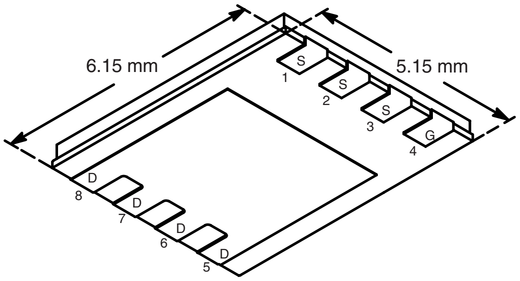
THE DATASHEET OF

SI7160DP-T1-GE3

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

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]	Q_g (Typ.)
30	0.0087 at V_{GS} = 10 V	20	21
	0.010 at V_{GS} = 4.5 V	20	

PowerPAK SO-8



Bottom View

Ordering Information: Si7160DP-T1-E3 (Lead (Pb)-free)
Si7160DP-T1-GE3 (Lead (Pb)-free and Halogen-free)

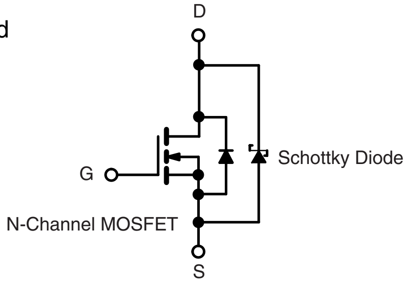
FEATURES

- **Halogen-free According to IEC 61249-2-21 Available**
- Ultra-Low On-Resistance Using High Density TrenchFET® Gen II Power MOSFET Technology
- Q_g Optimized
- New Low Thermal Resistance PowerPAK® Package with Low 1.07 mm Profile
- 100 % R_g Tested
- 100 % UIS Tested

Pb-free
RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Notebook
  - Logic DC/DC



ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	± 16	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	20[a]	A
	T_C = 70 °C		20[a]	
	T_A = 25 °C		17.8[b, c]	
	T_A = 70 °C		14.2[b, c]	
Pulsed Drain Current		I_{DM}	60	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	20[a]	
	T_A = 25 °C		4.5[b, c]	
Avalanche Current	L = 0.1 mH	I_{AS}	20	
Single Pulse Avalanche Energy		E_{AS}	20	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	27.7	W
	T_C = 70 °C		17.7	
	T_A = 25 °C		5[b, c]	
	T_A = 70 °C		3.2[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 ≤ 10 s	R_{thJA}	20	25	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	3.4	4.5	

Notes:
a. Package Limited.
b. Surface Mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. See Solder Profile (www.vishay.com/doc?73461). The PowerPAK SO-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.
e. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.
f. Maximum under Steady State conditions is 70 °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 µA	30			V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250 µA	1.0		2.5	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} = 30 V, V_{GS} = 0 V		0.26	1	mA
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 100 °C		12	100	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq 5$ V, V_{GS} = 10 V	30			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 15 A		0.0072	0.0087	Ω
		V_{GS} = 4.5 V, I_D = 10 A		0.0083	0.010	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 15 A		60		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		2970		pF
Output Capacitance	C_{oss}			475		
Reverse Transfer Capacitance	C_{rss}			180		
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 10 A		44	66	nC
		V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 10 A		21	32	
Gate-Source Charge	Q_{gs}			6.9		
Gate-Drain Charge	Q_{gd}			5.8		
Gate Resistance	R_g	f = 1 MHz		1.0	1.5	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 1.5 Ω $I_D \cong 10$ A, V_{GEN} = 4.5 V, R_g = 1 Ω		29	45	ns
Rise Time	t_r			115	175	
Turn-Off Delay Time	$t_{d(off)}$			43	65	
Fall Time	t_f			21	35	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 1.5 Ω $I_D \cong 10$ A, V_{GEN} = 10 V, R_g = 1 Ω		15	25	
Rise Time	t_r			12	20	
Turn-Off Delay Time	$t_{d(off)}$			33	50	
Fall Time	t_f			8	15	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			20	A
Pulse Diode Forward Current[a]	I_{SM}				60	
Body Diode Voltage	V_{SD}	I_S = 2 A		0.36	0.42	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 4 A, dI/dt = 100 A/µs, T_J = 25 °C		29	45	ns
Body Diode Reverse Recovery Charge	Q_{rr}			21	35	nC
Reverse Recovery Fall Time	t_a			15		ns
Reverse Recovery Rise Time	t_b			14		

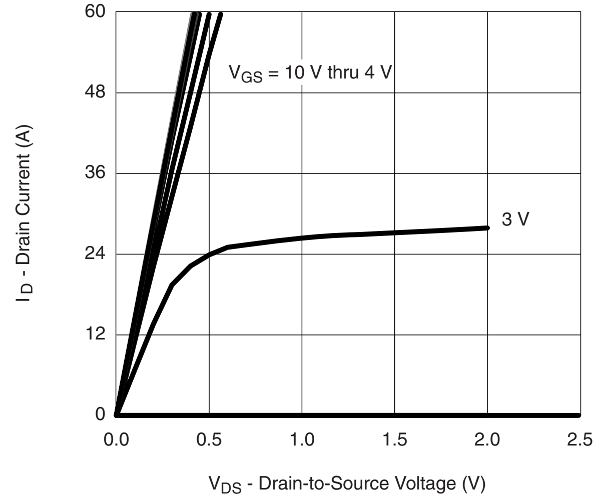
Notes:

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

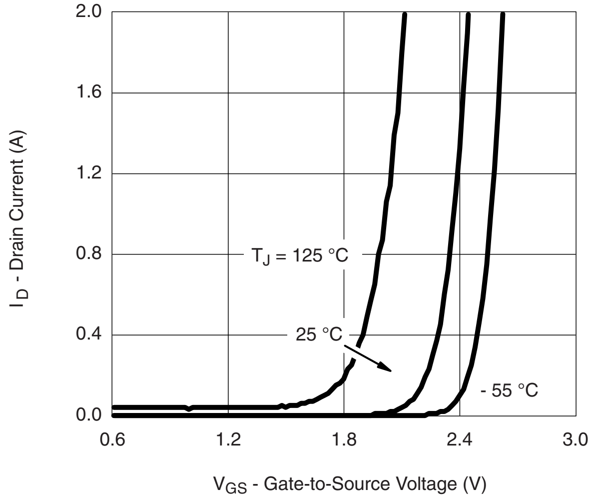
b. Guaranteed by design, not subject to production testing.

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.

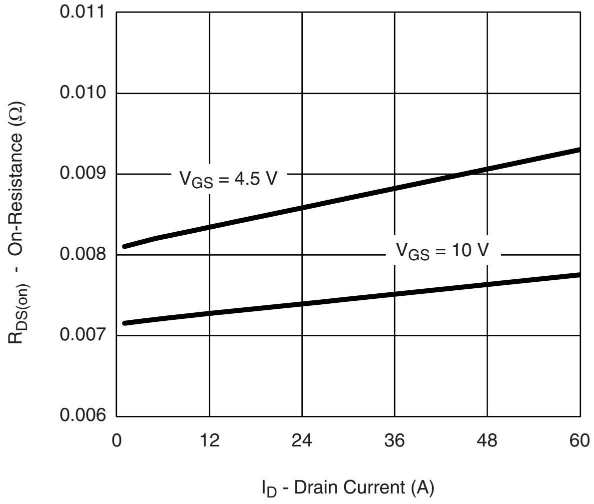
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



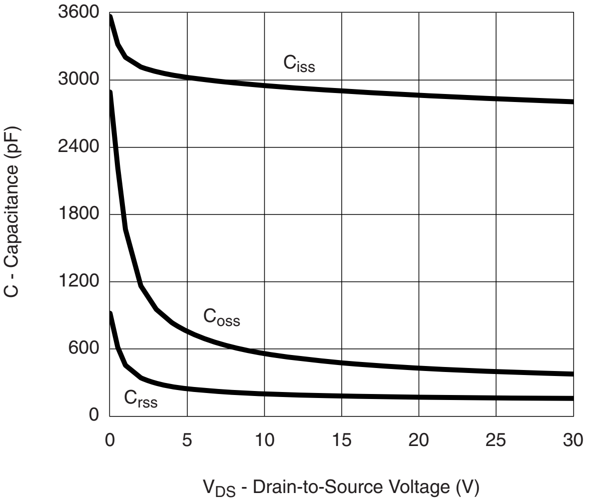
Output Characteristics



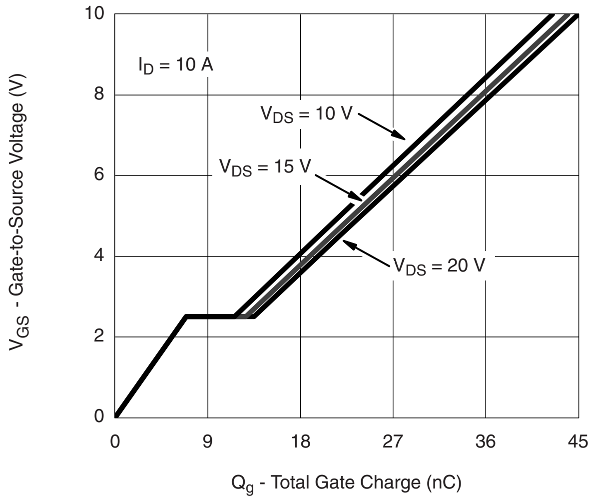
Transfer Characteristics



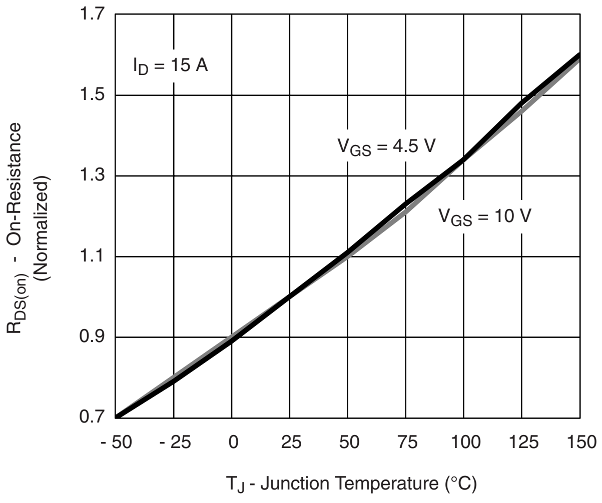
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

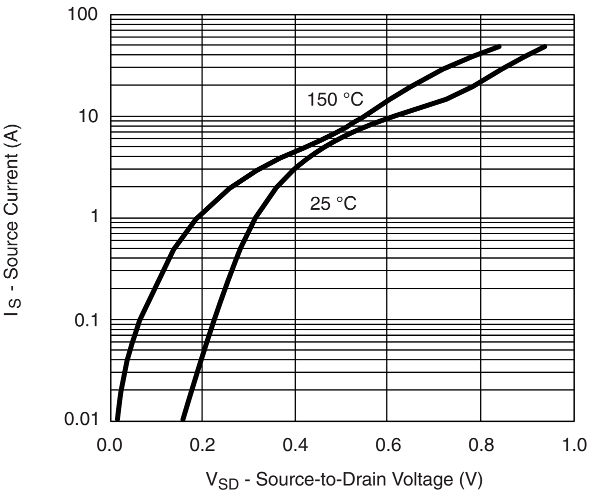


Gate Charge

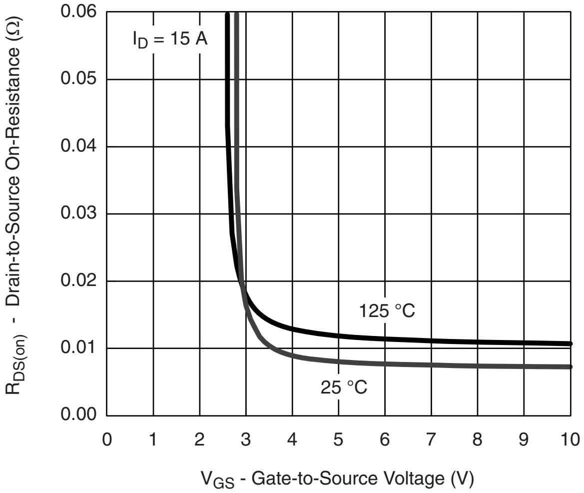


On-Resistance vs. Junction Temperature

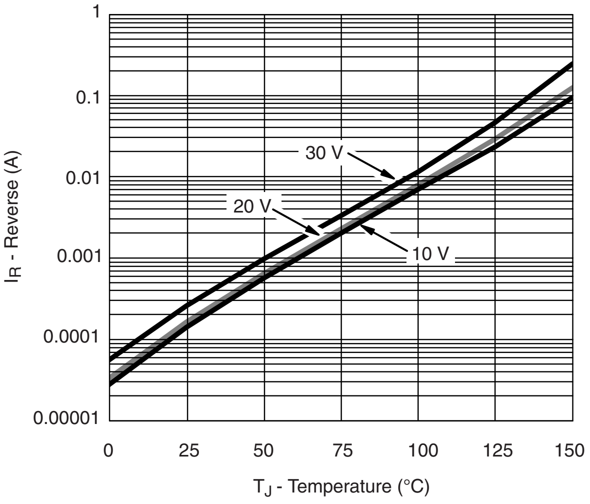
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



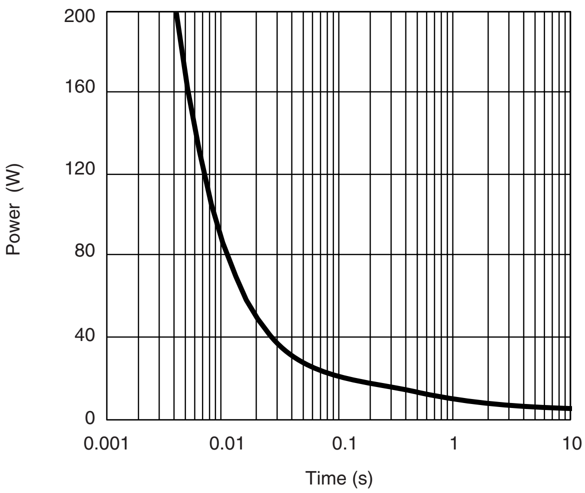
Source-Drain Diode Forward Voltage



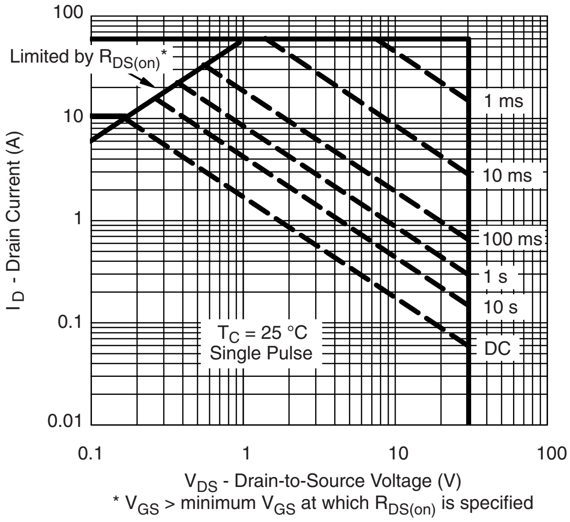
On-Resistance vs. Gate-to-Source Voltage



Reverse Current (Schottky)



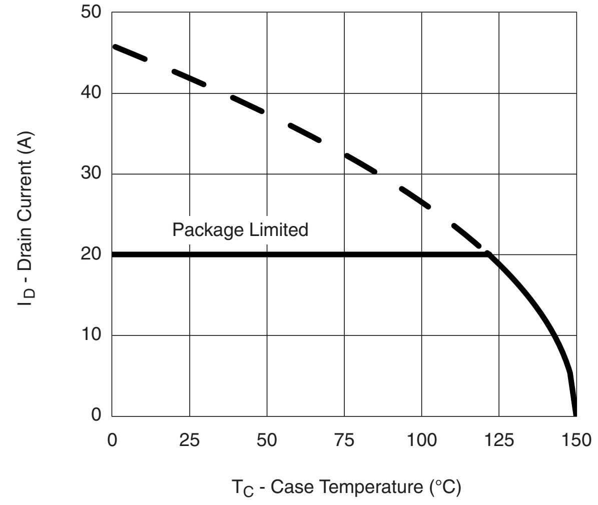
Single Pulse Power, Junction-to-Ambient



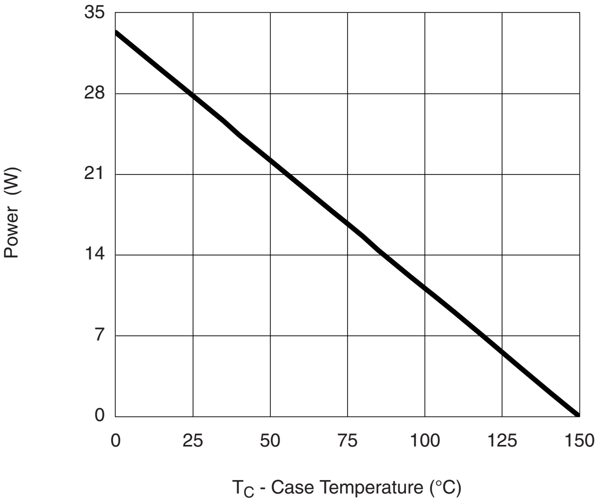
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

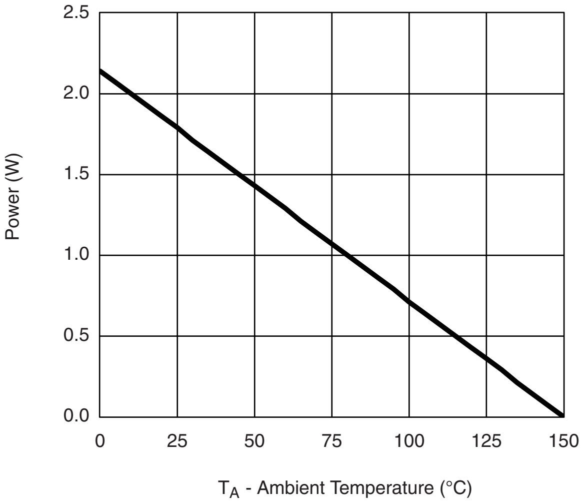
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



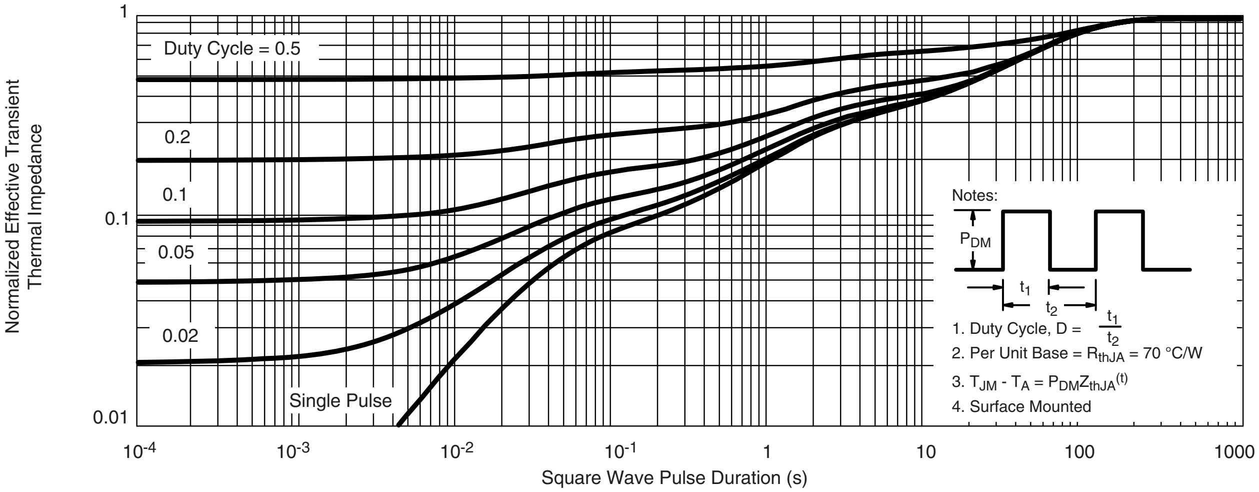
Power, Junction-to-Case



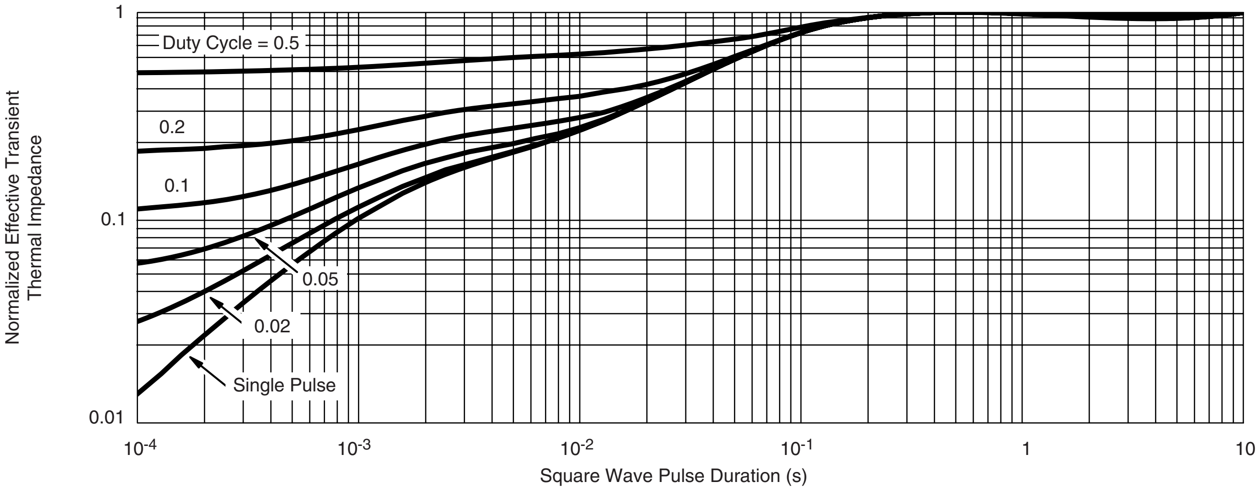
Power, Junction-to-Ambient

* 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-Case

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