

Automotive N-Channel 40 V (D-S) 175 °C MOSFET

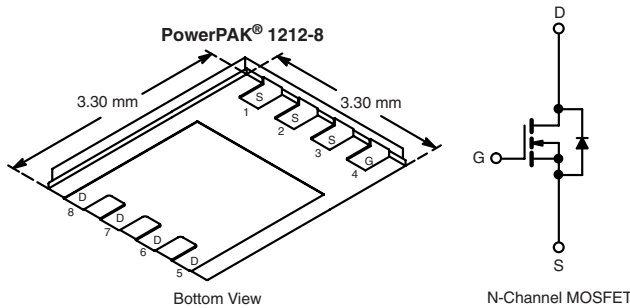
PRODUCT SUMMARY	
V _{DS} (V)	40
R _{DS(on)} (Ω) at V _{GS} = 10 V	0.018
R _{DS(on)} (Ω) at V _{GS} = 4.5 V	0.032
I _D (A)	2.3
Configuration	Single

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Compliant to RoHS Directive 2002/95/EC
- AEC-Q101 Qualified^d
- Find out more about Vishay's Automotive Grade Product Requirements at: www.vishay.com/applications



RoHS
COMPLIANT
HALOGEN
FREE



ORDERING INFORMATION	
Package	PowerPAK 1212-8
Lead (Pb)-free and Halogen-free	SQS400EN-T1-GE3

ABSOLUTE MAXIMUM RATINGS T _C = 25 °C, unless otherwise noted			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V _{DS}	40	V
Gate-Source Voltage	V _{GS}	± 20	
Continuous Drain Current ^a	I _D	T _C = 25 °C	14
		T _C = 125 °C	4.7
Continuous Source Current (Diode Conduction) ^a	I _S	4.7	A
Pulsed Drain Current ^b	I _{DM}	30	
Single Pulse Avalanche Current	I _{AS}	15	
Single Pulse Avalanche Energy	E _{AS}	11.25	
Maximum Power Dissipation ^b	P _D	T _C = 25 °C	52
		T _A = 25 °C	2.0
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to + 175	°C
Soldering Recommendations (Peak Temperature) ^{e, f}		260	

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient	R _{thJA}	33	°C/W
Junction-to-Case (Drain)	R _{thJC}	2.4	

Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR-4 material).
- Parametric verification ongoing.
- See Solder Profile (www.vishay.com/ppg?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.

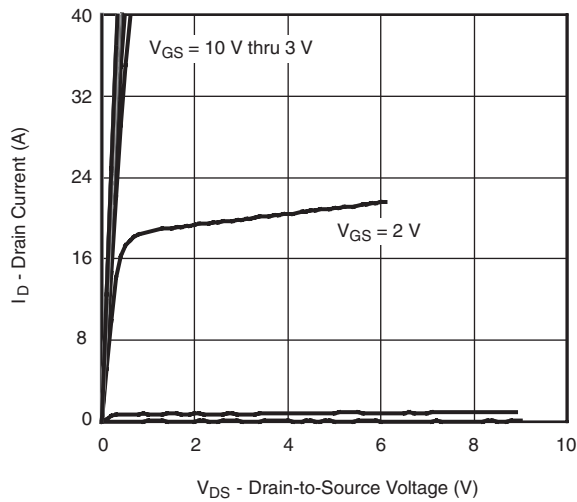
SPECIFICATIONS $T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = -250\text{ }\mu\text{A}$	40	-	-	V	
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	1.5	-	2.5		
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$	-	-	-1	μA
		$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$	-	-	-50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$, $T_J = 175\text{ }^\circ\text{C}$	-	-	-150	
On-State Drain Current ^a	$I_{D(on)}$	$V_{GS} = 10\text{ V}$	$V_{DS} \geq 5\text{ V}$	8	-	A	
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 12\text{ A}$	-	0.013	0.018	Ω
		$V_{GS} = 4.5\text{ V}$	$I_D = 9\text{ A}$	-	0.021	0.032	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}$, $I_D = 7\text{ A}$		-	12	S	
Dynamic^b							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 30\text{ V}$, $f = 1\text{ MHz}$	-	-	-	pF
Output Capacitance	C_{oss}			-	-	-	
Reverse Transfer Capacitance	C_{rss}			-	-	-	
Total Gate Charge ^c	Q_g	$V_{GS} = 10\text{ V}$	$V_{DS} = 30\text{ V}$, $I_D = 6\text{ A}$	-	-	-	nC
Gate-Source Charge ^c	Q_{gs}			-	-	-	
Gate-Drain Charge ^c	Q_{gd}			-	-	-	
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 30\text{ V}$, $R_L = 20\text{ }\Omega$ $I_D \cong 1.5\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$		-	-	-	ns
Rise Time ^c	t_r			-	-	-	
Turn-Off Delay Time ^c	$t_{d(off)}$			-	-	-	
Fall Time ^c	t_f			-	-	-	
Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^\circ\text{C}$^b							
Pulsed Current ^a	I_{SM}			-	-	30	A
Forward Voltage	V_{SD}	$I_F = 8.8\text{ A}$, $V_{GS} = 0\text{ V}$		-	0.8	1.2	V

Notes

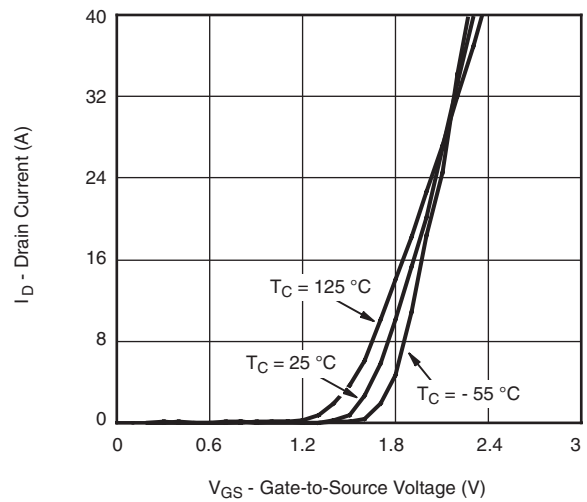
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

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.

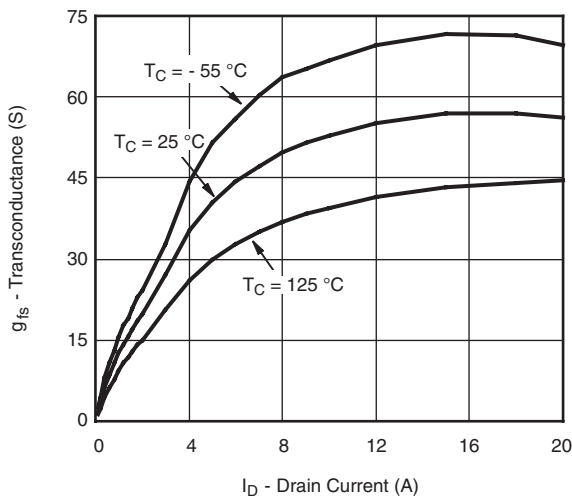
TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



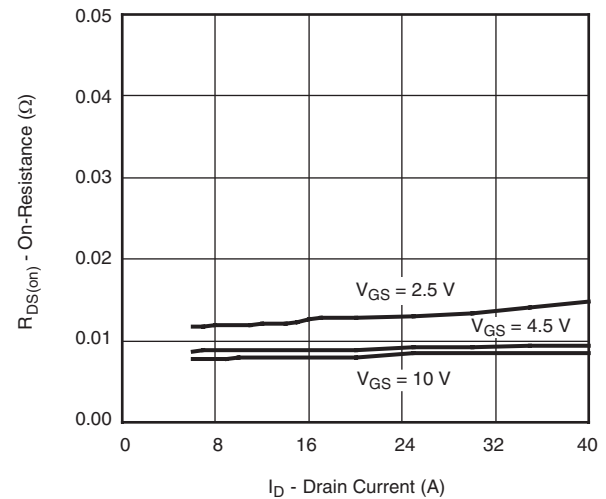
Output Characteristics



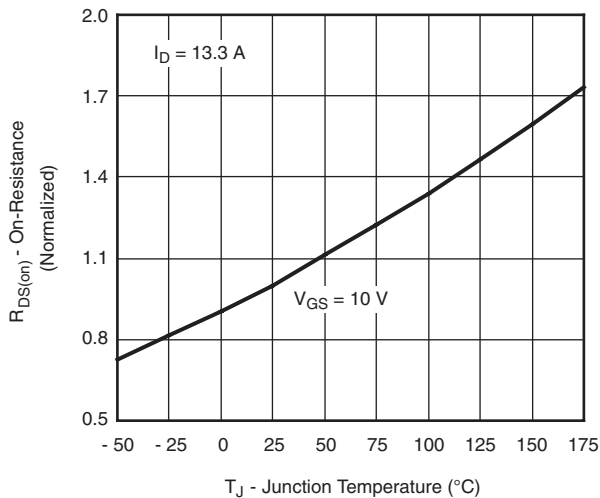
Transfer Characteristics



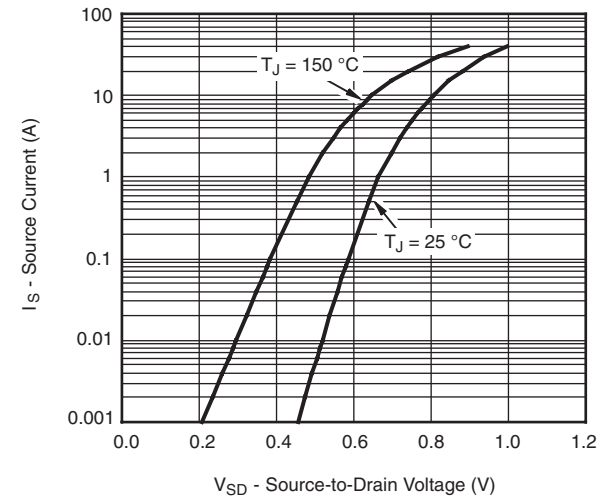
Transconductance



On-Resistance vs. Drain Current

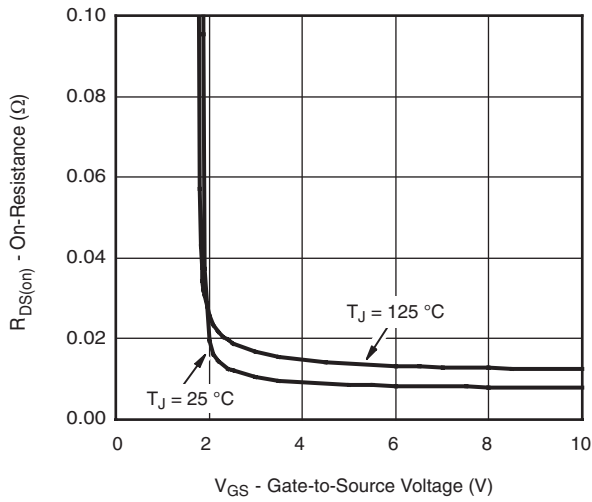


On-Resistance vs. Junction Temperature

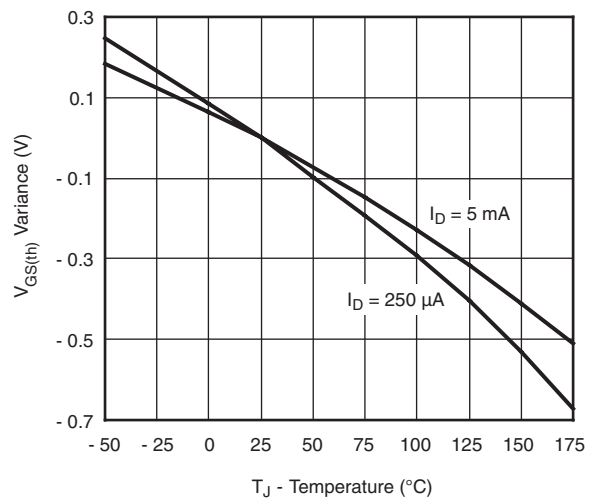


Source Drain Diode Forward Voltage

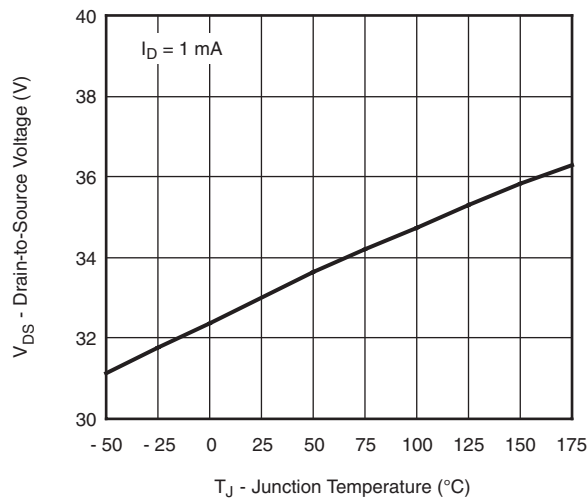
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On-Resistance vs. Gate-to-Source Voltage

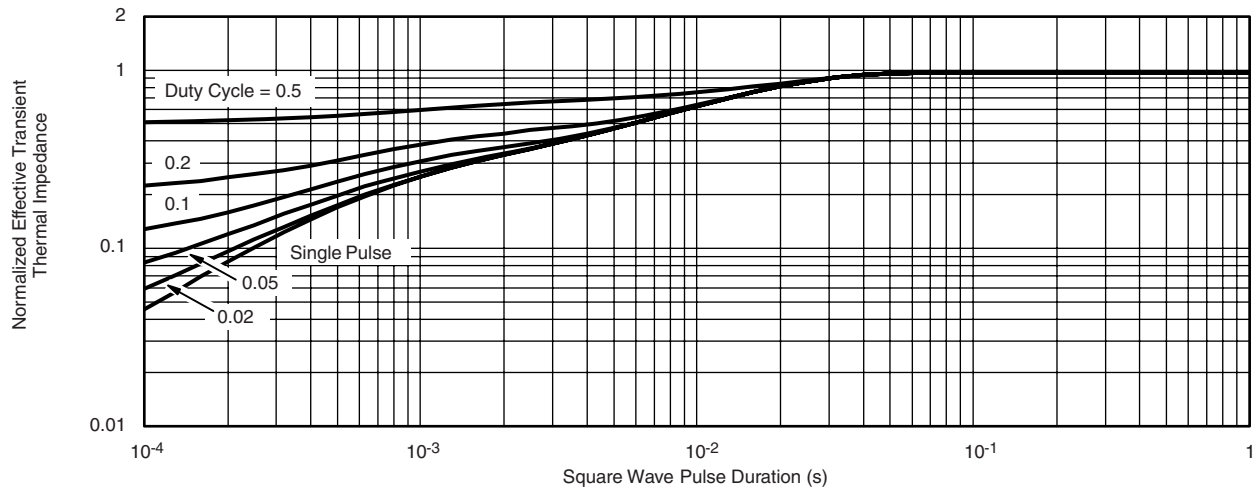


Threshold Voltage



Drain Source Breakdown vs. Junction Temperature

THERMAL RATINGS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Case

Note

The characteristics shown in the graph. Normalized Transient Thermal Impedance Junction to Case (25 °C) is given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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