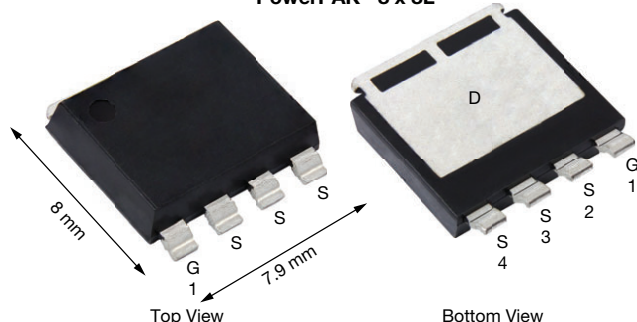


Automotive N-Channel 40 V (D-S) 175 °C MOSFET

PowerPAK® 8 x 8L

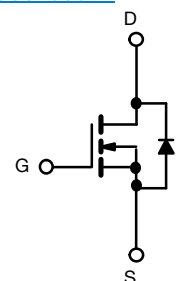


FEATURES

- 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	0.0007
I_D (A) ^e	487
Configuration	Single

ORDERING INFORMATION

Package	PowerPAK 8 x 8L
Lead (Pb)-free and halogen-free	SQJQ146E (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	487	A
$T_C = 25$ °C		281	
Continuous source current (diode conduction) ^e	I_S	272	
Pulsed drain current ^{a, e}	I_{DM}	1166	
Single pulse avalanche current	I_{AS}	70	mJ
Single pulse avalanche energy	E_{AS}	245	
Maximum power dissipation ^e	P_D	300	W
$T_C = 25$ °C		100	
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}	0.5	

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

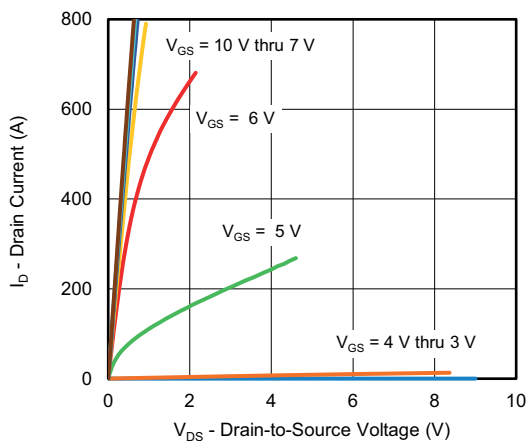
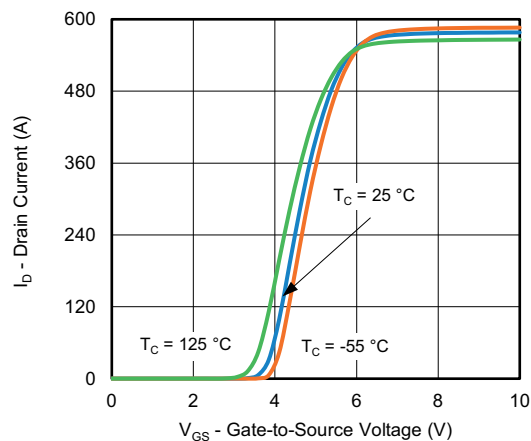
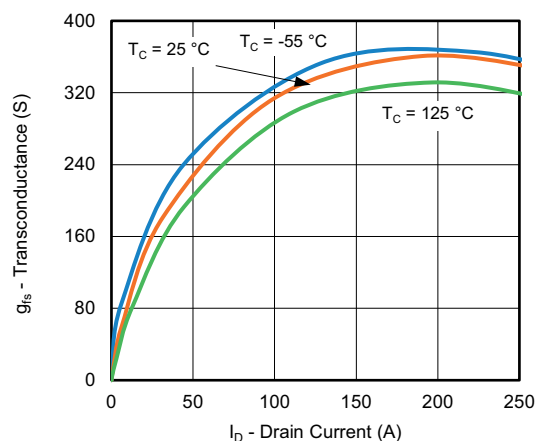
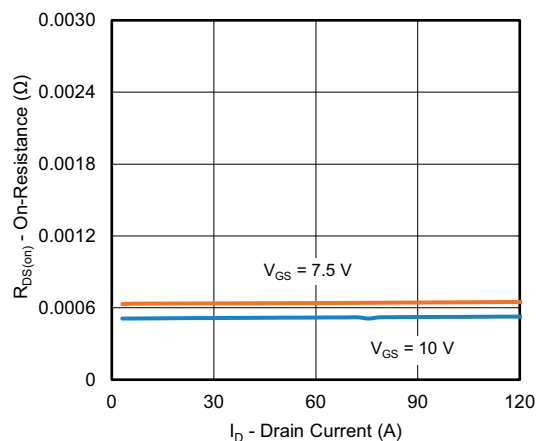
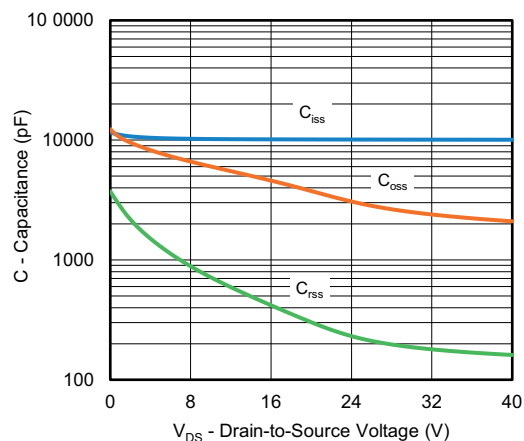
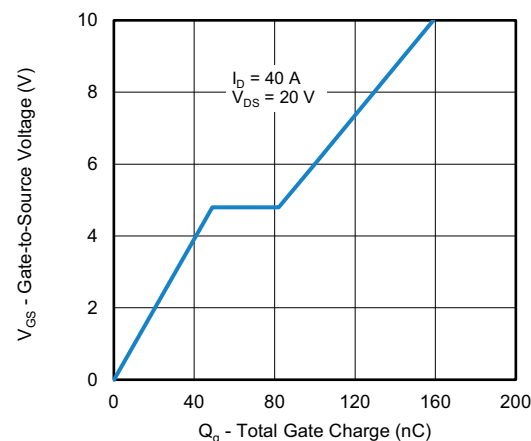


SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0, I _D = 250 μA		40	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.2	2.8	3.2	
Gate-source 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	-	-	800	
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	-	0.00055	0.0007	Ω
		V _{GS} = 10 V	I _D = 20 A, T _J = 125 °C	-	-	0.00105	
		V _{GS} = 10 V	I _D = 20 A, T _J = 175 °C	-	-	0.00128	
Forward transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 100 A		-	310	-	S
Dynamic ^b							
Input capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	10 038	14 054	pF
Output capacitance	C _{oss}			-	3014	4220	
Reverse transfer capacitance	C _{rss}			-	219	307	
Total gate charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 20 V, I _D = 40 A	-	159	239	nC
Gate-source charge ^c	Q _{gs}			-	49	-	
Gate-drain charge ^c	Q _{gd}			-	33	-	
Gate resistance	R _g	f = 1 MHz		0.6	1.6	3.2	Ω
Turn-on delay time ^c	t _{d(on)}	V _{DD} = 20 V, R _L = 0.5 Ω I _D ≅ 40 A, V _{GEN} = 10 V, R _g = 1 Ω		-	21	32	ns
Rise time ^c	t _r			-	18	27	
Turn-off delay time ^c	t _{d(off)}			-	55	83	
Fall time ^c	t _f			-	22	33	
Source-Drain Diode Ratings and Characteristics ^b							
Reverse recovery time	t _{rr}	V _{DD} = 32 V, I _{FM} = 40 A, di/dt = 100 A/μs		-	75	150	ns
Reverse recovery charge	Q _{rr}			-	107	214	nC
Reverse recovery current	I _{RM}			-	-2.6	-	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

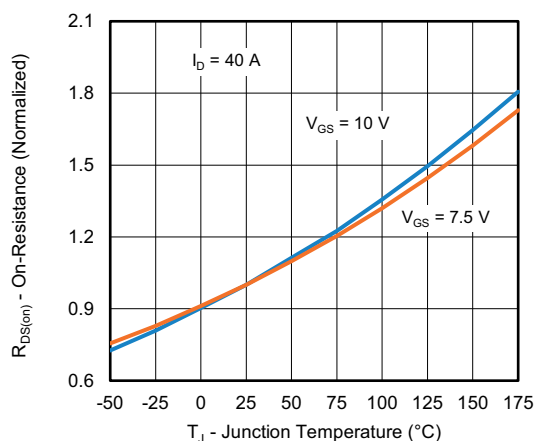
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

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.

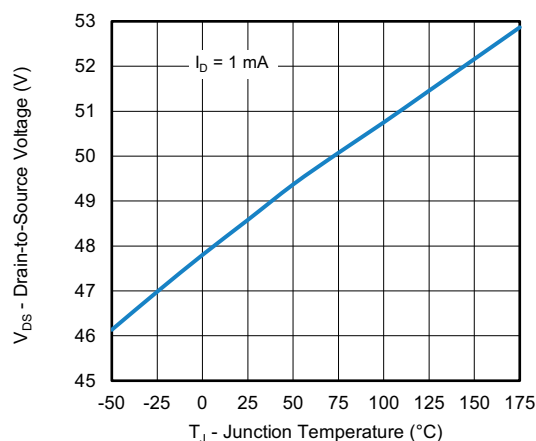
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge



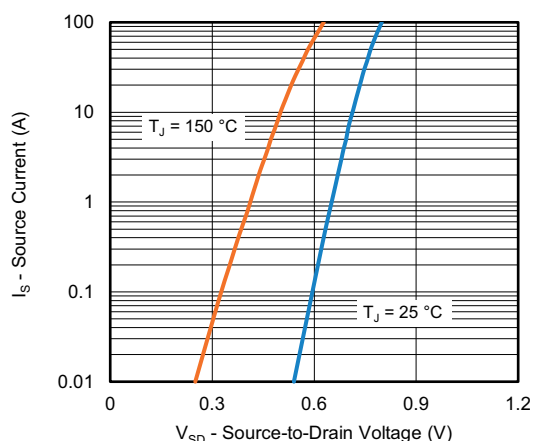
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



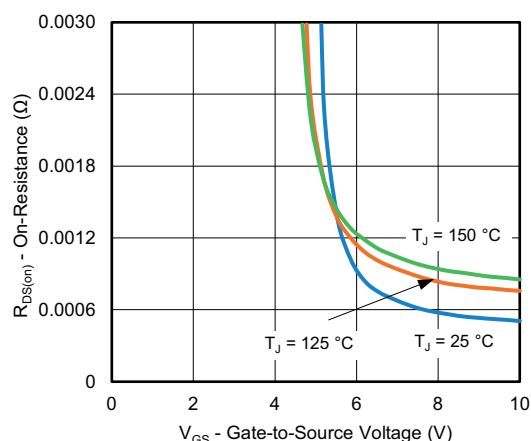
On-Resistance vs. Junction Temperature



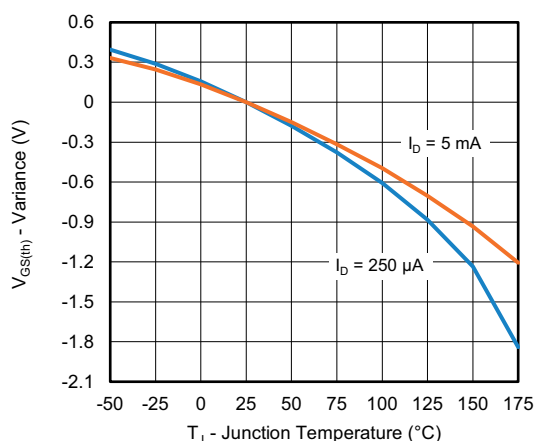
Drain Source Breakdown vs. Junction Temperature



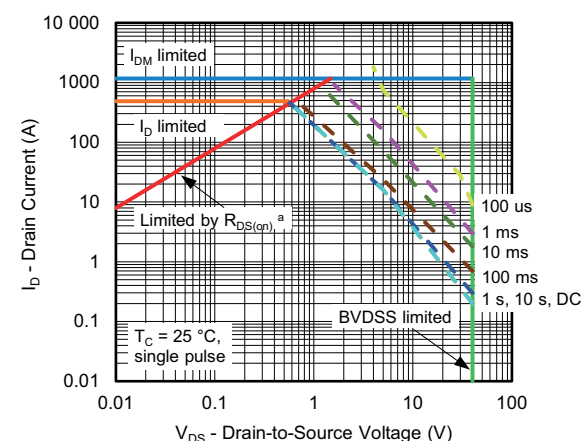
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



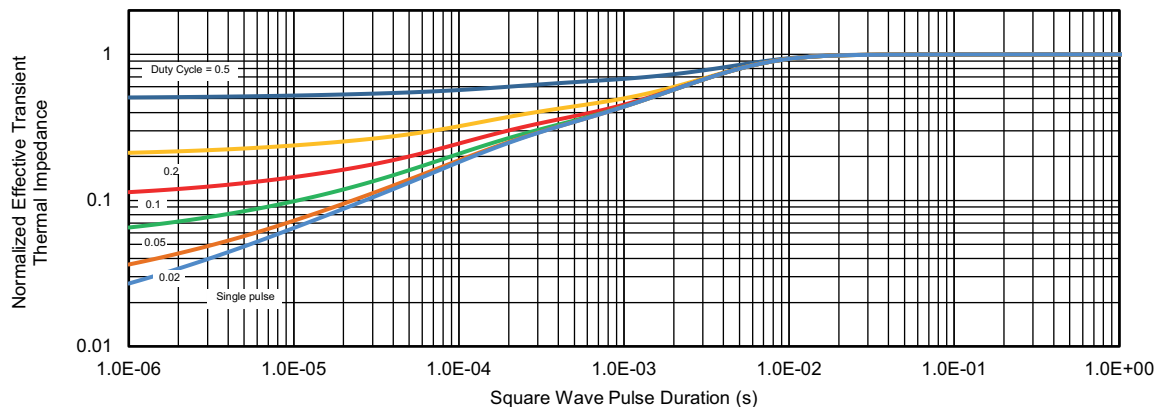
Safe Operating Area

Note

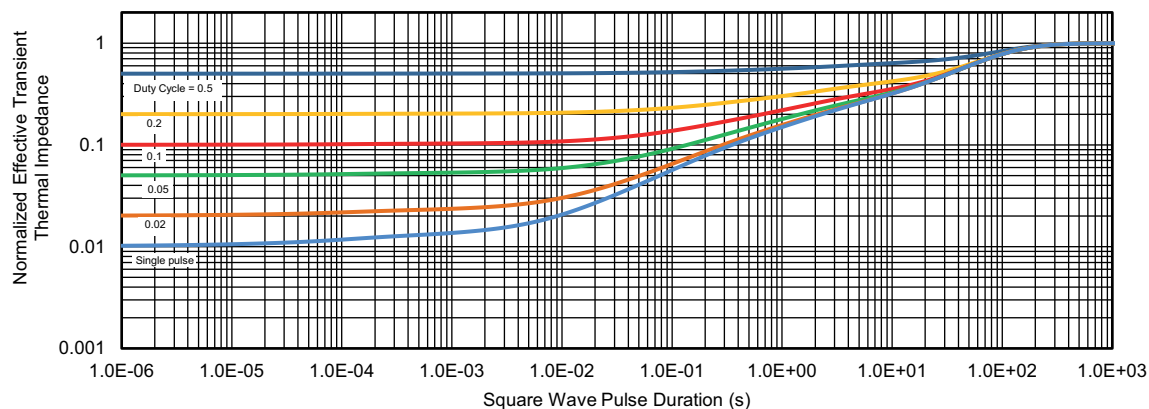
- a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



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



Normalized Thermal Transient Impedance, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Ambient

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