

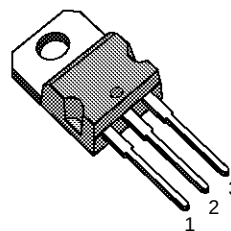
## N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

| TYPE   | V <sub>DSS</sub> | R <sub>DS(on)</sub> | I <sub>D</sub> |
|--------|------------------|---------------------|----------------|
| BUZ72A | 100 V            | < 0.25 $\Omega$     | 11 A           |

- TYPICAL R<sub>DS(on)</sub> = 0.23  $\Omega$
- AVALANCHE RUGGED TECHNOLOGY
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- 175°C OPERATING TEMPERATURE

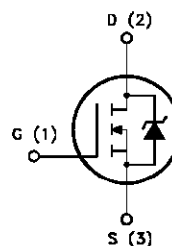
### APPLICATIONS

- 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)             | 100        | V    |
| V <sub>DGR</sub> | Drain- gate Voltage (R <sub>GS</sub> = 20 k $\Omega$ ) | 100        | 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   | 11         | A    |
| I <sub>DM</sub>  | Drain Current (pulsed)                                 | 44         | A    |
| P <sub>tot</sub> | Total Dissipation at T <sub>c</sub> = 25 °C            | 70         | 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  |      |

## BUZ72A

### THERMAL DATA

|                |                                     |     |      |               |
|----------------|-------------------------------------|-----|------|---------------|
| $R_{thj-case}$ | Thermal Resistance Junction-case    | Max | 2.14 | $^{\circ}C/W$ |
| $R_{thj-amb}$  | Thermal Resistance Junction-ambient | Max | 62.5 | $^{\circ}C/W$ |

### AVALANCHE CHARACTERISTICS

| Symbol   | Parameter                                                                                                                   | Value | Unit |
|----------|-----------------------------------------------------------------------------------------------------------------------------|-------|------|
| $I_{AR}$ | Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by $T_j$ max, $\delta < 1\%$ )                         | 11    | A    |
| $E_{AS}$ | Single Pulse Avalanche Energy (starting $T_j = 25^{\circ}C$ , $I_D = I_{AR}$ , $V_{DD} = 25 V$ )                            | 36    | mJ   |
| $E_{AR}$ | Repetitive Avalanche Energy (pulse width limited by $T_j$ max, $\delta < 1\%$ )                                             | 9     | mJ   |
| $I_{AR}$ | Avalanche Current, Repetitive or Not-Repetitive ( $T_c = 100^{\circ}C$ , pulse width limited by $T_j$ max, $\delta < 1\%$ ) | 7     | A    |

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

#### OFF

| Symbol        | Parameter                                        | Test Conditions                                                                   | Min. | Typ. | Max.        | Unit               |
|---------------|--------------------------------------------------|-----------------------------------------------------------------------------------|------|------|-------------|--------------------|
| $V_{(BR)DSS}$ | Drain-source Breakdown Voltage                   | $I_D = 250 \mu A$ $V_{GS} = 0$                                                    | 100  |      |             | V                  |
| $I_{DSS}$     | Zero Gate Voltage Drain Current ( $V_{GS} = 0$ ) | $V_{DS} = \text{Max Rating}$<br>$V_{DS} = \text{Max Rating}$ $T_j = 125^{\circ}C$ |      |      | 250<br>1000 | $\mu A$<br>$\mu A$ |
| $I_{GSS}$     | Gate-body Leakage Current ( $V_{DS} = 0$ )       | $V_{GS} = \pm 20 V$                                                               |      |      | $\pm 100$   | 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    | 2.9  | 4    | V        |
| $R_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS} = 10 V$ $I_D = 5 A$         |      | 0.23 | 0.25 | $\Omega$ |

### DYNAMIC

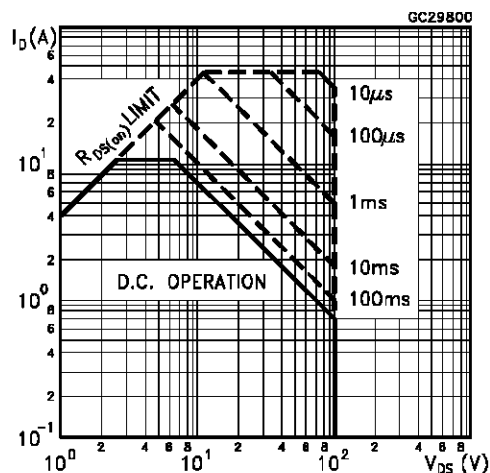
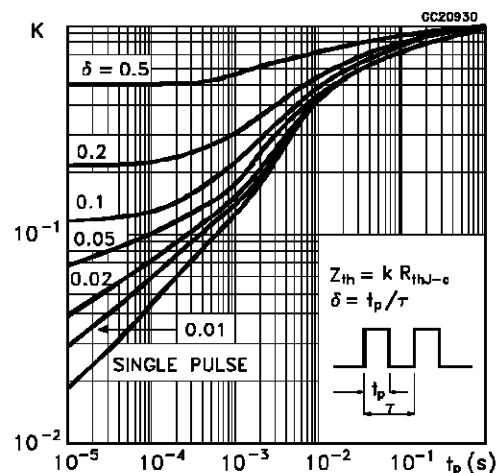
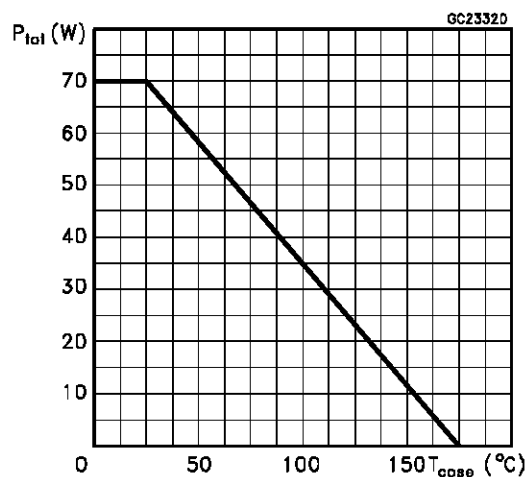
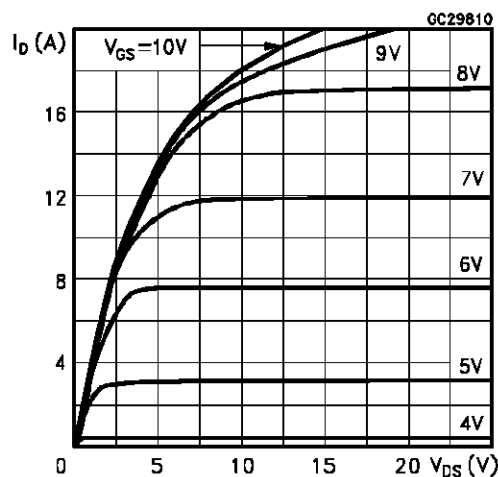
| Symbol                              | Parameter                                                               | Test Conditions                          | Min. | Typ.            | Max.             | Unit           |
|-------------------------------------|-------------------------------------------------------------------------|------------------------------------------|------|-----------------|------------------|----------------|
| $g_{fs} (*)$                        | Forward Transconductance                                                | $V_{DS} = 25 V$ $I_D = 5 A$              | 2.7  | 4.5             |                  | S              |
| $C_{iss}$<br>$C_{oss}$<br>$C_{rss}$ | Input Capacitance<br>Output Capacitance<br>Reverse Transfer Capacitance | $V_{DS} = 25 V$ $f = 1 MHz$ $V_{GS} = 0$ |      | 330<br>90<br>25 | 450<br>120<br>40 | pF<br>pF<br>pF |

### SWITCHING

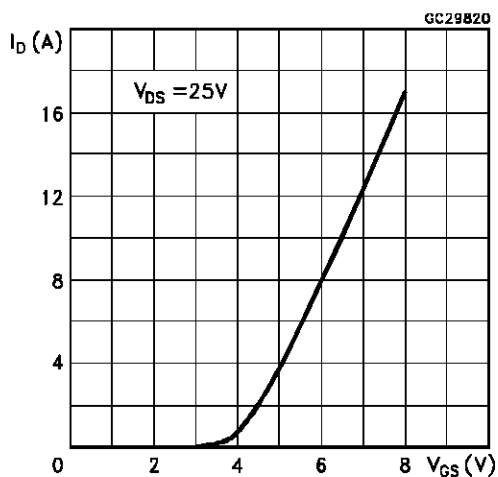
| Symbol                                        | Parameter                                                     | Test Conditions                                                        | Min. | Typ.                 | Max.                 | Unit                 |
|-----------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------|------|----------------------|----------------------|----------------------|
| $t_{d(on)}$<br>$t_r$<br>$t_{d(off)}$<br>$t_f$ | Turn-on Time<br>Rise Time<br>Turn-off Delay Time<br>Fall Time | $V_{DD} = 50 V$ $I_D = 5.5 A$<br>$R_{GS} = 4.7 \Omega$ $V_{GS} = 10 V$ |      | 10<br>50<br>25<br>20 | 15<br>75<br>40<br>30 | ns<br>ns<br>ns<br>ns |

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

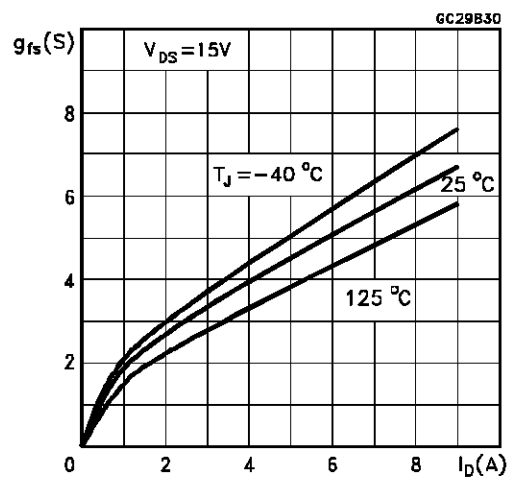
| Symbol                | Parameter                                                | Test Conditions                                                                                               | Min. | Typ.       | Max.     | Unit                |
|-----------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|------|------------|----------|---------------------|
| $I_{SD}$<br>$I_{SDM}$ | Source-drain Current<br>Source-drain Current<br>(pulsed) |                                                                                                               |      |            | 11<br>44 | A                   |
| $V_{SD} (*)$          | Forward On Voltage                                       | $I_{SD} = 22\text{ A}$ $V_{GS} = 0$                                                                           |      |            | 1.6      | V                   |
| $t_{rr}$<br>$Q_{rr}$  | Reverse Recovery<br>Time<br>Reverse Recovery<br>Charge   | $I_{SD} = 11\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$<br>$V_{DD} = 20\text{ V}$ $T_j = 150^\circ\text{C}$ |      | 80<br>0.22 |          | ns<br>$\mu\text{C}$ |

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

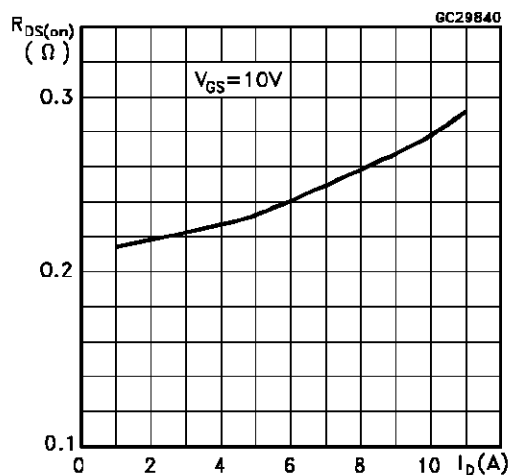
Transfer Characteristics



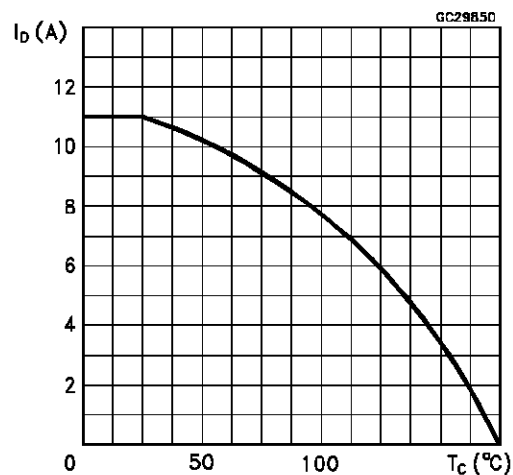
Transconductance



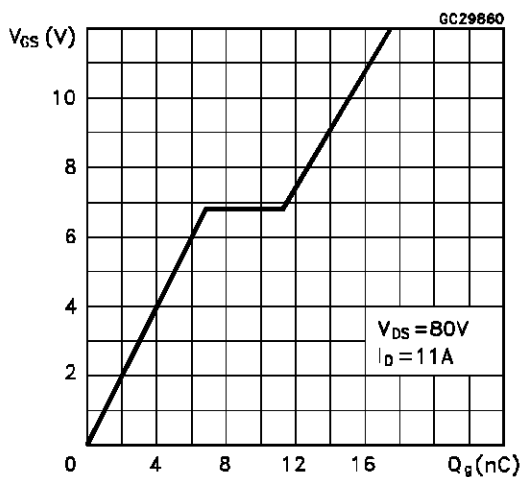
Static Drain-Source On Resistance



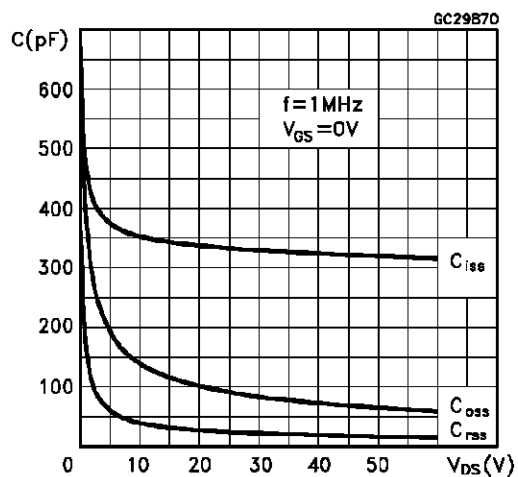
Maximum Drain Current vs Temperature



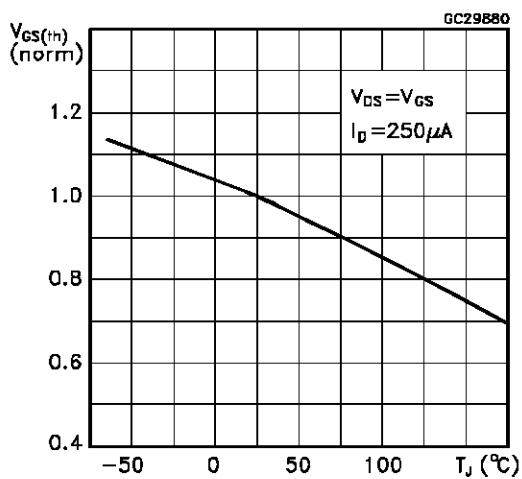
Gate Charge vs Gate-Source Voltage



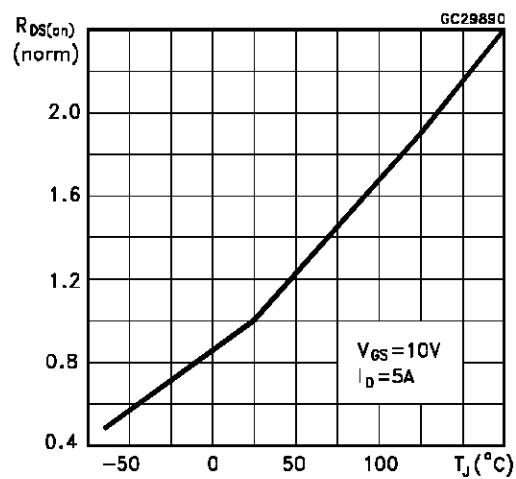
Capacitance Variation



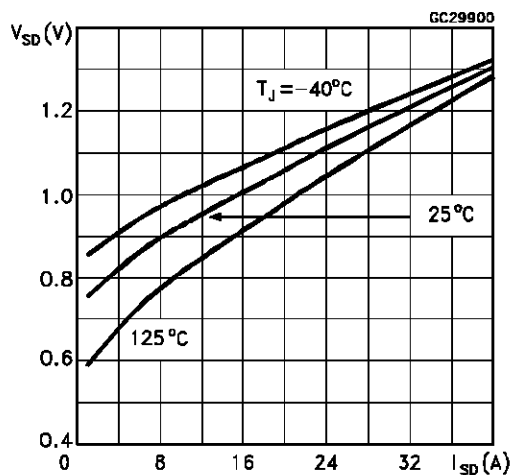
Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature

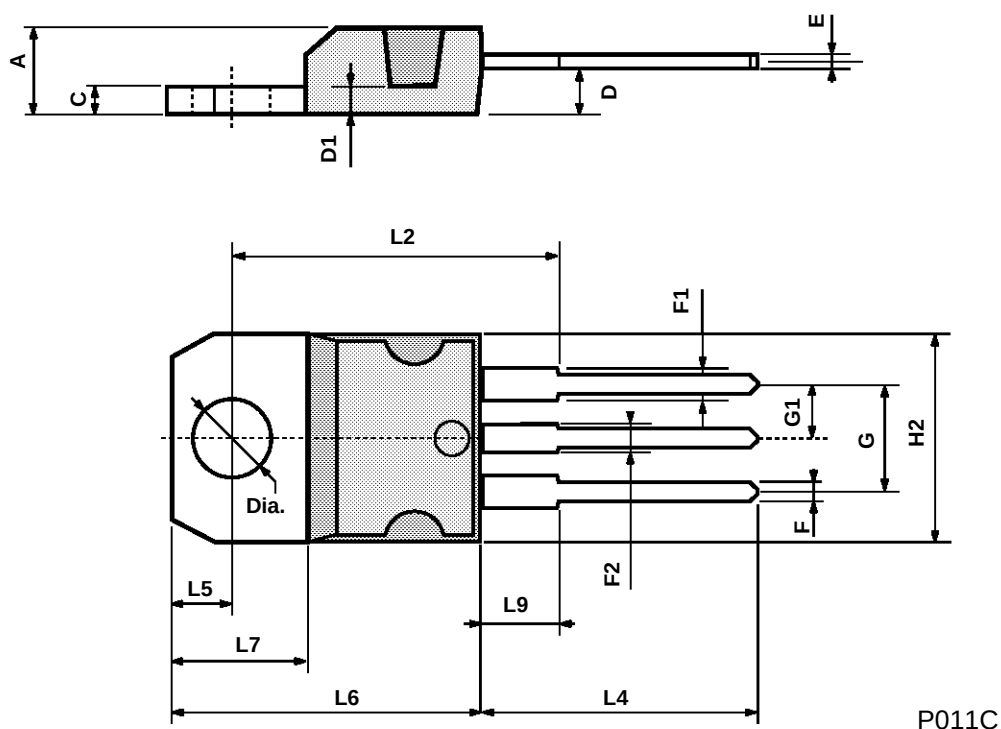


Source-Drain Diode Forward Characteristics



## 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 |



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