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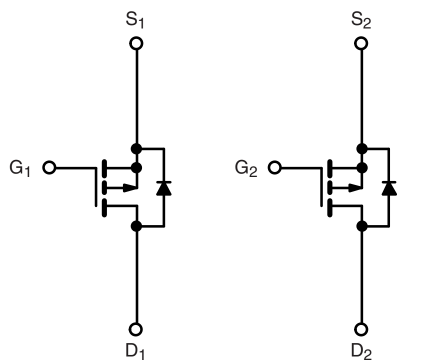
SI6981DQ-T1-GE3-VB Datasheet

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

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[d]	Q_g (Typ.)
- 20	0.013 at V_{GS} = - 4.5 V	-7.5	20 nC
	0.018 at V_{GS} = - 2.5 V	-6.5	
	0.032 at V_{GS} = - 1.8 V	-5.0	



P-Channel MOSFET   P-Channel MOSFET

FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- Trench Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- Adaptor Switch
- High Current Load Switch
- Notebook

TSSOP-8

Top View

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	- 20	V
Gate-Source Voltage		V_{GS}	± 12	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	- 7.5	A
	T_C = 70 °C		- 6.0	
	T_A = 25 °C		- 5.4[a, b]	
	T_A = 70 °C		- 4.5[a, b]	
Pulsed Drain Current		I_{DM}	- 30	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	- 4.1	
	T_A = 25 °C		- 2.1[a, b]	
Avalanche Current	L = 0.1 mH	I_{AS}	- 15	
Single-Pulse Avalanche Energy		E_{AS}	11.25	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	5	W
	T_C = 70 °C		3.2	
	T_A = 25 °C		2.5[a, b]	
	T_A = 70 °C		1.6[a, b]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Maximum Junction-to-Ambient[a, c]	t ≤ 10 s	R_{thJA}	38	50	°C/W
Maximum Junction-to-Foot	Steady State	R_{thJF}	20	25	

Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. t = 10 s.
c. Maximum under steady state conditions is 85 °C/W.
d. Based on T_C = 25 °C.

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 µA	- 20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = - 250 µA		- 14.5		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			2.8		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 0.4		- 1.0	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 20 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 20 V, V_{GS} = 0 V, T_J = 70 °C			- 10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ - 10 V, V_{GS} = - 5 V	- 20			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 7 A		0.013		Ω
		V_{GS} = - 2.5 V, I_D = - 6 A		0.018		
		V_{GS} = - 1.8 V, I_D = - 3 A		0.032		
Forward Transconductance[a]	g_{fs}	V_{DS} = - 10 V, I_D = - 9 A		40		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 10 V, V_{GS} = 0 V, f = 1 MHz		2380		pF
Output Capacitance	C_{oss}			340		
Reverse Transfer Capacitance	C_{rss}			280		
Total Gate Charge	Q_g	V_{DS} = - 10 V, V_{GS} = - 8 V, I_D = - 5 A		45	70	nC
		V_{DS} = - 10 V, V_{GS} = - 4.5 V, I_D = - 5 A		20	35	
Gate-Source Charge	Q_{gs}			3.1		
Gate-Drain Charge	Q_{gd}			8.4		
Gate Resistance	R_g	f = 1 MHz	1.0	4.8	9.6	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 2 Ω $I_D \cong$ - 5 A, V_{GEN} = - 8 V, R_g = 1 Ω		7	14	ns
Rise Time	t_r			9	18	
Turn-Off DelayTime	$t_{d(off)}$			108	200	
Fall Time	t_f			41	80	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 2 Ω $I_D \cong$ - 5 A, V_{GEN} = - 4.5 V, R_g = 1 Ω		14	28	
Rise Time	t_r			16	32	
Turn-Off DelayTime	$t_{d(off)}$			101	200	
Fall Time	t_f			40	80	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I_S	T_C = 25 °C			- 4.1	A
Pulse Diode Forward Current	I_{SM}				- 40	
Body Diode Voltage	V_{SD}	I_S = - 3 A, V_{GS} = 0 V		- 0.66	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = - 2.3 A, dI/dt = 100 A/µs, T_J = 25 °C		81	150	ns
Body Diode Reverse Recovery Charge	Q_{rr}			150	300	nC
Reverse Recovery Fall Time	t_a			43		ns
Reverse Recovery Rise Time	t_b			38		

Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 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.

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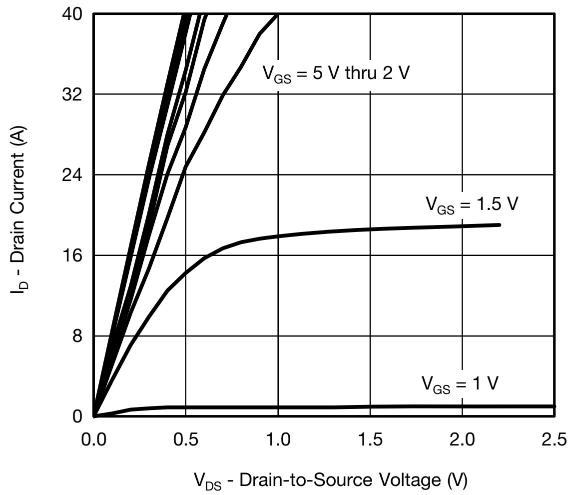
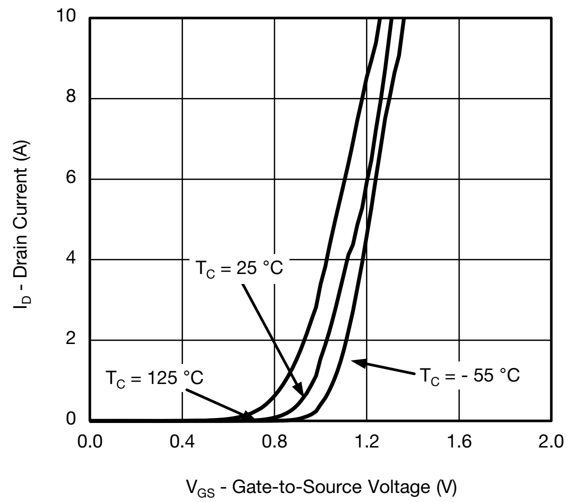
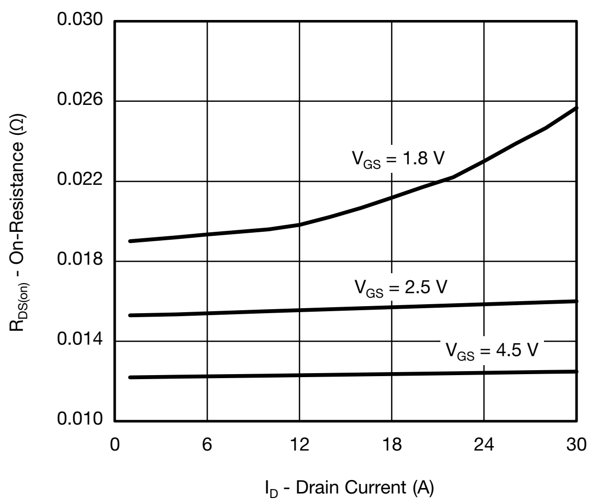
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



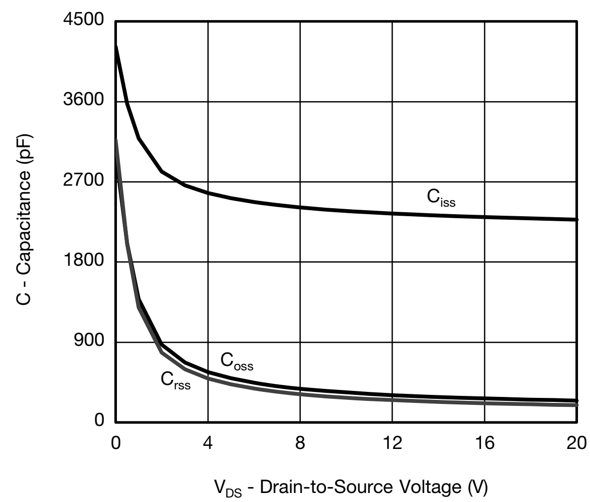
Output Characteristics



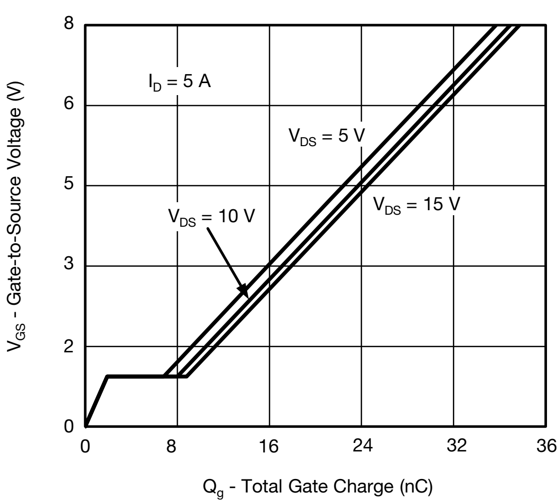
Transfer Characteristics



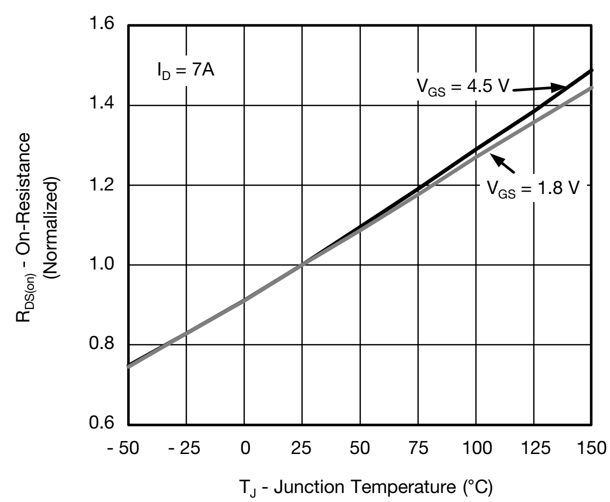
On-Resistance vs. Drain Current



Capacitance

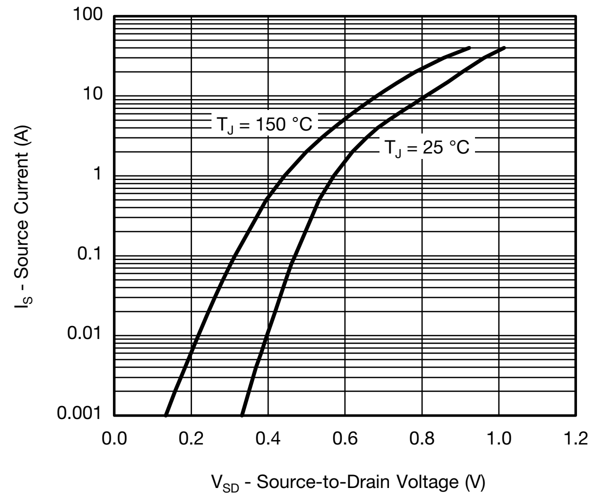


Gate Charge

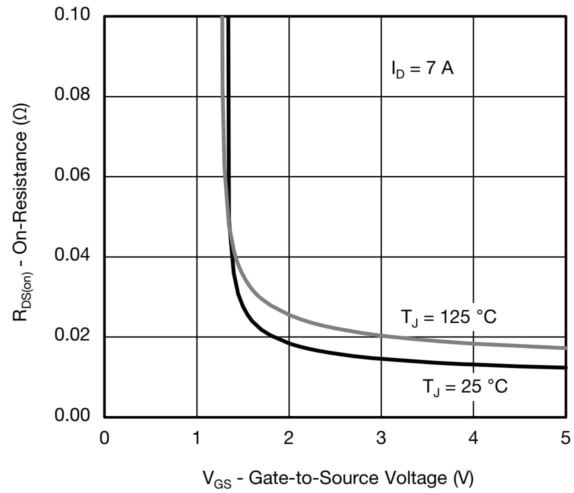


On-Resistance vs. Junction Temperature

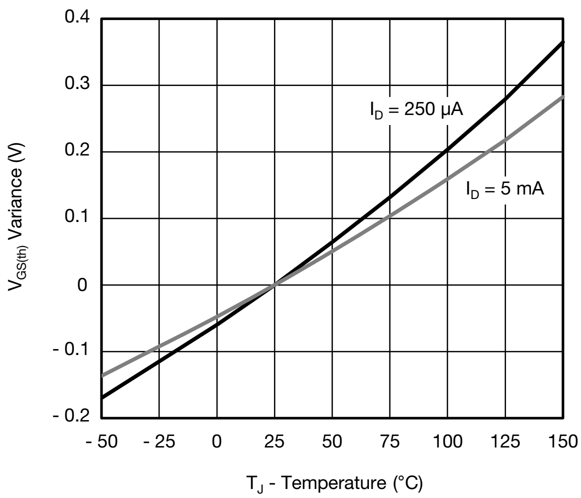
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



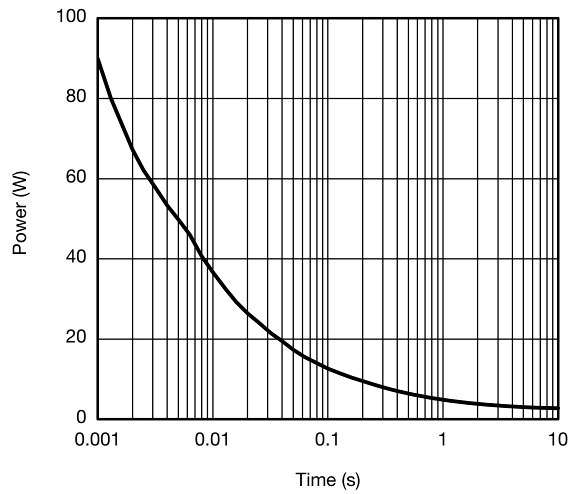
Source-Drain Diode Forward Voltage



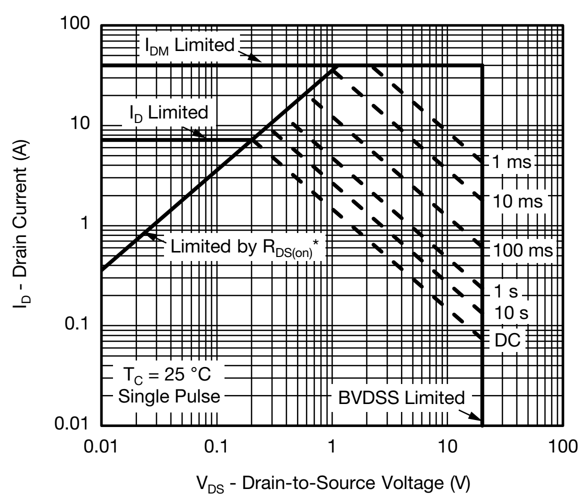
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



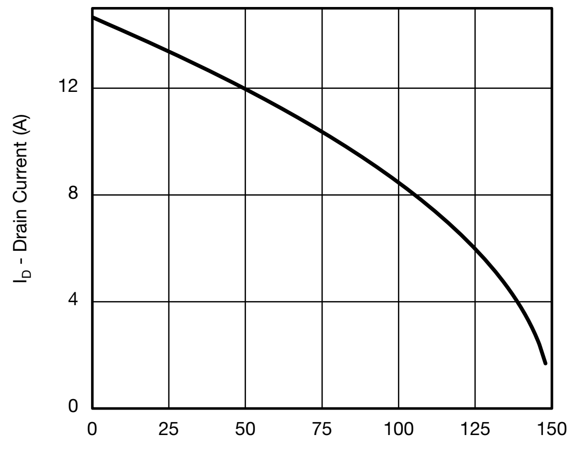
Single Pulse Power, Junction-to-Ambient



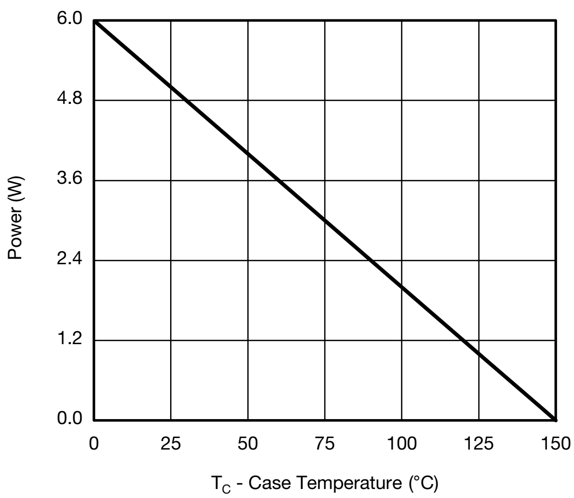
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

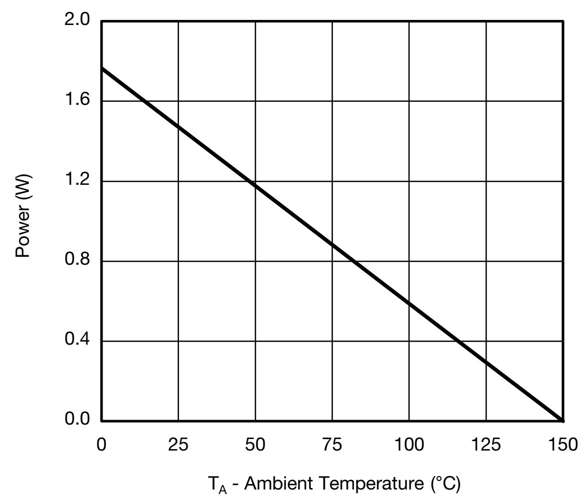
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



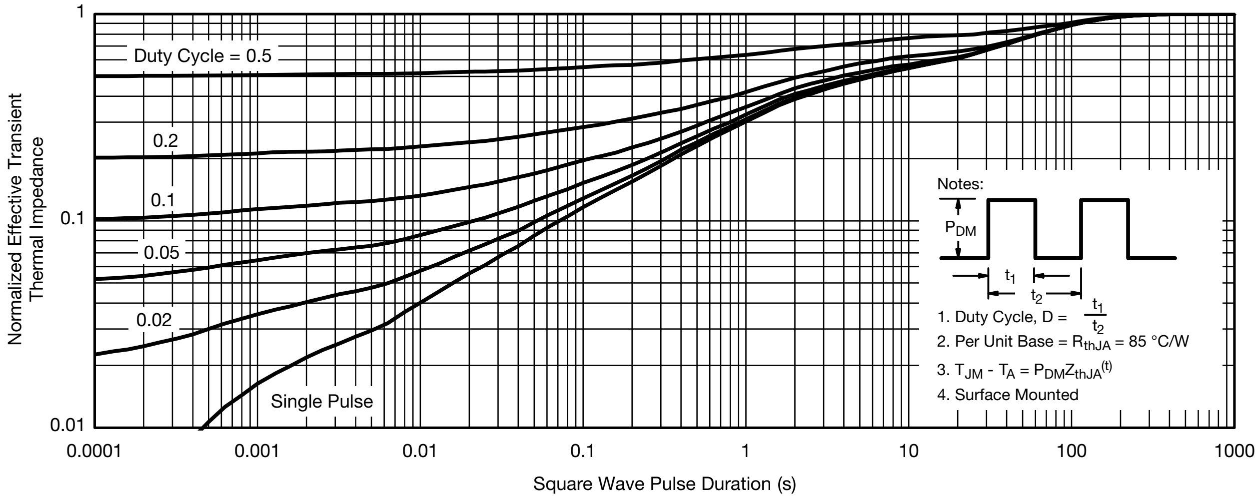
Power Derating, Junction-to-Foot



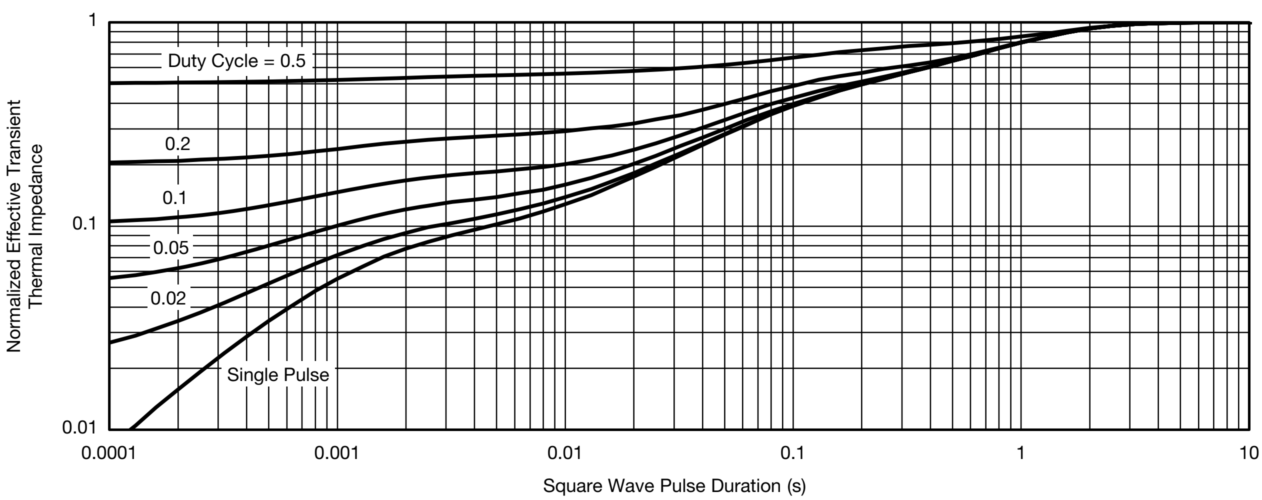
Power Derating, Junction-to-Ambient

* 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)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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