

**Series3-Terminal 0.1A Positive Voltage Regulators**

# LR78LXXA/B

**DESCRIPTION**

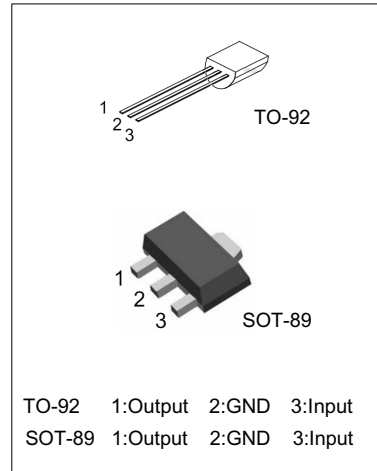
The LRC LR78LXX series is monolithic fixed voltage regulator integrated circuit. They are suitable for applications that required supply current up to 100mA.

**FEATURES**

- \*Output current up to 100mA
- \*Fixed output voltage of 5V ,9V,12V,15V available
- \*Thermal overload shutdown protection
- \*Short circuit current limiting
- \*We declare that material of product compliance with ROHS requirements.

**ORDERING INFORMATION**

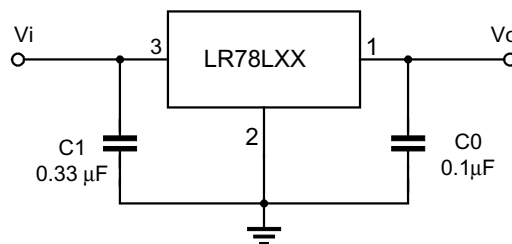
- \*LR78LXXA: SOT89
- \*LR78LXXB: TO-92


**ABSOLUTE MAXIMUM RATINGS**

(Operating temperature range applies unless otherwise specified)

| PARAMETER                           | SYMBOL    | MIN. | MAX. | UNIT        |
|-------------------------------------|-----------|------|------|-------------|
| Input voltage (for $V_o=5\sim 9V$ ) | $V_i$     |      | 30   | V           |
| (for $V_o=12\sim 24V$ )             | $V_i$     |      | 35   | V           |
| Output Current                      | $I_o$     |      | 100  | mA          |
| Power Dissipation                   | PD        |      |      | mW          |
| TO-92                               |           |      | 625  |             |
| SOT-89                              |           |      | 500  |             |
| Operating Junction Temperature      | $T_J$     | -40  | +150 | $^{\circ}C$ |
| Operating Ambient Temperature       | $T_{OPR}$ | -40  | +125 | $^{\circ}C$ |
| Storage Temperature Range           | $T_{STG}$ | -55  | +150 | $^{\circ}C$ |

ESD: HBM 2000V

**APPLICATION CIRCUIT**


Note 1: To specify an output voltage, substitute voltage value for "XX"

Note 2: Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

**LR78L05 ELECTRICAL CHARACTERISTICS**
*(VI=10V, Io=40mA, -55 °C <Tj<125 °C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)*

| PARAMETER                | SYMBOL | TEST CONDITIONS             | MIN  | TYP. | MAX  | UNIT          |
|--------------------------|--------|-----------------------------|------|------|------|---------------|
| Output Voltage           | Vo     | Tj=25°C                     | 4.80 | 5.0  | 5.20 | V             |
|                          |        | 7V<=Vi<=20V,Io=1mA-40mA     | 4.75 |      | 5.25 | V             |
|                          |        | 7V<=Vi<=VMAX,Io=1mA-70mA    | 4.75 |      | 5.25 | V<br>(Note 2) |
| Load Regulation          | Vo     | Tj=25°C,Io=1mA-100mA        |      | 11   | 60   | mV            |
|                          |        | Tj=25°C,Io=1mA-40mA         |      | 5.0  | 30   | mV            |
| Line regulation          | Vo     | 7V<=Vi<=20V,Tj=25°C         |      | 8    | 150  | mV            |
|                          |        | 8V<=Vi<=20V,Tj=25°C         |      | 6    | 100  | mV            |
| Quiescent Current        | Iq     | VIN=10V,Io=0mA,Tj=25°C      |      | 2.0  | 5.5  | mA            |
| Quiescent Current Change | ΔIq    | 8V<=Vi<=20V                 |      |      | 1.5  | mA            |
|                          | ΔIq    | 1mA<=Vi<=40mA               |      |      | 0.1  | mA            |
| Output Noise Voltage     | VN     | 10Hz<=f<=100kHz             |      | 40   |      | uV            |
| Ripple Rejection         | RR     | 8V<=Vi<=20V,f=120Hz,Tj=25°C | 40   | 49   |      | dB            |
| Dropout Voltage          | Vd     | Tj=25°C                     |      | 1.7  |      | V             |

**LR78L09 ELECTRICAL CHARACTERISTICS**
*(VI=15V,Io=40mA, -55 °C <Tj<125 °C,C1=0.33uF,Co=0.1uF,unless otherwise specified)(Note 1)*

| PARAMETER                | SYMBOL | TEST CONDITIONS                 | MIN  | TYP | AX   | UNIT          |
|--------------------------|--------|---------------------------------|------|-----|------|---------------|
| Output Voltage           | Vo     | Tj=25°C                         | 8.64 | 9.0 | 9.36 | V             |
|                          |        | 11.5V<=Vi<=24V,Io=1mA-40mA      | 8.55 |     | 9.45 | V             |
|                          |        | 11.5V<=Vi<=VMAX,<br>Io=1mA-70mA | 8.55 |     | 9.45 | V<br>(Note 2) |
| Load Regulation          | Vo     | Tj=25°C,Io=1mA-100mA            |      | 20  | 90   | mV            |
|                          |        | Tj=25°C,Io=1mA-40mA             |      | 10  | 45   | mV            |
| Line regulation          | Vo     | 11.5V<=Vi<=24V,Tj=25°C          |      | 90  | 200  | mV            |
|                          |        | 13V<=Vi<=24V,Tj=25°C            |      | 100 | 150  | mV            |
| Quiescent Current        | Iq     | VIN=15V,Io=0mA,Tj=25°C          |      | 2.0 | 5.5  | mA            |
| Quiescent Current Change | ΔIq    | 13V<=Vi<=24V                    |      |     | 1.5  | mA            |
|                          | ΔIq    | 1mA<=Vi<=40mA                   |      |     | 0.1  | mA            |
| Output Noise Voltage     | VN     | 10Hz<=f<=100kHz                 |      | 49  |      | UV            |
| Ripple Rejection         | RR     | 12V<=Vi<=23V,f=120Hz,Tj=25°C    | 36   | 44  |      | dB            |
| Dropout Voltage          | Vd     | Tj=25°C                         |      | 1.7 |      | V             |

Note 1: The Maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB. The data above represent pulse test conditions with junction temperatures specified at the initiation of test.

Note 2: Power dissipation<0.5W

**LR78L12 ELECTRICAL CHARACTERISTICS**

(VI=19V, Io=40mA, -55°C &lt; Tj &lt; 125°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

| Characteristic                | Symbol | Test conditions              |      | TYP | MAX  | UNIT          |
|-------------------------------|--------|------------------------------|------|-----|------|---------------|
| Output Voltage                | Vo     | Tj=25°C                      | 11.5 | 12  | 12.6 | V             |
|                               |        | 14.5V≤Vi≤27V, Io=1mA~40mA    | 11.4 |     | 12.6 | V             |
|                               |        | Io=1mA~70mA                  | 11.4 |     | 12.6 | V<br>(note 2) |
| Load Regulation               | ΔVo    | Tj=25°C, Io=1mA~100mA        |      | 36  | 100  | mV            |
|                               |        | Tj=25°C, Io=1mA~40mA         |      | 24  | 50   | mV            |
| Line regulation               | ΔVo    | 14.5V≤Vi≤27V, Tj=25°C        |      | 24  | 250  | mV            |
|                               |        | 16V≤Vi≤27V, Tj=25°C          |      | 12  | 200  | mV            |
| Quiescent Current             | Iq     | IO=0mA, Tj=25°C              |      | 2.0 | 5.5  | mA            |
| Quiescent Current Change      | ΔIq    | 16V≤Vi≤27V                   |      |     | 1.5  | mA            |
|                               | ΔIq    | 1mA≤Vi≤40mA                  |      |     | 0.1  | mA            |
| Output Noise Voltage          | VN     | 10Hz≤f≤100kHz, Tj=25°C       |      | 80  |      | μV            |
| Temperature coefficient of Vo | ΔVo/ΔT | Io=5mA                       |      | 1.0 |      | mV/°C         |
| Ripple Rejection              | RR     | 15V≤Vi≤25V, f=120Hz, Tj=25°C | 36   | 42  |      | dB            |
| Dropout Voltage               | Vd     |                              |      | 1.7 |      | V             |

**LR78L15 ELECTRICAL CHARACTERISTICS**

(VI=23V, Io=40mA, -55°C &lt; Tj &lt; 125°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

| Characteristic                | Symbol | Test conditions                  |       | TYP | MAX   | UNIT          |
|-------------------------------|--------|----------------------------------|-------|-----|-------|---------------|
| Output Voltage                | Vo     | Tj=25°C                          | 14.4  | 15  | 15.6  | V             |
|                               |        | 17.5V≤Vi≤30V, Io=1mA~40mA        | 14.25 |     | 15.75 | V             |
|                               |        | Io=1mA~70mA                      | 14.25 |     | 15.75 | V<br>(note 2) |
| Load Regulation               | ΔVo    | Tj=25°C, Io=1mA~100mA            |       | 45  | 150   | mV            |
|                               |        | Tj=25°C, Io=1mA~40mA             |       | 30  | 75    | mV            |
| Line regulation               | ΔVo    | 17.5V≤Vi≤30V, Tj=25°C            |       | 30  | 300   | mV            |
|                               |        | 20V≤Vi≤30V, Tj=25°C              |       | 15  | 250   | mV            |
| Quiescent Current             | Iq     | IO=0mA, Tj=25°C                  |       | 2.2 | 6.0   | mA            |
| Quiescent Current Change      | ΔIq    | 20V≤Vi≤30V                       |       |     | 1.5   | mA            |
|                               | ΔIq    | 1mA≤Vi≤40mA                      |       |     | 0.1   | mA            |
| Output Noise Voltage          | VN     | 10Hz≤f≤100kHz, Tj=25°C           |       | 90  |       | μV            |
| Temperature coefficient of Vo | ΔVo/ΔT | Io=5mA                           |       | 1.3 |       | mV/°C         |
| Ripple Rejection              | RR     | 18.5V≤Vi≤28.5V, f=120Hz, Tj=25°C | 33    | 39  |       | dB            |
| Dropout Voltage               | Vd     |                                  |       | 1.7 |       | V             |

## ELECTRICAL CHARACTERISTICS CURVES

Fig.1 LR78L05 Output Voltage vs Ambient Temperature

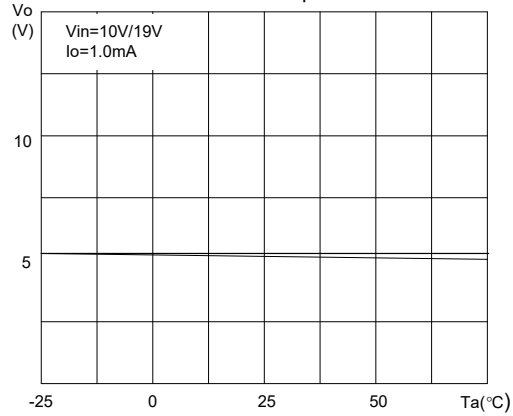


Fig.2 LR78L05 Quiescent Current vs Output Current

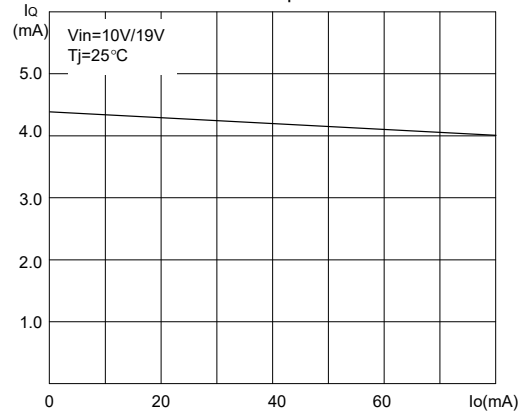


Fig.3 LR78L05 Quiescent Current vs Input

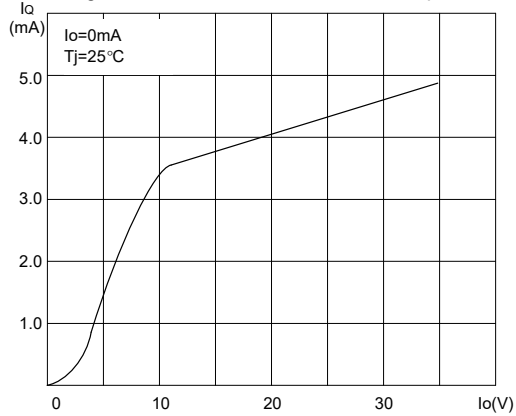


Fig.4 LR78L05 Thermal Shutdown

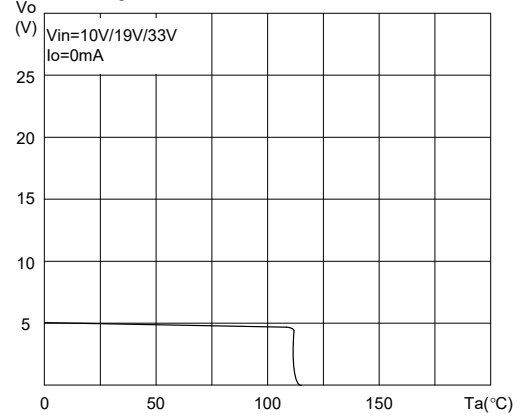


Fig.5 LR78L05 Output Characteristics

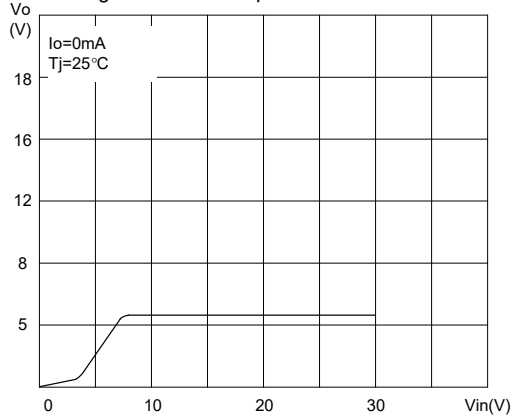
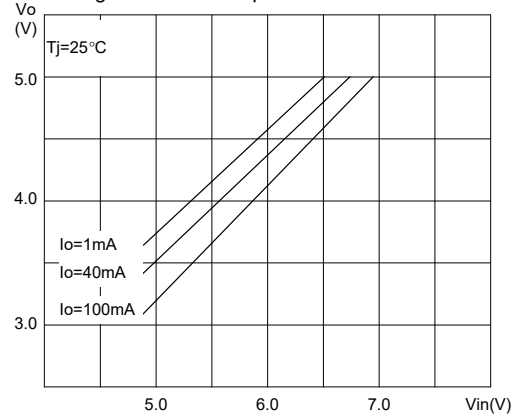
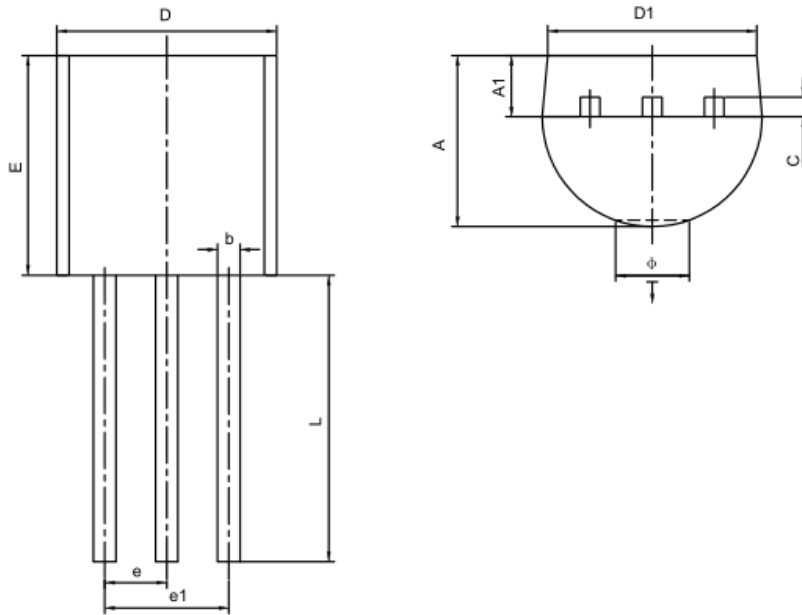


Fig.6 LR78L05 Dropout Characteristics

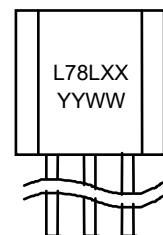


**TO-92 PACKAGE OUTLINE DIMENSIONS**


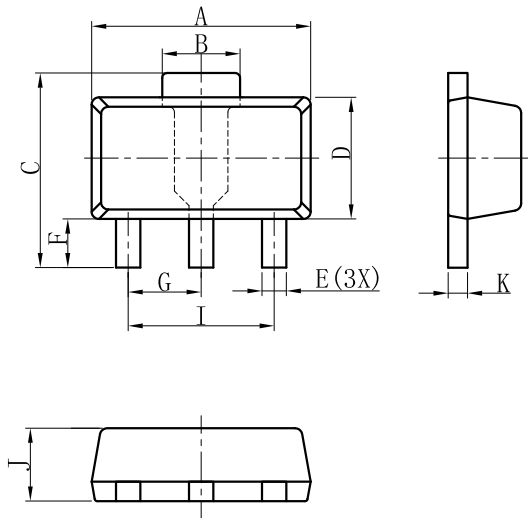
| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min                       | Max    | Min                  | Max   |
| A      | 3.300                     | 3.700  | 0.130                | 0.146 |
| A1     | 1.100                     | 1.400  | 0.043                | 0.055 |
| b      | 0.380                     | 0.550  | 0.015                | 0.022 |
| c      | 0.360                     | 0.510  | 0.014                | 0.020 |
| D      | 4.400                     | 4.700  | 0.173                | 0.185 |
| D1     | 3.430                     |        | 0.135                |       |
| E      | 4.300                     | 4.700  | 0.169                | 0.185 |
| e      | 1.270TYP                  |        | 0.050TYP             |       |
| e1     | 2.440                     | 2.640  | 0.096                | 0.104 |
| L      | 14.100                    | 14.500 | 0.555                | 0.571 |
| Ö      |                           | 1.600  |                      | 0.063 |
| ↓      | 0.000                     | 0.380  | 0.000                | 0.015 |

**SHIPPING INFORMATION**

1. Bag: 1000 Units/ Bag 10 Bag/ Box(240mm\*170mm\*96mm)  
4 Box/ Chest(365mm\*270mm\*210mm)
2. Tape: 2000 Units/ Box 10 Box/ Chest

**MARKING**


### Package Outline Dimension

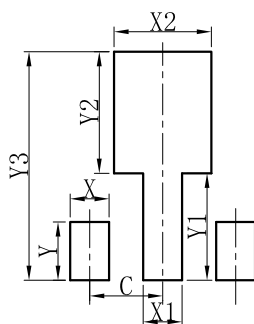
**SOT89-3**


| SOT89-3              |          |      |      |
|----------------------|----------|------|------|
| DIM                  | MIN      | NOR  | MAX  |
| A                    | 4.30     | 4.50 | 4.70 |
| B                    | 1.40     | 1.60 | 1.80 |
| C                    | 3.90     | 4.00 | 4.25 |
| D                    | 2.30     | 2.50 | 2.70 |
| E                    | 0.40     | 0.50 | 0.58 |
| F                    | 0.90     | 1.00 | 1.20 |
| G                    | 1.50 BSC |      |      |
| I                    | 3.00 BSC |      |      |
| J                    | 1.40     | 1.50 | 1.60 |
| K                    | 0.34     | 0.40 | 0.50 |
| All Dimensions in mm |          |      |      |

**GENERAL NOTES**

1. Top package surface finish  $Ra0.4 \pm 0.2\mu m$
2. Bottom package surface finish  $Ra0.7 \pm 0.2\mu m$
3. Side package surface finish  $Ra0.4 \pm 0.2\mu m$
4. Protrusion or Gate Burrs shall not exceed 0.10mm per side.

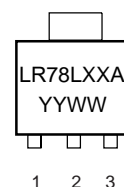
### Suggested Pad layout

**SOT89-3**


| SOT89-3 |      |
|---------|------|
| DIM     | (mm) |
| X       | 0.80 |
| Y       | 1.20 |
| X1      | 0.80 |
| Y1      | 2.20 |
| X2      | 2.00 |
| Y2      | 2.50 |
| C       | 1.50 |
| Y3      | 4.70 |

**SHIPPING INFORMATION**

Tape: 1000 Units/ Reel(7 inch)  
 7 Reel/ Box(226mm\*206mm\*230mm)  
 2 Box/Chest(435mm\*235mm\*247mm)

**MARKING**


单击下面可查看定价，库存，交付和生命周期等信息

[>>LRC\(乐山无线电\)](#)