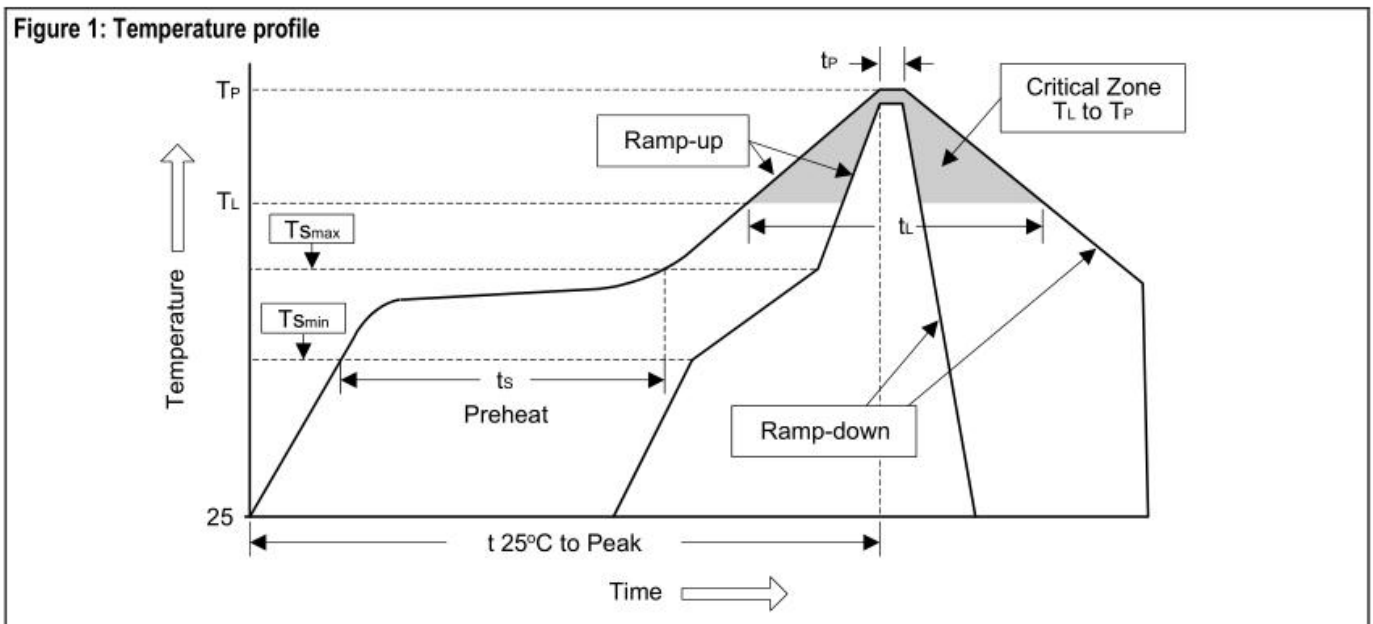


Figure 6. On-Resistance vs. Temperature



Soldering Methods for Products

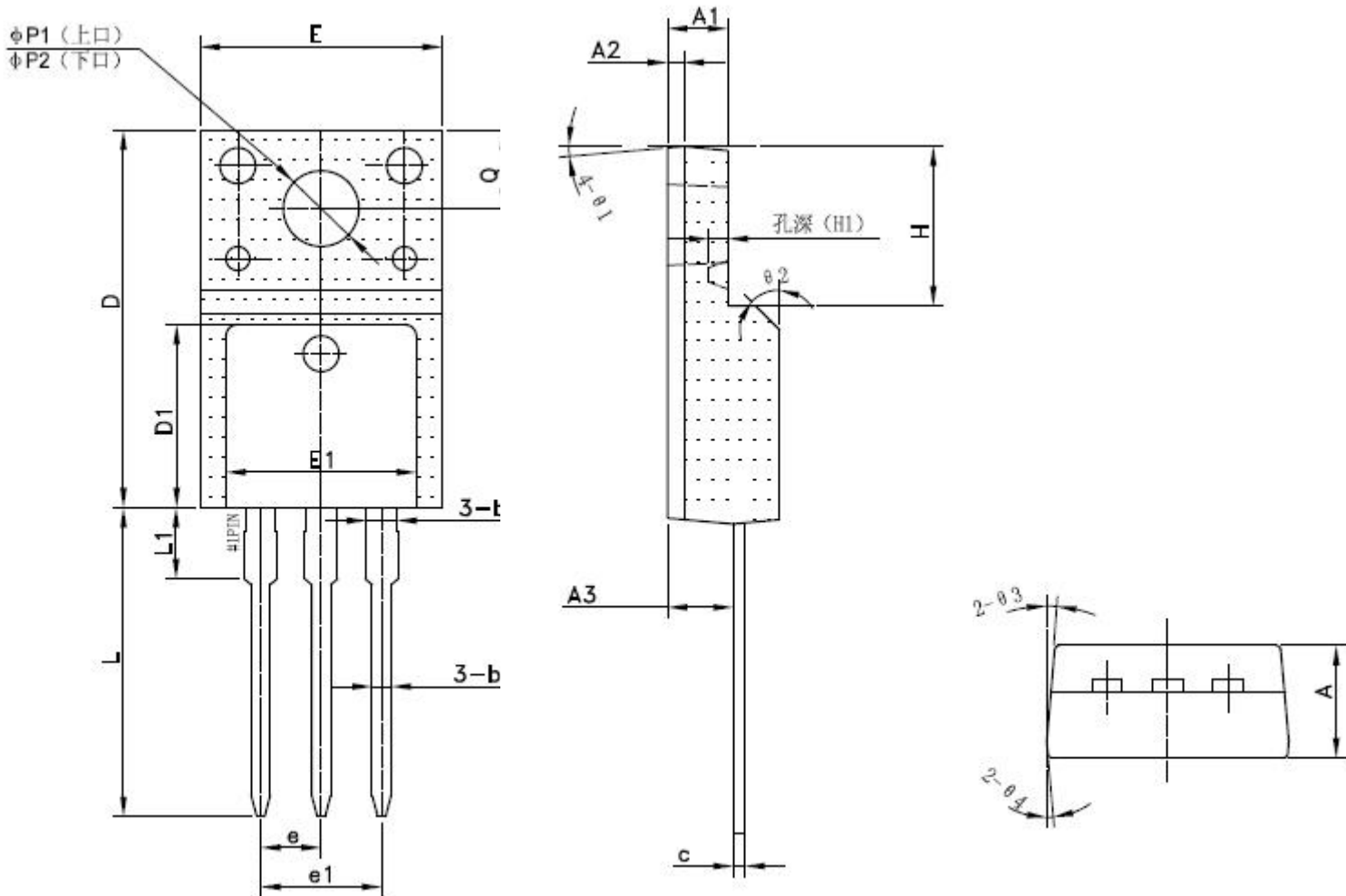
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate(TL to TP)	<3°C/sec	<3°C/sec
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(min to max)(ts)	60 to 120 sec	60 to 180 sec
Tsmax to TL		
- ramp-up rate	<3°C/sec	<3°C/sec
Time maintained above:		
-Temperature(TL)	183°C	217°C
-Time(tL)	60 to 150 sec	60 to 150 sec
Peak Temperature(Tp)	240°C+0/-5°C	250°C+0/-5°C
Time within 5°C of actual Peak Temperature	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25 °C to Peak Temperature	<6 minutes	<8 minutes



Note : 1.Storage environment: Temperature=10°C to 35@Humidity=45%±15%

- 2.Reflow soldering of surface-mount devices
- 3.Flow(wave) soldering(solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices	245°C±5°C	5sec±1sec
Pb-free devices	250°C+0/-5°C	5sec±1sec

Package Outline


Millimeter(mm)					
Symbol	Min	Max	Symbol	Min	Max
A	4.50	4.90	E	9.96	10.36
A1	2.44	2.64	E1	8.00TYP	
A2	0.60	0.80	e	2.54TYP	
A3	2.56	2.96	e1	5.08TYP	
b	0.70	0.95	H	6.50	6.90
b1	1.28TYP		L	12.48	13.20
c	0.45	0.65	L1	2.93TYP	
D	15.67	16.07	P1	2.98	3.38
D1	7.70TYP		P2	3.20.	3.60

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■ Modify record

Date	Version	Description	Pagination
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