

### Features

- High density cell design for ultra low  $R_{DS(ON)}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation
- Halogen free
- Qualified to AEC-Q101 standards for high reliability

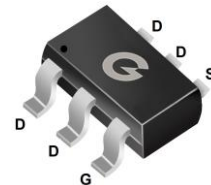
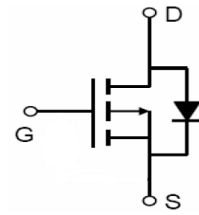
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### Typical Applications

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

### Mechanical Data

- Case: SOT-23-6L
- Molding Compound, UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin Plated Leads, Solderable Per MIL-STD-202, Method 208



SOT-23-6L

### Ordering Information

| Part Number | Package   | Shipping              | Marking Code |
|-------------|-----------|-----------------------|--------------|
| TBL4P06B-6L | SOT-23-6L | 3000pcs / Tape & Reel | 4P06B        |

### Maximum Ratings (@ $T_A=25^\circ\text{C}$ unless otherwise specified)

| Parameter                                             | Symbol    | Value    | Units |
|-------------------------------------------------------|-----------|----------|-------|
| Drain-Source Voltage                                  | $V_{DSS}$ | -60      | V     |
| Gate -Source Voltage                                  | $V_{GSS}$ | $\pm 20$ | V     |
| Continuous Drain Current ( $T_C = 25^\circ\text{C}$ ) | $I_D$     | -4       | A     |
| Pulsed Drain Current (NOTE2)                          | $I_{DM}$  | -12      | A     |

### Thermal Characteristics

| Parameter                                      | Symbol          | Limits      | Unit               |
|------------------------------------------------|-----------------|-------------|--------------------|
| Power Dissipation ( $T_A = 25^\circ\text{C}$ ) | $P_D$           | 1.6         | W                  |
| Junction-to-Air (NOTE1)                        | $R_{\theta JA}$ | 78          | $^\circ\text{C/W}$ |
| Operating Junction Temperature Range           | $T_J$           | -55 to +150 | $^\circ\text{C}$   |
| Storage Temperature Range                      | $T_{STG}$       | -55 to +150 | $^\circ\text{C}$   |

### Electrical Characteristics (@T<sub>A</sub>=25°C unless otherwise specified)

| Symbol                              | Parameter                              | Test conditions                                                                                 | MIN | TYP | MAX  | UNIT |
|-------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------|-----|-----|------|------|
| OFF Characteristics                 |                                        |                                                                                                 |     |     |      |      |
| V <sub>DSS</sub>                    | Drain-Source Breakdown Voltage         | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA                                                   | -60 | -   | -    | V    |
| I <sub>DSS</sub>                    | Drain to Source Leakage Current        | V <sub>DS</sub> = -60V, V <sub>GS</sub> = 0V                                                    | -   | -   | -1   | uA   |
| I <sub>GSS</sub>                    | Gate-body Leakage                      | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                    | -   | -   | ±0.1 | uA   |
| ON Characteristics                  |                                        |                                                                                                 |     |     |      |      |
| R <sub>DS(ON)</sub>                 | Static Drain-Source On-resistance      | V <sub>GS</sub> = -10V, I <sub>D</sub> = -4A                                                    | -   | -   | 170  | mΩ   |
| V <sub>GS(TH)</sub>                 | Gate Threshold Voltage                 | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250uA                                     | -1  | -   | -3   | V    |
| Pulse width tp≤380μs,δ≤2%           |                                        |                                                                                                 |     |     |      |      |
| Dynamic Characteristics             |                                        |                                                                                                 |     |     |      |      |
| Ciss                                | Input Capacitance                      | V <sub>GS</sub> = 0V                                                                            | -   | 850 | -    | pF   |
| Coss                                | Output Capacitance                     | V <sub>DS</sub> = -30V                                                                          | -   | 65  | -    |      |
| Crss                                | Reverse Transfer Capacitance           | f = 1.0MHz                                                                                      | -   | 28  | -    |      |
| SWITCHING CHARACTERISTICS ( NOTE4 ) |                                        |                                                                                                 |     |     |      |      |
| Qg                                  | Total Gate Charge                      | V <sub>DD</sub> = -30V, I <sub>D</sub> = -4A,<br>V <sub>GS</sub> = -10V                         | -   | 22  | -    | nC   |
| Qgs                                 | Gate to Source Charge                  |                                                                                                 | -   | 2.5 | -    | nC   |
| Qgd                                 | Gate to Drain (“ Miller” )Charge       |                                                                                                 | -   | 6   | -    | nC   |
| td(ON)                              | Turn-on Delay Time                     | V <sub>DD</sub> = -30V<br>V <sub>GS</sub> = -10V<br>R <sub>G</sub> = 3Ω<br>I <sub>D</sub> = -4A | -   | 7   | -    | nS   |
| tr                                  | Turn-on Rise Time                      |                                                                                                 | -   | 3   | -    | nS   |
| td(OFF)                             | Turn-Off Delay Time                    |                                                                                                 | -   | 28  | -    | nS   |
| tf                                  | Turn-Off Fall Time                     |                                                                                                 | -   | 5.5 | -    | nS   |
| Source-Drain Diode Characteristics  |                                        |                                                                                                 |     |     |      |      |
| VSD                                 | Diode Forward Voltage(NOTE3)           | IS = -4A,VGS = 0V                                                                               | -   | -   | -1.2 | V    |
| IS                                  | Continuous Source Current (Body Diode) |                                                                                                 | -   | -   | -4   | A    |

#### NOTES:

- 1: The value of R<sub>θJA</sub> is measured with device mounted on 1 in<sup>2</sup> FR-4 board with 2 oz copper.
- 2 : Pulse Width Limited By Safe Operating Area.

Ratings and Characteristic Curves ( $T_A=25^\circ\text{C}$  unless otherwise noted)

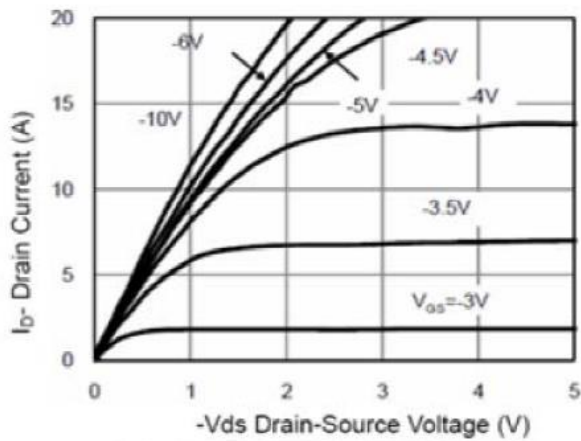


Fig.1- Output Characteristics

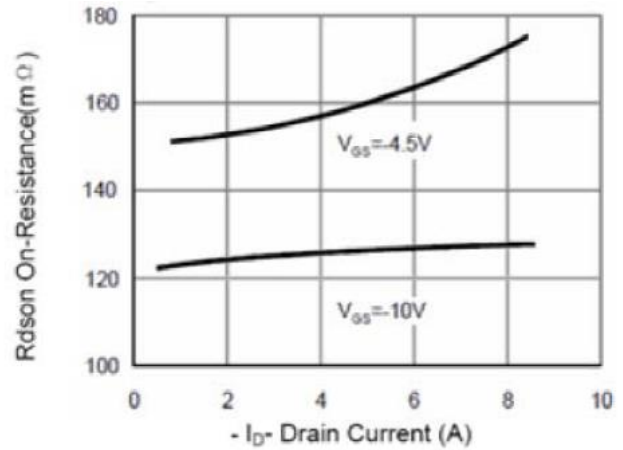


Fig.2-On-Resistance vs. Drain Current and Gate Voltage

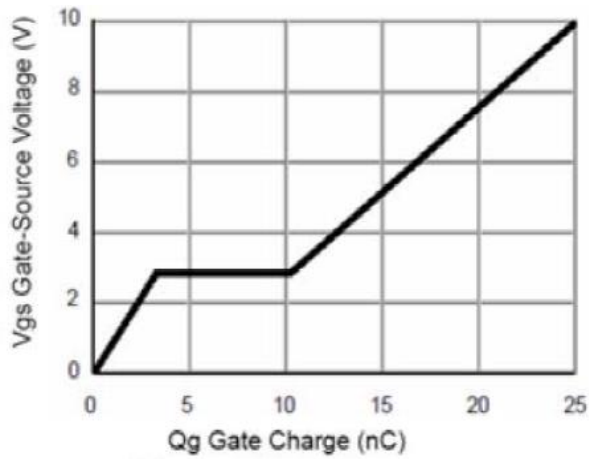


Fig.3- Gate Charge

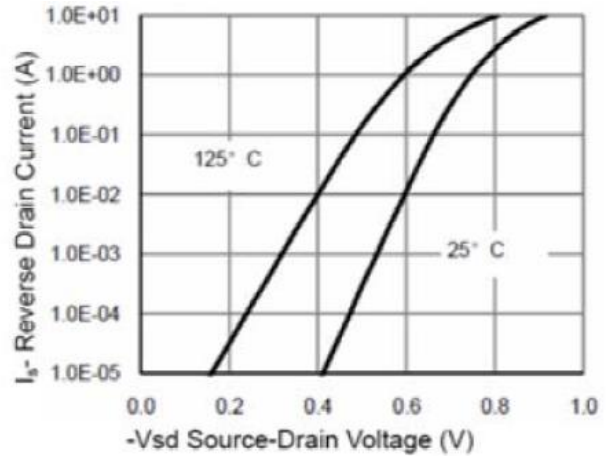


Fig.4- Body-Diode Characteristics

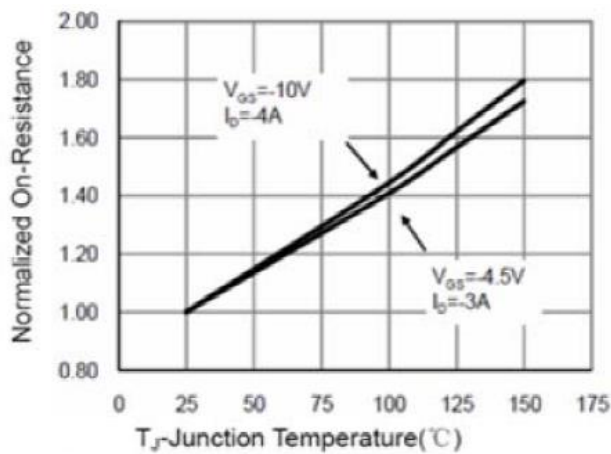


Fig.5-On-Resistance vs. Junction Temperature

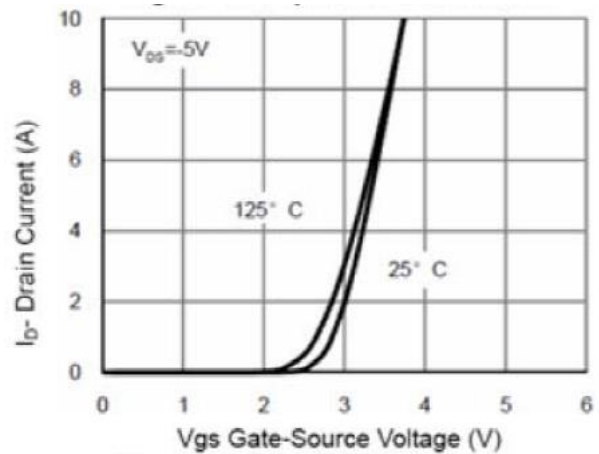


Fig.6-Transfer Characteristics

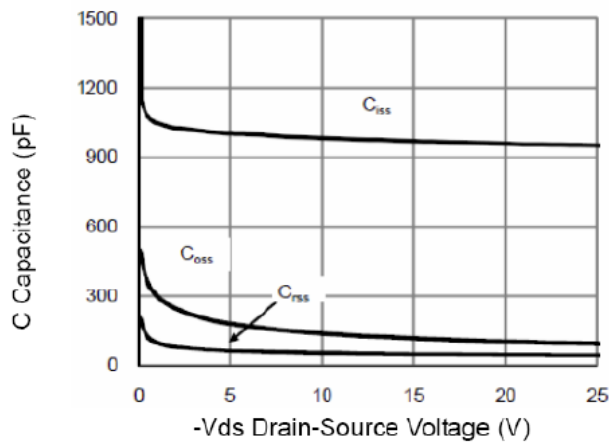


Fig.7-Capacitance Characteristics

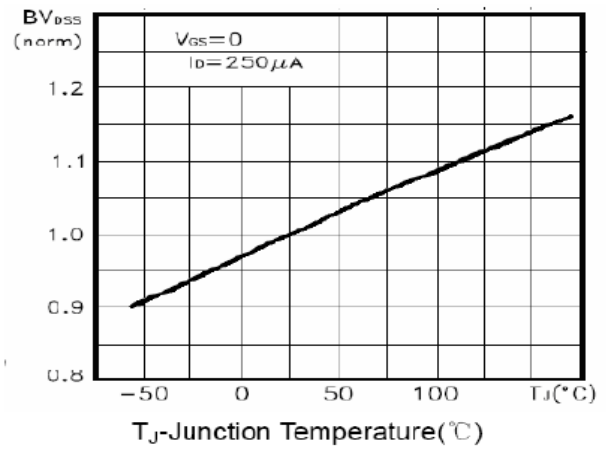


Fig.8- Drain-Source vs. Junction Temperature

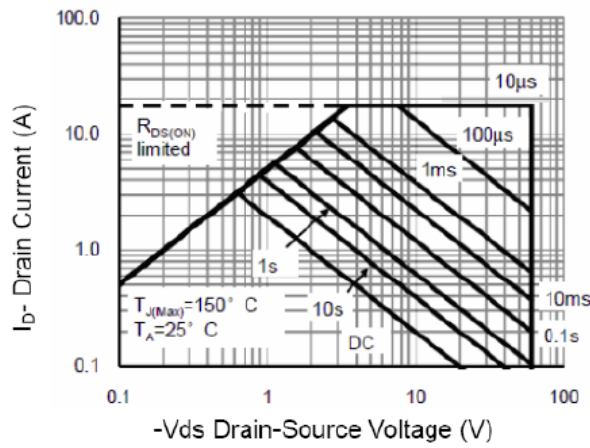


Fig.9-Safe Operation Area

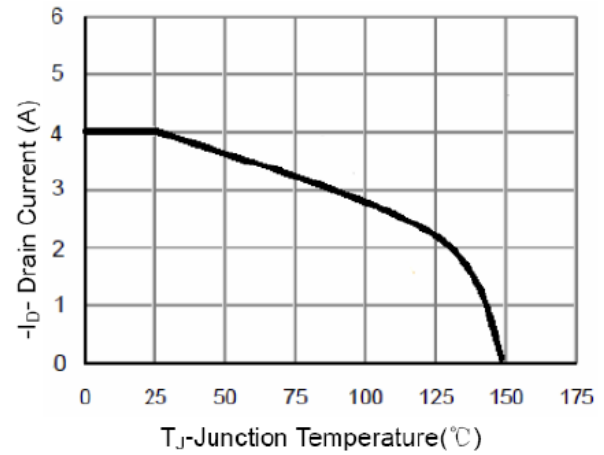
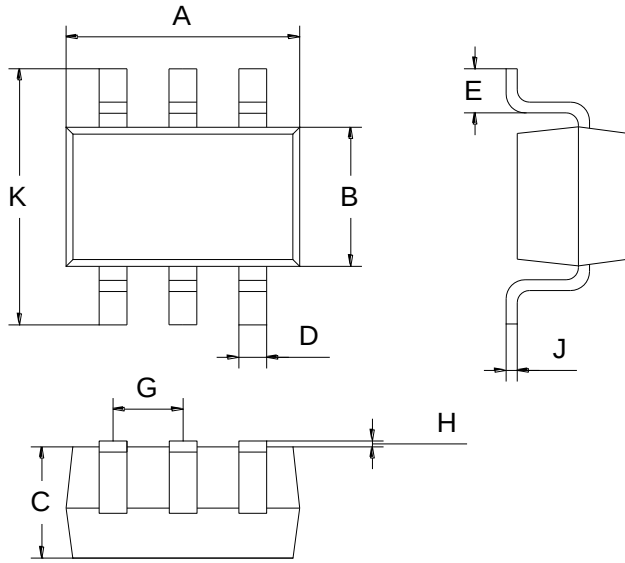


Fig.10-Id Current De-rating

## Package Outline Dimensions (unit: mm)

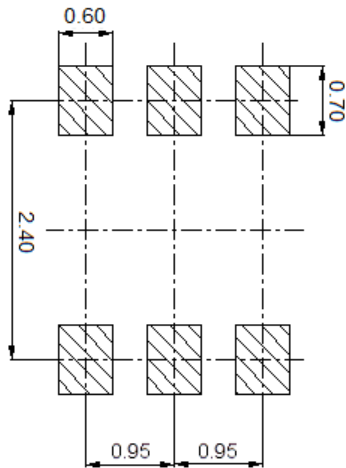
### SOT-23-6L



| SOT-23-6L |      |      |
|-----------|------|------|
| Dim       | Min  | Max  |
| A         | 2.80 | 3.00 |
| B         | 1.50 | 1.70 |
| C         | 1.00 | 1.20 |
| D         | 0.35 | 0.45 |
| E         | 0.35 | 0.55 |
| G         | 0.90 | 1.00 |
| H         | 0.02 | 0.10 |
| J         | 0.10 | 0.20 |
| K         | 2.60 | 3.00 |

## Mounting Pad Layout (unit: mm)

### SOT-23-6L



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