

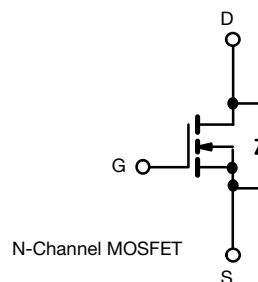
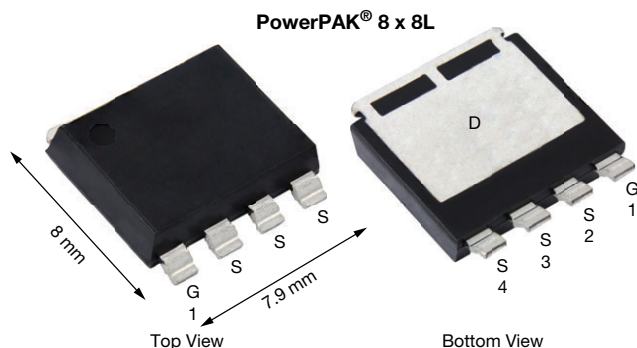
Automotive N-Channel 60 V (D-S) 175 °C MOSFET



RoHS
COMPLIANT
HALOGEN
FREE

FEATURES

- TrenchFET® Gen IV power MOSFET
- AEC-Q101 qualified
- 100 % R_g and UIS tested
- Thin 1.6 mm height
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912



PRODUCT SUMMARY	
V _{DS} (V)	60
R _{DS(on)} (Ω) at V _{GS} = 4.5 V	0.0011
R _{DS(on)} (Ω) at V _{GS} = 10 V	0.00080
I _D (A) ^e	461
Configuration	Single

ORDERING INFORMATION	
Package	PowerPAK 8 x 8L
Lead (Pb)-free and halogen-free	SQJQ160EL (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}	60	V
Gate-source voltage		V _{GS}	± 20	
Continuous drain current ^e	T _C = 25 °C	I _D	461	A
	T _C = 125 °C		266	
Continuous source current (diode conduction)		I _S	317	
Pulsed drain current ^a , ^e		I _{DM}	655	
Single pulse avalanche current		I _{AS}	69	
Single pulse avalanche energy		E _{AS}	238	mJ
Maximum power dissipation ^e	T _C = 25 °C	P _D	348	W
	T _C = 125 °C		116	
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	PCB mount ^b	R _{thJA}	44	°C/W
Junction-to-case (drain) ^d		R _{thJC}	0.43	

Notes

- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
- When mounted on 1" square PCB (FR4 material)
- See solder profile (www.vishay.com/doc?73257)
- 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		60	-	-	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} = 60 V	-	-	1	μA
		V _{GS} = 0 V	V _{DS} = 60 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 60 V, T _J = 175 °C	-	-	500	
On-state drain current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	50	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 4.5 V	I _D = 20 A	-	0.00090	0.0011	Ω
		V _{GS} = 10 V	I _D = 20 A	-	0.00056	0.00080	
		V _{GS} = 10 V	I _D = 20 A, T _J = 125 °C	-	-	0.0014	
		V _{GS} = 10 V	I _D = 20 A, T _J = 175 °C	-	-	0.0017	
Forward transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 40 A		-	205	-	S
Dynamic ^b							
Input capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	13 236	18 531	pF
Output capacitance	C _{oss}			-	4447	6226	
Reverse transfer capacitance	C _{rss}			-	219	307	
Total gate charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 30 V, I _D = 50 A	-	206	309	nC
Gate-source charge ^c	Q _{gs}			-	42	-	
Gate-drain charge ^c	Q _{gd}			-	31	-	
Gate resistance	R _g	f = 1 MHz		0.4	1.6	3.2	Ω
Turn-on delay time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 0.6 Ω, I _D ≡ 50 A, V _{GEN} = 10 V, R _g = 1 Ω		-	17	26	ns
Rise time ^c	t _r			-	13	20	
Turn-off delay time ^c	t _{d(off)}			-	82	123	
Fall time ^c	t _f			-	20	30	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed current ^a	I _{SM}			-	-	655	A
Forward voltage	V _{SD}	I _F = 40 A, V _{GS} = 0 V		-	0.7	1.1	V
Body diode reverse recovery time	t _{rr}	I _F = 50 A, di/dt = 100 A/μs		-	86	172	ns
Body diode reverse recovery charge	Q _{rr}			-	174	348	nC
Reverse recovery fall time	t _a			-	50	-	ns
Reverse recovery rise time	t _b			-	37	-	
Body diode peak reverse recovery current	I _{RM(REC)}			-	3.5	-	A

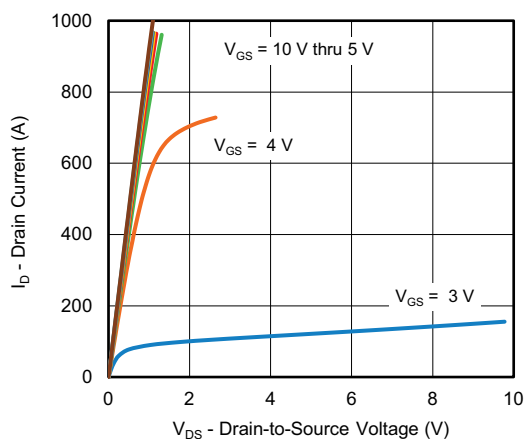
Notes

- 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

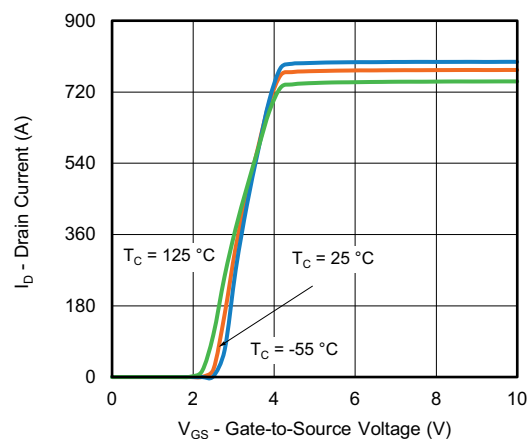
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



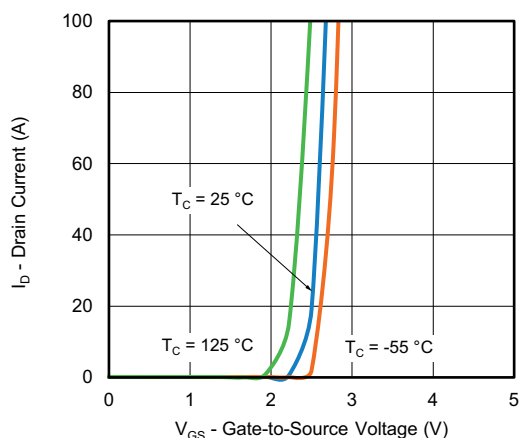
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)



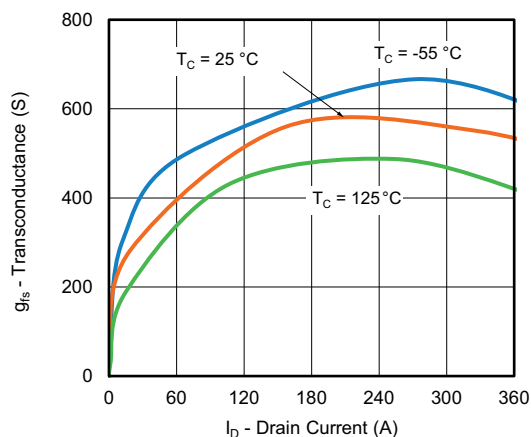
Output Characteristics



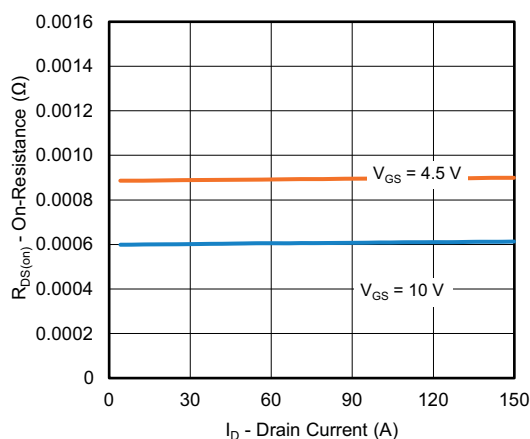
Transfer Characteristics



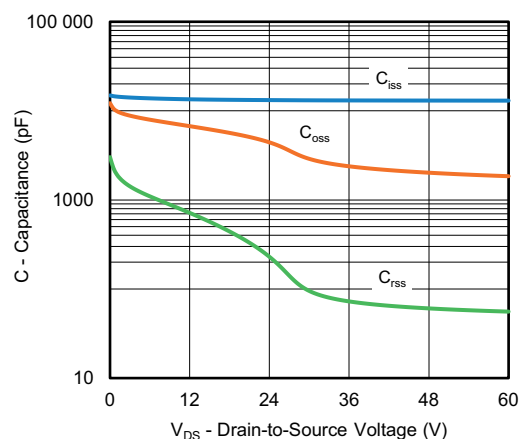
Transfer Characteristics



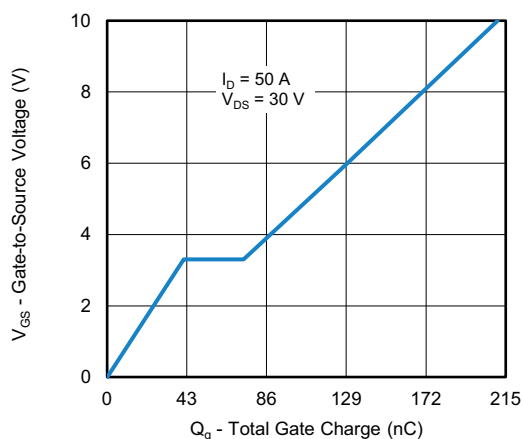
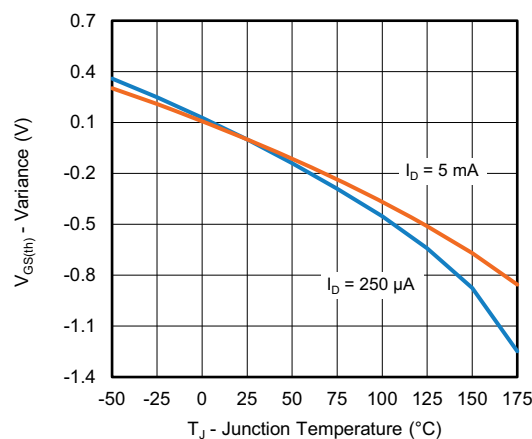
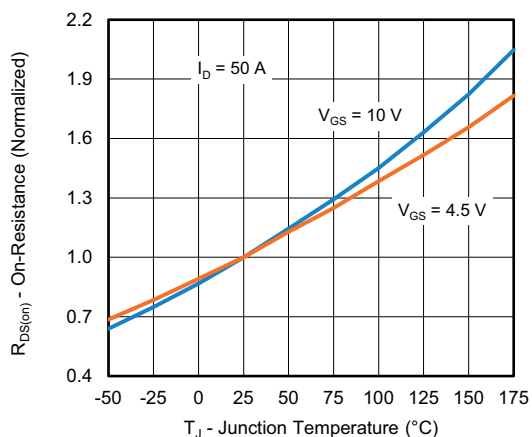
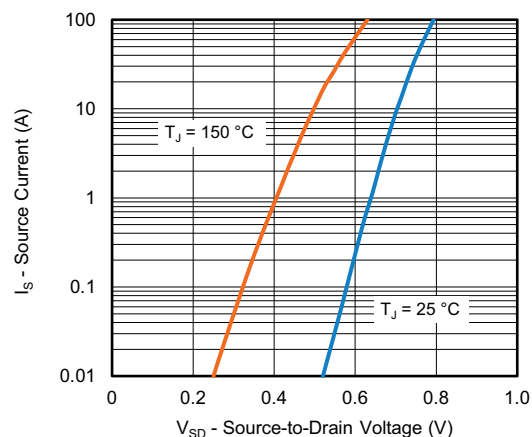
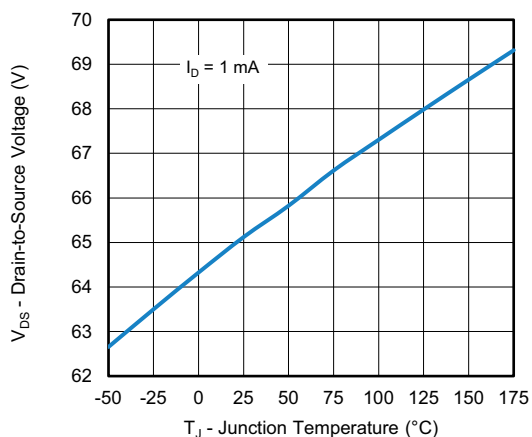
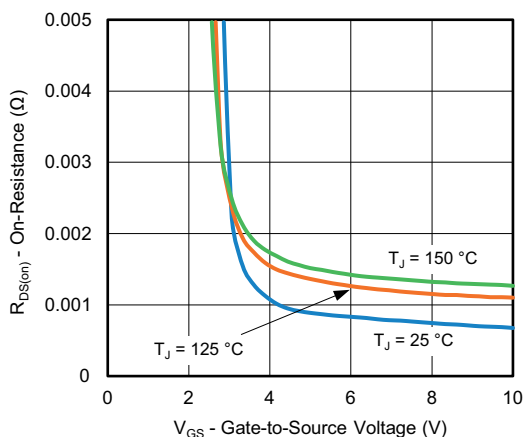
Transconductance



On-Resistance vs. Drain Current



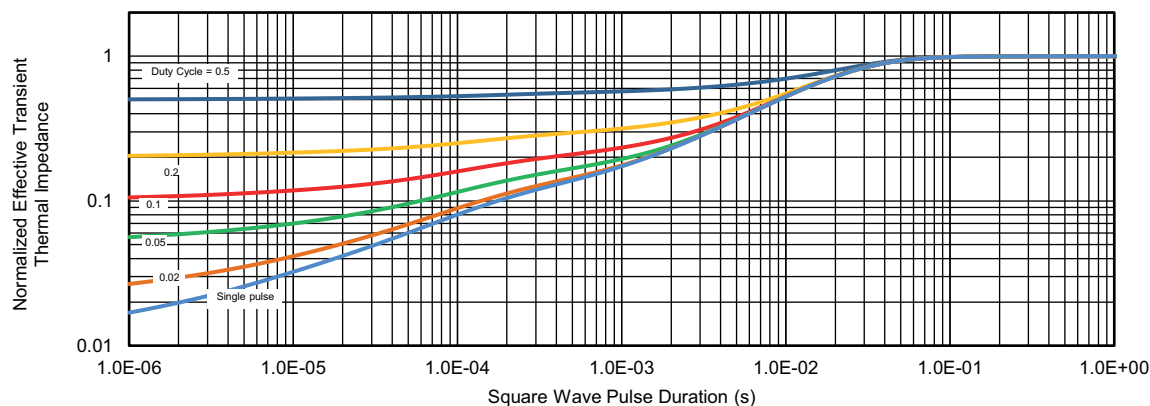
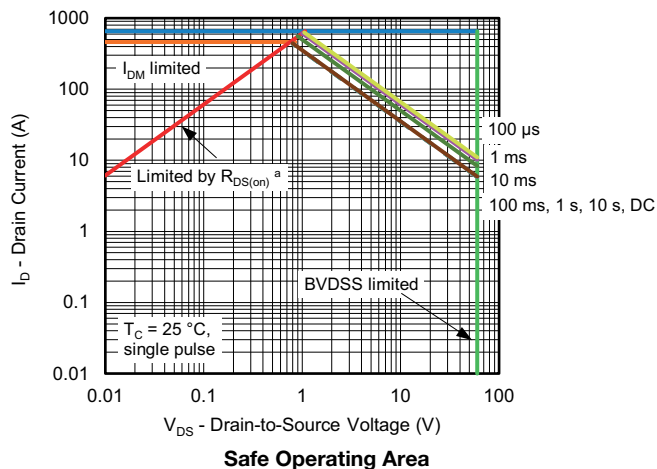
Capacitance

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

Gate Charge

Threshold Voltage

On-Resistance vs. Junction Temperature

Source Drain Diode Forward Voltage

Drain Source Breakdown vs. Junction Temperature

On-Resistance vs. Gate-to-Source Voltage
Note

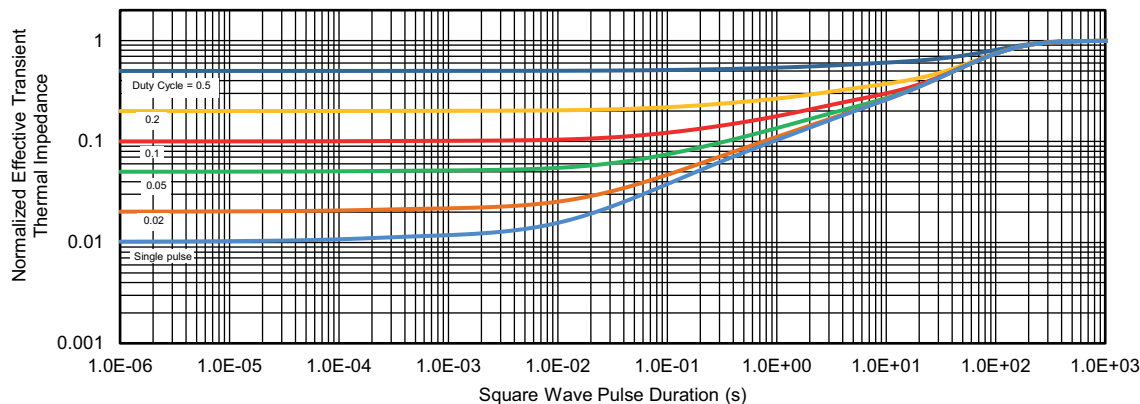
- $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



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



Normalized Thermal Transient Impedance, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Ambient

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