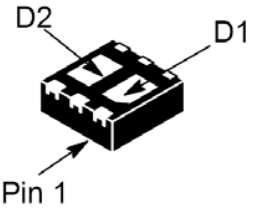
WPMD2008

Dual P-Channel, -20 V, -4.1A, Power MOSFET

Http://www.willsemi.com

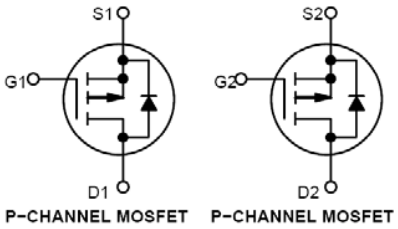


Description

The WPMD2008 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in DC-DC conversion applications. Standard Product WPMD2008 is Pb-free.

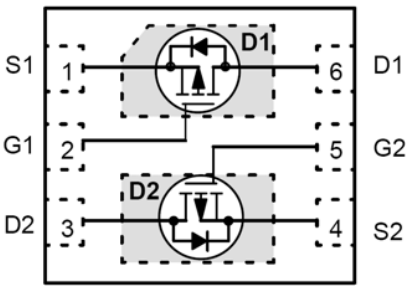
Features

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX
−20 V	110mΩ @ −4.5V
	138mΩ @ −2.5V



- Lowest RDS(on) Solution in 2x2 mm Package
- 1.8 V RDS(on) Rating for Operation at Low Voltage Gate Drive Logic Level
- Low Profile (< 0.8 mm) for Easy Fit in Thin Environments
- Bidirectional Current Flow with Common Source Configuration
- DFN6 Package Provides Exposed Drain Pad for Excellent Thermal Conduction

PIN CONNECTIONS



Application

- Optimized for Battery and Load Management Applications in Portable Equipment
- Li−Ion Battery Charging and Protection Circuits
- High Power Management in Portable, Battery Powered Products
- High Side Load Switch

MARKING DIAGRAM

E = Specific Device Code
YWW = Date Code

Order information

Part Number	Part Number	Shipping
WPMD2008-6/TR	DFN 6	3000Tape&Reel

Absolute Maximum Ratings (T_A=25°C unless otherwise specified)

Parameter	Symbol			Value	Units
V_{DS}	Drain-Source voltage			-20	V
V_{GS}	Gate-Source Voltage			±8	V
I_D	Continuous Drain Current[A]	Steady-State	T_A=25℃	-3	A
		Steady-State	T_A=85℃	-2.3	
		t ≤ 5s	T_A=25℃	-4.1	
P_D	Steady-State		T_A=25℃	1.45	W
	t ≤ 5 s			2.3	
I_D	Continuous Drain Current[B]	Steady-State	T_A=25℃	-2.0	A
			T_A=85℃	-1.5	
P_D	Power Dissipation [B]		T_A=25℃	0.7	W
I_{DM}	Pulse Drain Current [B]		tp=10us	-20	A
T_J	Operating Junction Temperature Range			-55~150	℃
Tstg	Storage Temperature Range				

A: Surface Mounted on FR4 Board using 1 in sq pad size, 2 oz Cu.
B: Surface Mounted on FR4 Board using the minimum pad size, 2oz Cu.

Thermal Resistance Ratings

Parameter	Symbol	Max	Unit
Junction to Ambient-Steady State[C]	$R_{\theta JA}$	86	℃/W
Junction to Ambient - t≤5[C]	$R_{\theta JA}$	54	℃/W
Junction to Ambient-Steady State Min Pad[D]	$R_{\theta JA}$	175	℃/W

C: Surface Mounted on FR4 Board using 1 in sq pad size, 2 oz Cu.
D: Surface Mounted on FR4 Board using the minimum pad size, 2oz Cu.

Electrical Characteristics

MOSFET ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = −250 uA		−20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = −16 V, V_{GS} = 0 V	T_J = 25°C			−1	uA
			T_J = 85°C			−10	
Gate−to−source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±8.0 V				±100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = −250 uA		−0.4	−0.6	−1	V
Drain−to−source On−resistance	$R_{DS(on)}$	V_{GS} = −4.5V, I_D = −2.0A			90	110	mΩ
		V_{GS} = −2.5, I_D = −2.0A			115	138	
Forward Transconductance	g_{FS}	V_{DS} = −10 V, I_D = −2.7A			7.0		S
CHARGES, CAPACITANCES AND GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = −15 V			480		pF
Output Capacitance	C_{OSS}				46		
Reverse Transfer Capacitance	C_{RSS}				10		
Total Gate Charge	$Q_{G(TOT)}$	VG_S = −4.5 V, V_{DS} = −6 V, I_D = −2.8 A			7.2		nC
Threshold Gate Charge	$Q_{G(TH)}$				2.2		
Gate−to−Source Charge	Q_{GS}				2.2		
Gate−to−Drain Charge	Q_{GD}				1.2		
Gate Resistance	R_G				8.8		Ω
SWITCHING CHARACTERISTICS							
Turn−On Delay Time	td(ON)	V_{GS} = −4.5 V, V_{Ds} = −6.0 V, I_D=-2.8A, R_G=6 Ω			38		ns
Rise Time	tr				25		
Turn−Off Delay Time	td(OFF)				43		
Fall Time	tf				5		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Recovery Voltage	V_{SD}	V_{GS} = 0 V, I_S = −1.0 A	T_J = 25°C		−0.7		V

Typical Performance Characteristics

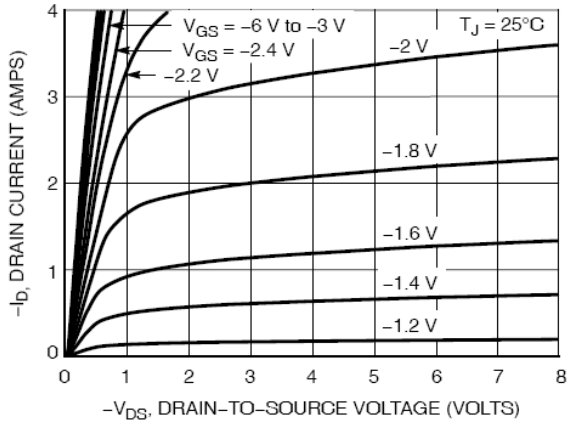


Figure 1. On−Region Characteristics

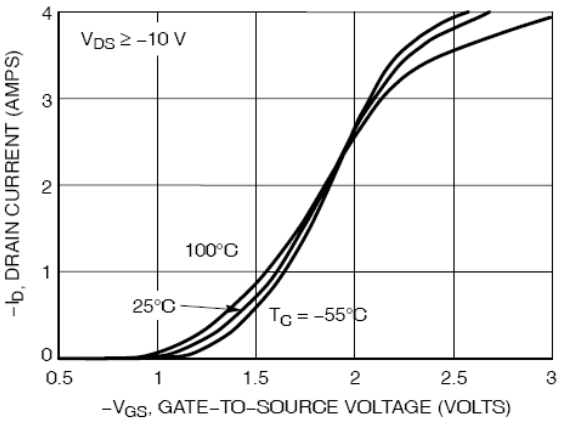


Figure 2. Transfer Characteristics

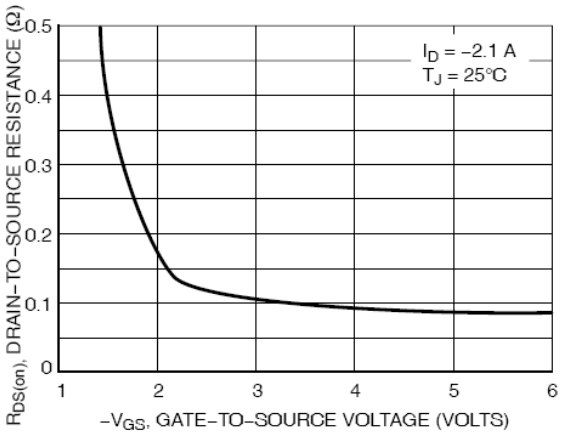


Figure 3. On−Resistance vs. Gate−to−Source Voltage

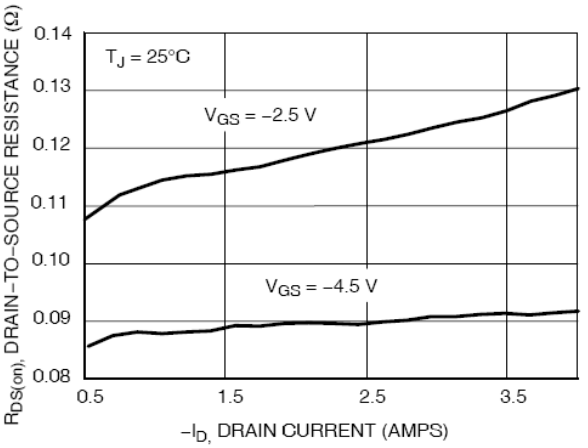


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

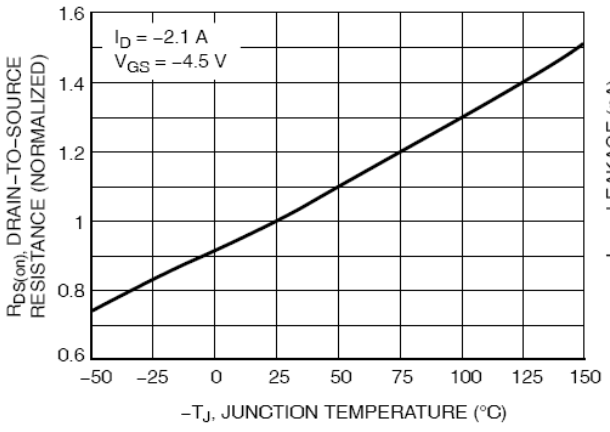


Figure 5. On−Resistance Variation with Temperature

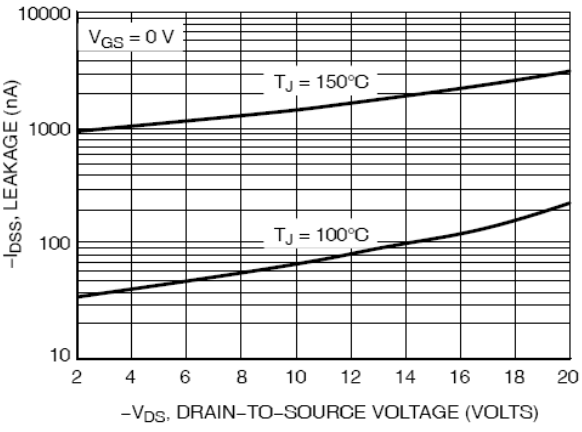


Figure 6. Drain−to−Source Leakage Current vs. Voltage

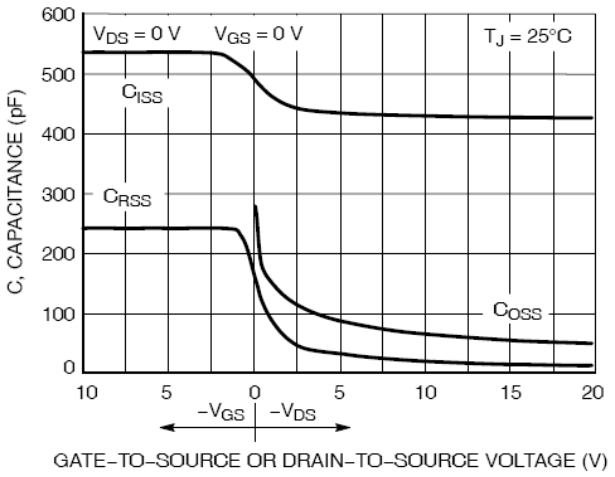


Figure 7. Capacitance Variation

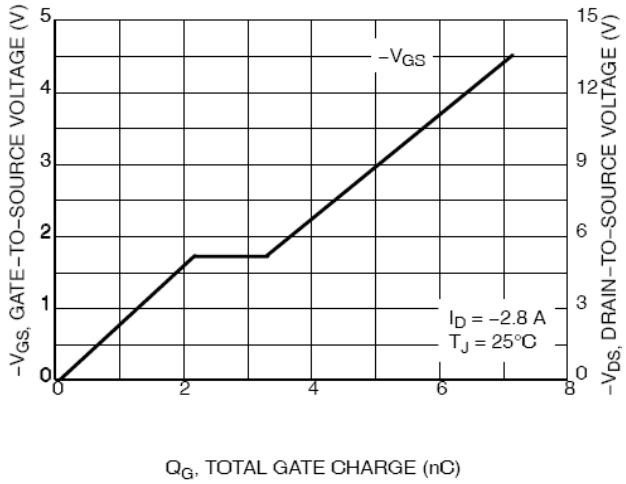


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

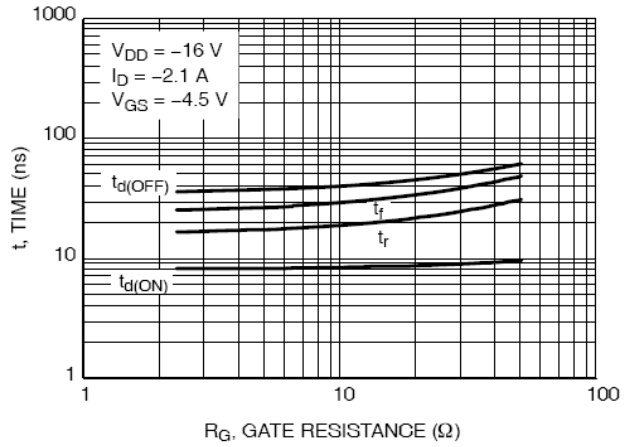


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

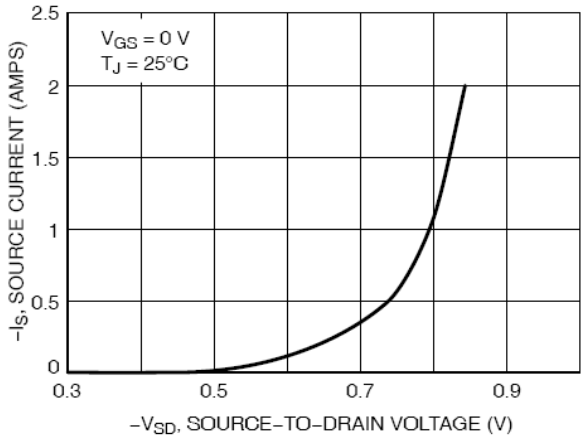


Figure 10. Diode Forward Voltage vs. Current

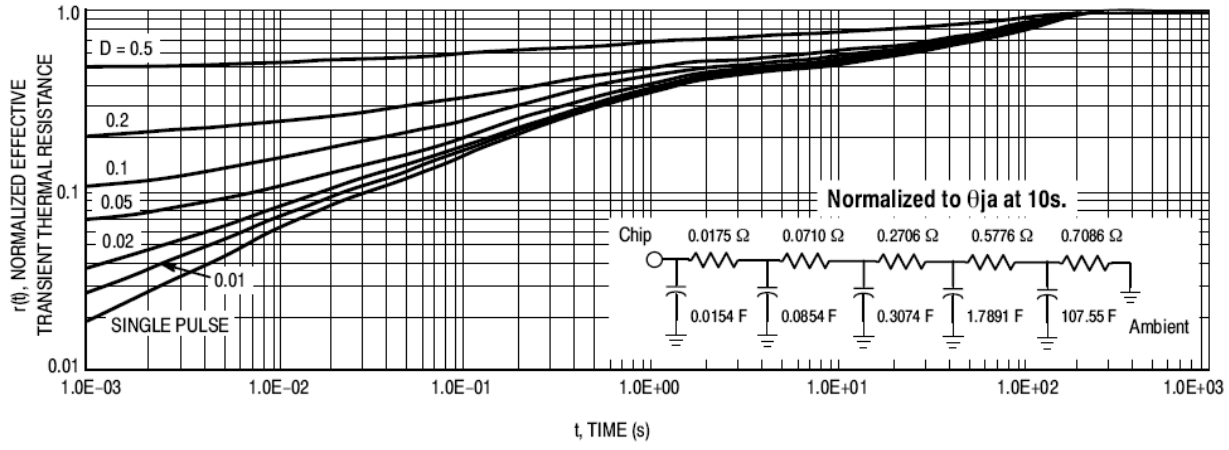
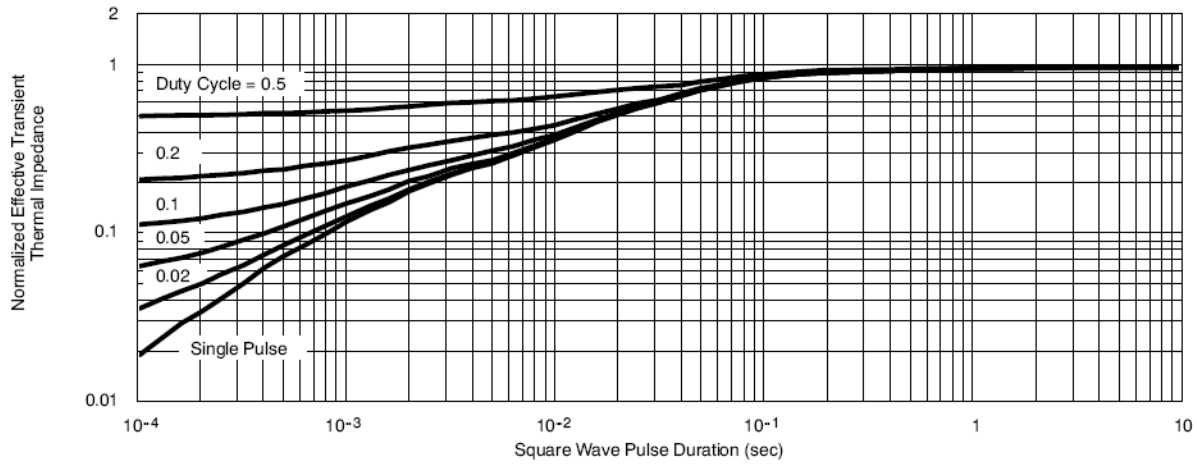
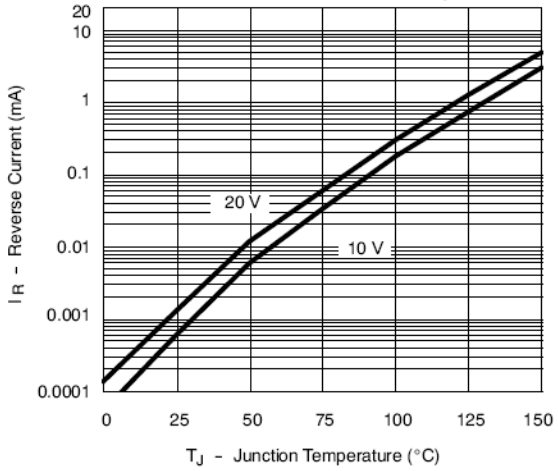


Figure 11. Thermal Response

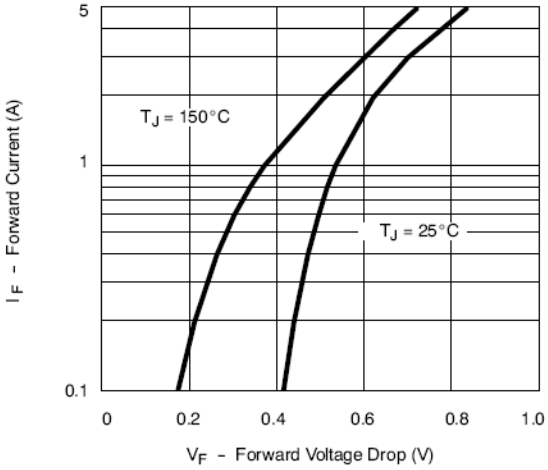
Normalized Thermal Transient Impedance, Junction-to-Foot



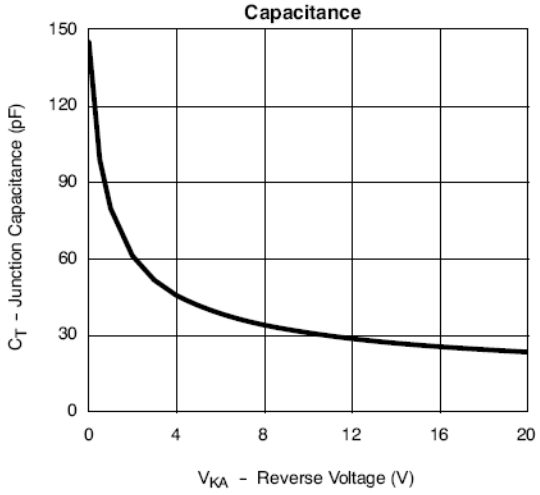
Reverse Current vs. Junction Temperature



Forward Voltage Drop



Capacitance

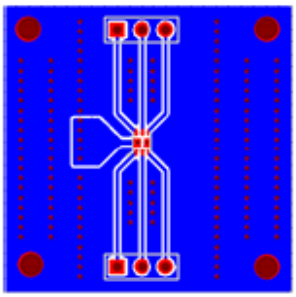


Power Dissipation Characteristics

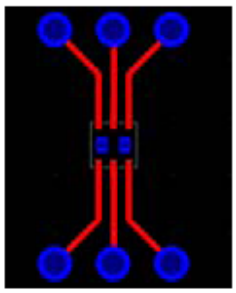
1. The package of WPMD2008 is DFN2x2-6L, surface mounted on FR4 Board using 1 in sq pad size，2 oz Cu，R θJA is 84 ℃/W, surface mounted on FR4 Board using minimum pad size，2 oz Cu， R θJA is 175℃ /W.

2. The power dissipation PD is based on TJ(MAX)=150°C, and the relation between TJ and Pd is TJ = Ta + R θJA* PD , the maximum power dissipation is determined by R θJA .

3. The R θJA is the thermal impedance from junction to ambient, using larger PCB pad size can get smaller R θJA and result in larger maximum power dissipation.



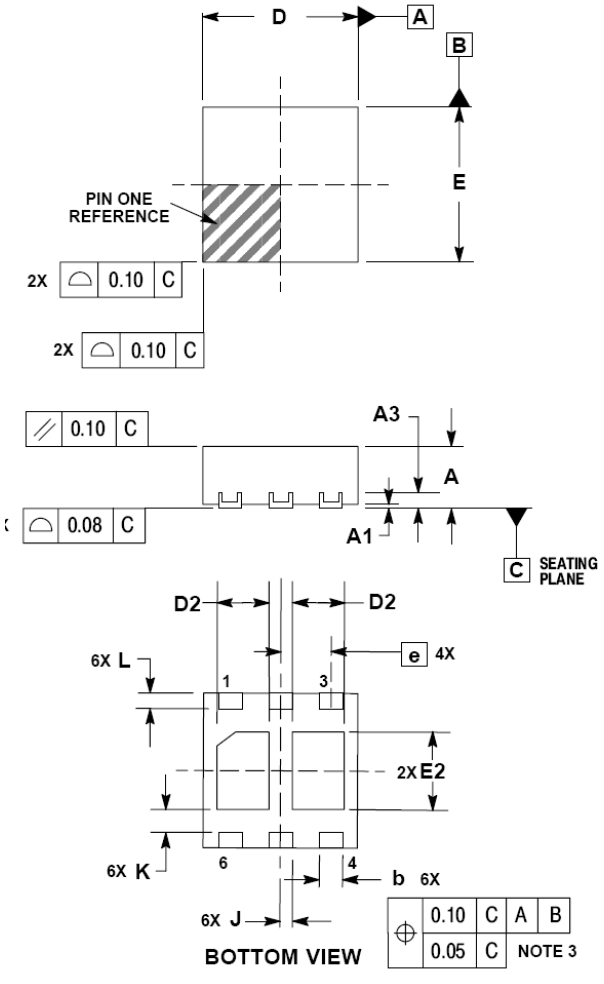
84 ℃/W when mounted on a 1 in^2 pad of 2 oz copper



175 ℃/W when mounted on a minimum pad of 2 oz copper

Packaging Information

DFN 6 Package Outline Dimension

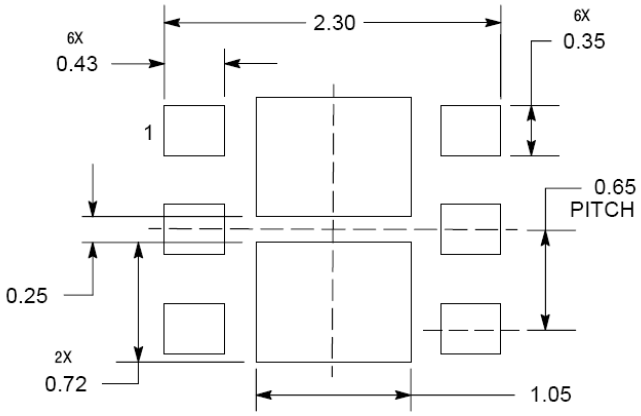


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.70	0.80
A1	0.00	0.05
A3	0.20 REF	
b	0.25	0.35
D	2.00 BSC	
D2	0.57	0.77
E	2.00 BSC	
E2	0.90	1.10
e	0.65 BSC	
K	0.25 REF	
L	0.20	0.30
J	0.15 REF	

STYLE 1:
PIN 1. SOURCE1
2. GATE1
3. DRAIN2
4. SOURCE2
5. GATE2
6. DRAIN1

SOLDERMASK DEFINED MOUNTING FOOTPRINT*



DIMENSIONS: MILLIMETERS