SQM50034EL

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RoHS

COMPLIANT HALOGEN

FREE

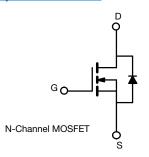
Automotive N-Channel 60 V (D-S) 175 °C MOSFET



PRODUCT SUMMARY						
V _{DS} (V)	60					
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.0039					
$R_{DS(on)}(\Omega)$ at $V_{GS} = 4.5 V$	0.0050					
I _D (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>



ABSOLUTE MAXIMUM RATINGS ($T_c = 25 \degree C$, unless otherwise noted)					
PARAMETER		SYMBOL	LIMIT	UNIT	
Drain-source voltage		V _{DS}	60	V	
Gate-source voltage		V _{GS}	± 20	v	
Continuous drain current	$T_C = 25 \ ^\circ C \ ^a$		100		
	T _C = 125 °C		80		
Continuous source current (diode conduction	I _S	100	А		
Pulsed drain current ^b	I _{DM}	320			
Single pulse avalanche current	L = 0.1 mH	I _{AS}	48		
Single pulse avalanche energy	L = 0.1 mm	E _{AS}	115	mJ	
Maximum power dissipation ^b	T _C = 25 °C	;	150	W	
	T _C = 125 °C	P _D	50	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}	40	°C/W	
Junction-to-case (drain)		R _{thJC}	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)

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

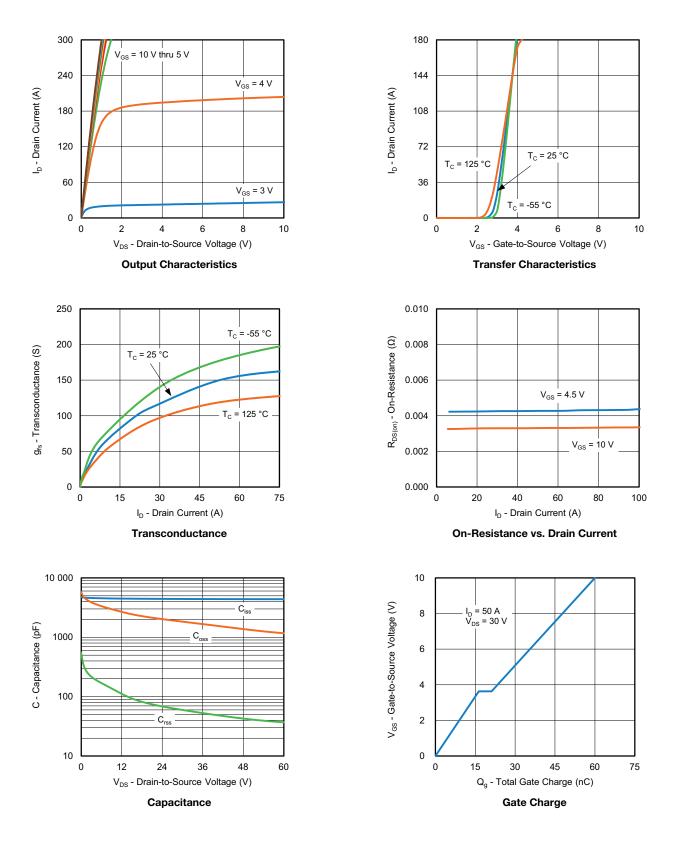
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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



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

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Document Number: 77032

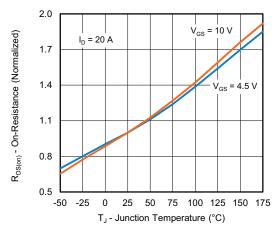
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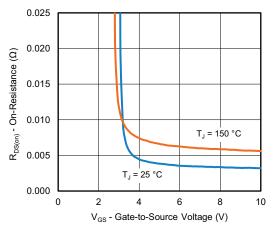
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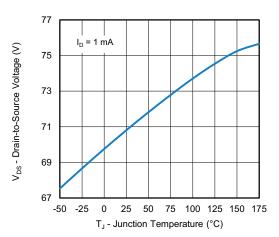
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



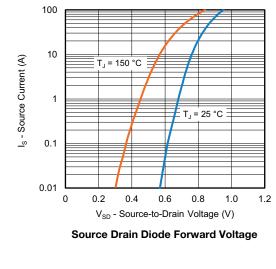
On-Resistance vs. Junction Temperature

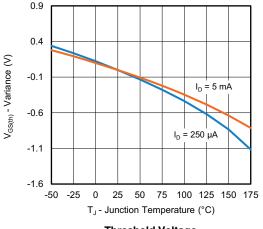


On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature







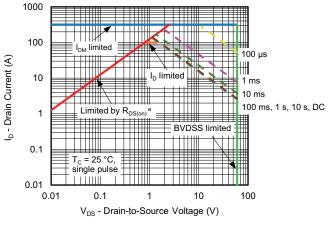
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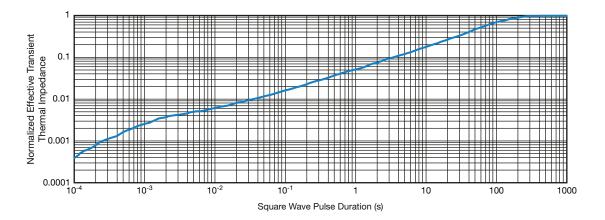
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THERMAL RATINGS ($T_A = 25 \text{ °C}$, unless otherwise noted)



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

Note

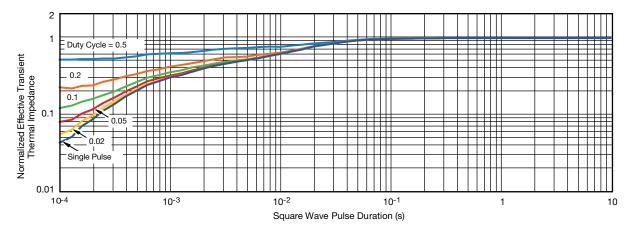
a. V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified



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THERMAL RATINGS (T_A = 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.



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TO-263 (D²PAK): 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 D²PAK: 3-Lead



Recommended Minimum Pads Dimensions in Inches/(mm)

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