

GENERAL DESCRIPTION

The RM709 and RC709 are monolithic, high gain DC operational amplifiers fabricated on a single silicon chip by the planar process.

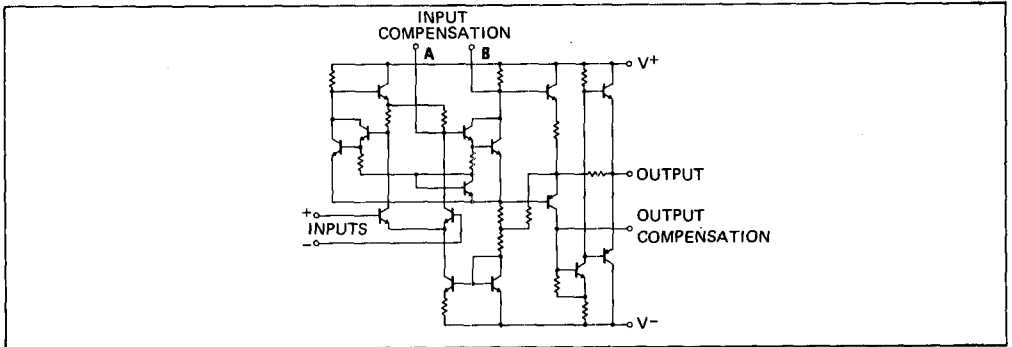
These devices are designed for use in operational amplifier signal processing, low level instrumentation, control systems and for the generation of special linear and non-linear transfer functions.

The RM709 operates over the full military temperature range from -55°C to +125°C. The RC709 is the commercial device intended to operate over a temperature range of 0°C to +70°C.

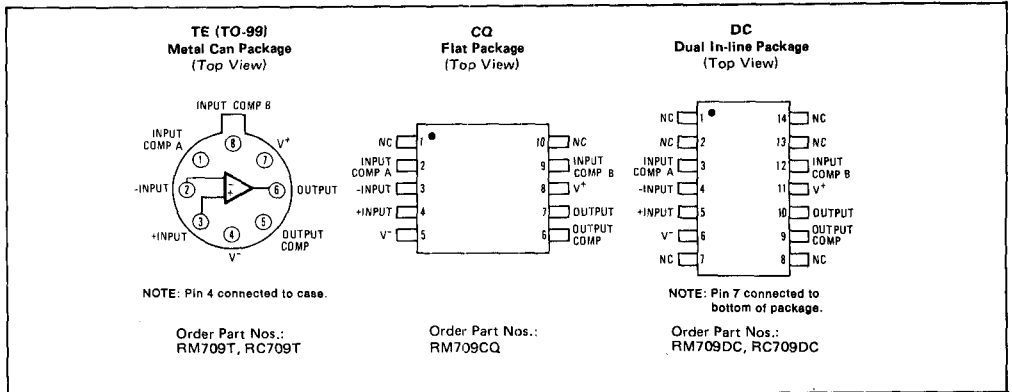
DESIGN FEATURES

- Low Input Offset Voltage $\pm 1.0\text{mV}$ Maximum
- Low Temperature Drift of Input Offset Voltage $\pm 6\mu\text{V}/^\circ\text{C}$ Maximum
- Low Temperature Drift of Input Offset Current (+25°C to +125°C) $0.3\text{nA}/^\circ\text{C}$ Maximum (-55°C to +25°C) $1.0\text{nA}/^\circ\text{C}$ Maximum
- Low Power Consumption 90mW Maximum
- High Performance Open Loop Gain Characteristics 45k Typical

SCHEMATIC DIAGRAM



CONNECTION INFORMATION



ABSOLUTE MAXIMUM RATINGS

| | | | |
|----------------------------|-------|---|-----------------|
| Supply Voltage | ±18V | Output Short-Circuit Duration (T _A = 25°C) | 5 sec |
| Differential Input Voltage | ±5V | Storage Temperature Range | -65°C to +150°C |
| Input Voltage | ±10V | Operating Temperature Range | |
| Power Dissipation (Note) | | RM709/709A | -55°C to +125°C |
| Dual In-line Package | 300mW | RC709 | 0°C to +70°C |
| TO-5 Package | 300mW | Lead Temperature (Soldering, 60s) | 300°C |
| Flat Package | 250mW | | |

ELECTRICAL CHARACTERISTICS (±9 ≤ V_S ≤ ±15V, T_A = 25°C unless otherwise specified)

| PARAMETER | CONDITIONS | RM709 | | | RC709 | | | UNITS |
|---|---|-------|-----|------|-------|------|-----|-------|
| | | MIN | TYP | MAX | MIN | TYP | MAX | |
| Input Offset Voltage | R _S ≤ 10kΩ | 1.0 | 3.0 | 2.0 | 7.5 | | | mV |
| Input Offset Current | | 25 | 100 | 100 | 500 | | | nA |
| Input Bias Current | | 180 | 300 | 300 | 1500 | | | nA |
| Input Resistance | | 220 | 400 | 50 | 250 | | | kΩ |
| Output Resistance | | | 150 | | 150 | | | Ω |
| Supply Current | V _S = ±15V | 2.6 | 4.0 | | 6.6 | | | mA |
| Power Consumption | V _S = ±15V | 80 | 120 | 80 | 200 | | | mW |
| Transient Response | R _L = 2kΩ, V _S = ±15V, V _{IN} = 20mV | | | | | | | |
| Rise Time | C ₁ = 5nF, R ₁ = 1.5k, C ₂ = 200pF, R ₂ = 50Ω | 0.3 | 1.0 | 0.3 | 1.0 | | | μs |
| Overshoot | C _L ≤ 100pF | 10 | 30 | 10 | 30 | | | % |
| Slew Rate | V _S = ±15V, R _L ≥ 10kΩ, A _V = 1 | 0.15 | 0.4 | | 0.4 | | | V/μs |
| Large Signal Voltage Gain | V _S = ±15V, R _L ≥ 2k, V _{OUT} = ±10V | | | 15 | 45 | | | kV/V |
| The following specifications apply for -55°C ≤ T_A ≤ +125°C for RM; 0°C ≤ T_A ≤ 70°C for RC. | | | | | | | | |
| Large Signal Voltage Gain | V _S = ±15V, R _L ≥ 2k, V _{OUT} = ±10V | 25 | 45 | 70 | 12 | | | kV/V |
| Input Offset Voltage | R _S ≤ 10kΩ | | | 4.0 | | 10 | | mV |
| Input Offset Current | T _A = max | | | 10 | | 100 | | nA |
| | T _A = min | | | 50 | | 300 | | 750 |
| Input Bias Current | T _A = min | | | 400 | | 1000 | | 2000 |
| Average Temperature of Coefficient of Input Offset Voltage | R _S = 50Ω, T _A = 25°C to T _A = max | | | 1.8 | | 10 | | μV/°C |
| | R _S = 50Ω, T _A = 25°C to T _A = min | | | 1.8 | | 10 | | |
| | R _S = 10k, T _A = 25°C to T _A = max | | | 2.0 | | 15 | | |
| | R _S = 10k, T _A = 25°C to T _A = min | | | 6.0 | | 15 | | |
| Average Temperature Coefficient of Input Offset Current | T _A = +25°C to max | | | | | | | nA/°C |
| | T _A = +25°C to min | | | | | | | |
| Input Voltage Range | V _S = ±15V | ±8.0 | ±10 | ±8.0 | ±10 | | | V |
| Output Voltage Swing | V _S = ±15V, R _L ≥ 10kΩ | ±12 | ±14 | ±12 | ±14 | | | V |
| | V _S = ±15V, R _L ≥ 2kΩ | ±10 | ±13 | ±10 | ±13 | | | |
| Input Resistance | T _A = min | 50 | 125 | 35 | 125 | | | kΩ |
| Common Mode Rejection Ratio | R _S ≤ 10kΩ | 70 | 90 | 65 | 90 | | | dB |
| Supply Voltage Rejection Ratio | R _S ≤ 10kΩ | 25 | 150 | 25 | 200 | | | μV/V |
| Supply Current | V _S = ±15V, T _A = max | | | | | | | mA |
| | V _S = ±15V, T _A = min | | | | | | | |
| Power Consumption | V _S = ±15V, T _A = max | | | | | | | mW |
| | V _S = ±15V, T _A = min | | | | | | | |

NOTE:

Derate linearly the maximum power dissipation of the dual in-line package at 8.6mW/°C for ambient temperature above +115°C, of the TO-5 package at 5.6mW/°C for ambient temperature above +95°C and of the flat package at 5.4mW/°C for ambient temperature above +103°C. For RC709, rating applies for case temperatures to +70°C.