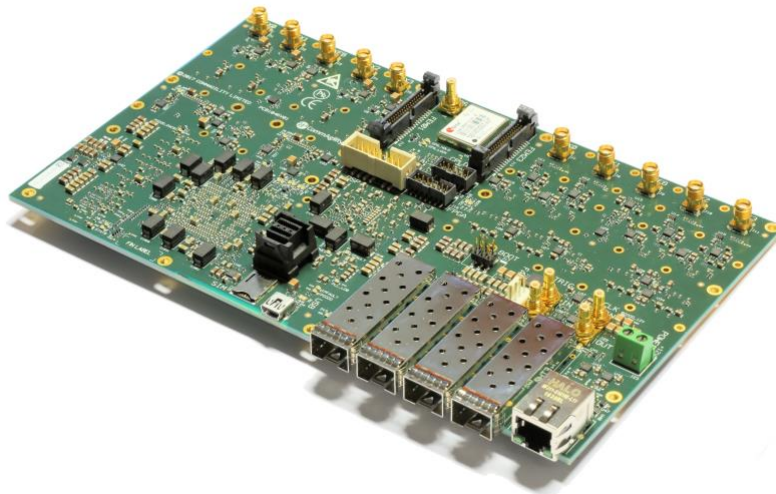


## CA-D8A4-RF4

### *Stand-alone baseband processing and RF card for eNodeB and UE in an LTE-A network*



- Includes four high quality, flexible and wideband RF channels, supporting MIMO and carrier aggregation
- Combines 4 ARM® Cortex®-A15 cores with 8 TI C66x+ DSP cores, accelerators and shared memory, plus FPGA, RF and CPRI interfaces
- Supported by CommAgility small cell and UE, PHY and stack software

The CommAgility CA-D8A4-RF4 is a stand-alone baseband processing and RF card supporting eNodeB and UE functionality in an LTE-A network.

The card includes four RF channels, tuneable in pairs over a very wide frequency range to cover LTE and unlicensed frequency bands, and with RF bandwidth up to 100MHz to support carrier aggregation and 5G applications.

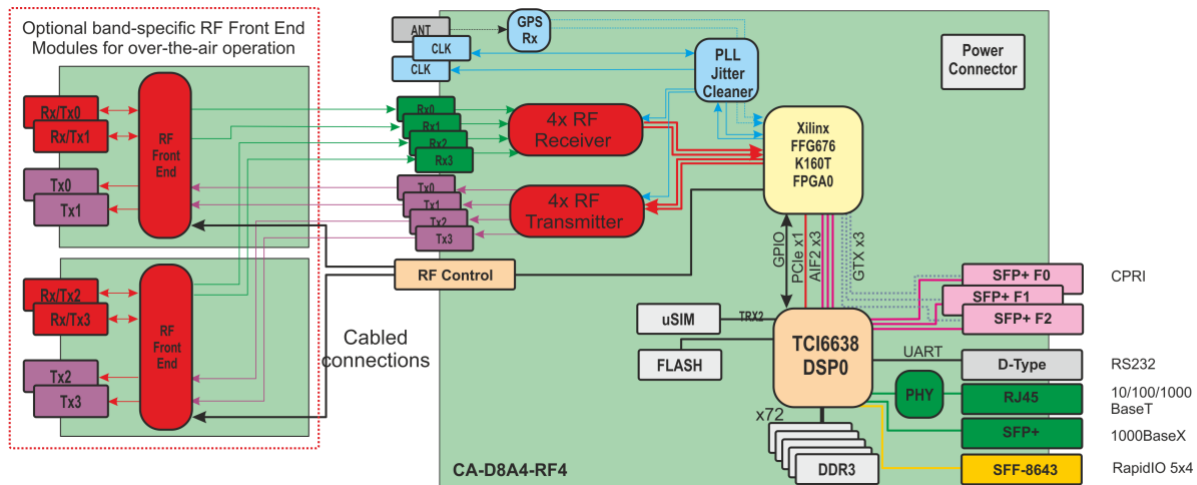
The RF channels include low latency control features to support UE and eNodeB operation. Discrete ADCs and DACs ensure high RF quality. Optional RF front end cards provide amplification and filtering to support specific bands in over-the-air applications.

The module's main processor is the TCI6638K2K, part of TI's Keystone II

generation of DSP/ARM SoCs. This SoC provides Layer 1-3 baseband processing, with a Gigabit Ethernet interface to the network. The EPC functionality can also be integrated into the SoC if required, giving a fully stand-alone network.

A Kintex-7 FPGA provides RF control, digital up/down conversion and processing, interfacing over CPRI to on-board baseband processing or external SFP+ interfaces.

For eNodeB, the card is supported by CommAgility's SmallCellPHY-TI and SmallCellSTACK LTE Release 10 software. For UE, the card is supported by CommAgility's MobilePHY-TI and MobileSTACK LTE Release 10 software. A version of Ref UE and Ref eNB will be available, with integrated software as flexible testing and reference solutions.



## Key Features

- Four flexible, wideband RF ports
- Texas Instruments TMS320TCI6638K2K DSP SoC
- 410MHz to 5925MHz RF frequency
- RF bandwidth up to 100MHz
- Optional band-specific RF front-end cards
- Additional high-speed RF control features
- Three CPRI interfaces
- Gigabit Ethernet
- RapidIO interface
- Master timing from GPS, IEEE1588, external clock or RF
- Single 12V power supply

## Resulting Benefits

- Supports MIMO and carrier aggregation
- The latest high performance TI device with 8 DSP cores and 4 ARM cores, for advanced wireless applications
- Supports LTE and unlicensed bands
- Supports 5G applications
- Amplification and filtering for over-the-air applications
- Supports real-time requirements for UE operation
- Allows use as a remote radio head or to control external RF
- Standard connection to packet core for control and management
- Supports 20Gbaud inter-card link
- Highly flexible for both eNodeB and UE applications
- Simple to use in the lab or in the field

## Hardware Specifications

### **DSP0:** TMS320TCI6638K2K KeyStone II SoC:

- 8x C66x DSP cores @ 1.2GHz
- 4x ARM A15 cores @ 1.4GHz
- Accelerators and packet processors
- 2Gbytes x72 DDR3L-1600 SDRAM
- 512Mbytes x16 boot FLASH
- 3x 5Gbaud AIF2 CPRI lanes
- GbE and UART interfaces
- 20Gbaud RapidIO interface

### **FPGA0:** Xilinx Kintex-7™ K160T FPGA

- Optional 3 CPRI lanes at up to 10.3Gbaud (CPRI rate 8)
- Interfaces to RF and DSP0
- Configured by DSP0 at boot-up
- Supplied with CommAgility image which performs RF control, up conversion and down conversion, CPRI interfacing etc.
- Crest Factor Reduction support optional

### **Timing:**

- Integrated GPS for timing sync
- Clock and sync
- Configurable PLL/jitter cleaner
- Timing from GPS, IEEE1588, received RF or external clock source

### **External I/O:**

- Four flexible RF channels, each with separate Tx/Rx SMA ports
- 3x SFP+ to DSP AIF2 or FPGA, up to 10.3Gbaud
- GPS aerial and 2 x SMB clock/sync
- RJ45 and SFP+ Gigabit Ethernet
- 12V power connector
- SFF-8643 to DSP RapidIO

### **Form Factor:**

- Standalone card with optional RF front-end cards for amplification and filtering
- Dimension: 225mm (L) x 165mm (W) x 26.5mm (H)

### **Debug:**

- DSP and FPGA debug connectors
- Mini-USB B jack and LEDs

## Environment/EMC/Safety

- Operating temp: -40°C to +70°C ambient (conduction cooled)
- Power consumption: typically <60W
- 2014/30/EC and FCC EMC compliant
- 2011/65/EU RoHS, 2012/19/EU WEEE, EC/1907/2006 REACH and 2014/53/EU RED compliant

## RF Specifications

### **RF Channels:**

- Four channels
- Each pair in a set is identical and frequency synchronized
- Two sets can be synchronized or set to different frequencies
- Tx and Rx can be the same (TDD) or different (FDD) frequencies

### **Frequency and Bandwidth:**

- RF Freq Range: 410MHz – 5925MHz
- RF Fine Freq Resolution: <1Hz
- RF Bandwidths supported: 1.4, 3, 5, 10, 15, 20, 30, 40, 100MHz
- Actual baseband sampling rates: up to 245.76MSPS
- For other RF configurations (for example narrowband LTE), please contact CommAgility

### **TX Ports:**

- Maximum Rated Output Power (PRAT) +21dBm eNodeB, +23dBm UE per antenna
- 0dBm without front-end module
- Tx Dynamic Range: >60dB
- EVM: <2% at 0dBm without FEM
- DAC SFDR: >55dB

### **RX Ports:**

- Maximum operational input power 0dBm
- Noise figure: <5dB, Pin <-50dBm with optional FEM
- Gain range: 50dBm supporting AGC with optional FEM

### **Calibration and Tuning:**

- Continuous auto-tuning of RF receive parameters

### **USIM Support:**

- Standard uSIM connection allows UE applications to be supported with suitable external RF

## Software

**FPGA:** CommAgility FPGA build for RF control, management and processing

**DSP:** TI RTOS Kernel BSP and drivers

**ARM:** Linux BSP and drivers; RF control

**LTE Layers 1-3:** For eNodeB, the card is supported by CommAgility's SmallCell PHY-TI and SmallCellSTACK LTE Release 10 software. For UE, the card is supported by CommAgility's MobilePHY-TI and MobileSTACK LTE Release 10 software.

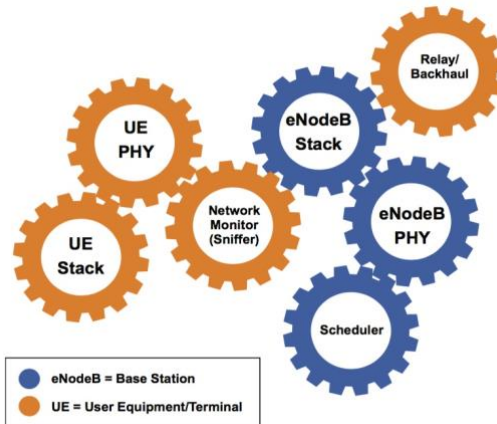
## OEM Partnership Services

**IN DEVELOPMENT:** Support and training; hardware customisation; software and FPGA development.

**IN PRODUCTION:** lead-time reduction; extended warranty; and repair; quick turn repairs and/or spares stocking.

**EXTENDED LIFE:** obsolescence management; guaranteed lifecycle; Escrow.

**LICENSING** can be offered for high volume projects.



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