General Description

The WSF45P10 is the highest performance trench P-Ch MOSFET with extreme high cell density , which provide excellent R_{DSON} and gate charge for most of the small power switching and load switch applications.

The WSF45P10 meet the RoHS and Green Product requirement with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Green Device Available

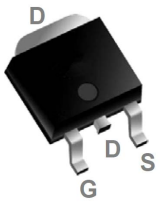
Product Summery

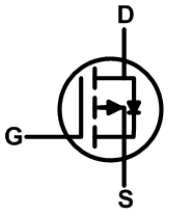
BV_{DSS}	R_{DSON}	I_D
-100V	44mΩ	-40A

Applications

- Inverters

TO-252 Pin Configuration





Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T_C=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		-100	V
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		175	°C
T_{STG}	Storage Temperature Range		-55 to 175	°C
I_S	Diode Continuous Forward Current	T_C=25°C	-40	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *		-120**	A
I_D	Continuous Drain Current	T_C=25°C	-40	A
		T_C=100°C	-26	
P_D	Maximum Power Dissipation	T_C=25°C	136	W
		T_C=100°C	68	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		1.1	°C/W
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62.5	
Avalanche Ratings				
E_{AS}	Avalanche Energy, Single Pulsed	L=0.5mH	308***	mJ

Note : * Repetitive rating ; pulse width limiited by junction temperatur
** Drain current is limited by junction temperature
*** VD=-80V

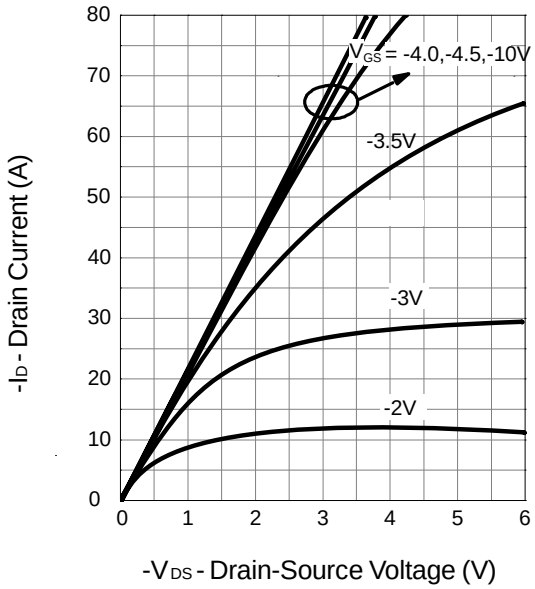
Electrical Characteristics (T_C=25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=-250μA	-100	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-100 V, V_{GS}=0V	-	-	-1	μA
		T_J=85°C	-	-	-10	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=-250μA	-1	-2	-3	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$*	Drain-Source On-state Resistance	V_{GS}=-10V, I_{DS}=-20A	-	44	55	mΩ
$R_{DS(ON)}$*	Drain-Source On-state Resistance	V_{GS}=-4.5V, I_{DS}=-20A	-	47	58.5	mΩ
Diode Characteristics						
V_{SD}*	Diode Forward Voltage	I_{SD}=-20A, V_{GS}=0V	-	-0.8	-1.2	V
t_{rr}	Reverse Recovery Time	I_{SD}=-20A,dI_{SD}/dt=-100A/μs	-	70	-	ns
Q_{rr}	Reverse Recovery Charge		-	90	-	nC
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	2	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-20V, Frequency=1.0MHz	-	5720	-	pF
C_{oss}	Output Capacitance		-	790	-	
C_{rss}	Reverse Transfer Capacitance		-	450	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-50V, R_G = 6 Ω, I_{DS} =-20A, V_{GS}=-10V,	-	30	-	ns
T_r	Turn-on Rise Time		-	79	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	82	-	
T_f	Turn-off Fall Time		-	69	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	V_{DS}=-80V,V_{GS}=-10V, I_{DS}=-20A	-	125	-	nC
Q_{gs}	Gate-Source Charge		-	21	-	
Q_{gd}	Gate-Drain Charge		-	45	-	

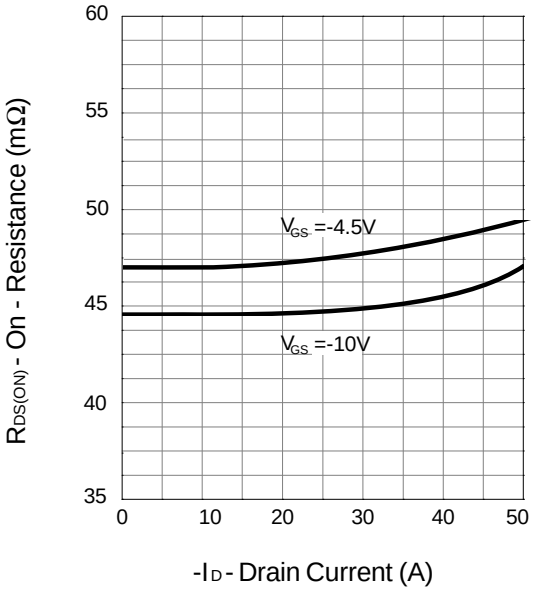
Note * : Pulse test ; pulse width ≤300μs, duty cycle≤2%.

Typical Characteristics

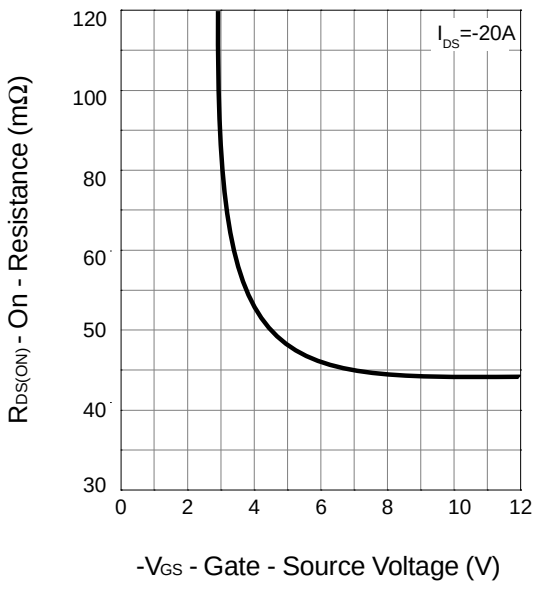
Output Characteristics



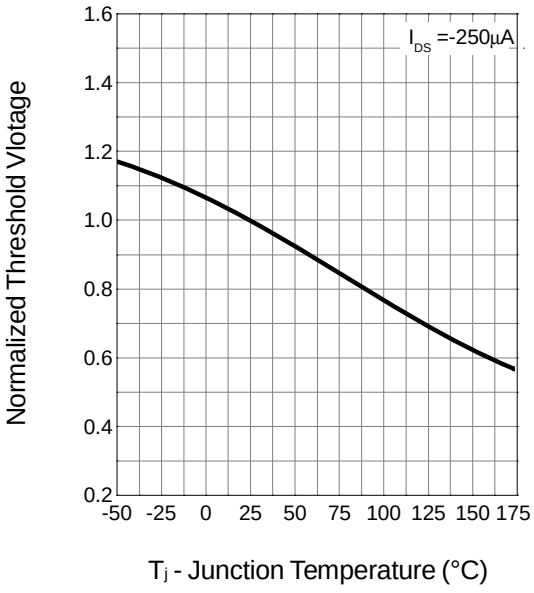
Drain-Source On Resistance



Drain-Source On Resistance

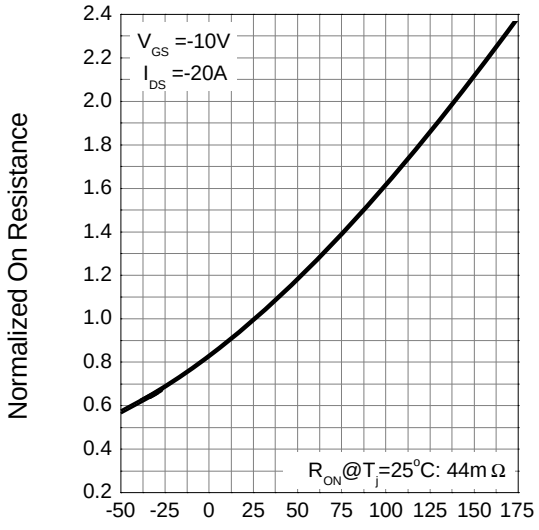


Gate Threshold Voltage

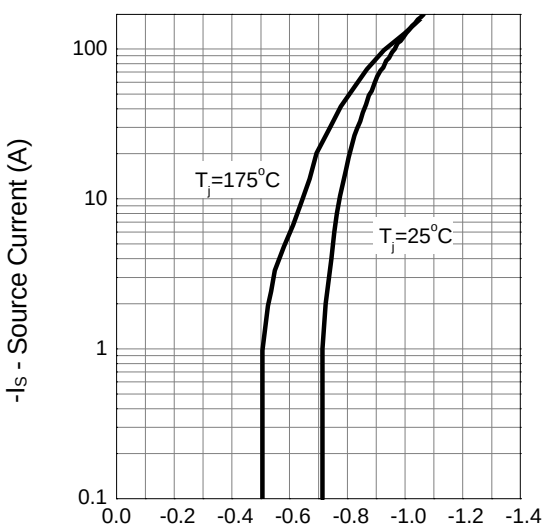


Typical Characteristics

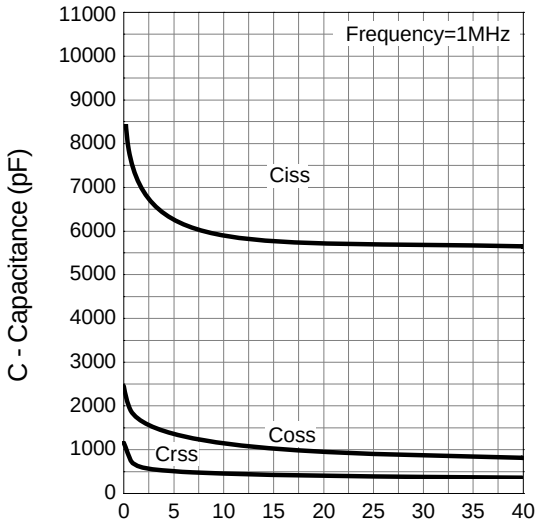
Drain-Source On Resistance



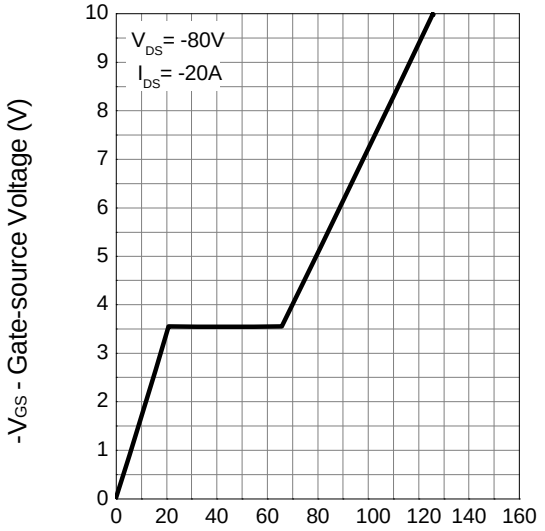
Source-Drain Diode Forward



Capacitance

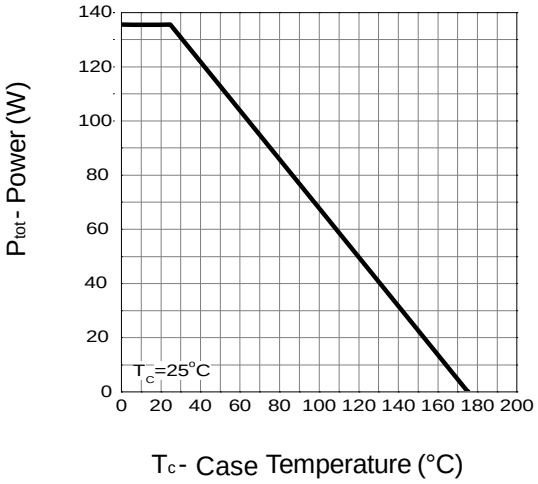


Gate Charge

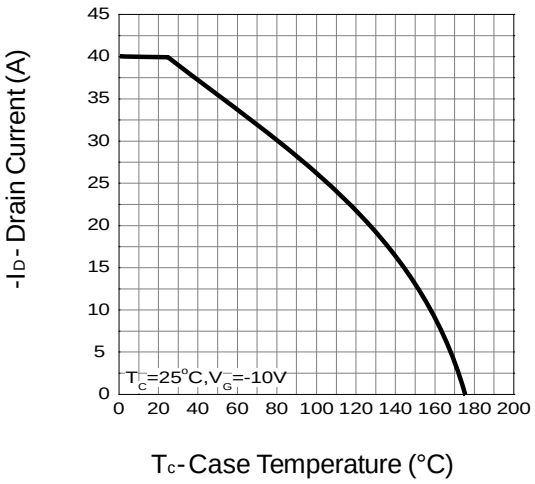


Typical Characteristics

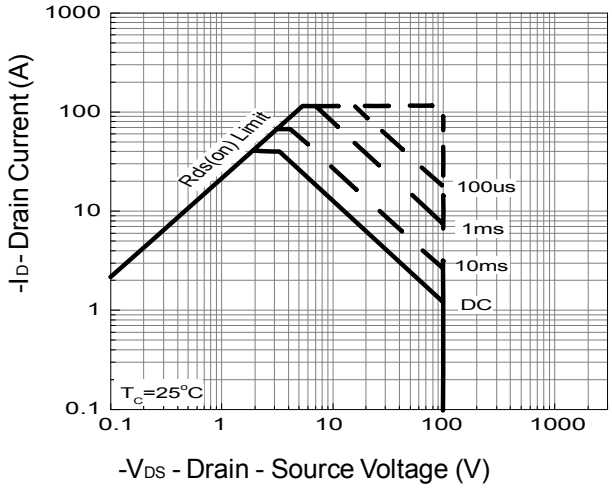
Power Dissipation



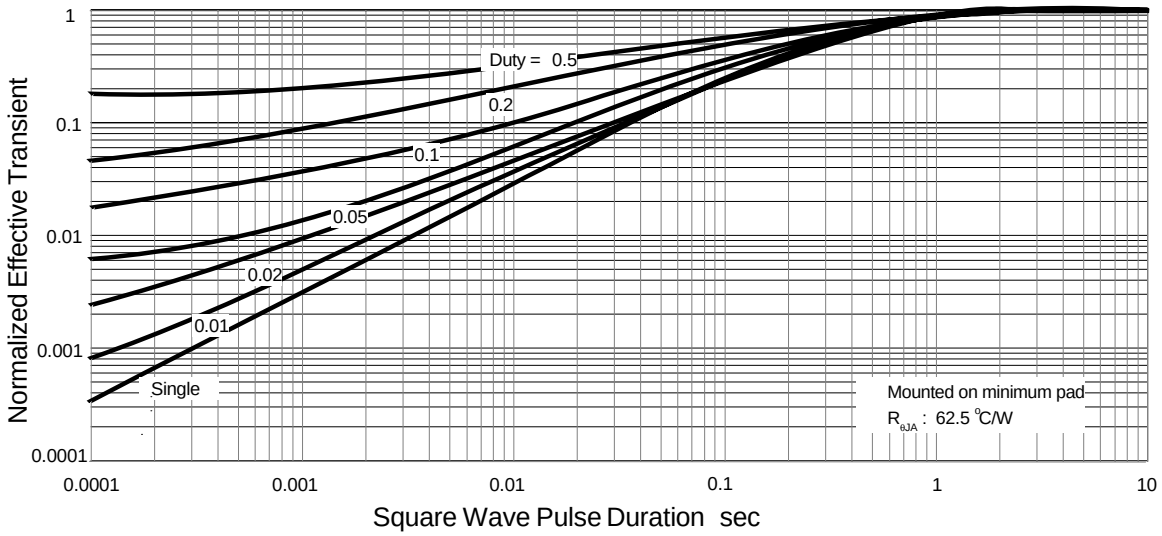
Drain Current



Safe Operation Area

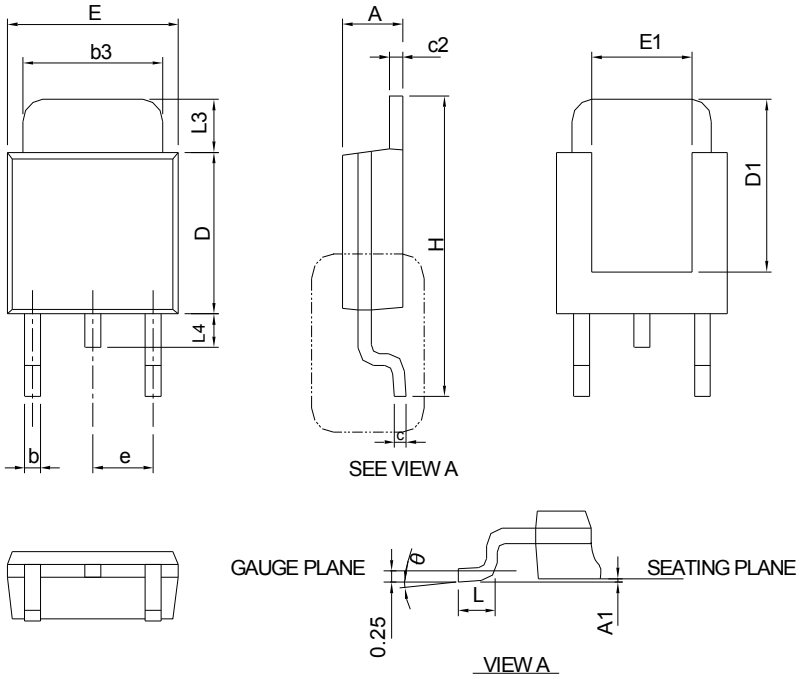


Thermal Transient Impedance



Package Information

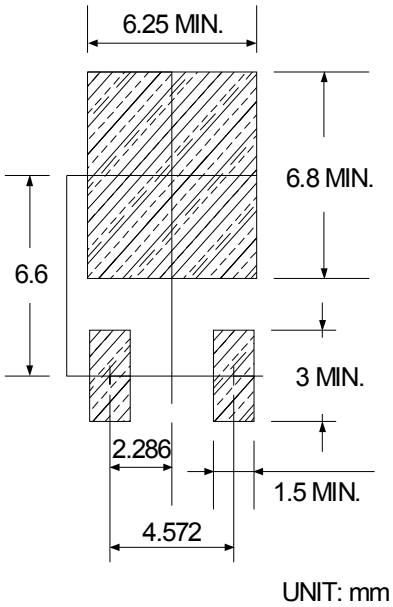
TO-252



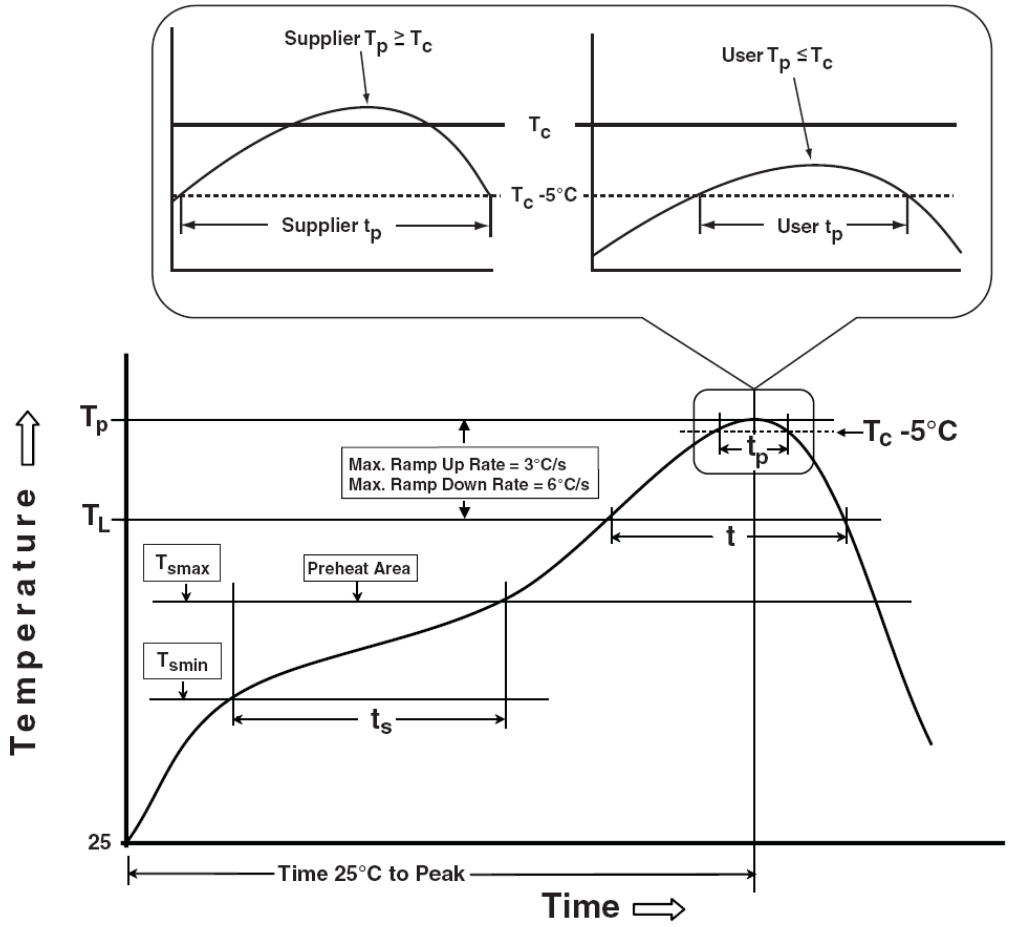
SYMBOL	TO-252			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.39	0.086	0.094
A1	-	0.13	-	0.005
b	0.50	0.89	0.020	0.035
b3	4.95	5.46	0.195	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.89	0.018	0.035
D	5.33	6.22	0.210	0.245
D1	4.57	6.00	0.180	0.236
E	6.35	6.73	0.250	0.265
E1	3.81	6.00	0.150	0.236
e	2.29 BSC		0.090 BSC	
H	9.40	10.41	0.370	0.410
L	0.90	1.78	0.035	0.070
L3	0.89	2.03	0.035	0.080
L4	-	1.02	-	0.040
θ	0°	8°	0°	8°

Note : Follow JEDEC TO-252 .

RECOMMENDED LAND PATTERN



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

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

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