

Terasic TR5 FPGA Development Kit

1. Overview

Terasic TR5 FPGA Development Kit



- **Company:** Terasic
- **Tel:** +886-3-5750880
- **Fax:**+886-3-5726690
- **Add:** 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan



TR5 FPGA development kit using the Altera Stratix V GX FPGA provides high-speed operation and transmission with large capacity up to 952K LE.

The board provides **four FMC connectors** and a **2x20 GPIO connector**. It offers a total of more than 500 I/Os for users to expand the usage with the peripherals connected. There are **built-in** high-speed **DDR3 memory** and **SSRAM** to increase the bandwidth for accessing large amounts of data for high-speed computation. In addition, the board also has **PCIe** and **SATA interfaces** for high-speed data transmission.



Four FMC connectors



2x20 GPIO connector



DDR3 memory



SSRAM



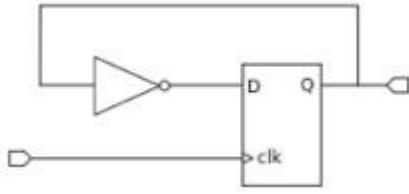
PCIe



SATA

The main applications of TR5 are ASIC prototyping validation and the establishment of prototype systems. The FMC connectors onboard are standard interfaces. Users can purchase or develop various FMC daughter cards to expand their system. For developers who need to use multiple FPGAs, they can leverage Terasic's FMC or PCIe cable to establish an inter-stackable multi-boards communication system. Users can also purchase Terasic PCIe daughter card to communicate with host PC.

- **Company: Terasic**
- **Tel: +886-3-5750880**
- **Fax: +886-3-5726690**
- **Add: 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan**



The TR5 development kit includes a variety of reference design examples for peripherals such as DDR3 SDRAM, SD card, USB-to-UART, SATA, PCIe, and an FMC connector. The kit is user friendly and enables users to quickly get started or verify the functions. The kit also provides a tool named "System Builder" software. It can automatically

generate a complete Quartus project including pin assignment and clock configuration IP upon users' selections of peripherals, FMC daughter cards, and a designated clock frequency. It helps users avoid time-consuming and error-prone manual pin-assignment work.

2. Specification

FPGA Device

5SGXEA7N2F45C2N

- 622K Logic Elements (LEs)
- 57.16 Mbits Memory
- 256 Variable-precision DSP Blocks
- 512 18x18-bit Multipliers Blocks
- 28 Fractional PLLs and 4DLLs
- ***FPGAs with higher LEs are also available. Please contact Terasic sales team.**

FPGA Configuration

- MAX II CPLD EPM2210 System Controller for Fast Passive Parallel (FPP x16) Configuration
- On-board USB-Blaster II for use with Quartus II Programmer

Memory

- 128MB Flash with a 16-bit Data Bus
- 2MB SSRAM (1M x 16)

DDR3 SO-DIMM Socket

- Up to 8GB Capacity
- Maximum Clock Rate at 933 MHz

- **Company: Terasic**
- **Tel: +886-3-5750880**
- **Fax: +886-3-5726690**
- **Add: 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwa**

On-board Clocks

- 50 MHz Fixed Oscillator
- CDCM6208 Programmable PLL
- LMK04906B Programmable PLL

SMA Connectors

- SMA Connector Pair for Differential Clock Input and Output

Buttons, Switches and LEDs

- 4 User-controllable LEDs
- 4 Buttons for User-defined Inputs
- 4 Slide Switches for User-defined Inputs

Mini PCI Express Gen 2x4 Connector

- Support PCI Express Gen2 x4 (5.0Gbps/lanes)
- High-speed Transceiver Channels up to 5 Gbps
- Support Downstream Mode

Two Serial ATA Ports

- SATA 3.0 Standard at 6Gbps Signaling Rate

Four FPGA Mezzanine Card (FMC) Connectors

- 2 HPC (high-pin count) FMC connectors up to 172 x2 Single-end I/O, 2 LPC (low-pin count) FMC connectors up to 76 x2 Single-end I/O
- 10 Transceiver Channels for each HPC FMC connector and 1 Transceiver Channel for LPC each HPC FMC connector
- FMC VITA 57.1 Compliant
- Adjustable VADJ : 1.2V/1.5V/1.8V/2.5V/3.0V.

One 40-pin Expansion Header

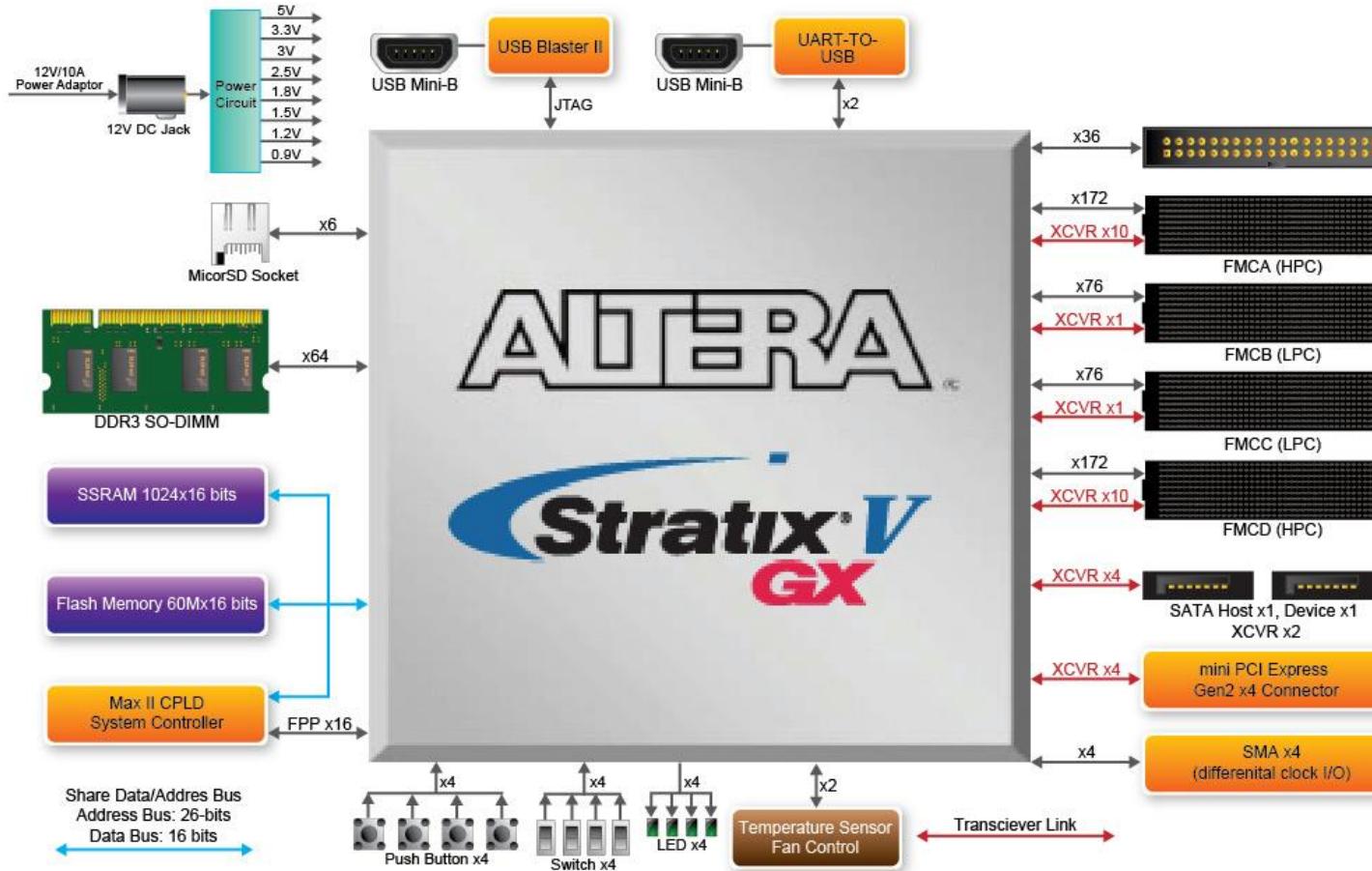
- 36 FPGA I/O pins; 4 power and ground lines
- I/O standards: 3.3V

- **Company: Terasic**
- **Tel: +886-3-5750880**
- **Fax: +886-3-5726690**
- **Add: 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwa**

Power

- DC 12V Input

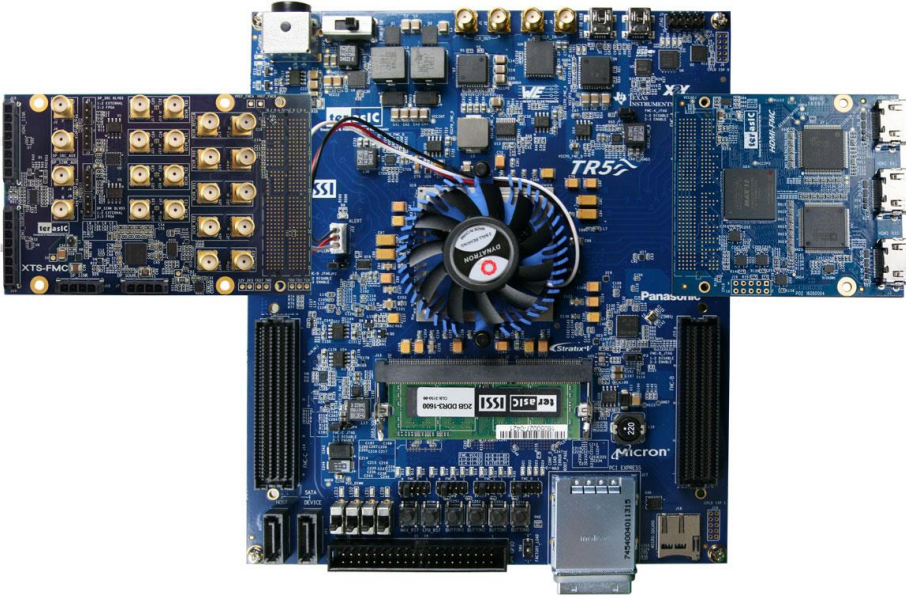
Block Diagram



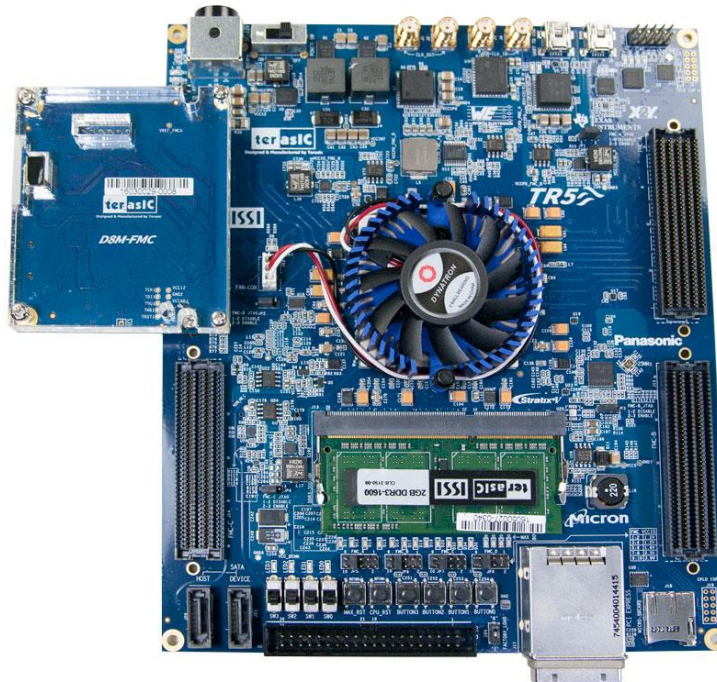
Expansion with FMC Connector

Connect to the FMC daughter cards: XTS-FMC and HDMI-FMC

- **Company: Terasic**
- **Tel: +886-3-5750880**
- **Fax: +886-3-5726690**
- **Add: 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan**

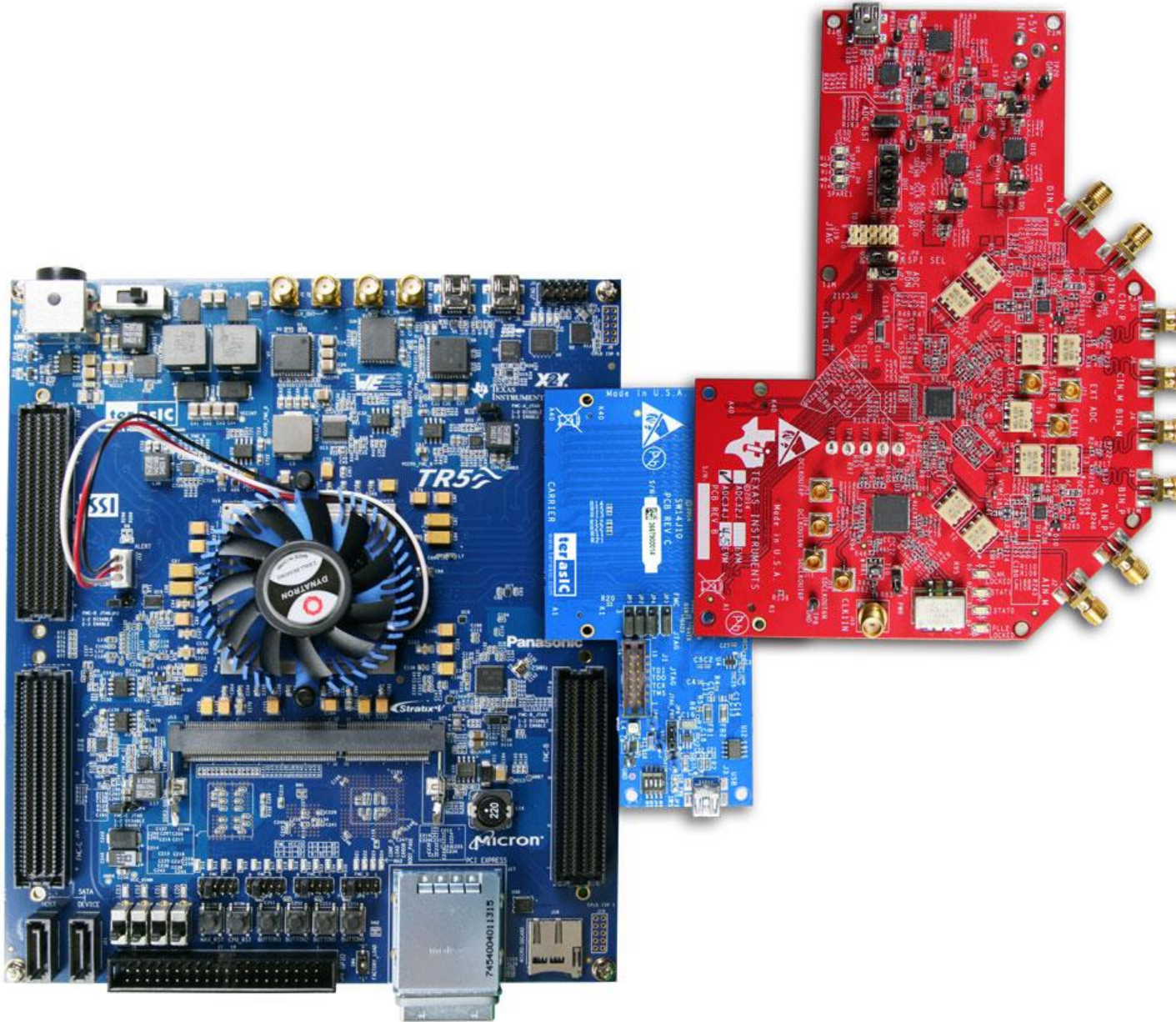


Connect to the D8M-FMC FMC daughter card



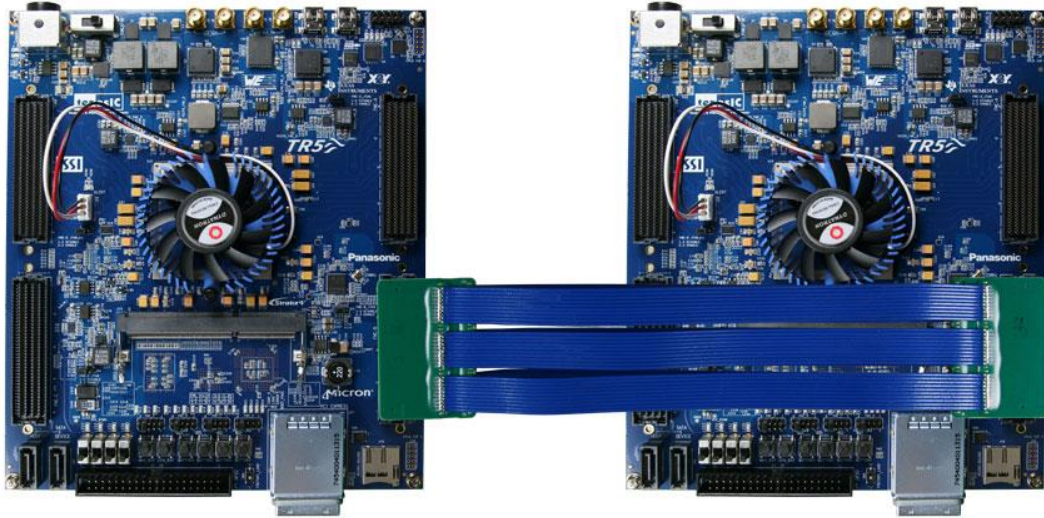
- **Company: Terasic**
- **Tel: +886-3-5750880**
- **Fax: +886-3-5726690**
- **Add: 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan**

Connect to TI JESD board through Terasic JESD-FMC adapter card



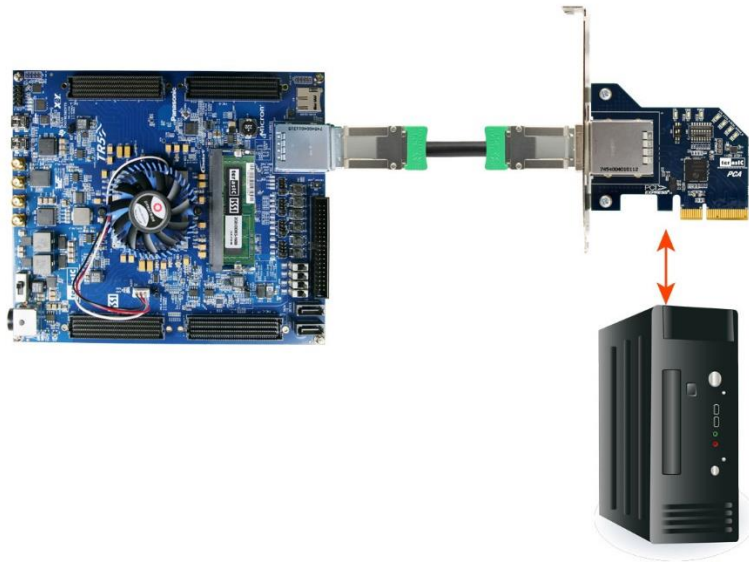
Board to board connection through FMC cable

- **Company:** Terasic
- **Tel:** +886-3-5750880
- **Fax:**+886-3-5726690
- **Add:** 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwa



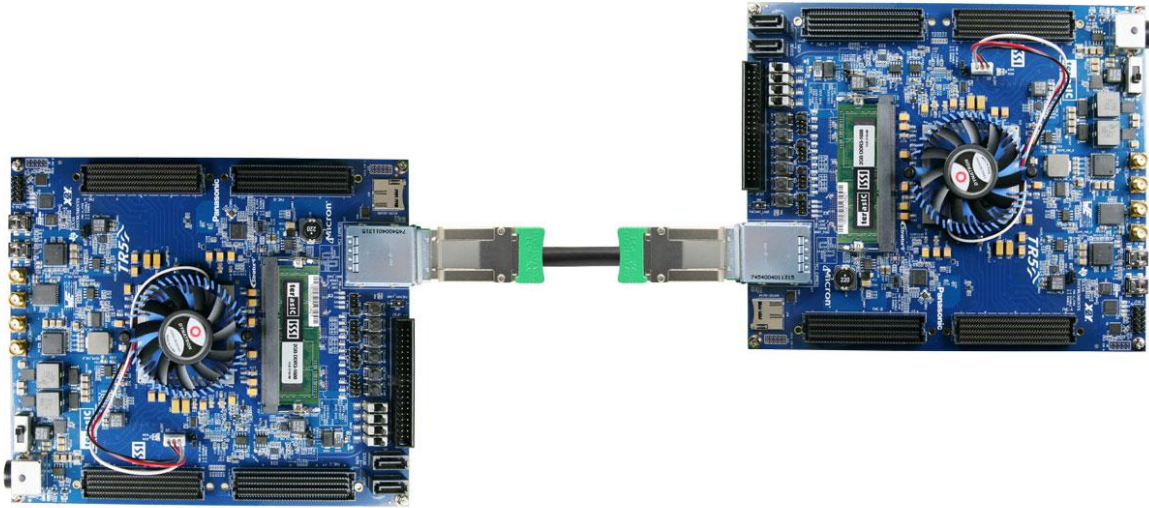
Expansion with PCI Express Cabling Connector

Connect to PC with [PCIe Cabling](#) and Terasic [PCA](#) adapter card



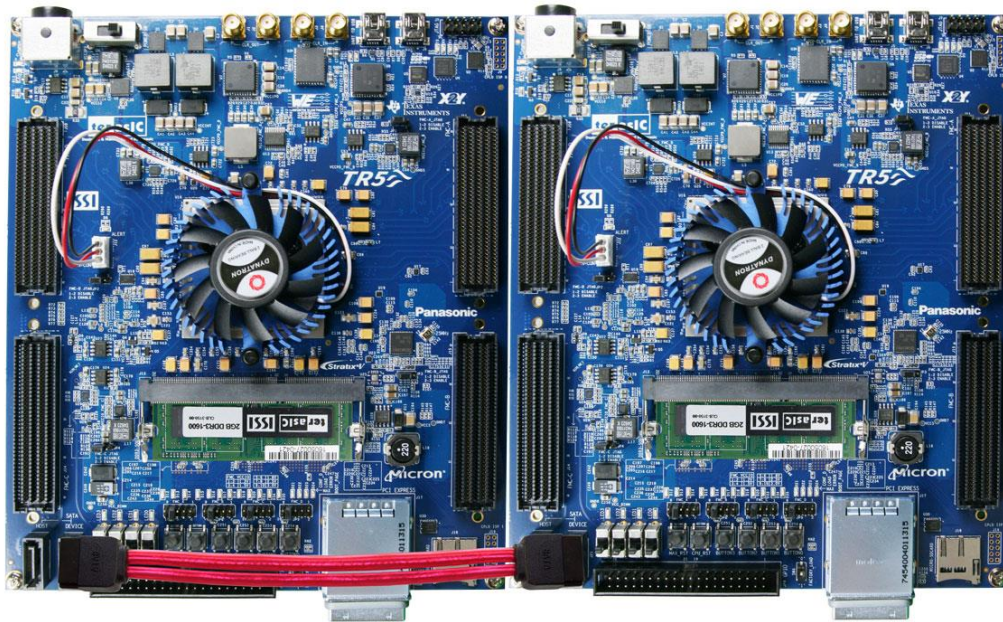
Board to board connection through [PCIe Cable](#)

- **Company: Terasic**
- **Tel: +886-3-5750880**
- **Fax: +886-3-5726690**
- **Add: 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan**



Expansion with SATA Connector

Board to board connection through SATA cable



- **Company: Terasic**
- **Tel: +886-3-5750880**
- **Fax: +886-3-5726690**
- **Add: 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan**

Expansion with GPIO Connector

Connect to the [DSM](#) daughter card



Connect to the [MTL2](#) daughter card



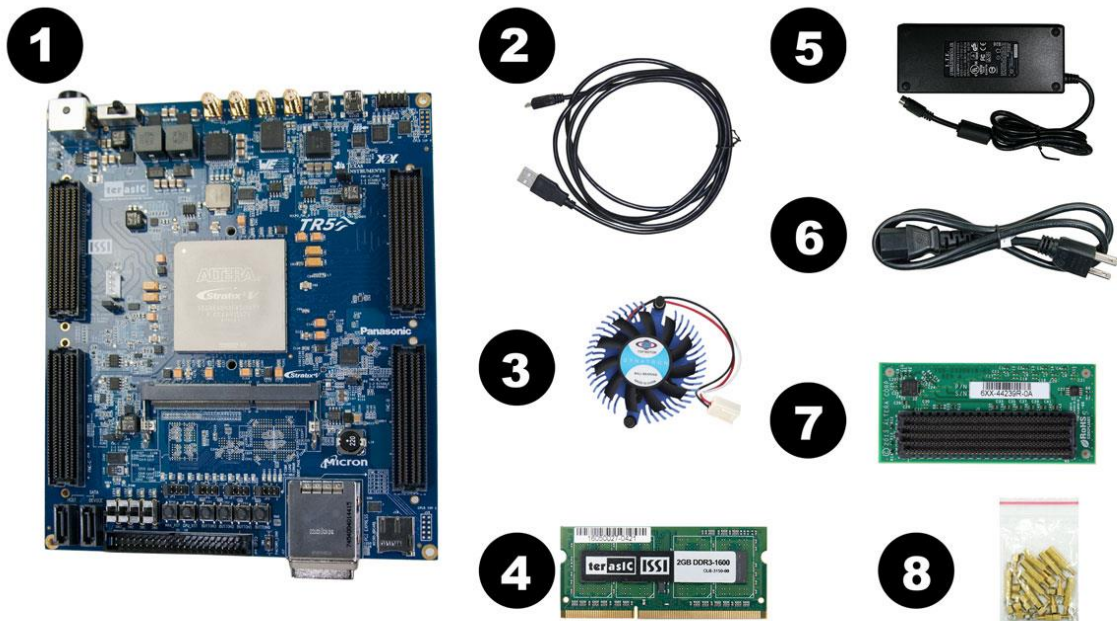
Connect to the [LT24](#) daughter card

- **Company:** Terasic
- **Tel:** +886-3-5750880
- **Fax:** +886-3-5726690
- **Add:** 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan



3. Kit content

- **Company: Terasic**
- **Tel: +886-3-5750880**
- **Fax: +886-3-5726690**
- **Add: 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwa**



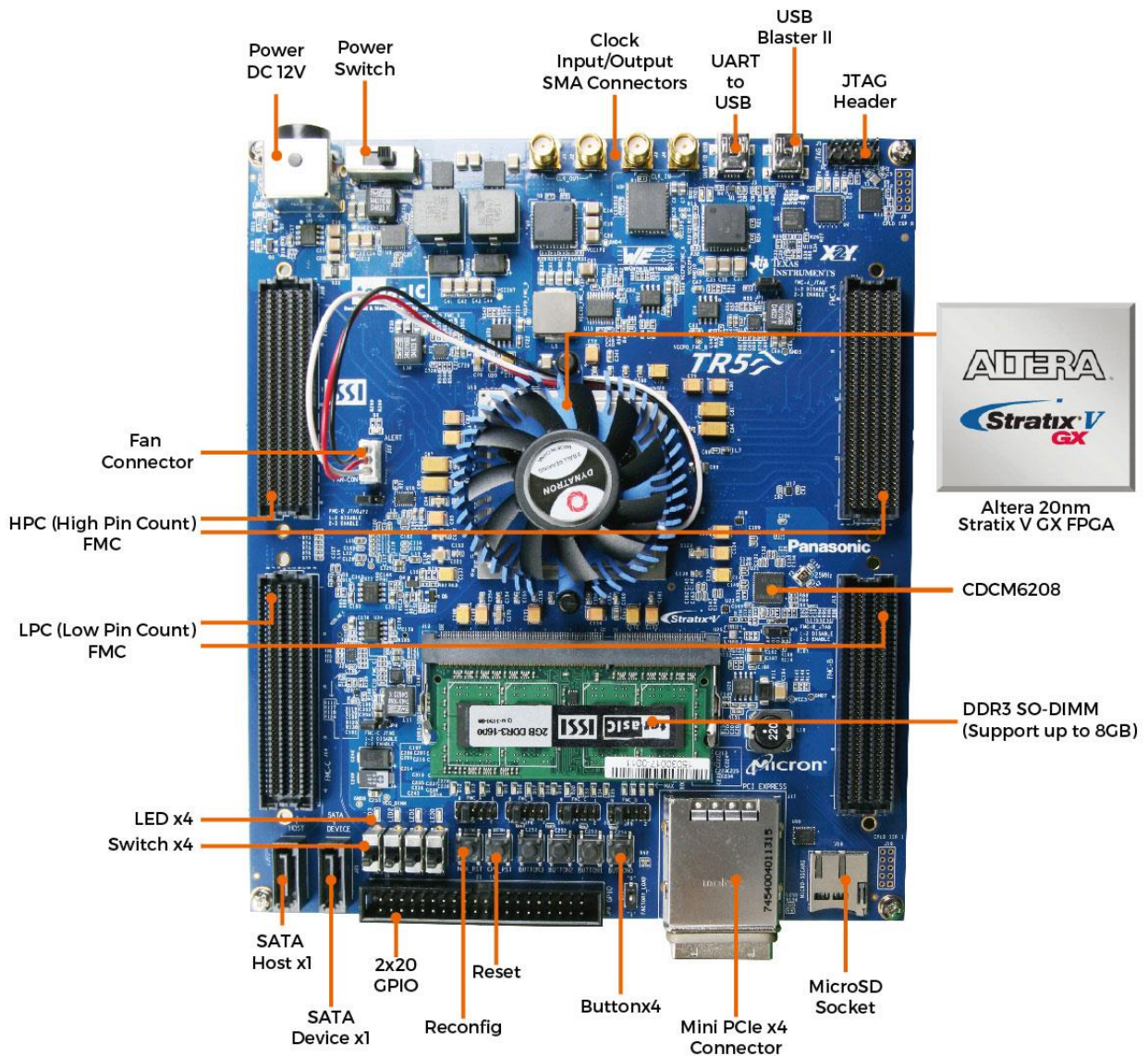
Quartus design software license is not included in this kit.

The TR5 package includes:

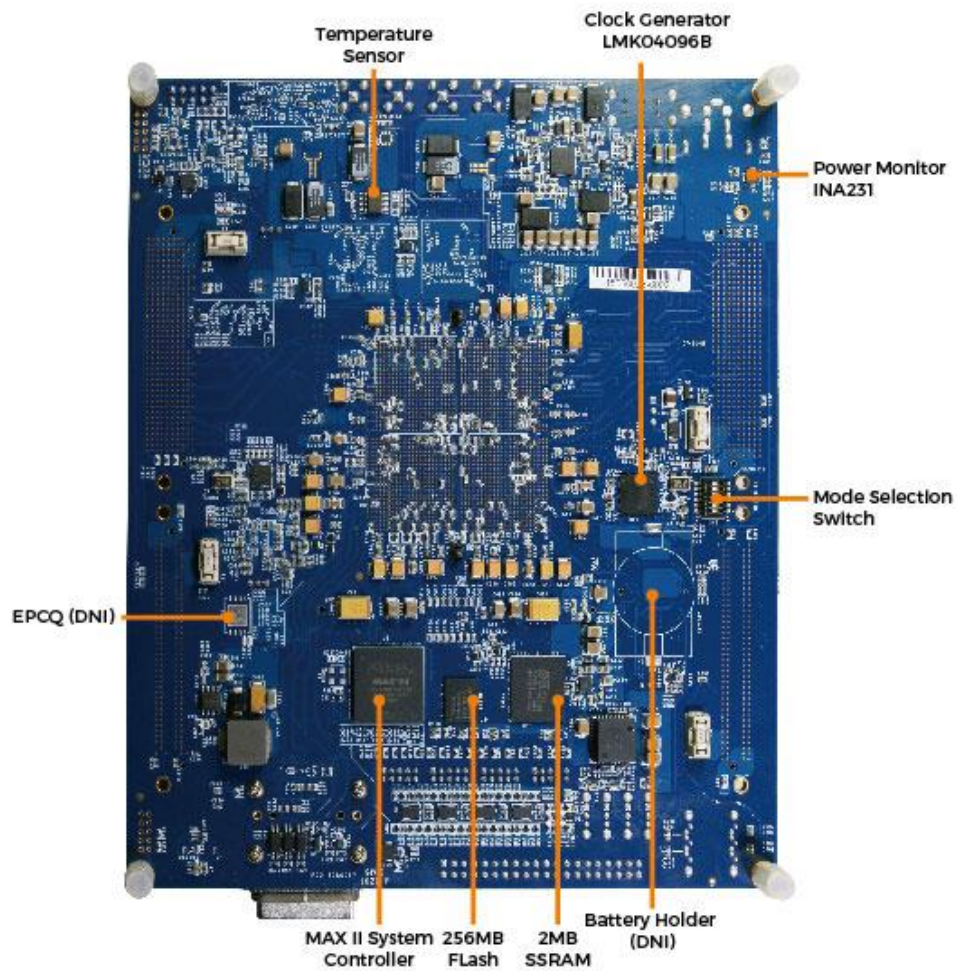
1. TR5 FPGA Development Kit
2. Type A to Mini-B USB Cable
3. Fan (Installed)
4. 2GB DDR3-1600 SO-DIMM Module (Installed)
5. 12V DC Power Supply
6. AC Power Cord
7. FMC Loopback Card
8. Screws, Copper Stands, and Silicon Footstands

4. Layout

- **Company: Terasic**
- **Tel: +886-3-5750880**
- **Fax: +886-3-5726690**
- **Add: 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan**



- **Company:** Terasic
- **Tel:** +886-3-5750880
- **Fax:** +886-3-5726690
- **Add:** 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan



Size : 160.8 x 188.5 mm

- **Company: Terasic**
- **Tel: +886-3-5750880**
- **Fax: +886-3-5726690**
- **Add: 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan**