

N-Channel 30 V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^e	Q_g (Typ.)
30	0.0062 at $V_{GS} = 10$ V	35	11.6 nC
	0.0087 at $V_{GS} = 4.5$ V	35	

FEATURES

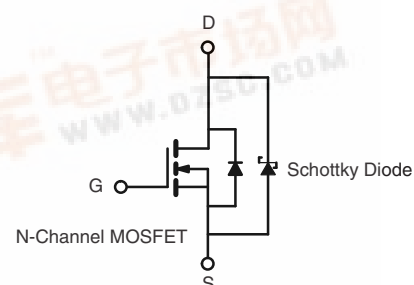
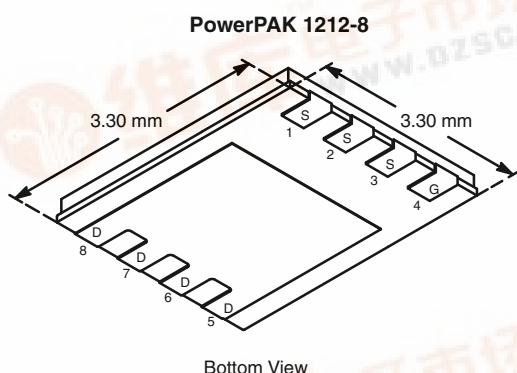
- Halogen-free According to IEC 61249-2-21 Definition
- SkyFET Monolithic TrenchFET[®] Power MOSFET and Schottky Diode
- Low Thermal Resistance PowerPAK[®] Package with Small Size and Low 1.07 mm Profile
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- System Power
- Low Side



Ordering Information: SiS776DN-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}	30	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	35 ^e
		$T_C = 70$ °C	35 ^e
		$T_A = 25$ °C	18.3 ^{a, b}
		$T_A = 70$ °C	14.5 ^{a, b}
Pulsed Drain Current	I_{DM}	60	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	35 ^e
		$T_A = 25$ °C	5.4 ^{a, b}
Single Pulse Avalanche Current	I_{AS}	20	mJ
Single Pulse Avalanche Energy	E_{AS}	20	
Maximum Power Dissipation	P_D	$T_C = 25$ °C	52
		$T_C = 70$ °C	33
		$T_A = 25$ °C	3.8 ^{a, b}
		$T_A = 70$ °C	2.4 ^{a, b}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 50 to 150	°C
Soldering Recommendations (Peak Temperature) ^{c, d}		260	

Notes:

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

b. $t = 10$ s.

c. See solder profile (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.

d. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.

e. Package limited.

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, b}	$t \leq 10$ s	R_{thJA}	24	33	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	1.9	2.4	

Notes:

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

b. Maximum under steady state conditions is 81 °C/W.

SPECIFICATIONS ($T_J = 25$ °C, unless otherwise noted)

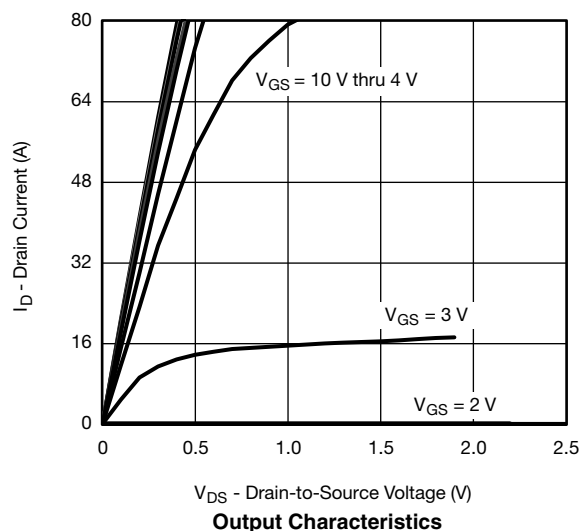
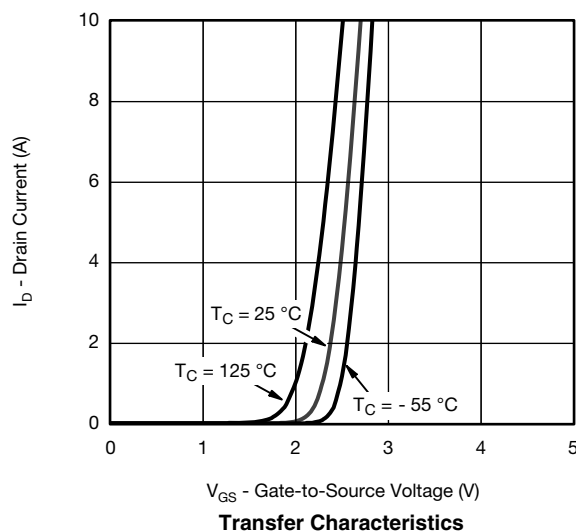
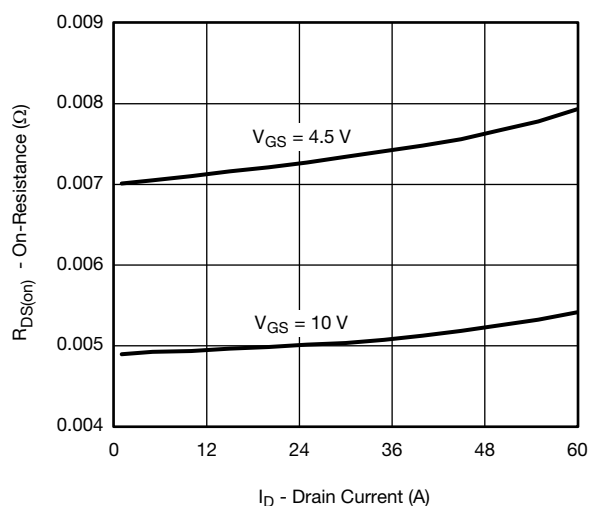
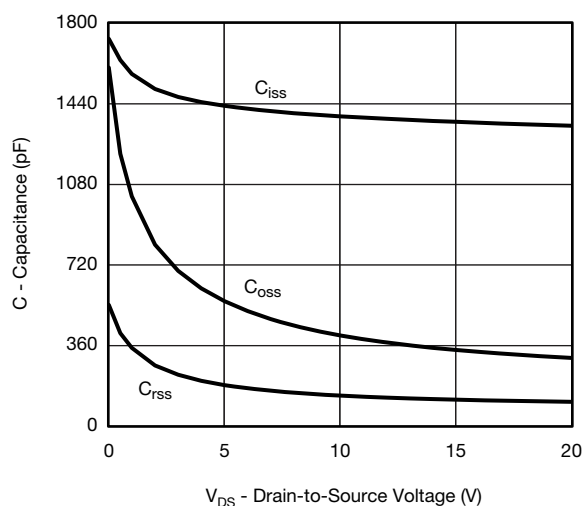
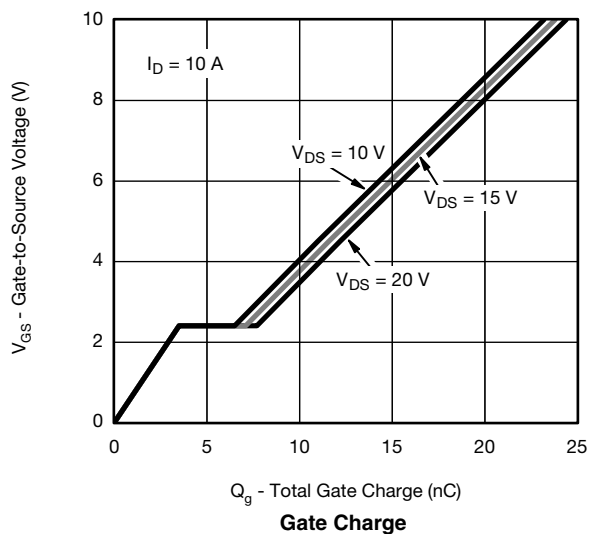
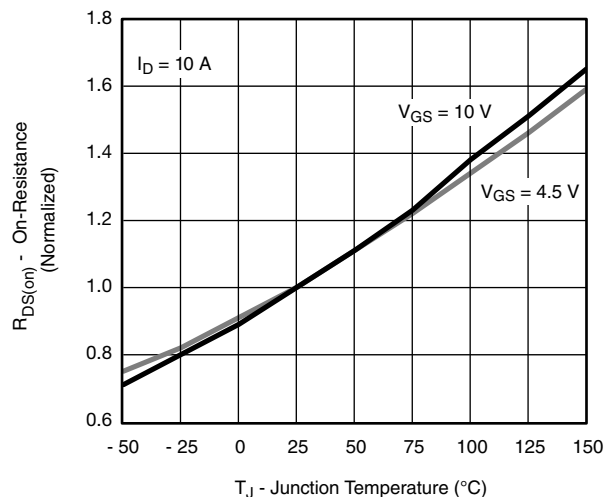
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0$ V, $I_D = 1$ mA	30			V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250$ μ A	1.0		2.5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 20$ V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30$ V, $V_{GS} = 0$ V		0.030	0.30	mA
		$V_{DS} = 30$ V, $V_{GS} = 0$ V, $T_J = 100$ °C		1.6	15	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5$ V, $V_{GS} = 10$ V	30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10$ V, $I_D = 10$ A		0.0050	0.0062	Ω
		$V_{GS} = 4.5$ V, $I_D = 7$ A		0.0072	0.0087	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 10$ V, $I_D = 10$ A		40		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 15$ V, $V_{GS} = 0$ V, $f = 1$ MHz		1360		pF
Output Capacitance	C_{oss}			340		
Reverse Transfer Capacitance	C_{rss}			117		
Total Gate Charge	Q_g	$V_{DS} = 15$ V, $V_{GS} = 10$ V, $I_D = 10$ A		24	36	nC
		$V_{DS} = 15$ V, $V_{GS} = 4.5$ V, $I_D = 10$ A		11.6	17.5	
Gate-Source Charge	Q_{gs}			3.5		
Gate-Drain Charge	Q_{gd}			3.6		
Gate Resistance	R_g	$f = 1$ MHz	0.4	1.5	3.0	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15$ V, $R_L = 1.5$ Ω $I_D \equiv 10$ A, $V_{GEN} = 4.5$ V, $R_g = 1$ Ω		18	35	ns
Rise Time	t_r			11	22	
Turn-Off Delay Time	$t_{d(off)}$			20	40	
Fall Time	t_f			10	20	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15$ V, $R_L = 1.5$ Ω $I_D \equiv 10$ A, $V_{GEN} = 10$ V, $R_g = 1$ Ω		11	22	
Rise Time	t_r			10	20	
Turn-Off Delay Time	$t_{d(off)}$			20	40	
Fall Time	t_f			8	16	

SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$			35	A
Pulse Diode Forward Current ^a	I_{SM}				60	
Body Diode Voltage	V_{SD}	$I_S = 3\text{ A}$		0.49	0.65	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 10\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^{\circ}\text{C}$		19	35	ns
Body Diode Reverse Recovery Charge	Q_{rr}			8	15	nC
Reverse Recovery Fall Time	t_a			8		ns
Reverse Recovery Rise Time	t_b			11		

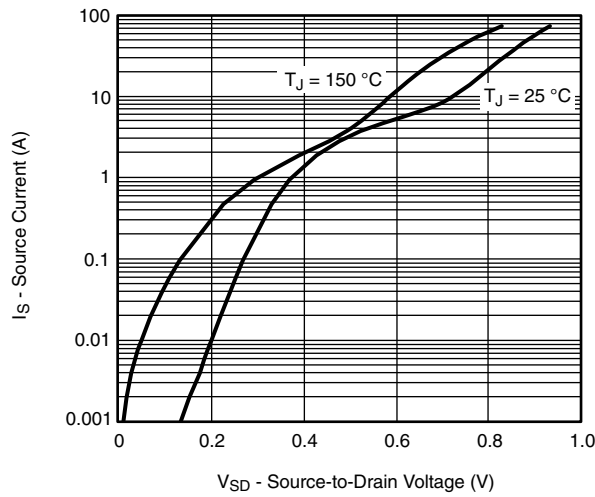
Notes:

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

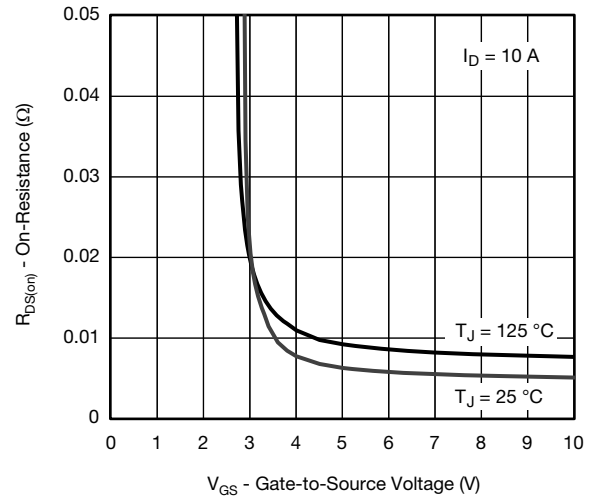
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

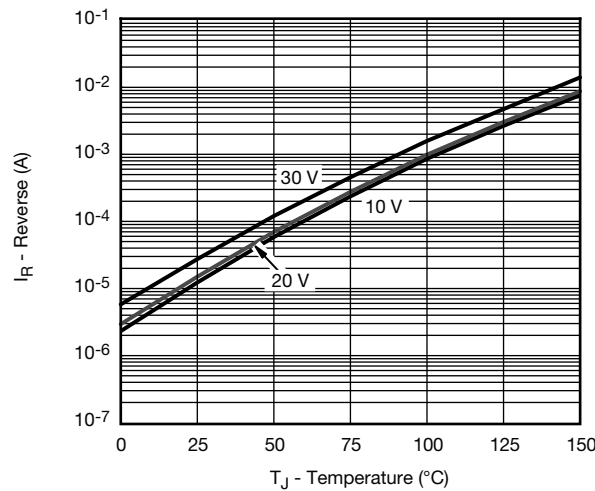
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



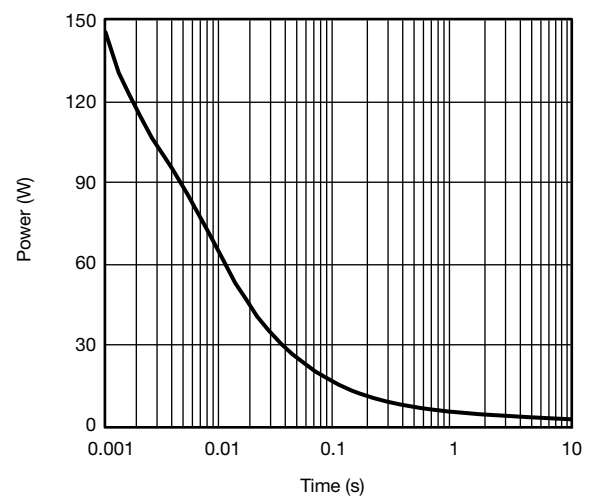
Source-Drain Diode Forward Voltage



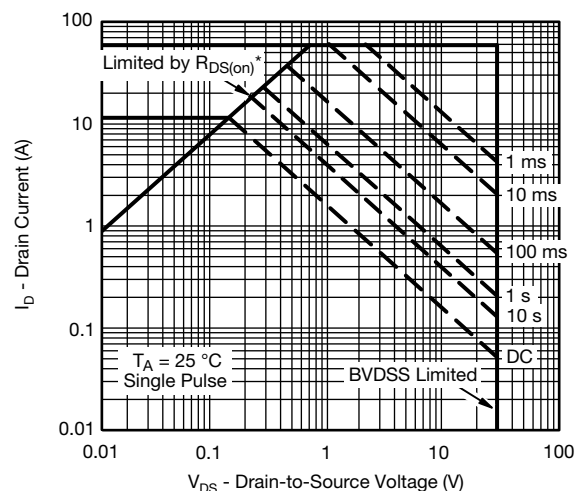
On-Resistance vs. Gate-to-Source Voltage



Reverse Current (Schottky)

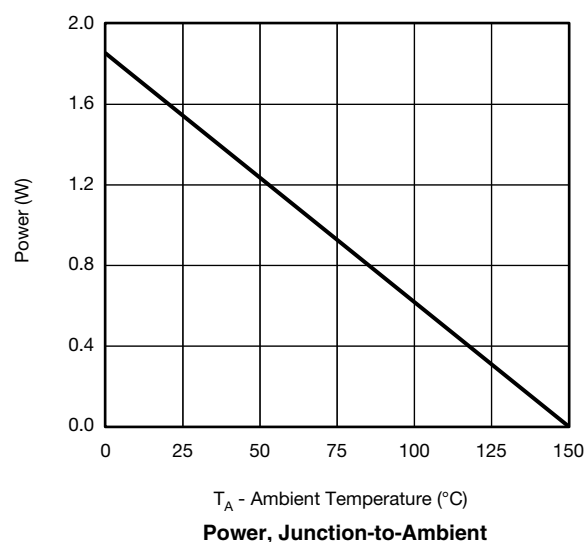
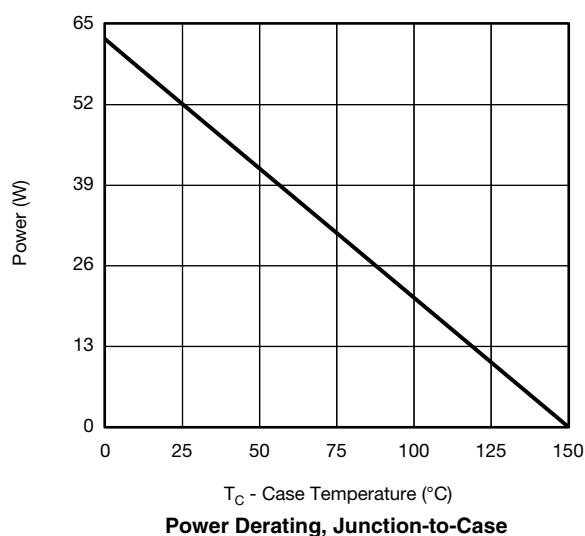
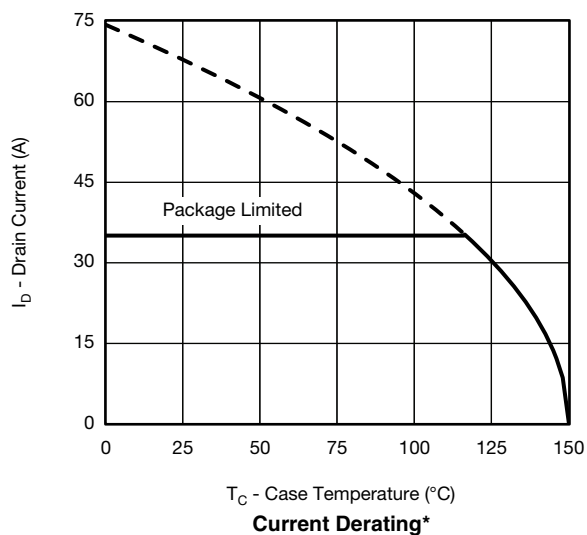


Single Pulse Power, Junction-to-Ambient



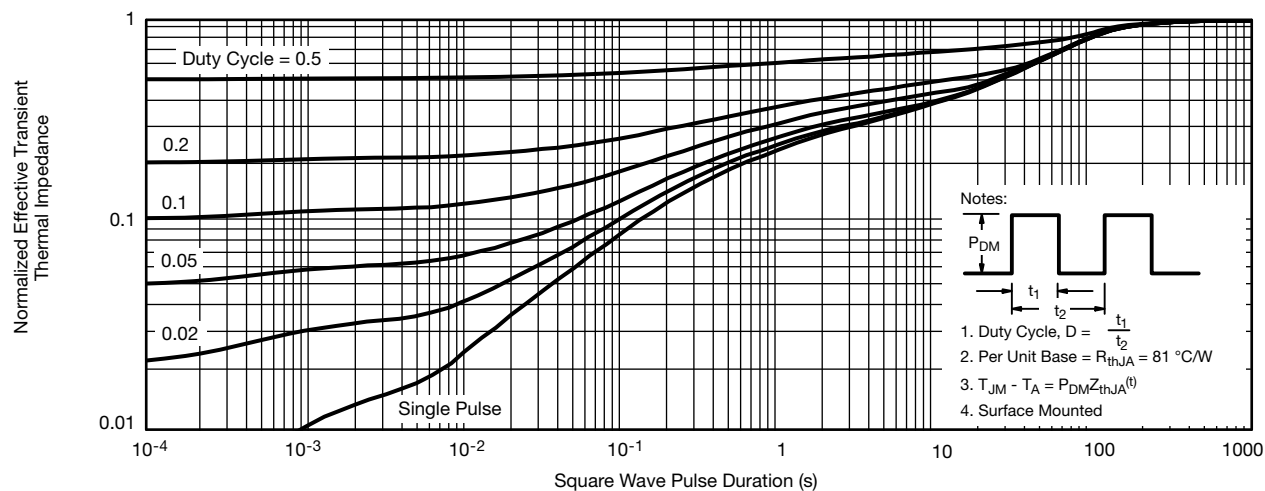
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

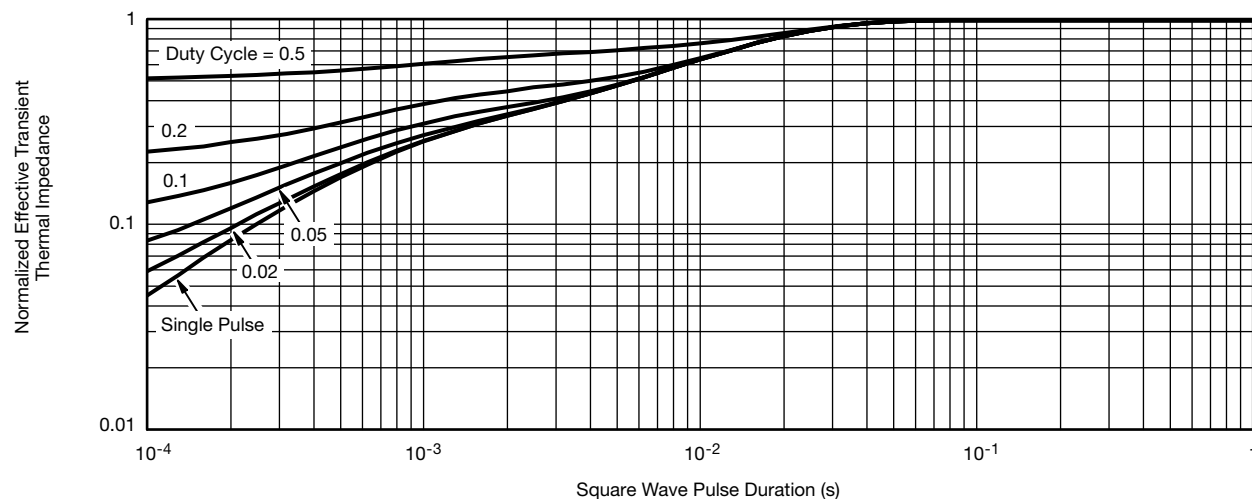
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


* 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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