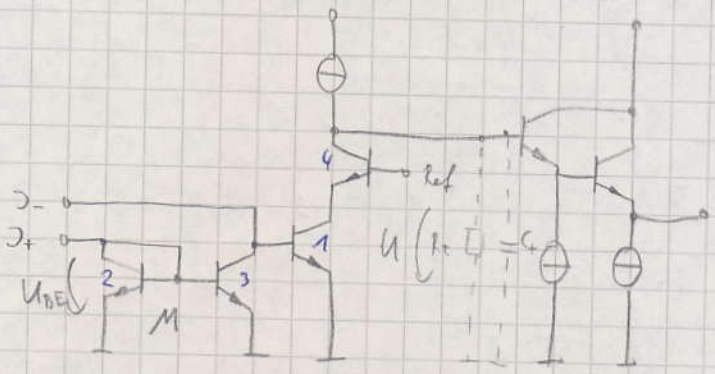
Norton-Verstärker (Stromdifferenz-Verstärker)

Schaltung (LM359)



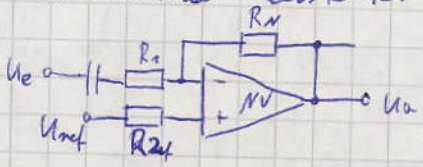
$$U = R_t (i_- - M i_+) b_1 \left(\frac{b_4}{b_4+1}\right) \approx b_1 R_t (i_- - i_+) \quad \text{für } M=1$$

Eingangswiderstände:

$$r_e^+ = \frac{r_{BE2,3}}{b+2} \qquad r_e^- = r_{BE1} \| r_{CE3} \approx r_{BE1}$$

Anwendungen NV

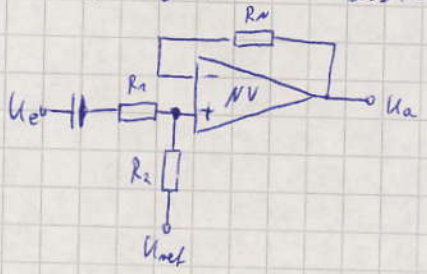
- invertierender Verstärker



AP: $\Im_{-A} = \Im_{+A} = \frac{U_{ref} - U_{BEA}}{R_2} = \frac{U_{aA} - U_{DEA}}{R_N}$

Verstärkung $\frac{u_e}{R_1} = -\frac{u_a}{R_N} \Rightarrow v' = -\frac{R_N}{R_1}$

- nichtinvertierender Verstärker



AP identisch mit invertierendem Verstärker

Verstärkung: $\frac{u_e}{R_1} = \frac{u_a}{R_N}$, $v = \frac{R_N}{R_1}$

R_1: U-I-Wandler

R_N: I-U-Wandler

National Semiconductor

August 2000

LM359
Dual, High Speed, Programmable, Current Mode (Norton) Amplifiers

General Description

The LM359 consists of two current differencing (Norton) input amplifiers. Design emphasis has been placed on obtaining high frequency performance and providing user programmable amplifier operating characteristics. Each amplifier is broadbanded to provide a high gain bandwidth product, fast slew rate and stable operation for an inverting closed loop gain of 10 or greater. Pins for additional external frequency compensation are provided. The amplifiers are designed to operate from a single supply and can accommodate input common-mode voltages greater than the supply.

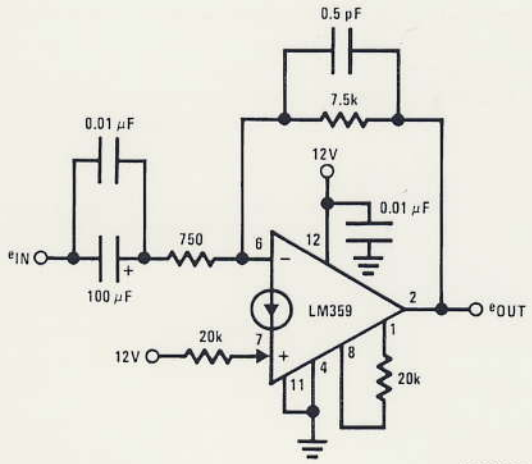
Applications

- General purpose video amplifiers
- High frequency, high Q active filters
- Photo-diode amplifiers
- Wide frequency range waveform generation circuits
- All LM3900 AC applications work to much higher frequencies

Features

- User programmable gain bandwidth product, slew rate, input bias current, output stage biasing current and total device power dissipation
- High gain bandwidth product (I_{SET} = 0.5 mA)
  400 MHz for A_V = 10 to 100
  30 MHz for A_V = 1
- High slew rate (I_{SET} = 0.5 mA)
  60 V/μs for A_V = 10 to 100
  30 V/μs for A_V = 1
- Current differencing inputs allow high common-mode input voltages
- Operates from a single 5V to 22V supply
- Large inverting amplifier output swing, 2 mV to V_{CC} − 2V
- Low spot noise, 6 nV/$\sqrt{Hz}$, for f > 1 kHz

Typical Application



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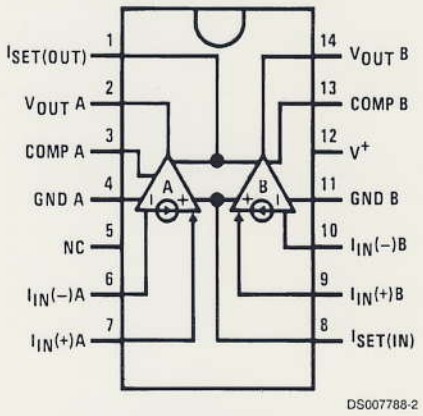
- A_V = 20 dB
- −3 dB bandwidth = 2.5 Hz to 25 MHz
- Differential phase error < 1° at 3.58 MHz
- Differential gain error < 0.5% at 3.58 MHz

Connection Diagram

Dual-In-Line Package



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Top View
Order Number LM359M or LM359N
See NS Package Number M14A or N14A

Schematic Diagram