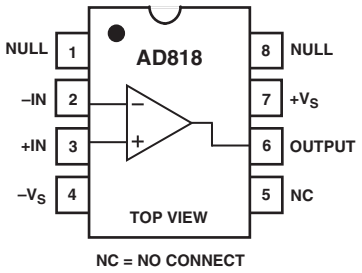
Low Cost, Low Power Video Op Amp

AD818

FEATURES
Low Cost
Excellent Video Performance
55 MHz 0.1 dB Bandwidth (Gain = +2)
0.01% and 0.05° Differential Gain and Phase Errors
High Speed
130 MHz Bandwidth (3 dB, G = +2)
100 MHz Bandwidth (3 dB, G+ = –1)
500 V/μs Slew Rate
80 ns Settling Time to 0.01% (V_O = 10 V Step)
High Output Drive Capability
50 mA Minimum Output Current
Ideal for Driving Back Terminated Cables
Flexible Power Supply
Specified for Single (+5 V) and Dual (±5 V to ±15 V) Power Supplies
Low Power: 7.5 mA Max Supply Current
Available in 8-Lead SOIC and 8-Lead PDIP

CONNECTION DIAGRAM

8-Lead Plastic Mini-DIP (N) and SOIC (R) Packages



GENERAL DESCRIPTION

The AD818 is a low cost video op amp optimized for use in video applications that require gains equal to or greater than +2 or –1. The AD818's low differential gain and phase errors, single supply functionality, low power, and high output drive make it ideal for cable driving applications such as video cameras and professional video equipment.

With video specs like 0.1 dB flatness to 55 MHz and low differential gain and phase errors of 0.01% and 0.05°, along with 50 mA of output current, the AD818 is an excellent choice for any video application. The 130 MHz 3 dB bandwidth (G = +2) and 500 V/μs slew rate make the AD818 useful in many high speed applications including video monitors, CATV, color copiers, image scanners, and fax machines.

The AD818 is fully specified for operation with a single +5 V power supply and with dual supplies from ±5 V to ±15 V. This power supply flexibility, coupled with a very low supply current of 7.5 mA and excellent ac characteristics under all power supply conditions, make the AD818 the ideal choice for many demanding yet power sensitive applications.

The AD818 is a voltage feedback op amp and excels as a gain stage in high speed and video systems (gain ≥ 2, or gain ≤ –1). It achieves a settling time of 45 ns to 0.1%, with a low input offset voltage of 2 mV max.

The AD818 is available in low cost, small 8-lead PDIP and SOIC packages.

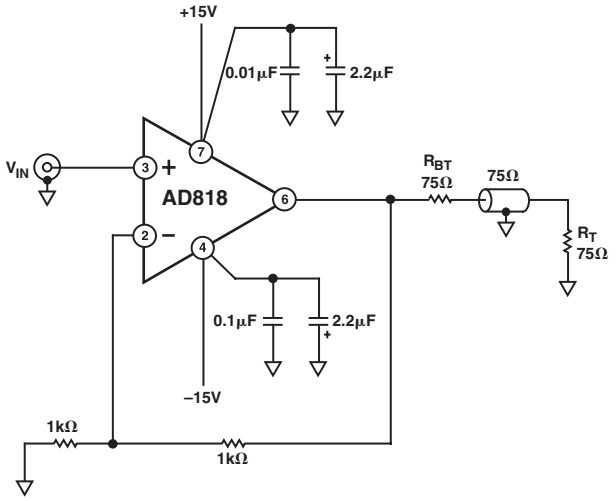


Figure 1. Video Line Driver

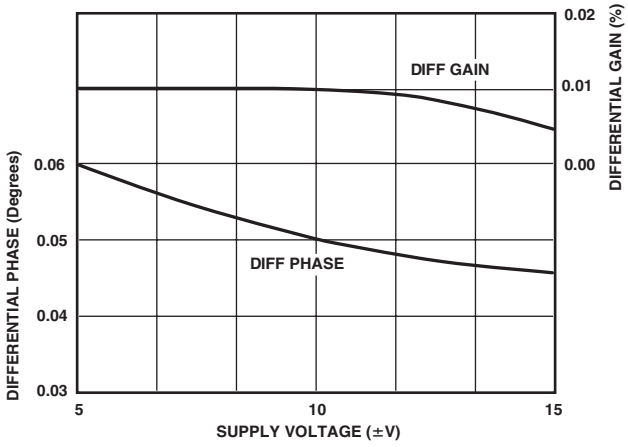


Figure 2. Differential Gain and Phase vs. Supply

AD818—SPECIFICATIONS (@ T_A = 25°C, unless otherwise noted.)

Parameter	Conditions	V_S	AD818A Min	AD818A Typ	AD818A Max	Unit
DYNAMIC PERFORMANCE						
–3 dB Bandwidth	Gain = +2	±5 V	70	95		MHz
		±15 V	100	130		MHz
		0 V, +5 V	40	55		MHz
	Gain = –1	±5 V	50	70		MHz
		±15 V	70	100		MHz
		0 V, +5 V	30	50		MHz
Bandwidth for 0.1 dB Flatness	Gain = +2	±5 V	20	43		MHz
	C_C = 2 pF	±15 V	40	55		MHz
		0 V, +5 V	10	18		MHz
	Gain = –1	±5 V	18	34		MHz
	C_C = 2 pF	±15 V	40	72		MHz
		0 V, +5 V	10	19		MHz
Full Power Bandwidth*	V_{OUT} = 5 V p-p					
	R_{LOAD} = 500 Ω	±5 V		25.5		MHz
	V_{OUT} = 20 V p-p					
	R_{LOAD} = 1 kΩ	±15 V		8.0		MHz
Slew Rate	R_{LOAD} = 1 kΩ	±5 V	350	400		V/µs
	Gain = –1	±15 V	450	500		V/µs
		0 V, +5 V	250	300		V/µs
Settling Time to 0.1%	–2.5 V to +2.5 V	±5 V		45		ns
	0 V–10 V Step, A_V = –1	±15 V		45		ns
Settling Time to 0.01%	–2.5 V to +2.5 V	±5 V		80		ns
	0 V–10 V Step, A_V = –1	±15 V		80		ns
Total Harmonic Distortion	F_C = 1 MHz	±15 V		63		dB
Differential Gain Error	NTSC	±15 V		0.005	0.01	%
(R_L = 150 Ω)	Gain = +2	±5 V		0.01	0.02	%
		0 V, +5 V		0.08		%
Differential Phase Error	NTSC	±15 V		0.045	0.09	Degrees
(R_L = 150 Ω)	Gain = +2	±5 V		0.06	0.09	Degrees
		0 V, +5 V		0.1		Degrees
Cap Load Drive				10		pF
INPUT OFFSET VOLTAGE		±5 V to ±15 V		0.5	2	mV
	T_{MIN} to T_{MAX}				3	mV
Offset Drift				10		µV/°C
INPUT BIAS CURRENT		±5 V, ±15 V		3.3	6.6	µA
	T_{MIN}				10	µA
	T_{MAX}				4.4	µA
INPUT OFFSET CURRENT		±5 V, ±15 V		25	300	nA
	T_{MIN} to T_{MAX}				500	nA
Offset Current Drift				0.3		nA/°C
OPEN-LOOP GAIN	V_{OUT} = ±2.5 V	±5 V				
	R_{LOAD} = 500 Ω		3	5		V/mV
	T_{MIN} to T_{MAX}		2			V/mV
	R_{LOAD} = 150 Ω		2	4		V/mV
	V_{OUT} = ±10 V	±15 V				
	R_{LOAD} = 1 kΩ		6	9		V/mV
	T_{MIN} to T_{MAX}		3			V/mV
	V_{OUT} = ±7.5 V	±15 V				
	R_{LOAD} = 150 Ω					
	(50 mA Output)		3	5		V/mV
COMMON-MODE REJECTION	V_{CM} = ±2.5 V	±5 V	82	100		dB
	V_{CM} = ±12 V	±15 V	86	120		dB
	T_{MIN} to T_{MAX}	±15 V	84	100		dB

Parameter	Conditions	V_S	AD818A Min	Typ	Max	Unit
POWER SUPPLY REJECTION	V_S = ±5 V to ±15 V		80	90		dB
	T_{MIN} to T_{MAX}		80			dB
INPUT VOLTAGE NOISE	f = 10 kHz	±5 V, ±15 V		10		nV/√Hz
INPUT CURRENT NOISE	f = 10 kHz	±5 V, ±15 V		1.5		pA/√Hz
INPUT COMMON-MODE VOLTAGE RANGE		±5 V	+3.8	+4.3		V
			–2.7	–3.4		V
		±15 V	+13	+14.3		V
			–12	–13.4		V
		0 V, +5 V	+3.8	+4.3		V
			+1.2	+0.9		V
OUTPUT VOLTAGE SWING	R_{LOAD} = 500 Ω	±5 V	3.3	3.8		±V
	R_{LOAD} = 150 Ω	±5 V	3.2	3.6		±V
	R_{LOAD} = 1 kΩ	±15 V	13.3	13.7		±V
	R_{LOAD} = 500 Ω	±15 V	12.8	13.4		±V
	R_{LOAD} = 500 Ω	0 V, +5 V	1.5, 3.5			V
Output Current		±15 V	50			mA
		±5 V	50			mA
		0 V, +5 V	30			mA
Short-Circuit Current		±15 V		90		mA
INPUT RESISTANCE				300		kΩ
INPUT CAPACITANCE				1.5		pF
OUTPUT RESISTANCE	Open Loop			8		Ω
POWER SUPPLY						
Operating Range	Dual Supply		±2.5		±18	V
	Single Supply		+5		+36	V
Quiescent Current		±5 V		7.0	7.5	mA
	T_{MIN} to T_{MAX}	±5 V			7.5	mA
		±15 V			7.5	mA
	T_{MIN} to T_{MAX}	±15 V		7.0	7.5	mA

*Full power bandwidth = slew rate/(2π V_{PEAK}).

Specifications subject to change without notice.

ABSOLUTE MAXIMUM RATINGS[1]

Supply Voltage	±18 V
Internal Power Dissipation[2]	
Plastic (N)	See Derating Curves
Small Outline (R)	See Derating Curves
Input Voltage (Common Mode)	$\pm V_S$
Differential Input Voltage	±6 V
Output Short-Circuit Duration	See Derating Curves
Storage Temperature Range (N, R)	–65°C to +125°C
Operating Temperature Range	–40°C to +85°C
Lead Temperature Range (Soldering 10 sec)	300°C

NOTES

[1]Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

[2]Specification is for device in free air: 8-lead plastic package, θ_{JA} = 90°C/W; 8-lead SOIC package, θ_{JA} = 155°C/W.

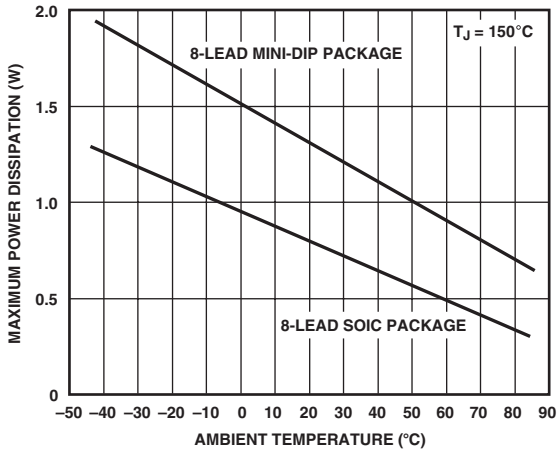


Figure 3. Maximum Power Dissipation vs. Temperature for Different Package Types

ORDERING GUIDE

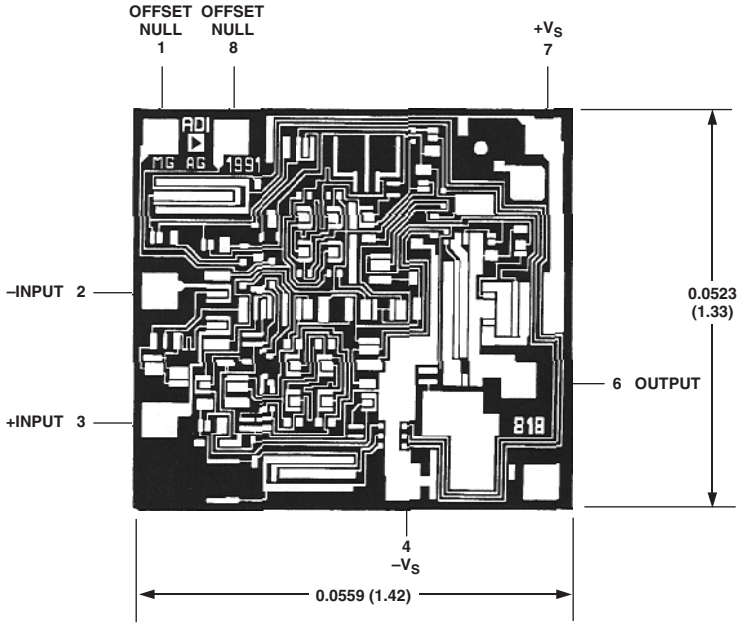
Model	Temperature Range	Package Description	Package Option
AD818AN	–40°C to +85°C	8-Lead Plastic PDIP	N-8
AD818AR	–40°C to +85°C	8-Lead Plastic SOIC	R-8
AD818AR-REEL	–40°C to +85°C	13" Tape and Reel	R-8
AD818AR-REEL7	–40°C to +85°C	7" Tape and Reel	R-8

CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although the AD818 features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

METALLIZATION PHOTOGRAPH

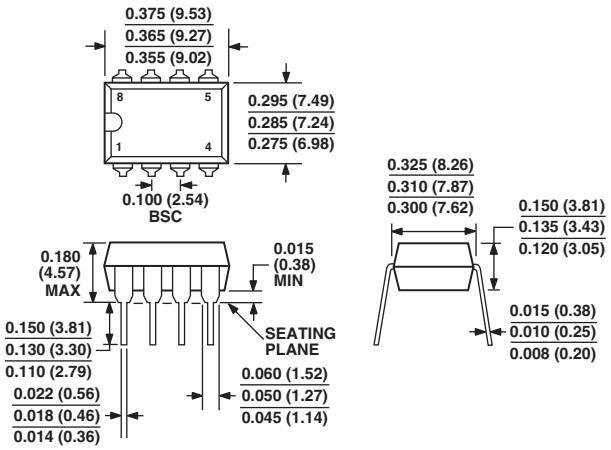
Dimensions shown in inches and (mm)



OUTLINE DIMENSIONS

8-Lead Plastic Dual In-Line Package [PDIP]
(N-8)

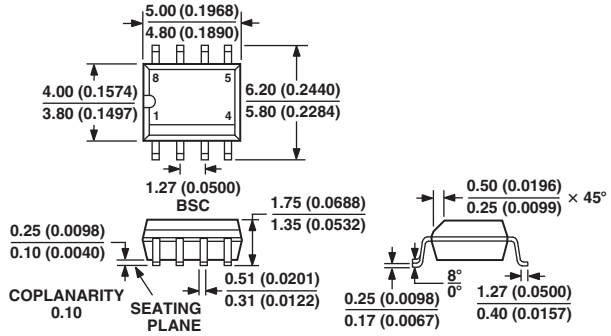
Dimensions shown in inches and (millimeters)



COMPLIANT TO JEDEC STANDARDS MO-095AA
CONTROLLING DIMENSIONS ARE IN INCHES; MILLIMETER DIMENSIONS
(IN PARENTHESES) ARE ROUNDED-OFF INCH EQUIVALENTS FOR
REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN

8-Lead Standard Small Outline Package [SOIC]
(R-8)

Dimensions shown in millimeters and (inches)



COMPLIANT TO JEDEC STANDARDS MS-012AA
CONTROLLING DIMENSIONS ARE IN MILLIMETERS; INCH DIMENSIONS
(IN PARENTHESES) ARE ROUNDED-OFF MILLIMETER EQUIVALENTS FOR
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