

AN-8011

FMS6366 Evaluation Board Application Note

Description

The FMS6366 offers comprehensive filtering for set top box or DVD applications. This part consists of triple 4:2:2 6th order filters with selectable 32/15MHz or 8/4MHz frequencies for YPbPr and a dual 8MHz filter for YC with a composite summer. Two-to-one multiplexers are provided on the triple filters as well as provisions for auxiliary input to the composite channel. The triple filters are intended for YPbPr signals. All channels accept DC coupled ground-referenced $1V_{pp}$ signals. The filters output $2V_{pp}$ signals into AC coupled terminated loads.

The FMS6366 is a next generation filter solution from Fairchild Semiconductor addressing the expanding filtering needs for set top boxes, and DVD players. The product provides selectable 4:2:2 HD/SD filtering on the YPbPr channels.

Thus, the FMS6366 addresses the requirement for a single set top box to be compatible with a variety of resolution standards. Additionally, the product provides additional filters for Y, C, and Composite Video (CV) outputs. Multiplexers on the YPbPr and CV channels provide further flexibility.

For DVD applications, the product provides filtering and output drive amplification for 6 channels of outputs. These include Y1, Pb, Pr, Y2, C, and CV outputs.

For Set top boxes, this product provides two channels of filtered video with the flexibility of selectable high order filtering for multiple resolution standards. Additional flexibility is provided by the Y (Luma) and C (Chroma) filters with a composite summer.

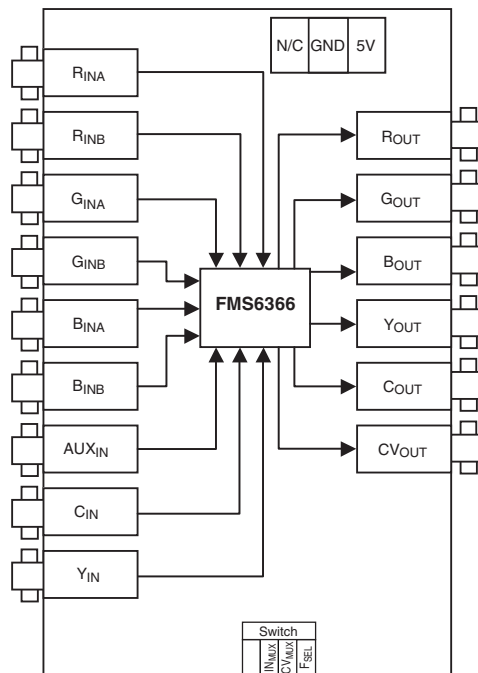
All channels provide 6dB gain, accept 1V ground referenced inputs, and drive AC coupled loads.

Applications

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

For a complete description of the FMS6366 please refer to the FMS6366 data sheet.

Evaluation Board Block Diagram



Evaluation Kit Contents

The FMS6366 Evaluation Kit contains the following items:

- AN-8011 – FMS6366 Evaluation Board Application Note
- The latest revision of the FMS6366 data sheet, which also can be obtained from <http://www.fairchildsemi.com>.
- Fully functional FMS6366 eval board
- Female power connector

Board Setup and Test

The following test equipment is necessary to test the FMS6366 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 FMS6366 Demo 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 FMS6366 eval board.
4. Start out with SW1-1 off (up), SW1-2 off (up), and SW1-3 on (down).
5. Connect YPbPr signal generator to the appropriate FMS6366 input connectors (Y_{1INA}, Pb_{1INA}, and Pr_{1INA}).
6. Connect the SD monitor input cables to the outputs of the FMS6366 eval board (Y_{1OUT}, Pb_{1OUT}, and Pr_{1OUT}).

7. Connect a composite signal into the Aux_{IN}
8. Connect Y_{2IN} and C_{IN}
9. Connect Channel A of SD monitor to CV_{OUT}
10. Turn power supply on.
11. Press YPbPr/RGB channel on SD monitor and verify test pattern as the same going through YPbPr_{IN}.
12. Switch SW1-3 off (up) and verify signal loss.
13. Switch cables from Y_{1INA} to Y_{1INB}, Pb_{1INA} to Pb_{1INB}, and Pr_{1INA} to Pr_{1INB}, signal should return.
14. Switch SW1-2 on (down)
15. Press Channel A on SD monitor to verify signal going through Y_{2IN} and C_{IN}.
16. Switch SW1-2 off (up) to switch to Aux_{IN}. Now CV_{OUT} is coming from Aux_{IN}.
17. Verify test pattern
18. Switch SW1-2 on (down) to switch back to Y_{2IN} and C_{IN}.
19. 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 off (up), and SW1-3 on (down).
3. Connect HD signal generator to appropriate FMS6366 input connectors (Y_{1INA}, Pb_{1INA}, and Pr_{1INA}).
4. Connect the HD monitor input cables to the outputs of the FMS6366 eval board (Y_{1OUT}, Pb_{1OUT}, and Pr_{1OUT}).
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 SW1-3 off (up) and verify signal loss.
9. Switch cables from Y_{1INA} to Y_{1INB}, Pb_{1INA} to Pb_{1INB}, and Pr_{1INA} to Pr_{1INB}, signal should return.
10. Functional testing is now complete.

Table 1. Switch Setting for Y1PbPr Channels

Control		Outputs		
IN _{MUX} (SW1-3)	F _{SEL} (SW1-1)	Pr _{OUT}	Y1 _{OUT}	Pb _{OUT}
Off	Off	Pr _{1INA} (SD)	Y1 _{1INA} (SD)	Pb _{1INA} (SD)
On	Off	Pr _{1INB} (SD)	Y1 _{1INB} (SD)	Pb _{1INB} (SD)
Off	On	Pr _{1INA} (HD)	Y1 _{1INA} (HD)	Pb _{1INA} (HD)
On	On	Pr _{1INB} (HD)	Y1 _{1INB} (HD)	Pb _{1INB} (HD)

Table 2. Switch Setting for Y2, C, and AUX_{IN} Channels

Control	Outputs		
CV _{MUX} (SW1-2)	Y2 _{OUT}	C _{OUT}	CV _{OUT}
On	Y2 _{IN}	C _{IN}	Y2 _{IN} /C _{IN}
On	Y2 _{IN}	C _{IN}	Y2 _{IN} /C _{IN}
Off	AUX _{IN}	N/A	AUX _{IN}
Off	AUX _{IN}	N/A	AUX _{IN}

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

Bill of Materials

Item	Quantity	Reference	Part
1	15	Y1OUT, Y1INA, Y1INB, Y2OUT, Y2IN, PrOUT, PrINA, PbOUT, PbINA, PbINB, PbINA, CVOOUT, COUT, AUXIN	BNC Connectors
2	6	C1, C2, C3, C27, C28, C29	220 μ F
3	10	C4 thru C12, C17	0.1 μ F
4	1	C13	22 μ F
5	1	C15	0.47 μ F
6	1	C16	0.01 μ F
7	1	D1	S1GB
8	1	D2	LED
9	1	FB1,FB2	10 μ H
10	1	JP1	PWRCON3
11	15	R1, R3, R5, R7, R10, R13, R14, R15, R18, R21, R24, R27, R32, R35	75 Ω
12	3	R2, R4, R6	10k Ω
13	9	R8, R11, R16, R19, R22, R25, R28, R30, R34	1M Ω
14	9	R9, R12, R17, R20, R23, R26, R29, R31, R32	3M Ω
15	1	R40	330 Ω
16	1	SW1	SW DIP-4
17	1	U1	FMS6366

Applications

DC Levels

At any given time, the input signal's DC level must be between 0.0V and 1.3V to utilize the optimal headroom and to avoid clipping at the outputs. The Y channels accept 1V_{pp} signals with the sync tip at ground. The Pb, Pr and C channels should be centered around 0.5V. This will ensure that the filter will utilize the optimal headroom and avoid clipping.

Driving the Digital Pins with 3.3V or 5V Logic

The FMS6366 digital inputs are compatible with most 3.3V and 5V logic. Verify that the V_{IH} and V_{IL} are within the specified limits.

Layout Considerations

General layout and supply bypassing play major roles in high frequency performance and thermal characteristics. The FMS6366DEMO 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

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx™	FAST®	ISOPLANAR™	PowerSaver™	SuperSOT™-8
ActiveArray™	FASTr™	LittleFET™	PowerTrench®	SyncFET™
Bottomless™	FPST™	MICROCOUPLER™	QFET®	TinyLogic®
Build it Now™	FRFET™	MicroFET™	QS™	TINYOPTO™
CoolFET™	GlobalOptoisolator™	MicroPak™	QT Optoelectronics™	TruTranslation™
CROSSVOLT™	GTO™	MICROWIRE™	Quiet Series™	UHC™
DOMET™	HiSeC™	MSX™	RapidConfigure™	UltraFET®
EcoSPARK™	I ² C™	MSXPro™	RapidConnect™	UniFET™
E ² CMOS™	i-Lo™	OCX™	µSerDes™	VCX™
EnSigna™	ImpliedDisconnect™	OCXPro™	SILENT SWITCHER®	Wire™
FACT™	IntelliMAX™	OPTOLOGIC®	SMART START™	
FACT Quiet Series™		OPTOPLANAR™	SPM™	
Across the board. Around the world.™		PACMAN™	Stealth™	
The Power Franchise®		POP™	SuperFET™	
Programmable Active Droop™		Power247™	SuperSOT™-3	
		PowerEdge™	SuperSOT™-6	

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

- | | |
|---|---|
| <p>1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.</p> | <p>2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.</p> |
|---|---|

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

Rev. 116