# GU20N03

**N-CHANNEL ENHANCEMENT MODE POWER MOSFET**

| | |
|---|---|
| $BV_{DSS}$ | 30V |
| $R_{DS(ON)}$ | 52mΩ |
| $I_D$ | 20A |

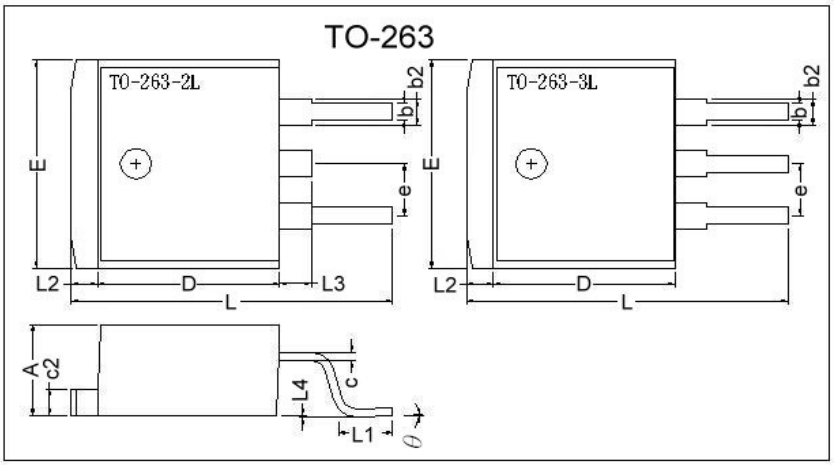
## Description

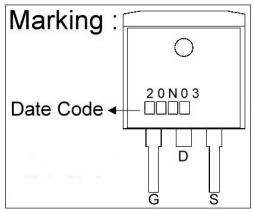
The GU20N03 provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.
The TO-263 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

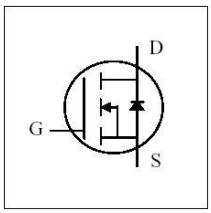
## Features

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

## Package Dimensions




| REF. | Millimeter | | REF. | Millimeter | |
|---|---|---|---|---|---|
| | Min. | Max. | | Min. | Max. |
| A | 4.40 | 4.80 | c2 | 1.25 | 1.45 |
| b | 0.76 | 1.00 | b2 | 1.17 | 1.47 |
| L4 | 0.00 | 0.30 | D | 8.6 | 9.0 |
| c | 0.36 | 0.5 | e | 2.54 REF. | |
| L3 | 1.50 REF. | | L | 14.6 | 15.8 |
| L1 | 2.29 | 2.79 | θ | 0° | 8° |
| E | 9.80 | 10.4 | L2 | 1.27 REF. | |

## 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 | $I_D$ @Tc=25℃ | 20 | A |
| Continuous Drain Current, $V_{GS}$@10V | $I_D$ @Tc=100℃ | 13 | A |
| Pulsed Drain Current[1] | $I_{DM}$ | 58 | A |
| Total Power Dissipation | $P_D$ @Tc=25℃ | 31 | W |
| Linear Derating Factor | | 0.25 | W/℃ |
| Operating Junction and Storage Temperature Range | Tj, Tstg | -55 ~ +150 | ℃ |

## Thermal Data

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Thermal Resistance Junction-case | Max. | Rthj-c | 4.0 | ℃/W |
| Thermal Resistance Junction-ambient | Max. | Rthj-a | 62 | ℃/W |

## Electrical Characteristics(Tj = 25℃ Unless otherwise specified)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 30 | - | - | V | $V_{GS}$=0, $I_D$=250uA |
| Breakdown Voltage Temperature Coefficient | $\triangle BV_{DSS}/\triangle Tj$ | - | 0.037 | - | V/℃ | Reference to 25℃, $I_D$=1mA |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1.0 | - | 3.0 | V | $V_{DS}$=$V_{GS}$, $I_D$=250uA |
| Forward Transconductance | $g_{fs}$ | - | 3 | - | S | $V_{DS}$=10V, $I_D$=10A |
| Gate-Source Leakage Current | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$= ±20V |
| Drain-Source Leakage Current(Tj=25℃) | $I_{DSS}$ | - | - | 1 | uA | $V_{DS}$=30V, $V_{GS}$=0 |
| Drain-Source Leakage Current(Tj=150℃) | | - | - | 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[2] | $Q_g$ | - | 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[2] | $T_{d(on)}$ | - | 4.9 | - | ns | $V_{DS}$=15V<br>$I_D$=20A<br>$V_{GS}$=10V<br>$R_G$=3.3Ω<br>$R_D$=0.75Ω |
| 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[2] | $V_{SD}$ | - | - | 1.3 | V | $I_S$=20A, $V_{GS}$=0V, Tj=25℃ |
| Continuous Source Current (Body Diode) | $I_S$ | - | - | 20 | A | $V_D$= $V_G$=0V, $V_S$=1.3V |
| Pulsed Source Current (Body Diode)[1] | $I_{SM}$ | - | - | 58 | A | |

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

2. Pulse width≦300us, duty cycle≦2%.

## Characteristics Curve

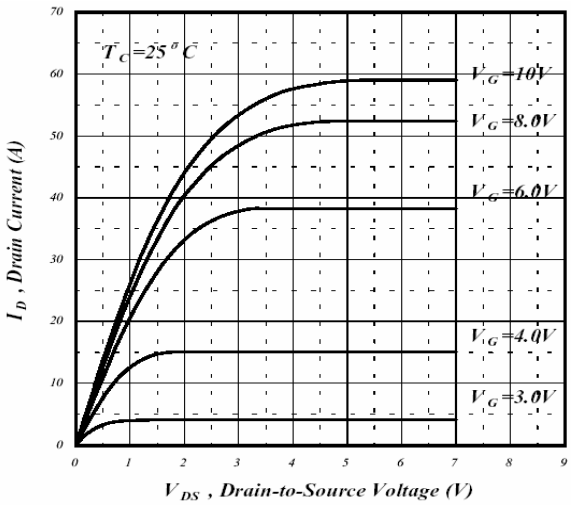



**Fig 1. Typical Output Characteristics**

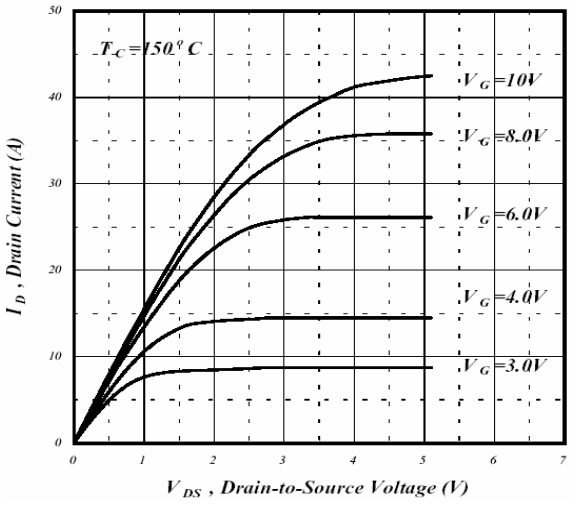



**Fig 2. Typical Output Characteristics**

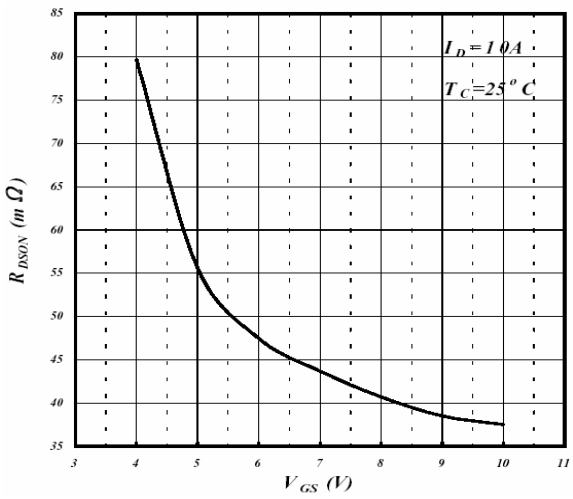



**Fig 3. On-Resistance v.s. Gate Voltage**

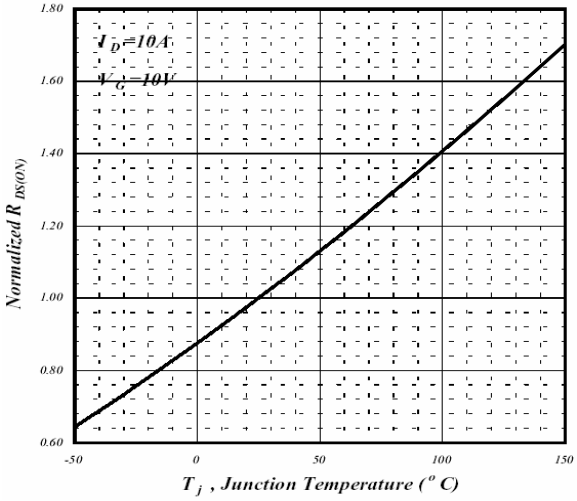



**Fig 4. Normalized On-Resistance v.s. Junction Temperature**

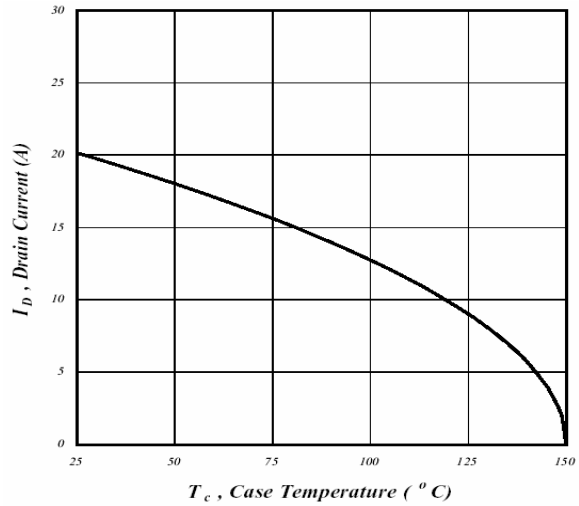



**Fig 5. Maximum Drain Current v.s. Case Temperature**

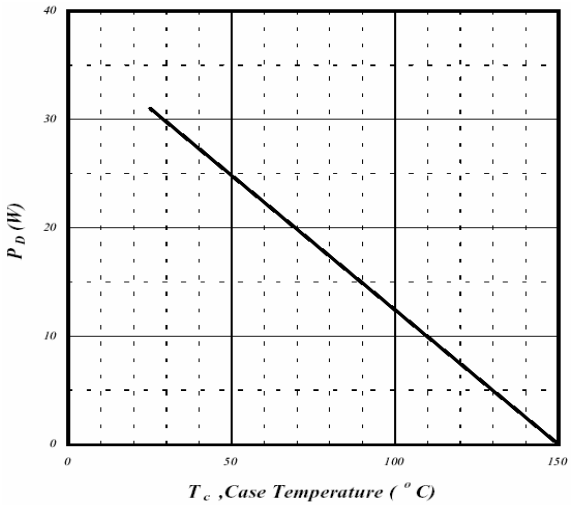



**Fig 6. Type Power Dissipation**

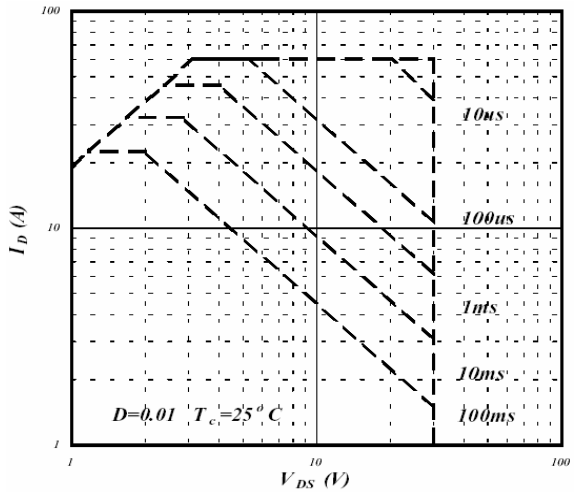



**Fig 7. Maximum Safe Operating Area**

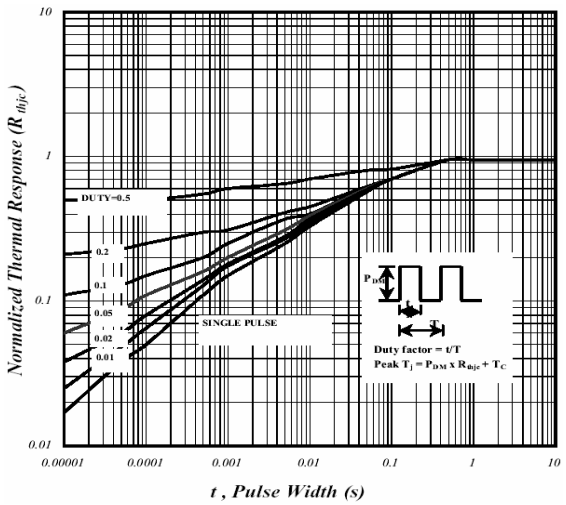



**Fig 8. Effective Transient Thermal Impedance**

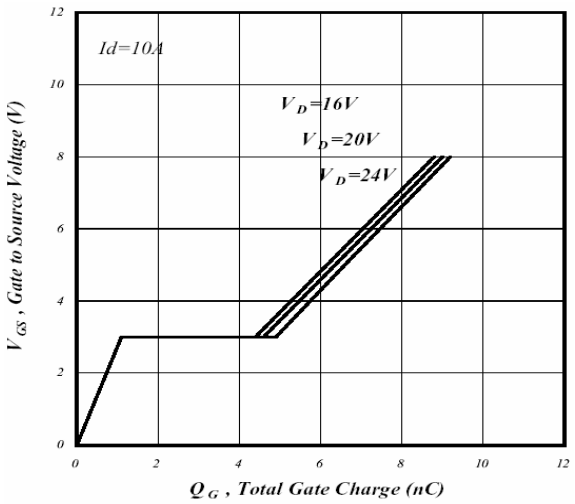



**Fig 9. Gate Charge Characteristics**

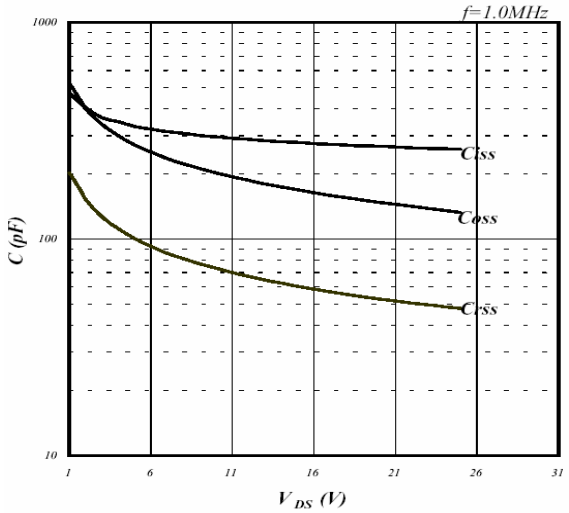



**Fig 10. Typical Capacitance Characteristics**

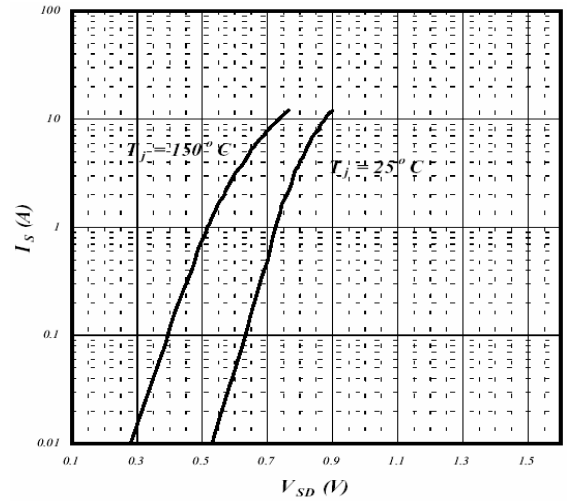



**Fig 11. Forward Characteristics of Reverse Diode**

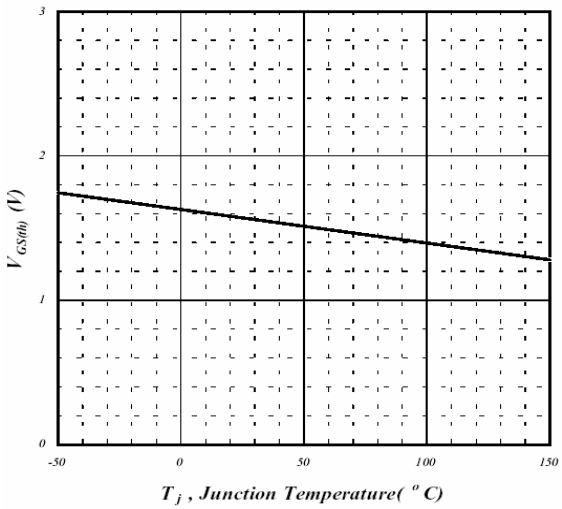



**Fig 12. Gate Threshold Voltage v.s. Junction Temperature**

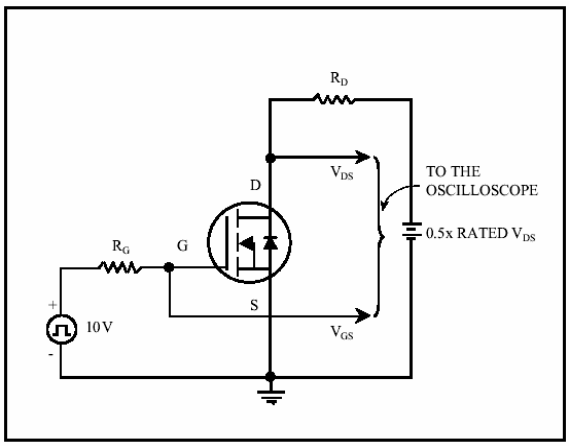



**Fig 13. Switching Time Circuit**

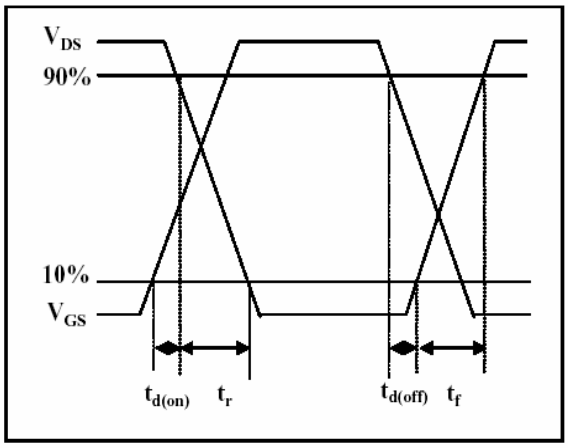



**Fig 14. Switching Time Waveform**

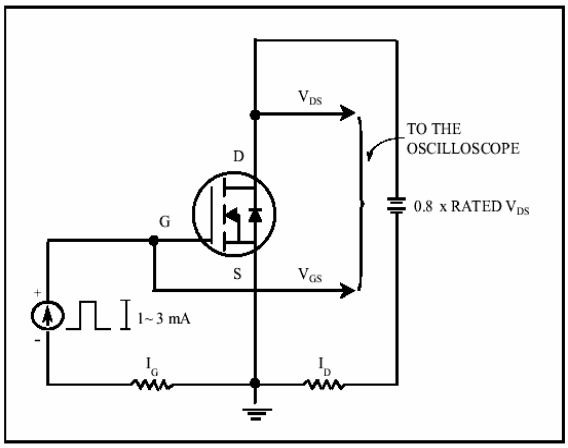



**Fig 15. Gate Charge Circuit**

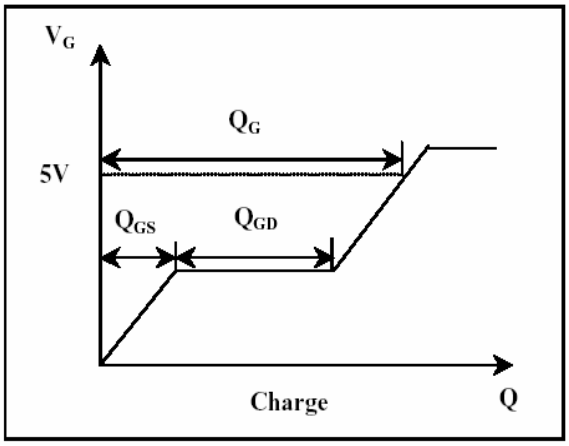



**Fig 16. Gate Charge Waveform**

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