Total Harmonic Distortion Analyzer
Data Sheet

Description

The MSTHDA is a single chip 1/6th octave-wide 5 harmonic Total Harmonic Distortion analyzer whose center frequencies are controlled by a single master clock. The center frequencies are set at the fundamental, second harmonic, third harmonic, fourth harmonic and fifth harmonic frequency. The sample to corner is 25:1 for the fifth-harmonic output and 125:1 at the fundamental output (Double Sampled). The fifth harmonic output is 3.4 MHz when clocked at 42.5 MHz (MSTHDA-1).

The MSTHDA includes two uncommitted op amps for adding additional fixed gain for microphone or other low level applications. A digitally programmable gain stage provides 0, 10 or 20 dB of gain. The PD pin selects power down, low power for ultrasonic applications and regular power for high frequency operation.

The MSTHDA is fabricated in 0.6 um CMOS process for low power consumption and operation from 3.0 to 5.5 VDC

Features

Selectable Power Modes as low as 2 mA (3V)
Power Down Mode to 400 uA
Operates from 3.0 V to 5.5 VDC
5 6 pole Bandpass filters in one package
Digitally controlled gain stage
Two Uncommitted Op Amps
No Microprocessor Needed

Applications

Multi-standard RFID Readers (MSTHDA-1)
Real-Time Distortion Analysis
Audio and Ultrasonic Analysis
Vibration Analysis

Absolute Maximum Ratings

Power Supply Voltage	+6V
Storage Temperature Range	-60 to +150°C
Operating Temperature Range	-45 to +85°C

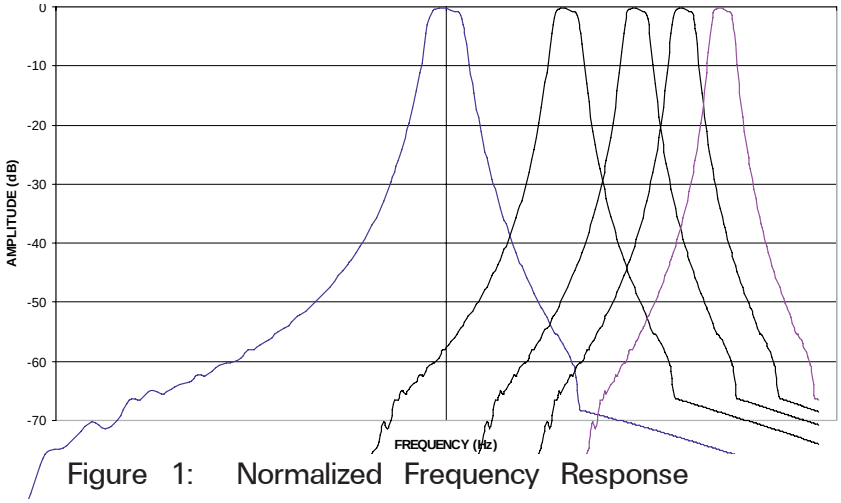

Figure 1: Normalized Frequency Response

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Electrical Characteristics

(VDD = +5.0V, T = 25 C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
DC Specifications						
Operating Voltage	VDD		3.3	5.0	5.5	V
Supply Current	IDD	PD=VDD RBias=100k		110		mA
Supply Current	IDD	PD=VDD		15		mA
Supply Current	IDD	PD=VDD/2		5		mA
Powerdown Current	IDD_{PD}	PD=VSS		400		µA
Input Impedance	RI			10		MΩ
Output Impedance	RO			500		Ω
Supply Current	IDD	PD=1/2*VDD VDD=3.3V	0.5	1.0	2.0	mA
AC Specifications						
-40 dB Bandwidth			0.76		1.32	Hz/Hz
Maximum Center Frequency		Output 5 PD=VDD/2V		1		MHz
Maximum Center Frequency		Output 5 PD=5V		2		MHz
Bandpass Q	Q			9.0		
Output Capacitive Load					20	pF
Output Signal Swing		RL = 10 MΩ		4.0		Vpp
Noise	e_n	To 1/2 Sample		180		µVrms
Clock to Corner Filter 1		Sample Rate is 2x Clock		62.5		Hz/Hz
Clock to Corner Filter 2		Sample Rate is 2x Clock		31.25		Hz/Hz
Clock to Corner Filter 3		Sample Rate is 2x Clock		20.83		Hz/Hz
Clock to Corner Filter 4		Sample Rate is 2x Clock		15.625		Hz/Hz
Clock to Corner Filter 5		Sample rate is 2x Clock		12.5		Hz/Hz
Gain	A_V		-0.5	0.0	0.5	dB
Output Offset Voltage	VOS	V_{IN} = 1 Vrms		50		mV
Distortion	THD			-71		dB

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Block Diagram

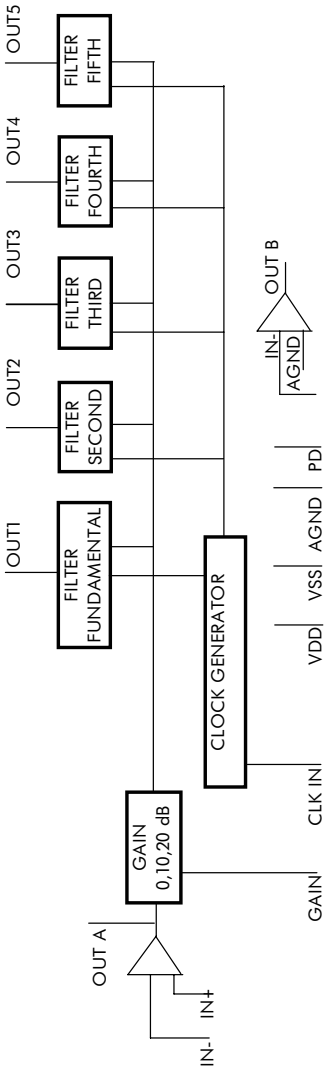

Figure 2: MSTHDA BLOCK DIAGRAM

Pin Description

1. INB Inverting Uncommitted Op Amp Input B
2. OUTA Op Amp Output A
3. INA Inverting Op Amp Input A
4. BIAS Bias Input on MSTHD-1
   IPA Noninverting Op Amp Input A MSTHD
5. AGND Connect to 1/2 VDD
6. CLK CMOS Clock adjusts position of bandpass filter outputs.
7. VSS Negative Supply; Tie to 0VDC
8. GAIN Tertiary Control: 0V, 0 dB,
   1/2 VDD 10 dB
   VDD 20 dB
9. PD Power Down; When CMOS high, device is powered down.
10. OUT1 Fundamental Filter Output
11. OUT2 Second Harmonic Filter Output
12. OUT3 Third Harmonic Filter Output
13. OUT4 Fourth Harmonic Filter Output
14. OUT5 Fifth Harmonic Filter Output
15. VDD Positive Supply Typically 5.0 VDC
16. OUTB Uncommitted Op Amp B Output.

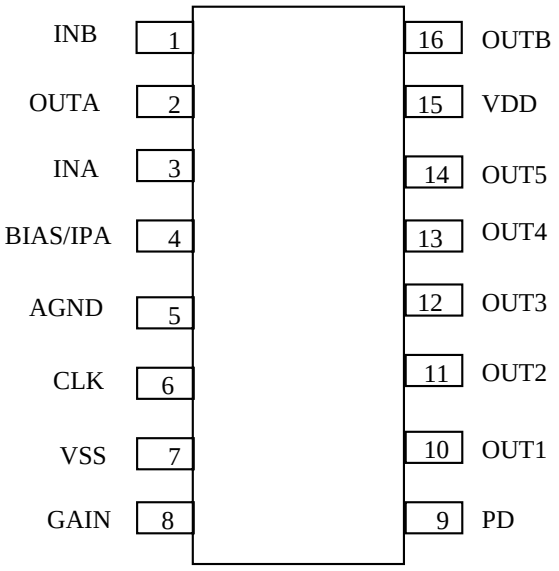

Figure 3: MSTHDA/MSTHDA-1 Pinout

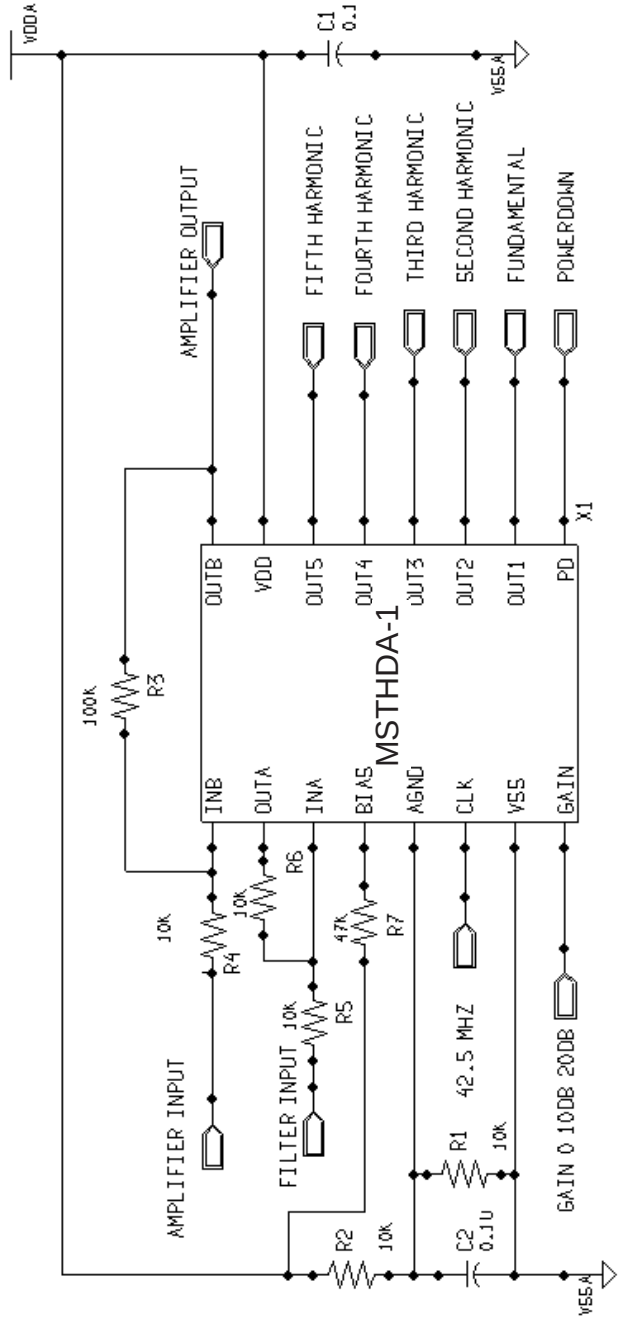

Figure 4: MSTHDA-1 Application Schematic (RFID Reader)

MSTHDA

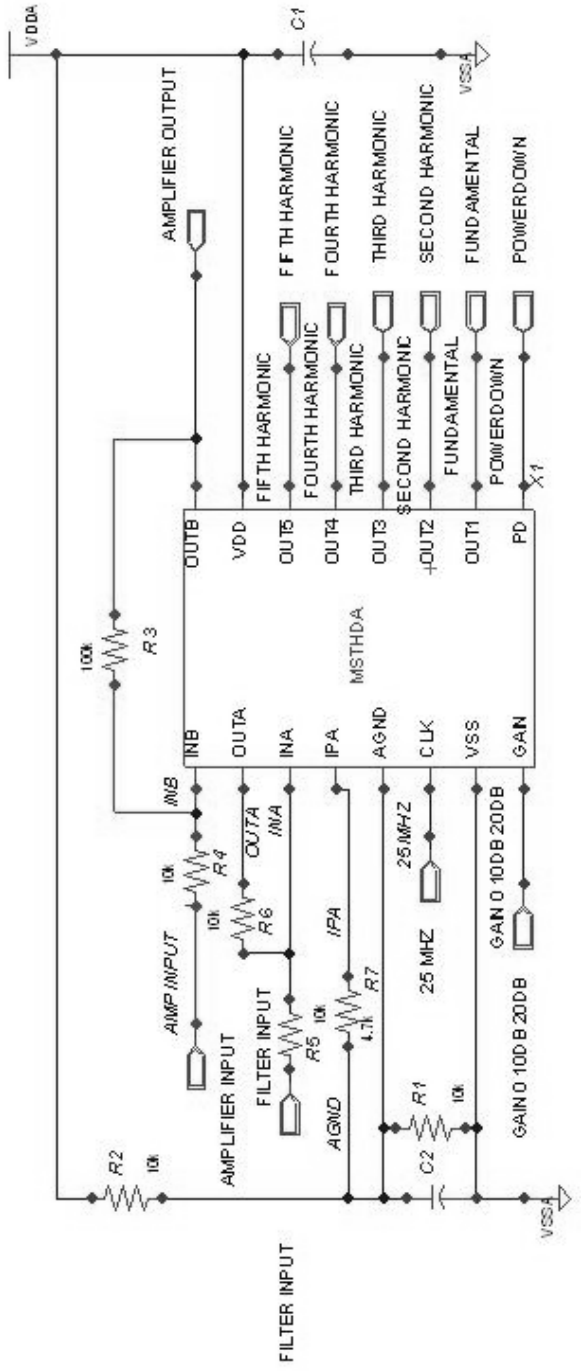

Figure 5: MSTHDA Application Schematic

STANDARD PRODUCTS

MSGEQ5A	Five Band Graphic Equalizer
MSGEQ7	Seven Band Graphic Equalizer
MSHFS1-6	Selectable High Frequency LP/BP Filter
MSFS1-6	Selectable Lowpass/Bandpass Filter
MSCAHF	Selectable High Frequency Active Lowpass/Bandpass Filter
MSU1F1-4, MSU2F1	Resistor Programmable Universal Active Filter
MSU1HF1-4, MSU2HF1	High Frequency Resistor Programmable Universal Active Filter
MSELP	Switched Capacitor Elliptic Lowpass Filter with Op Amps
MSNBLP	Switched Capacitor Butterworth Lowpass Filter
MSLE/B/C5L/M	Switched Capacitor General Purpose Lowpass Filter
MS2LFS	Dual Selectable Low Voltage Lowpass/Bandpass Filter
MSLFS	Selectable Low Voltage Lowpass/Bandpass Filter
MSHN1-6	Selectable High Pass/Notch Filter
MSRAAF	Resistor Programmable Active Audio Filter
MSRAHF	Resistor Programmable Active High Frequency Filter
MSDET	Tone Detector
MSEPAF	Electrically Programmable Active Filter
MSCBT	Communications Baseband Transceiver
MSLV14	14 MHz Video Lowpass Filter
MSSPSI	Smart Programmable Sensor Interface
MSCPSI	Computer Programmable Sensor Interface
MSTHDA	Total Harmonic Distortion Analyzer
MSSCSA	Single Chip Spectrum Analyzer
MSFIPS	FIP-140 Level 4+ Security Supervisor
MSLSA	Low Power Single Chip Spectrum Analyzer
MSRFIF	Radio Frequency Interface Front-End

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