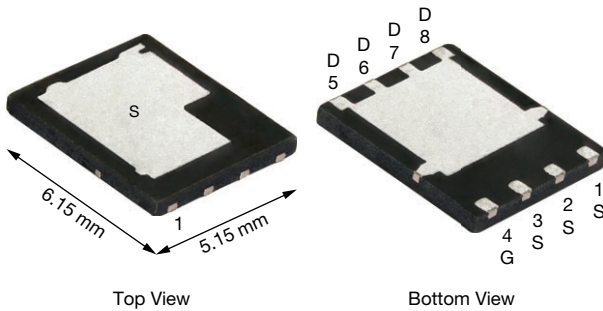


N-Channel 100 V (D-S) 175 °C MOSFET

PowerPAK® SO-8DC

FEATURES

- TrenchFET® Gen V power MOSFET
- Very low $R_{DS} - Q_g$ figure-of-merit (FOM)
- Tuned for the lowest $R_{DS} - Q_{oss}$ FOM
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE
APPLICATIONS

- Synchronous rectification
- Primary side switch
- DC/DC converters
- OR-ing and hot swap switch
- Power supplies
- Motor drive control
- Battery management



N-Channel MOSFET

PRODUCT SUMMARY

V_{DS} (V)	100
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.0036
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 7.5$ V	0.0042
Q_g typ. (nC)	40
I_D (A)	148
Configuration	Single

ORDERING INFORMATION

Package	PowerPAK SO-8DC
Lead (Pb)-free and halogen-free	SiDR510EP-T1-RE3

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	100	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	148 ^a
		$T_C = 70$ °C	124 ^a
		$T_A = 25$ °C	33 ^{b, c}
		$T_A = 70$ °C	27.7 ^{b, c}
Pulsed drain current ($t = 100$ μ s)	I_{DM}	300	A
Continuous source-drain diode current	I_S	$T_C = 25$ °C	136
		$T_A = 25$ °C	6.8 ^{b, c}
Single pulse avalanche current	I_{AS}	45	
Single pulse avalanche energy	E_{AS}	101	mJ
Maximum power dissipation	P_D	$T_C = 25$ °C	150
		$T_C = 70$ °C	105
		$T_A = 25$ °C	7.5 ^{b, c}
		$T_A = 70$ °C	5.25 ^{b, c}
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature) ^{d, e}		260	

Notes

- Package limited
- Surface mounted on 1" x 1" FR4 board
- $t = 10$ s
- See solder profile (www.vishay.com/doc?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
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components



THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^{a, b}	t ≤ 10 s	R _{thJA}	15	20	°C/W
Maximum junction-to-case (drain)	Steady state	R _{thJC}	0.8	1	
Maximum junction-to-case (source)	Steady state	R _{thJC}	1.1	1.4	

Notes

- a. Surface mounted on 1" x 1" FR4 board
- b. Maximum under steady state conditions is 54 °C/W

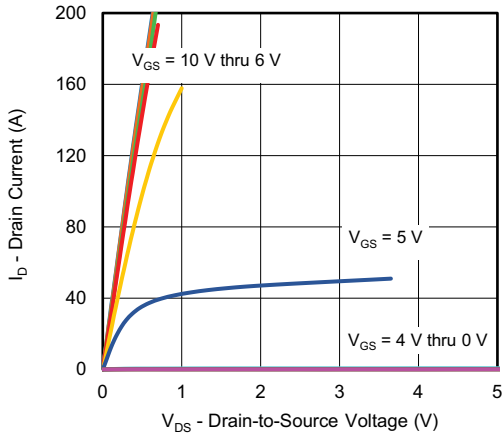
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = 1 mA	100	-	-	V
V _{DS} temperature coefficient	ΔV _{DS} /T _J	I _D = 10 mA	-	58	-	mV/°C
V _{GS(th)} temperature coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	-	-7.2	-	
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2	-	4	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} = 80 V, V _{GS} = 0 V	-	-	1	μA
		V _{DS} = 80 V, V _{GS} = 0 V, T _J = 70 °C	-	-	15	
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A	-	0.0030	0.0036	Ω
		V _{GS} = 7.5 V, I _D = 20 A	-	0.0034	0.0042	
Forward transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 20 A	-	57	-	S
Dynamic ^b						
Input capacitance	C _{ISS}	V _{DS} = 50 V, V _{GS} = 0 V, f = 1 MHz	-	4980	-	pF
Output capacitance	C _{OSS}		-	1050	-	
Reverse transfer capacitance	C _{RSS}		-	11	-	
Total gate charge	Q _g	V _{DS} = 50 V, V _{GS} = 10 V, I _D = 20 A	-	54	81	nC
Gate-source charge	Q _{gs}	V _{DS} = 50 V, V _{GS} = 7.5 V, I _D = 20 A	-	40	60	
Gate-drain charge	Q _{gd}		-	23.3	-	
Output charge	Q _{OSS}		V _{DS} = 50 V, V _{GS} = 0 V	-	3	
Gate resistance	R _g	f = 1 MHz	0.5	1.15	2	
Turn-on delay time	t _{d(on)}	V _{DD} = 50 V, R _L = 2.5 Ω, I _D ≅ 20 A, V _{GEN} = 10 V, R _g = 1 Ω	-	19	38	ns
Rise time	t _r		-	10	20	
Turn-off delay time	t _{d(off)}		-	29	58	
Fall time	t _f		-	8	16	
Turn-on delay time	t _{d(on)}	V _{DD} = 50 V, R _L = 2.5 Ω, I _D ≅ 20 A, V _{GEN} = 7.5 V, R _g = 1 Ω	-	24	48	
Rise time	t _r		-	14	28	
Turn-off delay time	t _{d(off)}		-	25	50	
Fall time	t _f		-	10	20	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I _S	T _C = 25 °C	-	-	136	A
Pulse diode forward current	I _{SM}		-	-	300	
Body diode voltage	V _{SD}	I _S = 5 A, V _{GS} = 0 V	-	0.76	1.1	V
Body diode reverse recovery time	t _{rr}	I _F = 10 A, di/dt = 100 A/μs, T _J = 25 °C	-	56	102	ns
Body diode reverse recovery charge	Q _{rr}		-	65	130	nC
Reverse recovery fall time	t _a		-	26	-	ns
Reverse recovery rise time	t _b		-	25	-	

Notes

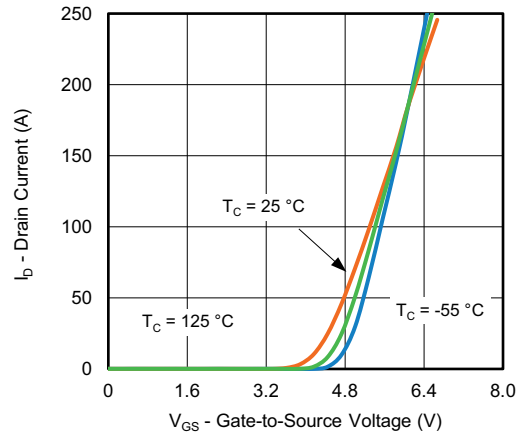
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
- b. Guaranteed by design, not subject to production testing

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.

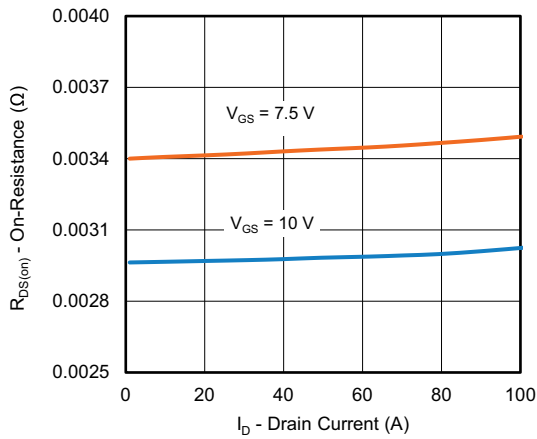
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



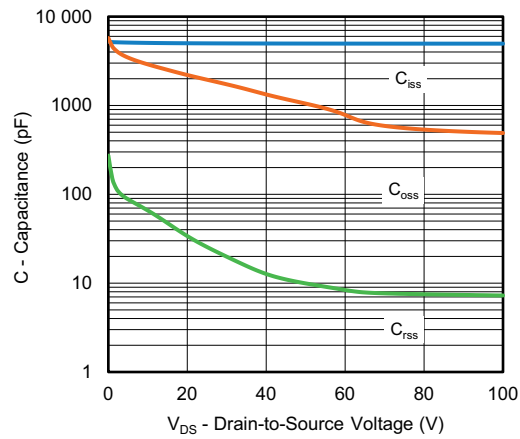
Output Characteristics



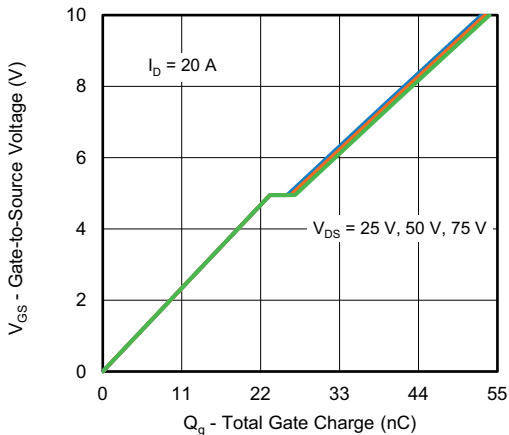
Transfer Characteristics



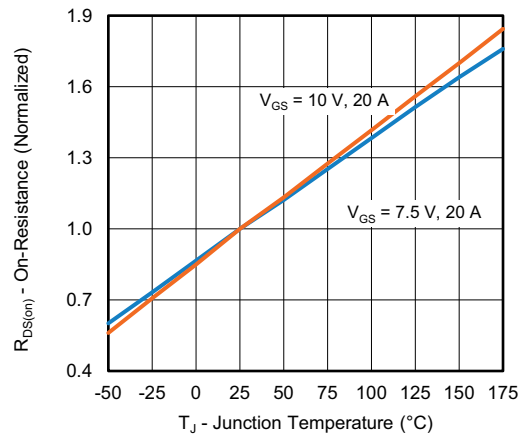
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



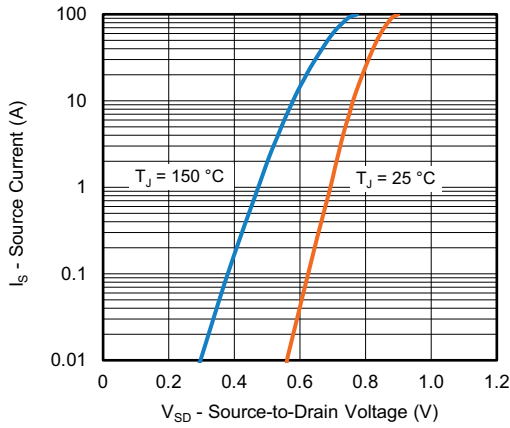
Gate Charge



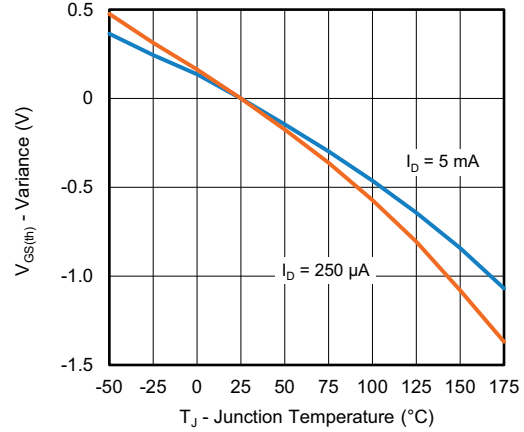
On-Resistance vs. Junction Temperature



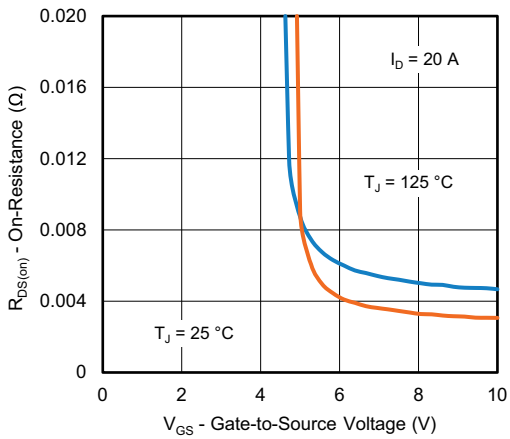
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



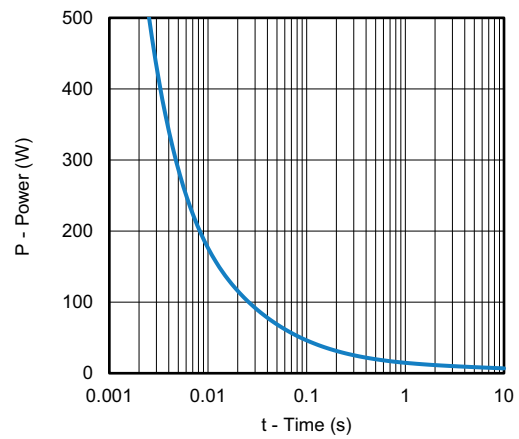
Source-Drain Diode Forward Voltage



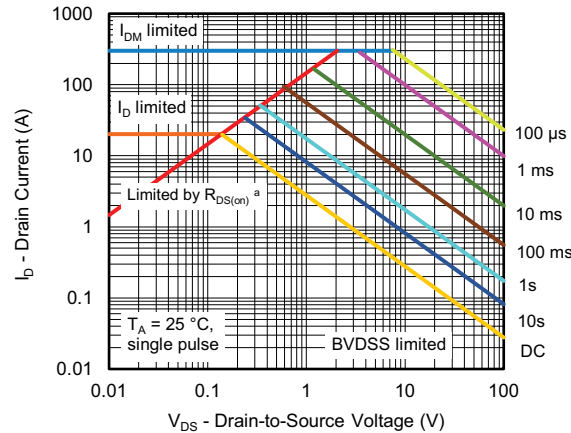
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage



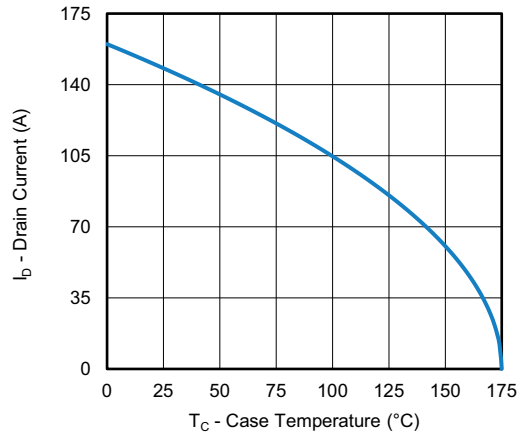
Single Pulse Power, Junction-to-Ambient



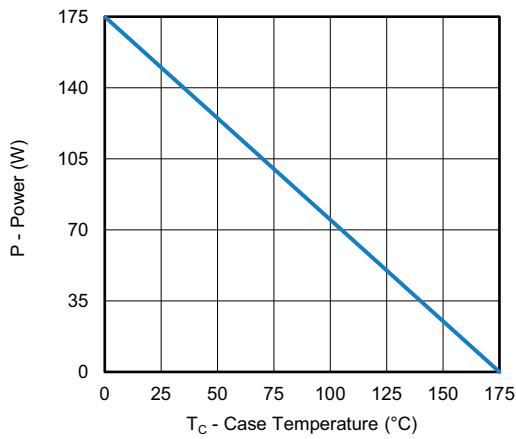
Safe Operating Area, Junction-to-Ambient



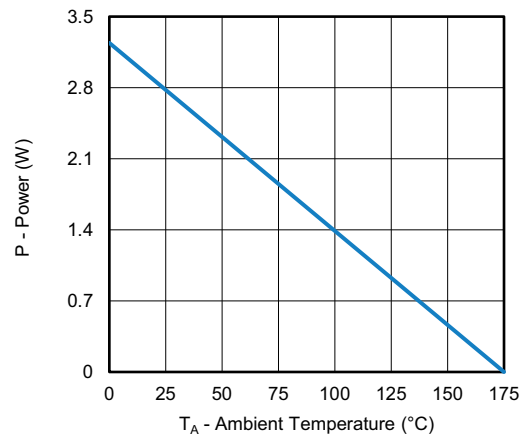
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ^a



Power, Junction-to-Case



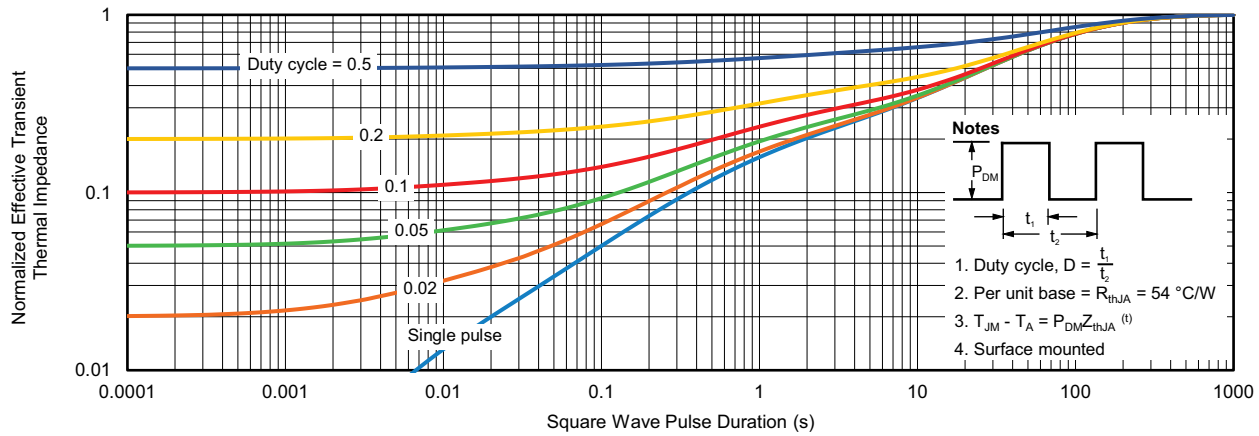
Power, Junction-to-Ambient

Note

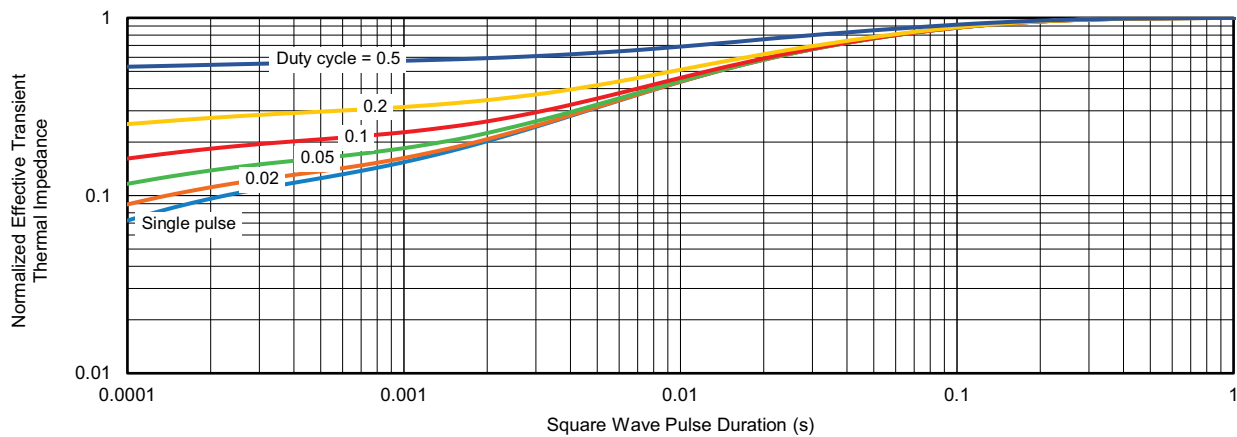
- a. The power dissipation P_D is based on T_J max. = 175 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



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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