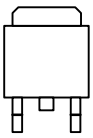
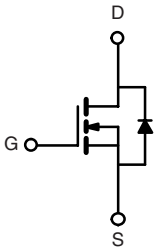
Automotive N-Channel 40 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	40
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.0035
$R_{DS(on)}$ (Ω) at V_{GS} = 4.5 V	-
I_D (A)	120
Configuration	Single

TO-263



Top View



N-Channel MOSFET

FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- AEC-Q101 Qualified[d]
- Compliant to RoHS Directive 2002/95/EC
- Find out more about Vishay's Automotive Grade Product Requirements at: www.vishay.com/applications

RoHS COMPLIANT
HALOGEN FREE
AUTOMOTIVE GRADE

ORDERING INFORMATION	
Package	TO-263
Lead (Pb)-free and Halogen-free	SQM110N04-04-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	120	A
	T_C = 125 °C		107	
Continuous Source Current (Diode Conduction)[a]		I_S	120	
Pulsed Drain Current[b]		I_{DM}	350	
Single Pulse Avalanche Energy	L = 0.1 mH	E_{AS}	180	mJ
Single Pulse Avalanche Current		I_{AS}	60	A
Maximum Power Dissipation[b]	T_C = 25 °C	P_D	250	W
	T_A = 25 °C		3.75	
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}	0.6	

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.

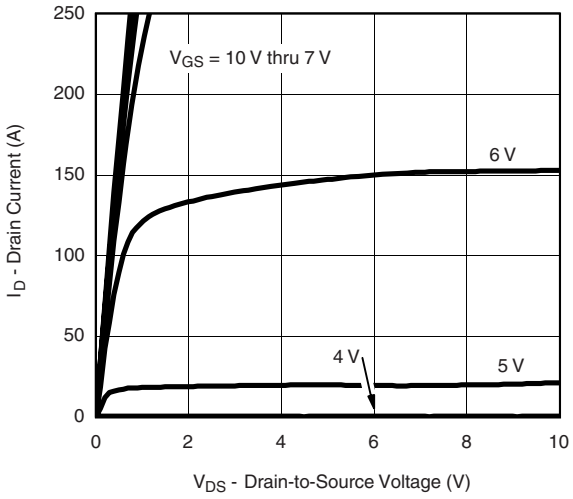
SPECIFICATIONS T_C = 25 °C, unless otherwise noted							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA		40	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA		2.5	-	3.5	
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	110	-	-	A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 30 A	-	0.0028	0.0035	Ω
		V_{GS} = 10 V	I_D = 30 A, T_J = 125 °C	-	-	0.0055	
		V_{GS} = 10 V	I_D = 30 A, T_J = 175 °C	-	-	0.0060	
		V_{GS} = 4.5 V	I_D = 20 A	-	-	-	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A		30	-	-	S
Dynamic[b]							
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 25 V, f = 1 MHz	-	6800	-	pF
Output Capacitance	C_{oss}			-	1110	-	
Reverse Transfer Capacitance	C_{rss}			-	690	-	
Total Gate Charge[c]	Q_g	V_{GS} = 10 V	V_{DS} = 30 V, I_D = 110 A	-	140	-	nC
Gate-Source Charge[c]	Q_{gs}			-	35	-	
Gate-Drain Charge[c]	Q_{gd}			-	55	-	
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 30 V, R_L = 0.47 Ω I_D ≅ 110 A, V_{GEN} = 10 V, R_g = 2.5 Ω		-	20	-	ns
Rise Time[c]	t_r			-	115	-	
Turn-Off Delay Time[c]	$t_{d(off)}$			-	75	-	
Fall Time[c]	t_f			-	85	-	
Source-Drain Diode Ratings and Characteristics T_C = 25 °C[b]							
Pulsed Current[a]	I_{SM}			-	-	350	A
Forward Voltage	V_{SD}	I_F = 110 A, V_{GS} = 0 V		-	1.1	1.4	V

Notes

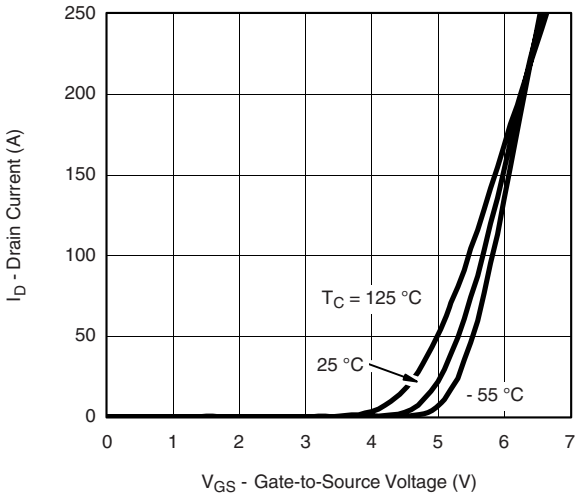
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

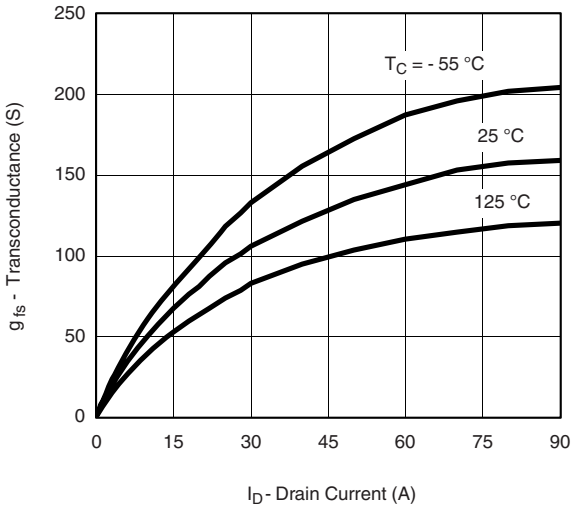
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



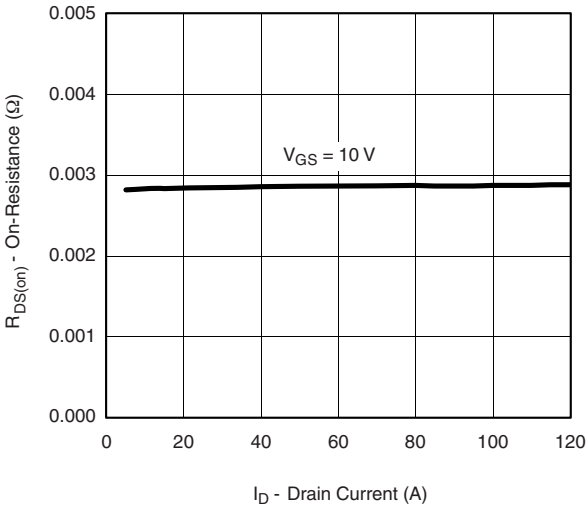
Output Characteristics



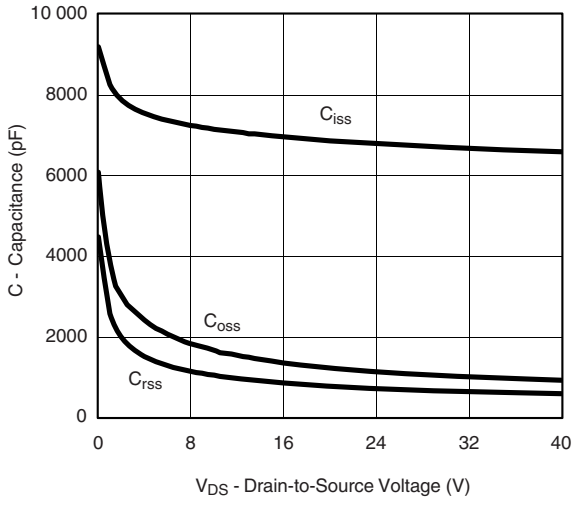
Transfer Characteristics



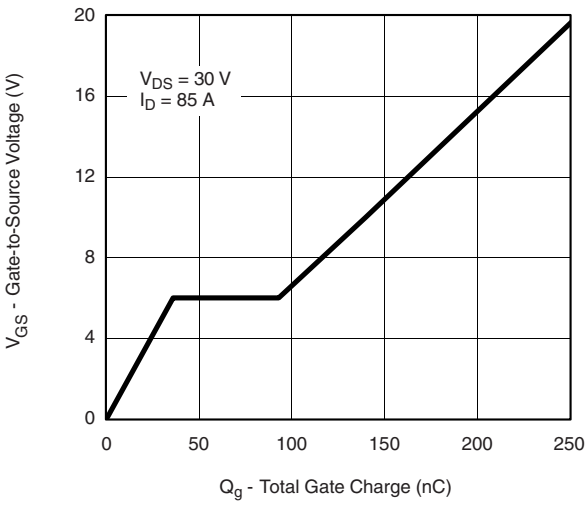
Transconductance



On-Resistance vs. Drain Current

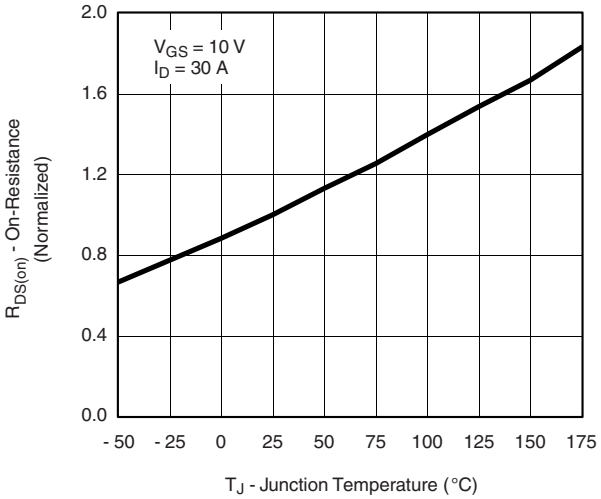


Capacitance

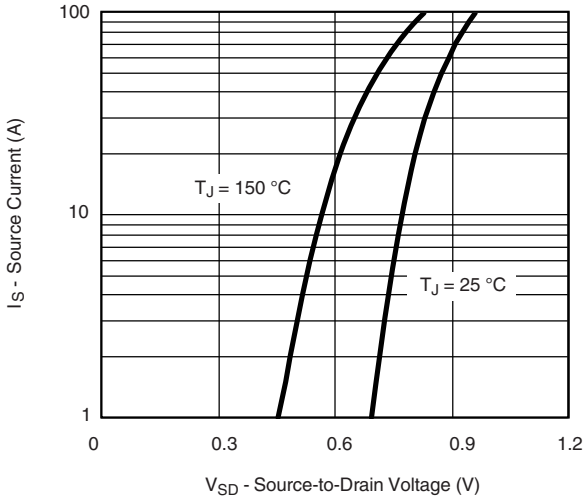


Gate Charge

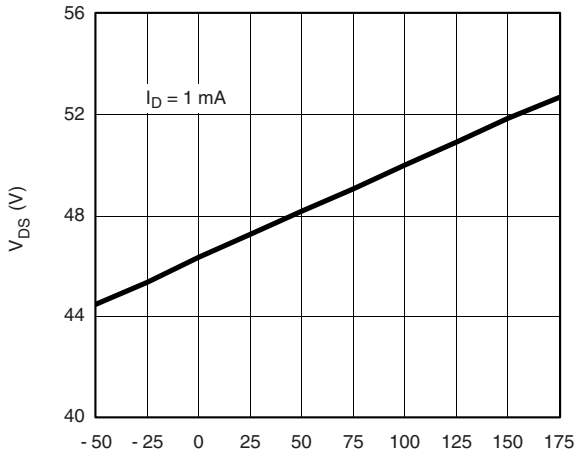
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



On-Resistance vs. Junction Temperature

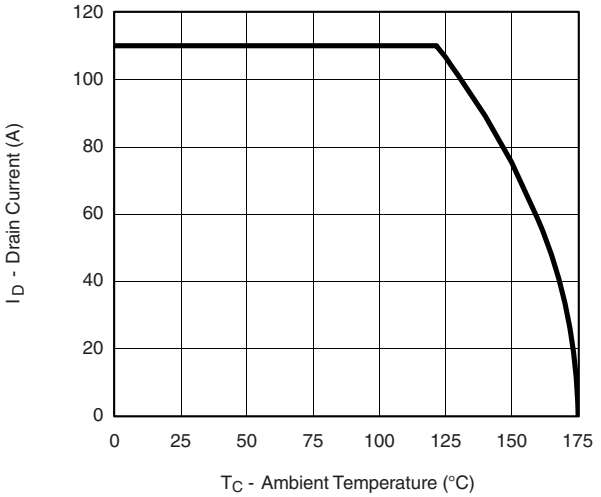


Source Drain Diode Forward Voltage

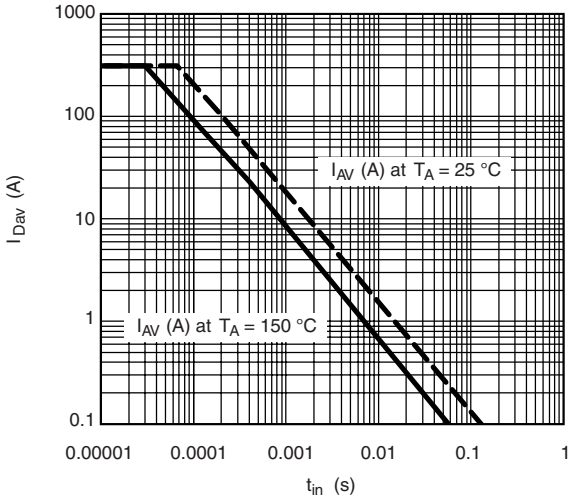


Drain Source Breakdownvs. Junction Temperature

THERMAL RATINGS T_A = 25 °C, unless otherwise noted

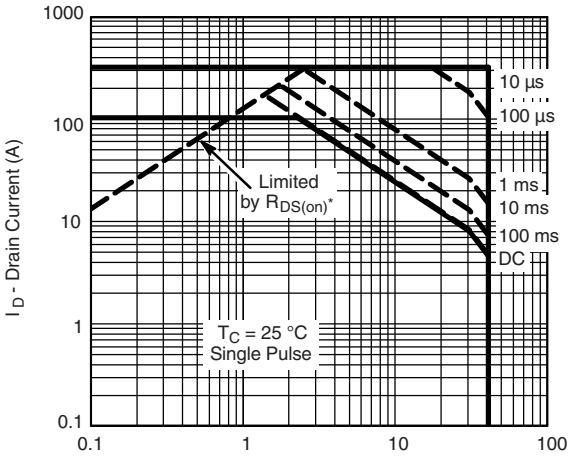


Maximum Drain Current vs. Ambient Temperature

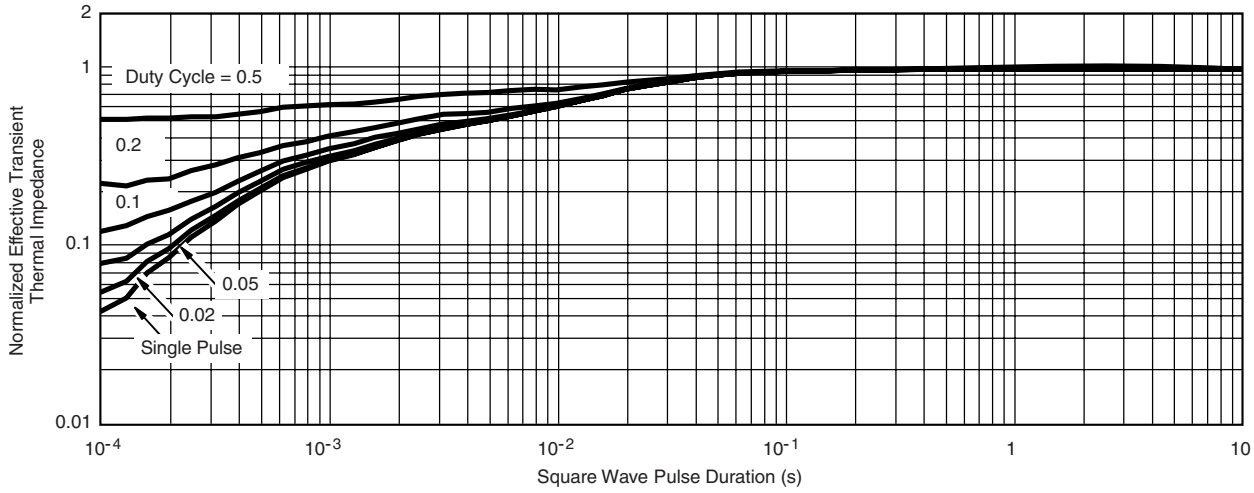


Avalanche Current vs. Time

THERMAL RATINGS T_A = 25 °C, unless otherwise noted



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

Note

The characteristics shown in the graph.

Normalized Transient Thermal Impedance Junction to Case (25 °C) is 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/ppg?68830.

Disclaimer

All product specifications and data are subject to change without notice.

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 herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

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.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.