

## N-Channel 75-V (D-S) MOSFET

PRODUCT SUMMARY			
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>	$Q_g$ (Typ.)
75	0.011 at $V_{GS} = 10$ V	28	33 nC
	0.0145 at $V_{GS} = 4.5$ V	28	

### FEATURES

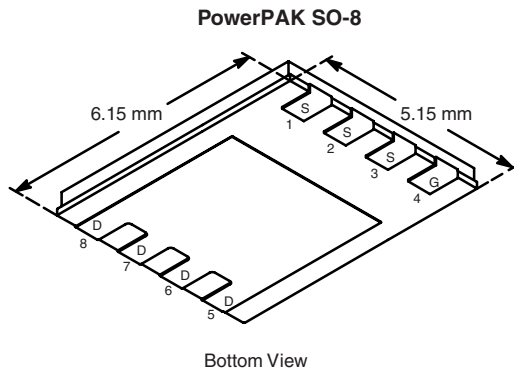
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET<sup>®</sup> Power MOSFET
- 100 %  $R_g$  Tested



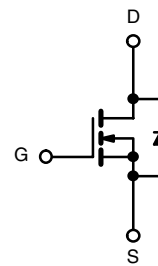
**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available

### APPLICATIONS

- Primary Side Switch



Ordering Information: Si7148DP-T1-E3 (Lead (Pb)-free)  
Si7148DP-T1-GE3 (Lead (Pb)-free and Halogen-free)



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	75	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 150$ °C)	$I_D$	$T_C = 25$ °C	A
		$T_C = 70$ °C	
		$T_A = 25$ °C	
		$T_A = 70$ °C	
Pulsed Drain Current	$I_{DM}$	60	
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25$ °C	28
		$T_A = 25$ °C	4.3 <sup>b, c</sup>
Avalanche Current	$I_{AS}$	45	
Single-Pulse Avalanche Energy	$E_{AS}$	100	mJ
Maximum Power Dissipation	$P_D$	$T_C = 25$ °C	W
		$T_C = 70$ °C	
		$T_A = 25$ °C	
		$T_A = 70$ °C	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150	°C
Soldering Recommendations (Peak Temperature) <sup>d, e</sup>		260	

Notes:

- Based on  $T_C = 25$  °C.
- Surface Mounted on 1" x 1" FR4 board.
- $t = 10$  s.
- See Solder Profile ([www.vishay.com/ppg?73257](http://www.vishay.com/ppg?73257)). The PowerPAK SO-8 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.

**THERMAL RESISTANCE RATINGS**

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a, b</sup>	$t \leq 10$ s	$R_{thJA}$	18	23	°C/W
Maximum Junction-to-Case (Drain)	Steady State	$R_{thJC}$	1.0	1.3	

Notes:

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

b. Maximum under Steady State conditions is 65 °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	75			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250$ $\mu$ A		75		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-6		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250$ $\mu$ A	1.5	2.0	2.5	V
		$V_{DS} = V_{GS}$ , $I_D = 5$ mA		2.3		
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0$ V, $V_{GS} = \pm 20$ V			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 75$ V, $V_{GS} = 0$ V			1	$\mu$ A
		$V_{DS} = 75$ V, $V_{GS} = 0$ V, $T_J = 55$ °C			10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5$ V, $V_{GS} = 10$ V	30			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10$ V, $I_D = 15$ A		0.0091	0.011	$\Omega$
		$V_{GS} = 4.5$ V, $I_D = 13.5$ A		0.012	0.0145	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15$ V, $I_D = 15$ A		60		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 35$ V, $V_{GS} = 0$ V, $f = 1$ MHz		2900		pF
Output Capacitance	$C_{oss}$			370		
Reverse Transfer Capacitance	$C_{rss}$			196		
Total Gate Charge	$Q_g$	$V_{DS} = 38$ V, $V_{GS} = 10$ V, $I_D = 15$ A		68	100	nC
Gate-Source Charge	$Q_{gs}$	$V_{DS} = 38$ V, $V_{GS} = 4.5$ V, $I_D = 15$ A		33	50	
Gate-Drain Charge	$Q_{gd}$			9.5		
Gate Resistance	$R_g$	$f = 1$ MHz	0.5	1.1	1.7	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 38$ V, $R_L = 3.8$ $\Omega$ $I_D \cong 10$ A, $V_{GEN} = 4.5$ V, $R_g = 1$ $\Omega$		33	50	ns
Rise Time	$t_r$			255	390	
Turn-Off Delay Time	$t_{d(off)}$			35	55	
Fall Time	$t_f$			100	150	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 38$ V, $R_L = 3.8$ $\Omega$ $I_D \cong 10$ A, $V_{GEN} = 10$ V, $R_g = 1$ $\Omega$		17	26	
Rise Time	$t_r$			46	70	
Turn-Off Delay Time	$t_{d(off)}$			39	60	
Fall Time	$t_f$			18	30	



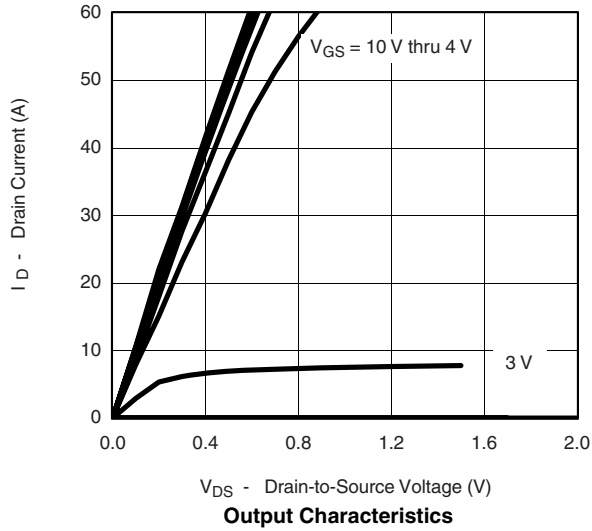
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
<b>Drain-Source Body Diode Characteristics</b>							
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			25	A	
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				60		
Body Diode Voltage	$V_{SD}$	$I_S = 4.3\text{ A}$		0.76	1.1	V	
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 12\text{ A}$ , $dI/dt = 100\text{ A}/\mu\text{s}$ , $T_J = 25\text{ }^\circ\text{C}$		41	65	ns	
Body Diode Reverse Recovery Charge	$Q_{rr}$				67	105	nC
Reverse Recovery Fall Time	$t_a$				27		ns
Reverse Recovery Rise Time	$t_b$				14		

Notes:

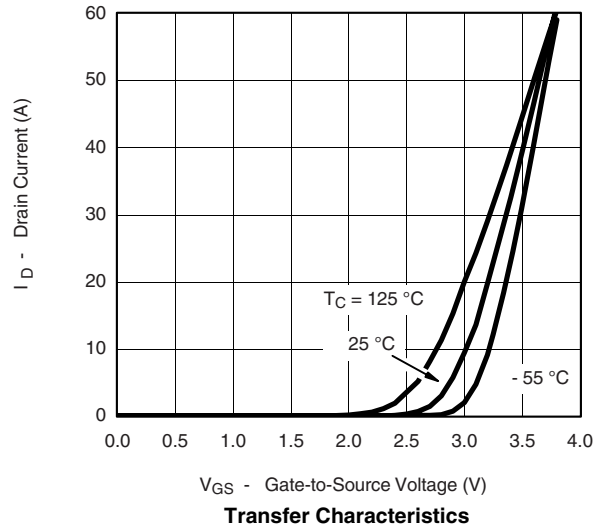
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

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.

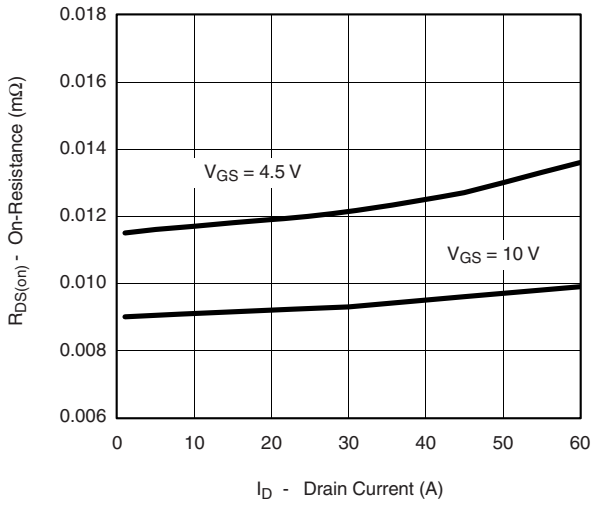
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



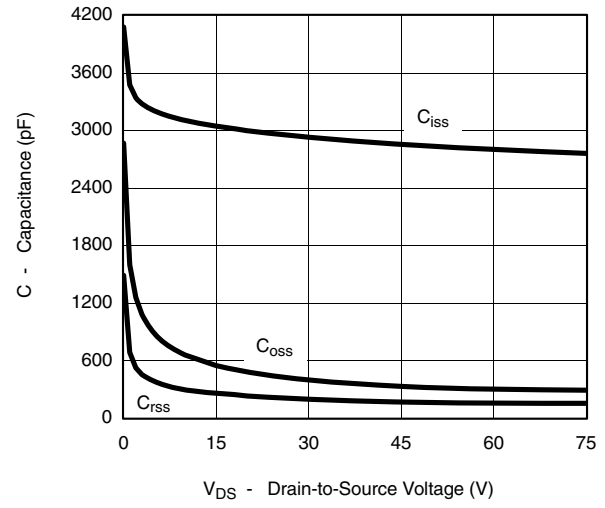
**Output Characteristics**



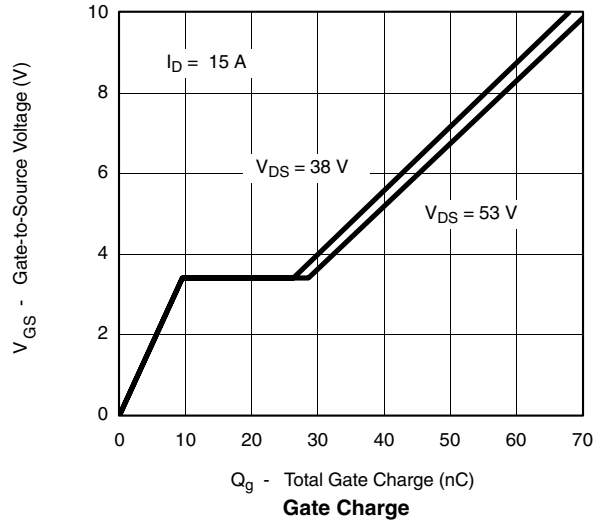
**Transfer Characteristics**



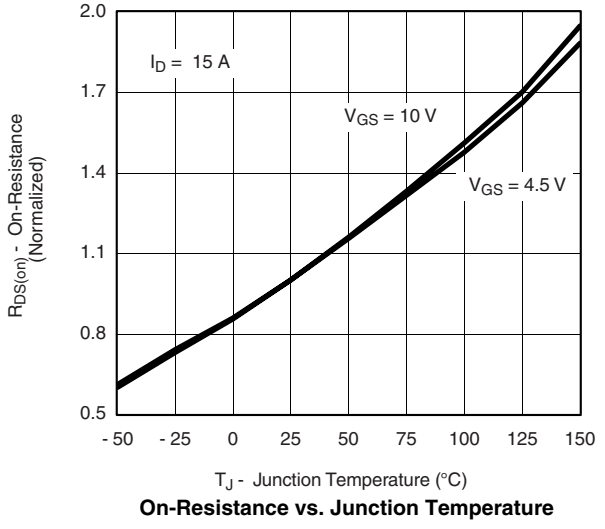
**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**

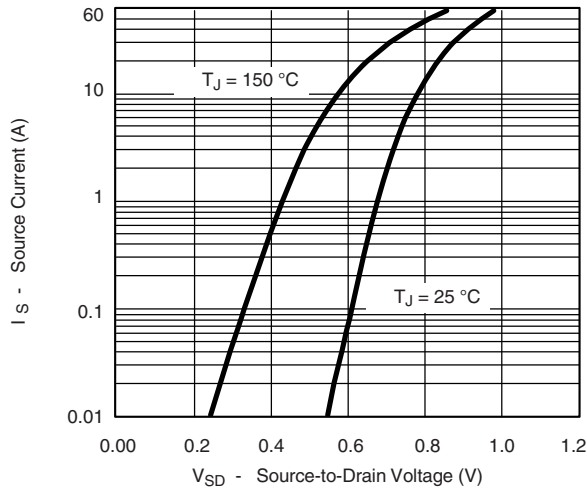


**Gate Charge**

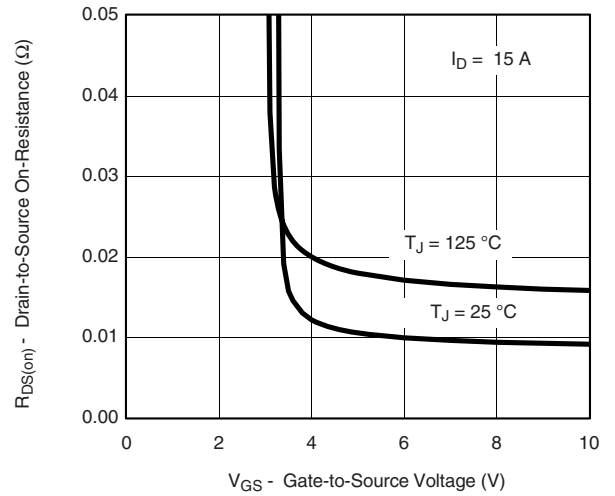


**On-Resistance vs. Junction Temperature**

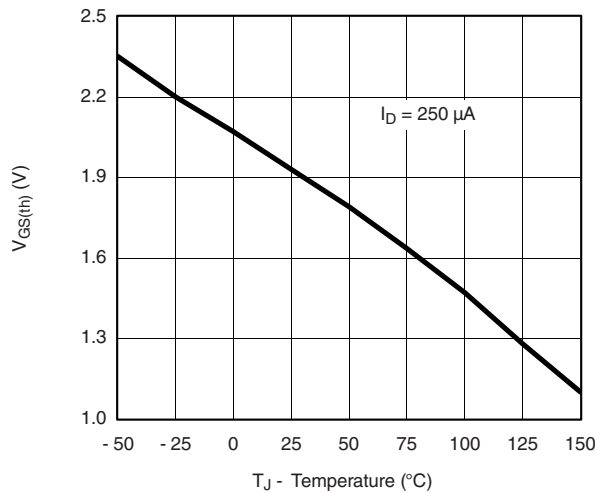
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



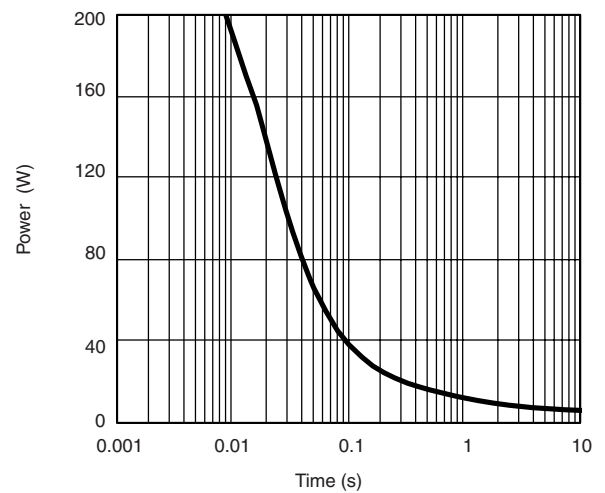
**Source-Drain Diode Forward Voltage**



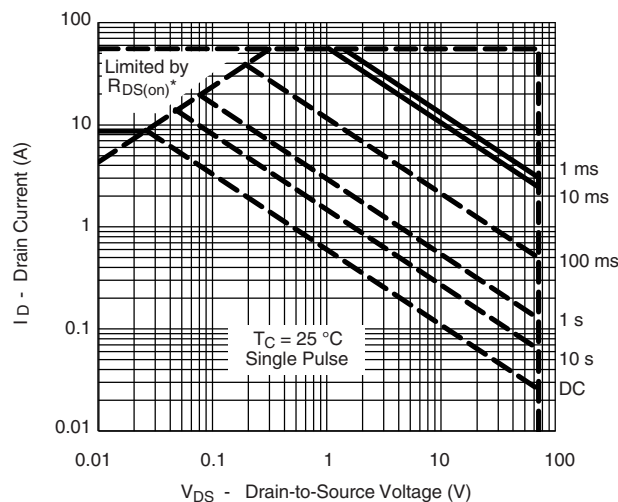
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



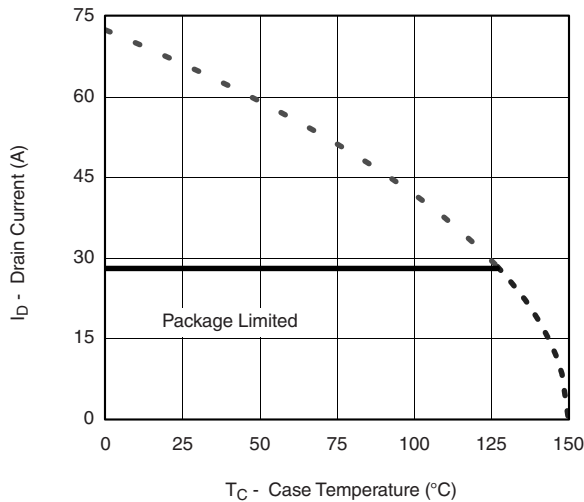
**Single Pulse Power, Junction-to-Ambient**



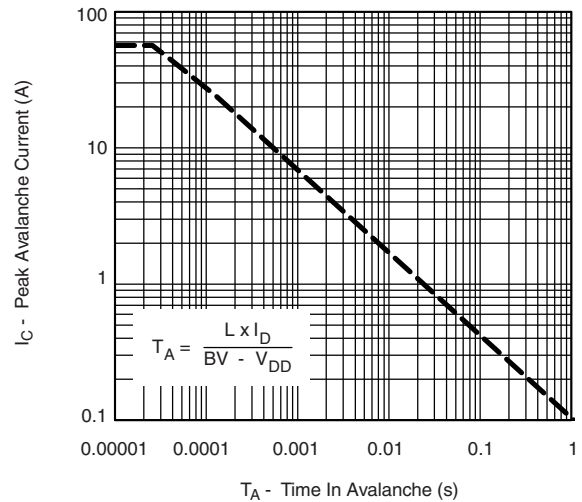
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

**Safe Operating Area, Junction-to-Ambient**

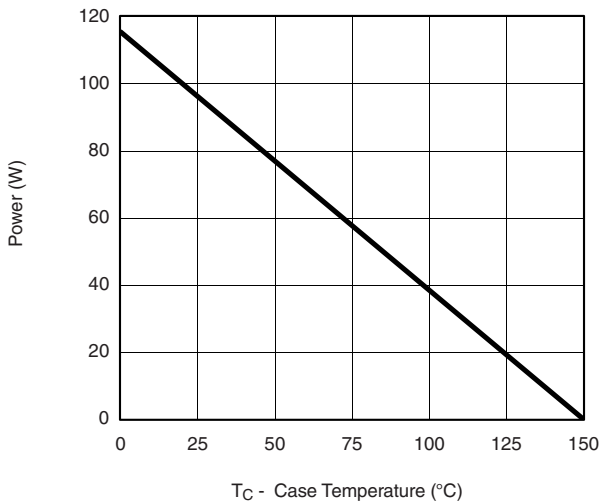
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



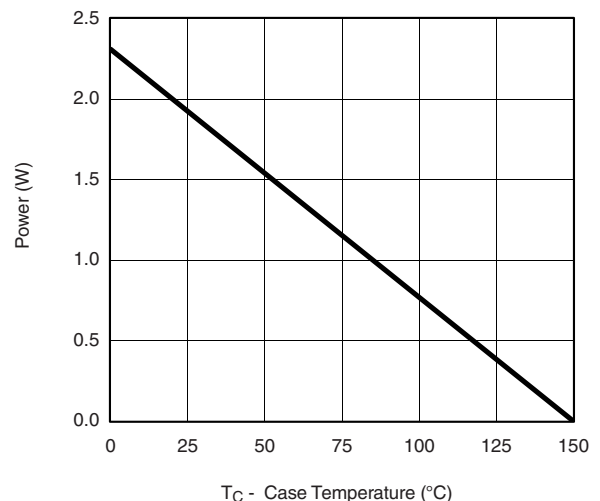
**Current Derating\***



**Single Pulse Avalanche Capability**



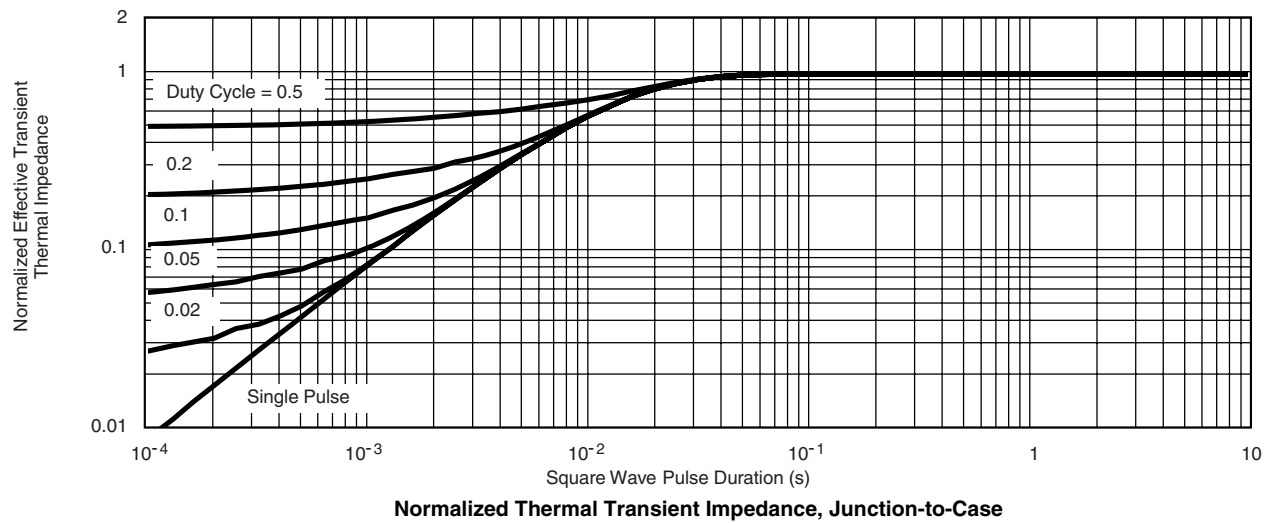
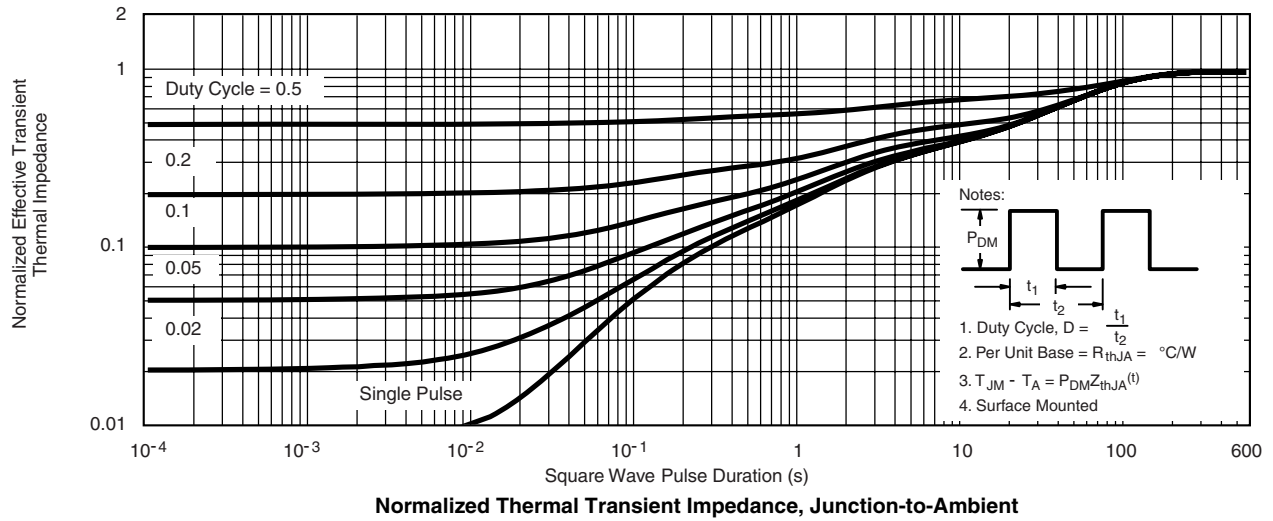
**Power, Junction-to-Case**



**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



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