

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

| TYPE       | V <sub>DSS</sub> | R <sub>DS(on)</sub> | I <sub>D</sub> |
|------------|------------------|---------------------|----------------|
| STP22NE03L | 30 V             | < 0.05 Ω            | 22 A           |

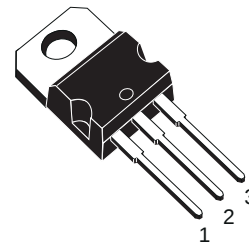
- TYPICAL R<sub>DS(on)</sub> = 0.034 Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- LOW GATE CHARGE 100 °C
- APPLICATION ORIENTED CHARACTERIZATION

### 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.

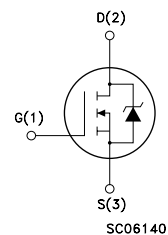
### APPLICATIONS

- 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. )



**TO-220**

### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

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

(•) Pulse width limited by safe operating area

(1) I<sub>SD</sub> ≤ 22 A, di/dt ≤ 300 A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>j</sub> ≤ T<sub>JMAX</sub>

## STP22NE03L

### THERMAL DATA

|                       |                                                |     |      |      |
|-----------------------|------------------------------------------------|-----|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case               | Max | 2.5  | °C/W |
| R <sub>thj-amb</sub>  | Thermal Resistance Junction-ambient            | Max | 62.5 | °C/W |
| R <sub>thc-sink</sub> | Thermal Resistance Case-sink                   | Typ | 0.5  | °C/W |
| T <sub>l</sub>        | Maximum Lead Temperature For Soldering Purpose |     | 300  | °C   |

### AVALANCHE CHARACTERISTICS

| Symbol          | Parameter                                                                                                                  | Max Value | Unit |
|-----------------|----------------------------------------------------------------------------------------------------------------------------|-----------|------|
| I <sub>AR</sub> | Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T <sub>j</sub> max, δ < 1%)                        | 22        | A    |
| E <sub>AS</sub> | Single Pulse Avalanche Energy (starting T <sub>j</sub> = 25 °C, I <sub>D</sub> = I <sub>AR</sub> , V <sub>DD</sub> = 15 V) | TBD       | mJ   |

### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

OFF

| Symbol               | Parameter                                             | Test Conditions                                                                      | Min. | Typ. | Max.    | Unit     |
|----------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------|------|------|---------|----------|
| V <sub>(BR)DSS</sub> | Drain-source Breakdown Voltage                        | I <sub>D</sub> = 250 μA V <sub>GS</sub> = 0                                          | 30   |      |         | V        |
| I <sub>DSS</sub>     | Zero Gate Voltage Drain Current (V <sub>GS</sub> = 0) | V <sub>DS</sub> = Max Rating<br>V <sub>DS</sub> = Max Rating T <sub>c</sub> = 125 °C |      |      | 1<br>10 | μA<br>μA |
| I <sub>GSS</sub>     | Gate-body Leakage Current (V <sub>DS</sub> = 0)       | V <sub>GS</sub> = ± 15 V                                                             |      |      | ± 100   | nA       |

ON (\*)

| Symbol              | Parameter                         | Test Conditions                                                                           | Min. | Typ.           | Max.         | Unit |
|---------------------|-----------------------------------|-------------------------------------------------------------------------------------------|------|----------------|--------------|------|
| V <sub>GS(th)</sub> | Gate Threshold Voltage            | V <sub>DS</sub> = V <sub>GS</sub> I <sub>D</sub> = 250 μA                                 | 1    | 1.7            | 2.5          | V    |
| R <sub>DS(on)</sub> | Static Drain-source On Resistance | V <sub>GS</sub> = 10V I <sub>D</sub> = 11 A<br>V <sub>GS</sub> = 5V I <sub>D</sub> = 11 A |      | 0.034<br>0.049 | 0.05<br>0.06 | Ω    |
| I <sub>D(on)</sub>  | On State Drain Current            | V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>DS(on)max</sub><br>V <sub>GS</sub> = 10 V   | 22   |                |              | A    |

### DYNAMIC

| Symbol                                                   | Parameter                                                               | Test Conditions                                                                     | Min. | Typ.             | Max.             | Unit           |
|----------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|------------------|------------------|----------------|
| g <sub>fs</sub> (*)                                      | Forward Transconductance                                                | V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>DS(on)max</sub> I <sub>D</sub> = 11 A | 7    | 13               |                  | S              |
| C <sub>iss</sub><br>C <sub>oss</sub><br>C <sub>rss</sub> | Input Capacitance<br>Output Capacitance<br>Reverse Transfer Capacitance | V <sub>DS</sub> = 25 V f = 1 MHz V <sub>GS</sub> = 0                                |      | 680<br>160<br>60 | 950<br>220<br>85 | pF<br>pF<br>pF |

**ELECTRICAL CHARACTERISTICS** (continued)**SWITCHING ON**

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

**SWITCHING OFF**

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

**SOURCE DRAIN DIODE**

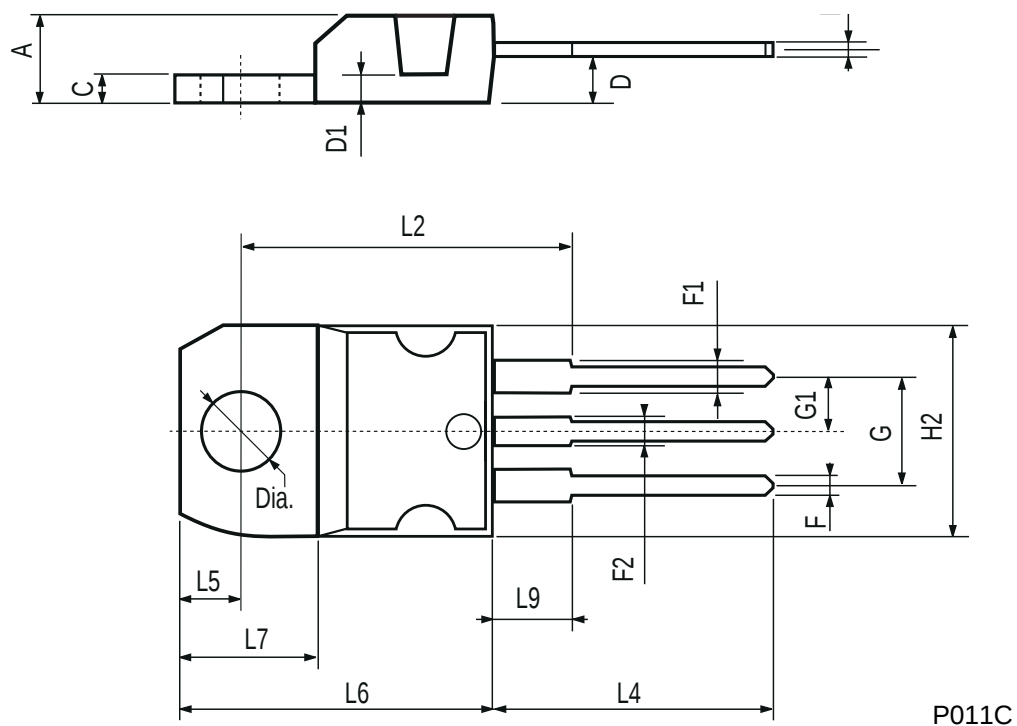
| Symbol             | Parameter                     | Test Conditions                                                                                                       | Min. | Typ. | Max. | Unit          |
|--------------------|-------------------------------|--------------------------------------------------------------------------------------------------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

(\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , 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 </tr <tr><td>L9</td><td>3.5</td><td></td><td>3.93</td><td>0.137</td><td></td><td>0.154</td></tr> <tr><td>DIA.</td><td>3.75</td><td></td><td>3.85</td><td>0.147</td><td></td><td>0.151</td></tr> | L9 | 3.5 |  | 3.93 | 0.137 |  | 0.154 | DIA. | 3.75 |  | 3.85 | 0.147 |  | 0.151 |
| L9   | 3.5   |      | 3.93  | 0.137 |       | 0.154                                                                                                                                                                                                 |    |     |  |      |       |  |       |      |      |  |      |       |  |       |
| DIA. | 3.75  |      | 3.85  | 0.147 |       | 0.151                                                                                                                                                                                                 |    |     |  |      |       |  |       |      |      |  |      |       |  |       |



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