

Pin Description

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Applications

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Ordering and Marking Information

SM2307PS Assembly Material Handling Code Temperature Range Package Code	Package Code A : SOT-23 Operating Junction Temperature Range C : -55 to 150 °C Handling Code TR : Tape & Reel Assembly Material G : Halogen and Lead Free Device
SM2307PS A : B07XX	XX - Lot Code

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 ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter		Rating	Unit
V _{DSS}	Drain-Source Voltage		-20	V
V _{GSS}	Gate-Source Voltage		±12	
I _D *	Continuous Drain Current	T _A =25°C	-6	A
		T _A =70°C	-4.8	
I _{DM} *	Pulsed Drain Current	T _A =25°C	-24	
		T _A =70°C	-19.2	
I _S *	Diode Continuous Forward Current		-2	°C
T _J	Maximum Junction Temperature		150	
T _{STG}	Storage Temperature Range		-55 to 150	
P _D *	Maximum Power Dissipation	T _A =25°C	1.6	W
		T _A =70°C	1.0	
R _{θJA} *	Thermal Resistance-Junction to Ambient	t ≤ 10s	80	°C/W
		Steady state	100	
R _{θJL}	Thermal Resistance-Junction to Lead	Steady state	52	

Note * :Surface Mounted on 1in² pad area, $t \leq 10\text{sec}$.

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	$V_{GS}=0\text{V}, I_{DS}=-250\mu\text{A}$	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-16\text{V}, V_{GS}=0\text{V}$	-	-	-1	μA
		$T_J=85^\circ\text{C}$	-	-	-30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=-250\mu\text{A}$	-0.5	-0.7	-1	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 12\text{V}, V_{DS}=0\text{V}$	-	-	± 100	nA
$R_{DS(ON)}^a$	Drain-Source On-State Resistance	$V_{GS}=-4.5\text{V}, I_{DS}=-6\text{A}$	-	23	29	m Ω
		$V_{GS}=-2.5\text{V}, I_{DS}=-3.7\text{A}$	-	30	40	
		$V_{GS}=-1.8\text{V}, I_{DS}=-2\text{A}$	-	41	60	
V_{SD}^a	Diode Forward Voltage	$I_{SD}=-1\text{A}, V_{GS}=0\text{V}$	-	-0.7	-1	V
GATE CHARGE CHARACTERISTICS^b						
Q_g	Total Gate Charge	$V_{DS}=-10\text{V}, V_{GS}=-4.5\text{V}, I_{DS}=-6\text{A}$	-	13.3	-	nC
Q_{gs}	Gate-Source Charge		-	1.6	-	
Q_{gd}	Gate-Drain Charge		-	4.5	-	

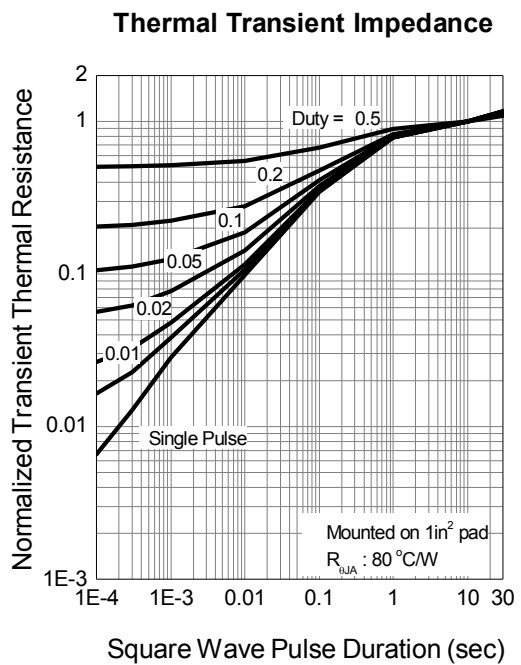
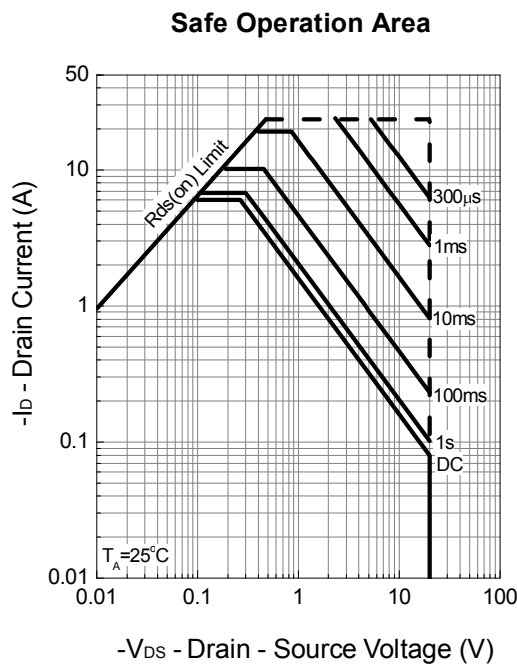
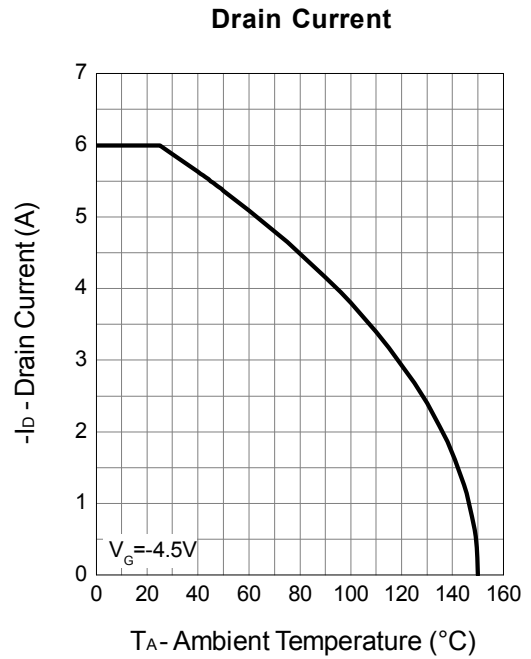
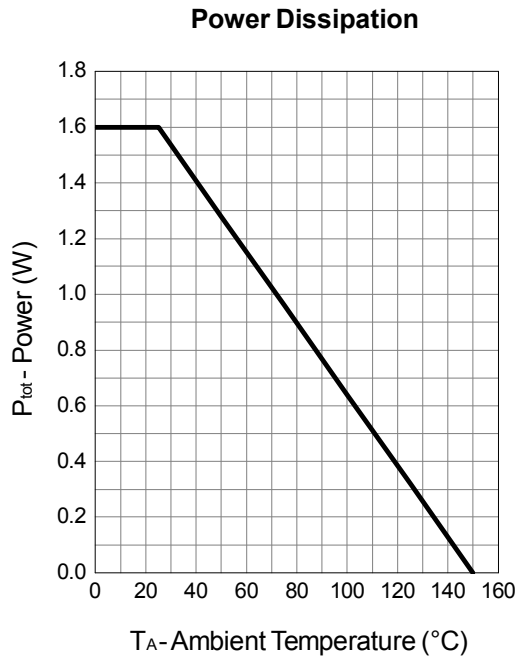
Electrical Characteristics (Cont.) ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
DYNAMIC CHARACTERISTICS^b						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	6	-	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=-10V,$ Frequency=1.0MHz	-	1155	-	pF
C_{oss}	Output Capacitance		-	205	-	
C_{rss}	Reverse Transfer Capacitance		-	165	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=-10V, R_L=10\Omega,$ $I_{DS}=-1A, V_{GEN}=-4.5V,$ $R_G=6\Omega$	-	7.7	-	ns
t_r	Turn-on Rise Time		-	13.8	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	40	-	
t_f	Turn-off Fall Time		-	19	-	
t_{rr}	Reverse Recovery Time	$I_{SD}=-6A, dI_{SD}/dt = 100A/\mu s$	-	17	-	ns
Q_{rr}	Reverse Recovery Charge		-	8	-	nC

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

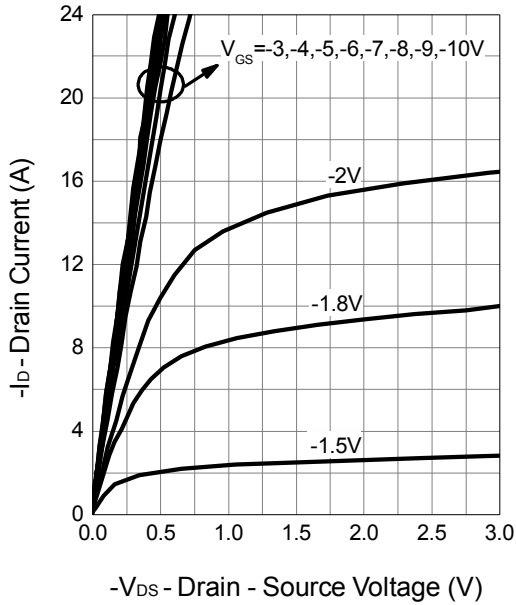
Note b : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

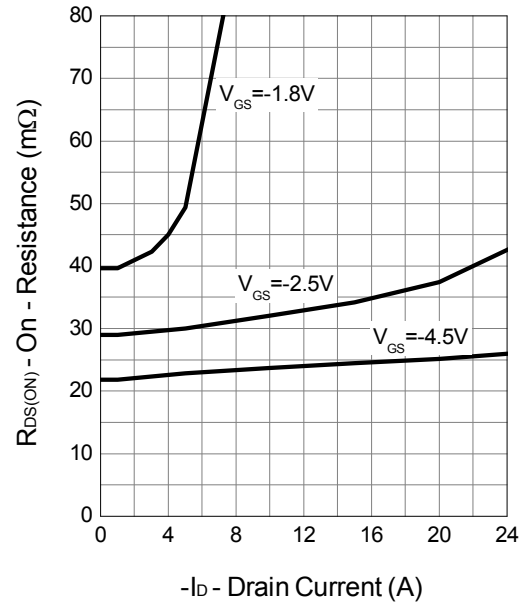


Typical Operating Characteristics (Cont.)

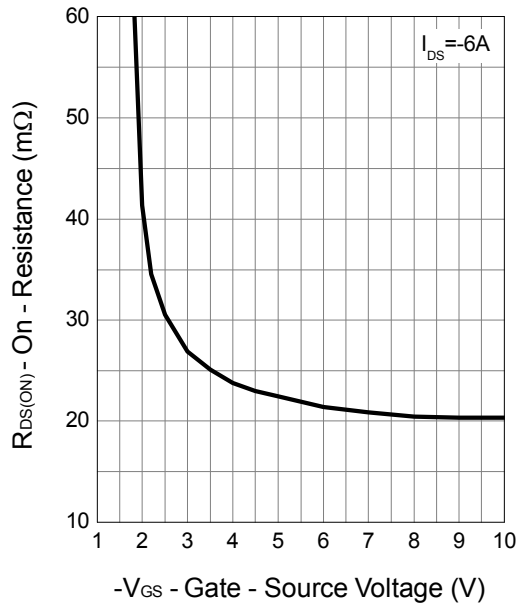
Output Characteristics



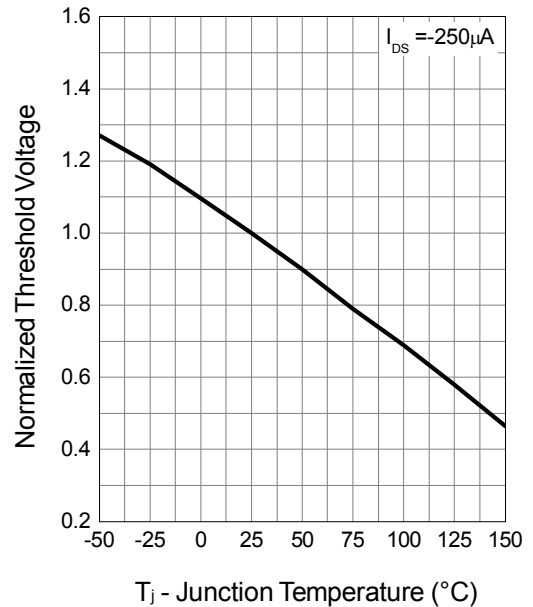
Drain-Source On Resistance



Gate-Source On Resistance

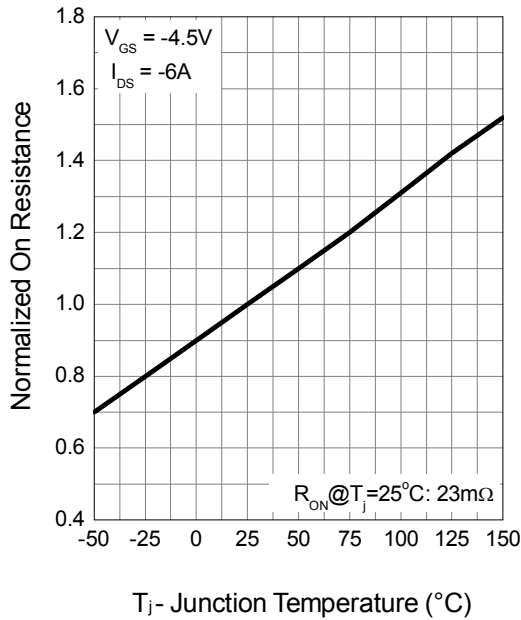


Gate Threshold Voltage

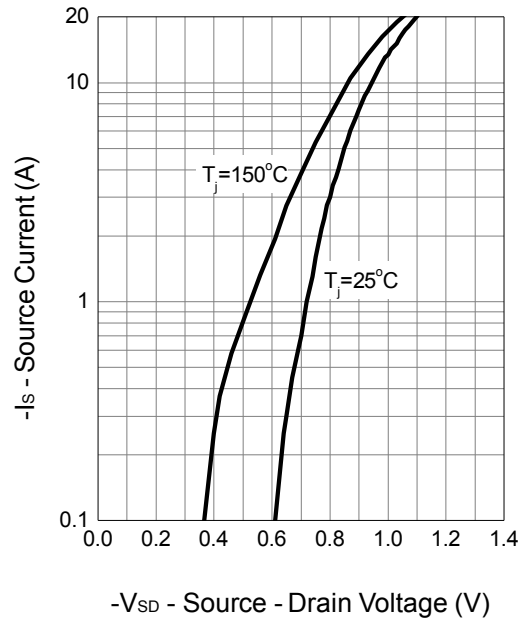


Typical Operating Characteristics (Cont.)

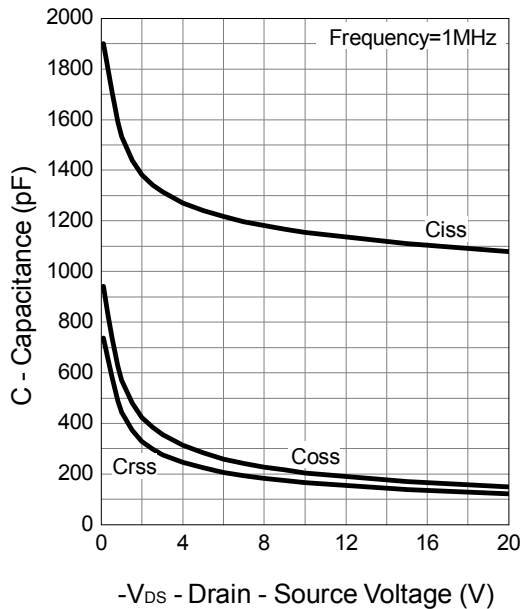
Drain-Source On Resistance



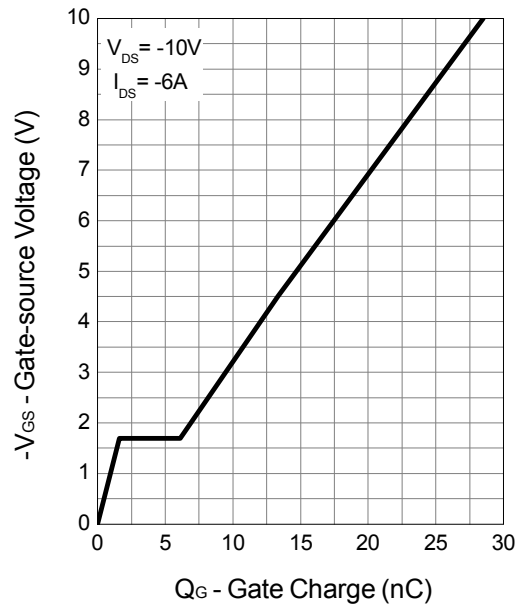
Source-Drain Diode Forward



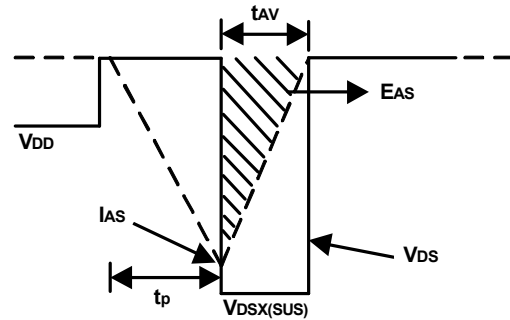
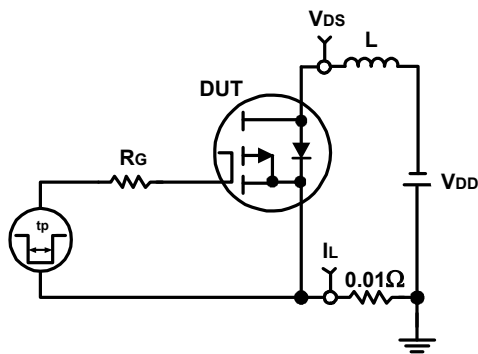
Capacitance



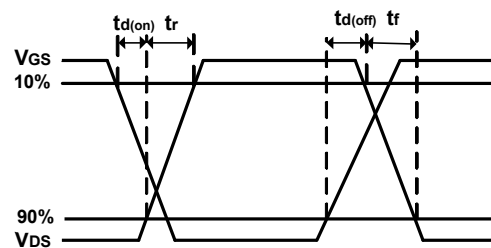
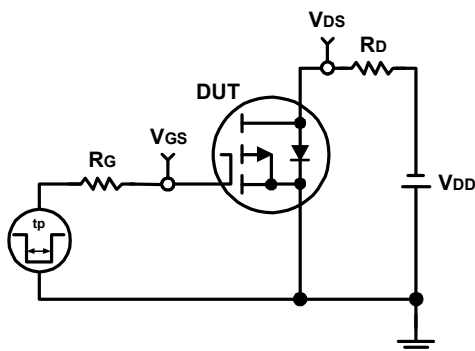
Gate Charge



Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms



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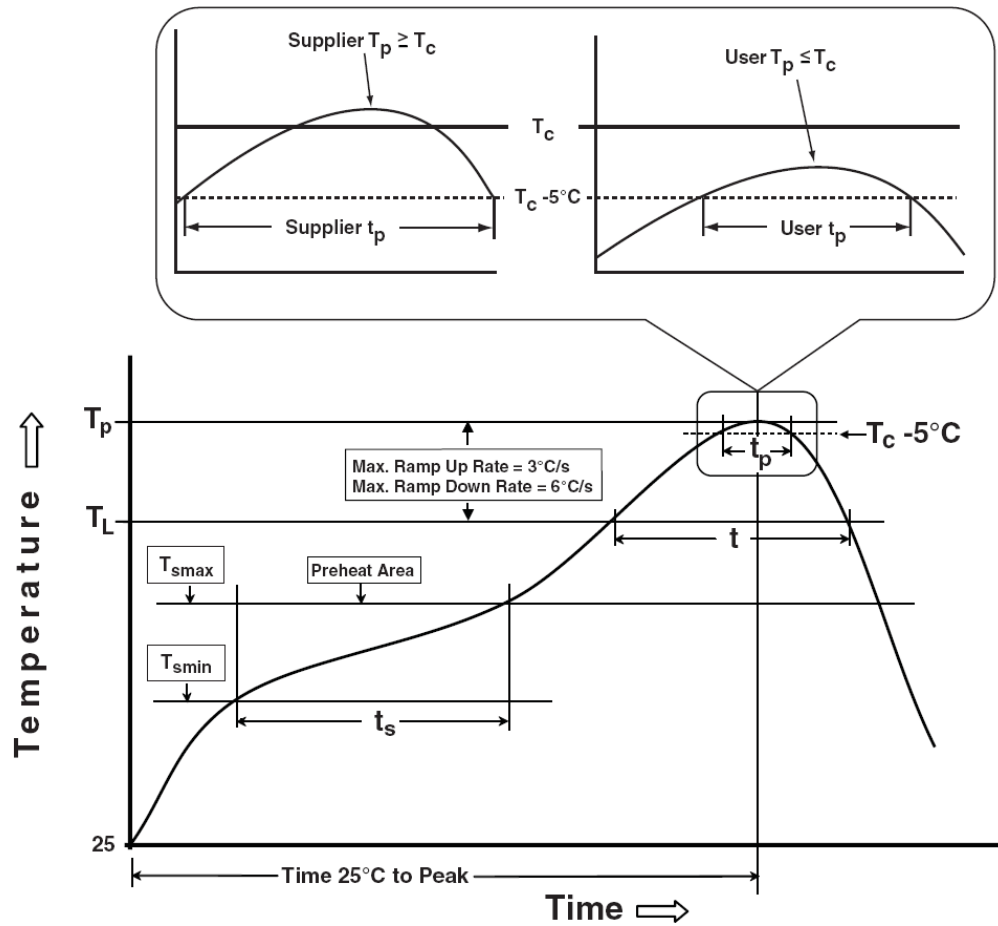
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Classification Profile



Classification Reflow Profiles

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