

Amplifiers and Comparators

Operational Amplifiers

Motorola offers a broad line of bipolar operational amplifiers to meet a wide range of applications. From low-cost industry-standard types to high precision circuits, the span encompasses a large range of performance capabilities. These linear integrated circuits are available as single, dual, and quad monolithic devices

in a variety of temperature ranges and package styles. Most devices may be obtained in unencapsulated "chip" form as well. For price and delivery information on chips, please contact your Motorola Sales Representative or Distributor.

Single Operational Amplifiers

Device	I_B	V_{IO}	TC_{VIO}	I_{IO}	A_{vol}	BW	SR	Supply Voltage		Description	Package Suffix
	μA	mV	$\mu V/^\circ C$	nA	V/mV	($A_v=1$) MHz	($A_v=1$) V/ μs	Min	Max		

Noncompensated

Commercial Temperature Range (0°C to +70°C)

LM301A	0.25	7.5	10	50	25	1.0	0.5	± 3.0	± 18	General Purpose	H, N:626, J:693
LM308	7.0	7.5	15	1.0	25	1.0	0.3	± 3.0	± 18	Precision	H, N:626
LM308A	7.0	0.5	5.0	1.0	80	1.0	0.3	± 3.0	± 18	Precision	H, N:626
MC1439	1.0	7.5	15	100	15	2.0	4.2	± 6.0	± 18	High Slew Rate	G:601, P1
MC1709C	1.5	7.5	15	500	15	1.0	0.3	± 3.0	± 18	General Purpose	G:601, P1, U
MC1748C	0.5	6.0	15	200	20	1.0	0.5	± 3.0	± 18	General Purpose	G:601, P1, U

Industrial Temperature Range (-25°C to +85°C)

LM201A	0.075	2.0	10	10	50	1.0	0.5	± 3.0	± 22	General Purpose	H, N:626, J:693
LM208	0.002	2.0	3.0	0.2	50	1.0	0.3	± 3.0	± 20	Precision	H, N:626, J:632, J-8
LM208A	0.002	0.5	1.0	0.2	80	1.0	0.3	± 3.0	± 20	Precision	H, N:626, J:632, J-8

Military Temperature Range (-55°C to +125°C)

LM101A	0.075	2.0	10	10	50	1.0	0.5	± 3.0	± 22	General Purpose	H, J:693
LM108	0.002	2.0	3.0	0.2	50	1.0	0.3	± 3.0	± 20	Precision	H, J, J-8:693
LM108A	0.002	0.5	1.0	0.2	80	1.0	0.3	± 3.0	± 20	Precision	H, J, J-8:693
MC1539	0.5	3.0	15	60	50	2.0	4.2	± 4.0	± 18	High Slew Rate	G:601
MC1709	0.5	5.0	15	200	25	1.0	0.3	± 3.0	± 18	General Purpose	G:601, U
MC1709A	0.6	3.0	5.0	100	25	1.0	0.5	± 3.0	± 18	High Performance MC1709	G:601
MC1748	0.5	5.0	15	200	50	1.0	0.5	± 3.0	± 22	General Purpose	G:601, U

Device	I_{IB}	V_{IO}	TC_{VIO}	I_{IO}	A_{vol}	BW	SR	Supply Voltage		Description	Package Suffix
	μA Max	mV Max	$\mu V/^{\circ}C$ Typ	nA Max	V/mV Min	($A_V=1$) MHz Typ	($A_V=1$) V/ μs Typ	Min	Max		

Internally Compensated**Commercial Temperature Range (0°C to +70°C)**

LF351	200 pA	10	10	100 pA	25	4.0	13	± 5.0	± 18	JFET Input	N 626
LF355	200 pA	10	5.0	50 pA	50	1.0	5.0	± 5.0	± 18	JFET Input	H 601, J 693
LF355B	100 pA	5.0	5.0	20 pA	50	2.5	5.0	± 5.0	± 22	JFET Input	H 601, J 693
LF356	200 pA	10	5.0	50 pA	50	2.0	15	± 5.0	± 18	JFET Input	H 601, J 693
LF356B	100 pA	5.0	5.0	20 pA	50	5.0	12	± 5.0	± 22	JFET Input	H 601, J 693
LF357	200 pA	10	5.0	50 pA	50	3.0	75	± 5.0	± 18	Wideband FET Input	H 601, J 693
LF357B	100 pA	5.0	5.0	20 pA	50	20	50	± 5.0	± 22	JFET Input	H 601, J 693
LF441C	100 pA	5.0	10	50 pA	25	2.0	6.0	± 5.0	± 18	Low Power JFET Input	N 626
LM11C	100 pA	0.6	2.0	10 pA	250	1.0	0.3	± 3.0	± 20	Precision	H, N 626, J 632, J-8 693
LM11CL	200 pA	5.0	3.0	25 pA	50	1.0	0.3	± 3.0	± 20	Precision	H, N 626, J 632, J-8 693
LM307	0.25	7.5	10	50	25	1.0	0.5	± 3.0	± 18	General Purpose	N 626
MC1436	0.04	10	12	10	70	1.0	2.0	± 15	± 34	High Voltage	G 601, U
MC1456	0.03	10	12	10	70	1.0	2.5	± 3.0	± 18	High Performance	G 601, P1, U
MC1733C	30	—	—	5.0 μA	80	90	—	± 4.0	± 8.0	Differential Wideband Video Amp	G 601, L, P 646
MC1741C	0.5	6.0	15	200	20	1.0	0.5	± 3.0	± 18	General Purpose	G 601, P1, U
MC1741SC	0.5	6.0	15	200	20	1.0	10	± 3.0	± 18	High Slew Rate	G 601, P1
MC1776C	0.003	6.0	15	3.0	100	1.0	0.2	± 1.2	± 18	μ Power, Programmable	G 601, P1, U
MC3476	0.05	6.0	15	25	50	1.0	0.2	± 1.5	± 18	Low Cost	G 601, P1, U
MC34001	200 pA	10	10	100 pA	25	4.0	13	± 5.0	± 18	JFET Input	G 601, P 626, U
MC34001B	200 pA	5.0	10	100 pA	50	4.0	13	± 5.0	± 18	JFET Input	G 601, P 626, U
MC34071	0.5	5.0	10	75	25	4.5	10	± 3.0	± 44	High Performance,	P 626, U
MC34071A	500 nA	3.0	10	50	50	4.5	10	± 3.0	± 44	Single Supply	P 626, U
MC34080	200 pA	1.0	10	100 pA	25	16	55	± 5.0	± 22	Decompensated	P 626, U
MC34080A	200 pA	0.5	10	100 pA	50	16	55	± 5.0	± 22	MC34081 for $A_V=2$	P 626, U
MC34081	200 pA	1.0	10	100 pA	25	8.0	30	± 5.0	± 22	High Speed, JFET Input	P 626, U
MC34081A	200 pA	0.5	10	100 pA	50	8.0	30	± 5.0	± 22	High Speed, JFET Input	P 626, U
MC34181	0.1 nA	2.0	10	0.05	25	4.0	10	± 2.5	± 18	Low Power JFET Input	P 626
OP-27F	0.055	0.06	0.3	50	1000	8.0	2.8	± 4.0	± 22	Low Noise, Precision	P 626
OP-27G	0.08	0.1	0.4	75	700	8.0	2.8	± 4.0	± 22	Low Noise, Precision	P 626
TL061AC	200 pA	6.0	10	100 pA	4.0	2.0	6.0	± 2.5	± 18	Low Power JFET Input	P 626
TL061C	200 pA	15	10	200 pA	4.0	2.0	6.0	± 2.5	± 18	Low Power JFET Input	P 626
TL071AC	200 pA	6.0	10	50 pA	50	4.0	13	± 5.0	± 18	Low Noise, JFET Input	P 626, JG
TL071C	200 pA	10	10	50 pA	25	4.0	13	± 5.0	± 18	Low Noise, JFET Input	P 626, JG
TL081AC	200 pA	6.0	10	100 pA	50	4.0	13	± 5.0	± 18	JFET Input	P 626, JG
TL081C	400 pA	15	10	200 pA	25	4.0	13	± 5.0	± 18	JFET Input	P 626, JG

Industrial Temperature Range (-25°C to +85°C)

OP-27F	0.055	0.06	0.3	50	1000	8.0	2.8	± 4.0	± 22	Low Noise, Precision	Z
OP-27G	0.08	0.1	0.4	75	700	8.0	2.8	± 4.0	± 22	Low Noise, Precision	Z

Automotive Temperature Range (-40°C to +85°C)

MC33071	0.5	5.0	10	75	25	4.5	10	± 3.0	± 44	High Performance,	P 626, U
MC33071A	500 nA	3.0	10	50	50	4.5	10	± 3.0	± 44	Single Supply	P 626, U
MC33171	0.1	4.5	10	20	50	1.8	2.1	± 3.0	± 44	Low Power, Single Supply	P 626
MC33181	0.1 nA	2.0	10	0.05	25	4.0	10	± 2.5	± 18	Low Power JFET Input	P 626
TL061V	200 pA	6.0	10	100 pA	4.0	2.0	6.0	± 2.5	± 18	Low Power JFET Input	P 626

OPERATIONAL AMPLIFIERS (continued)

Device	I_B μA Max	V_{IO} mV Max	TC_{VIO} $\mu V/^\circ C$ Typ	I_{IO} nA Max	A_{Vol} V/mV Min	BW ($A_V=1$) MHz Typ	SR ($A_V=1$) V/ μs Typ	Supply Voltage V		Description	Package Suffix
								Min	Max		

Internally Compensated

Military Temperature Range (-55°C to +125°C)

MC1536	0.02	5.0	10	3.0	100	1.0	2.0	± 15	± 40	High Voltage	G 601, U
MC1556	0.015	4.0	10	2.0	100	1.0	2.5	± 3.0	± 22	High Performance	G 601, 693 U
MC1733	0.2	—	—	3.0 μA	90	90	—	± 4.0	± 8.0	Differential Wideband Video Amp	G 603, L
MC1741	0.5	5.0	15	200	50	1.0	0.5	± 3.0	± 22	General Purpose	G 601, U
MC1741S	0.5	5.0	15	200	50	1.0	10	± 3.0	± 22	High Slew Rate	G 601, U
MC1776	0.0075	5.0	15	3.0	200	1.0	0.2	± 1.2	± 18	μ Power, Programmable	G 601, L
MC35001	100 pA	10	10	100 pA	25	4.0	13	± 5.0	± 22	JFET Input	G 601, U
MC35001B	100 pA	5.0	10	50 pA	50	4.0	13	± 5.0	± 22	JFET Input	G 601, U
MC35071	0.5	5.0	10	75	25	4.5	10	$+3.0$	$+44$	High Performance,	U
MC35071A	500 nA	3.0	10	50	50	4.5	10	$+3.0$	$+44$	Single Supply	U
MC35080	200 pA	1.0	10	100 pA	25	16	55	± 5.0	± 22	Decompensated	U
MC35080A	200 pA	0.5	10	100 pA	50	16	55	± 5.0	± 22	MC35081 for $A_V \geq 2$	U
MC35081	200 pA	1.0	10	100 pA	25	8.0	30	± 5.0	± 22	High Speed, JFET Input	U
MC35081A	200 pA	0.5	10	100 pA	50	8.0	30	± 5.0	± 22	High Speed, JFET Input	U
MC35171	0.1	4.5	10	20	50	1.8	2.1	$+3.0$	$+44$	Low Power, Single Supply	U
MC35181	0.1 nA	2.0	10	0.05	25	4.0	10	± 2.5	± 18	Low Power JFET Input	U
OP-27B	0.055	0.06	0.3	50	1000	8.0	2.8	± 4.0	± 22	Low Noise, Precision	Z
OP-27C	0.08	0.1	0.4	75	700	8.0	2.8	± 4.0	± 22	Low Noise, Precision	Z
TL061M	200 pA	6.0	10	100 pA	4.0	2.0	6.0	± 2.5	± 18	Low Power JFET Input	JG
TL081M	200 pA	9.0	10	100 pA	25	4.0	13	± 5.0	± 18	JFET Input	JG

Dual Operational Amplifiers

Device	I_B μA Max	V_{IO} mV Max	TC_{VIO} $\mu V/^\circ C$ Typ	I_{IO} nA Max	A_{Vol} V/mV Min	BW ($A_V=1$) MHz Typ	SR ($A_V=1$) V/ μs Typ	Supply Voltage V		Description	Package Suffix
								Min	Max		

Noncompensated

Commercial Temperature Range (0°C to +70°C)

MC1437	1.5	7.5	10	500	15	1.0	0.25	± 3.0	± 18	Dual MC1709	L, P 646
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Military Temperature Range (-55°C to +125°C)

MC1537	0.5	5.0	10	200	25	1.0	0.25	± 3.0	± 18	Dual MC1709	L
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Internally Compensated

Commercial Temperature Range (0°C to +70°C)

LF353	200 pA	10	10	100 pA	25	4.0	13	± 5.0	± 18	JFET Input	N 626
LF442C	100 pA	5.0	10	50 pA	25	2.0	6.0	± 5.0	± 18	Low Power JFET Input	N 626
LM358	0.25	6.0	7.0	50	25	1.0	0.6	± 1.5	± 18	Single Supply (Low Power Consumption)	H, N 626, J 693
LM833	1.0	5.0	2.0	200	31.6	15	7.0	± 2.5	± 18	Dual, Low Noise, Audio	N 626
MC1458	0.5	6.0	10	200	20	1.1	0.8	± 3.0	± 18	Dual MC1741	G 601, P1, U
MC1458C	0.7	10	10	300	20	1.1	0.8	± 3.0	± 18	Dual General Purpose	G 601, P1
MC1458S	0.5	6.0	10	200	20	1.0	10	± 3.0	± 18	High Slew Rate	G 601, P1, U
MC1747C	0.5	6.0	10	200	25	1.0	0.5	± 3.0	± 18	Dual MC1741	G 603, L, P2
MC3458	0.5	10	7.0	50	20	1.0	0.6	± 1.5	± 18	Split Supplies Single Supply (Low Crossover Distortion)	G 601, P1, U

OPERATIONAL AMPLIFIERS (continued)

Device	I_B	V_{IO}	TC_{VIO}	I_{IO}	A_{vol}	BW	SR	Supply		Description	Package Suffix
	μA	mV	$\mu V/^\circ C$	nA	V/mV	($A_V=1$) MHz	($A_V=1$) V/ μs	Min	Max		

Commercial Temperature Range (0°C to +70°C) (continued)

MC4558AC	0.5	5.0	10	200	50	2.8	1.6	± 3.0	± 22	High Frequency	P1
MC4558C	0.5	6.0	10	200	20	2.8	1.6	± 3.0	± 18	High Frequency	G 601, P1, U
MC34002	100 pA	10	10	100 pA	25	4.0	13	± 5.0	± 18	JFET Input	G 601, P 626, U
MC34002B	100 pA	5.0	10	70 pA	25	4.0	13	± 5.0	± 18	JFET Input	G 601, P 626, U
MC34072	0.5	5.0	10	75	25	4.5	10	$+3.0$	$+44$	High Performance,	P 626, U
MC34072A	500 nA	3.0	10	50	50	4.5	10	$+3.0$	$+44$	Single Supply	P 626, U
MC34082	200 pA	3.0	10	100 pA	25	8.0	30	± 5.0	± 22	High Speed, JFET Input	P 626, U
MC34082A	200 pA	1.0	10	100 pA	50	8.0	30	± 5.0	± 22	High Speed, JFET Input	P 626, U
MC34083	200 pA	3.0	10	100 pA	25	16	55	± 5.0	± 22	Decompensated	P 626, U
MC34083A	200 pA	1.0	10	100 pA	50	16	55	± 5.0	± 22	MC34082 for $A_V=2$	P 626, U
MC34182	0.1 nA	3.0	10	0.05	25	4.0	10	± 2.5	± 18	Low Power JFET Input	P 626
TL062AC	200 pA	6.0	10	100 pA	4.0	2.0	6.0	± 2.5	± 18	Low Power JFET Input	P 626
TL062C	200 pA	15	10	200 pA	4.0	2.0	6.0	± 2.5	± 18	Low Power JFET Input	P 626
TL072AC	200 pA	6.0	10	50 pA	5.0	4.0	13	± 5.0	± 18	Low Noise, JFET Input	P 626, JG 693
TL072C	200 pA	10	10	50 pA	25	4.0	13	± 5.0	± 18	Low Noise, JFET Input	P 626, JG 693
TL082AC	200 pA	6.0	10	100 pA	5.0	4.0	13	± 5.0	± 18	JFET Input	P 626, JG 693
TL082C	400 pA	15	10	200 pA	25	4.0	13	± 5.0	± 18	JFET Input	P 626, JG 693

Industrial Temperature Range (-25°C to +85°C)

LM258	0.15	5.0	10	30	50	1.0	0.6	± 1.5	± 18	Split or Single Supply Op Amp	H, N 626, J:693
								± 3.0	± 36		

Automotive Temperature Range (-40°C to +85°C)

LM2904	0.25	7.0	7.0	50	100 typ	1.0	0.6	± 1.5	± 13	Split or Single Supply Op Amp	H, N 626, J:693
								± 3.0	± 26		
MC3358	5.0	8.0	10	75	20	1.0	0.6	± 1.5	± 18	Split Supplies	P1-626
								$+3.0$	± 36	Single Supply	
MC33072	0.50	5.0	10	75	25	4.5	10	$+3.0$	-44	High Performance,	P 626, U
MC33072A	500 nA	3.0	10	50	50	4.5	10	$+3.0$	$+44$	Single Supply	P 626, U
MC33077	1.0	1.0	2.0	180	150	37	11	± 2.5	± 18	Dual, Low Noise	P 626
MC33078	750 nA	2.0	2.0	150	31.6	16	7.0	± 5.0	± 18	Low Noise	N 626
MC33172	0.10	4.5	10	20	50	1.8	2.1	$+3.0$	$+44$	Low Power, Single Supply	P 626
MC33182	0.1 nA	3.0	10	0.05	25	4.0	10	± 2.5	± 18	Low Power JFET Input	P 626
MC33282	100 pA	200 μV	5.0	50 pA	50	30	12	± 2.5	± 18	Low Input Offset JFET	P.646
TL062V	200 pA	6.0	10	100 pA	4.0	2.0	6.0	± 2.5	± 18	Low Power JFET Input	P:626

Military Temperature Range (-55°C to +125°C)

LM158	0.15	5.0	10	30	50	1.0	0.6	± 1.5	± 18	Split Supplies	H, J 693
								$+3.0$	-36	Single Supply (Low Power Consumption)	
MC1558	0.5	5.0	10	200	50	1.1	0.8	± 3.0	± 22	Dual MC1741	G 601, U
MC1558S	0.5	5.0	10	200	50	1.0	1.0	± 3.0	± 22	High Slew Rate	G 601, U
MC1747	0.5	5.0	10	200	50	1.0	0.5	± 3.0	± 22	Dual MC1741	G 601, L
MC3558	0.5	5.0	10	50	50	1.0	0.6	± 1.5	± 18	Split Supplies	G 601, U
								$+3.0$	$+36$	Single Supply	
MC4558	0.5	5.0	10	200	50	2.8	1.6	± 3.0	± 22	High Frequency	G 601, U
MC35002	100 pA	10	10	100 pA	25	4.0	13	± 5.0	± 22	JFET Input	G 601, U
MC35002B	100 pA	5.0	10	50 pA	50	4.0	13	± 5.0	± 22	JFET Input	G 601, U
MC35072	0.5	5.0	10	75	25	4.5	10	$+3.0$	$+44$	High Performance,	U
MC35072A	500 nA	3.0	10	50	50	4.5	10	$+3.0$	$+44$	Single Supply	U
MC35082	200 pA	3.0	10	100 pA	25	8.0	30	± 5.0	± 22	High Speed, JFET Input	U
MC35082A	200 pA	1.0	10	100 pA	50	8.0	30	± 5.0	± 22	High Speed, JFET Input	U

OPERATIONAL AMPLIFIERS (continued)

Device	I_B	V_{IO}	TC_{VIO}	I_{IO}	A_{vol}	BW	SR	Supply Voltage		Description	Package Suffix
	μA Max	mV Max	$\mu V/^\circ C$ Typ	nA Max	V/mV Min	($A_V=1$) MHz Typ	($A_V=1$) V/ μs Typ	Min	Max		

Military Temperature Range (-55°C to +125°C)

MC35083	200 pA	3.0	10	100 pA	25	16	55	-5.0	± 22	Decompensated	U
MC35083A	200 pA	1.0	10	100 pA	50	16	55	-5.0	± 22	MC35082 for $A_V \geq 2$	U
MC35172	0.1	4.5	10	20	50	1.8	2.1	+3.0	+44	Low Power, Single Supply	U
MC35182	0.1 nA	3.0	10	0.05	25	4.0	10	-2.5	± 18	Low Power JFET Input	U
TL062M	200 pA	6.0	10	100 pA	4.0	2.0	6.0	-2.5	± 18	Low Power JFET Input	JG
TL072M	200 pA	6.0	10	50 pA	35	4.0	13	-5.0	± 18	Low Noise JFET Input	JG
TL082M	200 pA	6.0	10	100 pA	25	4.0	13	-5.0	± 18	JFET Input	JG

Quad Operational Amplifiers

Device	I_B	V_{IO}	TC_{VIO}	I_{IO}	A_{vol}	BW	SR	Supply Voltage		Description	Package Suffix
	μA Max	mV Max	$\mu V/^\circ C$ Typ	nA Max	V/mV Min	($A_V=1$) MHz Typ	($A_V=1$) V/ μs Typ	Min	Max		

Internally Compensated

Commercial Temperature Range (0°C to +70°C)

LF347	200 pA	10	10	100 pA	25	4.0	13	-5.0	± 18	JFET Input	N 646
LF347B	200 pA	5.0	10	100 pA	50	4.0	13	-5.0	± 18	JFET Input	N 646
LF444C	100 pA	10	10	50 pA	25	2.0	6.0	-5.0	± 18	Low Power JFET Input	N 646
LM324	0.25	6.0	7.0	50	25	1.0	0.6	± 1.5	± 16	Low Power Consumption	J 632, N 646
LM348	0.2	6.0	—	50	25	1.0	0.5	± 3.0	± 18	Quad MC1741	J 632, N 646
MC3401	0.3	—	—	—	1.0	5.0	0.6	± 1.5	± 18	Norton Input	J 632, N 646
LM3900	—	—	—	—	—	—	—	-3.0	+36	—	—
MC3403	0.5	10	7.0	50	20	1.0	0.6	-1.5	± 18	No Crossover Distortion	L, P 646
MC4741C	0.5	6.0	15	200	20	1.0	0.5	± 3.0	± 18	Quad MC1741	L, P 646
MC34004	200 pA	10	10	100 pA	25	4.0	13	-5.0	± 18	JFET Input	L, P 646
MC34004B	200 pA	5.0	10	100 pA	50	4.0	13	± 5.0	± 18	JFET Input	L, P 646
MC34074	0.5	5.0	10	75	25	4.5	10	+3.0	+44	High Performance, Single Supply	L, P 646
MC34074A	500 nA	3.0	10	50	50	4.5	10	+3.0	+44	High Speed, JFET Input	P 646
MC34084	200 pA	12	10	100 pA	25	8.0	30	-5.0	± 22	High Speed, JFET Input	P 646
MC34084A	200 pA	6.0	10	100 pA	50	8.0	30	± 5.0	± 22	High Speed, JFET Input	P 646
MC34085	200 pA	12	10	100 pA	25	16	55	± 5.0	± 22	Decompensated	P 646
MC34085A	200 pA	6.0	10	100 pA	50	16	55	± 5.0	± 22	MC34084 for $A_V \geq 2$	P 646
MC34184	0.1 nA	10	10	0.05	25	4.0	10	-2.5	± 18	Low Power JFET Input	P 646
TL064AC	200 pA	6.0	10	100 pA	4.0	2.0	6.0	-2.5	± 18	Low Power JFET Input	N 646
TL064C	200 pA	15	10	200 pA	4.0	2.0	6.0	-2.5	± 18	Low Power JFET Input	N 646
TL074AC	200 pA	6.0	10	50 pA	50	4.0	13	-5.0	± 18	Low Noise JFET Input	J 632, N 646
TL074C	200 pA	10	10	50 pA	25	4.0	13	-5.0	± 18	Low Noise JFET Input	J 632, N 646
TL084AC	200 pA	6.0	10	100 pA	50	4.0	13	± 5.0	± 18	JFET Input	J 632, N 646
TL084C	400 pA	15	10	200 pA	25	4.0	13	± 5.0	± 18	JFET Input	J 632, N 646

Industrial Temperature Range (-25°C to +85°C)

LM224	0.15	5.0	7.0	30	50	1.0	0.6	± 1.5	± 18	Split or Single Supply OP Amp	J 632, N 646
LM248	0.2	6.0	—	50	25	1.0	0.5	± 3.0	± 18	Quad MC1741	J 632, N 646

Automotive Temperature Range (-40°C to +85°C)

LM2902	0.5	10	—	50	—	1.0	0.6	± 1.5	± 13	Differential Low Power	J 632, N 646
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OPERATIONAL AMPLIFIERS (continued)

Device	I_{IB}	V_{IO}	$TC_{V_{IO}}$	I_{IO}	A_{Vol}	BW	SR	Supply Voltage		Description	Package Suffix
	μA Max	mV Max	$\mu V/^{\circ}C$ Typ	nA Max	V/mV Min	($A_V=1$) MHz Typ	($A_V=1$) V/ μs Typ	Min	Max		
Automotive Temperature Range (-40°C to +85°C) (continued)											
MC3301	0.3	—	—	—	1.0	4.0	0.6	-2.0	-15	Norton Input	P 646
LM2900								+4.0	+28		N 646
MC3303	0.5	8.0	10	75	20	1.0	0.6	-1.5	+18	Differential	P 646
								+3.0	+36	General Purpose	
MC33074	0.5	4.5	10	75	25	4.5	10	+3.0	+44	High Performance, Single Supply	L, P:646
MC33074A	500 nA	3.0	10	50	50	4.5	10	+3.0	+44	Quad High Performance	L, P:646
MC33079	750 nA	2.5	2.0	150	31.6	9.0	7.0	-5.0	-18	Quad Low Noise	N 646
MC33174	0.1	4.5	10	20	50	1.8	2.1	-3.0	-44	Low Power, Single Supply	P 646
MC33184	0.1 nA	10	10	0.05	25	4.0	10	-2.5	-18	Low Power JFET Input	P 646
MC33274	650 nA	1.0	0.56	25 nA	31.6	5.5	11.5	-1.5	-18	High Performance	P 626
MC33284	100 pA	2.0	5.0	50 pA	50	3.0	12	-2.5	-18	Low Input Offset JFET	P 646
TL064V	200 pA	9.0	10	100 pA	4.0	20	6.0	-2.5	-18	Low Power JFET Input	N 646
Telecommunications Temperature Range (-40°C to +85°C)											
MC143403	1.0 nA	30	—	200 pA	45 dB	0.8	1.5	4.75	12.6	CMOS, Low Power, Drives Low-Impedance Loads	L, P 646
MC143404	1.0 nA	30	—	200 pA	60 dB	0.8	1.0	4.75	12.6	CMOS, Very Low Power	L, P 646
Military Temperature Range (-55°C to +125°C)											
LM124	0.15	5.0	7.0	30	50	1.0	0.6	-1.5	-16	Low Power Consumption	J 632, N 646
								+3.0	+32		
LM148	0.1	5.0	—	25	50	1.0	0.5	-3.0	-18	Quad MC1741	J 632
MC3503	0.5	5.0	7.0	50	50	1.0	0.6	-1.5	-18	General Purpose	L, P:646
								+3.0	+36	Low Power	
MC4741	0.5	5.0	15	200	50	1.0	0.5	-3.0	-22	Quad MC1741	L
MC35004	100 pA	10	10	100 pA	25	4.0	13	-5.0	-22	JFET Input	L
MC35004B	100 pA	5.0	10	50 pA	50	4.0	13	-5.0	-22	JFET Input	L
MC35074	0.5	5.0	10	75	25	4.5	10	+3.0	+44	High Performance, Single Supply	L
MC35074A	500 nA	3.0	10	50	50	4.5	10	-3.0	+44	Quad High Performance	L
MC35084	200 pA	12	10	100 pA	25	8.0	30	-5.0	-22	High Speed, JFET Input	L
MC35084A	200 pA	6.0	10	100 pA	50	8.0	30	-5.0	-22	High Speed, JFET Input	L
MC35085	200 pA	12	10	100 pA	25	16	55	-5.0	-22	Decompensated	L
MC35085A	200 pA	6.0	10	100 pA	50	16	55	-5.0	-22	MC35084 for $A_V \geq 2$	L
MC35174	0.1	4.5	10	20	50	1.8	2.1	+3.0	+44	Low Power, Single Supply	L
MC35184	0.1 nA	10	10	0.05	25	4.0	10	-2.5	-18	Low Power JFET Input	L
TL064M	200 pA	9.0	10	100 pA	4.0	2.0	6.0	-2.5	-18	Low Power JFET Input	J 632
TL074M	200 pA	9.0	10	50 pA	35	4.0	13	-5.0	-18	Low Noise JFET Input	J 632
TL084M	200 pA	9.0	10	100 pA	25	4.0	13	-5.0	-18	JFET Input	J 632

High Frequency Amplifiers

A variety of high frequency circuits with features ranging from low cost simplicity to multi-function versatility marks Motorola's line of integrated amplifiers. Devices described here are intended for industrial and communications appli-

cations. For devices especially dedicated to consumer products, i.e., TV and entertainment radio, see the "Consumer Electronics" section.

AGC Amplifiers

MC1590G Family — Wide-Band General Purpose Amplifiers

The MC1590G, MC1490, MC1350 family are basic building blocks — AGC (Automatic Gain Controlled) RF Video Amplifiers. These parts are recommended for applications up through 70 MHz. The best high frequency performance may be obtained by using the physically smaller SOIC version (shorter leads) — MC1350D. There are currently no other RF IC's like these, because other manufacturers have dropped their copies. Applications include variable gain video and instrumentation amplifiers, IF (Intermediate Frequency) amplifiers for radio and TV receivers, and transmitter power output control. Many uses will be found in medical instrumentation, remote monitoring, video graphics processing, and a variety of communications equipment. The family of parts using the same basic die (identical circuit with slightly different test parameters) is listed in the following table.

MC1545/1445 — Gated 2-Channel Input

Differential input and output amplifier with gated 2-channel input for a wide variety of switching purposes. Typical 50 MHz bandwidth makes it suitable for high

frequency applications such as video switching, FSK circuits, multiplexers, etc. Gating circuit is useful for AGC control.

Non-AGC Amplifiers

SE/NE592 — Differential Two Stage Video Amplifier

A monolithic, two stage differential output, wideband video amplifier. It offers fixed gains of 100 and 400 without external components and adjustable gains from 400 to 0 with one external resistor. The input stage has been designed so that with the addition of a few external reactive elements between the gain select terminals, the circuit can function as a high pass, low pass, or band pass filter. This feature makes the circuit ideal for use as a video or pulse amplifier in communications, magnetic memories, display and video recorder systems.

MC1733/MC1733C — Video Amplifier

Differential input and output amplifier provides three fixed gain options with bandwidth to 120 MHz. External resistor permits any gain setting from 10 to 400 V/V. Extremely fast rise time (2.5 ns typ) and propagation delay time (3.6 ns typ) makes this unit particularly useful as pulse amplifier in tape, drum, or disc memory read applications.

High-Frequency Amplifier Specifications

Operating Temperature Range			A _V dB	Bandwidth f _a MHz	V _{CC} /V _{EE} V _{dc}		Package/Suffix
-55° to +125°C	-40° to +85°C	0° to +70°C			Min	Max	
MC1590G	—	—	50 35	10 100	+6.0	+18	601
—	—	MC1350	50 50	45 45	+6.0	+18	626 P, 751 D
—	MC1490	—	50 35	10 100	+6.0	+18	626 P
MC1545	—	MC1445	19	50	±4.0	±12	632 L
SE592	—	NE592	52 40	40 90	±4.0	±8.0	603 H, 632 F 646 N
MC1733	—	MC1733C	52 40 20	40 90 120	±4.0	±8.0	603 G, 632 L 646 P

Miscellaneous Amplifiers

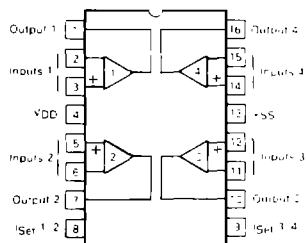
Motorola provides several bipolar and CMOS special purpose amplifiers which fill specific needs. These

devices range from low power CMOS programmable amplifiers and comparators to variable-gain bipolar power amplifiers.

CMOS

- MC14573: Quad Programmable Operational Amplifier
- MC14574: Quad Programmable Comparator
- MC14575: Dual Programmable Operational Amplifier and Dual Programmable Comparator

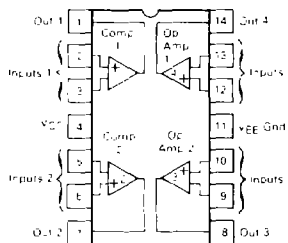
These low power devices are designed for applications such as active filters, voltage reference circuits, function generators, oscillators, and limit set alarms.



Bipolar

- MC3505/MC3405: Dual Operational Amplifier and Dual Comparator

This device contains two Differential Input Operational Amplifiers and two Comparators each set capable of single supply operation. This operational amplifier-comparator circuit will find its applications as a general purpose product for automotive circuits and as an industrial "building block."



Device	I _B μA Max	V _{IO} mV Max	I _O nA Max	A _{vol} V/mV Min	Response μs Typ	Supply Voltage		Package Suffix
						Single	Dual	
Bipolar								
MC3505	0.5	5.0	50	20	1.3	3.0 to 36	± 1.5 to ± 18	L'632
MC3405		10						L'632, P'646
CMOS								
MC14573	0.001	± 30	0.0001	1.0	10*	3.0 to 15	± 1.5 to ± 7.5	D'751B, P'648
MC14574								
MC14575								

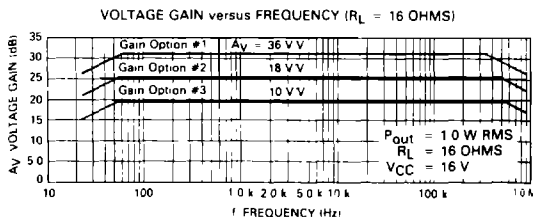
*Propagation Delay

Power Amplifiers Variable Gain

MC1554G—T_A = -55° to +125°C, Case 603C

MC1454G—T_A = 0° to +70°C, Case 603C

One-watt Power Amplifier for single or split supply operation. Typical voltage gain of 10, 18, or 33 V/V with 0.4% THD.



Comparators

Device	I _B μA Max	V _{IO} mV Max	I _{IO} μA Max	A _v V/V Typ	I _O mA Min	Response Time ns	Supply Voltage V	Description	Temperature Range (°C)	Package Suffix
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Single BIPOLAR

LM111	0.1	3.0	0.01	200 k	8.0	200	+15, -15	With strobe, will operate from single supply	-55 to +125	H, J-8
LM211	0.1	3.0	0.01	200 k	8.0	200	+15, -15		-25 to +85	H, J-8
LM311	0.25	7.5	0.05	200 k	8.0	200	+15, -15		0 to +70	H, N 626, J-8

CMOS

MC14578	1.0 pA	50	—	—	1.1	—	+3.5 to +14	Requires only 10 μA from single-ended supply	-30 to +70	D 751B, P 648
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Dual BIPOLAR

LM193	0.1	5.0	0.025	200 k	6.0	1300	± 1.5 to ± 18 or +3.0 to +36	Designed for single or split supply operation, input common mode includes ground (negative supply)	-55 to +125	H
LM193A	0.1	2.0	0.025	200 k	6.0	1300			-55 to +125	H
LM293	0.25	5.0	0.05	200 k	6.0	1300			-25 to +85	H
LM293A	0.25	2.0	0.05	200 k	6.0	1300			-25 to +85	H
LM393	0.25	5.0	0.05	200 k	6.0	1300			0 to +70	H, N-626
LM393A	0.25	2.0	0.05	200 k	6.0	1300			0 to +70	H, N 626
LM2903	0.25	7.0	0.05	200 k	6.0	1500			-40 to +85	N-626
MC3405	0.5	10	0.05	200 k	6.0	1300	± 1.5 to ± 7.5 or -3.0 to 15	This device contains two op amps and two comparators in a single package	0 to +70	L 632, P 646
MC3505	0.5	5.0	0.05	200 k	6.0	1300			-55 to +125	L 632

CMOS

MC14575	0.001	30	0.0001	20 k	3.0	1000	± 1.5 to ± 7.5 or +3.0 to 15	This device contains two op amps and two comparators in a single package	-40 to +85	P 648 D-751B
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Quad BIPOLAR

LM139	0.1	5.0	0.025	200 k	6.0	1300	± 1.5 to ± 18 or +3.0 to -36	Designed for single or split supply operation, input common mode includes ground (negative supply)	-55 to -125	J
LM139A	0.1	2.0	0.025	200 k	6.0	1300			-55 to -125	J
LM239	0.25	5.0	0.05	200 k	6.0	1300			-25 to +85	J, N 646
LM239A	0.25	2.0	0.05	200 k	6.0	1300			-25 to +85	J, N 646
LM339	0.25	5.0	0.05	200 k	6.0	1300			0 to -70	J, N-646
LM339A	0.25	2.0	0.05	200 k	6.0	1300			0 to -70	J, N 646
LM2901	0.25	7.0	0.05	100 k	6.0	1300			-40 to +85	N 646
MC3302	0.5	20	0.5	30 k	6.0	1300			-40 to +85	P 646
MC3430	40	6.0	1.0 Typ	1.2 k	16	33	+5.0, -5.0	High speed comparator sense-amplifier	0 to +70	L, P
MC3431	40	10	1.0 Typ	1.2 k	16	33	+5.0, -5.0		0 to +70	L, P
MC3432	40	6.0	1.0 Typ	1.2 k	16	40	+5.0, -5.0		0 to +70	L, P
MC3433	40	10	1.0 Typ	1.2 k	16	40	+5.0, -5.0		0 to +70	L, P

CMOS

MC14574	0.001	30	0.0001	20 k	3.0	10000	± 1.5 to ± 7.5 or -3.0 to +15	Externally programmable power dissipation with one or two resistors	-40 to +85	P 648 D 751B
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