

APPLICATION FOR CERTIFICATION

On Behalf of

Powertech Industrial Co Ltd

Green Powerlink Gateway

Model No. : M9PG01

FCC ID : NHS-M9PG01

Prepared for : Powertech Industrial Co Ltd
10F, No. 407, Chung Shan Rd., Sec 2
Chung Ho City, Taipei Hsien, 235 Taiwan

Prepared by : AUDIX Technology Corporation
EMC Department
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Date of Test : Apr. 21 ~ 26, 2011
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TEST REPORT CERTIFICATION

Applicant : Powertech Industrial Co Ltd

EUT Description : Green Powerlink Gateway

FCC ID : NHS-M9PG01

(A) Model No. : M9PG01

(B) Serial No. : N/A

(C) Power Supply : DC 5V

(D) Test Voltage : AC 120V/60Hz (Via I.T.E Power Supply)

Measurement Procedure Used:

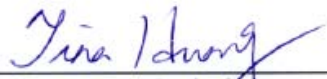
FCC RULES AND REGULATIONS PART 15 SUBPART C, October 2010
 AND ANSI C63.4/2003
 (FCC CFR 47 Part 15C, §15.207, §15.249, §15.209)

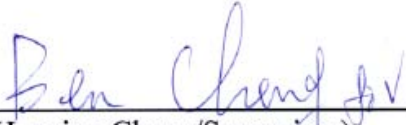
The device described above was tested by AUDIX Technology Corporation to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart C limits.


The measurement results are contained in this test report and AUDIX Technology Corporation is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC official limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX Technology Corporation.

Date of Test : Apr. 21 ~ 26, 2011 Date of Report : Apr. 28, 2011

Producer : 
 (Tina Huang/Administrator)

Reviewer : 
 (Henning Chang/Supervisor)

Signatory: 
 (Ben Cheng/Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	Green Powerlink Gateway
FCC ID	:	NHS-M9PG01
Model Number	:	M9PG01
Applicant	:	Powertech Industrial Co Ltd 10F, No. 407, Chung Shan Rd., Sec 2 Chung Ho City, Taipei Hsien, 235 Taiwan
Fundamental Frequency	:	915MHz
I.T.E Power Supply	:	HON-KWANG, M/N HK-S-050A050-US Input: 100-240V~, 50/60Hz, 0.2A Output: DC 5V, 0.5A DC Power Cord: Non-Shielded, Detachable, 1.5m
Date of Receipt of Sample	:	Mar. 03, 2011
Date of Test	:	Apr. 21 ~ 26, 2011

1.2. Tested Supporting System Details

1.2.1. SIMULATOR (AC SOCKET)

Model Number	:	N/A
Serial Number	:	N/A
Manufacturer	:	N/A
AC Power Cord	:	Non-Shielded, Detachable, 1.8m (3 Pin)

1.3. Description of Test Facility

Name of Firm	:	AUDIX Technology Corporation EMC Department No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang, Taipei Hsien, Taiwan.
Test Facility & Location (C2/AC)	:	No. 2 Shielded Room & Semi-Anechoic Chamber No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang, Taipei Hsien, Taiwan. Renewal on May 14, 2009 Federal Communication Commission Registration Number: 90993
NVLAP Lab. Code	:	200077-0
TAF Accreditation No	:	1724

1.4. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conduction Test	150kHz~30MHz	±1.73dB
Radiation Test (Distance: 3m)	30MHz~300MHz	± 2.91dB
	300MHz~1000MHz	± 2.94dB
	Above 1GHz	± 5.02dB

Remark : Uncertainty = $ku_c(y)$

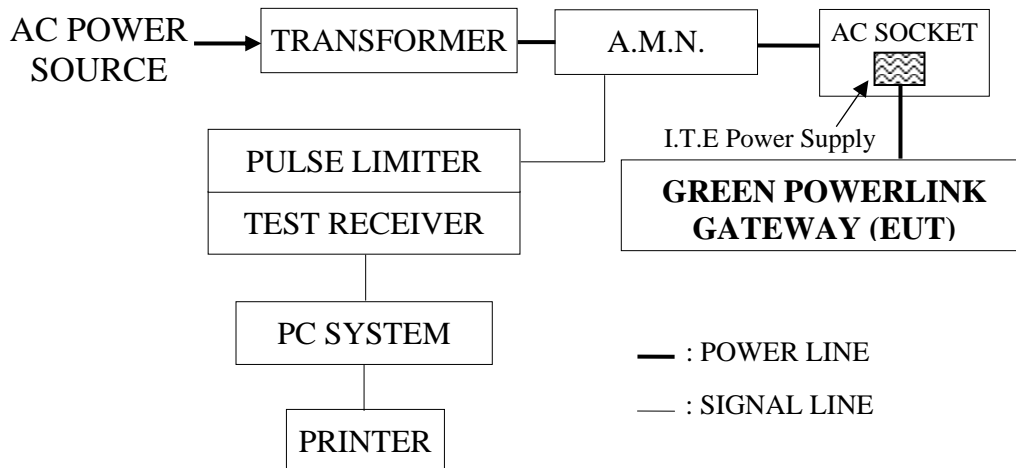
2. POWERLINE CONDUCTED EMISSION MEASUREMENT

2.1. Test Equipment

The following test equipment were used during the power line conducted measurement: (No. 2 Shielded Room)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R & S	ESCS30	100339	Mar. 08, 11'	Mar. 07, 12'
2.	A.M.N.	R & S	ESH2-Z5	890485/023	Apr. 18, 11'	Apr. 17, 12'
3.	Pulse Limiter	R & S	ESH3-Z2	001	Feb. 01, 11'	Jan. 31, 12'

2.2. Block Diagram of Test Setup



2.3. Powerline Conducted Emission Limit (§15.207)

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark1.: If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

2.: The lower limit applies at the band edges.

2.4. Operating Condition of EUT

- 2.4.1. Setup the **EUT (Green Powerlink Gateway)** as shown on 2.2.
- 2.4.2. Turn on the power of all equipment.
- 2.4.3. The **EUT (Green Powerlink Gateway)** was on transmitting function at work during all testing.

2.5. Test Procedure

The EUT was put on table which was above the ground by 80cm and I.T.E Power Supply' s power cord was connected to power mains through an Artificial Mains Network (A.M.N.). This provided a 50 ohm coupling impedance for the measuring equipment. (Please refer to the block diagram of the test setup and photographs.) Both sides of A.C. line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions simulators of the interface cables should be manipulated according to FCC ANSI C63.4-2003 during conducted measurement.

The bandwidth of the R & S Test Receiver ESCS 30 was set at 9kHz.

The frequency range from 150kHz to 30MHz was checked.

All the final readings from Test Receiver were measured with the Quasi-Peak detector and Average detector. (Remark: If the Average limit is met when using a Quasi-Peak detector, the Average detector is unnecessary)

2.6. Powerline Conducted Emission Measurement Results

PASSED. All emissions not reported below are too low against the prescribed limits.

The EUT was measured during this section testing and all the test results are listed in next pages.

EUT : Green Powerlink Gateway Model No. : M9PG01

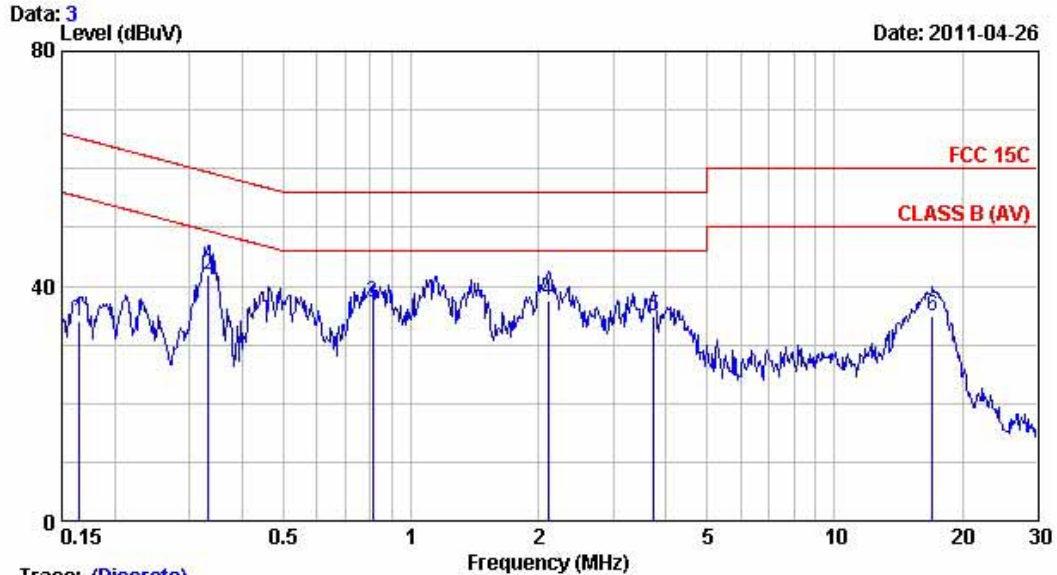
Test Date : Apr. 26, 2011 Temperature : 25 Humidity : 54%

The details are as follows :

Mode	Reference Test Data	
	Neutral	Line
1.	# 3	# 4



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Trace: (Discrete)

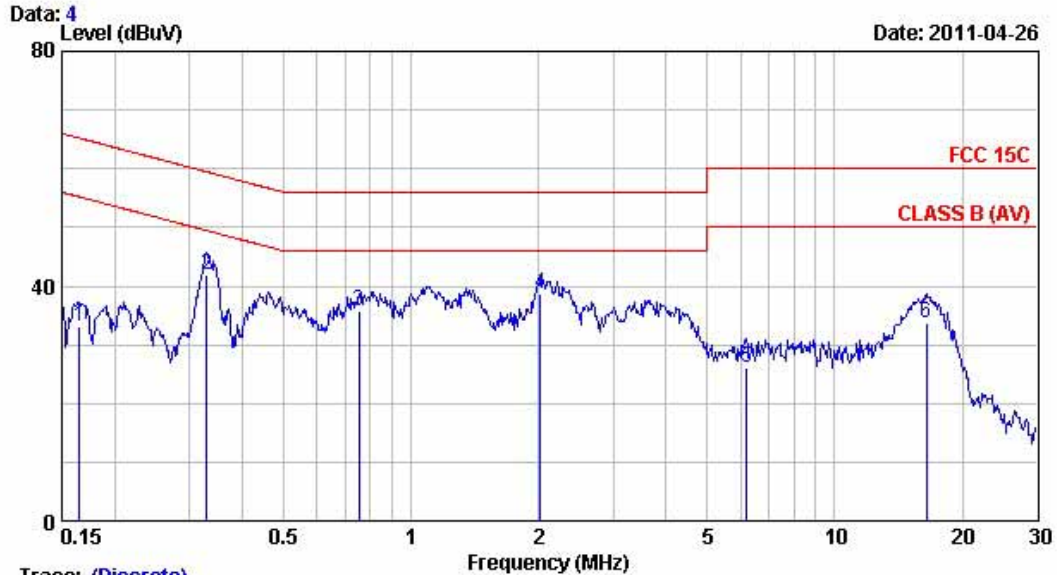
Site	: No.2 Shielded room	Data	: 3
Condition	: ESH2-Z5	Phase	: NEUTRAL
Limit	: FCC 15C		
Env. / Ins.	: 25°C,54% / ESCS 30 (339)	Engineer:	Charles_Yuan
EUT	: M9PG01		
Power Rating	: 120Vac/60Hz		
Test Mode	: TX MODE		

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.165	0.10	0.24	33.76	34.10	65.21	31.10	QP
2	0.332	0.10	0.30	41.56	41.96	59.40	17.43	QP
3	0.813	0.18	0.38	36.61	37.17	56.00	18.83	QP
4	2.110	0.20	0.40	36.83	37.43	56.00	18.57	QP
5	3.740	0.20	0.40	34.38	34.98	56.00	21.02	QP
6	17.018	0.44	0.70	33.77	34.91	60.00	25.09	QP

Remarks: 1.Emission Level= AMN Factor + Cable Loss + Reading.
 2.If the average limit is met when using a quasi-peak detector ,the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



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Trace: (Discrete)
 Site : No.2 Shielded room Data : 4
 Condition : ESH2-Z5 Phase : LINE
 Limit : FCC 15C
 Env. / Ins. : 25°C,54% / ESCS 30 (339) Engineer: Charles_Yuan
 EUT : M9PG01
 Power Rating : 120Vac/60Hz
 Test Mode : TX MODE

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.165	0.10	0.24	32.76	33.10	65.21	32.10	QP
2	0.330	0.10	0.30	41.39	41.79	59.44	17.65	QP
3	0.755	0.17	0.38	35.11	35.65	56.00	20.35	QP
4	2.023	0.20	0.40	38.02	38.62	56.00	17.38	QP
5	6.186	0.25	0.54	25.16	25.95	60.00	34.05	QP
6	16.486	0.49	0.70	32.37	33.57	60.00	26.43	QP

Remarks: 1.Emission Level= AMN Factor + Cable Loss + Reading.
 2.If the average limit is met when using a quasi-peak detector
 ,the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

3. RADIATED EMISSION MEASUREMENT

3.1. Test Equipment

The following test equipment was used during the radiated emission measurement:

3.1.1. For Frequency Range 30MHz-1000MHz (At Semi-Anechoic Chamber)

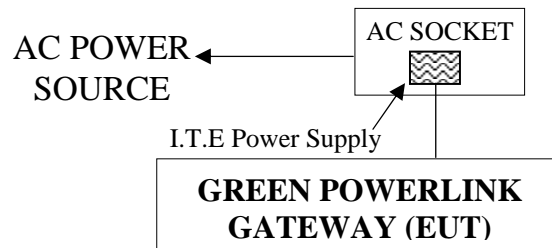
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	HP	8593EM	3826A00272	Jun. 29, 10'	Jun. 28, 11'
2.	Test Receiver	R & S	ESCS30	100339	Mar. 08, 11'	Mar. 07, 12'
3.	Pre-Amplifier	HP	8447D	2944A06305	Feb. 10, 11'	Feb. 09, 12'
4.	Biconical Antenna	CHASE	VBA6106A	1264	Mar. 08, 11'	Mar. 07, 12'
5.	Log Periodic Antenna	Schwarzbeck	UHALP 9108-A	0810	Mar. 08, 11'	Mar. 07, 12'

3.1.2. For Frequency Range Above 1GHz (At Semi-Anechoic Chamber)

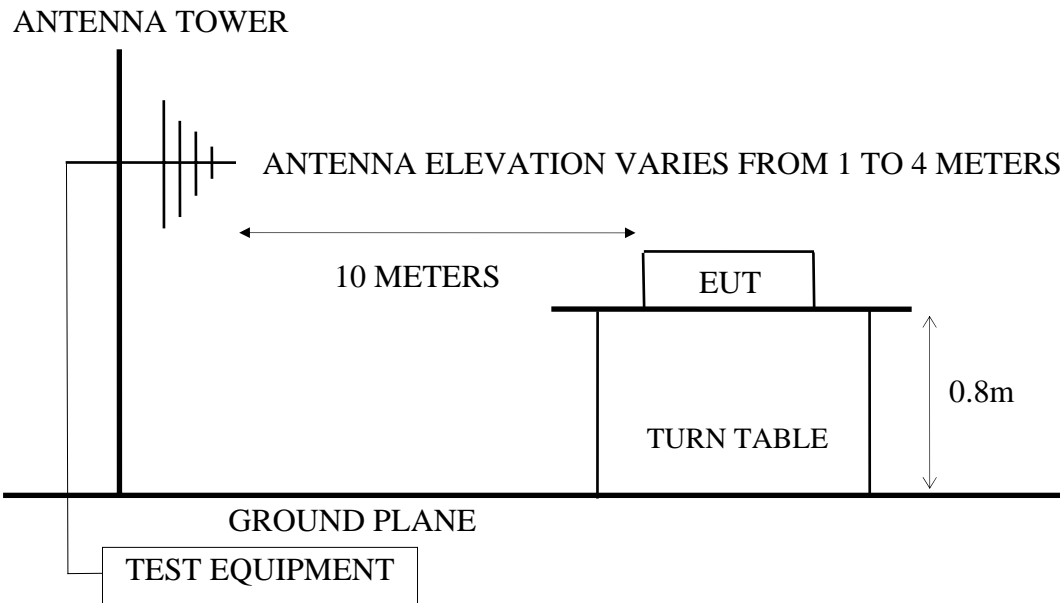
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	HP	8593EM	3826A00272	Jun. 29, 10'	Jun. 28, 11'
2.	Amplifier	HP	8449B	3008A02596	Jan. 11, 11'	Jan. 10, 12'
3.	Horn Antenna	EMCO	3115	9112-3775	May 10, 10'	May 09, 11'

3.2. Block Diagram of Test Setup

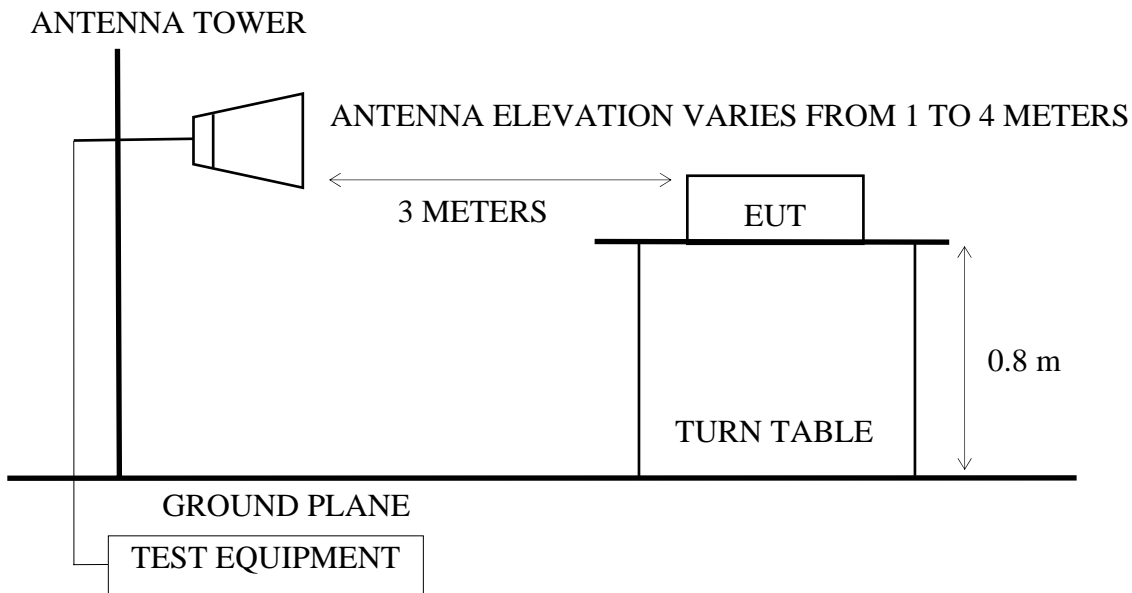
3.2.1. Block Diagram of connection between EUT and simulators



3.2.2. Open Area Test Site (10m) Setup Diagram for 30-1000MHz



3.2.3. Open Area Test Site (3m) Setup Diagram for above 1GHz



3.3. Radiated Emission Limits (§15.209)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMITS	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000	3	74.0 $\text{dB}\mu\text{V/m}$ (Peak) 54.0 $\text{dB}\mu\text{V/m}$ (Average)	

Remark : (1) Emission level ($\text{dB}\mu\text{V/m}$) = $20 \log$ Emission level ($\mu\text{V/m}$)

- (2) The tighter limit applies at the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) The limits in this table are based on CFR 47 Part 15.205(a)(b) and Part 15.209 (a).
- (5) The over 1GHz limit, FCC limit is used based on CFR 47 Part 15.35 (b) and Part 15.205(b) & Part 15.209(e) and Part 15.207(c).

3.4. Fundamental Frequency Limits (§15.249)

FUNDAMENTAL FREQUENCY MHZ	LIMITS
902-928	94 $\text{dB}\mu\text{V/m}$

3.5. Operating Condition of EUT

- 3.5.1. Setup the **EUT (Green Powerlink Gateway)** as shown on 3.2.
- 3.5.2. Turn on the power of all equipment.
- 3.5.3. The **EUT (Green Powerlink Gateway)** was on transmitting function at work during all testing.

3.6. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. EUT was set to 3 meters away from the receiving antenna which was mounted on an antenna tower. The antenna moved up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna such as calibrated biconical and log-periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to FCC ANSI C63.4-2003 regulation.

The bandwidth of the R & S Test Receiver ESCS 30 was set at 120kHz.
(For 30MHz to 1000MHz)

The resolution bandwidth and video bandwidth of test spectrum analyzer is 1MHz for peak detection (PK) at frequency above 1GHz.

The resolution bandwidth of test spectrum analyzer is 1MHz and the video bandwidth is 10Hz for average detection (AV) at frequency above 1GHz.

The frequency range from 30MHz to 10GHz
(Up to 10th harmonics from fundamental frequency) was checked.

Above 1GHz was measured with peak and average detector. For frequency from 1GHz to 10GHz or , we checked it in 1 meter distance and with a shorter cable 2 meter instead of original's. There is no signal exist.

3.7. Radiated Emission Measurement Test Results

PASSED. All emissions not reported below are too low against the prescribed limits.

EUT : Green Powerlink Gateway Model No. : M9PG01

Test Date : Apr. 21, 2011 Temperature : 24 Humidity : 62%

For Frequency Range 30MHz~1000MHz:

The EUT was measured during this section testing and all the test results are listed in section 3.7.1.

The details are as follows :

Mode	Reference Test Data	
	Horizontal	Vertical
1.	# 3	# 2

* Above all final readings were measured with Quasi-Peak detector.

For Out of Band:

The EUT was measured during this section testing and all the test results are listed in section 3.7.2.

The details are as follows :

Mode	Reference Test Data	
	Horizontal	Vertical
1.	# 6	# 5

For Frequency above 1GHz:

There is no noise emission and harmonic be found.

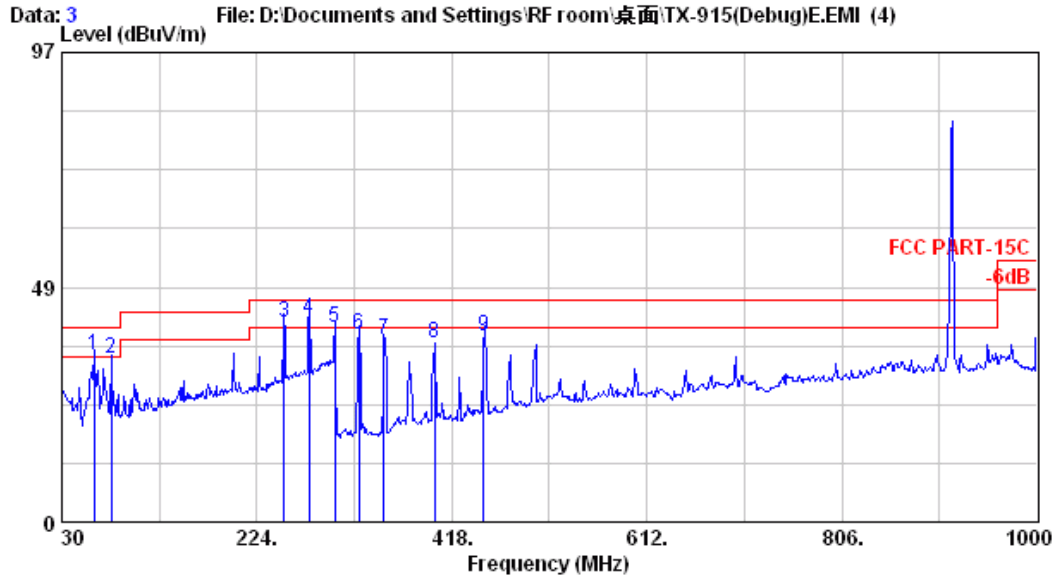
For Fundamental Frequency:

The EUT was measured during this section testing and all the test results are listed in section 3.7.4.

3.7.1. Frequency Range 30-1000MHz



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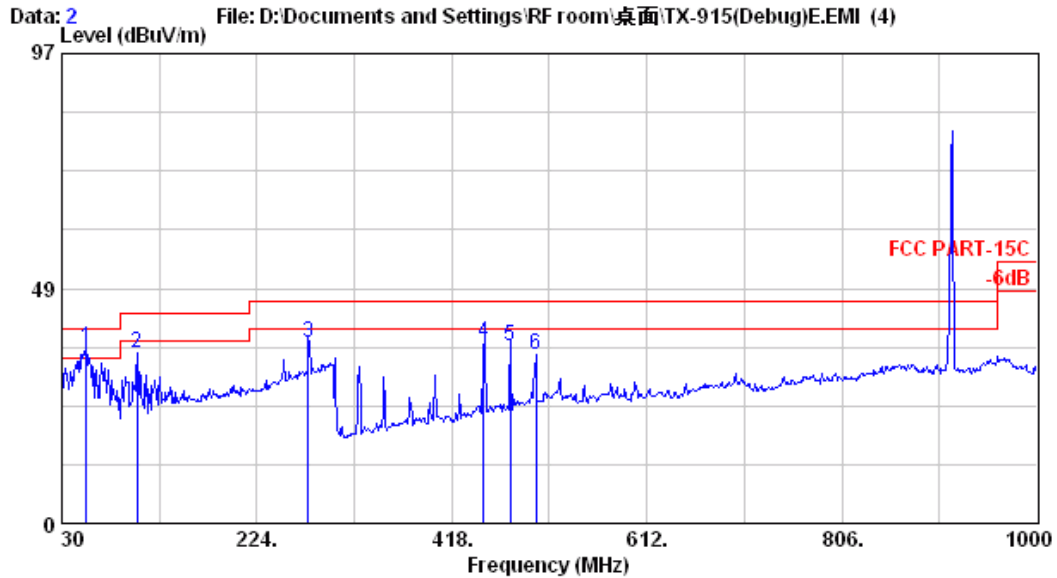
Site no. : A/C Chamber Data no. : 3
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 24°C /62% Engineer : Henning Chang
 EUT : M/N:M9PG01
 Power Rating : AC120V/60Hz
 Test Mode : TX Mode

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	62.010	12.28	1.60	20.49	34.38	40.00	5.62	QP
2	79.470	13.59	1.80	18.23	33.62	40.00	6.38	
3	251.130	23.90	3.50	13.77	41.17	46.00	4.83	QP
4	276.240	25.26	3.70	12.99	41.95	46.00	4.05	
5	301.400	14.59	3.90	21.83	40.32	46.00	5.68	
6	325.900	15.15	4.20	19.22	38.57	46.00	7.43	
7	350.400	15.44	4.30	17.85	37.59	46.00	8.41	
8	400.540	17.66	4.80	14.43	36.89	46.00	9.11	
9	449.800	17.65	5.40	15.33	38.37	46.00	7.63	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. All readings are Quasi-Peak values.



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Site no. : A/C Chamber Data no. : 2
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 24°C / 62% Engineer : Henning Chang
 EUT : M/N:M9PG01
 Power Rating : 120Vac/60Hz M/N:R9P6020300
 Test Mode : TX Mode

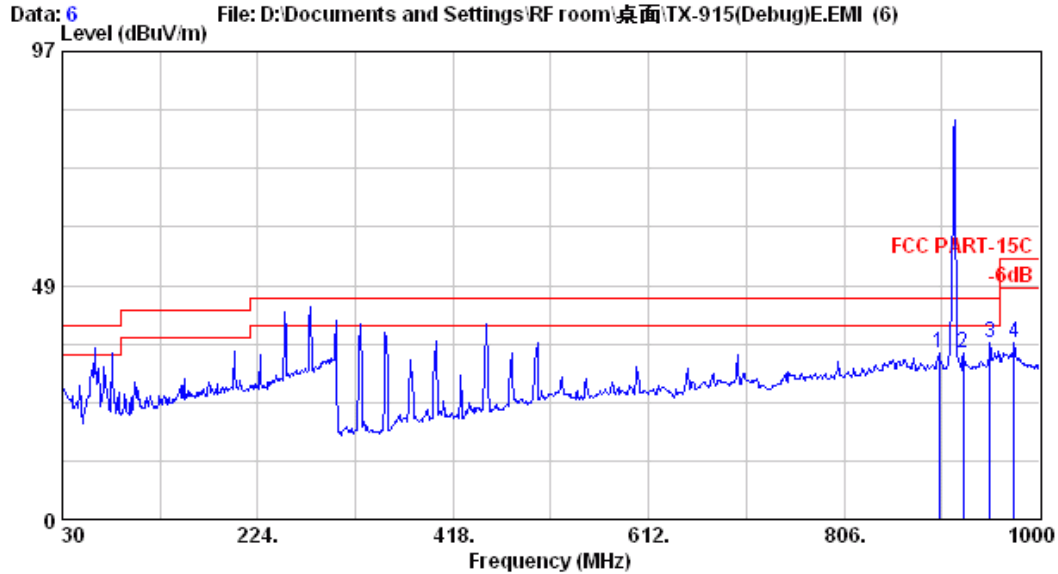
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	54.030	14.79	1.50	20.01	36.30	40.00	3.70	QP
2	104.690	17.58	2.15	15.51	35.23	43.50	8.27	
3	275.410	25.25	3.70	8.37	37.31	46.00	8.69	
4	449.800	17.65	5.40	14.29	37.33	46.00	8.67	QP
5	476.200	18.55	6.00	12.22	36.77	46.00	9.23	
6	501.420	18.95	6.52	9.31	34.79	46.00	11.21	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. All readings are Quasi-Peak values.

3.7.2. Out of Band



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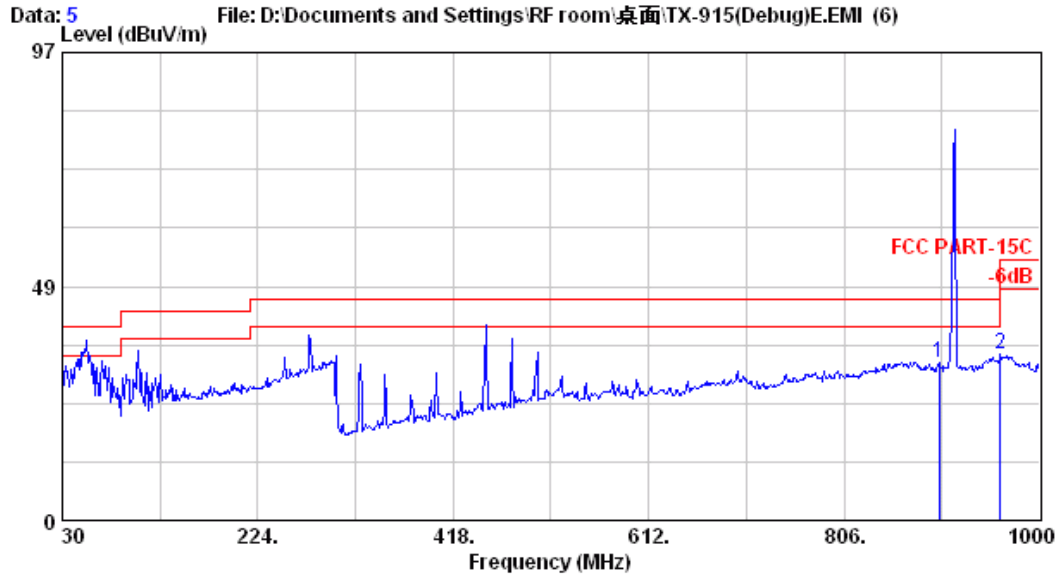
Site no. : A/C Chamber Data no. : 6
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 24°C / 62% Engineer : Henning Chang
 EUT : M/N:M9PG01
 Power Rating : AC120V/60Hz
 Test Mode : TX Mode

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	900.090	24.96	7.37	2.00	34.33	46.00	11.67	QP
2	924.340	24.48	7.40	2.56	34.44	46.00	11.56	
3	950.530	25.93	7.55	2.97	36.46	46.00	9.54	
4	974.780	26.52	7.70	2.34	36.56	54.00	17.44	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



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Site no. : A/C Chamber Data no. : 5
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 24*C /62% Engineer : Henning Chang
 EUT : M/N:M9PG01
 Power Rating : AC120V/60Hz
 Test Mode : TX Mode

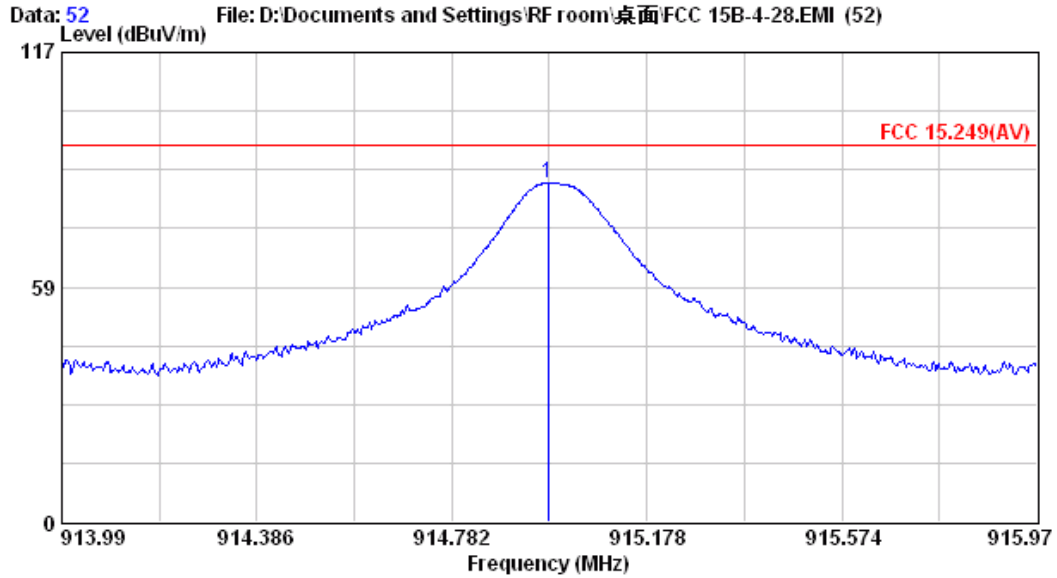
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	900.090	24.96	7.37	0.51	32.84	46.00	13.16	QP
2	961.200	26.50	7.60	0.20	34.30	54.00	19.70	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

3.7.3. Fundamental Frequency



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Site no. : A/C Chamber Data no. : 52
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC 15.249(AV)
 Env. / Ins. : E4446A 24°C /62% Engineer : Henning Chang
 EUT : M/N:M9PG01
 Power Rating : AC120V/60Hz
 Test Mode : TX Mode

	Ant. Factor	Cable Loss	Reading	Emission Level	Limits	Margin	Remark
Freq. (MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1 914.978	24.92	7.40	51.99	84.31	94.00	9.69	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. Fundamental frequency peak value has complied with average limit, thus Q.P. value is not required.

4. DEVIATION TO TEST SPECIFICATIONS

【NONE】