



STN2NE10

N - CHANNEL 100V - 0.33 Ω - 2A - SOT-223 STripFET™ POWER MOSFET

PRELIMINARY DATA

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|----------|------------------|---------------------|----------------|
| STN2NE10 | 100 V | < 0.4 Ω | 2 A |

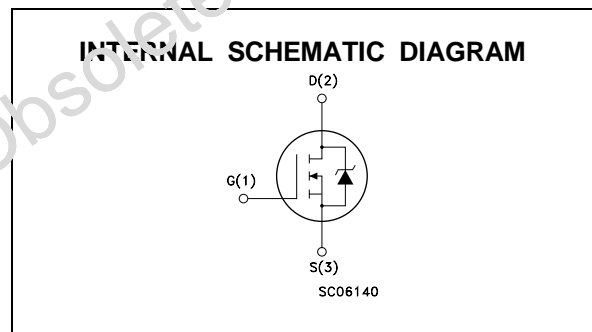
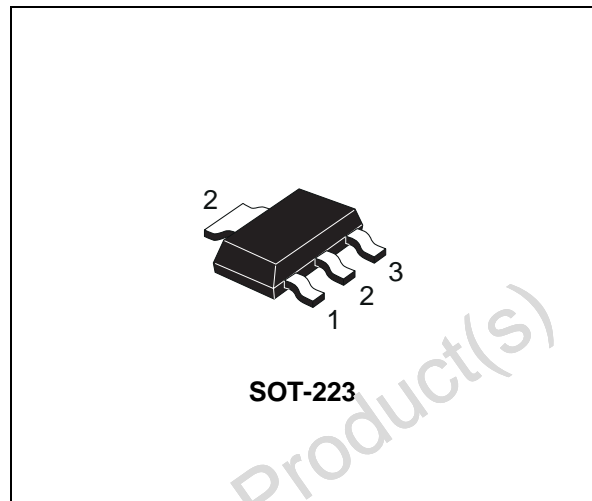
- TYPICAL R_{DS(on)} = 0.33 Ω
- EXCEPTIONAL dv/dt CAPABILITY
- AVALANCHE RUGGED TECHNOLOGY
- 100 % AVALANCHE TESTED
- APPLICATION ORIENTED CHARACTERIZATION

DESCRIPTION

This Power Mosfet is the latest development of STMicroelectronics unique "Single Feature Size™" stip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS

- DC MOTOR CONTROL (DISK DRIVES, etc.)
- DC-DC & DC-AC CONVERTERS
- SYNCHRONOUS RECTIFICATION



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------------|--|------------|------|
| V _{DS} | Drain-source Voltage (V _{GS} = 0) | 100 | V |
| V _{DGR} | Drain- gate Voltage (R _{GS} = 20 k Ω) | 100 | V |
| V _{GS} | Gate-source Voltage | ± 20 | V |
| I _D | Drain Current (continuous) at T _c = 25 °C | 2 | A |
| I _D | Drain Current (continuous) at T _c = 100 °C | 1.3 | A |
| I _{DM} (•) | Drain Current (pulsed) | 8 | A |
| P _{tot} | Total Dissipation at T _c = 25 °C | 2.5 | W |
| | Derating Factor | 0.02 | W/°C |
| dv/dt(1) | Peak Diode Recovery voltage slope | 6 | V/ns |
| T _{stg} | Storage Temperature | -65 to 150 | °C |
| T _j | Max. Operating Junction Temperature | 150 | °C |

(•) Pulse width limited by safe operating area
New RDS (on) spec. starting from JULY 98

(1) I_{SD} \leq 7 A, di/dt \leq 200 A/ μ s, V_{DD} \leq V_{(BR)DSS}, T_j \leq T_{JMAX}

STN2NE10

THERMAL DATA

| | | | | |
|---------------|--|-----|-----|-----------------------------|
| $R_{thj-pcb}$ | Thermal Resistance Junction-PC Board | Max | 50 | $^{\circ}\text{C}/\text{W}$ |
| $R_{thj-amb}$ | Thermal Resistance Junction-ambient (Surface Mounted) | Max | 60 | $^{\circ}\text{C}/\text{W}$ |
| T_l | Maximum Lead Temperature For Soldering Purpose | | 260 | $^{\circ}\text{C}$ |

AVALANCHE CHARACTERISTICS

| Symbol | Parameter | Max Value | Unit |
|----------|---|-----------|------|
| I_{AR} | Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max) | 2 | A |
| E_{AS} | Single Pulse Avalanche Energy (starting $T_j = 25^{\circ}\text{C}$, $I_D = I_{AR}$, $V_{DD} = 25\text{ V}$) | 20 | mJ |

ELECTRICAL CHARACTERISTICS ($T_{case} = 25^{\circ}\text{C}$ unless otherwise specified)

OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------|--|--|------|------|-----------|--------------------------------|
| $V_{(BR)DSS}$ | Drain-source Breakdown Voltage | $I_D = 250\ \mu\text{A}$ $V_{GS} = 0$ | 100 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current ($V_{GS} = 0$) | $V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$ $T_c = 125^{\circ}\text{C}$ | | | 1 10 | μA μA |
| I_{GSS} | Gate-body Leakage Current ($V_{DS} = 0$) | $V_{GS} = \pm 20\text{ V}$ | | | ± 100 | nA |

ON (*)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|-----------------------------------|---|------|------|------|----------|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}$ $I_D = 250\ \mu\text{A}$ | 2 | 3 | 4 | V |
| $R_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS} = 10\text{ V}$ $I_D = 1\text{ A}$ | | 0.33 | 0.4 | Ω |
| $I_{D(on)}$ | On State Drain Current | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10\text{ V}$ | 2 | | | A |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|------------------------------|---|------|------|------|------|
| g_{fs} (*) | Forward Transconductance | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 1\text{ A}$ | 1 | 1.8 | | S |
| C_{iss} | Input Capacitance | $V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$ $V_{GS} = 0\text{ V}$ | | 305 | | pF |
| C_{oss} | Output Capacitance | | | 45 | | pF |
| C_{rss} | Reverse Transfer Capacitance | | | 21 | | pF |

ELECTRICAL CHARACTERISTICS (continued)**SWITCHING ON**

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------|--------------------|--|------|------|------|------|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD} = 50\text{ V}$ $I_D = 35\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, see fig. 3) | | 7 | | ns |
| t_r | Rise Time | | | 17 | | ns |
| Q_g | Total Gate Charge | $V_{DD} = 80\text{ V}$ $I_D = 7\text{ A}$ $V_{GS} = 10\text{ V}$ | | 14 | 19 | nC |
| Q_{gs} | Gate-Source Charge | | | 6 | | nC |
| Q_{gd} | Gate-Drain Charge | | | 4 | | nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------|-----------------------|---|------|------|------|------|
| $t_{d(off)}$ | Turn-off Delay Time | $V_{DD} = 50\text{ V}$ $I_D = 3.5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, see fig. 3) | | 25 | | ns |
| t_f | Fall Time | | | 7 | | ns |
| $t_{r(Voff)}$ | Off-voltage Rise Time | $V_{clamp} = 16\text{ V}$ $I_D = 80\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Inductive Load, see fig. 5) | | 7 | | ns |
| t_f | Fall Time | | | 8 | | ns |
| t_c | Cross-over Time | | | 16 | | ns |

SOURCE DRAIN DIODE

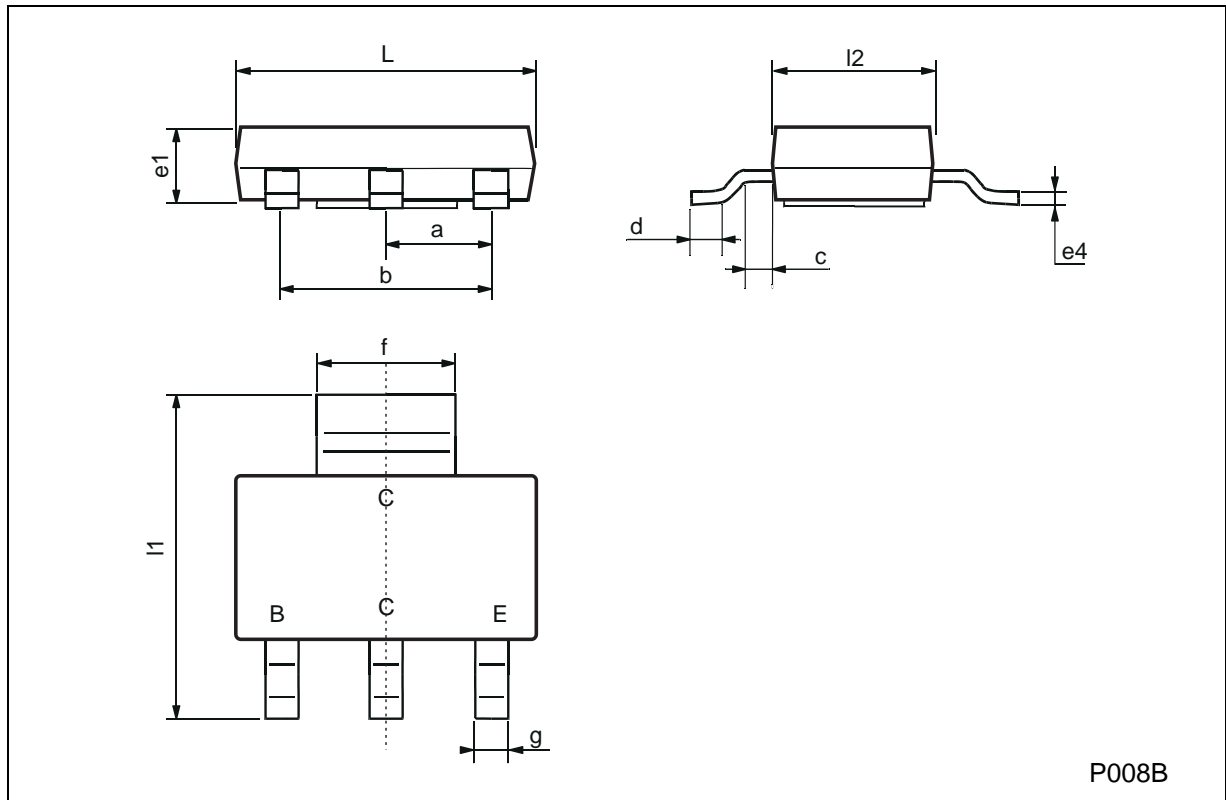
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------------|-------------------------------|--|------|------|------|---------------|
| I_{SD} | Source-drain Current | | | | 2 | A |
| $I_{SDM}(\bullet)$ | Source-drain Current (pulsed) | | | | 8 | A |
| $V_{SD} (*)$ | Forward On Voltage | $I_{SD} = 2\text{ A}$ $V_{GS} = 0$ | | | 1.5 | V |
| t_{rr} | Reverse Recovery Time | $I_{SD} = 7\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 30\text{ V}$ (see test circuit, fig. 5) | | 75 | | ns |
| Q_{rr} | Reverse Recovery Charge | | | 210 | | μC |
| I_{RRM} | Reverse Recovery Current | | | 5.5 | | A |

(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

(\bullet) Pulse width limited by safe operating area

SOT-223 MECHANICAL DATA

| DIM. | mm | | | mils | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| a | 2.27 | 2.3 | 2.33 | 89.4 | 90.6 | 91.7 |
| b | 4.57 | 4.6 | 4.63 | 179.9 | 181.1 | 182.3 |
| c | 0.2 | 0.4 | 0.6 | 7.9 | 15.7 | 23.6 |
| d | 0.63 | 0.65 | 0.67 | 24.8 | 25.6 | 26.4 |
| e1 | 1.5 | 1.6 | 1.7 | 59.1 | 63 | 66.9 |
| e4 | | | 0.32 | | | 12.6 |
| f | 2.9 | 3 | 3.1 | 114.2 | 118.1 | 122.1 |
| g | 0.67 | 0.7 | 0.73 | 26.4 | 27.6 | 28.7 |
| l1 | 6.7 | 7 | 7.3 | 263.8 | 275.6 | 287.4 |
| l2 | 3.5 | 3.5 | 3.7 | 137.8 | 137.8 | 145.7 |
| L | 6.3 | 6.5 | 6.7 | 248 | 255.9 | 263.8 |



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