N-Channel Enhancement Mode MOSFET

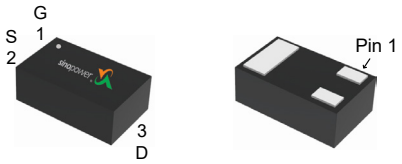
Features

- 30V/1A[a]
  - $R_{DS(ON)}$=184mΩ(max.)@V_{GS}=4.5V
  - $R_{DS(ON)}$=247mΩ(max.)@V_{GS}=2.5V
  - $R_{DS(ON)}$=380mΩ(max.)@V_{GS}=1.8V
- ESD Protection
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)
- Moisture Sensitivity Level MSL1 (per JEDEC J-STD-020D)

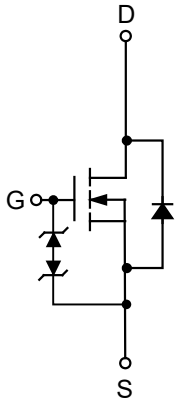
Applications

- High Speed and Analog Switching Applications.
- Low voltage drive (2.5V drive).
- Power Management in Notebook Computer.
- Portable Equipment and Battery Powered Systems.

Pin Description



DFN0.6x1-3_EP



N-Channel MOSFET

Ordering and Marking Information

SM1902NS □□□-□□□

- Assembly Material
- Handling Code
- Temperature Range
- Package Code

Package Code
QG : DFN0.6x1-3_EP
Operating Junction Temperature Range
C : -55 to 150 °C
Handling Code
TR : Tape & Reel
Assembly Material
G : Halogen and Lead Free Device

SM1902NS QG : • 02

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).

SINOPOWER reserves the right to make changes to improve reliability or manufacturability without notice, and advise customers to obtain the latest version of relevant information to verify before placing orders.

Absolute Maximum Ratings (T_A=25°C Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V_{DSS}	Drain-Source Voltage		30	V
V_{GSS}	Gate-Source Voltage		±12	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	
I_S	Diode Continuous Forward Current	T_A=25°C	0.8	A
I_D	Continuous Drain Current	T_A=25°C	1[a]	A
		T_A=70°C	1[a]	
I_{DM}[b]	Pulsed Drain Current	T_A=25°C	4	
P_D	Maximum Power Dissipation	T_A=25°C	0.9	W
		T_A=70°C	0.6	
$R_{\theta JA}$[c]	Thermal Resistance-Junction to Ambient	t ≤ 10s	108	°C/W
		Steady state	138	

Note a : Maximum continuous current is limited by bonding wire.
Note b : Pulse width is limited by maximum junction temperature.
Note c : Surface mounted on 1in^2 pad area, steady state t = 999s.

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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	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=24V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	0.5	0.75	1	V
I_{GSS}	Gate Leakage Current	V_{GS}=±12V, V_{DS}=0V	-	-	±10	μA
$R_{DS(ON)}$[d]	Drain-Source On-state Resistance	V_{GS}=4.5V, I_{DS}=0.4A	-	147	184	mΩ
		T_J=125°C	-	239	-	
		V_{GS}=2.5V, I_{DS}=0.3A	-	183	247	
		V_{GS}=1.8V, I_{DS}=0.2A	-	253	380	
Gfs	Forward Transconductance	V_{DS}=5V, I_{DS}=0.4A	-	1.2	-	S
Diode Characteristics						
V_{SD}[d]	Diode Forward Voltage	I_{SD}=0.2A, V_{GS}=0V	-	0.7	1.1	V
t_{rr}	Reverse Recovery Time	I_{SD}=0.4A, dI_{SD}/dt=100A/μs	-	6.9	-	ns
t_a	Charge Time		-	2.9	-	
t_b	Discharge Time		-	4	-	
Q_{rr}	Reverse Recovery Charge		-	1.7	-	nC
Dynamic Characteristics[e]						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, Frequency=1.0MHz	-	66	86	pF
C_{oss}	Output Capacitance		-	13	-	
C_{rss}	Reverse Transfer Capacitance		-	10	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=15V, R_L=15Ω, I_{DS}=1A, V_{GEN}=4.5V, R_G=6Ω	-	2.1	4	ns
t_r	Turn-on Rise Time		-	13	24	
$t_{d(OFF)}$	Turn-off Delay Time		-	40	73	
t_f	Turn-off Fall Time		-	29	52	
Gate Charge Characteristics[e]						
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=4.5V, I_{DS}=0.4A	-	0.8	1.2	nC
Q_{gs}	Gate-Source Charge		-	0.1	-	
Q_{gd}	Gate-Drain Charge		-	0.3	-	

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

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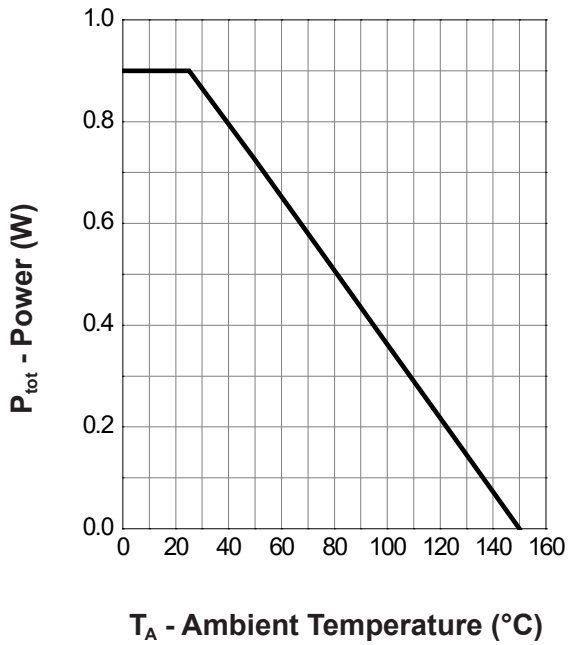
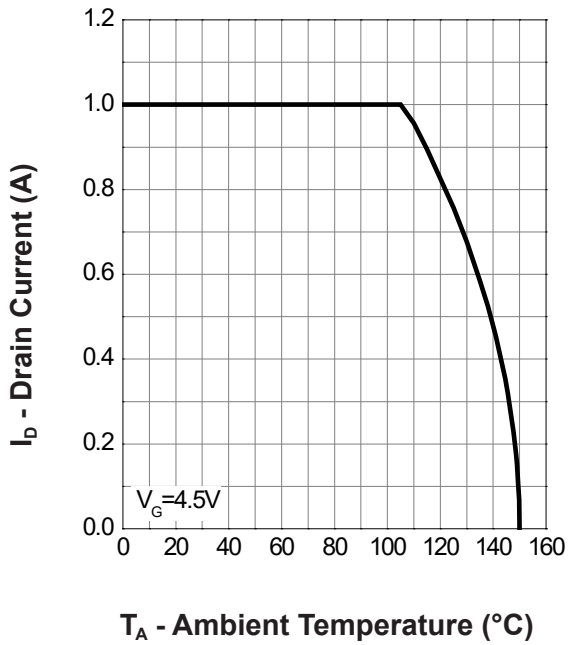
Typical Operating Characteristics

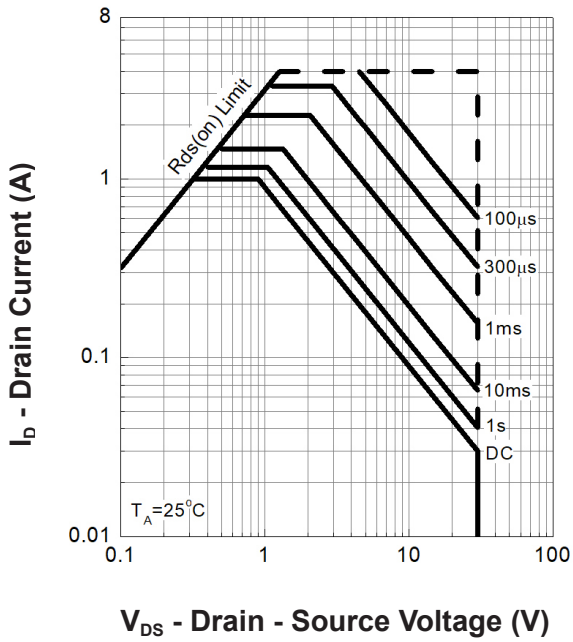
Power Dissipation



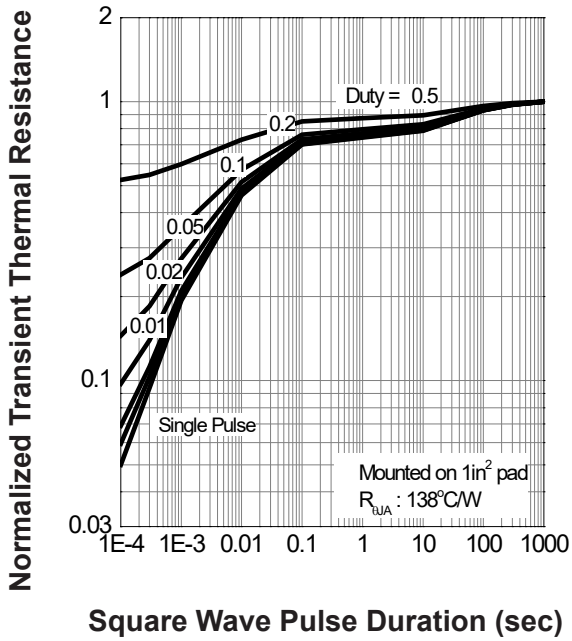
Drain Current



Safe Operation Area

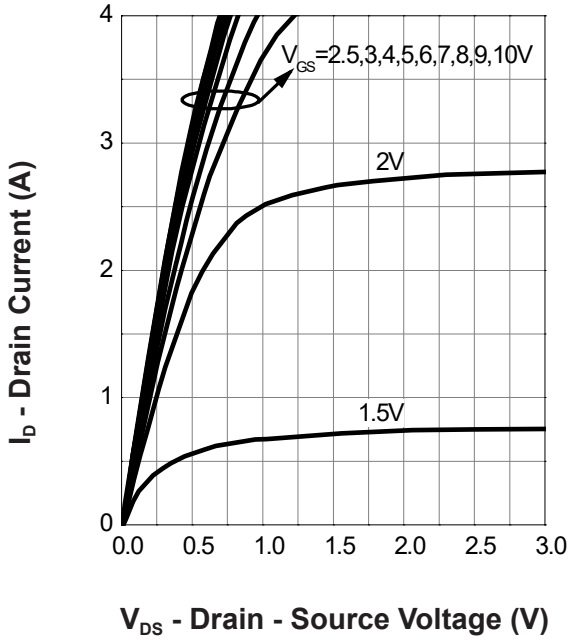


Thermal Transient Impedance

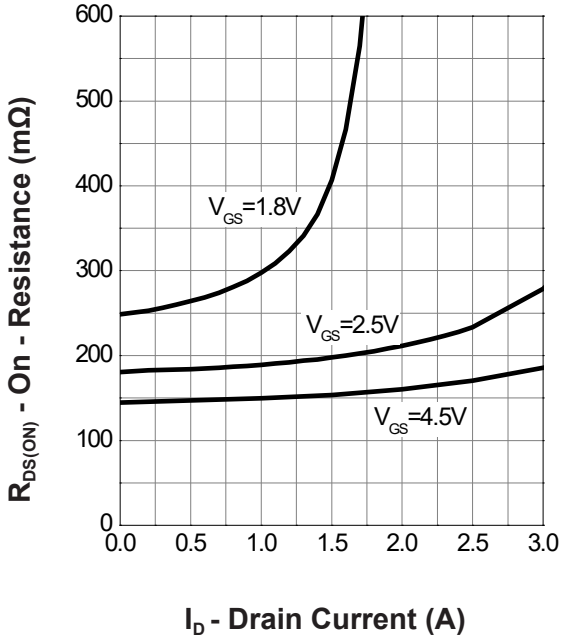


Typical Operating Characteristics(Cont.)

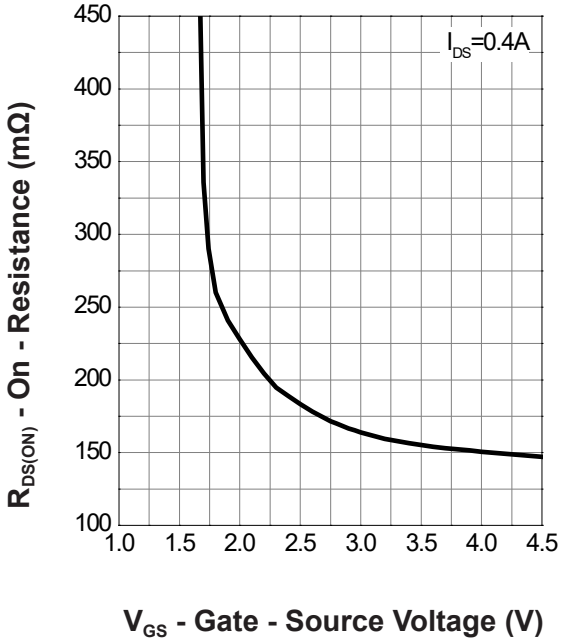
Output Characteristics



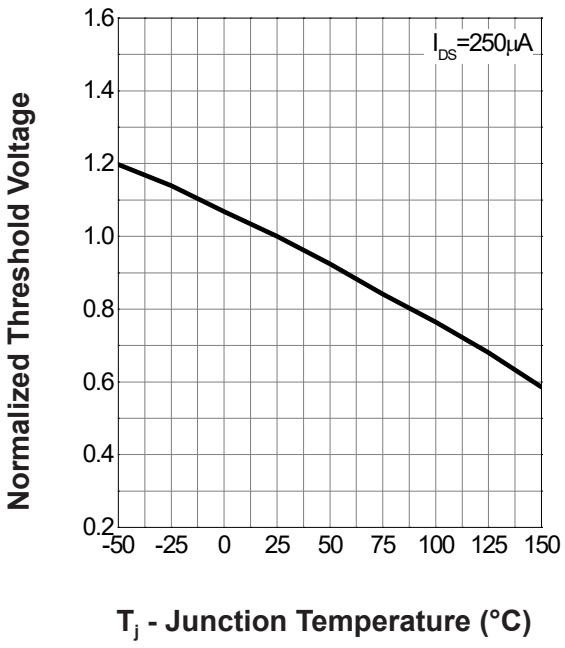
Drain-Source On Resistance



Gate-Source On Resistance



Gate Threshold Voltage



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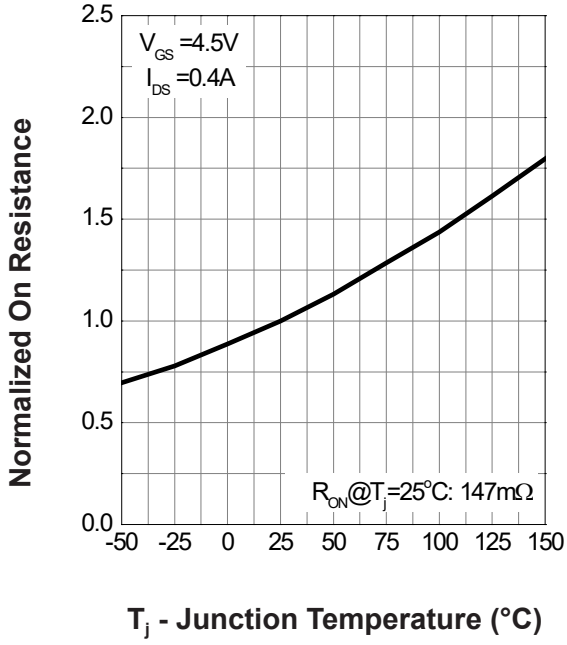
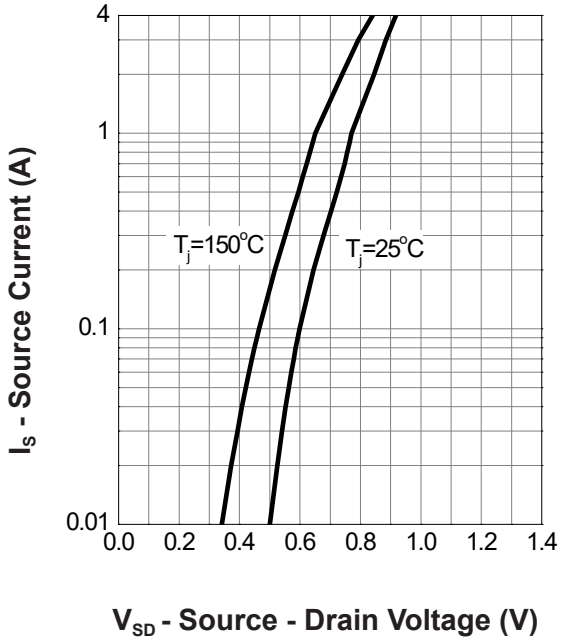
Typical Operating Characteristics(Cont.)

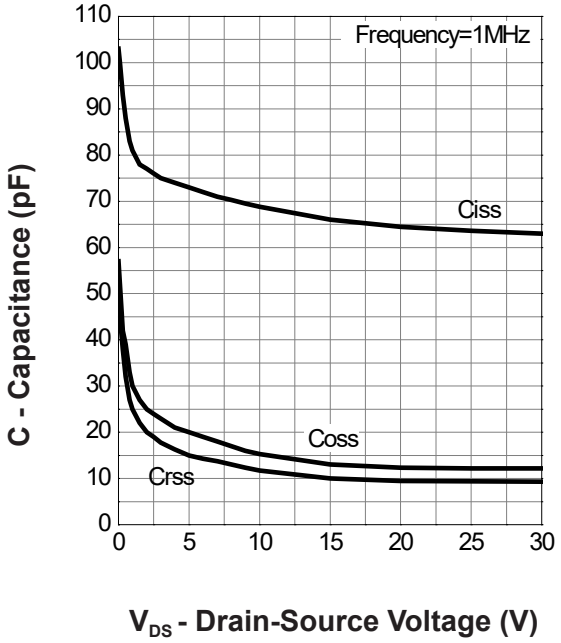
Drain-Source On Resistance



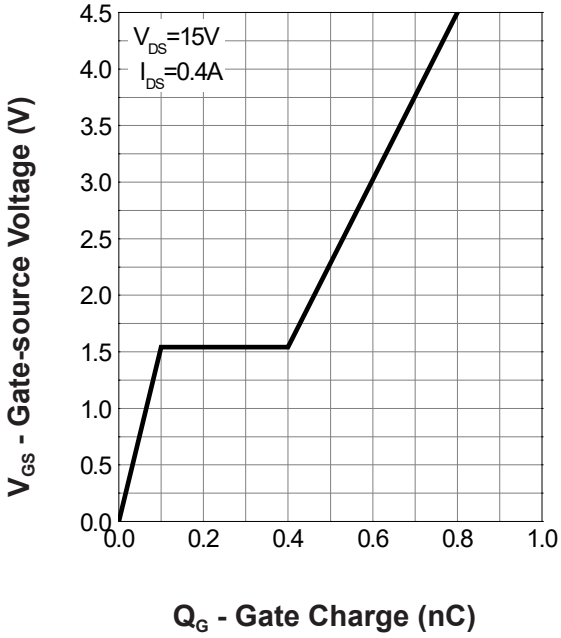
Source-Drain Diode Forward



Capacitance



Gate Charge



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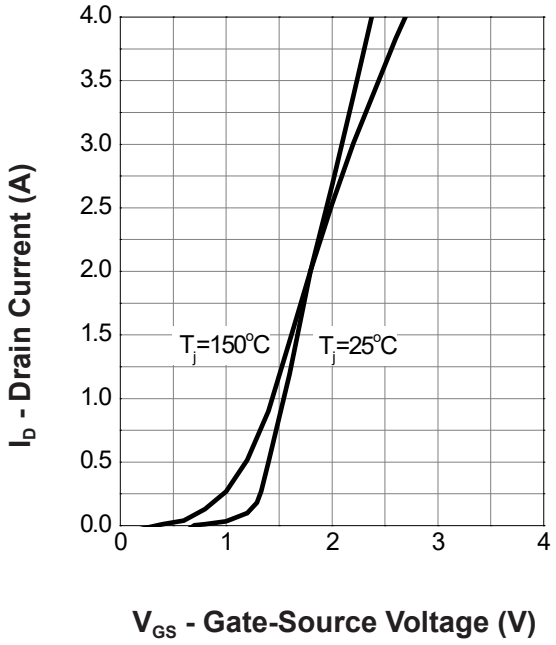
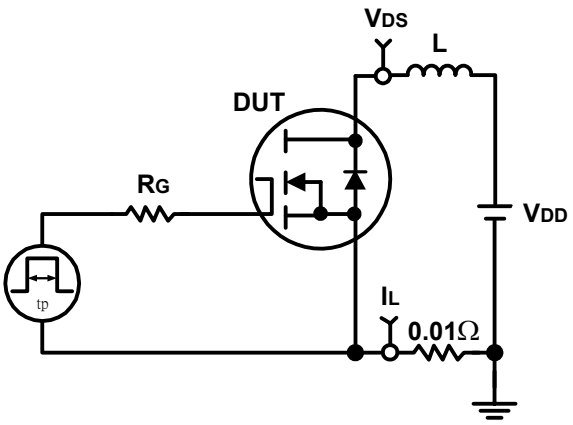
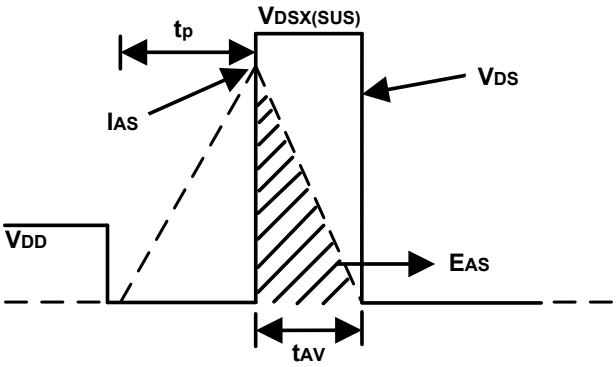
Typical Operating Characteristics(Cont.)

Transfer Characteristics

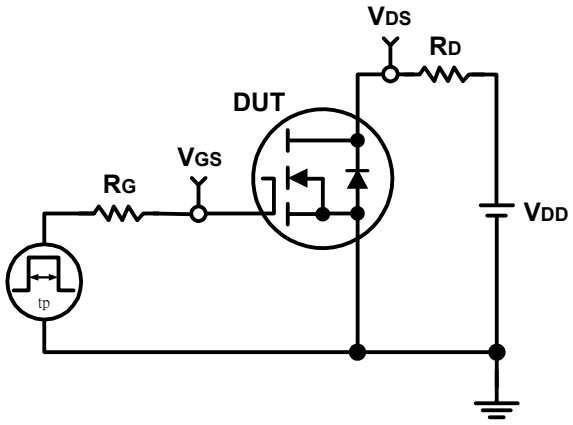


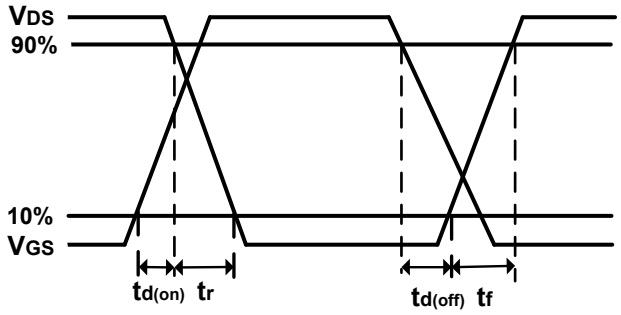
Avalanche Test Circuit and Waveforms





Switching Time Test Circuit and Waveforms





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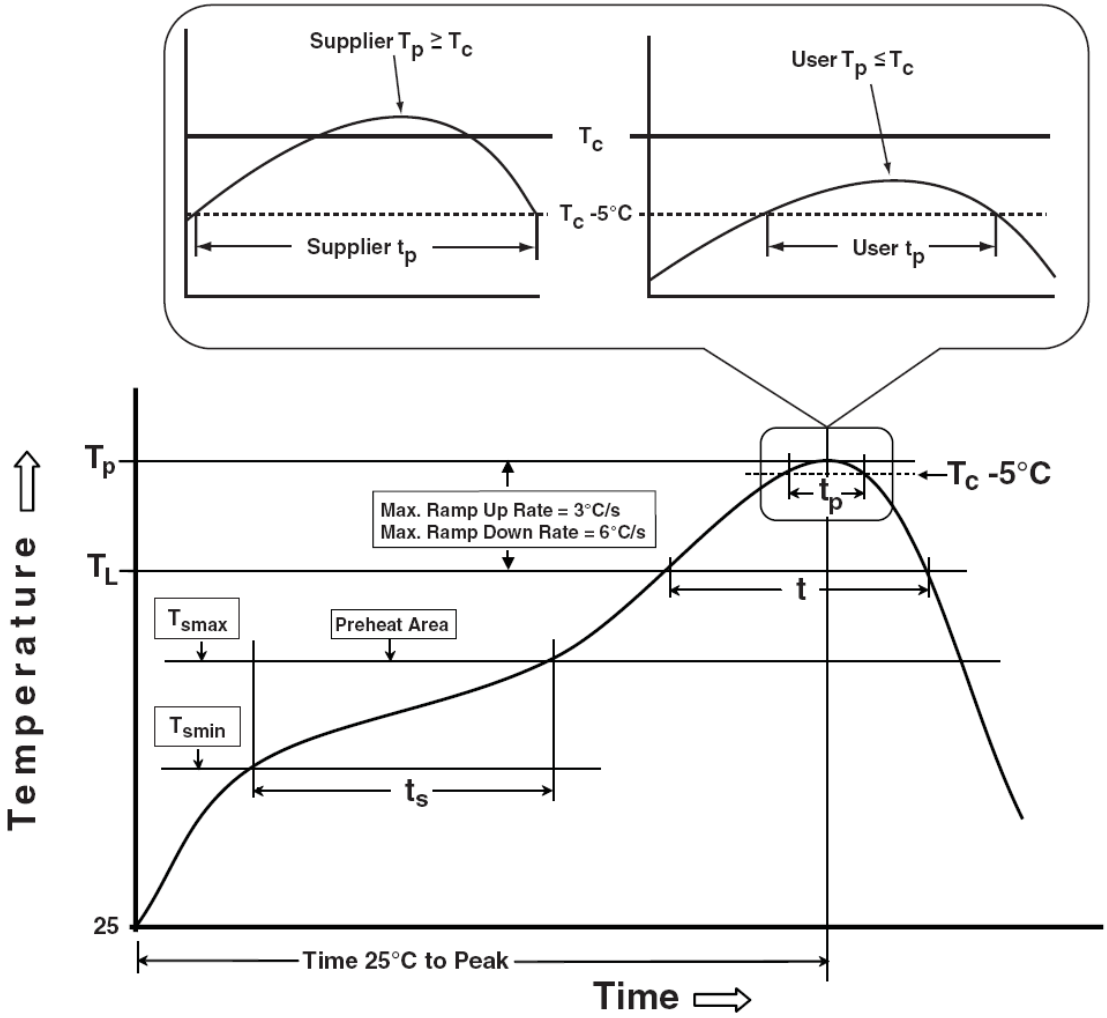
Classification Profile



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

Customer Service

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