SQM40031EL_GE3-VB Datasheet

P-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	- 40
$R_{DS(on)}$ (Ω) at V_{GS} = - 10 V	0.006
$R_{DS(on)}$ (Ω) at V_{GS} = - 4.5 V	0.007
I_D (A)	-80
Configuration	Single

FEATURES

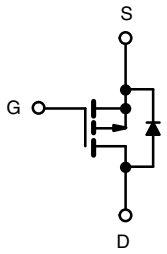
- **Halogen-free According to IEC 61249-2-21 Definition**
- SGT technology Power MOSFET
- Package with Low Thermal Resistance
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT
HALOGEN FREE

TO-263



Top View



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Drain-Source Voltage		V_{DS}	- 40	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	T_C = 25 °C	I_D	-80	A
	T_C = 125 °C		-50	
Continuous Source Current (Diode Conduction)[a]		I_S	-70	
Pulsed Drain Current[b]		I_{DM}	-240	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	-70	
Single Pulse Avalanche Energy		E_{AS}	1345	mJ
Maximum Power Dissipation[b]	T_C = 25 °C	P_D	250	W
	T_C = 125 °C		100	
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}	50	°C/W
Junction-to-Case (Drain)		R_{thJC}	0.6	

Notes

a. Package limited.
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
c. When mounted on 1" square PCB (FR-4 material).
d. Parametric verification ongoing.

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 V, I_D = - 250 µA		- 40	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA		- 1.0	-	-3.0	
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} = - 40 V	-	-	- 1	µA
		V_{GS} = 0 V	V_{DS} = - 40 V, T_J = 125 °C	-	-	- 50	
		V_{GS} = 0 V	V_{DS} = - 40 V, T_J = 175 °C	-	-	- 250	
On-State Drain Current[a]	$I_{D(on)}$	V_{GS} = - 10 V	V_{DS} ≤ - 5 V	- 30	-	-	A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 10 V	I_D = - 20 A	-	0.006	-	Ω
		V_{GS} = - 10 V	I_D = - 20 A, T_J = 125 °C	-	0.006	-	
		V_{GS} = - 10 V	I_D = - 20 A, T_J = 175 °C	-	0.011	-	
		V_{GS} = - 4.5 V	I_D = -20 A	-	0.005	-	
Forward Transconductance[b]	g_{fs}	V_{DS} = - 15 V, I_D = -20 A		-	35	-	S
Dynamic[b]							
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = - 25 V, f = 1 MHz	-	8000	-	pF
Output Capacitance	C_{oss}			-	301	-	
Reverse Transfer Capacitance	C_{rss}			-	208	-	
Total Gate Charge[c]	Q_g	V_{GS} = - 10 V	V_{DS} = - 50V, I_D = - 9.2 A	-	96	144	nC
Gate-Source Charge[c]	Q_{gs}			-	8.4	-	
Gate-Drain Charge[c]	Q_{gd}			-	23.5	-	
Gate Resistance	R_g	f = 1 MHz		1.5	3.13	4.7	Ω
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = - 50 V, R_L = 6.49 Ω I_D ≅ - 7.7 A, V_{GEN} = - 10 V, R_g = 1.0 Ω		-	11	17	ns
Rise Time[c]	t_r			-	11	17	
Turn-Off Delay Time[c]	$t_{d(off)}$			-	78	117	
Fall Time[c]	t_f			-	15	23	
Source-Drain Diode Ratings and Characteristics[b]							
Pulsed Current[a]	I_{SM}			-	-	- 240	A
Forward Voltage	V_{SD}	I_F = - 7.7 A, V_{GS} = 0 V		-	- 0.8	- 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 Electrical and Thermal Characteristics

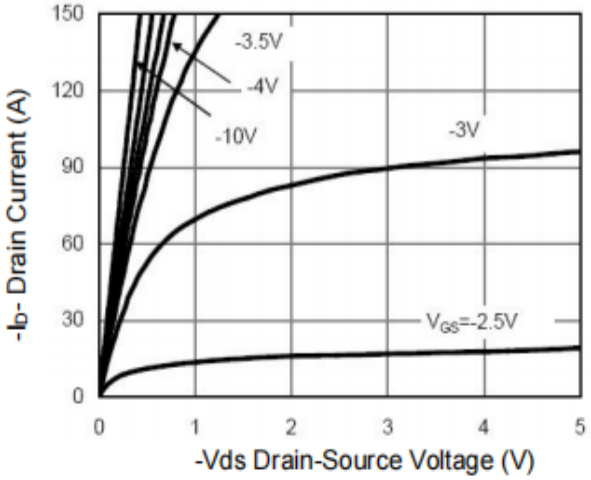


Figure 1 Output Characteristics

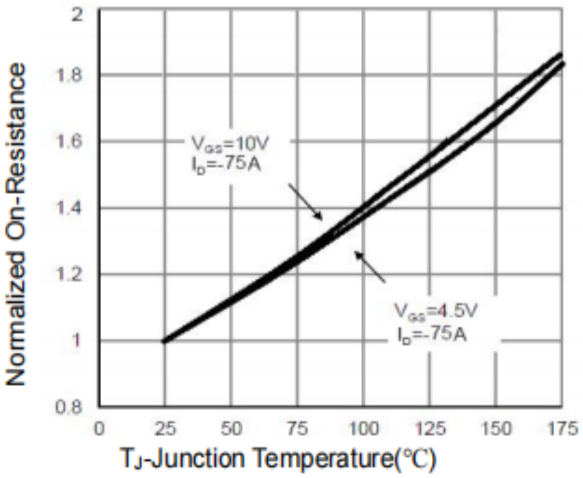


Figure 4 Rdson-JunctionTemperature

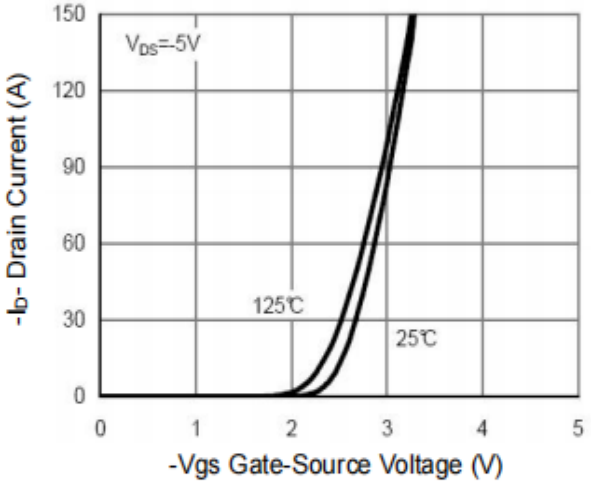


Figure 2 Transfer Characteristics

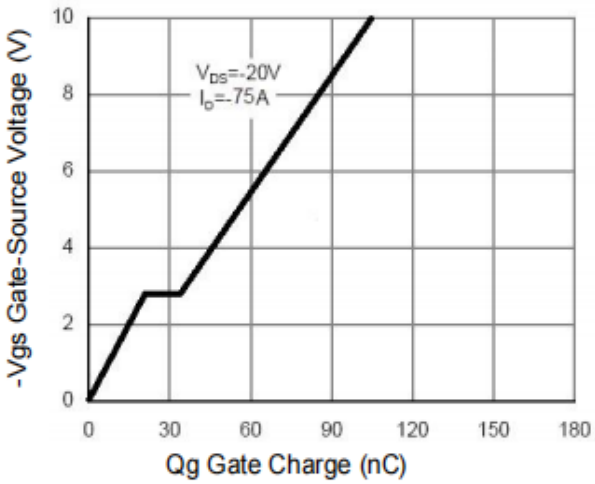


Figure 5 Gate Charge

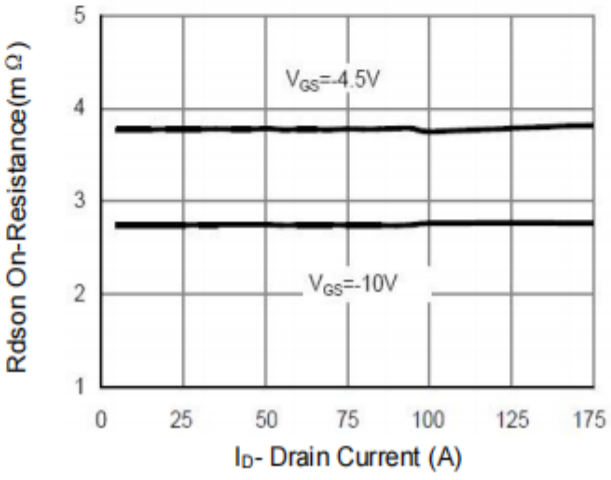


Figure 3 Rdson- Drain Current

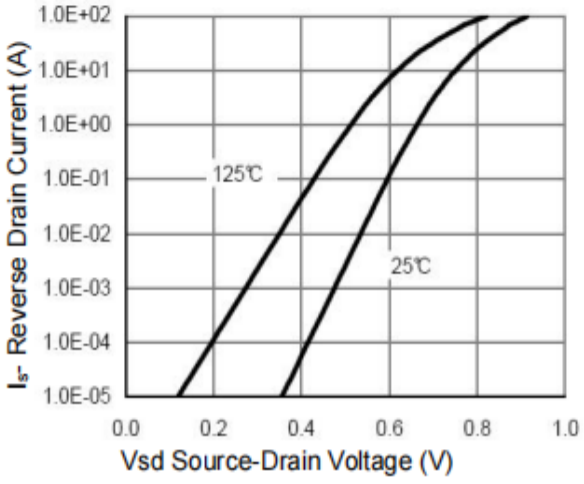


Figure 6 Source- Drain Diode Forward

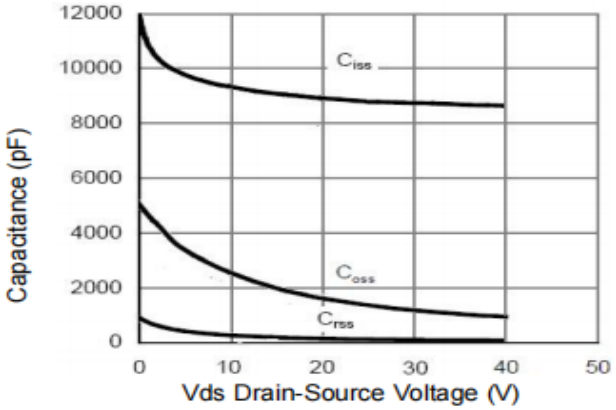


Figure 7 Capacitance vs Vds

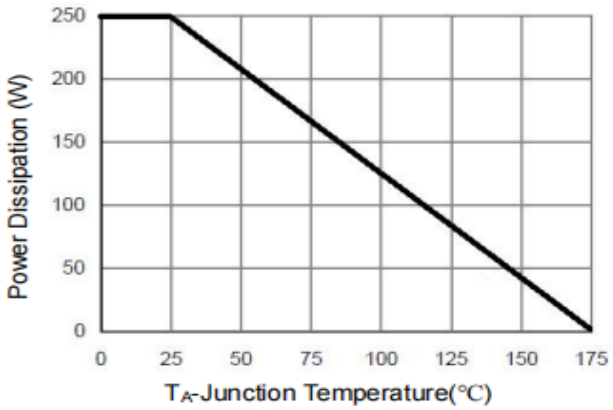


Figure 9 Power De-rating

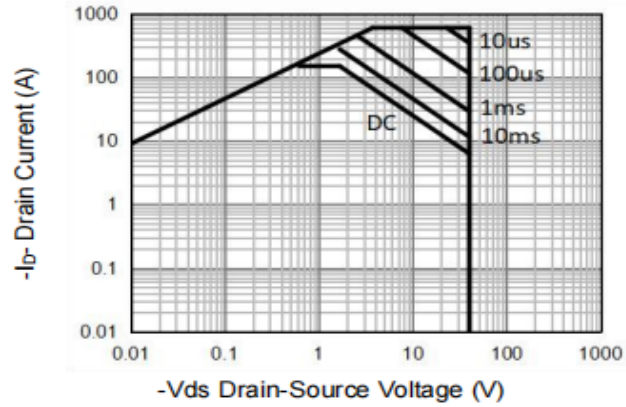


Figure 8 Safe Operation Area(Note 3)

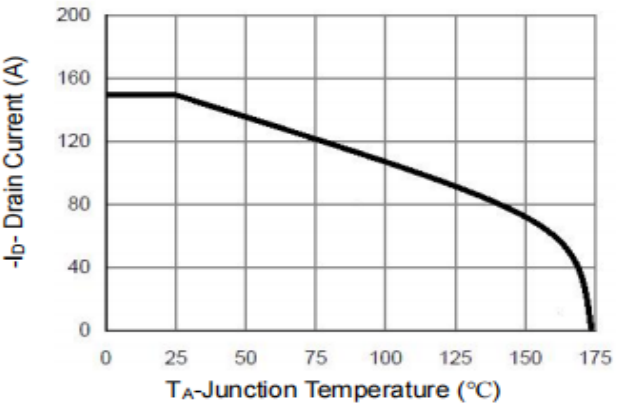


Figure 10 Current De-rating

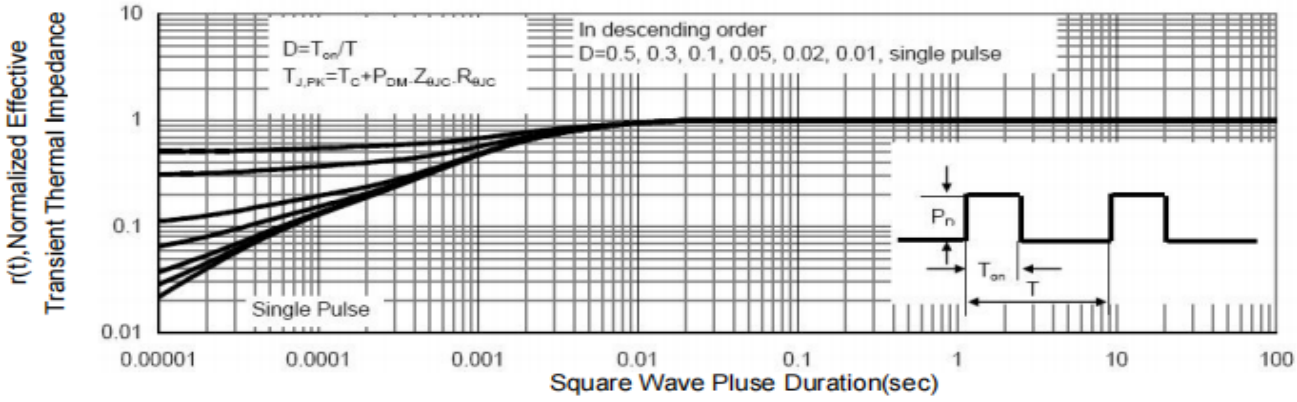
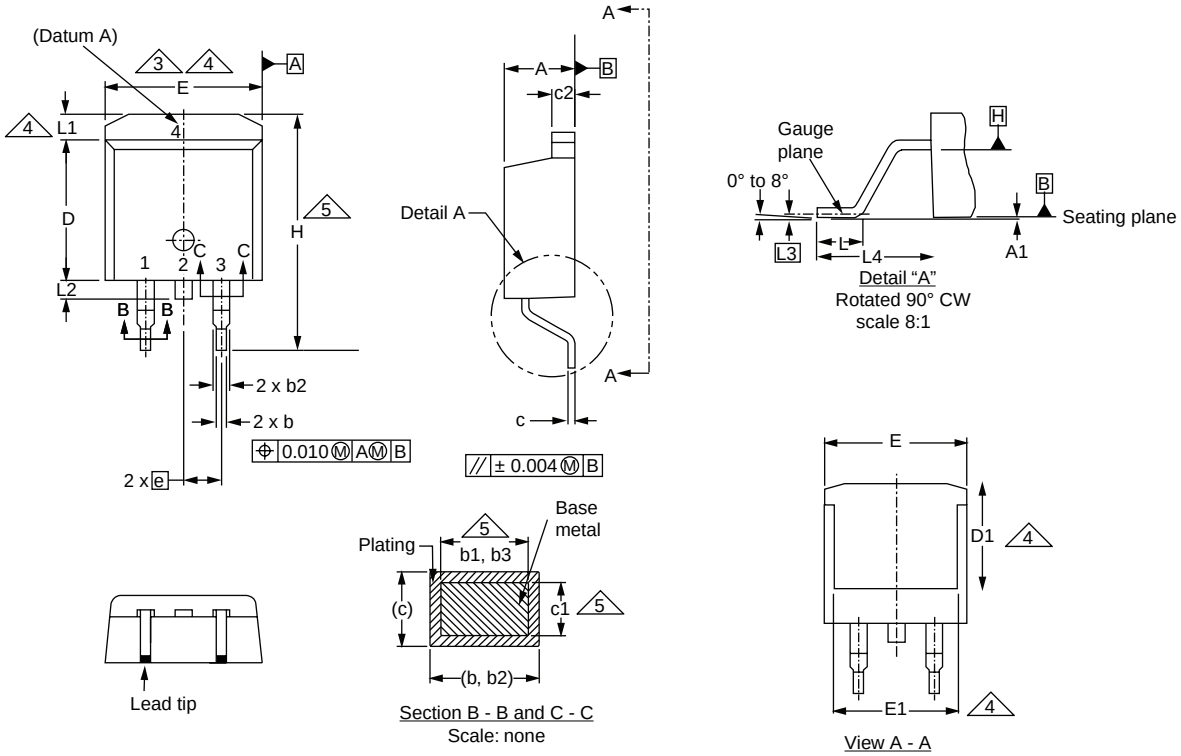


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-263



	MILLIMETERS		INCHES	
DIM.	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380

	MILLIMETERS		INCHES	
DIM.	MIN.	MAX.	MIN.	MAX.
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	-	1.65	-	0.066
L2	-	1.78	-	0.070
L3	0.25 BSC		0.010 BSC	
L4	4.78	5.28	0.188	0.208

ECN: S-82110-Rev. A, 15-Sep-08
DWG: 5970

Notes

1. Dimensioning and tolerancing per ASME Y14.5M.
2. Dimensions are shown in millimeters (inches).
3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body at datum A.
4. Thermal PAD contour optional within dimension E, L1, D1 and E1.
5. Dimension b1 and c1 apply to base metal only.
6. Datum A and B to be determined at datum plane H.
7. Outline conforms to JEDEC outline to TO-263AB.

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