

LINEAR INTEGRATED CIRCUITS

DESCRIPTION

The μ A709 is a high performance monolithic operational amplifier with differential inputs. High open loop gain, high input impedance, wide input common mode and output voltage ranges plus low temperature drift enable it to be used in many applications formerly satisfied only by discrete amplifiers.

FEATURES

- OPEN LOOP VOLTAGE GAIN = **45,000**
- OUTPUT VOLTAGE SWING = **$\pm 14V$**
- INPUT COMMON MODE RANGE = **$\pm 10V$**
- DIFFERENTIAL INPUT RESISTANCE = **μ A709 250k Ω
 μ A709C 400k Ω**

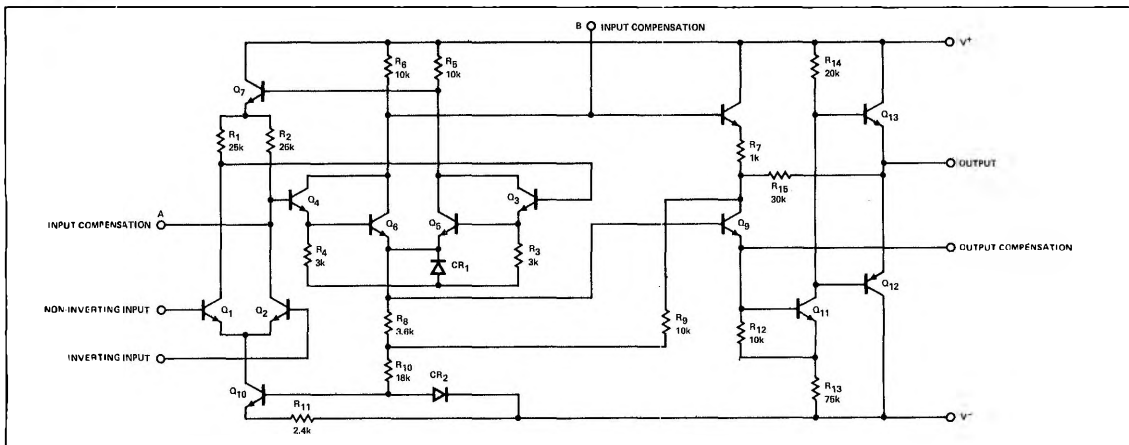
ABSOLUTE MAXIMUM RATINGS

Supply Voltage	$\pm 18V$
Internal Power Dissipation (Note 1)	N5709 250 mW S5709 300 mW
Differential Input Voltage	$\pm 5.0V$
Input Voltage	$\pm 10V$
Open Short-Circuit Duration ($T_A = 25^\circ C$)	$-25^\circ C$
Storage Temperature Range	$-65^\circ C$ to $+150^\circ C$
Operating Temperature Range	μ A709C $0^\circ C$ to $+75^\circ C$ μ A709 $-55^\circ C$ to $+125^\circ C$
Lead Temperature (Soldering, 60 sec)	$300^\circ C$

NOTE:

1. Rating applied for case temperatures to $+125^\circ C$; derate linearly at 5.6mW/ $^\circ C$ for ambient temperatures above $+95^\circ C$.

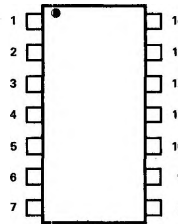
BASIC CIRCUIT SCHEMATIC



PIN CONFIGURATIONS

A PACKAGE

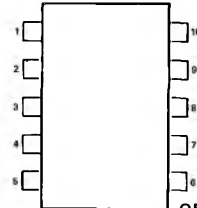
(Top View)



1. NC
2. NC
3. Input compensation A
4. Inverting input
5. Non-inverting input
6. V^-
7. NC
8. NC
9. Output Compensation
10. Output
11. V^+
12. Input compensation B
13. NC
14. NC

ORDER PART NOS.
 μ A790A/ μ A709CA

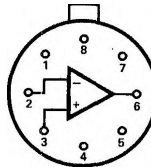
Q PACKAGE



1. NC
2. Input compensation A
3. Inverting input
4. Non-inverting input
5. V^-
6. Output compensation
7. Output
8. V^+
9. Input compensation B
10. NC

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T PACKAGE



1. Input compensation A
2. Inverting input
3. Non-inverting input
4. V^-
5. Output compensation
6. Output
7. V^+
8. Input compensation B

ORDER PART NOS. μ A709T/ μ A709CT

ELECTRICAL CHARACTERISTICS ($T_A = \pm 25^\circ\text{C}$, $V_S = \pm 15\text{V}$ (709C); $\pm 9 \leq V_S \leq \pm 15$ (709) unless otherwise specified)

PARAMETER	TEST CONDITIONS	μ A709			μ A709C			UNITS
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
INPUT CHARACTERISTICS								
Offset Voltage @ 25°C	$R_S \leq 10\text{K}\Omega$, $+9\text{V} \leq V_S \leq +15\text{V}$		1	5		2	7.5	mV
Over Temperature	$R_S \leq 10\text{K}\Omega$, $\pm 9\text{V} \leq \pm 15\text{V}$			6			10	mV
Offset Current @ 25°C			50	200		100	500	nA
Over Temperature	$T_A = +125^\circ\text{C}$		20	200				nA
	$T_A = -55^\circ\text{C}$		100	500				nA
	$0^\circ\text{C} \leq T_A \leq 75^\circ\text{C}$						750	nA
Bias Current @ 25°C			200	500		300	1500	nA
Over Temperature	$T_A = -55^\circ\text{C}$		0.5	1.5				μA
INPUT RESISTANCE @ 25°C		150	400		50	250		$\text{k}\Omega$
Over Temperature		40	100		35			$\text{k}\Omega$
INPUT VOLTAGE RANGE @ 25°C					± 8.0	± 10		V
Over Temperature	$V_S = \pm 15\text{V}$	± 8.0	± 10					V
OUTPUT CHARACTERISTICS								
Resistance @ 25°C			150			150		Ω
Voltage Swing	$R_L \geq 10\text{K}\Omega$				± 12	± 14		V
	$R_L \geq 2\text{k}\Omega$				± 10	± 13		V
Over Temperature	$V_S = \pm 15\text{V}$, $R_L \geq 10\text{K}\Omega$	± 12	± 14					V
	$V_S = \pm 15\text{V}$, $R_L \geq 2\text{K}\Omega$	± 10	± 13					V
POWER CONSUMPTION								
	$V_S = +15\text{V}$		80	165		80	200	mW
TRANSIENT RESPONSE (Figure 1)								
Rise Time	$V_{in} = 10\text{mV}$, $R_L = 2\text{K}\Omega$		0.3	1.0		0.3	1.0	μW
Overshoot	$C_L \leq 100\text{pF}$		10	30		10	30	%
LARGE SIGNAL VOLTAGE GAIN @ 25°C								
Over Temperature	$R_L \geq 25\text{K}\Omega$; $V_{out} = \pm 10\text{V}$				15,000	45,000		V/V
	$R_L \geq 25\text{K}\Omega$; $V_{out} = \pm 10\text{V}$	25,000	45,000	70,000	12,000			V/V
COMMON MODE REJECTION RATIO @ 25°C								
Over Temperature	$R_S \leq 10\text{K}\Omega$				65	90		dB
	$R_S \leq 10\text{K}\Omega$	70	90					dB
SUPPLY VOLTAGE REJECTION RATIO @ 25°C								
Over Temperature	$R_S \leq 10\text{K}\Omega$					25	200	$\mu\text{V}/\text{V}$
	$R_S \leq 10\text{K}\Omega$	25	150					$\mu\text{V}/\text{V}$
AVERAGE TEMPERATURE Coefficient of Input Offset Voltage								
	$R_S = 50\Omega$		3.0					$\mu\text{V}/^\circ\text{C}$
	$R_S \leq 10\text{K}\Omega$		6.0					$\mu\text{V}/^\circ\text{C}$

