

Dual N-Channel 190-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
190	3.8 at $V_{GS} = 4.5$ V	0.95	1.4 nC
	4.2 at $V_{GS} = 2.5$ V	0.9	
	17 at $V_{GS} = 1.8$ V	0.3	

FEATURES

- Halogen-free According to IEC 61249-2-21
- LITTLE FOOT[®] Power MOSFET
- New Thermally Enhanced PowerPAK[®] SC-70 Package
 - Small Footprint Area
 - Low On-Resistance
 - Thin 0.75 mm profile

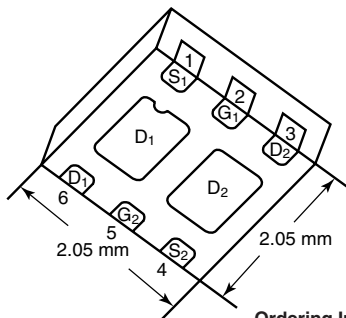


RoHS
COMPLIANT
HALOGEN
FREE

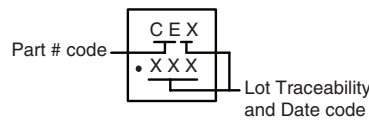
APPLICATIONS

- DC/DC Converter for Portable Devices
- Load Switch for Portable Devices

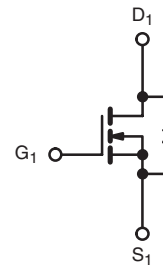
PowerPAK SC-70-6 Dual



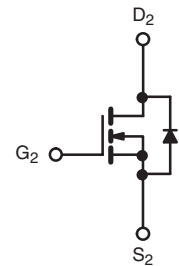
Marking Code



Ordering Information: SiA950DJ-T1-GE3 (Lead (Pb)-free and Halogen-free)



N-Channel MOSFET



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	190	V	
Gate-Source Voltage	V_{GS}	± 16		
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	0.95	
		$T_C = 70$ °C	0.76	
		$T_A = 25$ °C	0.47 ^{b, c}	
		$T_A = 70$ °C	0.38 ^{b, c}	
Pulsed Drain Current	I_{DM}	1	A	
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C		0.95
		$T_A = 25$ °C		0.47 ^{b, c}
Maximum Power Dissipation	P_D	$T_C = 25$ °C		7
		$T_C = 70$ °C	5	
		$T_A = 25$ °C	1.9 ^{b, c}	
		$T_A = 70$ °C	1.2 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C	
Soldering Recommendations (Peak Temperature) ^{d, e}		260		

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, f}	$t \leq 5$ s	R_{thJA}	52	65	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	12.5	16	

Notes:

a. $T_C = 25$ °C.

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

c. $t = 5$ s.d. See Solder Profile (www.vishay.com/ppg?73257). The PowerPAK SC-70 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.

e. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

f. Maximum under Steady State conditions is 110 °C/W.

SPECIFICATIONS $T_J = 25$ °C, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0$ V, $I_D = 250$ μ A	190			V	
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250$ μ A		200		mV/°C	
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		-3.0				
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250$ μ A	0.6		1.4	V	
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 16$ V			± 100	nA	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 190$ V, $V_{GS} = 0$ V			1	μ A	
		$V_{DS} = 190$ V, $V_{GS} = 0$ V, $T_J = 85$ °C			10		
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5$ V, $V_{GS} = 4.5$ V	1			A	
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5$ V, $I_D = 0.36$ A		3.0	3.8	Ω	
		$V_{GS} = 2.5$ V, $I_D = 0.35$ A		3.2	4.2		
		$V_{GS} = 1.8$ V, $I_D = 0.15$ A		3.5	17.0		
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15$ V, $I_D = 0.36$ A		2		S	
Dynamic^b							
Input Capacitance	C_{iss}	$V_{DS} = 100$ V, $V_{GS} = 0$ V, $f = 1$ MHz		90		pF	
Output Capacitance	C_{oss}		5				
Reverse Transfer Capacitance	C_{rss}		3				
Total Gate Charge	Q_g	$V_{DS} = 95$ V, $V_{GS} = 10$ V, $I_D = 0.47$ A		3	4.5	nC	
			$V_{DS} = 95$ V, $V_{GS} = 4.5$ V, $I_D = 0.47$ A		1.4		2.1
							0.25
Gate-Source Charge	Q_{gs}			0.40			
Gate-Drain Charge	Q_{gd}						
Gate Resistance	R_g	$f = 1$ MHz		2.3		Ω	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 95$ V, $R_L = 250$ Ω $I_D \cong 0.38$ A, $V_{GEN} = 4.5$ V, $R_g = 1$ Ω		10	15	ns	
Rise Time	t_r			15	25		
Turn-Off Delay Time	$t_{d(off)}$			25	40		
Fall Time	t_f			15	25		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 95$ V, $R_L = 250$ Ω $I_D \cong 0.38$ A, $V_{GEN} = 10$ V, $R_g = 1$ Ω		3	10	ns	
Rise Time	t_r			12	20		
Turn-Off Delay Time	$t_{d(off)}$			10	15		
Fall Time	t_f			10	15		
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C			0.95	A	
Pulse Diode Forward Current	I_{SM}				1		
Body Diode Voltage	V_{SD}	$I_S = 0.5$ A, $V_{GS} = 0$ V		0.8	1.2	V	



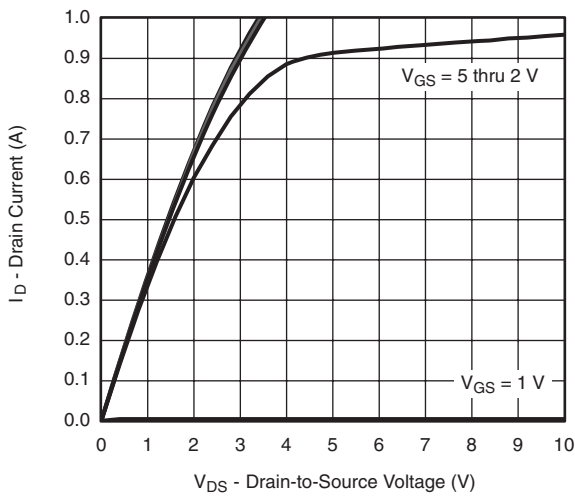
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Body Diode Characteristics						
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 0.5\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^\circ\text{C}$		45	70	ns
Body Diode Reverse Recovery Charge	Q_{rr}			45	70	nC
Reverse Recovery Fall Time	t_a			21		ns
Reverse Recovery Rise Time	t_b			24		

Notes:

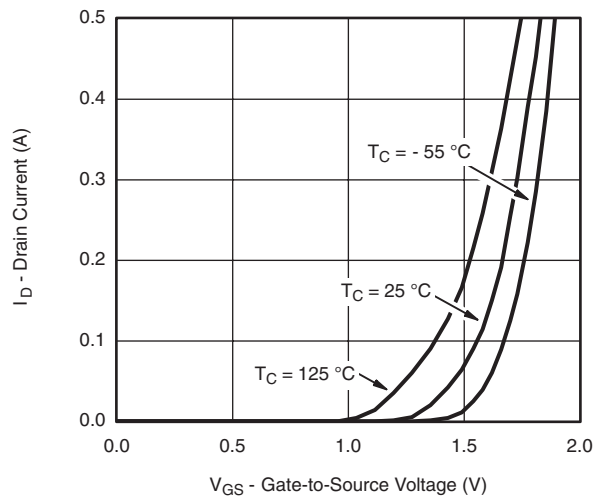
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

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.

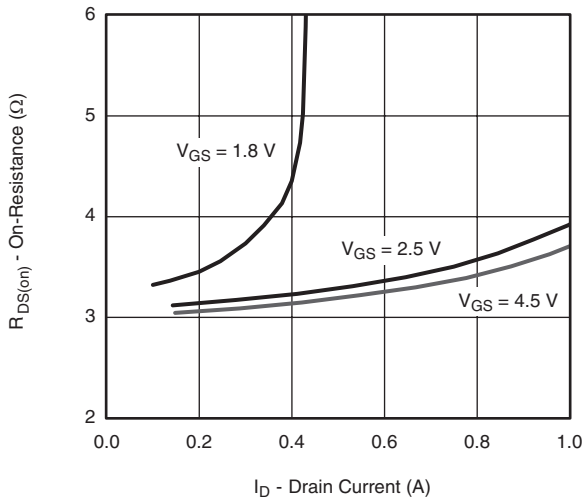
TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



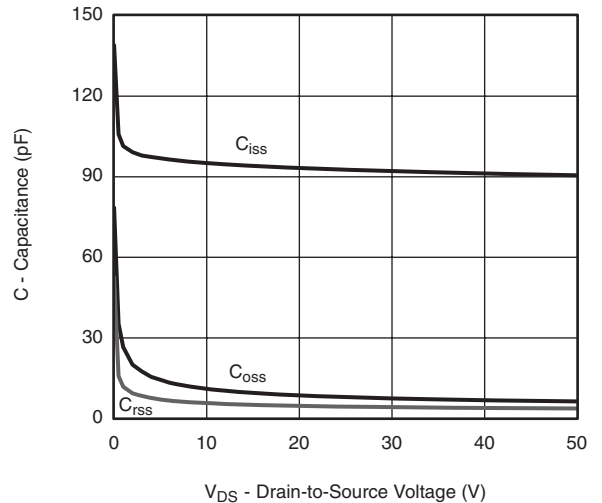
Output Characteristics



Transfer Characteristics

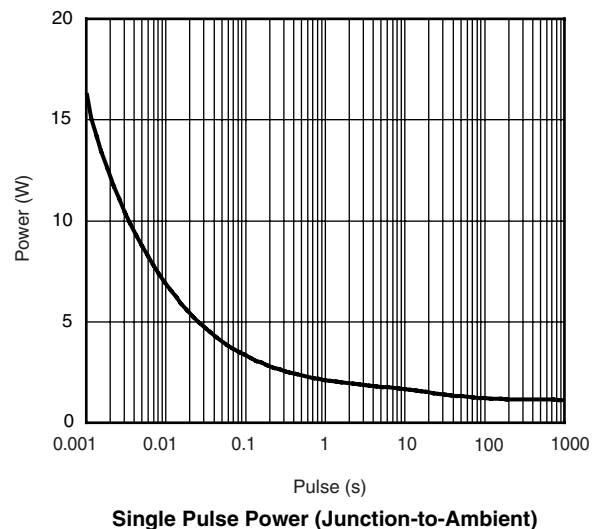
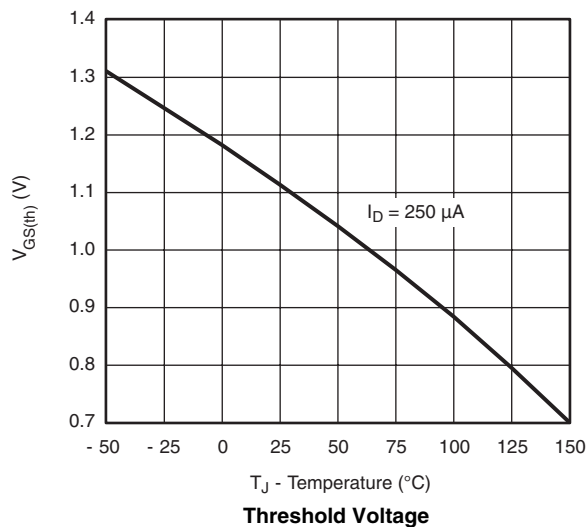
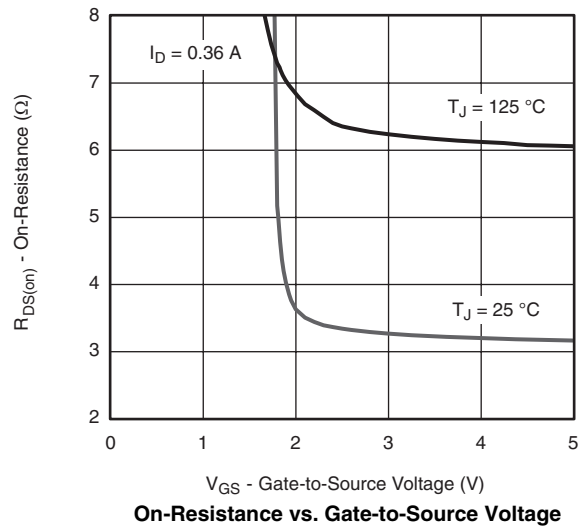
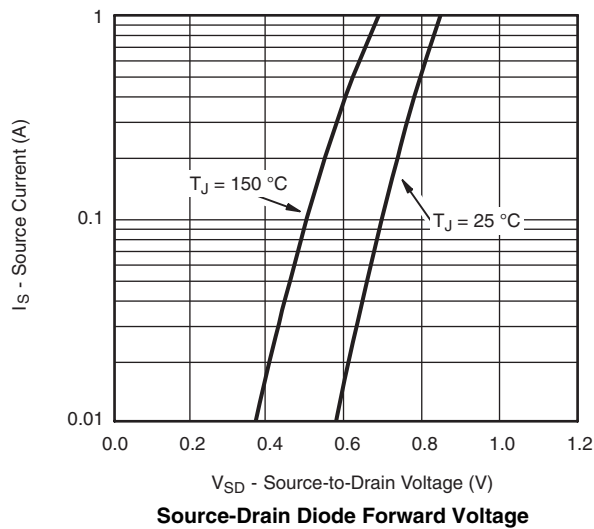
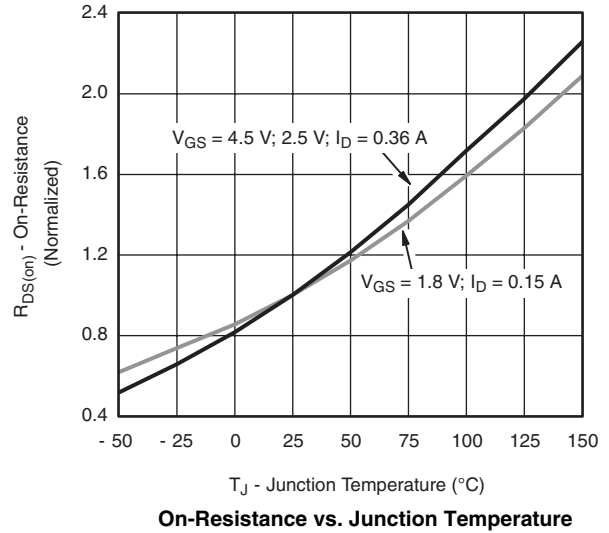
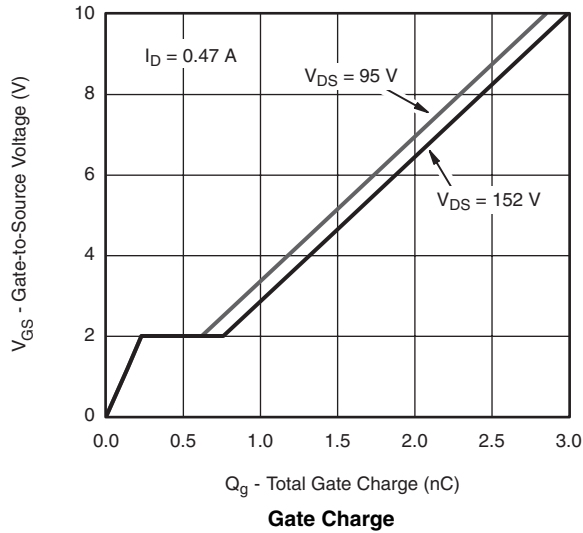


On-Resistance vs. Drain Current

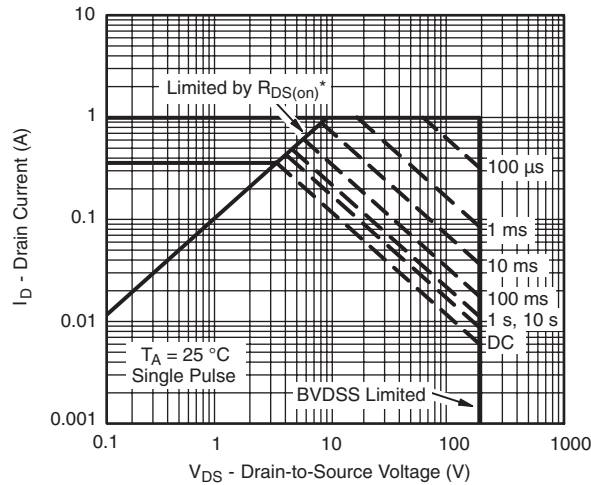


Capacitance

TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted

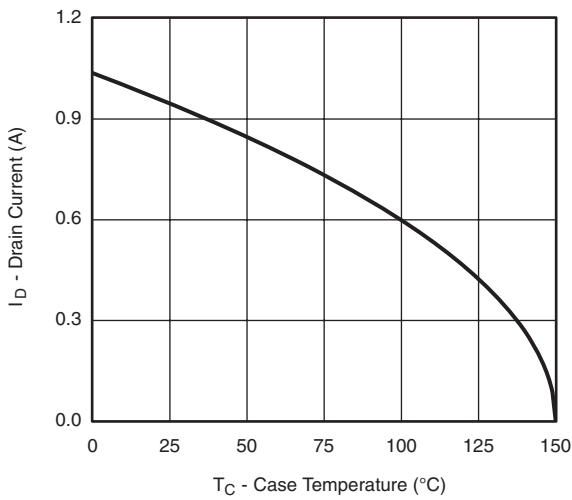


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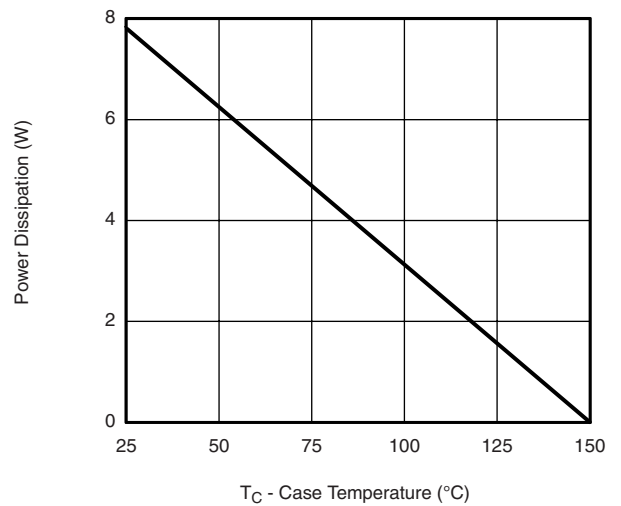


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient



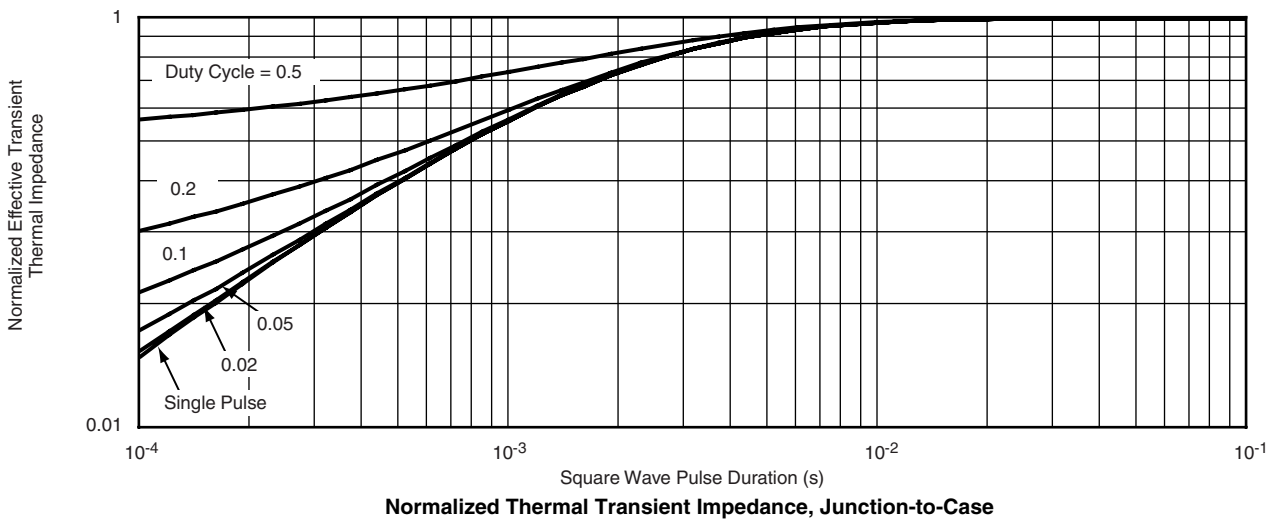
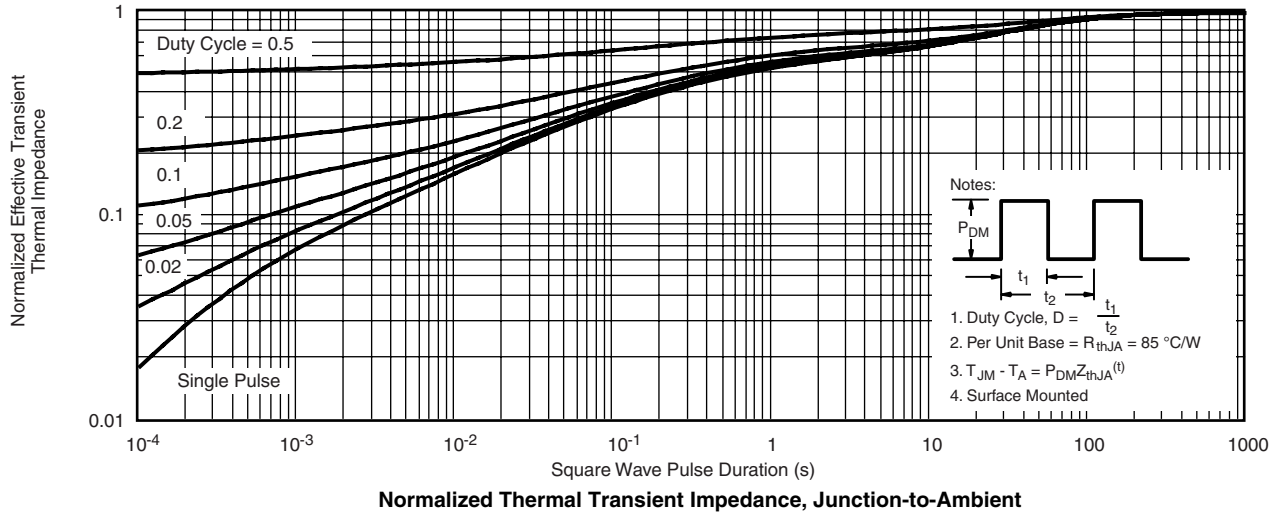
Current Derating*



Power Derating

* The power dissipation P_D is based on $T_{J(max)} = 150\text{ }^\circ\text{C}$, 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 $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



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