

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

## PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
30	0.011 at $V_{GS} = 10$ V	14
	0.0145 at $V_{GS} = 4.5$ V	12.2

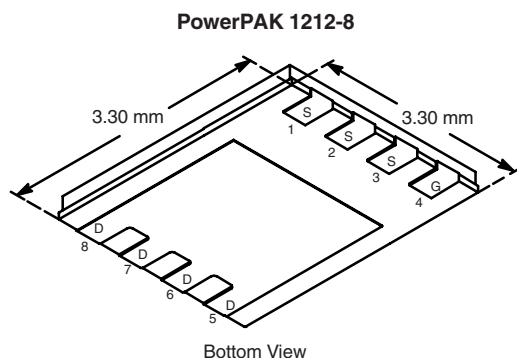
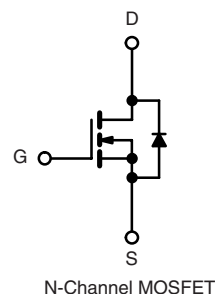
## FEATURES

- Halogen-free
- TrenchFET® Power MOSFET
- PWM Optimized
- New Low Thermal Resistance PowerPAK® Package with Low 1.07 mm Profile
- 100 %  $R_g$  Tested
- 100 % UIS Tested


**RoHS**  
COMPLIANT

## APPLICATIONS

- Adaptor Switch
- Load Switch


**Ordering Information:** SiS406DN-T1-GE3 (Lead (Pb)-free and Halogen-free)


## ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	10 s	Steady State	Unit
Drain-Source Voltage	$V_{DS}$	30		V
Gate-Source Voltage	$V_{GS}$	$\pm 25$		
Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>	$I_D$	14	9	A
		12.2	7.3	
Pulsed Drain Current	$I_{DM}$	50		
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	3.3	1.4	
Single Pulse Avalanche Current	$I_{AS}$	20		mJ
Avalanche Energy	$E_{AS}$	20		
Maximum Power Dissipation <sup>a</sup>	$P_D$	3.7	1.5	W
		2.3	1.0	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150		°C
Soldering Recommendations (Peak Temperature) <sup>b, c</sup>		260		

## THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	28	34	°C/W
		66	81	
Maximum Junction-to-Case (Drain)	$R_{thJC}$	2.0	2.4	

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

b. See Solder Profile (<http://www.vishay.com/ppg?73257>). The PowerPAK 1212-8 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.

c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

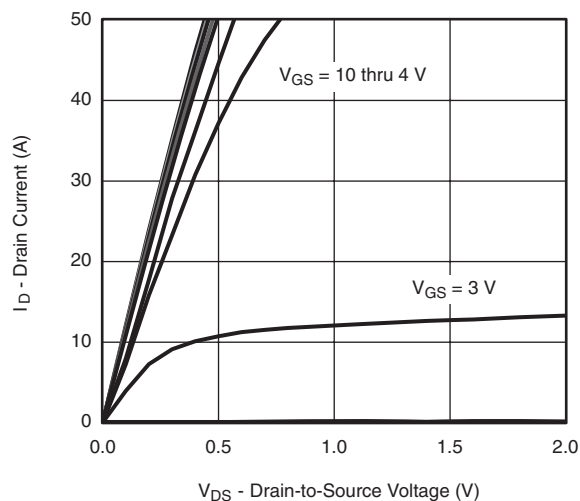
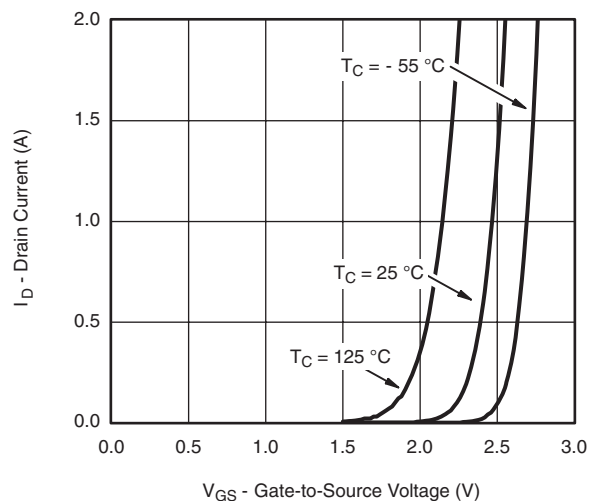
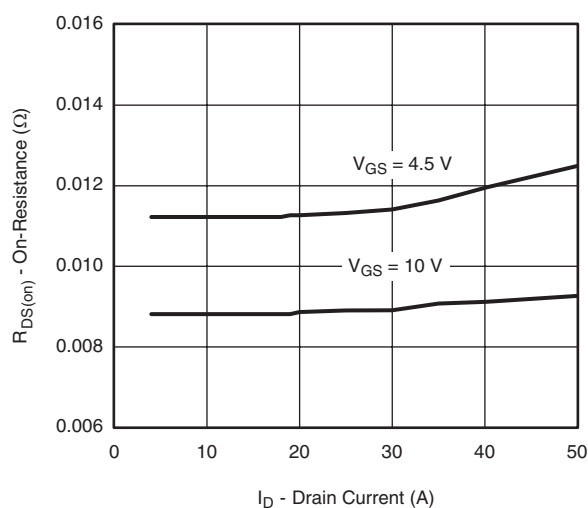
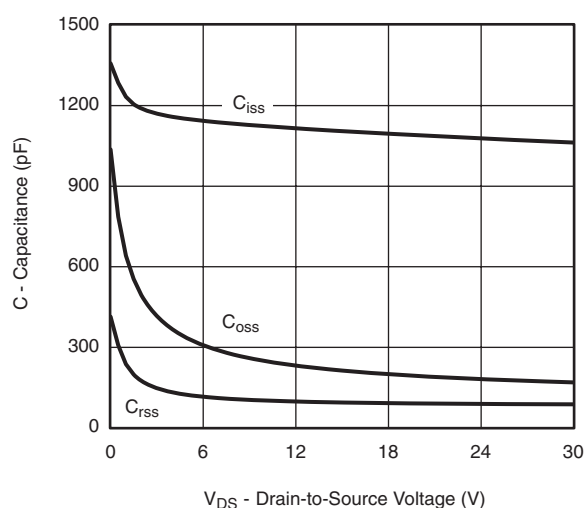
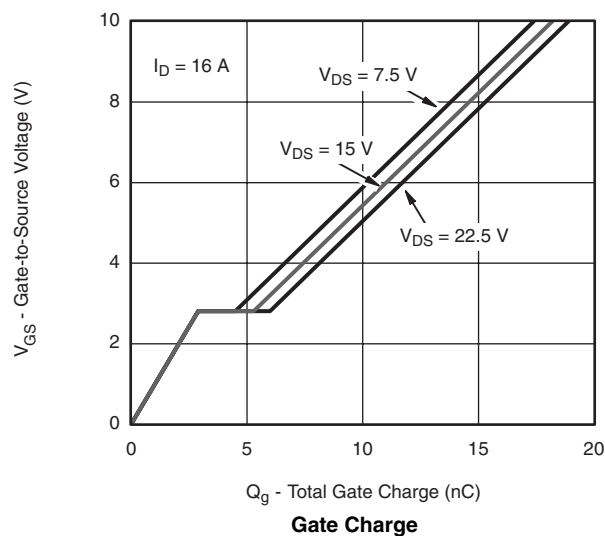
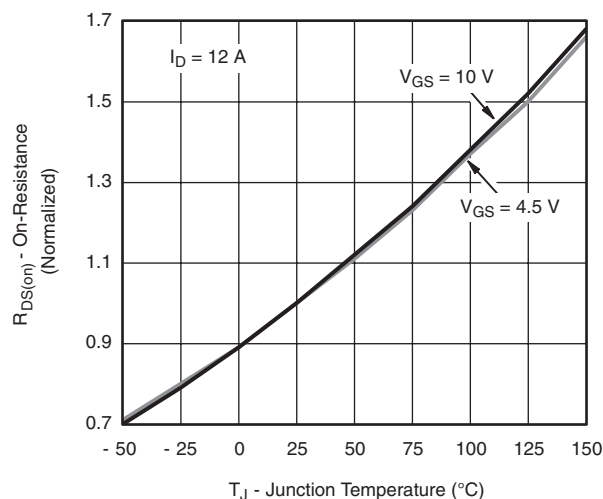
SPECIFICATIONS T <sub>J</sub> = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
V <sub>DS</sub> Temperature Coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA		32		mV/°C
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>			- 6.6		
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1.0		3.0	V
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 25 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V			1	μA
		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	30			A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 12 A		0.0088	0.011	Ω
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A		0.0115	0.0145	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 12 A		32		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		1100		pF
Output Capacitance	C <sub>oss</sub>			215		
Reverse Transfer Capacitance	C <sub>rss</sub>			95		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 16 A		18.2	28	nC
		V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 16 A		8.4	13	
Gate-Source Charge	Q <sub>gs</sub>			2.9		
Gate-Drain Charge	Q <sub>gd</sub>			2.4		
Gate Resistance	R <sub>g</sub>	f = 1 MHz	0.45	2.2	4.4	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> = 10 V, R <sub>g</sub> = 1 Ω		10	20	ns
Rise Time	t <sub>r</sub>			10	20	
Turn-Off Delay Time	t <sub>d(off)</sub>			22	35	
Fall Time	t <sub>f</sub>			8	16	
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		20	35	
Rise Time	t <sub>r</sub>			12	24	
Turn-Off Delay Time	t <sub>d(off)</sub>			25	40	
Fall Time	t <sub>f</sub>			12	24	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			16	A
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				50	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = 2.3 A		0.75	1.1	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 3.2 A, dI/dt = 100 A/μs, T <sub>J</sub> = 25 °C		20	40	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			12	25	nC
Reverse Recovery Fall Time	t <sub>a</sub>			11		ns
Reverse Recovery Rise Time	t <sub>b</sub>			9		

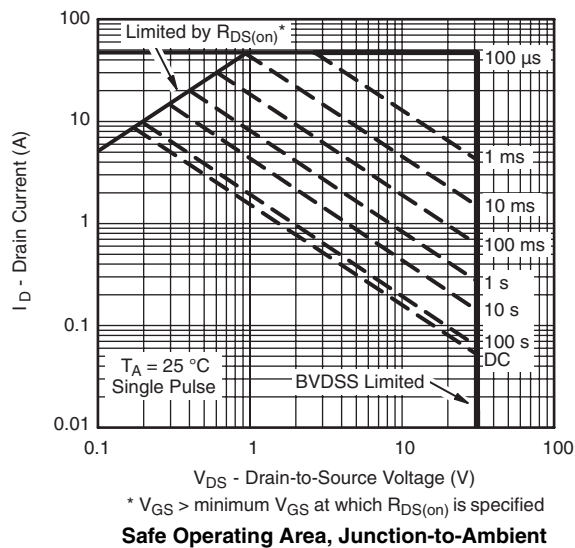
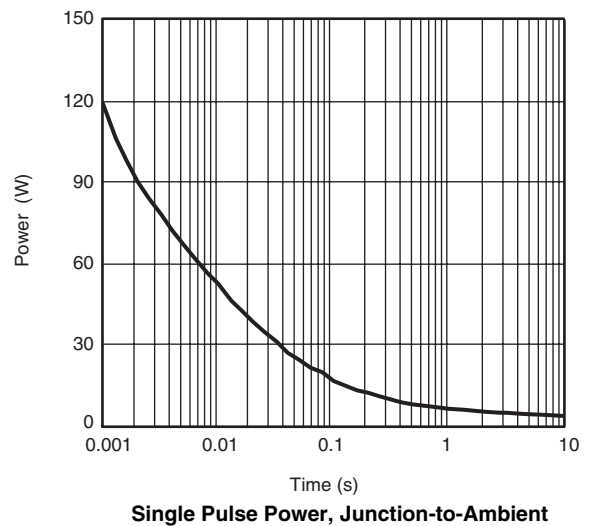
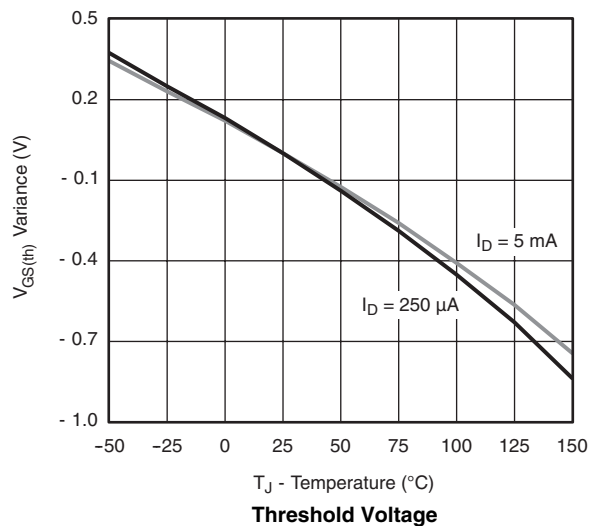
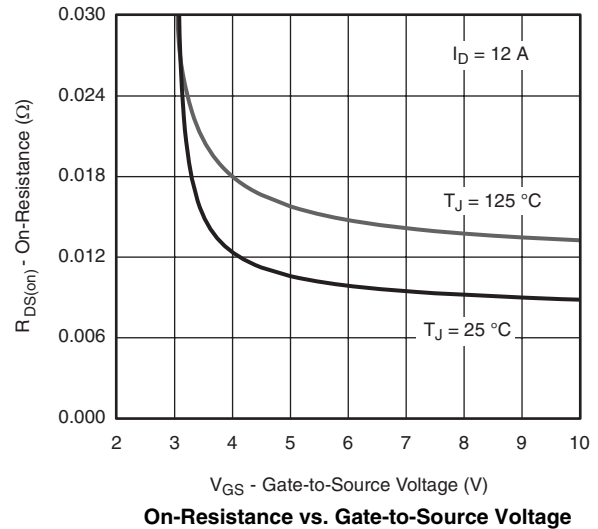
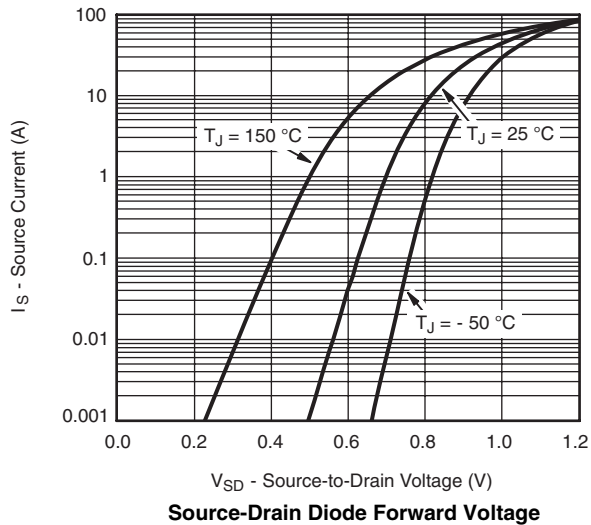
Notes:

a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

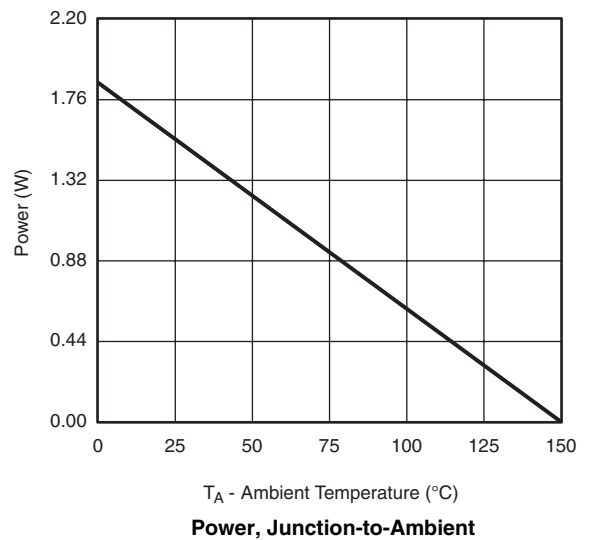
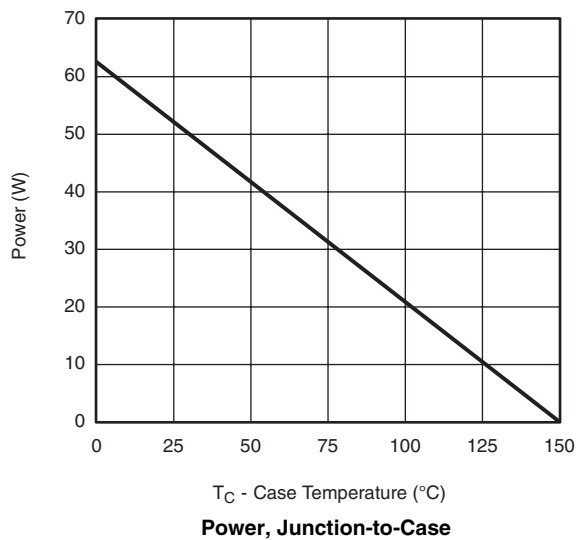
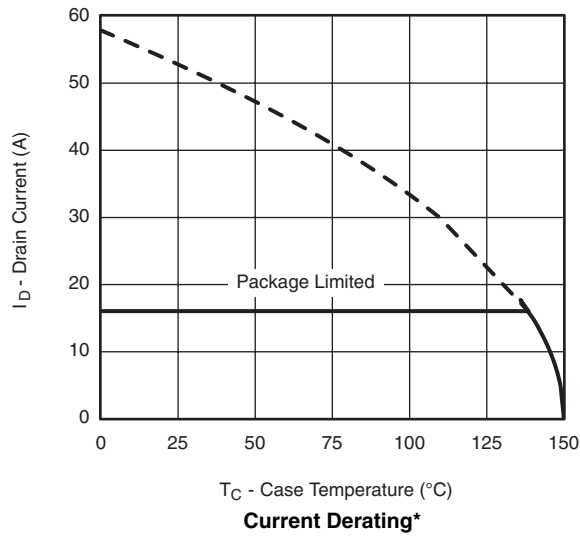
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure 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 and Gate Voltage****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

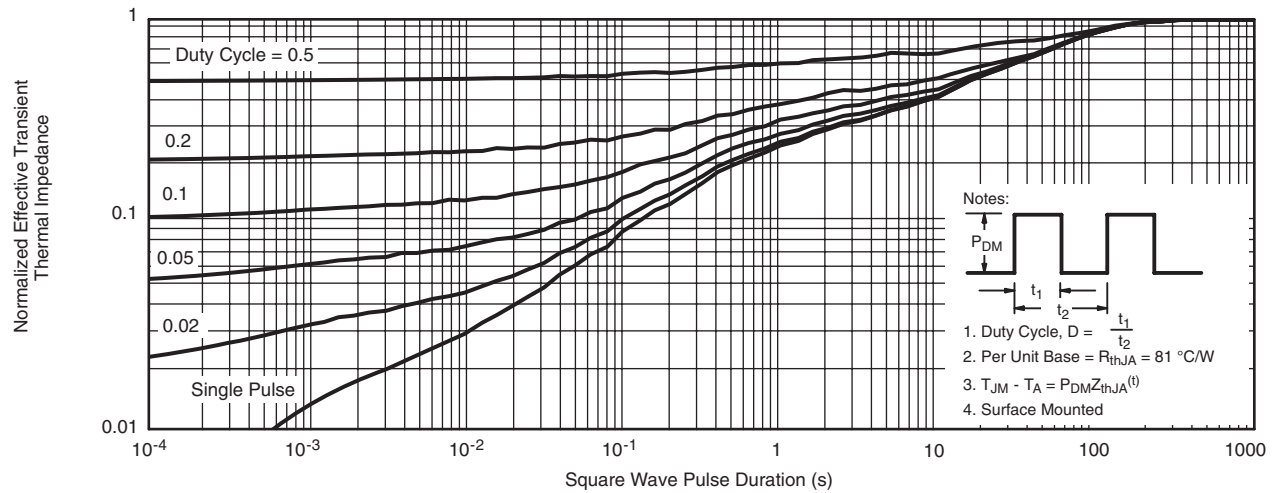
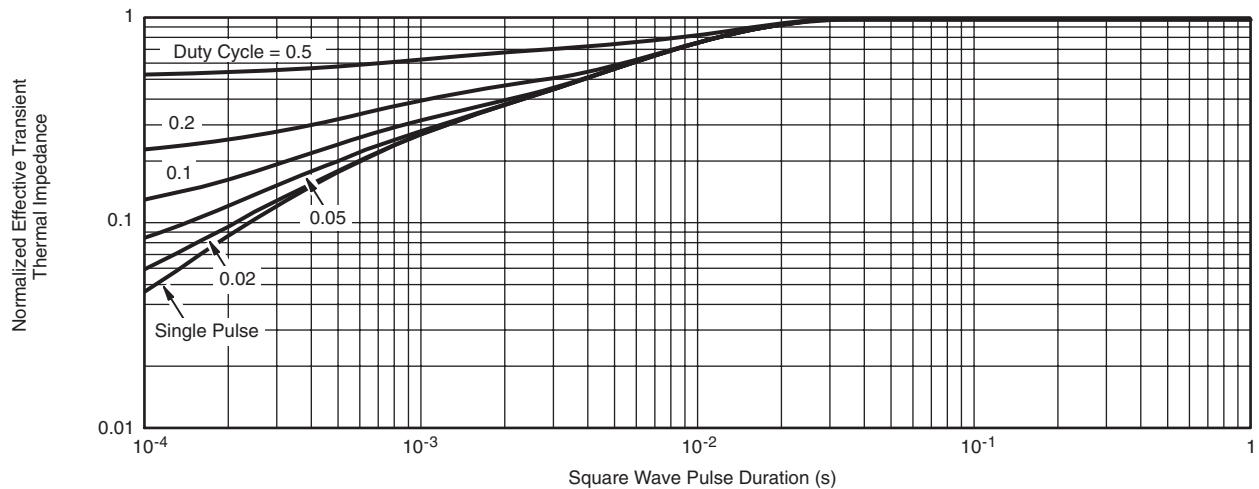
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\* The power dissipation  $P_D$  is based on  $T_{J(max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted**Normalized Thermal Transient Impedance, Junction-to-Ambient****Normalized Thermal Transient Impedance, Junction-to-Case**

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