



Quanta Microsystems, Inc.

IEEE802.16e WiMAX Full and Half Size Mini Card(WM553)

User Manual

Version: 0.1



Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This device is intended only for OEM integrators under the following conditions:

- 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna, As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: Contains FCC ID: T5U-WM553.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Canadian Regulatory Wireless Notice

This device complies with RSS-210 of the Industry Canada Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTE:

Industry Canada Radiation Exposure Statement:

This equipment complies with Industry Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This device is intended only for OEM integrators under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna,

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the Industry Canada authorization is no longer considered valid and the IC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Industry Canada authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains IC : 7424A-WM553”.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

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MiniCard(WM553)**

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1. Revision history

Version	Date	Author	Notices
0.1	6/30/2010	Thung-Wei	Initial draft



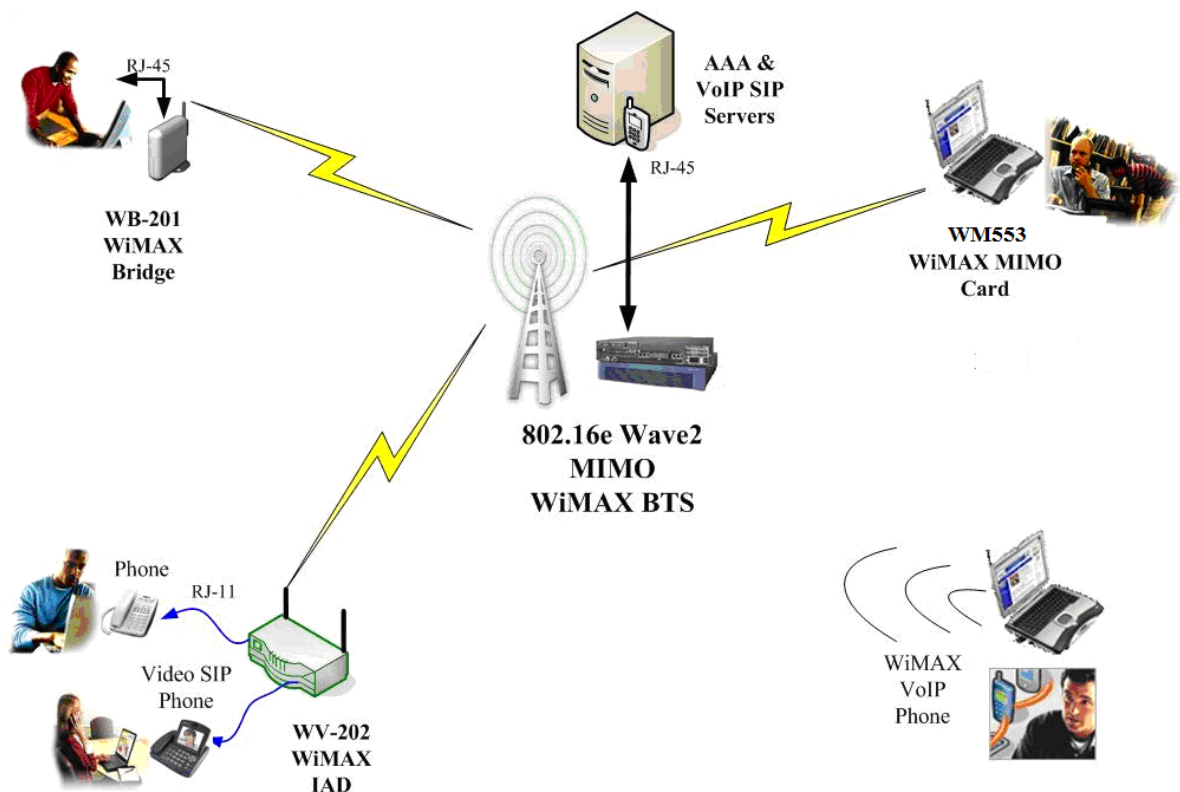
2. Introduction

The WM553 WiMAX MIMO PCIe half size miniCard supports IEEE 802.16e-2005 state of the art Scalable OFDMA based Technology. The WM553 operates 2.496~2.69GHz frequency licensed band and compliant with WiMAX forum Wave2 MIMO specification. It provides users a seamless broadband wireless access, video streaming at home, office or on the move.

To protect information transmitting through wireless network, standard security Sublayer PKMv2 EAP based user authorization/authentication and AES for data encryption are supported.

Easy-to-use Windows XP-based utility provide the graphic user interface is for system/link status, configuration and firmware upgrade.

Look at below diagram show you the example usage model for WM553 with our others products (WB201 WiMAX Bridge, WV202 WiMAX IAD). With the 802.16e-2005 WiMAX half size miniCard embedded in you device, you can enjoy a high-speed wireless last mile for Internet connection, on-line video streaming, and multi-player games with flexibility, speed, and security!

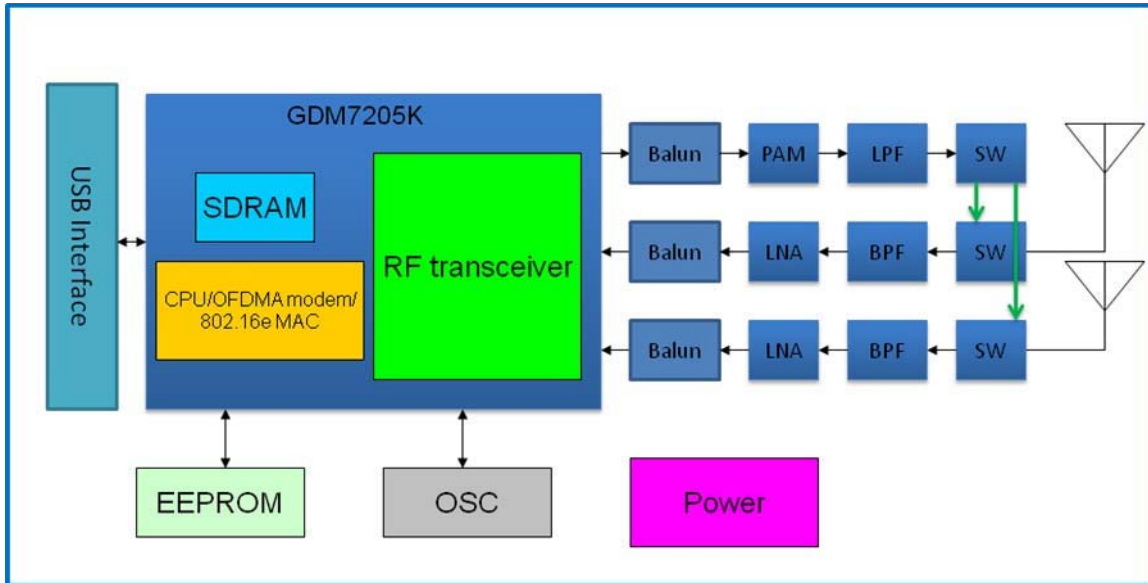


WiMAX Usage Model Example



3. Product Specifications

3.1 System Block Diagram



3.2 System Hardware Specifications

System	
CPU / RF Transceiver / SDRAM	GDM7205K
System Memory	512Kbit EEPROM
Network Interface	
Form Factor	PCIe Full and half size miniCard (USB2.0 signaling)
WiMAX Port	Three RF Switch Connectors
RF Switch Connector Type	Hirose U.FL-R-SMT
Standards	
Wireless	IEEE 802.16e-2005
I/O	
DC Power input port	DC +3.3V

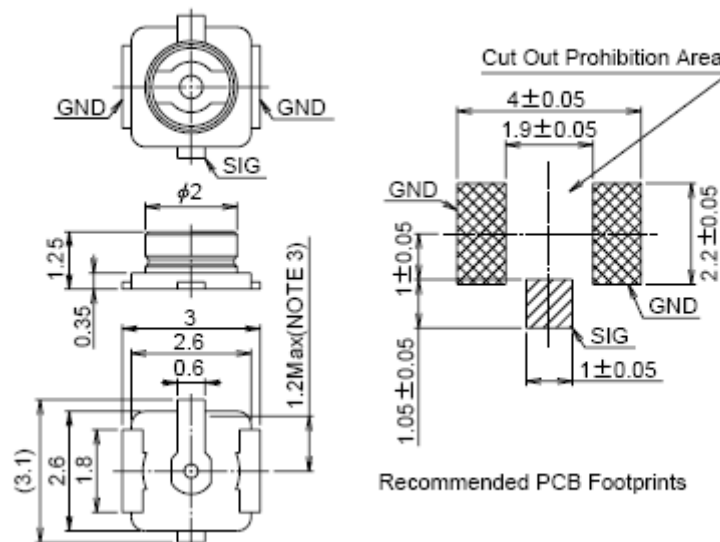
3.3 Wireless Specifications

Throughput (Down Link)	27 Mbps@64QAM-ctc-3/4, BW=10MHz (MIMO) 16.8 Mbps@64QAM-ctc-3/4, BW=10MHz (SISO)
Throughput (Up Link)	6 Mbps@64QAM-ctc-3/4, BW=10MHz
Modulation	S-OFDMA, MIMO



Modulation Technique	QPSK, 16QAM, 64QAM
Network Architectures	WiMAX Forum NRM (Network Reference Model)
Operating Frequencies	2.496~2.69GHz (WF 3A Profile), TDD
Operating Channels	In Channel Step Size 250KHz, (200KHz in Europe)
Channel Bandwidth	5 / 10 MHz
TX Output Power	+23dBm (Max), QPSK @ Antenna Port
Transmitter EVM	Meet IEEE 802.16e Specification
Receiver Sensitivity	Meet IEEE 802.16e Specification
Power Consumption	Below 2.5W

3.4 RF Connector Outline Dimension



3.5 Software Specifications

3.5.1 General Features Summary

- ⌘ MAC Addresses: Each card will have 48-bit unique 6 byte MAC address
- ⌘ Network parameters: (invoke DHCP client when get into operational state by utility)
 - Ⓜ IP address, Subnet Mask, and Default Gateway address can be supplied by the external DHCP server behind the BS
- ⌘ Configuration distribution
 - Ⓜ Accept by the BS Includes service, network parameters, radio and security settings via BS
- ⌘ Upgradeability



-
- ④ Accept new firmware via provided Windows utility
 - ⌘ Software Utility features
 - ④ Support Windows XP, Windows Vista
 - ④ Profile for different configuration
 - ④ Display Information for Driver, Tools and Board
 - ④ PHY and MAC Information Display
 - ④ Link State (Init, Ranging, Operational), RSSI/CINR Signal Strength, Service Flow information
 - ④ Statistic for WiMAX, Ethernet Packet traffics
 - ④ BS Channel & Scanning Configuration
 - ④ Connection control (Start, Stop, Reboot, Reconnect)
 - ④ Remote New Firmware Upgrade through HTTP/FTP protocols
 - ④ User Security Data Configuration (EAP-TTLS with CHAP, MSCHAPv2 Inner Authenticate)
 - ④ Device authentication (X.509 base certificate) (EAP-TLS)
 - ④ Debug & CLI interface

3.6 MAC & PHY Layer Capability

3.6.1 PHY Layer Capabilities Summary

- ⌘ S-OFDMA PHY
- ⌘ 512 and 1024-point FFT
- ⌘ 5 ms frame length
- ⌘ TDD Duplexing
- ⌘ DL/UL Split Ratio: (29,18) for 5 & 10MHz BW
- ⌘ DL MCS for MS, CC, CTC. UL MCS CTC
- ⌘ MIMO
 - ④ DL PUSC Matrix A, Matrix B vertical encoding
 - ④ UL PUSC Collaborative SM
- ⌘ Adaptive antennas
 - ④ UL Sounding Zones Table 1
 - ④ UL Sounding Zones Table 2
- ⌘ Ranging
 - ④ Initial / HO / Periodic
- ⌘ Fast Feedback / CQICH
 - ④ 6 bits Encoding
 - ④ CQICH Allocation IE
- ⌘ FEC coding schemes
 - ④ Repetition, Randomization, Tail Biting CC, CTC, Interleaving
- ⌘ H-ARQ
 - ④ Chase with CTC
 - ④ Category 1 DL aggregation
- ⌘ Permutations
 - ④ PUSC



- ⌘ Statistics
 - ④ RSSI
 - ④ CINR (Physical/Effective), measurement on preamble & pilots
- ⌘ Power control
 - ④ open-loop & closed-loop
- ⌘ MAP support
 - ④ Regular MAP
 - ④ Compressed MAP
 - ④ SUB-DL-UL-MAP
 - ④ MBS MAP message

3.6.2 MAC Layer Capabilities Summary

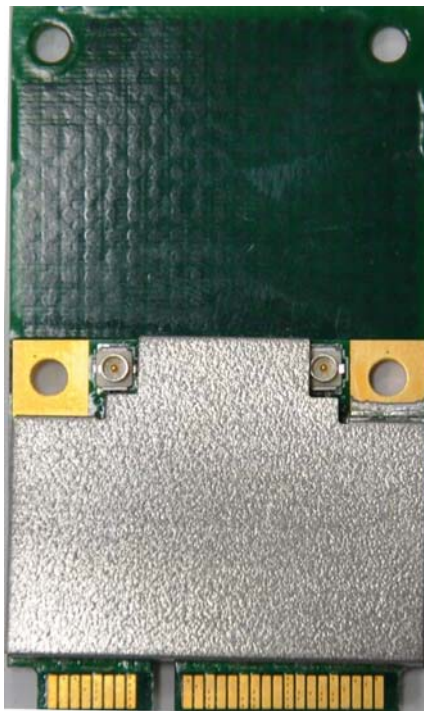
- ⌘ Convergence Support
 - ④ IPv4, IPv6
 - ④ PHS, ROHC header compression
- ⌘ MAC PDU formats Support
 - ④ PDU Concatenation
 - ④ SDU Fragmentation
 - ④ SDU Reassembly
 - ④ Packing
 - ④ MAC CRC
- ⌘ HARQ Support
- ⌘ ARQ
 - ④ ARQ ACK Type 0 ~ 3
 - ④ Selective, Cumulative, Cumulative with Selective ACK entry, Cumulative ACK with Block Sequence
- ⌘ QoS and Scheduling
 - ④ Service Flow: DSA, DSC, DSD initiated by BS or MS
 - ④ Data Delivery Service: BE, UGS
 - ④ RT-VR, NRT-VR, ERT-VR
 - ④ QoS module: Traffic Shaping, Weighted Fair scheduling, Congestion Management
- ⌘ Bandwidth allocation
 - ④ Full support all Request-Grant Mechanism
- ⌘ Power Saving modes
 - ④ Power optimizations function
 - ④ Sleep mode: power saving class type I
 - ④ Idle mode and Paging : initiation by MS/BS, Expedited network re-entry from Idle mode
- ⌘ Handover
 - ④ Hard handover
 - ④ Neighbor advertisement
 - ④ Scanning for cell selection
 - ④ HO optimization
 - ④ CID, SAID updates
- ⌘ Privacy



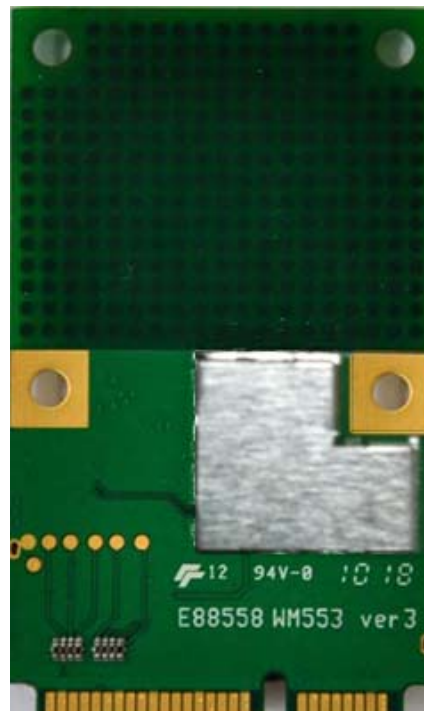
- ⌘ Authorization, Authentication, Crypto suites, Security Associations Authorization Policy Support
 - ④ PKMv2 Authorization Policy Support-Initial Network Entry/Re-entry (EAP-based authorization)
 - ④ Supported Cryptographic Suites (No / 3-DES, CCM, 128-bit AES/CCM, AES Key Wrap with 128-bit key)
 - ④ Message Authentication Code Mode (CMAC)
 - ④ Security Association (Static, Dynamic, Primary)
 - ④ SA Service Type (Unicast)
- ⌘ Multiple Base Station

4. Outward appearance picture

PCIe Full Size Mini Card

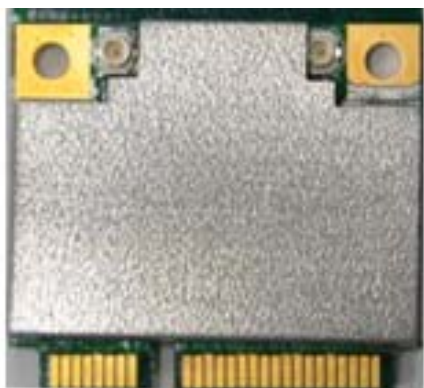


Top view



Bottom view

PCIe Half Size Mini Card



Top view



Bottom view

**Quanta Microsystems, Inc. WiMAX PCIe Full and Half Size
MiniCard(WM553)**

Dimension

PCIe Full Size Mini Card

- ☒ Length x Width x Height (mm) : 51.07mm x 30.03mm x 4.23mm
- ☒ Weight: 3 g

PCIe Half Size Mini Card

- ☒ Length x Width x Height (mm) : 26.80mm x 30.03mm x 4.23mm
- ☒ Weight: 3 g

4.2. Pins Definition

Connector Pin-out

Pin #	Name	Pin #	Name
51	Reserved	52	+3.3Vaux
49	Reserved	50	GND
47	Reserved	48	+1.5V
45	Reserved	46	LED_WPAN#
43	GND	44	LED_WLAN#
41	+3.3Vaux	42	LED_WWAN#
39	+3.3Vaux	40	GND
37	GND	38	USB_D+
35	GND	36	USB_D-
33	PETp0	34	GND
31	PETn0	32	SMB_DATA
29	GND	30	SMB_CLK
27	GND	28	+1.5V
25	PERp0	26	GND
23	PERn0	24	+3.3Vaux
21	GND	22	PERST#
19	Reserved* (UIM_C4)	20	W_DISABLE#
17	Reserved* (UIM_C8)	18	GND

Pin #	Name	Pin #	Name
9	GND	10	UIM_DATA
7	CLKREQ#	8	UIM_PWR
5	COEX2	6	1.5V
3	COEX1	4	GND
1	WAKE#	2	3.3Vaux

* Reserved for future UIM interface (if needed)

Mechanical Key

15	GND	16	UIM_VPP
13	REFCLK+	14	UIM_RESET
11	REFCLK-	12	UIM_CLK

5. Regulatory and Certification Requirements

FCC Part 15B Class B, Part 27, ICES-003 ,RSS-199,RSS-102 MPE



- ☒ RoHS Compliant

6. Environmental Requirements

- ☒ Operating Temperature: -20° to 75° C
- ☒ Storage Temperature: -40° to 85° C
- ☒ Operating Humidity: 10% to 85% (non-condensing)
- ☒ Storage Humidity: 5% to 90% (non-condensing)

7. Packaging Specifications

7.1 Package Dimension and Weight

Qty/Carton	TBD
Carton Weight (Lbs)	TBD
Carton Dimension	TBD
Package Weight (Lbs)	TBD
Package Dimension	TBD

7.2 Package Contents and Material

The following items will be required for the complete package of the router:

Item	Comments
Installation CD	Contents include User manual.
Warranty Card	Yes
White Box	Yes
Paper board	Yes
Color Sleeve	Yes
Other	

8. Warranty

One Year Limited warranty to customer on the product.