

N - CHANNEL ENHANCEMENT MODE " SINGLE FEATURE SIZE™ " POWER MOSFET

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|------------|------------------|---------------------|----------------|
| STP22NE03L | 30 V | < 0.05 Ω | 22 A |

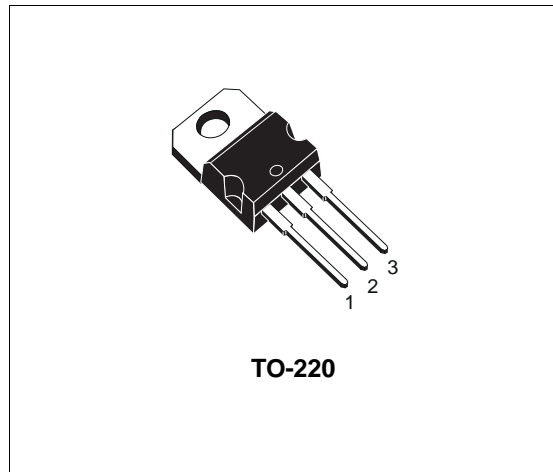
- TYPICAL R_{DS(on)} = 0.034 Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- LOW GATE CHARGE 100 °C
- APPLICATION ORIENTED CHARACTERIZATION

DESCRIPTION

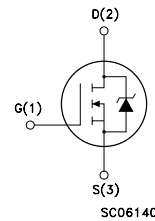
This Power Mosfet is the latest development of SGS-THOMSON unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SOLENOID AND RELAY DRIVERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC & DC-AC CONVERTERS
- AUTOMOTIVE ENVIRONMENT (INJECTION, ABS, AIR-BAG, LAMPDRIVERS, Etc.)



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------------|---|------------|------|
| V _{DS} | Drain-source Voltage (V _{GS} = 0) | 30 | V |
| V _{DGR} | Drain- gate Voltage (R _{GS} = 20 kΩ) | 30 | V |
| V _{GS} | Gate-source Voltage | ± 15 | V |
| I _D | Drain Current (continuous) at T _c = 25 °C | 22 | A |
| I _D | Drain Current (continuous) at T _c = 100 °C | 16 | A |
| I _{DM} (●) | Drain Current (pulsed) | 88 | A |
| P _{tot} | Total Dissipation at T _c = 25 °C | 60 | W |
| | Derating Factor | 0.4 | W/°C |
| dv/dt | Peak Diode Recovery voltage slope | 6 | V/ns |
| T _{stg} | Storage Temperature | -65 to 175 | °C |
| T _j | Max. Operating Junction Temperature | 175 | °C |

(●) Pulse width limited by safe operating area

(1) I_{SD} ≤ 22 A, di/dt ≤ 300 A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}

STP22NE03L

THERMAL DATA

| | | | | |
|----------------|--|-----|------|---------------|
| $R_{thj-case}$ | Thermal Resistance Junction-case | Max | 2.5 | $^{\circ}C/W$ |
| $R_{thj-amb}$ | Thermal Resistance Junction-ambient | Max | 62.5 | $^{\circ}C/W$ |
| $R_{thc-sink}$ | Thermal Resistance Case-sink | Typ | 0.5 | $^{\circ}C/W$ |
| T_l | Maximum Lead Temperature For Soldering Purpose | | 300 | $^{\circ}C$ |

AVALANCHE CHARACTERISTICS

| Symbol | Parameter | Max Value | Unit |
|----------|---|-----------|------|
| I_{AR} | Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max, $\delta < 1\%$) | 22 | A |
| E_{AS} | Single Pulse Avalanche Energy (starting $T_j = 25^{\circ}C$, $I_D = I_{AR}$, $V_{DD} = 15 V$) | TBD | mJ |

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

OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------|--|---|------|------|-----------|--------------------|
| $V_{(BR)DSS}$ | Drain-source Breakdown Voltage | $I_D = 250 \mu A$ $V_{GS} = 0$ | 30 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current ($V_{GS} = 0$) | $V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$ $T_c = 125^{\circ}C$ | | | 1 10 | μA μA |
| I_{GSS} | Gate-body Leakage Current ($V_{DS} = 0$) | $V_{GS} = \pm 15 V$ | | | ± 100 | nA |

ON (*)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|-----------------------------------|--|------|----------------|--------------|----------|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}$ $I_D = 250 \mu A$ | 1 | 1.7 | 2.5 | V |
| $R_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS} = 10V$ $I_D = 11 A$ $V_{GS} = 5V$ $I_D = 11 A$ | | 0.034 0.049 | 0.05 0.06 | Ω |
| $I_{D(on)}$ | On State Drain Current | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10 V$ | 22 | | | A |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|------------------------------|--|------|------|------|------|
| $g_{fs} (*)$ | Forward Transconductance | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 11 A$ | 7 | 13 | | S |
| C_{iss} | Input Capacitance | $V_{DS} = 25 V$ $f = 1 MHz$ $V_{GS} = 0$ | | 680 | 950 | pF |
| C_{oss} | Output Capacitance | | | 160 | 220 | pF |
| C_{rss} | Reverse Transfer Capacitance | | | 60 | 85 | pF |

ELECTRICAL CHARACTERISTICS (continued)**SWITCHING ON**

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------|--|---|------|--------------|-----------|----------------|
| $t_{d(on)}$ t_r | Turn-on Time Rise Time | $V_{DD} = 15\text{ V}$ $I_D = 11\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 5\text{ V}$ | | 15 70 | 20 100 | ns ns |
| Q_g Q_{gs} Q_{gd} | Total Gate Charge Gate-Source Charge Gate-Drain Charge | $V_{DD} = 24\text{ V}$ $I_D = 22\text{ A}$ $V_{GS} = 5\text{ V}$ | | 13 6 6 | 18 | nC nC nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------------------|---|---|------|----------------|----------------|----------------|
| $t_{r(Voff)}$ t_f t_c | Off-voltage Rise Time Fall Time Cross-over Time | $V_{DD} = 24\text{ V}$ $I_D = 22\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 5\text{ V}$ | | 13 33 55 | 18 46 77 | ns ns ns |

SOURCE DRAIN DIODE

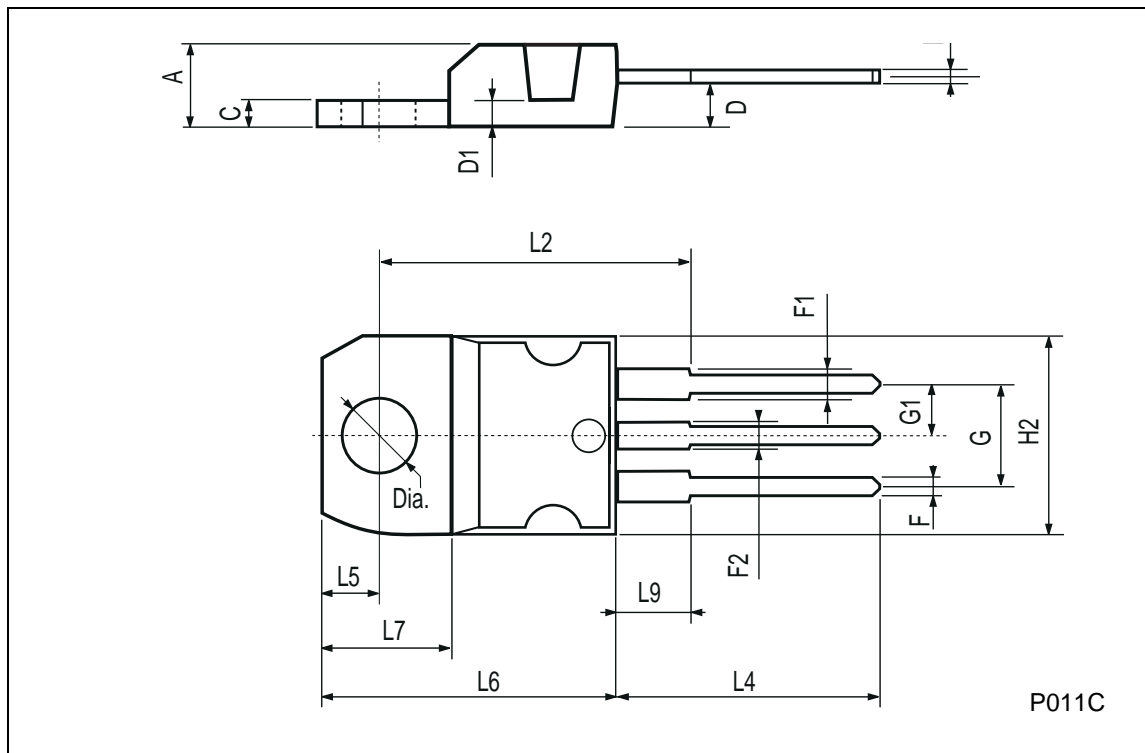
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|--|---|------|-----------------|----------|--------------------------|
| I_{SD} $I_{SDM}(\bullet)$ | Source-drain Current Source-drain Current (pulsed) | | | | 22 88 | A A |
| $V_{SD} (*)$ | Forward On Voltage | $I_{SD} = 22\text{ A}$ $V_{GS} = 0$ | | | 1.5 | V |
| t_{rr} Q_{rr} I_{RRM} | Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current | $I_{SD} = 22\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 15\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ | | 40 44 2.2 | | ns μC A |

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

(\bullet) Pulse width limited by safe operating area

TO-220 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|-------|------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| C | 1.23 | | 1.32 | 0.048 | | 0.051 |
| D | 2.40 | | 2.72 | 0.094 | | 0.107 |
| D1 | | 1.27 | | | 0.050 | |
| E | 0.49 | | 0.70 | 0.019 | | 0.027 |
| F | 0.61 | | 0.88 | 0.024 | | 0.034 |
| F1 | 1.14 | | 1.70 | 0.044 | | 0.067 |
| F2 | 1.14 | | 1.70 | 0.044 | | 0.067 |
| G | 4.95 | | 5.15 | 0.194 | | 0.203 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H2 | 10.0 | | 10.40 | 0.393 | | 0.409 |
| L2 | | 16.4 | | | 0.645 | |
| L4 | 13.0 | | 14.0 | 0.511 | | 0.551 |
| L5 | 2.65 | | 2.95 | 0.104 | | 0.116 |
| L6 | 15.25 | | 15.75 | 0.600 | | 0.620 |
| L7 | 6.2 | | 6.6 | 0.244 | | 0.260 |
| L9 | 3.5 | | 3.93 | 0.137 | | 0.154 |
| DIA. | 3.75 | | 3.85 | 0.147 | | 0.151 |



Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1998 SGS-THOMSON Microelectronics - Printed in Italy - All Rights Reserved

SGS-THOMSON Microelectronics GROUP OF COMPANIES
Australia - Brazil - Canada - China - France - Germany - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands -
Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A