

TABLE 4.1. OPERATIONAL AMPLIFIERS

Type	Mfg ^a	# per pkg ^b			Trim	Ext comp ^c	Min gain ^d	Total supply voltage		Supp curr max (mA)	Voltage				Current		e _n @1kHz typ nV/√Hz
											Offset		Drift		Bias max (nA)	Offset max (nA)	
		1	2	4				min (V)	max (V)		typ (mV)	max (mV)	typ (μV/°C)	max (μV/°C)			
BIPOLAR, PRECISION																	
OP-07A	PM+	•	A	—	•	—	1	6	44	4	0.01	0.025	0.2	0.6	2	2	9.6
OP-07E	PM+	•	A	—	•	—	1	6	44	4	0.03	0.08	0.3	1.3	4	3.8	9.6
OP-21A	PM	•	A	A	•	—	1	5	36	0.3	0.04	0.1	0.5	1	100	4	21
OP-27E	PM+	•	A	A	•	—	1	8	44	5	0.01	0.025	0.2	0.6	40	35	3.0
OP-27G	PM+	•	A	A	•	—	1	8	44	6	0.03	0.1	0.4	1.8	80	75	3.2
OP-37E	PM+	•	A	—	•	—	5	8	44	5	0.01	0.025	0.2	0.6	40	35	3.0
OP-50E	PM	•	—	—	•	•	5	10	36	4	0.01	0.025	0.15	0.3	5	1	4.5
OP-77E	PM	•	A	A	•	—	1	6	44	2	0.01	0.025	0.1	0.3	2	1.5	9.6
OP-90E	PM	•	A	A	•	—	1	1.6	36	0.02	0.05	0.15	0.3	2	15	3	60
OP-97E	PM	•	—	—	•	—	1	4.5	40	0.6	0.01	0.025	0.2	0.6	0.1	0.1	14
MAX400M	MA	•	—	—	•	—	1	6	44	4	0.004	0.01	0.2	0.3	2	2	9.6
LM607A	NS	•	—	—	•	•	1	6	44	1.5	0.015	0.025	0.2	0.3	2	2	6.5
AD707C	AD	•	A	—	•	—	1	6	36	3	0.005	0.015	0.03	0.1	1	1	9.6
AD846B	AD	•	—	—	•	•	2	10	36	6.5	0.025	0.075	0.8	3.5	250	(k)	2
LT1001A	LT	•	A	—	•	—	1	6	44	3.3	0.01	0.025	0.2	0.6	4	4	9.6
LT1007A	LT	•	—	—	•	—	1	5	44	4	0.01	0.025	0.2	0.6	35	30	2.5
LT1012C	LT+	•	A	—	•	•	1	4	40	0.6	0.01	0.05	0.2	1.5	0.15	0.15	14
LT1028A	LT	•	—	—	•	•	1	8	44	9.5	0.01	0.04	0.2	0.8	90	50	0.9
LT1037A	LT	•	—	—	•	—	5	5	44	4.5	0.01	0.025	0.2	0.6	35	30	2.5
RC4077A	RA	•	—	—	•	—	1	6	44	1.7	0.004	0.01	0.1	0.3	2	1.5	9.6
HA5134A	HA	—	—	•	—	—	1	10	40	8	0.05	0.1	0.3	1.2	25	25	7
HA5135	HA	•	—	—	•	—	1	8	40	1.7	0.01	0.08	0.4	1.3	4	4	9
HA5147A	HA	•	—	—	•	—	10	8	44	4	0.01	0.025	0.2	0.6	40	35	3.0

BIPOLAR, LOW-BIAS (see also "bipolar, precision")

OP-08E	PM	•	—	—	•	•	U	10	40	0.5	0.07	0.15	0.5	2.5	2	0.2	20
LM10	NS+	•	—	—	•	—	1	1	45	0.4	0.3	2	2	-	20	0.7	47
LM11	NS+	•	—	—	•	•	1	5	40	0.6	0.1	0.3	1	3	50pA	10pA	150
OP-12E	PM+	•	—	—	•	—	1	10	40	0.5	0.07	0.15	0.5	2.5	2	0.2	20
LM308	NS+	•	A	—	•	•	U	10	36	0.8	2	7.5	6	30	7	1	35
LM312	NS+	•	—	—	•	•	1	10	40	0.8	2	7.5	6	30	7	1	35
LP324	NS	—	—	•	—	—	1	4	32	0.25	2	4	10	-	10	2	-

BIPOLAR, SINGLE-SUPPLY

324A	NS+	A	A	•	—	—	1	3	32	3	2	3	7	30	100	30	-
LP324	NS	—	—	•	—	—	1	4	32	0.25	2	4	10	-	10	2	-
LT1013C	LT	—	•	A	—	—	1	4	44	1	0.06	0.3	0.4	2.5	50	2	22
HA5141A	HA	•	A	A	—	—	1	2	40	0.07	0.5	2	3	-	75	10	20

BIPOLAR, SINGLE-SUPPLY PRECISION

LT1006A	LT	•	—	—	•	—	1	2.7	44	0.5	0.02	0.05	0.2	1.3	15	0.5	22
LT1013A	LT	—	•	A	—	—	1	4	44	1	0.04	0.15	0.4	2	35	1.3	22

Type	Slew rate ^e (V/μs)	f _T typ (MHz)	CMRR min (dB)	PSRR min (dB)	Gain min (dB)	Max output curr (mA)	Max diff'l input ^f (V)	Swing to supplies? ^g				Comments
								In		Out		
								+	-	+	-	
OP-07A	0.17	0.6	110	100	110	10	30 ^h	-	-	-	-	
OP-07E	0.17	0.6	106	94	106	10	30 ^h	-	-	-	-	
OP-21A	0.25	0.6	100	104	120	-	30	-	-	-	-	low power
OP-27E	2.8	8	114	100	120	20	0.5	-	-	-	-	low noise
OP-27G	2.8	8	100	94	117	20	0.5	-	-	-	-	cheap grade
OP-37E	17	63	114	100	120	20	0.5	-	-	-	-	low noise, decomp OP-27
OP-50E	3	25	126	126	140	70	10 ^h	-	-	-	-	high current, low noise
OP-77E	0.3	0.6	120	110	134	12	30 ^h	-	-	-	-	improved OP-07
OP-90E	0.01	0.02	100	104	117	6	36	-	•	-	•	micropower
OP-97E	0.2	0.9	114	114	110	10	0.5	-	-	-	-	low power OP-77
MAX400M	0.3	0.6	114	100	114	12	30	-	-	-	-	lowest non-chopper V _{os}
LM607A	0.7	1.8	124	100	134	10	0.5	-	-	-	-	
AD707C	0.3	0.9	130	120	138	12	44	-	-	-	-	improved OP-07; dual = 708
AD846B	450	310	110	110	-	50	18	-	-	-	-	current feedback; fast
LT1001A	0.25	0.8	114	110	113	30	30	-	-	-	-	
LT1007A	2.5	8	117	110	137	20	0.5	-	-	-	-	low noise, ~OP-27
LT1012C	0.2	0.8	110	110	106	12	1	-	-	-	-	improved 312; dual = 1024
LT1028A	15	75	114	117	137	20	1	-	-	-	-	ultra low noise
LT1037A	15	60	117	110	137	20	0.5	-	-	-	-	decomp 1007, ~OP-37
RC4077A	0.25	0.8	120	110	128	15	30	-	-	-	-	lowest non-chopper V _{os}
HA5134A	1	4	94	100	108	20	40	-	-	-	-	quad, low noise
HA5135	0.8	2.5	106	94	120	20	15 ^h	-	-	-	-	
HA5147A	35	140	114	80	120	15	0.5	-	-	-	-	low noise, high speed, uncomp
OP-08E	0.12	0.8	104	104	98	5	0.5	-	-	-	-	precision 308
LM10	0.12	0.1	93	90	102	20	40	-	•	•	•	1V op-amp; precision; volt. ref.
LM11	0.3	0.5	110	100	100	2	0.5	-	-	-	-	precision; lowest bias bipolar
OP-12E	0.12	0.8	104	104	98	5	0.5	-	-	-	-	precision 312
LM308	0.15	0.3	80	80	88	5	0.5	-	-	-	-	original low-bias (superbeta)
LM312	0.15	0.3	80	96	88	5	0.5	-	-	-	-	compensated 308
LP324	0.05	0.1	80	90 ^t	94	5	32	-	•	-	•	low power, single supply
324A	0.5	1	65	65	88	20	30	-	•	-	•	a classic; dual=358A
LP324	0.05	0.1	80	90 ^t	94	5	32	-	•	-	•	low power, low bias
LT1013C	0.4	0.8	97	100	122	25	30	-	•	-	•	improved 358/324; quad = 1014
HA5141A	1.5	0.4	80	94	94	1	7	-	•	-	•	micropower
LT1006A	0.4	1	100	106	120	20	30	-	•	-	•	optional I _s = 90μA
LT1013A	0.4	0.8	100	103	124	25	30	-	•	-	•	improved 358/324; quad = 1014

TABLE 4.1 (cont'd)

Type	Mfg ^a	# per pkg ^b			Trim	Ext comp ^c	Min gain ^d	Total supply voltage		Supp curr max (mA)	Voltage				Current		e _n @1kHz typ nV/√Hz
								min (V)	max (V)		Offset		Drift		Bias max (nA)	Offset max (nA)	
		1	2	4							typ (mV)	max (mV)	typ (μV/°C)	max (μV/°C)			
BIPOLAR, HIGH-SPEED																	
OP-62E	PM	•	•	•	•	•	1	16	36	7	-	0.2	-	-	300	100	2.5
OP-63E	PM	•	•	•	•	•	1	16	36	7	-	0.75	-	-	300	100	7
OP-64E	PM	•	•	•	•	•	5	16	36	7	-	0.75	-	-	300	100	7
OP-65E	PM	•	•	•	•	•	1	9	14	25	-	2	-	-	3μA	1μA	-
CLC400	CL	•	•	•	•	•	1	-	7	15	2	5.5	20	40	25μA	(k)	12
AD509K	AD	•	•	•	•	•	3	10	40	6	4	8	-	40	200	25	19
SL541B	PL	•	•	•	•	•	10	-	24	21	-	5	15	-	25μA	10	-
VA705L	VT	•	A	A	•	•	1	8	12	10	1	2	20	-	900	25	-
VA706K	VT	•	A	A	•	•	1	8	12	10	4	10	20	-	1μA	120	-
VA707K	VT	•	A	A	•	•	12	8	12	10	3	6	20	-	1μA	120	-
LM837	NS	-	-	•	-	•	1	8	36	15	0.3	5	2	-	1μA	200	4.5
AD840K	AD	•	•	•	•	•	10	10	36	12	0.1	0.3	3	-	5μA	200	4
AD841K	AD	•	•	•	•	•	1	10	36	12	0.5	1	35	20	5μA	200	13
AD847J	AD	•	•	•	•	•	1	9	36	5.6	0.5	1	15	-	7μA	50 ^t	15 ⁱ
AD848J	AD	•	•	•	•	•	5	9	36	5.6	0.5	1	2	10	5μA	15 ^t	4 ⁱ
AD849J	AD	•	•	•	•	•	25	9	36	5.6	0.5	1	1	10	5μA	15 ^t	4 ⁱ
HA2539	HA	•	•	•	-	•	10	10	35	25	8	15	20	-	20μA	6μA	6
SL2541B	PL	•	•	•	•	•	1	14	30	25 ^t	10	-	20	-	20μA	-	-
HA2541	HA	•	•	•	•	•	1	10	35	45	-	2	20	-	35μA	7μA	10
HA2542	HA	•	•	•	•	•	2	10	35	40	-	10	20	-	35μA	7μA	10
HA2544	HA	•	•	•	•	•	1	10	33	10	6	15	10	-	15μA	2μA	-
CA3450	RC	•	•	•	•	•	1	10	14	35	8	15	-	-	350	150	-
HA5101	HA	•	A	A	•	•	1	4	40	6	0.5	3	3	-	200	75	3.3
HA5111	HA	•	A	A	•	•	10	4	40	6	0.5	3	3	-	200	75	3.3
HA5147A	HA	•	•	•	•	•	10	8	44	4	0.01	0.025	0.2	0.6	40	35	3.0
HA5195	HA	•	•	•	-	•	5	20	35	25	3	6	20	-	15μA	4μA	6
LM6361	NS	•	•	•	•	•	1	5	36	6.5	5	20	10	-	5μA	2μA	15
LM6364	NS	•	•	•	•	•	5	5	36	6.5	2	9	6	-	5μA	2μA	8
LM6365	NS	•	•	•	•	•	25	5	36	6.8	1	6	3	-	5μA	2μA	5
BIPOLAR, OTHER																	
OP-20B	PM	•	A	A	•	•	1	4	36	0.08	0.06	0.25	0.75	1.5	25	1.5	58
LM833	NS	-	•	•	-	•	1	10	36	8	0.3	5	2	-	1μA	200	4.5
CA3193A	RC	•	•	•	•	•	1	7	36	3.5	0.14	0.2	1	3	20	5	24
XR4560	XR	-	•	•	-	•	1	8	36	2	0.5	6	-	-	500	200	8
HA5151	HA	•	A	A	-	•	1	2	40	0.25	2	3	3	-	150	30	15
NE5534	SN+	•	A	-	•	•	3	6	44	8	0.5	4	-	-	2μA	300	4
MC33078	MO	-	•	A	-	•	1	10	36	5	0.15	2	2	-	750	150	4.5
MC33171	MO	•	A	A	•	•	1	3	44	0.25	2	4.5	10	-	100	20	32
MC34071A	MO	•	A	A	•	•	1	3	44	2.5	0.5	1.5	10	-	500	50	32

Type	Slew rate ^e (V/μs)	f _T typ (MHz)	CMRR min (dB)	PSRR min (dB)	Gain min (dB)	Max output curr (mA)	Max diff'l input ^f (V)	Swing to supplies? ^g				Comments
								In		Out		
								+	-	+	-	
OP-62E	15	50	110	105	111	20	5	-	-	-	-	precision
OP-63E	50	50	110	105	100	20	5	-	-	-	-	
OP-64E	200	200	110	105	100	20	5	-	-	-	-	
OP-65E	200	150	85	90	100	50	5	-	-	-	-	transimpedance; decomp=401
CLC400	700	280	40	40	-	50	-	-	-	-	-	
AD509K	120	20	80	80	80	-	15	-	-	-	-	
SL541B	175	100	60	46	46	6.5	9	-	-	-	-	fast, video
VA705L	35	25	60	60	80	50	9	-	-	-	-	video, drives 50Ω; fast settle
VA706K	42	25	60	60	66	50	9	-	-	-	-	video, drives 50Ω; fast settle
VA707K	105	300	60	60	74	50	9	-	-	-	-	decomp, fast, 50Ω
LM837	10	25	80	120	90	40	30	-	-	-	-	low noise, low distortion
AD840K	400	400	100	94	104	50	6	-	-	-	-	decomp 841; 842 has G>2
AD841K	300	40	90	90	88	50	6	-	-	-	-	fast settle; decomp versions
AD847J	300	50	78	75	70	20	6	-	-	-	-	fast settle; decomp versions
AD848J	300	250	104 ^t	104 ^t	82	25	6	-	-	-	-	decomp 847
AD849J	300	725	110 ^t	100 ^t	90	25	6	-	-	-	-	uncomp 847
HA2539	600	600	60	85	80	10	6	-	-	-	-	low noise, sim to 2540
SL2541B	900	800	47	40 ^t	45	10	10	-	-	-	-	has uncommitted unity gain buf
HA2541	280	40	70	60	80	10	6	-	-	-	-	fast settle, low distortion
HA2542	375	120	70	70	80	100	6	-	-	-	-	fast settle, decomp
HA2544	150	33	75	70	70	35	6	-	-	-	-	video
CA3450	420	190	50	60	96	75	5	-	-	-	-	video amp/line driver
HA5101	10	10	100 ^t	80	136 ^t	30	7	-	-	-	-	low noise
HA5111	50	100	100 ^t	100 ^t	136 ^t	30	7	-	-	-	-	low noise, uncomp
HA5147A	35	140	114	80	120	15	0.7	-	-	-	-	low noise, precision, uncomp
HA5195	200	150	74	70	80	25	6	-	-	-	-	Elantec EL2195 = improved
LM6361	300	50	70	72	52	30	8	-	-	-	-	vertical PNP
LM6364	300	160	102 ^t	70	66 ^t	30	8	-	-	-	-	vertical PNP
LM6365	300	725	80	104 ^t	75	30	8	-	-	-	-	vertical PNP
OP-20B	0.05	0.1	96	100	114	0.5	30	-	•	-	-	accurate low power
LM833	7	15	80	80	90	10	30	-	-	-	-	low noise, low distortion
CA3193A	0.25	1.2	110	100	110	7	5	-	-	-	-	
XR4560	4	10	70	76	86	100	30	-	-	-	-	intended for audio
HA5151	4.5	1.3	80	80	94	3	7	-	-	-	•	low power
NE5534	6	10	70	80	88	20	0.5	-	-	-	-	low noise, intended for audio
MC33078	7	16	80	80	90	20	36	-	-	-	-	low noise, low distortion
MC33171	2.1	1.8	80	80	94	4	44	-	•	-	-	
MC34071A	10	4.5	80	80	94	25	44	-	•	-	-	drives 0.01μF

TABLE 4.1 (cont'd)

Type	Mfg ^a	# per pkg ^b			Trim	Ext comp ^c	Min gain ^d	Total supply voltage		Supp curr max (mA)	Voltage				Current		e _n @1kHz typ nV/√Hz
		1	2	4				min (V)	max (V)		Offset		Drift		Bias max (nA)	Offset max (nA)	
											typ (mV)	max (mV)	typ (μV/°C)	max (μV/°C)			
BIPOLAR, OBSOLESCE																	
OP-01E	PM	•	—	—	•	—	1	10	44	3	1	2	3	10	50	5	—
OP-02E	PM	•	A	—	•	—	1	10	44	2	0.3	0.5	2	8	30	2	21
OP-05E	PM+	•	A	—	•	—	1	6	44	4	0.2	0.5	0.7	2	4	3.8	9.6
OP-11E	PM	—	—	•	—	—	1	10	44	6	0.3	0.5	2	10	300	20	12
307	NS+	•	—	—	—	—	1	10	44	2.5	2	7.5	6	30	250	50	16
LM318	NS+	•	—	—	•	•	1	10	40	10	4	10	—	—	500	200	14
349	NS	—	—	•	—	—	5	10	36	4.5	1	6	—	—	200	50	60
AD517L	AD	•	—	—	•	—	1	10	36	3	—	0.025	—	0.5	1	0.25	20
AD518J	AD	•	—	—	•	•	1	10	40	10	4	10	10	—	500	200	—
NE530	SN	•	A	—	•	—	1	10	36	3	2	5	6	—	150	40	30
NE531	SN	•	—	—	•	•	U	12	44	10	2	6	—	—	2μA	200	—
NE538	SN	•	A	—	•	—	5	10	36	2.8	2	5	6	—	150	40	18
μA725	FA+	•	—	—	•	•	U	6	44	3	0.5	1	2	5	100	20	—
μA739	FA	—	•	—	—	•	U	8	36	14	1	6	—	—	2μA	10μA	—
741C	FA+	•	A	A	•	—	1	10	36	2.8	2	6	—	—	500	200	—
748C	FA+	•	—	—	•	•	U	10	36	3.3	2	6	—	—	500	200	—
μA749	FA	—	•	—	—	•	U	8	36	10	1	3	3	—	750	400	—
1435	TP	•	—	—	•	•	10	24	32	30	2	5	5	25	20μA	—	—
1456	MO	•	—	—	•	—	1	10	36	3	5	10	—	—	30	10	45
HA2505	HA	•	—	—	•	•	1	20	40	6	4	8	20	—	250	50	—
HA2515	HA	•	—	—	•	•	1	20	40	6	5	10	30	—	250	50	—
HA2525	HA	•	—	—	•	•	3	20	40	6	5	10	30	—	250	50	—
HA2605	HA	•	—	—	•	•	1	10	45	4	3	5	10	—	25	25	—
HA2625	HA	•	—	—	•	•	5	10	45	4	3	5	10	—	25	25	—
CA3100	RC	•	—	—	•	•	10	13	36	11	1	5	—	—	2μA	400	—
4558	RA+	—	•	—	—	—	1	8	36	5.6	2	6	—	—	500	200	43
NE5535	SN	A	•	—	•	—	1	10	36	2.8	2	5	6	—	150	40	17
5539	SI+	•	—	—	—	•	7	6	24	15	2.5	5	5	10	20μA	—	4
JFET, PRECISION																	
OP-41E	PM	•	—	—	•	—	1	10	36	1	0.2	0.25	2.5	5	0.005	0.001	32
OP-43E	PM	•	—	—	•	—	1	10	36	1	0.2	0.25	2.5	5	0.005	0.001	32
OPA101B	BB	•	—	—	•	—	1	10	40	8	0.05	0.25	3	5	0.01	4pA	8
OPA111B	BB	•	A	—	•	—	1	10	36	3.5	0.05	0.25	0.5	1	1pA	0.7pA	7
AD547L	AD	•	A	—	•	—	1	5	36	1.5	—	0.25	—	1	0.025	2pA ^t	30
AD548C	AD	•	A	—	•	—	1	9	36	0.2	0.1	0.25	—	2	0.01	0.005	30
OPA627B	BB	•	—	—	•	—	1	9	36	8	0.04	0.1	0.5	0.8	0.02	0.02	5.2
AD711C	AD	•	A	A	•	—	1	9	36	2.8	0.1	0.25	2	3	0.025	0.01	18
AD845K	AD	•	—	—	•	—	1	9.5	36	12	0.1	0.25	1.5	5	1	0.1	25
LT1055A	LT	•	—	—	•	—	1	10	40	4	0.05	0.15	1.2	4	0.05	0.01	14
HA5170	HA	•	—	—	•	—	1	9	44	2.5	0.1	0.3	2	5	0.1	0.06	10

Type	Slew rate ^e typ (V/μs)	f _T typ (MHz)	CMRR min (dB)	PSRR min (dB)	Gain min (dB)	Max output curr (mA)	Max diff'l input ^f (V)	Swing to supplies? ^g		Comments
								In	Out	
								+ - + -		
OP-01E	18	2.5	80	80	94	6	30	- - - -		fast, precision
OP-02E	0.5	1.3	90	90	100	6	30	- - - -		precision, low current
OP-05E	0.17	0.6	110	94	106	10	30 ^h	- - - -		
OP-11E	1	2	110	90	100	6	30	- - - -		precision quad
307	0.5	1	70	70	84	10	30	• - - -		a classic; uncomp=301
LM318	70	15	70	65	86	10	0.5	- - - -		was popular
349	2	4	70	77	88	15	36	- - - -		decomp 348 (quad 741)
AD517L	0.1	0.25	110	96	120	10	30	- - - -		
AD518J	70	12	70	65	88	15	-	- - - -		
NE530	35	3	70	76	94	10	30	• - - -		fast; dual=5530
NE531	35	1	70	76	86	-	15	• - - -		
NE538	60	5	70	76	94	10	30	• - - -		fast; dual=5538
μA725	0.005	0.08	110	100	108	15	5	- - - -		original precision op-amp
μA739	1	6	70	85 ⁱ	76	1.5	5	- - - •		low noise, intended for audio
741C	0.5	1.2	70	76	86	20	30	- - - -		old classic; dual=1458, quad=348
748C	0.5	1.2	70	76	94	15	30	- - - -		uncomp 741
μA749	2	6	70	74	86	1.5	5	- - - •		sim to 739
1435	300	1GHz	80	75 ⁱ	80	10	2	- - - -		fast settle
1456	2.5	1	70	74	97	5	40	- - - -		
HA2505	30	12	74	74	84	10	15	• - - -		
HA2515	60	12	74	74	78	10	15	• - - -		
HA2525	120	20	74	74	78	10	15	• - - -		
HA2605	7	12	74	74	98	10	12	- - - -		
HA2625	35	100	74	74	98	10	12	- - - -		
CA3100	25	30	76	60	58	15	12	- - - -		
4558	1	2.5	70	74	86	15	30	- - - -		fast 1458
NE5535	15	1	70	76	94	10	30	• - - -		fast
5539	600	1200	70	66	46	40	10	- - - •		small output swing
OP-41E	1.3	0.5	100	92	120	15	20	• - - -		low bias, low dist; OP-43 faster
OP-43E	6	2.4	100	92	120	15	20	• - - -		low bias, low dist; OP-41 stabler
OPA101B	7	20	80	86	96	45	20	- - - -		low noise; decomp = OPA102
OPA111B	2	2	100	100	120	10	36	- - - -		low noise, low bias
AD547L	3	1	80	80	108	20	20	- - - -		dual = AD642, 647
AD548C	1.8	1	86	86	110	20	20	- - - -		improved LF441; dual = AD648
OPA627B	55	16	106	106	110	30	-	- - - -		fast
AD711C	20	4	86	86	106	20	20	- - - -		improved LF411/2
AD845K	100	16	94	95	108	30	36	- - - -		fast
LT1055A	13	5	86	90	104	30	40	- - - -		LT1056 is 20% faster
HA5170	8	8	90	74	110	10	30	• - - -		low noise

TABLE 4.1 (cont'd)

Type	Mfg ^a	# per pkg ^b			Trim	Ext comp ^c	Min gain ^d	Total supply voltage		Supp curr max (mA)	Voltage				Current		e _n @1kHz typ nV/√Hz
								min (V)	max (V)		Offset		Drift		Bias max (nA)	Offset max (nA)	
		1	2	4							typ (mV)	max (mV)	typ (μV/°C)	max (μV/°C)			
JFET, HIGH-SPEED																	
OP-42E	PM	•	—	—	•	—	1	15	40	6.5	0.3	0.75	4	10	0.2	0.04	13
OP-44E	PM	•	—	—	•	—	3	16	40	6	0.03	0.75	4	10	0.2	40pA	13
357B	NS+	•	—	—	•	—	5	10	36	7	3	5	5	—	100pA	0.02	12
AD380K	AD	•	—	—	•	•	U	12	40	15	—	1	—	10	0.1	5pA ^t	15
LF401A	NS	•	—	—	•	•	1	15	36	12	—	0.2	—	—	0.2	0.1	23
OPA404B	BB	—	•	•	—	—	1	10	36	10	0.26	0.75	3	—	0.004	4pA	15
LF457B	NS	•	—	—	•	—	5	10	36	10	0.18	0.4	3	4	50pA	20pA	10
OPA602C	BB	•	—	—	•	—	1	10	36	4	0.1	0.25	1	2	1pA	1pA	13
OPA605K	BB	•	—	—	•	•	50	10	40	9	0.25	0.5	—	5	0.035	2pA ^t	20
OPA606L	BB	•	—	—	•	—	1	10	36	9.5	0.1	0.5	3	5	0.01	5pA	13
AD744C	AD	•	A	—	•	•	2	9	36	4	0.1	0.25	2	3	0.05	0.02	18
AD843B	AD	•	—	—	•	—	1	9	36	12	0.5	1	15	—	1	0.1	13
AD845K	AD	•	—	—	•	—	1	9.5	36	10.2	0.1	0.25	1.5	3	0.4	0.05	25
LT1022A	LT	•	—	—	•	—	1	20	40	7	0.08	0.25	1.3	5	0.05	0.01	14
HA5160	HA	•	—	—	—	•	U	14	40	10	1	3	20	—	0.05	0.01	35
MC34080A	MO	•	A	A	•	—	2	6	44	3.4	0.3	0.5	10	—	0.2	0.1	30
MC34081A	MO	•	A	A	•	—	1	6	44	3.4	0.3	0.5	10	—	0.2	0.1	30
JFET, OTHER																	
TL031C	TI	•	A	A	•	—	1	10	36	0.28	0.5	1.5	6	—	0.2	0.1	41
TL051C	TI	•	A	A	•	—	1	10	36	3.2	0.6	1.5	8	—	0.2	0.1	18
TL061C	TI+	•	A	A	•	—	1	4	36	0.25	3	15	10	—	0.4	0.2	42
TL071C	TI+	•	A	A	•	—	1	7	36	2.5	3	10	10	—	0.2	0.05	18
TL081B	TI+	•	A	A	•	—	1	7	36	2.8	2	3	10	—	0.2	0.01	18
OPA121	BB	•	—	—	•	—	1	10	36	4	0.5	2	3	10	0.005	4pA	8
OPA128L	BB	•	—	—	•	—	1	10	36	1.5	0.14	0.5	—	5	75fA	30fA ^t	27
LF351	NS+	•	A	A	•	—	1	10	36	3.4	5	10	10	—	0.2	0.1	25
355B	NS+	•	—	—	•	—	1	10	36	4	3	5	5	—	100pA	0.02	20
356B	NS+	•	—	—	•	—	1	10	36	7	3	5	5	—	100pA	0.02	12
LF411	NS+	•	A	—	•	—	1	10	36	3.4	0.8	2	7	20	0.2	0.1	25
LFnnn	NS	—	•	•	—	—	1	6	36	25	1	—	—	—	100pA	50pA	3.5
LF441	NS	•	A	A	•	—	1	10	36	0.25	1	5	10	20	0.1	0.05	35
LF455B	NS	•	—	—	•	—	1	10	36	4	0.18	0.4	3	4	50pA	20pA	12
LF456B	NS	•	—	—	•	—	1	10	36	8	0.18	0.4	3	4	50pA	20pA	10
AD549L	AD	•	—	—	•	—	1	10	36	0.7	0.3	0.5	5	10	60fA	20fA ^t	35
AD611K	AD	•	—	—	•	—	1	10	36	2.5	0.25	0.5	5	10	0.05	0.025	18
LT1057A	LT	—	•	A	—	—	1	20	40	3.8	0.15	0.45	1.8	7	0.05	0.04	13
HA5180	HA	•	—	—	•	—	1	10	40	1	0.1	0.5	5	—	0.001	200fA	70
MC34001A	MO	•	A	A	•	—	1	8	36	2.5	1	2	10	—	0.1	0.05	25
MC34181	MO	•	A	A	•	—	1	3	36	0.2	0.5	2	10	—	0.1	0.05	38

Type	Slew rate ^e typ (V/μs)	f _T typ (MHz)	CMRR min (dB)	PSRR min (dB)	Gain min (dB)	Max output curr (mA)	Max diff'l input ^f (V)	Swing to supplies? ^g				Comments
								In		Out		
								+	-	+	-	
OP-42E	58	10	88	86	114	25	40	-	-	-	-	low Z _{out}
OP-44E	120	16	88	90	114	15	40	-	-	-	-	
357B	50	20	85	85	94	20	30	•	-	-	-	decomp 356
AD380K	330	300	60	60	92	60	20	-	-	-	-	hybrid, fast, 50Ω
LF401A	30	16	90	80	100	50	32	-	-	-	-	accurate
OPA404B	35	6.4	92	86	92	10	36	-	-	-	-	accurate quad
LF457B	50	20	86	86	106	100 ^l	40	•	-	-	-	low noise; drives 0.01μF
OPA602C	35	6.5	92	86	92	20	36	-	-	-	-	low bias, fast settle
OPA605K	94	20	80	74	104 ^t	30	20	-	-	-	-	uncomp
OPA606L	35	13	85	90	100	10	36	-	-	-	-	improved LF356
AD744C	75	13	86	92	108	20	36	-	-	-	-	very low dist (3ppm); fast settle
AD843B	250	35	100	95	88	50	-	-	-	-	-	fast settle
AD845K	100	16	94	98	106	25	20	-	-	-	-	fast settle
LT1022A	26	8.5	86	88	104	10	40	-	-	-	-	
HA5160	120	100	74	108	98	22	40	-	-	-	-	low bias
MC34080A	50	16	75	75	94	20	44	-	-	-	-	V _{in} > V ₊ +4V; decomp 34081
MC34081A	25	8	75	75	94	20	44	-	-	-	-	V _{in} > V ₊ +4V
TL031C	3	1	75	75	74	8	30	•	-	-	-	low power; improved TL061
TL051C	24	3	75	75	94	30	30	•	-	-	-	low dist; improved TL071/081
TL061C	3.5	1	70	70	70	5	30	-	-	-	-	low power
TL071C	13	3	70	70	88	10	30	-	-	-	-	lower noise
TL081B	13	3	80	80	94	10	30	-	-	-	-	
OPA121	2	2	86	86	110	10	36	-	-	-	-	low noise
OPA128L	3	1	90	90	110	10	36	-	-	-	-	very low bias
LF351	13	4	70	70	88	10	30	•	-	-	-	353=dual, 347=quad
355B	5	2.5	85	85	94	20	30	•	-	-	-	popular
356B	12	5	85	85	94	20	30	•	-	-	-	faster 355
LF411	15	4	70	70	88	20	30	•	-	-	-	jellybean
LFnnn	20	10	80	80	100	15	2	•	-	-	-	lowest noise JFET
LF441	1	1	70	70	88	4	30	•	-	-	-	low current jellybean
LF455B	5	3	86	86	106	100 ^l	40	•	-	-	-	low noise; drives 0.01μF
LF456B	12.5	5	86	86	106	100 ^l	40	•	-	-	-	low noise; drives 0.01μF
AD549L	3	1	90	90	110	10	36	-	-	-	-	electrometer; guard pin
AD611K	13	2	80	80	94	20	20	-	-	-	-	low dist, gen purp JFET
LT1057A	13	5	86	88	104	10	40	-	-	-	-	accurate dual/quad JFET
HA5180	7	2	90	90	106	15	40	-	-	-	-	very low bias over temp; noisy
MC34001A	13	4	80	80	94	20	30	•	-	-	-	
MC34181	10	4	70	70	88	8	36	-	-	-	-	low power, fast, low dist.

TABLE 4.1 (cont'd)

Type	Mfg ^a	# per pkg ^b			Trim	Ext comp ^c	Min gain ^d	Total supply voltage		Supp curr max (mA)	Voltage				Current		e _n @1kHz typ nV/√Hz
		1	2	4				min (V)	max (V)		Offset		Drift		Bias max (nA)	Offset max (nA)	
											typ (mV)	max (mV)	typ (μV/°C)	max (μV/°C)			
JFET, OBSOLESCE																	
OP-15E	PM+	•	A	—	•	—	1	10	44	4	0.2	0.5	2	5	0.05	0.01	15
OP-16E	PM+	•	—	—	•	—	1	10	44	7	0.2	0.5	2	5	0.05	0.01	15
AD515L	AD	•	—	—	•	—	1	10	36	1.5	0.4	1	—	25	80fA	80fA	50
AD542L	AD	•	—	—	•	—	1	10	36	1.5	—	0.5	—	5	0.025	2pA ^t	30
AD544L	AD	•	—	—	•	—	1	10	36	2.5	—	0.5	—	5	0.05	0.5pA ^t	18
AD545L	AD	•	—	—	•	—	1	10	36	1.5	—	0.5	—	5	0.001	—	35
ICH8500A	IL	•	—	—	•	—	1	16	36	2.5	—	50	—	—	10fA	10fA	40
MOSFET																	
OP-80E	PM	•	—	—	•	—	1	4.5	16	0.2	0.4	1	—	—	60fA	10fA ^t	70
TLC27L2A	TI	A	•	A	—	—	1	3	18	0.04	—	5	0.7	—	1pA ^t	1pA ^t	70
TLC27M2A	TI	A	•	A	—	—	1	3	18	0.6	—	5	2	—	1pA ^t	1pA ^t	38
TLC272A	TI	A	•	A	—	—	1	3	18	4	—	5	5	—	1pA ^t	1pA ^t	25
TLC279C	TI	—	—	•	—	—	1	3	18	8	0.4	1.2	2	—	0.7pA ^t	0.1pA ^t	25
LMC660A	NS	—	—	•	—	—	1	5	16	2.2	1	2	1.3	5	20pA	20pA	22
TLC1078C	TI	—	•	A	—	—	1	1.4	16	0.05	0.18	0.6	1	—	0.7pA ^t	0.1pA ^t	68
ALD1701	AL	•	—	—	—	—	1	2	12	0.25	—	4.5	7	—	0.03	0.025	—
ALD1702	AL	•	—	—	—	—	1	2	12	2	—	4.5	7	—	0.03	0.025	100
CA3140A	RC	•	A	—	•	—	1	4	44	6	2	5	6	—	0.04	0.02	40
CA3160A	RC	•	A	—	•	•	1	5	16	15	2	5	10	—	0.03	0.02	72
CA3410A	RC	—	—	•	—	—	1	4	36	10	3	8	10	—	0.03	0.01	40
CA3420A	RC	•	—	—	•	•	1	2	22	1	2	5	4	—	0.005	0.004	62
CA5160A	RC	•	A	—	•	•	1	5	15	0.4	1.5	4	—	—	0.01	0.005	—
CA5420A	RC	•	—	—	•	•	1	2	20	0.5	1	5	—	—	0.001	0.5pA	—
CA5422	RC	•	—	—	•	—	1	2	20	0.7	1.8	10	20	—	0.005	0.004	—
ICL7612B	IL+	•	—	—	—	—	1	3	18	2.5	—	5	5	—	0.05	0.03	100
ICL7641B	IL+	A	A	•	—	—	1	1	18	2.5	—	5	5	—	0.05	0.03	100
CHOPPER STABILIZED																	
MAX420E	MA	•	—	—	—	—	1	6	33	2	0.001	0.005	0.02	0.05	0.03	0.06	1.1 ^j
MAX422E	MA	•	—	—	—	—	1	6	33	0.5	0.001	0.005	0.02	0.05	0.03	0.06	1.1 ^j
LMC668A	NS	•	—	—	—	—	1	5	16	3.5	0.001	0.005	0.05	—	0.06	—	2 ^j
TSC900A	TS	•	—	—	—	—	1	4.5	16	0.2	—	0.005	0.02	0.05	0.05	0.5pA ^t	4 ^j
TSC901	TS	•	A	A	—	—	1	5	32	0.6	0.007	0.015	0.05	0.15	0.05	0.1	5 ^j
TSC911A	TS	•	A	A	—	—	1	4	16	0.6	0.005	0.015	0.05	0.15	0.07	0.02	11 ^j
TSC915	TS	•	—	—	—	—	1	7	32	1.5	—	0.01	0.01	0.1	0.1	0.1	0.8 ^j
TSC918	TS	•	—	—	—	—	1	4.5	16	0.8	—	0.05	0.4	0.8	0.1	0.5pA ^t	4 ^j
LTC1050	LT	•	—	—	—	—	1	4.8	16	1.5	0.5μV	0.005	0.01	0.05	0.03	0.06	1.6 ^j
LTC1052	LT	•	—	—	—	—	1	4.8	16	2	0.5μV	0.005	0.01	0.05	0.03	0.03	1.5 ^j
ICL7650	IL+	•	—	—	—	—	1	4.5	16	3.5	0.002	0.005	0.1	—	0.01	5pA ^t	2 ^j
ICL7650S	IL	•	—	—	—	—	1	4.5	16	3	0.7μV	0.005	0.02	0.1	0.01	0.02	2 ^j
ICL7652	IL+	•	—	—	—	—	1	5	16	3.5	0.002	0.005	0.1	—	0.03	25pA ^t	0.7 ^j
ICL7652S	IL	•	—	—	—	—	1	5	16	2.5	0.7μV	0.005	0.01	0.06	0.03	0.04	0.7 ^j
TSC76HV52TS	•	—	—	—	—	—	1	7	32	1.5	—	0.01	—	0.3	0.1	0.1	0.8 ^j

Type	Slew rate ^e (V/μs)	f _T typ (MHz)	CMRR min (dB)	PSRR min (dB)	Gain min (dB)	Max output curr (mA)	Max diff'l input ^f (V)	Swing to supplies? ^g				Comments
								In		Out		
								+	-	+	-	
OP-15E	17	6	86	86	100	15	40	-	-	-	-	precision fast 355
OP-16E	25	8	86	86	100	20	40	-	-	-	-	precision fast 356 (OP-17=decomp)
AD515L	1	0.4	70	74	94	10	20	-	-	-	-	very low bias, precision
AD542L	3	1	80	80	110	10	20	-	-	-	-	precision
AD544L	13	2	80	80	94	15	20	-	-	-	-	precision, low noise
AD545L	1	0.7	76	74 ^t	92	10	20	-	-	-	-	precision
ICH8500A	0.5	0.5	60	80 ^t	100 ^t	10	0.5	-	-	-	-	ultra low bias
OP-80E	0.4	0.3	60	60	100	10	16	-	•	•	•	electrometer; I _b <20pA @ 125°C
TLC27L2A	0.04	0.1	70	70	90	10	18	-	•	•	•	CMOS jellybeans
TLC27M2A	0.6	0.7	70	70	86	10	18	-	•	•	•	CMOS jellybeans
TLC272A	4.5	2.3	70	65	80	10	18	-	•	•	•	CMOS jellybeans
TLC279C	4.5	2.3	65	65	80	10	18	-	•	•	•	best V _{os} of 272-series
LMC660A	1.7	1.5	72	80	112	15	16	-	•	•	•	quad CMOS jellybean
TLC1078C	0.05	0.11	75	75	114	15	16	-	•	•	•	low offset
ALD1701	0.7	0.7	65	65	90	0.5	12	•	•	•	•	rail-to-rail; specs @ +5V supply
ALD1702	2.1	1.5	65	65	94	2	12	•	•	•	•	rail-to-rail; specs @ +5V supply
CA3140A	7	3.7	70	76	86	+10,-1	8	-	•	•	•	
CA3160A	10	4	80	76	94	12	8	-	•	•	•	MOS in/out (3130=uncomp)
CA3410A	10	5.4	80	80	86	6	16	-	•	•	-	high speed 324-type replacement
CA3420A	0.5	0.5	60	70	86	2	15	-	•	•	•	low I _b , good input protec.
CA5160A	10	4	-	-	90	1	?	-	•	•	•	CMOS output
CA5420A	0.5	0.5	-	-	85	0.5	15	-	•	•	•	similar to 3420
CA5422	1	1	60	60	80	2	15	-	•	•	•	unusual 2-section design
ICL7612B	1.6	1.4	60	70	80	5 ^m	18	•	•	•	•	programmable; in/out to both rails
ICL7641B	1.6	1.4	60	70	80	5 ^m	18	•	-	•	•	gen purp, low voltage
MAX420E	0.5	0.5	120	120	120	+2,-15	33	-	•	•	•	±15V V _S ; 0.1μV/mo; 430 has C _{int}
MAX422E	0.13	0.13	120	120	120	+0.2,-8	33	-	•	•	•	±15V V _S ; 0.1μV/mo; 432 has C _{int}
LMC668A	2.5	1	120	120	120	+5,-15	16	-	•	•	•	
TSC900A	0.2	0.7	110	120	120	2.5	16	-	•	-	•	low power
TSC901	2	0.8	120	120	120	-	36	-	•	-	•	±15V supply; int caps
TSC911A	2.5	1.5	110	112	116	3.5	16	-	•	-	•	int caps, noisy
TSC915	0.5	0.5	120	120	120	10	36	-	•	-	•	±15V supply
TSC918	0.2	0.7	98	105	100	-	16	-	•	-	•	inexpensive
LTC1050	4	2.5	120	125	130	+3,-20	16	-	•	•	•	int caps; 50nV/√month
LTC1052	4	1.2	120	120	120	+5,-15	16	-	•	•	•	improved 7652; 0.1μV/month
ICL7650	2.5	2	110	120	120	+5,-20	16	-	•	•	•	0.1μV/month
ICL7650S	2.5	2	120	120	136	+4,-20	16	-	•	•	•	improved 7650; 0.1μV/month
ICL7652	0.5	0.4	110	110	120	+5,-20	16	-	-	•	•	0.15μV/month
ICL7652S	1	0.5	120	120	136	+4,-20	16	-	-	•	•	improved 7652; 0.15μV/month
TSC76HV52	0.5	0.5	120	120	120	10	32	-	-	•	•	±15V supply

TABLE 4.1 (cont'd)

Type	Mfg ^a	# per pkg ^b			Trim	Ext comp ^c	Min gain ^d	Total supply voltage		Supp curr max (mA)	Voltage				Current		e _n @1kHz typ nV/√Hz
								min (V)	max (V)		Offset		Drift		Bias max (nA)	Offset max (nA)	
		typ (mV)	max (mV)	typ (μV/°C)							max (μV/°C)						
HIGH VOLTAGE																	
LM343	NS	•	—	—	•	—	1	10	68	5	2	8	-	-	40	10	35
LM344	NS	•	—	—	•	•	U	10	68	5	2	8	-	-	40	10	35
OPA445B	BB	•	—	—	•	—	1	20	100	4.5	1	3	10	-	0.05	0.01	16
1436	MO+	•	—	—	•	—	1	10	80	5	5	10	-	-	40	10	50
HA2645	HA	•	—	—	•	•	1	20	80	4.5	2	6	15	-	30	30	30
3580	BB	•	—	—	•	—	1	30	70	10	-	10	-	30	0.05	-	15
3581	BB	•	—	—	•	—	1	64	150	8	-	3	-	25	0.02	0.02	25
3582	BB	•	—	—	•	—	1	140	300	6.5	-	3	-	25	0.02	-	25
3583	BB	•	—	—	•	—	1	100	300	8.5	-	3	-	25	0.1	0.1	50
3584	BB	•	—	—	•	•	U	140	300	6.5	-	3	-	25	0.1	0.1	50

MONOLITHIC POWER

LM12	NS	•	—	—	—	—	1	20	80	80	2	7	-	50	300	100	90
OPA541B	BB	•	—	—	—	—	1	20	80	25	0.1	1	15	30	0.05	0.03	50
LM675	NS	•	—	—	—	—	10	16	60	50	1	10	25	-	2μA	500	-
SG1173	SG	•	—	—	—	—	1	10	50	20	2	4	-	30	500	150	-

(a) manufacturers are as follows (a "+" suffix designates multiple sources):

AD - Analog Devices	HO - Honeywell	RC - GE/RCA
AL - Advanced Linear Devices	HS - Hybrid Systems	RO - Rockwell
AM - Advanced Micro Devices	ID - Integrated Device Technology	SG - Silicon General
AN - Analogic	IL - GE/Intersil	SI - Siliconix
AP - Apex	IN - Intel	SN - Signetics
BB - Burr-Brown	IR - International Rectifier	SO - Sony
BT - Brooktree	KE - M.S.Kennedy Corp	ST - Supertex
CL - Comlinear	LT - Linear Technology Corp	TI - Texas Instruments
CR - Crystal Semiconductor	MA - Maxim	TM - Telmos
CY - Cypress	MN - Micro Networks	TO - Toshiba
DA - Datel	MO - Motorola	TP - Teledyne Philbrick
EL - Elantec	MP - Micro Power Systems	TQ - TriQuint
FA - Fairchild (National)	NE - NEC	TR - TRW
FE - Ferranti	NS - National Semiconductor	TS - Teledyne Semiconductor
GE - General Electric	OE - Optical Electronics Inc	VT - VTC
GI - General Instrument	PL - Plessey	XI - Xicor
HA - Harris	PM - Precision Monolithics	XR - Exar
HI - Hitachi	RA - Raytheon	ZI - Zilog

Type	Slew rate ^e typ (V/μs)	f _T typ (MHz)	CMRR min (dB)	PSRR min (dB)	Gain min (dB)	Max output curr (mA)	Max diff'l input ^f (V)	Swing to supplies? ^g				Comments
								In	Out			
LM343	2.5	1	70	74	97	10	68	-	-	-	-	monolithic
LM344	30	10	70	74	97	10	68	-	-	-	-	uncomp 343
OPA445B	10	2	80	80	100	15	80	-	-	-	-	low-bias, monolithic
1436	2	1	70	80	97	10	80	-	-	-	-	monolithic
HA2645	5	4	74	74	100	10	37	-	-	-	-	monolithic
3580	15	5	86 ^t	87 ^t	106 ^t	60	70	-	-	-	-	hybrid
3581	20	5	110 ^t	105 ^t	112 ^t	30	150	-	-	-	-	hybrid
3582	20	5	110 ^t	105 ^t	118 ^t	15	300	-	-	-	-	hybrid
3583	30	5	110 ^t	84 ^t	94	75	300	-	-	-	-	fast JFET, hybrid
3584	150	20	110 ^t	84 ^t	100	15	300	-	-	-	-	uncomp JFET, hybrid
LM12	9	0.7	75	80	94	10A	80	-	-	-	-	full output protection
OPA541B	10	1.6	95	100	90	10A	80	-	-	-	-	isolated case; no int. protec.
LM675	8	5.5	70	70	70	3000	60	-	-	-	-	full output protection
SG1173	0.8	1	76	80	92	3500	50	-	-	-	-	thermal shutdown

- (b) the symbol • indicates the number of op-amps per package for the part number shown; an "A" indicates the availability of other quantities of op-amps per package from the same manufacturer; some electrical characteristics (particularly offset voltage) may be degraded somewhat in multiple packages.
- (c) pins are provided for external compensation.
- (d) a number gives the minimum closed-loop gain without instability. Op-amps with pins for external compensation can generally be operated at lower gain, if an appropriate ext comp network is used. The letter U means that the op-amp is uncompensated – external capacitance is necessary for any small value of closed-loop gain.
- (e) at minimum stable closed-loop gain (usually unity gain), unless otherwise noted.
- (f) the maximum value without damage to the chip; not to exceed the total supply voltage used, if that is less.
- (g) a dot in an IN column means that the input operating common-mode range includes that supply rail; a dot in an OUT column means that the op-amp can swing its output all the way to the corresponding supply rail.
- (h) resistor-diode network draws input current for input differential greater than ±1V.
- (i) μV pp, 0.1-10Hz.
- (j) current-sensing inverting input ("current feedback" configuration); the bias currents at the two inputs may differ widely. The listed bias current is for the non-inverting input.
- (l) "raw" output (no current limit) available at pin 8, in addition to the conventional (protected) output at pin 6; the latter is limited to ±15mA.
- (m) min/max (worst case).
- (t) typical.

TABLE 4.2. RECOMMENDED OP-AMPS

Type	Mfg ^a	Amps per package ^b			Offset voltage max (mV)	Offset drift max ($\mu\text{V}/^\circ\text{C}$)	Input curr max (nA)	Total supply voltage		Supply curr max (mA)	e_n , typ		Slew rate typ (V/ μs)	f_T typ (MHz)	Comments
		1	2	4				min (V)	max (V)		10Hz (nV/ $\sqrt{\text{Hz}}$)	1kHz (nV/ $\sqrt{\text{Hz}}$)			
LF411	NS	•	A	—	2	20	0.2	10	36	3.4	50	25	15	4	general purpose jellybean
AD711K	AD	•	A	—	0.5	10	0.05	9	36	3	45	18	20	4	improved LF411
LM358A	NS+	—	•	A	3	20	100	3	32	1.2	—	—	0.5	1	single supply jellybean
TLC27M2A	TI	A	•	A	5	2 ^t	0.001 ^t	3	18	0.6	—	—	0.6	0.7	CMOS jellybean
OP-27E	PM+	•	A	A	0.025	0.6	40	8	44	5	3.5	3.0	2.8	8	precision, low-noise
OP-37E	PM+	•	A	—	0.025	0.6	40	8	44	5	3.5	3.0	17 ^h	63 ^h	ditto, faster (decomp, min. gain = 5)
HA5147A	HA	•	—	—	0.025	0.6	40	8	44	4	3.5	3.0	35 ^c	140 ^c	ditto, still faster (min. gain = 10)
OP-77E	PM	•	A	A	0.025	0.3	2	6	44	2	10.3	9.6	0.3	0.6	precision
LT1028A	LT	•	—	—	0.04	0.8	90	8	44	9.5	1.0	0.85	15	75	precision ultra-low-noise
LT1013A	LT	—	•	A	0.15	2	35	4	44	1	24	22	0.4	0.8	precision single-supply
LT1055A	LT	•	—	—	0.15	4	0.05	10	40	4	28	14	13	5	precision JFET
LT1012C	LT+	•	A	—	0.05	1.5	0.15	4	40	0.6	17	14	0.2	0.8	precision low-bias
OPA111B	BB	•	A	—	0.25	1	0.001	10	36	3.5	30	7	2	2	precision low-bias JFET
AD744K	AD	•	—	—	0.5	10	0.1	9	36	4	45	18	75 ^f	13 ^f	ultra low dist, stable, fast settle
LTC1052	IL+	•	—	—	0.005	0.05	0.03	4.8	16	2	—	—	4	1.2	chopper
OP-90E	PM	•	A	A	0.15	2	15	1.6	36	0.02	60	60	0.012	0.02	precision micropower
CA3440A	RC	•	—	—	5	4 ^t	0.04	4	15	(d)	250	110	0.003 ^e	0.005 ^e	nanopower (programmable)
AD549L	AD	•	—	—	0.5	10	60fA	10	36	0.7	90	35	3	1	ultra low input current JFET
LM10	NS+	•	—	—	2	2 ^t	20	1.1	40	0.4	50	46	0.1	0.4	low supply voltage, rail-to-rail output

(a) see footnotes to Table 4.1.

(b) • = this part number; A = available.

(c) $G > 10$.(d) programmable 0.02 μA –10 μA .(e) at $I_S = 1\mu\text{A}$.(f) $G > 2$.(h) $G > 5$.

(m) min/max. (t) typical.