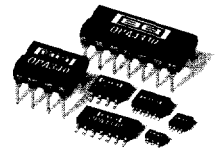
BURR-BROWN®



OPA340
OPA2340
OPA4340

www.burr-brown.com/databook/OPA340.html

SINGLE-SUPPLY, RAIL-TO-RAIL OPERATIONAL AMPLIFIERS

*Micro*Amplifier™ Series

FEATURES

- RAIL-TO-RAIL INPUT
- RAIL-TO-RAIL OUTPUT (within 1mV)
- *Micro*SIZE PACKAGES
- WIDE BANDWIDTH: 5.5MHz
- HIGH SLEW RATE: 6V/µs
- LOW THD+NOISE: 0.0007% (f = 1kHz)
- LOW QUIESCENT CURRENT: 750µA/channel
- SINGLE, DUAL, AND QUAD

APPLICATIONS

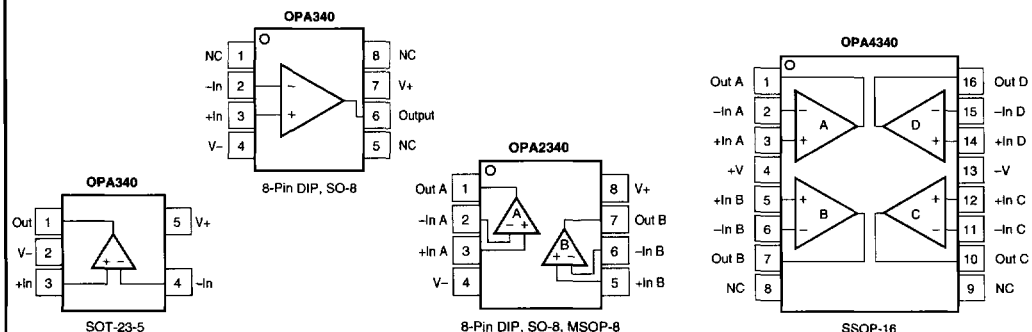
- DRIVING A/D CONVERTERS
- PCMCIA CARDS
- DATA ACQUISITION
- PROCESS CONTROL
- AUDIO PROCESSING
- COMMUNICATIONS
- ACTIVE FILTERS
- TEST EQUIPMENT

DESCRIPTION

OPA340 series rail-to-rail CMOS operational amplifiers are optimized for low voltage, single supply operation. Rail-to-rail input/output and high speed operation make them ideal for driving sampling analog-to-digital converters. They are also well suited for general purpose and audio applications as well as providing I/V conversion at the output of D/A converters. Single, dual, and quad versions have identical specifications for design flexibility.

The OPA340 series operates on a single supply as low as 2.5V with an input common-mode voltage range that extends 500mV below ground and 500mV above the positive supply. Output voltage swing is to within 1mV of the supply rails with a 100kΩ load. They offer excellent dynamic response (BW = 5.5MHz, SR = 6V/µs), yet quiescent current is only 750µA. Dual and quad designs feature completely independent circuitry for lowest crosstalk and freedom from interaction.

The single (OPA340) packages are the tiny 5-lead SOT-23-5 surface mount, SO-8 surface mount, and 8-pin DIP. The dual (OPA2340) comes in the miniature MSOP-8 surface mount, SO-8 surface mount, and 8-pin DIP packages. The quad (OPA4340) packages are the space-saving SSOP-16 surface mount, SO-14 surface mount, and the 14-pin DIP. All are specified from –40°C to +85°C and operate from –55°C to +125°C. A SPICE macromodel is available for design analysis.



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Internet: http://www.burr-brown.com/ • FAXLine: (800) 548-6133 (US/Canada Only) • Cable: BBRCORP • Telex: 066-6491 • FAX: (520) 889-1510 • Immediate Product Info: (800) 548-6132

SPECIFICATIONS: V_S = 2.7V to 5V

At T_A = +25°C, R_L = 10kΩ connected to $V_S/2$ and V_{OUT} = $V_S/2$, unless otherwise noted.
Boldface limits apply over the specified temperature range, T_A = –40°C to +85°C. V_S = 5V.

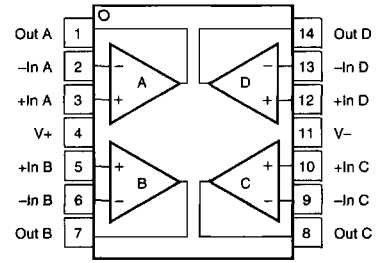
PARAMETER		CONDITION	OPA340NA, PA, UA OPA2340EA, PA, UA OPA4340EA, PA, UA MIN	TYP[1]	MAX	UNITS
OFFSET VOLTAGE						
Input Offset Voltage	V_{OS}	V_S = 5V		±150	±500	µV
vs Temperature	dV_{OS}/dT			**±2.5**		µV/°C
vs Power Supply	PSRR	V_S = 2.7V to 5.5V, V_{CM} = 0V		30	120	µV/V
T_A = –40°C to +85°C		V_S = 2.7V to 5.5V, V_{CM} = 0V			**120**	µV/V
Channel Separation, dc				0.2		µV/V
INPUT BIAS CURRENT						
Input Bias Current	I_B			±0.2	±10	pA
T_A = –40°C to +85°C					**±60**	pA
Input Offset Current	I_{OS}			±0.2	±10	pA
NOISE						
Input Voltage Noise, f = 0.1 to 50kHz				8		µVrms
Input Voltage Noise Density, f = 1kHz	e_n			25		nV/√Hz
Current Noise Density, f = 1kHz	i_n			3		fA/√Hz
INPUT VOLTAGE RANGE						
Common-Mode Voltage Range	V_{CM}		–0.3		(V+) +0.3	V
Common-Mode Rejection Ratio	CMRR	–0.3V < V_{CM} < (V+) –1.8V	80	92		dB
		V_S = 5V, –0.3V < V_{CM} < 5.3V	70	84		dB
		V_S = 2.7V, –0.3V < V_{CM} < 3V	66	80		dB
INPUT IMPEDANCE						
Differential				10^{13} ‖ 3		Ω ‖ pF
Common-Mode				10^{13} ‖ 6		Ω ‖ pF
OPEN-LOOP GAIN						
Open-Loop Voltage Gain	A_{OL}	R_L = 100kΩ, 5mV < V_O < (V+) –5mV	106	124		dB
T_A = –40°C to +85°C		R_L = 100kΩ, 5mV < V_O < (V+) –5mV	**106**			dB
		R_L = 10kΩ, 50mV < V_O < (V+) –50mV	100	120		dB
T_A = –40°C to +85°C		R_L = 10kΩ, 50mV < V_O < (V+) –50mV	**100**			dB
		R_L = 2kΩ, 200mV < V_O < (V+) –200mV	94	114		dB
T_A = –40°C to +85°C		R_L = 2kΩ, 200mV < V_O < (V+) –200mV	**94**			dB
FREQUENCY RESPONSE						
Gain-Bandwidth Product	GBW	G = 1		5.5		MHz
Slew Rate	SR	V_S = 5V, G = 1, C_L = 100pF		6		V/µs
Settling Time, 0.1%		V_S = 5V, 2V Step, C_L = 100pF		1		µs
0.01%		V_S = 5V, 2V Step, C_L = 100pF		1.6		µs
Overload Recovery Time		V_{IN} • G = V_S		0.2		µs
Total Harmonic Distortion + Noise	THD+N	V_S = 5V, V_O = 3Vp-p[2], G = 1, f = 1kHz		0.0007		%
OUTPUT						
Voltage Output Swing from Rail[3]		R_L = 100kΩ, A_{OL} ≥ 106dB		1	5	mV
T_A = –40°C to +85°C		R_L = 100kΩ, A_{OL} ≥ 106dB			**5**	mV
		R_L = 10kΩ, A_{OL} ≥ 100dB		10	50	mV
T_A = –40°C to +85°C		R_L = 10kΩ, A_{OL} ≥ 100dB			**50**	mV
		R_L = 2kΩ, A_{OL} ≥ 94dB		40	200	mV
T_A = –40°C to +85°C		R_L = 2kΩ, A_{OL} ≥ 94dB			**200**	mV
Short-Circuit Current	I_{SC}			±50		mA
Capacitive Load Drive	C_{LOAD}			See Typical Curve		
POWER SUPPLY						
Specified Voltage Range	V_S		2.7		5	V
Operating Voltage Range				2.5 to 5.5		V
Quiescent Current (per amplifier)	I_Q	I_O = 0, V_S = +5V		750	950	µA
T_A = –40°C to +85°C		I_O = 0, V_S = +5V			**1100**	µA
TEMPERATURE RANGE						
Specified Range			–40		+85	°C
Operating Range			–55		+125	°C
Storage Range			–55		+125	°C
Thermal Resistance	θ_{JA}					
SOT-23-5 Surface Mount				200		°C/W
MSOP-8 Surface Mount				150		°C/W
SO-8 Surface Mount				150		°C/W
8-Pin DIP				100		°C/W
SSOP-16 Surface Mount				100		°C/W
SO-14 Surface Mount				100		°C/W
14-Pin DIP				80		°C/W

NOTES: (1) V_S = +5V. (2) V_{OUT} = 0.25V to 3.25V. (3) Output voltage swings are measured between the output and power supply rails.

PIN CONFIGURATIONS

Top View SOIC/DIP

OPA4340



ELECTROSTATIC DISCHARGE SENSITIVITY

This integrated circuit can be damaged by ESD. Burr-Brown recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

ABSOLUTE MAXIMUM RATINGS[1]

Supply Voltage	5.5V
Signal Input Terminals, Voltage[2]	(V–) –0.5V to (V+) +0.5V
Current[2]	10mA
Output Short-Circuit[3]	Continuous
Operating Temperature	–55°C to +125°C
Storage Temperature	–55°C to +125°C
Junction Temperature	150°C
Lead Temperature (soldering, 10s)	300°C

NOTES: (1) Stresses above these ratings may cause permanent damage. (2) Input terminals are diode-clamped to the power supply rails. Input signals that can swing more than 0.5V beyond the supply rails should be current-limited to 10mA or less. (3) Short-circuit to ground, one amplifier per package.

PACKAGE/ORDERING INFORMATION

PRODUCT	PACKAGE	PACKAGE DRAWING NUMBER[1]	SPECIFIED TEMPERATURE RANGE	PACKAGE MARKING	ORDERING NUMBER[2]	TRANSPORT MEDIA
Single						
OPA340NA	5-Lead SOT-23-5	331	–40°C to +85°C	A40	OPA340NA-250	Tape and Reel
"	"	"	"	"	OPA340NA-3K	Tape and Reel
OPA340PA	8-Pin DIP	006	–40°C to +85°C	OPA340PA	OPA340PA	Rails
OPA340UA	SO-8 Surface-Mount	182	–40°C to +85°C	OPA340UA	OPA340UA	Rails[3]
Dual						
OPA2340EA	MSOP-8 Surface-Mount	337	–40°C to +85°C	A40A	OPA2340EA-250	Tape and Reel
"	"	"	"	"	OPA2340EA-2500	Tape and Reel
OPA2340PA	8-Pin DIP	006	–40°C to +85°C	OPA2340PA	OPA2340PA	Rails
OPA2340UA	SO-8 Surface-Mount	182	–40°C to +85°C	OPA2340UA	OPA2340UA	Rails[3]
Quad						
OPA4340EA	SSOP-16 Surface-Mount	322	–40°C to +85°C	OPA4340EA	OPA4340EA-250	Tape and Reel
"	"	"	"	"	OPA4340EA-2500	Tape and Reel
OPA4340PA	14-Pin DIP	010	–40°C to +85°C	OPA4340PA	OPA4340PA	Rails
OPA4340UA	SO-14 Surface Mount	235	–40°C to +85°C	OPA4340UA	OPA4340UA	Rails[3]

NOTES: (1) For detailed drawing and dimension table, please see end of data sheet, or Appendix C of Burr-Brown IC Data Book. (2) Models with -250, -2500, and -3K are available only in Tape and Reel in the quantities indicated (e.g., -250 indicates 250 devices per reel). Ordering 3000 pieces of "OPA340NA-3K" will get a single 3000 piece Tape and Reel. For detailed Tape and Reel mechanical information, refer to Appendix B of Burr-Brown IC Data Book. (3) SO-8 and SO-14 models also available in Tape and Reel.