

P-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^d	Q _g (Typ.)
- 30	0.005 at V _{GS} = - 10 V	- 29	61 nC
	0.00775 at V _{GS} = - 4.5 V	- 23	

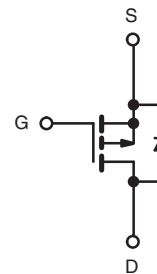
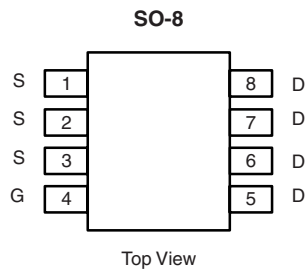
FEATURES

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



APPLICATIONS

- Adaptor Switch
- Notebook



Ordering Information: Si4459ADY-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}	- 30	V
Gate-Source Voltage	V _{GS}	± 20	
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	- 29	A
	T _C = 70 °C	- 23.5	
	T _A = 25 °C	- 19.7 ^{a, b}	
	T _A = 70 °C	- 15.6 ^{a, b}	
Pulsed Drain Current	I _{DM}	- 70	
Continuous Source-Drain Diode Current	T _C = 25 °C	- 6.5	
	T _A = 25 °C	- 2.9 ^{a, b}	
Avalanche Current	I _{AS}	- 30	
Single-Pulse Avalanche Energy	E _{AS}	45	mJ
Maximum Power Dissipation	T _C = 25 °C	7.8	W
	T _C = 70 °C	5.0	
	T _A = 25 °C	3.5 ^{a, b}	
	T _A = 70 °C	2.2 ^{a, b}	
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 ^{a, c}	R _{thJA}	29	35	°C/W
Maximum Junction-to-Foot	R _{thJF}	13	16	

Notes:

- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under Steady State conditions is 80 °C/W.
- Based on T_C = 25 °C.

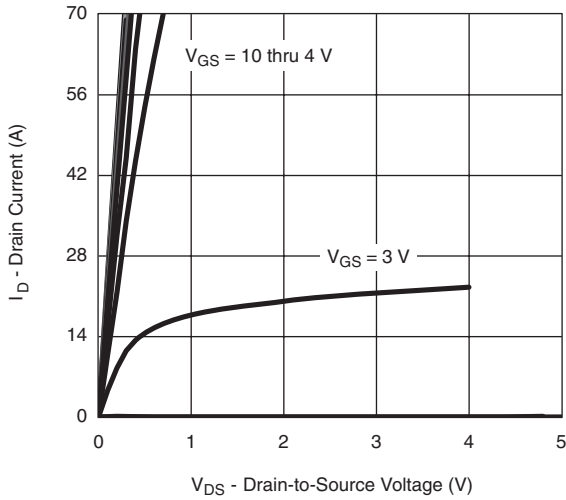
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		- 31		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		5.3			
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1.0		- 2.5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			- 5	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq -10\text{ V}, V_{GS} = -10\text{ V}$	- 30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -15\text{ A}$		0.0039	0.005	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -10\text{ A}$		0.0062	0.00775	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -15\text{ A}$		24		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		6000		pF
Output Capacitance	C_{oss}		860			
Reverse Transfer Capacitance	C_{rss}		790			
Total Gate Charge	Q_g	$V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}, I_D = -20\text{ A}$		129	195	nC
		$V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -20\text{ A}$		61	95	
Gate-Source Charge	Q_{gs}	$V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -20\text{ A}$		16.5		nC
Gate-Drain Charge	Q_{gd}		23.5			
Gate Resistance	R_g		$f = 1\text{ MHz}$	0.6	3.0	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 1.5\text{ }\Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		16	30	ns
Rise Time	t_r		16	30		
Turn-Off Delay Time	$t_{d(off)}$		80	150		
Fall Time	t_f		20	40		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 1.5\text{ }\Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		75	150	ns
Rise Time	t_r		130	260		
Turn-Off Delay Time	$t_{d(off)}$		60	120		
Fall Time	t_f		40	80		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			- 29	A
Pulse Diode Forward Current	I_{SM}				- 70	
Body Diode Voltage	V_{SD}	$I_S = -3\text{ A}, V_{GS} = 0\text{ V}$		- 0.71	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		67	130	ns
Body Diode Reverse Recovery Charge	Q_{rr}		74	150	nC	
Reverse Recovery Fall Time	t_a		22		ns	
Reverse Recovery Rise Time	t_b		45			

Notes:

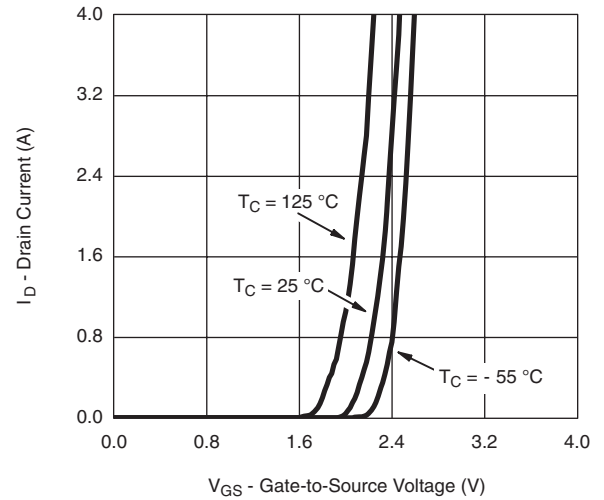
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

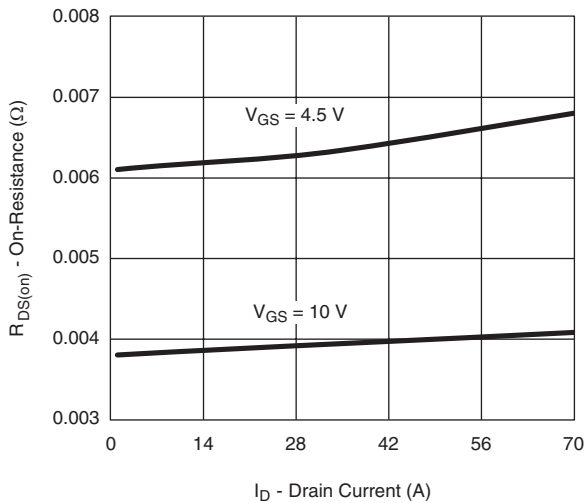
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



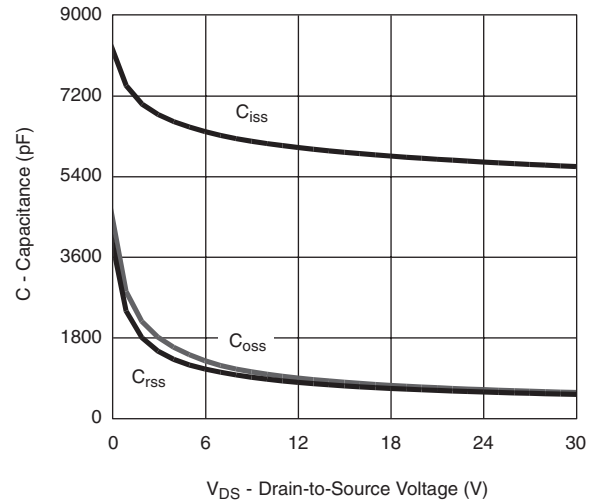
Output Characteristics



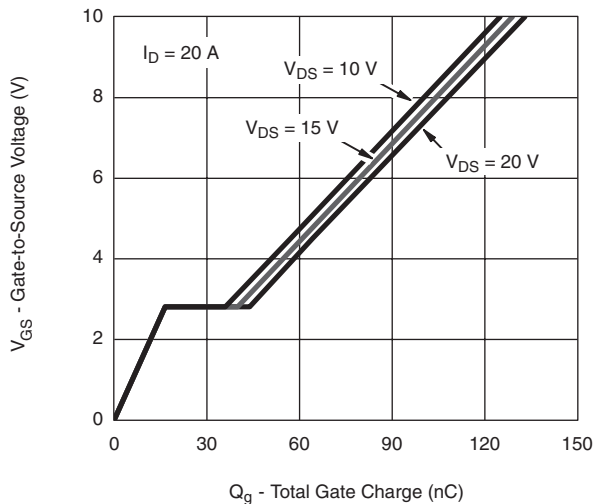
Transfer Characteristics



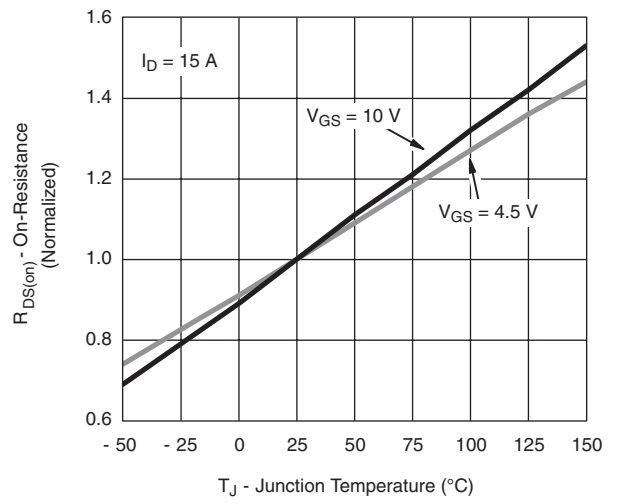
On-Resistance vs. Drain Current



Capacitance



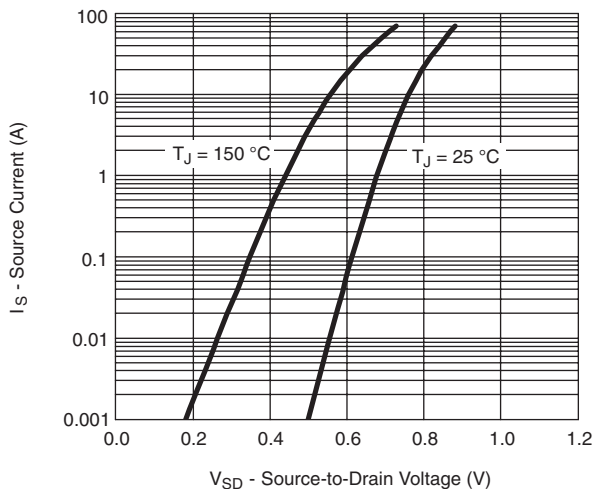
Gate Charge



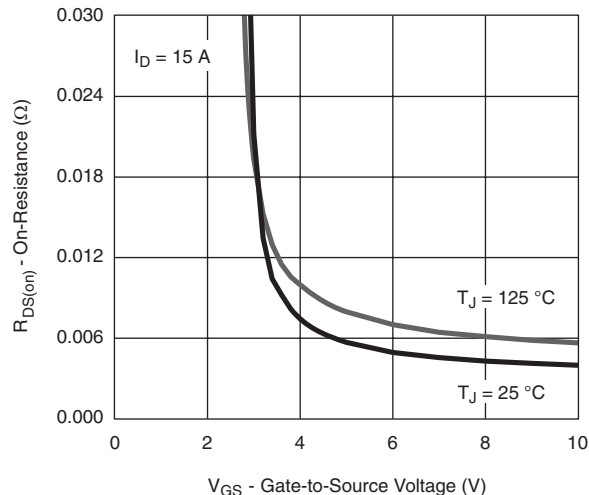
On-Resistance vs. Junction Temperature



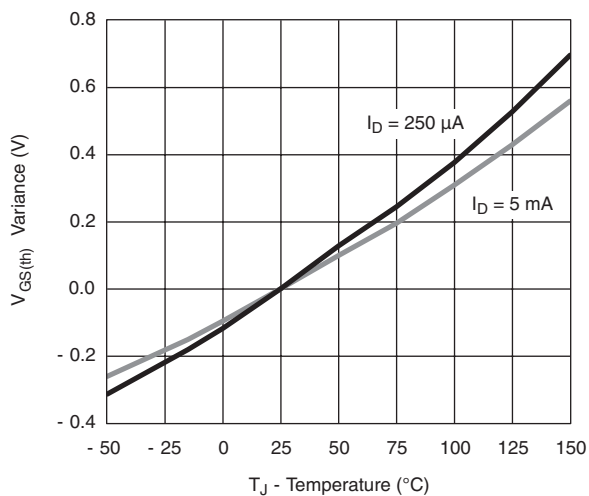
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



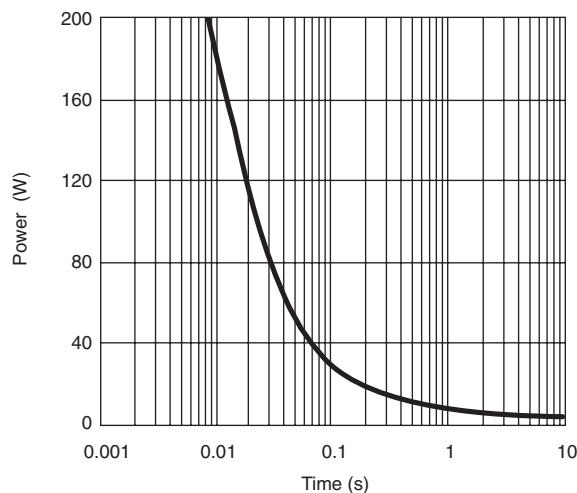
Source-Drain Diode Forward Voltage



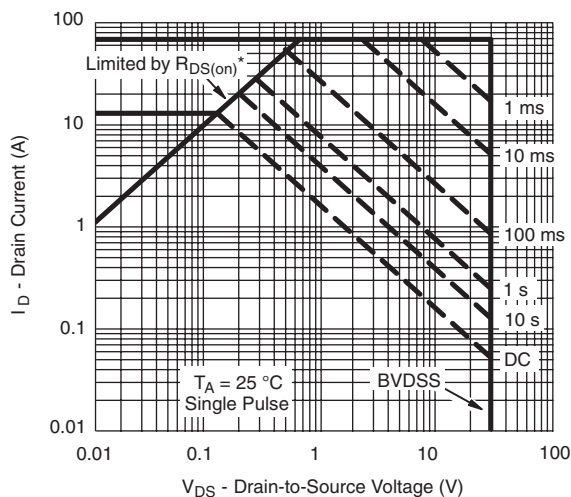
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient

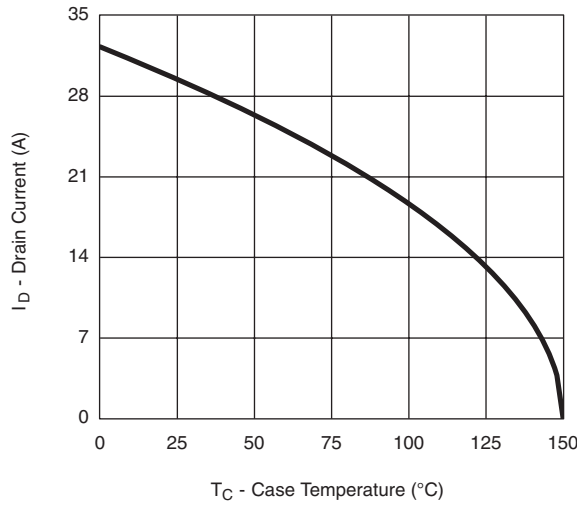


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

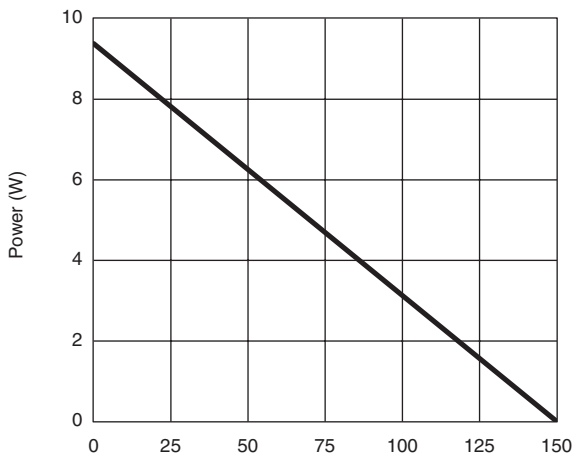
Safe Operating Area



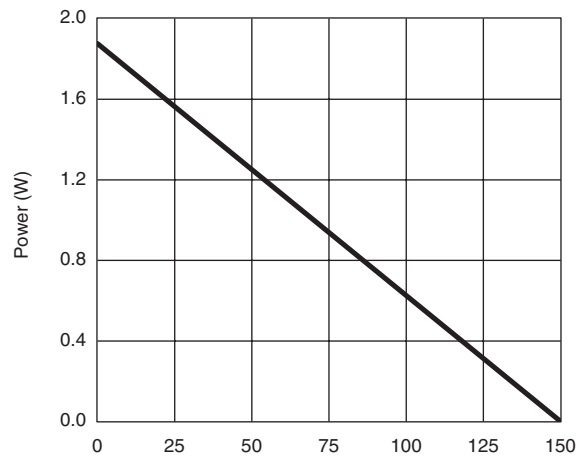
MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



Power, Junction-to-Foot

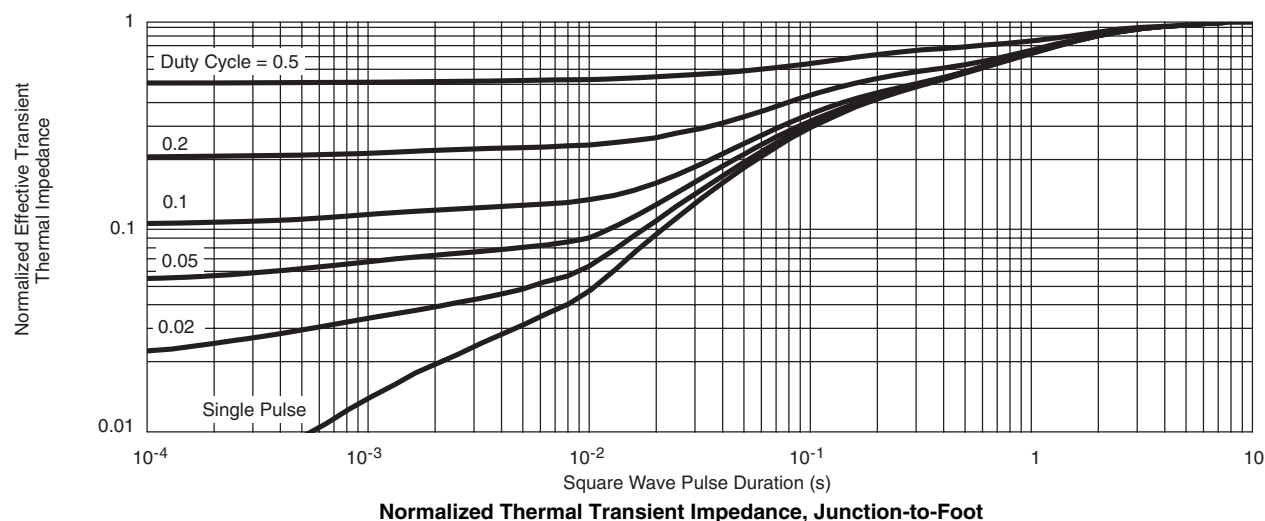
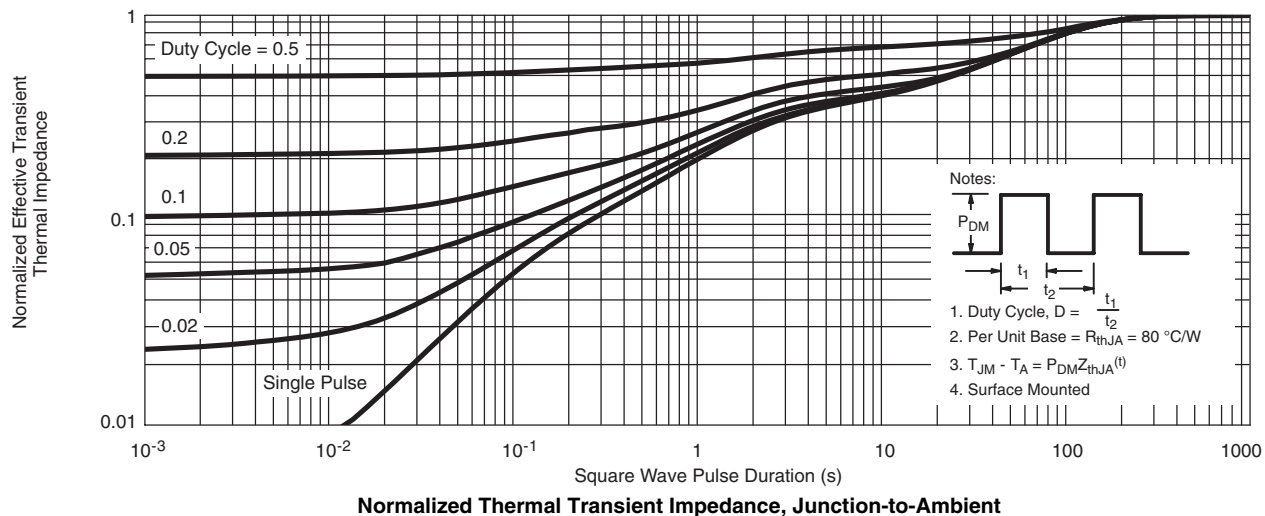


Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 175$ °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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