CommAgility

## DATASHEET

# AMC-K2L-RF2

## *AdvancedMC baseband processing and RF card*

- A highly integrated Advanced Mezzanine Card (AMC) based on TI's TCI6630K2L DSP SoC and AFE7500 RF front end
- A low cost, flexible card, usable as a full small cell solution
- RF output power up to 24dBm average, RF bandwidth up to 20MHz, and frequencies from 700MHz to 4GHz
- Can be used standalone or part of a larger MicroTCA system
- Flexible, high bandwidth off-board communications via Ethernet, CPRI and PCIe

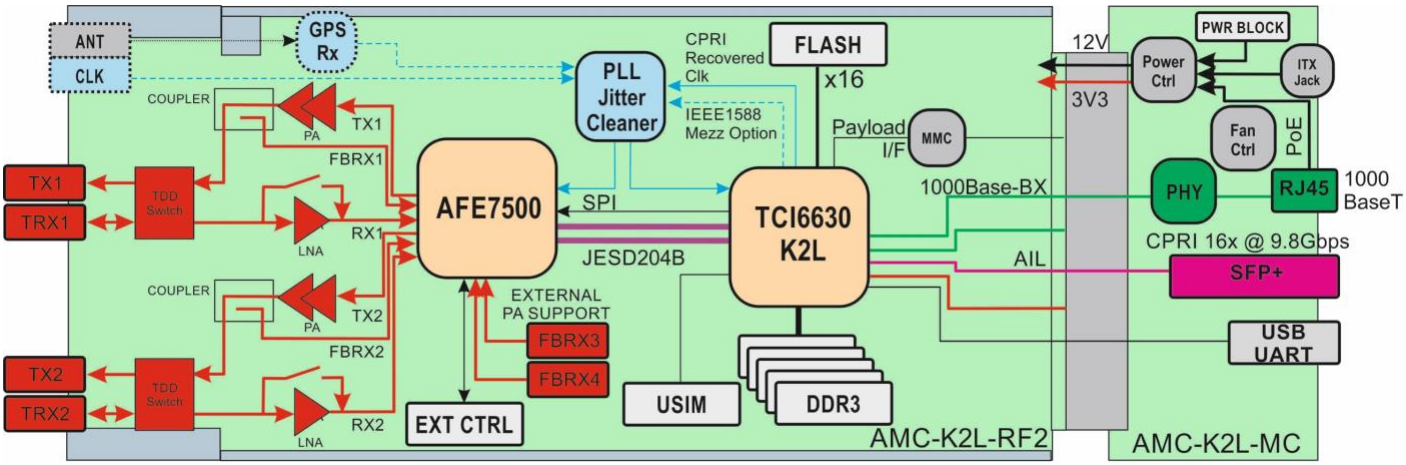
The AMC-K2L-RF2 is a high performance ARM and DSP based processing card with two integrated RF transceiver channels, all in the compact single width AMC form factor. It can be used as a complete baseband and RF small cell solution.

It supports wireless baseband processing and a 2x2 MIMO air interface in radio test systems and eNodeBs, and The module is optionally available with CommAgility's industry-leading SmallCellPHY-TI and SmallCellSTACK software, pre-integrated and tested to reduce risk and effort.

The main processor is the TCI6630K2L, part of TI's KeyStone II generation of DSP/ARM SoCs. It includes four C66x DSP cores and two ARM® Cortex®-A15 MPCore™ processors, all operating at up to 1.2 GHz.

I/O includes Gigabit Ethernet, PCIe and CPRI, giving connectivity to networks, host processors and additional RF. Flexible RF capabilities include Tx output power up to 24dBm average, RF bandwidth up to 20MHz, and FDD/TDD support. Build options cover most LTE bands, with others possible with additional customization. Using external cavity filters, the card can be directly deployed as an LTE small cell.

For maximum versatility, it can be deployed in a range of operating environments, including MicroTCA racks and standalone with the optional Micro Carrier card providing I/O, power and cooling.




## Key Features

- Two flexible, wideband RF channels
- Texas Instruments TCI6630K2L DSP SoC
- Texas Instruments AFE7500 family analog front end
- Pre-integrated LTE PHY and stack available, tested by tier 1 equipment vendors
- Single width mid- or full-size PICMG AMC.0 R2.0 Advanced Mezzanine Card
- Micro carrier card available for I/O, power and cooling
- Extended temperature range with conduction cooling option
- RF suitable for deployment

- +24dBm average Tx per channel
- Multiple cards can be synchronised

- CPRI port supporting master operation
- PCI Express interface
- Gigabit Ethernet interface

- Unparalleled support team

## Resulting Benefits

- Supports 2x2 MIMO systems natively
- The latest high performance TI device
- Flexible, high quality RF SoC

- Reduced cost, effort and risk to enable

- Highly compact, and works with industry standard MicroTCA chassis
- Minimal external hardware required for deployment, saving system cost
- Suitable for outdoor and rugged deployments
- Connects via cavity filters direct to an antenna for an LTE eNodeB
- RF output power sufficient for small cells
- To create more complex LTE systems with multiple sectors and carriers
- Can support a Remote Radio Head
- Higher rate connection to Intel Hosts
- Standard connection to packet core and for control and management
- Faster and easier project development

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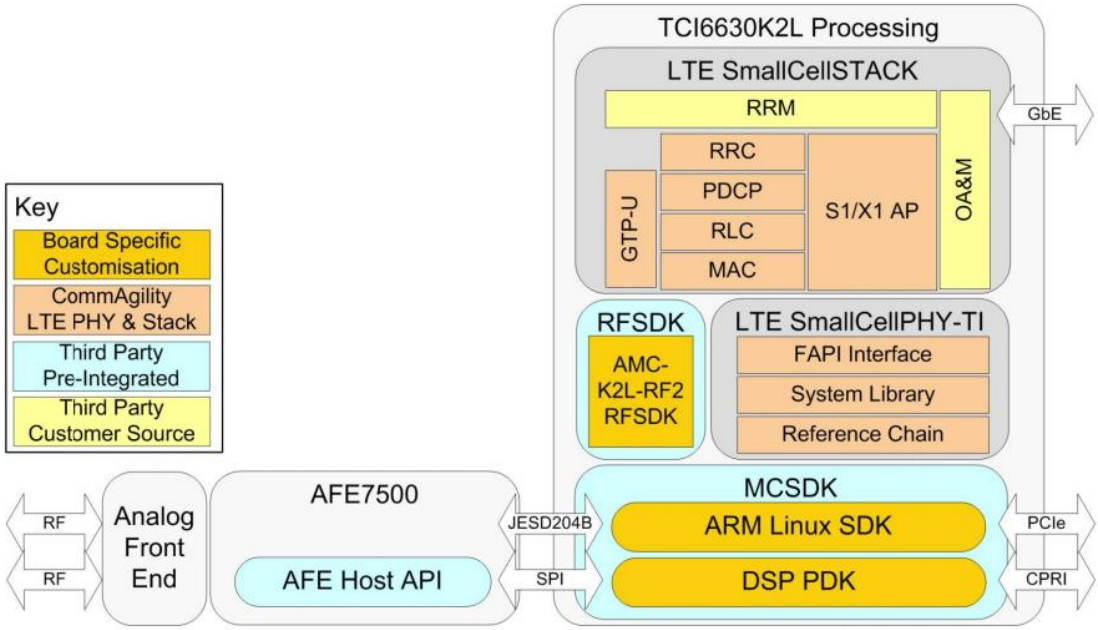


## Software

The AMC-K2L-RF2 supports CommAgility's pre-integrated LTE eNodeB PHY (SmallCellPHY-TI) and protocol stack (SmallCellSTACK) as optional licensable deliverables.

The physical layer software is used by Tier 1 LTE equipment vendors and is highly integrated with the Texas Instruments TCI6630K2L SoC for maximum performance.

Both software components are 3GPP Rel. 10 today, with roadmap to later 3GPP releases. CommAgility's engineers can also tailor the software to meet special application or processing needs. Source code for either module is available, with a variety of licensing models to meet customers' specific needs.

In addition, or for customers not using the LTE software, a wide range of lower level software is provided, including Linux BSP, DSP libraries for control and I/O, and an RF control API based on TI's RFSDK for the AFE7500 device.

## Hardware Specifications

**DSP0:** TCI6630K2L KeyStone II SoC:
- 4x C66x DSP cores @ 1.2 GHz
- 2x ARM A15 cores @ up to 1.2 GHz
- Accelerators and packet processors
- 2Gbytes x64 DDR3 SDRAM with ECC
- 256Mbytes x16 boot FLASH
- One 1x Gen2 PCIe connection to AMC Port 4, at up to 5Gbaud
- 1x AIL CPRI connection to AMC Port 2, at up to x16 rate
- 2x 1000BaseBX ports to AMC ports 0,1

**Timing:**
- Timing can be from CPRI, external clock or optional GPS, IEEE1588 with mezzanine

**Front panel I/O:**
- 2x SMA for RF Tx (FDD mode)
- 2x SMA for RF Rx (FDD) or TRx (TDD)
- Optional SMB for GPS antenna and clock/sync
- Optional 2x SMA for RF feedback ports
- LEDs

**Form Factor and Backplane:**
- Single-width, mid-size Advanced Mezzanine Card, AMC.0 Rev 2.0 compliant
- Full-size AMC.0 card with GPS, timing and RF feedback ports
- AMC.1 compliant PCIe to AMC port 4
- AMC.2 compliant GigE to ports 0, 1
- DSP AIL CPRI to port 2
- Chassis and logic ground bridged

**Micro Carrier Card AMC-K2L-MC**
- Power input from single 12V connector or Power over Ethernet (LTPoE++)
- Fan control (for fan cooled applications)
- 1000BaseT Ethernet on RJ-45
- CPRI SFP+ socket
- USB UART for Linux console

**Debug:**
- Breakout board for emulation, RS-232
- LEDs for TCI6630K2L

**Module Management Controller:**
- AMC.0 IPMB_L, FRU EEPROM data
- Power & reset, health monitoring

## RF Specifications

**RFIC:** TI AFE7500 family part providing flexible, high bandwidth RF interface with Tx, Rx and feedback ports, closely coupled to TCI6630 SoC via JESD ports, SPI, GPIO.

**RF Channels:**
- Two identical RF channels
- Tx and Rx can be the same (TDD) or different (FDD) frequencies and ports

**RF Frequency Build Options:**

| Build | Tx (MHz) | Rx (MHz) |
|---|---|---|
| B1A | 700-800 | 700-2700 |
| B1B | 800-900 | 700-2700 |
| B1C | 900-990 | 700-2700 |
| B2A | 1600-1950 | 700-2700 |
| B2B | 1900-2000 | 700-2700 |
| B2C | 2000-2300 | 700-2700 |
| B3A | 2100-2490 | 700-2700 |
| B3B | 2490-2700 | 700-2700 |
| B4A | 3400-3800 | 3400-4000 |

**TX Bandwidth:**
- 1.4, 3, 5, 10, 15, 20MHz bandwidth at full Tx power

**RX Bandwidth:**
- 5, 10, 15, 20MHz filtered analogue bandwidth
- 1.4 and 3MHz via digital filtering

**TX Ports:**
- Maximum Tx power: +24dBm average using CFR/DPD, +30dBm peak
- Gain Range: >60dB
- EVM: <2% across the usable range (without CFR), lower in many cases

**RX Ports:**
- Maximum input power (average):+10dBm (normal operation) +16dBm (safety max.)
- Gain range: >65dB
- Sensitivity: to antenna noise floor, with 5dB Noise Figure
- EVM: <2% across the usable range, much lower in many cases

**LTE Deployment:**
- RF ports will meet the LTE RF specifications for a small cell when connected via suitable cavity filters.

**External power amp control:**
- Amplifier control connector
- 2x feedback RF ports for external DPD

## Environment/EMC/Safety
- Operating temp: -40°C to +70°C ambient
- Air cooled, conduction cooled option
- Power consumption: 30W typical
- 2014/30/EC and FCC EMC compliant with appropriate chassis or housing
- 2011/65/EU RoHS, 2012/19/EU WEEE,2014/53/EU RED and 2014/35/EC LVD compliant

## 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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AMC-K2L-RF2 V07/0319