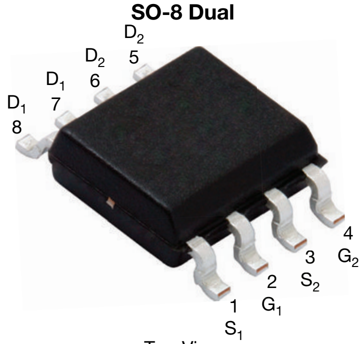
Automotive Dual N-Channel 60 V (D-S) 175 °C MOSFET

SO-8 Dual

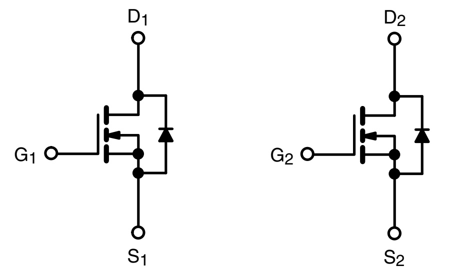


Top View

FEATURES

- TrenchFET® power MOSFET
- 100 % R_g and UIS tested
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE
Pb-free
RoHS COMPLIANT
HALOGEN FREE



N-Channel MOSFET   N-Channel MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	60
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.064
$R_{DS(on)}$ (Ω) at V_{GS} = 4.5 V	0.082
I_D (A) per leg	5.4
Configuration	Dual

ORDERING INFORMATION	
Package	SO-8
Lead (Pb)-free and halogen-free	SQ9945CEY (for detailed order number please see www.vishay.com/doc?79771)

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

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	T_C = 25 °C	I_D	5.4	A
	T_C = 125 °C		3.1	
Continuous Source Current (Diode Conduction)		I_S	3.6	
Pulsed Drain Current [a]		I_{DM}	21.5	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	8.5	
Single Pulse Avalanche Energy		E_{AS}	3.6	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	4	W
	T_C = 125 °C		1.3	
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 [b]	R_{thJA}	112	°C/W
Junction-to-Foot (Drain)		R_{thJF}	38	

Notes

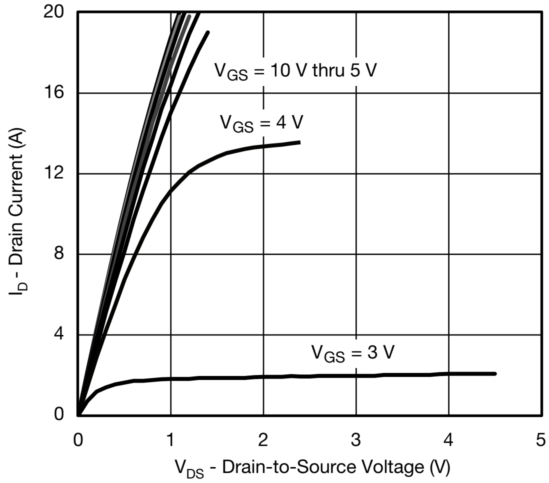
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
b. When mounted on 1" square PCB (FR4 material).

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		60	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA		1.5	2	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} = 60 V	-	-	1	μA
		V_{GS} = 0 V	V_{DS} = 60 V, T_J = 125 °C	-	-	50	
		V_{GS} = 0 V	V_{DS} = 60 V, T_J = 175 °C	-	-	150	
On-State Drain Current [a]	$I_{D(on)}$	V_{GS} = 10 V	V_{DS} ≥ 5 V	20	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 3.4 A	-	0.045	0.064	Ω
		V_{GS} = 10 V	I_D = 3.4 A, T_J = 125 °C	-	-	0.110	
		V_{GS} = 10 V	I_D = 3.4 A, T_J = 175 °C	-	-	0.137	
		V_{GS} = 4.5 V	I_D = 3.7 A	-	0.060	0.082	
Forward Transconductance [f]	g_{fs}	V_{DS} = 15 V, I_D = 3.7 A		-	12	-	S
Dynamic [b]							
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 25 V, f = 1 MHz	-	383	470	pF
Output Capacitance	C_{oss}			-	70	88	
Reverse Transfer Capacitance	C_{rss}			-	33	37	
Total Gate Charge [c]	Q_g	V_{GS} = 10 V	V_{DS} = 30 V, I_D = 4.3 A	-	8.9	12	nC
Gate-Source Charge [c]	Q_{gs}			-	1.5	1.7	
Gate-Drain Charge [c]	Q_{gd}			-	2.1	2.6	
Gate Resistance	R_g	f = 1 MHz		1.1	-	6.66	Ω
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DD} = 30 V, R_L = 8.8 Ω I_D ≅ 3.4 A, V_{GEN} = 10 V, R_g = 1 Ω		-	6	9	ns
Rise Time [c]	t_r			-	2.8	4.2	
Turn-Off Delay Time [c]	$t_{d(off)}$			-	17	26	
Fall Time [c]	t_f			-	1.7	3	
Source-Drain Diode Ratings and Characteristics [b]							
Pulsed Current [a]	I_{SM}			-	-	21.5	A
Forward Voltage	V_{SD}	I_F = 2 A, V_{GS} = 0 V		-	0.75	1.1	V
Body diode reverse recovery time	t_{rr}	I_F = 1.7 A, di/dt = 100 A/μs			16	32	ns
Body diode reverse recovery charge	Q_{rr}				13	26	nC
Reverse recovery fall time	t_a				13	-	ns
Reverse recovery rise time	t_b				3	-	
Body diode peak reverse recovery current	$I_{RM(REC)}$				-1.9	-	A

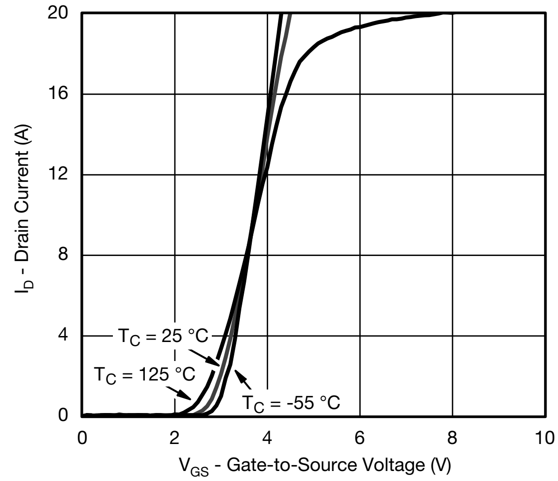
Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

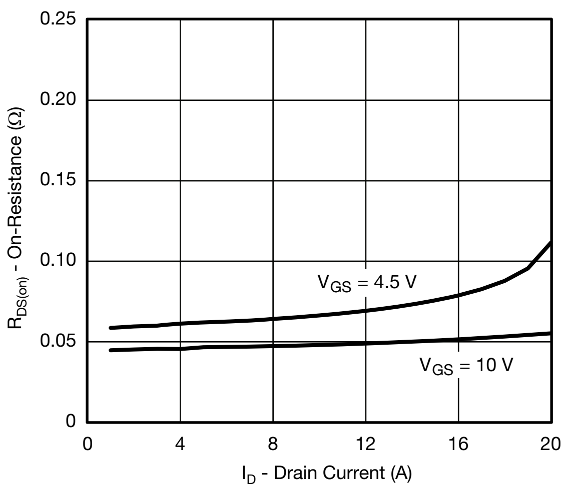
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



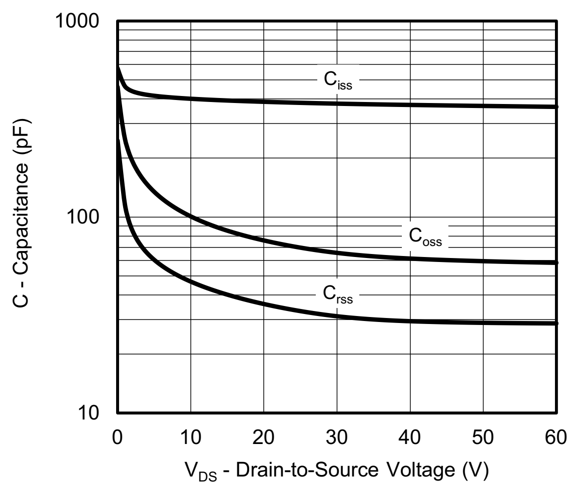
Output Characteristics



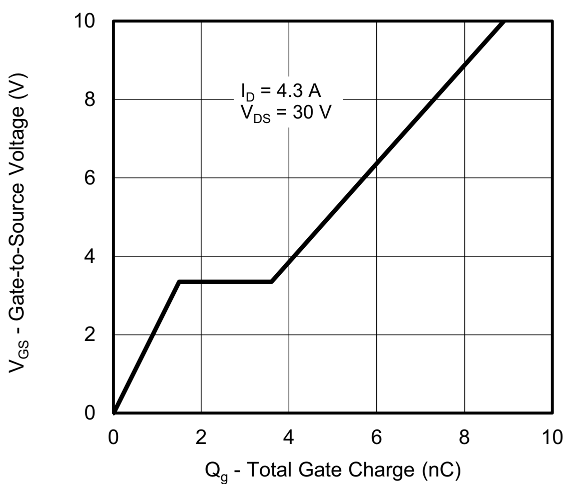
Transfer Characteristics



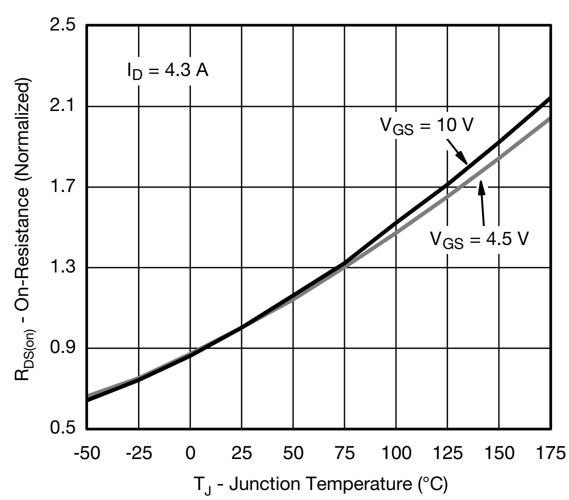
On-Resistance vs. Drain Current



Capacitance

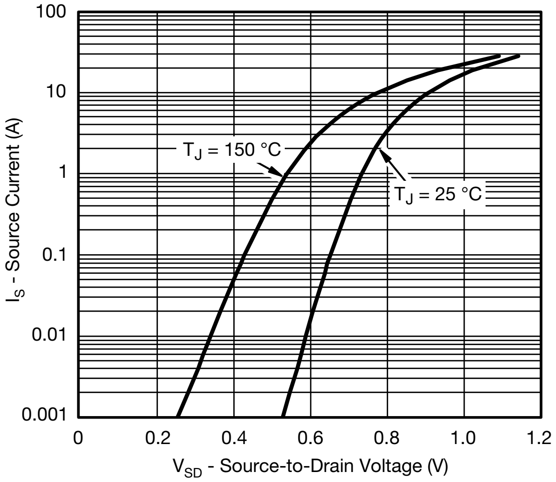


Gate Charge

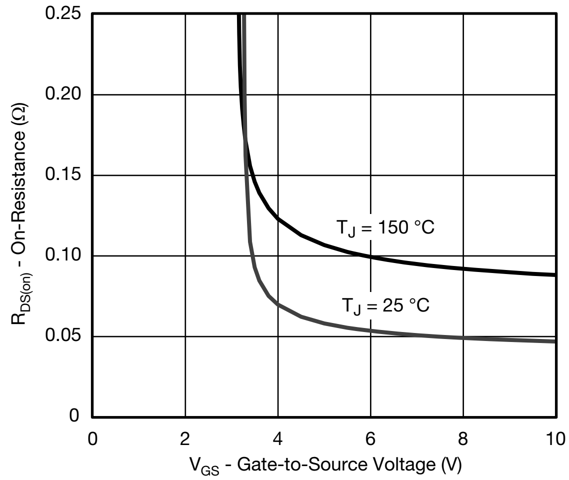


On-Resistance vs. Junction Temperature

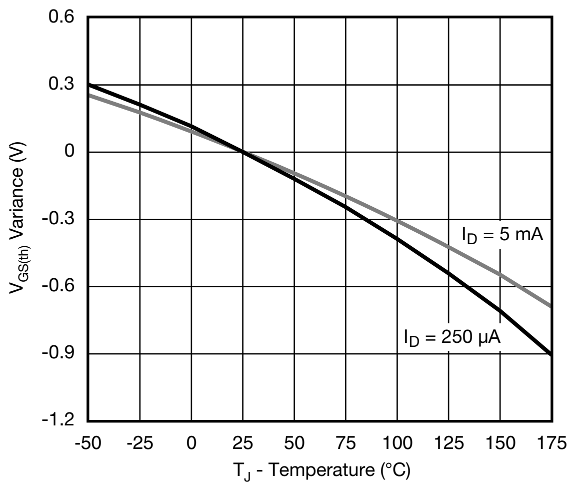
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



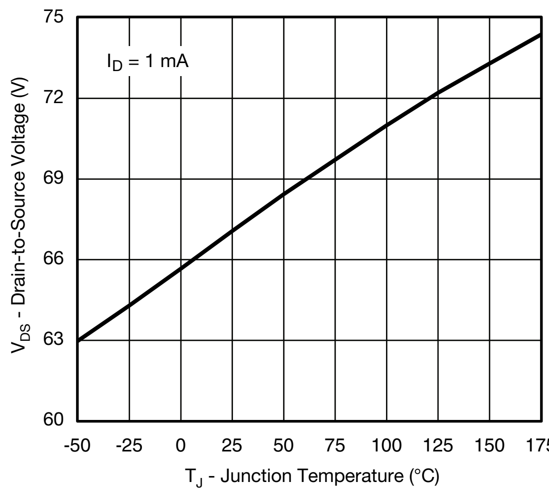
Source Drain Diode Forward Voltage



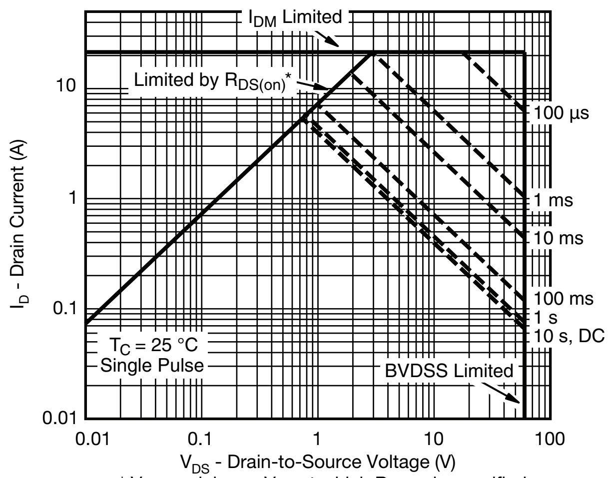
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



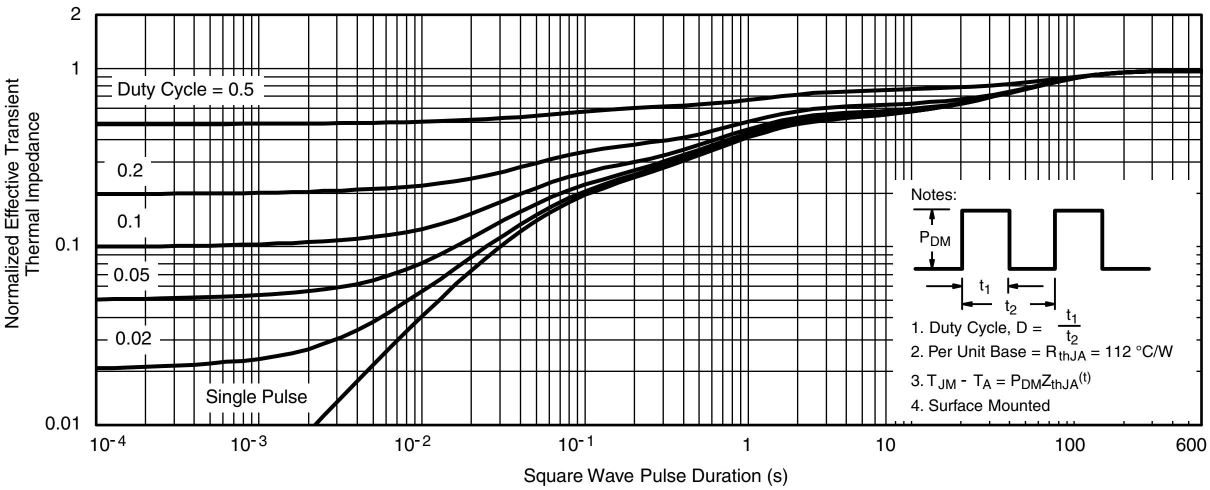
Drain Source Breakdown vs. Junction Temperature



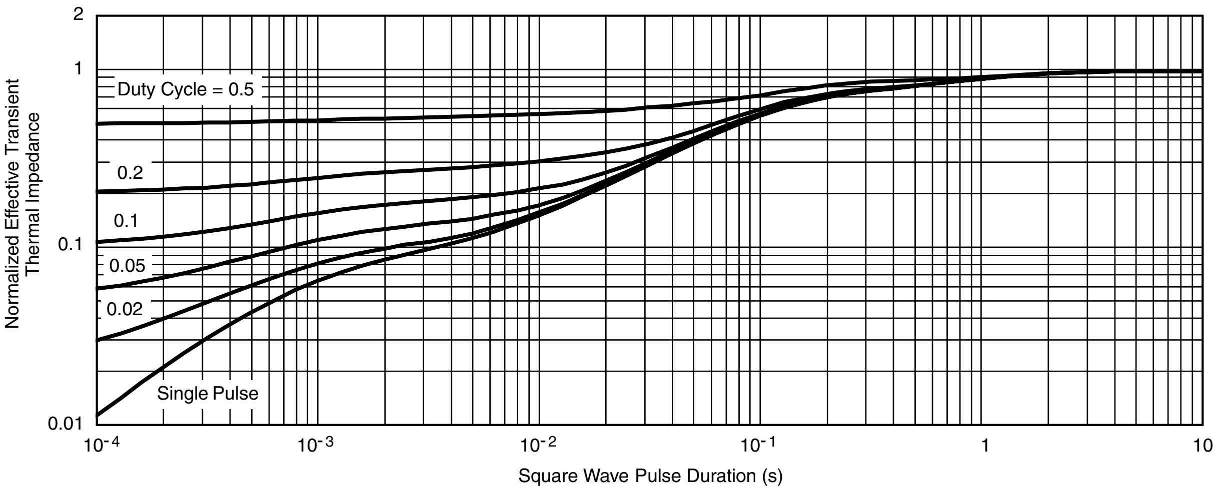
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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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