MCBC1709
MCB1709F

Advance Information

MONOLITHIC OPERATIONAL AMPLIFIER

Beam-lead sealed-junction technology and fabrication make the MCBC1709 and MCB1709F devices excellent choices for military, aerospace, and commercial applications; usages requiring a high degree of reliability under environmental conditions of severe temperature extremes, mechanical shock, and high humidity. Beam-lead products employ a silicon-nitride dielectric that hermetically seals the chip, eliminating the need for a hermetic package. The beam leads are gold cantilevered structures extending from the chip. These beams bond readily to a gold metalized substrate providing one of the most reliable interconnection systems known for semiconductor devices.

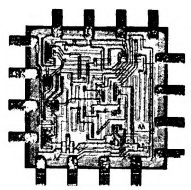
- High-Performance Open Loop Gain Characteristics
  A_{VOL} = 45,000 typical
- Low Temperature Drift – ±3.0 μV/°C
- Large Output Voltage Swing – ±14 V typical @ ±15 V Supply
- Low Output Impedance – Z_{out} = 150 ohms typical

MAXIMUM RATINGS (T_A = +25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Power Supply Voltage	V^+ V^-	+18 -18	Vdc
Differential Input Signal	V_{in}	±5.0	Volts
Common Mode Input Swing	CMV_{in}	$\pm V^+$	Volts
Load Current	I_L	10	mA
Output Short Circuit Duration	t_S	5.0	s
Power Dissipation Derate above T_A = +25°C	P_D	500 3.3	mW mW/°C
Operating Temperature Range	T_A	-55 to +125	°C
Storage Temperature Range	T_{stg}	-65 to +150	°C

OPERATIONAL AMPLIFIER
INTEGRATED CIRCUIT

MONOLITHIC SILICON



BEAM-LEAD CHIP
MCBC1709

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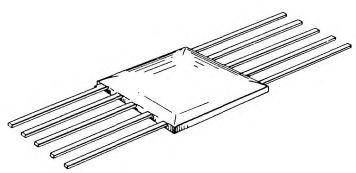
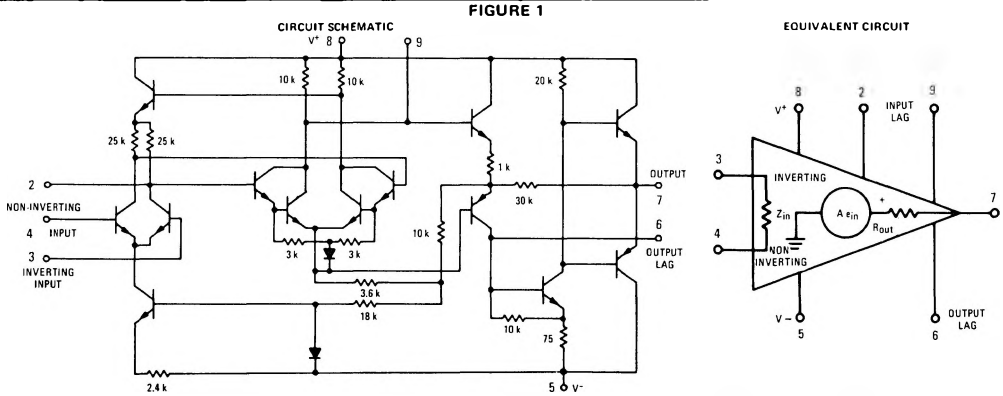


CASE 665
CERAMIC PACKAGE
MCB1709F

FIGURE 1



Pin numbers shown are for Case 665, refer to the chip bonding diagram for the corresponding beam connections.

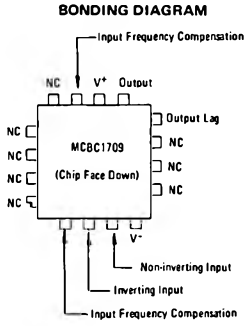
This is advance information on a new introduction and specifications are subject to change without notice.
See Packaging Information Section for outline dimensions.

ELECTRICAL CHARACTERISTICS (V^+ = +15 Vdc, V^- = -15 Vdc, T_A = +25°C unless otherwise noted)

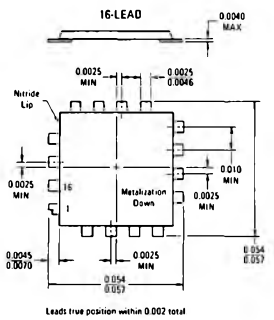
Characteristic	Symbol	MCBC1709 and MCB1709F			Unit
		Min	Typ	Max	
Open Loop Voltage Gain (V_o = ±10 V, T_A = -55°C to +125°C)	A_{VOL}	25,000	45,000	70,000	–
Output Impedance (f = 20 Hz)	Z_{out}	–	150	–	Ω
Input Impedance (f = 20 Hz)	Z_{in}	150	400	–	kΩ
Output Voltage Swing (R_L = 10 kΩ)	V_o	±12	±14	–	V_{peak}
(R_L = 2.0 kΩ)		±10	±13	–	
Input Common-Mode Voltage Swing	CMV_{in}	±8.0	±10	–	V_{peak}
Common-Mode Rejection Ratio (f = 20 Hz)	CM_{rej}	70	90	–	dB
Input Bias Current (T_A = +25°C)	I_b	–	0.2	0.5	μA
(T_A = -55°C)		–	0.5	1.5	
Input Offset Current (T_A = +25°C)	$\|I_{io}\|$	–	0.05	0.2	μA
(T_A = -55°C)		–	–	0.5	
(T_A = +125°C)		–	–	0.2	
Input Offset Voltage (T_A = +25°C)	$\|V_{io}\|$	–	1.0	5.0	mV
(T_A = -55°C to +125°C)		–	–	6.0	
Step Response					
Gain = 100, 5.0% overshoot, R_1 = 1.0 kΩ, R_2 = 100 kΩ, R_3 = 1.5 kΩ, C_1 = 100 pF, C_2 = 3.0 pF	t_f	–	0.8	–	μs
	t_{pd}	–	0.38	–	μs
	dV_{out}/dt ①	–	12	–	V/μs
Gain = 10, 10% overshoot, R_1 = 1.0 kΩ, R_2 = 10 kΩ, R_3 = 1.5 kΩ, C_1 = 500 pF, C_2 = 20 pF	t_f	–	0.6	–	μs
	t_{pd}	–	0.34	–	μs
	dV_{out}/dt ①	–	1.7	–	V/μs
Gain = 1, 5.0% overshoot, R_1 = 10 kΩ, R_2 = 10 kΩ, R_3 = 1.5 kΩ, C_1 = 5000 pF, C_2 = 200 pF	t_f	–	2.2	–	μs
	t_{pd}	–	1.3	–	μs
	dV_{out}/dt ①	–	0.25	–	V/μs
Average Temperature Coefficient of Input Offset Voltage (R_S = 50 Ω, T_A = -55°C to +125°C)	$\|TC_{Vio}\|$	–	3.0	–	μV/°C
(R_S ≤ 10 kΩ, T_A = -55°C to +125°C)		–	6.0	–	
DC Power Dissipation (Power Supply = ±15 V, V_o = 0)	P_D	–	80	165	mW
Positive Supply Sensitivity (V^- constant)	S^+	–	25	150	μV/V
Negative Supply Sensitivity (V^+ constant)	S^-	–	25	150	μV/V

① dV_{out}/dt = Slew Rate

BONDING DIAGRAM



Silicon Thickness = 2.0 mils nominal



PACKAGING AND HANDLING

The MCBC1709 beam-lead sealed-junction linear integrated circuit is available in chip form (non-encapsulated) as shown in the outline dimensional drawing. The shipping carrier for chips is a 2" square glass plate on which the chips are placed. A thin layer of polymer film covers the plate and retains the chips in place. The chips do not adhere to the film when it is lifted to remove them from the carrier. Care must be exercised when removing the chips from the carrier to ensure that the beams are not bent. A vacuum pickup is useful for this purpose.

See MC1709, MC1709C data sheet for typical characteristics curves.