

WAC-2241-M2

IEEE 802.11 ac/a/b/g/n/ WLAN + Bluetooth 4.1 M.2 2230 Combo Module

Datasheet

Version 0.5

B4



Revision History

Document	Date	Modification	Initials	Approved
Release				
Version 0.1	2014/08/04	Initial Release	Chao Lee	Chihhao Liao
Version 0.2	2014/08/27	Update mechanical drawing	Kevin Lin	Chihhao Liao
Version 0.3	2015/3/31	Update mechanical drawing	Yvonne Chen	Patrick Lin
Version 0.4	2015/4/17	Update power specifications	Chao Lee	Chihhao Liao
Version 0.5	2015/5/21	Update BT power specifications	Chao Lee	Chihhao Liao



1. Introduction

Gemicom Technology, Inc. introduces the pioneering IEEE 802.11 ac/a/b/g/n WIFI with Bluetooth 4.1 class I M.2 combo module --- **WAC-2241-M2.** This module is a highly integrated wireless local area network (WLAN) solution to let users enjoy the digital content through the latest wireless technology without using the extra cables and cords. It is fully compliant to Bluetooth 4.1 and v2.1 and supports EDR of 2Mbps and 3Mbps for data and audio communications. It enables a **high performance, cost effective, low power, compact solution**.

Compliant with the IEEE 802.11a/b/g/n/ac standard, this module uses Direct Sequence Spread Spectrum (DSSS), Orthogonal Frequency Division Multiplexing (OFDM), BPSK, QPSK, CCK and QAM baseband modulation technologies.

Compare to 802.11n technology, 802.11ac standard makes big improvement on speed and range.

Faster Speed: WLAN up to 867Mbps data rate.

This module adopts Broadcom dual-band WLAN & Bluetooth **BCM4356** single chip solution. All the other components are implemented by all means to reach the mechanical specification required.

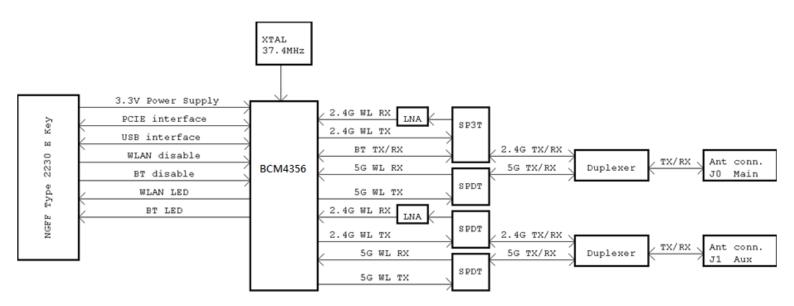


2. Features

- Wireless connection up to 867 Mbps for Wi-Fi
- 2 antennas to support 2(Transmit) × 2(Receive) diversity technology and Bluetooth
- WCS (Wireless Coexistence System)
- Low power consumption and high performance
- Enhanced wireless security
- Fully qualified Bluetooth BT4.1
- Enhanced Data Rate(EDR) compliant for both 2Mbps and 3Mbps supported
- Fully speed operation with Piconet and Scatternet support
- Electrical compliant to USB1.1 & 2.0



3. Block Diagram





4. General Specifications

Product Description IEEE 802.11 a/b/g/n/ac WI-Fi with Bluetooth 4.1 class I M.2 Combo Module Bluetooth Standard Bluetooth 4.1 Host Interface WI-Fi : PCI-E, BT : USB Major Chipset Broadcom BCM4356 Wi-Fi VID/PID 14E4/43EC WI-Fi SVID/SSPID 1A3B/221A BT VID/PID 13D3 /3488 Dimension 22mm x 30mm x 2.2mm (Tolerance remarked in mechanical drawing) Weight 2.4g Antenna IPEX MHF4 Connector Receptacle (20449) 1.main(I0):WiFi TX/RX, BT TX/RX 2umu x 30mm x 2.2mm (Tolerance remarked in mechanical drawing) Voltage power supply for host:3.3V+-5% Operating Temperature Operating: 0*80°C Storage temperature Operating: 0*80°C Storage temperature Operating: 0*80°C Frequency Range Wi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-hough band) for US/Canada and Europe 5.47-5.725 GHz (FCC UNII-hough band) for US/Canada Frequency Range Wi-Fi: Modulation BT: 2402MHz*2483MHz Wi-Fi: 802.111 ac/a/b/g/n: 0FDM 802.111 ac/a/b/g/n: 0FDM 802.111 ac/a/b/g/n: 0FDM Modulation BT: Header GF5K P	Model Name	WAC-2241-M2		
Bluetooth StandardBluetooth 4.1Host InterfaceWi-Fi : PCI-E , BT : USBMajor ChipsetBroadcom BCM4356Wi-Fi VID/PID14E4/43ECWi-Fi SVID/SSPID13B/221ABT VID/PID13D3 /3488Dimension22mm x 30mm x 2.2mm (Tolerance remarked in mechanical drawing)Weight24gAntenna1-PEX MHF4 Connector Receptacle (20449)1.main(IO):WiFi TX/RX , BT TX/RX2.aux(11): WiFi TX/RX , BT TX/RX2.aux(12): WiFi TX/RX , BT TX/RX2.aux(11): WiFi TX/RX , BT TX/RX2.aux(12): WiFi TX/RX , BT TX/RX2.aux(12): WiFi TX/RX , BT TX/RX5torage temperature5torage: -20°85'CEtertical SpecificationsFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-Invidel band) for US/Canada and Europe 5.47-5.725 GHz fCC UNII-Invidel band) for US/Canada and Europe 5.47-5.725 GHz (FCC UNII-Invidel band) for US/CanadaModulationBT: Header GFSK Payload 2M: 4-DQPSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKMutput PowerWi-Fi: nvram_p201 802.111: 16H-/2dBm (11Mbps)	Product Description	IEEE 802.11 a/b/g/n/ac Wi-Fi with Bluetooth 4.1 class I M.2 Combo		
Host InterfaceWi-Fi : USBMajor ChipsetBroadcom BCM4356Wi-Fi VID/PID14E4/43ECWi-Fi SVID/SSPID1A3B/221ABT VID/PID13D3 /3488Dimension22mm x 30mm x 2.2mm (Tolerance remarked in mechanical drawing)Weight2.4gAntennaIPEX MHF4 Connector Receptacle (20449)1.main(J0):WiFi TX/RX, BT TX/RX2.aux(J1): WiFi TX/RX, BT TX/RXOperating ConditionsVoltageopwer supply for host:3.3V+5%Operating TemperatureOperating: 0~80°CStorage temperatureStorage: -20~85°CElectrical SpecificationsFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-how band) for US/Canada, Japan and Europe 5.47-5.725 GHz for Europe 5.47-5.725 GHz (FCC UNII-high band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.47-5.725 GHz for Europe 5.47-5.725 GHz for Europe 5.47-5.725 GHz (FCC UNII-high band) for US/CanadaModulationGT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKMupt PowerWi-Fi: nvram_p201 802.111: 16+/-2dBm (14Mbps)		Module		
Major ChipsetBroadcom BCM4356Wi-Fi VID/PID14E4/43ECWi-Fi SSVID/SSPID1A3B/221ABT VID/PID13D3 /3488Dimension22mm x 30mm x 2.2mm (Tolerance remarked in mechanical drawing)Weight2.4gAntennaI-PEX MHF4 Connector Receptacle (20449)Antenna1.main(J0):WiFi TX/RX, BT TX/RX 2.aux(1): WiFi TX/RXOperating Conditions0perating: 0~80°CStorage temperatureSorage: 20~85°CElectrical SpecificationsForequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-how band) for US/Canada, Japan and EuropeFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-high band) for US/Canada, Japan and EuropeSocial SpecificationsFi: 2402MHz~2483MHzModulationBT: Header GFSK Payload 2N: 4-DQPSK Payload 2N: 4-DQPSK Payload 3N: 8DPSKModulationWi-Fi: nvram_p201 802.111: 16+/-2dBm (14Mbps)Output Power802.111: 15.51.51.51.51.51.51.51.51.51.51.51.51.5	Bluetooth Standard	Bluetooth4.1		
Wi-Fi VID/PID14E4/43ECWi-Fi SSVID/SSPID1A3B/221ABT VID/PID13D3 /3488Dimension22mm x 30mm x 2.2mm (Tolerance remarked in mechanical drawing)Weight2.4gAntennaI-PEX MHF4 Connector Receptacle (20449)Antenna1.main(J0):WiFi TX/RX, BT TX/RX 2.aux(1): WiFi TX/RXOperating Conditions0perating: 0-80°CStorage temperatureStorage: 10°80°CStorage temperatureOperating: 0-80°CElectrical Specifications0perating: 0-80°CFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-how band) for US/Canada, Japan and EuropeFir 2402/MHz~2483/MHz802.111 ac/a/b/g/n: OFDM 802.111 ac/a/b/g/n: OFDM	Host Interface	Wi-Fi : PCI-E , BT : USB		
Wi-Fi SSVID/SSPIDIA38/221ABT VID/PID1303 /3488Dimension22mm x 30mm x 2.2mm (Tolerance remarked in mechanical drawing)Weight2.4gAntennaI-PEX MHF4 Connector Receptacle (20449)AntennaI.main(J0):WiFi TX/RX, BT TX/RXDerating Conditionsz.aux(J1): WiFi TX/RX, BT TX/RXVoltagepower supply for host:3.3V+-5%Operating TemperatureOperating: 0~80°CStorage temperatureStorage: -20~85°CElectrical SpecificationsElectrical SpecificationsFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-Iniddle band) for US/Canada, Japan and EuropeStorage temperatureS.25-5.35 GHz (FCC UNII-middle band) for US/Canada, Japan and EuropeStorage temperatureS.21 ac/a/b/g/n: OFDM 802.11 ac/a/b/	Major Chipset	Broadcom BCM4356		
BT VID/PID13D3 / 3488Dimension22mm x 30mm x 2.2mm (Tolerance remarked in mechanical drawing)Weight2.4gAntennaI-PEX MHF4 Connector Receptacle (20449)AntennaI-main(J0):WiFi TX/RX , BT TX/RX 2.aux(J1): WiFi TX/RX , BT TX/RXOperating ConditionsOperating: 0°80°CYoltageOperating: 0°80°CStorage temperatureStorage: -20°85°CElectrical SpecificationsVi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-hidde band) for US/Canada, Japan and EuropeFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-hidde band) for US/Canada, Japan and EuropeBT:MidulationBT: 2402MHz~2483MHzModulationBT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKMi-Fi: nvram_p201 802.11b: 18+/-1.5dBm (11Mbps)Output Power802.11b: 18+/-1.5dBm (11Mbps)	Wi-Fi VID/PID	14E4/43EC		
Dimension22mm x 30mm x 2.2mm (Tolerance remarked in mechanical drawing)Weight2.4gAntennaI-PEX MHF4 Connector Receptacle (20449)Antenna1.main(J0):WiFi TX/RX, BT TX/RX 2.aux(J1): WiFi TX/RX, BT TX/RX 2.aux(J1): WiFi TX/RXOperating ConditionsOperating: 0°80°CVoltagepower supply for host:3.3V+5%Operating Temperature0perating: 0°80°CStorage temperatureStorage: 20°85°CElectrical SpecificationsFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-how band) for US/Canada, Japan and EuropeErospe5.25-5.35 GHz (FCC UNII-how band) for US/Canada, Japan and EuropeStorage temperatureS0.211 ac/a/b/g/n: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)ModulationBT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKModulationWi-Fi: nvram_p201 802.11a: 16+/-2dBm (54Mbps)Output Power802.11b: 18+/-1.5dBm (11Mbps)	Wi-Fi SSVID/SSPID	1A3B/221A		
Weight2.4gAntennaI-PEX MHF4 Connector Receptacle (20449)AntennaI.main(J0):WiFi TX/RX, BT TX/RX 2.aux(I1): WiFi TX/RXOperating ConditionsOperating: 0*80°CVoltagepower supply for host:3.3V+5%Operating TemperatureOperating: 0*80°CStorage temperatureStorage: -20*85°CElectrical SpecificationsElectrical SpecificationsFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-how band) for US/Canada, Japan and EuropeElectrical SpecificationsElectrope5.25-5.35 GHz (FCC UNII-high band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/CanadaBT: 2402MHz*2483MHzWi-Fi: 802.111 ac/a/b/g/n: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)ModulationBT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKWi-Fi: nvram_p201 802.111a: 16+/-2dBm (54Mbps)Output Power802.11b: 18+/-1.5dBm (11Mbps)	BT VID/PID	13D3 /3488		
I-PEX MHF4 Connector Receptacle (20449)1.main(J0):WiFi TX/RX , BT TX/RX2.aux(J1): WiFi TX/RX , BT TX/RXOperating ConditionsVoltagepower supply for host:3.3V+-5%Operating TemperatureOperating: 0°80°CStorage temperatureStorage: -20°85°CElectrical SpecificationsFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and EuropeEurope5.47-5.725 GHz fPCC UNII-middle band) for US/Canada and Europe 5.47-5.725 GHz fPCC UNII-high band) for US/CanadaBT: 2402MHz~2483MHzWodulationBT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKVutput PowerVi-Fi: nvram_p201 802.11b: 18+/-1.5dBm (11Mbps)	Dimension	22mm x 30mm x 2.2mm (Tolerance remarked in mechanical drawing)		
Antenna1.main(J0):WiFi TX/RX , BT TX/RX .2.aux(J1): WiFi TX/RXOperating ConditionsVoltagepower supply for host:3.3V+-5%Operating TemperatureOperating: 0°80°CStorage temperatureStorage: -20°85°CElectrical SpecificationsWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and Europe 5.47-5.725 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47-5.725 GHz (FCC UNII-high band) for US/Canada and Europe 5.47-5.725 GHz (FCC UNII-high band) for US/Canada BT: 2402MHz°2483MHzModulationBT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKModulationUVi-Fi: Norm_p201 802.111: 16+/-2dBm (54Mbps)Output PowerWi-Fi: 1.5dBm (11Mbps)	Weight	2.4g		
2.aux(J1): WiFi TX/RXOperating ConditionsVoltagepower supply for host:3.3V+-5%Operating TemperatureOperating: 0°80°CStorage temperatureStorage: -20°85°CElectrical SpecificationsFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-how band) for US/Canada, Japan and EuropeEurope5.25-5.35 GHz (FCC UNII-how band) for US/Canada and Europe 5.725-5.825 GHz (FCC UNII-high band) for US/CanadaBT: 2402MHz~2483MHzWi-Fi: 802.111 ac/a/b/g/n: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)ModulationBT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKWi-Fi: nvram_p201 802.111a: 16+/-2dBm (54Mbps)Gutput Power802.11b: 18+/-1.5dBm (11Mbps)		I-PEX MHF4 Connector Receptacle (20449)		
Operating ConditionsVoltagepower supply for host:3.3V+-5%Operating TemperatureOperating: 0~80°CStorage temperatureStorage: -20~85°CElectrical SpecificationsFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and EuropeEurope5.25-5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.725-5.825 GHz (FCC UNII-middle band) for US/Canada BT: 2402MHz~2483MHzModulationBT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKOutput Power802.11b: 18+/-1.5dBm (11Mbps)	Antenna 1.main(J0):WiFi TX/RX , BT TX/RX			
Voltagepower supply for host:3.3V+-5%Operating TemperatureOperating: 0~80°CStorage temperatureStorage: -20~85°CElectrical SpecificationsWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and EuropeFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-low band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/Canada BT: 2402MHz~2483MHzModulationBT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKOutput Power802.11b: 18+/-1.5dBm (11Mbps)		2.aux(J1): WiFi TX/RX		
Operating TemperatureOperating: 0°80°CStorage temperatureStorage: -20°85°CElectrical SpecificationsWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and EuropeFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and EuropeBUDDES.25-5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/Canada BT: 2402MHz~2483MHzModulationBT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKOutput Power802.11b: 18+/-1.5dBm (11Mbps)	Operating Conditions			
Storage temperatureStorage: -20~85°CElectrical SpecificationsFrequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and EuropeEurope5.25-5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/Canada BT: 2402MHz~2483MHzModulationBT: 802.11 ac/a/b/g/n: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)ModulationBT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKOutput Power802.11b: 18+/-1.5dBm (54Mbps)	Voltage	power supply for host:3.3V+-5%		
Electrical Specifications Frequency Range Wi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and Europe 5.25-5.35 GHz (FCC UNII-low band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/Canada BT: 2402MHz~2483MHz Wi-Fi: 802.11 ac/a/b/g/n: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps) BT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSK Wi-Fi: nvram_p201 802.11a: 16+/-2dBm (54Mbps)	Operating Temperature	Operating: 0~80°C		
Frequency RangeWi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / 5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and EuropeEurope5.25-5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/Canada BT: 2402MHz~2483MHzModulationWi-Fi: 802.111 ac/a/b/g/n: OFDM 	Storage temperature	Storage: -20~85°C		
Nodulation5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and Europe 5.25-5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/Canada BT: 2402MHz~2483MHzModulationWi-Fi: 802.11 ac/a/b/g/n: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)ModulationBT: Header GFSK Payload 2M: 4-DQPSK Payload 2M: 4-DQPSKWi-Fi: nvram_p201 802.11a: 16+/-2dBm (54Mbps)Wi-Fi: 802.11a: 16+/-2dBm (11Mbps)	Electrical Specifications			
Europe5.25-5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/CanadaBT: 2402MHz~2483MHzWi-Fi: 802.11 ac/a/b/g/n: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)BT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKWi-Fi: nvram_p201 802.11a: 16+/-2dBm (54Mbps)Wi-Fi: 1802.11b: 18+/-1.55Mm (11Mbps)	Frequency Range	Wi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz /		
S.25-5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/CanadaBT: 2402MHz~2483MHzWi-Fi: 802.11 ac/a/b/g/n: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)BT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKPayload 3M: 8DPSKWi-Fi: nvram_p201 802.11a: 16+/-2dBm (54Mbps)802.11b: 18+/-1.5dBm (11Mbps)		5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and		
5.47-5.725 GHz for Europe5.725-5.825 GHz (FCC UNII-high band) for US/CanadaBT: 2402MHz~2483MHzWi-Fi:802.11 ac/a/b/g/n: OFDM802.11 b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)BT:Header GFSKPayload 2M: 4-DQPSKPayload 3M: 8DPSKWi-Fi: nvram_p201802.11a: 16+/-2dBm (54Mbps)802.11b: 18+/-1.5dBm (11Mbps)		-		
5.725-5.825 GHz (FCC UNII-high band) for US/CanadaBT: 2402MHz~2483MHzWi-Fi:802.11 ac/a/b/g/n: OFDM802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)BT:Header GFSKPayload 2M: 4-DQPSKPayload 3M: 8DPSKVi-Fi: nvram_p201802.11a: 16+/-2dBm (54Mbps)802.11b: 18+/-1.5dBm (11Mbps)				
BT: 2402MHz~2483MHzWi-Fi:802.11 ac/a/b/g/n: OFDM802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)BT:Header GFSKPayload 2M: 4-DQPSKPayload 3M: 8DPSKWi-Fi: nvram_p201802.11a: 16+/-2dBm (54Mbps)802.11b: 18+/-1.5dBm (11Mbps)		-		
Wi-Fi:802.11 ac/a/b/g/n: OFDM802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)BT:Header GFSKPayload 2M: 4-DQPSKPayload 3M: 8DPSKWi-Fi: nvram_p201802.11a: 16+/-2dBm (54Mbps)802.11b: 18+/-1.5dBm (11Mbps)				
Nodulation802.11 ac/a/b/g/n: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSKNotiput PowerWi-Fi: nvram_p201 802.11b: 16+/-2dBm (54Mbps) 802.11b: 18+/-1.5dBm (11Mbps)				
Modulation802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)BT:Header GFSKPayload 2M: 4-DQPSKPayload 2M: 4-DQPSKPayload 3M: 8DPSKWi-Fi: nvram_p201802.11a: 16+/-2dBm (54Mbps)802.11a: 16+/-2dBm (54Mbps)Output Power802.11b: 18+/-1.5dBm (11Mbps)				
Modulation BT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSK Payload 3M: 8DPSK Wi-Fi: nvram_p201 802.11a: 16+/-2dBm (54Mbps) 802.11b: 18+/-1.5dBm (11Mbps)		-		
Header GFSKPayload 2M: 4-DQPSKPayload 3M: 8DPSKWi-Fi: nvram_p201802.11a: 16+/-2dBm (54Mbps)802.11b: 18+/-1.5dBm (11Mbps)	Modulation			
Payload 2M: 4-DQPSK Payload 3M: 8DPSKWi-Fi: nvram_p201 802.11a: 16+/-2dBm (54Mbps) 802.11b: 18+/-1.5dBm (11Mbps)	modulation			
Payload 3M: 8DPSK Wi-Fi: nvram_p201 802.11a: 16+/-2dBm (54Mbps) 802.11b: 18+/-1.5dBm (11Mbps)				
Wi-Fi: nvram_p201 802.11a: 16+/-2dBm (54Mbps) Output Power 802.11b: 18+/-1.5dBm (11Mbps)		-		
802.11a: 16+/-2dBm (54Mbps) Output Power 802.11b: 18+/-1.5dBm (11Mbps)		-		
Output Power 802.11b: 18+/-1.5dBm (11Mbps)				
	Output Power			
		802.11g: 16+/-1.5dBm (54Mbps)		
802.11n @2.4GHz: 15+/-1.5dBm (HT20 MCS7)				



	802.11n @2.4GHz: 15+/-1.5dBm (HT40 MCS7) 802.11n @5GHz: 15+/-2dBm (HT20 MCS7) 802.11n @5GHz: 14.5+/-2dBm (HT40 MCS7) 802.11ac @5GHz: 14+/-2dBm (HT80 MCS9)
	BT: 0 ≤ Output Power ≤ +10 dBm (Conductive)
	Wi-Fi:
	802.11a: -65 dBm
	802.11b: -76 dBm
	802.11g: -65 dBm
	802.11n@2.4GHz: HT20 MCS7 -64 dBm
Receive Sensitivity	802.11n @2.4GHz: HT40 MCS7 -61 dBm
	802.11n@5GHz: HT20 MCS7 -64 dBm
	802.11n @5GHz: HT40 MCS7 -61 dBm
	802.11ac @5GHz: VHT80 MCS9 -51 dBm
	BT: BER < 0.1% (Anritsu 8852B Tx -70 dBm)
	Wi-Fi: Open Space: ~300M / Indoor:~100M
Operating Range	(The transmission speed may vary according to the environment)
	BT: 10m~20m (depending on environment and NB model)
Regulatory	Follow BCM94356z regulatory list



4-1. Absolute Maximum Ratings

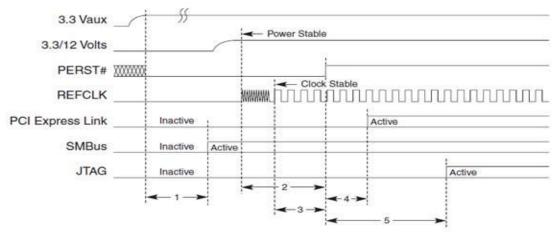
Symbol	Parameter	Max. Rating	Unit
V_{dd33}	Maximum I/O supply voltage	+3.9V	V

4-2. Recommended Operating Conditions

Symbol	Parameter	Rating	Unit
V _{dd33}	I/O voltage	3~3.63	V

4-3. Power UP Sequencing

PCI EXPRESS CARD ELECTROMECHANICAL SPECIFICATION, REV. 2.0



1.3.3Vaux stable to SMBus driven (optional). If no 3.3Vaux on platform, the delay is from +3.3V stable 2. Minimum time from power rails within specified tolerance to PERST# inactive (T_{PVPERL})

Figure 2-10: Power Up

3. Minimum clock valid to PERST# inactive (TPERST-CLK) 4. Minimum PERST# inactive to PCI Express link out of electrical idle

5. Minimum PERST# inactive to JTAG driven (optional)

OM14742B

Symbol	Parameter	Min	Max	Units	Notes	Figure
TPVPERL	Power stable to PERST# inactive	100		ms	1	Figure 2-10
T _{PERST-CLK}	REFCLK stable before PERST# inactive	100		μs	2	Figure 2-10
TPERST	PERST# active time	100		μs		Figure 2-11
T _{FAIL}	Power level invalid to PERST# active		500	ns	3	Figure 2-13
TWKRF	WAKE# rise – fall time		100	ns	4	Figure 2-14

Table 2-4: Power Sequencing and Reset Signal Timings



4-4. Power Consumption

WIRELESS

Test Bed		DELL Vostro 3560					
Test OS			Windows 8.1 Professional x64				
Test AP			Netg	ear R6300			
Driver Version		1.315.28	_Winblue_WH	CK_CS_x64_Dr	iver_2015020	3	
Test Voltage				3.3V			
		2.4G	5G	2.4G	5G	Note	
Item	Item		Disable ASPM		L1 Mode		
	AVG	27.6mA		10.4mA			
No connect AP	MAX	146.1mA		129.2mA			
	MIN	25.8mA		8.6mA			
	AVG	33.3mA	34.7mA	16.7mA	29.5mA		
Connect AP	MAX	154.0mA	232.5mA	127.6mA	237.5mA		
	MIN	26.0mA	26.1mA	8.5mA	8.8mA		
WLAN RF OFF(airplane mode)		26.4r	mA	9.2	mA		
Transmit by HT40/VHT80		503.9mA	650.1mA	478.1mA	642.8mA		
Receiver by HT40/VHT80		237.2mA	380.9mA	227.1mA	375.3mA		

1. The power consumption data were measured when NB operated in DC (battery) mode.

2. WLAN RF off mode in windows 8.1 under entering Airplane mode for testing.

3. Bluetooth function is disabled.

BLUETOOTH

	DELL Vostro 3	560	
	Windows 8.1 Professional x64		
	BTW12.0.1.450_Wi	n8.1_USB	
	3.3V		
	Current value Note		
AVG	9.4mA		
MAX	12.8mA		
MIN	8.7mA		
AVG	11.2mA		
MAX	16.7mA		
MIN	10.4mA		
	9.2mA		
	24.5mA		
	19.9mA		
	MAX MIN AVG MAX	Windows 8.1 Profes BTW12.0.1.450_Wi BTW12.0.1.450_Wi BTW12.0.1.450_Wi 3.3V Current value AVG 9.4mA MAX 12.8mA MIN 8.7mA MAX 16.7mA MIN 9.2mA VG 9.2mA	

1. The power consumption data were measured when NB operated in DC (battery) mode.

2. Wifi function is disabled.



5. Connector Pin-out Definitions (2230 NGFF Notch E)

Pin No.	Definition	Basic Description	Туре	Voltage
1	GND	Ground.	GND	
2	3.3V	3.3V power supply.	VCC	3.3V
3	USB_D+	USB (Host) data negative. Negative terminal of the USB transceiver.	Input/ Output	
4	3.3V	3.3V power supply.	VCC	3.3V
5	USB_D-	USB (Host) data positive. Positive terminal of the USB transceiver.	Input/ Output	
6	LED1#	WLAN LED, Active low.	Output	3.3V
7	GND	Ground.	GND	
8	PCM_CLK	PCM Clock/I2S Continuous serial clock. (in this project is not used, please let it open)	Input/ Output	1.8V
9	SDIO_CLK	SDIO 3.0 Clock. (in this project is not used, please let it open)	Input	1.8V
10	PCM_SYNC	PCM Synchronous dada sync/I2S Word select . (in this project is not used, please let it open)	Input/ Output	1.8V
11	SDIO_CMD	SDIO Command interface. (in this project is not used, please let it open)	Input/ Output	1.8V
12	PCM_OUT	PCM Synchronous data output/I2S Serial Data OUT. (in this project is not used, please let it open)	Output	1.8V
13	SDIO_DATA0	4 lines for SDIO Data exchange. (in this project is not used, please let it open)	Input/ Output	1.8V
14	PCM_IN	PCM Synchronous data input/I2S Serial Data IN. (in this project is not used, please let it open)	Input	1.8V
15	SDIO_DATA1	4 lines for SDIO Data exchange. (in this project is not used, please let it open)	Input/ Output	1.8V
16	LED2#	BT LED, Active low.	Output	3.3V
17	SDIO_DATA2	4 lines for SDIO Data exchange. (in this project is not used, please let it open)	Input/ Output	1.8V
18	GND	Ground.	GND	
19	SDIO_DATA3	4 lines for SDIO Data exchange. (in this project is not used, please let it open)	Input/ Output	1.8V
20	BT_HOST_WAKE_L	BT Wake, Active low(after SW download). (in this project is not used, please let it open)	Output	3.3V
21	SDIO_WAKE_L	SDIO Wake, Active low. (in this project is not used, please let it open)	Output	1.8V
22	UART_TX	UART Transmit data. (in this project is not used, please let it open)	Output	1.8V
23	SDIO Reset_L (WL_REG_ON)	This signal is used by the PMU to power up the WLAN section. Active low. (in this project is not used, please let it open)	Input	1.8V
32	UART_RX	UART Receive data. (in this project is not used, please let it open)	Input	1.8V
33	GND	Ground.	GND	
34	UART_RTS	UART Ready To Send. (in this project is not used, please let it open)	Output	1.8V
35	PERPO	Differential receiver.	Input	
36	UART_CTS	UART Clear To Send. (in this project is not used, please let it open)	Input	1.8V
37	PERNO	Differential receiver.	Input	



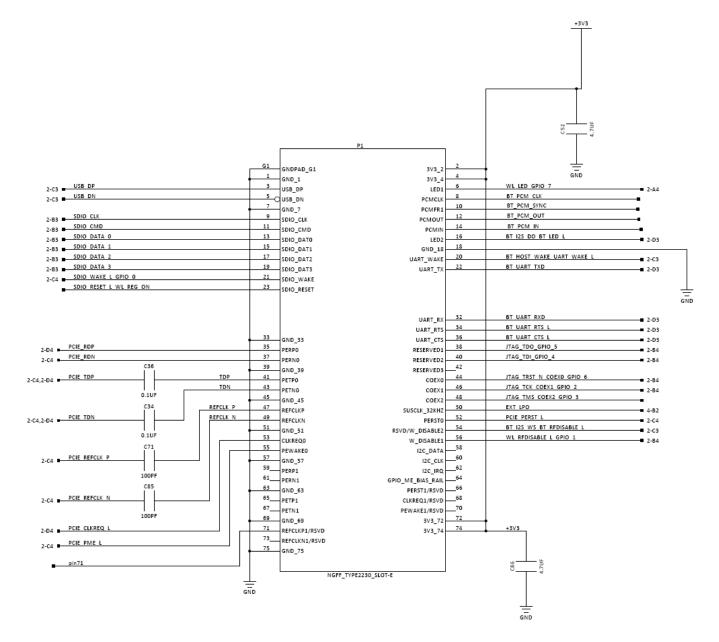
38	RESERVED1	JTAG function pin.(in this project is not used, please let it open)	Floating	
39	GND	Ground.	GND	
40	RESERVED2	JTAG function pin. (in this project is not used, please let it open)	Floating	
41	PETPO	Differential transmitter.	Output	
42	RESERVED3	No connect to gold fingers	Floating	
43	PETNO	Differential transmitter.	Output	
44	COEX3	JTAG function pin, (in this project is not used, please let it open)	Floating	
45	GND	Ground.	GND	
46	COEX2	JTAG function pin, (in this project is not used, please let it open)	Floating	
47	REFCLKP	PCIE differential clock.	Input	
48	COEX1	JTAG function pin, i(in this project is not used, please let it open)	Floating	
49	REFCLKN	PCIE differential clock.	Input	
50	SUSCLK_32KHz	Suspend Clock is a 32.768kHz clock supply input that is provided by platform to enable the add-in card to enter reduce power consumption modes.	Input	3.3V
51	GND	Ground.	GND	
52	PERST_L	PCIE system reset. Active low.	Input	3.3V
53	CLKREQ_L	PCIE clock request signal. Active low.	Output	3.3V
54	BT_DISABLE_L	BT disable, Active low.	Input	3.3V
55	PEWAKE_L	PCIE PME Wake, Open drain. Active low.	Output	3.3V
56	WL_DISABLE_L	WLAN disable , Active low.	Input	3.3V
57	GND	Ground.	GND	
58	I2C_DATA	No connect to gold fingers	Floating	
59	PERP1	No connect to gold fingers	Floating	
60	I2C_CLK	No connect to gold fingers	Floating	
61	PERN1	No connect to gold fingers	Floating	
62	I2C_IRQ	No connect to gold fingers	Floating	
63	GND	Ground.	GND	
64	RESERVED4	No connect to gold fingers	Floating	
65	PETP1	No connect to gold fingers	Floating	
66	PERST1	No connect to gold fingers	Floating	
67	PETN1	No connect to gold fingers	Floating	
68	CLKREQ1	No connect to gold fingers	Floating	
69	GND	Ground.	GND	
70	PEWAKE1	No connect to gold fingers	Floating	
71	REFCLKP1	No connect to gold fingers	Floating	



72	3.3V	3.3V power supply.	VCC	3.3V
73	REFCLKN1	No connect to gold fingers	Floating	
74	3.3V	3.3V power supply.	VCC	3.3V
75	GND	Ground.	GND	

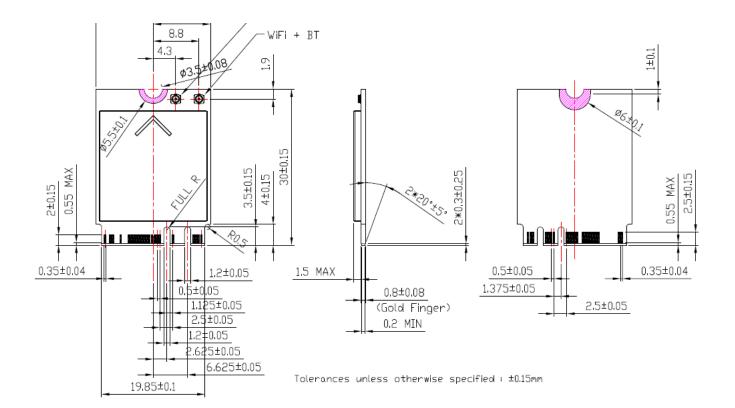


6. Schematics





7. Mechanical Drawing





RF CONNECTOR

