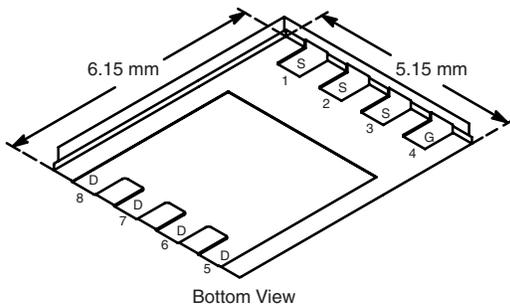




## P-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ.)
- 30	0.007 at V <sub>GS</sub> = - 10 V	- 30 <sup>d</sup>	63 nC
	0.0105 at V <sub>GS</sub> = - 4.5 V	- 30 <sup>d</sup>	

PowerPAK SO-8



### FEATURES

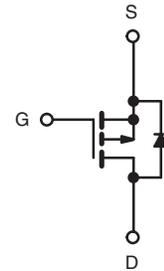
- Halogen-free
- TrenchFET® Power MOSFET
- 100% R<sub>G</sub> Tested
- 100% UIS Tested



RoHS  
COMPLIANT

### APPLICATIONS

- Notebook Battery Charging
- Notebook Adapter Switch
- Load Switch



Ordering Information: Si7159DP-T1-GE3 (Lead (Pb)-free and Halogen-free)

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>	- 30	V	
Gate-Source Voltage	V <sub>GS</sub>	± 25		
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	- 30 <sup>d</sup>	A
		T <sub>C</sub> = 70 °C	- 30 <sup>d</sup>	
		T <sub>A</sub> = 25 °C	- 20.7 <sup>a, b</sup>	
		T <sub>A</sub> = 70 °C	- 16.4 <sup>a, b</sup>	
Pulsed Drain Current	I <sub>DM</sub>	- 60	A	
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C		
		T <sub>A</sub> = 25 °C	- 4.5 <sup>a, b</sup>	
Avalanche Current	I <sub>AS</sub>	L = 0.1 mH	- 20	mJ
Single-Pulse Avalanche Energy			E <sub>AS</sub>	
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	83	W
		T <sub>C</sub> = 70 °C	53	
		T <sub>A</sub> = 25 °C	5.4 <sup>a, b</sup>	
		T <sub>A</sub> = 70 °C	3.4 <sup>a, b</sup>	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C	
Soldering Recommendations (Peak Temperature) <sup>e, f</sup>		260		

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a, c</sup>	R <sub>thJA</sub>	18	33	°C/W
Maximum Junction-to-Case	R <sub>thJC</sub>	1.0	1.5	

Notes:

- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under Steady State conditions is 65 °C/W.
- Package limited.
- See Solder Profile (<http://www.vishay.com/doc?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.



SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-30			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		-32		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			5.4		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1.0		-2.5	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 25\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-5	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq -10\text{ V}, V_{GS} = -10\text{ V}$	-30			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -15\text{ A}$		0.0058	0.007	$\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -10\text{ A}$		0.0085	0.0105	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -10\text{ V}, I_D = -15\text{ A}$		45		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		5170		pF
Output Capacitance	$C_{oss}$			930		
Reverse Transfer Capacitance	$C_{rss}$			890		
Total Gate Charge	$Q_g$	$V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}, I_D = -10\text{ A}$		118	180	nC
				63	95	
Gate-Source Charge	$Q_{gs}$	$V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -10\text{ A}$		14.3		
Gate-Drain Charge	$Q_{gd}$			29.8		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	0.4	2.1	4.2	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 1.5\text{ }\Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		16	30	ns
Rise Time	$t_r$			15	30	
Turn-Off Delay Time	$t_{d(off)}$			72	140	
Fall Time	$t_f$			17	30	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 1.5\text{ }\Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		73	140	
Rise Time	$t_r$			132	200	
Turn-Off Delay Time	$t_{d(off)}$			65	100	
Fall Time	$t_f$			40	70	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			-30	A
Pulse Diode Forward Current	$I_{SM}$				-60	
Body Diode Voltage	$V_{SD}$	$I_S = -3\text{ A}, V_{GS} = 0\text{ V}$		-0.72	-1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -10\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		54	100	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			50	100	nC
Reverse Recovery Fall Time	$t_a$			24		ns
Reverse Recovery Rise Time	$t_b$			30		

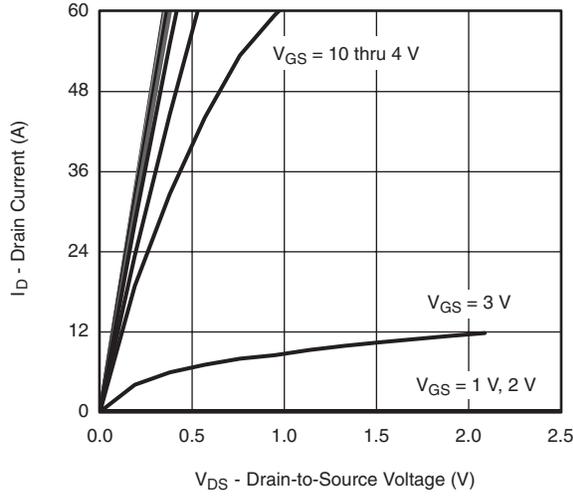
Notes:

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

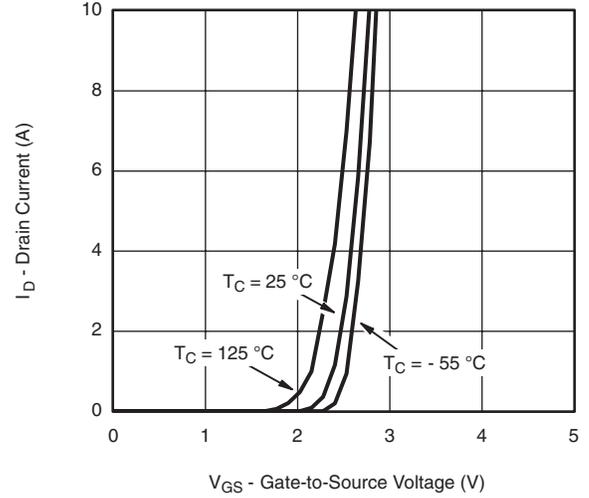
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



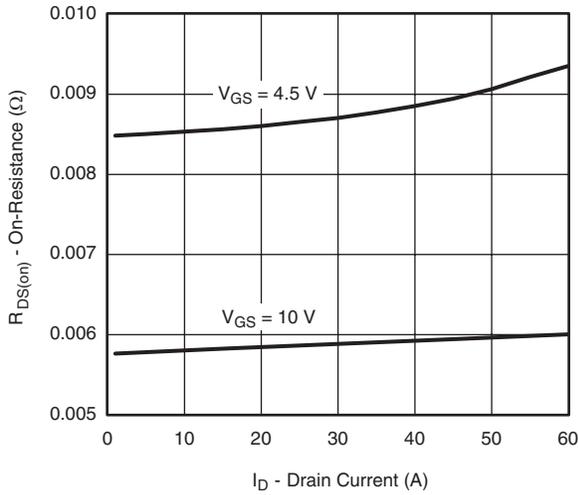
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



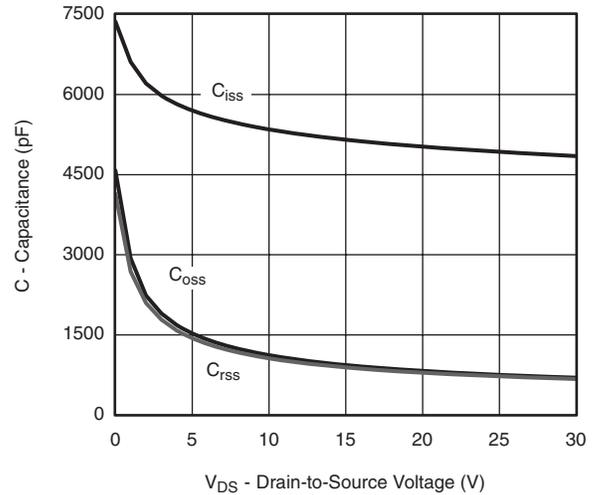
**Output Characteristics**



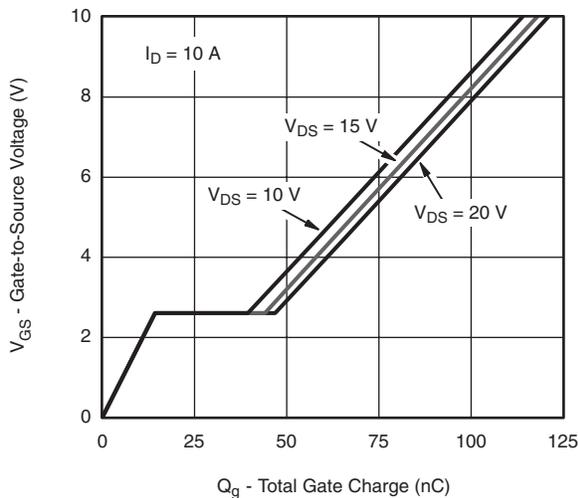
**Transfer Characteristics**



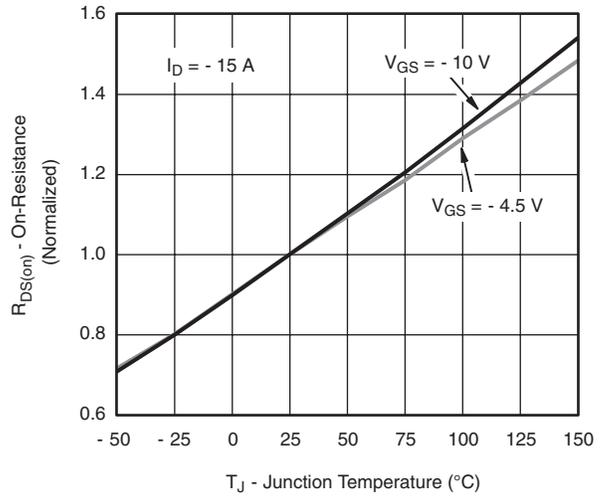
**On-Resistance vs. Drain Current**



**Capacitance**



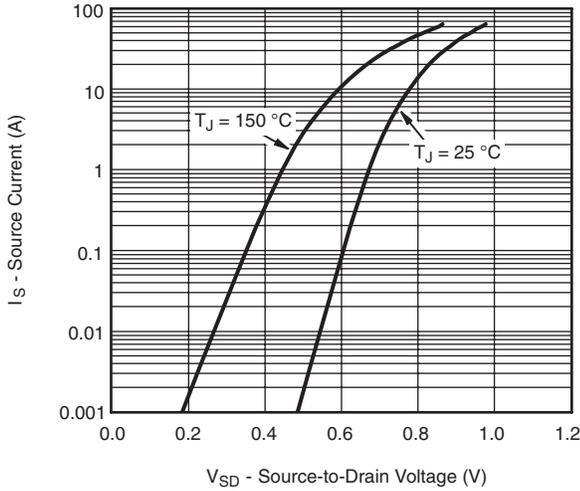
**Gate Charge**



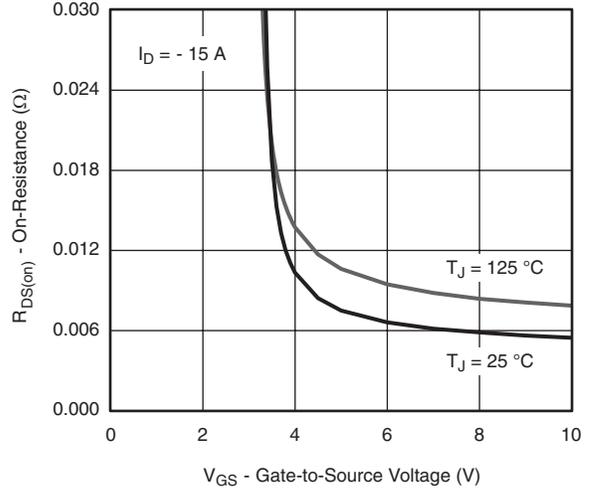
**On-Resistance vs. Junction Temperature**



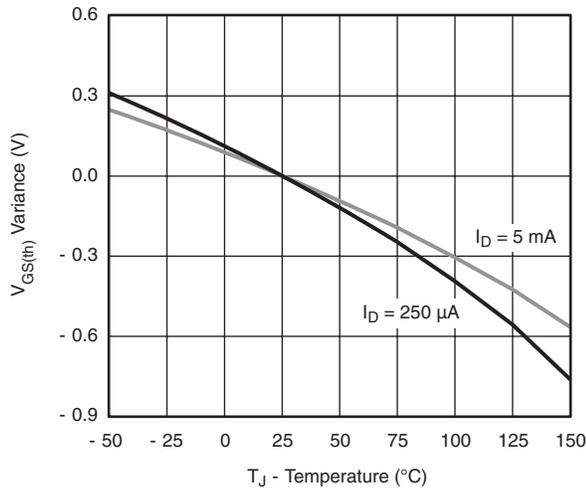
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



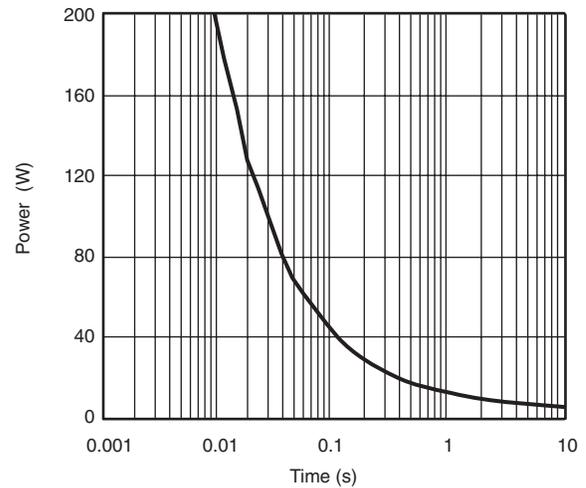
Source-Drain Diode Forward Voltage



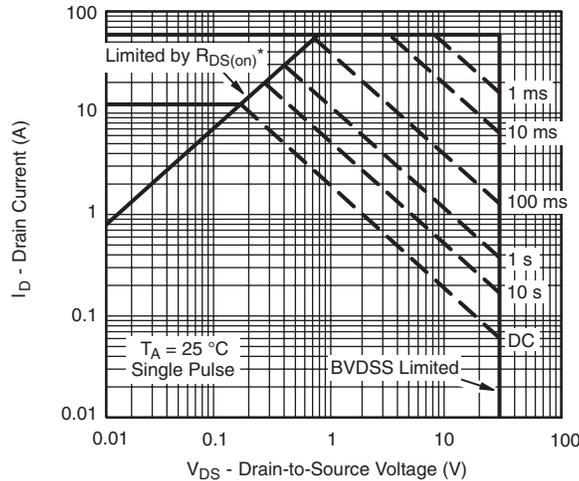
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient

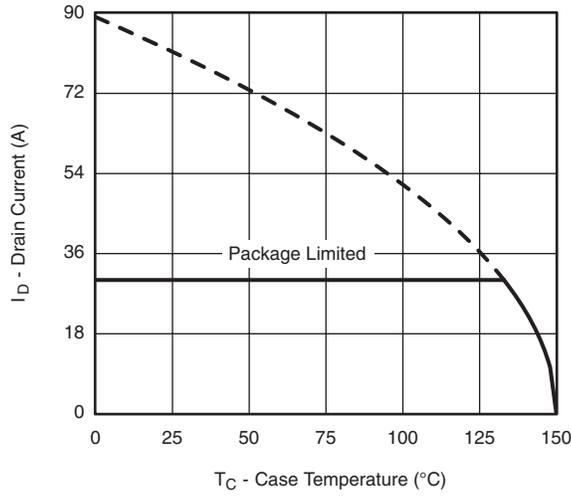


\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

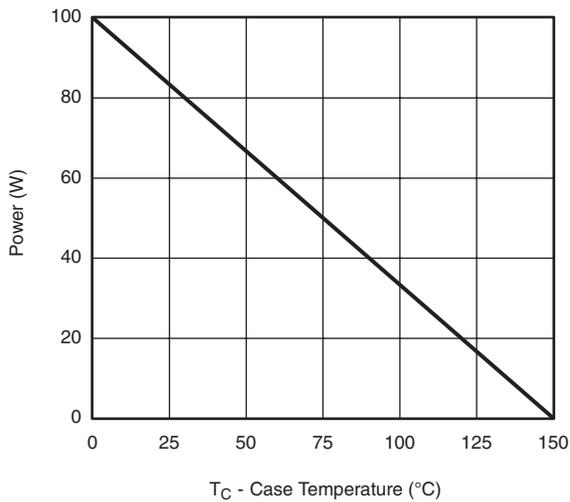
Safe Operating Area



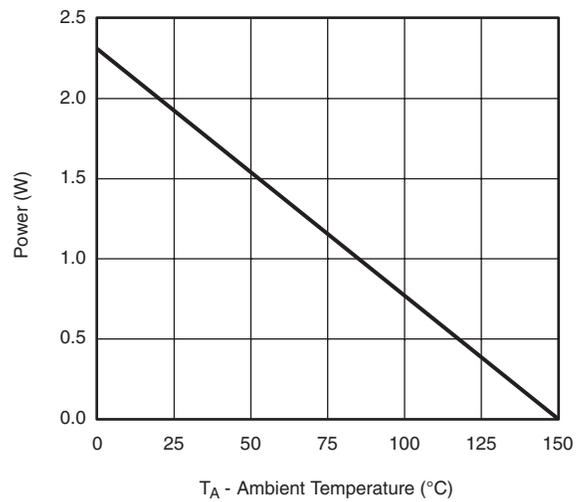
**MOSFET TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



**Current Derating\***



**Power, Junction-to-Case**

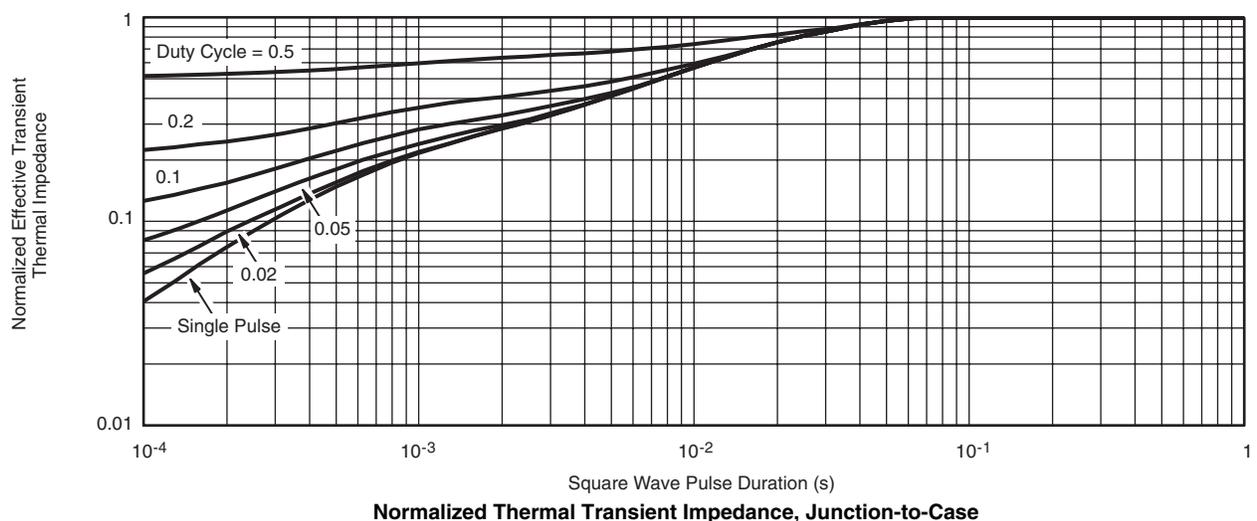
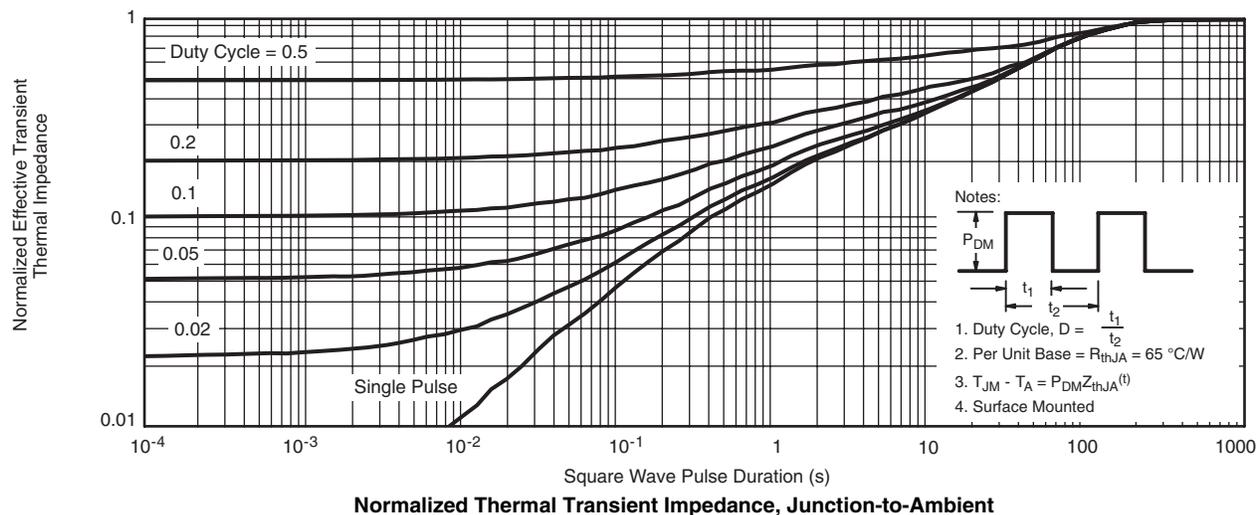


**Power Derating, Junction-to-Ambient**

\* 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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