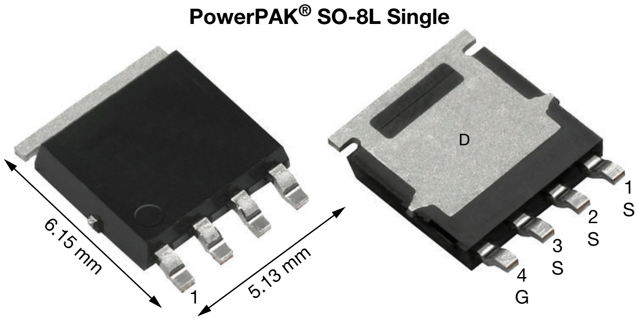
Automotive N-Channel 30 V (D-S) 175 °C MOSFET

PowerPAK® SO-8L Single



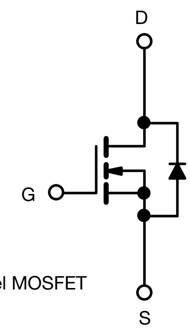
Top View   Bottom View

PRODUCT SUMMARY	
V_{DS} (V)	30
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.0120
$R_{DS(on)}$ (Ω) at V_{GS} = 4.5 V	0.0170
I_D (A)	30
Configuration	Single
Package	PowerPAK SO-8L

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
Pb-free
RoHS COMPLIANT
HALOGEN FREE



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Drain-source voltage		V_{DS}	30	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current	T_C = 25 °C [a]	I_D	30	A
	T_C = 125 °C		25	
Continuous source current (diode conduction) [a]		I_S	30	
Pulsed drain current [b]		I_{DM}	90	
Single pulse avalanche current	L = 0.1 mH	I_{AS}	22	
Single pulse avalanche energy		E_{AS}	24.2	mJ
Maximum power dissipation [b]	T_C = 25 °C	P_D	45	W
	T_C = 125 °C		15	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature) [d, e]			260	

THERMAL RESISTANCE RATINGS				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Junction-to-ambient	PCB mount [c]	R_{thJA}	70	°C/W
Junction-to-case (drain)		R_{thJC}	3.3	

Notes

a. Package limited
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
c. When mounted on 1" square PCB (FR4 material)
d. See solder profile (www.vishay.com/doc?73257). The PowerPAK SO-8L is a leadless package. 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
e. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components

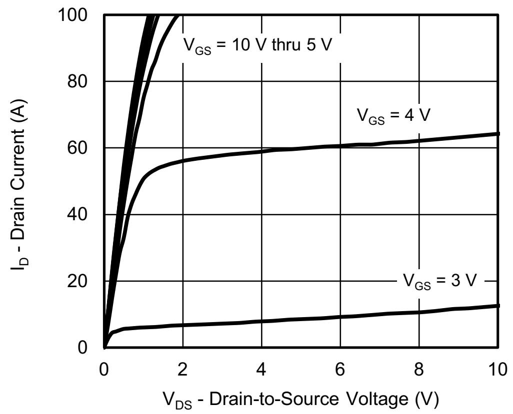
SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0, I_D = 250 μA		30	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA		1.5	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} = 30 V	-	-	1	μA
		V_{GS} = 0 V	V_{DS} = 30 V, T_J = 125 °C	-	-	50	
		V_{GS} = 0 V	V_{DS} = 30 V, T_J = 175 °C	-	-	250	
On-state drain current [a]	$I_{D(on)}$	V_{GS} = 10 V	V_{DS} ≥ 5 V	15	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 4.5 A	-	0.0098	0.0120	Ω
		V_{GS} = 4.5 V	I_D = 3 A	-	0.0139	0.0170	
		V_{GS} = 10 V	I_D = 4.5 A, T_J = 125 °C	-	-	0.0188	
		V_{GS} = 10 V	I_D = 4.5 A, T_J = 175 °C	-	-	0.0227	
Forward transconductance [b]	g_{fs}	V_{DS} = 15 V, I_D = 4 A		-	31	-	S
Dynamic [b]							
Input capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 15 V, f = 1 MHz	-	850	1110	pF
Output capacitance	C_{oss}			-	167	220	
Reverse transfer capacitance	C_{rss}			-	60	80	
Total gate charge [c]	Q_g	V_{GS} = 10 V	V_{DS} = 15 V, I_D = 5 A	-	15	25	nC
Gate-source charge [c]	Q_{gs}			-	3	-	
Gate-drain charge [c]	Q_{gd}			-	3	-	
Gate resistance	R_g	f = 1 MHz		0.7	1.5	2.3	Ω
Turn-on delay time [c]	$t_{d(on)}$	V_{DD} = 15 V, R_L = 3.8 Ω I_D ≅ 4 A, V_{GEN} = 10 V, R_g = 1 Ω		-	11	20	ns
Rise time [c]	t_r			-	5	10	
Turn-off delay time [c]	$t_{d(off)}$			-	21	40	
Fall time [c]	t_f			-	5	10	
Source-Drain Diode Ratings and Characteristics [b]							
Pulsed current [a]	I_{SM}			-	-	90	A
Forward voltage	V_{SD}	I_F = 4 A, V_{GS} = 0		-	0.79	1.2	V
Body diode reverse recovery time	t_{rr}	I_F = 3 A, di/dt = 100 A/μs		-	22	50	ns
Body diode reverse recovery charge	Q_{rr}			-	18	40	nC
Reverse recovery fall time	t_a			-	14	-	ns
Reverse recovery rise time	t_b			-	8	-	
Body diode peak reverse recovery current	$I_{RM(REC)}$			-	-1.5	-	A

Notes

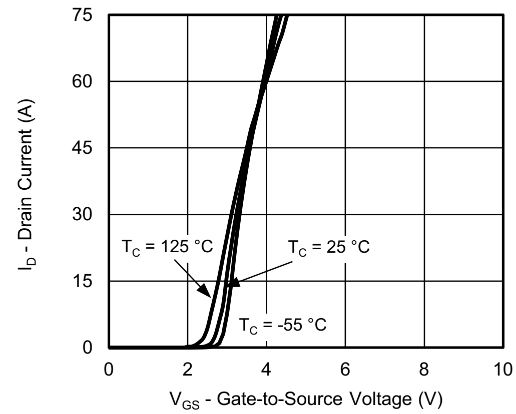
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

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.

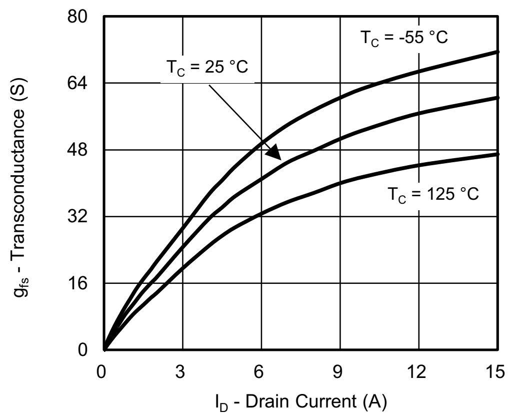
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



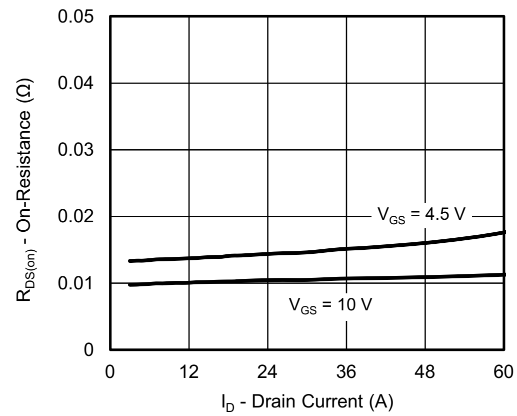
Output Characteristics



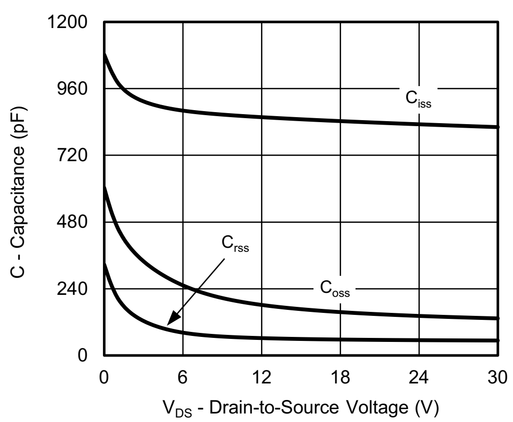
Transfer Characteristics



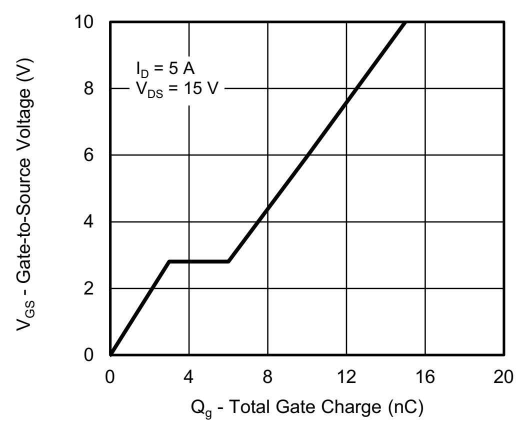
Transconductance



On-Resistance vs. Drain Current

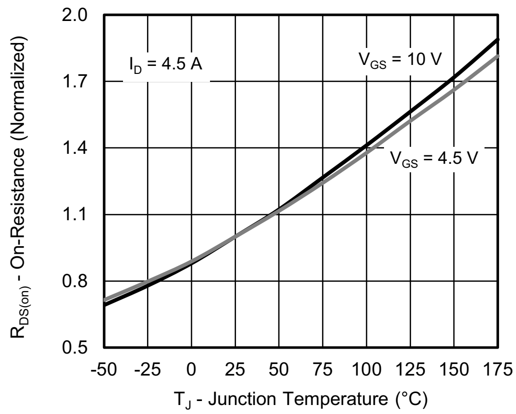


Capacitance

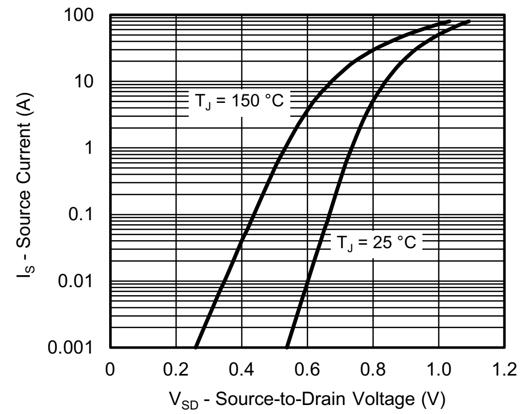


Gate Charge

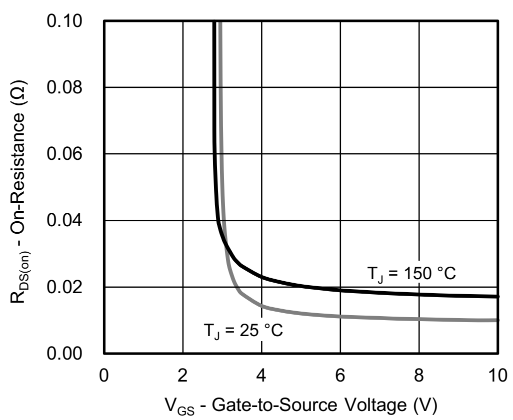
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



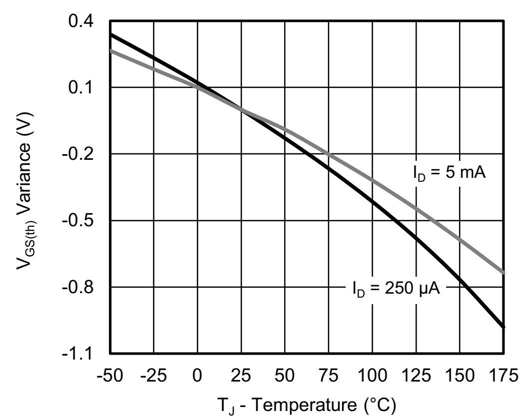
On-Resistance vs. Junction Temperature



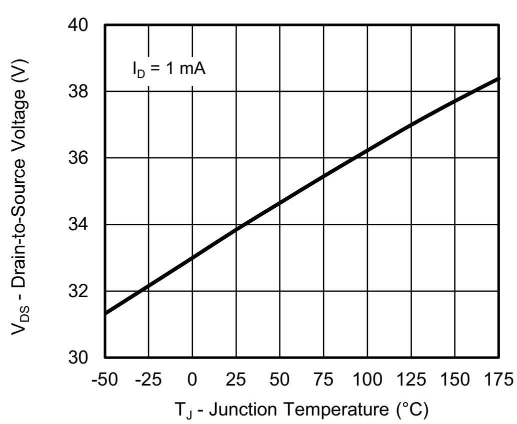
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

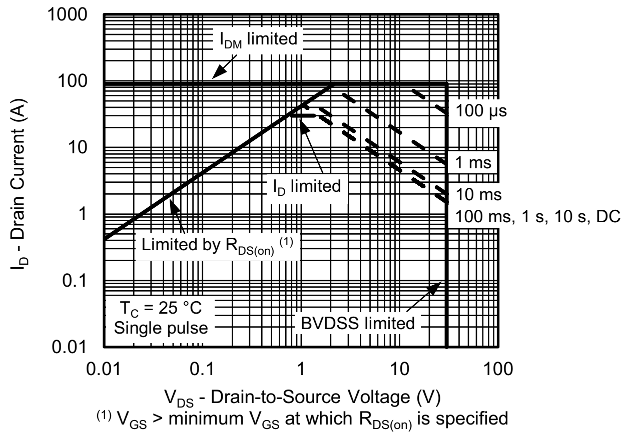


Threshold Voltage

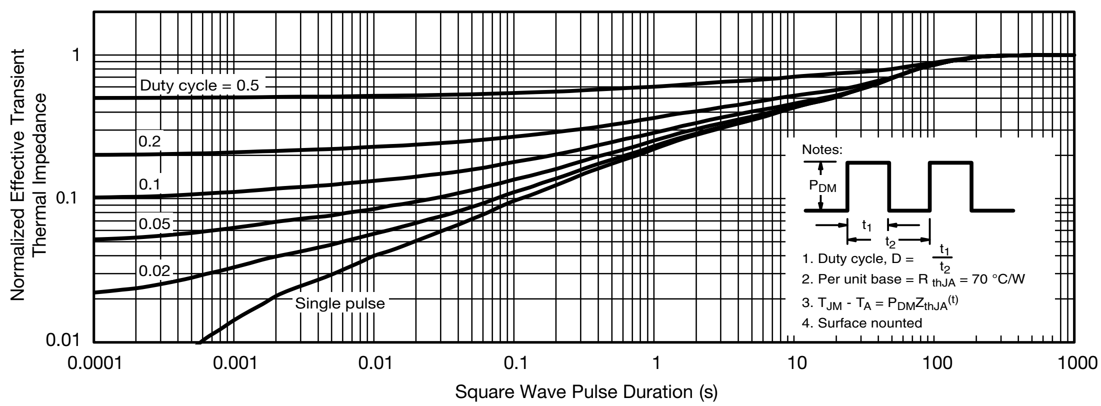


Drain Source Breakdown vs. Junction Temperature

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

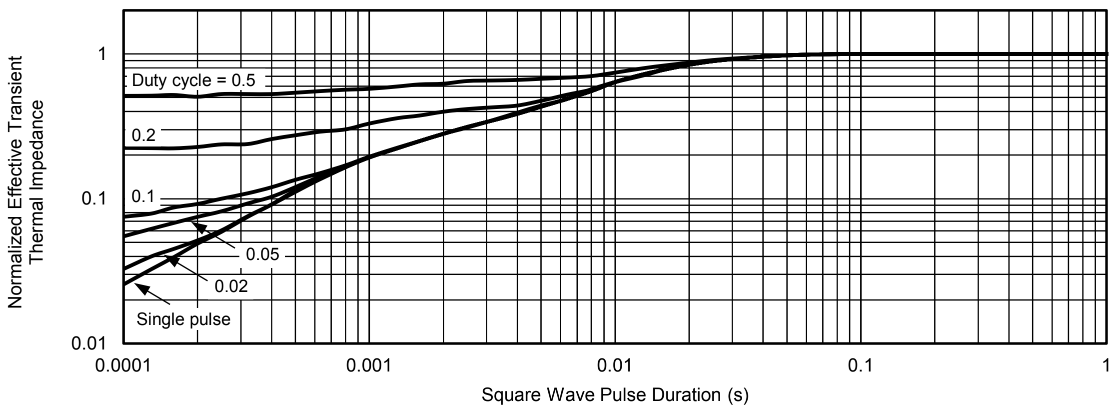


Safe Operating Area



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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