

# Test Report of FCC CFR 47 Part 15 Subpart B

On Behalf of

## **NetReach Technologies (Hangzhou), Inc.**

**FCC ID:** 2AA2E-NR1107

**Product Description:** Mini PC

**Test Model No.:** NR1107

**Supplementary Model:** N/A

**Brand Name:** NetReach

**Prepared for:** NetReach Technologies (Hangzhou), Inc.

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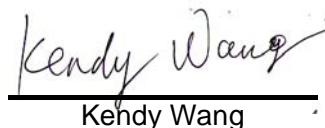
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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant:	<b>NetReach Technologies (Hangzhou), Inc.</b>
Address of Applicant:	Room 205-207, Building 3, No.452, 6th Avenue, Baiyang Subdistrict, Economic & Technical Development Zone, Hangzhou City, Zhejiang Province, China
Manufacturer:	<b>NetReach Technologies (Hangzhou), Inc.</b>
Address of Manufacturer:	Room 205-207, Building 3, No.452, 6th Avenue, Baiyang Subdistrict, Economic & Technical Development Zone, Hangzhou City, Zhejiang Province, China

#### General Description of E.U.T

Items	Description
EUT Description:	Mini PC
Trade Name:	NetReach
Test Model No.:	NR1107
Supplementary Model:	N/A
WIFI Module:	
Frequency Band:	2412M~2462M
Type of Modulation:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20/40: OFDM (64QAM, 16QAM, QPSK, BPSK)
Rated Voltage:	Input: 19VDC 3.42A from AC/DC adapter
Adapter Description:	Model:MN-A065-H190 Input: AC 100-240V 47-63Hz 1.5A MAX Output: 19VDC 3.42A

*NOTE: \* The test data gathered are from the production sample provided by the manufacturer.*

## **1.2 Test Standards**

The report of EUT is prepared in accordance with FCC Rules and Regulations Part 15 Subpart B 2006  
The objective of the manufacturer is to demonstrate compliance with the described above standards.

## **1.3 Test Facility**

All measurement required was performed at laboratory of Bontek Compliance Testing Laboratory Ltd at 1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China.

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

### **FCC – Registration No.: 338263**

BONTEK COMPLIANCE TESTING LABORATORY 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 338263, March 03, 2011.

### **IC Registration No.: 7631A**

The 3m alternate test site of BONTEK COMPLIANCE TESTING LABORATORY LTD. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 7631A on January 25, 2011.

### **CNAS - Registration No.: L3923**

BONTEK COMPLIANCE TESTING LABORATORY LTD. to ISO/IEC 17025:25 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. The acceptance letter from the CNAS is maintained in our files: Registration: L3923, March 22, 2012.

### **TUV – Registration No.: 50242657-0001**

Shenzhen Bontek Compliance Testing Laboratory Co., Ltd. An assessment of the laboratory was conducted according to the "Procedures and Conditions for EMC Test Laboratories" with reference to EN ISO/IEC 17025 by a TUV Rheinland auditor. Audit Report NO. 17010783-003

## 2. SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### 2.2 Support Equipments

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

Support equipments or special accessories in test configuration:

AUX Description:	Manufacturer	Model No.	Certificate	CABLE
Monitor	Dell	E178Pc	CE, FCC	1.5m Unshielded Power Cord 1.8m shielded data Cable with core
Keyboard	Dell	L100	CE, FCC	1.8m shielded data Cable with core
Mouse	Dell	OCJ339	CE, FCC	1.8m shielded data Cable with core

### 2.3 General Test Procedures

Conducted Emissions: The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.4-2003 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions: The EUT is placed on as turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.

### 2.4 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

Uncertainty figures are valid to a confidence level of 95%.

## 2.5 List of Measuring Equipments Used

Test equipments list of Shenzhen Bontek Compliance Testing Laboratory Co., Ltd.

No.	Equipment	Manufacturer	Model No.	S/N	Calibration date	Calibration due date
1	EMI Test Receiver	R&S	ESCI	100687	2013-4-5	2014-4-4
2	EMI Test Receiver	R&S	ESPI	100097	2013-7-24	2014-7-23
3	Amplifier	HP	8447D	1937A02492	2013-4-5	2014-4-4
4	Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	07101	2013-4-5	2014-4-4
5	Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	07102	2013-4-5	2014-4-4
6	Positioning Controller	C&C	CC-C-1F	MF7802113	N/A	N/A
7	Signal generator	Rhode & Schwarz	SMIQ 03HD + option SM-B1, SMIQB11, SMIQB12, SMIQB14, SMIQB17, SMIQB20	1125.5555.46	2013-4-5	2014-4-4
8	GSM system simulator	Rhode & Schwarz	CMU200 + option K20, K21, K22, K23, K24, K27, K28, K29, K42, K65, B12, B41, B52, B66, B56	1100.0008.34	2013-4-5	2014-4-4
9	GSM system simulator	Agilent	8960 Series 10 E1985A + GSM_AMPS	B.01.76 GB42450443	2013-4-5	2014-4-4
10	Spectrum Analyzer	Agilent	E4404B	US41192833	2013-4-5	2014-4-4
11	6dB Attenuator	Atten	Attenuator	DC-4GHz	2013-4-5	2014-4-4
12	Digital Multimeter	Fluke	15B	91280239	2013-4-5	2014-4-4
13	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	9163-324	2013-4-9	2014-4-8
14	Horn Antenna	SCHWARZBECK	BBHA9120A	0499	2012-11-27	2013-11-26
15	Active Loop Antenna	DAZE	ZN30900A	1200	2013-4-6	2014-4-5
16	9kHz-2.4GHz signal generator 2024	MARCONI	10S/6625-99-457-8730	112260/042	2013-4-5	2014-4-4
17	10dB attenuator	ELECTRO-METRICS	EM-7600	836	2013-4-5	2014-4-4
18	Spectrum Analyzer	R&S	FSP	100397	2012-11-1	2013-10-31
19	Broadband preamplifier	SCH WARZBECK	BBV9718	9718-182	2013-4-5	2014-4-4
20	Temperature & Humidity Chamber	TOPSTAT	TOS-831A	3438A05208	2013-4-5	2014-4-4

### 3. SUMMARY OF TEST RESULTS

Standard	Test Items	Result
FCC Part 15 Subpart B	Conduction Emission, 0.15MHz to 30MHz	Pass
FCC Part 15 Subpart B	Radiation Emission, 30MHz to 1000MHz	Pass

## 4. TEST OF AC POWER LINE CONDUCTED EMISSION

## 4.1 Limit of AC Power Line Conducted Emission

Frequency Range (MHz)	Limits ( dBuV)	
	Quasi-Peak	Average
0.150~0.500	66~56	56~46
0.500~5.000	56	46
5.000~30.00	60	50

## 4.2 EUT Setup

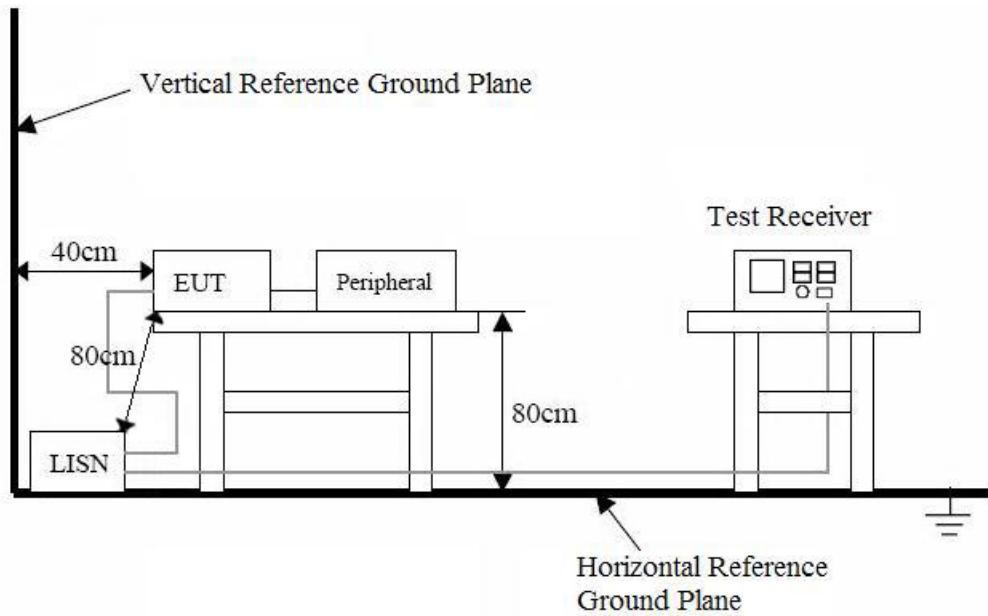
The setup of EUT is according with ANSI C63.4-2003 measurement procedure. The specification used was the FCC Rules and Regulations Part 15 Subpart B limits.

The EUT was placed center and the back edge of the test table.

The AV cables were draped along the test table and bundled to 30-40cm in the middle.

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.



Remark: The EUT was connected to a 120VAC/ 60Hz power source.

### **4.3 Instrument Setup**

The test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range.....150 KHz to 30 MHz  
Detector.....Peak & Quasi-Peak & Average  
Sweep Speed.....Auto  
IF Band Width.....9 KHz

### **4.4 Test Procedure**

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within -10 dB $\mu$ V of specification limits). Quasi-peak readings are distinguished with a "QP". Average readings are distinguished with a "AV".

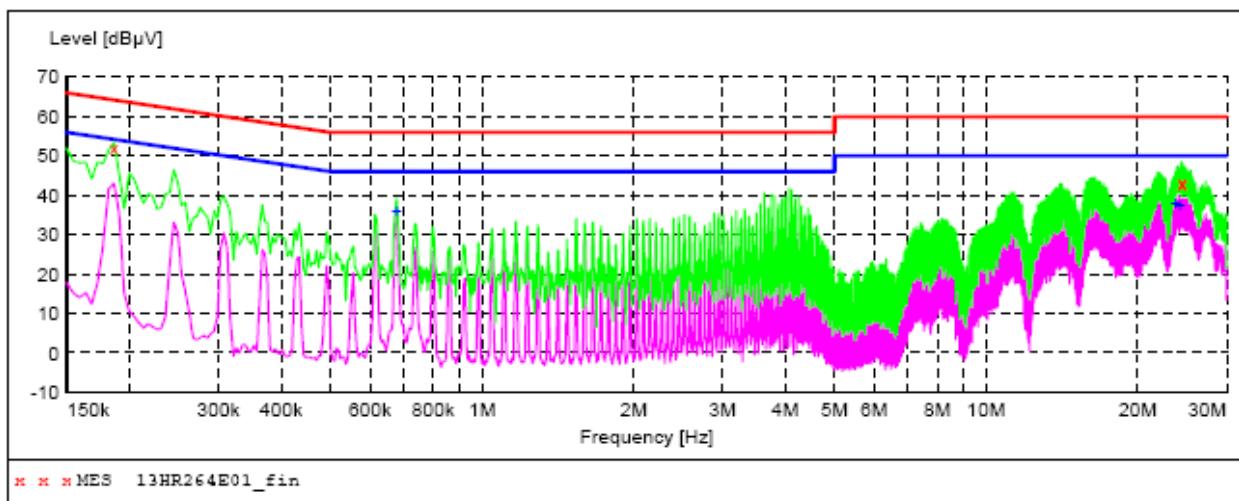
### **4.5 Test Result**

Temperature ( °C ) : 22~23	EUT: Mini PC
Humidity (%RH ) : 50~54	M/N: NR1107
Barometric Pressure ( mbar ) : 950~1000	Operation Condition: Normal Operation

## Conducted Emission:

EUT: Mini PC  
M/N: NR1107  
Operating Condition: Normal Operation  
Test Site: Shielded Room  
Operator: Yang  
Test Specification: AC 120V/60Hz for adapter  
Comment: L Line

**SCAN TABLE: "Voltage (150K-30M) FIN"**  
Short Description: 150K-30M Voltage



**MEASUREMENT RESULT: "13HR264E01\_fin"**

8/7/2013 14:39

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
0.186000	52.20	11.9	64	12.0	QP	L1	GND
24.450000	43.40	10.8	60	16.6	QP	L1	GND
24.513000	42.80	10.8	60	17.2	QP	L1	GND

**MEASUREMENT RESULT: "13HR264E01\_fin2"**

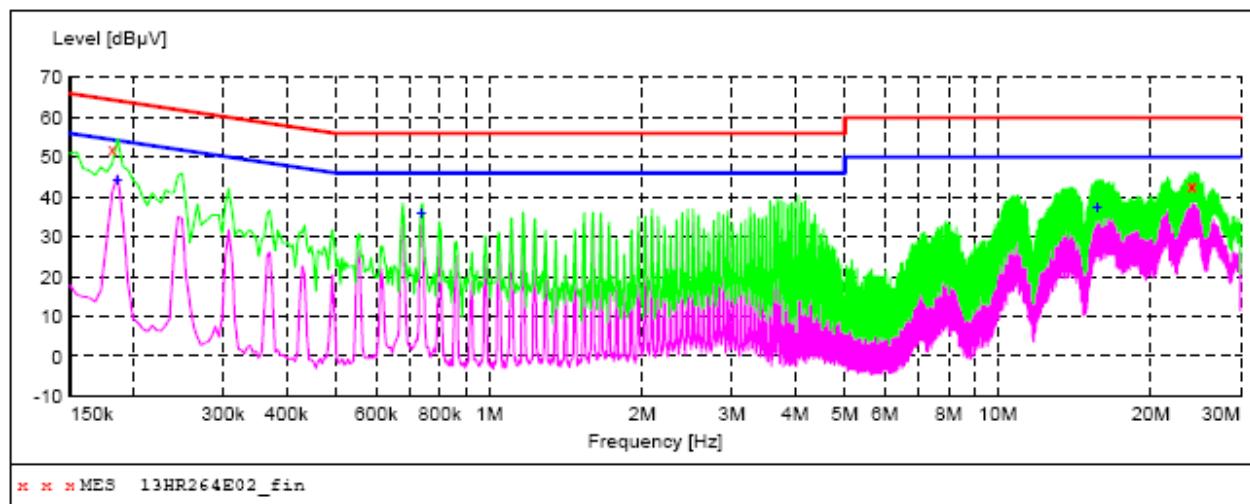
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Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
0.676500	36.10	10.4	46	9.9	AV	L1	GND
23.770500	38.00	10.8	50	12.0	AV	L1	GND
24.265500	37.70	10.8	50	12.3	AV	L1	GND

## Conducted Emission:

EUT: Mini PC  
M/N: NR1107  
Operating Condition: Normal Operation  
Test Site: Shielded Room  
Operator: Yang  
Test Specification: AC 120V/60Hz for adapter  
Comment: N Line

**SCAN TABLE: "Voltage (150K-30M) FIN"**  
Short Description: 150K-30M Voltage



## MEASUREMENT RESULT: "13HR264E02Fin"

8/7/2013 14:42

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
0.181500	52.20	12.0	64	12.2	QP	N	GND
24.004500	42.80	10.8	60	17.2	QP	N	GND
24.130500	42.70	10.8	60	17.3	QP	N	GND

## MEASUREMENT RESULT: "13HR264E02\_fin2"

8/7/2013 14:42

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
0.186000	44.20	11.9	54	10.0	AV	N	GND
0.735000	36.20	10.4	46	9.8	AV	N	GND
15.657000	37.60	10.8	50	12.4	AV	N	GND

## 5 - RADIATED DISTURBANCES

### 5.1 Limit of Radiated Disturbances

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB $\mu$ V/m)
30 ~ 88	3	40
88~216	3	43.5
216 ~ 960	3	46
960 ~ 1000	3	54

Note:

- (1) The tighter limit shall apply at the edge between two frequency bands.
- (2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

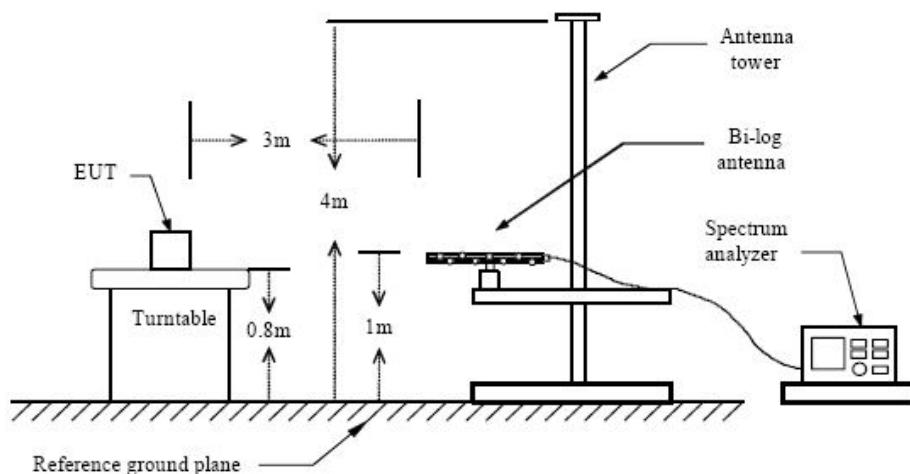
### 5.2 EUT Setup

The radiated emission tests were performed in the in the 3-meter anechoic chamber, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15 Subpart B limits.

The EUT was placed on the center of the test table.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

#### Below 1 GHz



### 5.3 Test Receiver Setup

According to FCC Part 15 rule, the frequency was investigated from 30 to 1000 MHz. During the radiated emission test, the test receiver was set with the following configurations:

Test Receiver Setting:

Detector.....Peak & Quasi-Peak  
IF Band Width.....120KHz  
Frequency Range.....30MHz to 1000MHz  
Turntable Rotated.....0 to 360 degrees

Antenna Position:

Height.....1m to 4m  
Polarity.....Horizontal and Vertical

### 5.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -10 dB $\mu$ V of specification limits), and are distinguished with a "QP" in the data table.

### 5.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB $\mu$ V means the emission is 7dB $\mu$ V below the maximum limit for Subpart B. The equation for margin calculation is as follows:

Margin = Limit – Corr. Ampl.

### 5.6 Radiated Emissions Test Result

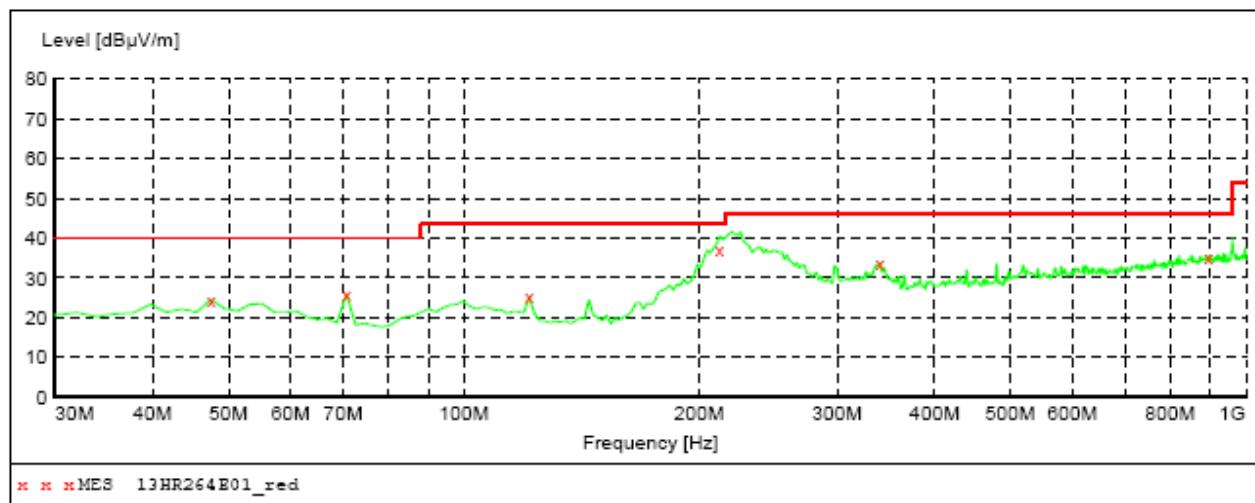
Temperature ( °C ) : 22~23	EUT: Mini PC
Humidity (%RH ): 50~54	M/N: NR1107
Barometric Pressure ( mbar ): 950~1000	Operation Condition: Normal Operation

## Radiated Emission Test Data(30~1000M):

EUT: Mini PC  
M/N: NR1107  
Operating Condition: Normal Operation  
Test Site: 3m CHAMBER  
Operator: Chen  
Test Specification: AC 120V/60Hz for adapter  
Comment: Polarization: Horizontal

### ***SWEET TABLE: "test (30M-1G)"***

Short Description:		Field Strength			
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Time Coupled	Bandw. 100 kHz	VULB9163 NEW



### ***MEASUREMENT RESULT: "13HR264E01\_red"***

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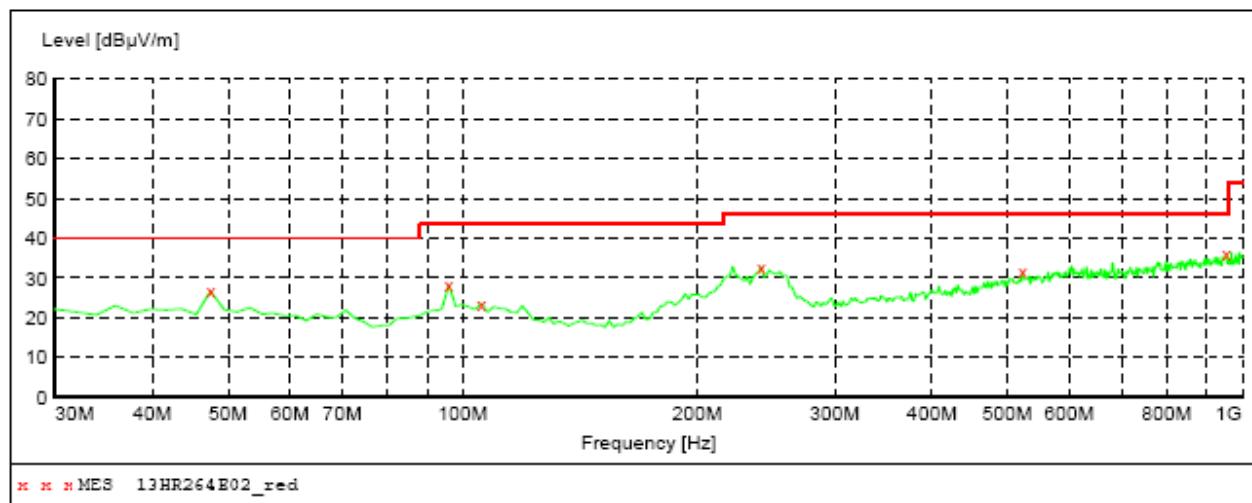
Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	24.60	15.8	40.0	15.4	QP	100.0	0.00	HORIZONTAL
70.740000	26.00	12.4	40.0	14.0	QP	100.0	0.00	HORIZONTAL
121.180000	25.20	14.5	43.5	18.3	QP	100.0	0.00	HORIZONTAL
212.360000	39.50	15.1	43.5	4.0	QP	100.0	0.00	HORIZONTAL
340.400000	33.80	20.2	46.0	12.2	QP	100.0	0.00	HORIZONTAL
895.240000	35.00	29.1	46.0	11.0	QP	100.0	0.00	HORIZONTAL

## Radiated Emission Test Data(30~1000M):

EUT: Mini PC  
M/N: NR1107  
Operating Condition: Normal Operation  
Test Site: 3m CHAMBER  
Operator: Chen  
Test Specification: AC 120V/60Hz for adapter  
Comment: Polarization: Vertical

### ***SWEEP TABLE: "test (30M-1G)"***

Short Description:		Field Strength		
Start Frequency	Stop Frequency	Detector	Meas.	IF
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz
				Transducer
				VULB9163 NEW



### ***MEASUREMENT RESULT: "13HR264E02\_red"***

8/7/2013 17:45

Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det. QP	Height cm	Azimuth deg	Polarization
47.460000	26.80	15.8	40.0	13.2	QP	100.0	0.00	VERTICAL
95.960000	28.40	17.2	43.5	15.1	QP	100.0	0.00	VERTICAL
105.660000	23.60	16.9	43.5	19.9	QP	100.0	0.00	VERTICAL
241.460000	32.90	17.0	46.0	13.1	QP	100.0	0.00	VERTICAL
522.760000	31.50	24.4	46.0	14.5	QP	100.0	0.00	VERTICAL
955.380000	36.10	29.6	46.0	9.9	QP	100.0	0.00	VERTICAL