



STY34NB50

N - CHANNEL 500V - 0.11Ω - 34 A - Max247 PowerMESH™ MOSFET

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|-----------|------------------|---------------------|----------------|
| STY34NB50 | 500 V | < 0.13 Ω | 34 A |

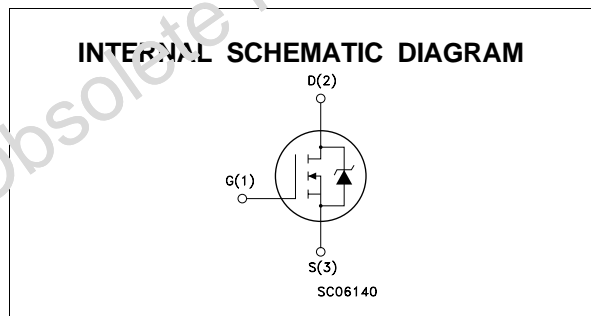
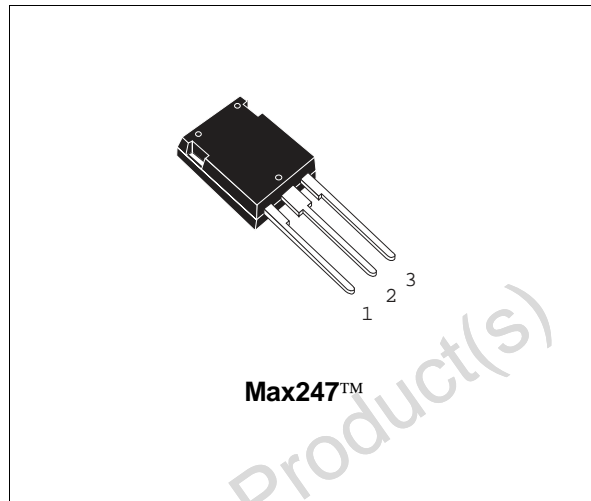
- TYPICAL R_{DS(on)} = 0.11 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- ± 30V GATE TO SOURCE VOLTAGE RATING
- 100% AVALANCHE TESTED
- LOW INTRINSIC CAPACITANCE
- GATE CHARGE MINIMIZED
- REDUCED VOLTAGE SPREAD

DESCRIPTION

Using the latest high voltage MESH OVERLAY™ process, SGS-Thomson has designed an advanced family of power MOSFETs with outstanding performances. The new patent pending strip layout coupled with the Company's proprietary edge termination structure, gives the lowest R_{DS(on)} per area, exceptional avalanche and dv/dt capabilities and unrivalled gate charge and switching characteristics.

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLY (SMPS)
- DC-AC CONVERTER FOR WELDING EQUIPMENT AND UNINTERRUPTIBLE POWER SUPPLY AND MOTOR DRIVE



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------------|---|------------|------|
| V _{DS} | Drain-source Voltage (V _{GS} = 0) | 500 | V |
| V _{DG} | Drain- gate Voltage (R _{GS} = 20 kΩ) | 500 | V |
| V _{GS} | Gate-source Voltage | ± 30 | V |
| I _D | Drain Current (continuous) at T _c = 25 °C | 34 | A |
| I _D | Drain Current (continuous) at T _c = 100 °C | 21.4 | A |
| I _{DM} (●) | Drain Current (pulsed) | 136 | A |
| P _{tot} | Total Dissipation at T _c = 25 °C | 450 | W |
| | Derating Factor | 3.61 | W/°C |
| dv/dt(1) | Peak Diode Recovery voltage slope | 4.5 | V/ns |
| T _{stg} | Storage Temperature | -65 to 150 | °C |
| T _j | Max. Operating Junction Temperature | 150 | °C |

(●) Pulse width limited by safe operating area

(1) I_{SD} ≤ 34 A, di/dt ≤ 200 A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}

STY34NB50

THERMAL DATA

| | | | | |
|-----------------------|--|-----|-------|------|
| R _{thj-case} | Thermal Resistance Junction-case | Max | 0.277 | °C/W |
| R _{thj-amb} | Thermal Resistance Junction-ambient | Max | 30 | °C/W |
| R _{thc-sink} | Thermal Resistance Case-sink | Typ | 0.1 | °C/W |
| T _l | 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) | 34 | A |
| E _{AS} | Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V) | 1000 | 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 = 250 μA V _{GS} = 0 | 500 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current (V _{GS} = 0) | V _{DS} = Max Rating V _{DS} = Max Rating T _c = 125 °C | | | 10 100 | μA μA |
| I _{GSS} | Gate-body Leakage Current (V _{DS} = 0) | V _{GS} = ± 30 V | | | ± 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 | 3 | 4 | 5 | V |
| R _{DS(on)} | Static Drain-source On Resistance | V _{GS} = 10 V I _D = 17 A | | 0.11 | 0.13 | Ω |
| I _{D(on)} | On State Drain Current | V _{DS} > I _{D(on)} × R _{DS(on)max} V _{GS} = 10 V | 34 | | | A |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|------------------------------|---|------|------|------|------|
| g _{fs} (*) | Forward Transconductance | V _{DS} > I _{D(on)} × R _{DS(on)max} I _D = 17 A | 18 | 20 | | S |
| C _{iss} | Input Capacitance | V _{DS} = 25 V f = 1 MHz V _{GS} = 0 | | 7000 | 9100 | pF |
| C _{oss} | Output Capacitance | | | 950 | 1235 | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 80 | 104 | pF |

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------|--------------------|--|------|------|------|------|
| $t_{d(on)}$ | Turn-on Time | $V_{DD} = 250\text{ V}$ $I_D = 17\text{ A}$ | | 46 | 64 | ns |
| t_r | Rise Time | $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 3) | | 32 | 45 | ns |
| Q_g | Total Gate Charge | $V_{DD} = 400\text{ V}$ $I_D = 34\text{ A}$ $V_{GS} = 10\text{ V}$ | | 159 | 223 | nC |
| Q_{gs} | Gate-Source Charge | | | 35 | | nC |
| Q_{gd} | Gate-Drain Charge | | | 67 | | nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------|-----------------------|---|------|------|------|------|
| $t_{r(Voff)}$ | Off-voltage Rise Time | $V_{DD} = 400\text{ V}$ $I_D = 34\text{ A}$ | | 56 | 78 | ns |
| t_f | Fall Time | $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ | | 53 | 74 | ns |
| t_c | Cross-over Time | (see test circuit, figure 5) | | 120 | 168 | ns |

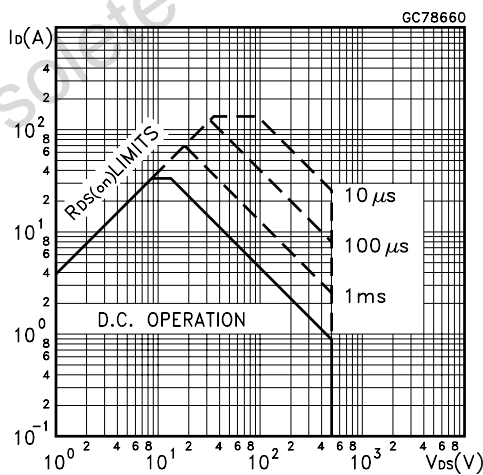
SOURCE DRAIN DIODE

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------------|-------------------------------|--|------|------|------|---------------|
| I_{SD} | Source-drain Current | | | | 34 | A |
| $I_{SDM}(\bullet)$ | Source-drain Current (pulsed) | | | | 136 | A |
| $V_{SD} (*)$ | Forward On Voltage | $I_{SD} = 34\text{ A}$ $V_{GS} = 0$ | | | 1.6 | V |
| t_{rr} | Reverse Recovery Time | $I_{SD} = 34\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 100\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ (see test circuit, figure 5) | | 950 | | ns |
| Q_{rr} | Reverse Recovery Charge | | | 12 | | μC |
| I_{RRM} | Reverse Recovery Current | | | 25 | | A |

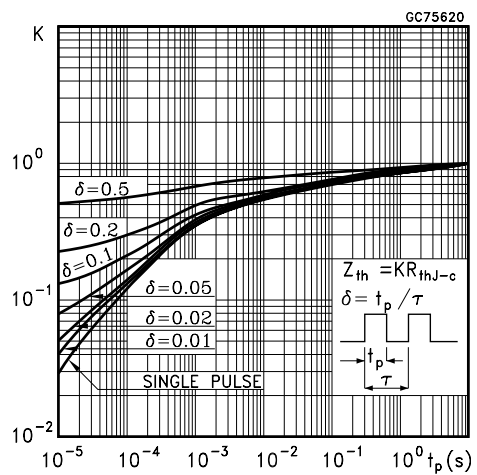
(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

(\bullet) Pulse width limited by safe operating area

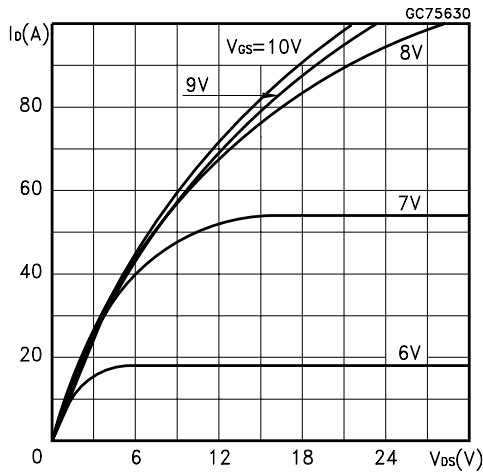
Safe Operating Area



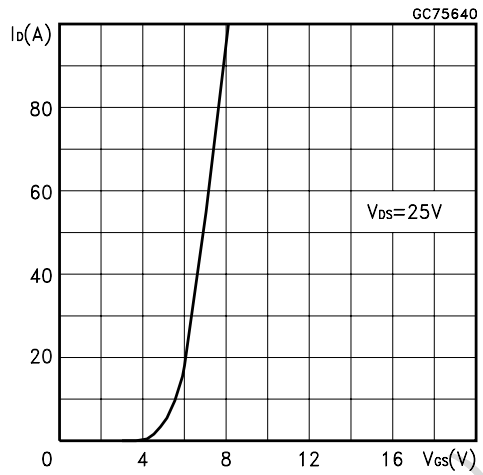
Thermal Impedance



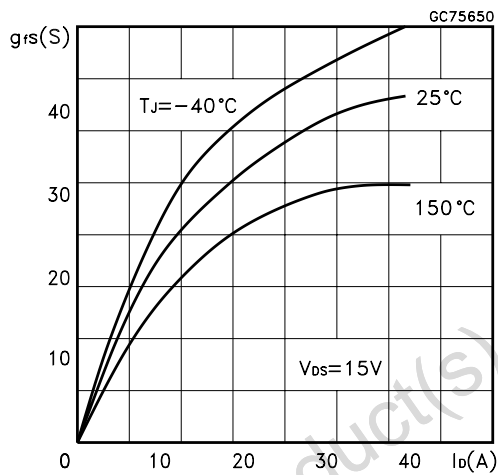
Output Characteristics



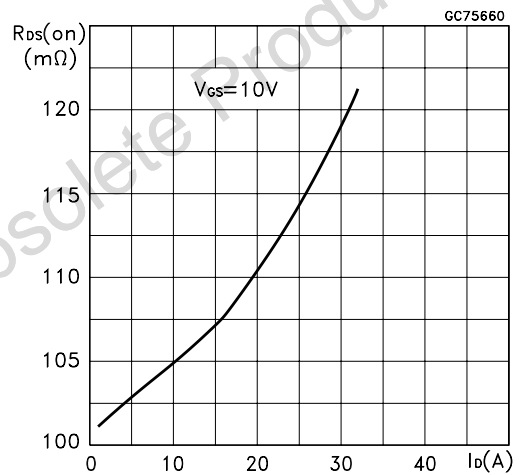
Transfer Characteristics



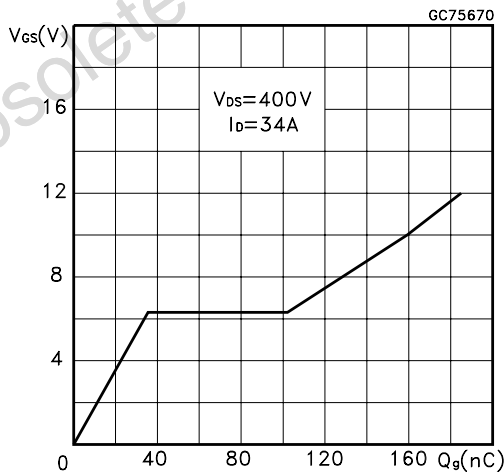
Transconductance



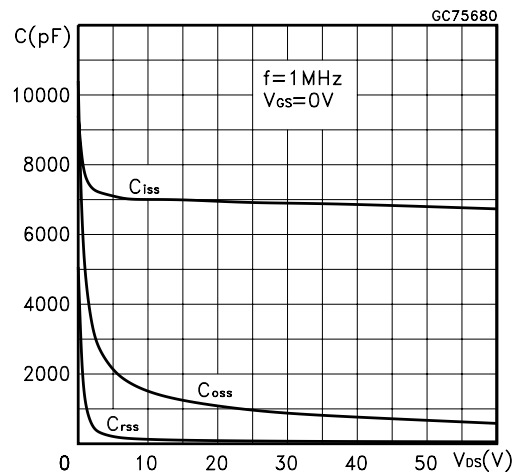
Static Drain-source On Resistance



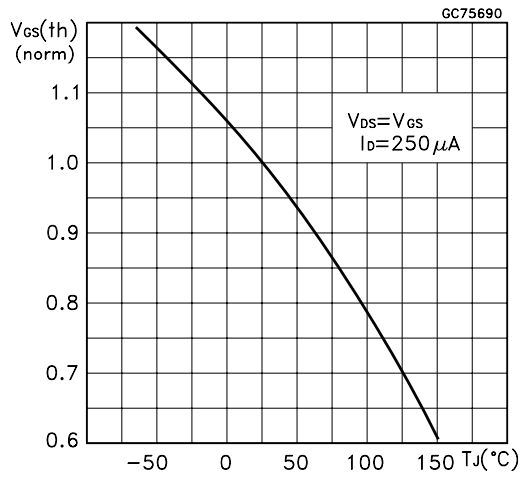
Gate Charge vs Gate-source Voltage



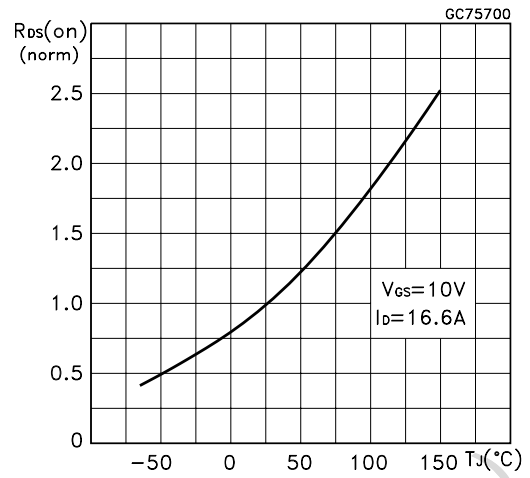
Capacitance Variations



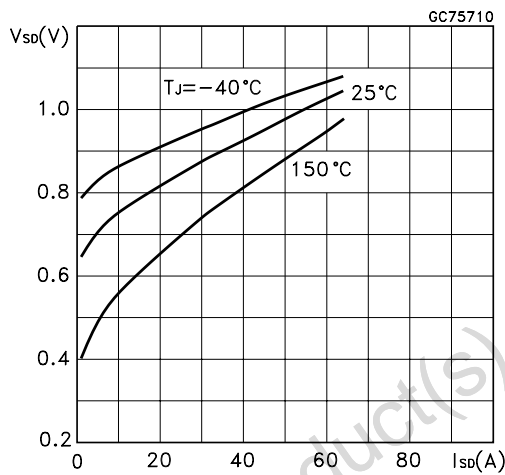
Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics



Obsolete Product(s) - Obsolete Product(s)

Fig. 1: Unclamped Inductive Load Test Circuit

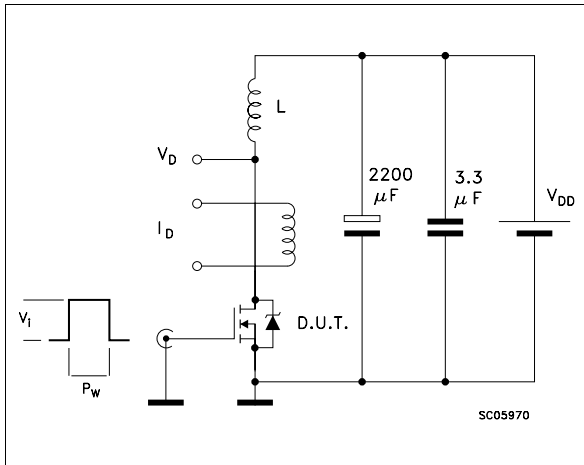


Fig. 2: Unclamped Inductive Waveform

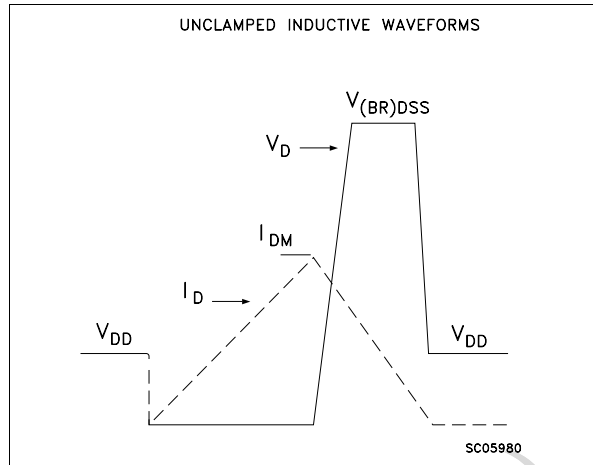


Fig. 3: Switching Times Test Circuits For Resistive Load

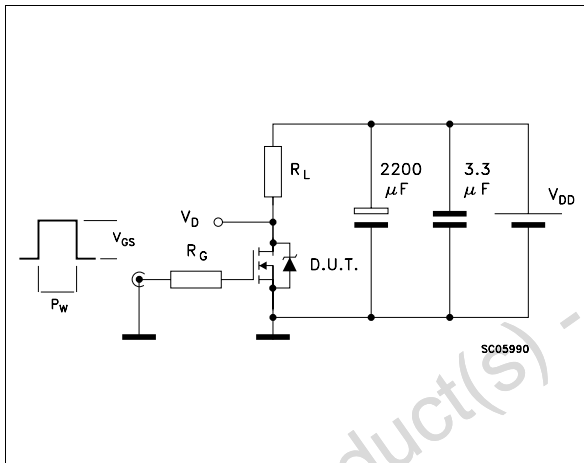


Fig. 4: Gate Charge test Circuit

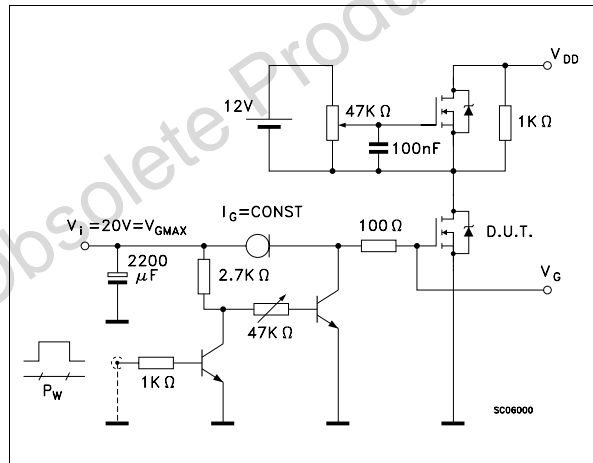
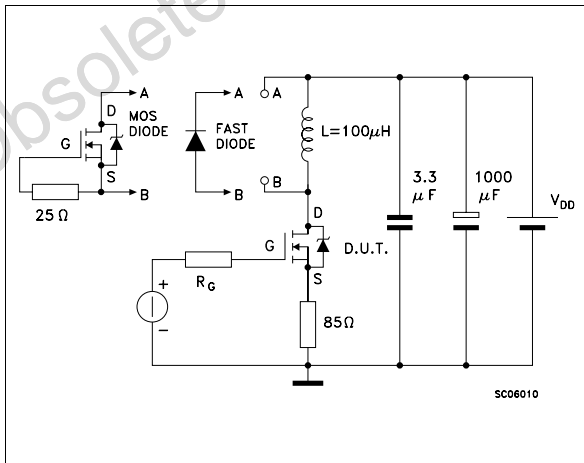
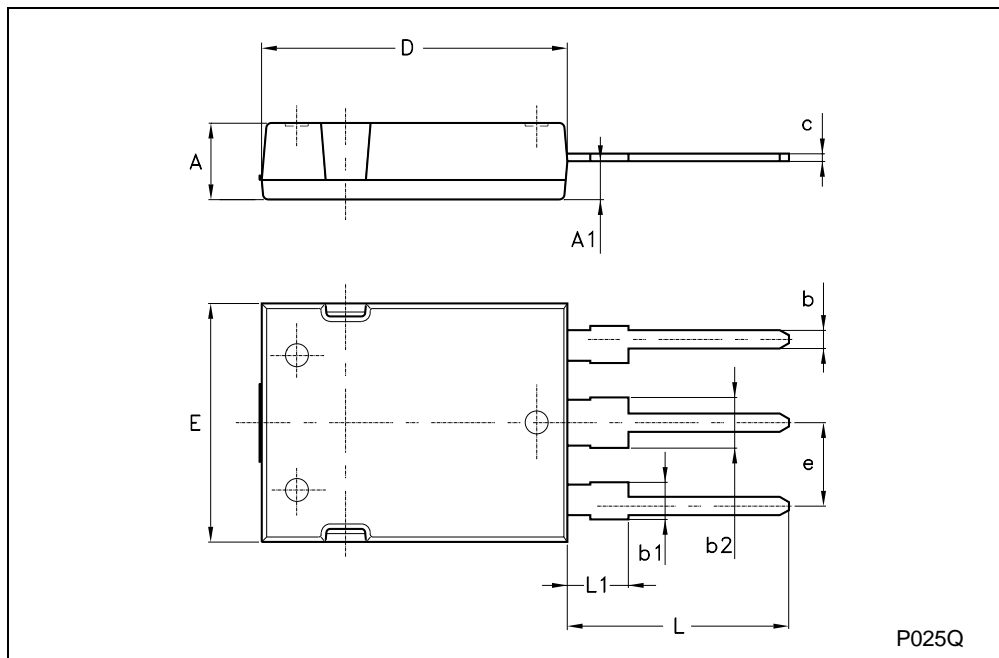


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



Max247 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|-------|------|-------|------|------|------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.70 | | 5.30 | | | |
| A1 | 2.20 | | 2.60 | | | |
| b | 1.00 | | 1.40 | | | |
| b1 | 2.00 | | 2.40 | | | |
| b2 | 3.00 | | 3.40 | | | |
| c | 0.40 | | 0.80 | | | |
| D | 19.70 | | 20.30 | | | |
| e | 5.35 | | 5.55 | | | |
| E | 15.30 | | 15.90 | | | |
| L | 14.20 | | 15.20 | | | |
| L1 | 3.70 | | 4.30 | | | |



Obsolete Product(s) - Obsolete Product(s)

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a trademark of STMicroelectronics

© 1998 STMicroelectronics – Printed in Italy – All Rights Reserved
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - France - Germany - Italy - Japan - Korea - Malaysia - Malta - Mexico - Morocco - The Netherlands - Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A.