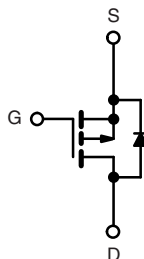
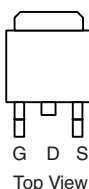


Automotive P-Channel 40 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

V_{DS} (V)	- 40
$R_{DS(on)}$ (Ω) at $V_{GS} = -10$ V	0.0040
$R_{DS(on)}$ (Ω) at $V_{GS} = -4.5$ V	0.0060
I_D (A)	- 120
Configuration	Single

TO-263


P-Channel MOSFET

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- AEC-Q101 Qualified^d
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

ORDERING INFORMATION

Package	TO-263
Lead (Pb)-free and Halogen-free	SQM110P04-04L-GE3

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 ^a	I_D	- 120	A
		- 120	
Continuous Source Current (Diode Conduction) ^a	I_S	- 120	
Pulsed Drain Current ^b	I_{DM}	- 330	
Single Pulse Avalanche Current	I_{AS}	- 80	
Single Pulse Avalanche Energy	E_{AS}	320	mJ
Maximum Power Dissipation ^b	P_D	375	W
		125	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 175	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.40	

Notes

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

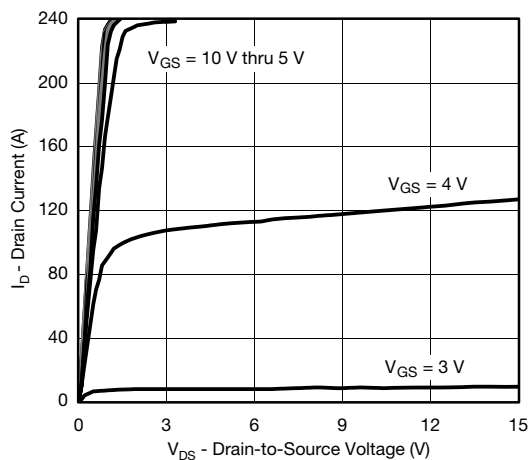
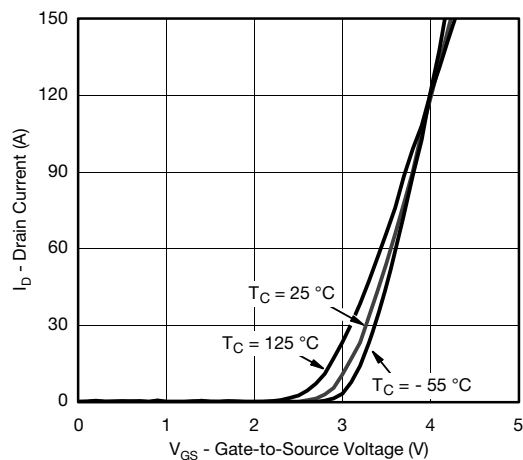
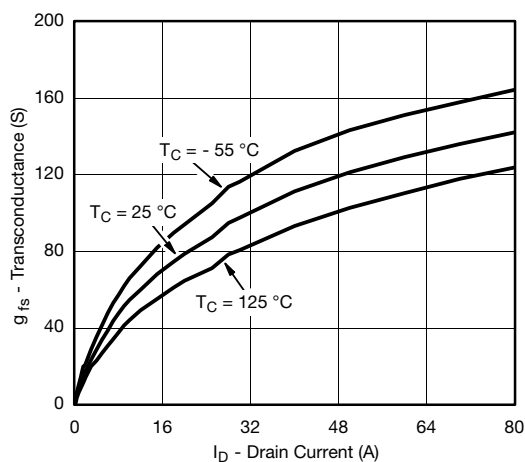
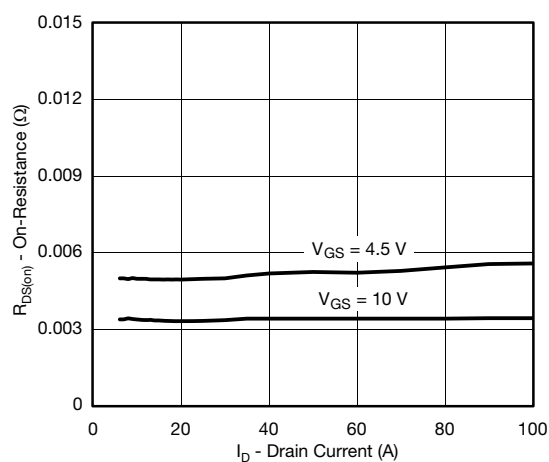
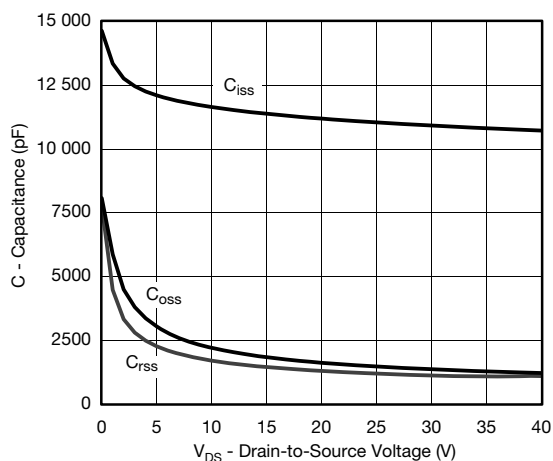
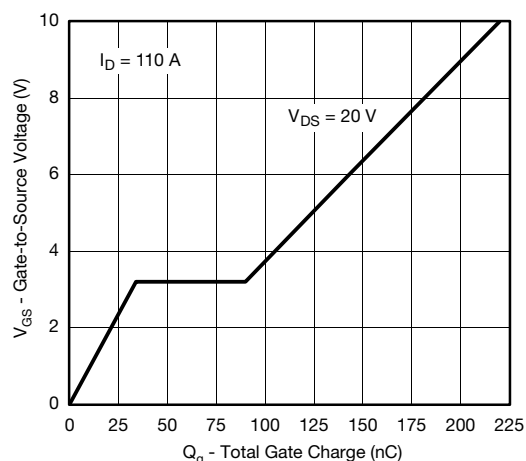


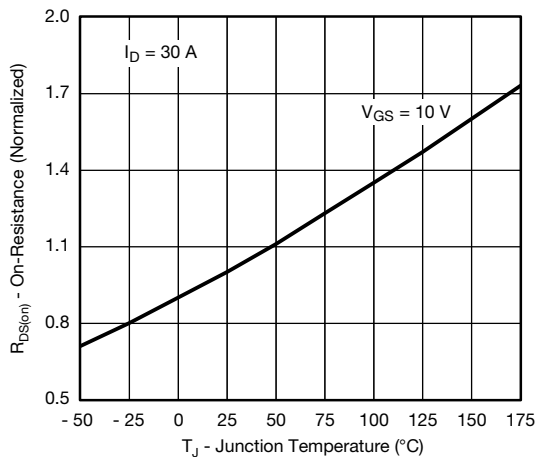
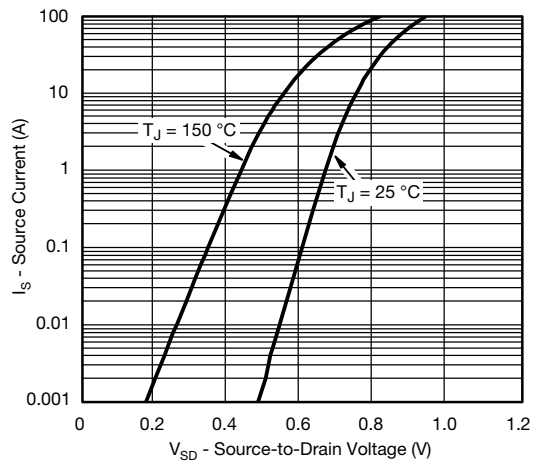
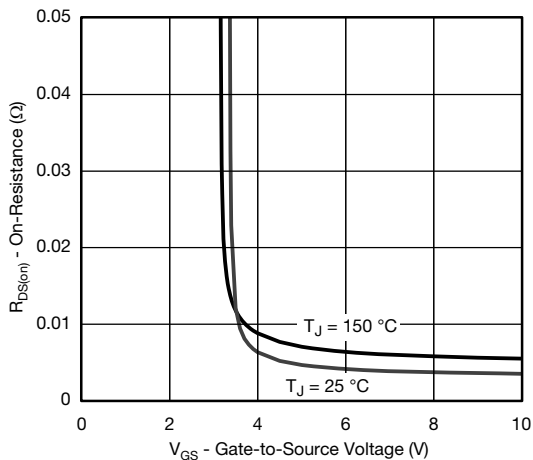
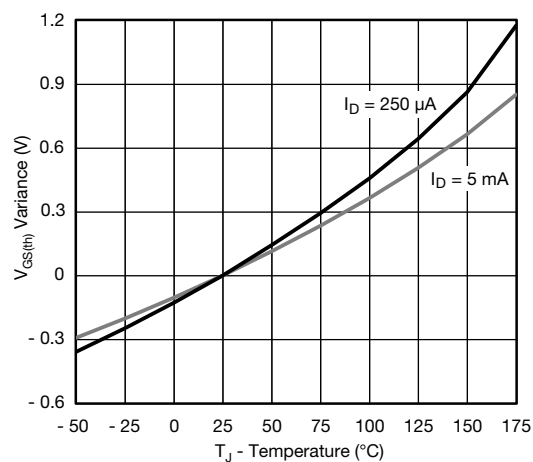
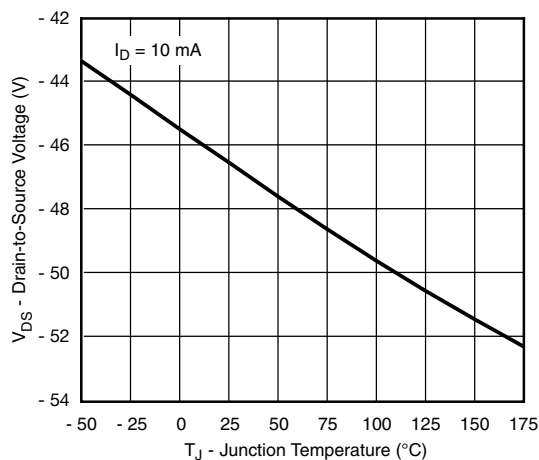
SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0, I _D = - 250 μA		- 40	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA		- 1.5	- 2.0	- 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} = - 40 V	-	-	- 1.0	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	- 120	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V	I _D = - 30 A	-	0.0034	0.0040	Ω
		V _{GS} = - 10 V	I _D = - 30 A, T _J = 125 °C	-	-	0.0059	
		V _{GS} = - 10 V	I _D = - 30 A, T _J = 175 °C	-	-	0.0070	
		V _{GS} = - 4.5 V	I _D = - 20 A	-	0.0050	0.0060	
Forward Transconductance ^b	g _{fs}	V _{DS} = - 15 V, I _D = - 30 A		-	97	-	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = - 20 V, f = 1 MHz	-	11 183	13 980	pF
Output Capacitance	C _{oss}			-	1614	2020	
Reverse Transfer Capacitance	C _{rss}			-	1294	1620	
Total Gate Charge ^c	Q _g	V _{GS} = - 10 V	V _{DS} = - 20 V, I _D = - 110 A	-	220	330	nC
Gate-Source Charge ^c	Q _{gs}			-	34	-	
Gate-Drain Charge ^c	Q _{gd}			-	56	-	
Gate Resistance	R _g	f = 1 MHz		1.2	2.5	3.7	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = - 20 V, R _L = 0.18 Ω I _D ≅ - 110 A, V _{GEN} = - 10 V, R _g = 1 Ω		-	17	26	ns
Rise Time ^c	t _r			-	15	23	
Turn-Off Delay Time ^c	t _{d(off)}			-	112	168	
Fall Time ^c	t _f			-	45	68	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed Current ^a	I _{SM}			-	-	- 330	A
Forward Voltage	V _{SD}	I _F = - 100 A, V _{GS} = 0		-	- 0.95	- 1.5	V

Notes

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

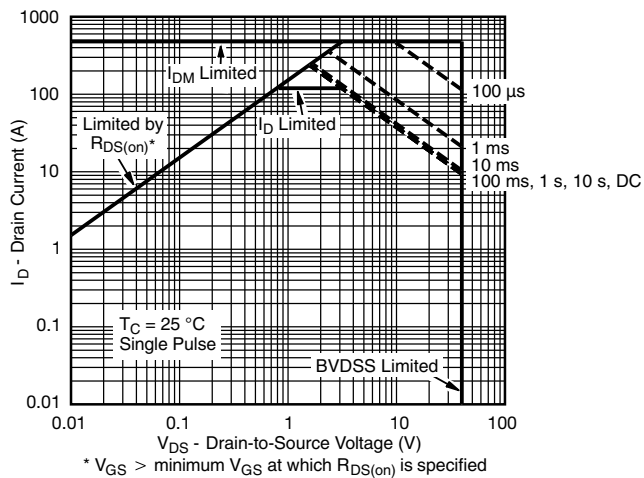
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

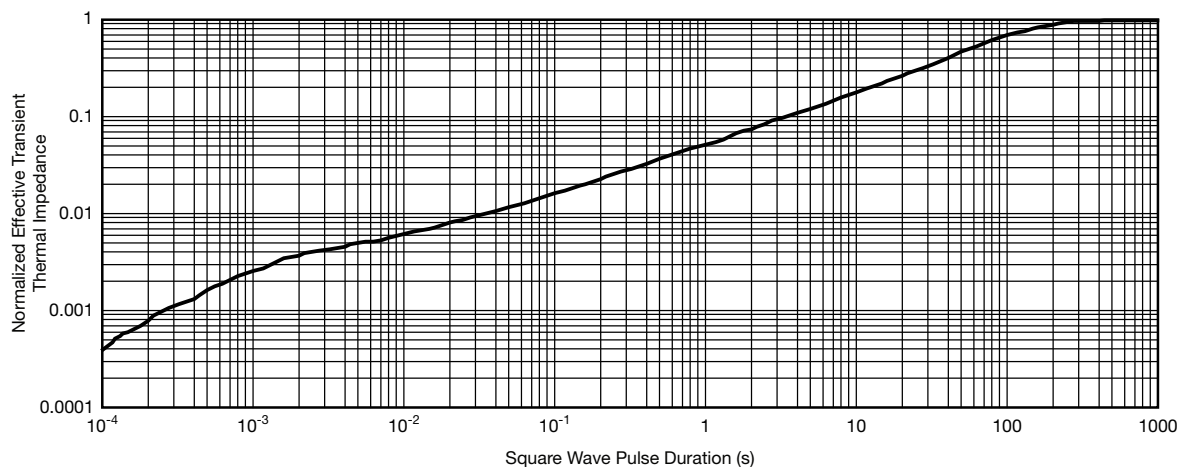
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

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 ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



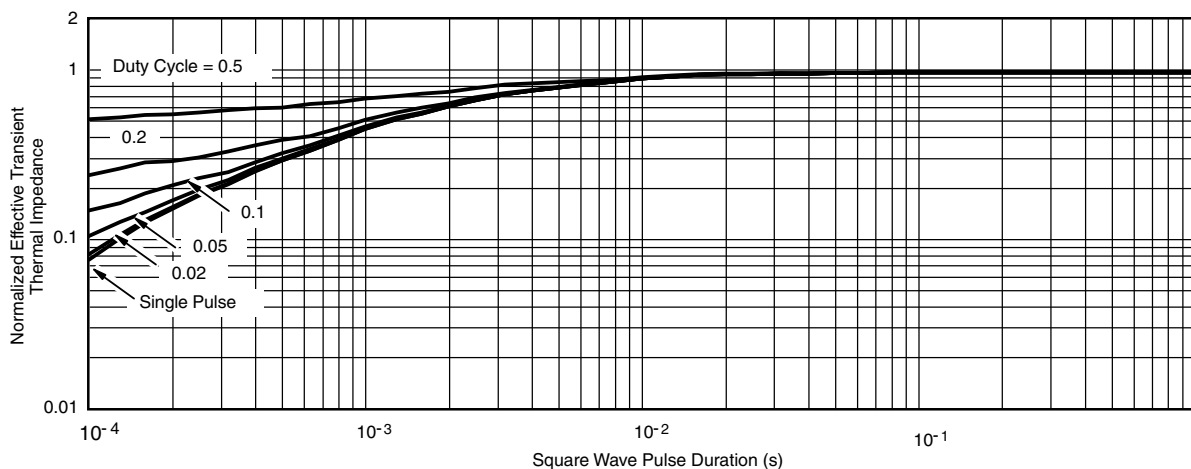
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, 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 ($25\text{ }^{\circ}\text{C}$)
 - Normalized Transient Thermal Impedance Junction-to-Case ($25\text{ }^{\circ}\text{C}$)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.

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