

LINEAR INTEGRATED CIRCUITS

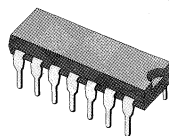


MC34004

JFET-INPUT QUAD OPERATIONAL AMPLIFIERS

- HIGH SLEW-RATE ... 13V/ μ s TYP.
- LOW POWER CONSUMPTION
- WIDE COMMON-RANGE AND DIFFERENTIAL VOLTAGE RANGES
- LOW INPUT BIAS AND OFFSET CURRENTS
- OUTPUT SHORT-CIRCUIT PROTECTION
- HIGH INPUT IMPEDANCE ... JFET-INPUT STAGE
- INTERNAL FREQUENCY COMPENSATION
- LATCH-UP-FREE OPERATION

The MC34004 JFET-input operational amplifiers are designed to offer high slew-rate, low input bias and offset current, and low offset voltage temperature coefficient. Each JFET-input operational amplifier incorporates well-matched, high-voltage JFET and bipolar transistors in a monolithic integrated circuit.



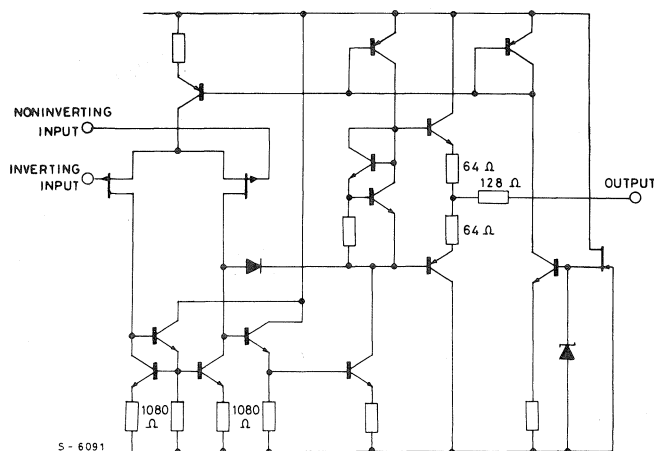
DIP-14
(Plastic and Ceramic)

ABSOLUTE MAXIMUM RATINGS

V_s	Supply voltage	± 18	V
V_{is}	Differential input voltage	± 30	V
V_i	Input voltage	± 16	V
T_{op}	Operating ambient temperature	0 to 70	$^{\circ}$ C
T_j	Operating junction temperature	115	$^{\circ}$ C
T_{stg}	Storage temperature	-65 to 150	$^{\circ}$ C

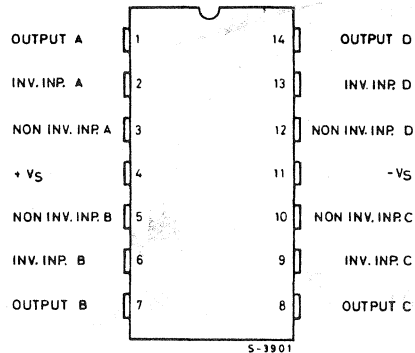
SCHEMATIC DIAGRAM

(one section)



CONNECTION DIAGRAM

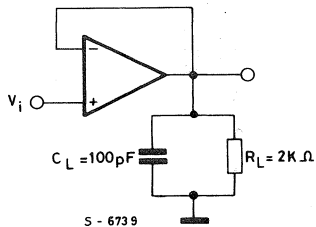
(top view)



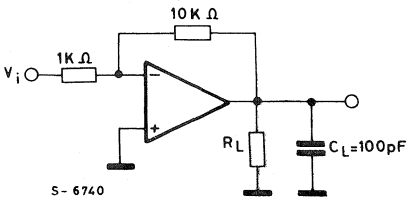
ORDERING NUMBERS

TYPE	PACKAGE	
	Plastic DIP-14	Ceramic DIP-14
MC34004	MC34004P	MC34004L
MC34004A	MC34004 AP	MC34004 AL
MC34004B	MC34004 BP	MC34004 BL

TEST CIRCUITS



Unity gain amplifier



Gain of 10 inverting amplifier

THERMAL DATA

			Ceramic DIP-14	Plastic DIP-14
R _{th j-amb}	Thermal resistance junction-ambient	max	150°C/W	200°C/W

**MC34004****ELECTRICAL CHARACTERISTICS** ($V_s = \pm 15V$, $T_{amb} = 25^\circ C$, otherwise specified)

Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_{OS} Input offset voltage	$R_s < 10K\Omega$	MC34004A		1	2	mV
		MC34004B		3	5	
		MC34004		5	10	
	$R_s < 10K\Omega$ $T_{amb} = \text{full range}$	MC34004A			4	
		MC34004B			7	
		MC34004			13	
$\frac{\Delta V_{OS}}{\Delta T}$ Input offset voltage drift	$R_s < 10K\Omega$ $T_{amb} = \text{full range}$			10		$\mu V/^\circ C$
I_{OS} Input offset current		MC34004A		25	50	pA
		MC34004B		25	100	
		MC34004		25	100	
	$T_{amb} = \text{full range}$	MC34004A			2	nA
		MC34004B			4	
		MC34004			4	
I_b Input bias current		MC34004A		50	100	pA
		MC34004B		50	200	
		MC34004		50	200	
	$T_{amb} = \text{full range}$	MC34004A			4	nA
		MC34004B			8	
		MC34004			8	
V_{CM} Common mode input voltage range			11	15 12		V
	$T_{amb} = \text{full range}$		± 11			
V_{OPP} Large signal voltage swing		$R_L > 10K\Omega$	± 12	± 14		V
		$R_L > 2K\Omega$	± 10	± 13		
	$T_{amb} = \text{full range}$	$R_L > 10K\Omega$	± 12			
		$R_L > 2K\Omega$	± 10			
G_V Large signal voltage gain	$R_L \geq 2K\Omega$ $V_o = \pm 10V$	MC34004A	50	150		V/mV
		MC34004B	50	150		
		MC34004	25	100		
	$R_L \geq 2K\Omega$ $V_o = \pm 10V$ $T_{amb} = \text{full range}$	MC34004A	25			
		MC34004B	25			
		MC34004	25			
B Unity gain bandwidth				4		MHz
R_i Input resistance				10^{12}		Ω
CMR Common mode rejection	$R_s < 10K\Omega$	MC34004A	80	100		dB
		MC34004B	80	100		
		MC34004	70	100		
	$T_{amb} = \text{full range}$	MC34004A	80			
		MC34004B	80			
		MC34004	70			

ELECTRICAL CHARACTERISTICS (continued)

Parameter	Test Conditions		Min.	Typ.	Max.	Unit
SVR Supply voltage rejection	$R_s < 10K\Omega$	MC34004A	80	100		dB
		MC34004B	80	100		
		MC34004	70	100		
	$T_{amb} = \text{full range}$	MC34004A	80			
		MC34004B	80			
		MC34004	70			
I_S Supply current	$R_L = \infty$	MC34004A		5.6	10	mA
		MC34004B		5.6	10	
		MC34004		5.6	10.8	
	$R_L = \infty$ $T_{amb} = \text{full range}$	MC34004A			11.2	
		MC34004B			11.2	
		MC34004			12	
SR Slew-rate at unity gain	$V_I = 10V$ $C_L = 100pF$	$R_L = 2K\Omega$		13		$V/\mu s$
e_N Total input noise voltage	$f = 1KHz$			25		$\frac{nV}{\sqrt{Hz}}$
i_N Total input noise current				0.01		$\frac{pA}{\sqrt{Hz}}$

Fig. 1 - Maximum peak to peak output voltage vs. frequency

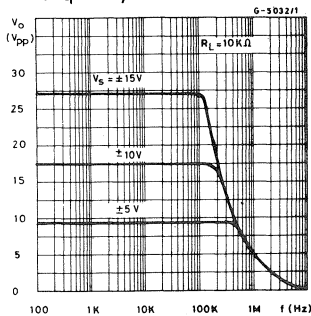


Fig. 2 - Maximum peak to peak output voltage vs. frequency

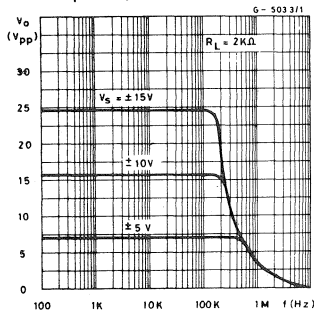


Fig. 3 - Maximum peak to peak output voltage vs. load resistance

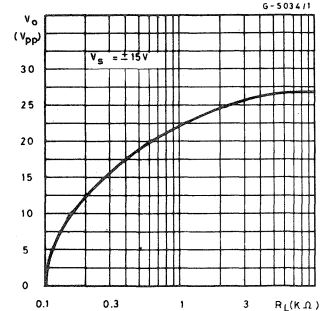


Fig. 4 - Input bias current vs. temperature

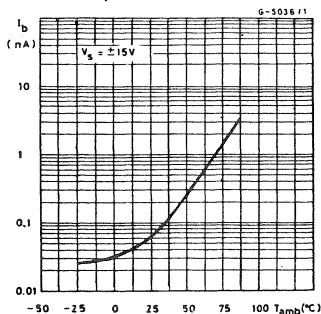


Fig. 5 - Supply current vs. temperature

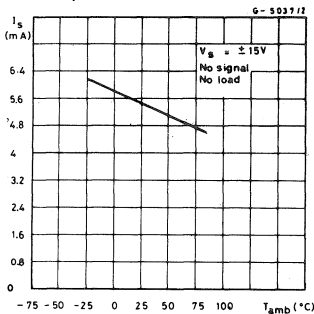


Fig. 6 - Supply current vs. supply voltage

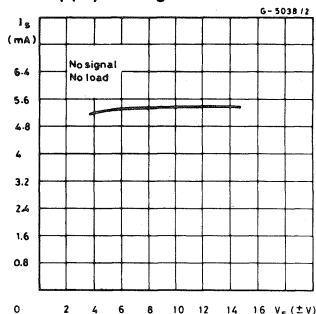


Fig. 7 - Large signal voltage gain and phase shift vs. frequency

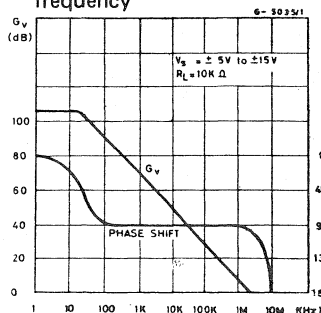


Fig. 8 - Equivalent input noise voltage vs. frequency

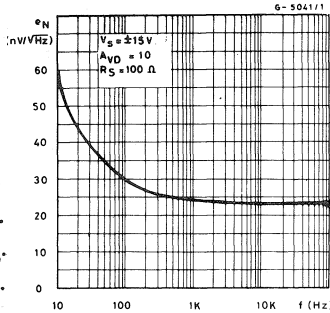
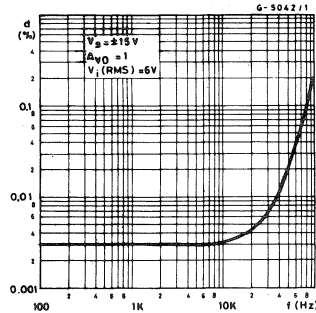
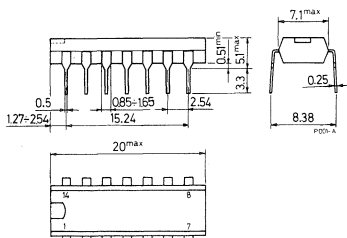


Fig. 9 - Total harmonic distortion vs. frequency



MECHANICAL DATA (Dimensions in mm)

DIP-14 (Plastic)



DIP-14 (Ceramic)

