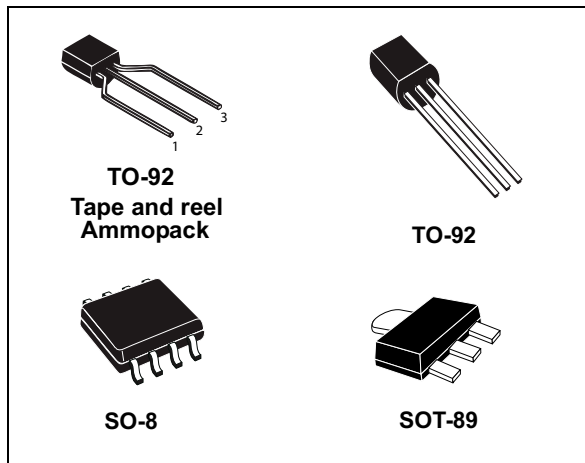


## Negative voltage regulators

Datasheet - production data



### Description

The L79L series of three-terminal negative regulators employ internal current limiting and thermal shutdown, making them essentially indestructible. If adequate heat-sink is provided, they can deliver up to 100 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 L79L series used as Zener diode/resistor combination replacement, offers an effective output impedance improvement of typically two orders of magnitude, along with lower quiescent current and lower noise.

### Features

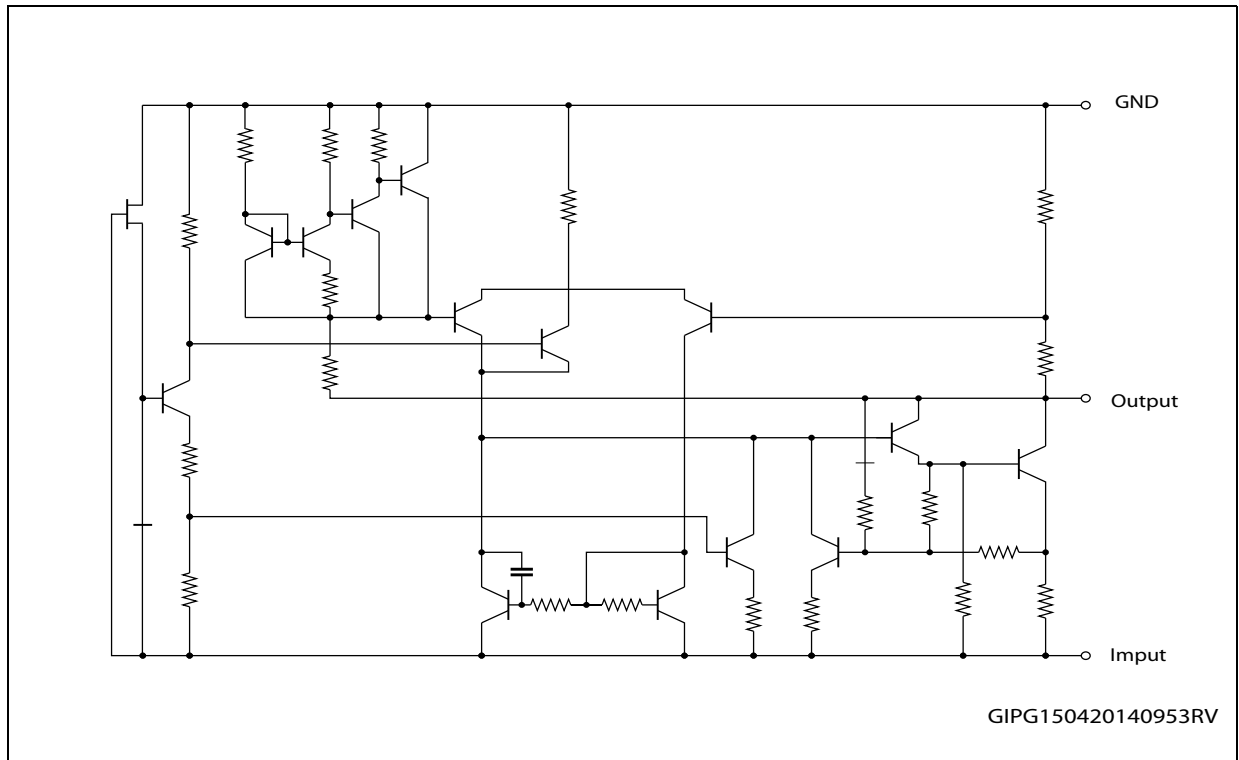
- Output current up to 100 mA
- Output voltages of -5; -8; -12; -15 V
- Thermal overload protection
- Short-circuit protection
- No external components are required
- Available in  $\pm 5\%$  (AC) or  $\pm 10\%$  (C) selection

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# 1 Diagram

Figure 1. Schematic diagram



## 2 Pin configuration

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

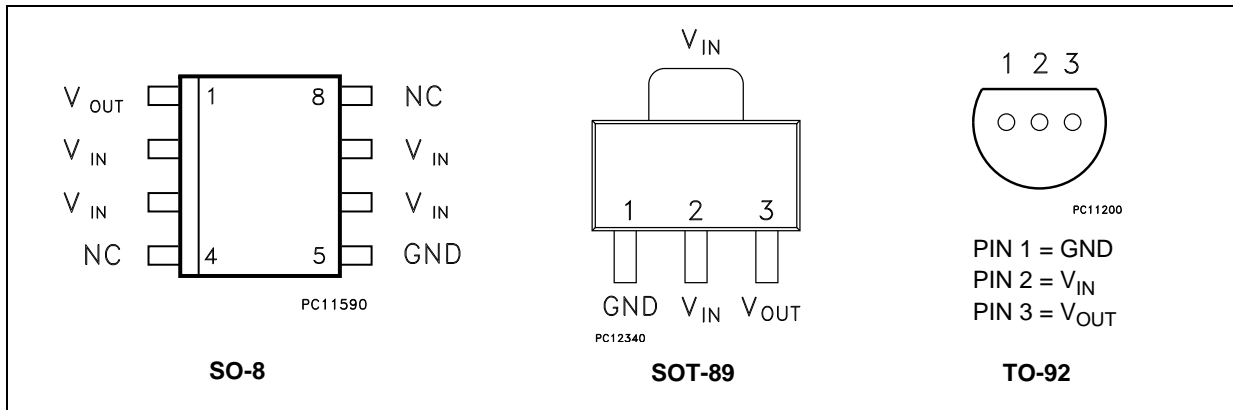
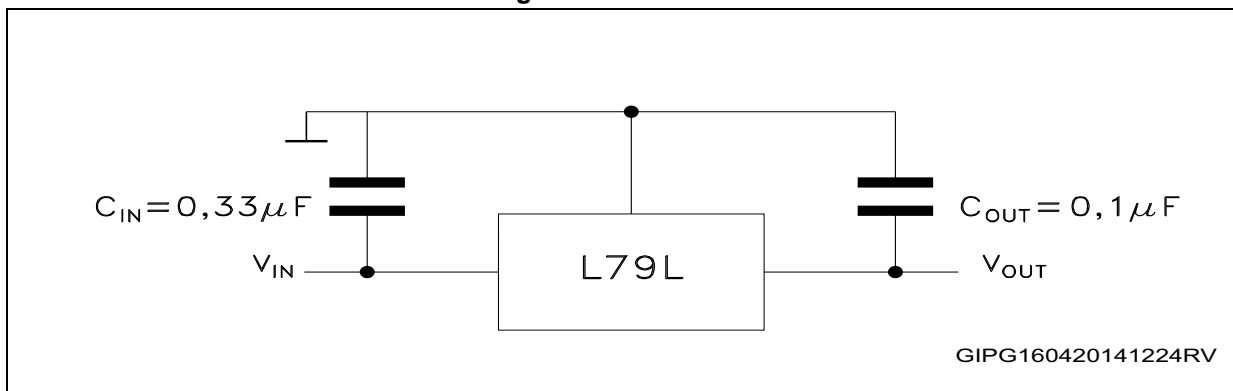


Figure 3. Test circuit



### 3 Maximum ratings

**Table 1. Absolute maximum ratings**

| Symbol           | Parameter                            | Value                             | Unit       |    |
|------------------|--------------------------------------|-----------------------------------|------------|----|
| V <sub>I</sub>   | DC input voltage                     | V <sub>O</sub> = -5 to -9 V       | -30        | V  |
|                  |                                      | V <sub>O</sub> = -12 to -15 V     | -35        |    |
| I <sub>O</sub>   | Output current                       | 100                               | mA         |    |
| P <sub>D</sub>   | Power dissipation                    | Internally limited <sup>(1)</sup> | mW         |    |
| T <sub>STG</sub> | Storage temperature range            | -40 to 150                        | °C         |    |
| T <sub>OP</sub>  | Operating junction temperature range | For L79LXXAC                      | 0 to 125   | °C |
|                  |                                      | For L79LXXAB                      | -40 to 125 |    |

1. Our SO-8 package used for Voltage Regulators is modified internally to have pins 2, 3, 6 and 7 electrically communed to the die attach flag. This particular frame decreases the total thermal resistance of the package and increases its ability to dissipate power when an appropriate area of copper on the printed circuit board is available for heat-sinking. The external dimensions are the same as for the standard SO-8.

**Table 2. Thermal data**

| Symbol            | Parameter                                  | SO-8              | TO-92 | SOT-89 | Unit |
|-------------------|--|-------------------|-------|--------|------|
| R <sub>thJC</sub> | Thermal resistance junction-case. (Max)    | 20                |       | 15     | °C/W |
| R <sub>thJA</sub> | Thermal resistance junction-ambient. (Max) | 55 <sup>(1)</sup> | 200   | 115    | °C/W |

1. Considering 6 cm<sup>2</sup> of copper Board heat-sink.

## 4 Electrical characteristics

Refer to the test circuits,  $V_I = -10\text{ V}$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ ,  $T_J = 0\text{ to }125\text{ }^\circ\text{C}$  for L79L05AC,  $T_J = -40\text{ to }125\text{ }^\circ\text{C}$  for L79L05AB, unless otherwise specified.

**Table 3. Electrical characteristics of L79L05AC and L79L05AB**

| Symbol | Parameter                | Test conditions   | Min.  | Typ. | Max.  | Unit          |
|--------|--------------------------|---|-------|------|-------|---------------|
| $V_O$  | Output voltage           | $T_J = 25^\circ\text{C}$  | -4.8  | -5   | -5.2  | V             |
| $V_O$  | Output voltage           | $I_O = 1\text{ to }40\text{ mA}$ , $V_I = -7\text{ to }-20\text{ V}$                                      | -4.75 |      | -5.25 | V             |
|        |                          | $I_O = 1\text{ to }70\text{ mA}$ , $V_I = -10\text{ V}$   | -4.75 |      | -5.25 |               |
| $DV_O$ | Line regulation          | $V_I = -7\text{ to }-20\text{ V}$ , $T_J = 25^\circ\text{C}$  |       |      | 150   | mV            |
|        |                          | $V_I = -8\text{ to }-20\text{ V}$ , $T_J = 25^\circ\text{C}$  |       |      | 100   |               |
| $DV_O$ | Load regulation          | $I_O = 1\text{ to }100\text{ mA}$ , $T_J = 25^\circ\text{C}$  |       |      | 60    | mV            |
|        |                          | $I_O = 1\text{ to }40\text{ mA}$ , $T_J = 25^\circ\text{C}$   |       |      | 30    |               |
| $I_d$  | Quiescent current        | $T_J = 25^\circ\text{C}$  |       |      | 6     | mA            |
|        |                          | $T_J = 125^\circ\text{C}$   |       |      | 5.5   | mA            |
| $DI_d$ | Quiescent current change | $I_O = 1\text{ to }40\text{ mA}$  |       |      | 0.1   | mA            |
|        |                          | $V_I = -8\text{ to }-20\text{ V}$   |       |      | 1.5   |               |
| eN     | Output noise voltage     | $B = 10\text{ Hz to }100\text{ kHz}$ , $T_J = 25^\circ\text{C}$   |       | 40   |       | $\mu\text{V}$ |
| SVR    | Supply voltage rejection | $V_I = -8\text{ to }-18\text{ V}$ , $f = 120\text{ Hz}$ , $I_O = 40\text{ mA}$ , $T_J = 25^\circ\text{C}$ | 41    | 49   |       | dB            |
| $V_d$  | Dropout voltage          |   |       | 1.7  |       | V             |

Refer to the test circuits,  $V_I = -14$  V,  $I_O = 40$  mA,  $C_I = 0.33$   $\mu$ F,  $C_O = 0.1$   $\mu$ F,  $T_J = 0$  to  $125$  °C for L79L08AC  $T_J = -40$  to  $125$  °C for L79L08AB, unless otherwise specified.

**Table 4. Electrical characteristics of L79L08AC and L79L08AB**

| Symbol | Parameter                | Test conditions   | Min.  | Typ. | Max.  | Unit    |
|--------|--------------------------|---|-------|------|-------|---------|
| $V_O$  | Output voltage           | $T_J = 25^\circ\text{C}$  | -7.68 | -8   | -8.32 | V       |
| $V_O$  | Output voltage           | $I_O = 1$ to $40$ mA, $V_I = -10.5$ to $-23$ V                                | -7.6  |      | -8.4  | V       |
|        |                          | $I_O = 1$ to $70$ mA, $V_I = -14$ V   | -7.6  |      | -8.4  |         |
| $DV_O$ | Line regulation          | $V_I = -10.5$ to $-23$ V, $T_J = 25^\circ\text{C}$                            |       |      | 175   | mV      |
|        |                          | $V_I = -11$ to $-23$ V, $T_J = 25^\circ\text{C}$                              |       |      | 125   |         |
| $DV_O$ | Load regulation          | $I_O = 1$ to $100$ mA, $T_J = 25^\circ\text{C}$                               |       |      | 80    | mV      |
|        |                          | $I_O = 1$ to $40$ mA, $T_J = 25^\circ\text{C}$                                |       |      | 40    |         |
| $I_d$  | Quiescent current        | $T_J = 25^\circ\text{C}$  |       |      | 6     | mA      |
|        |                          | $T_J = 125^\circ\text{C}$   |       |      | 5.5   | mA      |
| $DI_d$ | Quiescent current change | $I_O = 1$ to $40$ mA  |       |      | 0.1   | mA      |
|        |                          | $V_I = -11$ to $-23$ V  |       |      | 1.5   |         |
| eN     | Output noise voltage     | $B = 10$ Hz to $100$ kHz, $T_J = 25^\circ\text{C}$                            |       | 60   |       | $\mu$ V |
| SVR    | Supply voltage rejection | $V_I = -12$ to $-23$ V, $f = 120$ Hz, $I_O = 40$ mA, $T_J = 25^\circ\text{C}$ | 37    | 45   |       | dB      |
| $V_d$  | Dropout voltage          |   |       | 1.7  |       | V       |

Refer to the test circuits,  $V_I = -19\text{ V}$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ ,  $T_J = 0\text{ to }125\text{ }^\circ\text{C}$  for L79L12AC,  $T_J = -40\text{ to }125\text{ }^\circ\text{C}$  for L79L12AB, unless otherwise specified.

**Table 5. Electrical characteristics of L79L12AC and L79L12AB**

| Symbol | Parameter                | Test conditions  | Min.  | Typ. | Max.  | Unit          |
|--------|--------------------------|--|-------|------|-------|---------------|
| $V_O$  | Output voltage           | $T_J = 25^\circ\text{C}$   | -11.5 | -12  | -12.5 | V             |
| $V_O$  | Output voltage           | $I_O = 1\text{ to }40\text{ mA}$ , $V_I = -14.5\text{ to }-27\text{ V}$                                    | -11.4 |      | -12.6 | V             |
|        |                          | $I_O = 1\text{ to }70\text{ mA}$ , $V_I = -19\text{ V}$  | -11.4 |      | -12.6 |               |
| $DV_O$ | Line regulation          | $V_I = -14.5\text{ to }-27\text{ V}$ , $T_J = 25^\circ\text{C}$  |       |      | 250   | mV            |
|        |                          | $V_I = -16\text{ to }-27\text{ V}$ , $T_J = 25^\circ\text{C}$  |       |      | 200   |               |
| $DV_O$ | Load regulation          | $I_O = 1\text{ to }100\text{ mA}$ , $T_J = 25^\circ\text{C}$   |       |      | 100   | mV            |
|        |                          | $I_O = 1\text{ to }40\text{ mA}$ , $T_J = 25^\circ\text{C}$  |       |      | 50    |               |
| $I_d$  | Quiescent current        | $T_J = 25^\circ\text{C}$   |       |      | 6.5   | mA            |
|        |                          | $T_J = 125^\circ\text{C}$  |       |      | 6     | mA            |
| $DI_d$ | Quiescent current change | $I_O = 1\text{ to }40\text{ mA}$   |       |      | 0.1   | mA            |
|        |                          | $V_I = -16\text{ to }-27\text{ V}$   |       |      | 1.5   |               |
| eN     | Output noise voltage     | $B = 10\text{ Hz to }100\text{ kHz}$ , $T_J = 25^\circ\text{C}$  |       | 80   |       | $\mu\text{V}$ |
| SVR    | Supply voltage rejection | $V_I = -15\text{ to }-25\text{ V}$ , $f = 120\text{ Hz}$ , $I_O = 40\text{ mA}$ , $T_J = 25^\circ\text{C}$ | 37    | 42   |       | dB            |
| $V_d$  | Dropout voltage          |  |       | 1.7  |       | V             |



Refer to the test circuits,  $V_I = -23\text{ V}$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ ,  $T_J = 0\text{ to }125\text{ }^\circ\text{C}$  for L79L15AC,  $T_J = -40\text{ to }125\text{ }^\circ\text{C}$  for L79L15AB, unless otherwise specified.

**Table 6. Electrical characteristics of L79L15AC and L79L15AB**

| Symbol | Parameter                | Test conditions   | Min.   | Typ. | Max.   | Unit          |
|--------|--------------------------|---|--------|------|--------|---------------|
| $V_O$  | Output voltage           | $T_J = 25^\circ\text{C}$  | -14.4  | -15  | -15.6  | V             |
| $V_O$  | Output voltage           | $I_O = 1\text{ to }40\text{ mA}$ , $V_I = -17.5\text{ to }-30\text{ V}$   | -14.25 |      | -15.75 | V             |
|        |                          | $I_O = 1\text{ to }70\text{ mA}$ , $V_I = -23\text{ V}$   | -14.25 |      | -15.75 |               |
| $DV_O$ | Line regulation          | $V_I = -17.5\text{ to }-30\text{ V}$ , $T_J = 25^\circ\text{C}$   |        |      | 300    | mV            |
|        |                          | $V_I = -20\text{ to }-30\text{ V}$ , $T_J = 25^\circ\text{C}$   |        |      | 250    |               |
| $DV_O$ | Load regulation          | $I_O = 1\text{ to }100\text{ mA}$ , $T_J = 25^\circ\text{C}$  |        |      | 150    | mV            |
|        |                          | $I_O = 1\text{ to }40\text{ mA}$ , $T_J = 25^\circ\text{C}$   |        |      | 75     |               |
| $I_d$  | Quiescent current        | $T_J = 25^\circ\text{C}$  |        |      | 6.5    | mA            |
|        |                          | $T_J = 125^\circ\text{C}$   |        |      | 6      | mA            |
| $DI_d$ | Quiescent current change | $I_O = 1\text{ to }40\text{ mA}$  |        |      | 0.1    | mA            |
|        |                          | $V_I = -20\text{ to }-30\text{ V}$  |        |      | 1.5    |               |
| eN     | Output noise voltage     | $B = 10\text{ Hz to }100\text{ kHz}$ , $T_J = 25^\circ\text{C}$   |        | 90   |        | $\mu\text{V}$ |
| SVR    | Supply voltage rejection | $V_I = -18.5\text{ to }-28.5\text{ V}$ , $f = 120\text{ Hz}$<br>$I_O = 40\text{ mA}$ , $T_J = 25^\circ\text{C}$ | 34     | 39   |        | dB            |
| $V_d$  | Dropout voltage          |   |        | 1.7  |        | V             |

### 4.1 TO-92

Figure 4. TO-92 drawing

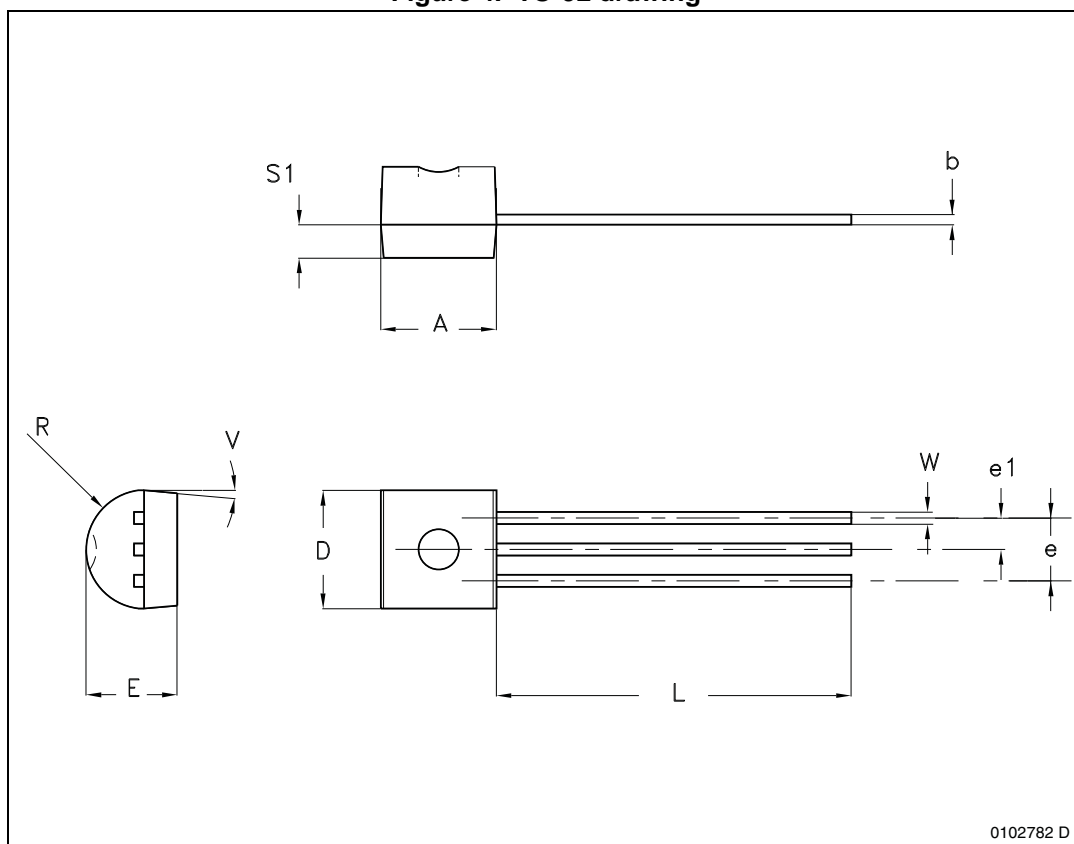


Table 7. TO-92 mechanical data

| Dim. | mm    |      |       |
|------|-------|------|-------|
|      | Min.  | Typ. | Max.  |
| A    | 4.32  |      | 4.95  |
| b    | 0.36  |      | 0.51  |
| D    | 4.45  |      | 4.95  |
| E    | 3.30  |      | 3.94  |
| e    | 2.41  |      | 2.67  |
| e1   | 1.14  |      | 1.40  |
| L    | 12.70 |      | 15.49 |
| R    | 2.16  |      | 2.41  |
| S1   | 0.92  |      | 1.52  |
| W    | 0.41  |      | 0.56  |
| V    |       | 5°   |       |

## 4.2 SO-8

Figure 5. SO-8 drawing

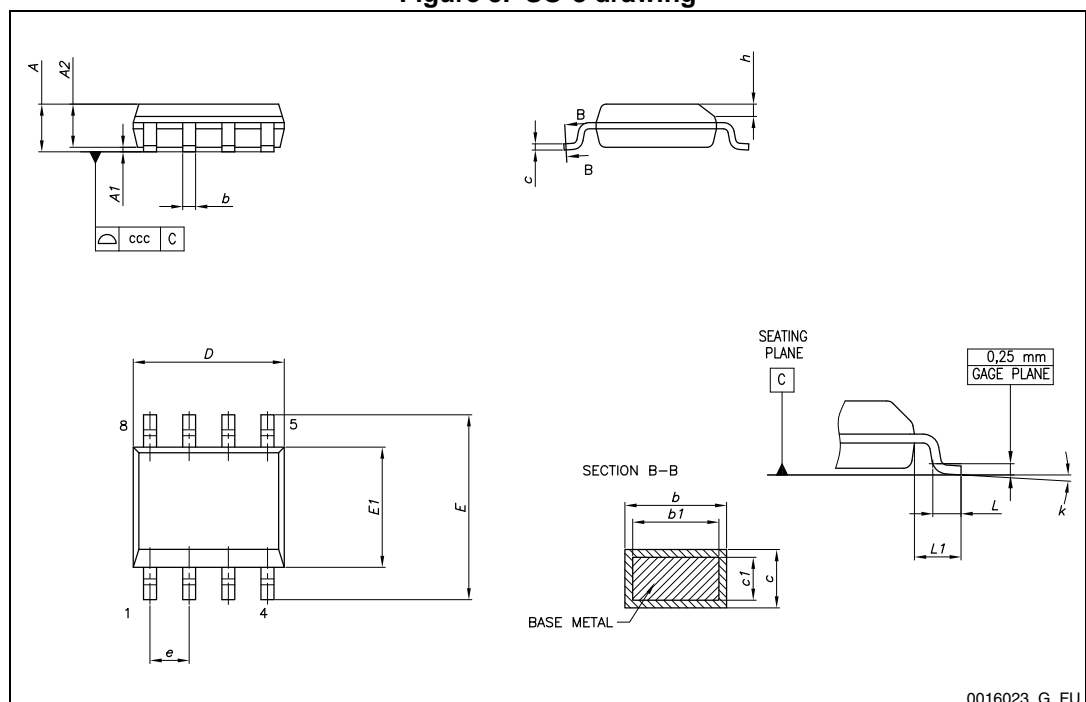
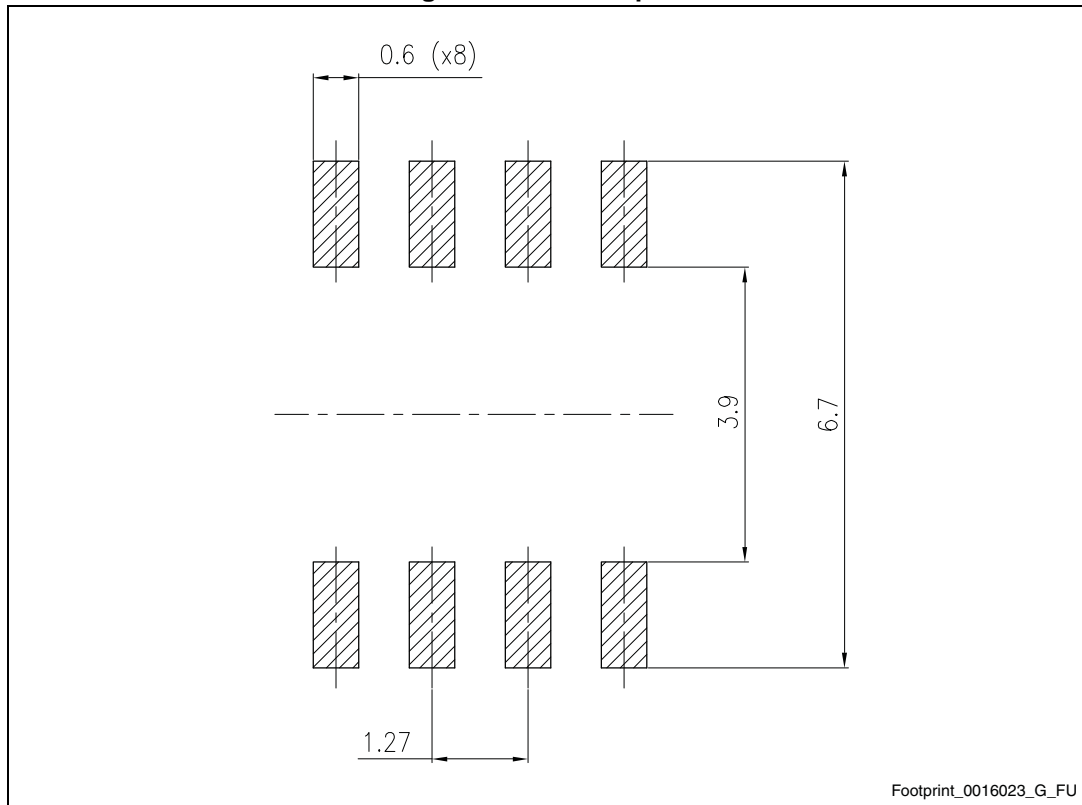


Table 8. SO-8 mechanical data

| Dim. | mm   |      |      |
|------|------|------|------|
|      | Min. | Typ. | Max. |
| A    |      |      | 1.75 |
| A1   | 0.10 |      | 0.25 |
| A2   | 1.25 |      |      |
| b    | 0.31 |      | 0.51 |
| b1   | 0.28 |      | 0.48 |
| c    | 0.10 |      | 0.25 |
| c1   | 0.10 |      | 0.23 |
| D    | 4.80 | 4.90 | 5.00 |
| E    | 5.80 | 6.00 | 6.20 |
| E1   | 3.80 | 3.90 | 4.00 |
| e    |      | 1.27 |      |
| h    | 0.25 |      | 0.50 |
| L    | 0.40 |      | 1.27 |
| L1   |      | 1.04 |      |
| L2   |      | 0.25 |      |
| k    | 0°   |      | 8°   |
| ccc  |      |      | 0.10 |

Figure 6. SO-8 footprint



### 4.3 SOT-89

Figure 7. SOT-89 drawing

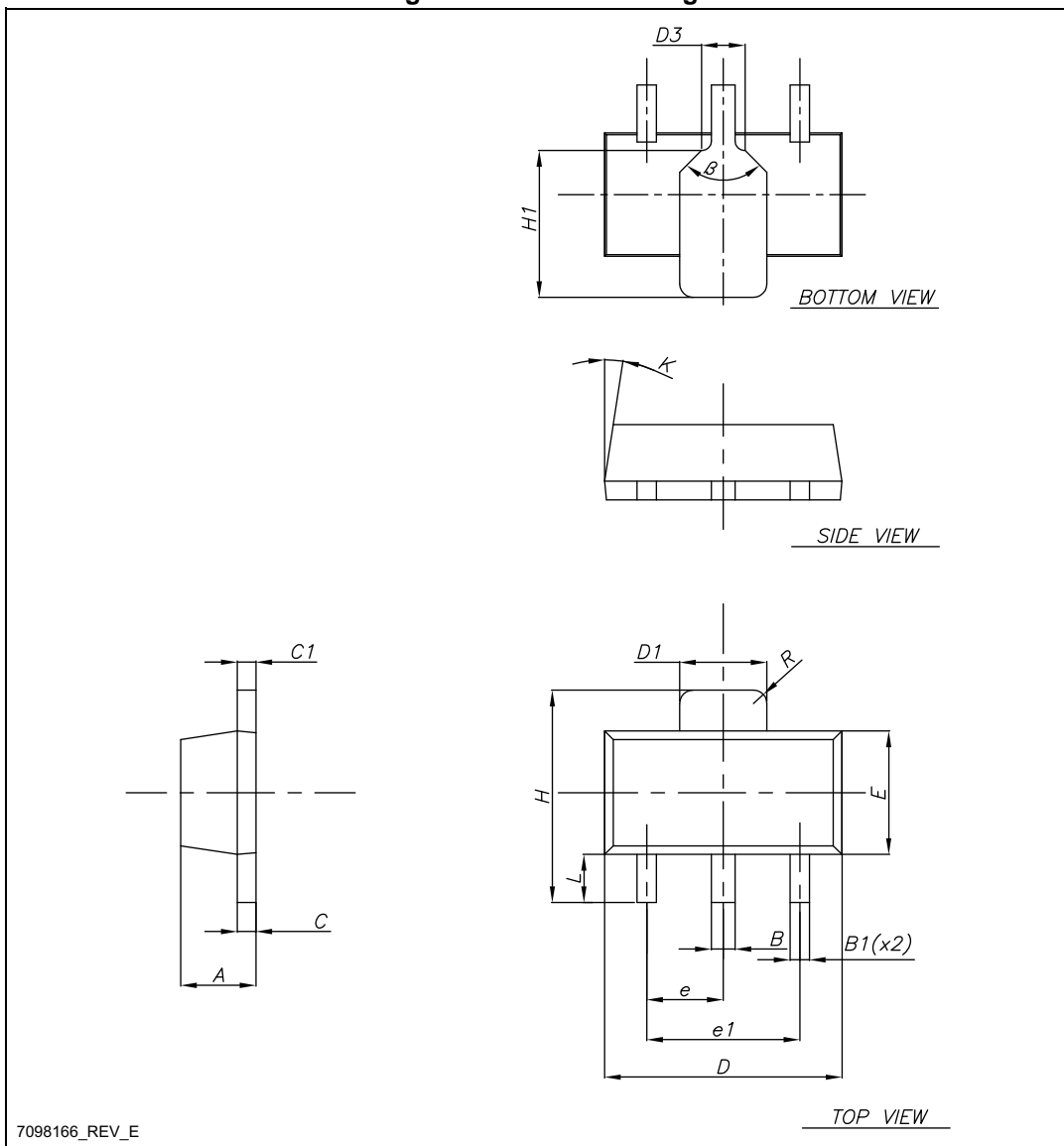
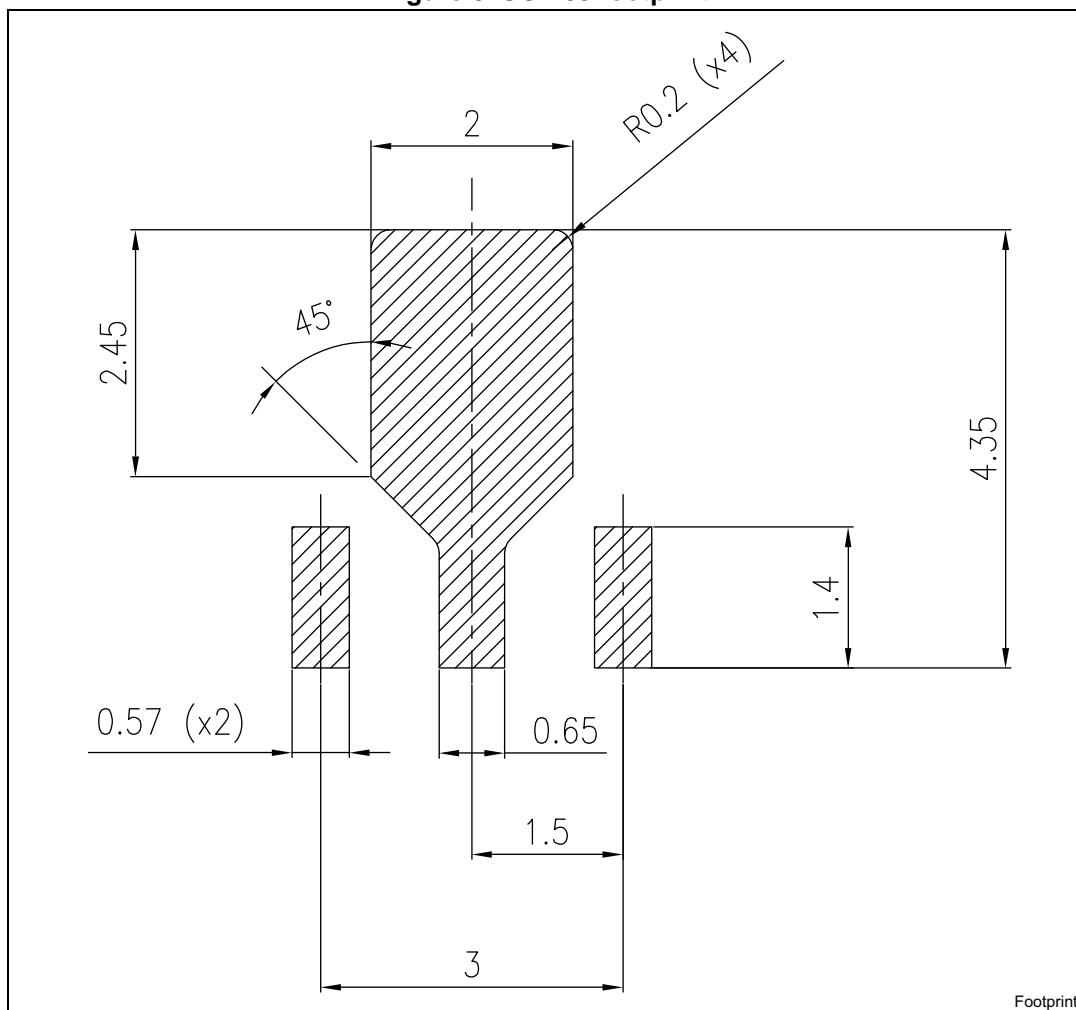


Table 9. SOT-89 mechanical data

| 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 |      | 1.20 |
| R    |      | 0.25 |      |
| b    |      | 90°  |      |

Figure 8. SOT-89 footprint





## 5 Packaging mechanical data

### 5.1 Tape and reel for TO-92

Figure 9. TO-92 tape and reel dimensions

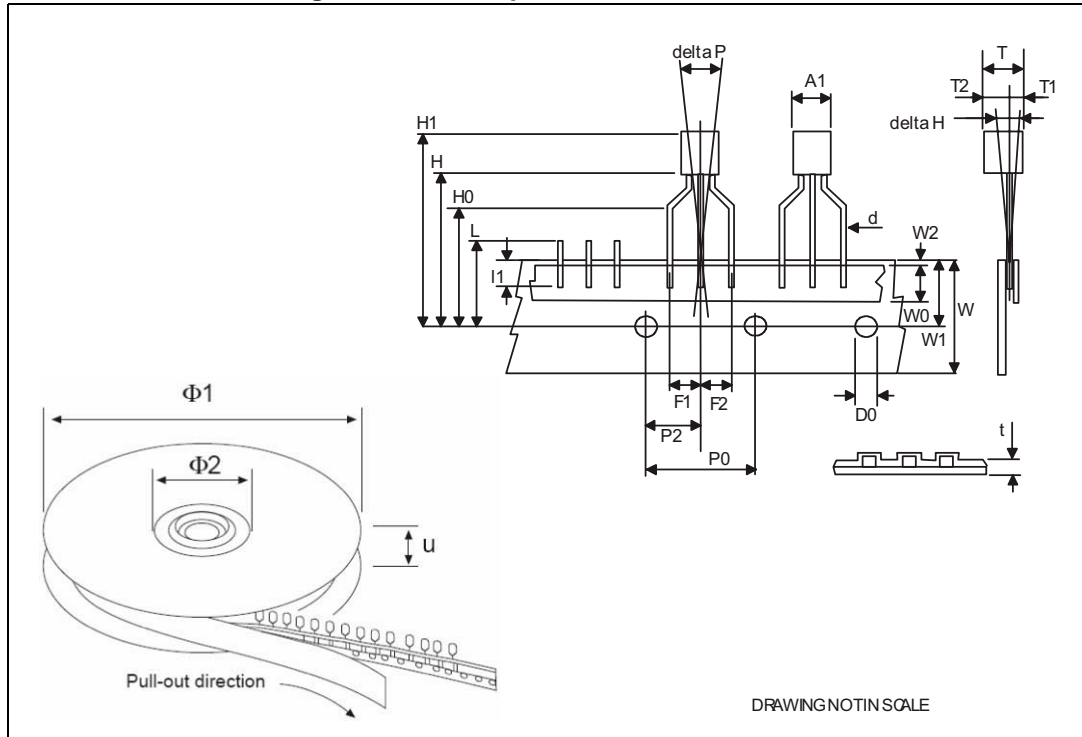


Table 10. TO-92 tape and reel mechanical data

| 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    |

## 5.2 Tape and reel for TO-92 Ammopak

Figure 10. TO-92 Ammopak

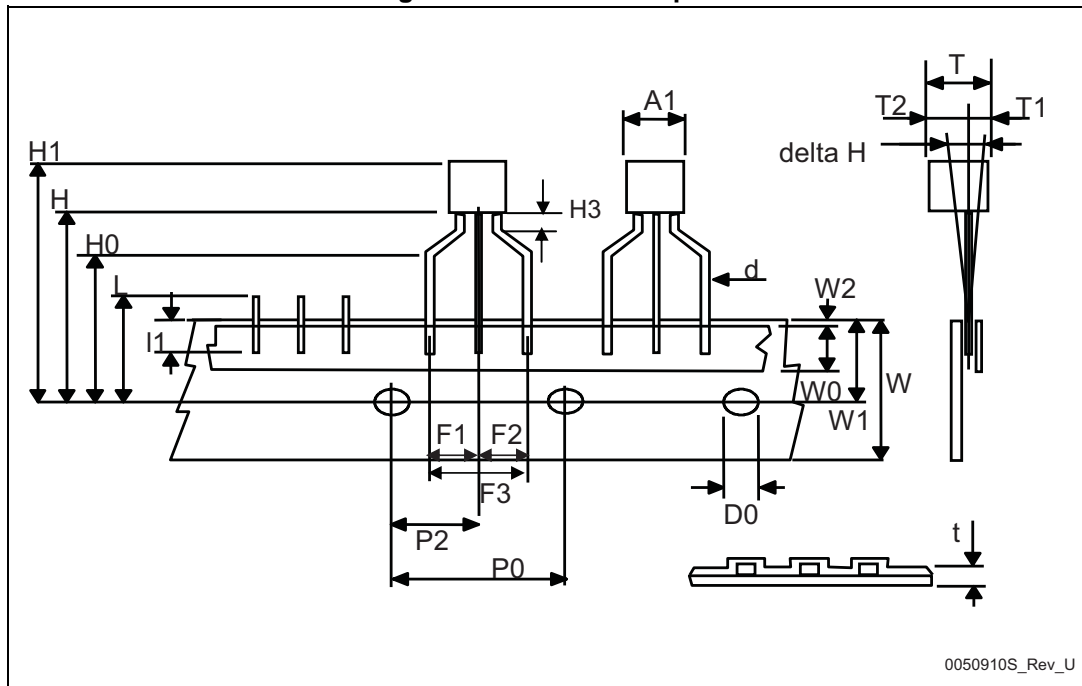


Table 11. TO-92 Ammopak mechanical data

| 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  |

### 5.3 Tape and reel for SOT-89

Figure 11. SOT-89 carrier tape drawing

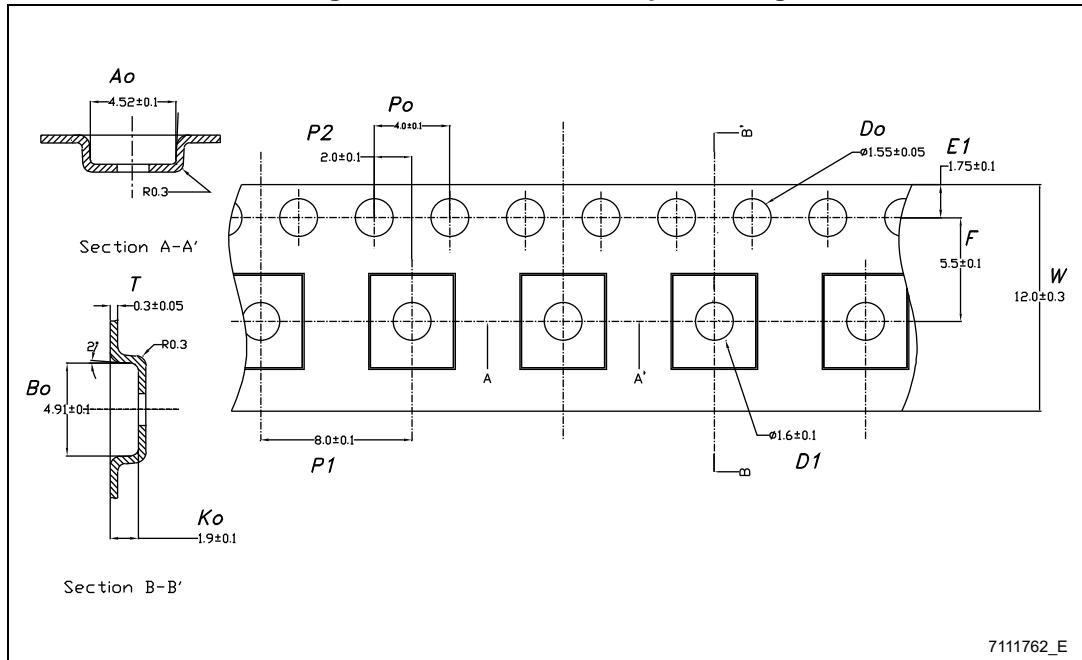


Table 12. SOT-89 carrier tape dimensions

| Dim. | mm.                |            |
|------|--------------------|------------|
|      | Values             | Tolerance  |
| Ao   | 4.52               | $\pm 0.10$ |
| Bo   | 4.91               | $\pm 0.10$ |
| 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   | $\varnothing 1.60$ | $\pm 0.10$ |

### 5.4 Tape and reel for SO-8

Figure 12. SO-8 tape and reel dimensions

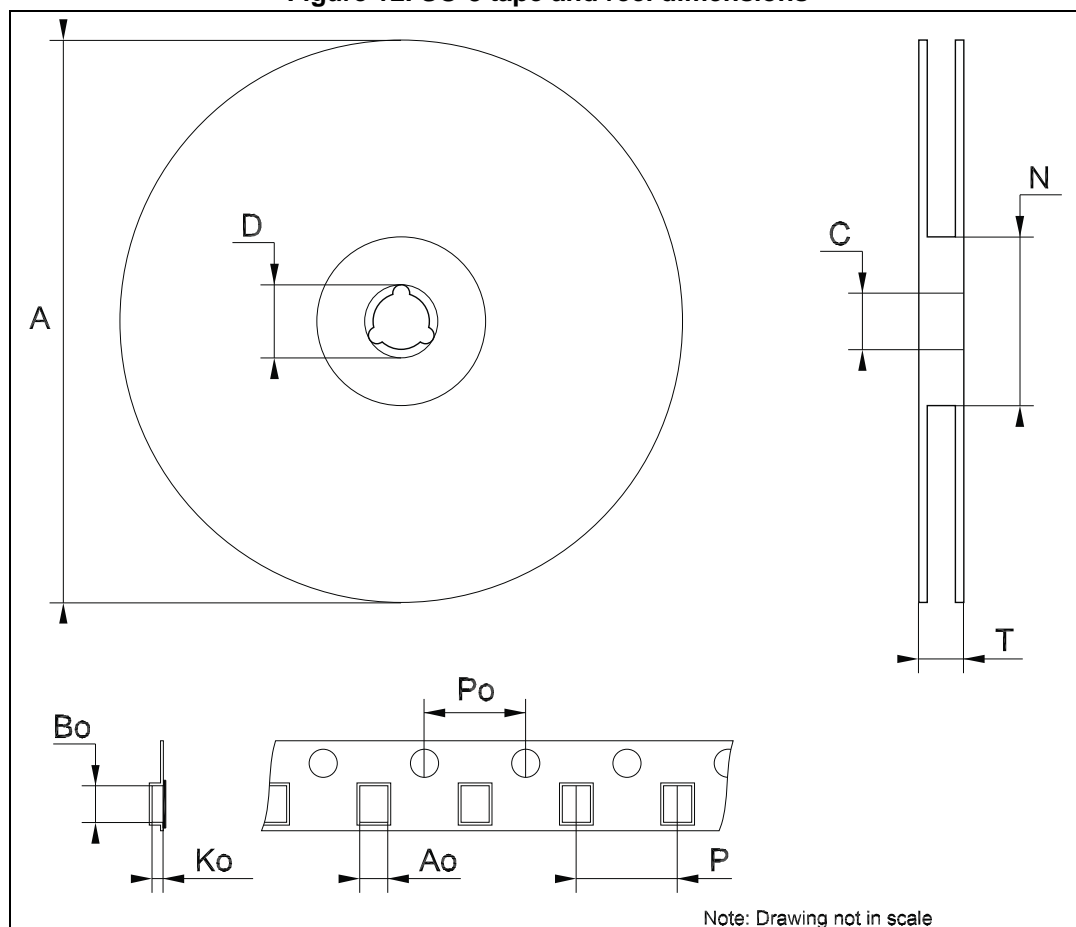


Table 13. SO-8 tape and reel mechanical data

| Dim. | Min. | Typ. | Max. |
|------|------|------|------|
| A    |      |      | 330  |
| C    | 12.8 |      | 13.2 |
| D    | 20.2 |      |      |
| N    | 60   |      |      |
| T    |      |      | 22.4 |
| Ao   | 8.1  |      | 8.5  |
| Bo   | 5.5  |      | 5.9  |
| Ko   | 2.1  |      | 2.3  |
| Po   | 3.9  |      | 4.1  |
| P    | 7.9  |      | 8.1  |

## 6 Order codes

Table 14. Order codes

| SO-8          | TO-92 (bag) | TO-92 (Ammopak) | TO-92 (tape and reel) | SOT89       | Output voltage |
|---------------|-------------|-----------------|-----------------------|-------------|----------------|
| L79L05ABD13TR | L79L05ACZ   | L79L05ABZ-AP    |                       | L79L05ABUTR | -5V            |
| L79L05ACD13TR |             | L79L08ACZ-AP    | L79L05ACZ-TR          | L79L05ACUTR | -5V            |
| L79L08ACD13TR |             |                 |                       |             | -8V            |
| L79L12ACD13TR |             |                 | L79L12ACZ-TR          | L79L12ACUTR | -12V           |
| L79L15ABD13TR |             |                 |                       |             | -15V           |
| L79L15ACD13TR |             |                 |                       | L79L15ACUTR | -15V           |



## 7 Revision history

**Table 15. Document revision history**

| Date        | Revision | Changes  |
|-------------|----------|--|
| 14-Mar-2005 | 9        | Add Tape and Reel for TO-92.   |
| 15-Mar-2005 | 10       | Add note on Table 3.   |
| 23-Dec-2005 | 11       | Mistake on ordering Table in Header.   |
| 12-Sep-2006 | 12       | Order codes updated.   |
| 25-Jul-2007 | 13       | Pin connection for SOT-89 updated on <a href="#">Figure 2</a> .  |
| 04-Dec-2007 | 14       | Modified: <a href="#">Table 14</a> .   |
| 14-Jul-2008 | 15       | Modified: <a href="#">Table 14 on page 24</a> .  |
| 29-Jul-2009 | 16       | Modified: <a href="#">Table 14 on page 24</a> .  |
| 17-Apr-2014 | 17       | Part numbers L79LxxAB, L78LxxAC, L78LxxC changed to L79L.<br>Removed Table 1: Device summary.<br>Updated the features and description in cover page.<br>Updated <a href="#">Figure 1: Schematic diagram</a> , <a href="#">Table 1: Absolute maximum ratings</a> and <a href="#">Table 14: Order codes</a> .<br>Added <a href="#">Section 5: Packaging mechanical data</a> .<br>Minor text changes. |

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