HIGH SPEED FET-INPUT OP AMPS
AD513, AD516

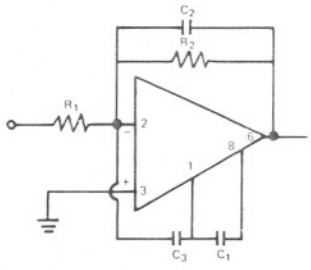
GENERAL DESCRIPTION

The AD513 and AD516 high speed FET op amps combine high DC accuracy with excellent dynamic response by utilizing the flexibility of external compensation. With simple lag compensation, the AD513 and AD516 achieve slew rate of 20V/μsec, and gain bandwidth of 1MHz at unity gain and 10MHz for gains greater than 100. With feedforward compensation a slew rate of 50V/μsec and gain bandwidth of 30MHz can be achieved. High accuracy DC specifications include max bias current as low as 20pA, a minimum gain of 50,000, and CMRR of 80dB.

The AD513 is suggested for all general purpose FET input amplifier requirements where low cost and frequency response flexibility are of prime importance. The AD516, with specifications otherwise similar to the AD513, offers significant improvement in offset voltage by supplementing the AD513 configuration with internal laser trimming of thin film resistors to provide typical offset voltages below 1mV.

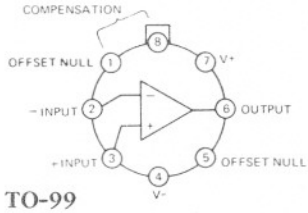
The devices are also fully short circuit protected and can be externally offset voltage nulled. All the circuits are supplied in the TO-99 package in the same pin configuration as the AD101A and AD108/108A. The AD513J/AD516J and AD513K/AD516K are specified for 0 to +70°C temperature range operation; the AD513S/AD516S for operation from -55°C to +125°C.

TYPICAL COMPENSATING SCHEMES



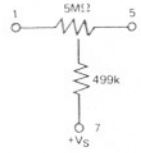
Gain (Inv)	1	1	10	10	10	100	100
R_1 (Ω)	10k	10k	10k	1k	1k	1k	100
R_2 (Ω)	10k	10k	100k	10k	10k	100k	10k
C_1 (pF)	30	1	8	1	0	1	0
C_2 (pF)	0	12	0	12	8	0	39
C_3 (pF)	0	150	0	0	150	0	0
BW (kHz)	1000	1000	500	1000	1000	100	300
Slew Rate (V/μs)	5	50	20	30	50	6	15

PIN CONFIGURATION
Top View



TO-99

Offset Nulling Scheme



ELECTRICAL SPECIFICATIONS (Typical @ +25°C and ±15VDC unless otherwise specified.)

Parameter	AD513J/AD516J	AD513K/AD516K	AD513S/AD516S
Open Loop Gain (Note 1)			
V_{OUT} = ±10V, $R_L \geq 2k\Omega$	20,000 min	50,000 min	50,000 min
T_A = min to max	15,000 min	40,000 min	40,000 min
Output Characteristics			
Voltage at R_L = 2kΩ, T_A = min to max	±10V min	*	*
at R_L = 10kΩ, T_A = min to max	±12V min	*	*
Load Capacitance, Unity Gain (Note 2)	1000pF	*	*
Short Circuit Current	25mA	*	*
Frequency Response			
Unity Gain, Small Signal (Feedforward)	1MHz	*	*
Slew Rate, Unity Gain (Feedforward)	50V/μsec	*	*
Input Offset Voltage (Note 3)	50mV max/3.5mV max	20mV max/1.5mV max	20mV max/1.5mV max
vs Temperature, T_A = min to max	75μV/°C max	25μV/°C max	50μV/°C max
vs Supply, T_A = min to max	300μV/V max	200μV/V max	200μV/V max
Input Bias Current			
Either Input (Note 4)	30pA max	20pA max	20pA max
Input Impedance			
Differential	$10^{11}\Omega \| 2pF$	*	*
Common Mode	$10^{11}\Omega \| 2pF$	*	*
Input Noise			
Voltage, 0.1Hz to 10Hz	15μV (p-p)	*	*
5Hz to 50kHz	5μV (rms)	*	*
f = 1kHz (spot noise)	$25nV/\sqrt{Hz}$	*	*
Input Voltage Range			
Differential	$\pm 2V_S$	*	*
Common Mode, T_A = min to max	±10V min	*	*
Common Mode Rejection, V_{in} = ±10V	70dB min	*	*
Power Supply			
Rated Performance	±15V	*	*
Operating	±(5 to 18)V	*	*
Quiescent Current	7mA max	*	*
Temperature			
Operating, Rated Performance	0 to +70°C	*	-55°C to +125°C
Storage	-65°C to +150°C	*	*
Price			
(1-24)	$11.00/$13.00	$13.50/$15.50	$21.00/$26.50
(25-99)	$9.00/$11.00	$10.80/$12.80	$16.80/$21.80
(100-999)	$7.50/$9.50	$9.00/$11.00	$14.00/$17.60

NOTES:
1. Open Loop Gain is specified with V_{OS} both nulled and unnulled.
2. A conservative design would not exceed 500pF of load capacitance.
3. Input Offset Voltage specifications are guaranteed after 5 minutes of operation at T_A = +25°C.
4. Bias Current specifications are guaranteed after 5 minutes of operation at T_A = +25°C. For higher temperatures, the current doubles every +10°C.

*Specifications same as for AD513J.