

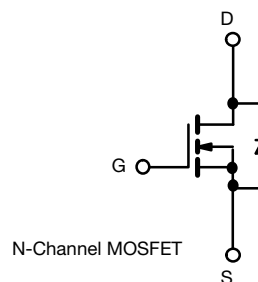
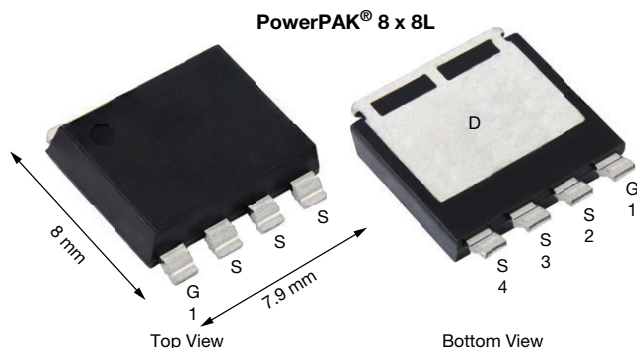
Automotive N-Channel 60 V (D-S) 175 °C MOSFET



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 | L = 0.1 mH | I _{AS} | 69 | |
| Single pulse avalanche energy | | E _{AS} | 238 | |
| 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 | 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 |

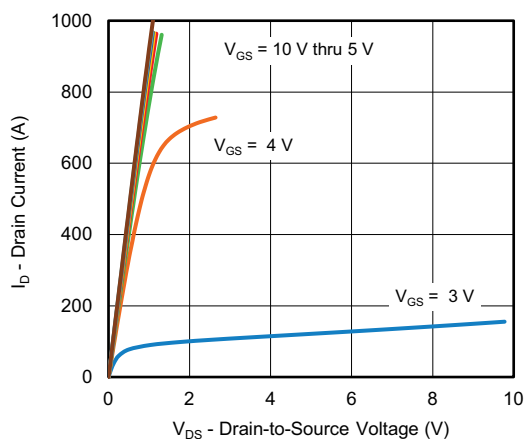
Notes

- 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

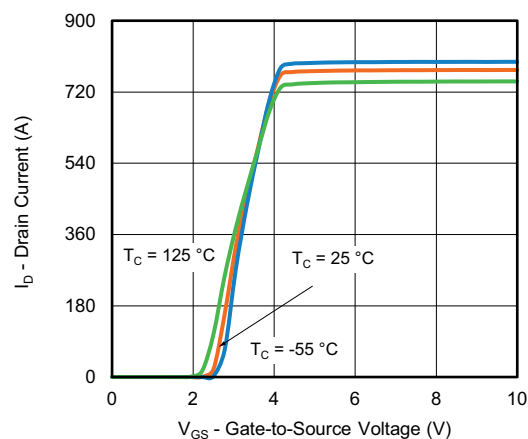
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



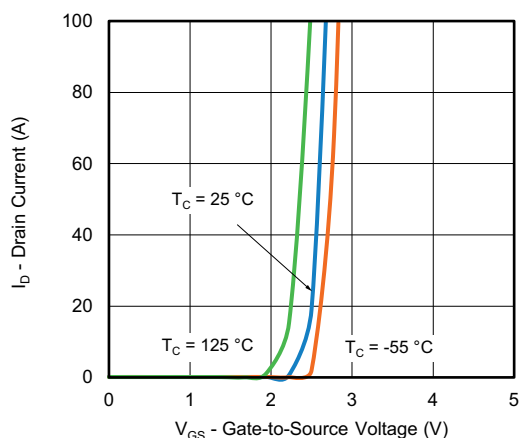
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



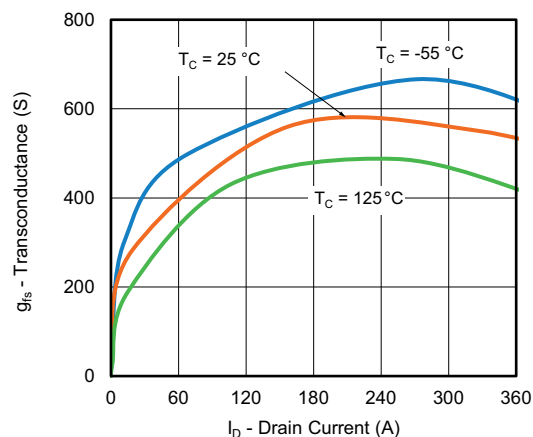
Output Characteristics



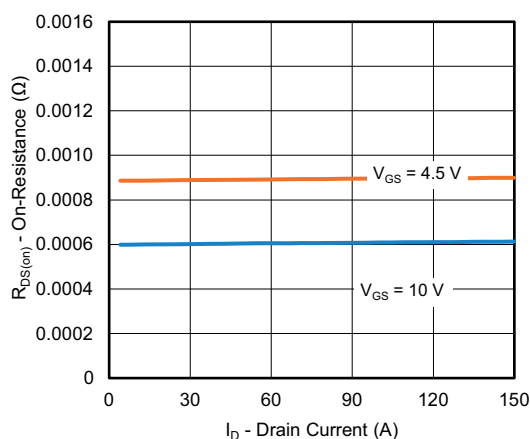
Transfer Characteristics



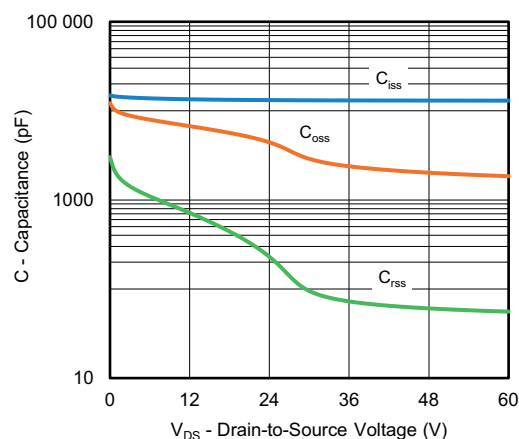
Transfer Characteristics



Transconductance



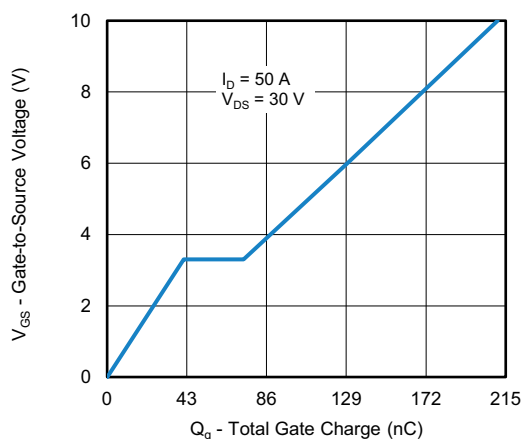
On-Resistance vs. Drain Current



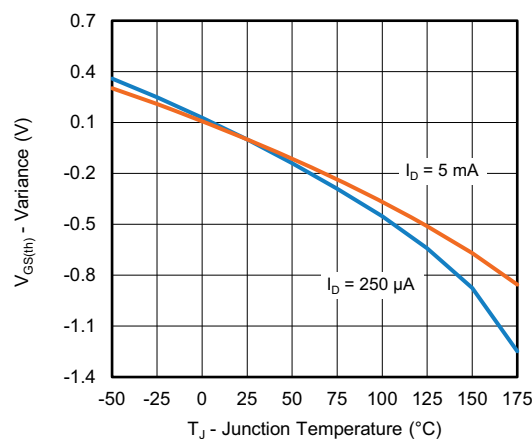
Capacitance



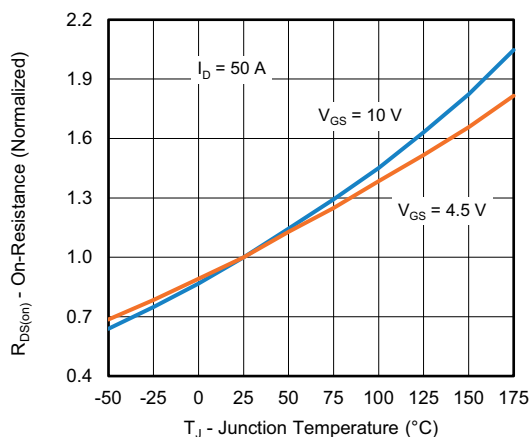
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)



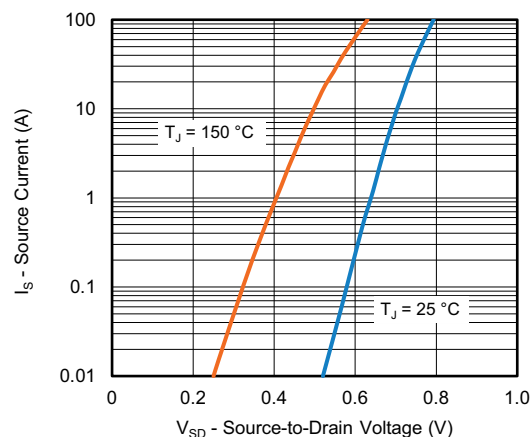
Gate Charge



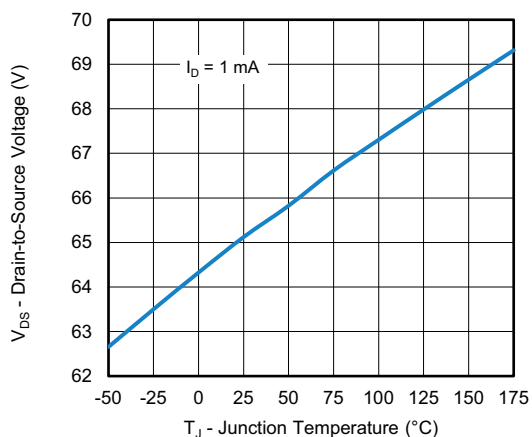
Threshold Voltage



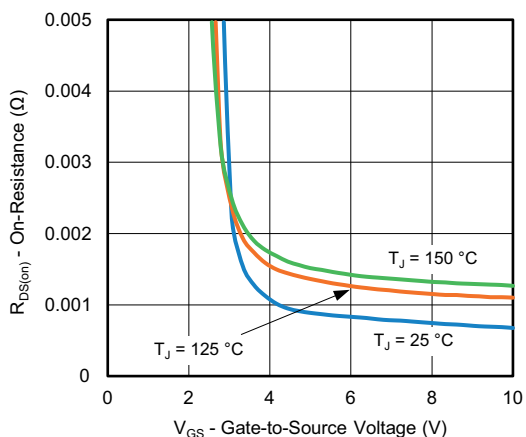
On-Resistance vs. Junction Temperature



Source Drain Diode Forward Voltage



Drain Source Breakdown vs. Junction Temperature



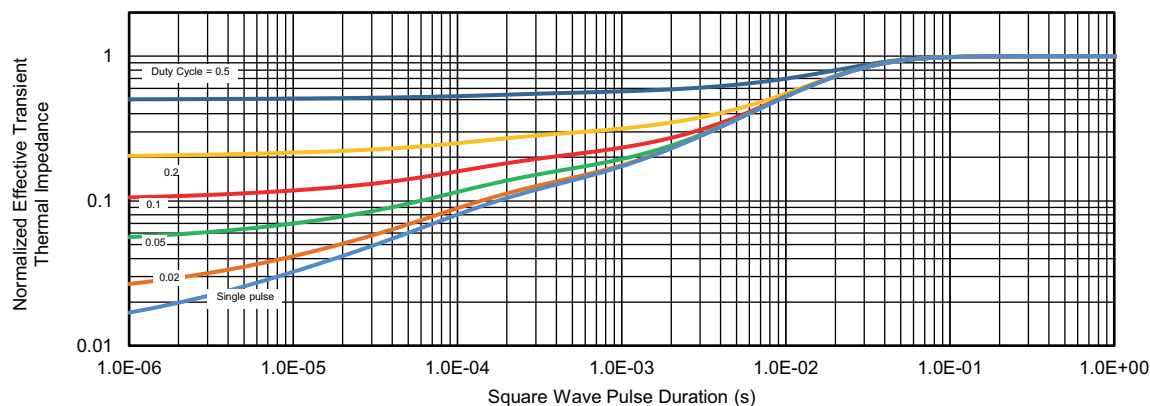
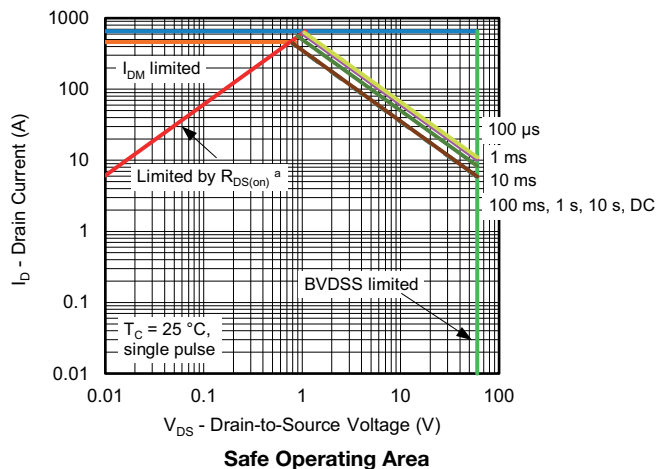
On-Resistance vs. Gate-to-Source Voltage

Note

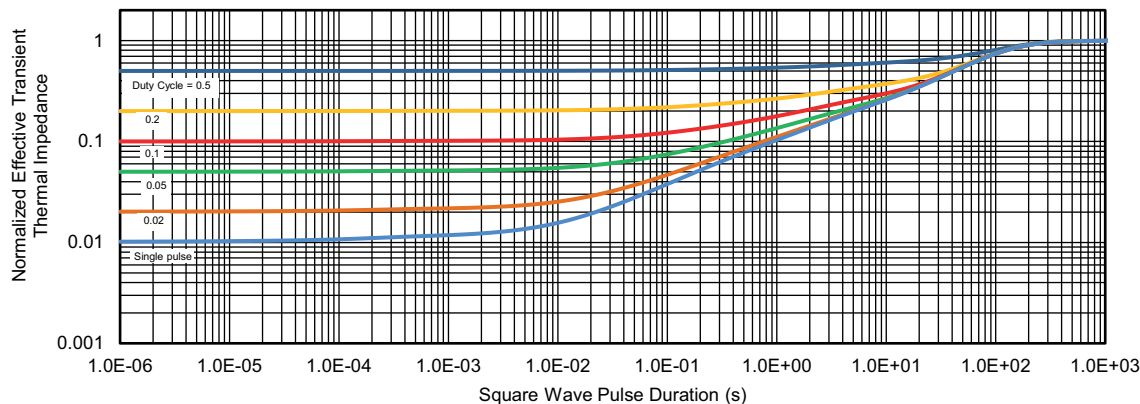
- a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



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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