

P-Channel 40-V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
- 40	0.0046 at V _{GS} = - 10 V	- 90	105 nC
	0.0065 at V _{GS} = - 4.5 V	- 70	

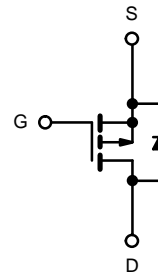
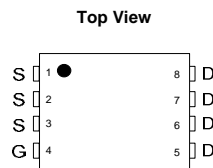
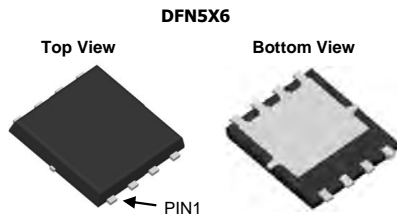
FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested



APPLICATIONS

- Notebook
- Load Switch



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	- 40	V
Gate-Source Voltage	V _{GS}	± 20	
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	- 90 ^a
		T _C = 70 °C	- 70 ^a
		T _A = 25 °C	- 25 ^{b, c}
		T _A = 70 °C	- 13 ^{b, c}
Pulsed Drain Current	I _{DM}	- 360	A
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	
		T _A = 25 °C	- 42 ^{b, c}
Single Pulse Avalanche Current	I _{AS}	- 88	mJ
Single Pulse Avalanche Energy	E _{AS}	260	
Maximum Power Dissipation	P _D	T _C = 25 °C	138
		T _C = 70 °C	83
		T _A = 25 °C	7.15 ^{b, c}
		T _A = 70 °C	4.3 ^{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 ≤ 10 s	R _{thJA}	20	35	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R _{thJC}	0.9	1.2	

Notes:

- Package limited.
- Surface Mounted on 1" x 1" FR4 board.
- t = 10 s.
- 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.
- Maximum under Steady State conditions is 54 °C/W.

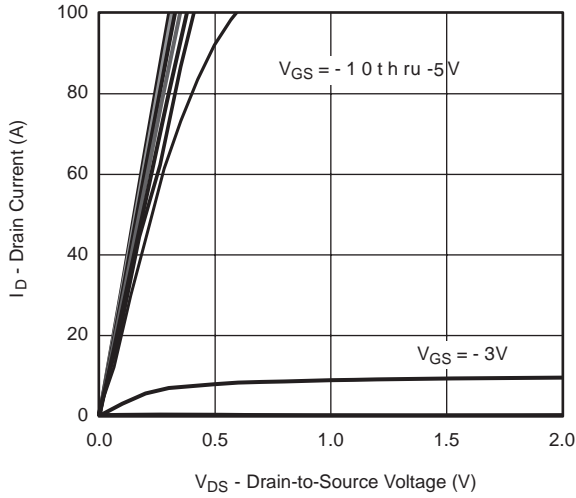
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 40			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		- 31		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			6.5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1.0		- 3.0	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -32\text{ V}, V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -32\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			- 10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	- 90			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -20\text{ A}$		0.0046	0.0059	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -15\text{ A}$		0.0065	0.0088	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -20\text{ A}$		17		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -32\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		5090		pF
Output Capacitance	C_{oss}			675		
Reverse Transfer Capacitance	C_{rss}			290		
Total Gate Charge	Q_g	$V_{DS} = -32\text{ V}, V_{GS} = -10\text{ V}, I_D = -20\text{ A}$		105	150	nC
				78	130	
Gate-Source Charge	Q_{gs}	$V_{DS} = -32\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -15\text{ A}$		19		
Gate-Drain Charge	Q_{gd}			27		
Gate Resistance	R_g		$f = 1\text{ MHz}$		1.9	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -32\text{ V}, R_L = 15\text{ }\Omega$ $I_D \cong -1.0\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		35		ns
Rise Time	t_r			15		
Turn-Off Delay Time	$t_{d(off)}$			110		
Fall Time	t_f			60		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -32\text{ V}, R_L = 15\text{ }\Omega$ $I_D \cong -1.0\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		45		
Rise Time	t_r			19		
Turn-Off Delay Time	$t_{d(off)}$			190		
Fall Time	t_f			70		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			- 90	A
Pulse Diode Forward Current ^a	I_{SM}				- 360	
Body Diode Voltage	V_{SD}	$I_S = -5\text{ A}$		- 0.6	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 3.5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		50	100	ns
Body Diode Reverse Recovery Charge	Q_{rr}			65	130	nC
Reverse Recovery Fall Time	t_a			26		ns
Reverse Recovery Rise Time	t_b			24		

Notes:

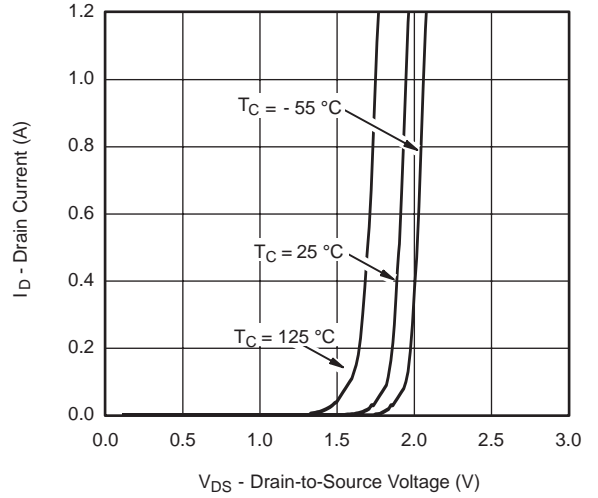
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

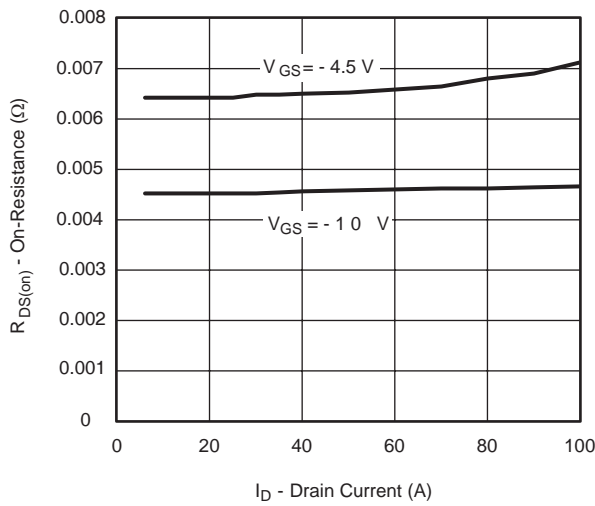
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



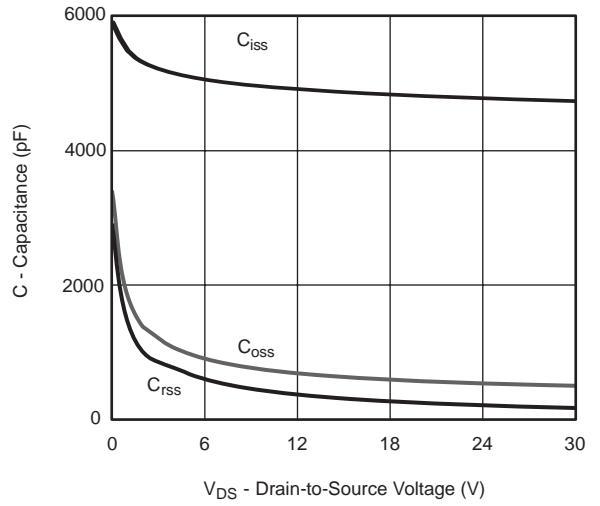
Output Characteristics



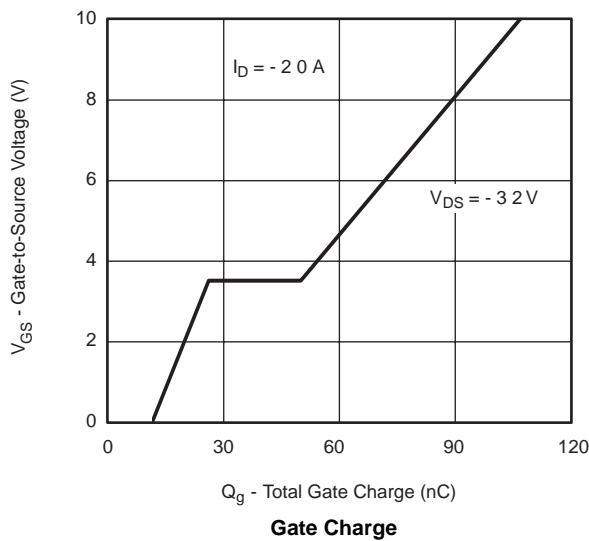
Transfer Characteristics



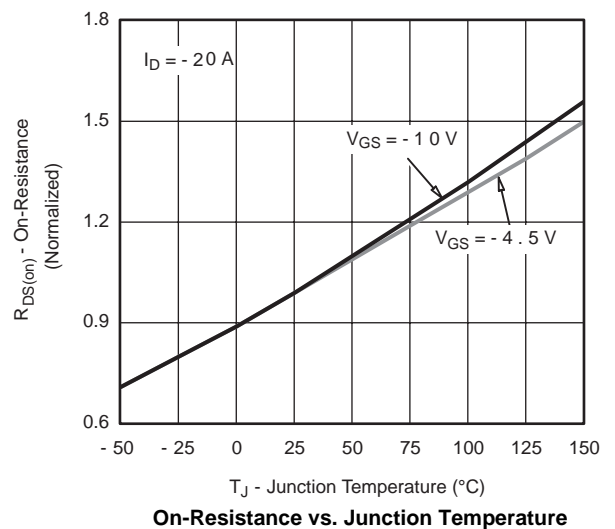
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

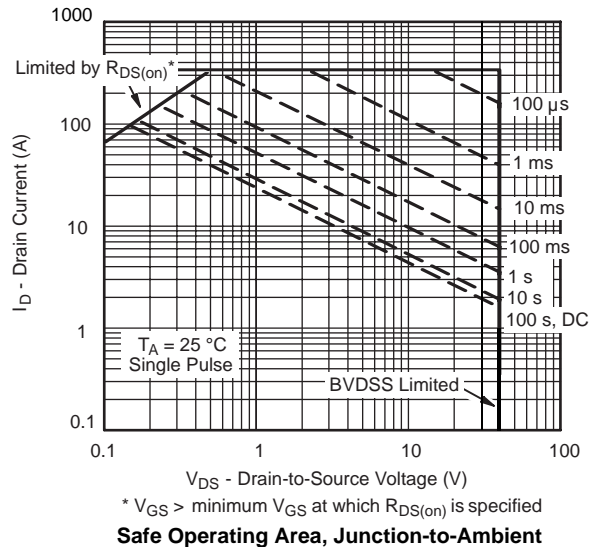
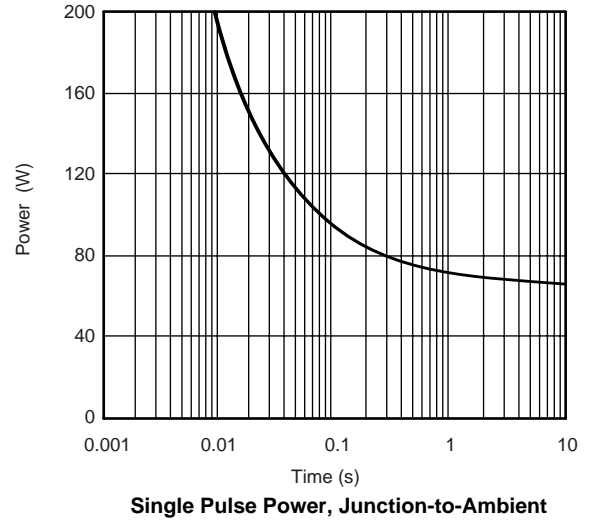
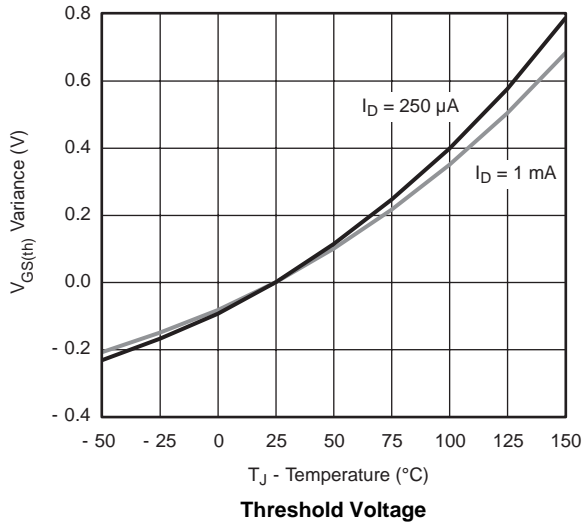
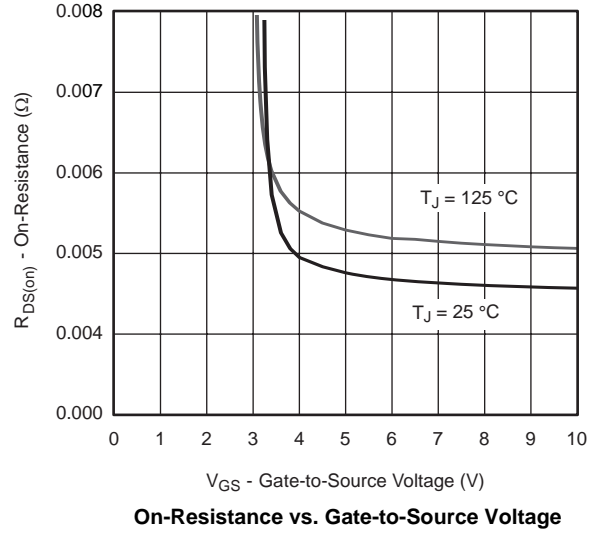
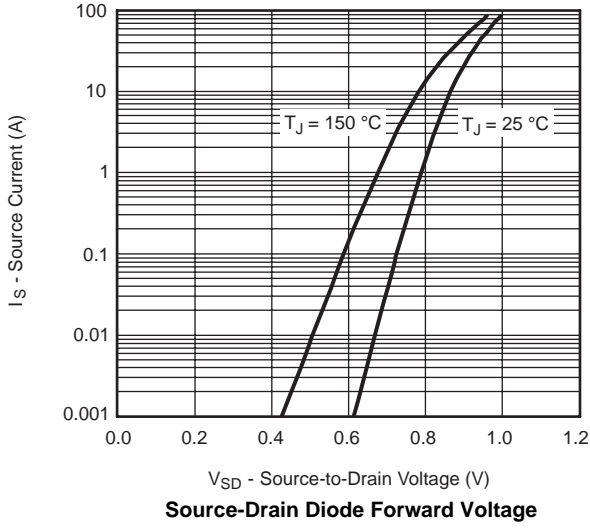


Gate Charge

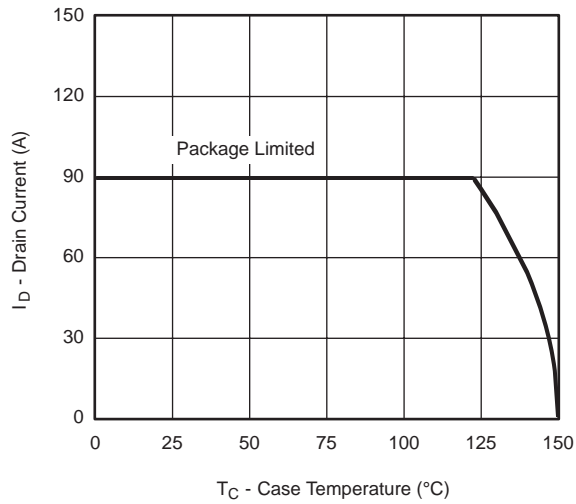


On-Resistance vs. Junction Temperature

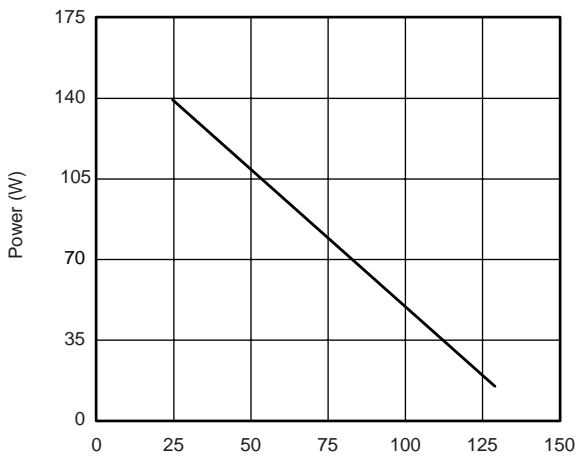
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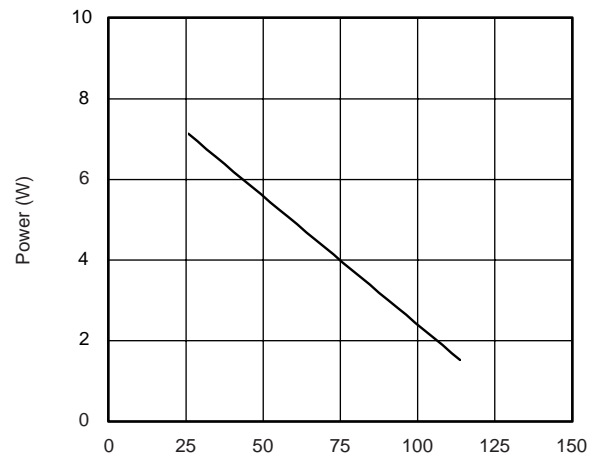
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



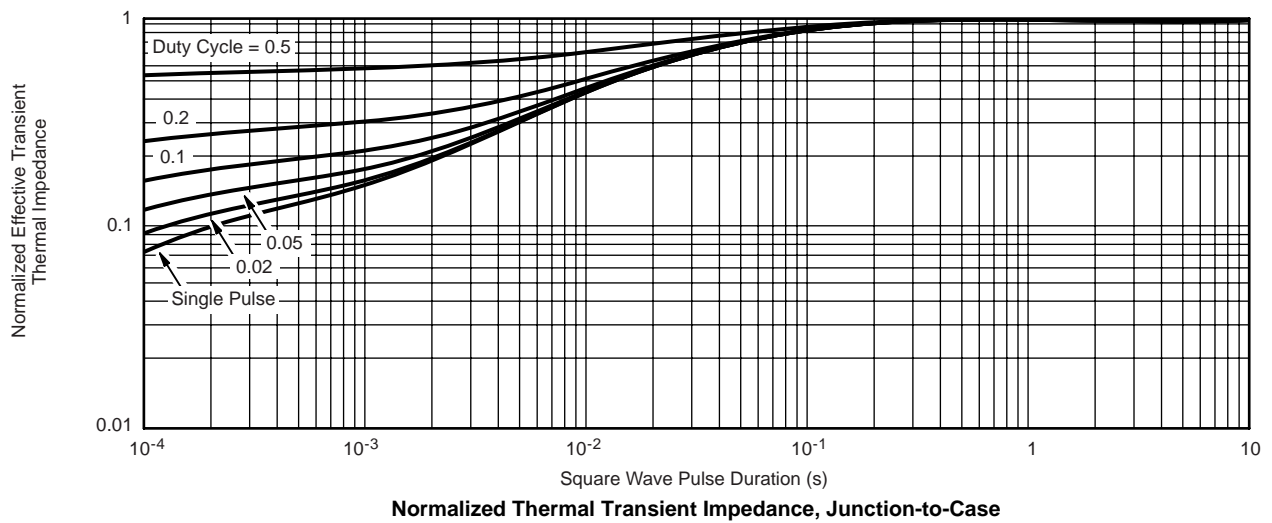
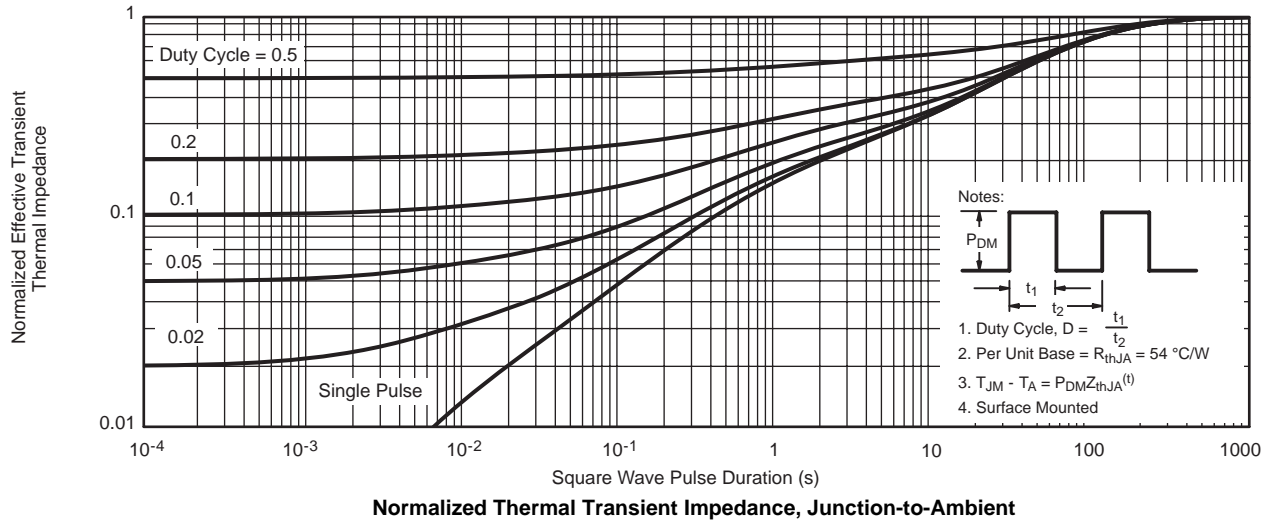
Power, Junction-to-Case



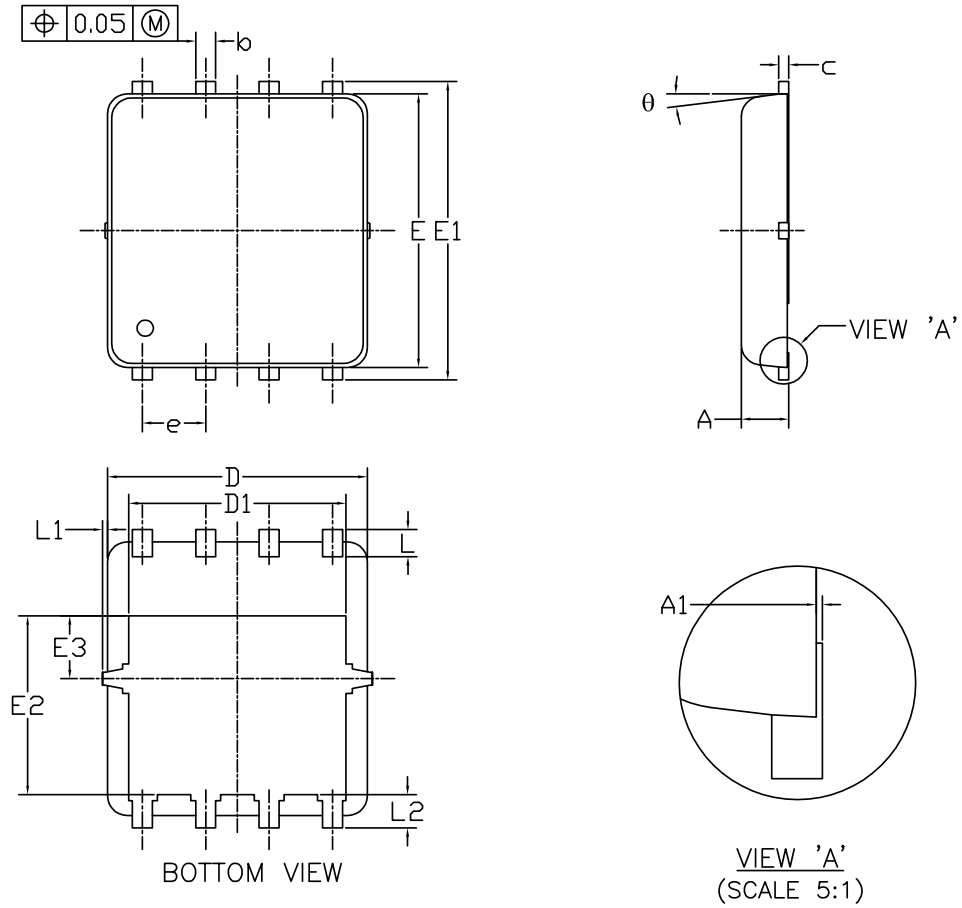
Power, Junction-to-Ambient

* 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.

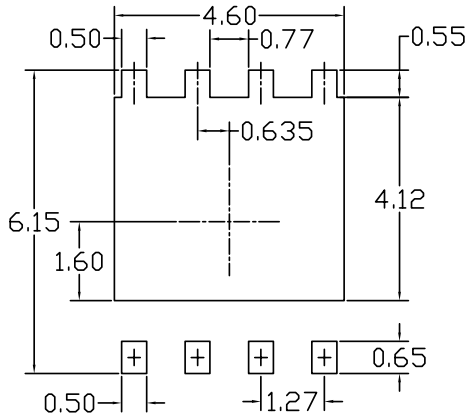
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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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