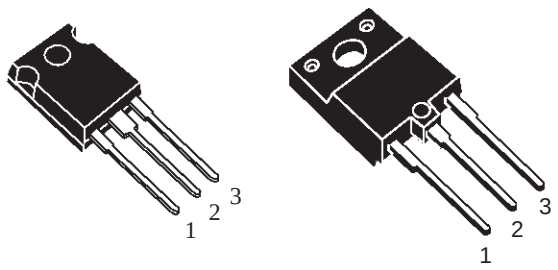
# STW8NA60
# STH8NA60FI

## N - CHANNEL ENHANCEMENT MODE FAST POWER MOS TRANSISTOR

| TYPE | $V_{DSS}$ | $R_{DS(on)}$ | $I_D$ |
|---|---|---|---|
| STW8NA60 | 600 V | < 1 Ω | 8 A |
| STH8NA60FI | 600 V | < 1 Ω | 5 A |

- TYPICAL $R_{DS(on)}$ = 0.92 Ω
- ± 30V GATE TO SOURCE VOLTAGE RATING
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED
- REDUCED THRESHOLD VOLTAGE SPREAD

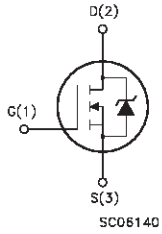



**TO-247** **ISOWATT218**

### APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLIES (SMPS)
- DC-AC CONVERTERS FOR WELDING EQUIPMENT AND UNINTERRUPTIBLE POWER SUPPLIES AND MOTOR DRIVE

**INTERNAL SCHEMATIC DIAGRAM**




### ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | | Unit |
|---|---|---|---|---|
| | | STW8NA60 | STH8NA60FI | |
| $V_{DS}$ | Drain-source Voltage ($V_{GS}$ = 0) | 600 | | V |
| $V_{DGR}$ | Drain- gate Voltage ($R_{GS}$ = 20 kΩ) | 600 | | V |
| $V_{GS}$ | Gate-source Voltage | ± 30 | | V |
| $I_D$ | Drain Current (continuous) at $T_c$ = 25 °C | 8 | 5 | A |
| $I_D$ | Drain Current (continuous) at $T_c$ = 100 °C | 5.1 | 3.2 | A |
| $I_{DM}$(•) | Drain Current (pulsed) | 32 | 32 | A |
| $P_{tot}$ | Total Dissipation at $T_c$ = 25 °C | 150 | 60 | W |
| | Derating Factor | 1.2 | 0.48 | W/°C |
| $V_{ISO}$ | Insulation Withstand Voltage (DC) | — | 4000 | V |
| $T_{stg}$ | Storage Temperature | -65 to 150 | | °C |
| $T_j$ | Max. Operating Junction Temperature | 150 | | °C |

(•) Pulse width limited by safe operating area

## THERMAL DATA

| | | | TO-247 | ISOWATT218 | |
|---|---|---|---|---|---|
| $R_{thj\text{-}case}$ | Thermal Resistance Junction-case | Max | 0.83 | 2.08 | $^oC/W$ |
| $R_{thj\text{-}amb}$ | Thermal Resistance Junction-ambient | Max | 30 | | $^oC/W$ |
| $R_{thc\text{-}sink}$ | Thermal Resistance Case-sink | Typ | 0.1 | | $^oC/W$ |
| $T_l$ | Maximum Lead Temperature For Soldering Purpose | | 300 | | $^oC$ |

## AVALANCHE CHARACTERISTICS

| Symbol | Parameter | Max Value | Unit |
|---|---|---|---|
| $I_{AR}$ | Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by $T_j$ max, $\delta < 1\%$) | 8 | A |
| $E_{AS}$ | Single Pulse Avalanche Energy (starting $T_j = 25\ ^oC$, $I_D = I_{AR}$, $V_{DD} = 50$ V) | 480 | mJ |

## ELECTRICAL CHARACTERISTICS ($T_{case} = 25\ ^oC$ unless otherwise specified)

OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-source Breakdown Voltage | $I_D = 250\ \mu A$ $V_{GS} = 0$ | 600 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current ($V_{GS} = 0$)<br>Zero Gate Voltage Drain Current ($V_{GS} = 0$) | $V_{DS}$ = Max Rating<br>$V_{DS}$ = Max Rating $T_c = 100\ ^oC$ | | | 25<br>250 | $\mu A$<br>$\mu A$ |
| $I_{GSS}$ | Gate-body Leakage Current ($V_{DS} = 0$) | $V_{GS} = \pm 30$ V | | | $\pm 100$ | nA |

ON (*)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}$ $I_D = 250\ \mu A$ | 2.25 | 3 | 3.75 | V |
| $R_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS} = 10$V $I_D = 4$ A | | 0.92 | 1 | $\Omega$ |
| $I_{D(on)}$ | On State Drain Current | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$<br>$V_{GS} = 10$ V | 8 | | | A |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $g_{fs}$ (*) | Forward Transconductance | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 4$ A | 4.5 | 6.6 | | S |
| $C_{iss}$<br>$C_{oss}$<br>$C_{rss}$ | Input Capacitance<br>Output Capacitance<br>Reverse Transfer Capacitance | $V_{DS} = 25$ V f = 1 MHz $V_{GS} = 0$ | | 1350<br>175<br>45 | 1690<br>230<br>60 | 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 Time<br>Rise Time | $V_{DD}$ = 300 V $I_D$ = 4 A<br>$R_G$ = 4.7 Ω $V_{GS}$ = 10 V<br>(see test circuit, figure 3) | | 20<br>35 | 28<br>35 | ns<br>ns |
| $(di/dt)_{on}$ | Turn-on Current Slope | $V_{DD}$ = 480 V $I_D$ = 8 A<br>$R_G$ = 47 Ω $V_{GS}$ = 10 V<br>(see test circuit, figure 5) | | 200 | | A/µs |
| $Q_g$<br>$Q_{gs}$<br>$Q_{gd}$ | Total Gate Charge<br>Gate-Source Charge<br>Gate-Drain Charge | $V_{DD}$ = 480 V $I_D$ = 8 A $V_{GS}$ = 10 V | | 58<br>9<br>27 | 82 | nC<br>nC<br>nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{r(Voff)}$<br>$t_f$<br>$t_c$ | Off-voltage Rise Time<br>Fall Time<br>Cross-over Time | $V_{DD}$ = 640 V $I_D$ = 8 A<br>$R_G$ = 4.7 Ω $V_{GS}$ = 10 V<br>(see test circuit, figure 5) | | 16<br>16<br>26 | 23<br>23<br>37 | ns<br>ns<br>ns |

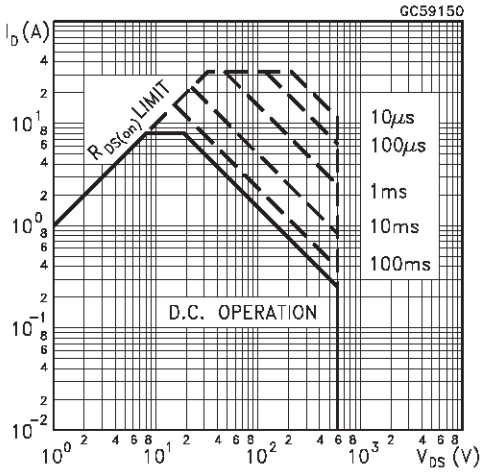
SOURCE DRAIN DIODE

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{SD}$<br>$I_{SDM}$(•) | Source-drain Current<br>Source-drain Current (pulsed) | | | | 8<br>32 | A<br>A |
| $V_{SD}$ (*) | Forward On Voltage | $I_{SD}$ = 8 A $V_{GS}$ = 0 | | | 1.6 | V |
| $t_{rr}$<br><br>$Q_{rr}$<br><br>$I_{RRM}$ | Reverse Recovery Time<br><br>Reverse Recovery Charge<br><br>Reverse Recovery Current | $I_{SD}$ = 8 A di/dt = 100 A/µs<br>$V_{DD}$ = 100 V $T_j$ = 150 °C<br>(see test circuit, figure 5) | | 600<br><br>10<br><br>33 | | ns<br><br>µC<br><br>A |

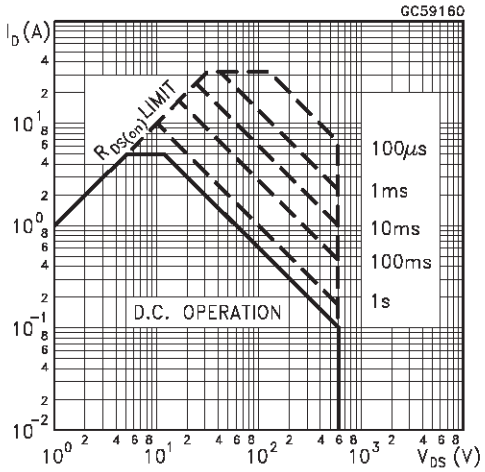
(*) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %

(•) Pulse width limited by safe operating area

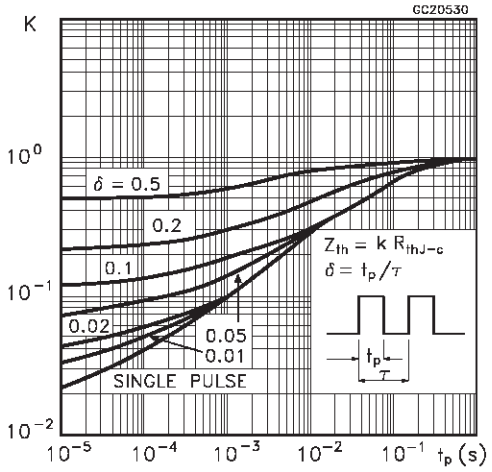
Safe Operating Area for TO-247



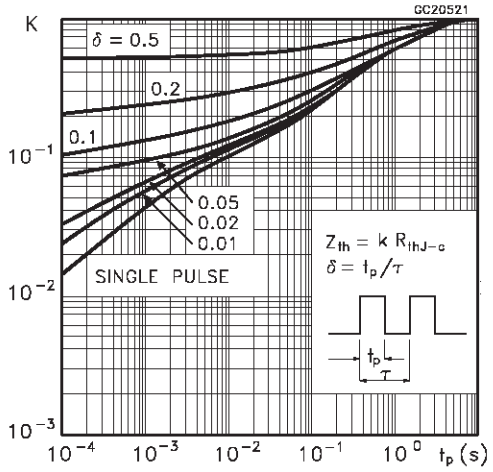

Safe Operating Area for ISOWATT218



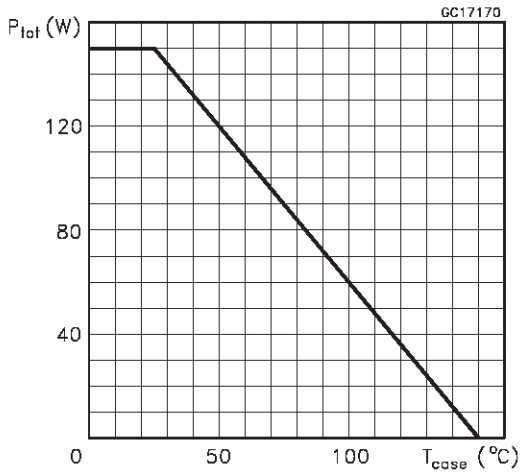
Thermal Impedance for TO-247



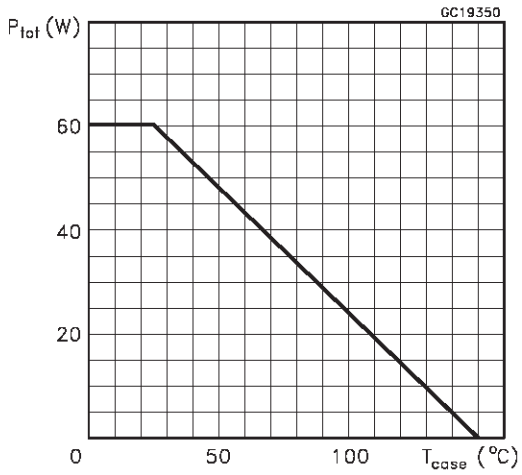

Thermal Impedance for ISOWATT218



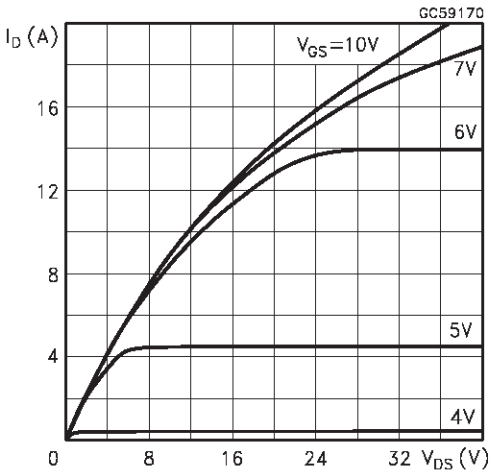

Derating Curve for TO-247



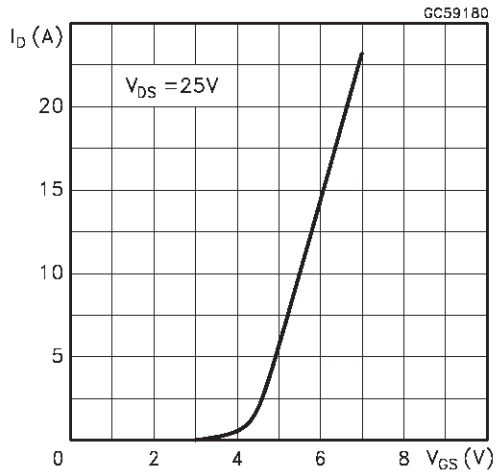

Derating Curve for ISOWATT218



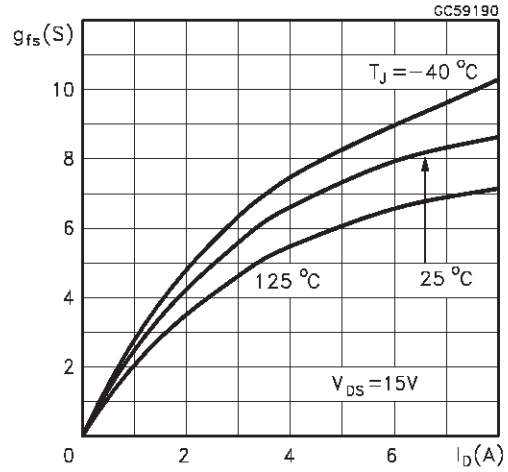

Output Characteristics



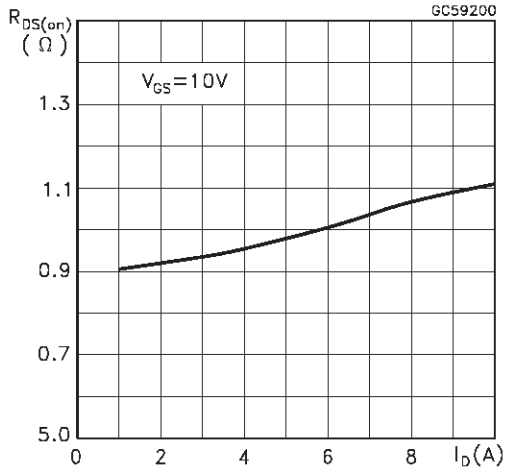

Transfer Characteristics



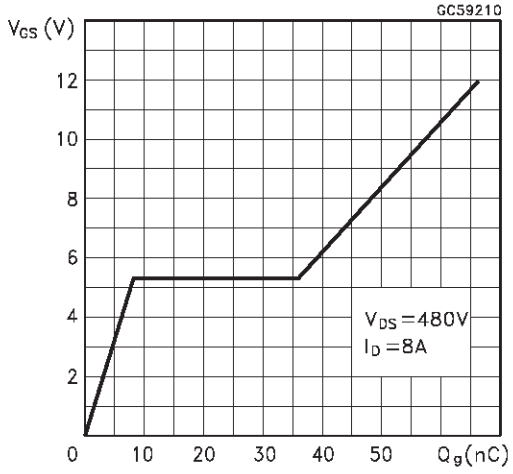
Transconductance



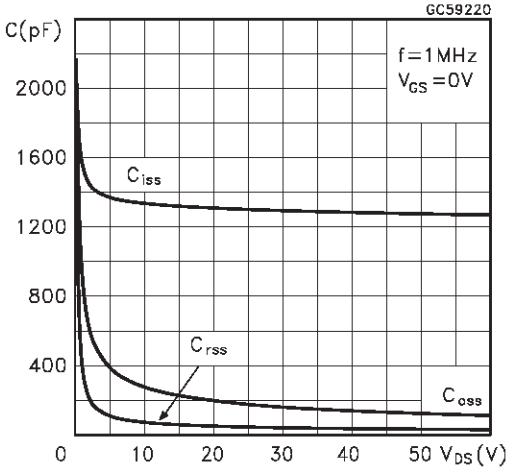

Static Drain-source On Resistance



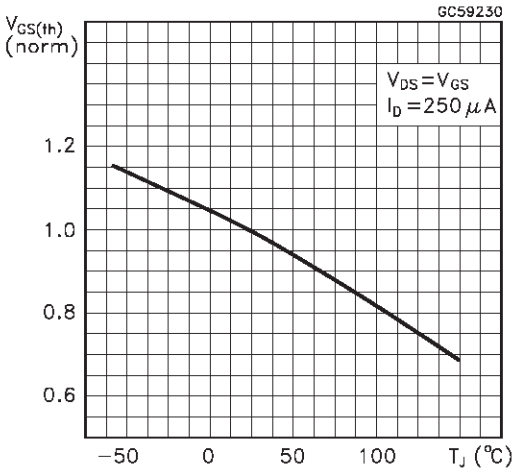

Gate Charge vs Gate-source Voltage



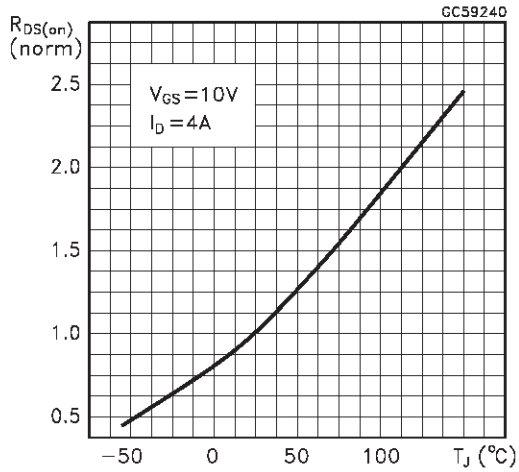

Capacitance Variations



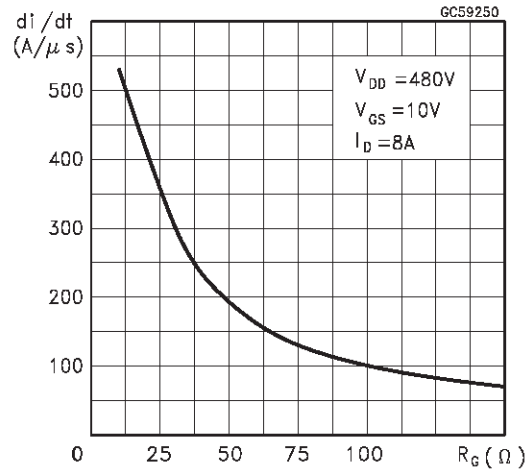

Normalized Gate Threshold Voltage vs Temperature



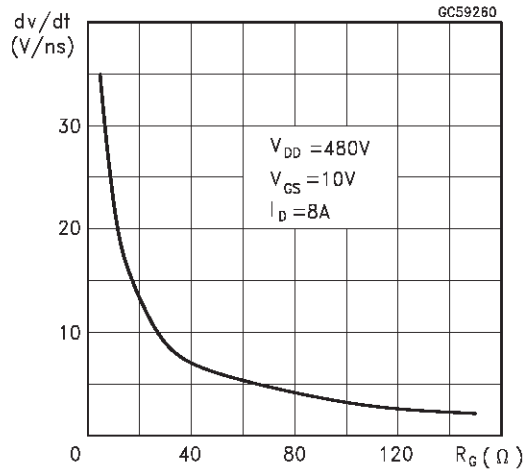

Normalized On Resistance vs Temperature



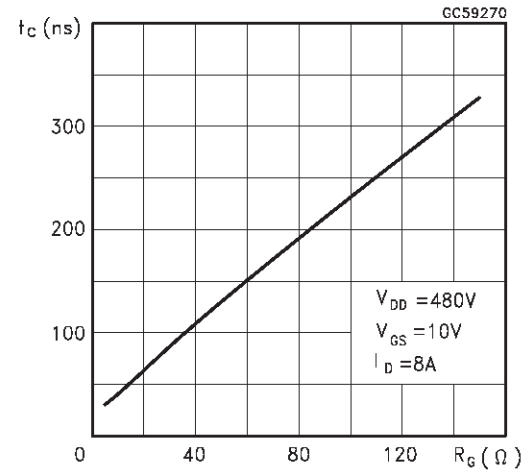
Turn-on Current Slope



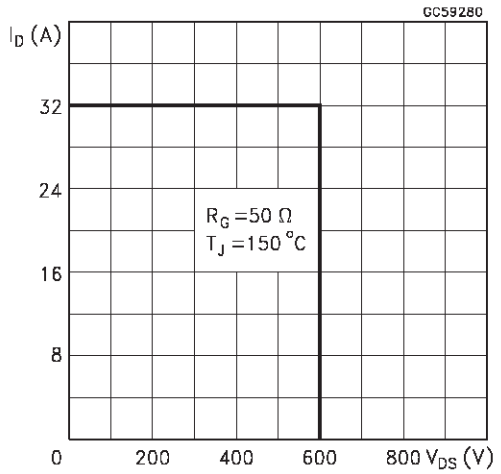

Turn-off Drain-source Voltage Slope



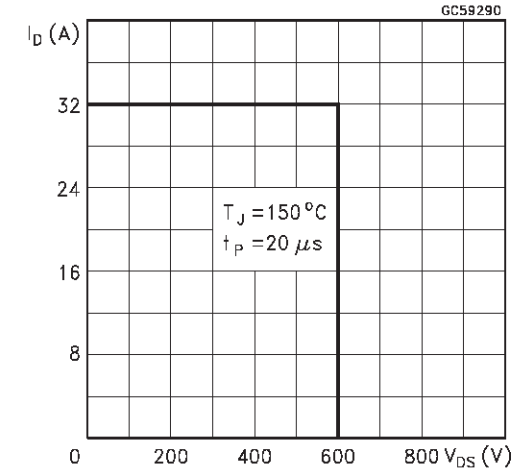

Cross-over Time




Switching Safe Operating Area




Accidental Overload Area




Source-drain Diode Forward Characteristics

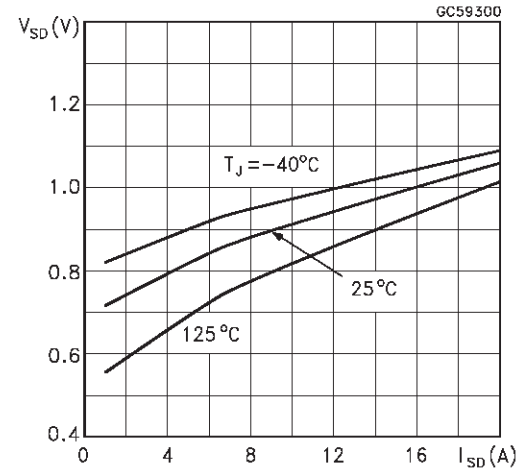


**Fig. 1:** Unclamped Inductive Load Test Circuit

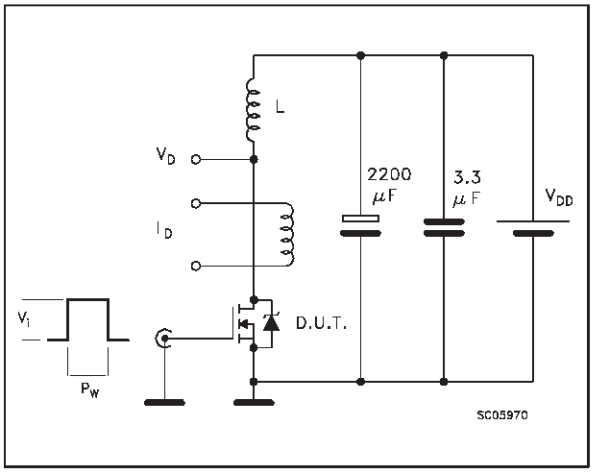



**Fig. 2:** Unclamped Inductive Waveform

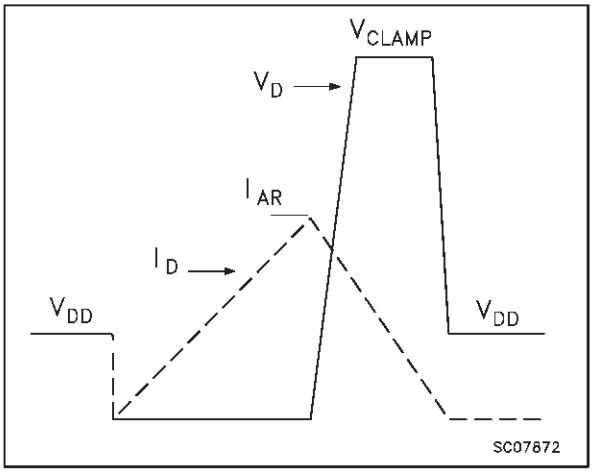



**Fig. 3:** Switching Times Test Circuits For Resistive Load

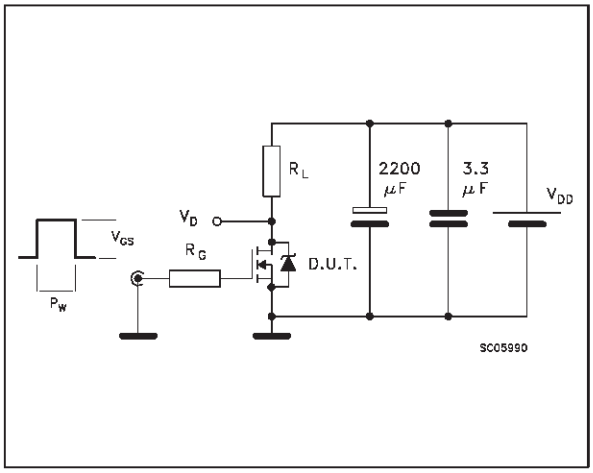



**Fig. 4:** Gate Charge test Circuit

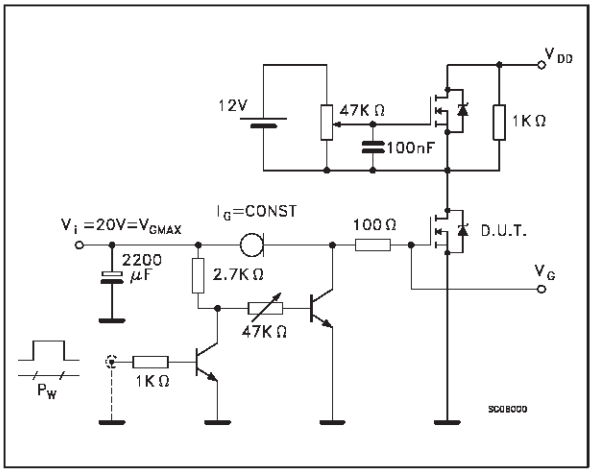
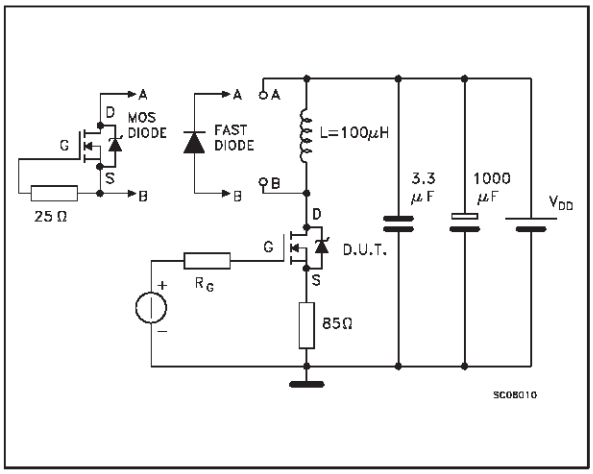
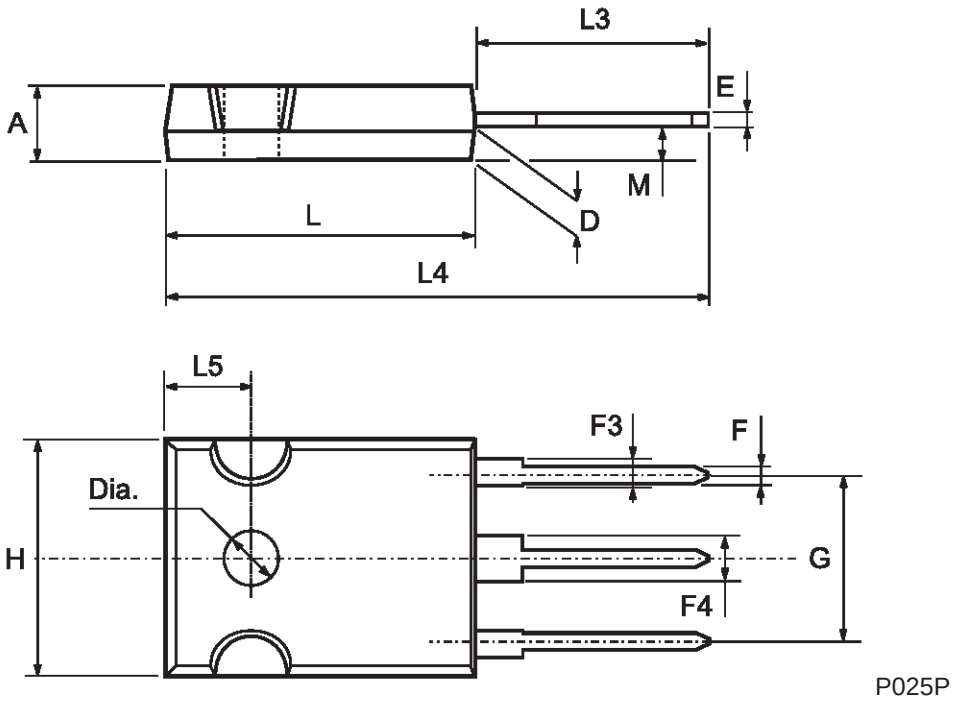



**Fig. 5:** Test Circuit For Inductive Load Switching And Diode Recovery Times



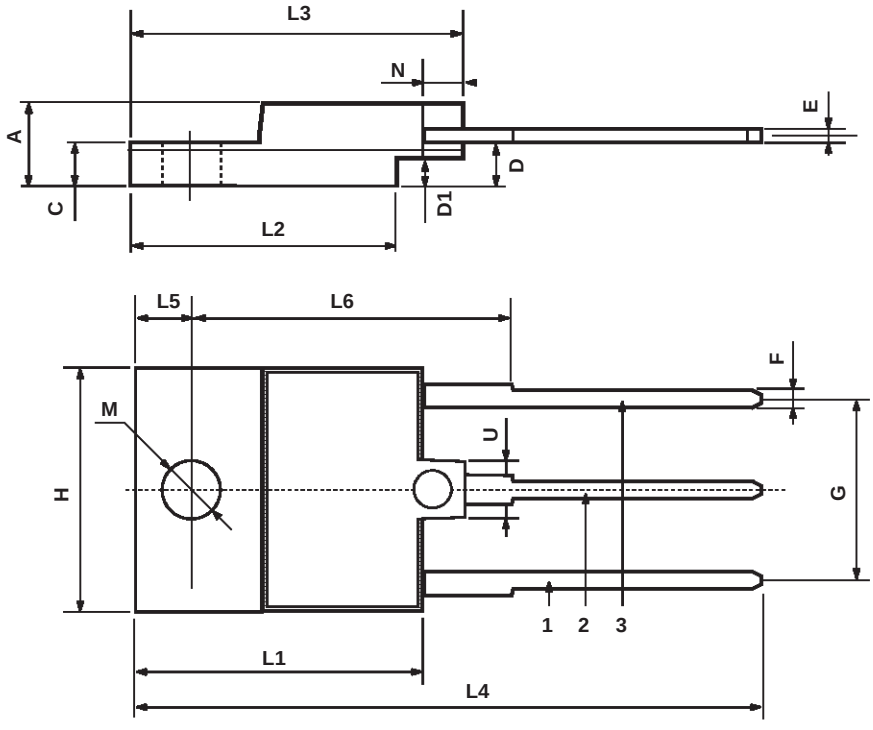
## TO-247 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.7 | | 5.3 | 0.185 | | 0.209 |
| D | 2.2 | | 2.6 | 0.087 | | 0.102 |
| E | 0.4 | | 0.8 | 0.016 | | 0.031 |
| F | 1 | | 1.4 | 0.039 | | 0.055 |
| F3 | 2 | | 2.4 | 0.079 | | 0.094 |
| F4 | 3 | | 3.4 | 0.118 | | 0.134 |
| G | | 10.9 | | | 0.429 | |
| H | 15.3 | | 15.9 | 0.602 | | 0.626 |
| L | 19.7 | | 20.3 | 0.776 | | 0.779 |
| L3 | 14.2 | | 14.8 | 0.559 | 0.413 | 0.582 |
| L4 | | 34.6 | | | 1.362 | |
| L5 | | 5.5 | | | 0.217 | |
| M | 2 | | 3 | 0.079 | | 0.118 |
| Dia | 3.55 | | 3.65 | 0.140 | | 0.144 |



## ISOWATT218 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 5.35 | | 5.65 | 0.210 | | 0.222 |
| C | 3.3 | | 3.8 | 0.130 | | 0.149 |
| D | 2.9 | | 3.1 | 0.114 | | 0.122 |
| D1 | 1.88 | | 2.08 | 0.074 | | 0.081 |
| E | 0.75 | | 1 | 0.029 | | 0.039 |
| F | 1.05 | | 1.25 | 0.041 | | 0.049 |
| G | 10.8 | | 11.2 | 0.425 | | 0.441 |
| H | 15.8 | | 16.2 | 0.622 | | 0.637 |
| L1 | 20.8 | | 21.2 | 0.818 | | 0.834 |
| L2 | 19.1 | | 19.9 | 0.752 | | 0.783 |
| L3 | 22.8 | | 23.6 | 0.897 | | 0.929 |
| L4 | 40.5 | | 42.5 | 1.594 | | 1.673 |
| L5 | 4.85 | | 5.25 | 0.190 | | 0.206 |
| L6 | 20.25 | | 20.75 | 0.797 | | 0.817 |
| M | 3.5 | | 3.7 | 0.137 | | 0.145 |
| N | 2.1 | | 2.3 | 0.082 | | 0.090 |
| U | | 4.6 | | | 0.181 | |




P025C

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- *Специальные условия для постоянных клиентов.*
- *Подбор аналогов.*
- *Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.*

- *Приемлемые сроки поставки, возможна ускоренная поставка.*
- *Доставку товара в любую точку России и стран СНГ.*
- *Комплексную поставку.*
- *Работу по проектам и поставку образцов.*
- *Формирование склада под заказчика.*

- *Сертификаты соответствия на поставляемую продукцию (по желанию клиента).*
- *Тестирование поставляемой продукции.*
- *Поставку компонентов, требующих военную и космическую приемку.*
- *Входной контроль качества.*
- *Наличие сертификата ISO.*

*В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.*

*Конструкторский отдел помогает осуществить:*

- *Регистрацию проекта у производителя компонентов.*
- *Техническую поддержку проекта.*
- *Защиту от снятия компонента с производства.*
- *Оценку стоимости проекта по компонентам.*
- *Изготовление тестовой платы монтаж и пусконаладочные работы.*

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