



AMERICAN MICROSYSTEMS, INC.

WavePlex™ Wireless Products

# SX071, SX072 & SX073 70MHz Modulators/Oscillators

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## FEATURE SHEET

### Introduction

#### SX071

The SX071 provides a single-ended modulated or unmodulated 70MHz signal on the OUT pin.

#### SX072

The SX072 provides a differential modulated or unmodulated 70MHz signal in which the OUTB signal is 180 degrees out of phase of the OUT signal.

#### SX073

The SX073 provides a quadrature modulated or unmodulated 70MHz signal in which the OUTQ signal lags the OUT signal by 90 degrees.

### General Description

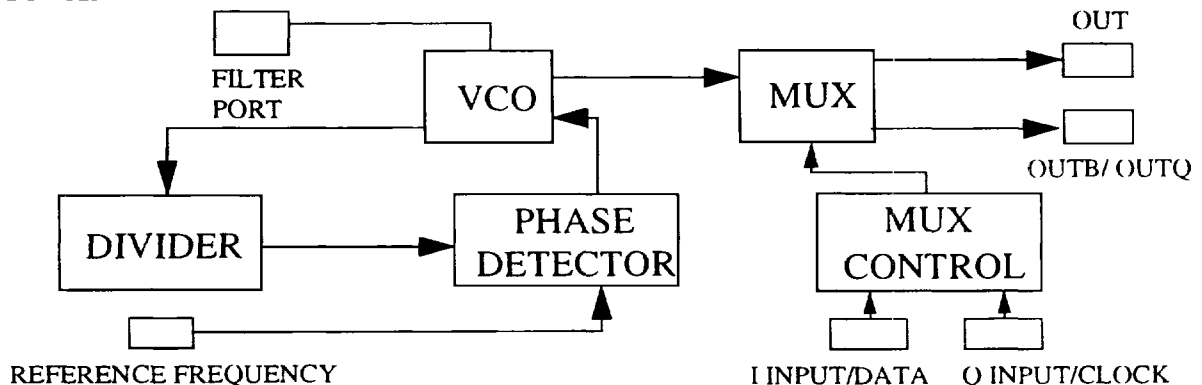
The SX071, SX072 and SX073 are monolithic integrated circuits (ICs) manufactured in AMI's 0.8 micron CMOS process. These chips provide low cost solutions for modulating digital data streams of up to 10 mega-bits/second (Mbps) to a 70 MHz intermediate frequency (IF) data stream. The chips can also be used to provide 70MHz frequency sources for other modulators or mixers. The reference clock can be any available digital clock at a one (1), five (5), or ten (10) MHz rate. These ICs have been designed to minimize the number of external components necessary for operation. All of these modulators/oscillators are capable of producing binary-phase-shift-keying (BPSK) or quadrature-phase-shift-keying (QPSK) modulation of the 70 MHz output. These chips are expected to

reduce parts count & cost and design complexity & size while reducing power consumption. Packaging allows use in space restricted applications such as PCMCIA cards.

### Common Features

- 3.3 volt or 5.0 volt operation
- Low power <10mw excluding output loads
- Input data rates to 10 Mbps on the I and Q inputs or 20Mbps in the serial data stream option.
- Small package minimizes board area, suitable for PCMCIA cards
- Optional tape and reel packaging
- Industrial temperature range -40 to +85 °C
- 50 or 330 ohm output impedance with VSWR<=2.0 across the temperature range
- Serial data to two bit wide converter will produce a QPSK modulated signal from a serial data stream
- BPSK modulation can be achieved by driving both the I and Q data pins with the same signal
- Oscillator functions can be achieved by connecting the input I and Q data pins to VDD or VSS
- Requires only two external components, a decoupling cap for the power supply and a loop filter cap for the VCO

### BLOCK DIAGRAM



\*AMSI003\*

## Functional Block Overview

The SX071, SX072 and SX073 ICs incorporate a VCO, a phase detector, digital dividers and phase mux circuitry. The VCO, phase detector and dividers are used to produce the 70 MHz output frequency that is locked to the reference frequency. The mux control and muxes are used to select the desired phases of the VCO that will appear as output pins. Phases of the VCO provide outputs with phase relationships of 0, 90, 180, and 270 degrees. The data on the I and Q pins control the phase

switches to select the desired VCO phase. QPSK modulation is generated by driving the I and Q input pins with I and Q baseband data. BPSK modulation is possible by driving both the I and Q pins with the same signal. The chip can be used as a 70MHz oscillator by tying the I and Q pins to ground or to VDD. The 70MHz output signal will swing from VSS to VDD (unloaded). Output impedance of the 70MHz signal can be 50 or 330 ohm.

## Absolute Maximum Ratings

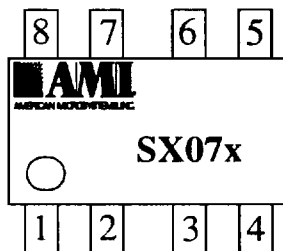
SYMBOL	PARAMETER	UNITS	RATINGS
VDD	Supply Voltage	V	5.5
PD	Total Power Dissipation	mW	200
TS	Storage Temperature	°C	-55 to +125
TL	Lead Temperature	°C	300 for < 10 sec
INV	Input Voltage	V	-0.3 to VDD + 0.3
INI	Input Current	mA	-10 to +10

## Operating Specifications

SYMBOL	PARAMETER	UNITS	RATINGS
VCC	Supply Voltage	V	3.0 to 3.6 or 4.75 to 5.25
TA	Operating Ambient Temperature	°C	-40 to +85
VIL	Input Low Voltage Level	V	0 to 30% of VDD
VIH	Input High Voltage Level	V	70% of VDD to VDD
ICC	Supply Current	mA	<3 *
OUTR	Output impedance	ohms	50 or 330
FREF	Reference Frequency	MHz	1, 5 or 10

\* measured at 3.3 volts VDD

## PIN CONNECTIONS



1. VCO Loop Filter
2. VSS
3. I Data In/Data\*
4. Q Data In/Clock\*
5. Reference Frequency In
6. VDD
7. OUT
8. OUTB/OUTQ/VSS\*

\*Function depends on part number/option