



# EMC TEST REPORT

**Report No. : EME-020666/01**  
**Model No. : GBU301**  
**Issued Date : June 26, 2002**

**Applicant : IOGEAR, Inc.**  
**23 Hubble, Irvine, CA 92618**

**Test By : Intertek Testing Services Taiwan Ltd.**  
**No. 11, Ko-Tze-Nan Chia-Tung Li, Shiang-Shan District,**  
**Hsinchu, Taiwan, R.O.C.**

This test report consists of 27 pages in total. It may be duplicated completely for legal use with the allowance of the applicant. It shall not be reproduced except in full, without the written approval of ITS Laboratory. The test result in this report only applies to the tested sample.

Project Engineer

Kaysi Chen

Approved By

MICHAEL CHEN  
GENERAL MANAGER  
ETL SEMKO DIVISION



Reviewed By

Elton Chen



## **Table of Contents**

Summary of Tests .....	4
1. General information .....	5
1.1 Identification of the EUT .....	5
1.2 Additional information about the EUT .....	5
1.3 Antenna description .....	6
1.4 Peripherals equipment.....	6
2. Test specifications .....	7
2.1 Test standard .....	7
2.2 Operation mode.....	7
2.3 Test equipment .....	8
3. 20dB Bandwidth test.....	9
3.1 Operating environment .....	9
3.2 Test setup & procedure .....	9
3.3 Measured data of modulated bandwidth test results.....	9
4. Carrier Frequency Separation test.....	10
4.1 Operating environment .....	10
4.2 Test setup & procedure .....	10
4.3 Measured data of Carrier Frequency Separation test result.....	10
5. Number of hopping frequencies test.....	11
5.1 Operating environment .....	11
5.2 Test setup & procedure .....	11
5.3 Measured data of number of hopping frequencies test result .....	11
6. Time of Occupancy (dwell time) test.....	12
6.1 Operating environment .....	12
6.2 Test setup & procedure .....	12
7. Maximum Output Power test.....	13
7.1 Operating environment .....	13
7.2 Test setup & procedure .....	13
7.3 Measured data of Maximum Output Power test results.....	13
8. RF Antenna Conducted Spurious test.....	14
8.1 Operating environment .....	14
8.2 Test setup & procedure .....	14



# Intertek Testing Services

## ETL SEMKO

FCC ID. : QLEGBU301

Report No.: EME-020666/01

Page 3 of 27

8.3 Measured data of the highest RF Antenna Conducted Spurious test result.....	14
9. Radiated Emission test.....	15
9.1 Operating environment .....	15
9.2 Test setup & procedure .....	15
9.3 Emission limits.....	16
9.4 Radiated spurious emission test data .....	17
9.4.1 Measurement results: frequencies equal to or less than 1 GHz .....	17
9.4.2 Measurement results: frequency above 1GHz .....	20
10. Emission on the band edge §FCC 15.247(C) .....	23
10.1 Operating environment .....	23
10.2 Test setup & procedure .....	23
11. Power Line Conducted Emission test §FCC 15.207.....	24
11.1 Operating environment .....	24
11.2 Test setup & procedure .....	24
11.3 Power Line Conducted Emission test data.....	25



**Summary of Tests**

**Bluetooth USB dongle-Model: GBU301**  
**FCC ID: QLEGBU301**

Test	Reference	Results
Maximum Output Power test	15.247(b)	Complies
Carrier Frequency Separation test	15.247(a)(1)	Complies
Number of hopping frequencies test	15.247(a)(1)	Complies
Time of Occupancy (dwell time) test	15.247(a)(1)	Complies
20dB Bandwidth test	15.247(a)(1)	Complies
RF Antenna Conducted Spurious test	15.247(c)	Complies
Radiated Spurious Emission test	15.205, 15.209	Complies
Power Line Conducted Emission test	15.207	Complies



## 1. General information

### 1.1 Identification of the EUT

Manufacturer	: IOGEAR, Inc.
Product	: Bluetooth USB dongle
Model No.	: GBU301
FCC ID.	: QLEGBU301
Frequency Range	: 2402MHz ~ 2480MHz
Channel Number	: 79
Frequency of Each Channel	: 2402 + k (MHz), k: 0 ~78
Type of Modulation	: GFSK
Power Supply	: 5Vdc from PC
Power Cord	: N/A
Sample Received	: June 20, 2002
Test Date(s)	: June 21, 2002 to June 25, 2002

A FCC DoC report has been generated for the client.

### 1.2 Additional information about the EUT

**The EUT** is a bluetooth device, and it is an external dongle, for enabling of Notebook and Desktop PC through USB interface to communicate wirelessly with other Bluetooth™ enabled devices. This dongle product provides hardware and software drivers to enable wireless experience under Windows 98/2000/ME/XP.

**The EUT** is a true saver for mobile and office workers to work intelligently in any different environment. With USB interface, the dongle is ready for Plug & Play. It also supports data transmission and is fully compliant with Bluetooth™ specification version 1.1 standard, class1, 2, & 3 operations, which allows up to 20 dBm output power, supporting operation range up to 100 meters.

The EUT has a series model, GBU302. GBU302 consists of two GBU301 in one package as a unit serves as marketing strategy.

For more detail features, please refer to User's manual as file name "Installation guide.pdf"



### 1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain : 1 dBi

Antenna Type : Ceramic antenna

### 1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
PC	HP	ALLON	US12345678	FCC DoC Approved
Key Board	BTC	BTC5306	A14613022	E5XKB5301
Monitor	HP	D2827A	KR91049220	C5F7NFCMC1518X
Mouse	Acer	M-S34	LTN61000734	DZL210472
Printer	HP	C2642A	TH86K1N2ZB	FCC DoC Approved
Modem	Dynalink	V1456VQE	00V230A00051494	FCC DoC Approved

Signal cable description:

USB Cable length 1.5m ×1



## **2. Test specifications**

### **2.1 Test standard**

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section §15.207、§15.209、§15.247 and ANSI C63.4/1992.

The AC power conducted emissions was investigated over the frequency range from 0.45MHz to 30MHz using a receiver bandwidth of 9kHz. (15.207 paragraph)

Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading recorded also on the report.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

The EUT setup configurations please refer to the photo of test configuration in item.

### **2.2 Operation mode**

The EUT transmitted continuously during all the tests.



# Intertek Testing Services

## ETL SEMKO

FCC ID. : QLEGBU301

Report No.: EME-020666/01

Page 8 of 27

### 2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Series No.	Cal.Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	825788/014	May 24, 2002
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	825428/005	June 10, 2002
Pulse Limiter	Rohde & Schwarz	9kHz~30MHz	ESH3-Z2	848.766/052	N/A
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	100137	July 9, 2001
Horn Antenna	EMCO	1GHz~18GHz	3115	9906-5822	Sep. 10, 2001
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	159	June 20, 2002
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	3111	June 20, 2002
Turn Table	HDGmbH	N/A	DS 420S	420/669/01	N/A
Antenna Tower	HDGmbH	N/A	MA 240	240/573	N/A
Microwave Amplifier	Agilent	2GHz~26.5GHz	8348A	3111A00567	Dec. 20, 2001
RF Power Meter	Boonton	10kHz~100GHz	4231A	79401	May 22, 2002
Power Sensor	Boonton	30MHz~8GHz	51011-EMC	32482	May 22, 2002

Note:

1. The calibration interval of the above instruments is 12 months.





### **3. 20dB Bandwidth test**

#### **3.1 Operating environment**

Temperature: 23 °C  
Relative Humidity: 60 %

#### **3.2 Test setup & procedure**

The 20dB bandwidth per FCC § 15.247(a)(1)(i) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 100 kHz, the video bandwidth  $\geq$  RBW, and the SPAN may equal to approximately 2 to 3 times the 20dB bandwidth. The test was performed at 3 channels (lowest, middle and highest channel). The maximum 20dB modulation bandwidth is in the following Table.

See 20dB Bandwidth plot as file name “20dB Bandwidth plot.pdf”

#### **3.3 Measured data of modulated bandwidth test results**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit
Low	2401.808	304	500kHz
Middle	2440.808	304	500kHz
High	2479.808	300	500kHz

\* The EUT has its hopping function disable.



#### **4. Carrier Frequency Separation test**

##### **4.1 Operating environment**

Temperature: 23 °C  
Relative Humidity: 60 %

##### **4.2 Test setup & procedure**

The carrier frequency separation per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at  $\geq 1\%$  of the span, the video bandwidth  $\geq RBW$ , and the SPAN was wide enough to capture the peaks of two adjacent channels. The carrier frequency separation result is in the following Table.

See Carrier Frequency Separation plot as file name “Carrier Frequency Separation plot.pdf”

##### **4.3 Measured data of Carrier Frequency Separation test result**

Channel	Frequency (MHz)	Measurement Frequency separation (MHz)
1	2402	1
2	2403	

\* The EUT has its hopping function enable.



**5. Number of hopping frequencies test**

**5.1 Operating environment**

Temperature: 23 °C  
Relative Humidity: 60 %

**5.2 Test setup & procedure**

The number of hopping frequencies per FCC § 15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at  $\geq 1\%$  of the span, the video bandwidth  $\geq RBW$ , and the SPAN was the frequency band of operation. The carrier frequency separation result is in the following Table.

See number of hopping frequencies plot as file name “number of hopping frequencies plot.pdf”

**5.3 Measured data of number of hopping frequencies test result**

Frequency Range (MHz)	Number of hopping frequencies	Total hopping channels
2400 ~ 2428.5	27	79
2429 ~ 2454.5	26	
2455 ~ 2483.5	26	

\* The EUT has its hopping function enable.



## **6. Time of Occupancy (dwell time) test**

### **6.1 Operating environment**

Temperature: 23 °C  
Relative Humidity: 60 %

### **6.2 Test setup & procedure**

The time of occupancy (dwell time) per FCC § 15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 1MHz, the video bandwidth  $\geq$  RBW, and the zero span function of spectrum analyzer was enable. The EUT has its hopping function enable.

The time of occupancy (Dwell time) is  $(30 \times 140\text{us})(\text{dwell time in 3 sec}) \times 10 = 42\text{ms} < 0.4\text{s}$  in 30sec.

See time of occupancy (dwell time) plot as file name “Time of Occupancy (dwell time).pdf”



## 7. Maximum Output Power test

### 7.1 Operating environment

Temperature: 22 °C  
Relative Humidity: 60 %

### 7.2 Test setup & procedure

The power output per FCC §15.247(b) was measured on the EUT using a 50 ohm SMA cable connected to power meter via power sensor. Power was read directly and cable loss correction (1dB) was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel).

### 7.3 Measured data of Maximum Output Power test results

Channel	Frequency (MHz)	C.B.L. (dB)	Reading (dBm)	Power Output		Limit (W)
				(dBm)	(mW)	
Lowest	2402	1	14.89	15.89	38.82	1
Middle	2441	1	14.04	15.04	31.92	1
Highest	2480	1	14.55	15.55	35.89	1

\* The EUT has its hopping function disable.



**8. RF Antenna Conducted Spurious test**

**8.1 Operating environment**

Temperature: 23 °C  
Relative Humidity: 60 %

**8.2 Test setup & procedure**

The measurements were performed from 30MHz to 25GHz RF antenna conducted per FCC 15.247 (c) was measured from the EUT antenna port using a 50ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz.

Harmonics and spurious noise must be at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. The table below is the results from the highest emission for each channel within the authorized band. This table was used to determine the spurious limits for each channel.

See RF Antenna Conducted plot as file name “RF Antenna Conducted plot.pdf”

**8.3 Measured data of the highest RF Antenna Conducted Spurious test result**

Channel	Max Spurious level at Frequency (MHz)	Spurious Emission level (dBuV)	Limit (dBuV)
Low	2483.50	70.82	99.15
Middle	703.08	70.85	99.27
High	2483.50	73.30	99.36

\* The EUT has its hopping function disable.

Note: 1. Limit = peak power output (in 100kHz RBW) – 20dB  
2. All the other emissions were very low the limit.

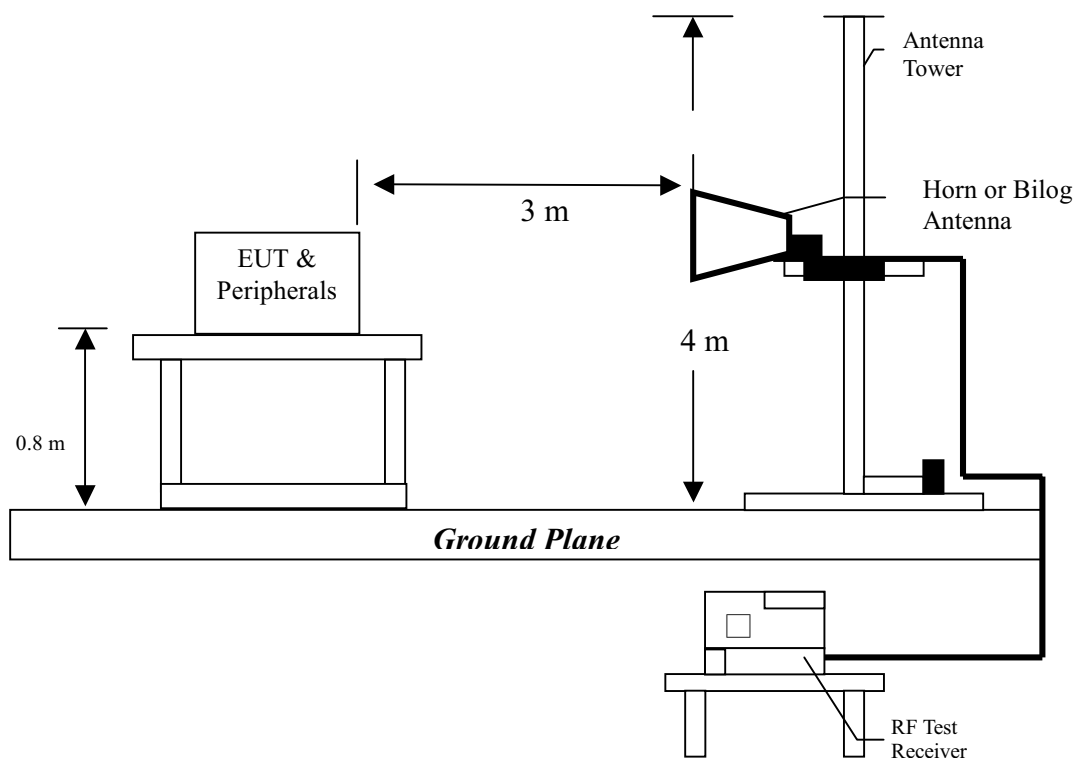
## 9. Radiated Emission test

### 9.1 Operating environment

Temperature: 23 °C  
Relative Humidity: 60 %

### 9.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emission measurements were performed from 30MHz to 25GHz. Spectrum Analyzer Resolution Bandwidth is 100kHz or greater for frequencies 30MHz to 1GHz, 1MHz – for frequencies above 1GHz.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.



### 9.3 Emission limits

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Limits (dB $\mu$ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of radiated emission measurement is  $\pm 3.078$  dB.





#### 9.4 Radiated spurious emission test data

##### 9.4.1 Measurement results: frequencies equal to or less than 1 GHz

EUT : GBU301  
Test Condition : Tx at low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
60.01000	QP	V	13.19	23.31	36.50	40.00	-3.50
144.05000	QP	V	14.29	16.51	30.80	43.50	-12.70
155.81000	QP	V	14.76	16.14	30.90	43.50	-12.60
215.90000	QP	V	11.59	12.81	24.40	43.50	-19.10
227.70000	QP	V	11.82	22.18	34.00	46.00	-12.00
240.11000	QP	V	12.86	14.84	27.70	46.00	-18.30
59.80000	QP	H	13.13	22.07	35.20	40.00	-4.80
249.80000	QP	H	12.86	18.34	31.20	46.00	-14.80
261.70000	QP	H	13.32	17.68	31.00	46.00	-15.00
270.30000	QP	H	13.63	17.58	31.21	46.00	-14.79
295.70000	QP	H	14.39	20.21	34.60	46.00	-11.40
645.80000	QP	H	21.32	18.08	39.40	46.00	-6.60

Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor..



# Intertek Testing Services

## ETL SEMKO

FCC ID. : QLEGBU301

Report No.: EME-020666/01

Page 18 of 27

### The radiated spurious emissions at

Frequency(MHz)	Margin
59.70000	-2.90

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

EUT : GBU301  
 Test Condition : Tx at middle channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
59.70000	QP	V	13.13	23.97	37.10	40.00	-2.90
123.40000	QP	V	12.89	24.51	37.40	43.50	-6.10
143.90000	QP	V	14.29	16.51	30.80	43.50	-12.70
155.80000	QP	V	14.76	16.14	30.90	43.50	-12.60
215.80000	QP	V	11.59	12.81	24.40	43.50	-19.10
227.60000	QP	V	11.82	22.18	34.00	46.00	-12.00
59.60000	QP	H	13.13	22.07	35.20	40.00	-4.80
165.00000	QP	H	14.92	18.68	33.60	43.50	-9.90
249.80000	QP	H	12.86	18.34	31.20	46.00	-14.80
261.70000	QP	H	13.32	17.68	31.00	46.00	-15.00
270.30000	QP	H	13.63	17.57	31.20	46.00	-14.80
295.70000	QP	H	14.39	20.21	34.60	46.00	-11.40

#### Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor..



# Intertek Testing Services

## ETL SEMKO

FCC ID. : QLEGBU301

Report No.: EME-020666/01

Page 19 of 27

EUT : GBU301  
Test Condition : Tx at high channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
59.80000	QP	V	13.13	23.27	36.40	40.00	-3.60
122.80000	QP	V	12.89	23.61	36.50	43.50	-7.00
144.20000	QP	V	14.29	15.51	29.80	43.50	-13.70
156.80000	QP	V	14.76	16.44	31.20	43.50	-12.30
216.10000	QP	V	11.59	13.51	25.10	46.00	-20.90
228.90000	QP	V	11.82	24.98	36.80	46.00	-9.20
59.70000	QP	H	13.13	21.37	34.50	40.00	-5.50
166.50000	QP	H	14.92	17.78	32.70	43.50	-10.80
250.10000	QP	H	13.17	17.63	30.80	46.00	-15.20
262.60000	QP	H	13.32	17.18	30.50	46.00	-15.50
272.40000	QP	H	13.63	18.47	32.10	46.00	-13.90
296.10000	QP	H	14.39	21.01	35.40	46.00	-10.60

**Remark:**

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor..



**9.4.2 Measurement results: frequency above 1GHz**

EUT : GBU301  
Test Condition : Tx at low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
4804	PK	V	28.02	37.9	39.4	49.28	74	-24.72
4804	AV	V	28.02	37.9	27.18	37.06	54	-16.94
7206	PK	V	28.02	43.26	40.2	55.44	74	-18.56
7206	AV	V	28.02	43.26	29.94	45.18	54	-8.82
9608	PK	V	28.02	46.8	39.88	58.66	74	-15.34
9608	AV	V	28.02	46.8	27.65	46.43	54	-7.57
12010	PK	V	28.02	48.57	-	-	74	-
12010	AV	V	28.02	48.57	-	-	54	-
4804	PK	H	28.02	37.9	38.75	48.63	74	-25.37
4804	AV	H	28.02	37.9	26.51	36.39	54	-17.61
7206	PK	H	28.02	43.26	39.66	54.9	74	-19.1
7206	AV	H	28.02	43.26	26.89	42.13	54	-11.87
9608	PK	H	28.02	46.8	38.92	57.7	74	-16.3
9608	AV	H	28.02	46.8	26.05	44.83	54	-9.17
12010	PK	H	28.02	48.57	-	-	74	-
12010	AV	H	28.02	48.57	-	-	54	-

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor.



# Intertek Testing Services

## ETL SEMKO

FCC ID. : QLEGBU301

Report No.: EME-020666/01

Page 21 of 27

EUT : GBU301  
 Test Condition : Tx at middle channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
4882	PK	V	28.02	37.9	39.79	49.67	74	-24.33
4882	AV	V	28.02	37.9	28.44	38.32	54	-15.68
7323	PK	V	28.02	43.26	41.71	56.95	74	-17.05
7323	AV	V	28.02	43.26	32.27	47.51	54	-6.49
9764	PK	V	28.02	46.8	40.77	59.55	74	-14.45
9764	AV	V	28.02	46.8	29.66	48.44	54	-5.56
12205	PK	V	28.02	48.72	-	-	74	-
12205	AV	V	28.02	48.72	-	-	54	-
4882	PK	H	28.02	37.9	40.63	50.51	74	-23.49
4882	AV	H	28.02	37.9	27.75	37.63	54	-16.37
7323	PK	H	28.02	43.26	40.01	55.25	74	-18.75
7323	AV	H	28.02	43.26	27.43	42.67	54	-11.33
9764	PK	H	28.02	46.8	40.25	59.03	74	-14.97
9764	AV	H	28.02	46.8	29.12	47.9	54	-6.1
12205	PK	H	28.02	48.72	-	-	74	-
12205	AV	H	28.02	48.72	-	-	54	-

**Remark:**

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor.



# Intertek Testing Services

## ETL SEMKO

FCC ID. : QLEGBU301

Report No.: EME-020666/01

Page 22 of 27

EUT : GBU301  
 Test Condition : Tx at high channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
4960	PK	V	28.02	37.9	37.87	47.75	74	-26.25
4960	AV	V	28.02	37.9	25.45	35.33	54	-18.67
7440	PK	V	28.02	43.29	41.97	57.24	74	-16.76
7440	AV	V	28.02	43.29	32.34	47.61	54	-6.39
9920	PK	V	28.02	46.78	42.32	61.08	74	-12.92
9920	AV	V	28.02	46.78	29.16	47.92	54	-6.08
12400	PK	V	28.02	48.86	-	-	74	-
12400	AV	V	28.02	48.86	-	-	54	-
4960	PK	H	28.02	37.9	38.26	48.14	74	-25.86
4960	AV	H	28.02	37.9	24.71	34.59	54	-19.41
7440	PK	H	28.02	43.29	40.71	55.98	74	-18.02
7440	AV	H	28.02	43.29	28.14	43.41	54	-10.59
9920	PK	H	28.02	46.78	40.75	59.51	74	-14.49
9920	AV	H	28.02	46.78	29.27	48.03	54	-5.97
12400	PK	H	28.02	48.86	-	-	74	-
12400	AV	H	28.02	48.86	-	-	54	-

**Remark:**

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor.



## 10. Emission on the band edge §FCC 15.247(C)

### 10.1 Operating environment

Temperature: 23 °C  
Relative Humidity: 60 %

### 10.2 Test setup & procedure

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

See band-edge plot as file name “Band-edge plot.pdf”.

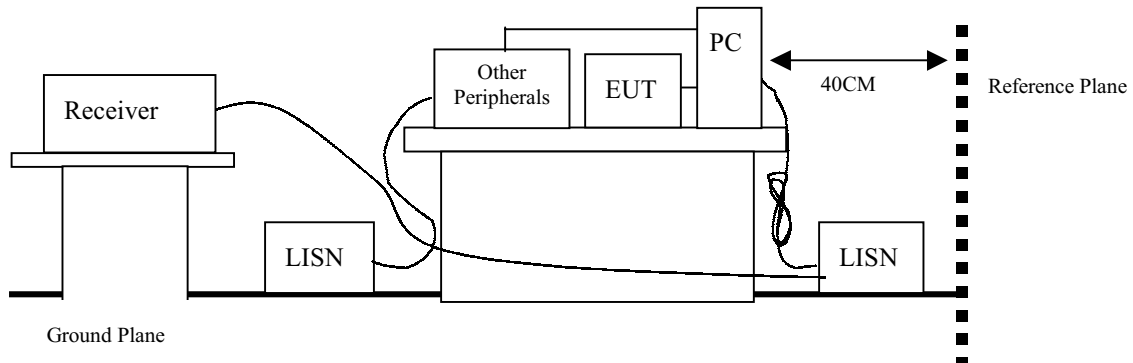


**11. Power Line Conducted Emission test §FCC 15.207**

**11.1 Operating environment**

Temperature: 23 °C  
Relative Humidity: 60 %

**11.2 Test setup & procedure**



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/1992 on conducted measurement. The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

See Power Line Conducted Emission plot as file name “Power Line Conducted Emission plot.pdf”.

**Emission Limit**

<b>FCC Part 15 Paragraph 15.207</b>		
Freq. (MHz)	Maximum RF Line Voltage	
	uV	dBuV
0.45 - 30	250	48.0





### 11.3 Power Line Conducted Emission test data

EUT : GBU301  
Test Condition : Tx at low Channel

Power Line (circle)	Freq. (MHz)	Reading (dB $\mu$ V) QP	Limit (dB $\mu$ V) QP	Margin (dB) QP
LINE	0.81800	21.3	48.00	-26.70
LINE	1.64200	24.5	48.00	-23.50
LINE	3.37800	24.6	48.00	-23.40
LINE	5.25800	28.6	48.00	-19.40
LINE	6.80200	36.0	48.00	-12.00
LINE	13.13800	33.0	48.00	-15.00
NEUTRAL	0.81800	22.8	48.00	-25.20
NEUTRAL	1.64200	25.2	48.00	-22.80
NEUTRAL	5.25800	29.4	48.00	-18.60
NEUTRAL	6.52200	34.0	48.00	-14.00
NEUTRAL	7.36200	35.9	48.00	-12.10
NEUTRAL	14.59400	28.5	48.00	-19.50

Remark:

1. The reading value including cable loss and LISN factor.
2. Uncertainty was calculated in accordance with NAMAS NIS 81.  
Expanded uncertainty (k=2) of conducted emission measurement is  $\pm 2.6$  dB.



# Intertek Testing Services

## ETL SEMKO

FCC ID. : QLEGBU301

Report No.: EME-020666/01

Page 26 of 27

EUT : GBU301  
Test Condition : Tx at middle Channel

Power Line (circle)	Freq. (MHz)	Reading (dB $\mu$ V) QP	Limit (dB $\mu$ V) QP	Margin (dB) QP
LINE	1.64200	24.4	48.00	-23.60
LINE	4.45800	25.8	48.00	-22.20
LINE	5.25800	29.4	48.00	-18.60
LINE	6.80200	35.8	48.00	-12.20
LINE	7.88200	34.3	48.00	-13.70
LINE	14.77800	33.8	48.00	-14.20
NEUTRAL	1.64200	22.8	48.00	-25.20
NEUTRAL	3.37800	25.2	48.00	-22.80
NEUTRAL	5.25800	29.4	48.00	-18.60
NEUTRAL	6.52200	34.0	48.00	-14.00
NEUTRAL	7.36200	35.9	48.00	-12.10
NEUTRAL	14.82600	28.5	48.00	-19.50

Remark:

1. The reading value including cable loss and LISN factor.
2. Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of conducted emission measurement is  $\pm 2.6$  dB.



# Intertek Testing Services

## ETL SEMKO

FCC ID. : QLEGBU301

Report No.: EME-020666/01

Page 27 of 27

EUT : GBU301  
Test Condition : Tx at high Channel

Power Line (circle)	Freq. (MHz)	Reading (dB $\mu$ V) QP	Limit (dB $\mu$ V) QP	Margin (dB) QP
LINE	1.64200	24.4	48.00	-23.60
LINE	3.37800	25.2	48.00	-22.80
LINE	5.25800	29.5	48.00	-18.50
LINE	6.80200	35.7	48.00	-12.30
LINE	7.88200	34.3	48.00	-13.70
LINE	14.53800	33.7	48.00	-14.30
NEUTRAL	1.64200	25.2	48.00	-22.80
NEUTRAL	3.33000	25.4	48.00	-22.60
NEUTRAL	5.25800	29.0	48.00	-19.00
NEUTRAL	6.70600	33.9	48.00	-14.10
NEUTRAL	7.36200	35.9	48.00	-12.10
NEUTRAL	14.77800	30.9	48.00	-17.10

Remark:

1. The reading value including cable loss and LISN factor.
2. Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of conducted emission measurement is  $\pm 2.6$  dB.