

N-CHANNEL ENHANCEMENT MODE POWER MOSFET

V_{DSS}	55V
$R_{DS(ON)}$	5.0m Ω
I_D	100A

Description

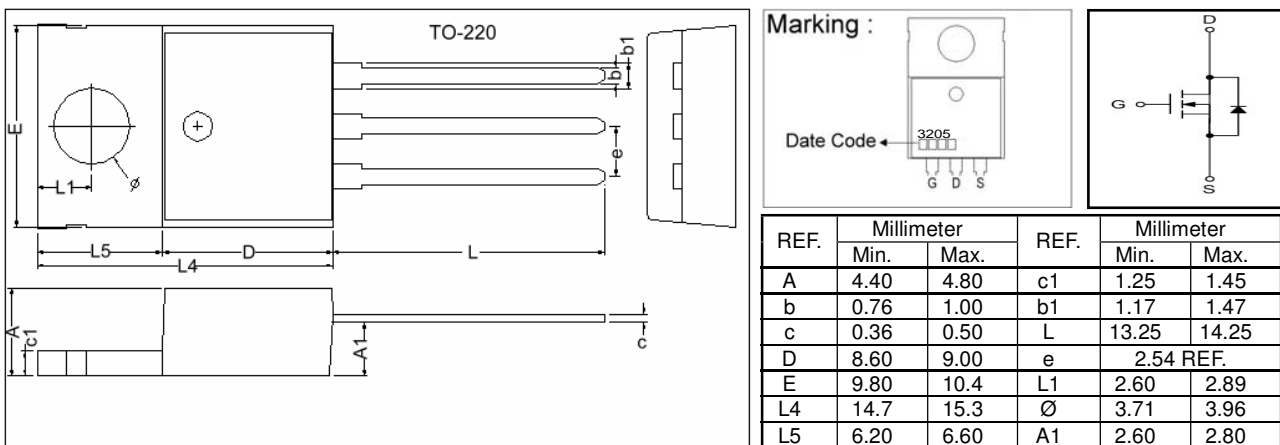
The BP3205 uses advanced trench technology to provide excellent on-resistance extremely efficient and cost-effectiveness device.

The through-hole version (TO-220) is available for low-profile applications and suited for low voltage applications such as DC/DC converters.

Features

*High Density Cell Design for Ultra Low On-Resistance

*Avalanche rated and reliable and rugged

Package Dimensions

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
Common Ratings ($T_A=25^\circ\text{C}$ Unless Otherwise Noted)			
V_{DSS}	Drain-Source Voltage	55	V
V_{GSS}	Gate-Source Voltage	25	
T_J	Maximum Junction Temperature	175	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ\text{C}$
I_S	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$ 100	A
Mounted on Large Heat Sink			
I_{DP}	300 μs Pulse Drain Current Tested	$T_C=25^\circ\text{C}$ 400	A
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$ 100	A
		$T_C=100^\circ\text{C}$ 75	
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$ 200	W
		$T_C=100^\circ\text{C}$ 85	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	42.5	
Avalanche Ratings			
E_{AS}	Avalanche Energy, Single Pulsed	$L=0.3\text{mH}$ 900*	mJ

Note : *VD=50V

Electrical Characteristics ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	BP3205			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	55	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=55V, V_{GS}=0V$ $T_J=85^\circ\text{C}$	-	-	1	μA
			-	-	10	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2	3	4	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 25V, V_{DS}=0V$	-	-	± 100	nA
$R_{DS(ON)}^a$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=50A$	-	5.0	6.0	m Ω
Diode Characteristics						
V_{SD}^a	Diode Forward Voltage	$I_{SD}=50A, V_{GS}=0V$	-	0.8	1	V
t_{rr}	Reverse Recovery Time	$I_{SD}=50A, di_{SD}/dt=100A/\mu s$	-	55	-	ns
Q_{rr}	Reverse Recovery Charge		-	117	-	nC

Electrical Characteristics (Cont.) ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

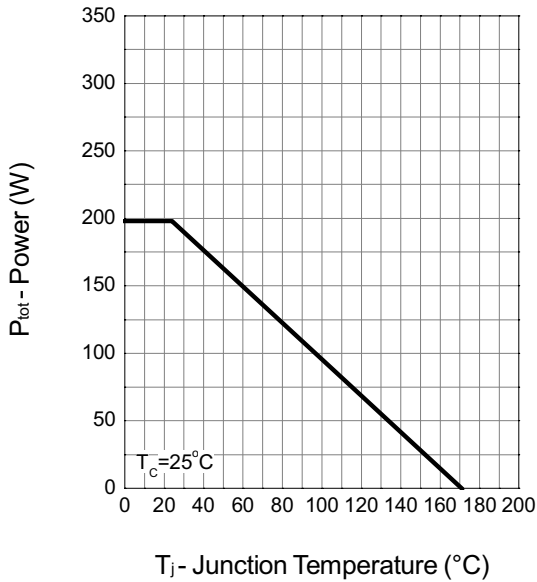
Symbol	Parameter	Test Conditions	BP3205			Unit
			Min.	Typ.	Max.	
Dynamic Characteristics^b						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	1.5	-	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=25V,$ Frequency=1.0MHz	-	5373	-	pF
C_{oss}	Output Capacitance		-	797	-	
C_{rss}	Reverse Transfer Capacitance		-	415	-	
$t_{d(ON)}$	Turn-on Delay Time		-	25	-	
T_r	Turn-on Rise Time	$V_{DD}=30V, R_L=30\Omega,$ $I_{DS}=50A, V_{GEN}=10V,$ $R_G=3.3\Omega$	-	20	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	85	-	
T_f	Turn-off Fall Time		-	41	-	
Gate Charge Characteristics^b						
Q_g	Total Gate Charge	$V_{DS}=30V, V_{GS}=10V,$ $I_{DS}=50A$	-	120	-	nC
Q_{gs}	Gate-Source Charge		-	30	-	
Q_{gd}	Gate-Drain Charge		-	45	-	

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

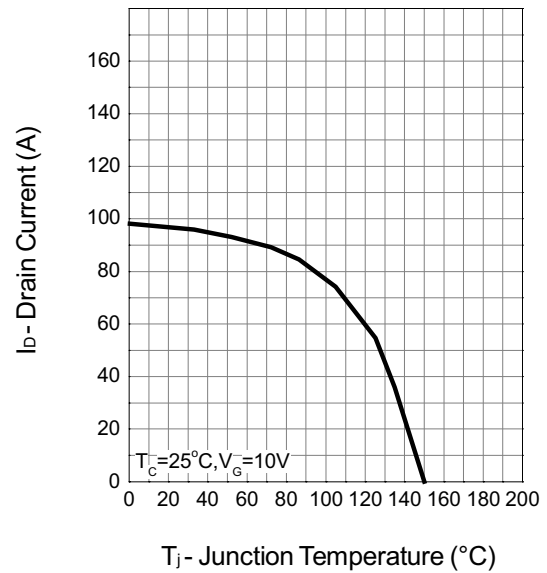
Note b : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

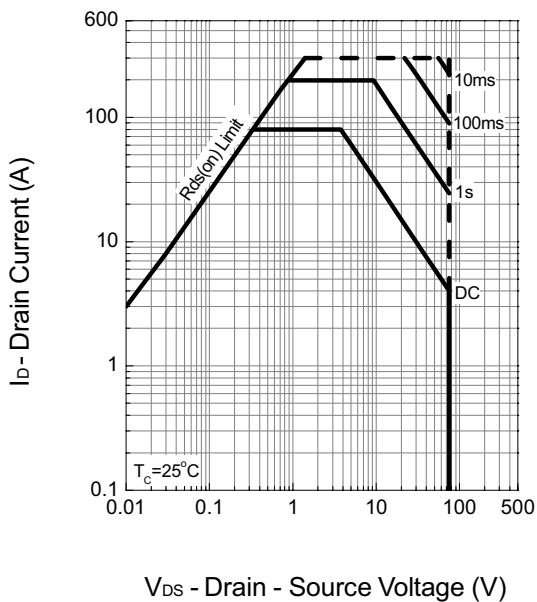
Power Dissipation



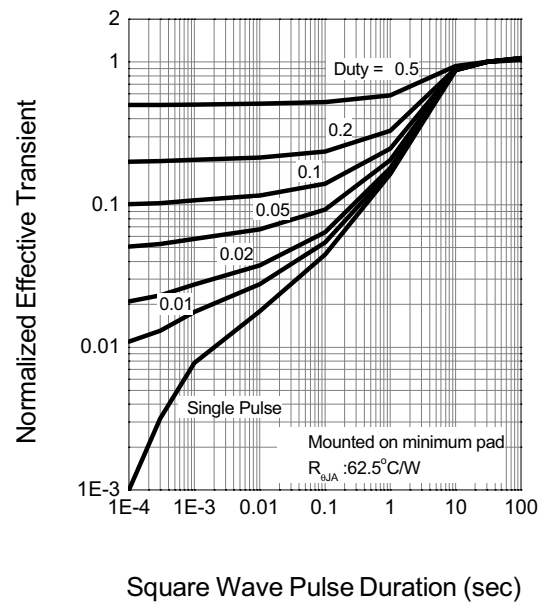
Drain Current



Safe Operation Area

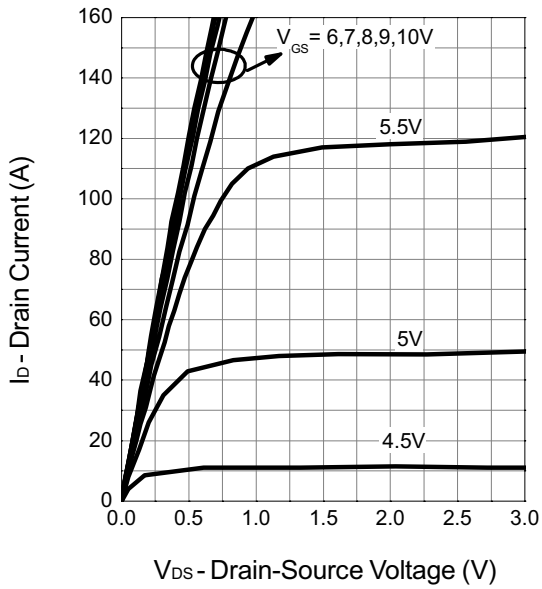


Thermal Transient Impedance

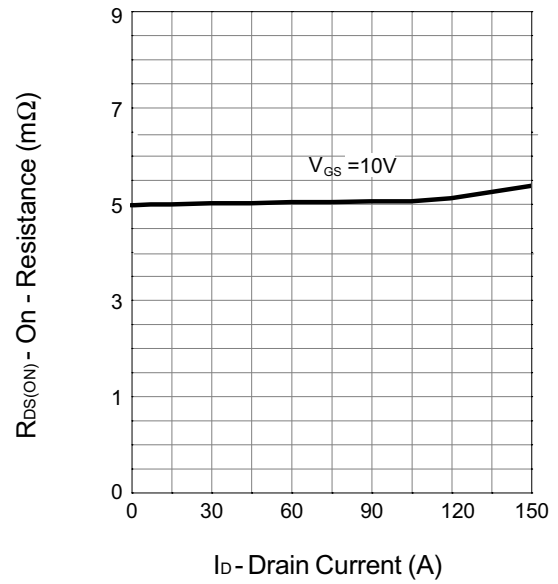


Typical Operating Characteristics (Cont.)

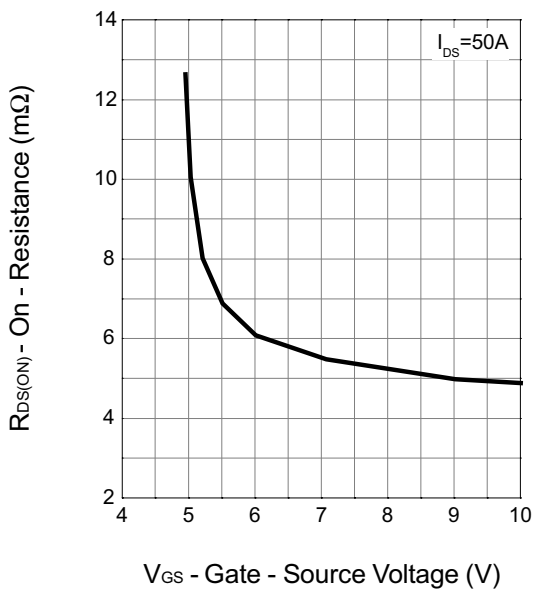
Output Characteristics



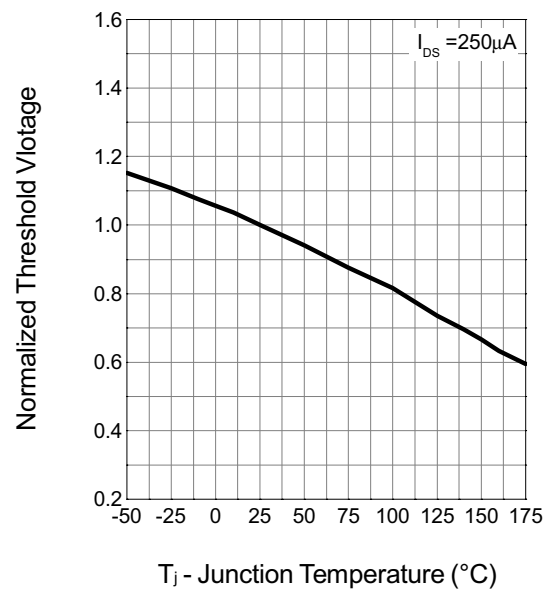
Drain-Source On Resistance



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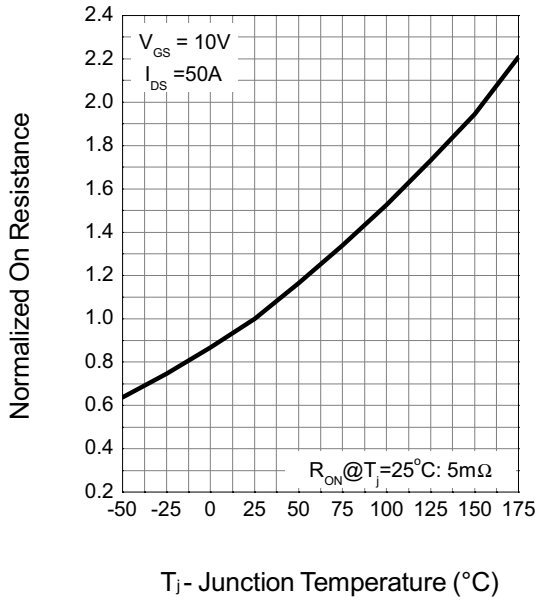


Gate Threshold Voltage

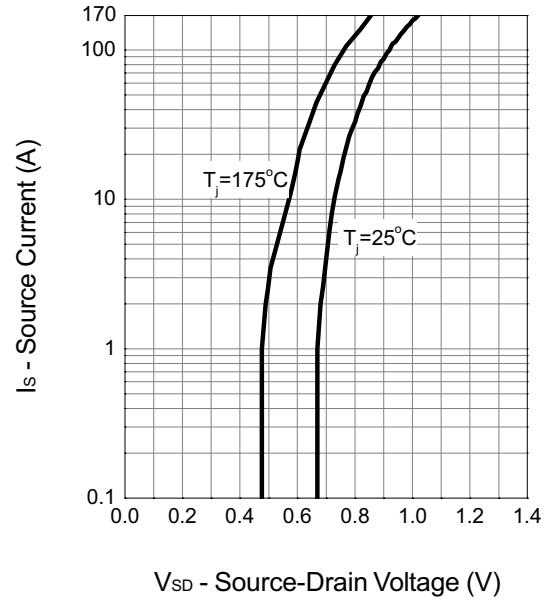


Typical Operating Characteristics (Cont.)

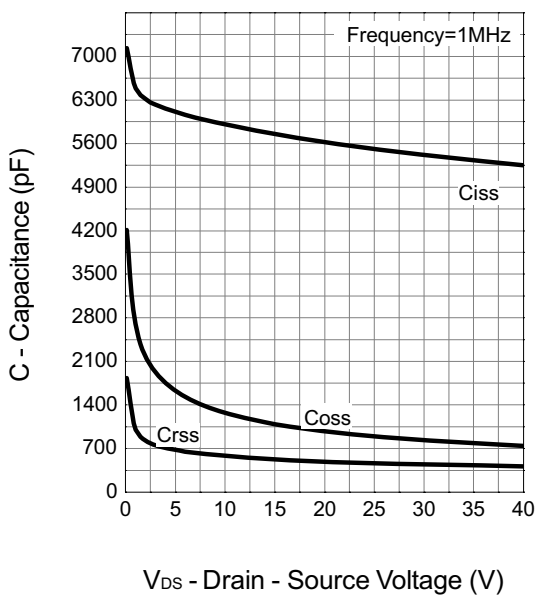
Drain-Source On Resistance



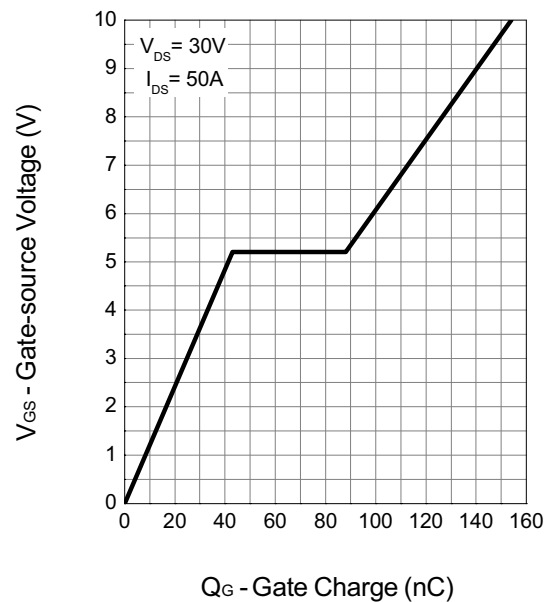
Source-Drain Diode Forward



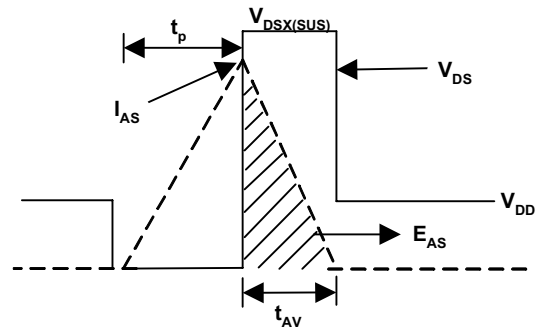
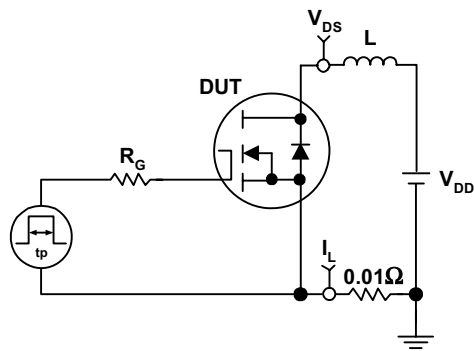
Capacitance



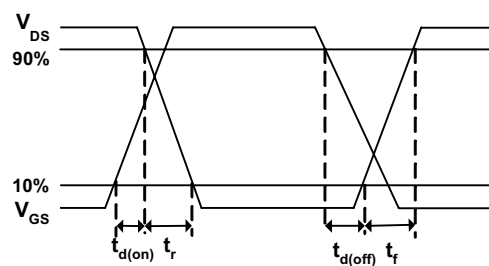
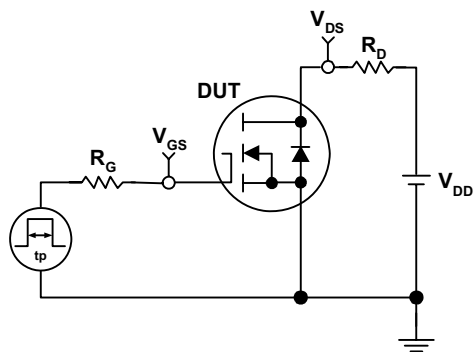
Gate Charge



Avalanche Test Circuit and Waveforms



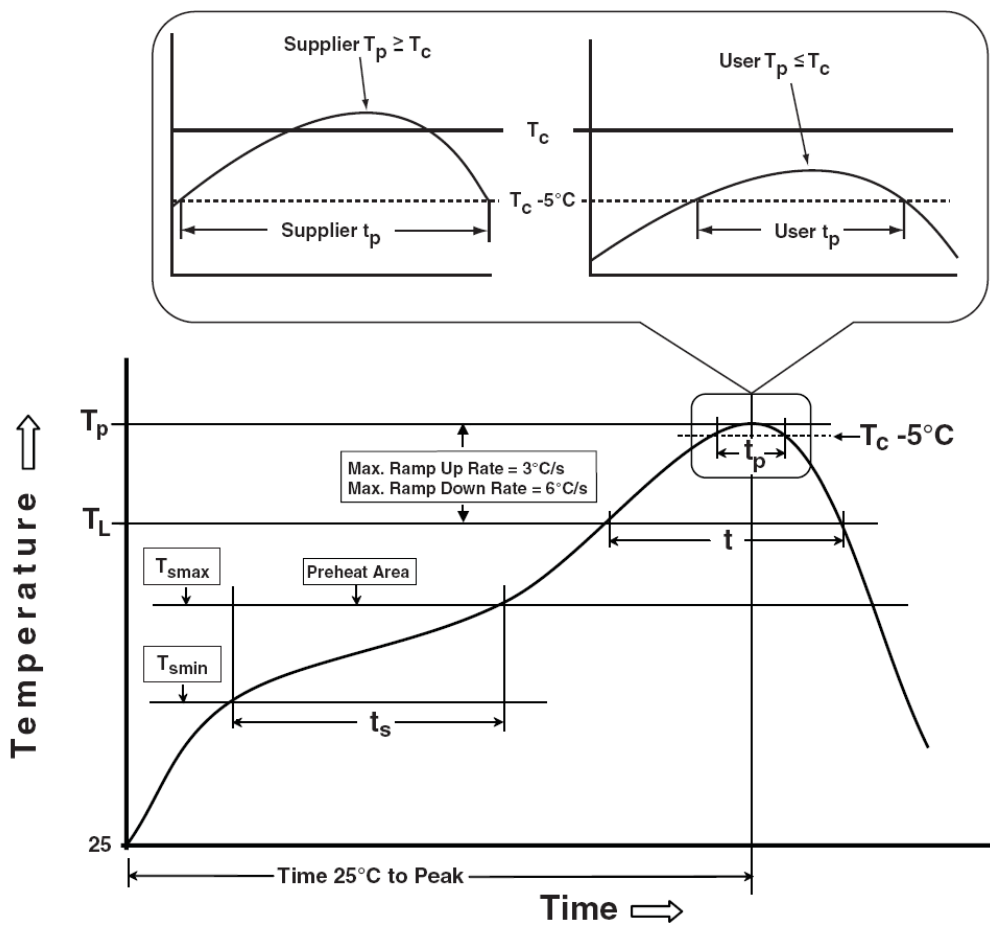
Avalanche Test Circuit and Waveforms



Devices Per Unit

Package Type	Unit	Quantity
TO-220	Tube	50

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 (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
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