

AN-8012

FMS6417A Evaluation Board Application Note

Description

The FMS6417A evaluation board provides a flexible base for evaluating the performance of the FMS6417A. The FMS6417A evaluation board operates from a standard supply voltage of +5V ±5%.

The FMS6417A offers comprehensive filtering for set top box or DVD applications. This part consists of a triple 6th order filter with selectable 32MHz or 8MHz frequencies and a dual filter for filtering Y,C with a composite summer and a modulator channel with sound-notch and FCC group delay compensation. The modulator provides sound-notching and FCC group delay compensation for NTSC.

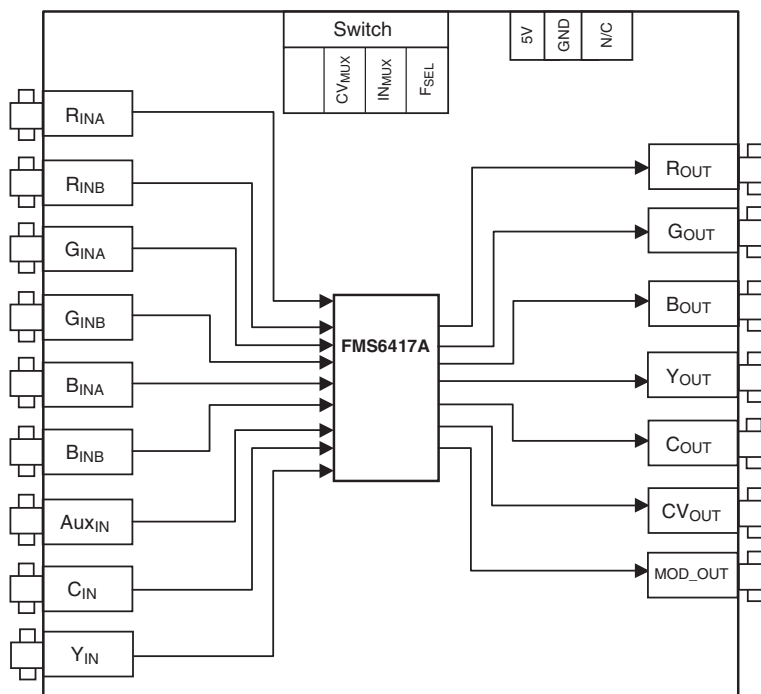
2-to-1 multiplexers are provided on the triple filters as well as provisions for auxiliary inputs to the composite channel. The triple filters are intended for either YPbPr, RGB, or YUV signals. All channels accept AC or DC coupled ground-referenced 1V signals. The filters output 2V_{pp} signals into AC coupled terminated loads. The low-pass filters are powered by 3.3V and the modulator and outputs by 5.0V.

Applications

- Cable set top boxes
- Satellite set top boxes
- DVD players
- HDTV
- Personal Video Recorders (PVR)
- Video On Demand (VOD)
- Media Centers

For a complete description of the FMS6417A please refer to the FMS6417A data sheet.

Evaluation Board Block Diagram



Evaluation Kit Contents

The FMS6417A Evaluation Kit contains the following items:

- AN-8012 – FMS6417A Evaluation Board Application Note
- The latest revision of the FMS6417A data sheet, which also can be obtained from <http://www.fairchildsemi.com>.
- Fully functional FMS6417A eval board
- Female power connector

Board Setup and Test

The following test equipment is necessary to test the FMS6417A eval board.

- One power supply +5V \pm 5%, 250mA
- One high resolution CRT monitor (2 channel with RGB)
- One NTSC or PAL video signal source capable of generating necessary outputs
- One video measurement set (VM5000)
- Assorted video cables
- One HDTV monitor
- One HD video signal source

Use the following procedure to verify that the FMS6417A eval board is functional. DO NOT turn on power supply until all connections are completed.

SD Verification

1. See Table 1 and Table 2 for all switch configurations.
2. Set power supply to 5.0V
3. Connect the power supply to the input voltage terminals of the FMS6417A eval board.
4. Start out with SW1-1 off (up), SW1-2 on (down), and SW1-3 on (down).
5. Connect RGB signal generator to the appropriate FMS6417A input connectors (RGB_{INA}).
6. Connect the SD monitor input cables to the outputs of the FMS6417A eval board. (RGB_{OUT}).
7. Connect a composite signal into the AUX_{IN}.

Table 1. Switch Setting for RGB Channels

Control		Outputs		
IN _{MUX} (SW1-2)	F _{SEL} (SW1-1)	R _{OUT}	G _{OUT}	B _{OUT}
Off	Off	R _{INB} (SD)	G _{INB} (SD)	B _{INB} (SD)
On	Off	R _{INA} (SD)	G _{INA} (SD)	B _{INA} (SD)
Off	On	R _{INB} (HD)	G _{INB} (HD)	B _{INB} (HD)
On	On	R _{INA} (HD)	G _{INA} (HD)	B _{INA} (HD)

Table 2. Switch Setting for Y, C, and AUX_{IN} Channels

Control		Outputs			
CV _{MUX} (SW1-3)	MODE	Y _{OUT}	C _{OUT}	CV _{OUT}	MOD _{OUT}
On	On	Y _{IN}	C _{IN}	Y _{IN} /C _{IN}	Y _{IN} /C _{IN}
On	On	Y _{IN}	C _{IN}	Y _{IN} /C _{IN}	Y _{IN} /C _{IN}
Off	On	AUX _{IN}	N/A	AUX _{IN}	AUX _{IN}
Off	On	AUX _{IN}	N/A	AUX _{IN}	AUX _{IN}

Note: There will not be any output on C_{OUT} while using AUX_{IN}.

8. Connect Y_{IN} and C_{IN}.
9. Connect Channel A of the SD monitor to CV_{OUT}.
10. Connect Channel B of the SD monitor to MOD_{OUT}.
11. Turn power supply on.
12. Press RGB channel on the SD monitor and verify test pattern as the same going through RGB_{IN}.
13. Switch SW1-2 off (up) and verify loss of signal.
14. Switch cables from R_{INA} to R_{INB}, G_{INA} to G_{INB}, and B_{INA} to B_{INB}, signal should return.
15. Press Channel A on SD monitor to verify signal going through Y_{IN} and C_{IN}.
16. Switch SW1-3 off (up) to switch to AUX_{IN}. Now CV_{OUT} is coming from AUX_{IN}.
17. Press Channel B on SD monitor and verify test pattern.
18. Switch SW-3 on (down) to switch back to Y_{IN} and C_{IN}.
19. Now Y_{IN} and C_{IN} are driving MOD_{OUT}.
20. Turn power supply off.

HD Verification

1. See Table 1 and Table 2 for all switch configurations.
2. Start out with SW1-1 on (down), SW1-2 on (down), and SW1-3 off (up).
3. Connect HD signal generator to appropriate FMS6417A input connectors (RGB_{INA}).
4. Connect the HD monitor input cables to the outputs of the FMS6417A eval board (RGB_{OUT}).
5. Turn power supply on.
6. Verify HD monitor is setup correctly.
7. Verify test pattern that is produced from the generator is the same pattern on the HD monitor.
8. Switch SW1-2 off (up) and verify signal loss.
9. Switch cables from R_{INA} to R_{INB}, G_{INA} to G_{INB}, and B_{INA} to B_{INB}, signal should return.
10. Functional testing is now complete.

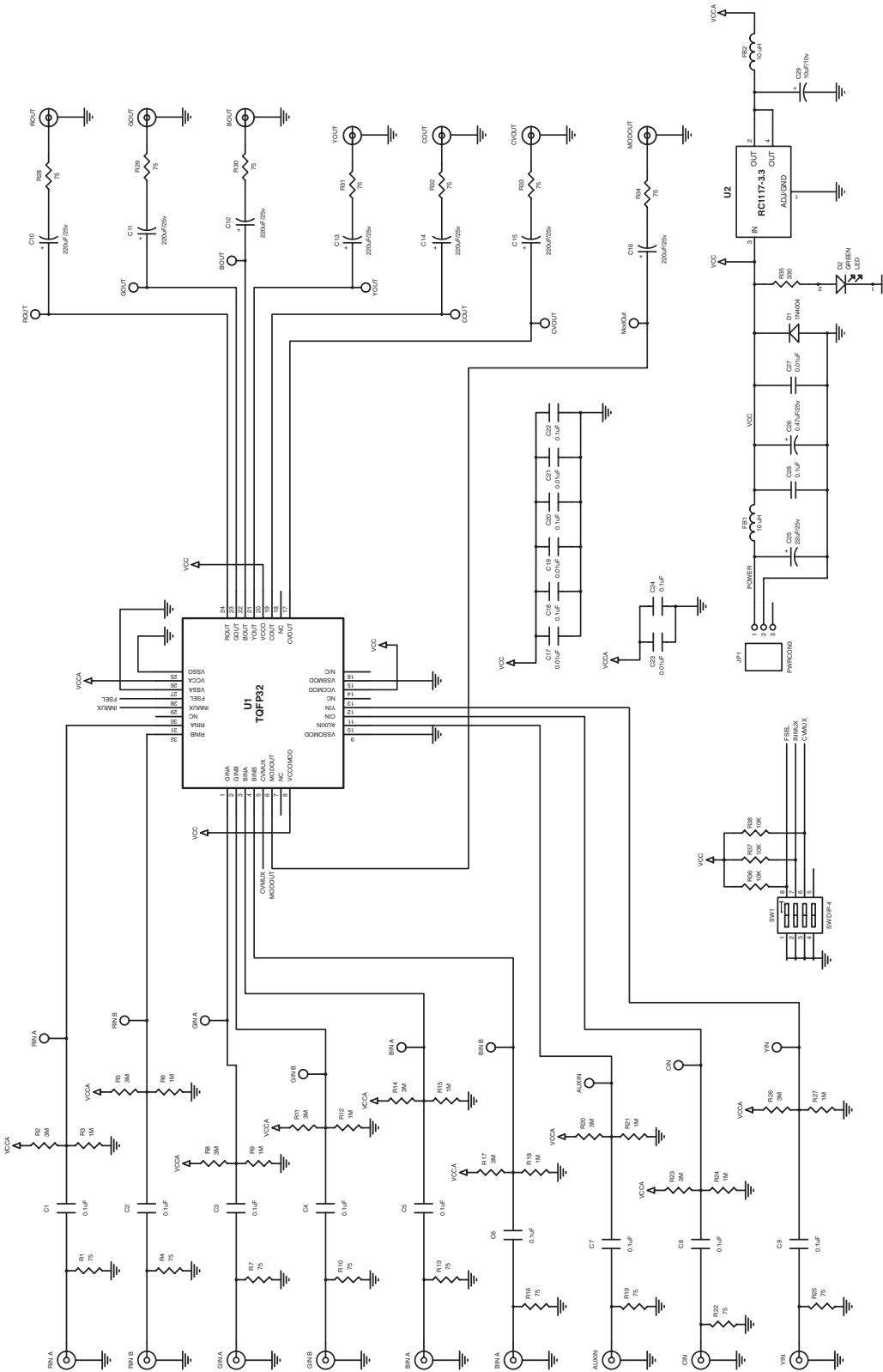


Figure 1. FMS6417A Schematic Diagram

Bill of Materials

Item	Quantity	Reference	Part
1	14	C1 thru C9, C18, C20, C22, C24, C28	0.1 μ F
2	7	C10 thru C16	220 μ F
3	5	C17, C19, C21, C23, C27	0.01 μ F
4	1	C25	22 μ F
5	1	C26	0.47 μ F
6	1	C29	10 μ F
7	1	D1	S1GB
8	1	D2	LED
9	2	FB1,FB2	10 μ H
10	1	JP1	PWRCON3
11	18	TP1 – TP16	Test Points
12	16	J1 – J16	BNC Connectors
13	16	R1, R4, R7, R10, R13, R16, R19, R22, R25, R28, R29, R30, R31, R32, R33, R34	75 Ω
14	9	R2, R5, R8,R11, R14, R17, R20, R23, R26	3M Ω
15	9	R3, R6, R9, R12, R15, R18, R21, R24, R27	1M Ω
16	3	R36, R37, R38	10k Ω
17	1	R35	330 Ω
18	1	SW1	SW DIP-4
19	1	U1	FMS6417A
20	1	U2	RC1117-3.3

Applications

DC levels on these parts need to be between 0 and 1.3V. The YIN Channel should nominally have the Sync Tip at ground and be a 1V signal. The CIN Channel should ride around the 0.3V level. This will ensure that the filter will utilize the optimal headroom and avoid clipping.

At any given time, the sum of Y_{IN} and C_{IN} must be 0.0V to 1.3V otherwise the CV_{OUT} may be clipped.

Driving the digital pins with 3.3V or 5V logic.

Either is allowed as long as the V_{IH} and V_{IL} are adhered to.

Layout Considerations

General layout and supply bypassing play major roles in high frequency performance and thermal characteristics. Fairchild offers the FMS6417ADEMO evaluation board to use as a guide for layout and to aid in device testing and characterization. The FMS6417ADEMO is a 4-layer board with a full power and ground plane. Following this layout configuration will provide the optimum performance and thermal characteristics. For optimum results, follow the steps below as a basis for high frequency layout.

- Include 10 μ F and 0.1 μ F ceramic bypass capacitors.
- Place the 10 μ F capacitor within 0.75 inches of the power pin
- Place the 0.1 μ F capacitor within 0.1 inches of the power pin
- For multi-layer boards, use a large ground plane to help dissipate heat.
- For 2 layer boards, use a ground plane that extends beyond the device by at least 0.5 inches
- Minimize all trace lengths to reduce series inductance

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