

Dual N-Channel 40-V (D-S) MOSFET

PRODUCT SUMMARY				
	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
N-Channel	40	0.039 at V _{GS} = 10 V	6.6	6.6
		0.050 at V _{GS} = 4.5 V	5.8	

FEATURES

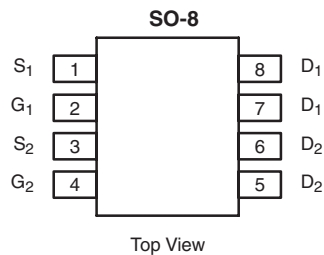
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



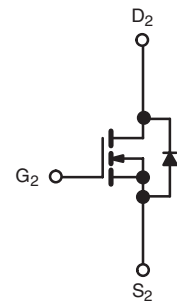
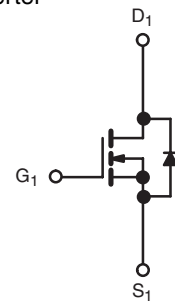
RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- CCFL Inverter



Ordering Information: Si4906DY-T1-E3 (Lead (Pb)-free)
Si4906DY-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}	40	V
Gate-Source Voltage		V _{GS}	± 16	
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	6.6	A
	T _C = 70 °C		5.3	
	T _A = 25 °C		5.3 ^{b, c}	
	T _A = 70 °C		4.2 ^{b, c}	
Pulsed Drain Current (10 μs Pulse Width)		I _{DM}	30	A
Source-Drain Current Diode Current	T _C = 25 °C	I _S	2.5	
	T _A = 25 °C		1.7 ^{b, c}	
Pulsed Source-Drain Current		I _{SM}	30	
Single Pulse Avalanche Current	L = 0.1 mH	I _{AS}	13	mJ
Single-Pulse Avalanche Energy		E _{AS}	8.5	
Maximum Power Dissipation	T _C = 25 °C	P _D	3.1	W
	T _C = 70 °C		2	
	T _A = 25 °C		2 ^{b, c}	
	T _A = 70 °C		1.28 ^{b, c}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Limit		Unit
			Typical	Maximum	
Maximum Junction-to-Ambient ^{b, d}	t ≤ 10 s	R _{thJA}	52	62.5	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R _{thJF}	32	40	

Notes:

- Based on T_C = 25 °C.
- Surface Mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under Steady State conditions is 110 °C/W.

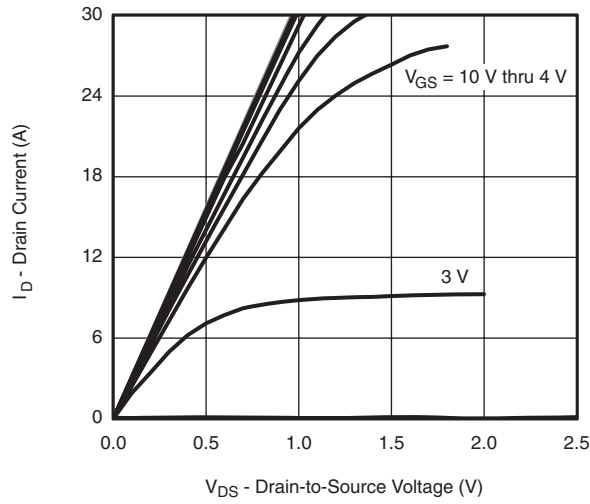
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	40			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		40		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-4.6		
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	0.8		2.2	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 16\text{ V}$			100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 40\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 55\text{ }^\circ\text{C}$			10	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 5\text{ V}$, $V_{GS} = 10\text{ V}$	20			A
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 5\text{ A}$		0.032	0.039	Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 4\text{ A}$		0.041	0.050	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 5\text{ A}$		15		S
Dynamic^a						
Input Capacitance	C_{iss}	$V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		625		pF
Output Capacitance	C_{oss}			88		
Reverse Transfer Capacitance	C_{rss}			50		
Total Gate Charge	Q_g	$V_{DS} = 20\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 5\text{ A}$		14.4	22	nC
		$V_{DS} = 20\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 5\text{ A}$		6.6	10	
Gate-Source Charge	Q_{gs}			1.6		
Gate-Drain Charge	Q_{gd}			2.3		
Gate Resistance	R_g	$f = 1\text{ MHz}$		2.3	3.5	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 20\text{ V}$, $R_L = 4\text{ }\Omega$ $I_D \cong 5\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$		9	15	ns
Rise Time	t_r			51	77	
Turn-Off Delay Time	$t_{d(off)}$			21	32	
Fall Time	t_f			6	10	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 20\text{ V}$, $R_L = 4\text{ }\Omega$ $I_D \cong 5\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 1\text{ }\Omega$		13	20	
Rise Time	t_r			85	128	
Turn-Off Delay Time	$t_{d(off)}$			17	26	
Fall Time	t_f			7	11	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			2.5	A
Pulse Diode Forward Current ^a	I_{SM}				30	
Body Diode Voltage	V_{SD}	$I_S = 1.7\text{ A}$		0.79	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 1.7\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^\circ\text{C}$		30	45	ns
Body Diode Reverse Recovery Charge	Q_{rr}			30	45	nC
Reverse Recovery Fall Time	t_a			17		ns
Reverse Recovery Rise Time	t_b			13		

Notes:

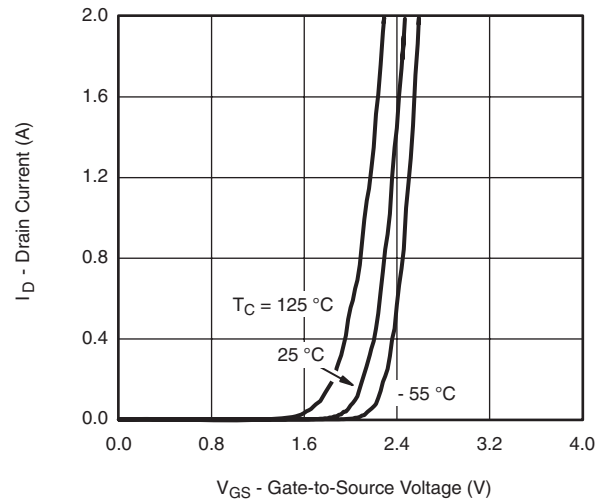
- a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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.

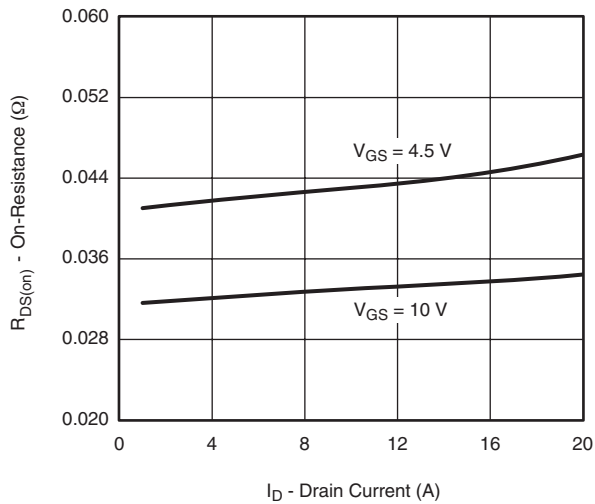
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



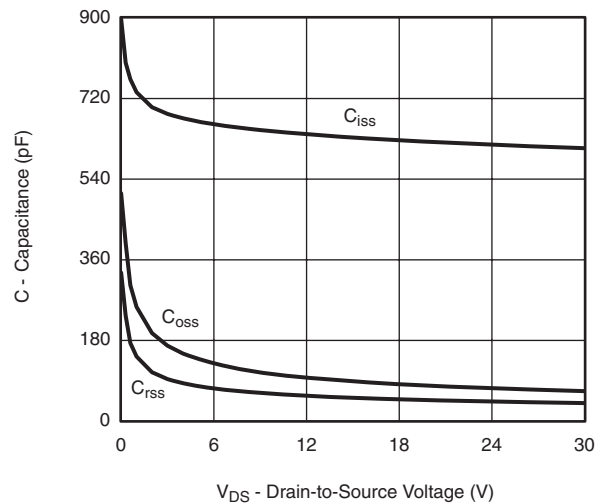
Output Characteristics



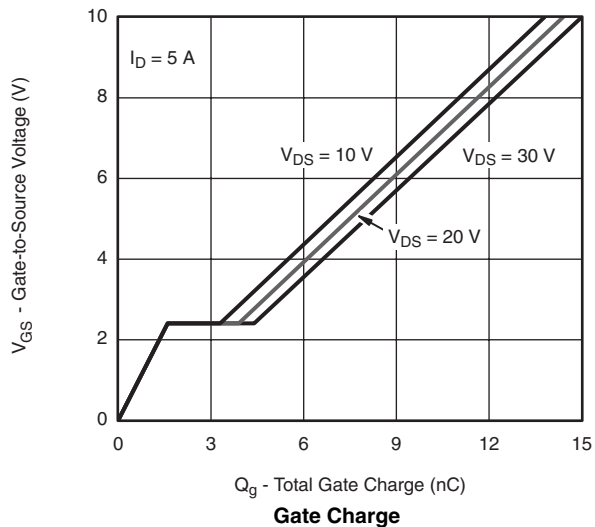
Transfer Characteristics



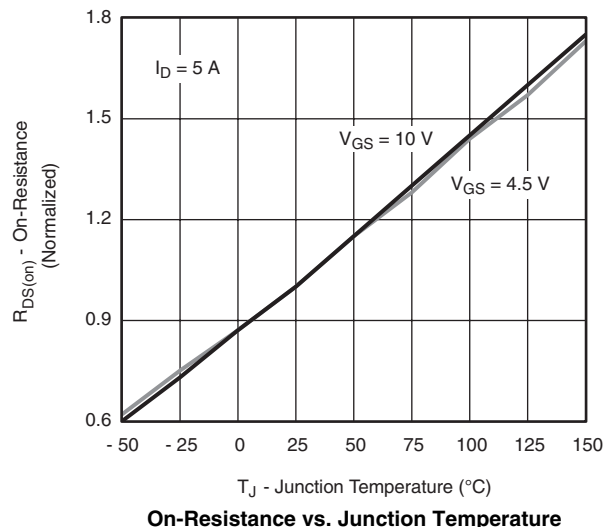
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

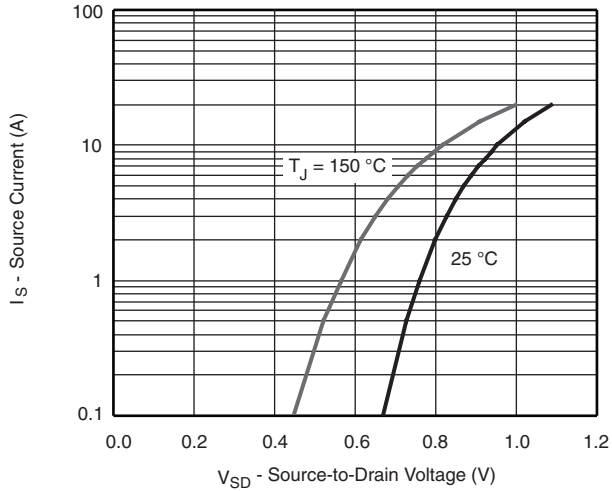


Gate Charge

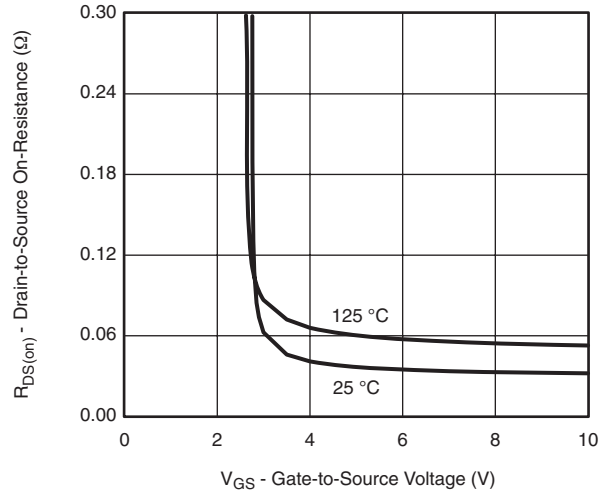


On-Resistance vs. Junction Temperature

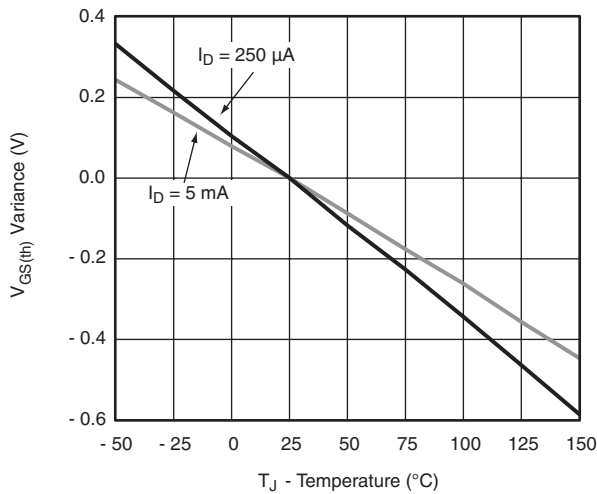
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



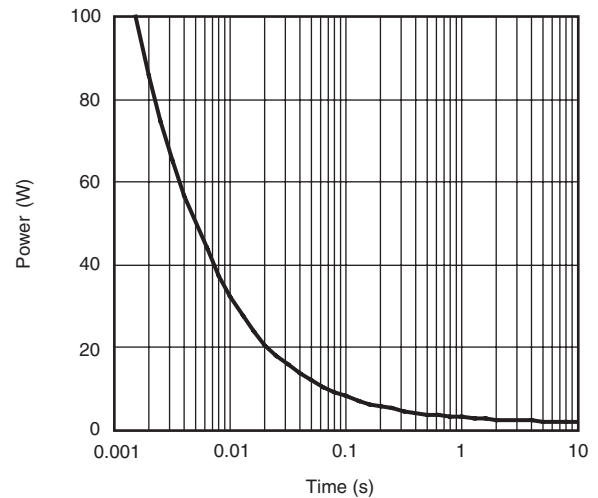
Source-Drain Diode Forward Voltage



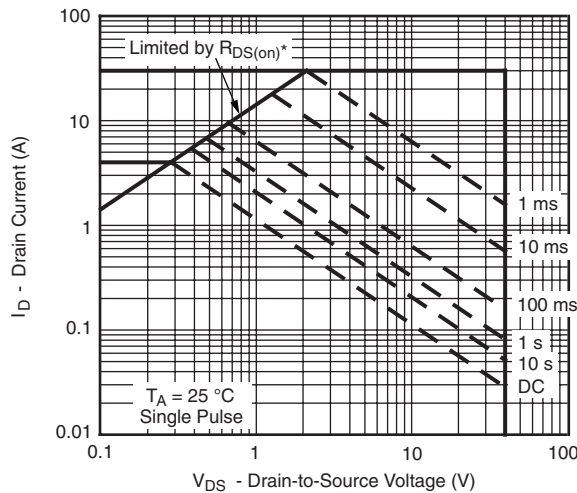
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



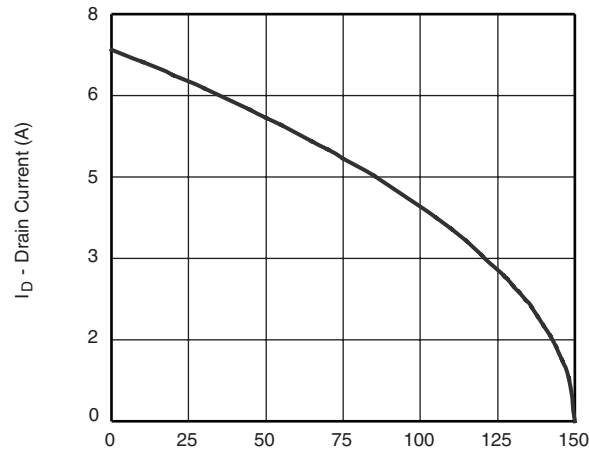
Single Pulse Power, Junction-to-Ambient



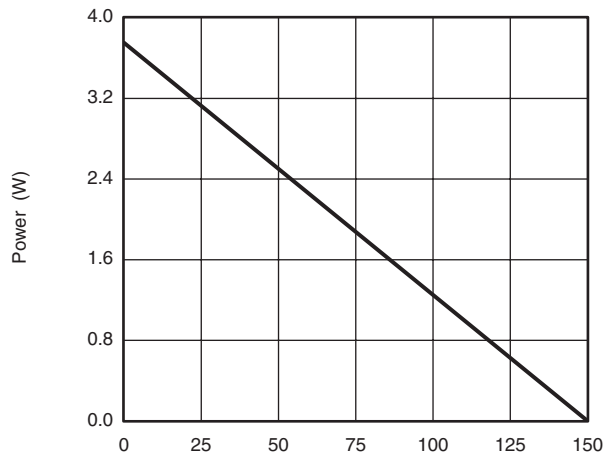
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

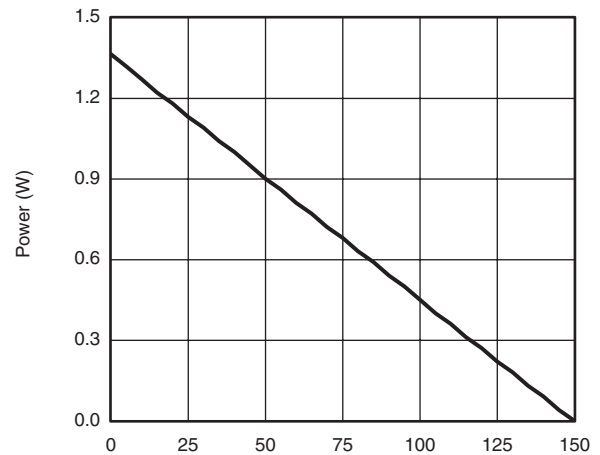
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



T_C - Case Temperature (°C)
Current Derating*



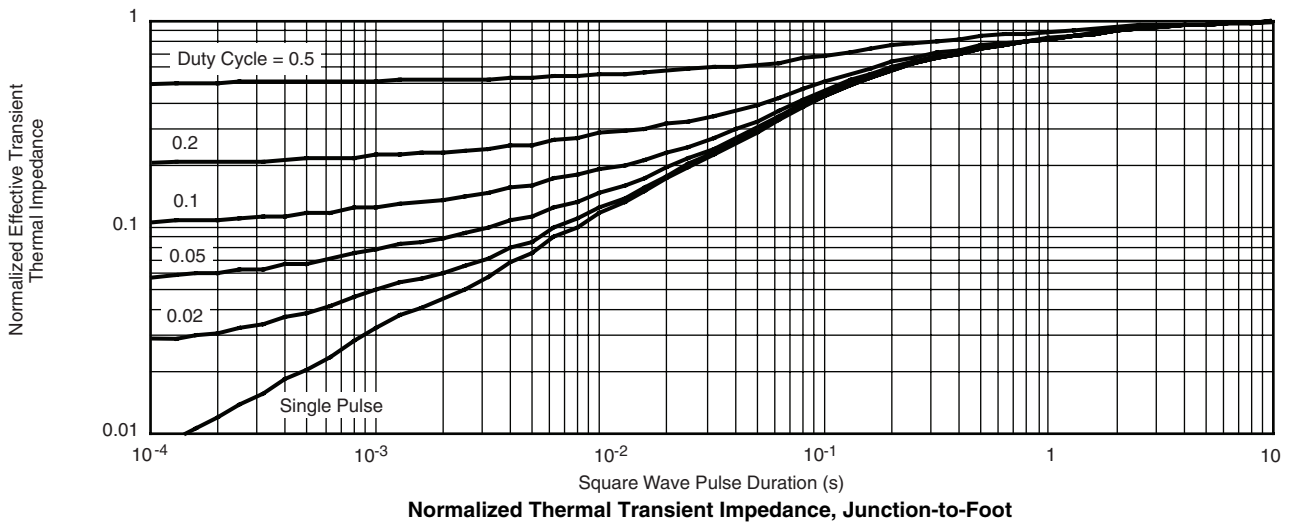
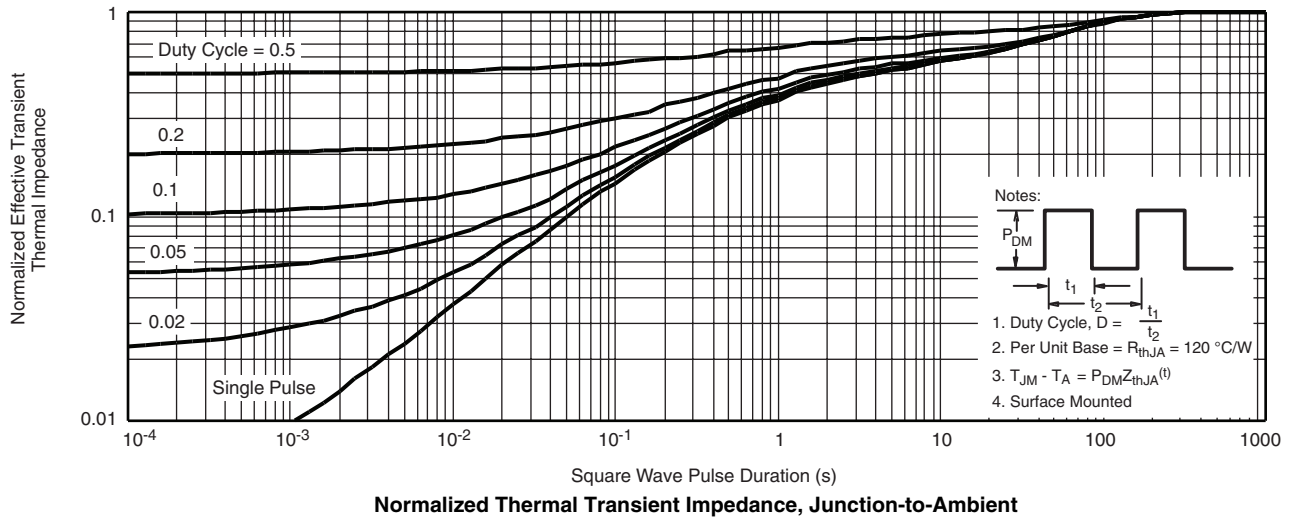
T_C - Case Temperature (°C)
Power Derating, Junction-to-Foot



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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