FAIRCHILD SEMICONDUCTOR®

July 2007

FHP3392 — Fixed-Gain, ±5V, Triple 2:1, High-Speed Video Multiplexer

Features

- 0.1dB gain flatness to 102MHz at $2V_{PP}$
- 9ns channel switching time
- <0.02%/0.03° differential gain/phase error
- 750MHz large signal -3dB bandwidth
- 2,600V/µs slew rate
- 60mA output current (easily drives two video loads)
- 70dB channel to channel isolation
- 25mA supply current
- 7mA supply current when disabled
- Fully specified at ±5V supplies
- Lead-free TSSOP-24 package

Applications

- RGB video switchers and routers
- Multiple input HDTV switching
- Picture-in-picture video switch
- Multi-channel ADC Driver

Description

The FHP3392 (G=2) is a triple 2:1 analog multiplexer designed for high-speed video applications. The output amplifiers offer a fixed gain of 6dB and stellar large signal performance of 335MHz -3dB bandwidth and 80MHz 0.1dB bandwidth. The $2V_{PP}$ bandwidth performance and 1,600V/µs slew rate exceed the requirements of high-definition television (HDTV) and other multimedia applications. The output amplifier provides ample output current to drive multiple video loads.

The FHP3392 may be operated with dual power supplies from ±2.5V to ±6V.

The FHP3392 consumes only 25mA of supply current and offer disable capability. While disabled, it consumes only 7mA and the outputs become high impedance, allowing multiplexer expansion with multiple FHP3392s.

Ordering Information

Part Number	Pb-Free	Gain	Operating Temperature Range	Package	Packing Method
FHP3392IMTC24X	Yes	6dB	-40°C to +85°C	24-Lead,Thin Shrink Outline Package, JEDEC MO-153, 4.4mm Wide	Tape and Reel

Moisture sensitivity level for all parts is MSL-1.

Block Diagram and Pin Configuration

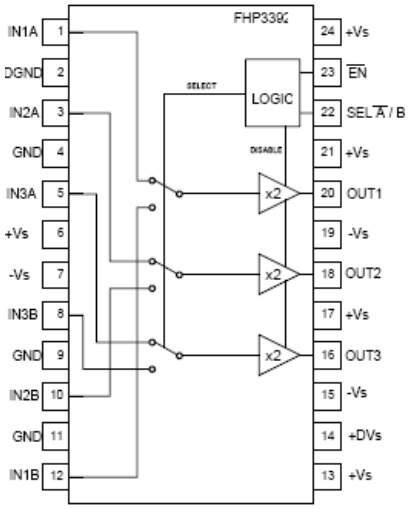


Figure 1. Block Diagram and Pin Configuration

Pin Definitions

Pin #	Name	Description
1	IN1A	1st Input Channel A
2	DGND	Digital Ground, must be connected to ground
3	IN2A	2nd Input Channel A
4	GND	Must be connected to ground
5	1N3A	3rd Input Channel A
6	+Vs	Positive supply
7	-Vs	Negative supply
8	IN3B	3rd Input Channel B
9	GND	Must be connected to ground
10	IN2B	2nd Input Channel B
11	GND	Must be connected to ground
12	IN1B	1st Input Channel B
13	$+V_S$	Positive supply
14	+DVs	Digital positive supply
15	$-V_S$	Negative supply
16	OUT3	3rd output
17	+Vs	Positive supply
18	OUT3	2nd output
19	$-V_S$	Negative supply
20	OUT1	1st Output
21	$+V_S$	Logic input; “0” = Channel A, “1” = Channel B
22	SEL $\overline{A}$/B	Enable pin; “0” = Enable, “1” = Disable; Enabled if left floating or grounded
23	$\overline{EN}$	Enable Pin: “0” = Channel A, “1” = Channel B
24	$+V_S$	Positive supply

Truth Table

SEL $\overline{A}$ / B	$\overline{EN}$	OUT
0	0	Channel A
1	0	Channel B
X	1	Disable

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.

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply Voltage	0	13.3	V
V_{IN}	Input Voltage Range	$-V_S - 0.5$	$+V_S + 0.5V$	V

Electrostatic Discharge Protection

Symbol	Parameter	Min.	Max.	Unit
ESD	Human Body Model (HBM)		3	kV
	Charged Device Model (CDM)		12	kV

Reliability Information

Symbol	Parameter	Min.	Typ.	Max.	Unit
T_J	Junction Temperature			150	°C
T_{STG}	Storage Temperature	-65		150	°C
T_{RF}	Reflow Temperature			260	°C
θ_{JA}	Thermal Resistance		87		°C/W

Note:

1. Thermal Resistance (θ_{JA}) JEDEC standard, multi-layer test boards, in still air.

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.

Symbol	Parameter	Min.	Typ.	Max.	Unit
T_A	Operating Temperature Range	-40		+85	°C
V_{CC}	Supply Voltage Range	±2.5	±5.0	±6.0	V

Electrical Characteristics at ±5V

T_A = 25°C, V_S = ± 5V, R_L = 150Ω; unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
Frequency Domain Response						
BW_{SS}	-3dB Bandwidth	V_{OUT} = 0.2V_{PP}		750		MHz
BW_{LS}	Large Signal Bandwidth	V_{OUT} = 2.0V_{PP}		560		MHz
$BW_{0.1dBSS}$	0.1dB Gain Flatness	V_{OUT} = 0.2V_{PP}		117		MHz
$BW_{0.1dBLS}$	0.1dB Gain Flatness	V_{OUT} = 2.0V_{PP}		102		MHz
Time Domain Response						
t_S	Settling Time to 0.1%	V_{OUT} = 2V step		4		ns
SR	Slew Rate	4V step		2600		V/µs
Distortion / Noise Response						
HD2	Second Harmonic Distortion	2V_{PP}, 5MHz		-85		dBc
HD3	Third Harmonic Distortion	2V_{PP}, 5MHz		-90		dBc
THD	Total Harmonic Distortion	2V_{PP}, 5MHz		-84		dB
		2V_{PP}, 22MHz		-72		dB
DG	Differential Gain	NTSC (3.58MHz)		0.04		%
DP	Differential Phase	NTSC (3.58MHz)		0.01		°
e_n	Input Voltage Noise	>1MHz		6.75		nV/Hz
i_n	Input Current Noise	>1MHz		22		pA/Hz
SNR	Signal-to-Noise Ratio	NTC-7 weighting, 4.2MHz LP filter, 100kHz PH filter		90		dB
X_{talk}	All Hostile Crosstalk	V_{OUT} = 2V_{PP}, ch-to-ch, 5MHz		-59		dB
		V_{OUT} = 2V_{PP}, ch-to-ch, 30MHz		-56		
DC Performance						
V_{OS}	Output Offset Voltage[2]	V_{IN} = 0	-18	2	18	mV
I_b	Input Bias Current[2]		-30	4	30	µA
G	Gain[2]	DC	1.9	2.0	2.1	V/V
GM	Gain Matching	Channel-to-channel, DC		0.05		%
PSRR	Power Supply Rejection Ratio[2]	DC, V_{CM} = 0, input referred, SEL = X	54	62		dB
I_S	Supply Current[2]	No load, $\overline{EN}$ = 0		25	30	mA
I_{EN}	Disable Supply Current[2]	$\overline{EN}$ = 1		7	10	mA
Switching Characteristics						
T_S	Switching Time 50% Logic to:	Channel-to channel				
	90% Output (10% Output Setting)[3]	Ch A inputs = +0.5V Ch B inputs = -0.5V		17.3		ns
	99% Output (1% Output Setting)[3]	Ch A inputs = +0.5V Ch B inputs = -0.5V		36		ns
V_{SW}	Channel Switching Transient (Glitch)	All inputs grounded		34		mV_{PP}

Notes:

2. 100% tested at 25°.
3. EN pin is grounded, channel A inputs = 0.5V, channel B inputs = -0.5V. Switching time is the transition time from 50% of SEL input value (+2.5V) to the time at which the switched channel is at 90% (or 99%) of its final value.

Electrical Characteristics at ±5V (Continued)

T_A = 25°C, V_S = ± 5V, R_L = 150Ω; unless otherwise noted.

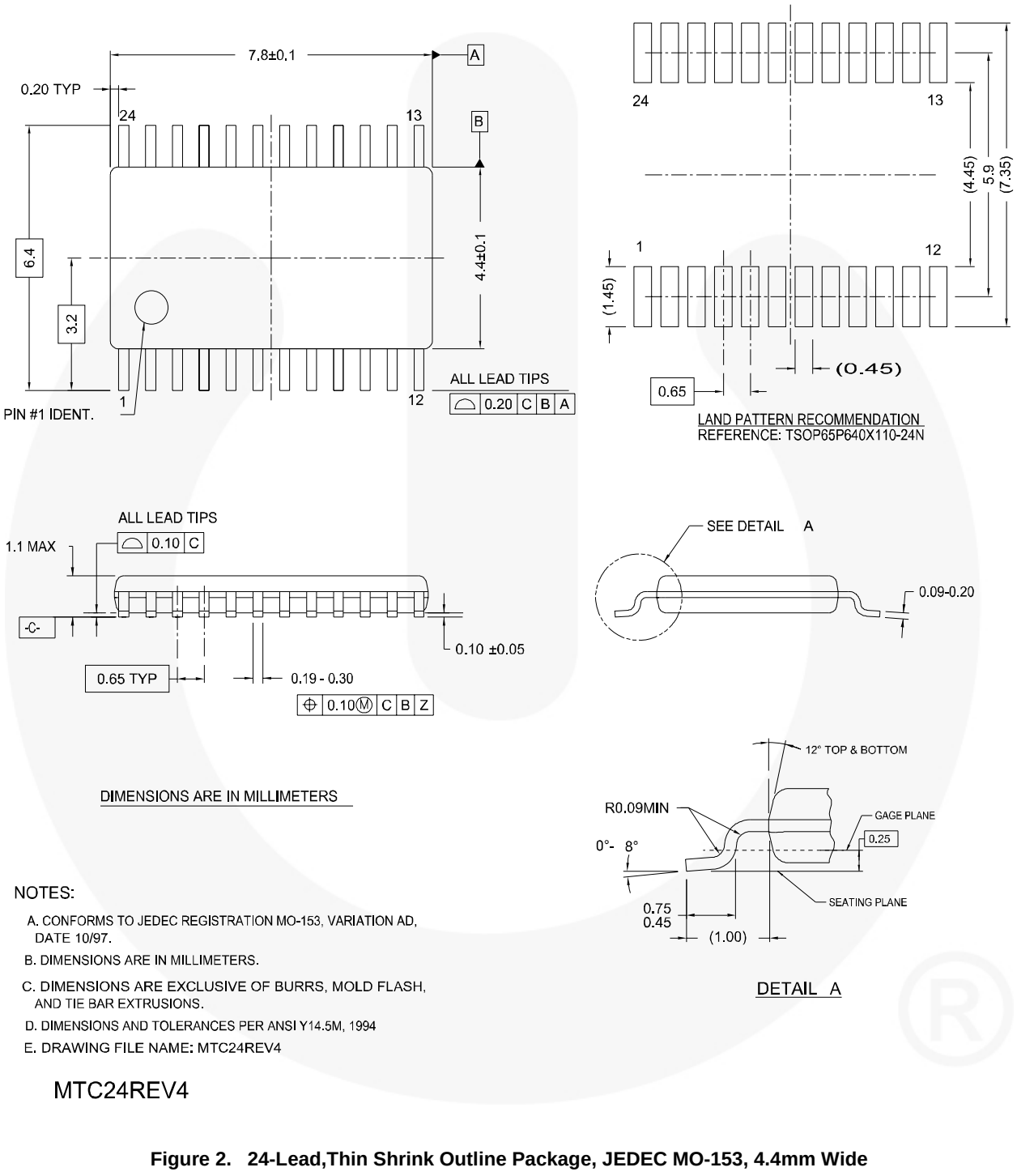
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
Digital Inputs						
V_{IH}	Logic HIGH Threshold	SEL and $\overline{EN}$ pins(4)	2.0			V
V_{IL}	Logic LOW Threshold	SEL and $\overline{EN}$ pins(4)			0.8	V
I_{IH}	Logic Pin Input Current HIGH	SEL and $\overline{EN}$ pins; Logic Input = 2V		27		µA
I_{IL}	Logic Pin Input Current LOW	SEL and $\overline{EN}$ pins; Logic Input = 0V		0		µA
Disable Characteristics						
EN_{ISO}	Disable Isolation	5MHz, V_{IN} = $1V_{PP}$, $\overline{EN}$ = 1		-81		dB
		30MHz, V_{IN} = $1V_{PP}$, $\overline{EN}$ = 1		-66		dB
CH_{ISO}	Channel-to-Channel Isolation	5MHz		-71		dB
ENT_{ON}	Turn-on-Time (Disable to ON)	V_{IN} = 0.5V		30		ns
ENT_{OFF}	Turn-off-Time (ON to Disable)	V_{IN} = 0.5V		65		ns
Input Characteristics						
R_{IN}	Input Resistance			115		kΩ
C_{IN}	Input Capacitance			10		pF
V_{IN}	Input Voltage Range			±2		V
Output Characteristics						
V_O	Output Voltage Swing	R_L = 2kΩ		±4		V
		R_L = 150Ω(4)	±3.2	±3.7		V
I_{OUT}	Linear Output Current			±95		mA
I_{SC}	Short Circuit Output Current	V_O = GND		±100		mA
R_{OUT}	Output Resistance, Closed Loop	Enabled, $\overline{EN}$ = 1, 100kHz		0.17		Ω
		Disabled, $\overline{EN}$ = 1, 100kHz		675		Ω
C_{OUT}	Output Capacitance	Disabled, $\overline{EN}$ = 1, 100kHz		2.7		pF

Note:

4. 100% tested at 25°.

Physical Dimensions

Dimensions are in millimeters unless otherwise noted.



NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AD, DATE 10/97.

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1994

E. DRAWING FILE NAME: MTC24REV4

MTC24REV4

Figure 2. 24-Lead,Thin Shrink Outline Package, JEDEC MO-153, 4.4mm Wide

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