



# STD10NF06L

N-CHANNEL 60V - 0.1Ω - 10A DPAK

STripFET™ POWER MOSFET

PRELIMINARY DATA

| TYPE       | V <sub>DSS</sub> | R <sub>DS(on)</sub> | I <sub>D</sub> |
|------------|------------------|---------------------|----------------|
| STD10NF06L | 60V              | <0.12Ω              | 10A            |

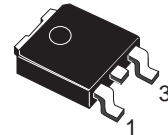
- TYPICAL R<sub>DS(on)</sub> = 0.1Ω
- SURFACE-MOUNTING DPAK (TO-252) POWER PACKAGE IN TAPE & REEL (SUFFIX "T4")

## DESCRIPTION

This MOSFET series realized with STMicroelectronics unique STripFET™ process has specifically been designed to minimize input capacitance and gate charge. It is therefore suitable as primary switch in advanced high-efficiency, high-frequency isolated DC-DC converters for Telecom and Computer applications. It is also intended for any applications with low gate drive requirements.

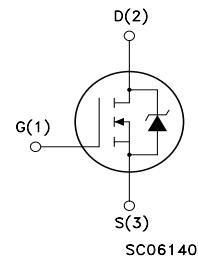
## APPLICATIONS

- DC-DC & DC-AC CONVERTERS
- DC MOTOR CONTROL



DPAK

## INTERNAL SCHEMATIC DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

| Symbol              | Parameter  | Value       | Unit |
|---------------------|--|-------------|------|
| V <sub>DS</sub>     | Drain-source Voltage (V <sub>GS</sub> = 0)           | 60          | V    |
| V <sub>DGR</sub>    | Drain-gate Voltage (R <sub>GS</sub> = 20 kΩ)         | 60          | V    |
| V <sub>GS</sub>     | Gate- source Voltage                                 | ± 15        | V    |
| I <sub>D</sub>      | Drain Current (continuous) at T <sub>C</sub> = 25°C  | 10          | A    |
| I <sub>D</sub>      | Drain Current (continuous) at T <sub>C</sub> = 100°C | 7           | A    |
| I <sub>DM</sub> (●) | Drain Current (pulsed)                               | 40          | A    |
| P <sub>TOT</sub>    | Total Dissipation at T <sub>C</sub> = 25°C           | 30          | W    |
|                     | Derating Factor                                      | 0.2         | W/°C |
| dv/dt (1)           | Peak Diode Recovery voltage slope                    | 30          | V/ns |
| E <sub>AS</sub> (2) | Single Pulse Avalanche Energy                        | 50          | mJ   |
| T <sub>stg</sub>    | Storage Temperature                                  | - 55 to 175 | °C   |
| T <sub>j</sub>      | Max. Operating Junction Temperature                  |             |      |

(●) Pulse width limited by safe operating area

(1) I<sub>SD</sub> ≤ 10A, di/dt ≤ 400A/μs, V<sub>DD</sub> = 48V, T<sub>j</sub> ≤ T<sub>JMAX</sub>.

(2) Starting T<sub>j</sub> = 25°C, I<sub>d</sub> = 7A, V<sub>DD</sub> = 20 V

## STD10NF06L

### THERMAL DATA

|                |  |     |      |
|----------------|--|-----|------|
| Rthj-case      | Thermal Resistance Junction-case Max           | 5   | °C/W |
| Rthj-amb       | Thermal Resistance Junction-ambient Max        | 100 | °C/W |
| T <sub>I</sub> | Maximum Lead Temperature For Soldering Purpose | 275 | °C   |

### ELECTRICAL CHARACTERISTICS (TCASE = 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  | 60   |      |         | 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> = ± 15V   |      |      | ±100    | nA       |

ON (1)

| 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> = 250µA                                 | 1    |             |              | V      |
| R <sub>DS(on)</sub> | Static Drain-source On Resistance | V <sub>GS</sub> = 10V, I <sub>D</sub> = 5 A<br>V <sub>GS</sub> = 5 V, I <sub>D</sub> = 5 A |      | 0.1<br>0.12 | 0.12<br>0.14 | Ω<br>Ω |

### DYNAMIC

| Symbol              | Parameter                    | Test Conditions                                       | Min. | Typ. | Max. | Unit |
|---------------------|------------------------------|---|------|------|------|------|
| g <sub>fs</sub> (1) | Forward Transconductance     | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 10A          |      | 6    |      | S    |
| C <sub>iss</sub>    | Input Capacitance            | V <sub>DS</sub> = 25V, f = 1 MHz, V <sub>GS</sub> = 0 |      | 346  |      | pF   |
| C <sub>oss</sub>    | Output Capacitance           |   |      | 54   |      | pF   |
| C <sub>rss</sub>    | Reverse Transfer Capacitance |   |      | 22   |      | pF   |

**ELECTRICAL CHARACTERISTICS (CONTINUED)****SWITCHING ON**

| Symbol      | Parameter          | Test Conditions   | Min. | Typ. | Max. | Unit |
|-------------|--------------------|---|------|------|------|------|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD} = 30V$ , $I_D = 5A$   |      | 10   |      | ns   |
| $t_r$       | Rise Time          | $R_G = 4.7\Omega$ , $V_{GS} = 4.5V$<br>(see test circuit, Figure 3) |      | 50   |      | ns   |
| $Q_g$       | Total Gate Charge  | $V_{DD} = 48V$ , $I_D = 10A$ ,<br>$V_{GS} = 5V$                     |      | 6    | 8    | nC   |
| $Q_{gs}$    | Gate-Source Charge |   |      | 3    |      | nC   |
| $Q_{gd}$    | Gate-Drain Charge  |   |      | 2.5  |      | nC   |

**SWITCHING OFF**

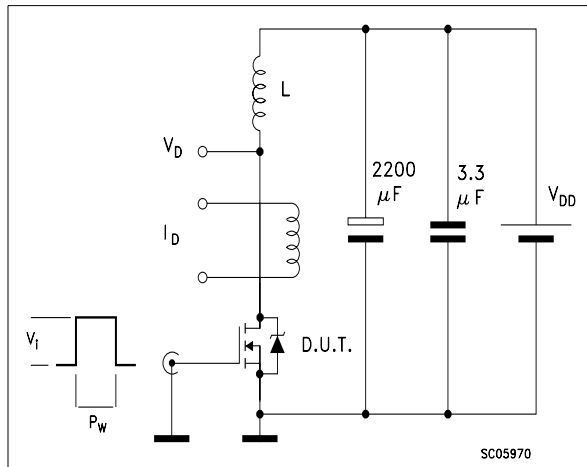
| Symbol       | Parameter           | Test Conditions  | Min. | Typ. | Max. | Unit |
|--------------|---------------------|--|------|------|------|------|
| $t_{d(off)}$ | Turn-off-Delay Time | $V_{DD} = 30V$ , $I_D = 5A$ ,<br>$R_G = 4.7\Omega$ , $V_{GS} = 4.5V$ |      | 20   |      | ns   |
| $t_f$        | Fall Time           | (see test circuit, Figure 5)   |      | 10   |      | ns   |

**SOURCE DRAIN DIODE**

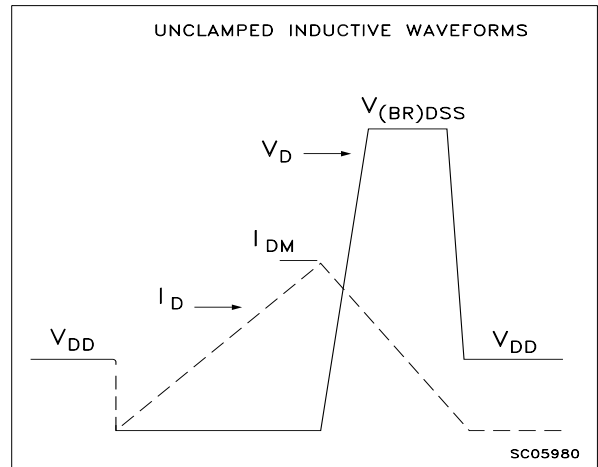
| Symbol        | Parameter                     | Test Conditions   | Min. | Typ. | Max. | Unit |
|---------------|-------------------------------|---|------|------|------|------|
| $I_{SD}$      | Source-drain Current          |   |      |      | 10   | A    |
| $I_{SDM} (2)$ | Source-drain Current (pulsed) |   |      |      | 40   | A    |
| $V_{SD} (1)$  | Forward On Voltage            | $I_{SD} = 10A$ , $V_{GS} = 0$   |      |      | 1.3  | V    |
| $t_{rr}$      | Reverse Recovery Time         | $I_{SD} = 10A$ , $di/dt = 100A/\mu s$ ,<br>$V_{DD} = 20V$ , $T_j = 150^\circ C$ |      | 30   |      | ns   |
| $Q_{rr}$      | Reverse Recovery Charge       | (see test circuit, Figure 5)  |      | 50   |      | nC   |
| $I_{RRM}$     | Reverse Recovery Current      |   |      | 3    |      | A    |

Note: 1. Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %.  
2. Pulse width limited by safe operating area.

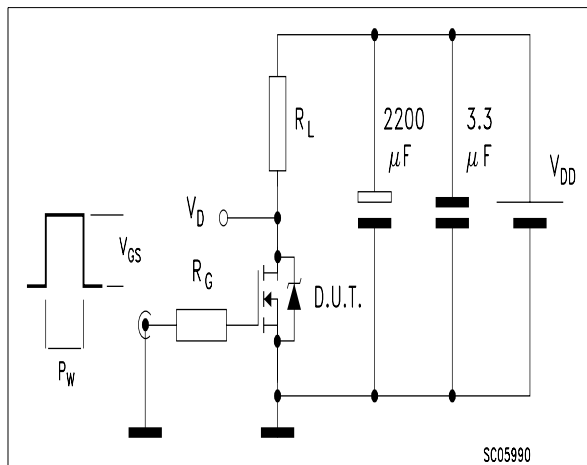
**Fig. 1: Unclamped Inductive Load Test Circuit**



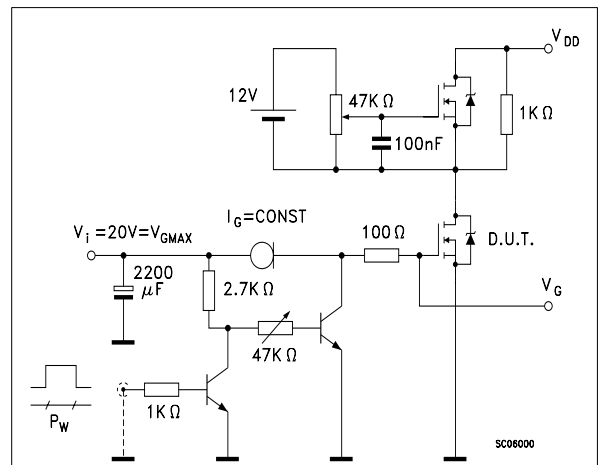
**Fig. 2: Unclamped Inductive Waveform**



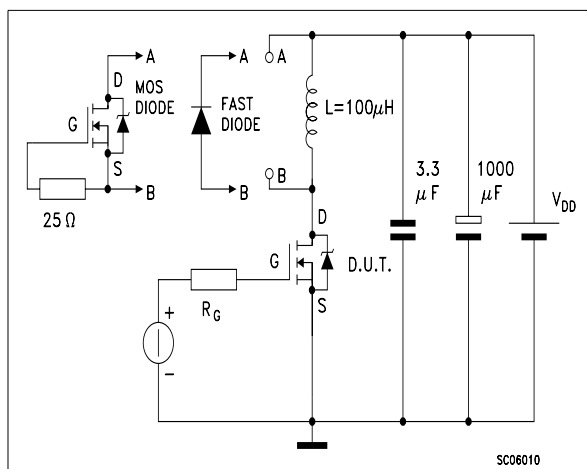
**Fig. 3: Switching Times Test Circuit For Resistive Load**



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

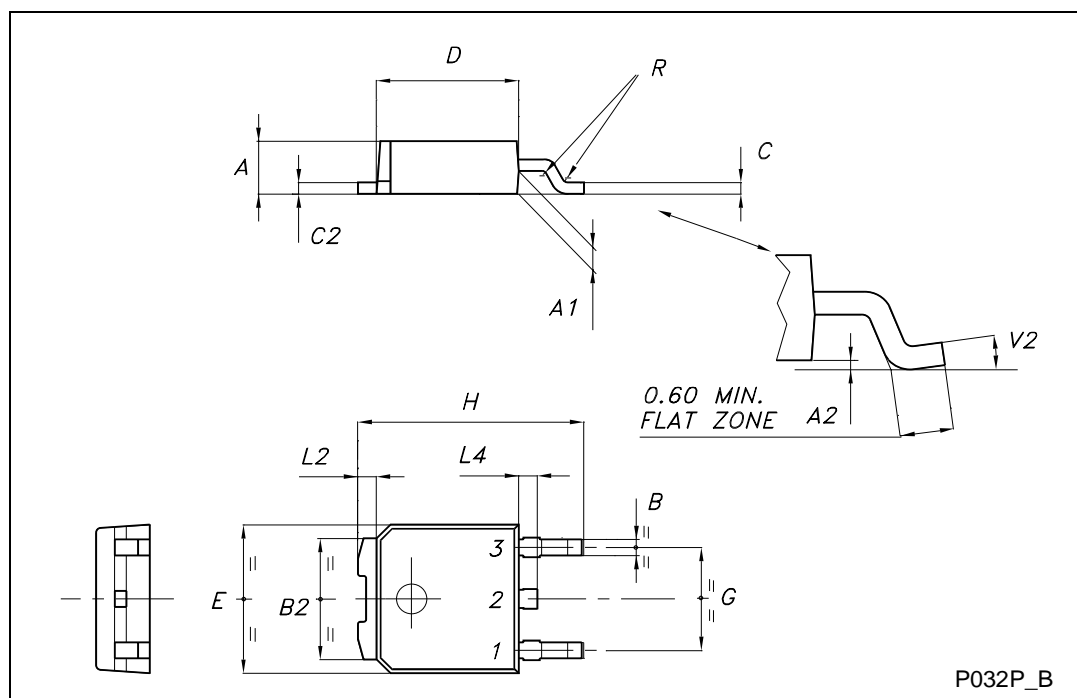


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



## TO-252 (DPAK) MECHANICAL DATA

| DIM. | mm   |      |       | inch  |       |       |
|------|------|------|-------|-------|-------|-------|
|      | MIN. | TYP. | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 2.20 |      | 2.40  | 0.087 |       | 0.094 |
| A1   | 0.90 |      | 1.10  | 0.035 |       | 0.043 |
| A2   | 0.03 |      | 0.23  | 0.001 |       | 0.009 |
| B    | 0.64 |      | 0.90  | 0.025 |       | 0.035 |
| B2   | 5.20 |      | 5.40  | 0.204 |       | 0.213 |
| C    | 0.45 |      | 0.60  | 0.018 |       | 0.024 |
| C2   | 0.48 |      | 0.60  | 0.019 |       | 0.024 |
| D    | 6.00 |      | 6.20  | 0.236 |       | 0.244 |
| E    | 6.40 |      | 6.60  | 0.252 |       | 0.260 |
| G    | 4.40 |      | 4.60  | 0.173 |       | 0.181 |
| H    | 9.35 |      | 10.10 | 0.368 |       | 0.398 |
| L2   |      | 0.8  |       |       | 0.031 |       |
| L4   | 0.60 |      | 1.00  | 0.024 |       | 0.039 |
| V2   | 0°   |      | 8°    | 0°    |       | 0°    |





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