

P-Channel 150-V (D-S) MOSFET

PRODUCT SUMMARY

V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
- 150	1.2 at V _{GS} = - 10 V	- 1.3	4.8 nC
	1.3 at V _{GS} = - 6 V	- 1.2	

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- 100 % UIS Tested

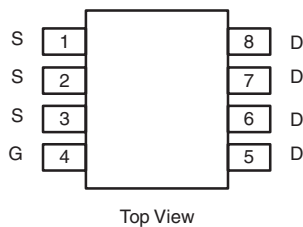


RoHS
COMPLIANT
HALOGEN
FREE
Available

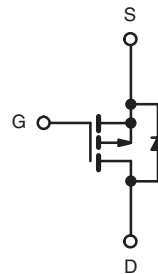
APPLICATIONS

- Active Clamp Switch
- Isolated DC/DC Converters

SO-8



Ordering Information: Si4409DY-T1-E3 (Lead (Pb)-free)
Si4409DY-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}	- 150	V
Gate-Source Voltage	V _{GS}	± 20	
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C - 1.3	A
		T _C = 70 °C - 1.0	
		T _A = 25 °C - 0.9 ^{b, c}	
		T _A = 70 °C - 0.7 ^{b, c}	
Pulsed Drain Current	I _{DM}	- 2	
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C - 1.3	
		T _A = 25 °C - 0.9 ^{b, c}	
Avalanche Current	I _{AS}	4	
Single-Pulse Avalanche Energy	E _{AS}	0.8	mJ
Maximum Power Dissipation	P _D	T _C = 25 °C 4.6	W
		T _C = 70 °C 2.9	
		T _A = 25 °C 2.2 ^{b, c}	
		T _A = 70 °C 1.4 ^{b, c}	
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 ^{b, d}	R _{thJA}	47	55	°C/W
Maximum Junction-to-Foot	R _{thJF}	22	27	

Notes:

- T_C = 25 °C.
- Surface Mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under Steady State conditions is 95 °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	- 150			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 160		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			5.5		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 2		- 4	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} = - 150 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 150 V, V _{GS} = 0 V, T _J = 55 °C			- 10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ - 10 V, V _{GS} = - 10 V	- 2			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 0.5 A		0.95	1.2	Ω
		V _{GS} = - 6 V, I _D = - 0.5 A		1.0	1.3	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 10 V, I _D = - 0.5 A		2.2		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 50 V, V _{GS} = 0 V, f = 1 MHz		332		pF
Output Capacitance	C _{oss}			25		
Reverse Transfer Capacitance	C _{rss}			13		
Total Gate Charge	Q _g	V _{DS} = - 75 V, V _{GS} = - 10 V, I _D = - 0.5 A		7.7	12	nC
		V _{DS} = - 75 V, V _{GS} = - 6 V, I _D = - 0.5 A		4.8	7.5	
Gate-Source Charge	Q _{gs}			1.5		
Gate-Drain Charge	Q _{gd}			2.5		
Gate Resistance	R _g	f = 1 MHz		9		Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 75 V, R _L = 75 Ω I _D ≡ - 1 A, V _{GEN} = - 10 V, R _g = 6 Ω		7	14	ns
Rise Time	t _r			10	20	
Turn-Off DelayTime	t _{d(off)}			16	30	
Fall Time	t _f			9	18	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 75 V, R _L = 75 Ω I _D ≡ - 1 A, V _{GEN} = - 6 V, R _g = 1 Ω		7	14	
Rise Time	t _r			10	20	
Turn-Off DelayTime	t _{d(off)}			13	25	
Fall Time	t _f			10	20	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I _S	T _C = 25 °C			- 1.3	A
Pulse Diode Forward Current	I _{SM}				- 2.0	
Body Diode Voltage	V _{SD}	I _S = - 1 A, V _{GS} = 0 V		- 0.7	- 1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 1.2 A, dI/dt = 100 A/μs, T _J = 25 °C		43	70	ns
Body Diode Reverse Recovery Charge	Q _{rr}			95	150	nC
Reverse Recovery Fall Time	t _a			40		ns
Reverse Recovery Rise Time	t _b			3		

Notes:

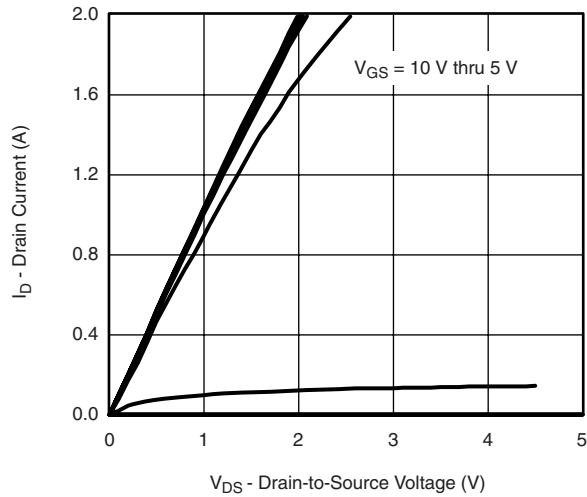
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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

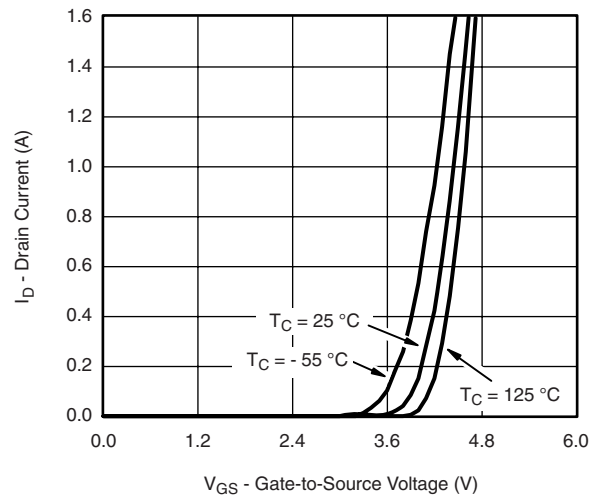
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



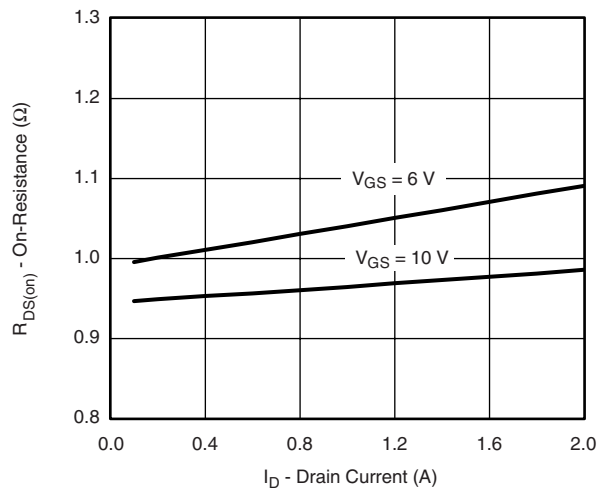
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



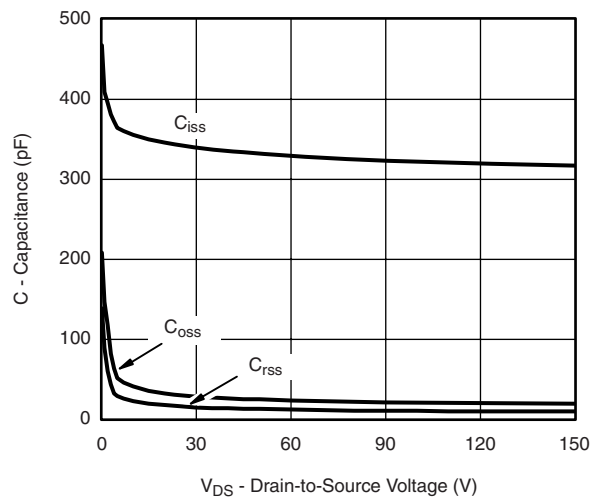
Output Characteristics



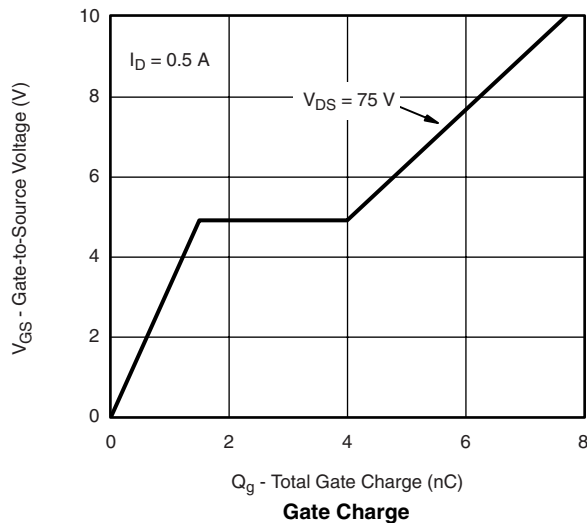
Transfer Characteristics



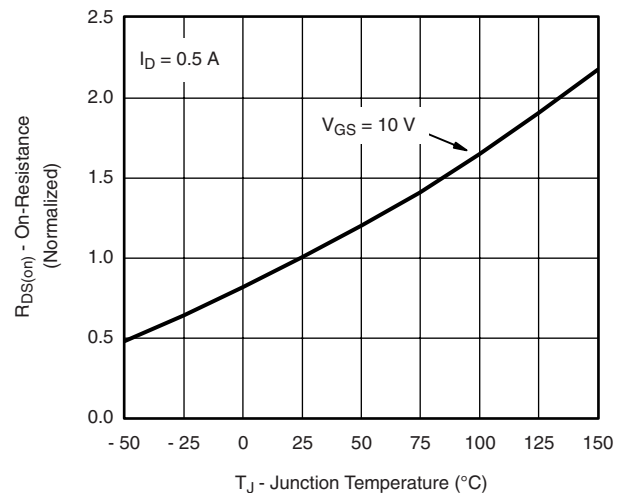
On-Resistance vs. Drain Current and Gate Voltage



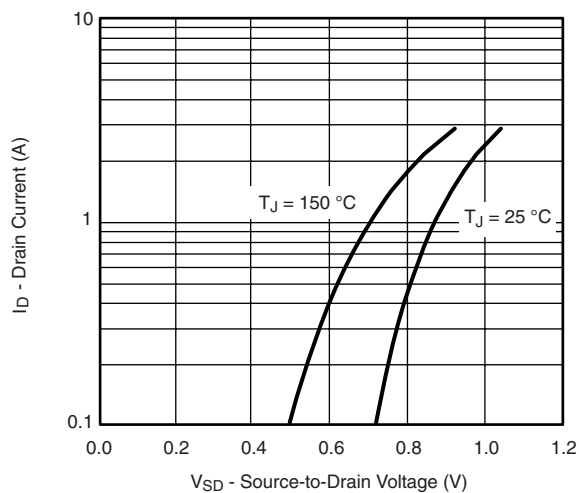
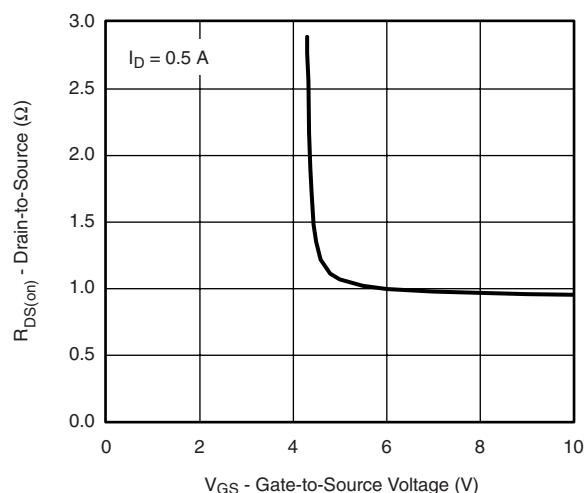
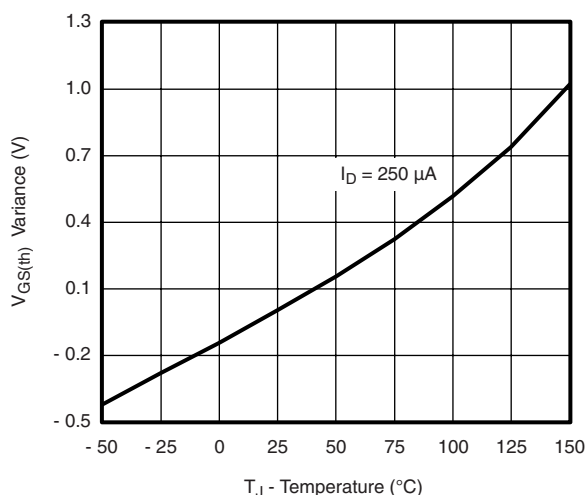
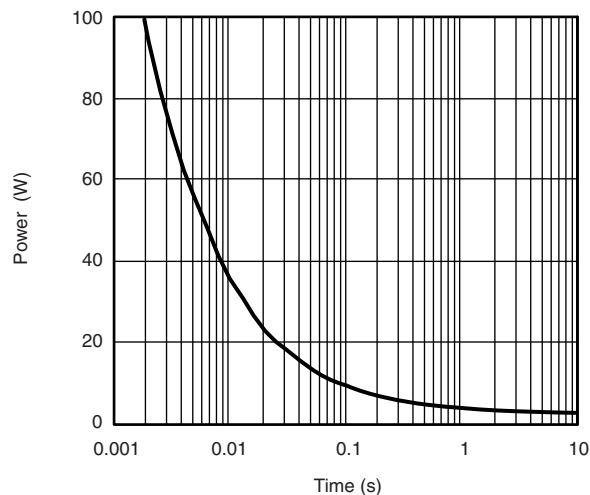
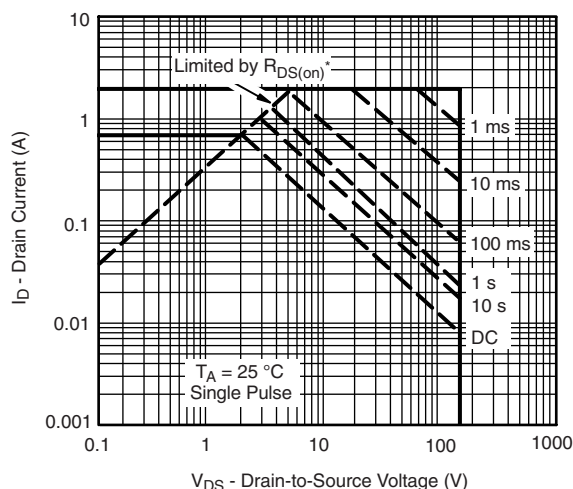
Capacitance



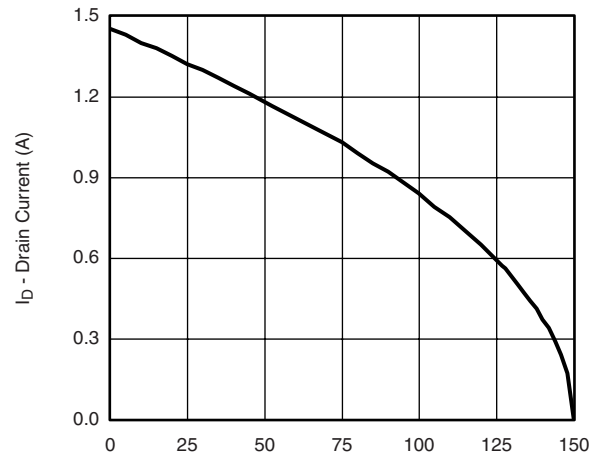
Gate Charge



On-Resistance vs. Junction Temperature

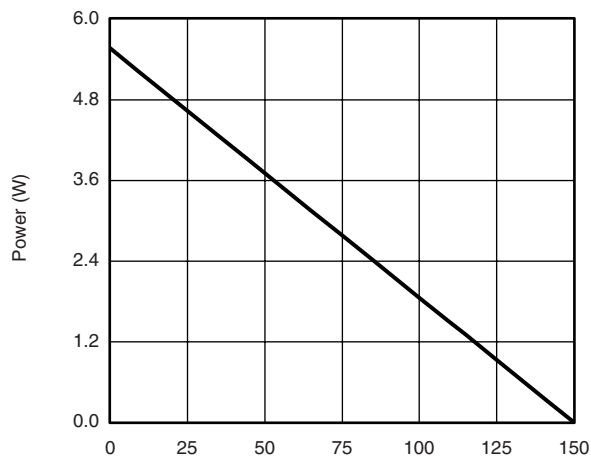
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**Source-Drain Diode Forward Voltage****On-Resistance vs. Gate-to-Source Voltage****Threshold Voltage****Single Pulse Power, Junction-to-Ambient*** $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified**Safe Operating Area, Junction-to-Ambient**

MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



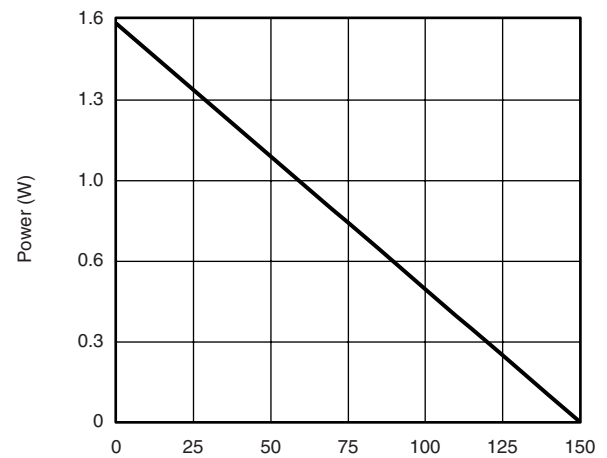
T_C - Case Temperature (°C)

Current Derating*



T_C - Case Temperature (°C)

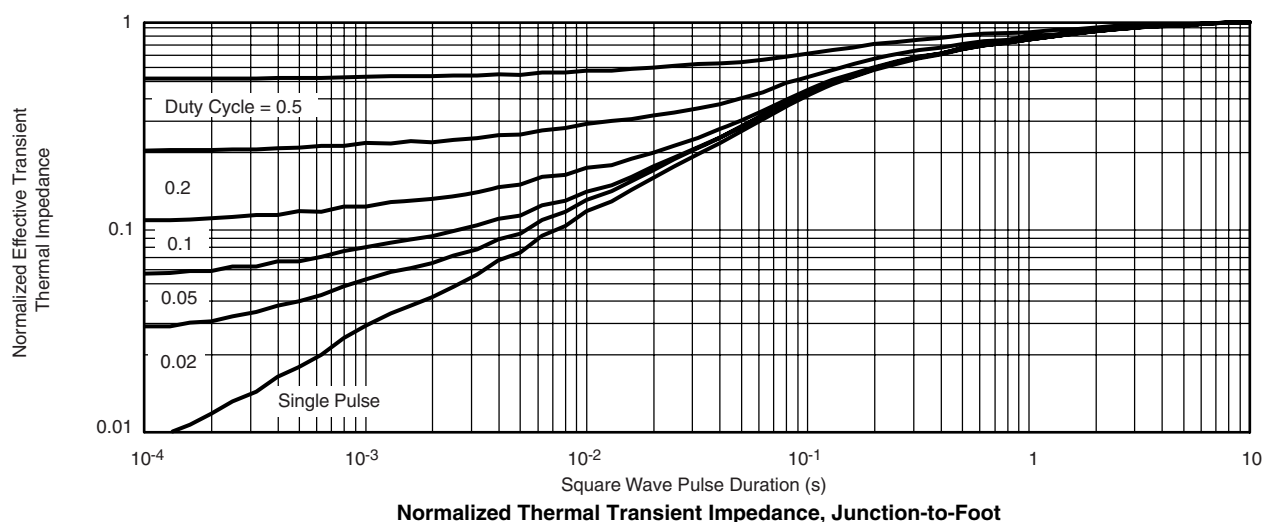
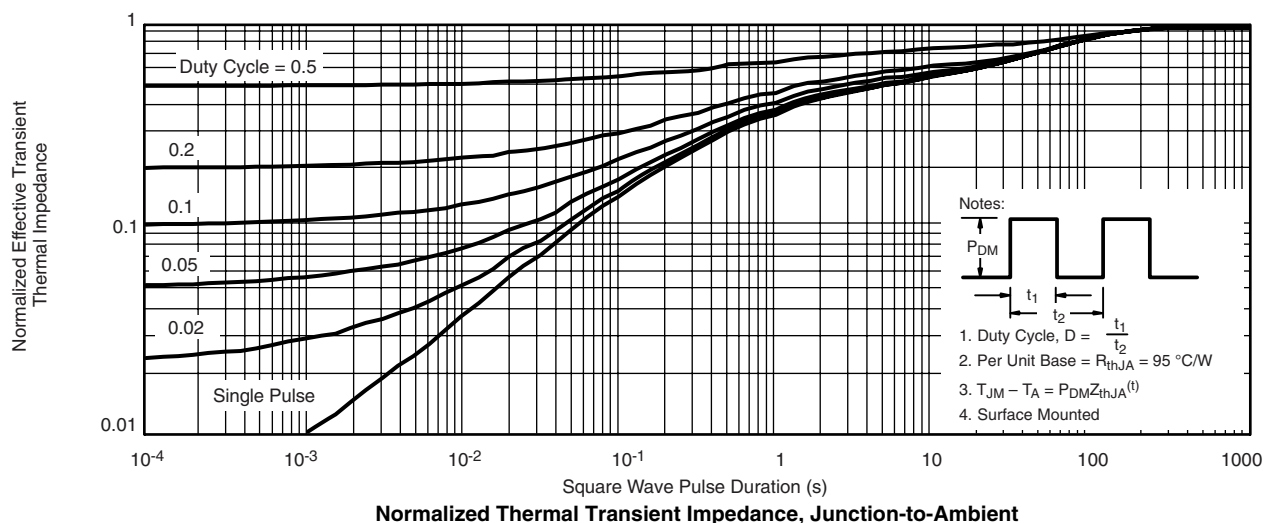
Power, Junction-to-Foot



T_A - Ambient Temperature (°C)

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

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