Si7123DN

Vishay Siliconix

P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 20	0.0106 at V_{GS} = - 4.5 V	- 16.0
	0.0136 at V_{GS} = - 2.5 V	- 14.1
	0.0189 at V_{GS} = - 1.8 V	- 12.0

FEATURES

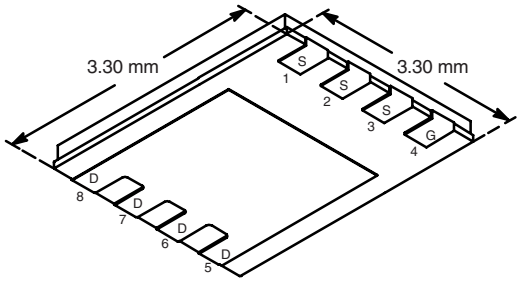
- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFET: 1.8 V Rated
- Ultra Low On-Resistance for Increased Battery Life
- New PowerPAK® Package
  - Low Thermal Resistance, R_{thJC}
  - Low 1.07 mm Profile
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT
HALOGEN FREE

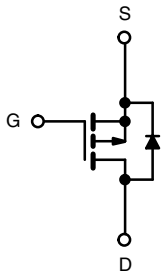
APPLICATIONS

- Load/Power Switching in Portable Devices

PowerPAK 1212-8



Bottom View



P-Channel MOSFET

Ordering Information: Si7123DN-T1-E3 (Lead (Pb)-free)
Si7123DN-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted

Parameter		Symbol	10 s	Steady State	Unit
Drain-Source Voltage		V_{DS}	- 20		V
Gate-Source Voltage		V_{GS}	± 8		
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	- 16.0	- 10.2	A
	T_A = 70 °C		- 12.8	- 8.2	
Pulsed Drain Current		I_{DM}	- 40		
Continuous Source Current (Diode Conduction)[a]		I_S	- 3.2	- 1.3	
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	3.8	1.5	W
	T_A = 70 °C		2.4	1.0	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		°C
Soldering Recommendations (Peak Temperature)[b, c]			260		

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[a]	t ≤ 10 s	R_{thJA}	26	33	°C/W
	Steady State		65	81	
Maximum Junction-to-Case	Steady State	R_{thJC}	1.9	2.4	

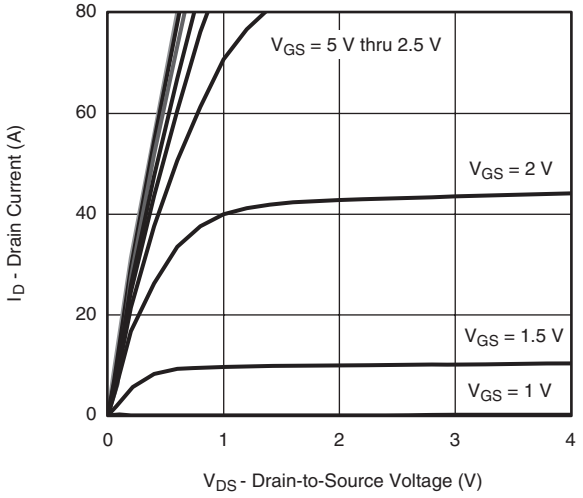
Notes:
a. Surface Mounted on 1" x 1" FR4 board.
b. See Solder Profile (www.vishay.com/ppg?73257). The PowerPAK 1212-8 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

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		- 19		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 0.4		- 1	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 = 55 °C			- 10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \leq$ - 5 V, V_{GS} = - 4.5 V	- 40			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 15 A		0.0086	0.0106	Ω
		V_{GS} = - 2.5 V, I_D = - 11.2 A		0.0112	0.0136	
		V_{GS} = - 1.8 V, I_D = - 5 A		0.0156	0.0189	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 15 V, I_D = - 4 A		27		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 10 V, V_{GS} = 0 V, f = 1 MHz		3729		pF
Output Capacitance	C_{oss}			542		
Reverse Transfer Capacitance	C_{rss}			475		
Total Gate Charge	Q_g	V_{DS} = - 10 V, V_{GS} = - 4.5 V, I_D = - 15 A		57	90	nC
		V_{DS} = - 10 V, V_{GS} = - 2.5 V, I_D = - 15 A		35.5	55	
Gate-Source Charge	Q_{gs}			4.5		
Gate-Drain Charge	Q_{gd}			16.1		
Gate Resistance	R_g	f = 1 MHz		2.0		Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 0.77 Ω $I_D \cong$ - 13 A, V_{GEN} = - 4.5 V, R_g = 1 Ω		25	50	ns
Rise Time	t_r			88	150	
Turn-Off DelayTime	$t_{d(off)}$			82	150	
Fall Time	t_f			28	45	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			- 25	A
Pulse Diode Forward Current[a]	I_{SM}				- 40	
Body Diode Voltage	V_{SD}	I_S = - 13 A		- 0.76	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = - 13 A, dI/dt = 100 A/µs, T_J = 25 °C		48	80	ns
Body Diode Reverse Recovery Charge	Q_{rr}			45	80	nC
Reverse Recovery Fall Time	t_a			19		ns
Reverse Recovery Rise Time	t_b			29		

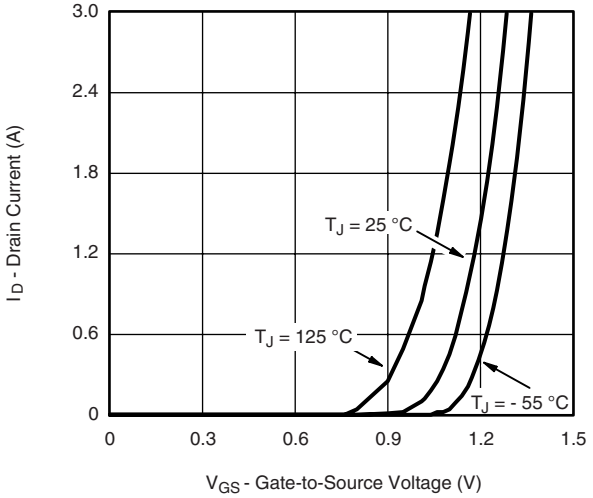
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

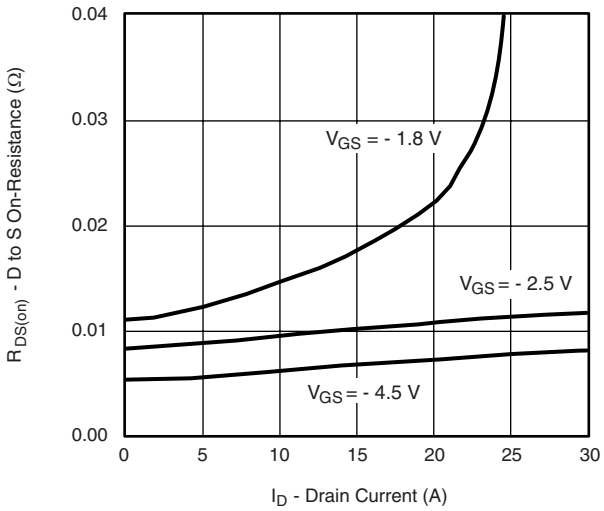
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



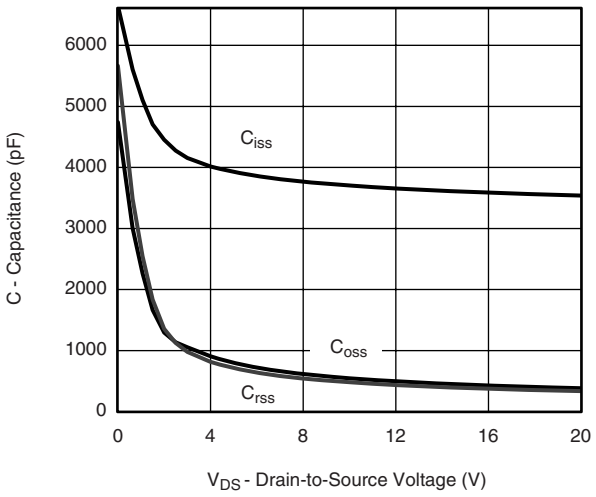
Output Characteristics



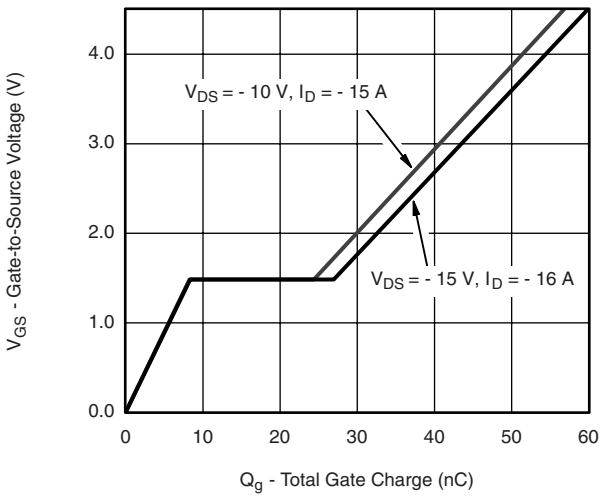
Transfer Characteristics



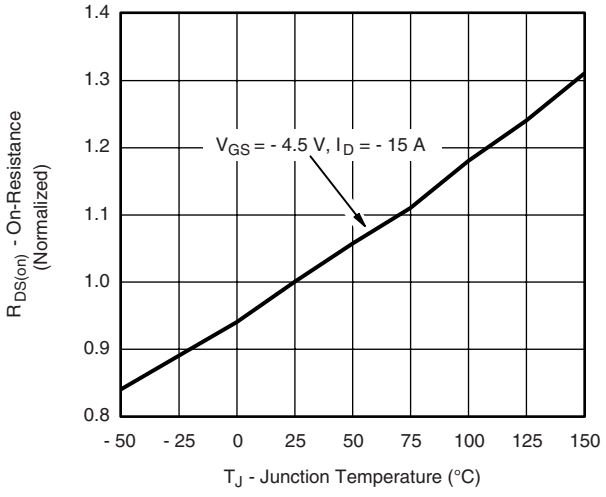
On-Resistance vs. Drain Current



Capacitance

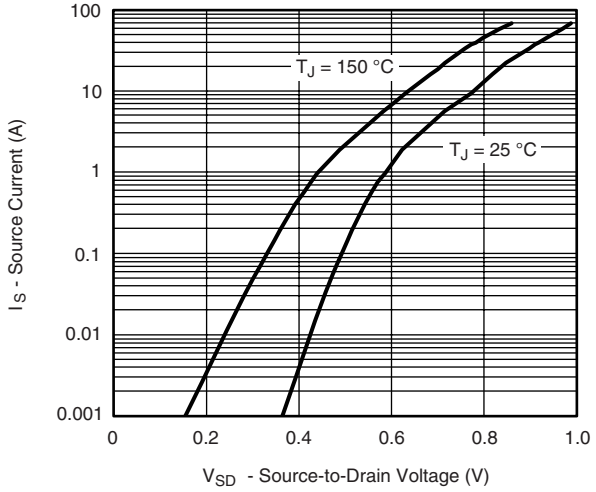


Gate Charge

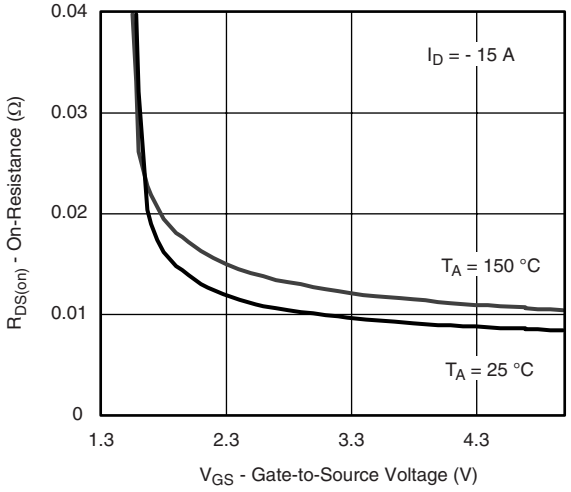


On-Resistance vs. Junction Temperature

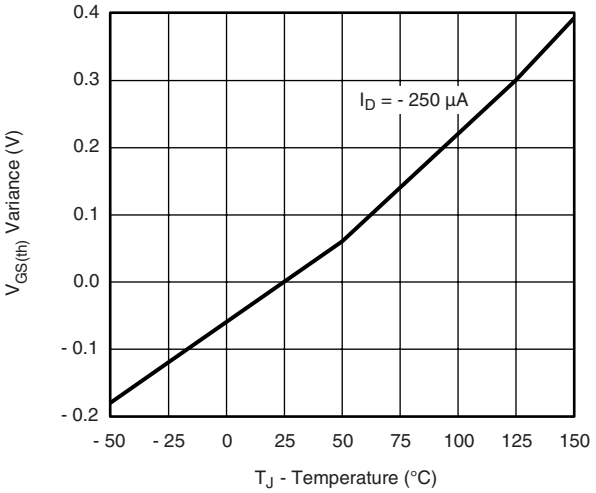
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



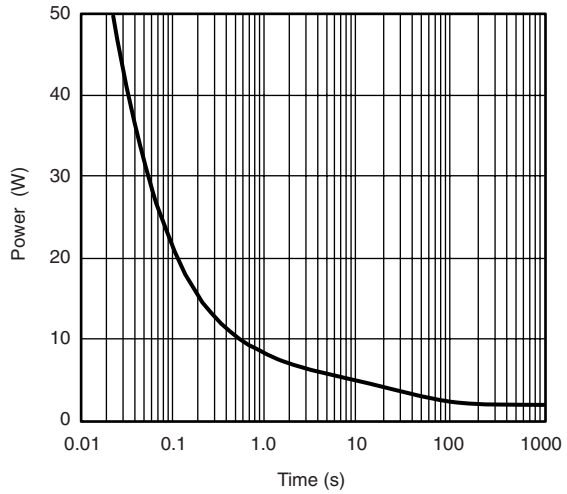
Source-Drain Diode Forward Voltage



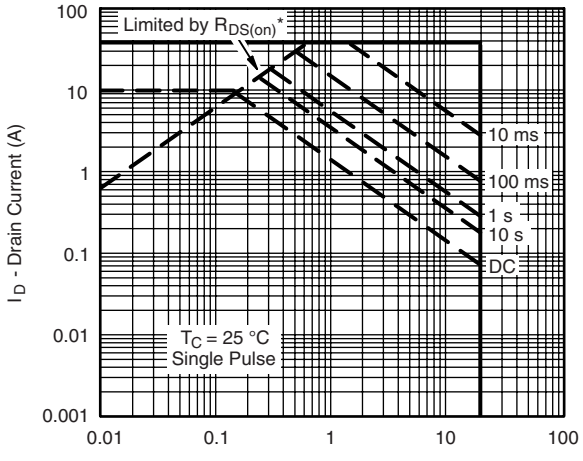
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



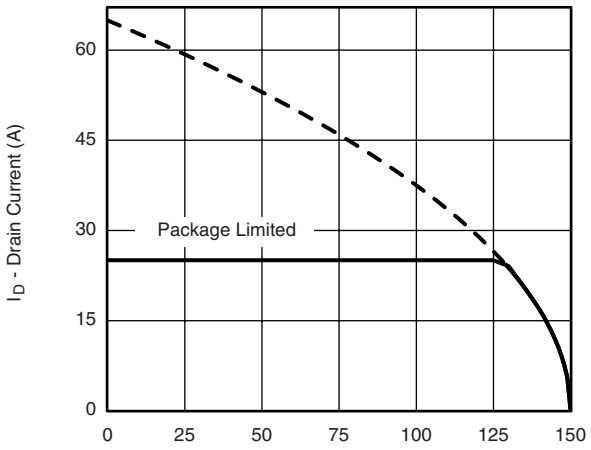
Single Pulse Power, Junction-to-Ambient



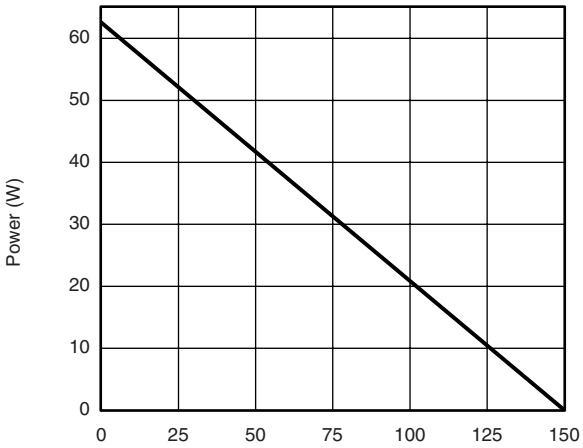
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

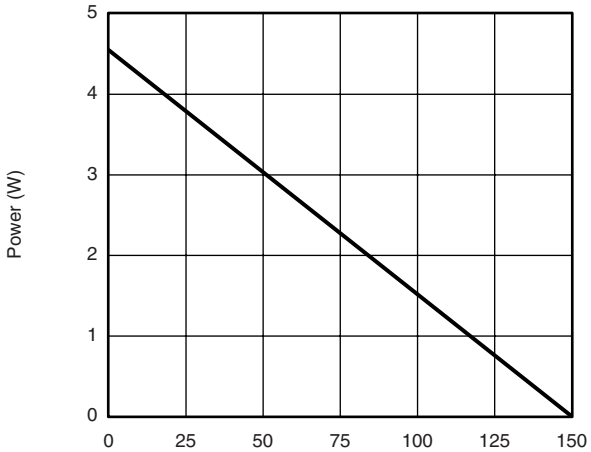
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



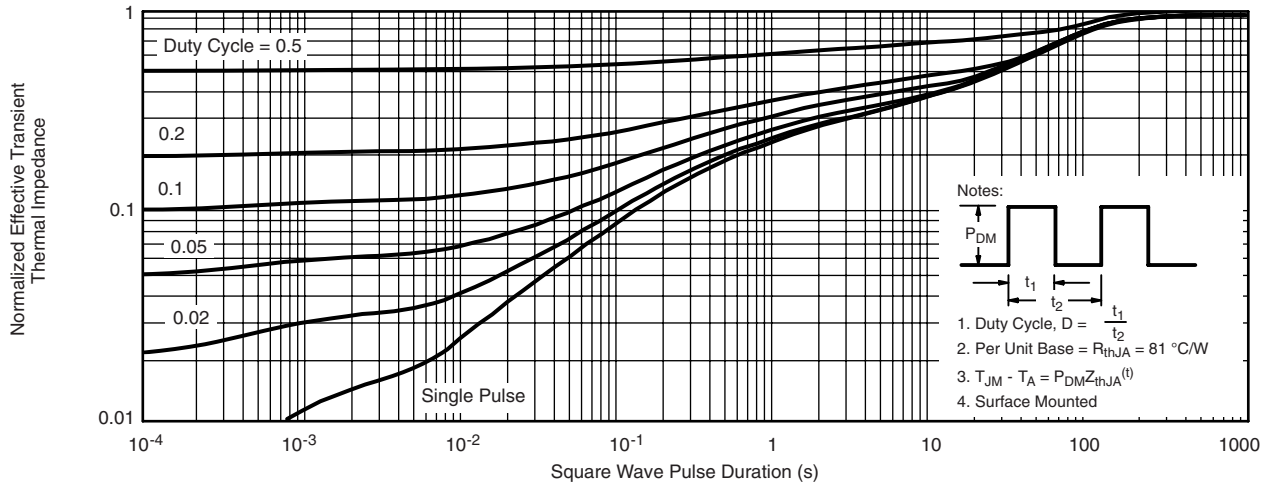
Power, Junction-to-Case



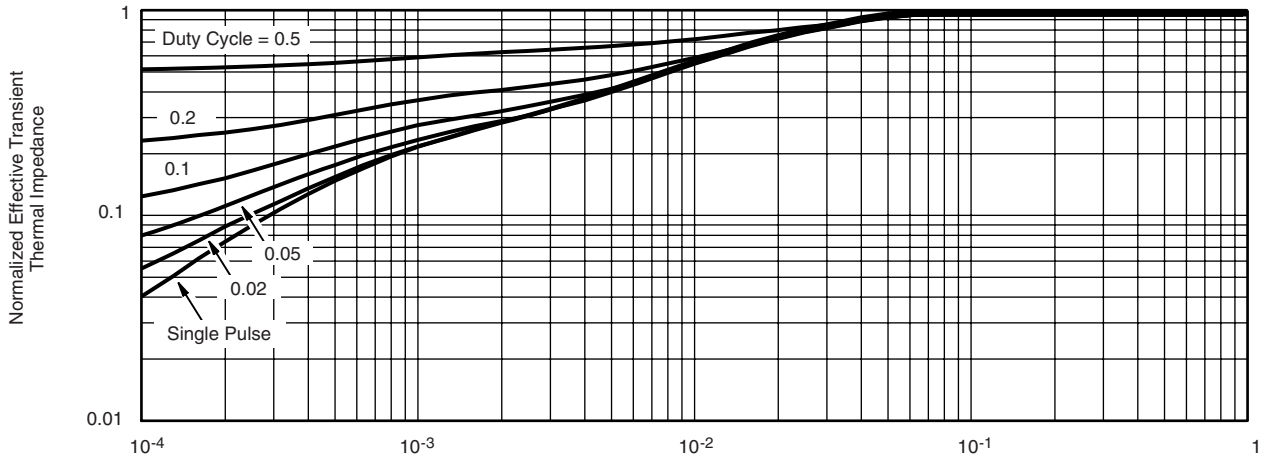
Power, Junction-to-Ambient

* 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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