

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

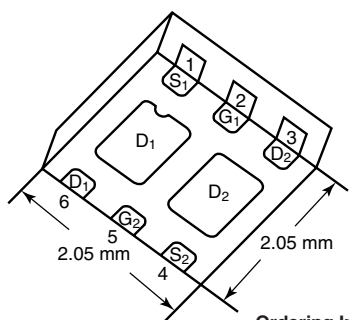


RoHS
COMPLIANT
HALOGEN
FREE

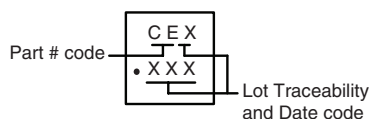
APPLICATIONS

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

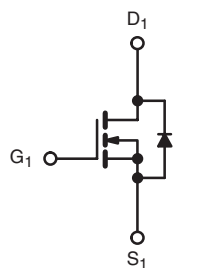
PowerPAK SC-70-6 Dual



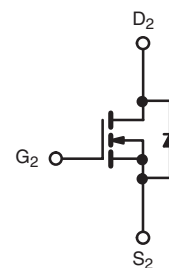
Marking Code



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



N-Channel MOSFET



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	190	V
Gate-Source Voltage	V_{GS}	± 16	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	$T_C = 25^\circ\text{C}$	A
		$T_C = 70^\circ\text{C}$	
		$T_A = 25^\circ\text{C}$	
		$T_A = 70^\circ\text{C}$	
Pulsed Drain Current	I_{DM}	1	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$	
		$T_A = 25^\circ\text{C}$	
Maximum Power Dissipation	P_D	$T_C = 25^\circ\text{C}$	W
		$T_C = 70^\circ\text{C}$	
		$T_A = 25^\circ\text{C}$	
		$T_A = 70^\circ\text{C}$	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature) ^{d, e}		260	

THERMAL RESISTANCE RATINGS

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

Notes:

a. $T_C = 25^\circ\text{C}$.

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

c. $t = 5 \text{ s}$.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 $T_J = 25^\circ\text{C}$, 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 μA	190			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		200		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 3.0		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.6		1.4	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 16 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 190 V, V _{GS} = 0 V			1	μA
		V _{DS} = 190 V, V _{GS} = 0 V, T _J = 85 °C			10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 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	
Gate-Source Charge	Q _{gs}			0.25		
Gate-Drain Charge	Q _{gd}			0.40		
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 ≅ 0.38 A, V _{GEN} = 4.5 V, R _g = 1 Ω		10	15	ns
Rise Time	t _r			15	25	
Turn-Off DelayTime	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 ≅ 0.38 A, V _{GEN} = 10 V, R _g = 1 Ω		3	10	
Rise Time	t _r			12	20	
Turn-Off DelayTime	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

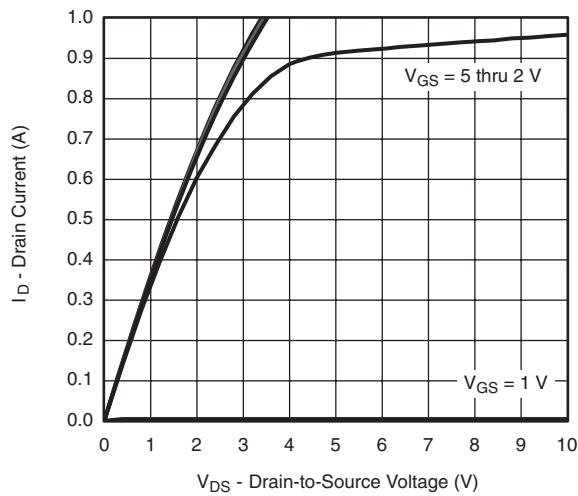
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Body Diode Characteristics						
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 0.5\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^\circ\text{C}$		45	70	ns
Body Diode Reverse Recovery Charge	Q_{rr}			45	70	nC
Reverse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

Notes:

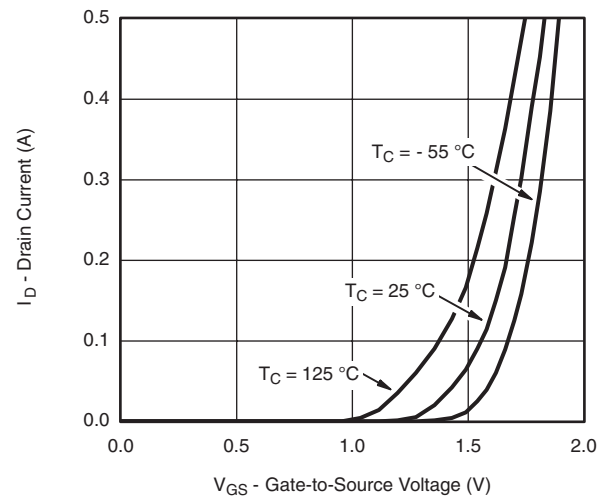
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

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.

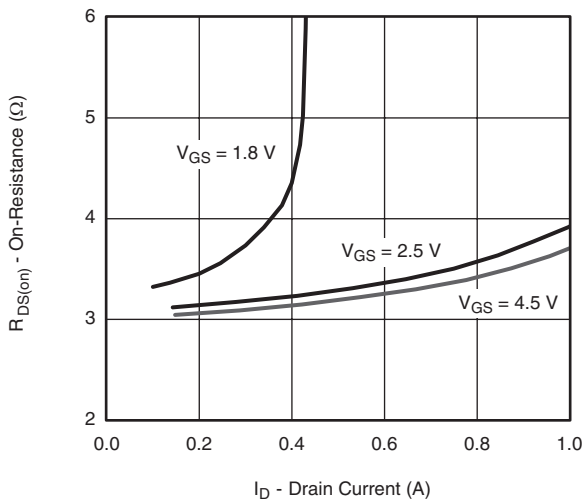
TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



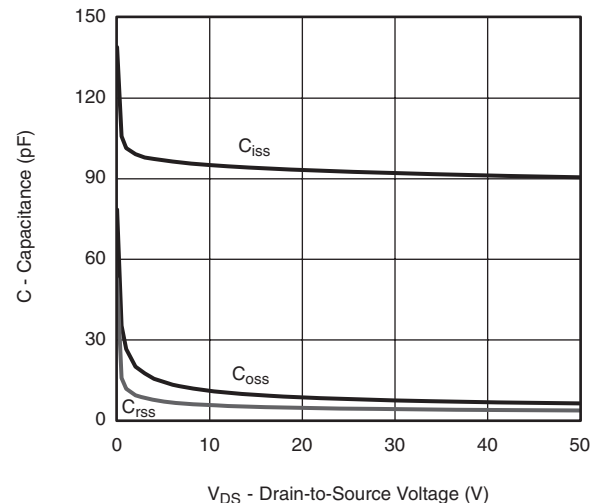
Output Characteristics



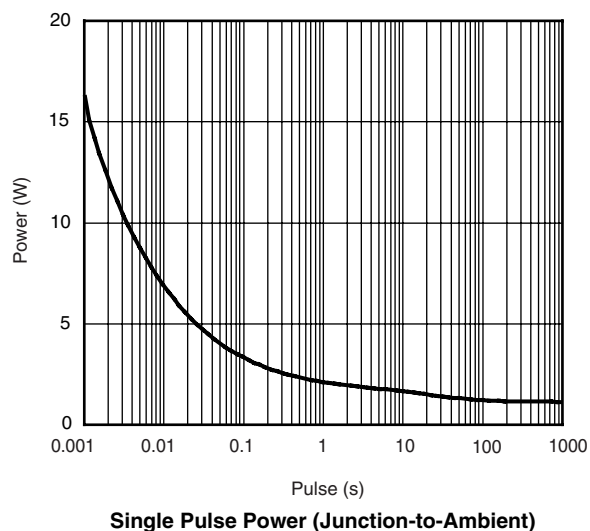
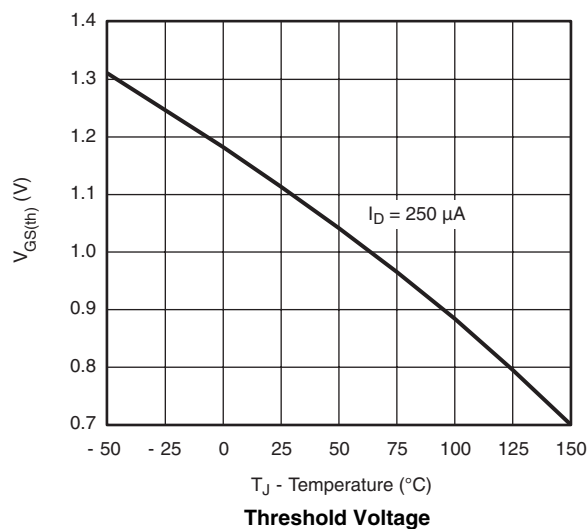
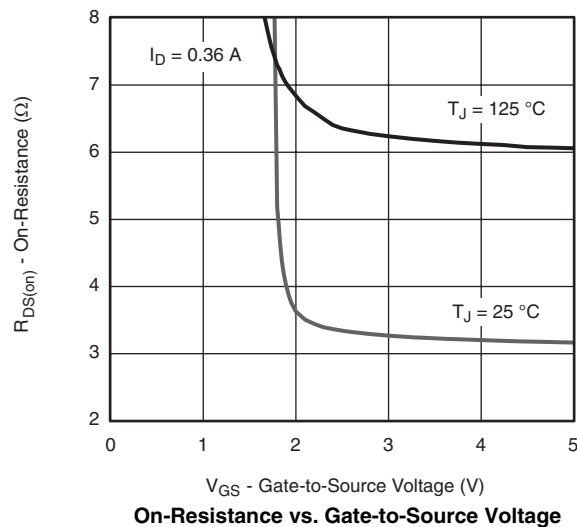
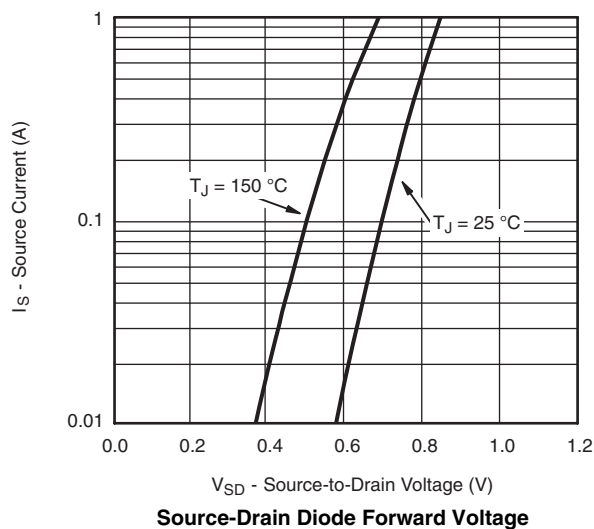
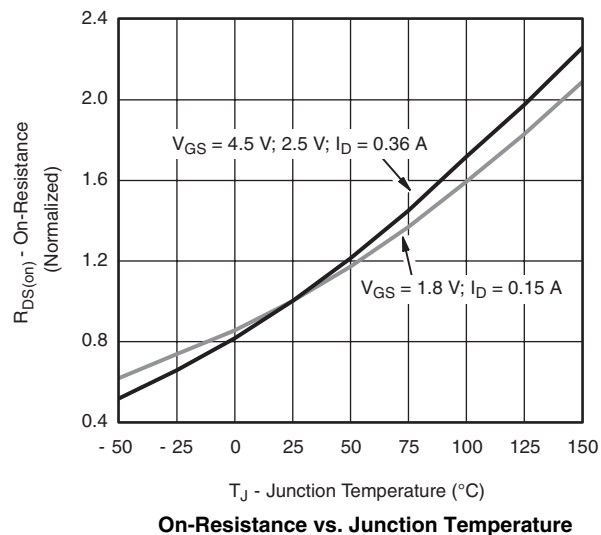
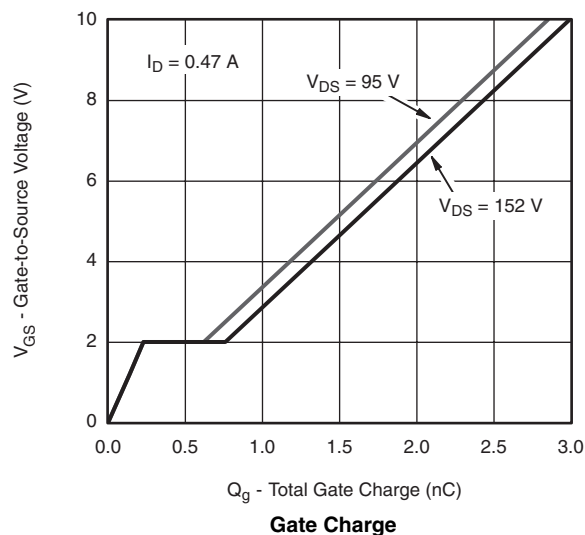
Transfer Characteristics



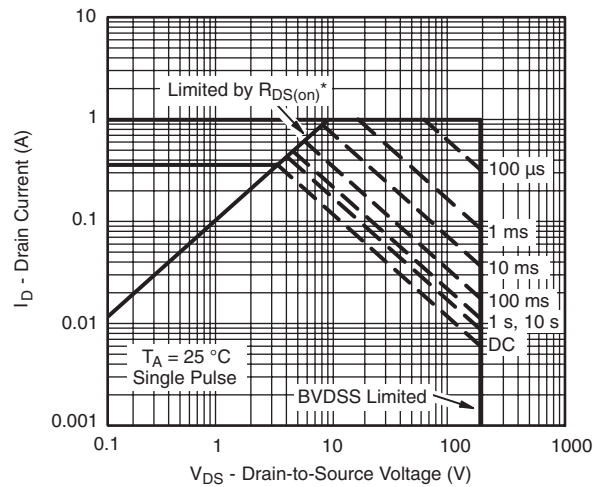
On-Resistance vs. Drain Current



Capacitance

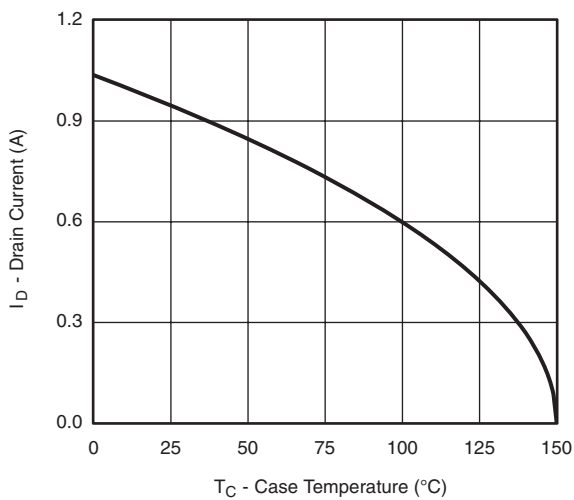
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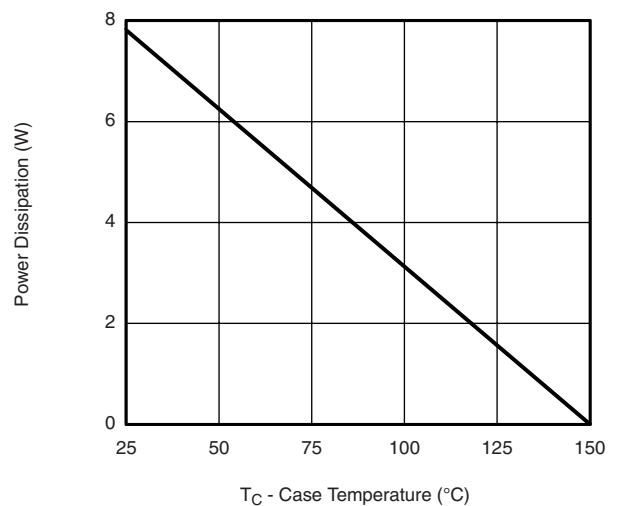


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

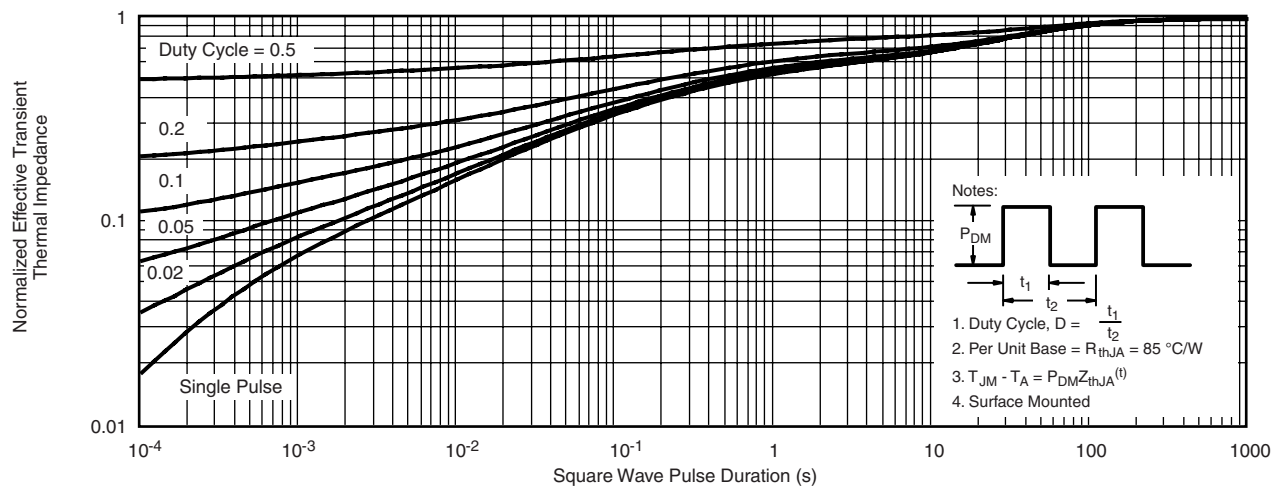
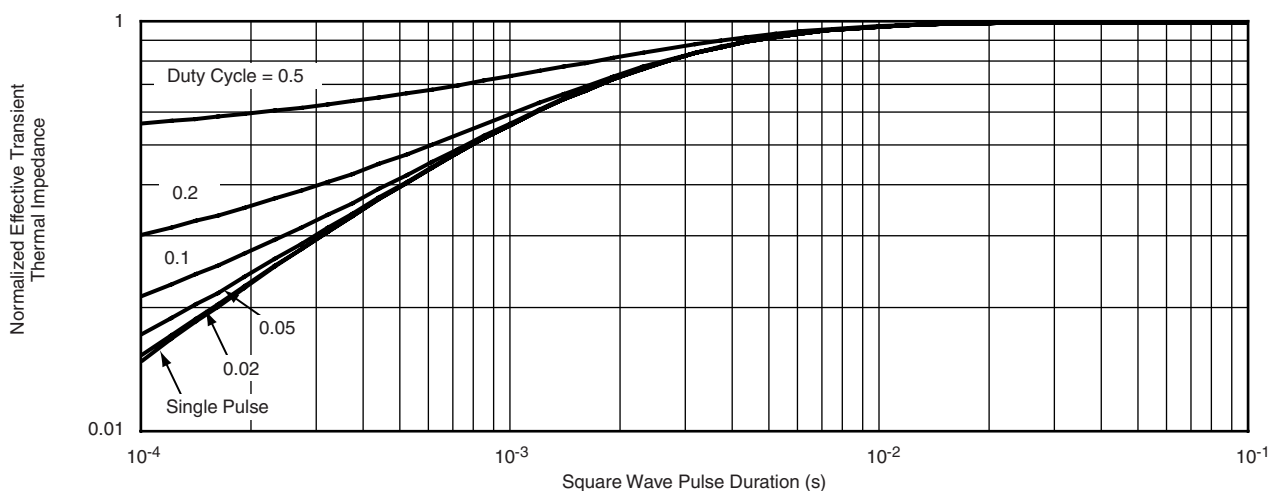


Current Derating*



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

Normalized Thermal Transient Impedance, Junction-to-Ambient

Normalized Thermal Transient Impedance, Junction-to-Case

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