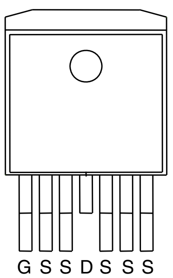
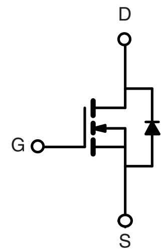
Automotive N-Channel 40 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	40
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.0011
$R_{DS(on)}$ (Ω) at V_{GS} = 4.5 V	0.0013
I_D (A)	200
Configuration	Single

TO-263-7L





N-Channel MOSFET

FEATURES

- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- 100 % R_g and UIS Tested
- AEC-Q101 Qualified[d]
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE
RoHS COMPLIANT
HALOGEN FREE

ORDERING INFORMATION	
Package	TO-263-7L
Lead (Pb)-free and Halogen-free	SQM200N04-1m1L-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]	T_C = 25 °C	I_D	200	A
	T_C = 125 °C		200	
Continuous Source Current (Diode Conduction)[a]		I_S	200	
Pulsed Drain Current[b]		I_{DM}	600	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	100	
Single Pulse Avalanche Energy		E_{AS}	500	mJ
Maximum Power Dissipation[b]	T_C = 25 °C	P_D	375	W
	T_C = 125 °C		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	PCB Mount[c]	R_{thJA}	40	°C/W
Junction-to-Case (Drain)		R_{thJC}	0.4	

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.

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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		1.5	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	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	-	-	500	
On-State Drain Current[a]	$I_{D(on)}$	V_{GS} = 10 V	$V_{DS} \geq 5$ V	200	-	-	A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 30 A	-	0.0008	0.0011	Ω
		V_{GS} = 10 V	I_D = 30 A, T_J = 125 °C	-	-	0.0019	
		V_{GS} = 10 V	I_D = 30 A, T_J = 175 °C	-	-	0.0023	
		V_{GS} = 4.5 V	I_D = 20 A	-	0.0009	0.0013	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 30 A		-	219	-	S
Dynamic[b]							
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 25 V, f = 1 MHz	-	16 524	20 655	pF
Output Capacitance	C_{oss}			-	2060	2575	
Reverse Transfer Capacitance	C_{rss}			-	484	605	
Total Gate Charge[c]	Q_g	V_{GS} = 10 V	V_{DS} = 20 V, I_D = 20 A	-	275	413	nC
Gate-Source Charge[c]	Q_{gs}			-	56.6	-	
Gate-Drain Charge[c]	Q_{gd}			-	45.4	-	
Gate Resistance	R_g	f = 1 MHz		4.2	8.5	12.8	Ω
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 20 V, R_L = 1 Ω $I_D \cong 20$ A, V_{GEN} = 10 V, R_g = 1 Ω		-	13	20	ns
Rise Time[c]	t_r			-	12	18	
Turn-Off Delay Time[c]	$t_{d(off)}$			-	443	665	
Fall Time[c]	t_f			-	126	189	
Source-Drain Diode Ratings and Characteristics[b]							
Pulsed Current[a]	I_{SM}			-	-	600	A
Forward Voltage	V_{SD}	I_F = 60 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.

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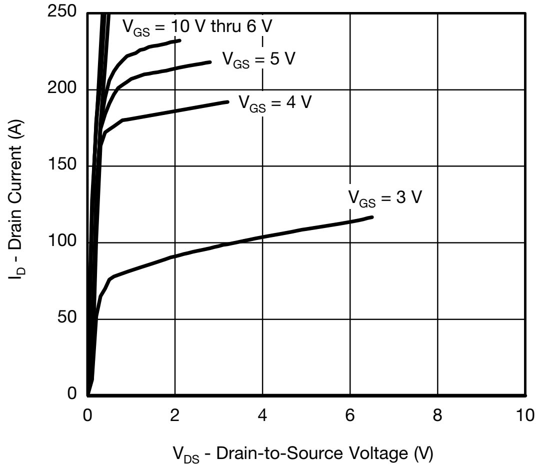
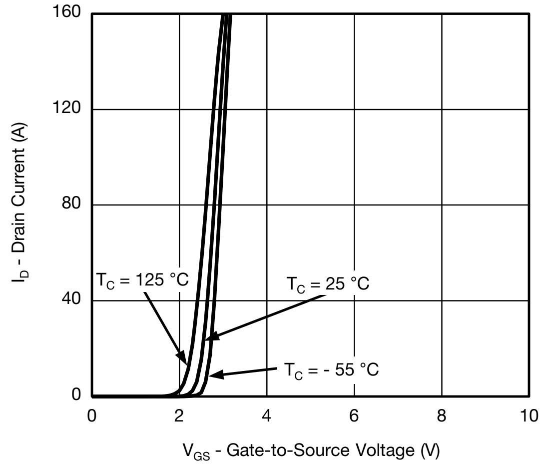
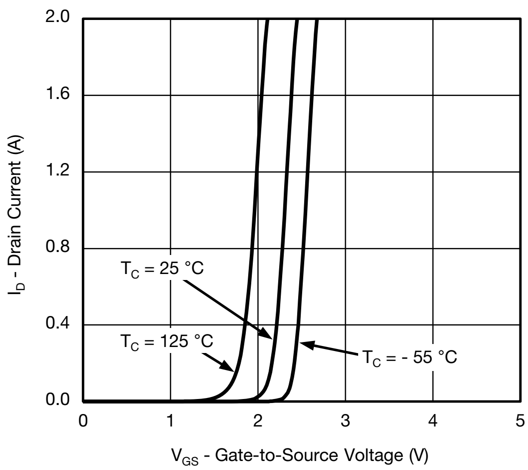
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



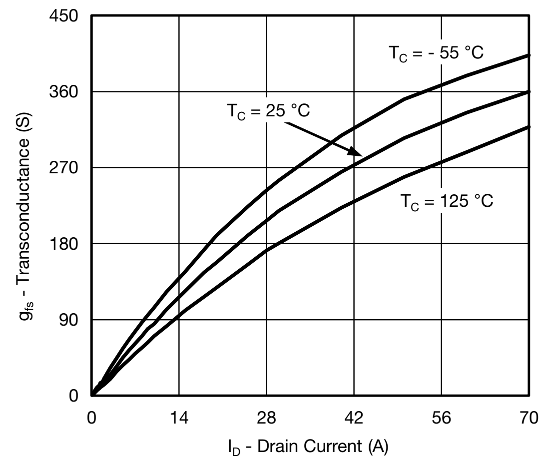
Output Characteristics



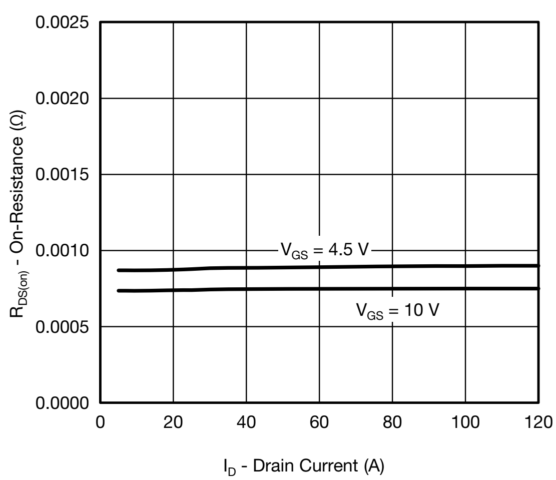
Transfer Characteristics



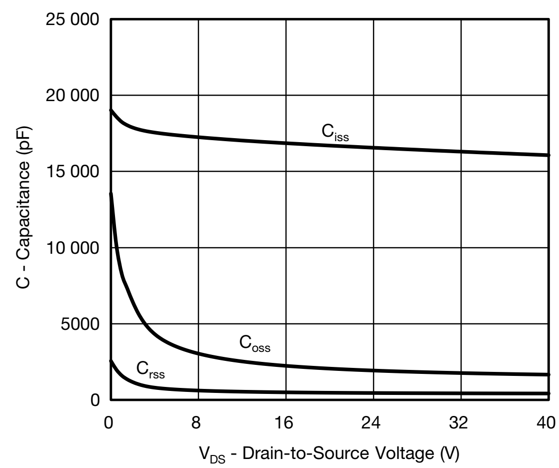
Transfer Characteristics



Transconductance



On-Resistance vs. Drain Current



Capacitance

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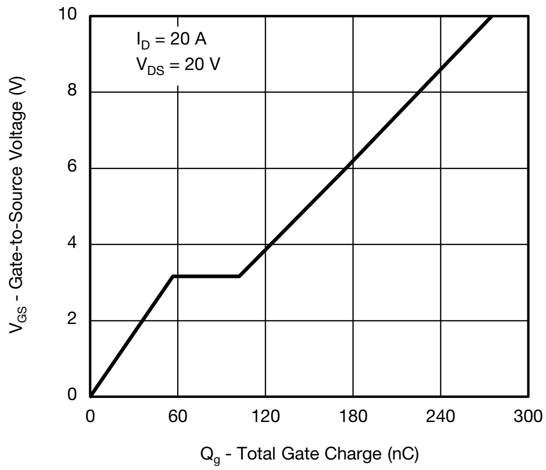
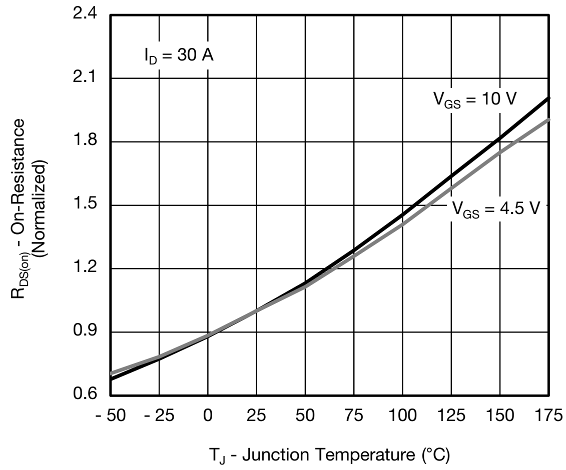
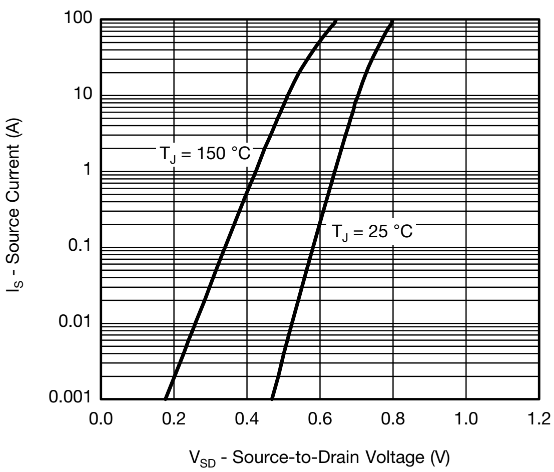


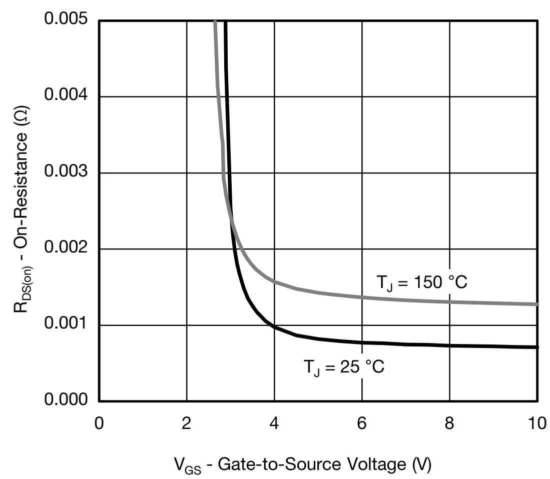
Gate Charge



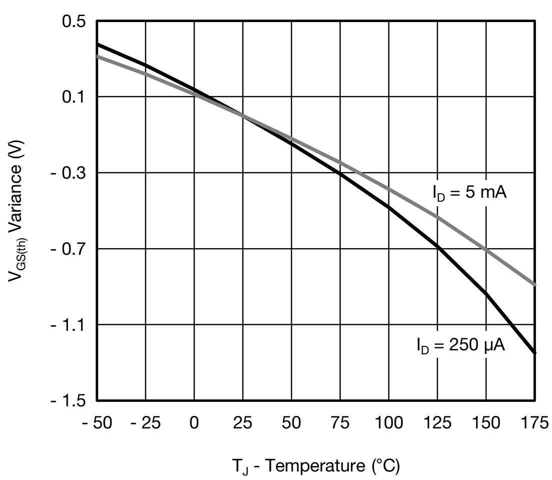
On-Resistance vs. Junction Temperature



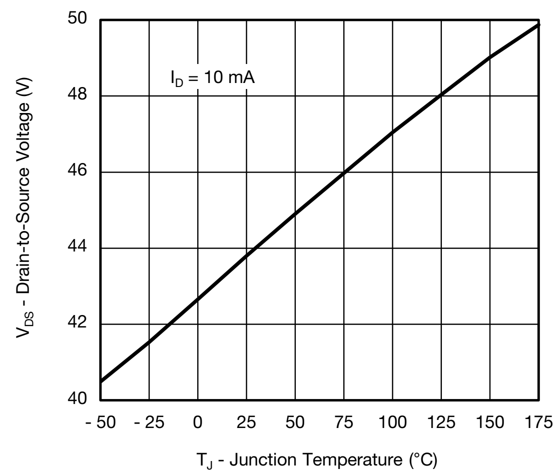
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Drain Source Breakdown vs. Junction Temperature

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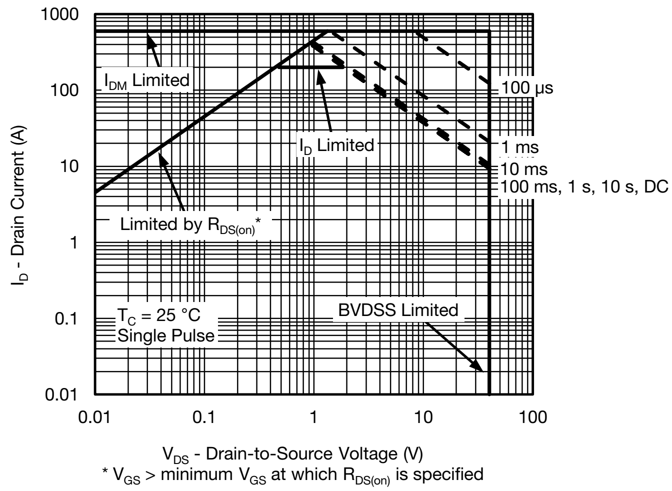
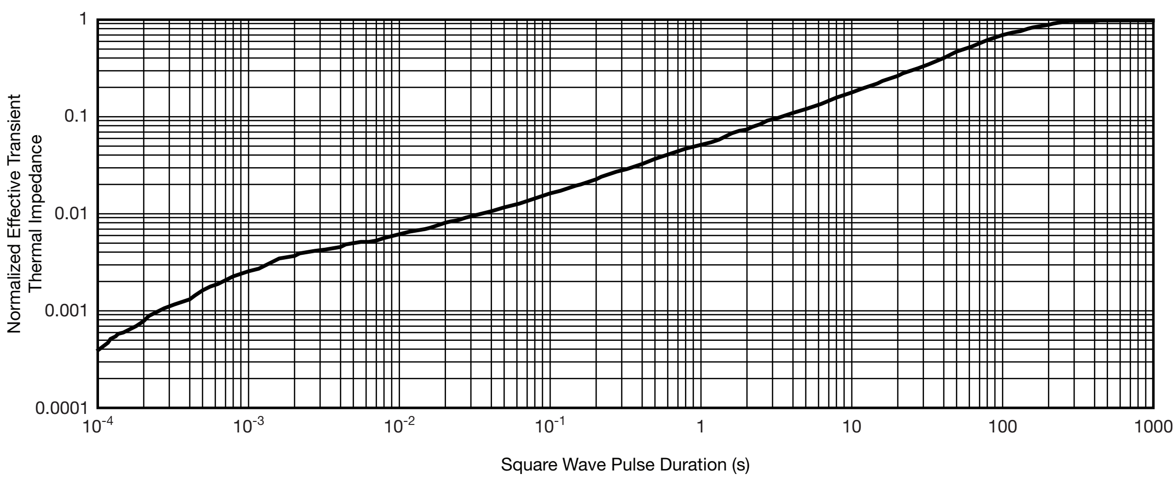


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

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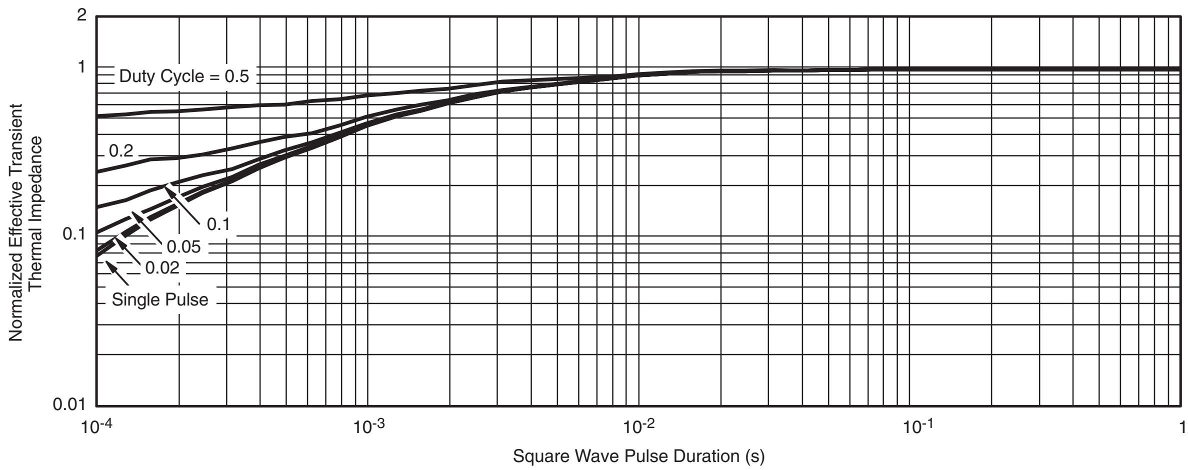

Normalized Thermal Transient Impedance, Junction-to-Case

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.

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