



## STD17NF03L

N-CHANNEL 30V - 0.038Ω - 17A - DPAK/IPAK  
STripFET™ POWER MOSFET

| TYPE       | V <sub>DSS</sub> | R <sub>DS(on)</sub> | I <sub>D</sub> |
|------------|------------------|---------------------|----------------|
| STD17NF03L | 30V              | <0.05Ω              | 17A            |

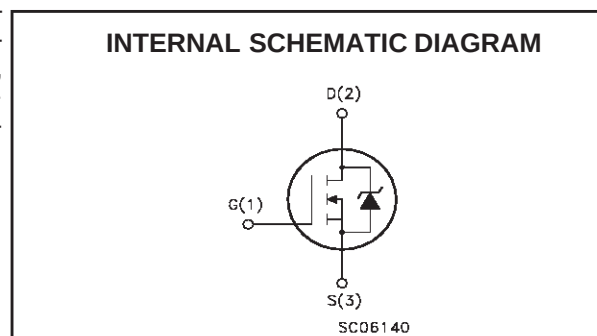
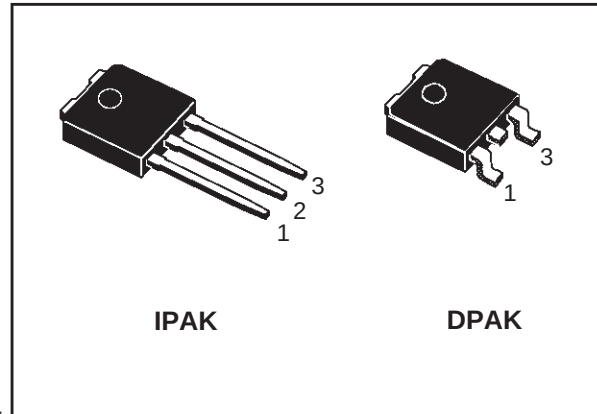
- TYPICAL R<sub>DS(on)</sub> = 0.038Ω
- EXCEPTIONAL dv/dt CAPABILITY
- APPLICATION ORIENTED CHARACTERIZATION
- ADD SUFFIX "T4" FOR ORDERING IN TAPE & REEL
- ADD SUFFIX "-1" FOR ORDERING IN IPAK VERSION

### DESCRIPTION

This Power Mosfet is the latest development of STMicroelectronics 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-DC & DC-AC CONVERTERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- SOLENOID AND RELAY DRIVERS
- AUTOMOTIVE ENVIRONMENT



### 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                                 | ±20        | V    |
| I <sub>D</sub>      | Drain Current (continuous) at T <sub>C</sub> = 25°C  | 17         | A    |
| I <sub>D</sub>      | Drain Current (continuous) at T <sub>C</sub> = 100°C | 12         | A    |
| I <sub>DM</sub> (●) | Drain Current (pulsed)                               | 68         | A    |
| P <sub>TOT</sub>    | Total Dissipation at T <sub>C</sub> = 25°C           | 20         | W    |
|                     | Derating Factor                                      | 0.13       | W/°C |
| dv/dt (1)           | Peak Diode Recovery voltage slope                    | 6          | V/ns |
| E <sub>AS</sub> (2) | Single Pulse Avalanche Energy                        | 200        | mJ   |
| 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> ≤ 17A, di/dt ≤ 300A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>j</sub> ≤ T<sub>JMAX</sub>.

(2) Starting T<sub>j</sub> = 25°C, I<sub>D</sub> = 11A, V<sub>DD</sub> = 15V

## STD17NF03L

### THERMAL DATA

|                |                                                |      |      |
|----------------|------------------------------------------------|------|------|
| Rthj-case      | Thermal Resistance Junction-case Max           | 7.5  | °C/W |
| Rthj-amb       | Thermal Resistance Junction-ambient Max        | 62.5 | °C/W |
| T <sub>l</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                                          | 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> = ±20V                                                                |      |      | ±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> = 8.5 A<br>V <sub>GS</sub> = 5 V, I <sub>D</sub> = 8.5 A |      | 0.038<br>0.045 | 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> = 10V       | 17   |                |              | A    |

### DYNAMIC

| Symbol              | Parameter                    | Test Conditions                                                                         | Min. | Typ. | Max. | Unit |
|---------------------|------------------------------|-----------------------------------------------------------------------------------------|------|------|------|------|
| g <sub>fs</sub> (1) | Forward Transconductance     | V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>DS(on)max</sub> ,<br>I <sub>D</sub> = 11A |      | 7    |      | S    |
| C <sub>iss</sub>    | Input Capacitance            | V <sub>DS</sub> = 25V, f = 1 MHz, V <sub>GS</sub> = 0                                   |      | 330  |      | pF   |
| C <sub>oss</sub>    | Output Capacitance           |                                                                                         |      | 90   |      | pF   |
| C <sub>rss</sub>    | Reverse Transfer Capacitance |                                                                                         |      | 40   |      | pF   |

## ELECTRICAL CHARACTERISTICS (CONTINUED)

## SWITCHING ON

| Symbol      | Parameter          | Test Conditions                                                  | Min. | Typ. | Max. | Unit |
|-------------|--------------------|------------------------------------------------------------------|------|------|------|------|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD} = 15V, I_D = 8.5A$                                       |      | 11   |      | ns   |
| $t_r$       | Rise Time          | $R_G = 4.7\Omega, V_{GS} = 4.5V$<br>(see test circuit, Figure 3) |      | 100  |      | ns   |
| $Q_g$       | Total Gate Charge  | $V_{DD} = 24V, I_D = 17A,$<br>$V_{GS} = 10V$                     |      | 6.5  | 9    | nC   |
| $Q_{gs}$    | Gate-Source Charge |                                                                  |      | 3.6  |      | nC   |
| $Q_{gd}$    | Gate-Drain Charge  |                                                                  |      | 2    |      | nC   |

## SWITCHING OFF

| Symbol       | Parameter             | Test Conditions                                                                                 | Min. | Typ. | Max. | Unit |
|--------------|-----------------------|-------------------------------------------------------------------------------------------------|------|------|------|------|
| $t_{d(off)}$ | Turn-off-Delay Time   | $V_{DD} = 15V, I_D = 8.5A,$<br>$R_G = 4.7\Omega, V_{GS} = 4.5V$<br>(see test circuit, Figure 3) |      | 25   |      | ns   |
| $t_f$        | Fall Time             |                                                                                                 |      | 22   |      | ns   |
| $t_{r(off)}$ | Off-voltage Rise Time | $V_{clamp} = 24V, I_D = 17A$<br>$R_G = 4.7\Omega, V_{GS} = 4.5V$                                |      | 22   |      | ns   |
| $t_f$        | Fall Time             | (see test circuit, Figure 5)                                                                    |      | 55   |      | ns   |
| $t_c$        | Cross-over Time       |                                                                                                 |      | 75   |      | ns   |

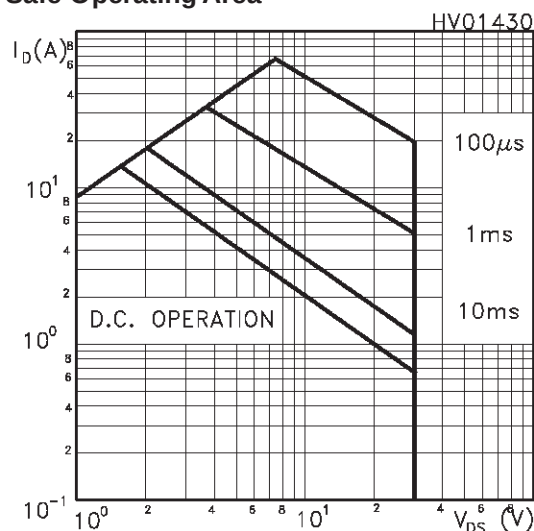
## SOURCE DRAIN DIODE

| Symbol        | Parameter                     | Test Conditions                                                                                          | Min. | Typ. | Max. | Unit |
|---------------|-------------------------------|----------------------------------------------------------------------------------------------------------|------|------|------|------|
| $I_{SD}$      | Source-drain Current          |                                                                                                          |      |      | 17   | A    |
| $I_{SDM} (1)$ | Source-drain Current (pulsed) |                                                                                                          |      |      | 68   | A    |
| $V_{SD} (2)$  | Forward On Voltage            | $I_{SD} = 17A, V_{GS} = 0$                                                                               |      |      | 1.5  | V    |
| $t_{rr}$      | Reverse Recovery Time         | $I_{SD} = 17A, di/dt = 100A/\mu s,$<br>$V_{DD} = 15V, T_J = 150^\circ C$<br>(see test circuit, Figure 5) |      | 30   |      | ns   |
| $Q_{rr}$      | Reverse Recovery Charge       |                                                                                                          |      | 18   |      | nC   |
| $I_{RRM}$     | Reverse Recovery Current      |                                                                                                          |      | 1.2  |      | A    |

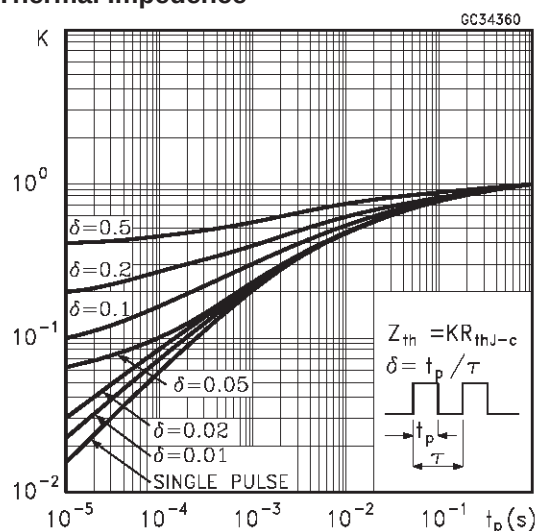
Note: 1. Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %.

2. Pulse width limited by safe operating area.

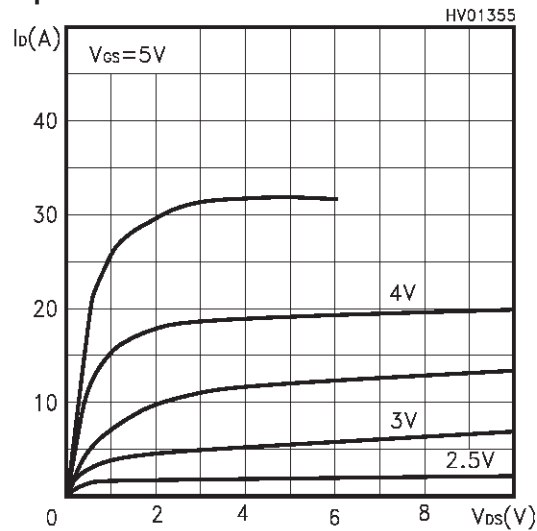
## Safe Operating Area



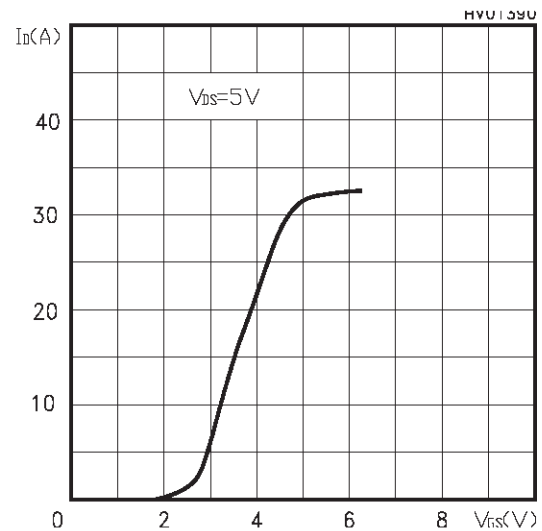
## Thermal Impedance



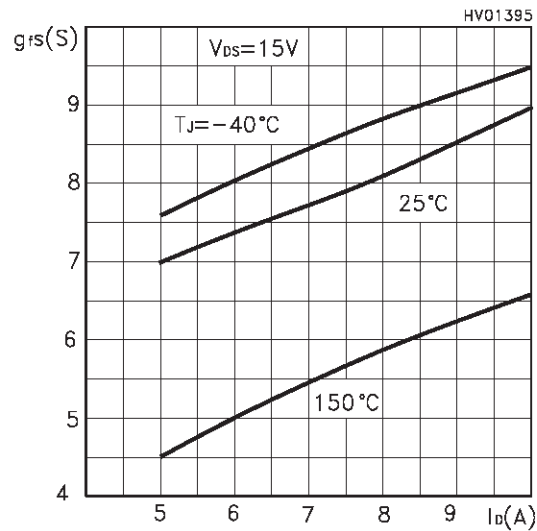
Output Characteristics



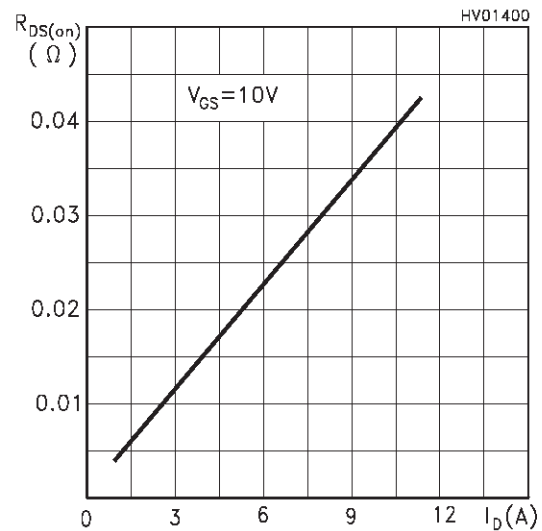
Transfer Characteristics



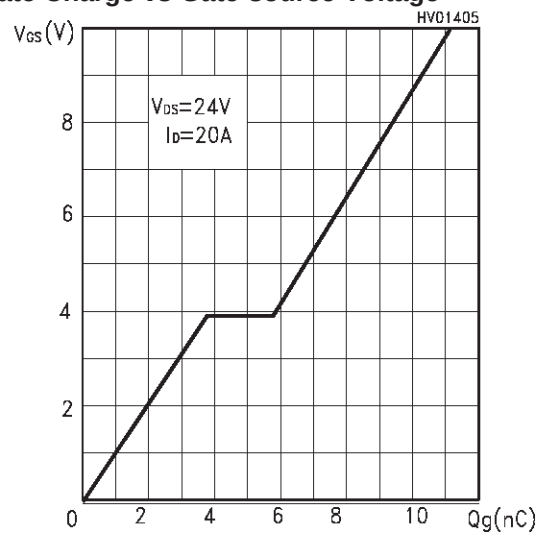
Transconductance



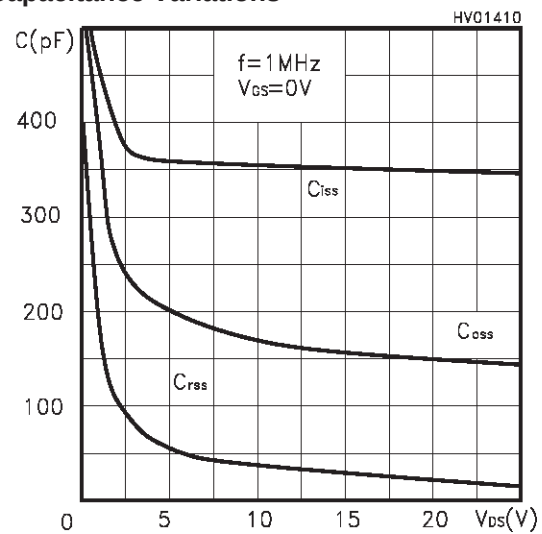
Static Drain-source On Resistance



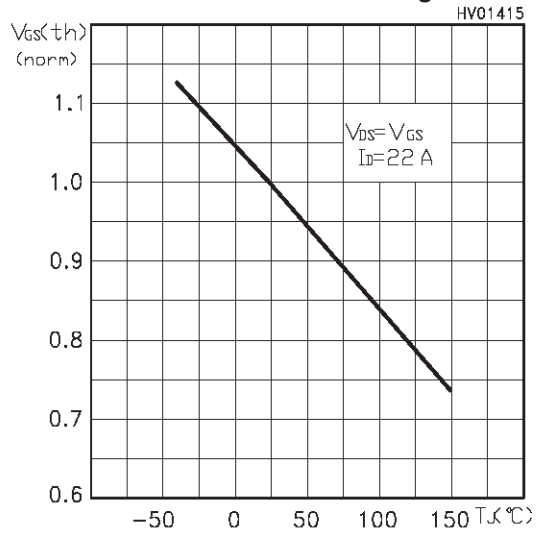
Gate Charge vs Gate-source Voltage



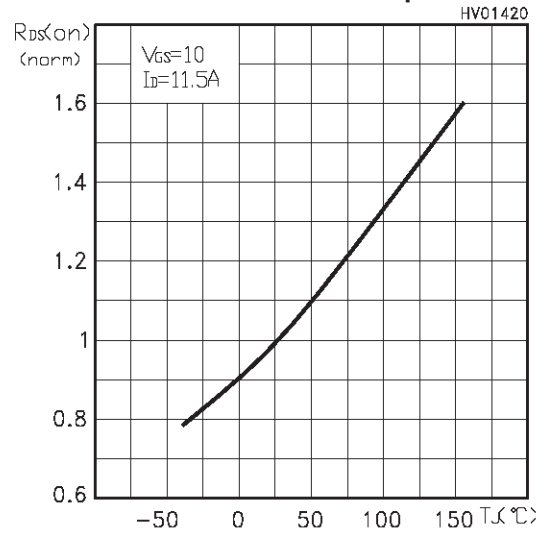
Capacitance Variations



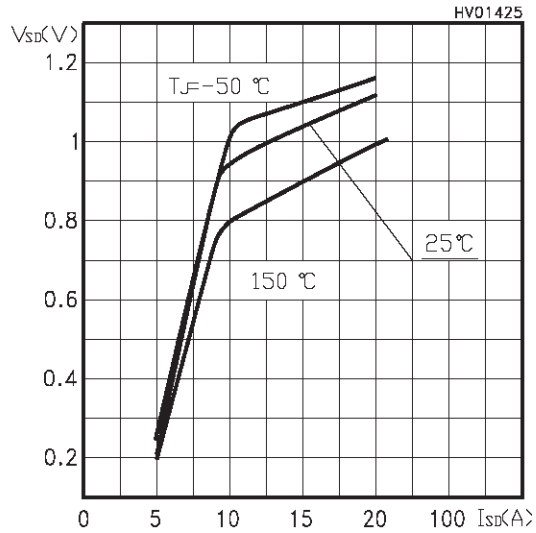
Normalized Gate Threshold Voltage vs Temp.



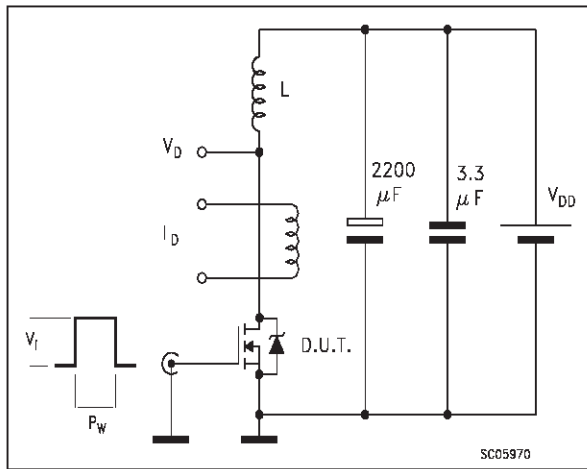
Normalized On Resistance vs Temperature



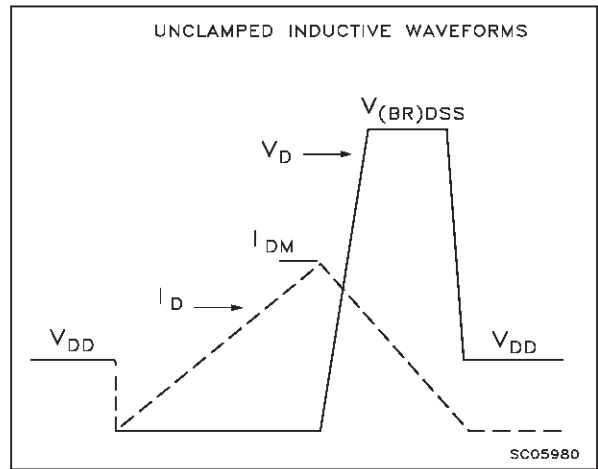
Source-drain Diode Forward Characteristics



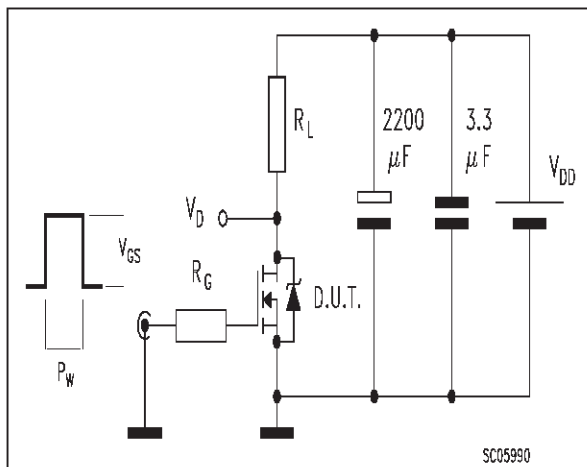
**Fig. 1: Unclamped Inductive Load Test Circuit**



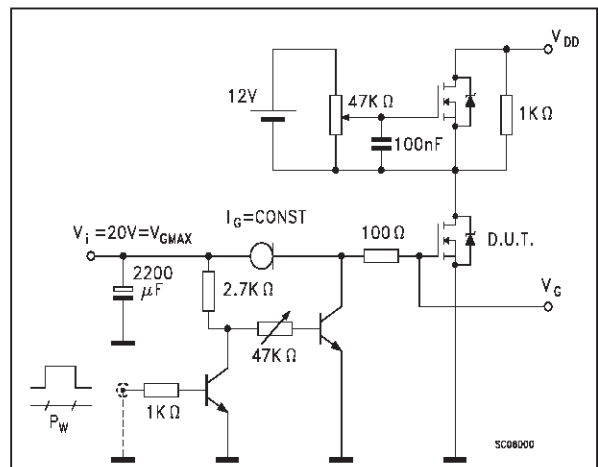
**Fig. 2: Unclamped Inductive Waveform**



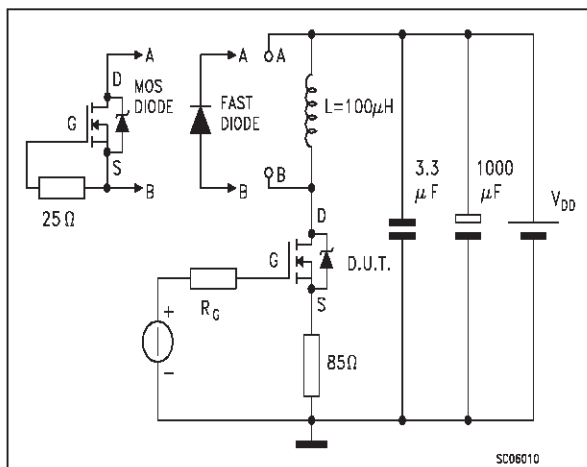
**Fig. 3: Switching Times Test Circuit For Resistive Load**



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

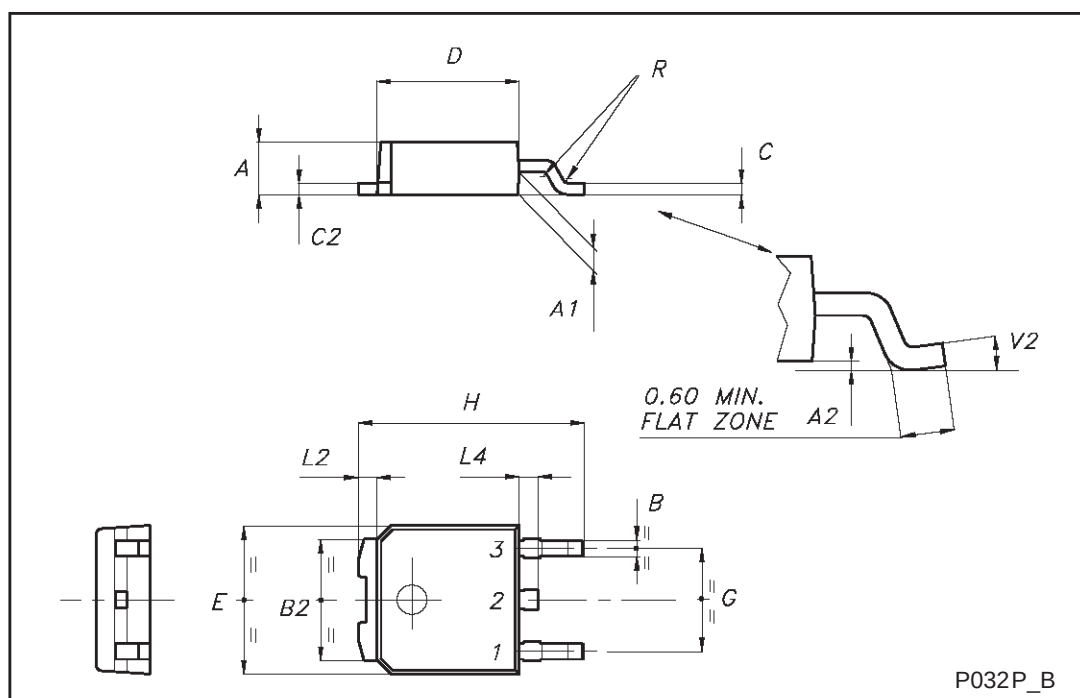


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



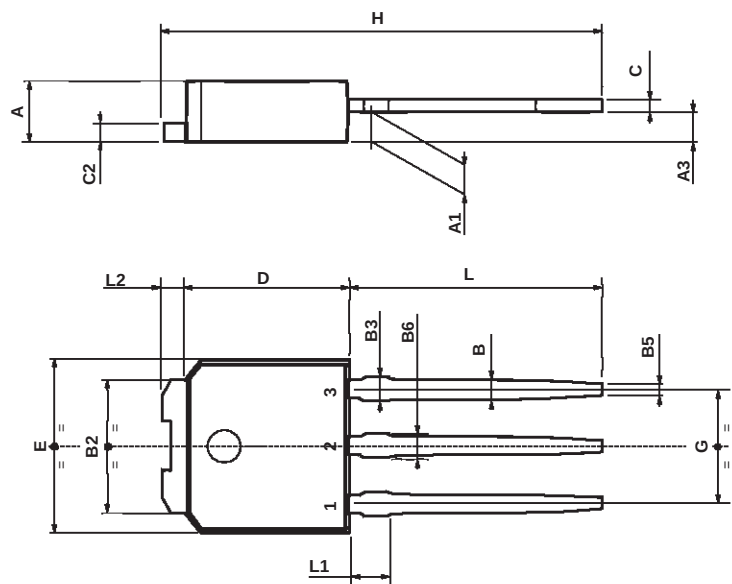
## TO-252 (DPAK) MECHANICAL DATA

| 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°    |



TO-251 (IPAK) MECHANICAL DATA

| DIM. | mm   |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    | 2.2  |      | 2.4  | 0.086 |       | 0.094 |
| A1   | 0.9  |      | 1.1  | 0.035 |       | 0.043 |
| A3   | 0.7  |      | 1.3  | 0.027 |       | 0.051 |
| B    | 0.64 |      | 0.9  | 0.025 |       | 0.031 |
| B2   | 5.2  |      | 5.4  | 0.204 |       | 0.212 |
| B3   |      |      | 0.85 |       |       | 0.033 |
| B5   |      | 0.3  |      |       | 0.012 |       |
| B6   |      |      | 0.95 |       |       | 0.037 |
| C    | 0.45 |      | 0.6  | 0.017 |       | 0.023 |
| C2   | 0.48 |      | 0.6  | 0.019 |       | 0.023 |
| D    | 6    |      | 6.2  | 0.236 |       | 0.244 |
| E    | 6.4  |      | 6.6  | 0.252 |       | 0.260 |
| G    | 4.4  |      | 4.6  | 0.173 |       | 0.181 |
| H    | 15.9 |      | 16.3 | 0.626 |       | 0.641 |
| L    | 9    |      | 9.4  | 0.354 |       | 0.370 |
| L1   | 0.8  |      | 1.2  | 0.031 |       | 0.047 |
| L2   |      | 0.8  | 1    |       | 0.031 | 0.039 |



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