

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T _A =25°C Unless Otherwise Noted)				
V _{DSS}	Drain-Source Voltage		80	V
V _{GSS}	Gate-Source Voltage		±25	
T _J	Maximum Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-55 to 150	
I _S	Diode Continuous Forward Current	T _C =25°C	83	A
I _{DP}	300µs Pulse Drain Current Tested	T _C =25°C	200	
I _D	Continuous Drain Current	T _C =25°C	83	
		T _C =100°C	52	
P _D	Maximum Power Dissipation	T _C =25°C	113	W
		T _C =100°C	45	
R _{θJC}	Thermal Resistance-Junction to Case		1.1	°C/W
R _{θJA}	Thermal Resistance-Junction to Ambient		62.5	
E _{AS}	Avalanche Energy, Single Pulsed	L=2mH	460	mJ

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	$V_{\text{GS}}=0\text{V}, I_{\text{DS}}=250\mu\text{A}$	80	-	-	V
$\Delta BV_{\text{DSS}}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	$V_{\text{GS}}=0\text{V}, I_{\text{DS}}=250\mu\text{A}$	-	0.073	-	$\text{V}/^{\circ}\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{\text{DS}}=60\text{V}, V_{\text{GS}}=0\text{V}$	-	-	1	μA
		$T_J=85^{\circ}\text{C}$	-	-	30	
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{\text{DS}}=V_{\text{GS}}, I_{\text{DS}}=250\mu\text{A}$	2	3	4	V
I_{GSS}	Gate Leakage Current	$V_{\text{GS}}=\pm 25\text{V}, V_{\text{DS}}=0\text{V}$	-	-	± 100	nA
$R_{\text{DS(ON)}}^a$	Drain-Source On-state Resistance	$V_{\text{GS}}=10\text{V}, I_{\text{DS}}=40\text{A}$	-	8	9.6	$\text{m}\Omega$
Diode Characteristics						
V_{SD}^a	Diode Forward Voltage	$I_{\text{SD}}=20\text{A}, V_{\text{GS}}=0\text{V}$	-	0.8	1.3	V
t_{rr}	Reverse Recovery Time	$I_{\text{SD}}=40\text{A},$ $dI_{\text{SD}}/dt=100\text{A}/\mu\text{s}$	-	41	-	ns
Q_{rr}	Reverse Recovery Charge		-	71	-	nC

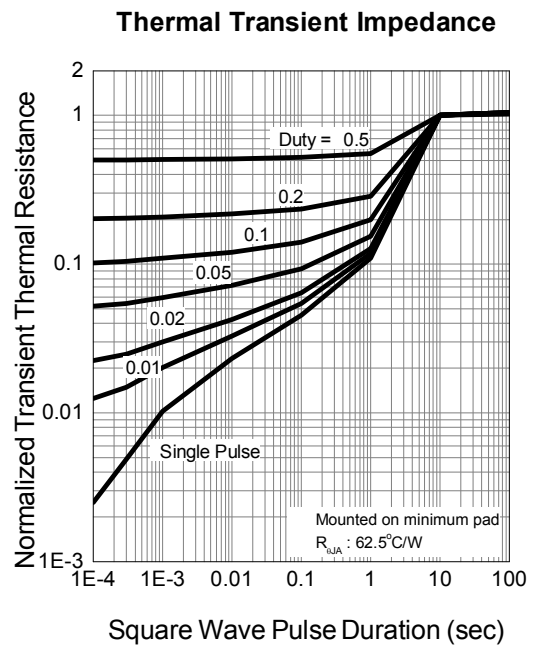
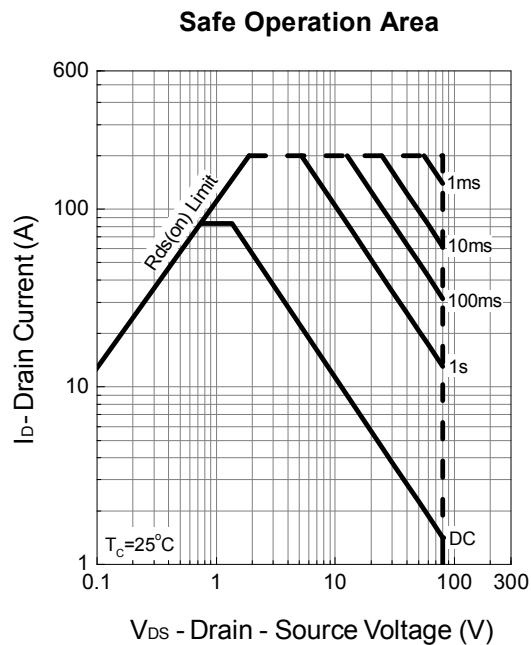
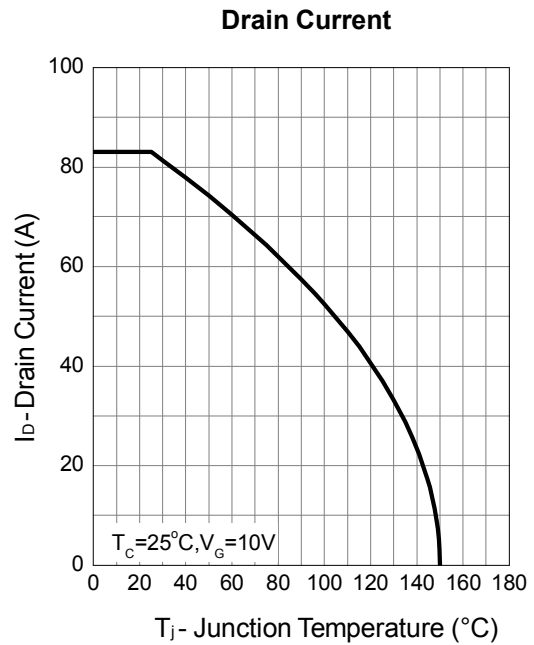
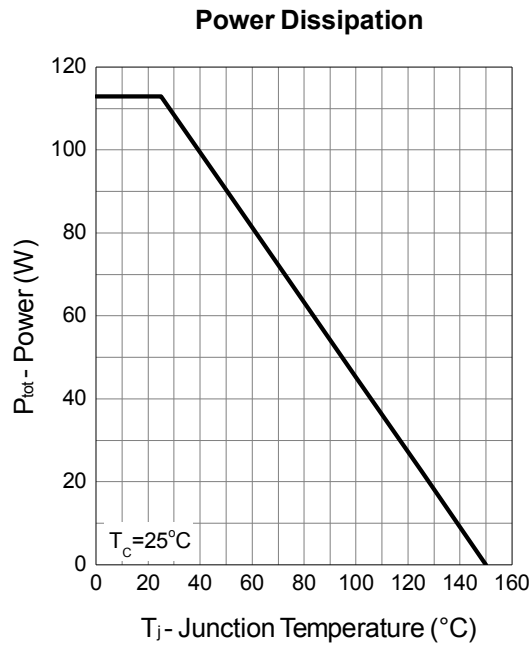
Electrical Characteristics (Cont.) ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Dynamic Characteristics ^b						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	1	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, Frequency=1.0MHz	-	4460	6240	pF
C _{oss}	Output Capacitance		-	362	-	
C _{rss}	Reverse Transfer Capacitance		-	276	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =30V, R _L =30Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	23	41	ns
t _r	Turn-on Rise Time		-	16	29	
t _{d(OFF)}	Turn-off Delay Time		-	75	135	
t _f	Turn-off Fall Time		-	38	68	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} =40V, V _{GS} =10V, I _{DS} =40A	-	89	125	nC
Q _{gs}	Gate-Source Charge		-	23	-	
Q _{gd}	Gate-Drain Charge		-	26	-	

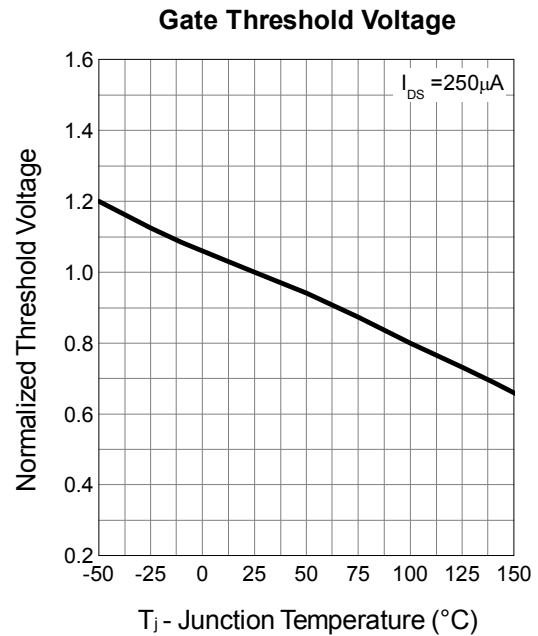
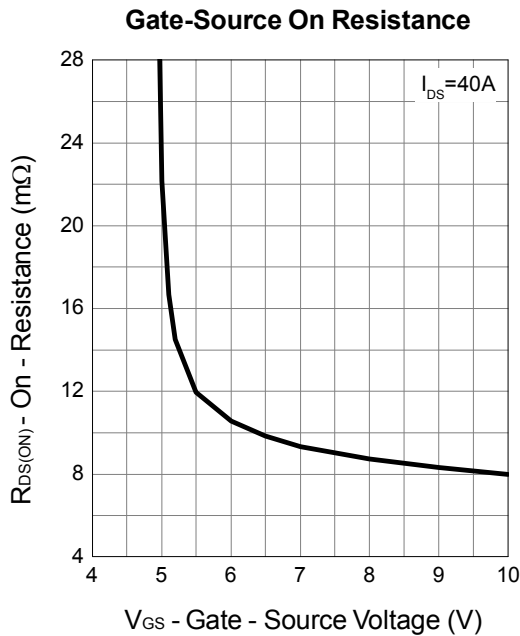
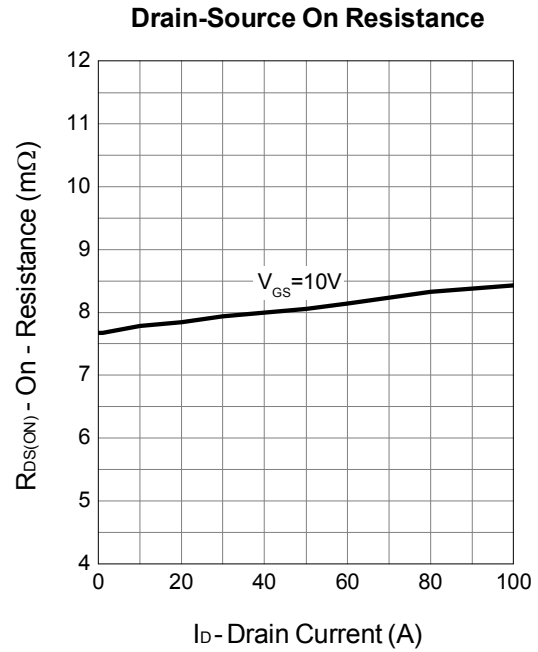
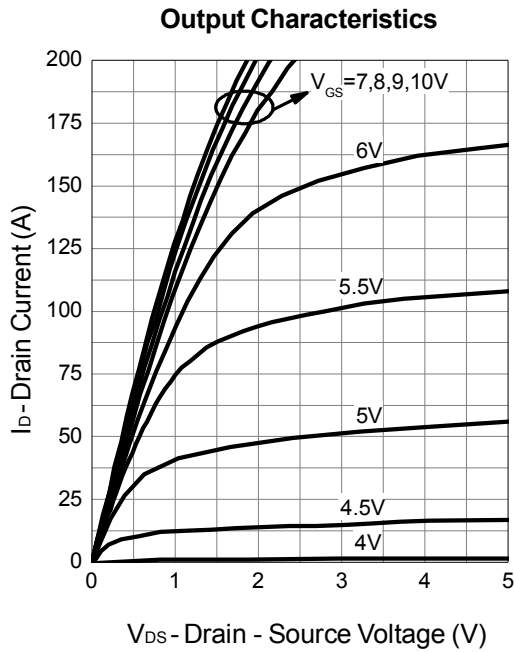
Note a : Pulse test ; pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

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

Typical Operating Characteristics

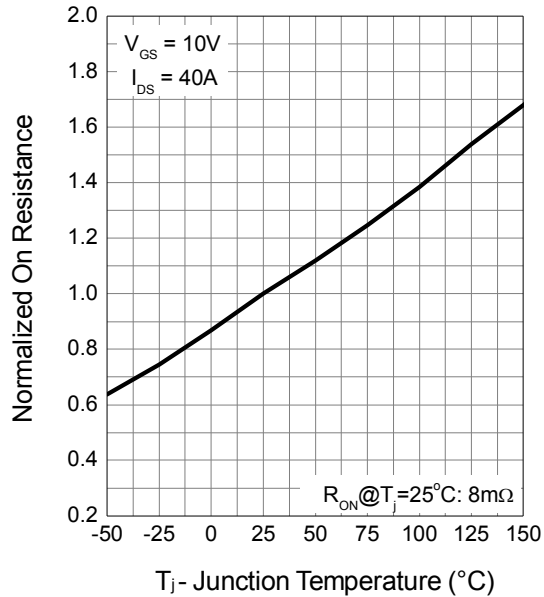


Typical Operating Characteristics (Cont.)

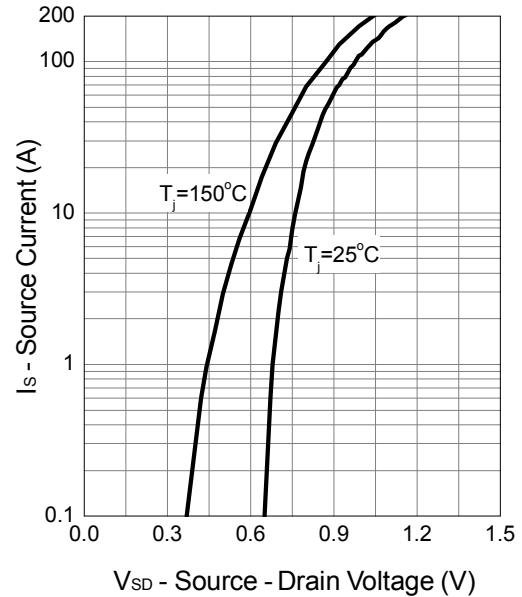


Typical Operating Characteristics (Cont.)

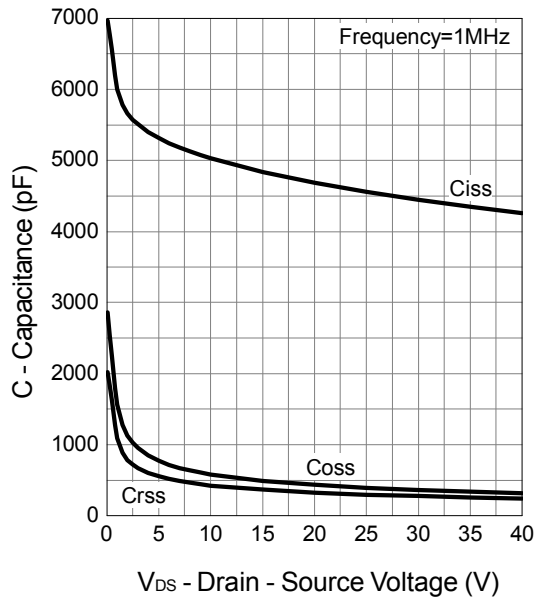
Drain-Source On Resistance



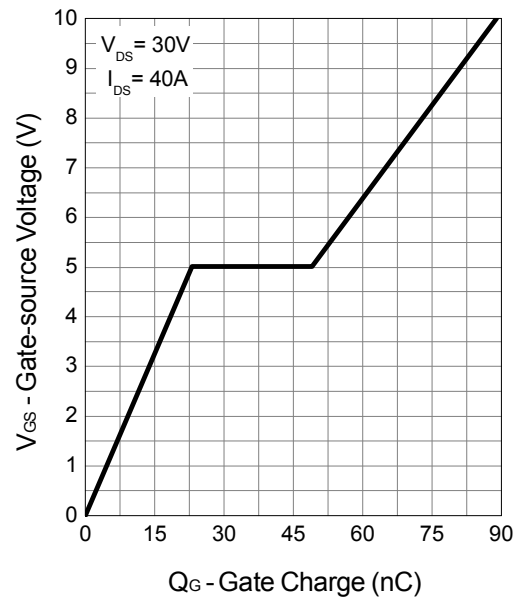
Source-Drain Diode Forward



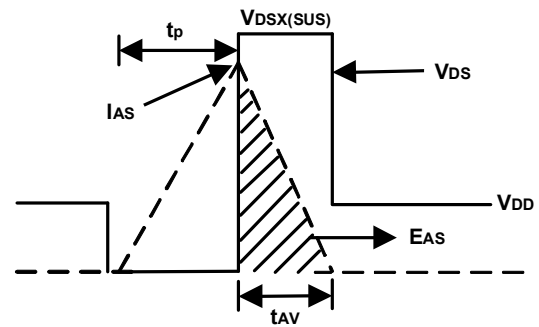
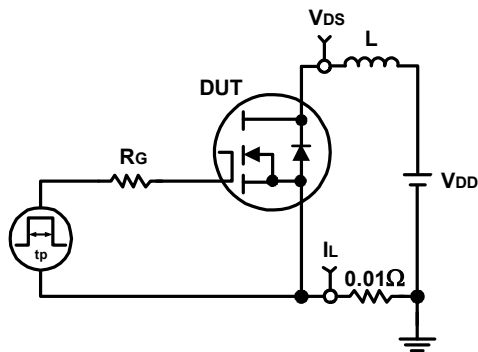
Capacitance



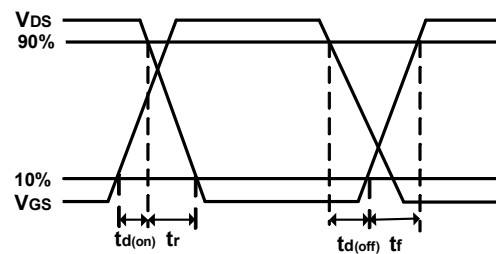
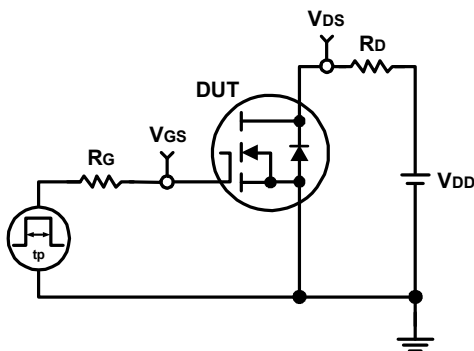
Gate Charge



Avalanche Test Circuit and Waveforms

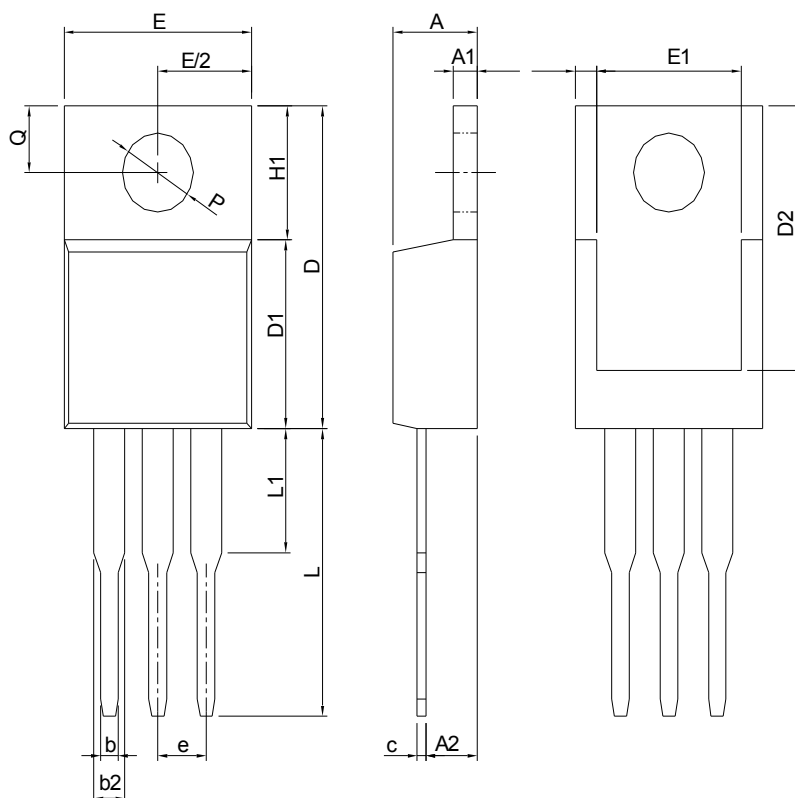


Switching Time Test Circuit and Waveforms



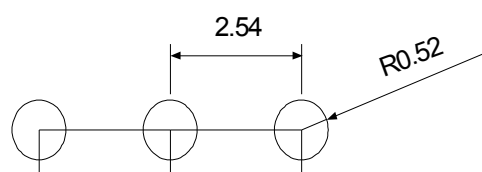
Package Information

TO-220



SYMBOL	TO-220			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	3.56	4.83	0.140	0.190
A1	0.51	1.40	0.020	0.055
A2	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b2	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.22	16.51	0.560	0.650
D1	8.38	9.02	0.330	0.355
D2	12.19	13.65	0.480	0.537
E	9.65	10.67	0.380	0.420
E1	6.86	8.89	0.270	0.350
e	2.54 BSC		0.100 BSC	
H1	5.84	6.86	0.230	0.270
L	12.70	14.73	0.500	0.580
L1	-	6.35	-	0.250
P	3.53	4.09	0.139	0.161
Q	2.54	3.43	0.100	0.135

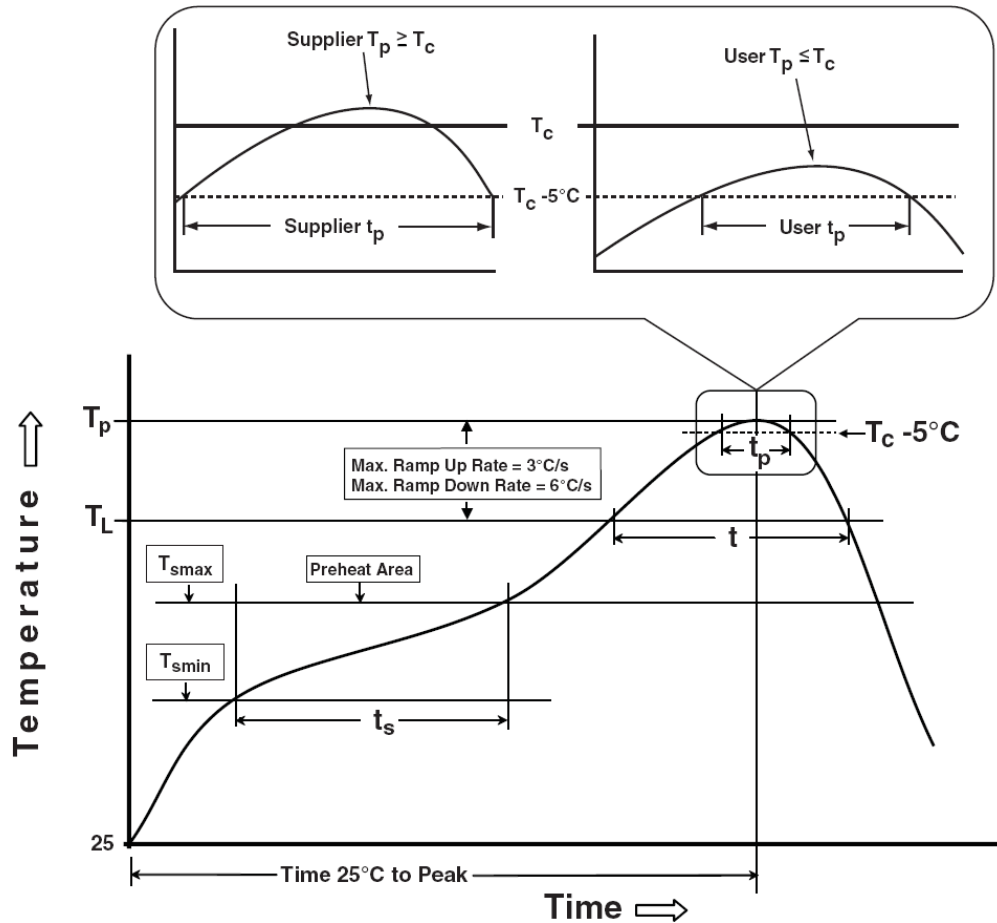
RECOMMENDED LAND PATTERN



UNIT: mm

Note: Follow JEDEC TO-220 AB.

Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (T_{smin}) Temperature max (T_{smax}) Time (T_{smin} to T_{smax}) (t_s)	100 °C 150 °C 60-120 seconds	150 °C 200 °C 60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max.	3°C/second max.
Liquidous temperature (T_L) Time at liquidous (t_L)	183 °C 60-150 seconds	217 °C 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 ³ <350	Volume mm ³ ≥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 ³ <350	Volume mm ³ 350-2000	Volume mm ³ >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

Customer Service

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