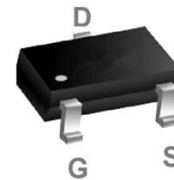


## Features

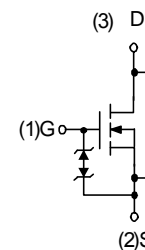
- 200V/1.2A,  
 $R_{DS(ON)} = 680m\Omega(\text{max.}) @ V_{GS}=10V$
- ESD Protection
- 100% UIS +  $R_g$  Tested
- Reliable and Rugged
- Lead Free and Green Devices Available  
 (RoHS Compliant)

## Pin Configuration


**SOT-23-3**

## Applications

- DC-DC converter for Networking.
- Load switch.


**N-Channel MOSFET**

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

Symbol	Parameter	Rating	Unit
<b>Common Ratings</b>			
$V_{DSS}$	Drain-Source Voltage	200	V
$V_{GSS}$	Gate-Source Voltage	$\pm 25$	
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	
$I_S$	Diode Continuous Forward Current	$T_A=25^\circ\text{C}$ 1.2	A
$I_D$	Continuous Drain Current	$T_A=25^\circ\text{C}$ 1.2	A
		$T_A=70^\circ\text{C}$ 0.96	
$I_{DM}^a$	Pulsed Drain Current	$T_A=25^\circ\text{C}$ 4.8	A
$P_D$	Maximum Power Dissipation	$T_A=25^\circ\text{C}$ 2.5	W
		$T_A=70^\circ\text{C}$ 1.6	
$R_{\theta JA}^c$	Thermal Resistance-Junction to Ambient	$t \leq 10s$ 50	$^\circ\text{C/W}$
		Steady State 90	$^\circ\text{C/W}$
$I_{AS}^b$	Avalanche Current, Single pulse	$L=0.5mH$ 1	A
$E_{AS}^b$	Avalanche Energy, Single pulse	$L=0.5mH$ 0.25	mJ

Note a : Pulse width limited by max. junction temperature.

Note b : UIS tested and pulse width limited by maximum junction temperature  $150^\circ\text{C}$  (initial temperature  $T_J=25^\circ\text{C}$ ).

Note c : Surface mounted on  $1\text{in}^2$  pad area.

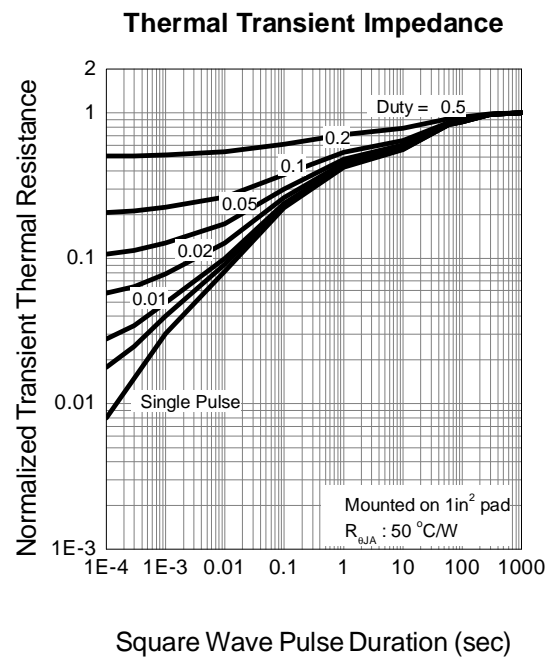
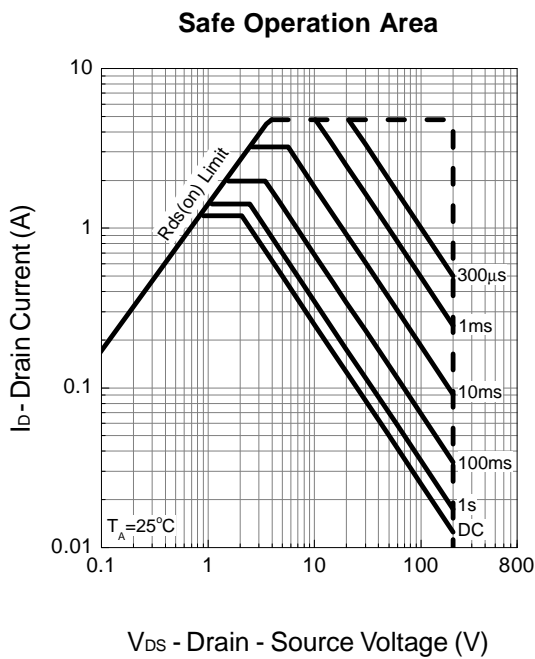
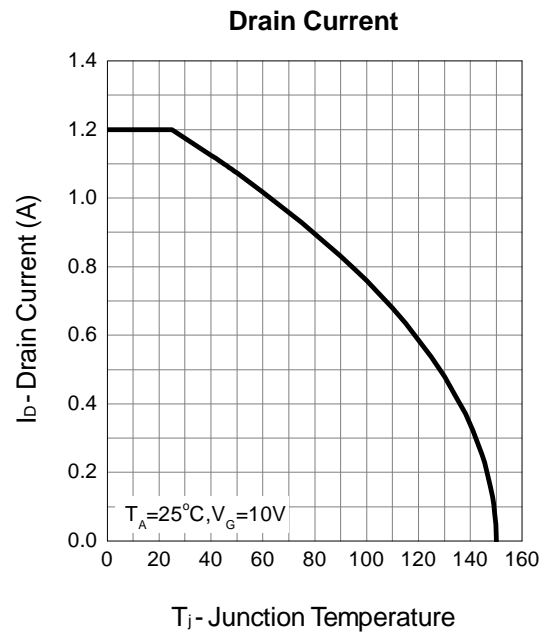
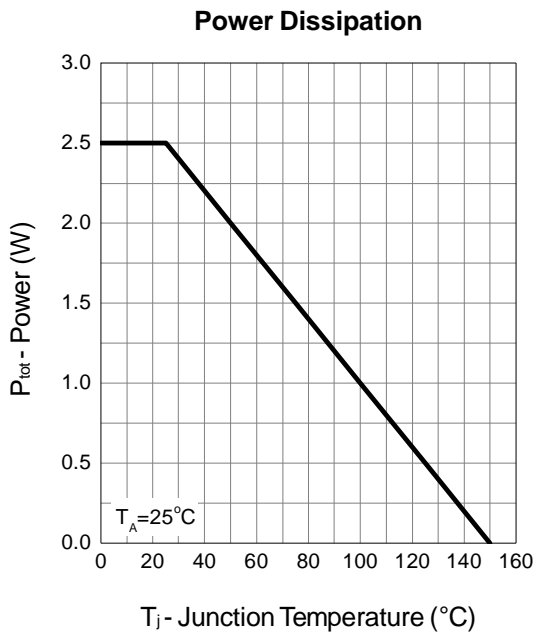
**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	200	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=160V, V_{GS}=0V$ $T_J=85^\circ\text{C}$	-	-	1	$\mu A$
			-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	3	4	5	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 25V, V_{DS}=0V$	-	-	$\pm 10$	$\mu A$
$R_{DS(ON)}^d$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=1A$	-	570	680	m $\Omega$
<b>Diode Characteristics</b>						
$V_{SD}^d$	Diode Forward Voltage	$I_{SD}=1A, V_{GS}=0V$	-	0.8	1.3	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=1A, di_{SD}/dt=100A/\mu s$	-	48	-	ns
$Q_{rr}$	Reverse Recovery Charge		-	70	-	nC
<b>Dynamic Characteristics<sup>e</sup></b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$	-	4	-	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=30V,$ Frequency=1.0MHz	-	280	-	pF
$C_{oss}$	Output Capacitance		-	25	-	
$C_{rss}$	Reverse Transfer Capacitance		-	8.5	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=30V, R_L=30\Omega,$ $I_{DS}=1A, V_{GEN}=10V,$ $R_G=6\Omega$	-	10	18	ns
$t_r$	Turn-on Rise Time		-	8	15	
$t_{d(OFF)}$	Turn-off Delay Time		-	9	17	
$t_f$	Turn-off Fall Time		-	2	4	
<b>Gate Charge Characteristics<sup>e</sup></b>						
$Q_g$	Total Gate Charge	$V_{DS}=100V, V_{GS}=10V,$ $I_{DS}=1A$	-	6	9	nC
$Q_{gs}$	Gate-Source Charge		-	2	-	
$Q_{gd}$	Gate-Drain Charge		-	1.5	-	

Note d : Pulse test ; pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ .

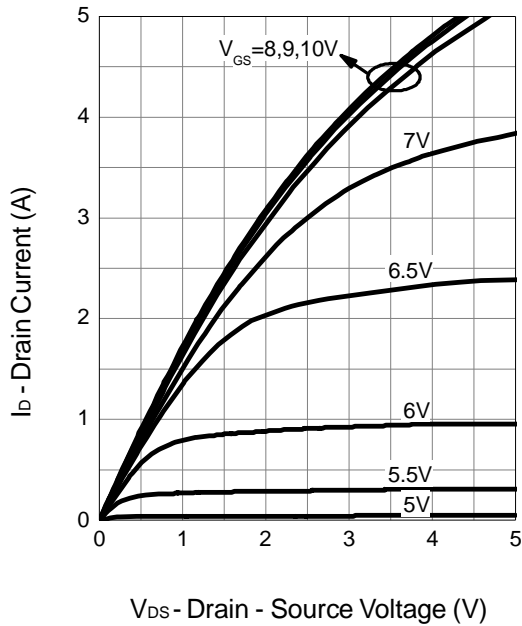
Note e : Guaranteed by design, not subject to production testing.

**Typical Operating Characteristics**

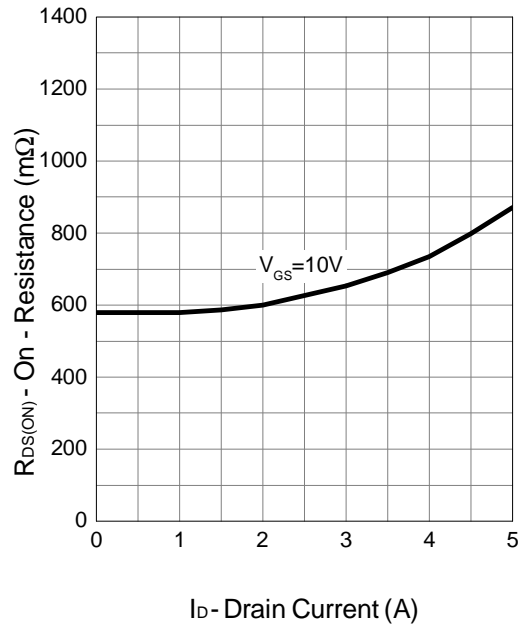


**Typical Operating Characteristics (Cont.)**

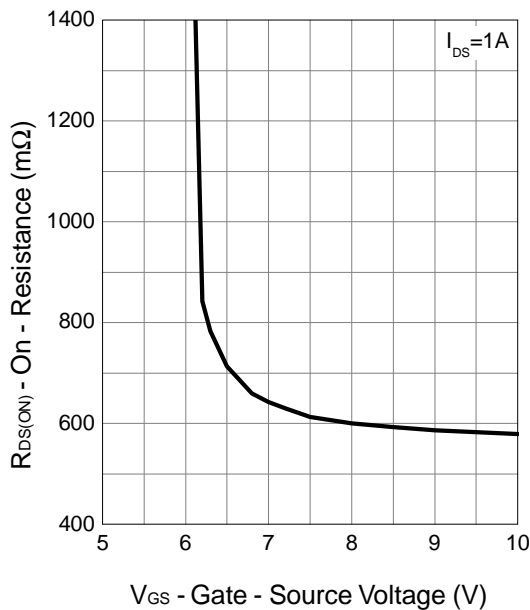
**Output Characteristics**



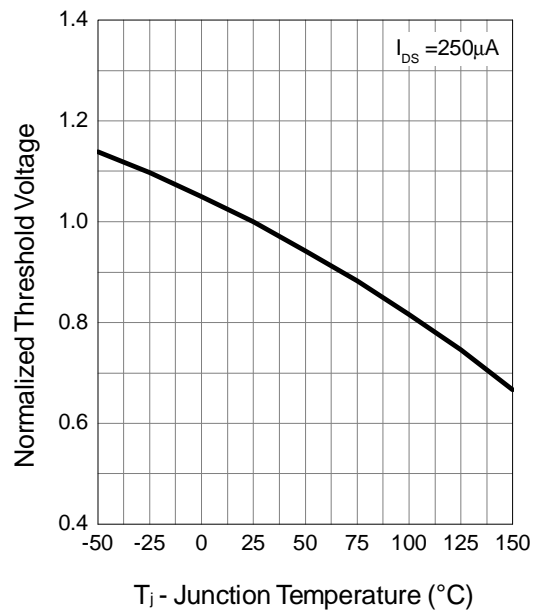
**Drain-Source On Resistance**



**Gate-Source On Resistance**

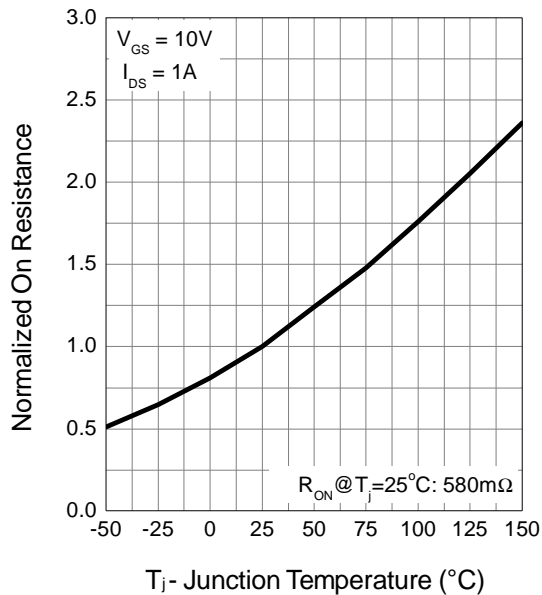


**Gate Threshold Voltage**

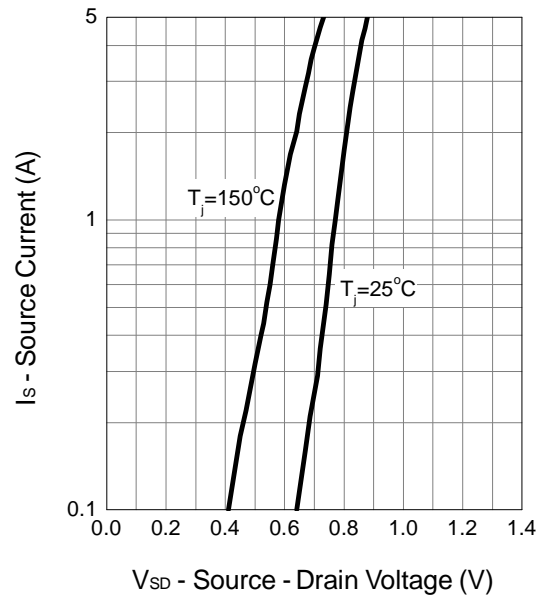


**Typical Operating Characteristics (Cont.)**

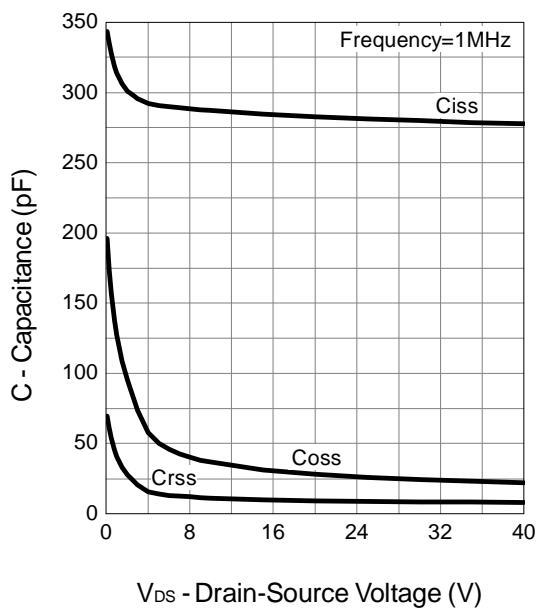
**Drain-Source On Resistance**



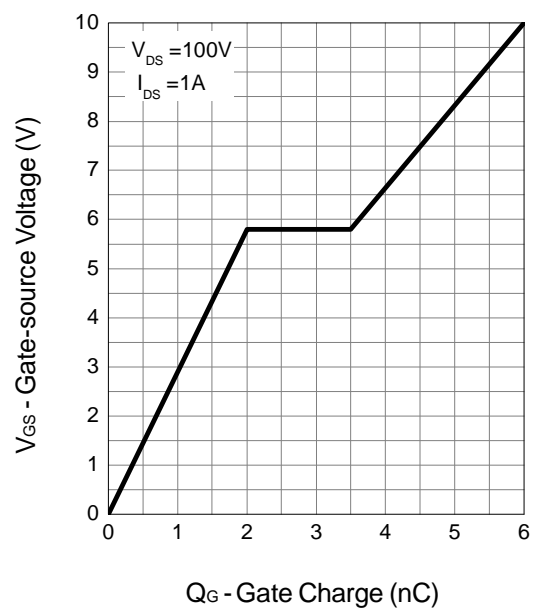
**Source-Drain Diode Forward**



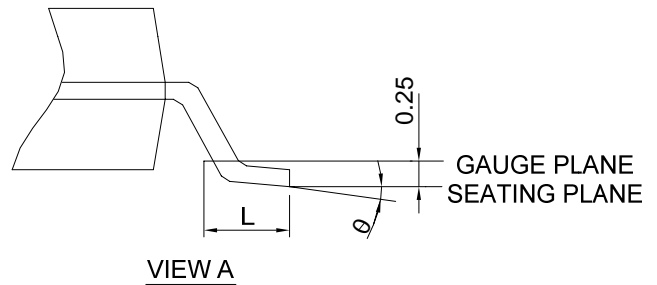
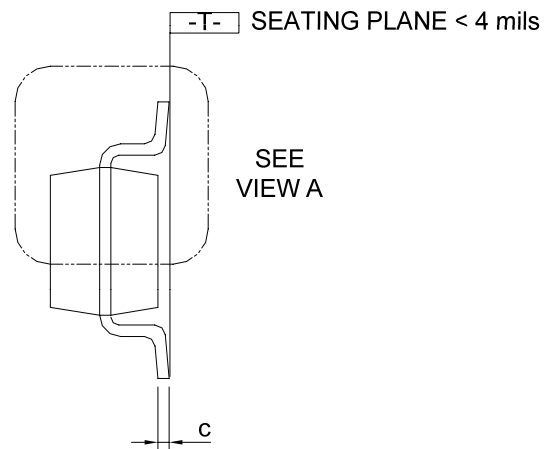
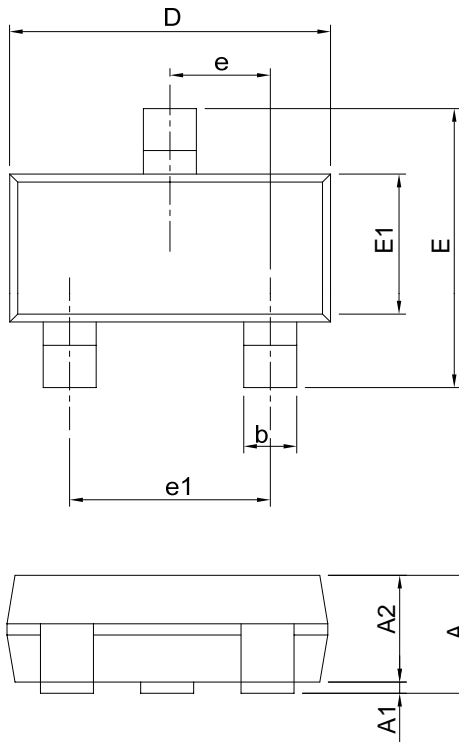
**Capacitance**



**Gate Charge**

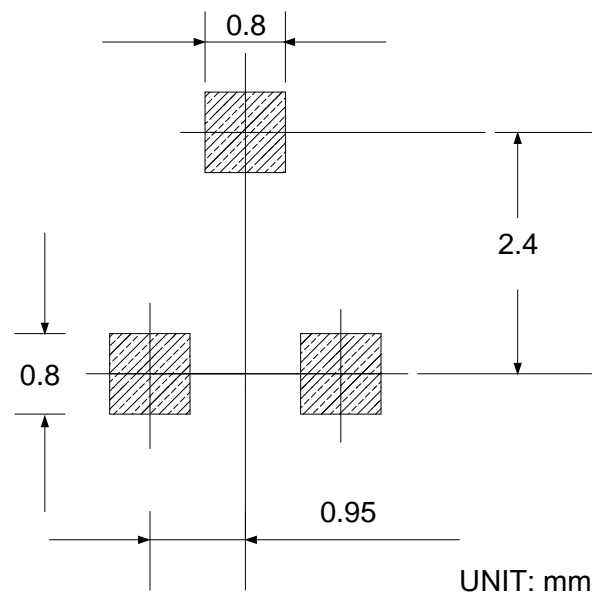


**Package Information SOT-23-3**



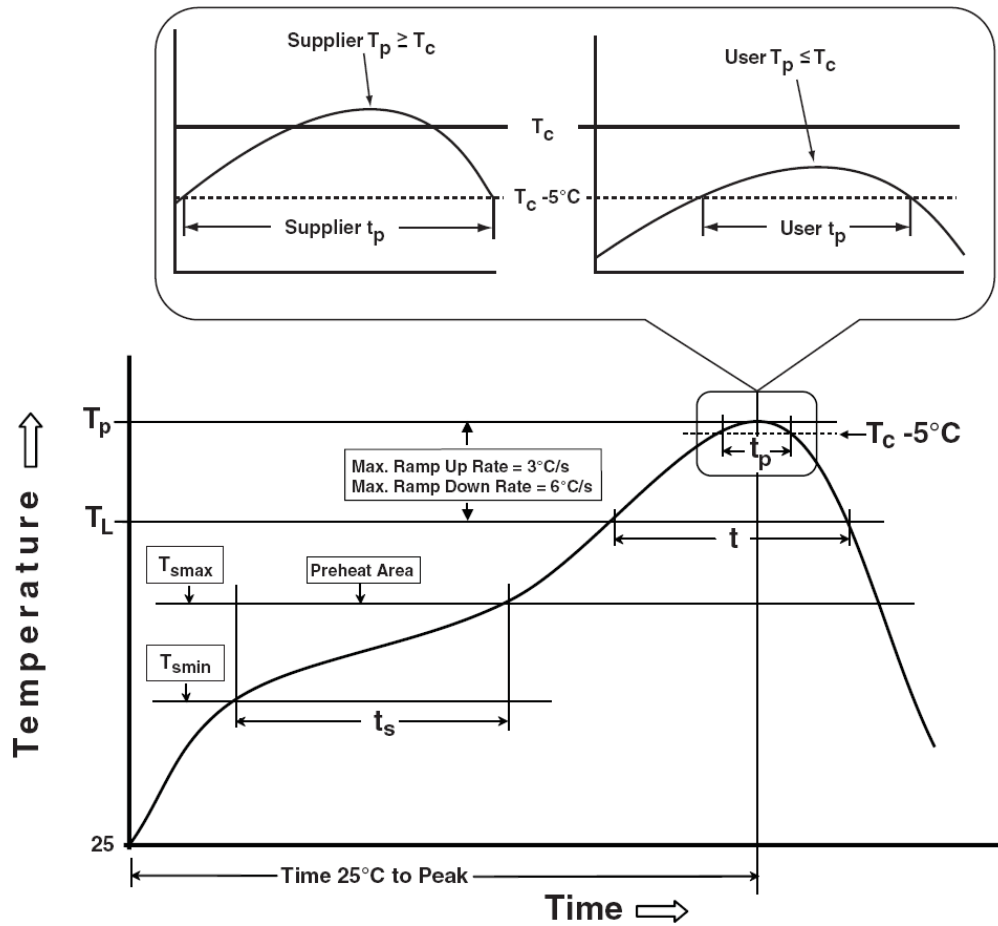
SYMBOLS	SOT-23-3			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.90	1.20	0.035	0.047
A1	0.00	0.08	0.000	0.003
A2	0.90	1.12	0.035	0.044
b	0.30	0.50	0.012	0.020
c	0.08	0.22	0.003	0.009
D	2.70	3.10	0.106	0.122
E	2.60	3.00	0.102	0.118
E1	1.40	1.80	0.055	0.071
e	0.95 BSC		0.037 BSC	
e1	1.9 BSC		0.075 BSC	
L	0.30	0.60	0.012	0.024
$\theta$	0°	8°	0°	8°

**RECOMMENDED LAND PATTERN**



Note : Dimension D and E1 do not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 10 mil per side.

### Classification Profile



## Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
<b>Preheat &amp; Soak</b>		
Temperature min ( $T_{smin}$ )	100 °C	150 °C
Temperature max ( $T_{smax}$ )	150 °C	200 °C
Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60-120 seconds	60-120 seconds
Average ramp-up rate ( $T_{smax}$ to $T_p$ )	3 °C/second max.	3°C/second max.
Liquidous temperature ( $T_L$ )	183 °C	217 °C
Time at liquidous ( $t_L$ )	60-150 seconds	60-150 seconds
Peak package body Temperature ( $T_p$ )*	See Classification Temp in table 1	See Classification Temp in table 2
Time ( $t_p$ )** within 5°C of the specified classification temperature ( $T_c$ )	20** seconds	30** seconds
Average ramp-down rate ( $T_p$ to $T_{smax}$ )	6 °C/second max.	6 °C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.
* Tolerance for peak profile Temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.		
** Tolerance for time at peak profile temperature ( $t_p$ ) is defined as a supplier minimum and a user maximum.		

Table 1. SnPb Eutectic Process – Classification Temperatures ( $T_c$ )

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2. Pb-free Process – Classification Temperatures ( $T_c$ )

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350-2000	Volume mm <sup>3</sup> >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥2.5 mm	250 °C	245 °C	245 °C

## Reliability Test Program

Test item	Method	Description
SOLDERABILITY	JESD-22, B102	5 Sec, 245°C
HTRB	JESD-22, A108	1000 Hrs, 80% of VDS max @ $T_{jmax}$
HTGB	JESD-22, A108	1000 Hrs, 100% of VGS max @ $T_{jmax}$
PCT	JESD-22, A102	168 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, -65°C~150°C



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