

## P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>c</sup>	Q <sub>g</sub> (Typ.)
- 20	0.66 at V <sub>GS</sub> = - 4.5 V	- 0.8	0.75 nC
	1.60 at V <sub>GS</sub> = - 2.5 V	- 0.55	

### FEATURES

- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> Tested
- Compliant to RoHS Directive 2002/95/EC
- Gate-Source ESD Protected

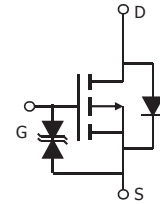
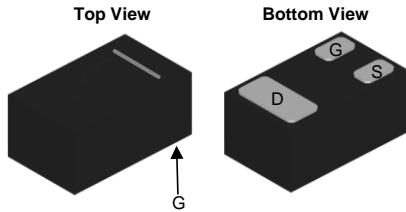


**RoHS**  
COMPLIANT

### APPLICATIONS

- Load Switch

DFN 1006



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V <sub>DS</sub>	- 20	V
Gate-Source Voltage		V <sub>GS</sub>	± 12	
Continuous Drain Current (T <sub>J</sub> = 150 °C)	T <sub>C</sub> = 25 °C	I <sub>D</sub>	- 0.8	A
	T <sub>C</sub> = 70 °C		- 0.5	
	T <sub>A</sub> = 25 °C		- 0.3 <sup>a, b</sup>	
	T <sub>A</sub> = 70 °C		- 0.15 <sup>a, b</sup>	
Pulsed Drain Current		I <sub>DM</sub>	- 3	
Continuous Source-Drain Diode Current	T <sub>C</sub> = 25 °C	I <sub>S</sub>	- 0.8	
	T <sub>A</sub> = 25 °C		- 0.3	
Maximum Power Dissipation	T <sub>C</sub> = 25 °C	P <sub>D</sub>	0.95	W
	T <sub>C</sub> = 70 °C		0.61	
	T <sub>A</sub> = 25 °C		0.3 <sup>a, b</sup>	
	T <sub>A</sub> = 70 °C		0.19 <sup>a, b</sup>	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 50 to 150	°C
Soldering Recommendations (Peak Temperature)			260	

Notes:

a. Surface mounted on 1" x 1" FR4 board.

b. t = 10 s.

c. Based on T<sub>C</sub> = 25 °C.

**THERMAL RESISTANCE RATINGS**

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a, b</sup>	$t \leq 10$ s	$R_{thJA}$	250	500	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJF}$	225	670	

Notes:

- a. Surface mounted on 1" x 1" FR4 board.  
 b. Maximum under steady state conditions is 360 °C/W.

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

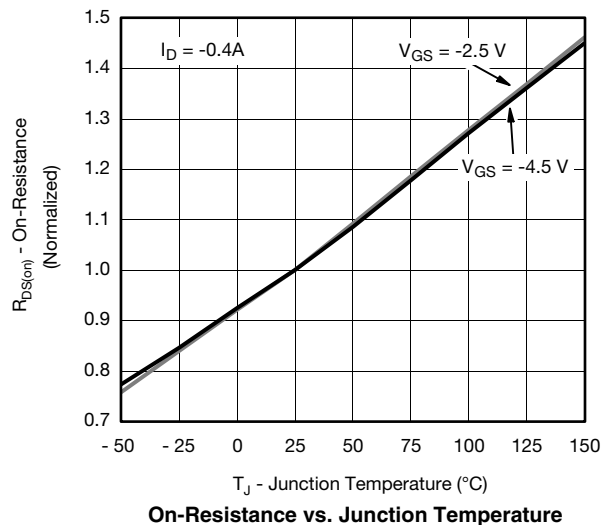
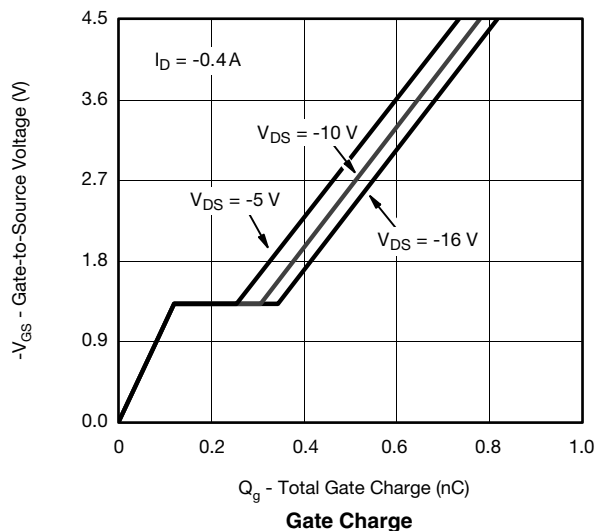
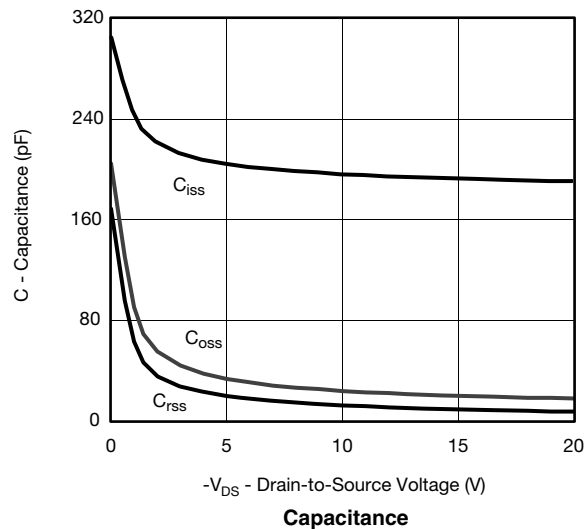
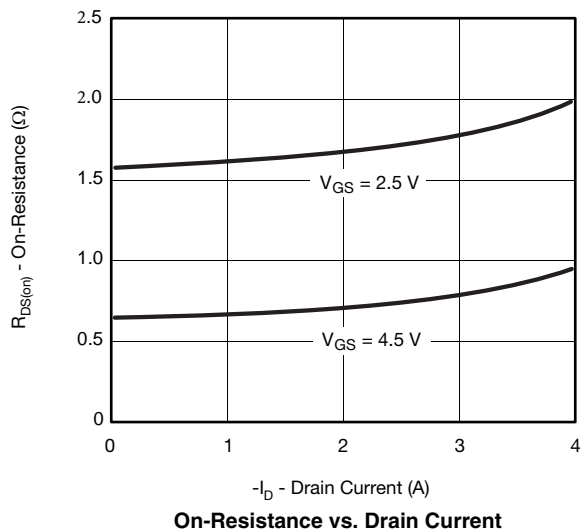
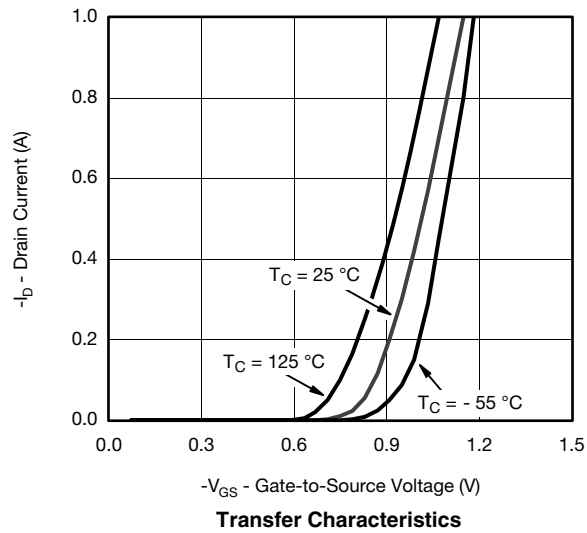
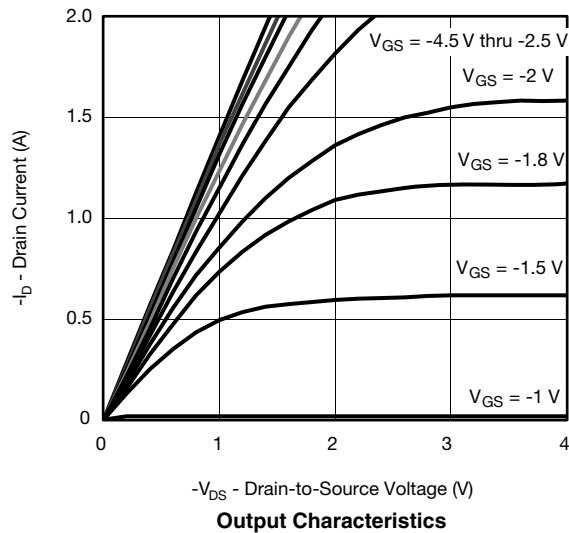
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0$ V, $I_D = -250$ $\mu$ A	- 20			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250$ $\mu$ A		- 14		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			2.4		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = -250$ $\mu$ A	- 0.4		- 1.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0$ V, $V_{GS} = \pm 12$ V			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20$ V, $V_{GS} = 0$ V			- 1	$\mu$ A
		$V_{DS} = -20$ V, $V_{GS} = 0$ V, $T_J = 55$ °C			- 10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \leq -5$ V, $V_{GS} = -4.5$ V	- 0.8			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5$ V, $I_D = -0.4$ A		0.66	0.85	$\Omega$
		$V_{GS} = -2.5$ V, $I_D = -0.2$ A		1.60	2.0	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -5$ V, $I_D = -0.4$ A		1		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -10$ V, $V_{GS} = 0$ V, $f = 1$ MHz		192		pF
Output Capacitance	$C_{oss}$			27		
Reverse Transfer Capacitance	$C_{rss}$			14		
Total Gate Charge	$Q_g$	$V_{DS} = -10$ V, $V_{GS} = -4.5$ V, $I_D = -0.4$ A		0.75		nC
Gate-Source Charge	$Q_{gs}$			0.2		
Gate-Drain Charge	$Q_{gd}$			0.3		
Gate Resistance	$R_g$	$f = 1$ MHz		43		$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10$ V, $R_L = 9.1$ $\Omega$ $I_D \cong -0.4$ A, $V_{GEN} = -4.5$ V, $R_g = 1$ $\Omega$		12		ns
Rise Time	$t_r$			8		
Turn-Off Delay Time	$t_{d(off)}$			23		
Fall Time	$t_f$			9		
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25$ °C			- 0.8	A
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				- 3	
Body Diode Voltage	$V_{SD}$	$I_F = -0.7$ A		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -0.7$ A, $di/dt = 100$ A/ $\mu$ s, $T_J = 25$ °C		18		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			7		nC
Reverse Recovery Fall Time	$t_a$			7		ns
Reverse Recovery Rise Time	$t_b$			11		

Notes:

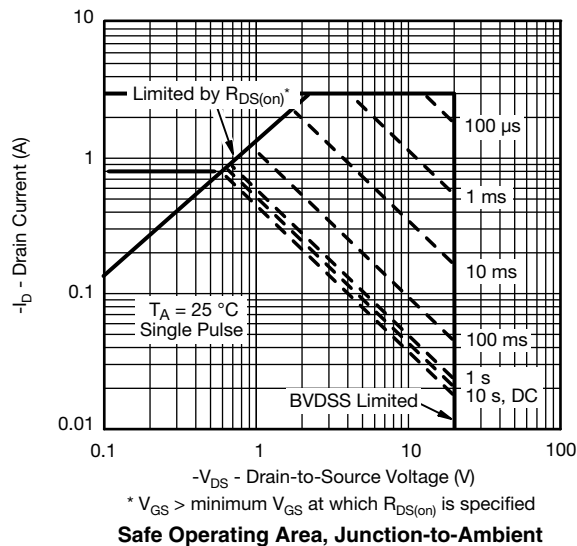
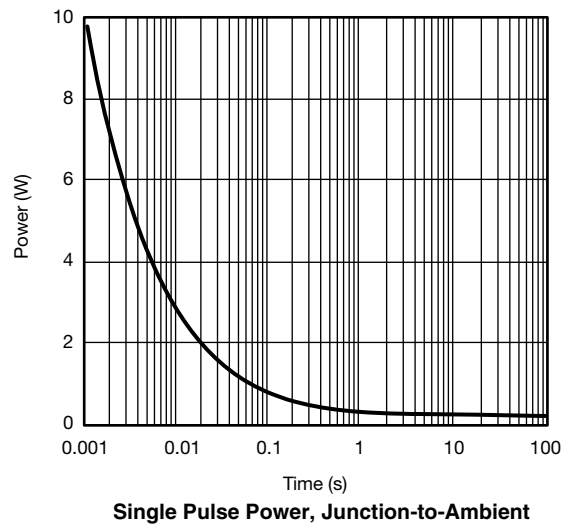
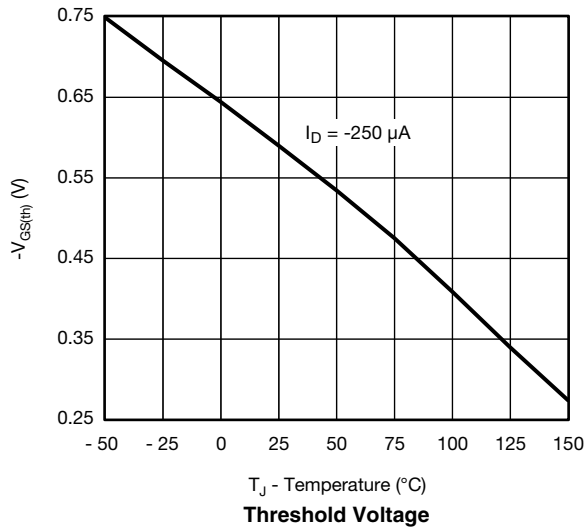
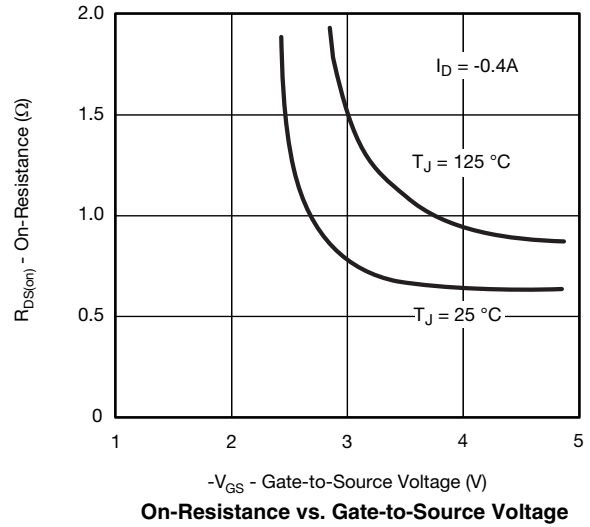
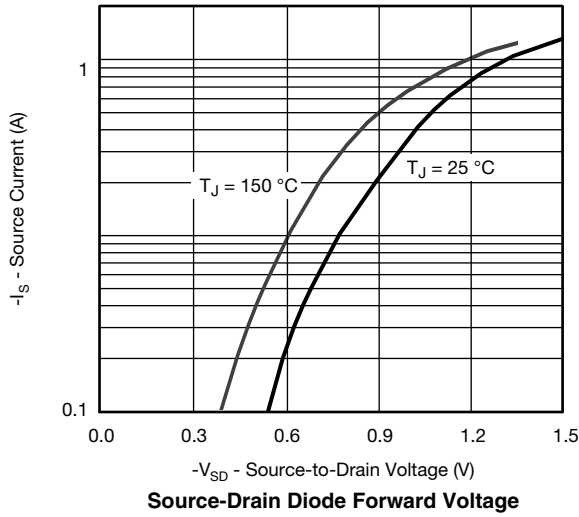
- a. Pulse test; pulse width  $\leq 300$   $\mu$ s, duty cycle  $\leq 2$  %.  
 b. Guaranteed by design, not subject to production testing.

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.

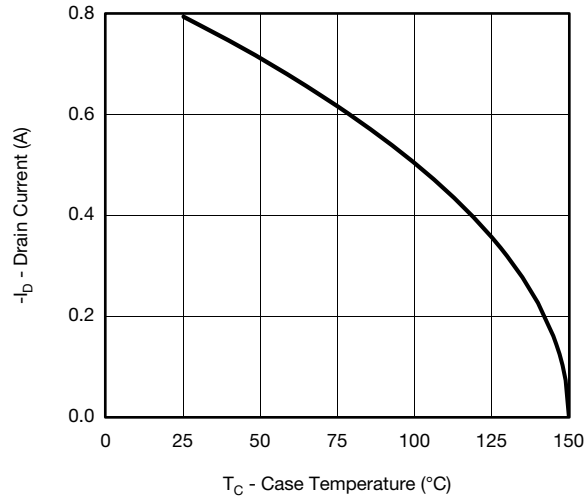
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



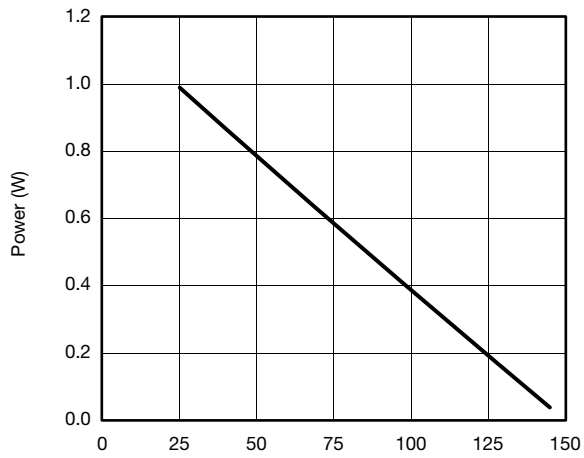
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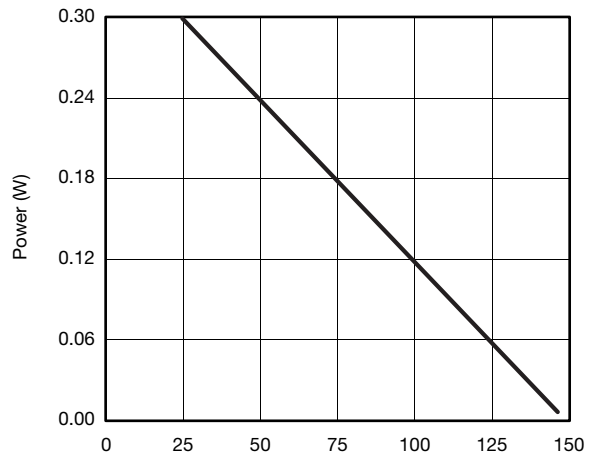
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



**Current Derating\***



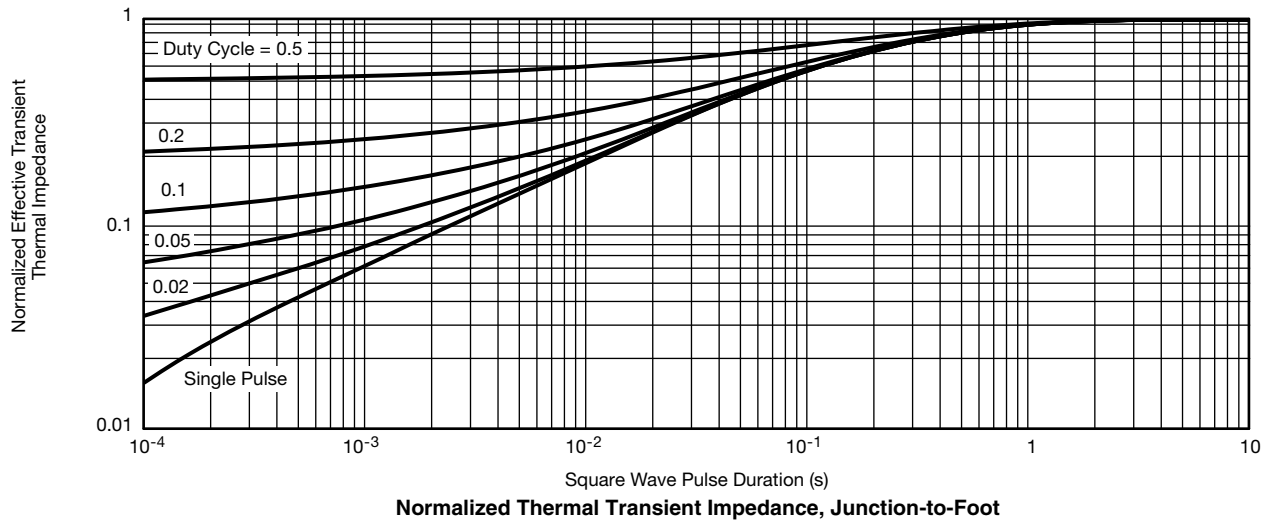
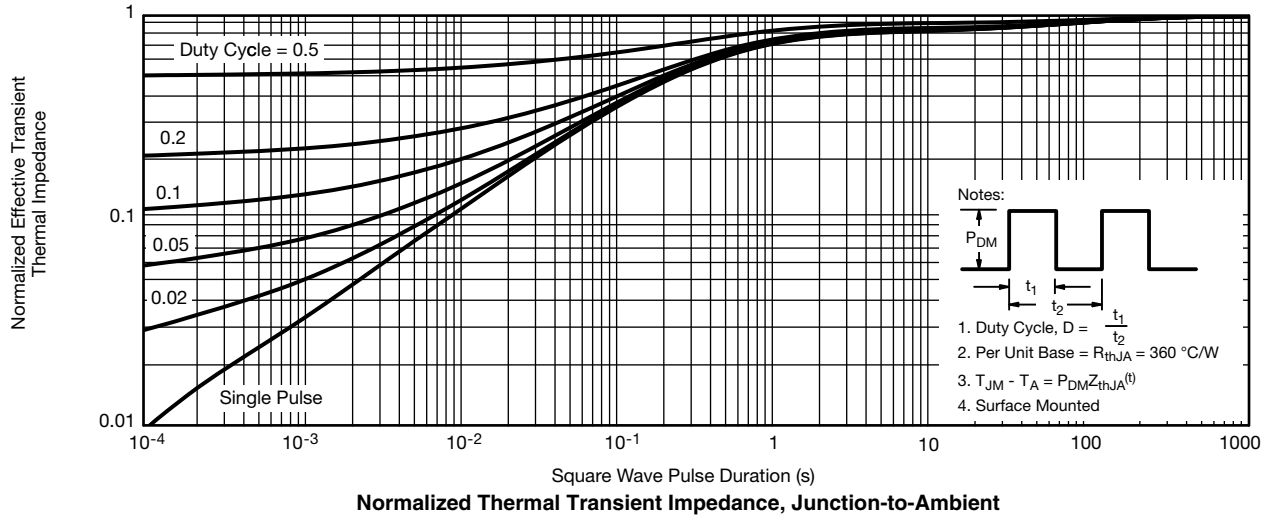
**Power, Junction-to-Case**



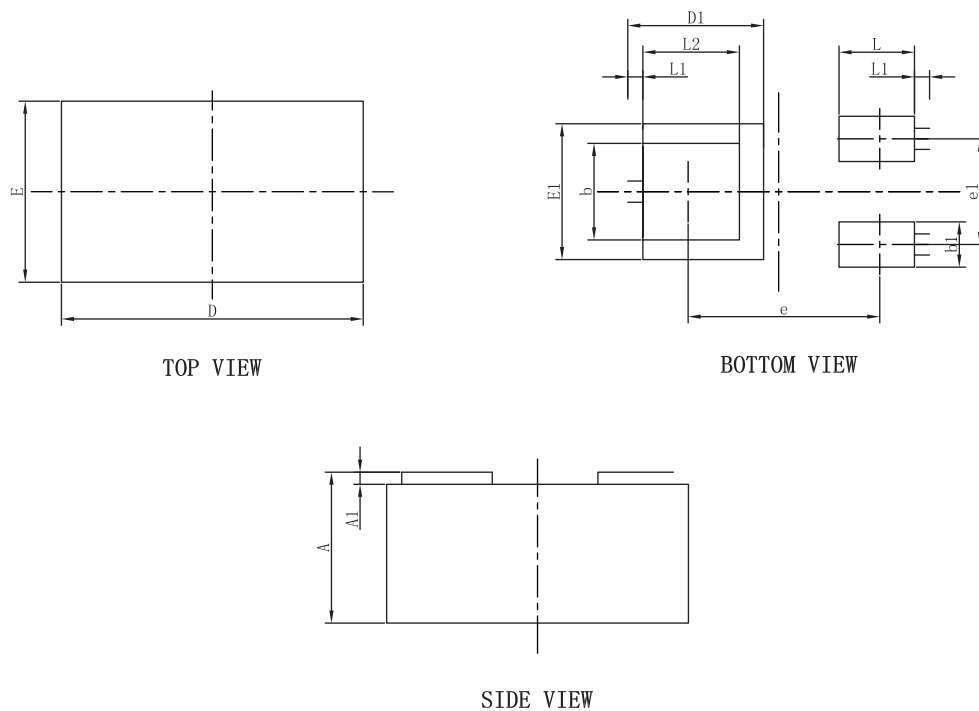
**Power, Junction-to-Ambient**

\* 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)



## DFN1006-3L PACKAGE OUTLINE



### COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX
A	0.400	0.500	0.600
A1	0.000	0.050	0.150
D	0.850	1.000	1.150
E	0.450	0.600	0.750
D1	0.450REF		
E1	0.450REF		
b	0.200	0.350	0.600
b1	0.050	0.150	0.250
e	0.635REF		
e1	0.200	0.300	0.500
L	0.150	0.250	0.350
L1	0.050REF		
L2	0.150	0.300	0.400

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