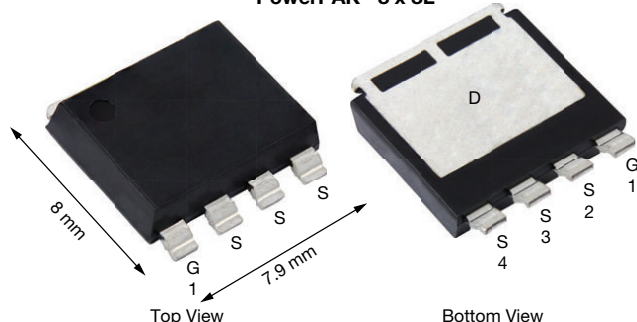


Automotive N-Channel 40 V (D-S) 175 °C MOSFET

PowerPAK® 8 x 8L

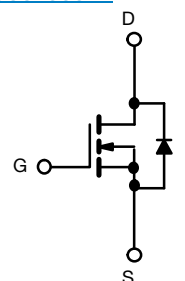


FEATURES

- TrenchFET® Gen IV power MOSFET
- 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



N-Channel MOSFET

PRODUCT SUMMARY

V_{DS} (V)	40
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.00124
I_D (A) ^e	345
Configuration	Single

ORDERING INFORMATION

Package	PowerPAK 8 x 8L
Lead (Pb)-free and halogen-free	SQJQ142E (for detailed order number please see www.vishay.com/doc?79776)

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	V
Continuous drain current ^e	I_D	345	A
$T_C = 25$ °C		199	
Continuous source current (diode conduction) ^e	I_S	252	
Pulsed drain current ^{a, e}	I_{DM}	791	
Single pulse avalanche current	I_{AS}	48	mJ
Single pulse avalanche energy	E_{AS}	115.2	
Maximum power dissipation ^e	P_D	277	W
$T_C = 25$ °C		92	
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature) ^c		260	

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-ambient	R_{thJA}	44	°C/W
Junction-to-case (drain) ^d	R_{thJC}	0.54	

Notes

- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %
- When mounted on 1" square PCB (FR4 material)
- 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
- As per JESD51-14
- 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

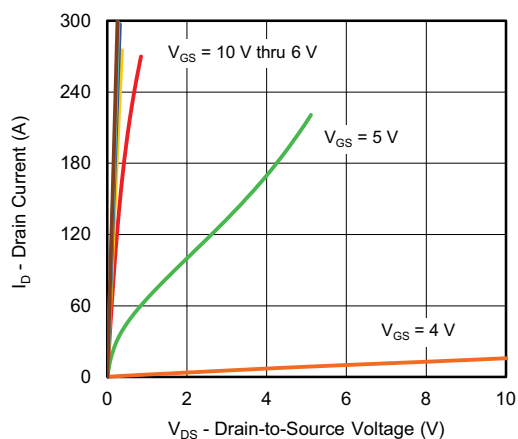
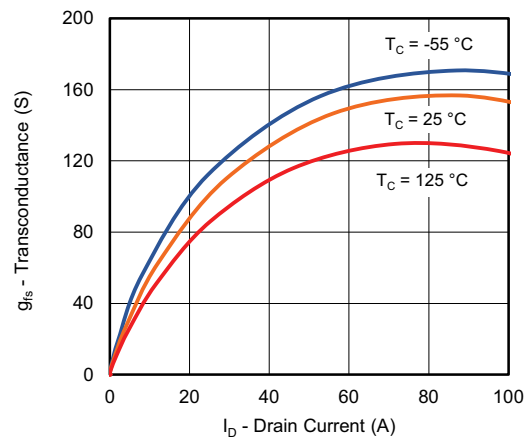
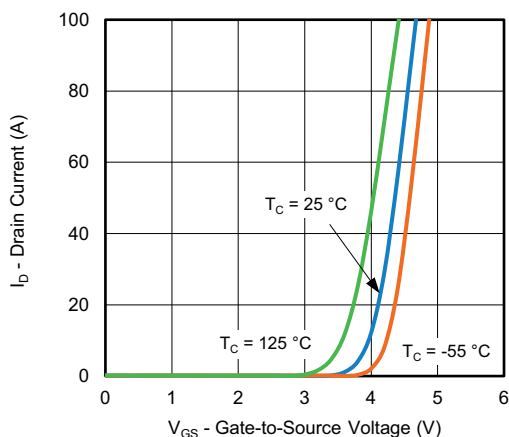
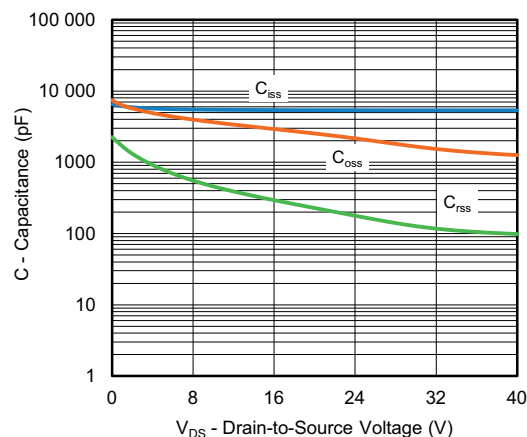
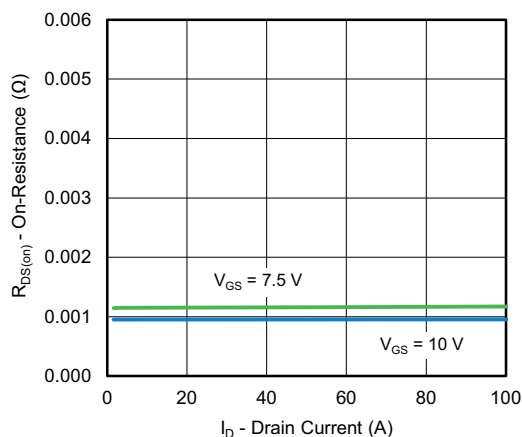
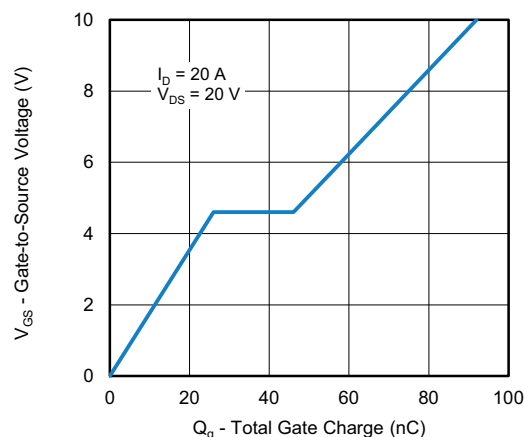


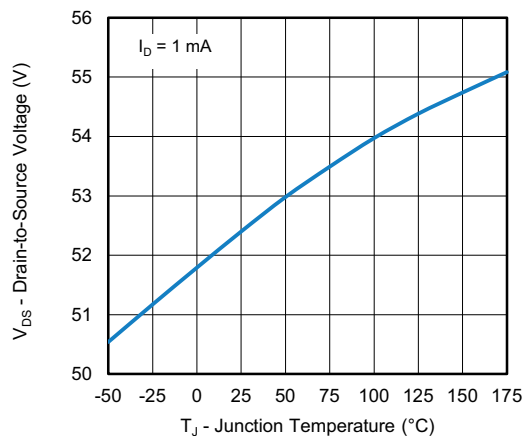
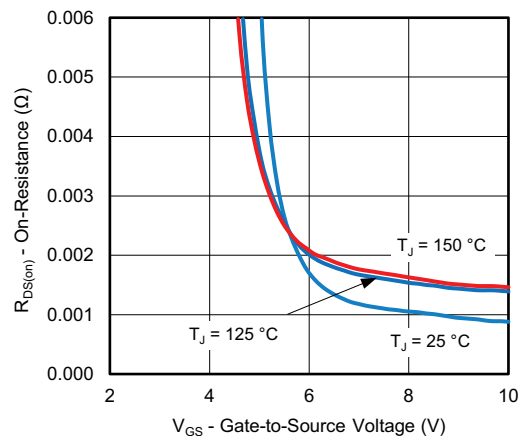
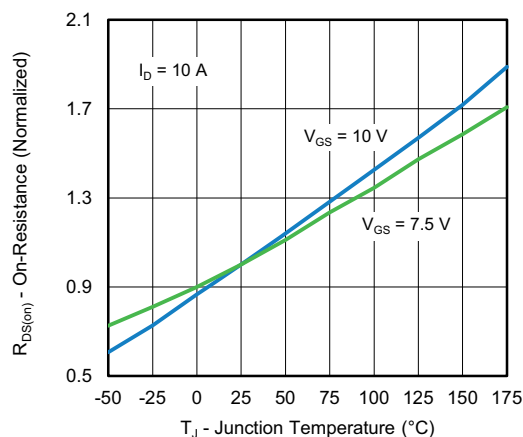
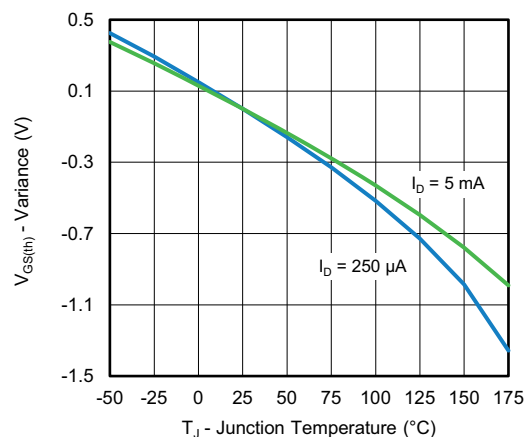
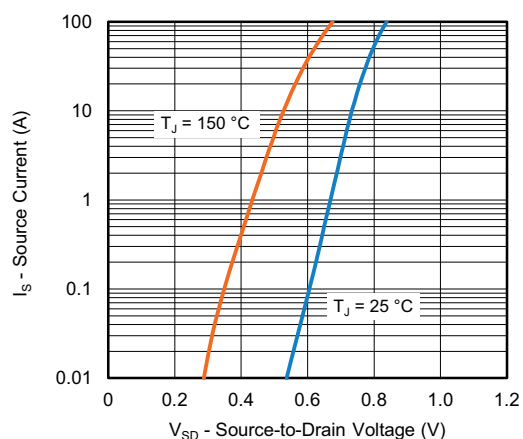
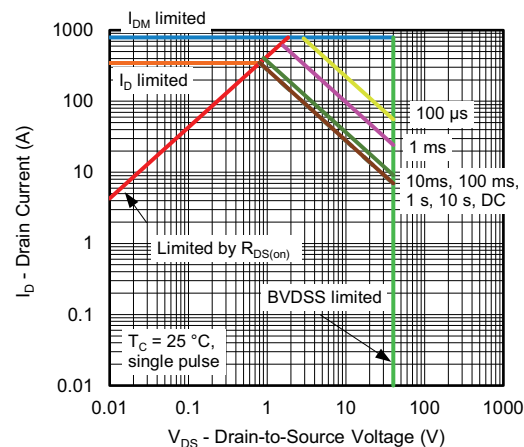
SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0, I _D = 250 μA		40	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2	3	3.5	
Gate-source 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} = 10 V	I _D = 20 A	-	0.00100	0.00124	Ω
		V _{GS} = 10 V	I _D = 20 A, T _J = 125 °C	-	-	0.00200	
		V _{GS} = 10 V	I _D = 20 A, T _J = 175 °C	-	-	0.00240	
Forward transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 60 A		-	150	-	S
Dynamic ^b							
Input capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	5360	6975	pF
Output capacitance	C _{oss}			-	2070	2700	
Reverse transfer capacitance	C _{rss}			-	167	215	
Total gate charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 20 V, I _D = 20 A	-	92	130	nC
Gate-source charge ^c	Q _{gs}			-	26	-	
Gate-drain charge ^c	Q _{gd}			-	20.1	-	
Gate resistance	R _g	f = 1 MHz		0.65	1.59	2.56	Ω
Turn-on delay time ^c	t _{d(on)}	V _{DD} = 20 V, R _L = 1 Ω I _D ≅ 20 A, V _{GEN} = 10 V, R _g = 1 Ω		-	18.5	26	ns
Rise time ^c	t _r			-	18	25	
Turn-off delay time ^c	t _{d(off)}			-	37	52	
Fall time ^c	t _f			-	14	20	
Source-Drain Diode Ratings and Characteristics ^b							
Reverse recovery time	t _{rr}	V _{DD} = 32 V, I _{FM} = 15 A, di/dt = 100 A/μs		-	59	-	ns
Reverse recovery charge	Q _{rr}			-	69	-	nC
Reverse recovery current	I _{RM}			-	2	3.2	A
Pulsed current ^a	I _{SM}			-	-	719	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.

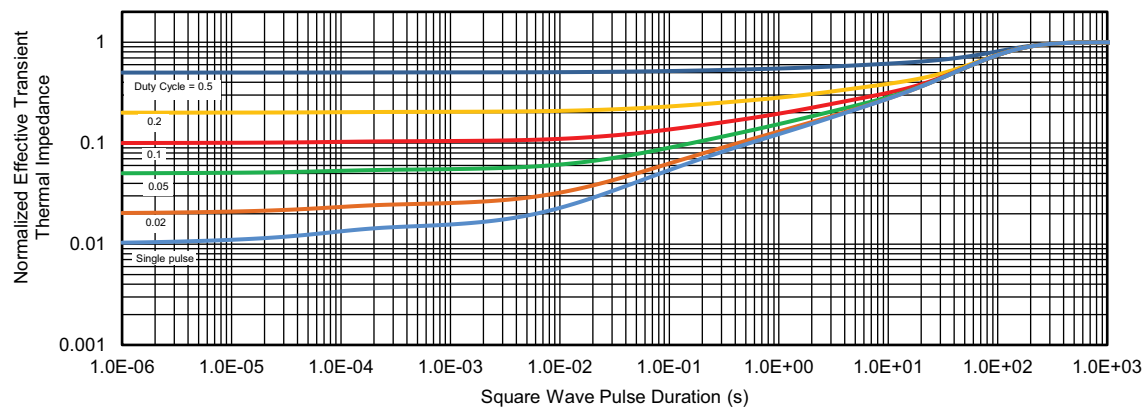
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Output Characteristics

Transconductance

Transfer Characteristics

Capacitance

On-Resistance vs. Drain Current

Gate Charge

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

Drain Source Breakdown vs. Junction Temperature

On-Resistance vs. Gate-to-Source Voltage

On-Resistance vs. Junction Temperature

Threshold Voltage

Source Drain Diode Forward Voltage

Safe Operating Area
Note

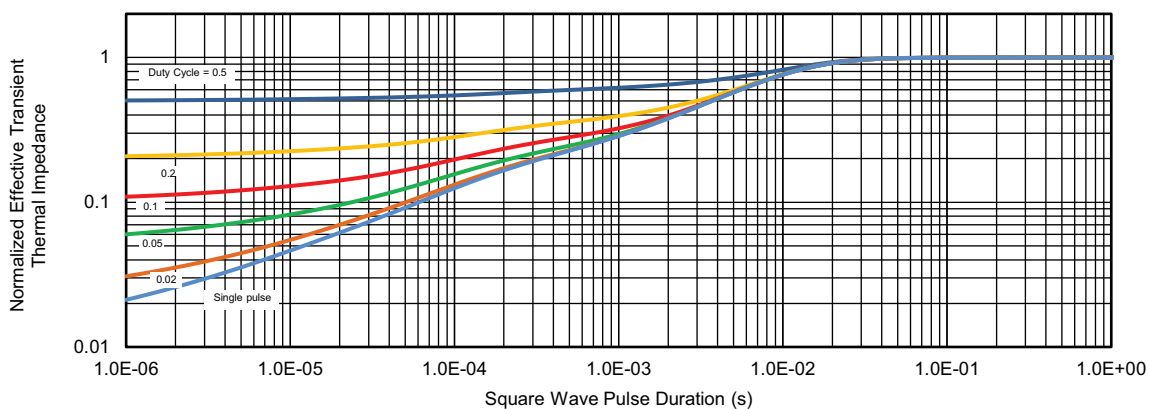
- $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



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



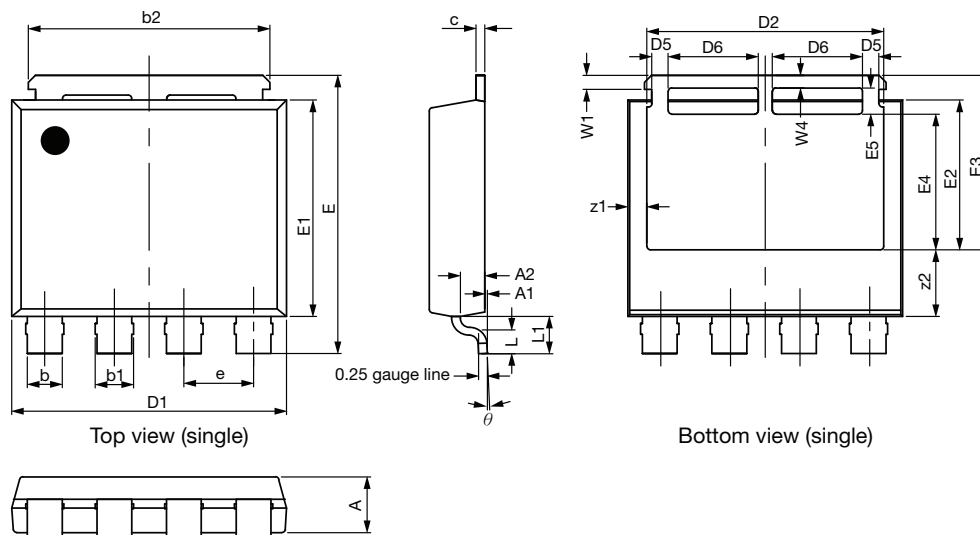
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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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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