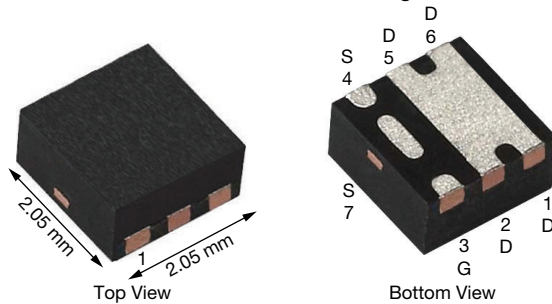


## P-Channel 20 V (D-S) MOSFET

**PowerPAK® SC-70-6L Single**

**FEATURES**

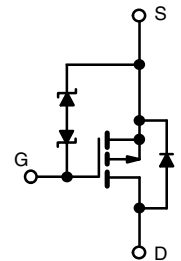
- TrenchFET® power MOSFET
- 100 % R<sub>g</sub> tested
- Thermally enhanced PowerPAK® SC-70 package
  - Small footprint area
  - Low on-resistance
- Typical ESD protection: 3000 V (HBM)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
 COMPLIANT  
 HALOGEN  
**FREE**
**PRODUCT SUMMARY**

V <sub>DS</sub> (V)	-20
R <sub>DS(on)</sub> max. (Ω) at V <sub>GS</sub> = -4.5 V	0.0320
R <sub>DS(on)</sub> max. (Ω) at V <sub>GS</sub> = -2.5 V	0.0410
R <sub>DS(on)</sub> max. (Ω) at V <sub>GS</sub> = -1.8 V	0.0675
Q <sub>g</sub> typ. (nC)	13.8
I <sub>D</sub> (A) <sup>a, e</sup>	-9
Configuration	Single

**Marking Code: KC**
**APPLICATIONS**

- Power management for portable and consumer
  - Load switches
  - Battery switches
  - Charger switches



P-Channel MOSFET

**ORDERING INFORMATION**

Package	PowerPAK SC-70
Lead (Pb)-free and halogen-free	SiA4265EDJ-T1-GE3

**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>	± 8	
Continuous drain current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	-9 <sup>e</sup>
		T <sub>C</sub> = 70 °C	-9 <sup>e</sup>
		T <sub>A</sub> = 25 °C	-7.8 <sup>b, c</sup>
		T <sub>A</sub> = 70 °C	-6.2 <sup>b, c</sup>
Pulsed drain current (t = 300 μs)	I <sub>DM</sub>	-20	A
Continuous source-drain diode current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	
		T <sub>A</sub> = 25 °C	-2.4
Maximum power dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	15.6
		T <sub>C</sub> = 70 °C	10
		T <sub>A</sub> = 25 °C	2.9 <sup>b, c</sup>
		T <sub>A</sub> = 70 °C	1.8 <sup>b, c</sup>
Operating junction and storage temperature range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C
Soldering recommendations (peak temperature) <sup>d, e</sup>		260	

**THERMAL RESISTANCE RATINGS**

PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient <sup>b, d</sup>	R <sub>thJA</sub>	32	43	°C/W
Maximum junction-to-foot (drain)	R <sub>thJF</sub>	6	8	

**Notes**

- T<sub>C</sub> = 25 °C
- Surface mounted on 1" x 1" FR4 board
- t = 5 s
- Maximum under steady state conditions is 80 °C/W
- Package limited



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	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = -250\text{ }\mu\text{A}$	-20	-	-	V
$V_{DS}$ temperature coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$	-	-14	-	mV/ $^\circ\text{C}$
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$		-	2.5	-	
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = -250\text{ }\mu\text{A}$	-0.4	-	-1	V
Gate-source leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 8\text{ V}$	-	-	$\pm 10$	$\mu\text{A}$
		$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 4.5\text{ V}$	-	-	$\pm 1$	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = -20\text{ V}$ , $V_{GS} = 0\text{ V}$	-	-	-1	
		$V_{DS} = -20\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 55\text{ }^\circ\text{C}$	-	-	-10	
Drain-source on-state resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}$ , $I_D = -4\text{ A}$	-	0.0265	0.0320	$\Omega$
		$V_{GS} = -2.5\text{ V}$ , $I_D = -4\text{ A}$	-	0.0340	0.0410	
		$V_{GS} = -1.8\text{ V}$ , $I_D = -2\text{ A}$	-	0.0465	0.0675	
<b>Dynamic <sup>b</sup></b>						
Input capacitance	$C_{iss}$	$V_S = 0\text{ V}$ , $f = 1\text{ MHz}$	-	1180	-	pF
Output capacitance	$C_{oss}$		-	135	-	
Reverse transfer capacitance	$C_{rss}$		-	130	-	
Total gate charge	$Q_g$	$V_{DS} = -10\text{ V}$ , $V_{GS} = -8\text{ V}$ , $I_D = -4.5\text{ A}$	-	23.8	36	nC
		$V_{DS} = -10\text{ V}$ , $V_{GS} = -4.5\text{ V}$ , $I_D = -4.5\text{ A}$	-	13.8	21	
Gate-source charge	$Q_{gs}$		-	1.9	-	
Gate-drain charge	$Q_{gd}$	-	3	-		
Gate resistance	$R_g$	$f = 1\text{ MHz}$	2.2	11	22	$\Omega$
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -10\text{ V}$ , $R_L = 2.8\text{ }\Omega$ $I_D \cong -3.6\text{ A}$ , $V_{GEN} = -4.5\text{ V}$ , $R_g = 1\text{ }\Omega$	-	22	33	ns
Rise time	$t_r$		-	21	32	
Turn-off delay time	$t_{d(off)}$		-	62	93	
Fall time	$t_f$		-	14	21	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -10\text{ V}$ , $R_L = 2.8\text{ }\Omega$ $I_D \cong -3.6\text{ A}$ , $V_{GEN} = -8\text{ V}$ , $R_g = 1\text{ }\Omega$	-	9	18	
Rise time	$t_r$		-	6	12	
Turn-off delay time	$t_{d(off)}$		-	65	98	
Fall time	$t_f$		-	15	23	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous source-drain diode current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$	-	-	-1.4	A
Pulse diode forward current	$I_{SM}$		-	-	-20	
Body diode voltage	$V_{SD}$	$I_S = -3.6\text{ A}$ , $V_{GS} = 0\text{ V}$	-	-0.8	-1.2	V
Body diode reverse recovery time	$t_{rr}$	$I_F = -3.6\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $T_J = 25\text{ }^\circ\text{C}$	-	13	20	ns
Body diode reverse recovery charge	$Q_{rr}$		-	5	10	nC
Reverse recovery fall time	$t_a$		-	8	-	ns
Reverse recovery rise time	$t_b$		-	5	-	

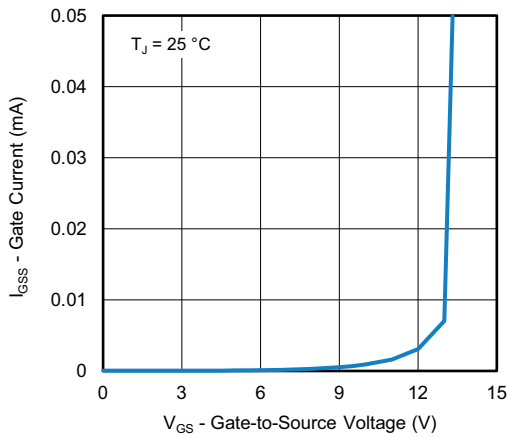
**Notes**

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

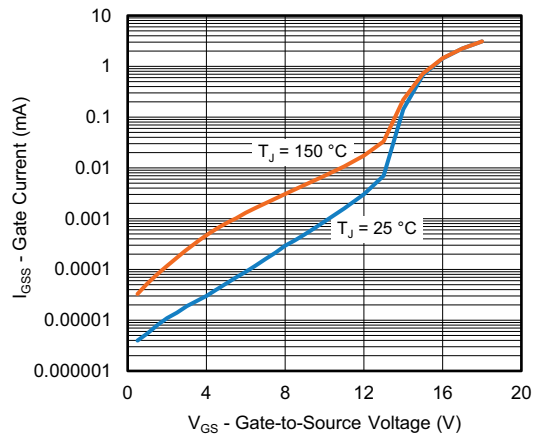
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



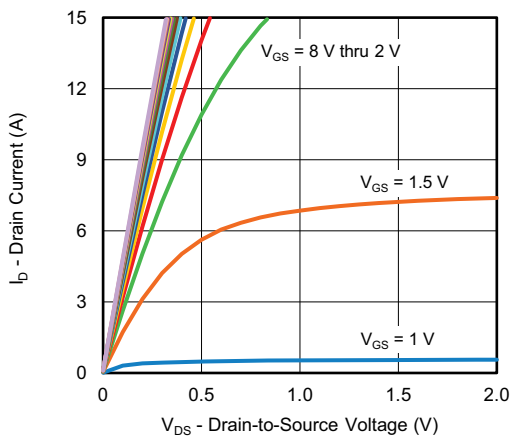
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



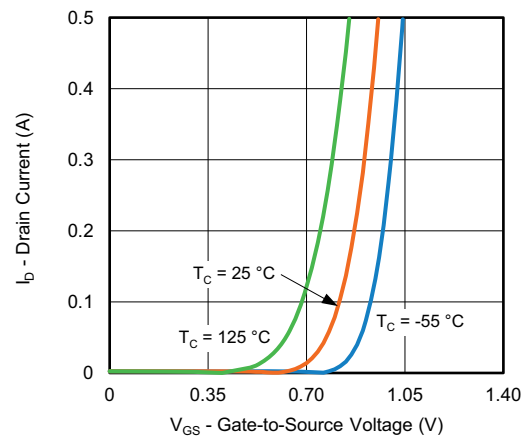
Gate Current vs. Gate-Source Voltage



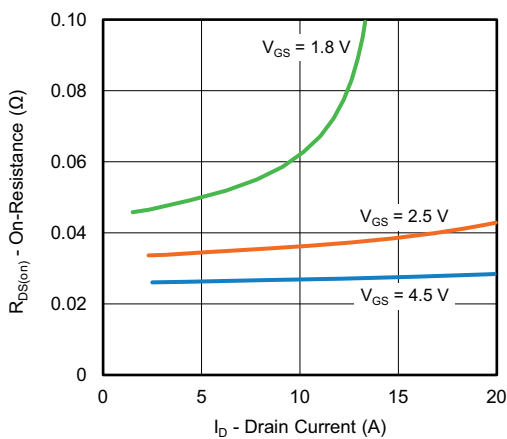
Gate Current vs. Gate-Source Voltage



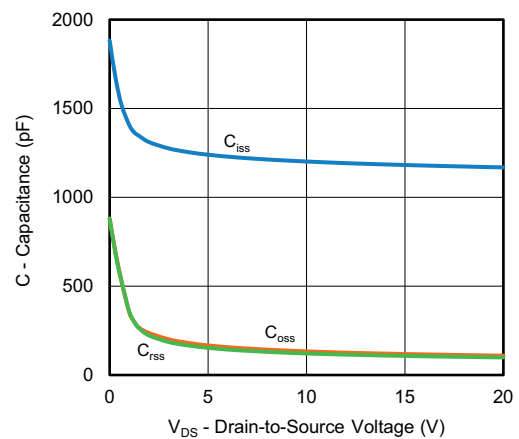
Output Characteristics



Transfer Characteristics

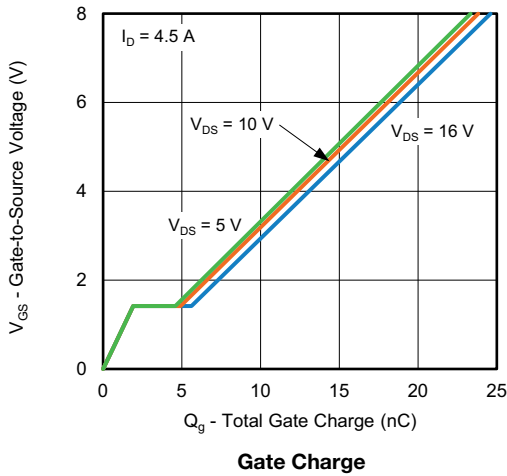


On-Resistance vs. Drain Current

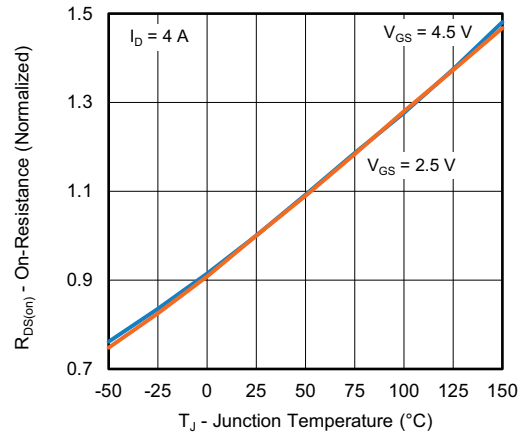


Capacitance

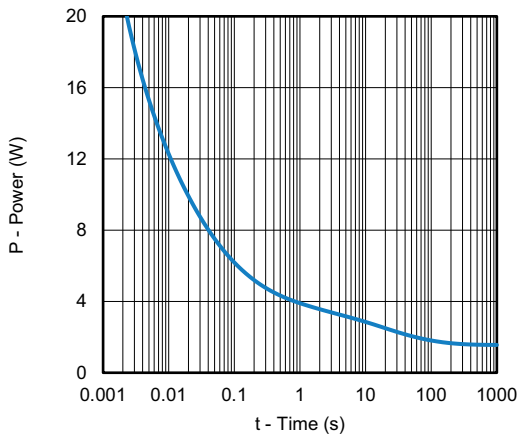
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



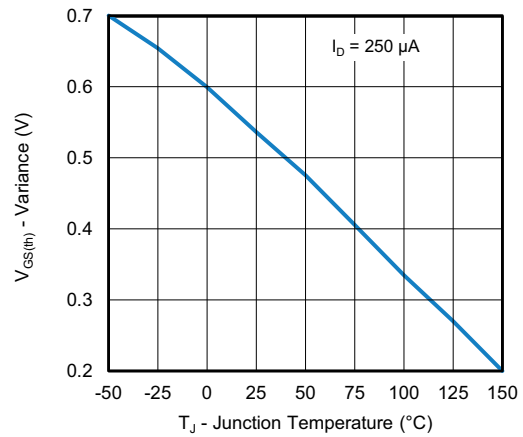
**Gate Charge**



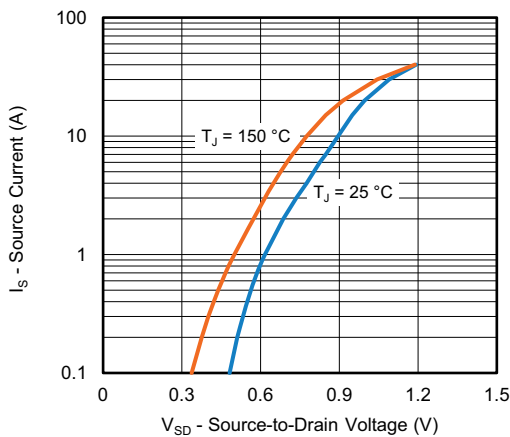
**On-Resistance vs. Junction Temperature**



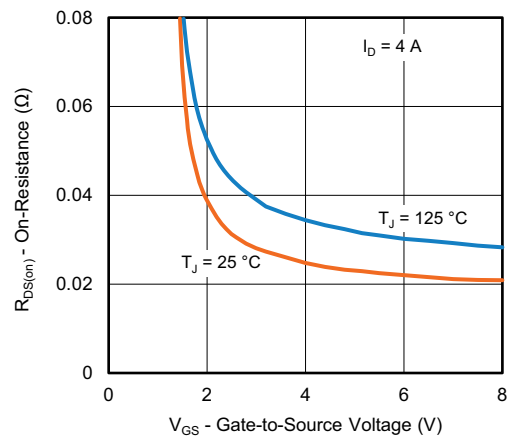
**Single Pulse Power, Junction-to-Ambient**



**Threshold Voltage**



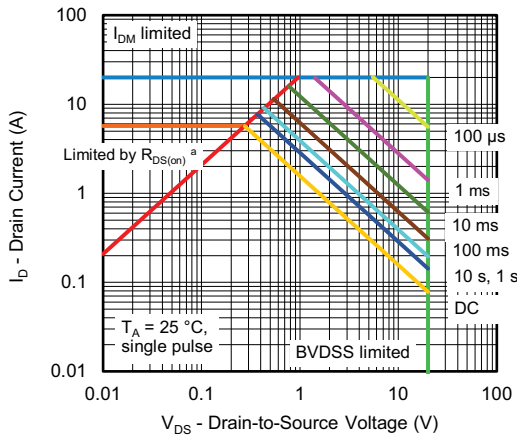
**Source-Drain Diode Forward Voltage**



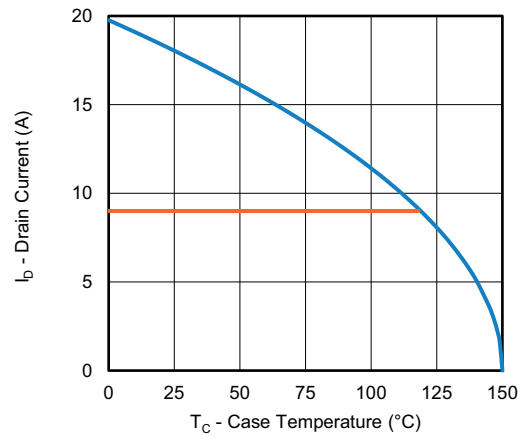
**On-Resistance vs. Gate-to-Source Voltage**



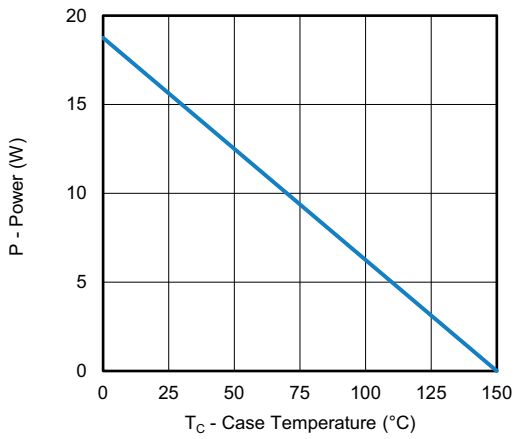
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



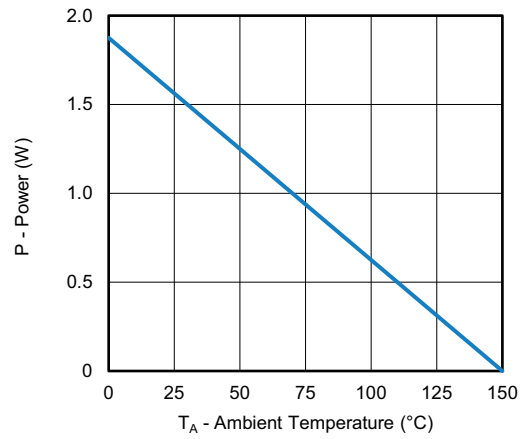
Safe Operating Area, Junction-to-Ambient



Current Derating <sup>a</sup>



Power Junction-to-Case



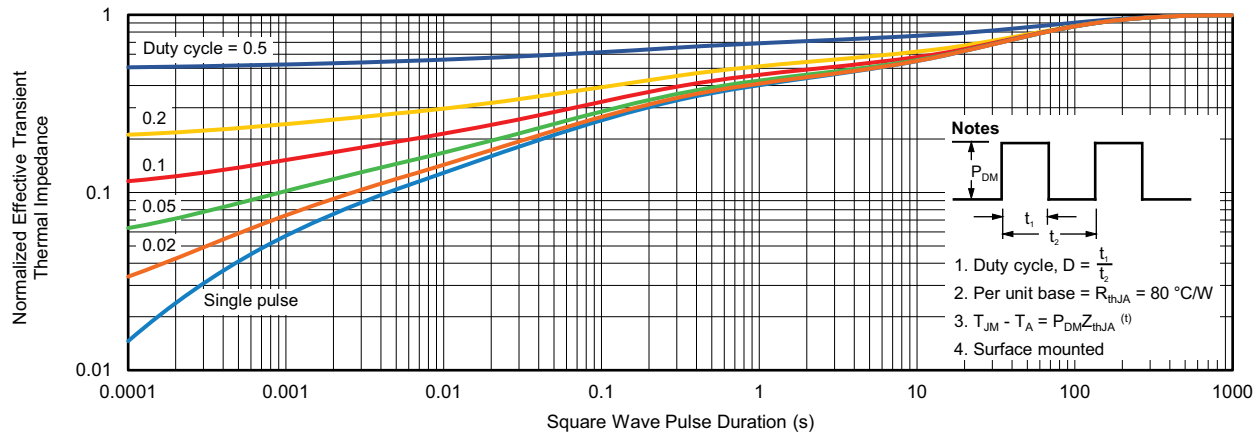
Power Junction-to-Ambient

Note

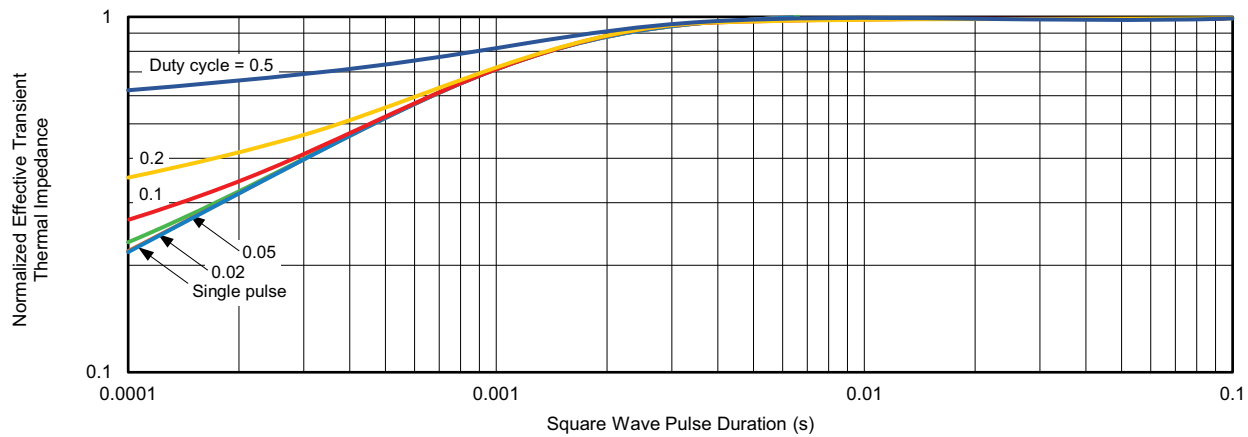
- a. The power dissipation  $P_D$  is based on  $T_J \text{ max.} = 150^\circ\text{C}$ , using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls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



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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