N-Channel 30 V (D-S) Super Junction Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
30	0.0094 at V_{GS} = 10 V	13.7
	0.0107 at V_{GS} = 4.5 V	

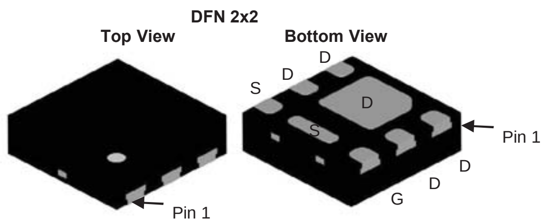
FEATURES

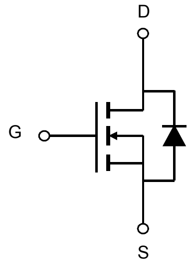
- DT-Trench Power MOSFET
- Ultra Small DFN2X2 Chipscale Packaging Reduces Footprint Area

Pb-free
RoHS COMPLIANT

APPLICATIONS

- DC/DC Converters in Computing,Servers,and POL
- Isolated DC/DC Converters in Telecom and Industrial





ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	13.7[a]	A
	T_C = 70 °C		11[a]	
	T_A = 25 °C		10[a, b, c]	
	T_A = 70 °C		5[b, c]	
Pulsed Drain Current		I_{DM}	55	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	10[a]	
	T_A = 25 °C		4.5[b, c]	
Maximum Power Dissipation	T_C = 25 °C	P_D	16	W
	T_C = 70 °C		10	
	T_A = 25 °C		2.5[b, c]	
	T_A = 70 °C		0.7[b, c]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature)[d, e]			260	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[b, f]	t ≤ 5 s	R_{thJA}	35	50	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	5.8	8.1	

Notes:

a. Package limited
b. Surface mounted on 1" x 1" FR4 board.
c. t = 5 s.
d. The DFN2X2 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
e. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
f. Maximum under steady state conditions is 80 °C/W.

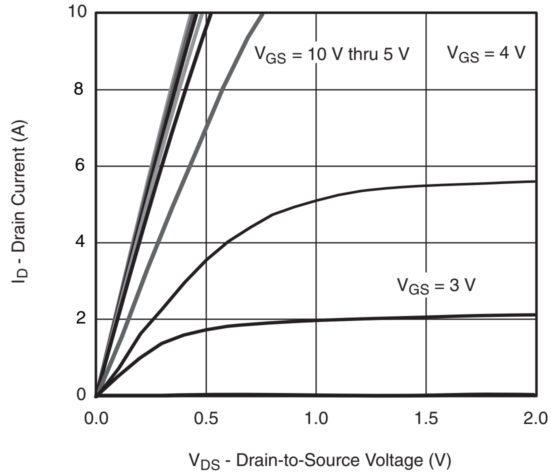
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		24		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 5.6		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS} , I_D = 250 µA	0.5		1.5	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 12 V			± 5	µA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 24 V, V_{GS} = 0 V			1	µA
		V_{DS} = 24 V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 4.5 V	25			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10V, I_D = 10 A		0.0094	0.013	Ω
		V_{GS} = 4.5 V, I_D = 5 A		0.0107	0.015	
Forward Transconductance[a]	g_{fs}	V_{DS} = 24 V, I_D = 7 A		35		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 24 V, V_{GS} = 0 V, f = 1 MHz		1010		pF
Output Capacitance	C_{oss}			320		
Reverse Transfer Capacitance	C_{rss}			90		
Total Gate Charge	Q_g	V_{DS} = 24 V, V_{GS} = 10 V, I_D = 10 A		9	18	nC
		V_{DS} = 24 V, V_{GS} = 4.5 V, I_D = 5 A		5	10	
Gate-Source Charge	Q_{gs}			2		
Gate-Drain Charge	Q_{gd}			1.7		
Gate Resistance	R_g	f = 1 MHz		2.9		Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 24 V, R_L = 1 Ω I_D ≅ 10 A, V_{GEN} = 10 V, R_g = 1 Ω		16		ns
Rise Time	t_r			10		
Turn-Off Delay Time	$t_{d(off)}$			15		
Fall Time	t_f			10		
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 24 V, R_L = 1 Ω I_D ≅ 5 A, V_{GEN} = 4.5 V, R_g = 1 Ω		10		
Rise Time	t_r			8		
Turn-Off Delay Time	$t_{d(off)}$			17		
Fall Time	t_f			8		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			10	A
Pulse Diode Forward Current	I_{SM}				40	
Body Diode Voltage	V_{SD}	I_S = 5 A, V_{GS} = 0 V		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 10 A, dI/dt = 100 A/µs, T_J = 25 °C		18	30	ns
Body Diode Reverse Recovery Charge	Q_{rr}			7	15	nC
Reverse Recovery Fall Time	t_a			8		ns
Reverse Recovery Rise Time	t_b			10		

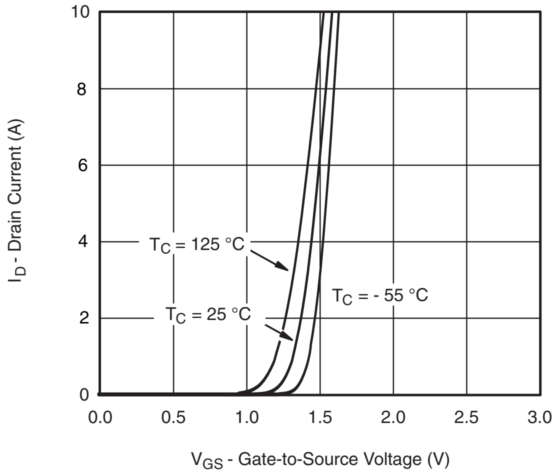
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

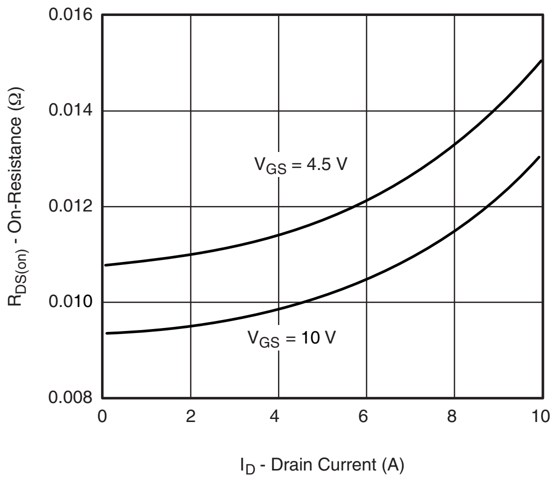
TYPICAL CHARACTERISTIC (25 °C, unless otherwise noted)



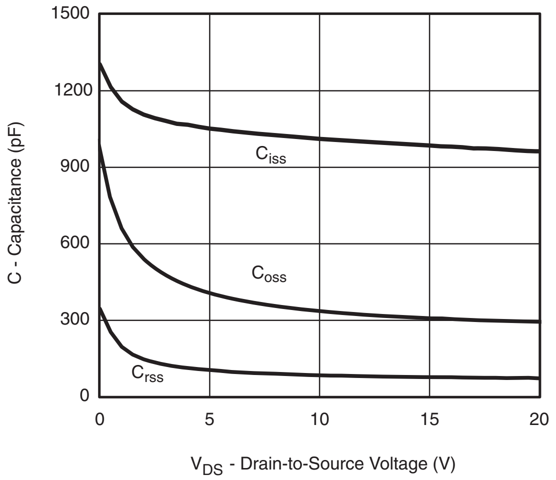
Output Characteristics



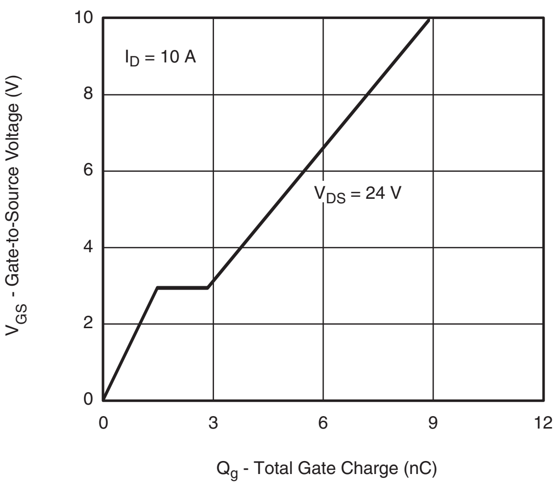
Transfer Characteristics



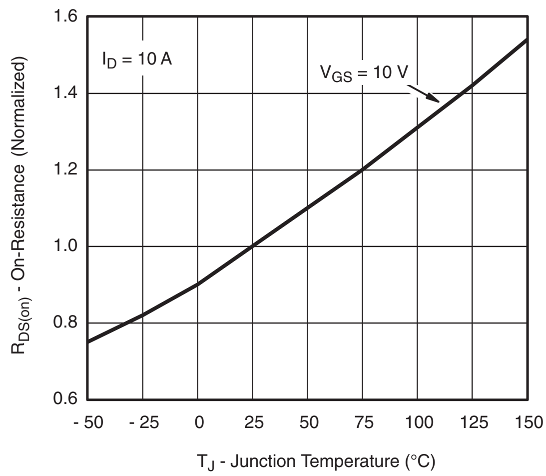
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

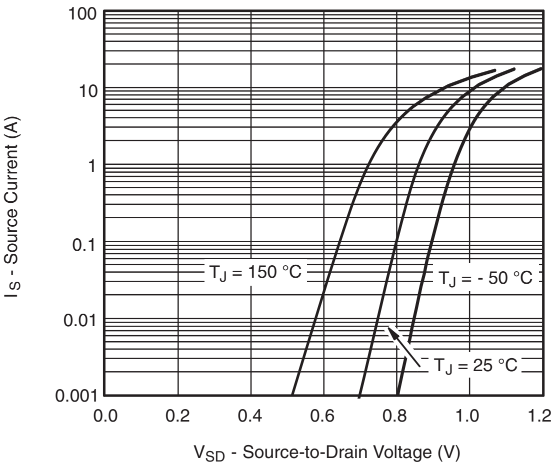


Gate Charge

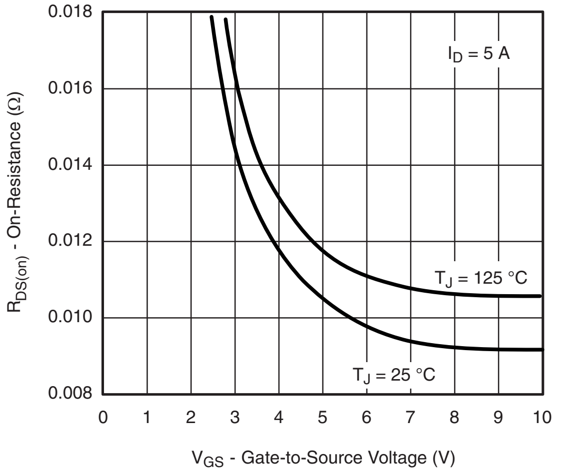


On-Resistance vs. Junction Temperature

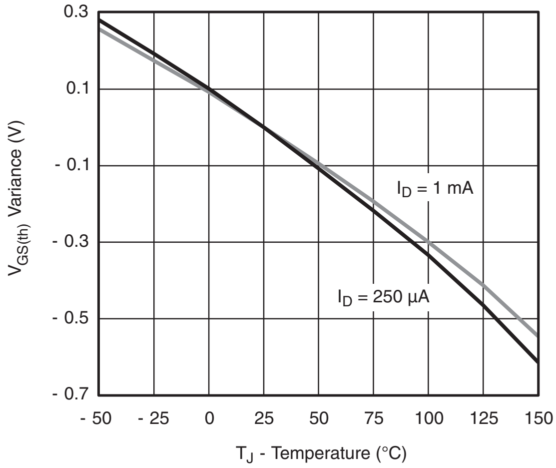
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



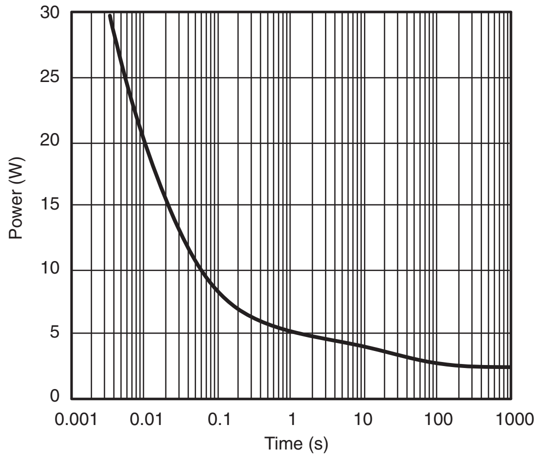
Source-Drain Diode Forward Voltage



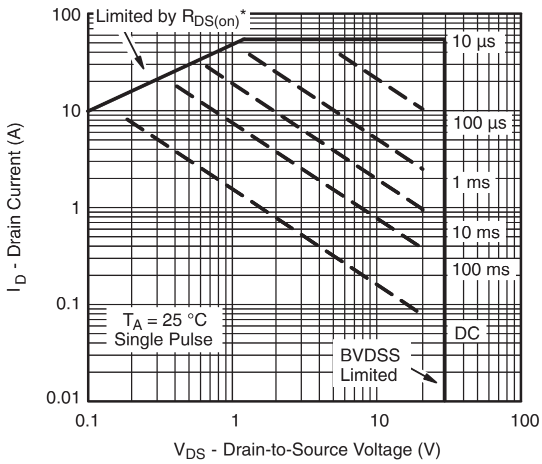
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



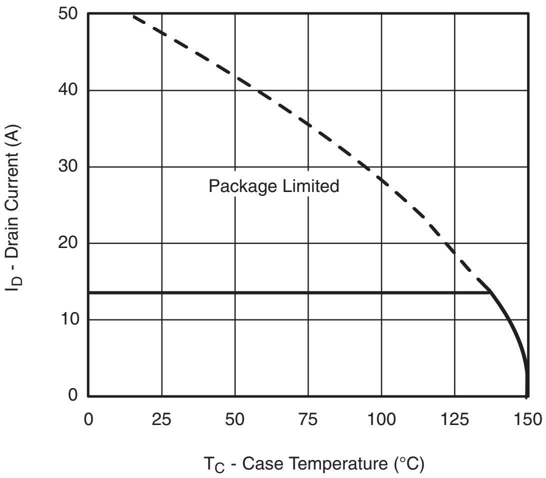
Single Pulse Power (Junction-to-Ambient)



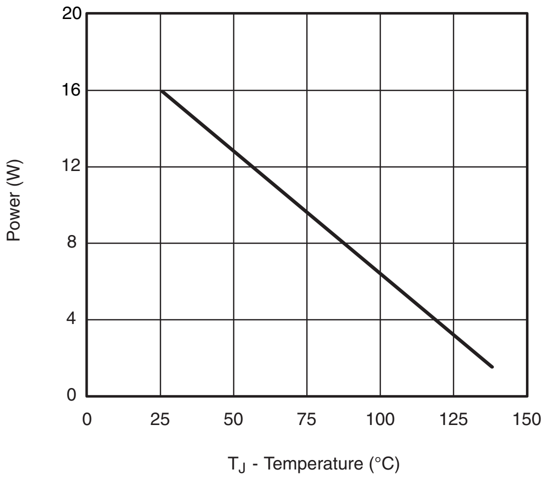
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



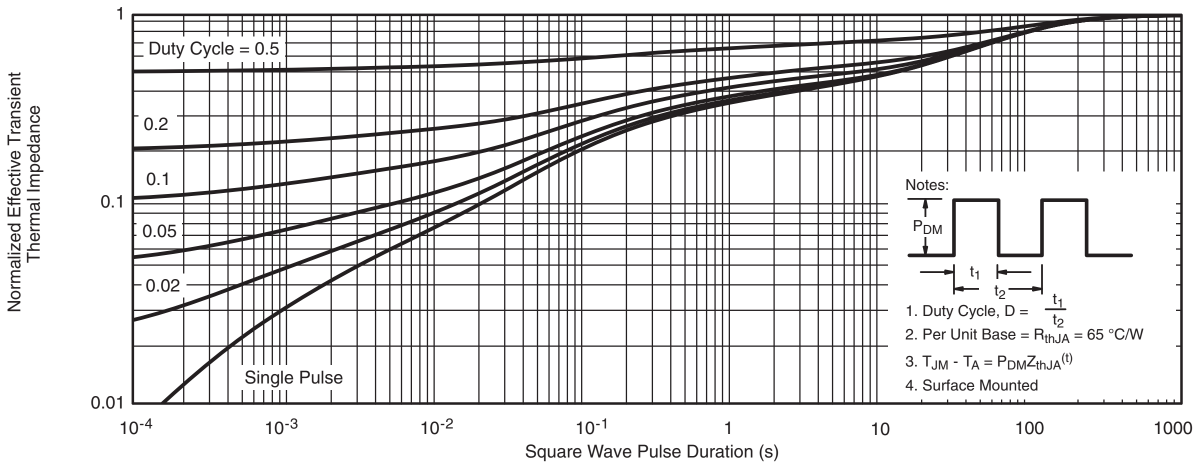
Current Derating*



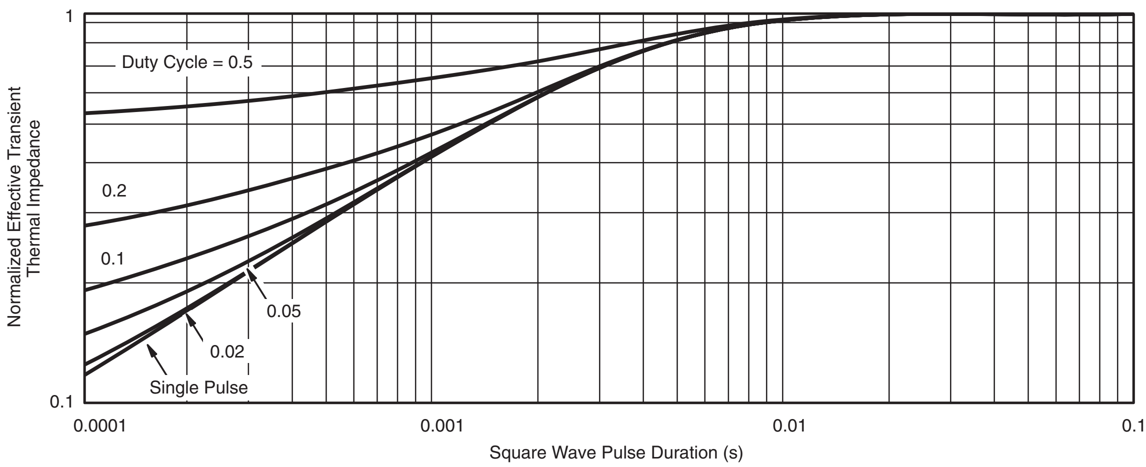
Power Derating

* The power dissipation P_D is based on $T_{J(max.)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

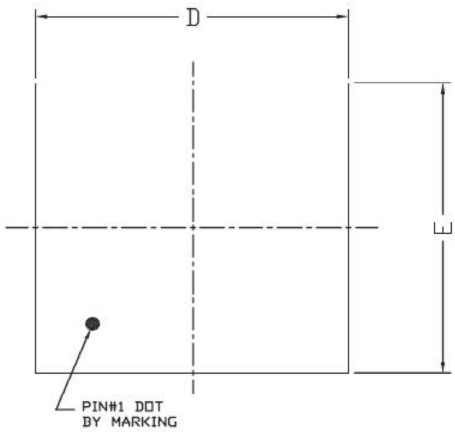


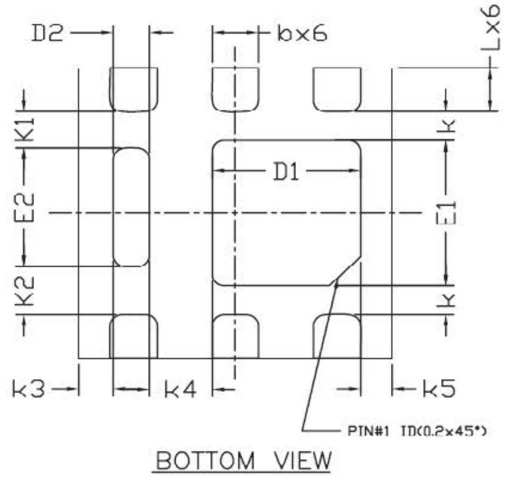
Normalized Thermal Transient Impedance, Junction-to-Ambient

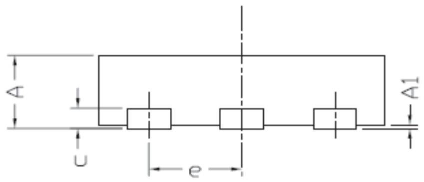


Normalized Thermal Transient Impedance, Junction-to-Case

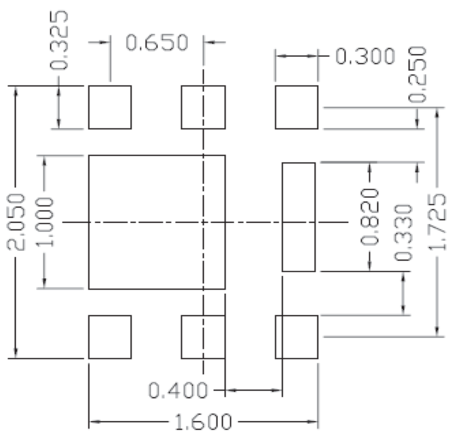
DFN2x2 _6L_EP1_S PACKAGE OUTLINE







RECOMMENDED LAND PATTERN



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.50	0.55	0.60	0.020	0.022	0.024
A1	0.00	——	0.05	0.000	——	0.002
b	0.25	0.30	0.35	0.010	0.012	0.014
c	0.152 REF			0.006 REF		
D	1.90	2.00	2.10	0.075	0.079	0.083
D1	0.85	0.95	1.05	0.033	0.037	0.041
D2	0.13	0.23	0.33	0.005	0.009	0.013
E	1.90	2.00	2.10	0.075	0.079	0.083
E1	0.90	1.00	1.10	0.035	0.039	0.043
E2	0.72	0.82	0.92	0.028	0.032	0.036
e	0.65 BSC			0.026 BSC		
K	0.20 BSC			0.008 BSC		
K1	0.25 BSC			0.010 BSC		
K2	0.33 BSC			0.013 BSC		
K3	0.22 BSC			0.009 BSC		
K4	0.40 BSC			0.016 BSC		
K5	0.20 BSC			0.008 BSC		
L	0.25	0.30	0.35	0.010	0.012	0.014

UNIT: mm

NOTE
1. CONTROLLING DIMENSION IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

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