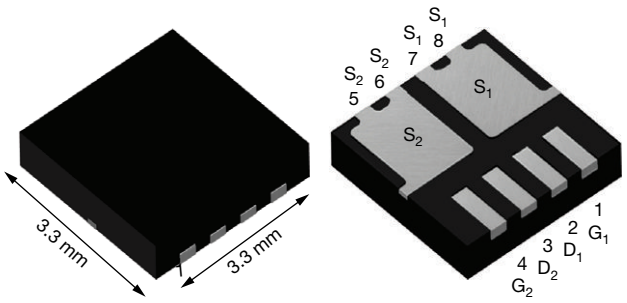
Common Drain Dual N-Channel 12 V (S1-S2) MOSFET

PowerPAK® 1212-8SCD



Top View Bottom View

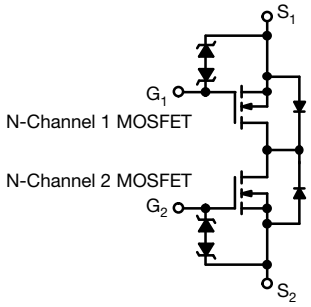
FEATURES

- TrenchFET® Gen IV power MOSFET
- Very low source-to-source on resistance
- Integrated common-drain n-channel MOSFETs in a compact and thermally enhanced package
- 100 % R_g and UIS tested
- Optimizes circuit layout for bi-directional current flow
- Typical ESD protection: 4500 V (HBM)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT HALOGEN FREE

APPLICATIONS

- Battery protection switch
- Bi-directional switch
- Load switch



PRODUCT SUMMARY	
V_{S1S2} (V)	12
$R_{S1S2(on)}$ max. (Ω) at V_{GS} = 4.5 V	0.0036
$R_{S1S2(on)}$ max. (Ω) at V_{GS} = 3.8 V	0.0041
$R_{S1S2(on)}$ max. (Ω) at V_{GS} = 2.5 V	0.0050
$R_{S1S2(on)}$ max. (Ω) at V_{GS} = 1.8 V	0.0074
Q_g typ. (nC) at V_{GS} = 2.5 V	25
I_{S1S2} (A) [a]	109
Configuration	Common drain

ORDERING INFORMATION	
Package	PowerPAK 1212-8SCD
Lead (Pb)-free and halogen-free	SiSF12EDN-GE3

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

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{S1S2}	12	V
Gate-source voltage		V_{GS}	± 8	
Continuous drain current (V_{GS} = 5 V, T_J = 150 °C)	T_C = 25 °C	I_{S1S2}	109	A
	T_C = 70 °C		87	
	T_A = 25 °C		30 [b, c]	
	T_A = 70 °C		24 [b, c]	
Pulsed drain current (t = 100 µs, V_{GS} = 5 V)		I_{S1S2M}	200	
Single pulse avalanche current, L = 0.1 mH			15	
Single pulse avalanche energy, L = 0.1 mH			11.25	mJ
Maximum power dissipation	T_C = 25 °C	P_D	69.4	W
	T_C = 70 °C		44.4	
	T_A = 25 °C		5.2 [b, c]	
	T_A = 70 °C		3.3 [b, c]	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature) [c]			260	

Notes

a. T_C = 25 °C
b. Surface mounted on 1" x 1" FR4 board
c. t = 10 s

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient [a]	t ≤ 10 s	R_{thJA}	19	24	°C/W
Maximum junction-to-case (drain)	Steady state	R_{thJC}	1.4	1.8	

Note

a. Surface mounted on 1" x 1" FR4 board

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)

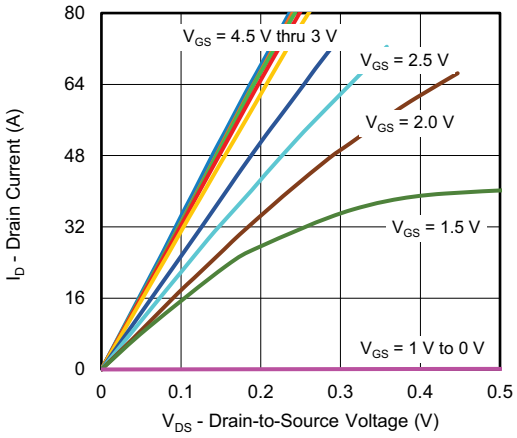
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 1 mA	12	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	V_{S1S2} = V_{GS}, I_D = 250 µA	0.4	-	1.0	
Gate-source leakage	I_{GSS}	V_{S1S2} = 0 V, V_{GS} = ± 5 V	-	-	± 1	µA
		V_{S1S2} = 0 V, V_{GS} = ± 8 V	-	-	± 30	
Zero gate voltage drain current	I_{DSS}	V_{S1S2} = 12 V, V_{GS} = 0 V	-	-	1	
		V_{S1S2} = 12 V, V_{GS} = 0 V, T_J = 70 °C	-	-	15	
Drain-source on-state resistance [a]	$R_{S1S2(on)}$	V_{GS} = 4.5 V, I_{S1S2} = 10 A	-	0.0030	0.0036	Ω
		V_{GS} = 3.8 V, I_{S1S2} = 10 A	-	0.0033	0.0041	
		V_{GS} = 2.5 V, I_{S1S2} = 10 A	-	0.0039	0.0050	Ω
		V_{GS} = 1.8 V, I_{S1S2} = 10 A	-	0.0058	0.0074	
Forward transconductance [a]	g_{fs}	V_{S1S2} = 6 V, I_{S1S2} = 10 A	-	75	-	S
Dynamic [b, c]						
Input capacitance	C_{iss}	V_{DS} = 6 V, V_{GS} = 0 V, f = 1 MHz	-	5950	-	pF
Output capacitance	C_{oss}		-	940	-	
Reverse transfer capacitance	C_{rss}		-	895	-	
Total gate charge	Q_g	V_{DS} = 6 V, V_{GS} = 4.5 V, I_D = 10 A	-	45.5	70	nC
		V_{DS} = 6 V, V_{GS} = 2.5 V, I_D = 10 A	-	25	38	
Gate-source charge	Q_{gs}		-	7.8	-	
Gate-drain charge	Q_{gd}		-	8.2	-	
Gate resistance	R_g	f = 1 MHz	0.4	1.0	1.7	Ω
Turn-on delay time	$t_{d(on)}$	V_{DD} = 6 V, R_L = 0.6 Ω, I_{S1S2} ≅ 10 A, V_{GEN} = 4.5 V, R_g = 1 Ω	-	22	45	ns
Rise time	t_r		-	197	395	
Turn-off delay time	$t_{d(off)}$		-	50	100	
Fall time	t_f		-	45	90	
Drain-Source Body Diode Characteristics [c]						
Continuous source-drain diode current	I_{S1S2}	T_C = 25 °C	-	-	63	A
Pulse diode forward current	I_{S1S2M}		-	-	200	
Body diode reverse recovery time	t_{rr}	I_F = 10 A, di/dt = 100 A/µs, T_J = 25 °C	-	23	46	ns
Body diode reverse recovery charge	Q_{rr}		-	12	25	nC
Reverse recovery fall time	t_a		-	12	-	ns
Reverse recovery rise time	t_b		-	11	-	

Notes

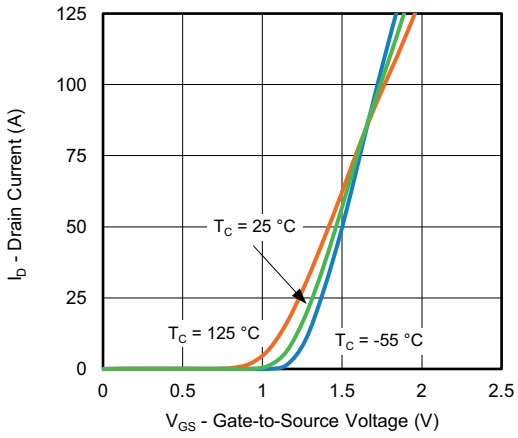
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %
c. Guaranteed by design, not subject to production testing
d. On single MOSFET

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.

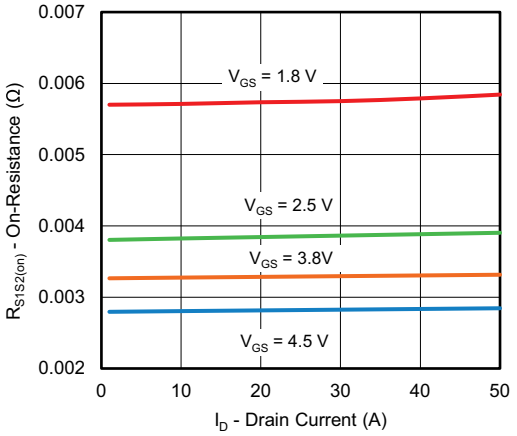
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



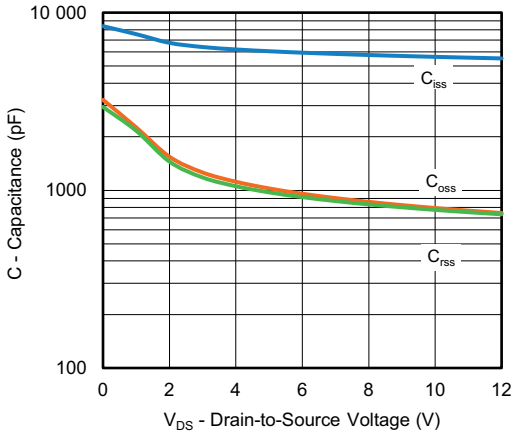
Output Characteristics



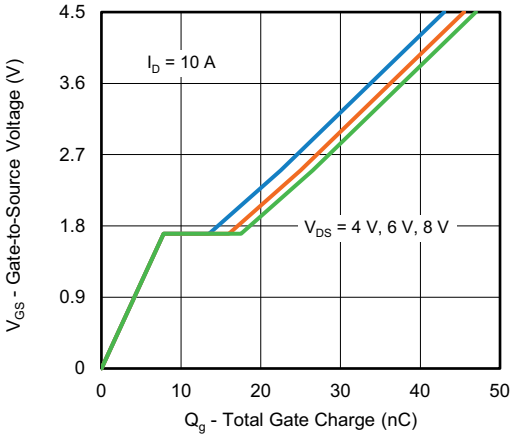
Transfer Characteristics



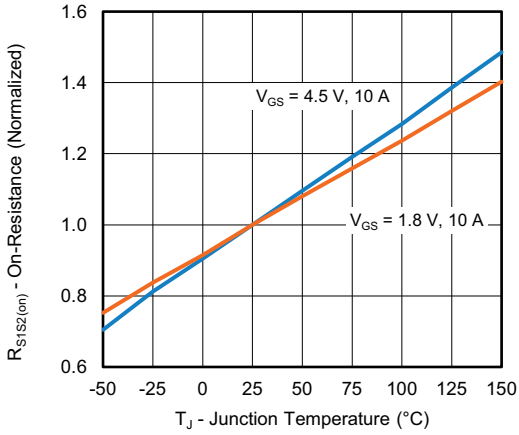
On-Resistance vs. Source Current and Gate Voltage



Capacitance [a]



Gate Charge [a]

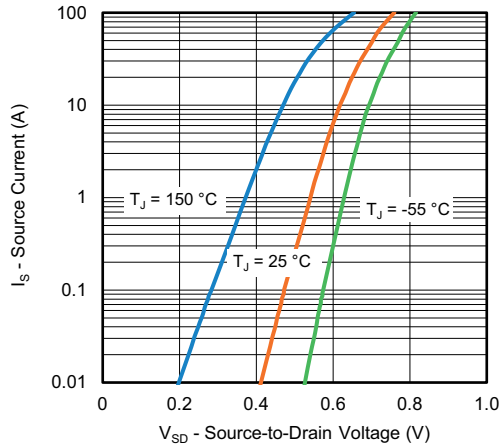


On-Resistance vs. Junction Temperature

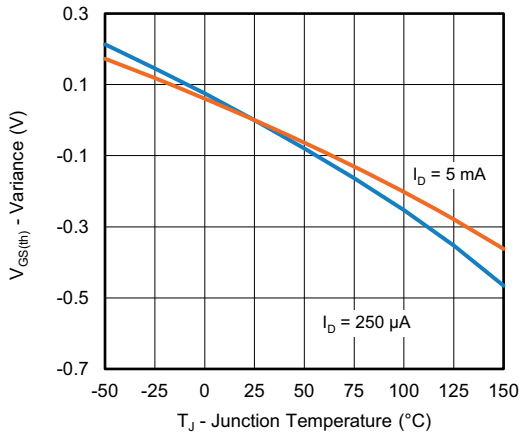
Note

a. For one channel only

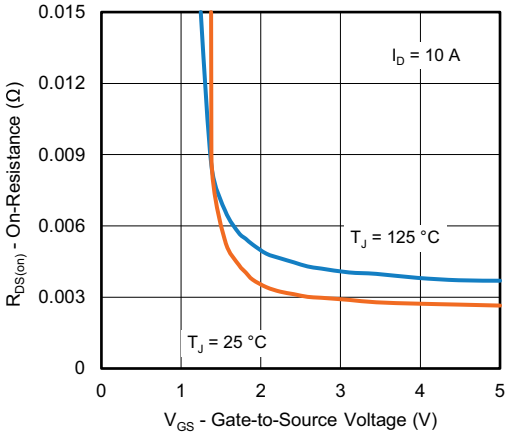
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



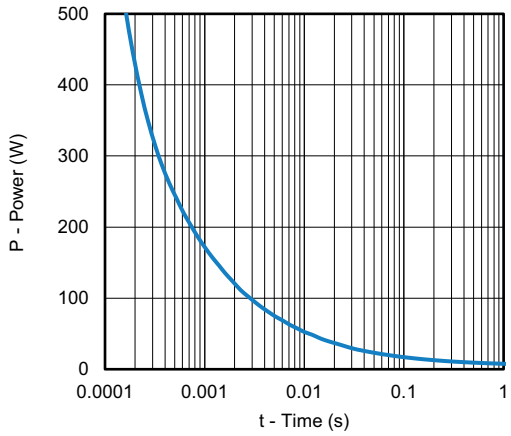
Source-Drain Diode Forward Voltage



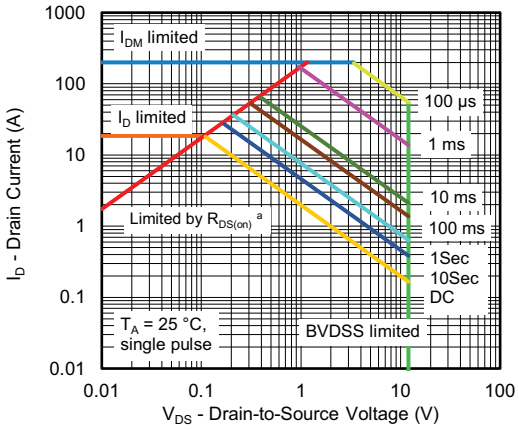
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage



Single Pulse Power, Junction-to-Ambient

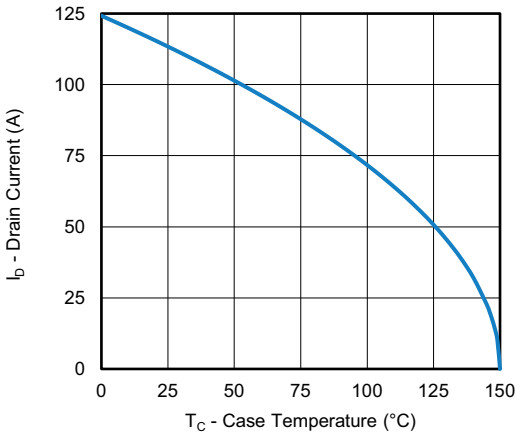


Safe Operating Area, Junction-to-Ambient

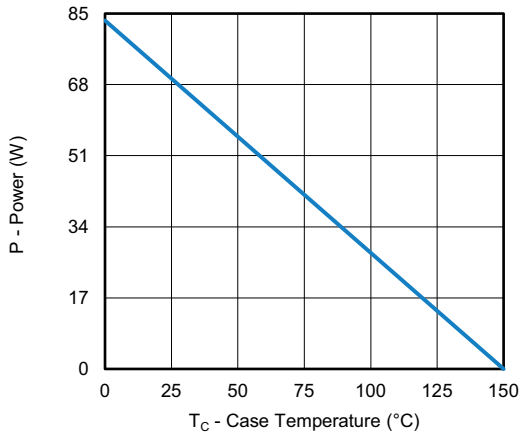
Note

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

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating [a]

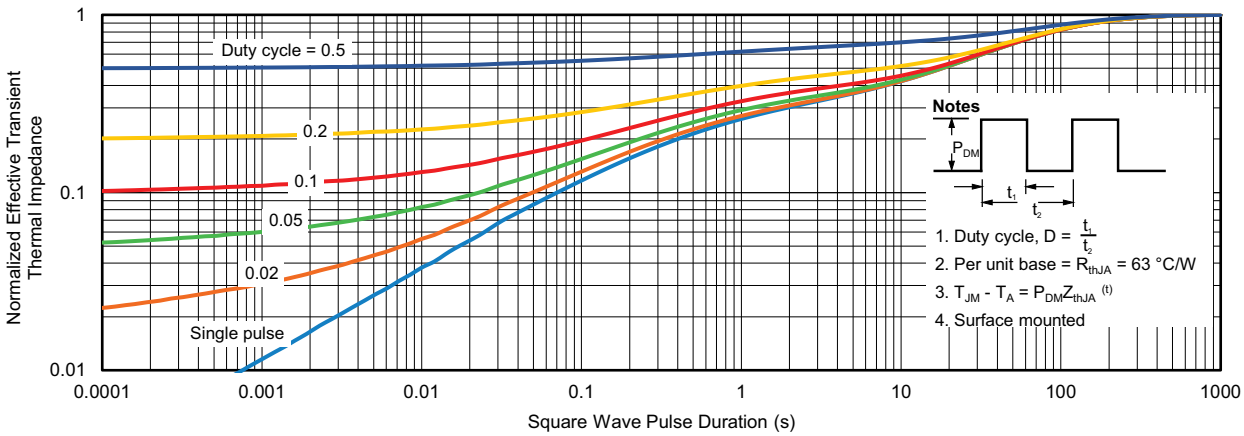


Power, Junction-to-Case

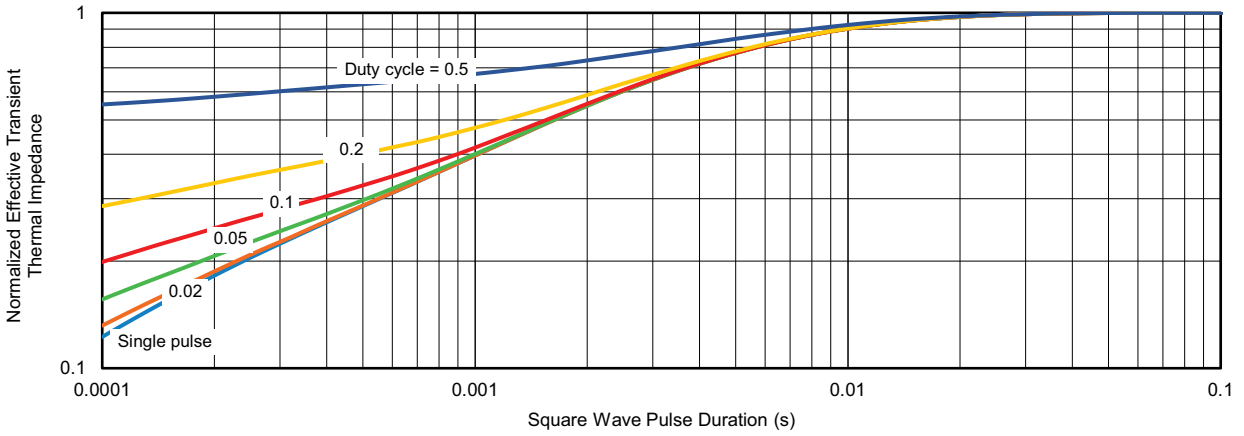
Notes

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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