

**Features**

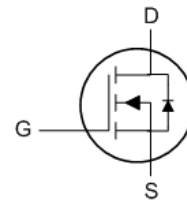
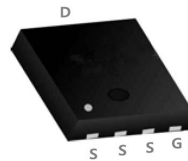
- 100% UIS + R<sub>g</sub> Tested
- Avalanche Rated
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

**Applications**

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.

**Product Summary**

BVDSS	RDSON	ID
25V	3.4mΩ <sub>(max.)</sub>	70A

**DFN3.3x3.3-8-EP Pin Configuration**

**Absolute Maximum Ratings** (T<sub>A</sub> = 25°C Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit	
<b>Common Ratings</b>				
V <sub>DSS</sub>	Drain-Source Voltage	25	V	
V <sub>GSS</sub>	Gate-Source Voltage	±12		
T <sub>J</sub>	Maximum Junction Temperature	150	°C	
T <sub>STG</sub>	Storage Temperature Range	-55 to 150		
I <sub>S</sub>	Diode Continuous Forward Current	T <sub>C</sub> =25°C	70 <sup>a</sup>	A
I <sub>D</sub>	Continuous Drain Current	T <sub>C</sub> =25°C	70 <sup>a</sup>	
		T <sub>C</sub> =100°C	60	
I <sub>DM</sub>	Pulsed Drain Current	T <sub>C</sub> =25°C	200 <sup>b</sup>	
P <sub>D</sub>	Maximum Power Dissipation	T <sub>C</sub> =25°C	62.5	W
		T <sub>C</sub> =100°C	25	
R <sub>θJC</sub>	Thermal Resistance-Junction to Case	Steady State	2	°C/W
I <sub>D</sub>	Continuous Drain Current	T <sub>A</sub> =25°C	20	A
		T <sub>A</sub> =70°C	16	
P <sub>D</sub>	Maximum Power Dissipation	T <sub>A</sub> =25°C	1.78	W
		T <sub>A</sub> =70°C	1.14	
R <sub>θJA</sub>	Thermal Resistance-Junction to Ambient	t ≤ 10s	35	°C/W
		Steady State	70	
I <sub>AS</sub> <sup>c</sup>	Avalanche Current, Single pulse	L=0.1mH	50	A
E <sub>AS</sub> <sup>c</sup>	Avalanche Energy, Single pulse	L=0.1mH	125	mJ

Note a : Package is limited by 50A.

Note b : Pulse width is limited by maximum junction temperature.

Note c : UIS tested and pulse width is limited by maximum junction temperature 150°C (initial temperature T<sub>J</sub> = 25°C).

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

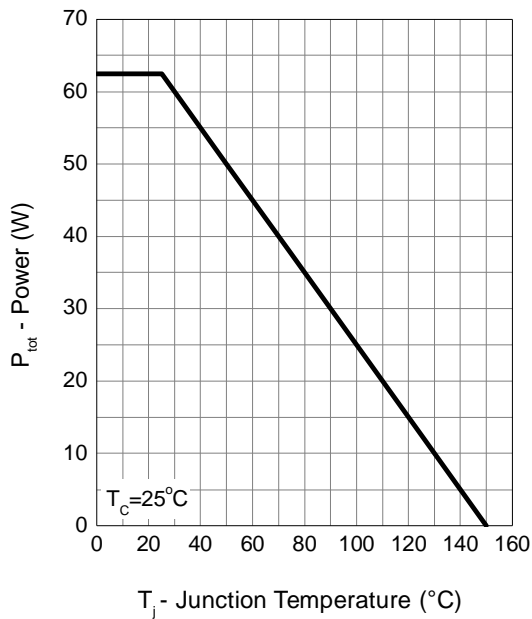
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	25	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=24V, V_{GS}=0V$ $T_J=85^\circ\text{C}$	-	-	1	$\mu A$
			-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	0.5	0.8	1.1	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	$\pm 10$	$\mu A$
$R_{DS(on)}^d$	Drain-Source On-state Resistance	$V_{GS}=4.5V, I_{DS}=20A$ $T_J=125^\circ\text{C}$	-	2.5	3.4	m $\Omega$
			-	3.9	-	
		$V_{GS}=2.5V, I_{DS}=20A$	-	3.0	4.0	
Gfs	Forward Transconductance	$V_{DS}=5V, I_{DS}=20A$	-	74	-	S
<b>Diode Characteristics</b>						
$V_{SD}^d$	Diode Forward Voltage	$I_{SD}=20A, V_{GS}=0V$	-	0.7	1.1	V
$t_{rr}$	Reverse Recovery Time	$I_F=20A, di_{SD}/dt=100A/\mu s$	-	14.8	-	ns
$t_a$	Charge Time		-	7.1	-	
$t_b$	Discharge Time		-	7.7	-	
$Q_{rr}$	Reverse Recovery Charge		-	3.9	-	
<b>Dynamic Characteristics<sup>e</sup></b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	0.85	-	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=15V,$ Frequency=1.0MHz	-	4920	-	pF
$C_{oss}$	Output Capacitance		-	510	-	
$C_{rss}$	Reverse Transfer Capacitance		-	350	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=15V, R_L=15\Omega,$ $I_{DS}=1A, V_{GEN}=10V,$ $R_G=6\Omega$	-	16.6	31	ns
$t_r$	Turn-on Rise Time		-	12.2	23	
$t_{d(OFF)}$	Turn-off Delay Time		-	135	244	
$t_f$	Turn-off Fall Time		-	48	87	
<b>Gate Charge Characteristics<sup>e</sup></b>						
$Q_g$	Total Gate Charge	$V_{DS}=15V, V_{GS}=4.5V,$ $I_{DS}=20A$	-	47	66	nC
$Q_g$	Total Gate Charge	$V_{DS}=15V, V_{GS}=10V,$ $I_{DS}=20A$	-	96	134	
$Q_{gth}$	Threshold Gate Charge		-	2.75	3.8	
$Q_{gs}$	Gate-Source Charge		-	5.5	7.7	
$Q_{gd}$	Gate-Drain Charge		-	16	22	

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

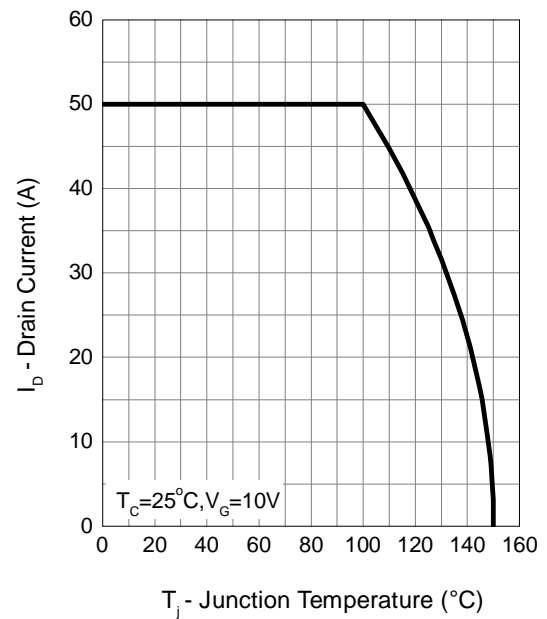
Note e : Guaranteed by design, not subject to production testing.

## Typical Operating Characteristics

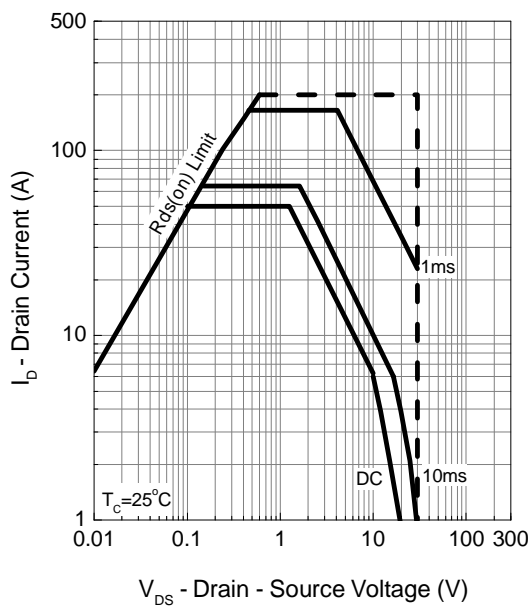
**Power Dissipation**



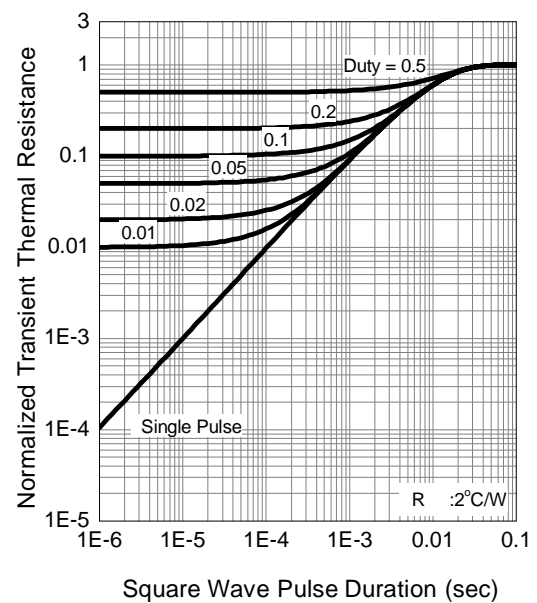
**Drain Current**



**Safe Operation Area**

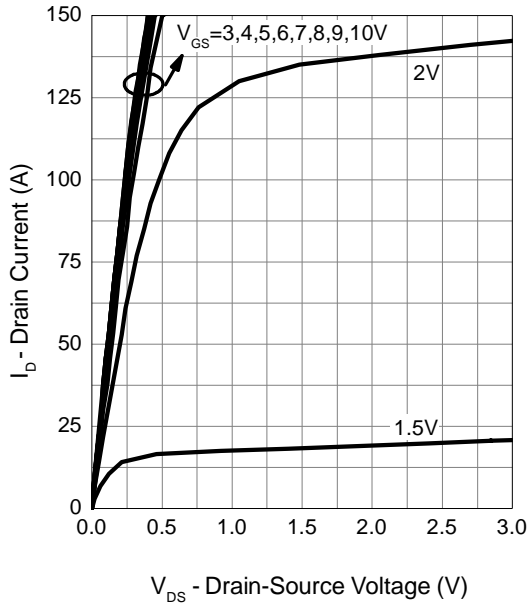


**Thermal Transient Impedance**

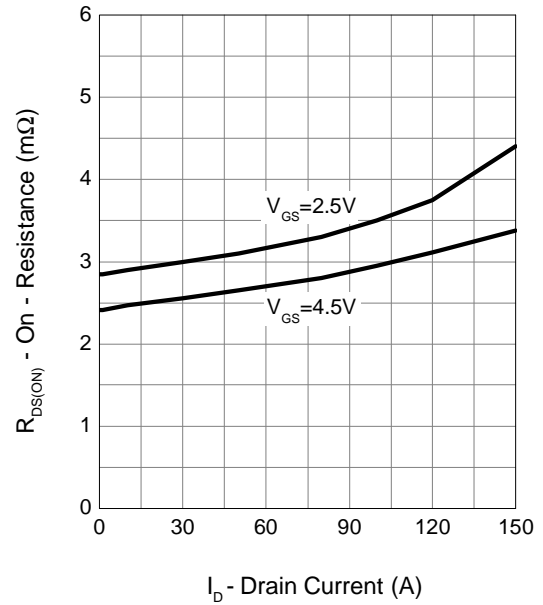


Typical Operating Characteristics (Cont.)

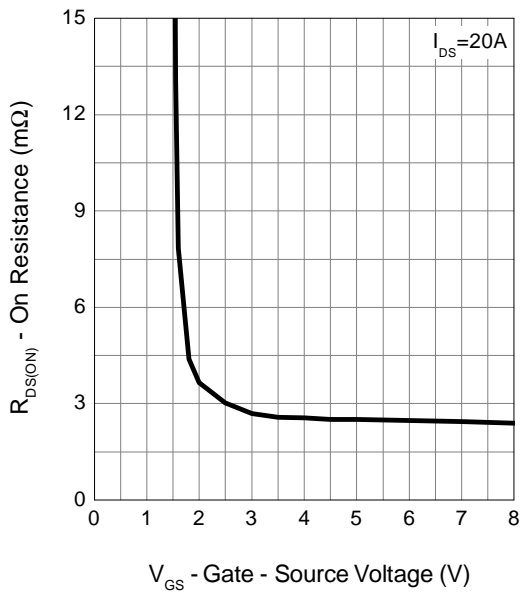
Output Characteristics



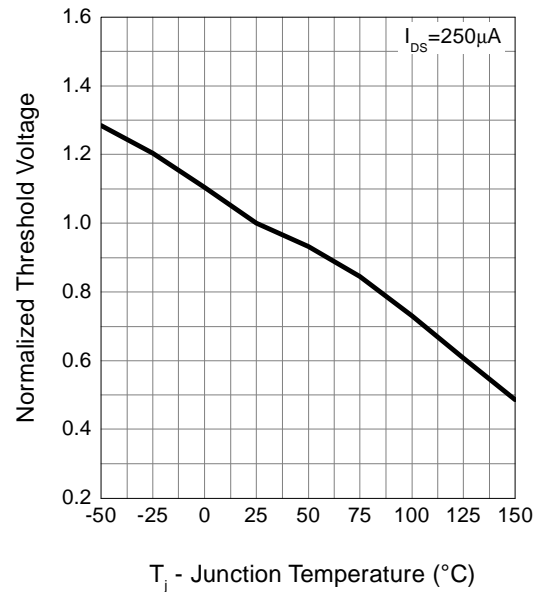
Drain-Source On Resistance



Gate-Source On Resistance

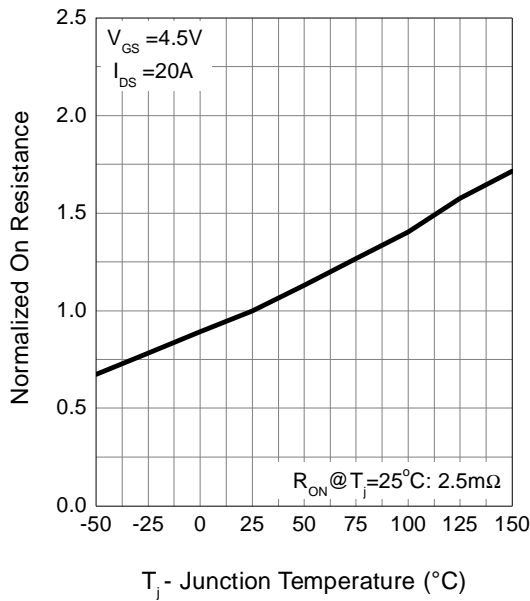


Gate Threshold Voltage

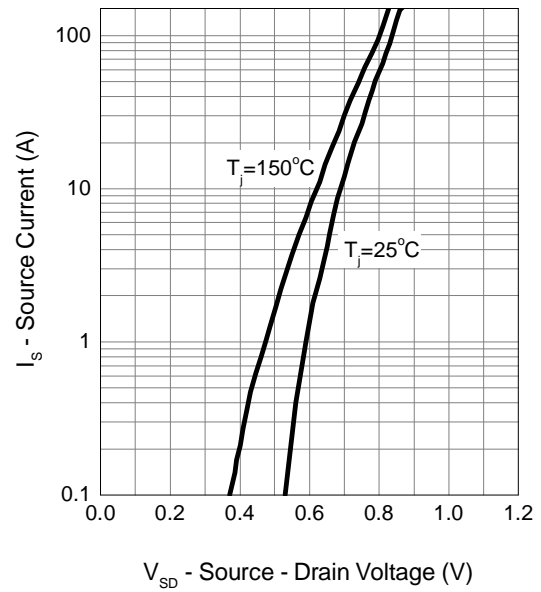


**Typical Operating Characteristics (Cont.)**

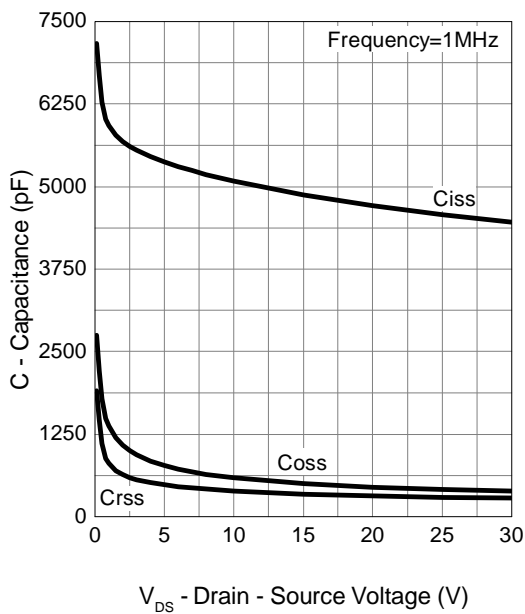
**Drain-Source On Resistance**



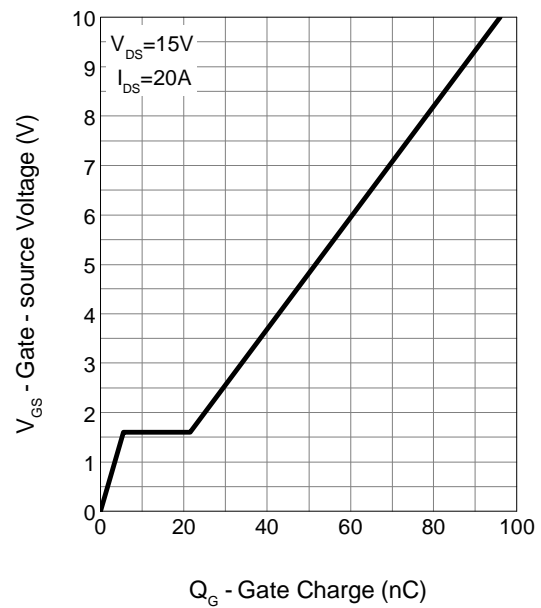
**Source-Drain Diode Forward**



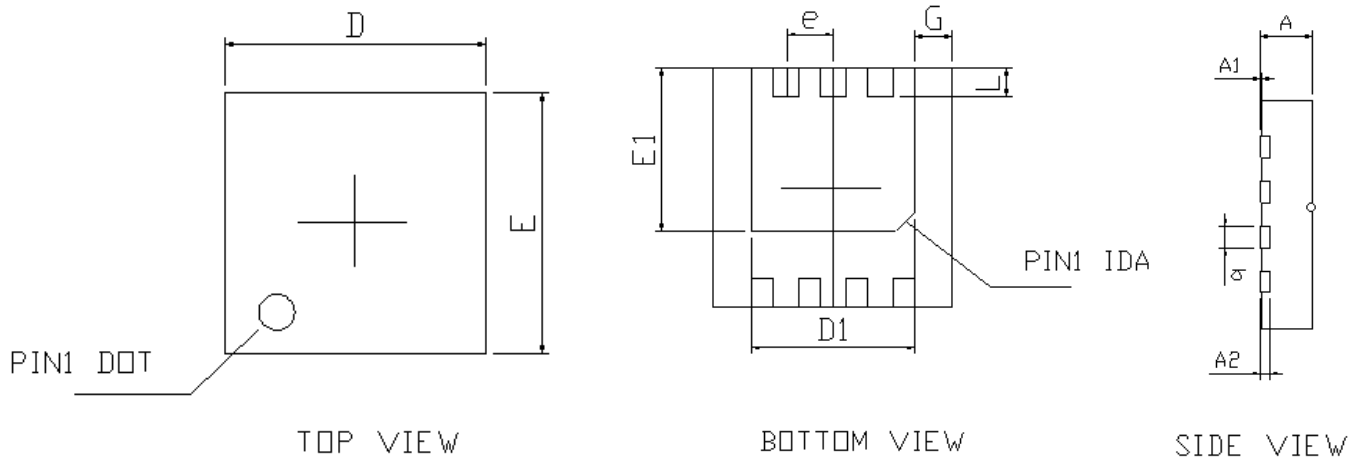
**Capacitance**



**Gate Charge**

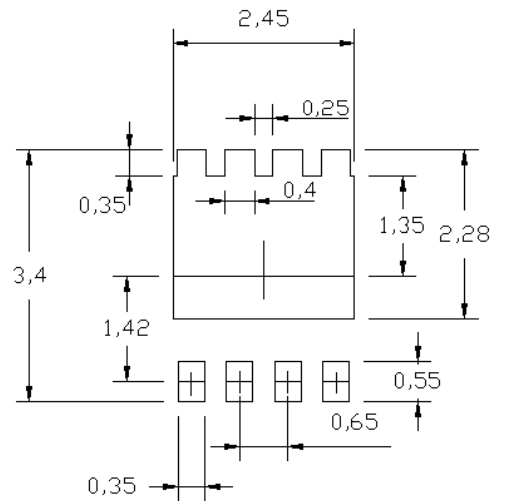


**DFN3.3x3.3B-8\_EP1-S**

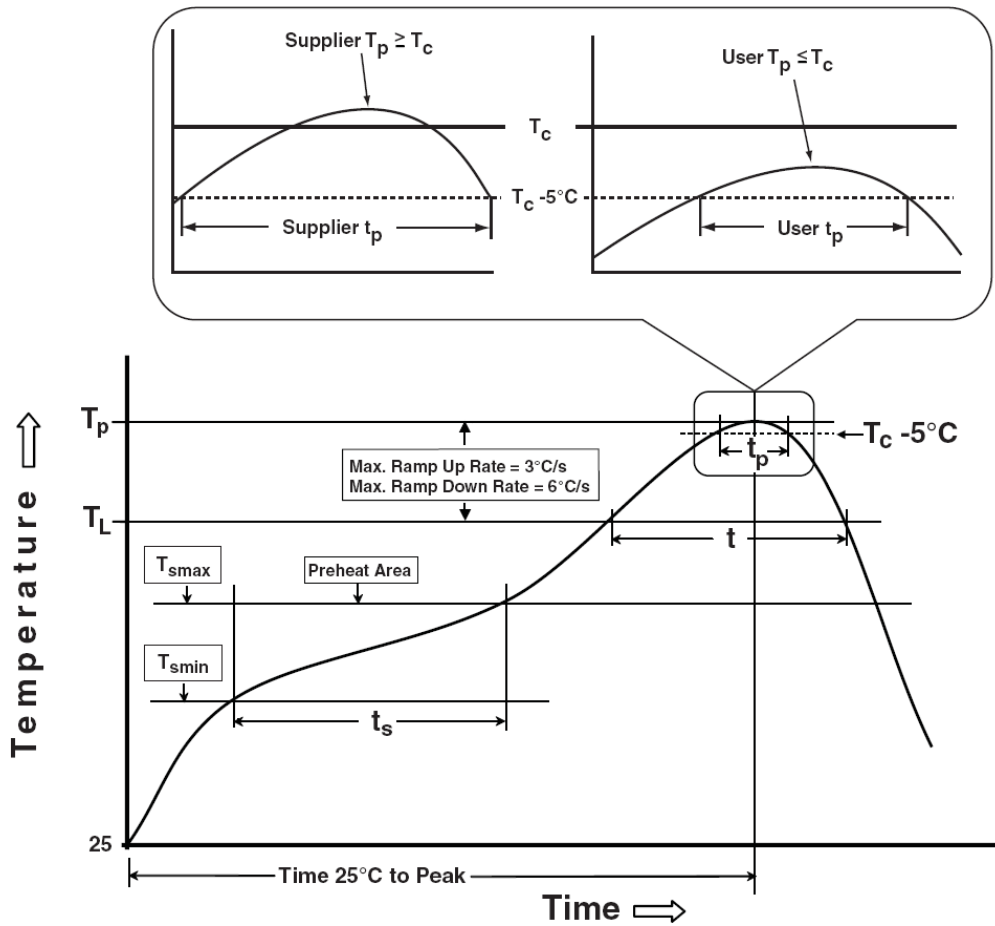


SYMBOLS	DFN3.3x3.3B-8_EP1_S			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.700	0.800	0.028	0.032
A1	0.000	0.050	0.000	0.002
A2	0.100	0.250	0.004	0.010
b	0.240	0.350	0.009	0.014
D	3.150	3.400	0.124	0.134
D1	2.100	2.350	0.083	0.093
E	3.150	3.400	0.124	0.134
E1	2.150	2.350	0.850	0.093
e	0.600	0.700	0.024	0.028
G	0.475	0.575	0.019	0.023
L	0.350	0.450	0.014	0.018

**RECOMMENDED LAND PATTERN**



**Classification Profile**



## Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
<b>Preheat &amp; Soak</b>		
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 <sup>3</sup> <350	Volume mm <sup>3</sup> ≥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 <sup>3</sup> <350	Volume mm <sup>3</sup> 350-2000	Volume mm <sup>3</sup> >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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