

## Getting Started with the **EK1HMC6350** Evaluation Kit and Software

### FEATURES

60 GHz evaluation kit designed for quick evaluation of the **HMC6300** and **HMC6301** transmit/receive chipset  
Demonstration platform allows easy integration of the **HMC6300** and **HMC6301** radio link with a baseband modem for over the air transmission

### APPLICATIONS

Point to point millimeter wave radio development  
Wireless Gigabyte Alliance/IEEE 802.11ad radio  
60 GHz RF sniffing  
60 GHz signal generator  
Modem development  
Radar/high resolution Imaging

### EVALUATION KIT CONTENTS

- 1 **HMC6300** Tx 60 GHz transmitter motherboard/module assembly with a MMPX interface
  - 1 **HMC6301** Rx 60 GHz receiver motherboard/module assembly with a MMPX interface
  - 2 hand formable 2 inch coaxial cables with a male MMPX connector on one end and a 1.85 mm male connector on the other end
  - 1 **HMC6300** motherboard/TX module with crystal, USB interface, supply regulators, MCX connector and differential I/Q interface
  - 1 **HMC6301** motherboard/RX module with crystal, USB interface, supply regulators, MCX connector and differential I/Q interface
  - 2 wall-mount power supplies
  - 2 USB 2.0 male/male 6 foot cables
  - 8 phase matched MCX to SMA cables for baseband interface on both motherboards
- Evaluation software CD-ROM containing the **HMC6300/HMC6301 Graphical User Interface** software GUI

### EQUIPMENT NEEDED

2 PCs, one designated for each motherboard for GUI control  
Baseband source  
Spectrum analyzer

### DOCUMENTS NEEDED

**HMC6300** data sheet  
**HMC6301** data sheet

### GENERAL DESCRIPTION

The **EK1HMC6350** evaluation kit allows users to set up a half-duplex, 60 GHz millimeter wave link using standard baseband analog interfaces. MMPX and 1.85 mm connectors are provided to interface with third party test equipment or millimeter wave antennas. The **EK1HMC6350** evaluation kit includes a USB interface and graphical user interface (GUI) software, the **HMC6300/HMC6301 Graphical User Interface**, allowing the user to program the **HMC6300** and **HMC6301** by writing to the device registers.

There are two motherboards in the kit: an **HMC6300** motherboard with the TX module location populated and the **HMC6301** motherboard with the RX module location populated.

Full specifications on the **HMC6300** and **HMC6301** are available in the **HMC6300** and **HMC6301** data sheets, which should be consulted in conjunction with this user guide when working with the evaluation board.

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## REVISION HISTORY

7/2016—Revision 0: Initial Version

## EVALUATION BOARD HARDWARE SETUP

### CONNECTING THE MMPX CABLE TO THE HMC6300 MOTHERBOARD/TX MODULE ASSEMBLY

Remove the HMC6300 motherboard/TX module assembly from the kit. Snap the MMPX semirigid cable into the HMC6300 TX module output connector, shown in Figure 1. The 1.85 mm connector at the other end of the cable can interface with test equipment or a WR-15 waveguide transition to connect with third party antennas.

### ATTACHING THE BASEBAND CABLES

Attach the four phase-matched baseband cables supplied with the EK1HMC6350 evaluation kit to the Tx baseband inputs, and the baseband cables snap into place. Attach the other end of the baseband cables to the user selected baseband source.

The baseband source can be test equipment or a modem that generates a baseband tone or modulated I/Q signal. Connect the baseband inputs on the motherboard to the baseband I/Q source as follows:

- Motherboard BB\_IP connects to the I positive baseband output
- Motherboard BB\_IM connects to I negative baseband output
- Motherboard BB\_QP connects to Q positive baseband output
- Motherboard BB\_QM connects to Q negative baseband output

Locate the wall mounted power supply and USB connector supplied in the kit and connect them to the HMC6300 motherboard/TX module assembly, shown in Figure 1 and Figure 2.

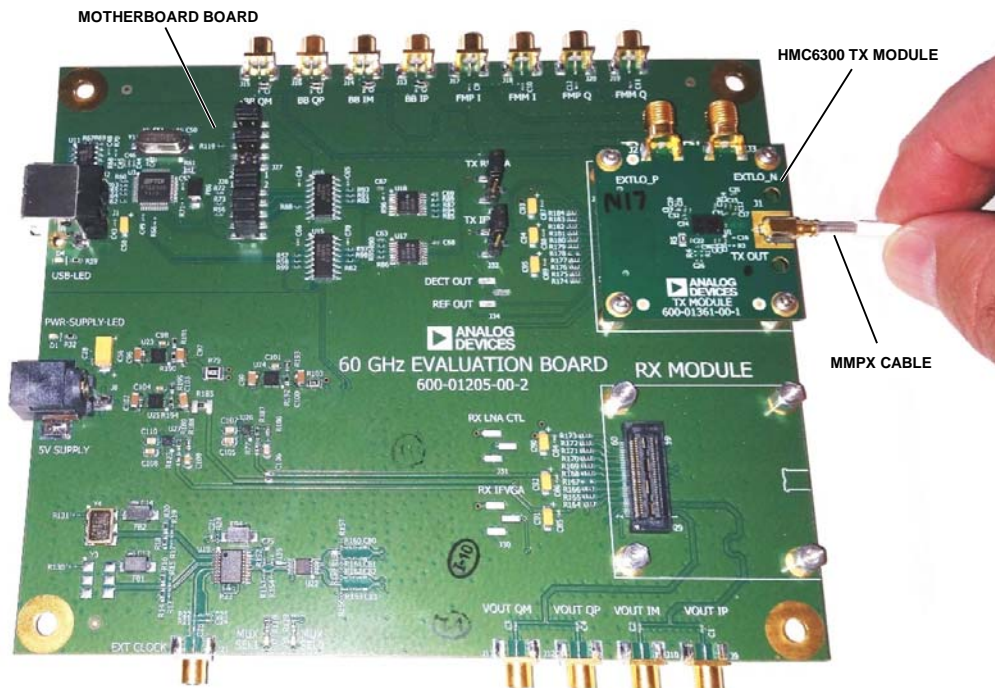


Figure 1. HMC6300 Assembly with the Motherboard Populated with the TX Module

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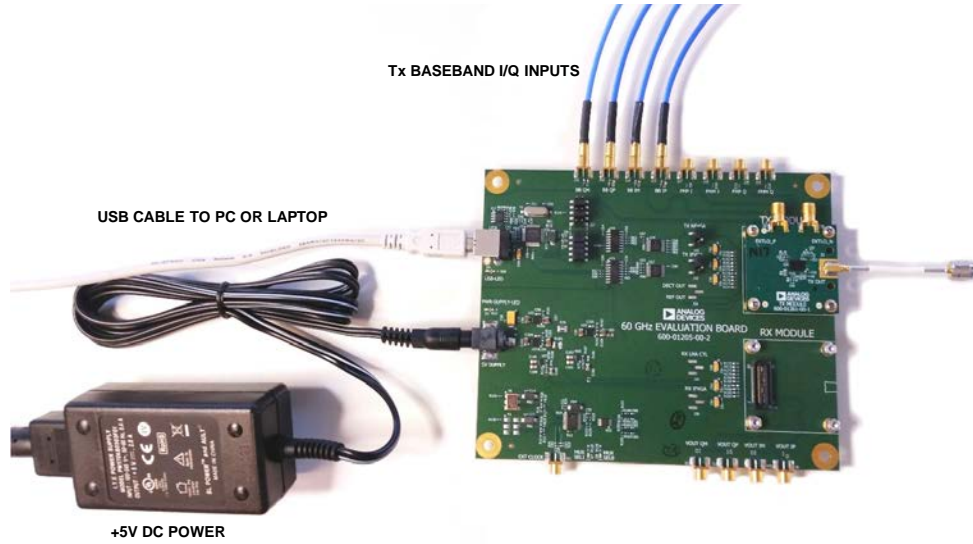


Figure 2. [HMC6300](#) Motherboard/TX Module Assembly with USB, DC Power, and I/Q Cables Installed

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**CONNECTING THE MMPX CABLE TO THE HMC6301 MOTHERBOARD/RX MODULE ASSEMBLY**

Locate the motherboard with the HMC6301 Rx receiver module installed. Snap the MMPX semirigid cable into the HMC6301 RX module output connector, shown in Figure 1. The 1.85 mm connector at the other end of the cable can interface with a test equipment or a WR-15 waveguide transition to connect with third party antennas.

Attach the four phase-matched baseband cables supplied with the EK1HMC6350 evaluation kit to the Rx baseband outputs, the baseband cables snap into place.

Attach the other end of the baseband cables to baseband test equipment or a modem that processes a baseband tone or modulated I/Q signal. Connect the baseband inputs on the motherboard to the baseband I/Q source as follows:

- Motherboard VOUT\_IP connects to I positive baseband input
- Motherboard VOUT\_IM connects to I negative baseband input
- Motherboard VOUT\_QP connects to Q positive baseband input
- Motherboard VOUT\_QM connects to Q negative baseband input

Locate the wall-mounted power supply and USB connector supplied in the EK1HMC6350 evaluation kit and connect them to the HMC6301 motherboard/RX module assembly, shown in Figure 3.

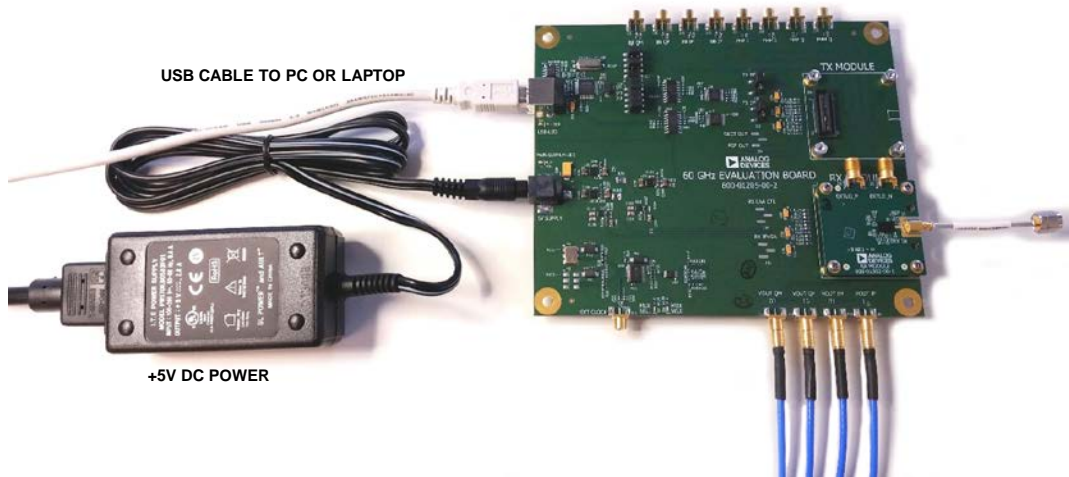


Figure 3. HMC6301 Assembly with the Motherboard Populated with the RX Module

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## EVALUATION BOARD SOFTWARE QUICK START PROCEDURES

### PROGRAMMING THE HMC6300 TX MODULE

Install the [HMC6300/HMC6301 Graphical User Interface](#) software on the primary PC and plug in the USB cable connected to the [HMC6300](#) motherboard assembly.

Open the **SoC 60 GHz Tx Control Panel** window by going to the **ADI Directory** in **Program Files** under the Windows® Start menu. When the **SoC 60 GHz Tx Control Panel** window opens, click the **Advanced** button (see Figure 4).

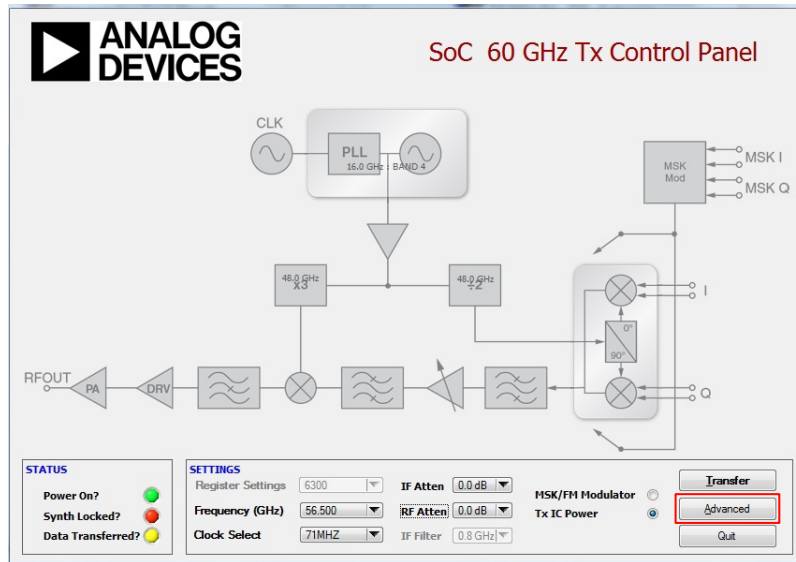


Figure 4. SoC 60 GHz Tx Control Panel Window for the HMC6300 Tx GUI

When the **SoC 60GHz Tx Advanced Control Panel** appears, perform the following steps (see Figure 5):

1. Select the carrier frequency desired from the **Frequency (GHz)** drop-down menu.
2. Click the **Transfer** button and the **HMC6300** device programs and locks to the desired frequency.

3. If the **HMC6300** device is successfully programmed, the **R/W** LED under **PLL Settings** turns green, indicating the read/write operation is properly executed. If the device locks to the selected frequency, the **Locked?** LED under the **PLL Settings** turns green (see Figure 6).

Figure 6 shows a successful data transfer and synthesizer lock. The transmitter then functions at full power on the selected channel. The Tx IF and RF attenuators, under the **Filtering/Attenuation Settings**, can be applied to reduce the Tx output power, if required.

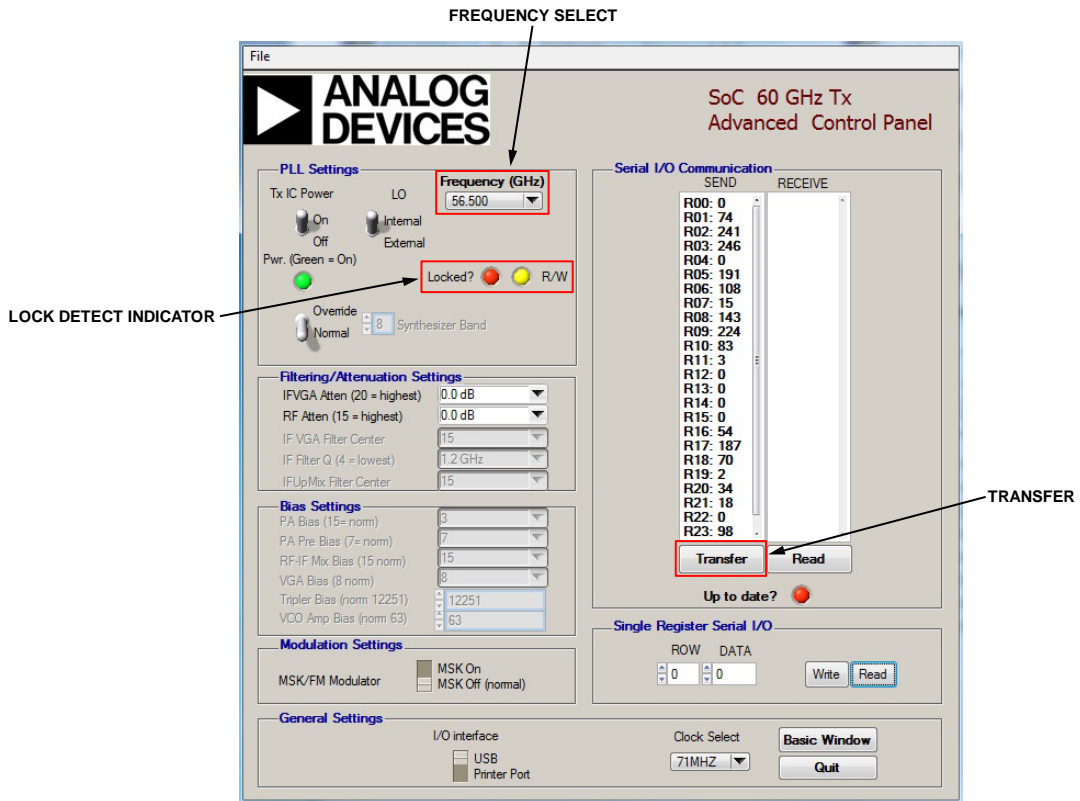


Figure 5. SoC 60GHz Tx Advanced Control Panel Window for the HMC6300 Tx GUI

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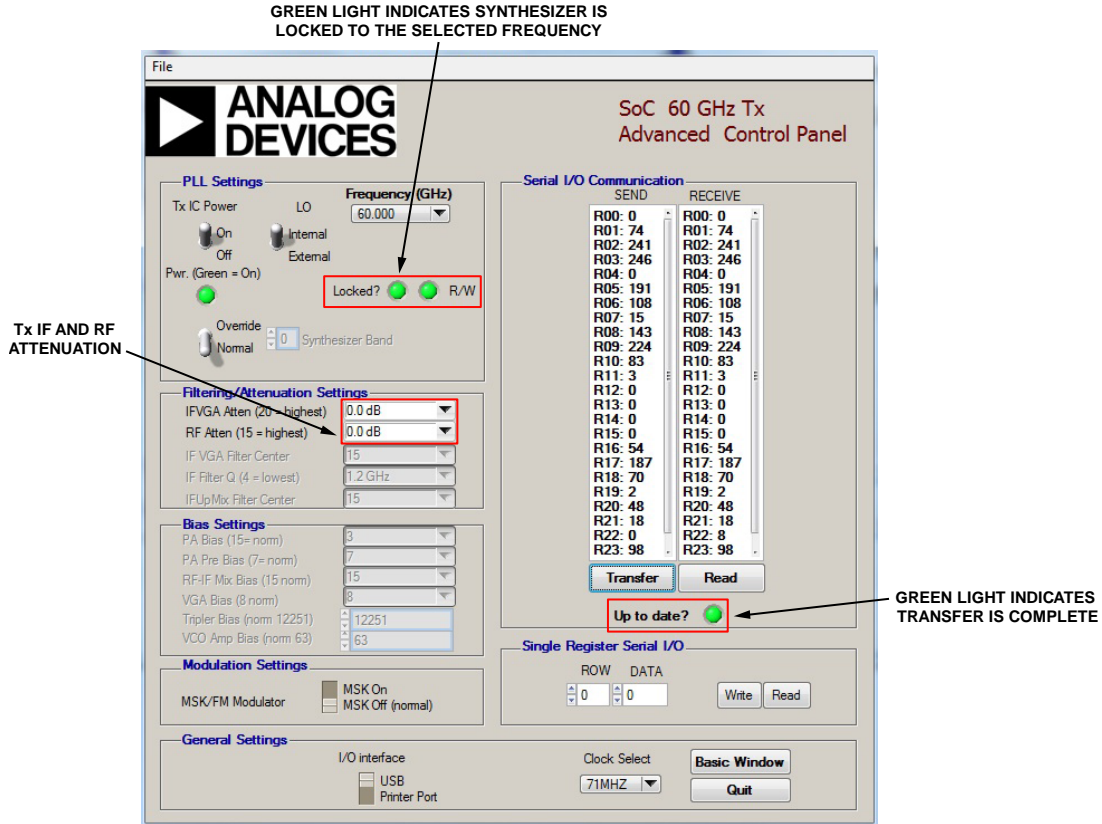


Figure 6. SoC 60GHz Tx Advanced Control Panel Window for the HMC6300 Tx GUI After Successfully Programming the HMC6300 to 60 GHz



**PROGRAMMING THE HMC6301 RX MODULE**

Install the [HMC6300/HMC6301 Graphical User Interface](#) software on the primary PC and plug in the USB cable connected to the [HMC6301](#) motherboard assembly. Open the **SoC 60 GHz Rx Control Panel** window by going to the **ADI Directory** in **Program Files** under the Windows **Start** menu. When the **SoC 60 GHz Rx Control Panel** window opens, click the **Advanced** button (see Figure 7). When the **SoC 60 GHz Rx Advanced Control Panel** window appears, perform the following steps (see Figure 8):

1. Select the carrier frequency desired from the **Frequency (GHz)** drop-down menu.
2. Click the **Transfer** button and the [HMC6301](#) device programs and locks to the desired frequency. If the [HMC6301](#) device is successfully programed, the **R/W LED** under **PLL Settings** turns green, indicating the read/write operation is properly executed. If the device locks to the selected frequency, the **Locked? LED** under the **PLL Settings** also turns green (see Figure 9).

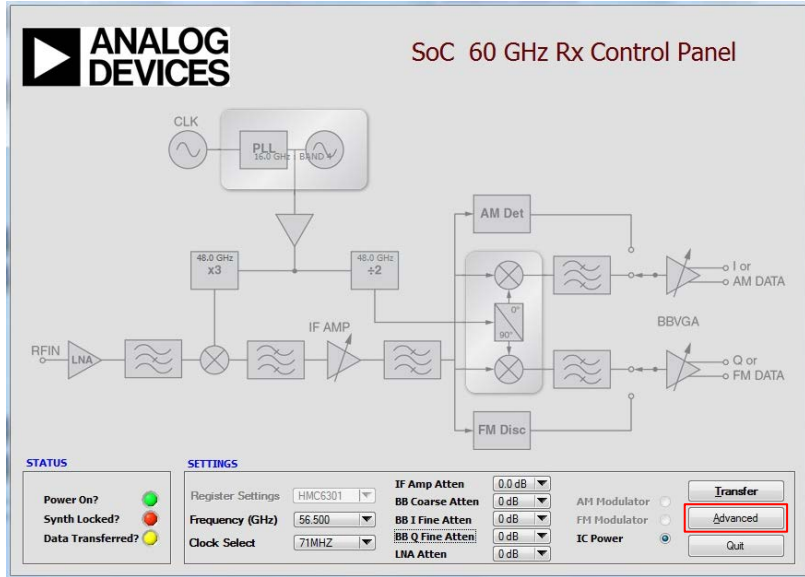


Figure 7. SoC 60 GHz Tx Control Panel Window for the HMC6301 Rx GUI

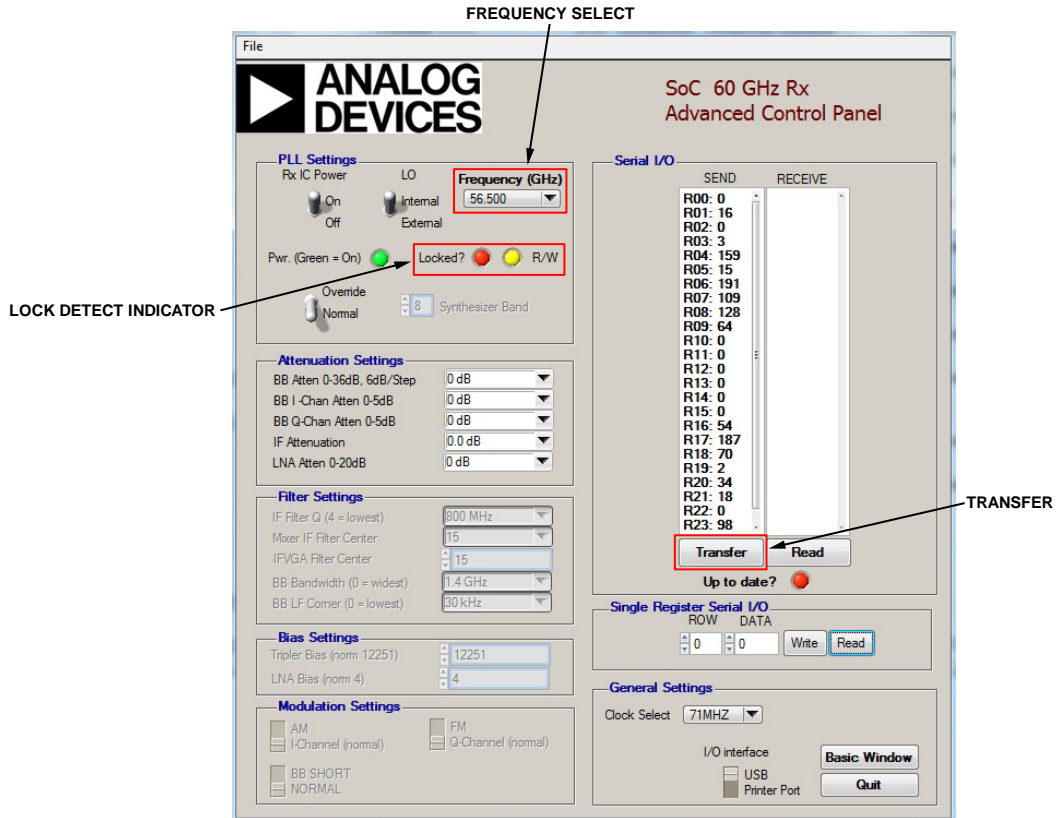


Figure 8. SoC 60GHz Tx Advanced Control Panel for the HMC6301 Rx GUI.

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Figure 9 shows a successful data transfer and synthesizer lock. The receiver then functions on the selected channel. The Rx baseband, IF attenuation, and LNA attenuation, under the

**Attenuation Settings**, must be adjusted to optimize the receiver gain to meet the signal-to-noise requirements at the Rx baseband output.

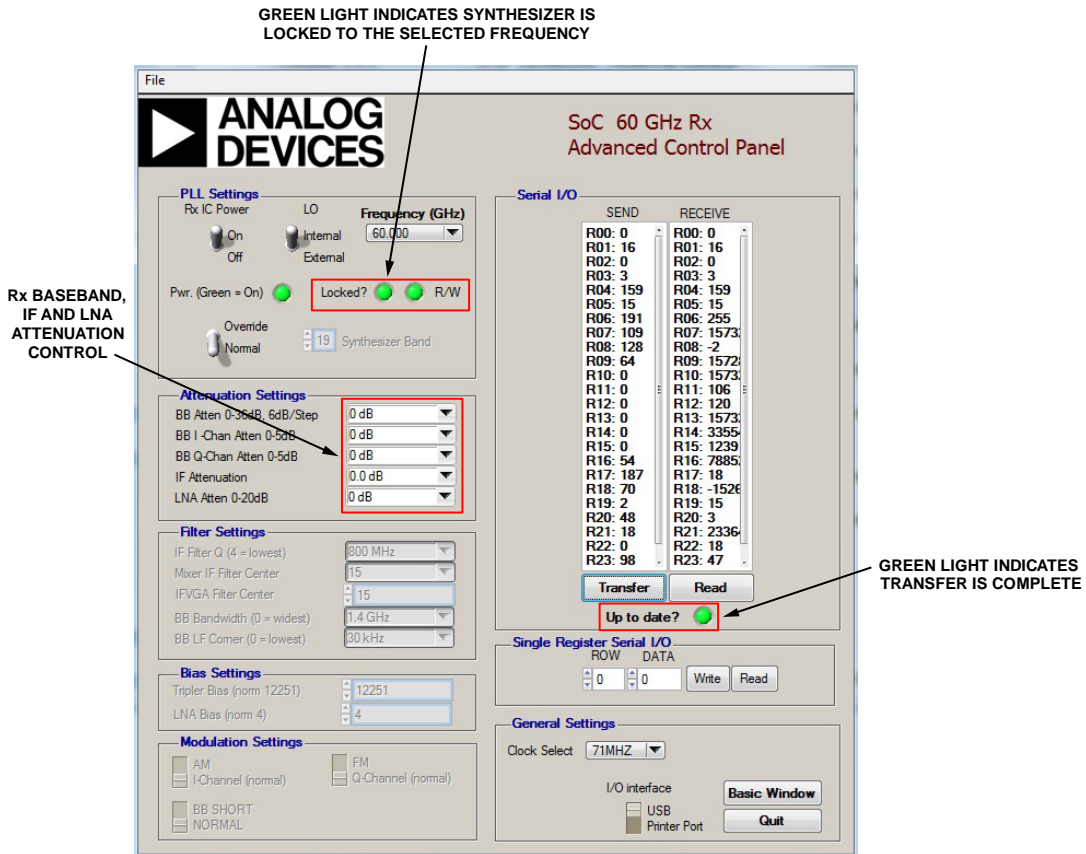


Figure 9. SoC 60GHz Tx Advanced Control Panel Window for the HMC6301 Rx GUI After Successfully Programming the HMC6301 to 60 GHz

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## 60 GHZ WIRELESS RADIO LINK

Figure 10 shows a typical half-duplex, 60 GHz link integrated with horn antennas. The modem can connect to the Tx baseband inputs and the Rx baseband outputs.

This configuration is typically used for integration with a baseband modem for 60 GHz over air testing. This allows for testing and characterization of the [HMC6300](#) and [HMC6301](#) devices.

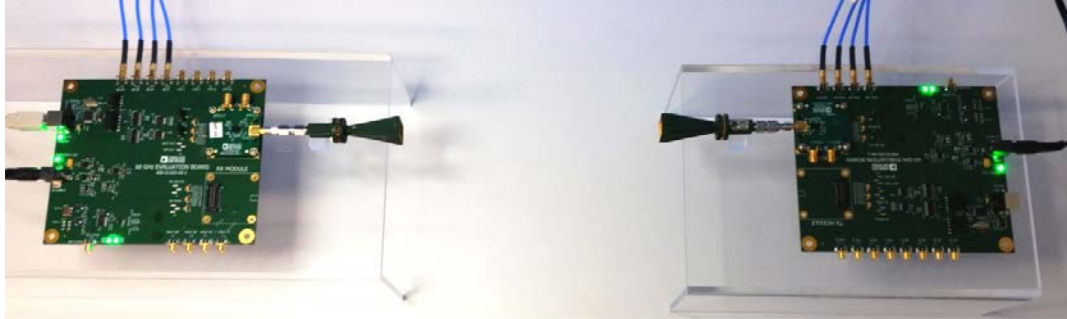


Figure 10. Typical [HMC6300](#) and [HMC6301](#) 60 GHz Radio Link



### ESD Caution

**ESD (electrostatic discharge) sensitive device.** Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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