6/2014

Tone Detector
Data Sheet

MSDET

Description

The Mixed Signal Integration Tone Detector (MSDET) is a monolithic CMOS integrated circuit for pre-processing analog signals before microcontroller operations. The MSDET contains an I and Q detector driven by a voltage controlled oscillator. The center frequency of the tone detection is one-half of the VCO frequency. Center frequencies from 1 Hz to 100 kHz can be detected, and FSK decoded. The MSDET is an analog PLL with the improved noise immunity inherent in such a design.

By using the MSDET to demodulate and detect FSK or tones a slower, lower cost microcontroller can be used. The reduction in microcontroller clock rate also reduces the problems with RF emissions for FCC and CE approvals. The MSDET operates with a supply voltage from 2.7 VDC to 5.5 VDC

The MSDET is superior to the industry standard 567 tone decoder in that more filtering can be added in the detection loop and output filter.

The MSDET is available in a 16-pin SOIC (150 mil wide). Industrial temperature range (-40 to +85^{o}C) is available.

Features

Low Power Consumption:
Less than 2.0 mW at 2.7V
Analog PLL for improved noise immunity

Applications

Satellite radio communications
Standard and non-standard tone detection
Standard and non-standard FSK demodulation
Caller ID demodulation
Bell 103, 202 or ITU V.21, V.23 demodulation

Absolute Maximum Ratings

Power Supply Voltage	+6 V
Storage Temperature Range	-60^{o} to +150^{o} C
Operating Temperature Range	-40^{o} to +85^{o} C

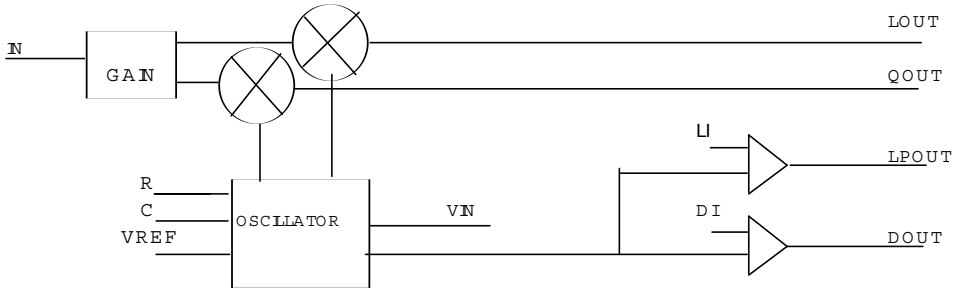


Figure 1 Block Diagram

Electrical Characteristics

(VDD = 5.0V, T = 25° C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
DC Specifications						
Operating Voltage	VDD		2.7		5.5	V
Supply Current	IDD		0.2	0.6	2.0	mA
Digital Outputs levels			0.5	VDD-0.5		VDC
Internal Voltage Reference	VREF		1.21	VDD·0.5		VDC
AC Specifications						
Input Tone Voltage			10	50	1000	mVp-p
FSK Input Impedance			10	24		kohms
VCO Minimum Frequency		R = 100 kohms C = 22 uF	1			Hz
VCO Maximum Frequency		R = 10 kohms C= 470 pF		90		kHz
VCO Loop Gain				8		Radians/Sec/V
Phase Comparator Gain				2		V/Radians

MSDET

Principles of Operation

The VCO in the MSDET oscillates at twice the detected frequency. The formula used for the tone detection is:

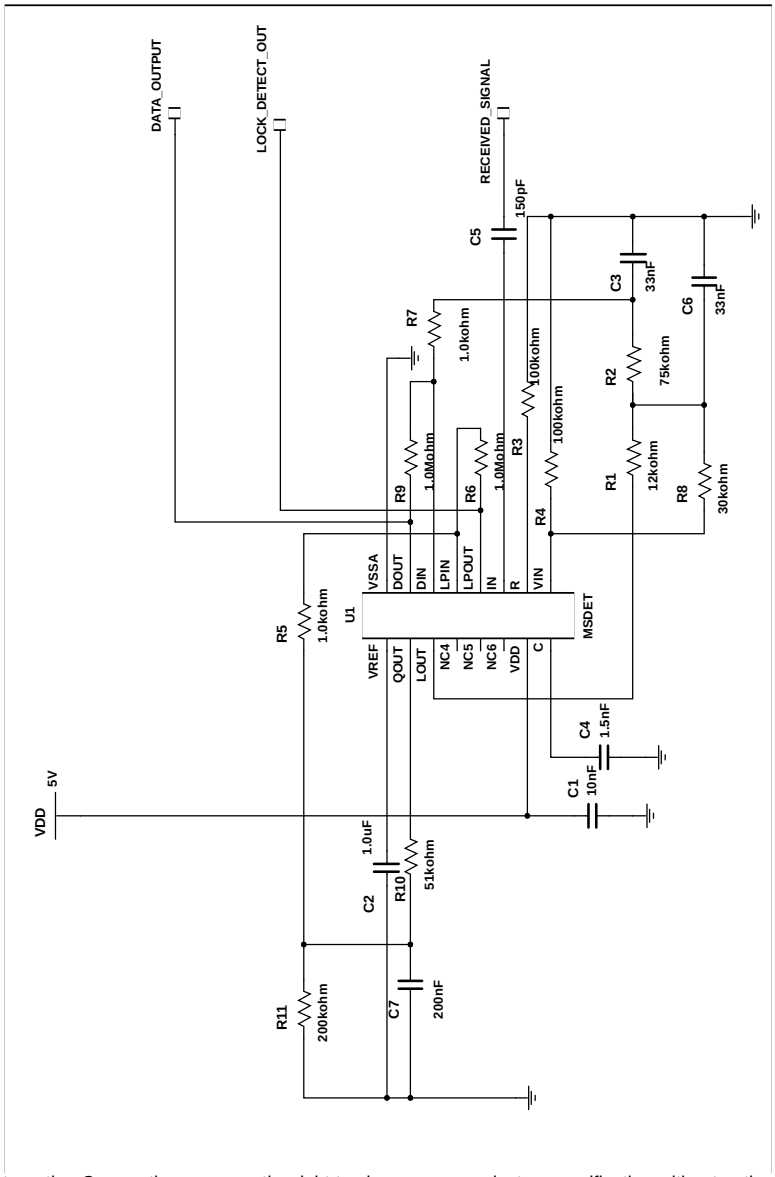
$f_{VCO} = 1/(3.35 \cdot R \cdot C)$

Internal flip-flops generate the quadrature clock needed for both FSK detection and coherent carrier detect. This is fed to two phase comparators. The QOUT of the MSDET is filtered and tied to VIN to close the loop and allow the phase error to control the VCO frequency.

With all analog PLLs there is a tendency to lock to third-harmonic of the desired tone. By using external filters and coupling capacitors, this characteristic can be minimized. The application schematic of the MSDET shows a low-value input coupling capacitor applying received signals to the input gain stage. This reduces sub-harmonic lock.

VREF	1	16	VSS
QOUT	2	15	DOUT
LOUT	3	14	DIN
NC4	4	13	LPIN
NC5	5	12	LPOUT
NC6	6	11	IN
VDD	7	10	R
C	8	9	VIN

Tone Detector
Data Sheet



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

Mixed Signal Integration
2157-50 O'Toole Avenue
San Jose, California 95131-1332
Phone: (408)-434-6305
Fax: (408)-434-6417

In Mississippi, Alabama, Georgia South Carolina, North Carolina, and Tennessee contact:

Adeptronics
9694 Madison Boulevard Suite A-14
Madison, Alabama 35758
Telephone: 256-772-1922
Facsimile: 256-772-0323

In Arizona, Utah, Colorado, Montana, Wyoming, Idaho, New Mexico and southern Nevada contact:

Nelco Electronix
6970 S. Holly Circle
Englewood, CO 80112
Telephone: 720-493-9630
Facsimile: 720-493-9631

In Indiana, Kentucky, Ohio, Michigan, and western Pennsylvania contact:

CCR Electronics, Inc.
825 Woodfield Crossing Blvd
Suite 100
Indianapolis, Indiana 46240-2495
Telephone: 317-469-4855

In Taiwan contact:

Maxtek Technology Co., Ltd.
5F, No. 13-20, Sec. 6, Min Chian E Road, Nei Hu
Taipei, 114 R.O.C.
Telephone: 886-2-2794-6060
Facsimile: 886-2-2879-8922

In Hong Kong and the People's Republic of China contact:

Alphatron
2L, Cooke Street/F
G/F, Hung Hom
Kowloon Bay, Hong Kong
Telephone: 852-2303-1290
Facsimile: 852-2900-3616

In Korea contact:

H. B. Corp.
#1409, Seocho World Officetel,
1355-3, Seocho-Dong, Seocho-Ku,
Seoul, Korea 137-070
Telephone: (02)3472-3450
Facsimile: (02)3472-3458

In Singapore, Indonesia and Malaysia contact:

EXER Technologies (S) PTE LTD
45 Kaki Bukit Industrial Terrace
Singapore 416125
Telephone: (65)-6-747-9669
Facsimile: (65)-6-749-9669

In Israel contact:

Phoenix Technologies Ltd.
3 Gavish St.
Kfar-Saba, 44424
Isreal
Telephone: 09-764-4800
Facsimile: 09-764-4801

In the United Kingdom contact:

Electronics 2000 Ltd.
Grafton House
Grafton Street
High Wycombe
Bucks HP12 3AJ
Telephone:00-44-1494-444044
Facsimile: 00-44-1494-470499

Catch our web site at "http://www.mix-sig.com" Send us e-mail at "info@mix-sig.com"