Si7370ADP

Vishay Siliconix

N-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY

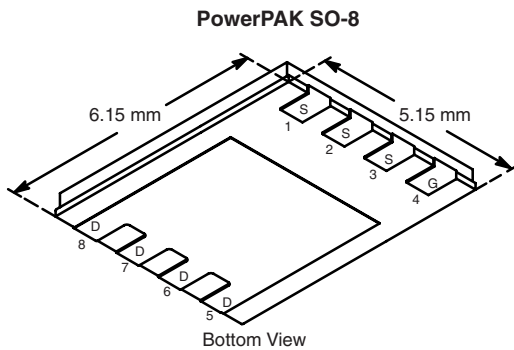| V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[b, c]	Q_g (Typ.)
60	0.010 at V_{GS} = 10 V	16	45
	0.0125 at V_{GS} = 6 V	14.4	

FEATURES

- **Halogen-free**
- TrenchFET® Power MOSFET
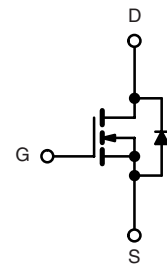- 100 % R_g Tested
- 100 % UIS Tested

RoHS COMPLIANT

APPLICATIONS

- Primary Side Switch for 24 V DC/DC Applications
- Secondary Synchronous Rectifier

PowerPAK SO-8

6.15 mm   5.15 mm

Bottom View

N-Channel MOSFET

Ordering Information: Si7370ADP-T1-GE3 (Lead (Pb)-free and Halogen-free)

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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	50[a]	A
	T_C = 70 °C		50[a]	
	T_A = 25 °C		16[b, c]	
	T_A = 70 °C		12.9[b, c]	
Pulsed Drain Current		I_{DM}	50	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	50[a]	
	T_A = 25 °C		4.4[b, c]	
Avalanche Current	L = 0.1 mH	I_{AS}	50	
Single Pulse Avalanche Energy		E_{AS}	125	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	69.4	W
	T_C = 70 °C		44.4	
	T_A = 25 °C		5.2[b, c]	
	T_A = 70 °C		3.3[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}	19	24	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	1.5	1.8	

Notes:
a. Package Limited.
b. Surface Mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. See Solder Profile (*http://www.vishay.com/ppg?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 65 °C/W.

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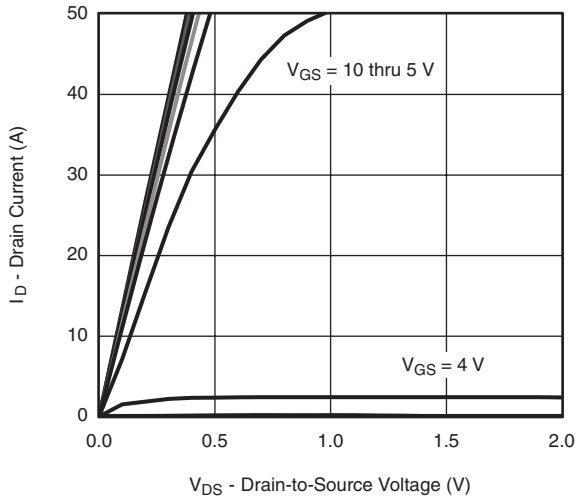| SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 μA	60			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 μA		60		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 9.8		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2.0		4.5	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 60 V, V_{GS} = 0 V			1	μA
		V_{DS} = 60 V, V_{GS} = 0 V, T_J = 55 °C			5	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	50			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 12 A		0.008	0.010	Ω
		V_{GS} = 6 V, I_D = 10 A		0.010	0.0125	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 10 A		50		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 30 V, V_{GS} = 0 V, f = 1 MHz		2850		pF
Output Capacitance	C_{oss}			375		
Reverse Transfer Capacitance	C_{rss}			150		
Total Gate Charge	Q_g	V_{DS} = 30 V, V_{GS} = 10 V, I_D = 12 A		45	70	nC
Gate-Source Charge	Q_{gs}			12.2		
Gate-Drain Charge	Q_{gd}			10		
Gate Resistance	R_g	f = 1 MHz	0.2	0.75	1.5	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 30 V, R_L = 30 Ω $I_D \cong$ 1 A, V_{GEN} = 10 V, R_g = 1 Ω		20	30	ns
Rise Time	t_r			9	18	
Turn-Off Delay Time	$t_{d(off)}$			40	60	
Fall Time	t_f			20	30	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 30 V, R_L = 30 Ω $I_D \cong$ 1 A, V_{GEN} = 10 V, R_g = 1 Ω		25	40	
Rise Time	t_r			14	25	
Turn-Off Delay Time	$t_{d(off)}$			35	55	
Fall Time	t_f			20	30	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			50	A
Pulse Diode Forward Current[a]	I_{SM}				50	
Body Diode Voltage	V_{SD}	I_S = 3 A		0.75	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 3 A, dI/dt = 100 A/μs, T_J = 25 °C		35	60	ns
Body Diode Reverse Recovery Charge	Q_{rr}			45	70	nC
Reverse Recovery Fall Time	t_a			22		ns
Reverse Recovery Rise Time	t_b			13		

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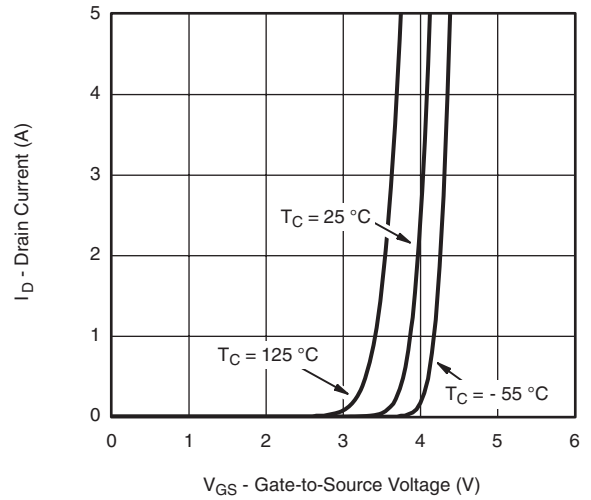b. Guaranteed by design, not subject to production testing.

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.
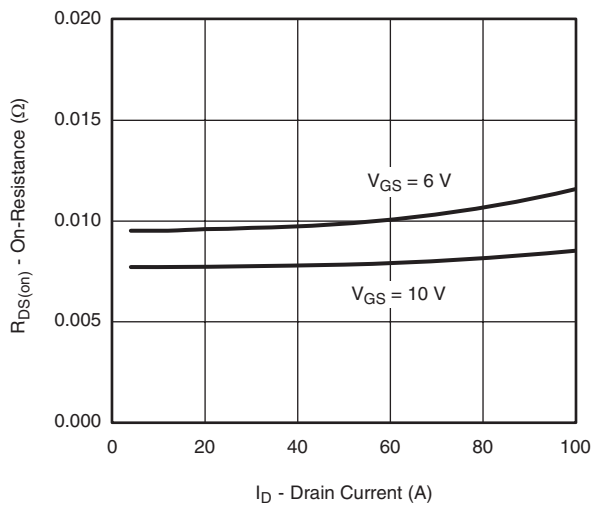
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TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Output Characteristics

V_{GS} = 10 thru 5 V

V_{GS} = 4 V

I_D - Drain Current (A)

V_{DS} - Drain-to-Source Voltage (V)

Transfer Characteristics

T_C = 25 °C

T_C = 125 °C

T_C = - 55 °C

I_D - Drain Current (A)

V_{GS} - Gate-to-Source Voltage (V)

On-Resistance vs. Drain Current and Gate Voltage

V_{GS} = 6 V

V_{GS} = 10 V

$R_{DS(on)}$ - On-Resistance (Ω)

I_D - Drain Current (A)

Capacitance

C_{iss}

C_{oss}

C_{rss}

C - Capacitance (pF)

V_{DS} - Drain-to-Source Voltage (V)

Gate Charge

I_D = 12 A

V_{DS} = 15 V

V_{DS} = 45 V

V_{DS} = 30 V

V_{GS} - Gate-to-Source Voltage (V)

Q_g - Total Gate Charge (nC)
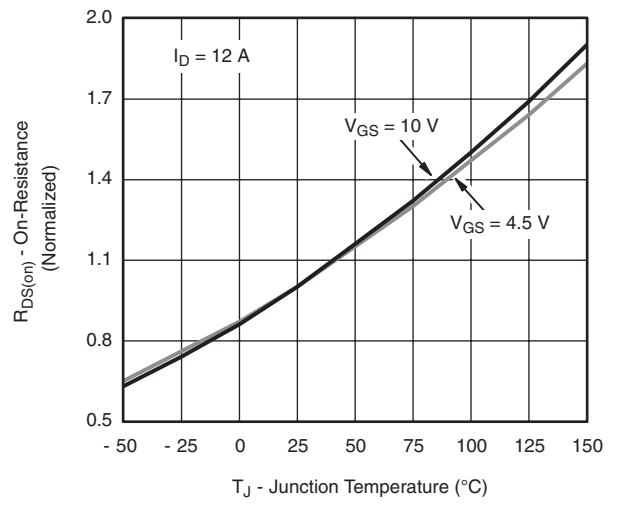
On-Resistance vs. Junction Temperature

I_D = 12 A

V_{GS} = 10 V

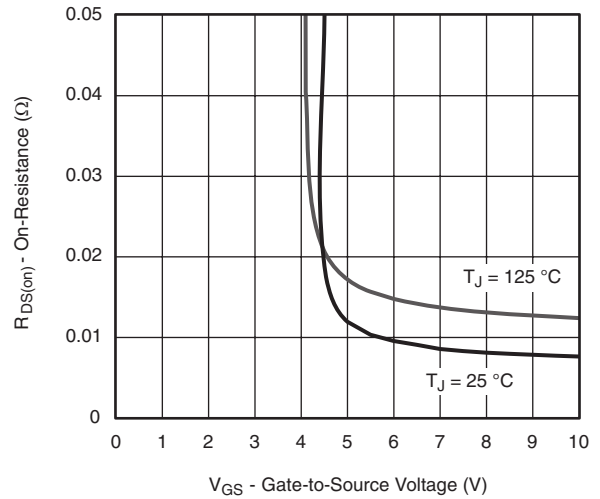V_{GS} = 4.5 V

$R_{DS(on)}$ - On-Resistance (Normalized)
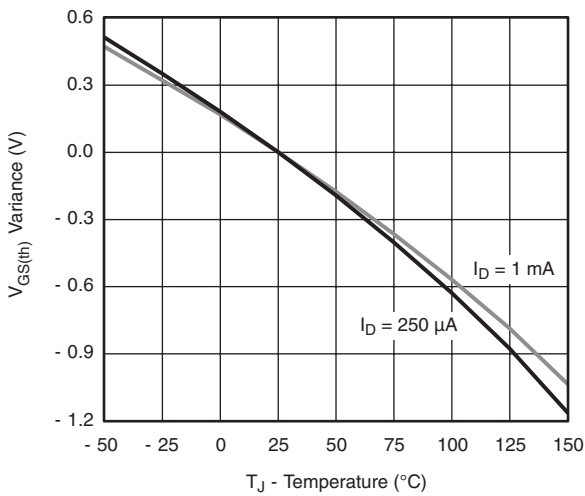
T_J - Junction Temperature (°C)

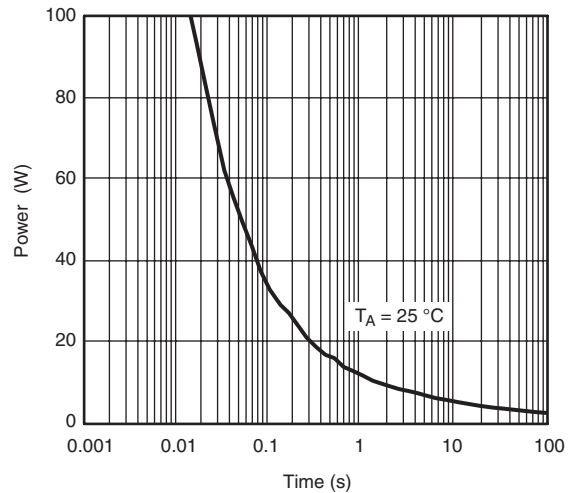## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted
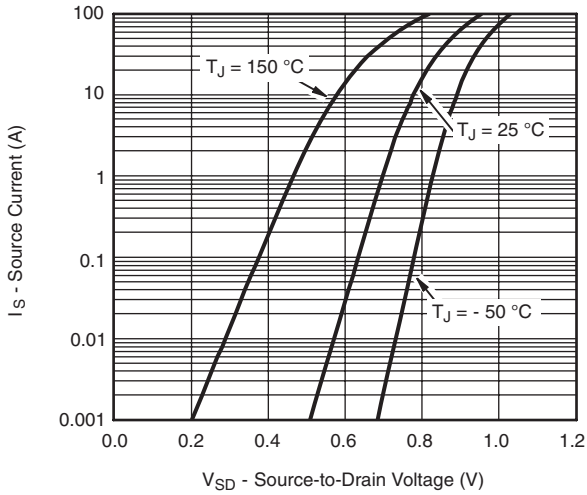
Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage
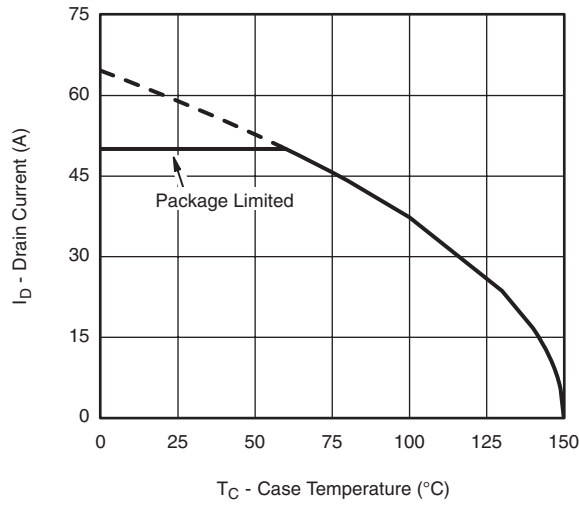
Threshold Voltage

Single Pulse Power, Junction-to-Ambient

Safe Operating Area, Junction-to-Ambient
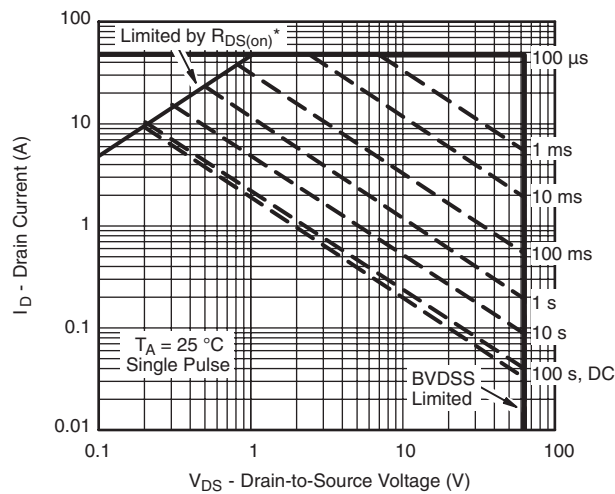
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

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TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Package Limited

I_D - Drain Current (A)

T_C - Case Temperature (°C)

Current Derating*

Power (W)

T_J - Junction Temperature (°C)
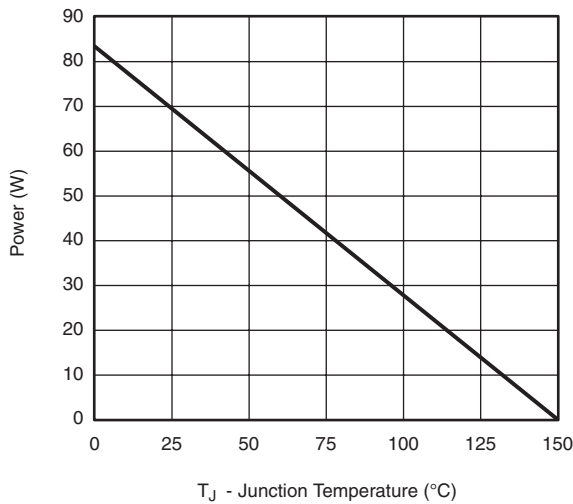
Power, Junction-to-Case

Power (W)

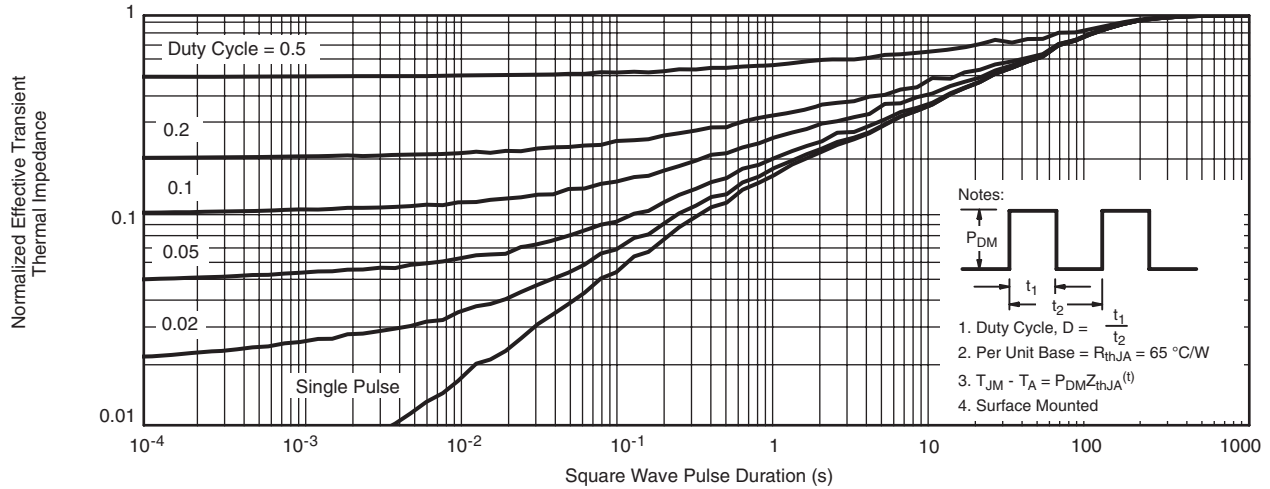T_J - Junction Temperature (°C)
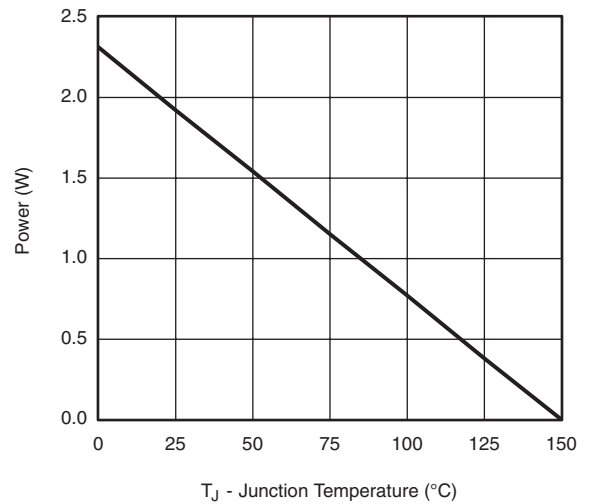
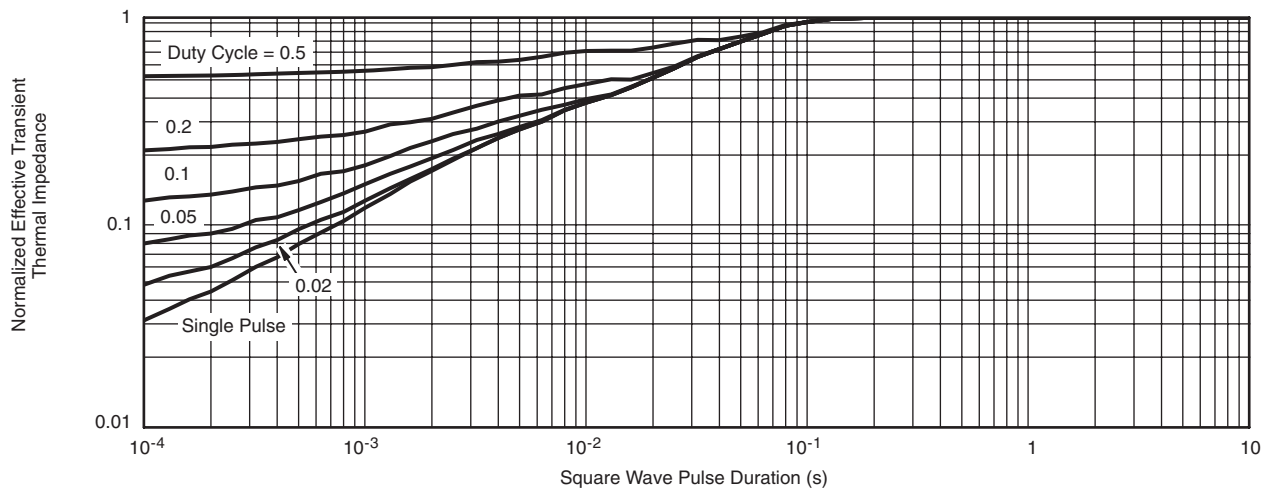**Power, Junction-to-Ambient**

* 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

Notes:
1. Duty Cycle, $D = \dfrac{t_1}{t_2}$
2. Per Unit Base = R_{thJA} = 65 °C/W
3. $T_{JM} - T_A = P_{DM}Z_{thJA}^{(t)}$
4. Surface Mounted

Normalized Thermal Transient Impedance, Junction-to-Ambient

Normalized Thermal Transient Impedance, Junction-to-Case

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