



STP30NS15LFP

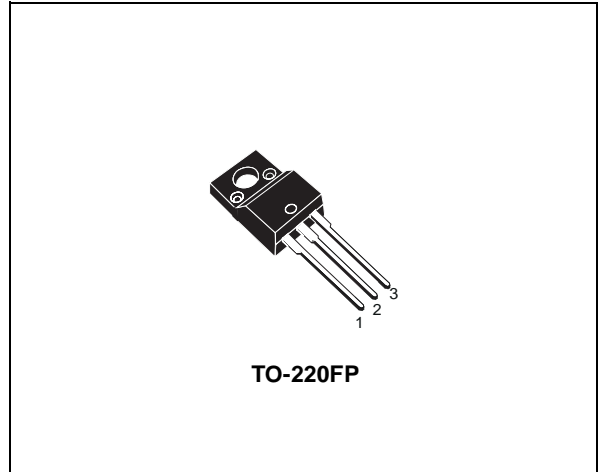
N-CHANNEL 150V - 0.085 Ω - 10A TO-220FP MESH OVERLAY™ POWER MOSFET

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|--------------|------------------|---------------------|----------------|
| STP30NS15LFP | 150 V | <0.1Ω | 10 A |

- TYPICAL R_{DS(on)} = 0.085Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED

DESCRIPTION

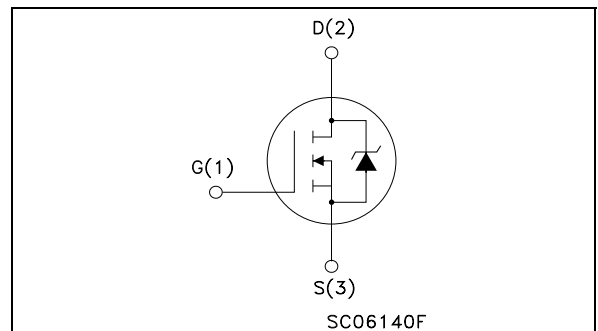
Using the latest high voltage MESH OVERLAY™ process, STMicroelectronics has designed an advanced family of power MOSFETs with outstanding performances. The new patent pending strip layout coupled with the Company's proprietary edge termination structure, gives the lowest R_{DS(on)} per area, exceptional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



APPLICATIONS

- SWITCHING "S" CAPACITOR

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------------|--|------------|------|
| V _{DS} | Drain-source Voltage (V _{GS} = 0) | 150 | V |
| V _{DGR} | Drain-gate Voltage (R _{GS} = 20 kΩ) | 150 | V |
| V _{GS} | Gate- source Voltage | ± 15 | V |
| I _D | Drain Current (continuous) at T _C = 25°C | 10 | A |
| I _D | Drain Current (continuous) at T _C = 100°C | 7 | A |
| I _{DM} (●) | Drain Current (pulsed) | 40 | A |
| P _{tot} | Total Dissipation at T _C = 25°C | 30 | W |
| | Derating Factor | 0.2 | W/°C |
| E _{AS} (1) | Single Pulse Avalanche Energy | 300 | mJ |
| dv/dt (2) | Peak Diode Recovery voltage slope | 2.4 | V/ns |
| T _{stg} | Storage Temperature | -55 to 175 | °C |
| T _j | Operating Junction Temperature | | |

(●) Pulse width limited by safe operating area.

(1) Starting T_j = 25 °C, I_D = 15A, V_{DD} = 75V

(2) I_{SD} ≤ 35A, di/dt ≤ 300A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}.

STP30NS15LFP

THERMAL DATA

| | | | | |
|----------------|--|-----|------|------|
| Rthj-case | Thermal Resistance Junction-case | Max | 5 | °C/W |
| Rthj-amb | Thermal Resistance Junction-ambient | Max | 62.5 | °C/W |
| T _I | Maximum Lead Temperature For Soldering Purpose | Typ | 300 | °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 | 150 | | | 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} = ± 15V | | | ±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 | 1 | 2 | 3 | V |
| R _{DS(on)} | Static Drain-source On Resistance | V _{GS} = 10 V I _D = 5 A V _{GS} = 5 V I _D = 5 A | | 0.085 0.1 | 0.1 0.112 | Ω Ω |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|------------------------------|---|------|------|------|------|
| g _{fs} (*) | Forward Transconductance | V _{DS} = 20 V I _D = 7 A | | 6 | | S |
| C _{iss} | Input Capacitance | V _{DS} = 25V, f = 1 MHz, V _{GS} = 0 | | 1080 | | pF |
| C _{oss} | Output Capacitance | | | 170 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 105 | | 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 | $V_{DD} = 75\text{ V}$ $I_D = 5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 1) | | 25 95 | | ns ns |
| Q_g Q_{gs} Q_{gd} | Total Gate Charge Gate-Source Charge Gate-Drain Charge | $V_{DD}=120\text{V}$ $I_D=10\text{A}$ $V_{GS}=5\text{V}$ (see test circuit, Figure 2) | | 40 7.5 20 | 54 | nC nC nC |

SWITCHING OFF

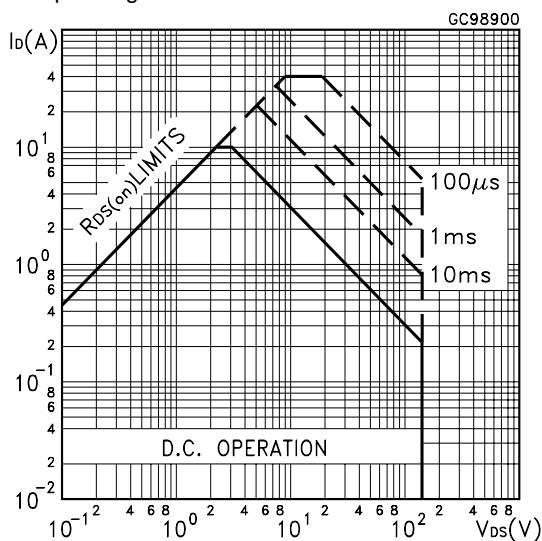
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|----------------------------------|---|---|------|----------------|------|----------------|
| $t_{d(off)}$ t_f | Turn-off Delay Time Fall Time | $V_{DD} = 75\text{ V}$ $I_D = 5\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 5\text{ V}$ (Resistive Load, Figure 1) | | 55 30 | | ns ns |
| $t_r(V_{off})$ t_f t_c | Off-voltage Rise Time Fall Time Cross-over Time | $V_{clamp} = 120\text{ V}$ $I_D = 10\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 4.5\text{ V}$ (Inductive Load, Figure 3) | | 15 30 50 | | ns ns ns |

SOURCE DRAIN DIODE

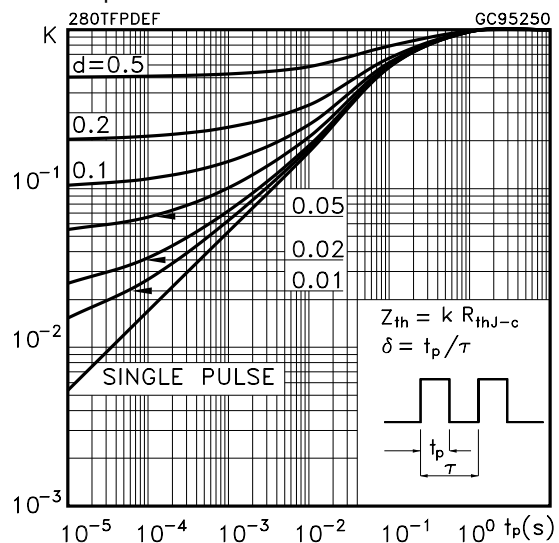
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|--|---|------|------------------|----------|---------------|
| I_{SD} $I_{SDM}(\bullet)$ | Source-drain Current Source-drain Current (pulsed) | | | | 10 40 | A A |
| $V_{SD}(\ast)$ | Forward On Voltage | $I_{SD} = 10\text{ A}$ $V_{GS} = 0$ | | | 1.3 | V |
| t_{rr} Q_{rr} I_{RRM} | Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current | $I_{SD} = 10\text{ A}$ $di/dt = 100\text{A}/\mu\text{s}$ $V_r = 30\text{ V}$ $T_j = 150^\circ\text{C}$ (Inductive Load, Figure 3) | | 160 950 12 | | ns nC A |

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

Safe Operating Area

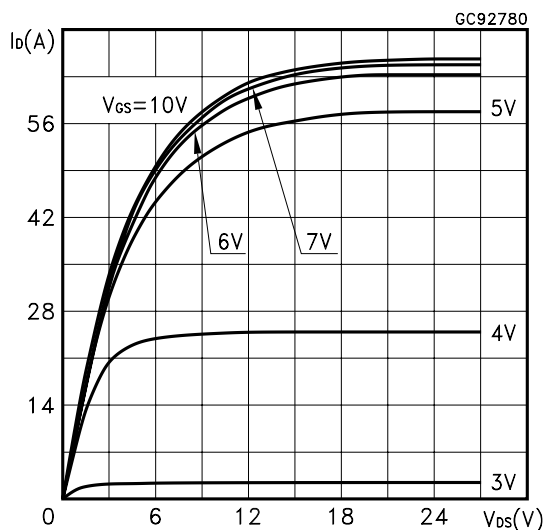


Thermal Impedance

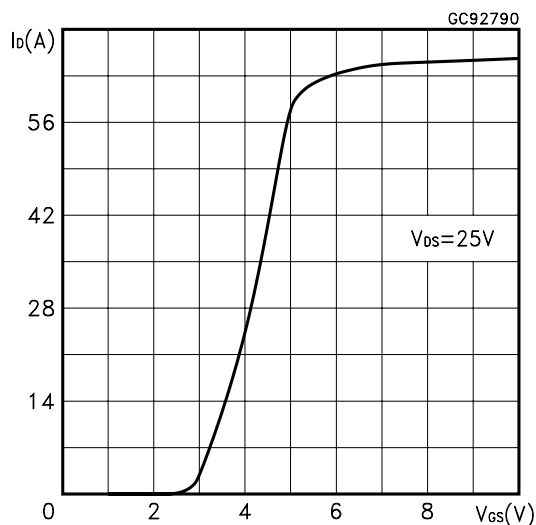


STP30NS15LFP

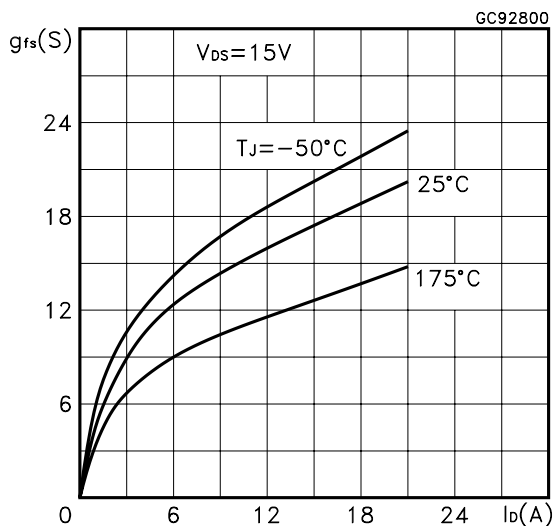
Output Characteristics



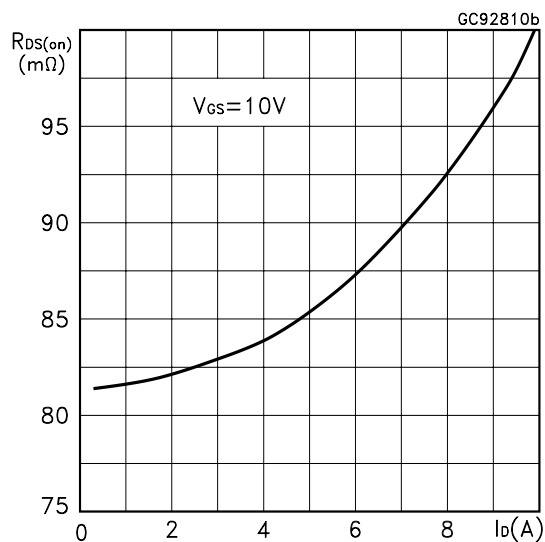
Transfer Characteristics



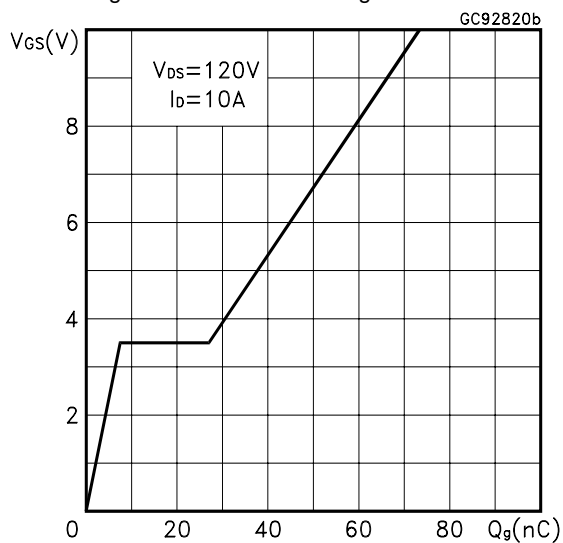
Transconductance



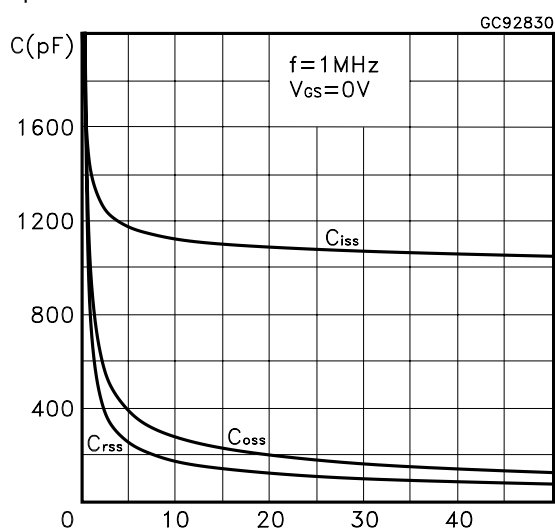
Static Drain-source On Resistance



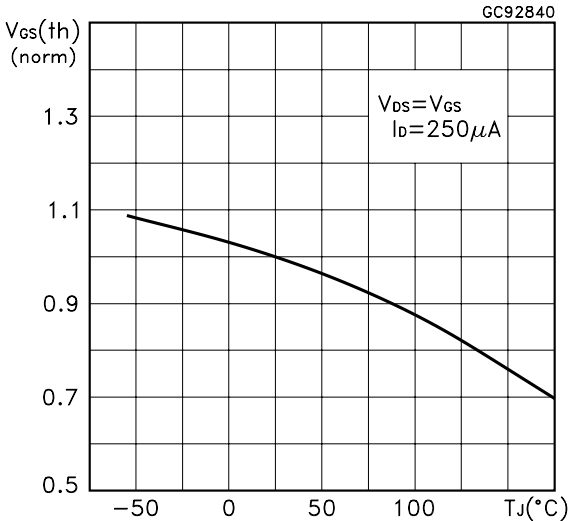
Gate Charge vs Gate-source Voltage



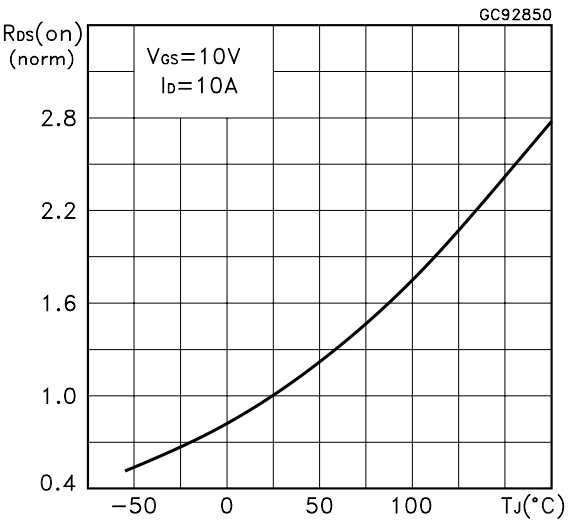
Capacitance Variations



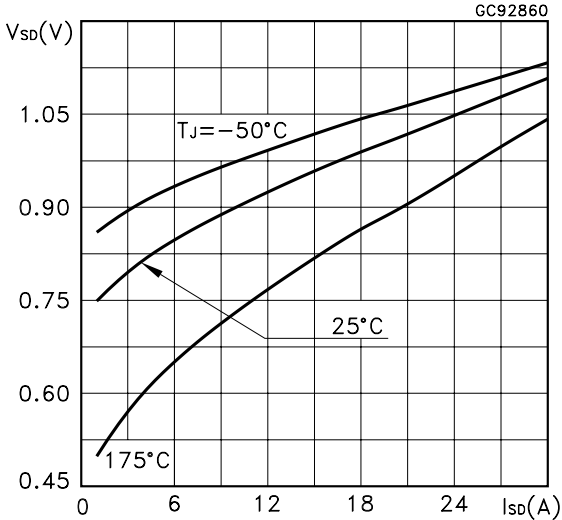
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature

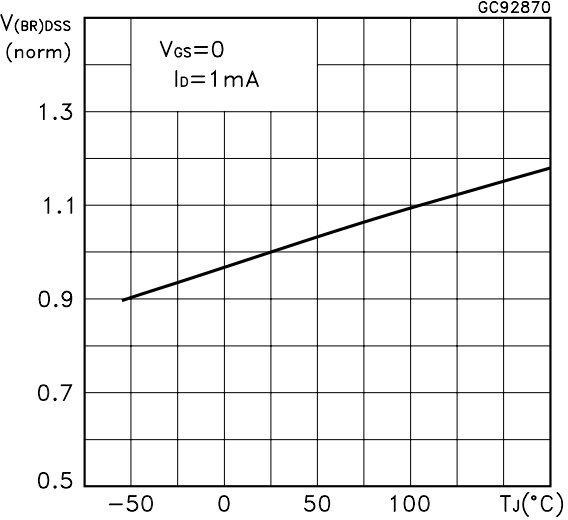


Fig. 1: Switching Times Test Circuits For Resistive Load

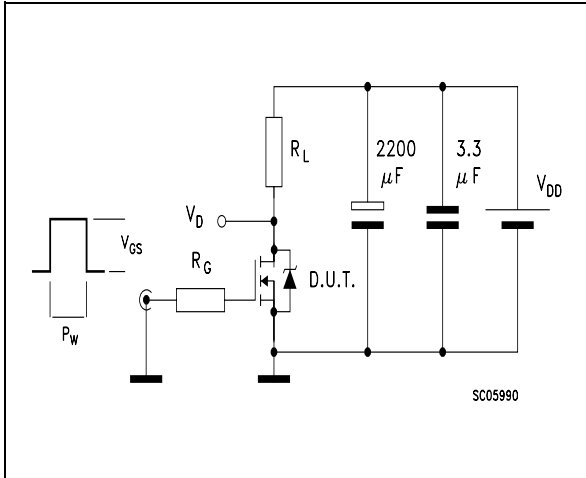


Fig. 2: Gate Charge test Circuit

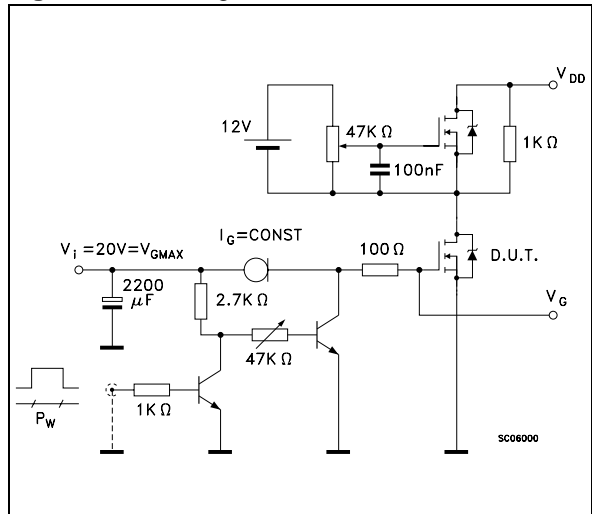
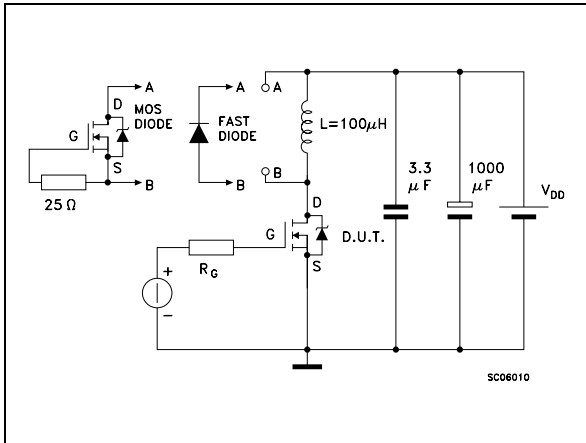
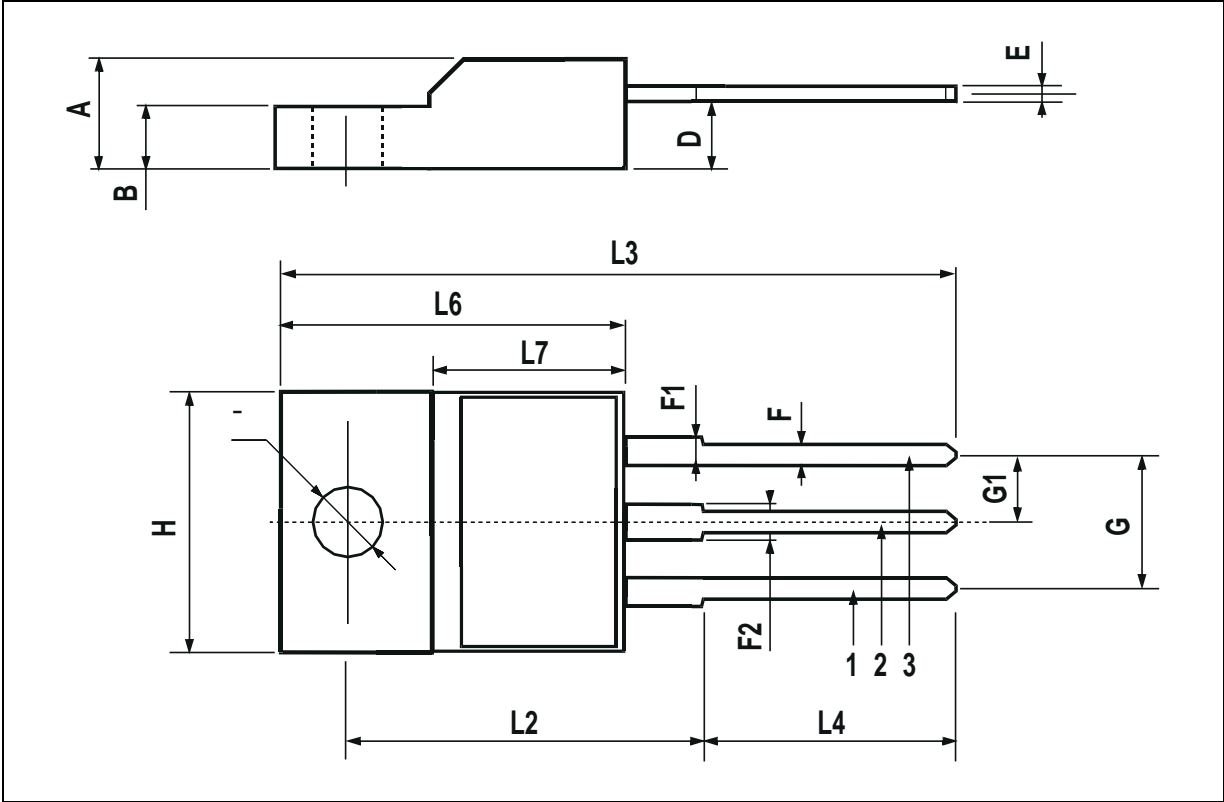


Fig. 3: Test Circuit For Diode Recovery Behaviour



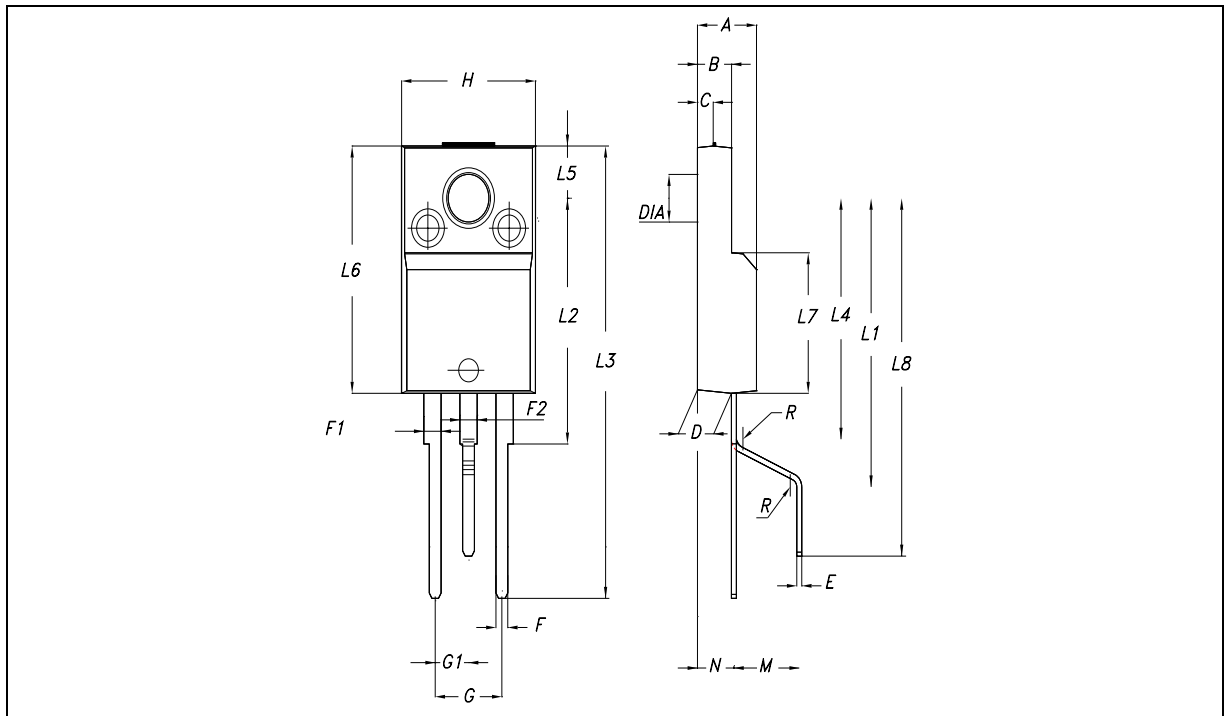
TO-220FP MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.4 | | 4.6 | 0.173 | | 0.181 |
| B | 2.5 | | 2.7 | 0.098 | | 0.106 |
| D | 2.5 | | 2.75 | 0.098 | | 0.108 |
| E | 0.45 | | 0.7 | 0.017 | | 0.027 |
| F | 0.75 | | 1 | 0.030 | | 0.039 |
| F1 | 1.15 | | 1.7 | 0.045 | | 0.067 |
| F2 | 1.15 | | 1.7 | 0.045 | | 0.067 |
| G | 4.95 | | 5.2 | 0.195 | | 0.204 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H | 10 | | 10.4 | 0.393 | | 0.409 |
| L2 | | 16 | | | 0.630 | |
| L3 | 28.6 | | 30.6 | 1.126 | | 1.204 |
| L4 | 9.8 | | 10.6 | 0.385 | | 0.417 |
| L6 | 15.9 | | 16.4 | 0.626 | | 0.645 |
| L7 | 9 | | 9.3 | 0.354 | | 0.366 |
| ∅ | 3 | | 3.2 | 0.118 | | 0.126 |



TO-220FP(023Y) MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|-----|------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 4.4 | | 4.6 | 0.173 | | 0.181 |
| B | 2.5 | | 2.7 | 0.009 | | 0.106 |
| C | 1 | | 1.4 | 0.039 | | 0.055 |
| D | 2.4 | | 2.75 | 0.094 | | 0.108 |
| E | 0.4 | | 0.7 | 0.015 | | 0.027 |
| F | 0.75 | | 1 | 0.029 | | 0.039 |
| F1 | 1.15 | | 1.7 | 0.045 | | 0.066 |
| F2 | 1.15 | | 1.7 | 0.045 | | 0.066 |
| G | 4.68 | | 5.48 | 0.184 | | 0.215 |
| G1 | 2.24 | | 2.84 | 0.088 | | 0.111 |
| H | 10 | | 10.4 | 0.393 | | 0.409 |
| L1 | 18.4 | | 19.2 | 0.724 | | 0.755 |
| L2 | | 16 | | | 0.629 | |
| L3 | 29 | | 30 | 1.14 | | 1.18 |
| L4 | 15.3 | | 16.1 | 0.60 | | 0.63 |
| L5 | | 3.4 | | | 0.133 | |
| L6 | 15.9 | | 16.4 | 0.625 | | 0.665 |
| L7 | 9 | | 9.3 | 0.354 | | 0.366 |
| L8 | 22.5 | | 23.6 | 0.885 | | 0.929 |
| M | 4.6 | | 5.4 | 0.181 | | 0.212 |
| N | 2.29 | | 3.29 | 0.090 | | 0.129 |
| Dia | 3 | | 3.2 | | | |



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. Specifications 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 registered trademark of STMicroelectronics
© 2003 STMicroelectronics - All Rights Reserved

All other names are the property of their respective owners.

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco -
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>

