Computer Systems, Inc.
MERCURY

MSK Modulator Component

FM3TR Waveform Reference Implementation

SDR Forum Contract

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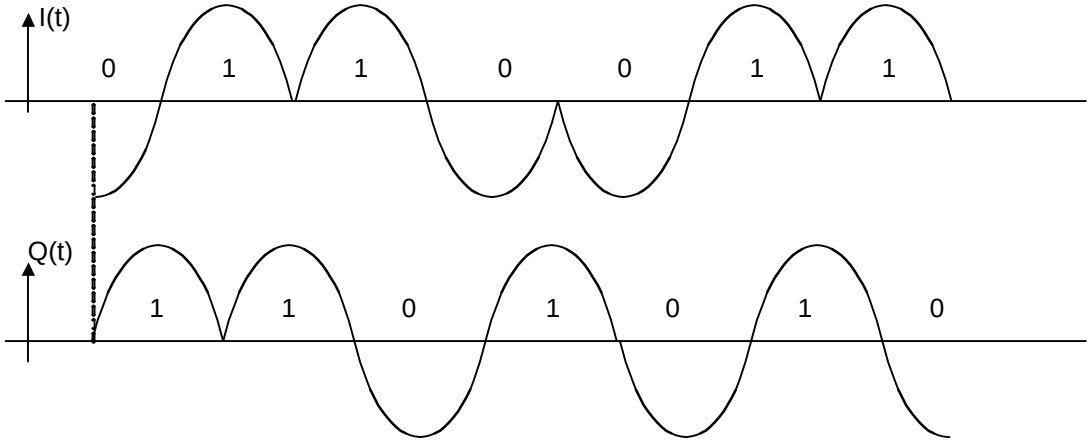
1 Component Name

MSK modulator

2 Component Processing Summary

Minimum shift keying (MSK) is a spectrally efficient digital modulation scheme used to represent data bits as an analog signal. Although MSK is actually a variant of binary frequency shift keying (BFSK), it is more commonly understood to operate similar to the well-known quadrature phase shift keying (QPSK) with a half sine-wave pulse shapes with in-phase (I) and quadrature (Q) symbols offset by exactly one symbol period. This translates to a complex baseband envelope with a constant amplitude and linear transitions between the symbols. The figure below depicts the baseband I/Q signal for MSK modulation:



3 Where used

The MSK modulator is used in all waveforms with an RF interface. This includes both voice and data waveforms.

4 Data Input and Output Ports

The MSK modulator component has one uses and one provides data port. The input data port (MSK_ModulatorIn) accepts a sequence of signed octets (one byte for data “bit”). After modulating, the component pushes a sequence of signed complex short integers representing the time-domain baseband signal to the output data port (MSK_ModulatorOut).

5 Control Interfaces

The MSK modulator component inherits the control interfaces from CF::Resource.

6 Component SCA Properties

Aside from the DLL execparams, the MSK modulator has no additional SCA properties.

7 Component Attributes/Key Variables

Below is a list of several key variables to the MSK modulator with a brief description of their purpose.

`m_pulse_shape`	The actual pulse shape is stored in this array.
`m_uiSamplesPerSymbol`	The number of samples used to represent a baseband symbol. It also describes the length of the `m_pulse_shape` array.

8 Processing Details

The MSK modulator accepts a stream of input bits and converts them to a complex baseband signal realization.

8.1 Method: Modulate()

The main processing behind the component is executed in the Modulate() method which generates the complex baseband signal from a stream of input bits. Even and odd input bits are represented by in-phase and quadrature pulses, respectively. The pulse shape template `m_pulse_shape` is copied to the output buffer accordingly.