FAIRCHILD SEMICONDUCTOR®

April 2006

FMS6203
Low-cost 3-Channel Video Filter Drivers for SD/PS/HD

Features

- Three 6th order video anti-aliasing or reconstruction filters
- Supports Component YPrPb or RGB video
- Three channels selectable to 8MHz,16MHz, 32MHz for SD/PS/HD applications
- Includes wide bandwidth bypass mode
- 6dB gain option available for 150Ω, doubly terminated video load
- 0dB gain option available for high-impedance loading
- Selectable Clamp or Bias mode on Pb,Pr / B,R inputs
- Inputs and outputs can be either AC or DC coupled
- DC-coupled outputs eliminate expensive coupling capacitors
- Output Disable
- 5V Only
- 2kV CDM / 8kV HBM ESD protection
- Lead (Pb) Free packages - TSSOP-14

Applications

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

Description

The FMS6203 offers comprehensive filtering for set top box or DVD applications. It is intended to replace passive LC filters and drivers with a low-cost integrated device.

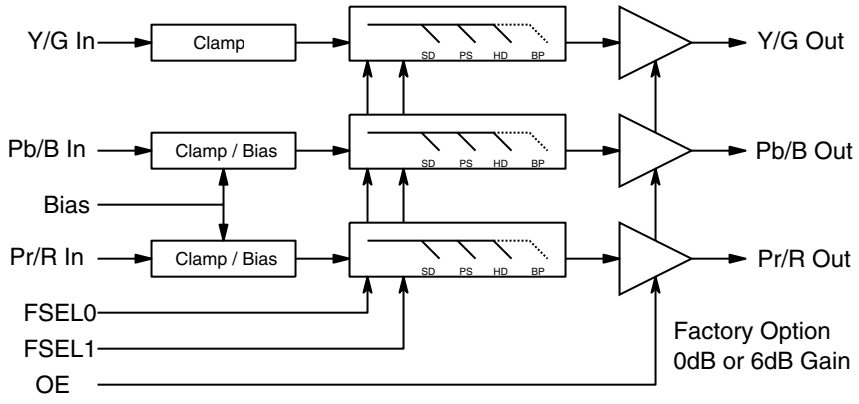
Filter channels are specialized for either component (YPbPr) or RGB video signals. These channels offer selectable frequency response of 8, 16, or 32MHz. The filters can also be bypassed for high-frequency operation. Additional functionality of these channels include input biasing mode and output disable.

The FMS6203 may be driven directly by a DC-coupled DAC output or an AC-coupled signal. All inputs accept standard $1V_{pp}$ video signals.

Each channel includes an output amplifier capable of driving a single (150Ω), AC or DC-coupled video load. All outputs can be disabled to save power in DC coupled applications.

The device is available in two factory set options, a 0dB gain option and a 6dB gain option.

Functional Block Diagram



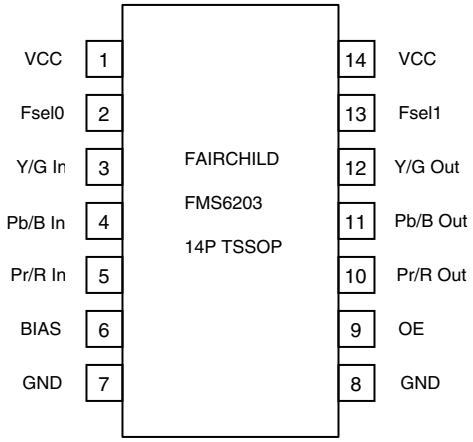
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Ordering Information

Part Number	Gain Setting	Package	Pb-Free	Operating Temperature Range	Packing Method
FMS6203MTC1400	0dB	TSSOP-14	Yes	0°C to 85°C	Tube
FMS6203MTC1400X	0dB	TSSOP-14	Yes	0°C to 85°C	Tape and Reel
FMS6203MTC1406	6dB	TSSOP-14	Yes	0°C to 85°C	Tube
FMS6203MTC1406X	6dB	TSSOP-14	Yes	0°C to 85°C	Tape and Reel

Moisture sensitivity level for all parts is MSL-1.

Pin Configuration



Pin Assignments

Pin#	Pin	Type	Description
1	VCC	Input	+5V supply
2	F_{SEL0}	Input	Selects filter corner frequency
3	Y/G In	Input	Selectable video input
4	Pb/B In	Input	Selectable video input
5	Pr/R In	Input	Selectable video input
6	BIAS	Input	Input Bias on Pb/B Pr/R 0=Bias 1=Clamp
7	GND	Input	Must be tied to ground. Do not float.
8	GND	Input	Must be tied to ground. Do not float.
9	OE	Input	Output disable control 0=On 1=Off
10	Pr/R Out	Output	Filtered SD,PS,HD,BP video output
11	Pb/B Out	Output	Filtered SD,PS,HD,BP video output
12	Y/G Out	Output	Filtered SD,PS,HD,BP video output
13	F_{SEL1}	Input	Selects filter corner frequency
14	VCC	Input	+5V supply

Absolute Maximum Ratings

The “Absolute Maximum Ratings” are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The “Recommended Operating Conditions” table defines the conditions for actual device operation.

Parameter	Min.	Max.	Unit
DC Supply Voltage	-0.3	6	V
Analog and Digital I/O	-0.3	V_{CC} + 0.3	V
Output Current, Any One Channel (Do Not Exceed)		50	mA

Reliability Information

Parameter	Min.	Typ.	Max.	Unit
Junction Temperature			150	°C
Storage Temperature Range	-65		150	°C
Lead Temperature (Soldering, 10s)			300	°C
Thermal Resistance ($Theta_{JA}$) JEDEC Standard Multi-Layer Test Boards, Still Air		97		°C/W

Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Unit
Operating Temperature Range	-40		85	°C
Supply Voltage Range	4.75	5.0	5.25	V

DC Electrical Characteristics

T_c = 25°C, V_{cc} = 5V, R_{source} = 37.5Ω, inputs AC coupled with 0.1μF, all outputs AC coupled with 220μF into 150Ω loads, referenced to 400kHz; all gain options; unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max	Units
I_{CC}	Supply Current[1]	No load		36	75	mA
I_{CC1}	Supply Current[1]	No load , Output disabled		15	35	mA
V_{IN}	Video Input Voltage Range	Referenced to GND if DC-coupled		1.0		Vpp
V_{IL}	Digital Input Low[1]	F_{Sel0},F_{Sel1}	0		0.8	V
V_{IH}	Digital Input High[1]	F_{Sel0},F_{Sel1}	2.4		V_{cc}	V
T_{ENABLE}	Output Enable Time	150 Ohm DC load		300		ns

Standard Definition Electrical Characteristics

T_c = 25°C, V_{in} = 1V_{pp}, V_{cc} = 5V, R_{source} = 37.5Ω, all inputs AC coupled with 0.1μF, all outputs AC coupled with 220μF into 150Ω loads, referenced to 400kHz, all gain options; unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max	Units
AV_{SD}	Channel Gain Error[1]		-0.4	0	0.4	dB
f_{1dBSD}	-1dB Bandwidth[1]		5.2	7.15		MHz
f_{cSD}	-3dB Bandwidth			8		MHz
f_{SBSD}	Attenuation(stopband reject)[1]	f = 27MHz	40	50		dB
DG	Differential Gain			0.3		%
DP	Differential Phase			1.0		°
THD	Output Distortion	V_{OUT} = 1.4V_{pp}, 3.58MHz		0.6		%
X_{TALKSD}	Crosstalk (ch-to-ch)	1 MHz		-70		dB
SNR	Signal-to-Noise Ratio[2]	NTC-7 weighting, 100kHz to 4.2MHz		75		dB
t_{pdSD}	Propagation Delay	Delay from input to output, 4.5MHz		85		ns

Progressive Scan Electrical Characteristics

T_c = 25°C, V_{in} = 1V_{pp}, V_{cc} = 5V, R_{source} = 37.5Ω, all inputs AC coupled with 0.1μF, all outputs AC coupled with 220μF into 150Ω loads, referenced to 400kHz, all gain options; unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max	Units
AV_{PS}	Channel Gain Error[1]		-0.4	0	0.4	dB
f_{1dBSPS}	-1dB Bandwidth[1]		10	13.5		MHz
f_{cPS}	-3dB Bandwidth			16		MHz
f_{SBPS}	Attenuation(stopband reject)[1]	f = 54MHz	37	44		dB
THD	Output Distortion	V_{OUT} = 1.4V_{pp}, 7MHz		0.55		%
X_{TALKPS}	Crosstalk (ch-to-ch)	1 MHz		-75		dB
SNR	Signal-to-Noise Ratio[2]	Unweighted; 100kHz to 15MHz		66		dB
t_{pdPS}	Propagation Delay	Delay from input to output, 10MHz		47		ns

Notes:

1. 100% tested at 25°C
2. SNR = 20 * log (714mV / rms noise)

High Definition Electrical Characteristics

T_c = 25°C, V_{in} = 1V_{pp}, V_{cc} = 5V, R_{source} = 37.5Ω, all inputs AC coupled with 0.1μF, all outputs AC coupled with 220μF into 150Ω loads, referenced to 400kHz, all gain options; unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max	Units
AV_{HD}	Channel Gain Error[1]		-0.4	0	0.4	dB
f_{1dBHD}	-1dB Bandwidth[1]		28	31		MHz
f_{cHD}	-3dB Bandwidth			32		MHz
f_{SBHD}	Attenuation(stopband reject)[1]	f = 74.25MHz	30	40		dB
THD	Output Distortion	V_{OUT} = 0.7V_{pp}, 22MHz ; 0dB ; 10kΩ load		0.5		%
		V_{OUT} = 1.4V_{pp}, 22MHz ; 6dB ; 150Ω load		0.5		%
X_{TALKHD}	Crosstalk (ch-to-ch)	1 MHz		-75		dB
		30 MHz		-57		dB
SNR	Signal-to-Noise Ratio[2]	Unweighted, 100kHz to 30MHz		66		dB
t_{pdHD}	Propagation Delay	Delay from input to output, 20MHz		25		ns

Bypass Mode Electrical Characteristics

T_c = 25°C, V_{in} = 1V_{pp}, V_{cc} = 5V, R_{source} = 37.5Ω, all inputs AC coupled with 0.1μF, all outputs AC coupled with 220μF into 150Ω loads, referenced to 400kHz, all gain options; unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max	Units
AV_{BP}	Channel Gain Error[1]	DC	-0.4	0	0.4	dB
f_{1dBBP}	-1dB Bandwidth			90		MHz
f_{cBP}	-3dB Bandwidth			115		MHz
THD	Output Distortion	V_{OUT} = 0.7V_{pp}, 22MHz ; 0dB ; 10kΩ load		0.3		%
		V_{OUT} = 1.4V_{pp}, 22MHz ; 6dB ; 150Ω load		0.25		%
X_{TALKBP}	Crosstalk (ch-to-ch)	1 MHz		-74		dB
		30 MHz		-64		dB
SNR	Signal-to-Noise Ratio[2]	Unweighted, 100kHz to 30MHz		70		dB

Notes:

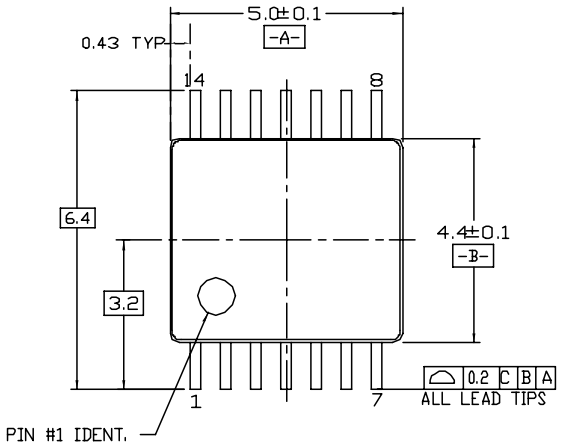
1. 100% tested at 25°C
2. SNR = 20 * log (714mV / rms noise)

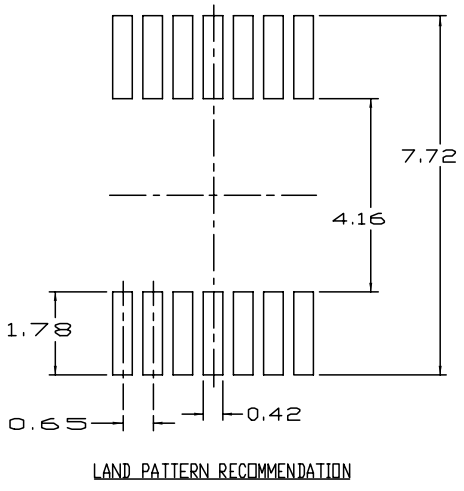
Frequency Select Truth Table

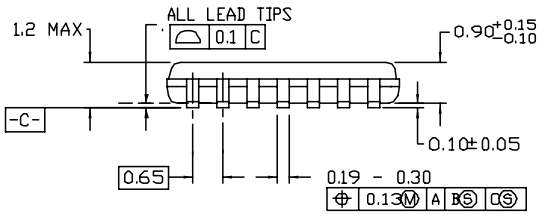
F_{SEL1}	F_{SEL0}	Filter Freq	Video Format	Sync Format
0	0	8MHz	SD,480i	Bi-level, 4.7μs pulse width
0	1	16MHz	PS,480p	Bi-level, 2.35μs pulse width
1	0	32MHz	HD,1080i,720p	Tri-level, 589ns pulse width
1	1	Bypass	-	-

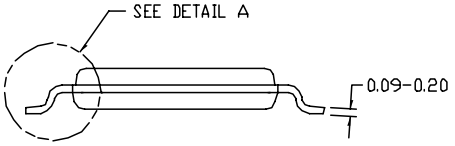
Mechanical Dimensions

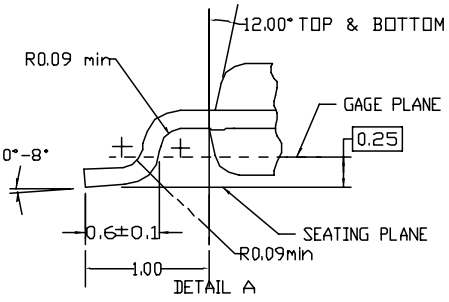
14-Lead (TSSOP)











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