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Vishay Siliconix

Automotive N-Channel 30 V (D-S) 175 °C MOSFET



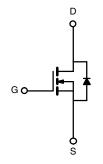
PRODUCT SUMMARY				
V _{DS} (V)	30			
$R_{DS(on)}$ (Ω) at $V_{GS} = 10 \text{ V}$	0.012			
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5 \text{ V}$	0.020			
I _D (A)	15			
Configuration	Single			

FEATURES

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







N-Channel MOSFET

ORDERING INFORMATION	
Package	SO-8
Lead (Pb)-free and halogen-free	SQ4410EY (for detailed order number please see www.vishay.com/doc?79771)

ABSOLUTE MAXIMUM RATING	iS (1 _C = 25 °C, unless	s otherwise noted	d)	
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	30	V
Gate-source voltage		V_{GS}	± 20	V
Continuous drain current	T _C = 25 °C	1	15	
	T _C = 125 °C	- I _D	9	
Continuous source current (diode conduction)		I _S	4.5	Α
Pulsed drain current ^a		I _{DM}	60	
Single pulse avalanche current	L = 0.1 mH	I _{AS}	38	
Single pulse avalanche energy	L=U.I MH	E _{AS}	72	mJ
Manifestor and a state of the s	T _C = 25 °C	T _C = 25 °C		W
Maximum power dissipation ^a	T _C = 125 °C	P_{D}	1.6	VV
Operating junction and storage temperature range		T _J , T _{stq}	-55 to +175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-ambient	PCB mount ^b	R_{thJA}	90	°C/W
Junction-to-foot (drain)		R_{thJF}	30	C/VV

Notes

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



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PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							•
Drain-source breakdown voltage	V _{DS}	$V_{GS} = 0$, $I_D = 250 \mu A$		30	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} =	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$		2.0	2.5	V
Gate-source leakage	I _{GSS}	V _{DS} =	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$		-	± 100	nA
		$V_{GS} = 0 V$	V _{DS} = 30 V	-	-	1	
Zero gate voltage drain current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 30 V, T _J = 125 °C	-	-	50	μΑ
		V _{GS} = 0 V	V _{DS} = 30 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 = 10 A	-	0.009	0.012	
Drain accurac on atota registance 8	Б	V _{GS} = 10 V	I _D = 6 A, T _J = 125 °C	-	-	0.018	
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 6 A, T _J = 175 °C	-	-	0.021	Ω
		V _{GS} = 4.5 V	I _D = 5 A	-	0.015	0.020	
Forward transconductance b	9fs	V _{DS}	= 15 V, I _D = 10 A	-	34	-	S
Dynamic ^b							
Input capacitance	C _{iss}				1906	2385	
Output capacitance	Coss	$V_{GS} = 0 V$	$V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$	-	460	575	pF
Reverse transfer capacitance	C _{rss}			-	183	230	
Total gate charge ^c	Q_g			-	35	53	
Gate-source charge ^c	Q _{gs}	V _{GS} = 10 V	$V_{DS} = 15 \text{ V}, I_{D} = 10 \text{ A}$	-	4.9	-	nC
Gate-drain charge ^c	Q _{gd}			-	5.4	-	
Gate resistance	R_{g}	f = 1 MHz		0.5	-	2	Ω
Turn-on delay time ^c	t _{d(on)}			-	11	17	
Rise time ^c	t _r	V_{DD} = 15 V, R_L = 1.5 Ω $I_D \cong$ 10 A, V_{GEN} = 10 V, R_g = 1 Ω		-	7	11	ns
Turn-off delay time c	t _{d(off)}			-	29	44	
Fall time ^c	t _f			-	8	12	
Source-Drain Diode Ratings and Char	acteristics ^b	•					
Pulsed current ^a	I _{SM}			-	-	60	Α
Forward voltage	V _{SD}	$I_F = 2.3 \text{ A}, V_{GS} = 0$		-	0.72	1.2	V

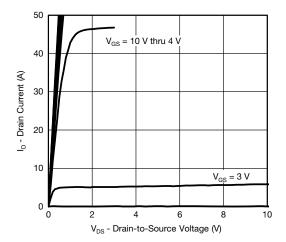
Notes

- c. Pulse test; pulse width $\leq 300~\mu s,~duty~cycle \leq 2~\%$
- d. Guaranteed by design, not subject to production testing
- e. Independent of operating temperature

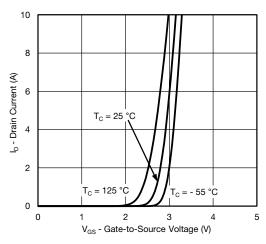
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



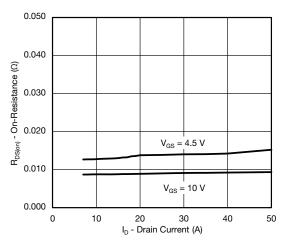
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



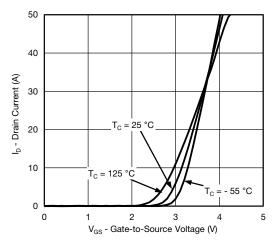
Output Characteristics



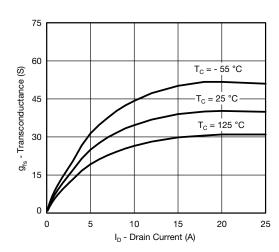
Transfer Characteristics



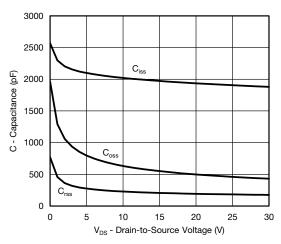
On-Resistance vs. Drain Current



Transfer Characteristics



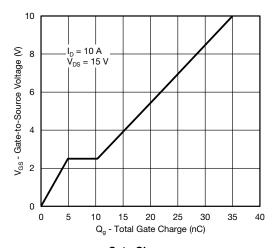
Transconductance



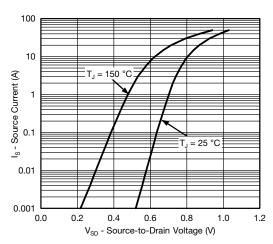
Capacitance



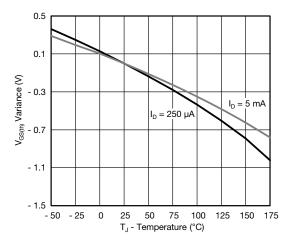
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



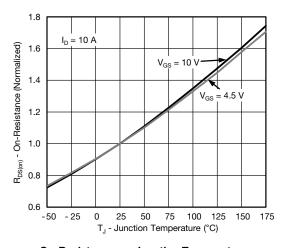
Gate Charge



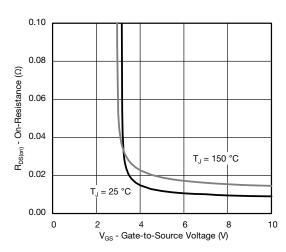
Source Drain Diode Forward Voltage



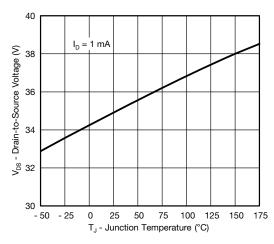
Threshold Voltage



On-Resistance vs. Junction Temperature



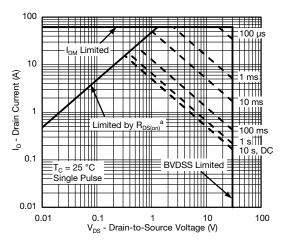
On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature



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



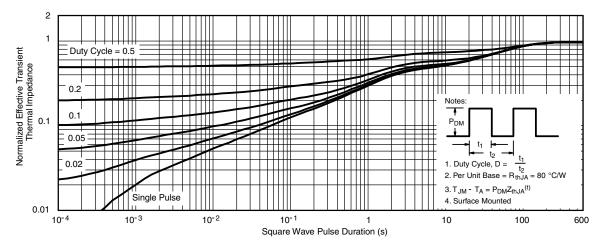
Safe Operating Area

Note

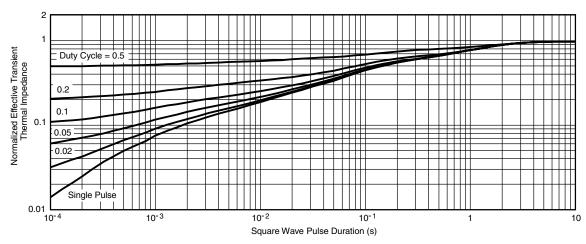
a. $V_{GS} > \mbox{minimum} \ V_{GS}$ at which $R_{DS(on)}$ is specified



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



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to Foot

Note

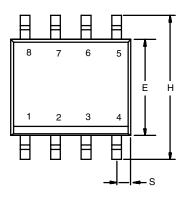
- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
 - Normalized Transient Thermal Impedance Junction-to-Foot (25 °C)

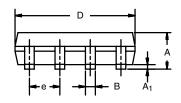
are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit 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

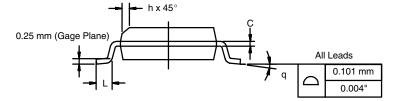
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SOIC (NARROW): 8-LEAD JEDEC Part Number: MS-012







	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	
ECN: C-06527-Rev. I. 11-Sep-06					

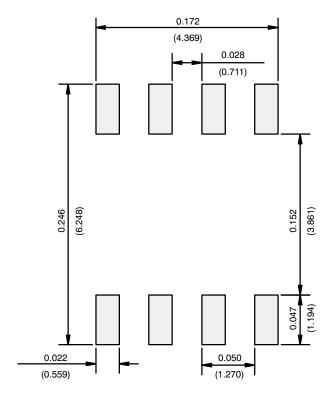
DWG: 5498

Document Number: 71192 www.vishay.com 11-Sep-06

APPLICATION NOTE



RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads Dimensions in Inches/(mm)

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