EMC Technologies (NZ) Ltd

Test Report No **50813.1**
Report date: 14th September 2005

TEST REPORT

Trimble Geo Explorer 2005 Handheld GPS with 802.11b WLAN and Bluetooth Transmitter Module

tested to the

Code of Federal Regulations (CFR) 47

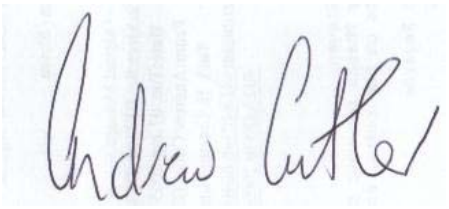
Part 15 – Radio Frequency Devices, Subpart C – Intentional Radiators

Section 15.247 – Operation in the band 2400 – 2483.5 MHz

for

Trimble Navigation New Zealand Ltd

This Test Report is issued with the authority of:



Andrew Cutler - General Manager

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

EMC Technologies (NZ) Ltd
STREET ADDRESS - 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand
POSTAL ADDRESS - PO Box 68 307, Newton, Auckland, New Zealand
Telephone: +64 9 360 0862 Fax: +64 9 360 0861
E-mail: aucklab@ihug.co.nz
Web Site: www.emctech.com.au

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1. CLIENT INFORMATION

Company Name	Trimble Navigation NZ Ltd
Address	PO Box 8729 Riccarton
City	Christchurch
Country	New Zealand
Contact	Mike Oosterman
Email	mike.oosterman@trimble.co.nz

2. DESCRIPTION OF TEST SAMPLE

Brand Name	Trimble
Model Number	GeoExplorer 2005
Product	Handheld GPS with Blue Tooth and 802.11b WLAN Module
Manufacturer	Trimble Navigation NZ Ltd
Country of Origin	New Zealand
Serial Number	4529458602
FCC ID	JUP612
Module FCC ID	IXMWM-BB-AG-01

3. COMPLIANCE STATEMENT

The **Trimble Geo Explorer 2005 Handheld GPS with 802.11b WLAN and Bluetooth Transmitter Module** complies with 47 CFR Part 15 and in particular Sections, 15.205, 15.207, 15.209 and 15.247 as detailed below

CLAUSE	TEST PERFORMED	RESULT
15.203	Antenna requirement	Complies
15.205	Operation in restricted bands	Complies
15.207	Conducted emissions	Complies
15.209	Radiated emissions	Complies
15.247:		
(a)(1)	FHSS channel bandwidth	Complies
(a)(1)(iii)	FHSS channel occupancy	Complies
(a)(2)	Digital modulation bandwidth	Complies
(b)(1)	FHSS peak output power	Complies
(b)(3)	Digital peak output power	Complies
(c)	Antenna gains exceeding 6 dBi	Not applicable
(d)	Spurious emissions	Complies
(e)	Digital modulation power spectral density	Complies
(f)	Hybrid systems	Noted
(g)	Hopping systems	Noted
(h)	Hopping systems intelligence	Noted
(i)	Radio frequency hazard	Not applicable

4. TEST SAMPLE DESCRIPTION

The sample tested is a Hand Held GPS unit which is contained within a Pocket PC that includes a module containing Bluetooth and 802.11b WLAN transmitters to enable the device to communicate with other computing devices using wireless technology.

Modulation system used

802.11b WLANi: Direct sequence spread spectrum
- DBPSK at 1 Mbps
- DQPSK at 2 Mbps
- CCK at 5.5 Mbps
- CCK at 11 Mbps

Bluetooth: Frequency hopping spread spectrum
- GFSK at 1 Mbps

Rated Module Output Power

WLAN: 14.5 dBm
Bluetooth: 2.5 dBm

Antenna Type

WLAN: ¼ whip monopole
Bluetooth: Mica SMD made by GigaAnt (P/N 3030A5645-01)

Test frequencies

WLAN: 2412 MHz, 2437 MHz, 2462 MHz
Bluetooth: 2402 MHz, 2440 MHz, 2480 MHz

Power Supply

Device is powered by internal batteries.

Device can be operated while sitting in the charger base which can be powered from 110 Vac or 230 Vac.

5. ATTESTATION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification with the following conditions:

The client selected the test sample.

The report relates only to the sample tested.

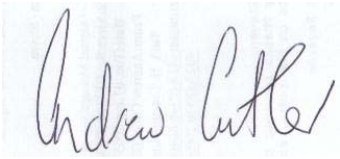
This report does not contain corrections or erasures.

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

In addition this equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations.

To the best of my knowledge, these tests were performed using measurement procedures that are consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards.

I further certify that the necessary measurements were made by EMC Technologies NZ Ltd, 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand.



Andrew Cutler
General Manager
EMC Technologies NZ Ltd

6. TRANSMITTER TEST RESULTS

Section 15.203 – Antenna requirement

The device has an integral antenna that is attached permanently.

Section 15.205 – Restricted bands of operation

Refer to measurements made with reference to Section 15.247 (c).

Section 15.207 – Conducted emissions

Normally this device operates using internal batteries.

However the device can be operated while sitting in a charger base (Cradle Guad 2 P/N 53500-00).

Testing was carried out with the device was operating while attached to the charger base when powered at 110 Vac.

Conducted emissions testing was carried out over the frequency range of 150 kHz to 30 MHz.

Testing was carried out in the laboratory's MacKelvie Street screened room.

The device was placed on top of the test table, which is 1m x 1.5m, 80cm above the screened room floor which acts as the horizontal ground plane. In addition the device was positioned 40cm away from the screened room wall which acts as the vertical ground plane. The artificial mains network was bonded to the screened room floor. At all times the device was kept more than 80cm from the artificial mains network.

Quasi-Peak measurements were made with a receiver bandwidth of 9 kHz.

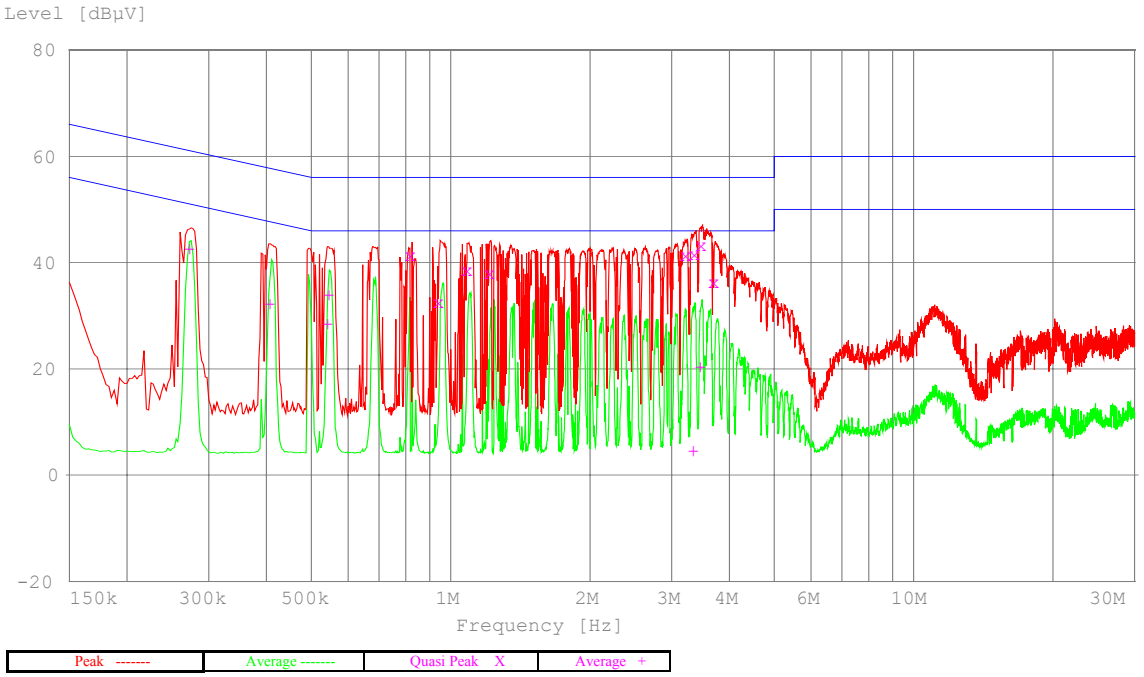
The supplied plot shows combined graphs of measurements made on both the phase and neutral AC voltage supply lines.

Measurement uncertainty with a confidence interval of 95% is:
- Mains terminal tests (0.15 - 30 MHz) ± 2.2 dB

Result: Complies

Conducted emissions testing

Comments:	Device tested when powered 110Vac in stand-by mode.



Quasi-Peak Measurements

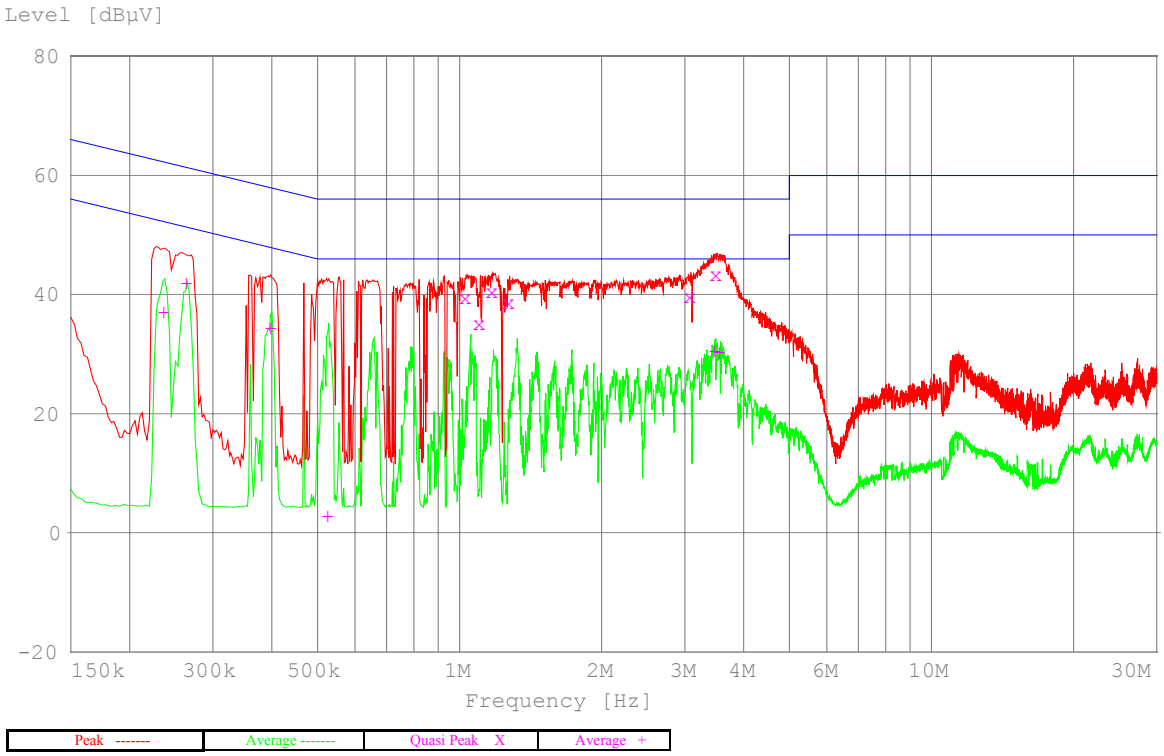
Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed	Phase	Rechecks dBµV
0.825000	41.46	56.00	14.54		L1	
0.950000	32.60	56.00	23.40		N	
1.092500	38.80	56.00	17.20		L1	
1.220000	38.15	56.00	17.85		L1	
3.245000	41.54	56.00	14.46		L1	
3.390000	41.64	56.00	14.36		N	
3.495000	43.41	56.00	12.59		L1	
3.730000	36.49	56.00	19.51		N	

Average Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed	Phase	Rechecks dBµV
0.275000	42.57	50.97	8.40		L1	
0.410000	32.33	47.65	15.31		L1	
0.547500	28.45	46.00	17.55		L1	
0.550000	33.95	46.00	12.05		L1	
3.370000	4.60	46.00	41.40		N	
3.490000	20.40	46.00	25.60		L1	

Conducted emissions testing

Comments:	Device tested when powered at 110 Vac when the Bluetooth transmitter was activated.



Quasi-Peak Measurements

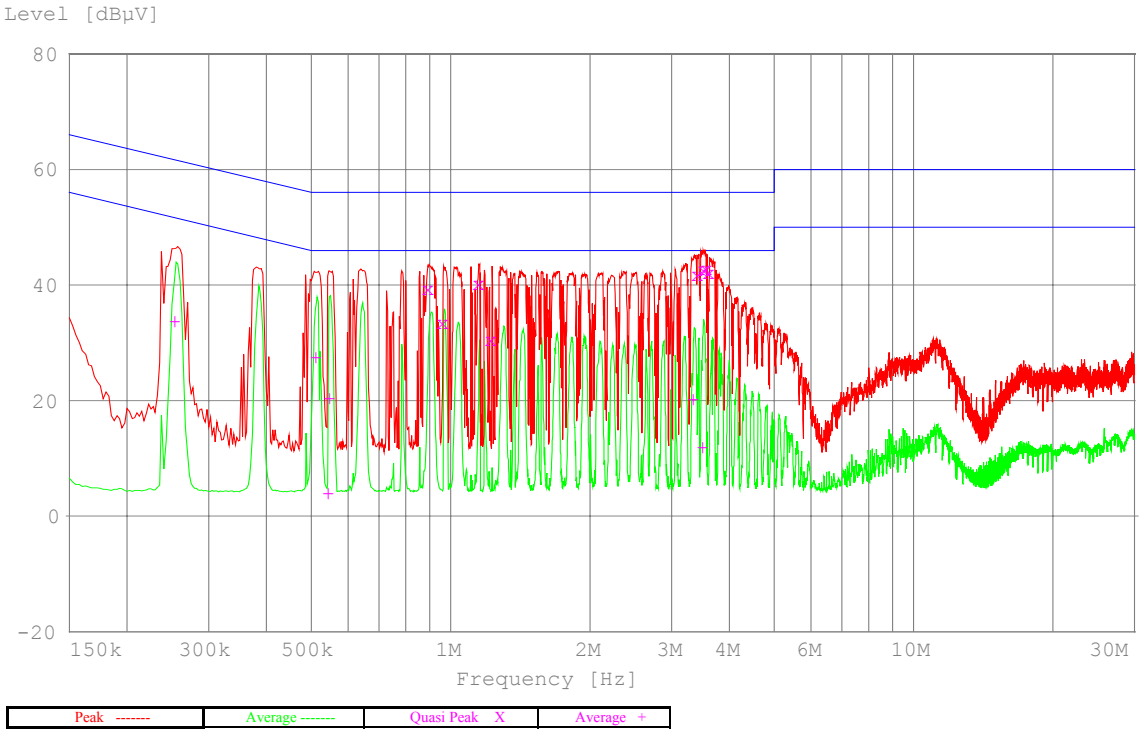
Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed	Phase	Rechecks dBµV
1.032500	39.53	56.00	16.47		L1	
1.105000	35.18	56.00	20.82		N	
1.175000	40.56	56.00	15.44		L1	
1.275000	38.76	56.00	17.24		L1	
3.085000	39.76	56.00	16.24		L1	
3.510000	43.33	56.00	12.67		L1	

Average Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed	Phase	Rechecks dBµV
0.237500	37.03	52.18	15.15		N	
0.265000	41.88	51.27	9.39		L1	
0.400000	34.28	47.85	13.57		L1	
0.527500	2.79	46.00	43.21		L1	
3.485000	30.45	46.00	15.55		L1	
3.570000	30.28	46.00	15.72		L1	

Conducted emissions testing

Comments:	Device tested when powered at 110 Vac when the WLAN transmitter was activated.



Quasi-Peak Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed	Phase	Rechecks dBµV
0.897500	39.50	56.00	16.50		L1	
0.965000	33.51	56.00	22.49		N	
1.155000	40.30	56.00	15.70		L1	
1.227500	30.56	56.00	25.44		L1	
3.425000	41.80	56.00	14.20		L1	
3.540000	42.77	56.00	13.23		L1	
3.580000	42.89	56.00	13.11		L1	
3.625000	42.27	56.00	13.73		N	

Average Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed	Phase	Rechecks dBµV
0.255000	33.73	51.59	17.87		L1	
0.515000	27.56	46.00	18.44		L1	
0.547500	4.02	46.00	41.98		L1	
0.550000	20.43	46.00	25.57		N	
3.355000	20.27	46.00	25.73		N	
3.520000	11.94	46.00	34.06		L1	

Section 15.209 – Radiated emissions

In accordance with section 15.247(c) attenuation below the general limits specified in Section 15.209(a) is not required except for those emissions that fall within the restricted bands defined in Section 15.205(a).

Section 15.247 (a) (1) – Frequency hopping systems channel bandwidth.

The frequency hopping system tested was a Bluetooth device.

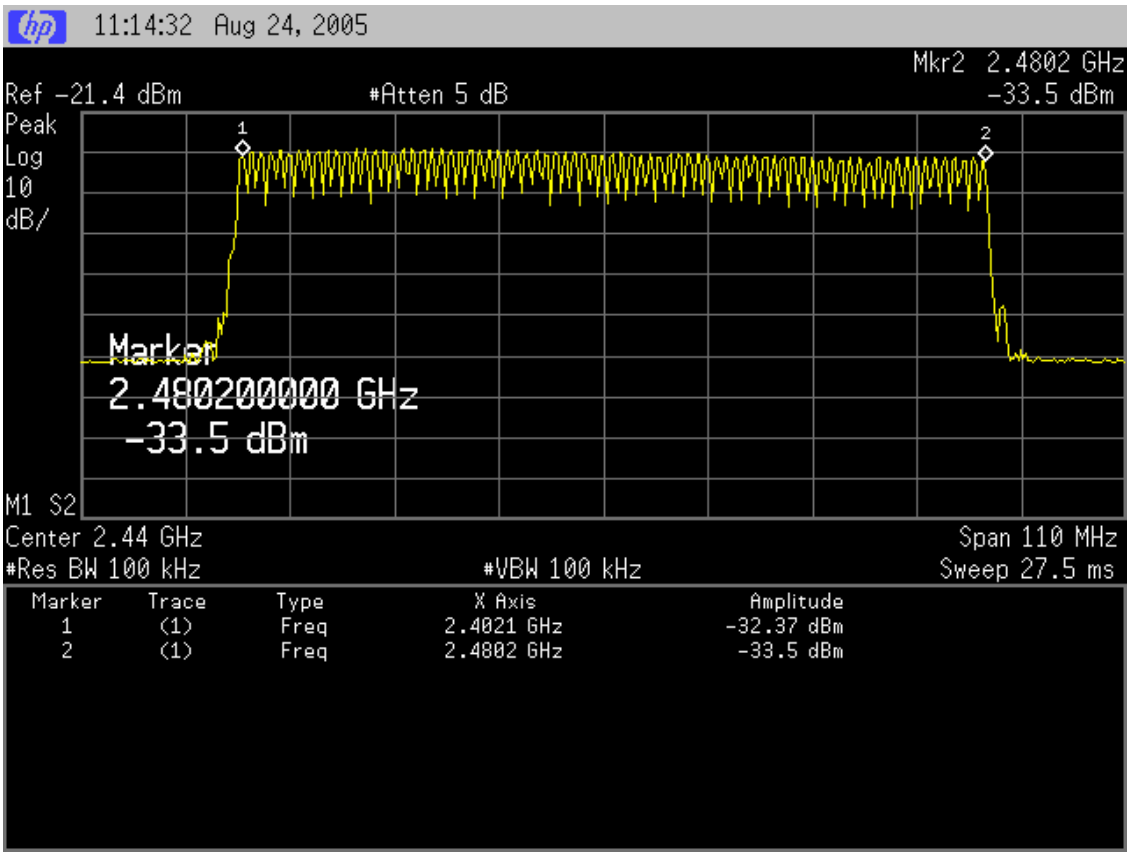
79 channels were observed in operation between 2402 MHz and 2480 MHz with a channel spacing of 1 MHz.

The 20 dB bandwidth has been measured at 2402 MHz, 2440 MHz and 2480 MHz using a spectrum analyser with a resolution bandwidth of 30 kHz that gave a worst case bandwidth of 863 kHz.

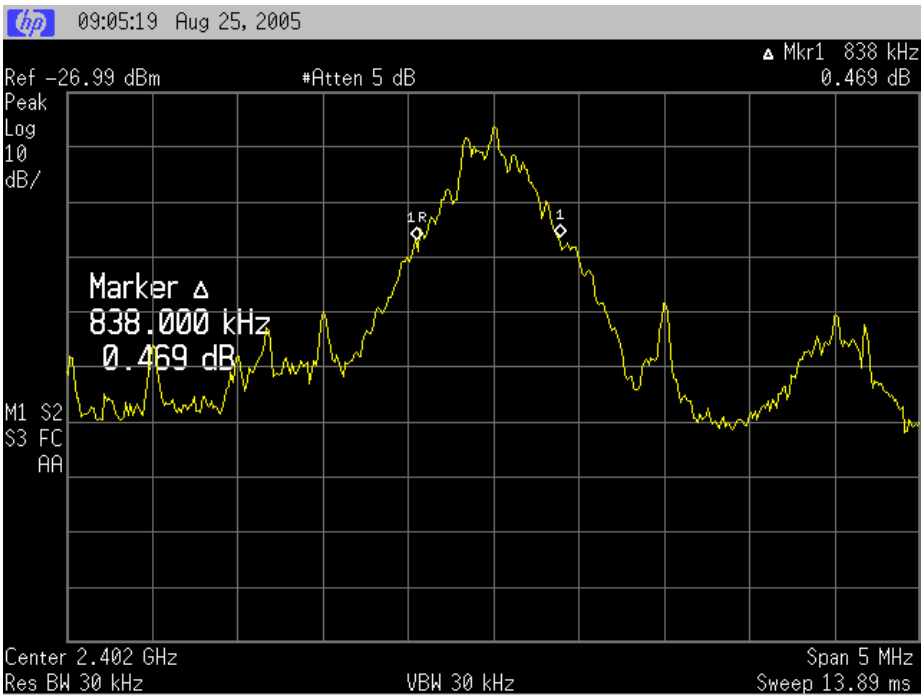
This approximates the calculated channel spacing of 1 MHz.

A resolution bandwidth of 100 kHz gave a worst case bandwidth of 1.125 MHz.

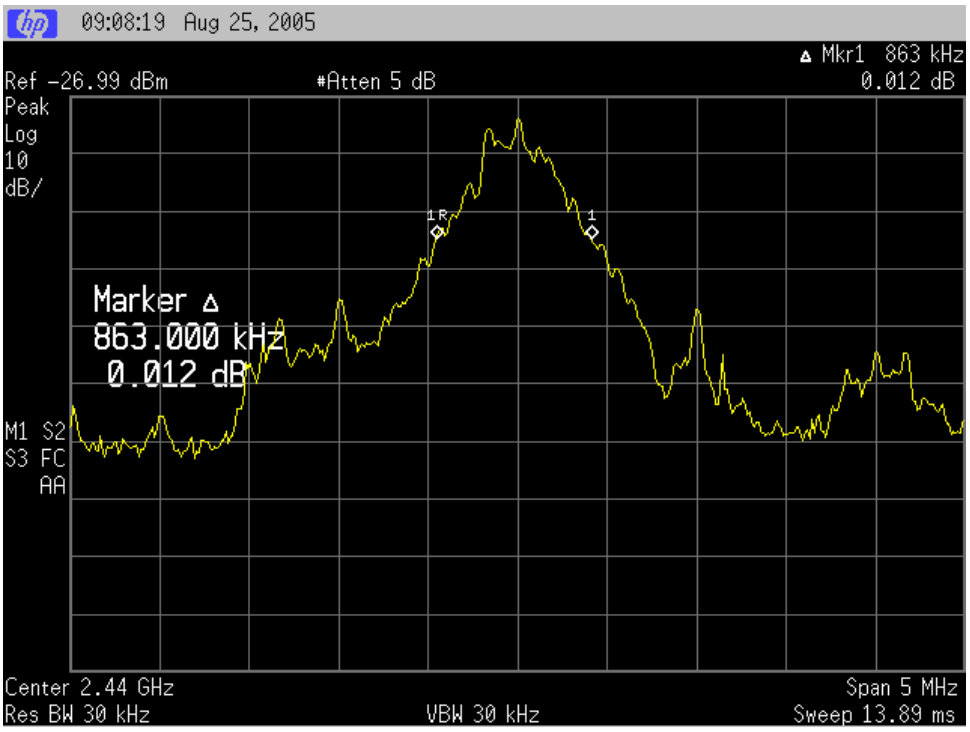
A channel spacing of 1 MHz can be observed in operation with a 20 dB bandwidth approximating 1 MHz when data was sent from the device to a remote laptop.



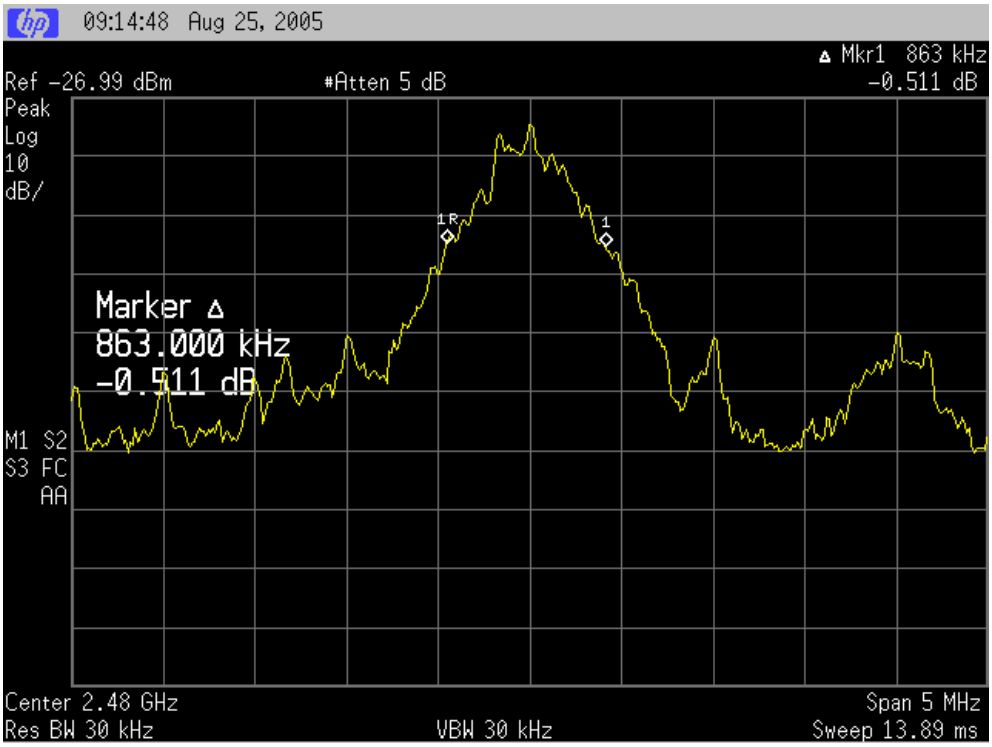
Bluetooth 2402 MHz 20 dB bandwidth



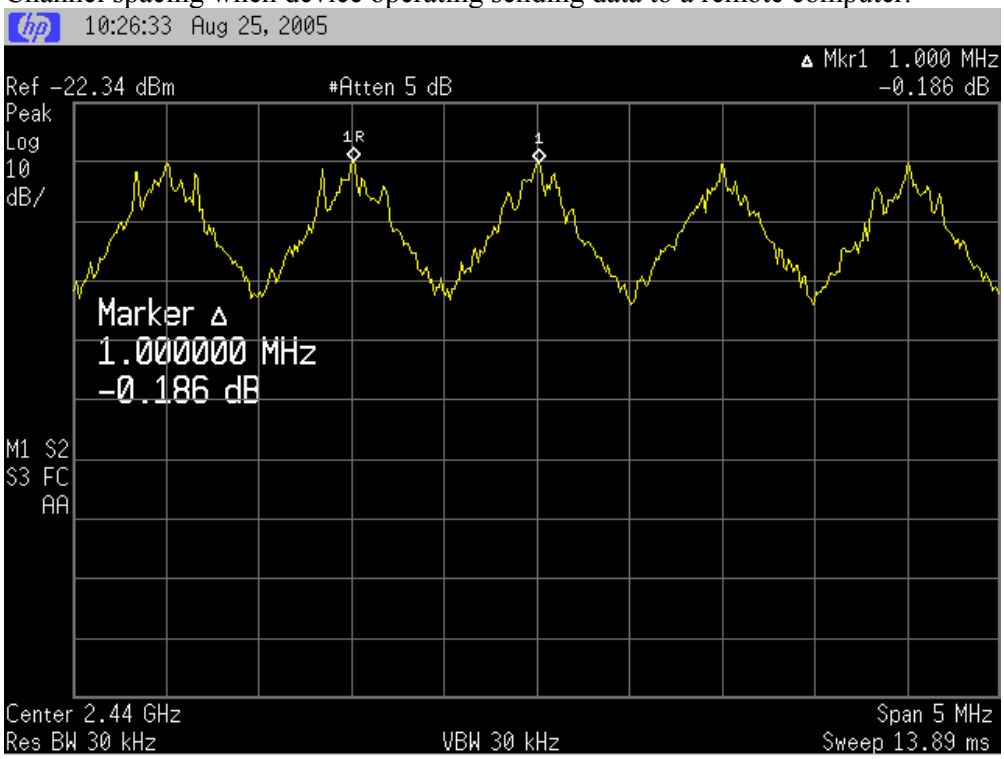
Bluetooth measurements. 2440 MHz. 20 dB bandwidth.



Bluetooth measurements. 2480 MHz. 20 dB bandwidth.



Channel spacing when device operating sending data to a remote computer.



Section 15.247 (a) (1) (iii) – Channel occupancy

As detailed previously 79 channels are used between 2402 – 2480 MHz.

The average time of occupancy on any channel shall not exceed 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels utilised.

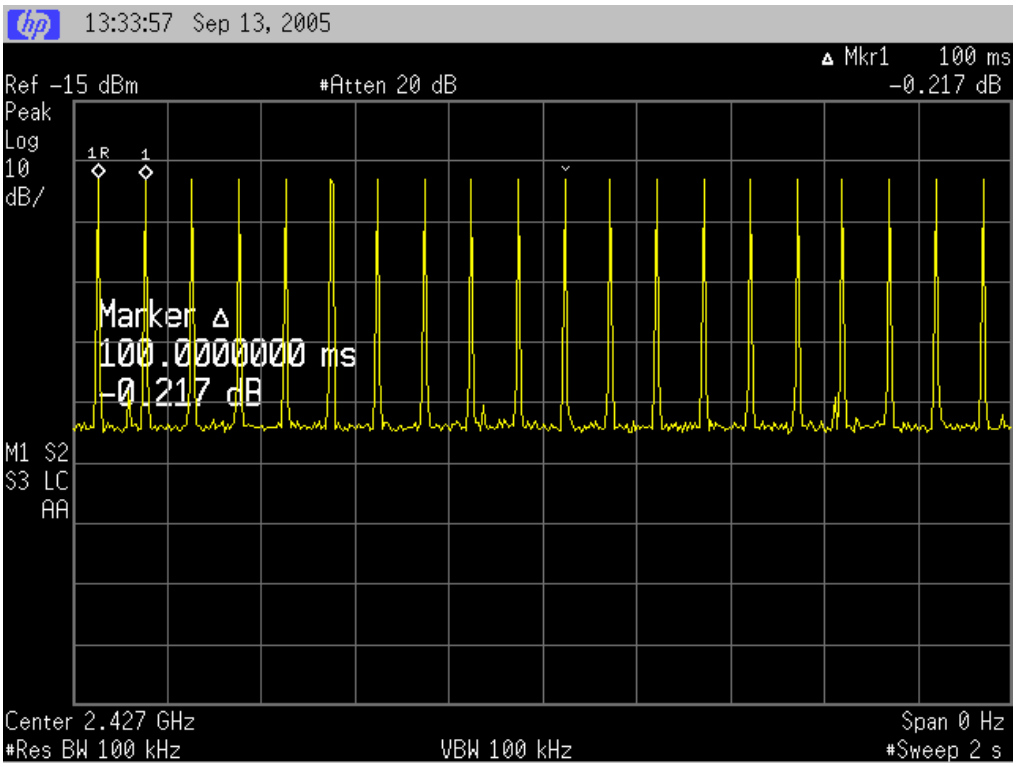
400 mS x 79 channels = 31.5 seconds.

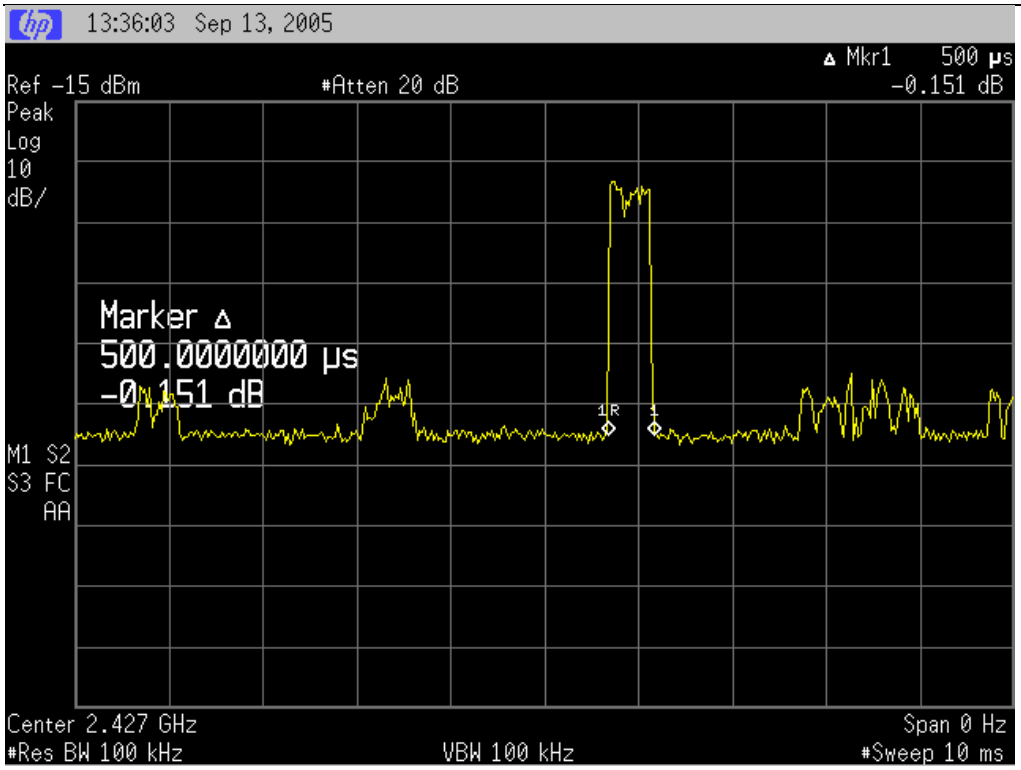
The Bluetooth specification states that each channel is occupied for 625 uS during which time any data is transmitted and received.

The device was operated using test software supplied by the client.

When tuned to 2427 MHz with a 0 Hz span the transmitter was observed to operate 20 times in 2 seconds.

Therefore in a 31.5 second period the transmitter would operate 315 times.





It can be seen that the transmitter operates for approximately 500 uS of the 625 uS.

As per the Bluetooth specification this device was operating in a master slave configuration.

In any observation period the transmitter will operate on one channel for up to 625 uS and then hop to the next channel to receive for up to 625 uS and then hop to the next channel to transmit for a further 625 uS etc.

In a 31.5 second period the transmitter is seen to operate 315 times.

This means that the channel will have operated in receive mode 315 times

The channel will have been occupied a total of 630 times.

In a period of 31.5 seconds each channel was occupied on average for a period of:

630 times x 625 uS = 0.39375 seconds or 393.75 mS.

The specification limit is 0.4 seconds or 400 mS in a 31.5 second observation period.

Result: Complies

Section 15.247 (a) (2) – Digital modulation channel bandwidth

The WLAN device tested was a Direct Sequence Spread Spectrum transmitter that could be programmed to operate on one of 11 channels between 2412 MHz and 2462 MHz with a channel spacing of 5 MHz.

Direct Sequence Spread Spectrum transmitters are systems using digital modulation techniques.

In the band 2400 – 2483.5 MHz the minimum 6 dB bandwidth shall be at least 500 kHz.

All measurements were made using radiated methods using software supplied by the client.

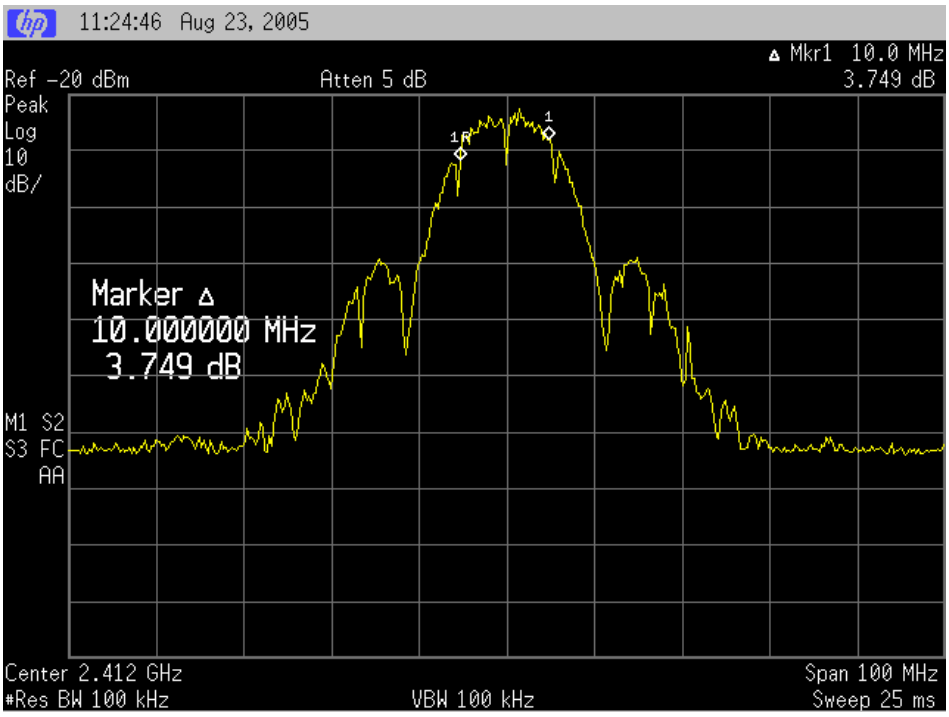
The –6dB bandwidth has been measured at 2412, 2437 and 2462 MHz using a spectrum analyser in peak hold mode and a horn antenna.

A resolution bandwidth of 100 kHz has been utilised.

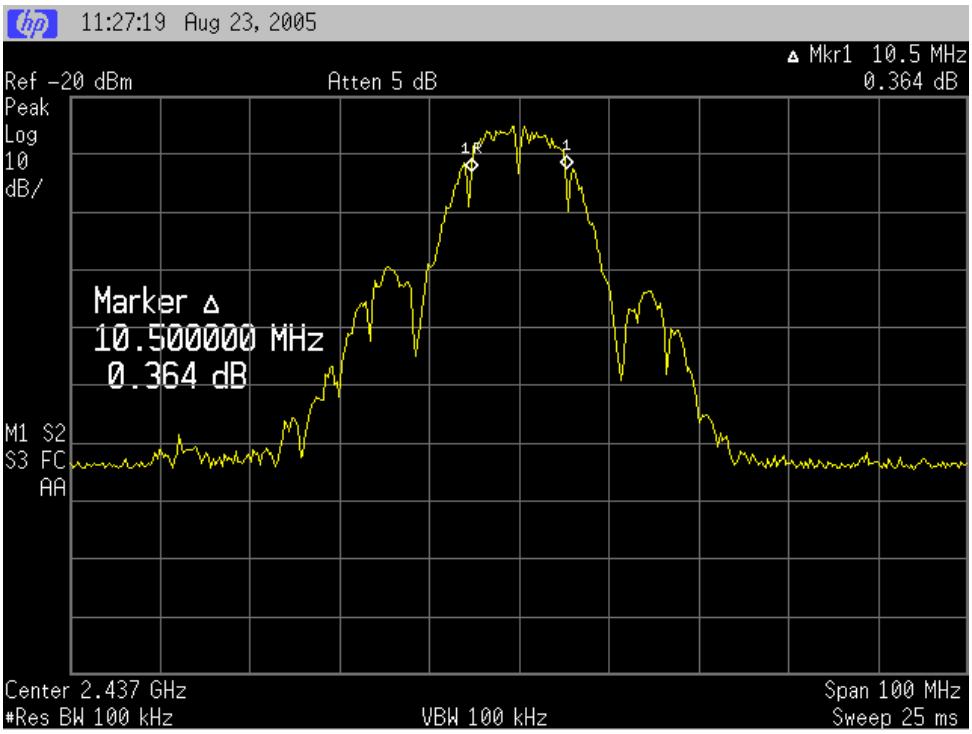
The 6 dB bandwidth has been measured to be 10.3, 10.0 and 10.0 MHz and is therefore greater than 500 kHz.

Result: Complies

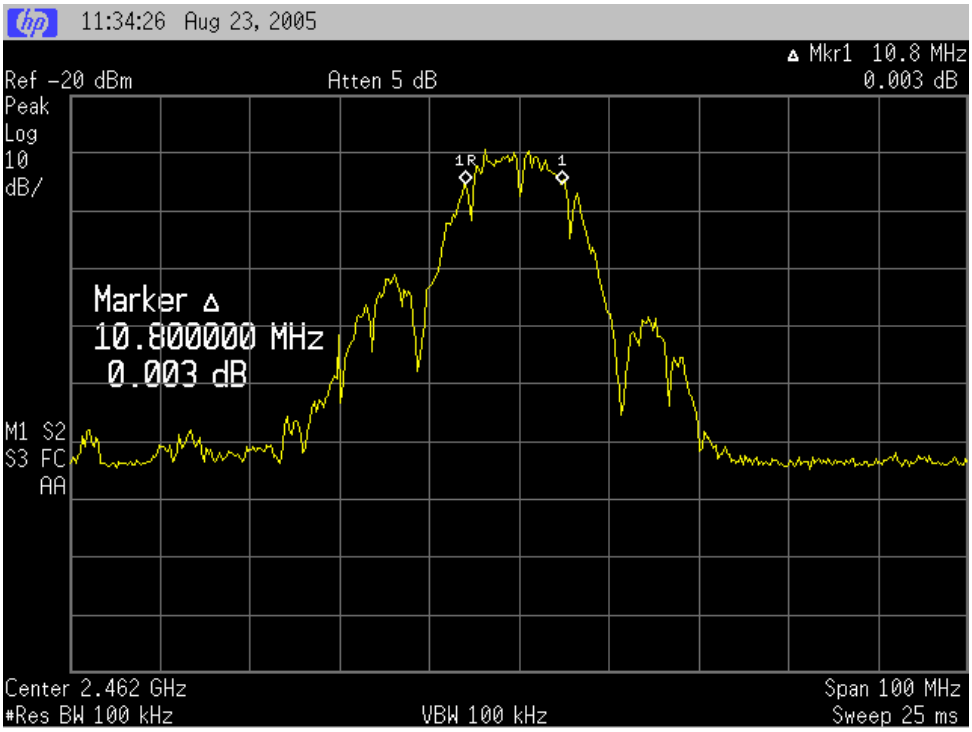
2412 MHz



2437 MHz



2462 MHz



Section 15.247 (b) (1) & (3) – Peak output power

As this device has no external antenna port, with the antenna being located internally; radiated measurements were made to determine the peak output power.

The device was placed on the test table, being 80 cm above the ground plane, with the computer screen display facing the test antenna located 3 metre away.

The device was rotated in order to determine the highest power output indication.

Measurements of the WLAN device were made with the spectrum analyser operating in peak hold mode with a resolution bandwidth of 5 MHz when transmitting continuously using CCK 11 Mbps modulation.

As the bandwidth of the emission exceeded the resolution bandwidth of the spectrum analyser power measurements were made in 5 MHz steps across the frequency band occupied by the emission and were then summed to give a final power level.

Measurements were made on a low, middle and high frequency channel

Frequency	Level	Limit	Result
MHz	dBm	dBm	
2412.0	3.9	30.0	Pass
2437.0	6.2	30.0	Pass
2462.0	8.6	30.0	Pass

The specification limit is 30 dBm (1.0W).

Measurements of the Bluetooth device were made with the spectrum analyser operating in peak hold mode with a resolution bandwidth of 1 MHz when transmitting continuously on selected channels.

Measurements were made on a low, middle and high frequency channel

Frequency	Level	Limit	Result
MHz	dBm	dBm	
2402.0	-10.5	30.0	Pass
2440.0	-7.9	30.0	Pass
2480.0	-9.4	30.0	Pass

The specification limit is 30 dBm (1.0W).

Variation by ±10% of the supply voltage to the charger base did not vary the output power observed.

Result: Complies.

Section 15.247 (i) – Radio Frequency Hazard Information

As this is a portable device that is normally used close to the body SAR measurements have been carried by EMC Technologies Pty Ltd.

Reference should be made to the test report that details these measurements

Section 15.247 (c) – Out of band emissions

As the transmitter has no external connections radiated measurements were made at the open area test site.

Testing was carried when transmitter continuously on 2402 MHz, 2440 MHz and 2480 MHz in Bluetooth mode and on 2412 MHz, 2437 MHz and 2462 MHz in WLAN mode when using CCK modulation with a data transfer rate of 11 Mbps.

The device was placed on the test table, being 0.8 m above the ground plane, with the front display facing the test antenna.

Measurements were made using a resolution bandwidth of 100 kHz where an emission fell outside of a restricted band.

When an emission fell within a restricted band, above 1 GHz, a peak detector and an average detector with a resolution bandwidth of 1 MHz were utilised in accordance with section 15.209.

Below 1 GHz a quasi peak detector with a resolution bandwidth of 120 kHz was utilised.

All measurements were initially made over a distance of 3 metres, which was decreased to 1.0 metres, as the emission levels from the device were very low.

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

In the unrestricted bands measurements were made to determine if the field strength of the emissions observed were more than 20 dB down on the highest in band emission level.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height with an automated antenna tower. The emission is measured in both vertical and horizontal antenna polarisations.

The emission level is determined in field strength by taking the following into consideration:

Level (dBμV/m) = Receiver Reading (dBμV) + Antenna Factor (dB) + Coax Loss (dB)

Measurement uncertainty with a confidence interval of 95% is:
- Free radiation tests (30 – 18,000 MHz) ± 4.1 dB

WLAN Transmitting on 2412 MHz

Frequency	Level	Limit	Antenna	Detector	Bandwidth	Result
MHz	dBuV/m	dBuV/m (dB)	Pol			
2412	93.3	-	Vert	peak	100 kHz	Pass
4824	-	54.0	Vert/Hort	average	1 MHz	Pass
7236	-	54.0	Vert/Hort	average	1 MHz	Pass
9648	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
12060	-	54.0	Vert/Hort	average	1 MHz	Pass
14472	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
16884	-	54.0	Vert/Hort	average	1 MHz	Pass

WLAN Transmitting on 2437 MHz

Frequency	Level	Limit	Antenna	Detector	Bandwidth	Result
MHz	dBuV/m	dBuV/m (dB)	Pol			
2437	101.4	-	Vert	peak	100 kHz	Pass
4874	-	54.0	Vert/Hort	average	1 MHz	Pass
7311	-	54.0	Vert/Hort	average	1 MHz	Pass
9748	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
12185	-	54.0	Vert/Hort	average	1 MHz	Pass
14622	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
17059	-	54.0	Vert/Hort	average	1 MHz	Pass

WLAN Transmitting on 2462 MHz

Frequency	Level	Limit	Antenna	Detector	Bandwidth	Result
MHz	dBuV/m	dBuV/m (dB)	Pol			
2462	95.1	-	Vert	peak	100 kHz	Pass
4924	-	54.0	Vert/Hort	average	1 MHz	Pass
7386	-	54.0	Vert/Hort	average	1 MHz	Pass
9848	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
12310	-	54.0	Vert/Hort	average	1 MHz	Pass
14772	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
17234	-	54.0	Vert/Hort	average	1 MHz	Pass

Where an average detector is listed in the above tables, measurements were also attempted using a peak detector where a limit of 74 dBuV/m was applied

Where an emission level is indicated by a –, levels had a margin greater than 20 dB when compared to the limit.

Bluetooth Transmitting on 2402 MHz

Frequency	Level	Limit	Antenna	Detector	Bandwidth	Result
MHz	dBuV/m	dBuV/m (dB)	Pol			
2402	84.7	-	Vert	peak	100 kHz	Pass
4804	-	54.0	Vert/Hort	average	1 MHz	Pass
7206	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
9608	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
12010	-	54.0	Vert/Hort	average	1 MHz	Pass
14412	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
16814	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass

Bluetooth Transmitting on 2440 MHz

Frequency	Level	Limit	Antenna	Detector	Bandwidth	Result
MHz	dBuV/m	dBuV/m (dB)	Pol			
2440	87.3	-	Vert	peak	100 kHz	Pass
4880	-	54.0	Vert/Hort	average	1 MHz	Pass
7320	-	54.0	Vert/Hort	average	1 MHz	Pass
9760	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
12200	-	54.0	Vert/Hort	average	1 MHz	Pass
14640	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
17080	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass

Bluetooth Transmitting on 2480 MHz

Frequency	Level	Limit	Antenna	Detector	Bandwidth	Result
MHz	dBuV/m	dBuV/m (dB)	Pol			
2480	85.8	-	Vert	peak	100 kHz	Pass
4960	-	54.0	Vert/Hort	average	1 MHz	Pass
7440	-	54.0	Vert/Hort	average	1 MHz	Pass
9920	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
12400	-	54.0	Vert/Hort	average	1 MHz	Pass
14880	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass
17360	-	(-20.0)	Vert/Hort	peak	100 kHz	Pass

Where an average detector is listed in the above tables, measurements were also attempted using a peak detector where a limit of 74 dBuV/m was applied

Where an emission level is indicated by a –, levels had a margin greater than 20 dB when compared to the limit.

Other emissions observed when the device was operating in Bluetooth mode on 2402 MHz where the highest emission observed using a 100 kHz bandwidth had a level of 84.7 dBuV/m and the –20 dB limit would be 64.7 dBuV/m.

Frequency	Level	Level	Limit	Margin	Result	Antenna
MHz	Vertical dBuV/m	Horizontal dBuV/m	dBuV/m	dB		Polarisation
30.000	25.9		64.7	38.8	Pass	Vertical
31.000	27.9	16.6	64.7	36.8	Pass	Vertical
32.000	22.8		64.7	41.9	Pass	Vertical
33.000	23.0		64.7	41.7	Pass	Vertical
34.000	30.4		64.7	34.3	Pass	Vertical
35.000	30.0		64.7	34.7	Pass	Vertical
38.000	38.1		40.0	1.9	Pass	Vertical
45.000	37.8		64.7	26.9	Pass	Vertical
46.000	36.4		64.7	28.3	Pass	Vertical
51.000	34.7		64.7	30.0	Pass	Vertical
52.200	20.4		64.7	44.3	Pass	Vertical
53.000	22.3		64.7	42.4	Pass	Vertical
54.000	22.0		64.7	42.7	Pass	Vertical
56.000	21.6		64.7	43.1	Pass	Vertical
64.800	24.4		64.7	40.3	Pass	Vertical
70.100	22.6		64.7	42.1	Pass	Vertical
79.220	25.2		64.7	39.5	Pass	Vertical
82.250	19.2		64.7	45.5	Pass	Vertical
103.590	32.8		64.7	31.9	Pass	Vertical
106.600	21.6		64.7	43.1	Pass	Vertical
113.000	37.4		43.5	6.1	Pass	Vertical
115.780	32.0		43.5	11.5	Pass	Vertical
117.000	33.2		43.5	10.3	Pass	Vertical
119.200	21.2		43.5	22.3	Pass	Vertical
121.300	19.7		43.5	23.8	Pass	Vertical
143.100	16.0		64.7	48.7	Pass	Vertical
149.300	21.5		64.7	43.2	Pass	Vertical
161.400	19.7	15.5	64.7	45.0	Pass	Vertical
167.600	20.1	15.3	64.7	44.6	Pass	Vertical
276.650	18.8	17.3	46.0	27.2	Pass	Vertical
301.500	18.0		64.7	46.7	Pass	Vertical
307.750	21.6		64.7	43.1	Pass	Vertical
320.000	21.6	14.7	64.7	43.1	Pass	Vertical
326.000	23.3	14.0	46.0	22.7	Pass	Vertical
332.000	22.1	15.1	46.0	23.9	Pass	Vertical

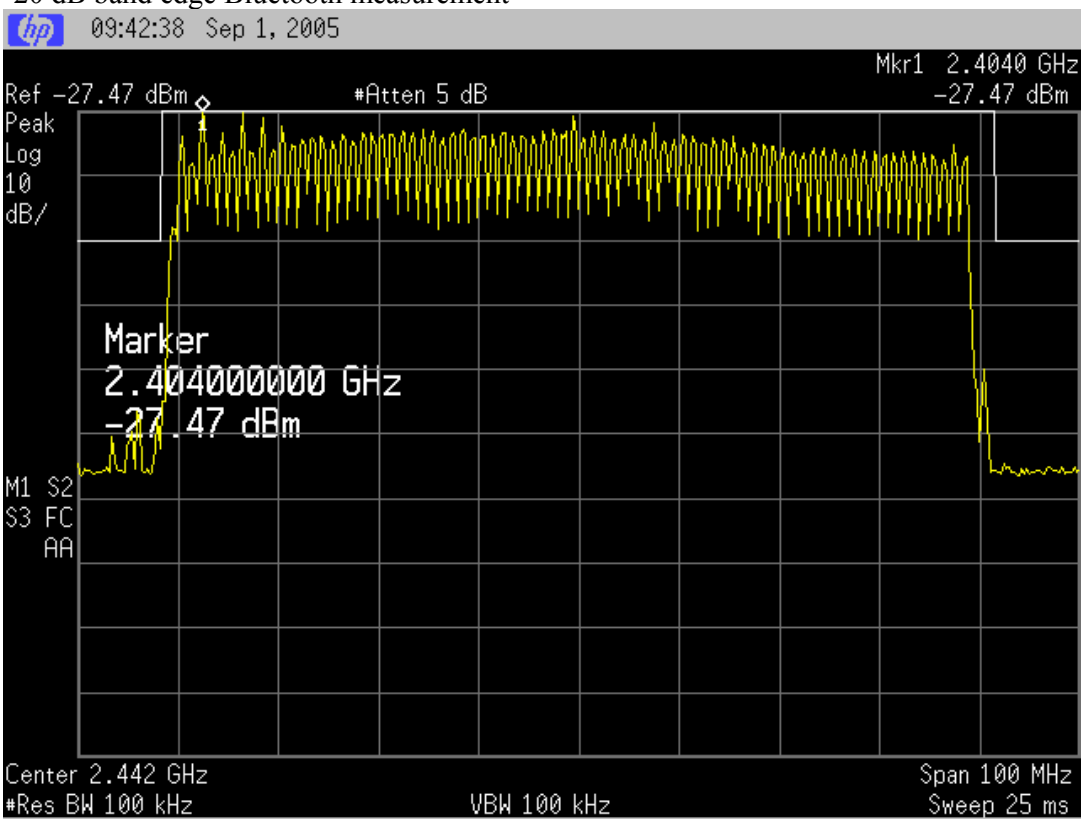
Band edge measurements

Both the WLAN device and the Bluetooth device are required to operate in the band 2400 MHz to 2483.5 MHz.

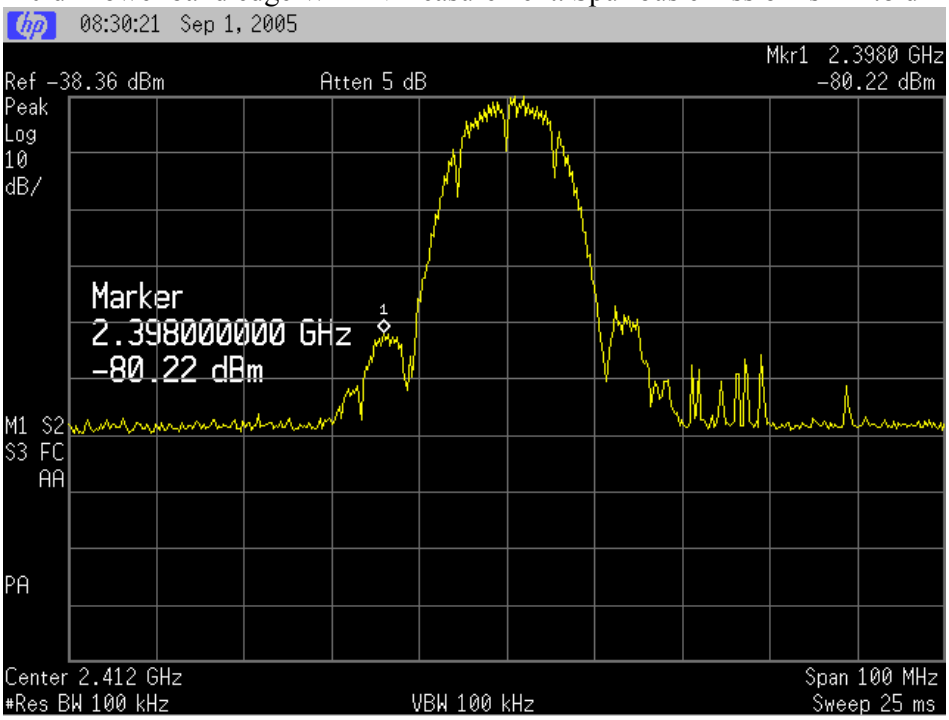
As the device did not have an antenna terminal radiated measurements were made at the test site.

Initially relative measurements were made in the laboratory using a 100 kHz resolution bandwidth with the –20 dB limit being applied at both band edges.

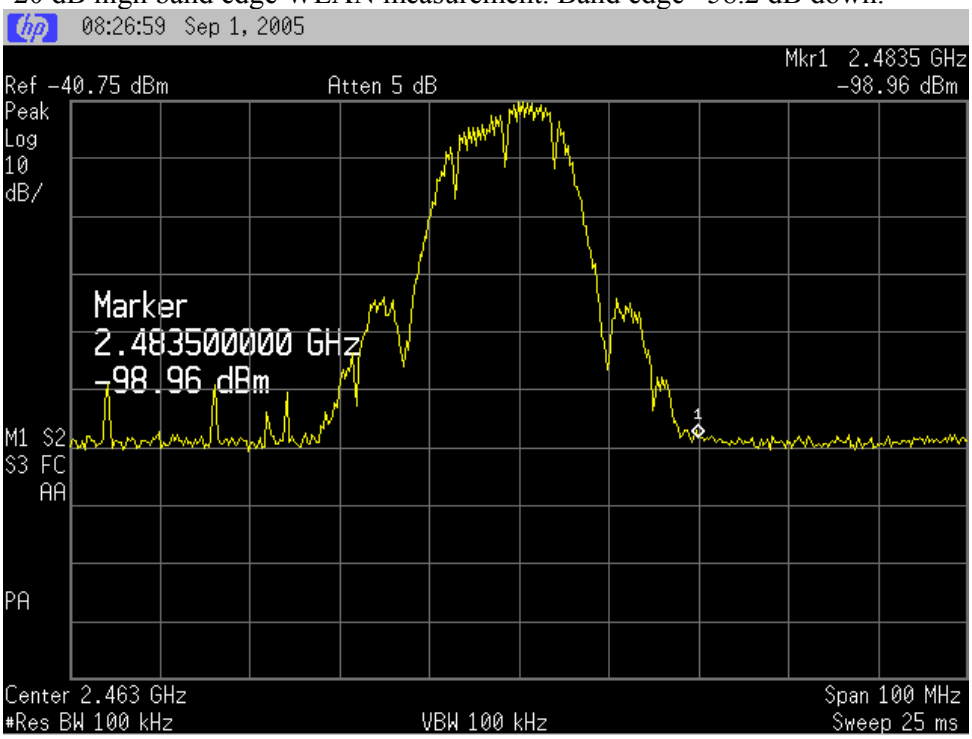
-20 dB band edge Bluetooth measurement



-20 dB lower band edge WLAN measurement. Spurious emission is –41.8 dB down.



-20 dB high band edge WLAN measurement. Band edge –58.2 dB down.



At 2400 MHz the closest restricted band is 2310 – 2390 MHz.

Test site measurements were also made at 2400 MHz and also in the band 2310 – 2390 using a peak detector with a 100 kHz bandwidth.

No emissions were detected within 20 dB of the 64 dBuV/m limit (-20 dB limit) at 2400 MHz when the Bluetooth transmitter was operating on 2402 MHz or the WLAN transmitter was operating on 2412 MHz.

At 2483.5 MHz the closest restricted band is 2483.5 – 2500 MHz.

Test site measurements were also made at 2483.5 MHz using a peak detector and an average detector using a 1.0 MHz bandwidth.

No emissions were detected within 20 dB of the 54 dBuV/m and 74 dBuV/m limits when using these detectors.

Result: Complies

Section 15.247 (e) – Peak power spectral density

As this device has no external antenna port, with the antenna being located internally; radiated measurements were made to determine the peak power spectral density.

The device was placed on the test table, being 80 cm above the ground plane, with the device facing the test antenna located 3 metres away.

The device was rotated in order to determine the highest power output indication.

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

Measurements were made on a low, middle and high frequency channel.

Frequency MHz	Level dBm	Limit dBm	Result
2412	-25.4	8.0	Pass
2438	-23.2	8.0	Pass
2462	-19.6	8.0	Pass

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

Testing was carried out with using CCK modulation with a data transfer rate set to 11 Mbps.

Result: Complies.

7. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Ref No
Aerial Controller	EMCO	1090	9112-1062	3710
Aerial Mast	EMCO	1070-1	9203-1661	3708
Turntable	EMCO	1080-1-2.1	9109-1578	3709
VHF Balun	Schwarzbeck	VHA 9103	-	3603
Biconical Antenna	Schwarzbeck	BBA 9106	-	3612
Log Periodic Antenna	Schwarzbeck	UHALP 9107	-	3702
Spectrum Analyser	Hewlett Packard	HP8566B	-	E1030
Measurement Receiver	Rohde & Schwarz	ESCS 30	839873/1	E1595
Spectrum Analyser	Hewlett Packard	E7405A	US39150142	3776
Power Supply	Hewlett Packard	6032A	-	E1069
Coax Cable	Sucoflex	104PA	2736/4PA	-
Horn Antenna	EMCO	3115	9511-4629	E1526
Horn Antenna	Electrometrics	RGA-60	6234	E1494
Signal Generator	Rohde & Schwarz	SMP04	1035 5005.04	E1560
Temperature Chamber	Contherm	M180F	-	E1129

8. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies NZ Ltd registration with the Federal Communications Commission as a listed facility, Registration Number: 90838, which was updated on February 17th, 2004.

In addition testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ISO 17025: 1999.

All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ISO 17025: 1999.

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with 46 accreditation bodies in 34 economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

9. PHOTOGRAPHS

External view of device

Device FCC label + Identification Details

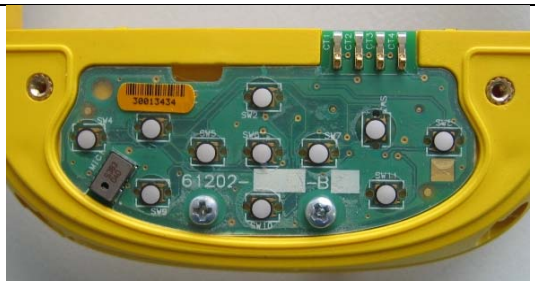
Charger base + identification label

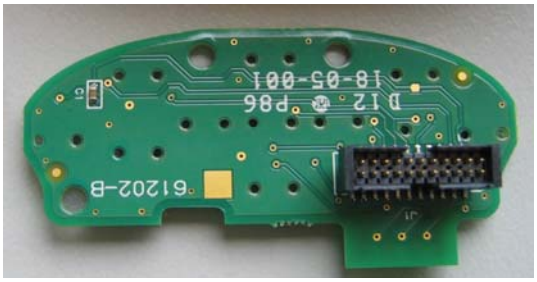
Charger base AC adaptor

Conducted emissions test set up

Radiated emissions test set up

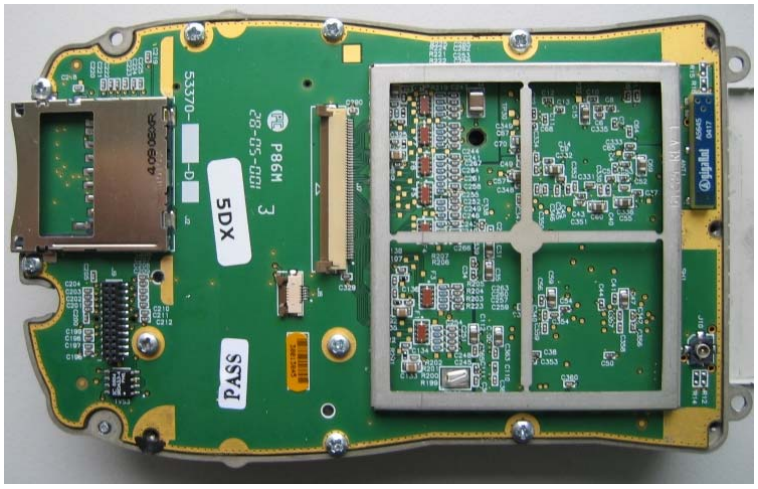
Internal views – General Overview

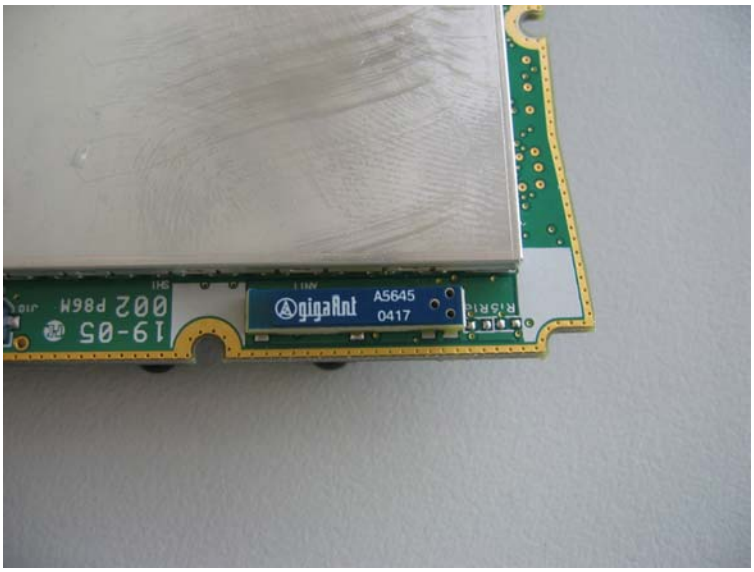




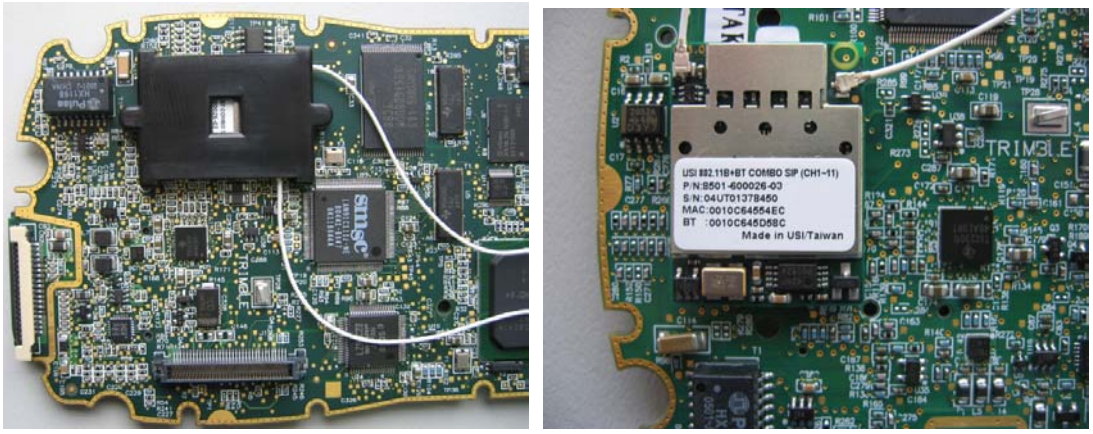
WLAN Antenna and Location

Bluetooth Antenna and Location (Blue GigaAnt device)

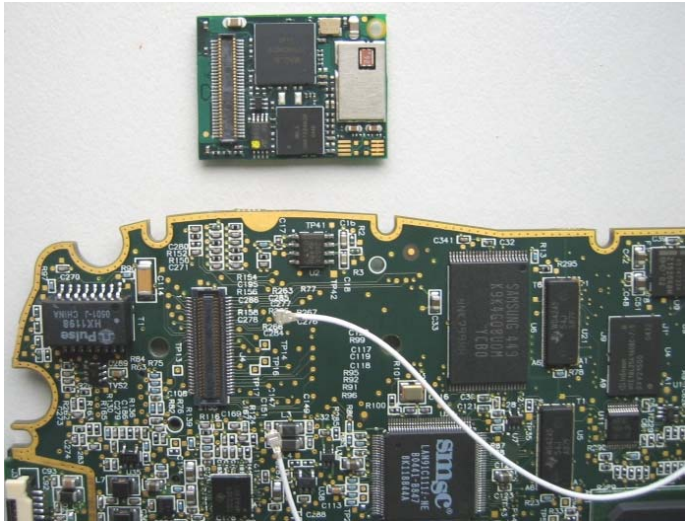


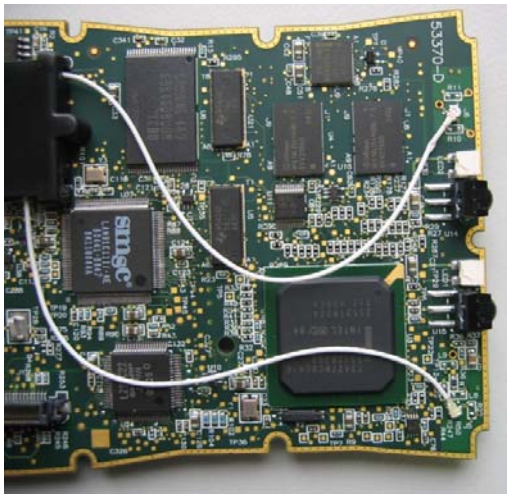


Transmitter Module Front Side

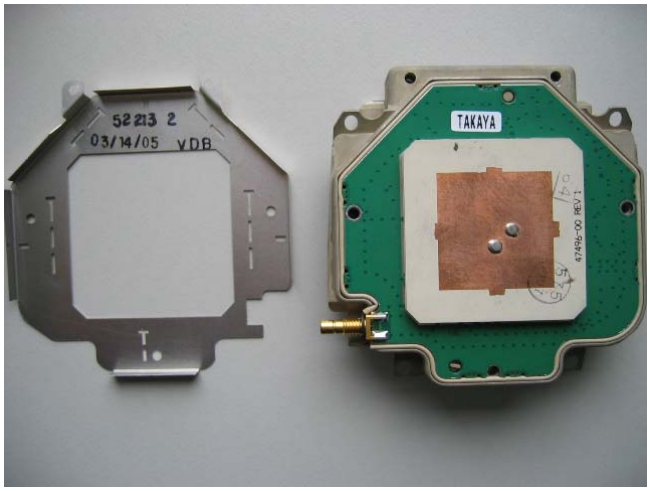


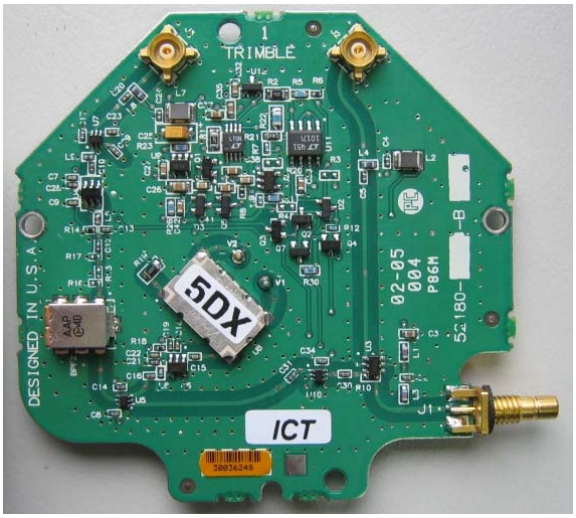
WLAN / Bluetooth Transmitter Module Rear Side





GPS Receive Antenna





Internal Views – Specific Boards