Seven Band Graphic Equalizer Data Sheet

MSGEQ7

Description

The seven band graphic equalizer IC is a CMOS chip that divides the audio spectrum into seven bands, 63Hz, 160Hz, 400Hz, 1kHz, 2.5kHz, 6.25kHz and 16kHz. The seven frequencies are peak detected and multiplexed to the output to provide a DC representation of the amplitude of each band. No external components are needed to select the filter responses. Only an off chip resistor and capacitor are needed to select the on chip clock oscillator frequency. The filter center frequencies track this frequency.

Other than coupling and decoupling capacitors, no other external components are needed. The chip supply can be between 2.7 and 5.5 volts with 5 volts providing the best performance. The device has very low quiescent current (less than 1mA typical) for portable audio devices. The multiplexor is controlled by a reset and a strobe, permitting multiplexor readout with only two pins. The multiplexor readout rate also controls the decay time (10% decay per read), so no external pins are needed for this function.

Features

Low Power Consumption
Only Two External Components
On Chip Ground Reference
Switched - Capacitor Filters
3.3 or 5 volt Operation
20 dB of Gain Typical
On Chip Oscillator
Output Multiplexor
Variable Decay Time
8 Pin Package

Applications

Portable Stereos
Car Stereos
Hi-Fi Stereos
Spectrum Analyzers

Absolute Maximum Ratings

Power Supply Voltage	+6V
Storage Temperature	-60 to + 150 C
Operating Temperature	0 to 70 C

Frequency Response
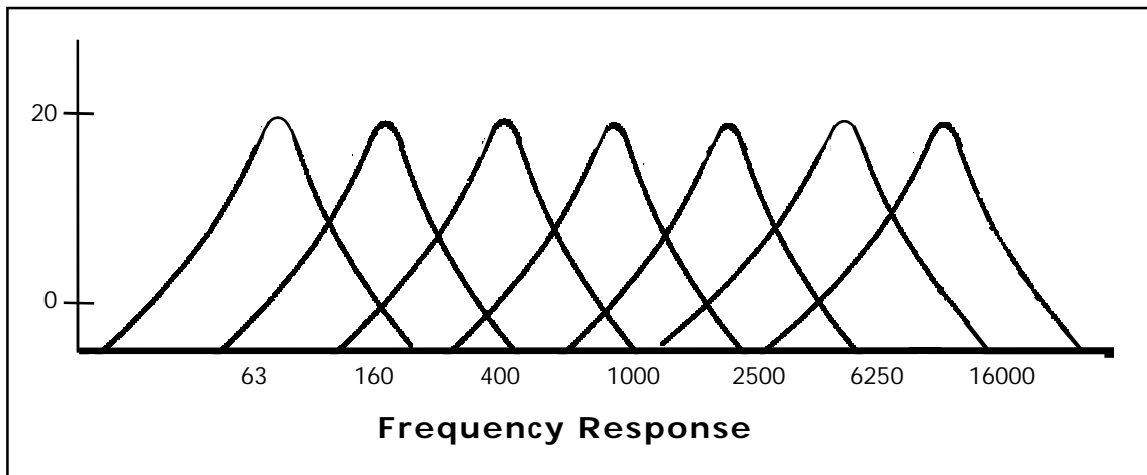
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Electrical Characteristics_____
(VDD = +5.0V, T = 25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
DC Specifications						
Operating Voltage	VDD		2.7	5.0	5.5	V
Supply Current	IDD	1 Mohm Load on Output	0.5	0.8	1.0	mA
Output Drive	IO			1		mA
Output Impedance	ZO			700		ohms
Output Offset	VOS				600	mV
Band Offset Difference		Same device			200	mV
AC Specifications						
Gain	AV	Peak input to DC output, Vin = 100 mVpp, fin = 1 kHz	20	22	24	dB
Filter Q	Q		5.5	6.0	6.5	
Output Swing		Vin = 0.3Vpp, fin = 1 kHz	3.5	4		V
Clock Frequency	FCLK	C = 33 pF*, R = 200 kohms	145	165	180	kHz
Input Impedance	ZIN		1			Mohm

* includes stray capacitance

MSGEQ7

Ordering Information_____

Part Number	Package	Operating Temperature
MSGEQ7P	8 Pin Dip	0-70 ^{o}C
MSGEQ7N	8 Pin 150 mils SOIC	0-70 ^{o}C

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Pin Description_____

1. VDD   Positive Power Supply
              Typically 5 Volts
2. VSS   Negative Power Supply
              Typically 0 Volts
3. OUT   Multiplexed DC Output
4. STROBE   Channel Selection Pin
5. IN   Audio Input
6. GND   Internally Generated Ground
              Reference.Typically 2.5V
7. RESET   Resets Multiplexor
8. CKIN   Clock Oscillator Pin

Pin Configuration_____
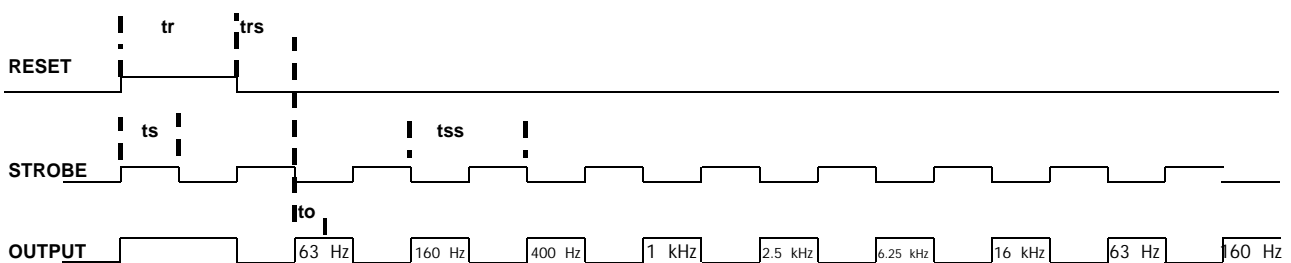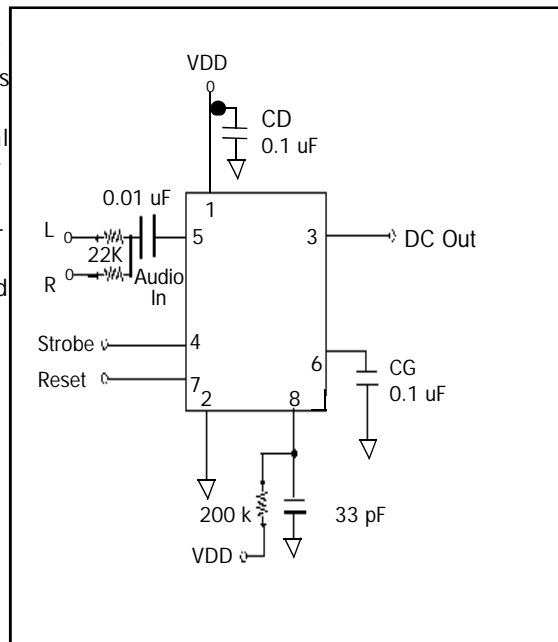
MSGEQ7

VDDA	1	8	CKIN
VSSA	2	7	RESET
OUT	3	6	GND
STROBE	4	5	IN
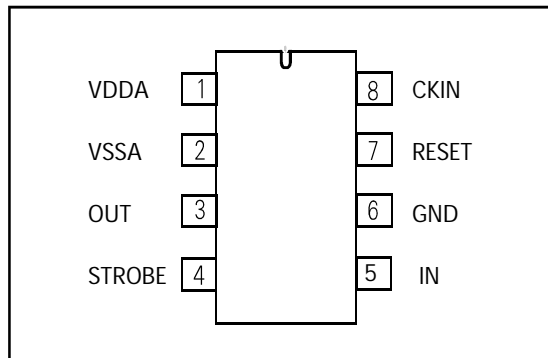
Block Diagram_____
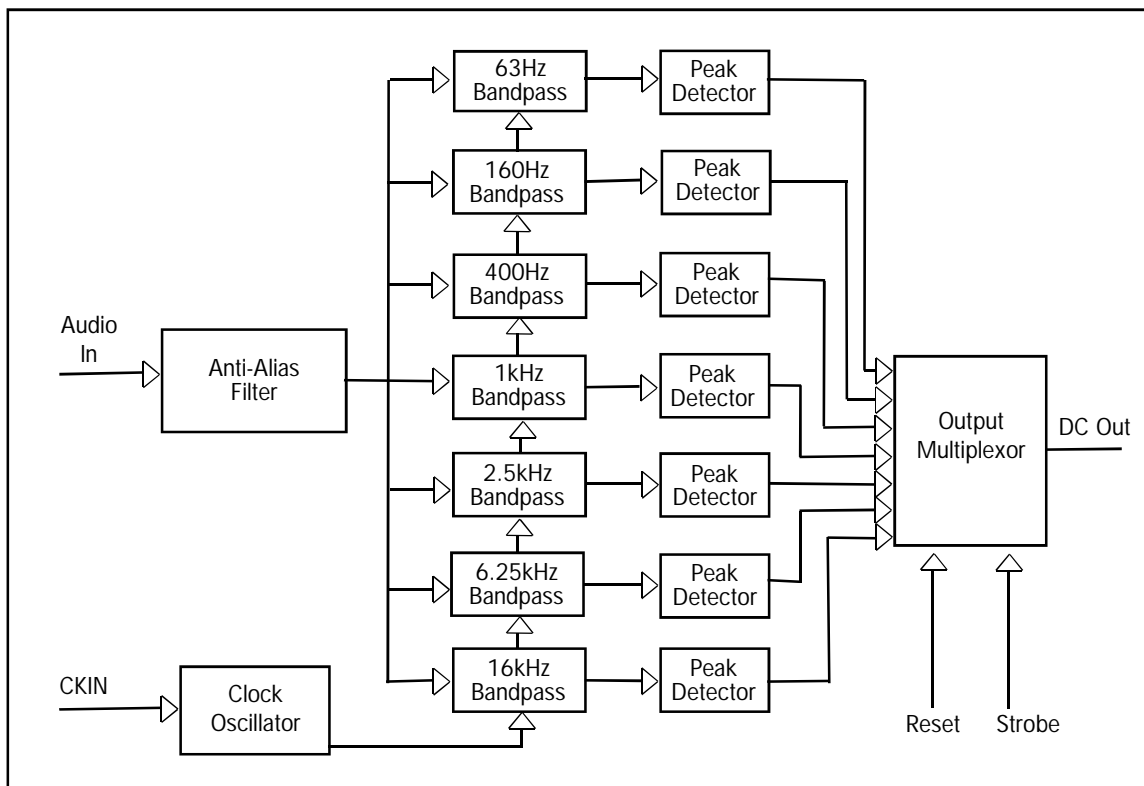
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Multiplexor Operation ———— Typical Application _____

The DC peak output for measurement is se-
lected using the reset and strobe pins. Reset
high resets the multiplexor. Reset low enables
the strobe pin. After the first strobe leading
edge, 63Hz output is on OUT. Each additional
strobe leading edge advances the multiplexor
one channel (63Hz, 160Hz, 400Hz, 1kHz,
2.5kHz, 6.25kHz, 16kHz etc.) and this will re-
peat indefinitely. The multiplexor read rate is
also the output decay time control. Each read
decays that channel approximately 10%. The
strobe timing is shown below:

MSGEQ7

VDD

CD
0.1 uF

0.01 uF

L ○ 22K

R ○ Audio
In

1
5
3 → DC Out

Strobe ○ 4
Reset ○ 7
2   8

6 CG
0.1 uF

200 k   33 pF

VDD ○

tr   trs

RESET

ts   tss

STROBE

to

OUTPUT | 63 Hz | 160 Hz | 400 Hz | 1 kHz | 2.5 kHz | 6.25 kHz | 16 kHz | 63 Hz | 160 Hz

tr - Reset Pulse Width		100 nS min
trs - Reset to Strobe	**Delay**	72 uS min
ts - Strobe Pulse Width		18 uS min
tss - Strobe to Strobe	**Delay**	72 uS min
to - Output Settling Time		36 uS min (with Cload = 22 pF and Rload = 1 Mohm)

Strobe Timing Diagram

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