

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	0.0055 at $V_{GS} = 10$ V	25	13.8 nC
	0.0076 at $V_{GS} = 4.5$ V	21	

FEATURES

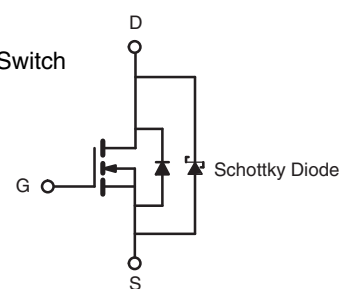
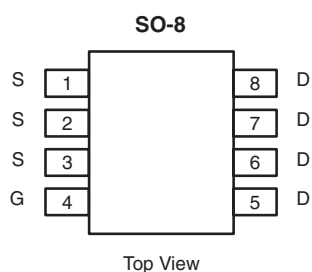
- Halogen-free According to IEC 61249-2-21 Definition
- SkyFET[®] Monolithic TrenchFET[®] Power MOSFET and Schottky Diode
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Notebook PC
- System Power
- VRM, POL, Server
- Synchronous Rectifier Switch



Ordering Information: Si4752DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

N-Channel MOSFET

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}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	25
		$T_C = 70$ °C	20
		$T_A = 25$ °C	17.4 ^{b, c}
		$T_A = 70$ °C	13.8 ^{b, c}
Pulsed Drain Current (300 μ s)	I_{DM}	80	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	5.6
		$T_A = 25$ °C	2.7 ^{b, c}
Single Pulse Avalanche Current	I_{AS}	20	
Single Pulse Avalanche Energy	E_{AS}	20	mJ
Maximum Power Dissipation	P_D	$T_C = 25$ °C	6.25
		$T_C = 70$ °C	4.0
		$T_A = 25$ °C	3.0 ^{b, c}
		$T_A = 70$ °C	1.9 ^{b, c}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	33	42	°C/W
Maximum Junction-to-Foot (Drain)	R_{thJF}	16	20	

Notes:

a. Based on $T_C = 25$ °C.

b. Surface mounted on 1" x 1" FR4 board.

c. $t = 10$ s.

d. Maximum under Steady State conditions is 85 °C/W.

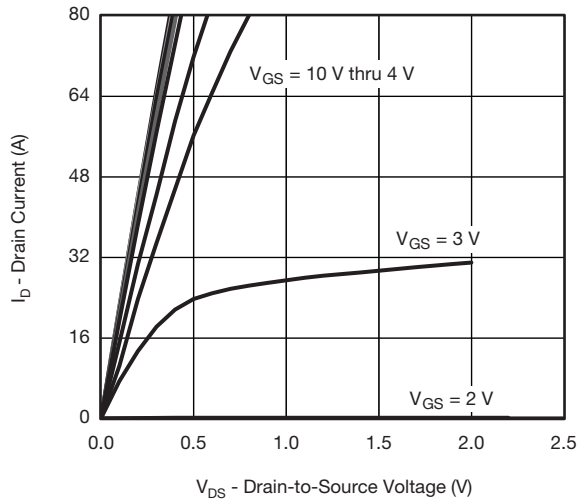
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 1 mA	30			V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 1 mA	1.0		2.2	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V		0.018	0.15	mA
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 100 °C		2.0	20	
On -State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	20			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 10 A		0.0045	0.0055	Ω
		V _{GS} = 4.5 V, I _D = 7 A		0.0063	0.0076	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 10 A		45		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		1700		pF
Output Capacitance	C _{oss}			410		
Reverse Transfer Capacitance	C _{rss}			130		
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 10 A		28.5	43	nC
Gate-Source Charge	Q _{gs}	V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 10 A		13.8	21	
Gate-Drain Charge	Q _{gd}			4.2		
Gate Resistance	R _g			3.8		
f = 1 MHz			0.3	1.4	2.8	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		18	35	ns
Rise Time	t _r			15	30	
Turn-Off Delay Time	t _{d(off)}			25	50	
Fall Time	t _f			8	16	
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		11	22	
Rise Time	t _r			12	24	
Turn-Off Delay Time	t _{d(off)}			25	50	
Fall Time	t _f			8	16	
Drain-Source Body Diode and Schottky Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			5.6	A
Pulse Diode Forward Current ^a	I _{SM}				80	
Body Diode Voltage	V _{SD}	I _S = 3 A		0.46	0.65	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 10 A, dI/dt = 100 A/μs, T _J = 25 °C		23	45	ns
Body Diode Reverse Recovery Charge	Q _{rr}			12	24	nC
Reverse Recovery Fall Time	t _a			11		ns
Reverse Recovery Rise Time	t _b			12		

Notes:

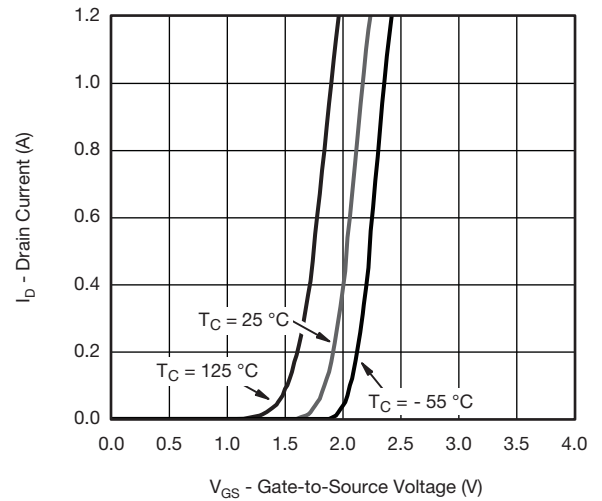
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

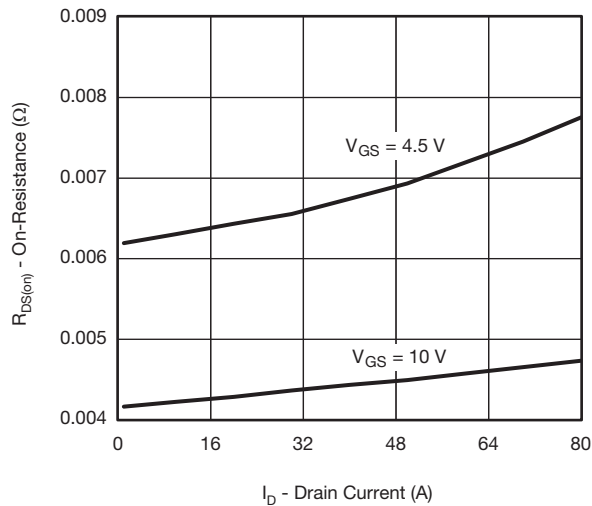
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



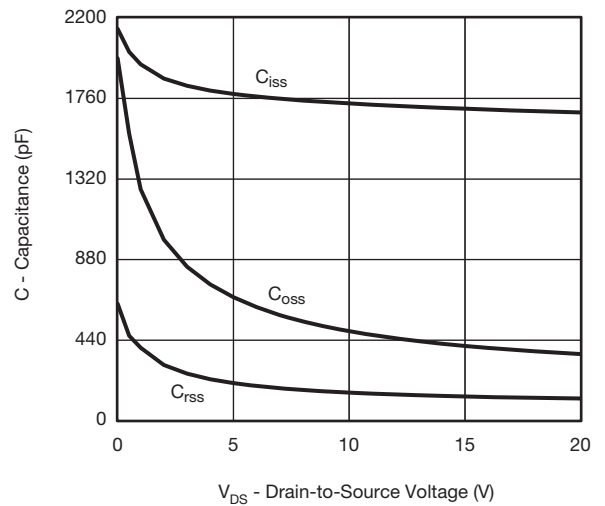
Output Characteristics



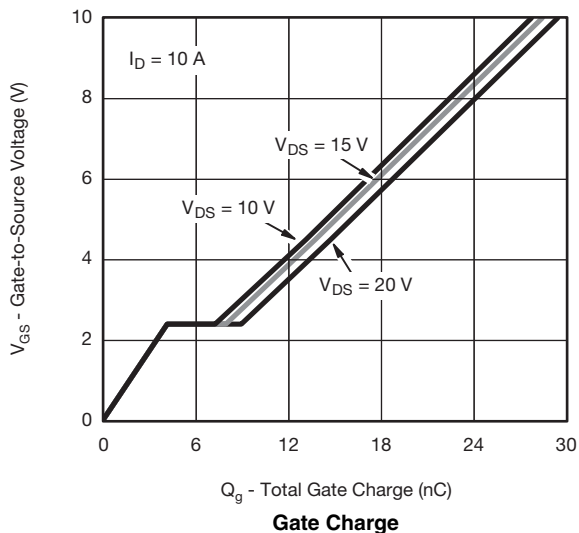
Transfer Characteristics



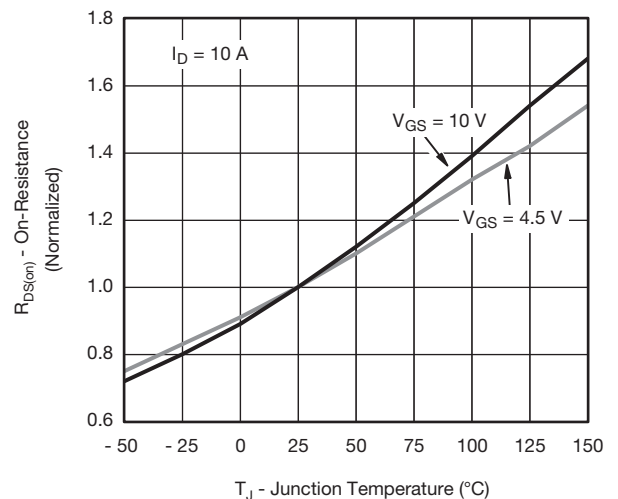
On-Resistance vs. Drain Current



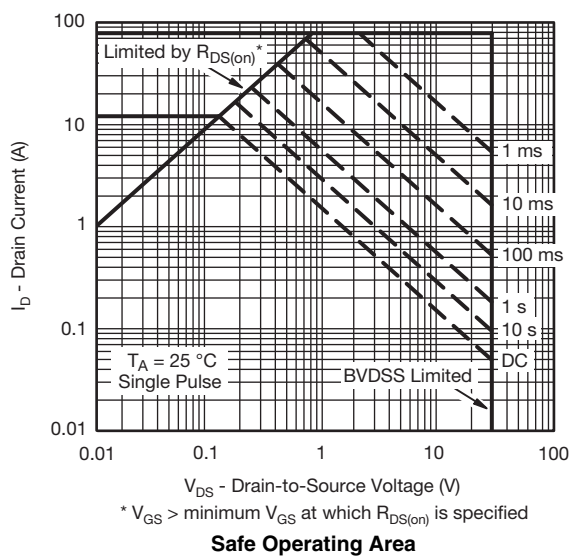
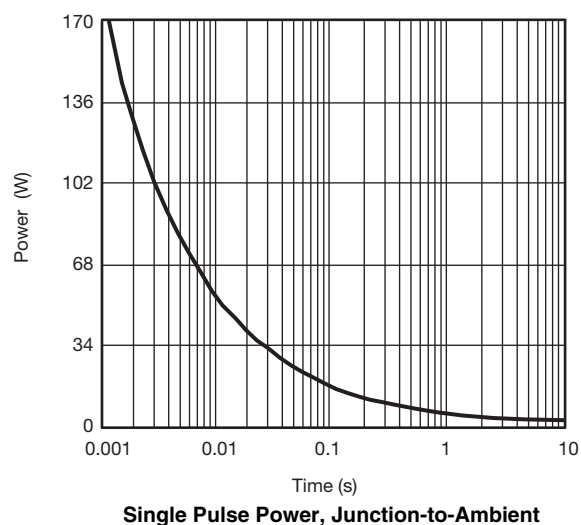
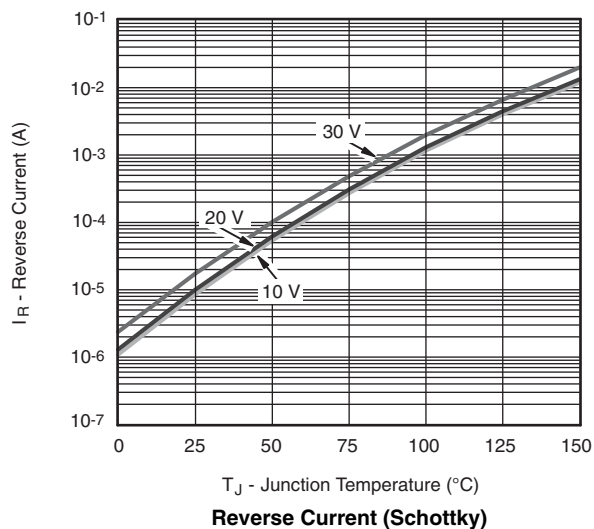
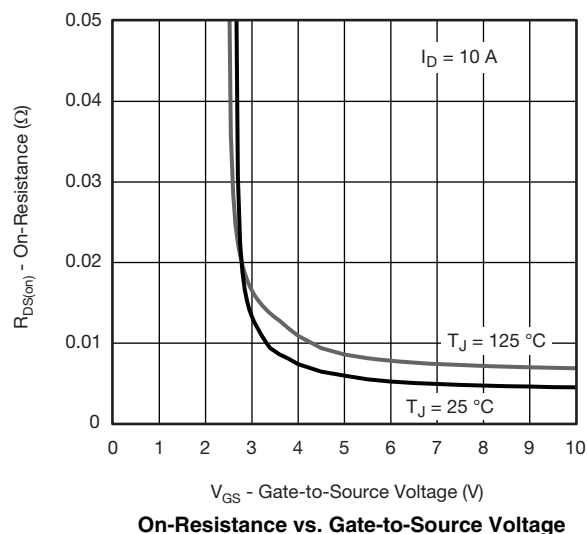
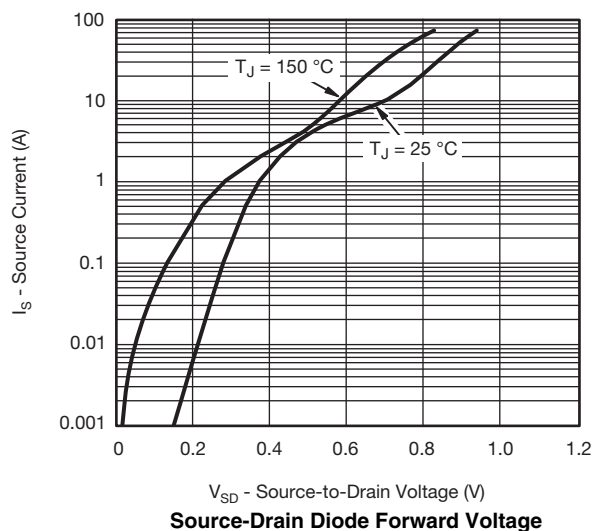
Capacitance



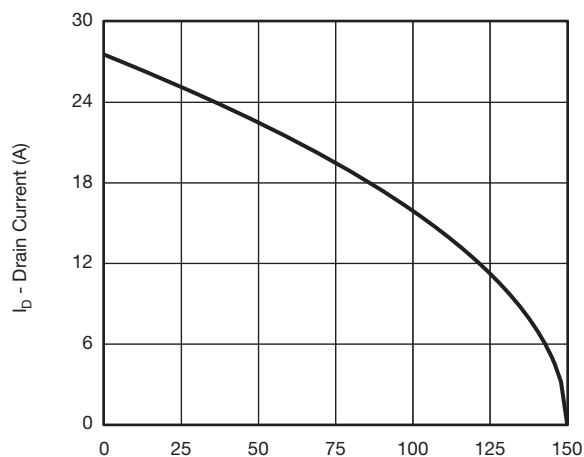
Gate Charge



On-Resistance vs. Junction Temperature

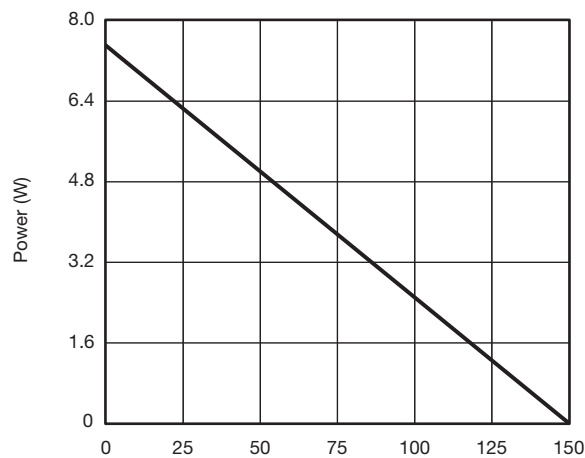
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

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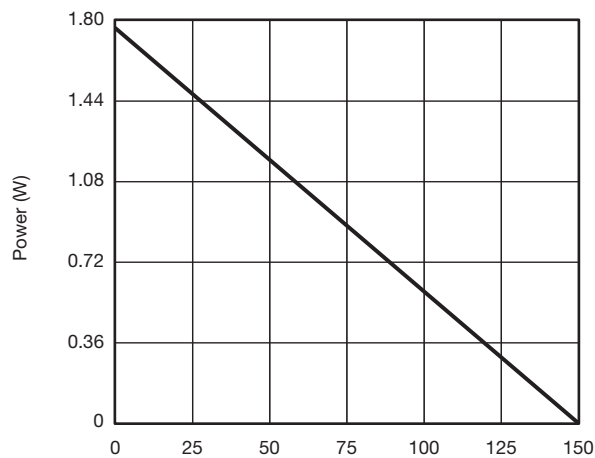
T_C - Case Temperature (°C)

Current Derating*



T_C - Case Temperature (°C)

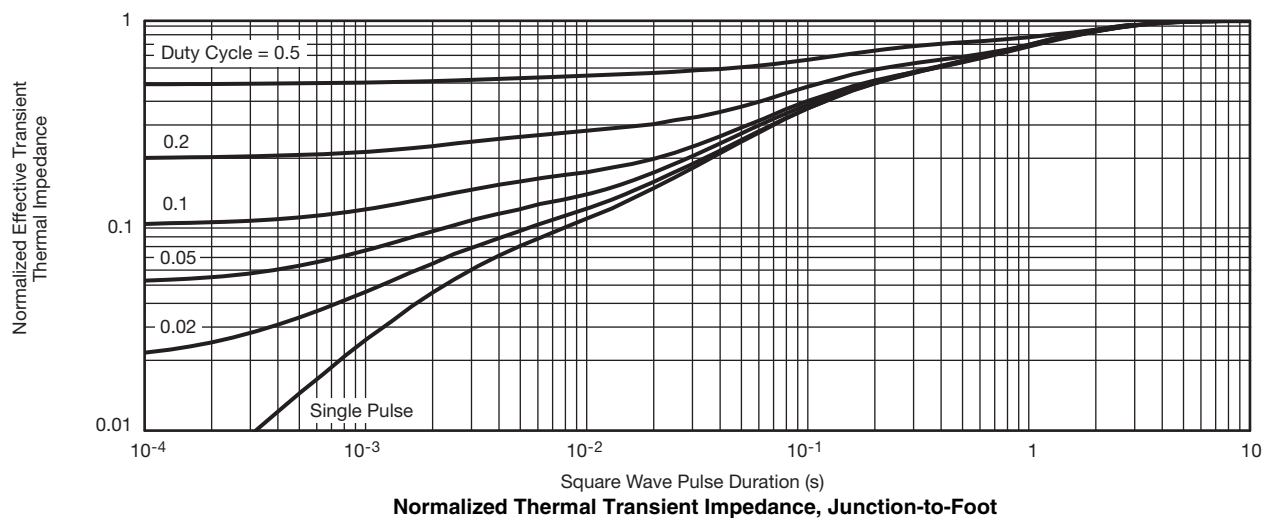
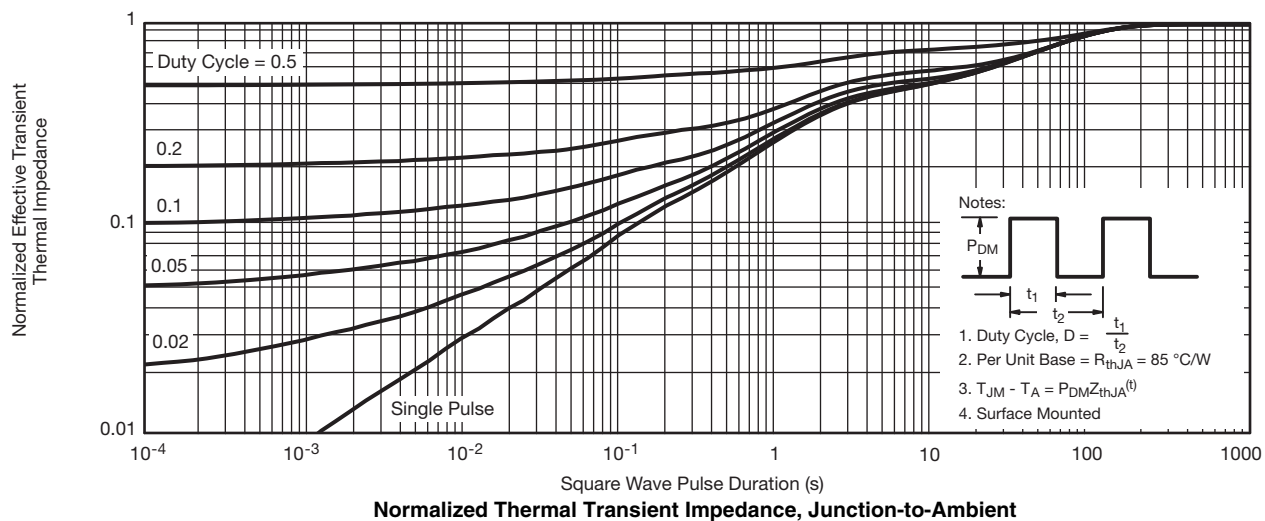
Power Derating, Junction-to-Foot



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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