

P-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
- 20	0.07 at $V_{GS} = - 4.5$ V	- 5	4.5 nC
	0.105 at $V_{GS} = - 2.5$ V	- 4.1	

FEATURES

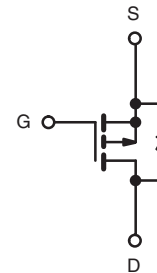
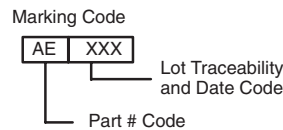
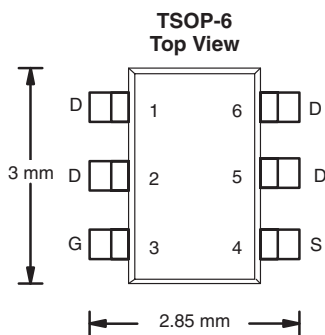
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- PWM Optimized, Low Q_{gd}/Q_{gs} Ratio
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Load Switch for Portable Applications
- Small Portable DC-DC Applications



Ordering Information: Si3403DV-T1-E3 (Lead (Pb)-free)
Si3403DV-T1-GE3 (Lead (Pb)-free and Halogen-free)

P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	- 20	V	
Gate-Source Voltage	V_{GS}	± 12		
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	- 5 ^a	A
		$T_C = 70$ °C	- 4	
		$T_A = 25$ °C	- 4 ^{b,c}	
		$T_A = 70$ °C	- 3.1 ^{b,c}	
Pulsed Drain Current	I_{DM}	- 20		
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	- 2.6	
		$T_A = 25$ °C	1.6 ^{b,c}	
Avalanche Current	I_{AS}	5		
Single-Pulse Avalanche Energy	E_{AS}	1.25	mJ	
Maximum Power Dissipation	P_D	$T_C = 25$ °C	3.2	W
		$T_C = 70$ °C	2.1	
		$T_A = 25$ °C	2 ^{b,c}	
		$T_A = 70$ °C	1.25 ^{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}	51	62.5	°C/W
Maximum Junction-to-Foot	R_{thJF}	32	39	

Notes:

- Package Limited.
- Surface mounted on 1" x 1" FR4 board.
- $t = 5$ s.
- Maximum under Steady State conditions is 110 °C/W.

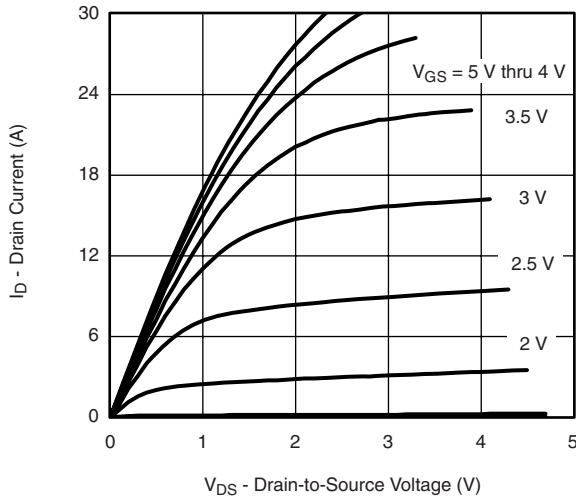
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		-20		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		3			
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.6		-1.5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq -10\text{ V}, V_{GS} = -4.5\text{ V}$	-10			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -3.5\text{ A}$		0.058	0.070	Ω
		$V_{GS} = -2.5\text{ V}, I_D = -3\text{ A}$		0.085	0.105	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -3.5\text{ A}$		10		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		480		pF
Output Capacitance	C_{oss}		132			
Reverse Transfer Capacitance	C_{rss}		55			
Total Gate Charge	Q_g	$V_{DS} = -10\text{ V}, V_{GS} = -10\text{ V}, I_D = -5\text{ A}$	9.7	14.5	nC	
			4.5	7		
Gate-Source Charge	Q_{gs}	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -5\text{ A}$	1		nC	
Gate-Drain Charge	Q_{gd}		1			
Gate Resistance	R_g		$f = 1\text{ MHz}$	7.5		11.5
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 2\text{ }\Omega$ $I_D \cong -5\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$	4	8	ns	
Rise Time	t_r		24	36		
Turn-Off Delay Time	$t_{d(off)}$		17	26		
Fall Time	t_f		8	15		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 2\text{ }\Omega$ $I_D \cong -5\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$	20	30		
Rise Time	t_r		55	85		
Turn-Off Delay Time	$t_{d(off)}$		15	23		
Fall Time	t_f		11	17		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			-2.6	A
Pulse Diode Forward Current	I_{SM}				-20	
Body Diode Voltage	V_{SD}	$I_S = -1\text{ A}, V_{GS} = 0\text{ V}$		-0.75	-1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -3.5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		25	38	ns
Body Diode Reverse Recovery Charge	Q_{rr}		11.25	17	nC	
Reverse Recovery Fall Time	t_a		9		ns	
Reverse Recovery Rise Time	t_b		16			

Notes:

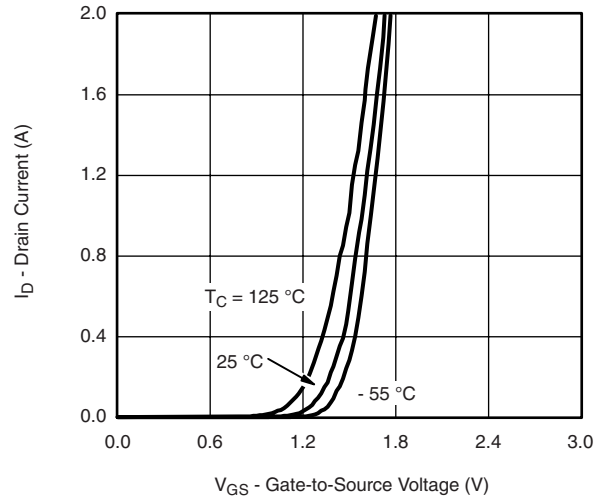
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

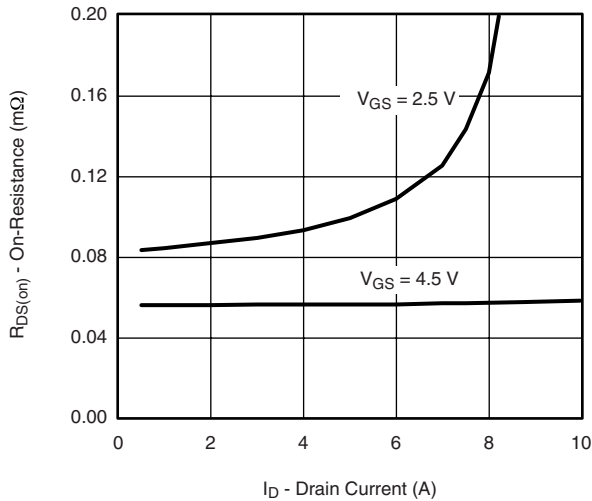
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



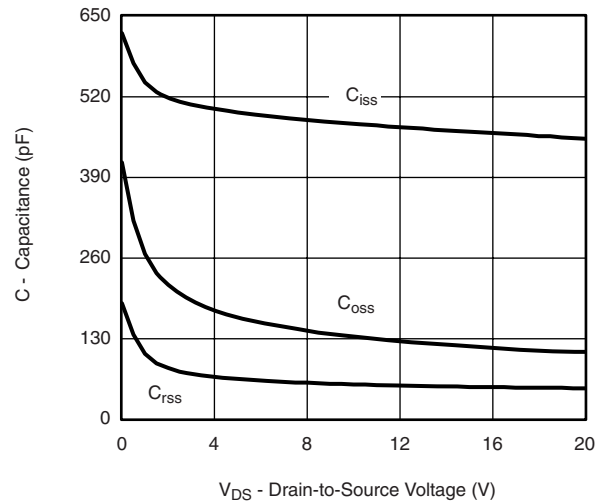
Output Characteristics



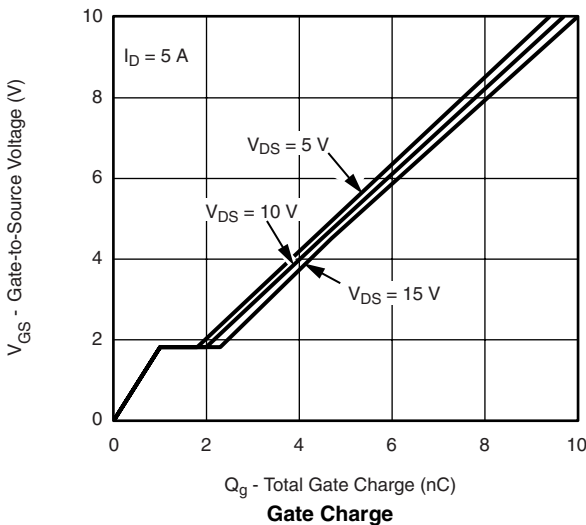
Transfer Characteristics



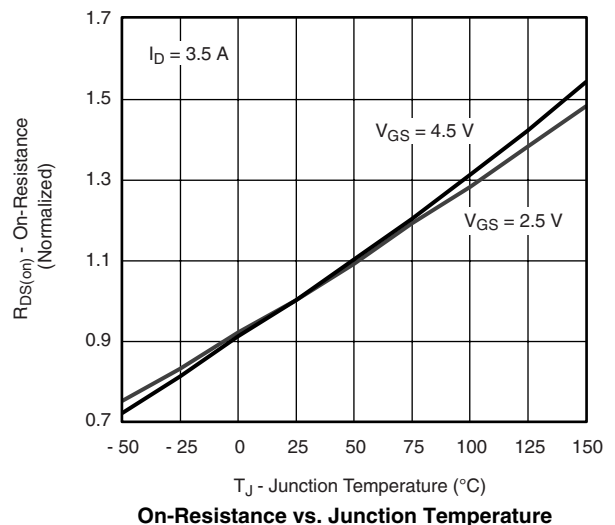
On-Resistance vs. Drain Current



Capacitance

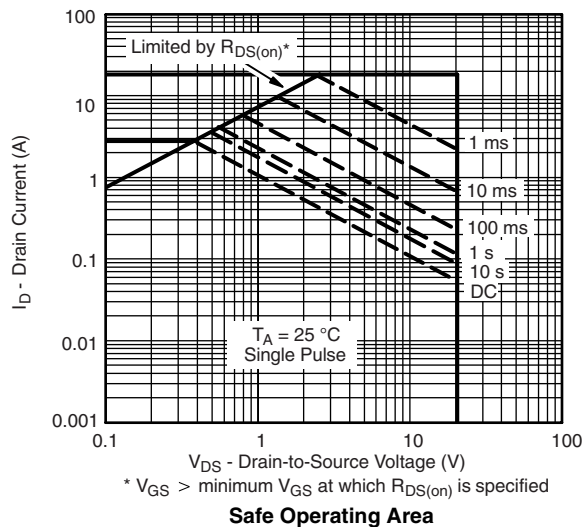
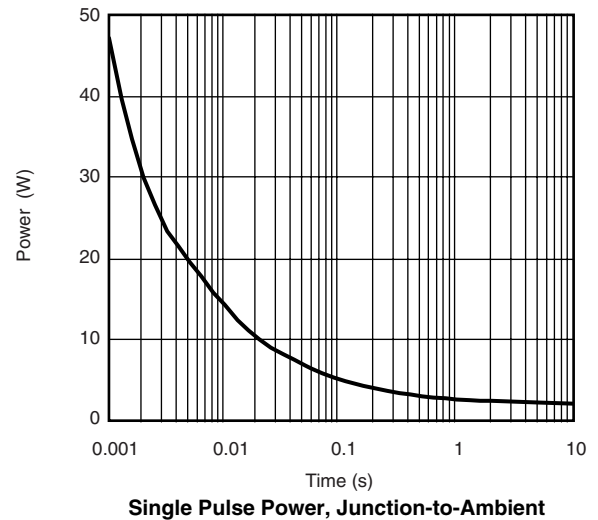
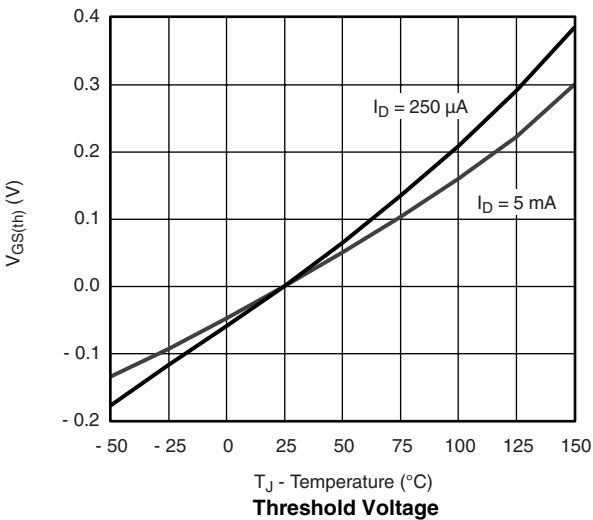
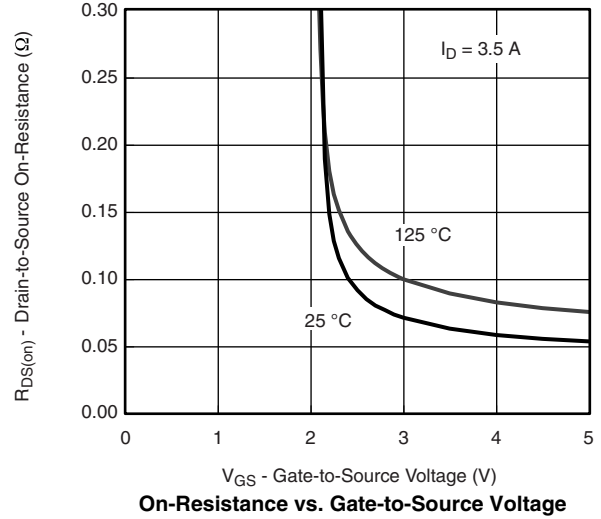
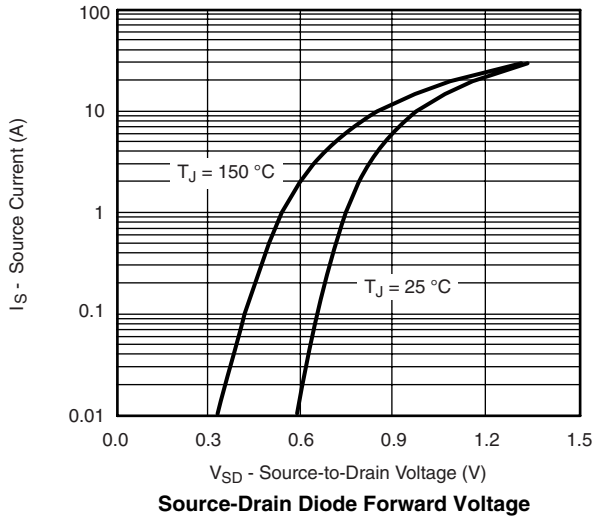


Gate Charge

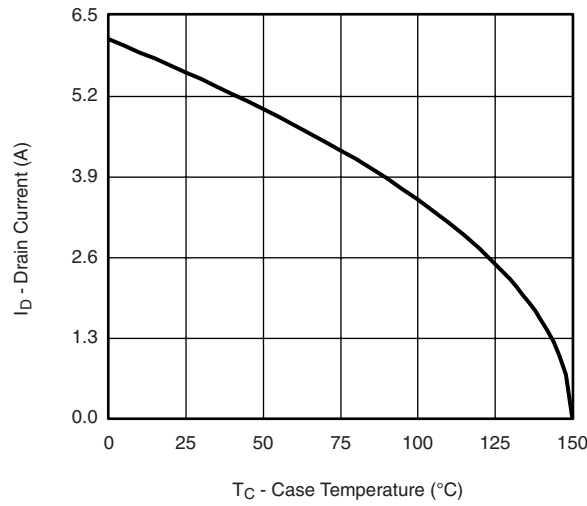


On-Resistance vs. Junction Temperature

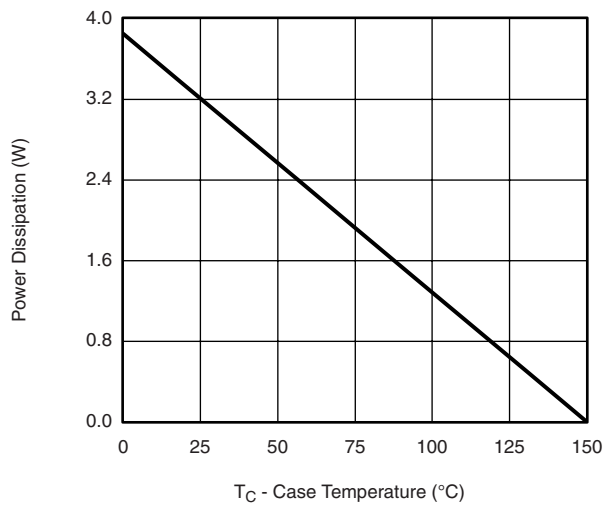
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



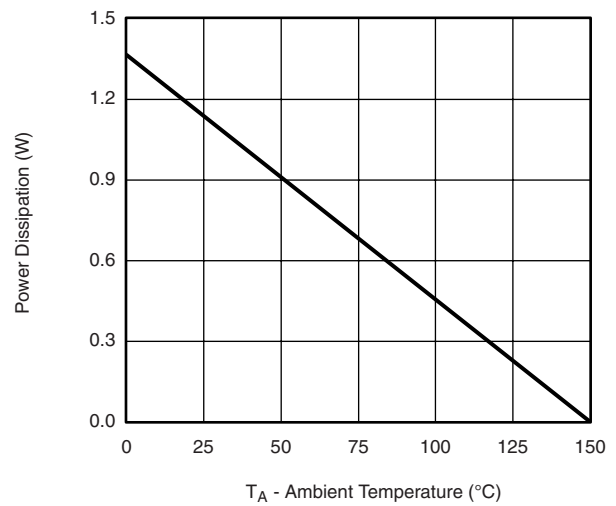
MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



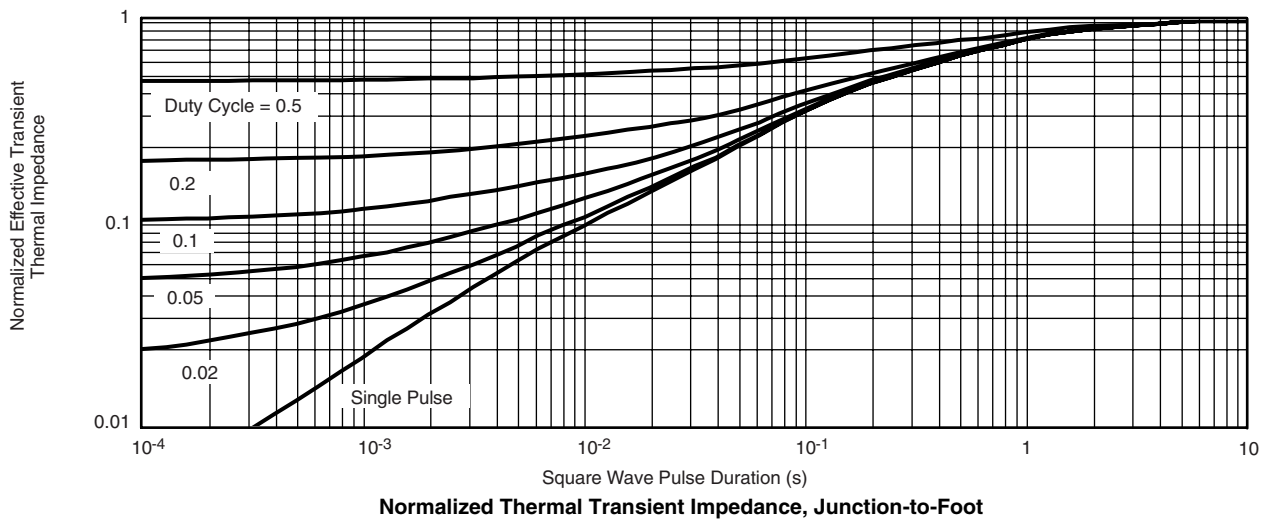
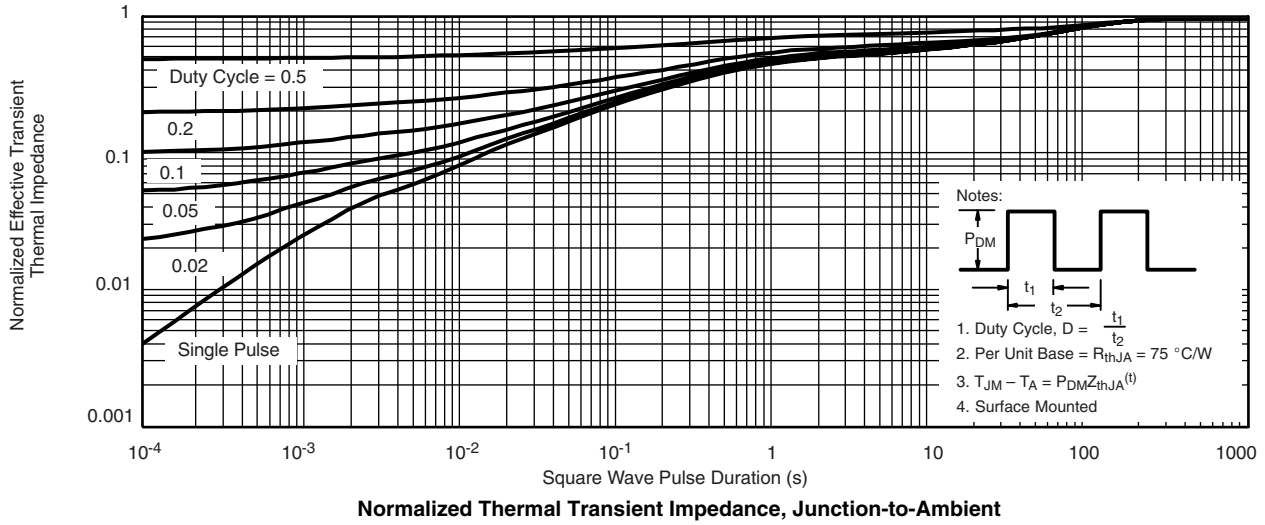
Power, Junction-to-Foot



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



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