



BUREAU VERITAS

Test Report No.: FC120814N026

# TEST REPORT

Applicant:	Zhuhai FTZ Oplink Communications, Inc.
Address:	#29, #30 Lianfeng Avenue, Free Trade Zone, Zhuhai City, Guangdong Province, China 591030

Manufacturer or Supplier	Prime Foundation Inc.
Address	No.19, Baoying Nan Road Guangzhou Free Trade Zone, Guangzhou, P.R.China 510730
Product:	433MHz wireless USB dongle
Brand Name:	Oplink
Model:	DGL1130
Additional Model & Model Difference:	NA
Date of tests:	Aug. 27, 2012~ Aug. 31, 2012



the tests have been carried out according to the requirements of the following standards:

FCC Part 15, Subpart C (Section 15.231)

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

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Approved by Sam Tung  
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Date: Aug.31, 2012

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VERITAS**

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	N/A	Aug.31,2012



# 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.231)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
§15.203	Antenna Requirement	PASS	Compliant
§15.207 (a)	AC Power Conducted Emission	PASS	Compliant
§15.209 §15.231(b)	Radiated Emission	PASS	Compliant
§15.231 (a)	Deactivation Testing	PASS	Compliant
§15.231(c)	Emission Bandwidth Measurement	PASS	Compliant

## 2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.94dB
Radiated emissions	30MHz ~ 1000MHz	3.6419dB
	1GHz ~ 18GHz	2.2dB
	18GHz ~ 40GHz	1.94dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.



### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	433MHz wireless USB dongle
<b>MODEL NO.</b>	DGL1130
<b>FCC ID</b>	OS3DGL01
<b>NOMINAL VOLTAGE</b>	DC 5V from USB
<b>MODULATION TYPE</b>	ASK
<b>OPERATING FREQUENCY</b>	433.92MHz
<b>NUMBER OF CHANNEL</b>	1
<b>ANTENNA TYPE</b>	Built-in spring antenna · 2.5dbi
<b>I/O PORTS</b>	NA

**NOTE:**

For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

#### 3.2 DESCRIPTION OF TEST MODES

The EUT was tested under the following modes' the final worst mode were marked in boldface and recorded in this report.

FREQUENCY	TEST MODES
433.92MHz	Transmitting

#### 3.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	RE ≥ 1G	RE < 1G	PLC	EB	DT	
-	√	√	√	√	√	-

Where **RE ≥ 1G:** Radiated Emission above 1GHz      **RE < 1G:** Radiated Emission below 1GHz  
**PLC:** Power Line Conducted Emission      **EB:** 20dB Bandwidth measurement  
**DT:** Deactivation Time measurement



**POWER LINE CONDUCTED EMISSION TEST:**

- 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).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	FSK

**RADIATED EMISSION TEST (ABOVE 1 GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	FSK

**RADIATED EMISSION TEST (BELOW 1 GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	FSK



**EMISSION BANDWIDTH MEASUREMENT:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	FSK

**DEACTIVATION TIME MEASUREMENT:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	FSK

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	27deg. C, 73%RH	120Vac, 60Hz	Venless long
RE<1G	26deg. C, 67%RH	120Vac, 60Hz	Venless long
EB	26deg. C, 73%RH	120Vac, 60Hz	Venless long
PLC	25deg. C, 70%RH	120Vac, 60Hz	Venless long
DT	24deg. C, 73%RH	120Vac, 60Hz	Venless long





### 3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.231)**

**ANSI C63.4-2009**

**ANSI C63.4-2009**

All test items have been performed and recorded as per the above standards.

### 3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	5P2PM2X	12400120329	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A



## 4. TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Impedance Stabilization Network	TESEQ	ISN T800	27957	Oct.16,11	Oct.16,12
EMI Test Receiver	Rohde&Schwarz	ESU 26	100005	May 15,12	May 14,13
Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100168	May 15,12	May 14,13
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	May 15,12	May 14,13
Test software	ADT	ADT_Cond_V7.3.7	N/A	N/A	N/A

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA
  2. The test was performed in Dongguan Shielded Room 553.



#### 4.1.3 TEST PROCEDURES

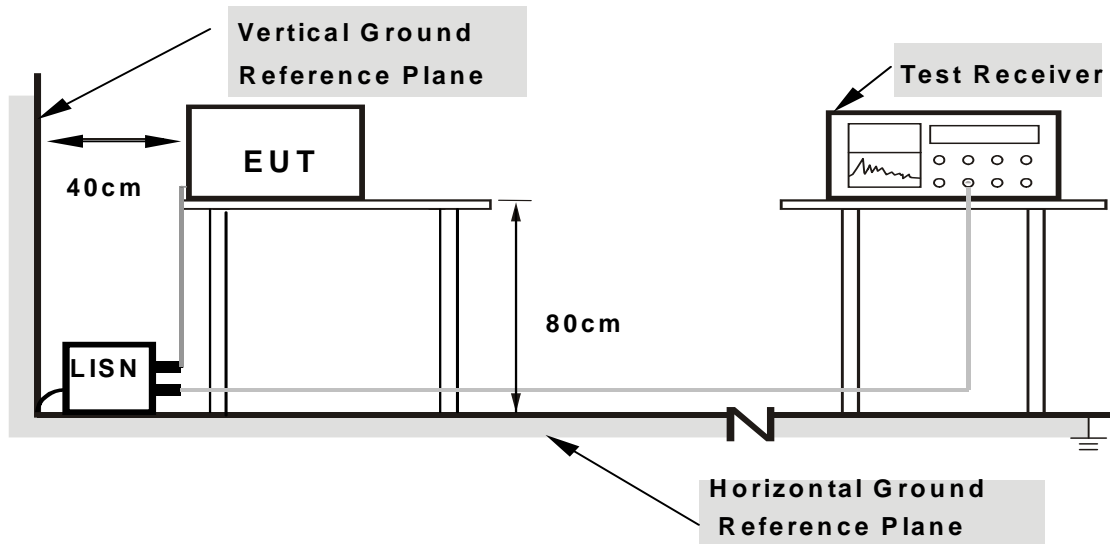
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.1.5 TEST SETUP



- Note: 1.Support units were connected to second LISN.**  
**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes**

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT OPERATING CONDITIONS

- a. Turned on the power of all equipment.
- b. EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.



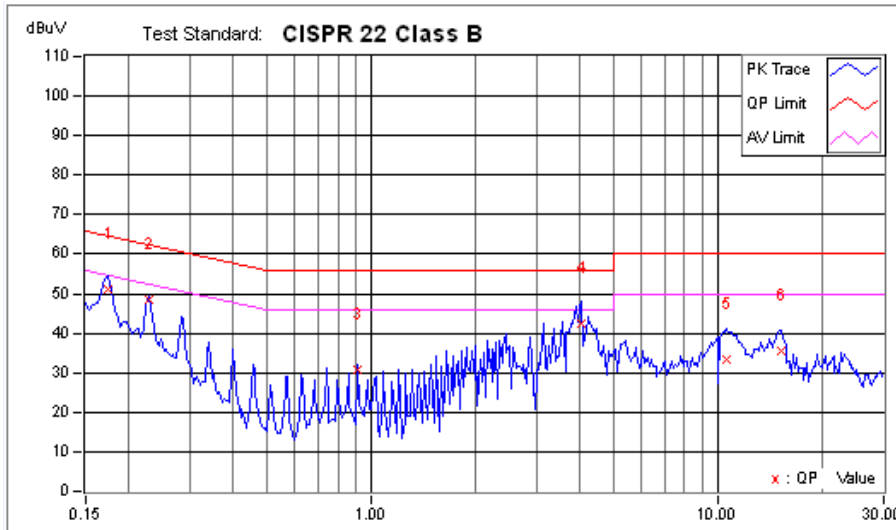
**4.1.7 TEST RESULTS**

**CONDUCTED WORST-CASE DATA**

<b>INPUT POWER</b>	AC 120V/60Hz	<b>6dB BANDWIDTH</b>	9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 66% RH,	<b>PHASE</b>	Line

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17344	0.15	51.02	42.64	51.17	42.79	64.79	54.79	-13.62	-12.00
2	<b>0.22812</b>	<b>0.15</b>	<b>48.28</b>	<b>41.09</b>	<b>48.48</b>	<b>41.24</b>	<b>62.52</b>	<b>52.52</b>	<b>-14.09</b>	<b>-11.28</b>
3	0.91172	0.19	30.40	26.79	30.59	26.98	56.00	46.00	-25.41	-19.02
4	4.04688	0.34	42.24	30.81	42.58	31.15	56.00	46.00	-13.42	-14.85
5	10.60547	0.44	33.00	26.08	33.44	26.53	60.00	50.00	-26.56	-23.47
6	15.26563	0.54	34.77	29.24	35.31	29.78	60.00	50.00	-24.69	-20.22

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.

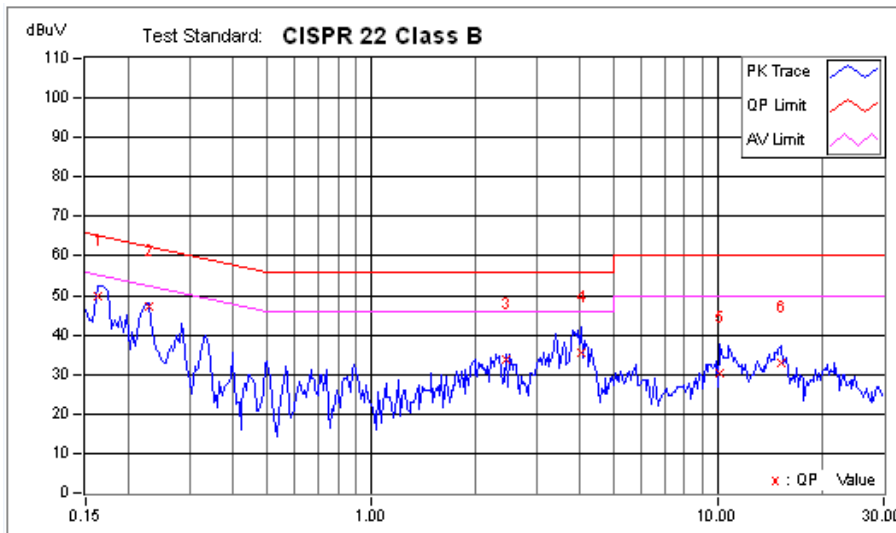




<b>INPUT POWER</b>	AC 120V/60Hz	<b>6dB BANDWIDTH</b>	9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	20 deg. C, 46% RH,	<b>PHASE</b>	Neutral

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.13	49.63	35.45	49.76	35.58	65.38	55.38	-15.61	-19.79
2	<b>0.22812</b>	<b>0.14</b>	<b>47.12</b>	<b>38.48</b>	<b>47.26</b>	<b>38.62</b>	<b>62.52</b>	<b>52.52</b>	<b>-15.26</b>	<b>-13.90</b>
3	2.44141	0.28	33.38	27.73	33.66	28.01	56.00	46.00	-22.34	-17.99
4	4.01563	0.35	35.31	24.15	35.66	24.50	56.00	46.00	-20.34	-21.50
5	10.11718	0.48	29.67	22.76	30.15	23.24	60.00	50.00	-29.85	-26.76
6	15.12891	0.60	32.25	27.09	32.85	27.69	60.00	50.00	-27.15	-22.31

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.





### 4.2 RADIATED EMISSION MEASUREMENT

#### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

According to §15.231(a), 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 (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66–40.70	2,250	225
70–130	1,250	125
130–174	<sup>1</sup> 1,250 to 3,750	<sup>1</sup> 125 to 375
174–260	3,750	375
260–470	<sup>1</sup> 3,750 to 12,500	<sup>1</sup> 375 to 1,250
Above 470	12,500	1,250

**NOTE:**

- <sup>1</sup> Linear interpolations.
- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



#### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent	E4446A	MY46180622	May 02, 12	May 01, 13
Test Receiver ROHDE & SCHWARZ	ESVD	847398/003	May 15,12	May 14,13
Bilog Antenna TESEQ	CBL 6111D	27089	July 16,12	July 15,13
Horn Antenna EMCO	3117	00062558	Oct.19,11	Oct.19,12
10m Semi-anechoic Chamber ETS-LINDGREN	21.4m*12.1m*8.8m	NSEMC006	Mar. 24,12	Mar. 23,13
RF Cable IMRO	IMRO-400	10m Cable 1#10m	May 16,12	May 15,13
RF Cable IMRO	IMRO-400	10m Cable 2#3m	May 16,12	May 15,13
Signal Amplifier EMCI	EMC330	980095	Nov 07,11	Nov 07,12
Signal Amplifier HP	8449B	3008A00409	May 31,12	May 30,13
Spectrum Analyzer Agilent	E7405A	MY45118807	May 15,12	May 14,13
RF Cable DRAKA	M06/25-RG102	10m Cable 2#	May 16,12	May 15,13
Test software	ADT_Radiated_V7. 6.15	N/A	N/A	N/A

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA.
  2. The test was performed in Dongguan Chamber 10m.
  3. The horn antenna are used only for the measurement of emission frequency above 1GHz if tested.





#### 4.2.3 TEST PROCEDURES

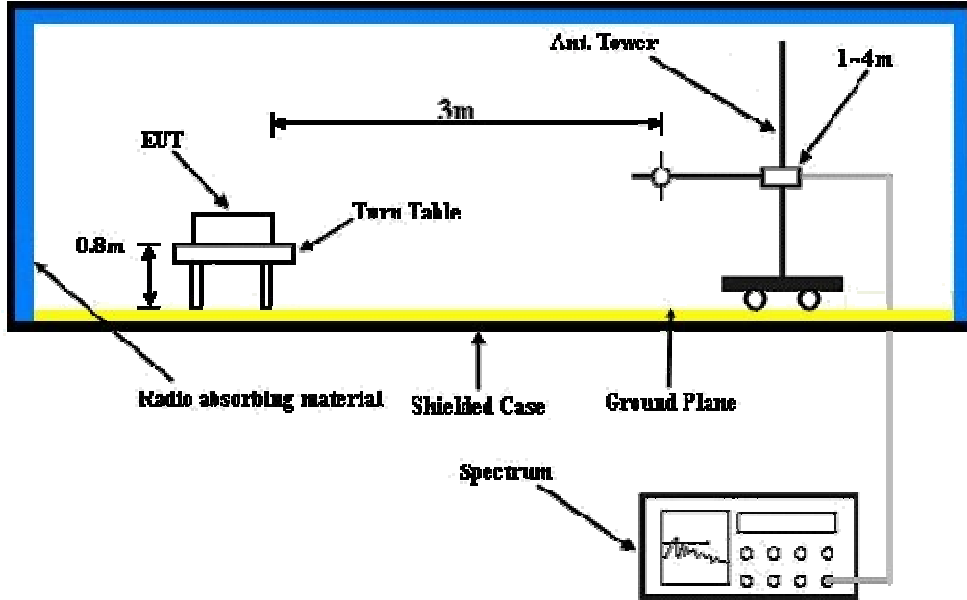
The basic test procedure was in accordance with ANSI C63.4 (section 12).

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters Semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. During the test, each emission was maximized by: having the EUT continuously working, The turntable was rotated to maximize the emission level.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.2.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.2.6 EUT OPERATING CONDITIONS

- Placed the EUT on the testing table.
- Enable EUT under transmission condition continuously at specific channel frequency.



4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA: Transmitting

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBUV)	Emission Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	433.52 PK	18.3	8.0	26.3	46.0	-19.7	200	151
2	433.92 PK	18.8	66.3	85.0	100.8	-15.8	200	4
	433.92 AV	18.8	60.3	79.0	80.8	-1.8	200	4
3	544.10 PK	21.1	5.0	27.0	46.0	-19.0	100	86
4	575.14 PK	21.8	5.8	27.6	46.0	-18.4	150	82
5	685.72 PK	22.8	4.9	27.7	46.0	-18.3	100	86
6	807.94 PK	25.3	1.7	27.0	46.0	-19.0	200	52
7	867.84 PK	25.9	24.9	50.8	80.8	-30.0	147	189
	867.84 AV	25.9	18.9	44.8	60.8	-16.0	147	189
8	918.52 PK	26.4	3.6	30.0	46.0	-16.0	125	124
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBUV)	Emission Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	433.52 PK	18.3	4.1	22.4	46.0	-23.6	200	117
2	433.92 PK	18.8	57.8	76.5	100.8	-24.3	100	0
	433.92 AV	18.8	51.8	70.5	80.8	-10.3	100	0
3	524.70 PK	20.7	4.5	25.2	46.0	-20.8	100	51
4	575.14 PK	21.8	2.9	24.7	46.0	-21.3	100	68
5	625.58 PK	22.5	4.3	26.8	46.0	-19.2	100	171
6	745.86 PK	23.9	0.5	24.4	46.0	-21.6	150	157
7	815.70 PK	25.4	3.1	28.5	46.0	-17.5	100	17
8	867.84 PK	25.9	22.7	48.6	80.8	-32.2	141	85
	867.84 AV	25.9	16.7	42.6	60.8	-18.2	141	85

NOTE:

- The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) at frequency below 1GHz.
- Emission level(dBUV/m)=Raw Value(dBUV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- Margin value = Emission level – Limit value.
- Fundamental AV value =PK Emission +20\*log(duty cycle)Where the duty factor is calculated from following formula:20 log (Duty cycle) = 20 log (50.05 ms / 100 ms) = -6 dB  
Please see page 22 for plotted duty.



ABOVE 1GHZ WORST-CASE DATA: Transmitting

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3M									
No.	Frequency	Factor	Reading	Emission	Limit	Margin	Tower / Table		
	MHz	dB	dBuV	dBuV	dBuV	dB	cm	deg	
1	1301.76 (PK)	27.9	30.9	58.8	74.0	-15.2	114	202	
* 2	1301.76 (AV)	27.9	24.9	52.8	54.0	-1.2	114	202	
3	1735.68 (PK)	29.1	13.9	43.0	80.8	-37.8	142	71	
4	1735.68 (AV)	29.1	7.9	37.0	60.8	-23.8	142	71	
5	2169.60 (PK)	30.5	16.5	47.0	80.8	-33.8	161	256	
6	2169.60 (AV)	30.5	10.5	41.0	60.8	-19.8	161	256	
7	2603.52 (PK)	32.1	17.3	49.4	80.8	-31.4	125	209	
8	2603.52 (AV)	32.1	11.3	43.4	60.8	-17.4	125	209	
9	3037.44 (PK)	33.3	18.0	51.3	80.8	-29.5	104	241	
10	3037.44 (AV)	33.3	12.0	45.3	60.8	-15.5	104	241	
11	3471.36 (PK)	34.0	9.9	43.9	80.8	-36.9	129	198	
12	3471.36 (AV)	34.0	3.9	37.9	60.8	-22.9	129	198	
13	3905.28 (PK)	35.2	11.0	46.2	74.0	-27.8	113	190	
14	3905.28 (AV)	35.2	5.0	40.2	54.0	-13.8	113	190	
15	4339.20 (PK)	36.2	11.7	47.9	74.0	-26.1	116	328	
16	4339.20 (AV)	36.2	5.7	41.9	54.0	-12.1	116	328	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3M									
No.	Frequency	Factor	Reading	Emission	Limit	Margin	Tower / Table		
	MHz	dB	dBuV	dBuV	dBuV	dB	cm	deg	
1	1301.76 (PK)	27.9	27.0	54.9	74.0	-19.1	154	86	
* 2	1301.76 (AV)	27.9	21.0	48.9	54.0	-5.1	154	86	
3	1735.68 (PK)	29.1	19.6	48.7	80.8	-32.1	144	327	
4	1735.68 (AV)	29.1	13.6	42.7	60.8	-18.1	144	327	
5	2169.60 (PK)	30.5	21.1	51.6	80.8	-29.2	101	156	
6	2169.60 (AV)	30.5	15.1	45.6	60.8	-15.2	101	156	
7	2603.52 (PK)	32.1	12.8	44.9	80.8	-35.9	102	96	
8	2603.52 (AV)	32.1	6.8	38.9	60.8	-21.9	102	96	
9	3037.44 (PK)	33.3	19.6	52.9	80.8	-27.9	118	290	
10	3037.44 (AV)	33.3	13.6	46.9	60.8	-13.9	118	290	
11	3471.36 (PK)	34.0	10.6	44.6	80.8	-36.2	100	336	
12	3471.36 (AV)	34.0	4.6	38.6	60.8	-22.2	100	336	
13	3905.28 (PK)	35.2	13.5	48.7	74.0	-25.3	100	107	
14	3905.28 (AV)	35.2	7.5	42.7	54.0	-11.3	100	107	
15	4339.20 (PK)	36.2	9.2	45.4	74.0	-28.6	100	329	
16	4339.20 (AV)	36.2	3.2	39.4	54.0	-14.6	100	329	



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### NOTE:

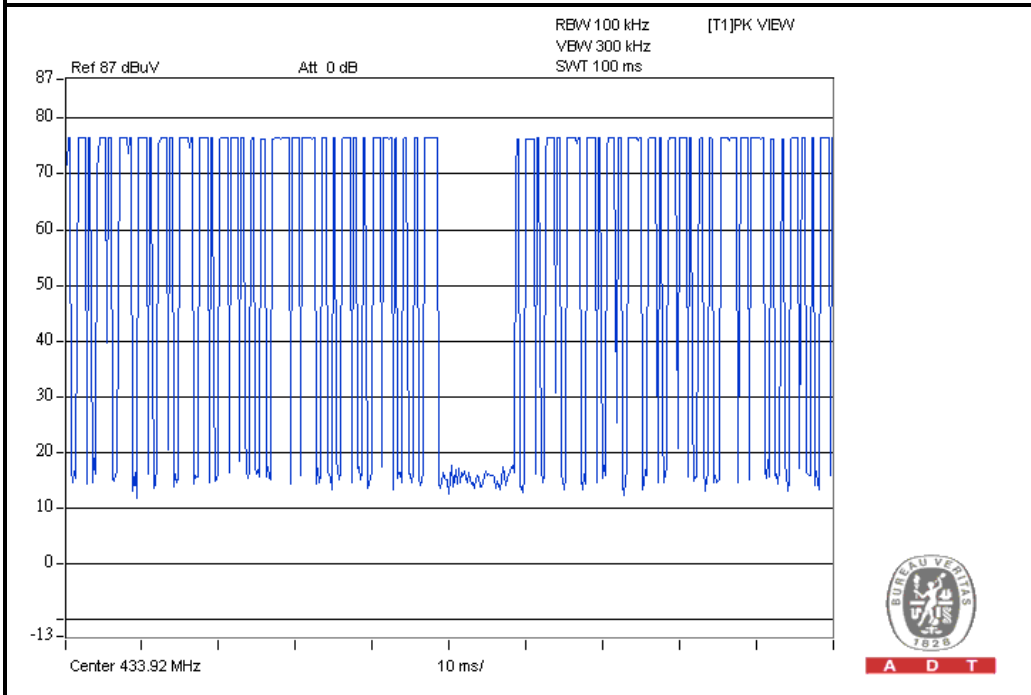
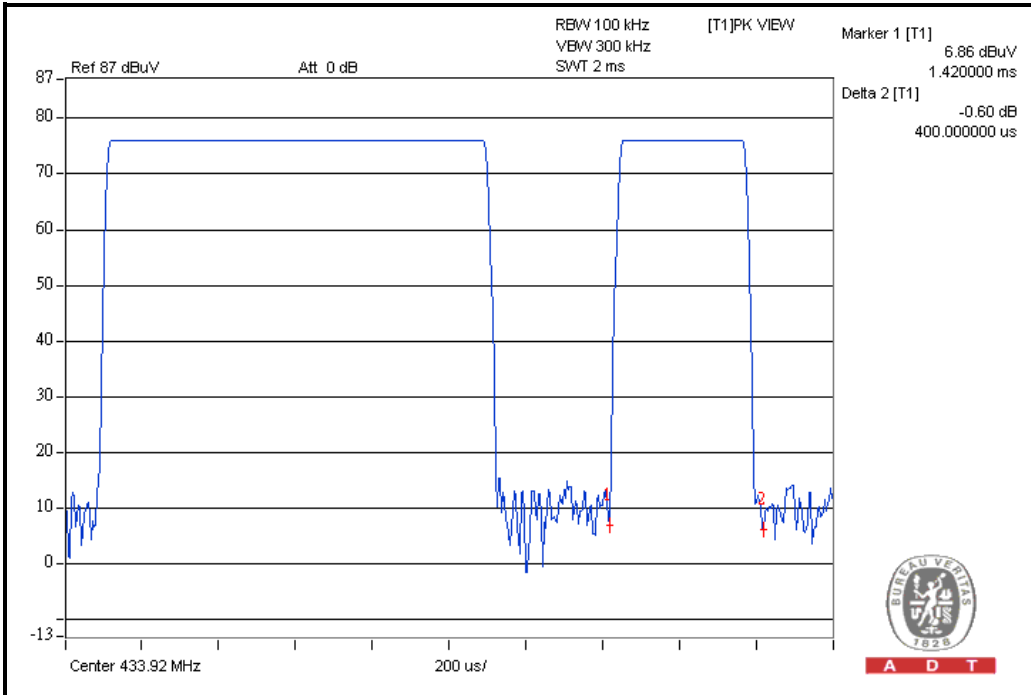
6. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) at frequency below 1GHz.
7. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
8. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
9. Margin value = Emission level – Limit value.
10. Fundamental AV value =PK Emission +20\*log(duty cycle)Where the duty factor is calculated from following formula: $20 \log (\text{Duty cycle}) = 20 \log (50.05 \text{ ms} / 100 \text{ ms}) = -6 \text{ dB}$   
Please see page 22 for plotted duty.





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$$\begin{aligned}
 20 \log (\text{Duty cycle}) &= 20 \log [(1.084 \text{ ms} \times 34 + 0.4 \text{ ms} \times 33 / 100 \text{ ms})] \\
 &= 20 \log ( 50.05 \text{ ms} / 100 \text{ ms}) \\
 &= -6 \text{ dB}
 \end{aligned}$$

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### 4.3 20dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT

According to FCC 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

*Limit=Fundamental Frequency×0.25%=433.9×0.25%=1084.75kHz*

#### 4.3.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer ROHDE & SCHWARZ	E4446A	MY46180622	May 02, 12	May 01, 13
Horn Antenna EMCO	3117	00062558	Oct.19, 11	Oct.19, 12
10m Semi-anechoic Chamber ETS-LINDGREN	21.4m*12.1m*8.8m	NSEMC006	Mar 24,12	Mar 23,13
RF Cable IMRO	IMRO-400	10m Cable 2#3m	May 16,12	May 15,13
Signal Amplifier EMCI	EMC 012645	980077	Nov 07,11	Nov 07,12
RF Cable DRAKA	M06/25-RG102	10m Cable 2#	May 16,12	May 15,13
Test software ADT	ADT_Radiated_V7.6.15	N/A	N/A	N/A

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA
2. The test was performed in Dongguan Chamber RF



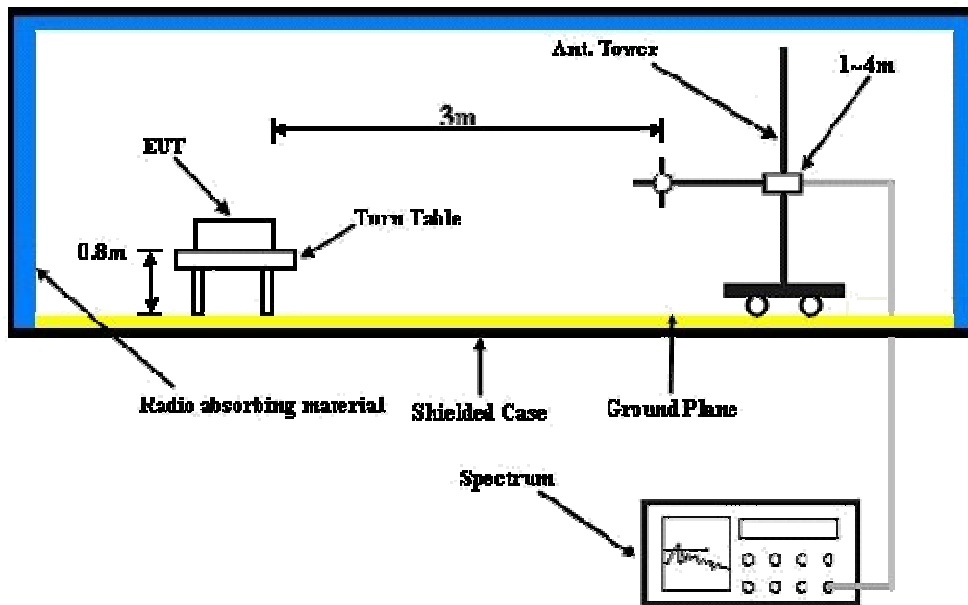
#### 4.3.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

#### 4.3.3 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.4 TEST SETUP



#### 4.3.5 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously channel frequency.





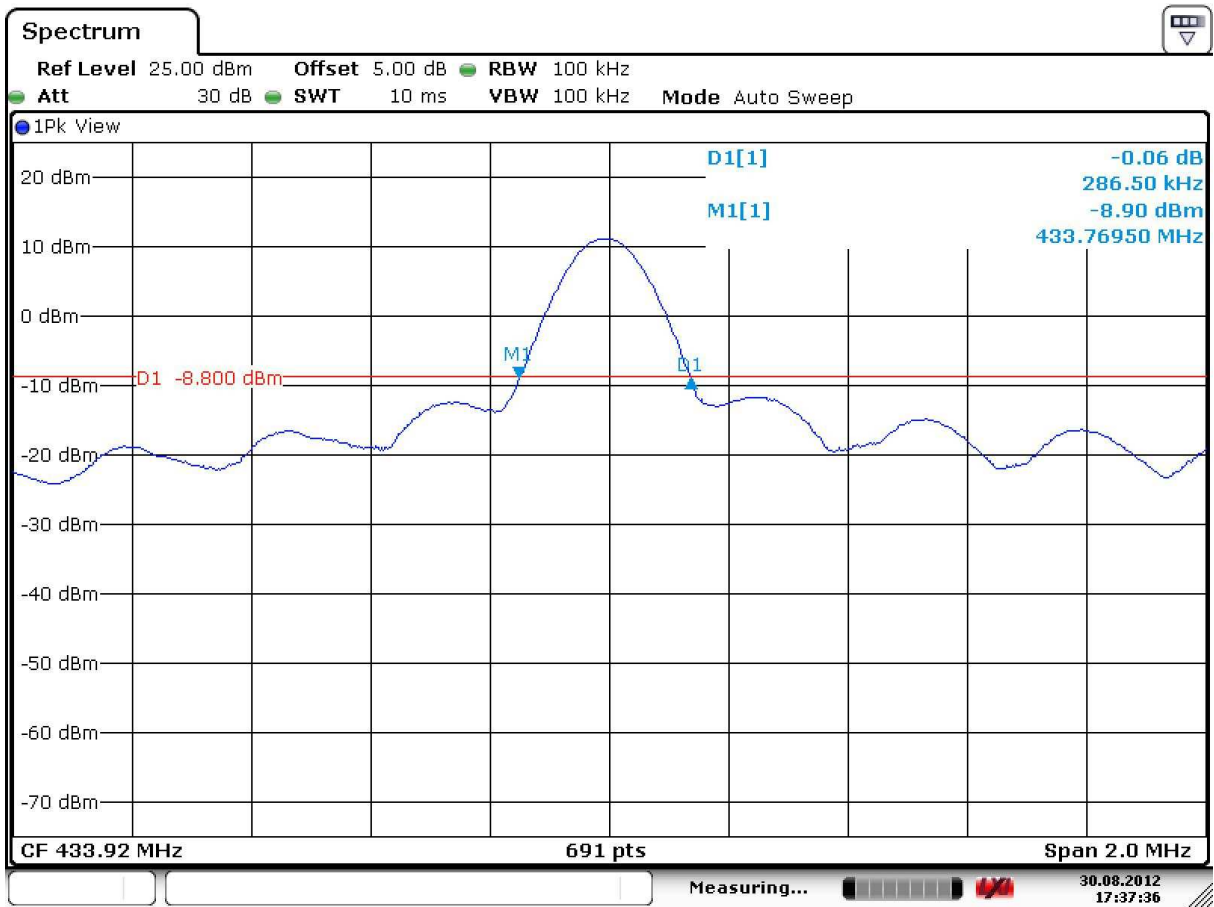
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### 4.3.6 TEST RESULTS

FREQUENCY (MHz)	20dB BANDWIDTH (kHz)	MAXIMUM LIMIT (kHz)	PASS/FAIL
433.92	286.50	1084.75	PASS

#### Test Data:



Date: 30.AUG.2012 17:37:36

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### 4.4 DEACTIVATION TEST

#### 4.4.1 LIMITS OF DEACTIVATION TEST

15.231 (a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

15.231 (a)(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

#### 4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer ROHDE & SCHWARZ	E4446A	MY46180622	May 02, 12	May 01, 13
Horn Antenna EMCO	3117	00062558	Oct.19, 11	Oct.19, 12
10m Semi-anechoic Chamber ETS-LINDGREN	21.4m*12.1m*8.8m	NSEMC006	Mar 24,12	Mar 23,13
RF Cable IMRO	IMRO-400	10m Cable 2#3m	May 16,12	May 15,13
Signal Amplifier EMCI	EMC 012645	980077	Nov 07,11	Nov 07,12
RF Cable DRAKA	M06/25-RG102	10m Cable 2#	May 16,12	May 15,13
Test software ADT	ADT_Radiated_V7.6.15	N/A	N/A	N/A

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA

2. The test was performed in Dongguan Chamber 10m.

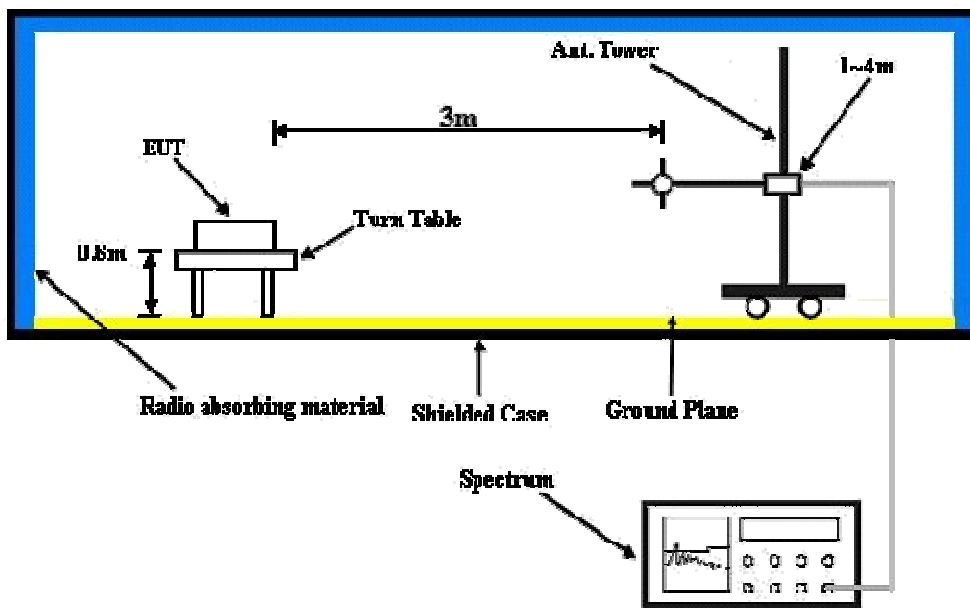
#### 4.4.2 TEST PROCEDURE

The EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the transmission duration was measured and recorded.

#### 4.4.3 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.4.4 TEST SETUP



#### 4.4.5 EUT OPERATING CONDITIONS

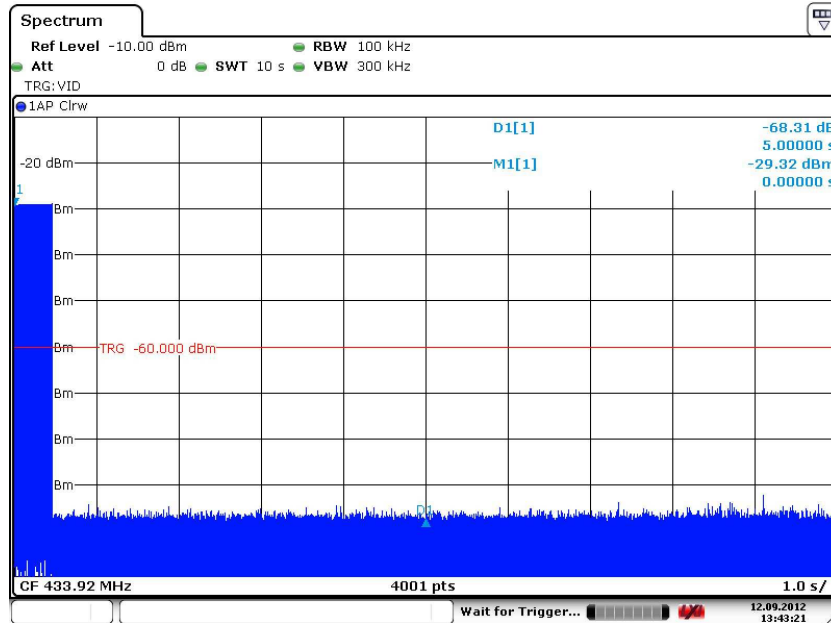
- Placed the EUT on the testing table.
- The EUT's working normally used to enable the EUT under transmission condition which was radiated to the spectrum analyzer set to the EUT's operation frequencies.



4.4.6 TEST RESULTS

PUSH BUTTON	FREQUENCY (MHz)	MAXIMUM LIMIT (sec)	PASS/FAIL
1	433.92	5	PASS

The plots of test results are attached as below.



Date: 12.SEP.2012 13:43:21



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## **5 PHOTOGRAPHS OF THE TEST CONFIGURATION**

Please refer to the attached file (Test Setup Photo).



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## **6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**