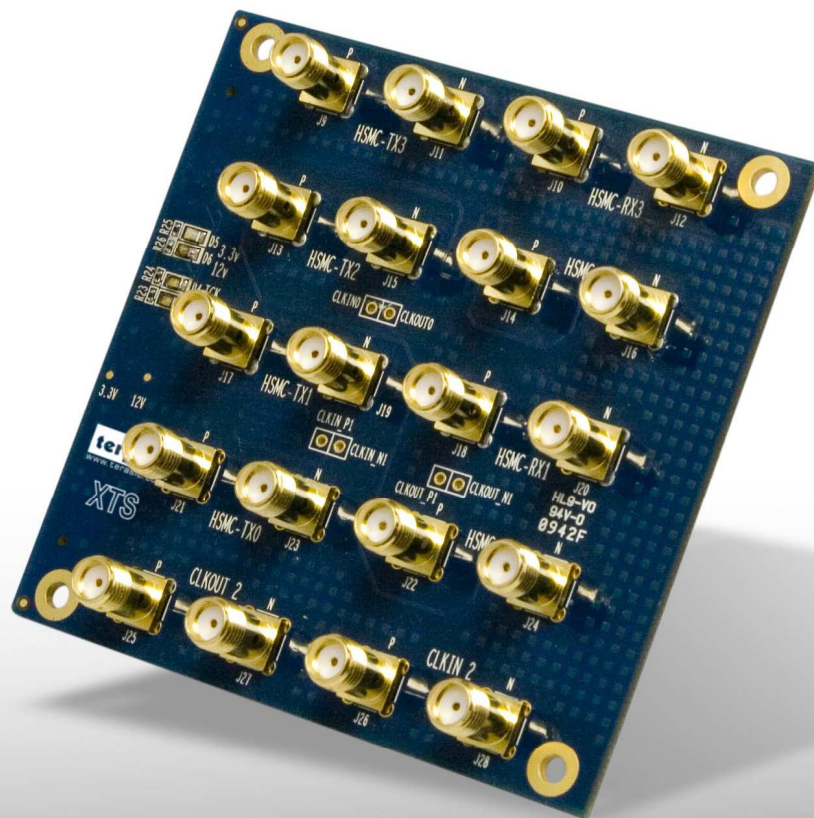


XTS

Terasic XTS Daughter Card

User Manual



| | |
|--|-----------|
| INTRODUCTION | 1 |
| 1-1 1.1 FEATURES | 1 |
| 1.2 ABOUT THE KIT | 2 |
| 1-2 1.2 GETTING HELP | 2 |
| ARCHITECTURE | 3 |
| 1-3 2.1 LAYOUT AND COMPONENTS | 3 |
| 1-4 2.2 BLOCK DIAGRAM | 5 |
| BOARD COMPONENTS..... | 6 |
| 1-5 3.1 HSMC EXPANSION CONNECTOR | 6 |
| DEMONSTRATION..... | 13 |
| 4.1 INTRODUCTION..... | 13 |
| 4.2 SYSTEM REQUIREMENTS | 14 |
| 4.3 SETUP THE DEMONSTRATION..... | 14 |
| 4.4 DEMO OPERATION | 16 |
| APPENDIX | 17 |
| 5.1 REVISION HISTORY..... | 17 |
| 5.2 ALWAYS VISIT XTS WEBPAGE FOR NEW MAIN BOARD..... | 17 |

The XTS daughter card is designed to convert FPGA transceiver channels to SMA connectors through a High-Speed Mezzanine Connector (HSMC) interface. It is intended to allow users to evaluate the performance of transceiver-based host boards with HSMC interface specifically Stratix IV GX, Stratix II GX, Arria II GX, and Cyclone IV GX with integrated transceivers. Through the SMA connectors, the FPGA transceiver signals can be easily connected to measurement instruments as well as allowing gigabit data rate communication between multiple FPGA boards. The XTS daughter card is the ideal platform to allow users to prototype and test their high-speed interfaces quickly and easily in support of transceiver performance for jitter, protocol compliance, and equalization.

1.1 Features

Figure 1.1 shows the photo of the XTS card. The important functions of the XTS card are listed below:

- Convert transceiver channels to SMA connectors through HSMC interface
- Support 4 transceiver channels
- SMA connectors for PLL input and output differential clock
- Applicable for large volume applications that require high-speed (Gigabit) data transfer

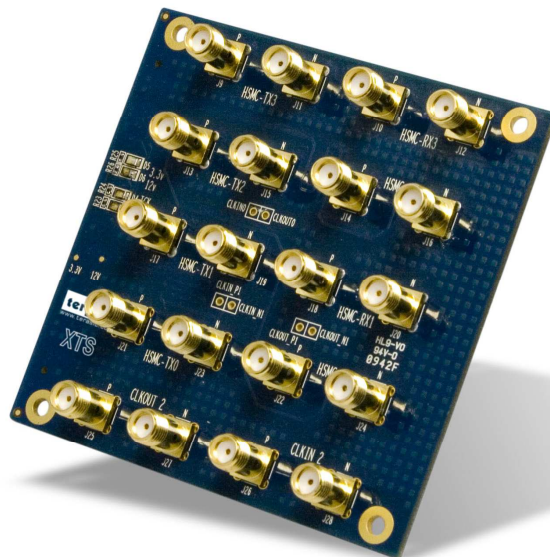


Figure 1.1. The picture of the XTS card

1.2 About the KIT

This section describes the package content

- XTS Card x 1
- System CD-ROM x 1

The CD contains technical documents of the XTS card

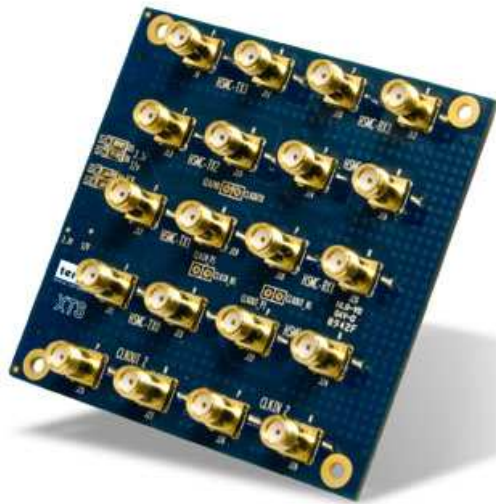


Figure 1.2 XTS Card Package

1.2 Getting Help

Here are some places to get help if you encounter any problem:

- ✓ Email to support@terasac.com
- ✓ Taiwan & China: +886-3-550-8800
- ✓ Korea : +82-2-512-7661
- ✓ Japan: +81-428-77-7000

This chapter describes the architecture of the XTS card including block diagram and components.

2.1 Layout and Componets

The picture of the XTS is shown in Figure 2.1 and Figure 2.2. It depicts the layout of the board and indicates the locations of the connectors and key components.

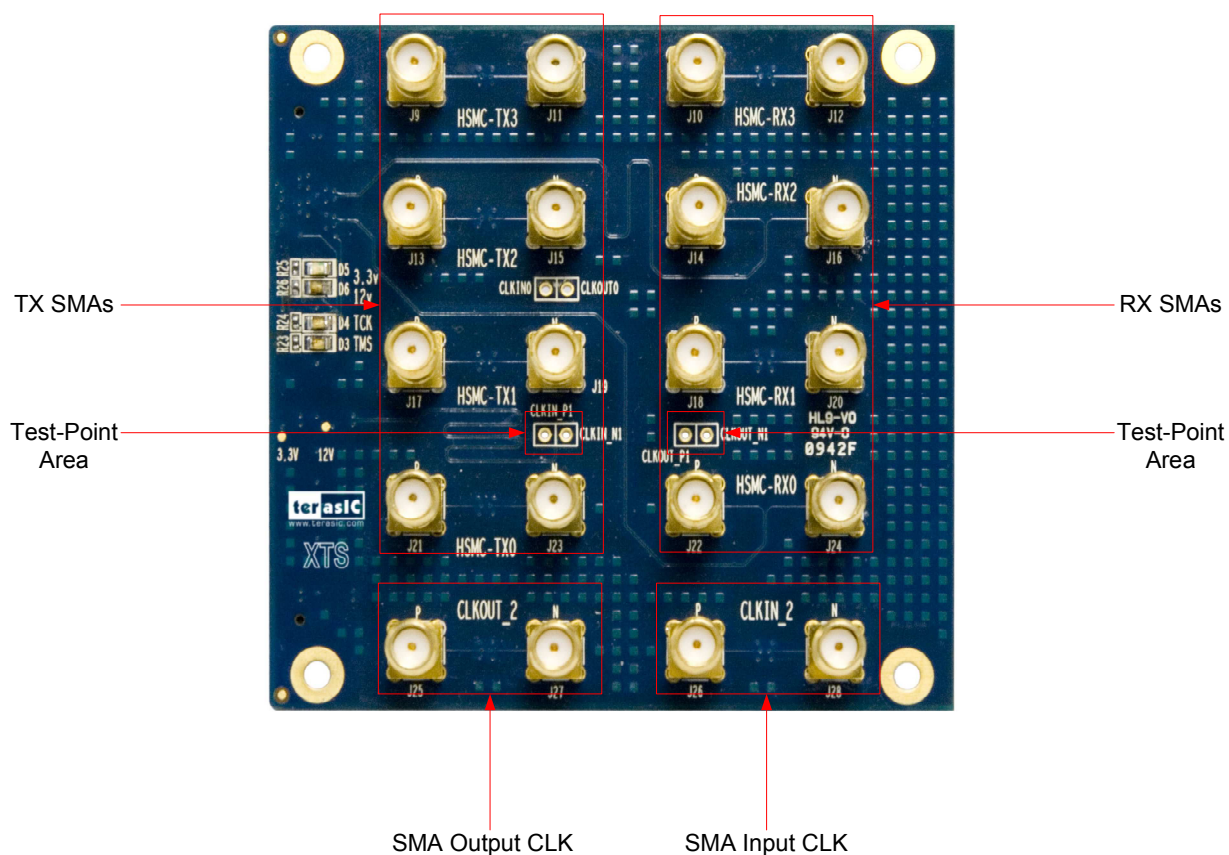


Figure 2.1 The XTS Card PCB and component diagram

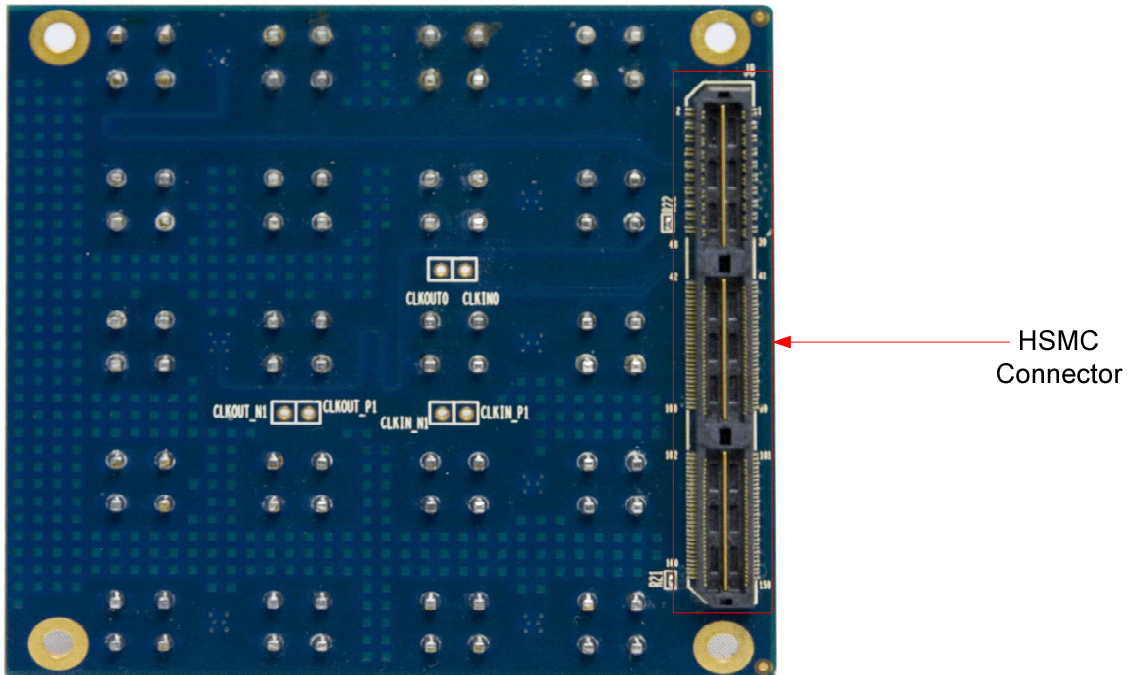


Figure 2.2 The XTS card back side – HSMC connector view

The following components are provided on the XTS card :

- HSMC expansion connector (J8)
- TX SMAs (J9,J11,J13,J15,J17,J19,J21,J23)
- RX SMAs (J10,J12,J14,J16,J18,J20,J22,J24)
- SMA Output CLK (J25,J27)
- SMA Input CLK (J26,J28)

2.2 Block Diagram

Figure 2.3 shows the block diagram of the XTS card.

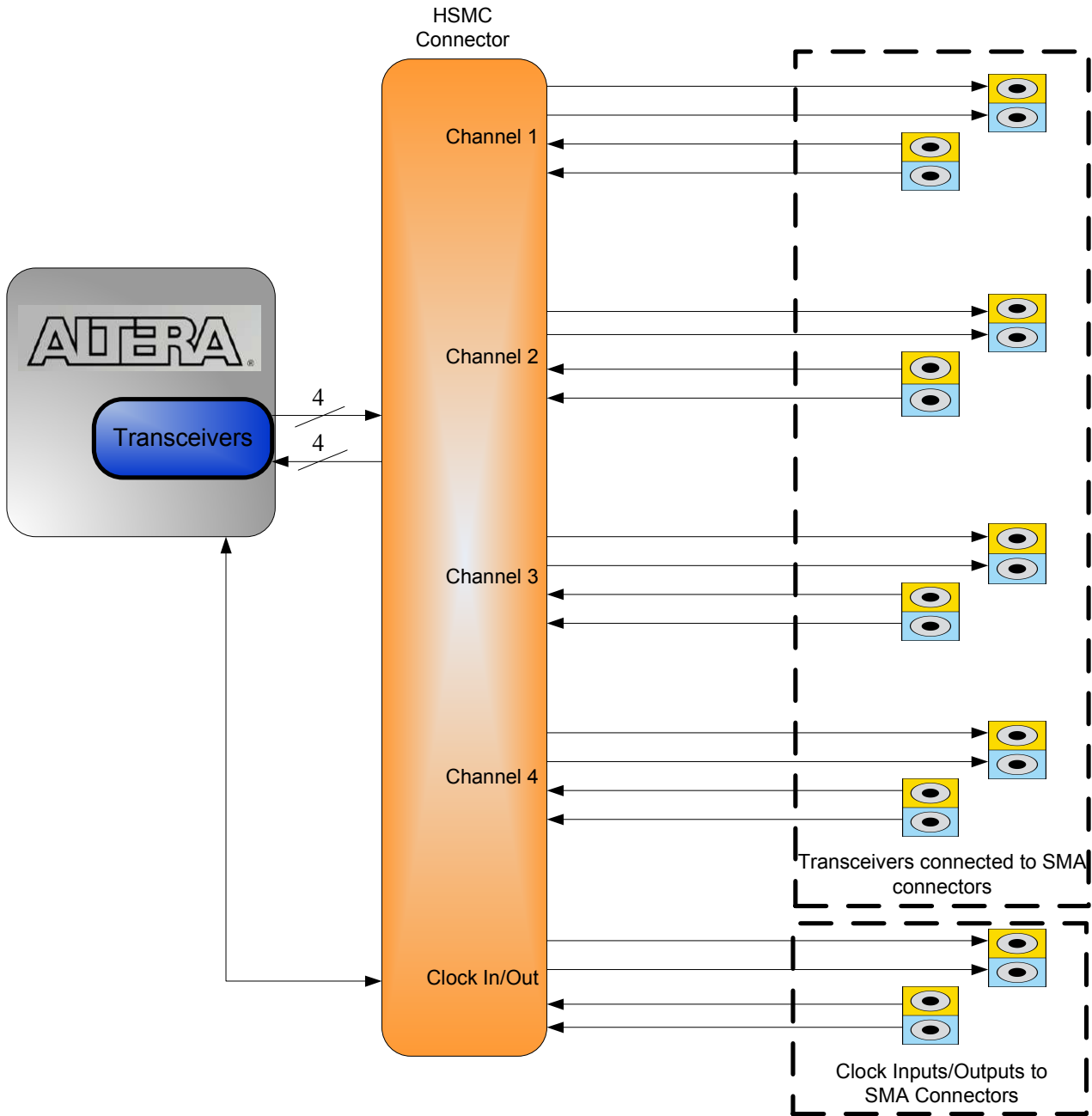


Figure 2.3. The block diagram of the XTS Card

This section will describe the detailed information of the components, connector interfaces, and the pin mappings on the XTS card.

3.1 HSMC Expansion Connector

This section describes the HSMC connector on the XTS card

The XTS card contains an Altera standard HSMC connector. All the other interfaces on the XTS card are connected to the HSMC connector. Figure 3.1 shows the pin-outs of the HSMC connector and Table 3.1 lists the description of each signals corresponding to the HSMC connector.

Board Components

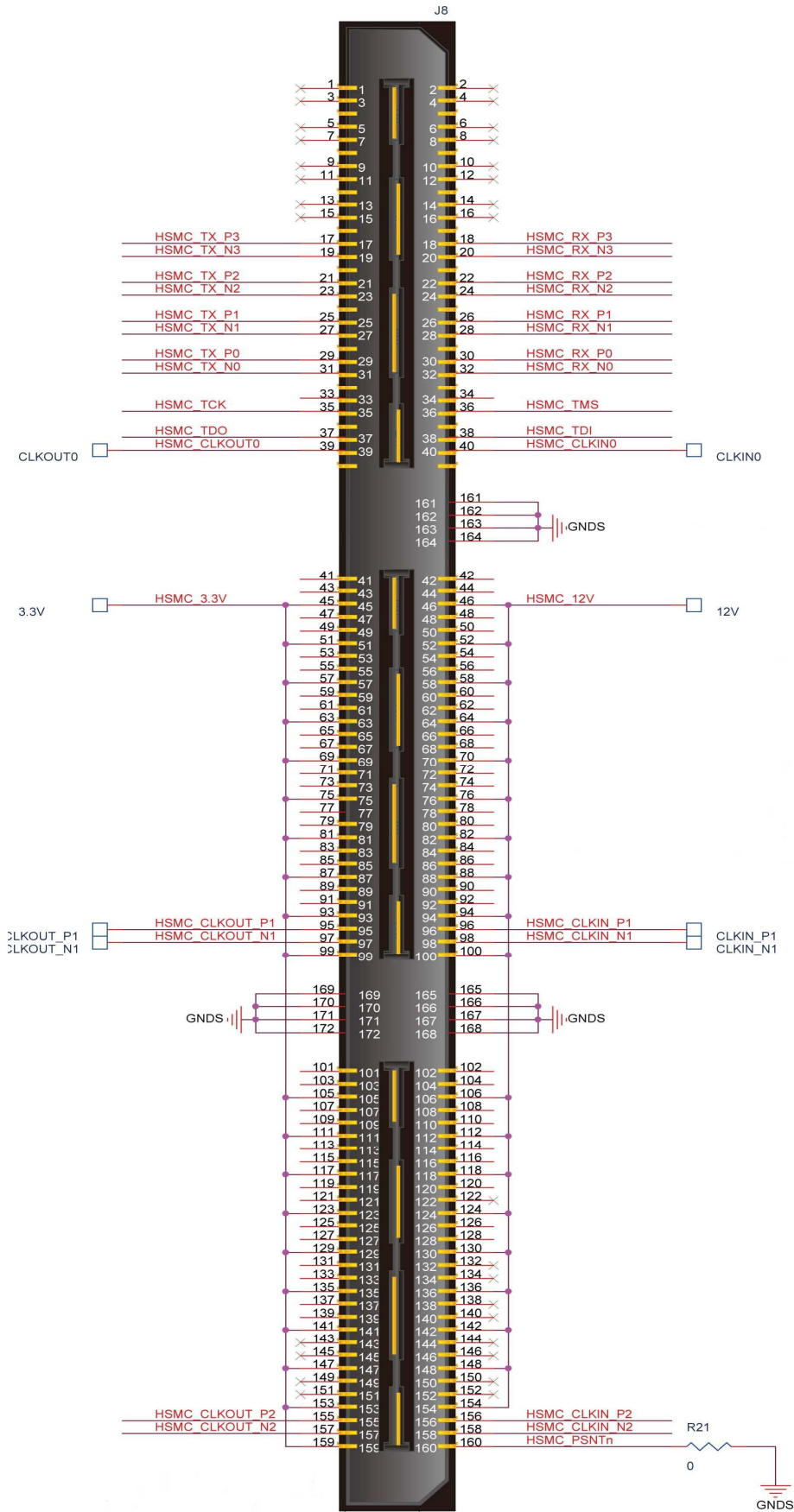


Figure 3.1 The pin-outs of the HSMC connector.

Board Components

Table 3.1 below lists the HSMC signal direction and description

| Pin Numbers | Name | Direction | Description |
|-------------|------------|-----------|------------------------|
| 1 | N.C. | N/A | Not Connect |
| 2 | N.C. | N/A | Not Connect |
| 3 | N.C. | N/A | Not Connect |
| 4 | N.C. | N/A | Not Connect |
| 5 | N.C. | N/A | Not Connect |
| 6 | N.C. | N/A | Not Connect |
| 7 | N.C. | N/A | Not Connect |
| 8 | N.C. | N/A | Not Connect |
| 9 | N.C. | N/A | Not Connect |
| 10 | N.C. | N/A | Not Connect |
| 11 | N.C. | N/A | Not Connect |
| 12 | N.C. | N/A | Not Connect |
| 13 | N.C. | N/A | Not Connect |
| 14 | N.C. | N/A | Not Connect |
| 15 | N.C. | N/A | Not Connect |
| 16 | N.C. | N/A | Not Connect |
| 17 | HSMC_TX_P3 | Output | SMA Transceiver Output |
| 18 | HSMC_RX_P3 | Input | SMA Transceiver Input |
| 19 | HSMC_TX_N3 | Output | SMA Transceiver Output |
| 20 | HSMC_RX_N3 | Input | SMA Transceiver Input |
| 21 | HSMC_TX_P2 | Output | SMA Transceiver Output |
| 22 | HSMC_RX_P2 | Input | SMA Transceiver Input |
| 23 | HSMC_TX_N2 | Output | SMA Transceiver Output |
| 24 | HSMC_RX_N2 | Input | SMA Transceiver Input |
| 25 | HSMC_TX_P1 | Output | SMA Transceiver Output |
| 26 | HSMC_RX_P1 | Input | SMA Transceiver Input |
| 27 | HSMC_TX_N1 | Output | SMA Transceiver Output |
| 28 | HSMC_RX_N1 | Input | SMA Transceiver Input |
| 29 | HSMC_TX_P0 | Output | SMA Transceiver Output |
| 30 | HSMC_RX_P0 | Input | SMA Transceiver Input |
| 31 | HSMC_TX_N0 | Output | SMA Transceiver Output |
| 32 | HSMC_RX_N0 | Input | SMA Transceiver Input |
| 33 | N.C. | N/A | Not Connect |
| 34 | N.C. | N/A | Not Connect |
| 35 | HSMC_TCK | Inout | JTAG |

Board Components

| | | | |
|----|--------------|-------|--------------------|
| 36 | HSMC_TMS | Inout | JTAG |
| 37 | HSMC_TDO | Inout | JTAG |
| 38 | HSMC_TDI | Inout | JTAG |
| 39 | HSMC_CLKOUT0 | N/A | CLKOUT0 Test-Point |
| 40 | HSMC_CLKIN0 | N/A | CLKIN0 Test-Point |
| 41 | N.C. | N/A | Not Connect |
| 42 | N.C. | N/A | Not Connect |
| 43 | N.C. | N/A | Not Connect |
| 44 | N.C. | N/A | Not Connect |
| 45 | 3V3 | Power | Power 3.3V |
| 46 | 12V | Power | Power 12V |
| 47 | N.C. | N/A | Not Connect |
| 48 | N.C. | N/A | Not Connect |
| 49 | N.C. | N/A | Not Connect |
| 50 | N.C. | N/A | Not Connect |
| 51 | 3V3 | Power | Power 3.3V |
| 52 | 12V | Power | Power 12V |
| 53 | N.C. | N/A | Not Connect |
| 54 | N.C. | N/A | Not Connect |
| 55 | N.C. | N/A | Not Connect |
| 56 | N.C. | N/A | Not Connect |
| 57 | 3V3 | Power | Power 3.3V |
| 58 | 12V | Power | Power 12V |
| 59 | N.C. | N/A | Not Connect |
| 60 | N.C. | N/A | Not Connect |
| 61 | N.C. | N/A | Not Connect |
| 62 | N.C. | N/A | Not Connect |
| 63 | 3V3 | Power | Power 3.3V |
| 64 | 12V | Power | Power 12V |
| 65 | N.C. | N/A | Not Connect |
| 66 | N.C. | N/A | Not Connect |
| 67 | N.C. | N/A | Not Connect |
| 68 | N.C. | N/A | Not Connect |
| 69 | 3V3 | Power | Power 3.3V |
| 70 | 12V | Power | Power 12V |
| 71 | N.C. | N/A | Not Connect |
| 72 | N.C. | N/A | Not Connect |
| 73 | N.C. | N/A | Not Connect |

Board Components

| | | | |
|-----|----------------|-------|--------------------------------|
| 74 | N.C. | N/A | Not Connect |
| 75 | 3V3 | Power | Power 3.3V |
| 76 | 12V | Power | Power 12V |
| 77 | N.C. | N/A | Not Connect |
| 78 | N.C. | N/A | Not Connect |
| 79 | N.C. | N/A | Not Connect |
| 80 | N.C. | N/A | Not Connect |
| 81 | 3V3 | Power | Power 3.3V |
| 82 | 12V | Power | Power 12V |
| 83 | N.C. | N/A | Not Connect |
| 84 | N.C. | N/A | Not Connect |
| 85 | N.C. | N/A | Not Connect |
| 86 | N.C. | N/A | Not Connect |
| 87 | 3V3 | Power | Power 3.3V |
| 88 | 12V | Power | Power 12V |
| 89 | N.C. | N/A | Not Connect |
| 90 | N.C. | N/A | Not Connect |
| 91 | N.C. | N/A | Not Connect |
| 92 | N.C. | N/A | Not Connect |
| 93 | 3V3 | Power | Power 3.3V |
| 94 | 12V | Power | Power 12V |
| 95 | HSMC_CLKOUT_P1 | N/A | Differential CLKOUT Test-Point |
| 96 | HSMC_CLKIN_P1. | N/A | Differential CLKIN Test-Point |
| 97 | HSMC_CLKOUT_N1 | N/A | Differential CLKOUT Test-Point |
| 98 | HSMC_CLKIN_N1 | N/A | Differential CLKIN Test-Point |
| 99 | 3V3 | Power | Power 3.3V |
| 100 | 12V | Power | Power 12V |
| 101 | N.C. | N/A | Not Connect |
| 102 | N.C. | N/A | Not Connect |
| 103 | N.C. | N/A | Not Connect |
| 104 | N.C. | N/A | Not Connect |
| 105 | 3V3 | Power | Power 3.3V |
| 106 | 12V | Power | Power 12V |
| 107 | N.C. | N/A | Not Connect |
| 108 | N.C. | N/A | Not Connect |
| 109 | N.C. | N/A | Not Connect |
| 110 | N.C. | N/A | Not Connect |
| 111 | 3V3 | Power | Power 3.3V |

Board Components

| | | | |
|-----|------|-------|-------------|
| 112 | 12V | Power | Power 12V |
| 113 | N.C. | N/A | Not Connect |
| 114 | N.C. | N/A | Not Connect |
| 115 | N.C. | N/A | Not Connect |
| 116 | N.C. | N/A | Not Connect |
| 117 | 3V3 | Power | Power 3.3V |
| 118 | 12V | Power | Power 12V |
| 119 | N.C. | N/A | Not Connect |
| 120 | N.C. | N/A | Not Connect |
| 121 | N.C. | N/A | Not Connect |
| 122 | N.C. | N/A | Not Connect |
| 123 | 3V3 | Power | Power 3.3V |
| 124 | 12V | Power | Power 12V |
| 125 | N.C. | N/A | Not Connect |
| 126 | N.C. | N/A | Not Connect |
| 127 | N.C. | N/A | Not Connect |
| 128 | N.C. | N/A | Not Connect |
| 129 | 3V3 | Power | Power 3.3V |
| 130 | 12V | Power | Power 12V |
| 131 | N.C. | N/A | Not Connect |
| 132 | N.C. | N/A | Not Connect |
| 133 | N.C. | N/A | Not Connect |
| 134 | N.C. | N/A | Not Connect |
| 135 | 3V3 | Power | Power 3.3V |
| 136 | 12V | Power | Power 12V |
| 137 | N.C. | N/A | Not Connect |
| 138 | N.C. | N/A | Not Connect |
| 139 | N.C. | N/A | Not Connect |
| 140 | N.C. | N/A | Not Connect |
| 141 | 3V3 | Power | Power 3.3V |
| 142 | 12V | Power | Power 12V |
| 143 | N.C. | N/A | Not Connect |
| 144 | N.C. | N/A | Not Connect |
| 145 | N.C. | N/A | Not Connect |
| 146 | N.C. | N/A | Not Connect |
| 147 | 3V3 | Power | Power 3.3V |
| 148 | 12V | Power | Power 12V |
| 149 | N.C. | N/A | Not Connect |

Board Components

| | | | |
|-----|----------------|--------|-----------------------------|
| 150 | N.C. | N/A | Not Connect |
| 151 | N.C. | N/A | Not Connect |
| 152 | N.C. | N/A | Not Connect |
| 153 | 3V3 | Power | Power 3.3V |
| 154 | 12V | Power | Power 12V |
| 155 | HSMC_CLKOUT_P2 | Output | SMA differential Output CLK |
| 156 | HSMC_CLKIN_P2 | Input | SMA differential Input CLK |
| 157 | HSMC_CLKOUT_N2 | Output | SMA differential Output CLK |
| 158 | HSMC_CLKIN_N2 | Input | SMA differential Input CLK |
| 159 | 3V3 | Power | Power 3.3V |
| 160 | HSMC_PSNTn | Power | Power Ground |

This chapter illustrates the reference design for the XTS HSMC card

4.1 Introduction

This section describes the functionality of the demonstration briefly.

The demonstration illustrates a loopback test for transceiver channels using the XTS daughter card and the Stratix IV GX FPGA Development board. Figure 4.1 depicts the basic block diagram for this demonstration. The demonstration is intended for users to provide a basic introduction to the XTS daughter card with the procedures to control different hardware and software settings.

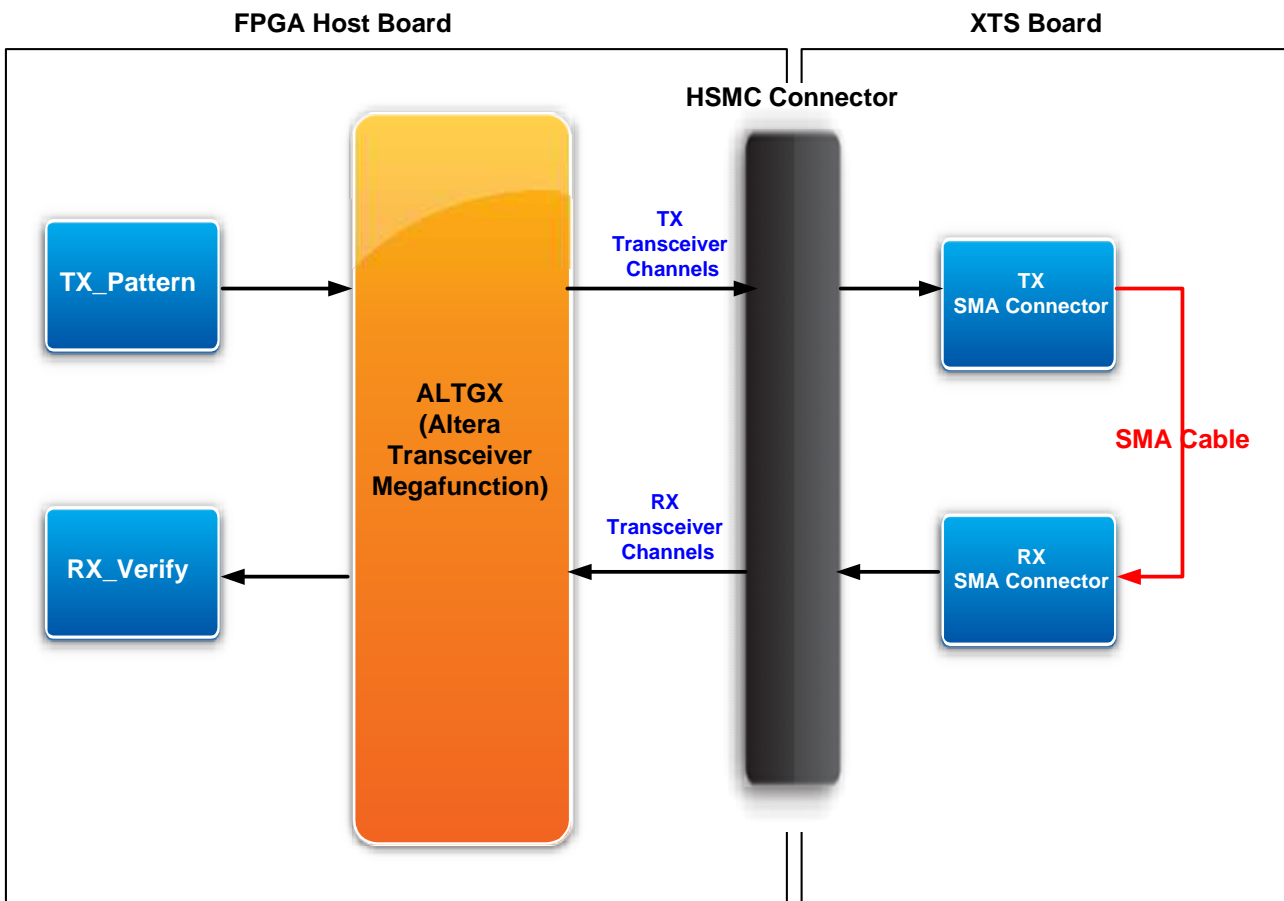


Figure 4.1 Block diagram of the loopback test function

4.2 System Requirements

The following items are required for the XTS loopback demonstration.

- XTS x 1
- Stratix IV GX FPGA Development Board x 1
- SMA Cable x 8

4.3 Setup the Demonstration

Figure 4.2, 4.3, 4.4 and 4.5 shows how to setup hardware for the XTS demonstration.

- i. Connect SMA Cable to J21 and J23 as shown in Figure 4.2 to short the positive signal of the transceiver channel 0 (HSMC-TX0p).

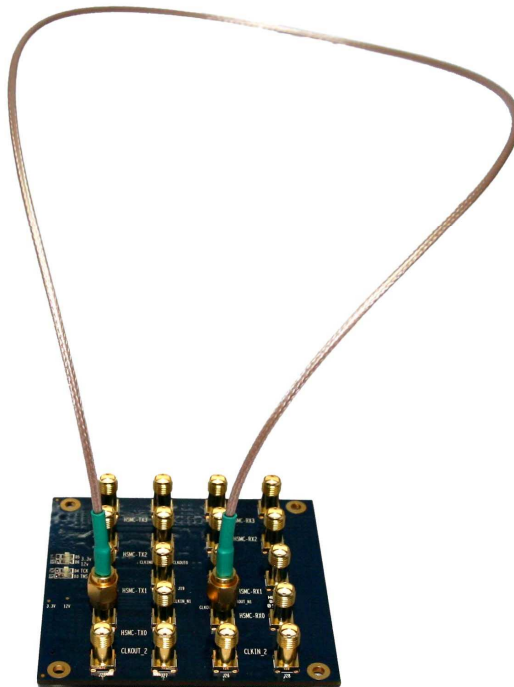


Figure 4.2 Short J21 and J22 via SMA Cable

- ii. Connect SMA Cable to J22 and J24 as shown in Figure 4.3 to short the negative signal of the transceiver channel 0 (HSMC-TX0n).

Demonstration

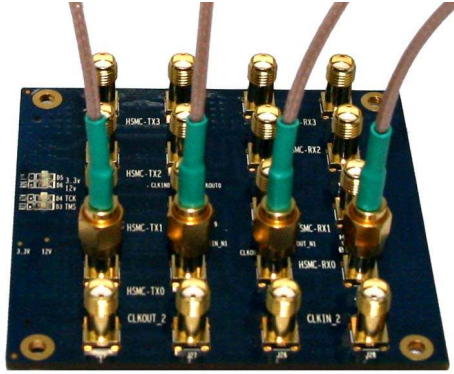


Figure 4.3 Short J23 and J24 via SMA Cable

- iii. Repeat steps i and ii to short the other transceiver channels as shown in Figure 4.4.

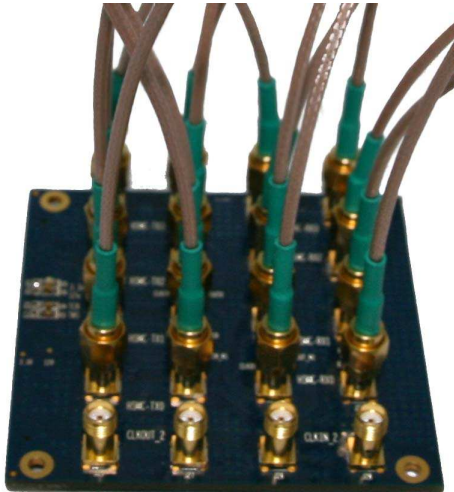


Figure 4.4 Short all the transceiver channels

- iv. Connect the XTS card to Stratix IV GX FPGA Development Board (See Figure 4.5).

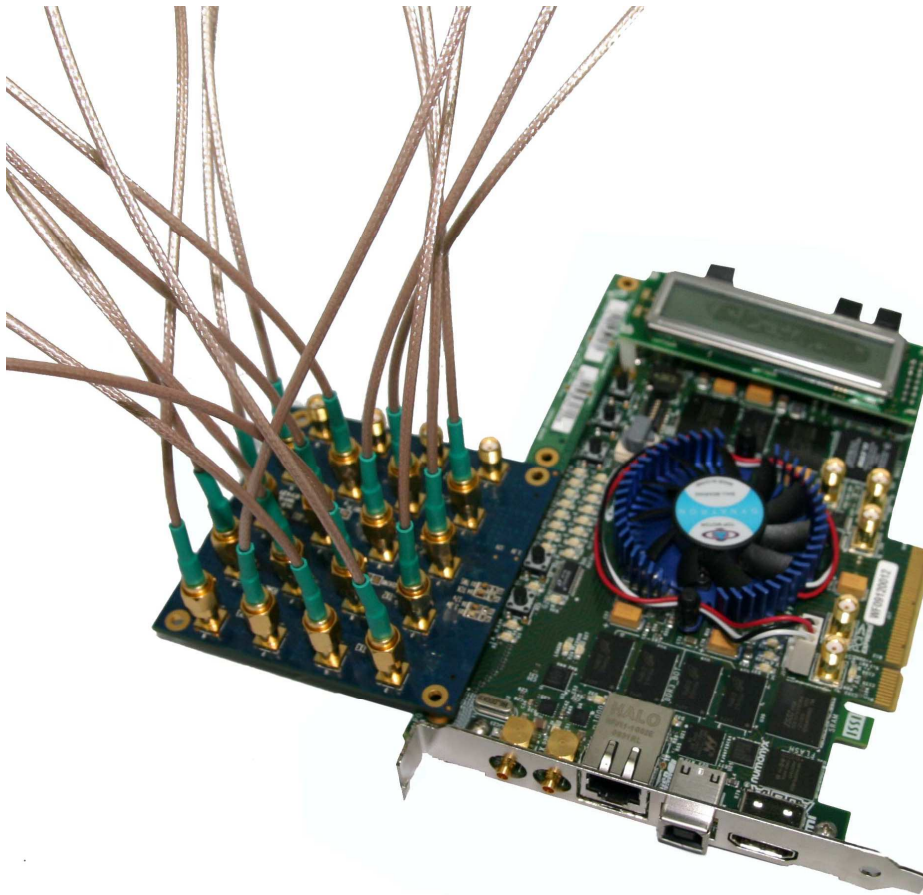


Figure 4.5 Transceiver loopback test setup

Note: The XTS card must be connected to HSMC Slot “A” of the Stratix IV GX FPGA Development Board for this demonstration

4.4 Demo Operation

This section describes the procedures of running the demonstration

FPGA Configuration

Demonstration Setup, File Locations, and Instructions

Transceiver Loopback Test Demo:

- Project directory: xts_loopback_test_s4gfp
- Bit Stream used: xts_loopback_test_s4gfp.sof
- Stratix IV GX FPGA Development Kit Setup
 - ✓ Set SW4 switches 1, 2, 4 in the “up” position and switches 3, 5, 6, 8 in the “down” position
 - ✓ Set the rotary switch (SW2) to the 0 position
- Power on the Stratix IV GX FPGA Development Board and download the SOF file (xts_loopback_test_s4gfp.sof)
- LED0~LED3 shows the test results for transceiver channels 0~3, respectively. If the LED is blinking, it

indicates the test has passed.

- Remove one of the SMA cable from one of the connector so that the loopback will fail. A Failure is indicated on the Stratix IV GX FPGA Dev Kit when the LED turns ON
- To reset the board test system, press and release the PB0 reset button on the host board
- Press and release PB1 can insert error pattern and create failure condition.



5.1 Revision History

| Date | Change Log |
|--------------|-----------------------------|
| DEC 29, 2009 | Initial Version |
| JAN 12, 2010 | Added demonstration chapter |

5.2 Always Visit XTS Webpage for New Main board

We will be continuing providing interesting examples and labs on our XTS

webpage. Please visit www.altera.com or xts.terasic.com for more information.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [Daughter Cards & OEM Boards](#) category:

Click to view products by [Terasic Technologies](#) manufacturer:

Other Similar products are found below :

[ADZS-21262-1-EZEXT](#) [27911](#) [MPC5777C-416DS](#) [KITMPC5744DBEVM](#) [SPC56ELADPT144S](#) [TMDXRM46CNCD](#) [DM160216](#) [EV-ADUCM350GPIOTHZ](#) [EV-ADUCM350-BIO3Z](#) [ATSTK521](#) [1130](#) [MA160015](#) [MA240013](#) [MA240026](#) [MA320014](#) [MA330014](#) [MA330017](#) [TMDSCNCD28054MISO](#) [MIKROE-2152](#) [MIKROE-2154](#) [MIKROE-2381](#) [TSSOP20EV](#) [MIKROE-1108](#) [MIKROE-1516](#) [SPS-READER-GEVK](#) [AC244049](#) [AC244050](#) [AC320004-3](#) [2077](#) [ATSMARTCARD-XPRO](#) [EIC - Q600 -230](#) [ATZB-212B-XPRO](#) [SPC560PADPT100S](#) [SPC560BADPT64S](#) [MA180018](#) [EIC - Q600 -220](#) [AC164134-1](#) [BOB-12035](#) [STM8/128-D/RAIS](#) [AC164127-6](#) [AC164127-4](#) [AC164134-3](#) [AC164156](#) [MA320021](#) [MA320024](#) [DFR0285](#) [DFR0312](#) [DFR0356](#) [MA320023](#) [MIKROE-2564](#)