



# STD100NH03L

N-CHANNEL 30V - 0.005  $\Omega$  - 60A DPAK  
STripFET™ III POWER MOSFET

| TYPE        | V <sub>DSS</sub> | R <sub>DS(on)</sub> | I <sub>D</sub> |
|-------------|------------------|---------------------|----------------|
| STD100NH03L | 30 V             | < 0.0055 $\Omega$   | 60 A(2)        |

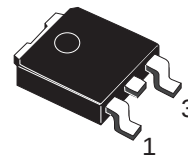
- TYPICAL R<sub>DS(on)</sub> = 0.005  $\Omega$  @ 10 V
- R<sub>DS(on)</sub> \* Q<sub>g</sub> INDUSTRY'S BENCHMARK
- CONDUCTION LOSSES REDUCED
- SWITCHING LOSSES REDUCED
- LOW THRESHOLD DEVICE
- SURFACE-MOUNTING DPAK (TO-252)  
POWER PACKAGE IN TAPE & REEL  
(SUFFIX "T4")

## DESCRIPTION

The **STD100NH03L** utilizes the latest advanced design rules of ST's proprietary STripFET™ technology. This is suitable for the most demanding DC-DC converter application where high efficiency is to be achieved.

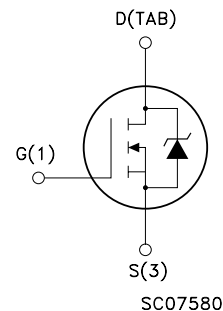
## APPLICATIONS

- SPECIFICALLY DESIGNED AND OPTIMISED FOR HIGH EFFICIENCY DC/DC CONVERTERS



**DPAK  
TO-252**  
(Suffix "T4")

## INTERNAL SCHEMATIC DIAGRAM



## Ordering Information

| SALES TYPE    | MARKING   | PACKAGE | PACKAGING   |
|---------------|-----------|---------|-------------|
| STD100NH03LT4 | D100NH03L | TO-252  | TAPE & REEL |

## 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 k $\Omega$ ) | 30         | V    |
| V <sub>GS</sub>     | Gate- source Voltage                                  | ± 20       | V    |
| I <sub>D</sub> (2)  | Drain Current (continuous) at T <sub>C</sub> = 25°C   | 60         | A    |
| I <sub>D</sub> (2)  | Drain Current (continuous) at T <sub>C</sub> = 100°C  | 60         | A    |
| I <sub>DM</sub> (3) | Drain Current (pulsed)                                | 240        | A    |
| P <sub>tot</sub>    | Total Dissipation at T <sub>C</sub> = 25°C            | 100        | W    |
|                     | Derating Factor                                       | 0.66       | W/°C |
| E <sub>AS</sub> (4) | Single Pulse Avalanche Energy                         | 700        | mJ   |
| T <sub>stg</sub>    | Storage Temperature                                   | -55 to 175 | °C   |
| T <sub>j</sub>      | Max. Operating Junction Temperature                   |            |      |

## STD100NH03L

### THERMAL DATA

|                       |                                                |     |     |      |
|-----------------------|------------------------------------------------|-----|-----|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case               | Max | 1.5 | °C/W |
| R <sub>thj-amb</sub>  | Thermal Resistance Junction-ambient            | Max | 100 | °C/W |
| R <sub>thj-pcb</sub>  | Thermal Resistance Junction-pcb(§)             | Max | 43  | °C/W |
| T <sub>I</sub>        | Maximum Lead Temperature For Soldering Purpose |     | 275 | °C   |

(§) When Mounted on 1 inch<sup>2</sup> FR-4 board, 2 oz of Cu.

### 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> = ± 20V                                                             |      |      | ±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    | 1.8             | 2.5              | V      |
| R <sub>DS(on)</sub> | Static Drain-source On Resistance | V <sub>GS</sub> = 10 V I <sub>D</sub> = 30 A<br>V <sub>GS</sub> = 5 V I <sub>D</sub> = 30 A |      | 0.005<br>0.0060 | 0.0055<br>0.0105 | Ω<br>Ω |

#### DYNAMIC

| Symbol                                                   | Parameter                                                               | Test Conditions                                                       | Min. | Typ.              | Max. | Unit           |
|----------------------------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------|------|-------------------|------|----------------|
| g <sub>fs</sub> (5)                                      | Forward Transconductance                                                | V <sub>DS</sub> = 10 V I <sub>D</sub> = 30 A                          |      | 40                |      | 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> = 15V f = 1 MHz V <sub>GS</sub> = 0                   |      | 4100<br>680<br>70 |      | pF<br>pF<br>pF |
| R <sub>G</sub>                                           | Gate Input Resistance                                                   | f = 1 MHz Gate DC Bias = 0<br>Test Signal Level = 20 mV<br>Open Drain |      | 1.3               |      | Ω              |

## STD100NH03L

### ELECTRICAL CHARACTERISTICS (continued)

#### SWITCHING ON

| Symbol                        | Parameter                                                    | Test Conditions                                                                                                        | Min. | Typ.              | Max. | Unit           |
|-------------------------------|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|------|-------------------|------|----------------|
| $t_{d(on)}$<br>$t_r$          | Turn-on Delay Time<br>Rise Time                              | $V_{DD} = 15\text{ V}$ $I_D = 30\text{ A}$<br>$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$<br>(Resistive Load, Figure 3) |      | 16<br>95          |      | ns<br>ns       |
| $Q_g$<br>$Q_{gs}$<br>$Q_{gd}$ | Total Gate Charge Source<br>Gate Charge<br>Gate-Drain Charge | $V_{DD} = 15\text{ V}$ $I_D = 60\text{ A}$ $V_{GS} = 10\text{ V}$                                                      |      | 57<br>11.8<br>7.3 | 77   | nC<br>nC<br>nC |
| $Q_{oss}^{(6)}$               | Output Charge                                                | $V_{DS} = 16\text{ V}$ $V_{GS} = 0\text{ V}$                                                                           |      | 27                |      | nC             |
| $Q_{gls}^{(7)}$               | Third-quadrant Gate Charge                                   | $V_{DS} < 0\text{ V}$ $V_{GS} = 10\text{ V}$                                                                           |      | 55                |      | nC             |

#### SWITCHING OFF

| Symbol                | Parameter                        | Test Conditions                                                                                                          | Min. | Typ.     | Max. | Unit     |
|-----------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------|------|----------|------|----------|
| $t_{d(off)}$<br>$t_f$ | Turn-off Delay Time<br>Fall Time | $V_{DD} = 15\text{ V}$ $I_D = 30\text{ A}$<br>$R_G = 4.7\ \Omega$ , $V_{GS} = 10\text{ V}$<br>(Resistive Load, Figure 3) |      | 48<br>23 |      | ns<br>ns |

#### SOURCE DRAIN DIODE

| Symbol                            | Parameter                                                                    | Test Conditions                                                                                                                               | Min. | Typ.            | Max.      | Unit          |
|-----------------------------------|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------|-----------|---------------|
| $I_{SD}$<br>$I_{SDM}$             | Source-drain Current<br>Source-drain Current (pulsed)                        |                                                                                                                                               |      |                 | 60<br>240 | A<br>A        |
| $V_{SD}^{(5)}$                    | Forward On Voltage                                                           | $I_{SD} = 30\text{ A}$ $V_{GS} = 0$                                                                                                           |      |                 | 1.4       | V             |
| $t_{rr}$<br>$Q_{rr}$<br>$I_{RRM}$ | Reverse Recovery Time<br>Reverse Recovery Charge<br>Reverse Recovery Current | $I_{SD} = 60\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$<br>$V_{DD} = 30\text{ V}$ $T_J = 150^\circ\text{C}$<br>(see test circuit, Figure 5) |      | 46<br>64<br>2.8 | 62<br>86  | ns<br>nC<br>A |

(2) Value limited by wire bonding

(3) Pulse width limited by safe operating area.

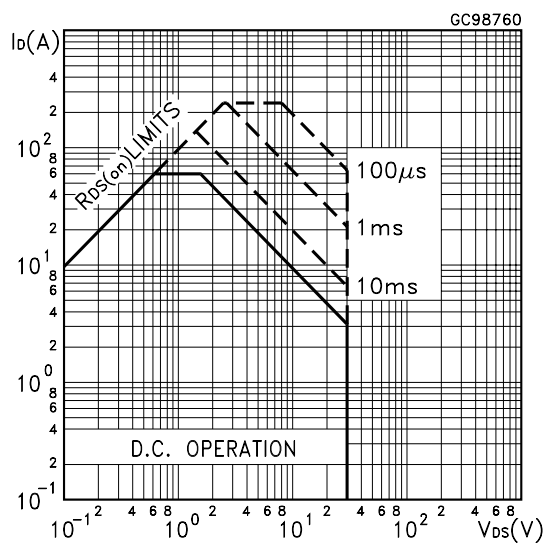
(4) Starting  $T_J = 25^\circ\text{C}$ ,  $I_D = 30\text{ A}$ ,  $V_{DD} = 15\text{ V}$

(5) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.

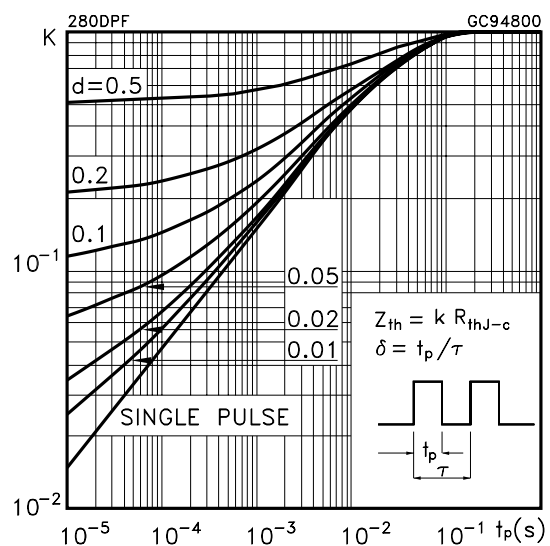
(6)  $Q_{oss} = C_{oss} \cdot \Delta V_{in}$ ,  $C_{oss} = C_{gd} + C_{ds}$ . See Appendix A

(7) Gate charge for synchronous operation

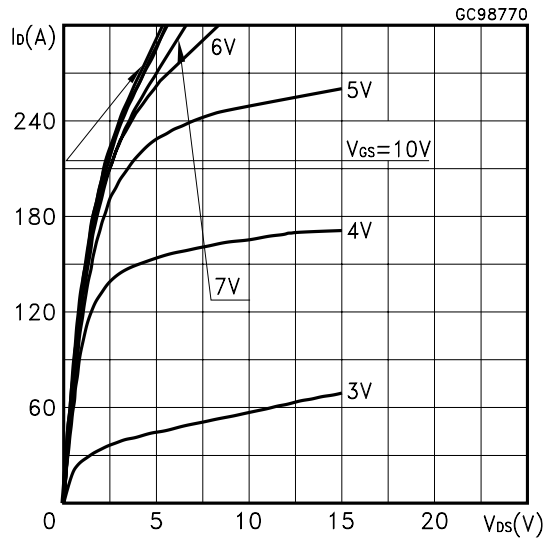
#### Safe Operating Area



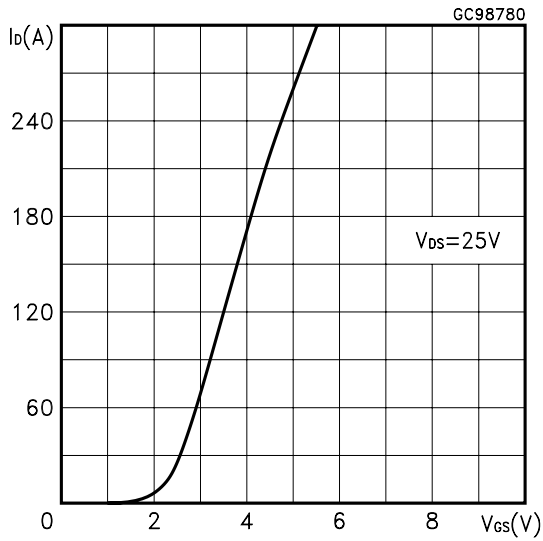
#### Thermal Impedance



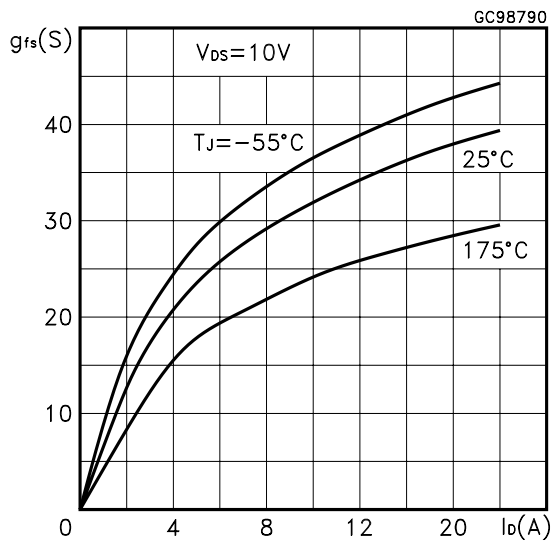
Output Characteristics



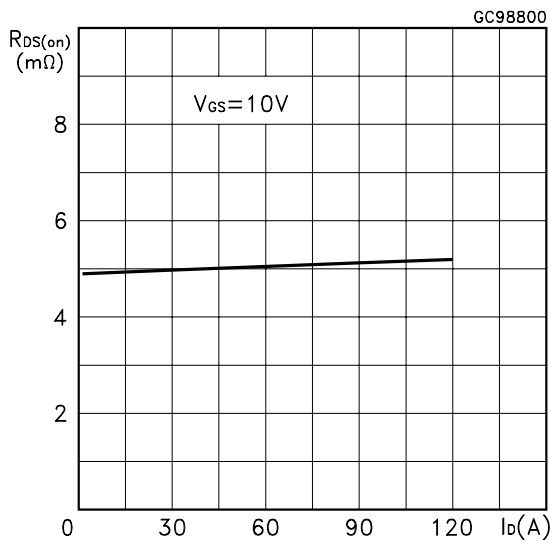
Transfer Characteristics



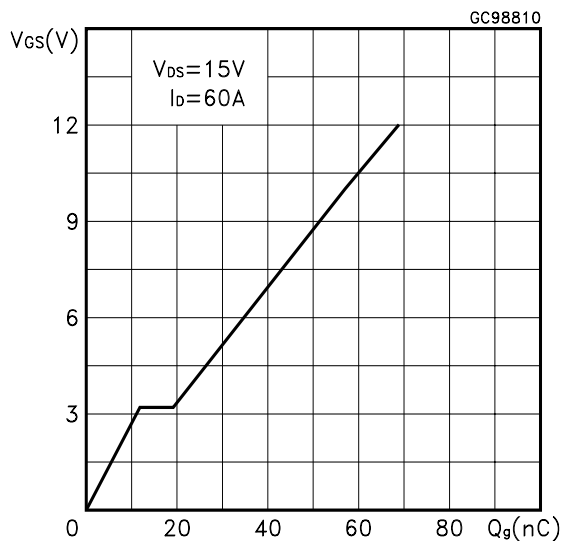
Transconductance



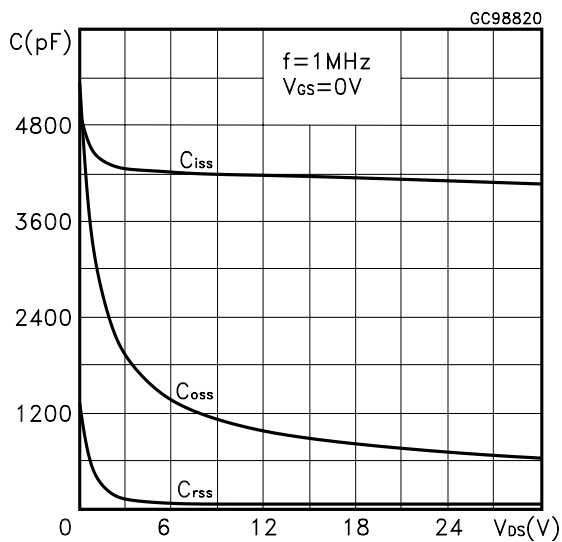
Static Drain-source On Resistance



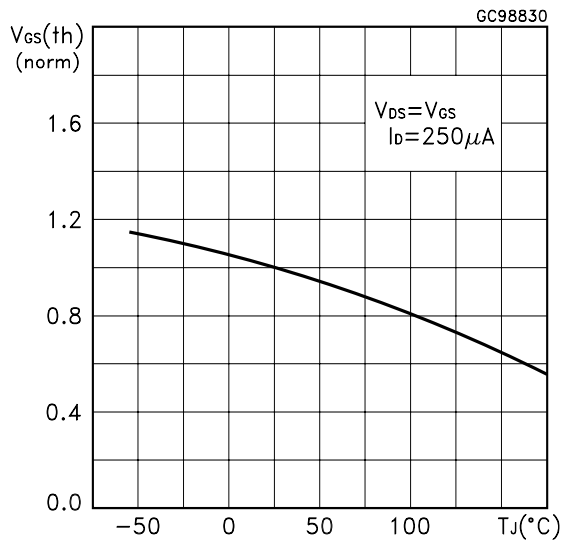
Gate Charge vs Gate-source Voltage



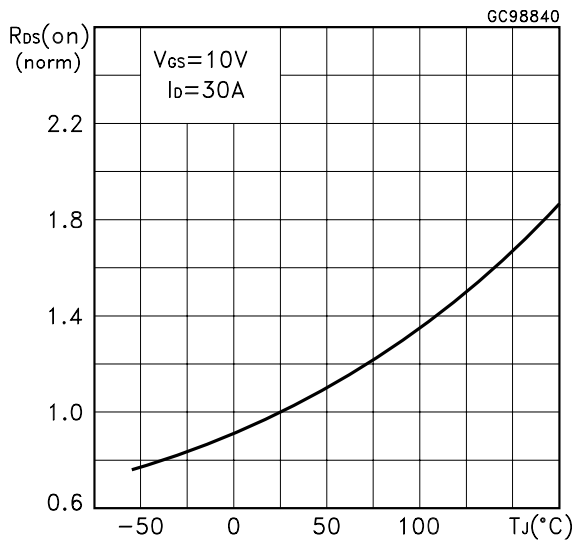
Capacitance Variations



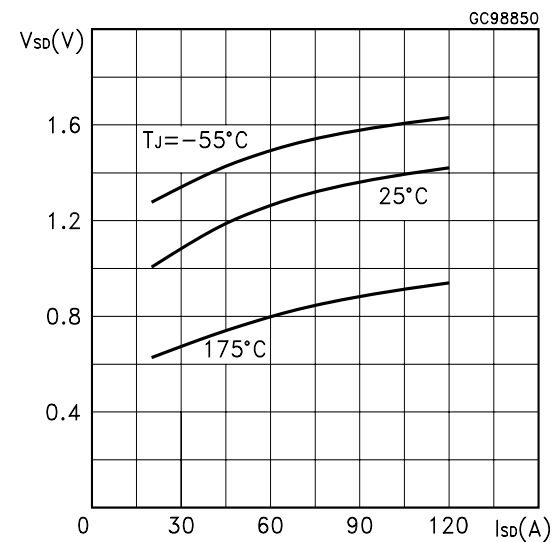
Normalized Gate Threshold Voltage vs Temperature



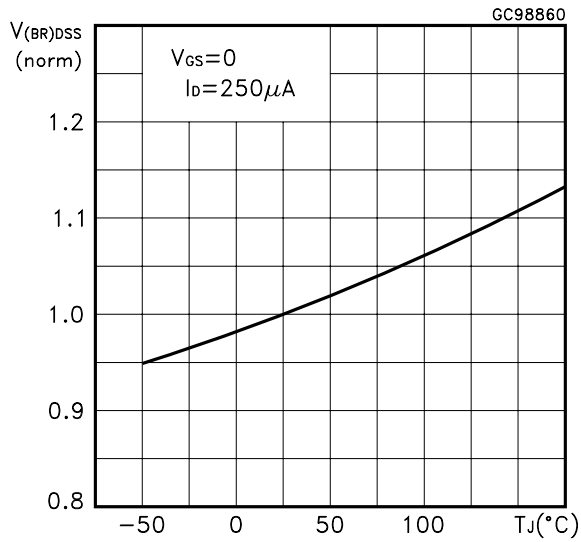
Normalized on Resistance vs Temperature



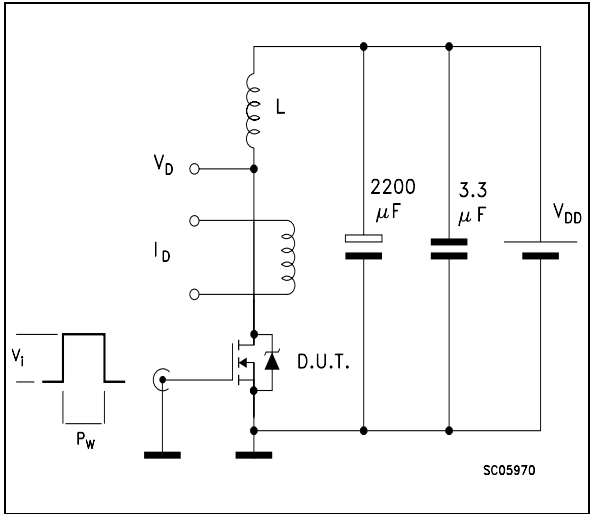
Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature



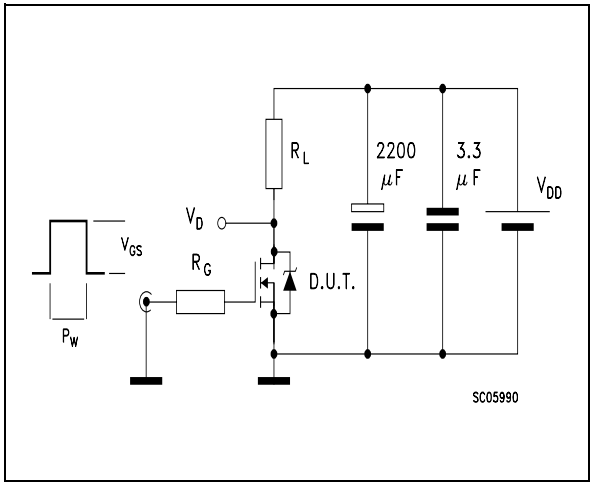
**Fig. 1: Unclamped Inductive Load Test Circuit**



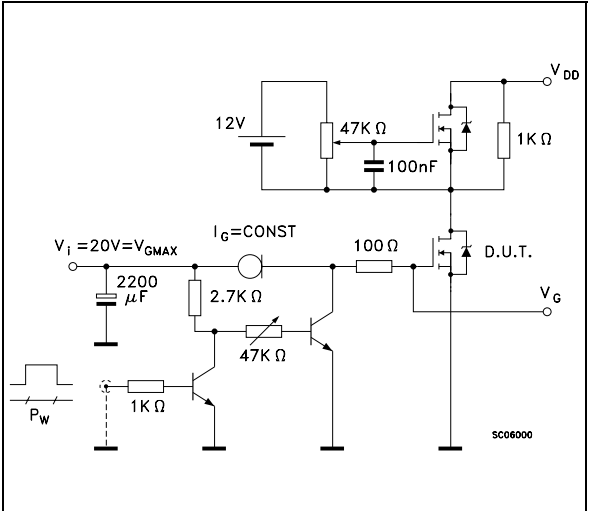
**Fig. 2: Unclamped Inductive Waveform**



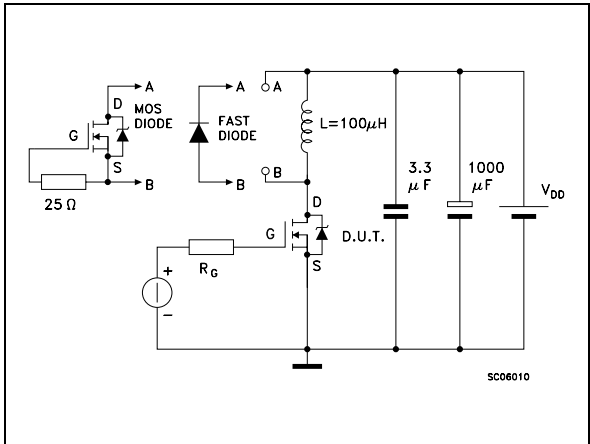
**Fig. 3: Switching Times Test Circuits For Resistive Load**



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

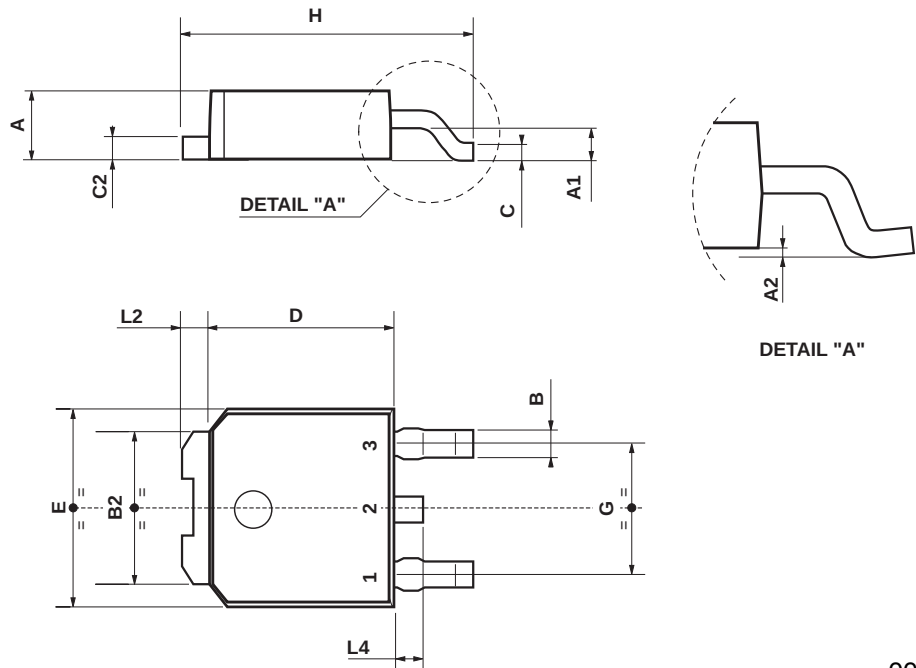


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



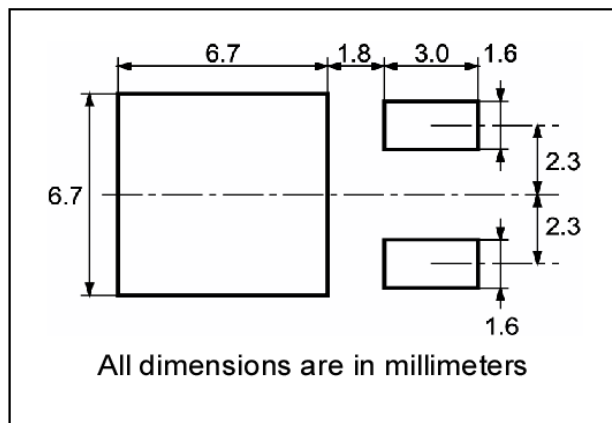
TO-252 (DPAK) MECHANICAL DATA

| 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 |
| A2   | 0.03 |      | 0.23 | 0.001 |       | 0.009 |
| B    | 0.64 |      | 0.9  | 0.025 |       | 0.035 |
| B2   | 5.2  |      | 5.4  | 0.204 |       | 0.212 |
| 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    | 9.35 |      | 10.1 | 0.368 |       | 0.397 |
| L2   |      | 0.8  |      |       | 0.031 |       |
| L4   | 0.6  |      | 1    | 0.023 |       | 0.039 |

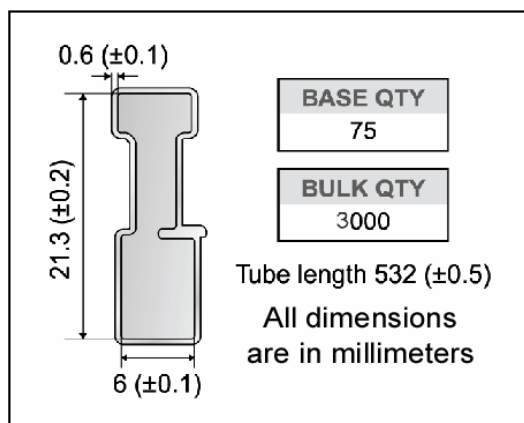


0068772-B

## DPAK FOOTPRINT



## TUBE SHIPMENT (no suffix)\*



## TAPE AND REEL SHIPMENT (suffix "T4")\*

