# TM07N04MI N-Channel Enhancement Mosfet

## General Description

- Low R $_{DS(ON)}$
- RoHS and Halogen-Free Compliant

## Applications

- Load switch
- PWM

## General Features

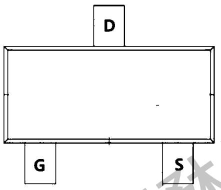
$V_{DS}$ = 40V $I_D$ =7.0A

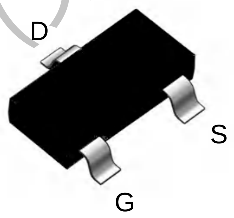
$R_{DS(ON)}$=19 mΩ (Typ.) @ $V_{GS}$=10V

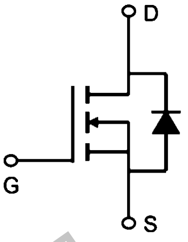
100% UIS Tested

100% $R_g$ Tested

MI:SOT-23-3L







Marking: 40N05

## Absolute Maximum Ratings ($T_C$=25℃unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 40 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_A$=25˚C | Continuous Drain Current, $V_{GS}$ @ 10V | 7.0 | A |
| $I_D$@$T_A$=70˚C | Continuous Drain Current, $V_{GS}$ @ 10V | 5 | A |
| $I_{DM}$ | Pulsed Drain Current | 26.8 | A |
| $P_D$@$T_A$=25˚C | Total Power Dissipation | 2.0 | W |
| EAS | Single Pulsed Avalanche Energy | 13 | mJ |
| $T_{STG}$ | Storage Temperature Range | -55 to 175 | ˚C |
| $T_J$ | Operating Junction Temperature Range | -55 to 175 | ˚C |

## Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{θJA}$ | Thermal Resistance Junction-ambient | --- | 170 | ˚C/W |
| $R_{θJC}$ | Thermal Resistance Junction-Case | --- | --- | ˚C/W |

## Electrical Characteristics ($T_J$=25℃ unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Off Characteristic** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250μA | 40 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=40V, $V_{GS}$=0V | - | - | 1.0 | μA |
| $I_{GSS}$ | Gate to Body Leakage Current | $V_{DS}$=0V, $V_{GS}$=±20V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 1.2 | 1.6 | 2.0 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance note3 | $V_{GS}$=10V, $I_D$=8A | - | 19 | 24 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=5A | - | 25 | 35 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=20V, $V_{GS}$=0V, f=1.0MHz | - | 633 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 67 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 58 | - | pF |
| $Q_g$ | Total Gate Charge | $V_{DS}$=20V, $I_D$=8A, $V_{GS}$=10V | - | 12 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 3.2 | - | nC |
| $Q_{gd}$ | Gate-Drain(“Miller”) Charge | | - | 3.1 | - | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD}$= 20V, $R_L$ =2.5Ω $V_{GS}$=10V,$R_{REN}$ =3Ω | - | 4 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 3 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 15 | - | ns |
| $t_f$ | Turn-off Fall Time | | - | 2 | - | ns |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 7 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 32 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS}$=0V, $I_S$= 8A | - | - | 1.2 | V |

## Typical Performance Characteristics

**Figure1:** Output Characteristics

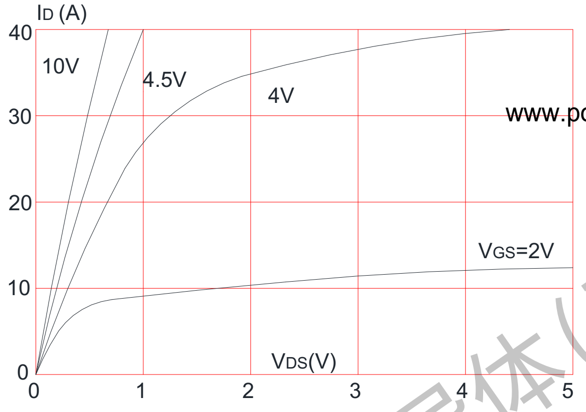


**Figure 2:** Typical Transfer Characteristics

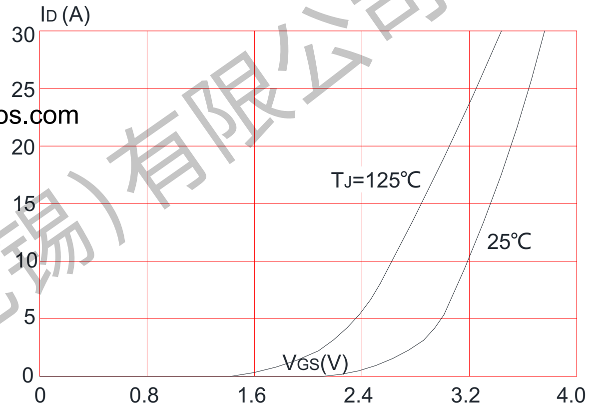


**Figure 3:**On-resistance vs. Drain Current

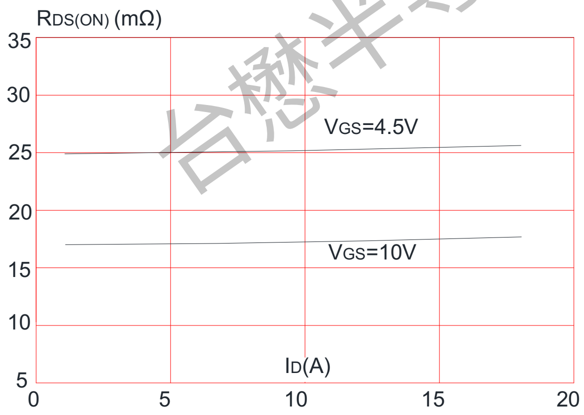


**Figure 4**: Body Diode Characteristics

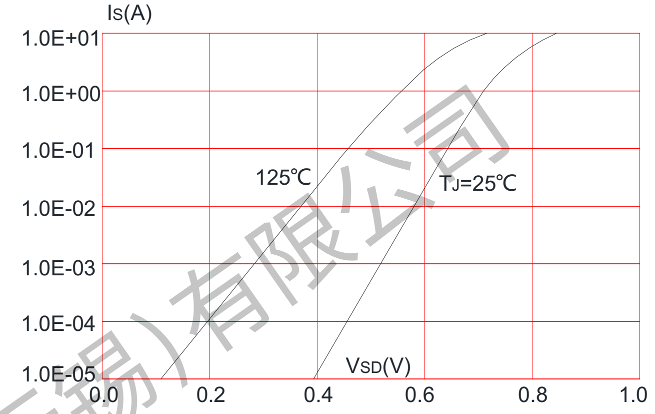


**Figure 5:** Gate Charge Characteristics

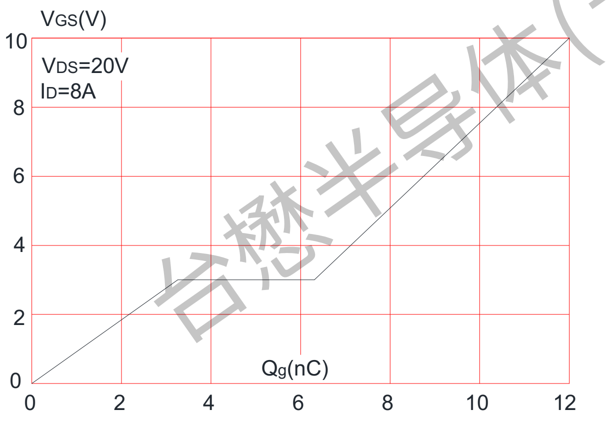


**Figure 6:** Capacitance Characteristics

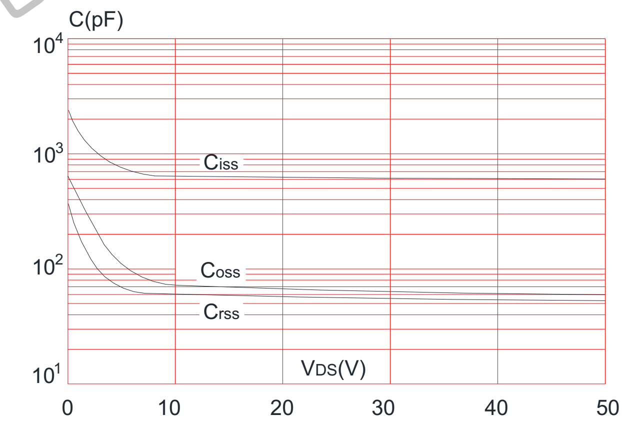


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

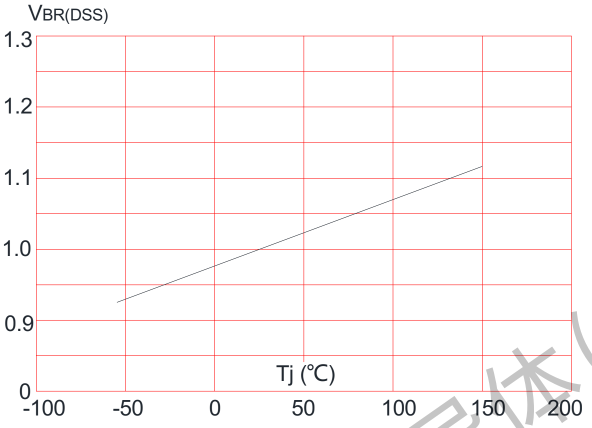


**Figure 8:** Normalized on Resistance vs. Junction Temperature

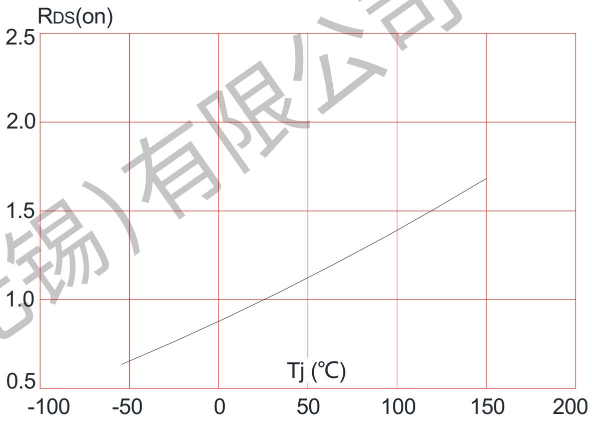


**Figure 9:** Maximum Safe Operating Area

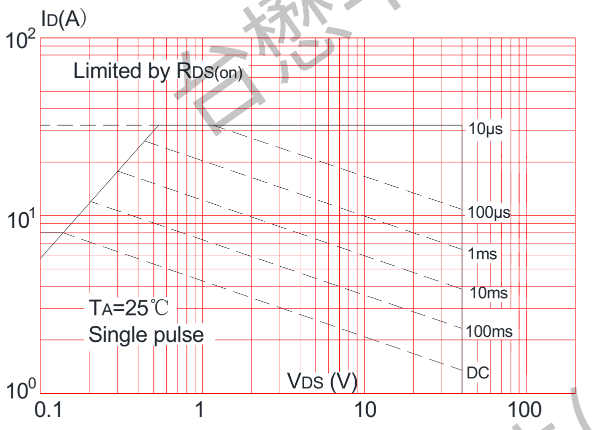


**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

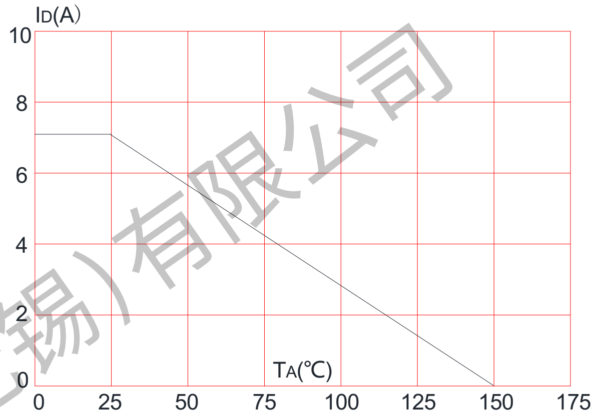
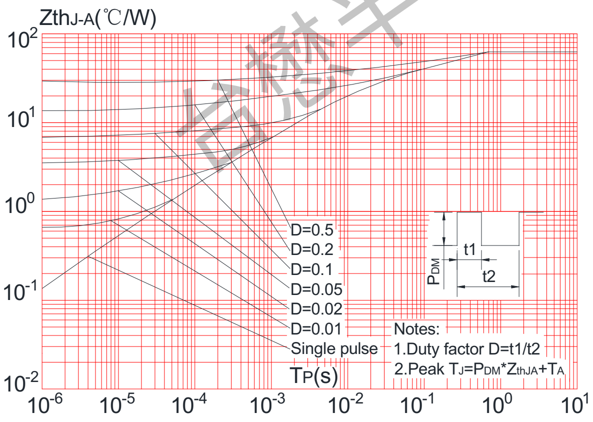
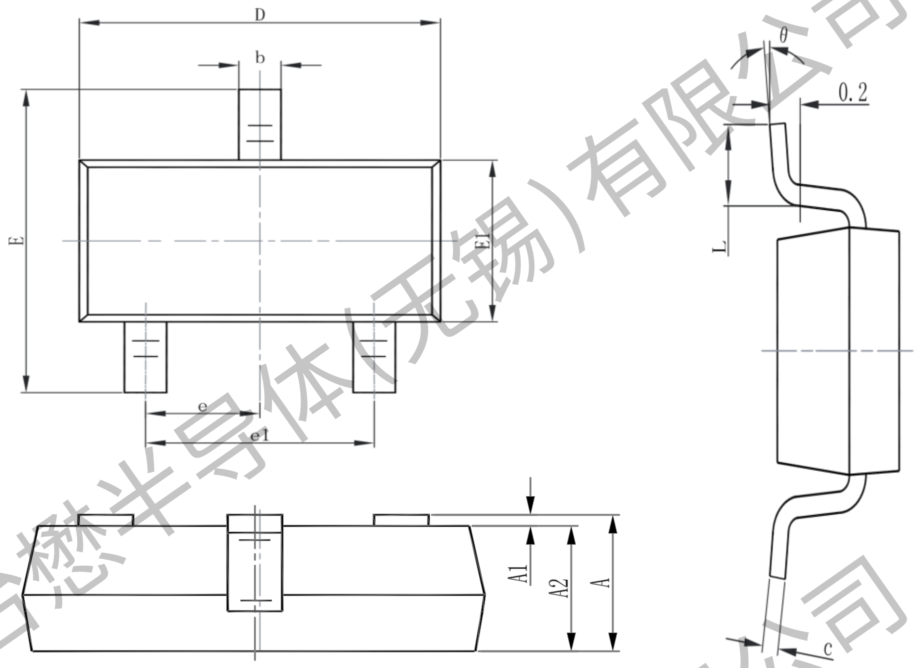


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



Notes:
1.Duty factor D=t1/t2
2.Peak $T_J=P_{DM}*Z_{thJA}+T_A$

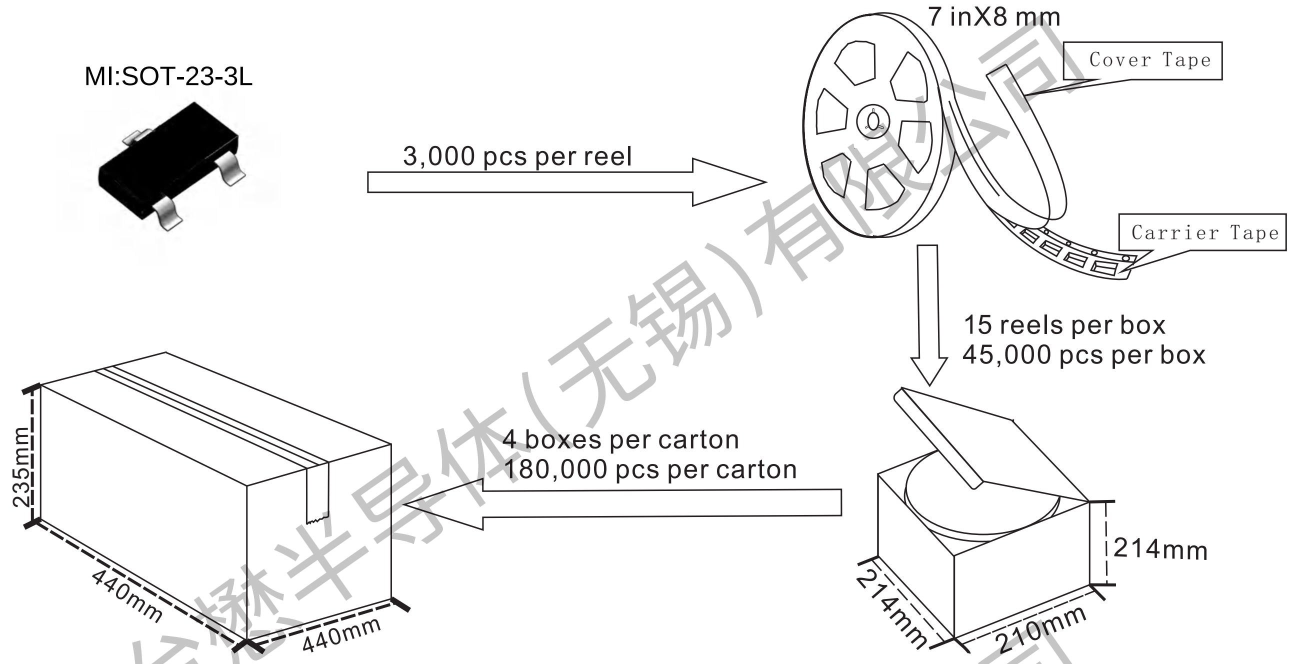
## Package Mechanical Data:SOT-23-3L



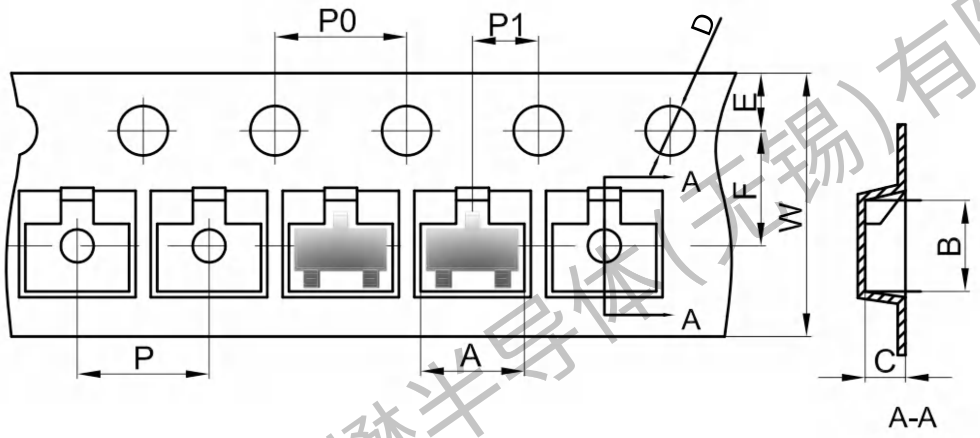
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | **Min.** | **Max.** | **Min.** | **Max.** |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E1 | 1.500 | 1.700 | 0.059 | 0.067 |
| E | 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° |

# SOT-23-3L Packing

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

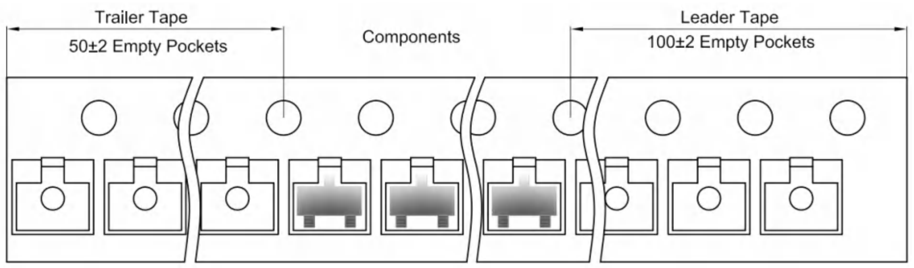


## SOT-23-3L Embossed Carrier Tape



| Dimensions are in millimeter | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Pkg type | A | B | C | D | E | F | P0 | P | P1 | W |
| SOT-23-3L | 3.15 | 2.77 | 1.22 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

## SOT-23-3L Tape Leader and Trailer



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Revision history:

| Date | Rev | Description | Page |
|---|---|---|---|
| 2023.09.06 | 23.09 | Original | |