

Vishay Siliconix

Automotive Dual N-Channel 60 V (D-S) 175 °C MOSFET



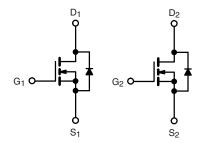
PRODUCT SUMMARY				
V _{DS} (V)	60			
$R_{DS(on)}(\Omega)$ at $V_{GS} = 10 \text{ V}$	0.040			
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5 \text{ V}$	0.055			
I _D (A) per leg	7			
Configuration	Dual			

FEATURES

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







N-Channel MOSFET N-Channel MOSFET

ORDERING INFORMATION	
Package	SO-8
Lead (Pb)-free and Halogen-free	SQ4946CEY (for detailed order number please see www.vishay.com/doc?79776)

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)					
PARAMETER		SYMBOL	LIMIT	UNIT	
Drain-source voltage		V _{DS}	60	V	
Gate-source voltage		V_{GS}	± 20	V	
Continuous drain current	T _C = 25 °C	1	7		
	T _C = 125 °C	I _D	4		
Continuous source current (diode conduction) ^a		I _S	3.6	Α	
Pulsed drain current ^b		I _{DM}	28		
Single pulse avalanche current	L = 0.1 mH	I _{AS}	18		
Single pulse avalanche energy	L = 0.1 min	E _{AS}	16.2	mJ	
Maximum power dissipation	T _C = 25 °C	P _D	4	W	
	T _C = 125 °C		1.3	VV	
Operating junction and storage temperature range		T _J , T _{stg}	-55 to +175	°C	

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	LIMIT	UNIT	
Junction-to-ambient	PCB mount ^c	R_{thJA}	110	°C/W	
Junction-to-foot (drain)		R_{thJF}	34	G/VV	

Notes

- a. Package limited
- b. Pulse test; pulse width \leq 300 μ s, duty cycle \leq 2 %
- c. When mounted on 1" square PCB (FR4 material)



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PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static						<u> </u>	
Drain-source breakdown voltage	V_{DS}	V _{GS} = 0 V, I _D = 250 μA		60	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} =	· V _{GS} , I _D = 250 μA	1.5	2.0	2.5	V
Gate-source leakage	I _{GSS}	V _{DS} =	0 V, V _{GS} = ± 20 V	=	-	± 100	nA
		V _{GS} = 0 V	V _{DS} = 60 V	-	-	1	
Zero gate voltage drain current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 60 V, T _J = 125 °C	-	-	50	μА
		V _{GS} = 0 V	V _{DS} = 60 V, T _J = 175 °C	-	-	150	
On-state drain current ^a	I _{D(on)}	V _{GS} = 10 V	$V_{DS} \ge 5 V$	20	-	-	Α
		V _{GS} = 10 V	I _D = 4.5 A	-	0.033	0.040	
Drain-source on-state resistance a	R _{DS(on)}	V _{GS} = 10 V	I _D = 4.5 A, T _J = 125 °C	=.	-	0.066	Ω
Brain source on state resistance	1 (DS(on)	V _{GS} = 10 V	I _D = 4.5 A, T _J = 175 °C	=	-	0.081	
		$V_{GS} = 4.5 \text{ V}$	$I_D = 4 A$	-	0.045	0.055	
Forward transconductance b	9fs	V _{DS} :	= 15 V, I _D = 4.5 A	-	15	_	S
Dynamic ^b							
Input capacitance	C_{iss}			-	600	750	
Output capacitance	C _{oss}	$V_{GS} = 0 V$	V _{DS} = 25 V, f = 1 MHz	-	110	140	pF
Reverse transfer capacitance	C _{rss}			-	50	62	
Total gate charge ^c	Qg			-	11.7	18	
Gate-source charge ^c	Q _{gs}	V _{GS} = 10 V	$V_{DS} = 30 \text{ V}, I_{D} = 5.3 \text{ A}$	-	1.8	2.7	nC
Gate-drain charge ^c	Q_{gd}			1	2.8	4.2	
Gate resistance	R_g	f = 1 MHz		1.3	-	6	Ω
Turn-on delay time ^c	t _{d(on)}			-	7	11	
Rise time ^c	t _r	$V_{DD} = 30 \text{ V}, \text{ R}_L = 6.8 \Omega$ $I_D \cong 4.4 \text{ A}, \text{ V}_{GEN} = 10 \text{ V}, \text{ R}_g = 1 \Omega$		=	3.3	5	ns
Turn-off delay time ^c	t _{d(off)}			-	22.4	33.5	-
Fall time ^c	t _f			=.	2.1	3.2	
Source-Drain Diode Ratings and Charact	eristics ^b						
Pulsed current ^a	I _{SM}			-	-	28	Α
Forward voltage	V_{SD}	I _F = 2 A, V _{GS} = 0 V		-	0.75	1.1	V
Body diode reverse recovery time	t _{rr}	l _F = 4.4 A, di/dt = 100 A/μs		-	20	40	ns
Body diode reverse recovery charge	Q _{rr}			=	17	34	nC
Reverse recovery fall time	ta			-	15	-	
Reverse recovery rise time	t _b			-	5	-	ns
Body diode peak reverse recovery current	I _{RM(REC)}			=,	-1.91	_	Α

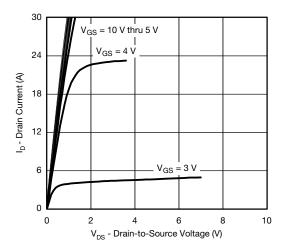
Notes

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

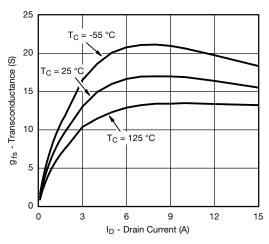
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



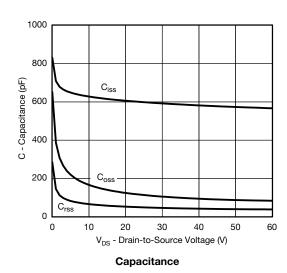
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)

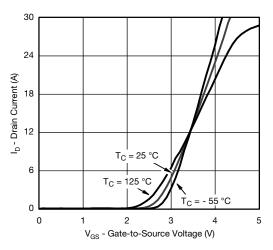


Output Characteristics

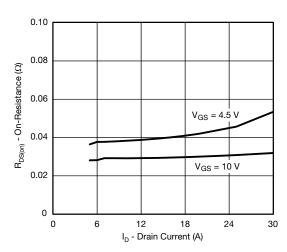


Transconductance

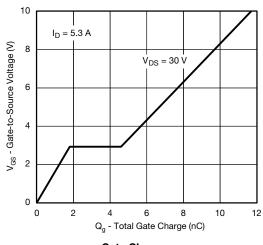




Transfer Characteristics

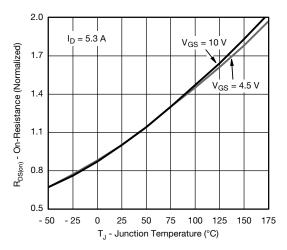


On-Resistance vs. Drain Current

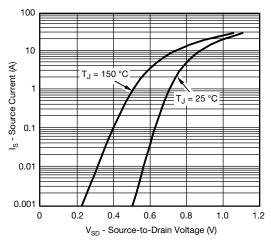




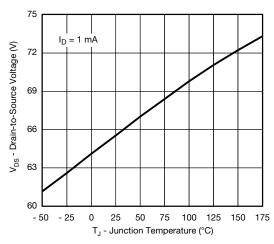
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



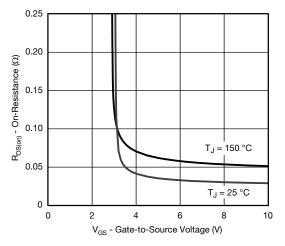
On-Resistance vs. Junction Temperature



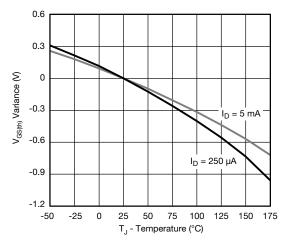
Source Drain Diode Forward Voltage



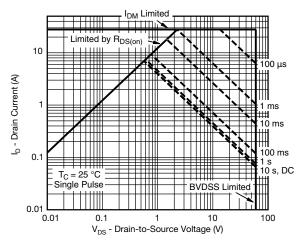
Drain Source Breakdown vs. Junction Temperature



On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



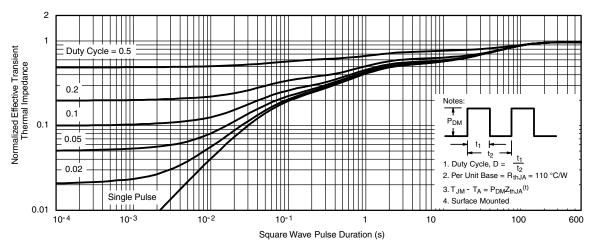
Safe Operating Area

Note

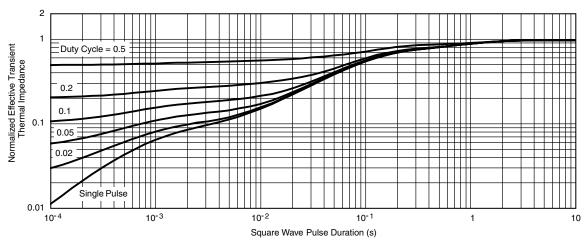
a. V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified



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



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
 - Normalized Transient Thermal Impedance Junction-to-Foot (25 °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.

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?77342.



SOIC (NARROW): 8-LEAD JEDEC Part Number: MS-012







	MILLIM	IETERS	INCHES		
DIM	Min	Max	Min	Max	
Α	1.35	1.75	0.053	0.069	
A ₁	0.10	0.20	0.004	0.008	
В	0.35	0.51	0.014	0.020	
С	0.19	0.25	0.0075	0.010	
D	4.80	5.00	0.189	0.196	
Е	3.80	4.00	0.150	0.157	
е	1.27	BSC	0.050 BSC		
Н	5.80	6.20	0.228	0.244	
h	0.25	0.50	0.010	0.020	
L	0.50	0.93	0.020	0.037	
q	0°	8°	0°	8°	
S	0.44	0.64	0.018	0.026	
FCN: C-06527-Rev 11-Sen-06					

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RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads Dimensions in Inches/(mm)

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