



STD35NF06L

N-CHANNEL 60V - 0.014 Ω - 35A DPAK STripFET™ II POWER MOSFET

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|------------|------------------|---------------------|----------------|
| STD35NF06L | 60 V | < 0.017 Ω | 35 A |

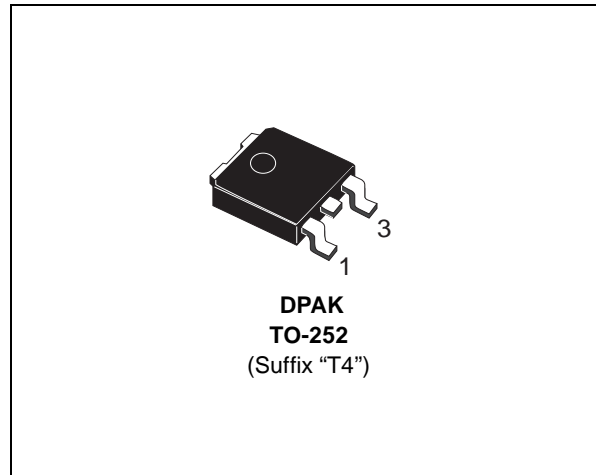
- TYPICAL R_{DS(on)} = 0.014 Ω
- LOW THRESHOLD DRIVE
- GATE CHARGE MINIMIZED
- SURFACE-MOUNTING DPAK (TO-252)
POWER PACKAGE IN TAPE & REEL
(SUFFIX "T4")

DESCRIPTION

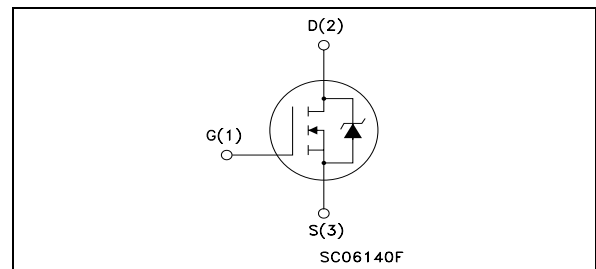
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS

- DC-AC CONVERTERS
- AUTOMOTIVE SWITCHING APPLICATION



INTERNAL SCHEMATIC DIAGRAM



Ordering Information

| SALES TYPE | MARKING | PACKAGE | PACKAGING |
|--------------|----------|---------|-------------|
| STD35NF06LT4 | D35NF06L | TO-252 | TAPE & REEL |

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 | ± 16 | V |
| I _D | Drain Current (continuous) at T _C = 25°C | 35 | A |
| I _D | Drain Current (continuous) at T _C = 100°C | 24.5 | A |
| I _{DM} (●) | Drain Current (pulsed) | 140 | A |
| P _{tot} | Total Dissipation at T _C = 25°C | 80 | W |
| | Derating Factor | 0.67 | W/°C |
| dv/dt (1) | Peak Diode Recovery voltage slope | 5 | V/ns |
| E _{AS} (2) | Single Pulse Avalanche Energy | 280 | mJ |
| T _{stg} | Storage Temperature | -55 to 175 | °C |
| T _j | Operating Junction Temperature | | |

(●) Pulse width limited by safe operating area.

(1) I_{SD} ≤ 35A, di/dt ≤ 100A/μs, V_{DD} ≤ V(BR)DSS, T_j ≤ T_{JMAX}
 (2) Starting T_j = 25 °C, I_D = 30A, V_{DD} = 30V

THERMAL DATA

| | | | | |
|----------------|--|-----|------|------|
| Rthj-case | Thermal Resistance Junction-case | Max | 1.88 | °C/W |
| Rthj-amb | Thermal Resistance Junction-ambient | Max | 100 | °C/W |
| T _l | Maximum Lead Temperature For Soldering Purpose (1.6 mm from case, for 10 sec) | Max | 275 | °C |

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 = 250 μA, V _{GS} = 0 | 60 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current (V _{GS} = 0) | V _{DS} = Max Rating V _{DS} = Max Rating T _C = 125°C | | | 1 10 | μA μA |
| I _{GSS} | Gate-body Leakage Current (V _{DS} = 0) | V _{GS} = ± 16V | | | ±100 | nA |

ON (*)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|-----------------------------------|---|------|----------------|----------------|--------|
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} = V _{GS} I _D = 250 μA | 1 | | | V |
| R _{DS(on)} | Static Drain-source On Resistance | V _{GS} = 10 V I _D = 17.5 A V _{GS} = 4.5 V I _D = 17.5 A | | 0.014 0.016 | 0.017 0.020 | Ω Ω |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--|---|---|------|--------------------|------|----------------|
| g _{fs} (*) | Forward Transconductance | V _{DS} = 15 V I _D = 17.5 A | | 28 | | S |
| C _{iss} C _{oss} C _{rss} | Input Capacitance Output Capacitance Reverse Transfer Capacitance | V _{DS} = 25V f = 1 MHz V _{GS} = 0 | | 1700 305 105 | | pF pF pF |

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------|--|---|------|---------------|------|----------------|
| $t_{d(on)}$ t_r | Turn-on Delay Time Rise Time | $V_{DD} = 30\text{ V}$ $I_D = 27.5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 3) | | 20 100 | | ns ns |
| Q_g Q_{gs} Q_{gd} | Total Gate Charge Gate-Source Charge Gate-Drain Charge | $V_{DD} = 48\text{ V}$ $I_D = 55\text{ A}$ $V_{GS} = 4.5\text{ V}$ | | 25 5 10 | 33 | nC nC nC |

SWITCHING OFF

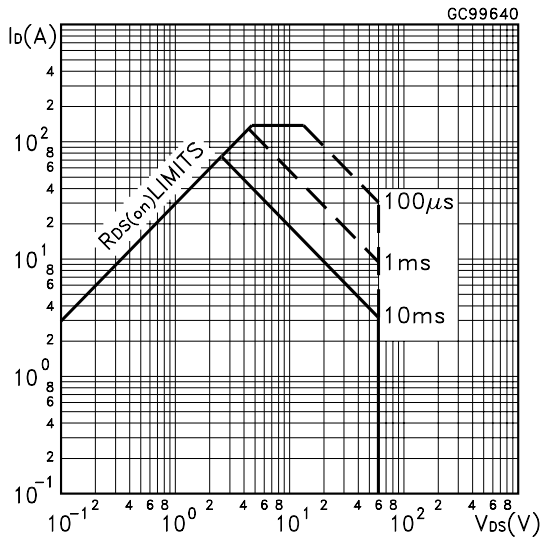
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------|----------------------------------|---|------|----------|------|----------|
| $t_{d(off)}$ t_f | Turn-off Delay Time Fall Time | $V_{DD} = 30\text{ V}$ $I_D = 27.5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 3) | | 40 20 | | ns ns |

SOURCE DRAIN DIODE

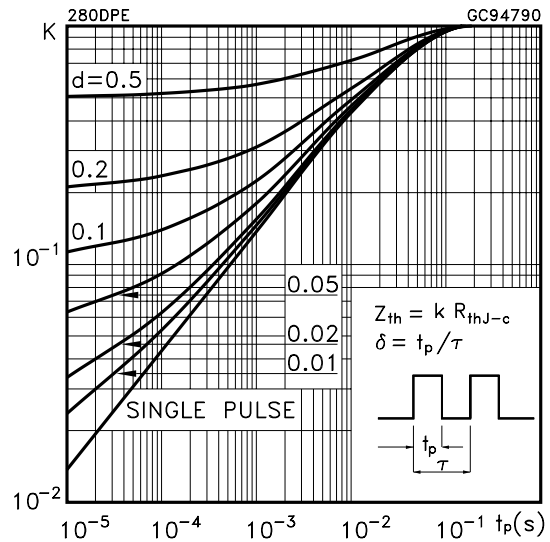
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|--|---|------|----------------|-----------|---------------|
| I_{SD} $I_{SDM} (\bullet)$ | Source-drain Current Source-drain Current (pulsed) | | | | 35 140 | A A |
| $V_{SD} (*)$ | Forward On Voltage | $I_{SD} = 35\text{ A}$ $V_{GS} = 0$ | | | 1.5 | V |
| t_{rr} Q_{rr} I_{RRM} | Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current | $I_{SD} = 35\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 30\text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5) | | 80 200 5 | | ns nC A |

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

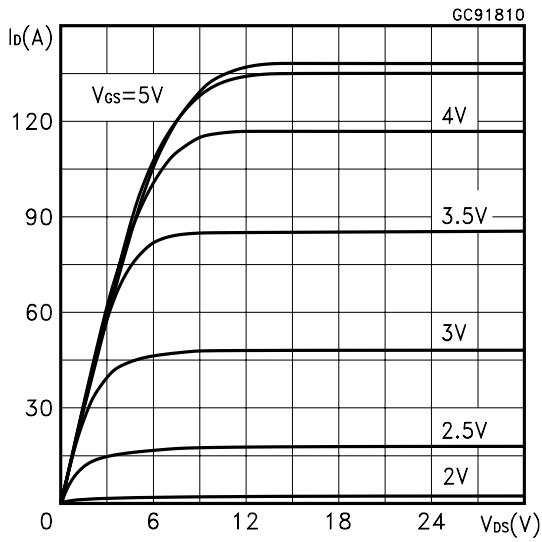
Safe Operating Area



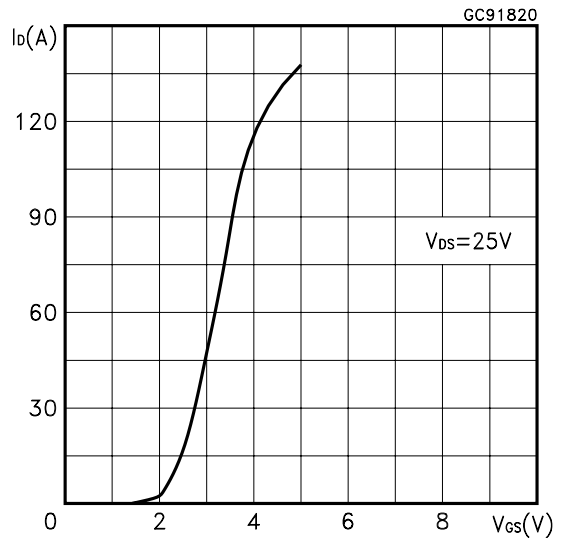
Thermal Impedance



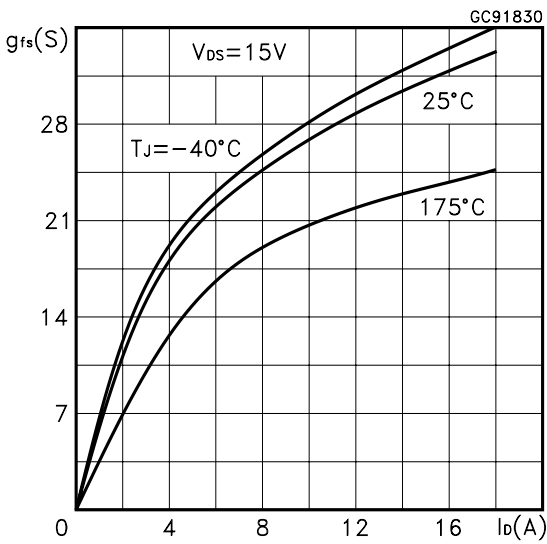
Output Characteristics



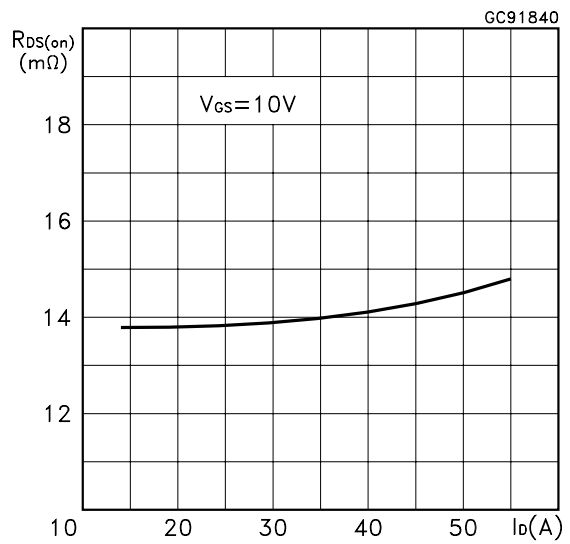
Transfer Characteristics



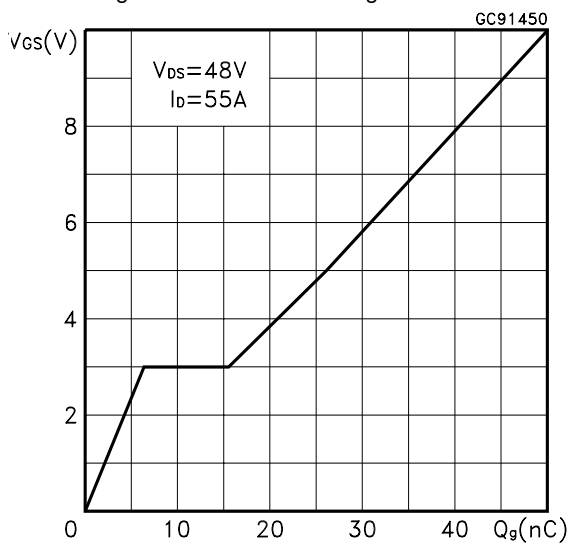
Transconductance



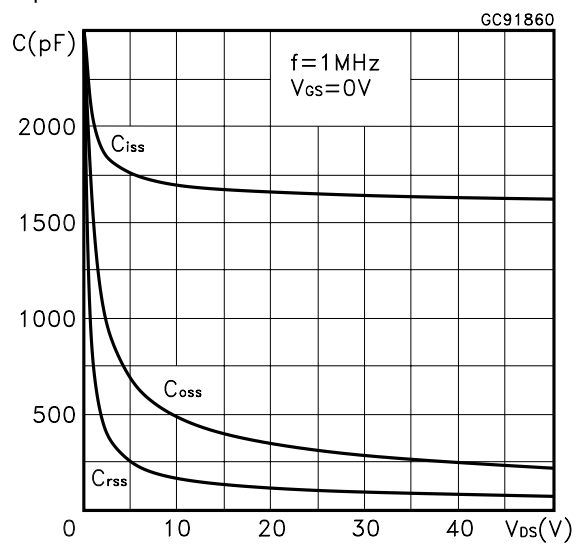
Static Drain-source On Resistance



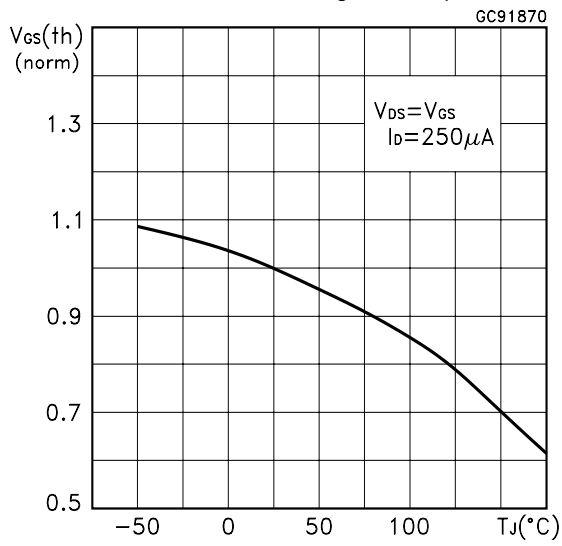
Gate Charge vs Gate-source Voltage



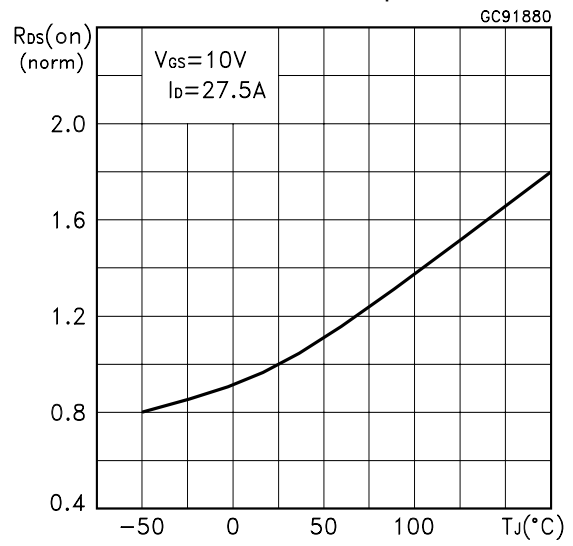
Capacitance Variations



Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics

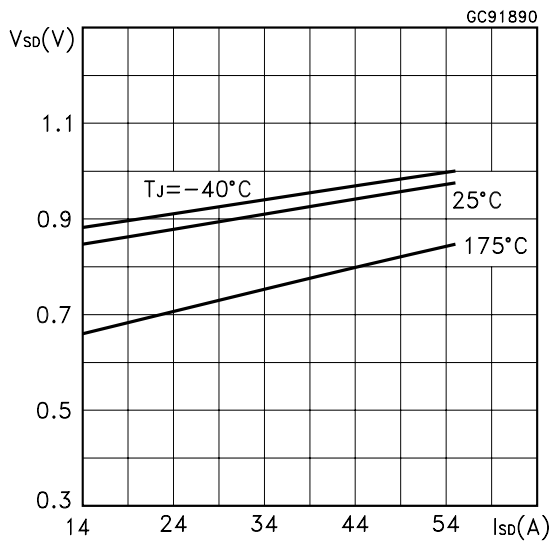


Fig. 1: Unclamped Inductive Load Test Circuit

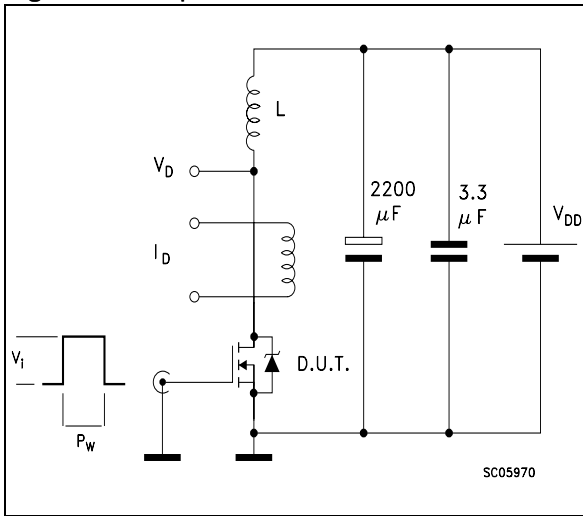


Fig. 2: Unclamped Inductive Waveform

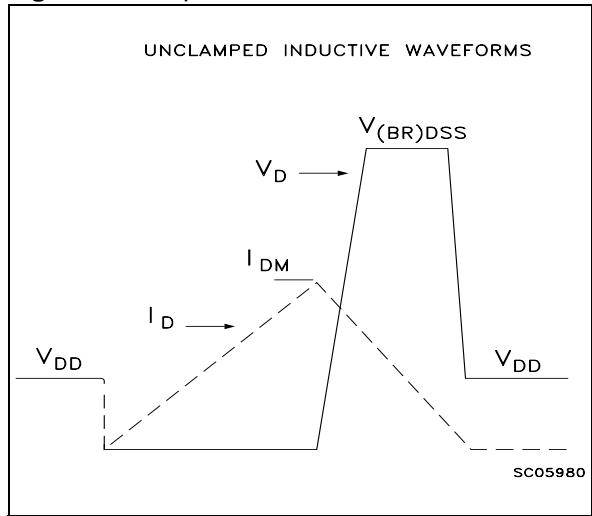


Fig. 3: Switching Times Test Circuits For Resistive Load

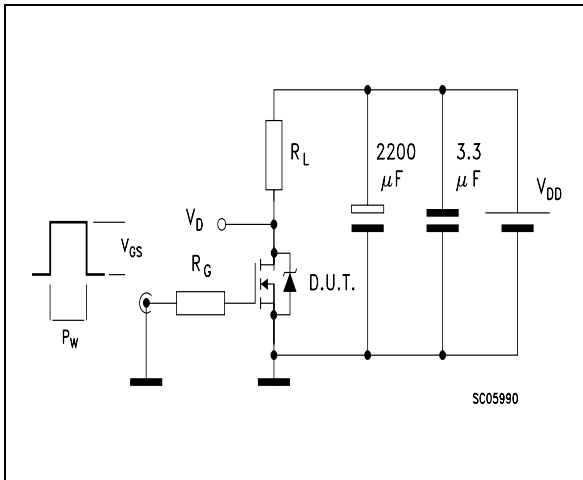


Fig. 4: Gate Charge test Circuit

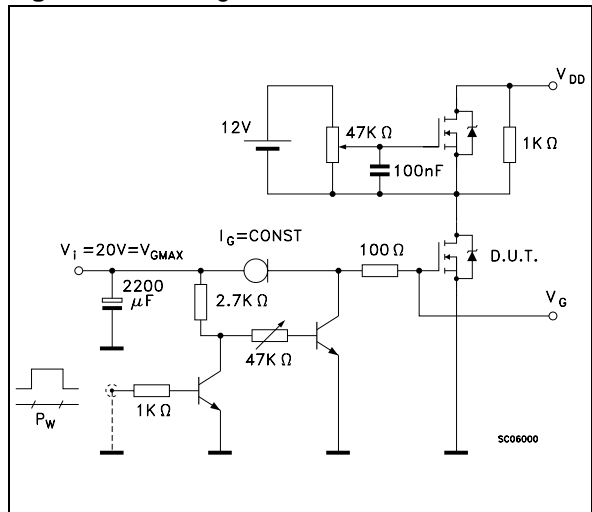
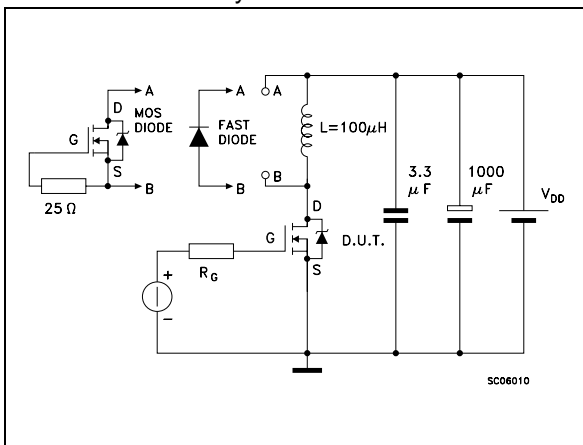
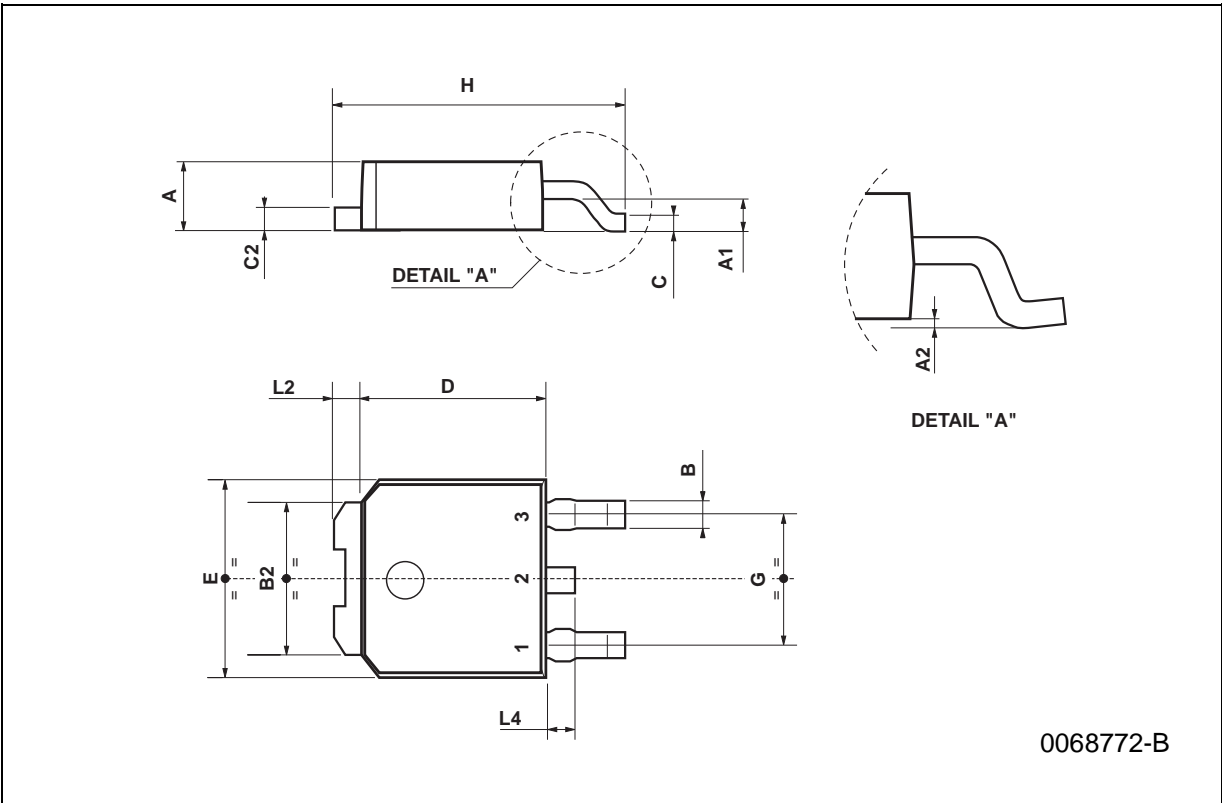


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times

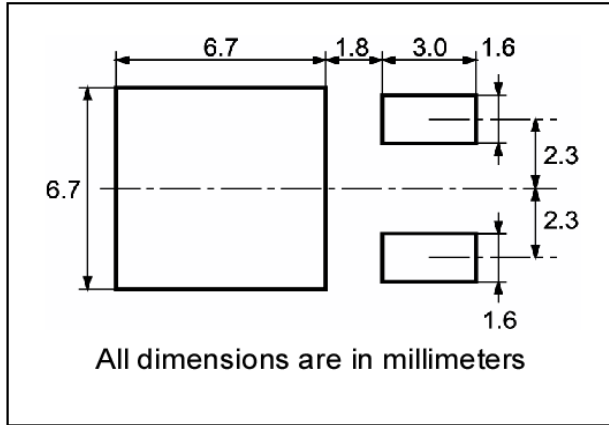


TO-252 (DPAK) MECHANICAL DATA

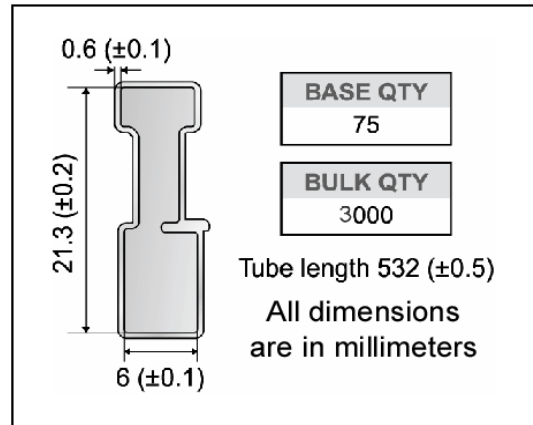
| DIM. | mm | | | inch | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 2.2 | | 2.4 | 0.086 | | 0.094 |
| A1 | 0.9 | | 1.1 | 0.035 | | 0.043 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.64 | | 0.9 | 0.025 | | 0.035 |
| B2 | 5.2 | | 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 |



DPAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*

40 mm min. Access hole at slot location

Full radius

Tape slot in core for tape start 2.5mm min. width

T

C

N

G measured at hub

REEL MECHANICAL DATA

| DIM. | mm | | inch | |
|------|------|------|-------|--------|
| | MIN. | MAX. | MIN. | MAX. |
| A | | 330 | | 12.992 |
| B | 1.5 | | 0.059 | |
| C | 12.8 | 13.2 | 0.504 | 0.520 |
| D | 20.2 | | 0.795 | |
| G | 16.4 | 18.4 | 0.645 | 0.724 |
| N | 50 | | 1.968 | |
| T | | 22.4 | | 0.881 |

| BASE QTY | BULK QTY |
|----------|----------|
| 1000 | 1000 |

TAPE MECHANICAL DATA

| DIM. | mm | | inch | |
|------|------|------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A0 | 6.8 | 7 | 0.267 | 0.275 |
| B0 | 10.4 | 10.6 | 0.409 | 0.417 |
| B1 | | 12.1 | | 0.476 |
| D | 1.5 | 1.6 | 0.059 | 0.063 |
| D1 | 1.5 | | 0.059 | |
| E | 1.65 | 1.85 | 0.065 | 0.073 |
| F | 7.4 | 7.6 | 0.291 | 0.299 |
| K0 | 2.55 | 2.75 | 0.100 | 0.108 |
| P0 | 3.9 | 4.1 | 0.153 | 0.161 |
| P1 | 7.9 | 8.1 | 0.311 | 0.319 |
| P2 | 1.9 | 2.1 | 0.075 | 0.082 |
| R | 40 | | 1.574 | |
| W | 15.7 | 16.3 | 0.618 | 0.641 |

10 pitches cumulative tolerance on tape +/- 0.2 mm

TOP COVER TAPE

Center line of cavity

User Direction of Feed

For machine ref. only including draft and radii concentric around B0

FEED DIRECTION

Bending radius R min.

*on sales type

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