

# GJ20N03

## N-CHANNEL ENHANCEMENT MODE POWER MOSFET

|         |      |
|---------|------|
| BVDSS   | 30V  |
| RDS(ON) | 52mΩ |
| ID      | 20A  |

### Description

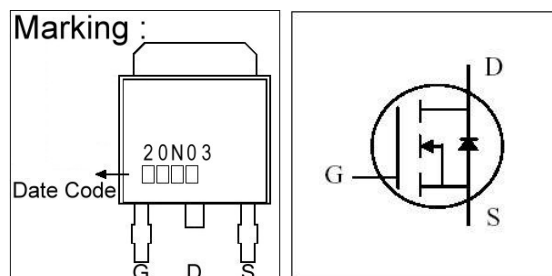
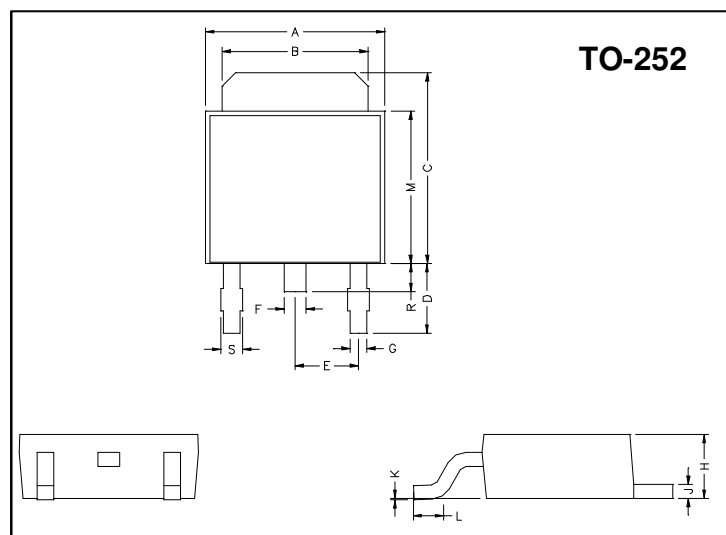
The GJ20N03 provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-252 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

### Features

- \*Dynamic dv/dt Rating
- \*Repetitive Avalanche Rated
- \*Simple Drive Requirement
- \*Fast Switching

### Package Dimensions



| 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                             | $V_{DS}$                | 30         | V    |
| Gate-Source Voltage                              | $V_{GS}$                | ±20        | V    |
| Continuous Drain Current, $V_{GS}@10V$           | $I_D @T_C=25^{\circ}C$  | 20         | A    |
| Continuous Drain Current, $V_{GS}@10V$           | $I_D @T_C=100^{\circ}C$ | 13         | A    |
| Pulsed Drain Current <sup>1</sup>                | $I_{DM}$                | 53         | A    |
| Total Power Dissipation                          | $P_D @T_C=25^{\circ}C$  | 31         | W    |
| Linear Derating Factor                           |                         | 0.25       | 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.    | Rthj-c | 4.0   | °C/W |
| Thermal Resistance Junction-ambient Max. | Rthj-a | 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                      | $BV_{DSS}$                     | 30   | -     | -    | V    | $V_{GS}=0, I_D=250\mu A$   |
| Breakdown Voltage Temperature Coefficient           | $\Delta BV_{DSS} / \Delta T_j$ | -    | 0.037 | -    | V/°C | Reference to 25°C, $I_D=1mA$   |
| Gate Threshold Voltage                              | $V_{GS(th)}$                   | 1.0  | -     | 3.0  | V    | $V_{DS}=V_{GS}, I_D=250\mu A$  |
| Forward Transconductance                            | $g_{fs}$                       | -    | 3     | -    | S    | $V_{DS}=10V, I_D=10A$  |
| Gate-Source Leakage Current                         | $I_{GSS}$                      | -    | -     | ±100 | nA   | $V_{GS}= \pm 20V$  |
| Drain-Source Leakage Current(T <sub>j</sub> =25°C)  | $I_{DSS}$                      | -    | -     | 1    | uA   | $V_{DS}=30V, V_{GS}=0$   |
| Drain-Source Leakage Current(T <sub>j</sub> =150°C) |                                | -    | -     | 100  | uA   | $V_{DS}=24V, V_{GS}=0$   |
| Static Drain-Source On-Resistance                   | $R_{DS(ON)}$                   | -    | -     | 52   | mΩ   | $V_{GS}=10V, I_D=10A$  |
|   |                                | -    | -     | 85   |      | $V_{GS}=4.5V, I_D=8A$  |
| Total Gate Charge <sup>2</sup>                      | $Q_g$                          | -    | 6.1   | -    | nC   | $I_D=10A$<br>$V_{DS}=24V$<br>$V_{GS}=5V$   |
| Gate-Source Charge                                  | $Q_{gs}$                       | -    | 1.4   | -    |      |  |
| Gate-Drain ("Miller") Change                        | $Q_{gd}$                       | -    | 4     | -    |      |  |
| Turn-on Delay Time <sup>2</sup>                     | $T_{d(on)}$                    | -    | 4.9   | -    | ns   | $V_{DS}=15V$<br>$I_D=20A$<br>$V_{GS}=10V$<br>$R_G=3.3\Omega$<br>$R_D=0.75\Omega$ |
| Rise Time   | $T_r$                          | -    | 29    | -    |      |  |
| Turn-off Delay Time                                 | $T_{d(off)}$                   | -    | 14.3  | -    |      |  |
| Fall Time   | $T_f$                          | -    | 3.6   | -    |      |  |
| Input Capacitance                                   | $C_{iss}$                      | -    | 290   | -    | pF   | $V_{GS}=0V$<br>$V_{DS}=25V$<br>$f=1.0MHz$  |
| Output Capacitance                                  | $C_{oss}$                      | -    | 160   | -    |      |  |
| Reverse Transfer Capacitance                        | $C_{rss}$                      | -    | 45    | -    |      |  |

**Source-Drain Diode**

| Parameter                                       | Symbol   | Min. | Typ. | Max. | Unit | Test Conditions                      |
|---|----------|------|------|------|------|--------------------------------------|
| Forward On Voltage <sup>2</sup>                 | $V_{SD}$ | -    | -    | 1.3  | V    | $I_S=20A, V_{GS}=0V, T_j=25^\circ C$ |
| Continuous Source Current (Body Diode)          | $I_S$    | -    | -    | 20   | A    | $V_D=V_G=0V, V_S=1.3V$               |
| Pulsed Source Current (Body Diode) <sup>1</sup> | $I_{SM}$ | -    | -    | 53   | A    |                                      |

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

2. Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

## Characteristics Curve

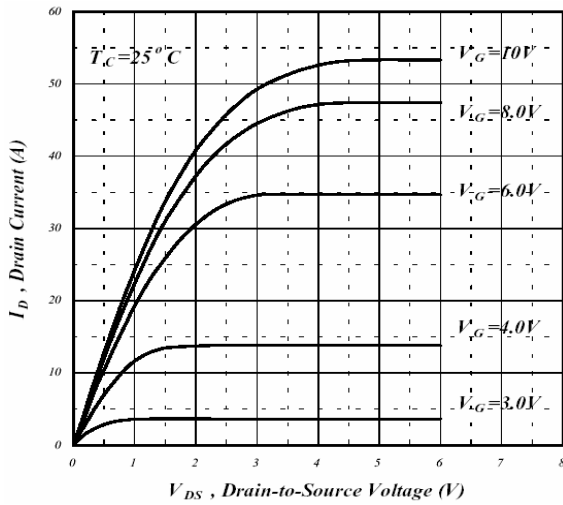


Fig 1. Typical Output Characteristics

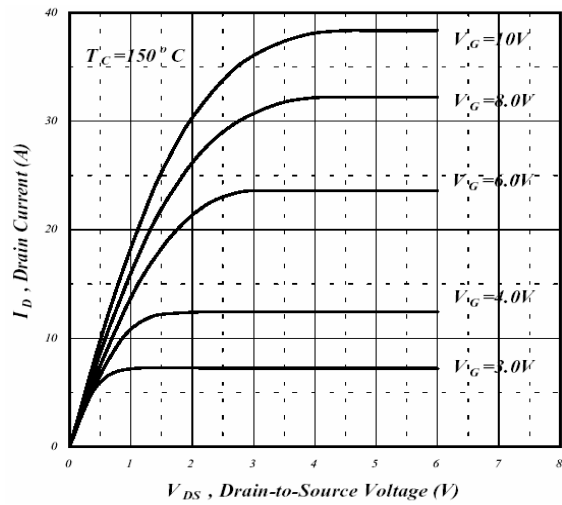


Fig 2. Typical Output Characteristics

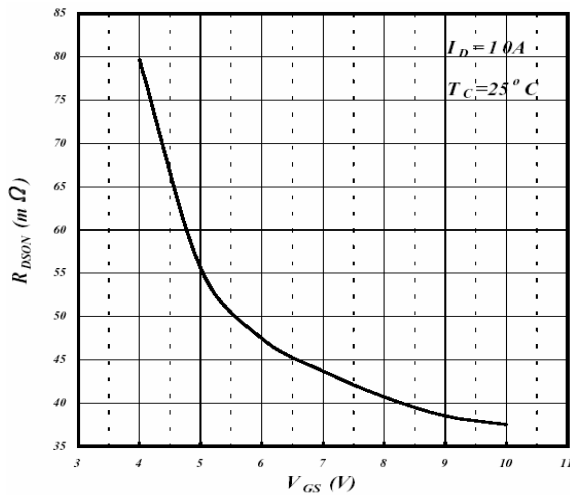


Fig 3. On-Resistance v.s. Gate Voltage

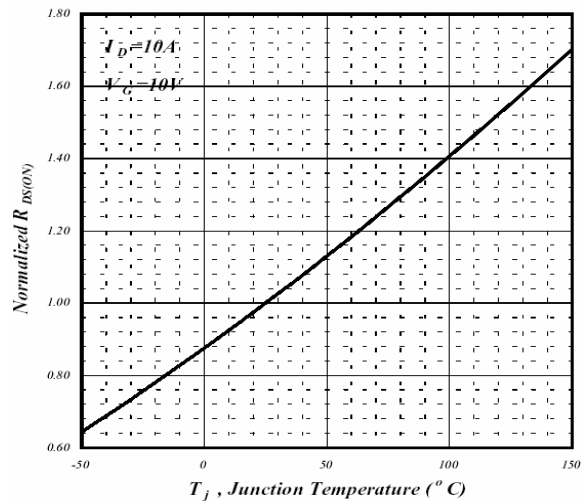


Fig 4. Normalized On-Resistance v.s. Junction Temperature

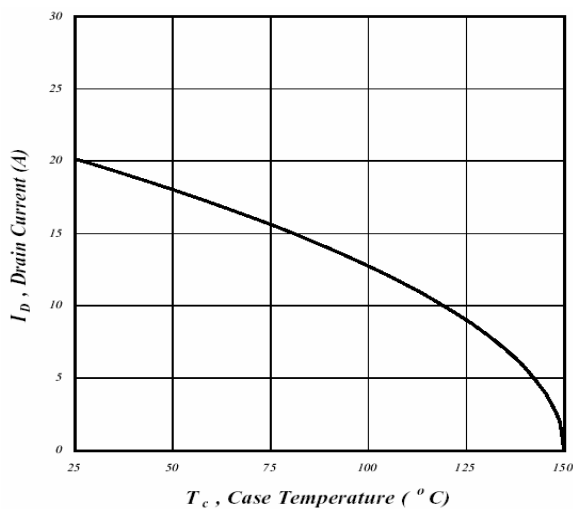


Fig 5. Maximum Drain Current v.s. Case Temperature

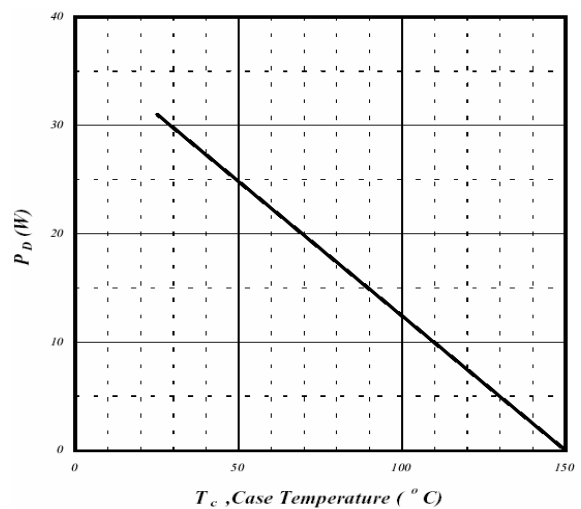


Fig 6. Type Power Dissipation

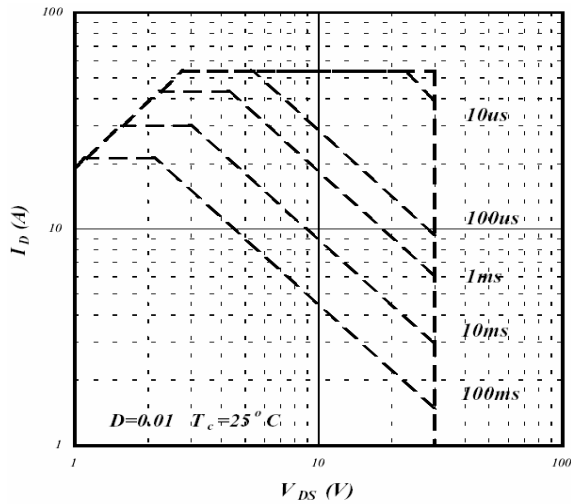


Fig 7. Maximum Safe Operating Area

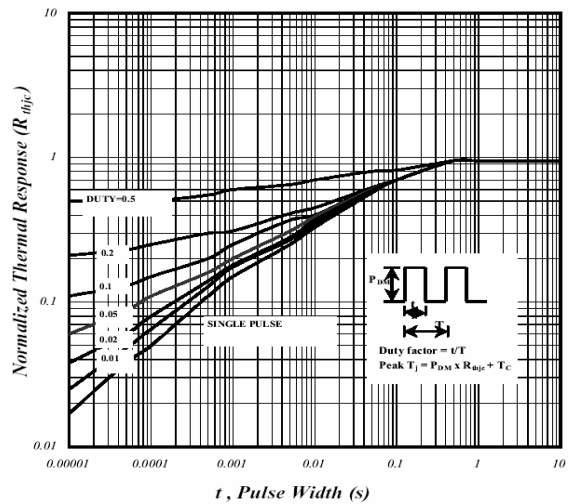


Fig 8. Effective Transient Thermal Impedance

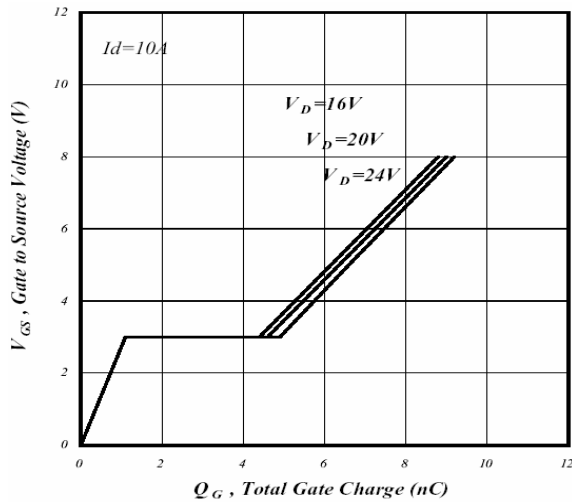


Fig 9. Gate Charge Characteristics

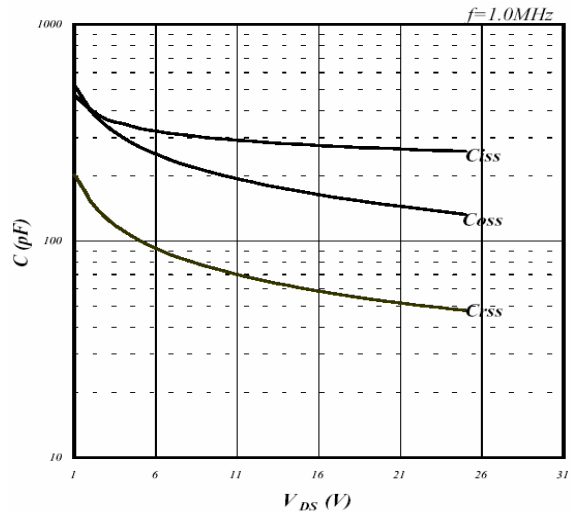


Fig 10. Typical Capacitance Characteristics

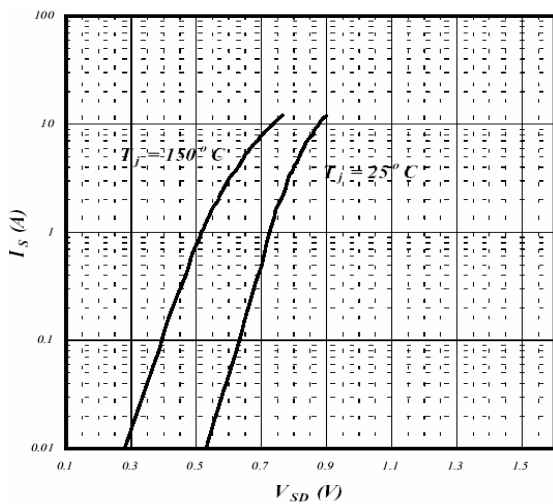


Fig 11. Forward Characteristics of Reverse Diode

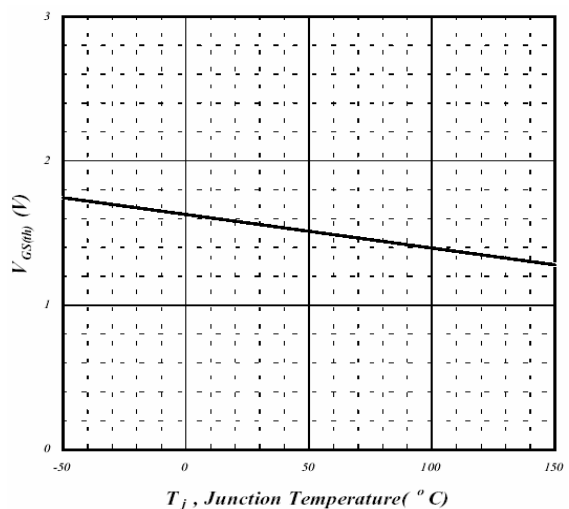
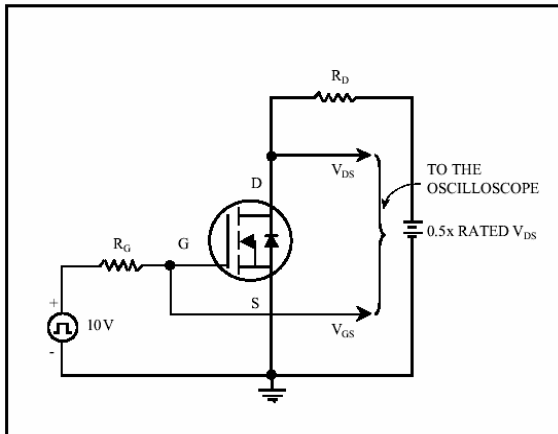
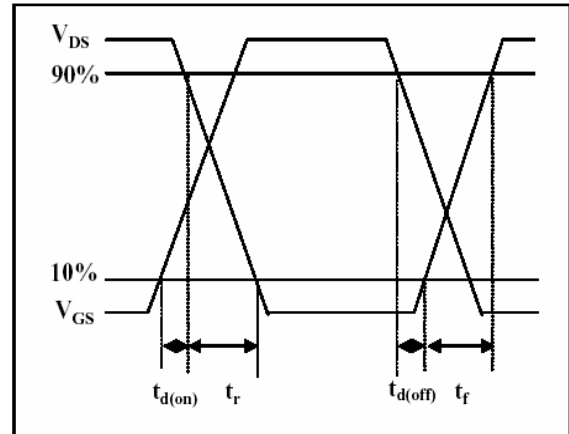


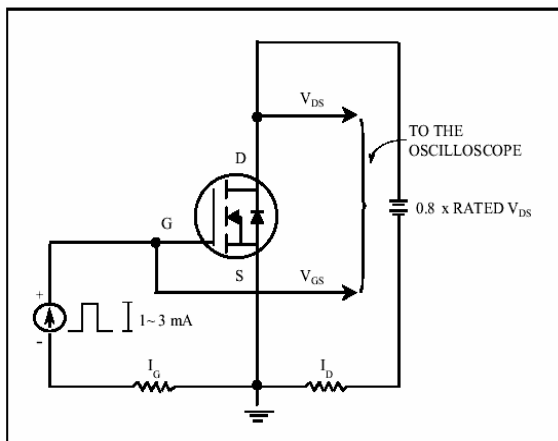
Fig 12. Gate Threshold Voltage v.s. Junction Temperature



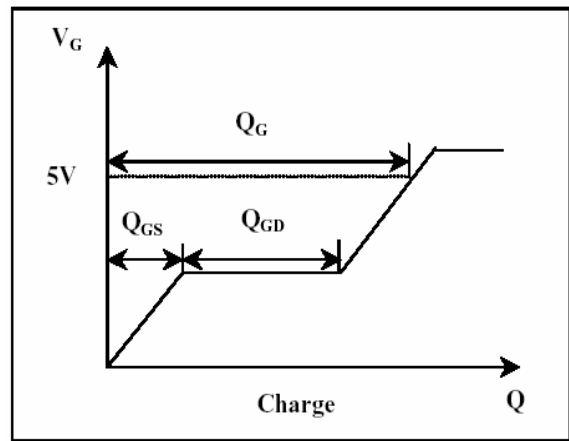
**Fig 13. Switching Time Circuit**



**Fig 14. Switching Time Waveform**



**Fig 15. Gate Charge Circuit**



**Fig 16. Gate Charge Waveform**

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