



TM04G03MI6

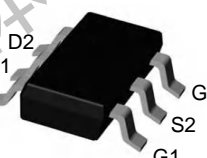
N+P-Channel Enhancement Mode Mosfet

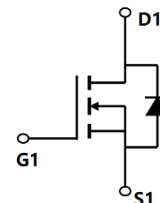
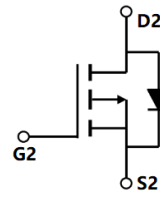
| | |
|--|--|
| <p>General Description</p> <ul style="list-style-type: none"> • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • Load switch • PWM | <p>General Features</p> <p>N Channl</p> <p>$V_{DS} = 30V, I_D = 5.6A$</p> <p>$R_{DS(ON)} = 26m\Omega(Typ.) @ V_{GS} = 10V$</p> <p>P Channl</p> <p>$V_{DS} = -30V, I_D = -3.9A$</p> <p>$R_{DS(ON)} = 52m\Omega(Typ.) @ V_{GS} = -10V$</p> <p>100% UIS Tested 100% R_g Tested</p> |
|--|--|



MI6: SOT-23-6L

| | | | |
|----|---|---|----|
| G1 | 1 | 6 | D1 |
| S2 | 2 | 5 | S1 |
| G2 | 3 | 4 | D2 |



Marking: 04G03

Absolute Maximum Ratings: ($T_c=25^\circ C$ unless otherwise noted)

| Symbol | Parameter | N-Channel | P-Channel | Units |
|----------------|--|-------------|-----------|------------|
| V_{DS} | Drain-Source Voltage | 30 | -30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | ± 20 | V |
| I_D | Continuous Drain Current- $T_C=25^\circ C$ | 5.6 | -3.9 | A |
| | Continuous Drain Current- $T_C=100^\circ C$ | 3.6 | -2.6 | |
| I_{DM} | 300 μs Pulsed Drain Current | 21 | -15 | A |
| P_D | Power Dissipation | 1.4 | 1.4 | W |
| T_J, T_{STG} | Operating and Storage Junction Temperature Range | -55 to +175 | | $^\circ C$ |

Thermal Characteristics:

| Symbol | Parameter | Typ. | Max. | Units |
|-----------------|-------------------------------------|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient | --- | 85 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case | --- | 50 | $^\circ C/W$ |

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

| Symbol | Parameter | Test Conditions | N Channel | | | Unit | |
|------------------------------------|----------------------------------|---|----------------|------|-----------|------------|----|
| | | | Min. | Typ. | Max. | | |
| Static Characteristics | | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_{DS}=250\mu A$ | 30 | - | - | V | |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=24V, V_{GS}=0V$ | - | - | 1 | μA | |
| | | $T_J=85^\circ C$ | - | - | 30 | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_{DS}=250\mu A$ | 1.5 | 2.5 | 3.5 | V | |
| I_{GSS} | Gate Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA | |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance | $V_{GS}=10V, I_{DS}=4.9A$ | - | 26 | 35 | m Ω | |
| | | $V_{GS}=4.5V, I_{DS}=3A$ | - | 38 | 58 | | |
| Diode Characteristics | | | | | | | |
| V_{SD} | Diode Forward Voltage | $I_{SD}=1A, V_{GS}=0V$ | - | 0.75 | 1.1 | V | |
| t_{rr} | Reverse Recovery Time | $I_{SD}=4.9A, di_{SD}/dt=100A/\mu s$ | - | 9.2 | - | ns | |
| Q_{rr} | Reverse Recovery Charge | | - | 4.3 | - | nC | |
| Dynamic Characteristics | | | | | | | |
| R_g | Gate Resistance | $V_{GS}=0V, V_{DS}=0V, F=1MHz$ | - | 2.3 | - | Ω | |
| C_{iss} | Input Capacitance | $V_{GS}=0V, V_{DS}=15V, Frequency=1.0MHz$ | - | 215 | - | pF | |
| C_{oss} | Output Capacitance | | - | 37 | - | | |
| C_{rss} | Reverse Transfer Capacitance | | - | 28 | - | | |
| $t_{d(ON)}$ | Turn-on Delay Time | | - | 5.3 | 8 | | ns |
| T_r | Turn-on Rise Time | $V_{DD}=15V, R_L=15\Omega, I_{DS}=1A, V_{GEN}=10V, R_G=6\Omega$ | - | 11 | 16 | | |
| $t_{d(OFF)}$ | Turn-off Delay Time | - | 12 | 17 | | | |
| T_f | Turn-off Fall Time | - | 2.6 | 4 | | | |
| Gate Charge Characteristics | | | | | | | |
| Q_g | Total Gate Charge | $V_{DS}=15V, I_{DS}=4.9A$ | $V_{GS}=4.5V,$ | - | 3 | - | nC |
| | | | $V_{GS}=10V$ | - | 5.8 | - | |
| Q_{gs} | Gate-Source Charge | $V_{DS}=15V, V_{GS}=10V, I_{DS}=4.9A$ | - | 1.1 | - | | |
| Q_{gd} | Gate-Drain Charge | | - | 1.5 | - | | |
| Q_{gth} | Threshold Gate Charge | | - | 0.5 | - | | |

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P-Channel Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Test Conditions | P Channel | | | Unit | |
|------------------------------------|----------------------------------|--|-------------------------|-------|------|------|----|
| | | | Min. | Typ. | Max. | | |
| Static Characteristics | | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _{DS} =-250μA | -30 | - | - | V | |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =-24V, V _{GS} =0V T _J =85°C | - | - | -1 | μA | |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _{DS} =-250μA | -1.5 | -2.5 | -3.5 | V | |
| I _{GSS} | Gate Leakage Current | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA | |
| R _{DS(ON)} | Drain-Source On-State Resistance | V _{GS} =-10V, I _{DS} =-3A | - | 52 | 62 | mΩ | |
| | | V _{GS} =-4.5V, I _{DS} =-1.9A | - | 65 | 88 | | |
| Diode Characteristics | | | | | | | |
| V _{SD} | Diode Forward Voltage | I _{SD} =-1A, V _{GS} =0V | - | -0.75 | -1.1 | V | |
| t _{rr} | Reverse Recovery Time | I _{SD} =-3A, dI _{SD} /dt=100A/μs | - | 19 | - | ns | |
| Q _{rr} | Reverse Recovery Charge | | - | 14 | - | nC | |
| Dynamic Characteristics | | | | | | | |
| R _g | Gate Resistance | V _{GS} =0V, V _{DS} =0V, F=1MHz | - | 7 | - | Ω | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =-15V, Frequency=1.0MHz | - | 229 | - | pF | |
| C _{oss} | Output Capacitance | | - | 42 | - | | |
| C _{riss} | Reverse Transfer Capacitance | | - | 33 | - | | |
| t _{d(ON)} | Turn-on Delay Time | V _{DD} =-15V, R _L =15Ω, I _{DS} =-1A, V _{GEN} =-10V, R _G =6Ω | - | 7.2 | - | ns | |
| T _r | Turn-on Rise Time | | - | 9.3 | - | | |
| t _{d(OFF)} | Turn-off Delay Time | | - | 15.4 | - | | |
| T _f | Turn-off Fall Time | | - | 3.6 | - | | |
| Gate Charge Characteristics | | | | | | | |
| Q _g | Total Gate Charge | V _{DS} =-15V, I _{DS} =-3A | V _{GS} =-4.5V, | - | 3.3 | - | nC |
| | | | V _{GS} =-10V | - | 6.5 | - | |
| Q _{gs} | Gate-Source Charge | V _{DS} =-15V, V _{GS} =-10V, I _{DS} =-3A | - | 1.1 | - | | |
| Q _{gd} | Gate-Drain Charge | | - | 1.1 | - | | |
| Q _{gth} | Threshold Gate Charge | | - | 0.6 | - | | |

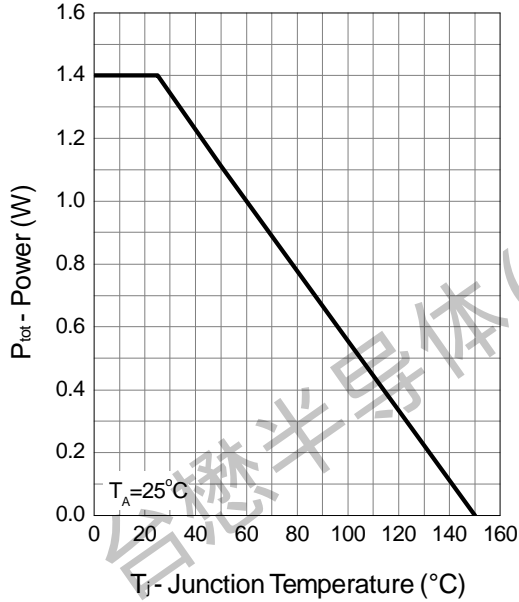


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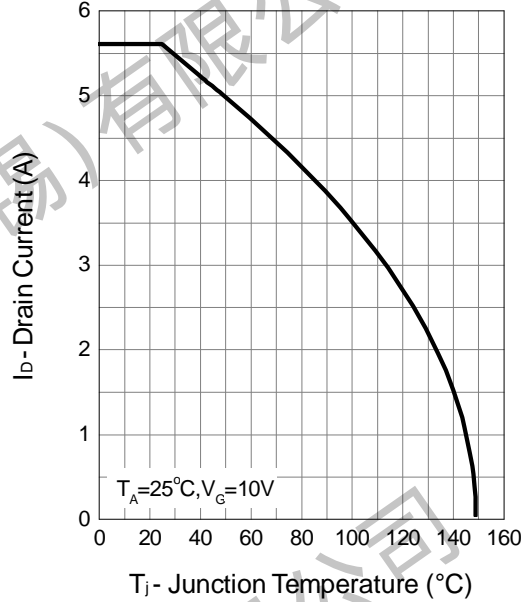
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N-Channel Typical Characteristics

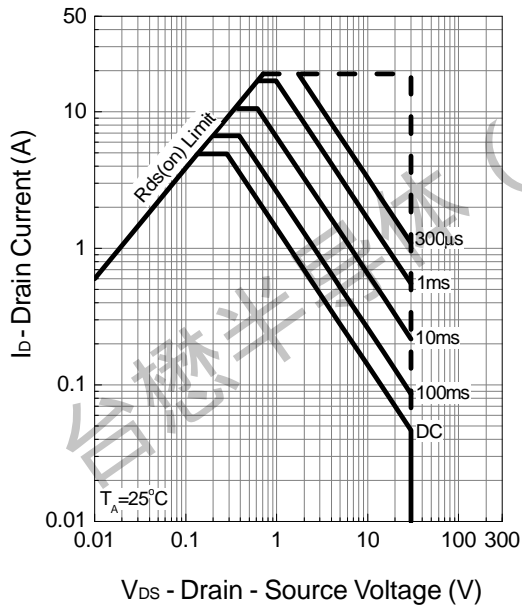
Power Dissipation



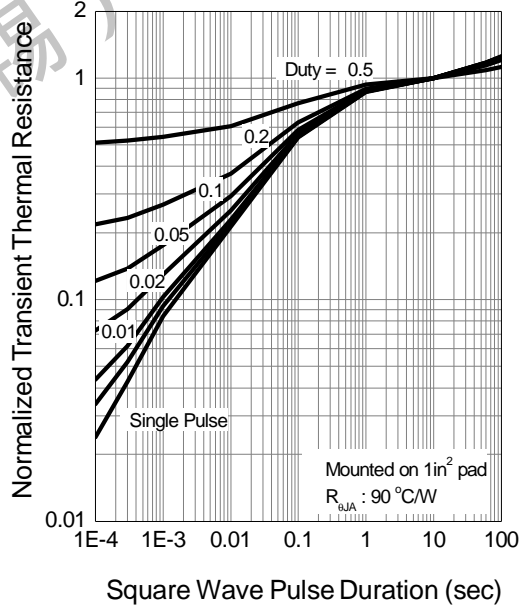
Drain Current



Safe Operation Area



Thermal Transient Impedance

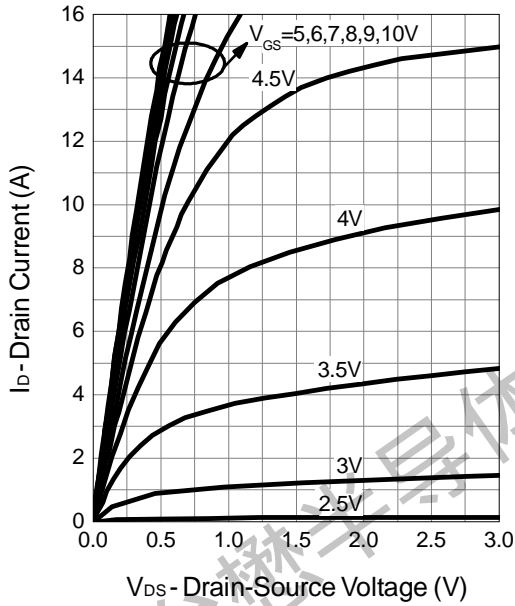




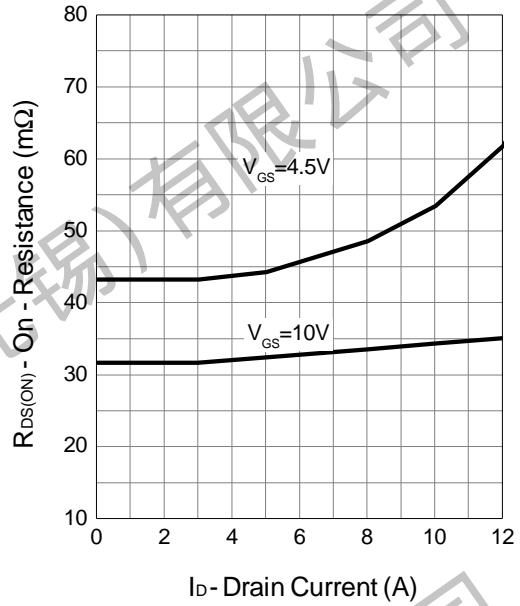
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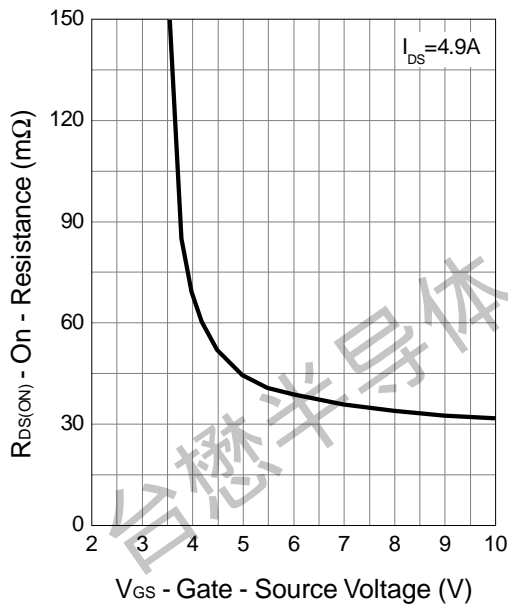
Output Characteristics



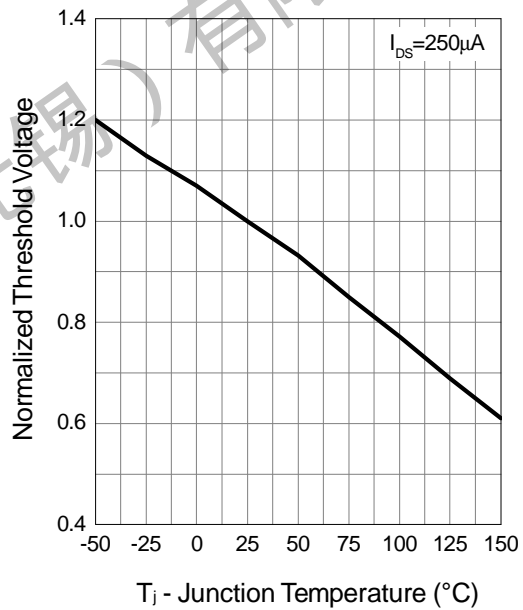
Drain-Source On Resistance



Gate-Source On Resistance



Gate Threshold Voltage

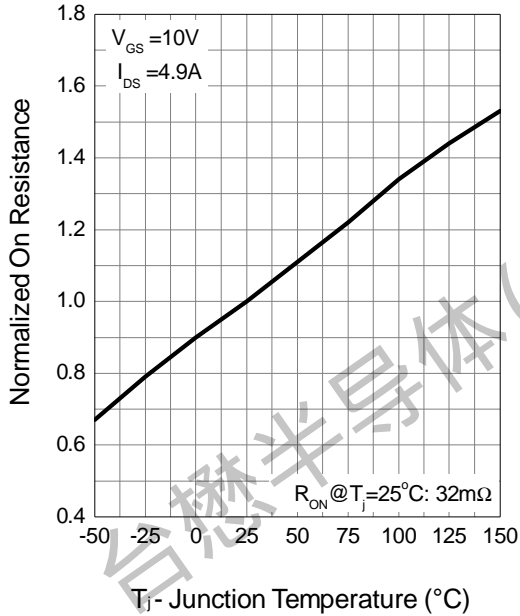




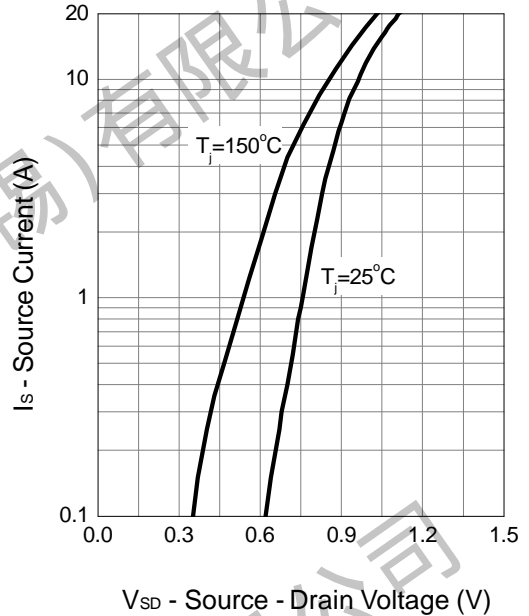
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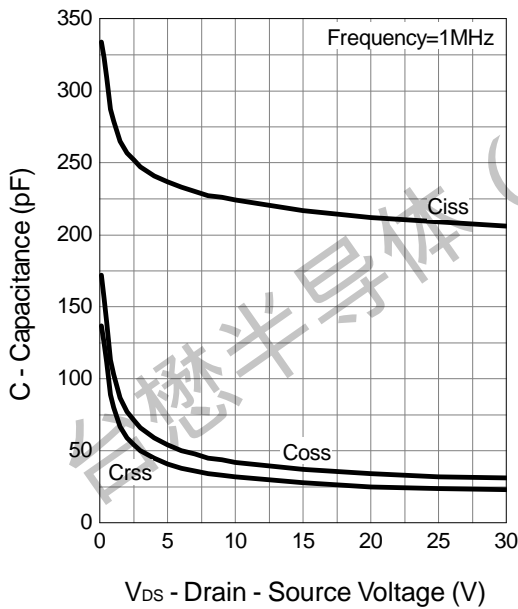
Drain-Source On Resistance



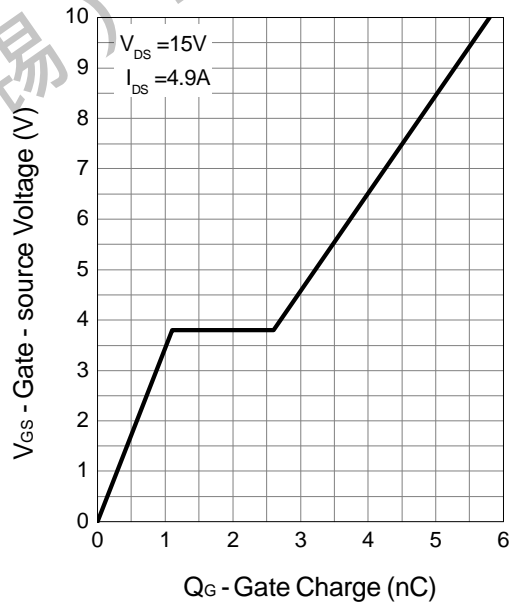
Source-Drain Diode Forward



Capacitance



Gate Charge



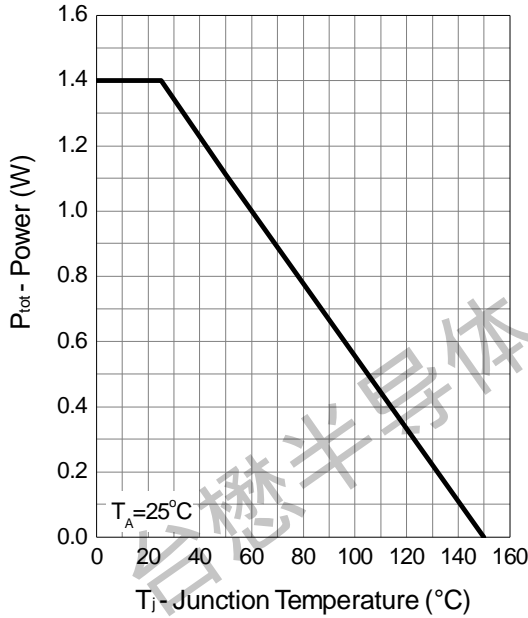


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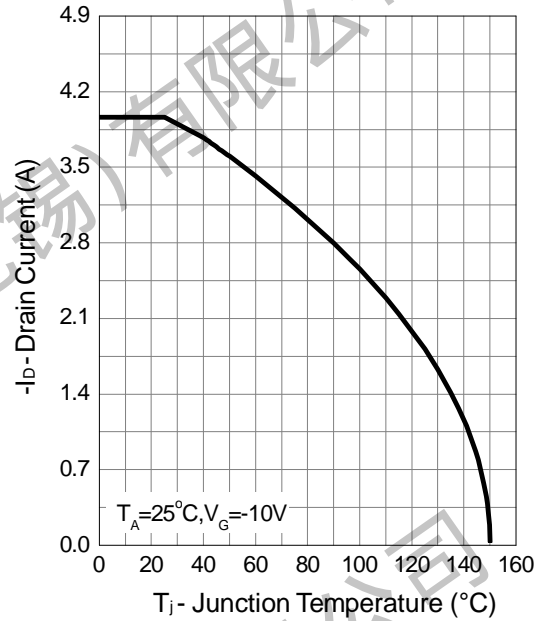
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P-Typical Characteristics

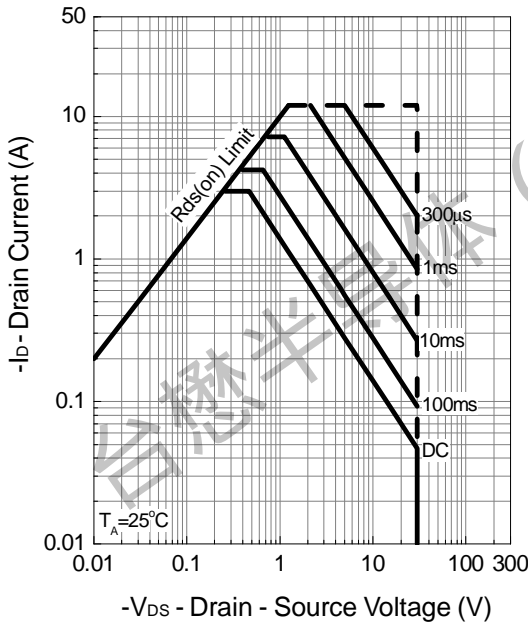
Power Dissipation



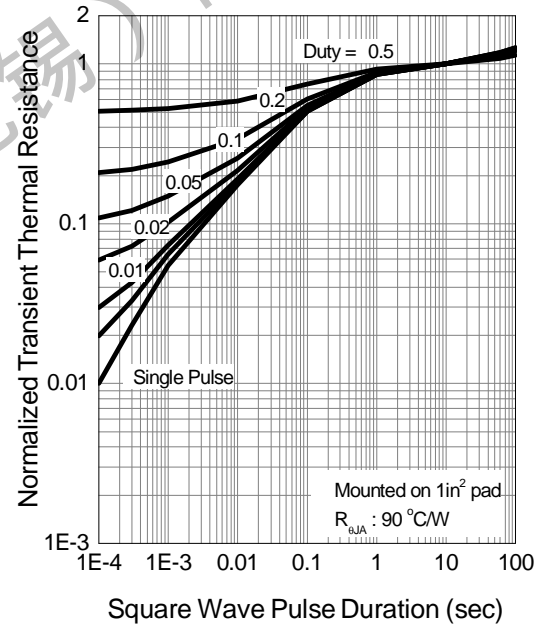
Drain Current



Safe Operation Area



Thermal Transient Impedance

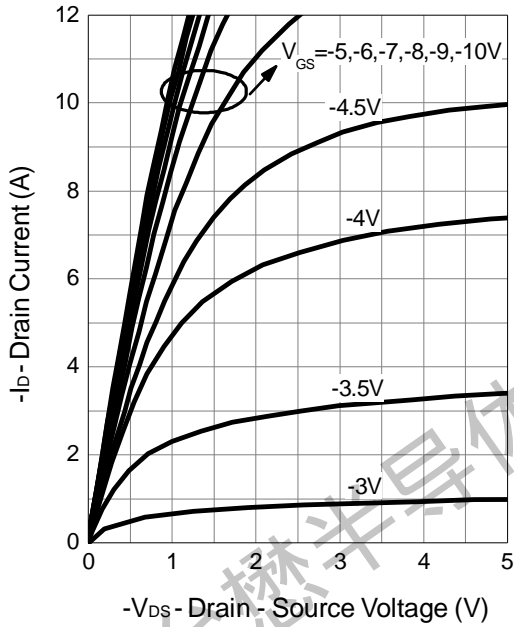




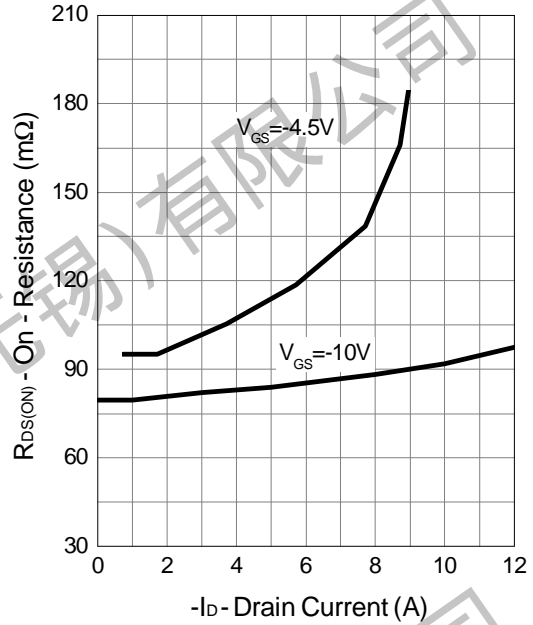
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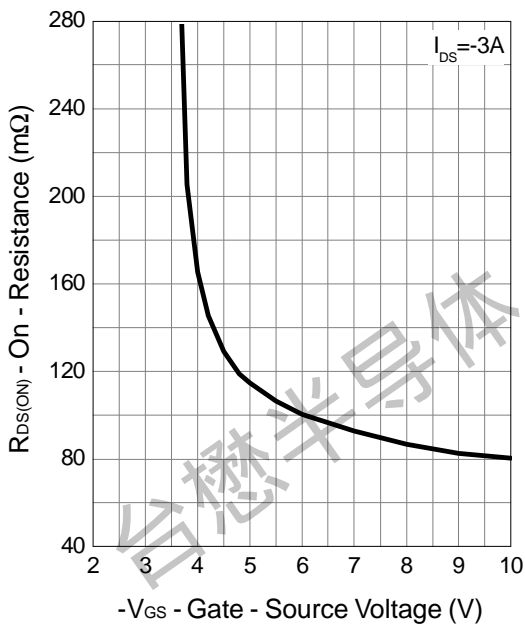
Output Characteristics



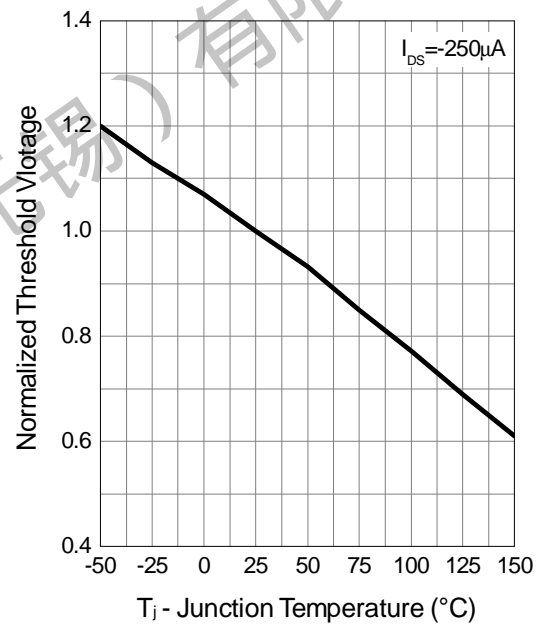
Drain-Source On Resistance



Gate-Source On Resistance



Gate Threshold Voltage

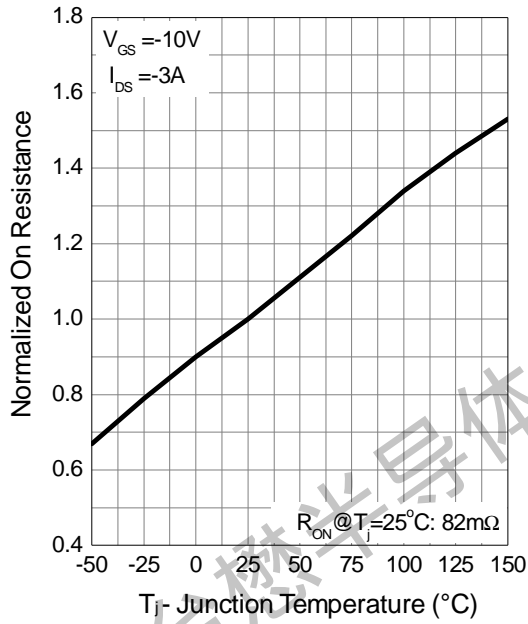




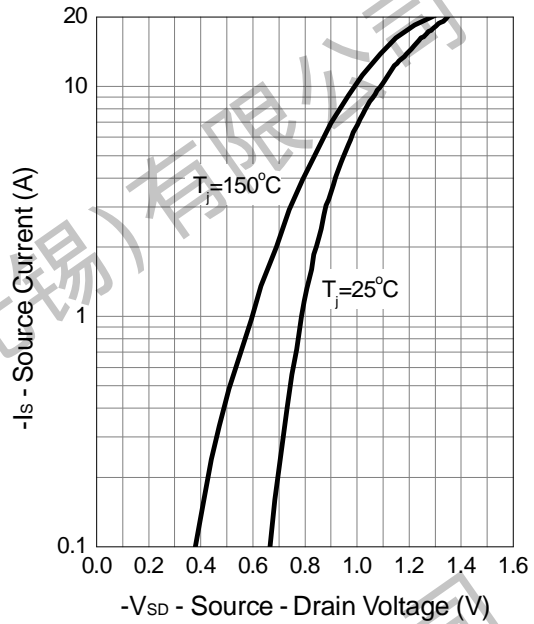
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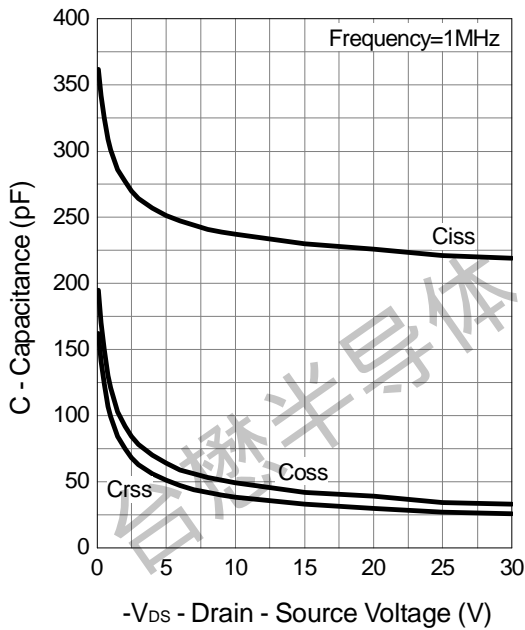
Drain-Source On Resistance



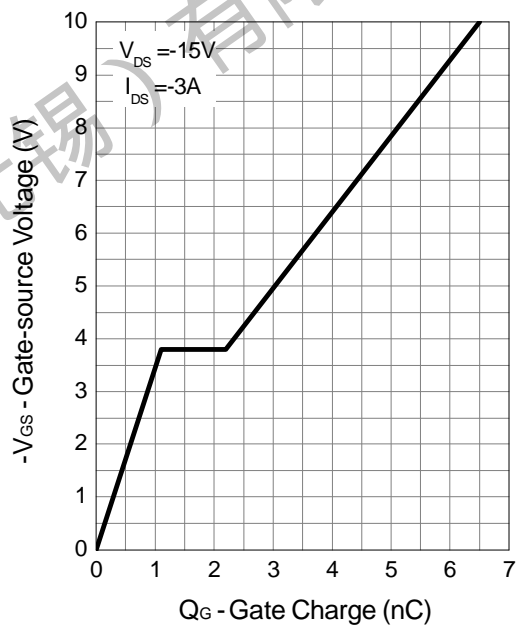
Source-Drain Diode Forward



Capacitance



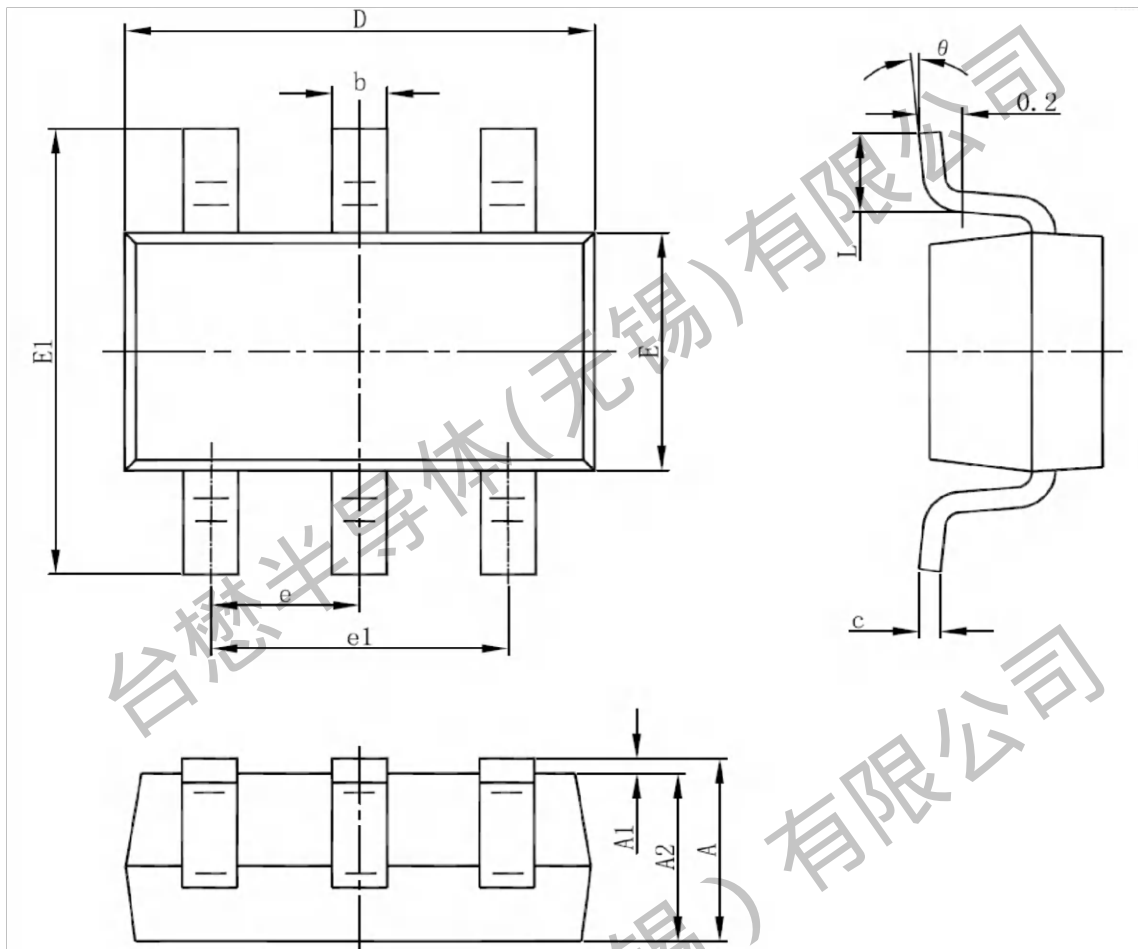
Gate Charge



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Package Mechanical Data :SOT-23-6L



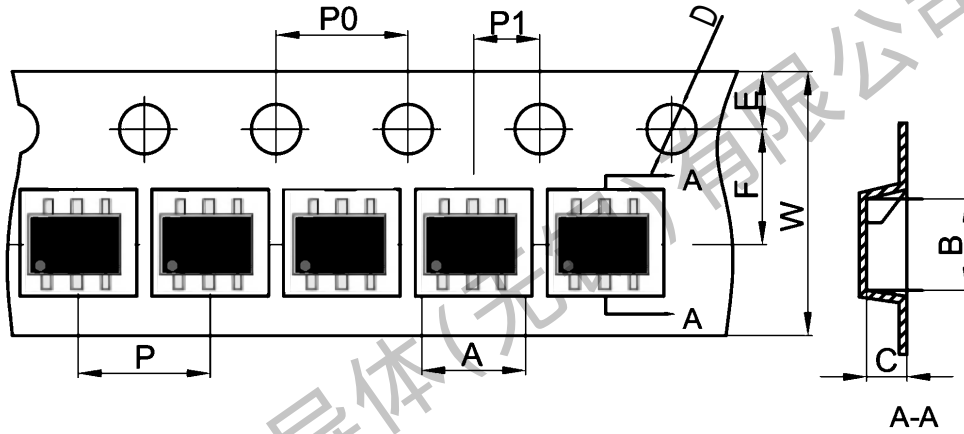
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E | 1.500 | 1.700 | 0.059 | 0.067 |
| E1 | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.950(BSC) | | 0.037(BSC) | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| θ | 0° | 8° | 0° | 8° |



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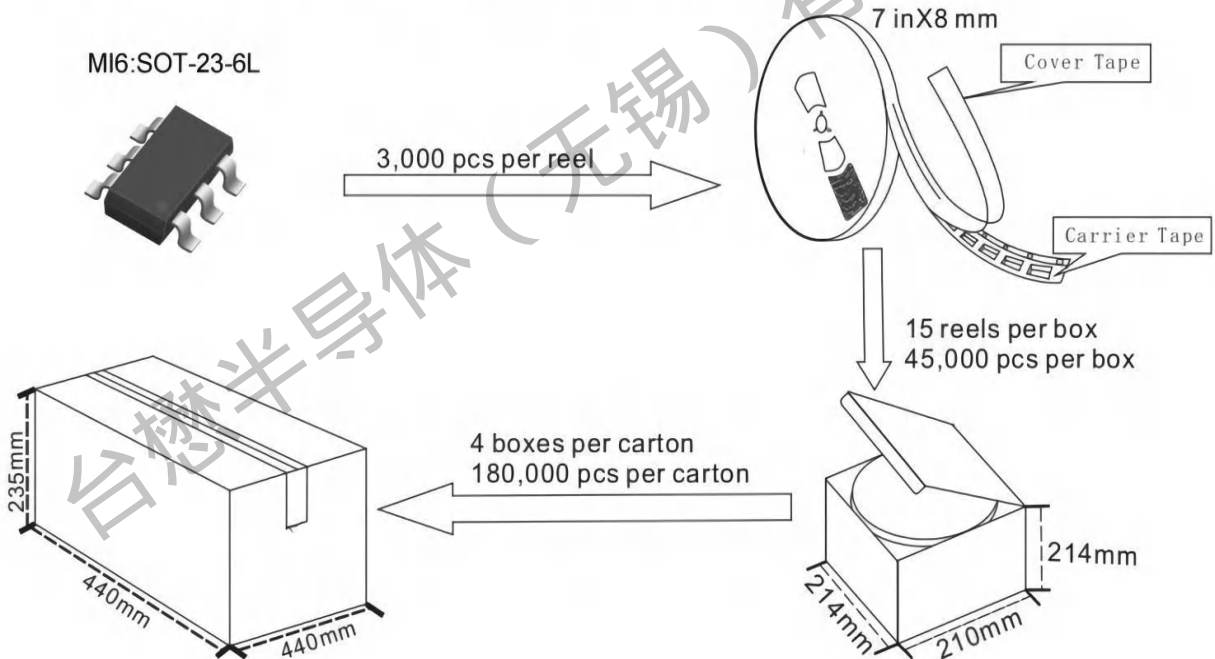
SOT-23-6L Embossed Carrier Tape



| Dimensions are in millimeter | | | | | | | | | | |
|------------------------------|------|------|------|-------|------|------|------|------|------|------|
| Pkg type | A | B | C | D | E | F | P0 | P | P1 | W |
| SOT-23-6L | 3.15 | 2.77 | 1.22 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

SOT-23-6L Packing

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





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Revision history:

| Date | Rev | Description | Page |
|------------|-------|-------------|------|
| 2023.06.22 | 23.06 | Original | |