AD9361
Transmit Power Control User Guide

TABLE OF CONTENTS

REVISION HISTORY

8/2011—Rev 2.0C Release

10/2011—Rev 2.1C Minor syntax changes

2/2012—Rev 2.2C Corrected symbol gain description

4/2012—Rev 2.3C Removed symbol gain, cleaned up document

GENERAL DESCRIPTION

The AD9361 transceiver uses an accurate and efficient method of transmit power control (TPC) that involves a minimum of interaction with the Baseband Processor (BBP). In addition, the BBP can update transmit power on a symbol-by-symbol basis. This user guide shows how to setup the registers for the various modes and how to use Transmit Power Control during normal operation.

TX ATTENUATION WORDS

A single 9-bit word controls the attenuation of a particular transmitter path (e.g. Tx1). The control word for Tx1 is stored in 0x073[D7:D0] and 0x074[D0]. The control word for Tx2 is stored in 0x075[D7:D0] and 0x076[D0].

The internal lookup table is 360(d) entries deep and the overall transmit path attenuation step size is 0.25dB/LSB across the entire table. An attenuation word of zero results in 0dB of attenuation. The value of 359(d) results in an overall attenuation of 89.75dB. The lookup table is hard-coded in the AD9361 and it not writable.

ATTENUATION WORD UPDATE OPTIONS

The BBP can write attenuation words at any time and three different actions cause the words to take effect.

1. The Enable State Machine moves from the Alert to the Tx state. This is the typical method of operation for TDD systems. In typical TDD applications, the AD9361 moves among the following states: Alert>>Tx>>Alert>>Rx>>Alert etc. Each time the AD9361 moves from Alert to Tx, the transmit attenuation words are loaded from the SPI register into the various attenuation blocks of the transmit path.
2. For FDD applications, the attenuation words update when using the immediate update function. There are two options
    a. If the "Mask Clr Atten Update" bit in 0x077[D6] is set, then the "Immediately Update TPC Atten" bit in D6 of 0x07C is *not* self-clearing. In this case, the Immediate Update bit can be set during initialization. When the BBP writes new attenuation words, the transmit power output immediately updates. One caveat of this mode is that the attenuation bits may not take effect at exactly the same time, resulting in a brief period of indeterminate output power.
    b. If the "Mask Clr Atten Update" bit in 0x077[D6] is clear, then the "Immediately Update TPC Atten" bit in D6 of 0x07C *is* self-clearing. To update the output power, the BBP writes new attenuation words and then the Immediate Update bit is set high. The transmit power updates immediately and the AD9361 clears the Immediate Update bit. This is the preferred method of using the immediate update function as it ensures that all of the attenuation bits take effect at the same time.
3. The transmitters transition from the disabled state to the enabled state. This only applies to the FDD Independent Control Mode. The Enable State Machine User Guide describes this operational mode in more detail. The FDD Independent Control Mode is useful for both TDD and FDD applications.

USING TX1 WORD FOR TX1 AND TX2

Setting the "Sel Tx1 & Tx2" bit (D6 of 0x079) high causes the AD9361 to use the Tx1 attenuation word for both transmitters. The bit is normally cleared.