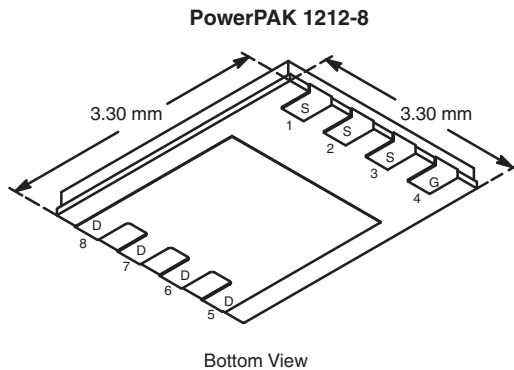


## N-Channel 30 V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>e</sup>	Q <sub>g</sub> (Typ.)
30	0.0062 at V <sub>GS</sub> = 10 V	35	11.6 nC
	0.0087 at V <sub>GS</sub> = 4.5 V	35	



Ordering Information: SiS776DN-T1-GE3 (Lead (Pb)-free and Halogen-free)

### FEATURES

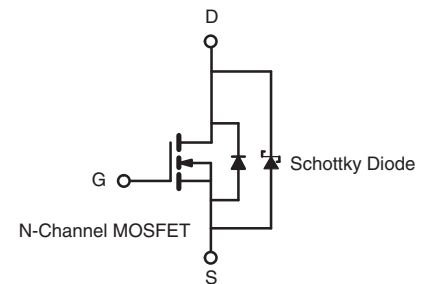
- Halogen-free According to IEC 61249-2-21 Definition
- SkyFET Monolithic TrenchFET<sup>®</sup> Power MOSFET and Schottky Diode
- Low Thermal Resistance PowerPAK<sup>®</sup> Package with Small Size and Low 1.07 mm Profile
- 100 % R<sub>g</sub> Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS  
COMPLIANT  
HALOGEN  
FREE

### APPLICATIONS

- System Power - Low Side



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>	± 20	
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	35 <sup>e</sup>
		T <sub>C</sub> = 70 °C	35 <sup>e</sup>
		T <sub>A</sub> = 25 °C	18.3 <sup>a, b</sup>
		T <sub>A</sub> = 70 °C	14.5 <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	5.4 <sup>a, b</sup>
Single Pulse Avalanche Current	I <sub>AS</sub>	20	mJ
Single Pulse Avalanche Energy	E <sub>AS</sub>	20	
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	52
		T <sub>C</sub> = 70 °C	33
		T <sub>A</sub> = 25 °C	3.8 <sup>a, b</sup>
		T <sub>A</sub> = 70 °C	2.4 <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) <sup>c, d</sup>		260	

Notes:

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

b. t = 10 s.

c. See solder profile ([www.vishay.com/doc?73257](http://www.vishay.com/doc?73257)). The PowerPAK 1212-8 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.

d. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.

e. Package limited.

**THERMAL RESISTANCE RATINGS**

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a, b</sup>	$t \leq 10$ s	$R_{thJA}$	24	33	°C/W
Maximum Junction-to-Case (Drain)	Steady State	$R_{thJC}$	1.9	2.4	

Notes:

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

b. Maximum under steady state conditions is 81 °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, $I_D = 1$ mA	30			V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250$ $\mu$ A	1.0		2.5	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0$ V, $V_{GS} = \pm 20$ V			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30$ V, $V_{GS} = 0$ V		0.030	0.30	mA
		$V_{DS} = 30$ V, $V_{GS} = 0$ V, $T_J = 100$ °C		1.6	15	
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, $I_D = 10$ A		0.0050	0.0062	$\Omega$
		$V_{GS} = 4.5$ V, $I_D = 7$ A		0.0072	0.0087	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 10$ V, $I_D = 10$ A		40		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 15$ V, $V_{GS} = 0$ V, $f = 1$ MHz		1360		pF
Output Capacitance	$C_{oss}$			340		
Reverse Transfer Capacitance	$C_{rss}$			117		
Total Gate Charge	$Q_g$	$V_{DS} = 15$ V, $V_{GS} = 10$ V, $I_D = 10$ A		24	36	nC
		$V_{DS} = 15$ V, $V_{GS} = 4.5$ V, $I_D = 10$ A		11.6	17.5	
Gate-Source Charge	$Q_{gs}$	$V_{DS} = 15$ V, $V_{GS} = 4.5$ V, $I_D = 10$ A		3.5		nC
Gate-Drain Charge	$Q_{gd}$			3.6		
Gate Resistance	$R_g$		$f = 1$ MHz	0.4	1.5	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15$ V, $R_L = 1.5$ $\Omega$ $I_D \cong 10$ A, $V_{GEN} = 4.5$ V, $R_g = 1$ $\Omega$		18	35	ns
Rise Time	$t_r$			11	22	
Turn-Off Delay Time	$t_{d(off)}$			20	40	
Fall Time	$t_f$			10	20	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15$ V, $R_L = 1.5$ $\Omega$ $I_D \cong 10$ A, $V_{GEN} = 10$ V, $R_g = 1$ $\Omega$		11	22	
Rise Time	$t_r$			10	20	
Turn-Off Delay Time	$t_{d(off)}$			20	40	
Fall Time	$t_f$			8	16	



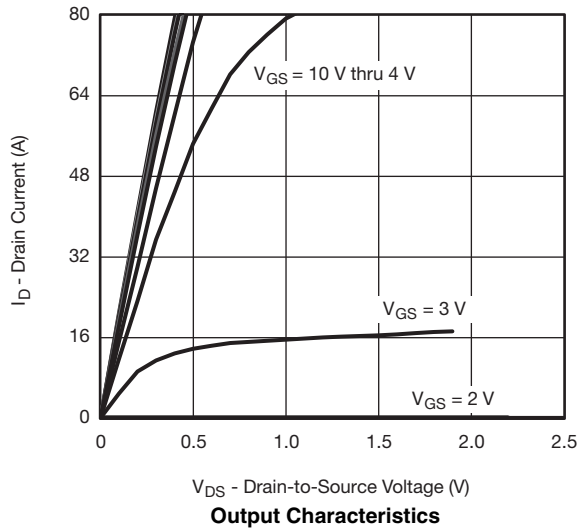
SPECIFICATIONS ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			35	A
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				60	
Body Diode Voltage	$V_{SD}$	$I_S = 3\text{ A}$		0.49	0.65	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 10\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $T_J = 25\text{ }^\circ\text{C}$		19	35	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			8	15	nC
Reverse Recovery Fall Time	$t_a$			8		ns
Reverse Recovery Rise Time	$t_b$			11		

Notes:

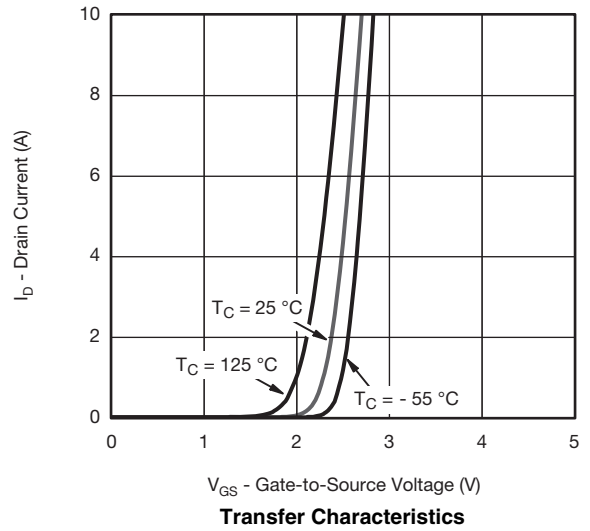
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

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.

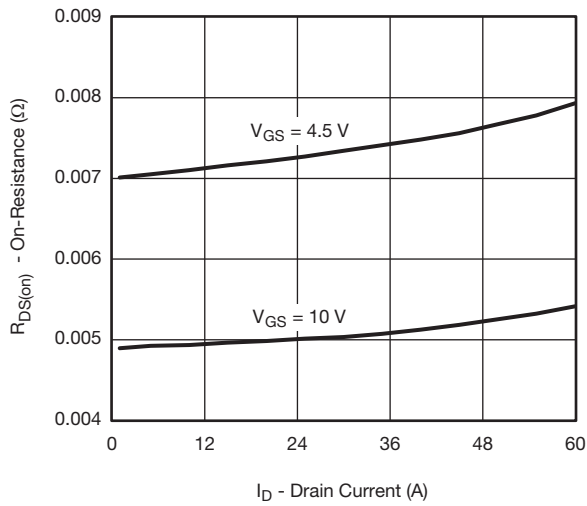
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



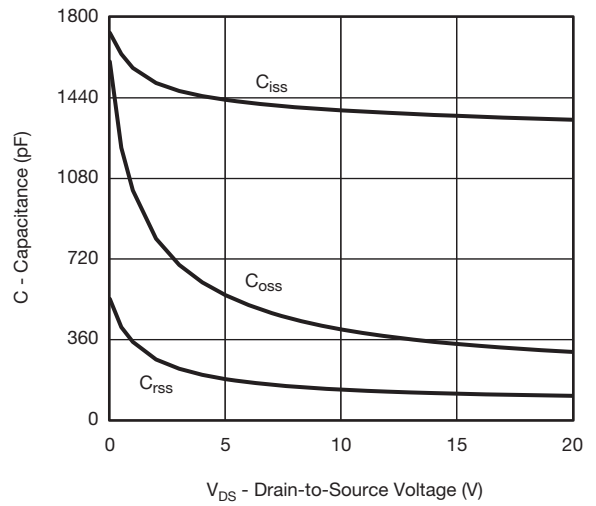
**Output Characteristics**



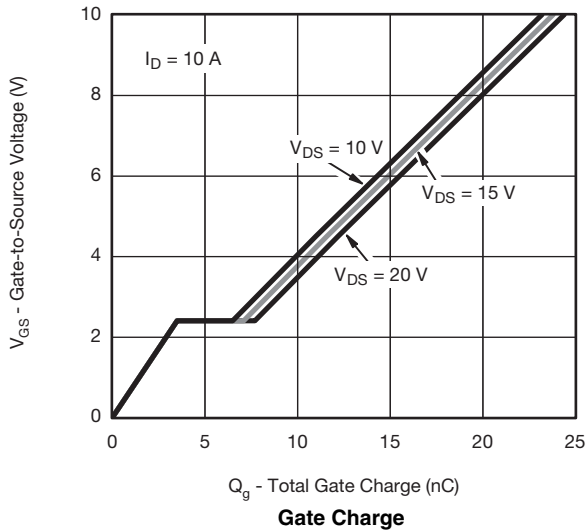
**Transfer Characteristics**



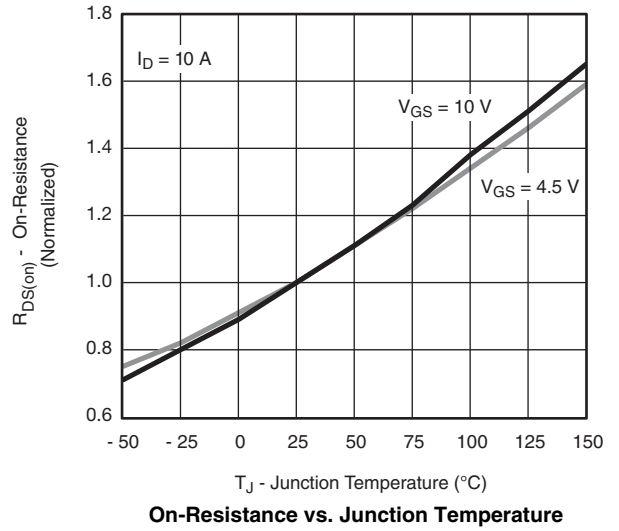
**On-Resistance vs. Drain Current**



**Capacitance**

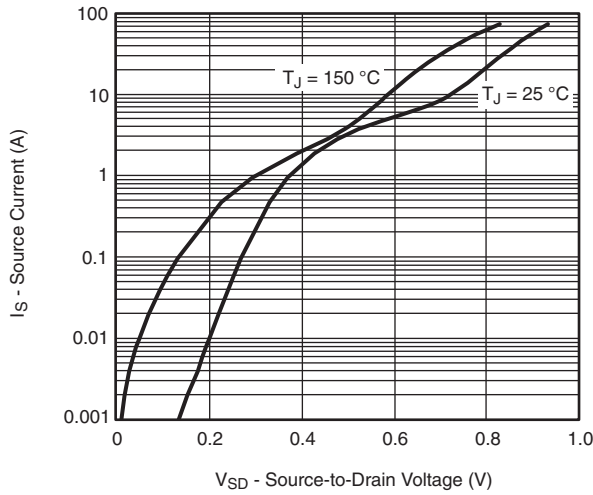


**Gate Charge**

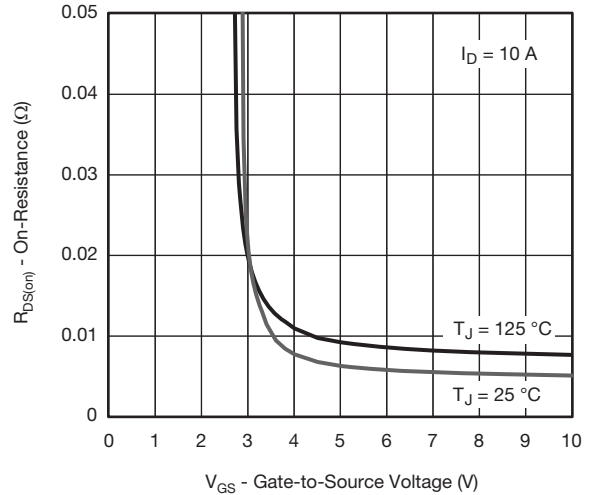


**On-Resistance vs. Junction Temperature**

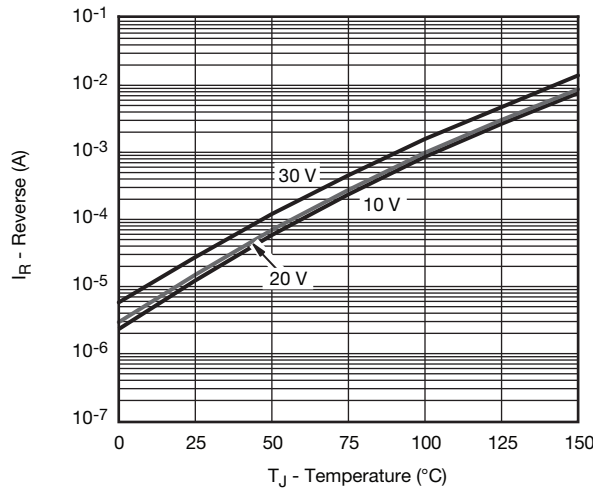
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



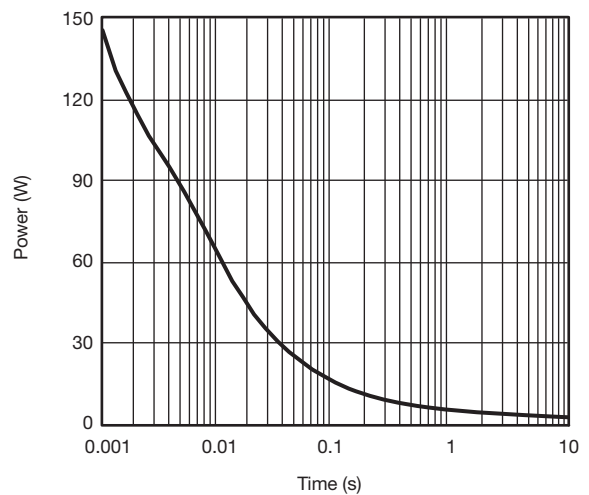
**Source-Drain Diode Forward Voltage**



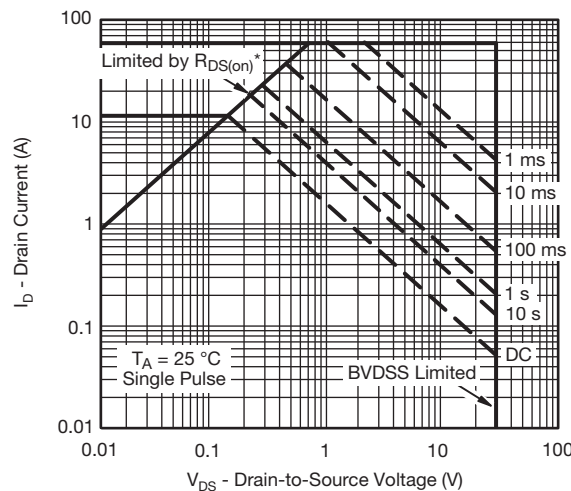
**On-Resistance vs. Gate-to-Source Voltage**



**Reverse Current (Schottky)**



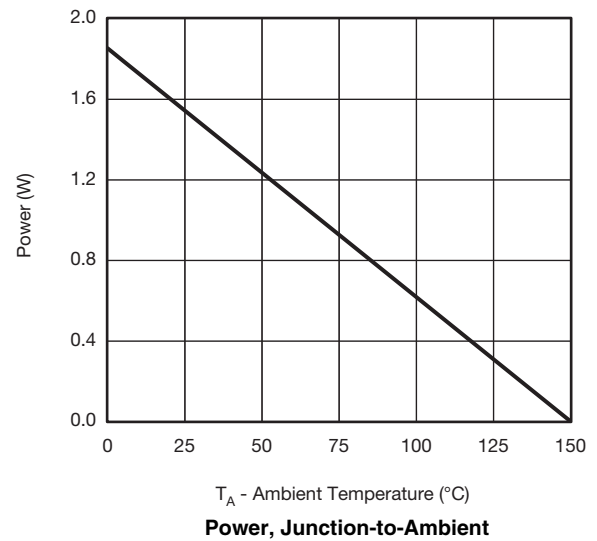
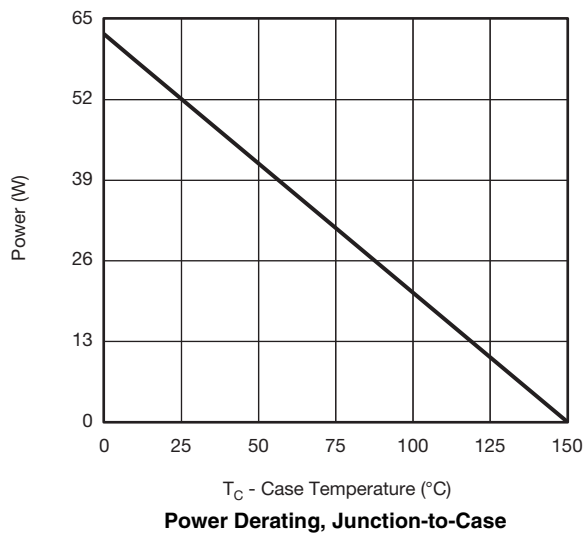
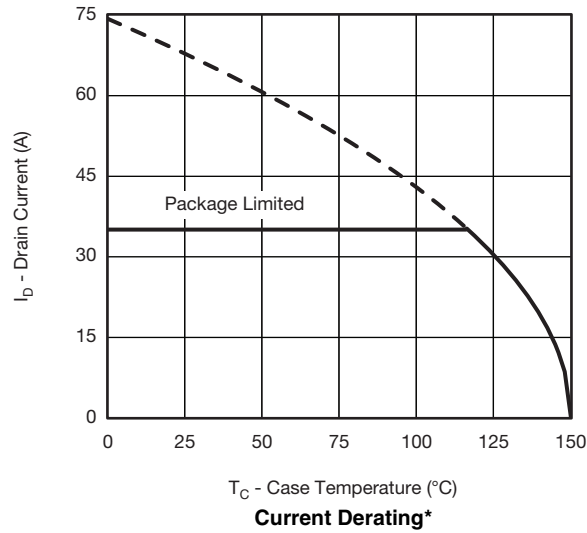
**Single Pulse Power, Junction-to-Ambient**



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

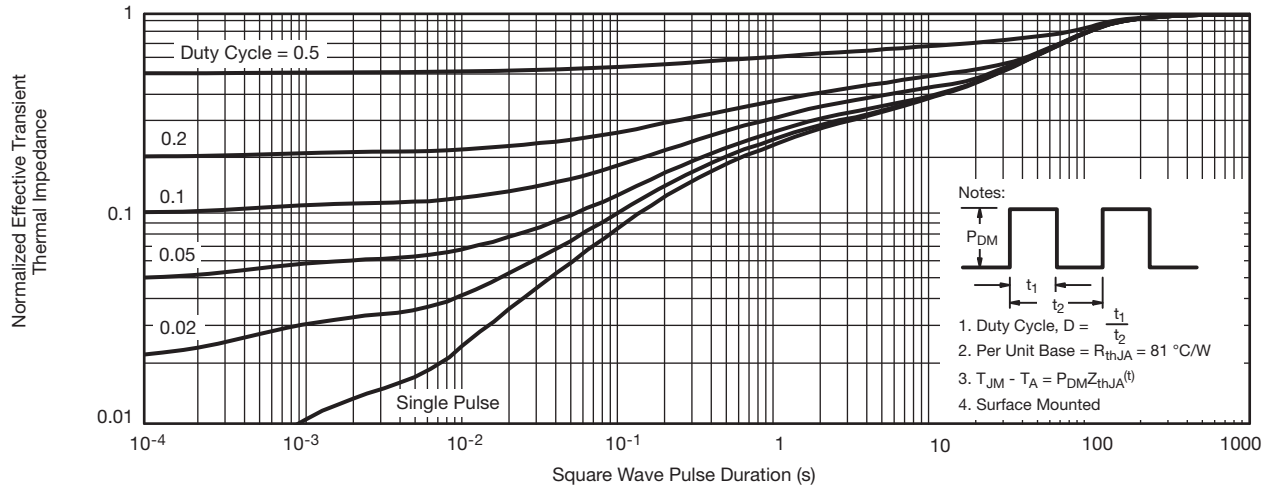
**Safe Operating Area, Junction-to-Ambient**

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

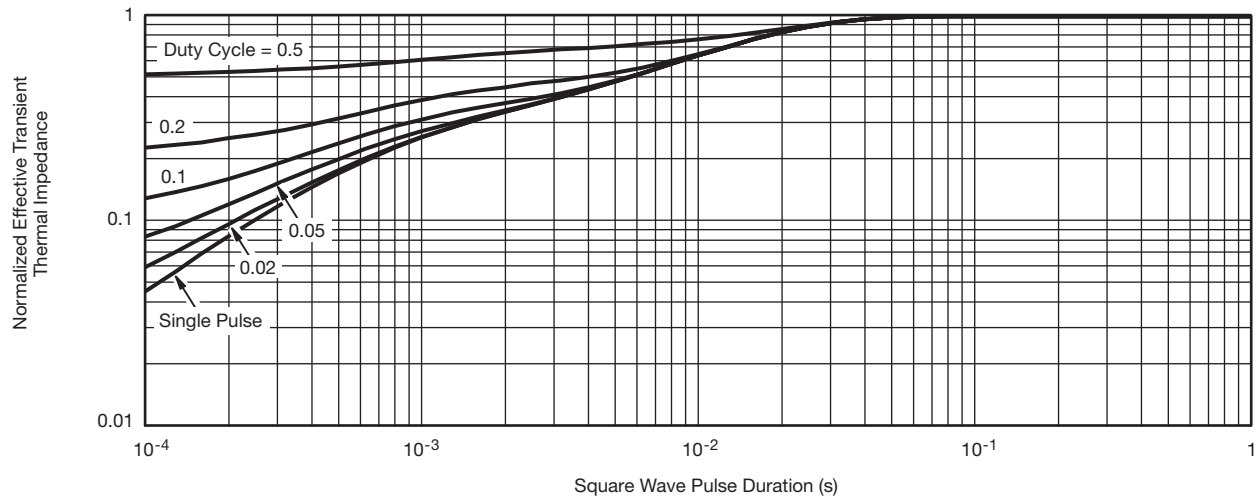


\* The power dissipation  $P_D$  is based on  $T_{J(max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

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



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



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

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