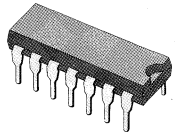
LINEAR INTEGRATED CIRCUITS

SGS **MC34004**

JFET-INPUT QUAD OPERATIONAL AMPLIFIERS

- HIGH SLEW-RATE ... 13V/μs 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.



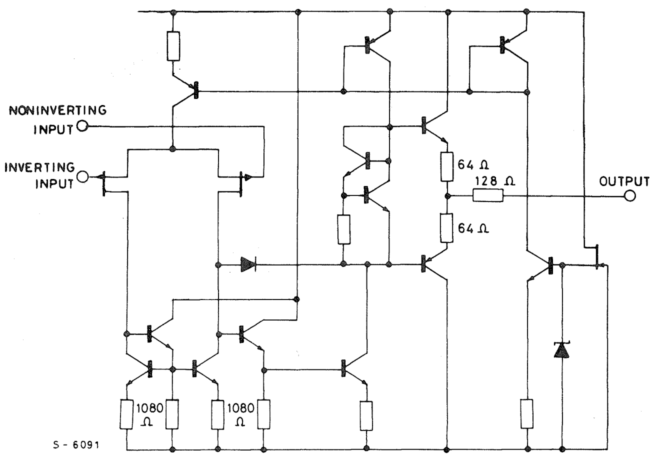
DIP-14
(Plastic and Ceramic)

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	°C
T_j	Operating junction temperature	115	°C
T_{stg}	Storage temperature	-65 to 150	°C

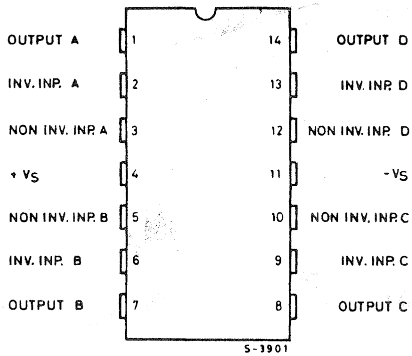
SCHEMATIC DIAGRAM

(one section)



CONNECTION DIAGRAM

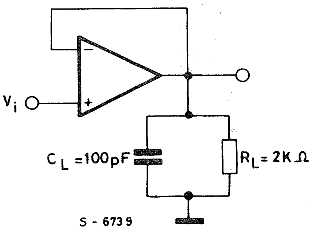
(top view)



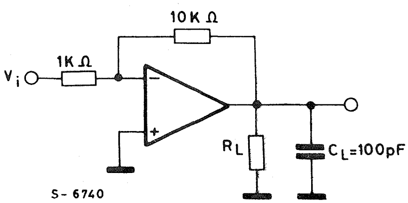
ORDERING NUMBERS

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
$R_{th\ j\text{-}amb}$	Thermal resistance junction-ambient	max	150°C/W	200°C/W

ELECTRICAL CHARACTERISTICS ($V_s = \pm 15V$, $T_{amb} = 25°C$, 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} = full range	MC34004A			4	
			MC34004B			7	
			MC34004			13	
$\frac{\Delta V_{OS}}{\Delta T}$	Input offset voltage drift	$R_s < 10K\Omega$ T_{amb} = full range			10		$\mu V/°C$
I_{OS}	Input offset current		MC34004A		25	50	pA
			MC34004B		25	100	
			MC34004		25	100	
		T_{amb} = 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} = full range	MC34004A			4	nA
			MC34004B			8	
			MC34004			8	
V_{CM}	Common mode input voltage range			11	15 12		V
		T_{amb} = full range		± 11			
V_{OPP}	Large signal voltage swing		$R_L > 10K\Omega$	± 12	± 14		V
			$R_L > 2K\Omega$	± 10	± 13		
		T_{amb} = 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} = 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} = 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} = 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} = 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/µs
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

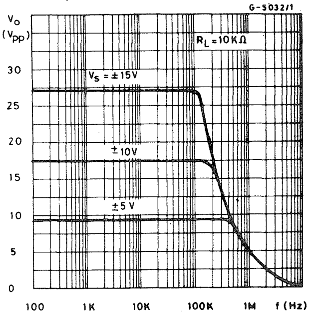


Fig. 2 - Maximum peak to peak output voltage vs. frequency

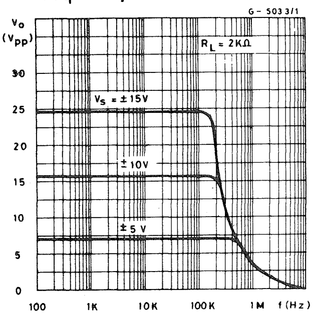


Fig. 3 - Maximum peak to peak output voltage vs. load resistance

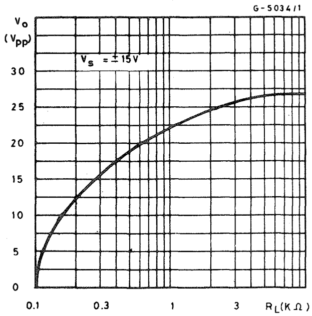


Fig. 4 - Input bias current vs. temperature

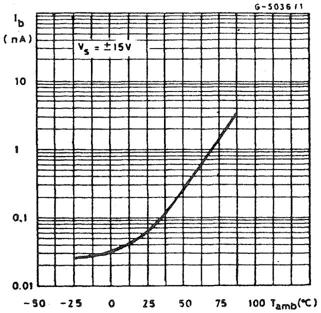


Fig. 5 - Supply current vs. temperature

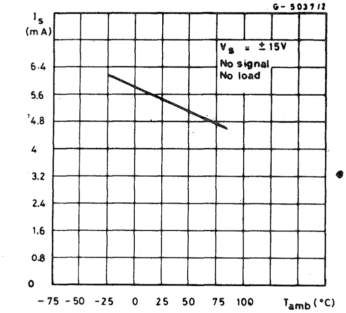


Fig. 6 - Supply current vs. supply voltage

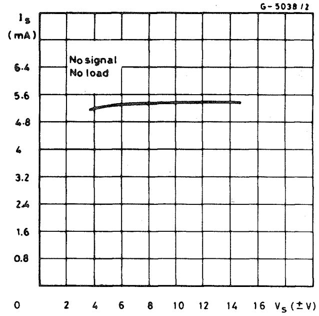


Fig. 7 - Large signal voltage gain and phase shift vs. frequency

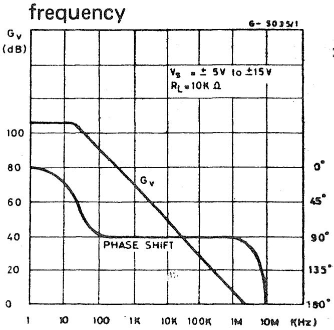


Fig. 8 - Equivalent input noise voltage vs. frequency

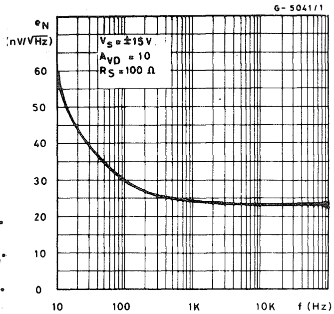
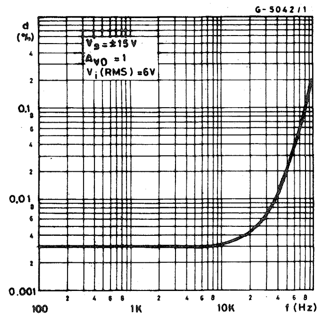
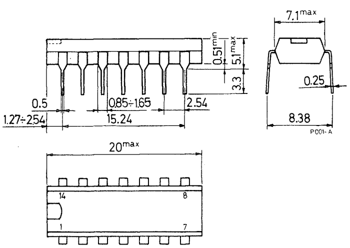


Fig. 9 - Total harmonic distortion vs. frequency



MECHANICAL DATA (Dimensions in mm)

DIP-14 (Plastic)



DIP-14 (Ceramic)