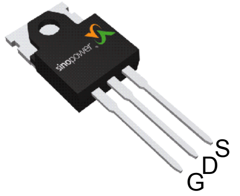
N-Channel Enhancement Mode MOSFET

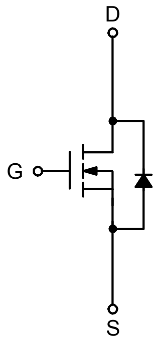
Features

- 75V/102A,
  $R_{DS(ON)}$=9mΩ (max.) @ V_{GS}=10V
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

Pin Description



Top View of TO-220H



N-Channel MOSFET

Applications

- Power Management for Inverter Systems.

Ordering and Marking Information

SM7575NS □□□-□□□ Assembly Material Handling Code Temperature Range Package Code	Package Code FH : TO-220H Operating Junction Temperature Range C : -55 to 175 °C Handling Code TU : Tube (50ea/tube) Assembly Material G : Halogen and Lead Free Device
SM7575NS FH : SM7575N XXXXX	XXXXX - Lot Code

Note: SINOPOWER lead-free products contain molding compounds/die attach materials and 100% matte tin plate termination finish; which are fully compliant with RoHS. SINOPOWER lead-free products meet or exceed the lead-free requirements of IPC/JEDEC J-STD-020D for MSL classification at lead-free peak reflow temperature. SINOPOWER defines “Green” to mean lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight).

Absolute Maximum Ratings (T$_A$ = 25°C Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V_{DSS}	Drain-Source Voltage		75	V
V_{GSS}	Gate-Source Voltage		±25	
T_J	Maximum Junction Temperature		175	°C
T_{STG}	Storage Temperature Range		-55 to 175	
I_S	Diode Continuous Forward Current	T_C=25°C	80	A
I_{DP}	300μs Pulse Drain Current Tested	T_C=25°C	300	
I_D	Continuous Drain Current	T_C=25°C	102	
		T_C=100°C	75	
P_D	Maximum Power Dissipation	T_C=25°C	176	W
		T_C=100°C	88	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.85	°C/W
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62.5	
E_{AS}	Avalanche Energy, Single Pulsed	L=2mH	1	J

Electrical Characteristics (T$_A$ = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	75	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	V_{GS}=0V, I_{DS}=250μA	-	0.07	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=60V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	2	3	4	V
I_{GSS}	Gate Leakage Current	V_{GS}=±25V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$[a]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=40A	-	7.5	9	mΩ
Gfs	Forward Transconductance	V_{DS}=5V, I_{DS}=30A	-	50	-	S
Diode Characteristics						
V_{SD}[a]	Diode Forward Voltage	I_{SD}=20A, V_{GS}=0V	-	0.8	1.1	V
t_{rr}	Reverse Recovery Time	I_{DS}=40A, dI_{SD}/dt=100A/μs	-	40	-	ns
Q_{rr}	Reverse Recovery Charge		-	50	-	nC

Electrical Characteristics (Cont.) (T$_A$ = 25°C Unless Otherwise Noted)

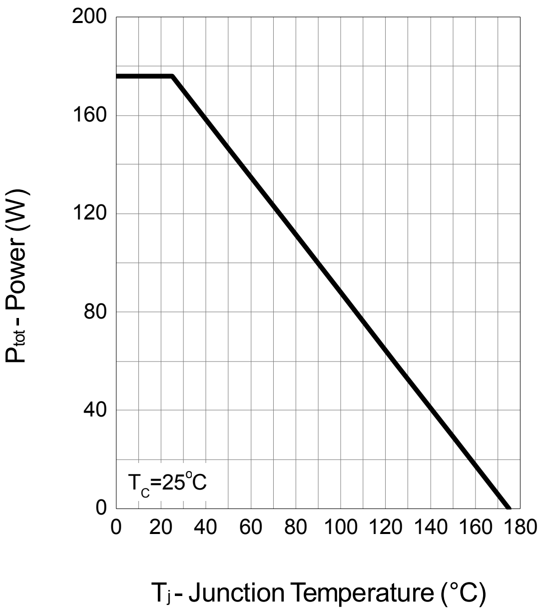
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Dynamic Characteristics [b]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	1.3	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=30V, Frequency=1.0MHz	-	4500	-	pF
C_{oss}	Output Capacitance		-	440	-	
C_{rss}	Reverse Transfer Capacitance		-	260	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=30V, R_L=30Ω, I_{DS}=1A, V_{GEN}=10V, R_G=6Ω	-	23	42	ns
T_r	Turn-on Rise Time		-	12	23	
$t_{d(OFF)}$	Turn-off Delay Time		-	70	126	
T_f	Turn-off Fall Time		-	40	72	
Gate Charge Characteristics [b]						
Q_g	Total Gate Charge	V_{DS}=30V, V_{GS}=10V, I_{DS}=40A	-	80	112	nC
Q_{gs}	Gate-Source Charge		-	27	-	
Q_{gd}	Gate-Drain Charge		-	19	-	

Note a：Pulse test width≤300µs, duty cycle≤2%.

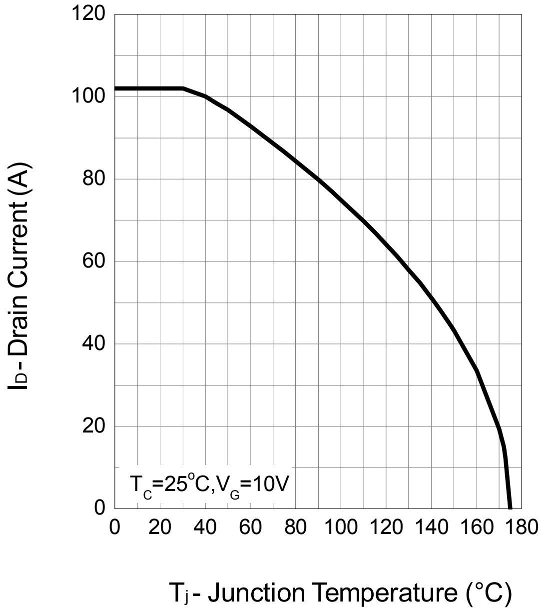
Note b：Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

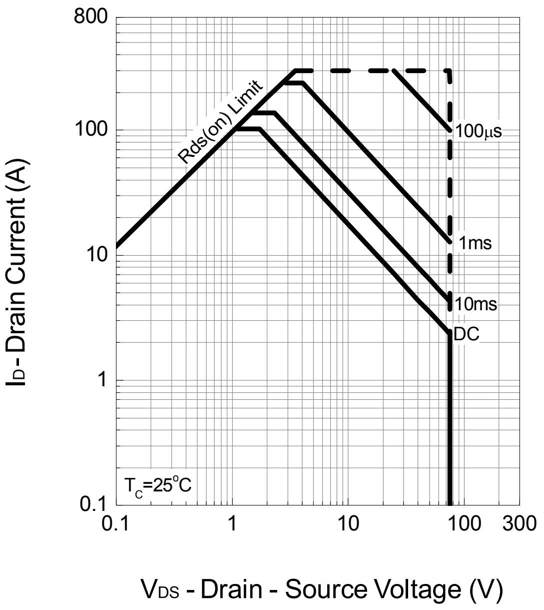
Power Dissipation



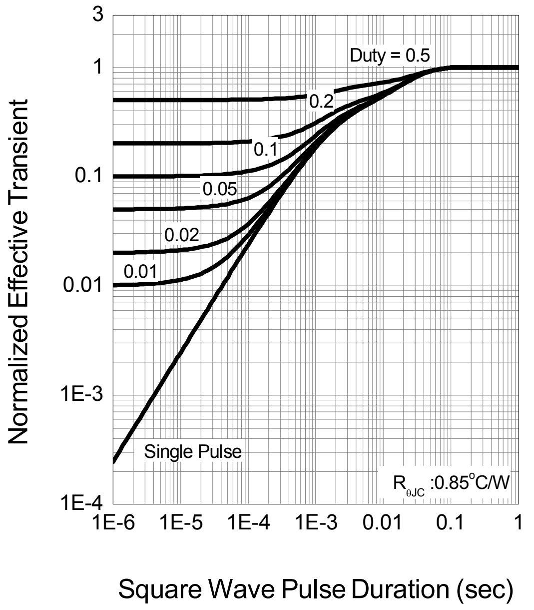
Drain Current



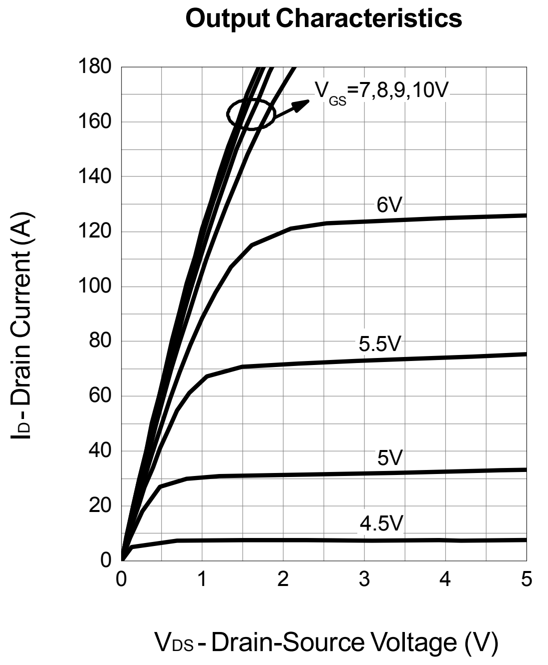
Safe Operation Area

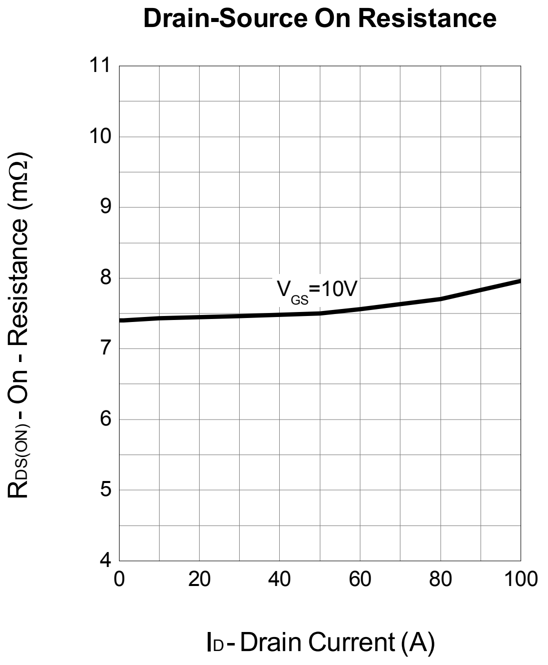


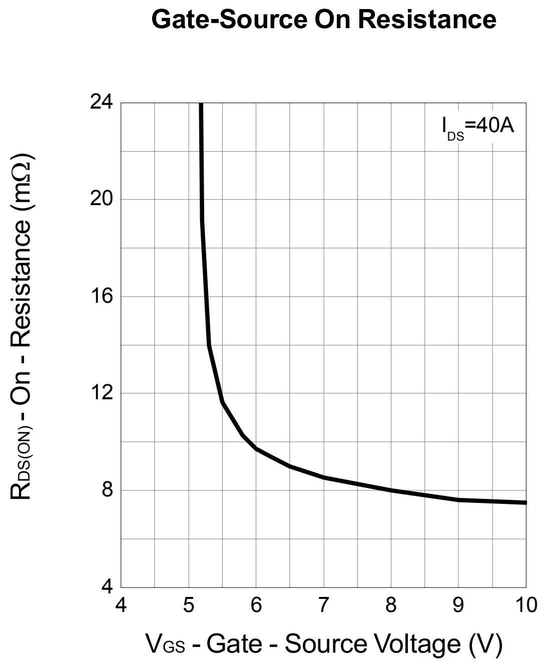
Thermal Transient Impedance

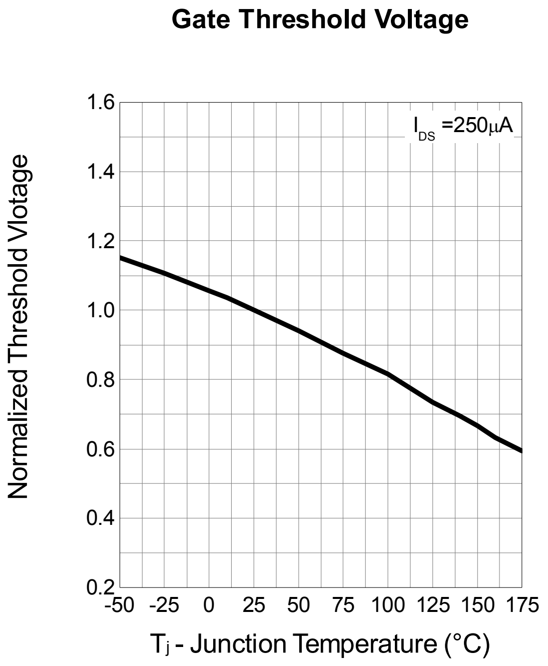


Typical Operating Characteristics (Cont.)

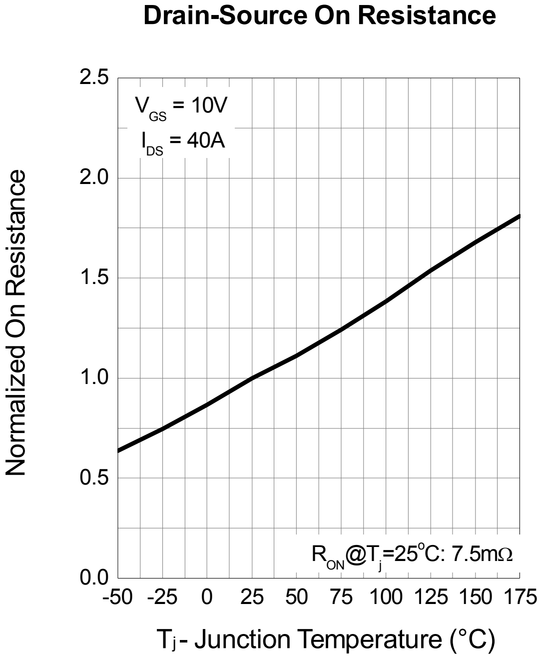


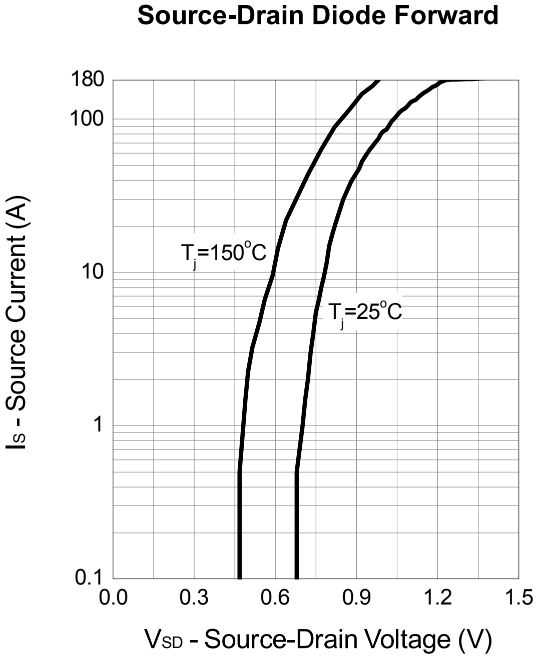


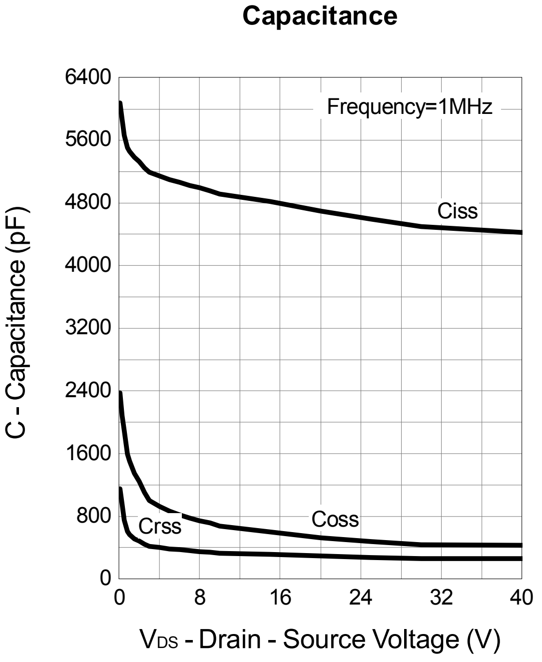


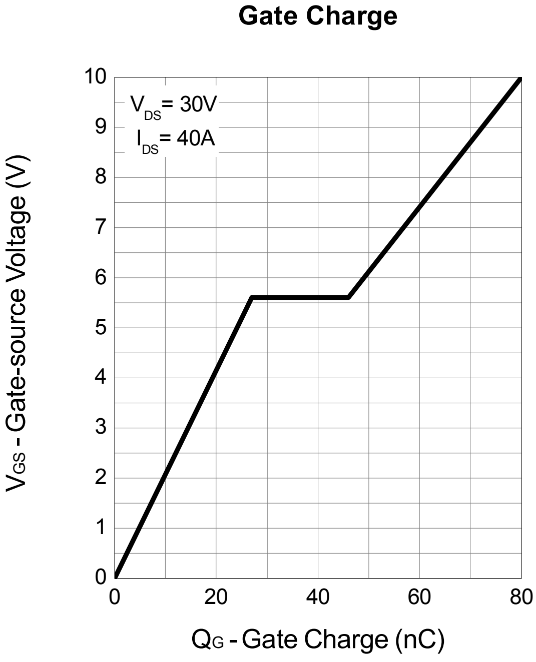


Typical Operating Characteristics (Cont.)

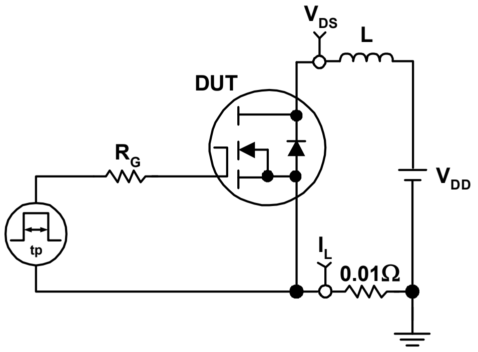


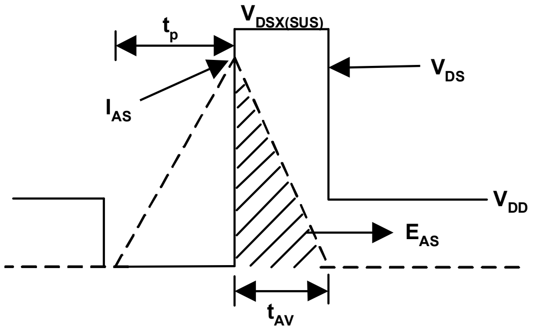




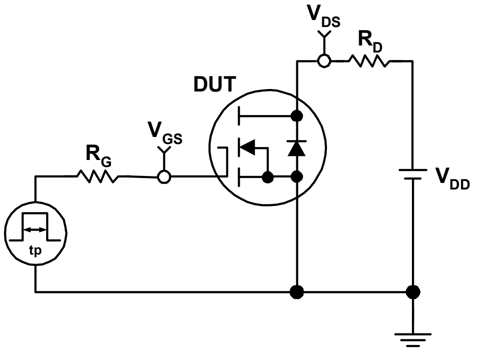


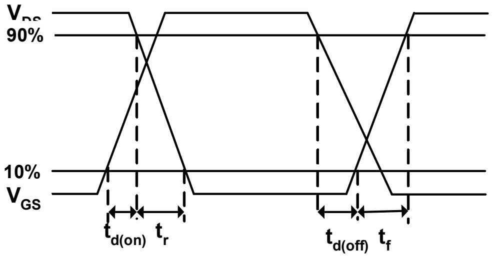
Avalanche Test Circuit and Waveforms





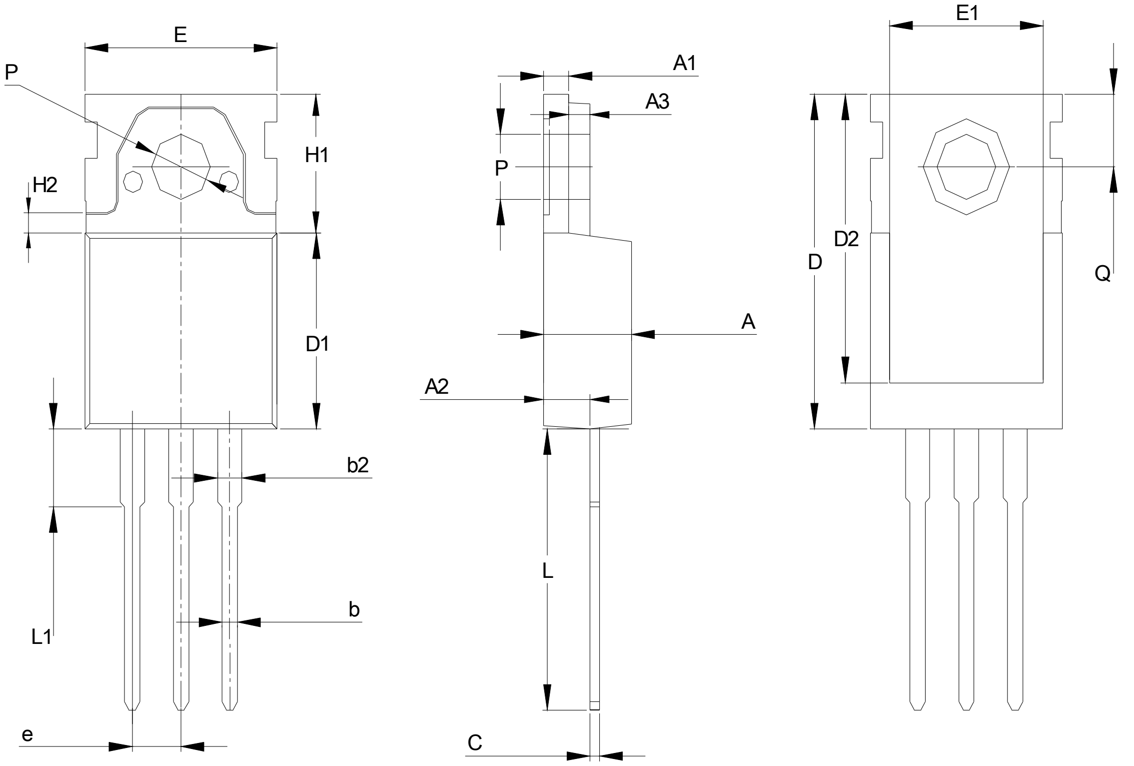
Avalanche Test Circuit and Waveforms





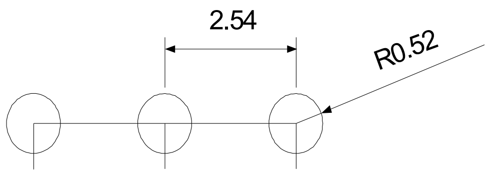
Package Information

TO-220H



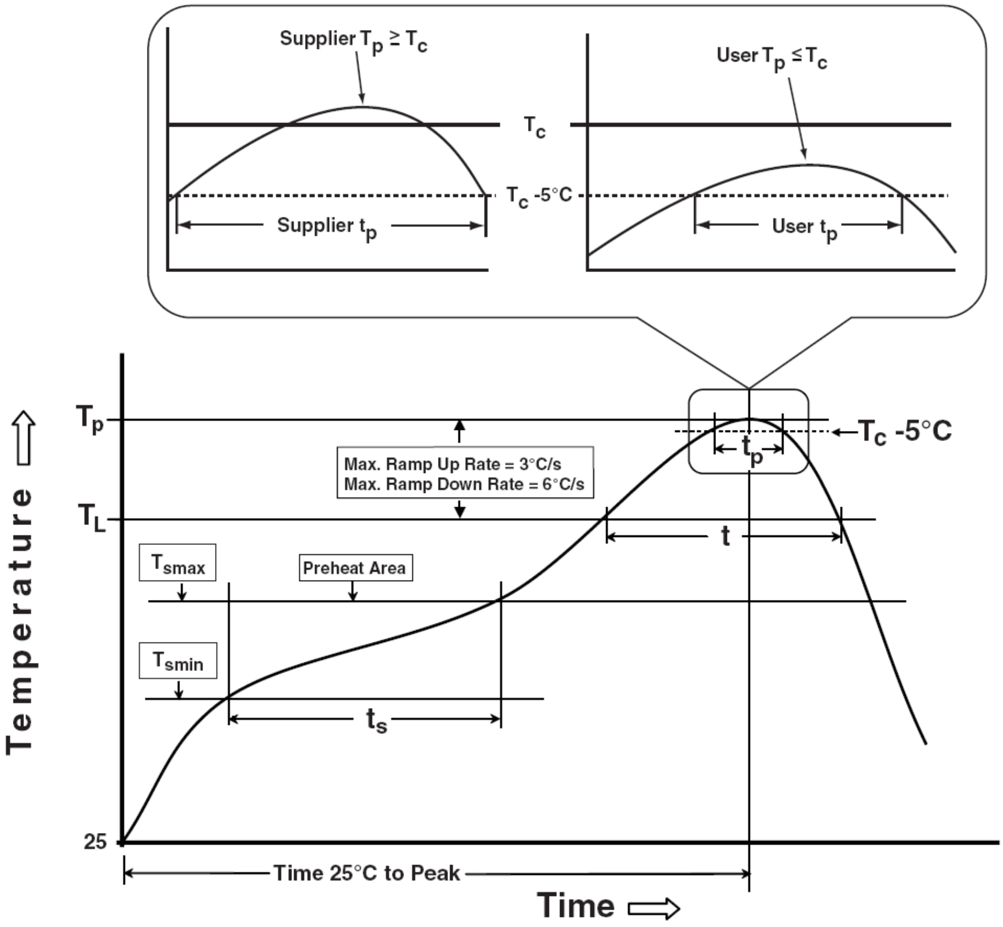
SYMBOL	TO-220H			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	3.56	4.83	0.140	0.190
A1	0.51	1.50	0.020	0.059
A2	2.03	2.92	0.080	0.115
A3	1.05	1.15	0.041	0.045
b	0.38	1.02	0.015	0.040
b2	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.22	16.51	0.560	0.650
D1	8.38	9.30	0.330	0.366
D2	12.19	13.65	0.480	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
H2	0.95	1.05	0.037	0.041
L	12.70	14.73	0.500	0.580
L1	-	6.35	-	0.250
P	3.00	3.20	0.118	0.126
Q	3.30	3.50	0.130	0.138

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 (Tc)

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 (Tc)

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 @ Tjmax
HTGB	JESD-22, A108	1000 Hrs, 100% of VGS max @ Tjmax
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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