

**GJ3310****P-CHANNEL ENHANCEMENT MODE POWER MOSFET**

|         |       |
|---------|-------|
| BVDSS   | -20V  |
| RDS(ON) | 150mΩ |
| ID      | -10A  |

**Description**

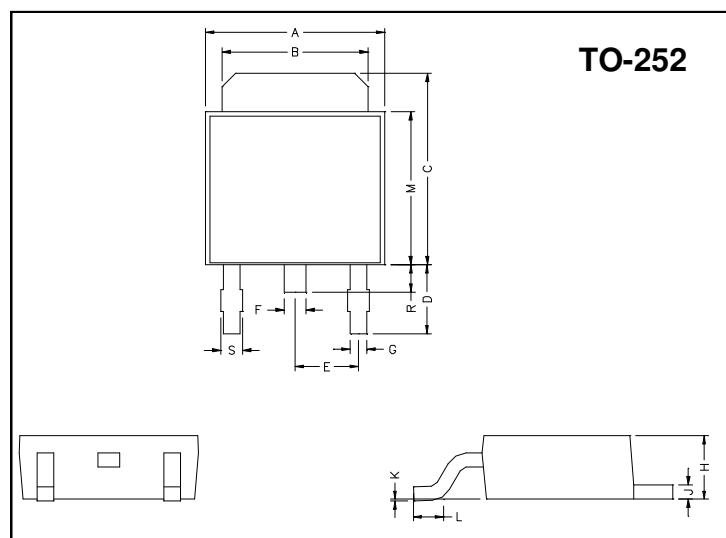
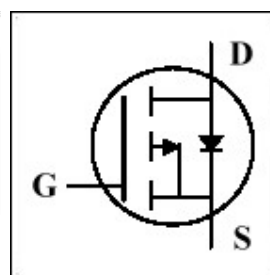
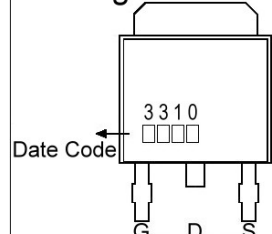
The GJ3310 provide the designer with the best combination of fast switching, low on-resistance and cost-effectiveness.

The TO-252 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage and battery power applications.

**Features**

\*Simple Drive Requirement

\*2.5V Gate Drive Capability

**Package Dimensions****Marking :**

| REF. | Millimeter |      | REF. | Millimeter |      |
|------|------------|------|------|------------|------|
|      | Min.       | Max. |      | Min.       | Max. |
| A    | 6.40       | 6.80 | G    | 0.50       | 0.70 |
| B    | 5.20       | 5.50 | H    | 2.20       | 2.40 |
| C    | 6.80       | 7.20 | J    | 0.45       | 0.55 |
| D    | 2.40       | 3.00 | K    | 0          | 0.15 |
| E    | 2.30 REF.  |      | L    | 0.90       | 1.50 |
| F    | 0.70       | 0.90 | M    | 5.40       | 5.80 |
| S    | 0.60       | 0.90 | R    | 0.80       | 1.20 |

**Absolute Maximum Ratings**

| Parameter                                        | Symbol                  | Ratings    | Unit          |
|--------------------------------------------------|-------------------------|------------|---------------|
| Drain-Source Voltage                             | $V_{DS}$                | -20        | V             |
| Gate-Source Voltage                              | $V_{GS}$                | $\pm 12$   | V             |
| Continuous Drain Current, $V_{GS}@10V$           | $I_D @ T_C=25^\circ C$  | -10        | A             |
| Continuous Drain Current, $V_{GS}@10V$           | $I_D @ T_C=100^\circ C$ | -6.2       | A             |
| Pulsed Drain Current <sup>1</sup>                | $I_{DM}$                | -24        | A             |
| Total Power Dissipation                          | $P_D @ T_C=25^\circ C$  | 25         | W             |
| Linear Derating Factor                           |                         | 0.01       | W/ $^\circ C$ |
| Operating Junction and Storage Temperature Range | $T_j, T_{stg}$          | -55 ~ +150 | $^\circ C$    |

**Thermal Data**

| Parameter                                | Symbol      | Value | Unit         |
|------------------------------------------|-------------|-------|--------------|
| Thermal Resistance Junction-case Max.    | $R_{thj-c}$ | 5.0   | $^\circ C/W$ |
| Thermal Resistance Junction-ambient Max. | $R_{thj-a}$ | 110   | $^\circ C/W$ |

**Electrical Characteristics (T<sub>j</sub> = 25°C unless otherwise specified)**

| Parameter                                           | Symbol                         | Min. | Typ. | Max. | Unit | Test Conditions                                                                                                 |
|-----------------------------------------------------|--------------------------------|------|------|------|------|-----------------------------------------------------------------------------------------------------------------|
| Drain-Source Breakdown Voltage                      | BV <sub>DSS</sub>              | -20  | -    | -    | V    | V <sub>GS</sub> =0, I <sub>D</sub> =-250uA                                                                      |
| Breakdown Voltage Temperature Coefficient           | $\Delta BV_{DSS} / \Delta T_j$ | -    | -0.1 | -    | V/°C | Reference to 25°C, I <sub>D</sub> =-1mA                                                                         |
| Gate Threshold Voltage                              | V <sub>GS(th)</sub>            | -0.5 | -    | -    | V    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA                                                       |
| Forward Transconductance                            | g <sub>fs</sub>                | -    | 4.4  | -    | S    | V <sub>DS</sub> =-5V, I <sub>D</sub> =-2.8A                                                                     |
| Gate-Source Leakage Current                         | I <sub>GSS</sub>               | -    | -    | ±100 | nA   | V <sub>GS</sub> = ±12V                                                                                          |
| Drain-Source Leakage Current(T <sub>j</sub> =25°C)  | I <sub>DSS</sub>               | -    | -    | -1   | uA   | V <sub>DS</sub> =-20V, V <sub>GS</sub> =0                                                                       |
| Drain-Source Leakage Current(T <sub>j</sub> =150°C) |                                | -    | -    | -25  | uA   | V <sub>DS</sub> =-16V, V <sub>GS</sub> =0                                                                       |
| Static Drain-Source On-Resistance                   | R <sub>DS(ON)</sub>            | -    | -    | 150  | mΩ   | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2.8A                                                                   |
|                                                     |                                | -    | -    | 250  |      | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2.0A                                                                   |
| Total Gate Charge <sup>2</sup>                      | Q <sub>g</sub>                 | -    | 6    | -    | nC   | I <sub>D</sub> =-2.8A<br>V <sub>DS</sub> =-6V<br>V <sub>GS</sub> =-5V                                           |
| Gate-Source Charge                                  | Q <sub>gs</sub>                | -    | 1.5  | -    |      |                                                                                                                 |
| Gate-Drain ("Miller") Charge                        | Q <sub>gd</sub>                | -    | 0.6  | -    |      |                                                                                                                 |
| Turn-on Delay Time <sup>2</sup>                     | T <sub>d(on)</sub>             | -    | 2.5  | -    | ns   | V <sub>DS</sub> =-6V<br>I <sub>D</sub> =-1A<br>V <sub>GS</sub> =-5V<br>R <sub>G</sub> =6Ω<br>R <sub>D</sub> =6Ω |
| Rise Time                                           | T <sub>r</sub>                 | -    | 60   | -    |      |                                                                                                                 |
| Turn-off Delay Time                                 | T <sub>d(off)</sub>            | -    | 70   | -    |      |                                                                                                                 |
| Fall Time                                           | T <sub>f</sub>                 | -    | 60   | -    |      |                                                                                                                 |
| Input Capacitance                                   | C <sub>iss</sub>               | -    | 300  | -    | pF   | V <sub>GS</sub> =0V<br>V <sub>DS</sub> =-6V<br>f=1.0MHz                                                         |
| Output Capacitance                                  | C <sub>oss</sub>               | -    | 180  | -    |      |                                                                                                                 |
| Reverse Transfer Capacitance                        | C <sub>rss</sub>               | -    | 60   | -    |      |                                                                                                                 |

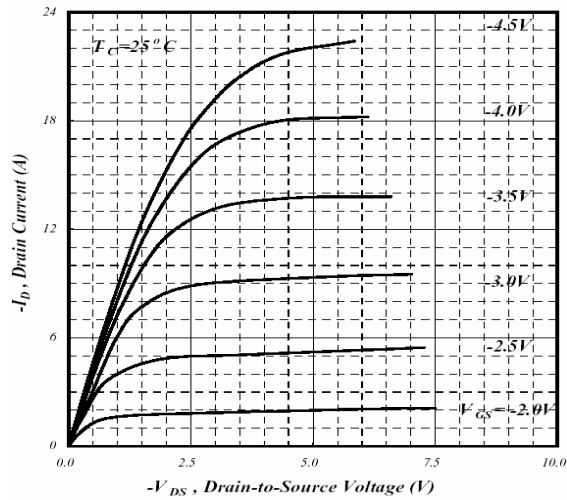
**Source-Drain Diode**

| Parameter                                       | Symbol          | Min. | Typ. | Max. | Unit | Test Conditions                                                 |
|-------------------------------------------------|-----------------|------|------|------|------|-----------------------------------------------------------------|
| Forward On Voltage <sup>2</sup>                 | V <sub>SD</sub> | -    | -    | -1.2 | V    | I <sub>S</sub> =-10A, V <sub>GS</sub> =0V, T <sub>j</sub> =25°C |
| Continuous Source Current (Body Diode)          | I <sub>S</sub>  | -    | -    | -10  | A    | V <sub>D</sub> =V <sub>G</sub> =0V, V <sub>S</sub> =-1.2V       |
| Pulsed Source Current (Body Diode) <sup>1</sup> | I <sub>SM</sub> | -    | -    | -24  | A    |                                                                 |

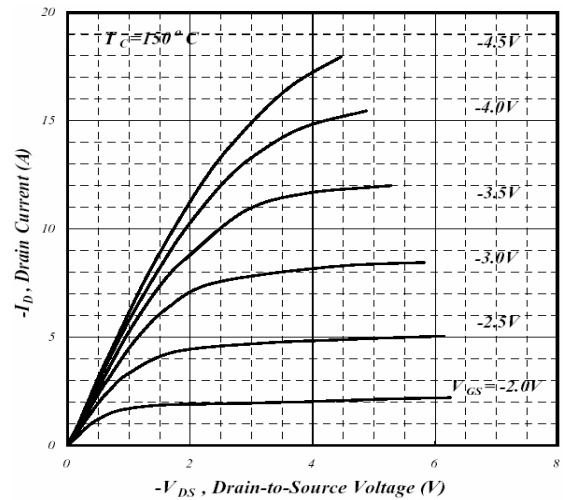
Notes: 1. Pulse width limited by safe operating area.

2. Pulse width ≤ 300us, duty cycle ≤ 2%.

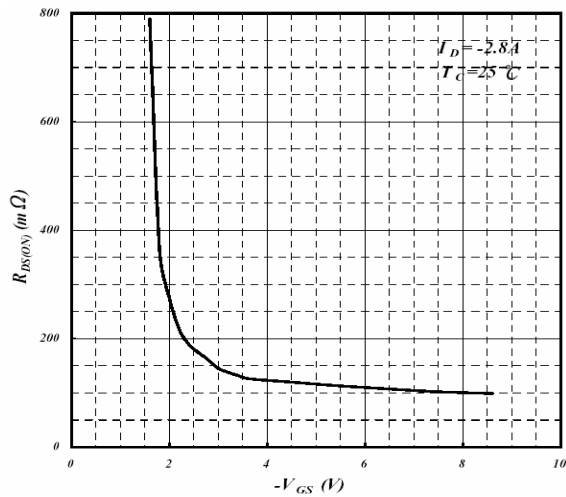
## Characteristics Curve



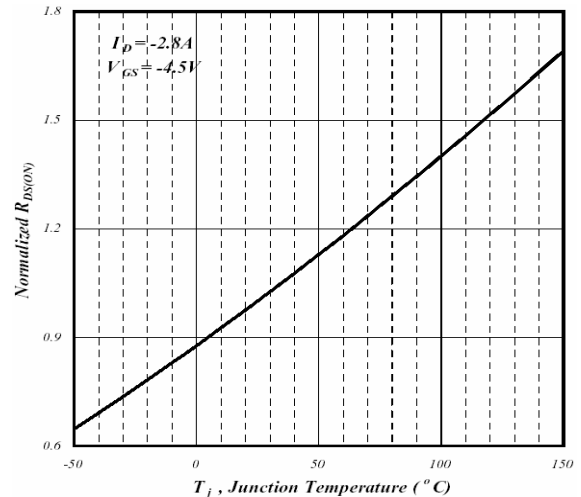
**Fig 1. Typical Output Characteristics**



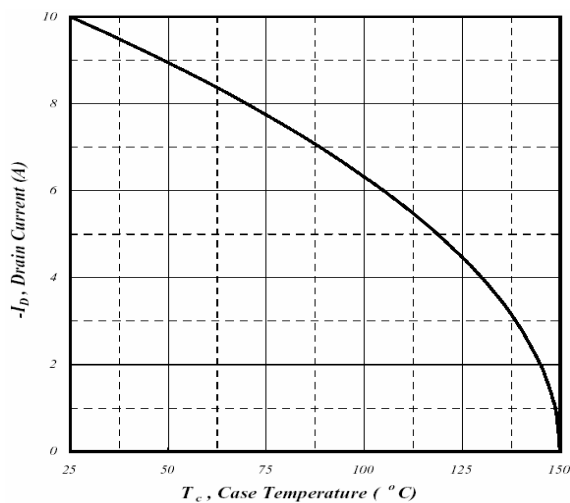
**Fig 2. Typical Output Characteristics**



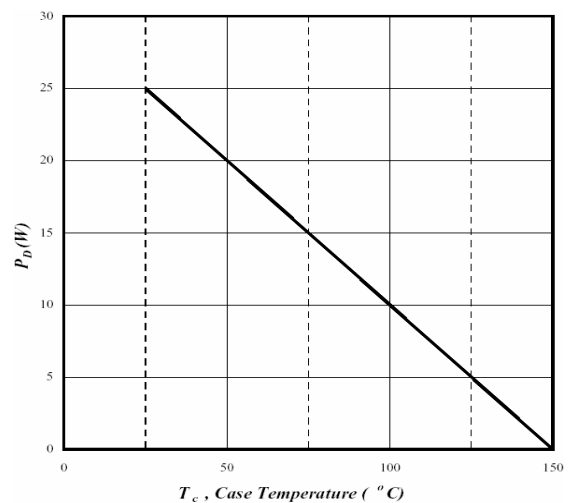
**Fig 3. On-Resistance v.s. Gate Voltage**



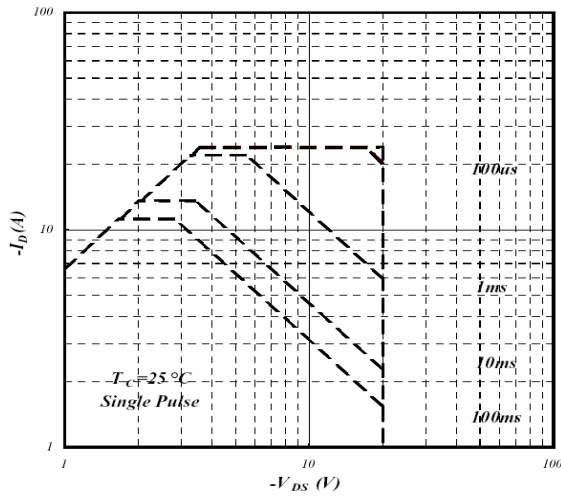
**Fig 4. Normalized On-Resistance v.s. Junction Temperature**



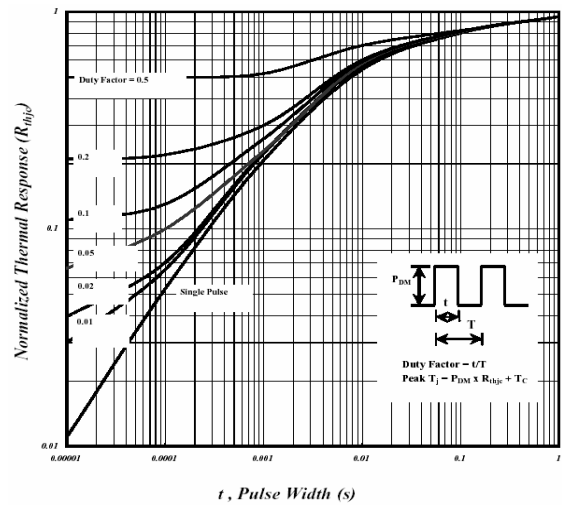
**Fig 5. Maximum Drain Current v.s. Case Temperature**



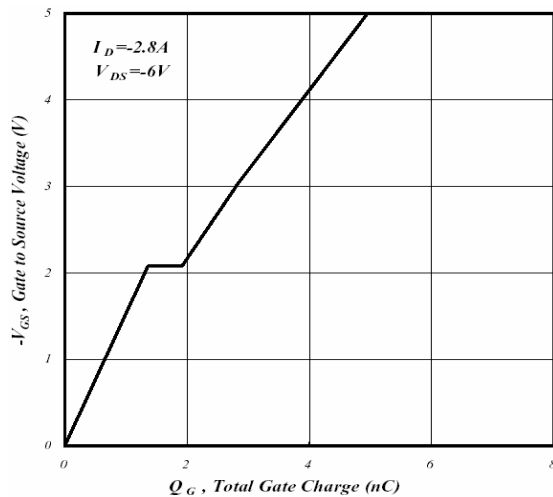
**Fig 6. Type Power Dissipation**



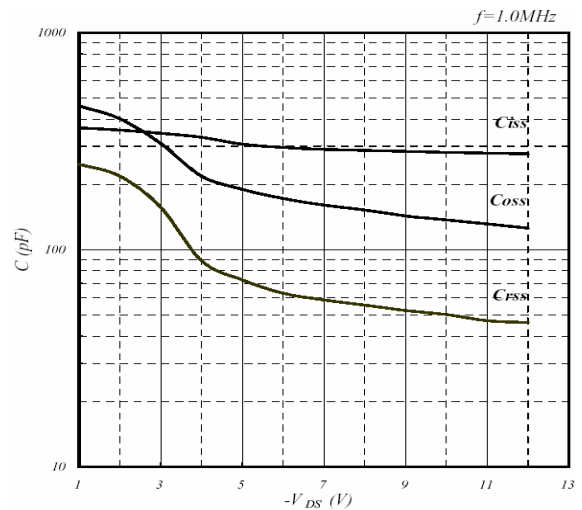
**Fig 7. Maximum Safe Operating Area**



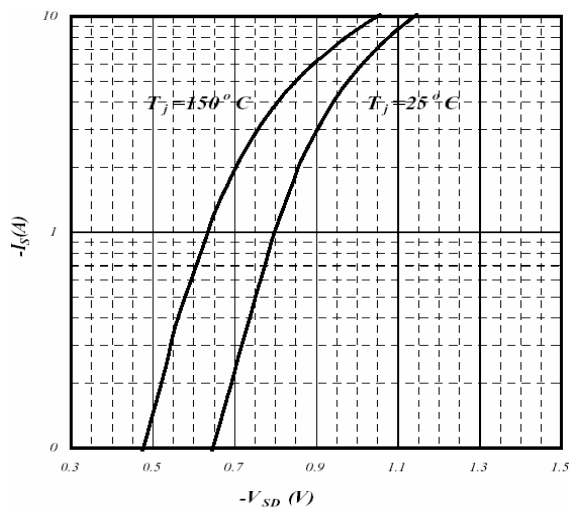
**Fig 8. Effective Transient Thermal Impedance**



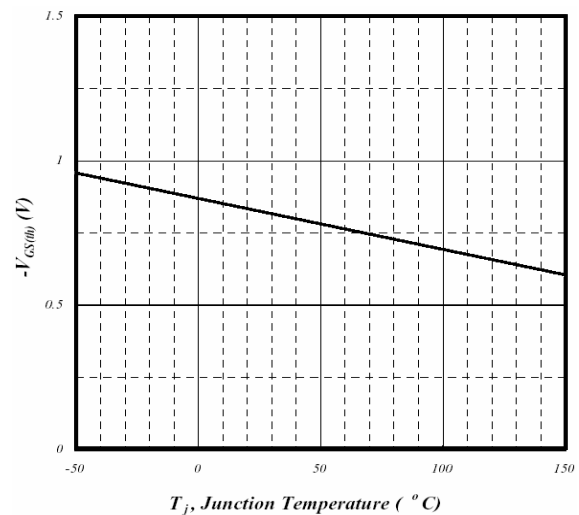
**Fig 9. Gate Charge Characteristics**



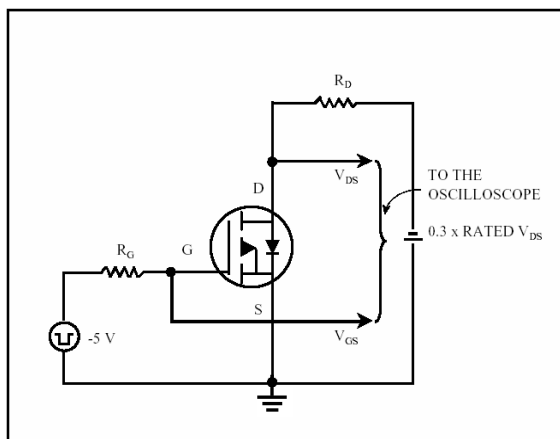
**Fig 10. Typical Capacitance Characteristics**



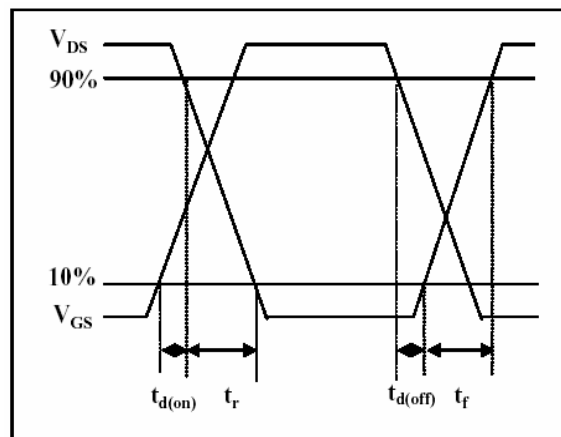
**Fig 11. Forward Characteristics of Reverse Diode**



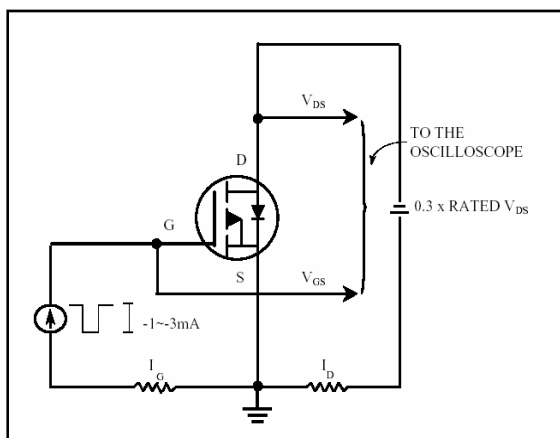
**Fig 12. Gate Threshold Voltage v.s. Junction Temperature**



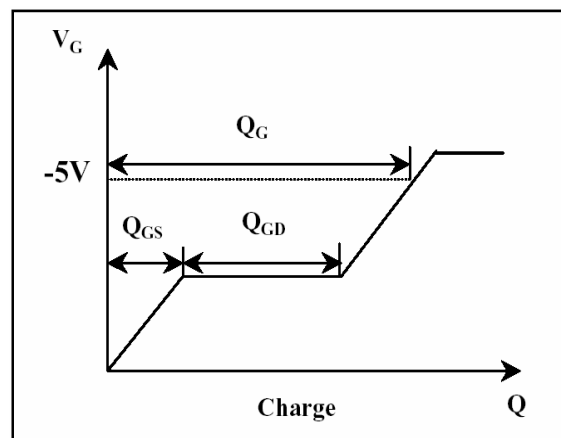
**Fig 13. Switching Time Circuit**



**Fig 14. Switching Time Waveform**



**Fig 15. Gate Charge Circuit**



**Fig 16. Gate Charge Waveform**

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