Dual/Quad Single-Supply Operational Amplifiers

OP292/OP492

FEATURES

Single-Supply Operation: 4.5 V to 33 V
Input Common-Mode Includes Ground
Output Swings to Ground
High Slew Rate: 3 V/μs
High Gain Bandwidth: 4 MHz
Low Input Offset Voltage
High Open-Loop Gain
No Phase Inversion
Low Cost

APPLICATIONS

Disk Drives
Mobile Phones
Servo Controls
Modems and Fax Machines
Pagers
Power Supply Monitors and Controls
Battery-Operated Instrumentation

GENERAL DESCRIPTION

The OP292/OP492 are low cost, general purpose dual and quad operational amplifiers designed for single-supply applications and are ideal for 5 olt systems.

Fabricated on Analog Devices' CBCMOS process, the OP292/OP492 series has a PNP input stage that allows the input voltage range to include ground. A BiCMOS output stage enables the output to swing to ground while sinking current.

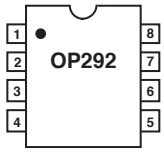
The OP292/OP492 series is unity-gain stable and features an outstanding combination of speed and performance for single- or dual-supply operation. The OP292/OP492 provide high slew rate, high bandwidth, with open-loop gain exceeding 40,000 and offset voltage under 800 Ω (OP292) and 1 mV (OP492). With these combinations of features and low supply current, the OP292/OP492 series is an excellent choice for battery-operated applications.

The OP292/OP492 series performance is specified for single- or dual-supply voltage operation over the extended industrial temperature range (–40°C to +125°C).

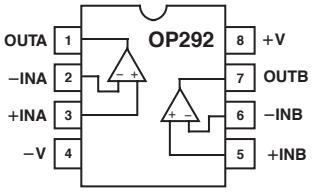
Package options for the OP292 and OP492 include plastic DIP, SO-8 (OP292) and SO-14.

PIN CONNECTIONS

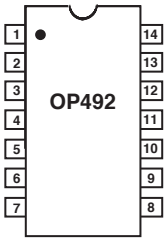
8-Lead Narrow-Body SOIC (S-Suffix)



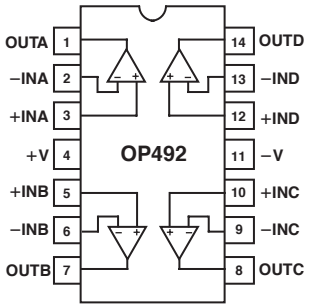
8-Lead Epoxy DIP (P-Suffix)



14-Lead Narrow-Body SOIC (S-Suffix)



14-Lead Epoxy DIP (P-Suffix)



OP292/OP492–SPECIFICATIONS

ELECTRICAL CHARACTERISTICS (@ V_S = 5 V, VC_M = 0 V, V_O = 2 V, T_A = 25°C unless otherwise noted.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage						
OP292	V_{OS}			0.1	0.8	mV
		$-40°C \le T_A \le +85°C$		0.3	1.2	mV
		$-40°C \le T_A \le +125°C$		0.5	2.5	mV
OP492	V_{OS}			0.1	1	mV
		$-40°C \le T_A \le +85°C$		0.3	1.5	mV
		$-40°C \le T_A \le +125°C$		0.5	2.5	mV
Input Bias Current	I_B			450	700	nA
		$-40°C \le T_A \le +85°C$		0.75	2.5	µA
		$-40°C \le T_A \le +125°C$		3.0	5.0	µA
Input Offset Current	I_{OS}			7	50	nA
		$-40°C \le T_A \le +85°C$		100	700	nA
		$-40°C \le T_A \le +125°C$		0.4	1.2	µA
Input Voltage Range			0		4.0	V
Common-Mode Rejection Ratio	CMRR	V_{CM} = 0 V to 4.0 V	75	95		dB
		$-40°C \le T_A \le +85°C$	70	93		dB
		$-40°C \le T_A \le +125°C$	65	90		dB
Large-Signal Voltage Gain	A_{VO}	R_L = 10 kΩ, V_O = 0.1 V to 4 V	25	200		V/mV
		$-40°C \le T_A \le +85°C$	10	100		V/mV
		$-40°C \le T_A \le +125°C$	5	50		V/mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	$-40°C \le T_A \le +125°C$		2	10	µV/°C
Long-Term V_{OS} Drift	$\Delta V_{OS}/\Delta T$	Note 1		1		µV/Month
Bias Current Drift	$\Delta I_B/\Delta T$	$-40°C \le T_A \le +85°C$		6		pA/°C
		$-40°C \le T_A \le +125°C$		400		pA/°C
Offset Current Drift	$\Delta I_{OS}/\Delta T$	$-40°C \le T_A \le +85°C$		1.5		pA/°C
		$-40°C \le T_A \le +125°C$		2		pA/°C
OUTPUT CHARACTERISTICS						
Output Voltage Swing						
High	V_{OUT}	R_L = 100 kΩ to GND				
		$-40°C \le T_A \le +125°C$	4.0	4.3		V
		R_L = 2 kΩ to GND	3.8	4.1		V
		$-40°C \le T_A \le +125°C$	3.7	3.9		V
Low	V_{OUT}	R_L = 100 kΩ to V+		8	20	mV
		$-40°C \le T_A \le +125°C$		12	20	mV
		R_L = 2 kΩ to V+		280	450	mV
		$-40°C \le T_A \le +125°C$		300	550	mV
Short-Circuit Current Limit	I_{SC}		5	8		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_S = 4.5 V to 30 V, V_O = 2 V	75	95		dB
		$-40°C \le T_A \le +125°C$	70	90		dB
Supply Current Per Amp	I_{SY}	V_O = 2 V				
OP292, OP492				0.8	1.2	mA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L = 10 kΩ		3		V/µs
		$-40°C \le T_A \le +125°C$	1	2		V/µs
Gain Bandwidth Product	GBP			4		MHz
Phase Margin	ϕ_m			75		Degrees
Channel Separation	CS	f_O = 1 kHz		100		dB
NOISE PERFORMANCE						
Voltage Noise	e_n p-p	0.1 Hz to 10 Hz		25		µV p-p
Voltage Noise Density	e_n	f = 1 kHz		15		nV/√Hz
Current Noise Density	i_n			0.7		pA/√Hz

NOTES

[1]Long-term offset voltage drift is guaranteed by 1,000 hours life test performed on three independent wafer lots at 125 °C with LTPD of 1.3.

Specifications subject to change without notice.

ELECTRICAL CHARACTERISTICS (@ V_S = 5 V, VC_M = 0 V, V_O = 2 V, T_A = 25°C unless otherwise noted.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage						
OP292	V_{OS}			1.0	2.0	mV
		–40°C ≤ T_A ≤ +85°C		1.2	2.5	mV
		–40°C ≤ T_A ≤ +125°C		1.5	3	mV
OP492	V_{OS}			1.4	2.5	mV
		–40°C ≤ T_A ≤ +85°C		1.7	2.8	mV
		–40°C ≤ T_A ≤ +125°C		2	3	mV
Input Bias Current	I_B			375	700	nA
		–40°C ≤ T_A ≤ +125°C		0.5	1	µA
Input Offset Current	I_{OS}			7	50	nA
		–40°C ≤ T_A ≤ +85°C		20	100	nA
		–40°C ≤ T_A ≤ +125°C		0.4	1.2	µA
Input Voltage Range		Note 1	–11		11	V
Common-Mode Rejection Ratio	CMRR	V_{CM} = ±11 V	78	100		dB
		–40°C ≤ T_A ≤ +125°C	75	95		dB
Large-Signal Voltage Gain	A_{VO}	R_L = 10 kΩ, V_O = ±10 V	25	120		V/mV
		–40°C ≤ T_A ≤ +85°C	10	75		V/mV
		–40°C ≤ T_A ≤ +125°C	5	60		V/mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	–40°C ≤ T_A ≤ +125°C		4	10	µV/°C
Bias Current Drift	$\Delta I_B/\Delta T$	–40°C ≤ T_A ≤ +125°C		3		pA/°C
OUTPUT CHARACTERISTICS						
Output Voltage Swing	V_O	R_L = 2 kΩ to GND	±11	±12.2		V
		–40°C ≤ T_A ≤ +125°C	±10	±11		V
		R_L = 100 kΩ to GND	±13.8	±14.3		V
		–40°C ≤ T_A ≤ +125°C	±13.5	±14.0		mV
Short-Circuit Current Limit	I_{SC}	Short Circuit to GND	8	10.5		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_S = ±2.25 V to ±15 V	75	86		dB
		40°C ≤ T_A ≤ +125°C	70	83		dB
Supply Current Per Amp	I_{SY}	V_O = 0 V				
OP292, OP492				1	1.4	mA
DYNAMIC PERFORMANCE						
Slew Rate		SR R_L =10 kΩ	2.5	4		V/µs
		–40°C ≤ T_A ≤ +125°C	2	3		V/µs
Gain Bandwidth Product	GBP			4		MHz
Phase Margin	ϕ_m			75		Degrees
Channel Separation	CS	f_O = 1k Hz		100		dB
NOISE PERFORMANCE						
Voltage Noise	e_n p-p	0.1 Hz to 10 Hz		25		µV p-p
Voltage Noise Density	e_n	f = 1k Hz		15		nV/$\sqrt{\text{Hz}}$
Current Noise Density	i_n			0.7		pA/$\sqrt{\text{Hz}}$

NOTES

[1]Input voltage range is guaranteed by CMRR tests.

Specifications subject to change without notice.

ABSOLUTE MAXIMUM RATINGS[1]

Supply Voltage . . . . . 33 V
Input Voltage[2] . . . . . –15 V to +14 V
Differential Input Voltage[2] V
Output Short-Circuit Duration . . . . . UNLIMITED
Storage Temperature Range
P, S Package . . . . . –65°C to +150°C
Operating Temperature Range
OP292/OP492 P, S . . . . . –40°C to +125°C
Junction Temperature Range
P, S Package . . . . . –65°C to +125°C
Lead Temperature Range (Soldering, 60 sec) . . . . . 300°C

Package Type	θ_{JA}[3]	θ_{JC}	Unit
8-Pin Plastic DIP (P)	103	43	°C/W
14-Pin Plastic DIP (P)	83	39	°C/W
8-Pin SOIC (S)	158	43	°C/W
14-Pin SOIC (S)	120	36	°C/W

NOTES
[1]Absolute maximum ratings apply to both DICE and packaged parts, unless otherwise noted.
[2]For supply voltages less than 36 V, the absolute maximum input voltage is equal to the supply voltage.
[3]θ_{JA} is specified for the worst-case conditions, i.e., θ_{JA} is specified for device in socket for P-DIP package; θ_{JA} is specified for device soldered in circuit board for SOIC package.

ORDERING GUIDE

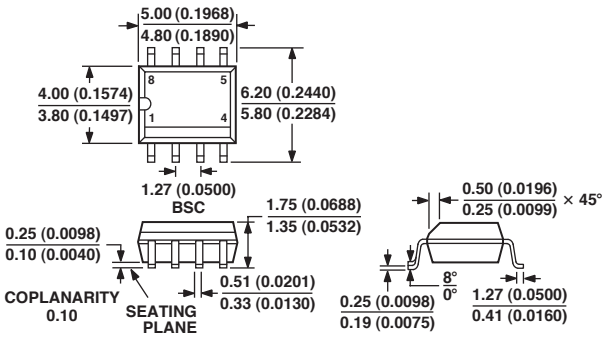
Model	Temperature Range	Package Option
OP292GP*	–40°C to +125°C	N-8
OP292GS	–40°C to +125°C	RN-8
OP492GP*	–40°C to +125°C	N-14
OP492GS	–40°C to +125°C	RN-14

*Not for new design, obsolete April 2002.

OUTLINE DIMENSIONS

8-Lead Standard Small Outline Package [SOIC]
Narrow Body
(RN-8)

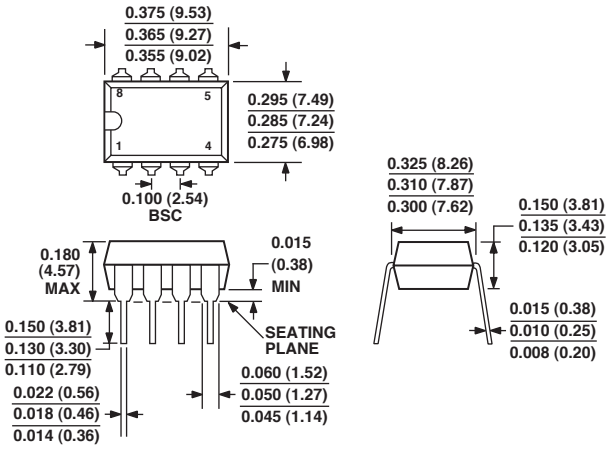
Dimensions shown in millimeters and (inches)



COMPLIANT TO JEDEC STANDARDS MS-012AA
CONTROLLING DIMENSIONS ARE IN MILLIMETERS; INCH DIMENSIONS
(IN PARENTHESES) ARE ROUNDED-OFF MILLIMETER EQUIVALENTS FOR
REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN

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

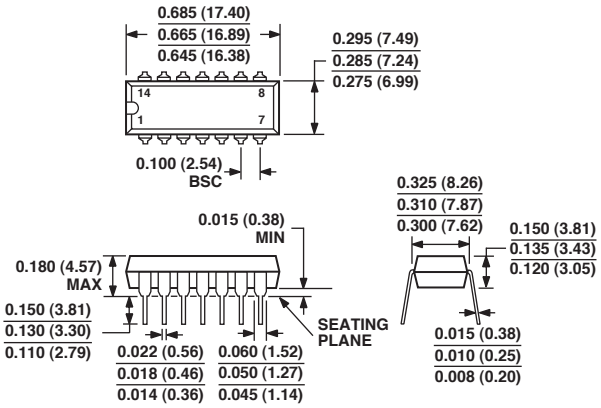
Dimensions shown in inches and (millimeters)



COMPLIANT TO JEDEC STANDARDS MO-095AA
CONTROLLING DIMENSIONS ARE IN INCHES; MILLIMETERS DIMENSIONS
(IN PARENTHESES)

14-Lead Plastic Dual-in-Line Package [PDIP]
(N-14)

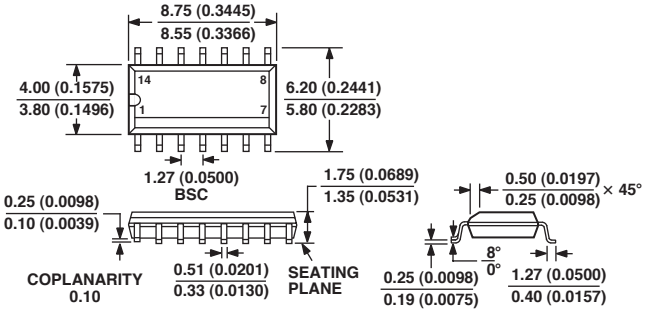
Dimensions shown in inches and (millimeters)



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

14-Lead Standard Small Outline Package [SOIC]
Narrow Body
(RN-14)

Dimensions shown in millimeters and (inches)



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