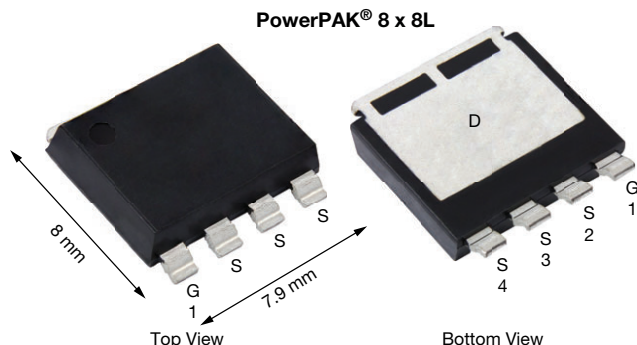


Automotive P-Channel 40 V (D-S) 175 °C MOSFET



PRODUCT SUMMARY

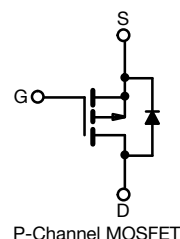
V _{DS} (V)	-40
R _{DS(on)} (Ω) at V _{GS} = -10 V	0.0020
I _D (A)	-390
Configuration	Single
Package	PowerPAK 8 x 8L

FEATURES

- AEC-Q101 qualified
- 100 % R_g and UIS tested
- Thin 1.6 mm package
- Very low thermal resistance
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

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

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	-40	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current	$T_C = 25\text{ }^{\circ}\text{C}$	I_D	-390	A
	$T_C = 125\text{ }^{\circ}\text{C}$		-226	
Continuous source current (diode conduction)		I_S	545	
Pulsed drain current ^b		I_{DM}	-489	
Single pulse avalanche current	L = 0.1 mH	I_{AS}	66	
Single pulse avalanche energy		E_{AS}	218	
Maximum power dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	P_D	600	W
	$T_C = 125\text{ }^{\circ}\text{C}$		200	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +175	$^{\circ}\text{C}$
Soldering recommendations (peak temperature) ^d			260	

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-ambient	PCB mount °	R _{thJA}	44	°C/W
Junction-to-case (drain)		R _{thJC}	0.25	

Notes

- a. Package limited
- b. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2 \%$
- c. When mounted on 1" square PCB (FR4 material)
- d. See solder profile (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 °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		-40	-	-	V	
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		-1.5	-2	-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	-	-	200		
		V _{GS} = 0 V	V _{DS} = -40 V, T _J = 175 °C	-	-	330		
On-state drain current ^a	I _{D(on)}	V _{GS} = -10 V	V _{DS} ≥ -5 V	-100	-	-	A	
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = -4.5 V	I _D = 8 A	-	0.0020	0.0029	Ω	
		V _{GS} = -10 V	I _D = -10 A	-	0.0014	0.0020		
		V _{GS} = -10 V	I _D = -10 A, T _J = 125 °C	-	-	0.0035		
		V _{GS} = 10 V	I _D = -10 A, T _J = 175 °C	-	-	0.0040		
Forward transconductance ^b	g _{fs}	V _{DS} = -15 V, I _D = -50 A		-	180	-	S	
Dynamic ^b								
Input capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	44 421	62 190	pF	
Output capacitance	C _{oss}			-	1633	2287		
Reverse transfer capacitance	C _{rss}			-	1476	2067		
Total gate charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = -20 V, I _D = -30 A	-	487	731	nC	
Gate-source charge ^c	Q _{gs}			-	89	-		
Gate-drain charge ^c	Q _{gd}			-	82	-		
Gate resistance	R _g	f = 1 MHz		1.1	2.2	3.3	Ω	
Turn-on delay time ^c	t _{d(on)}	V _{DD} = -20 V, R _L = 0.67 Ω I _D ≡ -30 A, V _{GEN} = -10 V, R _g = 1 Ω		-	22	33	ns	
Rise time ^c	t _r			-	30	45		
Turn-off delay time ^c	t _{d(off)}			-	196	294		
Fall time ^c	t _f			-	64	96		
Source-Drain Diode Ratings and Characteristics ^b								
Reverse recovery time	t _a	V _{DD} = -32 V, I _{FM} = -20 A, di/dt = 100 A/μs		-	21	-	ns	
	t _b			-	19	-		
	t _{rr}			-	40	80		
Reverse recovery charge	Q _{rr}			-	42	84	nC	
Reverse recovery current	I _{RM}			-	-	2.0	A	
Pulsed current ^a	I _{SM}	-	-	1100	A			
Forward voltage	V _{SD}	I _F = -50 A, V _{GS} = 0		-	-0.8	-1.1	V	

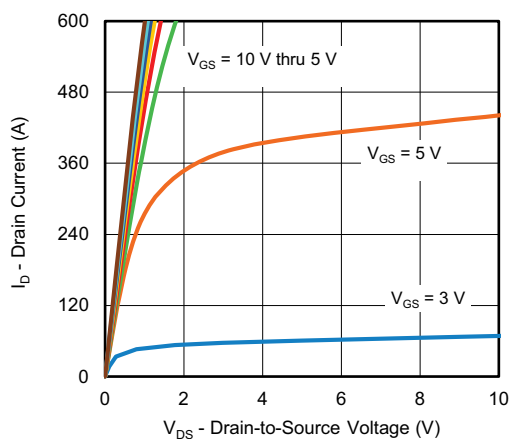
Notes

- 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

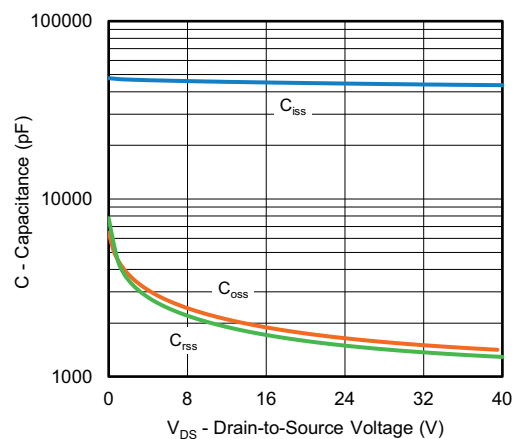
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



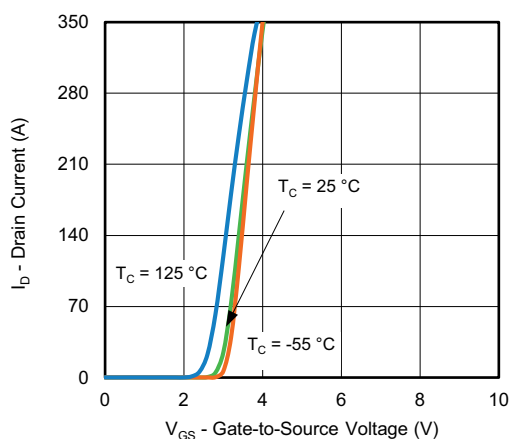
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



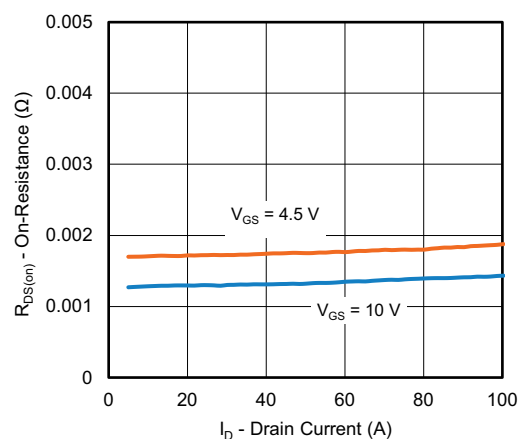
Output Characteristics



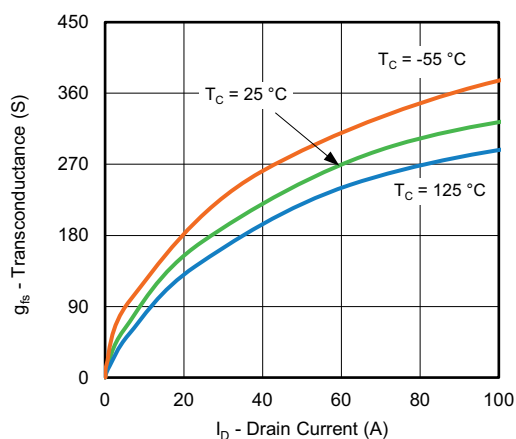
Capacitance



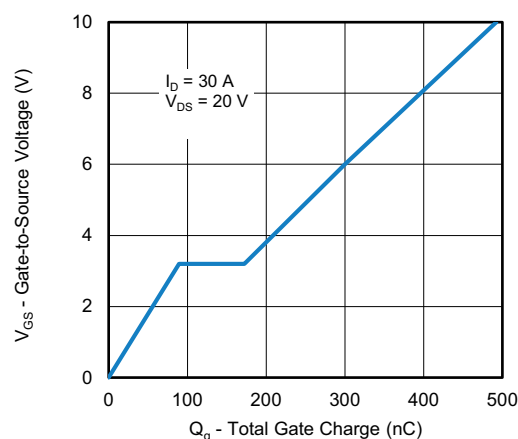
Transfer Characteristics



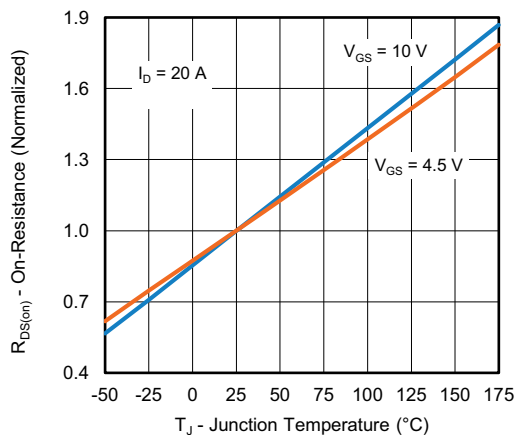
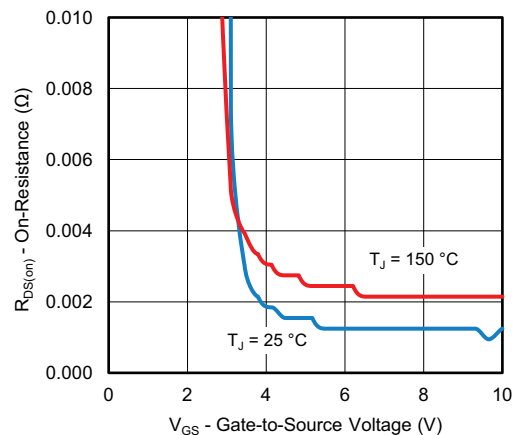
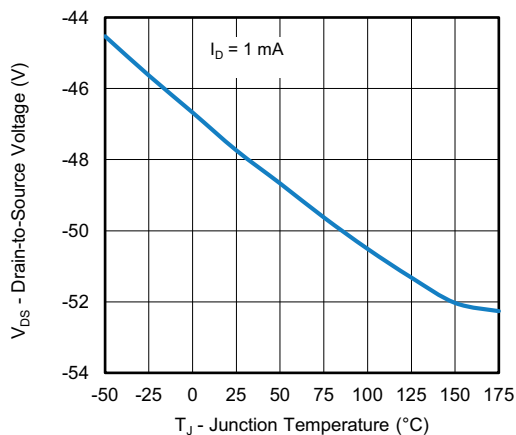
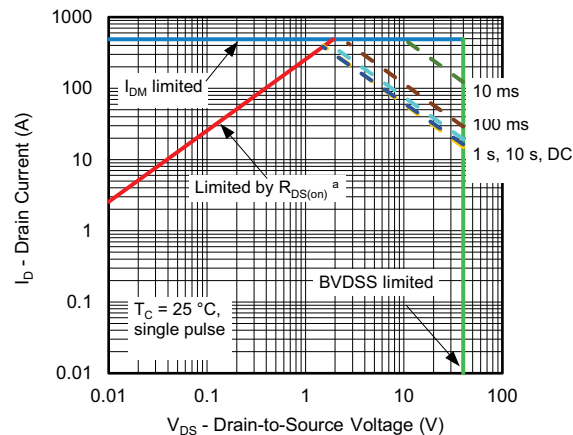
On-Resistance vs. Drain Current

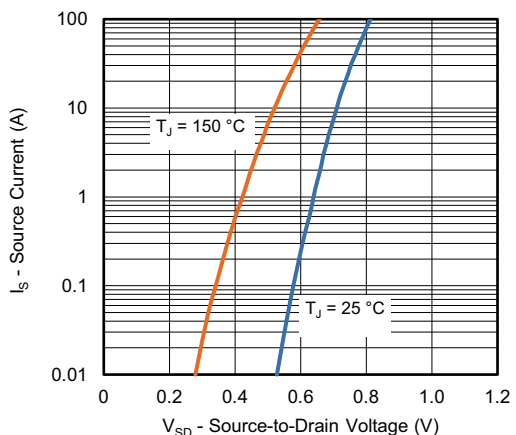
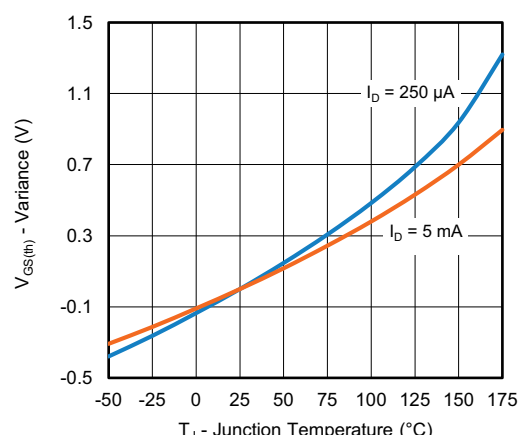


Transconductance



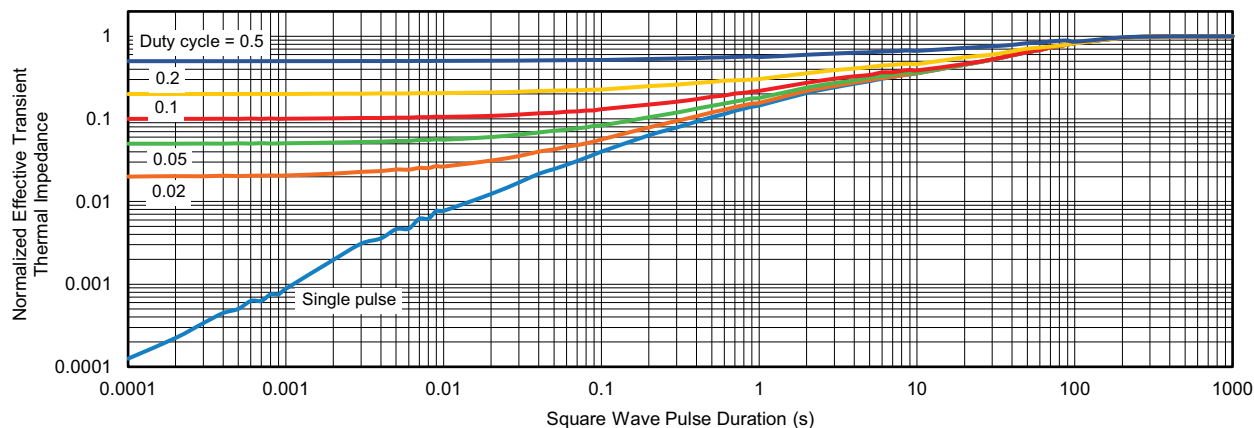
Gate Charge

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

On-Resistance vs. Junction Temperature

On-Resistance vs. Gate-to-Source Voltage

Drain Source Breakdown vs. Junction Temperature

Safe Operating Area
Note

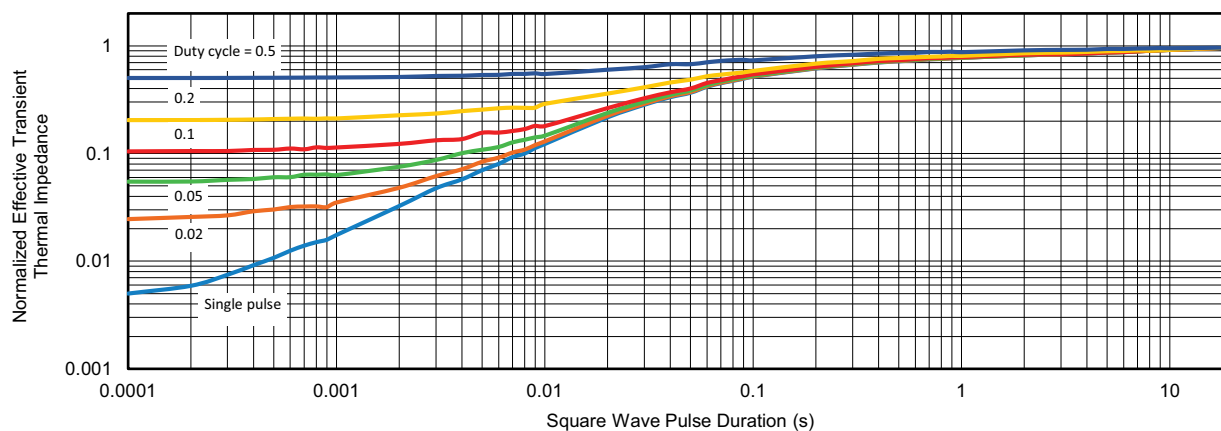
a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Source Drain Diode Forward Voltage

Threshold Voltage



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



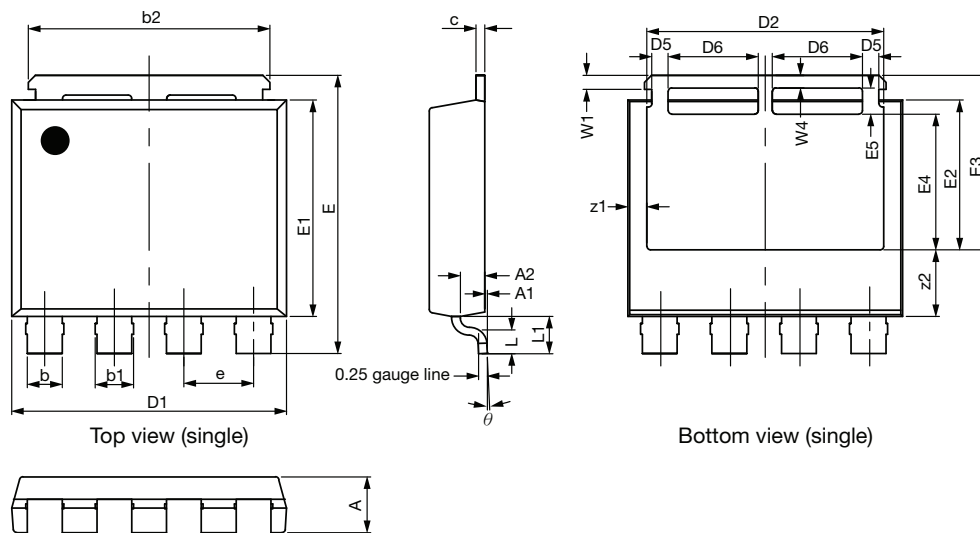
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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PowerPAK® 8 x 8L BWL Case Outline 2



DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.50	1.60	1.70	0.059	0.063	0.067
A1	0.00	-	0.127	0.000	-	0.005
A2	0.655	0.705	0.755	0.026	0.028	0.030
b	0.92	1.00	1.08	0.036	0.039	0.043
b1	1.02	1.10	1.18	0.040	0.043	0.046
b2	6.84	6.94	7.04	0.269	0.273	0.277
c	0.20	0.25	0.30	0.008	0.010	0.012
D1	7.80	7.90	8.00	0.307	0.311	0.315
D2	6.70	6.80	6.90	0.264	0.268	0.272
D5	0.37	0.47	0.57	0.015	0.019	0.022
D6	2.49	2.59	2.69	0.098	0.102	0.106
e	1.97	2.00	2.03	0.078	0.079	0.080
E	7.90	8.00	8.10	0.311	0.315	0.319
E1	6.12	6.22	6.32	0.241	0.245	0.249
E2	4.21	4.31	4.41	0.166	0.170	0.174
E3	4.92	5.02	5.12	0.194	0.198	0.202
E4	3.80	3.90	4.00	0.150	0.154	0.157
E5	0.65	0.75	0.85	0.026	0.030	0.033
L	0.61	0.68	0.75	0.024	0.027	0.030
L1	1.00	1.07	1.15	0.039	0.042	0.045
W1	0.30	0.40	0.50	0.012	0.016	0.020
W4	0.32	0.37	0.42	0.013	0.015	0.017
z1	0.45	0.55	0.65	0.018	0.022	0.026
z2	1.81	1.91	2.01	0.071	0.075	0.079
θ	0°	-	5°	0°	-	5°

ECN: S19-0643-Rev. B, 05-Aug-2019
DWG: 6073

Note

- Millimeter will govern



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