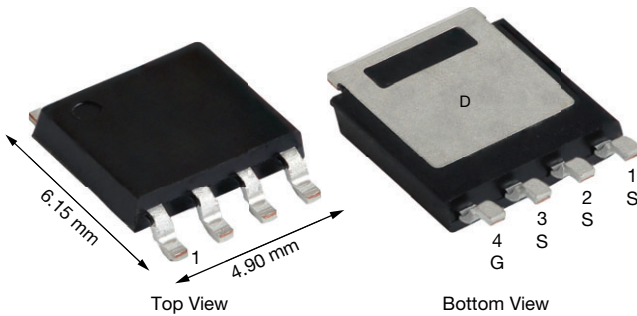
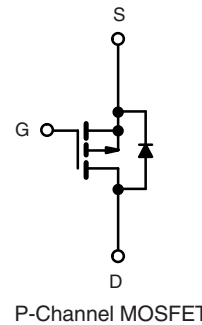


# Automotive P-Channel 60 V (D-S) 175 °C MOSFET

**PowerPAK® SO-8L**

**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	0.0088
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = -4.5 V	0.0163
I <sub>D</sub> (A) <sup>g</sup>	-118
Configuration	Single

ORDERING INFORMATION	
Package	PowerPAK SO-8L
Lead (Pb)-free and Halogen-free	SQJ161ELP-T1-GE3

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 <sup>a</sup>	V <sub>GS</sub>	± 20		
Continuous drain current <sup>g</sup>	I <sub>D</sub>	T <sub>C</sub> = 25 °C <sup>b</sup>	-118	
		T <sub>C</sub> = 125 °C	-68	
Continuous source current (diode conduction) <sup>b, g</sup>	I <sub>S</sub>	-223	A	
Pulsed drain current <sup>c, g</sup>	I <sub>DM</sub>	-262		
Single pulse avalanche current	I <sub>AS</sub>	-52		
Single pulse avalanche energy	E <sub>AS</sub>	L = 0.1 mH	135	mJ
Maximum power dissipation <sup>c, g</sup>			T <sub>C</sub> = 25 °C	
		T <sub>C</sub> = 125 °C	82	W
Operating junction and storage temperature range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°C	
Soldering recommendations (peak temperature) <sup>d, e</sup>		260		

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-ambient	R <sub>thJA</sub>	42	°C/W
Junction-to-case (drain) <sup>f</sup>	R <sub>thJC</sub>	0.61	

**Notes**

- Not intended for continuous use with positive gate voltage > 5.0 V
- Package limited
- When mounted on 1" square PCB (FR4 material)
- See solder profile ([www.vishay.com/doc?73257](http://www.vishay.com/doc?73257)). For PowerPAK SO-8L, the end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
- Using thermal characterization methods based on JE51-14
- Values based on R<sub>thJC</sub> and T<sub>C</sub> of 25 °C. Actual values achievable will be dependent on the thermal characteristics of the complete system



SPECIFICATIONS (T <sub>C</sub> = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
<b>Static</b>							
Drain-source breakdown voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0, I <sub>D</sub> = -250 μA		-60	-	-	V
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA		-1.5	-2.0	-2.5	
Gate-source leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V		-	-	± 100	nA
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = -60 V	-	-	-1	μA
		V <sub>GS</sub> = 0 V	V <sub>DS</sub> = -60 V, T <sub>J</sub> = 125 °C	-	-	-50	
		V <sub>GS</sub> = 0 V	V <sub>DS</sub> = -60 V, T <sub>J</sub> = 175 °C	-	-	-150	
On-state drain current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>GS</sub> = -10 V	V <sub>DS</sub> ≥ -5 V	-30	-	-	A
Drain-source on-state resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10 V	I <sub>D</sub> = -10 A	-	0.0073	0.0088	Ω
		V <sub>GS</sub> = -10 V	I <sub>D</sub> = -10 A, T <sub>J</sub> = 125 °C	-	-	0.0143	
		V <sub>GS</sub> = -10 V	I <sub>D</sub> = -10 A, T <sub>J</sub> = 175 °C	-	-	0.0175	
		V <sub>GS</sub> = -4.5 V	I <sub>D</sub> = -8 A	-	0.0125	0.0163	
Forward transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -15 V, I <sub>D</sub> = -30 A		-	62	-	S
<b>Dynamic <sup>b</sup></b>							
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = -25 V, f = 1 MHz	-	4140	5796	pF
Output capacitance	C <sub>oss</sub>			-	2176	3047	
Reverse transfer capacitance	C <sub>rss</sub>			-	93	131	
Total gate charge <sup>c</sup>	Q <sub>g</sub>	V <sub>GS</sub> = -10 V	V <sub>DS</sub> = -30 V, I <sub>D</sub> = -15 A	-	61	92	nC
Gate-source charge <sup>c</sup>	Q <sub>gs</sub>			-	15	-	
Gate-drain charge <sup>c</sup>	Q <sub>gd</sub>			-	8	-	
Gate resistance	R <sub>g</sub>	f = 1 MHz		0.6	1,6	3,2	Ω
Turn-on delay time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = -30 V, R <sub>L</sub> = 3 Ω, I <sub>D</sub> = -15 A, V <sub>GEN</sub> = -10 V, R <sub>g</sub> = 1 Ω		-	17	26	ns
Rise time <sup>c</sup>	t <sub>r</sub>			-	6	9	
Turn-off delay time <sup>c</sup>	t <sub>d(off)</sub>			-	39	59	
Fall time <sup>c</sup>	t <sub>f</sub>			-	7	11	
<b>Source-Drain Diode Ratings and Characteristics <sup>b</sup></b>							
Pulsed current <sup>a</sup>	I <sub>SM</sub>			-	-	-262	A
Forward voltage	V <sub>SD</sub>	I <sub>F</sub> = -10 A, V <sub>GS</sub> = 0 V		-	-0.76	-1.2	V
Body diode reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = -10 A, di/dt = 100 A/μs		-	73	146	ns
Body diode reverse recovery charge	Q <sub>rr</sub>			-	105	210	nC
Reverse recovery fall time	t <sub>a</sub>			-	38	-	ns
Reverse recovery rise time	t <sub>b</sub>			-	35	-	
Body diode peak reverse recovery current	I <sub>RM(REC)</sub>			-	-2.4	-	A

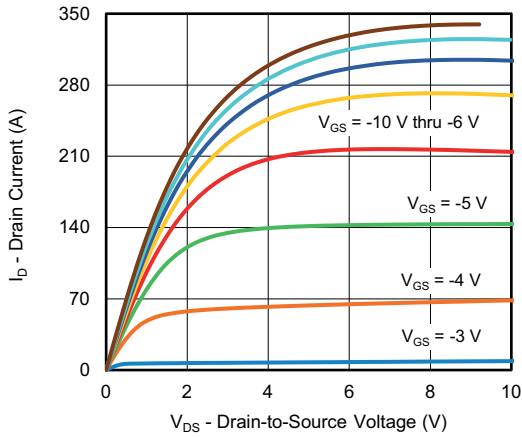
**Notes**

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

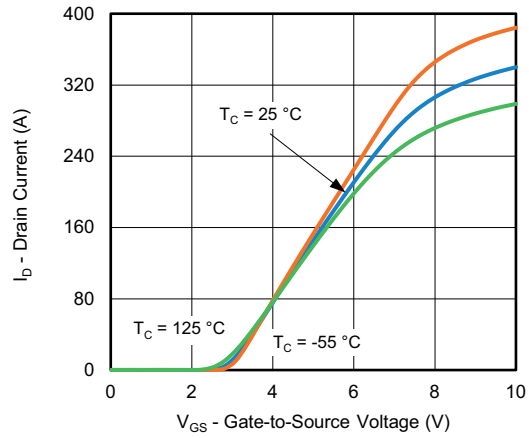
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



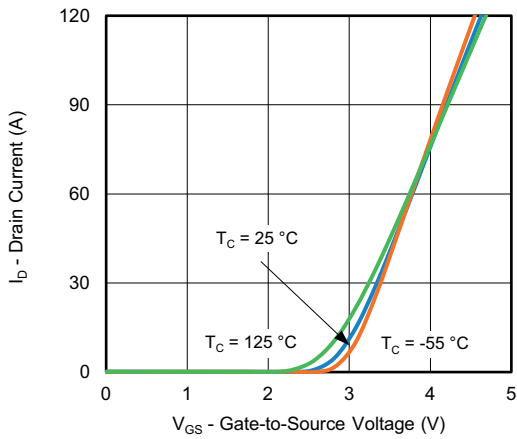
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, unless otherwise noted)



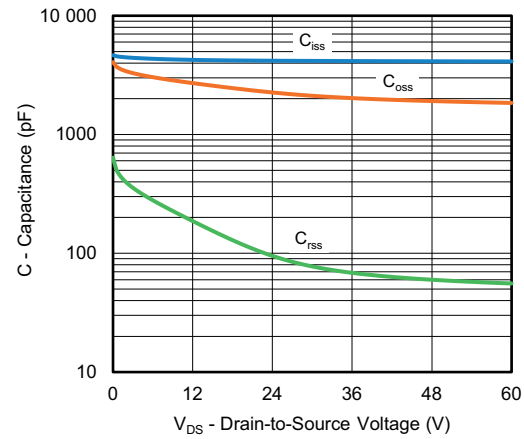
Output Characteristics



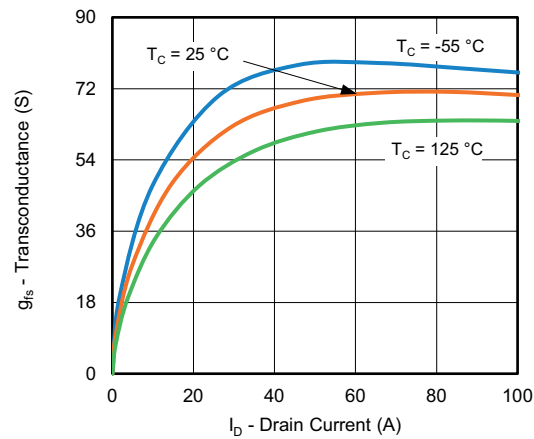
Transfer Characteristics



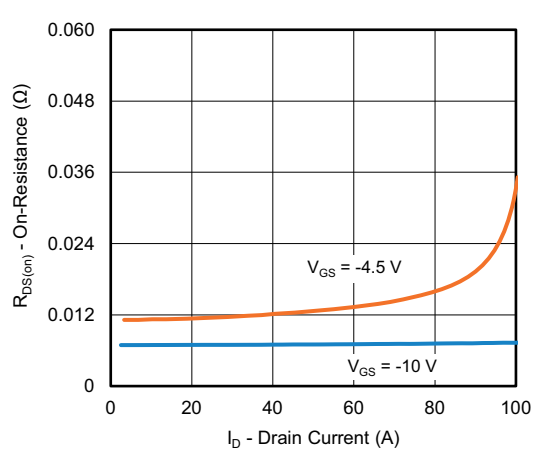
Transfer Characteristics



Capacitance



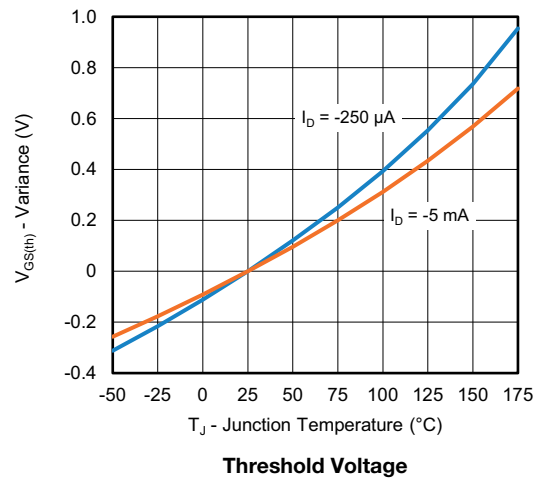
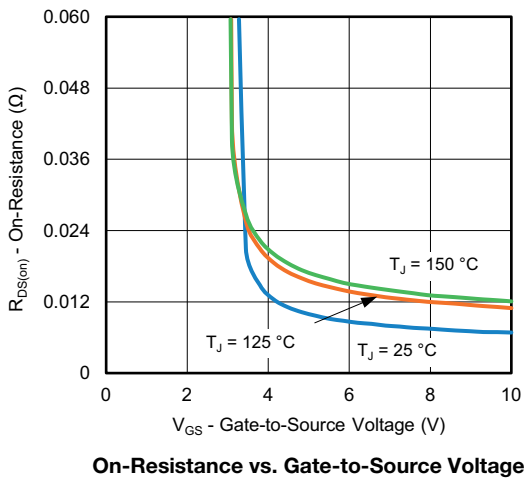
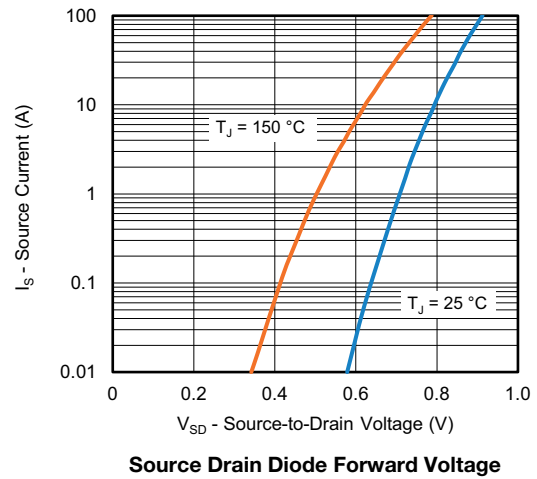
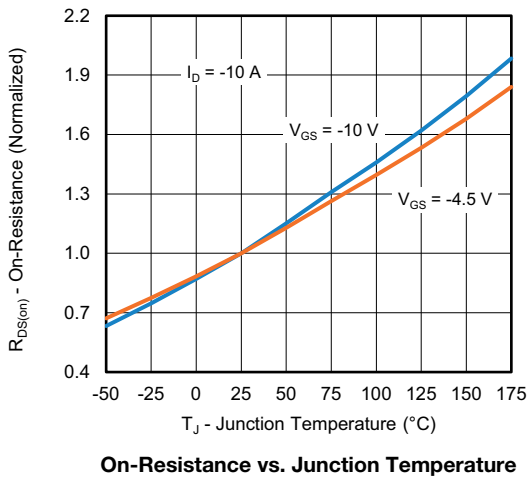
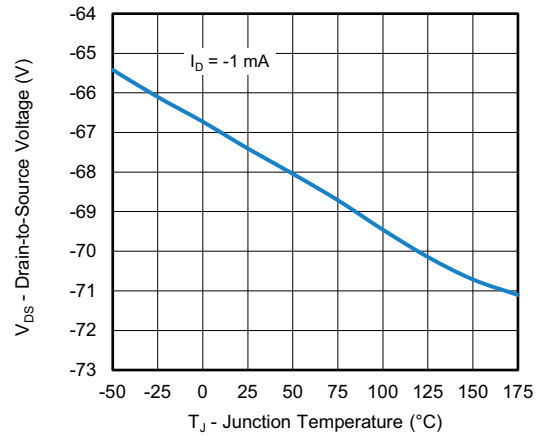
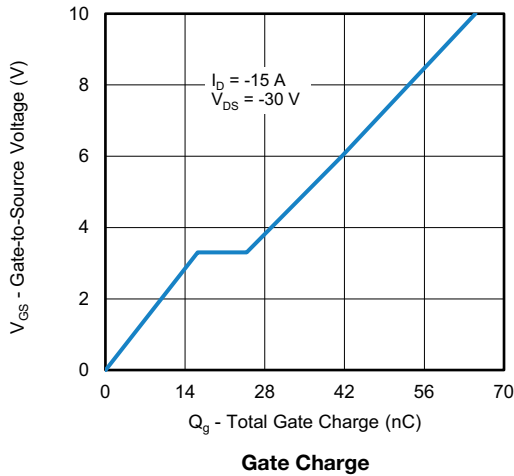
Transconductance



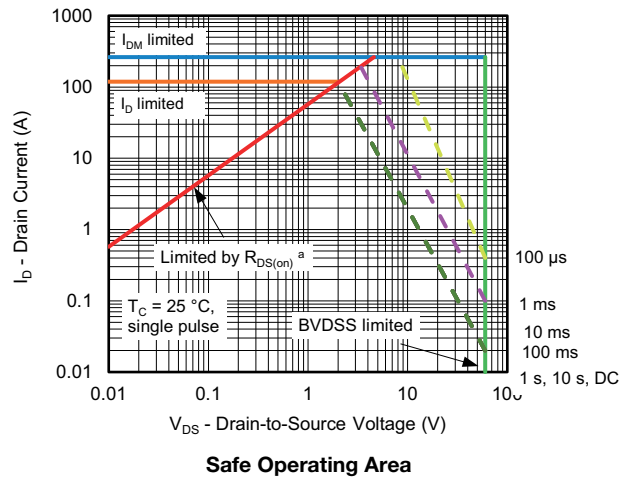
On-Resistance vs. Drain Current



TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, unless otherwise noted)



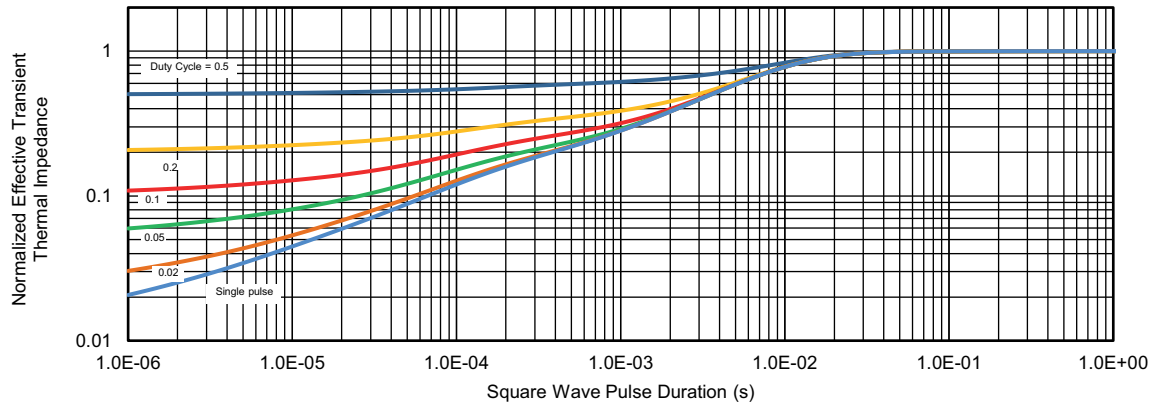
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



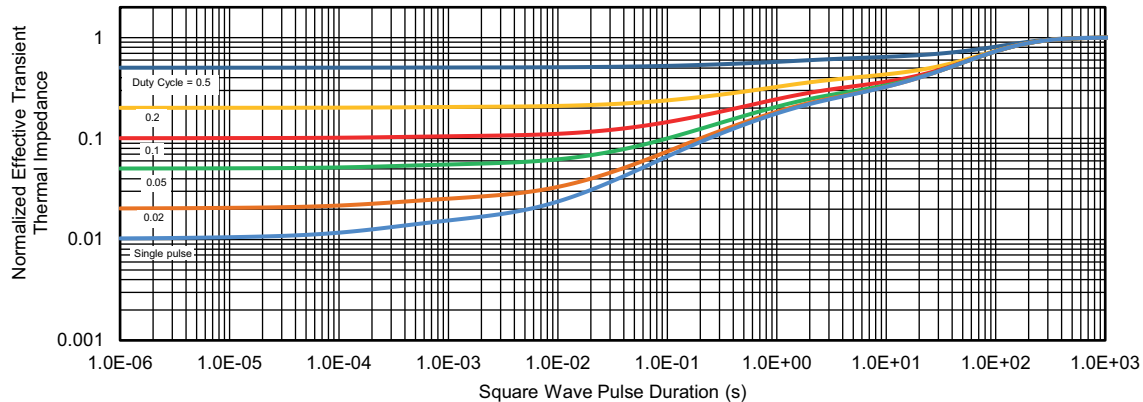
**Note**

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

**THERMAL RATINGS** ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



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



### Normalized Thermal Transient Impedance, Junction-to-Ambient

#### 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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