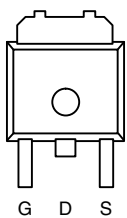


Automotive N-Channel 50 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	50
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.018
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V	0.020
I_D (A)	45
Configuration	Single

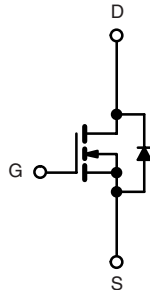
FEATURES

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


TO-252


Top View

Drain Connected to Tab



N-Channel MOSFET

ORDERING INFORMATION

Package	TO-252
Lead (Pb)-free and Halogen-free	SQD45N05-20L-GE3

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	50	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ^a	I_D	$T_C = 25$ °C	A
		$T_C = 100$ °C	
Continuous Source Current (Diode Conduction) ^a	I_S	45	A
Pulsed Drain Current ^b	I_{DM}	100	
Single Pulse Avalanche Energy	E_{AS}	101	mJ
Single Pulse Avalanche Current			
Maximum Power Dissipation ^b	P_D	$T_C = 25$ °C	W
		$T_A = 25$ °C	
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}	60	°C/W
Junction-to-Case (Drain)			

Notes

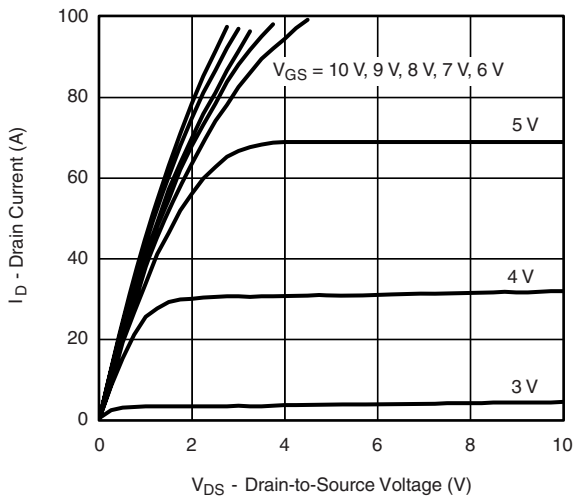
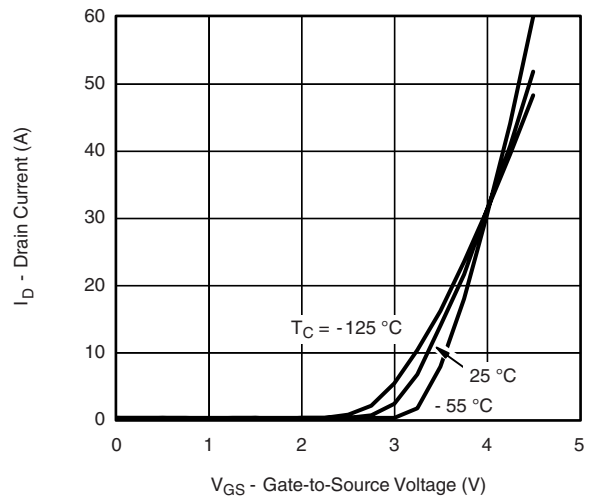
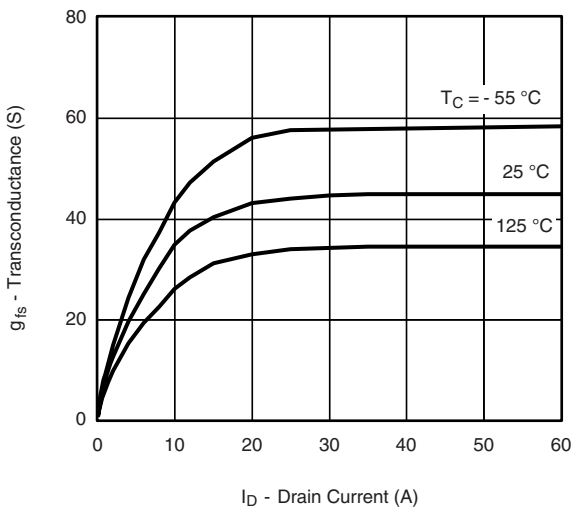
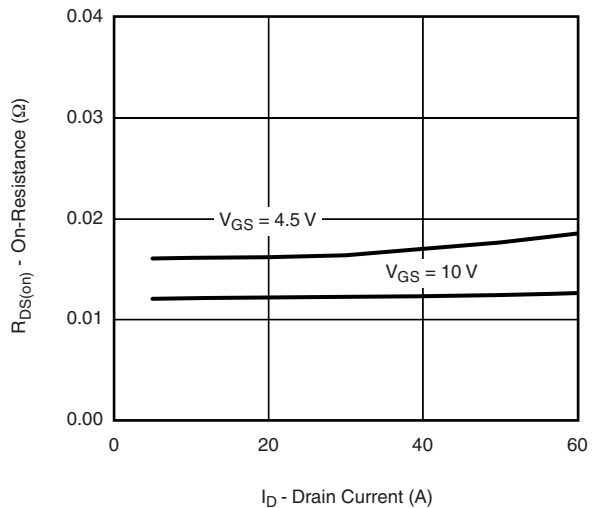
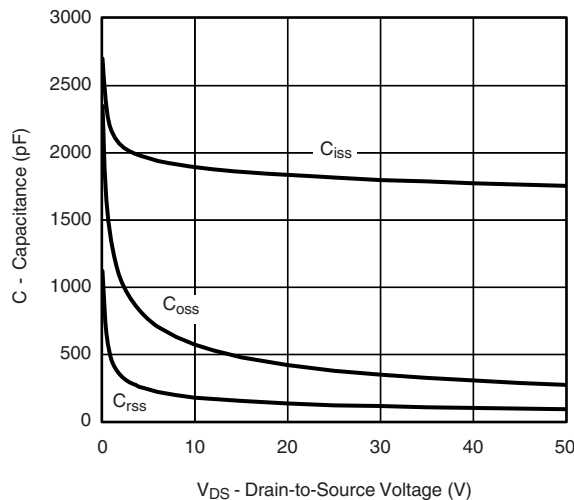
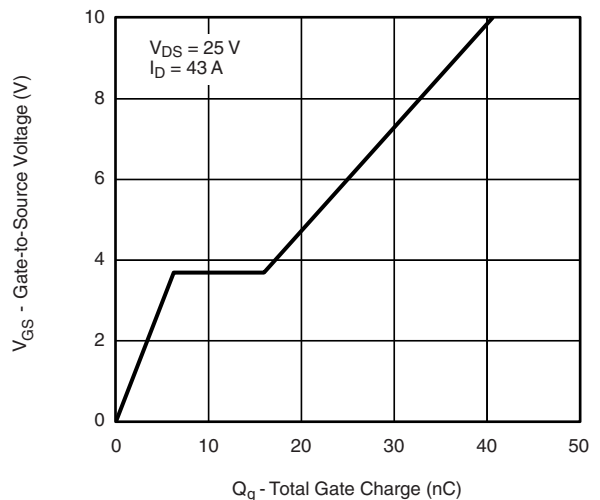
- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR-4 material).
- Parametric verification ongoing.

SPECIFICATIONS $T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$		50	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$		1.5	2.0	2.5	
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 50\text{ V}$	-	-	1.0	μA
		$V_{GS} = 0\text{ V}$	$V_{DS} = 50\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = 50\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	-	250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{GS} = 10\text{ V}$	$V_{DS} \geq 5\text{ V}$	45	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 20\text{ A}$	-	-	0.018	Ω
		$V_{GS} = 10\text{ V}$	$I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	-	0.036	
		$V_{GS} = 10\text{ V}$	$I_D = 45\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	-	0.040	
		$V_{GS} = 4.5\text{ V}$	$I_D = 45\text{ A}$	-	-	0.020	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 30\text{ A}$		20	-	-	S
Dynamic^b							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	-	1800	-	pF
Output Capacitance	C_{oss}			-	370	-	
Reverse Transfer Capacitance	C_{rss}			-	130	-	
Total Gate Charge ^c	Q_g	$V_{GS} = 10\text{ V}$	$V_{DS} = 25\text{ V}, I_D = 43\text{ A}$	-	43	-	nC
Gate-Source Charge ^c	Q_{gs}			-	7	-	
Gate-Drain Charge ^c	Q_{gd}			-	10	-	
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 25\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \cong 45\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		-	10	-	ns
Rise Time ^c	t_r			-	10	-	
Turn-Off Delay Time ^c	$t_{d(off)}$			-	32	-	
Fall Time ^c	t_f			-	7	-	
Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^\circ\text{C}$ ^b							
Pulsed Current ^a	I_{SM}			-	-	43	A
Forward Voltage	V_{SD}	$I_F = 45\text{ A}, V_{GS} = 0\text{ V}$		-	-	1.5	V

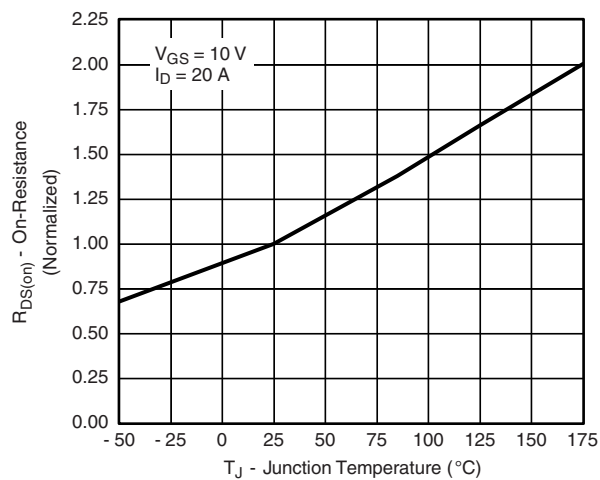
Notes

- 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.

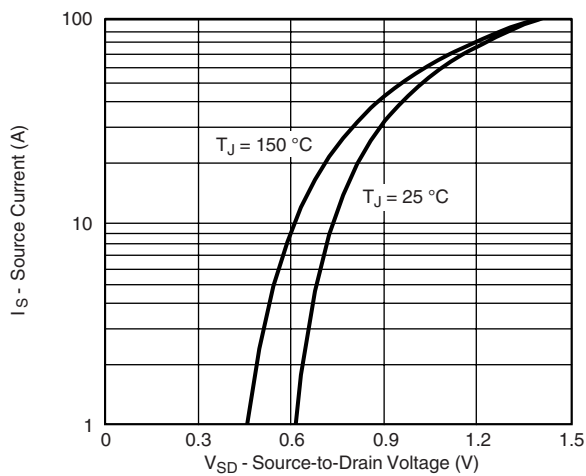
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

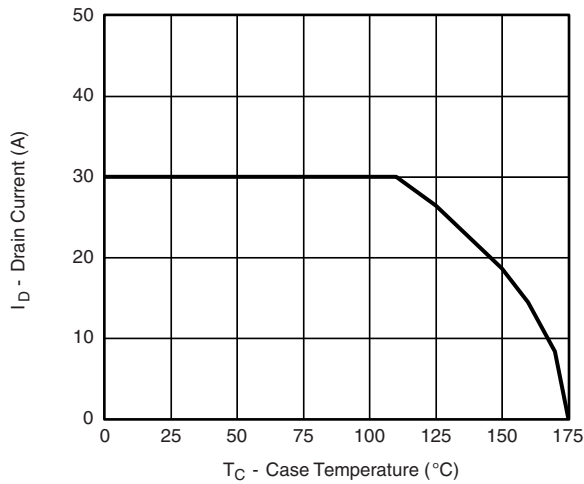
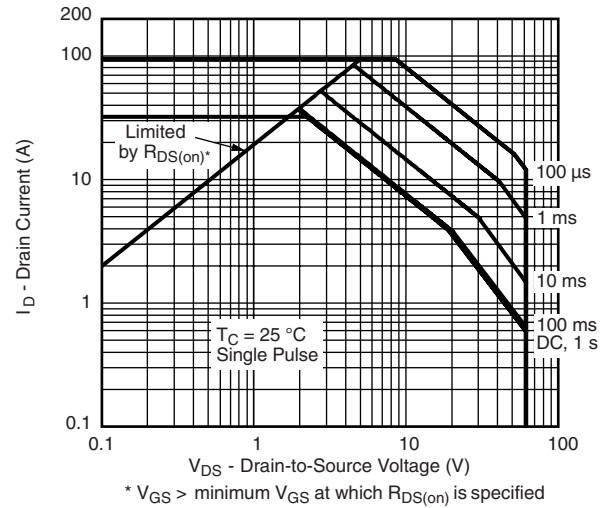
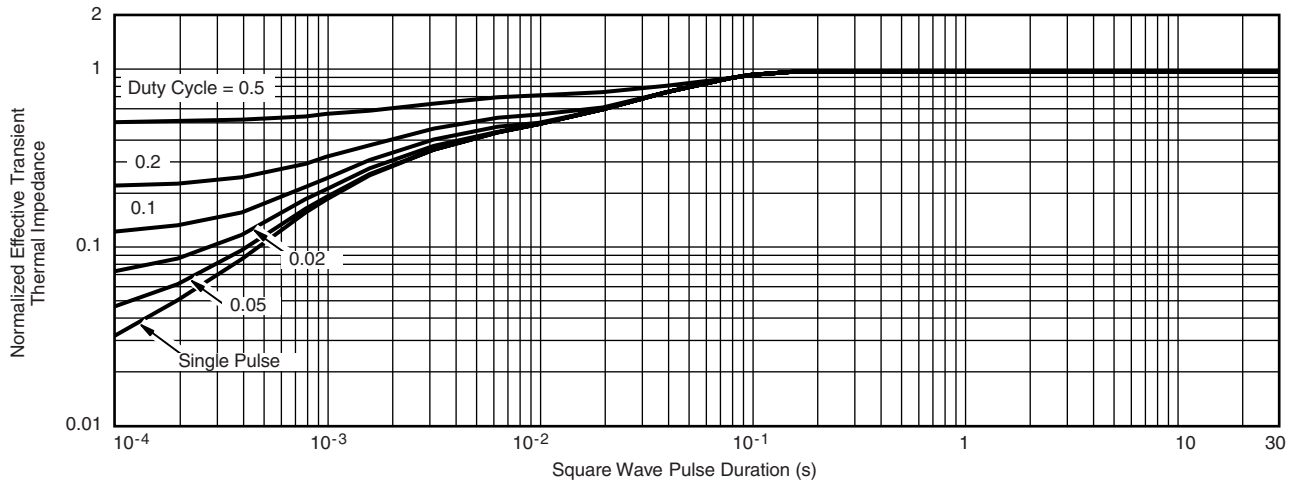
TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



On-Resistance vs. Junction Temperature



Source Drain Diode Forward Voltage

THERMAL RATINGS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted

Maximum Drain Current vs. Ambient Temperature

Safe Operating Area

Normalized Thermal Transient Impedance, Junction-to-Case
Note

The characteristics shown in the graph.

Normalized Transient Thermal Impedance Junction to Case ($25\text{ }^\circ\text{C}$) 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 $1\text{ } \times \text{ } 1\text{ } \times \text{ } 0.062\text{ } \text{''}$, 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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