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Report No.: GZEM120900381603
Page: 1 of 33
FCC ID: VS9VX1P34KLD

TEST REPORT

Application No.:	GZEM1209003816RF
Applicant:	Goodbetterbest Limited
FCC ID:	VS9VX1P34KLD
Product Name:	VX-1 Wireless Controller For PS3
Product Description:	Radio controller and dongle with 2.4 GHz as carrier.
Model No.:	VX1PS3-41
Standards:	47 CFR PART 15 Subpart C: 2011 section 15.249
Date of Receipt:	2012-09-22
Date of Test:	2012-09-22 to 2012-12-07
Date of Issue:	2012-12-19
Test Result :	Pass*

* In the configuration tested, the EUT complied with the standards specified above.



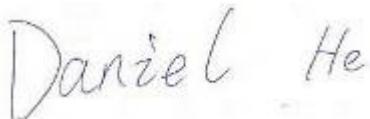
The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2012-12-19		Original

Authorized for issue by:			
Tested By	 (Daniel He) / Project Engineer	2012-09-22 to 2012-12-07	Date
Prepared By	 (Daniel He) / Project Engineer	2012-12-10	Date
Checked By	 Strong Yao/ Reviewer	2012-12-19	Date

3 Test Summary

TEST	TEST REQUIREMENT	TEST METHOD	RESULT
Field Strength of Fundamental	FCC PART 15 C section 15.249 (a)	ANSI C63.10: Clause 6.6	PASS
Field Strength of Unwanted Emissions	FCC PART 15 C section 15.249 (a) section 15.249 (d)	ANSI C63.10: Clause 6.4, 6.6 and 6.7	PASS**
Band Edges	FCC PART 15 C section 15.249 (d)	ANSI C63.10: Clause 6.9.2	PASS
Occupied Bandwidth	FCC PART 15 C section 15.215(c)	ANSI C63.10: Clause 6.9.1	PASS
Conducted Emissions at Mains Terminals	FCC PART 15 C section 15.207	ANSI C63.10: Clause 6.2	PASS

Remark:

EUT: In this whole report EUT means Equipment Under Test.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radio Frequency.

ANSI C63.10: the detail version is ANSI C63.10:2009 in the whole report.

Remark: this report only record the dongle test data, about the controller test date can refer to the report GZEM120900381601.

** The EUT passed Field Strength of Unwanted Emissions test after retest.

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5 General Information

5.1 Client Information

Applicant: Goodbetterbest Limited
Address of Applicant: Suites 103-107 Oevonshire Business Centre Works Road, Letchworth Herts 5GB 1GJ United Kingdom

5.2 General Description of E.U.T.

Product Name: VX-1 Wireless Controller For PS3
Model No.: VX1PS3-41

5.3 Details of E.U.T.

Operating Frequency 2405MHz to 2475MHz
Type of Modulation: GFSK
Number of Channels 71
Channel Separation: 1 MHz
Antenna Type PCB Layout Inverted F
Antenna gain: 0dBi
Power Supply: DC 5.0V supply by PS3 from USB for dongle

5.4 Description of Support Units

Associated equipment provided by the test lab:

Description	Manufacturer	Model No.	SN/Certificate NO
NoteBook	IBM	T60	L3-F3755
Monitor	SAMSUNG	225MS	CR22HVMP900646W
Playstation 3	Sony	CECH-3012A	4-295-267-01

Remark: the Notebook only use for fix frequency.

5.5 Other Information Requested by the Customer

None.

5.6 Deviation from Standards

Biconical and log periodic antennas were used instead of dipole antennas.

5.7 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory,
198 Kezhu Road, Scientechn Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

5.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- **FCC (Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **Industry Canada (Registration No.: 4620B-1)**

The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

- **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584, G-449 and T-1179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IEC6006-10 and Rules of procedure IEC6006-10, and the relevant IEC600 CB-Scheme Operational documents.

6 Equipment Used during Test

RE in Chamber						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date	Calibration Interval
					(YYYY-MM-DD)	
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2014-08-30	2Y
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2013-06-29	1Y
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	100236	2013-03-12	1Y
EMC0528	RI High frequency Cable	SGS	20 m	N/A	2013-06-01	1Y
EMC2025	Trilog Broadband Antenna 30-3000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9163	9163-450	2013-12-17	2Y
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2013-11-27	2Y
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2013-03-26	2Y
EMC2026	Horn Antenna 1-18GHz	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	9120D-841	2013-11-28	2Y
EMC0518	Horn Antenna	Rohde & Schwarz	HF906	100096	2014-07-01	2Y
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2013-03-12	1Y
EMC0049	Amplifier	Agilent	8447D	2944A10862	2013-03-12	1Y
EMC0075	310N Amplifier	Sonama	310N	272683	2013-03-12	1Y
EMC0523	Active Loop Antenna	EMCO	6502	42963	2014-04-07	2Y
EMC2041	Broad-Band Horn Antenna (14)15-26.5(40)GHz	SCHWARZBECK MESS-ELEKTRONI	BBHA 9170	9170-375	2014-06-01	3Y
EMC0530	10m Semi-Anechoic Chamber	ETS	N/A	N/A	2014-04-27	2Y

Conducted Emission						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC0306	Shielding Room	Zhong Yu	8 x 3 x 3.8 m ³	N/A	N/A	N/A
EMC0118	Two-line v-netwok	R&S	ENV216	100359	2013-03-12	1Y
EMC0102	LISN	SCHAFFNER CHASE	MN2050D/1	1421	2013-9-6	1Y
EMC2046	Artificial Mains Network (LISN)	AFJ Instruments	LT32C	S.N.32031120150	2013-03-12	1Y
EMC0506	EMI Test Receiver	Rohde & Schwarz	ESCS30	100085	2013-03-12	1Y
EMC0107	Coaxial Cable	SGS	2m	N/A	2013-07-10	1Y
EMC0106	Voltage Probe	SGS	N/A	N/A	N/A	1Y
EMC0120	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	20550	2013-11-5	1Y
EMC0121	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	20549	2013-11-5	1Y
EMC0122	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	20548	2013-11-5	1Y
EMC2047	CDN	Elektronik-Feinmechanik	L-801:AF2	2793	2014-11-11	3Y
EMC2048	CDN	Elektronik-Feinmechanik	L-801:M2/M3	2738	2014-11-11	3Y
EMC2062	6dB Attenuator	HP	8491A	24487	2013-01-11	1Y
EMC167	Conical metal housing	SGS-EMC	N/A	N/A	2013-02-16	1Y

General used equipment						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC0006	DMM	Fluke	73	70681569	2013-11-5	1Y
EMC0007	DMM	Fluke	73	70671122	2013-11-5	1Y

7 Test Results

7.1 E.U.T. Operation

Test Voltage:	DC 5.0V
Temperature:	20.0 -25.0 °C
Humidity:	38-50 % RH
Atmospheric Pressure:	1000 -1010 mbar
Test frequencies and frequency range:	According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table: According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:

Number of fundamental frequencies to be tested in EUT transmit band

Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

Frequency range of radiated emission measurements

Lowest frequency generated in the device	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower
At or above 10 GHz to below 30 GHz	5th harmonic of highest fundamental frequency or to 100 GHz, whichever is lower
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified

EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2405	27	2432	54	2459
1	2406	28	2433	55	2460
2	2407	29	2434	56	2461
3	2408	30	2435	57	2462
4	2409	31	2436	58	2463
5	2410	32	2437	59	2464
6	2411	33	2438	60	2465
7	2412	34	2439	61	2466
8	2413	35	2440	62	2467
9	2414	36	2441	63	2468
10	2415	37	2442	64	2469
11	2416	38	2443	65	2470
12	2417	39	2444	66	2471
13	2418	40	2445	67	2472
14	2419	41	2446	68	2473
15	2420	42	2447	69	2474
16	2421	43	2448	70	2475
17	2422	44	2449		
18	2423	45	2450		
19	2424	46	2451		
20	2425	47	2452		
21	2426	48	2453		
22	2427	49	2454		
23	2428	50	2455		
24	2429	51	2456		
25	2430	52	2457		
26	2431	53	2458		

Test frequencies are the lowest channel: 0 channel(2405 MHz), middle channel: 32 channel(2437 MHz) and highest channel: 70 channel(2475MHz)

7.2 Antenna Requirement

Standard requirement

15.203 requirement:

For intentional device. According to 15.203. an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

EUT Antenna

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0 dBi.

12Mhz Crystal, Loading 20P, Tolerance:10PPM

Test result: The unit does meet the FCC requirements.

7.3 Field Strength of Fundamental& Field Strength of Unwanted Emissions& Band Edge

Test Requirement: FCC Part15 C section 15.249

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dB μ V/m @ 3m)	Field Strength of Harmonics (dB μ V/m @ 3m)
902 to 928	94.0	54.0
2400 to 2483.5	94.0	54.0
5725 to 5875	94.0	54.0
24000 to 24250	108.0	68.0

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Limits: The fundamental frequency range is in the frequency band of the EUT is 2406MHz ~ 2476MHz.

The limit for Average field strength dB μ V/m for the fundamental frequency = 94.0 dB μ V/m.

The limit for Peak field strength dB μ V/m for the fundamental frequency = 114.0 dB μ V/m.

No fundamental is allowed in the restricted bands.

The limit for average field strength dB μ V/m for the harmonics = 54.0 dB μ V/m.

The limit for peak field strength dB μ V/m for the harmonics = 74.0 dB μ V/m.

Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or 54.0 dB μ V/m in 15.209. Here the limit for the other emission is 54.0 dB μ V/m.

Test Method: ANSI C63.10: Clause 6.4, 6.6 and 6.7 for Field Strength of Fundamental& Field Strength of Unwanted Emissions

ANSI C63.10: Clause 6.9.2 for Band Edge

Status Pre-test the EUT in continuous transmitting mode with setup as stand-alone in X, Y, Z three axes, found the worst case is X axes and report the data.

Measurement Distance: 3m (Semi-Anechoic Chamber)

Frequency range 9 kHz – 25 GHz for transmitting mode.

Test instrumentation resolution bandwidth

9 kHz (9 kHz - 30 MHz), 120 kHz (30 MHz - 1000 MHz), 1 MHz (1000 MHz – 25 GHz)

Test Procedure:

1) 9 kHz to 30 MHz emissions:

For testing performed with the loop antenna, testing was performed in accordance to ANSI C63.10. The centre of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

2) 30 MHz to 1 GHz emissions:

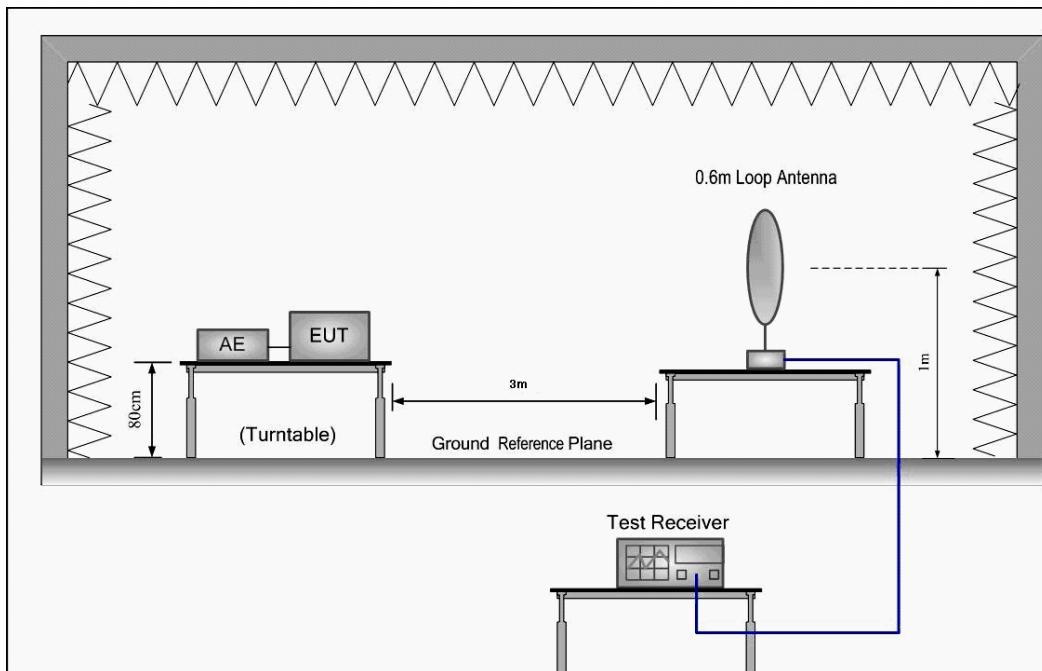
For testing performed with the bi-log type antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

3) 1 GHz to 25 GHz emissions:

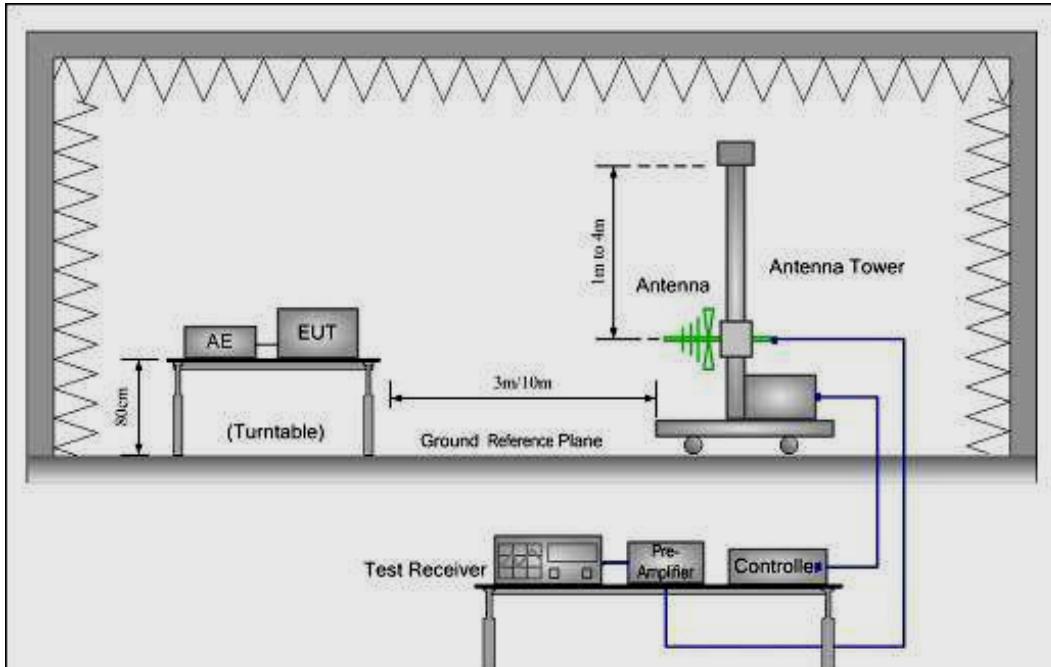
For testing performed with the horn antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360°, the antenna height scan between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

Test Configuration:

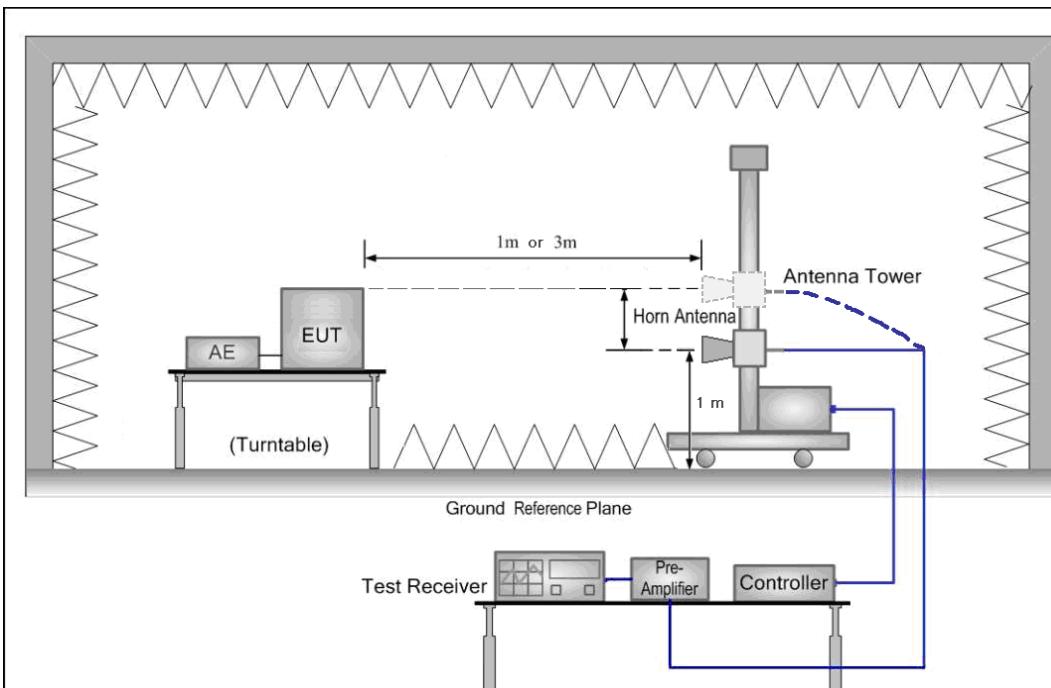
1) 9 kHz to 30 MHz emissions:



2) 30 MHz to 1 GHz emissions:



3) 1 GHz to 25 GHz emissions:



The field strength is calculated by adding the Antenna Factor, Cable Loss & Per-amplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Loss – Preamplifier Factor

1. Test at low Channel in transmitting status

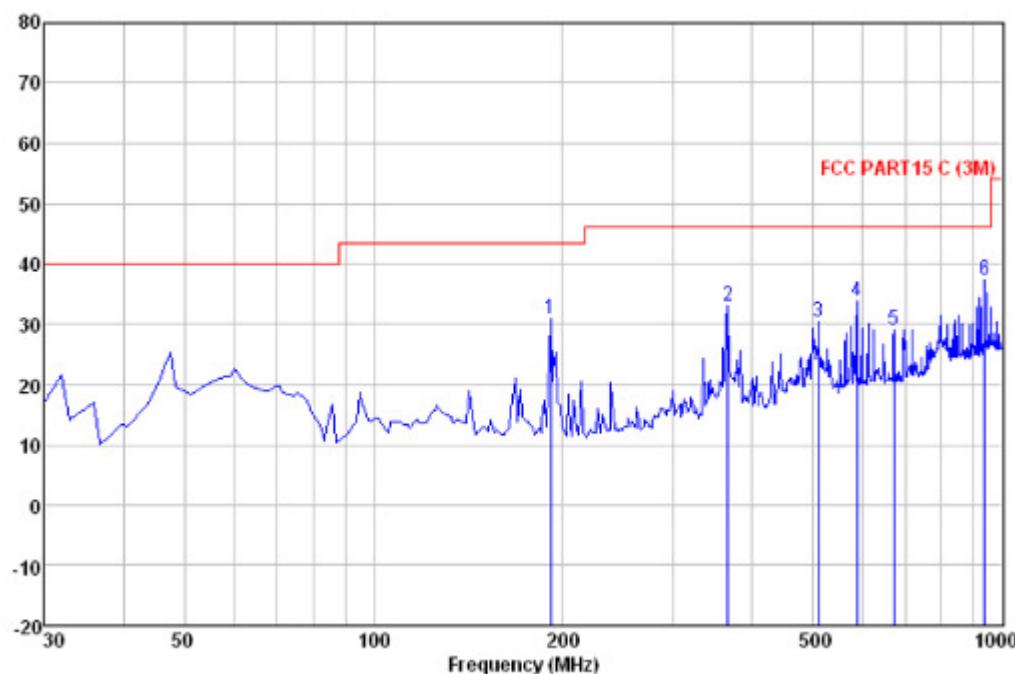
9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30 MHz~1 GHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

Vertical:

Peak scan

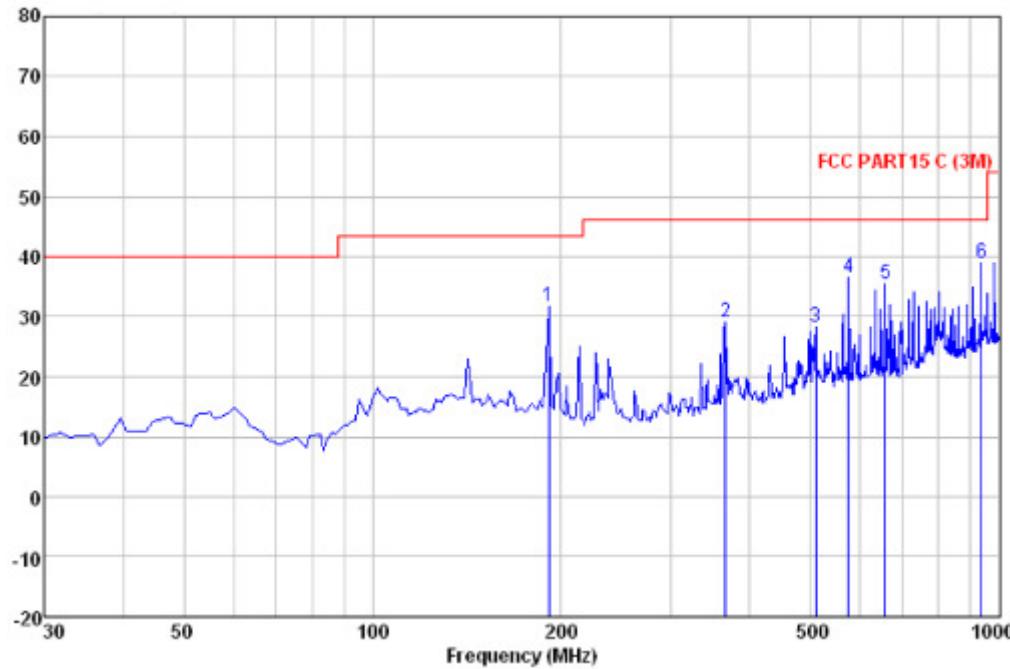
Level (dB μ V/m)

Quasi-peak measurement

Freq MHz	Read Level dB μ V	Antenna Factor dB/m	Cable Loss dB	Preamp Level dB	Level dB μ V/m	Over Limit dB	Limit dB μ V/m	Line Remark
191.020	48.08	10.56	1.85	29.53	30.96	-12.54	43.50	QP
365.620	45.59	14.48	2.61	29.60	33.08	-12.92	46.00	QP
510.150	40.13	16.79	3.09	29.49	30.52	-15.48	46.00	QP
586.780	41.88	18.24	3.23	29.41	33.94	-12.06	46.00	QP
672.140	36.18	18.72	3.49	29.32	29.07	-16.93	46.00	QP
935.980	39.77	21.34	4.13	28.00	37.24	-8.76	46.00	QP

Horizontal:

Peak scan

Level (dB μ V/m)

Quasi-peak measurement

Freq	Read		Antenna		Cable		Preamp	Over	Limit	Line	Remark
	Level	Factor	Loss	Factor	Level	Limit					
MHz	dB μ V	dB/m		dB	dB	dB μ V/m	dB	dB μ V/m			
191.020	48.93	10.56		1.85	29.53	31.81	-11.69	43.50	QP		
365.620	41.50	14.48		2.61	29.60	28.99	-17.01	46.00	QP		
509.180	37.76	16.79		3.09	29.49	28.15	-17.85	46.00	QP		
575.140	44.74	18.03		3.18	29.42	36.53	-9.47	46.00	QP		
657.590	42.62	18.66		3.46	29.34	35.40	-10.60	46.00	QP		
935.980	41.58	21.34		4.13	28.00	39.05	-6.95	46.00	QP		

1~25 GHz Field Strength of Fundamental & Field Strength of Unwanted Emissions.

Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2405.000	27.58	6.60	49.44	95.34	80.08	114.00	V
4810.000	31.54	11.14	49.30	65.78	59.16	74.00	V
7215.000	36.47	13.09	49.71	57.49	57.34	74.00	V
2405.000	27.58	6.60	49.44	93.29	78.03	114.00	H
4810.000	31.54	11.14	49.30	67.35	60.73	74.00	H
7215.000	36.47	13.09	49.71	58.28	58.13	74.00	H

Average Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2405.000	27.58	6.60	49.44	83.16	67.90	94.00	V
4810.000	31.54	11.14	49.30	54.32	47.70	54.00	V
7215.000	36.47	13.09	49.71	46.09	45.94	54.00	V
2405.000	27.58	6.60	49.44	82.47	67.21	94.00	H
4810.000	31.54	11.14	49.30	56.32	49.70	54.00	H
7215.000	36.47	13.09	49.71	49.31	49.16	54.00	H

Band Edge:

Peak Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2400.000	27.58	6.56	49.44	52.68	37.38	74.00	V
2483.500	27.55	6.99	49.42	53.41	38.53	74.00	V
2400.000	27.58	6.56	49.44	53.32	38.02	74.00	H
2483.500	27.55	6.99	49.42	54.64	39.76	74.00	H

Average Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2400.000	27.58	6.56	49.44	43.12	27.82	54.00	V
2483.500	27.55	6.99	49.42	43.23	28.35	54.00	V
2400.000	27.58	6.56	49.44	43.19	27.89	54.00	H
2483.500	27.55	6.99	49.42	43.37	28.49	54.00	H

2. Test at middle Channel in transmitting status

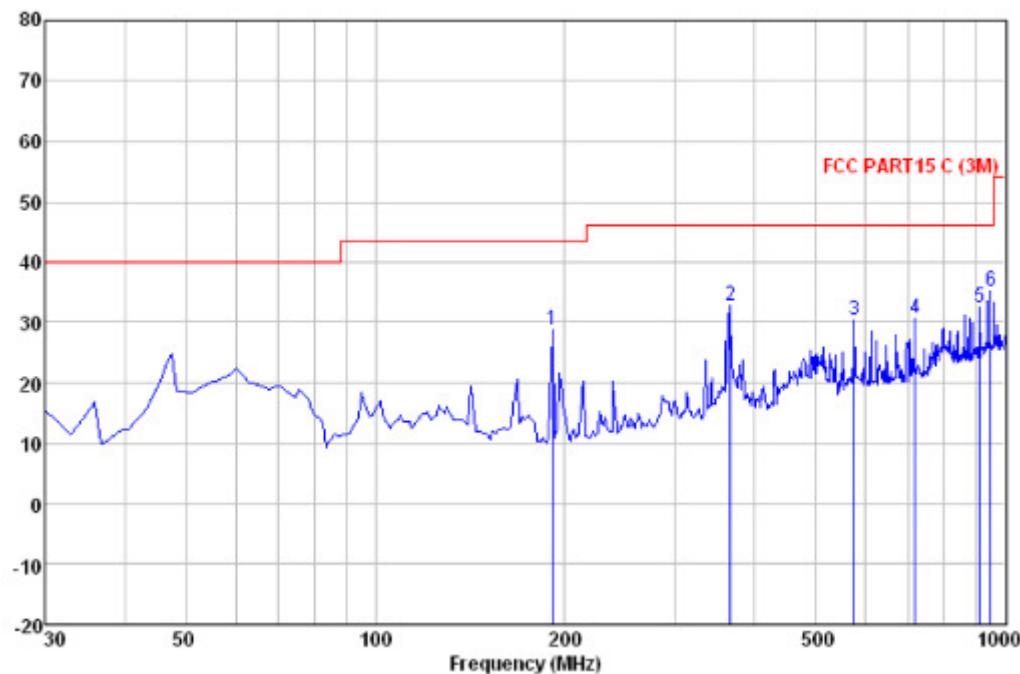
9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30 MHz~1 GHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

Vertical:

Peak scan

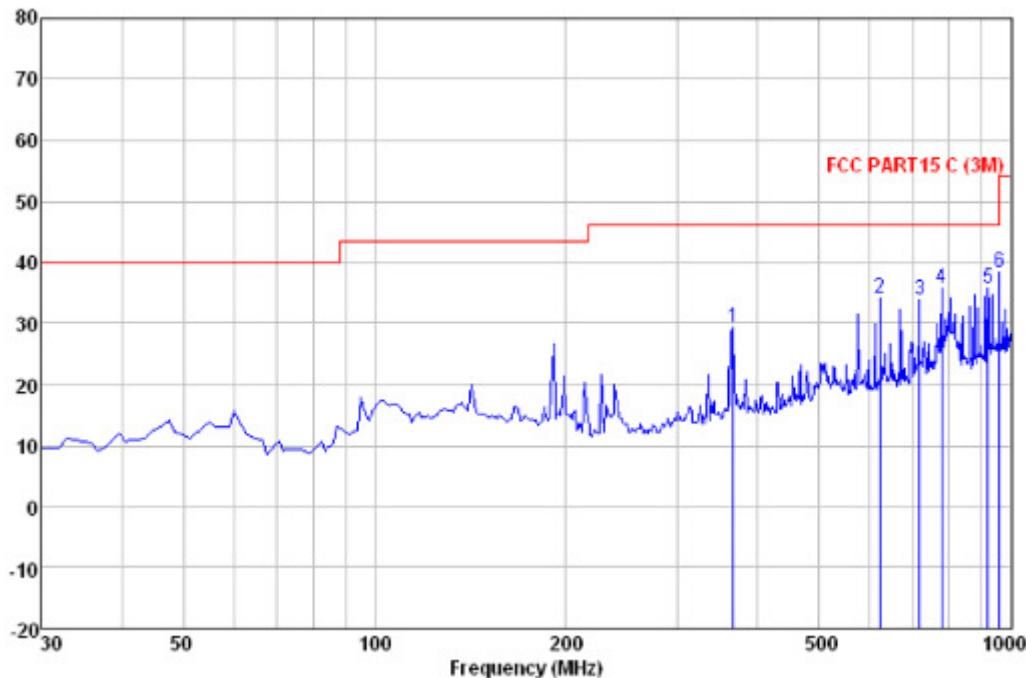
Level (dB μ V/m)

Quasi-peak measurement

Freq MHz	Read Level dB μ V	Antenna Factor dB/m	Cable Loss dB	Preamp Factor dB	Level dB μ V/m	Over Limit dB	Limit dB μ V/m	Line Remark
191.020	46.00	10.56	1.85	29.53	28.88	-14.62	43.50	QP
365.620	45.39	14.48	2.61	29.60	32.88	-13.12	46.00	QP
575.140	38.57	18.03	3.18	29.42	30.36	-15.64	46.00	QP
718.700	37.41	19.05	3.60	29.28	30.78	-15.22	46.00	QP
909.790	35.43	21.15	4.17	28.22	32.53	-13.47	46.00	QP
947.620	37.55	21.40	4.11	27.90	35.16	-10.84	46.00	QP

Horizontal:

Peak scan

Level (dB μ V/m)

Quasi-peak measurement

Freq MHz	Read	Antenna Level	Cable Loss	Preamp Factor	Level	Over Limit	Limit	Line Remark
	dB μ V	dB/m	dB	dB	dB μ V/m	dB	dB μ V/m	
365.620	41.83	14.48	2.61	29.60	29.32	-16.68	46.00	QP
622.670	41.58	18.54	3.36	29.38	34.10	-11.90	46.00	QP
718.700	40.53	19.05	3.60	29.28	33.90	-12.10	46.00	QP
777.870	41.31	19.77	3.82	29.22	35.68	-10.32	46.00	QP
921.430	38.34	21.24	4.15	28.11	35.62	-10.38	46.00	QP
959.260	40.63	21.49	4.18	27.82	38.48	-7.52	46.00	QP

1~25 GHz Field Strength of Fundamental & Field Strength of Unwanted Emissions.

Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2437.000	27.57	6.81	49.43	93.78	78.73	114.00	V
4874.000	31.57	11.24	49.30	68.54	62.05	74.00	V
7311.000	36.50	13.11	49.60	59.74	59.75	74.00	V
2437.000	27.57	6.81	49.43	89.41	74.36	114.00	H
4874.000	31.57	11.24	49.30	67.43	60.94	74.00	H
7311.000	36.50	13.11	49.60	58.98	58.99	74.00	H

Average Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2437.000	27.57	6.81	49.43	81.23	66.18	94.00	V
4874.000	31.57	11.24	49.30	55.49	49.00	54.00	V
7311.000	36.50	13.11	49.60	47.52	47.53	54.00	V
2437.000	27.57	6.81	49.43	78.39	63.34	94.00	H
4874.000	31.57	11.24	49.30	55.74	49.25	54.00	H
7311.000	36.50	13.11	49.60	47.42	47.43	54.00	H

Band Edge:

Peak Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2400.000	27.58	6.56	49.44	53.14	37.84	74.00	V
2483.500	27.55	6.99	49.42	52.99	38.11	74.00	V
2400.000	27.58	6.56	49.44	53.08	37.78	74.00	H
2483.500	27.55	6.99	49.42	52.96	38.08	74.00	H

Average Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2400.000	27.58	6.56	49.44	42.74	27.44	54.00	V
2483.500	27.55	6.99	49.42	42.36	27.48	54.00	V
2400.000	27.58	6.56	49.44	43.28	27.98	54.00	H
2483.500	27.55	6.99	49.42	43.19	28.31	54.00	H

3. Test at high Channel in transmitting status

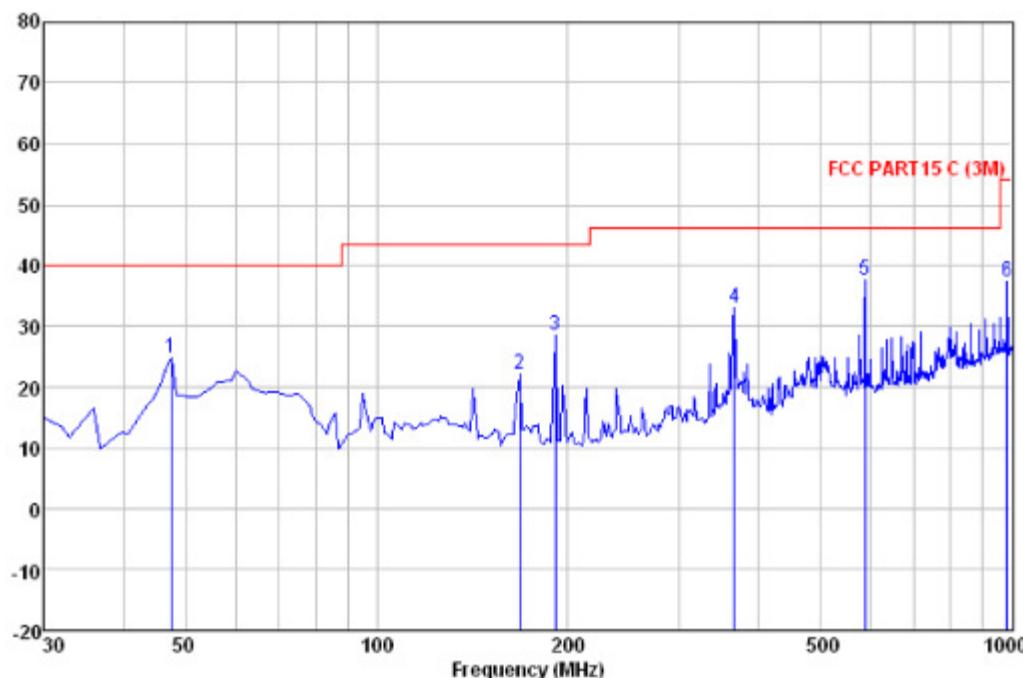
9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30 MHz~1 GHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

Vertical:

Peak scan

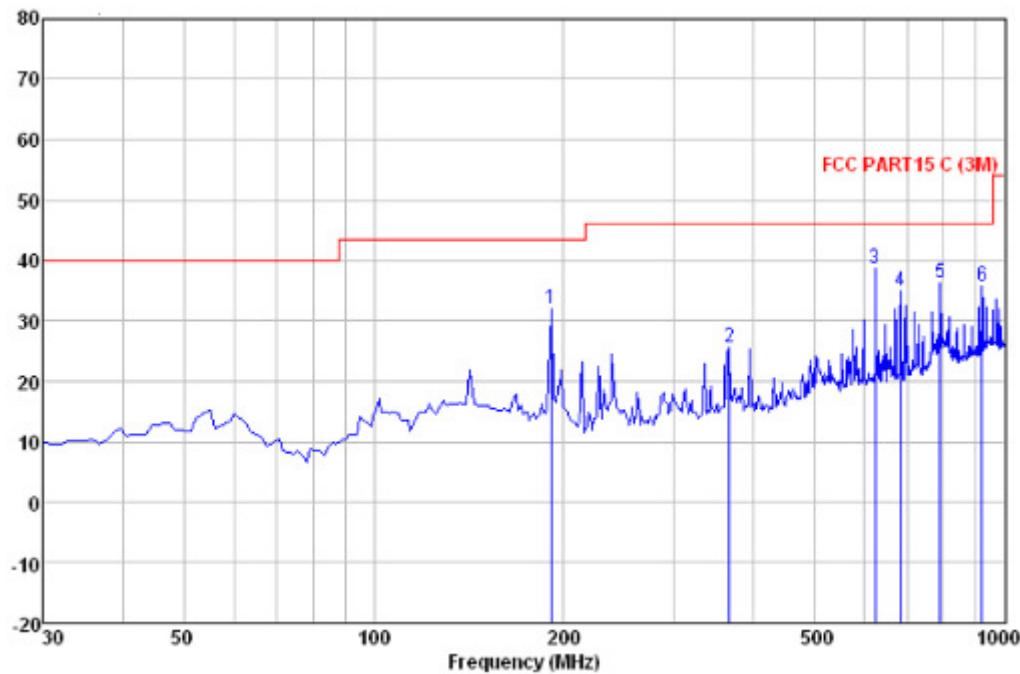
Level (dB μ V/m)

Quasi-peak measurement

Freq MHz	Read Level dB μ V	Antenna Factor	Cable Loss dB	Preamp Factor	Level dB	Over Limit dB	Line Limit dB μ V/m	Remark
	MHz	dB/m	dB	dB μ V/m	dB	dB μ V/m	QP	
47.460	40.01	13.41	0.98	29.50	24.90	-15.10	40.00	QP
167.740	41.00	8.90	1.78	29.62	22.06	-21.44	43.50	QP
191.020	45.53	10.56	1.85	29.53	28.41	-15.09	43.50	QP
365.620	45.57	14.48	2.61	29.60	33.06	-12.94	46.00	QP
586.780	45.49	18.24	3.23	29.41	37.55	-8.45	46.00	QP
982.540	38.95	21.62	4.33	27.63	37.27	-16.73	54.00	QP

Horizontal:

Peak scan

Level (dB μ V/m)

Quasi-peak measurement

Freq	ReadAntenna		Cable Preamp		Over Limit	Line	Remark
	Level	Factor	Loss	Factor			
MHz	dB μ V	dB/m	dB	dB	dB μ V/m	dB	dB μ V/m
191.020	49.01	10.56	1.85	29.53	31.89	-11.61	43.50 QP
365.620	38.02	14.48	2.61	29.60	25.51	-20.49	46.00 QP
622.670	46.15	18.54	3.36	29.38	38.67	-7.33	46.00 QP
683.780	41.90	18.75	3.51	29.31	34.85	-11.15	46.00 QP
789.510	41.66	19.92	3.88	29.21	36.25	-9.75	46.00 QP
921.430	38.54	21.24	4.15	28.11	35.82	-10.18	46.00 QP

1~25 GHz Field Strength of Fundamental & Field Strength of Unwanted Emissions.**Peak & Average Measurement****Peak Measurement:**

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2475.00	27.56	6.98	49.42	94.28	79.40	114.00	V
4950.000	31.68	11.37	49.30	65.94	59.69	74.00	V
7425.000	36.60	13.60	49.72	57.22	57.70	74.00	V
2475.00	27.56	6.98	49.42	90.24	75.36	114.00	H
4950.000	31.68	11.37	49.30	65.35	59.10	74.00	H
7425.000	36.60	13.60	49.72	56.97	57.45	74.00	H

Average Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2475.00	27.56	6.98	49.42	83.02	68.14	94.00	V
4950.000	31.68	11.37	49.30	54.17	47.92	54.00	V
7425.000	36.60	13.60	49.72	47.13	47.61	54.00	V
2475.00	27.56	6.98	49.42	78.41	63.53	94.00	H
4950.000	31.68	11.37	49.30	56.53	50.28	54.00	H
7425.000	36.60	13.60	49.72	46.49	46.97	54.00	H

Band Edge:

Peak Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2400.000	27.58	6.56	49.44	52.48	37.18	74.00	V
2483.500	27.55	6.99	49.42	53.29	38.41	74.00	V
2400.000	27.58	6.56	49.44	53.78	38.48	74.00	H
2483.500	27.55	6.99	49.42	53.16	38.28	74.00	H

Average Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2400.000	27.58	6.56	49.44	42.54	27.24	54.00	V
2483.500	27.55	6.99	49.42	42.18	27.30	54.00	V
2400.000	27.58	6.56	49.44	43.32	28.02	54.00	H
2483.500	27.55	6.99	49.42	43.27	28.39	54.00	H

Remark:

- 1). The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Loss - Preamplifier Factor.
- 2). As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.
- 3). The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

Test result: The unit does meet the FCC requirements.

7.4 Occupied Bandwidth

Test Requirement: FCC Part 15 C section 15.249

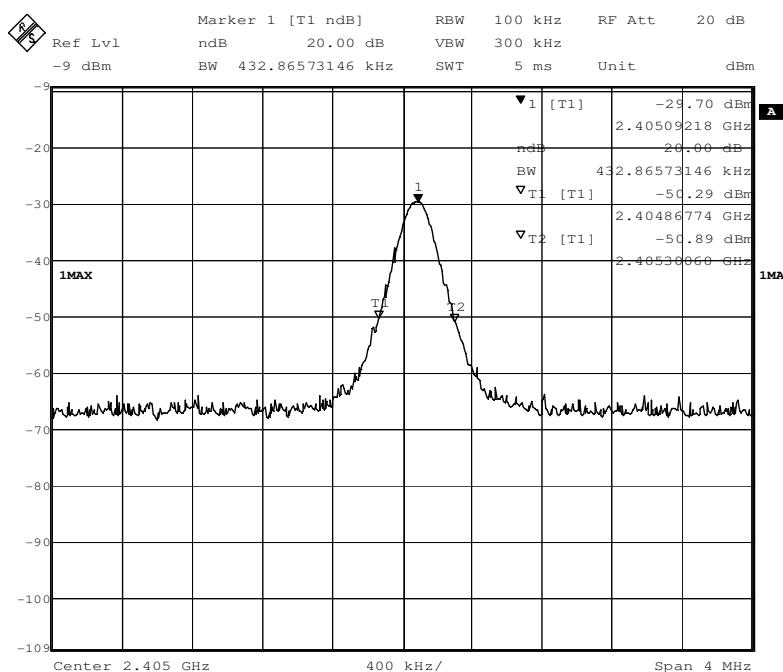
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Test Method: ANSI C63.10: Clause 6.9.1

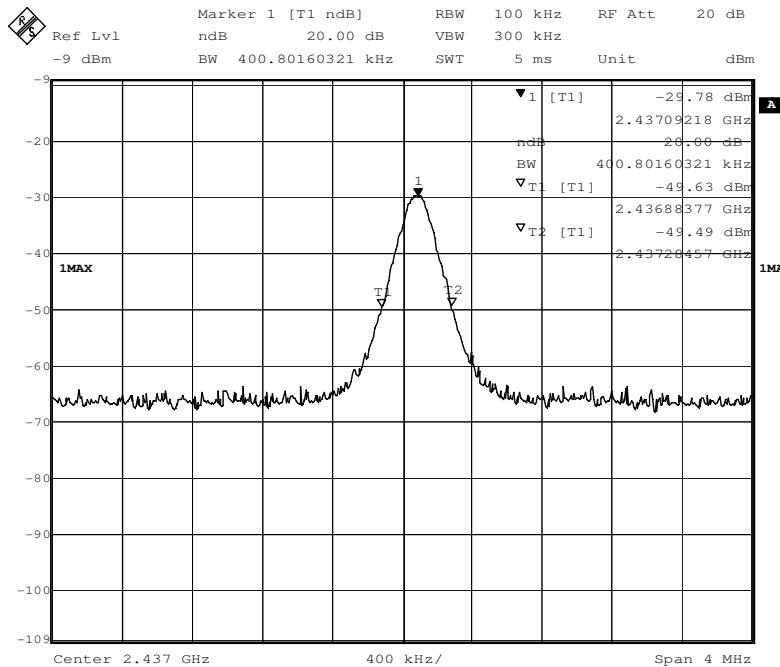
Operation within the band 2.400 to 2.4835 GHz

Method of measurement: A small sample of the transmitter output was fed into the Spectrum Analyzer and the attached plot was taken.

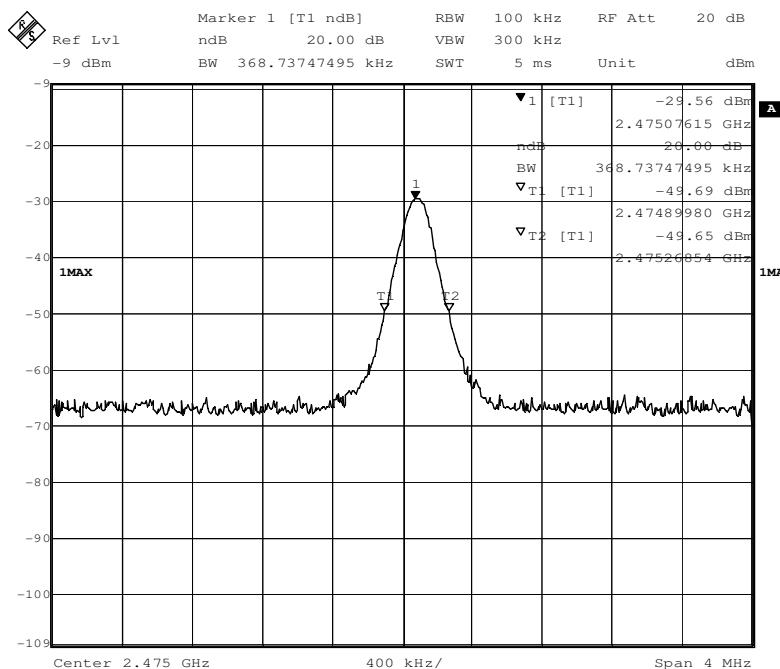
1. Test in the lowest frequency 2.405GHz



2. Test in the middle frequency 2.437GHz



3. Test in the highest frequency 2.475 GHz



The results: The unit does meet the FCC requirements.

7.5 Conducted Emissions at Mains Terminals 150 kHz to 30 MHz

Test Requirement: FCC Part 15 C section 15.207

Test Method: ANSI C63.10: Clause 6.2

Frequency Range: 150 kHz to 30 MHz

Detector: Peak for pre-scan (9 kHz Resolution Bandwidth)

Test Limit

Limits for conducted disturbance at the mains ports of class B

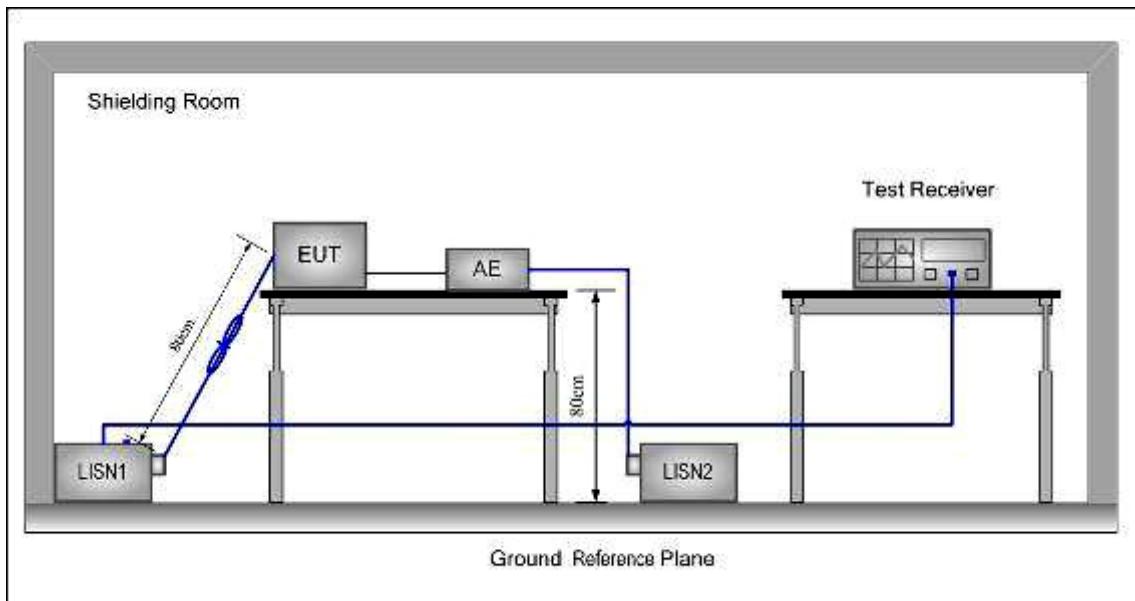
Frequency Range (MHz)	Class B Limit dB(µV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

NOTE 1 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.

EUT Operation: Test in normal operating mode. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Test Configuration:



Test procedure:

1. The mains terminal disturbance voltage test was conducted in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0,8 m from the LISN 2.

7.5.1 Measurement Data

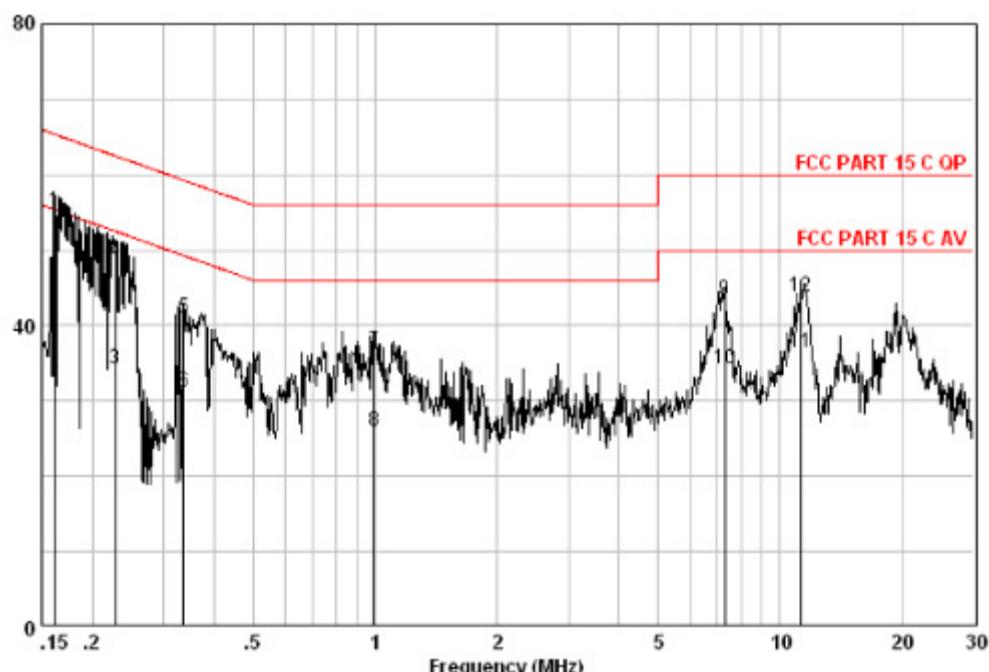
An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected. For EUT the communicating was worst case mode.

The following Quasi-Peak and Average measurements were performed on the EUT:

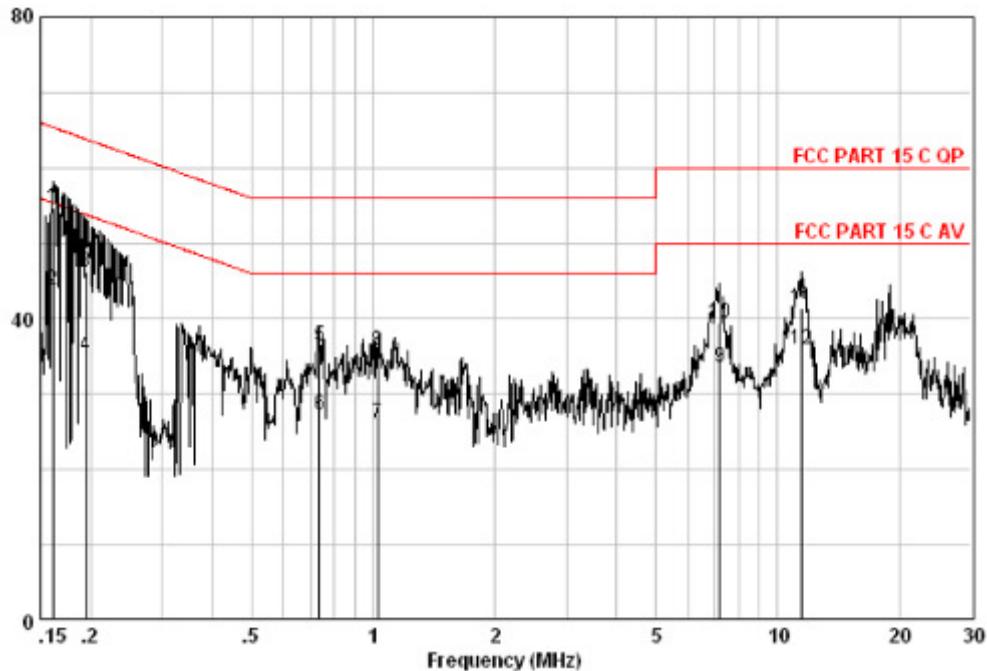
Neutral Line

Level (dB μ V)



Measure data:

Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
MHz	dB μ V	dB	dB	dB μ V	dB μ V	dB	
0.162	45.38	0.08	9.65	55.11	65.38	-10.28	QP
0.162	33.77	0.08	9.65	43.50	55.38	-11.89	AVERAGE
0.228	24.49	0.11	9.64	34.24	52.52	-18.28	AVERAGE
0.228	38.74	0.11	9.64	48.49	62.52	-14.03	QP
0.336	31.28	0.06	9.63	40.97	59.31	-18.34	QP
0.336	21.58	0.06	9.63	31.27	49.31	-18.04	AVERAGE
0.994	27.01	0.02	9.68	36.71	56.00	-19.29	QP
0.994	16.15	0.02	9.68	25.85	46.00	-20.15	AVERAGE
7.290	33.28	0.15	9.85	43.28	60.00	-16.72	QP
7.290	24.27	0.15	9.85	34.27	50.00	-15.73	AVERAGE
11.257	26.16	0.19	10.06	36.41	50.00	-13.59	AVERAGE
11.257	33.57	0.19	10.06	43.82	60.00	-16.18	QP

Live Line
Level (dB μ V)

Measure result:

Freq MHz	Read Level dB μ V	Cable Loss dB	LISN Factor dB	Level dB μ V	Limit Line dB μ V	Over Limit dB	Remark
0.162	44.95	0.08	9.63	54.66	65.38	-10.73	QP
0.162	34.21	0.08	9.63	43.92	55.38	-11.47	AVERAGE
0.194	36.45	0.12	9.62	46.20	63.84	-17.65	QP
0.194	25.32	0.12	9.62	35.07	53.84	-18.78	AVERAGE
0.735	26.64	0.04	9.64	36.32	56.00	-19.68	QP
0.735	17.61	0.04	9.64	27.29	46.00	-18.71	AVERAGE
1.027	16.44	0.02	9.64	26.10	46.00	-19.90	AVERAGE
1.027	26.16	0.02	9.64	35.82	56.00	-20.18	QP
7.213	23.68	0.14	9.82	33.64	50.00	-16.36	AVERAGE
7.213	29.58	0.14	9.82	39.54	60.00	-20.46	QP
11.498	31.10	0.19	10.06	41.35	60.00	-18.65	QP
11.498	25.82	0.19	10.06	36.07	50.00	-13.93	AVERAGE

--End of the report--