

700V N-Channel POWER MOSFET

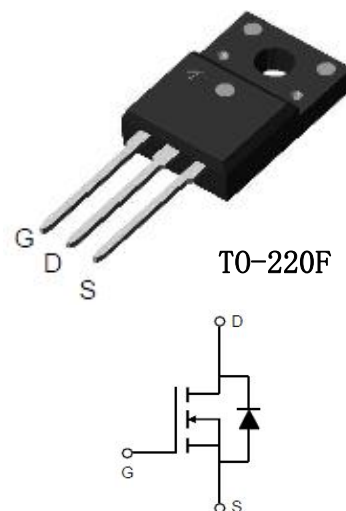
Features

- $V_{DSS}=700V$ $I_D=11A$
- $R_{DS(ON)}=0.85\Omega(\text{Max.})@V_{GS}=10V$
- 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
SI11N70F	TO-220F	SI11N70F	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	700	V
V_{GSS}	Gate-Source Voltage	± 30	V
I_D	Continuous Drain Current	11	A
I_{DM}	Pulsed Drain Current	44	A
P_D	Power Dissipation ($T_C=25^\circ\text{C}$)	70	W
I_{AR}	Avalanche Current	9	A
E_{AS}	Single Pulse Avalanche Energy	405	mJ
E_{AR}	Repetitive Avalanche Energy	54	mJ
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Resistance

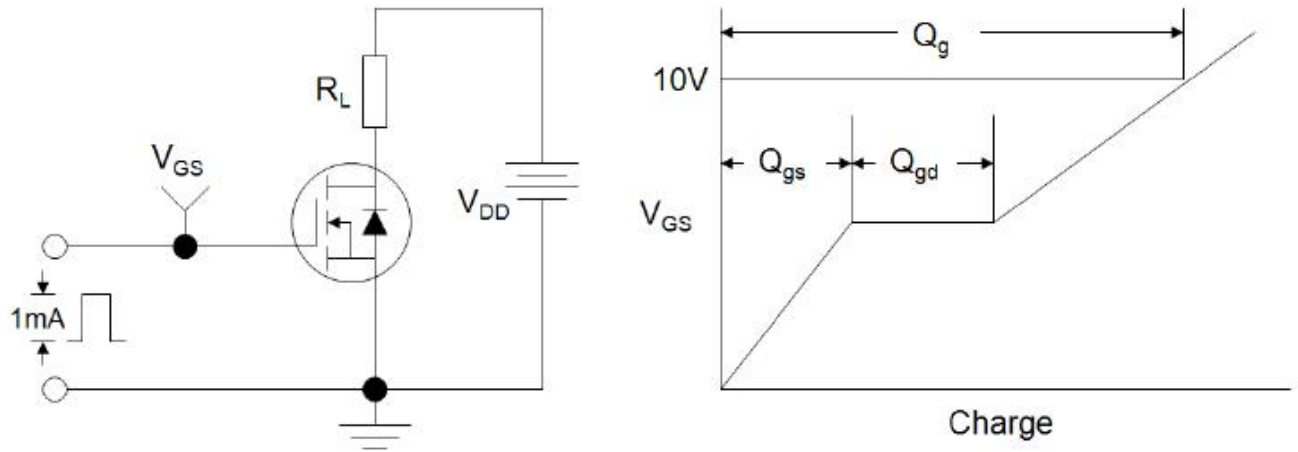
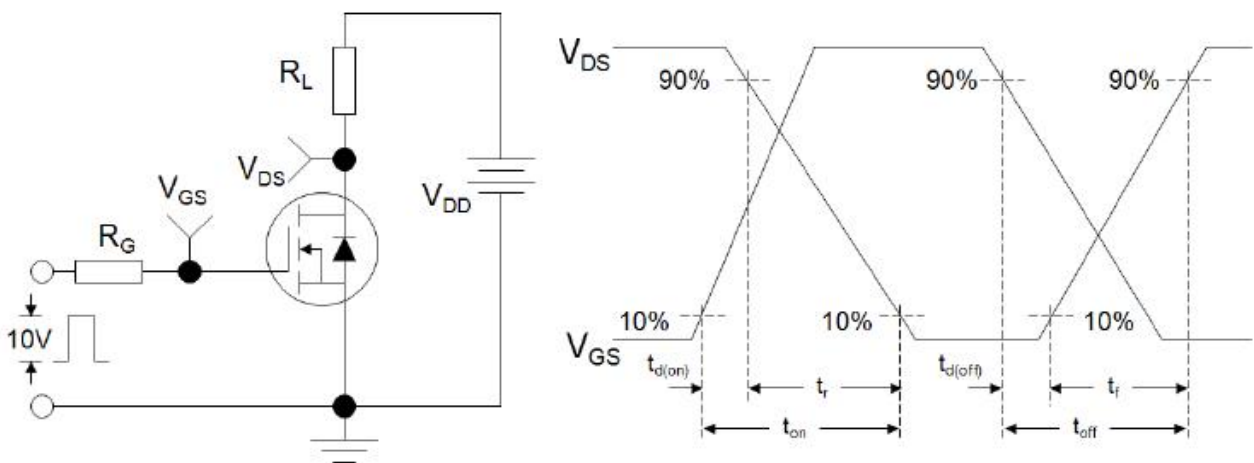
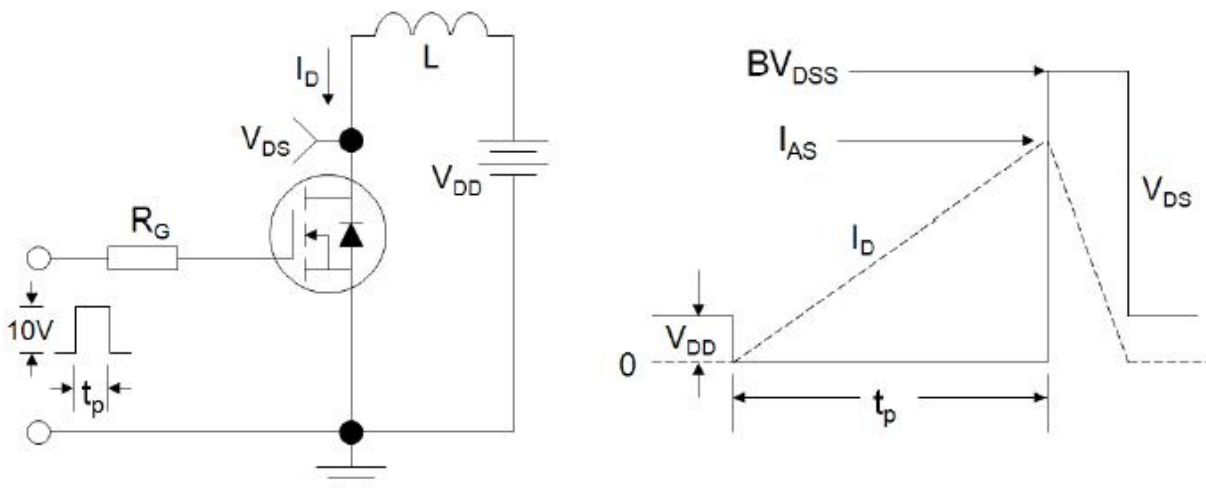
Parameter	Symbol	Value	Unit
Thermal resistance, Junction – Case.	R_{thJC}	1.78	$^\circ\text{C}/\text{W}$
Thermal resistance, Junction – Ambient.	R_{thJA}	62.5	

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

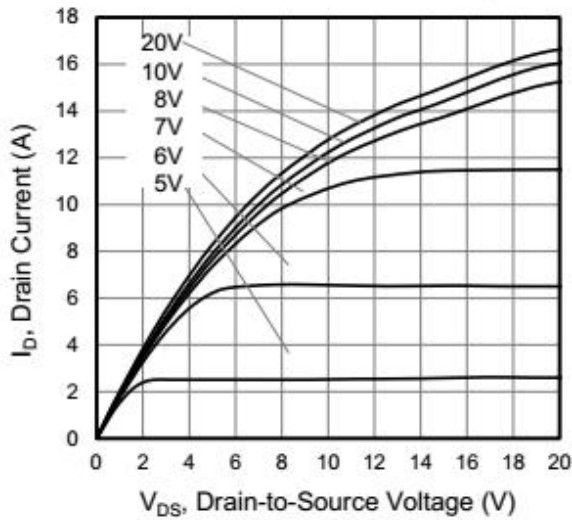
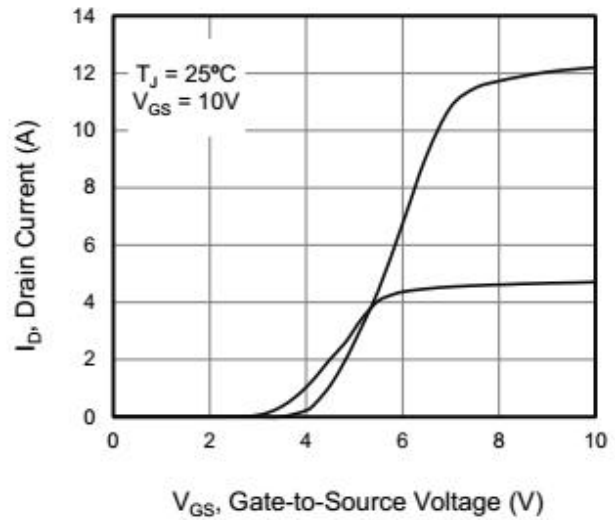
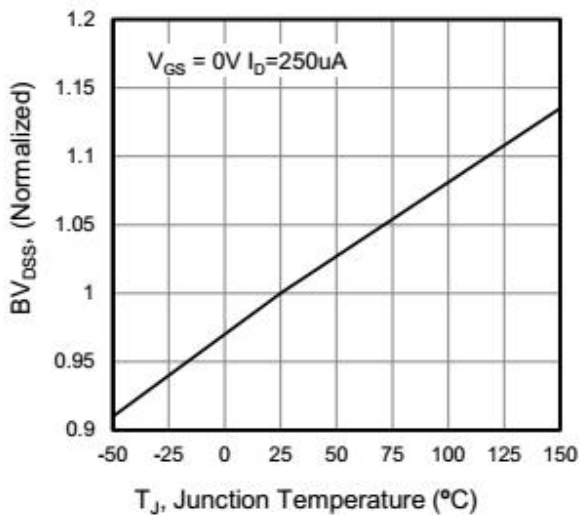
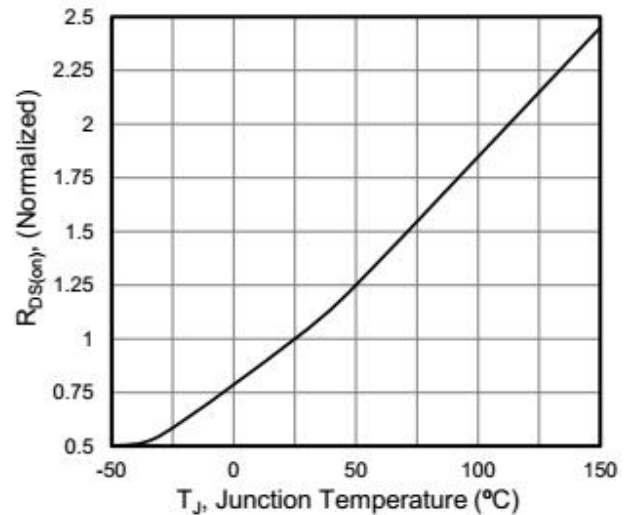
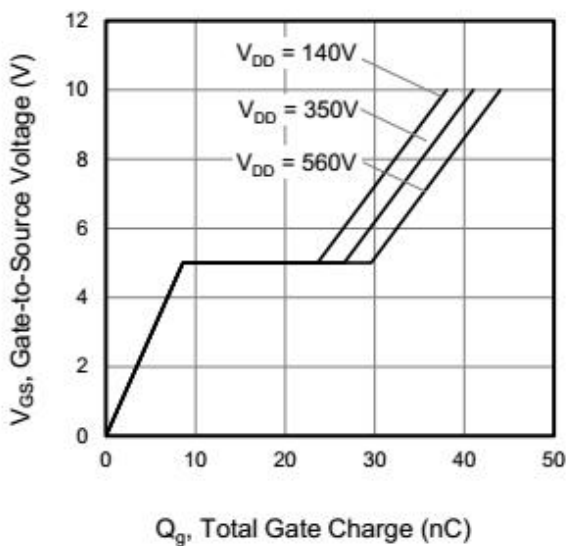
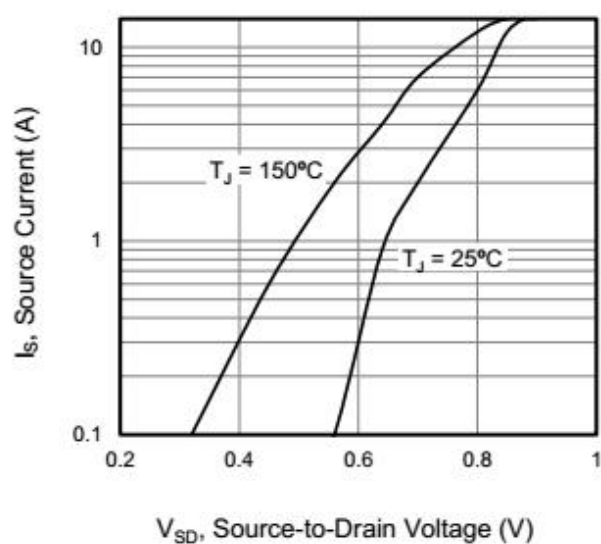
Symbol	Parameter	Test Conditions	Min	TYP	Max	Unit
Static Characteristics						
BV_{DSS}	Drain-source breakdown voltage	$V_{GS}=0V, I_D=250\mu A$	700	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=700V, V_{GS}=0V$	-	-	1	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 30V$	-	-	± 100	nA
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	3.0	-	4.0	V
$R_{DS(on)}$	Drain-Source On-Resistance	$V_{GS}=10V, I_D=5.5A$	-	-	0.85	Ω
Dynamic Characteristic						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V, f=1.0MHz$	-	1540	-	pF
C_{oss}	Output Capacitance		-	175	-	
C_{rss}	Reverse Transfer Capacitance		-	21	-	
Q_G	Gate Total Charge	$V_{DS}=560V, I_D=11A, V_{GS}=10V,$	-	44	-	nC
Q_{gs}	Gate-Source charge		-	8.6	-	
Q_{gd}	Gate-Drain charge		-	21	-	
$t_{d(on)}$	Turn-on delay time	$V_{DD}=350V, I_D=11A, R_G=25\Omega$	-	30	-	nS
t_r	Rise time		-	12	-	
$t_{d(off)}$	Turn-off delay time		-	95	-	
t_f	Fall time		-	22	-	
Drain-Source Body Diode Characteristics						
V_{SD}	Body Diode Forward Voltage	$V_{GS}=0V, I_{SD}=11A$	-	-	1.4	V
t_{rr}	Body Diode Reverse Recovery Time	$V_{GS}=0V, I_S=11A, dI_F/dt=100A/\mu s$	-	380	-	nS
Q_{rr}	Body Diode Reverse Recovery Charge		-	4.5	-	μC
I_S	Continuous Drain-Source Diode Forward Current		-	-	11	A
I_{SM}	Pulsed Drain-Source Diode Forward Current		-	-	44	A

Notes:

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_S=9A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^\circ$
- 3.Pulse Test: Pulse width $\leq 350\mu s$, Duty Cycle $\leq 1\%$

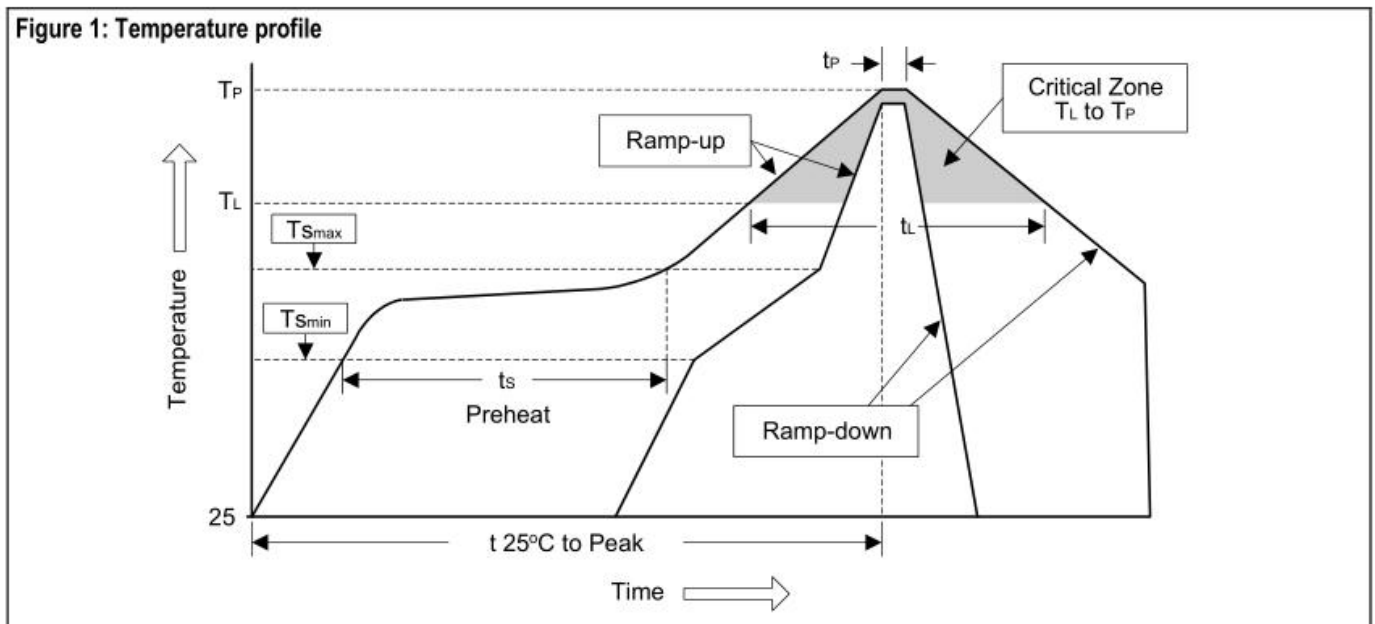
Switching Time Test Circuit and Wave forms
Figure A: Gate Charge Test Circuit and Waveform

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. Transfer Characteristics

Figure 3. BV_{DSS} vs. Temperature

Figure 4. On-Resistance vs. Temperature

Figure 5. Gate Charge

Figure 6. Body Diode Forward Voltage


Soldering Methods for Products

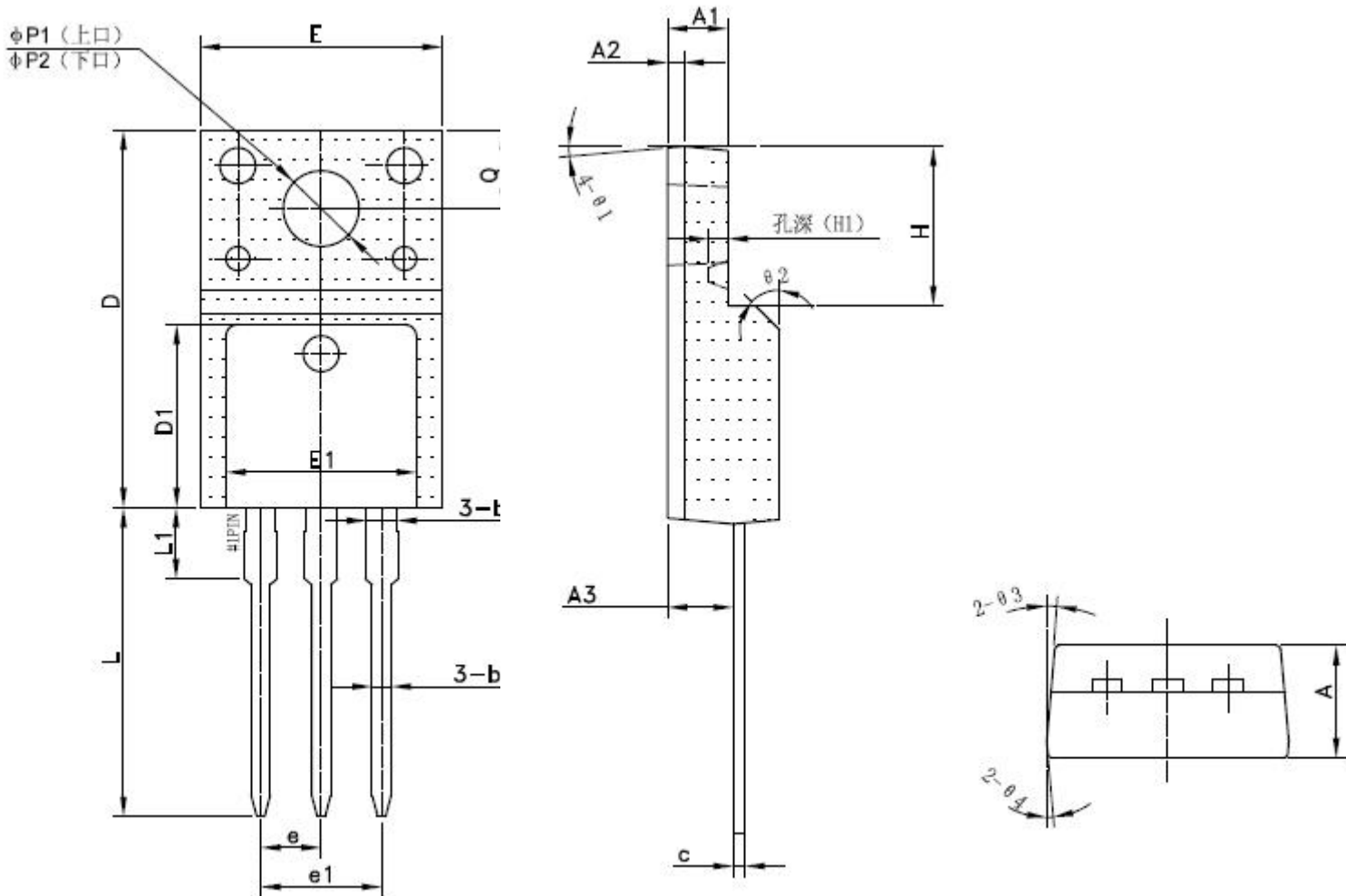
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate(TL to TP)	<3°C/sec	<3°C/sec
Preheat -Temperature Min(Ts min) -Temperature Max(Ts max) -Time(min to max)(ts)	100°C 150°C 60 to 120 sec	150°C 200°C 60 to 180 sec
Tsmax to TL - ramp-up rate	<3°C/sec	<3°C/sec
Time maintained above: -Temperature(TL) -Time(tL)	183°C 60 to 150 sec	217°C 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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