General Description:
The HDK-AR-CD45 is a Hardware Development Kit for MIPI devices employing the Arasan Combo ASIC test chip Apollo-Lite, supporting MIPI C-PHY v2.0 @ 4.5gsps, and MIPI D-PHY v2.1 @ 4.5gbps.

The Apollo-Lite test chip (© 2022 Arasan Chip Systems Inc.) is fabricated via TSMC 12nm / 7nm FINFET process.

The system includes hardware and software required for FPGA designs testing/validation, as well as for the validation of fabricated MIPI ICs or End-User Devices.

HDK Key Features:
- 4-lane D-PHY<sup>SM</sup> 2.5 configuration provides:
  - 18 Gbps when operating at 4.5 Gbps/lane
- 3-channel C-PHY<sup>SM</sup> 2.0 configuration provides:
  - 23.94 Gbps when operating at 3.5 Gsps/trio-
  - 30.78 Gbps when operating at 4.5 Gsps/trio-
    (short haul)
- Supports HS, LP, and ALP modes
- Supports Fast Lane Turnaround mode, Low-Power Escape modes, and Ultra Low-Power State mode
- 80 Mbps to 1.5 Gbps per data lane in D-PHY<sup>SM</sup> mode without deskew calibration
- Up to 2.5 Gbps per data lane in D-PHY<sup>SM</sup> mode with deskew calibration
- Up to 4.5 Gbps per data lane in D-PHY<sup>SM</sup> mode with equalization
- Up to 4.5 Gbps (10.26 Gbps) per data trio-lane in C-PHY<sup>SM</sup> mode
- On-board programmable PLL with Spread Spectrum Clocking
- Supports new power saving HS-Tx half swing mode for D-PHY<sup>SM</sup>
- Supports HS-IDLE mode for D-PHY<sup>SM</sup>
- Supports HS deskew, Alternate calibration sequence, Preamble sequence
- Supports polarity swap for all lanes between DP/DN or A/B/C
- Offers SPI access to all registers
- Supports standard PPI interface compliant with MIPI Specifications
- Activates and disconnects high speed termination for Rx and Tx modes
- Supports "Stuck-At Scan" for DC scan feature

HDK-AR-CD45-Rx / HDK-AR-CD45-Tx
- HDK-AR-CD45-PHY
  PHY board (config for Tx or Rx)
- Xilinx VC707
  Xilinx Development Board (configured for Tx or Rx)
- HDK-AR-CD45-PC
  HDK System PC
- Options:
  - HDK-AR-CD45-TB-MX
    (I/O Test Kit) (shown)
  - HDK-AR-CD45-ISK
    (Image Sensor Kit)
  - HDK-AR-CD45-IDK
    (Image Display Kit)

HDK-AR-CD45-RxTx Configuration:
- HDK-AR-CD45-PHY
  PHY board (config for Tx)
- Xilinx VC707
  (configured for Tx)
- HDK-AR-CD45-PHY
  PHY board (config for Rx)
- Xilinx VC707
  (configured for Rx)
- HDK-AR-CD45-PC
  HDK System PC
- Options:
  - HDK-AR-CD45-BBK
    (Bridge Board Kit)
  - HDK-AR-CD45-ISK/IDK
    (Image Sensor & Display Kit)

HDK-AR-CD45-RxTxSG Configuration:
- HDK-AR-CD45-PHY
  PHY board (config for Tx)
- Xilinx VC707
  (configured for Tx)
- HDK-AR-CD45-PHY
  PHY board (config for Rx)
- Xilinx VC707
  (configured for Rx)
- HDK-AR-CD45-BBK
  (Bridge Board Kit)
- HDK-AR-CD45-SGK
  Signal Generator Kit
- HDK-AR-CD45-PC
  HDK System PC

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HDK Components Description:

- **HDK-AR-CD45-PHY:**
  - HDK PHY board containing the socket for the Arasan Apollo-Lite PHY test chip (© 2022 Arasan Chip Systems Inc.)
  - Configurable for Tx or Rx
- **Xilinx VC707:**
  - Xilinx Development Board (requires a PCI X8 slot)
- **HDK-AR-CD45-IOK (I/O Kit):**
  - Connects to target Tx or Rx devices
  - Includes IO board containing MMCX connector and Scope Probe Holding Board for performing scope measurements in a convenient manner
- **HDK-AR-CD45-ISK (Image Sensor Kit):**
  - Adds a MIPI Image Sensor to the HDK
  - Includes Image Sensor Adapter and Image Sensor Module.
- **HDK-AR-CD45-IDK (Image Display Kit):**
  - Adds a MIPI Image Display to the HDK
  - Includes Image Display Adapter and Image Display Module.
- **HDK-AR-CD45-BBK (Bridge Board Kit):**
  - Connects two HDK-CD45-PHY boards (Rx and Tx)
  - Accepts Scope Probe Holding Board
- **HDK-AR-CD45-ISDK (Image Sensor and Display Kit):**
  - Adds a MIPI Image Sensor and Image Display to the HDK
- **HDK-AR-CD45-SGK (Signal Generator Kit):**
  - Adds a MIPI Signal Generator to the HDK
  - Includes Image Sensor Adapter and Image Sensor Module
  - used to generate configurable MIPI test patterns
- **HDK-AR-CD45-PC:**
  - HDK System PC with preinstalled test software
  - Optional
- **HDK-AR-CD45-TB-MX (Test I/O Board):**
  - Allows customer devices to be tested with the HDK
  - Employs MMCX connectors for lane signals

Options:

Options:

- **IOK** (I/O Kit)
- **ISK** (Image Sensor Kit)
- **IDK** (Image Display Kit)
- **BBK** (Bridge Board Kit)
- **ISDK** (Image Sensor & Display Kit)

VTE Application:

- Win 10 compatible
- Includes IDE for developing C-like test scripts
- User Friendly UI
- Comprehensive Test Log Generation
- Includes Test Scripts
- Optional MIPI Protocol Analyzer

Xilinx Vivado Project (optional)

- Project includes communication with Host and Apollo-Lite PHY chip
- Interface provided for Customer module insertion
- Includes configuration bit files for VC707 and PHY chip

System Resources

- Test Script
- Display for MIPI Data
- Protocol Analyzer

Test Results Log

VTE Application Program Screenshot