Inrevium Product Portfolio

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Base Boards

Virtex UltraScale – High Density Scalable ASIC Prototyping Platform

The Virtex UltraScale prototyping platform is intended for development of large SoCs and incorporates single/dual Virtex UltraScale 440 FPGAs, the world’s largest FPGA with performance features that include high-speed internal logic and high-bandwidth interfaces.

FEATURES
- Shorten development time by providing an ASIC emulation platform
- 2 kinds of memory modules: DDR4 SODIMM and DDR3 SODIMM.
- Support software adjustment for FMC I/O ADJ voltage.

DESCRIPTION
- Device:
  o XCVU440-2FLVA2892C x1 (solo) / x2(dual)
  o XC7Z030-2FFG676 x1
- Memory:
  o Up to 8GB(solo) / 16GB(dual) DDR3 and/or DDR4 SODIMM
- Interface
  o 4x(solo) / 8x(dual) HPC-FMC connectors
  o 5x(solo) / 10x (dual) QTH connectors
  o Total up to 2250 GPIO, 88 GTH
  o USB 3.0
  o Gigabit Ethernet
  o JTAG header
  o UART debug pin
  o PMOD interface
  o Power LEDs
  o DIP/Push switches, LEDs, Test pins
- Configuration:
  o microSD Card
  o SPI Flash

Part Number: TBS-VU-440-LSI SOLO/DUAL
Kintex UltraScale – 8K4K Image Evaluation Platform

The platform accelerate development Super-High Definition 8K image Processing

Features

- 20nm Kintex UltraSCALE XCKU060/115-2FFVA1517
- 2 x DDR4 SDRAM(2,400Mbps)64bit enables wide band data buffer
- Provide the extensibility with GTH transceiver
  - 7 x FMC connectors (see the example table below)
  - On board 4 x SFP + socket for Video stream through Ethernet

<table>
<thead>
<tr>
<th>FMC 0</th>
<th>GTH</th>
<th>Standard IO</th>
<th>FMC Card Connect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>72 pin 3.3V TB-TZ-02S-EHC</td>
</tr>
<tr>
<td>FMC1</td>
<td>8</td>
<td>8</td>
<td>72pin 1.8V TB-FMCH-DP2 TB-FMCH-12GSDI</td>
</tr>
<tr>
<td>FMC2</td>
<td>8</td>
<td>8</td>
<td>12pin 1.8V TB-FMCH-VBY1-AO</td>
</tr>
<tr>
<td>FMC3</td>
<td>8</td>
<td>8</td>
<td>72pin 1.8V TB-FMCH-DP2 TB-FMCH-12GSDI</td>
</tr>
<tr>
<td>FMC4</td>
<td>4</td>
<td>4</td>
<td>12pin 1.8V TB-FMCH-VBY1-AO (pin)</td>
</tr>
<tr>
<td>FMC5</td>
<td>0</td>
<td>8</td>
<td>12pin 1.8V TB-FMCH-VBY1-AO (pin)</td>
</tr>
<tr>
<td>FMC6</td>
<td>4</td>
<td>4</td>
<td>12pin 1.8V TB-FMCH-VBY1-AO</td>
</tr>
</tbody>
</table>

Description

- Device : XCKU060/115-2FFVA1517
- Memory : DDR4-SDRAM (64bit) x2
- Interface :
  - FMC
  - SFP + Socket
  - RS-232C (Connector is USB-B type)
  - PMOD (Digilent module interface)
  - 10pin header for XILINX cable
  - General pin header
  - Push switch , DIP switch , LED
- Clock :
  - 200MHz for DDR4
  - 148.5MHz for image processing
  - 156.25MHz for high speed Serdes
  - PLL for general purpose
- Configuration : QUAD Dual-SPI Flash
- Board size:H280 x W313(mm)
- Power (AC adopter)

Reference Design

- DDR4 memory controller (MIG)
- FMC Connection: Chip2Chip design

Part Number TB-KU-060-ACDC-8K / TB-KU-115-ACDC-8K

2 Not all VITA57.1 signals are populated.
The Quattro platform accelerates development across a wide range of industries including but not limited to Video/Broadcast, Aerospace and Communications.

### Features
- 20nm Kintex UltraScale FPGA
- 2x DDR4 SDRAM (2,400Mbps) 64-bit enables wideband data buffering
- Expandable via four (4) FMC HPC connectors
  - 10 GTH transceivers per FMC (one implemented as 8+2 due to SLR)
- Substantial I/Os for LVDS or single ended connectivity
- On board SFP+ socket for Video stream through Ethernet

### Description
- **Device**: Kintex UltraScale XCKU115-2FFVA1517
- **Memory**: 4GB DDR4-SDRAM (64bit) 2,400Mbps
- **Interface**:
  - FMC x4
  - On board Zynq for system management and processing
  - SFP+ Interface
  - General purpose LEDs and switches
  - Proven operation with inrevium HDMI4K, 12G-SDI, DP1.2, V-by-One®, MIPI, and Zynq FMCs
  - Multi-board synchronization hardware support
- **Clock**:
  - Flexible clocking architecture, featuring
    - Multiple clocks
    - Programmable clock generator, Quad PLL
- **Configuration**: QUAD Dual-SPI Flash
- **Board size**: H208 x W313(mm)
- **Power**: +12V (AC adopter)

### Part Number
TB-KU-115-QUATTRO

2 Not all VITA57.1 signals are populated.
**Virtex-7 – FPGA ASIC Development Test Platform**

Reducing development schedule for SoC emulation and ASIC development

**FEATURES**
- Shortens development time by providing an ASIC emulation platform
- Provision of high-speed interfaces including high-speed I/O connectors and expansion FPGA results in an ASIC development platform with excellent flexibility and expandability
- Use of supplied reference designs allows testing to be performed under actual operating conditions with high clock speed

**DESCRIPTION**
- **Device:**
  - XC7V2000T-2FLG1925
  - XC7K325T-2FFG900
- **Memory:**
  - DDR3 SDRAM 2Gbit x8
- **Interface**
  - Connectors for FMC cards:
    - High-speed I/O connector (120 pin) x5
  - PCI Express Gen 2 8-lane
  - USB 2.0/3.0 (device) Type-B
  - MMCX clock input/output
  - DVI (Tx, Rx), Full HD supported
  - 10pin header for XILINX cable
  - General 24pin header
  - Push switch, DIP switch, LED
- **Configuration**:
  - microSD Card (Virtex-7 FPGA Only)
  - NAND Flash (Virtex-7 FPGA Only)
  - QSPI Flash (Kintex-7 FPGA)
- **Power Supply**
- **Board size**: H300 x W400(mm)

**BLOCK DIAGRAM**

**REFERENCE DESIGN**
- DDR3 memory controller (MIG)
- DVI, USB3.0/2.0 Interface design

Part Number: TB-7V-2000T-LSI

Please ask your sales engineer!
Virtex-7 – FPGA Large-Scale PCI Express Gen3 Evaluation Platform

Flexibility and extensible for Hi-Speed and Hi-Density application

Features

The TB-7VX-zzzzT-PCIEXP series also provides x8-lane PCI Express Gen3 (using FPGA integrated block for PCI Express) and the high-speed memory interface 1,600 Mbps DDR3 SDRAM SO-DIMM 2 system as standard. Connecting the optional fibre solution TB-FMCH-OPT10 FMC card with optical cable interface to TB-7VX-zzzzT-PCIEXP enables 10ch of 10G optical modules to be mounted on each FMC connector. This achieves an optical interface configuration of up to 400Gbps.

Description

- Device:
  - XC7VX690T-2FFG1926
  - XC7VX980T-2FFG1926
  - XC7VX1140T-2FLG1926
- Memory:
  - DDR3-SDRAM SO-DIMM Connector x2 (with 4GByte SO-DIMM module)
  - SPI Flash 128Mbit
- Interface:
  - FMC HPC x4 (GTH 10CH is connected to each FMC and only LA is assigned for user input/output)
  - PCI Express x8 (Gen3)
  - USB3.0 Device
  - MMCX Clock input
  - PMOD (Digilent module interface)
  - 10pin header for XILINX cable
  - General 16pin header
  - Push switch , DIP switch , LED
- Configuration:
  - microSD Card
  - BPI Flash
- Power
- Board size:H140 x W312(mm)

Block Diagram

Reference Design

- PCI Express DMA Design with Time limitation
- DDR3 memory controller (MIG)

Part Number TB-7VX-690T-PCIEXP / TB-7VX-980T-PCIEXP / TB-7VX-1140T-PCIEXP

\(^2\) Not all VITA57.1 signals are populated.
Kintex-7 – ACDC (Acquisition, Contribution, Distribution Consumption) 1.0 Base board

Extensible for General purpose Kintex-7 FPGA Platform

Features
The ACDC 1.0 base board is a revolutionary platform suited for evaluation test-and-debug, and development of video designs. With GTX transceivers and 64bit x 1,800Mbps DDR3 memory the board meets the high-bandwidth, high-performance requirements of ultra-realistic, high-definition display technology such as 4K2K and OLED. The ACDC 1.0 base board also provides the best power-to-performance optimization in designs compared to competitive offerings.

Description
- Device: XC7K325T-2FFG900
- Memory: DDR3 SDRAM 2Gbit x4
- Interface
  - FMC
    - HPC (High Pin Count) x2
    - LPC (Low Pin Count) x2
  - GTX Transceiver 5.4Gbps 8chx2 (HPC)
  - MMCM for External Clock
  - UART (RS-232C D-sub9pin)
  - XADC pin header
  - 10pin header XILINX for cable
  - Push switch, DIP switch, LED
- Clock:
  - 74.25MHz OSC (via Socket)
  - 135MHz & 200MHz OSC & PLL
- Configuration: QUAD SPI Flash
- Power Supply
- Board size: H175 x W240(mm)

Reference Design
- HDMI Frame Buffer Design
  - HDMI frame Buffer with TB-FMCH-HDMI2
  - Memory controller
- EDK Base System Builder Design
  - XBD file for EDK base system builder
  - MicroBlaze softcore CPU and peripherals

Part Number TB-7K-325T-IMG

\(^4\) Not all VITA57.1 signals are populated.
The ACDC A7 Evaluation Board is an ideal video processing platform for 4K video applications.

### Features

The Artix-7 FPGA ACDC A7 Evaluation Board is an ideal video processing platform for 4K video applications. Inrevium recognized for its strong design expertise in 4K video, imaging and multimedia products have made available a video development package that targets video processing development using an Artix-7 FPGA device. The package includes an Artix-7 FPGA development board (TB-A7-200T-IMG) featuring the leading system performance per watt Artix-7 family to allow additional functionality and connectivity via FMC option cards. The ACDC A7 development board delivers a complete 4K development platform with various reference designs for Display Port1.2, HDMI2.0, V-by-One HS, and 6GSDI. Furthermore, the board has a DDR3 SODIMM, creating a complete integrated memory interface solution for memory-intensive applications.

### Description

- Develop audio applications with S/PDIF interface
- Develop networking applications with 10/100/1000 Mbps Ethernet (RGMII)
- High-performance serial connectivity with 8 GTP transceivers per FMC connector (16 total)
- Expand I/O with FMC interface x 2
- Hardware and pre-verified reference designs
- Optimized for quickly prototyping 4K applications using Artix-7 FPGAs
- Supports embedded processing with MicroBlaze, soft 32bit RISC
- Advanced memory interface with 1GB 64bit DDR3 SODIMM up to 800Mbps
- Power Supply

### Reference Design

- Targeted Reference Design featuring Xilinx Display Port, 6G SDI and HDMI (V-by-One HS reference design is optional)

**Part Number TB-A7-200T-IMG**

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5 Not all VITA57.1 signals are populated.
Zynq-7000 – All Programmable SoC Extension Microcontroller Card

Individual software development platform with level extensible for any application

Feature

TB-7Z-020-EMC has excellent connectivity with the main development system such as the TB-7V-2000T-LSI or any other inrevium platform. By featuring Zynq-7000 All Programmable SoC, small size and wide range of interfaces, the TB-7Z-020-EMC goes far beyond just connection ability with FPGA evaluation platform. Software engineers can use the TB-7Z-020-EMC to perform repeated testing on real hardware during the development process.

Description

- Device : XC7Z020-1CLG484
- Memory :
  - DDR3 SDRAM 1GByte
  - microSD Card socket and media
  - 128Mbit QSPI flash memory
- Expansion Interface :
  - FMC (LPC) x 2
  - LPC (Mezzanine)
  - LPC (Carrier)
- General Purpose interface :
  - Gigabit Ethernet
  - USB2.0 (Host Device)
  - UART (RS-232C)
  - CAN
  - DVI TX
  - Push switch, DIP switch, LED
- Debug interface :
  - MICTOR-38 for ARM
  - 10pin header for XILINX cable
- Clock : Multi-clock generator
  - ARM 33.33MHz
  - Logic 148.5MHz
- Power Supply
- Board size : H69 x W130(mm)

Block Diagram

Part Number: TB-7Z-020-EMC

Reference Design

- FPGA Board Connection: chip2chip design
- DIV output Reference Design
- Linux boot Reference Design

6 Not all VITA57.1 signals are populated.
**Zynq-7000 – Industrial Grade SOM (System on Module)**

Module board corresponding to industrial network module

**FEATURES**
- Business Card sized small module with Zynq-7000 All Programmable SoC and peripherals.
- Enables to implement multiple industrial network on single platform
- 2ch Giga Ethernet for supporting flexible topology
- Mass Production usage

**DESCRIPTION**
- Device: XC7Z020-CLG400I
- Memory:
  - DDR3 SDRAM 512MByte
  - QSPI Flash 16MByte
  - 64Kbit Non-volatile F-RAM
- Expansion IO Connector
  - 120 Position Connector 0.80mm Pitch (PL IO:60 / PS IO:10)
- General Purpose Interface:
  - Gigabit Ethernet x 2
  - Socket for microSD card
- Debug Interface:
  - JTAG
  - LED
- Clock:
  - Processing System
  - Programmable Logic
  - RTC Device
- Power Supply: Single DC5V operation
- Board size :H60 x W85(mm) *Protruding parts are not included
- Operating Temperature: 0°C ~ +50°C

**BLOCK DIAGRAM**

Part Number TB-7Z-IAE
**Use Case**

This reference design enables greater development time shortening for machine vision systems.

**Description**

- **Daughter board**: TB-7Z-IAE
- **Device**: XC6SLX45-FGG484
- **Memory**:
  - DDR2 SDRAM 1Gbit
  - QSPI Flash 64Mbit
- **Interface**:
  - USB2.0 (Host)
  - DVI TX
  - CameraLink Base
  - 10/100Mbps Ethernet (RJ45)
  - CAN (D-SUB9)
  - RS-232C (D-SUB9)
  - PMOD x2
  - XADC (Pin header)
- **Debug Interface**:
  - ARM JTAG 20 pin header
  - 10pin header for XILINX Cable
  - Push Switch, DIP Switch, LED, Rotary Switch
- **Power (AC adopter)**
- **Board size**: H110 x W185(mm)

**Reference Design**

- Machine vision
FPGA Mezzanine Cards (FMC)

**High Pin Count FMC**

- **HDMI 2.0 Card**
  - Part Number: TB-FMCH-HDMI4K
  - HDMI 2.0 Input x 1
  - HDMI 2.0 Output x 1
  - Expansion connector for additional TB-FMCH-HDMI4K HDMI IP required.

- **DisplayPort 1.2 Card**
  - Part Number: TB-FMCH-DP2
  - DisplayPort 1.2 Standard
  - Sink/Source 1 CH each
  - Working with Xilinx’s Displayport IP

- **12G SDI Card**
  - Part Number: TB-FMCH-12GSDI
  - 75Ω HD-BNC, 1ch IN, 1ch OUT
  - 3ch Bi-direction
  - Expansion connector for additional TB-FMCH-12GSDI
  - Analog B.B SYNC input
  - Supports FMC 1.8V IO
  - Attached D-IN-8NC-8NC convert cable
  - 143.5MHz, 148.35-165MHz clock

- **QSFP Module Card**
  - Part Number: TB-FMCH-OPT10
  - QSFP Module x2
  - SFP Module x2
  - 156.25MHz OSC & MMCX IN for reference clock

- **SMA TX/RX Card**
  - Part Number: TB-FMCH-FMC2SMA
  - SMA TX/RX 4CH
  - 156.5MHz OSC & SMA IN for reference clock

- **8Lane V-by-One HS LVDS Card**
  - Part Number: TB-FMCH-VBY1-AD(51pin)
  - 51pin connector (41pin mounting option)
  - Support for 8Lane
  - Supports LVDS connector
  - X168.5MHz / 712.25MHz for reference clock
  - On board PLL

- **HDMI 1.4 Card**
  - Part Number: TB-FMCH-HDMI2
  - HDMI 1.4 Card
  - 1.8V IO modification version

- **3G/HD/SD SDI Card**
  - Part Number: TB-FMCH-3GSDI2A
  - 3G/HD/SD SDI 2ch IN, 2ch OUT
  - 2ch Bi-direction
  - Expansion connector for additional TB-FMCH-3GSDI2A
  - Analog B.B SYNC input
  - Supports FMC 1.8V IO
  - Attached DIN-BNC convert cable

**Notes:**
- Individual RX/TX Board
- RX x2, TX x2
- Uses ADI conversion chips to R/G/B or YUV
- Up to 1080P Full HD resolution
- 3D Format supported
- 1.8V IO requirement, please contact us
FPGA Mezzanine Card (FMC) Standard

Developed by a consortium of companies ranging from FPGA vendors to end users, the FPGA Mezzanine Card is an ANSI standard that provides a standard Mezzanine Card form factor, connectors and modular interface to an FPGA located on a base board. Decoupling the I/O interfaces from the FPGA simplifies I/O interface module design while maximizing carrier card reuse.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Pin</th>
<th>User IO (High Speed Serial IO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Pin Count (HPC)</td>
<td>400 pin</td>
<td>168 pin (10 channels)</td>
</tr>
<tr>
<td>Low Pin Count (LPC)</td>
<td>160 pin</td>
<td>72 pin (1 channels)</td>
</tr>
</tbody>
</table>

Low Pin Count FMC

- 44 pin, x4
- FMC’s LA, HA and HB group signals are connected

1000 Base-T Ethernet Card
- Part Number: TB-FMCL-GLAN-B

LVDS Card
- Part Number: TB-FMCL-LVDS
  - For developing LVDS interface
  - LVDS Tx/Rx Loopback Design (Verilog/AHL)

USB3.0 Device Card
- Part Number: TB-FMCL-USB30
  - CYUSB3014 (CYPRESS)
  - USB Function only

Pin Header Card
- Part Number: TB-FMCL-PH
  - 30pin, pin header x3
  - Each pin header connect 24 signals
**IP Cores**

### V-by-ONE HS IP Core

Supporting the higher frame rates and the higher resolutions required by advancing FPD technology

**Features**

- Targets high-speed video signal transmission based on internal connection of equipment.
- Up to 3.75Gbps data rate (effective data rate 3Gbps) per lane.
- Data scrambling and Clock Data Recovery (CDR) to reduce EMI. CDR solves the skew problem between clock and data in conventional transfer systems.

**Logic Resources**

<table>
<thead>
<tr>
<th>Core Resources (in case of Xilinx-7 FPGA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LANE</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>TX</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>16</td>
</tr>
</tbody>
</table>

| RX   | 1   | 1300 | 400  | 2    | 1    | 1     |
| 2    | 2   | 2500 | 900  | 10   | 1    | 1     |
| 4    | 4   | 5000 | 1500 | 20   | 1    | 1     |
| 8    | 8   | 9800 | 3500 | 16   | 1    | 1     |
| 16   | 16  | 20000 | 7000 | 32   | 1    | 1     |

**Core Spec**

- 1-, 2-, 4-, 8-, 16-lane operation (Design service for 32 lanes is available.)
- Variable settings of driver swing, pre-emphasis and equalizer.
- Flexible implementation and package compatibility.

**Support FPGA**

Virtex-7 FPGA / Kintex-7 FPGA / Artix-7 FPGA

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**MECHATROLINK – III Master IP Core**

Controlling 62 slaves in perfect synchronization

**Features**

- **Master Function**
- **MAX 66MHz Clock, High-speed, Synchronous host interface**
- **Flexible system configuration by FGPA Logic fabric**
  - 16bit/8bit CPU buss, asynchronous buss
  - Zynq AP SoC or MicroBlaze base SoC

**Core Spec**

- Network: MECHATROLINK-III Network ×2 (Port For MII interface 100Mbp Full Duplex mode)
- Host interface: 32bit Joint memory interface / 32bit register interface
- Interrupt: 2 interrupt output
- Bit ordering: little endian
- Deliverable style: Net list

**Support FPGA**

Spartan-6 FPGA
Zynq-7000 All Programmable SoC (Under Development)

**Logic Resource**

<table>
<thead>
<tr>
<th>Core Resources (in case of Spartan-6 FPGA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFs</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>Master</td>
</tr>
<tr>
<td>Slave</td>
</tr>
</tbody>
</table>

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**Function specifications**

<table>
<thead>
<tr>
<th>MECHATROLINK-III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical layer</td>
</tr>
<tr>
<td>Baud Rate</td>
</tr>
<tr>
<td>Transmission Cycle Time</td>
</tr>
<tr>
<td>String Size</td>
</tr>
<tr>
<td>Number of Slaves</td>
</tr>
<tr>
<td>Maximum Transmission Distance</td>
</tr>
<tr>
<td>Minimum Distance between Stations</td>
</tr>
<tr>
<td>Topology</td>
</tr>
</tbody>
</table>
3D ToF Camera Module

What is TOF Camera?
The TOF --Time of Flight-- camera, it is the depth image sensing camera that can measure the depth distance at each pixel by the reflection time from the near-infrared light of objects that have been pulse emission. TOF camera is the promising solution that can be applied to a variety of applications that require three-dimensional information in the industrial field.

Description
Controller of TOF sensor module is implemented in ARM internal organs FPGA (Zynq-7000 All Programmable SoC). It is possible to customize over the details on the user side. Easily build a PC based evaluation environment and host processing system by utilizing the sample application and SDK provided.

Block Diagram

Features

Object recognition
Extract only the object to be located at a particular distance. It can be realized easy to separate from the background of the necessary parts. It improves and reduces the recognition accuracy of the identification process.

Part Number TB-7Z-TCDK-GC2/TB-7Z-TCDK-GC3

Object surveillance
It can be detected an object cannot be detected from the visible image by using depth image. It is useful for detection and warning of intrusion into the area.

Form recognition
It is possible to recognize the shape of the object simply by shooting a three-dimensional shape and texture (colour pattern) without parallax.
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