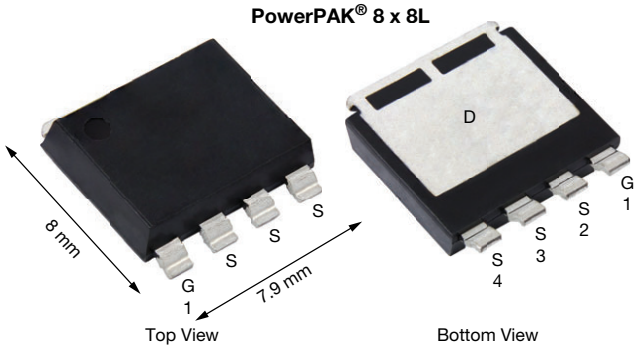
Automotive N-Channel 60 V (D-S) 175 °C MOSFET



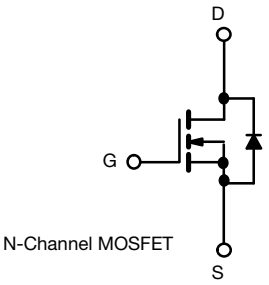
FEATURES

- 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

AUTOMOTIVE GRADE

RoHS COMPLIANT

HALOGEN FREE



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	L = 0.1 mH	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

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %
b. When mounted on 1" square PCB (FR4 material)
c. See solder profile (www.vishay.com/doc?73257)
d. As per JESD51-14
e. Values based on $_{RthJC}$ and T_C of 25 °C- Actual values achievable will be dependent on the thermal characteristics of the complete system

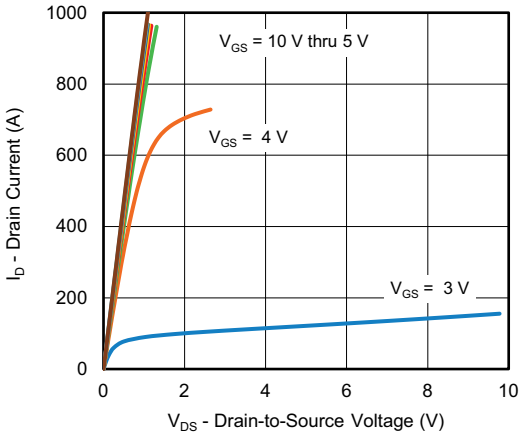
SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0, I_D = 250 µA		60	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA		1.5	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

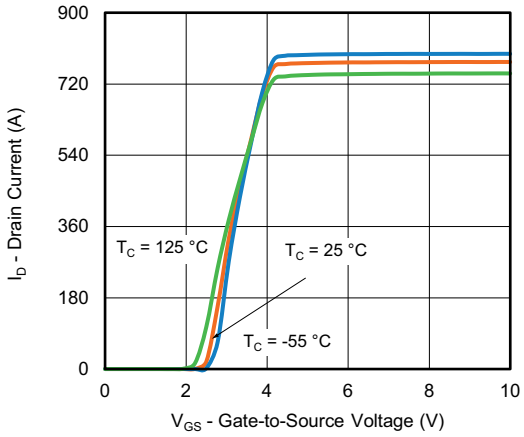
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

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.

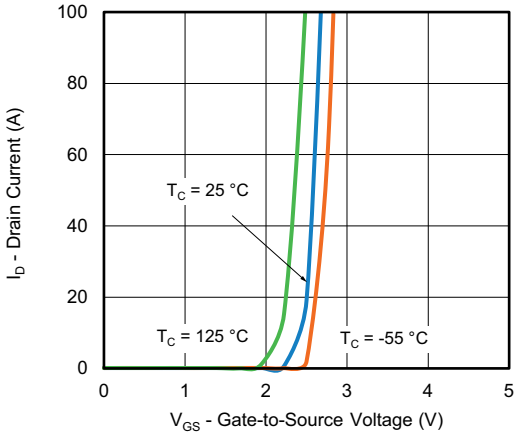
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



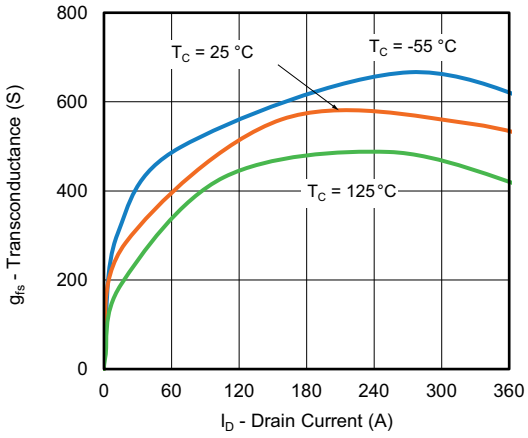
Output Characteristics



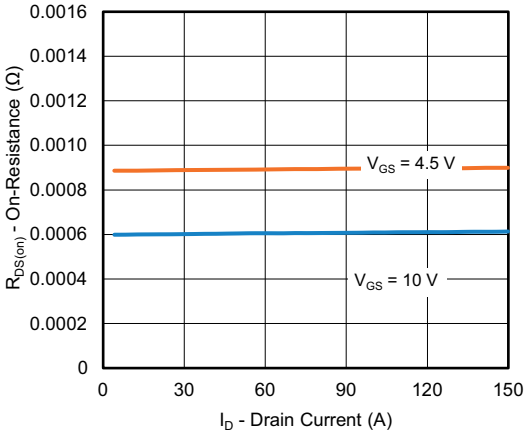
Transfer Characteristics



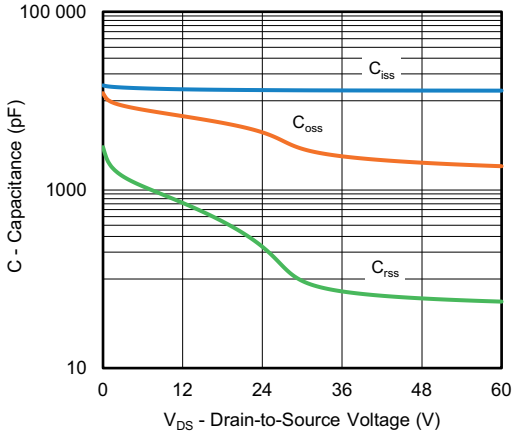
Transfer Characteristics



Transconductance

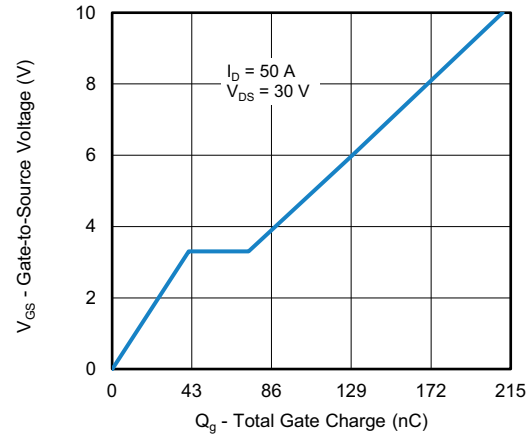


On-Resistance vs. Drain Current

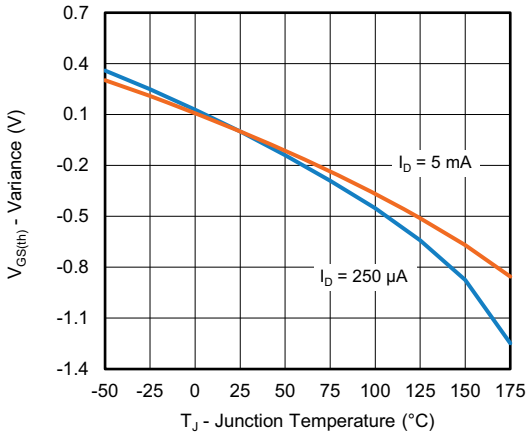


Capacitance

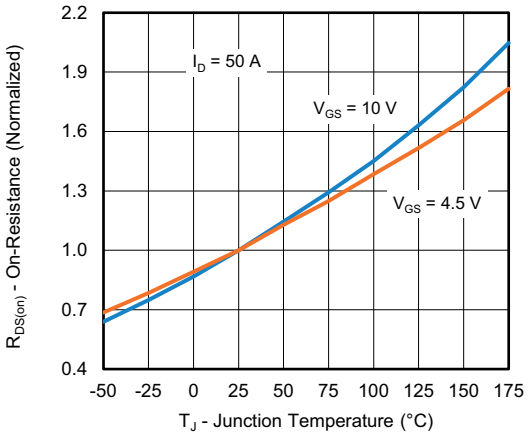
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



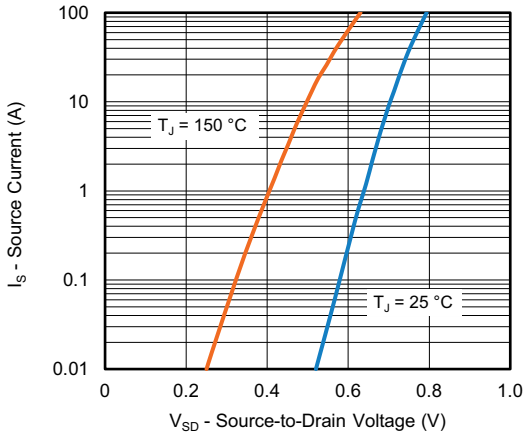
Gate Charge



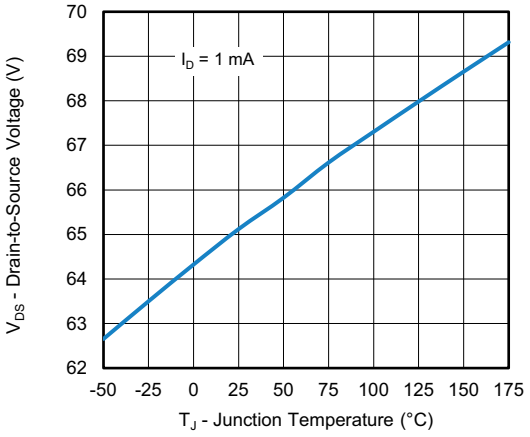
Threshold Voltage



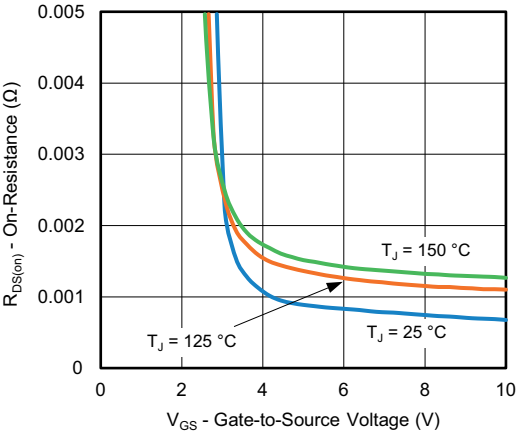
On-Resistance vs. Junction Temperature



Source Drain Diode Forward Voltage



Drain Source Breakdown vs. Junction Temperature

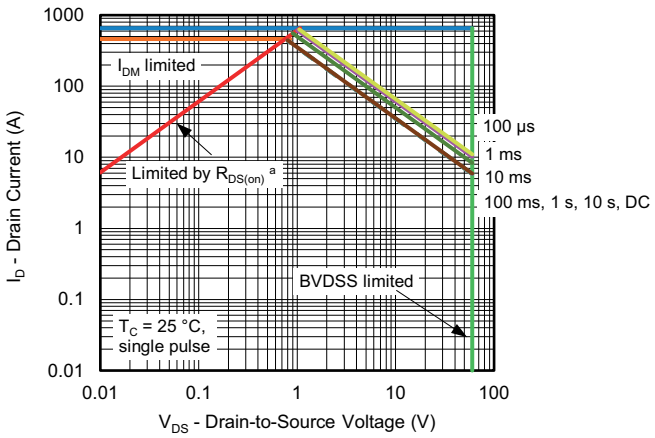


On-Resistance vs. Gate-to-Source Voltage

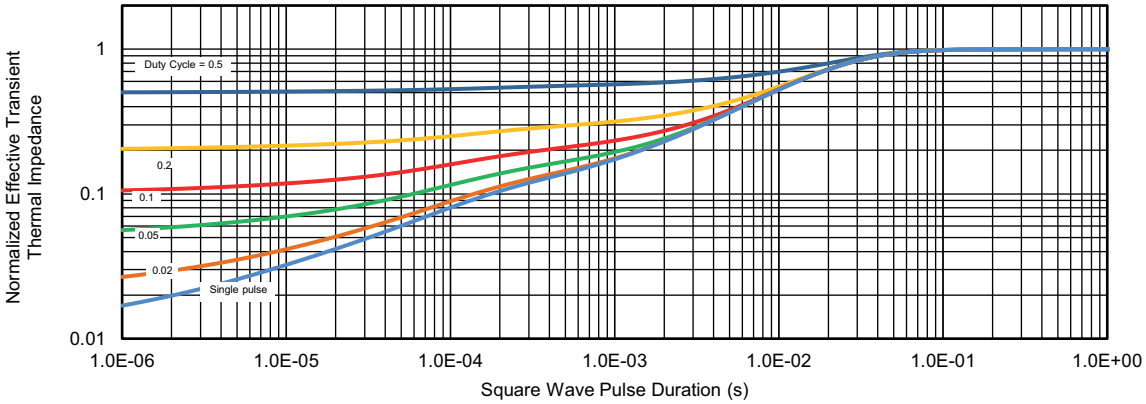
Note

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

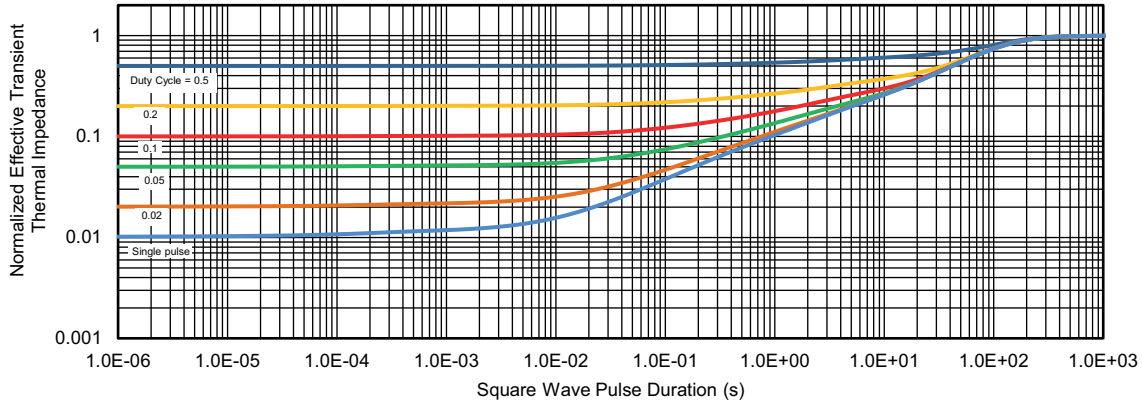
THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Ambient

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