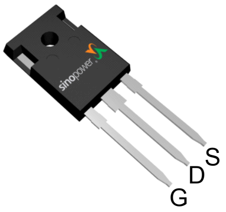
SM8A01NSW

N-Channel Enhancement Mode MOSFET

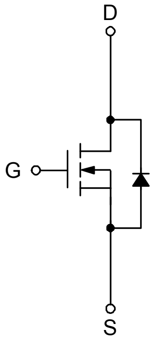
Features

- 800V/13A,
  $R_{DS(ON)}$= 0.38Ω(max.) @ V_{GS}= 10V
  V_{DS}@Tj, max=930 (typ.)
- Reliable and Rugged
- Avalanche Rated
- Lead Free and Green Devices Available (RoHS Compliant)

Pin Description



Top View of TO-247



N-Channel MOSFET

Applications

- AC/DC Power Conversion in Switched Mode Power Supplies (SMPS).
- Uninterruptible Power Supply (UPS),
- Adapter.

Ordering and Marking Information

SM8A01NS □□-□□□ Assembly Material Handling Code Temperature Range Package Code	Package Code W : TO-247 Operating Junction Temperature Range C : -55 to 150 °C Handling Code TU : Tube (30ea/tube) Assembly Material G : Halogen and Lead Free Device
SM8A01NS W : SM8A01N XXXXX	XXXXX - Date 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

Symbol	Parameter		Rating	Unit
Common Ratings (T_A=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		800	V
V_{GSS}	Gate-Source Voltage		±30	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	
I_S	Diode Continuous Forward Current		13 [a]	A
I_{DP}	300μs Pulse Drain Current Tested	T_C=25°C	40[a]	
I_D	Continuous Drain Current	T_C=25°C	13 [a]	
		T_C=100°C	9 [a]	
P_D	Maximum Power Dissipation	T_C=25°C	208	W
		T_C=100°C	83	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.6	°C/W
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62.5	
Drain-Source Avalanche Ratings				
dv/dt [b]	MOSFET dv/dt ruggedness		50	V/ns
E_{AS} [c]	Avalanche Energy, Single Pulsed		250	mJ
I_{AR} [d]	Avalanche Current		2.5	A
E_{AR} [d]	Repetitive Avalanche Energy		0.6	mJ

Note a：limited by maximum junction temperature.

Note b：V_{DS}=640V, I_D=13A.

Note c：I_D=2.5A, V_{DD}=50V, T_j=25°C.

Note d：Repetitive Rating : Pulse width limited by maximum junction temperature.

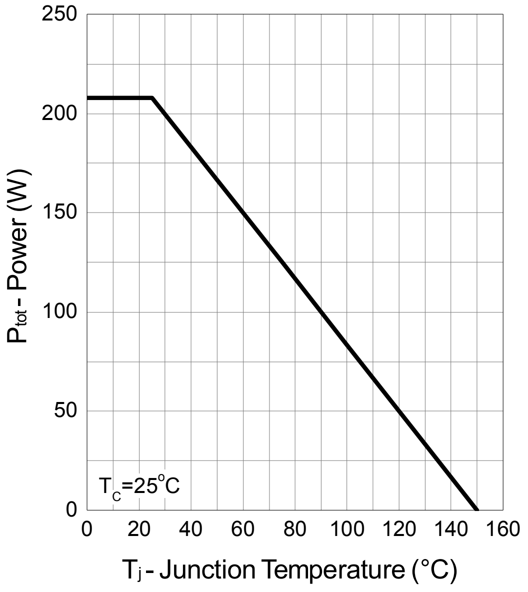
Electrical Characteristics (T$_A$ = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
Static Characteristics							
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA		800	-	-	V
			T_J=150°C	-	930	-	
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=640V, V_{GS}=0V		-	-	1	μA
			T_J=150°C	-	-	200	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA		2.5	3.5	4.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±30V, V_{DS}=0V		-	-	±100	nA
$R_{DS(ON)}$ [e]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=8A		-	0.33	0.38	Ω
Diode Characteristics							
V_{SD} [e]	Diode Forward Voltage	I_{SD}=13A, V_{GS}=0V		-	0.87	1.3	V
t_{rr}	Reverse Recovery Time	I_{SD}=13A, V_R=480V dI_{SD}/dt=100A/μs		-	385	-	ns
Q_{rr}	Reverse Recovery Charge			-	7	-	μC
I_{rm}	Peak Reverse Recovery Current			-	37	-	A
Dynamic Characteristics [f]							
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V, F=1MHz		-	1.45	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, Frequency=1.0MHz		-	1820	2500	pF
C_{oss}	Output Capacitance			-	745	-	
C_{rss}	Reverse Transfer Capacitance			-	45	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=400V, R_L=30Ω, I_{DS}=13A, V_{GEN}=10V, R_G=6Ω		-	16	-	ns
T_r	Turn-on Rise Time			-	45	-	
$t_{d(OFF)}$	Turn-off Delay Time			-	44	-	
T_f	Turn-off Fall Time			-	34	-	
Gate Charge Characteristics [f]							
Q_g	Total Gate Charge	V_{DS}=640V, V_{GS}=10V, I_{DS}=13A		-	55	75	nC
Q_{gs}	Gate-Source Charge			-	11	-	
Q_{gd}	Gate-Drain Charge			-	26	-	

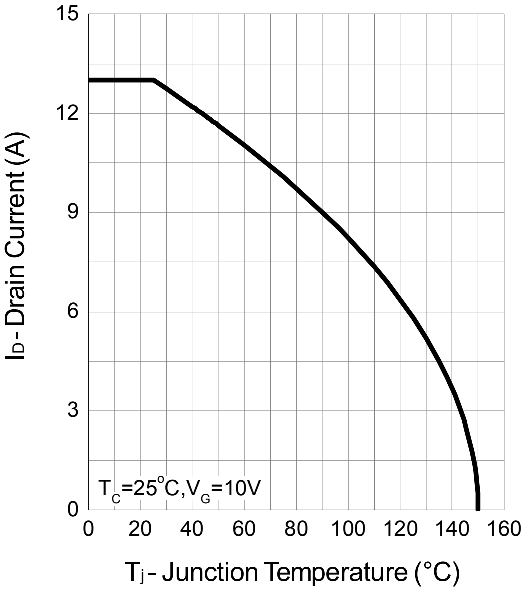
Note e : Pulse test ; pulse width≤300μs, duty cycle≤2%.
Note f : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

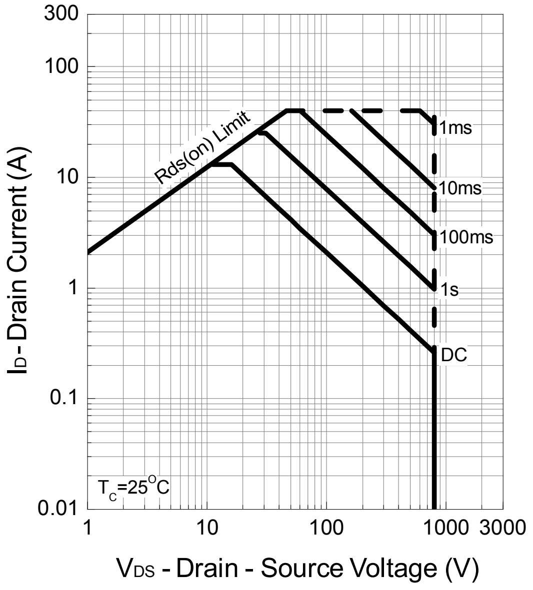
Power Dissipation



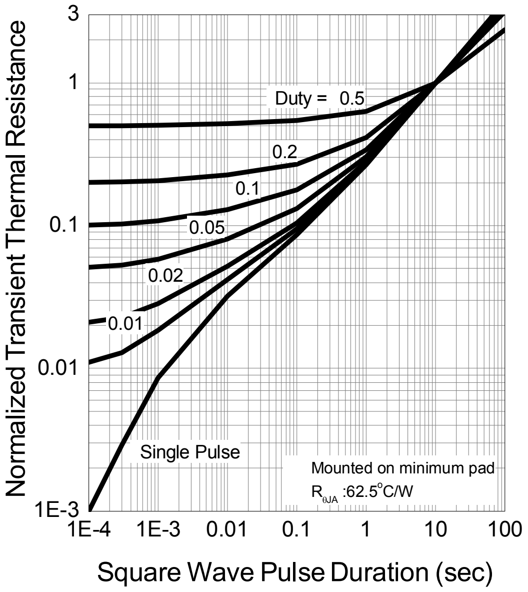
Drain Current



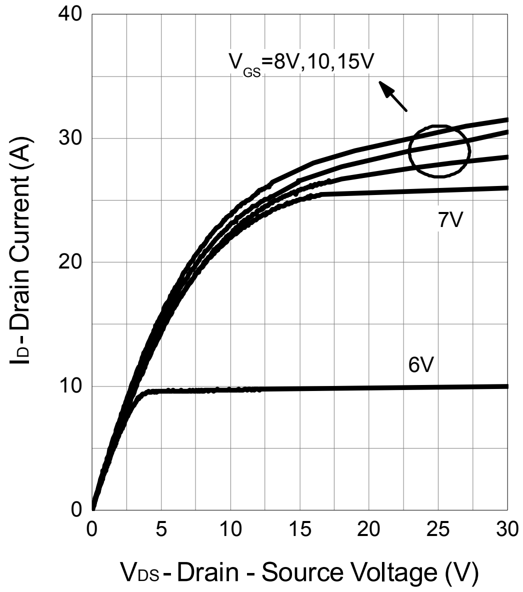
Safe Operation Area



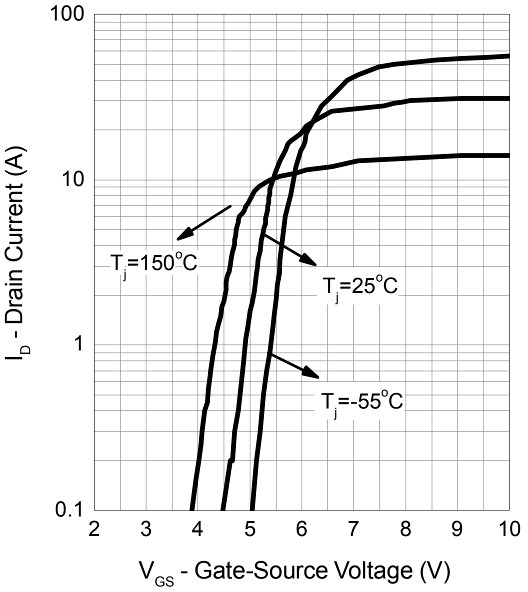
Thermal Transient Impedance



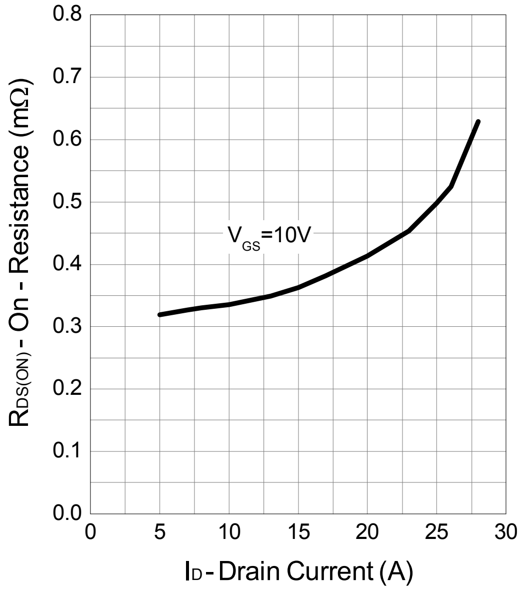
Typical Operating Characteristics (Cont.)



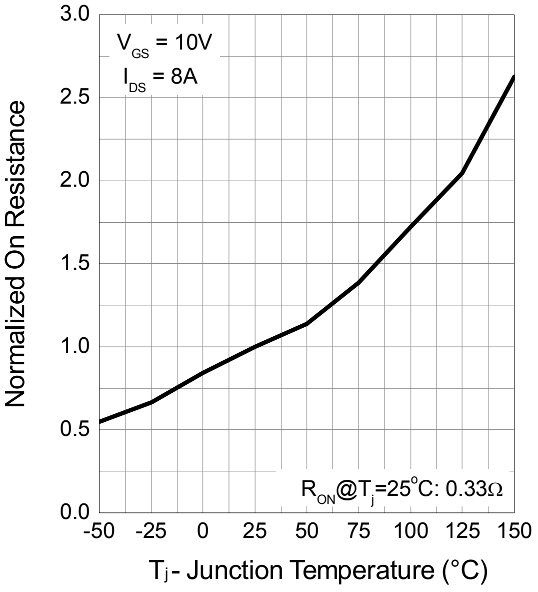
Output Characteristics



Transfer Characteristics



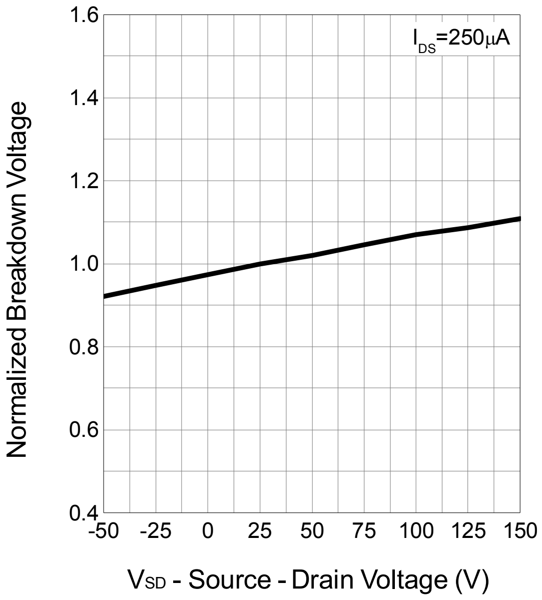
Drain-Source On Resistance



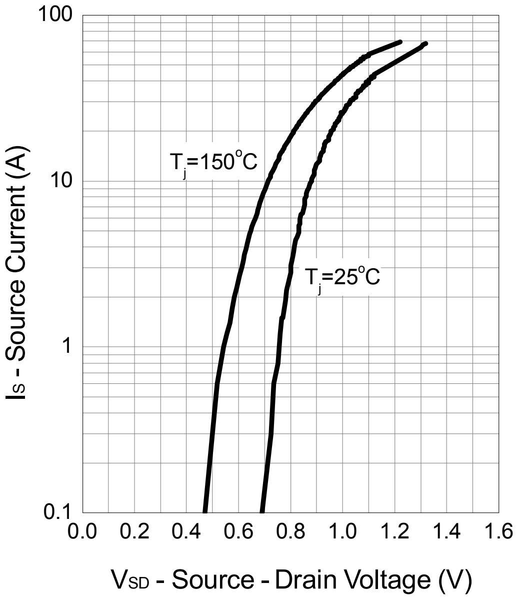
Drain-Source On Resistance

Typical Operating Characteristics (Cont.)

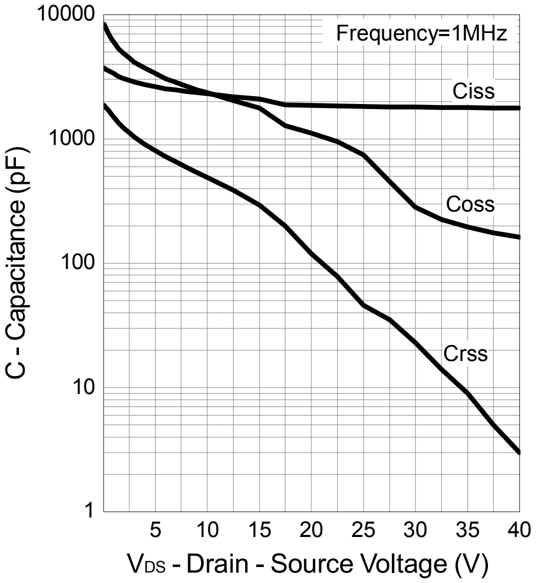
BVDSS vs Junction Temperature



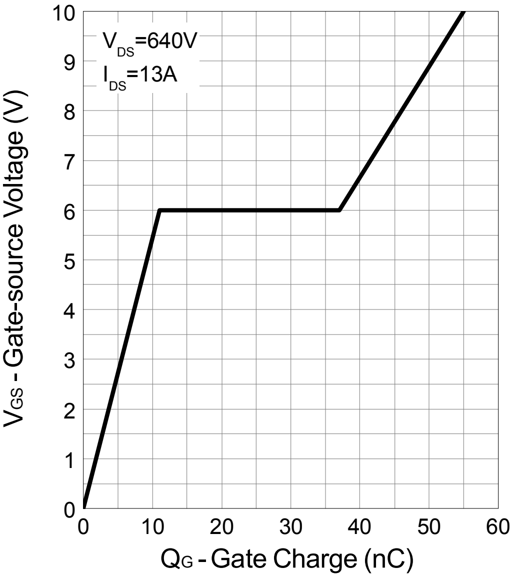
Source-Drain Diode Forward



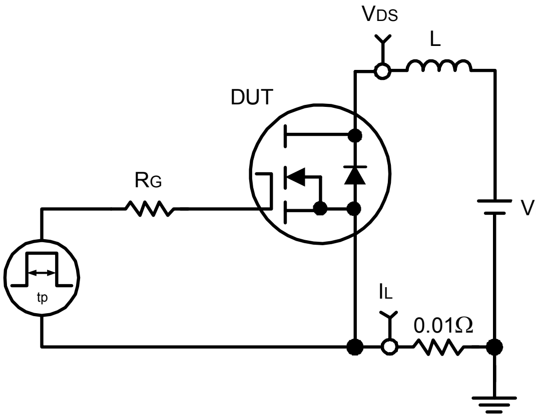
Capacitance

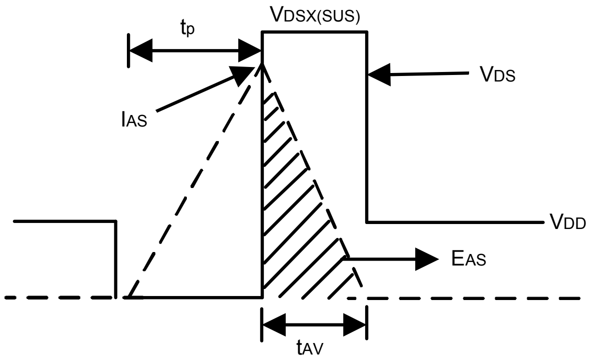


Gate Charge

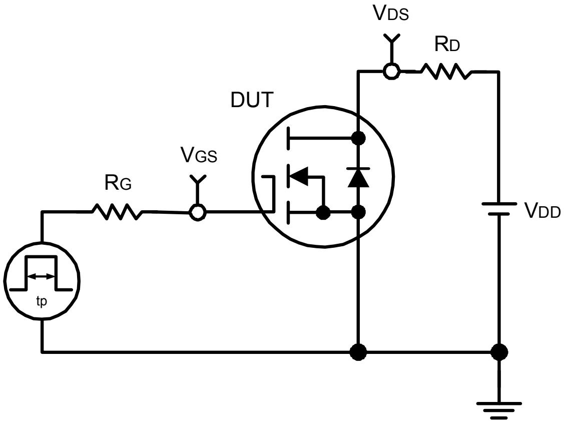


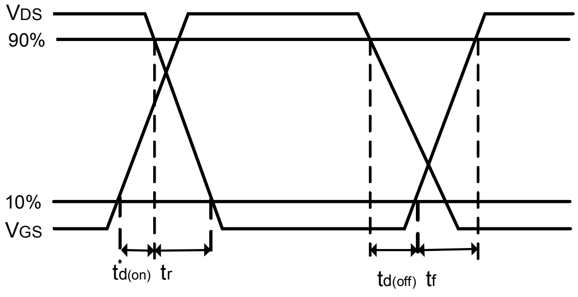
Avalanche Test Circuit and Waveforms





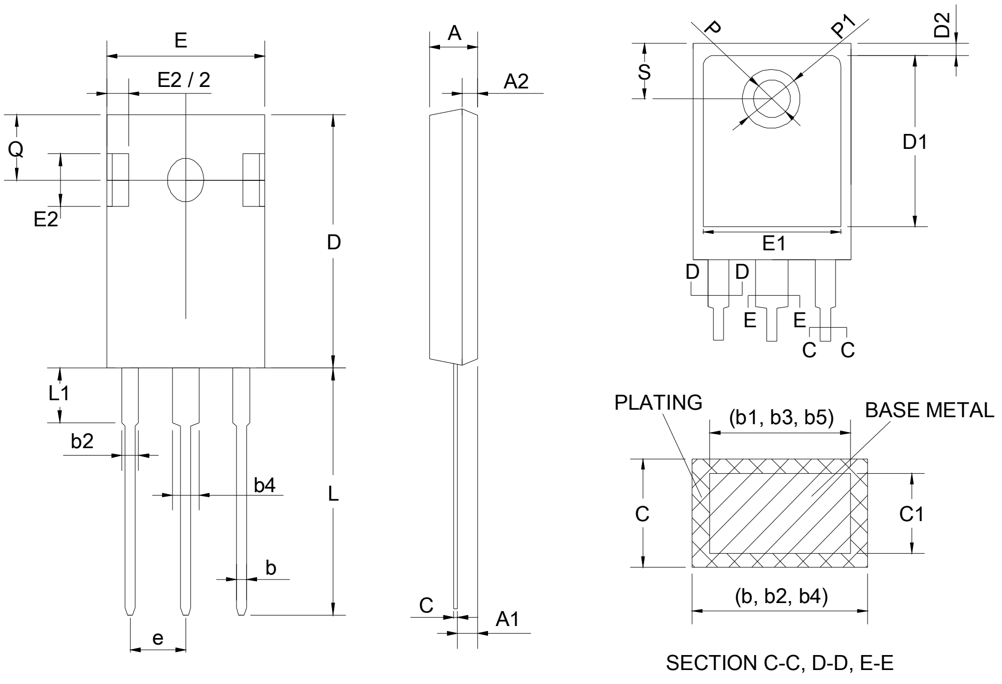
Switching Time Test Circuit and Waveforms





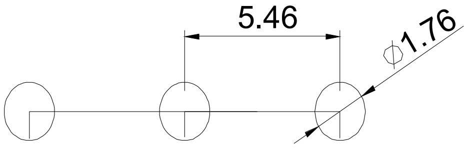
Package Information

TO-247



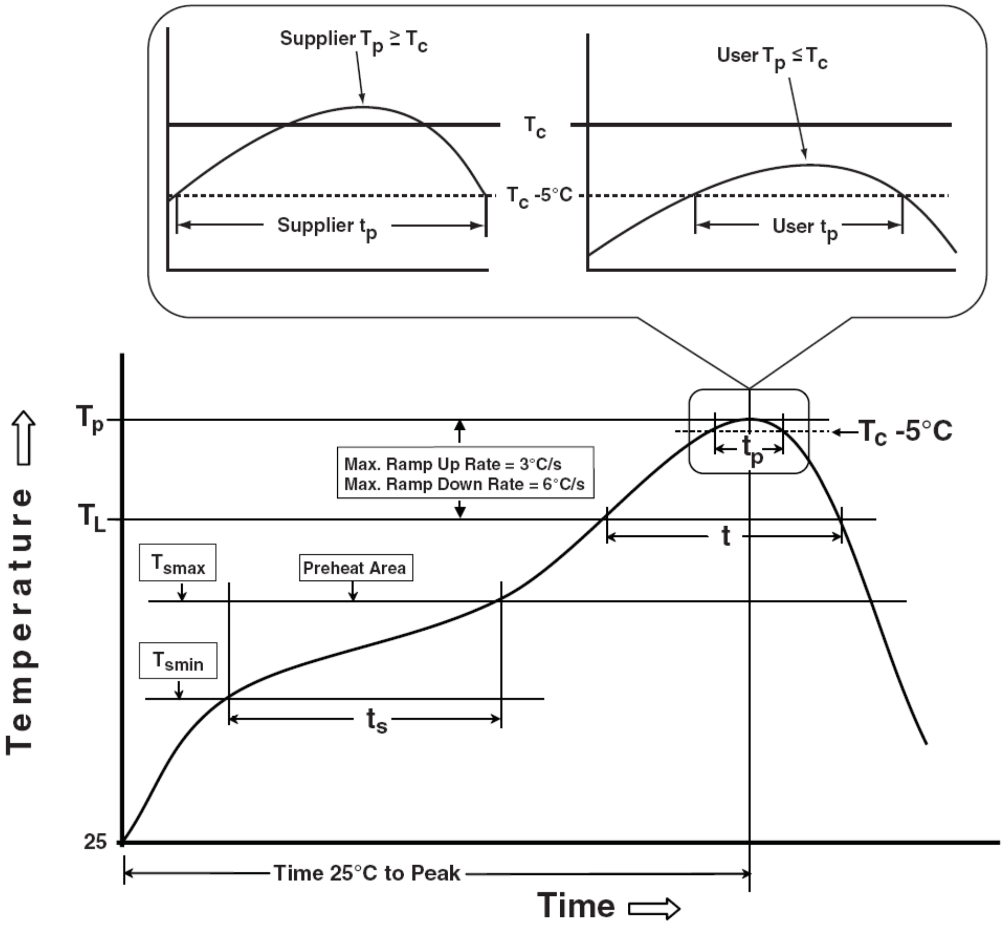
SYMBOL	TO-247			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.7	5.31	0.185	0.209
A1	2.21	2.59	0.087	0.102
A2	1.5	2.49	0.059	0.098
D	20.8	21.46	0.819	0.845
E	15.49	16.26	0.610	0.640
E2	4.32	5.49	0.170	0.216
e	5.46 BSC		0.215 BSC	
L	19.81	20.32	0.780	0.800
L1	-	4.5	-	0.177
P	3.56	3.66	0.140	0.144
Q	5.38	6.2	0.212	0.244
S	6.15 BSC		0.242 BSC	
b	0.99	1.4	0.039	0.055
b1	0.99	1.35	0.039	0.053
b2	1.65	2.39	0.065	0.094
b3	1.65	2.34	0.065	0.092
b4	2.59	3.43	0.102	0.135
b5	2.59	3.38	0.102	0.133
c	0.38	0.89	0.015	0.035
c1	0.38	0.84	0.015	0.033
D1	13.08	-	0.515	-
D2	0.51	1.35	0.020	0.053
E1	13.46	-	0.530	-
P1	-	7.4	-	0.291

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
HOLT	JESD-22, A108	1000 Hrs, Bias @ 125°C
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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