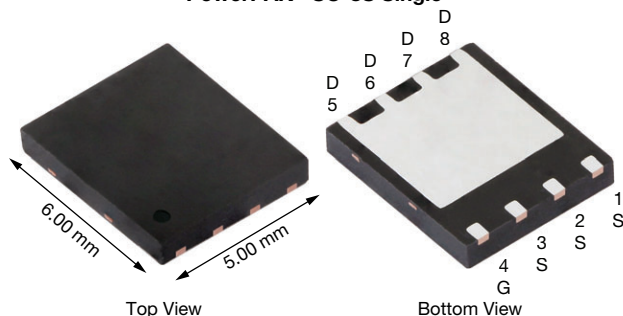


N-Channel 20 V (D-S) MOSFET

PowerPAK® SO-8S Single


FEATURES

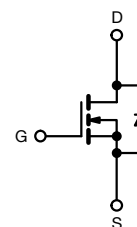
- TrenchFET® Gen V power MOSFET
- Very low $R_{DS(on)}$ x Q_g figure-of-merit (FOM)
- 100 % R_g and UIS tested
- Enhance power dissipation and lower R_{thJC}
- Leadership $R_{DS(on)}$ minimizes power loss from conduction
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Synchronous rectification
- DC/DC converters
- Battery management



N-Channel MOSFET

PRODUCT SUMMARY

V_{DS} (V)	20
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 4.5$ V	0.00035
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 2.5$ V	0.00085
Q_g typ. (nC)	113
I_D (A) ^a	797
Configuration	Single

ORDERING INFORMATION

Package	PowerPAK SO-8S
Lead (Pb)-free, halogen-free and board level reliability	SiRS5200DP-T1-RE3

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}	+8, -7	V
Continuous drain current ($T_J = 150$ °C)	$T_C = 25$ °C	797	A
	$T_C = 70$ °C	637	
	$T_A = 25$ °C	138 ^{b, c}	
	$T_A = 70$ °C	110 ^{b, c}	
Pulsed drain current ($V_{GS} = 4.5$ V, $t = 100$ μ s)	I_{DM}	1000	A
Continuous source-drain diode current	$T_C = 25$ °C	252	A
	$T_A = 25$ °C	7.6 ^{b, c}	
Single pulse avalanche current	$L = 0.1$ mH	84	mJ
Single pulse avalanche energy	E_{AS}	353	
Maximum power dissipation	$T_C = 25$ °C	278	W
	$T_C = 70$ °C	178	
	$T_A = 25$ °C	8.3 ^{b, c}	
	$T_A = 70$ °C	5.3 ^{b, c}	
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature) ^c		260	

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^{b, f}	R_{thJA}	10	15	°C/W
Maximum junction-to-case (drain)	R_{thJC}	0.30	0.45	

Notes

- $T_C = 25$ °C
- Surface mounted on 1" x 1" FR4 board
- $t = 10$ s
- See solder profile (www.vishay.com/doc?73257). The PowerPAK SO-8S 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
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components
- Maximum under steady state conditions is 45 °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 = 250 μA	20	-	-	V
V _{DS} temperature coefficient	ΔV _{DS} /T _J	I _D = 10 mA	-	18	-	mV/°C
V _{GS(th)} temperature coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	-	-4.4	-	
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.4	-	1.5	V
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = +8 V, -7 V	-	-	± 100	nA
Zero gate voltage drain current	I _{DSS}	V _{DS} = 16 V, V _{GS} = 0 V	-	-	5	μA
		V _{DS} = 16 V, V _{GS} = 0 V, T _J = 55 °C	-	-	50	
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 20 A	-	0.00029	0.00035	Ω
		V _{GS} = 2.5 V, I _D = 20 A	-	0.00060	0.00085	
Forward transconductance ^a	g _{fs}	V _{DS} = 10 V, I _D = 60 A	-	240	-	S
Dynamic ^b						
Input capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	-	11 710	-	pF
Output capacitance	C _{oss}		-	5000	-	
Reverse transfer capacitance	C _{rss}		-	305	-	
Total gate charge	Q _g	V _{DS} = 10 V, V _{GS} = 10 V, I _D = 20 A	-	262	386	nC
		V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 20 A	-	113	170	
Gate-source charge	Q _{gs}		-	39	-	
Gate-drain charge	Q _{gd}		-	10	-	
Output charge	Q _{oss}	V _{DS} = 10 V, V _{GS} = 0 V	-	125	-	
Gate resistance	R _g	f = 1 MHz	0.34	1.7	3.4	Ω
Turn-on delay time	t _{d(on)}	V _{DD} = 10 V, R _L = 1 Ω, I _D ≅ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω	-	51	100	ns
Rise time	t _r		-	70	140	
Turn-off delay time	t _{d(off)}		-	105	210	
Fall time	t _f		-	30	60	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I _S	T _C = 25 °C	-	-	252	A
Pulse diode forward current	I _{SM}		-	-	1000	
Body diode voltage	V _{SD}	I _S = 10 A, V _{GS} = 0 V	-	0.70	1.1	V
Body diode reverse recovery time	t _{rr}	I _F = 10 A, di/dt = 100 A/μs, T _J = 25 °C	-	86	175	ns
Body diode reverse recovery charge	Q _{rr}		-	175	350	nC
Reverse recovery fall time	t _a		-	45	-	ns
Reverse recovery rise time	t _b		-	41	-	

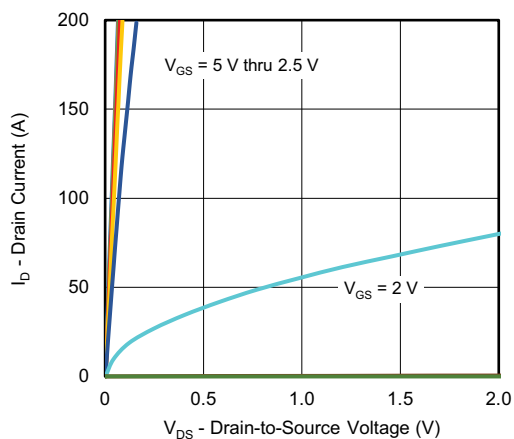
Notes

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

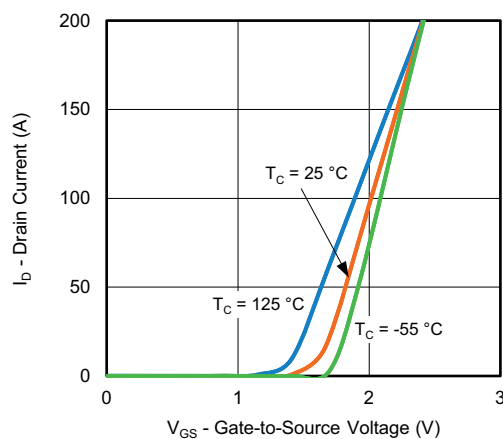
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



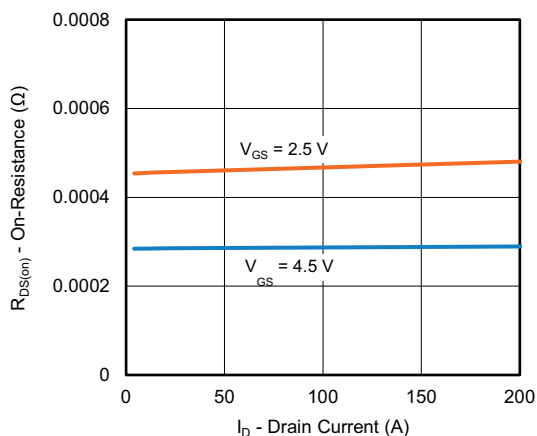
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



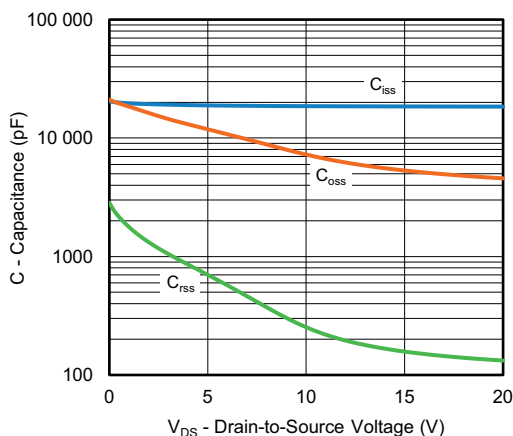
Output Characteristics



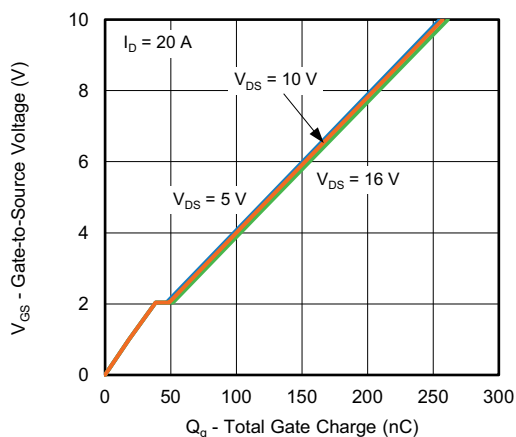
Transfer Characteristics



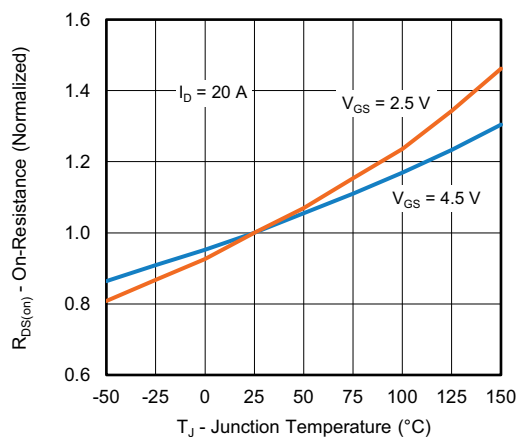
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



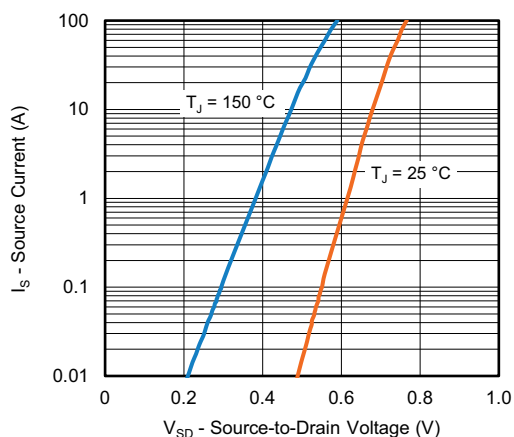
Gate Charge



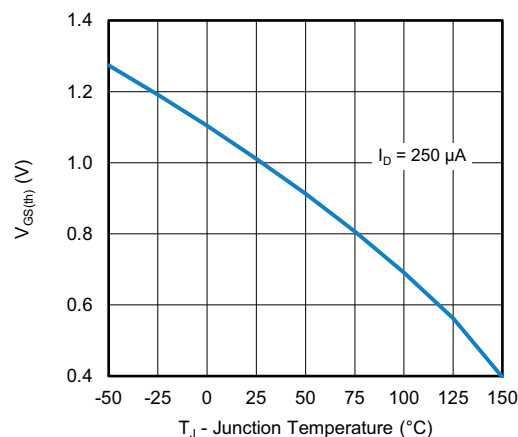
On-Resistance vs. Junction Temperature



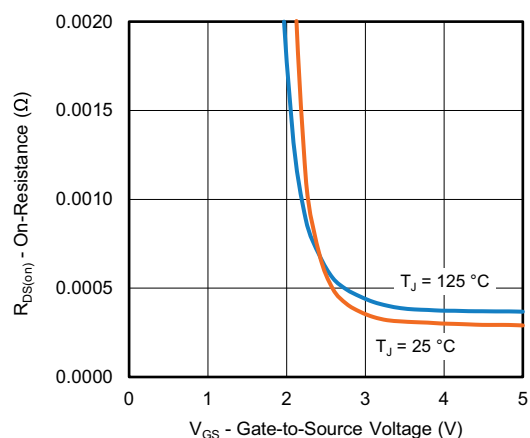
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



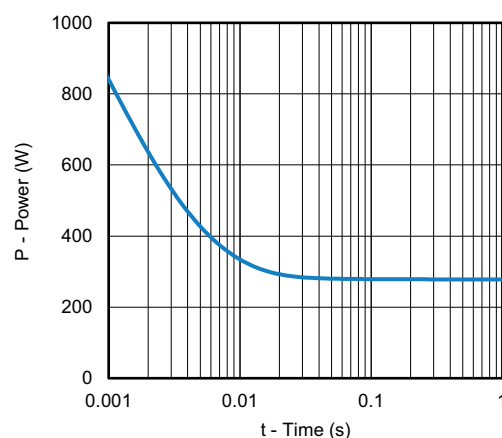
Source-Drain Diode Forward Voltage



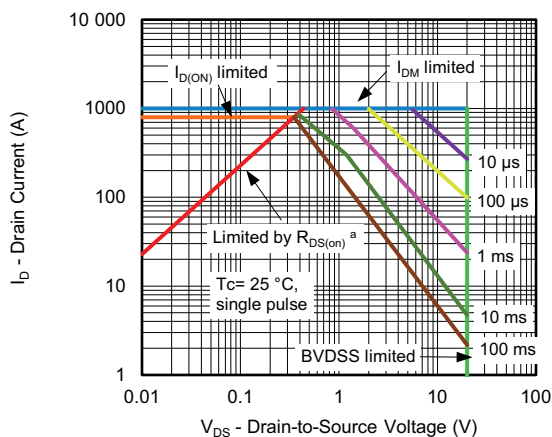
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage



Single Pulse Power, Junction-to-Case



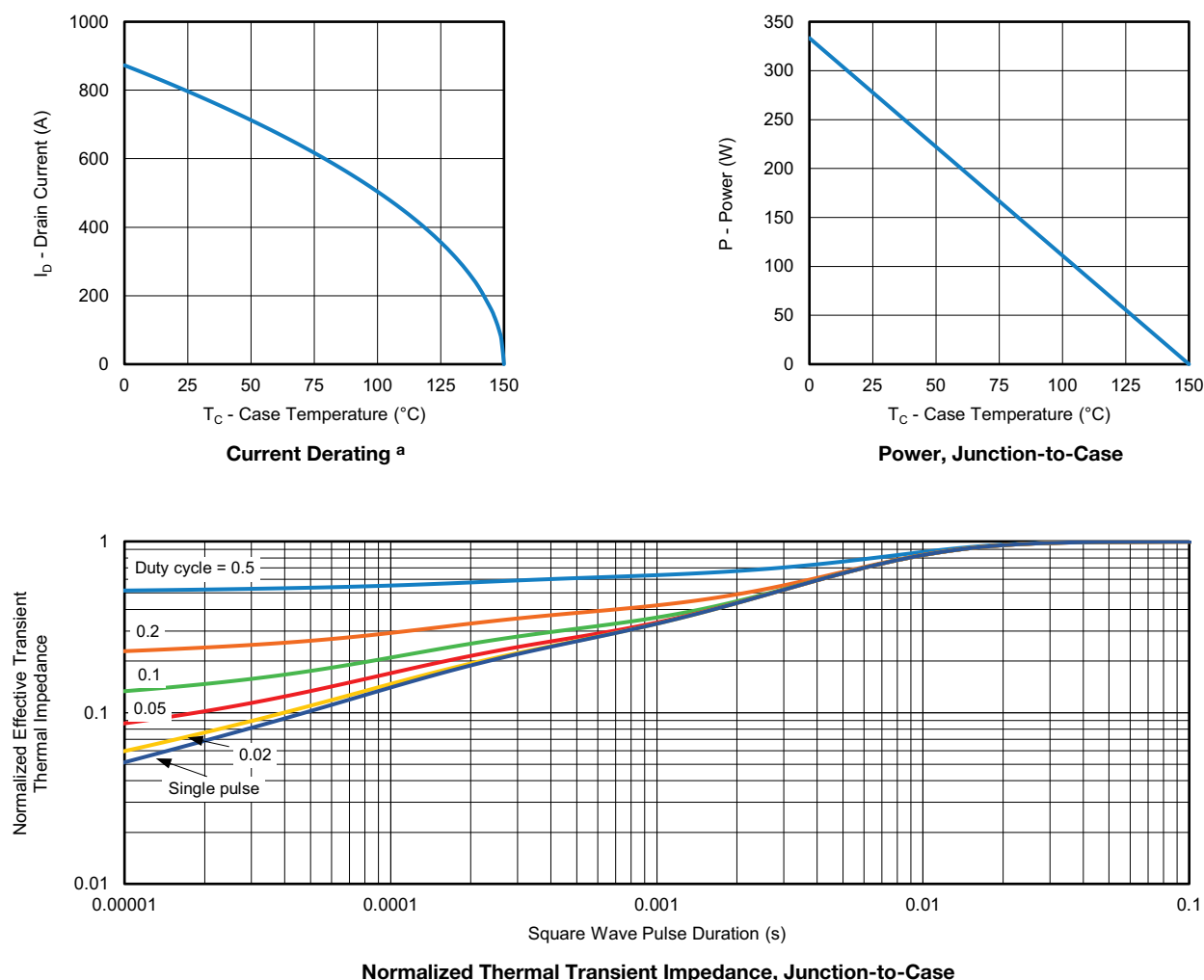
Safe Operating Area, Junction-to-Case

Note

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



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Note

- a. 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

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