

N-CHANNEL ENHANCEMENT MODE POWER MOSFET

V_{DSS}	80V
$R_{DS(ON)}$	7.0m Ω
I_D	75A

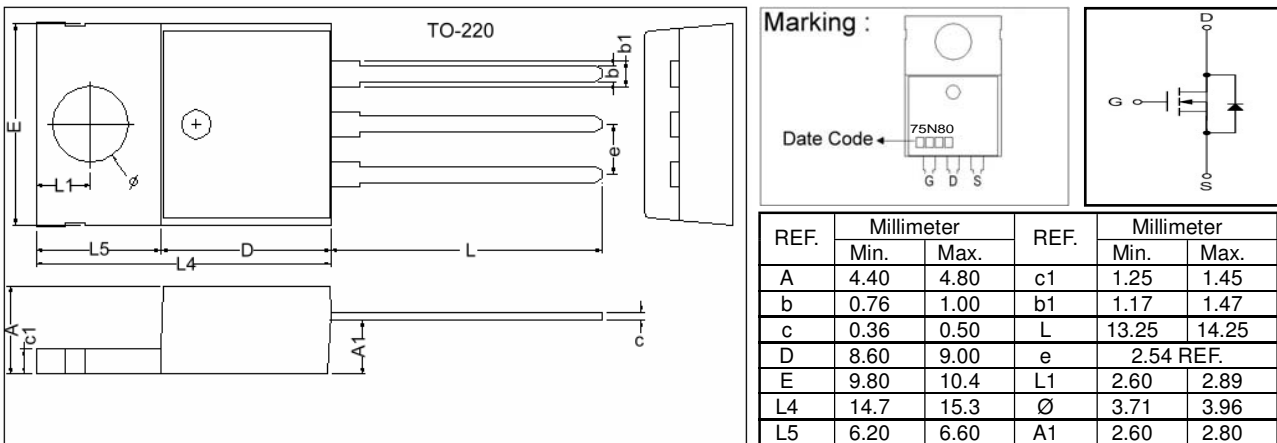
Description

The BP75N80 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	80	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	$T_C=25^\circ\text{C}$ 75	A
Mounted on Large Heat Sink			
I_{DP}	300 μs Pulse Drain Current Tested	$T_C=25^\circ\text{C}$ 320	A
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$ 75	A
		$T_C=100^\circ\text{C}$ 65	
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$ 210	W
		$T_C=100^\circ\text{C}$ 125	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62.5	
Avalanche Ratings			
E_{AS}	Avalanche Energy, Single Pulsed	$L=0.3\text{mH}$ 810*	mJ

Note : *VD=50V

Electrical Characteristics (T_A = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	BP75N80			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	-	80	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =80V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	10	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	2	3	4	V
I _{GSS}	Gate Leakage Current	V _{GS} =±25V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^a	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =40A	-	7.0	7.9	mΩ
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} =40A, V _{GS} =0V	-	0.8	1	V
t _{rr}	Reverse Recovery Time	I _{SD} =40A, dI _{SD} /dt=100A/μs	-	62	-	ns
Q _{rr}	Reverse Recovery Charge		-	127	-	nC

Electrical Characteristics (Cont.) (T_A = 25°C Unless Otherwise Noted)

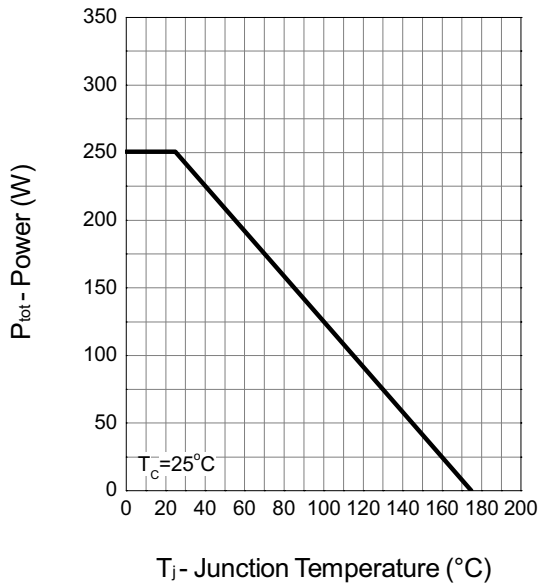
Symbol	Parameter	Test Conditions	BP75N80			Unit
			Min.	Typ.	Max.	
Dynamic Characteristics^b						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	0.82	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, Frequency=1.0MHz	-	6600	-	pF
C _{oss}	Output Capacitance		-	1000	-	
C _{rss}	Reverse Transfer Capacitance		-	480	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =30V, R _L =30Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	37	68	ns
T _r	Turn-on Rise Time		-	120	139	
t _{d(OFF)}	Turn-off Delay Time		-	115	208	
T _f	Turn-off Fall Time		-	75	136	
Gate Charge Characteristics^b						
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =10V, I _{DS} =40A	-	154	216	nC
Q _{gs}	Gate-Source Charge		-	43	-	
Q _{gd}	Gate-Drain Charge		-	45	-	

Note a : Pulse test ; pulse width≤300μs, duty cycle≤2%.

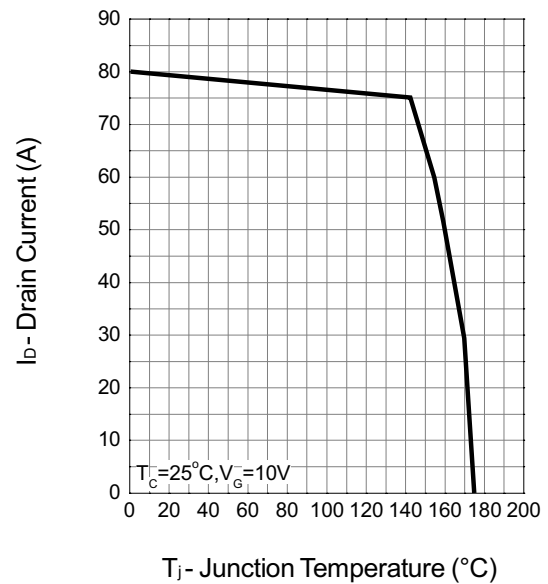
Note b : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

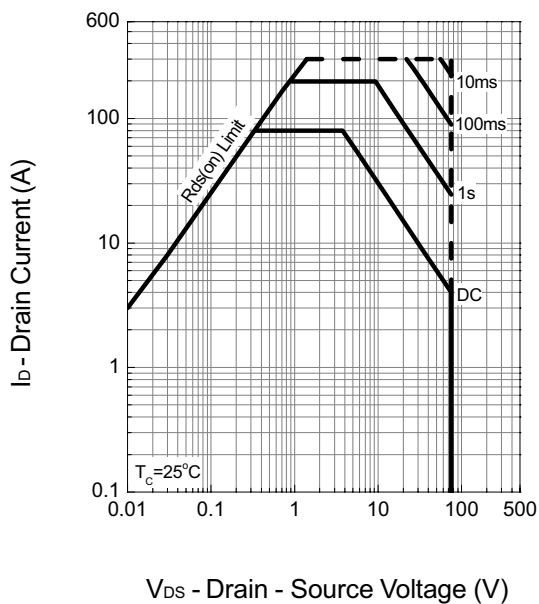
Power Dissipation



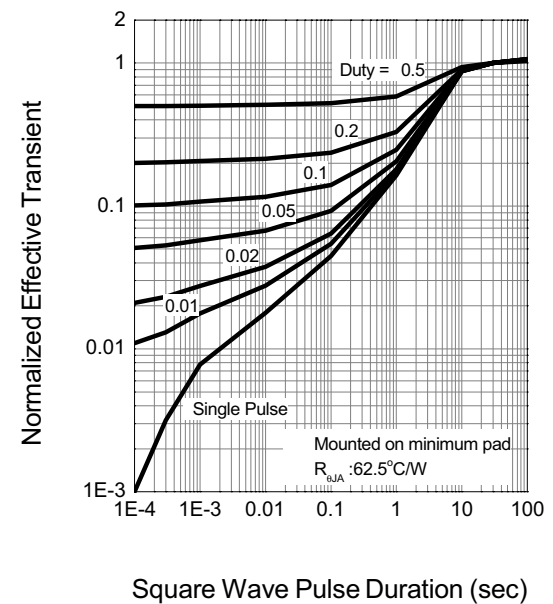
Drain Current



Safe Operation Area

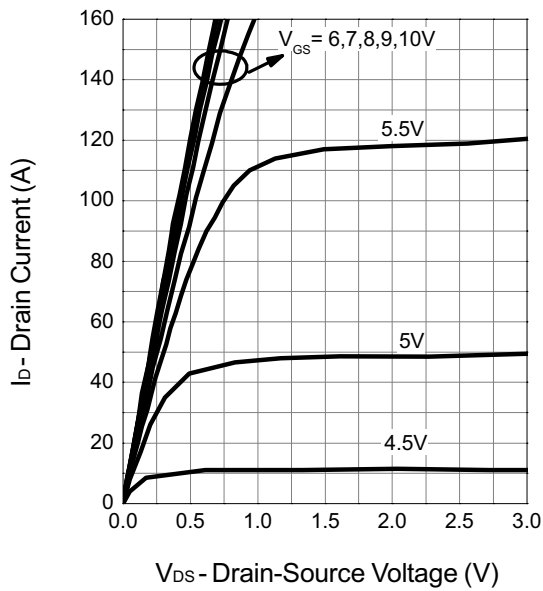


Thermal Transient Impedance

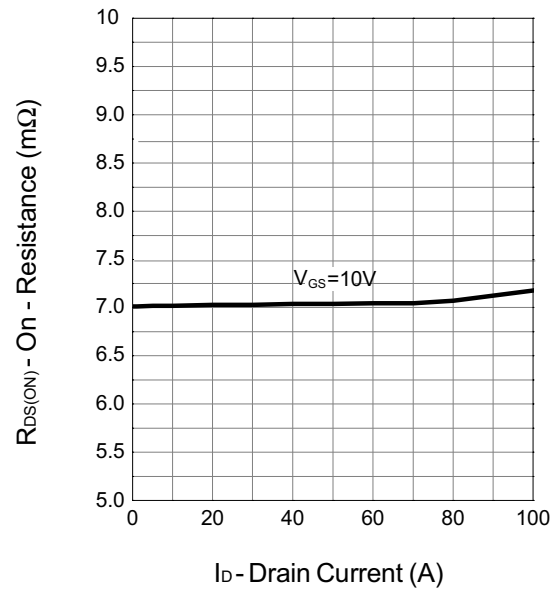


Typical Operating Characteristics (Cont.)

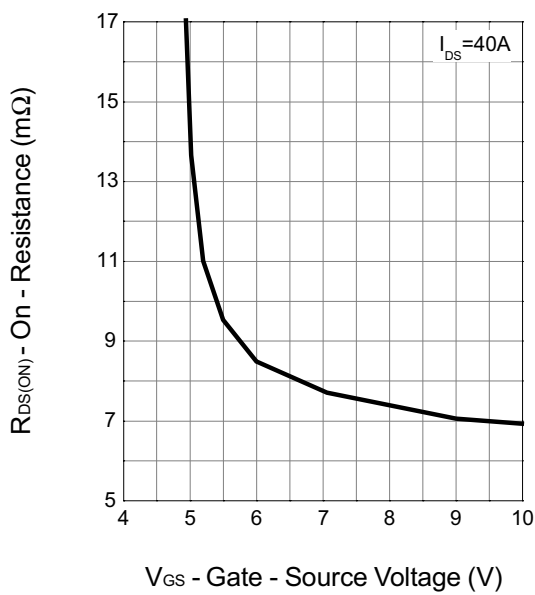
Output Characteristics



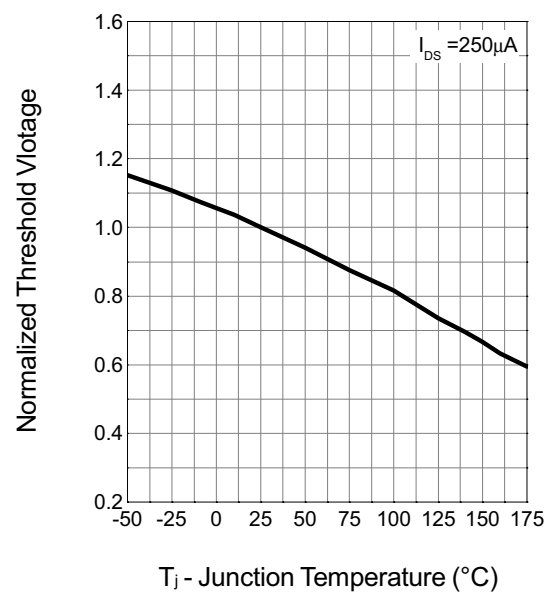
Drain-Source On Resistance



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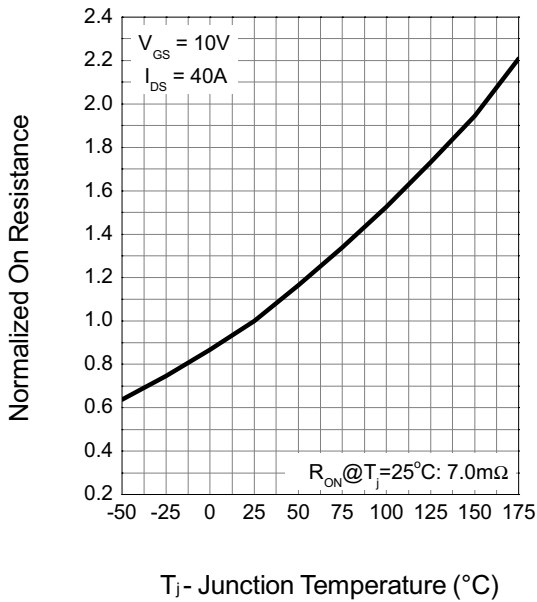


Gate Threshold Voltage

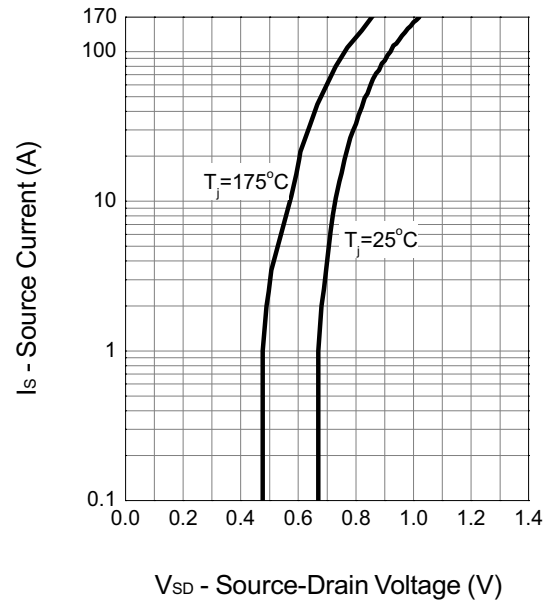


Typical Operating Characteristics (Cont.)

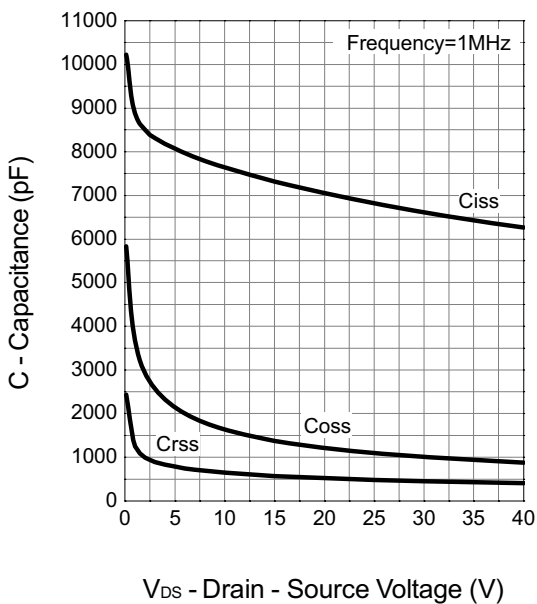
Drain-Source On Resistance



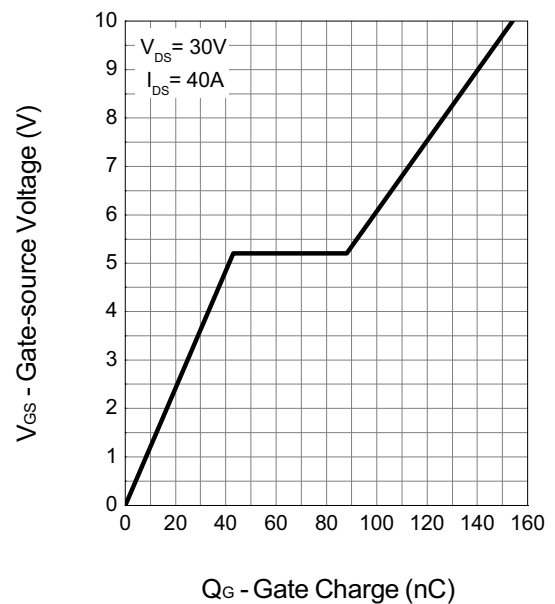
Source-Drain Diode Forward



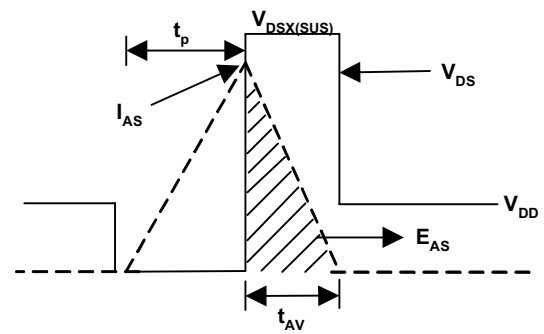
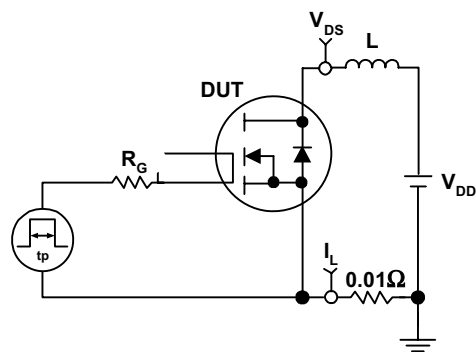
Capacitance



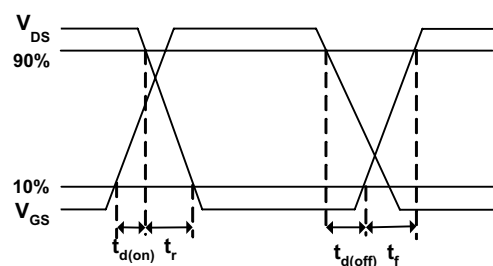
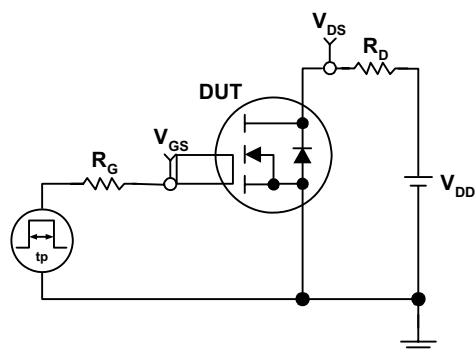
Gate Charge



Avalanche Test Circuit and Waveforms



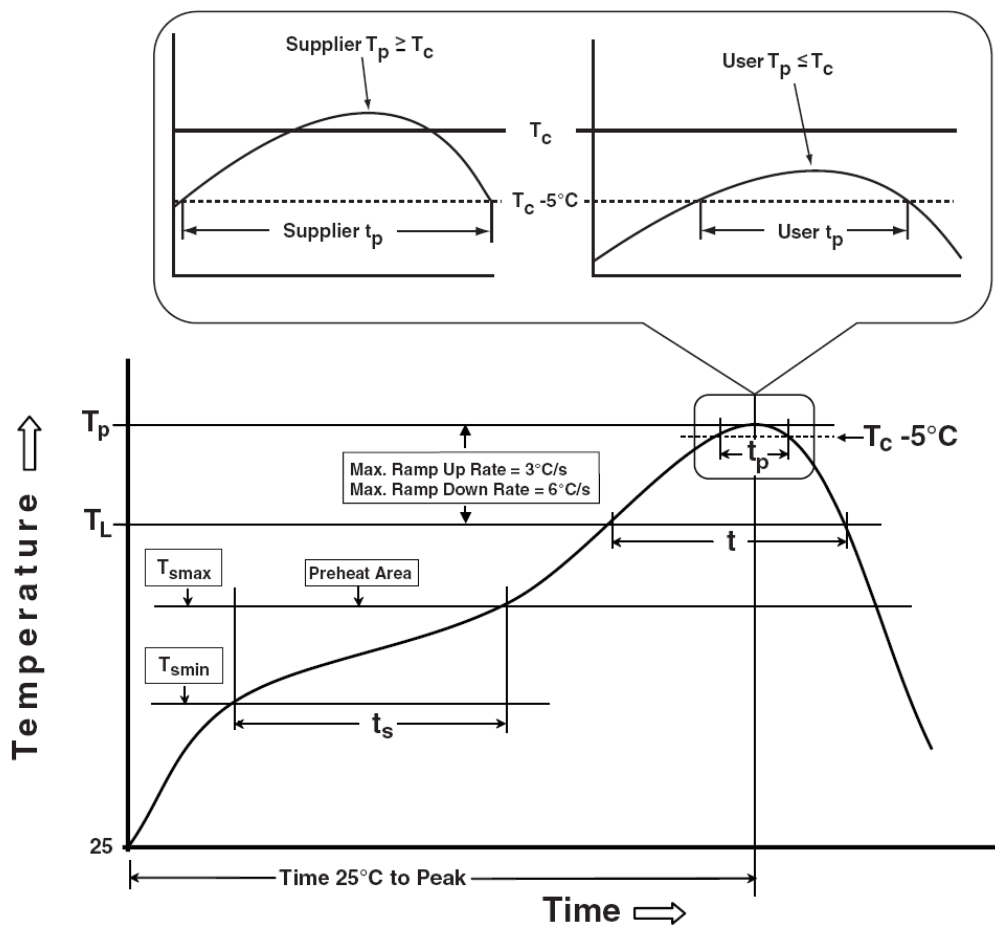
Avalanche Test Circuit and Waveforms



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