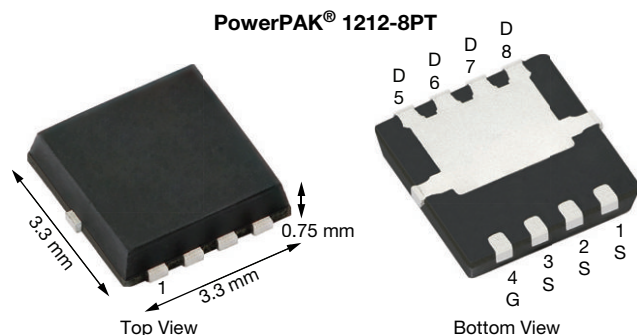


P-Channel 20 V (D-S) MOSFET



FEATURES

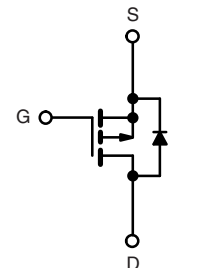
- TrenchFET® Gen IV p-channel power MOSFET
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Adaptor switch
- Battery switch
- Load switch



P-Channel MOSFET

PRODUCT SUMMARY

V _{DS} (V)	-20
R _{DS(on)} max. (Ω) at V _{GS} = -10 V	0.0038
R _{DS(on)} max. (Ω) at V _{GS} = -4.5 V	0.0050
R _{DS(on)} max. (Ω) at V _{GS} = -2.5 V	0.0090
Q _g typ. (nC)	48
I _D (A) ^a	-104
Configuration	Single

ORDERING INFORMATION

Package	PowerPAK 1212-8PT
Lead (Pb)-free and halogen-free	Si7615BDN-T1-GE3

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}	± 12	V
Continuous drain current (T _J = 150 °C)	I _D	T _C = 25 °C	-104 ^a
		T _C = 70 °C	-83 ^a
		T _A = 25 °C	-29 ^{b, c}
		T _A = 70 °C	-23 ^{b, c}
Pulsed drain current (t = 100 μs)	I _{DM}	-150	A
Continuous source-drain diode current	I _S	T _C = 25 °C	-60 ^a
		T _A = 25 °C	-4.7 ^{b, c}
Single pulse avalanche current	I _{AS}	-22	A
Single pulse avalanche energy	E _{AS}	24	mJ
Maximum power dissipation	P _D	T _C = 25 °C	66
		T _C = 70 °C	42
		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	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^{b, f}	R _{thJA}	19	24	°C/W
Maximum junction-to-case (drain)	R _{thJC}	1.3	1.9	°C/W

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 1212-8PT 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 60 °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 = -250 μA	-	-15	-	mV/°C
V _{GS(th)} temperature coefficient	ΔV _{GS(th)} /T _J		-	3.4	-	
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} = ± 12 V	-	-	± 100	nA
Zero gate voltage drain current	I _{DSS}	V _{DS} = -20 V, V _{GS} = 0 V	-	-	-1	μA
		V _{DS} = -20 V, V _{GS} = 0 V, T _J = 55 °C	-	-	-10	
On-state drain current ^a	I _{D(on)}	V _{DS} ≤ -5 V, V _{GS} = -10 V	-30	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = -10 V, I _D = -20 A	-	0.0029	0.0038	Ω
		V _{GS} = -4.5 V, I _D = -15 A	-	0.0037	0.0050	
		V _{GS} = -2.5 V, I _D = -5 A	-	0.0060	0.0090	
Forward transconductance ^a	g _{fs}	V _{DS} = -10 V, I _D = -30 A	-	97	-	S
Dynamic ^b						
Input capacitance	C _{iss}	V _{DS} = -10 V, V _{GS} = 0 V, f = 1 MHz	-	4890	-	pF
Output capacitance	C _{oss}		-	735	-	
Reverse transfer capacitance	C _{rss}		-	705	-	
Total gate charge	Q _g	V _{DS} = -10 V, V _{GS} = -10 V, I _D = -15 A	-	103	155	nC
		V _{DS} = -10 V, V _{GS} = -4.5 V, I _D = -15 A	-	48	72	
Gate-source charge	Q _{gs}		-	11	-	
Gate-drain charge	Q _{gd}	-	12	-		
Gate resistance	R _g	f = 1 MHz	0.7	3.6	7.2	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	-	25	50	ns
Rise time	t _r		-	25	50	
Turn-off delay time	t _{d(off)}		-	90	180	
Fall time	t _f		-	50	100	
Turn-on delay time	t _{d(on)}	V _{DD} = -10 V, R _L = 1 Ω, I _D ≅ -10 A, V _{GEN} = -10 V, R _g = 1 Ω	-	10	20	
Rise time	t _r		-	5	10	
Turn-off delay time	t _{d(off)}		-	85	170	
Fall time	t _f		-	30	60	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I _S	T _C = 25 °C	-	-	60	A
Pulse diode forward current	I _{SM}		-	-	150	
Body diode voltage	V _{SD}	I _S = -5 A, V _{GS} = 0 V	-	0.74	-1.1	V
Body diode reverse recovery time	t _{rr}	I _F = -10 A, di/dt = 100 A/μs, T _J = 25 °C	-	25	50	ns
Body diode reverse recovery charge	Q _{rr}		-	13	26	nC
Reverse recovery fall time	t _a		-	13	-	ns
Reverse recovery rise time	t _b		-	12	-	

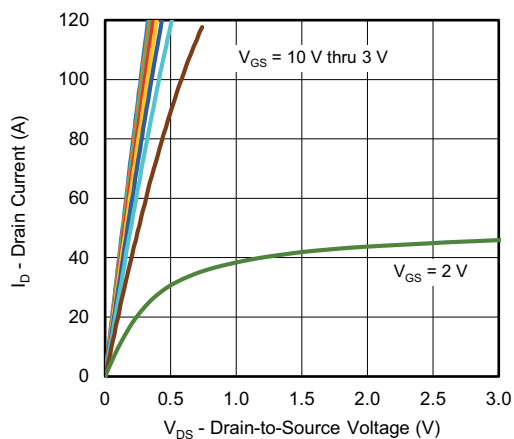
Notes

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

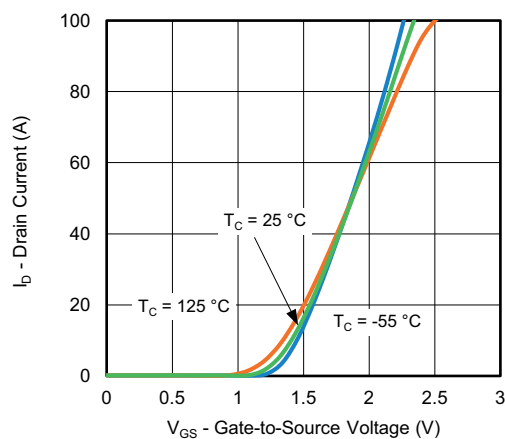
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



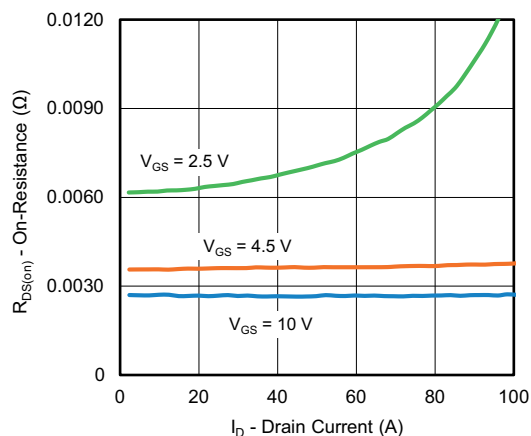
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



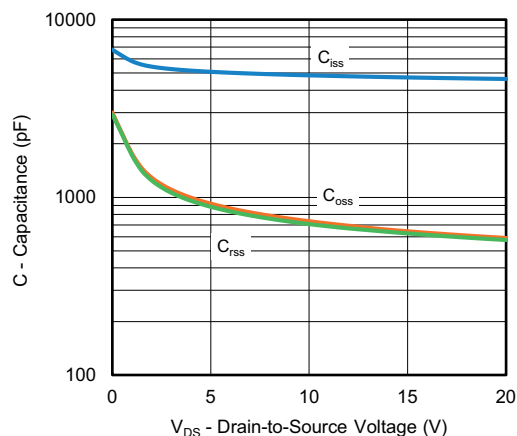
Output Characteristics



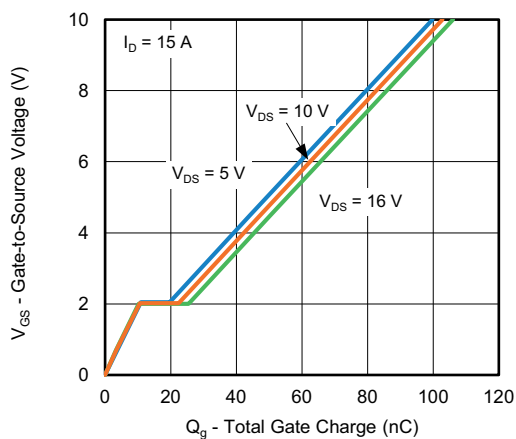
Transfer Characteristics



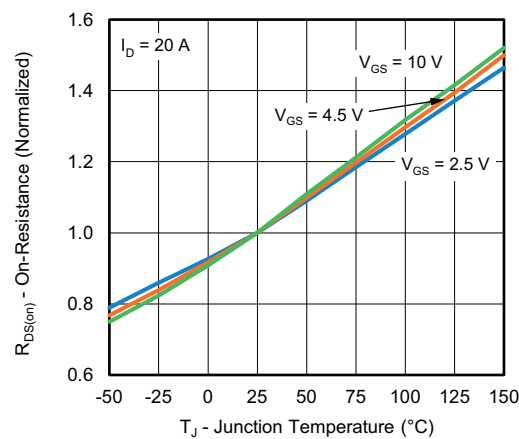
On-Resistance vs. Drain Current and Gate Voltage



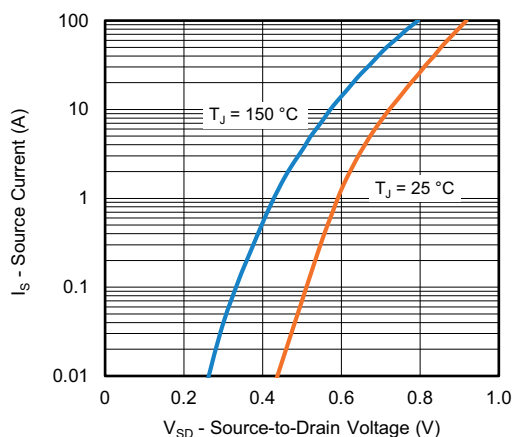
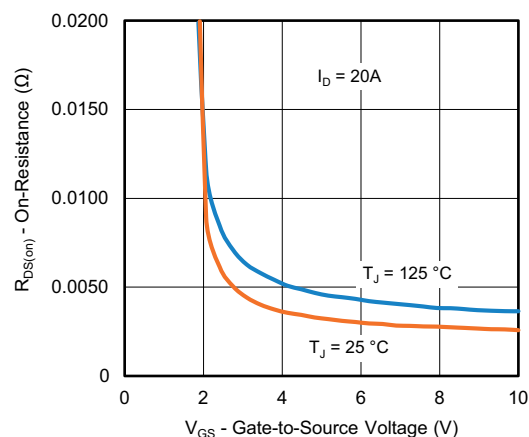
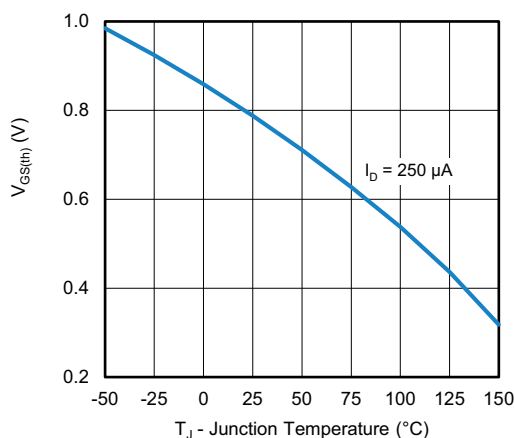
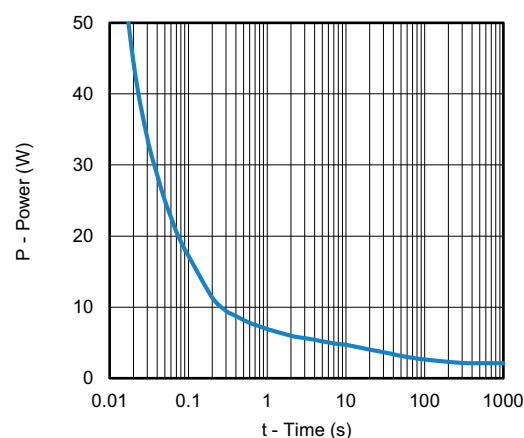
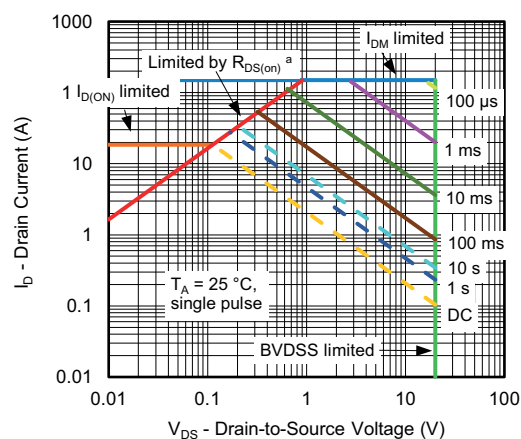
Capacitance



Gate Charge



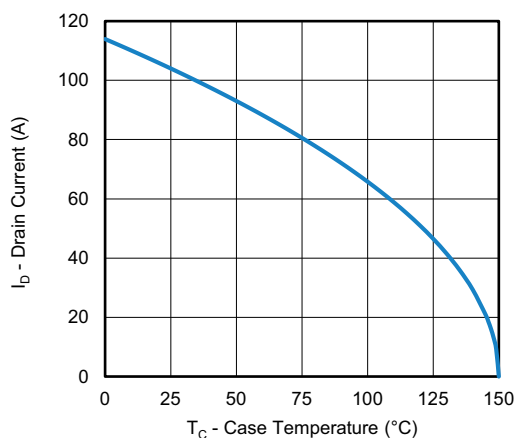
On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Single Pulse Power, Junction-to-Ambient

Safe Operating Area, Junction-to-Ambient
Note

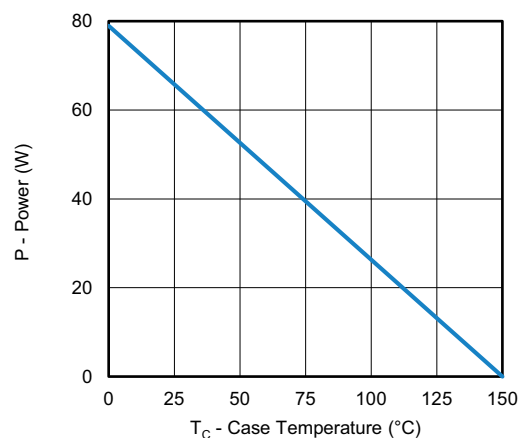
a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ^a



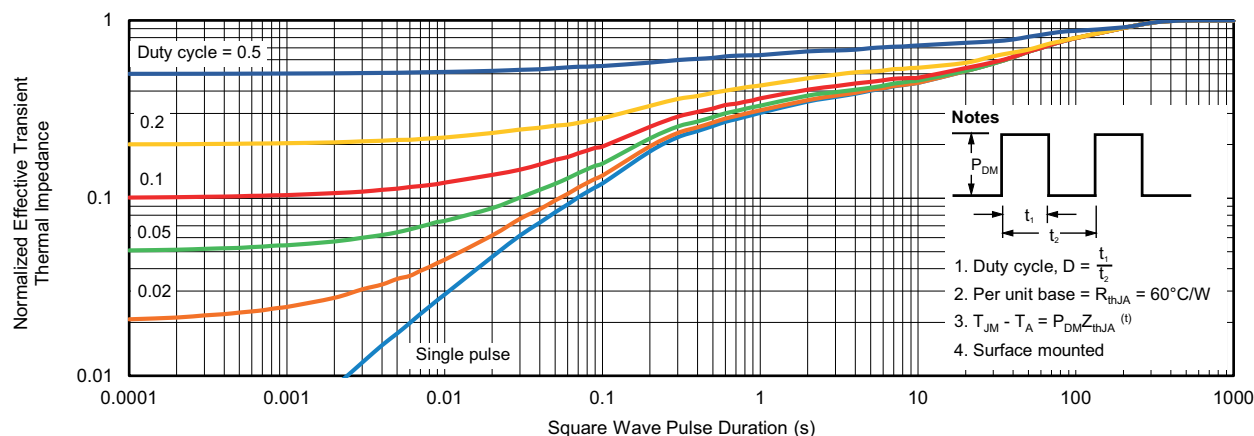
Power Derating, Junction-to-Case

Note

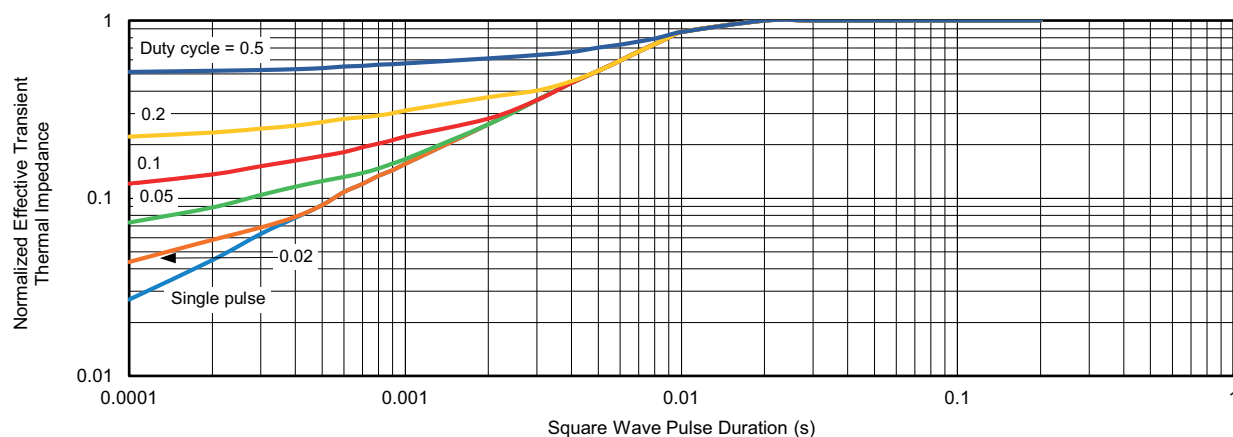
- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



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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