

SOT-227 Power Module Single Switch - Power MOSFET, 420 A



SOT-227

FEATURES

- $I_D > 420\text{ A}$, $T_C = 25\text{ °C}$
- TrenchFET® power MOSFET
- Low input capacitance (C_{iss})
- Reduced switching and conduction losses
- Ultra low gate charge (Q_g)
- Avalanche energy rated (U_{IS})
- UL approved file E78996
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


**RoHS
COMPLIANT**

| PRIMARY CHARACTERISTICS | |
|-------------------------|------------------|
| V_{DSS} | 100 V |
| $R_{DS(on)}$ | 1.3 mΩ |
| $I_D^{(1)}$ | 330 A at 90 °C |
| Type | Modules - MOSFET |
| Package | SOT-227 |

| ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ °C}$ unless otherwise specified) | | | | |
|---|----------------|--|-------------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MAX. | UNITS |
| MOSFET | | | | |
| Drain to source voltage | V_{DSS} | | 100 | V |
| Continuous drain current, V_{GS} at 10 V | I_D | $T_C = 25\text{ °C}$ | 435 | A |
| | | $T_C = 90\text{ °C}$ | 330 | |
| Pulsed drain current | $I_{DM}^{(1)}$ | | 1130 | |
| Power dissipation | P_D | $T_C = 25\text{ °C}$ | 652 | W |
| Gate to source voltage | V_{GS} | | ± 20 | V |
| Single pulse avalanche energy | E_{AS} | $T_C = 25\text{ °C}$, $L = 10\text{ mH}$, $V_{GS} = 10\text{ V}$ | 11 500 | mJ |
| Single pulse avalanche current | I_{AS} | $T_C = 25\text{ °C}$, $L = 10\text{ mH}$, $V_{GS} = 10\text{ V}$ | 48 | A |
| MODULE | | | | |
| Insulation voltage (RMS) | V_{ISOL} | any terminal to case, $t = 1\text{ min}$ | 2500 | V |
| Operating junction temperature range | T_J | | -55 to +175 | °C |

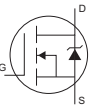
Notes

(1) Limited at maximum junction temperature



| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|--|----------------------|-----------------------|---------|------|------------|-------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Junction and storage temperature range | T_J, T_{Stg} | | -55 | - | 175 | °C |
| Junction to case | MOSFET R_{thJC} | | - | - | 0.23 | °C/W |
| Case to heat sink | Module R_{thCS} | Flat, greased surface | - | 0.1 | - | |
| Weight | | | - | 30 | - | g |
| Mounting torque | | Torque to terminal | - | - | 1.1 (9.7) | Nm (lbf.in) |
| | | Torque to heatsink | - | - | 1.8 (15.9) | Nm (lbf.in) |
| Case style | | | SOT-227 | | | |

| ELECTRICAL CHARACTERISTICS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified) | | | | | | |
|---|---------------|---|------|------|-------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 750\text{ }\mu\text{A}$ | 100 | - | - | V |
| Static drain to source on-resistance | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 200\text{ A}$ | - | 1.3 | 2.15 | mΩ |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 750\text{ }\mu\text{A}$ | 2.2 | 2.9 | 3.8 | V |
| Forward transconductance | g_{fs} | $V_{DS} = 20\text{ V}, I_D = 20\text{ A}, V_{GS} = 10\text{ V}$ | - | 94 | - | S |
| Drain to source leakage current | I_{DSS} | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$ | - | 0.6 | 4 | μA |
| | | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | - | 32 | - | |
| Gate to source leakage | I_{GSS} | $V_{GS} = \pm 20\text{ V}$ | - | - | ± 350 | nA |
| Total gate charge | Q_g | $I_D = 200\text{ A}$ $V_{DS} = 50\text{ V}$ $V_{GS} = 10\text{ V}$ | - | 375 | - | nC |
| Gate to source charge | Q_{gs} | | - | 84 | - | |
| Gate to drain ("Miller") charge | Q_{gd} | | - | 138 | - | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = 50\text{ V}$ $I_D = 100\text{ A}$ $R_g = 1.2\text{ }\Omega$ $V_{GS} = 10\text{ V}$ | - | 45 | - | ns |
| Rise time | t_r | | - | 275 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 152 | - | |
| Fall time | t_f | | - | 172 | - | |
| Input capacitance | C_{iss} | $V_{GS} = 0\text{ V}$ $V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$ | - | 17.3 | - | nF |
| Output capacitance | C_{oss} | | - | 9.2 | - | |
| Reverse transfer capacitance | C_{rss} | | - | 0.9 | - | |

| SOURCE-DRAIN RATINGS AND CHARACTERISTICS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified) | | | | | | |
|---|----------|---|------|------|------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Continuous source current (body diode) | I_S | MOSFET symbol showing the integral reverse p-n junction diode  | - | - | 435 | A |
| Pulsed source current (body diode) | I_{SM} | | - | - | 1130 | |
| Diode forward voltage | V_{SD} | $I_S = 200\text{ A}, V_{GS} = 0\text{ V}$ | - | 0.91 | 1.5 | V |
| Reverse recovery time | t_{rr} | $T_J = 25\text{ }^\circ\text{C}, I_F = I_S = 50\text{ A},$ $di/dt = 100\text{ A}/\mu\text{s}, V_R = 50\text{ V}$ | - | 171 | - | ns |
| Reverse recovery charge | Q_{rr} | | - | 740 | - | nC |
| Reverse recovery current | I_{RM} | | - | 8.7 | - | A |

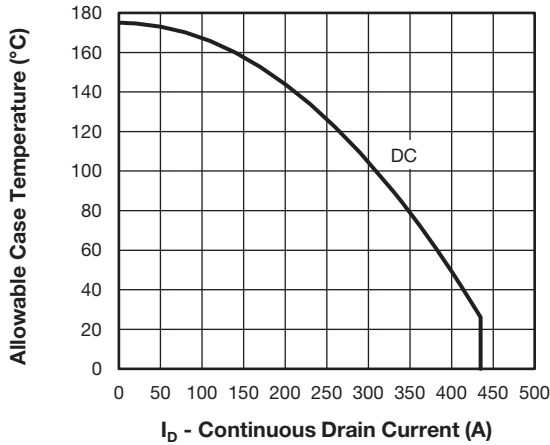


Fig. 1 - Maximum Continuous Drain Current vs. Case Temperature

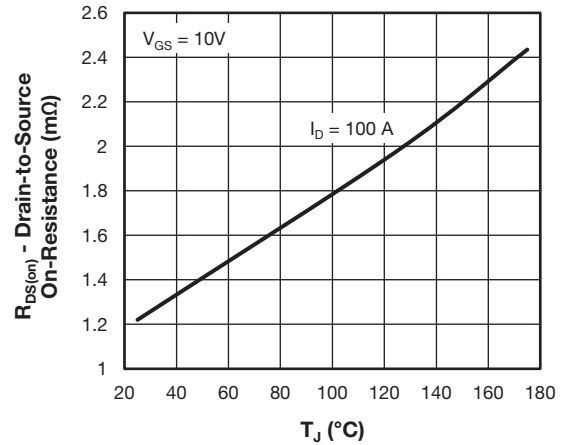


Fig. 4 - Typical Drain-to-Source On-Resistance vs. Temperature

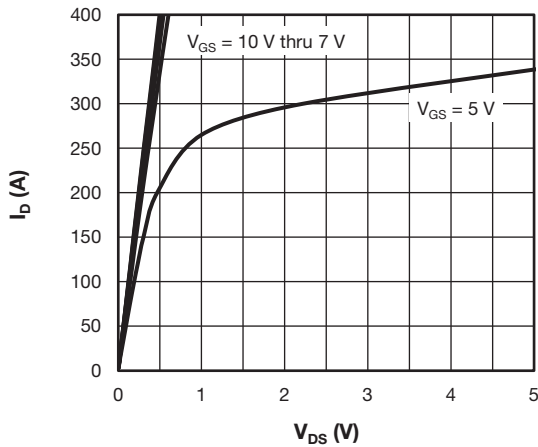


Fig. 2 - Typical Drain to Source Current Output Characteristics at $T_J = 25\text{ }^\circ\text{C}$

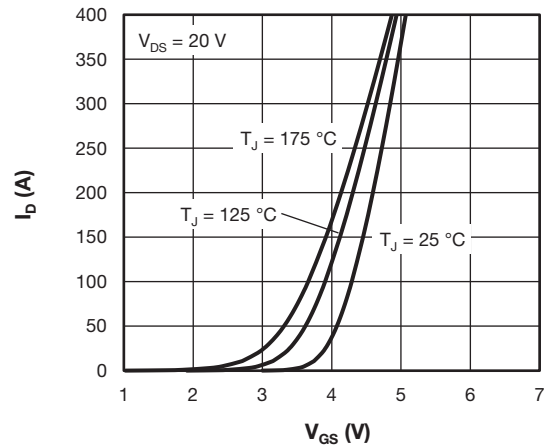


Fig. 5 - Typical Transfer Characteristics

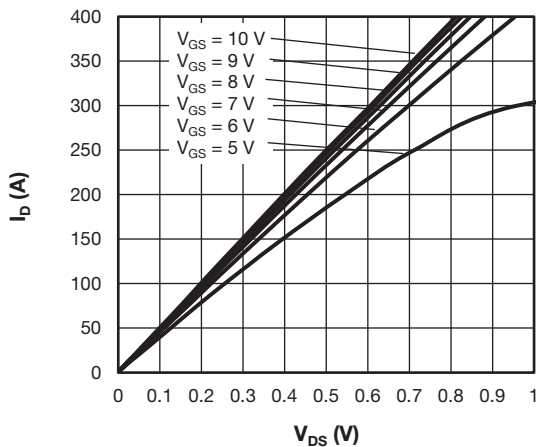


Fig. 3 - Typical Drain to Source Current Output Characteristics at $T_J = 125\text{ }^\circ\text{C}$

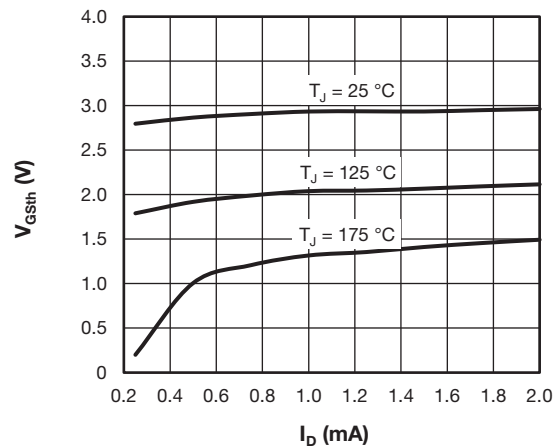


Fig. 6 - Typical Gate Threshold Voltage Characteristics

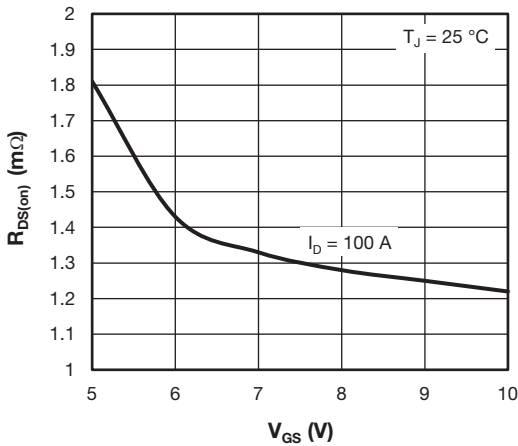


Fig. 7 - Typical Drain-State Resistance vs. Gate-to-Source Voltage

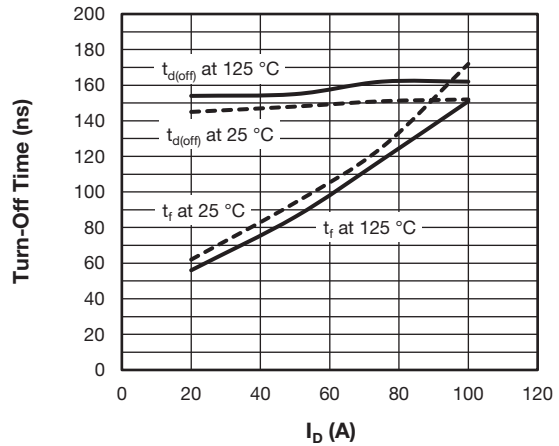


Fig. 10 - Typical Turn off Switching Time vs. I_D
 $V_{DD} = 50 \text{ V}$, $R_g = 1.2 \text{ } \Omega$, $V_{GS} = \pm 10 \text{ V}$, $L = 500 \text{ } \mu\text{H}$

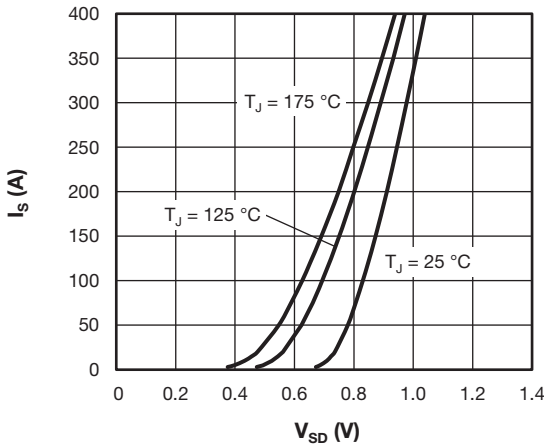


Fig. 8 - Typical Body Diode Source-to-Drain Current Characteristics

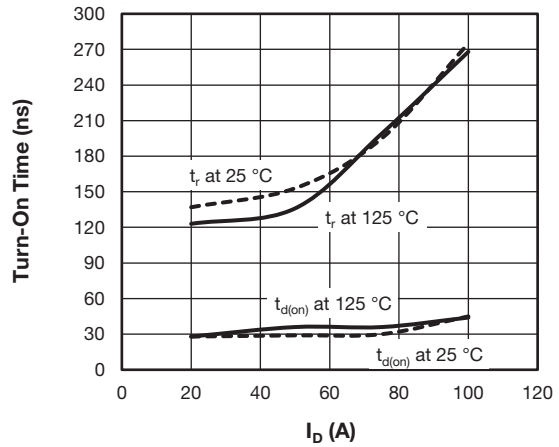


Fig. 11 - Typical Turn-on Switching Time vs. I_D
 $V_{DD} = 50 \text{ V}$, $R_g = 1.2 \text{ } \Omega$, $V_{GS} = \pm 10 \text{ V}$, $L = 500 \text{ } \mu\text{H}$

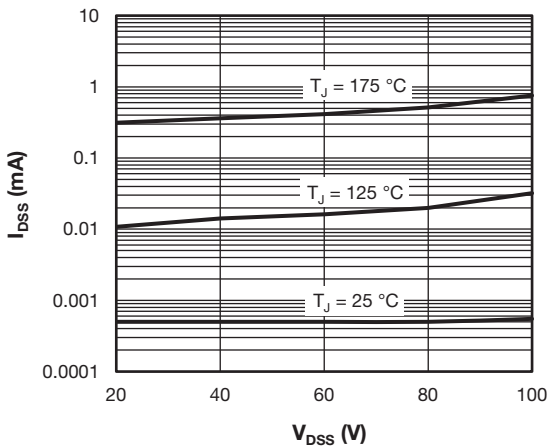


Fig. 9 - Typical Zero Gate Voltage Drain Current

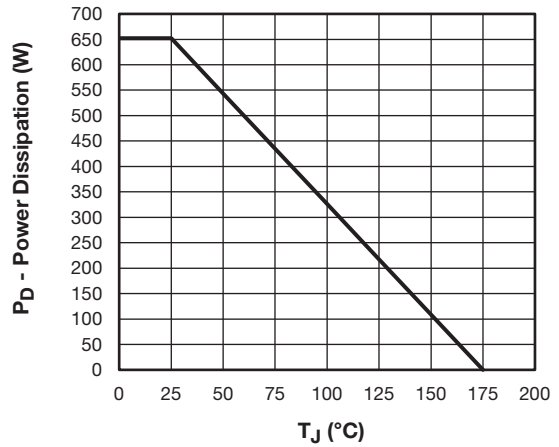


Fig. 12 - Power Dissipation Curve

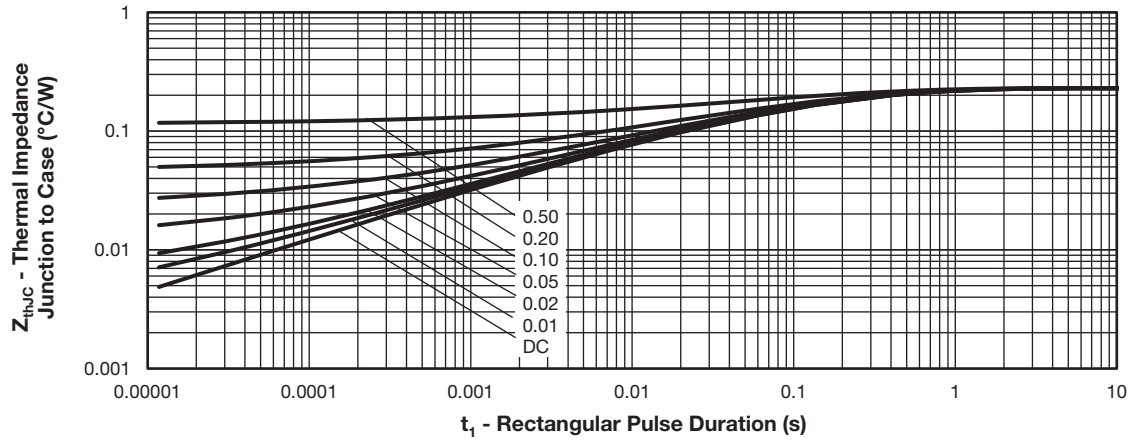


Fig. 13 - Maximum Thermal Impedance Junction-to-Case Characteristics

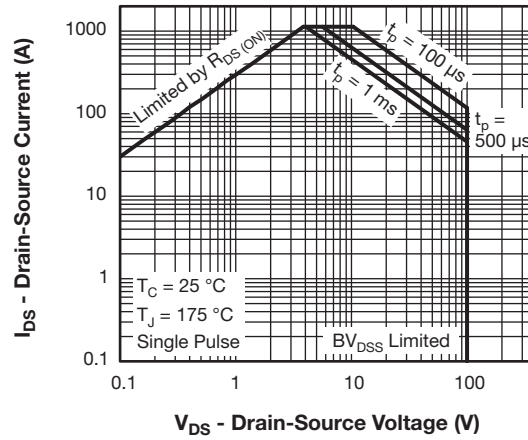


Fig. 14 - Safe Operating Area

ORDERING INFORMATION TABLE

| | | | | | | | |
|-------------|------------|----------|----------|------------|----------|----------|-----------|
| Device code | VS- | F | C | 420 | S | A | 10 |
| | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ |

- 1** - Vishay Semiconductors product
- 2** - MOSFET module
- 3** - MOSFET die generation
- 4** - Current rating (420 = 420 A)
- 5** - Circuit configuration (S = single switch)
- 6** - Package indicator (SOT-227 standard insulated base)
- 7** - Voltage rating (10 = 100 V)

Quantity per tube is 10, M4 screw and washer included

| CIRCUIT CONFIGURATION | | |
|-----------------------|----------------------------|-----------------|
| CIRCUIT | CIRCUIT CONFIGURATION CODE | CIRCUIT DRAWING |
| Single switch | S | |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95423 |
| Packaging information | www.vishay.com/doc?95425 |



SOT-227 Generation 2

DIMENSIONS in millimeters (inches)



Note

- Controlling dimension: millimeter



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