

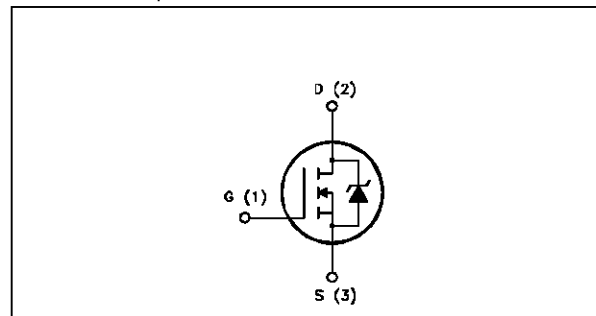
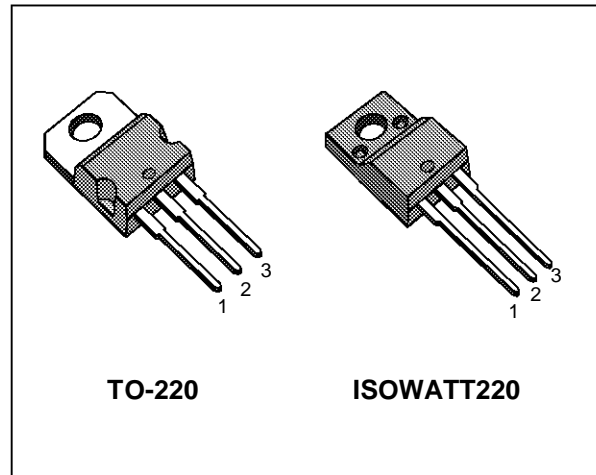
N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|-------------|------------------|---------------------|----------------|
| STP15N05L | 50 V | < 0.15 Ω | 15 A |
| STP15N05LFI | 50 V | < 0.15 Ω | 10 A |

- TYPICAL R_{DS(on)} = 0.115 Ω
- AVALANCHE RUGGED TECHNOLOGY
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW GATE CHARGE
-
- 175°C OPERATING TEMPERATURE
- APPLICATION ORIENTED CHARACTERIZATION

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SOLENOID AND RELAY DRIVERS
- REGULATORS
- DC-DC & DC-AC CONVERTERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
-



| Symbol | Parameter | Value | | Unit |
|---------------------|---|------------|-------------|------|
| | | STP15N05L | STP15N05LFI | |
| V | Drain-source Voltage (V _{GS} = 0) | 50 | | V |
| V _{DGR} | Drain- gate Voltage (R _{GS} = 20 kΩ) | 50 | | V |
| V _{GS} | Gate-source Voltage | ± 15 | | V |
| I _D | Drain Current(continuous) at T _c = 25 °C | 15 | 10 | A |
| I _D | Drain Current (continuous) at T _c = 100 °C | 10 | 7 | A |
| I _{DM} (●) | Drain Current (pulsed) | 60 | 60 | A |
| P _{tot} | Total Dissipation at T _c = 25 °C | 70 | 35 | W |
| | Derating Factor | 0.47 | 0.23 | W/°C |
| V _{ISO} | Insulation Withstand Voltage (DC) | — | 2000 | V |
| T _{stg} | Storage Temperature | -65 to 175 | | °C |
| T _j | Max.Operating Junction Temperature | 175 | | °C |

(●) Pulse width limited by safe operating area

STP15N05L/FI

THERMAL DATA

| | | TO-220 | ISOWATT220 | |
|-----------------------|--|--------|------------|------|
| R _{thj-case} | Thermal Resistance Junction-case Max | 2.14 | 4.29 | °C/W |
| R _{thj-amb} | Thermal Resistance Junction-ambient Max | 62.5 | | °C/W |
| R _{thc-sink} | Thermal Resistance Case-sink Typ | 0.5 | | °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, δ < 1%) | 15 | A |
| E _{AS} | Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 25 V) | 45 | mJ |
| E _{AR} | Repetitive Avalanche Energy (pulse width limited by T _j max, δ < 1%) | 10 | mJ |
| I _{AR} | Avalanche Current, Repetitive or Not-Repetitive (T _c = 100 °C, pulse width limited by T _j max, δ < 1%) | 10 | A |

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 | 50 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current (V _{GS} = 0) | V _{DS} = Max Rating V _{DS} = Max Rating x 0.8 T _c = 125 °C | | | 1 10 | μA μA |
| I _{GSS} | Gate-body Leakage Current (V _{DS} = 0) | V _{GS} = ± 15 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 | 1 | 1.6 | 2.5 | V |
| R _{DS(on)} | Static Drain-source On Resistance | V _{GS} = 5 V I _D = 7.5 A | | 0.115 | 0.15 | Ω |
| I _{D(on)} | On State Drain Current | V _{DS} > I _{D(on)} x R _{DS(on)max} V _{GS} = 10 V | 15 | | | A |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|------------------------------|--|------|------|------|------|
| g _{fs} (*) | Forward Transconductance | V _{DS} > I _{D(on)} x R _{DS(on)max} I _D = 7.5 A | 5 | 9 | | S |
| C _{iss} | Input Capacitance | V _{DS} = 25 V f = 1 MHz V _{GS} = 0 | | 350 | 500 | pF |
| C _{oss} | Output Capacitance | | | 150 | 200 | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 50 | 80 | pF |

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------|--|---|------|--------------|-----------|------------------|
| $t_{d(on)}$ t_r | Turn-on Time Rise Time | $V_{DD} = 25\text{ V}$ $I_D = 7.5\text{ A}$ $R_G = 50\ \Omega$ $V_{GS} = 5\text{ V}$ (see test circuit, figure 3) | | 60 190 | 90 270 | ns ns |
| $(di/dt)_{on}$ | Turn-on Current Slope | $V_{DD} = 40\text{ V}$ $I_D = 15\text{ A}$ $R_G = 50\ \Omega$ $V_{GS} = 5\text{ V}$ (see test circuit, figure 5) | | 120 | | A/ μs |
| Q_g Q_{gs} Q_{gd} | Total Gate Charge Gate-Source Charge Gate-Drain Charge | $V_{DD} = 40\text{ V}$ $I_D = 15\text{ A}$ $V_{GS} = 5\text{ V}$ | | 12 7 4 | 18 | nC nC nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------------------|---|--|------|-----------------|-----------------|----------------|
| $t_{r(Voff)}$ t_f t_c | Off-voltage Rise Time Fall Time Cross-over Time | $V_{DD} = 40\text{ V}$ $I_D = 15\text{ A}$ $R_G = 50\ \Omega$ $V_{GS} = 5\text{ V}$ (see test circuit, figure 5) | | 40 60 110 | 60 90 160 | ns ns ns |

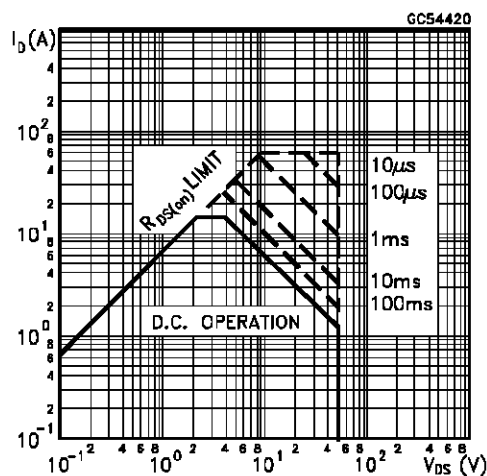
SOURCE DRAIN DIODE

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|---|---|------|-------------------|----------|--------------------------|
| I_{SD} $I_{SDM}(\bullet)$ | Source-drain Current Source-drain Current (pulsed) | | | | 15 60 | A A |
| $V_{SD} (*)$ | Forward On Voltage | $I_{SD} = 15\text{ A}$ $V_{GS} = 0$ | | | 1.5 | V |
| t_{rr} Q_{rr} I_{RRM} | Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current | $I_{SD} = 15\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 25\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ (see test circuit, figure 5) | | 80 0.18 4.5 | | ns μC A |

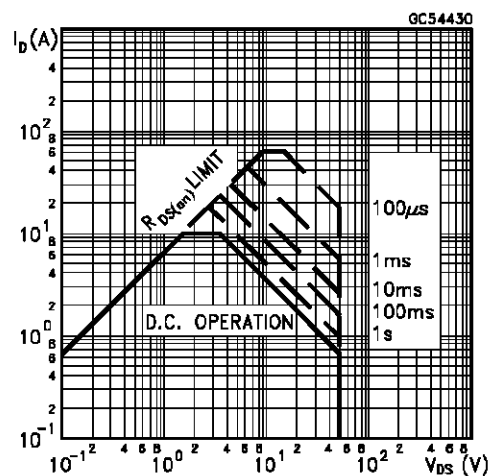
(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

(\bullet) Pulse width limited by safe operating area

Safe Operating Areas For TO-220

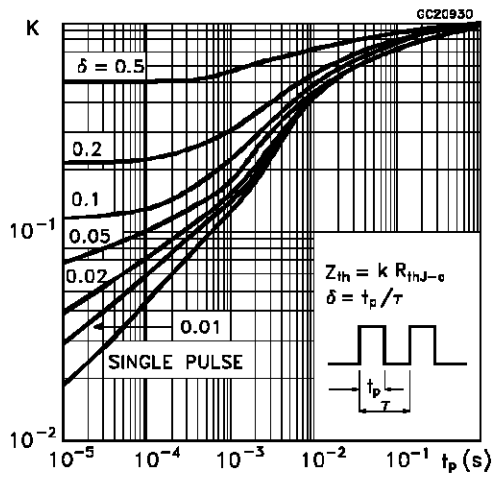


Safe Operating Areas For ISOWATT220

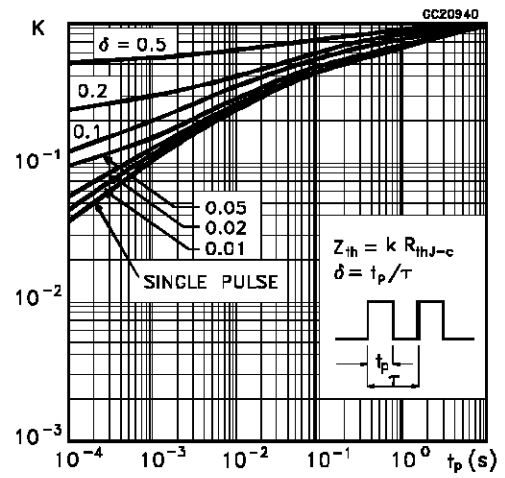


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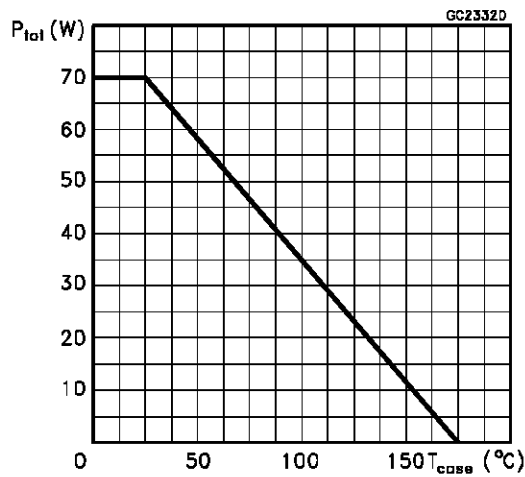
Thermal Impedance For TO-220



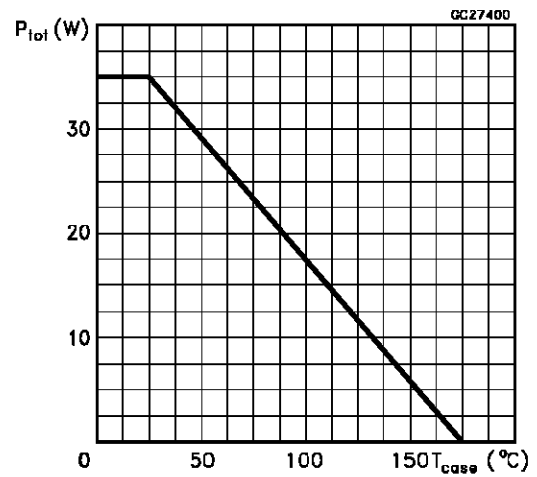
Thermal Impedance For ISOWATT220



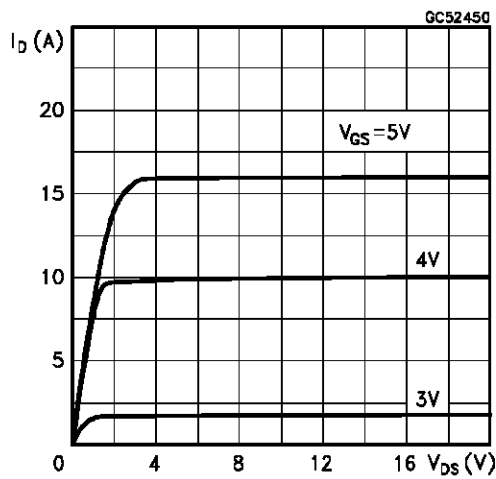
Derating Curve For TO-220



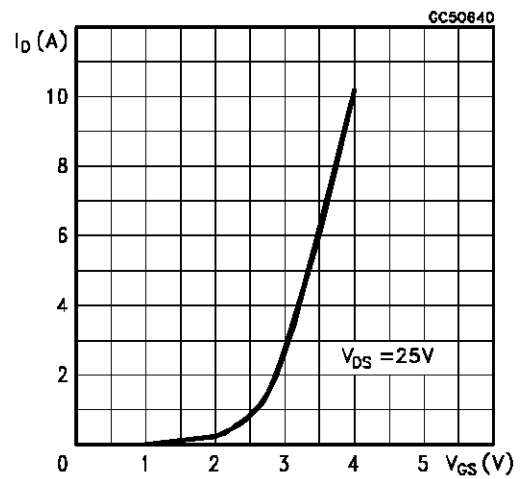
Derating Curve For ISOWATT220



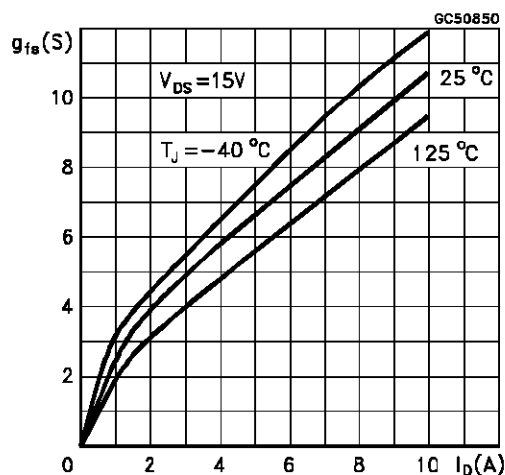
Output Characteristics



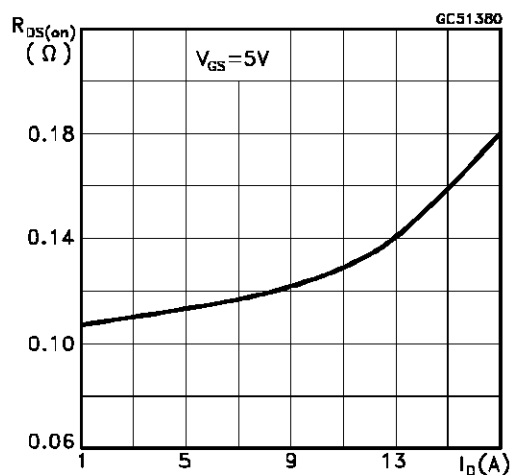
Transfer Characteristics



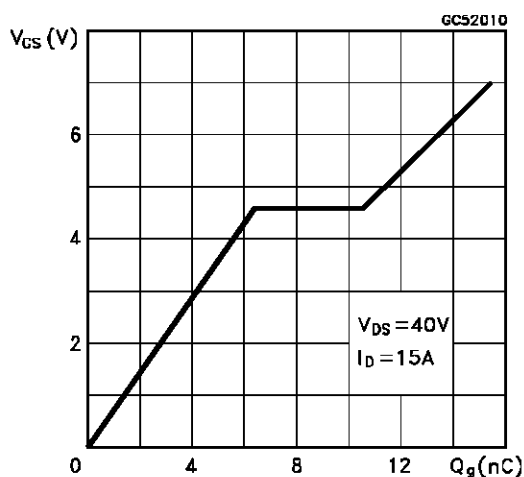
Transconductance



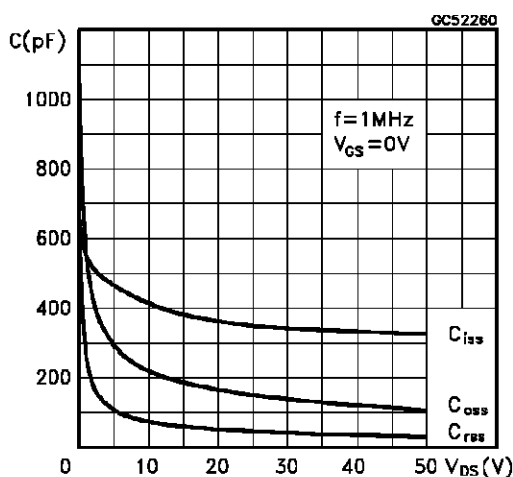
Static Drain-source On Resistance



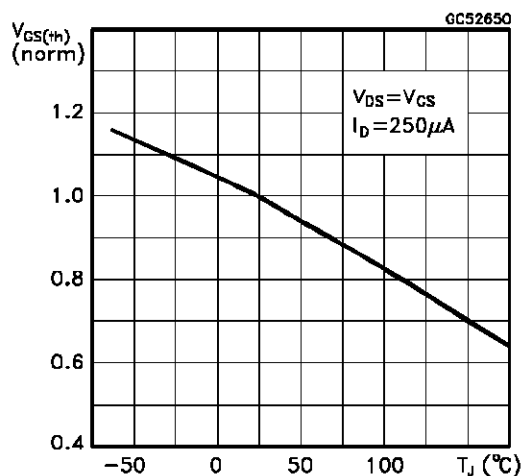
Gate Charge vs Gate-source Voltage



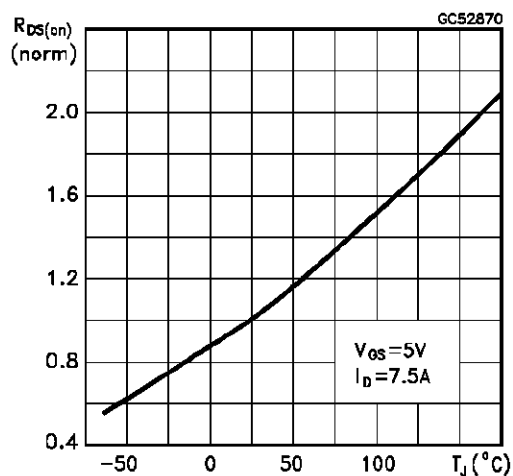
Capacitance Variations



Normalized Gate Threshold Voltage vs Temperature

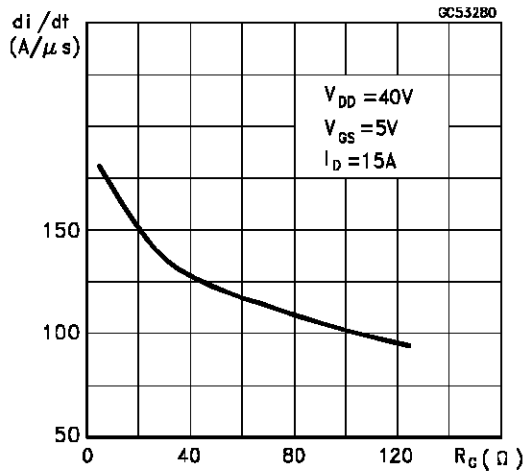


Normalized On Resistance vs Temperature

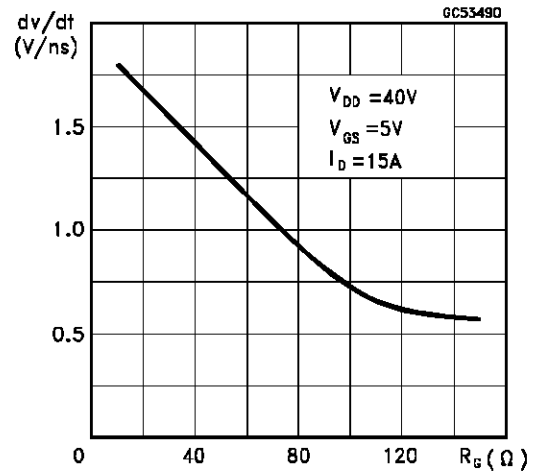


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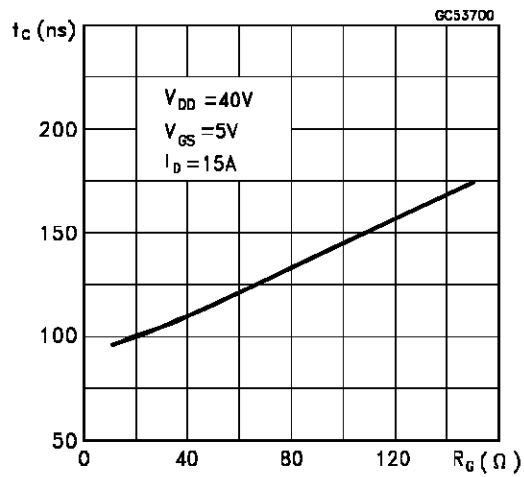
Turn-on Current Slope



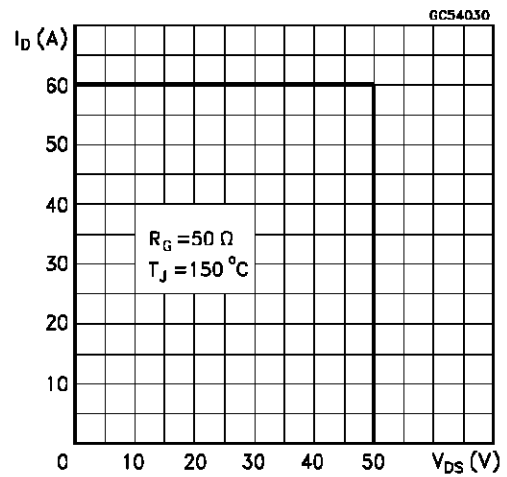
Turn-off Drain-source Voltage Slope



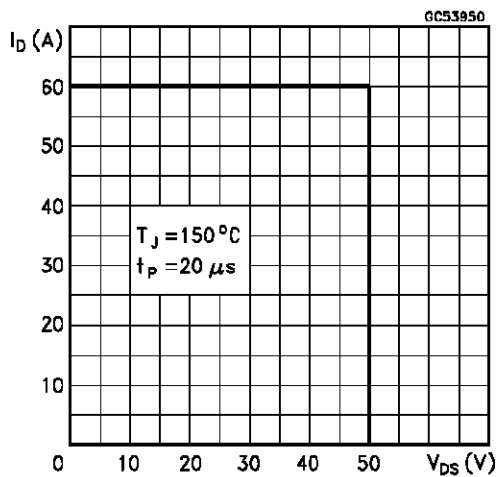
Cross-over Time



Switching Safe Operating Area



Accidental Overload Area



Source-drain Diode Forward Characteristics

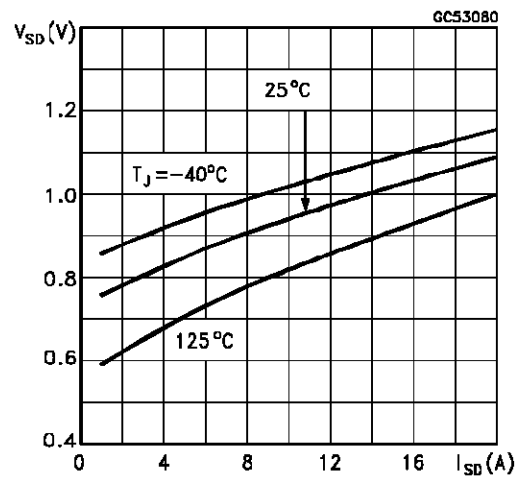


Fig. 1: Unclamped Inductive Load Test Circuits

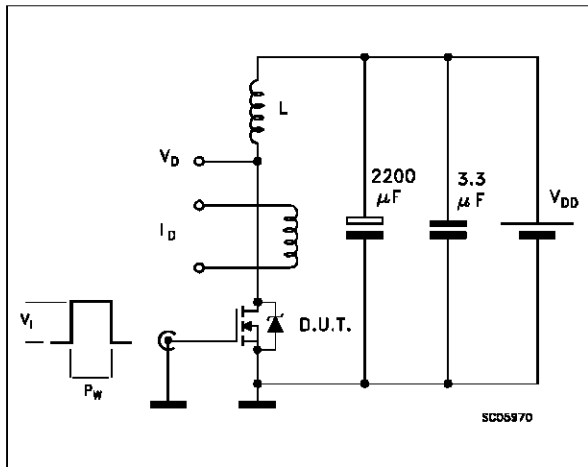


Fig. 2: Unclamped Inductive Waveforms

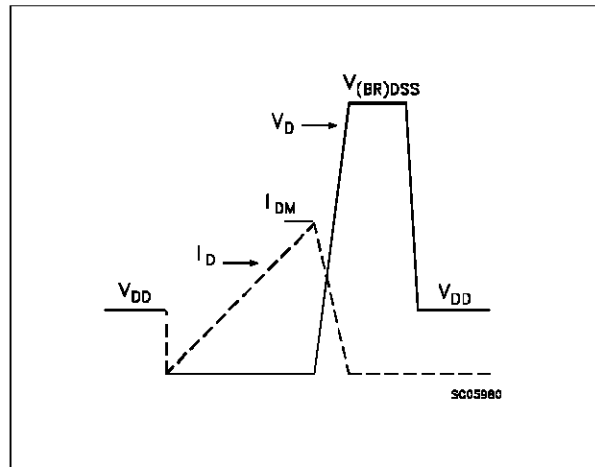


Fig. 3: Switching Times Test Circuits For Resistive Load

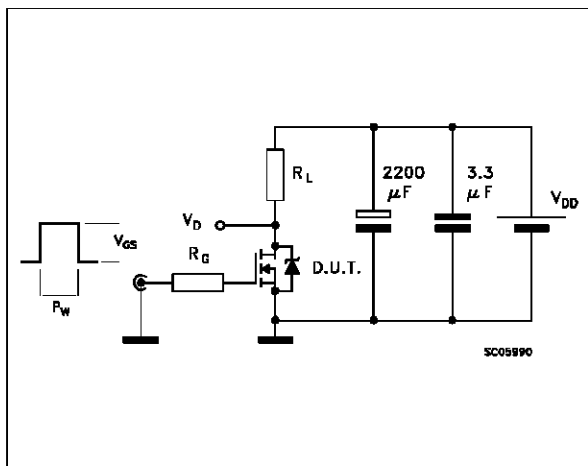


Fig. 4: Gate Charge Test Circuit

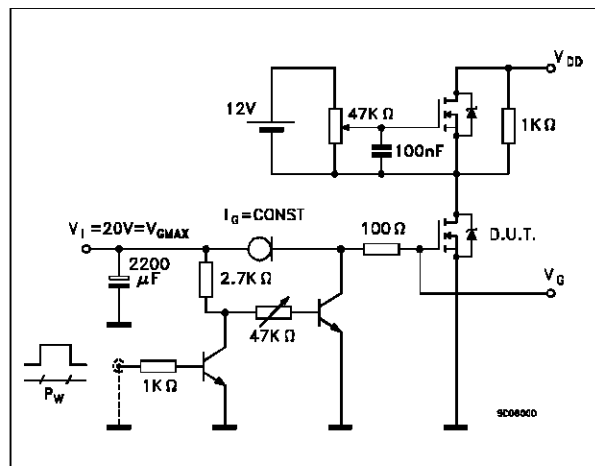
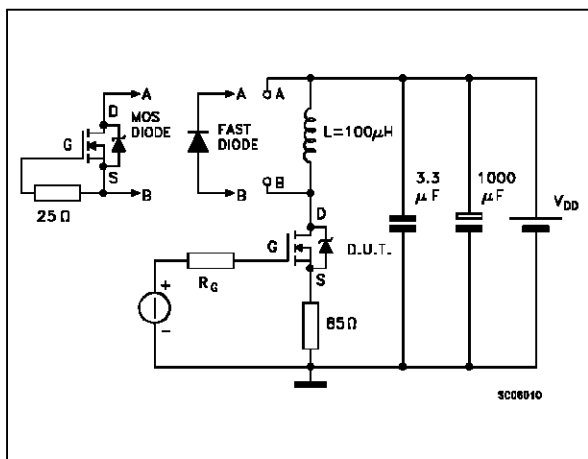


Fig. 5: Test Circuit For Inductive Load Switching And Diode Reverse Recovery Time



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