Evolutive™
WiMAX Series

WiMAX 3.5 GHz Mini-PCI Reference Design

Evolutive™ WiMAX DM256 Series

The Evolutive™ WiMAX 3.5 GHz Mini-PCI Reference Design, available as an upgrade to the Wavesat WiMAX Reference Kit, is a development platform to guide and support efforts in designing 3.5 GHz WiMAX compliant wireless systems using Wavesat's DM256 integrated circuit.

This Reference Design in form of an extended length Mini-PCI module facilitates system design by providing a plug-and-play complete solution for the lower layer air interface and time critical low-level MAC functionality. It allows ODMs and OEMs to tailor the motherboard providing the higher layer application processor and peripherals according to their specific needs, hence reducing development efforts.

Highlights

- Fully supports 1st round certification WiMAX profile
  - profM3_PMP MAC system profile
  - 3.5 GHz RF interface
  - 3.5 MHz & 7MHz bandwidth
  - TDD and HFDD Duplexing modes
  - profC3_20 transmit power class profile
- Meets WiMAX spectral mask and EVM requirement.
- Adaptive modulation (BPSK, QPSK, 16-QAM & 64-QAM).
- Meets all six SUI Non Line of Sight (NLOS) channel models.
- Patented channel equalization/synchronization algorithms.

Benefits

- Provides low-level MAC and PHY functionality with standard mini-PCI interface to customer motherboard.
- Complete access to the DM256 & MC236-PCI registers via software.
- Forward compatibility with IEEE 802.16e PHY for mobile applications.
- Working Reference Design to help fine tune your prototype.
- License to reuse all schematics.
- Saves months on design cycle.
- Fast proof-of-concept capability.

At a Glance

- DM256 3.5 GHz extended Mini-PCI reference design includes one Mini-PCI module, technical documentation, schematics, Gerbers, BOM and 6-months of technical support.
- Highly integrated low cost solution with small form-factor and standard Mini-PCI interface.
- Downlink/Uplink remote management.
- Embedded WiMAX testing functions.

Evolutive™ WiMAX DM256 ASIC

The DM256 is a low cost integrated circuit with low power consumption that implements the IEEE 802.16-2004 OFDM™ PHY layer protocol. It is designed to be the main component of an OFDM modem for Broadband Wireless Access (BWA).
The chip can be used for a Base Station as well as for a CPE. The DM256 includes analog front end, which provides digital IF, analog IF (real or complex values) or analog Baseband I/Q interface. TDD, HFDD, and FDD duplexing modes are supported. Different bandwidths can be selected and the IF frequency is programmable.

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Technical Specifications*

Modulation	OFDM (BPSK, QPSK, 16-QAM, 64-QAM)
Bandwidth	Programmable, supports 3.5 MHz & 7 MHz**
Spectral Efficiency	5 bits/sec/Hz (64-QAM uncoded)
Error Control Coding	Concatenated Reed-Solomon Convolutional Code
SNR for BER 10^{-10}	24 dB (64-QAM-2/3)
Power Requirement	4.75 W (average consumption through Mini-PCI interface)
RF Frequency	TDD and HFDD: 3.4 to 3.6 GHz in steps of 250kHz
RF Input Dynamic Range	-20 dBm to the sensitivity threshold***
RF Output Power Level at Antenna	20dBm≤ $P_{Tx,max}$ ≤ 23dBm (profC3_20)
RF Output Dynamic Range	50 dB

**Subject to change without notice*
***Other bandwidths can be selected but will not be tested because out of WiMAX scope*
****Please refer to 802.16-2004 specification for each modulation*

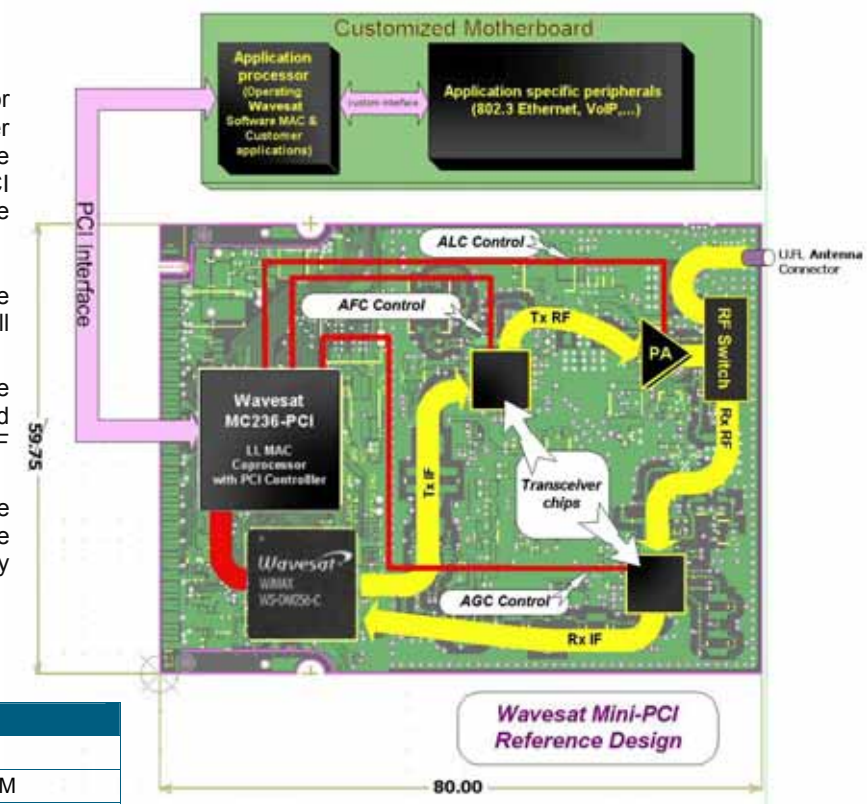
OFDM Modem Mini-PCI Module

The Mini-PCI reference design integrates Wavesat's DM256 and MC236-PCI on an extended Mini-PCI module. The motherboard processor has access to and from the modem card through the Mini-PCI Interface. For data transmission the DM256 encodes and modulates the digital data from the MAC into an OFDM analog signal which is sent to the RF circuitry. For data reception, the DM256 receives the OFDM analog signal from the RF chipset and demodulates and encodes it into digital data for the MAC.

MC236-PCI MAC Coprocessor

The MC236-PCI is a low-level hardware MAC coprocessor for the IEEE P802.16-2004 Wireless MAN-OFDM™ MAC layer protocol and is intended to be a companion device to the DM256 PHY level ASIC. It includes the core for the PCI controller interface (V.2.2) for communication with the motherboard processor. Functions include:

- Offloading timing-critical low-level operations from the motherboard processor allowing the system to achieve full data throughput using a low-cost processor;
- Serving as a bridge between the DM256 PHY ASIC and the processor. The MC236-PCI can be adapted to be interfaced with a wide selection of popular processors and RF solutions.
- Providing control lines to the RF Transceiver chipset for fine control of the output power (Automatic Level Control), the receiver gain (Automatic Gain Control) and the frequency accuracy (Automatic Frequency Control).



Mini-PCI card footprint approximately in actual size

Ordering Information

Model	Content
Mini-PCI Upgrade Kit[1] WS-mPCIRFM35-UK	2 DM256 Mini-PCI Reference Cards
	Schematics, Gerbers (on demand) & BOM
	6-Month Tech Support [2]
	2 Mini-PCI to PCI Adapter Cards

1 *Only available to current owners of or as an option to a Wavesat Reference Kit*

2 *For Wavesat provided hardware & software*

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