



## BUZ11A

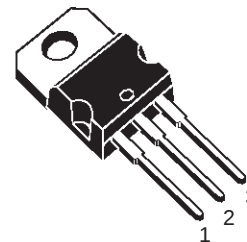
N - CHANNEL 50V - 0.045 $\Omega$  - 26A TO-220  
STripFET™ MOSFET

| TYPE   | V <sub>DSS</sub> | R <sub>DS(on)</sub> | I <sub>D</sub> |
|--------|------------------|---------------------|----------------|
| BUZ11A | 50 V             | < 0.055 $\Omega$    | 26 A           |

- TYPICAL R<sub>DS(on)</sub> = 0.045  $\Omega$
- AVALANCHE RUGGED TECHNOLOGY
- 100% AVALANCHE TESTED
- HIGH CURRENT CAPABILITY
- 175°C OPERATING TEMPERATURE

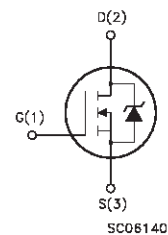
### APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SOLENOID AND RELAY DRIVERS
- REGULATORS
- DC-DC & DC-AC CONVERTERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- AUTOMOTIVE ENVIRONMENT (INJECTION, ABS, AIR-BAG, LAMPDRIVERS, Etc.)



TO-220

### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

| Symbol           | Parameter                                              | Value      | Unit |
|------------------|--------------------------------------------------------|------------|------|
| V <sub>DS</sub>  | Drain-source Voltage (V <sub>GS</sub> = 0)             | 50         | V    |
| V <sub>DGR</sub> | Drain- gate Voltage (R <sub>GS</sub> = 20 k $\Omega$ ) | 50         | V    |
| V <sub>GS</sub>  | Gate-source Voltage                                    | $\pm 20$   | V    |
| I <sub>D</sub>   | Drain Current (continuous) at T <sub>c</sub> = 25 °C   | 26         | A    |
| I <sub>DM</sub>  | Drain Current (pulsed)                                 | 104        | A    |
| P <sub>tot</sub> | Total Dissipation at T <sub>c</sub> = 25 °C            | 75         | W    |
| T <sub>stg</sub> | Storage Temperature                                    | -65 to 175 | °C   |
| T <sub>j</sub>   | Max. Operating Junction Temperature                    | 175        | °C   |
|                  | DIN HUMIDITY CATEGORY (DIN 40040)                      | E          |      |
|                  | IEC CLIMATIC CATEGORY (DIN IEC 68-1)                   | 55/150/56  |      |

First digit of the datecode being Z or K identifies silicon characterized in this datasheet.

## BUZ11A

### THERMAL DATA

|                       |                                     |     |      |      |
|-----------------------|-------------------------------------|-----|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case    | Max | 1.67 | °C/W |
| R <sub>thj-amb</sub>  | Thermal Resistance Junction-ambient | Max | 62.5 | °C/W |

### AVALANCHE CHARACTERISTICS

| Symbol          | Parameter                                                                                                                 | Value | Unit |
|-----------------|---------------------------------------------------------------------------------------------------------------------------|-------|------|
| I <sub>AR</sub> | Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T <sub>j</sub> max, δ < 1%)                       | 30    | A    |
| E <sub>AS</sub> | Single Pulse Avalanche Energy (starting T <sub>j</sub> = 25 °C, I <sub>D</sub> = I <sub>AR</sub> , V <sub>DD</sub> = 30V) | 120   | mJ   |

### 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                                          | 50   |      |         | 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>j</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> = ± 20 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> = 1 mA | 2.1  | 3     | 4     | V    |
| R <sub>DS(on)</sub> | Static Drain-source On Resistance | V <sub>GS</sub> = 10 V I <sub>D</sub> = 19 A            |      | 0.045 | 0.055 | Ω    |

### DYNAMIC

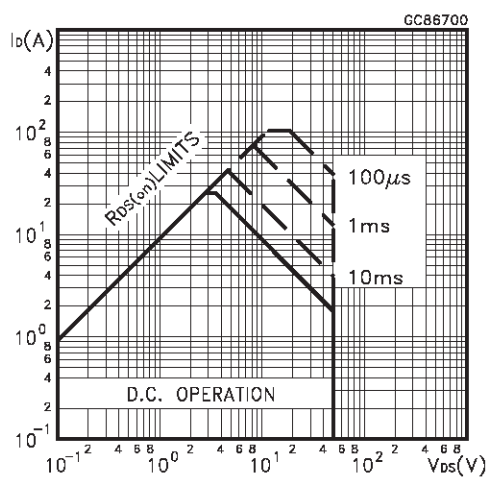
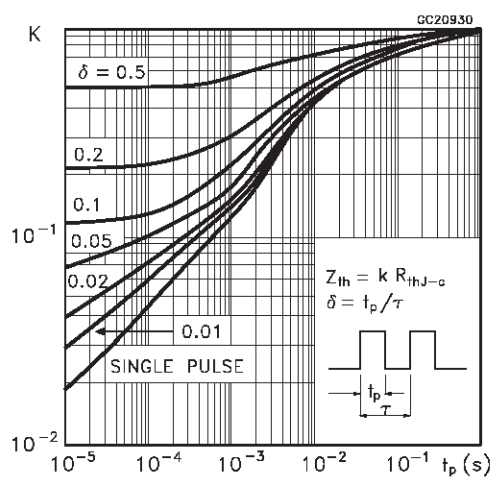
| Symbol                                                   | Parameter                                                               | Test Conditions                                      | Min. | Typ.              | Max. | Unit           |
|----------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------|------|-------------------|------|----------------|
| g <sub>fs</sub> (*)                                      | Forward Transconductance                                                | V <sub>DS</sub> = 25 V I <sub>D</sub> = 19 A         | 10   | 17                |      | 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> = 25 V f = 1 MHz V <sub>GS</sub> = 0 |      | 1400<br>200<br>50 |      | pF<br>pF<br>pF |

### SWITCHING

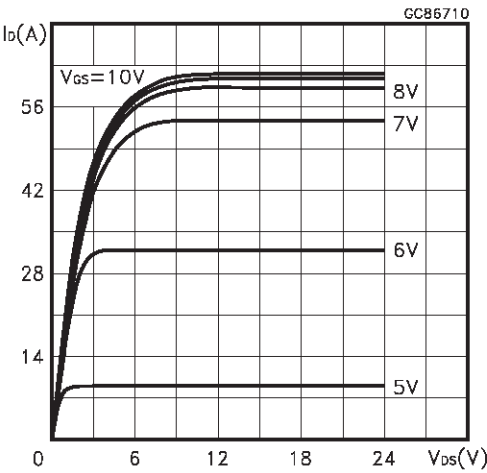
| Symbol                                                                        | Parameter                                                     | Test Conditions                                                                                | Min. | Typ.                 | Max. | Unit                 |
|-------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------|------|----------------------|------|----------------------|
| t <sub>d(on)</sub><br>t <sub>r</sub><br>t <sub>d(off)</sub><br>t <sub>f</sub> | Turn-on Time<br>Rise Time<br>Turn-off Delay Time<br>Fall Time | V <sub>DD</sub> = 30 V I <sub>D</sub> = 15 A<br>R <sub>GS</sub> = 4.7 Ω V <sub>GS</sub> = 10 V |      | 18<br>95<br>50<br>20 |      | ns<br>ns<br>ns<br>ns |

**ELECTRICAL CHARACTERISTICS** (continued)**SOURCE DRAIN DIODE**

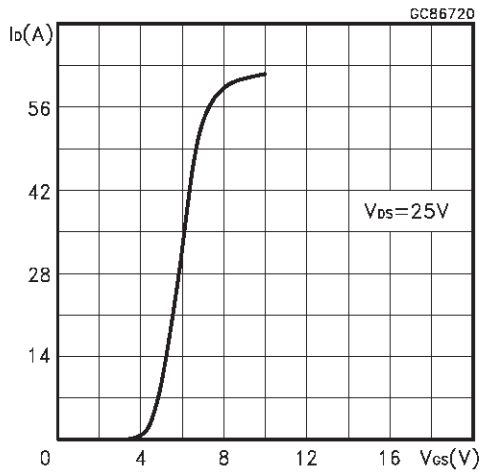
| Symbol       | Parameter                     | Test Conditions                                                                                                       | Min. | Typ. | Max. | Unit          |
|--------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $I_{SD}$     | Source-drain Current          |                                                                                                                       |      |      | 26   | A             |
| $I_{SDM}$    | Source-drain Current (pulsed) |                                                                                                                       |      |      | 104  | A             |
| $V_{SD} (*)$ | Forward On Voltage            | $I_{SD} = 60\text{ A}$ $V_{GS} = 0$                                                                                   |      |      | 1.8  | V             |
| $t_{rr}$     | Reverse Recovery Time         | $I_{SD} = 26\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$<br>$V_{DD} = 30\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ |      | 85   |      | ns            |
| $Q_{rr}$     | Reverse Recovery Charge       |                                                                                                                       |      | 0.19 |      | $\mu\text{C}$ |

(\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %**Safe Operating Area****Thermal Impedance**

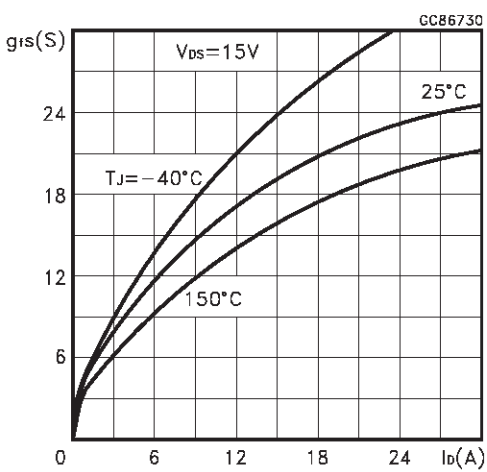
Output Characteristics



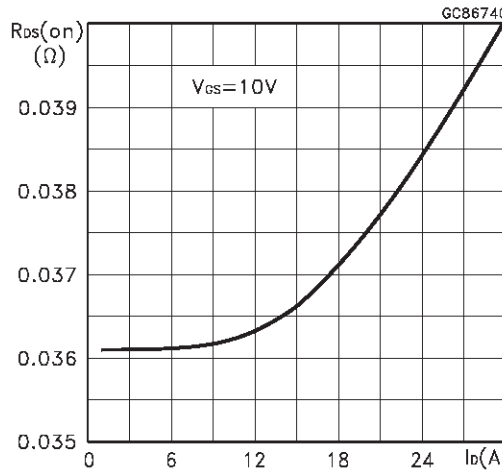
Transfer Characteristics



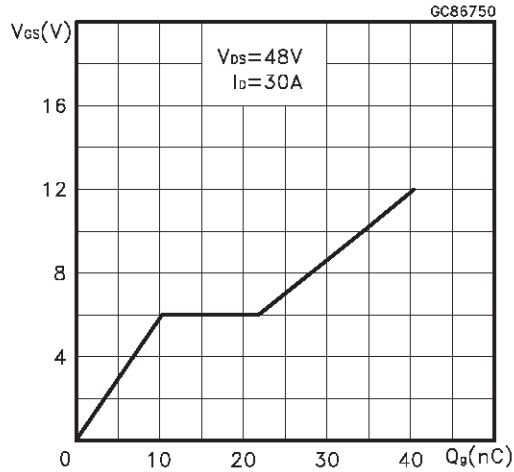
Transconductance



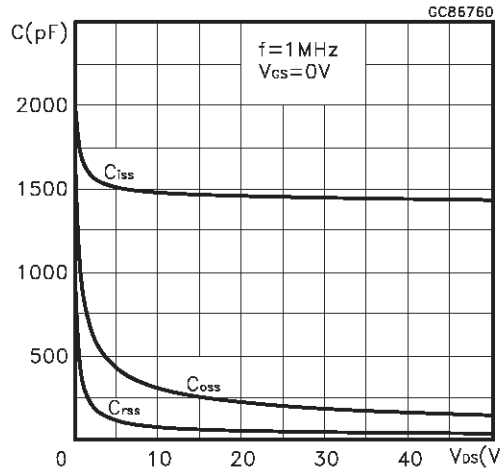
Static Drain-source On Resistance



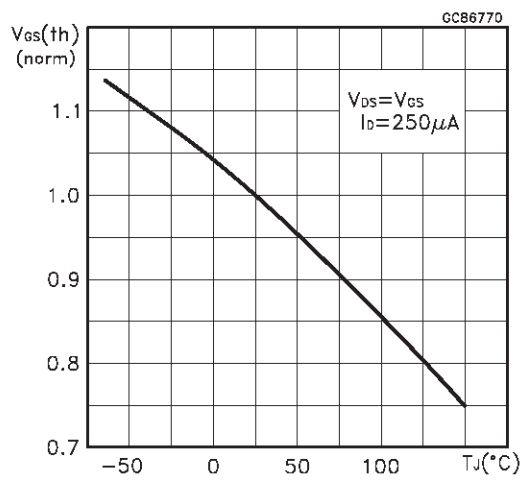
Gate Charge vs Gate-source Voltage



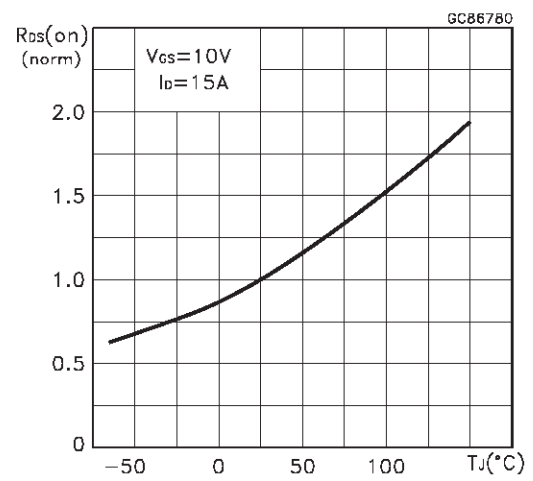
Capacitance Variations



Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

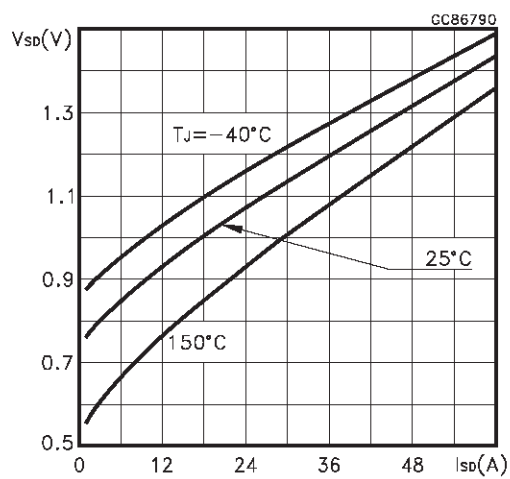


Fig. 1: Unclamped Inductive Load Test Circuit



Fig. 2: Unclamped Inductive Waveform

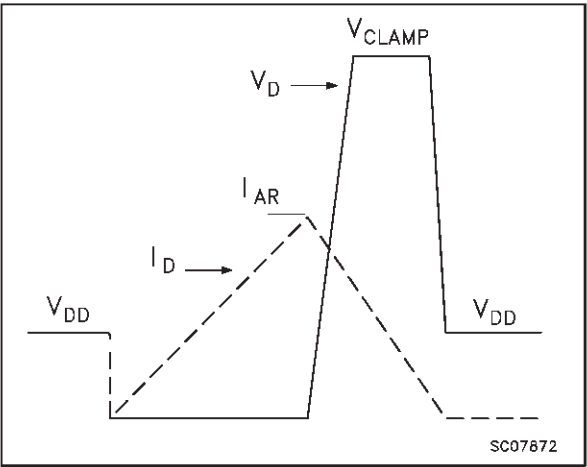


Fig. 3: Switching Times Test Circuits For Resistive Load



Fig. 4: Gate Charge test Circuit

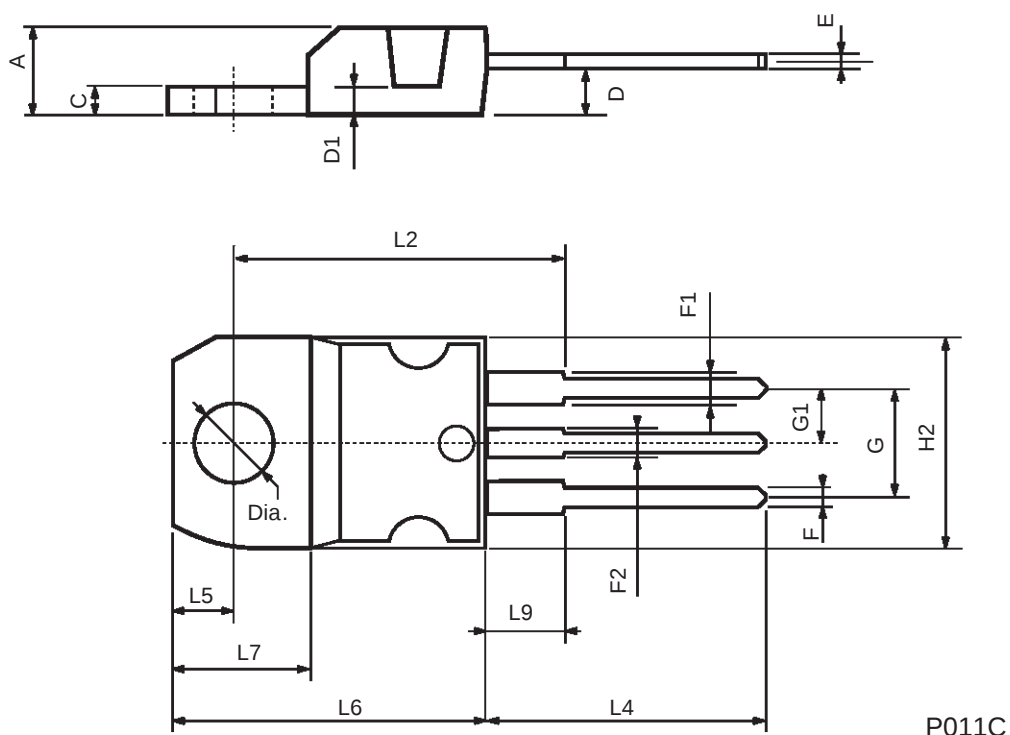


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



## TO-220 MECHANICAL DATA

| DIM. | mm    |      |       | inch  |       |       |
|------|-------|------|-------|-------|-------|-------|
|      | MIN.  | TYP. | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.40  |      | 4.60  | 0.173 |       | 0.181 |
| C    | 1.23  |      | 1.32  | 0.048 |       | 0.051 |
| D    | 2.40  |      | 2.72  | 0.094 |       | 0.107 |
| D1   |       | 1.27 |       |       | 0.050 |       |
| E    | 0.49  |      | 0.70  | 0.019 |       | 0.027 |
| F    | 0.61  |      | 0.88  | 0.024 |       | 0.034 |
| F1   | 1.14  |      | 1.70  | 0.044 |       | 0.067 |
| F2   | 1.14  |      | 1.70  | 0.044 |       | 0.067 |
| G    | 4.95  |      | 5.15  | 0.194 |       | 0.203 |
| G1   | 2.4   |      | 2.7   | 0.094 |       | 0.106 |
| H2   | 10.0  |      | 10.40 | 0.393 |       | 0.409 |
| L2   |       | 16.4 |       |       | 0.645 |       |
| L4   | 13.0  |      | 14.0  | 0.511 |       | 0.551 |
| L5   | 2.65  |      | 2.95  | 0.104 |       | 0.116 |
| L6   | 15.25 |      | 15.75 | 0.600 |       | 0.620 |
| L7   | 6.2   |      | 6.6   | 0.244 |       | 0.260 |
| L9   | 3.5   |      | 3.93  | 0.137 |       | 0.154 |
| DIA. | 3.75  |      | 3.85  | 0.147 |       | 0.151 |



P011C

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