



## FCC 47 CFR PART 15 SUBPART C

### TEST REPORT

For

**RF2IR Dongle (Radio Frequency To Infrared Convertor)**

**Model Number: OVU760001/01**

**Serial Number: 3139 228 10201**

**Trade Name: PHILIPS**

*Issued to*

**Philips Electronics Singapore Pte Ltd**

**Category Peripherals & Control, Philips Consumer Lifestyle, 620A Lorong 1,  
Toa Payoh, Building TP1, Level 2, Singapore 319762**

*Issued by*



**Compliance Certification Services Inc.**  
**No. 11, Wu-Gong 6<sup>th</sup> Rd., Wugu Industrial Park,**  
**Taipei Hsien 248, Taiwan (R.O.C.)**

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**Issued Date: May 26, 2011**



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**Revision History**

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		May 26, 2011		Initial Issue	ALL	Eunice Shen



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## 1. TEST RESULT CERTIFICATION

**Applicant:** Philips Electronics Singapore Pte Ltd  
Category Peripherals & Control, Philips Consumer Lifestyle,  
620A Lorong 1, Toa Payoh, Building TP1, Level 2, Singapore  
319762

**Equipment Under Test:** RF2IR Dongle (Radio Frequency To Infrared Convertor)

**Trade Name:** PHILIPS

**Model Number:** OVU760001/01

**Serial Number:** 3139 228 10201

**Date of Test:** May 13 ~ 19, 2011

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

### We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.4: 2003** and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements emission limits of FCC Rules Part 15.207, 15.209 and 15.249.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Reviewed by:

Rex Lai  
Section Manager  
Compliance Certification Services Inc.

Gina Lo  
Section Manager  
Compliance Certification Services Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	RF2IR Dongle (Radio Frequency To Infrared Convertor)
<b>Trade Name</b>	PHILIPS
<b>Model Number</b>	OVU760001/01
<b>Serial Number</b>	3139 228 10201
<b>Model Discrepancy</b>	N/A
<b>Received Date</b>	May 6, 2011
<b>Power Supply</b>	Powered from host device via USB cable.
<b>USB Cable</b>	Shielded, 1.8m (Non-detachable)
<b>RF Technology used</b>	IEEE802.15.4 (according RF4CE protocol requirement)
<b>Operating Frequency</b>	2.425GHz, 2.450GHz, 2.475GHz
<b>Operating Number of Channels</b>	3 Channels (2425MHz, 2450MHz, 2475MHz)
<b>Modulation Technique</b>	O- QPSK (Offset Quadrature Phase Shift Keying)
<b>Antenna Gain</b>	-6.55dBi
<b>Antenna Designation</b>	PCB Antenna

**Remark:**

1. The sample selected for test was production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **RCSOVU76A** filing to comply with Section 15.107, 15.109, 15.207, 15.209, 15.249 (FCC Part 15, Subpart C Rules.)



### **3. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.4: 2003 and FCC CFR 47 Part 15.207, 15.209 and 15.249.

#### **3.1 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.

#### **3.2 EUT EXERCISE**

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209, 15.249 under the FCC Rules Part 15 Subpart C.

#### **3.3 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 13.1.4.1 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 and average detector modes.

##### **Radiated Emissions**

The EUT is placed on a turn table, 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.



### 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



### **3.5 DESCRIPTION OF TEST MODES**

The EUT (model: OVU760001/01) had been tested under operating condition.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

Channel Low (2425MHz), Channel Mid (2450MHz) and Channel High (2475MHz) were chosen for the final testing.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z mode), lie-down position (X, Y mode). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.





## 4. INSTRUMENT CALIBRATION

### 4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

*Remark: Each piece of equipment is scheduled for calibration once a year and Loop Antenna is scheduled for calibration once three years.*

Wugu 966 Chamber A				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	11/03/2011
EMI Test Receiver	R&S	ESCI	100064	02/03/2012
Pre-Amplifier	Mini-Circuits	ZFL-1000LN	SF350700823	01/12/2012
Pre-Amplifier	MITEQ	AFS44-00102650-42-10P-44	1415367	11/19/2011
Bilog Antenna	Sunol Sciences	JB3	A030105	10/06/2011
Horn Antenna	EMCO	3117	00055165	01/12/2012
Loop Antenna	EMCO	6502	8905/2356	06/10/2013
Turn Table	CCS	CC-T-1F	N/A	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R
Site NSA	CCS	N/A	N/A	12/26/2011
Test S/W	EZ-EMC (CCS-3A1RE)			

Conducted Emission room # A				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESHS10	843743/015	03/24/2012
LISN	SCHWARZBECK	NSLK 8127	8127-541	12/18/2011
LISN	SCHAFFNER	NNB 41	03/10013	N.C.R.
Test S/W	CCS-3A1-CE			



### 4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 1.6202
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0606
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9979
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5790
3M Semi Anechoic Chamber / 8G~18G	+/- 2.5928
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7212
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9520

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



## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No. 199, Chunghsen Road, Hsintien City, Auerbach / Opf GERMANY

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

☐ No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### 5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.




Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



### 5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	 FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method –47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	 Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

\* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.



## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

No	Equipment	Trade Name	Model	Serial No.	FCC ID	Data Cable	Power Cord
1	Notebook PC	HP	dv6-1332TX	CNF9491GLJ	PD9112BNHU	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
2	LCD Monitor	DELL	3008WFP	CN-0XK290-7161 8-846-169L	FCC DoC	Unshielded, 1.8m	shielded, 1.8m
3	USB Mouse	Logitech	M-UAG96B	HC8500L	FCC DoC	Shielded, 1.8m	N/A
4	USB 2.0 External HDD	TeraSyS	F12-UF(COMBO)	A0100215-42O014	FCC DoC	Shielded, 1.8m	N/A
5	Remote Control	N/A	N/A	N/A	N/A	N/A	N/A

**Remark:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



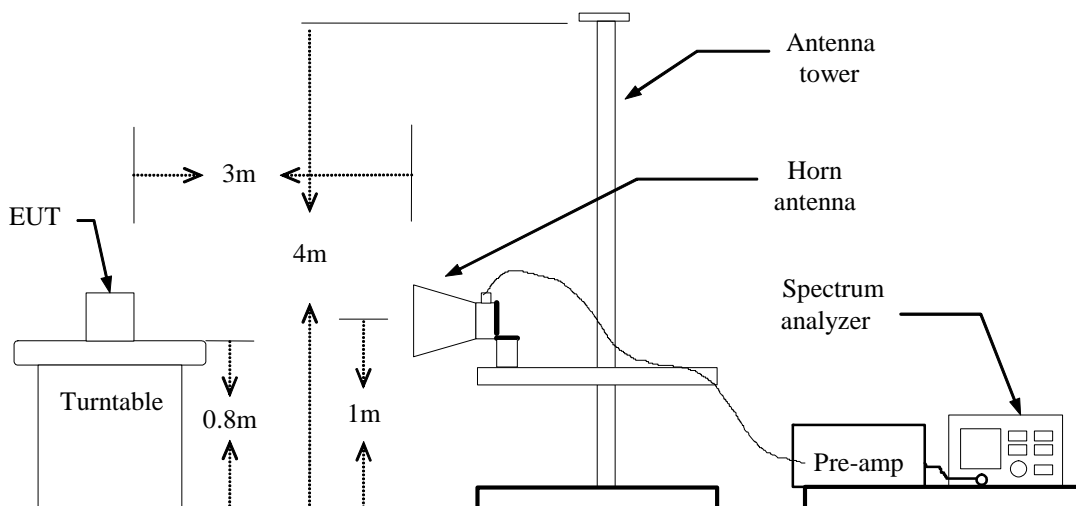
## 7. FCC PART 15.249 REQUIREMENTS

### 7.1 20 DB BANDWIDTH

#### LIMIT

None; for reporting purposes only.

#### Test Configuration



#### TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=30kHz, VBW = 100kHz, Span = 10MHz, Sweep = auto.
4. Mark the peak frequency and 20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

#### TEST RESULTS

*No non-compliance noted*

#### Test Data

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2425	2.77
Mid	2450	2.81
High	2475	2.74



## Test Plot

### CH Low

\* Agilent 16:30:10 May 19, 2011

R T

 $\Delta$  Mkr2 2.77 MHz

0.49 dB

Ref 0 dBm

#Atten 10 dB

#Peak

Log

10

dB/

DI

-50.2

dBm

LgAv

V1 S2

Center 2.425 00 GHz

Span 10 MHz

#Res BW 30 kHz

#VBW 100 kHz

Sweep 10.6 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.425 04 GHz	-30.20 dBm
2R	(1)	Freq	2.423 56 GHz	-51.27 dBm
2Δ	(1)	Freq	2.77 MHz	0.49 dB

### CH Mid

\* Agilent 16:33:03 May 19, 2011

R T

 $\Delta$  Mkr2 2.81 MHz

0.09 dB

Ref 0 dBm

#Atten 10 dB

#Peak

Log

10

dB/

DI

-51.3

dBm

LgAv

V1 S2

Center 2.450 00 GHz

Span 10 MHz

#Res BW 30 kHz

#VBW 100 kHz

Sweep 10.6 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.450 05 GHz	-31.35 dBm
2R	(1)	Freq	2.448 54 GHz	-52.48 dBm
2Δ	(1)	Freq	2.81 MHz	0.09 dB



## CH High

Agilent 16:35:16 May 19, 2011

R T

$\Delta$  Mkr2 2.74 MHz

Ref 0 dBm

#Atten 10 dB

-0.05 dB

#Peak

Log  
10  
dB/

DI  
-50.8  
dBm

LgAv

V1 S2

Center 2.475 00 GHz

Span 10 MHz

#Res BW 30 kHz

#VBW 100 kHz

Sweep 10.6 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.475 05 GHz	-30.79 dBm
2R	(1)	Freq	2.473 59 GHz	-51.47 dBm
2Δ	(1)	Freq	2.74 MHz	-0.05 dB





## 7.2 BAND EDGES MEASUREMENT

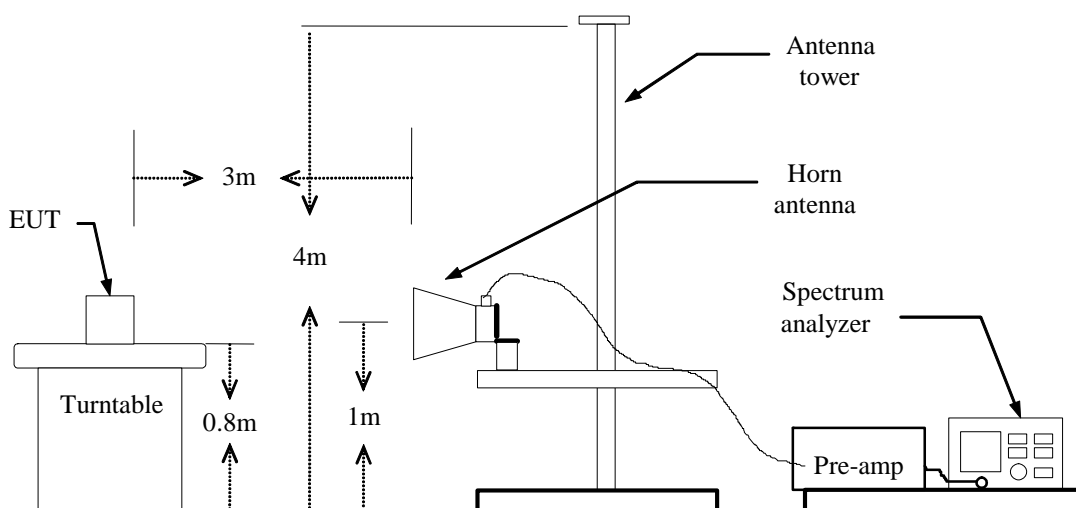
### LIMIT

1. In the above emission table, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ at 3-meter)	Field Strength (dB $\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

2. As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits in paragraphs (a) and (b) of this section 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. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

### Test Configuration



### TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

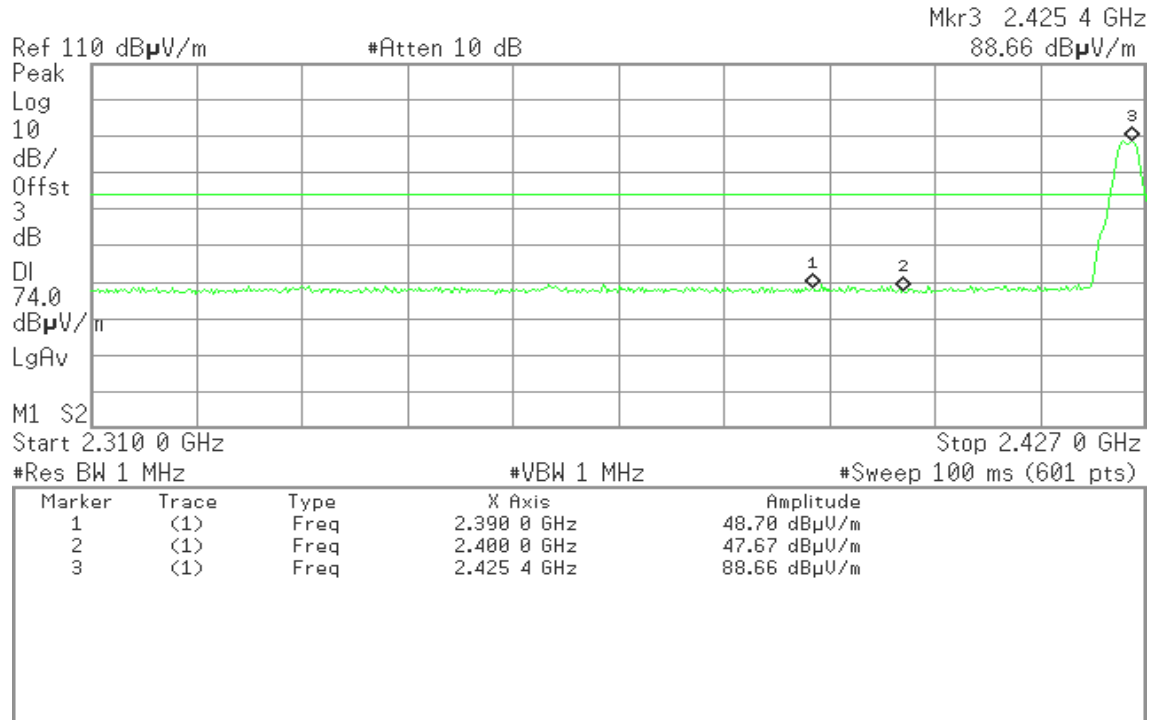
### TEST RESULTS

Refer to attach spectrum analyzer data chart.

**Band Edges (CH Low)****Detector mode: Peak****Polarity: Vertical**

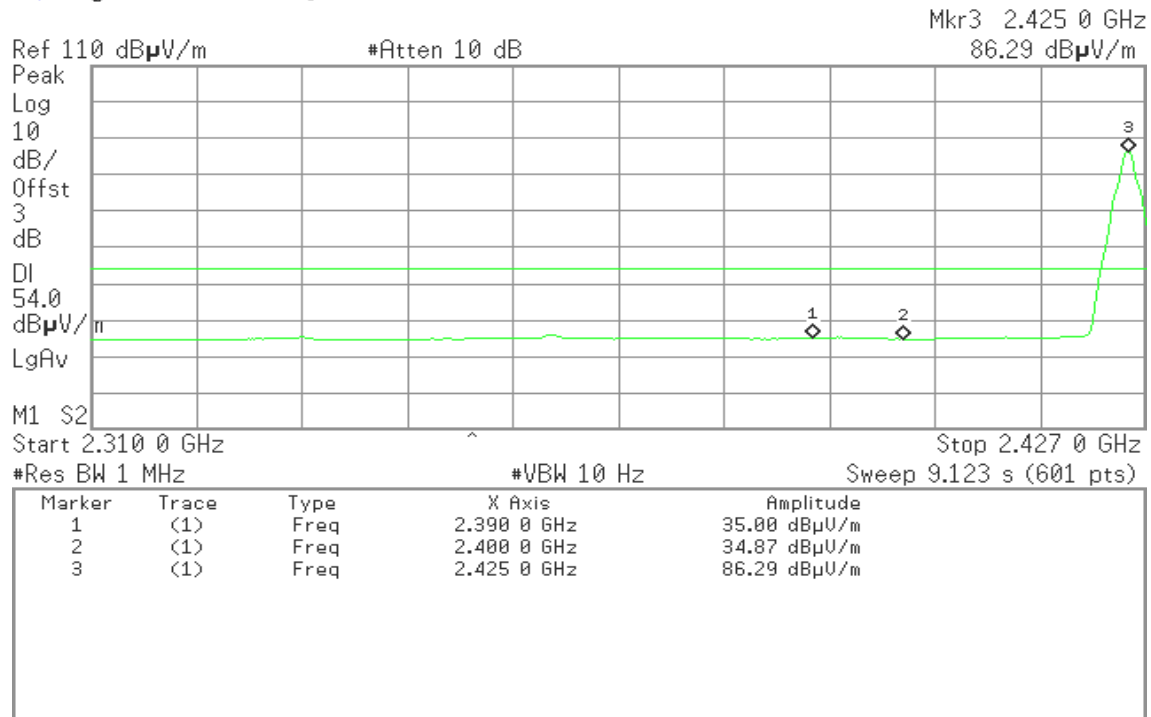
\* Agilent 14:58:22 May 16, 2011

R T

**Detector mode: Average****Polarity: Vertical**

\* Agilent 15:00:25 May 16, 2011

R T





## Detector mode: Peak

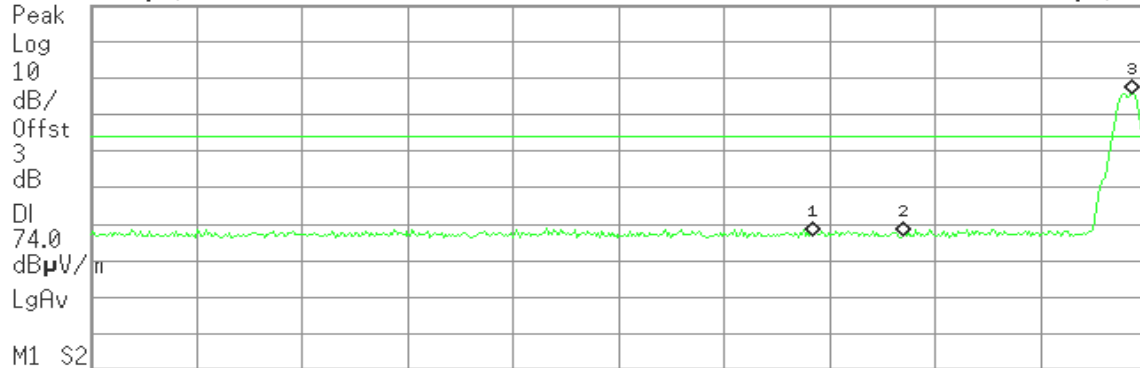
## Polarity: Horizontal

\* Agilent 15:14:20 May 16, 2011

T

Mkr3 2.425 4 GHz  
85.68 dB $\mu$ V/mRef 110 dB $\mu$ V/m

#Atten 10 dB



Start 2.310 0 GHz

Stop 2.427 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.390 0 GHz	46.98 dB $\mu$ V/m
2	(1)	Freq	2.400 0 GHz	46.93 dB $\mu$ V/m
3	(1)	Freq	2.425 4 GHz	85.68 dB $\mu$ V/m

## Detector mode: Average

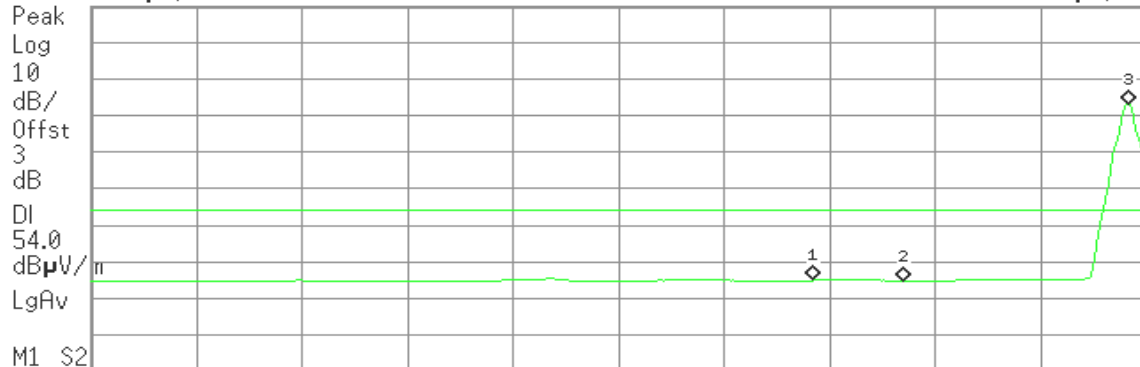
## Polarity: Horizontal

\* Agilent 15:13:32 May 16, 2011

T

Mkr3 2.425 0 GHz  
83.31 dB $\mu$ V/mRef 110 dB $\mu$ V/m

#Atten 10 dB



Start 2.310 0 GHz

Stop 2.427 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 9.123 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.390 0 GHz	34.88 dB $\mu$ V/m
2	(1)	Freq	2.400 0 GHz	34.76 dB $\mu$ V/m
3	(1)	Freq	2.425 0 GHz	83.31 dB $\mu$ V/m

**Band Edges (CH High)****Detector mode: Peak****Polarity: Vertical**

\* Agilent 15:43:54 May 16, 2011

R T

Mkr1 2.483 50 GHz  
44.34 dB $\mu$ V/mRef 110 dB $\mu$ V/m

#Atten 10 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

74.0

dB $\mu$ V/m

LgAv

W1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.473 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

**Detector mode: Average****Polarity: Vertical**

\* Agilent 15:42:44 May 16, 2011

R T

Mkr1 2.483 50 GHz  
35.38 dB $\mu$ V/mRef 110 dB $\mu$ V/m

#Atten 10 dB

#Peak

Log

10

dB/

Offst

3

dB

DI

54.0

dB $\mu$ V/m

LgAv

W1 S2

S3 FC

A AA

E(f):

FTun

Swp

Start 2.473 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

^ Stop 2.500 00 GHz

Sweep 2.105 s (601 pts)



**Detector mode: Peak**

**Polarity: Horizontal**

Agilent 15:59:54 May 16, 2011

T

Mkr1 2.483 50 GHz  
47.96 dB $\mu$ V/m

Ref 110 dB $\mu$ V/m

#Atten 10 dB

Peak

Log

10

dB/

Offst

3

dB

DI

74.0

dB $\mu$ V/m

LgAv

M1 S2

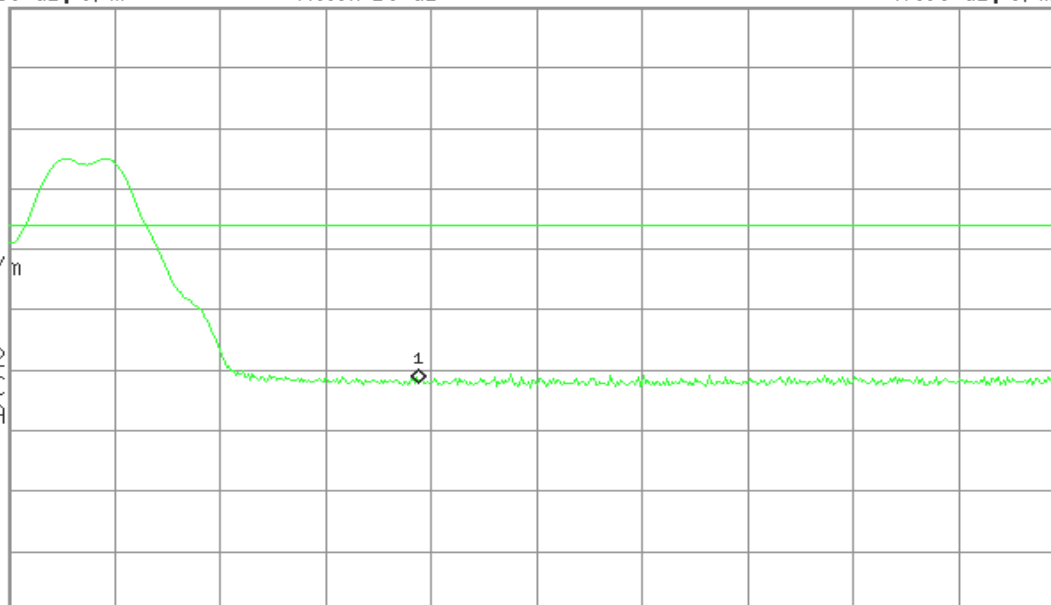
S3 FC

A AA

£(f):

FTun

Swp



Center 2.486 50 GHz

Span 27 MHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

**Detector mode: Average**

**Polarity: Horizontal**

Agilent 15:55:36 May 16, 2011

T

Mkr1 2.483 50 GHz  
35.23 dB $\mu$ V/m

Ref 110 dB $\mu$ V/m

#Atten 10 dB

Peak

Log

10

dB/

Offst

3

dB

DI

54.0

dB $\mu$ V/m

LgAv

M1 S2

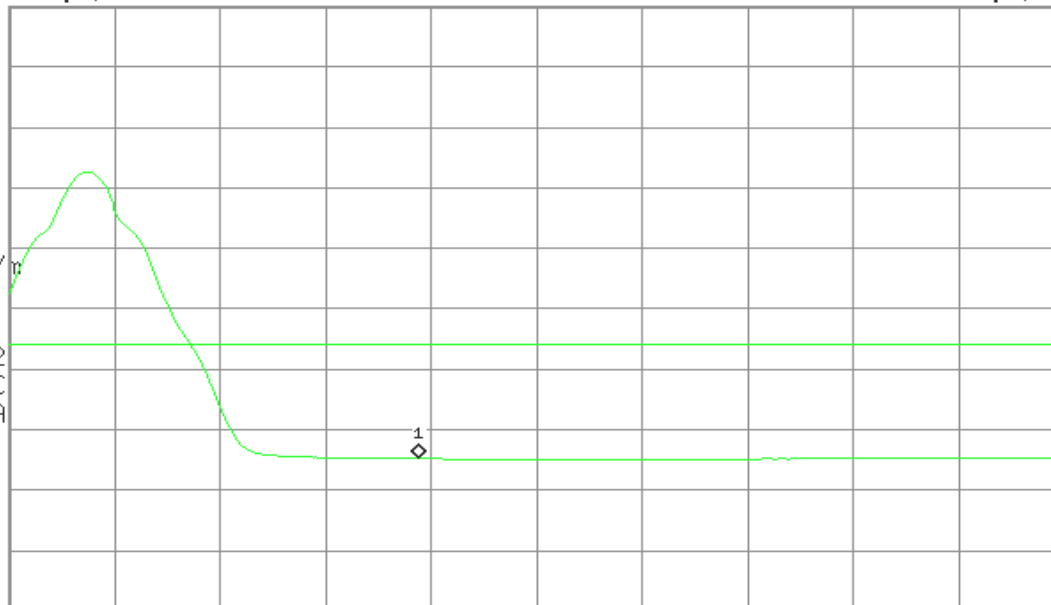
S3 FC

A AA

£(f):

FTun

Swp



Start 2.473 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 2.105 s (601 pts)



## 7.3 SPURIOUS EMISSION

### LIMIT

1. In the 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 Field Strength (mV/m)	Field Strength of Harmonics (μV/m)
902-928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

2. 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 (μV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

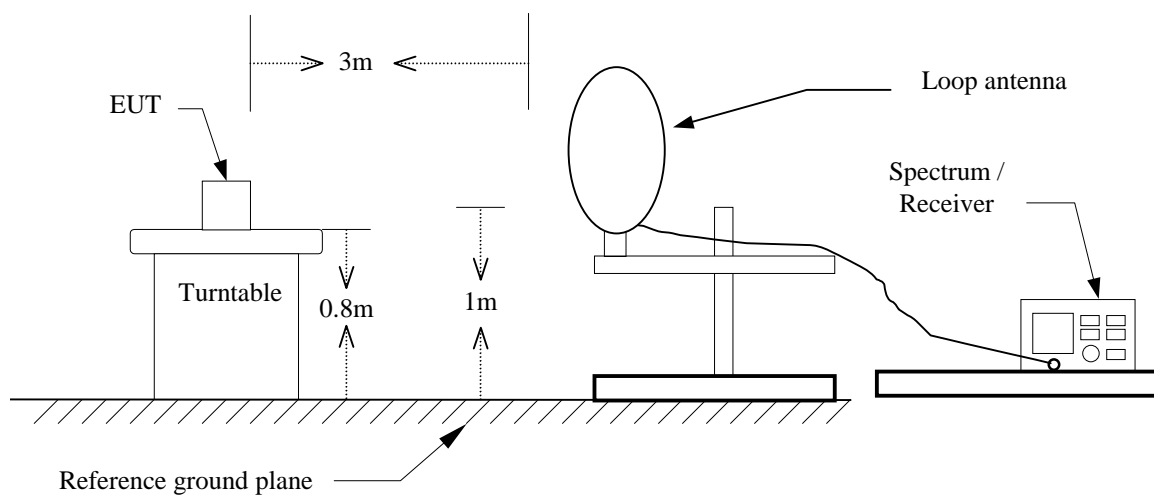
3. In the above emission table, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

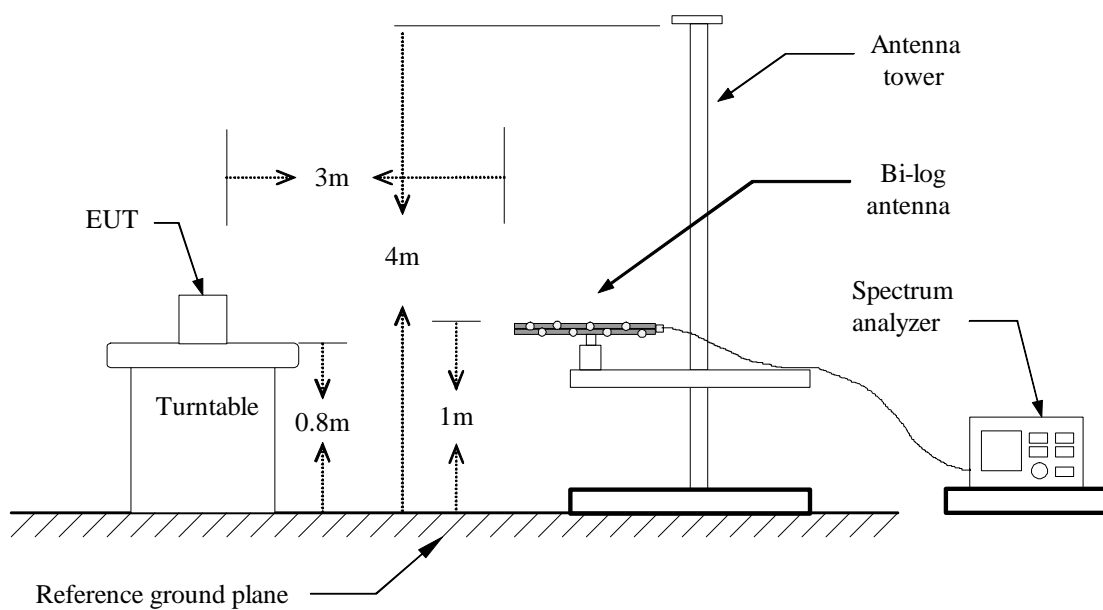


## Test Configuration

9kHz ~ 30MHz

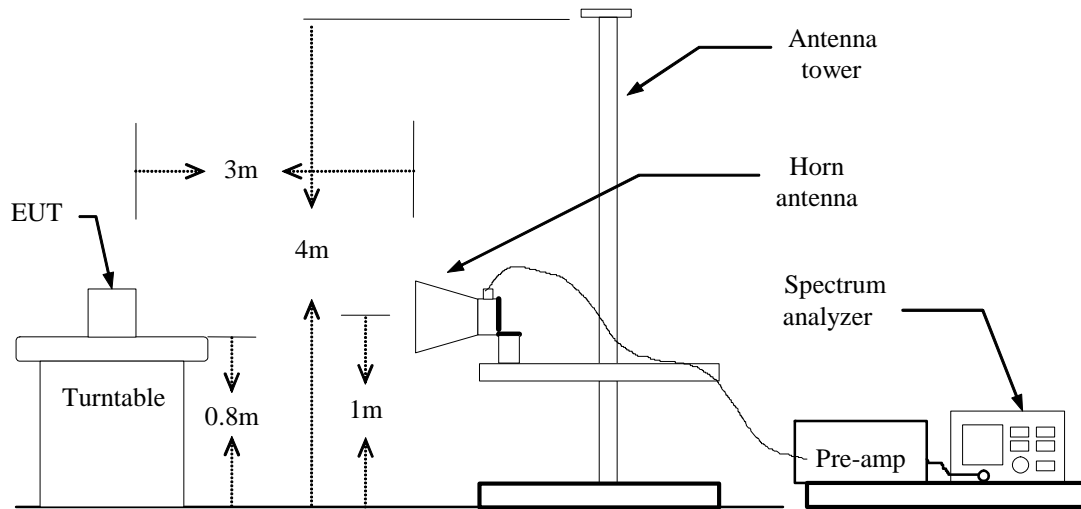


30MHz ~ 1GHz





Above 1 GHz







## **TEST PROCEDURE**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:  
Below 1GHz:  
RBW=100kHz / VBW=300kHz / Sweep=AUTO  
Above 1GHz:  
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO  
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

**Below 1 GHz****Operation Mode:** Normal Link**Test Date:** May 16, 2011**Temperature:** 24°C**Tested by:** Ali Shu**Humidity:** 41% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Detector Mode (PK/QP)	Ant.Pol. (H/V)
30.00	39.68	-1.86	37.82	40.00	-2.18	QP	V
162.57	38.72	-10.69	28.03	43.50	-15.47	QP	V
274.12	39.09	-9.52	29.58	46.00	-16.42	Peak	V
414.77	32.98	-6.73	26.25	46.00	-19.75	Peak	V
710.62	27.69	-2.39	25.30	46.00	-20.70	Peak	V
872.28	28.49	-0.75	27.75	46.00	-18.25	Peak	V
78.50	40.87	-15.06	25.81	40.00	-14.19	Peak	H
162.57	40.41	-10.69	29.72	43.50	-13.78	Peak	H
277.35	37.30	-9.48	27.82	46.00	-18.18	Peak	H
322.62	36.39	-8.70	27.69	46.00	-18.31	Peak	H
623.32	28.32	-3.51	24.81	46.00	-21.19	Peak	H
705.77	28.06	-2.46	25.61	46.00	-20.39	Peak	H

**Remark:**

1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
2. Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5.  $\text{Margin (dB)} = \text{Remark result (dBuV/m)} - \text{Quasi-peak limit (dBuV/m)}$ .

**Above 1 GHz****Operation Mode:** Tx / CH Low**Test Date:** May 16, 2011**Temperature:** 24°C**Tested by:** Ali Shu**Humidity:** 41% RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Result		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol H/V
				Peak (dBuV/m)	AV (dBuV/m)					
2425.00	93.05	90.49	-4.17	88.88	86.32	114.00	94.00	-7.68	AVG	V
2000.00	54.83	---	-5.47	49.36	---	74.00	54.00	-4.64	Peak	V
2673.33	52.82	---	-3.28	49.54	---	74.00	54.00	-4.46	Peak	V
4875.00	49.43	42.02	2.71	52.14	44.73	74.00	54.00	-9.27	AVG	V
7666.67	46.68	33.67	7.59	54.28	41.26	74.00	54.00	-12.74	AVG	V
N/A										
2425.00	89.88	87.45	-4.17	85.71	83.28	114.00	94.00	-10.72	AVG	H
2123.33	52.91	---	-5.15	47.76	---	74.00	54.00	-6.24	Peak	H
4850.00	50.15	47.32	2.66	52.81	49.98	74.00	54.00	-4.02	AVG	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m). Peak detector mode and average detector mode of the emission shown in Result column.

**Operation Mode:** Tx / CH Mid**Test Date:** May 16, 2011**Temperature:** 24°C**Tested by:** Ali Shu**Humidity:** 41% RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Result		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol H/V
				Peak (dBuV/m)	AV (dBuV/m)					
2450.00	91.32	88.86	-4.08	87.24	84.78	114.00	94.00	-9.22	AVG	V
1596.67	54.16	---	-9.57	44.59	---	74.00	54.00	-9.41	Peak	V
4900.00	51.32	46.35	2.76	54.08	49.11	74.00	54.00	-4.89	AVG	V
N/A										
2450.00	89.12	86.70	-4.08	85.04	82.62	114.00	94.00	-11.38	AVG	H
2120.00	53.93	---	-5.16	48.77	---	74.00	54.00	-5.23	Peak	H
4900.00	49.11	---	2.76	51.87	---	74.00	54.00	-2.13	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m). Peak detector mode and average detector mode of the emission shown in Result column.

**Operation Mode:** Tx / CH High**Test Date:** May 16, 2011**Temperature:** 24°C**Tested by:** Ali Shu**Humidity:** 41% RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Result		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol H/V
				Peak (dBuV/m)	AV (dBuV/m)					
2473.33	93.17	90.80	-3.98	89.19	86.82	114.00	94.00	-7.18	AVG	V
1290.00	55.09	---	-10.77	44.32	---	74.00	54.00	-9.68	Peak	V
4950.00	49.79	45.38	2.86	52.65	48.24	74.00	54.00	-5.76	AVG	V
N/A										
2473.33	88.90	86.54	-3.98	84.92	82.56	114.00	94.00	-11.44	AVG	H
1960.00	52.94	---	-5.88	47.07	---	74.00	54.00	-6.93	Peak	H
4950.00	49.32	48.40	2.86	52.18	51.26	74.00	54.00	-2.74	AVG	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m). Peak detector mode and average detector mode of the emission shown in Result column.



## 7.4 POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	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

\* Decreases with the logarithm of the frequency.

### Test Configuration

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

### TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



## TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

### Test Data

**Operation Mode:** Normal Link

**Test Date:** May 13, 2011

**Temperature:** 26°C

**Tested by:** Sehni Hu

**Humidity:** 60% RH

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1500	48.73	31.13	0.17	48.90	31.30	65.99	56.00	-17.09	-24.70	L1
0.2000	50.04	40.34	0.16	50.20	40.50	63.61	53.61	-13.41	-13.11	L1
0.2700	41.74	30.54	0.16	41.90	30.70	61.12	51.12	-19.22	-20.42	L1
0.3300	31.24	22.74	0.16	31.40	22.90	59.45	49.45	-28.05	-26.55	L1
2.6800	19.48	13.28	0.22	19.70	13.50	56.00	46.00	-36.30	-32.50	L1
13.4200	32.26	27.46	0.54	32.80	28.00	60.00	50.00	-27.20	-22.00	L1
0.1900	47.85	34.15	0.25	48.10	34.40	64.04	54.04	-15.94	-19.64	L2
0.2500	39.35	28.35	0.25	39.60	28.60	61.76	51.76	-22.16	-23.16	L2
0.3200	32.75	23.05	0.25	33.00	23.30	59.71	49.71	-26.71	-26.41	L2
0.4400	29.05	22.65	0.25	29.30	22.90	57.06	47.06	-27.76	-24.16	L2
9.2600	17.87	11.97	0.43	18.30	12.40	60.00	50.00	-41.70	-37.60	L2
13.4200	32.99	28.19	0.51	33.50	28.70	60.00	50.00	-26.50	-21.30	L2

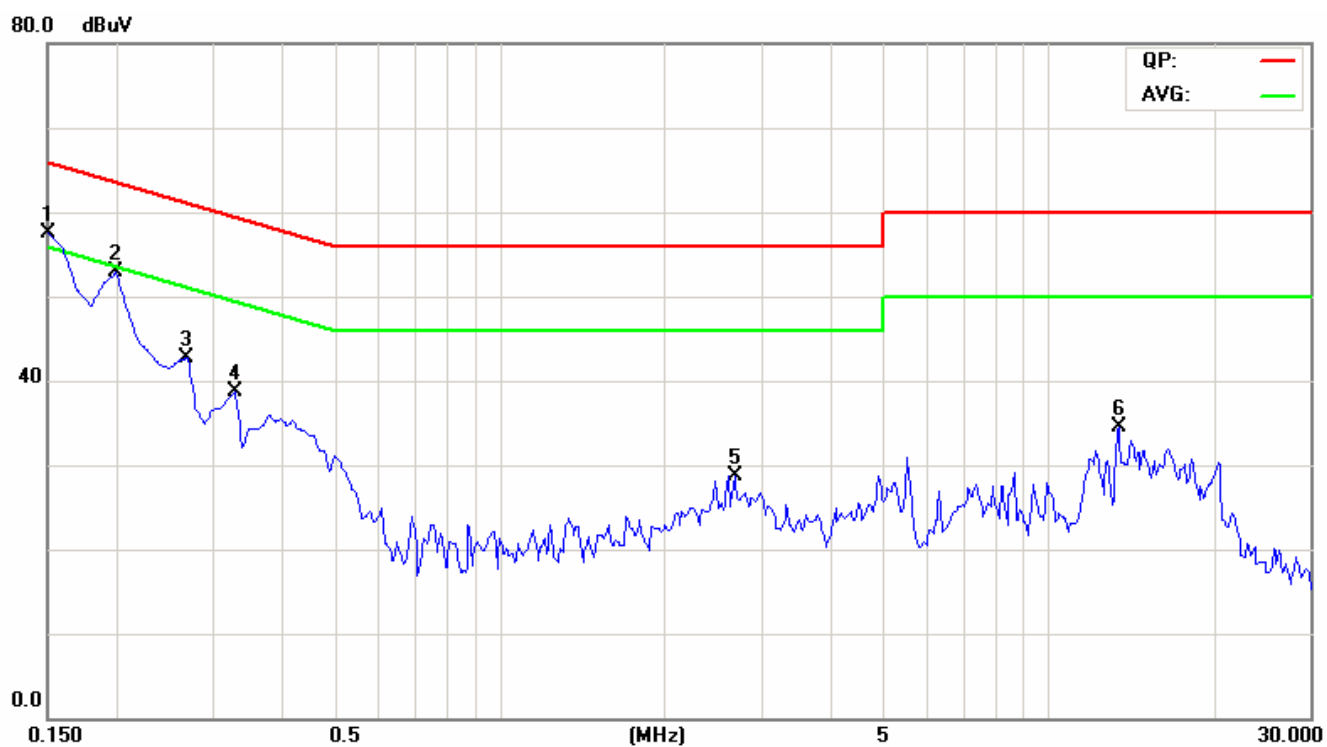
### Remark:

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPN between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)
5. "-" means Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.



## Test Plots

### Conducted emissions (Line 1)



### Conducted emissions (Line 2)

