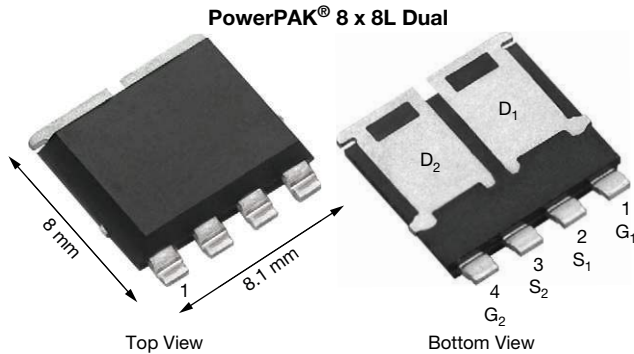
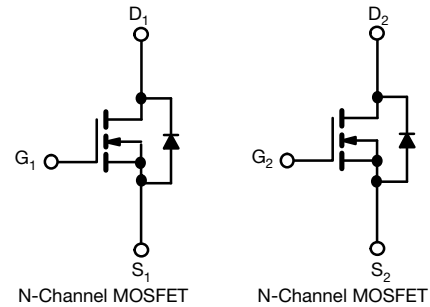


# Automotive Dual N-Channel 40 V (D-S) 175 °C MOSFET



## FEATURES

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



PRODUCT SUMMARY	
V <sub>DS</sub> (V)	40
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = 10 V	0.0023
I <sub>D</sub> (A) per leg	100
Configuration	Dual

ORDERING INFORMATION	
Package	PowerPAK 8 x 8L
Lead (Pb)-free and halogen-free	SQJQ936E (for detailed order number please see <a href="http://www.vishay.com/doc?79776">www.vishay.com/doc?79776</a> )

ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)					
PARAMETER	SYMBOL	LIMIT	UNIT		
Drain-source voltage	V <sub>DS</sub>	40	V		
Gate-source voltage	V <sub>GS</sub>	± 20			
Continuous drain current	I <sub>D</sub>	T <sub>C</sub> = 25 °C <sup>a</sup>	100	A	
		T <sub>C</sub> = 125 °C	82		
Continuous source current (diode conduction) <sup>a</sup>	I <sub>S</sub>	68	mJ		
Pulsed drain current <sup>b</sup>	I <sub>DM</sub>	400			
Single pulse avalanche current	I <sub>AS</sub>	46.5			
Single pulse avalanche energy	E <sub>AS</sub>	L = 0.1 mH			110
Maximum power dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	75	W	
		T <sub>C</sub> = 125 °C	25		
Operating junction and storage temperature range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°C		
Soldering recommendations (peak temperature) <sup>d</sup>		260			

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	LIMIT	UNIT	
Junction-to-ambient	R <sub>thJA</sub>	60	°C/W	
Junction-to-case (drain)	R <sub>thJC</sub>	2		

## Notes

- Package limited
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
- When mounted on 1" square PCB (FR4 material)
- See solder profile ([www.vishay.com/doc?73257](http://www.vishay.com/doc?73257)). 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



SPECIFICATIONS ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
<b>Static</b>							
Drain-source breakdown voltage	$V_{DS}$	$V_{GS} = 0, I_D = 250\text{ }\mu\text{A}$		40	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$		2.5	3.0	3.5	
Gate-source leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$		-	-	$\pm 100$	nA
Zero gate voltage drain current	$I_{DSS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 20\text{ V}$	-	-	1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	-	150	
On-state drain current <sup>a</sup>	$I_{D(on)}$	$V_{GS} = 10\text{ V}$	$V_{DS} \geq 5\text{ V}$	40	-	-	A
Drain-source on-state resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 5\text{ A}$	-	0.0019	0.0023	$\Omega$
		$V_{GS} = 10\text{ V}$	$I_D = 5\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	-	0.0033	
		$V_{GS} = 10\text{ V}$	$I_D = 5\text{ A}, T_J = 175\text{ }^\circ\text{C}$	-	-	0.0039	
Forward transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 15\text{ A}$		-	120	-	S
<b>Dynamic <sup>b</sup></b>							
Input capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	-	4600	6600	$\text{pF}$
Output capacitance	$C_{oss}$			-	1450	2030	
Reverse transfer capacitance	$C_{rss}$			-	120	170	
Total gate charge <sup>c</sup>	$Q_g$	$V_{GS} = 10\text{ V}$	$V_{DS} = 20\text{ V}, I_D = 15\text{ A}$	-	75	113	$\text{nC}$
Gate-source charge <sup>c</sup>	$Q_{gs}$			-	22	-	
Gate-drain charge <sup>c</sup>	$Q_{gd}$			-	16	-	
Gate resistance	$R_g$	$f = 1\text{ MHz}$		0.9	1.9	2.6	$\Omega$
Turn-on delay time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 20\text{ V}, R_L = 1.3\text{ }\Omega,$ $I_D \cong 15\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		-	18	27	$\text{ns}$
Rise time <sup>c</sup>	$t_r$			-	24	36	
Turn-off delay time <sup>c</sup>	$t_{d(off)}$			-	34	51	
Fall time <sup>c</sup>	$t_f$			-	14	21	
<b>Source-Drain Diode Ratings and Characteristics <sup>b</sup></b>							
Pulsed current <sup>a</sup>	$I_{SM}$			-	-	272	A
Forward voltage	$V_{SD}$	$I_F = 40\text{ A}, V_{GS} = 0\text{ V}$		-	1	1.1	V
Body diode reverse recovery time	$t_{rr}$	$I_F = 40\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		-	63	126	ns
Body diode reverse recovery charge	$Q_{rr}$			-	86	172	nC
Reverse recovery fall time	$t_a$			-	29	-	ns
Reverse recovery rise time	$t_b$			-	33	-	
Body diode peak reverse recovery current	$I_{RM(REC)}$			-	2.6	-	A

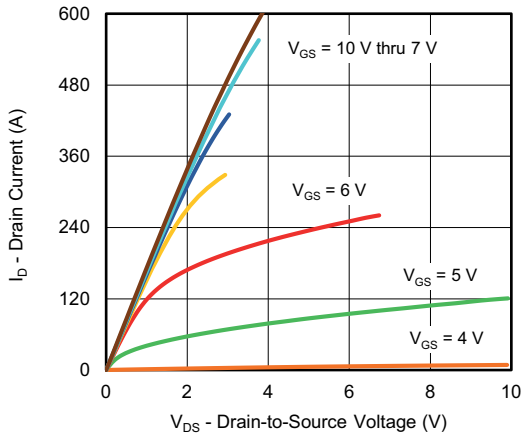
**Notes**

- 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

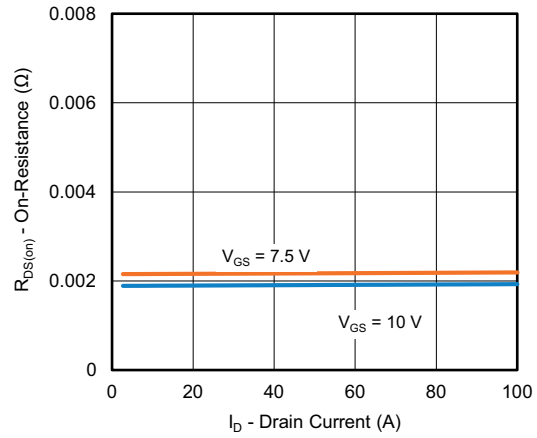
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



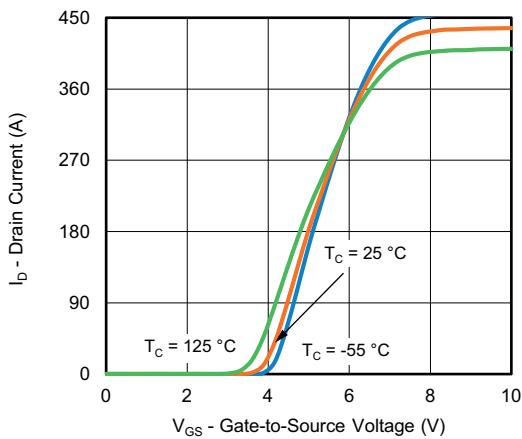
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, unless otherwise noted)



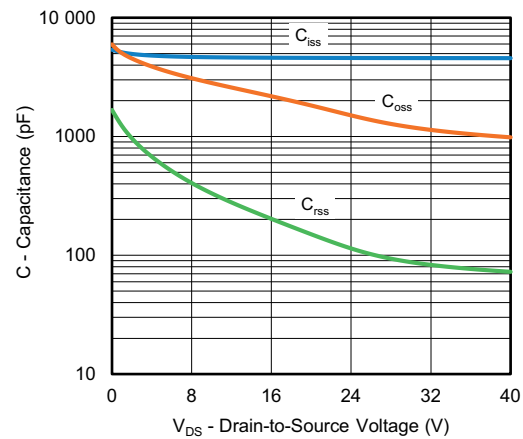
Output Characteristics



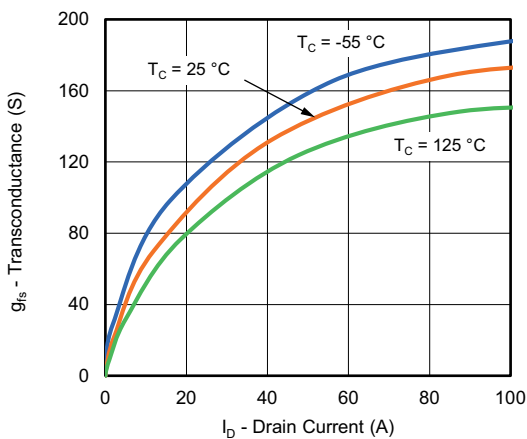
On-Resistance vs. Drain Current



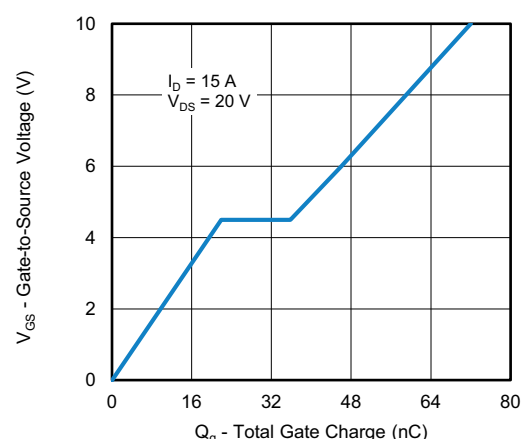
Transfer Characteristics



Capacitance



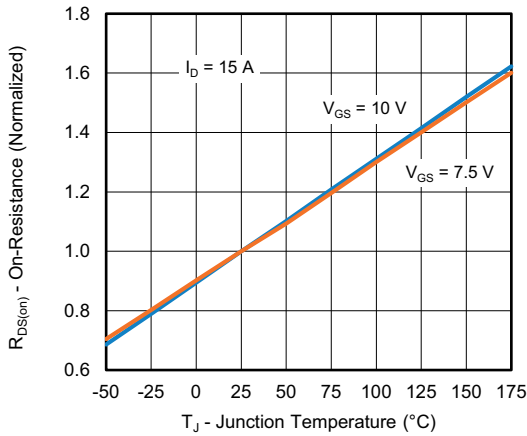
Transconductance



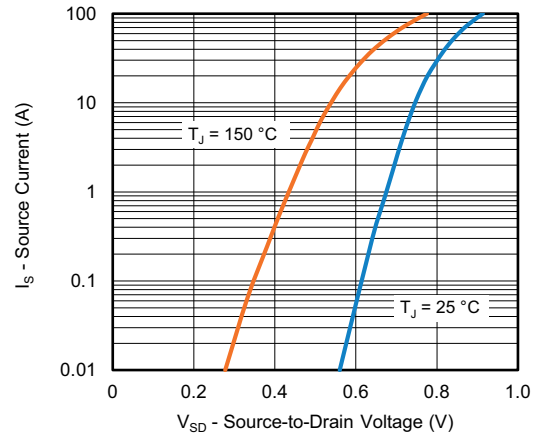
Gate Charge



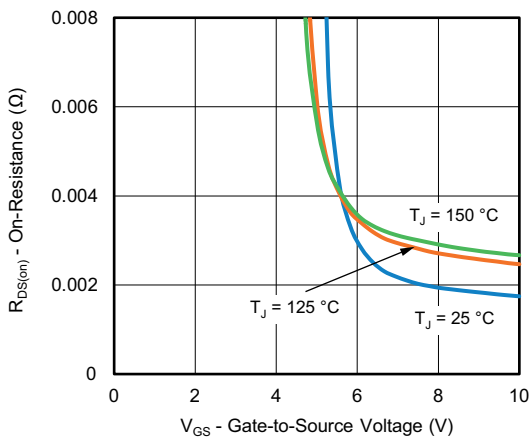
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, unless otherwise noted)



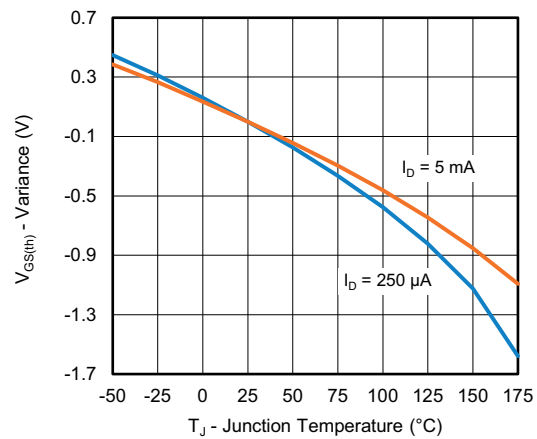
On-Resistance vs. Junction Temperature



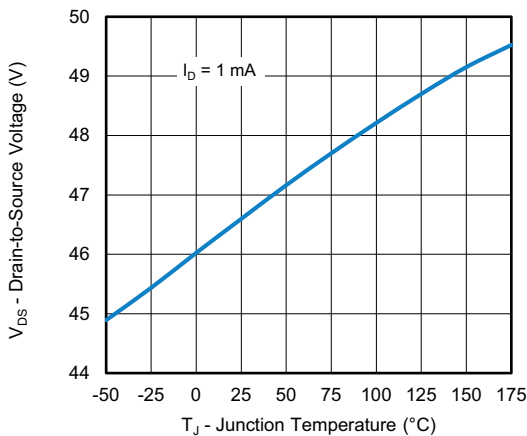
Source Drain Diode Forward Voltage



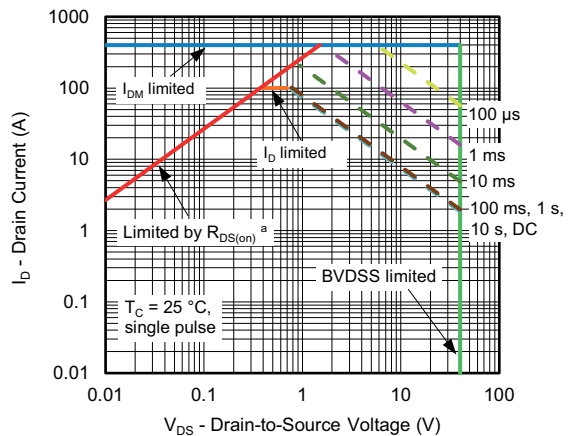
On-Resistance vs. Gate to Source Voltage



Threshold Voltage



Drain Source Breakdown vs. Junction Temperature



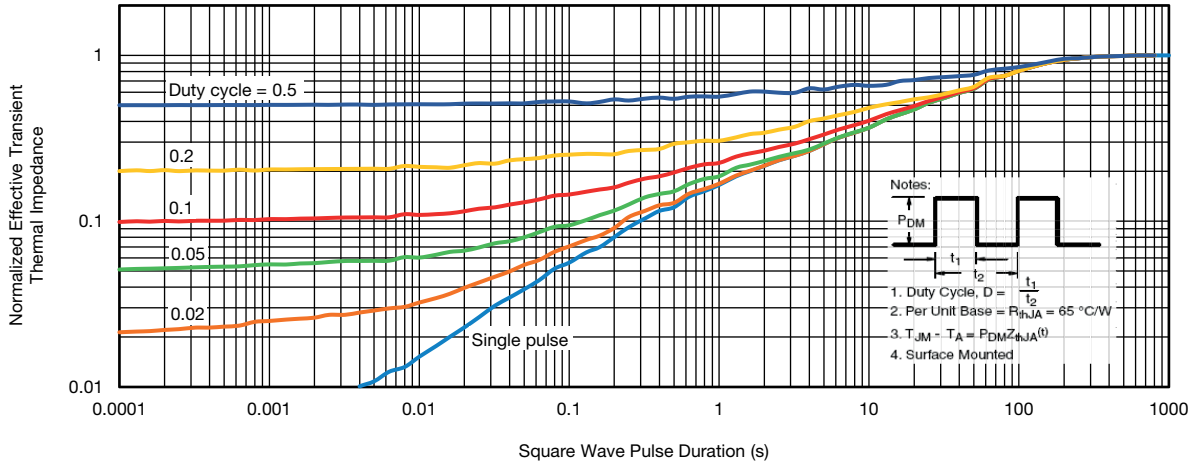
Safe Operating Area

Note

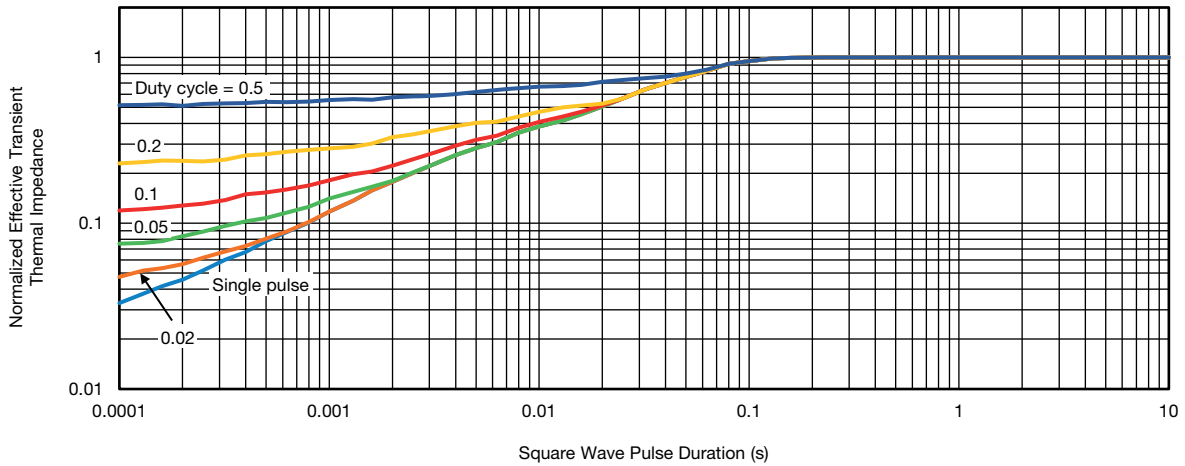
a. V<sub>GS</sub> > minimum V<sub>GS</sub> at which R<sub>DS(on)</sub> is specified



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



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



**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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