



Global Product Certification
EMC-EMF Safety Approvals

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**EMI TEST REPORT FOR CERTIFICATION
to
FCC PART 15 Subpart C (Section 15.247) & RSS-210
Class II Permissive Change**

FCC ID: QOQWT41E

Radio Module: BlueGiga Bluetooth

Bluetooth Model: WT41-E-HCI3

Host PC: Rugged Tablet PC
Model Number: CC61

Tested For: Handheld Group AB

Report Number: M110840_FCC_WT41-E-HCI3_C2PC

Issue Date: 30th September 2011

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Report No. M110840_FCC_WT41-E-HCI3_C2PC

Radio Module: BlueGiga Bluetooth

Bluetooth Model: WT41-E-HCI3

FCC ID: QOQWT41E

Equipment Type: Intentional Radiator (Transceiver)

Host PC: Rugged Tablet PC

Model Number: CC61

Tested for: Handheld Group AB

Address: Kinnegatan 17A SE-531 33 Lidkoping, Sweden

Contact: Jerker Hellstrom

Phone: +46 510 54 71 70

Test Standards: FCC Part 15 – Radio Frequency Devices

FCC Part 15 Subpart C - Intentional Radiators

Section 15.247: 2400 – 2483.5 MHz & 5725 – 5850 MHz Operation Bands

ANSI C63.4 – 2003

RSS-210 Issue 8 Low Power Licence-Exempt RadioCommunication Devices Annex 8: 2400–2483.5 MHz & 5725–5850 MHz Operation Bands

RSS-GEN Issue 3 General Requirements and Information for the Certification of Radiocommunication Equipment

Test Date: 7th September 2011

Test Engineer: Chieu Huynh - B.Eng (Hons) Electronics

Attestation: *I hereby certify that the device(s) described herein were tested as described in this report and that the data included is that which was obtained during such testing.*



Authorised Signatory: Chieu Huynh
 Senior EMC Engineer
 EMC Technologies Pty Ltd

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Accreditation No. 5290

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1.0 INTRODUCTION

EMI testing was performed on the BlueGiga Bluetooth Module, Model: WT41-E-HCI3 installed in Rugged Tablet PC, Model: CC61.

The OEM Bluetooth module WT41-E is modular certified under FCC ID: QOQWT41E. The Host tablet PC CC61 also is previously certified under FCC ID: YY3-017LRBT

The intention of this reporting is to add the WT41-E Bluetooth module to the host tablet PC CC61. All required WT41-E-HCI3 Bluetooth test results are reported within this report.

There are colour variations of the tablet PC, gray colour or yellow colour case. The material, size, and shape of the case is identical, it's just the colour that is different.

Test results and procedures were performed in accordance with the following Federal Communications Commission (FCC) standards/regulations:

47 CFR, Part 15, Subpart C:	Rules for intentional radiators (particularly section 15.247)
Section 15.203:	Antenna requirements
Section 15.205:	Restricted bands of operation
Section 15.207:	Conducted Emission Limits
Section 15.209:	Radiated Emission Limits (General requirements)
Section 15.247:	Operation in the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz

The test sample **complied** with the requirements of 47 CFR, Part 15 Subpart C - Section 15.247.

The test sample also complied with the Industry Canada RSS-210 issue 8 - Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Annex 8.

The measurement procedure used was in accordance with ANSI C63.4-2003. The instrumentation conformed to the requirements of ANSI C63.2-1996.



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1.1 Summary of Results

FCC Part 15 Subpart C Clauses	Industry Canada RSS-210 Issue 8 and RSS-Gen Clauses	Test Performed	Result
15.203	RSS-Gen (7.1.4)	Antenna Requirement	Complied
15.205	2.2 (Table 1)	Operation in Restricted Band	Complied
15.207	RSS-Gen (7.2.2)	Conducted Emissions	Note 1
15.209	RSS-Gen (6)	Radiated Emissions	Complied
15.247 (a)(1)	A8.1 (b) (d)	Channel Occupancy/Bandwidth	Note 2
15.247 (b)(1)	A8.4	Peak Output Power	Note 2
15.247 (c)	RSS-Gen (7.1.4)	Antenna Gain > 6 dBi	Not Applicable. Antenna gain < 6 dBi
15.247 (d)	A8.5	Out of Band Emissions	Complied
15.247 (e)	A8.2 (b)	Peak Power Spectral Density	Not Applicable. EUT is not digital modulated system
15.247 (f)	A8.3	Hybrid Systems (Note 3)	Not Applicable. EUT does not employ a hybrid system
15.247 (g)	A8.1	Frequency Hopping	Note 2
15.247 (h)	A8.1	Frequency Hopping	Note 2
15.247 (i)	RSS-Gen (5.5)	Radio Frequency Hazard	Complied

Note 1: Refer to FCC Part 15B test report

Note 2: Refer to original FCC 15.247 test report, FCC ID: QOQWT41E

Note 3: Hybrid systems are those that employ a combination of both frequency hopping and digital modulations technique.

1.2 Modifications

No modifications were required.



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2.0 GENERAL INFORMATION

(Information supplied by the Client)

2.1 EUT (Bluetooth) Details

Transmitter:	Bluetooth Module
Model Number:	WT41-E-HCI3
Manufacturer:	BlueGiga
Network Standard:	Bluetooth™ RF Test Specification
Modulation Type:	Frequency Hopping Spread Spectrum (FHSS)
Frequency Range:	2402 MHz to 2480 MHz
Number of Channels:	79
Carrier Spacing:	1.0 MHz
Antenna Type and Gain:	FXP70 Freedom 2.4GHz 5dBi Gain
Max. Output Power:	16 dBm

Channel Number	Frequency (MHz)	Bluetooth Utility power setting	
		Power (Ext, Int)	Configuration
1	2402	255, 51	Packet Type = 15 Packet Size = 339 CFG PKT
2	2403		
-	-		
39	2440		
40	2441	255, 56	
41	2442		
-	-		
78	2479		
79	2480	255, 51	

2.2 Host Tablet PC Details

Host PC:	Rugged Tablet PC
Model Number:	CC61
PC System FCC ID:	YY3-017LRBT

2.3 Test Configuration

Test software was used to configure the Bluetooth to transmit during the test. Measurements were performed while the transmitter transmitting.

Power is provided via an AC adaptor. Testing was performed at a voltage of 110VAC at 50Hz.

2.4 Test Procedure

Emissions measurements were performed in accordance with the procedures of ANSI C63.4-2003. Radiated emissions tests were performed at a distance of 3 metres from the EUT.

2.5 Test Facility

2.5.1 General

EMC Technologies Pty Ltd is listed by the FCC as a test laboratory able to perform compliance testing for the public. EMC Technologies is listed as an FCC part 47CFR2.948 test lab and may perform the testing required under Parts 15 and 18 – **FCC Registration Number 90560**

EMC Technologies Pty Ltd has also been accredited as a Conformity Assessment Body (CAB) by Australian Communications and Media Authority (ACMA) under the APECTEL MRA and is designated to perform compliance testing on equipment subject to Declaration of Conformity (Doc) and Certification under Parts 15 & 18 of the FCC Commission's rules – **Registration Number 494713 & Designation number AU0001**.

EMC Technologies has also been accepted by Industry Canada for the performance of radiated measurements in accordance with RSS 212, Issue 1 (Provisional) - **Industry Canada number 3569B**.

Measurements were performed at EMC Technologies' laboratory in Keilor Park, Victoria Australia.

2.5.2 NATA Accreditation

EMC Technologies is accredited in Australia to test to the following standards by the National Association of Testing Authorities (NATA).

"FCC Part 15 unintentional and intentional emitters in the frequency range 9kHz to 18 GHz excluding TV receivers (15.117 and 15.119), TV interface devices (15.115), cable ready consumer electronic equipment (15.118), cable locating equipment (15.213) and unlicensed national information infrastructure devices (Sub part E)."

The current full scope of accreditation can be found on the NATA website: www.nata.asn.au
It also includes a large number of emissions, immunity, SAR, EMR and Safety standards.

NATA is the Australian national laboratory accreditation body and has accredited EMC Technologies to operate to the IEC/ISO17025 requirements. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires fully documented test procedures, continued calibration of all equipment to the National Standard at the National Measurements Institute (NMI) and an internal quality system to ISO 9002. NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A²LA).

2.6 Test Equipment Calibration

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Agilent Technologies (Australia) Pty Ltd or the National Measurement Institute (NMI). All equipment calibration is traceable to Australia national standards at the National Measurements Institute. The reference antenna calibration was performed by NMI and the working antennas (biconical, log-periodic and horns) calibrated by the EMC Technologies. The complete list of test equipment used for the measurements, including calibration dates and traceability is contained in the Measurement Instrument Details.

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FCC 15.247 (DSS) RESULTS

3.0 CONDUCTED EMISSION MEASUREMENTS

Refer to FCC Part 15B Test Report

4.0 RADIATED SPURIOUS EMISSION MEASUREMENTS

4.1 Test Procedure

Testing was performed in accordance with the requirements of FCC Part 15.247(d).

Radiated emission measurements were performed to the limits as per section 15.209 and 15.247. All measurements above 1 GHz were made over a distance of 3 metres.

Calibrated EMCO 3115 and ETS standard gain horn antennas were used for measurements between 1 GHz to 25 GHz.

The measurement of emissions above 1000 MHz was measured using a following setting:

Peak measurements setting: RBW = VBW = 1 MHz

Average measurements setting: RBW = 1 MHz and VBW = 10 Hz

The receiver bandwidth was set to 6 dB.

The EUT was slowly rotated with the Peak Detector set to Max-Hold. This was performed for two antenna heights. When an emission was located, it was positively identified and its maximum level found by rotating the automated turntable, and by varying the antenna height. Each significant peak was investigated with the Peak/Average Detectors. The measurement data for each frequency range was corrected for cable losses, antenna factors and preamplifier gain. This process was performed for both horizontal and vertical antenna polarisations.

4.2 Calculation of field strength

The field strength was calculated automatically by the software using all the pre-stored calibration data. The method of calculation is shown below:

E = V + AF - G + L Where:

E = Radiated Field Strength in dB μ V/m.

V = EMI Receiver Voltage in dB μ V. (measured value)

AF = Antenna Factor in dB(m⁻¹). (stored as a data array)

G = Preamplifier Gain in dB. (stored as a data array)

L = Cable loss in dB. (stored as a data array of Insertion Loss versus frequency)

- Example Field Strength Calculation**

Assuming a receiver reading of 34.0 dB μ V is obtained at 90 MHz, the Antenna Factor at that frequency is 9.2 dB. The cable loss is 1.9 dB while the preamplifier gain is 20 dB. The resulting Field Strength is therefore as follows:

$$34.0 + 9.2 + 1.9 - 20 = 25.1 \text{ dB}\mu\text{V/m}$$



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4.3 Radiated Emissions (Spurious and Harmonics)

All orientations were investigated and tested. Worst results were reported below.

4.3.1 Frequency Band: 1 – 25 GHz

The 74 dB μ V/m @ 3m and 54 dB μ V/m @ 3m limits are applied for emissions fall in the restricted bands. The limits for emission outside the restricted band are 20 dB below the fundamental field strength.

Channel 1 - 2402 MHz

Frequency MHz	Peak Detecto dB μ V/m	Average Detector dB μ V/m	Peak Limit dB μ V/m	Average Limit dB μ V/m	Result	
2402	114.5	111.5	Transmit Frequency			
4804	49.1	39.6	74.0	54.0	Complied	
7206	54.4	46.8	94.5	74.5	Complied	

Channel 40 - 2441 MHz

Frequency MHz	Peak Detecto dB μ V/m	Average Detector dB μ V/m	Peak Limit dB μ V/m	Average Limit dB μ V/m	Result	
2441	115.0	111.6	Transmit Frequency			
4882	50.7	44.1	74.0	54.0	Complied	
7323	51.6	40.5	74.0	54.0	Complied	

Channel 79 - 2480 MHz

Frequency MHz	Peak Detecto dB μ V/m	Average Detector dB μ V/m	Peak Limit dB μ V/m	Average Limit dB μ V/m	Result	
2480	113.5	109.8	Transmit Frequency			
4960	51.7	45.1	74.0	54.0	Complied	
7440	56.6	49.0	74.0	54.0	Complied	
12400	56.2	42.6	74.0	54.0	Complied	

Result: Harmonics were recorded up to 25 GHz. The worst case emissions complied with the FCC limits of sections 15.209 and 15.247 by a margin of 5.0 dB.

Other emissions (1065 MHz, 1863 MHz and 2126 MHz) were recorded from the host PC.

4.3.2 Frequency Band: 30 - 1000 MHz

Refer to FCC Part 15B Test Report

4.3.3 RF Conducted Measurements at the Antenna Terminal (including Band Edge)

Refer to original FCC 15.247 test report, FCC ID: QOQWT41E



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5.0 PEAK OUTPUT POWER

Refer to original FCC 15.247 test report, FCC ID: QOQWT41E

6.0 CHANNEL BANDWIDTH & CHANNEL OCCUPANCY

Refer to original FCC 15.247 test report, FCC ID: QOQWT41E

7.0 RADIO FREQUENCY EXPOSURE (HAZARD) INFORMATION

Testing was performed in accordance with the requirements of FCC Part 15.247(i)

Spread spectrum transmitters operating in the 2400 - 2483.5 MHz and 5725 – 5850 MHz bands are required to be operated in a manner that ensures that the public is not exposed to RF energy levels in accordance with CFR 47, Section 1.1307(b)(1).

In accordance with this section and also section 2.1093 this device has been defined as a portable device.

SAR testing was performed in accordance with OET Bulletin 65 and reported under EMC Technologies reports M110841 SAR FCC Report. The highest SAR value of 1.21 mW/g was measured which complied with the FCC human exposure requirements of 47 CFR 2.1093 (d).

8.0 ANTENNA REQUIREMENT

This intentional radiator was designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.



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9.0 COMPLIANCE STATEMENT

The BlueGiga Bluetooth Module, Model: WT41-E-HCI3 installed in Rugged Tablet PC, Model: CC61, **complied** with the requirements of 47 CFR, Part 15 Subpart C - Rules for Radio Frequency Devices (intentional radiators), Section 15.247 - Operation in the frequency bands 2400 - 2483.5 MHz and 5725 – 5850 MHz.

The test sample also complied with the Industry Canada RSS-210 issue 8 - Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Annex 8 and the RF exposure requirements of RSS-102.

Results were as follows:

FCC Part 15 Subpart C Clauses	Industry Canada RSS-210 Issue 8 and RSS-Gen Clauses	Test Performed	Result
15.203	RSS-Gen (7.1.4)	Antenna Requirement	Complied
15.205	2.2 (Table 1)	Operation in Restricted Band	Complied
15.207	RSS-Gen (7.2.2)	Conducted Emissions	Note 1
15.209	RSS-Gen (6)	Radiated Emissions	Complied
15.247 (a)(1)	A8.1 (b) (d)	Channel Occupancy/Bandwidth	Note 2
15.247 (b)(1)	A8.4	Peak Output Power	Note 2
15.247 (c)	RSS-Gen (7.1.4)	Antenna Gain > 6 dBi	Not Applicable. Antenna gain < 6 dBi
15.247 (d)	A8.5	Out of Band Emissions	Complied
15.247 (e)	A8.2 (b)	Peak Power Spectral Density	Not Applicable. EUT is not digital modulated system
15.247 (f)	A8.3	Hybrid Systems (Note 3)	Not Applicable. EUT does not employ a hybrid system
15.247 (g)	A8.1	Frequency Hopping	Note 2
15.247 (h)	A8.1	Frequency Hopping	Note 2
15.247 (i)	RSS-Gen (5.5)	Radio Frequency Hazard	Complied

Note 1: Refer to FCC Part 15B test report

Note 2: Refer to original FCC 15.247 test report, FCC ID: QOQWT41E

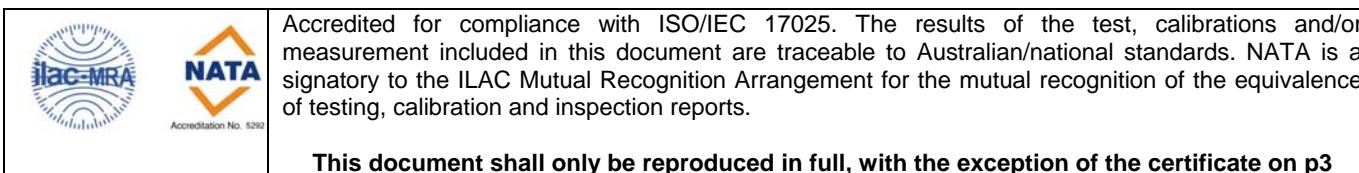
Note 3: Hybrid systems are those that employ a combination of both frequency hopping and digital modulations technique.

10.0 MEASUREMENT UNCERTAINTIES

EMC Technologies has evaluated the equipment and the methods used to perform the emissions testing. The estimated measurement uncertainties for emissions tests shown within this report are as follows:

Radiated Emissions:	30 MHz to 300 MHz	±5.1 dB
	300 MHz to 1000 MHz	±4.7 dB
	1 GHz to 18 GHz	±4.6 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.



11.0 MEASUREMENT INSTRUMENT

EQUIPMENT TYPE	MANUFACTURER, MODEL NUMBER and SERIAL NUMBER	CALIBRATION DUE DD/MM/YY
EMI RECEIVER	Rohde & Schwarz, Model ESU40 SN 1302.6005.40, 20 Hz – 40 GHz	08/12/11
ANTENNAS	Narda Standard Gain Horn, M/N: 644	19/11/12
	ETS Standard Gain Horn, M/N: 3160-03	19/11/12
	ETS Standard Gain Horn, M/N: 3160-05	19/11/12
	ETS Standard Gain Horn, M/N: 3160-06	19/11/12
	ETS Standard Gain Horn, M/N: 3160-07	19/11/12
	ETS Standard Gain Horn, M/N: 3160-08	19/11/12
	ETS Standard Gain Horn, M/N: 3160-09	08/02/14
	EMCO 3115 DOUBLE RIDGED HORN 1 - 18 GHz Sn: 8908-3282	12/01/12



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