

## Low Power Spectrum Analyzer Preliminary Data Sheet

### Description

The MSLSA is a single chip 1/6<sup>th</sup> octave 6 band spectrum analyzer whose center frequencies are controlled by a single master clock. The center frequencies are set at 1.12246, 1.2599, 1.4142, 1.5874, 1.78179 and 2 (normalized). The sample to corner is 100:1 for the 2 Hz normalized output and 178.16:1 at the 1.122 Hz normalized output. The MSLSA's 1.12246 Hz output is 55.1 kHz (Clock at 5 MHz). Multiple MSLSA can be connected for spectrum analysis by taking the master clock of the high frequency filter and dividing by 2.

The MSLSA 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 operation at 2 MHz center frequency.

The MSLSA 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
- Regular Power Consumption: 5 mA at +5V
- Low Power Consumption: 2 mA at +5VDC
- Powerdown Mode
- Operates from 3.0 V to 5.5 VDC
- 6 Six pole Bandpass filters in one package
- Digitally controlled gain stage
- Two Uncommitted Op Amps
- No Microprocessor Needed

### Applications

- Real-Time Spectrum Analysis
- Audio and Ultrasonic Analysis
- Vibration Analysis

MSLSA

### Absolute Maximum Ratings

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

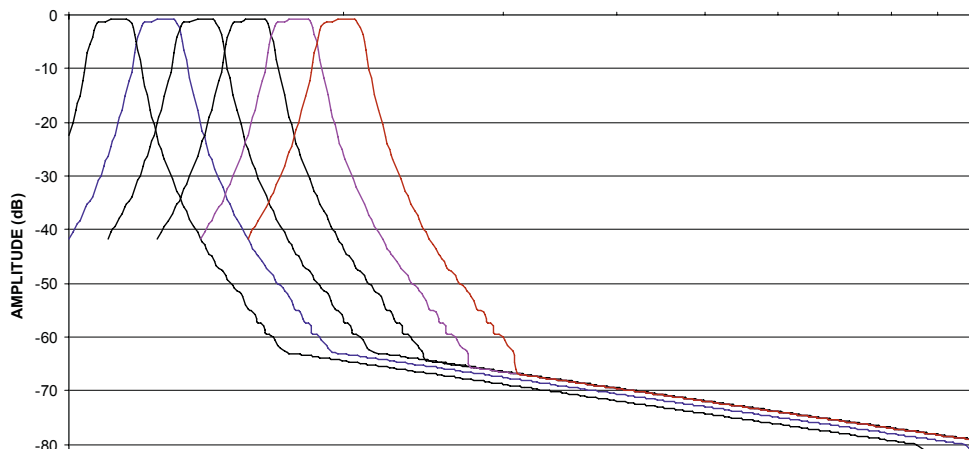


Figure 1: Normalized Frequency Response

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### Electrical Characteristics \_\_\_\_\_

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

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PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>DC Specifications</b>						
Operating Voltage	VDD		3.0	5.0	5.5	V
Supply Current	IDD	PD=0V	2			mA
Output Current	IO	RL = 100 KΩ	1.0			mA
Supply Current	IDD	PD=0.5VDD	5			mA
Output Current	IO	RL = 100 KΩ	1.0			mA
Power Down Current	I <sub>PD</sub>	PD=VDD	400			μA
<b>AC Specifications</b>						
Output Impedance	Z <sub>o</sub>		500			Ω
Clock to Corner Ratio	fclk/fcncr	Filter 1	89.08			Hz/Hz
Clock to Corner Ratio	fclk/fcncr	Filter 2	79.36			Hz/Hz
Clock to Corner Ratio	fclk/fcncr	Filter 3	70.62			Hz/Hz
Clock to Corner Ratio	fclk/fcncr	Filter 4	63			Hz/Hz
Clock to Corner Ratio	fclk/fcncr	Filter 5	56.12			Hz/Hz
Clock to Corner Ratio	fclk/fcncr	Filter 6	50			Hz/Hz
Maximum Center Frequency	fcenter	Filter 6 Output	2			MHz
Maximum Center Frequency	fcenter	Filter 6 PD=1/2 VDD	0.1			MHz
Ripple			0.2			dB
Input Offset Voltage	VOS		3.3			mV
40 dB Bandwidth		Normalized Fo	0.76		1.32	
Filter Q	Q		9			
Unity Gain Bandwidth	BW	PD=1/2 VDD	6			MHz

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## Block Diagram

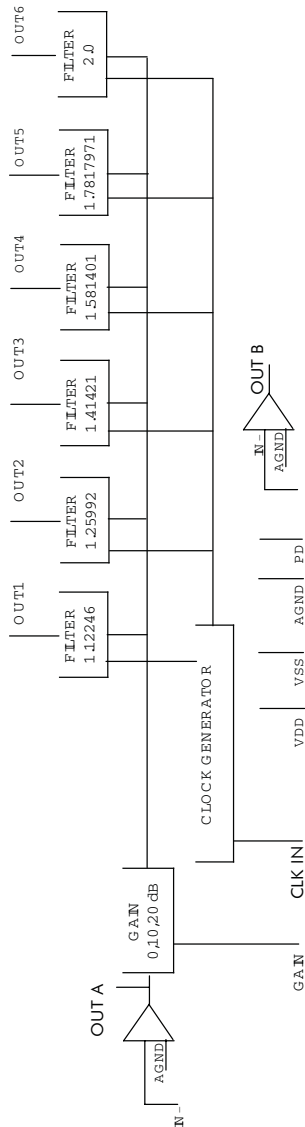


Figure 2: MSLSA BLOCK DIAGRAM

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## Low Power Spectrum Analyzer Preliminary Data Sheet

### Pin Description

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>1. INB Inverting Uncommitted Op Amp Input B</li> <li>2. OUTA Op Amp Output A</li> <li>3. INA Inverting Op Amp Input A</li> <li>4. AGND Connect to 1/2 VDD</li> <li>5. CLK CMOS Level Selects position of bandpass filter outputs</li> <li>6. VSS Negative Supply; Tie to OVDC</li> <li>7. GAIN Tertiary Control: 0V, 0 dB, 1/2 VDD 10 dB, VDD 20 dB</li> <li>8. PD Power Down; When CMOS high, device is powered down.</li> </ol> | <p style="text-align: right; margin-right: 20px;">1/2 VDD selects regular power<br/>VSS selects low power</p> <ol style="list-style-type: none"> <li>9. OUT1 1.12X Filter Output</li> <li>10. OUT2 1.26X Filter Output</li> <li>11. OUT3 1.41X Filter Output</li> <li>12. OUT4 1.59X Filter Output</li> <li>13. OUT5 1.78X Filter Output</li> <li>14. OUT6 2X Octave Filter Output</li> <li>15. VDD Positive Supply Typically 5.0 VDC</li> <li>16. OUTB Uncommitted Op Amp B Output.</li> </ol> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

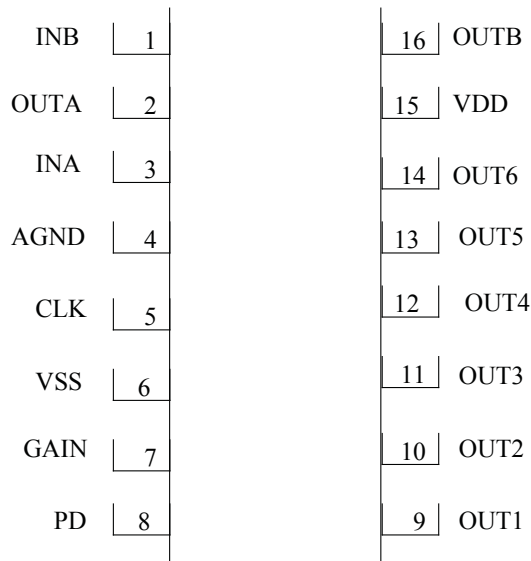
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Figure 3: MSLSA Pinout

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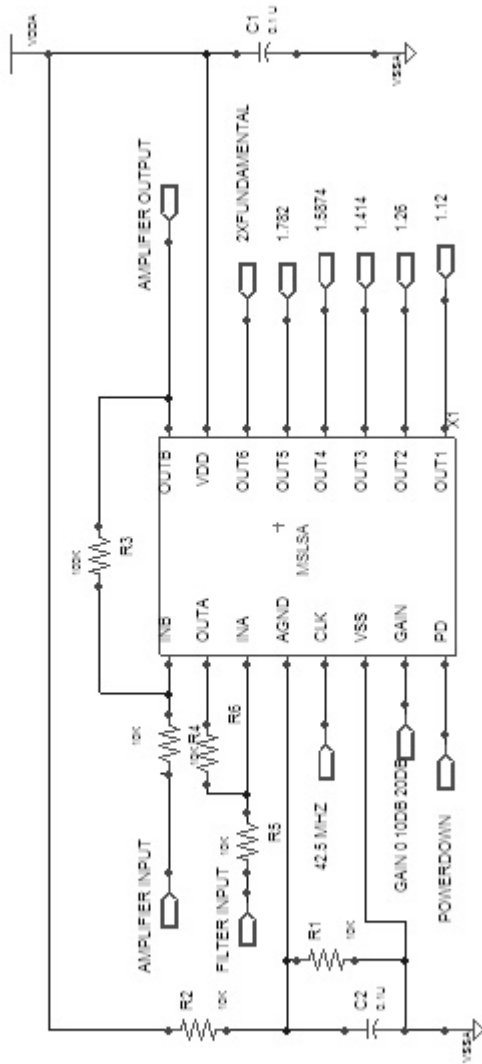


Figure 4: MSLSA Application Schematic

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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
MSCPSI	Computer Programmable Sensor Interface
MSSPSI	Smart Programmable Sensor Interface
MSRFIF	Radio Frequency Interface Front End

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