

# GSC4404

## N-CHANNEL ENHANCEMENT MODE POWER MOSFET

|         |      |
|---------|------|
| BVDSS   | 30V  |
| RDS(ON) | 24mΩ |
| ID      | 8.5A |

### Description

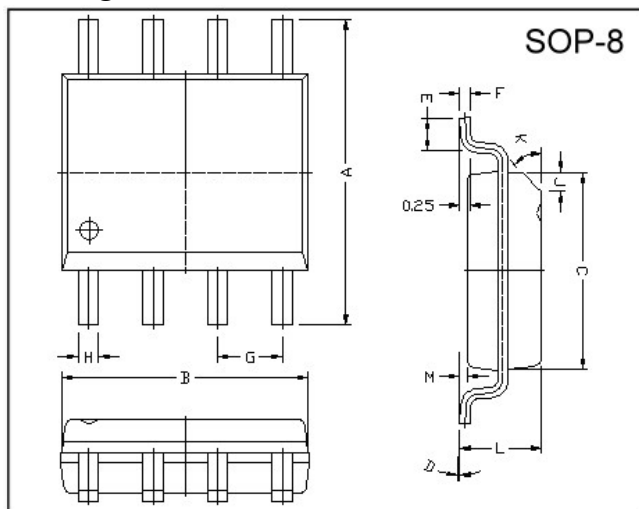
The GSC4404 uses advanced trench technology to provide excellent on-resistance, low gate charge and operation with gate voltage as low as 2.5V.

The SOP-8 package is universally preferred for all commercial-industrial surface mount applications and suited for use as a load switch or in PWM applications.

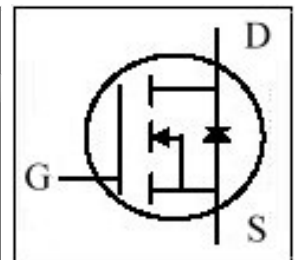
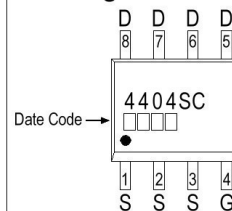
### Features

- \*Simple Drive Requirement
- \*Lower On-resistance
- \*Fast Switching Characteristic

### Package Dimensions



#### Marking :



| REF. | Millimeter |      | REF. | Millimeter |      |
|------|------------|------|------|------------|------|
|      | Min.       | Max. |      | Min.       | Max. |
| A    | 5.80       | 6.20 | M    | 0.10       | 0.25 |
| B    | 4.80       | 5.00 | H    | 0.35       | 0.49 |
| C    | 3.80       | 4.00 | L    | 1.35       | 1.75 |
| D    | 0°         | 8°   | J    | 0.375 REF. |      |
| E    | 0.40       | 0.90 | K    | 45°        |      |
| F    | 0.19       | 0.25 | G    | 1.27 TYP.  |      |

### Absolute Maximum Ratings

| Parameter                                        | Symbol                | Ratings    | Unit          |
|--------------------------------------------------|-----------------------|------------|---------------|
| Drain-Source Voltage                             | $V_{DS}$              | 30         | V             |
| Gate-Source Voltage                              | $V_{GS}$              | $\pm 12$   | V             |
| Continuous Drain Current, $V_{GS}@10V$           | $I_D @T_A=25^\circ C$ | 8.5        | A             |
| Continuous Drain Current, $V_{GS}@10V$           | $I_D @T_A=70^\circ C$ | 7.1        | A             |
| Pulsed Drain Current <sup>1</sup>                | $I_{DM}$              | 60         | A             |
| Total Power Dissipation                          | $P_D @T_A=25^\circ C$ | 2.5        | W             |
| Linear Derating Factor                           |                       | 0.02       | 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-ambient Max. | $R_{thj-amb}$ | 50    | $^\circ C/W$ |

**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>   | 30   | -    | -    | V    | V <sub>GS</sub> =0, I <sub>D</sub> =250uA                                                  |
| Gate Threshold Voltage                             | V <sub>GS(th)</sub> | 0.7  | -    | 1.4  | V    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA                                   |
| Forward Transconductance                           | g <sub>fs</sub>     | -    | 16   | -    | S    | V <sub>DS</sub> =5V, I <sub>D</sub> =5A                                                    |
| 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> =30V, V <sub>GS</sub> =0                                                   |
| Drain-Source Leakage Current(T <sub>j</sub> =55°C) |                     | -    | -    | 5    | uA   | V <sub>DS</sub> =24V, V <sub>GS</sub> =0                                                   |
| Static Drain-Source On-Resistance                  | R <sub>DS(ON)</sub> | -    | -    | 24   | mΩ   | V <sub>GS</sub> =10V, I <sub>D</sub> =8.5A                                                 |
|                                                    |                     | -    | -    | 30   |      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =8.5A                                                |
|                                                    |                     | -    | -    | 48   |      | V <sub>GS</sub> =2.5V, I <sub>D</sub> =5.0A                                                |
| Total Gate Charge <sup>2</sup>                     | Q <sub>g</sub>      | -    | 9.7  | 12   | nC   | I <sub>D</sub> =8.5A<br>V <sub>DS</sub> =15V<br>V <sub>GS</sub> =4.5V                      |
| Gate-Source Charge                                 | Q <sub>gs</sub>     | -    | 1.63 | -    |      |                                                                                            |
| Gate-Drain ("Miller") Charge                       | Q <sub>gd</sub>     | -    | 3.1  | -    |      |                                                                                            |
| Turn-on Delay Time <sup>2</sup>                    | T <sub>d(on)</sub>  | -    | 3.3  | -    | ns   | V <sub>DS</sub> =15V<br>V <sub>GS</sub> =10V<br>R <sub>G</sub> =6Ω<br>R <sub>L</sub> =1.8Ω |
| Rise Time                                          | T <sub>r</sub>      | -    | 4.7  | -    |      |                                                                                            |
| Turn-off Delay Time                                | T <sub>d(off)</sub> | -    | 26   | -    |      |                                                                                            |
| Fall Time                                          | T <sub>f</sub>      | -    | 4.1  | -    |      |                                                                                            |
| Input Capacitance                                  | C <sub>iss</sub>    | -    | 857  | 1050 | pF   | V <sub>GS</sub> =0V<br>V <sub>DS</sub> =15V<br>f=1.0MHz                                    |
| Output Capacitance                                 | C <sub>oss</sub>    | -    | 97   | -    |      |                                                                                            |
| Reverse Transfer Capacitance                       | C <sub>rss</sub>    | -    | 71   | -    |      |                                                                                            |

**Source-Drain Diode**

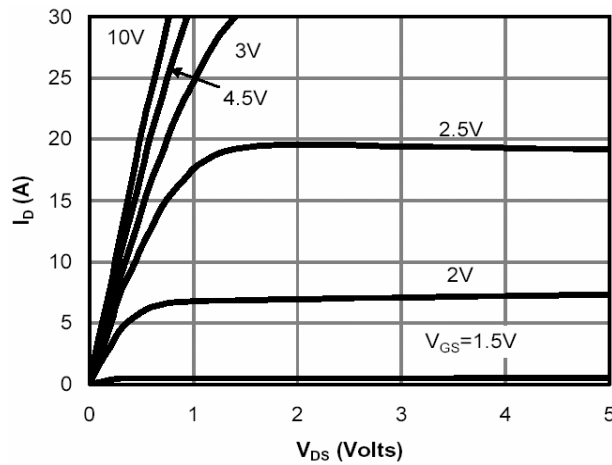
| Parameter                              | Symbol          | Min. | Typ. | Max. | Unit | Test Conditions                                           |
|----------------------------------------|-----------------|------|------|------|------|-----------------------------------------------------------|
| Forward On Voltage <sup>2</sup>        | V <sub>SD</sub> | -    | -    | 1.0  | V    | I <sub>S</sub> =1.0A, V <sub>GS</sub> =0V                 |
| Continuous Source Current (Body Diode) | I <sub>S</sub>  | -    | -    | 4.3  | A    | V <sub>D</sub> = V <sub>G</sub> =0V, V <sub>S</sub> =1.0V |
| Reverse Recovery Time <sup>2</sup>     | T <sub>rr</sub> | -    | 15   | -    | ns   | I <sub>S</sub> =5.0A, V <sub>GS</sub> =0V                 |
| Reverse Recovery Charge                | Q <sub>rr</sub> | -    | 8.6  | -    | nC   | di/dt=100A/μs                                             |

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

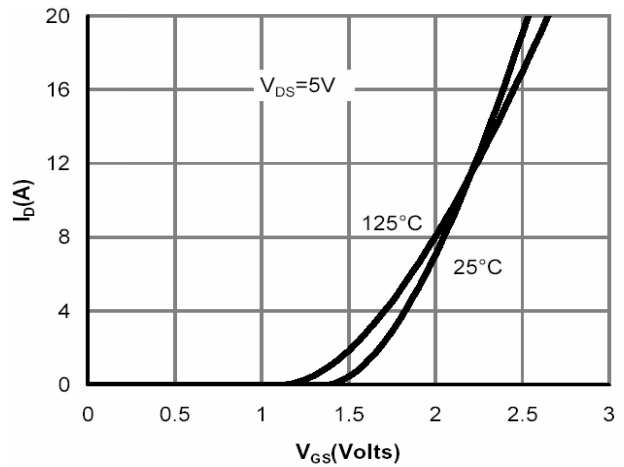
2. Pulse width ≤ 300us, duty cycle ≤ 2%.

3. Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board; 125°C/W when mounted on Min. copper pad.

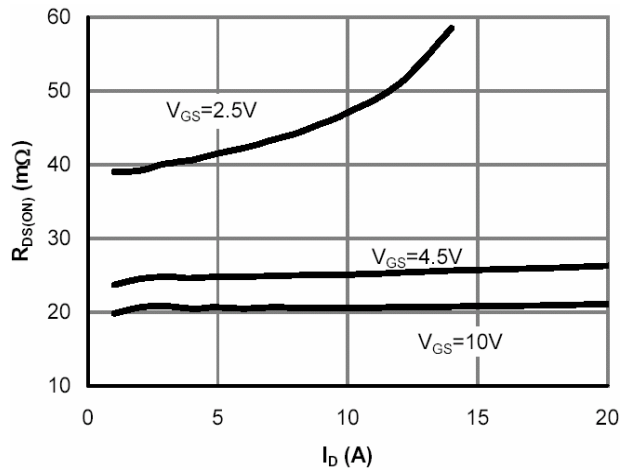
## Characteristics Curve



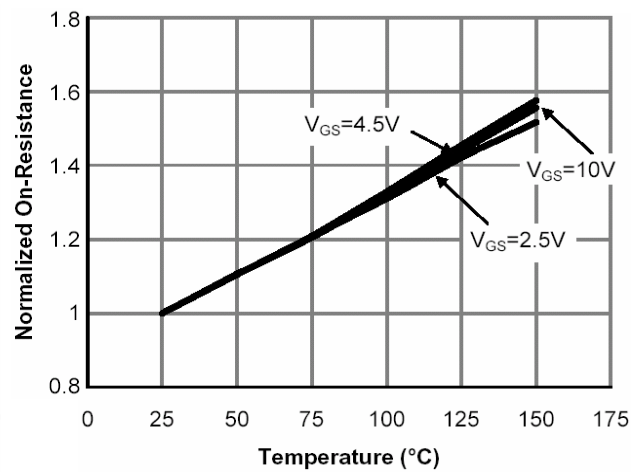
**Fig 1. Typical Output Characteristics**



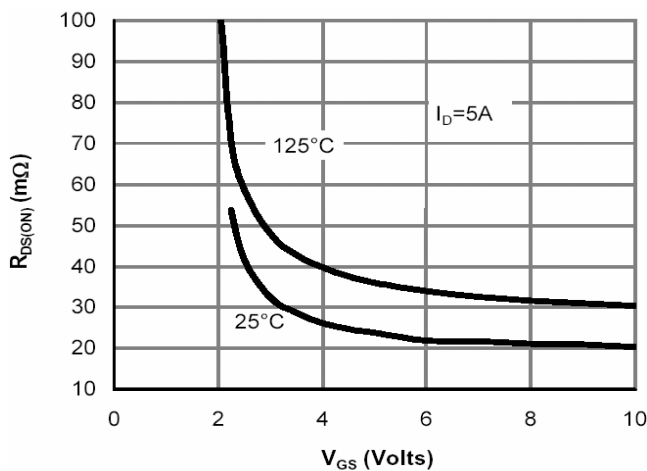
**Fig 2. Transfer Characteristics**



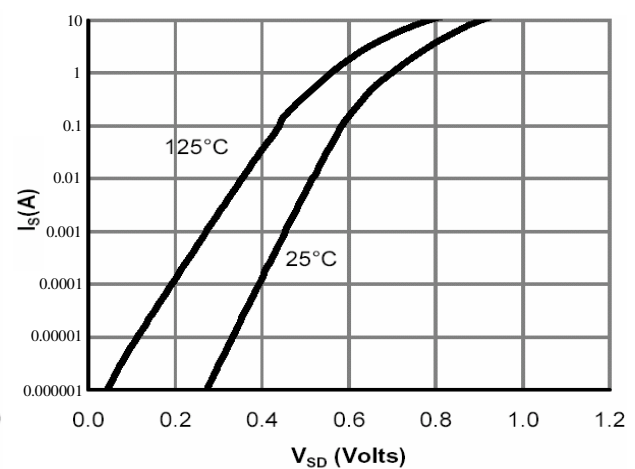
**Fig 3. On-Resistance v.s. Drain Current and Gate Voltage**



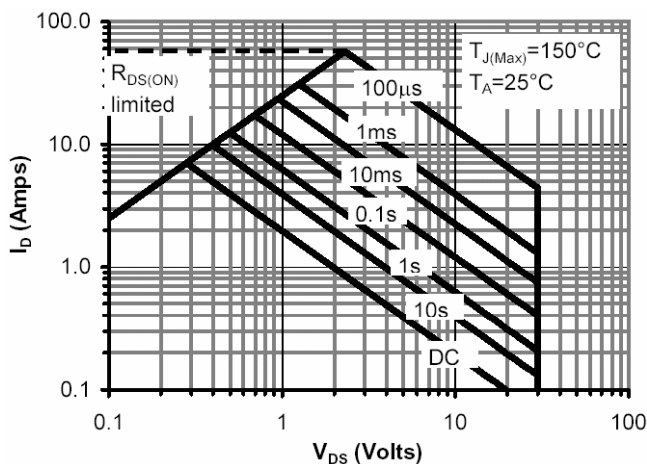
**Fig 4. On-Resistance v.s. Junction Temperature**



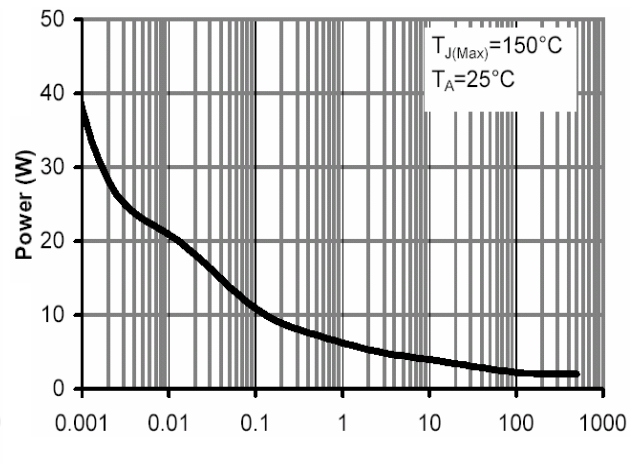
**Fig 5. On-Resistance v.s. Gate-Source Voltage**



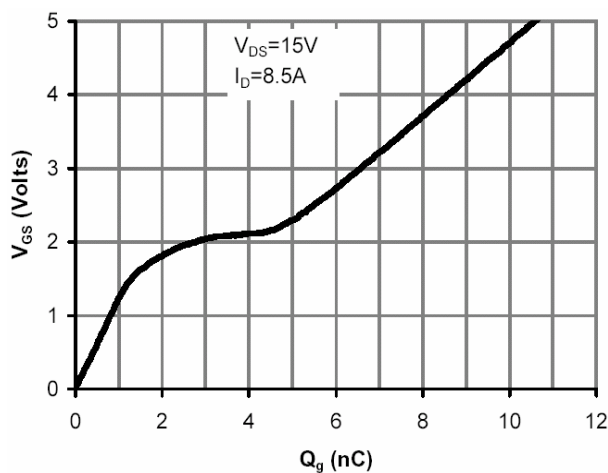
**Fig 6. Body Diode Characteristics**



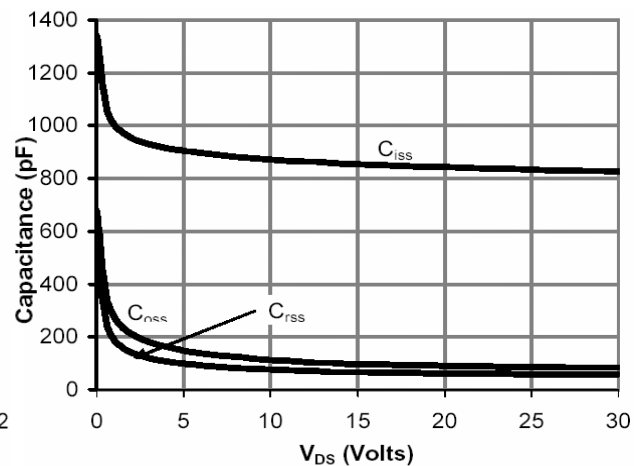
**Fig 7. Maximum Safe Operating Area**



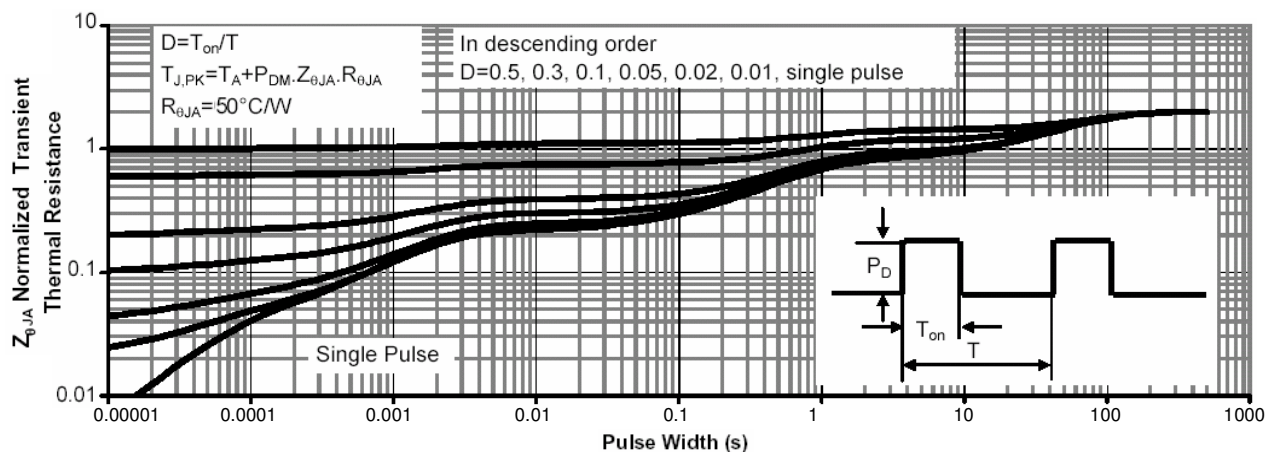
**Fig 8. Single Pulse Maximum Power Dissipation**



**Fig 9. Gate Charge Characteristics**



**Fig 10. Typical Capacitance Characteristics**



**Fig 11. Normalized Maximum Transient Thermal Impedance**

**Important Notice:**

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of GTM.
- GTM reserves the right to make changes to its products without notice.
- GTM semiconductor products are not warranted to be suitable for use in life-support Applications, or systems.
- GTM assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.

**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