

78LXX

LINEAR INTEGRATED CIRCUIT

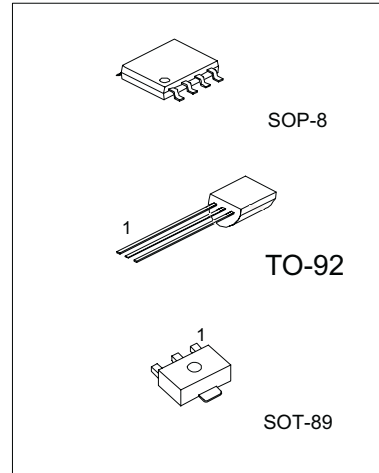
3-TERMINAL 0.1A POSITIVE VOLTAGE REGULATOR

DESCRIPTION

The Contek 78LXX family 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, 6V, 8V, 9V, 10V, 12V, 15V, 18V and 24V available
- *Thermal overload shutdown protection
- *Short circuit current limiting

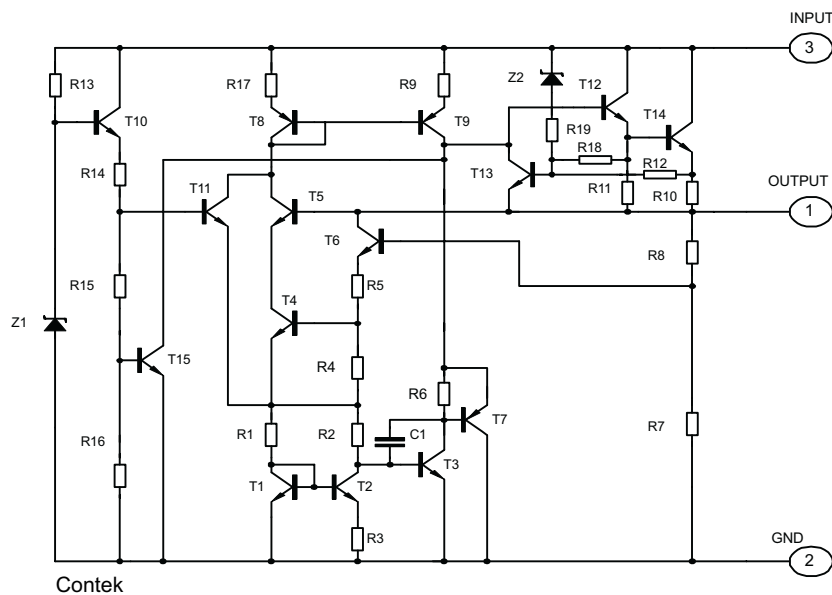


SOP-8 1:Output 2,3,6,7:GND 8:Input
4,5:N.C.

TO-92 1:Output 2:GND; 3:Input

SOT-89 1:Output 2:GND; 3:Input

TEST CIRCUIT



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ABSOLUTE MAXIMUM RATINGS

(Operating temperature range applies unless otherwise specified)

| PARAMETER | SYMBOL | MIN. | MAX. | UNIT |
|---|------------------|-------|------|------|
| Input voltage(for Vo=5~9V) (for Vo=12~24V) | V _I | | 30 | V |
| | V _I | | 35 | V |
| Output Current | I _o | | 150 | mA |
| Power Dissipation | PD | | | |
| | | SOP-8 | 300 | mW |
| | | TO-92 | 500 | |
| | | | 350 | |
| Operating Junction Temperature Range | T _{OPR} | -20 | +150 | C |
| Storage Temperature Range | T _{STG} | -55 | +150 | C |

Contek 78L05 ELECTRICAL CHARACTERISTICS

(V_I=10V, I_o=40mA, 0 C <T_j<125 C, C₁=0.33uF, C_o=0.1uF, unless otherwise specified)(Note 1)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP. | MAX | UNIT |
|---|-------------------|--|------|-------|------|---------------|
| Output Voltage | V _o | T _j =25 C | 4.9 | 5.0 | 5.1 | V |
| | | 7V<=V _I <=20V, I _o =1mA-40mA | 4.9 | | 5.1 | V |
| | | 7V<=V _I <=V _{MAX} , I _o =1mA-70mA | 4.85 | | 5.15 | V (note 2) |
| Load Regulation | V _o | T _j =25 C, I _o =1mA-100mA | | 11 | 60 | mV |
| | | T _j =25 C, I _o =1mA-40mA | | 5.0 | 30 | mV |
| Line regulation | V _o | 7V<=V _I <=20V, T _j =25 C | | 8 | 150 | mV |
| | | 8V<=V _I <=20V, T _j =25 C | | 6 | 100 | mV |
| Quiescent Current | ΔI _q | V _{IN} =10V, I _o =0mA, T _j =25 C | | 2.0 | 5.5 | mA |
| Quiescent Current Change | ΔI _q | 8V<=V _I <=20V | | | 1.5 | mA |
| | | 1mA<=V _I <=40mA | | | 0.1 | mA |
| Output Noise Voltage | V _N | 10Hz<=f<=100kHz | | 40 | | uV |
| Temperature coefficient of V _o | V _o /T | I _o =5mA | | -0.65 | | mV/ C |
| Ripple Rejection | RR | 8V<=V _I <=20V, f=120Hz, T _j =25 C | 41 | 80 | | dB |
| Dropout Voltage | V _d | T _j =25 C | | 1.7 | | V |

Contek 78L06 ELECTRICAL CHARACTERISTICS

(V_I=12V, I_o=40mA, 0 C <T_j<125 C, C₁=0.33uF, C_o=0.1uF, unless otherwise specified)(Note 1)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP. | MAX | UNIT |
|--------------------------|-----------------|---|------|------|------|---------------|
| Output Voltage | V _o | T _j =25 C | 5.75 | 6.0 | 6.25 | V |
| | | 8.5V<=V _I <=20V, I _o =1mA-40mA | 5.7 | | 6.3 | V |
| | | 8.5V<=V _I <=V _{MAX} , I _o =1mA-70mA | 5.7 | | 6.3 | V (note 2) |
| Load Regulation | V _o | T _j =25 C, I _o =1mA-100mA | | 12.8 | 80 | mV |
| | | T _j =25 C, I _o =1mA-70mA | | 5.8 | 40 | mV |
| Line regulation | V _o | 8.5V<=V _I <=20V, T _j =25 C | | 64 | 175 | mV |
| | | 9V<=V _I <=20V, T _j =25 C | | 54 | 125 | mV |
| Quiescent Current | ΔI _q | V _{IN} =12V, I _o =0mA, T _j =25 C | | 3.9 | 6.0 | mA |
| Quiescent Current Change | ΔI _q | 9V<=V _I <=20V | | | 1.5 | mA |
| | | 1mA<=V _I <=40mA | | | 0.1 | mA |



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| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP. | MAX | UNIT |
|---|-------------------|--|-----|------|-----|-------|
| Output Noise Voltage | V _N | 10Hz<=f<=100kHz | | 49 | | uV |
| Temperature coefficient of V _o | V _o /T | I _o =5mA | | 0.75 | | mV/ C |
| Ripple Rejection | RR | 10V<=V _I <=20V,f=120Hz, T _j =25 C | 40 | 46 | | dB |
| Dropout Voltage | V _d | T _j =25 C | | 1.7 | | V |

Contek 78L08 ELECTRICAL CHARACTERISTICS

(V_I=14V,I_o=40mA,0 C<T_j<125 C,C₁=0.33uF,Co=0.1uF,unless otherwise specified)(Note 1)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---------------------|--|-----|------|-----|---------------|
| Output Voltage | V _o | T _j =25 C | 7.7 | 8.0 | 8.3 | V |
| | | 10.5V<=V _I <=23V,I _o =1mA-40mA | 7.6 | | 8.4 | V |
| | | 10.5V<=V _I <=V _{MAX} , I _o =1mA-70mA | 7.6 | | 8.4 | V (note 2) |
| Load Regulation | V _o | T _j =25 C,I _o =1mA-100mA | | 15 | 80 | mV |
| | | T _j =25 C,I _o =1mA-70mA | | 8.0 | 40 | mV |
| Line regulation | V _o | 10.5V<=V _I <=23V,T _j =25 C | | 10 | 175 | mV |
| | | 11V<=V _I <=23V,T _j =25 C | | 8 | 125 | mV |
| Quiescent Current | ΔI _q | V _I =14V,I _o =0mA,T _j =25 C | | 2.0 | 5.5 | mA |
| Quiescent Current Change | ΔI _q | 11V<=V _I <=23V | | | 1.5 | mA |
| | | 1mA<=V _I <=40mA | | | 0.1 | mA |
| Output Noise Voltage | V _N | 10Hz<=f<=100kHz | | 49 | | uV |
| Temperature coefficient of V _o | ΔV _o /ΔT | I _o =5mA | | 0.75 | | mV/ C |
| Ripple Rejection | RR | 11V<=V _I <=23V,f=120Hz,T _j =25 C | 39 | 70 | | dB |
| Dropout Voltage | V _d | T _j =25 C | | 1.7 | | V |

Contek 78L09 ELECTRICAL CHARACTERISTICS

(V_I=15V,I_o=40mA,0 C<T_j<125 C,C₁=0.33uF,Co=0.1uF,unless otherwise specified)(Note 1)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---------------------|--|------|------|------|---------------|
| Output Voltage | V _o | T _j =25 C | 8.64 | 9.0 | 9.36 | V |
| | | 11.5V<=V _I <=24V,I _o =1mA-40mA | 8.55 | | 9.45 | V |
| | | 11.5V<=V _I <=V _{MAX} , I _o =1mA-70mA | 8.55 | | 9.45 | V (note 2) |
| Load Regulation | V _o | T _j =25 C,I _o =1mA-100mA | | 20 | 90 | mV |
| | | T _j =25 C,I _o =1mA-40mA | | 10 | 45 | mV |
| Line regulation | V _o | 11.5V<=V _I <=24V,T _j =25 C | | 90 | 200 | mV |
| | | 13V<=V _I <=24V,T _j =25 C | | 100 | 150 | mV |
| Quiescent Current | ΔI _q | V _I =15V,I _o =0mA,T _j =25 C | | 2.0 | 6.0 | mA |
| Quiescent Current Change | ΔI _q | 13V<=V _I <=24V | | | 1.5 | mA |
| | | 1mA<=V _I <=40mA | | | 0.1 | mA |
| Output Noise Voltage | V _N | 10Hz<=f<=100kHz | | 49 | | UV |
| Temperature coefficient of V _o | ΔV _o /ΔT | I _o =5mA | | 0.75 | | mV/ C |
| Ripple Rejection | RR | 12V<=V _I <=23V,f=120Hz,T _j =25 C | 38 | 44 | | dB |
| Dropout Voltage | V _d | T _j =25 C | | 1.7 | | V |



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Contek 78L12 ELECTRICAL CHARACTERISTICS

($V_I=19V, I_o=40mA, 0\text{ C} < T_j < 125\text{ C}, C_1=0.33\mu F, C_o=0.1\mu F$, unless otherwise specified)(Note 1)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|-----------------------|---------------------------------|------|------|------|---------------|
| Output Voltage | Vo | Tj=25 C | 11.5 | 12 | 12.5 | V |
| | | 14.5V<=Vi<=27V, Io=1mA-40mA | 11.4 | | 12.6 | V |
| | | 14.5V<=Vi<=VMAX, Io=1mA-70mA | 11.4 | | 12.6 | V (note 2) |
| Load Regulation | Vo | Tj=25 C, Io=1mA-100mA | | 25 | 150 | mV |
| | | Tj=25 C, Io=1mA-40mA | | 12 | 75 | mV |
| Line regulation | Vo | 14.5V<=Vi<=27V, Tj=25 C | | 25 | 300 | mV |
| | | 16V<=Vi<=27V, Tj=25 C | | 20 | 250 | mV |
| Quiescent Current | ΔI_q | VIN=19V, Io=0mA, Tj=25 C | | 2.0 | 6.0 | mA |
| Quiescent Current Change | ΔI_q | 16V<=Vi<=27V | | | 1.5 | mA |
| | ΔI_q | 1mA<=Vi<=40mA | | | 0.1 | mA |
| Output Noise Voltage | VN | 10Hz<=f<=100kHz | | 80 | | μV |
| Temperature coefficient of Vo | $\Delta V_o/\Delta T$ | Io=5mA | | -1.0 | | mV/ C |
| Ripple Rejection | RR | 15V<=Vi<=25V, f=120Hz, Tj=25 C | 37 | 65 | | dB |
| Dropout Voltage | Vd | Tj=25 C | | 1.7 | | V |

Contek 78L15 ELECTRICAL CHARACTERISTICS

($V_I=23V, I_o=40mA, 0\text{ C} < T_j < 125\text{ C}, C_1=0.33\mu F, C_o=0.1\mu F$, unless otherwise specified)(Note 1)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | 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 |
| | | 17.5V<=Vi<=VMAX, Io=1mA-70mA | 14.25 | | 15.75 | V (note 2) |
| Load Regulation | Vo | Tj=25 C, Io=1mA-100mA | | 20 | 150 | mV |
| | | Tj=25 C, Io=1mA-70mA | | 25 | 150 | mV |
| Line regulation | Vo | 17.5V<=Vi<=30V, Tj=25 C | | 25 | 150 | mV |
| | | 20V<=Vi<=30V, Tj=25 C | | 15 | 75 | mV |
| Quiescent Current | ΔI_q | VIN=23V, Io=0mA, Tj=25 C | | 2.2 | 6.5 | mA |
| Quiescent Current Change | ΔI_q | 20V<=Vi<=30V | | | 1.5 | mA |
| | ΔI_q | 1mA<=Vi<=40mA | | | 0.1 | mA |
| Output Noise Voltage | VN | 10Hz<=f<=100kHz | | 90 | | μV |
| Temperature coefficient of Vo | $\Delta V_o/\Delta T$ | Io=5mA | | -1.3 | | mV/ C |
| Ripple Rejection | RR | 18.5V<=Vi<=28.5V, f=120Hz, Tj=25 C | 34 | 63 | | dB |
| Dropout Voltage | Vd | Tj=25 C | | 1.7 | | V |



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Contek 78L18 ELECTRICAL CHARACTERISTICS

($V_I=27V, I_o=40mA, 0\text{ C} < T_j < 125\text{ C}, C_1=0.33\mu F, C_o=0.1\mu F$, unless otherwise specified)(Note 1)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|-----------------------|--------------------------------|------|------|------|---------------|
| Output Voltage | Vo | Tj=25 C | 17.3 | 18 | 18.7 | V |
| | | 21V<=Vi<=33V, Io=1mA-40mA | 17.1 | | 18.9 | V |
| | | 21V<=Vi<=VMAX, Io=1mA-70mA | 17.1 | | 18.9 | V (note 2) |
| Load Regulation | Vo | Tj=25 C, Io=1mA-100mA | | 30 | 170 | mV |
| | | Tj=25 C, Io=1mA-40mA | | 15 | 85 | mV |
| Line regulation | Vo | 21V<=Vi<=33V, Tj=25 C | | 145 | 300 | mV |
| | | 22V<=Vi<=33V, Tj=25 C | | 135 | 250 | mV |
| Quiescent Current | ΔI_q | VIN=27V, Io=0mA, Tj=25 C | | 2.0 | 6.0 | mA |
| Quiescent Current Change | ΔI_q | 21V<=Vi<=33V | | | 1.5 | mA |
| | ΔI_q | 1mA<=Vi<=40mA | | | 0.1 | mA |
| Output Noise Voltage | VN | 10Hz<=f<=100kHz | | 150 | | μV |
| Temperature coefficient of Vo | $\Delta V_o/\Delta T$ | Io=5mA | | -1.8 | | mV/ C |
| Ripple Rejection | RR | 23V<=Vi<=33V, f=120Hz, Tj=25 C | 34 | 48 | | dB |
| Dropout Voltage | Vd | Tj=25 C | | 1.7 | | V |

Contek 78L24 ELECTRICAL CHARACTERISTICS

($V_I=33V, I_o=40mA, 0\text{ C} < T_j < 125\text{ C}, C_1=0.33\mu F, C_o=0.1\mu F$, unless otherwise specified)(Note 1)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|-----------------------|--------------------------------|------|------|------|---------------|
| Output Voltage | Vo | Tj=25 C | 23 | 24 | 25 | V |
| | | 27V<=Vi<=38V, Io=1mA-40mA | 22.8 | | 25.2 | V |
| | | 27V<=Vi<=VMAX, Io=1mA-70mA | 22.8 | | 25.2 | V (note 2) |
| Load Regulation | Vo | Tj=25 C, Io=1mA-100mA | | 40 | 200 | mV |
| | | Tj=25 C, Io=1mA-40mA | | 20 | 100 | mV |
| Line regulation | Vo | 27V<=Vi<=38V, Tj=25 C | | 160 | 300 | mV |
| | | 28V<=Vi<=38V, Tj=25 C | | 150 | 250 | mV |
| Quiescent Current | ΔI_q | VIN=33V, Io=0mA, Tj=25 C | | 2.2 | 6.0 | mA |
| Quiescent Current Change | ΔI_q | 27V<=Vi<=38V | | | 1.5 | mA |
| | ΔI_q | 1mA<=Vi<=40mA | | | 0.1 | mA |
| Output Noise Voltage | VN | 10Hz<=f<=100kHz | | 200 | | μV |
| Temperature coefficient of Vo | $\Delta V_o/\Delta T$ | Io=5mA | | -2.0 | | mV/ C |
| Ripple Rejection | RR | 27V<=Vi<=38V, f=120Hz, Tj=25 C | 34 | 45 | | 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



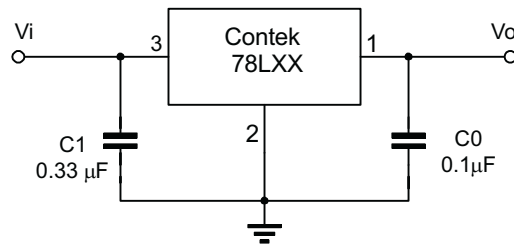
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APPLICATION CIRCUIT



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.



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TYPICAL PERFORMANCE CHARACTERISTICS

Fig.1 Ambient temperature vs. Power dissipation

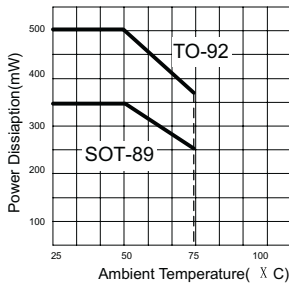


Fig.2 Conte 78L05 Output Voltage vs. Ambient temperature

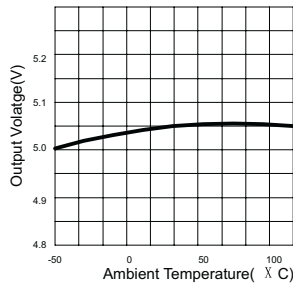


Fig.3 Contek78L12 Power dissipation vs. Ambient temperature

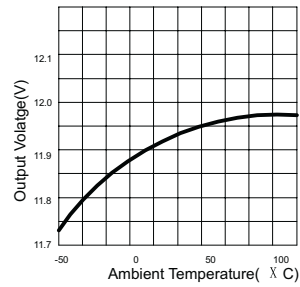


Fig.4 Output Characteristics (I_p=0mA, T_j=25 °C)

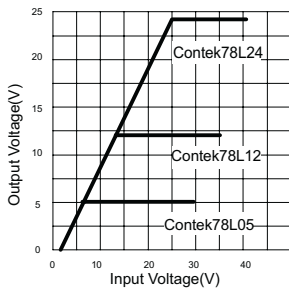


Fig.5 Contek78L05 Dropout Characteristics (T_j=25 °C)

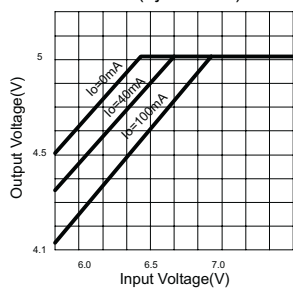


Fig.6 Short Circuit output current (T_j=25 °C)

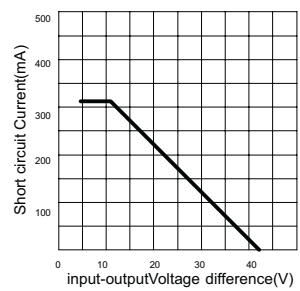


Fig.7 Contek78L12/24 quiescent current vs output current (T_j=25 °C)

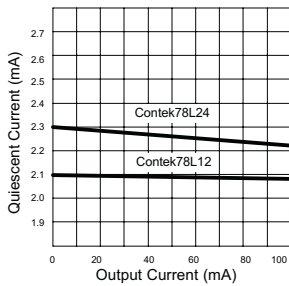


Fig.8 Contek78L05 Quiescent Current vs. Input Voltage (I_o=0mA, T_j=25 °C)

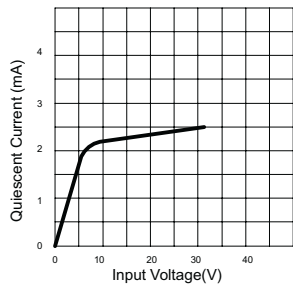


Fig.9 Peak output current vs Dropout voltage difference

