



# STP16N10L

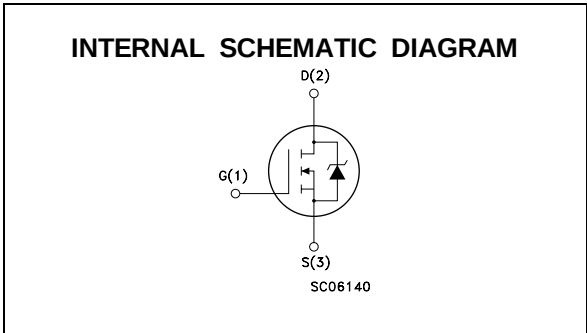
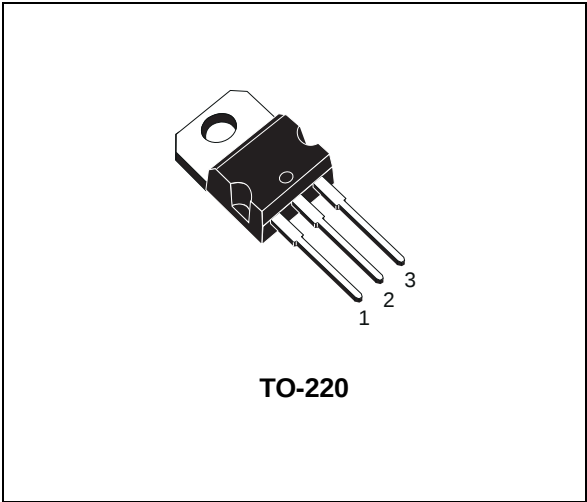
## N - CHANNEL 100V - 0.14 Ω - 16A - TO-220 POWER MOS TRANSISTOR

| TYPE      | V <sub>DSS</sub> | R <sub>DS(on)</sub> | I <sub>D</sub> |
|-----------|------------------|---------------------|----------------|
| STP16N10L | 100 V            | < 0.16 Ω            | 16 A           |

- TYPICAL R<sub>DS(on)</sub> = 0.14 Ω
- AVALANCHE RUGGED TECHNOLOGY
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- HIGH CURRENT CAPABILITY
- 175°C OPERATING TEMPERATURE
- HIGH dV/dt RUGGEDNESS
- APPLICATION ORIENTED CHARACTERIZATION

### APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- POWER MOTOR CONTROL
- DC-DC & DC-AC CONVERTERS
- SYNCHRONOUS RECTIFICATION



### ABSOLUTE MAXIMUM RATINGS

| Symbol              | Parameter                                             | Value      | Unit |
|---------------------|-------------------------------------------------------|------------|------|
| V <sub>DS</sub>     | Drain-source Voltage (V <sub>GS</sub> = 0)            | 100        | V    |
| V <sub>DGR</sub>    | Drain- gate Voltage (R <sub>GS</sub> = 20 kΩ)         | 100        | V    |
| V <sub>GS</sub>     | Gate-source Voltage                                   | ± 15       | V    |
| I <sub>D</sub>      | Drain Current (continuous) at T <sub>c</sub> = 25 °C  | 16         | A    |
| I <sub>D</sub>      | Drain Current (continuous) at T <sub>c</sub> = 100 °C | 11         | A    |
| I <sub>DM</sub> (•) | Drain Current (pulsed)                                | 64         | A    |
| P <sub>tot</sub>    | Total Dissipation at T <sub>c</sub> = 25 °C           | 90         | W    |
|                     | Derating Factor                                       | 0.4        | W/°C |
| dV/dt(1)            | Peak Diode Recovery voltage slope                     | 0.6        | V/ns |
| T <sub>stg</sub>    | Storage Temperature                                   | -65 to 175 | °C   |
| T <sub>j</sub>      | Max. Operating Junction Temperature                   | 175        | °C   |

## STP16N10L

### THERMAL DATA

|                       |                                                |     |      |      |
|-----------------------|------------------------------------------------|-----|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case               | Max | 1.67 | °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>I</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)                                | 16        | 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> = 50 V) | 150       | 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                                          | 100  |      |         | 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> = 5V I <sub>D</sub> = 8 A<br>V <sub>GS</sub> = 10V I <sub>D</sub> = 8 A |      | 0.14<br>0.12 | 0.16<br>0.14 | Ω<br>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 | 16   |              |              | 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> = 8 A | 6.5  | 10               |                   | 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                               |      | 800<br>150<br>50 | 1100<br>200<br>70 | pF<br>pF<br>pF |

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

| Symbol      | Parameter          | Test Conditions                                                  | Min. | Typ. | Max. | Unit |
|-------------|--------------------|------------------------------------------------------------------|------|------|------|------|
| $t_{d(on)}$ | Turn-on Time       | $V_{DD} = 50\text{ V}$ $I_D = 8\text{ A}$                        |      | 15   | 20   | ns   |
| $t_r$       | Rise Time          | $R_G = 4.7\ \Omega$ $V_{GS} = 5\text{ V}$                        |      | 40   | 55   | ns   |
| $Q_g$       | Total Gate Charge  | $V_{DD} = 80\text{ V}$ $I_D = 16\text{ A}$ $V_{GS} = 5\text{ V}$ |      | 20   | 30   | nC   |
| $Q_{gs}$    | Gate-Source Charge |                                                                  |      | 6    |      | nC   |
| $Q_{gd}$    | Gate-Drain Charge  |                                                                  |      | 10   |      | nC   |

**SWITCHING OFF**

| Symbol        | Parameter             | Test Conditions                            | Min. | Typ. | Max. | Unit |
|---------------|-----------------------|--------------------------------------------|------|------|------|------|
| $t_{r(Voff)}$ | Off-voltage Rise Time | $V_{DD} = 80\text{ V}$ $I_D = 16\text{ A}$ |      | 12   | 18   | ns   |
| $t_f$         | Fall Time             | $R_G = 4.7\ \Omega$ $V_{GS} = 5\text{ V}$  |      | 12   | 18   | ns   |
| $t_c$         | Cross-over Time       |                                            |      | 25   | 35   | ns   |

**SOURCE DRAIN DIODE**

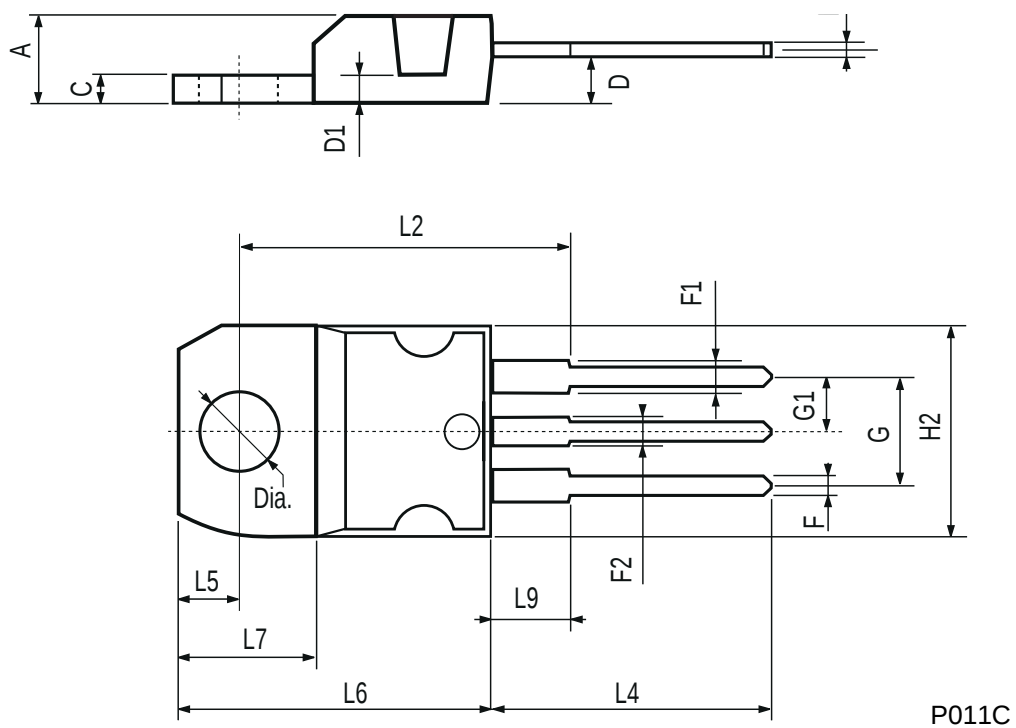
| Symbol             | Parameter                     | Test Conditions                                                                                                       | Min. | Typ. | Max. | Unit          |
|--------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $I_{SD}$           | Source-drain Current          |                                                                                                                       |      |      | 16   | A             |
| $I_{SDM}(\bullet)$ | Source-drain Current (pulsed) |                                                                                                                       |      |      | 64   | A             |
| $V_{SD} (*)$       | Forward On Voltage            | $I_{SD} = 16\text{ A}$ $V_{GS} = 0$                                                                                   |      |      | 1.5  | V             |
| $t_{rr}$           | Reverse Recovery Time         | $I_{SD} = 16\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$<br>$V_{DD} = 30\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ |      | 145  |      | ns            |
| $Q_{rr}$           | Reverse Recovery Charge       |                                                                                                                       |      | 580  |      | $\mu\text{C}$ |
| $I_{RRM}$          | Reverse Recovery Current      |                                                                                                                       |      | 8    |      | 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 |
| L9   | 3.5   |      | 3.93  | 0.137 |       | 0.154 |
| DIA. | 3.75  |      | 3.85  | 0.147 |       | 0.151 |



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