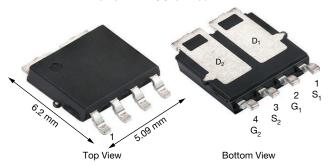


Vishay Siliconix

# Automotive Dual N-Channel 40 V (D-S) 175 °C MOSFET

### PowerPAK® SO-8L Dual BWL

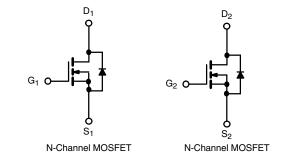


PRODUCT SUMMARY			
V <sub>DS</sub> (V)	40		
$R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 10 \text{ V}$	0.00317		
I <sub>D</sub> (A) per leg <sup>e</sup>	123		
Configuration	Dual		

### **FEATURES**

- TrenchFET® Gen IV power MOSFET
- AEC-Q101 qualified
- 100 % R<sub>q</sub> and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912





ORDERING INFORMATION	
Package	PowerPAK® SO-8L
Lead (Pb)-free and halogen-free	SQJ738EP (for detailed order number please see <a href="https://www.vishay.com/doc?79771">www.vishay.com/doc?79771</a> )

PARAMETER		SYMBOL	LIMIT	UNIT	
Drain-source voltage		$V_{DS}$	40	V	
Gate-source voltage		V <sub>GS</sub>	± 20	V	
Continuous drain current <sup>e</sup>	T <sub>C</sub> = 25 °C <sup>a</sup>	1	123		
	T <sub>C</sub> = 125 °C	I <sub>D</sub>	71		
Continuous source current (diode conduction)		I <sub>S</sub>	85	А	
Pulsed drain current b, e		I <sub>DM</sub>	399		
Single pulse avalanche current	L = 0.1 mH	I <sub>AS</sub>	30		
Single pulse avalanche energy	L = U.1 MH	E <sub>AS</sub>	45	mJ	
Maximum power dissipation <sup>b</sup>	T <sub>C</sub> = 25 °C	Б	93	w	
	T <sub>C</sub> = 125 °C	$P_{D}$	31		
Operating junction and storage temperature range		T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°C	
Soldering recommendations (peak temperature) d, e			260	٠.	

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	LIMIT	UNIT	
Junction-to-ambient	PCB mount <sup>c</sup>	$R_{thJA}$	47	°C/W	
Junction-to-case (drain) <sup>d</sup>		$R_{thJC}$	1.6	G/ <b>VV</b>	

#### Notes

- a. Pulse test; pulse width  $\leq 300~\mu s,~duty~cycle \leq 2~\%$
- b. When mounted on 1" square PCB (FR4 material)
- c. See solder profile (www.vishay.com/doc?73257).
- d. As per on JESD51-14
- e. Values based on RthJC and TC of 25 °C. Actual values achievable will be dependent on the thermal characteristics of the complete system



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PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
Static								
Drain-source breakdown voltage	V <sub>DS</sub>	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$		40	-	-	V	
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$		3.0	3.5	V	
Gate-source leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$		-	-	± 100	nA	
Zero gate voltage drain current		V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 40 V	-	-	1		
	I <sub>DSS</sub>	$V_{GS} = 0 V$	V <sub>DS</sub> = 40 V, T <sub>J</sub> = 125 °C	-	-	50	μΑ	
		$V_{GS} = 0 V$	V <sub>DS</sub> = 40 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	$V_{DS} \ge 5 V$	10	-	-	Α	
Drain-source on-state resistance <sup>a</sup>		V <sub>GS</sub> = 10 V	I <sub>D</sub> = 7 A	-	0.0028	0.00317	Ω	
	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 7 A, T <sub>J</sub> = 125 °C	-	-	0.0052		
		V <sub>GS</sub> = 10 V	I <sub>D</sub> = 7 A, T <sub>J</sub> = 175 °C	-	-	0.0062		
Forward transconductance b	9 <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A		-	80		S	
Dynamic <sup>b</sup>								
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 25 V, f = 1 MHz	-	2245	3143	pF	
Output capacitance	C <sub>oss</sub>			-	763	1069		
Reverse transfer capacitance	C <sub>rss</sub>			-	42	59		
Total gate charge <sup>c</sup>	$Q_g$		<sub>SS</sub> = 10 V V <sub>DS</sub> = 20 V, I <sub>D</sub> = 15 A	-	37	56	nC	
Gate-source charge <sup>c</sup>	$Q_{gs}$	V <sub>GS</sub> = 10 V		-	11	-		
Gate-drain charge <sup>c</sup>	$Q_{gd}$			-	8	-		
Gate resistance	$R_g$	f = 1 MHz		1.1	2.2	3.3	Ω	
Turn-on delay time <sup>c</sup>	t <sub>d(on)</sub>	$V_{DD} = 20 \text{ V}, \text{ R}_{L} = 1.33 \Omega$ $I_{D} \cong 15 \text{ A},  V_{GEN} = 10 \text{ V}, \text{ R}_{g} = 1 \Omega$		-	13	20	- ns	
Rise time <sup>c</sup>	t <sub>r</sub>			-	5	9		
Turn-off delay time <sup>c</sup>	t <sub>d(off)</sub>			-	23	35		
Fall time <sup>c</sup>	t <sub>f</sub>			-	7	11		
Source-drain diode ratings and characteristics	cteristics <sup>b</sup>							
Pulsed current <sup>a</sup>	I <sub>SM</sub>			-	-	399	Α	
Forward voltage	$V_{SD}$	I <sub>F</sub> = 7 A, V <sub>GS</sub> = 0 V		-	0.88	1.2	V	
Body diode reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 7 A, di/dt = 100A/us		-	34	68	ns	
Body diode reverse recovery charge	Q <sub>rr</sub>			25	50	-	nC	
Reverse recovery fall time	t <sub>a</sub>			-	16	-	ns	
Reverse recovery rise time	t <sub>b</sub>			-	18	-		
Body diode peak reverse recovery current	I <sub>RM(REC)</sub>			-	-1.3	-	Α	

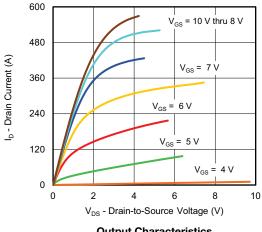
## Notes

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

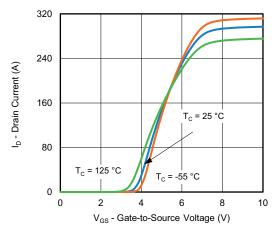
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



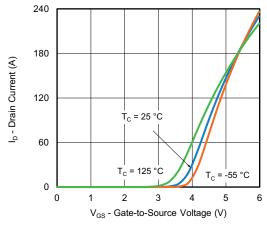
## **TYPICAL CHARACTERISTICS** (T<sub>A</sub> = 25 °C, unless otherwise noted)



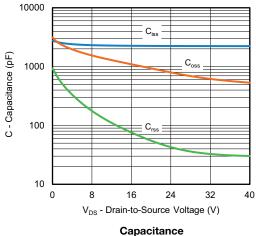
**Output Characteristics** 

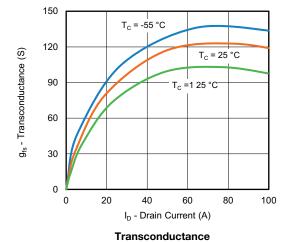


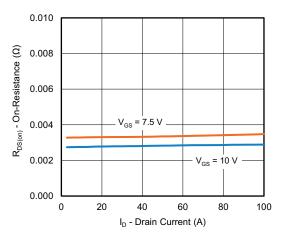
**Transfer Characteristics** 



**Transfer Characteristics** 





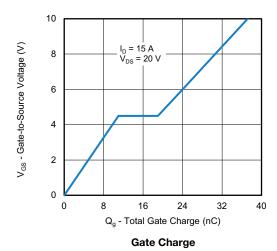


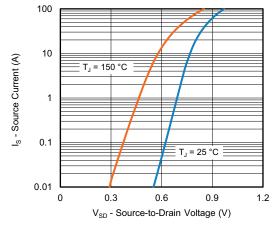
On-Resistance vs. Drain Current

For technical questions, contact: automostech

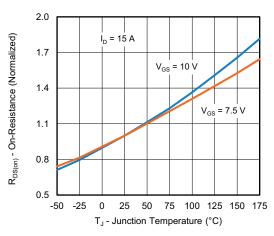


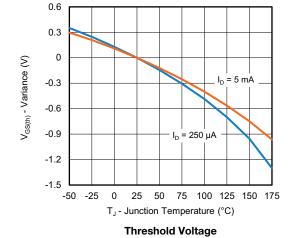
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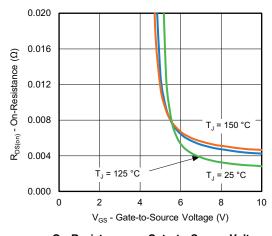


**Source Drain Diode Forward Voltage** 





On-Resistance vs. Junction Temperature



56 55 V<sub>DS</sub> - Drain-to-Source Voltage (V) 54 53 52 51 50 49 48 -25 0 25 50 75 100 125 150 175 -50 T<sub>J</sub> - Junction Temperature (°C)

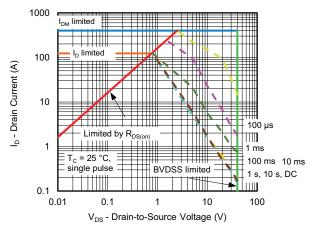
On-Resistance vs. Gate-to-Source Voltage

Drain Source Breakdown vs. Junction Temperature

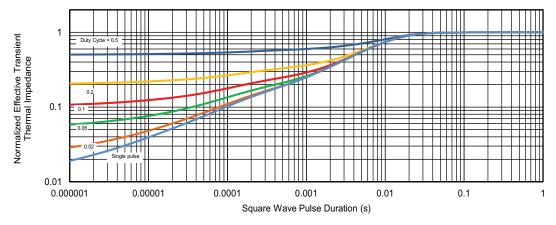
For technical questions, contact: automostech



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



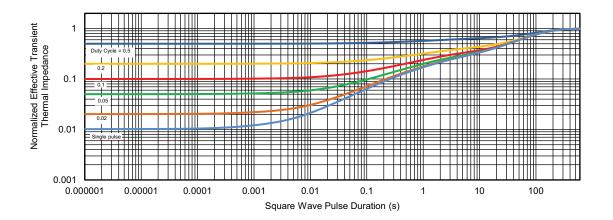
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case



## THERMAL RATINGS (T<sub>A</sub> = 25 °C, unless otherwise noted)



### 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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