Spectrum Analyzer

Overview

The Spectrum Analyzer component tracks the power of input signal and places the output power in a coefficient memory location in I2C memory. The input signal, prior to feeding to the Spectrum Analyzer, has to pass through appropriate band-pass filters at desired center frequencies. If the input signal is fed directly to the Spectrum Analyzer, without going through the band-pass filters, then the Spectrum Analyzer functions like a VU meter.

Description

The output of the Spectrum Analyzer is:

$$Out(n) = \log \{ LPF\_d1\_K * out(n-1) + abs[in(n-1)]* LPF\_n1\_K + abs[in(n)]*LPF\_n0\_K \}$$

The Spectrum Analyzer can be configured to process from 1 to 8 independent channels.

Configurable Properties

None

I2C Interface

The output of the spectrum Analyzer placed in the I2C memory as shown in the table below. The output is in the 7.x format, to get the output power level in the decimal value, divide the Power Level Output by 2^N, where N is 17 if the coefficient memory width is 24 bits, and N is 9 if the coefficient memory width is 16 bits. Following two examples show the procedure for format conversion:

Example 1 – Devices with 24 bit coefficient memory width:

    If Power Level Output = 0xE70000, then Decimal Value = -1638400, so, Power Level output in dB = Decimal Value / 2^{17} = -12.5 dB

Example 2 – Devices with 16 bit coefficient memory width:

    If Power Level Output = 0xE700, then Decimal Value = -6400, so, Power Level output in dB = Decimal Value / 2^9 = -12.5 dB

I2C Address	DSP Memory Address	Size	Scaling	Description
I2CAddress1	DspCoefBlockStart1	4 bytes	7.x	Power Level Output
I2CAddress2	DspCoefBlockStart2	4 bytes	7.x	Power Level Output

I2CAddress3	DspCoefBlockStart3	4 bytes	7.x	Power Level Output
I2CAddress4	DspCoefBlockStart4	4 bytes	7.x	Power Level Output
I2CAddress5	DspCoefBlockStart5	4 bytes	7.x	Power Level Output
I2CAddress6	DspCoefBlockStart6	4 bytes	7.x	Power Level Output
I2CAddress7	DspCoefBlockStart7	4 bytes	7.x	Power Level Output
I2CAddress8	DspCoefBlockStart8	4 bytes	7.x	Power Level Output

Usage

The Spectrum Analyzer tracks the input power level across multiple bands. Each input of the Spectrum Analyzer tracks one of the input pass bands.

The process flow snapshot below shows an example usage of the Spectrum Analyzer. The spectrum analyzers specAna_1 and specAna_14 measure the power in 10 different bands defined by the 10 Biquads. Whereas the Spectrum Analyzer specAna_15 measures the average signal power and so works as a VU meter.