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EMI TEST REPORT FOR CERTIFICATION to FCC PART 15 Subpart C (Section 15.247)

FCC ID:	US8-SA-04
Radio Module:	WLAN IEEE 802.11b
Model:	BGW200EG
Host:	Infusion
Model:	SA-04
Report Number	M060926_Cert_Infusion_BGW200EG
Tested for:	Torian Wireless Ltd
Issue Date:	5th December 2006

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Report Number:	M060926_Cert_Infusion_BGW200EG
Radio Modules:	WLAN IEEE 802.11b
Model:	BGW200EG
Manufacturer:	Philips
Host:	Infusion
Model:	SA-04
Manufacturer:	Inventec Electronics (M) Sdn. Bhd.
FCC ID:	US8-SA-04
Equipment Type:	Intentional Radiator (Transceiver)
Tested for:	Torian Wireless Ltd
Address:	204 Johnston Street Collingwood VIC 3066 Australia
Contact:	James Hamond
Test Standards:	FCC Part 15, Subpart C – Intentional Radiators FCC Part 15.247: 2400 – 2483.5 MHz Operation Band ANSI C63.4 – 2003 OET Bulletin No. 65
Test Dates:	27th September to 22nd November 2006
Test Officers:	**Chieu Huynh** **B.Eng (Hons) Electronics** **Kevin Hansen**

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:
Chris Zombolas
Technical Director
EMC Technologies Pty Ltd

EMI TEST REPORT FOR CERTIFICATION
to
FCC PART 15 Subpart C (Section 15.247)

1.0 INTRODUCTION

EMI testing was performed on the Wireless LAN IEEE 802.11b, Model: BGW200EG.

The WLAN is a built-in device in the Infusion, Model: SA-04. Enclosure port and Input/Output ports of the host were tested while the EUT was functional.

The WLAN module supports IEEE 802.11b configuration.

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 and 5725-5850 MHz

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

The Infusion is a portable music player able to play and store MP3 music, tune into FM radio and receive internet radio using a WiFi network. The results for the Wifi (WLAN Transmitter) are reported in this test report. The results for the FM Radio (Receiver) and the MP3 Player are reported separately (refer to EMC Technologies' test reports: M060926_DoC_FM_Receiver and M060926_Verification_MP3_Player).

1.1 Summary of Results

FCC Part 15, Subpart C Clauses	Test Performed	Result
15.203	Antenna Requirement	**Not Applicable**
15.205	Operation in Restricted Band	**Complies**
15.207	Conducted Emissions	**Complies**
15.209	Radiated Emissions	**Complies**
15.247 (a)(2)	Channel Bandwidth	**Complies**
15.247 (b)(3)	Peak Output Power	**Complies**
15.247 (i)	Radio Frequency Hazard	**Complies**
15.247 (d)	Out of Band Emissions	**Complies**
15.247 (e)	Peak Power Spectral Density	**Complies**

The measurement procedure used was in accordance with ANSI C63.4-2003 and OET Bulletin No. 65. The instrumentation conformed to the requirements of ANSI C63.2-1996.

1.2 Modifications

- Ferrite (1 loop) was installed on USB cable. Fair-Rite part number: 0444164281
- Ferrite (1 loop) was installed on DC power cable. Fair-Rite part number: 0444164281

2.0 GENERAL INFORMATION

(Information supplied by the Client)

2.1 Product Details

Radio Module:	WLAN IEEE 802.11b
Model:	BGW200EG
Manufacturer:	Philips
Antenna:	Broad Band Ceramic Antenna
Part Number:	RFANT7635110A1T Series
Max Gain:	2 dBi
Manufacturer:	Walsin Technology Corporation
FCC ID:	US8-SA-04
Equipment Type:	Intentional Radiator (Transceiver)
Host:	Infusion
Model Number:	SA-04
Manufacturer:	Inventec Electronics (M) Sdn. Bhd.
Microprocessor:	Arm 9
Crystal Frequencies:	32.686 kHz and 12 MHz
SDRAM:	90 MHz
CPU core:	180 MHz
Real Time Clock:	32.686 kHz
AC Adapter:	SUNNY Switching
Model Number:	SYS1298-1506-W2A
Input Voltage:	100 – 240 VAC, 50 – 60 Hz, 1 Amp Max
Output Voltage:	+9 V, 1.5 Amps

2.2 Technical Specifications - WLAN Transmitter

Transmitter:	WLAN IEEE 802.11b
Model Number:	BGW200EG
Chip Set:	BGW200EG
Manufacturer:	Philips
Modulation Type:	Direct Sequence Spread Spectrum (DSSS)
Data Rates:	DBPSK – 1Mbps DQPSK – 2Mbps CCK – 5.5Mbps, 11Mbps
Frequency Range:	2400 – 2483.5 MHz

Frequency allocation for 802.11b:

Channel Number	Frequency (MHz)
1	2412*
2	2417
3	2422
4	2427
5	2432
6	2437*
7	2442
8	2447
9	2452
10	2457
11	2462*

*Channels tested and reported

2.3 Operational Description

The EUT is a WLAN IEEE 802.11b, Model: SA-04, installed in host Infusion, Model: SA-04. The antenna is a Broad Band Ceramic Antenna (RFANT7635110A1T Series) manufactured by Walsin Technology Corporation.

The Infusion is a portable music player able to play and store MP3 music, tune into FM radio and receive internet radio using a WiFi network.

This WiFi function is based on a complete, single-package 802.11b solution combining baseband/MAC, RF transceiver and power amplifier. It is implemented on a separate PCB that connects to the main PCB via a board to board connector. This PCB has two layers and Ground plane runs on both layers everywhere except around the ceramic antenna.

2.4 Test Configuration

The WLAN Module was set to Ad hoc mode, transmitting every 100 milliseconds and set to normal (managed) mode when testing receiving mode.

The device has no antenna port; all tests were performed as radiated measurement.

Refer to photos in Appendix B3 for WLAN Antenna locations.

2.5 Block Diagram

Refer to Appendix D - Block Diagram

2.6 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 and 10 metres from the EUT. OET Bulletin 65 dated June 2001 was used for reference.

2.7 Test Facility

2.7.1 General

Radiated Emission measurements were performed at EMC Technologies open area test site (OATS) situated at Lerderderg Gorge, near the township of Bacchus Marsh in Victoria, Australia. Conducted emission measurements were performed at EMC Technologies' laboratory in Tullamarine, Victoria Australia.

The above sites have been fully described in a report submitted to the FCC office, and accepted in a letter dated June 14, 2002, **FCC Registration Number 90560**.
EMC Technologies open area test site (OATS) has also been accepted by Industry Canada for the performance of radiated measurements in accordance with RSS 212, Issue 1 (Provisional).
Industry Canada File Number, IC 4161, (Registration Date - November 5th 2001).

2.7.2 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 Laboratory (NML) 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 (A^2LA).

2.8 Units of Measurements

2.8.1 Conducted Emissions

Measurements are reported in units of dB relative to one microvolt. (dBμV).

2.8.2 Radiated Emissions

Measurements are reported in units of dB relative to one microvolt per metre (dBμV/m).

2.9 Test Equipment Calibration

All 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 Laboratory (NML). All equipment calibration is traceable to Australia national standards at the National Measurements Laboratory. The reference antenna calibration was performed by NML and the working antennas (biconical and log-periodic) calibrated by the NATA approved procedures. The complete list of test equipment used for the measurements, including calibration dates and traceability is contained in Appendix A

2.10 Ambients at OATS

The Open Area Test Site (OATS) is an area of low background ambient signals. No significant broadband ambients are present however commercial radio and TV signals exceed the limit in the FM radio, VHF and UHF television bands. Radiated prescan measurements were performed in the shielded enclosure to check for possible radiated emissions at the frequencies where the OATS ambient signals exceeded the test limit.

RESULTS – WLAN IEEE 802.11b

3.0 CONDUCTED EMISSION MEASUREMENTS

Testing was performed in accordance with the requirements of FCC Part 15.207

3.1 Test Procedure

The arrangement specified in ANSI C63.4-2003 was adhered to for the conducted EMI measurements. The EUT was placed in the RF screened enclosure and a CISPR EMI Receiver as defined in ANSI C63.2-1996 was used to perform the measurements.

The EMI Receiver was operated under program control using the Max-Hold function and automatic frequency scanning, measurement and data logging techniques. The specified 0.15 MHz to 30 MHz frequency range was sub-divided into sub-ranges to ensure that all short duration peaks were captured.

3.2 Peak Maximising Procedure

The various operating modes of the system were investigated. For each of the sub-ranges, the EMI receiver was set to continuous scan with the Peak detector set to Max-Hold mode. The Quasi-Peak detector and the Average detector were then invoked to measure the actual Quasi-Peak and Average level of the most significant peaks, which were detected.

3.3 Calculation of Voltage Levels

The voltage levels were automatically measured in software and compared to the test limit. The method of calculation was as follows:

VEMI = **VRx + LBPF**

Where: **VEMI =** the Measured EMI voltage in dBµV to be compared to the limit.
VRx = the Voltage in dBµV read directly at the EMI receiver.
LBPF = the loss in dB of the cables and the Limiter and Band pass Filter.

3.4 Plotting of Conducted Emission Measurement Data

The measurement data pertaining to each frequency sub-range were then concatenated to form a single graph of (peak) amplitude versus frequency. This was performed for both Active and Neutral lines and the composite graph were subsequently plotted. A list of the highest relevant peaks and the respective Quasi-Peak and Average values were also plotted on the graph.

3.5 Results of Conducted Emission Measurements (AC Mains Ports)

Initial investigations were performed with all modulation types: (DBPSK, DQPSK and CCK). No significant differences in emissions were observed. Final testing was performed while the WLAN transmitter continuously operated on the low (Channel 1, 2412 MHz) frequency channel with the modulation rate of 11 Mbps (CCK).

All emissions complied with the quasi peak and average limits by margins of greater than 20 dB. The measurement uncertainty was ±2.0 dB. Refer to Appendix K (graphs 1 & 2) for plots of the conducted EMI measurements.

Result: Complies

4.0 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. The measurements were made at the open area test site.

The EUT was set up on the table top (placed on turntable) of total height 80 cm above the ground plane, and operated as described in section 2 of this report. The EMI Receiver was operated under software control via the PC Controller through the IEEE.488 Interface Bus Card Adaptor. The test frequency range was sub-divided into smaller bands with sufficient frequency resolution to permit reliable display and identification of possible EMI peaks while also permitting fast frequency scan times. A calibrated Biconical antenna was used for measurements between 30 MHz to 232 MHz and a calibrated Logperiodic antenna used for measurements between 230 MHz to 1000 MHz. Calibrated EMCO 3115, EMCO 3116 and ETS standard gain horn antennas were used for measurements between 1 to 25 GHz.

The measurement of emissions between 30 - 1000 MHz was measured with the resolution bandwidth of 120 kHz and the video bandwidth of 300 kHz.

The measurement of emissions above 1000 MHz, appearing in the restricted bands, was made using an average detector with a bandwidth of 1.0 MHz.

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 Quasi-Peak/Average Detectors. The software for cable losses automatically corrected the measurement data for each frequency range, antenna factors and preamplifier gain and all data was then stored on disk in sequential data files. 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 dBμV/m.
V = EMI Receiver Voltage in dBμV. (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 dBμV 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 dBμV/m

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (1000 MHz – 18,000 MHz) ± 4.1 dB
(30 MHz – 1,000 MHz) ± 3.7 dB

4.3 Radiated Emissions (Spurious and Harmonics)

4.3.1 Frequency Band: 1 – 25 GHz

All measurements above 1 GHz were initially made over a distance of 3 metres. This was decreased to 1.0 metre as the emission levels from the device were very low.

The 54 dBμV/m limit at 3 metres has been converted to 64 dBμV/m at 1 metre using a factor of 20 dB per decade where emissions were located in the restricted bands.

Testing was performed while the 802.11b transmitter continuously operated.

Initial investigations were performed with three modulation types: (DBPSK, DQPSK and CCK). No significant differences in emissions were observed. Final testing was performed while the transmitter continuously operated with the modulation rate of 11 Mbps (CCK).

Channel 1 - 2412 MHz

Frequency MHz	Level dBuV/m		Antenna Polarization	Peak Limit dBuV/m	Average Limit dBuV/m	Result
	Peak Detector	Average Detector				
2412	91.3					
4824	48.2	35.9	Vert/Hort	74.0	54.0	Pass
7236	low	low	Vert/Hort	-	-	Pass
9648	51.7	44.4	Vert/Hort	-	-	Pass
12060	low	low	Vert/Hort	74.0	54.0	Pass
14472	low	low	Vert/Hort	74.0	54.0	Pass
16884	low	low	Vert/Hort	-	-	Pass
19296	low	low	Vert/Hort	84.0* (1m)	64.0* (1m)	Pass
21708	low	low	Vert/Hort	-	-	Pass
24120	low	low	Vert/Hort	-	-	Pass

*Measurement was performed at 1 metre distance and the limits were corrected accordingly.
Low = noise floor level

Channel 6 - 2437 MHz

Frequency MHz	Level dBuV/m		Antenna Polarization	Peak Limit dBuV/m	Average Limit dBuV/m	Result
	Peak Detector	Average Detector				
2437	91.6					
4874	48.8	37.4	Vert/Hort	74.0	54.0	Pass
7311	low	low	Vert/Hort	74.0	54.0	Pass
9748	51.9	44.1	Vert/Hort	-	-	Pass
12185	low	low	Vert/Hort	74.0	54.0	Pass
14622	low	low	Vert/Hort	-	-	Pass
17059	low	low	Vert/Hort	-	-	Pass
19496	low	low	Vert/Hort	84.0* (1m)	64.0* (1m)	Pass
21933	low	low	Vert/Hort	-	-	Pass
24370	low	low	Vert/Hort	-	-	Pass

*Measurement was performed at 1 metre distance and the limits were corrected accordingly.
Low = noise floor level

Channel 11 - 2462 MHz

Frequency MHz	Level dBuV/m		Antenna Polarization	Peak Limit dBuV/m	Average Limit dBuV/m	Result
	Peak Detector	Average Detector				
2462	92.2					
4924	49.0	36.7	Vert/Hort	74.0	54.0	Pass
7386	low	low	Vert/Hort	74.0	54.0	Pass
9848	52.0	44.3	Vert/Hort	-	-	Pass
12310	low	low	Vert/Hort	74.0	54.0	Pass
14772	low	low	Vert/Hort	-	-	Pass
17234	low	low	Vert/Hort	-	-	Pass
19696	low	low	Vert/Hort	84.0* (1m)	64.0* (1m)	Pass
22158	low	low	Vert/Hort	84.0* (1m)	64.0* (1m)	Pass
24620	low	low	Vert/Hort	-	-	Pass

*Measurement was performed at 1 metre distance and the limits were corrected accordingly.
Low = noise floor level

Results: 2^{nd} and 4^{th} harmonics were recorded within the restricted bands of up to 25 GHz. Other harmonics were confirmed low with both RBW and VBW reduced. Harmonics were complied with the FCC limits in sections 15.209 and 15.247. The measurement uncertainty for radiated emissions in this band was ±4.1 dB.

4.3.2 Frequency Band: 30 - 1000 MHz

Testing was performed at a distance of 3 metres.

Initial investigations were performed with all modulation types: (DBPSK, DQPSK and CCK). No significant differences in emissions were observed. Final testing was performed while the 802.11b transmitter continuously operated on the low (Channel 1, 2412 MHz) frequency channel with the modulation rate of 11 Mbps (CCK).

Frequency MHz	Polarisation	QP Measured dBμV/m	QP Limit dBμV/m	ΔQP ± dB
41.94	Vertical	29.1	29.5	-0.5
360.0	Vertical	32.6	35.5	-2.9
359.99	Horizontal	29.9	35.5	-5.6
40.55	Vertical	23.4	29.5	-6.1
106.24	Vertical	26.7	33.0	-6.4
44.74	Vertical	22.8	29.5	-6.7
39.17	Vertical	22.7	29.5	-6.9
198.56	Vertical	26.0	33.0	-7.0
99.28	Vertical	25.6	33.0	-7.4
125.88	Vertical	25.5	33.0	-7.5
202.81	Vertical	25.0	33.0	-8.0
68.53	Vertical	21.4	29.5	-8.1
110.47	Vertical	24.8	33.0	-8.2
114.68	Vertical	24.7	33.0	-8.3
46.14	Vertical	20.5	29.5	-9.0
100.68	Vertical	23.9	33.0	-9.1
128.67	Vertical	23.7	33.0	-9.3
294.70	Horizontal	19.6	35.5	-15.9

Results: The highest radiated emission peak occurred at 41.94 MHz (Vertical Polarity) and complied with FCC quasi peak limit by a margin of 0.5 dB. The measurement uncertainty in this band was ± 3.7 dB. Refer to Appendix K (graphs 3 & 4) for plots of the radiated EMI measurements.

4.3.3 RF Conducted Measurements at the Antenna Terminal

Not applicable, as EUT has no antenna port.

4.3.4 Band Edge Measurements

In the 100 kHz bandwidth within the operating band, the highest emissions (spurious/harmonics) level that is produced by the intentional radiator shall be at least 20 dB below.

The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised.

The fundamental field strength at 2412 MHz is 91.3 dBμV/m. Delta different of band edge low (2390 MHz) is 50.3 dB. Therefore, band edge low field strength level is 40.0 dBμV/m.
The fundamental field strength at 2462 MHz is 92.2 dBμV/m. Delta different of band edge high (2483.5 MHz) is 50.7 dB. Therefore, band edge high field strength level is 41.5 dBμV/m.

Refer to Appendix J for band edge plots.

Results: Complied.

5.0 PEAK OUTPUT POWER - Section 15.247 (b)(3)

Testing was performed in accordance with the requirements of FCC Part 15.247(b)(3).

Measurements were performed while the WLAN transmitter continuously transmitted.

The device has no antenna port; test was performed as radiated measurement at Open Area Test Site (OATS).

Measurements were made with the spectrum analyser operating in peak hold mode with a resolution bandwidth of 3 MHz.

The power envelope of the device was determined with the antenna using vertical and horizontal polarisations,

The power envelope was maximised by rotating the device using a turntable and by height scanning between 1 – 4 metres using the automated antenna tower.

As the bandwidth of the emission exceeded the resolution bandwidth of the spectrum analyser power measurements were made in 3 MHz steps across the frequency band occupied by the emission that were then summed using a spreadsheet.

Each of these emissions was recorded in dBuV and was then converted to dBm and subsequently into an absolute power level (mW).

Each of these individual power levels was then summed to give a total envelope power for the emission.

The radiated power was then determined by adding factors for the cable losses, antenna gains and path loss.

Example calculation - Low Channel – 2412 MHz

Freq MHz	Level dBuV	Level dBm	Level uW	Total Power uW	Total Power dBm	Ant Gain dB	Coax Loss dB	Path Loss dB	Power dBm	Power mW
2403	low	-	-							
2406	57	-50	0.1							
2409	61	-46	0.25							
2412	62	-45	0.32	0.095	-40.22	9.8	2.5	49.6	2.1	1.6
2415	60	-47	0.2							
2418	56	-51	0.08							
2421	low	-	-							

Initial investigations were performed with three modulation types: (DBPSK, DQPSK and CCK). Peak output power with CCK modulation (rate = 11 Mbps) was observed to be slightly worst. Final testing was performed while the transmitter continuously operating with the modulation rate of 11 Mbps (CCK). Measurements were made on a low, middle and high frequency channel

Peak Output Power

Frequency MHz	P dBm	Limit dBm	P mW	Limit mW	Result
2412	2.3	30	1.7	1000	Pass
2437	3.0	30	2.0	1000	Pass
2462	3.3	30	2.1	1000	Pass

Variation by +/- 15% of the supply voltage, in accordance with section 15.31(e), did not vary the output power.

Result: Complies.

6.0 CHANNEL BANDWIDTH

Testing was performed in accordance with the requirements of FCC Part 15.247(a)(2)

In the band 2400 - 2483.5 MHz the minimum 6 dB bandwidth was at least 500 kHz. The 6 dB bandwidth was measured while the transmitter continuously transmitted.

The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised

Initial investigations were performed with three modulation types: (DBPSK, DQPSK and CCK). No significant differences in bandwidth were observed. Final testing was performed while the transmitter continuously operating with the modulation rate of 11 Mbps (CCK).

Frequency MHz	Bandwidth MHz	Result	6 dB Bandwidth Plots
2412.0	11.4	Complies	Appendix I
2437.0	11.4	Complies	Appendix I
2462.0	11.4	Complies	Appendix I

The minimum 6 dB bandwidth is at least 500 kHz

Result: Complies

7.0 PEAK POWER SPECTRAL DENSITY - Section 15.247(d)

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

The resolution bandwidth of 3 kHz and the video bandwidth of 30 kHz were utilised

Initial investigations were performed with three modulation types: (DBPSK, DQPSK and CCK). Peak power spectral density with CCK modulation (rate = 11 Mbps) was observed to be slightly worst. Final testing was performed while the transmitter continuously operating with the modulation rate of 11 Mbps (CCK).

Frequency MHz	Level dBm	Limit dBm	Result
2412.0	-30.7	8.0	Complies
2437.0	-31.7	8.0	Complies
2462.0	-31.7	8.0	Complies

The specification limit is 8 dBm in any 3 kHz band during a continuous transmission.

Result: Complies

8.0 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 band is required to be operates 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).

The MPE calculation shown below is for the WLAN device for a separation distance of greater than 20cm.

In accordance with Section 1.1310, the Maximum Permissible Exposure (MPE) limit for the General Population/Uncontrolled Exposure of 1.0 has been applied, i.e 1mW/cm^2.

Friis transmission formula: $Pd = (P*G) / (4*\pi*r^2)$

where: Pd = power density (mW/cm^2)
P = power input to the antenna (mW)
G = antenna gain (numeric)
r = distance to the center of radiation of the antenna (cm)

The result was extracted from section 5.0 of this report:
Maximum peak output power = 3.3 dBm = 2.1 mW
Antenna gain (typical) = 2 dBi = 1.6 numeric
Prediction distance = 20 cm
Prediction frequency = 2462 MHz
MPE limit for uncontrolled exposure at prediction frequency = 1 mW/cm^2

The power density calculated = 0.0007 mW/cm^2

Results: Calculations show that the Radio devices with described antennas complied with Maximum Permissible Exposure (MPE) limit for the General Population/Uncontrolled Exposure

9. 0 ANTENNA REQUIREMENT

Testing to the requirements of FCC Part 15.203 was not applicable as this intentional radiator was designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

10.0 COMPLIANCE STATEMENT

The Wireless LAN EEE 802.11b, Model: BGW200EG installed in Host - Infusion, Model: SA-04 tested on behalf of Torian Wireless Limited, **complies** with the requirements of 47 CFR, Part 15 Subpart C - Rules for Radio Frequency Devices (intentional radiators), Section 15.247 -Operation in the frequency band 2400 - 2483.5 MHz.

Results were as follows:

FCC Part 15, Subpart C Clauses	Test Performed	Result
15.203	Antenna Requirement	**Not Applicable**
15.205	Operation in Restricted Band	**Complies**
15.207	Conducted Emissions	**Complies**
15.209	Radiated Emissions	**Complies**
15.247 (a)(2)	Channel Bandwidth	**Complies**
15.247 (b)(3)	Peak Output Power	**Complies**
15.247 (i)	Radio Frequency Hazard	**Complies**
15.247 (d)	Out of Band Emissions	**Complies**
15.247 (e)	Peak Power Spectral Density	**Complies**

TEST REPORT APPENDICES

APPENDIX A: MEASUREMENT INSTRUMENT DETAILS
APPENDIX B: REPORT PHOTOGRAPHS
APPENDIX C: OPERATIONAL DESCRIPTION
APPENDIX D: BLOCK DIAGRAM
APPENDIX E: SCHEMATICS
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APPENDIX H: USER MANUAL
APPENDIX I: CHANNEL BANDWIDTH PLOTS
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APPENDIX K: GRAPHS of EMI MEASUREMENTS

Attachment 1: RF Exposure Information