

N-Channel 80-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
80	0.013 at $V_{GS} = 10$ V	17.3	35 nC

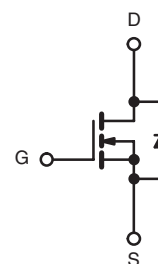
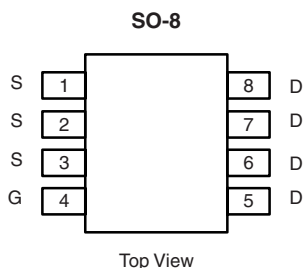
FEATURES

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


RoHS
COMPLIANT

APPLICATIONS

- Primary Side Switch
- Half Bridge
- Intermediate Bus Converter



N-Channel MOSFET

Ordering Information: Si4110DY-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}	80	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	17.3
		$T_C = 70$ °C	13.9
		$T_A = 25$ °C	11.7 ^{b, c}
		$T_A = 70$ °C	9.4 ^{b, c}
Pulsed Drain Current	I_{DM}	60	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	6.5
		$T_A = 25$ °C	3 ^{b, c}
Single Pulse Avalanche Current	I_{AS}	35	
Single Pulse Avalanche Energy	E_{AS}	61.3	mJ
Maximum Power Dissipation	P_D	$T_C = 25$ °C	7.8
		$T_C = 70$ °C	5
		$T_A = 25$ °C	3.6 ^{b, c}
		$T_A = 70$ °C	2.3 ^{b, c}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature)		260	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	29	35	°C/W
Maximum Junction-to-Foot (Drain)	R_{thJF}	13	16	

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 80 °C/W.

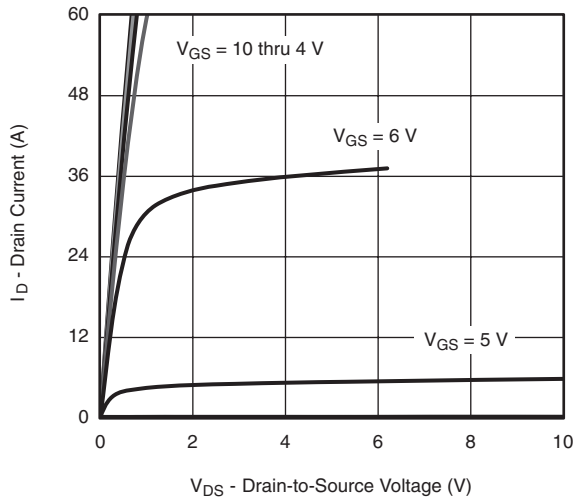
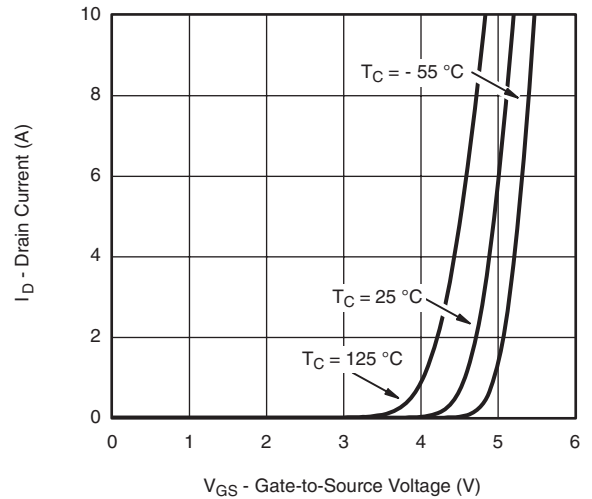
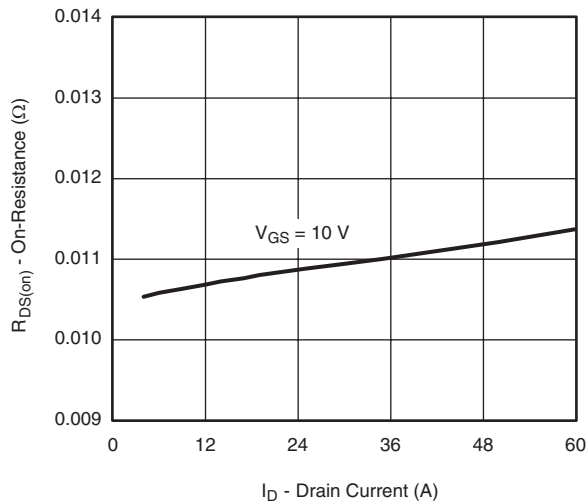
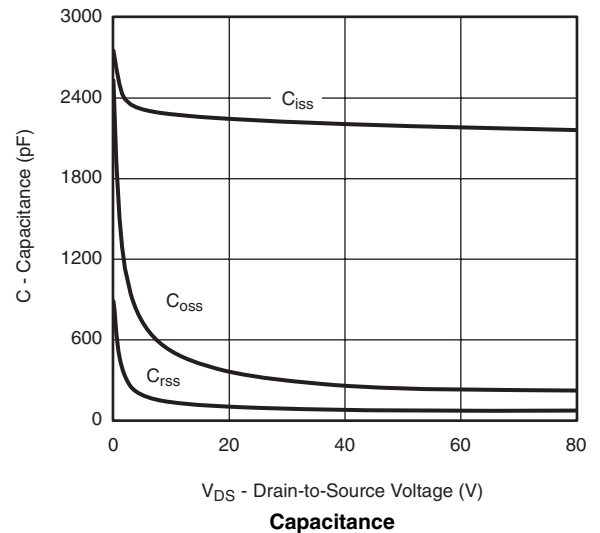
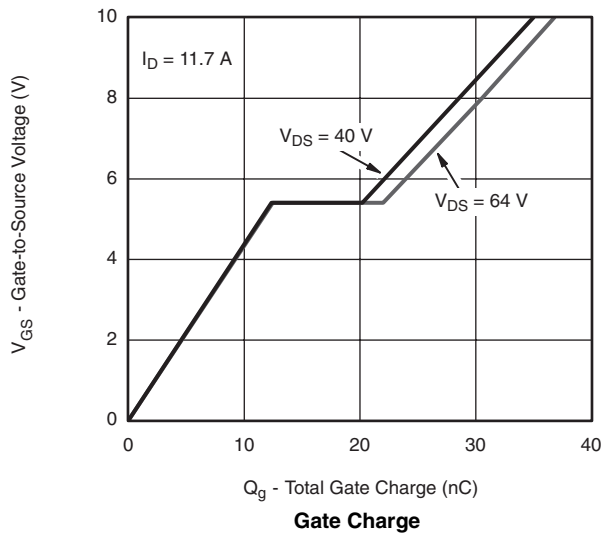
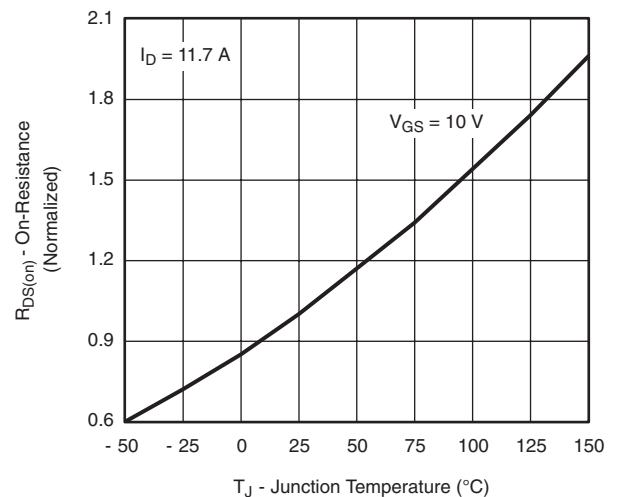
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	80			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		84		mV/ $^{\circ}\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 9.8		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2		4	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}	$V_{DS} = 80\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 80\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 55\text{ }^{\circ}\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}$, $V_{GS} = 10\text{ V}$	20			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 11.7\text{ A}$		0.0108	0.0130	Ω
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 11.7\text{ A}$		23		S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{DS} = 40\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		2205		pF
Output Capacitance	C_{oss}			260		
Reverse Transfer Capacitance	C_{rss}			78		
Total Gate Charge	Q_g	$V_{DS} = 40\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 11.7\text{ A}$		35	53	nC
Gate-Source Charge	Q_{gs}			12.5		
Gate-Drain Charge	Q_{gd}			8		
Gate Resistance	R_g	$f = 1\text{ MHz}$	0.22	1.1	2.2	Ω
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 40\text{ V}$, $R_L = 4.3\text{ }\Omega$ $I_D \cong 9.4\text{ A}$, $V_{GEN} = 8\text{ V}$, $R_g = 1\text{ }\Omega$		18	27	ns
Rise Time	t_r			10	18	
Turn-Off Delay Time	$t_{d(off)}$			22	33	
Fall Time	t_f			8	16	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 40\text{ V}$, $R_L = 4.3\text{ }\Omega$ $I_D \cong 9.4\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$		15	23	
Rise Time	t_r			9	18	
Turn-Off Delay Time	$t_{d(off)}$			22	33	
Fall Time	t_f			7	14	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$			6.5	A
Pulse Diode Forward Current ^a	I_{SM}				60	
Body Diode Voltage	V_{SD}	$I_S = 9.4\text{ A}$		0.80	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 9.4\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^{\circ}\text{C}$		45	68	ns
Body Diode Reverse Recovery Charge	Q_{rr}			82	123	nC
Reverse Recovery Fall Time	t_a			34		ns
Reverse Recovery Rise Time	t_b			11		

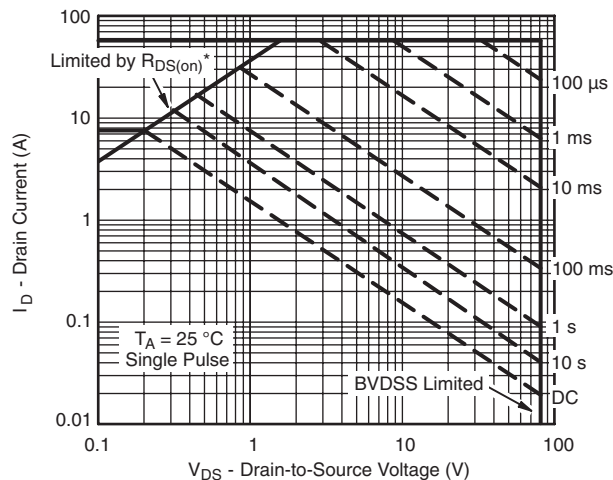
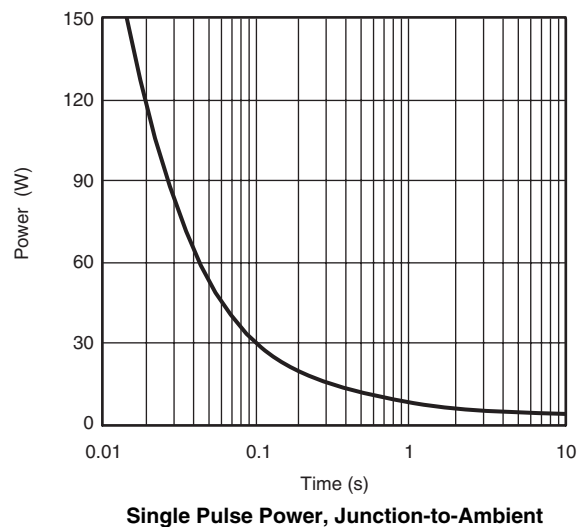
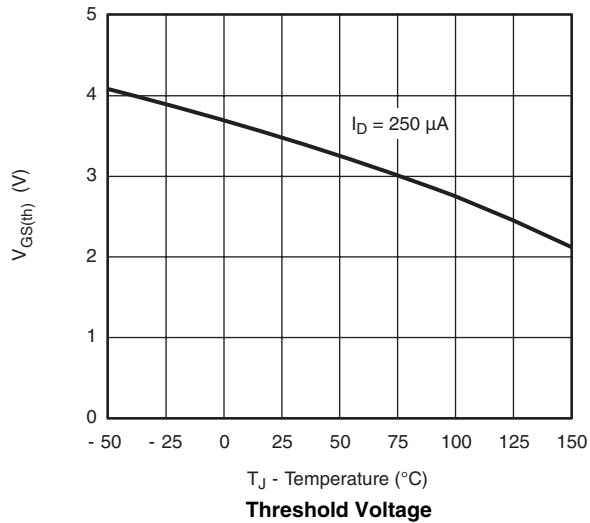
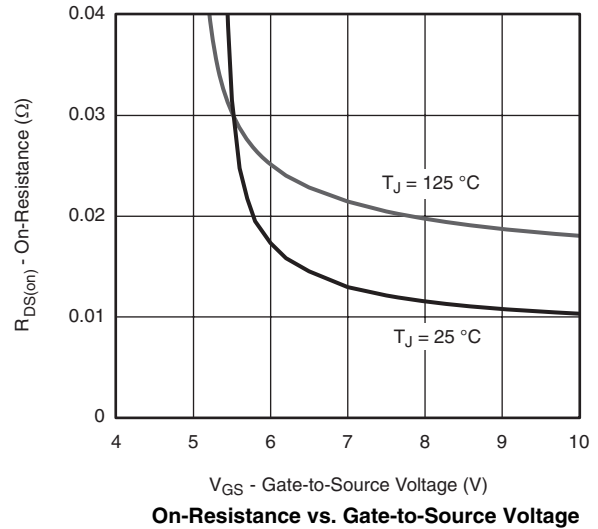
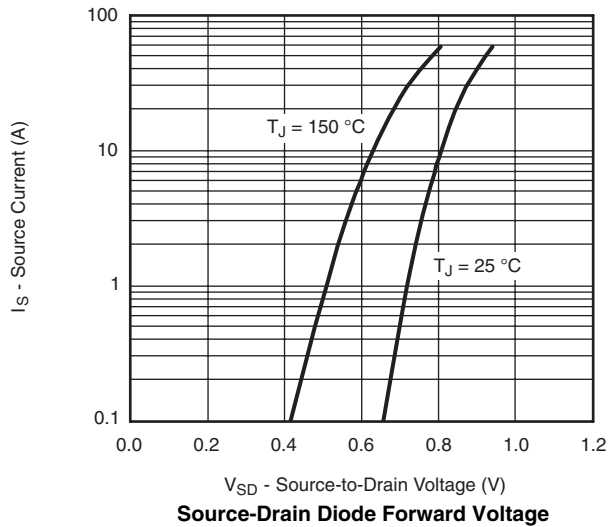
Notes:

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**

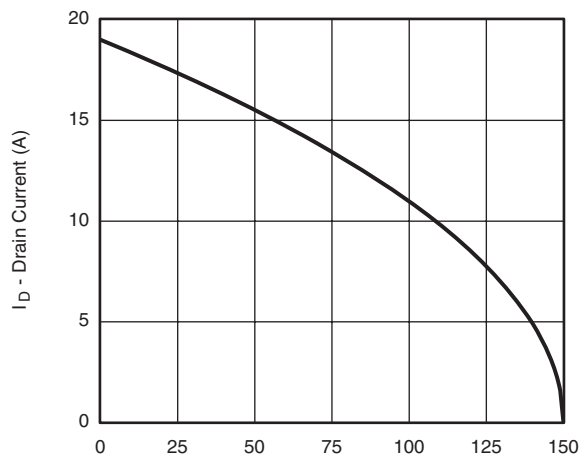
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

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

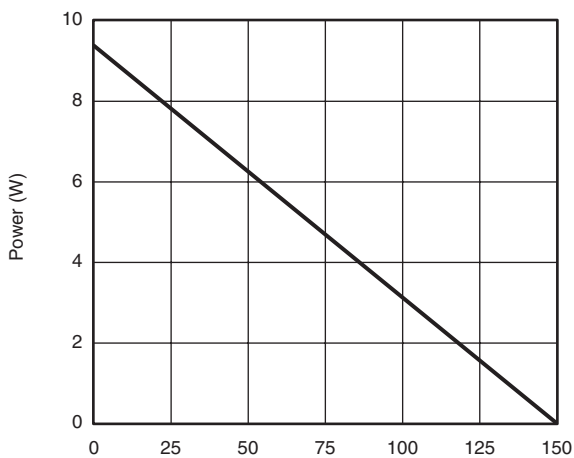
Safe Operating Area, Junction-to-Ambient



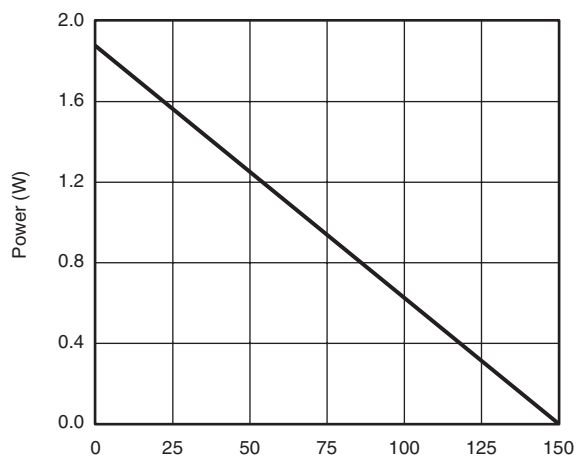
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



T_C - Case Temperature (°C)
Current Derating*

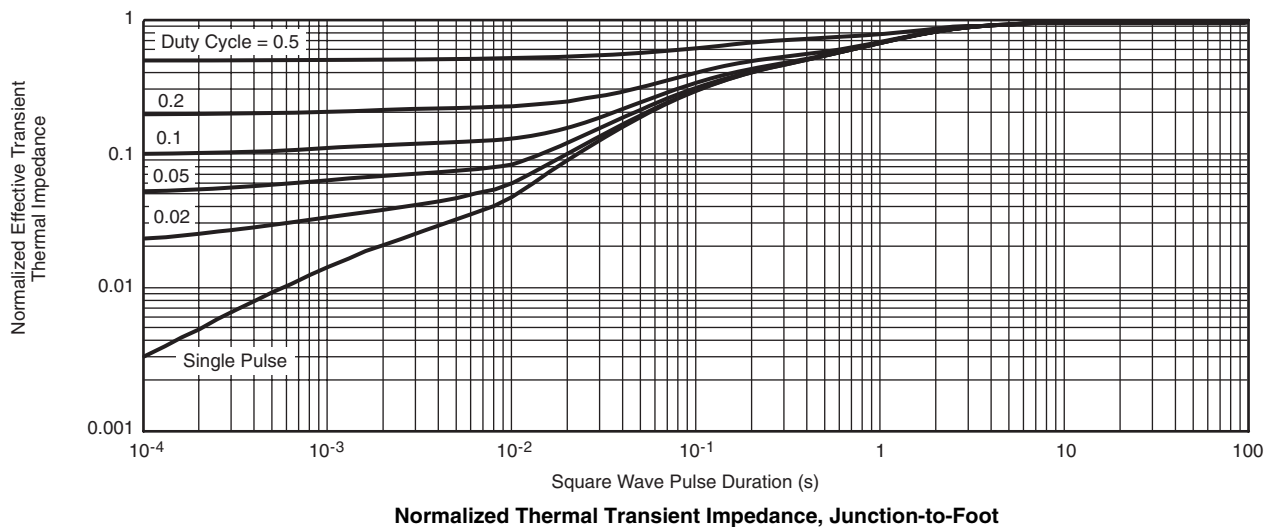
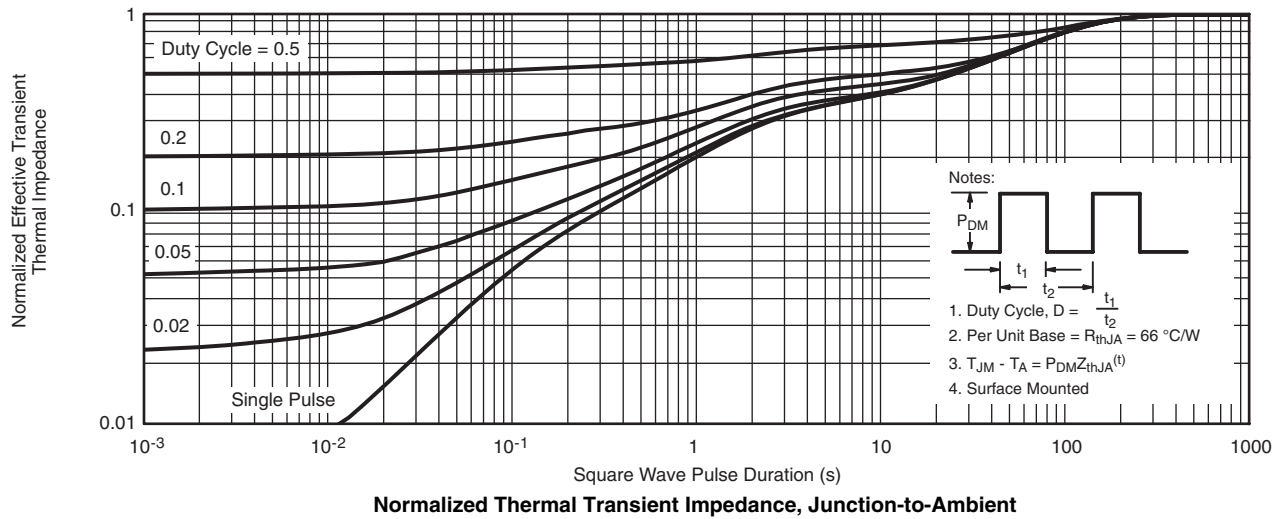


T_C - Case Temperature (°C)
Power, Junction-to-Case



T_A - Ambient Temperature (°C)
Power, 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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