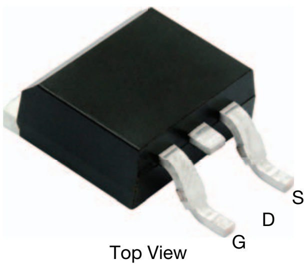
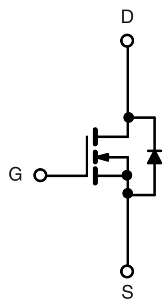
Automotive N-Channel 100 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	100
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.0059
$R_{DS(on)}$ (Ω) at V_{GS} = 4.5 V	0.0080
I_D (A)	75
Configuration	Single
Package	TO-263

TO-263



Top View



N-Channel MOSFET

FEATURES

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

AUTOMOTIVE GRADE

RoHS COMPLIANT

HALOGEN FREE

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	T_C = 25 °C [a]	I_D	75	A
	T_C = 125 °C		67	
Continuous Source Current (Diode Conduction) [a]		I_S	75	
Pulsed Drain Current [b]		I_{DM}	180	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	60	
Single Pulse Avalanche Energy		E_{AS}	180	mJ
Maximum Power Dissipation [b]	T_C = 25 °C	P_D	166	W
	T_C = 125 °C		55	
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}	0.9	

Notes

a. Package limited.
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
c. When mounted on 1" square PCB (FR4 material).

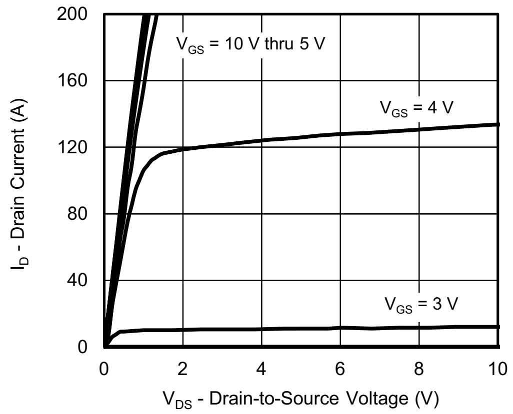
SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0, I_D = 250 μA		100	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA		1.5	2.0	2.5	
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V	V_{DS} = 100 V	-	-	1	μA
		V_{GS} = 0 V	V_{DS} = 100 V, T_J = 125 °C	-	-	50	
		V_{GS} = 0 V	V_{DS} = 100 V, T_J = 175 °C	-	-	500	
On-State Drain Current [a]	$I_{D(on)}$	V_{GS} = 10 V	$V_{DS} \geq$ 5 V	50	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 30 A	-	0.0046	0.0059	Ω
		V_{GS} = 10 V	I_D = 30 A, T_J = 125 °C	-	-	0.0099	
		V_{GS} = 10 V	I_D = 30 A, T_J = 175 °C	-	-	0.0123	
		V_{GS} = 4.5 V	I_D = 20 A	-	0.0056	0.0080	
Forward Transconductance [b]	g_{fs}	V_{DS} = 15 V, I_D = 25 A		-	95	-	S
Dynamic [b]							
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 25 V, f = 1 MHz	-	4170	5500	pF
Output Capacitance	C_{oss}			-	1935	2600	
Reverse Transfer Capacitance	C_{rss}			-	160	220	
Total Gate Charge [c]	Q_g	V_{GS} = 10 V	V_{DS} = 50 V, I_D = 50 A	-	66	100	nC
Gate-Source Charge [c]	Q_{gs}			-	14	-	
Gate-Drain Charge [c]	Q_{gd}			-	12	-	
Gate Resistance	R_g	f = 1 MHz		0.90	1.92	3	Ω
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DD} = 50 V, R_L = 1.08 Ω $I_D \cong$ 50 A, V_{GEN} = 10 V, R_g = 1 Ω		-	13	25	ns
Rise Time [c]	t_r			-	21	35	
Turn-Off Delay Time [c]	$t_{d(off)}$			-	34	60	
Fall Time [c]	t_f			-	13	25	
Source-Drain Diode Ratings and Characteristics [b]							
Pulsed Current [a]	I_{SM}			-	-	180	A
Forward Voltage	V_{SD}	I_F = 50 A, V_{GS} = 0		-	0.90	1.5	V

Notes

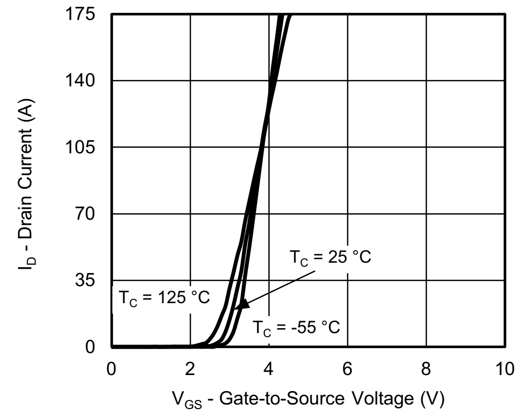
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

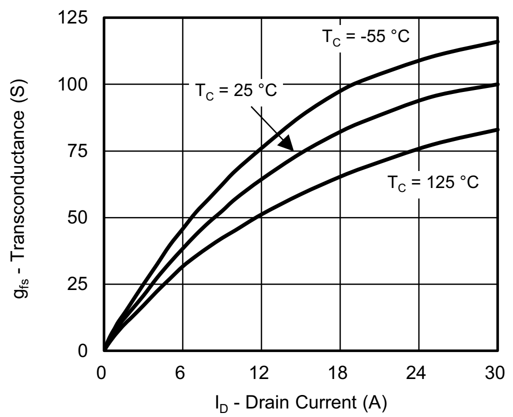
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



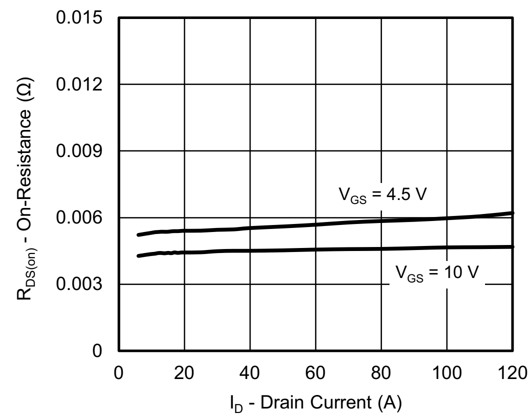
Output Characteristics



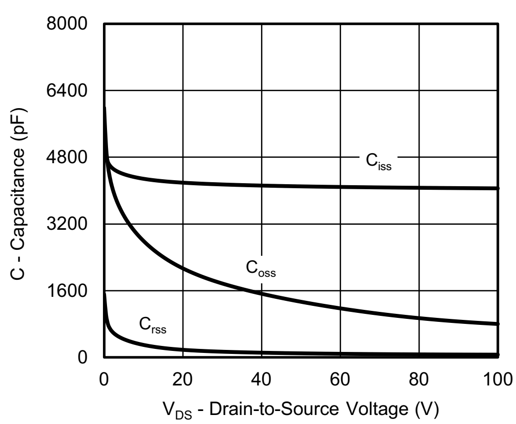
Transfer Characteristics



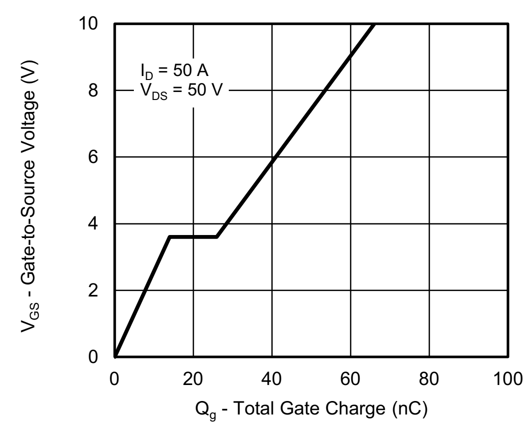
Transconductance



On-Resistance vs. Drain Current

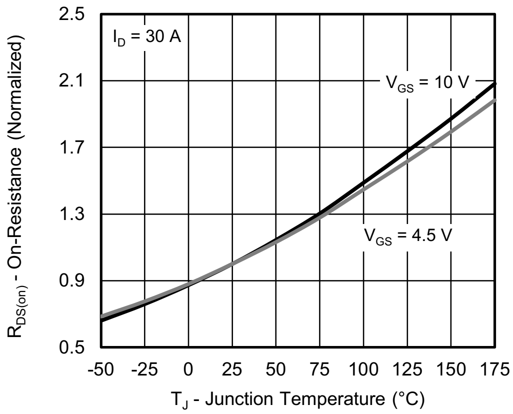


Capacitance

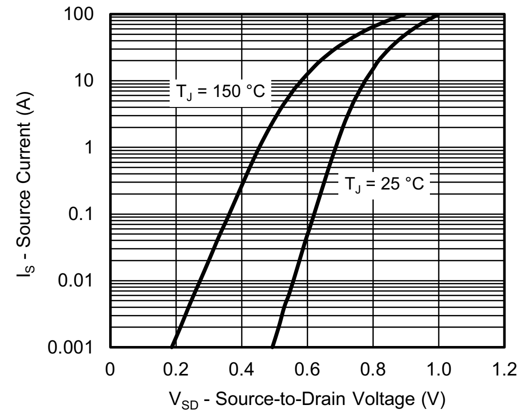


Gate Charge

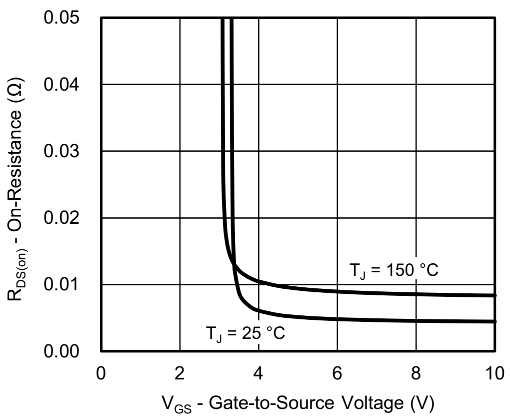
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



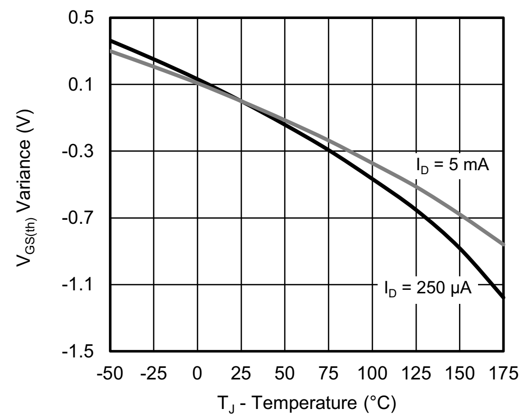
On-Resistance vs. Junction Temperature



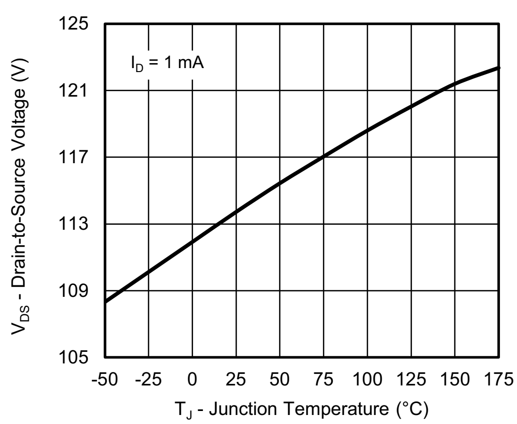
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

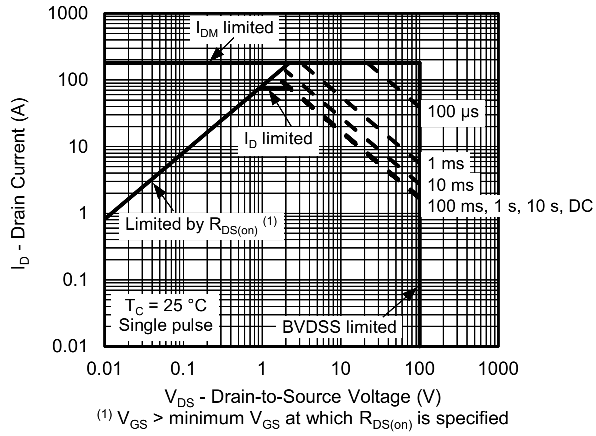


Threshold Voltage

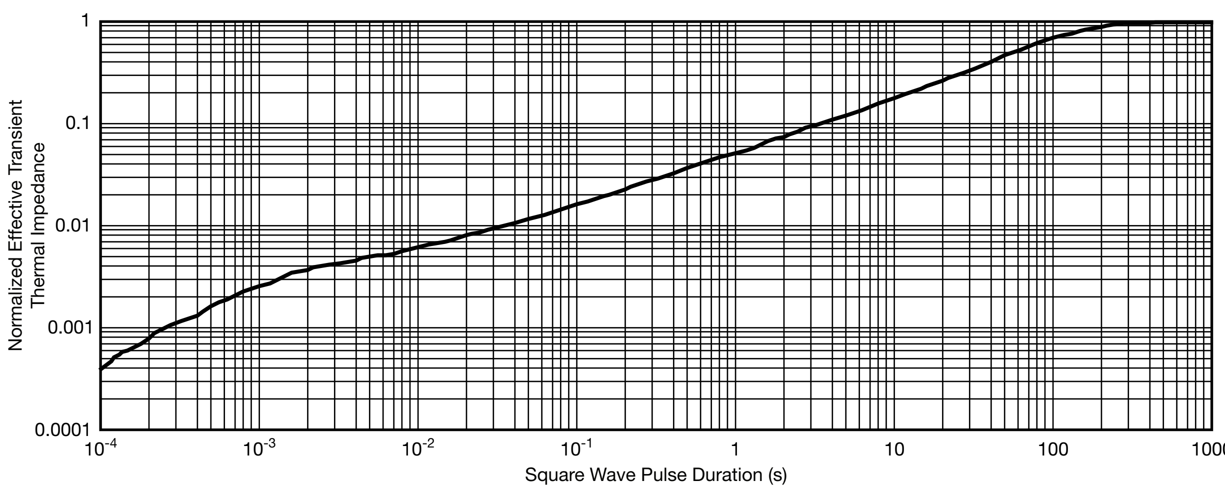


Drain Source Breakdown vs. Junction Temperature

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

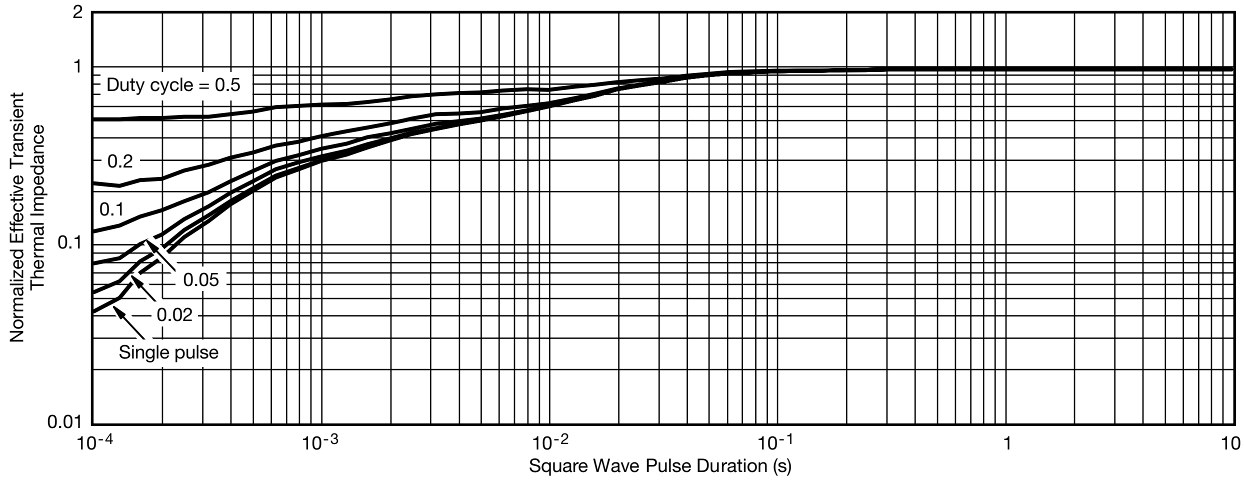


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

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.

D^2PAK / TO-263 and TO-262

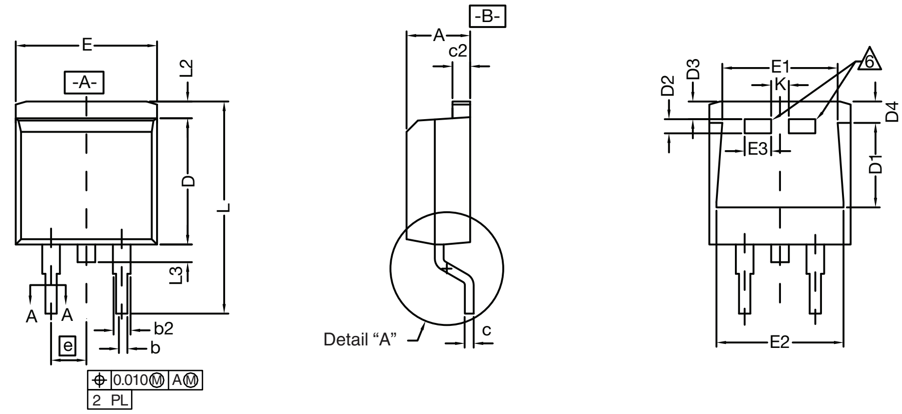
Ordering codes for the SQ rugged series power MOSFETs in the D^2PAK / TO-263 and TO-262 packages:

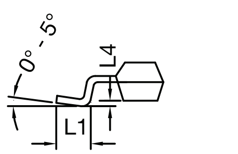
DATASHEET PART NUMBER	OLD ORDERING CODE [a]	NEW ORDERING CODE
SQM100N04-2m7	SQM100N04-2M7-GE3	**SQM100N04-2M7_GE3**
SQM100N10-10	SQM100N10-10-GE3	**SQM100N10-10_GE3**
SQM110N05-06L	SQM110N05-06L-GE3	**SQM110N05-06L_GE3**
SQM110P06-8m9L	SQM110P06-8M9L-GE3	**SQM110P06-8M9L_GE3**
SQM120N02-1m3L	SQM120N02-1M3L-GE3	**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**
SQM40010EL	-	**SQM40010EL_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**
SQM70060EL	-	**SQM70060EL_GE3**
SQM85N15-19	SQM85N15-19-GE3	**SQM85N15-19_GE3**
SQV120N10-3m8	SQV120N10-3m8-GE3	**SQV120N10-3m8_GE3**
SQV120N06-4m7L	-	**SQV120N06-4m7L_GE3**

Note

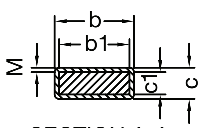
a. Old ordering code is obsolete and no longer valid for new orders

TO-263 (D^2PAK): 3-LEAD





DETAIL A (ROTATED 90°)



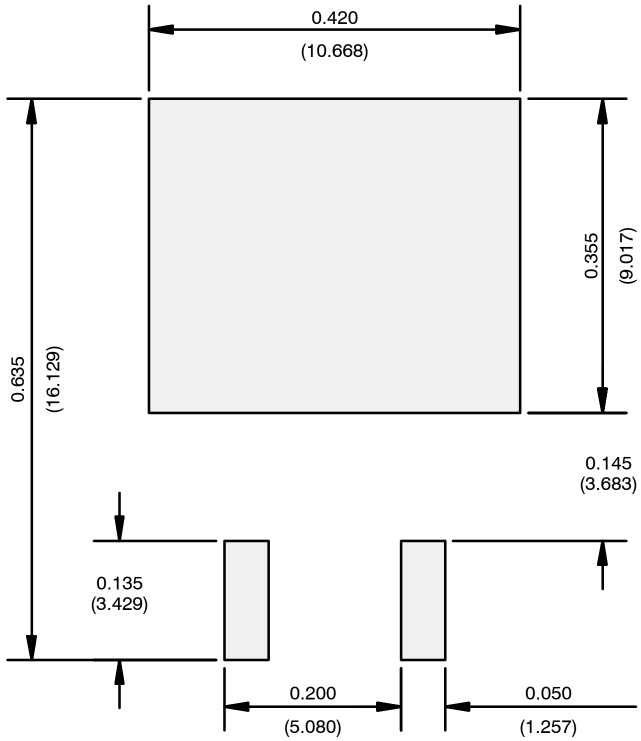
SECTION A-A

DIM.	INCHES MIN.	INCHES MAX.	MILLIMETERS MIN.	MILLIMETERS MAX.
A	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* 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
c1 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
e	0.100 BSC		2.54 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	
M	-	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.
6. This feature is for thick lead.

RECOMMENDED MINIMUM PADS FOR D^2PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

Return to Index

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.

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.