

# G2304

## N-CHANNEL ENHANCEMENT MODE POWER MOSFET

|                     |       |
|---------------------|-------|
| BV <sub>DSS</sub>   | 25V   |
| R <sub>DS(ON)</sub> | 117mΩ |
| I <sub>D</sub>      | 2.7A  |

### Description

The G2304 provides the designer with the best combination of fast switching, low on-resistance and cost-effectiveness.

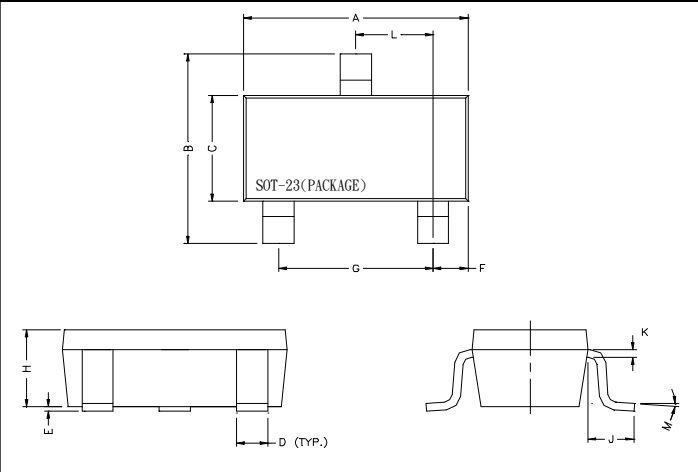
### Features

- Super High Dense Cell Design for Extremely Low R<sub>DS(ON)</sub>
- Reliable and Rugged

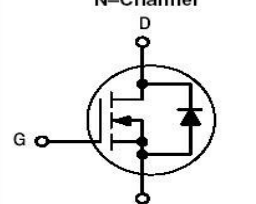
### Applications

- Power Management in Notebook Computer
- Portable Equipment
- Battery Powered System.

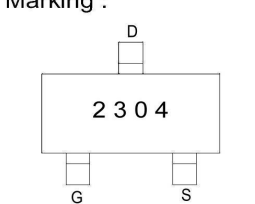
### Package Dimensions



N-Channel



Marking :



| REF. | Millimeter |      | REF. | Millimeter |      |
|------|------------|------|------|------------|------|
|      | Min.       | Max. |      | Min.       | Max. |
| A    | 2.70       | 3.10 | G    | 1.90       | REF. |
| B    | 2.40       | 2.80 | H    | 1.00       | 1.30 |
| C    | 1.40       | 1.60 | K    | 0.10       | 0.20 |
| D    | 0.35       | 0.50 | J    | 0.40       | -    |
| E    | 0          | 0.10 | L    | 0.85       | 1.15 |
| F    | 0.45       | 0.55 | M    | 0'         | 10'  |

### 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 <sup>3</sup> , V <sub>GS</sub> @4.5V | I <sub>D</sub> @TA=25°C           | 2.7        | A    |
| Continuous Drain Current <sup>3</sup> , V <sub>GS</sub> @4.5V | I <sub>D</sub> @TA=70°C           | 2.2        | A    |
| Pulsed Drain Current <sup>1,2</sup>                           | I <sub>DM</sub>                   | 10         | A    |
| Power Dissipation   | P <sub>D</sub> @TA=25°C           | 1.38       | W    |
| Linear Derating Factor  |                                   | 0.01       | W/°C |
| Operating Junction and Storage Temperature Range              | T <sub>J</sub> , T <sub>stg</sub> | -55 ~ +150 | °C   |

### Thermal Data

| Parameter   | Symbol             | Ratings | Unit |
|---|--------------------|---------|------|
| Thermal Resistance Junction-ambient <sup>3</sup> Max. | R <sub>thj-a</sub> | 90      | °C/W |

## Electrical Characteristics(Tj = 25°C Unless otherwise specified)

| Parameter                                      | Symbol                       | Min. | Typ. | Max. | Unit | Test Conditions   |
|--|------------------------------|------|------|------|------|---|
| Drain-Source Breakdown Voltage                 | $BV_{DSS}$                   | 25   | -    | -    | V    | $V_{GS}=0, I_D=250\mu A$  |
| Breakdown Voltage Temperature Coefficient      | $\Delta BV_{DSS}/\Delta T_j$ | -    | 0.1  | -    | 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                       | $g_{fs}$                     | -    | 3.4  | -    | S    | $V_{DS}=4.5V, I_D=2.5A$   |
| Gate-Source Leakage Current                    | $I_{GSS}$                    | -    | -    | ±100 | nA   | $V_{GS}= \pm 20V$   |
| Drain-Source Leakage Current(Tj=25°C)          | $I_{DSS}$                    | -    | -    | 1    | uA   | $V_{DS}=25V, V_{GS}=0$  |
| Drain-Source Leakage Current(Tj=70°C)          |                              | -    | -    | 10   | uA   | $V_{DS}=25V, V_{GS}=0$  |
| Static Drain-Source On-Resistance <sup>2</sup> | $R_{DS(on)}$                 | -    | -    | 117  | mΩ   | $I_D=2.5A, V_{GS}=10V$  |
|  |                              | -    | -    | 190  |      | $I_D=2.0A, V_{GS}=4.5V$   |
| Total Gate Charge <sup>2</sup>                 | $Q_g$                        | -    | 5.9  | 10   | nC   | $I_D=2.5A$  |
| Gate-Source Charge                             | $Q_{gs}$                     | -    | 0.8  | -    |      | $V_{DS}=15V$  |
| Gate-Drain ("Miller") Change                   | $Q_{gd}$                     | -    | 2.1  | -    |      | $V_{GS}=10V$  |
| Turn-on Delay Time <sup>2</sup>                | $T_{d(on)}$                  | -    | 4.5  | -    | ns   | $V_{DS}=15V$<br>$I_D=1A$<br>$V_{GS}=10V$<br>$R_G=6\Omega$<br>$R_D=15\Omega$ |
| Rise Time                                      | $T_r$                        | -    | 11.5 | -    |      |   |
| Turn-off Delay Time                            | $T_{d(off)}$                 | -    | 12   | -    |      |   |
| Fall Time                                      | $T_f$                        | -    | 3    | -    |      |   |
| Input Capacitance                              | $C_{iss}$                    | -    | 110  | -    | pF   | $V_{GS}=0V$<br>$V_{DS}=15V$<br>$f=1.0MHz$                                   |
| Output Capacitance                             | $C_{oss}$                    | -    | 85   | -    |      |   |
| Reverse Transfer Capacitance                   | $C_{rss}$                    | -    | 39   | -    |      |   |

## Source-Drain Diode

|   |          |   |   |     |   |                                      |
|---|----------|---|---|-----|---|--------------------------------------|
| Forward On Voltage <sup>2</sup>                 | $V_{SD}$ | - | - | 1.2 | V | $I_S=1.25A, V_{GS}=0 T_j=25^\circ C$ |
| Continuous Source Current(Body Diode)           | $I_S$    | - | - | 1   | A | $V_D=V_G=0V, V_S=1.2V$               |
| Pulsed Source Current (Body Diode) <sup>1</sup> | $I_{SM}$ | - | - | 10  | A |                                      |

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;270°C/w when mounted on min. copper pad.

## Characteristics Curve

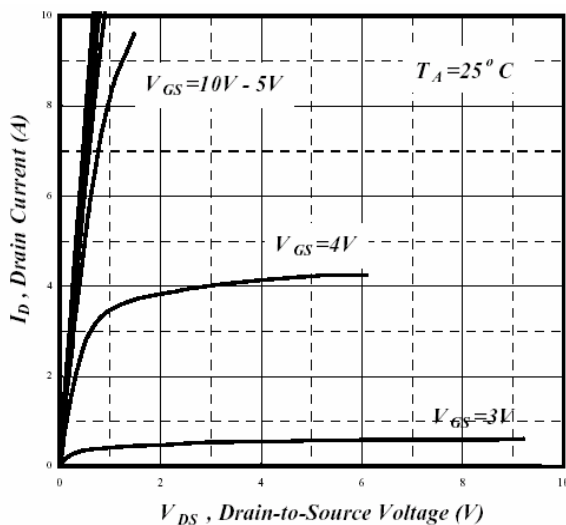


Fig 1. Typical Output Characteristics

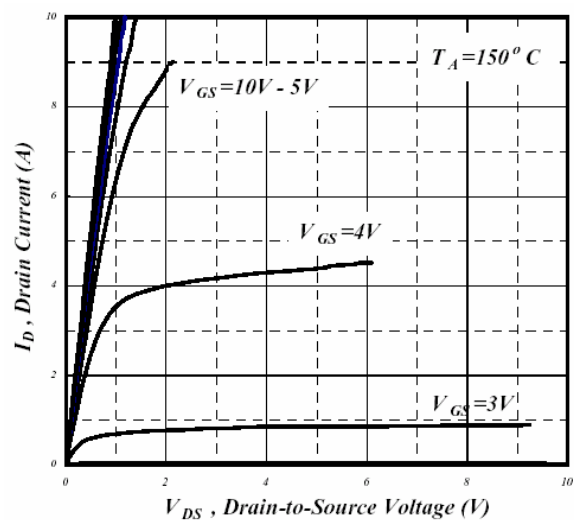
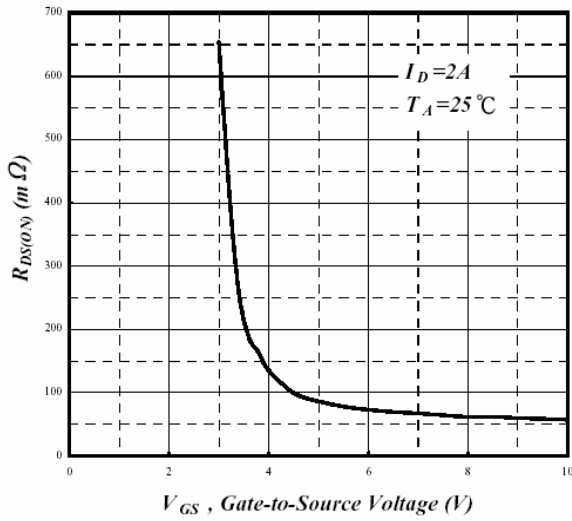
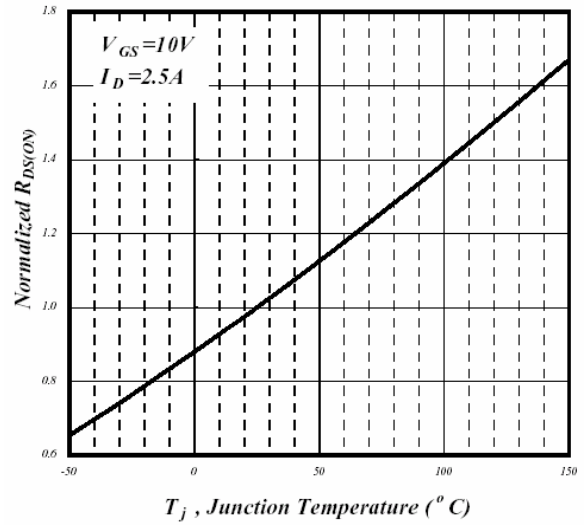


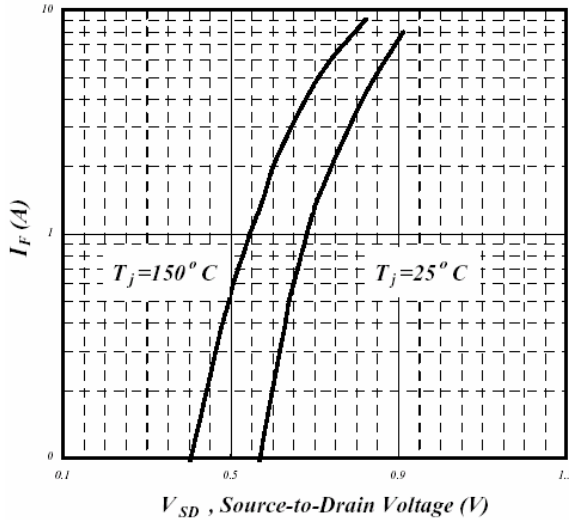
Fig 2. Typical Output Characteristics



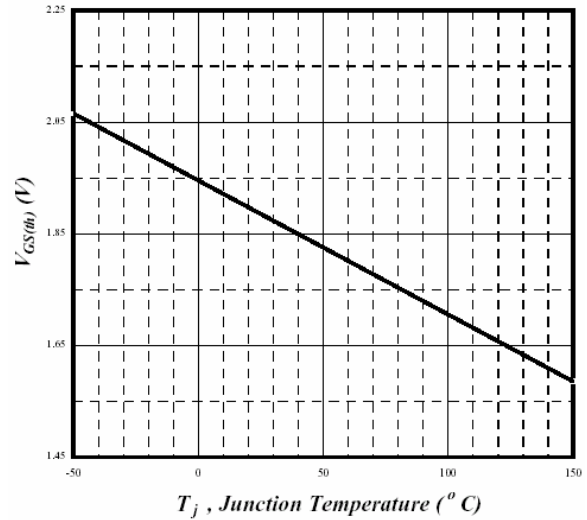
**Fig 3. On-Resistance v.s. Gate Voltage**



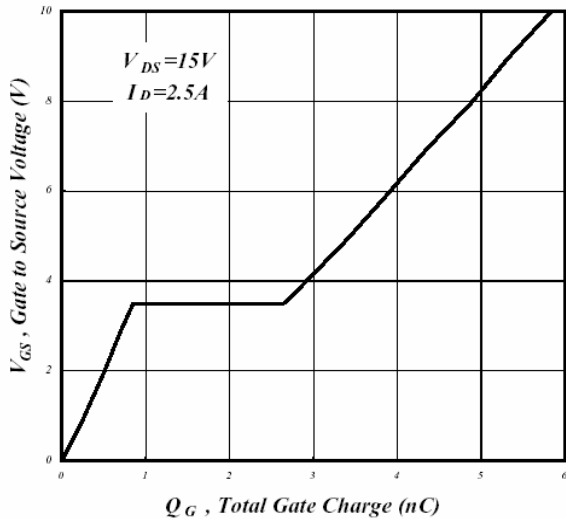
**Fig 4. Normalized On-Resistance v.s. Junction Temperature**



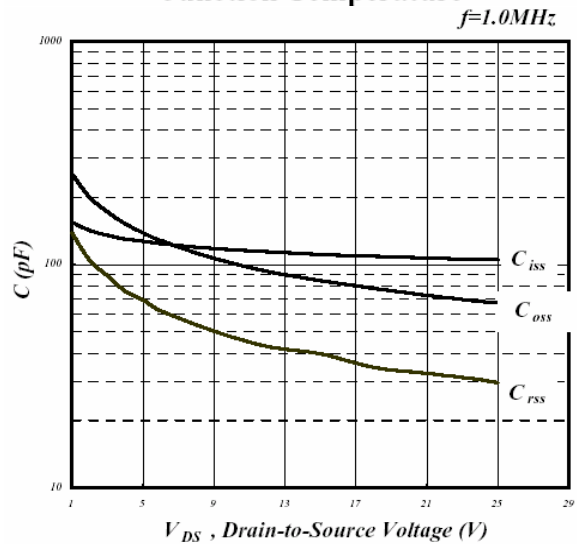
**Fig 5. Forward Characteristic of Reverse Diode**



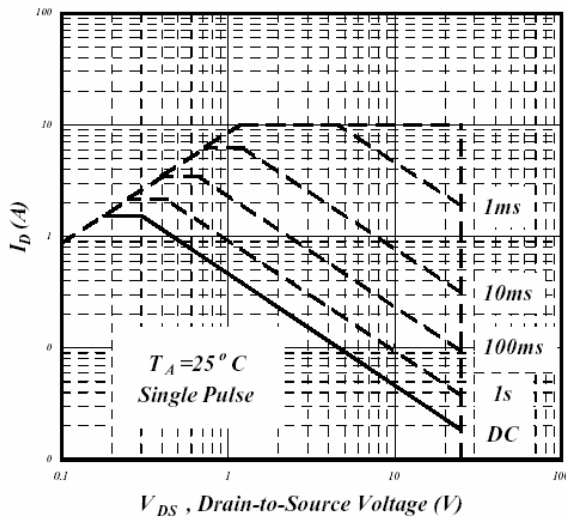
**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**



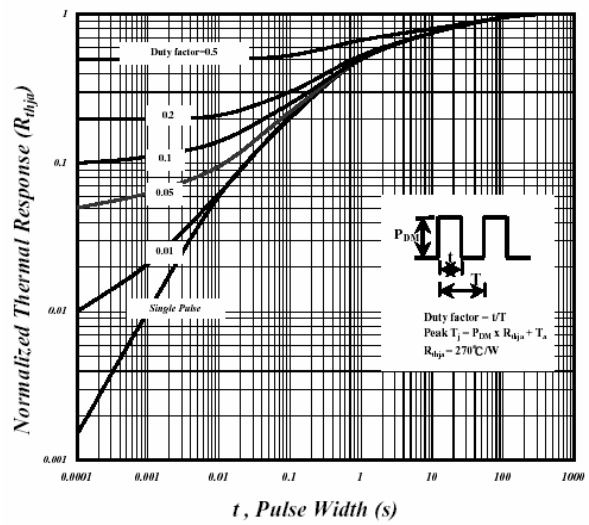
**Fig7. Gate Charge Characteristics**



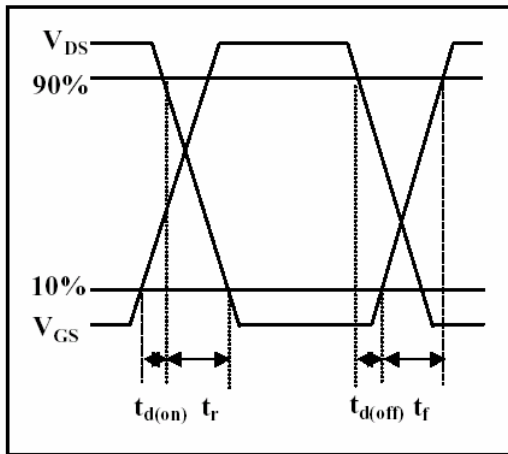
**Fig 8. Typical Capacitance Characteristics**



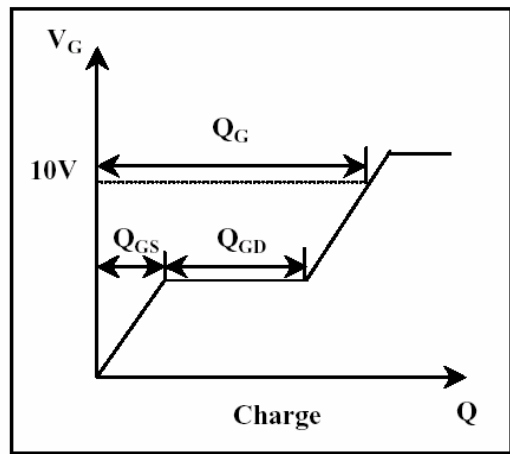
**Fig 9. Maximum Safe Operating Area**



**Fig10. Effective Transient Thermal Impedance**



**Fig 11. Switching Time Waveform**



**Fig 12. Gate Charge Waveform**

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