



# STT3PF30L

## P-CHANNEL 30V - 0.14 $\Omega$ - 3A SOT23-6L STripFET™ II POWER MOSFET

| TYPE      | V <sub>DSS</sub> | R <sub>DS(on)</sub> | I <sub>D</sub> |
|-----------|------------------|---------------------|----------------|
| STT3PF30L | 30 V             | <0.165 $\Omega$     | 3 A            |

- TYPICAL R<sub>DS(on)</sub> = 0.14  $\Omega$
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY
- LOW THRESHOLD DRIVE

### DESCRIPTION

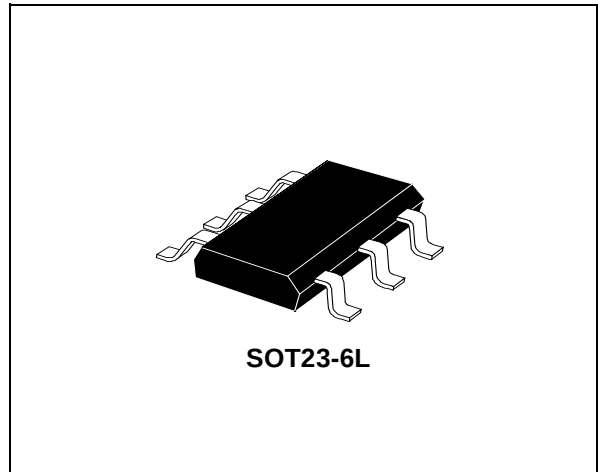
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

### APPLICATIONS

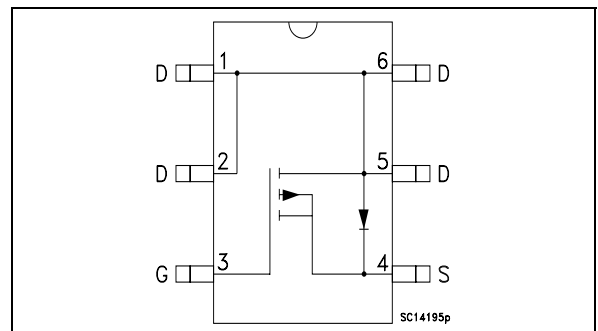
- DC MOTOR DRIVE
- DC-DC CONVERTERS
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT
- POWER MANAGEMENT IN PORTABLE/DESKTOP PCs
- CELLULAR

### MARKING

- STA3



### INTERNAL SCHEMATIC DIAGRAM



### 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                                  | ± 16  | V    |
| I <sub>D</sub>      | Drain Current (continuous) at T <sub>C</sub> = 25°C   | 2.4   | A    |
| I <sub>D</sub>      | Drain Current (continuous) at T <sub>C</sub> = 100°C  | 1.5   | A    |
| I <sub>DM</sub> (●) | Drain Current (pulsed)                                | 10    | A    |
| P <sub>tot</sub>    | Total Dissipation at T <sub>C</sub> = 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

## STT3PF30L

### THERMAL DATA

|                      |                                         |     |            |      |
|----------------------|-----------------------------------------|-----|------------|------|
| R <sub>thj-amb</sub> | (*)Thermal Resistance Junction-ambient  | Max | 78         | °C/W |
| R <sub>thj-amb</sub> | (**)Thermal Resistance Junction-ambient | Max | 156        | °C/W |
| T <sub>j</sub>       | Max. Operating Junction Temperature     |     | -55 to 150 | °C   |
| T <sub>stg</sub>     | Storage Temperature                     |     | -55 to 150 | °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<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> = ± 16 V                                                            |      |      | ±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    | 1.6          | 2.5          | V      |
| R <sub>DS(on)</sub> | Static Drain-source On Resistance | V <sub>GS</sub> = 10 V I <sub>D</sub> = 1.5 A<br>V <sub>GS</sub> = 4.5 V I <sub>D</sub> = 1.5 A |      | 0.14<br>0.16 | 0.165<br>0.2 | Ω<br>Ω |

#### DYNAMIC

| Symbol                                                   | Parameter                                                               | Test Conditions                                      | Min. | Typ.            | Max. | Unit           |
|----------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------|------|-----------------|------|----------------|
| g <sub>fs</sub> (*)                                      | Forward Transconductance                                                | V <sub>DS</sub> =25 V I <sub>D</sub> = 1.5 A         |      | 4               |      | 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> = 25V f = 1 MHz, V <sub>GS</sub> = 0 |      | 420<br>95<br>30 |      | pF<br>pF<br>pF |

**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                              | $V_{DD} = 15\text{ V}$ $I_D = 1.5\text{ A}$<br>$R_G = 4.7\ \Omega$ $V_{GS} = 4.5\text{ V}$<br>(Resistive Load, Figure 1) |      | 14.5<br>37      |      | ns<br>ns       |
| $Q_g$<br>$Q_{gs}$<br>$Q_{gd}$ | Total Gate Charge<br>Gate-Source Charge<br>Gate-Drain Charge | $V_{DD} = 24\text{ V}$ $I_D = 3\text{ A}$ $V_{GS} = 4.5\text{ V}$<br>(see test circuit, Figure 2)                        |      | 4.8<br>1.7<br>2 | 7    | nC<br>nC<br>nC |

**SWITCHING OFF**

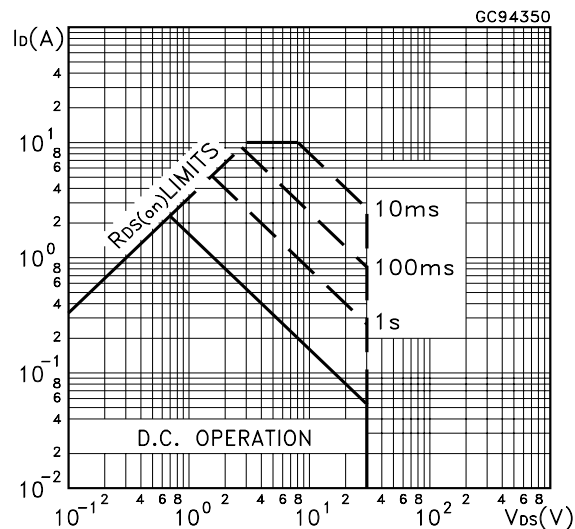
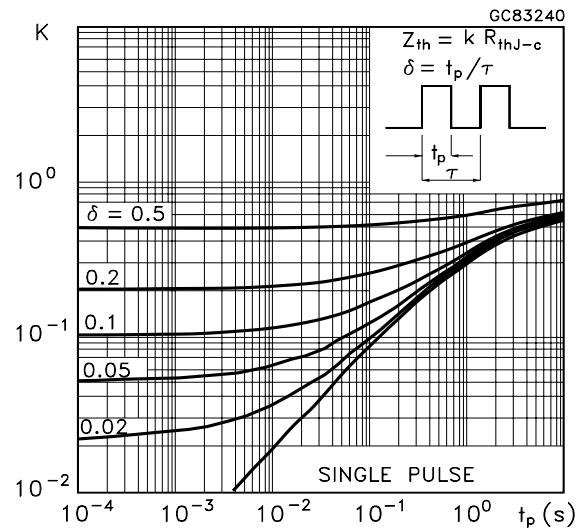
| Symbol                | Parameter                        | Test Conditions                                                                                                            | Min. | Typ.     | Max. | Unit     |
|-----------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------|------|----------|------|----------|
| $t_{d(off)}$<br>$t_f$ | Turn-off Delay Time<br>Fall Time | $V_{DD} = 15\text{ V}$ $I_D = 1.5\text{ A}$<br>$R_G = 4.7\ \Omega$ , $V_{GS} = 4.5\text{ V}$<br>(Resistive Load, Figure 1) |      | 90<br>23 |      | ns<br>ns |

**SOURCE DRAIN DIODE**

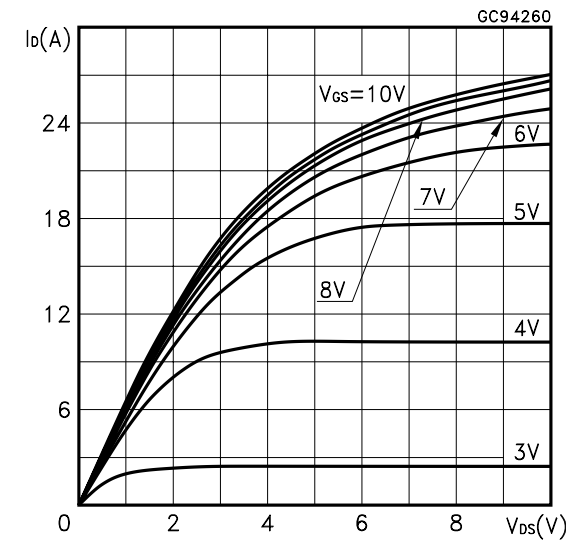
| Symbol                            | Parameter                                                                    | Test Conditions                                                                                                                              | Min. | Typ.            | Max.    | Unit          |
|-----------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------|---------|---------------|
| $I_{SD}$<br>$I_{SDM} (\bullet)$   | Source-drain Current<br>Source-drain Current (pulsed)                        |                                                                                                                                              |      |                 | 3<br>12 | A<br>A        |
| $V_{SD} (*)$                      | Forward On Voltage                                                           | $I_{SD} = 3\text{ A}$ $V_{GS} = 0$                                                                                                           |      |                 | 1.2     | V             |
| $t_{rr}$<br>$Q_{rr}$<br>$I_{RRM}$ | Reverse Recovery Time<br>Reverse Recovery Charge<br>Reverse Recovery Current | $I_{SD} = 3\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$<br>$V_{DD} = 15\text{ V}$ $T_j = 150^\circ\text{C}$<br>(see test circuit, Figure 3) |      | 35<br>25<br>1.5 |         | ns<br>nC<br>A |

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

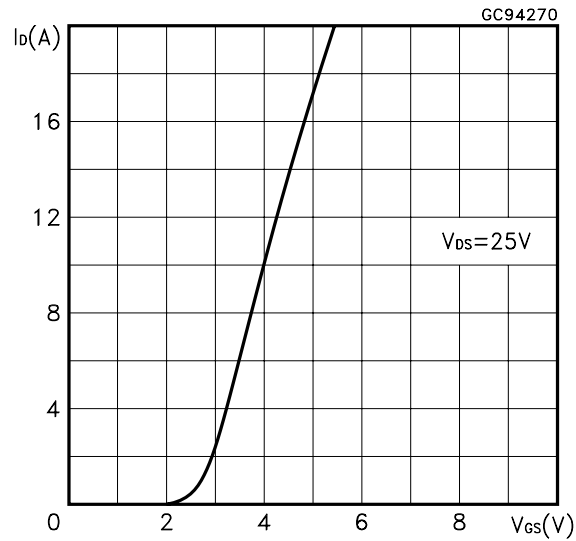
(\bullet) Pulse width limited by safe operating area.

**Safe Operating Area****Thermal Impedance**

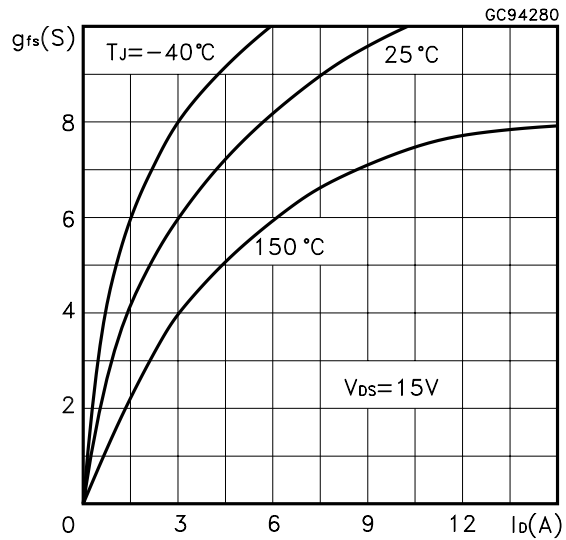
Output Characteristics



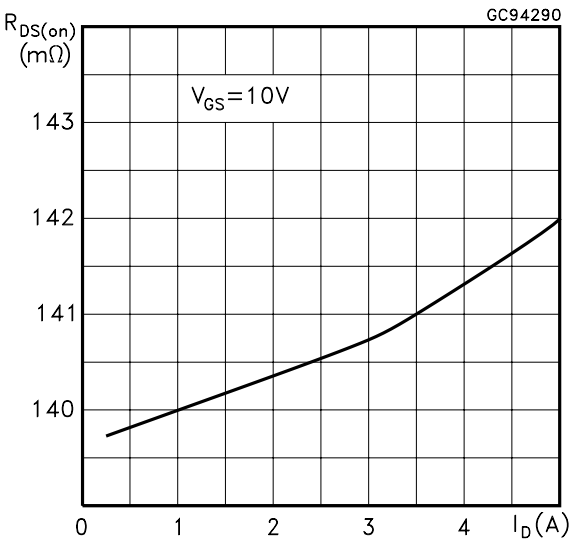
Transfer Characteristics



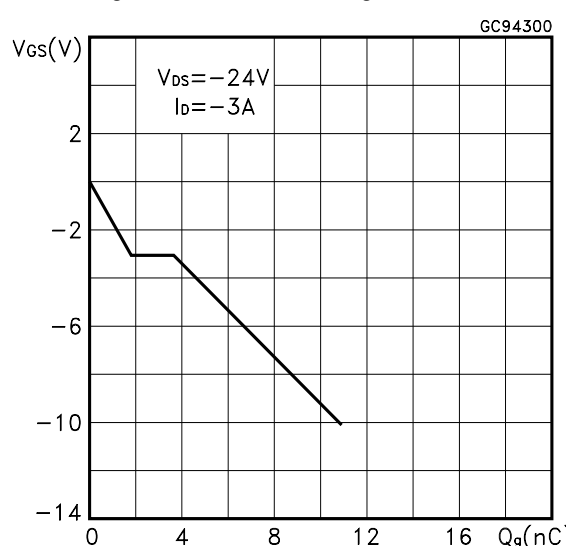
Transconductance



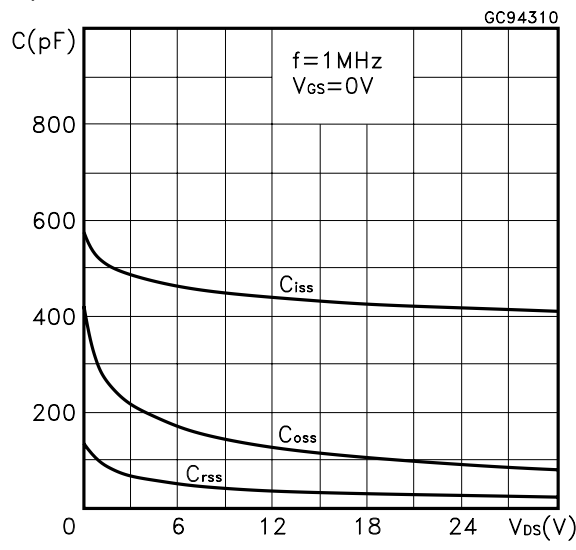
Static Drain-source On Resistance



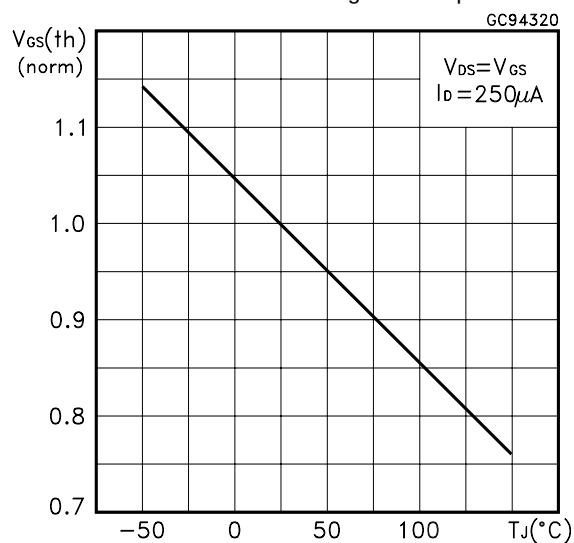
Gate Charge vs Gate-source Voltage



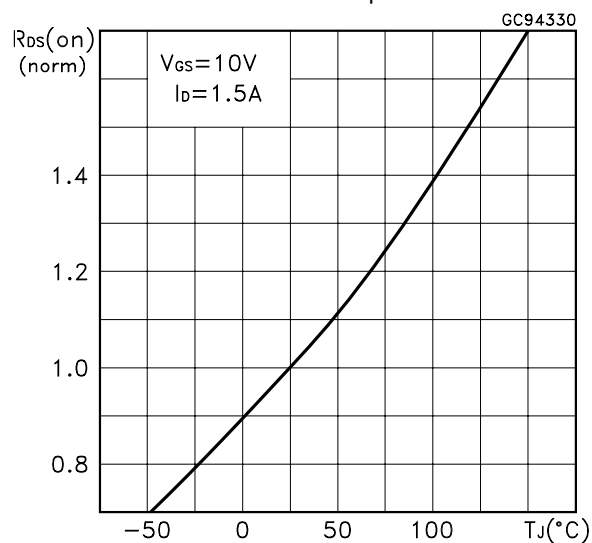
Capacitance Variations



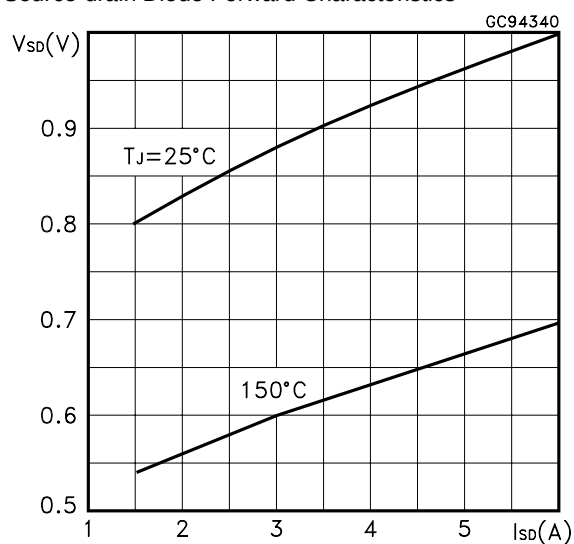
Normalized Gate Threshold Voltage vs Temperature



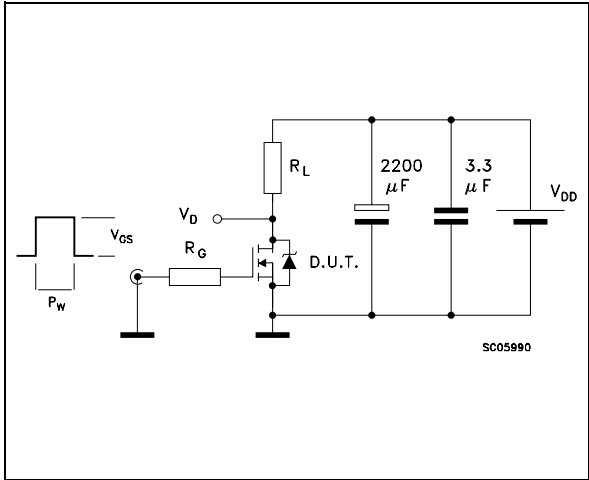
Normalized on Resistance vs Temperature



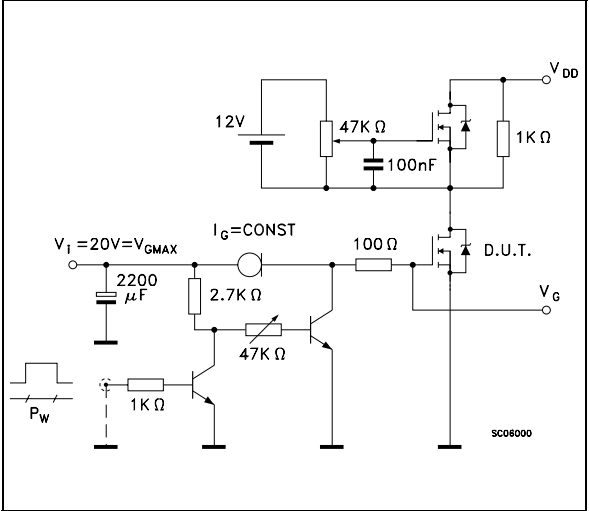
Source-drain Diode Forward Characteristics



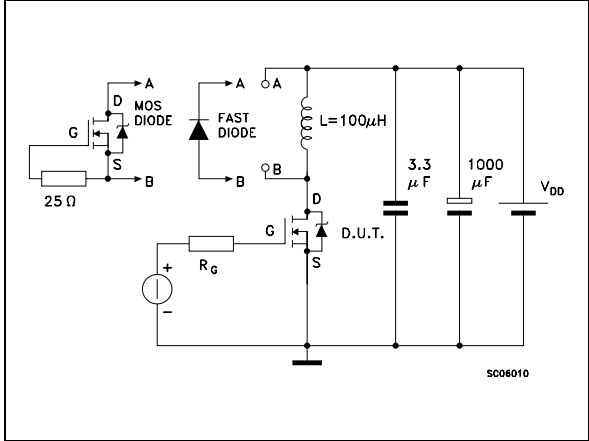
**Fig. 1:** Switching Times Test Circuits For Resistive Load



**Fig. 2:** Gate Charge test Circuit

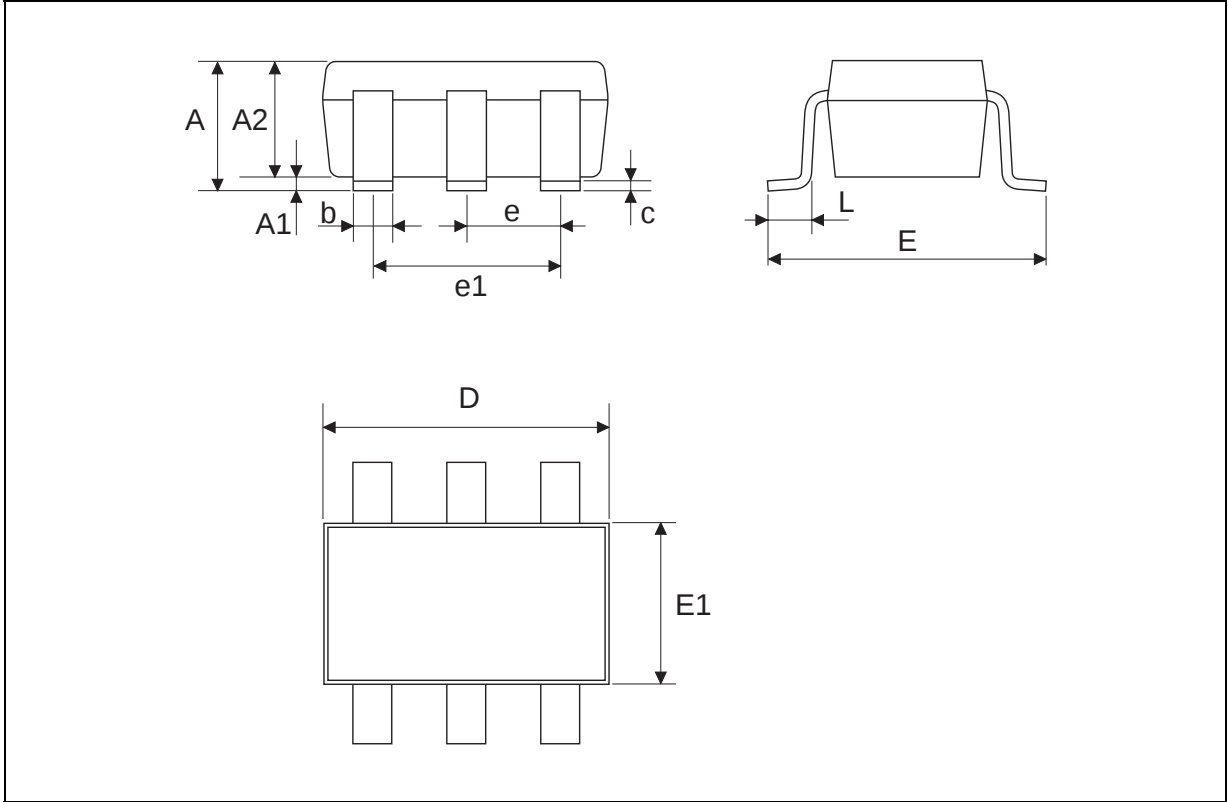


**Fig. 3:** Test Circuit For Diode Recovery Behaviour



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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