

# GI3403

## P-CHANNEL ENHANCEMENT MODE POWER MOSFET

|         |       |
|---------|-------|
| BVDSS   | -30V  |
| RDS(ON) | 200mΩ |
| ID      | -10A  |

### Description

The GI3403 utilized advanced processing techniques to achieve the lowest possible on-resistance, extremely efficient and cost-effectiveness device.  
The TO-251 package is universally used for commercial-industrial applications.

### Features

- \*Simple Drive Requirement
- \*Lower Gate Charge
- \*Fast Switching

### Package Dimensions

**TO-251**

**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    | 7.20       | 7.80 | K    | 0.45       | 0.60 |
| E    | 2.30 REF.  |      | L    | 0.90       | 1.50 |
| F    | 0.60       | 0.90 | M    | 5.40       | 5.80 |

### Absolute Maximum Ratings

| Parameter  | Symbol                 | Ratings    | Unit |
|--|------------------------|------------|------|
| Drain-Source Voltage                             | $V_{DS}$               | -30        | V    |
| Gate-Source Voltage                              | $V_{GS}$               | ±20        | V    |
| Continuous Drain Current                         | $I_D @T_C=25^{\circ}C$ | -10        | A    |
| Continuous Drain Current                         | $I_D @T_C=70^{\circ}C$ | -8.6       | A    |
| Pulsed Drain Current <sup>1</sup>                | $I_{DM}$               | -48        | A    |
| Total Power Dissipation                          | $P_D @T_C=25^{\circ}C$ | 36.7       | W    |
| Linear Derating Factor                           |                        | 0.29       | W/°C |
| Operating Junction and Storage Temperature Range | $T_j, T_{stg}$         | -55 ~ +150 | °C   |

### Thermal Data

| Parameter                                | Symbol         | Value | Unit |
|--|----------------|-------|------|
| Thermal Resistance Junction-case Max.    | $R_{thj-case}$ | 3.4   | °C/W |
| Thermal Resistance Junction-ambient Max. | $R_{thj-amb}$  | 110   | °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>              | -30  | -    | -    | 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>            | -1.0 | -    | -3.0 | V    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA   |
| Forward Transconductance                            | g <sub>fs</sub>                | -    | 2    | -    | S    | V <sub>DS</sub> =-10V, I <sub>D</sub> =-6A  |
| Gate-Source Leakage Current                         | I <sub>GSS</sub>               | -    | -    | ±100 | nA   | V <sub>GS</sub> = ±20V  |
| Drain-Source Leakage Current(T <sub>j</sub> =25°C)  | I <sub>DSS</sub>               | -    | -    | -1   | uA   | V <sub>DS</sub> =-30V, V <sub>GS</sub> =0   |
| Drain-Source Leakage Current(T <sub>j</sub> =150°C) |                                | -    | -    | -25  | uA   | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0   |
| Static Drain-Source On-Resistance <sup>2</sup>      | R <sub>DS(ON)</sub>            | -    | -    | 200  | mΩ   | V <sub>GS</sub> =-10V, I <sub>D</sub> =-6A  |
|   |                                | -    | -    | 400  |      | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4A   |
| Total Gate Charge <sup>2</sup>                      | Q <sub>g</sub>                 | -    | 3.8  | -    | nC   | I <sub>D</sub> =-6A<br>V <sub>DS</sub> =-24V<br>V <sub>GS</sub> =-4.5V  |
| Gate-Source Charge                                  | Q <sub>gs</sub>                | -    | 1.7  | -    |      |   |
| Gate-Drain ("Miller") Charge                        | Q <sub>gd</sub>                | -    | 1.6  | -    |      |   |
| Turn-on Delay Time <sup>2</sup>                     | T <sub>d(on)</sub>             | -    | 6.7  | -    | ns   | V <sub>DS</sub> =-15V<br>I <sub>D</sub> =-6A<br>V <sub>GS</sub> =-10V<br>R <sub>G</sub> =2Ω<br>R <sub>D</sub> =2.5Ω |
| Rise Time   | T <sub>r</sub>                 | -    | 20.8 | -    |      |   |
| Turn-off Delay Time                                 | T <sub>d(off)</sub>            | -    | 14.9 | -    |      |   |
| Fall Time   | T <sub>f</sub>                 | -    | 4.4  | -    |      |   |
| Input Capacitance                                   | C <sub>iss</sub>               | -    | 217  | -    | pF   | V <sub>GS</sub> =0V<br>V <sub>DS</sub> =-25V<br>f=1.0MHz  |
| Output Capacitance                                  | C <sub>oss</sub>               | -    | 103  | -    |      |   |
| Reverse Transfer Capacitance                        | C <sub>rss</sub>               | -    | 31   | -    |      |   |

**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> =-1.25A, V <sub>GS</sub> =0V               |
| Reverse Recovery Time           | T <sub>rr</sub> | -    | 35   | -    | ns   | I <sub>S</sub> =-6A, V <sub>GS</sub> =0V<br>dI/dt=100A/μs |
| Reverse Recovery Charge         | Q <sub>rr</sub> | -    | 63   | -    | nC   |   |

Notes: 1. Pulse width limited by Max. junction temperature.

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

## Characteristics Curve

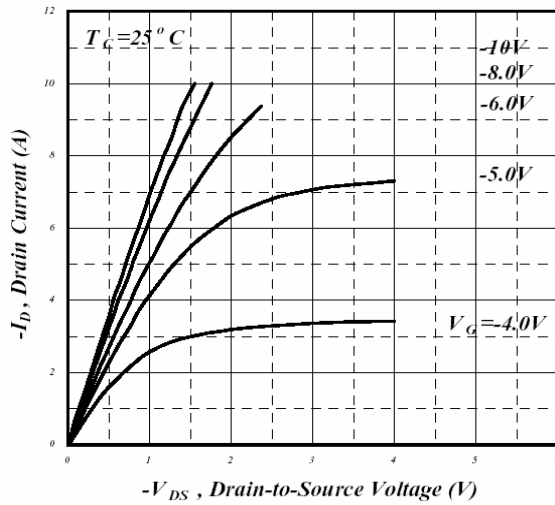


Fig 1. Typical Output Characteristics

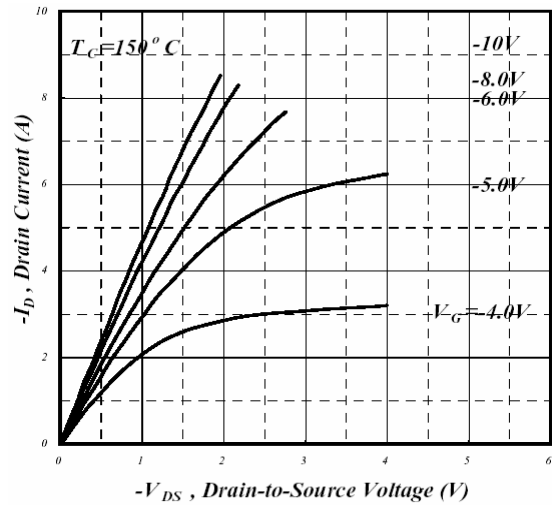


Fig 2. Typical Output Characteristics

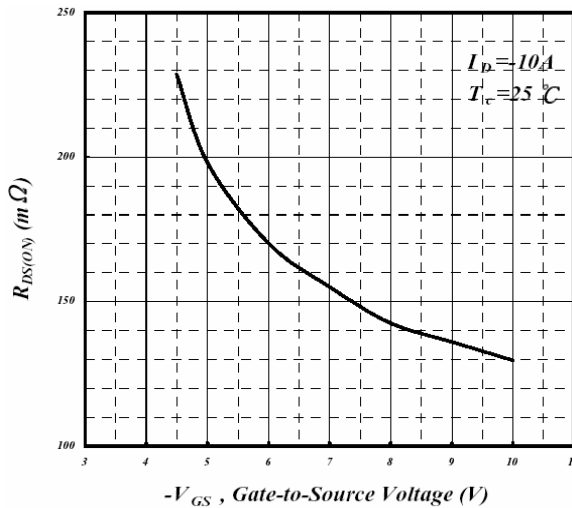


Fig 3. On-Resistance v.s. Gate Voltage

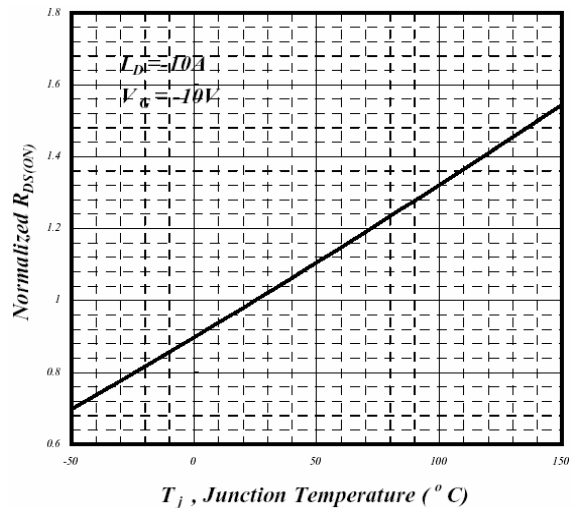


Fig 4. Normalized On-Resistance v.s. Junction Temperature

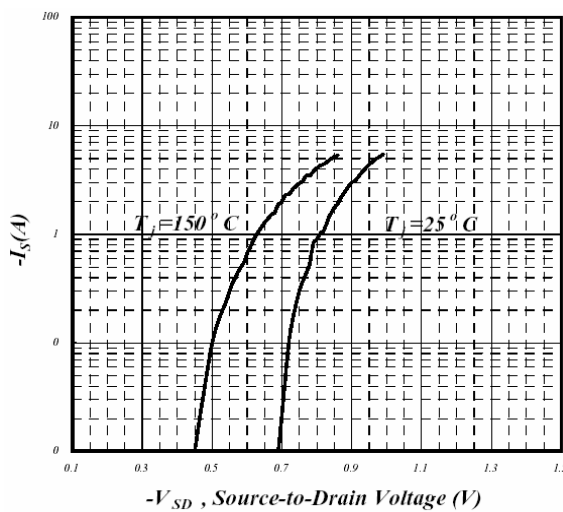


Fig 5. Forward Characteristics of Reverse Diode

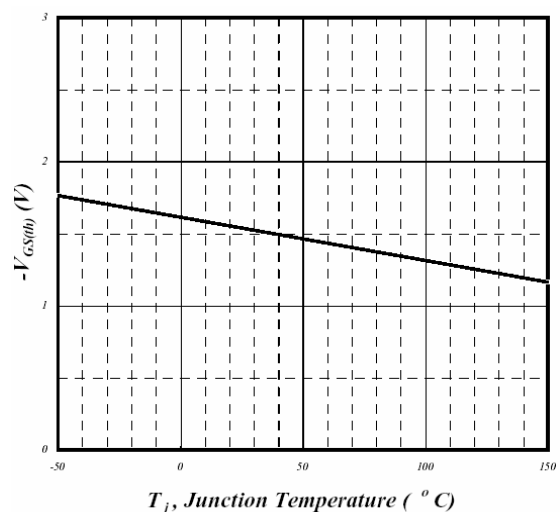
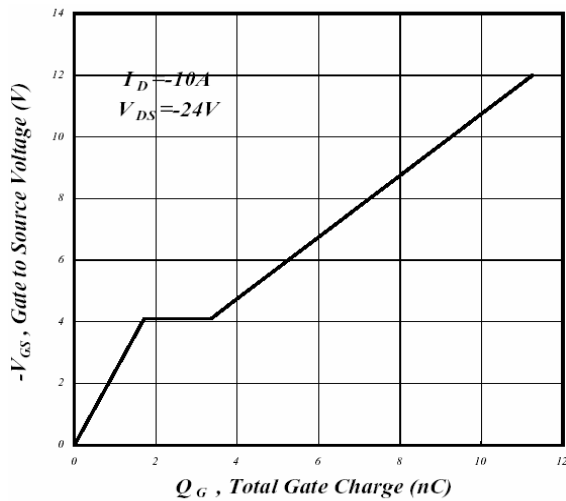
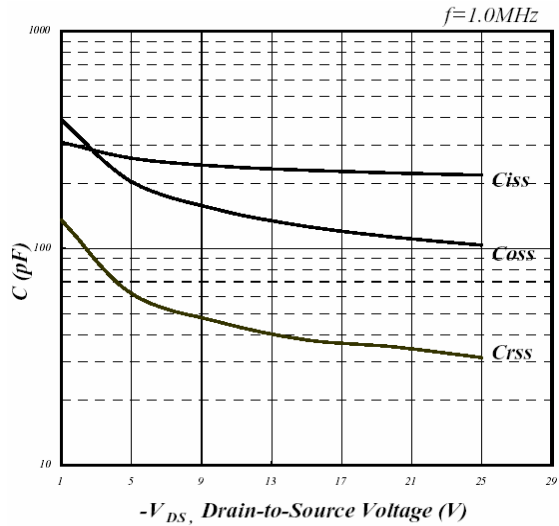


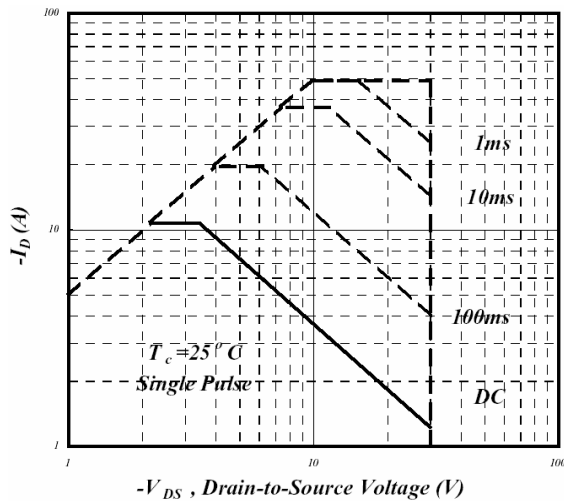
Fig 6. Gate Threshold Voltage v.s. Junction Temperature



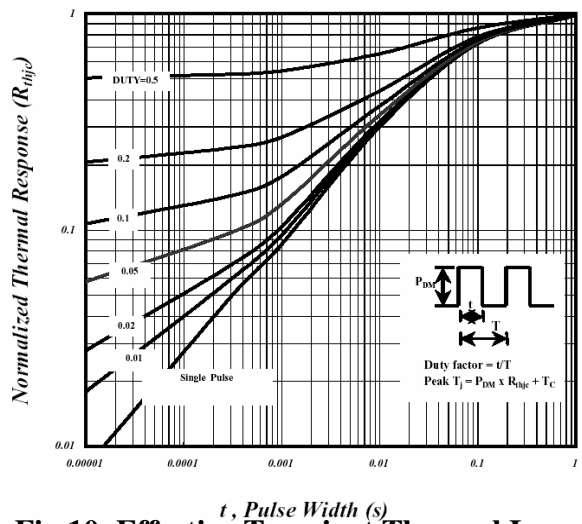
**Fig 7. Gate Charge Characteristics**



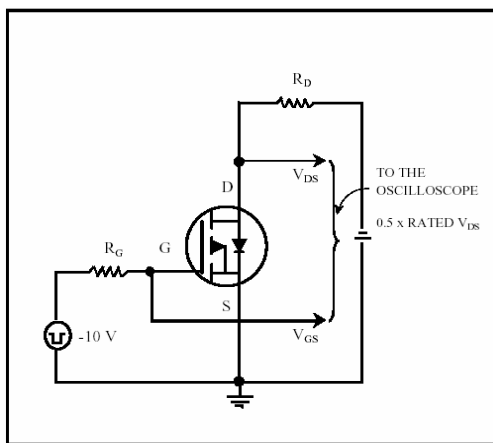
**Fig 8. Typical Capacitance Characteristics**



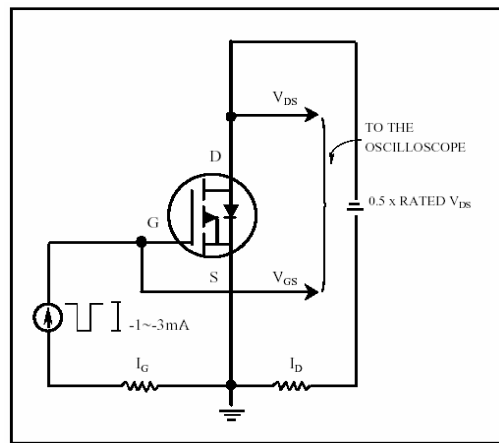
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



**Fig 11. Switching Time Circuit**



**Fig 12. Gate Charge Circuit**

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