

# HMC987LP5E Evaluation Kit

Analog, Digital & Mixed-Signal ICs, Modules, Subsystems & Instrumentation

## User Manual

Software & Hardware Installation



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## 1. Introduction

This document describes the functionality of the HMC987LP5E Evaluation Kit. The HMC987LP5E Evaluation board can be controlled via parallel port or SPI (Serial Port Interface). Parallel port control is implemented by simple jumper settings on the evaluation board. Serial Port interface offers more flexibility. This HMC987LP5E Evaluation Kit also includes the PC compatible software with Graphical User Interface (GUI), and software drivers necessary for Serial Port Interface, allowing the user to read from and write to all device registers, set gain levels and save & recall device configurations.

*Note: For most up-to-date software download and information please visit [www.hittite.com](http://www.hittite.com).*

## 2. Package Contents

### 2.1 Hardware

Verify that all the items listed in Table 1 are included in the shipment.

Item	Quantity
HMC987LP5E Evaluation Board	1
USB Interface Board	1
6' USB A Male to USB B Male Cable	1
CD ROM (Contains User Manual and software)	1

Table 1: Packing List

### 2.2 Software

The HMC987LP5E Evaluation Software enables users to communicate with and control HMC987LP5E Evaluation Board with their PC, and observe full functionality and performance of the HMC987LP5E.

## 3. Operating Environment

This evaluation kit is designed for use in a laboratory setting at ambient room temperature (25°C) and is not protected against moisture. The USB Interface Board has an ESD rating of +/-3000V, however the HMC987LP5E may have a lower rating (check the product's datasheet for its specific ESD rating). Use appropriate ESD procedures and precautionary measures when handling all electronic hardware.

## 4. Setup and Installation

### 4.1 User Provided Equipment

In addition to the items provided in the evaluation kit, the user must provide the following equipment to communicate with the device under test.

- DC Power Supply
- DC Cables
- Signal source Generator
- Computer (PC) with Standard USB port if SPI control of the HMC987LP5E is desired.

For detail specifications regarding operating system and software requirements please visit [www.hittite.com](http://www.hittite.com)

## 4.2 Hardware Setup

The HMC987LP5E can be controlled via the parallel port or the SPI (Serial Port Interface). More information is available in the HMC987LP5E datasheet.

### 4.2.1 Parallel Port Control Setup

Setup all hardware according to [Figure 1](#).

- Apply 4 V to 5 V to TP1 (TP2 is GND) on HMC987LP5E eval board. Supply current should be ~390 mA.
- Ensure jumper J7 is off, to enable parallel mode of the HMC987LP5E (PMODE\_SEL = 1).
- Any enabled outputs that are not used should be terminated with a 50  $\Omega$  termination to ground.
- Jumpers J5 (SCLK), J6 (SDI), and J10 (SEN) are used to enable individual LVPECL outputs according to the following truth table:

**Table 2. HMC987LP5E Parallel Port Output Control Truth Table**

SCLK, SDI, SEN	Enabled Outputs
000	OUT2
001	OUT2 + OUT7
010	OUT2 + OUT7 + OUT4
011	OUT2 + OUT7 + OUT4 + OUT6
100	OUT2 + OUT7 + OUT4 + OUT6 + OUT5 + OUT5
101	OUT2 + OUT7 + OUT4 + OUT6 + OUT5 + OUT5 + OUT3
110	OUT2 + OUT7 + OUT4 + OUT6 + OUT5 + OUT5 + OUT3 + OUT8
111	OUT2 + OUT7 + OUT4 + OUT6 + OUT5 + OUT5 + OUT3 + OUT8 + OUT1

Note that jumper ON pulls the signal to ground (0 V).

- The RF Buffer Enable is controlled from jumper J9. Installing the jumper pulls the enable to 0 - disabling the buffer. If the jumper is open, the buffer is enabled at maximum gain.

Note that the HMC987LP5E evaluation board includes a very low noise HMC987LP3E regulator. It is programmed (via resistors) to take in a voltage from 4.0 V to 5 V and generate the 3.3 V required for the HMC987LP5E.

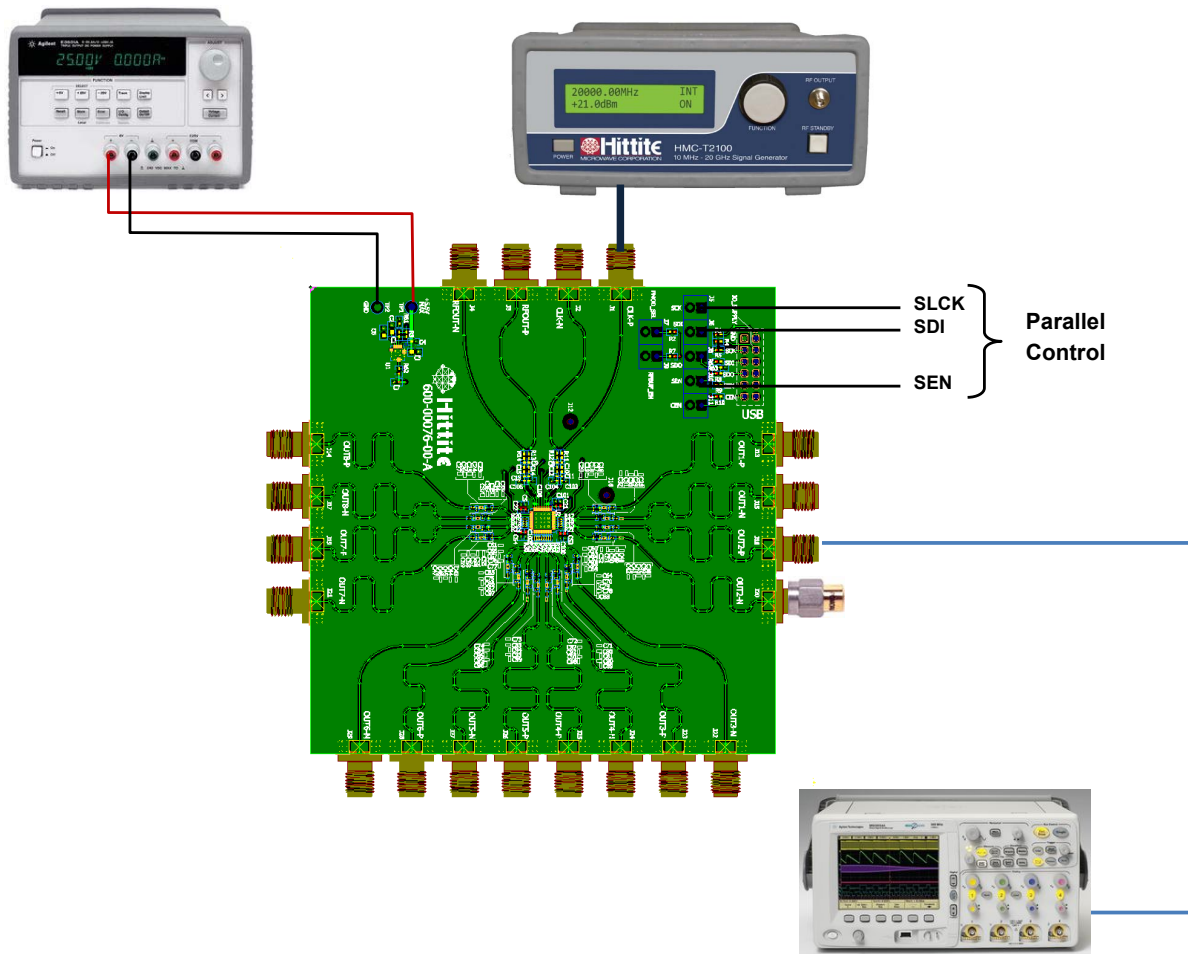


Figure 1. HMC987LP5E Eval Board Parallel Port Control Test Setup

#### 4.2.2 SPI Control

Setup all hardware according to [Figure 2](#).

- Connect the USB board to HMC987LP5E eval board.
- Connect the USB cable to USB board.
- Apply 4 V to 5 V to TP1 (TP2 is GND) on HMC987LP5E eval board. Supply current should be ~395 mA.
- Use a jumper on J7 to disable Parallel Mode of the HMC987LP5E.
- Any enabled outputs that are not used should be terminated with a 50  $\Omega$  termination to ground.

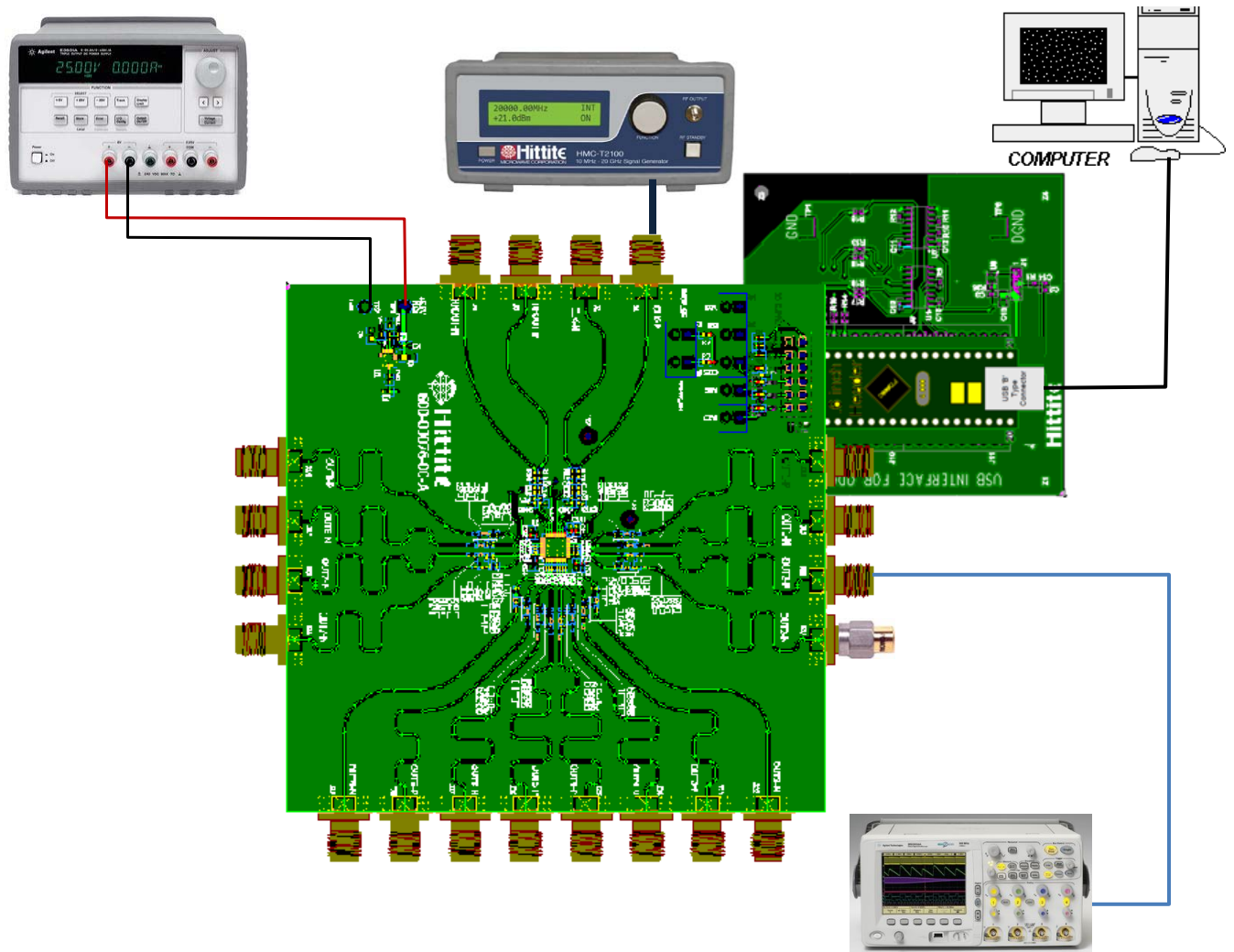


Figure 2. HMC987LP5E Eval Board SPI Control Test Setup

#### 4.2.2.1 Software Installation

**Note:** Installing/Uninstalling the HMC987LP5E Evaluation Software requires administrative privileges

To install/uninstall HMC987LP5E Evaluation Software, double click on “HMC987LP5E Eval Software Installer.exe” that was downloaded from [www.hittite.com](http://www.hittite.com), or provided with a CD, and follow the installation/uninstallation wizard.

### 4.3 Evaluation Board Configuration

The HMC987LP5E Evaluation Board schematic shows various input/output configurations. Default configurations are populated, and optional ones (labeled 'depop') are not populated. HMC987LP5E evaluation board is configured for differential drive, with AC coupling on both the input and output, by default. Components that are not populated on the HMC987LP5E evaluation board are not included in the evaluation kit.

For low frequency signals (< 500 MHz) the 100 pF DC blocking capacitors on input and output should be increased.

Detailed information about various input/output HMC987LP5E interface configuration options are available in the HMC987LP5E datasheet.

#### 4.3.1 Single-Ended Input Configuration

Hardware evaluation board changes are required to configure the HMC987LP5E evaluation board for single-ended input operation.

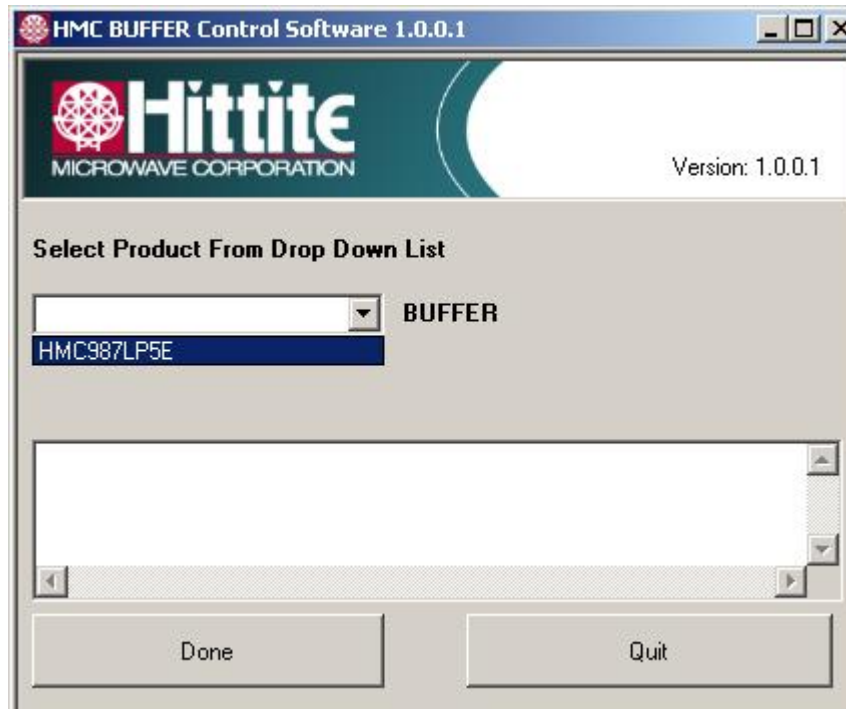
To configure HMC987LP5E evaluation board for single-ended input operation simply populate C104 with a 1 nF capacitor, and remove C12. Drive input CLKP (J1), and CLKN (J2) is AC grounded.

#### 4.3.2 Single-Ended Output Configuration

When measuring single-ended, ensure that the other unused output is terminated with 50  $\Omega$  to ground.

## 5. Using the HMC987LP5E Evaluation Software

1. Ensure that the USB interface hardware is connected to the evaluation board, and that the HMC987LP5E is powered.
2. Launch HMC987LP5E Evaluation Software by selecting on "Hittite BUFFER Eval Software Vx.exe" from the Program Files menu of your computer. The main window should open. See [Figure 3](#) below.



*Figure 3. HMC FANOUT BUFFER Control Software*

3. From this window select the HMC987LP5E from the drop down menu and press "Done" and the following window appears.





Figure 4. HMC987LP5E Main GUI

This interface allows the user:

- To save and load HMC987LP5E register configurations.
  - To open an existing register configuration file use the “Load Register File” button.
  - To save a register configuration to a file use the “Save Register File” button. This allows you to instantly recall the desired register state by using the “ Load Register File” button.

Click on ‘Open HMC987LP5E GUI.’

## 5.1 HMC987LP5E GUI

The HMC987LP5E GUI ([Figure 5](#)) allows the user:

- Enable/disable individual buffers (LVPECL outputs)
- Read the chip ID
- Select input impedance
- Adjust output RF buffer settings including gain settings

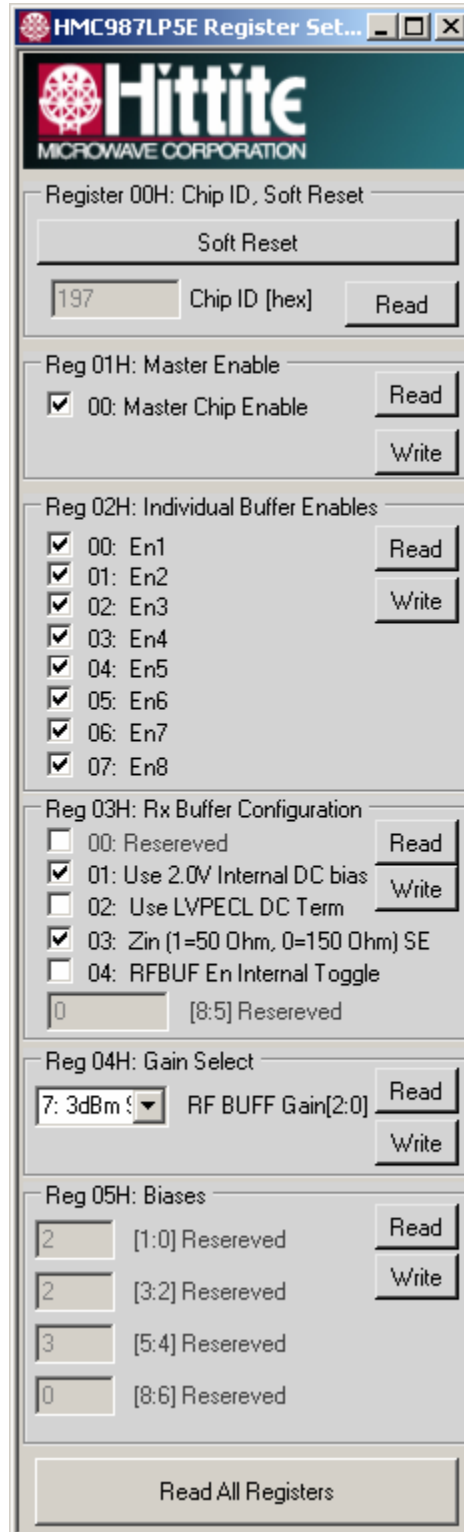


Figure 5. Register Settings

## 5.2 Direct Register Access

- “Direct SPI Access” button in the ‘HMC987LP5E Main GUI’ provides direct register read/write capability ([Figure 6](#)).

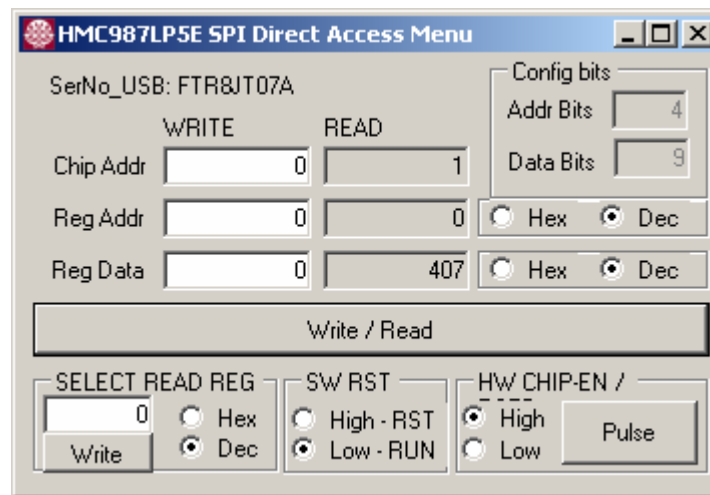


Figure 6. Direct SPI Access

## 6. Technical Support

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