## SQM50034EL

www.vishay.com

**Vishay Siliconix** 

RoHS

COMPLIANT HALOGEN

FREE

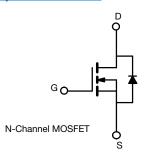
# Automotive N-Channel 60 V (D-S) 175 °C MOSFET



PRODUCT SUMMARY						
V <sub>DS</sub> (V)	60					
$R_{DS(on)}$ ( $\Omega$ ) at $V_{GS}$ = 10 V	0.0039					
$R_{DS(on)}(\Omega)$ at $V_{GS} = 4.5 V$	0.0050					
I <sub>D</sub> (A)	100					
Configuration	Single					
Package	TO-263					

#### FEATURES

- TrenchFET® power MOSFET
- · Package with low thermal resistance
- 100 %  $R_q$  and UIS tested
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_c = 25 \degree C$ , unless otherwise noted)					
PARAMETER		SYMBOL	LIMIT	UNIT	
Drain-source voltage		V <sub>DS</sub>	60	V	
Gate-source voltage		V <sub>GS</sub>	± 20	v	
Continuous drain current	$T_C = 25 \ ^\circ C \ ^a$		100		
	T <sub>C</sub> = 125 °C		80		
Continuous source current (diode conduction	I <sub>S</sub>	100	А		
Pulsed drain current <sup>b</sup>	I <sub>DM</sub>	320			
Single pulse avalanche current	L = 0.1 mH	I <sub>AS</sub>	48		
Single pulse avalanche energy	L = 0.1 mm	E <sub>AS</sub>	115	mJ	
Maximum power dissipation <sup>b</sup>	T <sub>C</sub> = 25 °C	;	150	W	
	T <sub>C</sub> = 125 °C	P <sub>D</sub>	50	vv	
Operating junction and storage temperature	range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°C	

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	LIMIT	UNIT	
Junction-to-ambient	PCB mount <sup>c</sup>	R <sub>thJA</sub>	40	°C/W	
Junction-to-case (drain)		R <sub>thJC</sub>	1	0/10	

#### Notes

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

1

Vishay Siliconix

**SQM50034EL** 

VISHAY	
	www.vishay.com

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
Static						•		
Drain-source breakdown voltage	V <sub>DS</sub>	$V_{GS} = 0 V, I_D = 250 \mu A$		60	-	-	v	
Gate-source threshold voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_D = 250 \ \mu A$		1.5	2.0	2.5	v	
Gate-source leakage	I <sub>GSS</sub>	$V_{DS} = 0 V, V_{GS} = \pm 20 V$		-	-	± 100	nA	
		$V_{GS} = 0 V$	V <sub>DS</sub> = 60 V	-	-	1		
Zero gate voltage drain current	I <sub>DSS</sub>	$V_{GS} = 0 V$	V <sub>DS</sub> = 60 V, T <sub>J</sub> = 125 °C	-	-	50	μA	
		$V_{GS} = 0 V$	V <sub>DS</sub> = 60 V, T <sub>J</sub> = 175 °C	-	-	300	μA	
On-state drain current <sup>a</sup>	I <sub>D(on)</sub>	$V_{GS} = 10 V$	$V_{DS} \ge 5 V$	100	-	-	Α	
		$V_{GS} = 10 V$	I <sub>D</sub> = 20 A	-	0.0032	0.0039		
	D	$V_{GS} = 4.5 V$	I <sub>D</sub> = 15 A	-	0.0041	0.0050		
Drain-source on-state resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 20 A, T <sub>J</sub> = 125 °C	-	-	0.0063	Ω	
		V <sub>GS</sub> = 10 V	I <sub>D</sub> = 20 A, T <sub>J</sub> = 175 °C	-	-	0.0075	1	
Forward transconductance b	9 <sub>fs</sub>	V <sub>DS</sub>	= 15 V, I <sub>D</sub> = 20 A	-	97	-	S	
Dynamic <sup>b</sup>		•			•	•		
Input capacitance	C <sub>iss</sub>		V <sub>DS</sub> = 25 V, f = 1 MHz	-	4425	6100	pF	
Output capacitance	C <sub>oss</sub>	$V_{GS} = 0 V$		-	1989	2800		
Reverse transfer capacitance	C <sub>rss</sub>			-	67	95		
Total gate charge <sup>c</sup>	Qg			-	60	90		
Gate-source charge <sup>c</sup>	Q <sub>gs</sub>	$V_{GS} = 10 \text{ V}$ $V_{DS} = 30 \text{ V}, I_D = 50 \text{ A}$		-	16.3	-	nC	
Gate-drain charge <sup>c</sup>	Q <sub>gd</sub>			-	4.8	-		
Gate resistance	Rg	f = 1 MHz		0.6	1.24	1.9	Ω	
Turn-on delay time <sup>c</sup>	t <sub>d(on)</sub>			-	15	25		
Rise time <sup>c</sup>	t <sub>r</sub>	V <sub>DD</sub> =	= 30 V, $R_L$ = 0.6 $\Omega$	-	7	15		
Turn-off delay time <sup>c</sup>	t <sub>d(off)</sub>	$I_D \cong 50 \text{ A}, V_{\text{GEN}} = 10 \text{ V}, \text{R}_g = 1 \Omega$		-	33	50	ns	
Fall time <sup>c</sup>	t <sub>f</sub>			-	7	15		
Source-Drain Diode Ratings and Chara	cteristics <sup>b</sup>	•			•	•		
Pulsed current <sup>a</sup>	I <sub>SM</sub>	1		-	-	320	Α	
Forward voltage	V <sub>SD</sub>	$I_{F} = 25 \text{ A}, V_{GS} = 0 \text{ V}$		-	0.81	1.5	V	
Body diode reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 30 A, di/dt = 100 A/μs		-	42	85	ns	
Body diode reverse recovery charge	Q <sub>rr</sub>			-	34	70	nC	
Reverse recovery fall time	t <sub>a</sub>			-	15	-		
Reverse recovery rise time	t <sub>b</sub>			-	27	-	ns	
Body diode peak reverse recovery current	I <sub>RM(REC)</sub>			-	-1.45	-	А	

#### 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

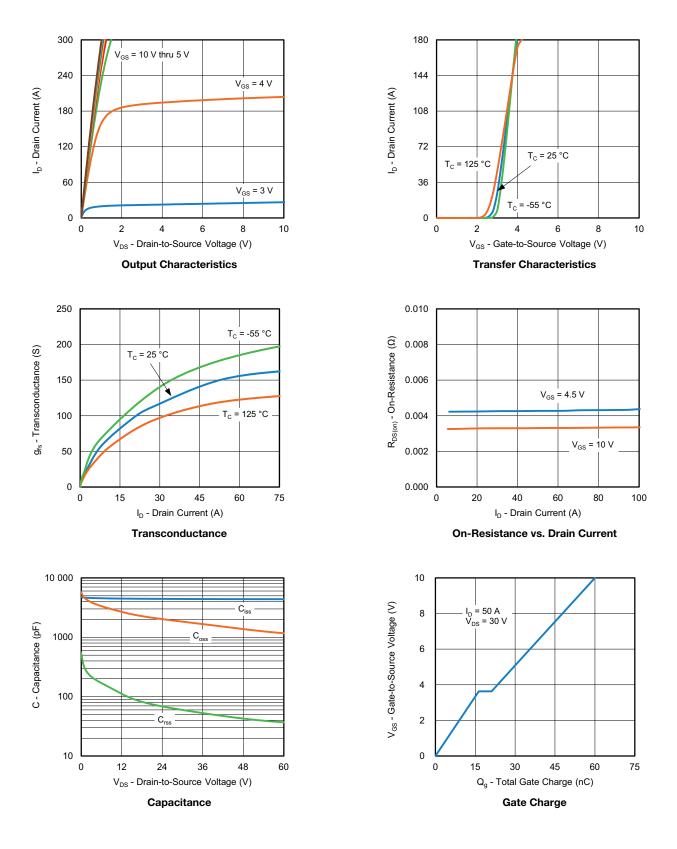
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

2



Vishay Siliconix

### **TYPICAL CHARACTERISTICS** (T<sub>A</sub> = 25 °C, unless otherwise noted)



S19-0407-Rev. A, 06-May-2019

3

Document Number: 77032

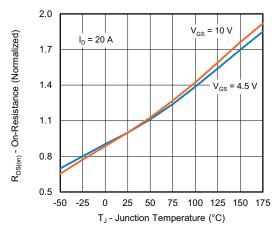
For technical questions, contact: <u>automostechsupport@vishay.com</u> THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT <u>www.vishay.com/doc?91000</u>



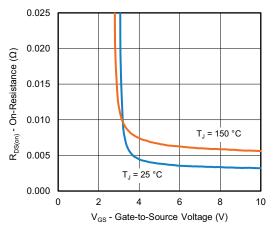
## SQM50034EL

**Vishay Siliconix** 

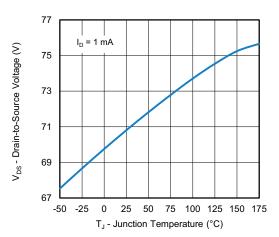
### **TYPICAL CHARACTERISTICS** (T<sub>A</sub> = 25 °C, unless otherwise noted)



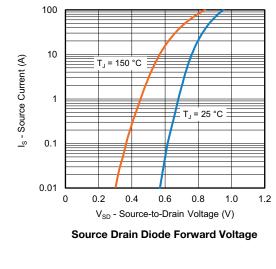
On-Resistance vs. Junction Temperature

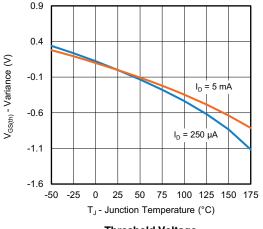


On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature







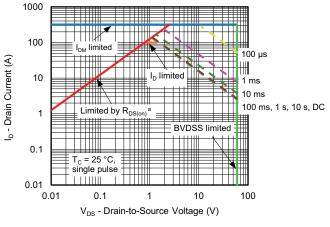
4

For technical questions, contact: <u>automostechsupport@vishay.com</u> THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT <u>www.vishay.com/doc?91000</u> VISHAY. www.vishay.com

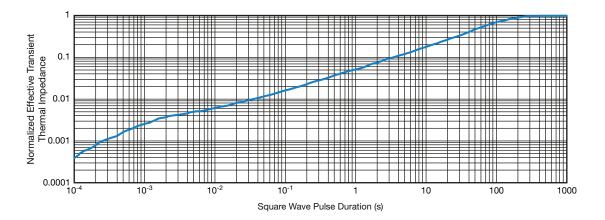
SQM50034EL

**Vishay Siliconix** 

### **THERMAL RATINGS** ( $T_A = 25 \text{ °C}$ , unless otherwise noted)



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

#### Note

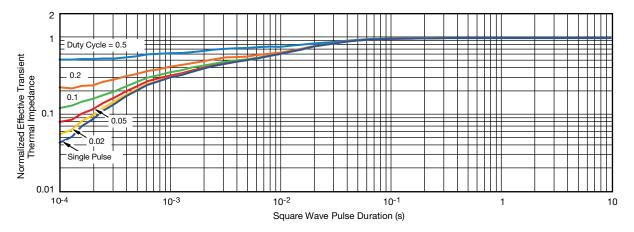
a.  $V_{GS}$  > minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified



## SQM50034EL

## **Vishay Siliconix**

### THERMAL RATINGS (T<sub>A</sub> = 25 °C, unless otherwise noted)



#### Normalized Thermal Transient Impedance, Junction-to-Case

#### Note

The characteristics shown in the two graphs

- Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)

- Normalized Transient Thermal Impedance Junction-to-Case (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?77032.



**Vishay Siliconix** 

TO-263 (D<sup>2</sup>PAK): 3-LEAD









DETAIL A (ROTATED 90°)



		INCHES		MILLIMETERS		
DIM.		MIN.	MAX.	MIN.	MAX.	
А		0.160	0.190	4.064	4.826	
	b	0.020	0.039	0.508	0.990	
	b1	0.020	0.035	0.508	0.889	
	b2	0.045	0.055	1.143	1.397	
с*	Thin lead	0.013	0.018	0.330	0.457	
C	Thick lead	0.023	0.028	0.584	0.711	
c1	Thin lead	0.013	0.017	0.330	0.431	
CI	Thick lead	0.023	0.027	0.584	0.685	
	c2	0.045	0.055	1.143	1.397	
	D	0.340	0.380	8.636	9.652	
	D1	0.220	0.240	5.588	6.096	
D2		0.038	0.042	0.965	1.067	
D3		0.045	0.055	1.143	1.397	
D4		0.044	0.052	1.118	1.321	
	E	0.380	0.410	9.652	10.414	
	E1	0.245	-	6.223	-	
E2		0.355	0.375	9.017	9.525	
E3		0.072	0.078	1.829	1.981	
	е	0.100 BSC		C 2.54 BSC		
	К	0.045	0.055	1.143	1.397	
	L	0.575	0.625	14.605	15.875	
	L1	0.090	0.110	2.286	2.794	
L2		0.040	0.055	1.016	1.397	
L3		0.050	0.070	1.270	1.778	
	L4	0.010 BSC		0.254 BSC		
	М	-	0.002	-	0.050	
ECN: T13-0707-Rev. K, 30-Sep-13 DWG: 5843						

#### Notes

- 1. Plane B includes maximum features of heat sink tab and plastic. 2. No more than 25 % of L1 can fall above seating plane by
- max. 8 mils.3. Pin-to-pin coplanarity max. 4 mils.
- 4. \*: Thin lead is for SUB, SYB.
  - Thick lead is for SUM, SYM, SQM.
- 5. Use inches as the primary measurement.

This feature is for thick lead.

Revison: 30-Sep-13



### **RECOMMENDED MINIMUM PADS FOR D<sup>2</sup>PAK: 3-Lead**



Recommended Minimum Pads Dimensions in Inches/(mm)

Return to Index



Vishay

## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

© 2024 VISHAY INTERTECHNOLOGY, INC. ALL RIGHTS RESERVED

Revision: 01-Jan-2024