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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FAIRCHILD SEMICONDUCTOR®

August 2009

FMS6690
Six Channel, 6th Order, SD/PS/HD Video Filter Driver

Features

Á Three Selectable Sixth-Order 15/32MHz (PS/HD) Filters

Á Three Fixed Sixth-Order 8MHz (SD) Filters with MUXed Input

Á Transparent Input Clamping

Á Single Video Load Drive ($2V_{PP}$, 150T, A_V= 6dB)

Á AC-or DC-Coupled Inputs

Á AC-or DC-Coupled OutTw0083Tj32Tm0 T346346308 Tw[AC)5.2(-Tc0 Tw0083Tj/TT2 1 Tf0 150)59693.6 Tm .6 Tm . 0 Twe4ml0 to replace passive LC filters and drivers with a low-cost integrated device. Six 6

th-order Butterworth filters provide improved image quality compared to typical passive solutions. The combination of low-power Standard Definition (SD), Progressive Scan (PS), and High Definition (HD) filters greatly simplifies DVD video output circuitry. Three channels offer fixed SD filters and feature an additional MUXed input, while the other three channels are selectable between PS and HD filters. The FMS6690 offers a fixed gain of 6dB.

The FMS6690 may be directly driven by a DC-coupled DAC output or an AC-coupled signal. Internal diode clamps and bias circuitry may be used if AC-coupled inputs are required *(see Applications section for details)*.

The outputs can drive AC-or DC-coupled single (150T) video loads. DC-coupling the outputs removes the need for output coupling capacitors. The input DC levels are offset approximately +280mV at the output.

Ordering Information

Part Number	Operating Temperature Range	Eco Status	Package	Packing Method
FMS6690MTC20X	0° to 70°C	RoHS	20-Lead Thin Shrink Outline Package (TSSOP)	2500 Units in Tape and Reel

For Fairchild's definition of Eco Status, please visit: http://www.fairchildsemi.com/company/green/rohs_green.html.

Block Diagram

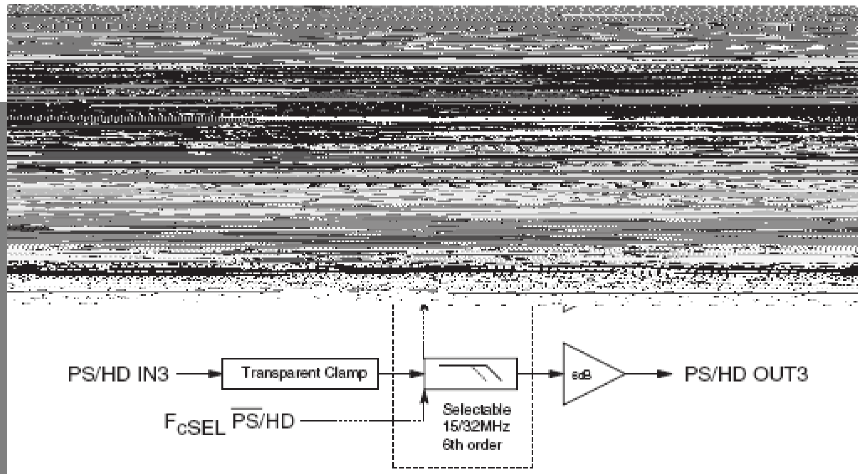


Figure 1. Block Diagram

Pin Configuration

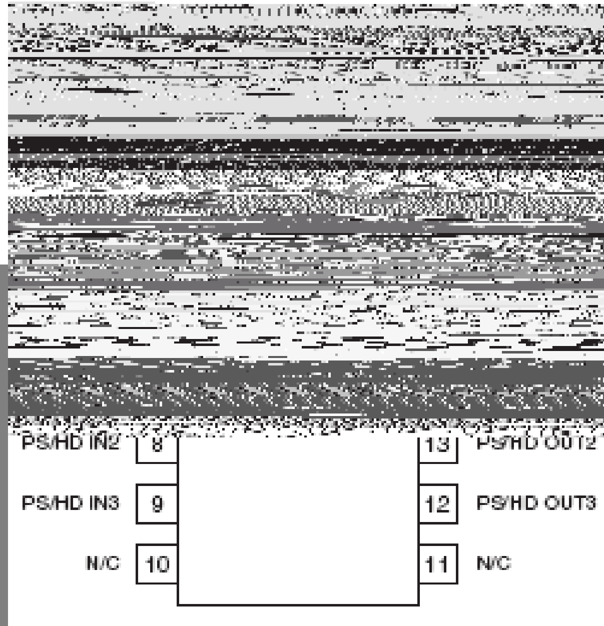


Figure 2. Pin Configuration

Pin Definitions

Pin #	Name	Type	Description
1	SD IN1	Input	SD Video Input, Channel 1
2	SD IN2	Input	SD Video Input, Channel 2
3	SD IN3A	Input	SD Video Input, Channel 3A
4	SD IN3B	Input	SD Video Input, Channel 3B
5	VCC	Input	+5V Supply
6	FcSEL	Input	Selects Filter Corner Rrequency for Pins 7, 8, and 9; “0” = PS, “1” = HD
7	PS/HD IN1	Input	Selectable PS or HD Video Input, Channel 1
8	PS/HD IN2	Input	Selectable PS or HD Video Input, Channel 2
9	PS/HD IN3	Input	Selectable PS or HD Video Input, Channel 3
10	N/C	Input	No Connect

Standard-Definition Electrical Characteristics

Unless otherwise noted, T_A=25°C, V_{IN}=1V_{PP}, V_{CC}=5V, all inputs AC coupled with 0.1µF, all outputs AC coupled with 220µF into 150T loads, referenced to 400kHz.

Typical Performance Characteristics

Unless otherwise noted T_C=25°C, V_{IN}=1V_{PP}, V_{CC}=5V, R_{SOURCE}=37.5Ω, inputs AC coupled with 0.1µF, all outputs AC coupled with 220µF into150Ω loads.

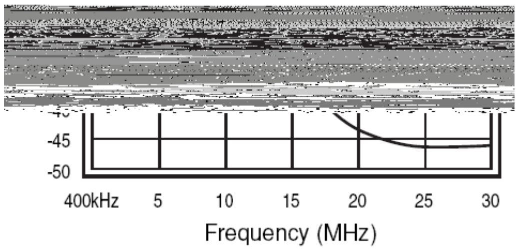


Figure 3. SD Gain vs. Frequency

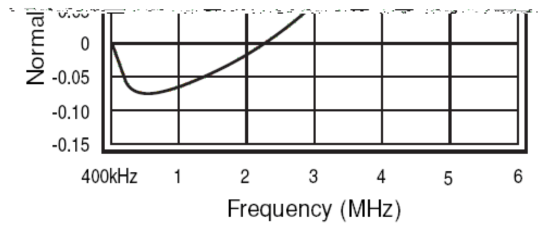


Figure 4. SD Flatness vs. Frequency

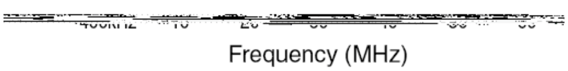


Figure 5. PS Gain vs. Frequency

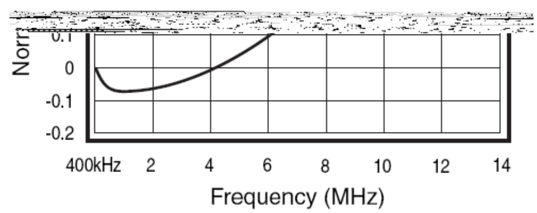


Figure 6. PS Flatness vs. Frequency

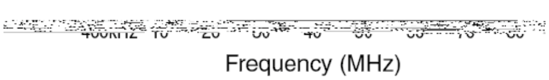


Figure 7. HD Gain vs. Frequency

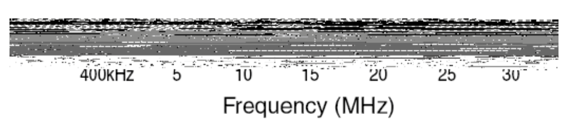


Figure 8. HD Flatness vs. Frequency

Typical Performance Characteristics

Unless otherwise noted T_C=25°C, V_{IN}=1V_{PP}, V_{CC}=5V, R_{SOURCE}=37.5Ω, inputs AC coupled with 0.1µF, all outputs AC coupled with 220µF into150Ω loads.

Figure 9. SD Group Delay vs. Frequency

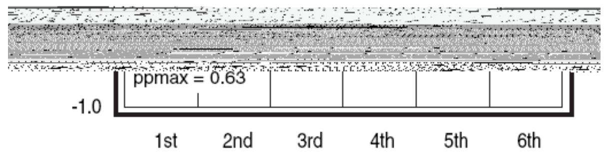


Figure 10. Noise vs. Frequency

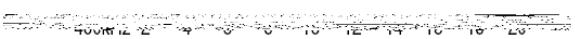


Figure 11. PS Group Delay vs. Frequency

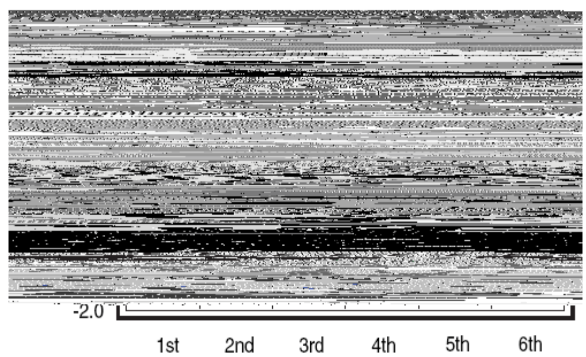


Figure 12. SD Differential Gain

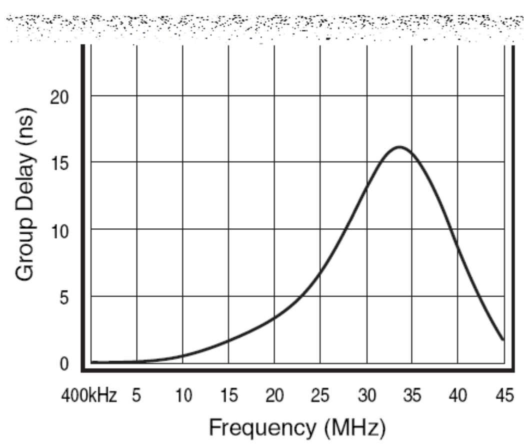


Figure 13. HD Group Delay vs. Frequency

Applications Information

Functional Description

The FMS6690 Low-Cost Video Filter (LCVF) provides 6dB gain (9dB optional, contact factory for further information) from input to output. In addition, the input is slightly offset to optimize the output driver performance. The offset is held to the minimum required value to decrease the standing DC current into the load. Typical voltage levels are shown in Figure 14.

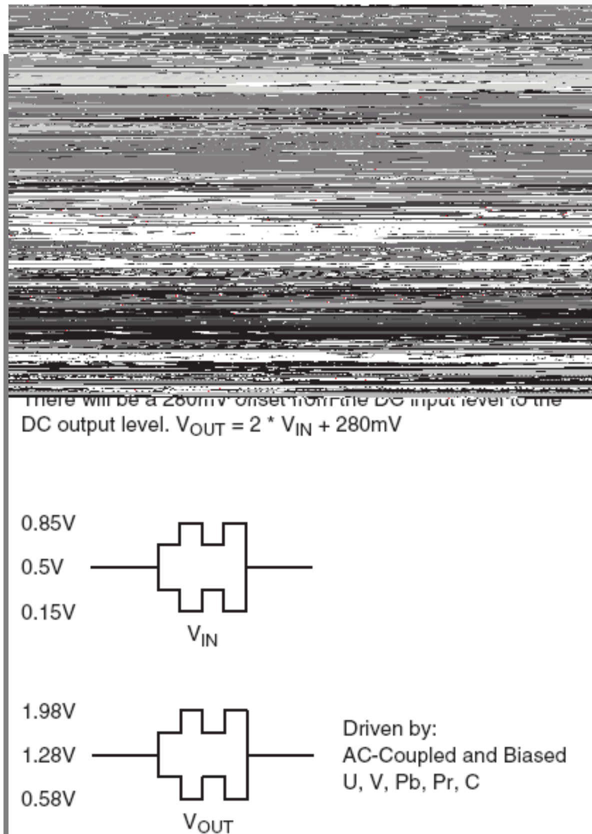
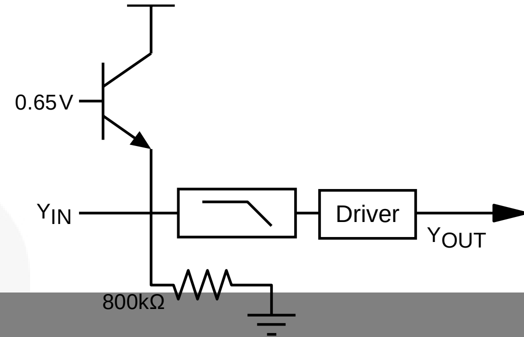


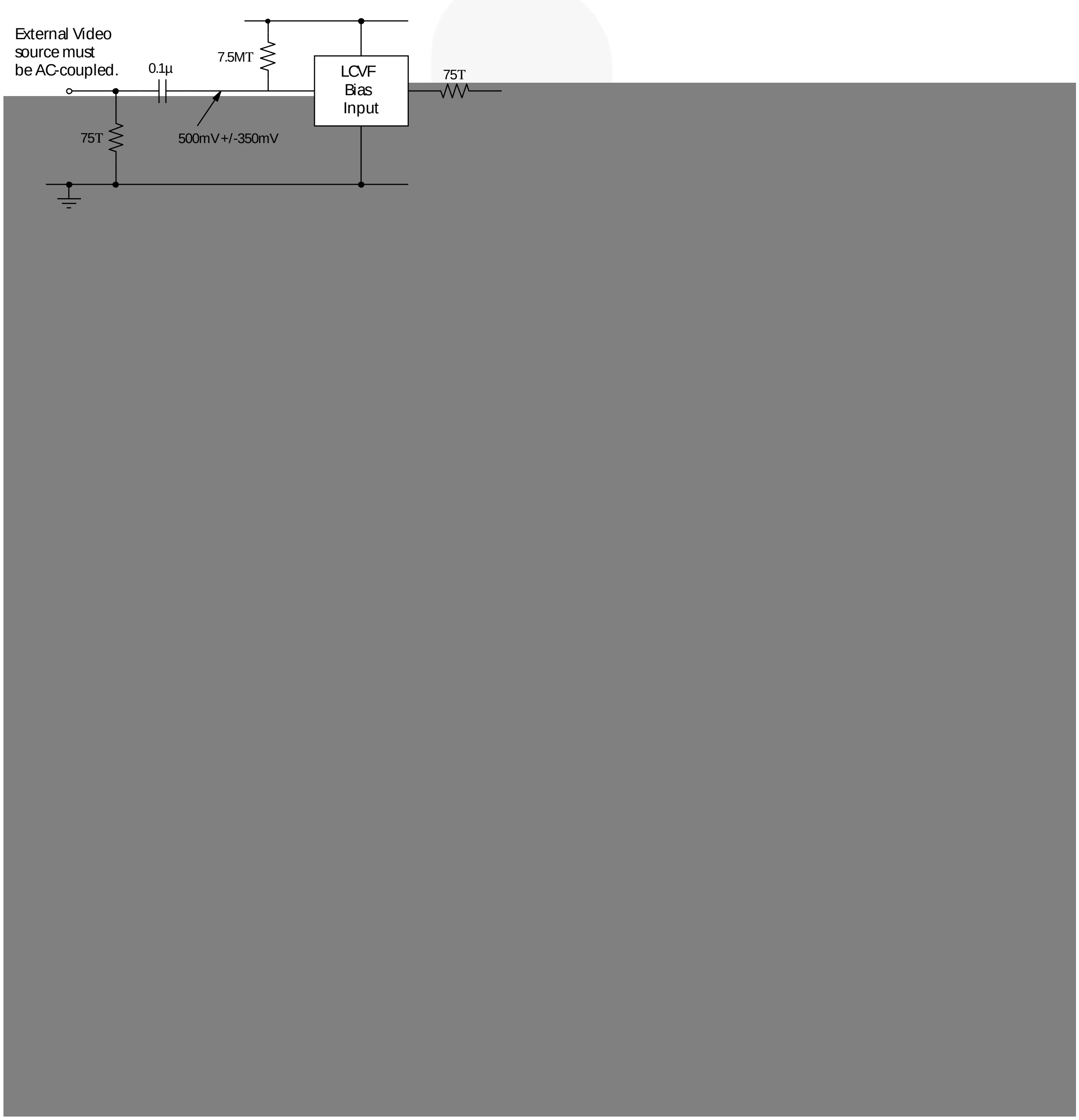
Figure 14. Typical Voltage Levels

The FMS6690 provides an internal diode clamp to support AC-coupled input signals. If the input signal does not go below ground, the input clamp does not operate. This allows DAC outputs to directly drive the FMS6690 without an AC coupling capacitor. The worst-case sync tip compression, due to the clamp, does not exceed 7mV. The input level set by the clamp, combined with the internal DC offset, keeps the output within acceptable range. When the input is AC-coupled, the diode clamp sets the sync tip (or lowest voltage) just below ground.

For symmetric signals like C, U, V, Cb, Cr, Pb, and Pr; the average DC bias is fairly constant and the inputs can be AC-coupled with the addition of a pull-up resistor to set the DC input voltage. DAC outputs can also drive these same signals without the AC coupling capacitor. A conceptual illustration of the input clamp circuit is shown in Figure 15.



The same method can be used for biased signals with the addition of a pull-up resistor to make sure the clamp never operates. The internal pull-down resistance is 800kT±20%, so the external resistance should be 7.5MT to set the DC level to 500mV. If a pull-up resistance of less than 7.5MT desired, add an external pull-down such that the DC input level is set to 500mV.



Layout Considerations

Layout and supply bypassing play major roles in high-frequency performance and thermal characteristics. Fairchild offers a demonstration board, FMS6690DEMO, to use as a guide for layout and to aid in device testing and characterization. The FMS6690DEMO is a four-layer board with a full power and ground plane. Following this layout configuration provides the optimum performance and thermal characteristics. For optimum results, follow these steps as a basis for high-frequency layout:

Á Include 10μF and 0.1μ

Typical Application

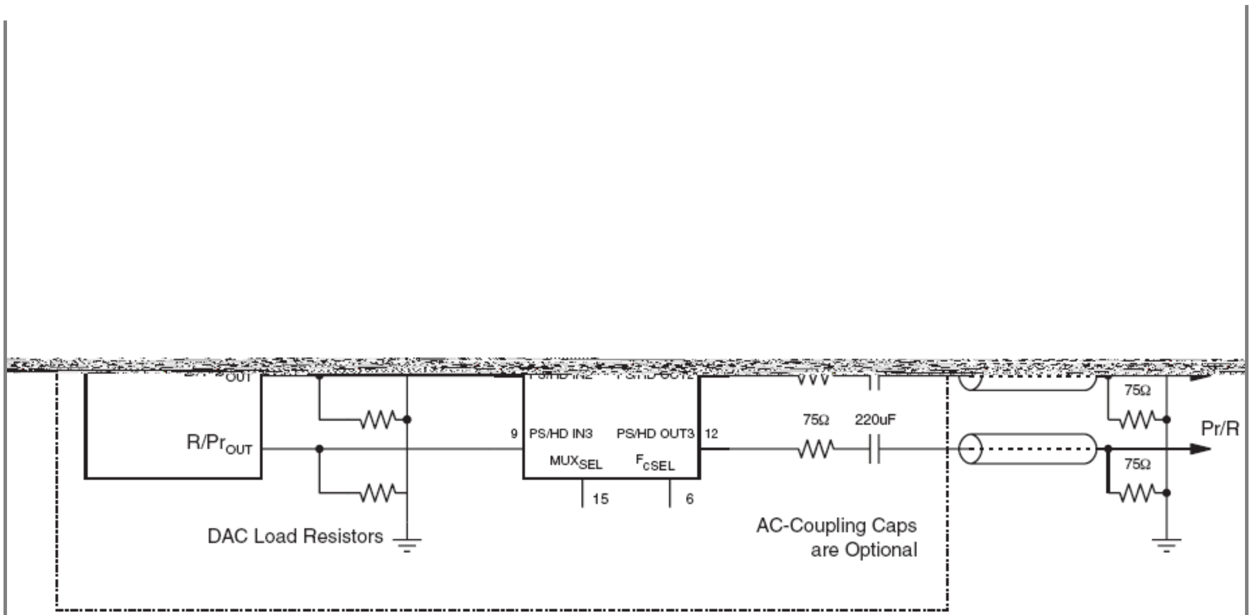


Figure 23. Typical Application Diagram