Automotive
N-Channel 20 V (D-S) 175 °C MOSFET

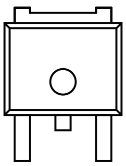
PRODUCT SUMMARY	
V_{DS} (V)	20
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.0043
$R_{DS(on)}$ (Ω) at V_{GS} = 4.5 V	0.006
I_D (A)	50
Configuration	Single

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

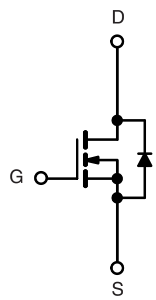
TO-252



G D S

Top View

Drain Connected to Tab



N-Channel MOSFET

ORDERING INFORMATION	
Package	TO-252
Lead (Pb)-free and Halogen-free	SQD50N02-04-GE3

ABSOLUTE MAXIMUM RATINGS T_C = 25 °C, unless otherwise noted

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current[a]	T_C = 25 °C	I_D	34	A
	T_C = 100 °C		50	
Continuous Source Current (Diode Conduction)[a]		I_S	8.3	
Pulsed Drain Current[b]		I_{DM}	100	
Single Pulse Avalanche Energy	L = 0.1 mH	E_{AS}	65	mJ
Single Pulse Avalanche Current		I_{AS}	36	A
Maximum Power Dissipation[b]	T_C = 25 °C	P_D	8.3	W
	T_A = 25 °C		136	
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}	1.1	

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.

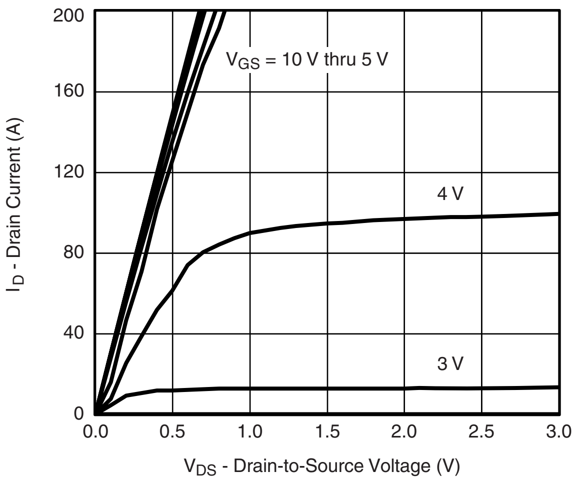
SPECIFICATIONS T_C = 25 °C, unless otherwise noted							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA		20	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA		0.8	-	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} = 20 V	-	-	1.0	µA
		V_{GS} = 0 V	V_{DS} = 20 V, T_J = 125 °C	-	-	50	
		V_{GS} = 0 V	V_{DS} = 20 V, T_J = 175 °C	-	-	-	
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 = 20 A	-	0.0035	0.0043	Ω
		V_{GS} = 10 V	I_D = 20 A, T_J = 125 °C	-	-	0.0061	
		V_{GS} = 10 V	I_D = 20 A, T_J = 125 °C	-	-	-	
		V_{GS} = 4.5 V	I_D = 20 A	-	0.0048	0.006	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 20 A		15	-	-	S
Dynamic[b]							
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 10 V, f = 1 MHz	-	5000	-	pF
Output Capacitance	C_{oss}			-	1650	-	
Reverse Transfer Capacitance	C_{rss}			-	770	-	
Total Gate Charge[c]	Q_g	V_{GS} = 4.5 V	V_{DS} = 10 V, I_D = 50 A	-	40	-	nC
Gate-Source Charge[c]	Q_{gs}			-	14	-	
Gate-Drain Charge[c]	Q_{gd}			-	13	-	
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 10 V, R_L = 0.2 Ω $I_D \cong$ 50 A, V_{GEN} = 10 V, R_g = 2.5 Ω		-	20	-	ns
Rise Time[c]	t_r			-	20	-	
Turn-Off Delay Time[c]	$t_{d(off)}$			-	50	-	
Fall Time[c]	t_f			-	15	-	
Source-Drain Diode Ratings and Characteristics T_C = 25 °C[b]							
Pulsed Current[a]	I_{SM}			-	-	100	A
Forward Voltage	V_{SD}	I_F = 50 A, V_{GS} = 0 V		-	0.9	1.5	V

Notes

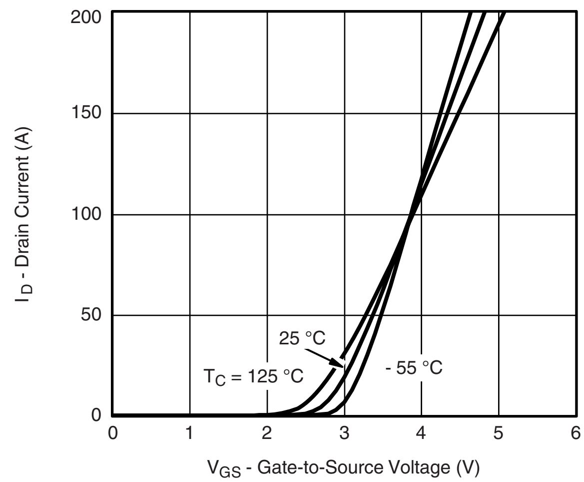
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

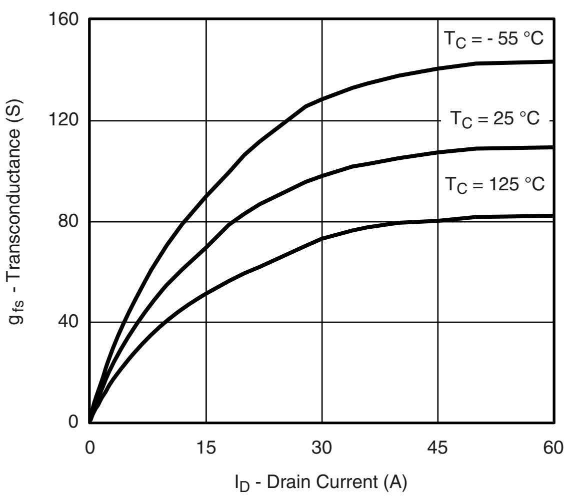
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



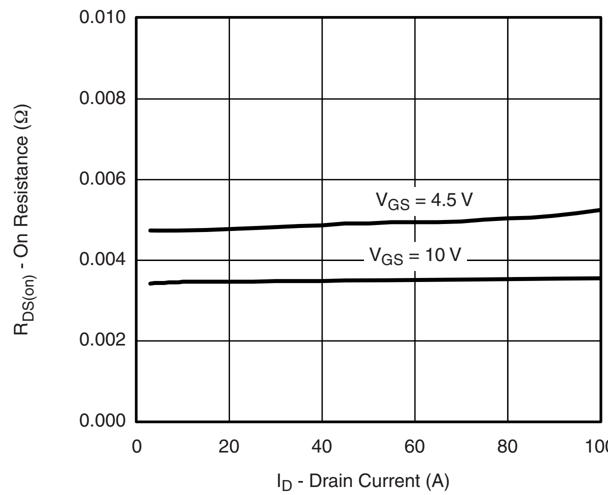
Output Characteristics



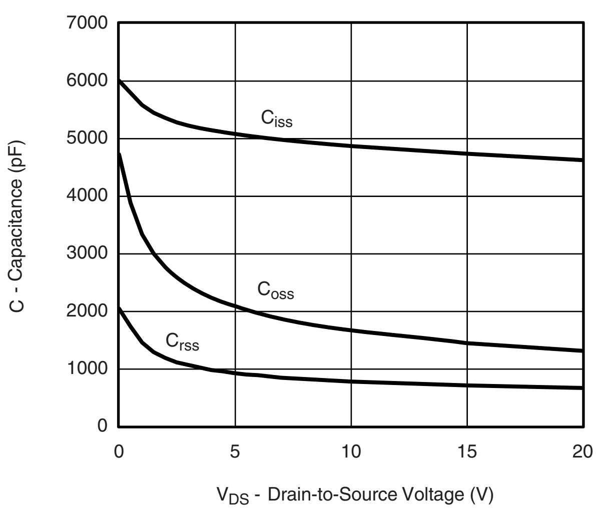
Transfer Characteristics



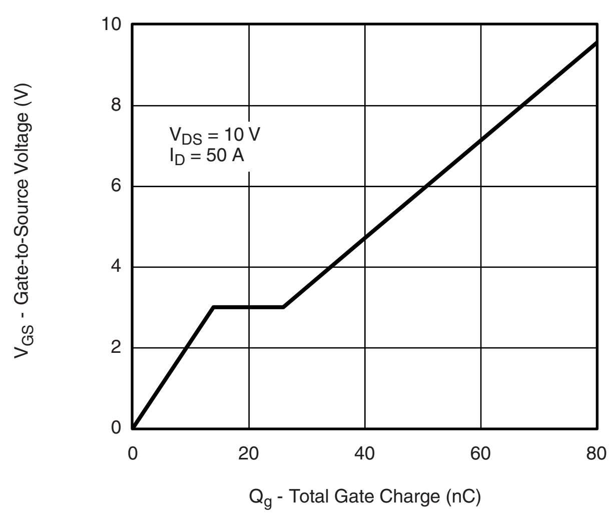
Transconductance



On-Resistance vs. Drain Current

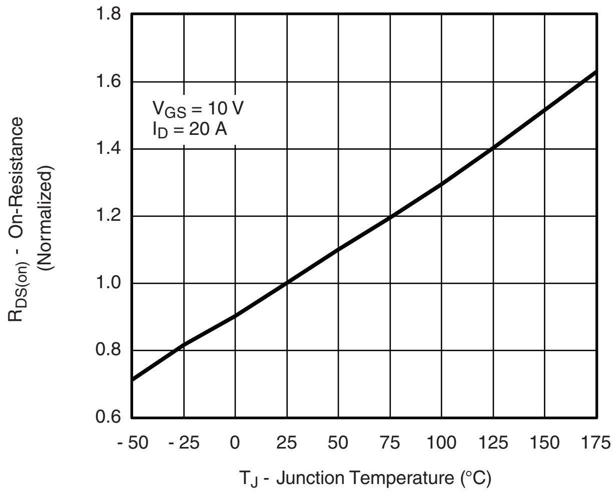


Capacitance

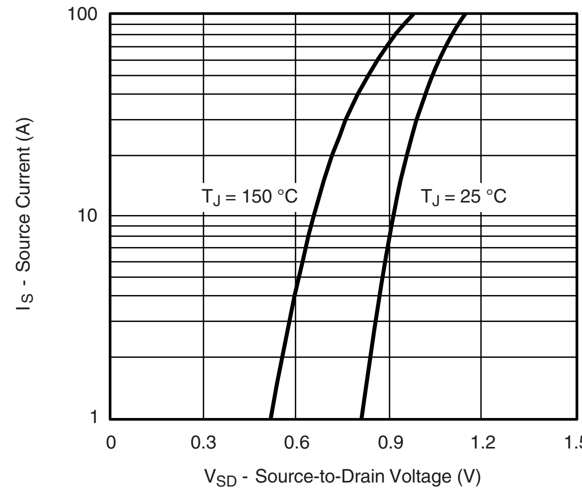


Gate Charge

TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted

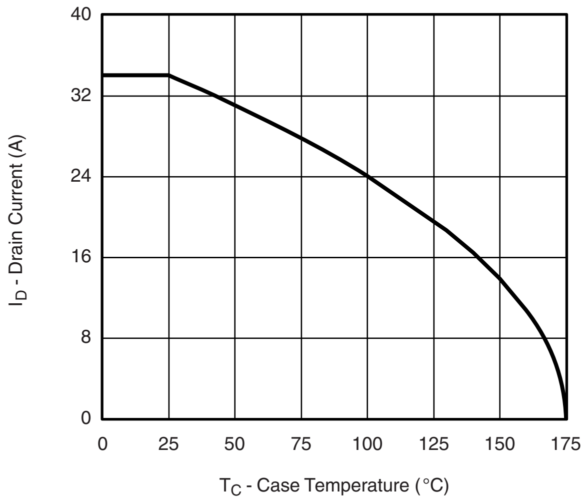


On-Resistance vs. Junction Temperature

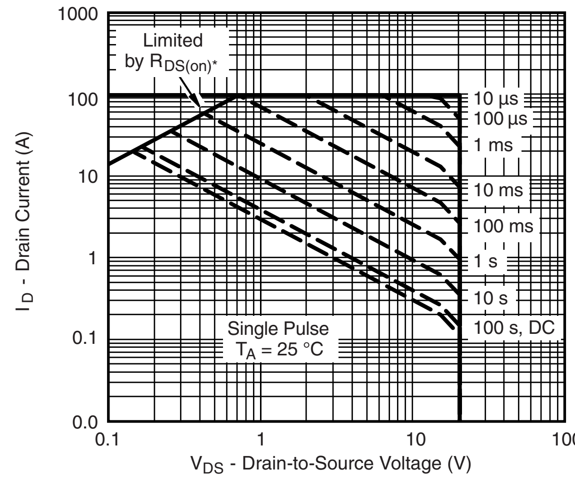


Source Drain Diode Forward Voltage

THERMAL RATINGS T_A = 25 °C, unless otherwise noted

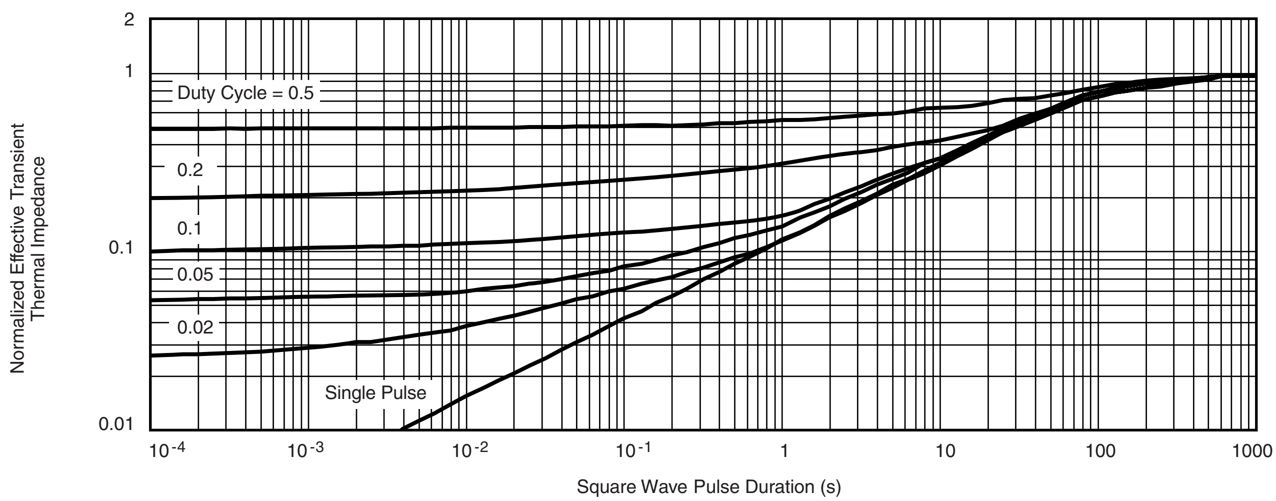


Maximum Drain Current vs. Ambient Temperature



* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

Note

The characteristics shown in the graph. Normalized Transient Thermal Impedance Junction to Ambient (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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