

## P-Channel 60-V (D-S) MOSFET

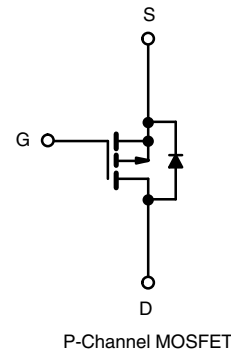
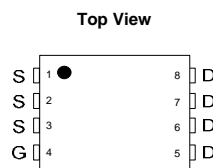
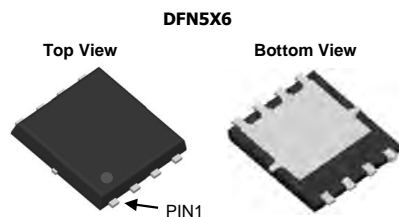
PRODUCT SUMMARY		
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
-60	0.012 at V <sub>GS</sub> = -10 V	-60
	0.020 at V <sub>GS</sub> = -4.5 V	-50

### FEATURES

- DT-Trench Power MOSFET
- 100 % R<sub>G</sub> and UIS Tested

### APPLICATIONS

- Notebook
- Load Switch



ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	Limit	UNIT
Drain-Source Voltage		V <sub>DS</sub>	- 60	V
Gate-Source Voltage		V <sub>GS</sub>	± 20	
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	T <sub>A</sub> = 25 °C	I <sub>D</sub>	- 60	A
	T <sub>A</sub> = 70 °C		- 50	
Pulsed Drain Current		I <sub>DM</sub>	- 240	
Continuous Source Current (Diode Conduction) <sup>a</sup>		I <sub>S</sub>	- 60	
Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	- 62	
Single Pulse Avalanche Energy		E <sub>AS</sub>	225	mJ
Maximum Power Dissipation <sup>a</sup>	T <sub>A</sub> = 25 °C	P <sub>D</sub>	43	W
	T <sub>A</sub> = 70 °C		38	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C
Soldering Recommendations (Peak Temperature) <sup>b, c</sup>			260	

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum Junction-to-Ambient <sup>a</sup>	t ≤ 10 s	R <sub>thJA</sub>	15	23	°C/W
	Steady State		22	35	
Maximum Junction-to-Case (Drain)	Steady State	R <sub>thJC</sub>	1	1.3	

### Notes

- Surface mounted on 1" x 1" FR4 board.
- The DFN5x6 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.
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.

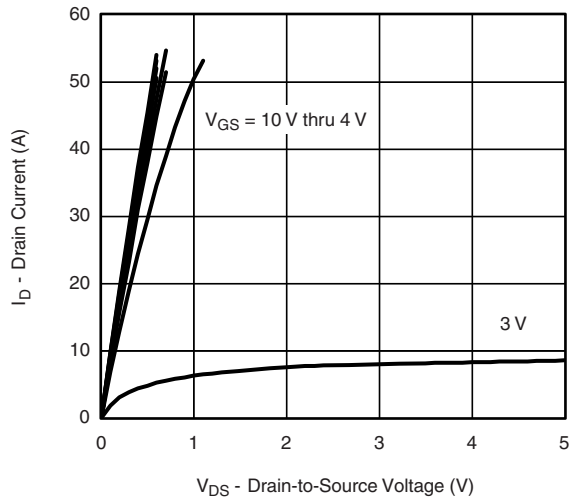
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-1	-	-3	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 20\ \text{V}$	-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -48\ \text{V}, V_{GS} = 0\ \text{V}$	-	-	-1	$\mu\text{A}$
		$V_{DS} = -48\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 70\text{ }^\circ\text{C}$	-	-	-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \leq -5\ \text{V}, V_{GS} = -10\ \text{V}$	-60	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\ \text{V}, I_D = -15\ \text{A}$	-	0.012	0.0145	$\Omega$
		$V_{GS} = -4.5\ \text{V}, I_D = -10\ \text{A}$	-	0.020	0.0250	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\ \text{V}, I_D = -15\ \text{A}$	-	31	-	S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -4.5\ \text{A}, V_{GS} = 0\ \text{V}$	-	-0.7	-1.2	V
<b>Dynamic <sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -30\ \text{V}, V_{GS} = -10\ \text{V}, I_D = -15\ \text{A}$	-	121	190	nC
Gate-Source Charge	$Q_{gs}$		-	20	-	
Gate-Drain Charge	$Q_{gd}$		-	32	-	
Gate Resistance	$R_g$		-	3	-	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -30\ \text{V}, R_L = 30\ \Omega$ $I_D \cong -15\ \text{A}, V_{GEN} = -10\ \text{V}, R_g = 6\ \Omega$	-	20	30	ns
Rise Time	$t_r$		-	20	30	
Turn-Off Delay Time	$t_{d(off)}$		-	205	310	
Fall Time	$t_f$		-	90	135	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = -4.5\ \text{A}, dI/dt = 100\ \text{A}/\mu\text{s}$	-	45	70	

**Notes**

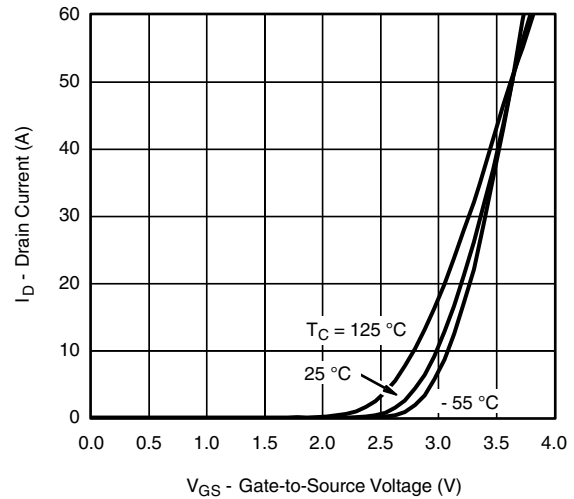
- a. Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 b. Guaranteed by design, not subject to production testing.

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.

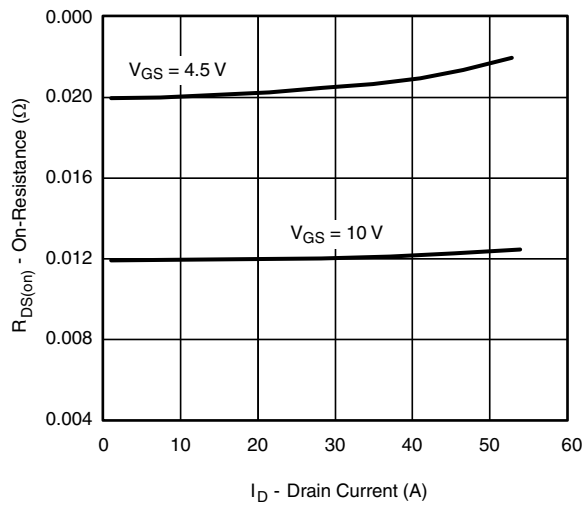
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



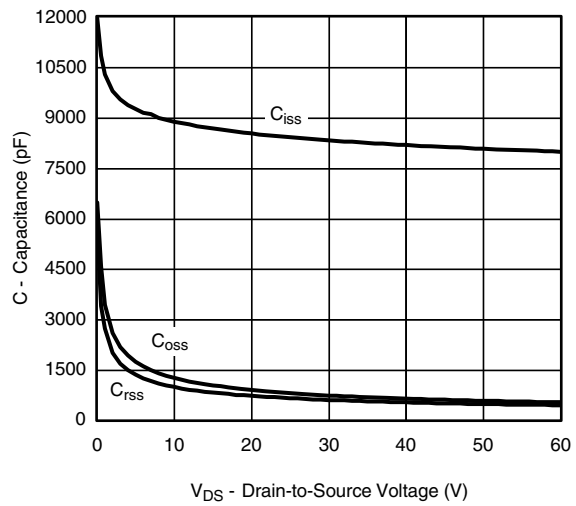
**Output Characteristics**



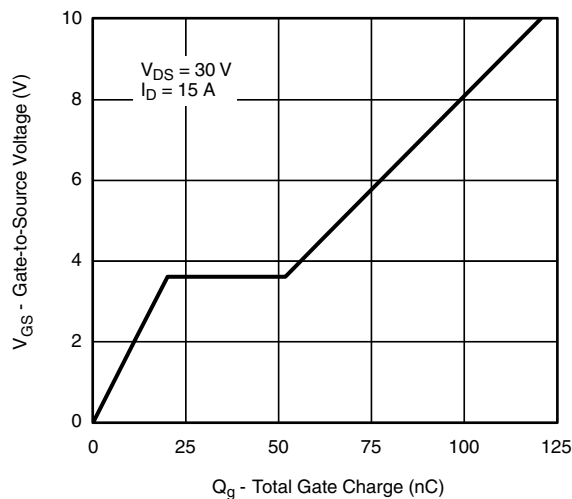
**Transfer Characteristics**



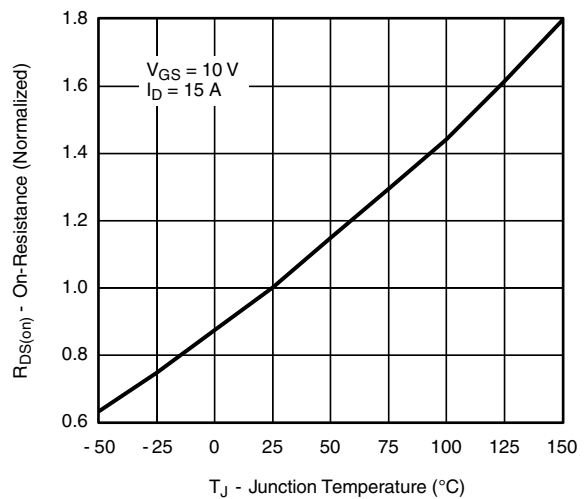
**On-Resistance vs. Drain Current**



**Capacitance**

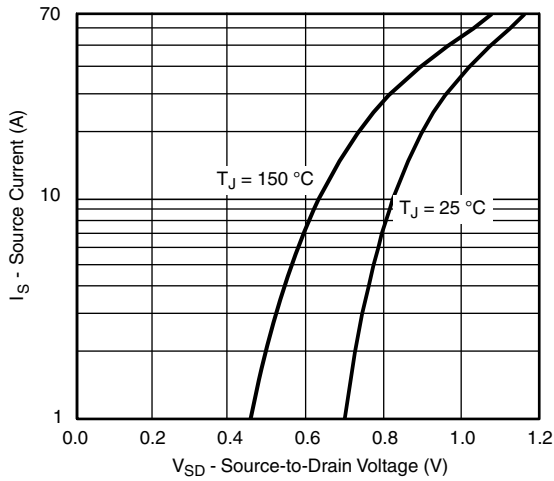


**Gate Charge**

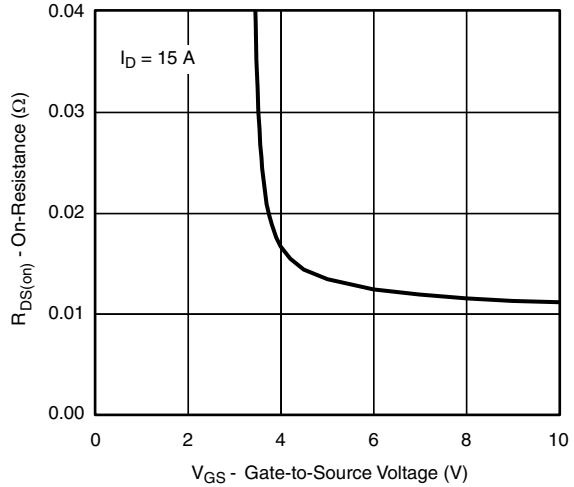


**On-Resistance vs. Junction Temperature**

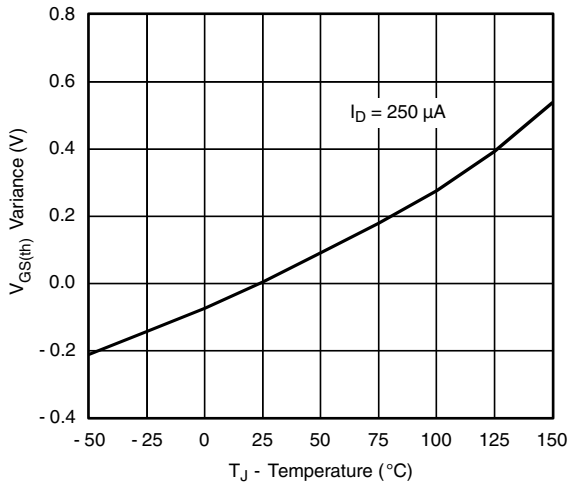
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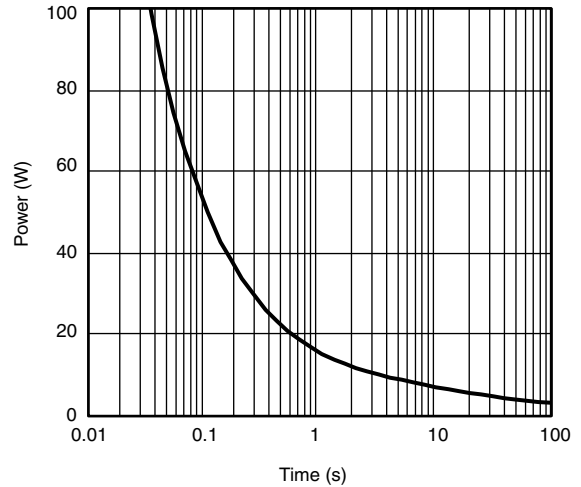
**Source-Drain Diode Forward Voltage**



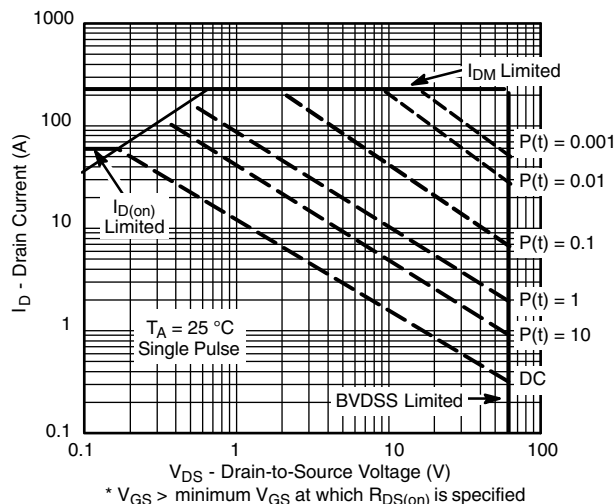
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**

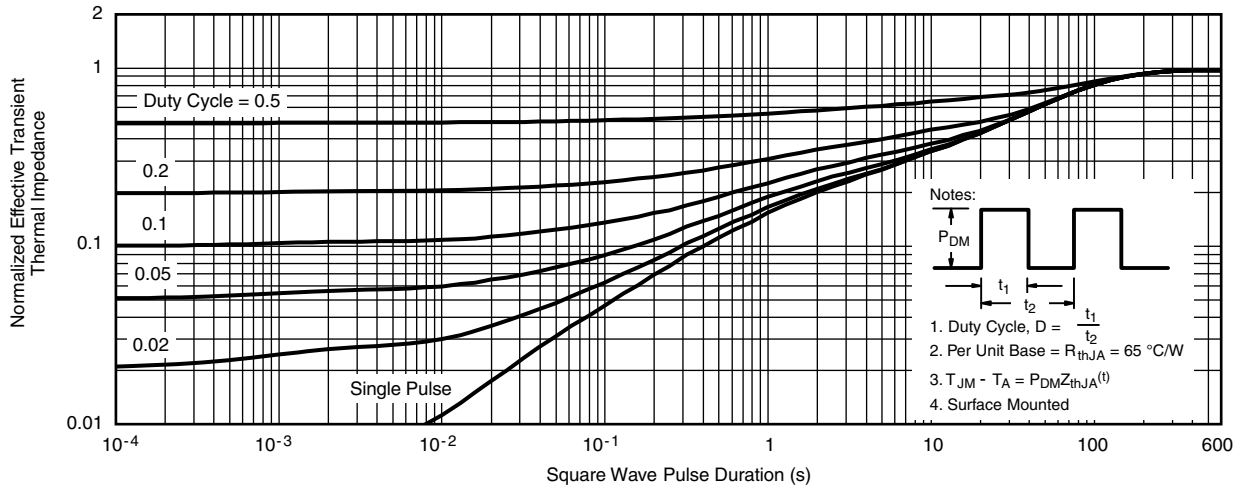


**Single Pulse Power, Junction-to-Ambient**

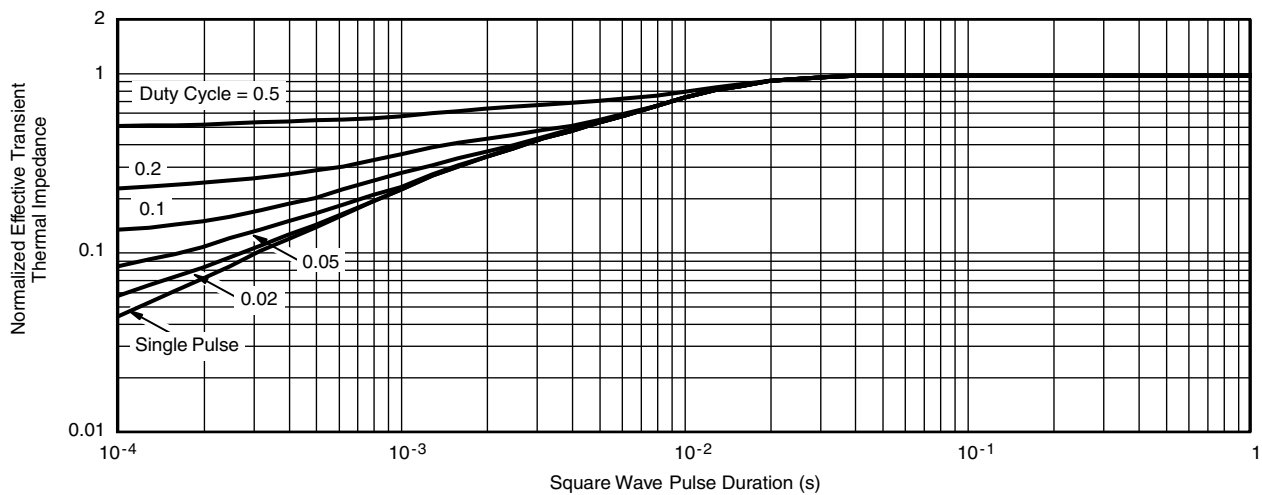


**Safe Operating Area**

**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

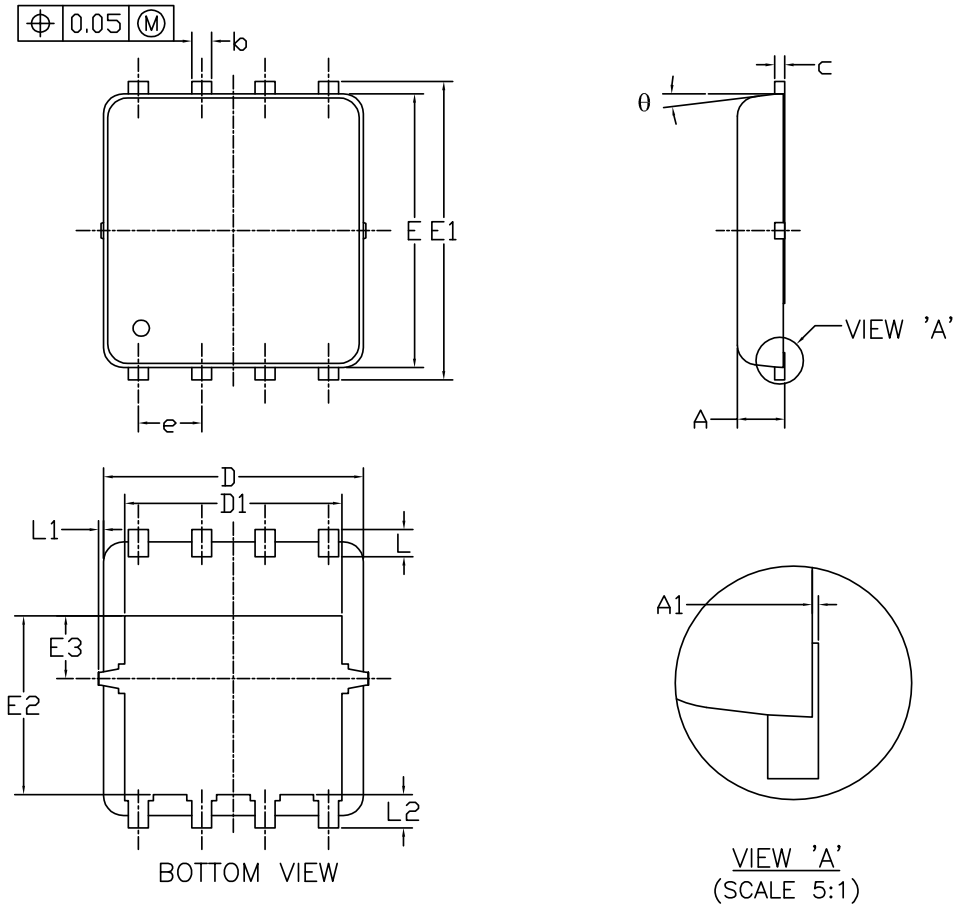


**Normalized Thermal Transient Impedance, Junction-to-Ambient**

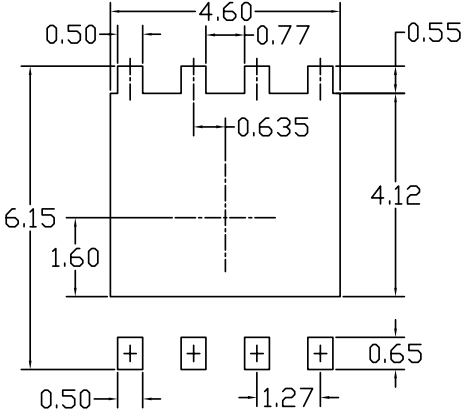


**Normalized Thermal Transient Impedance, Junction-to-Case**

DFN5x6\_8L\_EP1\_P PACKAGE OUTLIN



RECOMMENDED LAND PATTERN



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.85	0.95	1.00	0.033	0.037	0.039
A1	0.00	---	0.05	0.000	---	0.002
b	0.30	0.40	0.50	0.012	0.016	0.020
c	0.15	0.20	0.25	0.006	0.008	0.010
D	4.80	5.20	5.30	0.201	0.205	0.209
D1	4.25	4.35	4.45	0.167	0.171	0.175
E	5.45	5.55	5.65	0.215	0.219	0.222
E1	5.95	6.05	6.15	0.234	0.238	0.242
E2	3.525	3.625	3.725	0.139	0.143	0.147
E3	1.175	1.275	1.375	0.046	0.050	0.054
e	1.27 BSC			0.050 BSC		
L	0.45	0.55	0.65	0.018	0.022	0.026
L1	0	---	0.15	0	---	0.006
L2	0.68 REF			0.027 REF		
θ	0°	---	10°	0°	---	10°

NOTE

UNIT: mm

- PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.  
MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 6 MILS EACH.
- CONTROLLING DIMENSION IS MILLIMETER.  
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

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