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FAIRCHILD SEMICONDUCTOR®

June 2010

FMS6151
Ultra-Portable Video Filter Driver

Features

- 5th-Order 8MHz (SD) Filter
- Power Down to 25nA
- DC-Coupled Input
- AC- or DC-Coupled Output
- DC-Coupled Output Eliminates AC-Coupling Cap
- SAG Correction Reduces Size of AC-Coupling Cap
- Fixed Gain of 6dB
- Small, Lead-Free, MicroPak™ Packaging

Applications

- Digital Still Cameras
- Camera Phones
- Personal Digital Assistants
- Set Top Boxes
- Digital Video Recorders

Description

The FMS6151 low-cost integrated video filter is intended to replace passive LC filters and drivers in low-voltage portable video applications. The 5th-order filter provides better image quality compared to typical 2nd- and 3rd-order passive solutions.

The FMS6151 is intended to be directly driven by a DC-coupled DAC output. The output can drive an AC- or DC-coupled doubly terminated coax (150Ω) load. DC-coupling the output removes the need for an expensive output coupling capacitor. If an AC-coupled output is needed, the SAG correction circuit can be used to reduce the AC output coupling capacitor value. Input DC levels are offset by approximately 100mV. This internal level shift is incorporated to prevent sync pulse clipping.

Offering SAG correction, 6dB fixed gain, and a 5th-order low-pass filter in a space-saving MicroPak™ package makes the FMS6151 well suited for space-sensitive applications, such as cellular phones and digital cameras.

Block Diagram

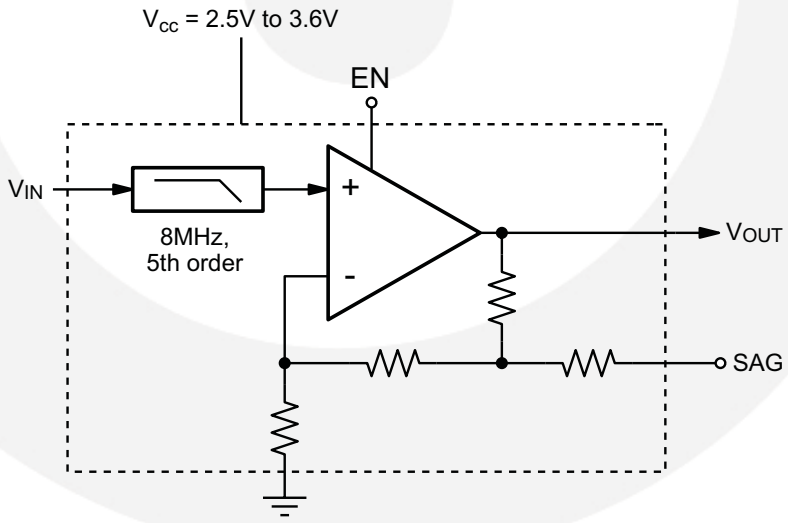


Figure 1. Block Diagram

Ordering Information

Part Number	Operating Temperature Range	Package	Packaging Method
FMS6151L6X	-40°C to +105°C	6-Lead MicroPak™	Reel

Pin Configuration

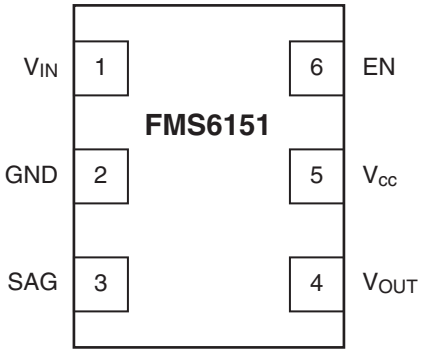


Figure 2. Pin Assignments

Pin Assignments

Pin#	Pin Name	Type	Description
1	V_{IN}	Input	Input video
2	GND	Input	Ground
3	SAG	Input	SAG
4	V_{OUT}	Output	Filtered video output
5	V_{CC}	Input	Positive power supply
6	EN	Input	Enable 0 = Disabled 1 = Enabled

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Parameter		Min.	Max.	Unit
DC Supply Voltage		-0.3	6.0	V
Analog and Digital I/O		-0.3	$+V_{CC}$ +0.3	V
Maximum Output Current, Do Not Exceed			45	mA
Electrostatic Discharge Protection Level	Human Body Model, JESD22-A114	6		kV
	Charged Device Model, JESD22-C101	2		

Reliability Information

Parameter	Min.	Typ.	Max.	Unit
Junction Temperature			+150	°C
Storage Temperature Range	-65		+150	°C
Thermal Resistance (θ_{JA}), JDEC Standard, Multi-layer Test Boards, Still Air			271	°C/W

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

Parameter	Min.	Typ.	Max.	Unit
Operating Temperature Range	-40		+105	°C
Supply Voltage Range	2.5	2.7	3.6	V

DC Electrical Characteristics

T_A = 25°C, V_{CC} = 2.7V, R_s = 37.5Ω, AC-coupled output into 150Ω load, SAG pin connected to V_{OUT} pin, unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_{CC}	Supply Current(1)	V_{CC} = 2.7V, No Load		3.8	6.4	mA
V_{IN}	Video Input Voltage Range	Referenced to GND		1.2		V_{pp}
Vols	Output Level Shift(1)	V_{IN} = 0V	50	200	350	mV
PSRR	Vols over power supply	V_{CC} = 2.7V to 3.3V		40		dB
I_{SH}	Shut Down Current			25		nA
V_{il}	Disabled Logic Low(1)		0		0.8	V
V_{ih}	Enabled Logic High(1)		V_{CC}*0.6		V_{CC}	V
t_{ON}	Enable Time			1.5		µs
t_{OFF}	Disable Time			50		ns

AC Electrical Characteristics

T_A = 25°C, V_{CC} = 2.7V, R_s = 37.5Ω, AC-coupled output into 150Ω load, SAG pin connected to V_{OUT} pin, unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
A_V	Gain(1)	DC	6.0	6.2	6.4	dB
f_{1dB}	-1dB Bandwidth(1)		5.0	6.7		MHz
f_c	-3dB Bandwidth			8		MHz
f_{SB}	Attenuation(1) (Stopband Reject)	27MHz	40	47		dB
DG	Differential Gain			0.5		%
DP	Differential Phase			0.5		°
SNR	Signal-to-Noise Ratio	NTC-7 Weighting, 100kHz to 4.2MHz		78		dB

Note:
1. 100% tested at 25°C.

Typical Performance Characteristics

T_A = 25°C, V_{CC} = 2.7V, R_s = 37.5Ω, AC-coupled output into 150Ω load, SAG pin connected to V_{OUT} pin, unless otherwise noted.

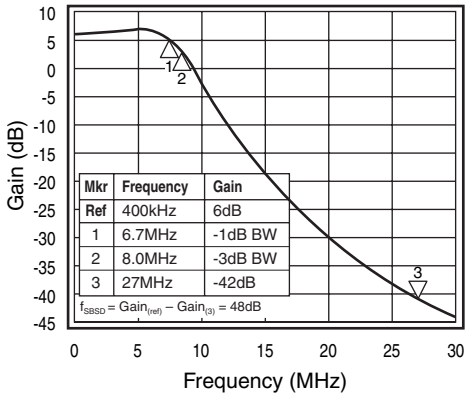


Figure 3. Frequency Response

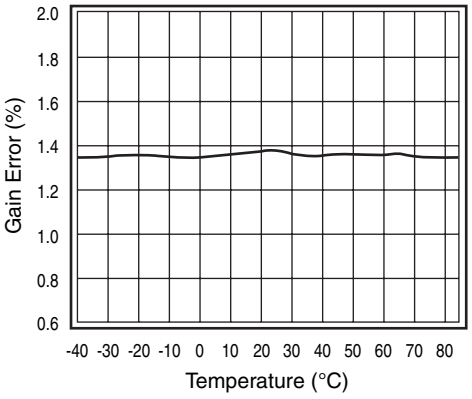


Figure 4. Gain Error vs. Temperature

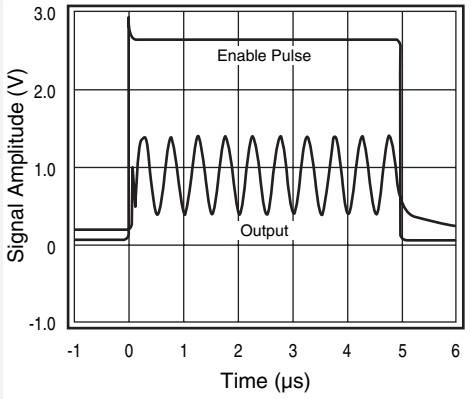


Figure 5. Enable/Disable Response

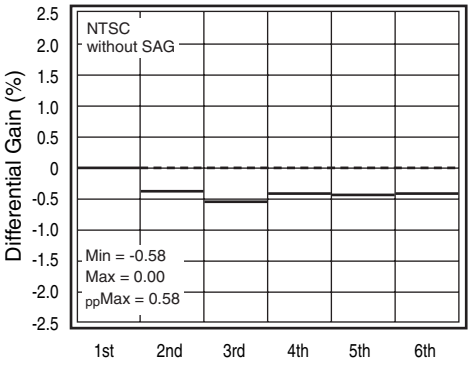


Figure 6. Differential Gain

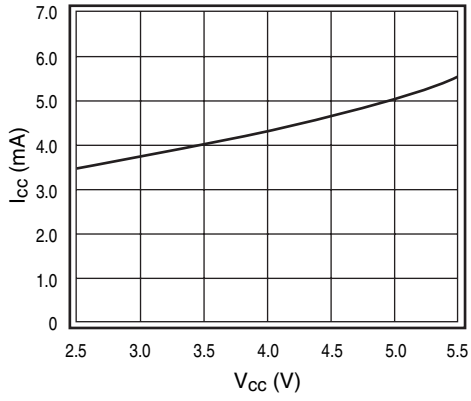


Figure 7. I_{CC} vs. Supply Voltage

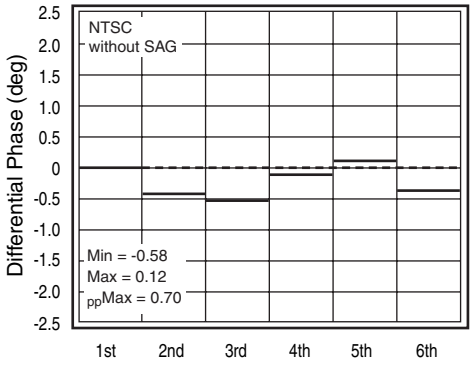


Figure 8. Differential Phase

Typical Performance Characteristics

T_A = 25°C, V_{CC} = 2.7V, R_s = 37.5Ω, AC-coupled output into 150Ω load, SAG pin connected to V_{OUT} pin, unless otherwise noted.

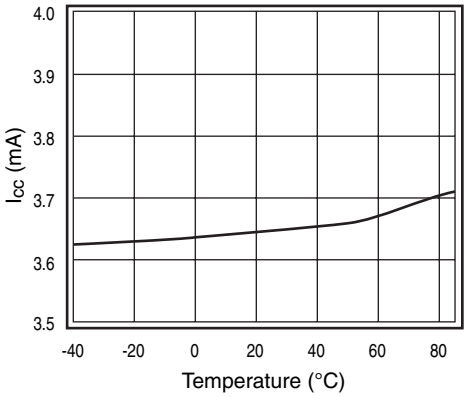


Figure 9. Supply Current vs. Temperature

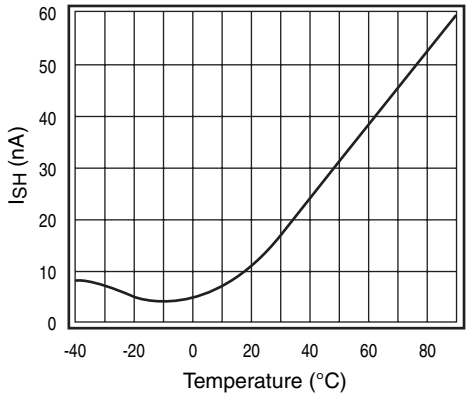


Figure 10. Shutdown Current vs. Temperature

Application Information

Input Voltage

The FMS6151 is intended to be directly driven by a DC-coupled DAC output. The input common-mode range of the FMS6151 is $1.2V_{pp}$, ground referenced.

Enable/Shutdown

The FMS6151 has a shutdown feature that disables the output and reduces the quiescent current to ~25nA. This feature is especially useful in portable applications, such as cellular phones, hand held gaming devices, and video cameras requiring video filtering and drive capability.

Internal Level Shift

The FMS6151 has an internal level-shift circuit to avoid sync tip clipping. The output signal is shifted 200mV toward the V_{CC} rail to help prevent clipping. This offset is useful when DC coupled out or using SAG correction.

SAG Correction

SAG correction provides excellent performance with a small output coupling capacitor. It eliminates the 220µF - 1000µF output coupling capacitors traditionally used. The traditional output circuit (220µF into 150Ω load) creates a single pole (-3dB) at 5Hz. Reducing this capacitor causes excessive phase shift, resulting in video field tilt that can prevent proper recovery of the synchronization signals.

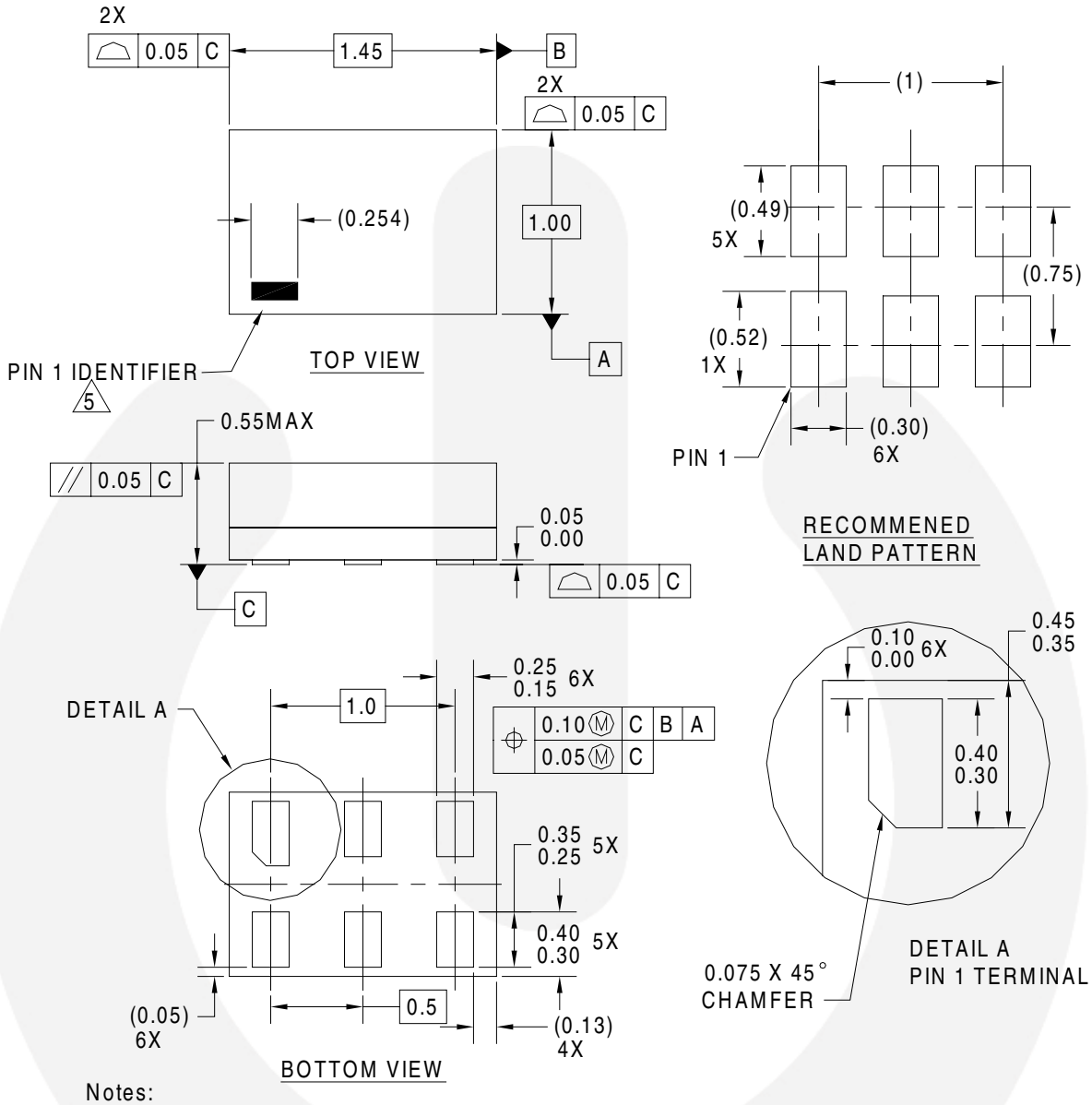
The FMS6151 SAG correction circuit provides a small amount of peaking, which provides compensation of the phase response, significantly reducing video field tilt. The SAG correction circuit allows decrease of the large 220µF output coupling capacitor. A 22µF is used for SAG correction and a 47µF is used for the output coupling capacitor; much smaller and cheaper than traditional circuit requirements.

Output Configuration

The FMS6151 output is a low-impedance voltage driver. It is capable of driving an AC- or DC-coupled single load.

For more application information, please refer to FMS6151 Application Note, AN-8005.

Physical Dimensions



Notes:

1. CONFORMS TO JEDEC STANDARD M0-252 VARIATION UAAD
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-1994
4. FILENAME AND REVISION: MAC06AREV4
5. PIN ONE IDENTIFIER IS 2X LENGTH OF ANY OTHER LINE IN THE MARK CODE LAYOUT.

Figure 11. 6-Lead MicroPak™ Package

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