

P-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
- 20	0.018 at $V_{GS} = - 4.5$ V	- 9 ^a	20 nC
	0.027 at $V_{GS} = - 2.5$ V	- 6 ^a	

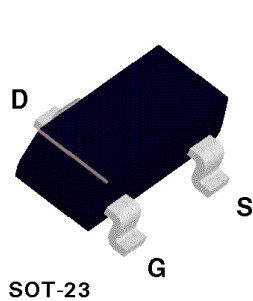
FEATURES

- DT-Trench Power MOSFET
- 100 % R_g Tested
- Built in ESD Protection with Zener Diode
- Typical ESD Performance: 1800 V
- Compliant to RoHS Directive 2002/95/EC

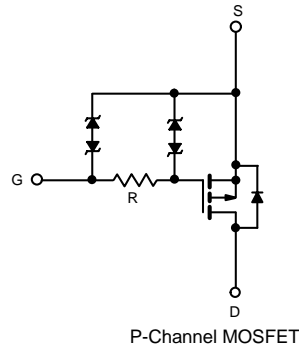

RoHS
 COMPLIANT

APPLICATIONS

- Portable Devices
 - Load Switch
 - Battery Switch
 - Charger Switch



SOT-23



P-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 20	V
Gate-Source Voltage	V_{GS}	± 12	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	- 9 ^a	A
	$T_C = 70$ °C	- 6 ^a	
	$T_A = 25$ °C	- 5 ^{b, c}	
	$T_A = 70$ °C	- 4.1 ^{b, c}	
Pulsed Drain Current	I_{DM}	- 27	A
Continuous Source-Drain Diode Current	$T_C = 25$ °C	- 6 ^a	
	$T_A = 25$ °C	- 2.9 ^{b, c}	
Maximum Power Dissipation	$T_C = 25$ °C	19	W
	$T_C = 70$ °C	12	
	$T_A = 25$ °C	3.5 ^{b, c}	
	$T_A = 70$ °C	2.2 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature) ^{d, e}		260	

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, e}	t ≤ 5 s	R _{thJA}	28	36	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R _{thJC}	5.3	6.5	

Notes:

a. Package limited.

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

 c. $t = 5$ s.

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

e. Maximum under Steady State conditions is 80 °C/W.

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted

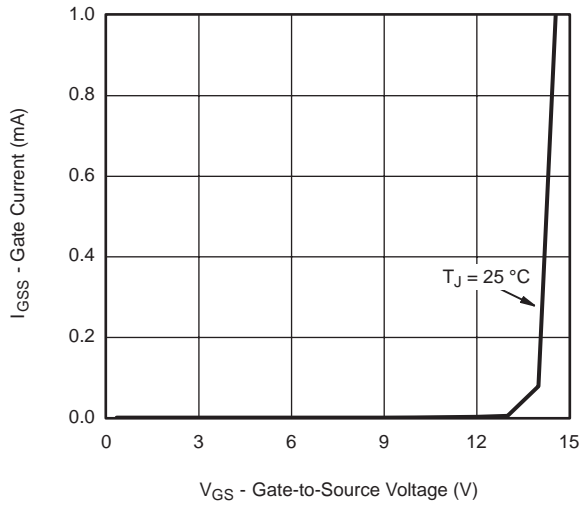
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 20			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 12		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			3		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 0.5		- 1.5	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 V			± 20	μA
		V _{DS} = 0 V, V _{GS} = ± 4.5 V			± 0.5	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 20 V, V _{GS} = 0 V			- 1	
		V _{DS} = - 20 V, V _{GS} = 0 V, T _J = 55 °C			- 10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≤ - 5 V, V _{GS} = - 4.5 V	- 20			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 4.5 V, I _D = - 2.6 A		0.018	0.024	Ω
		V _{GS} = - 2.5 V, I _D = - 2.3 A		0.027	0.030	
		V _{GS} = - 1.8 V, I _D = - 1.5 A		0.040	0.065	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 10 V, I _D = - 1.6 A		35		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz		3050		pF
Output Capacitance	C _{oss}			1172		
Reverse Transfer Capacitance	C _{rss}			256		
Total Gate Charge	Q _g	V _{DS} = - 10 V, V _{GS} = - 8 V, I _D = - 5 A		50	75	nC
Gate-Source Charge		V _{DS} = - 10 V, V _{GS} = - 4.5 V, I _D = - 5 A		20	30	
	Q _{gs}			3.3		
Gate-Drain Charge	Q _{gd}			8.4		
Gate Resistance	R _g	f = 1 MHz	0.2	1	2	kΩ
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 10 V, R _L = 1 Ω I _D ≅ - 5 A, V _{GEN} = - 4.5 V, R _g = 1 Ω		0.71	1.1	us
Rise Time	t _r			1.7	2.6	
Turn-Off Delay Time	t _{d(off)}			6	9	
Fall Time	t _f			3.2	5	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 10 V, R _L = 1 Ω I _D ≅ - 5 A, V _{GEN} = - 10 V, R _g = 1 Ω		0.3	0.45	
Rise Time	t _r			0.6	0.9	
Turn-Off Delay Time	t _{d(off)}			10	15	
Fall Time	t _f			3.5	5.5	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			- 9	A
Pulse Diode Forward Current	I _{SM}				- 27	
Body Diode Voltage	V _{SD}	I _S = - 5 A, V _{GS} = 0 V		- 0.85	- 1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 6 A, dI/dt = 100 A/μs, T _J = 25 °C		30	60	ns
Body Diode Reverse Recovery Charge	Q _{rr}			20	40	nC
Reverse Recovery Fall Time	t _a			13		ns
Reverse Recovery Rise Time	t _b			17		

Notes:

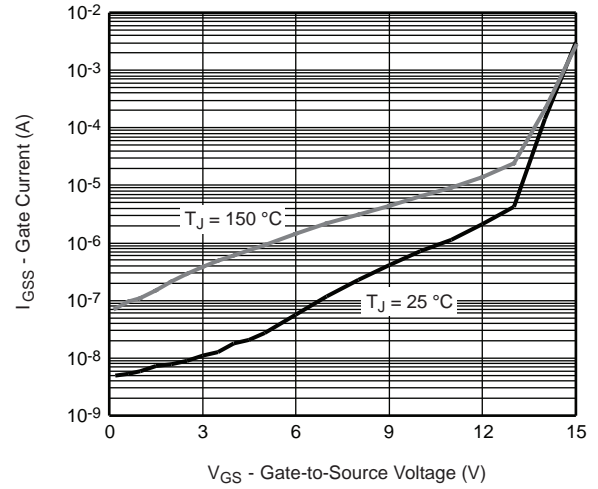
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

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.

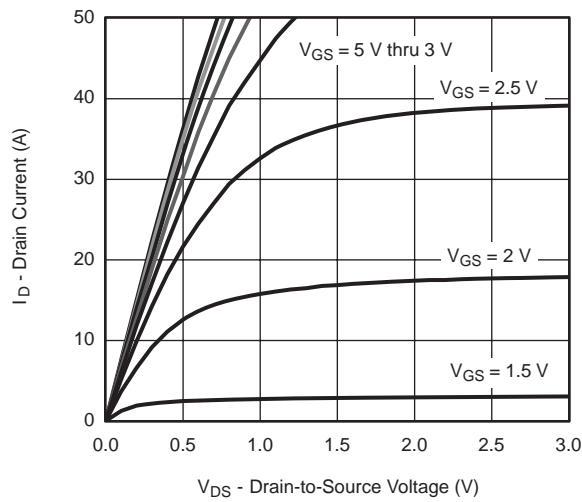
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



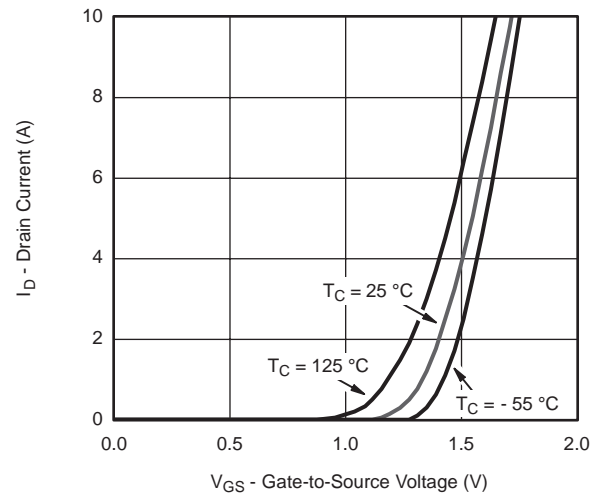
Gate Current vs. Gate-Source Voltage



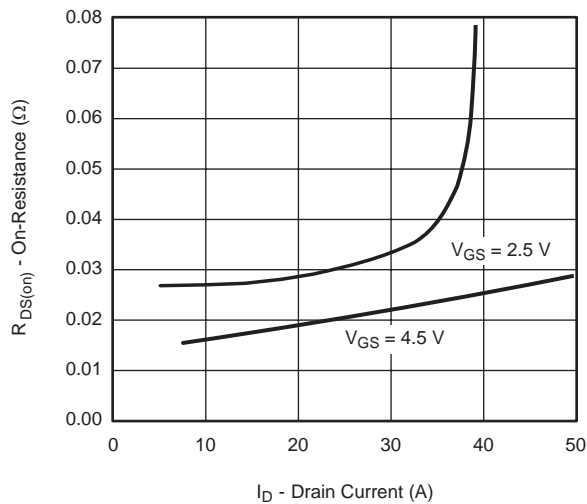
Gate Current vs. Gate-Source Voltage



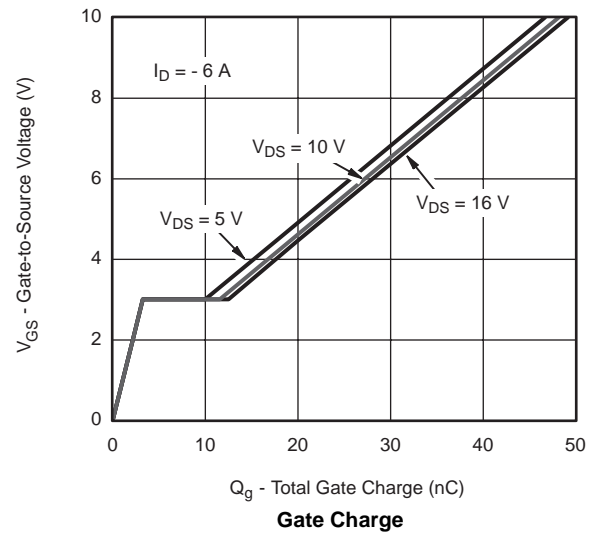
Output Characteristics



Transfer Characteristics



On-Resistance vs. Drain Current

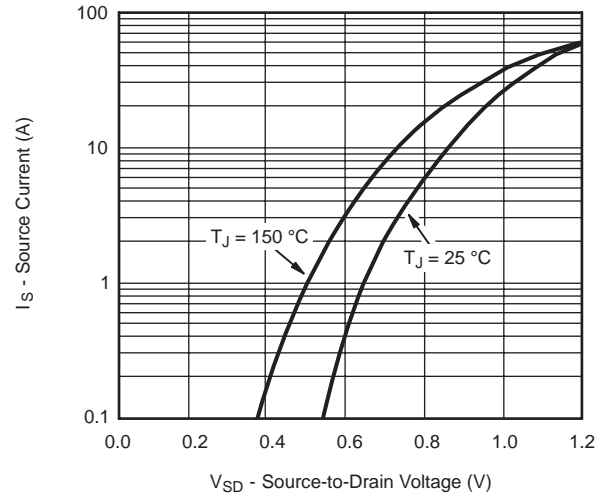


Gate Charge

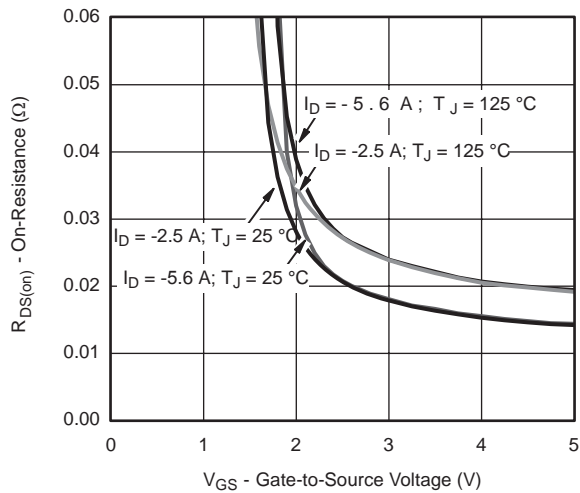
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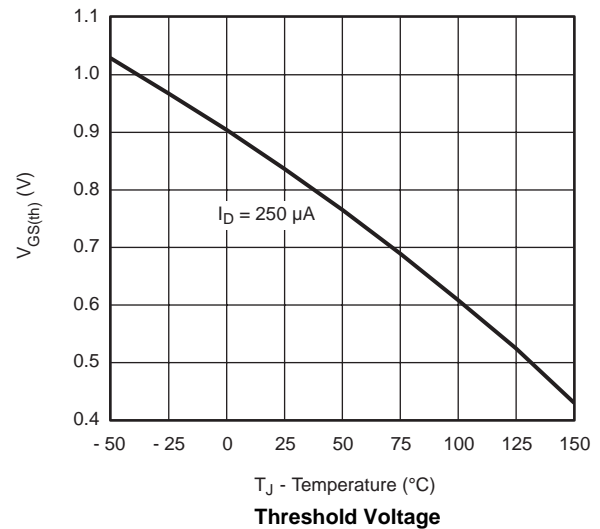
On-Resistance vs. Junction Temperature



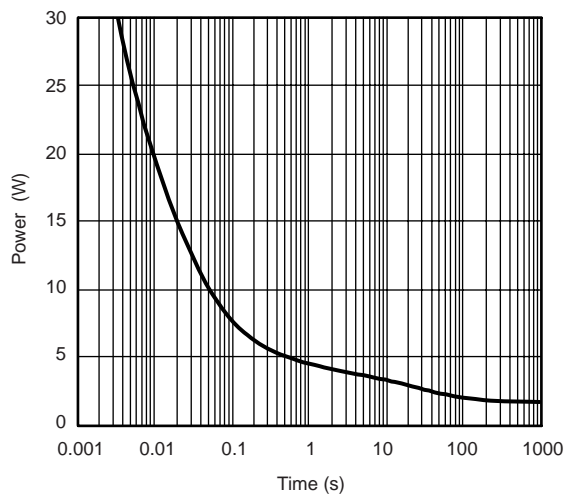
Source-Drain Diode Forward Voltage



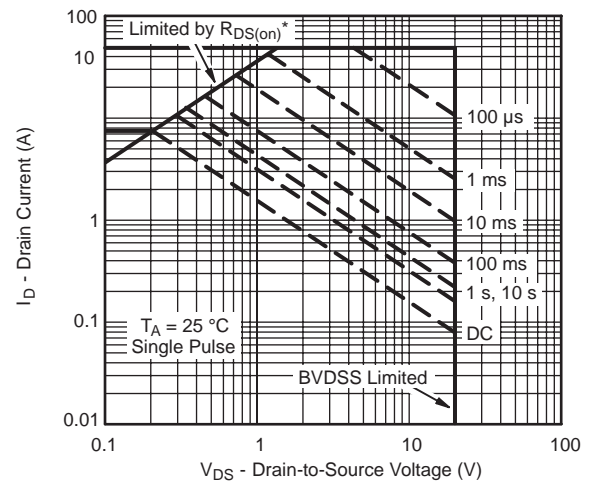
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

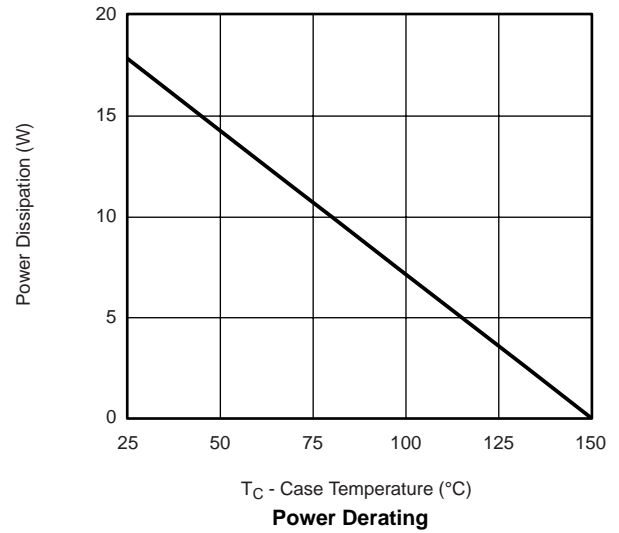
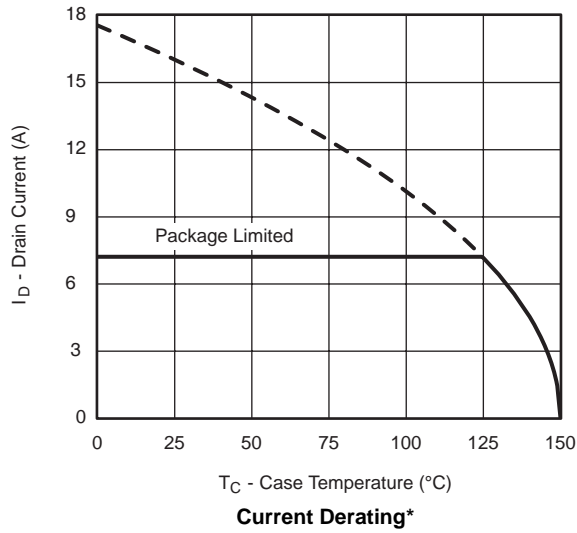


Single Pulse Power, Junction-to-Ambient



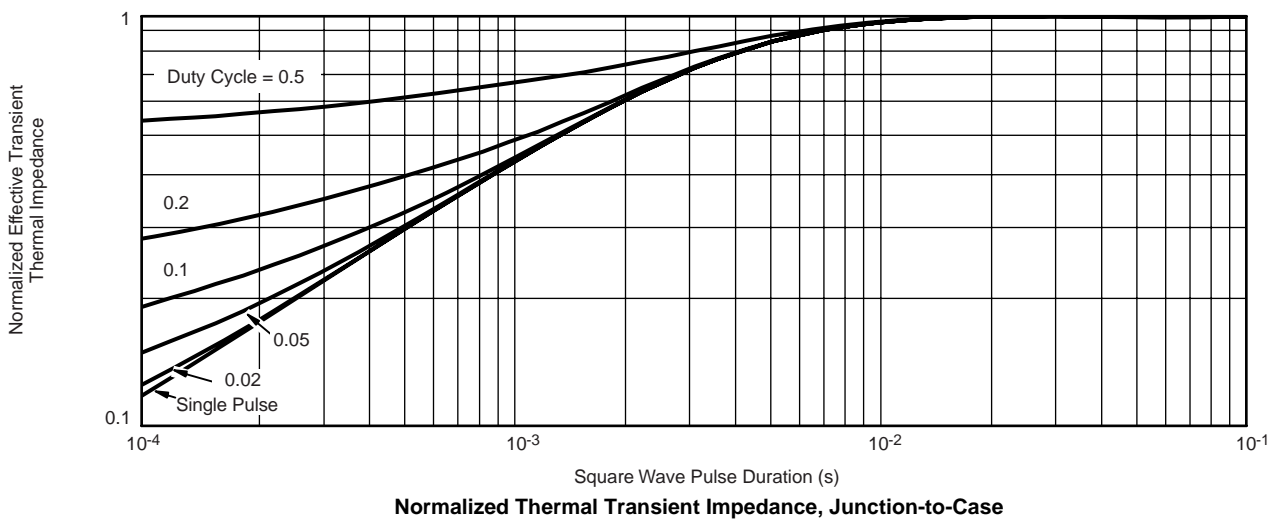
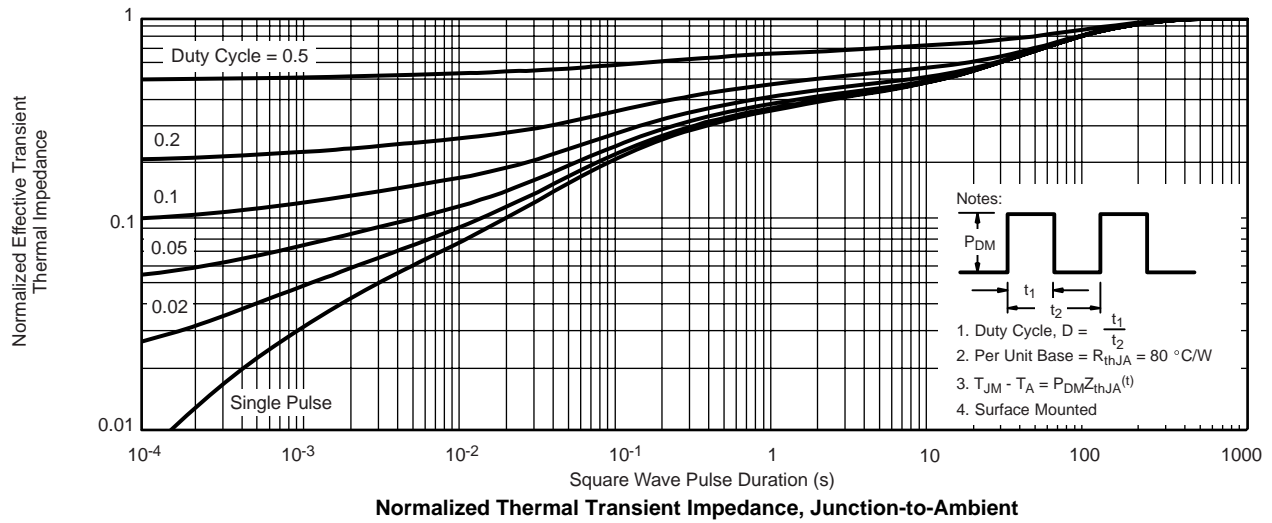
Safe Operating Area, Junction-to-Ambient
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

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



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