

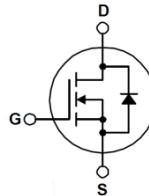
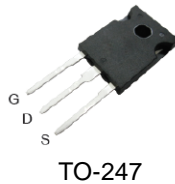
TSK82N25M 250V N-Channel MOSFET

General Description

This Power MOSFET is produced using Truesemi's advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high power inverter, cutting machine.

Features

- 82A, 250V, Max. $R_{DS(on)} = 35m\Omega @ V_{GS} = 10V$
- Low gate charge (typical 70nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter | | Value | Units |
|----------------|---|---------------------------|-------------|------------------|
| V_{DSS} | Drain-Source Voltage | | 250 | V |
| V_{GS} | Gate-Source Voltage | | ± 20 | V |
| I_D | Drain Current | $T_C = 25^\circ\text{C}$ | 82 | A |
| | | $T_C = 100^\circ\text{C}$ | 66 | A |
| I_{DM} | Pulsed Drain Current | (Note 1) | 328 | A |
| E_{AS} | Single Pulsed Avalanche Energy | (Note 2) | 3062 | mJ |
| dv/dt | Peak Diode Recovery dv/dt | (Note 3) | 4.5 | V/ns |
| P_D | Power Dissipation ($T_C = 25^\circ\text{C}$) | | 550 | W |
| T_J, T_{STG} | Operating and Storage Temperature Range | | -55 to +150 | $^\circ\text{C}$ |
| T_L | Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | | 300 | $^\circ\text{C}$ |

Thermal Resistance Characteristics

| Symbol | Parameter | Typ. | Max. | Units |
|-----------------|---|------|------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | -- | 0.29 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | -- | 40 | $^\circ\text{C/W}$ |

Electrical Characteristics $T_C=25^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|--------|-----------|-----------------|-----|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-----|-------|

On Characteristics

| | | | | | | |
|--------------|-----------------------------------|---|----|----|----|------------|
| V_{GS} | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$ | 3 | | 5 | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS} = 10 \text{ V}, I_D = 40 \text{ A}$ | -- | 29 | 35 | m Ω |

Off Characteristics

| | | | | | | |
|------------|------------------------------------|--|-----|----|------|---------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$ | 250 | -- | -- | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 250 \text{ V}, V_{GS} = 0 \text{ V}$ | -- | -- | 1 | μA |
| | | $V_{DS}=200 \text{ V}, V_{GS}=0 \text{ V}, TC=125^\circ\text{C}$ | -- | -- | 10 | μA |
| I_{GSSF} | Gate-Body Leakage Current, Forward | $V_{GS} = 20 \text{ V}, V_{DS} = 0 \text{ V}$ | -- | -- | 100 | nAnA |
| I_{GSSR} | Gate-Body Leakage Current, Reverse | $V_{GS} = -20 \text{ V}, V_{DS} = 0 \text{ V}$ | -- | -- | -100 | nAnA |

Dynamic Characteristics

| | | | | | | |
|------------|------------------------------|--|----|------|----|----|
| C_{iss} | Input Capacitance | $V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1.0 \text{ MHz}$ | -- | 6904 | -- | pF |
| C_{oss} | Output Capacitance | | -- | 783 | -- | pF |
| C_{riss} | Reverse Transfer Capacitance | | -- | 67 | -- | pF |

Switching Characteristics

| | | | | | | |
|--------------|---------------------|--|----|-----|----|----|
| $t_{d(on)}$ | Turn-On Time | $V_{DS} = 125 \text{ V}, I_D = 82 \text{ A}, R_G = 25 \Omega, V_{GS} = 15 \text{ V}$ (Note 4,5) | -- | 80 | -- | ns |
| t_r | Turn-On Rise Time | | -- | 26 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 297 | -- | ns |
| t_f | Turn-Off Fall Time | | -- | 79 | -- | ns |
| Q_g | Total Gate Charge | $V_{DS} = 250 \text{ V}, I_D = 82 \text{ A}, V_{GS} = 10 \text{ V}$ (Note 4,5) | -- | 123 | -- | nC |
| Q_{gs} | Gate-Source Charge | | -- | 45 | -- | nC |
| Q_{gd} | Gate-Drain Charge | | -- | 48 | -- | nC |

Source-Drain Diode Maximum Ratings and Characteristics

| | | | | | | |
|----------|---|--|----|-----|-----|---|
| I_S | Continuous Source-Drain Diode Forward Current | -- | -- | 82 | A | |
| I_{SM} | Pulsed Source-Drain Diode Forward Current | -- | -- | 328 | | |
| V_{SD} | Source-Drain Diode Forward Voltage | $V_{GS}=0 \text{ V}, I_S=82 \text{ A}, T_J=25^\circ\text{C}$ | -- | -- | 1.5 | V |

NOTES:

1. Repeated rating: Pulse width limited by safe operating area
2. $L=5\text{mH}, I_{AS}=35\text{A}, V_{DD}=50\text{V}, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
3. Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature typical characteristics

Typical Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

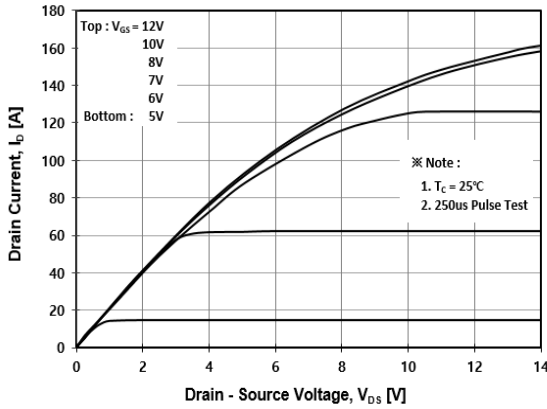


Fig. 2 Typical Transfer Characteristics

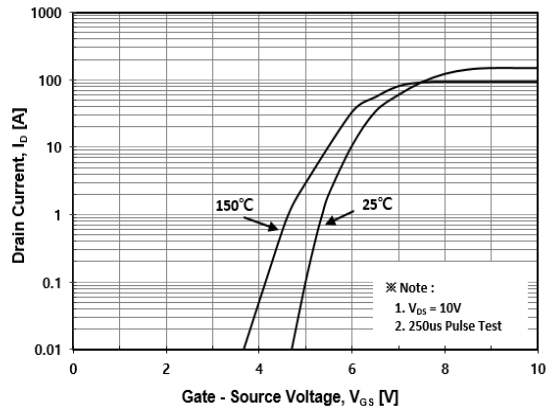


Fig. 3 On-Resistance Variation with Drain Current and Gate Voltage

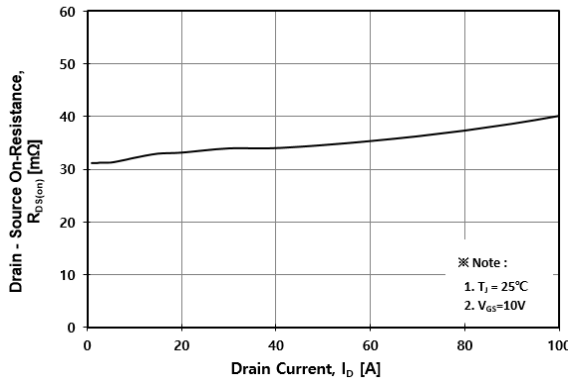


Fig. 4 Body Diode Forward Voltage Variation with Source Current

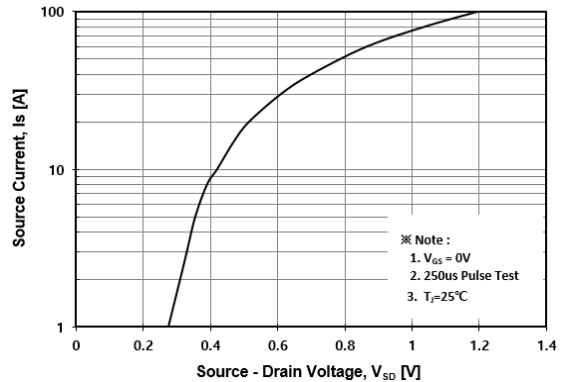


Fig. 5 Typical Capacitance Characteristics

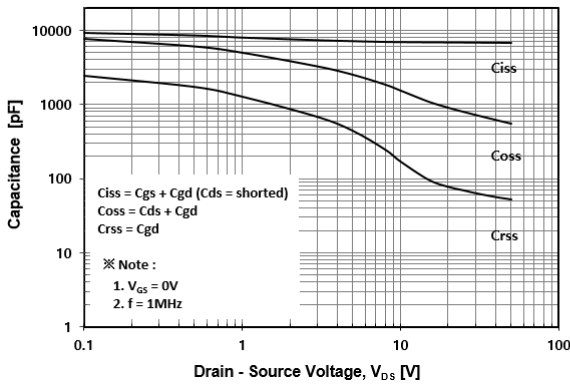


Fig. 6 Typical Total Gate Charge Characteristics

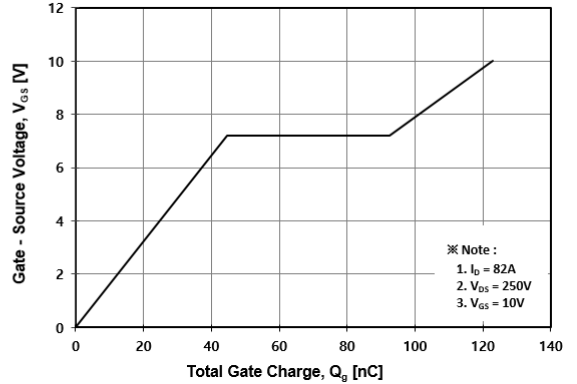


Fig. 7 Breakdown Voltage Variation vs. Temperature

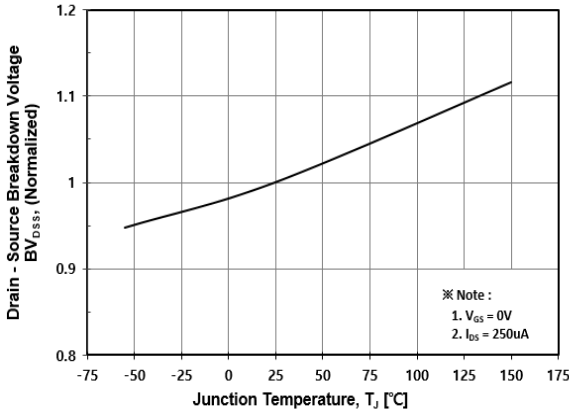


Fig. 8 On-Resistance Variation vs. Temperature

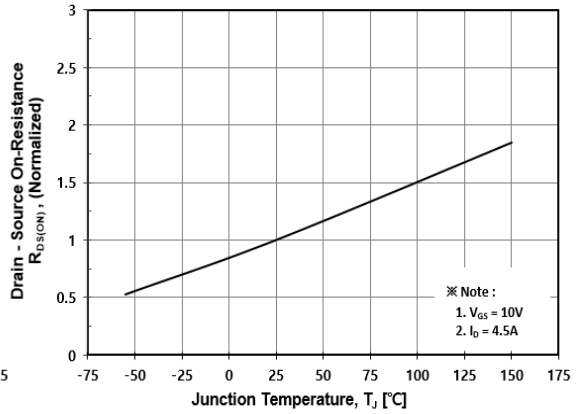


Fig. 9 Maximum Drain Current vs. Case Temperature

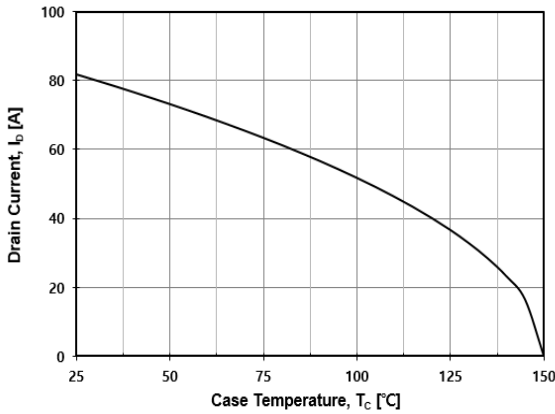


Fig. 10 Maximum Safe Operating Area

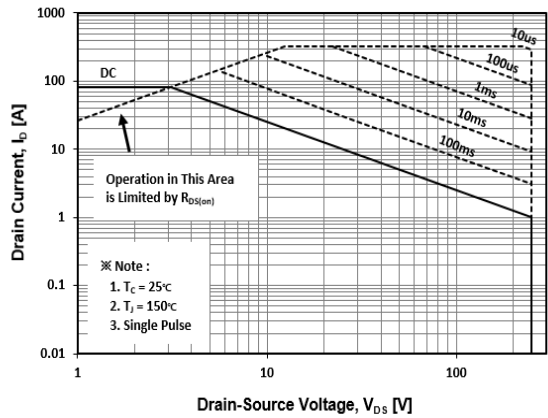


Fig. 11 Transient Thermal Impedance

