

N-Channel 25-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
25	0.0046 at $V_{GS} = 10$ V	40	13 nC
	0.0062 at $V_{GS} = 4.5$ V	40	

FEATURES

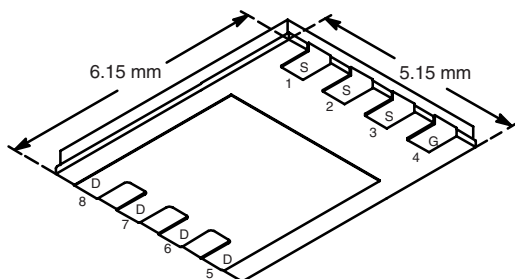
- Halogen-free
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested


RoHS
COMPLIANT

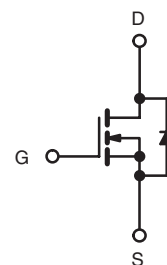
APPLICATIONS

- Low-Side Switch
- Server, VRM

PowerPAK SO-8



Bottom View



N-Channel MOSFET

Ordering Information: SiR436DP-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}	25	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	I_D	40 ^a	A
		40 ^a	
		25 ^{b, c}	
		20 ^{b, c}	
Pulsed Drain Current	I_{DM}	80	mJ
Avalanche Current	I_{AS}	40	
Avalanche Energy	E_{AS}	80	
Continuous Source-Drain Diode Current	I_S	40 ^a	A
		4.1 ^{b, c}	
Maximum Power Dissipation	P_D	50	W
		32	
		5 ^{b, c}	
		3.2 ^{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, f}	R_{thJA}	20	25	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	2.0	2.5	

Notes:

a. Based on $T_C = 25$ °C. Package limited.

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

c. $t = 10$ s.

d. See Solder Profile (<http://www.vishay.com/ppg?73257>). The PowerPAK SO-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.

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

f. Maximum under Steady State conditions is 70 °C/W.

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

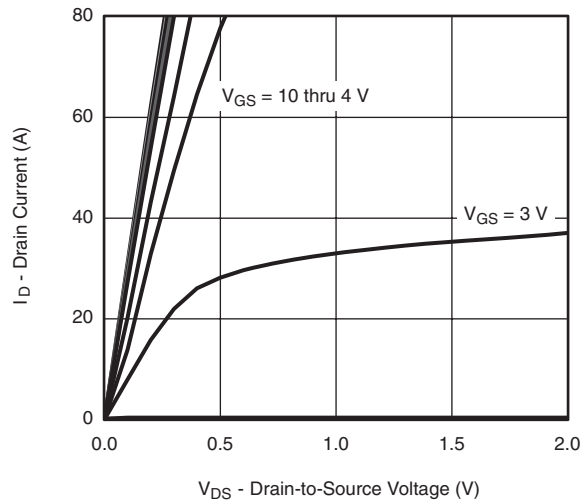
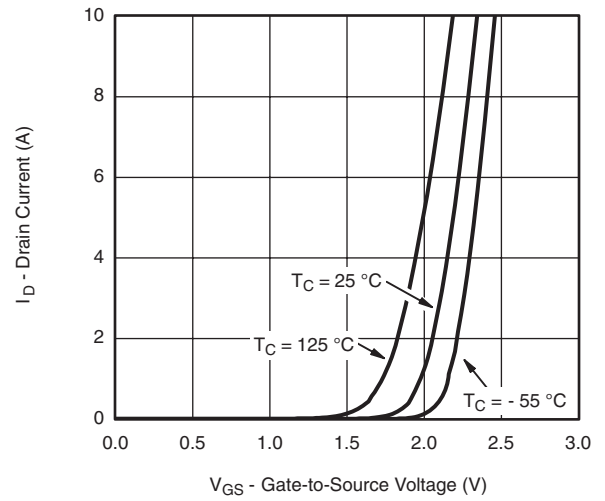
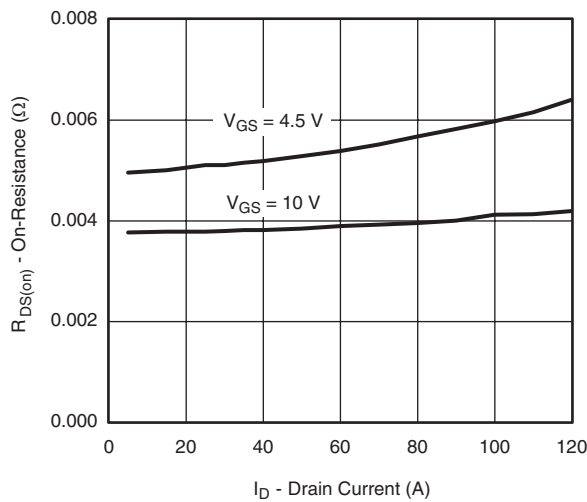
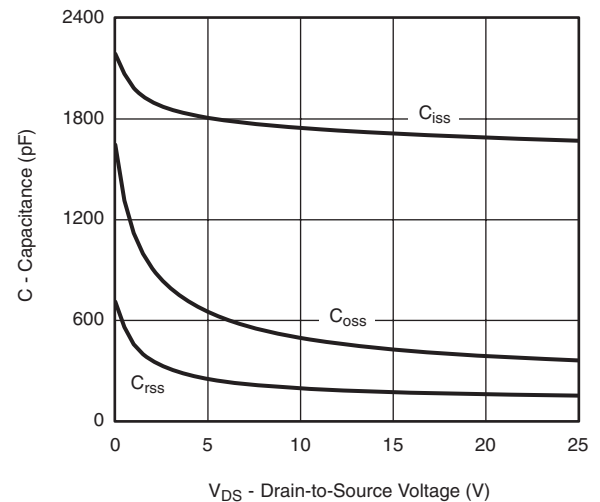
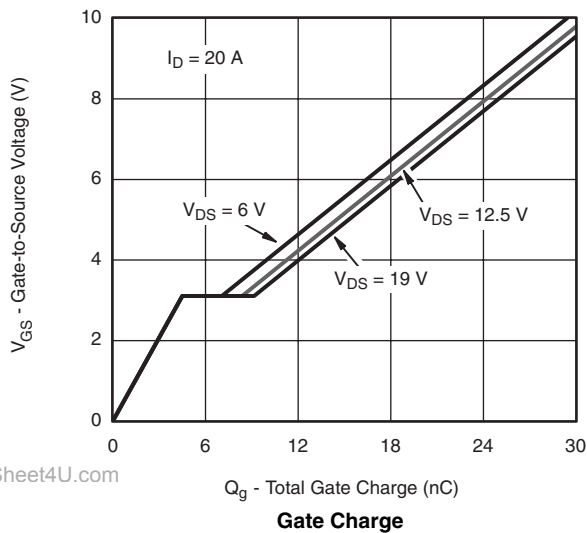
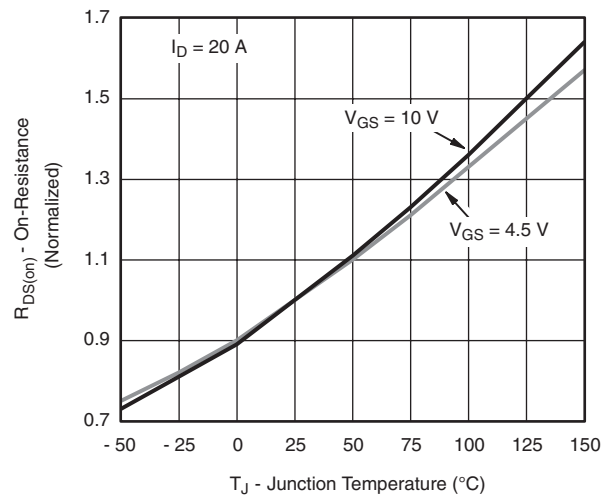
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	25			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		24		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 5.5		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1		3	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 25 V, V _{GS} = 0 V			1	μA
		V _{DS} = 25 V, V _{GS} = 0 V, T _J = 55 °C			5	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	50			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.0038	0.0046	Ω
		V _{GS} = 4.5 V, I _D = 18 A		0.005	0.0062	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 20 A		60		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		1715		pF
Output Capacitance	C _{oss}			425		
Reverse Transfer Capacitance	C _{rss}			170		
Total Gate Charge	Q _g	V _{DS} = 12.5 V, V _{GS} = 10 V, I _D = 20 A		31	47	nC
		V _{DS} = 12.5 V, V _{GS} = 4.5 V, I _D = 20 A		13	20	
Gate-Source Charge	Q _{gs}			4.5		
Gate-Drain Charge	Q _{gd}			3.9		
Gate Resistance	R _g	f = 1 MHz		1.0	2.0	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 12.5 V, R _L = 12.5 Ω I _D ≅ 1.0 A, V _{GEN} = 4.5 V, R _g = 1 Ω		22	40	ns
Rise Time	t _r			11	25	
Turn-Off Delay Time	t _{d(off)}			32	50	
Fall Time	t _f			8	25	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 12.5 V, R _L = 12.5 Ω I _D ≅ 1.0 A, V _{GEN} = 10 V, R _g = 1 Ω		13	25	
Rise Time	t _r			8	15	
Turn-Off Delay Time	t _{d(off)}			30	40	
Fall Time	t _f			9	15	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			40	A
Pulse Diode Forward Current	I _{SM}				80	
Body Diode Voltage	V _{SD}	I _S = 4.1 A, V _{GS} = 0 V		0.75	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 4.1 A, dI/dt = 100 A/μs, T _J = 25 °C		28	56	ns
Body Diode Reverse Recovery Charge	Q _{rr}			20	40	nC
Reverse Recovery Fall Time	t _a			15		ns
Reverse Recovery Rise Time	t _b			13		

Notes:

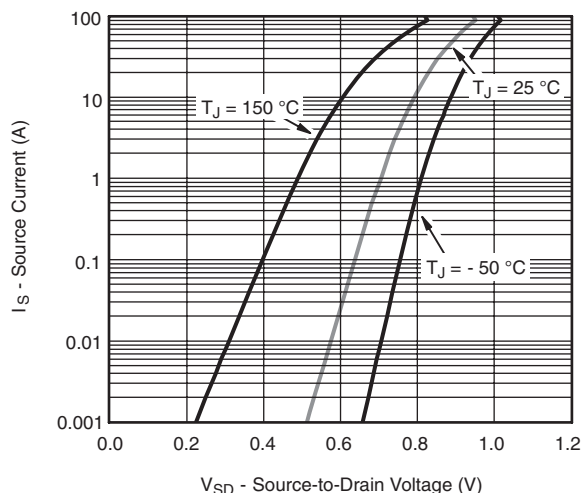
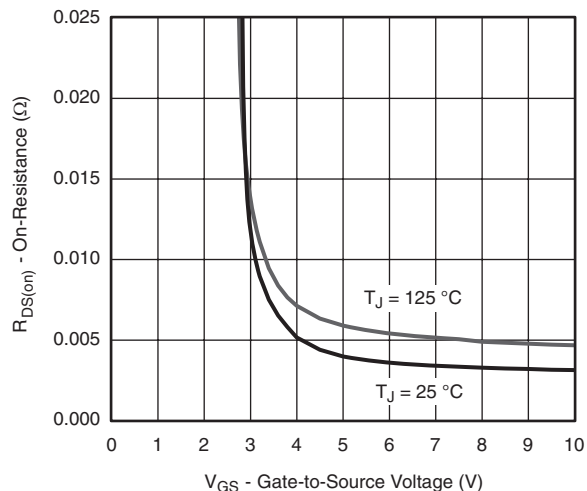
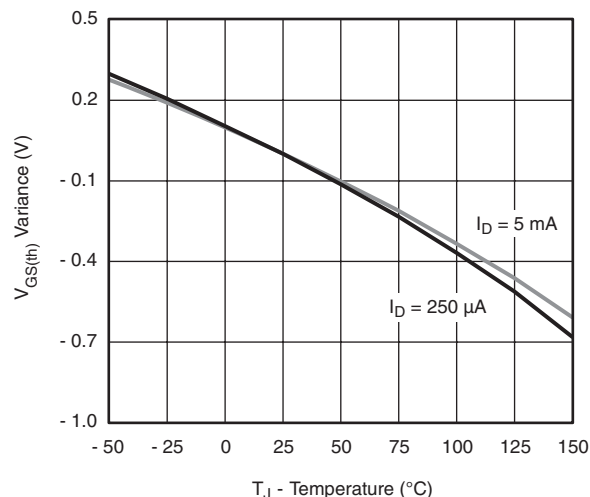
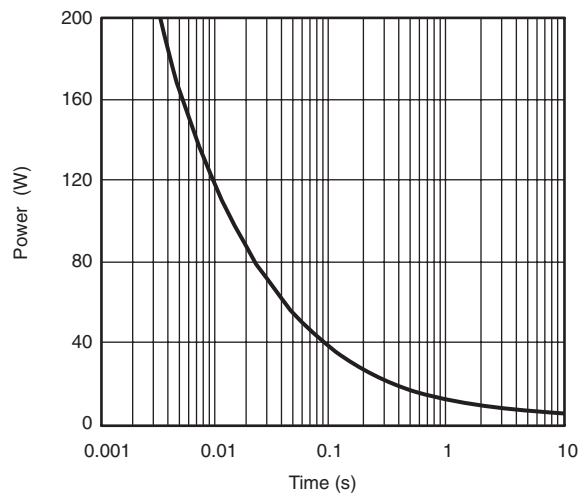
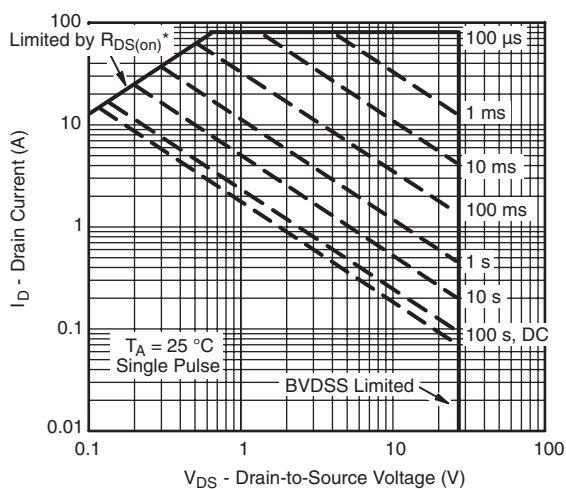
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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

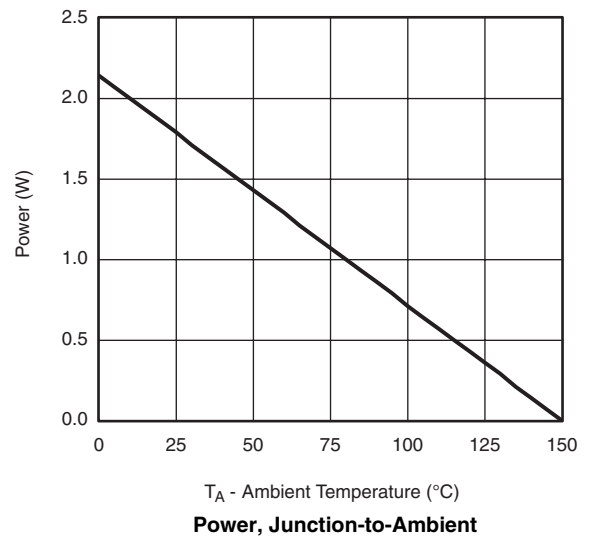
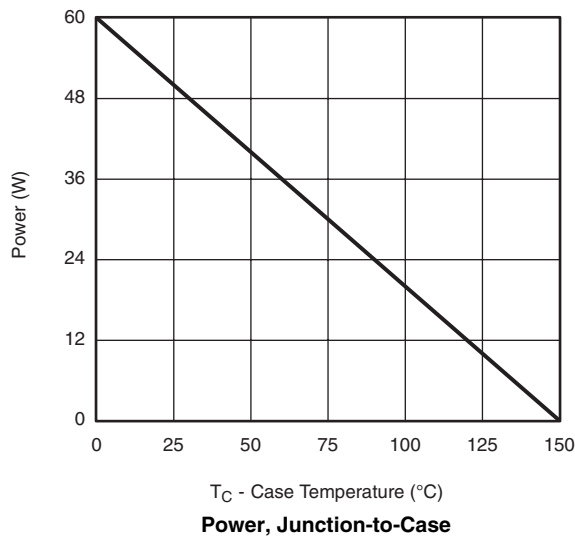
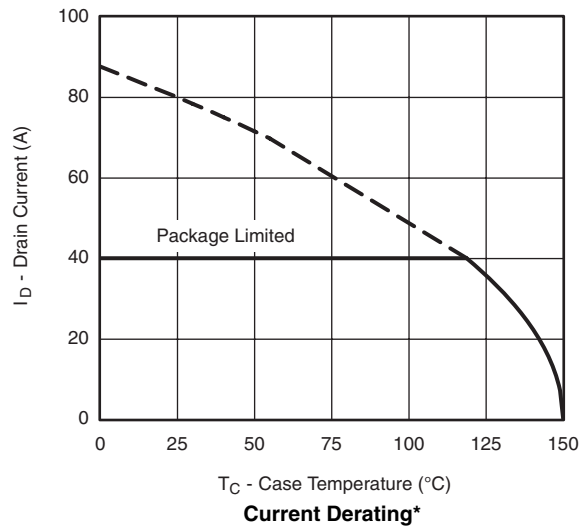
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

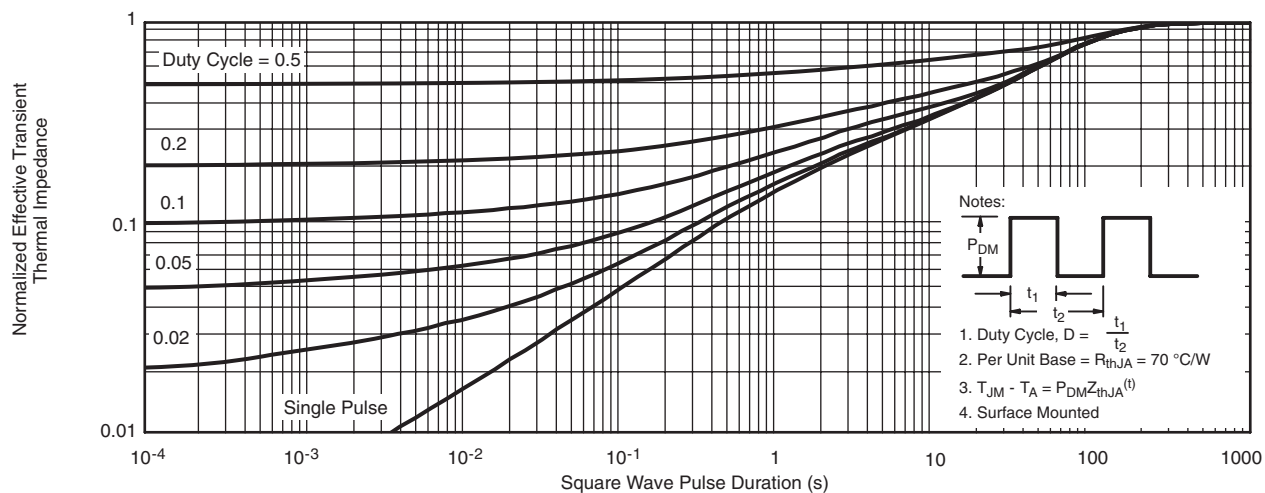
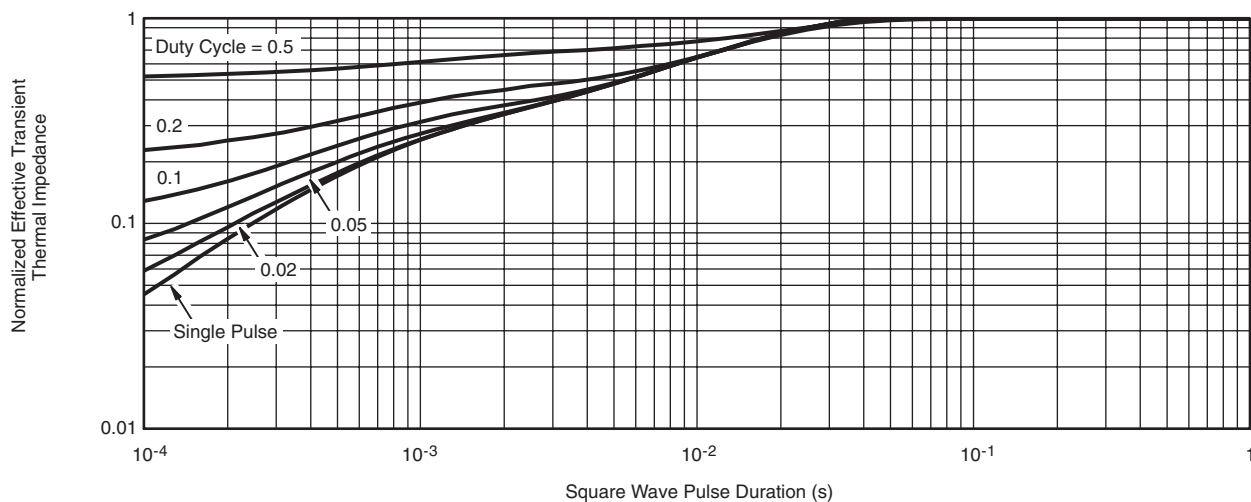
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TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**Source-Drain Diode Forward Voltage****On-Resistance vs. Gate-to-Source Voltage****Threshold Voltage****Single Pulse Power (Junction-to-Ambient)*** $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ 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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