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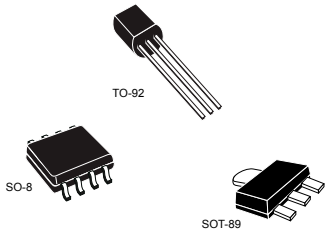
# L78L

Datasheet

## Positive voltage regulators




| Maturity status link |
| --- |
| L78L |

## Features

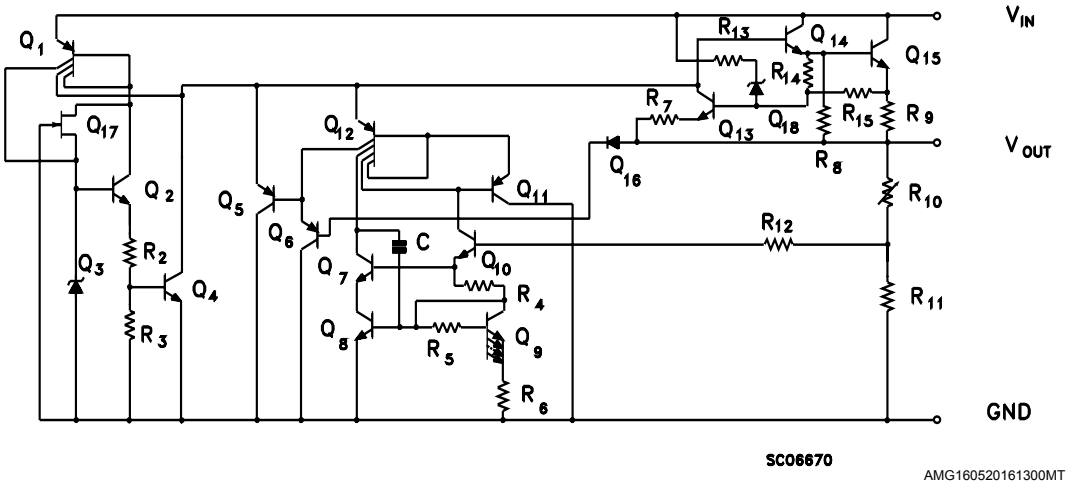
- Output current up to 100 mA
- Output voltages of 3.3; 5; 6; 8; 9; 10; 12; 15; 18; 24 V thermal overload protection
- Short-circuit protection
- No external components are required
- Available in either ± 4% (A) or ± 8% (C) selection

## Description

The L78L 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 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 L78L series used as Zener diode/resistor combination replacement, offers e improvement along with lower quiescent current and lower noise.

# 1 Diagram

Figure 1. **Schematic diagram**




AMG160520161300MT

## 2 Pin configuration

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

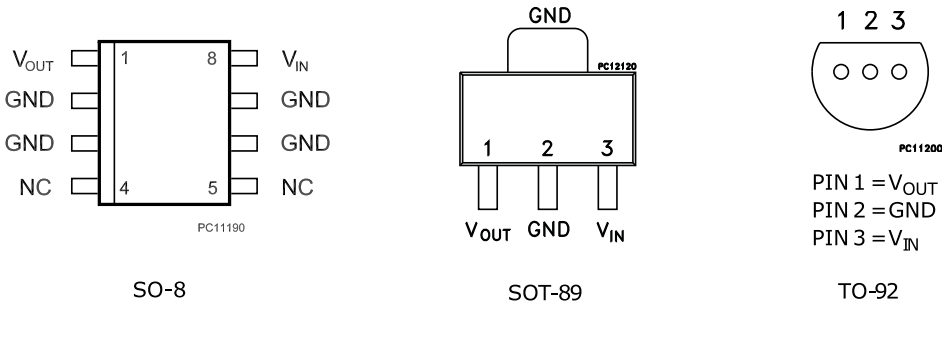



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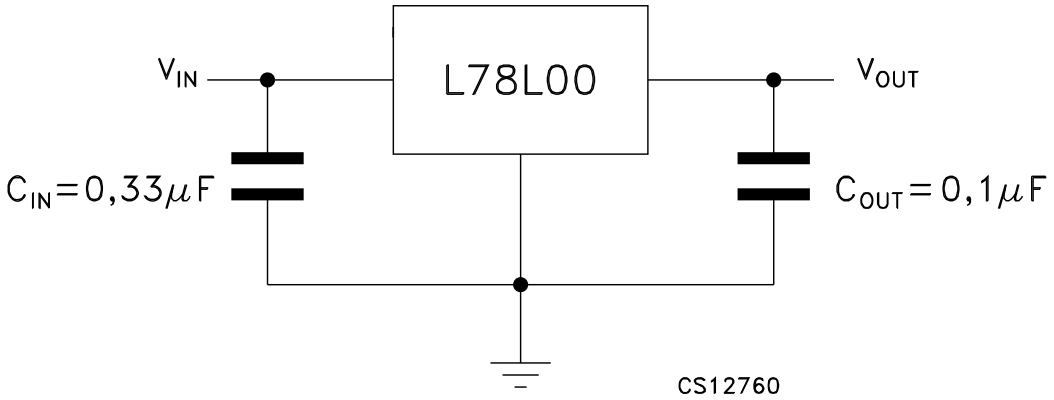
**Figure 3. Test circuits**




AMG160520161302MT

# 3 Maximum ratings

**Table 1. Absolute maximum ratings**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_I$ | DC Input voltage | $V_O$ = 3.3 to 9 V | 30 | V |
| | | $V_O$ = 12 to 15 V | 35 | |
| | | $V_O$ = 18 to 24 V | 40 | |
| $I_O$ | Output current | | 100 | mA |
| $P_D$ | Power dissipation | | Internally limited (1) | mW |
| $T_{STG}$ | Storage temperature range | | -65 to 150 | °C |
| $T_{OP}$ | Operating junction temperature range | for L78LxxAC / L78LxxC | 0 to 125 | °C |
| | | for L78LxxAB | -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 |
|---|---|---|---|---|---|
| $R_{thJC}$ | Thermal resistance junction-case (max) | 20 | | 15 | °C/W |
| $R_{thJA}$ | Thermal resistance junction-ambient (max) | 55 (1) | 200 | 55 (1) | °C/W |

1. *Considering 6 cm² of copper Board heat-sink.*

# 4 Electrical characteristics

**Table 3. Electrical characteristics of L78L33C - Refer to the test circuits, $T_J$ = 0 to 125 °C, $V_I$ = 8.3 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 3.036 | 3.3 | 3.564 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 5.3 to 20 V | 2.97 | | 3.63 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 8.3 V | 2.97 | | 3.63 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 5.4 to 20 V, $T_J$ = 25 °C | | | 150 | mV |
| | | $V_I$ = 6.3 to 20 V, $T_J$ = 25 °C | | | 100 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 60 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 30 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6 | mA |
| | | $T_J$ = 125 °C | | | 5.5 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.2 | mA |
| | | $V_I$ = 6.3 to 20 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 40 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 6.3 to 16.3 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 41 | 49 | | dB |
| $V_d$ | Dropout voltage | | | 2 | | V |

**Table 4. Electrical characteristics of L78L05C - Refer to the test circuits, $T_J$ = 0 to 125 °C, $V_I$ = 10 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 4.6 | 5 | 5.4 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 7 to 20 V | 4.5 | | 5.5 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 10 V | 4.5 | | 5.5 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 8.5 to 20 V, $T_J$ = 25 °C | | | 200 | mV |
| | | $V_I$ = 9 to 20 V, $T_J$ = 25 °C | | | 150 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 60 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 30 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6 | mA |
| | | $T_J$ = 125 °C | | | 5.5 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.2 | mA |
| | | $V_I$ = 8 to 20 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 40 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 9 to 20 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 40 | 49 | | dB |
| $V_d$ | Dropout voltage | | | 2 | | V |

**Table 5. Electrical characteristics of L78L08C - Refer to the test circuits, $T_J$ = 0 to 125 °C,$V_I$ = 14 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 7.36 | 8 | 8.64 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 8.5 to 20 V | 7.2 | | 8.8 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 12 V | 7.2 | | 8.8 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 10.5 to 20 V, $T_J$ = 25 °C | | | 200 | mV |
| | | $V_I$ = 11 to 20 V, $T_J$ = 25 °C | | | 150 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 80 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 40 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6 | mA |
| | | $T_J$ = 125 °C | | | 5.5 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.2 | mA |
| | | $V_I$ = 8 to 20 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 60 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 9 to 20 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 36 | 45 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

**Table 6. Electrical characteristics of L78L09C - Refer to the test circuits, $T_J$ = 0 to 125 °C, $V_I$ = 15 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 8.28 | 9 | 9.72 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 11.5 to 23 V | 8.1 | | 9.9 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 15 V | 8.1 | | 9.9 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 11.5 to 23 V, $T_J$ = 25 °C | | | 250 | mV |
| | | $V_I$ = 12 to 23 V, $T_J$ = 25 °C | | | 200 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 80 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 40 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6 | mA |
| | | $T_J$ = 125 °C | | | 5.5 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.2 | mA |
| | | $V_I$ = 12 to 23 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 70 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 12 to 23 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 36 | 44 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

**Table 7. Electrical characteristics of L78L10C - Refer to the test circuits, $T_J$ = 0 to 125 °C, $V_I$ = 16 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 9.2 | 10 | 10.8 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 12.5 to 23 V | 9 | | 11 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 16 V | 9 | | 11 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 12.5 to 23 V, $T_J$ = 25 °C | | | 230 | mV |
| | | $V_I$ = 13 to 23 V, $T_J$ = 25 °C | | | 170 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 80 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 40 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6 | mA |
| | | $T_J$ = 125 °C | | | 5.5 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.1 | mA |
| | | $V_I$ = 13 to 23 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 60 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 14 to 23 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 37 | 45 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

**Table 8. Electrical characteristics of L78L12C - Refer to the test circuits, $T_J$ = 0 to 125 °C, $V_I$ = 19 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 11.1 | 12 | 12.9 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 14.5 to 27 V | 10.8 | | 13.2 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 19 V | 10.8 | | 13.2 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 14.5 to 27 V, $T_J$ = 25 °C | | | 250 | mV |
| | | $V_I$ = 16 to 27 V, $T_J$ = 25 °C | | | 200 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 100 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 50 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6.5 | mA |
| | | $T_J$ = 125 °C | | | 6 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.2 | mA |
| | | $V_I$ = 16 to 27 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 80 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 15 to 25 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 36 | 42 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

**Table 9. Electrical characteristics of L78L15C - Refer to the test circuits, $T_J$ = 0 to 125 °C, $V_I$ = 23 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 13.8 | 15 | 16.2 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 17.5 to 30 V | 13.5 | | 16.5 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 23 V | 13.5 | | 16.5 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 17.5 to 30 V, $T_J$ = 25 °C | | | 300 | mV |
| | | $V_I$ = 20 to 30 V, $T_J$ = 25 °C | | | 250 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 150 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 75 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6.5 | mA |
| | | $T_J$ = 125 °C | | | 6 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.2 | mA |
| | | $V_I$ = 20 to 30 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 90 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 18.5 to 28.5 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 33 | 39 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

**Table 10. Electrical characteristics of L78L18C - Refer to the test circuits, $T_J$ = 0 to 125 °C, $V_I$ = 27 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 16.6 | 18 | 19.4 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 22 to 33 V | 16.2 | | 19.8 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 27 V | 16.2 | | 19.8 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 22 to 33 V, $T_J$ = 25 °C | | | 320 | mV |
| | | $V_I$ = 22 to 33 V, $T_J$ = 25 °C | | | 270 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 170 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 85 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6.5 | mA |
| | | $T_J$ = 125 °C | | | 6 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.2 | mA |
| | | $V_I$ = 23 to 33 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 120 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 23 to 33 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 32 | 38 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

**Table 11. Electrical characteristics of L78L24C - Refer to the test circuits, $T_J$ = 0 to 125 °C, $V_I$ = 33 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 22.1 | 24 | 25.9 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 27 to 38 V | 21.6 | | 26.4 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 33 V | 21.6 | | 26.4 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 27 to 38 V, $T_J$ = 25 °C | | | 350 | mV |
| | | $V_I$ = 28 to 38 V, $T_J$ = 25 °C | | | 300 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 200 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 100 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6.5 | mA |
| | | $T_J$ = 125 °C | | | 6 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.2 | mA |
| | | $V_I$ = 28 to 38 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 200 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 29 to 35 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 30 | 37 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

**Table 12. Electrical characteristics of L78L33AB and L78L33AC - Refer to the test circuits, $T_J$ = 0 to 125 °C (AC) $T_J$ = -40 to 125 °C (AB),$V_I$ = 8.3 V, $I_O$ = 40mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 3.168 | 3.3 | 3.432 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 5.3 to 20 V | 3.135 | | 3.465 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 8.3 V | 3.135 | | 3.465 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 5.4 to 20 V, $T_J$ = 25 °C | | | 150 | mV |
| | | $V_I$ = 6.3 to 20 V, $T_J$ = 25 °C | | | 100 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 60 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 30 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6 | mA |
| | | $T_J$ = 125 °C | | | 5.5 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.1 | mA |
| | | $V_I$ = 6.3 to 20 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 40 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 6.3 to 16.3 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 41 | 49 | | dB |
| $V_d$ | Dropout voltage | | | 2 | | V |

**Table 13. Electrical characteristics of L78L05AB and L78L05AC - Refer to the test circuits, $T_J$ = 0 to 125 °C (AC) $T_J$ = -40 to 125 °C (AB), $V_I$ = 10 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 4.8 | 5 | 5.2 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 7 to 20 V | 4.75 | | 5.25 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 10 V | 4.75 | | 5.25 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 7.3 to 20 V, $T_J$ = 25 °C | | | 150 | mV |
| | | $V_I$ = 8 to 20 V, $T_J$ = 25 °C | | | 100 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 60 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 30 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6 | mA |
| | | $T_J$ = 125 °C | | | 5.5 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.1 | mA |
| | | $V_I$ = 8 to 20 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 40 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 8 to 18 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 41 | 49 | | dB |
| $V_d$ | Dropout voltage | | | 2 | | V |

**Table 14. Electrical characteristics of L78L06AB and L78L06AC - Refer to the test circuits, $T_J$ = 0 to 125 °C (AC) $T_J$ = -40 to 125 °C (AB), $V_I$ = 12 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 5.76 | 6 | 6.24 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 8.5 to 20 V | 5.7 | | 6.3 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 12 V | 5.7 | | 6.3 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 8.5 to 20 V, $T_J$ = 25 °C | | | 150 | mV |
| | | $V_I$ = 9 to 20 V, $T_J$ = 25 °C | | | 100 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 60 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 30 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6 | mA |
| | | $T_J$ = 125 °C | | | 5.5 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.1 | mA |
| | | $V_I$ = 9 to 20 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 50 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 9 to 20 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 39 | 46 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

**Table 15. Electrical characteristics of L78L08AB and L78L08AC - Refer to the test circuits, $T_J$ = 0 to 125 °C (AC) $T_J$ = -40 to 125 °C (AB), $V_I$ = 14 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °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 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 10.5 to 23 V, $T_J$ = 25 °C | | | 175 | mV |
| | | $V_I$ = 11 to 23 V, $T_J$ = 25 °C | | | 125 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 80 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 40 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6 | mA |
| | | $T_J$ = 125 °C | | | 5.5 | mA |
| $\Delta I_d$ | 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 °C | | 60 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 12 to 23 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 37 | 45 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

**Table 16. Electrical characteristics of L78L09AB and L78L09AC - Refer to the test circuits, $T_J$ = 0 to 125 °C (AC) $T_J$ = -40 to 125 °C (AB), $V_I$ =15 V, $I_O$= 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 8.64 | 9 | 9.36 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 11.5 to 23 V | 8.55 | | 9.45 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 15 V | 8.55 | | 9.45 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 11.5 to 23 V, $T_J$ = 25 °C | | | 225 | mV |
| | | $V_I$ = 12 to 23 V, $T_J$ = 25 °C | | | 150 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 80 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 40 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6 | mA |
| | | $T_J$ = 125 °C | | | 5.5 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.1 | mA |
| | | $V_I$ = 12 to 23 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 70 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 12 to 23 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 37 | 44 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

**Table 17. Electrical characteristics of L78L10AC - Refer to the test circuits, $T_J$ = 0 to 125 °C (AC) $T_J$ = -40 to 125 °C (AB), $V_I$= 16 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 9.6 | 10 | 10.4 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 12.5 to 23 V | 9.5 | | 10.5 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 16 V | 9.5 | | 10.5 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 12.5 to 23 V, $T_J$ = 25 °C | | | 230 | mV |
| | | $V_I$ = 13 to 23 V, $T_J$ = 25 °C | | | 170 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 80 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 40 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6 | mA |
| | | $T_J$ = 125 °C | | | 5.5 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.1 | mA |
| | | $V_I$ = 13 to 23 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 60 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 14 to 23 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 37 | 45 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

**Table 18. Electrical characteristics of L78L12AB and L78L12AC - Refer to the test circuits, $T_J$ = 0 to 125 °C (AC) $T_J$ = -40 to 125 °C (AB), $V_I$ =19 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

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

**Table 19. Electrical characteristics of L78L15AB and L78L15AC - Refer to the test circuits, $T_J$ = 0 to 125 °C (AC) $T_J$ = -40 to 125 °C (AB), $V_I$ = 23 V,$I_O$= 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

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

**Table 20. Electrical characteristics of L78L18AC - Refer to the test circuits, $T_J$ = 0 to 125 °C (AC) $T_J$ = -40 to 125 °C (AB),$V_I$ = 27 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

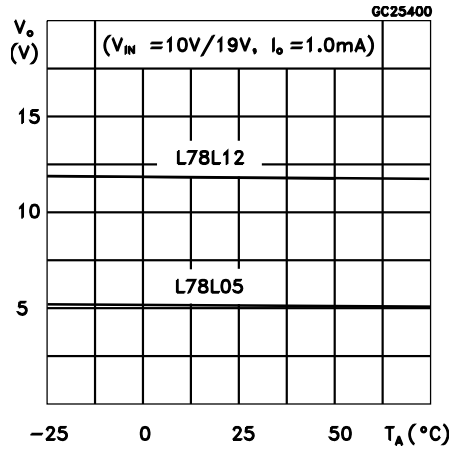
| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 17.3 | 18 | 18.7 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 22 to 33 V | 17.1 | | 18.9 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 27 V | 17.1 | | 18.9 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 22 to 33 V, $T_J$ = 25 °C | | | 320 | mV |
| | | $V_I$ = 22 to 33 V, $T_J$ = 25 °C | | | 270 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 170 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 85 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6.5 | mA |
| | | $T_J$ = 125 °C | | | 6 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.1 | mA |
| | | $V_I$ = 23 to 33 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 120 | | µV |
| SVR | Supply voltage rejection | $V_I$ = 23 to 33 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 33 | 38 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

**Table 21. Electrical characteristics of L78L24AB and L78L24AC - Refer to the test circuits, $T_J$ = 0 to 125 °C (AC) $T_J$ = -40 to 125 °C (AB),$V_I$ = 33 V, $I_O$ = 40 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | $T_J$ = 25 °C | 23 | 24 | 25 | V |
| $V_O$ | Output voltage | $I_O$ = 1 to 40 mA, $V_I$ = 27 to 38 V | 22.8 | | 25.2 | V |
| | | $I_O$ = 1 to 70 mA, $V_I$ = 33 V | 22.8 | | 25.2 | |
| $\Delta V_O$ | Line regulation | $V_I$ = 27 to 38 V, $T_J$ = 25 °C | | | 350 | mV |
| | | $V_I$ = 28 to 38 V, $T_J$ = 25 °C | | | 300 | |
| $\Delta V_O$ | Load regulation | $I_O$ = 1 to 100 mA, $T_J$ = 25 °C | | | 200 | mV |
| | | $I_O$ = 1 to 40 mA, $T_J$ = 25 °C | | | 100 | |
| $I_d$ | Quiescent current | $T_J$ = 25 °C | | | 6.5 | mA |
| | | $T_J$ = 125 °C | | | 6 | mA |
| $\Delta I_d$ | Quiescent current change | $I_O$ = 1 to 40 mA | | | 0.1 | mA |
| | | $V_I$ = 28 to 38 V | | | 1.5 | |
| eN | Output noise voltage | B = 10 Hz to 100 kHz, $T_J$ = 25 °C | | 200 | | µV5y |
| SVR | Supply voltage rejection | $V_I$ = 29 to 33 V, f = 120 Hz<br>$I_O$ = 40 mA, $T_J$ = 25 °C | 31 | 37 | | dB |
| $V_d$ | Dropout voltage | | | 1.7 | | V |

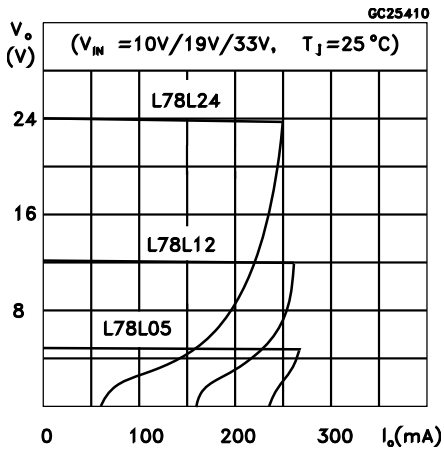
# 5 Typical performance

**Figure 4. L78L05/12 output voltage vs. ambient temperature**



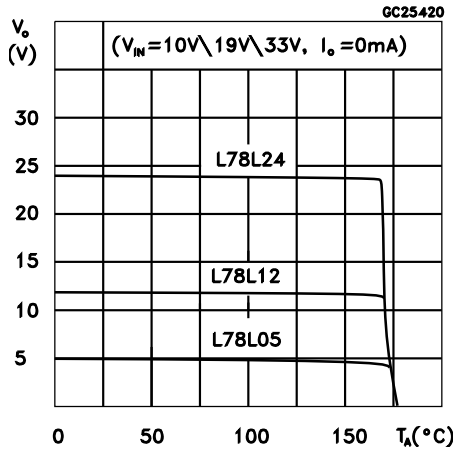

AMG160520161303MT

**Figure 5. L78L05/12/24 load characteristics**



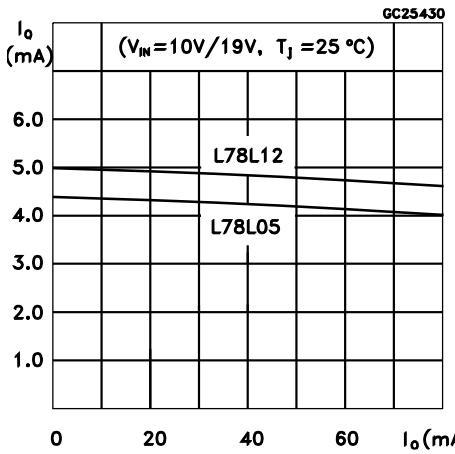

AMG160520161304MT

**Figure 6. L78L05/12/24 thermal shutdown**



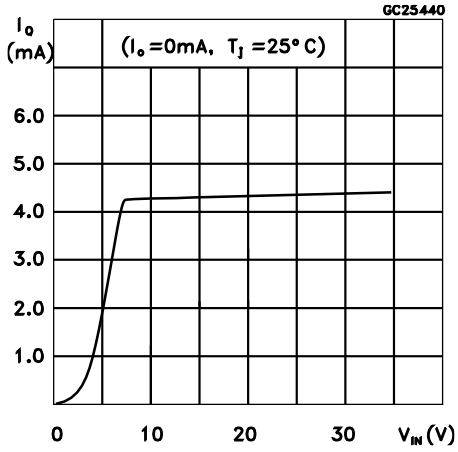

AMG160520161305MT

**Figure 7. L78L05/12 quiescent current vs. output current**




AMG160520161306MT

Figure 8. L78L05 quiescent current vs. input voltage




AMG160520161307MT

Figure 9. L78L05/12/24 output characteristics

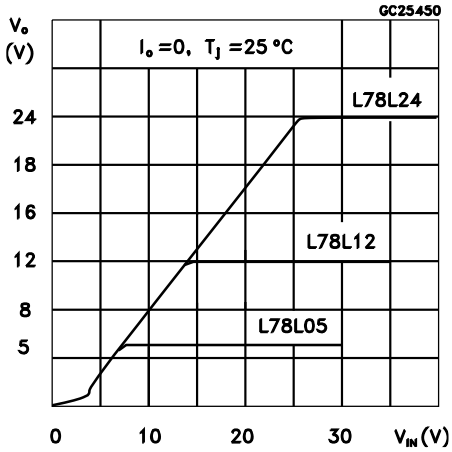



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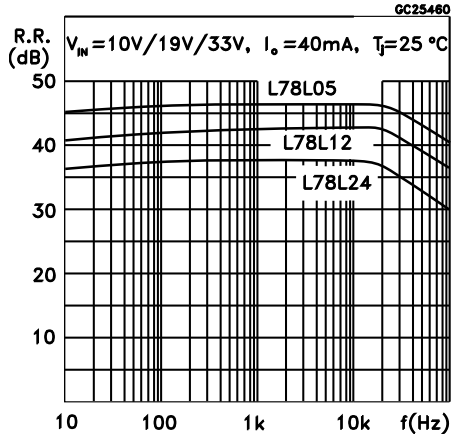
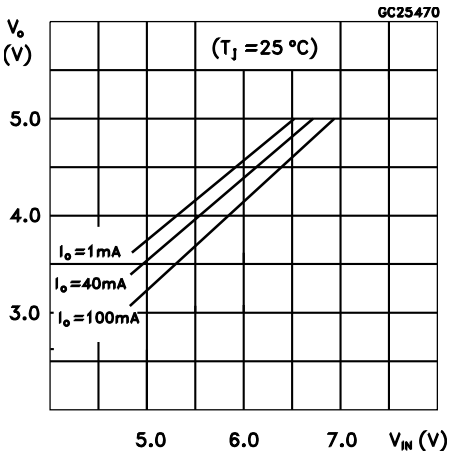
Figure 10. L78L05/12/24 ripple rejection



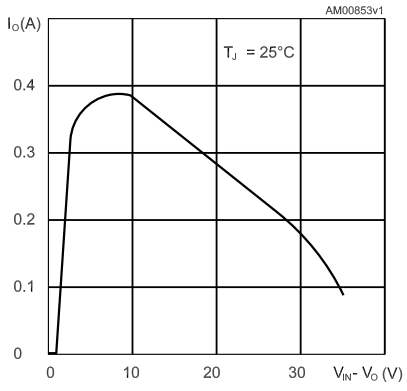

AMG160520161309MT

Figure 11. L78L05 dropout characteristics




AMG160520161310MT

Figure 12. L78L short-circuit output current




AMG160520161311MT

# 6 Typical application

Figure 13. **High output current short-circuit protected**

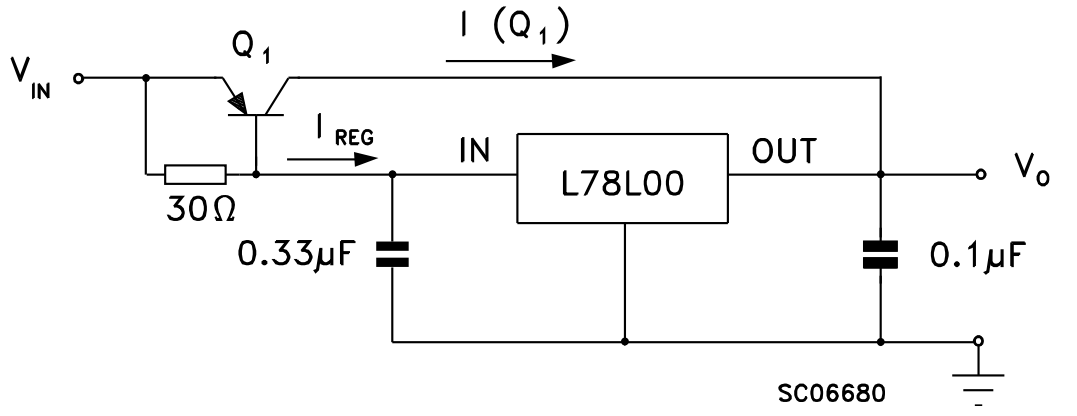



Figure 14. **Outuput boost circuit**

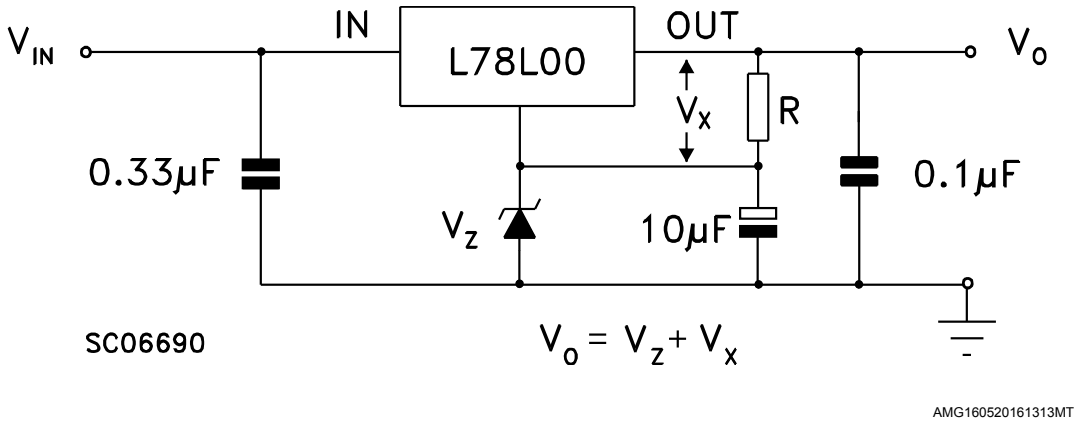



Figure 15. **Current regulator**

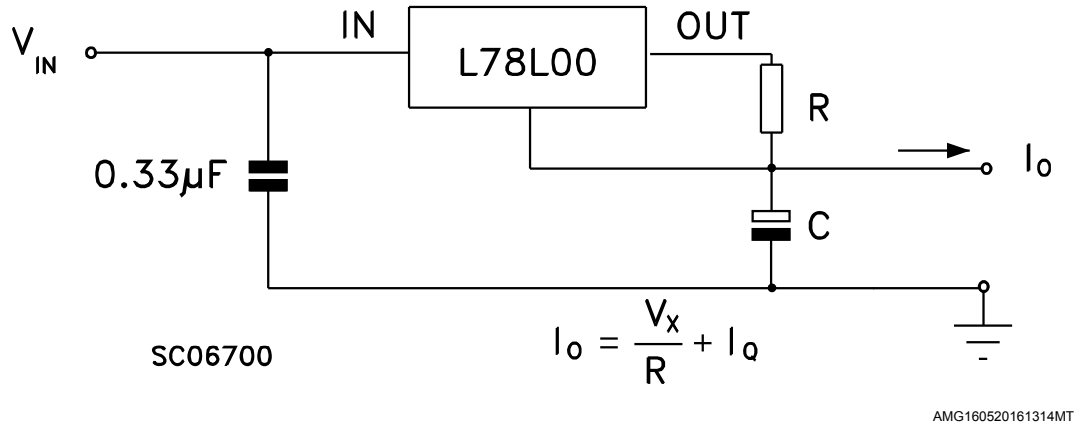
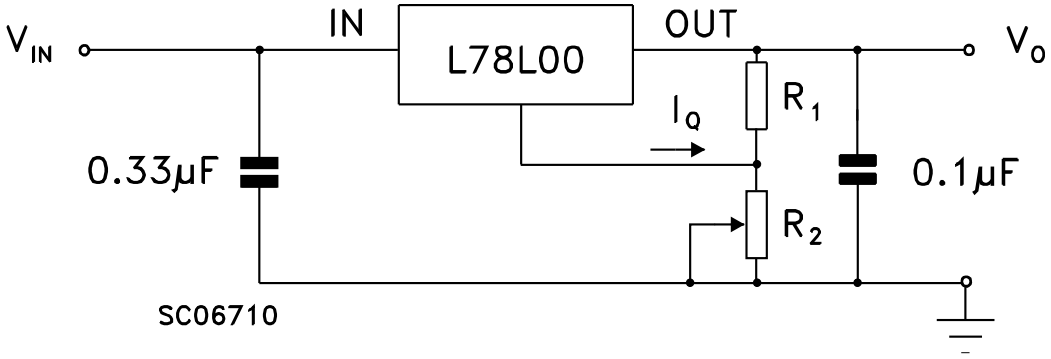


Figure 16. **Adjustable output regulator**




AMG160520161315MT

# 7 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

## 7.1 TO-92 package information

**Figure 17. TO-92 package outline**

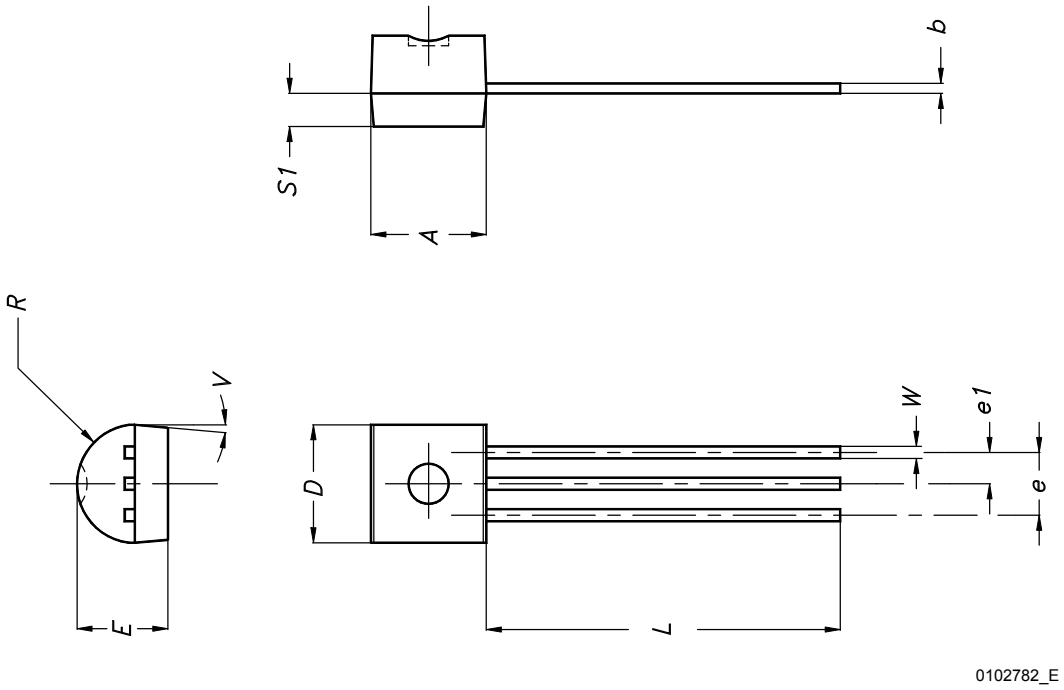



**Table 22. TO-92 mechanical data**

| 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° | |

## 7.2 TO-92 packing information

Figure 18. **TO-92 tape and reel outline**

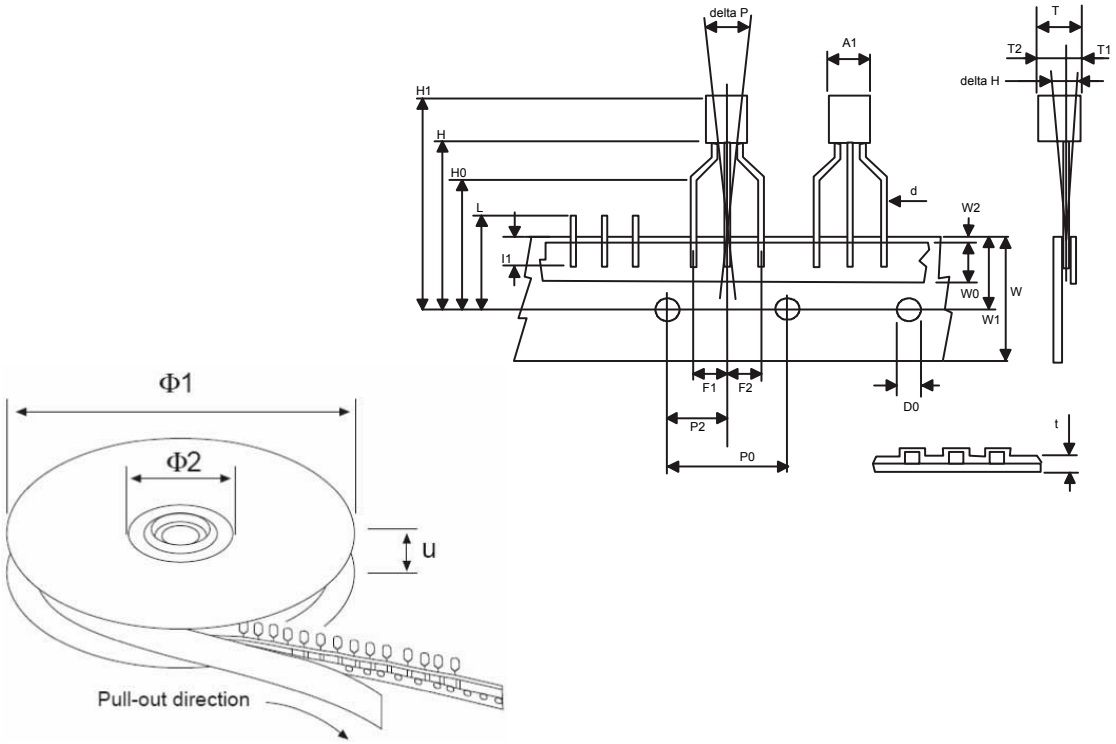


Table 23. **TO-92 tape and reel mechanical data**

| 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 |
| I1 | 3.00 | | |
| delta P | -1.00 | | 1.00 |
| Ø1 | 352 | 355 | 358 |
| Ø2 | 28 | 30 | 32 |
| u | 44 | 47 | 50 |

## 7.3 TO-92 Ammopak packing information

Figure 19. **TO-92 Ammopak tape and reel outline**

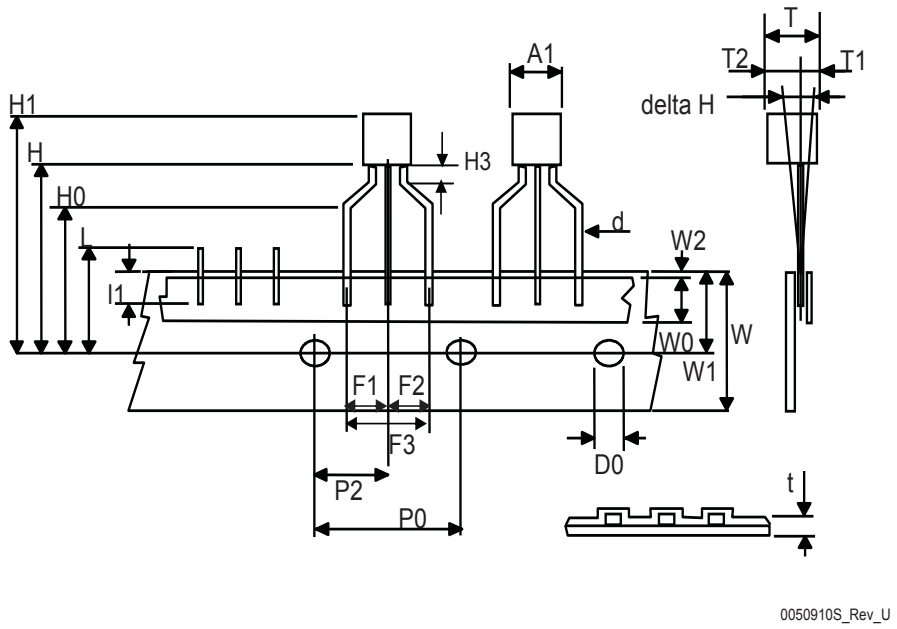


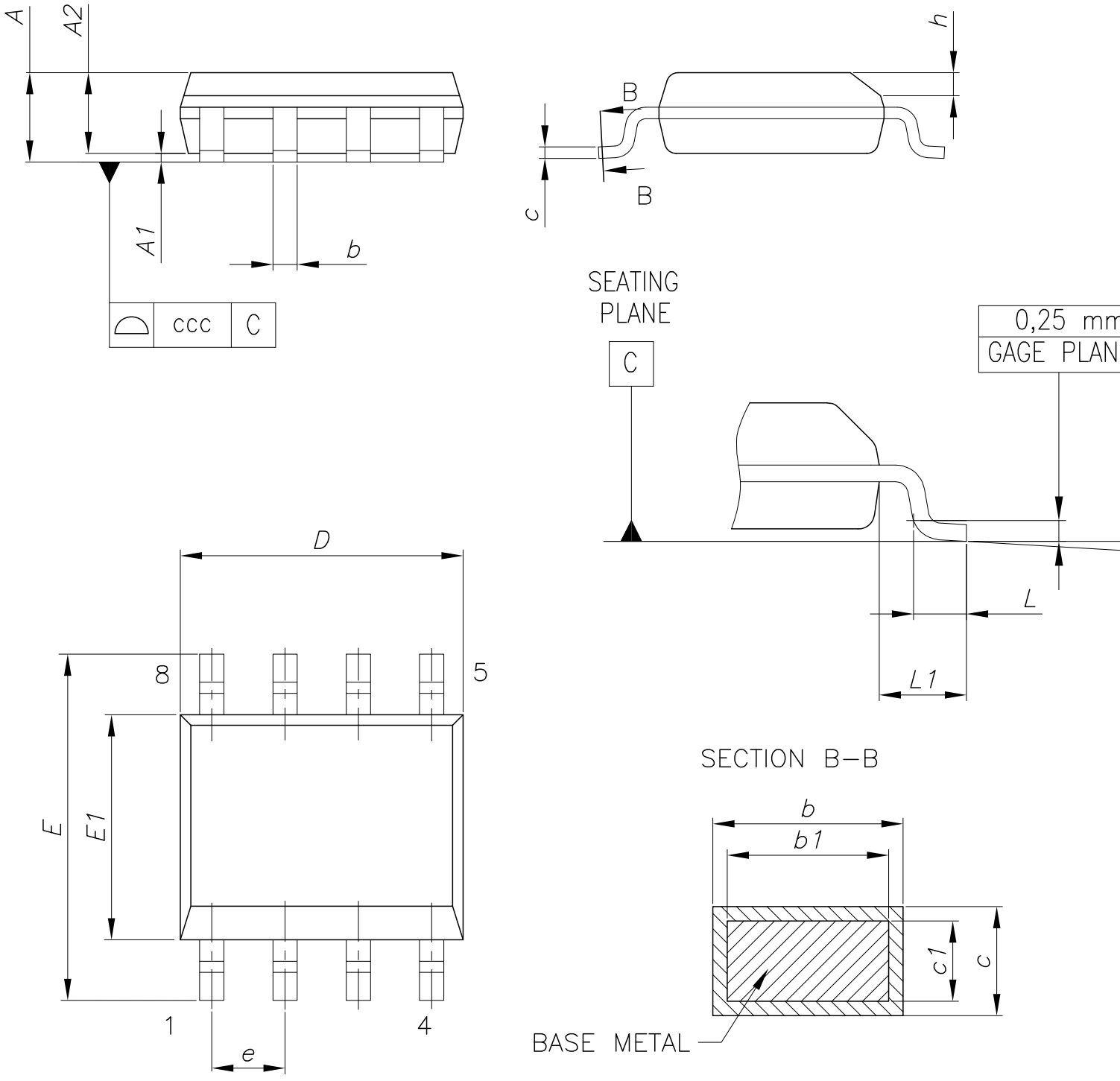

Table 24. **TO-92 Ammopak tape and reel mechanical data**

| 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 |

| Dim. | mm | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| L | | | 11.00 |
| l1 | 3.00 | | |
| delta P | -1.00 | | 1.00 |

## 7.4 SO-8 package information

Figure 20. **SO-8 package outline**

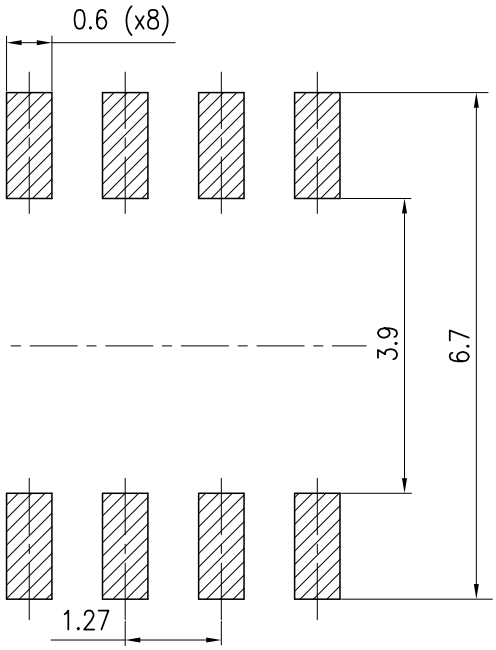



0016023_So-807_fig2_

Table 25. **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 21. **SO-8 recommended footprint (dimensions are in mm)**




0016023_So-807_footprint_Rev

## 7.5 SO-8 packing information

Figure 22. **SO-8 tape and reel dimensions**

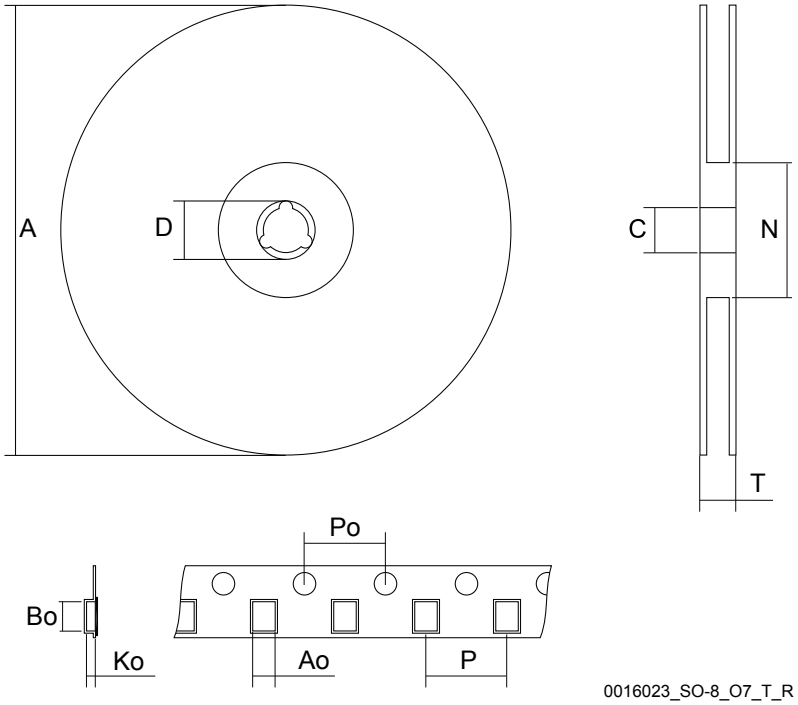



Figure 23. **Tape orientation**

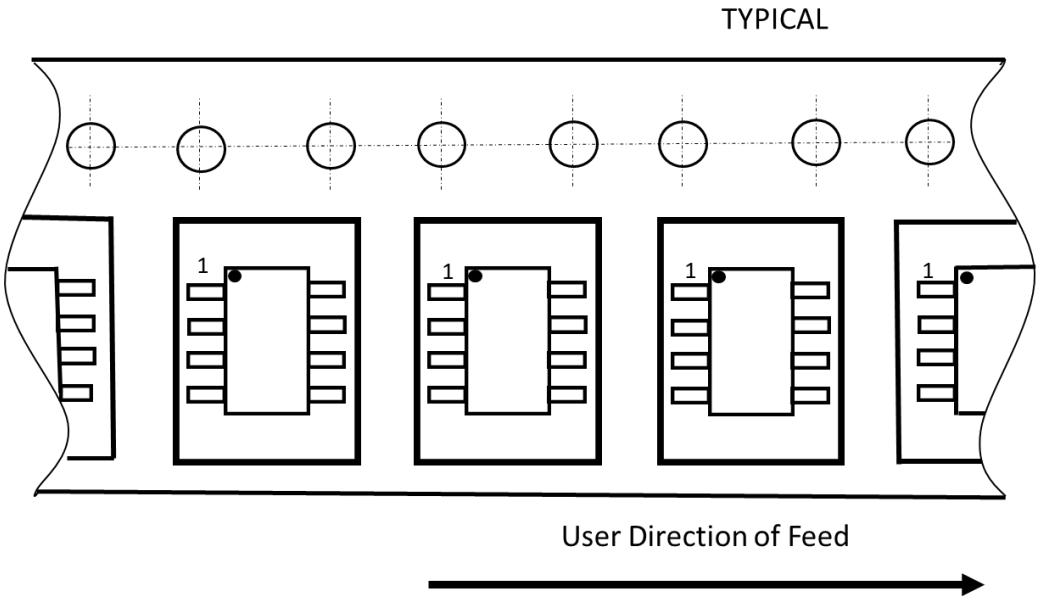


Table 26. **SO-8 tape and reel mechanical data**

| Dim. | mm | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | | - | 330 |
| C | 12.8 | | 13.2 |
| D | 20.2 | | |
| N | 60 | | |
| T | | | 22.4 |
| Ao | 6.5 | | 6.7 |
| Bo | 5.4 | | 5.6 |
| Ko | 2.0 | | 2.2 |
| Po | 3.9 | | 4.1 |
| P | 7.9 | | 8.1 |

## 7.6 SOT-89 package information

Figure 24. **SOT-89 package outline**

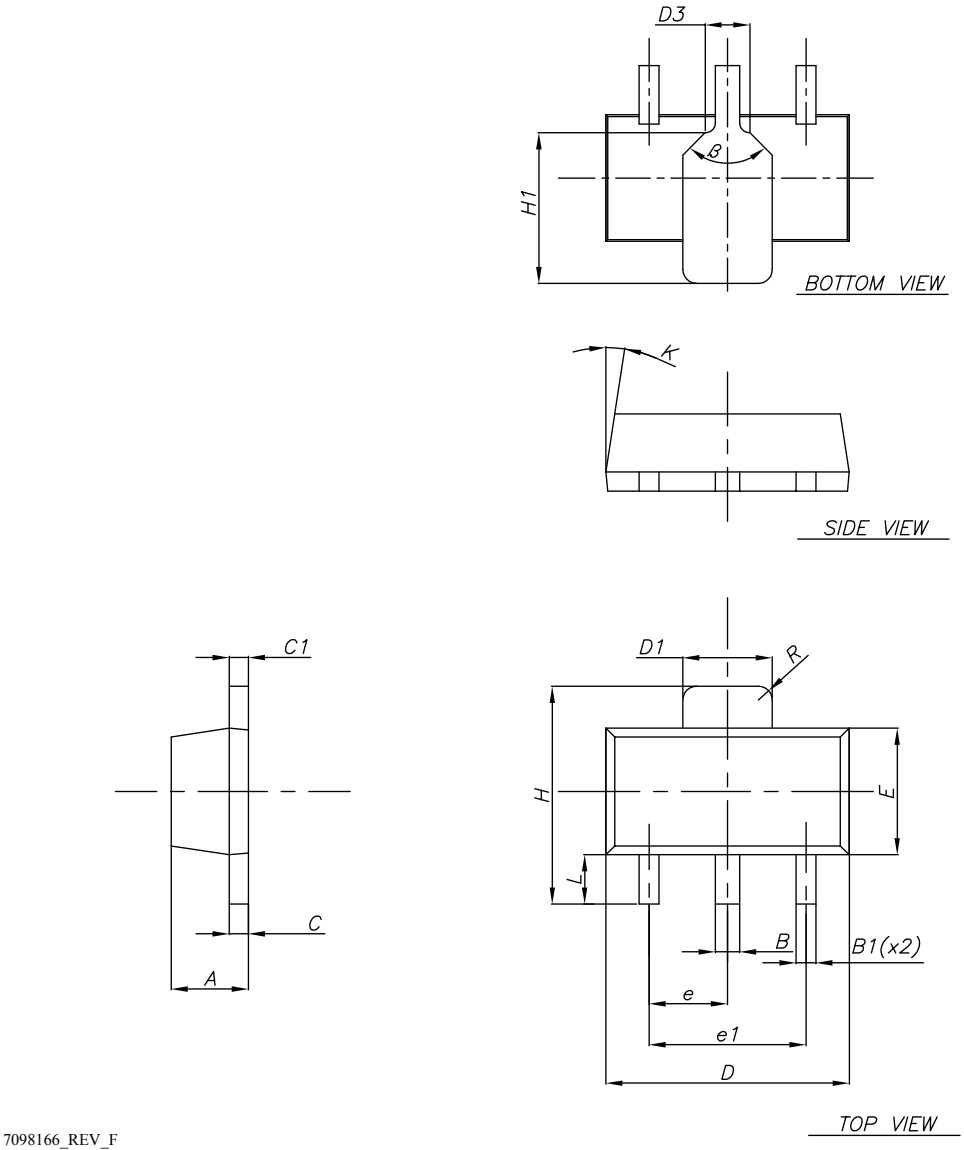
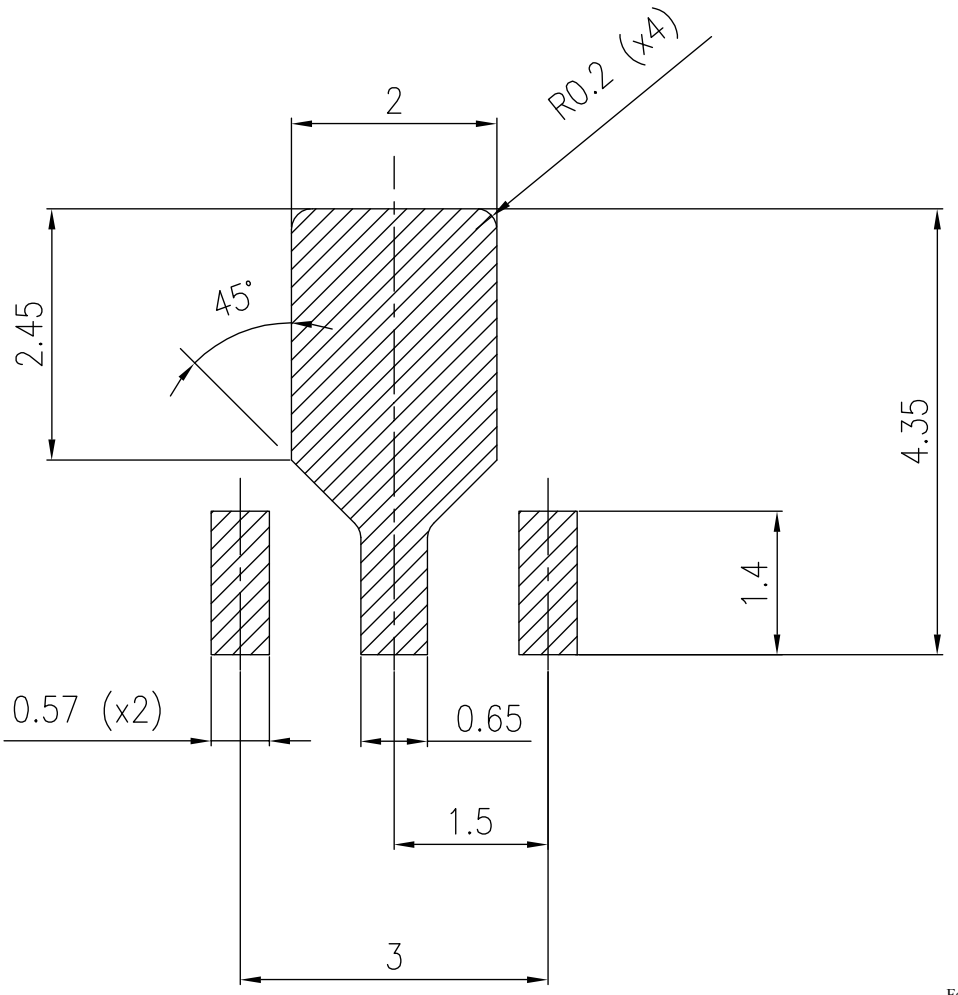


Table 27. **SOT-89 mechanical data**

| 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 | |
| β | | 90° | |

Figure 25. **SOT-89 recommended footprint**




Footprint

## 7.7 SOT-89 packing information

Figure 26. **SOT-89 carrier tape outline**

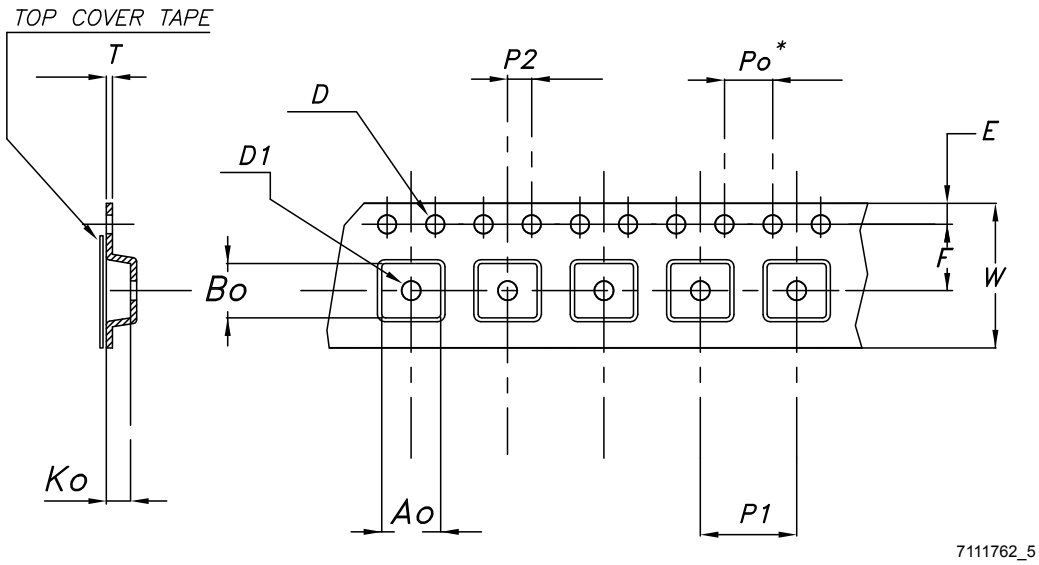



Figure 27. **SOT-89 device orientation**

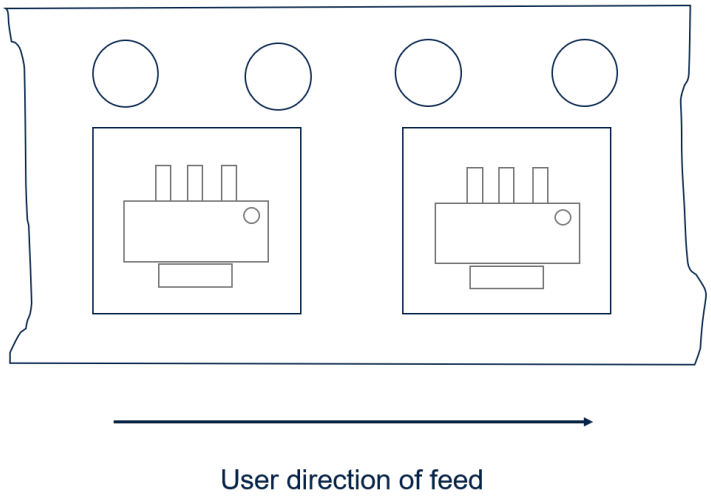
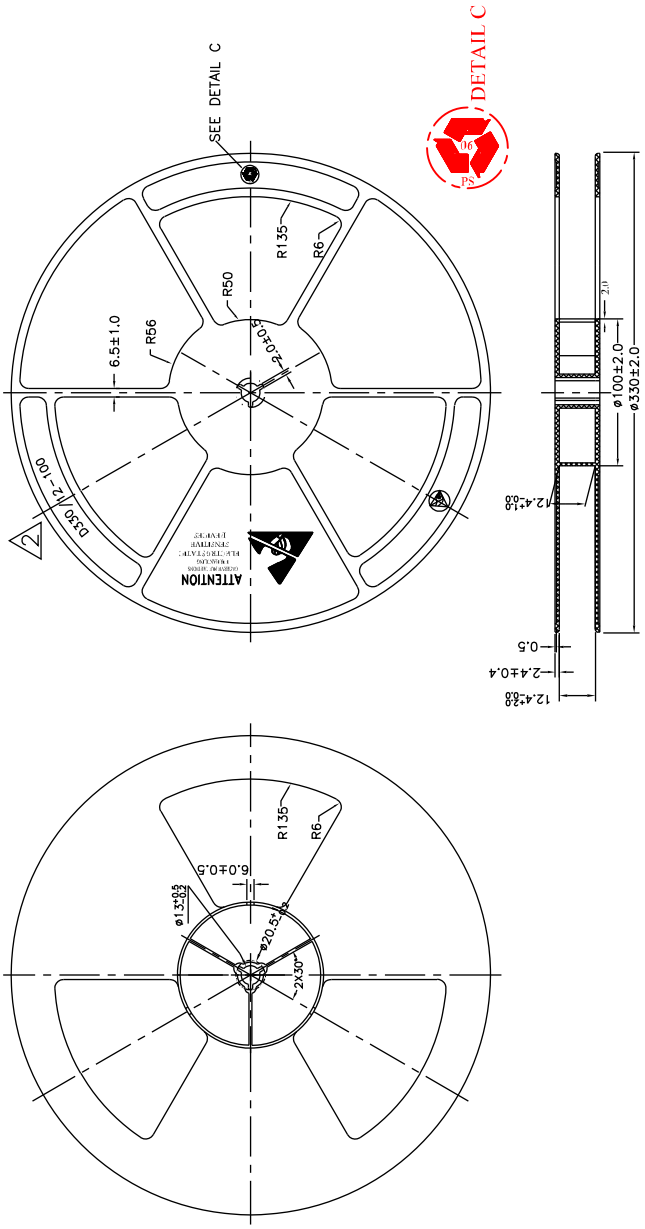


Table 28. **SOT-89 carrier tape mechanical data**

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

Figure 28. **SOT-89 reel drawing**



# 8 Ordering information

Table 29. **Order codes**

| Part numbers | | | | | Output voltages (V) |
|---|---|---|---|---|---|
| SO-8 | TO-92 (Bag) [1] | TO-92 (ammopack) | TO-92 (tape and reel) | SOT-89 | |
| L78L33ABD-TR | | L78L33ABZ-AP | | L78L33ABUTR | 3.3 |
| L78L33ACD13TR | L78L33ACZ | L78L33ACZ-AP | L78L33ACZTR | L78L33ACUTR | 3.3 |
| L78L33CD-TR | | | | | 3.3 |
| L78L05ABD13TR | L78L05ABZ | L78L05ABZ-AP | L78L05ABZ-TR | L78L05ABUTR | 5 |
| L78L05ACD13TR | L78L05ACZ | L78L05ACZ-AP | L78L05ACZTR | L78L05ACUTR | 5 |
| L78L05CD13TR | L78L05CZ | | | | 5 |
| | L78L06ABZ | | | L78L06ABUTR | 6 |
| L78L06ACD13TR | | | | L78L06ACUTR | 6 |
| L78L08ABD13TR | | L78L08ABZ-AP | L78L08ABZTR | | 8 |
| L78L08ACD13TR | L78L08ACZ | | L78L08ACZTR | L78L08ACUTR | 8 |
| L78L09ABD13TR | L78L09ABZ | | | L78L09ABUTR | 9 |
| L78L09ACD13TR | | L78L09ACZ-AP | L78L09ACZ-TR | L78L09ACUTR | 9 |
| | | | | L78L10ACUTR | 10 |
| L78L12ABD-TR | L78L12ABZ | L78L12ABZ-AP | | L78L12ABUTR | 12 |
| L78L12ACD13TR | L78L12ACZ | L78L12ACZ-AP | L78L12ACZ-TR | L78L12ACUTR | 12 |
| L78L12CD13TR | | | | | 12 |
| | | L78L15ABZ-AP | | L78L15ABUTR | 15 |
| L78L15ACD13TR | L78L15ACZ | | | L78L15ACUTR | 15 |
| L78L15CD-TR | | | | | 15 |
| | | | | L78L18ACUTR | 18 |
| L78L18CD13TR | | | | | 18 |
| | | | L78L24ABZ-TR | | 24 |
| | | L78L24ACZ-AP | | L78L24ACUTR | 24 |
| L78L24CD-TR | | | | | 24 |

1. *Available in Ammopak with the suffix "-AP" or in tape and reel with the suffix "TR". Please note that in these cases pins are shaped according to tape and reel specifications.*

Table 30. **Marking information**

| Part numbers | Marking | Packages | Output voltages |
|---|---|---|---|
| L78L05ABD13TR | 78L05B | SO-8 | 5 V |
| L78L05ABUTR | 8C | SOT-89 | 5 V |
| L78L05ABZ | L78L05A | TO-92 | 5 V |
| L78L05ABZ-AP | L78L05A | TO-92 | 5 V |
| L78L05ABZ-TR | L78L05A | TO-92 | 5 V |
| L78L05ACD13TR | 78L05A | SO-8 | 5 V |
| L78L05ACUTR | 8C | SOT-89 | 5 V |
| L78L05ACZ | L78L05A | TO-92 | 5 V |
| L78L05ACZ-AP | L78L05A | TO-92 | 5 V |
| L78L05ACZTR | L78L05A | TO-92 | 5 V |
| L78L05CD13TR | 78L05 | SO-8 | 5 V |
| L78L05CZ | L78L05A | TO-92 | 5 V |
| L78L06ABUTR | 8E | SOT-89 | 6 V |
| L78L06ABZ | L78L06A | TO-92 | 6 V |
| L78L06ACD13TR | L78L06A | SO-8 | 6 V |
| L78L06ACUTR | 8E | SOT-89 | 6 V |
| L78L08ABD13TR | 78L08B | SO-8 | 8 V |
| L78L08ABZ-AP | L78L08A | TO-92 | 8 V |
| L78L08ABZTR | L78L08A | TO-92 | 8 V |
| L78L08ACD13TR | 78L08A | SO-8 | 8 V |
| L78L08ACUTR | 8G | SOT-89 | 8 V |
| L78L08ACZ | L78L08A | TO-92 | 8 V |
| L78L08ACZTR | L78L08A | TO-92 | 8 V |
| L78L08CD13TR | 78L08 | SO-8 | 8 V |
| L78L09ABD13TR | 78L09B | SO-8 | 8 V |
| L78L09ABZ | L78L09A | TO-92 | 9 V |
| L78L09ABUTR | 8H | SOT-89 | 9 V |
| L78L09ACD13TR | 78L09A | SO8 | 9 V |
| L78L09ACUTR | 8H | SOT-89 | 9 V |
| L78L09ACZ-AP | L78L09A | TO-92 | 9 V |
| L78L09ACZ-TR | L78L09A | TO-92 | 9 V |
| L78L10ACUTR | 8I | SOT-89 | 10 V |
| L78L12ABD-TR | 78L12B | SO-8 | 12 V |
| L78L12ABUTR | 8K | SOT-89 | 12 V |
| L78L12ABZ | L78L12A | TO-92 | 12 V |
| L78L12ABZ-AP | L78L12A | TO 92 | 12 V |
| L78L12ACD13TR | 78L12A | SO-8 | 12 V |
| L78L12ACUTR | 8K | SOT-89 | 12 V |
| L78L12ACZ | L78L12A | TO-92 | 12 V |
| L78L12ACZ-AP | L78L12A | TO-92 | 12 V |

| Part numbers | Marking | Packages | Output voltages |
|---|---|---|---|
| L78L12ACZ-TR | L78L12A | TO-92 | 12 V |
| L78L12CD13TR | 78L12 | SO-8 | 12 V |
| L78L15ABUTR | 8L | SOT-89 | 15 V |
| L78L15ABZ-AP | L78L15A | TO-92 | 15 V |
| L78L15ACD13TR | 78L15A | SO-8 | 15 V |
| L78L15ACUTR | 8L | SOT-89 | 15 V |
| L78L15ACZ | L78L15A | TO-92 | 15 V |
| L78L15CD-TR | 78L15 | SO-8 | 15 V |
| L78L18ACUTR | 8B | SOT-89 | 18 V |
| L78L18CD13TR | L78L18 | SO-8 | 18 V |
| L78L24ABZ-TR | L78L24A | TO-92 | 24 V |
| L78L24ACUTR | 8P | SOT-89 | 24 V |
| L78L24ACZ-AP | L78L24A | TO-92 | 24 V |
| L78L24CD-TR | 78L24 | SO-8 | 24 V |
| L78L33ABD-TR | 78L33B | SO-8 | 3.3 V |
| L78L33ABUTR | 8A | SOT-89 | 3.3 V |
| L78L33ABZ-AP | L78L33A | TO-92 | 3.3 V |
| L78L33ACD13TR | 78L33A | SO-8 | 3.3 V |
| L78L33ACUTR | 8A | SOT-89 | 3.3 V |
| L78L33ACZ | L78L33A | TO-92 | 3.3 V |
| L78L33ACZ-AP | L78L33A | TO-92 | 3.3 V |
| L78L33ACZTR | L78L33A | TO-92 | 3.3 V |

## Revision history

Table 31. **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. |
| 07-Jun-2007 | 13 | Order codes updated. |
| 18-Sep-2007 | 14 | Added Table 1 in cover page. |
| 15-Jul-2008 | 15 | Modified: Table 1 and Table 28: Order codes. |
| 18-Aug-2008 | 16 | Modified Figure 12 on page 26. |
| 03-Apr-2009 | 17 | Added: RthJA value for SOT-89 Table 2 on page 5. |
| 08-Feb-2011 | 18 | Added note Table 26 on page 39 |
| 21-Feb-2012 | 19 | Modified: SOT-89 Figure 2 on page 4. |
| 14-Aug-2012 | 20 | Updated TOP value for L78L00AC in Table 1 on page 5.<br>Minor text changes. |
| 07-Sep-2012 | 21 | Added: Table 29: Marking information. |
| 14-Apr-2014 | 22 | Part numbers L78LxxAB, L78LxxAC, L78LxxC changed to L78L.<br>Removed Table1: Device summary.<br>Updated features and description in cover page, Table 28: Order codes, Table 29: Marking information and Section 7: Package information.<br>Added Section: Packing mechanical data.<br>Minor text changes. |
| 06-Oct-2014 | 23 | Updated Table 28: Order codes and Table 29: Marking information.<br>Minor text changes. |
| 10-Feb-2015 | 24 | Updated Table 29: Marking information.<br>Minor text changes. |
| 10-Feb-2016 | 25 | Updated Table 29: Marking information and Section 7.7: SOT-89 packing information.<br>Minor text changes. |
| 21-Jun-2016 | 26 | Changed test condition values for the parameter "Line regulation"and the typical value for the parameter "Dropout voltage" in : Table 3: "Electrical characteristics of L78L33C", Table 4: "Electrical characteristics of L78L05C", Table 12: "Electrical characteristics of L78L33AB and L78L33AC" and Table 13: "Electrical characteristics of L78L05AB and L78L05AC".<br>Minor text changes. |
| 30-Nov-2020 | 27 | Added Figure 27. SOT-89 device orientation. |
| 07-Apr-2021 | 28 | Added Figure 28. SOT-89 reel drawing. |
| 11-Jul-2024 | 29 | Updated Table 29 |
| 05-Aug-2024 | 30 | Updated Table 29 |

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