



N-Channel 105-V (D-S) 175 °C MOSFET

| PRODUCT SUMMARY | | |
|-------------------|---------------------------|-----------|
| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ (Ω) | I_D (A) |
| 105 | 0.035 @ $V_{GS} = 10$ V | 37.5 |
| | 0.038 @ $V_{GS} = 6$ V | 36.0 |

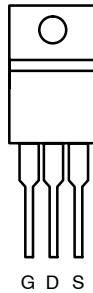
FEATURES

- TrenchFET® Power MOSFETS
- 175 °C Junction Temperature

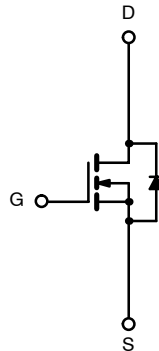
APPLICATIONS

- Automotive
 - Motor Drives
 - 12-V Systems
- Note Book PC adaptors

TO-220AB



Top View



N-Channel MOSFET

Ordering Information: SUP40N10-35—E3

| ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) | | | | |
|---|----------------------------|---------------------------|------------------|----|
| Parameter | Symbol | Limit | Unit | |
| Drain-Source Voltage | V_{DS} | 105 | V | |
| Gate-Source Voltage | V_{GS} | ± 20 | | |
| Continuous Drain Current ($T_J = 175^\circ\text{C}$) | I_D | $T_C = 25^\circ\text{C}$ | 37.5 | |
| | | $T_C = 125^\circ\text{C}$ | 21.5 | |
| Pulsed Drain Current | I_{DM} | 75 | A | |
| Avalanche Current | I_{AR} | 35 | | |
| Repetitive Avalanche Energy ^a | E_{AR} | L = 0.1 mH | 61 | mJ |
| Maximum Power Dissipation ^a | | $T_C = 25^\circ\text{C}$ | 107 ^b | W |
| | $T_A = 25^\circ\text{C}^c$ | 3.75 | | |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | -55 to 175 | $^\circ\text{C}$ | |

| THERMAL RESISTANCE RATINGS | | | | |
|----------------------------|------------|------------------------|------|--------------------|
| Parameter | Symbol | Limit | Unit | |
| Junction-to-Ambient | R_{thJA} | PCB Mount ^c | 40 | $^\circ\text{C/W}$ |
| | | Free Air | 62.5 | |
| Junction-to-Case (Drain) | R_{thJC} | 1.4 | | |

Notes

- Duty cycle $\leq 1\%$.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).



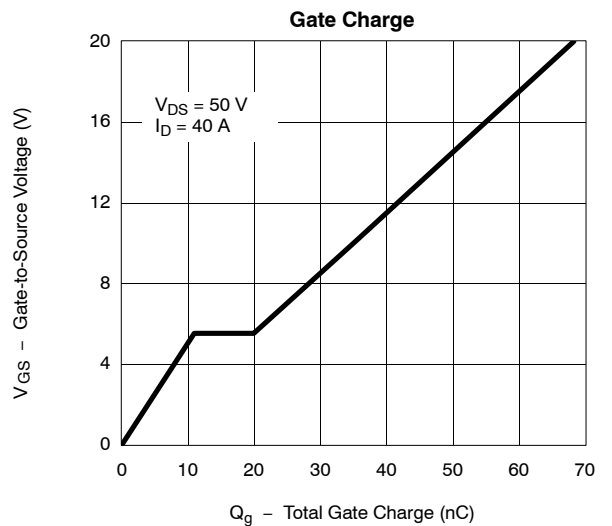
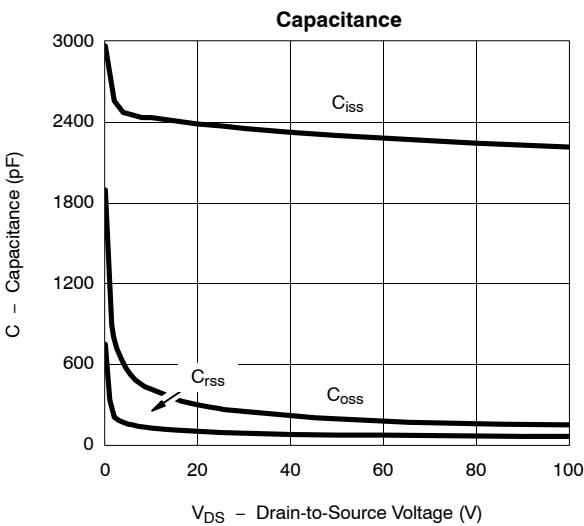
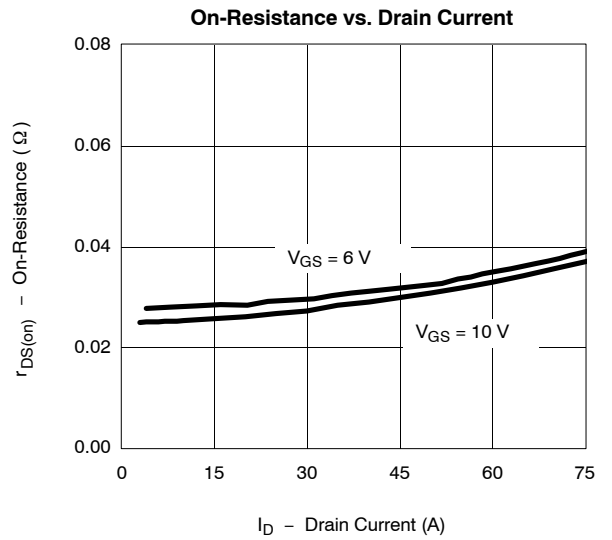
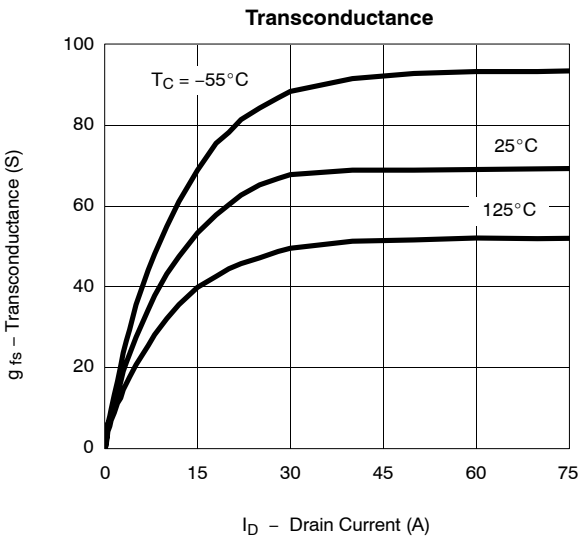
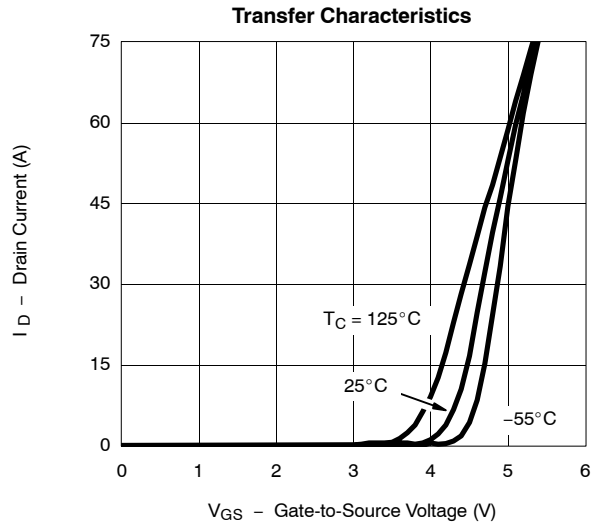
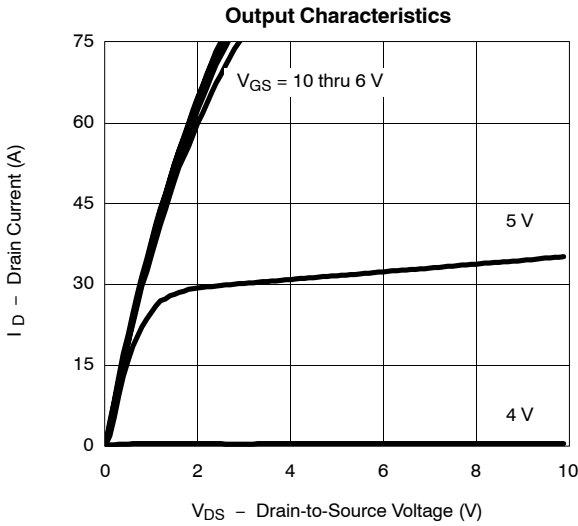
| SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED) | | | | | | |
|---|----------------------|---|-----|-------|-------|------|
| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V _{(BR)DSS} | V _{GS} = 0 V, I _D = 250 μA | 105 | | | V |
| Gate-Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250 μA | 2 | | 4 | |
| Gate-Body Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±20 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 105 V, V _{GS} = 0 V | | | 1 | μA |
| | | V _{DS} = 105 V, V _{GS} = 0 V, T _J = 125 °C | | | 50 | |
| | | V _{DS} = 105 V, V _{GS} = 0 V, T _J = 175 °C | | | 250 | |
| On-State Drain Current ^a | I _{D(on)} | V _{DS} ≥ 5 V, V _{GS} = 10 V | 75 | | | A |
| Drain-Source On-State Resistance ^a | r _{DS(on)} | V _{GS} = 10 V, I _D = 15 A | | 0.026 | 0.035 | Ω |
| | | V _{GS} = 6 V, I _D = 10 A | | 0.028 | 0.038 | |
| | | V _{GS} = 10 V, I _D = 15 A, T _J = 125 °C | | | 0.063 | |
| | | V _{GS} = 10 V, I _D = 15 A, T _J = 175 °C | | | 0.077 | |
| Forward Transconductance ^a | g _{fs} | V _{DS} = 15 V, I _D = 15 A | 10 | | | S |
| Dynamic^b | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz | | 2400 | | pF |
| Output Capacitance | C _{oss} | | | 270 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 90 | | |
| Total Gate Charge ^c | Q _g | V _{DS} = 50 V, V _{GS} = 10 V, I _D = 40 A | | 35 | 60 | nC |
| Gate-Source Charge ^c | Q _{gs} | | | 11 | | |
| Gate-Drain Charge ^c | Q _{gd} | | | 9 | | |
| Gate Resistance | R _g | | | 1.7 | | Ω |
| Turn-On Delay Time ^c | t _{d(on)} | V _{DD} = 50 V, R _L = 1.25 Ω I _D = 40 A, V _{GEN} = 10 V, R _g = 2.5 Ω | | 11 | 20 | ns |
| Rise Time ^c | t _r | | | 12 | 20 | |
| Turn-Off Delay Time ^c | t _{d(off)} | | | 30 | 45 | |
| Fall Time ^c | t _f | | | 12 | 20 | |
| Source-Drain Diode Ratings and Characteristics (T_C = 25 °C)^b | | | | | | |
| Continuous Current | I _S | | | | 37.5 | A |
| Pulsed Current | I _{SM} | | | | 75 | |
| Forward Voltage ^a | V _{SD} | I _F = 30 A, V _{GS} = 0 V | | 1.0 | 1.5 | V |
| Reverse Recovery Time | t _{rr} | I _F = 30 A, di/dt = 100 A/μs | | 60 | 100 | ns |
| Peak Reverse Recovery Current | I _{RM(REC)} | | | 5 | 8 | A |
| Reverse Recovery Charge | Q _{rr} | | | 0.15 | 0.4 | μC |

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.

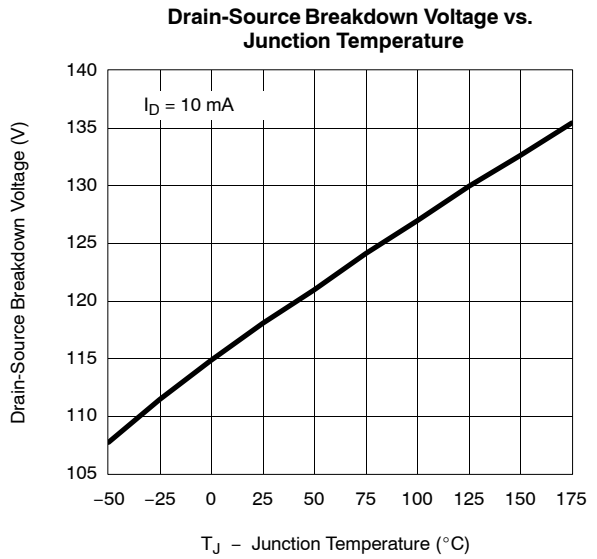
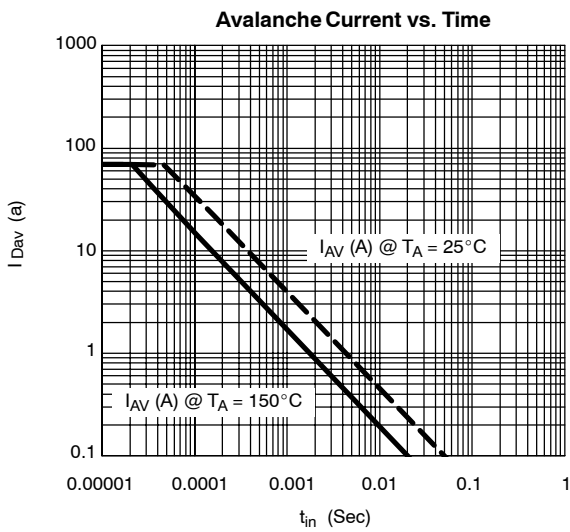
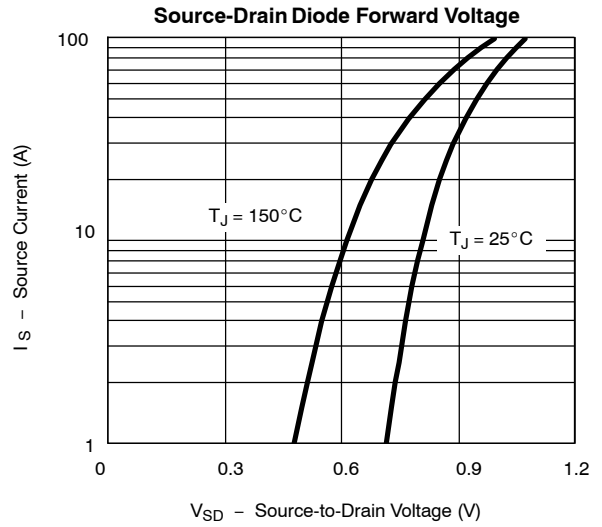
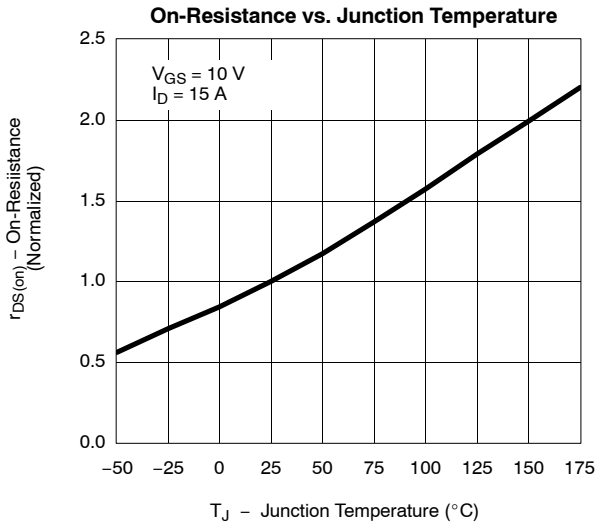


TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)





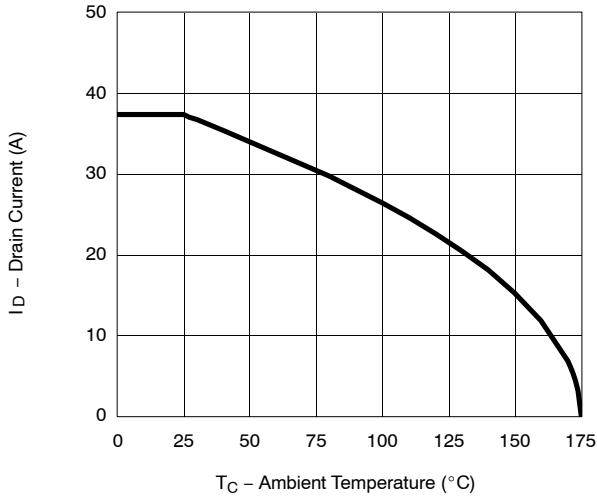
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



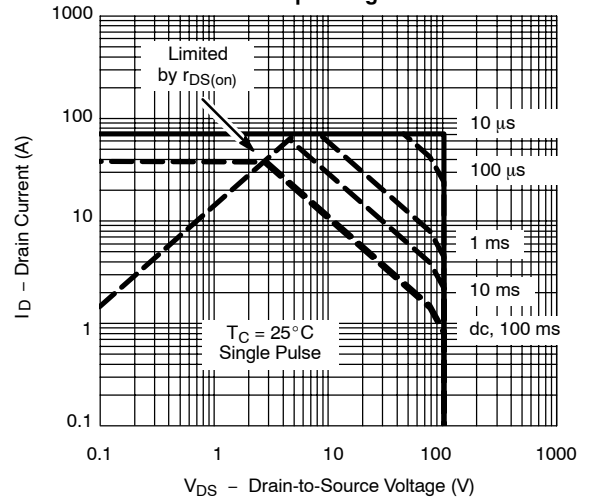


THERMAL RATINGS

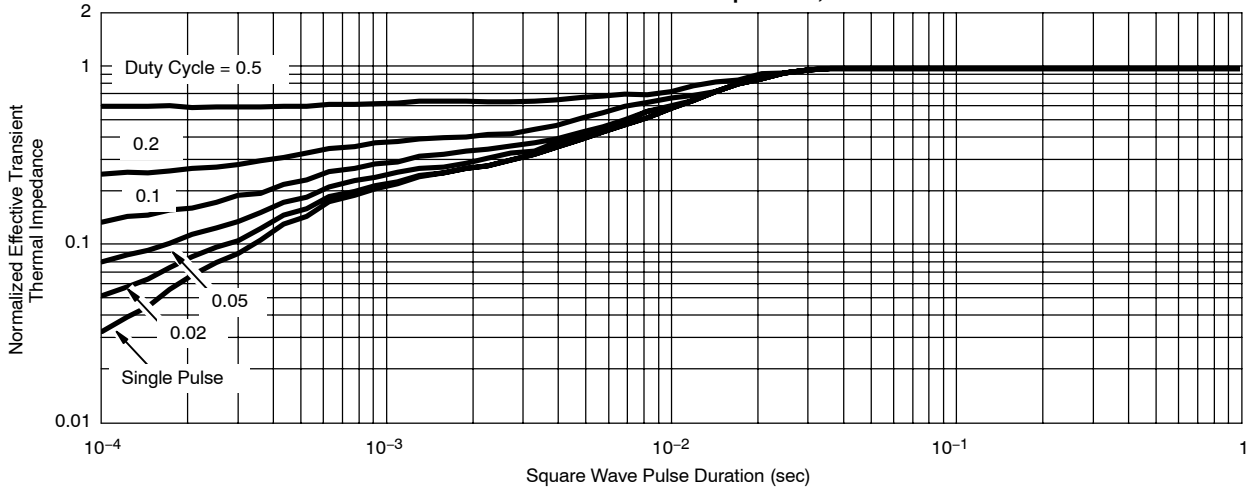
Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case





Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.