



STT3PF20V

P-CHANNEL 20V - 0.14 Ω - 2.2A SOT23-6L 2.7-DRIVE STripFET™ II POWER MOSFET

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|-----------|------------------|--|----------------|
| STT3PF20V | 20 V | < 0.20 Ω (@4.5V) < 0.25 Ω (@2.7V) | 2.2 A |

- TYPICAL R_{DS(on)} = 0.14 Ω (@4.5V)
- TYPICAL R_{DS(on)} = 0.20 Ω (@2.7V)
- ULTRA LOW THRESHOLD GATE DRIVE (2.7V)
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY

DESCRIPTION

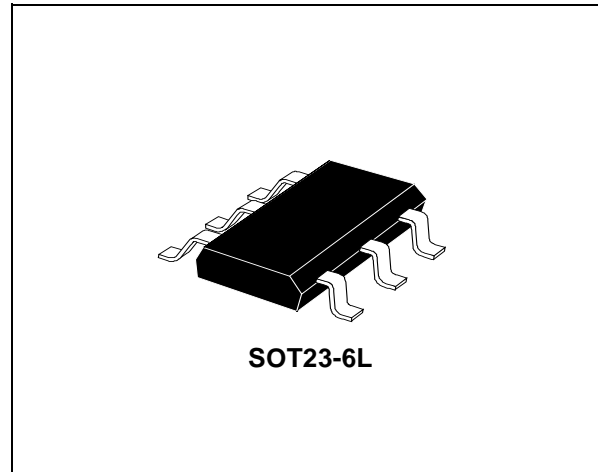
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

APPLICATIONS

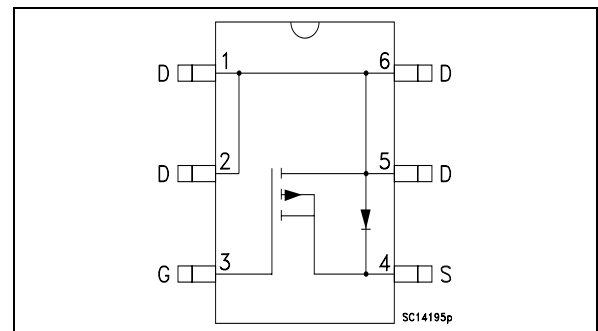
- DC-DC CONVERTERS
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT
- CELLULAR

MARKING

- STP2



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------------|---|----------|------|
| V _{DS} | Drain-source Voltage (V _{GS} = 0) | 20 | V |
| V _{DGR} | Drain-gate Voltage (R _{GS} = 20 k Ω) | 20 | V |
| V _{GS} | Gate- source Voltage | \pm 12 | V |
| I _D | Drain Current (continuous) at T _C = 25°C | 2.2 | A |
| I _D | Drain Current (continuous) at T _C = 100°C | 1.39 | A |
| I _{DM} (●) | Drain Current (pulsed) | 8.8 | A |
| P _{tot} | Total Dissipation at T _C = 25°C | 1.6 | W |

(●) Pulse width limited by safe operating area.

Note: P-CHANNEL MOSFET actual polarity of voltages and current has to be reversed

STT3PF20V

THERMAL DATA

| | | | | |
|--|--|-----|--------------------------------|------------------|
| Rthj-amb T _j T _{stg} | (*)Thermal Resistance Junction-ambient Max. Operating Junction Temperature Storage Temperature | Max | 78 -55 to 150 -55 to 150 | °C/W °C °C |
|--|--|-----|--------------------------------|------------------|

(*) Mounted on a 1 inch pad of 2 oz. Cu in FR-4 board

(**) Mounted on a minimum pad of 2 oz. Cu in FR-4 board

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 | 20 | | | 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} = ± 12 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 | 0.6 | | | V |
| R _{DS(on)} | Static Drain-source On Resistance | V _{GS} = 4.5 V I _D = 1 A V _{GS} = 2.7 V I _D = 1 A | | 0.14 0.20 | 0.20 0.25 | Ω Ω |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|--|------|-----------------|------|----------------|
| g _{fs} (*) | Forward Transconductance | V _{DS} =15 V I _D = 1 A | | 4 | | S |
| C _{iss} C _{oss} C _{riss} | Input Capacitance Output Capacitance Reverse Transfer Capacitance | V _{DS} = 15V f = 1 MHz, V _{GS} = 0 | | 315 87 17 | | 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 | $V_{DD} = 10\text{ V}$ $I_D = 1\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 3) | | 38 30 | | ns ns |
| Q_g Q_{gs} Q_{gd} | Total Gate Charge Gate-Source Charge Gate-Drain Charge | $V_{DD} = 10\text{ V}$ $I_D = 2\text{ A}$ $V_{GS} = 4.5\text{ V}$ | | 3.5 0.34 0.8 | 4.7 | nC nC nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------|----------------------------------|--|------|----------|------|----------|
| $t_{d(off)}$ t_f | Turn-off Delay Time Fall Time | $V_{DD} = 10\text{ V}$ $I_D = 1\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 3) | | 45 11 | | ns ns |

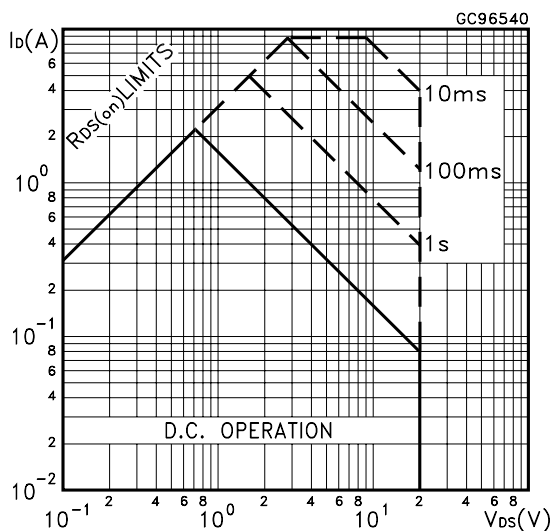
SOURCE DRAIN DIODE

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|--|--|------|----------------|------------|---------------|
| I_{SD} $I_{SDM}(\bullet)$ | Source-drain Current Source-drain Current (pulsed) | | | | 2.2 8.8 | A A |
| $V_{SD}(\ast)$ | 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) | | 15 7.5 1 | | ns nC A |

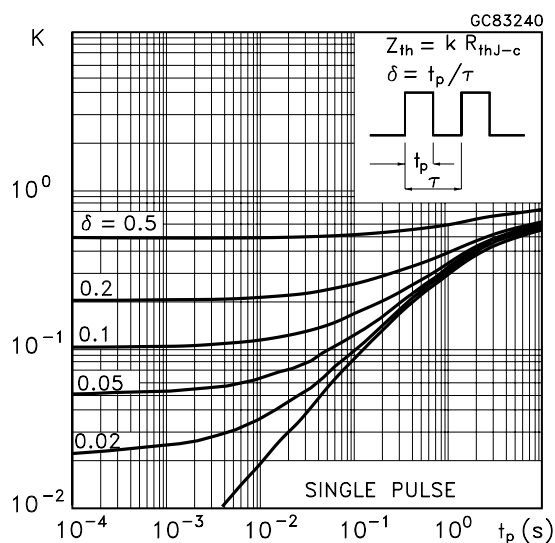
(\ast) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

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

Safe Operating Area

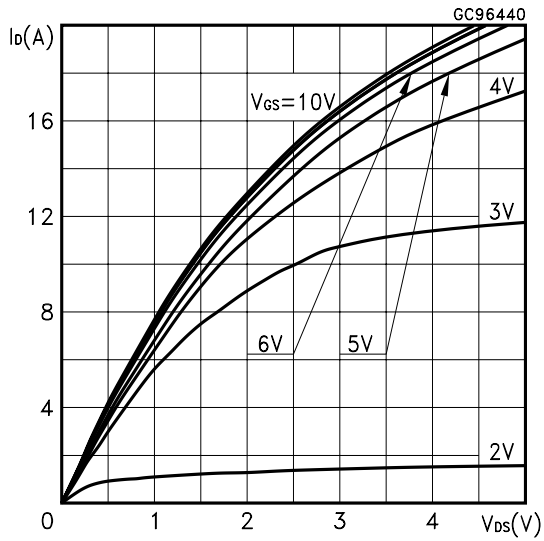


Thermal Impedance

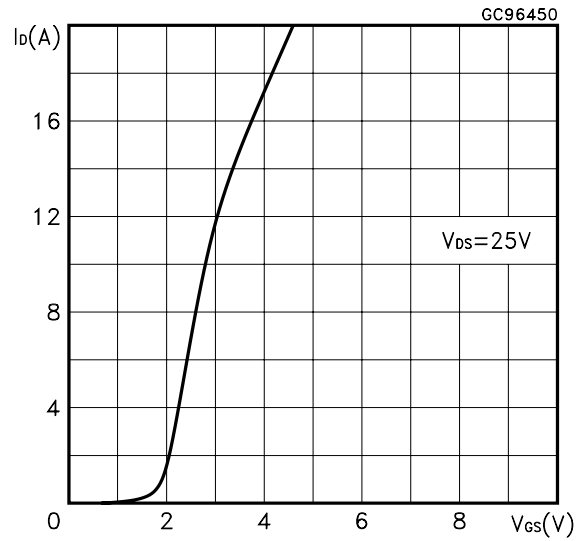


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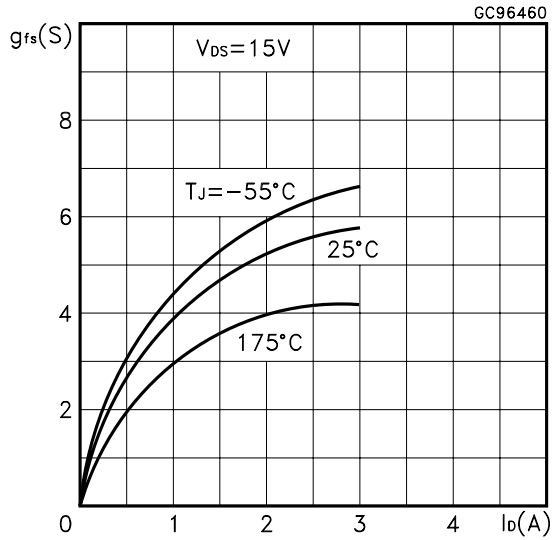
Output Characteristics



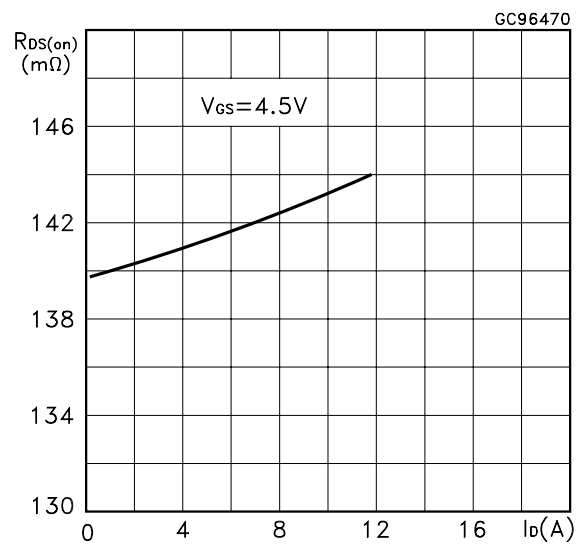
Transfer Characteristics



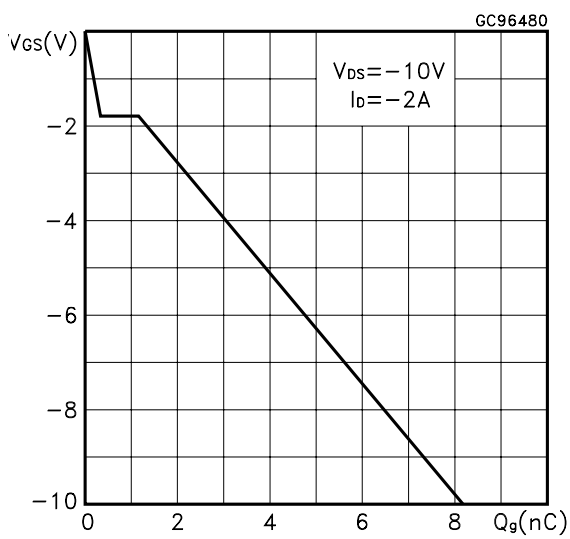
Transconductance



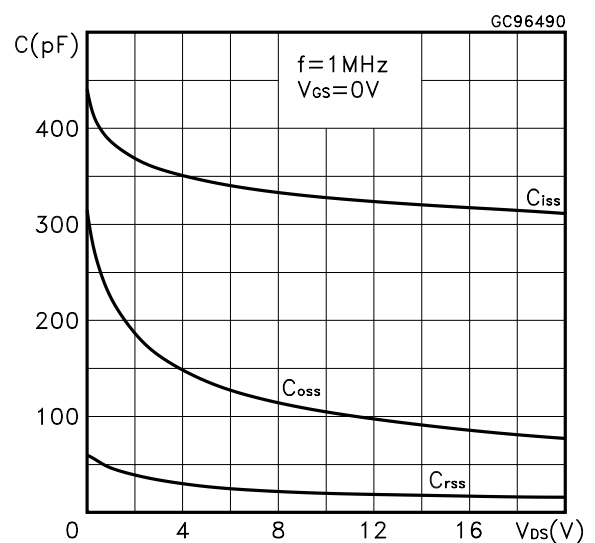
Static Drain-source On Resistance



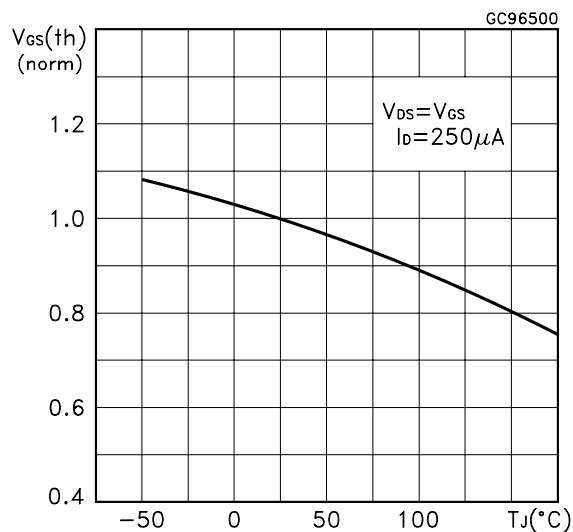
Gate Charge vs Gate-source Voltage



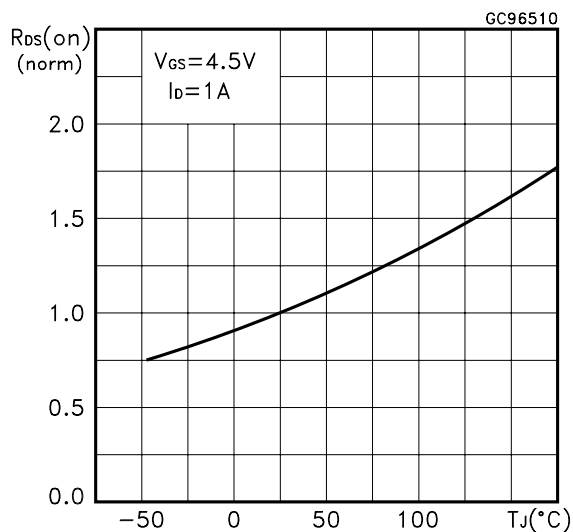
Capacitance Variations



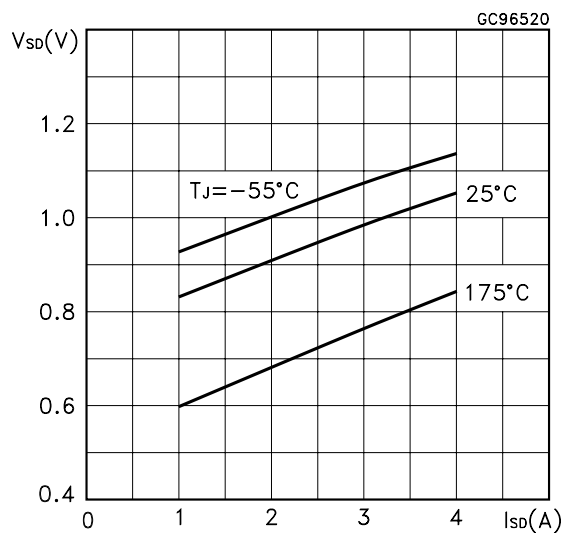
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature.

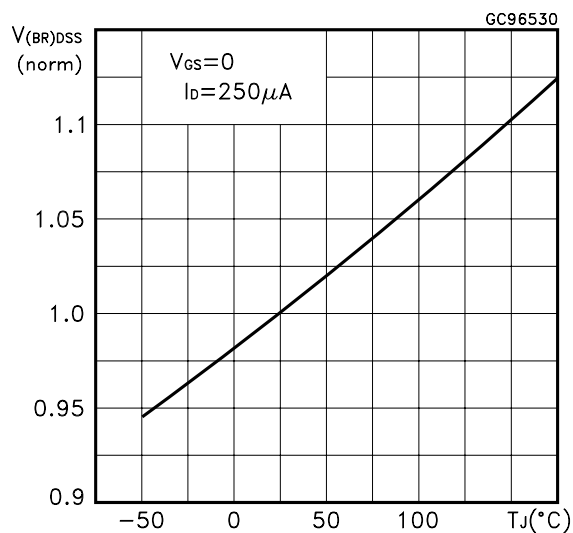


Fig. 1: Unclamped Inductive Load Test Circuit

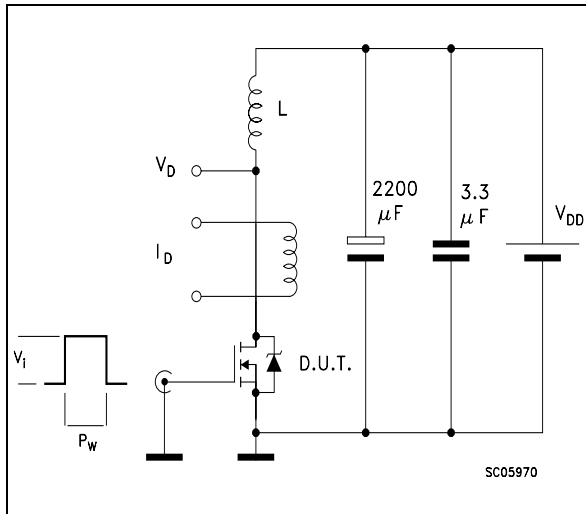


Fig. 2: Unclamped Inductive Waveform

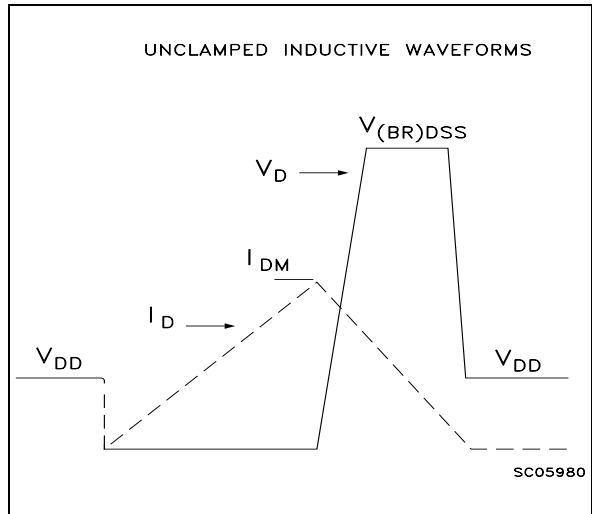


Fig. 3: Switching Times Test Circuits For Resistive Load

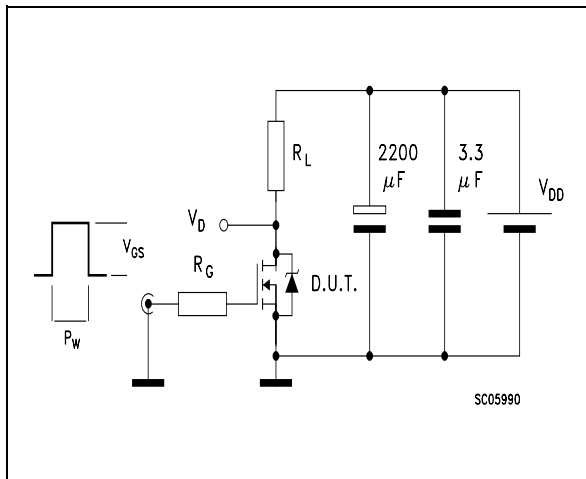


Fig. 4: Gate Charge test Circuit

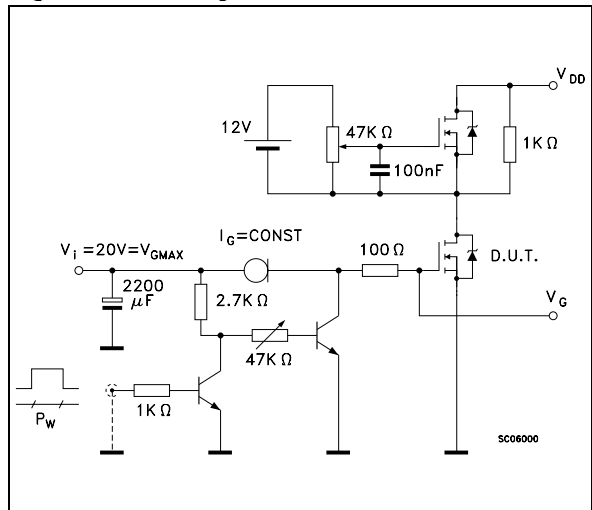
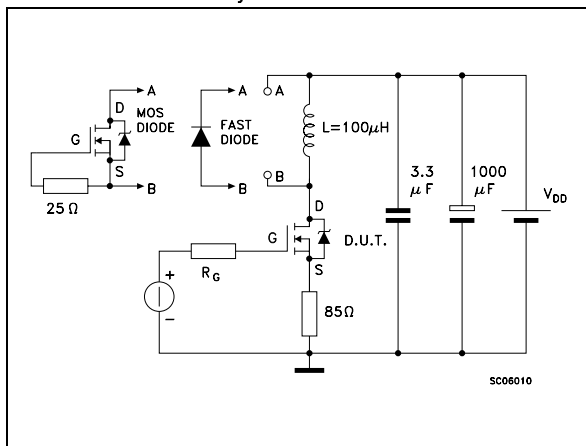
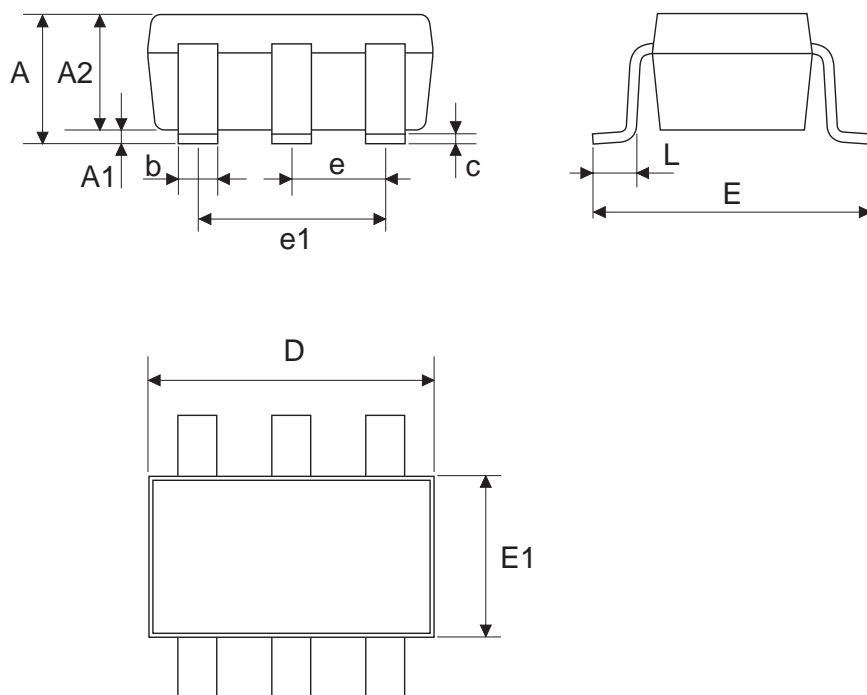


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



SOT23-6L MECHANICAL DATA

| DIM. | mm | | | mils | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 0.90 | | 1.45 | 0.035 | | 0.057 |
| A1 | 0.00 | | 0.15 | 0.000 | | 0.006 |
| A2 | 0.90 | | 1.30 | 0.035 | | 0.051 |
| b | 0.25 | | 0.50 | 0.010 | | 0.020 |
| C | 0.09 | | 0.20 | 0.004 | | 0.008 |
| D | 2.80 | | 3.10 | 0.110 | | 0.122 |
| E | 2.60 | | 3.00 | 0.102 | | 0.118 |
| E1 | 1.50 | | 1.75 | 0.059 | | 0.069 |
| L | 0.35 | | 0.55 | 0.014 | | 0.022 |
| e | | 0.95 | | | 0.037 | |
| e1 | | 1.90 | | | 0.075 | |



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