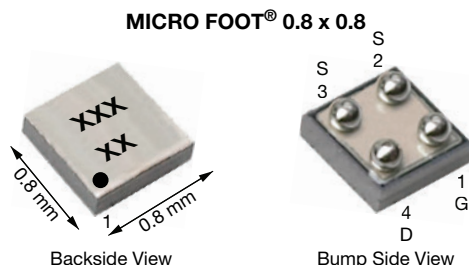


# N-Channel 30 V (D-S) MOSFET



**Marking code:** xx = AR  
xxx = Date/lot traceability code

PRODUCT SUMMARY	
$V_{DS}$ (V)	30
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 10$ V	0.128
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 4.5$ V	0.131
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 3.7$ V	0.134
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 2.5$ V	0.143
$Q_g$ typ. (nC)	2.4
$I_D$ (A) <sup>a</sup>	2.2
Configuration	Single

ORDERING INFORMATION	
Package	MICRO FOOT® 0.8 x 0.8
Lead (Pb)-free and halogen-free	Si8818EDB-T2-E1

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Drain-source voltage		$V_{DS}$	30	V
Gate-source voltage		$V_{GS}$	$\pm 12$	
Continuous drain current ( $T_J = 150$ °C)	$T_A = 25$ °C	$I_D$	2.2 <sup>a</sup>	A
	$T_A = 70$ °C		1.7 <sup>a</sup>	
	$T_A = 25$ °C		1.6 <sup>b</sup>	
	$T_A = 70$ °C		1.2 <sup>b</sup>	
Pulsed drain current ( $t = 300$ $\mu$ s)		$I_{DM}$	8	A
Continuous source-drain diode current	$T_A = 25$ °C	$I_S$	0.7 <sup>a</sup>	
	$T_A = 25$ °C		0.4 <sup>b</sup>	
Maximum power dissipation	$T_A = 25$ °C	$P_D$	0.9 <sup>a</sup>	W
	$T_A = 70$ °C		0.6 <sup>a</sup>	
	$T_A = 25$ °C		0.5 <sup>b</sup>	
	$T_A = 70$ °C		0.3 <sup>b</sup>	
Operating junction and storage temperature range		$T_J, T_{stg}$	-55 to +150	°C
Soldering recommendations (peak temperature) <sup>c</sup>			260	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum junction-to-ambient <sup>a, d</sup>	t ≤ 5 s	R <sub>thJA</sub>	105	135	°C/W
Maximum junction-to-ambient <sup>b, e</sup>			200	260	

## Notes

- Surface mounted on 1" x 1" FR4 board with full copper,  $t = 5$  s
- Surface mounted on 1" x 1" FR4 board with minimum copper,  $t = 5$  s
- Refer to IPC/JEDEC® (J-STD-020), no manual or hand soldering
- Maximum under steady state conditions is 185 °C/W
- Maximum under steady state conditions is 330 °C/W

## FEATURES

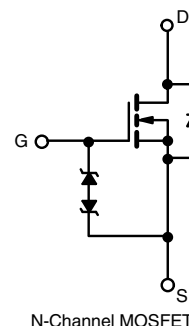
- TrenchFET® power MOSFET
- Ultra small 0.8 mm x 0.8 mm outline
- Ultra thin 0.39 mm max. height
- Typical ESD protection 1700 V (HBM)
- Material categorization:  
for definitions of compliance please see  
[www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## APPLICATIONS

- Load switch
- OVP switch
- High speed switching
- DC/DC converters
- For smart phones, tablet PCs,  
and mobile computing



N-Channel MOSFET



SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-source breakdown voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30	-	-	V
V <sub>DS</sub> temperature coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA	-	30	-	mV/°C
V <sub>GS(th)</sub> temperature coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>		-	-3.0	-	
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	0.6	-	1.0	V
Gate-source leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 4.5 V	-	-	± 0.1	μA
		V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 12 V	-	-	± 1	
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V	-	-	1	
		V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C	-	-	10	
On-state drain current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V	10	-	-	A
Drain-source on-state resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 1 A	-	0.095	0.128	Ω
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 1 A	-	0.100	0.131	
		V <sub>GS</sub> = 3.7 V, I <sub>D</sub> = 1 A	-	0.105	0.134	
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 0.5 A	-	0.120	0.143	
Forward transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 2 A	-	10	-	S
Dynamic <sup>b</sup>						
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz	-	206	-	pF
Output capacitance	C <sub>oss</sub>		-	40	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	20	-	
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 1 A	-	4.6	8	nC
Gate-source charge	Q <sub>gs</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 1 A	-	2.4	4.5	
Gate-drain charge	Q <sub>gd</sub>		-	0.6	-	
			-	0.4	-	
Gate resistance	R <sub>g</sub>	f = 1 MHz	-	4	-	Ω
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 15 V, R <sub>L</sub> = 15 Ω I <sub>D</sub> ≅ 1 A, V <sub>GEN</sub> = 4.5 V, R <sub>g</sub> = 1 Ω	-	15	30	ns
Rise time	t <sub>r</sub>		-	20	40	
Turn-off delay time	t <sub>d(off)</sub>		-	20	40	
Fall time	t <sub>f</sub>		-	10	20	
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 15 V, R <sub>L</sub> = 15 Ω I <sub>D</sub> ≅ 1 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω	-	5	10	
Rise time	t <sub>r</sub>		-	10	20	
Turn-off delay time	t <sub>d(off)</sub>		-	15	30	
Fall time	t <sub>f</sub>		-	5	10	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	-	-	0.7	A
Pulse diode forward current	I <sub>SM</sub>		-	-	8	
Body diode voltage	V <sub>SD</sub>	I <sub>S</sub> = 50 mA, V <sub>GS</sub> = 0 V	-	0.56	1.0	V
Body diode reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 1 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °C	-	16	30	ns
Body diode reverse recovery charge	Q <sub>rr</sub>		-	6	12	nC
Reverse recovery fall time	t <sub>a</sub>		-	13.5	-	ns
Reverse recovery rise time	t <sub>b</sub>		-	2.5	-	

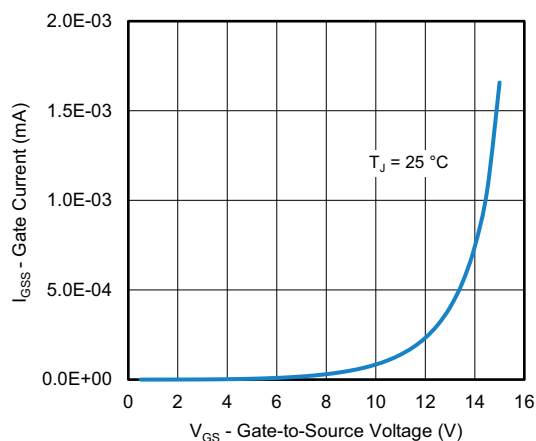
**Note**

- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$   
b. Guaranteed by design, not subject to production testing  
c. Pulse diode forward transient current: pulse width at 100 ms, duty cycle  $\leq 2\%$ .  $I_{SM}$  max. = 1.5 A

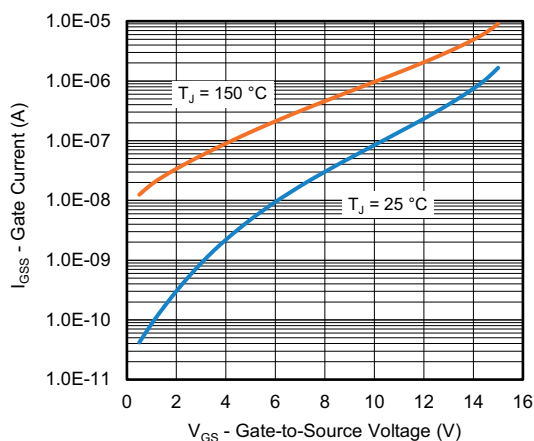
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



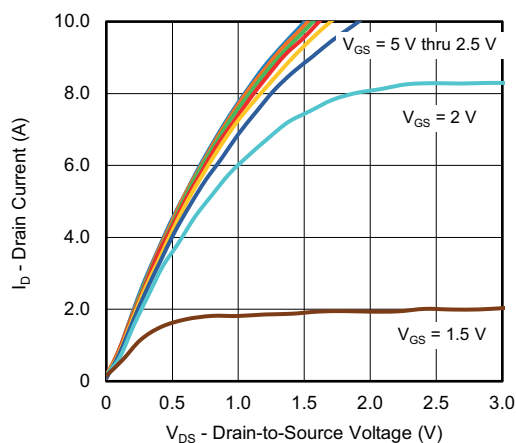
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



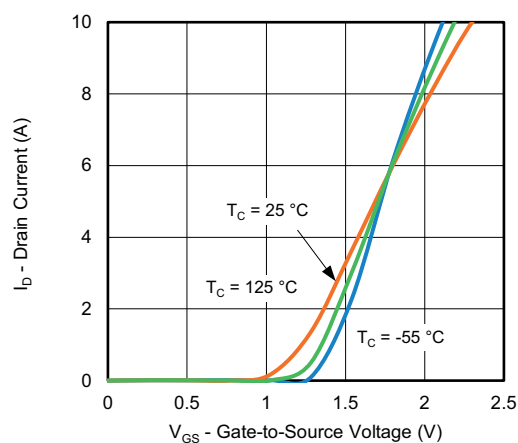
**Gate Current vs. Gate-Source Voltage**



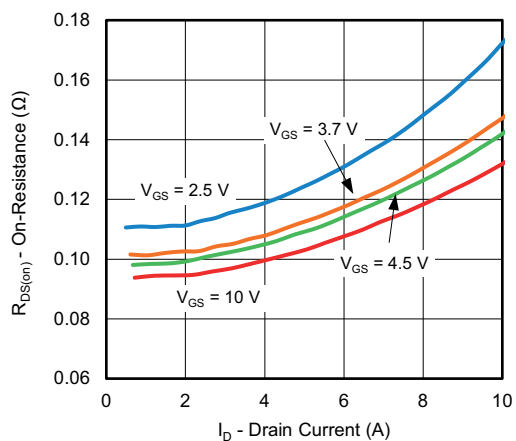
**Gate Current vs. Gate-Source Voltage**



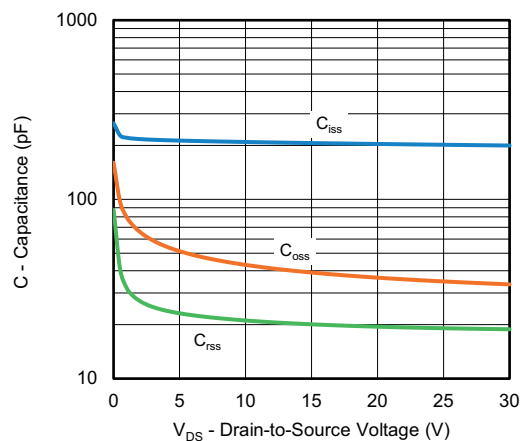
**Output Characteristics**



**Transfer Characteristics**



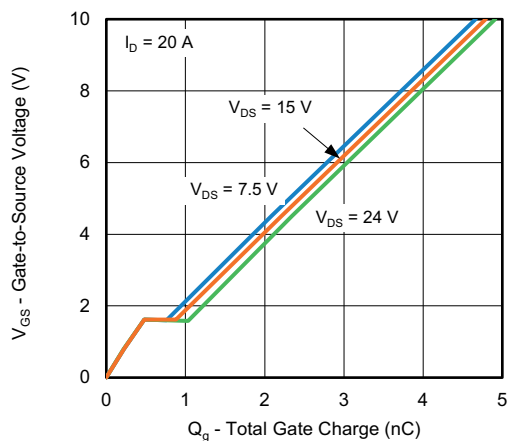
**On-Resistance vs. Drain Current**



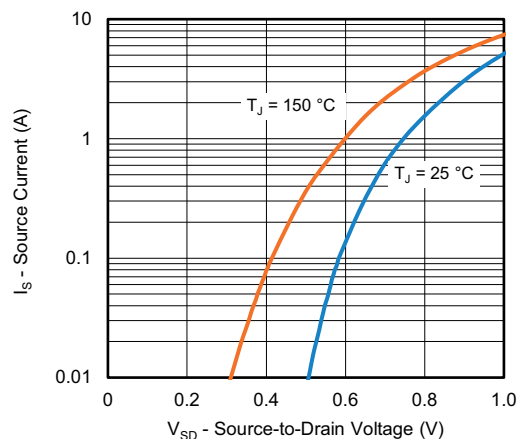
**Capacitance vs. Drain-to-Source Voltage**



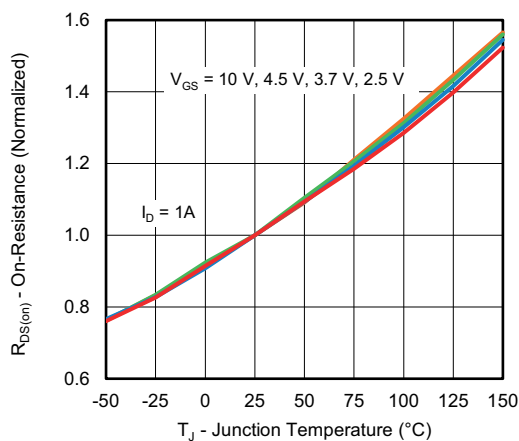
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



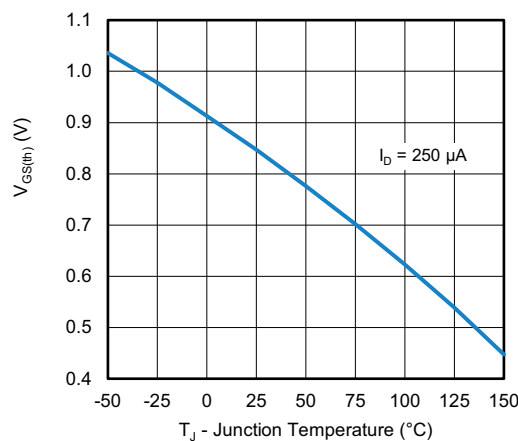
**Gate Charge**



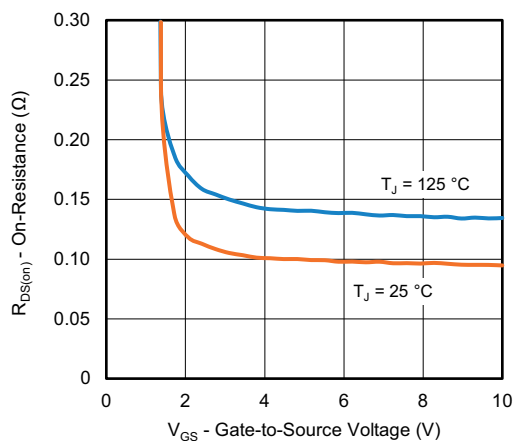
**Source-Drain Diode Forward Voltage**



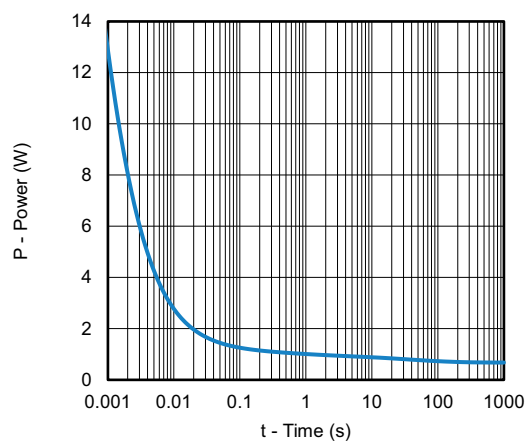
**On-Resistance vs. Junction Temperature**



**Threshold Voltage**



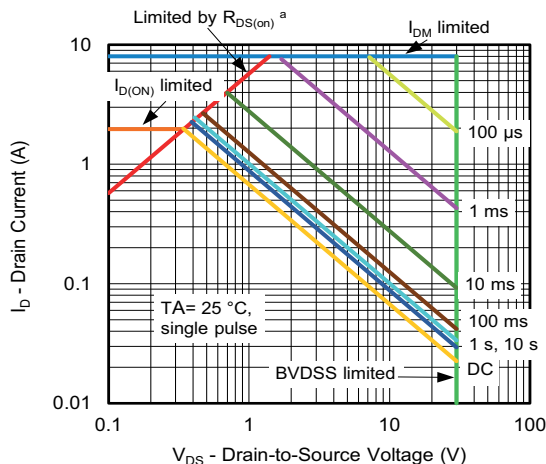
**On-Resistance vs. Gate-to-Source Voltage**



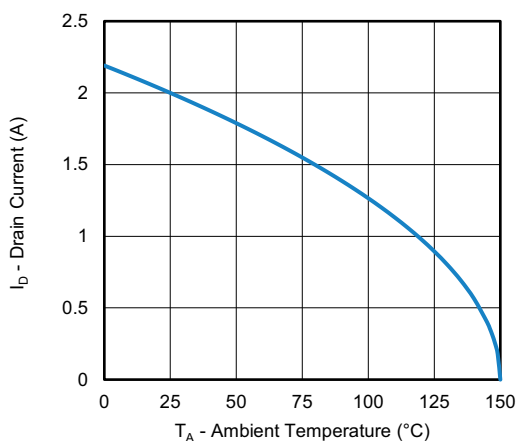
**Single Pulse Power, Junction-to-Ambient**



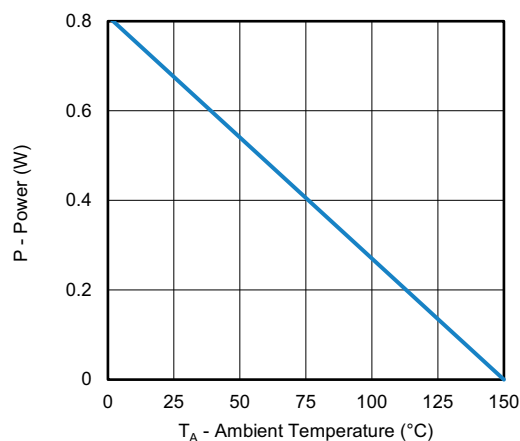
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



**Safe Operating Area, Junction-to-Ambient <sup>b</sup>**



**Current Derating <sup>a, b</sup>**



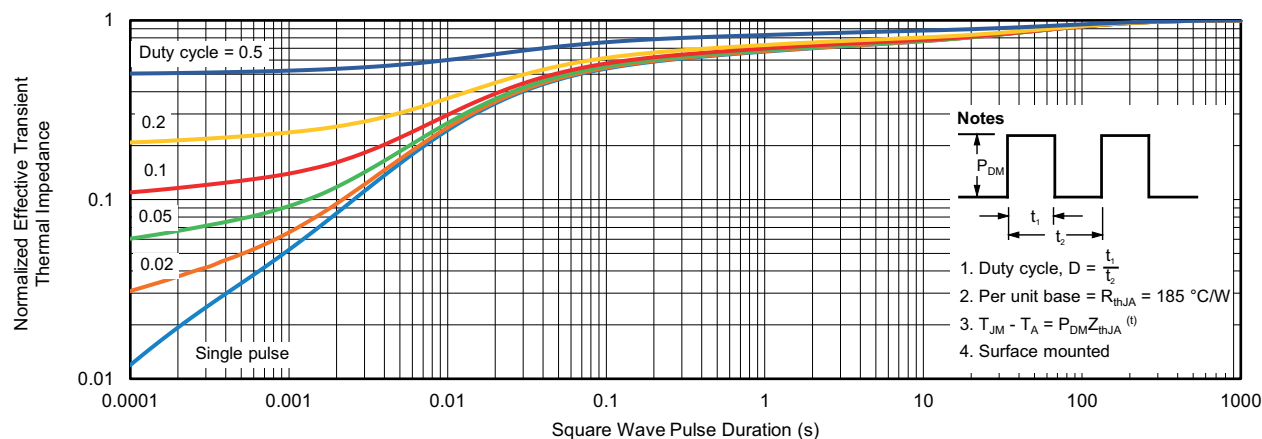
**Power Derating <sup>b</sup>**

**Notes**

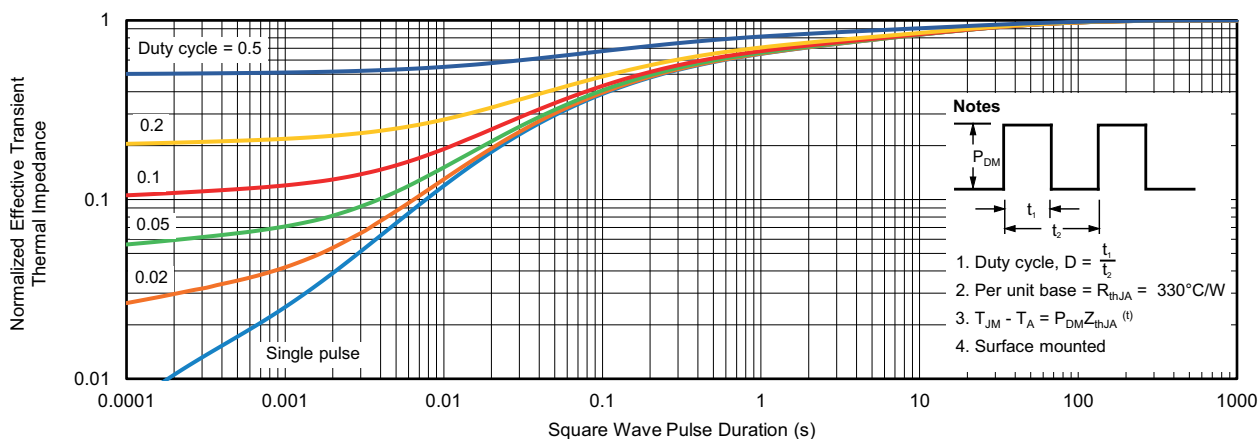
- The power dissipation  $P_D$  is based on  $T_J$  max. = 150 °C, using junction-to-ambient thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit
- When mounted on 1" x 1" FR4 with full copper



**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



**Normalized Thermal Transient Impedance, Junction-to-Ambient (On 1" x 1" FR4 Board with Maximum Copper)**



**Normalized Thermal Transient Impedance, Junction-to-Ambient (On 1" x 1" FR4 Board with Minimum Copper)**

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