



ZHEJIANG UNI-NE Technology CO., LTD

浙江宇力微新能源科技有限公司



## 78S12M Data Sheet

V 1.1

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## Positive voltage regulators

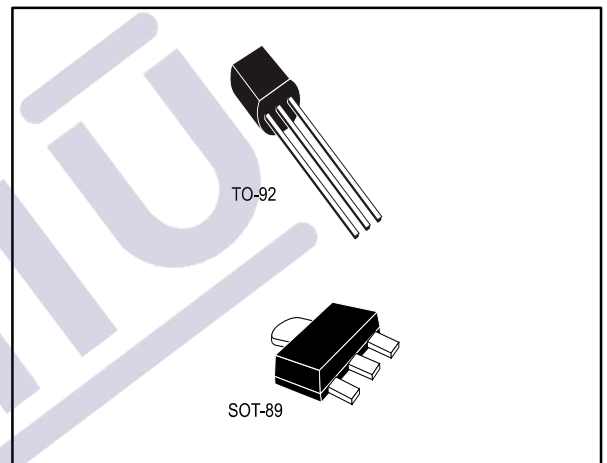
### Description

The 78S12M series of three terminal positive regulators employ internal current limiting and thermal shutdown, making them essentially indestructible. If adequate heat-sink is provided, they can deliver up to 120 mA output current.

They are intended as fixed voltage regulators in a wide range of applications including local or on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power pass elements to make high-current voltage regulators. The 78S12M series used as Zener diode/resistor combination replacement, offers e improvement along with lower quiescent current and lower noise.

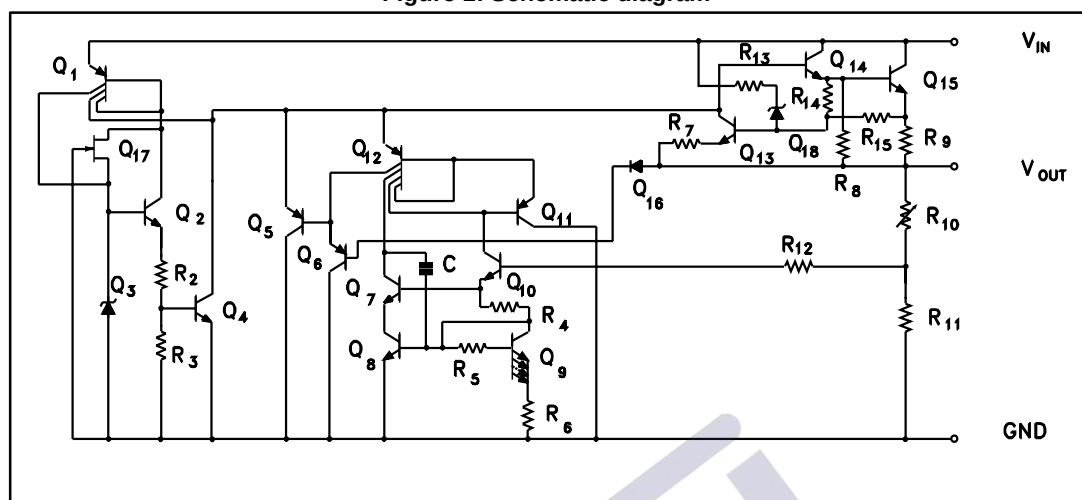
### Features

- Output current up to 120 mA
- Output voltages of 12V
- thermal overload protection
- Internal Short Circuit Current Limiting
- No external components are required
- Available in  $\pm 2\%$



## Diagram

Figure 1: Schematic diagram



## Pin configuration

Figure 2: Pin connection (top view, bottom view for TO-92)

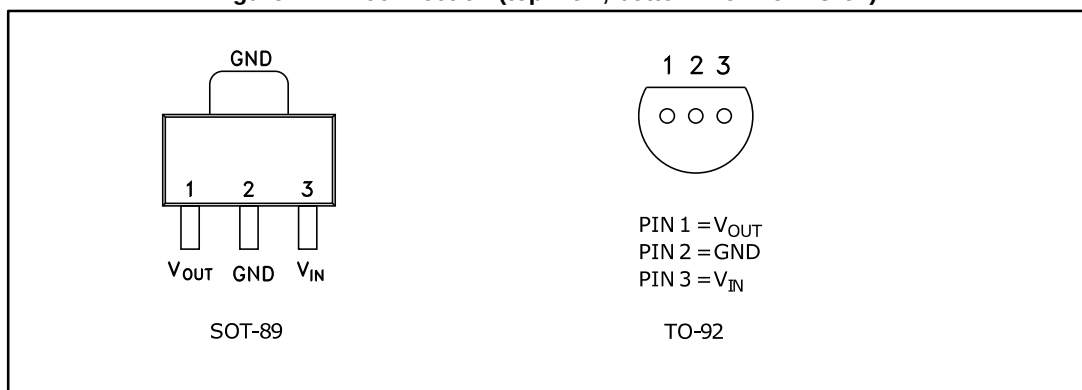
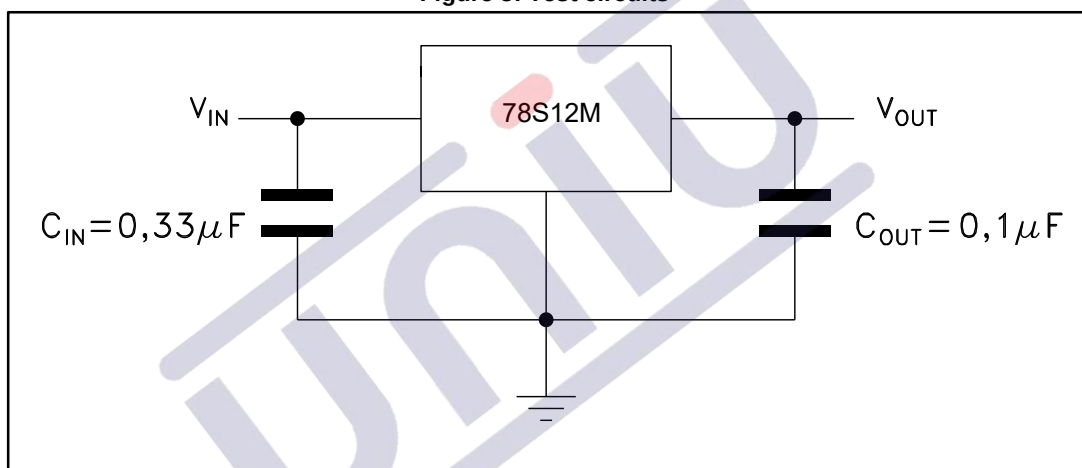


Figure 3: Test circuits



## Maximum ratings

absolute maximum ratings over operating temperature range (unless otherwise noted)

| 78S12M                                                       | PARAMETER  | UNIT |
|--------------------------------------------------------------|------------|------|
| Input voltage, $V_I$                                         | 35         | V    |
| Virtual junction temperature range, $T_J$                    | 150        | °C   |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds | 260        | °C   |
| Storage temperature range, $T_{STG}$                         | -65 to 150 | °C   |

recommended operating conditions

| 78S12M                                        | MIN | MAX | UNIT |
|-----------------------------------------------|-----|-----|------|
| Input voltage, $V_I$                          | 8   | 20  | V    |
| Output current, $I_O$                         |     | 100 | mA   |
| Operating virtual junction temperature, $T_J$ | 0   |     | °C   |

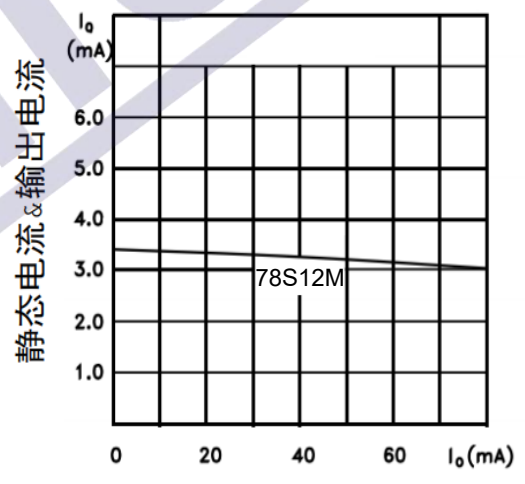
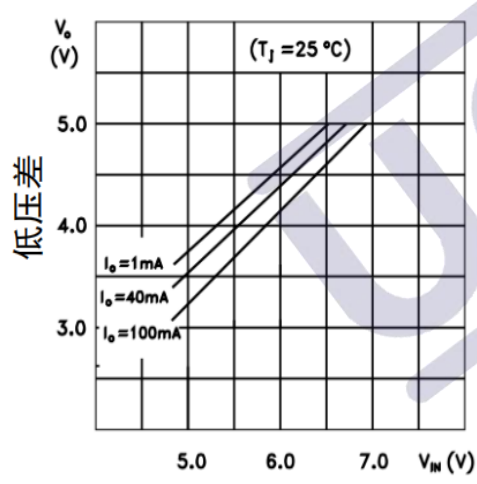
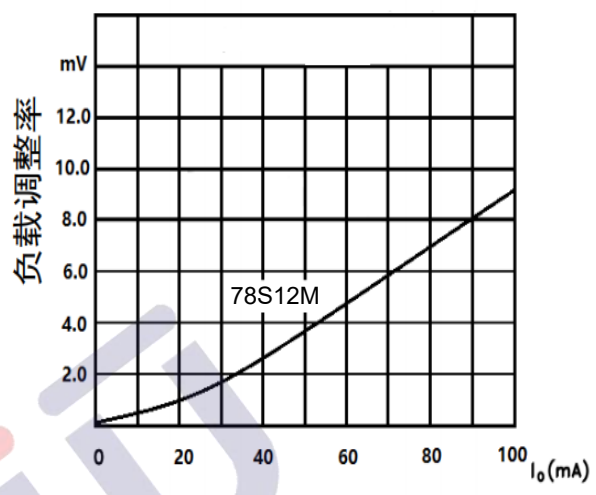
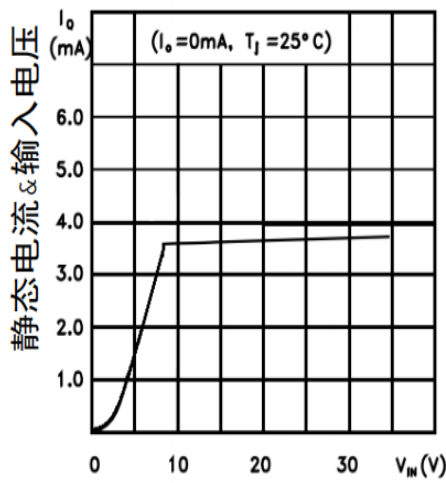
## Electrical characteristics

electrical characteristics at specified virtual junction temperature,  $V_I = 19V$ ,  
 $I_O = 40mA$  (unless otherwise noted)

| PARAMETER                 | TEST CONDITIONS                                                 | T ①        | 78S12M |     |      | UNIT |
|---------------------------|-----------------------------------------------------------------|------------|--------|-----|------|------|
|                           |                                                                 |            | MIN    | TYP | MAX  |      |
| Output voltage            |                                                                 | 25°C       | 11.5   | 12  | 12.5 | V    |
|                           | $I_O = 1\text{ mA to }40\text{ mA}$ , $V_I = 14V\text{ to }27V$ | Full range | 11.4   | 12  | 12.6 |      |
|                           | $I_O = 1\text{ mA to }70\text{ mA}$                             | Full range | 11.4   | 12  | 12.6 |      |
| Input voltage regulation  | $V_I = 14.5V\text{ to }27V$                                     | 25°C       |        | 55  | 250  | mV   |
|                           | $V_I = 16V\text{ to }27V$                                       |            |        | 49  | 200  |      |
| Ripple rejection          | $V_I = 15V\text{ to }25V$ , $f = 120\text{ Hz}$                 | 25°C       | 37     | 42  |      | dB   |
| Output voltage regulation | $I_O = 1\text{ mA to }100\text{ mA}$                            | 25°C       |        | 22  | 100  | mV   |
|                           | $I_O = 1\text{ mA to }40\text{ mA}$                             |            |        | 13  | 50   |      |
| Output noise voltage      | $f = 10\text{ Hz to }100\text{ kHz}$                            | 25°C       |        | 70  |      | μV   |
| Dropout voltage           |                                                                 | 25°C       |        | 1.7 |      | V    |
| Bias current              |                                                                 | 25°C       |        | 4.3 | 6    | mA   |
|                           |                                                                 | 125°C      |        |     | 5.5  |      |
| Bias current change       | $V_I = 16V\text{ to }27V$                                       | Full range |        |     | 1.5  | mA   |
|                           | $I_O = 1\text{ mA to }40\text{ mA}$                             |            |        |     | 0.1  |      |

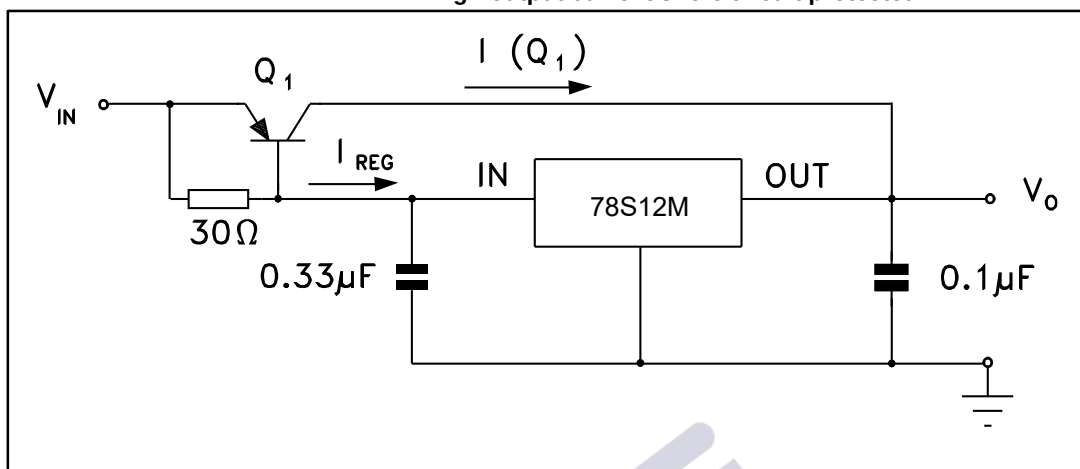
① Pulse-testing techniques maintain  $T_J$  as close to  $T_A$  as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Full range for the 78S12M is  $T_J = 0^\circ\text{C to }70^\circ\text{C}$

Typical performance

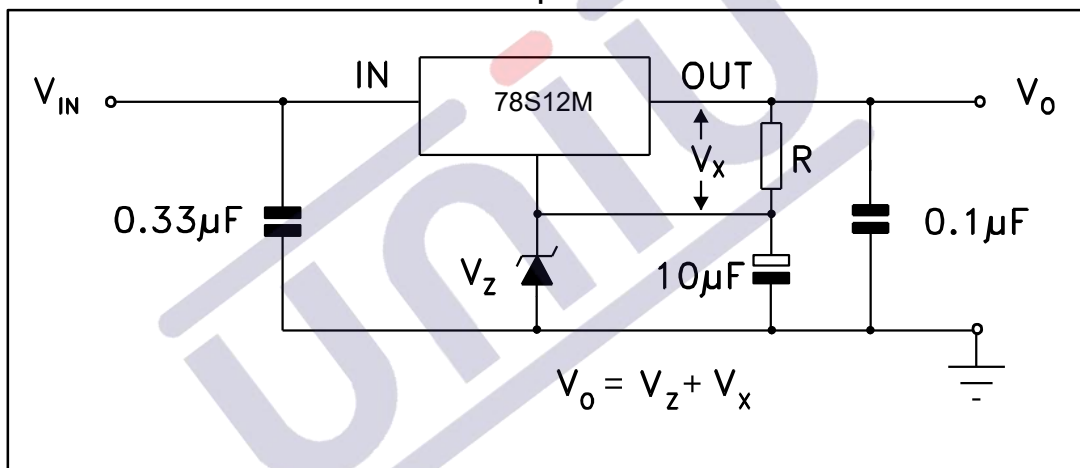


## Typical application

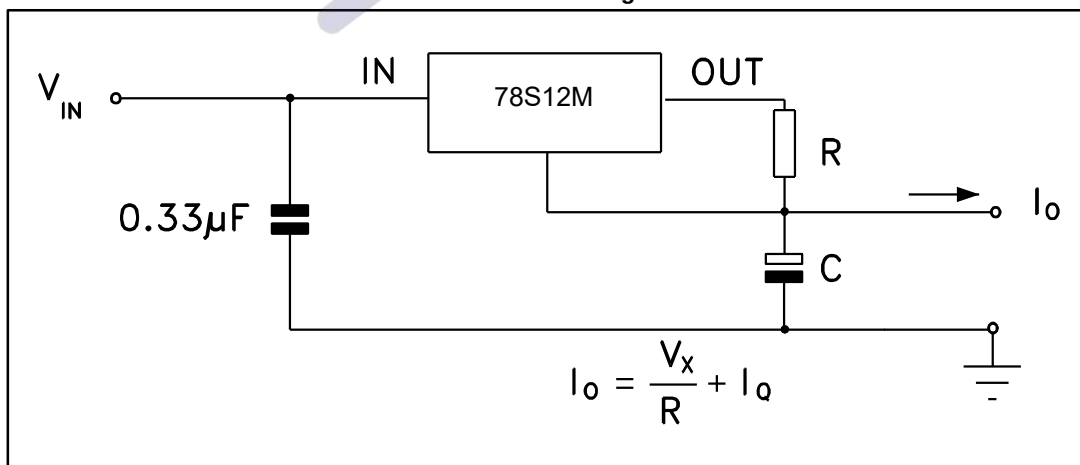
High output current short-circuit protected



Output boost circuit



Current regulator

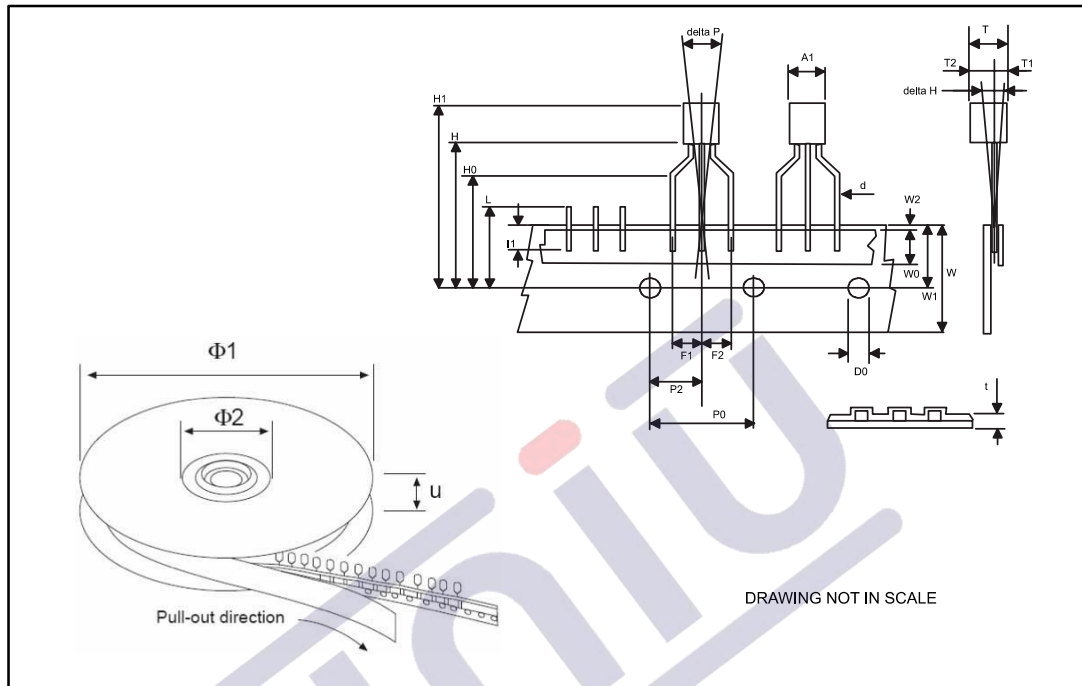




## Package information

### TO-92 packing information

: TO-92 tape and reel outline

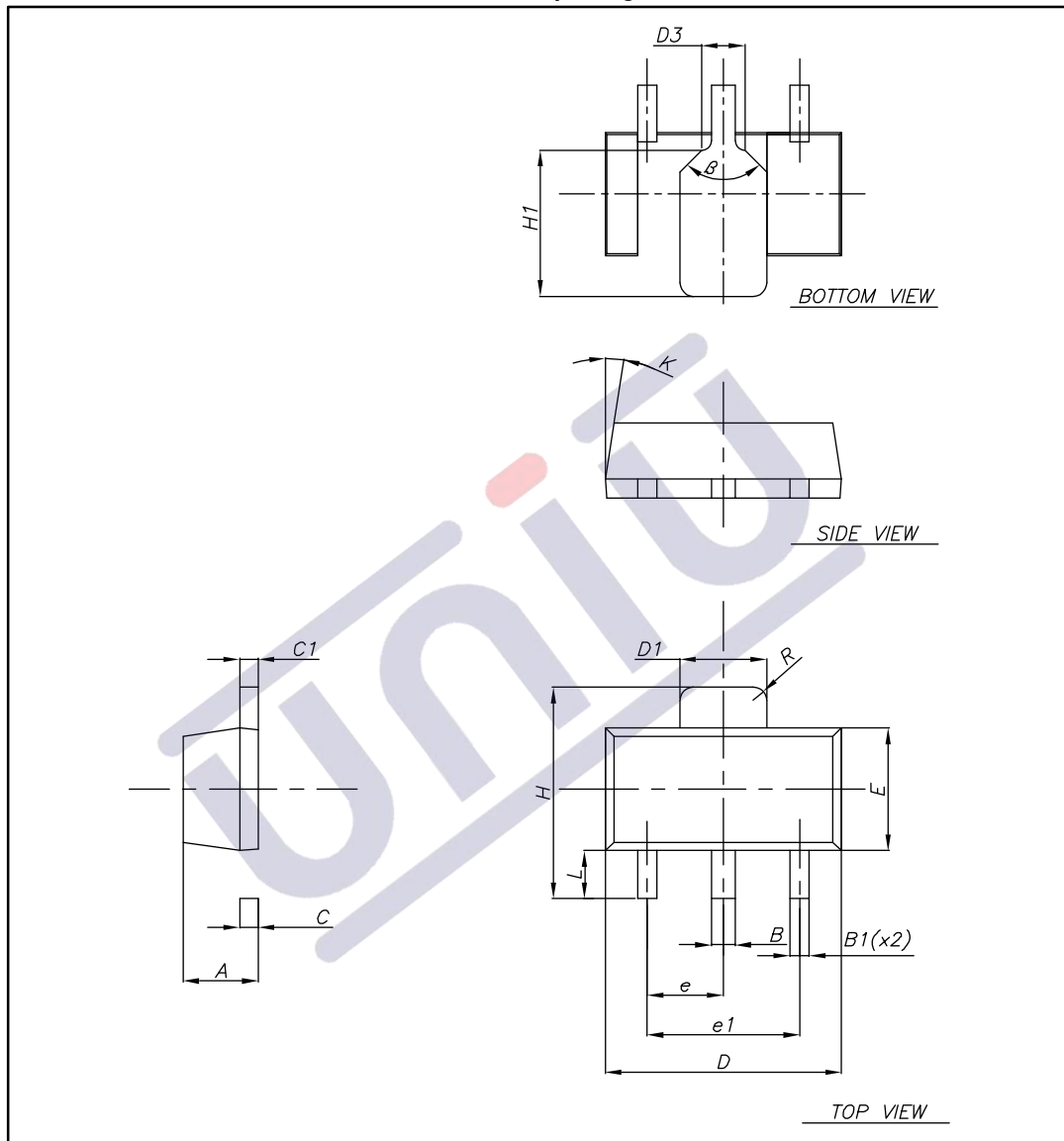


TO-92 tape and reel mechanical data

| Dim.    | mm    |       |       |
|---------|-------|-------|-------|
|         | Min.  | Typ.  | Max.  |
| A1      |       |       | 4.80  |
| T       |       |       | 3.80  |
| T1      |       |       | 1.60  |
| T2      |       |       | 2.30  |
| d       | 0.45  | 0.47  | 0.48  |
| P0      | 12.50 | 12.70 | 12.90 |
| P2      | 5.65  | 6.35  | 7.05  |
| F1, F2  | 2.40  | 2.50  | 2.94  |
| F3      | 4.98  | 5.08  | 5.48  |
| delta H | -2.00 |       | 2.00  |
| W       | 17.50 | 18.00 | 19.00 |
| W0      | 5.5   | 6.00  | 6.5   |
| W1      | 8.50  | 9.00  | 9.25  |
| W2      |       |       | 0.50  |
| H       |       | 18.50 | 21    |
| H3      | 0.5   | 1     | 2     |
| H0      | 15.50 | 16.00 | 18.8  |
| H1      |       | 25.0  | 27.0  |
| D0      | 3.80  | 4.00  | 4.20  |
| t       |       |       | 0.90  |
| L       |       |       | 11.00 |
| l1      | 3.00  |       |       |
| delta P | -1.00 |       | 1.00  |
| Ø1      | 352   | 355   | 358   |
| Ø2      | 28    | 30    | 32    |
| u       | 44    | 47    | 50    |

## SOT-89 package information

SOT-89 package outline



SOT-89 mechanical data

| Dim. | mm   |      |      |
|------|------|------|------|
|      | Min. | Typ. | Max. |
| A    | 1.40 |      | 1.60 |
| B    | 0.44 |      | 0.56 |
| B1   | 0.36 |      | 0.48 |
| C    | 0.35 |      | 0.44 |
| C1   | 0.35 |      | 0.44 |
| D    | 4.40 |      | 4.60 |
| D1   | 1.62 |      | 1.83 |
| D3   |      | 0.90 |      |
| E    | 2.29 |      | 2.60 |
| e    | 1.42 |      | 1.57 |
| e1   | 2.92 |      | 3.07 |
| H    | 3.94 |      | 4.25 |
| H1   | 2.70 |      | 3.10 |
| K    | 1°   |      | 8°   |
| L    | 0.89 |      | 120  |
| R    |      | 0.25 |      |
| β    |      | 90°  |      |

SOT-89 carrier tape outline

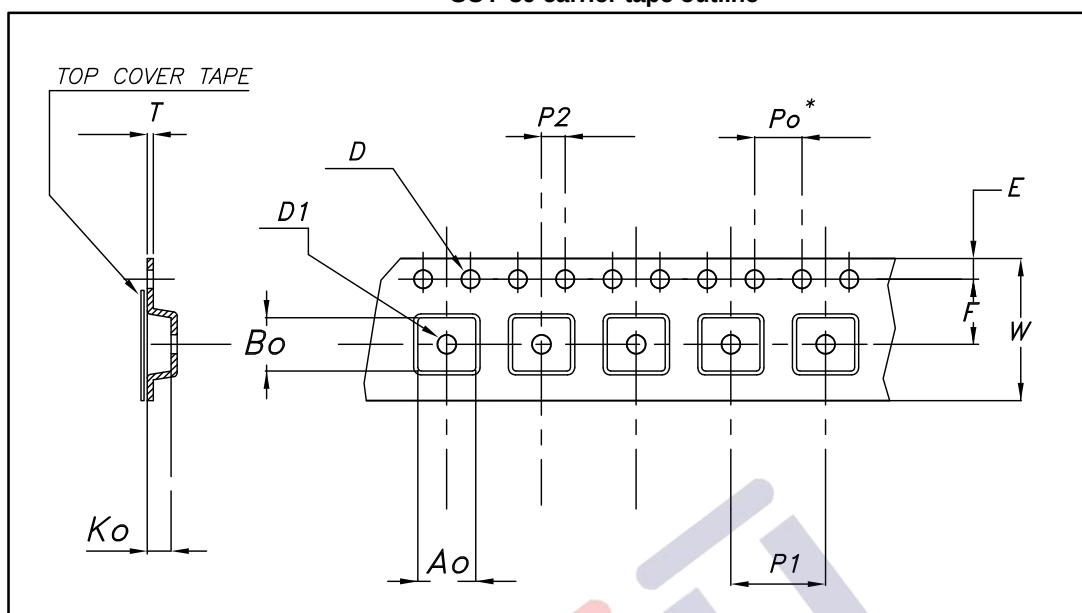


Table : SOT8-89 carrier tape mechanical data

| Dim. | mm                 |            |
|------|--------------------|------------|
|      | Value              | Tolerance  |
| Ao   | 4.91               | $\pm 0.10$ |
| Bo   | 4.52               | $\pm 0.10$ |
| Ko   | 1.90               | $\pm 0.10$ |
| F    | 5.50               | $\pm 0.10$ |
| E    | 1.75               | $\pm 0.10$ |
| W    | 12                 | $\pm 0.30$ |
| P2   | 2                  | $\pm 0.10$ |
| Po   | 4                  | $\pm 0.10$ |
| P1   | 8                  | $\pm 0.10$ |
| T    | 0.30               | $\pm 0.10$ |
| D    | $\varnothing 1.55$ | $\pm 0.05$ |
| D1   | $\varnothing 1.60$ | $\pm 0.10$ |

## 1.版本记录

| DATE       | REV. | DESCRIPTION       |
|------------|------|-------------------|
| 2018/04/19 | 1.0  | First Release     |
| 2021/11/10 | 1.1  | Layout adjustment |
|            |      |                   |
|            |      |                   |

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## 3.联系我们

浙江宇力微新能源科技有限公司

总部地址：绍兴市越城区斗门街道袍渚路25号中节能科创园45幢4/5楼

电话：0575-85087896（研发部）

传真：0575-88125157

E-mail:htw@uni-semic.com

无锡地址：江苏省无锡市锡山区先锋中路6号中国电子（无锡）数字芯城1#综合楼503室

电话:0510-85297939

E-mail:zh@uni-semic.com

深圳地址：深圳市宝安区西乡街道南昌社区宝源路泳辉国际商务大厦410

电话：0755-84510976

E-mail:htw@uni-semic.com