

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	0.0085 at $V_{GS} = 10$ V	17	18.8 nC
	0.0105 at $V_{GS} = 4.5$ V	15.6	

SCHOTTKY AND BODY DIODE PRODUCT SUMMARY

V_{DS} (V)	V_{SD} (V)	I_S (A)
30	0.4 at 2 A	5 ^a

FEATURES

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

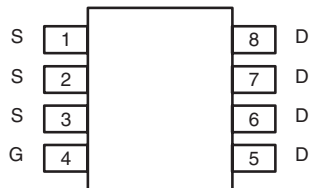
APPLICATIONS

- Notebook Logic DC/DC
- Low Side



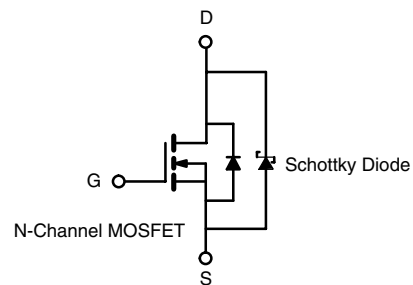
RoHS
COMPLIANT
HALOGEN
FREE
Available

SO-8



Top View

Ordering Information: Si4636DY-T1-E3 (Lead (Pb)-free)
Si4636DY-T1-GE3 (Lead (Pb)-free and Halogen-free)



ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 16	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	$T_C = 25^\circ\text{C}$	A
		$T_C = 70^\circ\text{C}$	
		$T_A = 25^\circ\text{C}$	
		$T_A = 70^\circ\text{C}$	
Pulsed Drain Current	I_{DM}	60	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$	
		$T_A = 25^\circ\text{C}$	
Single Pulse Avalanche Current	I_{AS}	20	mJ
Single Pulse Avalanche Energy	E_{AS}	20	
Maximum Power Dissipation	P_D	$T_C = 25^\circ\text{C}$	W
		$T_C = 70^\circ\text{C}$	
		$T_A = 25^\circ\text{C}$	
		$T_A = 70^\circ\text{C}$	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	40	50	$^\circ\text{C/W}$
Maximum Junction-to-Foot (Drain)	R_{thJF}	23	28	

Notes:

- Based on $T_C = 25^\circ\text{C}$.
- Surface Mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- Maximum under Steady State conditions is 90°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		0.19	1	mA
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 100 °C		14	100	
On -State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	30			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 10 A		0.0067	0.0085	Ω
		V _{GS} = 4.5 V, I _D = 8 A		0.008	0.0105	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 10 A		55		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		2635		pF
Output Capacitance	C _{oss}			435		
Reverse Transfer Capacitance	C _{rss}			138		
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 10 A		40	60	nC
		V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 10 A		18.8	30	
Q _{gs}			7.1			
Q _{gd}			4.7			
Gate Resistance	R _g	f = 1 MHz		1.3	2.0	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 1.5 Ω I _D ≅ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω		32	50	ns
Rise Time	t _r			87	135	
Turn-Off Delay Time	t _{d(off)}			43	65	
Fall Time	t _f			19	30	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 1.5 Ω I _D ≅ 10 A, V _{GEN} = 10 V, R _g = 1 Ω		12	20	
Rise Time	t _r			12	20	
Turn-Off Delay Time	t _{d(off)}			33	50	
Fall Time	t _f			9	16	
Drain-Source Body Diode and Schottky Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			5.0	A
Pulse Diode Forward Current ^a	I _{SM}				60	
Body Diode Voltage	V _{SD}	I _S = 2 A		0.36	0.41	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 4 A, dI/dt = 100 A/μs, T _J = 25 °C		28	45	ns
Body Diode Reverse Recovery Charge	Q _{rr}			19	30	nC
Reverse Recovery Fall Time	t _a			14		ns
Reverse Recovery Rise Time	t _b			14		

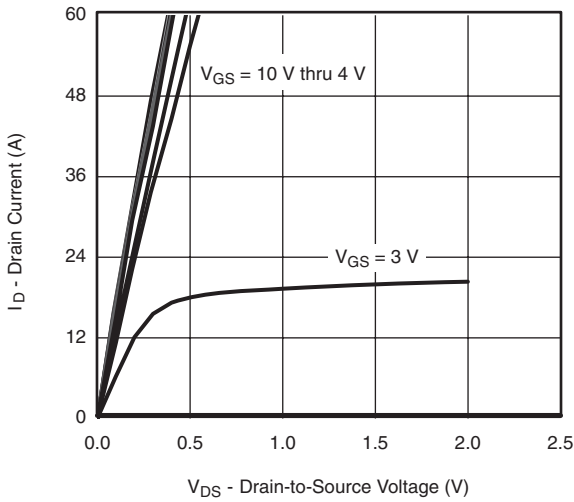
Notes:

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

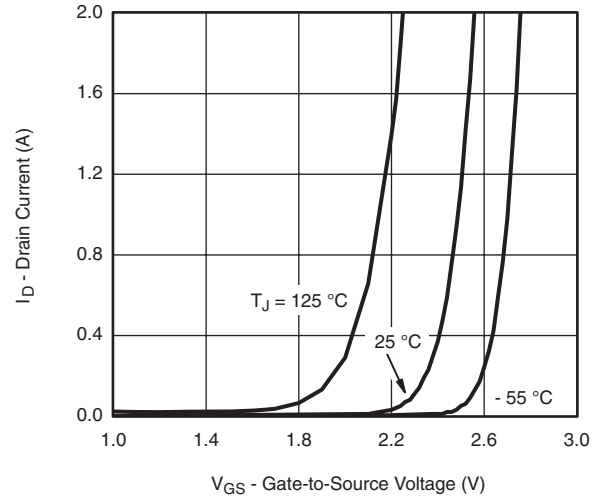
b. Guaranteed by design, not subject to production testing.

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.

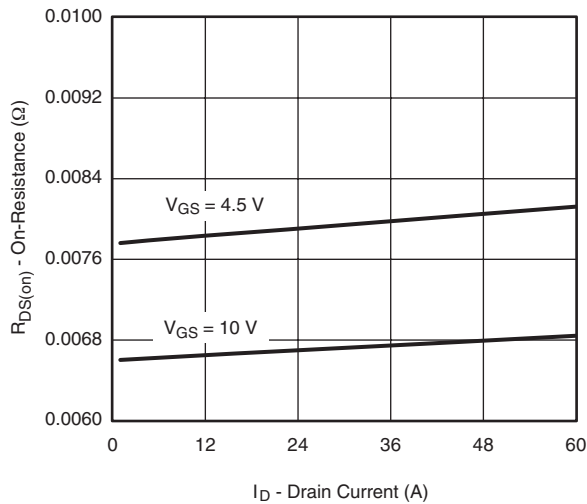
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



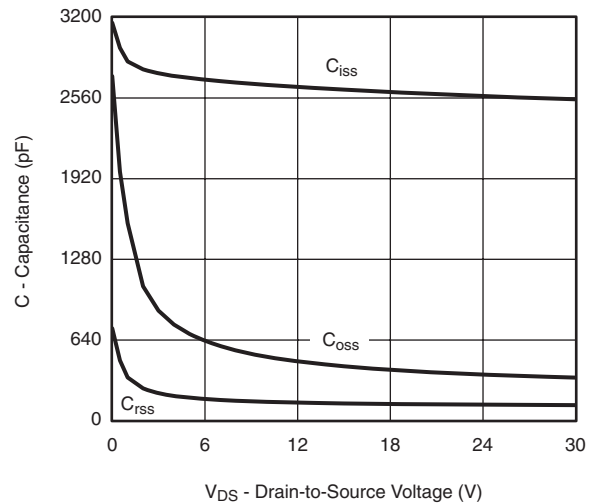
Output Characteristics



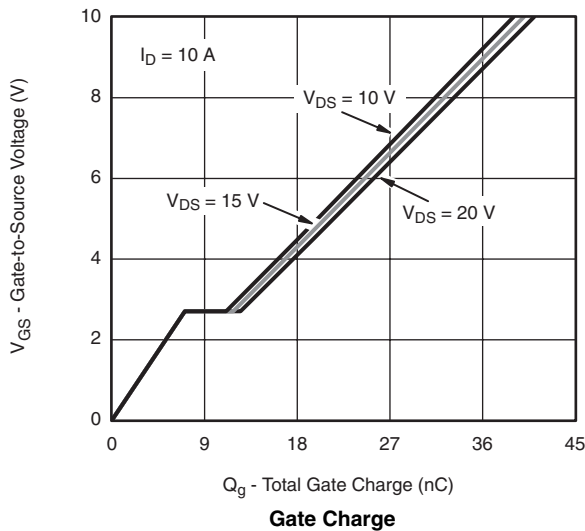
Transfer Characteristics



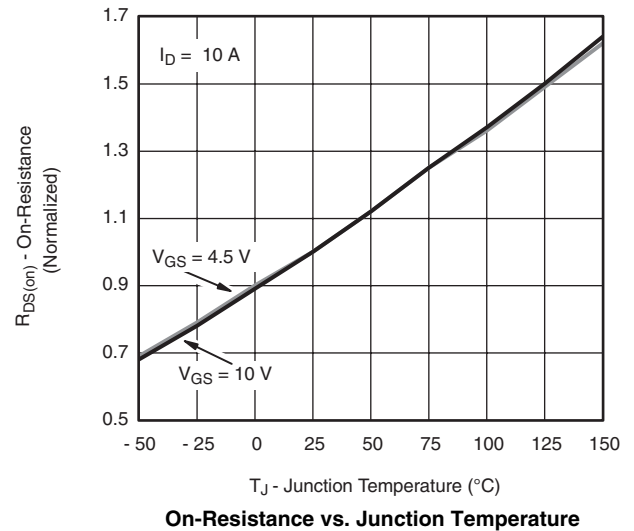
On-Resistance vs. Drain Current



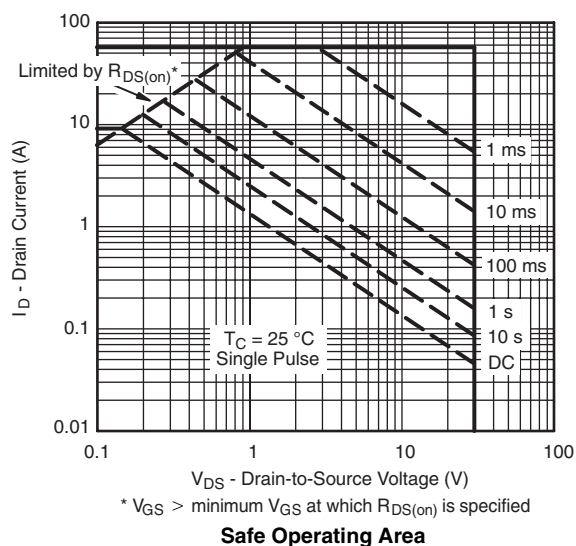
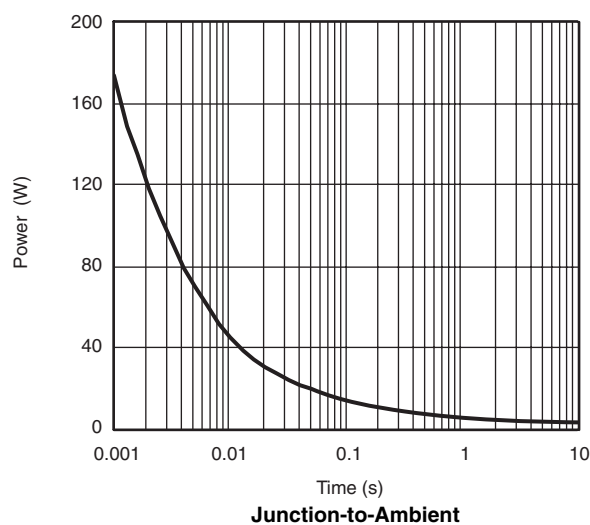
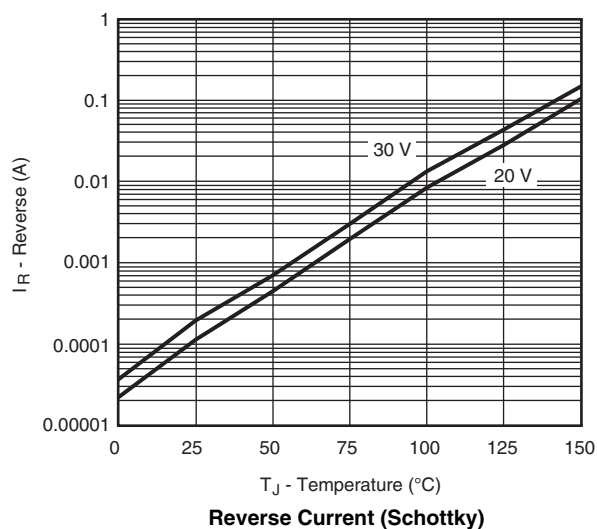
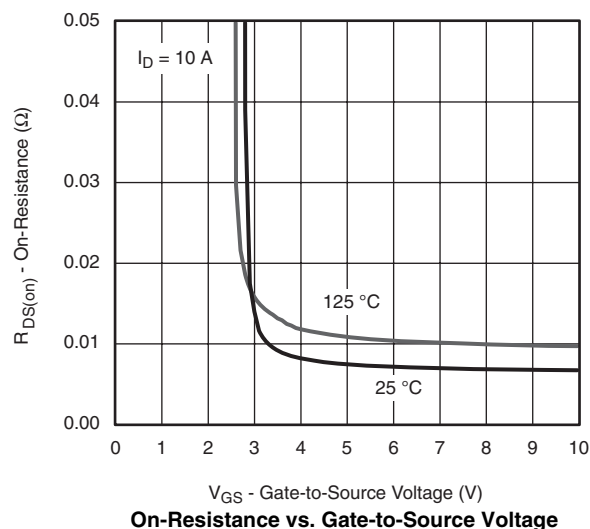
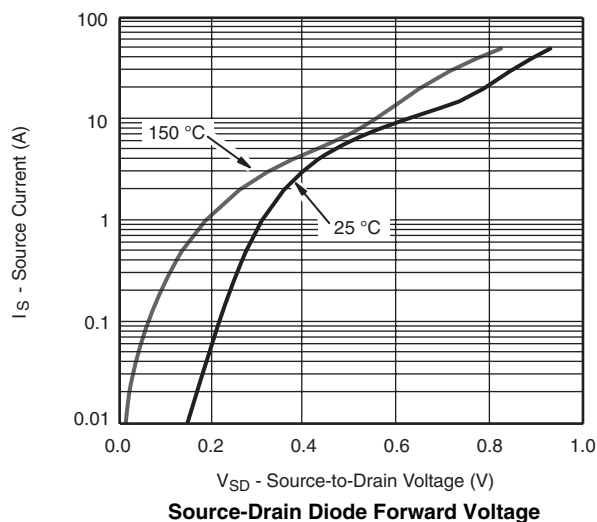
Capacitance



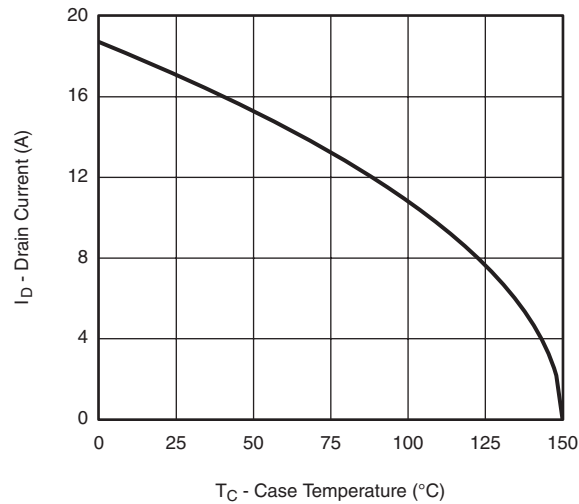
Gate Charge



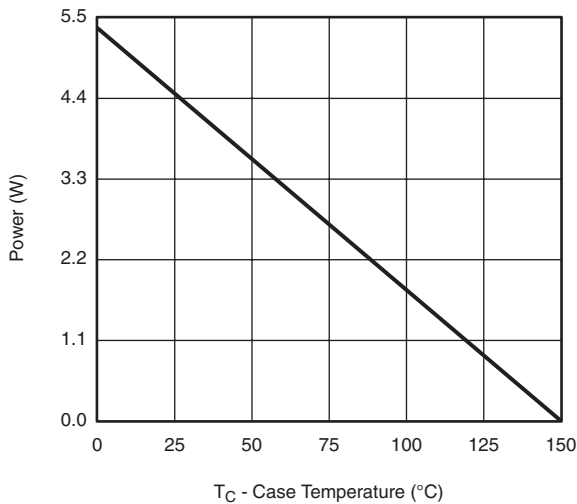
On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

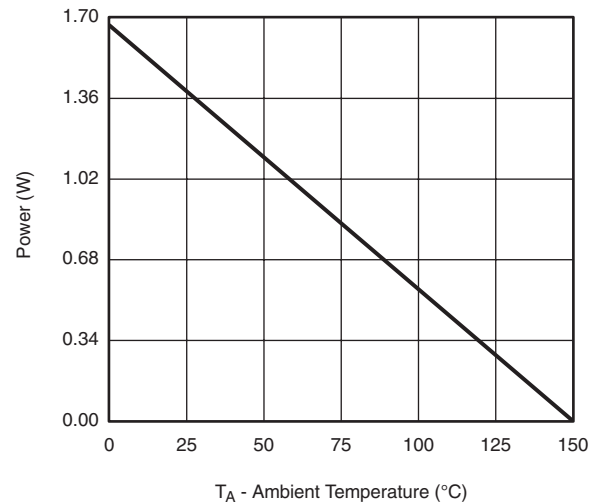
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*

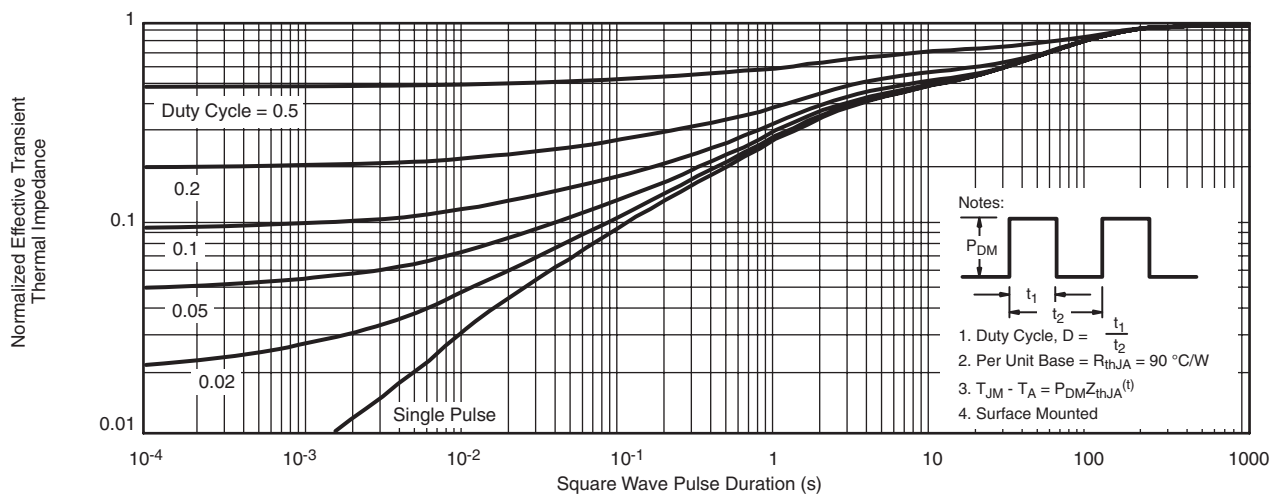
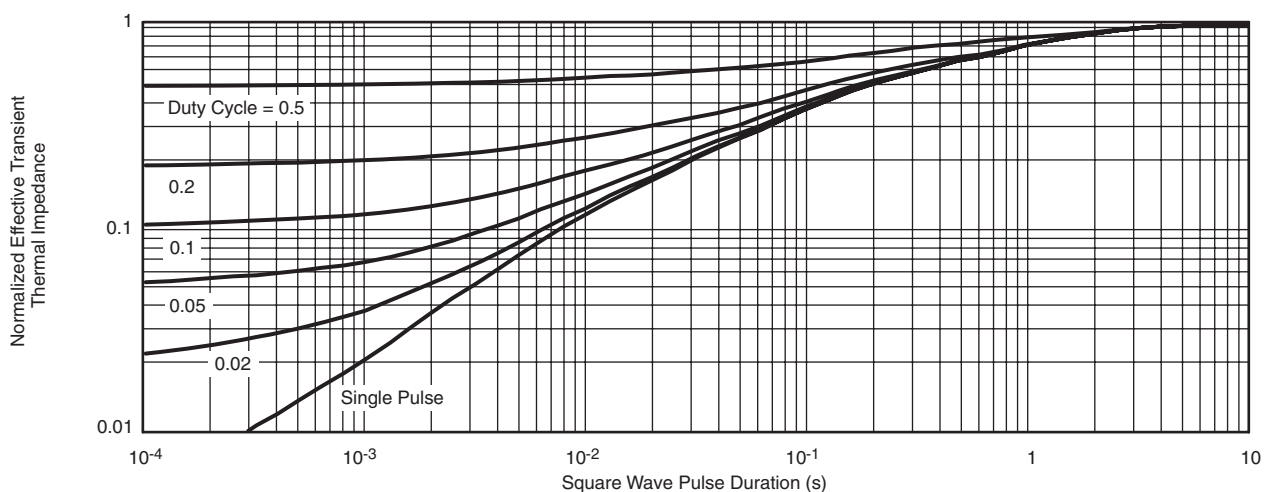


Power Derating, Junction-to-Foot



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-Case**

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