

MAXIM

MAX4383 Evaluation Kit

Evaluates: MAX4383

General Description

The MAX4383 evaluation kit (EV kit) demonstrates the capability of the high-speed MAX4383 op amp configured in a 5-pole, lowpass, multiple feedback (Rauch) filter that provides a Butterworth response with a bandwidth of -3dB at 30MHz (typ). This circuit can be used for video anti-aliasing and reconstruction filtering for HDTV, Progressive DVD, and XGA resolution graphics displays. The MAX4383 EV kit is designed to drive a 75Ω back-terminated load, common in video applications, with an overall gain of 1. The MAX4383 EV kit is a fully assembled and tested surface-mount board that operates from either a +5V single supply or ±5V dual supplies.

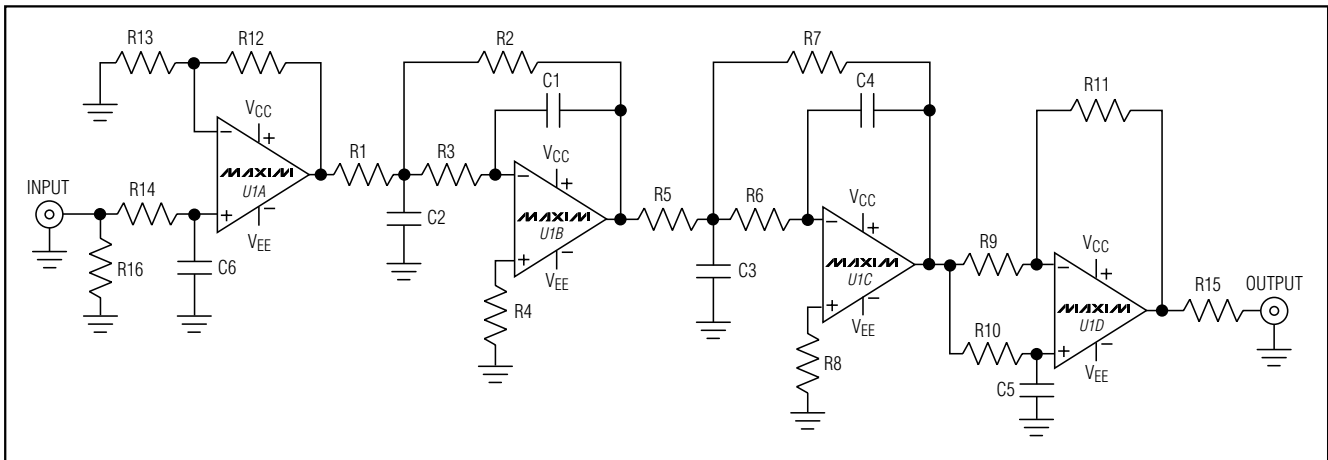
Features

- ◆ Video Filter Solution for ATSC and High-Resolution Graphics Applications
- ◆ 5-Pole Active Multiple Feedback (Rauch) Video Filter
- ◆ 30MHz Bandwidth at -3dB (typ)
- ◆ >40dB Attenuation at 74.25MHz
- ◆ +5V Single-Supply or ±5V Dual-Supply Operation
- ◆ Surface-Mount Construction
- ◆ Fully Assembled and Tested
- ◆ Eliminates Costly Inductors with More Accurate R-C Components

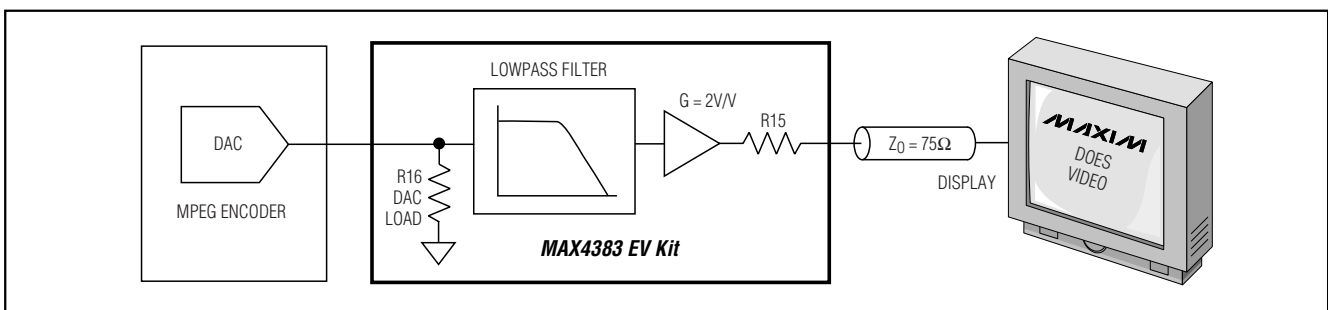
Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX4383EVKIT	0°C to +70°C	14 TSSOP

Simplified Circuit



Typical Application Circuit



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Component Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
Murata	770-436-1300	770-436-3030	www.murata.com
Taiyo Yuden	800-348-2496	847-925-0899	www.t-yuden.com
TDK	847-803-6100	847-390-4405	www.component.tdk.com

Please indicate that you are using the MAX4383 when contacting these suppliers.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C4	2	3.3pF ± 0.25 pF, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H3R3CT
C2	1	68pF $\pm 5\%$, 50V C0G ceramic capacitor (0603) Murata GRM1885C1H680J or TDK C1608C0G1H680JT
C3	1	27pF $\pm 5\%$, 50V C0G ceramic capacitor (0603) Murata GRM1885C1H270J or TDK C1608C0G1H270JT
C5	1	33pF $\pm 5\%$, 50V C0G ceramic capacitor (0603) Taiyo Yuden UMK107CG330JZ or TDK C1608C0G1H330JT
C6	1	100pF $\pm 5\%$, 50V C0G ceramic capacitor (0603) Murata GRM1885C1H101J TDK C1608C0G1H101JT
C7, C9	2	10 μ F $\pm 20\%$, 6.3V X5R ceramic capacitors (0805) Taiyo Yuden JMK212BJ106MG or TDK C2012X5R0J106M
C8, C10	2	0.1 μ F $\pm 10\%$, 25V X7R ceramic capacitors (0603) TDK C1608X7R1E104K
R1, R2, R4, R5, R7–R13	11	210 Ω $\pm 1\%$ resistors (0805)
R3	1	100 Ω $\pm 1\%$ resistor (0805)
R6	1	121 Ω $\pm 1\%$ resistor (0805)
R14, R15, R16	3	75 Ω $\pm 1\%$ resistors (0805)
R17	0	Not installed, resistor (0805)
U1	1	MAX4383EUD (14-pin TSSOP)
INPUT, OUTPUT	2	BNC connectors
None	1	MAX4383 PC board

Quick Start

Required equipment:

- Dual ± 5.0 V DC power supply
- Signal generation platform (e.g., Tektronix TG 2000)
- Video measurement set (e.g., Tektronix VM 700A)

The MAX4383 EV kit is a fully assembled and tested surface-mount board. Follow the steps below for board operation. **Do not turn on the power supply until all connections are completed.**

Procedures

- 1) Connect the output from the 75 Ω video signal generator to the INPUT BNC connector on the EV kit.
- 2) Connect the input of the 75 Ω video measurement set to the OUTPUT BNC connector on the EV kit.
- 3) Connect the +5.0V supply to the VCC pad. Connect ground to the GND pad.
- 4) Connect the -5.0V supply to the VEE pad. For single-supply (+5.0V) operation, connect VEE to ground and bias the input appropriately.
- 5) Set the signal generator for multiburst sweep.
- 6) Turn on the ± 5.0 V DC power supply.
- 7) Analyze the filtered output signal with the VM700 video measurement set.

Note: The generator (signal source) and the video test set (load) must be 75 Ω terminated, and the signal source must also provide a DC return to ground. This is the function of R16 and R15, respectively. These resistors are set to 75 Ω in the MAX4383 EV kit. If a 50 Ω system is used, R16 must be changed to 50 Ω . If a 50 Ω analyzer is used, R15 must be 50 Ω . The DAC must supply a DC voltage to bias the input of the MAX4383. If your DAC has insufficient bias to do this, add a 5.6k Ω resistor between VCC and the junction of R16 and R14.

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Detailed Description

The MAX4383 EV kit is a fully assembled and tested surface-mount circuit board that demonstrates the capability of the high-speed MAX4383 op amp configured in a 5-pole, active lowpass multiple feedback filter circuit. The filter can be used for video anti-aliasing or as a reconstruction filter for ATSC (HDTV) or high-resolution (XGA) graphics. The circuit has a 75Ω DAC load (R16), a gain of $2V/V$, and a 75Ω source (R15) for driving a 75Ω back-terminated load to an overall gain of 1. The board operates from either a $+5V$ single supply or $\pm 5V$ dual supplies.

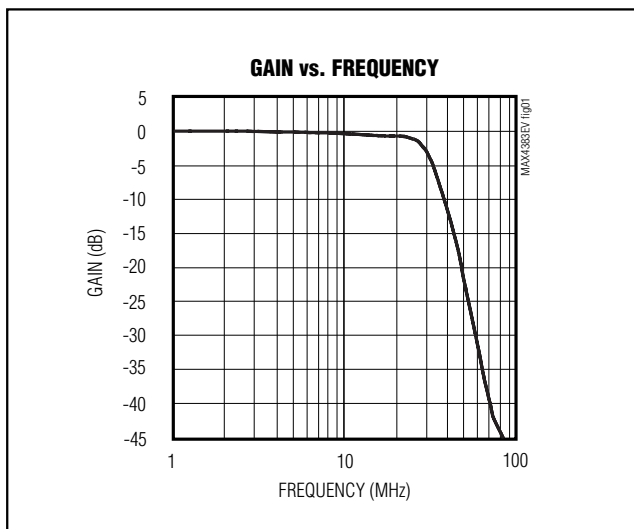


Figure 1. Gain vs. Frequency Response of the EV Kit Filter

The MAX4383 EV kit demonstrates a lower cost, but more accurate way to design video filters. Using R-C, rather than L-C components, it provides a 30MHz, -3dB bandwidth with $>40\text{dB}$ rejection at 74.25MHz (Figure 1), as well as group-delay compensation and buffering using a single MAX4383 quad op amp. The improved tolerance of R-C, versus L-C components, removes the need for production tuning. Some initial tuning may be required to account for the variation in the DAC load and parasitic components due to PC board layout differences. The MAX4383 EV kit uses dual supplies, but the MAX4383 can be run from a single supply.

The MAX4383 EV kit is a Rauch, or multiple feedback realization of a 5-pole modified Legendre characteristic using one 1st-order $+6\text{dB}$ gain stage and two 2nd-order unity-gain stages. The final stage is a 1st-order group delay compensator, which drives the back-terminated 75Ω load to an overall unity gain. There are three sensitive points in the circuit; R14, which controls the real pole, C1 and C4, that control the high-frequency poles, and C5 that sets the group delay compensation.

The MAX4383 EV kit comes with a 75Ω termination (R16) and a BNC connector (INPUT) in place of the DAC normally found at the input for measurement purposes, and this reduces the gain to -6dB overall. The values of R14 and R16 are based on the DAC with a typical load resistance of 25Ω to 35Ω . To accommodate different load resistors, adjust the value of the R14 and the C6 product accordingly. The values of C1 and C4 reflect a two-sided PC board with minimal ground plane around the op amps pins. C5 adjusts the group delay compensation. Adjust the value of C1 and C4 for bandwidth before adjusting C5 for group-delay variation compensation.

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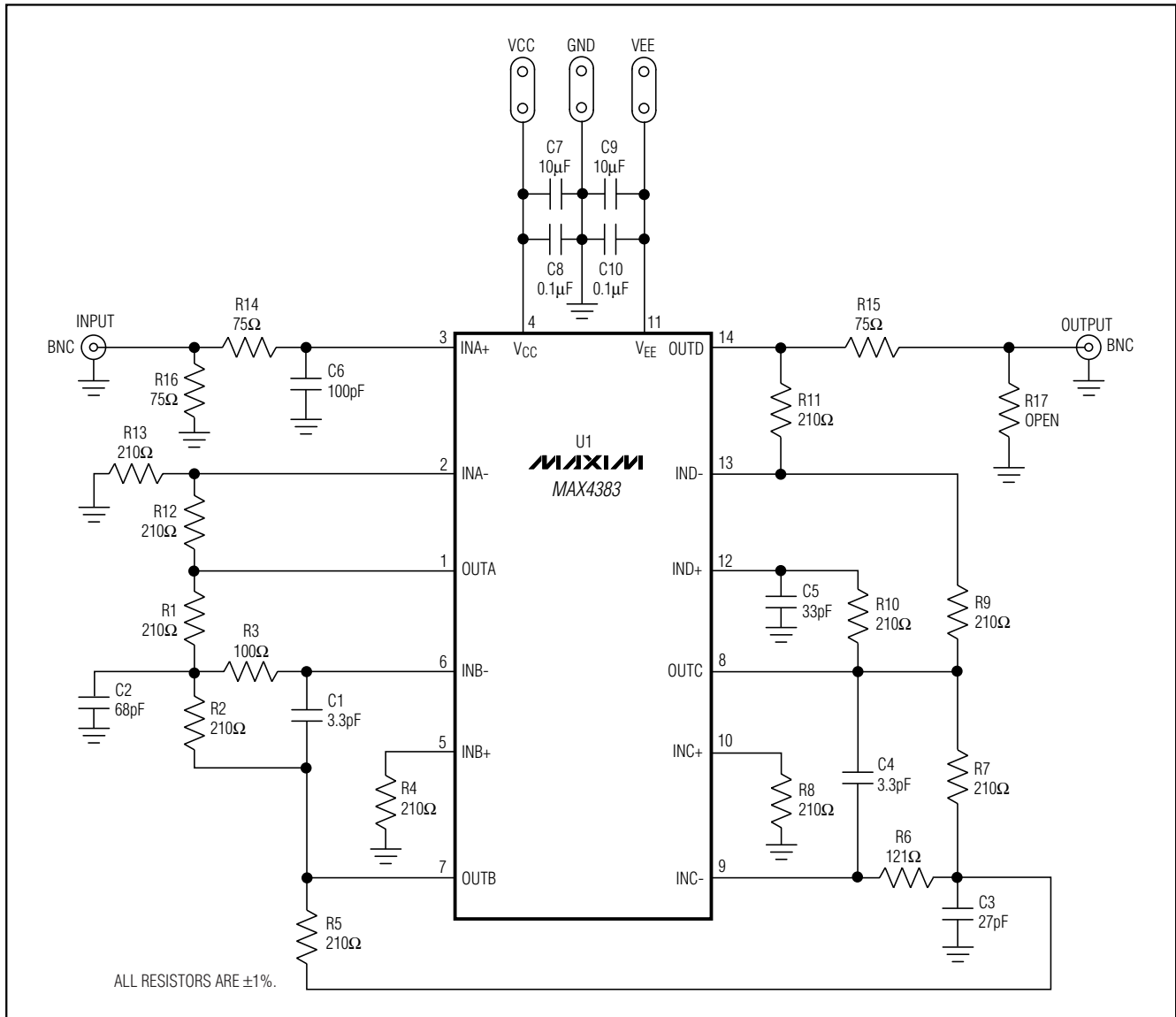


Figure 2. MAX4383 EV Kit Schematic

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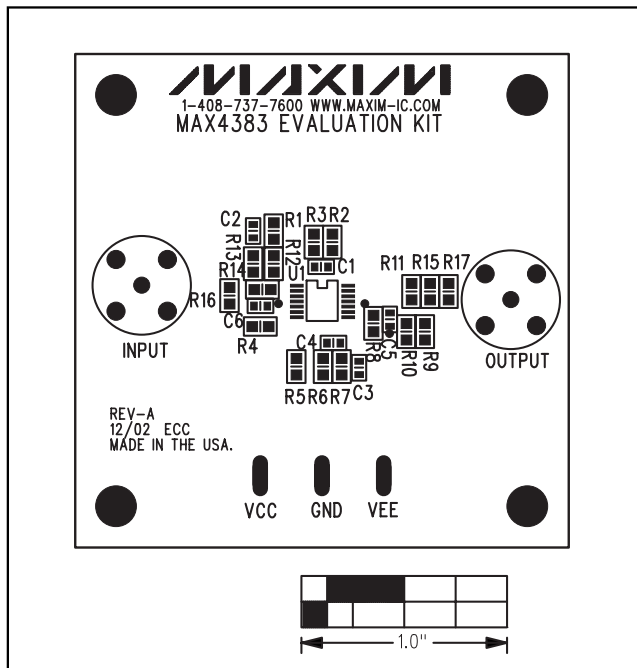


Figure 3. MAX4383 EV Kit Component Placement Guide—Component Side

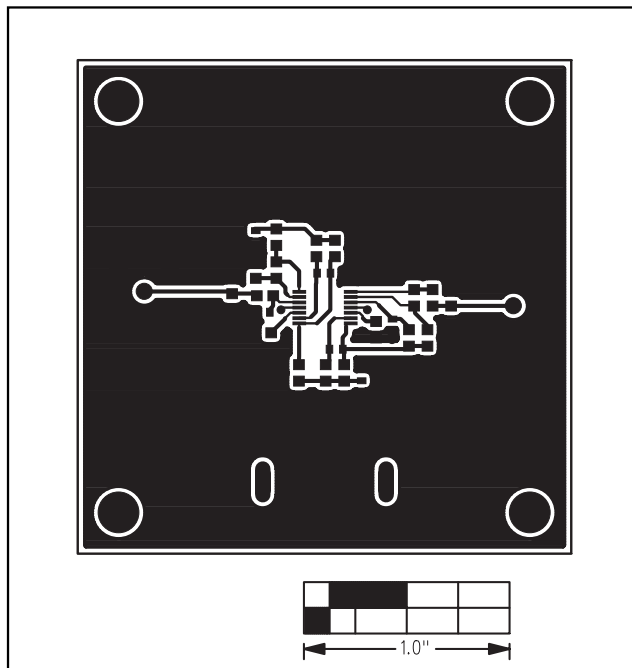


Figure 4. MAX4383 EV Kit PC Board Layout—Component Side

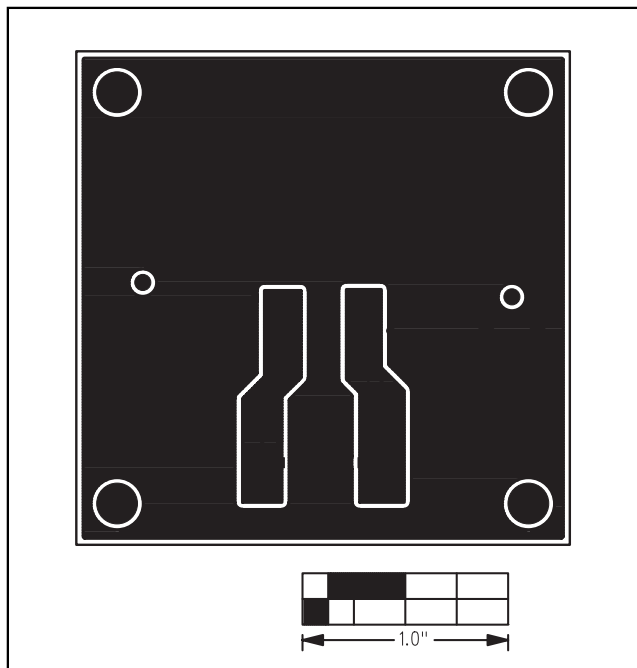


Figure 5. MAX4383 EV Kit PC Board Layout—Solder Side

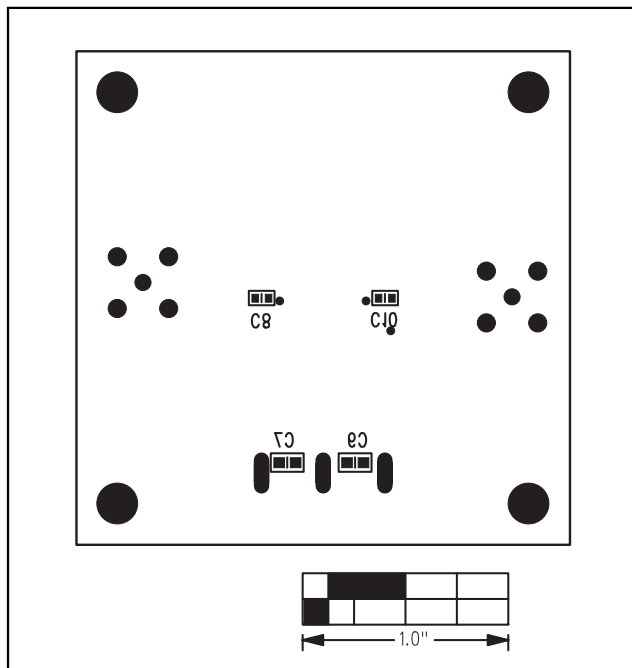


Figure 6. MAX4383 EV Kit Component Placement Guide—Solder Side

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