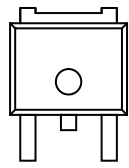


Automotive P-Channel 40 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	- 40
$R_{DS(on)}$ (Ω) at $V_{GS} = -10$ V	0.013
$R_{DS(on)}$ (Ω) at $V_{GS} = -4.5$ V	0.022
I_D (A)	- 50
Configuration	Single

FEATURES

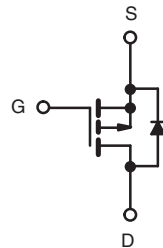
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- Compliant to RoHS Directive 2002/95/EC
- AEC-Q101 Qualified^d
- Find out more about Vishay's Automotive Grade Product Requirements at: www.vishay.com/applications


TO-252


G D S

Top View

Drain Connected to Tab



P-Channel MOSFET

ORDERING INFORMATION

Package	TO-252
Lead (Pb)-free and Halogen-free	SQD50P04-13L-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	I_D	$T_C = 25$ °C ^a	- 50
		$T_C = 125$ °C	- 35
Continuous Source Current (Diode Conduction) ^a	I_S	- 50	A
Pulsed Drain Current ^b	I_{DM}	- 200	
Single Pulse Avalanche Current	I_{AS}	- 39	
Single Pulse Avalanche Energy	E_{AS}	76	mJ
Maximum Power Dissipation ^b	P_D	$T_C = 25$ °C	83
		$T_C = 125$ °C	27
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}	50	°C/W
Junction-to-Case (Drain)	R_{thJC}	1.8	

Notes

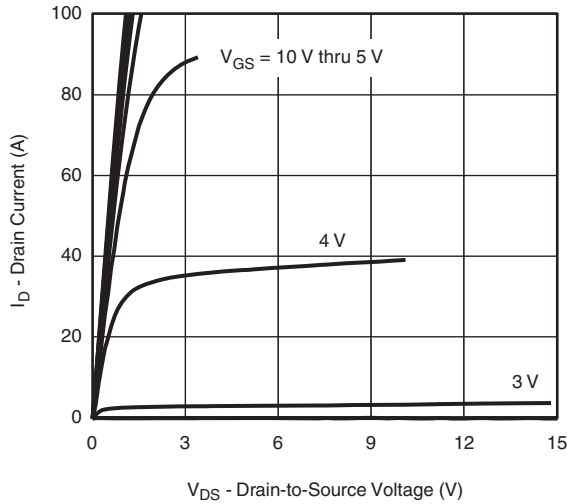
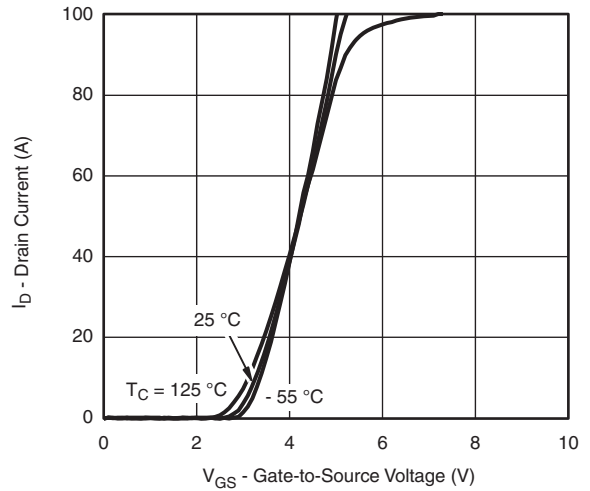
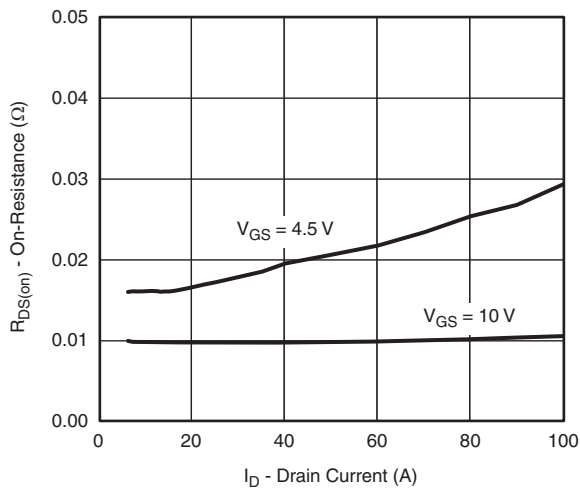
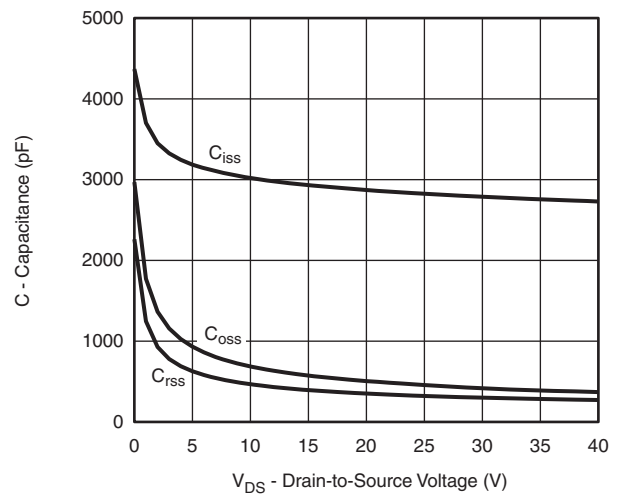
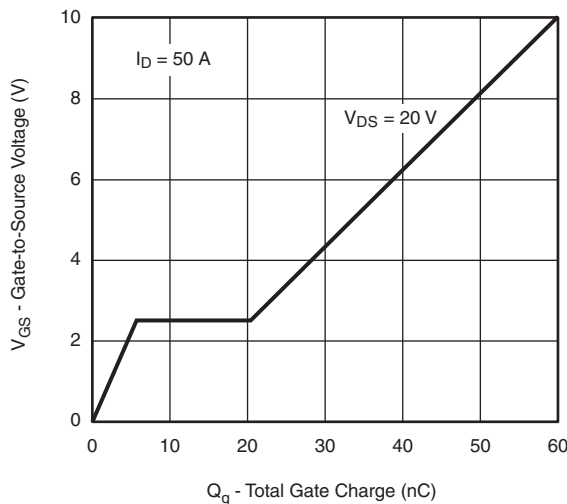
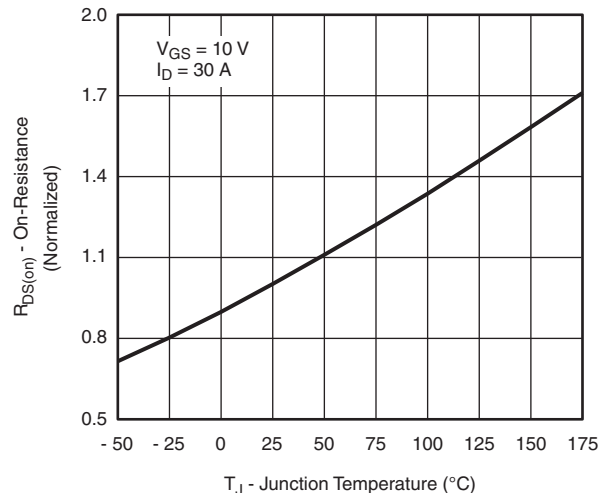
- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR-4 material).
- Parametric verification ongoing.

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 V, I _D = - 250 μA	- 40	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1.5	-	- 2.5	
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	-	-	- 150	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = - 10 V, V _{DS} ≤ - 5 V	- 50	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 17 A	-	0.010	0.013	Ω
		V _{GS} = - 10 V, I _D = - 50 A, T _J = 125 °C	-	-	0.019	
		V _{GS} = - 10 V, I _D = - 50 A, T _J = 175 °C	-	-	0.023	
		V _{GS} = - 4.5 V, I _D = - 14 A	-	0.016	0.022	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 17 A	-	38	-	S
Dynamic^b						
Input Capacitance	C _{iSS}	V _{GS} = 0 V, V _{DS} = - 20 V, f = 1 MHz	-	2872	3590	pF
Output Capacitance	C _{oss}		-	508	635	
Reverse Transfer Capacitance	C _{rSS}		-	352	440	
Total Gate Charge ^c	Q _g	V _{GS} = - 10 V, V _{DS} = - 40 V, I _D = - 50 A	-	60	90	nC
Gate-Source Charge ^c	Q _{gs}		-	5.7	8.6	
Gate-Drain Charge ^c	Q _{gd}		-	14.7	22	
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = - 20 V, R _L = 0.4 Ω I _D = - 50 A, V _{GEN} = - 10 V, R _g = 1 Ω	-	10	15	ns
Rise Time ^c	t _r		-	12	18	
Turn-Off Delay Time ^c	t _{d(off)}		-	40	60	
Fall Time ^c	t _f		-	16	24	
Source-Drain Diode Ratings and Characteristics^b						
Pulsed Current ^a	I _{SM}		-	-	- 200	A
Forward Voltage	V _{SD}	I _F = - 35 A, V _{GS} = 0 V	-	- 0.9	- 1.5	V

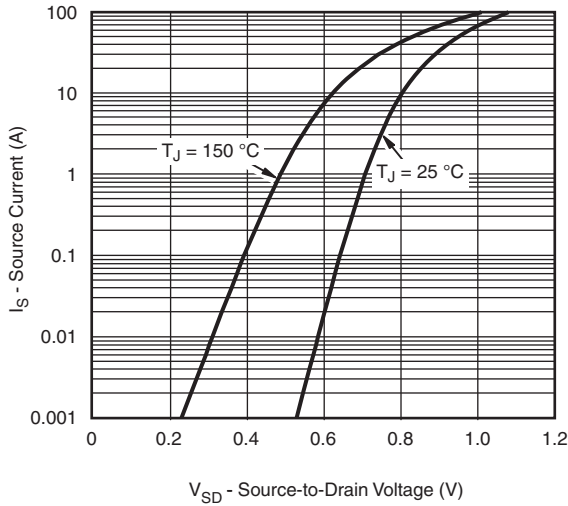
Notes

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

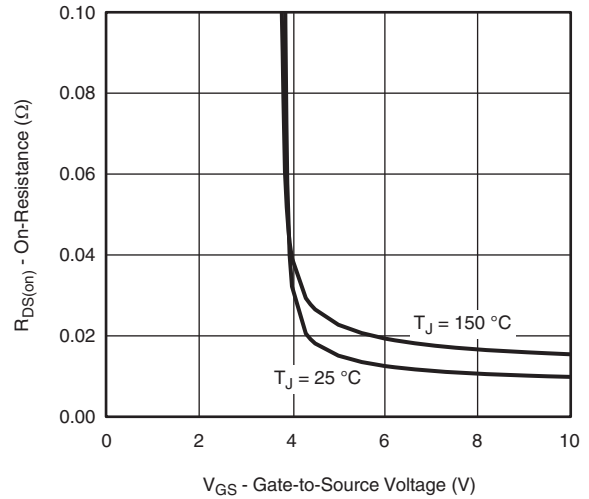
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

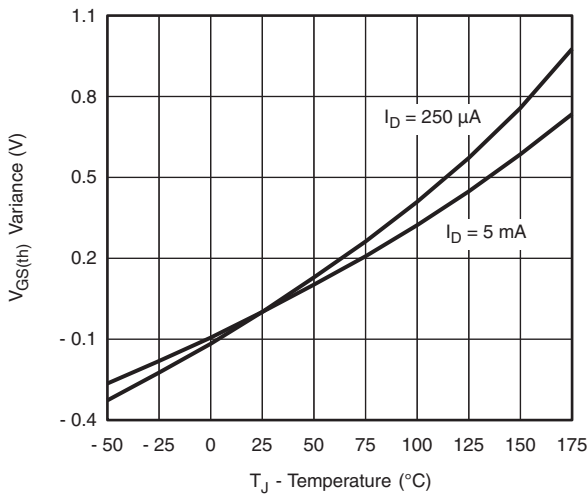
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



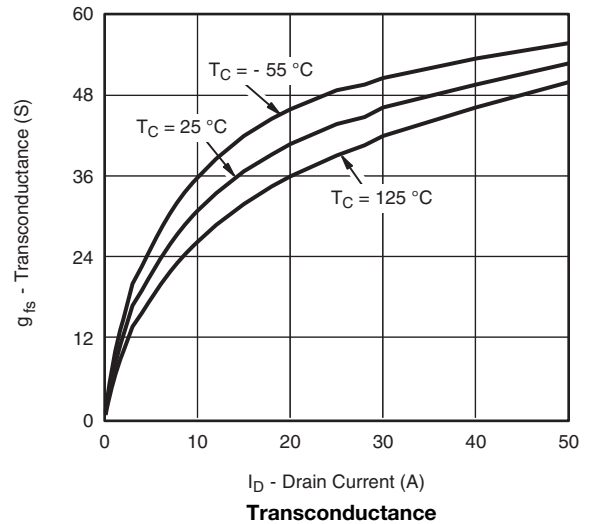
Source Drain Diode Forward Voltage



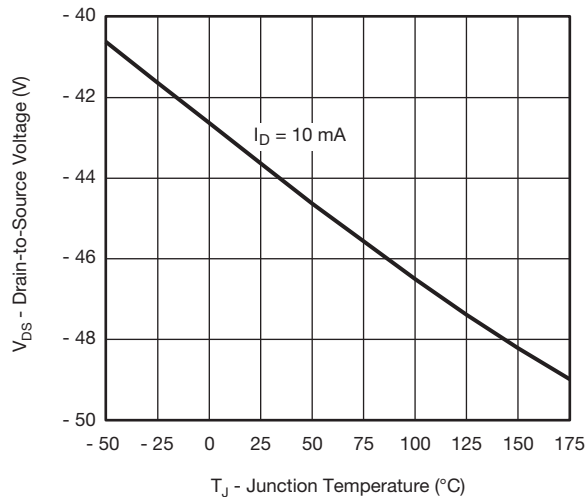
On-Resistance vs. Gate-to Source Voltage



Threshold Voltage

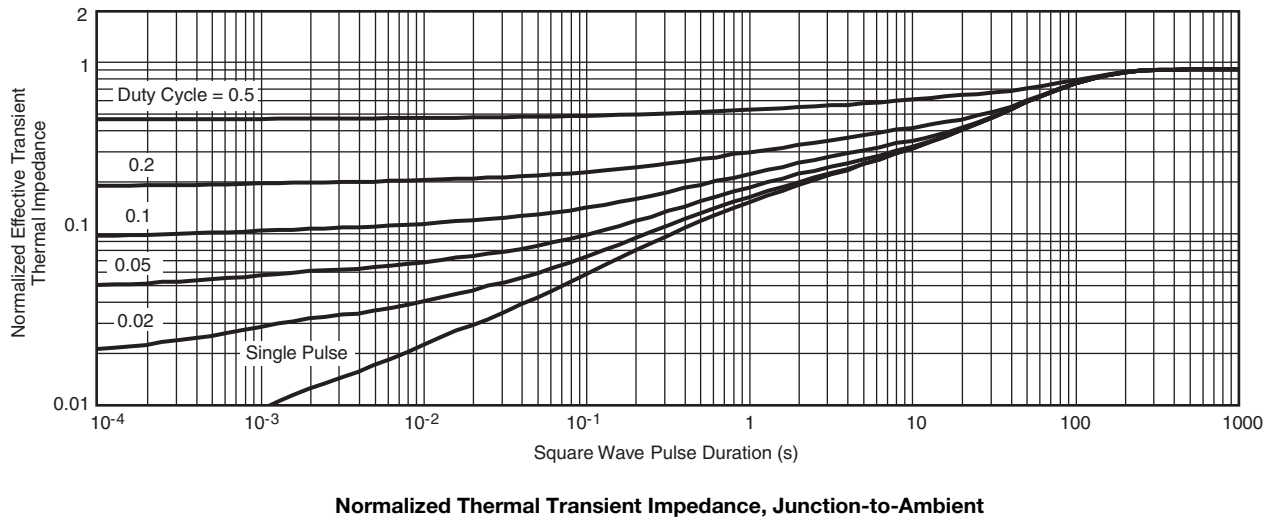
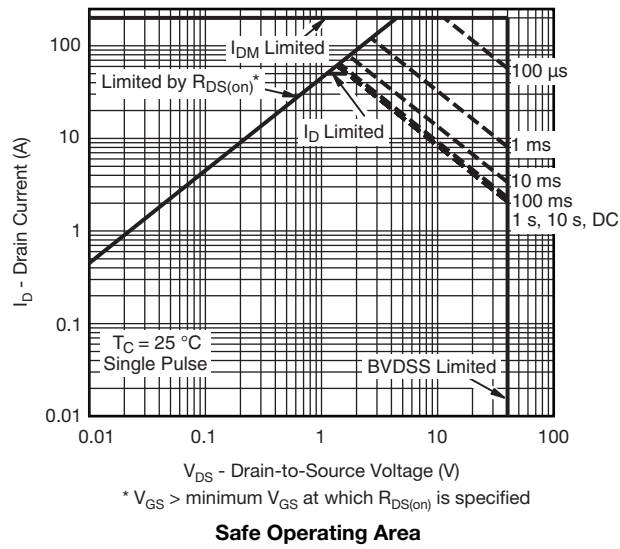


Transconductance

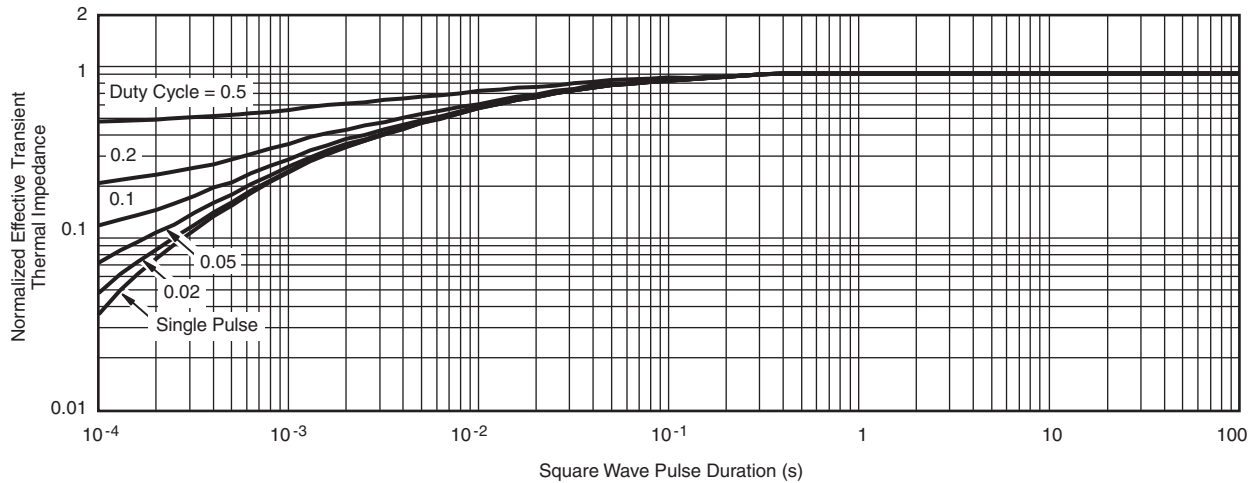


Drain Source Breakdown vs. Junction Temperature

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



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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