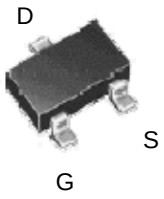
# N-Channel Enhancement Mode Field Effect Transistor

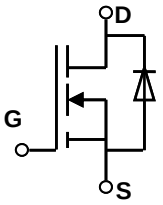
## FEATURES

- Super high dense cell design for low $R_{DS(ON)}$
- Rugged and reliable
- **S**imple drive requirement
- SOT-23 package

| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DSS}$ | $I_D$ | $R_{DS(ON)}$ (mΩ) Typ |
| 20V | 4.5A | 30@ $V_{GS}$=4.5V |
| | | 50@ $V_{GS}$=2.5V |

NOTE：The MT2312 is available in a lead-free package




## ABSOLUTE MAXIMUM RATINGS（$T_A$=25℃ unless otherwise noted）

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 20 | V |
| Gate-Source Voltage | $V_{GS}$ | ±12 | V |
| Drain Current-Continuous[a] @Tj=125℃ | $I_D$ | 3.6 | A |
| - Pulse [b] | $I_{DM}$ | 12 | A |
| Drain-source Diode Forward Current[a] | $I_S$ | 1.25 | A |
| Maximum Power Dissipation[a] | $P_D$ | 1.25 | W |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 to 150 | ℃ |

## THERMAL CHARACTERISTICS

| | | | |
|---|---|---|---|
| Thermal Resistance, Junction-to Ambient[a] | Rth $J_A$ | 100 | ℃/W |

## ELECTRICAL CHARACTERISTICS ($T_A$=25℃ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V,$I_D$=250μA | 20 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=16V,$V_{GS}$=0V | | | 1 | μA |
| Gate-Body Leakage | $I_{GSS}$ | $V_{GS}$=±8V,$V_{DS}$=0V | | | ±100 | nA |
| ON CHARACTERITICS | | | | | | |
| Gate Threshold Voltage | $V_{GS}$(th) | $V_{DS}$=$V_{GS}$,$I_D$=-250μA | 0.5 | 0.8 | 1.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=4.5V,$I_D$=2.8A | | 30 | 45 | mΩ |
| | | $V_{GS}$=2.5V,$I_D$=2.0A | | 50 | 60 | |
| Forward Transconductance | $g_{FS}$ | $V_{GS}$=5V,$I_D$=5A | | 5 | | S |
| DAYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$=10V,$V_{GS}$=0V f=1.0MHz | | 586 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 101 | | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 59 | | pF |
| SWITCHING CHARACTERISISTICS | | | | | | |
| Turn-On Delay Time | $t_{D(ON)}$ | $V_{DD}$=10V $I_D$=3.6A, $V_{GEN}$=4.5V $R_L$=10ohm $R_{GEN}$=10ohm | | 6.5 | | ns |
| Rise Time | tr | | | 32.1 | | ns |
| Turn-Off Delay Time | $t_{D(OFF)}$ | | | 58.4 | | ns |
| Fall Time | tf | | | 48 | | ns |
| Total Gate Charge | Qg | $V_{DS}$=10V,$I_D$=1A $V_{GS}$=4.5V | | 6 | | nC |
| Gate-Source Charge | Qgs | | | 1.35 | | nC |
| Gate-Drain Charge | Qgd | | | 1.5 | | nC |

## ELECTRICAL CHARACTERICS (TA=25℃ unless otherwise noted)

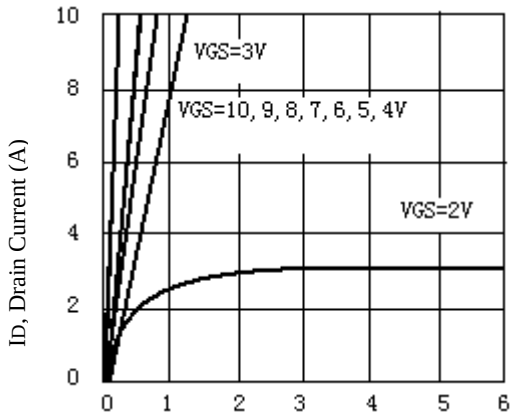
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| DRAIN-SOURCE DIODE CHARACTERISTICS | | | | | | |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V,$I_S$=1.25A | | 0.84 | 1.2 | V |

Notes

a. Surface Mounted on FR4 Board, t≦10sec

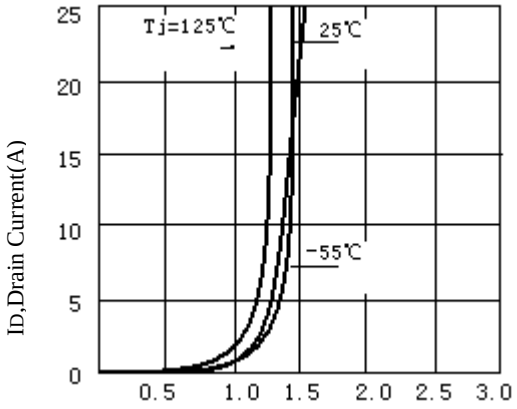
b. Pulse Test: Pulse Width≦300Us, Duty Cycle≦2%

c. Guaranteed by design, not subject to production testing.



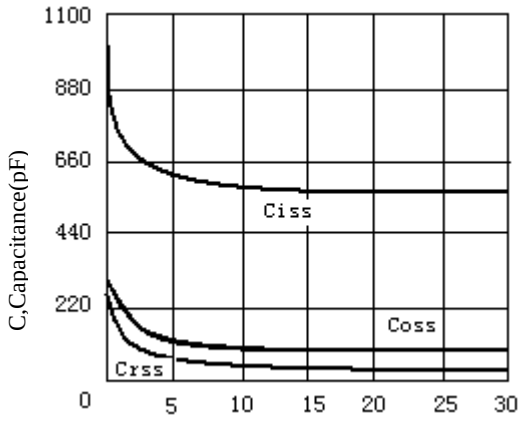

$V_{DS}$, Drain-to-Source Voltage (V)

Figure 1. Output Characteristics




$V_{GS}$, Gate-to-source Voltage (V)

Figure 2. Transfer Characteristics




VGS, Drain-to Source Voltage

Figure3. Capacitance

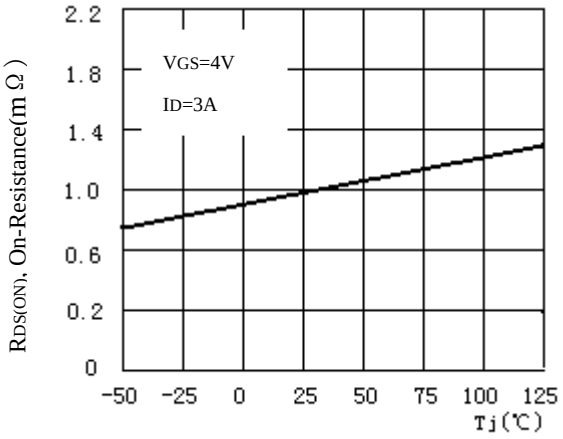



Figure4. On-Resistance Variation with Temperature

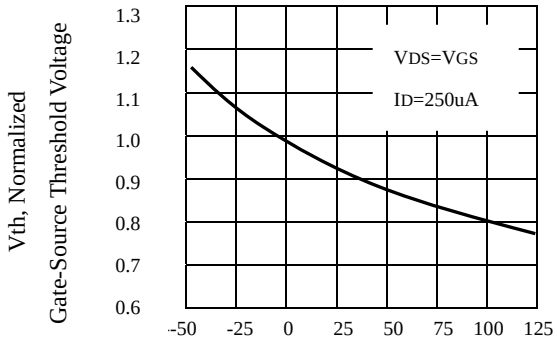



Figure5.Gate Threshold Variation With Temperature

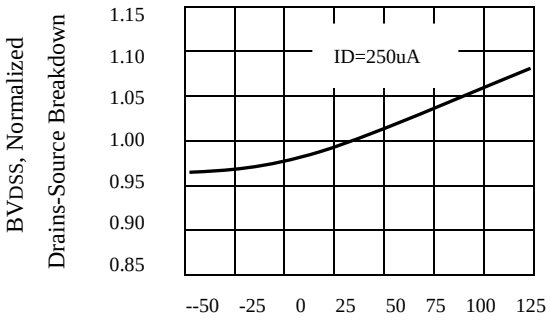



Figure6.Breakdown Voltage Variation With Temperature

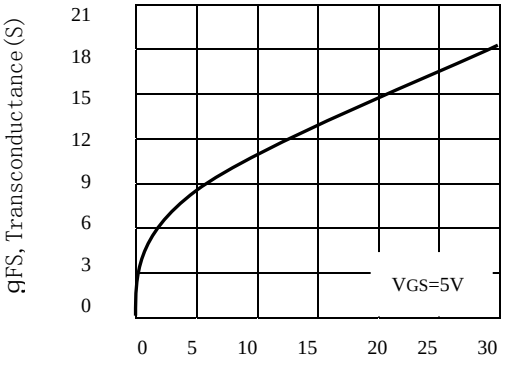



Figure7.Transconductance Variation With Drain Current

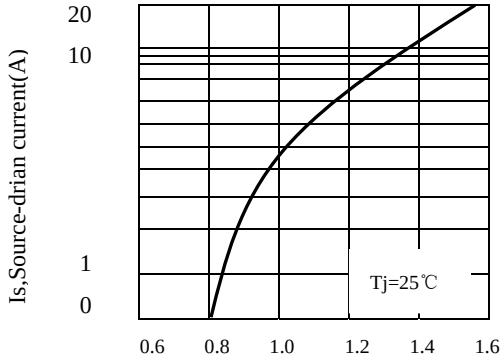



Figure8.Body Diode Forward Voltage Variation with Source Current

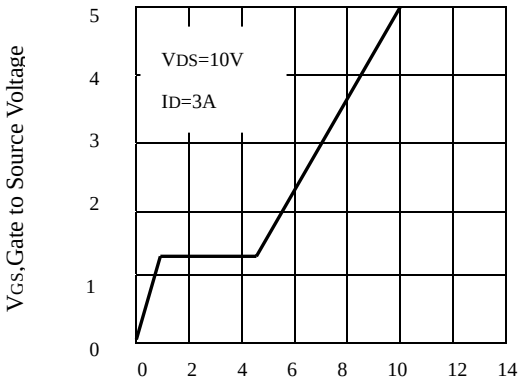



Figure9. Gate Charge

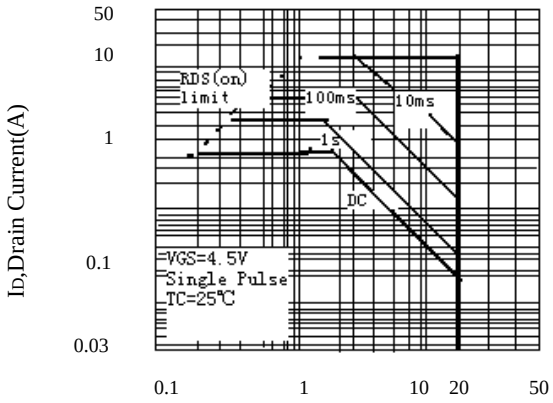



Figure10.Maximum Safe Operating Area

# SOT-23 Std Tape and Reel Data

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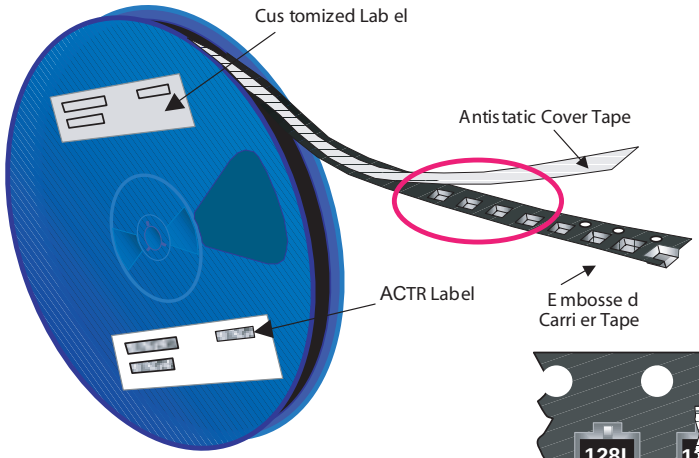
## SOT23-3L Packaging
**Configuration:** Figure 1.0

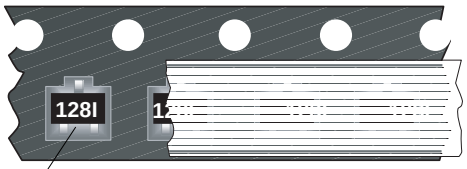



**Packaging Description:**

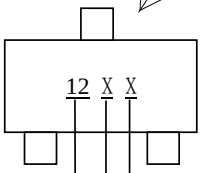
SOT23-3L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 177mm diameter reel. The reels are dark blue in color and is made of polystyrene plastic (anti-static coated). Other option comes in 10,000 units per 13" or 330cm diameter reel. This and some other options are described in the Packaging Information table.

These full reels are individually labeled and placed inside a standard immediate box made of recyclable corrugated brown paper with a Fairchild logo printing. One box contains five reels maximum. And these immediate boxes are placed inside a labeled shipping box which comes in different sizes depending on the number of parts shipped.

| SOT23-3L Packaging Information | | |
|---|---|---|
| Packaging Option | Standard (no flow code) | D87Z |
| Packaging type | TNR | TNR |
| Qty per Reel/Tube/Bag | 3,000 | 10,000 |
| Reel Size | 7" Dia | 13" |
| Box Dimension (mm) | 193x183x80 | 355x333x40 |
| Max qty per Box | 15,000 | 30,000 |
| Weight per unit (gm) | 0.0082 | 0.0082 |
| Weight per Reel (kg) | 0.1175 | 0.4006 |
| Note/Comments | | |

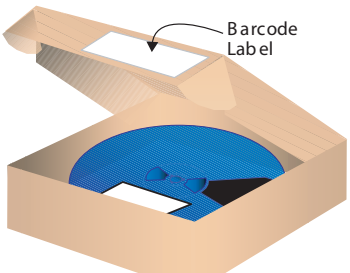



**SOT23-3L Unit Orientation**



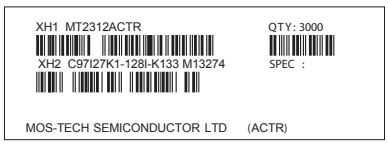

**MARKING** DIAGRAM

X:Month Code
X:Year Code
12：Part NO.

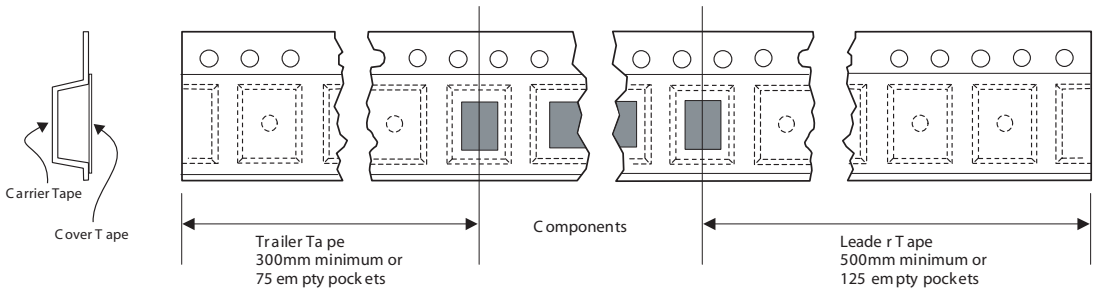



193mm x 183mm x 80mm
Pizza Box for Standard Option

Barcode Label sample




## SOT23-3L Tape Leader and Trailer
**Configuration:** Figure 2.0



# SOT-23 Std Tape and Reel Data, continued

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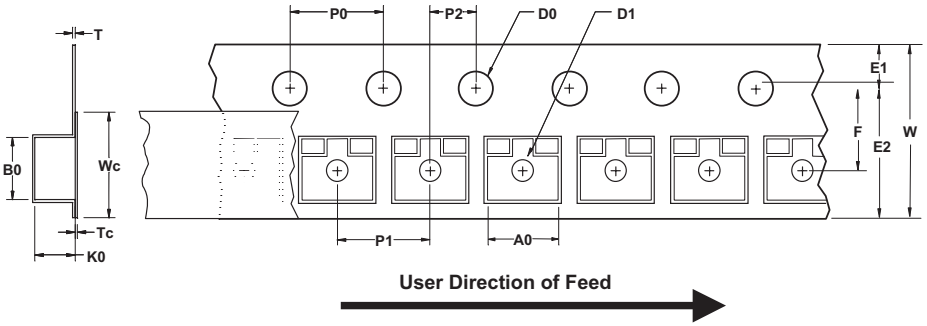
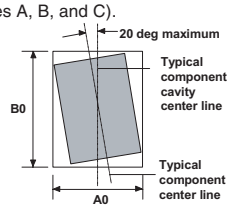
## SOT23-3L Embossed Carrier Tape
**Configuration:** Figure 3.0



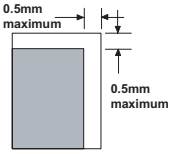

| Dimensions are in millimeter | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pkg type** | **A0** | **B0** | **W** | **D0** | **D1** | **E1** | **E2** | **F** | **P1** | **P0** | **K0** | **T** | **Wc** | **Tc** |
| **SOT-23** (8mm) | 3.15 +/-0.10 | 2.77 +/-0.10 | 8.0 +/-0.3 | 1.55 +/-0.05 | 1.125 +/-0.125 | 1.75 +/-0.10 | 6.25 min | 3.50 +/-0.05 | 4.0 +/-0.1 | 4.0 +/-0.1 | 1.30 +/-0.10 | 0.228 +/-0.013 | 5.2 +/-0.3 | 0.06 +/-0.02 |

Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).


Sketch A (Side or Front Sectional View)
**Component Rotation**

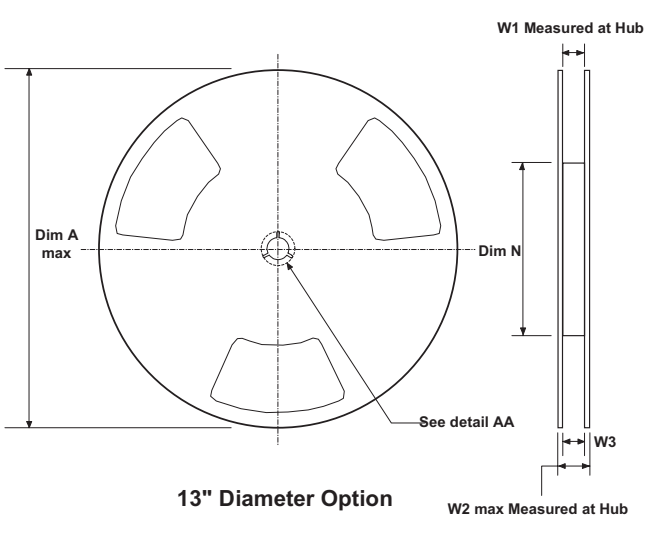



Sketch B (Top View)
**Component Rotation**

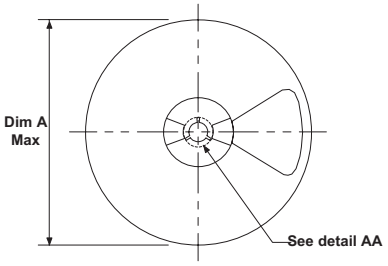



Sketch C (Top View)
**Component lateral movement**

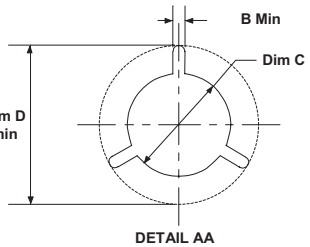
## SOT23-3L Reel Configuration: Figure 4.0




**13" Diameter Option**




**7" Diameter Option**




| Dimensions are in inches and millimeters | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tape Size** | **Reel Option** | **Dim A** | **Dim B** | **Dim C** | **Dim D** | **Dim N** | **Dim W1** | **Dim W2** | **Dim W3 (LSL-USL)** |
| 8mm | 7" Dia | 7.00 177.8 | 0.059 1.5 | 512 +0.020/-0.008 13 +0.5/-0.2 | 0.795 20.2 | 2.165 55 | 0.331 +0.059/-0.000 8.4 +1.5/0 | 0.567 14.4 | 0.311 - 0.429 7.9 - 10. 9 |
| 8mm | 13" Dia | 13.00 330 | 0.059 1.5 | 512 +0.020/-0.008 13 +0.5/-0.2 | 0.795 20.2 | 4.00 100 | 0.331 +0.059/-0.000 8.4 +1.5/0 | 0.567 14.4 | 0.311 - 0.429 7.9 - 10. 9 |

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   3）用于治疗（切除患部、给药等）的装置。
   4）其他直接影响到人的生命的装置。
9. 在使用本资料所记载的产品时，对于最大额定值、工作电源电压的范围、放热特性、安装条件及其他条件请在本公司规定的保证范围内使用。如果超出了本公司规定的保证范围使用时，对于由此而造成的故障和出现的事故，本公司将不承担任何责任。
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11. 如果把本资料所记载的产品从其载体设备上卸下，有可能造成婴儿误吞的危险。顾客在将本公司产品安装到顾客的设备上时，请顾客自行负责将本公司产品设置为不容易剥落的安全设计。如果从顾客的设备上剥落而造成事故时，本公司将不承担任何责任。
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## Keep safety first in your circuit designs!

1. MOS-TECH Semiconductor Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.
   Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.