# AN-6030
## FMS6400 Evaluation Board Application Note


## Summary

The FMS6400 evaluation board provides a flexible base for evaluating the performance of the FMS6400. The board operates from a standard supply voltage of +5V +/- 5%.

The FMS6400 is intended to replace passive LC filters and drivers with a low-cost integrated device. Three 5th-order filters provide improved image quality compared to typical 2nd and 3rd-order passive solutions. The FMS6400 offers further flexibility with gain selection of 0dB or 6dB.

For a complete description of the FMS6400, please refer to the FMS6400 datasheet at:
http://www.fairchildsemi.com/pf/FM/FMS6400.html


## Applications

- Cable set-top boxes
- Satellite set-top boxes
- DVD players
- Personal Video Recorders (PVR)
- Video On Demand (VOD)
- LCD and DTV

## Evaluation Kit Contents

The FMS6400 Evaluation Kit contains the following items:

- AN-6030 – FMS6400 Evaluation Board Application Note
- The latest revision of the FMS6400 datasheet, also available at http://www.fairchildsemi.com.
- Fully functional FMS6400 evaluation board
- Female power connector

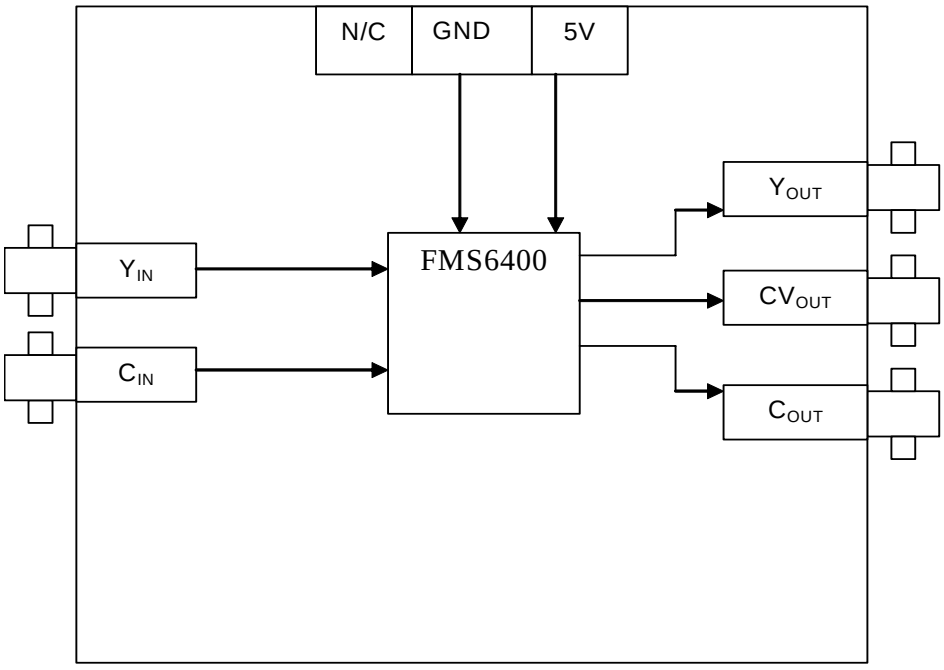



**Figure 1. FMS6400 Block Diagram**

## Board Setup

Use the following procedure to verify that the FMS6400 evaluation board is functional. This only verifies functionality. These instructions do not test any parameters outlined in the datasheet. The following test equipment is necessary to test the FMS6400 evaluation board:

- One power supply +5V ±5%, 250mA
- One high-resolution CRT monitor (two channels with RGB)
- One NTSC or PAL video signal source capable of generating necessary outputs
- One video measurement set (VM700)
- Assorted video cables

**Do NOT turn on power supply until all connections are completed.**

## Board Test

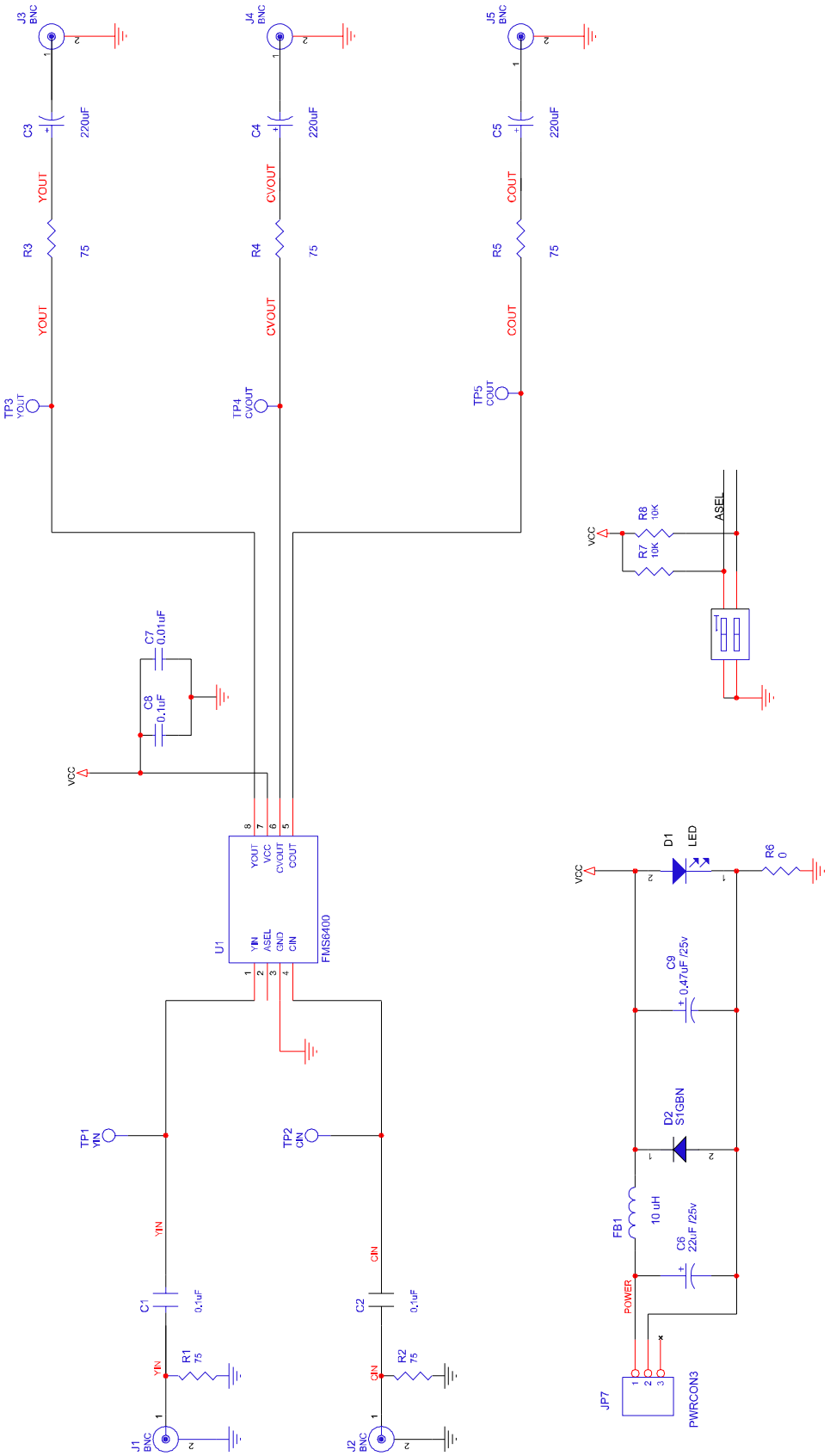
1. Set the power supply to 5.0V.
2. Connect the power supply to the input voltage terminals of the evaluation board.
3. Connect the $Y_{OUT}$ signal from the signal source to the $Y_{IN}$ connector on the FMS6400 evaluation board.
4. Connect the $C_{OUT}$ signal from the signal source to the $C_{IN}$ connector on the FMS6400 evaluation board.
5. Connect the $CV_{IN}$ of the monitor to the $CV_{OUT}$ connector on the FMS6400 evaluation board.
6. Turn on the power supply.
7. Verify test pattern that is produced from the generator is the same as the pattern on the monitor screen.

Functional test is complete.

## Bill of Materials

| Item | Quantity | Reference | Part |
|---|---|---|---|
| 1 | 3 | C1,C2,C8 | 0.1µF |
| 2 | 3 | C3,C4,C5 | 220µF |
| 3 | 1 | C6 | 22µF /25v |
| 4 | 1 | C7 | 0.1µF |
| 5 | 1 | C9 | 0.47µF /25v |
| 6 | 1 | D1 | GREEN |
| 7 | 1 | D2 | S1GBN |
| 8 | 1 | FB1 | 10µH |
| 9 | 1 | JP7 | PWRCON3 |
| 10 | 5 | J1,J2,J3,J4,J5 | BNC |
| 11 | 5 | R1,R2,R3,R4,R5 | 75 |
| 12 | 1 | R6 | 0 |
| 13 | 2 | R7,R8 | 10K |
| 14 | 1 | SW1 | SW DIP-6 |
| 15 | 1 | TP1 | $Y_{IN}$ |
| 16 | 1 | TP2 | $C_{IN}$ |
| 17 | 1 | TP3 | $Y_{OUT}$ |
| 18 | 1 | TP4 | $CV_{OUT}$` |
| 19 | 1 | TP5 | $C_{OUT}$ |
| 20 | 1 | U1 | FMS6400 |

# Board Schematic



# Applications Information

The FMS6400 is designed to support AC-coupled input and may have AC- or DC- coupled output. Both channels have DC-restore circuitry to clamp the DC input levels during video sync. The Y and C channels use separate feedback clamps. The clamp pulse is derived from the Y channel.

## Luminance (Y) I/O

The typical luma input is driven by either a low-impedance source of $1V_{pp}$ or the output of a 75Ω terminated line driven by the output of a current DAC. In either case, the input must be capacitively coupled to allow the sync-detect and DC-restore circuitry to operate properly. All outputs are capable of driving $2V_{pp}$, AC- or DC-coupled, into either a single or dual video load. A single video load consists of a series 75 Ω impedance-matching resistor connected to a terminated 75 Ω line, which presents a total of 150 Ω loading to the part. A dual load would be two in parallel, which would present a total of 75 Ω to the part. The gain of the Y, C and CV signals is 6dB with $1V_{pp}$ input levels. Even when two loads are present, the driver produces a full $2V_{pp}$ signal at its output pin.

## Chrominance (C) I/O

The chrominance input can be driven in the same manner as the luminance input, but is typically only a $0.7V_{pp}$ signal. Since the chrominance signal doesn't contain any DC content, the output signal can be AC coupled using a capacitor as small as 0.1µF if DC coupling is not desired.

## Composite Video (CV) Output

The composite video output driver is the same as the other outputs. When driving a dual load, either output functions if the other output connection is inadvertently shorted, providing these loads are AC coupled.

## Layout Considerations

General layout and supply bypassing play major roles in high-frequency performance and thermal characteristics. The FMS6400 evaluation board is a four-layer board with full power and ground planes. Following this layout configuration provides the optimum performance and thermal characteristics. For best results, follow the rules below as a basis for high-frequency layout:

- Include 1µF and 0.1µF ceramic bypass capacitors.
- Place the 1µF capacitor within 0.75 inches of the power pin.
- Place the 0.1µF capacitor within 0.1 inches of the power pin.
- For multi-layer boards, use a large ground plane to help dissipate heat.
- For two-layer boards, use a ground plane that extends beyond the device by at least 0.5 inches.
- Minimize all trace lengths to reduce series inductances.