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Vishay Siliconix

Automotive N-Channel 40 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY				
V _{DS} (V)	40			
$R_{DS(on)}(\Omega)$ at $V_{GS} = 10 \text{ V}$	0.0018			
I _D (A)	200			
Configuration	Single			
Package	TO-263-7L			

FEATURES

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

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Top View G	N-Channel I	G O O O O O O O O O O O O O O O O O O O
DLUTE MAXIMUM RATINGS ($T_C = 25 ^{\circ}C$, unles	s otherwise noted)	
METER	SYMBOL	LIMIT

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)					
PARAMETER	SYMBOL	LIMIT	UNIT		
Drain-Source Voltage	Drain-Source Voltage			V	
Gate-Source Voltage		V_{GS}	± 20	V	
Continuous Drain Current	T _C = 25 °C ^a	1	200		
Continuous Drain Current	T _C = 125 °C	l _D	192		
Continuous Source Current (Diode Conduction)	I _S	200	Α		
Pulsed Drain Current ^b	I _{DM}	600			
Single Pulse Avalanche Current	L = 0.1 mH	l _{AS}	85		
Single Pulse Avalanche Energy	L = 0.1 IIII1	E _{AS}	361	mJ	
Maximum Power Dissipation ^b	T _C = 25 °C	D	375	W	
	T _C = 125 °C	P_{D}	125	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}	0.4	C/VV	

Notes

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



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PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static		1				L	
Drain-Source Breakdown Voltage	V_{DS}	V _{GS} =	= 0 V, I _D = 250 μA	40	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} =	· V _{GS} , I _D = 250 μA	2.5	3.0	3.5	V
Gate-Source Leakage	I _{GSS}	V _{DS} =	0 V, V _{GS} = ± 20 V	-	-	± 100	nA
		$V_{GS} = 0 V$	V _{DS} = 40 V	-	-	1	
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 40 V, T _J = 125 °C	-	-	50	μΑ
		V _{GS} = 0 V	V _{DS} = 40 V, T _J = 175 °C	1	-	250	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	200	-	-	Α
	. ,	V _{GS} = 10 V	I _D = 30 A	-	0.0015	0.0018	Ω
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 30 A, T _J = 125 °C	-	-	0.0028	
		V _{GS} = 10 V	I _D = 30 A, T _J = 175 °C	-	-	0.0034	
Forward Transconductance b	9 _{fs}	V_{DS}	V _{DS} = 15 V, I _D = 30 A		198	-	S
Dynamic ^b							
Input Capacitance	C _{iss}			-	13 880	17 350	
Output Capacitance	C _{oss}	$V_{GS} = 0 V$	$V_{GS} = 0 \text{ V}$ $V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$		1414	1770	рF
Reverse Transfer Capacitance	C _{rss}			-	840	1050	
Total Gate Charge ^c	Q_g			-	206	310	
Gate-Source Charge c	Q _{gs}	$V_{GS} = 10 \text{ V}$	$V_{DS} = 20 \text{ V}, I_{D} = 120 \text{ A}$	-	50	-	nC
Gate-Drain Charge ^c	Q _{gd}			-	44	-	
Gate Resistance	R_g		f = 1 MHz	0.25	0.8	1.8	Ω
Turn-On Delay Time ^c	t _{d(on)}			-	26	39	
Rise Time ^c	t _r	V_{DD} = 20 V, R_L = 0.17 Ω I_D \cong 120 A, V_{GEN} = 10 V, R_g = 1 Ω		-	21	32	ns
Turn-Off Delay Time ^c	t _{d(off)}			-	68	102	
Fall Time ^c	t _f			-	12	18	
Source-Drain Diode Ratings and Chara	cteristics b				•		
Pulsed Current ^a	I _{SM}			-	-	600	Α
Forward Voltage	V_{SD}	I _F = 80 A, V _{GS} = 0 V			0.86	1.5	V

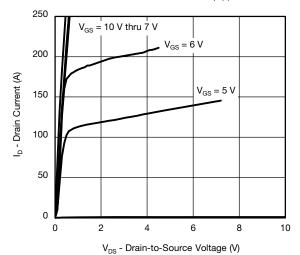
Notes

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

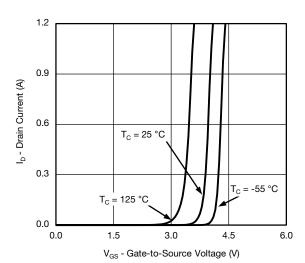
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



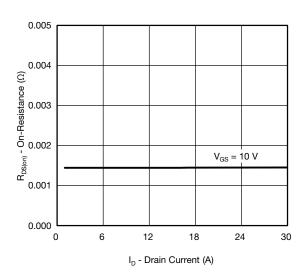
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



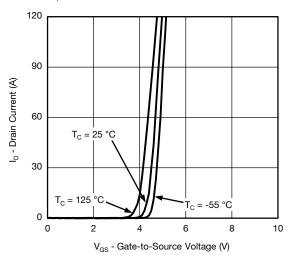
Output Characteristics



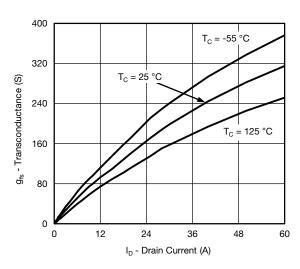
Transfer Characteristics



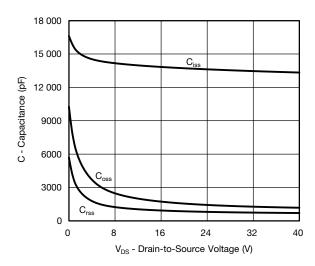
On-Resistance vs. Drain Current



Transfer Characteristics



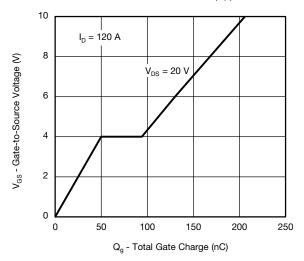
Transconductance



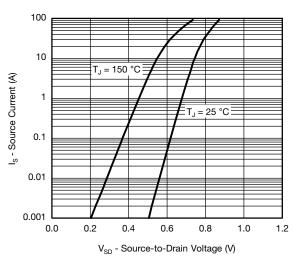
Capacitance



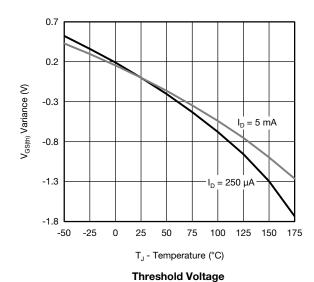
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



Gate Charge



Source Drain Diode Forward Voltage



0.5

-50

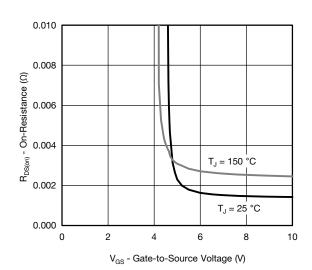
-25

0 25 50

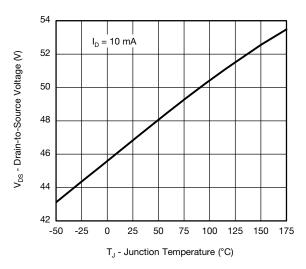
T_J - Junction Temperature (°C)

100 125

On-Resistance vs. Junction Temperature



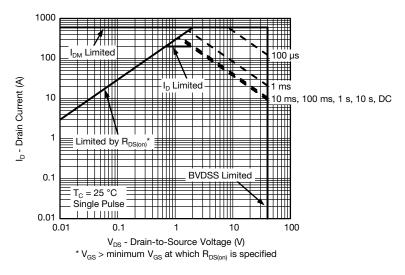
On-Resistance vs. Gate-to-Source Voltage



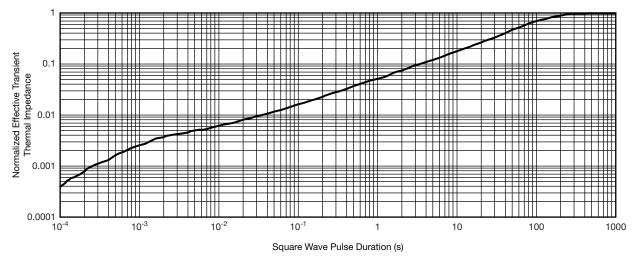
Drain Source Breakdown vs. Junction Temperature



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



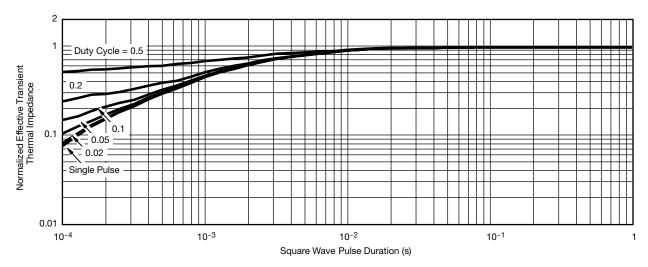
Safe Operating Area



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-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/ppg267184.



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REVISION HISTORY ^a			
REVISION	DATE	DESCRIPTION OF CHANGE	
В	04-Aug-15	Revised R _g minimum limit	

Note

a. As of April 2014

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D²PAK / TO-263 and TO-262

Ordering codes for the SQ rugged series power MOSFETs in the D²PAK / TO-263 and TO-262 packages:

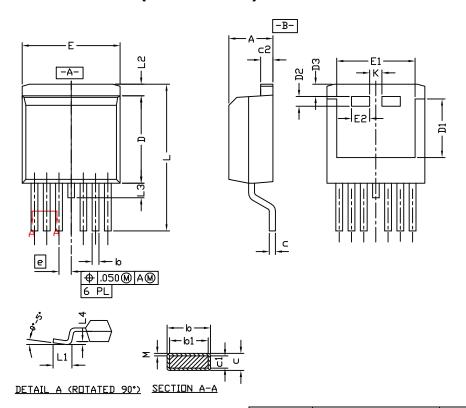
DATASHEET PART NUMBER	OLD ORDERING CODE a	NEW ORDERING CODE
SQM100N04-2m7	SQM100N04-2M7-GE3	SQM100N04-2M7_GE3
SQM100N10-10	SQM100N10-10-GE3	SQM100N10-10_GE3
SQM110N05-06L	SQM110N05-06L-GE3	SQM110N05-06L_GE3
SQM110P06-8m9L	SQM110P06-8M9L-GE3	SQM110P06-8M9L_GE3
SQM120N02-1m3L	SQM120N02-1M3L-GE3	SQM120N02-1M3L_GE3
SQM120N03-1m5L	SQM120N03-1M5L-GE3	SQM120N03-1M5L_GE3
SQM120N04-1m7	SQM120N04-1M7-GE3	SQM120N04-1M7_GE3
SQM120N04-1m7L	SQM120N04-1M7L-GE3	SQM120N04-1M7L_GE3
SQM120N04-1m9	SQM120N04-1M9-GE3	SQM120N04-1M9_GE3
SQM120N06-06	SQM120N06-06-GE3	SQM120N06-06_GE3
SQM120N06-3m5L	SQM120N06-3M5L-GE3	SQM120N06-3M5L_GE3
SQM120N10-09	SQM120N10-09-GE3	SQM120N10-09_GE3
SQM120N10-3m8	SQM120N10-3M8-GE3	SQM120N10-3M8_GE3
SQM120P04-04L	SQM120P04-04L-GE3	SQM120P04-04L_GE3
SQM120P06-07L	SQM120P06-07L-GE3	SQM120P06-07L_GE3
SQM120P10-10m1L	-	SQM120P10_10m1LGE3
SQM200N04-1m1L	SQM200N04-1M1L-GE3	SQM200N04-1M1L_GE3
SQM200N04-1m7L	SQM200N04-1M7L-GE3	SQM200N04-1M7L_GE3
SQM200N04-1m8	SQM200N04-1M8-GE3	SQM200N04-1M8_GE3
SQM25N15-52	SQM25N15-52-GE3	SQM25N15-52_GE3
SQM35N30-97	SQM35N30-97-GE3	SQM35N30-97_GE3
SQM40N10-30	SQM40N10-30-GE3	SQM40N10-30_GE3
SQM40N15-38	SQM40N15-38-GE3	SQM40N15-38_GE3
SQM40P10-40L	SQM40P10-40L-GE3	SQM40P10-40L_GE3
SQM47N10-24L	SQM47N10-24L-GE3	SQM47N10-24L_GE3
SQM50020EL	-	SQM50020EL_GE3
SQM50N04-4m0L	SQM50N04-4M0L-GE3	SQM50N04-4M0L_GE3
SQM50N04-4m1	SQM50N04-4M1-GE3	SQM50N04-4M1_GE3
SQM50P03-07	SQM50P03-07-GE3	SQM50P03-07_GE3
SQM50P04-09L	SQM50P04-09L-GE3	SQM50P04-09L_GE3
SQM50P06-15L	SQM50P06-15L-GE3	SQM50P06-15L_GE3
SQM50P08-25L	SQM50P08-25L-GE3	SQM50P08-25L_GE3
SQM60030E	-	SQM60030E_GE3
SQM60N06-15	SQM60N06-15-GE3	SQM60N06-15_GE3
SQM60N20-35	SQM60N20-35-GE3	SQM60N20-35_GE3
SQM85N15-19	SQM85N15-19-GE3	SQM85N15-19_GE3
SQV120N10-3m8	SQV120N10-3m8-GE3	SQV120N10-3m8_GE3
SQV120N06-4m7L	-	SQV120N06-4m7L_GE3

Note

a. Old ordering code is obsolete and no longer valid for new orders



D²PAK (TO-263-7L) Case Outline



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. Lead thickness 25 mils.
- 5. For SUM part numbers lead thickness is 24 mils to 29 mils.
- 6. For reference only.
- 7. Use inches as the primary measurement.
- 8. This feature is only for SUM.

	INCHES		MILLIN	METERS
DIM.	MIN.	MAX.	MIN.	MAX.
Α	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
c* SUB	0.012	0.018	0.305	0.457
c* SUM	0.022	0.028	0.559	0.711
c1	0.018	0.025	0.457	0.635
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
Е	0.380	0.410	9.652	10.414
E1	0.245	-	6.223	-
E2	0.072	0.078	1.829	1.981
е	0.050 BSC		1.27 BSC	
K	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: T13-0709-Rev. B, 30-Sep-13 DWG: 6006				

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Document Number: 63782

Revision: 30-Sep-13



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Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

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Revision: 02-Oct-12 Document Number: 91000

ПОСТАВКА ЭЛЕКТРОННЫХ КОМПОНЕНТОВ

многоканальный

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001 Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

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