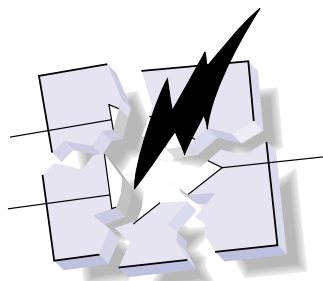
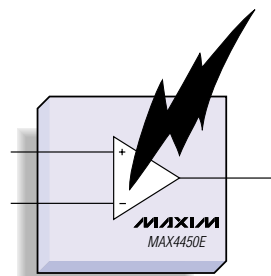


Industry's First $\pm 15\text{kV}$ ESD-Protected Op Amps

**Integrated ESD Solution Speeds Qualification and Eliminates
Up to Six External Components**



The Competition



**Maxim's $\pm 15\text{kV}$
ESD Protection**

Protects Exposed Analog/Video I/O Connectors!

Targeted for applications where an input or an output is exposed to the outside world, such as video and communications, Maxim's new line of $\pm 15\text{kV}$ ESD-protected amplifiers are compliant with International ESD Standards: $\pm 15\text{kV}$ IEC 1000-4-2 Air-Gap Discharge; $\pm 8\text{kV}$ IEC 1000-4-2 Contact Discharge; and $\pm 15\text{kV}$ Human Body Model. The MAX4450E, MAX4451E, MAX4380E-MAX4383E, and MAX4389E-MAX4396E eliminate the need for discrete ESD protection, thus reducing layout iterations, cost, and board space.

Compliant with International ESD Standards

- $\pm 15\text{kV}$ IEC 1000-4-2 Air-Gap Discharge
- $\pm 8\text{kV}$ IEC 1000-4-2 Contact Discharge
- $\pm 15\text{kV}$ Human Body Model

High Performance

- 210MHz -3dB Bandwidth
- 55MHz 0.1dB Gain Flatness
- 485V/ μs Slew Rate

Part	No. of Amps	-3dB BW (MHz)	Slew Rate (V/ μs)	0.1dB Gain Flatness (MHz)	Shutdown	ESD Protection (kV)
MAX4450E/MAX4380E	1	210	485	55	No/Yes	± 15
MAX4389E/MAX4390E	1	145	200	35	Yes/No	± 15
MAX4451E/MAX4381E	2	210	485	55	No/Yes	± 15
MAX4392E/MAX4393E	2	145	200	35	No/Yes	± 15
MAX4382E/MAX4394E	3	210/145	485/200	55/35	Yes	± 15
MAX4383E/MAX4384E	4	210	485	55	No/Yes	± 15
MAX4395E/MAX4396E	4	145	200	35	No/Yes	± 15

What's Inside

- Video Amps
- Mux-Amps
- Crosspoint Switches
- Video Filters

ANALOG DESIGN GUIDE

1	Multiplexers, Switches
2	Interface Products
3	Op Amps, Comparators
4	DC-DC Converters, Power Supplies
5	μP Supervisory
6	Analog Filters
7	A/D Converters
8	Video/High-Speed Amps
9	D/A Converters
10	Analog Functions
11	Voltage References
12	Temperature Sensors
13	High-Speed ADCs & DACs
14	Signal Conditioners

World's Fastest Op Amp in Tiny SC70 Package

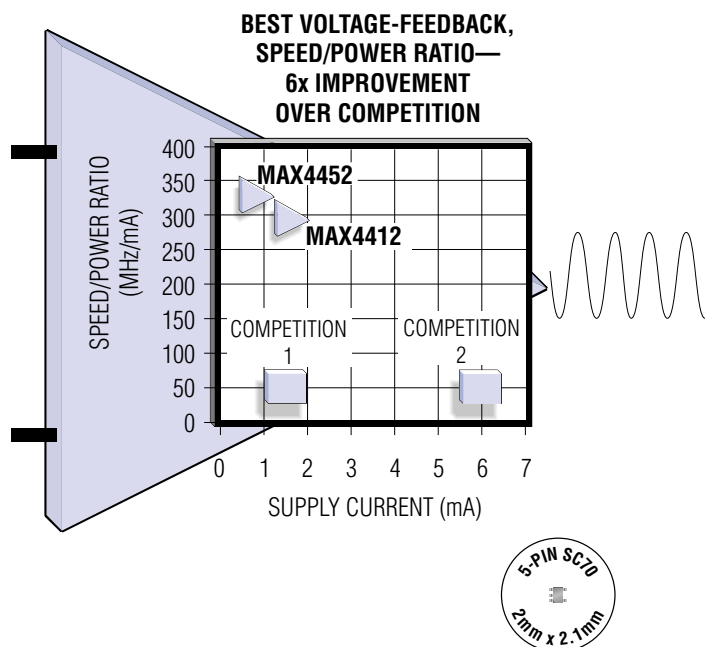
Best Speed/Power Ratio with 1.7mA, 500MHz Op Amp

MAX4412/MAX4413

- 500MHz -3dB Bandwidth
- 1.7mA Supply Current
- Operates from Single 2.7V to 5.5V Supply

MAX4452/MAX4453/MAX4454

- 200MHz -3dB Bandwidth
- 620µA Supply Current
- Operates from Single 2.7V to 5.25V Supply
- 5-Pin SC70 and SOT23, 8-Pin SOT23, and 14-Pin TSSOP Packages



HALF THE SIZE OF A SOT23!

Get Current-Feedback Performance with
a Low-Cost, Voltage-Feedback Op Amp

Part	No. of Amps	Min Stable Gain (V/V)	Supply Voltage Range (V)	Supply Current Per Amp (mA)	Gain Bandwidth (MHz)	Distortion (5MHz, SFDR) (dBc)	Pin-Package
MAX4412/13	1/2	1	2.7 to 5.5	1.7	500	-84	5-SC70/SOT23, 8-SOT23
MAX4414/6/8	1/2/4	1	2.7 to 5.5	1.6	400	-84	8-µMAX/SO, 14-TSSOP
MAX4415/7/9	1/2/4	5	2.7 to 5.5	1.6	750	-76	8-µMAX/SO, 14-TSSOP
MAX4452/3/4	1/2/4	1	2.7 to 5.25	0.62	200	-83 (at 1MHz)	5-SC70, 8-SOT23, 14-TSSOP
MAX4352/3/4	1/2/4	5	2.7 to 5.25	0.62	400	-83 (at 1MHz)	5-SC70, 8-SOT23, 14-TSSOP



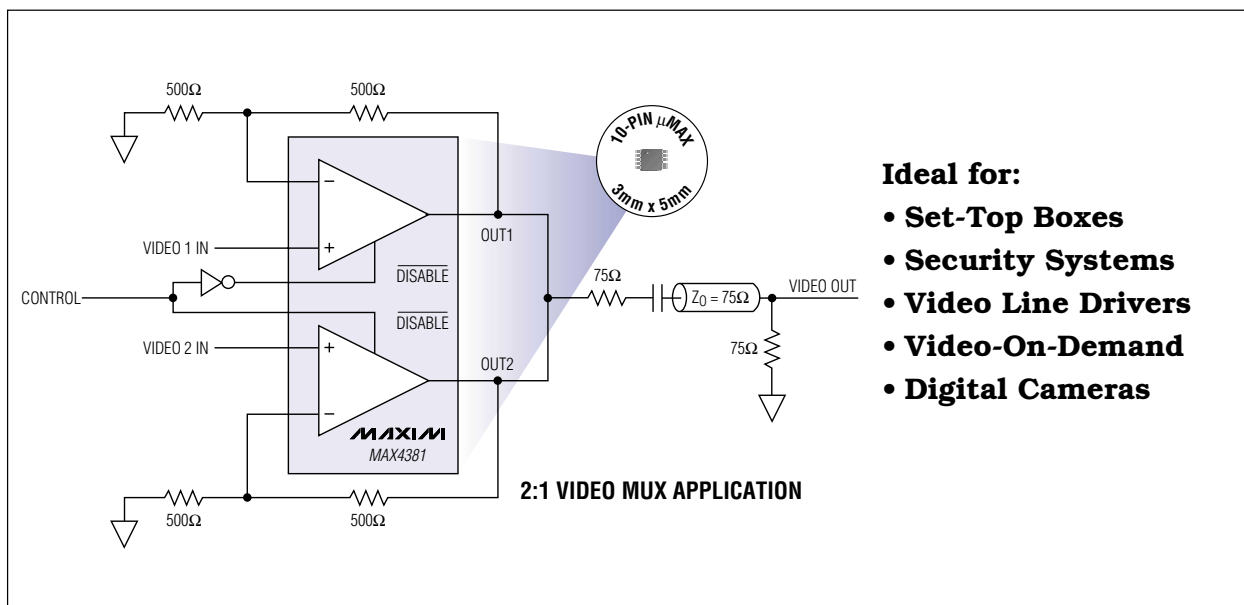
Get Price, Delivery, and Place Orders Online at
www.maxim-ic.com





Smallest 210MHz Video Op Amps with Disable

Ideal for Low-Cost Video Multiplexing Applications



Small

- Single Amplifier with Disable Available in Ultra-Small 6-Pin SC70

Versatile

- Operate from Single +5V or Dual ±5V Supplies

High Performance

- 40MHz 0.1dB Large-Signal Gain Flatness is Ideal for HDTV

Robust

- Capable of Driving Up to Three Back-Terminated 75Ω Video Lines

The MAX4380–MAX4384 single/dual/triple/quad, low-power, single-supply, high-speed op amps are available in ultra-small SC70, μMAX, and TSSOP packages. The combination of Rail-to-Rail® outputs, low-power operation, wide bandwidth, and high-impedance output disable mode in ultra-small packages makes these op amps ideal for a variety of multiplexing applications for the consumer video market, including set-top boxes and video surveillance systems.

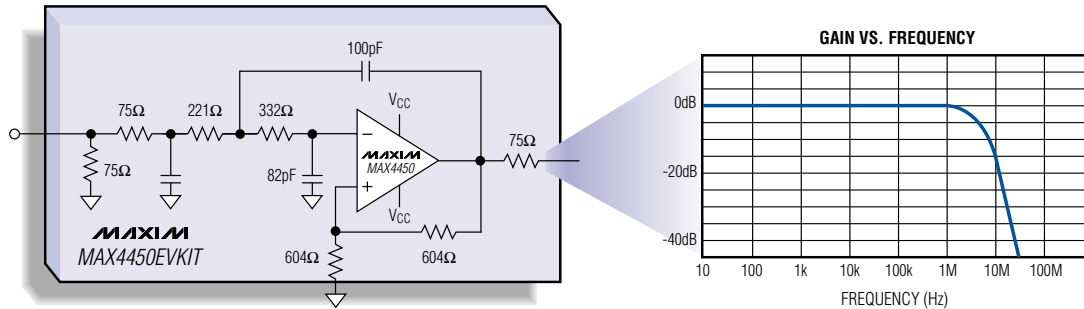
Part	No. of Amps	Supply Voltage (V)	-3dB BW (MHz)	Slew Rate (V/μs)	0.1dB Gain Flatness (MHz)	Shutdown
MAX4450/MAX4380	1	4.5 to 11	210	485	55	No/Yes
MAX4389/MAX4390	1	4.5 to 11	100	200	30	Yes/No
MAX4350	1	±5	210	485	55	No
MAX4451/MAX4381	2	4.5 to 11	210	485	55	No/Yes
MAX4392/MAX4393	2	4.5 to 11	100	200	30	No/Yes
MAX4351	2	±5	210	485	55	No
MAX4382/MAX4394	3	4.5 to 11	210/100	485/200	55/30	Yes
MAX4383/MAX4384	4	4.5 to 11	210	485	55	No/Yes
MAX4395/MAX4396	4	4.5 to 11	100	200	30	No/Yes

Rail-to-Rail is a registered trademark of Nippon Motorola, Ltd.



Active 3-Pole Video Filter Exceeds Performance Expectations

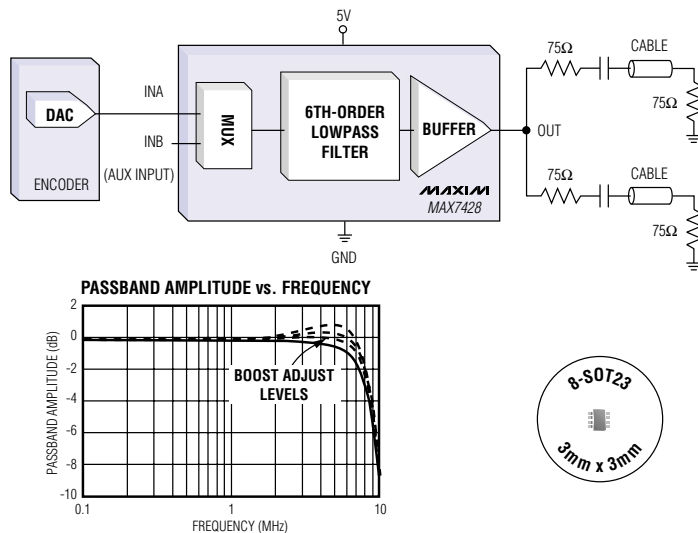
The MAX4450 EV Kit Video Reconstruction Filter is Ideal for NTSC and PAL Consumer Applications



**Fully Assembled and Tested EV Kits Available—
Call Your Nearest Maxim Office for One Now!**

- -23dB Attenuation at 13.5MHz
- -43dB Attenuation at 27MHz
- Single +5V or Dual $\pm 5V$ Operation
- Directly Drives 75Ω Reverse-Terminated Video Line

World's Smallest Integrated Video Reconstruction Filter and Buffer



- Tiny SOT23 Package Saves Board Space
- Fixed Filter Characteristics, Ideal for NTSC, PAL, and SDTV Video Signals
- Stopband: -50dB at 27MHz
- Drives Two 150Ω Video Loads
- 1.5dB Adj Boost at 4.5MHz
- Input 2:1 Channel Multiplexer
- Output Disable
- Save Design Time

Part	Number of Channels	Composite Video Signal	Y/C Video Signal	Component Video Signal	Supply Range (V/μs)	Pin-Package	Price† (\$)
MAX7428	1	✓	✓	✓	4.5 to 5.5	8-SOT23	0.90
MAX7430*	2	✓	✓	✓	4.5 to 5.5	10-μMAX	0.90
MAX7432*	3	✓	✓	✓	4.5 to 5.5	14-TSSOP	0.90

*Future product—contact factory for availability.

†1000-up recommended resale. Prices provided are for design guidance and are FOB USA. International prices will differ due to local duties, taxes, and exchange rates. Not all packages are offered in 1k increments, and some may require minimum order quantities.



First 345MHz, Single-Supply, 2-/4-/8-Channel Video Mux-Amps

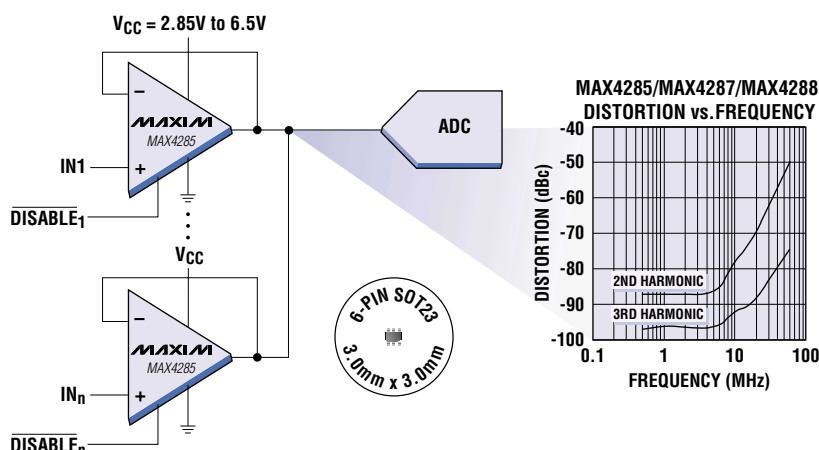
Clean Switching,
Simple Solutions

- Low 6.1mA Supply Current (MAX4310/MAX4313)
- Single-Supply Operation to 4.0V
- Rail-to-Rail Outputs
- Ultra-Low Switching Glitch of 10mVp-p
- 345MHz -3dB Bandwidth (MAX4311)

Part	No. of Channels	Minimum Stable Gain (V/V)	-3dB Small-Signal Bandwidth (MHz)	0.1dB Gain Flatness (MHz)	Differential Gain/Phase (%/°)	Slew Rate (V/μs)	Channel Switching Time (ns)	Switching Transient (mVp-p)
MAX4310	2	1	280	60	0.06/0.08	460	40	10
MAX4311	4	1	345	40	0.06/0.08	430	40	10
MAX4312	8	1	265	35	0.06/0.08	345	40	10
MAX4313	2	Fixed gain of 2	150	40	0.09/0.03	540	40	10
MAX4314	4	Fixed gain of 2	127	78	0.09/0.03	430	40	10
MAX4315	8	Fixed gain of 2	97	46	0.09/0.03	310	40	10

3V, 250MHz, SOT23 ADC Buffer Amplifiers with -88dBc SFDR at 5MHz

High-Speed Enable/Disable Mode Ideal for Multiplexing Applications



- 3V/5V Operation
- 200MHz Large-Signal Bandwidth
- Up to 100mA Output Current Drive
- 350V/μs Slew Rate
- 6ns 0.1% Settling Time
- 40ns/50ns Enable/Disable Times

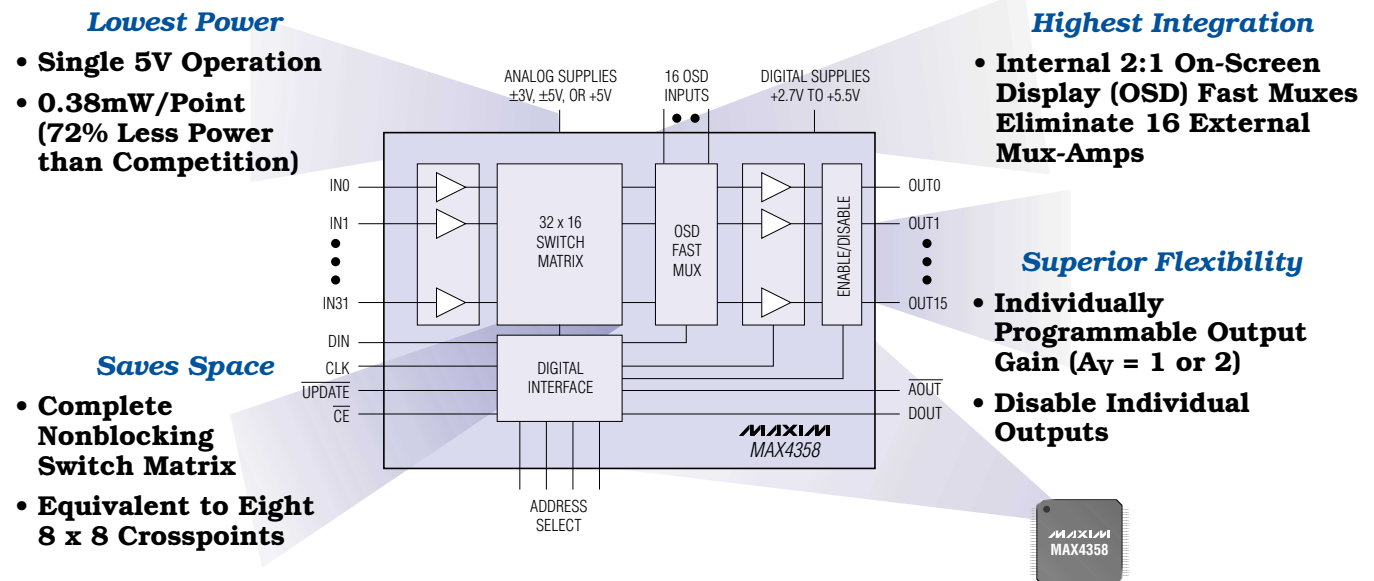
Part	No. of Amps	Minimum Stable Gain (V/V)	Large-Signal -3dB Bandwidth (VCC = 3V, 1Vp-p) (MHz)	Distortion (5MHz, SFDR) (dBc)	Slew Rate (V/μs)	High-Speed Disable	Pin-Package
MAX4285/4286	1	1/5	200	-87	350	Yes	6-SOT23, 8-SO
MAX4287/4387	2	1/5	200	-87	350	No	8-μMAX/SO
MAX4288/4388	2	1/5	200	-87	350	Yes	10-μMAX, 14-SO

World's Largest Video Crosspoint Switch plus Output Buffers

32 x 16 Crosspoint Switches Includes On-Screen Display Insertion
(continued on next page)

- 32 x 16 Nonblocking Matrix with Buffered Input and Outputs
- Programmable Output Buffer Gain (1 or 2)
- On-Screen Display Insertion Through Internal Fast Mux-Switch
- Flexible Serial-Programmable Control
- Dual $\pm 3V$ to $\pm 5V$ or Single +5V Supply Operation
- Ideal for Building Larger Arrays
- 144-Pin TQFP Package
- Low Power Consumption

Complete Nonblocking Matrix with OSD and I/O Buffers



Choose Maxim for the Largest Selection of Video Crosspoint Matrices

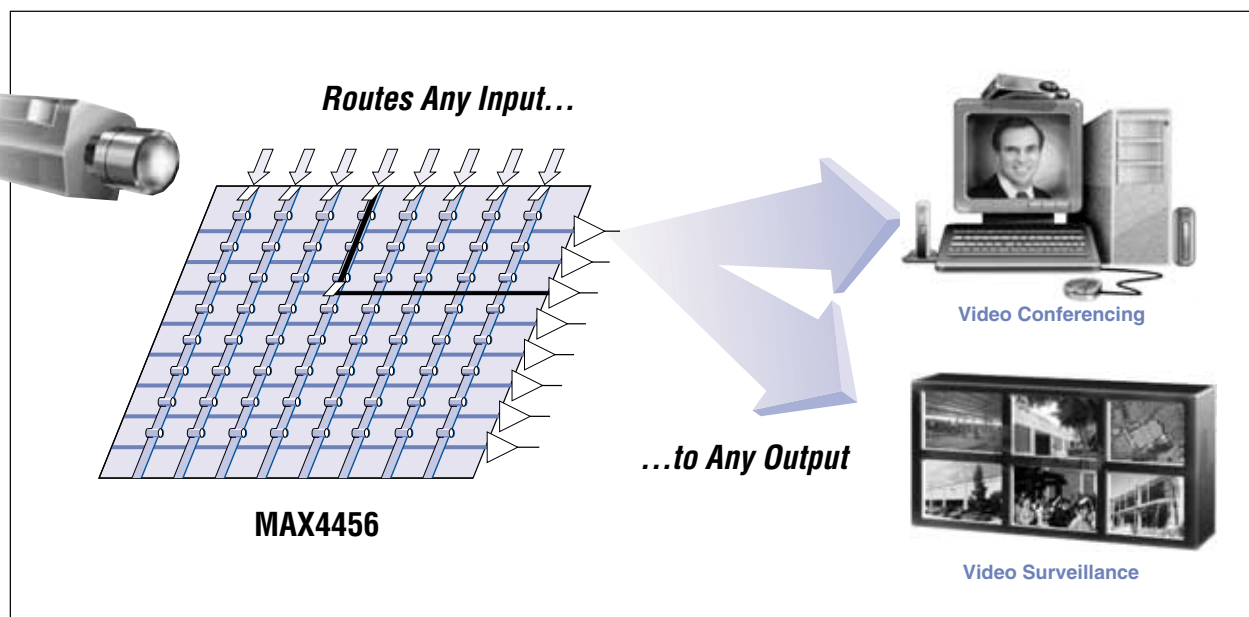
	Part	Configuration	OSD Insertion Fast Mux	Supply Range (V)	-3dB Bandwidth (MHz)	0.1dB Gain Flatness (MHz)	Differential Gain/Phase (%/°)	Off-Isolation (dB)	Pin-Package	Price [†] (\$)
NEW	MAX4355	16 x 16	No	$\pm 3, \pm 5, +5$	110	14	0.002/0.02	-110	100-TQFP	65.00
NEW	MAX4356	16 x 16	Yes	$\pm 3, \pm 5, +5$	110	14	0.002/0.02	-110	128-TQFP	73.00
NEW	MAX4357	32 x 16	No	$\pm 3, \pm 5, +5$	95	15	0.002/0.02	-110	128-TQFP	95.00
NEW	MAX4358	32 x 16	Yes	$\pm 3, \pm 5, +5$	95	15	0.002/0.02	-110	144-TQFP	105.00

[†]1000-up recommended resale. Prices provided are for design guidance and are FOB USA. International prices will differ due to local duties, taxes, and exchange rates. Not all packages are offered in 1k increments, and some may require minimum order quantities.

World's Largest Video Crosspoint Switch plus Output Buffers

32 x 16 Crosspoint Switches Includes On-Screen Display Insertion (continued from previous page)

Maxim's new family of highly integrated video crosspoint switches greatly simplifies designs traditionally composed of discrete components. The MAX4355/MAX4357 contain a 16 x 16 video-switching matrix, while the MAX4356/MAX4358 contain a 32 x 16 video-switching matrix. All inputs and outputs are buffered. The outputs drive standard 75Ω back-terminated video loads and are individually programmable for a gain of 1 or 2. Fast internal mux-switches facilitate insertion of OSD information. These devices are programmed through a 3-wire serial interface and initialized with a single update signal. The MAX4355-MAX4358 are ideal for security and video-on-demand applications.



Maxim Has a Complete Portfolio of Video Crosspoint Switches

Part	Configuration	Gain (V/V)	-3dB Bandwidth (MHz)	All-Channel Off-Isolation (dB)	Slew Rate (V/μs)	Price (\$) [†]
MAX4359	4 x 4	1	35	80	250	4.98
MAX4360	8 x 4	1	35	80	250	7.48
MAX4456	8 x 8	1	35	80	250	9.98
MAX458	8 x 4	1	100	60	200	21.85
MAX459	8 x 4	2	90	60	200	21.85

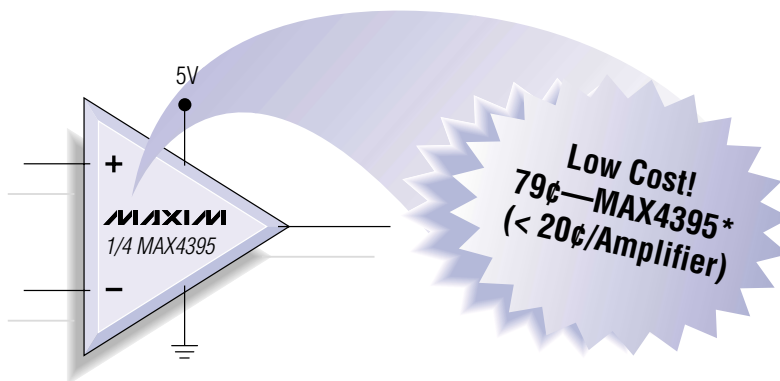
[†]1000-up recommended resale. Prices provided are for design guidance and are FOB USA. International prices will differ due to local duties, taxes, and exchange rates. Not all packages are offered in 1k increments, and some may require minimum order quantities.

145MHz, R/R Output Video Amps for Under 20¢*

Low-Cost Op Amps Fit into Tiny SC70-5 Packages

Ideal for:

- Set-Top Boxes
- Video Line Drivers
- Video-On-Demand
- Digital Cameras
- Security Systems



Low Cost

- < 20¢ Per Amplifier*
(MAX4395 Quad Amp—
79¢, 100k pcs.)

Versatile

- Operates From Single
+5V or Dual $\pm 5V$ Supplies
- High-Impedance Disable Mode

Saves Space

- Singles in 6-Pin SC70
- Duals in 8-Pin SOT23
- Quads in 14-Pin TSSOP

High Performance

- 30MHz 0.1dB Gain Flatness
- 50mA Output Drive

Part	No. of Amps	Supply Voltage (V)	-3dB BW (MHz)	Slew Rate (V/ μ s)	Shutdown	Price [†] (\$)
MAX4389	1	4.5 to 11	145	200	Yes	0.52
MAX4390	1	4.5 to 11	145	200	No	0.49
MAX4392	2	4.5 to 11	145	200	No	0.66
MAX4393	2	4.5 to 11	145	200	Yes	0.71
MAX4394	3	4.5 to 11	145	200	Yes	0.87
MAX4395	4	4.5 to 11	145	200	No	1.02
MAX4396	4	4.5 to 11	145	200	Yes	1.10

*MAX4395 quad op amp, 100k pcs.

[†]1000-up recommended resale. Prices provided are for design guidance and are FOB USA.

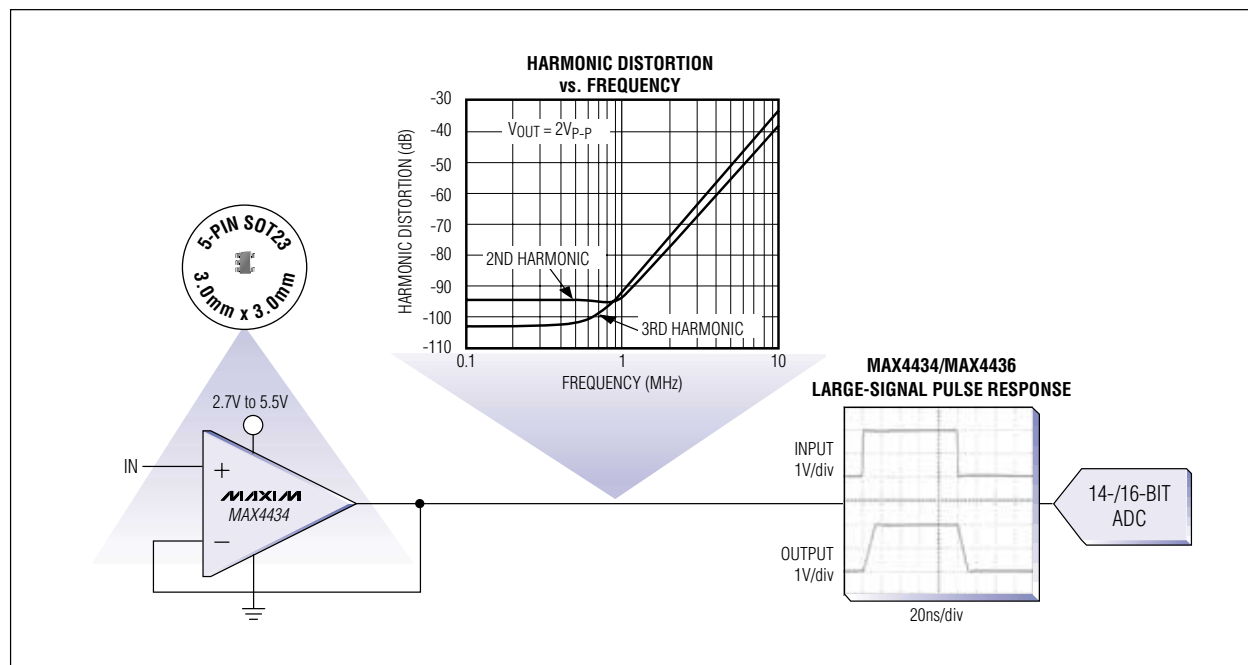
International prices will differ due to local duties, taxes, and exchange rates. Not all packages are offered in 1k increments, and some may require minimum order quantities.





World's Smallest Single-Supply, 16-Bit-Accurate, 150MHz Op Amps Settle to 0.0015% in Just 35ns

-98dBc SFDR and 115dB A_{VOL} Make These Amplifiers Ideal for High-Speed 14-/16-Bit Buffering



- **35ns Settling Time to 0.0015%**
- **115dB A_{VOL}**
- **65mA High Output Drive**
- **Ultra-Low -98dBc SFDR at 1MHz, 2Vp-p Output**
- **2.2nV/ $\sqrt{\text{Hz}}$ Input Voltage Noise Density**
- **338V/ μs Slew Rate (MAX4435/MAX4437)**

	Part	No. of Amps	Supply Voltage (V)	Minimum Gain Stable (V/V)	Settling Time to 0.0015% (ns)	Minimum Open-Loop Gain (dB)	SFDR at 1MHz (dBc)	-3dB Bandwidth (MHz)	Pin-Package	Price† (\$)
NEW	MAX4434	1	2.7 to 5.5	1	35	115	-98	150	5-SOT23	2.25
NEW	MAX4435	1	2.7 to 5.5	2	23	115	-98	150	5-SOT23	2.25
NEW	MAX4436	2	2.7 to 5.5	1	35	115	-98	150	8- μ MAX/SO	3.25
NEW	MAX4437	2	2.7 to 5.5	2	23	115	-98	150	8- μ MAX/SO	3.25
	MAX4430	1	± 5	1	37	125	-100	180	5-SOT23	2.25
	MAX4431	1	± 5	2	63	125	-100	215	5-SOT23	2.25
	MAX4432	2	± 5	1	37	125	-100	180	8- μ MAX/SO	3.25
	MAX4433	2	± 5	2	63	125	-100	215	8- μ MAX/SO	3.25

†1000-up recommended resale. Prices provided are for design guidance and are FOB USA. International prices will differ due to local duties, taxes, and exchange rates. Not all packages are offered in 1k increments, and some may require minimum order quantities.



Video/High-Speed Products

(CONTINUES ON NEXT PAGE)

Amplifiers

Single Supply

MAX4012
(low cost, SOT23,
200MHz)

★ MAX4434/4435
(SOT23, 250MHz,
-115dBc SFDR)

★ MAX4436/4437
(dual, 250MHz,
-115dBc SFDR)

★ MAX4450
(low cost, SC70,
210MHz, Rail-to-Rail)

MAX4451
(low cost, dual,
SOT23-8, 210MHz
Rail-to-Rail)

MAX4452/4453/4454
(single/dual/quad, 620μA,
200MHz, SC70)

Dual Supplies

MAX404
(40MHz,
AVCL = +2)

MAX408/428/448
(single/dual/
quad, 33MHz,
AVCL = +3)

MAX435
(275MHz, diff in/
diff out)

MAX436
(200MHz, diff in/
single out)

MAX452
(50MHz)

MAX457
(70MHz dual)

★ MAX477
(300MHz,
1100V/μs)

★ MAX4100/4101
(500MHz,
low power)

★ MAX4102/4103
(250MHz, lowest
DP/DG)

★ MAX4104/4105
(625MHz, SOT23,
2.1nV/√Hz)

★ MAX4106/4107
(350MHz,
0.75nV/√Hz)

★ MAX4108/4109
(400MHz,
-93dBc SFDR,
1200V/μs)

★ MAX4112/4113
(400MHz, 1200V/μs)

cont. →

Buffers

Single Supply

MAX4014
(low cost, SOT23,
200MHz,
AVCL = +2)

MAX4017/4019/4022
(low cost, dual/
triple/quad, 150MHz,
AVCL = +2)

MAX4214/4215
(SOT23, 300MHz,
AVCL = +2)

MAX4217/4219/4222
(dual/triple/quad,
200MHz,
AVCL = +2)

Dual Supplies

MAX460
(140MHz,
JFET input)

MAX467/468
(triple/quad,
100MHz)

MAX469/470
(triple/quad,
90MHz, AVCL = +2)

★ MAX496/497
(quad, 375MHz/
275MHz,
AVCL = +1/+2)

★ MAX4178/4278
(330MHz/310MHz,
AVCL = +1/+2)

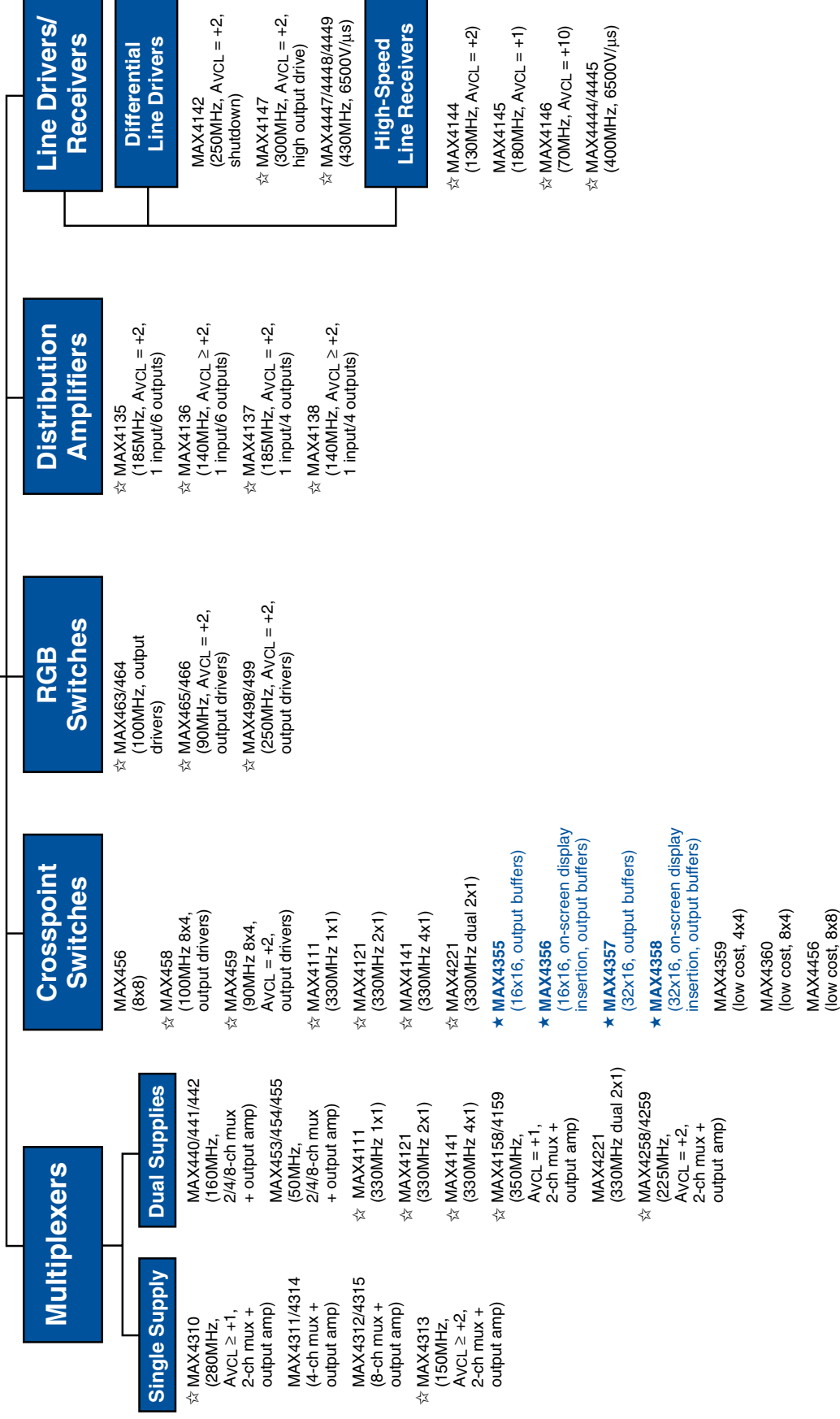
★ MAX4200/4201/4202
(single, 500MHz,
open-loop buffers)

MAX4203/4204/4205
(dual, 500MHz,
open-loop buffers)

★ New product
† Future product
☆ Evaluation kit available

Video/High-Speed Products

(CONTINUED)



★ New product
 † Future product
 ☆ Evaluation kit available