

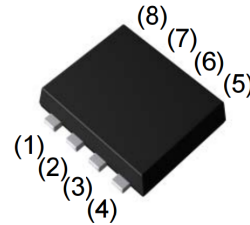
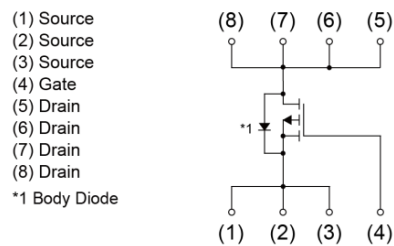
Features

- 30V/-45A,
 - $R_{DS(ON)} = 12m\Omega(\text{max.}) @ V_{GS} = -10V$
 - $R_{DS(ON)} = 17m\Omega(\text{max.}) @ V_{GS} = -6V$
 - $R_{DS(ON)} = 21m\Omega(\text{max.}) @ V_{GS} = -4.5V$
- 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


DFN5X6A-8_EP


Absolute Maximum Ratings $(T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit	
V_{DSS}	Drain-Source Voltage	-30	V	
V_{GSS}	Gate-Source Voltage	± 25		
I_D^a	Continuous Drain Current ($V_{GS} = -10V$)	$T_A = 25^\circ\text{C}$	-15	A
		$T_A = 70^\circ\text{C}$	-12	
I_{DM}^a	300 μs Pulsed Drain Current ($V_{GS} = -10V$)	-60		
I_D^c	Continuous Drain Current ($V_{GS} = -10V$)	$T_C = 25^\circ\text{C}$	-45	
		$T_C = 100^\circ\text{C}$	-26	
I_S^a	Diode Continuous Forward Current	-4		
I_{AS}^b	Avalanche Current, Single pulse ($L = 0.3mH$)	-26		
E_{AS}^b	Avalanche Energy, Single pulse ($L = 0.3mH$)	101	mJ	
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150		
P_D^a	Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	4.2	W
		$T_A = 70^\circ\text{C}$	2.7	
P_D^c	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	31	
		$T_C = 100^\circ\text{C}$	12.5	
$R_{\theta JA}^a$	Thermal Resistance-Junction to Ambient	$t \leq 10s$	30	$^\circ\text{C}/\text{W}$
		Steady State	65	
$R_{\theta JC}^c$	Thermal Resistance-Junction to Case	Steady State	4	

Note a : Surface Mounted on $1in^2$ pad area, $t \leq 10sec$.

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

Note c : The power dissipation P_D is based on $T_{J(MAX)} = 150^\circ\text{C}$, and it is useful for reducing junction-to-case thermal resistance ($R_{\theta JC}$) when additional heat sink is used.

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

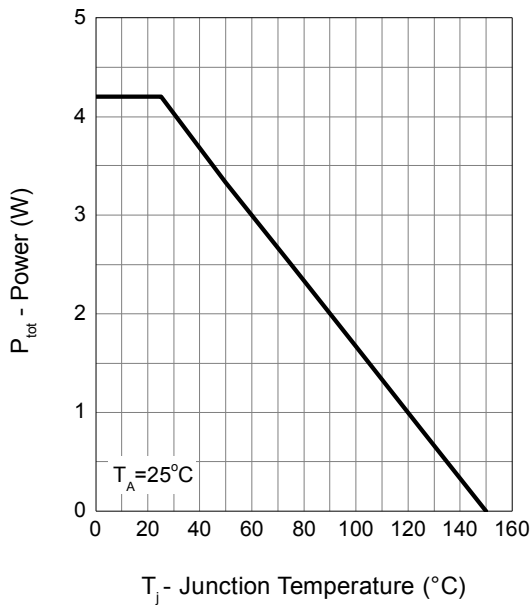
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=-250\mu A$	-30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-24V, V_{GS}=0V$	-	-	-1	μA
		$T_J=85^\circ C$	-	-	-30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-1.5	-2	-2.5	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 25V, V_{DS}=0V$	-	-	± 100	nA
$R_{DS(ON)}^d$	Drain-Source On-state Resistance	$V_{GS}=-10V, I_{DS}=-15A$	-	9.6	12	m Ω
		$V_{GS}=-6V, I_{DS}=-10A$	-	13	17	
		$V_{GS}=-4.5V, I_{DS}=-5A$	-	15	21	
Diode Characteristics						
V_{SD}^d	Diode Forward Voltage	$I_{SD}=-1A, V_{GS}=0V$	-	-0.7	-1	V
t_{rr}^e	Reverse Recovery Time	$I_{SD}=-15A, di_{SD}/dt=100A/\mu s$	-	22	-	ns
Q_{rr}^e	Reverse Recovery Charge		-	15	-	nC
Dynamic Characteristics^e						
R_g	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	-	2	-	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=-15V,$ Frequency=1.0MHz	-	1550	-	pF
C_{oss}	Output Capacitance		-	315	-	
C_{rss}	Reverse Transfer Capacitance		-	245	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=-15V, R_L=15\Omega,$ $I_{DS}=-1A, V_{GEN}=-10V,$ $R_G=6\Omega$	-	13	-	ns
t_r	Turn-on Rise Time		-	15	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	50	-	
t_f	Turn-off Fall Time		-	29	-	
Gate Charge Characteristics^e						
Q_g	Total Gate Charge	$V_{DS}=-15V, V_{GS}=-10V,$ $I_{DS}=-15A$	-	31	-	nC
Q_{gs}	Gate-Source Charge		-	4.3	-	
Q_{gd}	Gate-Drain Charge		-	10	-	

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

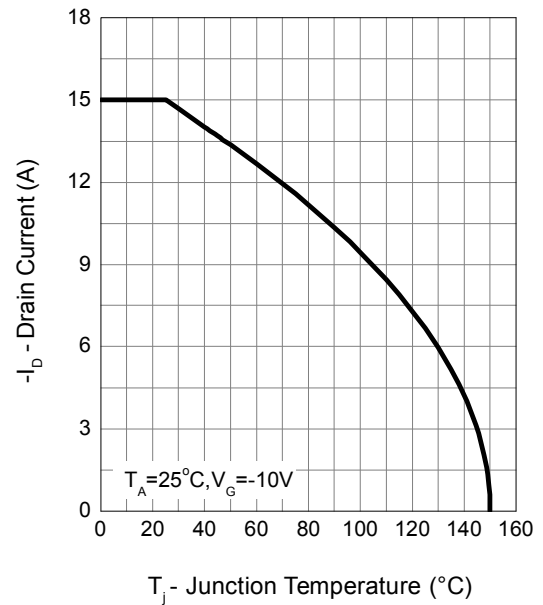
Note e : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

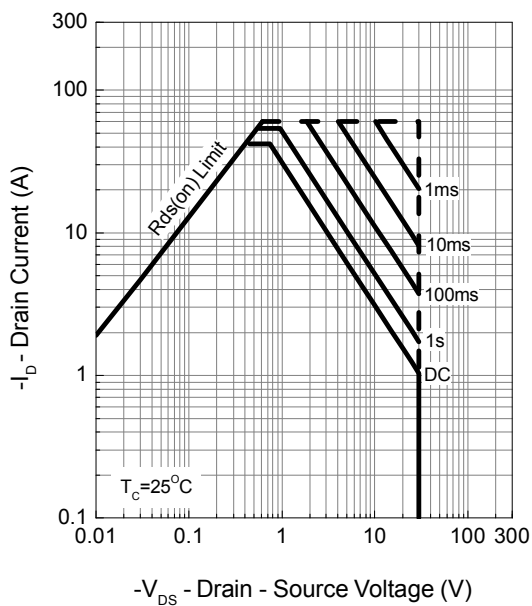
Power Dissipation



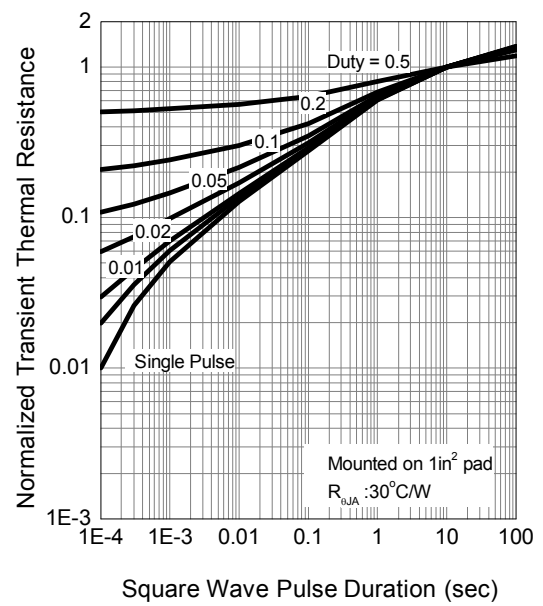
Drain Current



Safe Operation Area

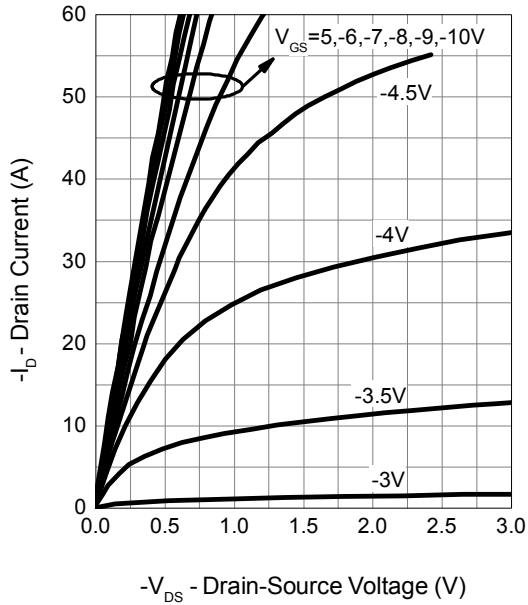


Thermal Transient Impedance

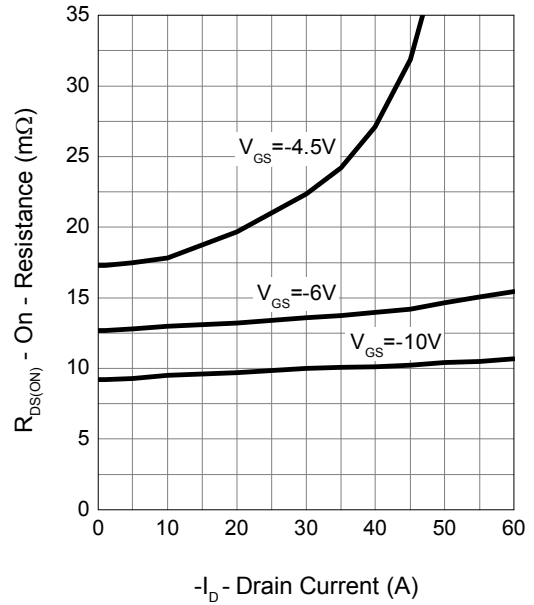


Typical Operating Characteristics (Cont.)

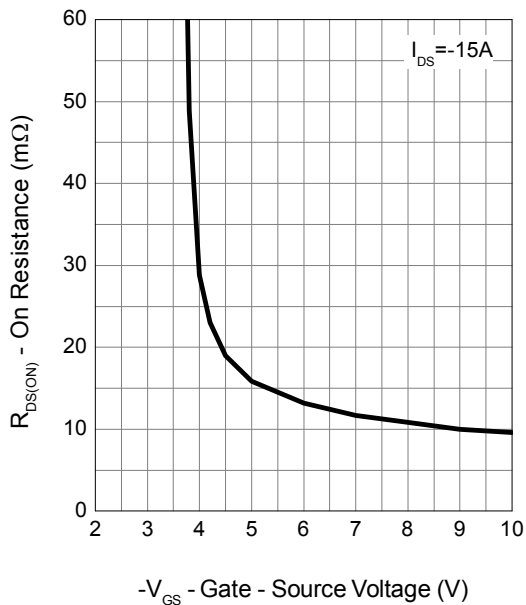
Output Characteristics



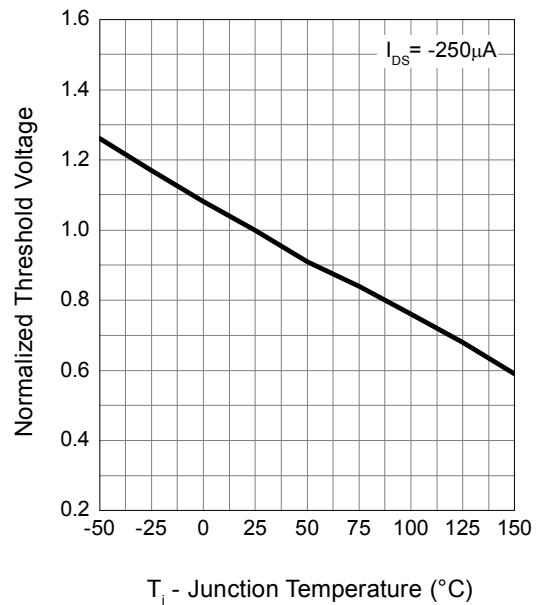
Drain-Source On Resistance



Gate-Source On Resistance

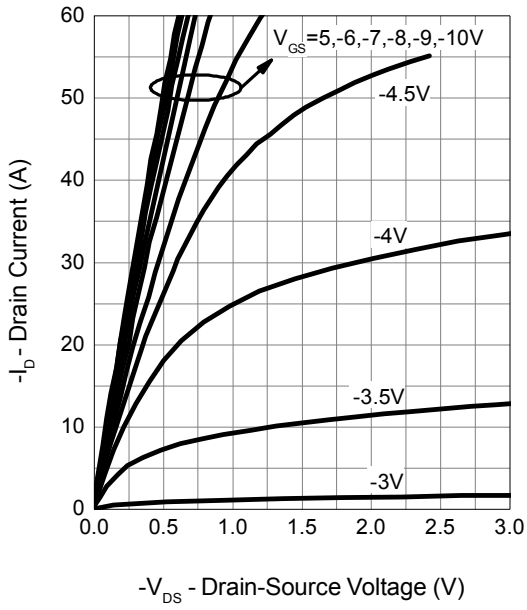


Gate Threshold Voltage

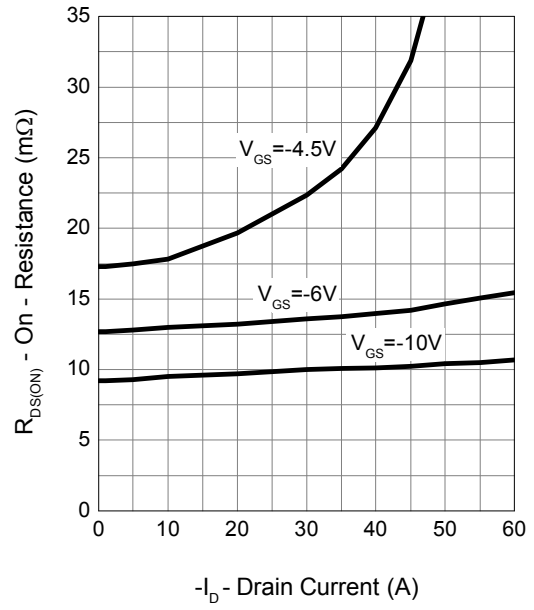


Typical Operating Characteristics (Cont.)

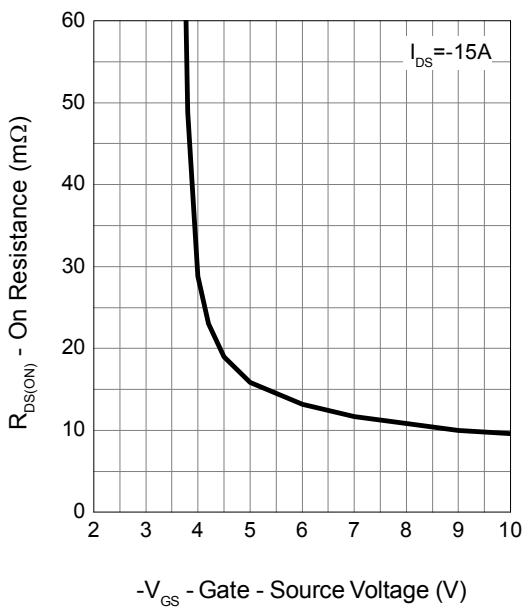
Output Characteristics



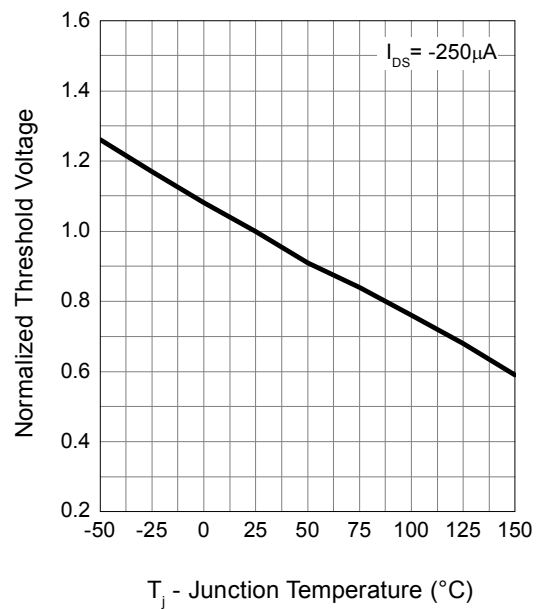
Drain-Source On Resistance



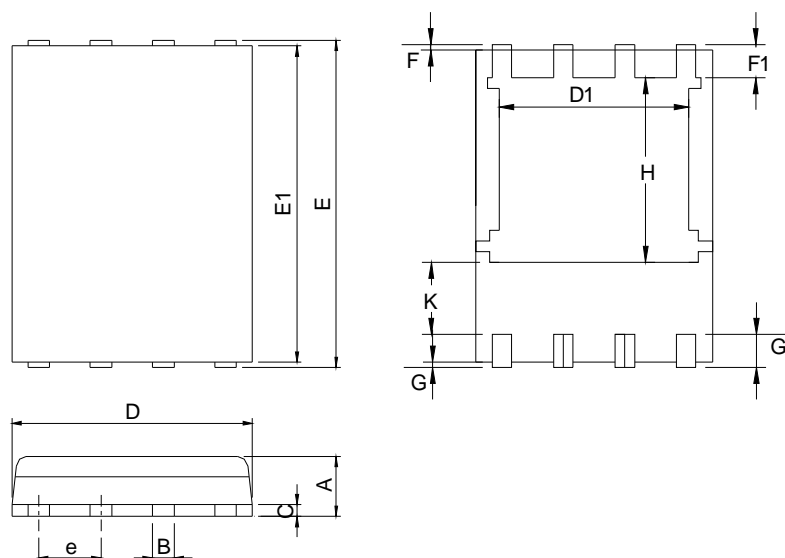
Gate-Source On Resistance



Gate Threshold Voltage

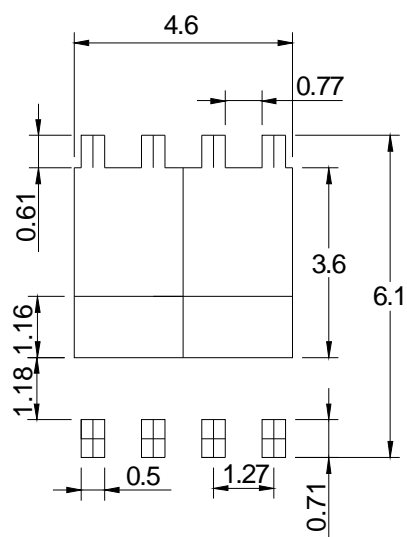


Package Information



SYMBOL	DFN5x6A-8_EP			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.90	1.20	0.035	0.047
B	0.3	0.51	0.012	0.020
C	0.19	0.25	0.007	0.010
D	4.80	5.30	0.189	0.209
D1	4.00	4.40	0.157	0.173
E	5.90	6.20	0.232	0.244
E1	5.50	5.80	0.217	0.228
e	1.27 BSC		0.050 BSC	
F	0.05	0.30	0.002	0.012
F1	0.35	0.75	0.014	0.030
G	0.05	0.30	0.002	0.012
G1	0.35	0.75	0.014	0.030
H	3.34	3.9	0.131	0.154
K	0.762	-	0.03	-

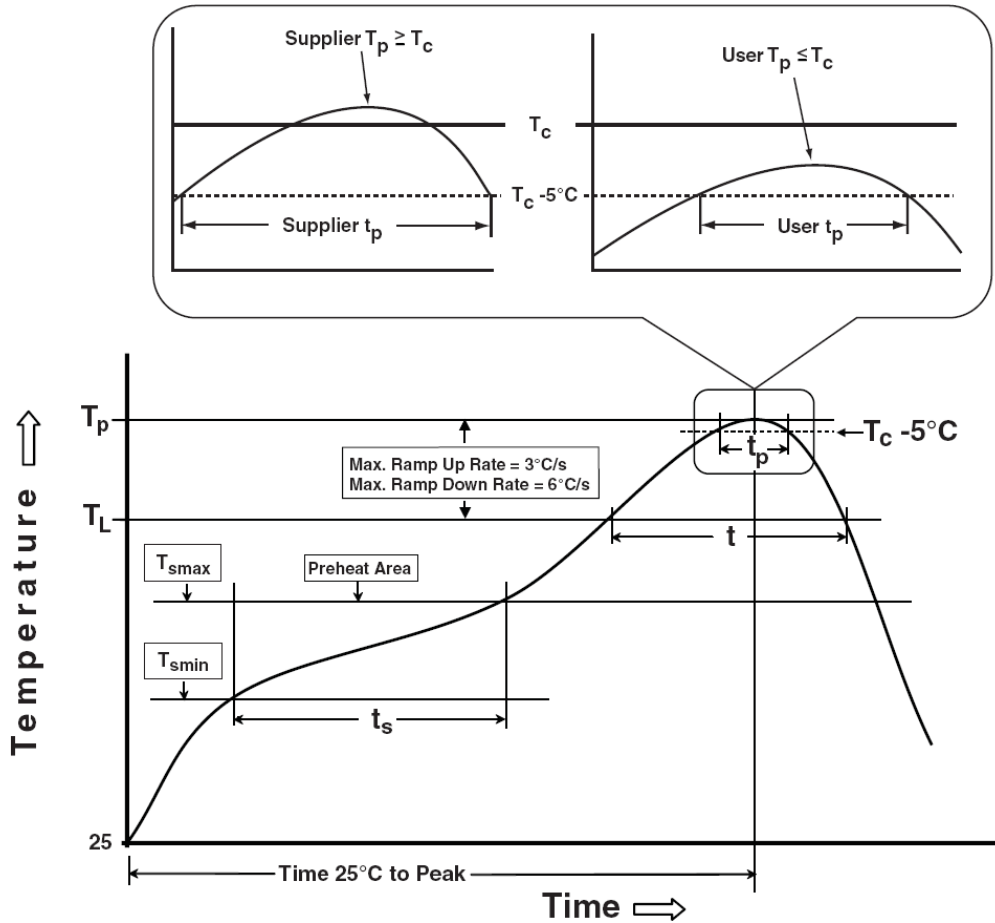
RECOMMENDED LAND PATTERN



UNIT: mm

Note : 1.Dimension D, D1,D2 and E1 do not include mold flash or protrusions.
Mold flash or protrusions shall not exceed 10 mil.

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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