



## SGS-CSTC Standards Technical Services (Shanghai)Co., Ltd.

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Report No.: SHEM110800100701  
Page: 1 of 20

# TEST REPORT

**Application No. :** SHEM110800100701

**Applicant:** Honeywell srl

**FCC ID:** HS9VCU-01

**IC:** 573U-VCU01

**Fundamental Frequency :** 125KHz

**Equipment Under Test (EUT):**

**Marking:** Honeywell

**Name:** Tema-Voyager™

**Model No.:** VCU-017015EN1N00, VCU-017015EN1N01

VCU-017015EN1N01 is the typical model base on the worse case at the emission test.

**Standards:** FCC PART 15 SUBPART C, Section 15.209

RSS-210 Issue 8 (December 2010)

RSS-Gen Issue 3 (December 2010)

**Date of Receipt:** Sep. 15, 2011

**Date of Test:** Sep. 15, 2011 to Oct 25, 2011

**Date of Issue:** Oct 26, 2011

**Test Result :** **PASS \***

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

Jim Xu  
E&E Section Head  
SGS-CSTC(Shanghai) Co., Ltd.

Neil Zhang  
E&E Project Engineer  
SGS-CSTC(Shanghai) Co., Ltd.

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## Test Summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Field Strength of Fundamental	15.209	RSS-210 Issue 8 Annex 2	Pass
Radiated Emission	15.209	RSS-210 Issue 8 Section 2	Pass
Power Line Conducted Emission	15.207	RSS-Gen Issue 8 Section 7.2.4	Pass
Receiver Spurious Emission	-	RSS-Gen Issue 3 Section 4.10	Pass
Occupied Bandwidth	15.215	RSS-Gen Issue 3 Section 4.6.1	Tested
Antenna Requirement	15.203	-	Compliance

Noted: “-” means not required in the rules.

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## 2 General Information

### 2.1 Client Information

Applicant :	Honeywell srl
Applicant Address:	VIA PHILIPS 12 – 20052 MONZA – MI – ITALY
Manufacturer:	Honeywell srl
Manufacturer Address:	VIA PHILIPS 12 – 20052 MONZA – MI – ITALY

### 2.2 Details of E.U.T.

Marking:	Honeywell
Name:	Tema-Voyager™
Model No.:	VCU-017015EN1N00, VCU-017015EN1N01 VCU-017015EN1N01 is the typical model base on the worse case at the emission test.
Power Supply:	DC 12V / 0.4A
Hardware Version and Software Version:	Module number is integrated with hardware and software version: VCU-017015EN1N00 VCU-017015EN1N01
Frequency	125KHz
Modulation Type:	FSK

### 2.3 Description of Support Units

Name	Model No.	Remark
TIGER POWER SUPPLY	TGS15-2	Input:AC:100~240V 50/60Hz 0.5A Output:DC +12V 1.25A
Laptop	ThinkPad X100e	N/A
AC Adapter	Lenovo 65W 20V	N/A
Mouse	Lenovo M-UAE119	N/A

### 2.4 Test Location

Tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.  
No.588 West Jindu Road, Songjiang District, Shanghai, China. 201612.

Tel: +86 21 6191 5666 Fax: +86 21 6191 5655

No tests were sub-contracted.

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## 2.5 Other Information Requested by the Customer

None.

## 2.6 Test Facility

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

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 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. Date of expiry: 2014-07-26.

- **FCC – Registration No.: 402683**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683, Expiry Date: 2012-03-17.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A. Expiry Date: 2014-09-20.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3172 and C-3514 respectively. Date of Registration: 2009-11-30. Date of Expiry: 2012-03-17.

### 3 Test Results

#### 3.1 Test Instruments

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	EMI test receiver	Rohde & Schwarz	ESU40	100109	2011-6-3	2012-6-1
2	Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-679	2011-6-3	2012-6-1
3	Horn Antenna	Rohde & Schwarz	HF906	100284	2011-3-12	2012-3-10
4	ANTENNA	SCHWARZBECK	VULB9168	9168-313	2011-6-3	2012-6-1
5	Ultra broadband antenna	Rohde & Schwarz	HL562	100227	2010-11-9	2011-11-8
6	Atmosphere pressure meter	Shanghai ZhongXuan Electronic Co;Ltd	BY-2009P	--	2010-12-15	2011-12-14
7	CLAMP METER	FLUKE	316	86080010	2011-04-22	2012-04-20
8	Thermo-Hygrometer	ZHICHEN	ZC1-2	01050033	2011-01-15	2012-01-14
9	High-low temperature cabinet	Shanghai YuanZhen	GW2050	--	2011-6-17	2012-6-16
11	Tunable Notch Filter	Wainwright instruments GmbH	WRCT1800.0/2000.0-0.2/40-5SSK	11	2011-1-26	2012-1-25
12	Tunable Notch Filter	Wainwright instruments GmbH	WRCT800.0/880.0-0.2/40-5SSK	9	2011-1-26	2012-1-25
13	High pass Filter	FSCW	HP 12/2800-5AA2	19A45-02	2011-4-8	2012-4-7
14	Low nosie amplifier	TESEQ	LNA6900	70133	2011-7-5	2012-7-4
15	EMI test receiver	Rohde & Schwarz	ESCS30	100086	2011-06-04	2012-06-03

16	Line impedance stabilization network	SCHWARZBECK	NSLK8127	8127-490	2011-05-07	2012-05-06
17	Loop Antenna	Rohde & Schwarz	HFH2-Z2	--	2011-6-3	2012-6-3

### 3.2 E.U.T. Operation

Input voltage: 12V DC

Operating Environment:

Temperature: 25.0 °C

Humidity: 45 % RH

Atmospheric Pressure: 1010 mbar

EUT Operation: The EUT has been tested under operating condition:connected with laptop with network cable, and use software:Honeywell EBI R410.2 installed at laptop to do the data transmitter.

### 3.3 Test Procedure & Measurement Data

#### 3.3.1 Field Strength of Fundamental

**Test Requirement:** FCC Part15 15.207

**Test date:** Sep. 15, 2011

**Test Procedures**

1. Radiated emissions from the EUT were measured according to the dictates of ANSI C63.10:2009.
2. Test Procedures for emission from 9 kHz to 30 MHz
  - a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
  - b. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
  - c. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360

degrees to find the maximum reading.

d. The test-receiver system was set to Average Detect Function and Specified Bandwidth with Maximum Hold Mode.

3. Test Procedures for emission from 30 MHz to 1000 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 1 meter away from the interference-receiving antenna.

c. The antenna is a broadband antenna, and its height 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.

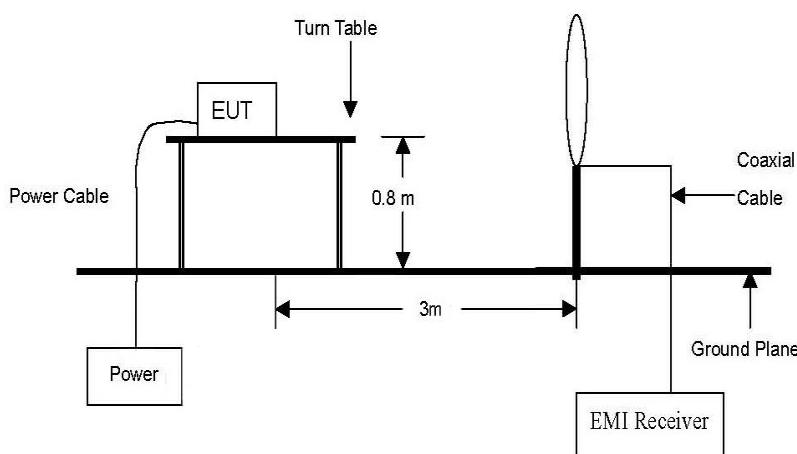
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

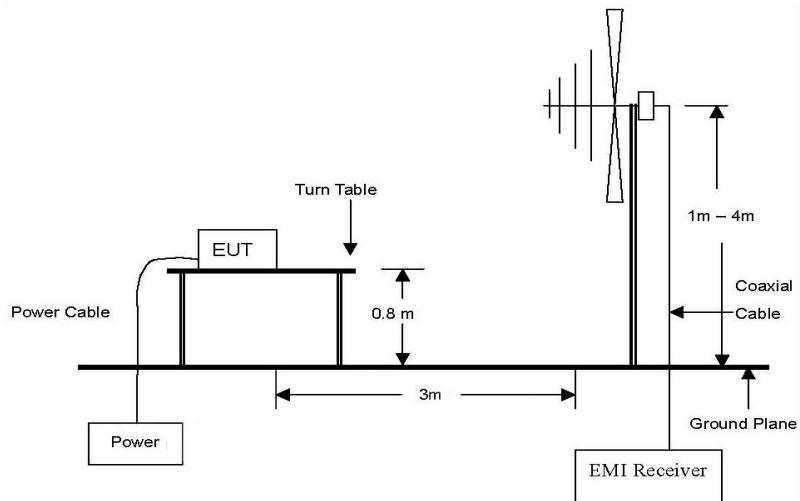
f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**EUT Setup:**

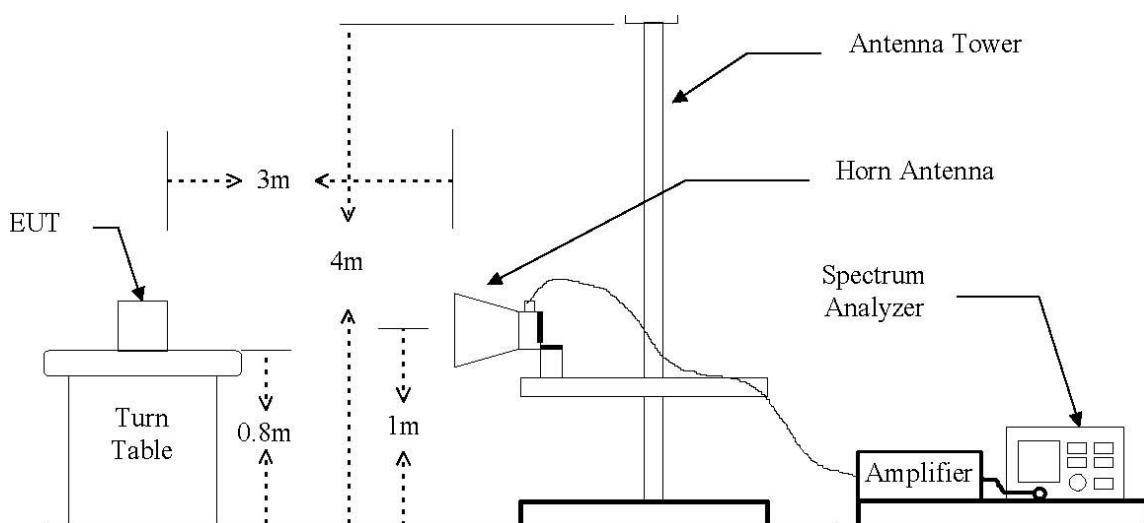
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30MHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 18 GHz Emissions.



**Limit****Radiated emission limits, general requirements**

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (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

**Measurement Result**

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Radiated Emissions			Ant	Correction Factors	Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	Ant.(dB/m)	Actual (dBuV/ m)	Limit (dBuV/ m)	Margi n (dB)
0.125	86.3	Average	H	-18.93	67.37	105.67	38.30

1. A Peak limit is 20 dB above the average limit.
2.  $3m\text{ Limit(dBuV/m)} = 20\log(2400/F_{(kHz)})+40\log(300/3)$   
 $= 20\log(2400/125)+40\log(300/3)$   
 $= 25.67+80$   
 $= 105.67$

**Remark:**

To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes. The worst emission was found in lie-down position(XY axis) and the worst case was recorded.

### 3.3.2 Radiated Emission

<b>Test Requirement:</b>	FCC Part15 15.207
<b>Test date:</b>	Sep. 15, 2011
<b>Standard Applicable</b>	ANSI C63.10:2009
<b>Test Procedures</b>	<p>1. Test Procedures for emission from 9 kHz to 30 MHz</p> <p>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>b. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.</p> <p>c. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>d. The test-receiver system was set to Average Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>2. Test Procedures for emission from 30 MHz to 1000 MHz</p> <p>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>b. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 1 meter away from the interference-receiving antenna.</p> <p>c. The antenna is a broadband antenna, and its height 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.</p> <p>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 table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p>
<b>EUT Setup</b>	Same as section 3.3.1 of this report

**Limit**

Frequency (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

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

9KHz~30MHz

Radiated Emissions			Ant	Correction Factors	Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	Ant.(dB/m)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
0.011	97.94	Average	H	-20.93	77.01	86.53	9.52
0.720	67.08	Average	H	-19.51	47.57	50.44	2.87
0.011	97.99	Average	V	-20.93	77.06	86.53	9.47
0.720	68.58	Average	V	-19.51	49.07	50.44	1.37

30MHz~1GHz

Radiated Emissions			Ant	Correction Factors	Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	Ant.(dB/m)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
245.0	50.86	QP	H	-14.12	36.74	46	9.26
374.93	55.57	QP	H	-13.87	41.70	46	4.30
374.93	49.63	QP	V	-13.87	35.76	46	10.24
499.87	48.85	QP	V	-13.57	35.28	46	10.72

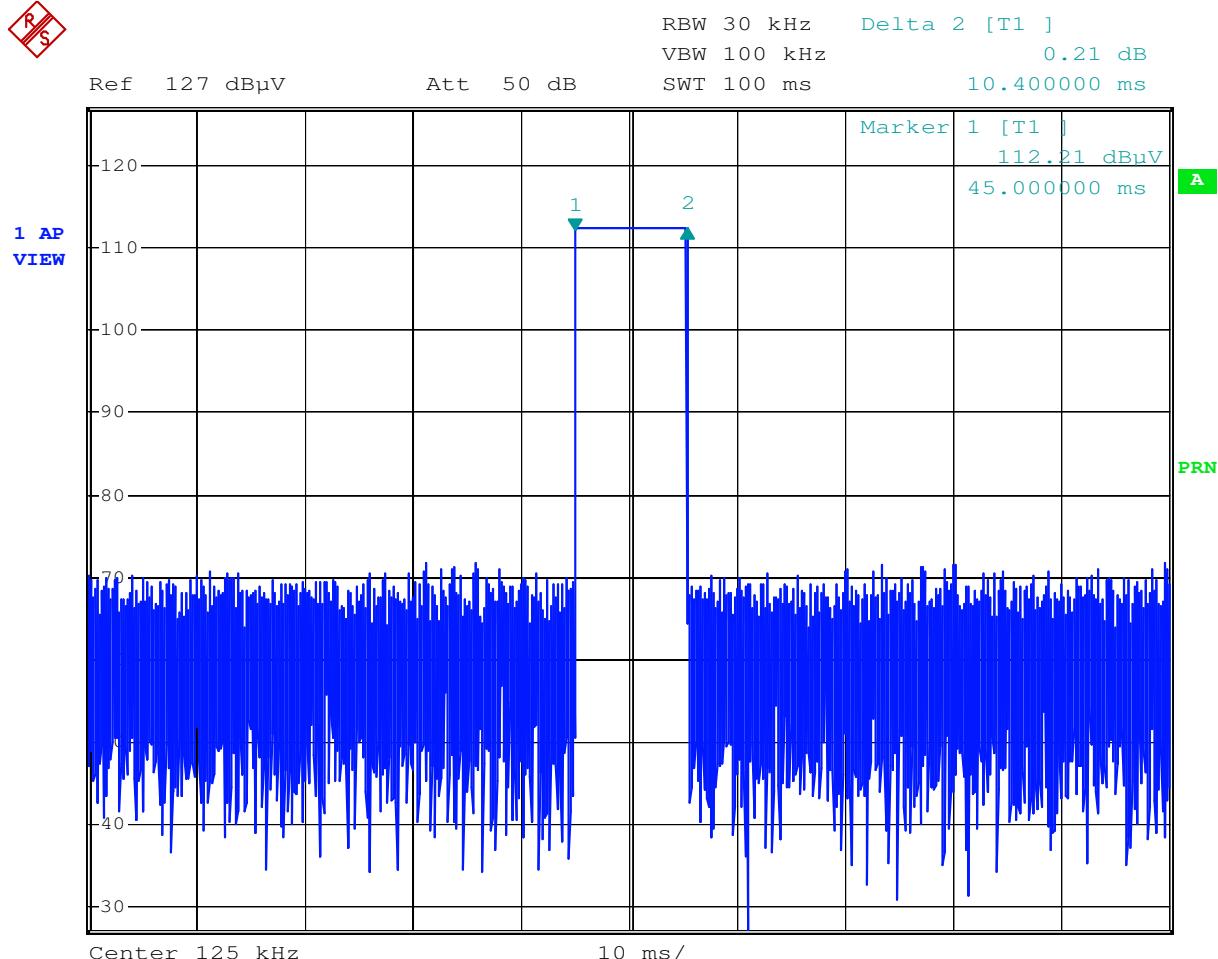
**Remark:**

To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes. The worst emission was found in lie-down position(XY axis) and the worst case was recorded.

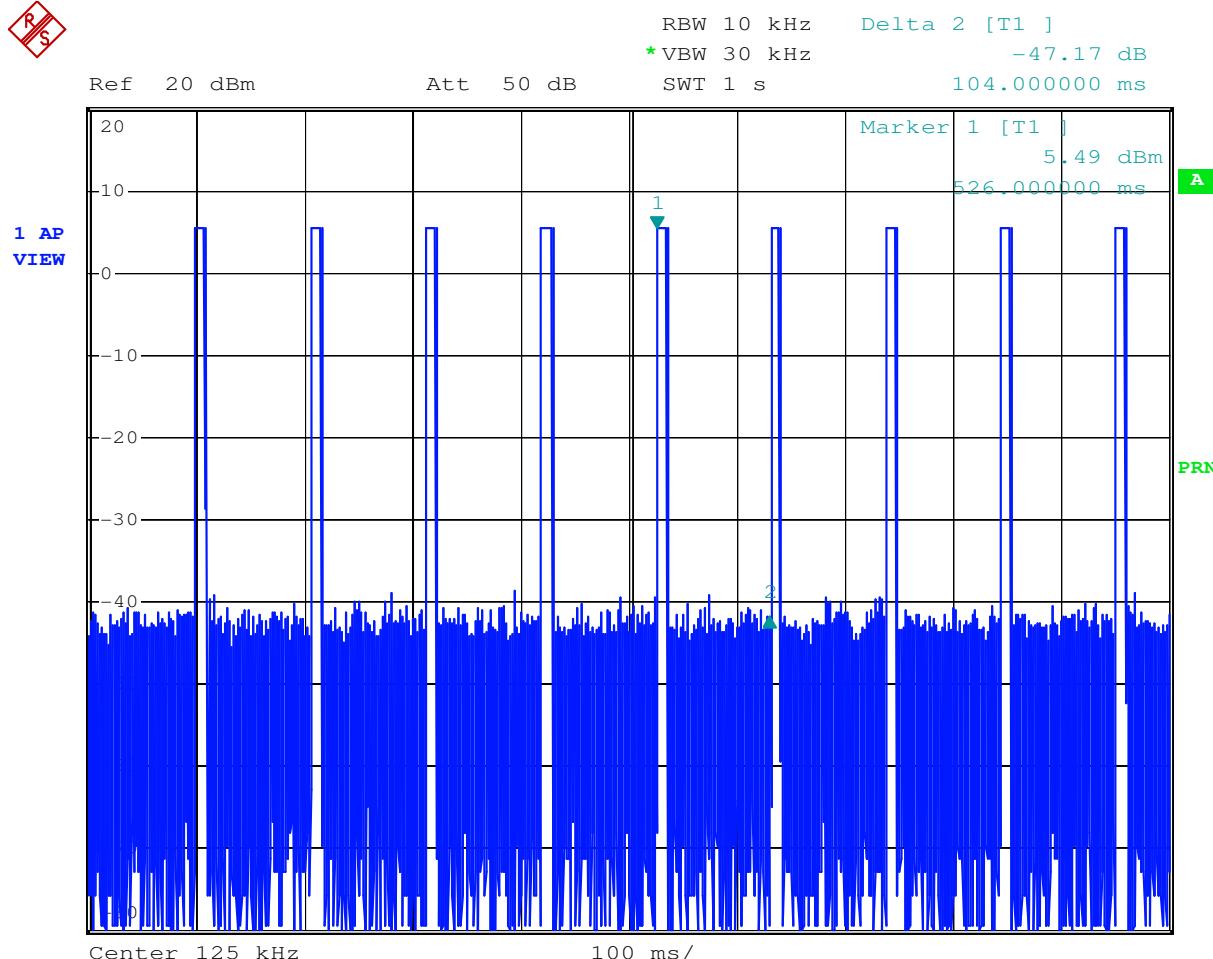
**Note:**

1. Other Spurious Emission Frequencies were not detected up to 1000 MHz.

**Duty cycle****Measurement Result:****Ton = 10.4ms****Tp = 100.0ms****Factor =  $20 \times \log(Ton/Tp) = 20 \times \log (10.4/100.0) = -19.7 \text{ dB}$** **Test Plot:**



Date: 10.NOV.2011 14:34:39



Date: 10.NOV.2011 14:49:27

### 3.3.3 Receiver Spurious Emission (Radiated)

**Test Requirement:** RSS-Gen Issue 3 Section 4.10

**Test date:** Sep. 15, 2011

**Standard Applicable:** ANSI C63.10:2009

**Measurement Procedure:** Same as section 4.3.1 of this report

**Measurement Result:**

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical

Radiated Emissions			Ant	Correction Factors	Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	Ant.(dB/m)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
499.87	44.70	QP	H	-13.57	31.13	46	14.87
499.87	45.49	QP	V	-13.57	31.92	46	14.08

**Remark:**

To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes. The worst emission was found in lie-down position(XY axis) and the worst case was recorded.

**Note:**

1. Other spurious frequencies were not detected up to 1000 MHz.

### 3.3.4 Conducted Emission Test

**Test Requirement:** FCC Part15 15.207

**Test date:** Aug. 28, 2011

**Standard Applicable** According to section 15.207, frequency 150KHz to 30MHz shall not not exceed the limit table as blew.

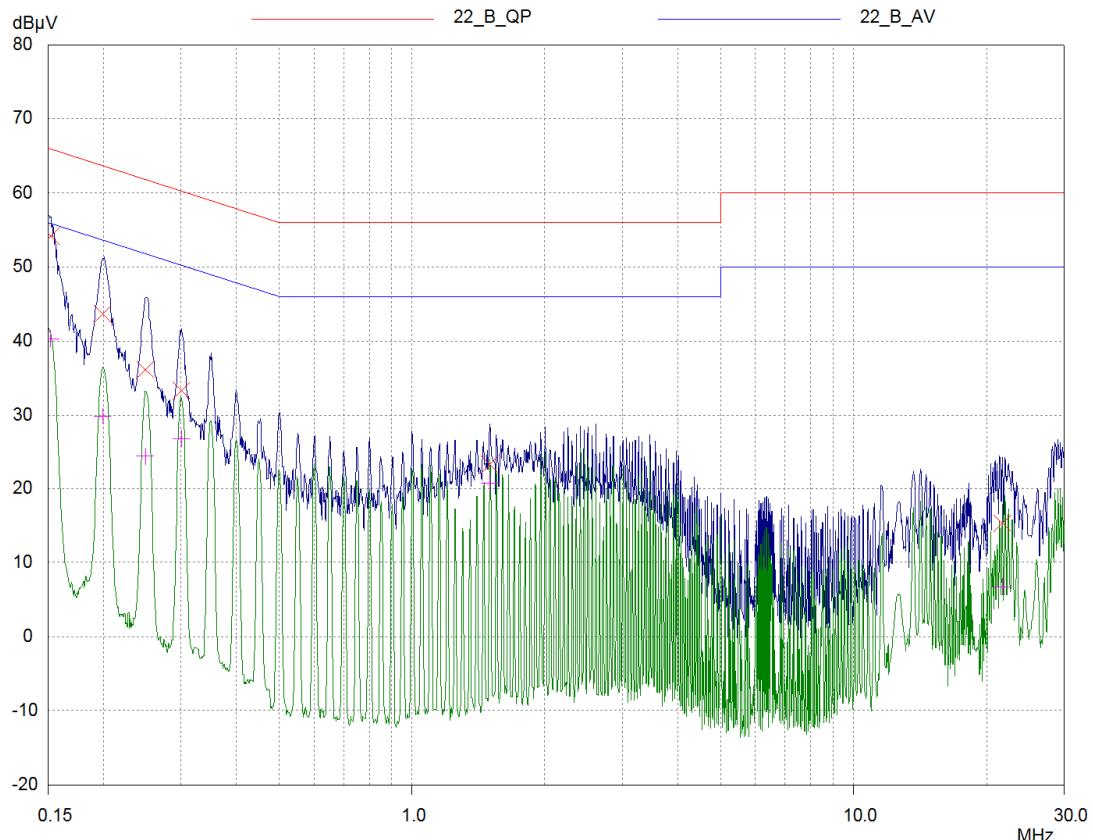
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 <sup>*</sup>	56 to 46 <sup>*</sup>
0.5-5	56	46
5-30	60	50

**EUT Setup**

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10-2009.
2. EUT is charged with PC. The AC Power adaptor of PC was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120V AC/60Hz power source.

**Measurement Result**

Operation mode:Normal Link Mode

**Final Measurement Results**

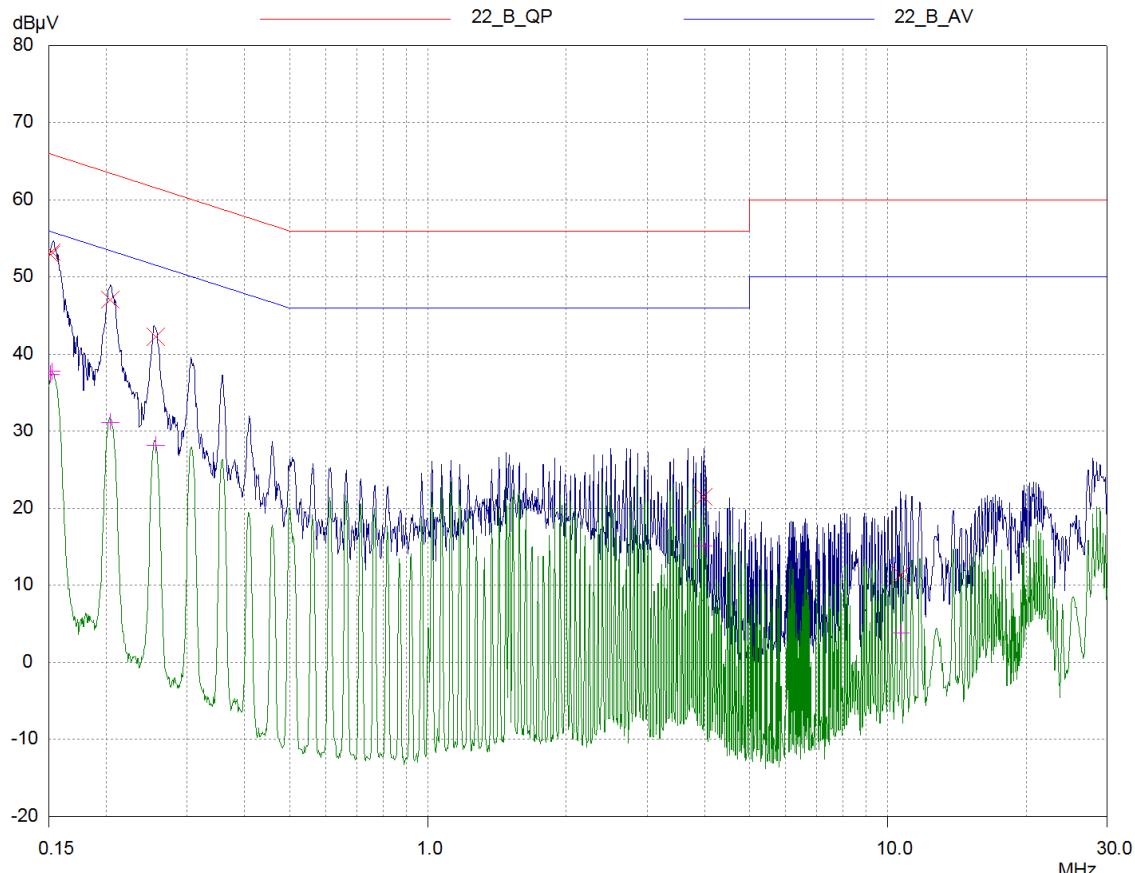
Frequency MHz	QP Level dB $\mu$ V	QP Limit dB $\mu$ V	QP Delta dB
------------------	------------------------	------------------------	----------------

0.1518	54.17	65.90	11.73
0.19915	43.67	63.65	19.98
0.24904	36.19	61.79	25.60
0.30043	33.33	60.23	26.90
1.50121	23.24	56.00	32.76
21.69189	15.29	60.00	44.71

Frequency MHz	AV Level dB $\mu$ V	AV Limit dB $\mu$ V	AV Delta dB
------------------	------------------------	------------------------	----------------

0.1518	40.37	55.90	15.53
0.19915	29.84	53.65	23.81
0.24904	24.39	51.79	27.40
0.30043	26.71	50.23	23.52
1.50121	20.75	46.00	25.25
21.69189	6.72	50.00	43.28

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**N Line:****Final Measurement Results**

Frequency MHz	QP Level dB $\mu$ V	QP Limit dB $\mu$ V	QP Delta dB
------------------	------------------------	------------------------	----------------

0.1512	52.91	65.93	13.02
0.1518	53.29	65.90	12.61
0.20397	47.09	63.45	16.36
0.25608	42.27	61.56	19.29
3.97621	21.46	56.00	34.54
10.65851	11.32	60.00	48.68

Frequency MHz	AV Level dB $\mu$ V	AV Limit dB $\mu$ V	AV Delta dB
------------------	------------------------	------------------------	----------------

0.1512	37.46	55.93	18.47
0.1518	37.81	55.90	18.09
0.20397	31.25	53.45	22.20
0.25608	28.16	51.56	23.40
3.97621	15.08	46.00	30.92
10.65851	3.76	50.00	46.24

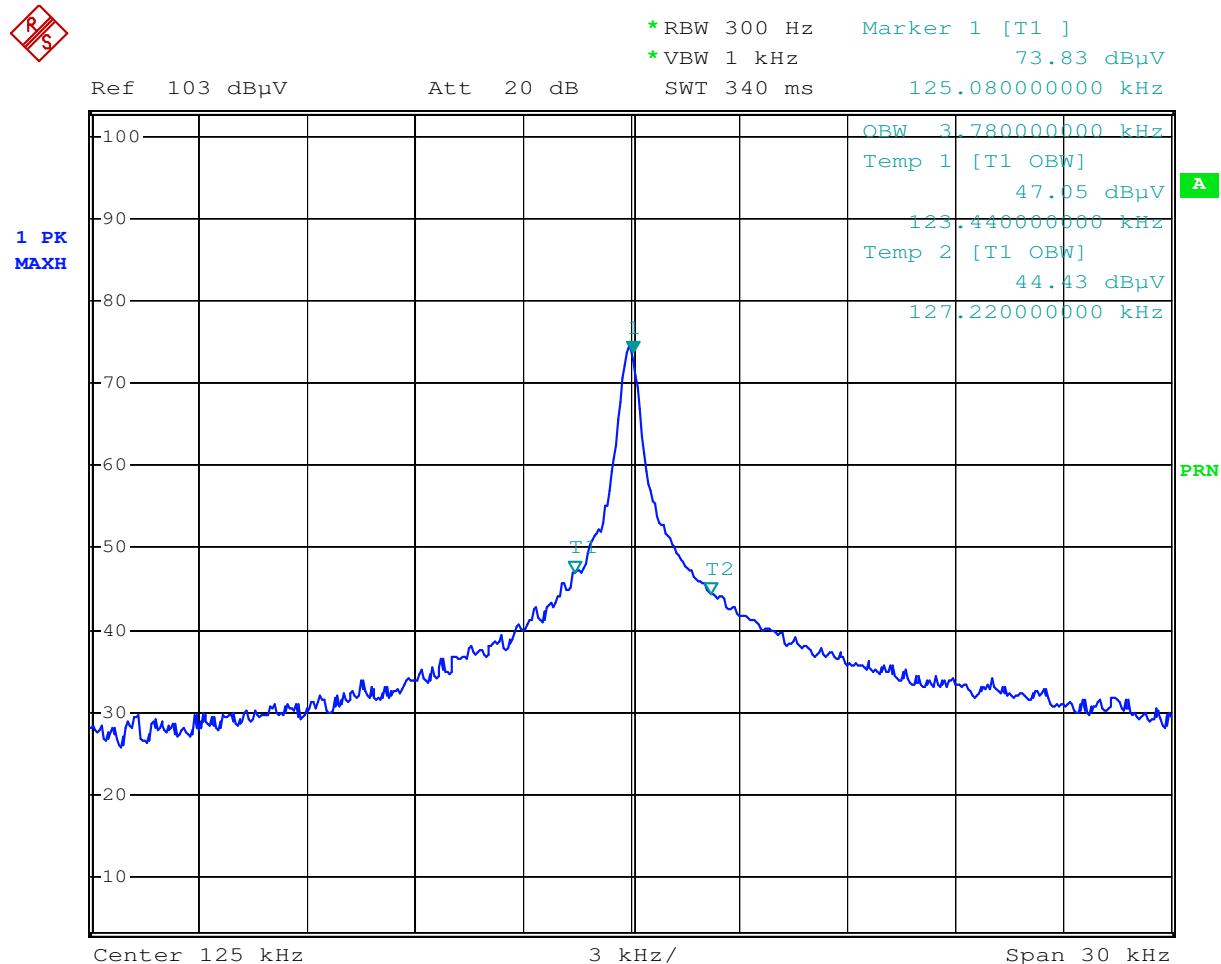
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### 3.3.5 Occupied Bandwidth Test

<b>Test Requirement:</b>	RSS-Gen Issue 3 Section 4.6.1
<b>Test date:</b>	Oct. 11, 2011
<b>Standard Applicable</b>	According to the section RSS-Gen Issue 3 Section 4.6.1
<b>EUT Setup</b>	<ol style="list-style-type: none"><li>1. The transmitter output is connected to the spectrum analyzer.</li><li>2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW=300 Hz, VBW=1 kHz and Span=30 kHz.</li><li>3. The bandwidth of fundamental frequency was measured and recorded.</li></ol>

**Measurement Result:**

Carrier Frequency (MHz)	Bandwidth (KHz)
0.125	3.78



### 3.3.6 Antenna Requirement

**Test Requirement:** FCC Part15 15.203

#### 3.3.6.1 Standard Requirement

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.

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

#### 3.3.6.2 Antenna Connected Construction

The antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

#### 3.3.6.3 Result

The EUT antenna is integral Antenna. It comply with the standard requirement.

### End of Report