

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
Common Ratings ($T_A=25^{\circ}\text{C}$ Unless Otherwise Noted)			
V_{DSS}	Drain-Source Voltage	100	V
V_{GSS}	Gate-Source Voltage	± 20	
T_J	Maximum Junction Temperature	150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	
I_S	Diode Continuous Forward Current	8	A
I_{DP}	300 μs Pulse Drain Current Tested	$T_C=25^{\circ}\text{C}$ 60	
I_D	Continuous Drain Current	$T_C=25^{\circ}\text{C}$ 16	
		$T_C=100^{\circ}\text{C}$ 10	
P_D	Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$ 25	W
		$T_C=100^{\circ}\text{C}$ 10	
$R_{\theta\text{JC}}$	Thermal Resistance-Junction to Case	5	$^{\circ}\text{C/W}$
$R_{\theta\text{JA}}$	Thermal Resistance-Junction to Ambient	62.5	
E_{AS}	Avalanche Energy, Single Pulsed	$L=0.1\text{mH}$ 75	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	$V_{\text{GS}}=0\text{V}$, $I_{\text{DS}}=250\mu\text{A}$	100	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{\text{DS}}=80\text{V}$, $V_{\text{GS}}=0\text{V}$	-	-	1	μA
		$T_J=85^{\circ}\text{C}$	-	-	30	
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{\text{DS}}=V_{\text{GS}}$, $I_{\text{DS}}=250\mu\text{A}$	1	2	2.5	V
I_{GSS}	Gate Leakage Current	$V_{\text{GS}}=\pm 16\text{V}$, $V_{\text{DS}}=0\text{V}$	-	-	± 18	μA
$R_{\text{DS(ON)}}^a$	Drain-Source On-state Resistance	$V_{\text{GS}}=10\text{V}$, $I_{\text{DS}}=8\text{A}$	-	36	44	$\text{m}\Omega$
Diode Characteristics						
V_{SD}^a	Diode Forward Voltage	$I_{\text{SD}}=4\text{A}$, $V_{\text{GS}}=0\text{V}$	-	0.8	1.1	V
t_{rr}	Reverse Recovery Time	$I_{\text{SD}}=8\text{A}$,	-	47	-	ns
Q_{rr}	Reverse Recovery Charge	$dI_{\text{SD}}/dt=100\text{A}/\mu\text{s}$	-	87	-	nC

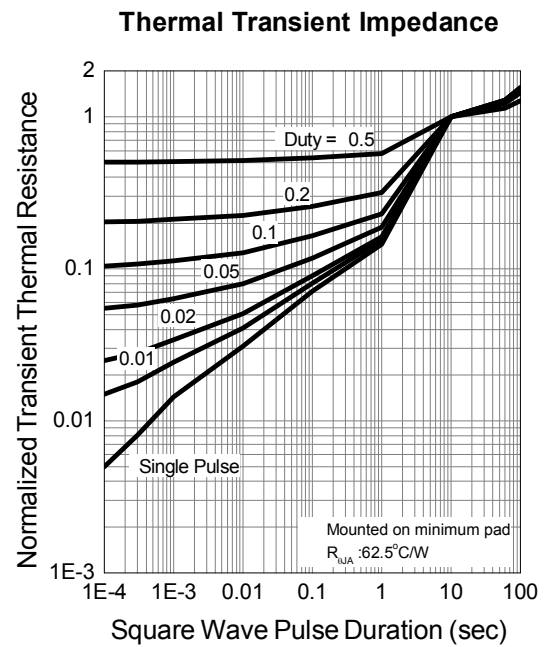
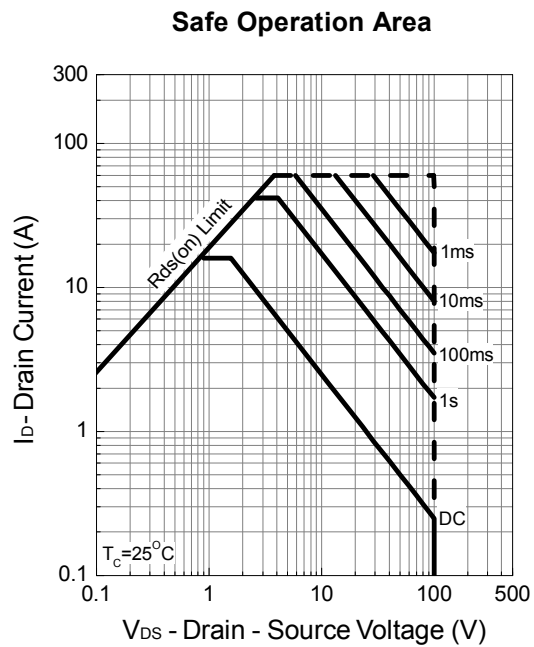
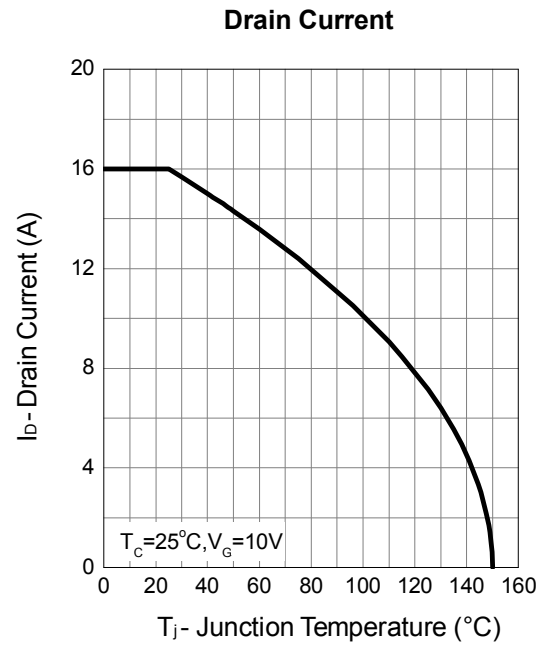
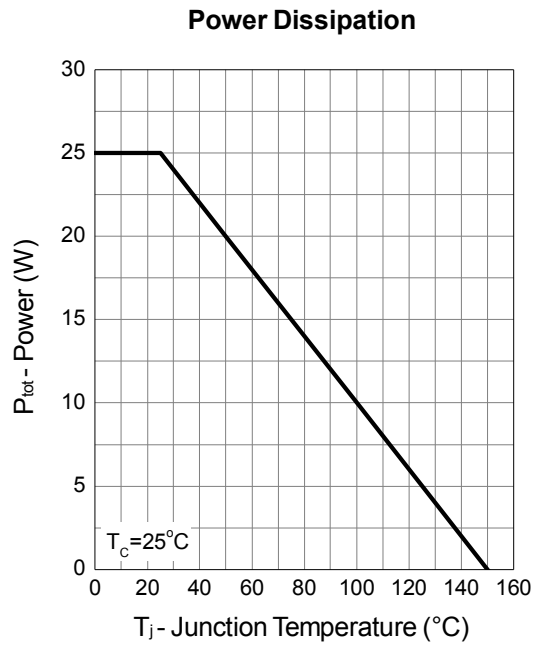
Electrical Characteristics (Cont.) ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Dynamic Characteristics ^b						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V,F=1MHz	-	1.8	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, Frequency=1.0MHz	-	1960	-	pF
C _{oss}	Output Capacitance		-	125	-	
C _{rss}	Reverse Transfer Capacitance		-	80	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =30V, R _L =30Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	8.5	16	ns
t _r	Turn-on Rise Time		-	5.5	11	
t _{d(OFF)}	Turn-off Delay Time		-	45	82	
t _f	Turn-off Fall Time		-	10	19	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} =50V, V _{GS} =10V, I _{DS} =8A	-	41	57	nC
Q _{gs}	Gate-Source Charge		-	6.5	-	
Q _{gd}	Gate-Drain Charge		-	9.5	-	

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

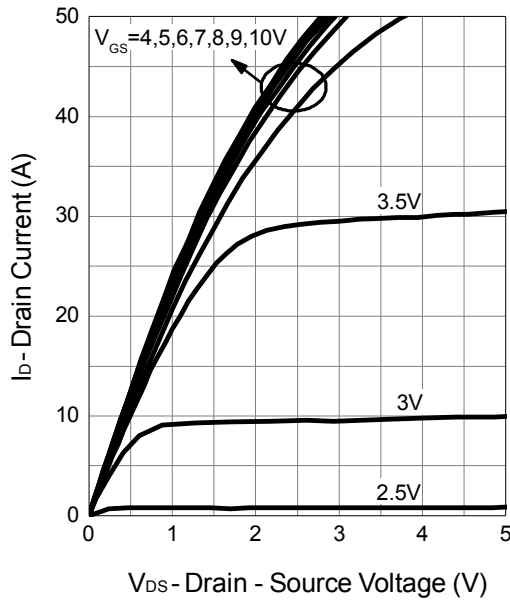
Note b : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

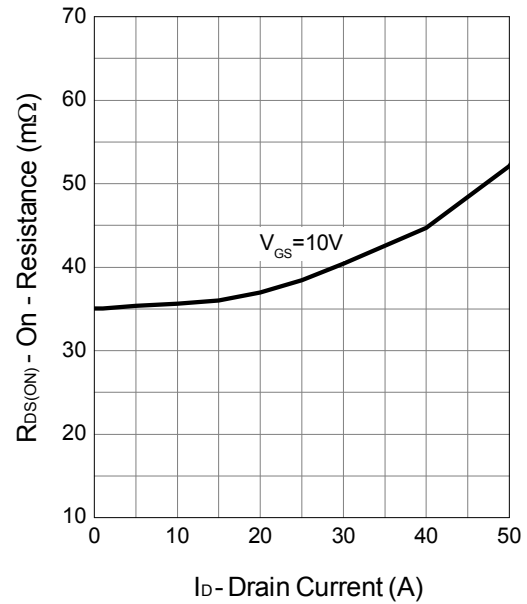


Typical Operating Characteristics (Cont.)

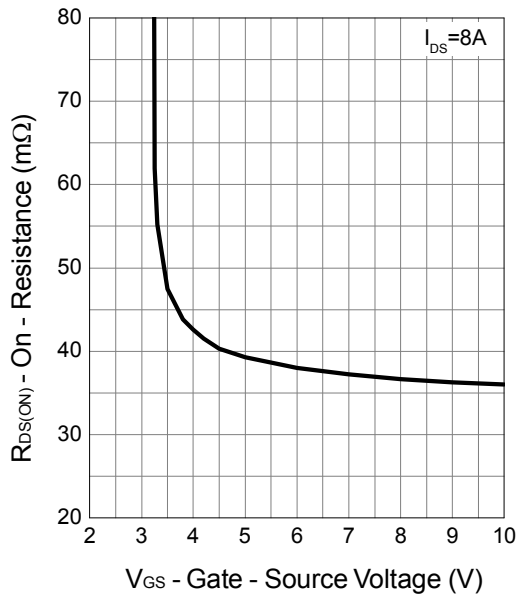
Output Characteristics



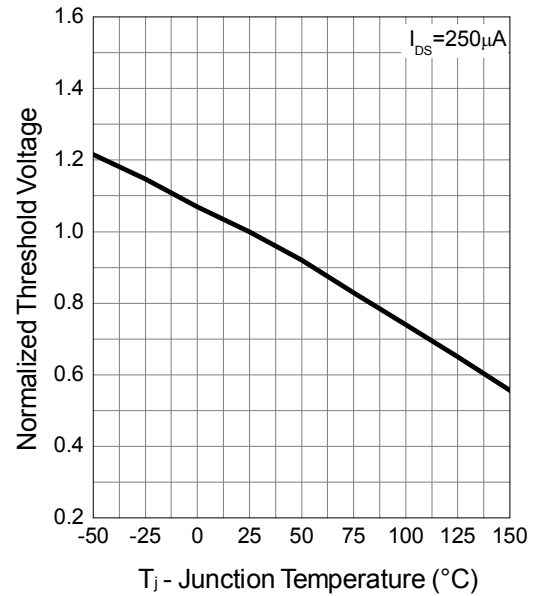
Drain-Source On Resistance



Gate-Source On Resistance

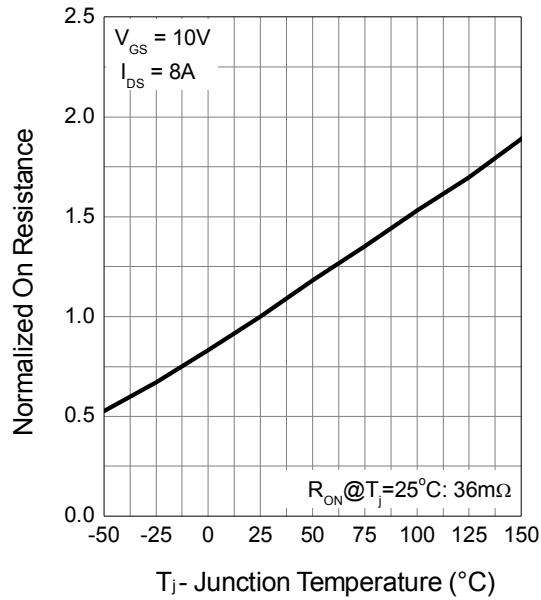


Gate Threshold Voltage

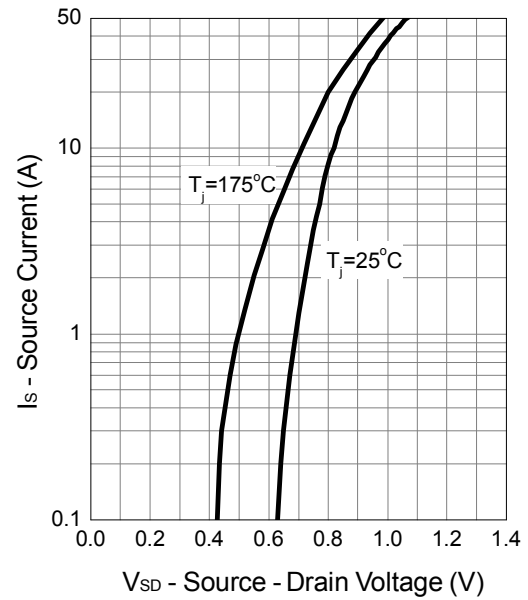


Typical Operating Characteristics (Cont.)

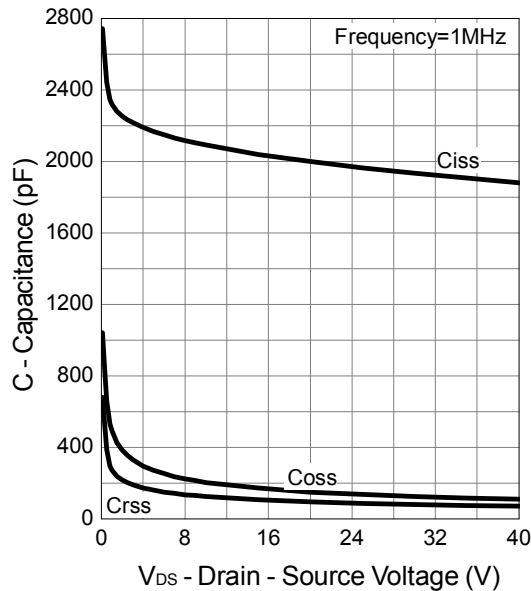
Drain-Source On Resistance



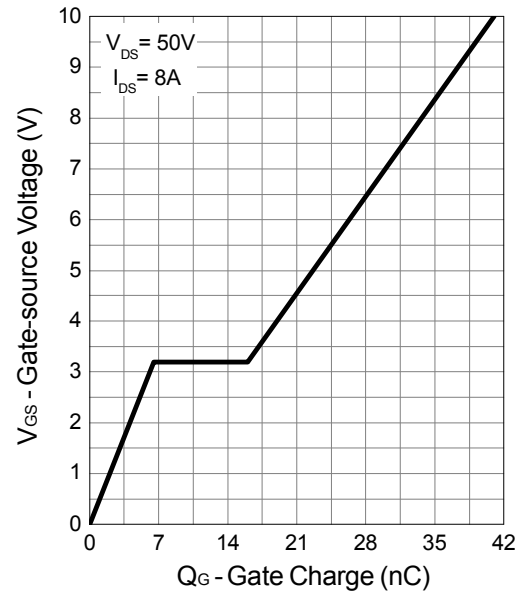
Source-Drain Diode Forward



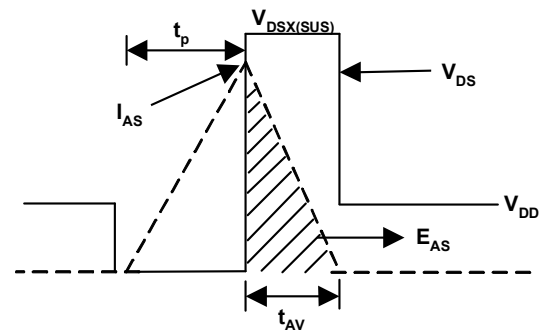
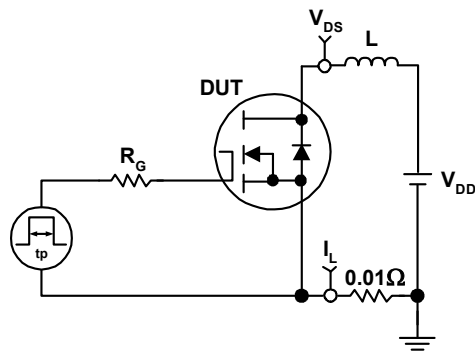
Capacitance



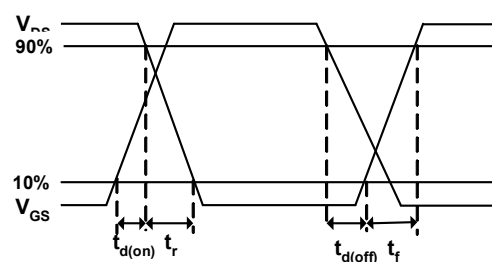
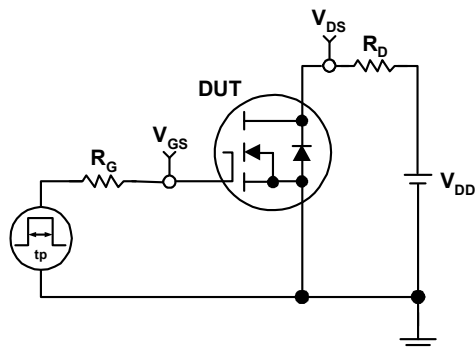
Gate Charge



Avalanche Test Circuit and Waveforms

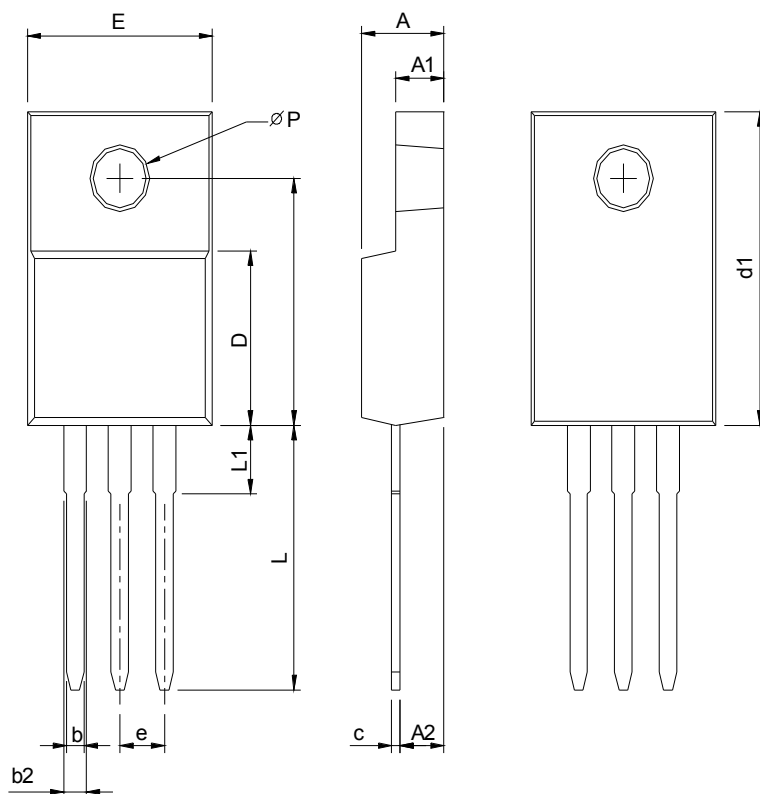


Switching Time Test Circuit and Waveforms



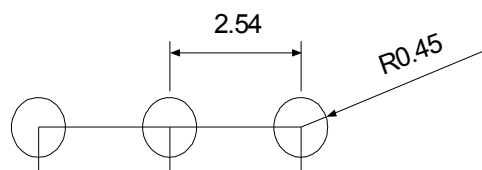
Package Information

TO-220FP



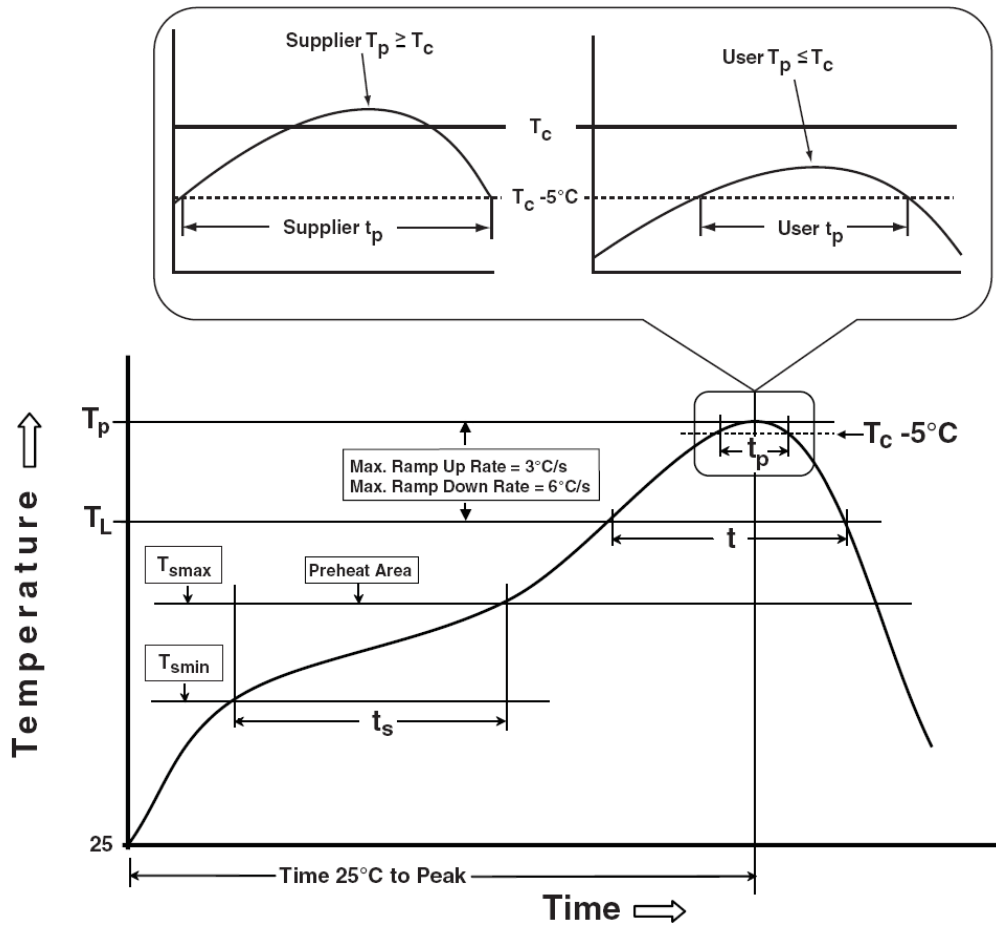
SYMBOL	TO-220FP			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.20	4.80	0.165	0.189
A1	2.60	3.20	0.102	0.126
A2	2.10	2.90	0.083	0.114
b	0.50	1.00	0.020	0.039
b2	0.90	1.90	0.035	0.075
c	0.30	0.80	0.012	0.031
D	8.10	9.10	0.319	0.358
d1	14.50	16.50	0.571	0.650
d2	12.10	12.90	0.476	0.508
E	9.70	10.70	0.382	0.421
e	2.54 BSC		0.100 BSC	
L	13.00	14.50	0.512	0.570
L1	1.60	4.00	0.063	0.157
P	3.00	3.60	0.118	0.142

RECOMMENDED LAND PATTERN



UNIT: mm

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

Sinopower Semiconductor, Inc.

5F, No. 6, Dusing 1St Rd., Hsinchu Science Park,

Hsinchu, 30078, Taiwan

TEL: 886-3-5635818 Fax: 886-3-5642050