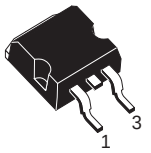
# STB30NE06L

## N-CHANNEL 60V - 0.35 Ω - 30A $D^2PAK$
## STripFET™ POWER MOSFET

| TYPE | $V_{DSS}$ | $R_{DS(on)}$ | $I_D$ |
|---|---|---|---|
| STB30NE06L | 60 V | <0.05 Ω | 30 A |

- TYPICAL $R_{DS}(on)$ = 0.035Ω
- 100% AVALANCHE TESTED
- LOW GATE CHARGE 100 $^oC$
- APPLICATION ORIENTED CHARACTERIZATION
- FOR THROUGH-HOLE VERSION CONTACT SALES OFFICE

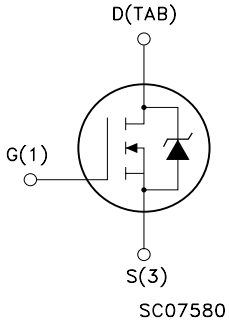



**$D^2PAK$**
**TO-263**
(suffix"T4")

### DESCRIPTION
This Power Mosfet is the latest development of STMicroelectronis 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
- DC MOTOR CONTROL
- DC-DC & DC-AC CONVERTERS

### INTERNAL SCHEMATIC DIAGRAM




### ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-source Voltage ($V_{GS}$ = 0) | 60 | V |
| $V_{DGR}$ | Drain-gate Voltage ($R_{GS}$ = 20 kΩ) | 60 | V |
| $V_{GS}$ | Gate- source Voltage | ±20 | V |
| $I_D$ | Drain Current (continuos) at $T_C$ = 25°C | 30 | A |
| $I_D$ | Drain Current (continuos) at $T_C$ = 100°C | 21 | A |
| $I_{DM}$(•) | Drain Current (pulsed) | 120 | A |
| $P_{tot}$ | Total Dissipation at $T_C$ = 25°C | 80 | W |
| | Derating Factor | 0.53 | W/°C |
| $T_{stg}$ | Storage Temperature | –60 to 175 | °C |
| $T_j$ | Max. Operating Junction Temperature | 175 | °C |

(•)Pulse width limited by safe operating area.

## THERMAL DATA

| | | | | |
|---|---|---|---|---|
| $R_{thj\text{-}case}$ | Thermal Resistance Junction-case | Max | 1.875 | °C/W |
| $R_{thj\text{-}amb}$ | Thermal Resistance Junction-ambient | Max | 62.5 | °C/W |
| $R_{thc\text{-}sink}$ | Thermal Resistance Case-sink | Typ | 0.5 | °C/W |
| $T_j$ | Maximum Lead Temperature For Soldering Purpose | | 300 | °C |

## AVALANCHE CHARACTERISTICS

| Symbol | Parameter | Max Value | Unit |
|---|---|---|---|
| $I_{AR}$ | Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by $T_j$ max) | 20 | A |
| $E_{AS}$ | Single Pulse Avalanche Energy (starting $T_j$ = 25 °C, $I_D = I_{AR}$, $V_{DD}$ = 50 V) | 100 | mJ |

## ELECTRICAL CHARACTERISTICS ($T_{case}$ = 25 °C unless otherwise specified)

OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-source Breakdown Voltage | $I_D$ = 25 µA, $V_{GS}$ = 0 | 60 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current ($V_{GS}$ = 0) | $V_{DS}$ = Max Rating<br>$V_{DS}$ = Max Rating, $T_C$ = 125 °C | | | 1<br>10 | µA<br>µA |
| $I_{GSS}$ | Gate-body Leakage Current ($V_{DS}$ = 0) | $V_{GS}$ = ±20 V | | | ±100 | nA |

ON (1)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}$ $I_D$ = 250 µA | 1 | 1.75 | 2.5 | V |
| $I_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS}$ = 5V $I_D$ = 15 A<br>$V_{GS}$ = 10V $I_D$ = 15 A | | 0.045<br>0.035 | 0.06<br>0.05 | Ω<br>Ω |
| $I_{D(on)}$ | On State Drain Current | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$<br>$V_{GS}$ = 10 V | 30 | | | A |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $g_{fs}$ (1) | Forward Transconductance | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$, $I_D$=15 A | 10 | 18 | | S |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 25V f = 1 MHz $V_{GS}$ = 0 | | 1350 | | pF |
| $C_{oss}$ | Output Capacitance | | | 195 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitances | | | 58 | | pF |

**ELECTRICAL CHARACTERISTICS** (continued)

SWITCHING ON

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(on)}$<br>$t_r$ | Turn-on Delay Time Rise Time | $V_{DD}$ = 30 V $I_D$ = 15 A<br>$R_G$ = 4.7 Ω $V_{GS}$ = 4.5 V<br>(see test circuit, Figure 3) | | 25<br>105 | | ns<br>ns |
| $Q_g$ | Total Gate Charge | $V_{DD}$=48 V $I_D$=30 A $V_{GS}$=5 V | | 20 | 28 | nC |
| $Q_{gs}$ | Gate-Source Charge | | | 8 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 10 | | nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(off)}$<br>$t_f$ | Turn-off Delay Time<br>Fall Time | $V_{DD}$ = 30 V $I_D$ = 15 A<br>$R_G$ = 4.7 Ω $V_{GS}$ = 4.5 V<br>(Resistive Load, see fig.3) | | 50<br>20 | | ns<br>ns |
| $t_{d(off)}$<br>$t_f$<br>$t_c$ | Off-voltage Rise Time<br>Fall Time<br>Cross-over Time | $V_{clamp}$ = 48 V $I_D$ = 30 A<br>$R_G$ = 4.7 Ω $V_{GS}$ = 4.5 V<br>(Inductive Load, see fig.5) | | 15<br>40<br>60 | | ns<br>ns<br>ns |

SOURCE DRAIN DIODE

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{SD}$ | Source-drain Current | | | | 30 | A |
| $I_{SDM}$ (•) | Source-drain Current (pulsed) | | | | 120 | A |
| $V_{SD}$ (*) | Forward On Voltage | $I_{SD}$ = 30 A $V_{GS}$ = 0 | | | 1.5 | V |
| $t_{rr}$<br>$Q_{rr}$<br>$I_{RRM}$ | Reverse Recovery Time<br>Reverse Recovery Charge<br>Reverse Recovery Current | $I_{SD}$ = 30 A di/dt = 100 A/µs<br>$V_{DD}$ = 30V $T_j$ = 150 °C<br>(see test circuit, Figure 3) | | 80<br>0.18<br>4.5 | | ns<br>µC<br>A |

(*)Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
(•)Pulse width limited by safe operating area.

**Fig. 1:** Unclamped Inductive Load Test Circuit

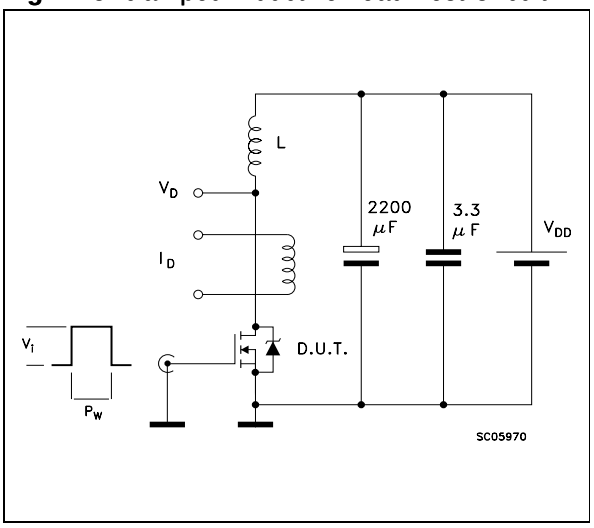



**Fig. 2:** Unclamped Inductive Waveform

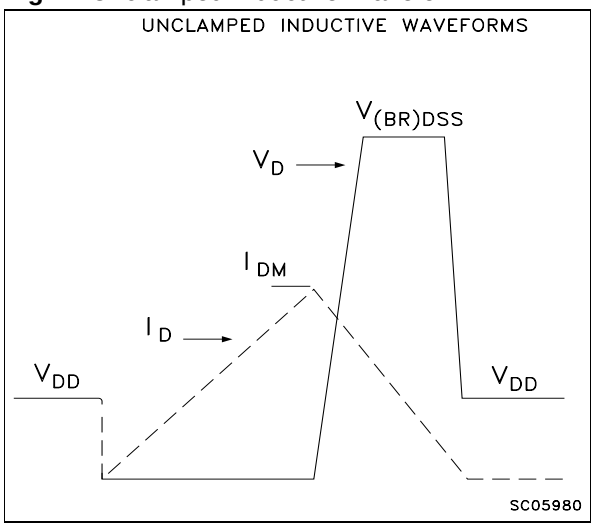



**Fig. 3:** Switching Times Test Circuits For Resistive Load

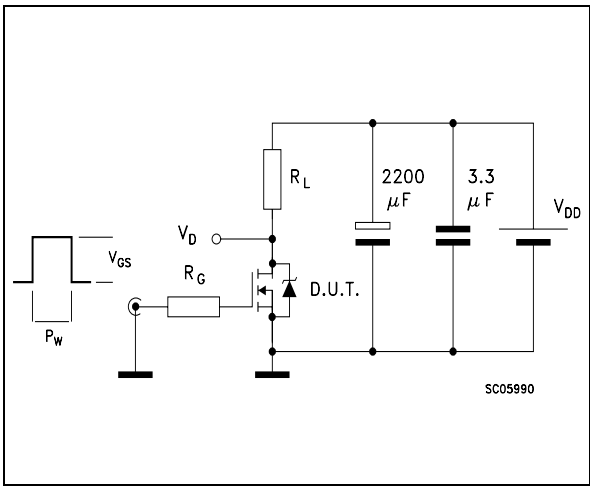



**Fig. 4:** Gate Charge test Circuit

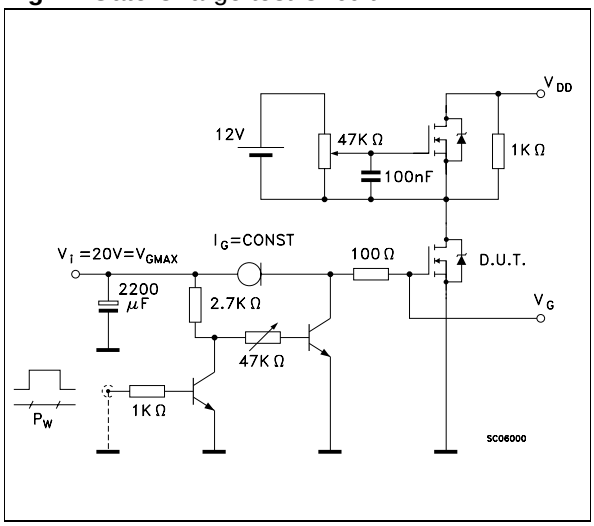
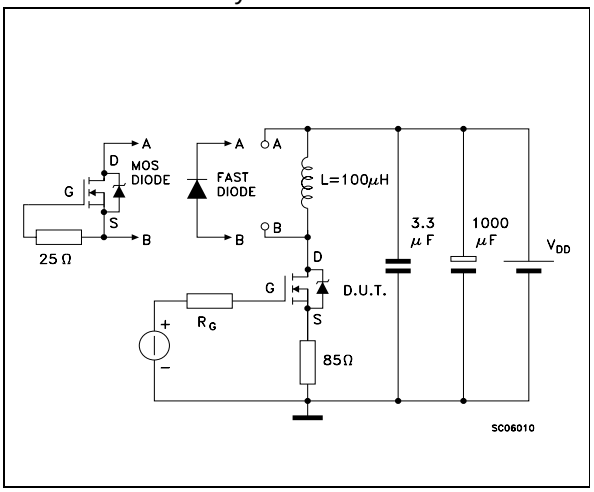



**Fig. 5:** Test Circuit For Inductive Load Switching And Diode Recovery Times



## D²PAK MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 4.4 | | 4.6 | 0.173 | | 0.181 |
| A1 | 2.49 | | 2.69 | 0.098 | | 0.106 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.7 | | 0.93 | 0.027 | | 0.036 |
| B2 | 1.14 | | 1.7 | 0.044 | | 0.067 |
| C | 0.45 | | 0.6 | 0.017 | | 0.023 |
| C2 | 1.23 | | 1.36 | 0.048 | | 0.053 |
| D | 8.95 | | 9.35 | 0.352 | | 0.368 |
| D1 | | 8 | | | 0.315 | |
| E | 10 | | 10.4 | 0.393 | | |
| E1 | | 8.5 | | | 0.334 | |
| G | 4.88 | | 5.28 | 0.192 | | 0.208 |
| L | 15 | | 15.85 | 0.590 | | 0.625 |
| L2 | 1.27 | | 1.4 | 0.050 | | 0.055 |
| L3 | 1.4 | | 1.75 | 0.055 | | 0.068 |
| M | 2.4 | | 3.2 | 0.094 | | 0.126 |
| R | | 0.4 | | | 0.015 | |
| V2 | 0º | | 8º | | | |