

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ 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 _C =25°C	10	A
I _D	Continuous Drain Current	T _C =25°C	40	
		T _C =100°C	26	
I _{DM}	Pulsed Drain Current	T _C =25°C	90	
P _D	Maximum Power Dissipation	T _C =25°C	32	W
		T _C =100°C	12.8	
R _{θJC}	Thermal Resistance-Junction to Case	Steady State	3.9	°C/W
I _D	Continuous Drain Current	T _A =25°C	9	A
		T _A =70°C	7	
I _{DM}	Pulsed Drain Current	T _A =25°C	36	
P _D ^a	Maximum Power Dissipation	T _A =25°C	1.5	W
		T _A =70°C	1	
R _{θJa} ^{b,c}	Thermal Resistance-Junction to Ambient	t ≤ 10s	34	°C/W
		Steady State	84	
I _{AS} ^d	Avalanche Current, Single pulse	L=0.1mH	20	A
E _{AS} ^d	Avalanche Energy, Single pulse	L=0.1mH	20	mJ

Note a : $R_{\theta\text{JA}}$ steady state $t=999\text{s}$.

Note b : $t \leq 10\text{s}$ and surface mounted on FR-4 board using 1in^2 pad, 2 oz Cu.

Note c : Steady time = 999s and surface mounted on FR-4 board using 1in^2 pad, 2 oz Cu.

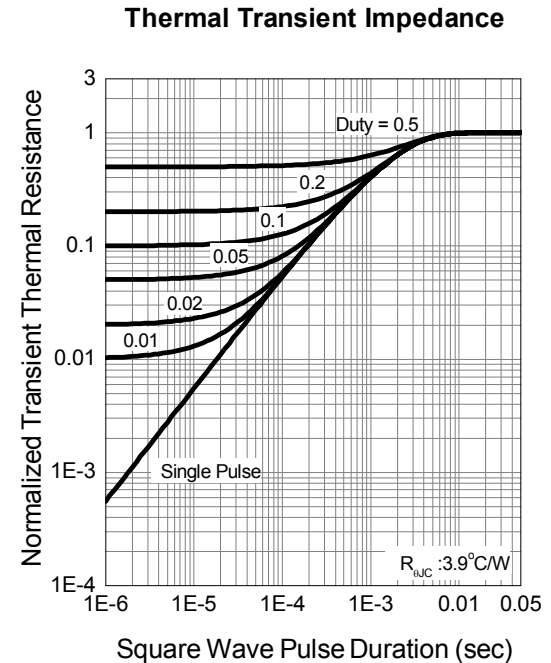
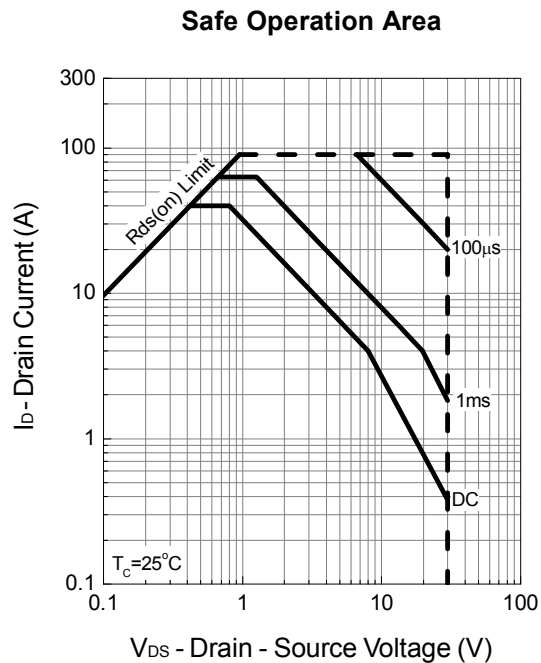
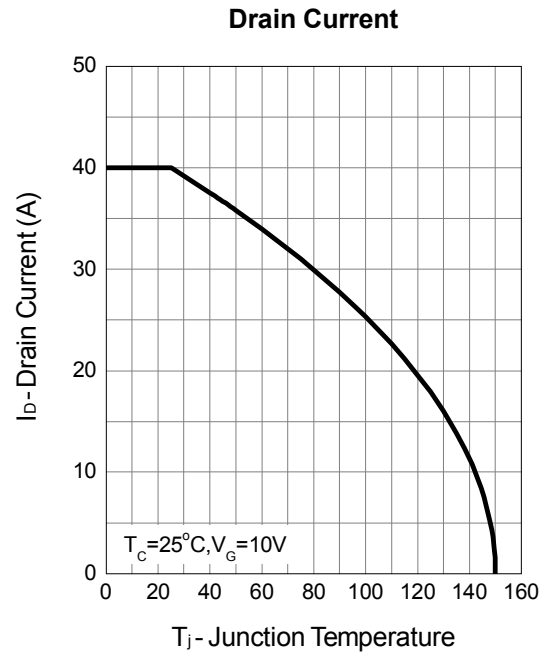
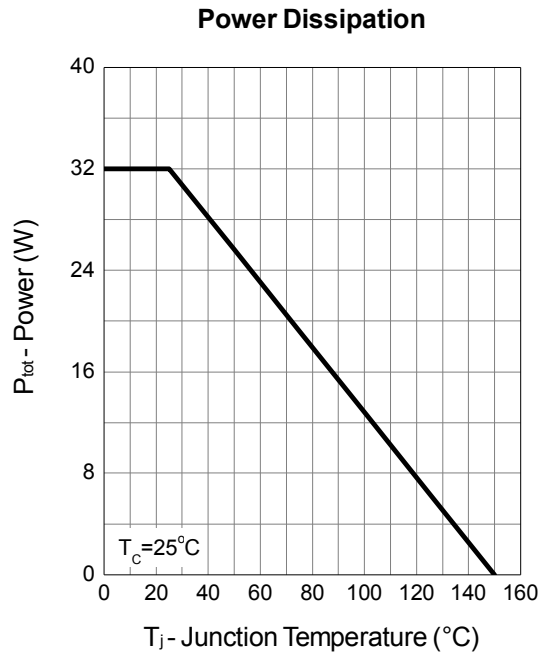
Note d : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature $T_J=25^\circ\text{C}$).

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} =0V, I _{DS} =250μA	30	-	-	V
BV _{DSS} t	Drain-Source Breakdown Voltage (transient)	V _{GS} =0V, I _{D(aval)} =20A T _{case} =25°C, t _{transient} =100ns	34	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V T _J =85°C	- -	- -	1 30	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	0.5	0.85	1.3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^e	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =10A	-	9	10.8	mΩ
		V _{GS} =4.5V, I _{DS} =7A	-	9.6	12	
		V _{GS} =2.5V, I _{DS} =5A	-	12	16	
Gfs	Forward Transconductance	V _{DS} =25V, I _{DS} =20A	-	45	-	S
Diode Characteristics						
V _{SD} ^e	Diode Forward Voltage	I _{SD} =3A, V _{GS} =0V	-	0.75	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} =10A, dl _{SD} /dt=100A/μs	-	12.2	-	ns
t _a	Charge Time		-	7.5	-	
t _b	Discharge Time		-	4.6	-	
Q _{rr}	Reverse Recovery Charge		-	5.6	-	nC
Dynamic Characteristics						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	2.4	4.3	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Frequency= 1.0MHz	-	1150	1500	pF
C _{oss}	Output Capacitance		-	120	-	
C _{rss}	Reverse Transfer Capacitance		-	85	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, R _L =15Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	9.6	18	ns
t _r	Turn-on Rise Time		-	10	18	
t _{d(OFF)}	Turn-off Delay Time		-	29	53	
t _f	Turn-off Fall Time		-	4.5	8	
Gate Charge Characteristics						
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =10V, I _{DS} =10A	-	25.5	36	nC
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =4.5V, I _{DS} =10A	-	11	12	
Q _{gth}	Threshold Gate Charge		-	0.85	-	
Q _{gs}	Gate-Source Charge		-	2.4	-	
Q _{gd}	Gate-Drain Charge		-	3.4	-	

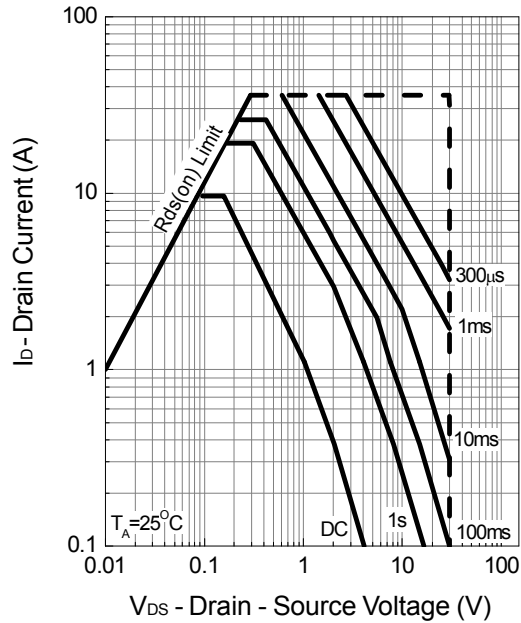
Note e : Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

Typical Operating Characteristics

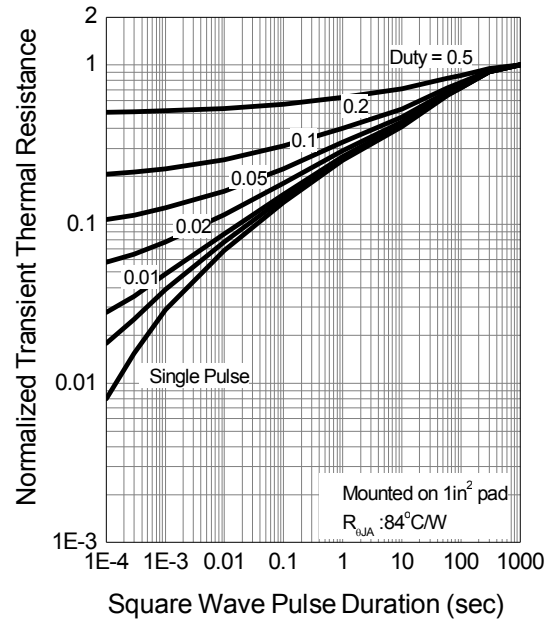


Typical Operating Characteristics (Cont.)

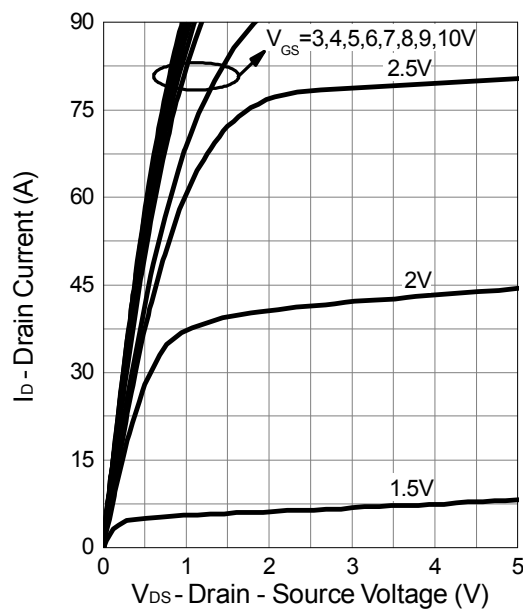
Safe Operation Area



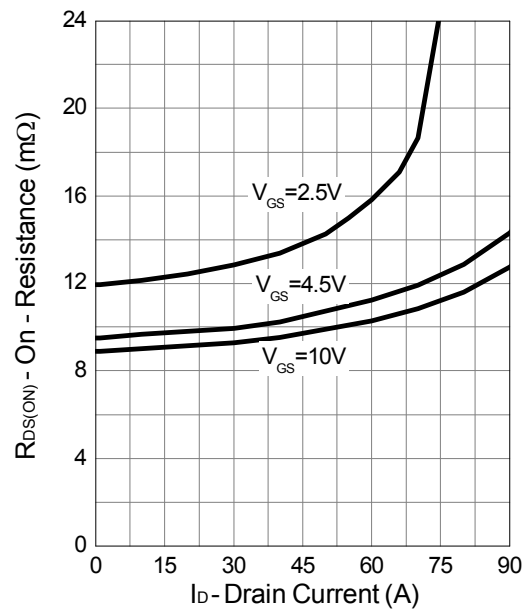
Thermal Transient Impedance



Output Characteristics

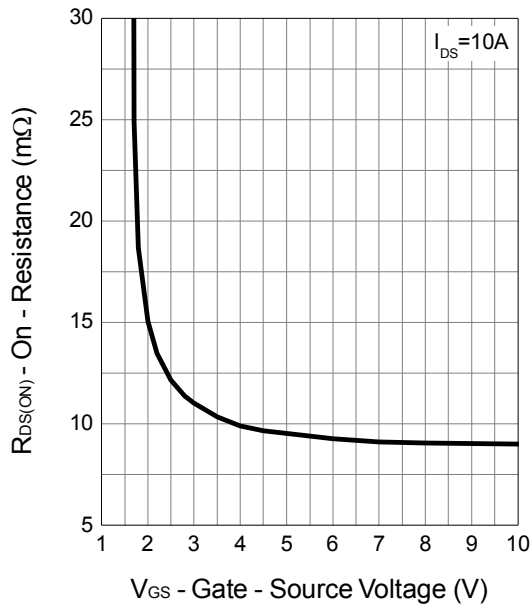


Drain-Source On Resistance

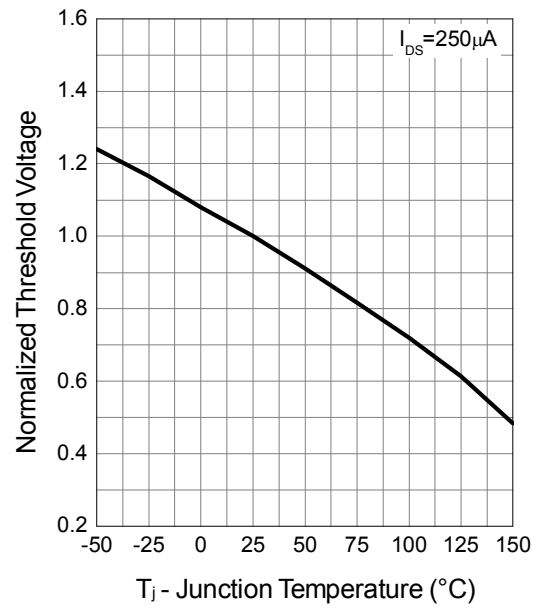


Typical Operating Characteristics (Cont.)

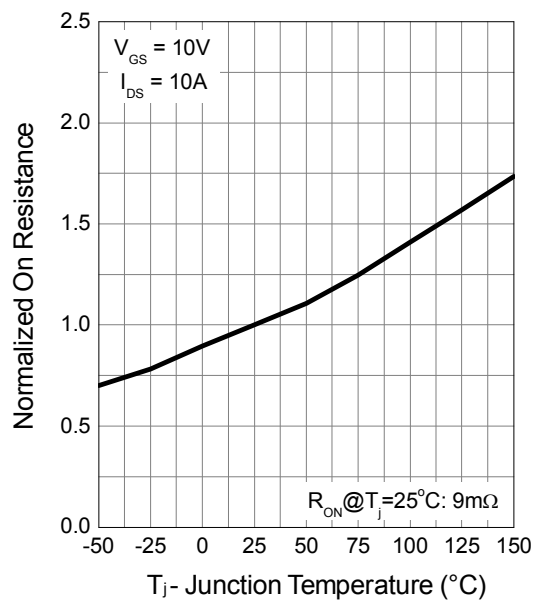
Gate-Source On Resistance



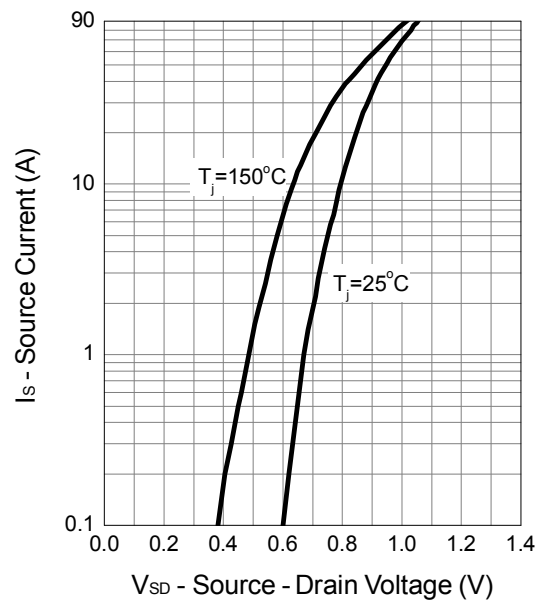
Gate Threshold Voltage



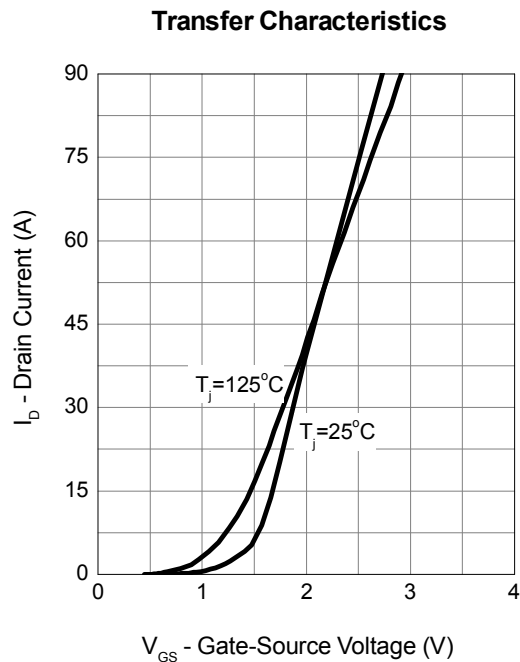
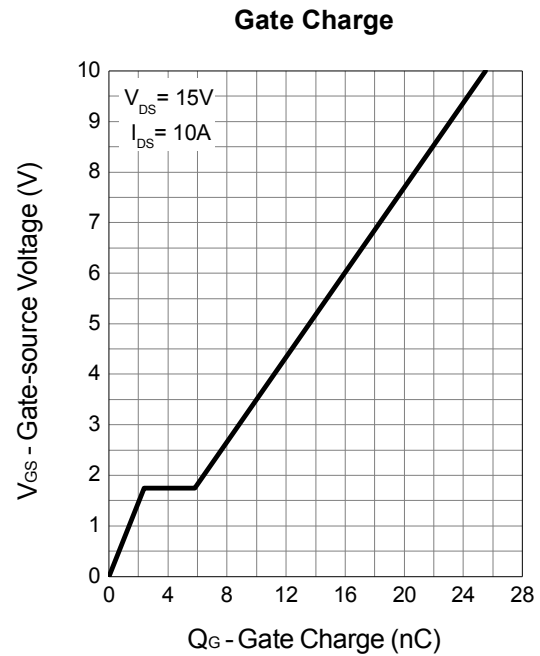
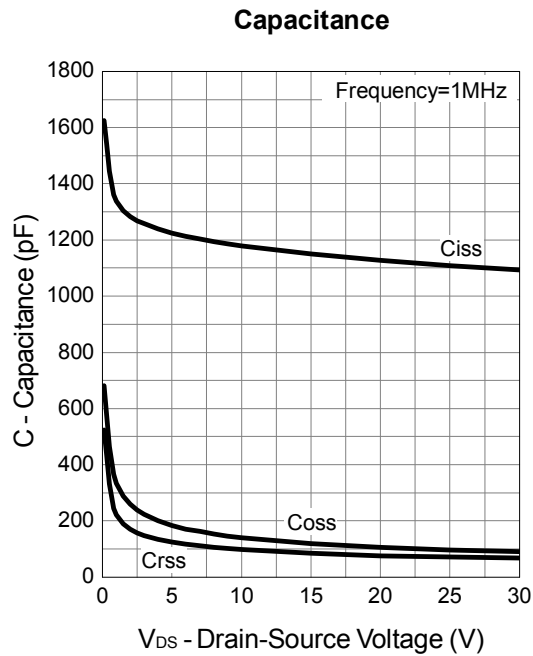
Drain-Source On Resistance



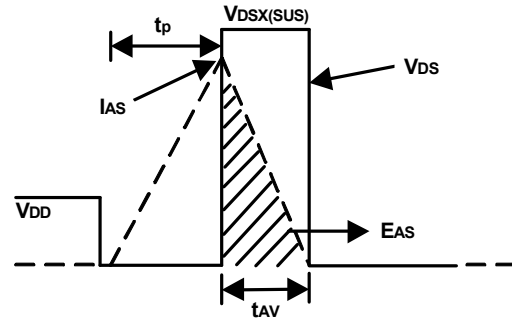
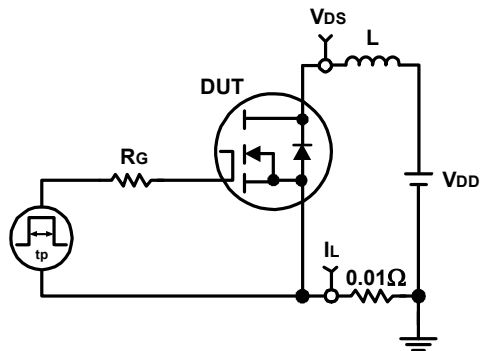
Source-Drain Diode Forward



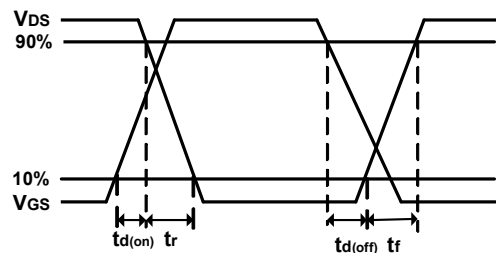
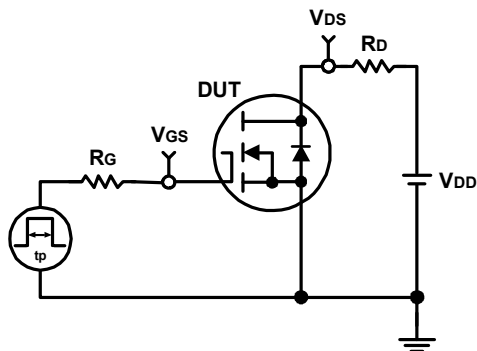
Typical Operating Characteristics (Cont.)



Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms



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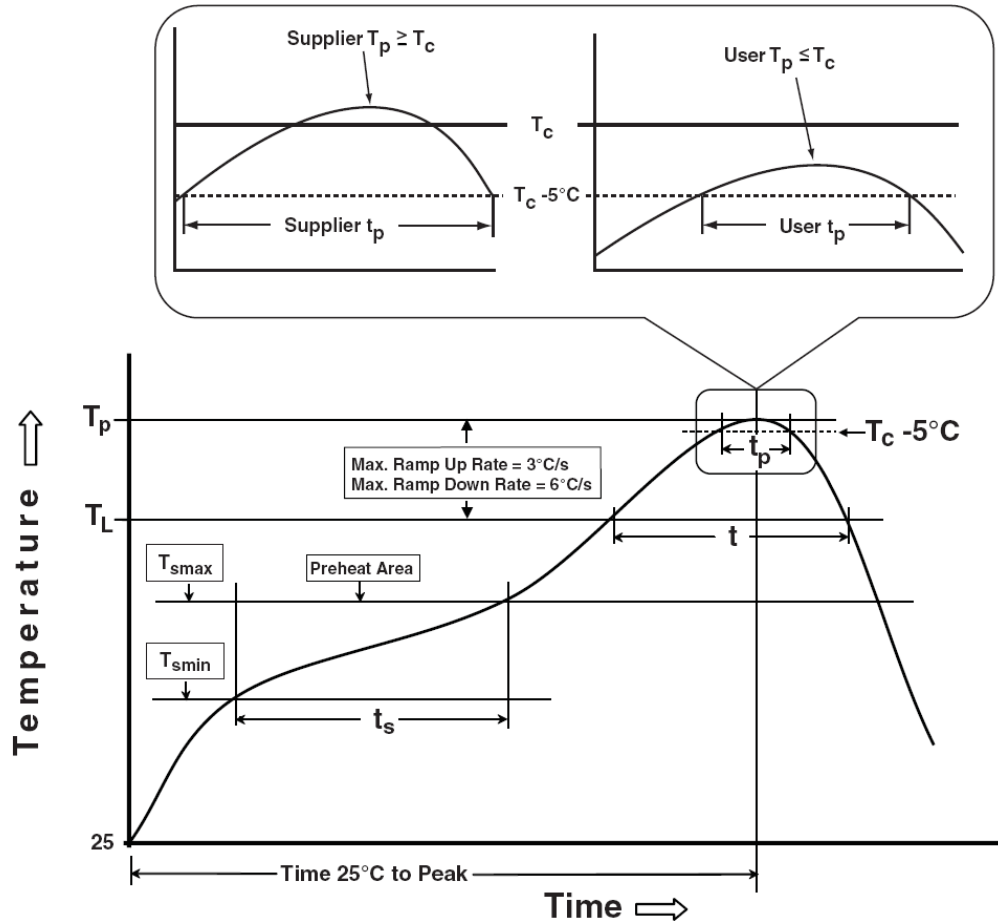
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Classification Profile



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

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