



STN2NF10

N-CHANNEL 100V - 0.23Ω - 2A SOT-223 STripFET™ II POWER MOSFET

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|----------|------------------|---------------------|----------------|
| STN2NF10 | 100 V | < 0.26 Ω | 2 A |

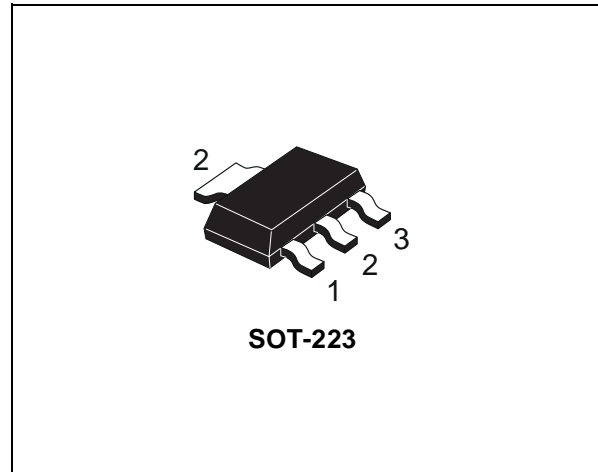
- TYPICAL R_{DS(on)} = 0.23 Ω

DESCRIPTION

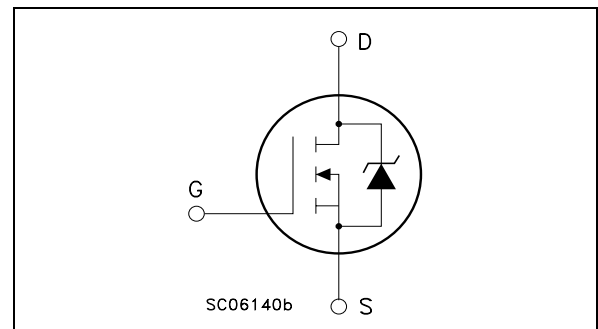
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

APPLICATIONS

- DC-DC & DC-AC CONVERTERS
- DC MOTOR CONTROL (DISK DRIVERS, etc.)
- SYNCHRONOUS RECTIFICATION



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------------|--|------------|------|
| V _{DS} | Drain-source Voltage (V _{GS} = 0) | 100 | V |
| V _{DGR} | Drain-gate Voltage (R _{GS} = 20 kΩ) | 100 | V |
| V _{GS} | Gate- source Voltage | ± 20 | V |
| I _{D(●)} | Drain Current (continuous) at T _C = 25°C | 2 | A |
| I _D | Drain Current (continuous) at T _C = 100°C | 1.26 | A |
| I _{DM(●●)} | Drain Current (pulsed) | 8 | A |
| P _{tot} | Total Dissipation at T _C = 25°C | 2.5 | W |
| | Derating Factor | 0.02 | W/°C |
| E _{AS(1)} | Single Pulse Avalanche Energy | 300 | mJ |
| T _{stg} | Storage Temperature | -65 to 150 | °C |
| T _j | Max. Operating Junction Temperature | 150 | °C |

- (●●) Pulse width limited by safe operating area.
- (●) Current limited by the package

(1) I_{SD} ≤ 1A, di/dt ≤ 300A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}

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THERMAL DATA

| | | | | |
|----------------------------|--|-----|-----------|------------|
| Rthj-pcb | Thermal Resistance Junction-PCB (1 inch ² copper board) | | 50 | °C/W |
| Rthj-pcb T _I | Thermal Resistance Junction-PCB (min. footprint) Maximum Lead Temperature For Soldering Purpose | Typ | 90 260 | °C/W °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 | 100 | | | 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} = ± 20V | | | ±100 | nA |

ON (1)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|--------------------------------------|---|------|------|------|------|
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} = V _{GS} I _D = 250 μA | 2 | | 4 | V |
| R _{DS(on)} | Static Drain-source On Resistance | V _{GS} = 10 V I _D = 1 A | | 0.23 | 0.26 | Ω |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|---------------------------------|---|------|------|------|------|
| g _{fs} (*) | Forward Transconductance | V _{DS} > I _{D(on)} × R _{DS(on)max} I _D = 1A | | 2.5 | | S |
| C _{iss} | Input Capacitance | V _{DS} = 25V, f = 1 MHz, V _{GS} = 0 | | 280 | | pF |
| C _{oss} | Output Capacitance | | | 45 | | pF |
| C _{riss} | Reverse Transfer Capacitance | | | 20 | | 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 | $V_{DD} = 50\text{ V}$ $I_D = 1\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3) | | 6 10 | | ns ns |
| Q_g Q_{gs} Q_{gd} | Total Gate Charge Gate-Source Charge Gate-Drain Charge | $V_{DD} = 80\text{ V}$ $I_D = 2\text{ A}$ $V_{GS} = 10\text{ V}$ | | 10 2.5 4 | | nC nC nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------------------------|---|--|------|---------------|------|----------------|
| $t_{d(off)}$ t_f t_c | Turn-off Delay Time Fall Time Cross-over Time | $V_{clamp} = 80\text{ V}$ $I_D = 2\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$ (Inductive Load, Figure 5) | | 19 4 15 | | ns ns ns |

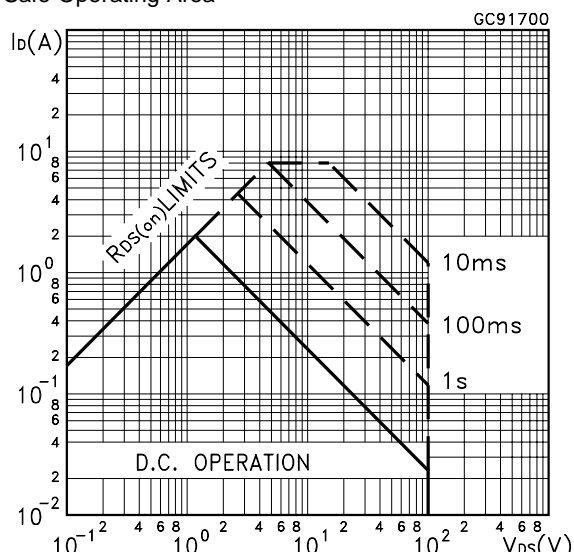
SOURCE DRAIN DIODE

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|--|--|------|----------------|--------|---------------|
| I_{SD} $I_{SDM} (\bullet)$ | Source-drain Current Source-drain Current (pulsed) | | | | 2 8 | A A |
| $V_{SD} (*)$ | Forward On Voltage | $I_{SD} = 2\text{ A}$ $V_{GS} = 0$ | | | 1.2 | V |
| t_{rr} Q_{rr} I_{RRM} | Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current | $I_{SD} = 2\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 10\text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5) | | 70 175 5 | | ns nC A |

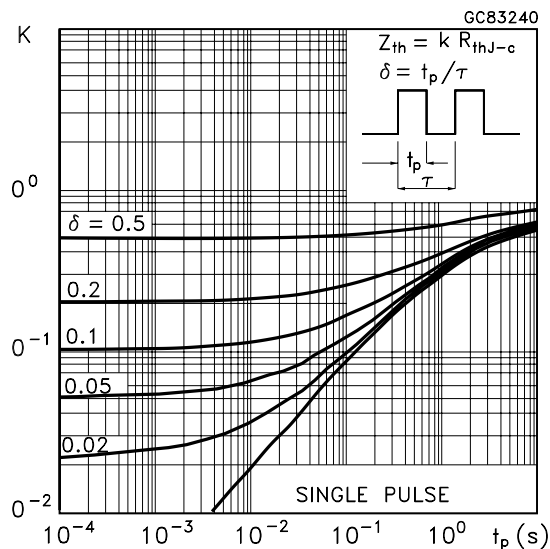
(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

(\bullet) Pulse width limited by safe operating area.

Safe Operating Area

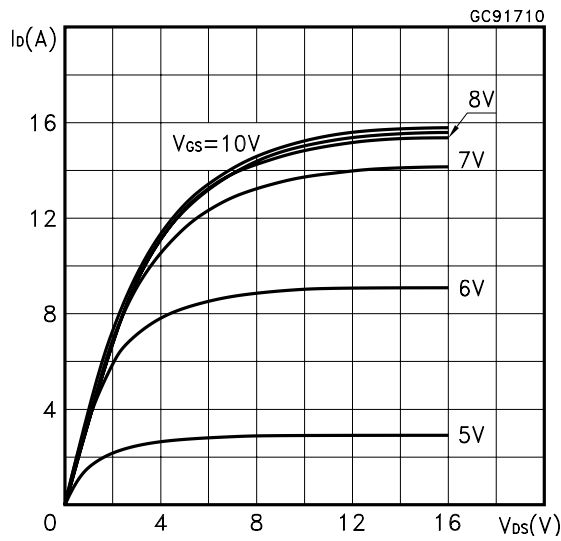


Thermal Impedance

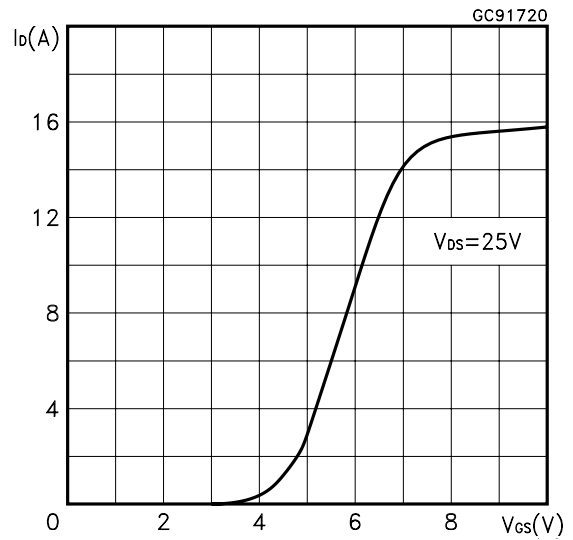


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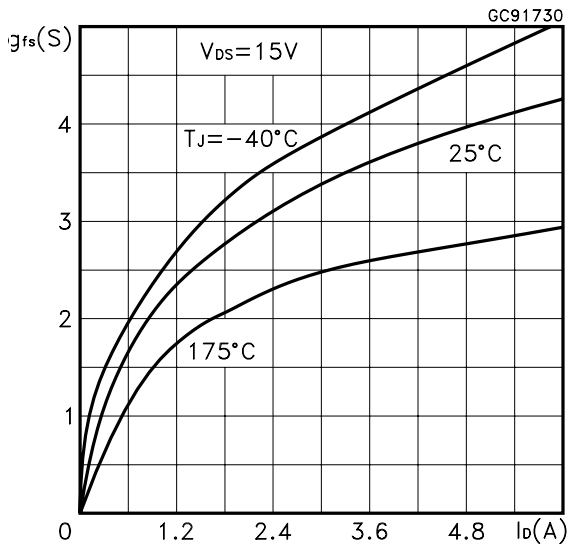
Output Characteristics



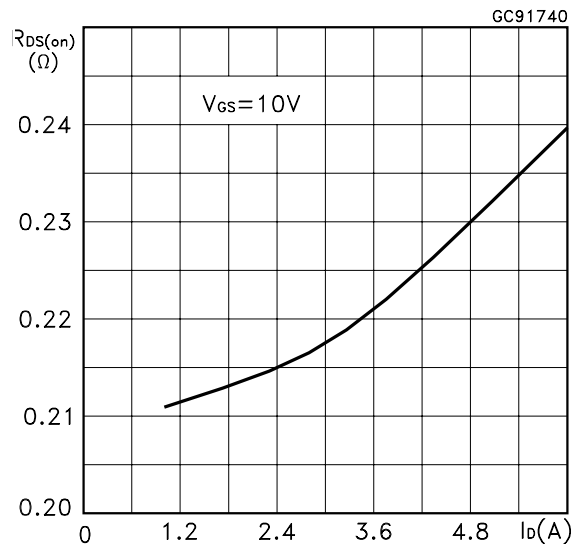
Transfer Characteristics



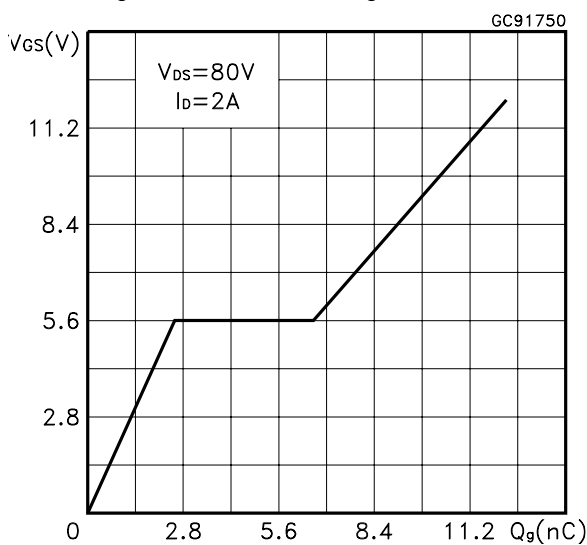
Transconductance



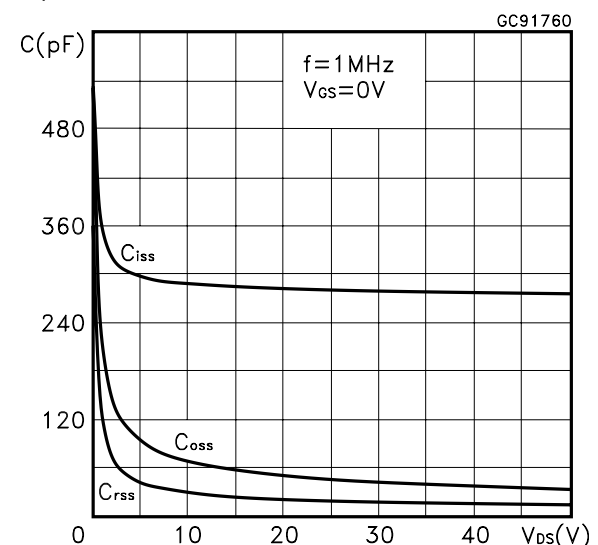
Static Drain-source On Resistance



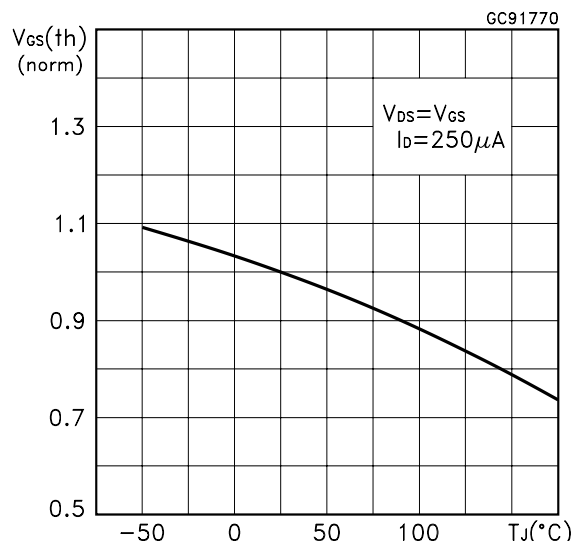
Gate Charge vs Gate-source Voltage



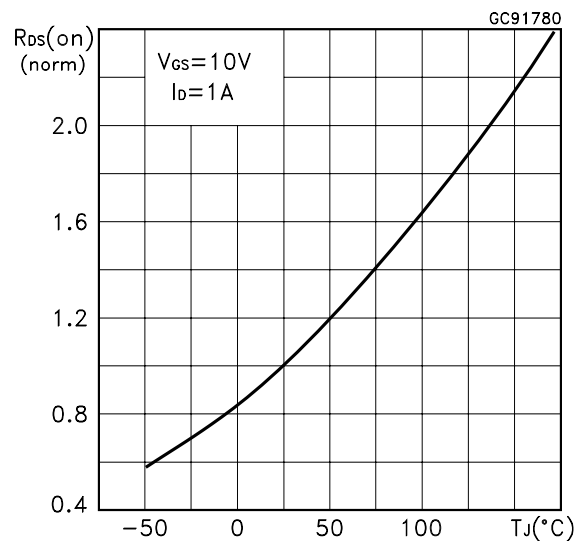
Capacitance Variations



Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics

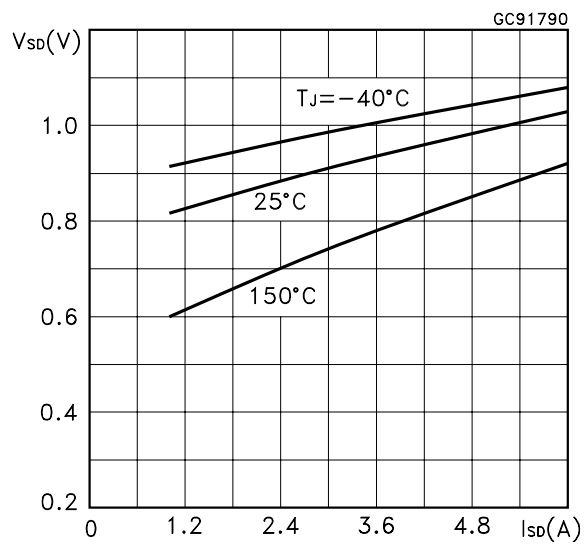


Fig. 1: Unclamped Inductive Load Test Circuit

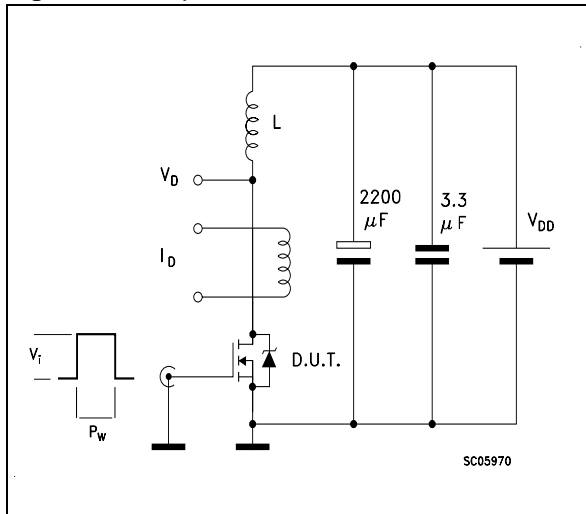


Fig. 2: Unclamped Inductive Waveform

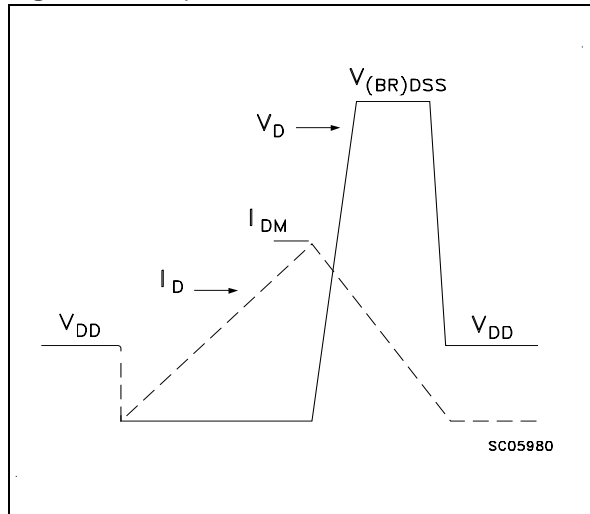


Fig. 3: Switching Times Test Circuits For Resistive Load

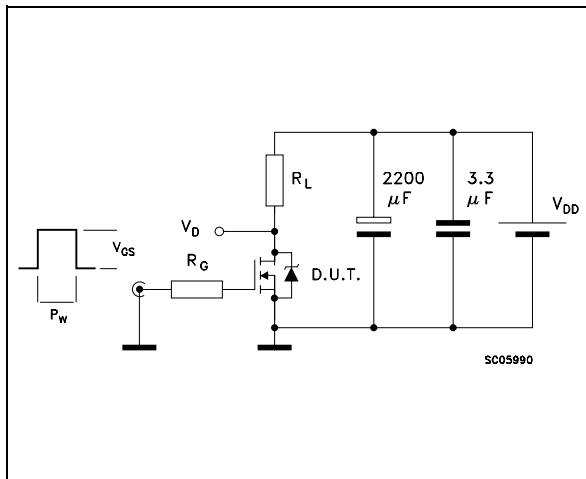


Fig. 4: Gate Charge test Circuit

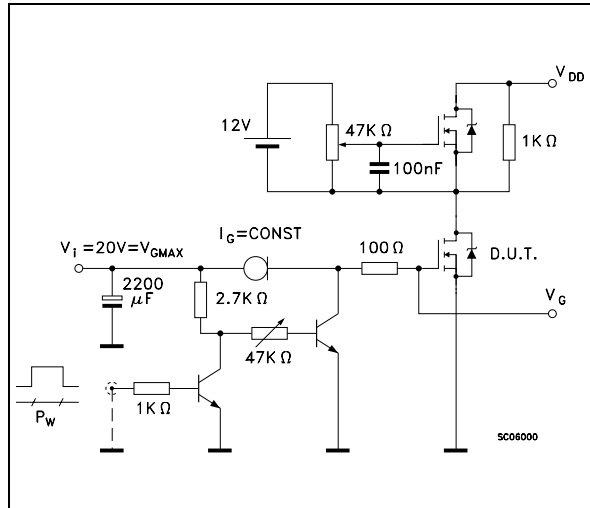
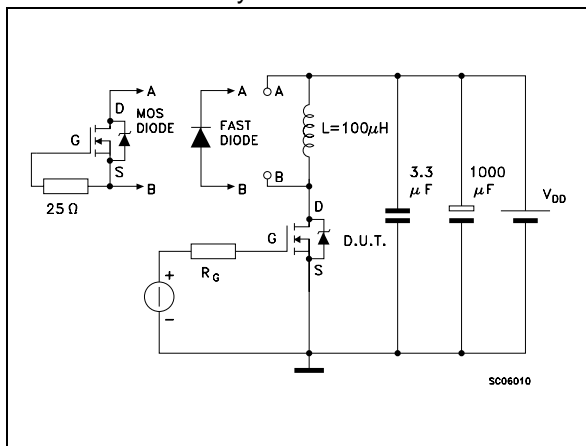
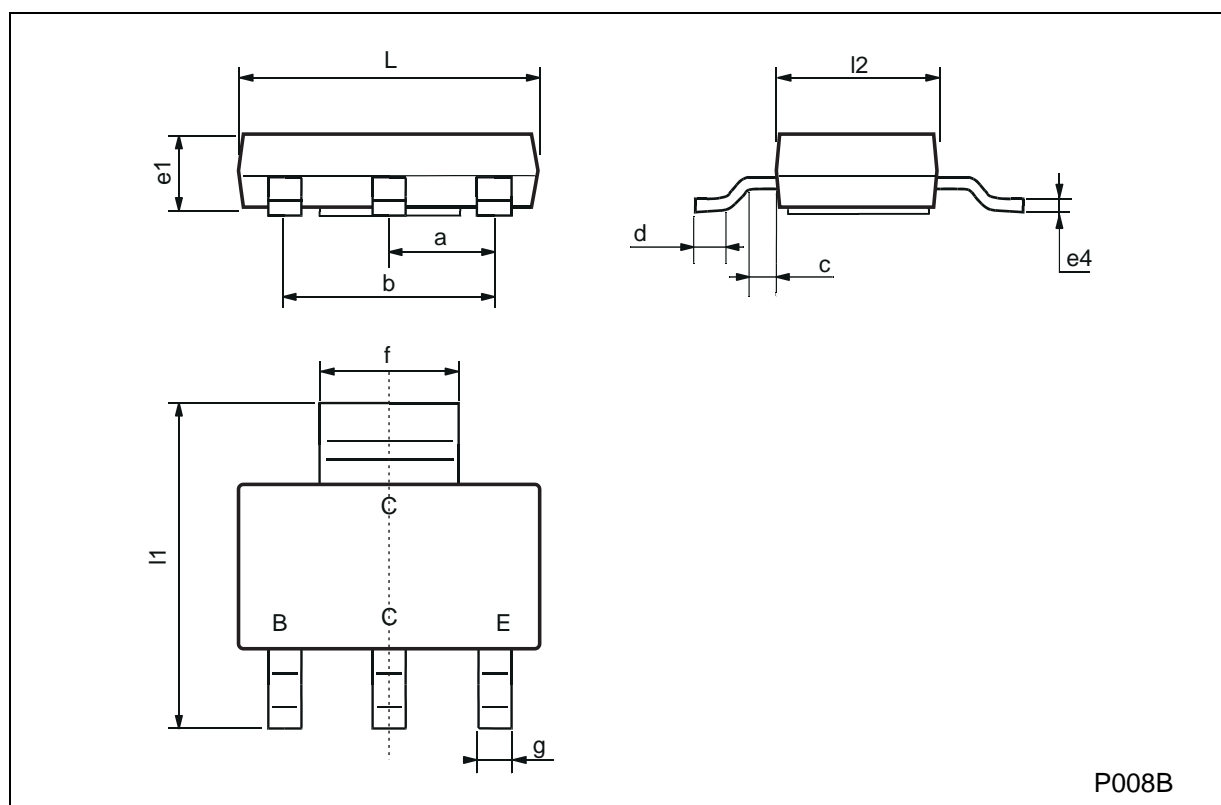


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



SOT-223 MECHANICAL DATA

| DIM. | mm | | | mils | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| a | 2.27 | 2.3 | 2.33 | 89.4 | 90.6 | 91.7 |
| b | 4.57 | 4.6 | 4.63 | 179.9 | 181.1 | 182.3 |
| c | 0.2 | 0.4 | 0.6 | 7.9 | 15.7 | 23.6 |
| d | 0.63 | 0.65 | 0.67 | 24.8 | 25.6 | 26.4 |
| e1 | 1.5 | 1.6 | 1.7 | 59.1 | 63 | 66.9 |
| e4 | | | 0.32 | | | 12.6 |
| f | 2.9 | 3 | 3.1 | 114.2 | 118.1 | 122.1 |
| g | 0.67 | 0.7 | 0.73 | 26.4 | 27.6 | 28.7 |
| l1 | 6.7 | 7 | 7.3 | 263.8 | 275.6 | 287.4 |
| l2 | 3.5 | 3.5 | 3.7 | 137.8 | 137.8 | 145.7 |
| L | 6.3 | 6.5 | 6.7 | 248 | 255.9 | 263.8 |



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