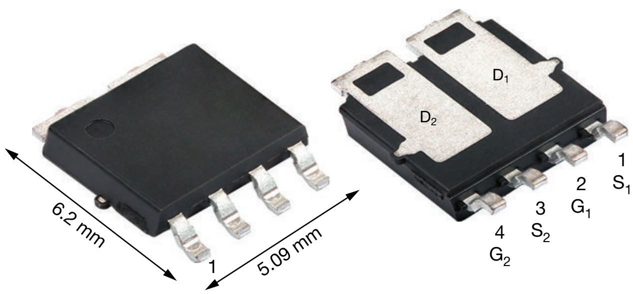
Automotive Dual N-Channel 40 V (D-S) 175 °C MOSFET

PowerPAK® SO-8L Dual BWL

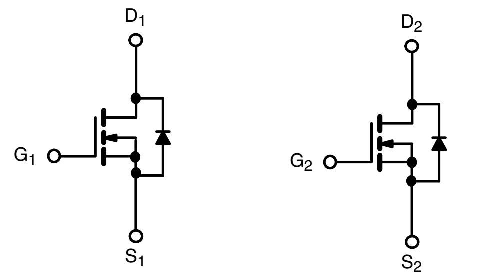


Top View   Bottom View

FEATURES

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

AUTOMOTIVE GRADE
RoHS COMPLIANT
HALOGEN FREE



N-Channel MOSFET   N-Channel MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	40
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.0073
$R_{DS(on)}$ (Ω) at V_{GS} = 4.5 V	0.010
I_D (A) per leg [e]	68
Configuration	Dual

ORDERING INFORMATION	
Package	PowerPAK® SO-8L
Lead (Pb)-free and halogen-free	SQJ748ELP (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}	40	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current [e]	T_C = 25 °C [a]	I_D	68	A
	T_C = 125 °C		39	
Continuous source current (diode conduction) [e]		I_S	68	
Pulsed drain current [b, e]		I_{DM}	175	
Single pulse avalanche current	L = 0.1 mH	I_{AS}	17	
Single pulse avalanche energy		E_{AS}	14	mJ
Maximum power dissipation [b, e]	T_C = 25 °C	P_D	85	W
	T_C = 125 °C		22	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature)			260	

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-ambient	PCB mount [c]	R_{thJA}	52	°C/W
Junction-to-case (drain) [d]		R_{thJC}	2.3	

Notes

a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 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 R_{thJC} and T_C of 25 °C. Actual values achievable will be dependent on the thermal characteristics of the complete system.

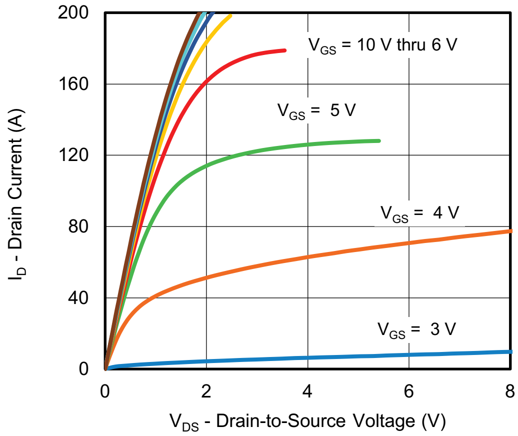
SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 μA	40	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	1.2	2.0	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} = 40 V	-	-	1	μA
		V_{GS} = 0 V, V_{DS} = 40 V, T_J = 125 °C	-	-	50	
		V_{GS} = 0 V, V_{DS} = 40 V, T_J = 175 °C	-	-	150	
On-state drain current [a]	$I_{D(on)}$	V_{GS} = 10 V, V_{DS} ≥ 5 V	10	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 15 A	-	0.0058	0.0073	Ω
		V_{GS} = 4.5 V, I_D = 15 A	-	0.0080	0.0100	
		V_{GS} = 10 V, I_D = 15 A, T_J = 125 °C	-	-	0.0120	
		V_{GS} = 10 V, I_D = 15 A, T_J = 175 °C	-	-	0.0140	
Forward transconductance [b]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	-	60	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	-	1081	1514	pF
Output capacitance	C_{oss}		-	298	418	
Reverse transfer capacitance	C_{rss}		-	37	52	
Total gate charge [c]	Q_g	V_{GS} = 10 V, V_{DS} = 20 V, I_D = 15 A	-	19	29	nC
Gate-source charge [c]	Q_{gs}		-	4	-	
Gate-drain charge [c]	Q_{gd}		-	4	-	
Gate resistance	R_g	f = 1 MHz	1.0	3.0	4.5	Ω
Turn-on delay time [c]	$t_{d(on)}$	V_{DD} = 20 V, R_L = 1.33 Ω I_D ≅ 15 A, V_{GEN} = 10 V, R_g = 1 Ω	-	10	15	ns
Rise time [c]	t_r		-	4	8	
Turn-off delay time [c]	$t_{d(off)}$		-	20	30	
Fall time [c]	t_f		-	4	8	
Source-Drain Diode Ratings and Characteristics [b]						
Pulsed current [a]	I_{SM}		-	-	175	A
Forward voltage	V_{SD}	I_F = 7 A, V_{GS} = 0 V	-	0.88	1.2	V
Body diode reverse recovery time	t_{rr}	I_F = 10 A, di/dt = 100A/us	-	21	42	ns
Body diode reverse recovery charge	Q_{rr}		-	8	15	nC
Reverse recovery fall time	t_a		-	9	-	ns
Reverse recovery rise time	t_b		-	13	-	
Body diode peak reverse recovery current	$I_{RM(REC)}$		-	-0.7	-	A

Notes

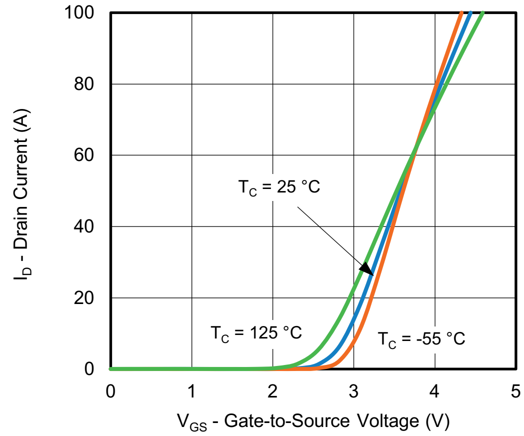
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

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.

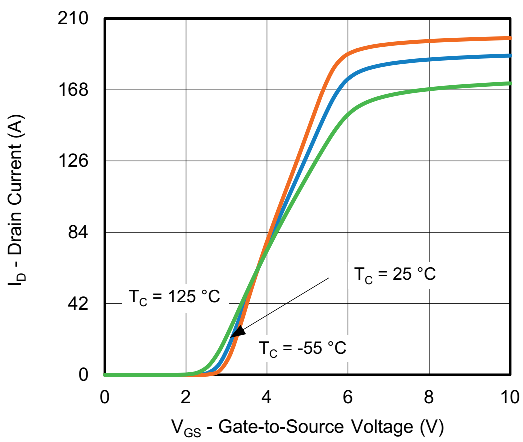
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



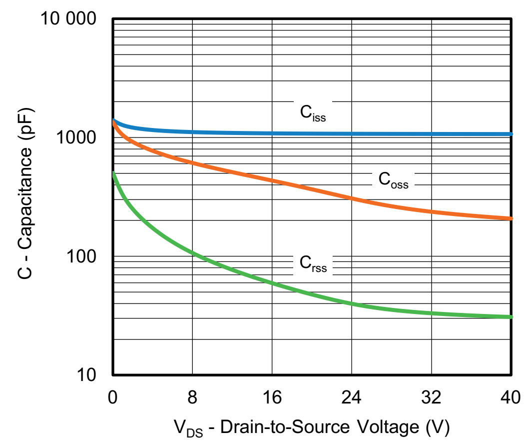
Output Characteristics



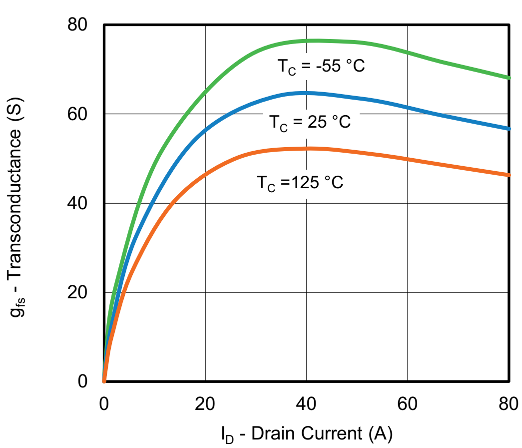
Transfer Characteristics



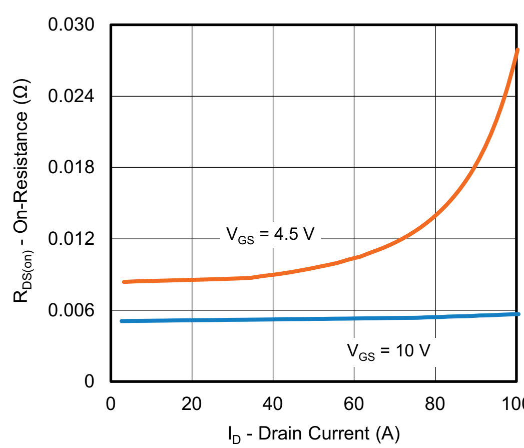
Transfer Characteristics



Capacitance

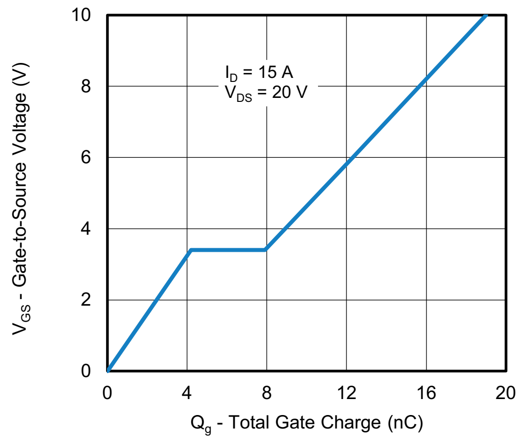


Transconductance

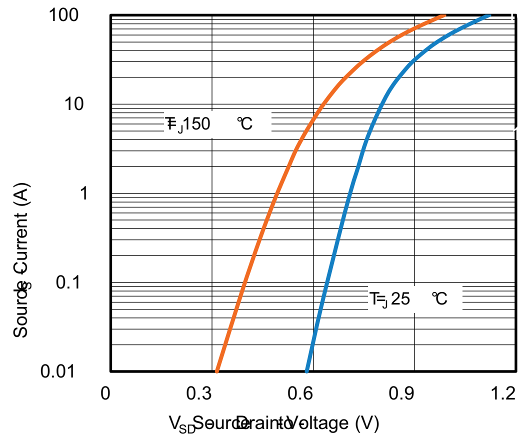


On-Resistance vs. Drain Current

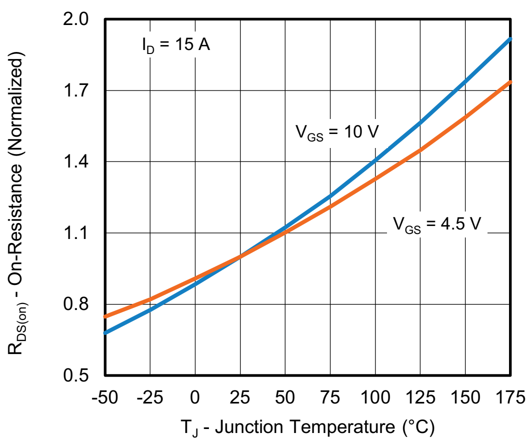
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



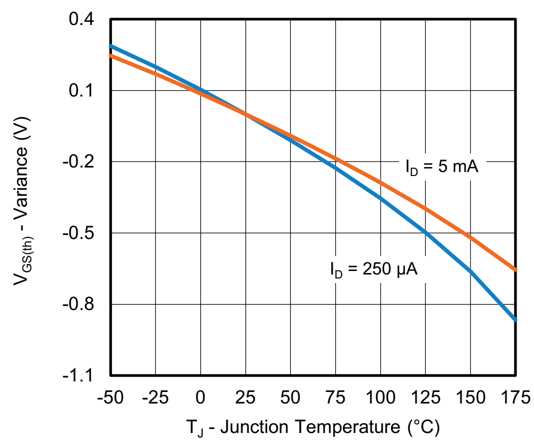
Gate Charge



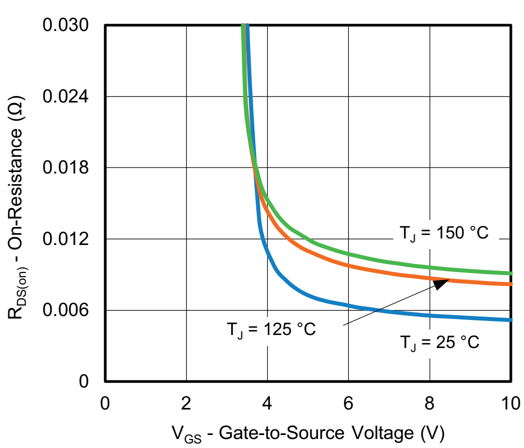
Source Drain Diode Forward Voltage



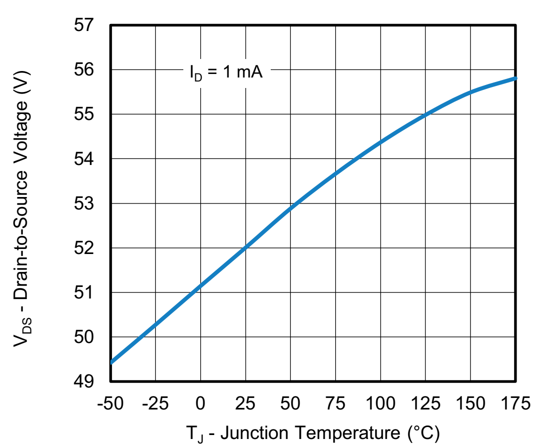
On-Resistance vs. Junction Temperature



Threshold Voltage

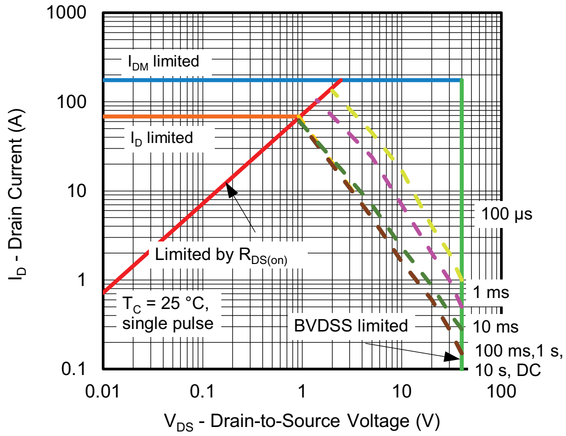


On-Resistance vs. Gate-to-Source Voltage

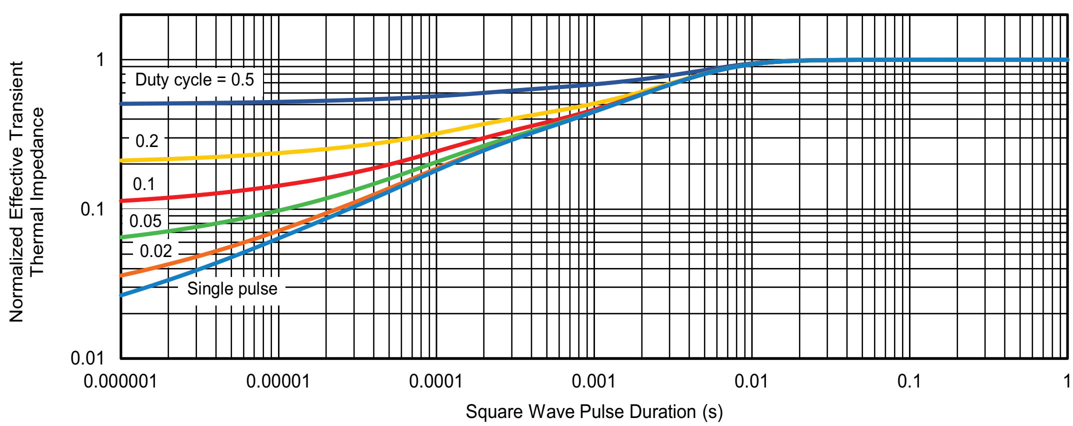


Drain Source Breakdown vs. Junction Temperature

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

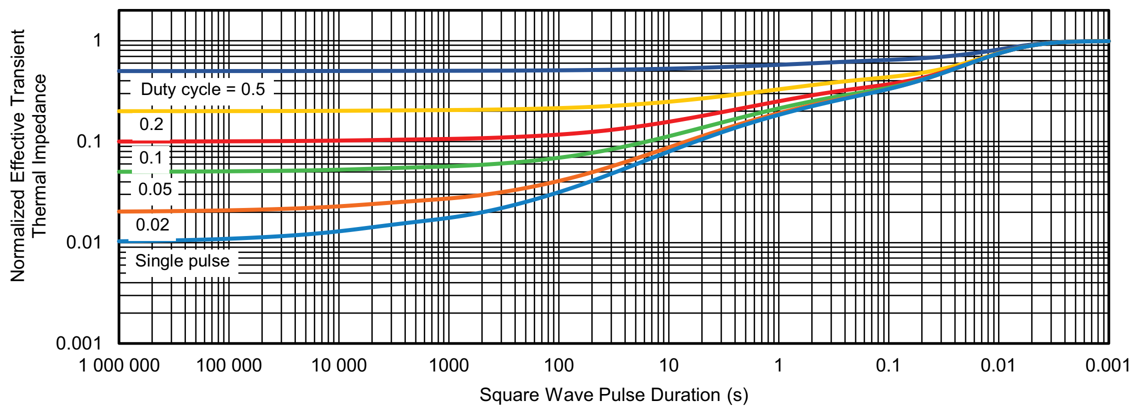


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

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



Normalized Thermal Transient Impedance, Junction-to-Case

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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