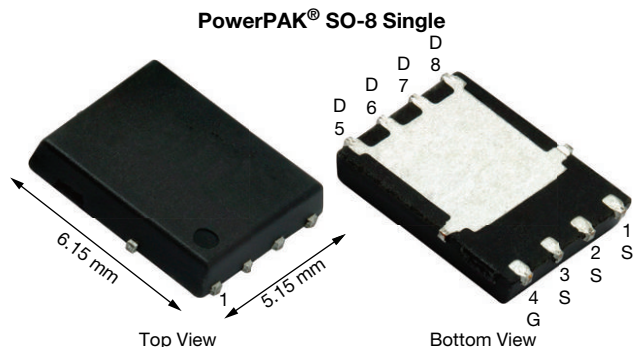


N-Channel 25 V (D-S) MOSFET



PRODUCT SUMMARY	
V_{DS} (V)	25
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.00058
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 4.5$ V	0.00082
Q_g typ. (nC)	61
I_D (A)	100 a, g
Configuration	Single

ORDERING INFORMATION	
Package	PowerPAK SO-8 Single
Lead (Pb)-free and halogen-free	SiRA20DP-T1-RE3

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-source voltage	V_{DS}	25	V	
Gate-source voltage	V_{GS}	+16 / -12		
Continuous drain current ($T_J = 150^\circ\text{C}$)	I_D	$T_C = 25^\circ\text{C}$	100 a	A
		$T_C = 70^\circ\text{C}$	100 a	
		$T_A = 25^\circ\text{C}$	81.7 b, c	
		$T_A = 70^\circ\text{C}$	65.3 b, c	
Pulsed drain current ($t = 100 \mu\text{s}$)	I_{DM}	500		
Continuous source-drain diode current	I_S	$T_C = 25^\circ\text{C}$	94.5	
		$T_A = 25^\circ\text{C}$	5.6 b, c	
Single pulse avalanche current	I_{AS}	60		
Single pulse avalanche energy	E_{AS}	180	mJ	
Maximum power dissipation	P_D	$T_C = 25^\circ\text{C}$	104	W
		$T_C = 70^\circ\text{C}$	66.6	
		$T_A = 25^\circ\text{C}$	6.25 b, c	
		$T_A = 70^\circ\text{C}$	4 b, c	
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +150		$^\circ\text{C}$
Soldering recommendations (peak temperature) c		260		

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient b	$t \leq 10$ s	R_{thJA}	15	20	$^\circ\text{C}/\text{W}$
Maximum junction-to-case (drain)	Steady state	R_{thJC}	0.9	1.2	

Notes

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- See solder profile (www.vishay.com/doc?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.
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
- Maximum under steady state conditions is $54^\circ\text{C}/\text{W}$.
- $T_C = 25^\circ\text{C}$.

FEATURES

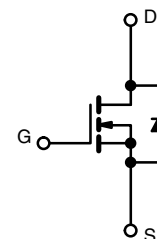
- TrenchFET® Gen IV power MOSFET
- Optimized Q_g , Q_{gd} , and Q_{gd}/Q_{gs} ratio reduces switching related power loss
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Synchronous rectification
- High power density DC/DC
- Synchronous buck converter
- OR-ing
- Load switching
- Battery management



N-Channel MOSFET

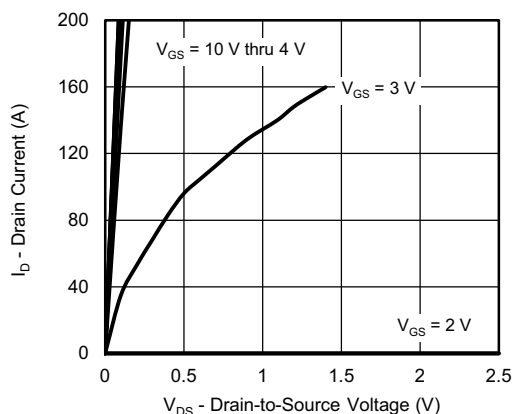
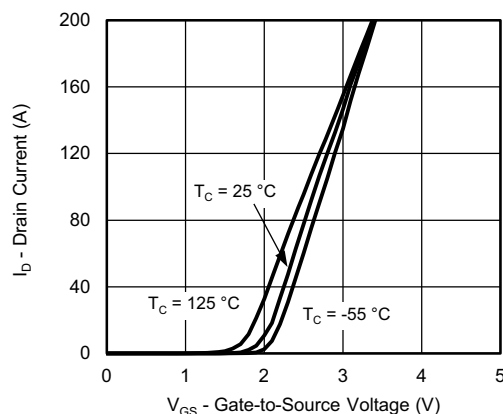
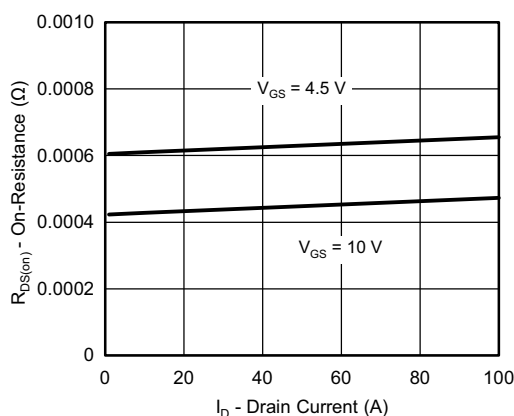
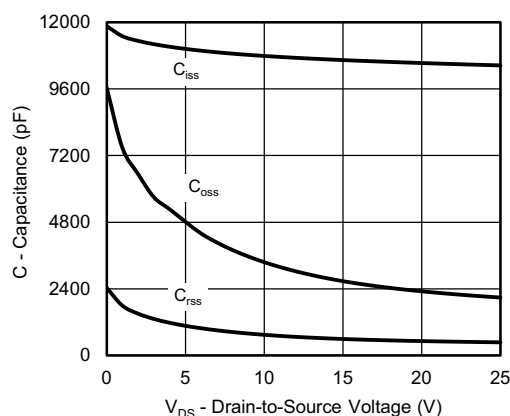
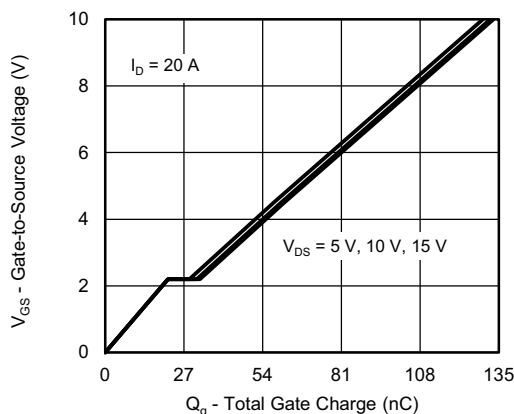
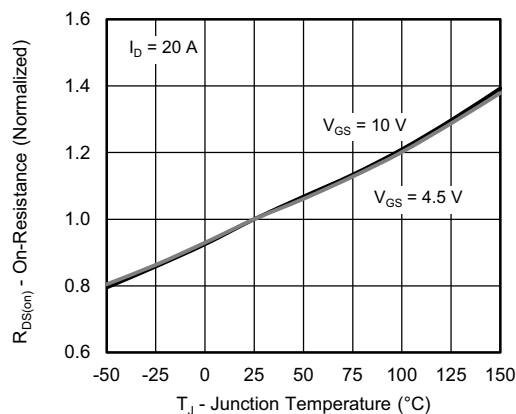


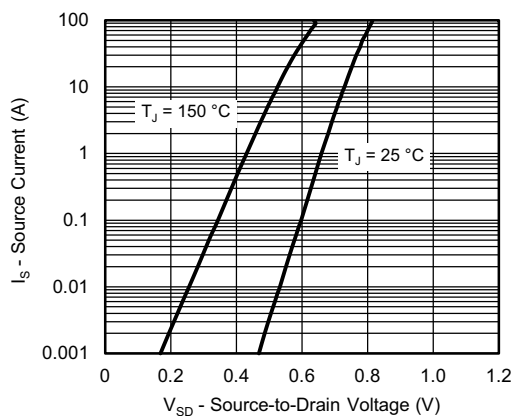
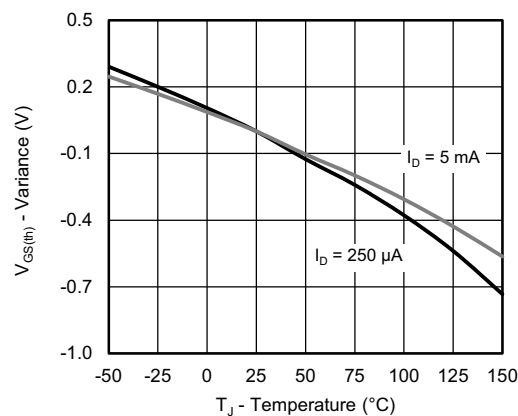
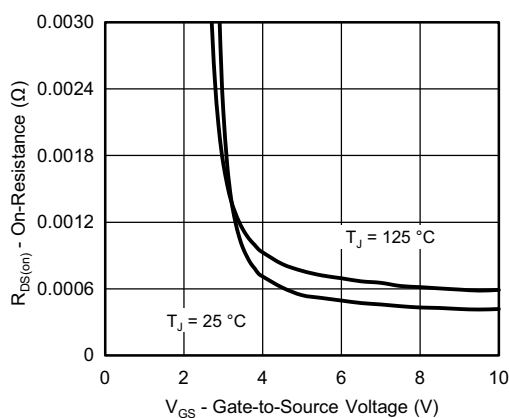
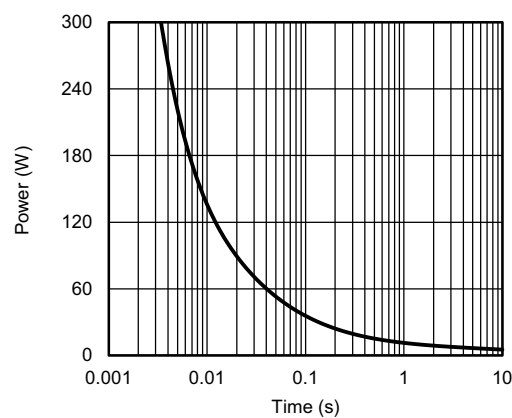
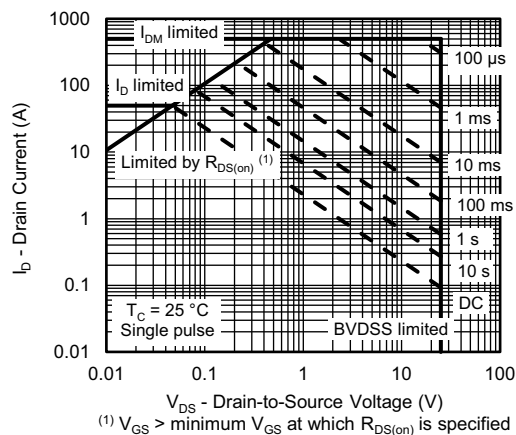
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Static							
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	25	-	-	V	
V _{DS} temperature coefficient	ΔV _{DS} /T _J	I _D = 10 mA	-	21	-	mV/°C	
V _{GS(th)} temperature coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	-	-4.8	-		
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1	-	2.1	V	
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = +16 / -12 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 = 70 °C	-	-	15		
On-state drain current ^a	I _{D(on)}	V _{DS} ≥ 10 V, V _{GS} = 10 V	40	-	-	A	
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A	-	0.00048	0.00058	Ω	
		V _{GS} = 4.5 V, I _D = 20 A	-	0.00065	0.00082		
Forward transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 20 A	-	110	-	S	
Dynamic ^b							
Input capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	-	10 850	-	pF	
Output capacitance	C _{oss}		-	3360	-		
Reverse transfer capacitance	C _{rss}		-	720	-		
Total gate charge	Q _g	V _{DS} = 10 V, V _{GS} = 10 V, I _D = 20 A	-	134	200	nC	
		V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 20 A	-	61	92		
Gate-source charge	Q _{gs}		-	24	-		
Gate-drain charge	Q _{gd}		-	9.2	-		
Gate resistance	R _g	f = 1 MHz	0.1	0.38	0.75	Ω	
Turn-on delay time	t _{d(on)}	V _{DD} = 10 V, R _L = 0.5 Ω, I _D ≅ 20 A, V _{GEN} = 10 V, R _g = 1 Ω	-	19	38	ns	
Rise time	t _r		-	24	48		
Turn-off delay time	t _{d(off)}		-	53	105		
Fall time	t _f		-	9	18		
Turn-on delay time	t _{d(on)}	V _{DD} = 10 V, R _L = 0.5 Ω, I _D ≅ 20 A, V _{GEN} = 4.5 V, R _g = 1 Ω	-	51	100		
Rise time	t _r		-	95	190		
Turn-off delay time	t _{d(off)}		-	47	94		
Fall time	t _f		-	16	32		
Drain-Source Body Diode Characteristics							
Continuous source-drain diode current	I _S	T _C = 25 °C	-	-	94.5	A	
Pulse diode forward current	I _{SM}		-	-	300		
Body diode voltage	V _{SD}	I _S = 5 A, V _{GS} = 0 V	-	0.71	1.1	V	
Body diode reverse recovery time	t _{rr}	I _F = 20 A, dI/dt = 100 A/μs, T _J = 25 °C	-	63	126	ns	
Body diode reverse recovery charge	Q _{rr}		-	87	174	nC	
Reverse recovery fall time	t _a		-	27	-	ns	
Reverse recovery rise time	t _b		-	36	-		

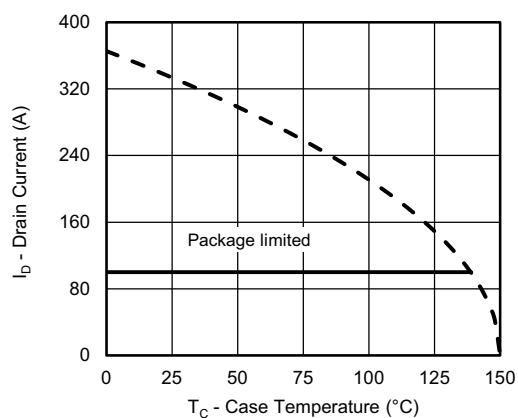
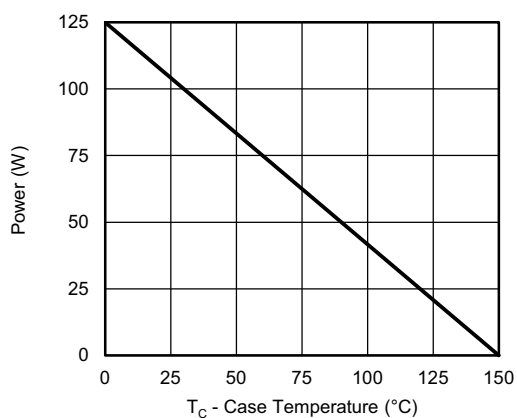
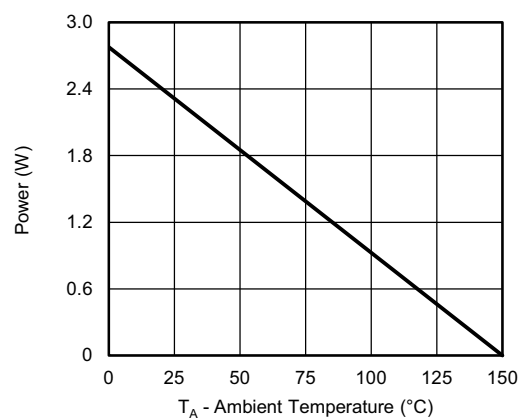
Notes

- 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

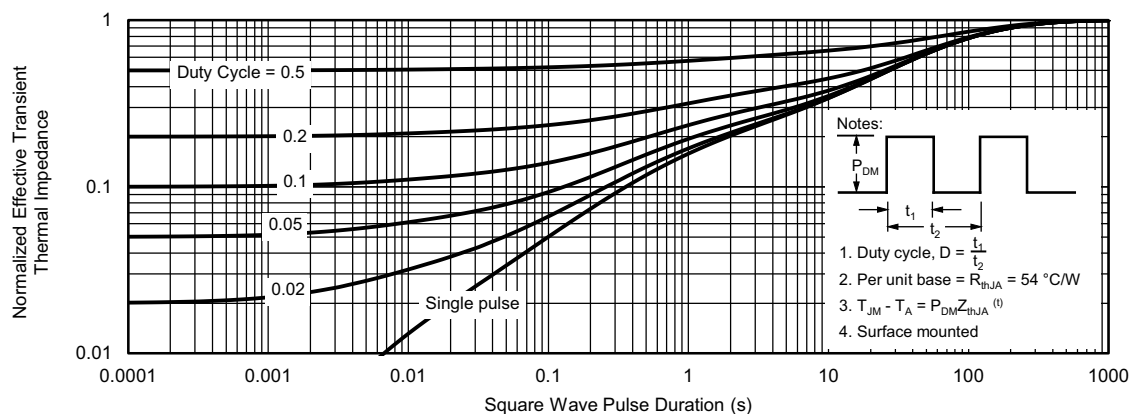
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Source-Drain Diode Forward Voltage

Threshold Voltage

On-Resistance vs. Gate-to-Source Voltage

Single Pulse Power, Junction-to-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

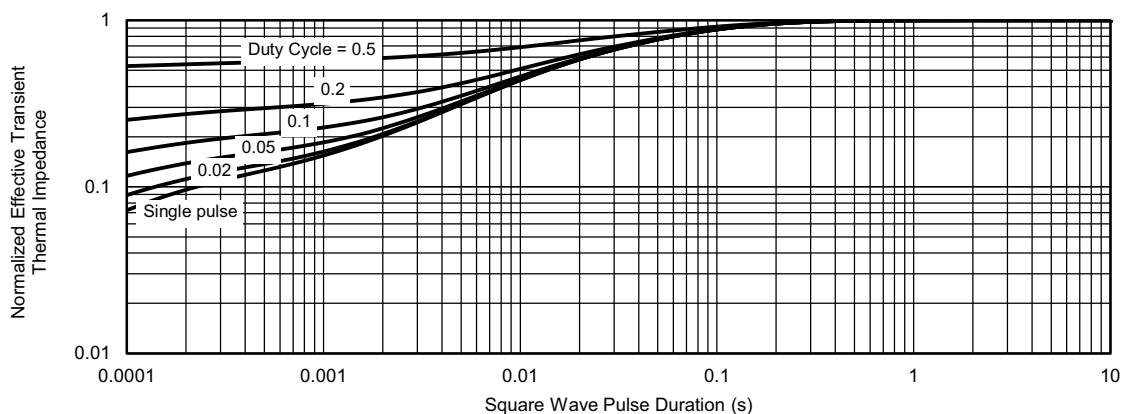
- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



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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