SQ4431EY

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Vishay Siliconix

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



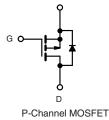
PRODUCT SUMMARY				
V _{DS} (V)	-30			
$R_{DS(on)}(\Omega)$ at $V_{GS} = -10 V$	0.030			
$R_{DS(on)}(\Omega)$ at $V_{GS} = -4.5 V$	0.052			
I _D (A)	-10.8			
Configuration	Single			

FEATURES

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



COMPLIANT HALOGEN



ORDERING INFORMATION	
Package	SO-8
Lead (Pb)-free and halogen-free	SQ4431EY (for detailed order number please see <u>www.vishay.com/doc?79771</u>)

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)						
PARAMETER		SYMBOL	LIMIT	UNIT		
Drain-source voltage		V _{DS}	-30	V		
Gate-source voltage		V _{GS}	± 20	V		
Continuous drain surrant	T _C = 25 °C	- I _D	-10.8			
Continuous drain current	T _C = 125 °C		-6.2			
Continuous source current (diode conduction)		I _S	-5.4	А		
Pulsed drain current ^a		I _{DM}	-43.2			
Single pulse avalanche current	0.1 ml	I _{AS}	-21			
Single pulse avalanche energy	L = 0.1 mH	E _{AS}	22	mJ		
Maximum power dissipation	T _C = 25 °C	D	6	W		
	T _C = 125 °C	P _D	2	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 ^b	R _{thJA}	92	°C/W	
Junction-to-foot (drain)		R _{thJF}	25	0/10	

Notes

a. Pulse test; pulse width $\leq 300~\mu s,~duty~cycle \leq 2~\%$

b. When mounted on 1" square PCB (FR-4 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} =	$V_{DS} = V_{GS}, I_D = -250 \ \mu A$		-2.0	-2.5		
Gate-source leakage	I _{GSS}	$V_{DS} =$	$V_{DS} = 0 V, V_{GS} = \pm 20 V$		-	± 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	μA	
		$V_{GS} = 0 V$	V_{DS} = -30 V, T_{J} = 175 °C	-	-	-150		
On-state drain current ^a	I _{D(on)}	$V_{GS} = -10 V$	$V_{DS} \le -5 V$	-40	-	-	А	
		$V_{GS} = -4.5 V$	I _D = -5 A	-	0.045	0.052	Ω	
Drain source on state resistance a	P	$V_{GS} = -10 V$	I _D = -6 A	-	0.022	0.030		
Drain-source on-state resistance ^a	R _{DS(on)}	$V_{GS} = -10 V$	$I_D = -6 \text{ A}, \text{T}_\text{J} = 125 \ ^\circ\text{C}$	-	0.027	0.032		
		$V_{GS} = -10 V$	I _D = -6 A, T _J = 175 °C	-	0.035	0.042		
Forward transconductance b	9 _{fs}	V _{DS} = -15 V, I _D = -6 A		-	25	-	S	
Dynamic ^b								
Input capacitance	C _{iss}			-	1010	1265	pF	
Output capacitance	C _{oss}	$V_{GS} = 0 V$	V _{DS} = -15 V, f = 1 MHz	-	243	-		
Reverse transfer capacitance	C _{rss}			-	167	-		
Total gate charge ^c	Qg			-	25	-		
Gate-source charge ^c	Q _{gs}	$V_{GS} = -10 V$	$V_{DS} = -15 \text{ V}, \text{ I}_{D} = -7.2 \text{ A}$	-	4	-	nC	
Gate-drain charge ^c	Q _{gd}			-	5	-		
Gate resistance	R _g	f = 1 MHz		1.5	3.36	5.5	Ω	
Turn-on delay time ^c	t _{d(on)}			-	10	-		
Rise time ^c	t _r	V_{DD} = -15 V, R _L = 15 Ω I _D ≅ -1 A, V _{GEN} = -10 V, R _g = 6 Ω		-	12	-	- ns	
Turn-off delay time ^c	t _{d(off)}			-	33	-		
Fall time ^c	t _f			-	15	-		
Source-Drain Diode Ratings and Char	racteristics ^b							
Pulsed current ^a	I _{SM}			-	-40	-	А	
Forward voltage	V _{SD}	I _F = -2.1 A, V _{GS} = 0		_	-0.8	-1.1	V	

Notes

a. Pulse test; pulse width \leq 300 µs, duty cycle \leq 2 %

b. Guaranteed by design, not subject to production testing

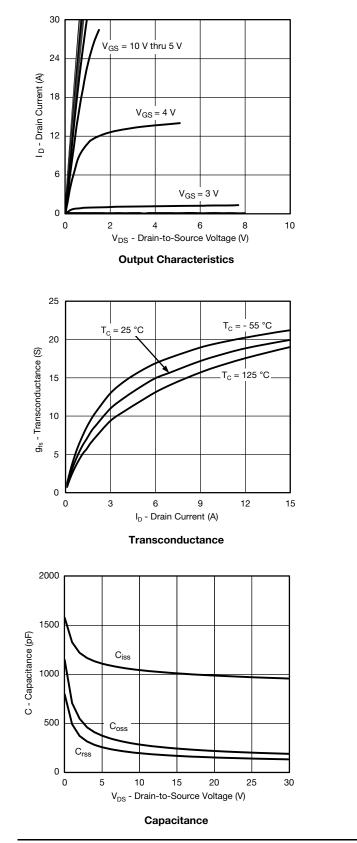
c. Independent of operating temperature

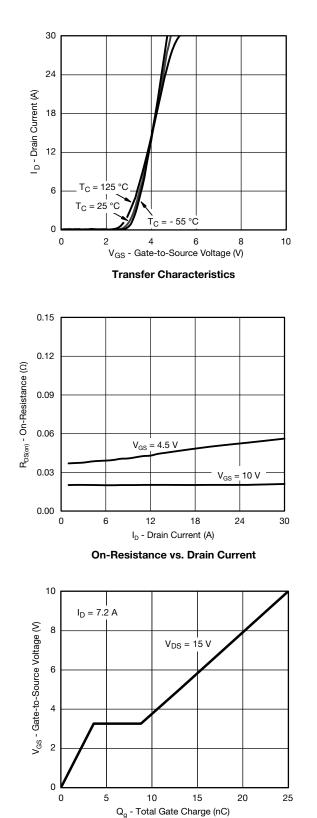
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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





Gate Charge

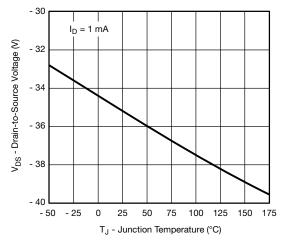
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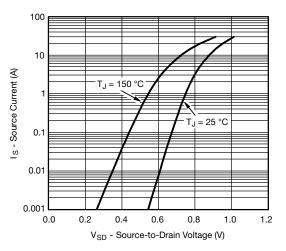
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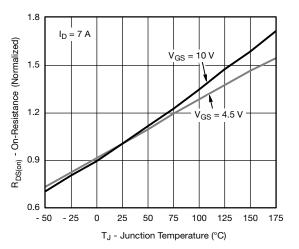
TYPICAL CHARACTERISTICS ($T_A = 25 \text{ °C}$, unless otherwise noted)



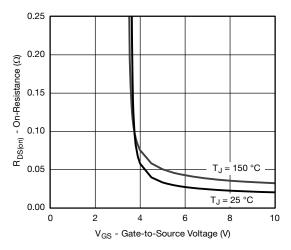
Drain Source Breakdown vs. Junction Temperature



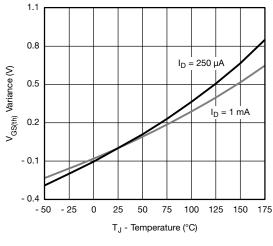
Source Drain Diode Forward Voltage



On-Resistance vs. Junction Temperature



On-Resistance vs. Gate-to-Source Voltage



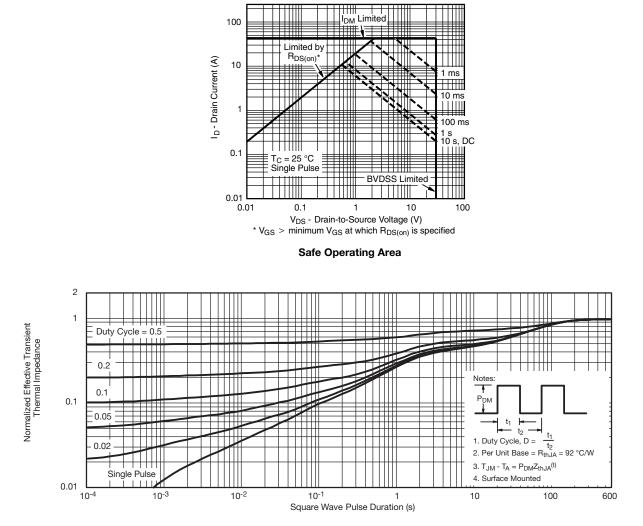
Threshold Voltage

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

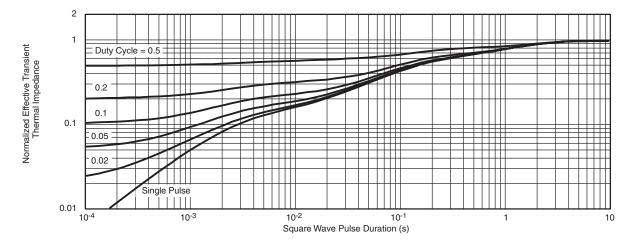


Normalized Thermal Transient Impedance, Junction-to-Ambient



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



Normalized Thermal Transient Impedance, Junction-to-Foot

Note

The characteristics shown in the two graphs

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- 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?65527.



Package Information

Vishay Siliconix

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





	MILLIM	IETERS	INCHES		
DIM	Min	Мах	Min	Max	
A	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	
E	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					

Application Note 826

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RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads Dimensions in Inches/(mm)

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Revision: 01-Jul-2024