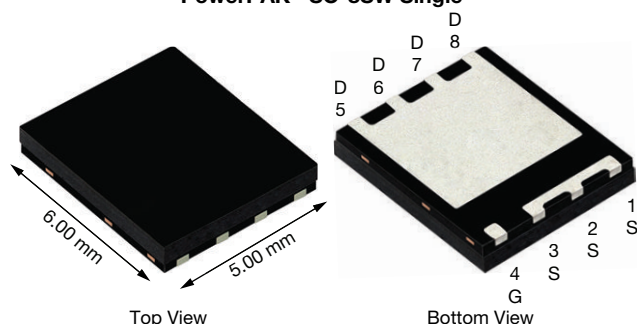


Automotive N-Channel 40 V (D-S) 175 °C MOSFET

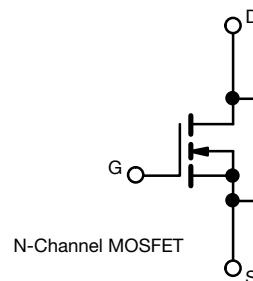
PowerPAK® SO-8SW Single


FEATURES

- TrenchFET® Gen IV power MOSFET
- AEC-Q101 qualified
- 100 % R_g and UIS tested
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE



PRODUCT SUMMARY	
V_{DS} (V)	40
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.00124
I_D (A) ^e	215
Configuration	Single

ORDERING INFORMATION	
Package	PowerPAK® SO-8SW
Lead (Pb)-free and halogen-free	SQRS136EP (for detailed order number please see www.vishay.com/doc?79771)

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 ^e	$T_C = 25$ °C	I_D	215	A
	$T_C = 125$ °C		125	
Continuous source current (diode conduction)		I_S	97	
Pulsed drain current ^{a, e}		I_{DM}	385	
Single pulse avalanche current	$L = 0.1$ mH	I_{AS}	50	
		E_{AS}	125	mJ
Maximum power dissipation	$T_C = 25$ °C	P_D	107	W
	$T_C = 125$ °C		35	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature) ^c			260	

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-ambient	PCB mount ^b	R_{thJA}	42	°C/W
Junction-to-case (drain) ^d		R_{thJC}	1.4	

Notes

- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %
- When mounted on 1" square PCB (FR4 material)
- See solder profile (www.vishay.com/doc?73257). 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
- As per on JESD51-14
- Values based on R_{thJC} and T_C of 25 °C. Actual values achievable will be dependent on the thermal characteristics of the complete system

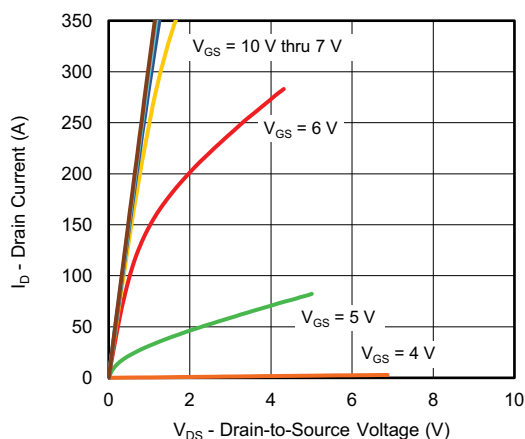
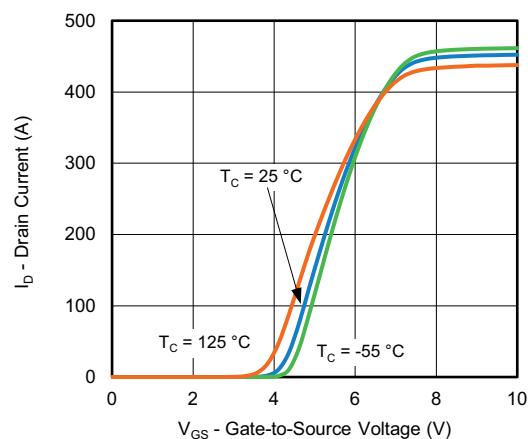
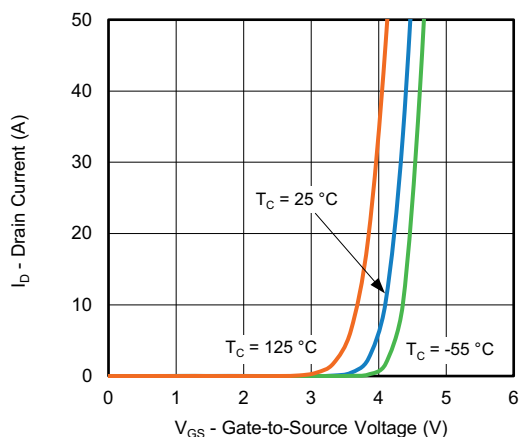
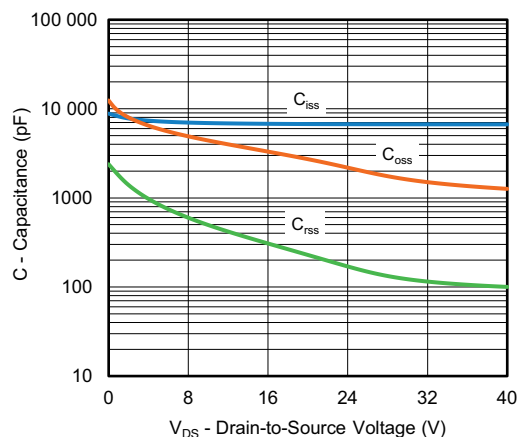
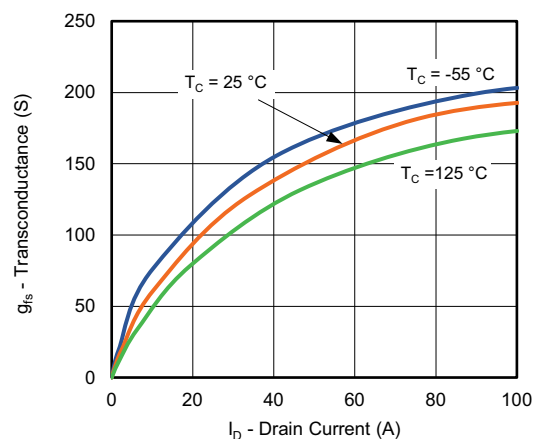
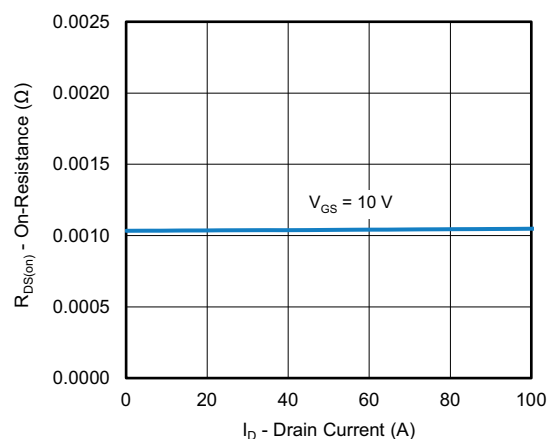


SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0, I _D = 250 μA		40	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.5	3.0	3.5	
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	nA
Zero gate voltage drain current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 40 V	-	-	1	μA
		V _{GS} = 0 V	V _{DS} = 40 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 40 V, T _J = 175 °C	-	-	500	
On-state drain current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	30	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 10 A	-	0.00103	0.00124	Ω
		V _{GS} = 10 V	I _D = 10 A, T _J = 125 °C	-	-	0.00192	
		V _{GS} = 10 V	I _D = 10 A, T _J = 175 °C	-	-	0.00231	
Forward transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 10 A		-	61	-	S
Dynamic ^b							
Input capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	6717	10080	pF
Output capacitance	C _{oss}			-	2060	3090	
Reverse transfer capacitance	C _{rss}			-	159	320	
Total gate charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 20 V, I _D = 30 A	-	90	140	nC
Gate-source charge ^c	Q _{gs}			-	25.9	-	
Gate-drain charge ^c	Q _{gd}			-	21.9	-	
Gate resistance	R _g	f = 1 MHz		0.75	1.68	2.6	Ω
Turn-on delay time ^c	t _{d(on)}	V _{DD} = 20 V, R _L = 0.667 Ω I _D ≅ 30 A, V _{GEN} = 10 V, R _g = 1 Ω		-	20	40	ns
Rise time ^c	t _r			-	31	65	
Turn-off delay time ^c	t _{d(off)}			-	40	80	
Fall time ^c	t _f			-	15	30	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed current ^a	I _{SM}			-	-	385	A
Forward voltage	V _{SD}	I _F = 10 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		-	63	130	ns
Body diode reverse recovery charge	Q _{rr}			-	93	190	nC
Reverse recovery fall time	t _a			-	34	-	ns
Reverse recovery rise time	t _b			-	29	-	
Body diode peak reverse recovery current	I _{RM(REC)}					-	-2.5

Notes

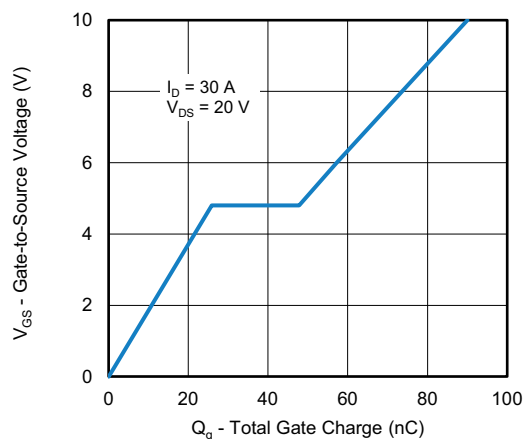
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

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.

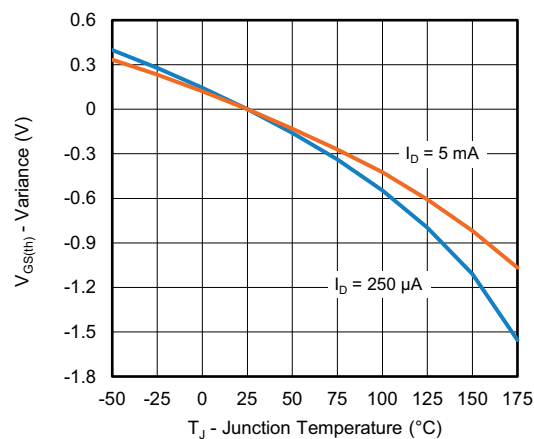
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transfer Characteristics

Capacitance

Transconductance

On-Resistance vs. Drain Current



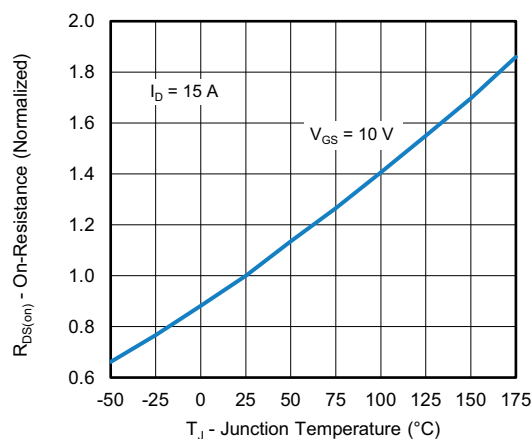
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



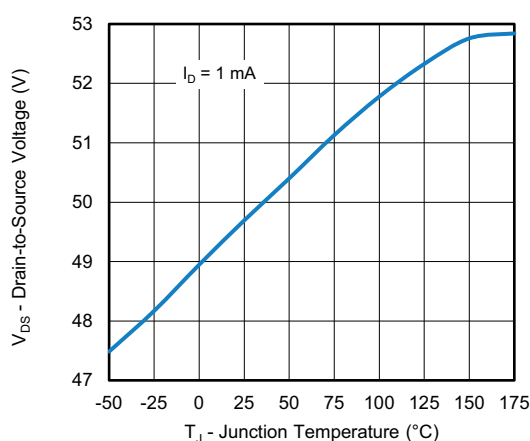
Gate Charge



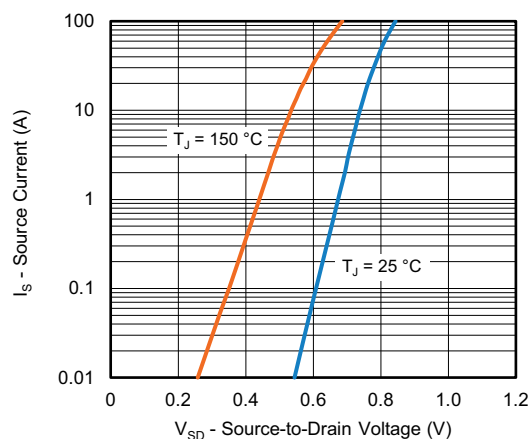
Threshold Voltage



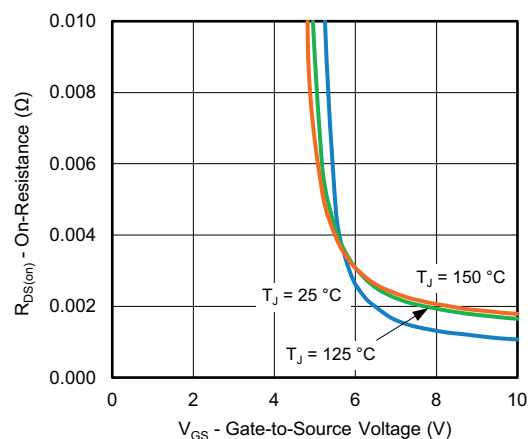
On-Resistance vs. Junction Temperature



Drain Source Breakdown vs. Junction Temperature



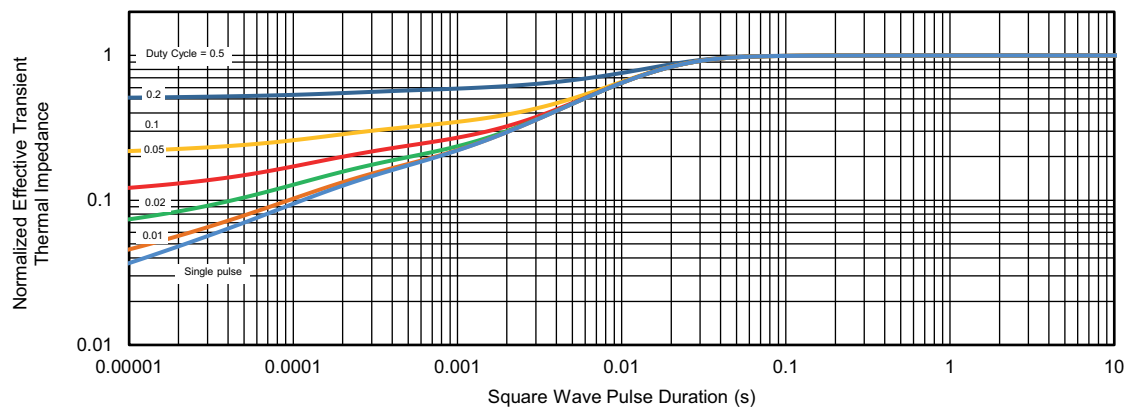
Source Drain Diode Forward Voltage



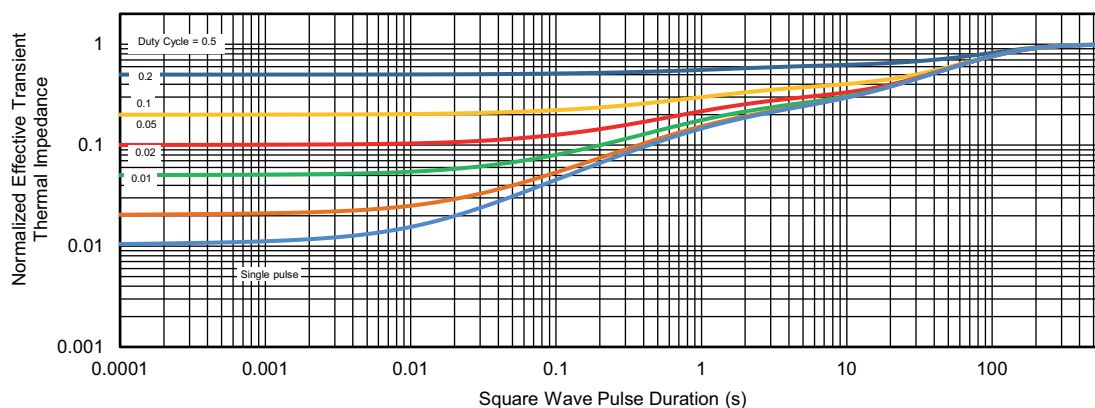
On-Resistance vs. Gate-to-Source Voltage



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



Normalized Thermal Transient Impedance, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Ambient

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient ($25\text{ }^{\circ}\text{C}$)
 - Normalized Transient Thermal Impedance Junction-to-Case ($25\text{ }^{\circ}\text{C}$)are 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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