


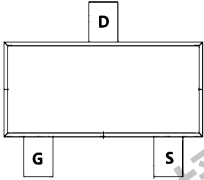
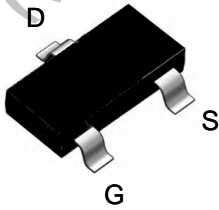
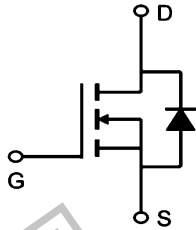


TM03N02I

N-Channel Enhancement Mosfet

| | |
|--|--|
| <p>General Description</p> <ul style="list-style-type: none"> • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • Load switch • PWM | <p>General Features</p> <p>$V_{DS} = 20V$ $I_D = 3.0A$</p> <p>$R_{DS(ON)} = 43\text{ m}\Omega$ (Typ.) @ $V_{GS} = 4.5V$</p> <p>100% UIS Tested 100% R_g Tested</p>  |
|--|--|

I: SOT-23

Marking: A2SHB

Absolute Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|--------------------------------|---|------------|------------------|
| V_{DS} | Drain-Source Voltage | 20 | V |
| V_{GS} | Gate-Source Voltage | ± 12 | V |
| $I_D @ T_A = 25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 4.5V^1$ | 3.0 | A |
| $I_D @ T_A = 70^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 4.5V^1$ | 1.16 | A |
| I_{DM} | Pulsed Drain Current ² | 11 | A |
| $P_D @ T_A = 25^\circ\text{C}$ | Total Power Dissipation ³ | 0.85 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient ¹ | --- | 162 | $^\circ\text{C/W}$ |
| R_{JC} | Thermal Resistance Junction Case ¹ | --- | --- | $^\circ\text{C/W}$ |

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N-Channel Enhancement Mosfet
Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|--|---|------|------|-----------|------------|
| Off Characteristic | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 20 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=20V, V_{GS}=0V,$ | - | - | 1.0 | μA |
| I_{GSS} | Gate to Body Leakage Current | $V_{DS}=0V, V_{GS}=\pm 12V$ | - | - | ± 100 | nA |
| On Characteristics | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 0.5 | 0.7 | 0.9 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance note2 | $V_{GS}=4.5V, I_D=3A$ | - | 43 | 62 | m Ω |
| | | $V_{GS}=2.5V, I_D=2A$ | - | 62 | 86 | |
| Dynamic Characteristics | | | | | | |
| C_{iss} | Input Capacitance | $V_{DS}=10V, V_{GS}=0V,$ $f=1.0\text{MHz}$ | - | 164 | - | pF |
| C_{oss} | Output Capacitance | | - | 38 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 28 | - | pF |
| Q_g | Total Gate Charge | $V_{DS}=10V, I_D=3A,$ $V_{GS}=4.5V$ | - | 2.7 | - | nC |
| Q_{gs} | Gate-Source Charge | | - | 0.4 | - | nC |
| Q_{gd} | Gate-Drain("Miller") Charge | | - | 0.5 | - | nC |
| Switching Characteristics | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}=10V, I_D=3A,$ $R_{GEN}=3\Omega, V_{GS}=4.5V$ | - | 8 | - | ns |
| t_r | Turn-on Rise Time | | - | 27 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 26 | - | ns |
| t_f | Turn-off Fall Time | | - | 33 | - | ns |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I_S | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 3 | A |
| I_{SM} | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 12 | A |
| V_{SD} | Drain to Source Diode Forward Voltage | $V_{GS}=0V, I_S=3A$ | - | - | 1.2 | V |

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

 2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

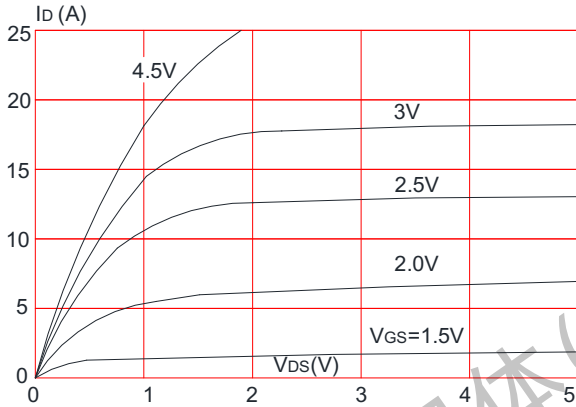


Figure 2: Typical Transfer Characteristics

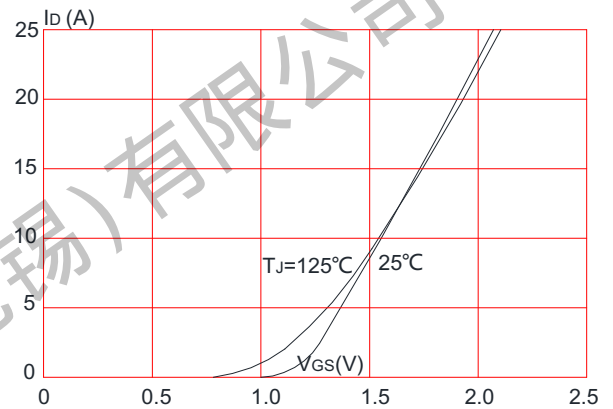


Figure 3: On-resistance vs. Drain Current

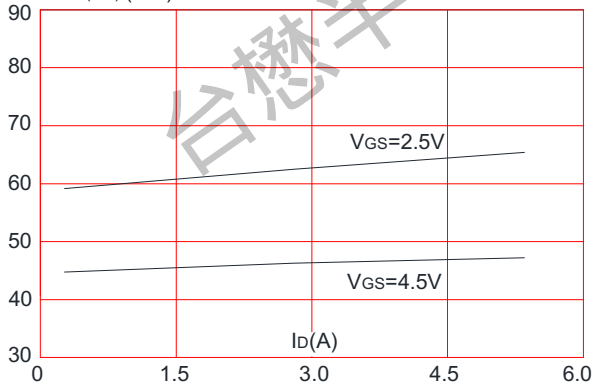


Figure 4: Body Diode Characteristics

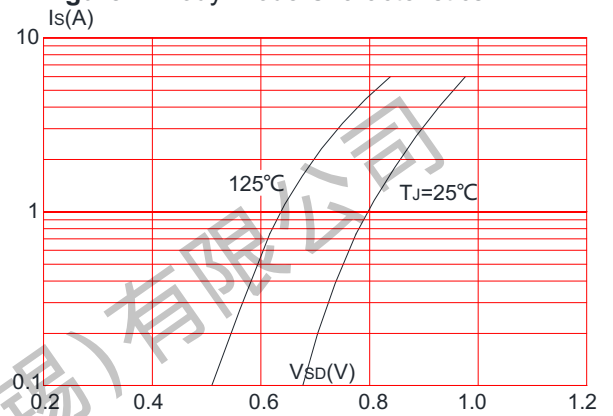


Figure 5: Gate Charge Characteristics

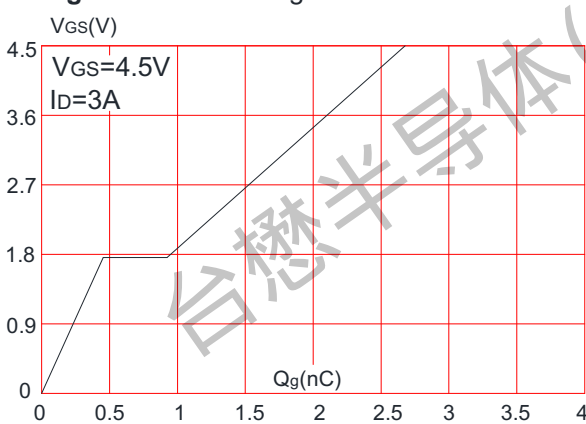
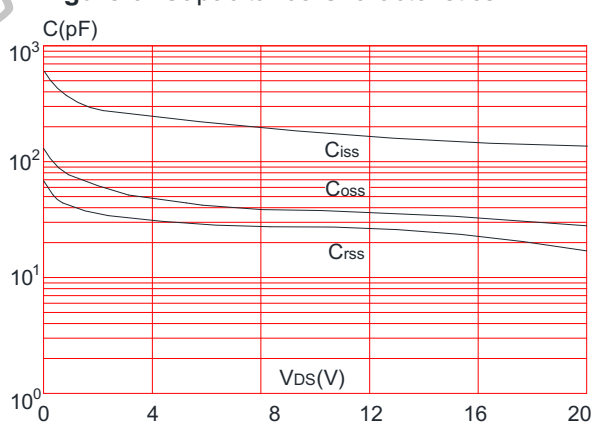


Figure 6: Capacitance Characteristics



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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

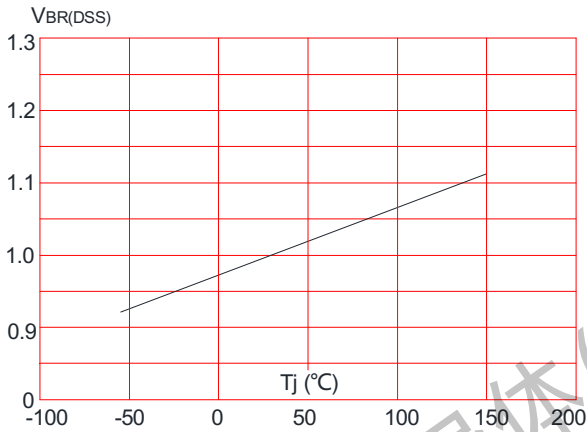


Figure 8: Normalized on Resistance vs. Junction Temperature

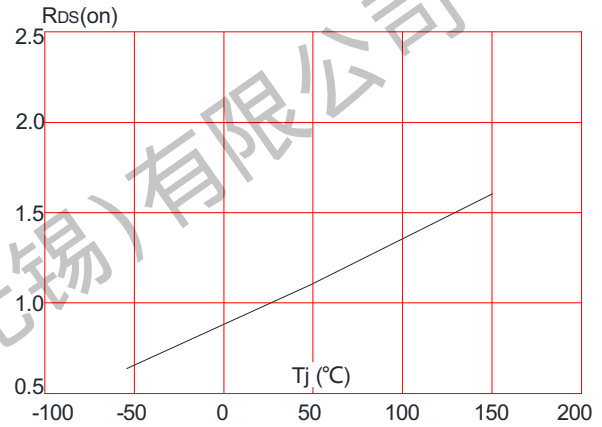


Figure 9: Maximum Safe Operating Area

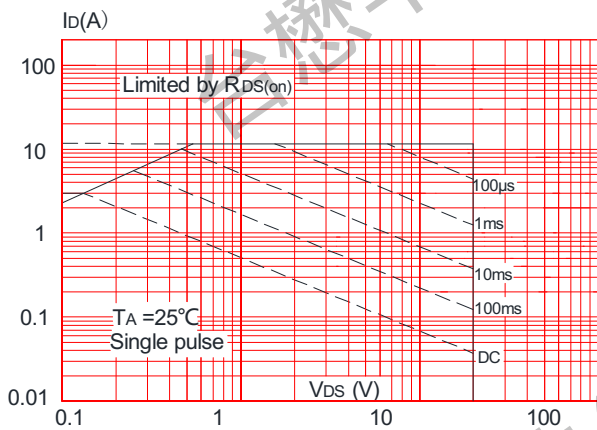


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

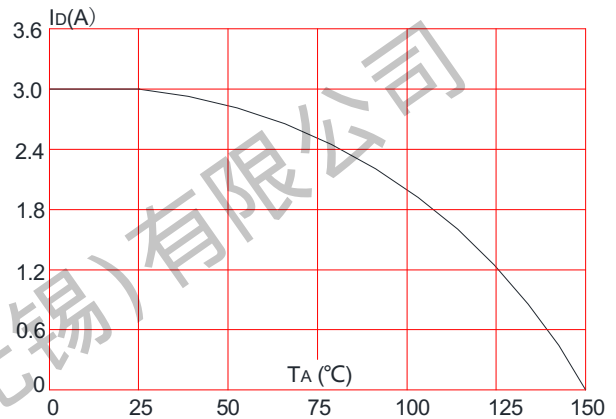
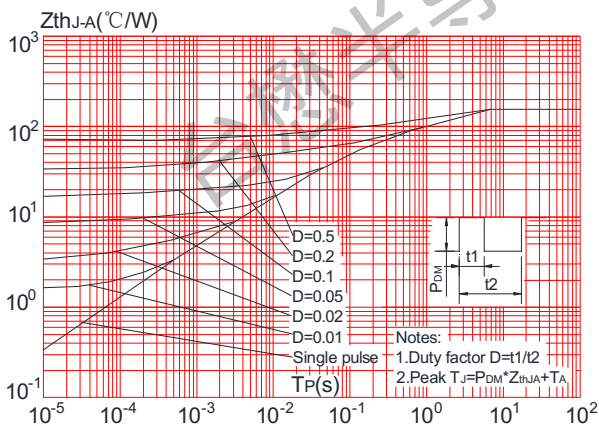


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

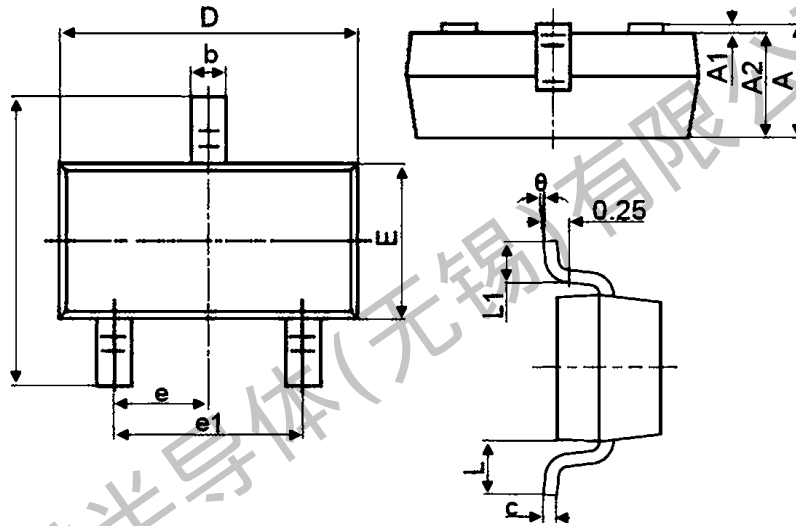




TM03N02I

N-Channel Enhancement Mosfet

Package Mechanical Data:SOT-23



| Symbol | Dimensions in Millimeters | |
|--------|---------------------------|-------|
| | MIN. | MAX. |
| A | 0.900 | 1.150 |
| A1 | 0.000 | 0.100 |
| A2 | 0.900 | 1.050 |
| b | 0.300 | 0.500 |
| c | 0.080 | 0.150 |
| D | 2.800 | 3.000 |
| E | 1.200 | 1.400 |
| E1 | 2.250 | 2.550 |
| e | 0.950TYP | |
| e1 | 1.800 | 2.000 |
| L | 0.550REF | |
| L1 | 0.300 | 0.500 |
| θ | 0° | 8° |

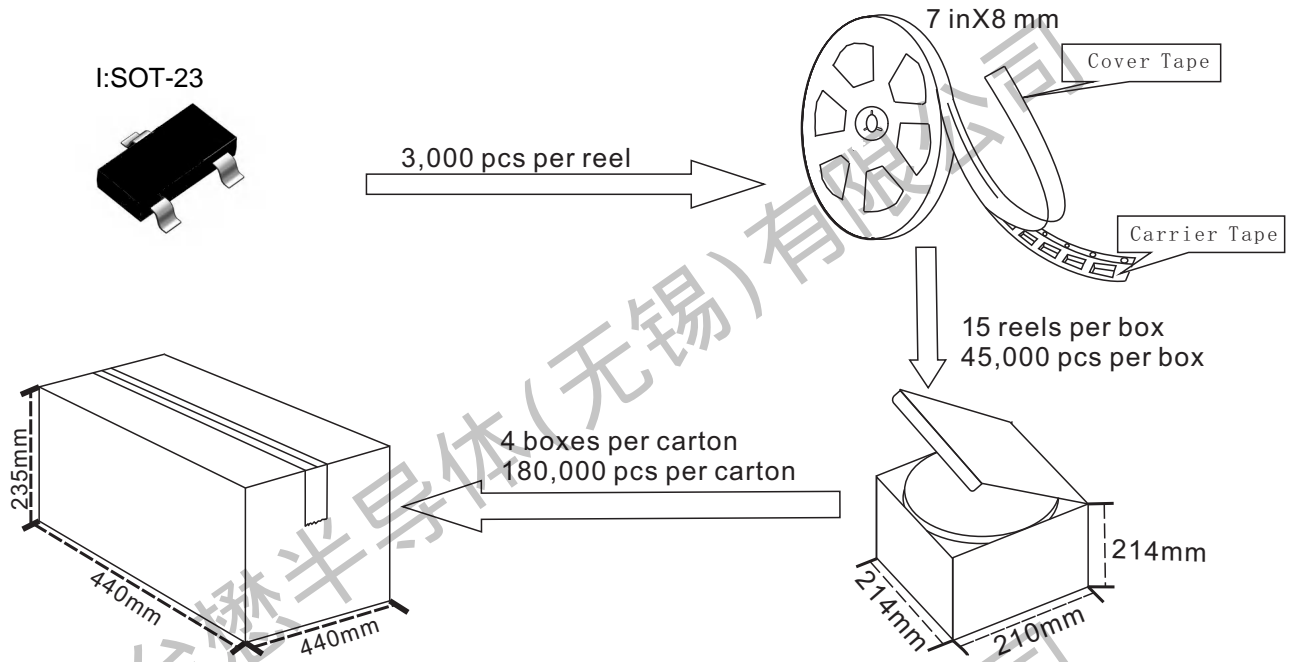


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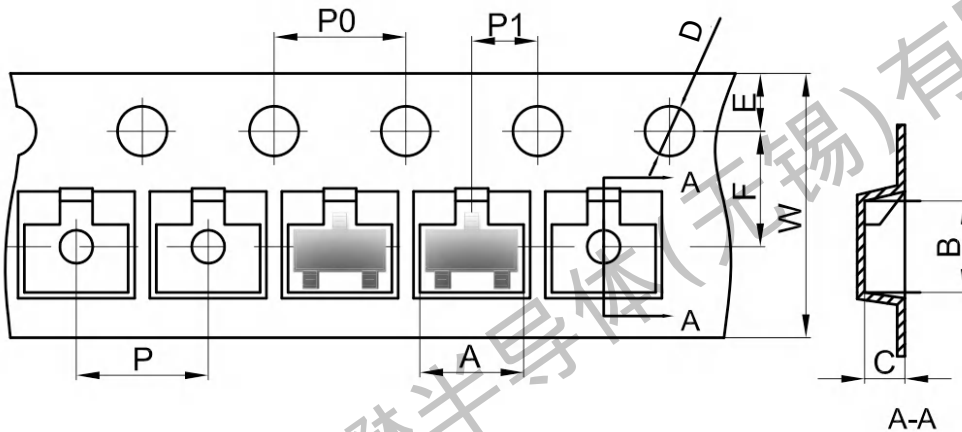
N-Channel Enhancement Mosfet

SOT-23 Packing

1. The method of packaging and dimension are shown as below figure. (Dimension in mm)



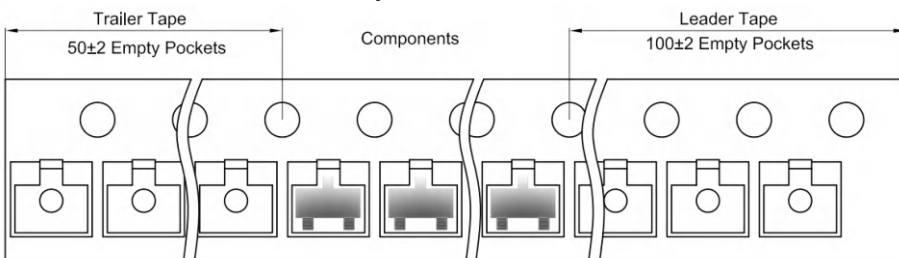
SOT-23 Embossed Carrier Tape



Dimensions are in millimeter

| Pkg type | A | B | C | D | E | F | P0 | P | P1 | W |
|----------|------|------|------|-------|------|------|------|------|------|------|
| SOT-23 | 3.15 | 2.77 | 1.22 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

SOT-23 Tape Leader and Trailer





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Revision history:

| Date | Rev | Description | Page |
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