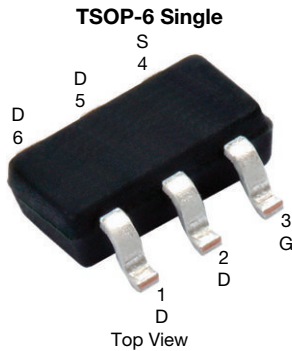


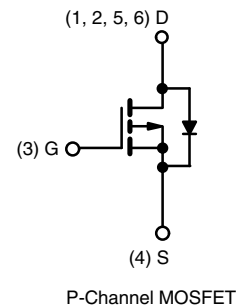
## Automotive P-Channel 60 V (D-S) 175 °C MOSFET



### FEATURES

- TrenchFET® power MOSFET
- AEC-Q101 qualified
- 100 % R<sub>g</sub> and UIS tested
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

 AUTOMOTIVE  
GRADE

**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**


PRODUCT SUMMARY	
V <sub>DS</sub> (V)	-60
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = -10 V	0.095
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = -4.5 V	0.135
I <sub>D</sub> (A)	-5.3
Configuration	Single

Marking Code: 9Q

ORDERING INFORMATION	
Package	TSOP-6
Lead (Pb)-free and halogen-free	SQ3427CEV (for detailed order number please see <a href="http://www.vishay.com/doc?79771">www.vishay.com/doc?79771</a> )

ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V <sub>DS</sub>	-60	V
Gate-Source Voltage		V <sub>GS</sub>	± 20	
Continuous Drain Current	T <sub>C</sub> = 25 °C	I <sub>D</sub>	-5.3	A
	T <sub>C</sub> = 125 °C		-3	
Continuous Source Current (Diode Conduction)		I <sub>S</sub>	-6.3	
Pulsed Drain Current <sup>a</sup>		I <sub>DM</sub>	-21	
Single Pulse Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	-21	
Single Pulse Avalanche Energy		E <sub>AS</sub>	22	mJ
Maximum Power Dissipation	T <sub>C</sub> = 25 °C	P <sub>D</sub>	5	W
	T <sub>C</sub> = 125 °C		1.6	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount <sup>b</sup>	R <sub>thJA</sub>	110	°C/W
Junction-to-Foot (Drain)		R <sub>thJF</sub>	30	

### Notes

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



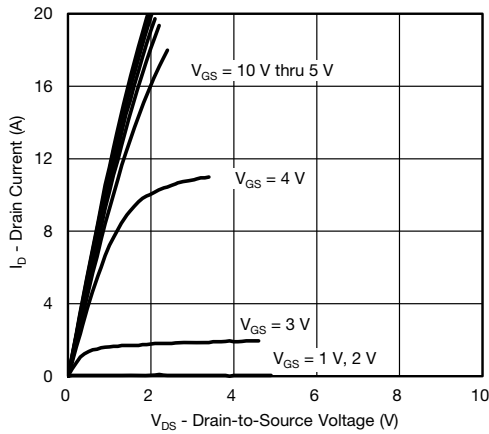
<b>SPECIFICATIONS</b> ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
<b>Static</b>							
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0, I_D = -250\text{ }\mu\text{A}$		-60	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$		-1.5	-2	-2.5	
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$		-		$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = -60\text{ V}$	-	-	-1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$	$V_{DS} = -60\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	-50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = -60\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	-	-150	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{GS} = -10\text{ V}$	$V_{DS} \leq -5\text{ V}$	-10	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$	$I_D = -4.5\text{ A}$	-	0.079	0.095	$\Omega$
		$V_{GS} = -10\text{ V}$	$I_D = -4.5\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	-	0.148	
		$V_{GS} = -10\text{ V}$	$I_D = -4.5\text{ A}, T_J = 175\text{ }^\circ\text{C}$	-	-	0.178	
		$V_{GS} = -4.5\text{ V}$	$I_D = -3.5\text{ A}$	-	0.112	0.135	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -4\text{ A}$		-	9	-	S
<b>Dynamic <sup>b</sup></b>							
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = -30\text{ V}, f = 1\text{ MHz}$	-	726	1000	$\mu\text{F}$
Output Capacitance	$C_{OSS}$			-	91	120	
Reverse Transfer Capacitance	$C_{RSS}$			-	56	80	
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{GS} = -10\text{ V}$	$V_{DS} = -30\text{ V}, I_D = -5\text{ A}$	-	16.9	22	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			-	2.9	-	
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			-	4.1	-	
Gate Resistance	$R_g$	f = 1 MHz		2.5	5	7.5	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = -30\text{ V}, R_L = 6\text{ }\Omega$ $I_D \cong -5\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		-	8	12	ns
Rise Time <sup>c</sup>	$t_r$			-	24	35	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			-	25	38	
Fall Time <sup>c</sup>	$t_f$			-	33	50	
<b>Source-Drain Diode Ratings and Characteristics <sup>b</sup></b>							
Pulsed Current <sup>a</sup>	$I_{SM}$			-	-	-21	A
Forward Voltage	$V_{SD}$	$I_F = -1.6\text{ A}, V_{GS} = 0\text{ V}$		-	-0.8	-1.2	V
Body diode reverse recovery time	$t_{rr}$	$I_F = -1.7\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		-	23	46	ns
Body diode reverse recovery charge	$Q_{rr}$			-	27	54	nC
Reverse recovery fall time	$t_a$			-	20	-	ns
Reverse recovery rise time	$t_b$			-	3	-	ns
Body diode peak reverse recovery current	$I_{RM(REC)}$			-	-2.86	-	A

**Notes**

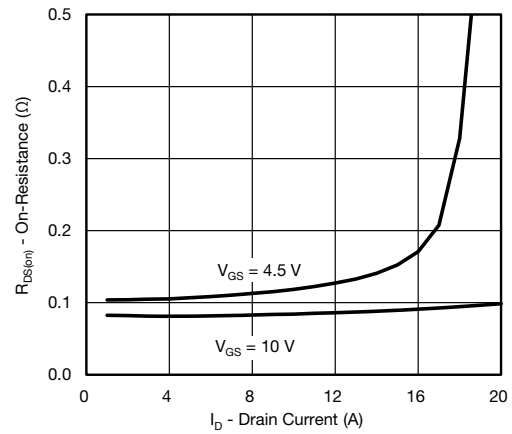
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

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.

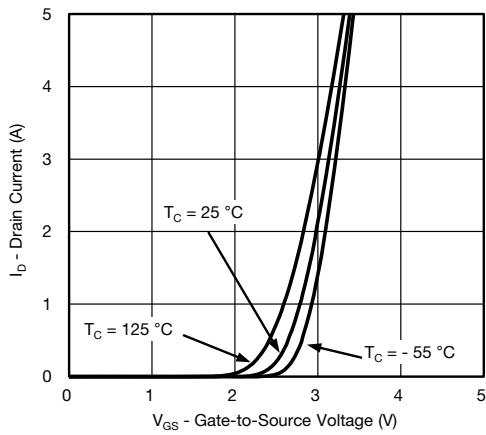
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



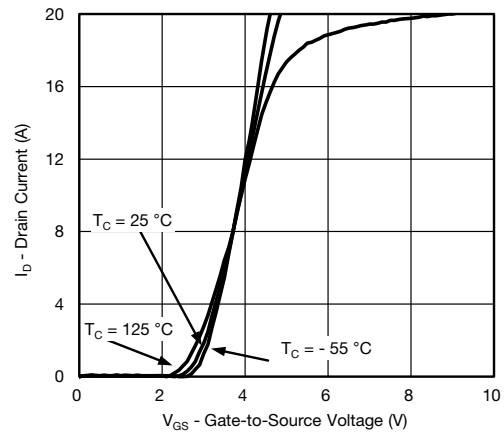
**Output Characteristics**



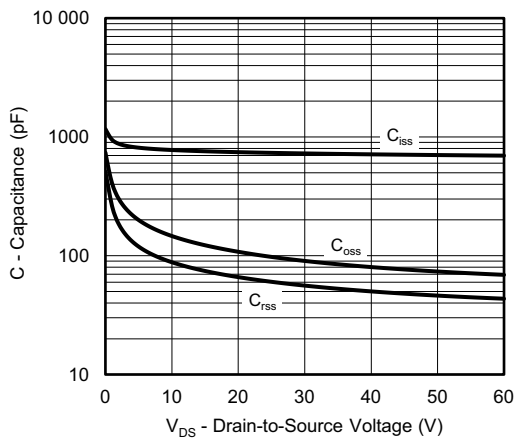
**On-Resistance vs. Drain Current and Gate Voltage**



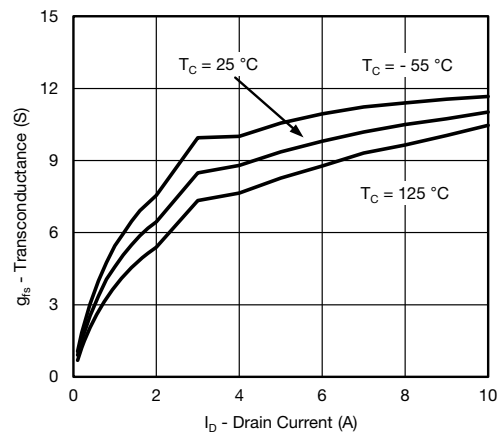
**Transfer Characteristics**



**Transfer Characteristics**



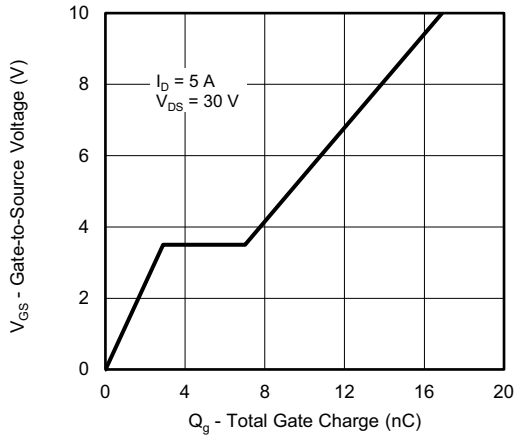
**Capacitance**



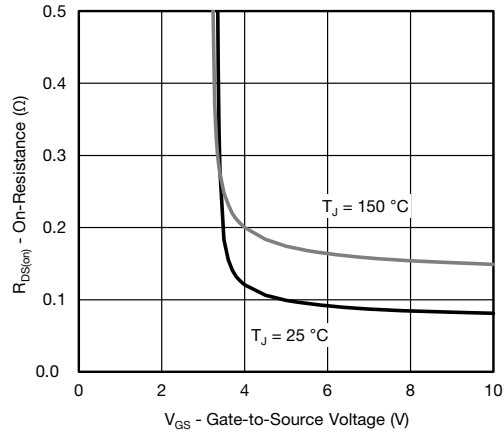
**Transconductance**



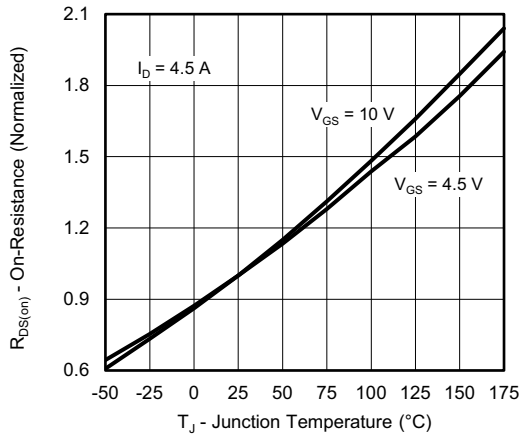
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



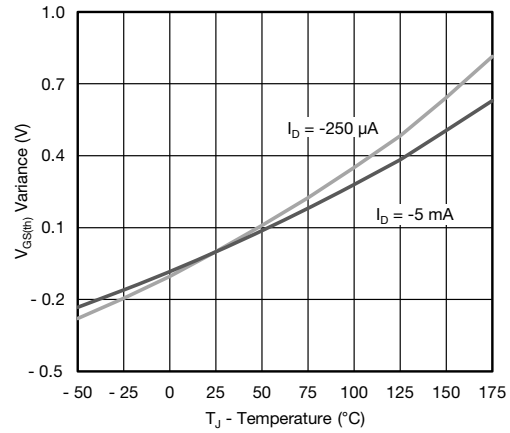
Gate Charge



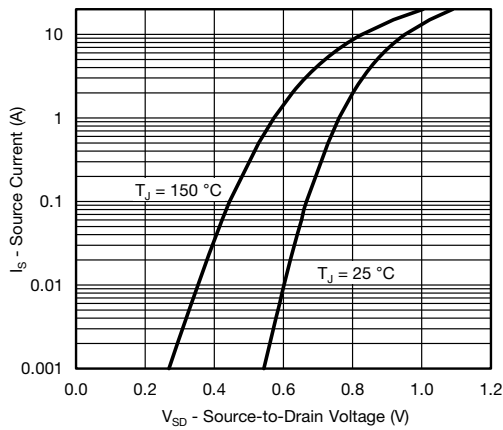
On-Resistance vs. Gate-to-Source Voltage



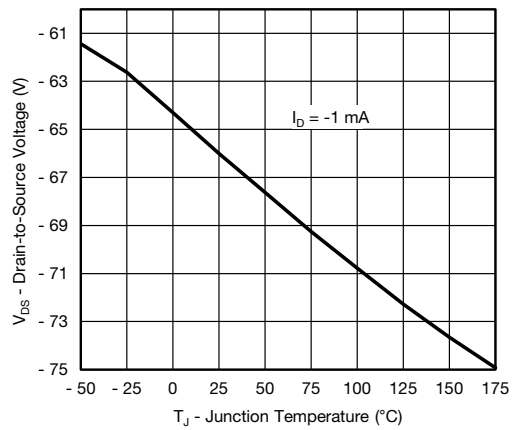
On-Resistance vs. Junction Temperature



Threshold Voltage



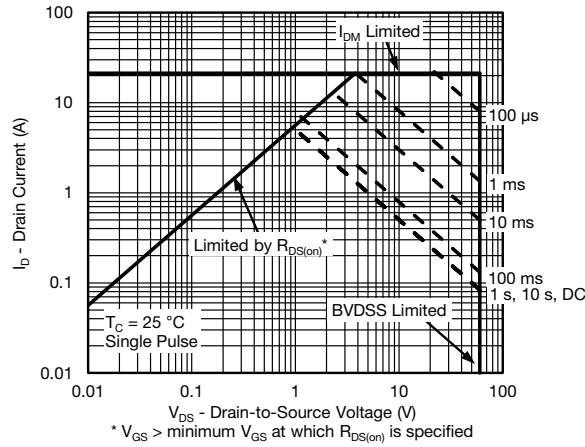
Source-Drain Diode Forward Voltage



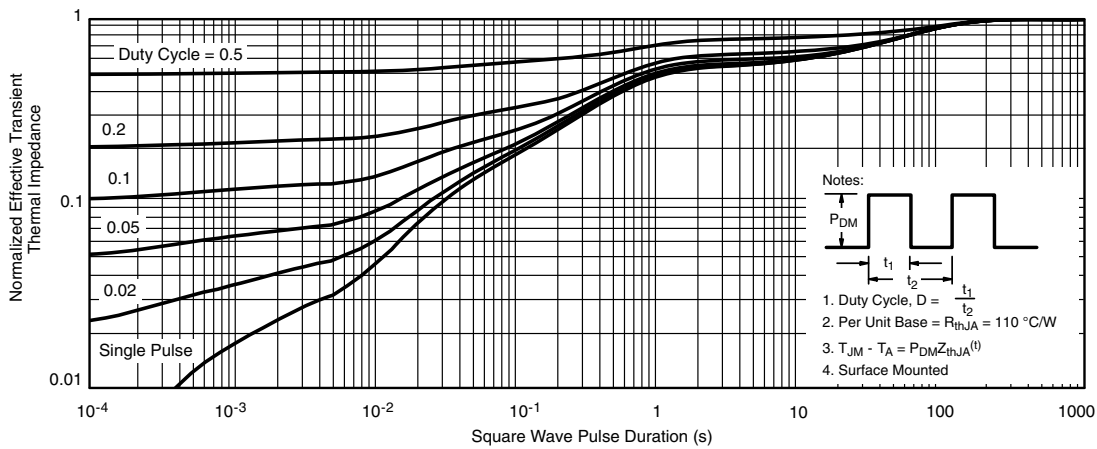
Drain-to-Source Voltage vs. Junction Temperature



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



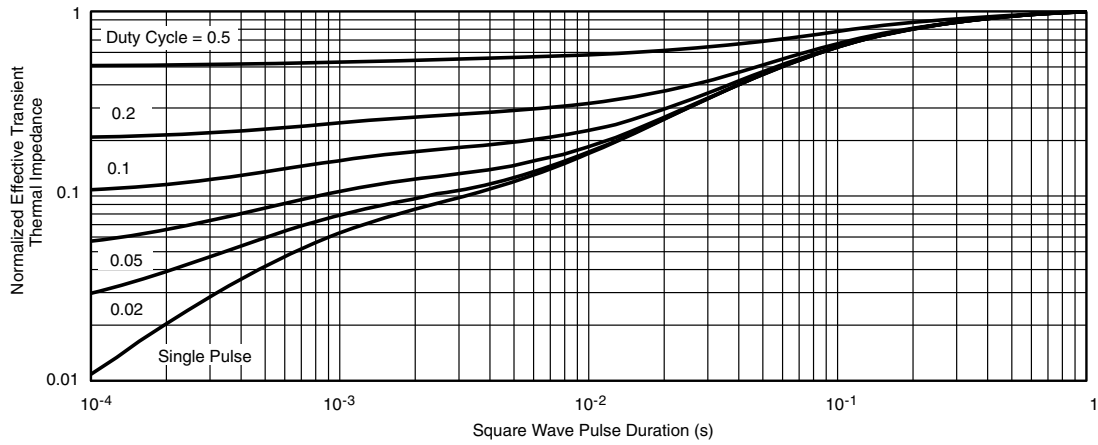
Safe Operating Area, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient



**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



**Normalized Thermal Transient Impedance, Junction-to-Foot**

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## TSOP: 5/6-LEAD

JEDEC Part Number: MO-193C



**5-LEAD TSOP**



**6-LEAD TSOP**



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
<b>A</b>	0.91	-	1.10	0.036	-	0.043
<b>A<sub>1</sub></b>	0.01	-	0.10	0.0004	-	0.004
<b>A<sub>2</sub></b>	0.90	-	1.00	0.035	0.038	0.039
<b>b</b>	0.30	0.32	0.45	0.012	0.013	0.018
<b>c</b>	0.10	0.15	0.20	0.004	0.006	0.008
<b>D</b>	2.95	3.05	3.10	0.116	0.120	0.122
<b>E</b>	2.70	2.85	2.98	0.106	0.112	0.117
<b>E<sub>1</sub></b>	1.55	1.65	1.70	0.061	0.065	0.067
<b>e</b>	0.95 BSC			0.0374 BSC		
<b>e<sub>1</sub></b>	1.80	1.90	2.00	0.071	0.075	0.079
<b>L</b>	0.32	-	0.50	0.012	-	0.020
<b>L<sub>1</sub></b>	0.60 Ref			0.024 Ref		
<b>L<sub>2</sub></b>	0.25 BSC			0.010 BSC		
<b>R</b>	0.10	-	-	0.004	-	-
<b>θ</b>	0°	4°	8°	0°	4°	8°
<b>θ<sub>1</sub></b>	7° Nom			7° Nom		
ECN: C-06593-Rev. I, 18-Dec-06						
DWG: 5540						



# Recommended Land Pattern For TSOP-5L / TSOP-6L



**Note**

- All dimensions are in inches (millimeter)

ECN: C22-0860-Rev. B, 24-Oct-2022  
 DWG: 3010





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