

# AMIS-53050 Frequency Agile Transceiver

## Key Features

- Operating frequency range: 300 to 960MHz
- Low power single-chip CMOS transceiver
- Patented Quick Start crystal oscillator
- Low power receive Sniff Mode™
- Periodic transmit using Burst mode
- Internal low power 10kHz oscillator
- Internal self calibration functions
- SPI/I<sup>2</sup>C interface bus
- 3-wire/4-wire serial data interface
- Two analog to digital converter channels
- Internal fractional N frequency synthesizer
- Internal temperature sensor
- Minimal external components
- On/off shift key/frequency shift key modulation/Gaussian FSK (BT = 1)

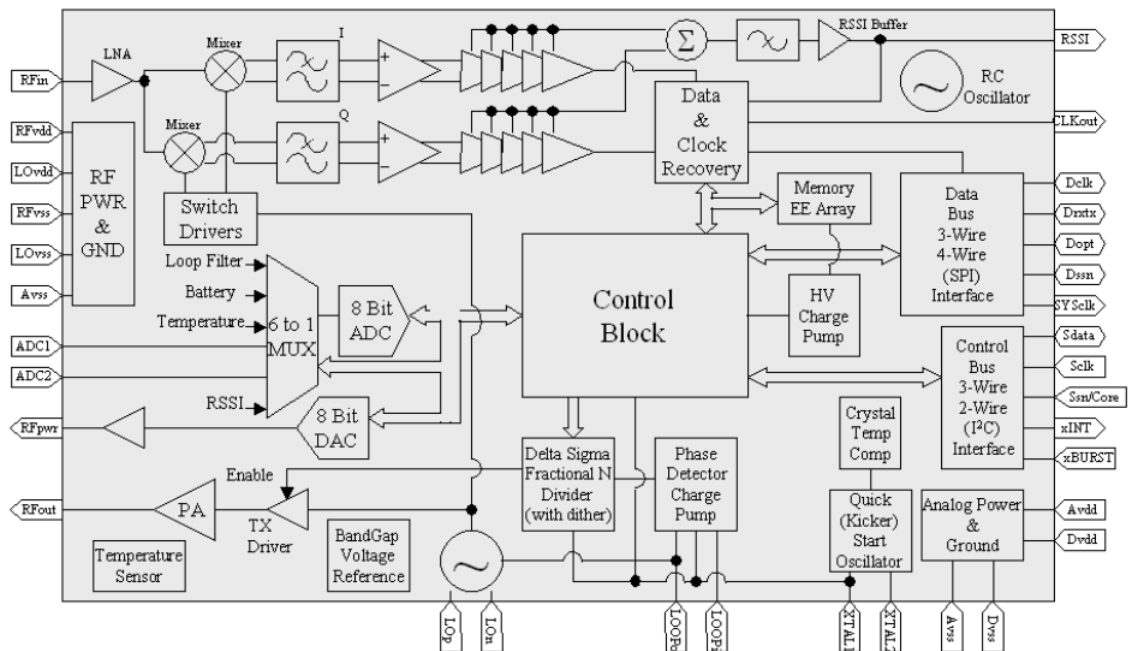


## Product Description

The AMIS-53050 is a highly flexible member of AMI Semiconductor's family of single-chip wireless transceivers. It is ideally suited for low to moderate data rate, low power, sub 1GHz, narrow band,

FSK/GFSK/OOK, multiple channel, wireless applications in the automotive and industrial markets. The AMIS-53050 can easily be interfaced to a baseband processor via a serial interface bus.

## Circuit Description



## System Features

- Operating voltage range: 2.2 to 3.3V
- Operating temperature range: -40 to +85°C
- Operating frequency range: 300 to 960MHz
- Data rate:
  - 1 to 19.2kbps (OOK)
  - 1 to 128kbps (FSK/GFSK)
- Transmit output power:
  - +15dBm max (high power)
  - +0dBm max (low power)
- Receiver sensitivity
  - -115dBm (OOK @ 1kbps)
  - -105dBm (FSK @ 20kbps)
- Transmit current: 50mA typical (15dBm)
- Receiver current: 12mA (continuous)
- Minimum RX energy detect time: 130µs (Sniff)
- PLL lock time < 50µs
- Receiver linearity:
  - IP2: +60dBm
  - IP3: +5dBm
- Transmit on/off ratio: 60dBm (OOK modulation)
- Transmit harmonics: -35dBc (with external components)
- Inputs/outputs are CMOS compatible

### Package

32-pin LQFP

Package information and pin listing can be obtained at [www.amis.com](http://www.amis.com).

### Transmitter

The AMIS-53050 RF transmitter has two output power ranges achieving 0dBm or +15dBm for frequencies in the range of 300 to 960MHz. The output power is programmable in each of the two output power bands.

The transmit data can be NRZ or Manchester encoded. Data can also be modulated as on/off shift keyed or frequency shift keyed (or Gaussian FSK). Data rates for the OOK modulation can be as high as 19.2kbps. Data rates for the FSK/GFSK modulation can be as high as 128kbps.

### Receiver

The AMIS-53050 has a single receiver channel and a single transmit channel, which can be connected to individual antennas or can be combined into a single antenna. The receiver uses four different data demodulators for the on/off shift keyed or frequency shift keyed modulated. The FSK/GFSK data is recovered using either a PLL circuit or an FFT circuit along with a CDR circuit. The OOK data is recovered using an RSSI circuit along an optional CDR circuit.

The AMIS-53050 uses a clock and data recovery circuit to recover the data stream. The CDR circuit synchronizes a clock to the data rate of the received data.

The AMIS-53050 can encode the data as NRZ or Manchester.

### Fractional N PLL

The AMIS-53050 requires a single external crystal working with an internal VCO and PLL to generate frequencies from 300 to 960MHz. The AMIS-53050 has internal capacitors that eliminate the need for external load capacitors and can trim the frequencies with a self calibration. A patented Quick Start circuit is used to force the crystal oscillator onto

the desired frequency in microseconds rather than in milliseconds.

Low power operation of the timers used for such things as Sniff, Burst and housekeeping in the AMIS-53050 is provided by an internal low power 10kHz oscillator.

### Interface

The AMIS-53050 has separate interfaces for data and control. The transfer of TX/RX data between the AMIS-53050 and an external host/controller is done with a 3-wire serial interface or a 4-wire SPI compatible serial interface. Control information is written to the AMIS-53050 registers or read from the AMIS-53050 registers using either a 3-wire serial interface or a 2-wire I<sup>2</sup>C compatible serial interface.

The first register in the AMIS-53050 is a command register allowing single byte writes to the AMIS-53050 setting the mode of the radio.

### Analog to Digital Converter

The AMIS-53050 has an internal analog to digital converter. Two analog channels are available to use external to the AMIS-53050. The ADC will store its readings, which then can be read by an external microprocessor.

- ADC resolution: 8 bits
- Internal reference: 2V
- ADC conversion rate: 200kps

### Burst Transmissions

The AMIS-53050 can be programmed as a stand alone device that will periodically wake and transmit data.

### Serial TX/RX Protocol

The AMIS-53050 provides data formatting to add preamble, ID, CRC, and packet length to the transmitted data packet. The receiver can detect transmission errors, buffer the received data and transfer data to an external controller with a modified SPI interface with the AMIS-53050 as a master.

## AMI Semiconductor

[www.amis.com](http://www.amis.com)



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