

# GE88LS02

## N-CHANNEL ENHANCEMENT MODE POWER MOSFET

|                     |     |
|---------------------|-----|
| BV <sub>DSS</sub>   | 25V |
| R <sub>DS(ON)</sub> | 5mΩ |
| I <sub>D</sub>      | 75A |

### Description

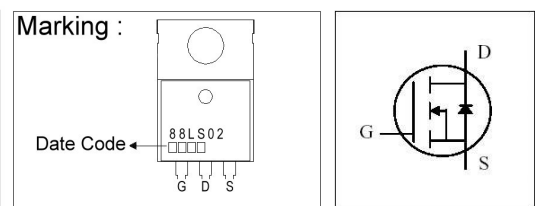
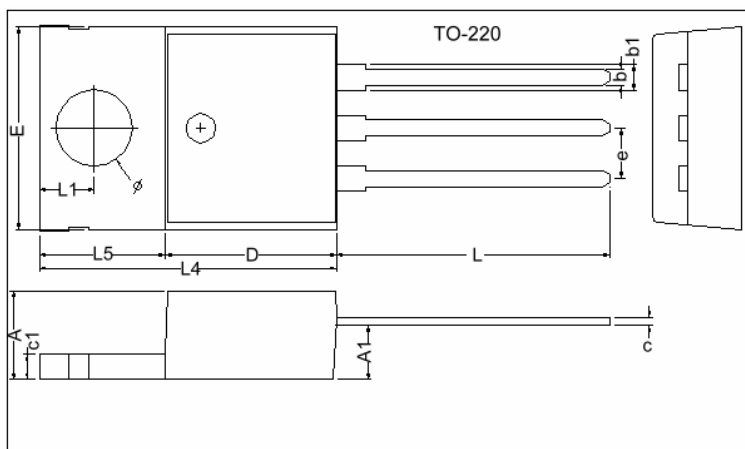
The GE88LS02 used advanced design and process to achieve low gate charge, low on-resistance and fast switching performance.

The through-hole version (TO-220) is available for low-profile applications and suited for low voltage applications such as DC/DC converters.

### Features

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

### Package Dimensions



| REF. | Millimeter |      | REF. | Millimeter |       |
|------|------------|------|------|------------|-------|
|      | Min.       | Max. |      | Min.       | Max.  |
| A    | 4.40       | 4.80 | c1   | 1.25       | 1.45  |
| b    | 0.76       | 1.00 | b1   | 1.17       | 1.47  |
| c    | 0.36       | 0.50 | L    | 13.25      | 14.25 |
| D    | 8.60       | 9.00 | e    | 2.54 REF.  |       |
| E    | 9.80       | 10.4 | L1   | 2.60       | 2.89  |
| L4   | 14.7       | 15.3 | Ø    | 3.71       | 3.96  |
| L5   | 6.20       | 6.60 | A1   | 2.60       | 2.80  |

### Absolute Maximum Ratings

| Parameter                                        | Symbol                                | Ratings    | Unit |
|--------------------------------------------------|---------------------------------------|------------|------|
| Drain-Source Voltage                             | V <sub>DS</sub>                       | 25         | V    |
| Gate-Source Voltage                              | V <sub>GS</sub>                       | ±20        | V    |
| Continuous Drain Current, V <sub>GS</sub> @4.5V  | I <sub>D</sub> @T <sub>C</sub> =25°C  | 75         | A    |
| Continuous Drain Current, V <sub>GS</sub> @4.5V  | I <sub>D</sub> @T <sub>C</sub> =100°C | 62.5       | A    |
| Pulsed Drain Current <sup>1</sup>                | I <sub>DM</sub>                       | 350        | A    |
| Total Power Dissipation                          | P <sub>D</sub> @T <sub>C</sub> =25°C  | 96         | W    |
| Linear Derating Factor                           |                                       | 0.75       | W/°C |
| Operating Junction and Storage Temperature Range | T <sub>j</sub> , T <sub>stg</sub>     | -55 ~ +150 | °C   |

### Thermal Data

| Parameter                                | Symbol                | Value | Unit |
|------------------------------------------|-----------------------|-------|------|
| Thermal Resistance Junction-case Max.    | R <sub>thj-case</sub> | 1.3   | °C/W |
| Thermal Resistance Junction-ambient Max. | R <sub>thj-amb</sub>  | 62    | °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>              | 25   | -    | -    | V    | V <sub>GS</sub> =0, I <sub>D</sub> =250uA                                                                           |
| Breakdown Voltage Temperature Coefficient           | $\Delta BV_{DSS} / \Delta T_j$ | -    | 0.02 | -    | 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>                | -    | 29   | -    | S    | V <sub>DS</sub> =10V, I <sub>D</sub> =30A                                                                           |
| 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> =25V, V <sub>GS</sub> =0                                                                            |
| Drain-Source Leakage Current(T <sub>j</sub> =150°C) |                                | -    | -    | 100  | uA   | V <sub>DS</sub> =20V, V <sub>GS</sub> =0                                                                            |
| Static Drain-Source On-Resistance <sup>2</sup>      | R <sub>DS(ON)</sub>            | -    | -    | 5    | mΩ   | V <sub>GS</sub> =10V, I <sub>D</sub> =45A                                                                           |
|                                                     |                                | -    | -    | 7    |      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =30A                                                                          |
| Total Gate Charge <sup>2</sup>                      | Q <sub>g</sub>                 | -    | 28   | 45   | nC   | I <sub>D</sub> =30A<br>V <sub>DS</sub> =20V<br>V <sub>GS</sub> =4.5V                                                |
| Gate-Source Charge                                  | Q <sub>gs</sub>                | -    | 5    | -    |      |                                                                                                                     |
| Gate-Drain ("Miller") Charge                        | Q <sub>gd</sub>                | -    | 19   | -    |      |                                                                                                                     |
| Turn-on Delay Time <sup>2</sup>                     | T <sub>d(on)</sub>             | -    | 10   | -    | ns   | V <sub>DS</sub> =15V<br>I <sub>D</sub> =30A<br>V <sub>GS</sub> =10V<br>R <sub>G</sub> =3.3Ω<br>R <sub>D</sub> =0.5Ω |
| Rise Time                                           | T <sub>r</sub>                 | -    | 80   | -    |      |                                                                                                                     |
| Turn-off Delay Time                                 | T <sub>d(off)</sub>            | -    | 37   | -    |      |                                                                                                                     |
| Fall Time                                           | T <sub>f</sub>                 | -    | 85   | -    |      |                                                                                                                     |
| Input Capacitance                                   | C <sub>iss</sub>               | -    | 2070 | 3310 | pF   | V <sub>GS</sub> =0V<br>V <sub>DS</sub> =25V<br>f=1.0MHz                                                             |
| Output Capacitance                                  | C <sub>oss</sub>               | -    | 990  | -    |      |                                                                                                                     |
| Reverse Transfer Capacitance                        | C <sub>rss</sub>               | -    | 300  | -    |      |                                                                                                                     |

**Source-Drain Diode**

| Parameter                       | Symbol          | Min. | Typ. | Max. | Unit | Test Conditions                                           |
|---------------------------------|-----------------|------|------|------|------|-----------------------------------------------------------|
| Forward On Voltage <sup>2</sup> | V <sub>SD</sub> | -    | -    | 1.3  | V    | I <sub>S</sub> =45A, V <sub>GS</sub> =0V                  |
| Reverse Recovery Time           | T <sub>rr</sub> | -    | 50   | -    | ns   | I <sub>S</sub> =30A, V <sub>GS</sub> =0V<br>di/dt=100A/μs |
| Reverse Recovery Charge         | Q <sub>rr</sub> | -    | 51   | -    | nC   |                                                           |

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

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

## Characteristics Curve

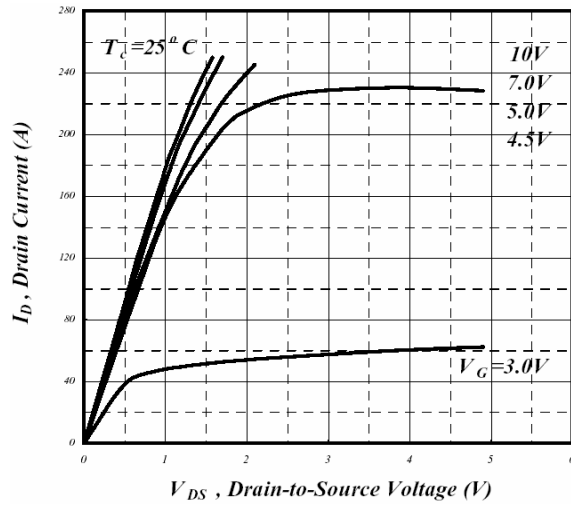


Fig 1. Typical Output Characteristics

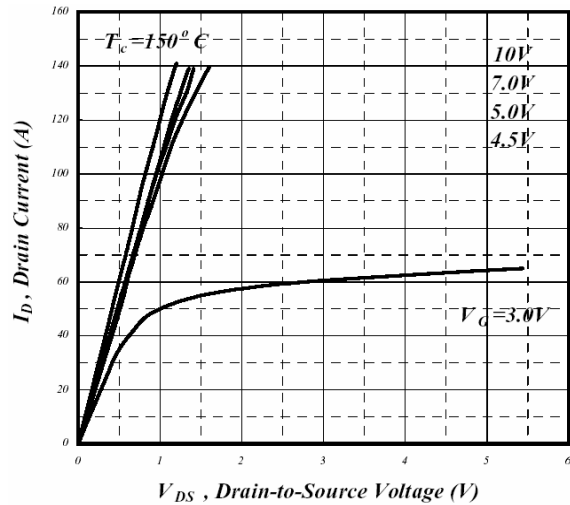


Fig 2. Typical Output Characteristics

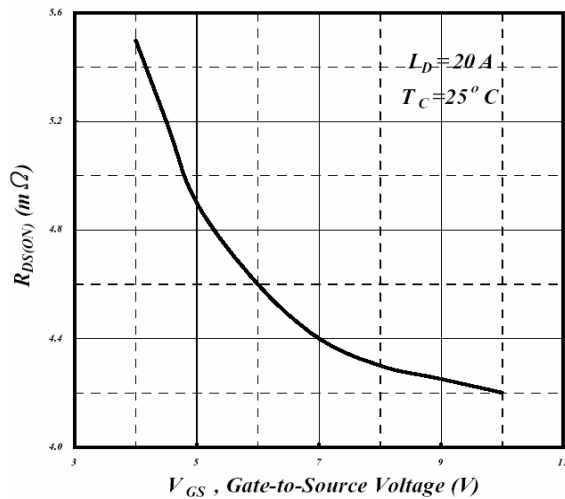


Fig 3. On-Resistance v.s. Gate Voltage

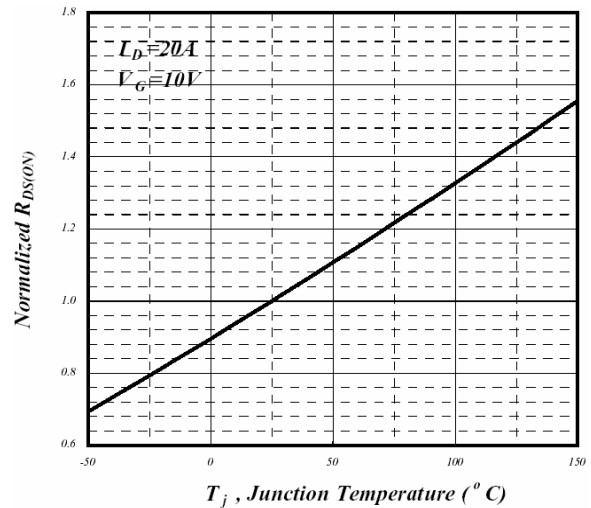


Fig 4. Normalized On-Resistance v.s. Junction Temperature

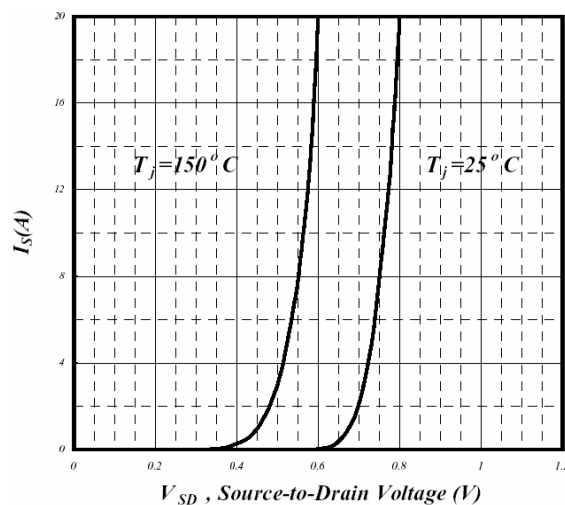


Fig 5. Forward Characteristics of Reverse Diode

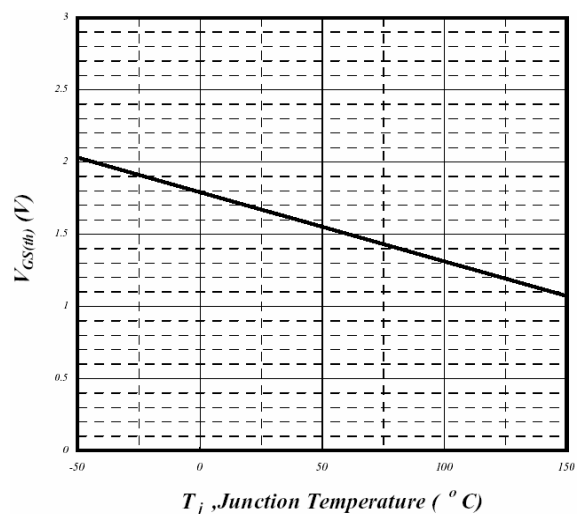
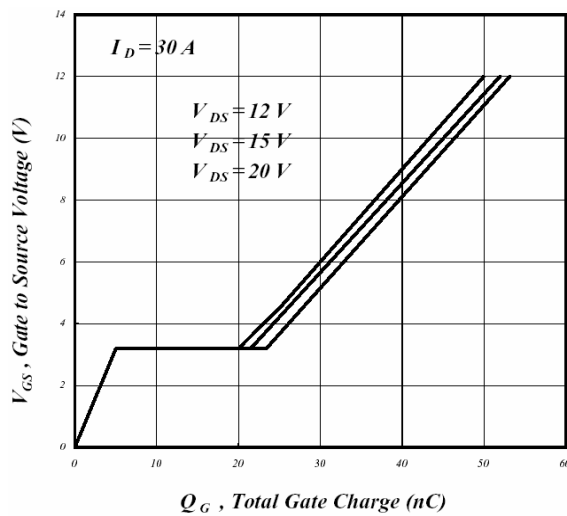
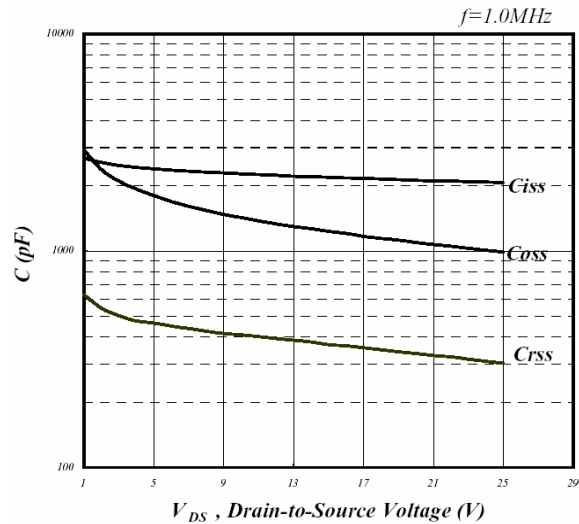


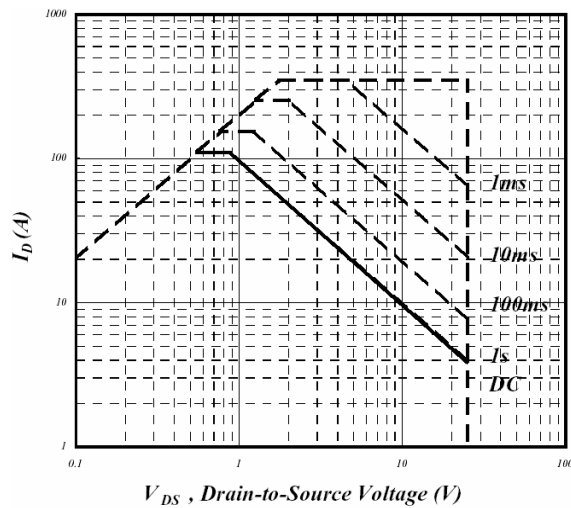
Fig 6. Gate Threshold Voltage v.s. Junction Temperature



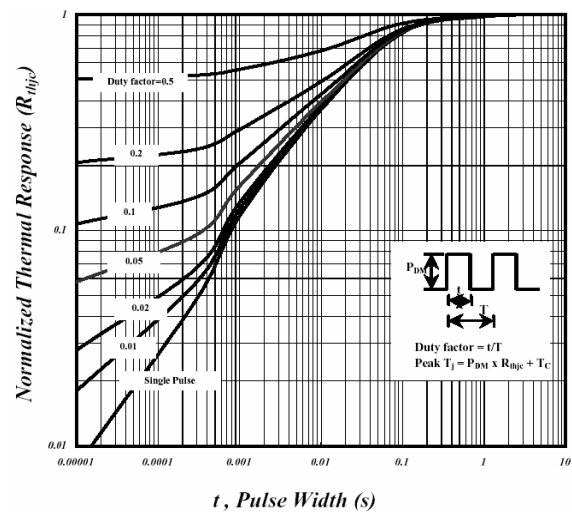
**Fig 7. Gate Charge Characteristics**



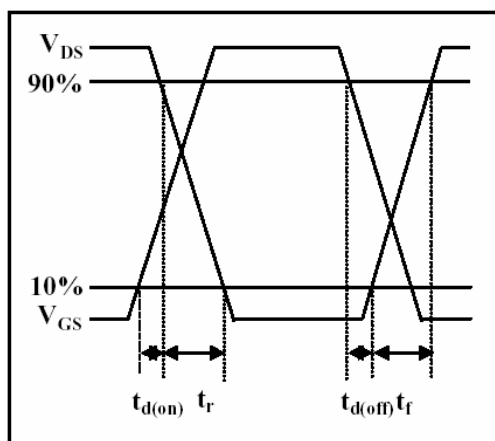
**Fig 8. Typical Capacitance Characteristics**



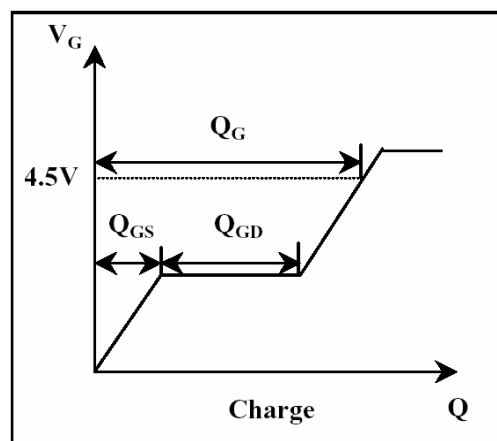
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



**Fig 11. Switching Time Waveform**



**Fig 12. Gate Charge Waveform**

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#### Head Office And Factory:

- Taiwan:** No. 17-1 Tatung Rd. Fu Kou Hsin-Chu Industrial Park, Hsin-Chu, Taiwan, R. O. C.  
TEL : 886-3-597-7061 FAX : 886-3-597-9220, 597-0785
- China:** (201203) No.255, Jang-Jiang Tsai-Lueng RD. , Pu-Dung-Hsin District, Shang-Hai City, China  
TEL : 86-21-5895-7671 ~ 4 FAX : 86-21-38950165