



## FCC TEST REPORT (15.247)

**REPORT NO.:** 090727FIA01

**MODEL NO.:** RU-822, RU-822-100

**RECEIVED:** Jul. 24, 2009

**TESTED:** Jul. 24 ~ Sep. 03, 2009

**ISSUED:** Sep. 07, 2009

**APPLICANT:** JUPITER TECHNOLOGY (WUXI) CO.,LTD

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## 1. CERTIFICATION

**PRODUCT:** RFID Reader

**MODEL:** RU-822, RU-822-100

**BRAND:** MTI

**APPLICANT:** JUPITER TECHNOLOGY (WUXI) CO.,LTD

**TESTED:** ENGINEERING SAMPLE

**TEST SAMPLE:** Jul. 24 ~ Sep. 03, 2009

**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)  
**ANSI C63.4-2003**

The above equipment (Model: RU-822, RU-822-100) has been tested by **ADT(Shanghai) Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :**  , **DATE:** Sep. 07, 2009

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**TECHNICAL ACCEPTANCE :**  , **DATE:** Sep. 07, 2009

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Director of Operations



## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.247)			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -1.48dB at 3.34MHz
15.247(a)(1)	Hopping Channel Separation Spec. : Min. 25 kHz or 20 dB bandwidth, whichever is greater	PASS	Meet the requirement of limit
15.247(a)(1)(iii)	Number of Hopping Frequency Used Spec.: At least 15 channels	PASS	Meet the requirement of limit
15.247(a)(1)(iii)	Dwell Time on Each Channel Spec. : Max. 0.4 second within 31.6 second	PASS	Meet the requirement of limit
	Channel Bandwidth	PASS	Meet the requirement of limit
15.247(a)(1)	Maximum Peak Output Power Limit: max. 21dBm	PASS	Meet the requirement of limit
15.247(d)	Transmitter Radiated Emissions FCC Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -3.09dB at 33.27MHz
15.247(d)	Band Edge Measurement Limit: 20 dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit



## 2.1 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	2.55 dB
Radiated emissions	30MHz ~ 200MHz	2.98 dB
	200MHz ~ 1000MHz	2.96 dB
	1GHz ~18GHz	2.26 dB

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>EUT</b>	RFID Reader
<b>MODEL NO.</b>	RU-822, RU-822-100
<b>FCC ID</b>	WIO- MTI-RU-822
<b>POWER SUPPLY</b>	5.0Vdc from batteries
<b>MODULATION TYPE</b>	ASK
<b>MODULATION TECHNOLOGY</b>	FHSS
<b>FREQUENCY RANGE</b>	902-928MHz
<b>NUMBER OF CHANNEL</b>	50
<b>OUTPUT POWER</b>	832mW
<b>ANTENNA TYPE</b>	Please see note 2
<b>DATA CABLE</b>	N/A
<b>I/O PORTS</b>	N/A
<b>ACCESSORY DEVICES</b>	Power adapter

#### NOTE:

1. The EUT uses the following power adapter.

<b>BRAND</b>	CINCON Electronics Co., Ltd
<b>MODEL</b>	TR15RA050
<b>INPUT POWER</b>	100-240V~ 47-63Hz 0.4A
<b>OUTPUT POWER</b>	5V DC 2.0A
<b>POWER LINE</b>	1.8m non-shielded power cable

2. There is one antenna (internal antenna) provided to this EUT:  
(external antenna is optional)

	Type	Gain(dBi)	Connector
Internal Antenna	Patch	3	Male MMCX
External Antenna	Panel	6	Male RP-TNC

3. The internal and external ports can not transmit in the same time.

4. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.



### 3.2 DESCRIPTION OF TEST MODES

The EUT was tested under the following modes:

- ◆ Mode 1: Operate with internal antenna
- ◆ Mode 2: Operate with external antenna

50 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	902.75	15	910.25	30	917.75	45	925.25
1	903.25	16	910.75	31	918.25	46	925.75
2	903.75	17	911.25	32	918.75	47	926.25
3	904.25	18	911.75	33	919.25	48	926.75
4	904.75	19	912.25	34	919.75	49	927.25
5	905.25	20	912.75	35	920.25		
6	905.75	21	913.25	36	920.75		
7	906.25	22	913.75	37	921.25		
8	906.75	23	914.25	38	921.75		
9	907.25	24	914.75	39	922.25		
10	907.75	25	915.25	40	922.75		
11	908.25	26	915.75	41	923.25		
12	908.75	27	916.25	42	923.75		
13	909.25	28	916.75	43	924.25		
14	909.75	29	917.25	44	924.75		





### 3.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	Applicable to				Description
	PLC	RE<1G	RE>=1G	APCM	
-	√	√	√	√	NA

Where **PLC**: Power Line Conducted Emission      **RE<1G**: Radiated Emission Below 1GHz  
**RE>=1G**: Radiated Emission Above 1GHz      **APCM**: Antenna Port Conducted Measurement

#### **POWER LINE CONDUCTED EMISSION:**

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
0 to 49	0	FHSS	ASK

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

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, 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 TECHNOLOGY	MODULATION TYPE	AXIS
0 to 49	0, 24, 49	FHSS	ASK	Y

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

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, 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 TECHNOLOGY	MODULATION TYPE	AXIS
0 to 49	0, 24, 49	FHSS	ASK	Y

**BANDEDGE MEASUREMENT:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, 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 TECHNOLOGY	MODULATION TYPE	AXIS
0 to 49	0, 49	FHSS	ASK	Y

**ANTENNA PORT CONDUCTED MEASUREMENT:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations 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 TECHNOLOGY	MODULATION TYPE
0 to 49	0, 24, 49	FHSS	ASK



### 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 (Section 15.247)

#### ANSI C63.4-2003

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

**NOTE:** Public Notice DA 00-705 Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

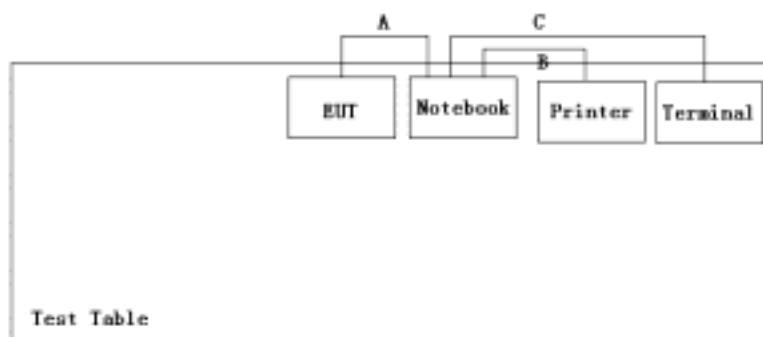
### 3.5 DESCRIPTION OF SUPPORT UNITS

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.

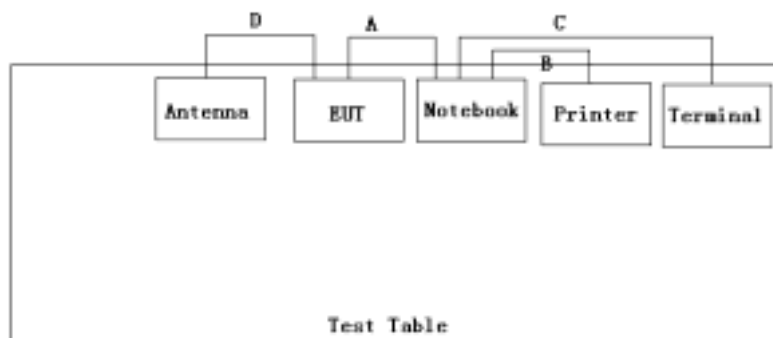
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	LENOVO	R61i	N/A	N/A
2	Printer	HP	Laser Jet 1018	N/A	N/A
3	Terminal	N/A	N/A	N/A	N/A
4	Antenna	Laird	S9028pcrw	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
A	1.0m shielded USB cable
B	1.8 m shielded USB cable
C	1.0 m unshielded telephone cable
D	2.4 m shielded RF cable

### 3.6 CONFIGURATION OF SYSTEM UNUSER TEST MODE 1



### MODE 2





## 4. TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Receiver R&S	ESCS30	E1R1002	Dec. 30, 2009
LISN Schwarzbeck	ENV216	E1L1011	Apr. 01, 2010
Software ADT	ADT_Cond_ V7.3.0	N/A	N/A

**NOTE:** The calibration interval of the above test instruments is 12 months.

#### 4.1.3 TEST PROCEDURES

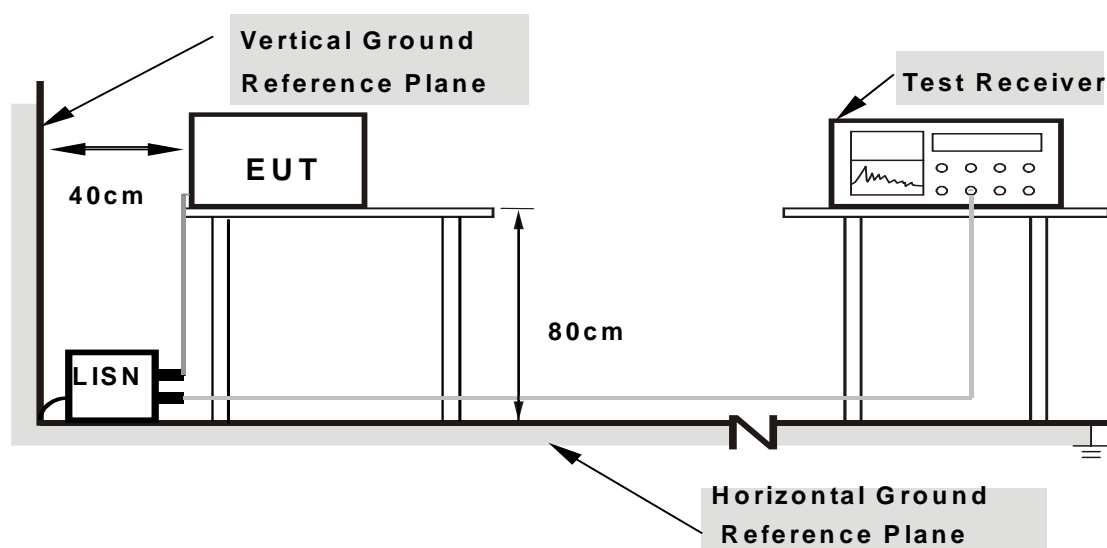
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling 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 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

##### Mode 1:

- a. Link printer and terminal to the notebook.
- b. Link EUT to the notebook with USB cable.
- c. Use test software to configure EUT to operate with internal antenna.

##### Mode 2:

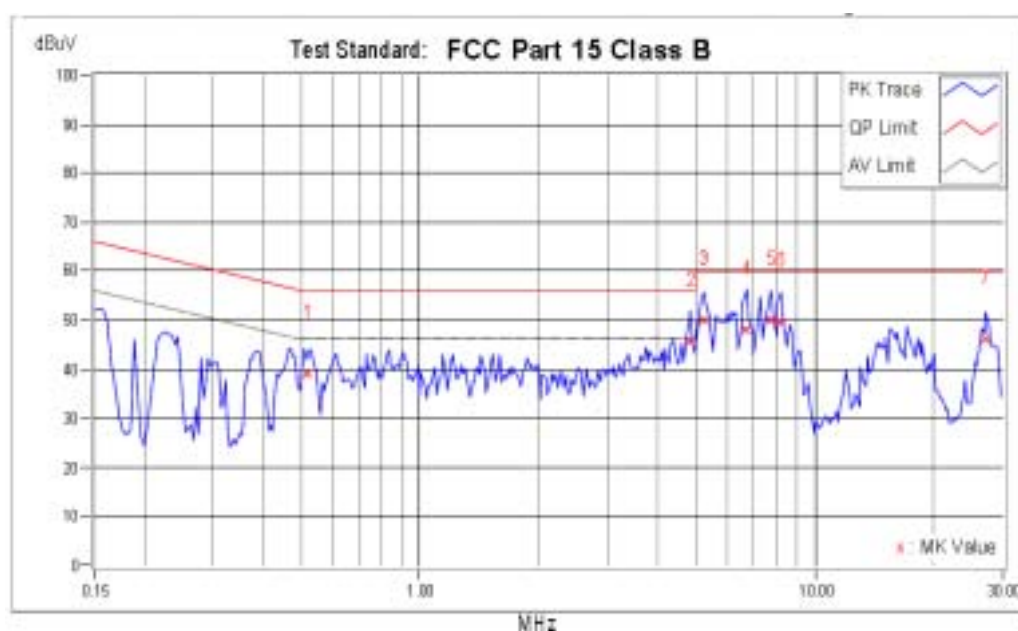
- a. Link printer and terminal to the notebook.
- b. Link the external antenna to the EUT.
- c. Link EUT to the notebook with USB cable.
- d. Use test software to configure EUT to operate with internal antenna.

## 4.1.7 TEST RESULTS

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	PHASE	Line 1
MODE	1	INPUT POWER (SYSTEM)	120Vac, 60Hz
TRANSFER RATE	1.0Mbps	6dB BANDWIDTH	9kHz
ENVIRONMENTAL CONDITIONS	21deg. C, 50%RH, 988hPa	TESTED BY	Wade Mao

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.52	9.72	29.46	18.41	39.18	28.13	56.00	46.00	-16.82	-17.87
2	4.84	9.88	35.77	28.32	45.65	38.20	56.00	46.00	-10.35	-7.80
3	5.25	9.89	39.92	31.90	49.81	41.79	60.00	50.00	-10.19	-8.21
4	6.74	9.95	38.09	30.97	48.04	40.92	60.00	50.00	-11.96	-9.08
5	7.73	9.98	40.06	33.21	50.04	43.19	60.00	50.00	-9.96	-6.81
6	8.23	10.01	39.70	33.45	49.71	43.46	60.00	50.00	-10.29	-6.54
7	27.00	10.30	35.71	26.55	46.01	36.85	60.00	50.00	-13.99	-13.15

- 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.

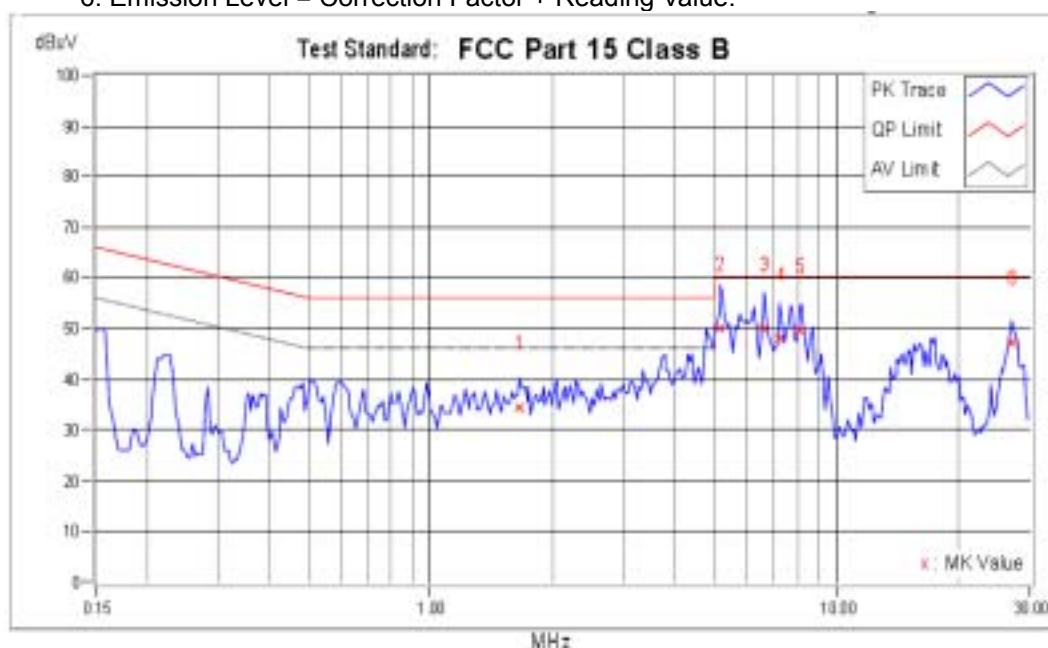




EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	PHASE	Line 2
MODE	1	INPUT POWER (SYSTEM)	120Vac, 60Hz
TRANSFER RATE	1.0Mbps	6dB BANDWIDTH	9kHz
ENVIRONMENTAL CONDITIONS	21deg. C, 66%RH, 988hPa	TESTED BY	Ray

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	1.66	9.77	24.49	15.34	34.26	25.11	56.00	46.00	-21.74	-20.89
2	5.18	9.94	40.07	32.24	50.01	42.18	60.00	50.00	-9.99	-7.82
3	6.64	9.98	40.11	32.61	50.09	42.59	60.00	50.00	-9.91	-7.41
4	7.24	10.00	38.17	30.35	48.17	40.35	60.00	50.00	-11.83	-9.65
5	8.15	10.04	39.50	32.98	49.54	43.02	60.00	50.00	-10.46	-6.98
6	27.00	10.50	36.70	26.03	47.20	36.53	60.00	50.00	-12.80	-13.47

- 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.





EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	PHASE	Line 1
MODE	2	INPUT POWER (SYSTEM)	120Vac, 60Hz
TRANSFER RATE	1.0Mbps	6dB BANDWIDTH	9kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH, 100 kPa	TESTED BY	Wade Mao

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.38	9.72	27.40	21.85	37.12	31.57	58.35	48.35	-21.23	-16.78
2	0.52	9.72	31.31	22.06	41.03	31.78	56.00	46.00	-14.97	-14.22
3	3.10	9.82	34.59	27.37	44.41	37.19	56.00	46.00	-11.59	-8.81
4	3.34	9.83	41.72	34.69	51.55	44.52	56.00	46.00	-4.45	-1.48
5	7.27	9.96	33.84	27.33	43.80	37.29	60.00	50.00	-16.20	-12.71
6	19.44	10.18	27.09	20.44	37.27	30.62	60.00	50.00	-22.73	-19.38

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

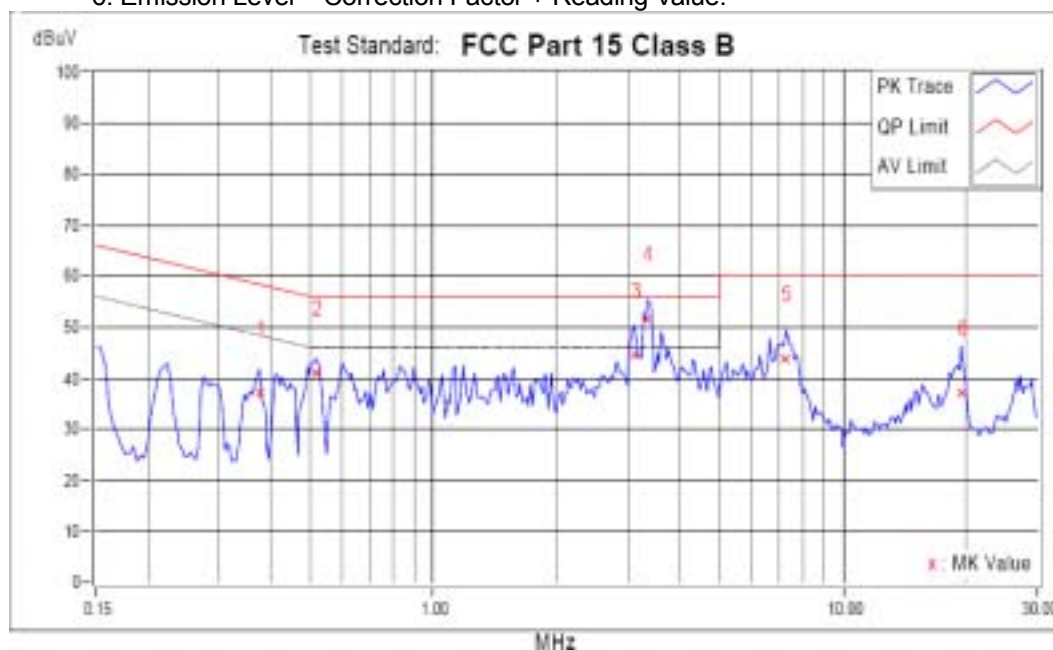
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

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.

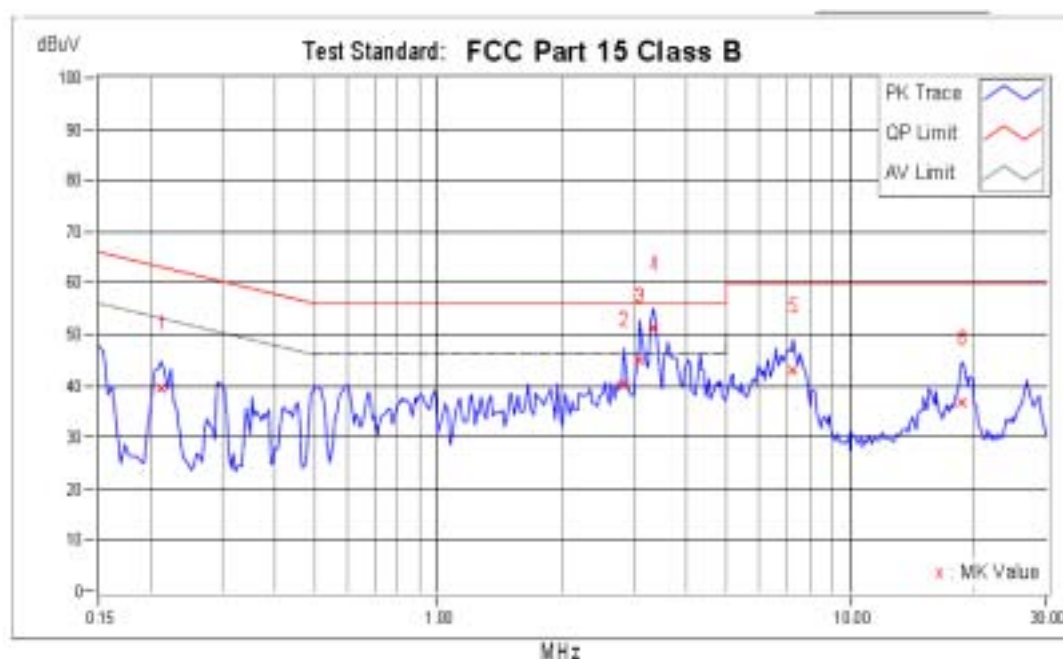




EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	PHASE	Line 2
MODE	2	INPUT POWER (SYSTEM)	120Vac, 60Hz
TRANSFER RATE	1.0Mbps	6dB BANDWIDTH	9kHz
ENVIRONMENTAL CONDITIONS	21deg. C, 50%RH, 988hPa	TESTED BY	Wade Mao

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.21	9.71	29.57	17.69	39.28	27.40	63.10	53.10	-23.83	-25.71
2	2.82	9.84	30.54	23.26	40.38	33.10	56.00	46.00	-15.62	-12.90
3	3.09	9.85	35.15	26.98	45.00	36.83	56.00	46.00	-11.00	-9.17
4	3.34	9.86	41.43	33.93	51.29	43.79	56.00	46.00	-4.71	-2.21
5	7.28	10.00	33.09	26.09	43.09	36.09	60.00	50.00	-16.91	-13.91
6	18.75	10.42	26.29	17.78	36.71	28.20	60.00	50.00	-23.29	-21.80

- 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

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. 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.	CALIBRATED UNTIL
Spectrum Agilent	E4403B	E1S1001	Aug. 04, 2010
Receiver R&S	ESCS30	E1R1001	Jan. 03, 2010
Trilog Broadband Antenna Schwarzbeck	VULB 9168	E1A1001	Aug. 04, 2010
Horn Antenna Schwarzbeck	BBHA 9120D	E1A1002	Jan. 03, 2010
Spectrum R&S	FSP30	E1S1002	Aug. 04, 2010
Preamplifier Agilent	HP 8447D	E1A2001	Sep. 08, 2010
Preamplifier Agilent	HP 8449B	E1A2002	Sep. 08, 2010
Software ADT	ADT_Radiated_V7.5	N/A	N/A



#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. 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 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 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.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

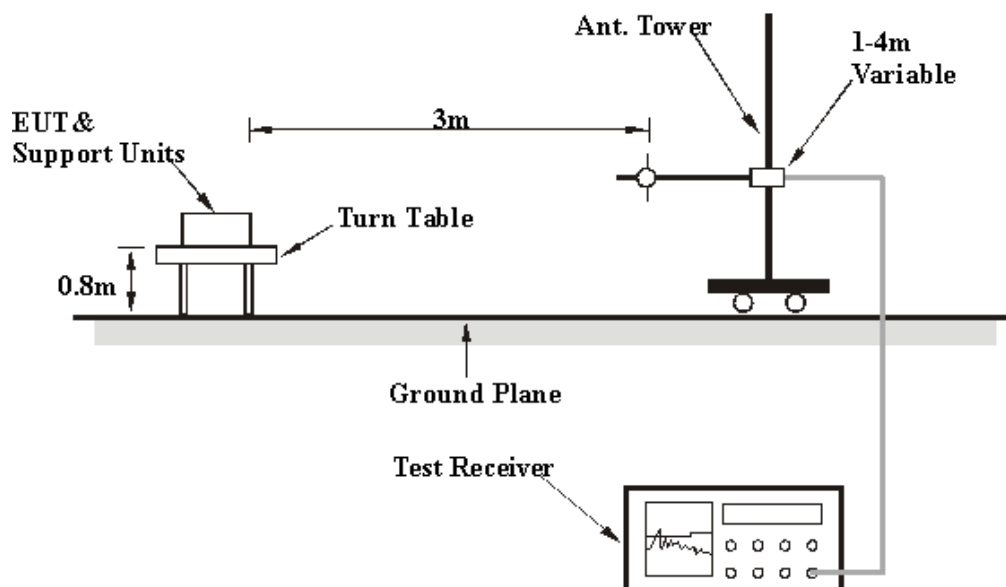
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.

#### 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

Mode 1:

- d. Link printer and terminal to the notebook.
- e. Link EUT to the notebook with USB cable.
- f. Use test software to configure EUT to operate with internal antenna.

Mode 2:

- a. Link printer and terminal to the notebook.
- b. Link the external antenna to the EUT.
- c. Link EUT to the notebook with USB cable.
- d. Use test software to configure EUT to operate with internal antenna.



## 4.2.7 TEST RESULTS

## Internal antenna port

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1 GHz
INPUT POWER (SYSTEM)	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH 101 kPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	36.86	25.49	40.00	-14.51 QP
2	81.00	9.96	40.00	-30.04 QP
3	158.15	27.92	43.50	-15.58 QP
4	275.75	24.07	46.00	-21.93 QP
5	456.00	24.16	46.00	-21.84 QP
6	902.00	62.73	115.16	-52.43 PK
7	902.00	51.85	91.81	-39.96 AV
8	* 902.70	135.16		PK
9	* 902.70	111.81		AV
10	960.00	22.83	46.00	-23.17 QP
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	36.86	28.38	40.00	-11.62 QP
2	51.20	24.15	40.00	-15.85 QP
3	83.97	26.72	40.00	-13.28 QP
4	120.83	25.19	43.50	-18.31 QP
5	157.78	29.61	43.50	-13.89 QP
6	902.00	58.99	112.74	-53.75 PK
7	902.00	48.64	91.81	-43.17 AV
8	* 902.75	132.74		PK
9	*902.70	111.81		AV
10	960.00	26.17	46.00	-19.83 QP

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.





EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Above 1 GHz
INPUT POWER (SYSTEM)	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH 101 kPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	1805.50	38.40	74.00	-35.60 PK
2	2708.25	42.60	74.00	-31.40 PK
3	3611.00	43.96	74.00	-30.04 PK
4	4513.75	48.61	74.00	-25.39 PK
5	5416.50	48.66	74.00	-25.34 PK
6	6319.25	50.83	74.00	-23.17 PK
7	7222.00	54.25	74.00	-19.75 PK
8	8124.75	55.88	74.00	-18.12 PK
9	9027.50	56.65	74.00	-17.35 PK
10	1805.50	27.13	54.00	-26.87 AV
11	2708.25	29.92	54.00	-24.08 AV
12	3611.00	30.75	54.00	-23.25 AV
13	4513.75	35.15	54.00	-18.85 AV
14	5416.50	35.89	54.00	-18.11 AV
15	6319.25	37.97	54.00	-16.03 AV
16	7322.00	41.41	54.00	-12.59 AV
17	8124.75	42.53	54.00	-11.47 AV
18	9027.50	43.69	54.00	-10.31 AV



ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	1805.50	38.10	74.00	-35.90 PK
2	2708.25	42.84	74.00	-31.16 PK
3	3611.00	44.30	74.00	-29.70 PK
4	4513.75	48.10	74.00	-25.90 PK
5	5416.50	50.08	74.00	-23.92 PK
6	6319.25	51.64	74.00	-22.36 PK
7	7322.00	55.33	74.00	-18.67 PK
8	8124.75	55.60	74.00	-18.40 PK
9	9027.50	56.50	74.00	-17.50 PK
10	1805.50	25.71	54.00	-28.29 AV
11	2708.25	29.56	54.00	-24.44 AV
12	3611.00	30.69	54.00	-23.31 AV
13	4513.75	35.11	54.00	-18.89 AV
14	5416.50	35.87	54.00	-18.13 AV
15	6319.25	37.98	54.00	-16.02 AV
16	7322.00	41.41	54.00	-12.59 AV
17	8124.75	42.51	54.00	-11.49 AV
18	9027.50	43.67	54.00	-10.33 AV

- EMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level – Limit value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 24	FREQUENCY RANGE	Below 1 GHz
INPUT POWER (SYSTEM)	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH 101 kPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	36.87	20.10	40.00	-19.90 QP
2	157.50	27.48	43.50	-16.02 QP
3	242.43	29.47	46.00	-16.53 QP
4	367.07	12.31	46.00	-33.69 QP
5	456.00	27.54	46.00	-18.46 QP
6	*914.70	135.39		PK
7	* 914.75	112.04		AV
8	960.00	25.50	46.00	-20.50 QP
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	38.05	28.78	40.00	-11.22 QP
2	56.67	25.84	40.00	-14.16 QP
3	118.00	25.22	43.50	-18.28 QP
4	152.03	32.32	43.50	-11.18 QP
5	242.43	26.30	46.00	-19.70 QP
6	*914.70	135.39		PK
7	*914.70	112.04		AV
8	960.00	25.16	46.00	-20.84 QP

**REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level – Limit value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 24	FREQUENCY RANGE	Above 1 GHz
INPUT POWER (SYSTEM)	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH 101 kPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	1234.00	42.38	74.00	-31.62 PK
2	1829.50	38.30	74.00	-35.70 PK
3	2744.25	43.62	74.00	-30.38 PK
4	3659.00	42.74	74.00	-31.26 PK
5	4573.75	47.15	74.00	-26.85 PK
6	5488.50	47.80	74.00	-26.20 PK
7	6403.25	50.57	74.00	-23.43 PK
8	7318.00	53.75	74.00	-20.25 PK
9	8232.75	54.47	74.00	-19.53 PK
10	9147.50	56.72	74.00	-17.28 PK
11	1234.00	27.52	54.00	-26.48 AV
12	1829.50	29.71	54.00	-24.29 AV
13	2744.25	30.81	54.00	-23.19 AV
14	3659.00	30.59	54.00	-23.41 AV
15	4573.75	35.28	54.00	-18.72 AV
16	5488.50	35.42	54.00	-18.58 AV
17	6403.25	38.14	54.00	-15.86 AV
18	7318.00	41.43	54.00	-12.57 AV
19	8232.75	42.26	54.00	-11.74 AV
20	9147.50	43.58	54.00	-10.42 AV



ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	1234.00	53.03	74.00	-20.97 PK
2	1829.50	37.81	74.00	-36.19 PK
3	2744.25	42.65	74.00	-31.35 PK
4	3659.00	44.24	74.00	-29.76 PK
5	4573.75	47.86	74.00	-26.14 PK
6	5488.50	47.68	74.00	-26.32 PK
7	6403.25	50.82	74.00	-23.18 PK
8	7318.00	53.93	74.00	-20.07 PK
9	8232.75	54.79	74.00	-19.21 PK
10	9147.50	56.20	74.00	-17.80 PK
11	1234.00	27.94	54.00	-26.06 AV
12	1829.50	25.17	54.00	-28.83 AV
13	2744.25	30.07	54.00	-23.93 AV
14	3659.00	30.57	54.00	-23.43 AV
15	4573.75	35.26	54.00	-18.74 AV
16	5488.50	35.40	54.00	-18.60 AV
17	6403.25	38.12	54.00	-15.88 AV
18	7318.00	41.43	54.00	-12.57 AV
19	8232.75	42.25	54.00	-11.75 AV
20	9147.50	43.58	54.00	-10.42 AV

- EMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level – Limit value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 49	FREQUENCY RANGE	Below 1 GHz
INPUT POWER (SYSTEM)	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH 101 kPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	35.08	19.23	40.00	-20.77 QP
2	80.00	16.94	40.00	-23.06 QP
3	157.28	29.65	43.50	-13.85 QP
4	226.55	23.72	46.00	-22.28 QP
5	456.07	26.07	46.00	-19.93 QP
6	*927.20	117.33		PK
7	* 927.20	112.77		AV
8	928.00	63.89	97.33	-33.44 PK
9	928.00	54.14	92.77	-38.63 AV
10	960.00	22.25	46.00	-23.75 QP
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	32.17	28.55	40.00	-11.45 QP
2	56.77	27.12	40.00	-12.88 QP
3	118.00	25.74	43.50	-17.76 QP
4	158.35	29.64	43.50	-13.86 QP
5	242.43	24.32	46.00	-21.68 QP
6	* 927.20	117.34		PK
7	*927.20	112.77		AV
8	928.00	63.20	97.34	-34.14 PK
9	928.00	55.53	92.77	-37.24 AV
10	960.00	25.40	46.00	-20.60 QP

**REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level – Limit value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 49	FREQUENCY RANGE	Above 1 GHz
INPUT POWER (SYSTEM)	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH 101 kPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	1270.00	43.81	74.00	-30.19 PK
2	1854.50	44.66	74.00	-29.34 PK
3	2781.75	43.52	74.00	-30.48 PK
4	3709.00	44.10	74.00	-29.90 PK
5	4636.25	47.94	74.00	-26.06 PK
6	5563.50	48.72	74.00	-25.28 PK
7	6490.75	50.41	74.00	-23.59 PK
8	7418.00	54.41	74.00	-19.59 PK
9	8345.25	54.72	74.00	-19.28 PK
10	9272.50	57.45	74.00	-16.55 PK
11	1270.00	29.58	54.00	-24.42 AV
12	1854.50	30.35	54.00	-23.65 AV
13	2781.75	32.31	54.00	-21.69 AV
14	3709.00	31.38	54.00	-22.62 AV
15	4636.25	35.47	54.00	-18.53 AV
16	5563.50	36.04	54.00	-17.96 AV
17	6490.75	38.37	54.00	-15.63 AV
18	7418.00	41.97	54.00	-12.03 AV
19	8345.25	42.45	54.00	-11.55 AV
20	9272.50	44.23	54.00	-9.77 AV



ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	1270.00	49.77	74.00	-24.23 PK
2	1854.50	40.60	74.00	-33.40 PK
3	2781.75	43.57	74.00	-30.43 PK
4	3709.00	44.39	74.00	-29.61 PK
5	4636.25	48.24	74.00	-25.76 PK
6	5563.50	47.96	74.00	-26.04 PK
7	6490.75	50.83	74.00	-23.17 PK
8	7418.00	54.59	74.00	-19.41 PK
9	8345.25	56.39	74.00	-17.61 PK
10	9272.50	56.76	74.00	-17.24 PK
11	1270.00	31.48	54.00	-22.52 AV
12	1854.50	31.94	54.00	-22.06 AV
13	2781.75	31.48	54.00	-22.52 AV
14	3709.00	31.38	54.00	-22.62 AV
15	4636.25	35.45	54.00	-18.55 AV
16	5563.50	36.06	54.00	-17.94 AV
17	6490.75	38.43	54.00	-15.57 AV
18	7418.00	42.02	54.00	-11.98 AV
19	8345.25	42.49	54.00	-11.51 AV
20	9272.50	44.25	54.00	-9.75 AV

**EMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level – Limit value.





## External antenna port

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1 GHz
INPUT POWER (SYSTEM)	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH 101 kPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	33.80	36.71	40.00	-3.29 QP
2	168.00	32.20	43.50	-11.30 QP
3	296.75	13.22	46.00	-32.78 QP
4	484.85	16.64	46.00	-29.36 QP
5	796.30	18.73	46.00	-27.27 QP
6	902.00	73.93	108.73	-34.80 PK
7	902.00	70.71	107.70	-36.99 AV
8	* 902.75	128.73		PK
9	* 902.73	127.70		AV
10	960.00	21.02	46.00	-24.98 QP
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	33.27	36.91	40.00	-3.09 QP
2	296.75	12.39	46.00	-33.61 QP
3	415.57	19.04	46.00	-26.96 QP
4	536.83	14.72	46.00	-31.28 QP
5	747.80	17.71	46.00	-28.29 QP
6	902.00	73.78	111.00	-37.22 PK
7	902.00	72.80	110.63	-37.83 AV
8	* 902.75	131.00		PK
9	* 902.73	130.63		AV
10	960.00	20.84	46.00	-25.16 QP

**REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level – Limit value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Above 1 GHz
INPUT POWER (SYSTEM)	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH 101 kPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	1805.50	37.61	74.00	-36.39 PK
2	2708.25	41.82	74.00	-32.18 PK
3	3611.00	44.14	74.00	-29.86 PK
4	4513.75	47.07	74.00	-26.93 PK
5	5416.50	49.00	74.00	-25.00 PK
6	6319.25	50.60	74.00	-23.40 PK
7	7222.00	54.34	74.00	-19.66 PK
8	8124.75	55.05	74.00	-18.95 PK
9	9027.50	56.72	74.00	-17.28 PK
10	1805.50	26.55	54.00	-27.45 AV
11	2708.25	29.65	54.00	-24.35 AV
12	3611.00	30.04	54.00	-23.96 AV
13	4513.75	34.62	54.00	-19.38 AV
14	5416.50	35.88	54.00	-18.12 AV
15	6319.25	37.96	54.00	-16.04 AV
16	7222.00	41.26	54.00	-12.74 AV
17	8124.75	42.50	54.00	-11.50 AV
18	9027.50	43.65	54.00	-10.35 AV



ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	1805.50	37.93	74.00	-36.07 PK
2	2710.00	47.96	74.00	-26.04 PK
3	3611.00	43.08	74.00	-30.92 PK
4	4513.75	47.85	74.00	-26.15 PK
5	5416.50	49.29	74.00	-24.71 PK
6	6319.25	50.99	74.00	-23.01 PK
7	7222.00	54.02	74.00	-19.98 PK
8	8124.75	54.69	74.00	-19.31 PK
9	9027.50	56.04	74.00	-17.96 PK
10	1805.50	34.27	54.00	-19.73 AV
11	2710.00	29.15	54.00	-24.85 AV
12	3611.00	30.23	54.00	-23.77 AV
13	4513.75	34.97	54.00	-19.03 AV
14	5416.50	36.04	54.00	-17.96 AV
15	6319.25	38.21	54.00	-15.79 AV
16	7222.00	41.48	54.00	-12.52 AV
17	8124.75	42.65	54.00	-11.35 AV
18	9027.50	43.67	54.00	-10.33 AV

- EMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level – Limit value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 24	FREQUENCY RANGE	Below 1 GHz
INPUT POWER (SYSTEM)	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH 101 kPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	32.75	35.17	40.00	-4.83 QP
2	168.00	28.70	43.50	-14.80 QP
3	325.85	11.64	46.00	-34.36 QP
4	561.08	14.85	46.00	-31.15 QP
5	747.80	20.28	46.00	-25.72 QP
6	* 914.75	128.37		PK
7	* 914.75	127.96		AV
8	960.00	34.48	46.00	-11.52 QP
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	30.30	36.12	40.00	-3.88 QP
2	325.85	11.78	46.00	-34.22 QP
3	461.65	20.89	46.00	-25.11 QP
4	747.80	19.12	46.00	-26.88 QP
5	784.17	17.91	46.00	-28.09 QP
6	* 914.75	130.64		PK
7	*914.75	130.23		AV
8	960.00	34.33	46.00	-11.67 QP

**REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level – Limit value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 24	FREQUENCY RANGE	Above 1 GHz
INPUT POWER (SYSTEM)	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH 101 kPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	1829.50	39.69	74.00	-34.31 PK
2	2744.25	44.74	74.00	-29.26 PK
3	3659.00	45.78	74.00	-28.22 PK
4	4573.75	48.48	74.00	-25.52 PK
5	5488.50	48.84	74.00	-25.16 PK
6	6403.25	51.66	74.00	-22.34 PK
7	7318.00	54.65	74.00	-19.35 PK
8	8232.75	56.07	74.00	-17.93 PK
9	9147.50	58.53	74.00	-15.47PK
10	1829.50	29.78	54.00	-24.22 AV
11	2744.25	30.62	54.00	-23.38 AV
12	3659.00	32.63	54.00	-21.37 AV
13	4573.75	36.49	54.00	-17.51 AV
14	5488.50	36.62	54.00	-17.38 AV
15	6403.50	39.49	54.00	-14.51 AV
16	7318.00	42.70	54.00	-11.30 AV
17	8232.75	43.58	54.00	-10.42 AV
18	9147.50	45.77	54.00	-8.23 AV



ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	1829.50	38.93	74.00	-35.07 PK
2	2744.25	42.24	74.00	-31.76 PK
3	3659.00	45.41	74.00	-28.59 PK
4	4573.75	49.01	74.00	-24.99 PK
5	5488.50	48.96	74.00	-25.04 PK
6	6403.25	51.75	74.00	-22.25 PK
7	7318.00	55.13	74.00	-18.87 PK
8	8232.75	56.54	74.00	-17.46 PK
9	9147.50	58.47	74.00	-15.53 PK
10	1829.50	30.54	54.00	-23.46 AV
11	2744.25	31.46	54.00	-22.54 AV
12	3659.00	32.49	54.00	-21.51 AV
13	4573.50	36.36	54.00	-17.64 AV
14	5488.50	36.50	54.00	-17.50 AV
15	6403.25	39.35	54.00	-14.65 AV
16	7318.00	42.64	54.00	-11.36 AV
17	8232.75	43.56	54.00	-10.44 AV
18	9147.50	45.78	54.00	-8.22 AV

- EMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level – Limit value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 49	FREQUENCY RANGE	Below 1 GHz
INPUT POWER (SYSTEM)	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH 101 kPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	33.60	35.27	40.00	-4.73 QP
2	168.00	28.42	43.50	-15.08 QP
3	216.00	23.74	43.50	-19.76 QP
4	460.12	23.46	46.00	-22.54 QP
5	750.23	17.86	46.00	-28.14 QP
6	* 927.25	129.53		PK
7	* 927.25	128.89		AV
8	928.00	74.51	109.53	-35.02 PK
9	928.00	65.78	108.89	-43.11AV
10	960.00	34.62	46.00	-11.38 QP
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	33.62	34.13	40.00	-5.87 QP
2	168.22	30.69	43.50	-12.81 QP
3	231.28	19.76	46.00	-26.24 QP
4	460.07	20.94	46.00	-25.06 QP
5	711.42	18.05	46.00	-27.95 QP
6	* 927.25	130.38		PK
7	* 927.25	130.06		AV
8	928.00	74.47	110.38	-35.91PK
9	928.00	66.44	110.06	-43.62 AV
10	960.00	33.74	46.00	-12.26 QP

**REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level – Limit value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 49	FREQUENCY RANGE	Above 1 GHz
INPUT POWER (SYSTEM)	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 50%RH 101 kPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	1854.50	40.52	74.00	-33.48 PK
2	2781.75	43.90	74.00	-30.10PK
3	3709.00	46.71	74.00	-27.29 PK
4	4636.25	49.33	74.00	-24.67 PK
5	5563.50	49.76	74.00	-24.24 PK
6	6490.75	51.54	74.00	-22.46 PK
7	7418.00	55.85	74.00	-18.15 PK
8	8345.25	56.68	74.00	-17.32 PK
9	9272.50	58.25	74.00	-15.75 PK
10	1854.50	31.73	54.00	-22.27 AV
11	2781.75	31.85	54.00	-22.15 AV
12	3709.00	33.15	54.00	-20.85 AV
13	4636.25	36.33	54.00	-17.67 AV
14	5563.50	37.18	54.00	-16.82 AV
15	6490.75	39.69	54.00	-14.31 AV
16	7418.00	43.06	54.00	-10.94 AV
17	8345.25	43.94	54.00	-10.06 AV
18	9272.50	45.85	54.00	-8.15 AV





ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M				
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)
1	1854.50	40.75	74.00	-33.25 PK
2	2781.75	43.57	74.00	-30.43 PK
3	3709.00	46.31	74.00	-27.69 PK
4	4636.25	48.57	74.00	-25.43 PK
5	5563.50	49.79	74.00	-24.21 PK
6	6490.75	51.70	74.00	-22.30 PK
7	7418.00	55.06	74.00	-18.94 PK
8	8345.25	57.34	74.00	-16.66 PK
9	9272.50	58.57	74.00	-15.43 PK
10	1854.50	31.81	54.00	-22.19 AV
11	2781.75	32.20	54.00	-21.80 AV
12	3709.00	33.14	54.00	-20.86 AV
13	4636.25	36.44	54.00	-17.56 AV
14	5563.50	37.28	54.00	-16.72 AV
15	6490.75	39.75	54.00	-14.25 AV
16	7418.00	43.05	54.00	-10.95 AV
17	8345.25	44.04	54.00	-9.96 AV
18	9272.50	45.84	54.00	-8.16 AV

- EMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level – Limit value.



### 4.3 NUMBER OF HOPPING FREQUENCY USED

#### 4.3.1 LIMIT OF HOPPING FREQUENCY USED

At least 15 channels frequencies, and should be equally spaced.

#### 4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009

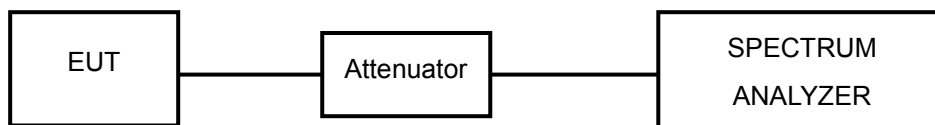
#### 4.3.3 TEST PROCEDURES

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via an attenuator. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- Set the SA on View mode and then plot the result on SA screen.
- Repeat above procedures until all frequencies measured were complete.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.5 TEST SETUP

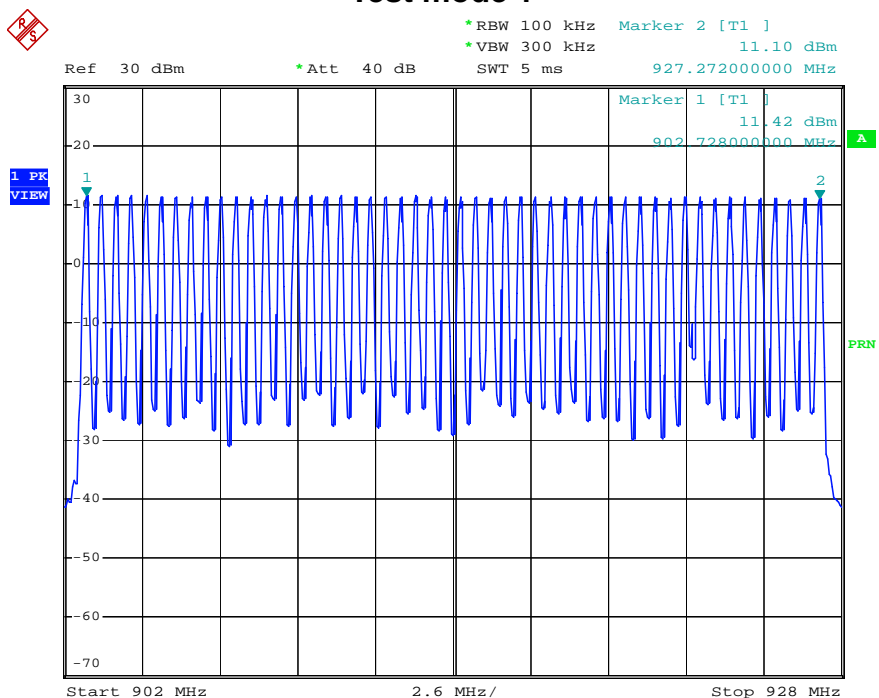


#### 4.3.6 TEST RESULTS

There are 50 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

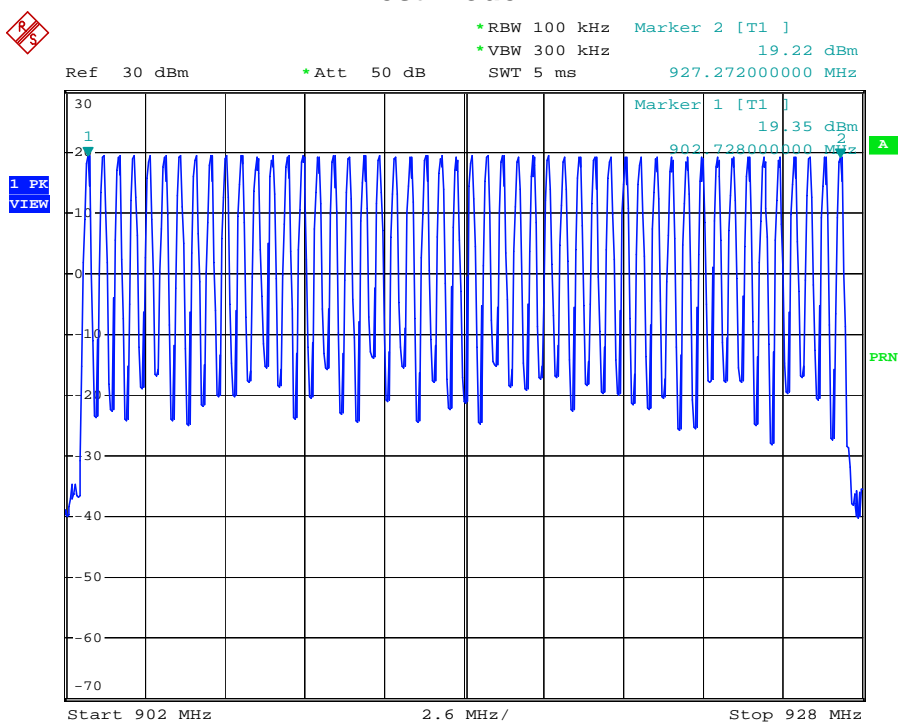


### Test mode 1



Date: 22.JUL.2009 12:39:34

### Test mode 2



Date: 23.JUL.2009 15:39:49



#### 4.4 DWELL TIME ON EACH CHANNEL

##### 4.4.1 LIMIT OF DWELL TIME USED

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

##### 4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009

##### 4.4.3 TEST PROCEDURES

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via an attenuator. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- Repeat above procedures until all different time-slot modes have been completed.

##### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation.



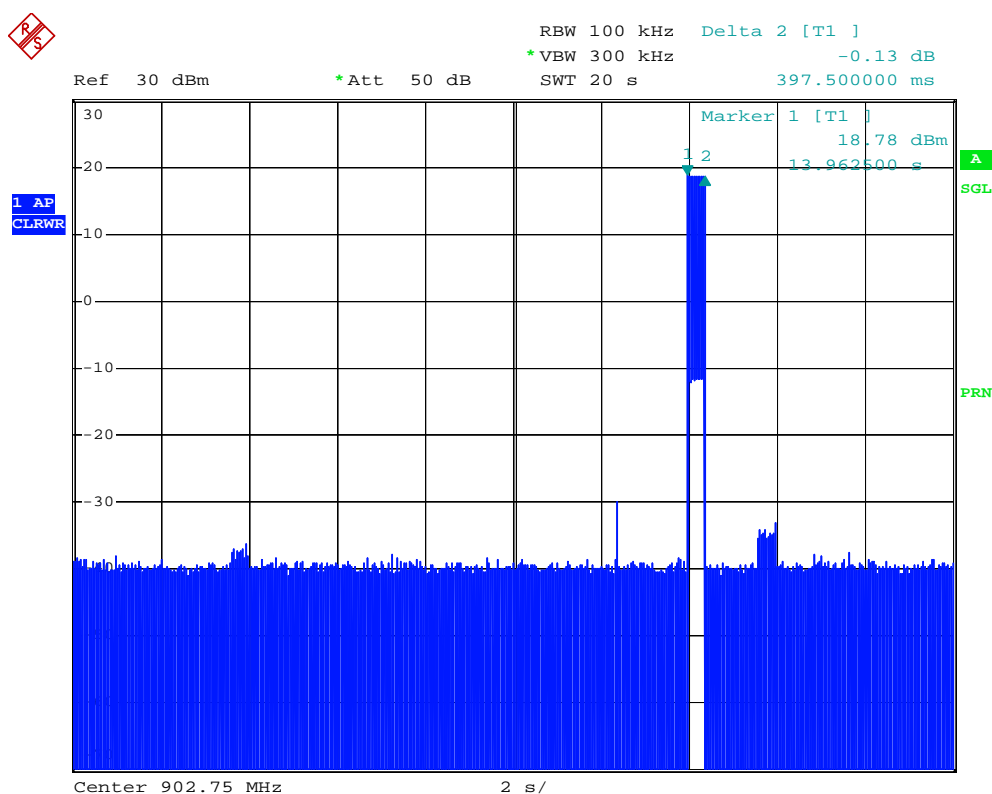
## 4.4.5 TEST SETUP

Same as 4.3.5.

## 4.4.6 TEST RESULTS

<b>TEST MODE</b>	Mode 1	<b>INPUT POWER</b>	120Vac, 60Hz
<b>MODULATION TYPE</b>	ASK	<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 60%RH, 1001hpa
<b>TESTED BY</b>	Ray Xue		

NUMBER OF TRANSMISSION IN A 20S	LENGTH OF TRANSMISSION TIME(MSEC)	RESULT (MSEC)	LIMIT (MSEC)
1	397.5	397.5	400

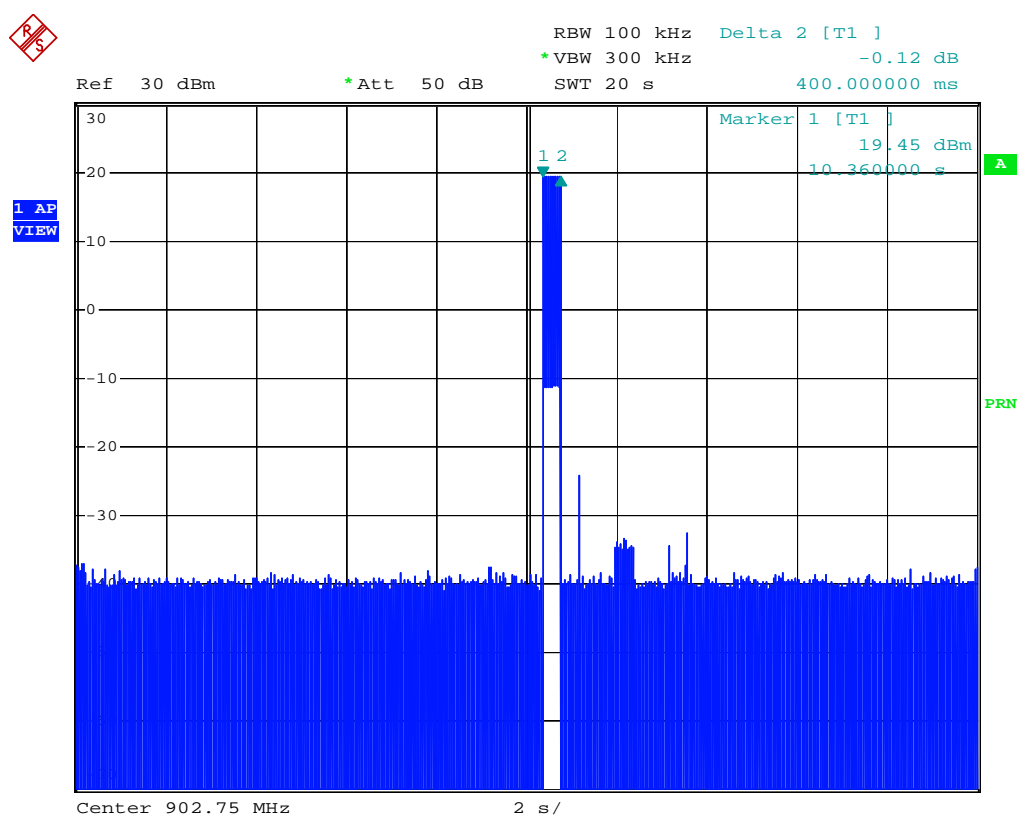


Date: 23.JUL.2009 15:01:31



<b>TEST MODE</b>	Mode 2	<b>INPUT POWER</b>	120Vac, 60Hz
<b>MODULATION TYPE</b>	ASK	<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 60%RH, 1001hpa
<b>TESTED BY</b>	Ray Xue		

NUMBER OF TRANSMISSION IN A 20S	LENGTH OF TRANSMISSION TIME(MSEC)	RESULT (MSEC)	LIMIT (MSEC)
1	400	400	400



Date: 23.JUL.2009 16:20:06



## 4.5 CHANNEL BANDWIDTH

### 4.5.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 902-928MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dB bandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

### 4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009

### 4.5.3 TEST PROCEDURE

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- Repeat above procedures until all frequencies measured were complete.





#### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.5.5 TEST SETUP

Same as 4.3.5.

#### 4.5.6 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



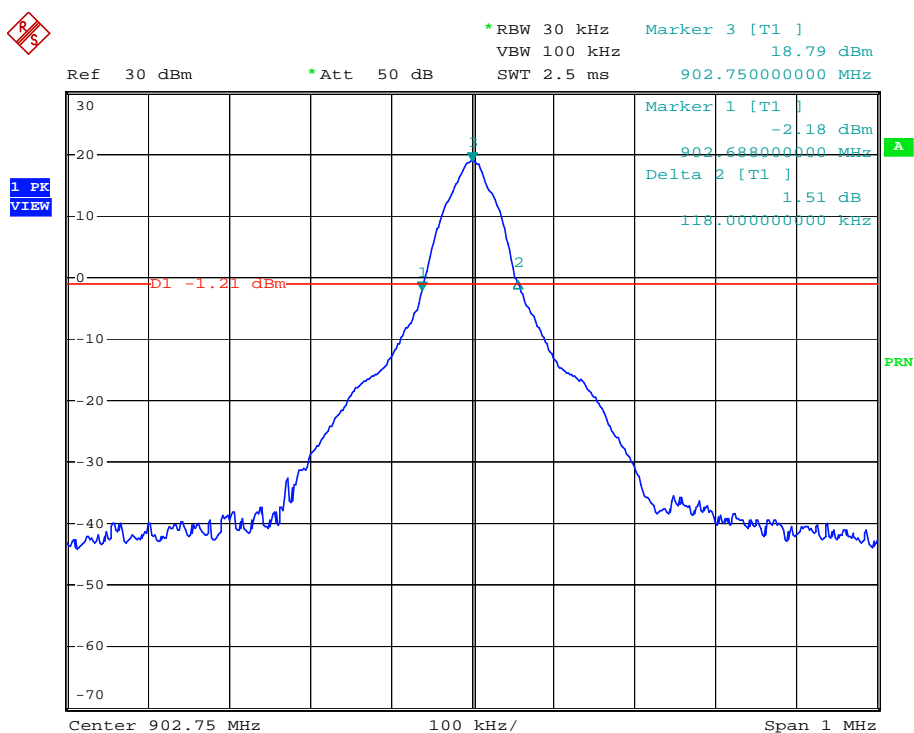
## 4.5.7 TEST RESULTS

## Mode 1

<b>MODULATION TYPE</b>	ASK	<b>ENVIRONMENTAL CONDITIONS</b>	24deg. C, 64%RH, 991hPa
<b>INPUT POWER</b>	5Vdc from adapter	<b>TESTED BY</b>	Ray Xue

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	902.75	0.118
24	914.75	0.13
49	927.25	0.128

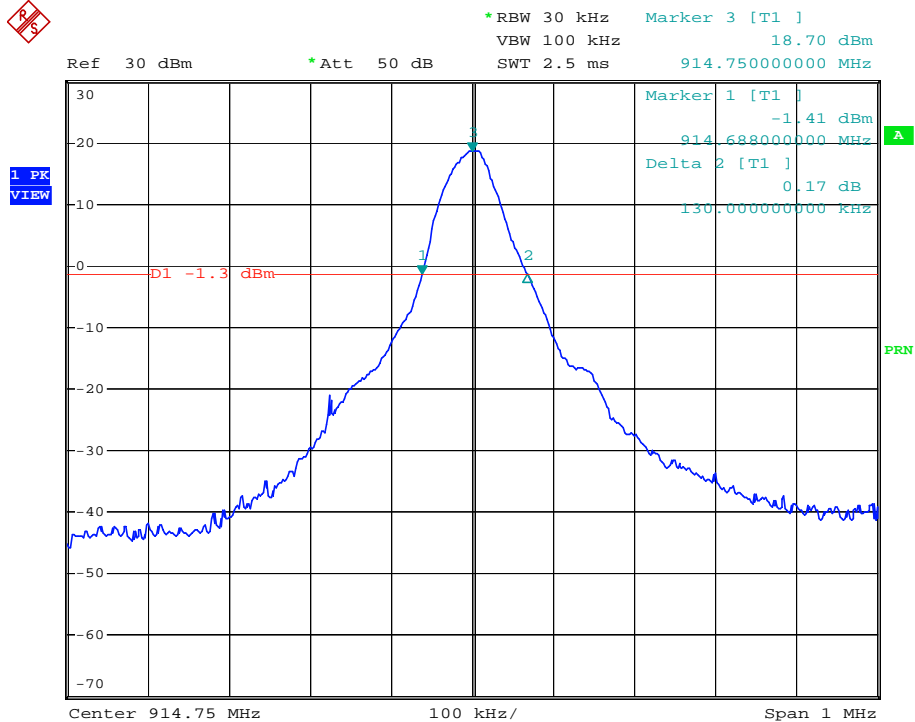
## CH 0



Date: 23.JUL.2009 14:46:49

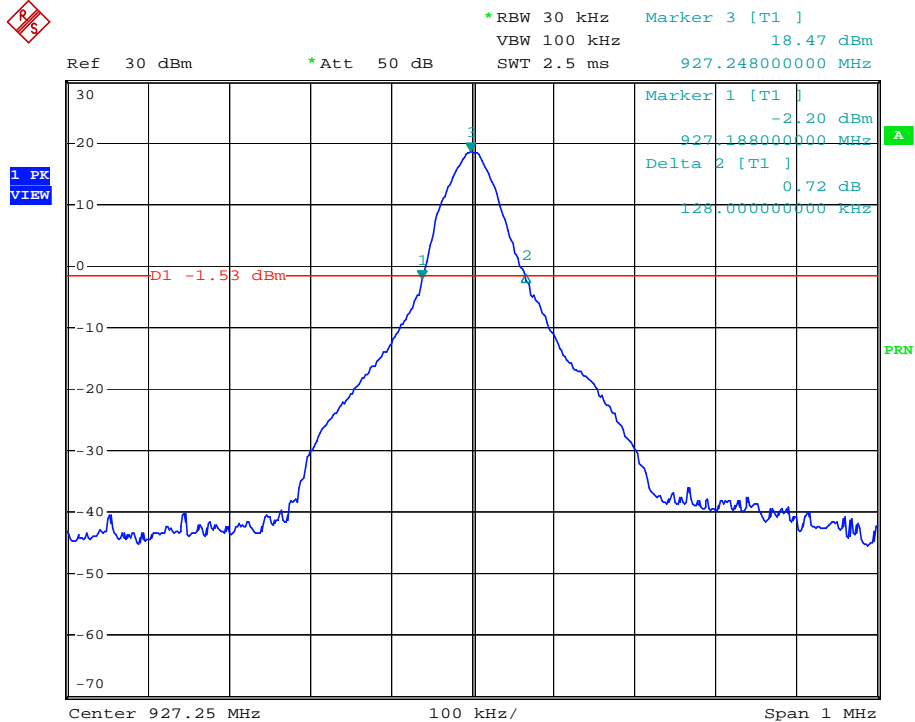


## CH 24



Date: 23.JUL.2009 14:48:08

## CH 49



Date: 23.JUL.2009 14:49:44

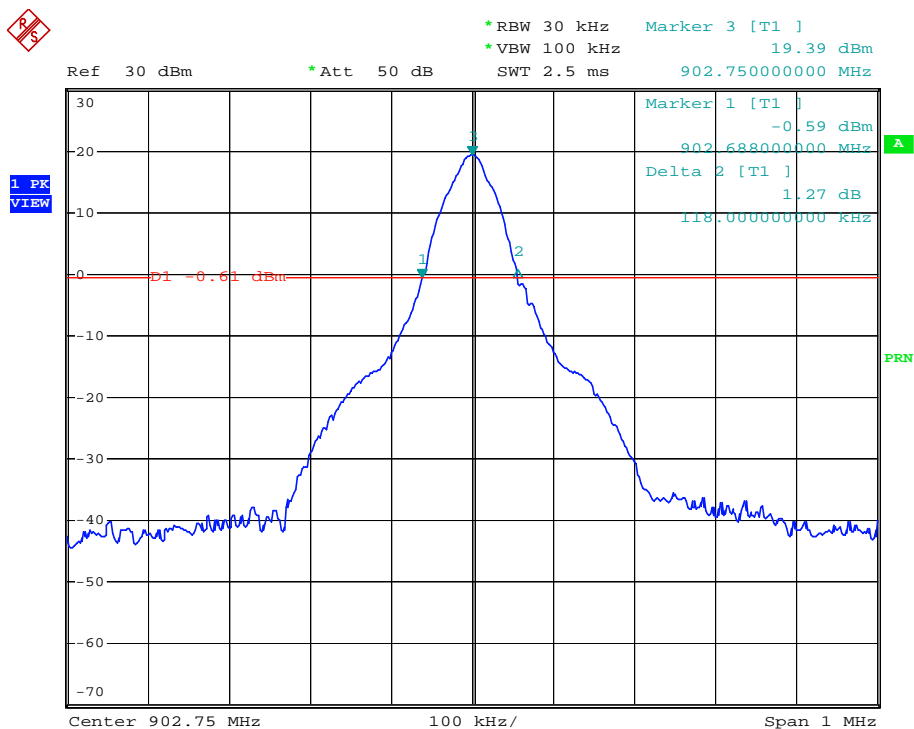


## Mode 2

<b>MODULATION TYPE</b>	ASK	<b>ENVIRONMENTAL CONDITIONS</b>	24deg. C, 64%RH, 991hPa
<b>INPUT POWER</b>	5Vdc from adapter	<b>TESTED BY</b>	Ray Xue

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	902.75	0.118
24	914.75	0.132
49	927.25	0.124

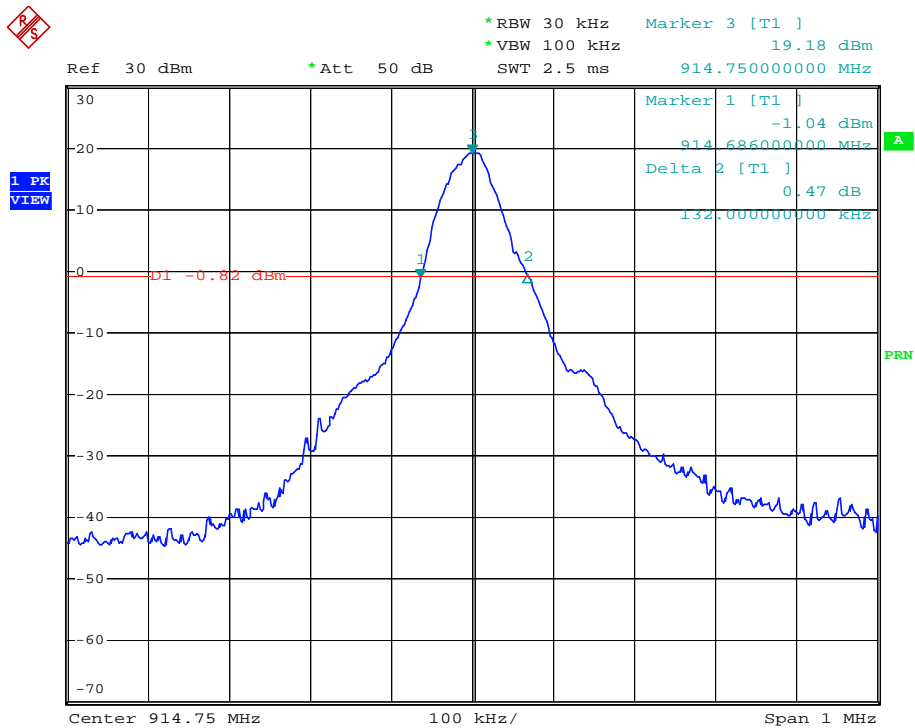
## Ch0



Date: 23.JUL.2009 15:51:22

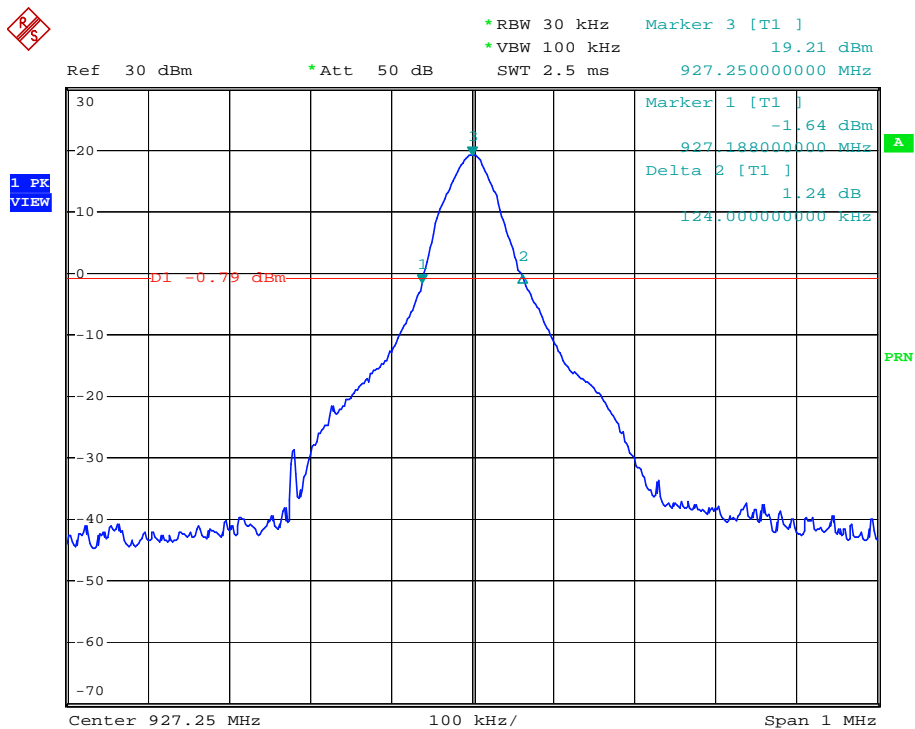


## Ch24



Date: 23.JUL.2009 15:52:44

## Ch49



Date: 23.JUL.2009 15:55:20



## 4.6 HOPPING CHANNEL SEPARATION

### 4.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

### 4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009

**NOTES:** The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

### 4.6.3 TEST PROCEDURES

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- By using the MaxHold function record the separation of two adjacent channels.
- Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
- Repeat above procedures until all frequencies measured were complete.

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.6.5 TEST SETUP

Same as 4.3.5



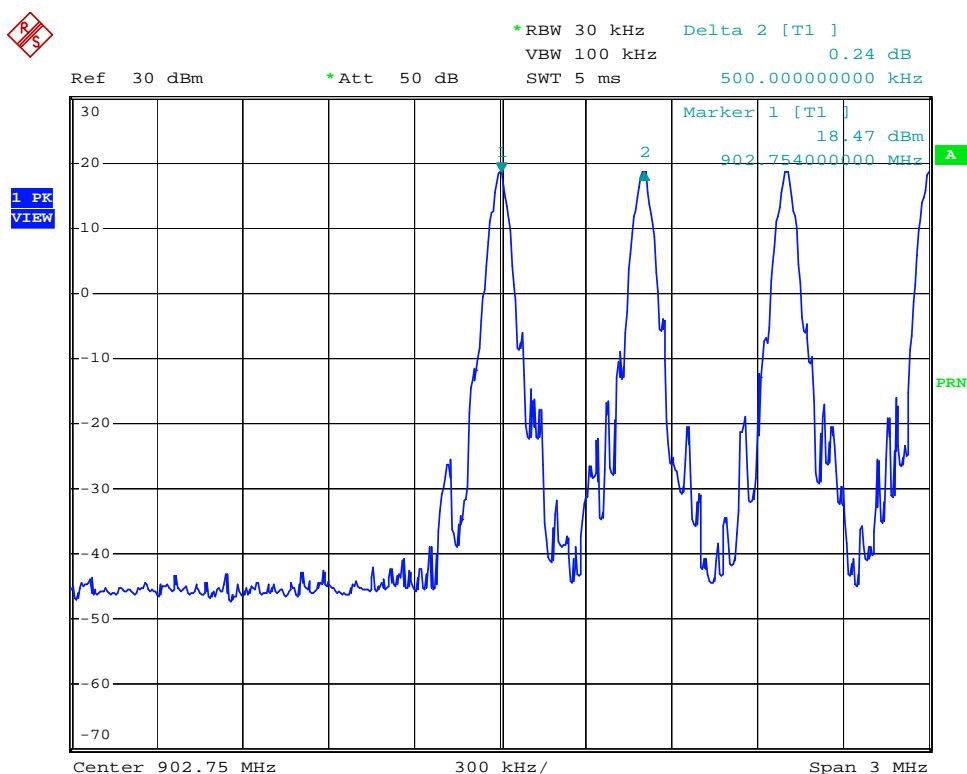
## 4.6.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	120Vac, 60Hz
MODULATION TYPE	ASK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001Hpa
TESTED BY	Ray Xue		

CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	902.75	0.50	0.12	0.08	pass
24	914.75	0.50	0.13	0.09	pass
49	927.25	0.50	0.13	0.09	pass

**NOTE:** The minimum limit is two-third of 20dB bandwidth.

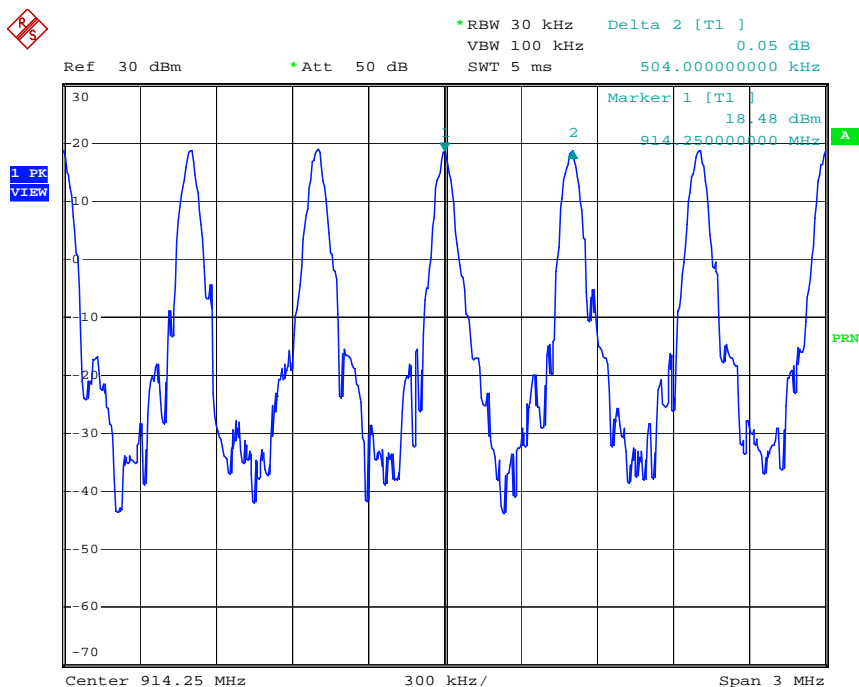
CH0



Date: 23.JUL.2009 14:55:59

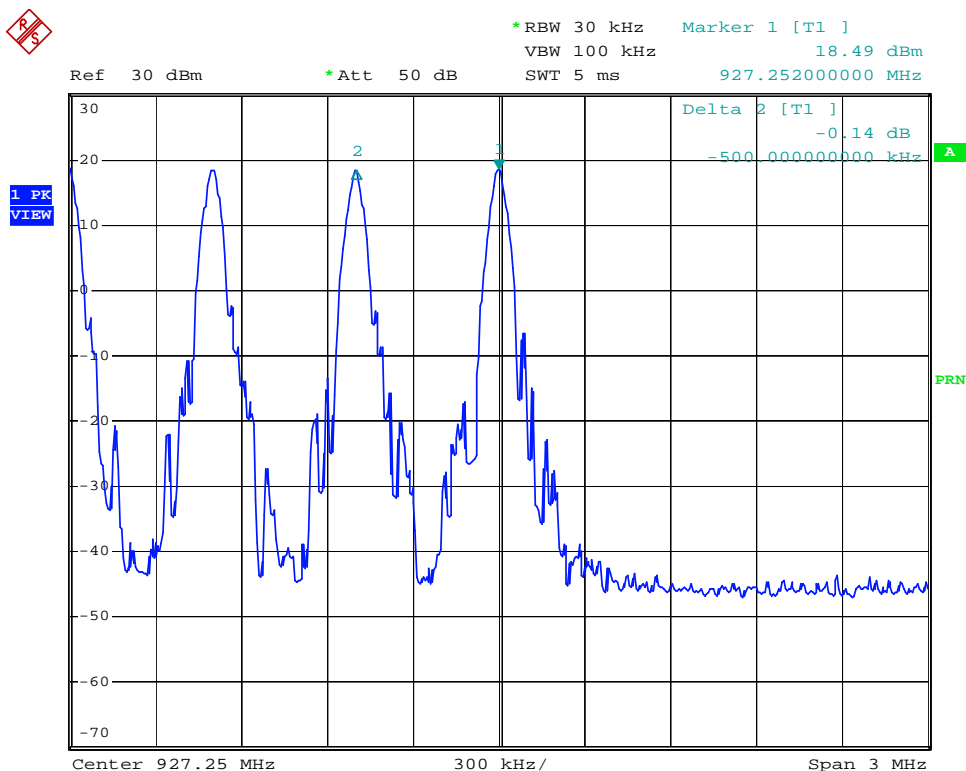


## CH24



Date: 23.JUL.2009 14:54:21

## CH49



Date: 23.JUL.2009 14:57:52



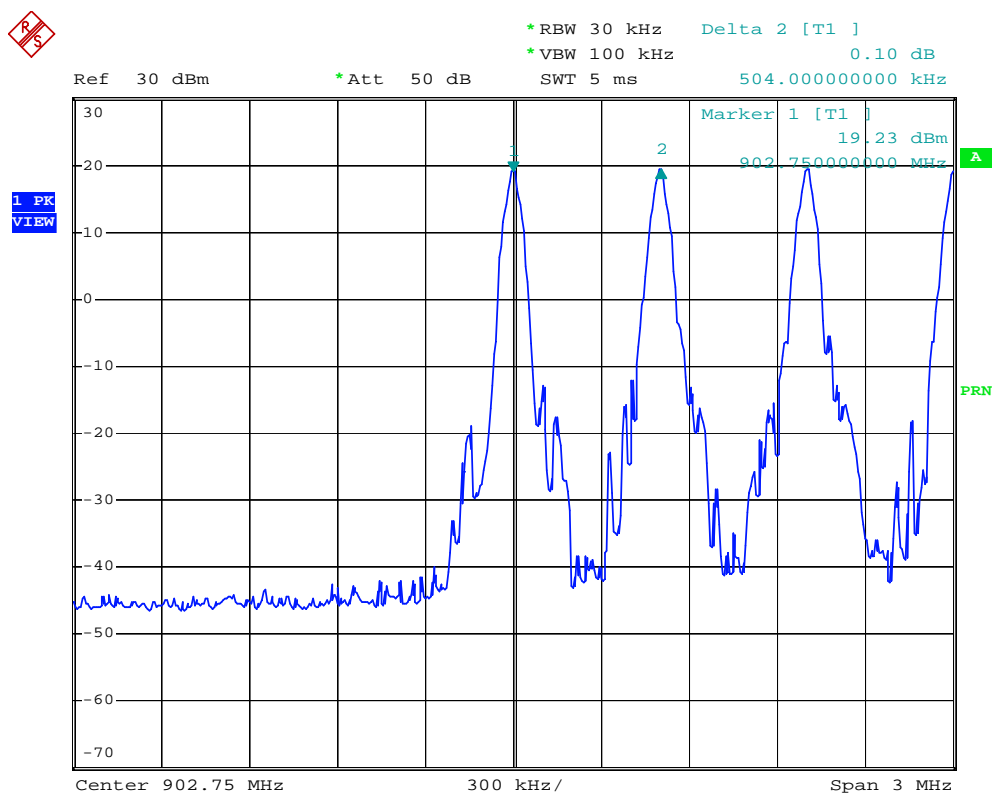


<b>TEST MODE</b>	Mode 2	<b>INPUT POWER</b>	120Vac, 60Hz
<b>MODULATION TYPE</b>	ASK	<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 60%RH, 1001Hpa
<b>TESTED BY</b>	Ray Xue		

CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	902.75	0.50	0.12	0.08	pass
24	914.75	0.50	0.13	0.09	pass
49	927.25	0.50	0.12	0.08	pass

**NOTE:** The minimum limit is two-third of 20dB bandwidth.

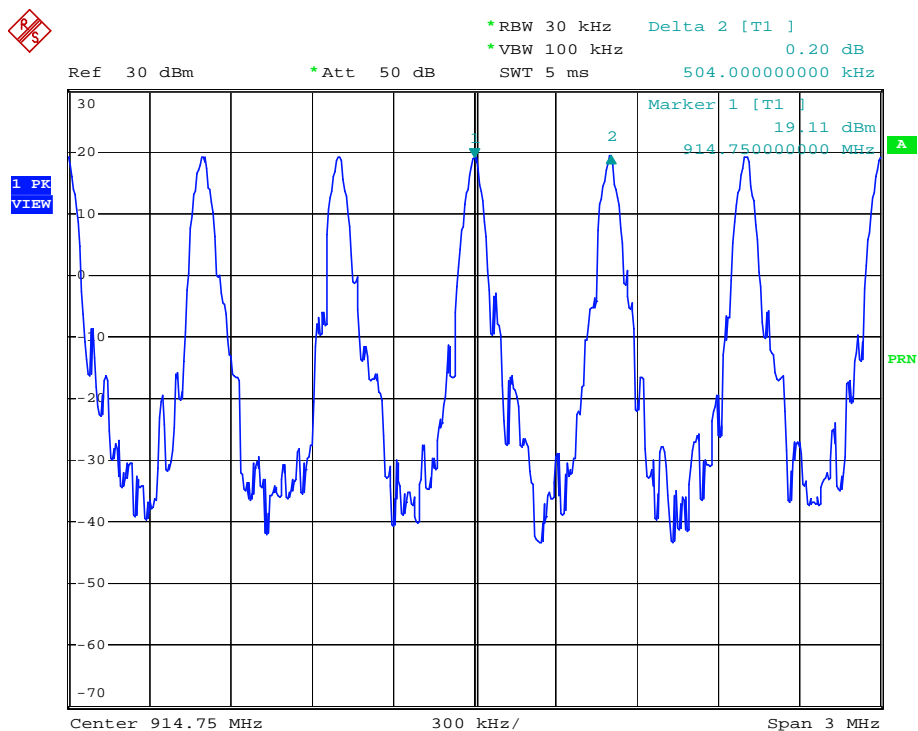
## CH0



Date: 23.JUL.2009 16:17:44

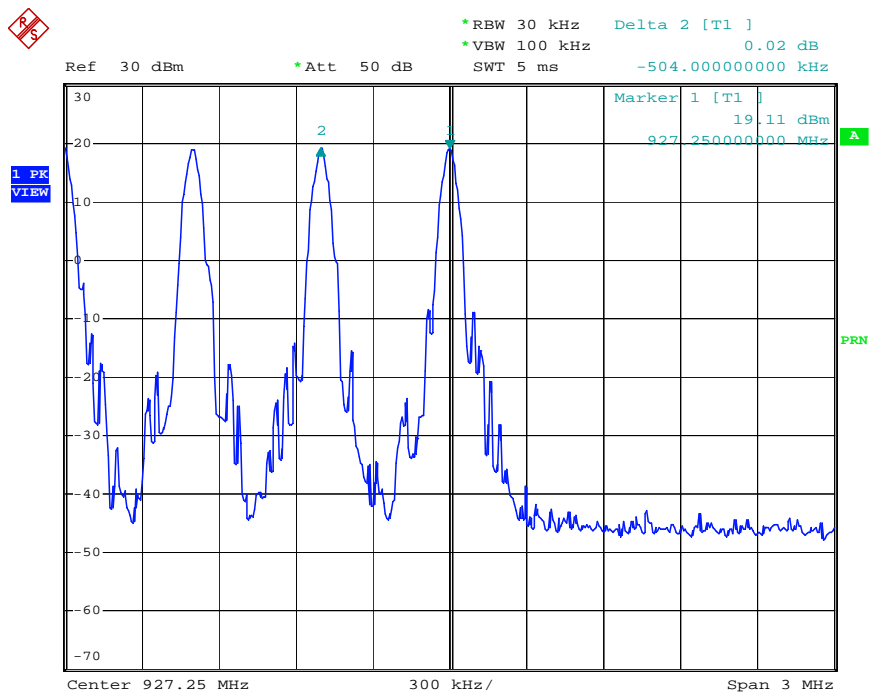


## CH24



Date: 23.JUL.2009 15:46:28

## CH49



Date: 23.JUL.2009 15:48:55



## 4.7 MAXIMUM PEAK OUTPUT POWER

### 4.7.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 125mW.

### 4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009

### 4.7.3 TEST PROCEDURES

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument via an attenuator. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using 1MHz RBW and 3 MHz VBW.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

### 4.7.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.7.5 TEST SETUP

Same as 4.3.5.



#### 4.7.6 EUT OPERATING CONDITION

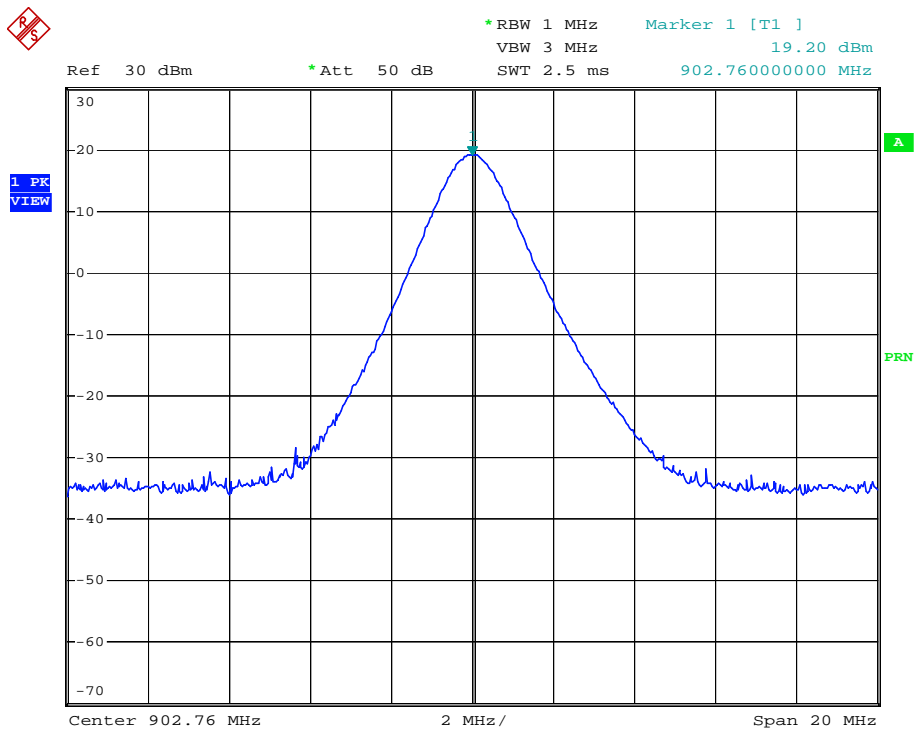
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.7.7 TEST RESULTS

<b>TEST MODE</b>	Mode 1	<b>INPUT POWER</b>	120Vac, 60Hz
<b>MODULATION TYPE</b>	ASK	<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 60%RH, 1001hpa
<b>TESTED BY</b>	Ray Xue		

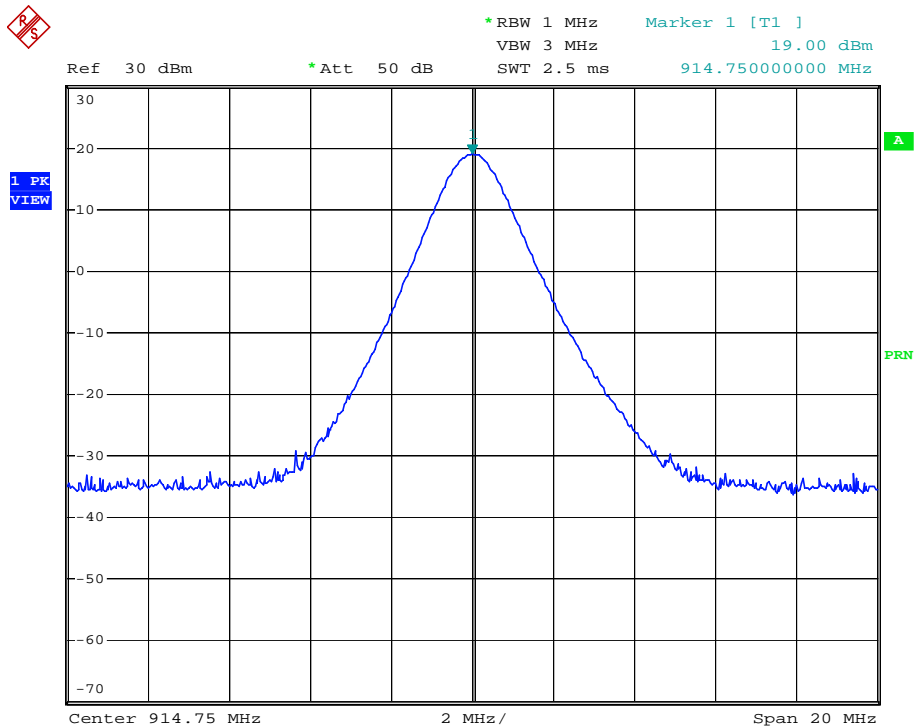
CHANNEL	CHANNEL FREQUENCY (MHz)	Reading Value (dBm)	Attenuation (dB)	PK Power (dBm)	Limit (dBm)	Result
CH0	902.75	19.2	10	29.2	30	PASS
CH24	914.75	19.0	10	29.0	30	PASS
CH49	927.25	18.61	10	28.61	30	PASS

Ch0



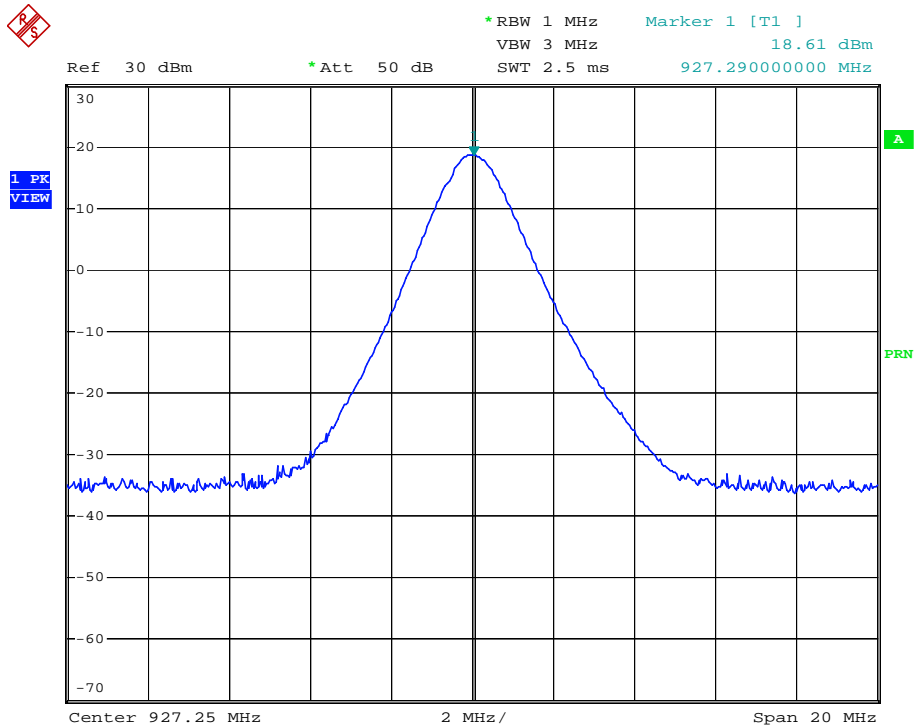
Date: 23.JUL.2009 14:40:05

## Ch24



Date: 23.JUL.2009 14:41:20

## Ch49

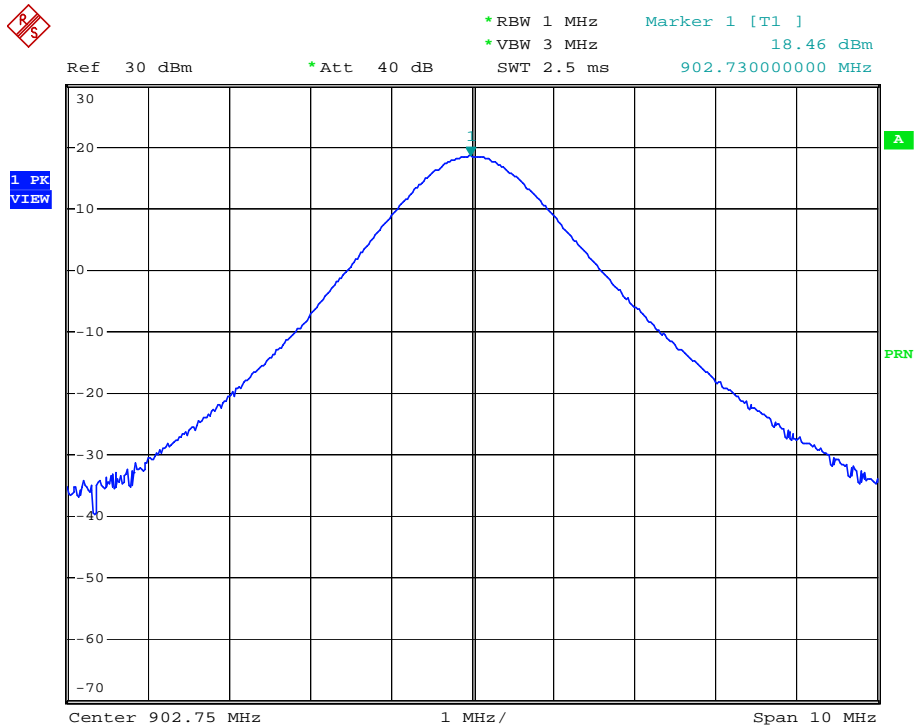


Date: 23.JUL.2009 14:42:33

TEST MODE	Mode 2	INPUT POWER	120Vac, 60Hz
MODULATION TYPE	ASK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001hpa
TESTED BY	Ray Xue		

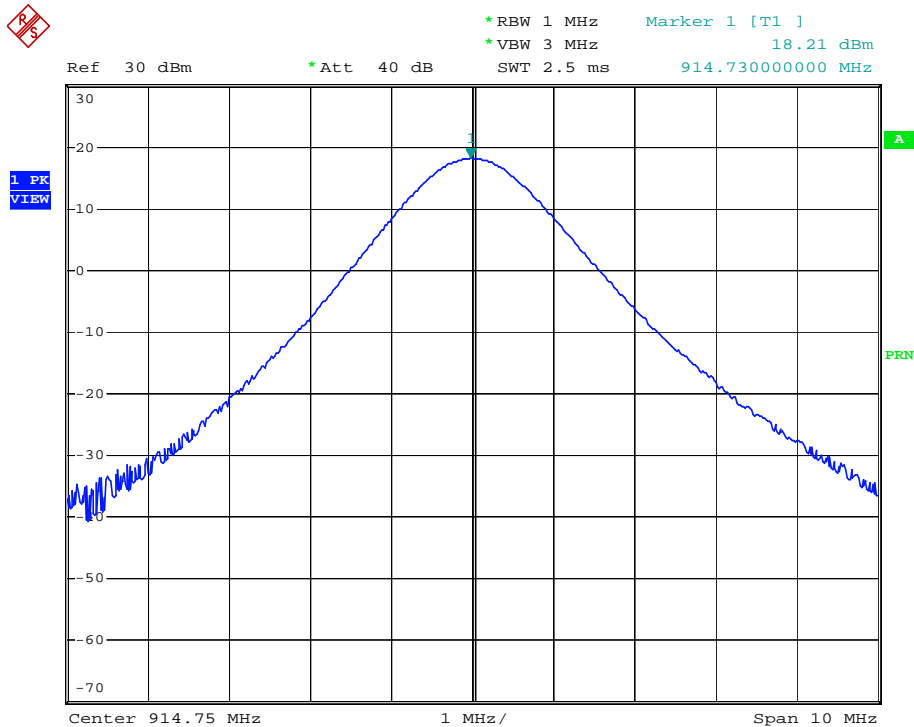
CHANNEL	CHANNEL FREQUENCY (MHz)	Reading Value (dBm)	Attenuation (dB)	PK Power (dBm)	Limit (dBm)	Result
CH0	902.75	18.46	10	28.46	30	PASS
CH24	914.75	18.21	10	28.21	30	PASS
CH49	927.25	17.86	10	27.86	30	PASS

Ch0



Date: 2.SEP.2009 11:44:26

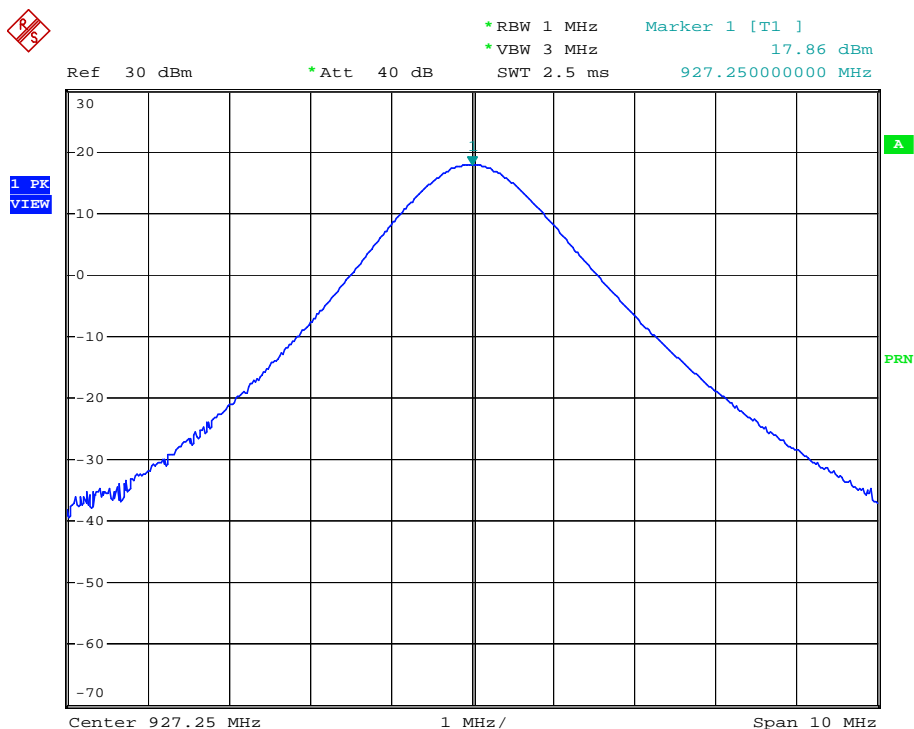
## Ch24



Date: 2.SEP.2009 11:47:06



Ch49



Date: 2.SEP.2009 11:48:03

## 4.8 BAND EDGES MEASUREMENT

### 4.8.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100KHz RBW).

### 4.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009

### 4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz with suitable frequency





span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

#### 4.8.4 DEVIATION FROM TEST STANDARD

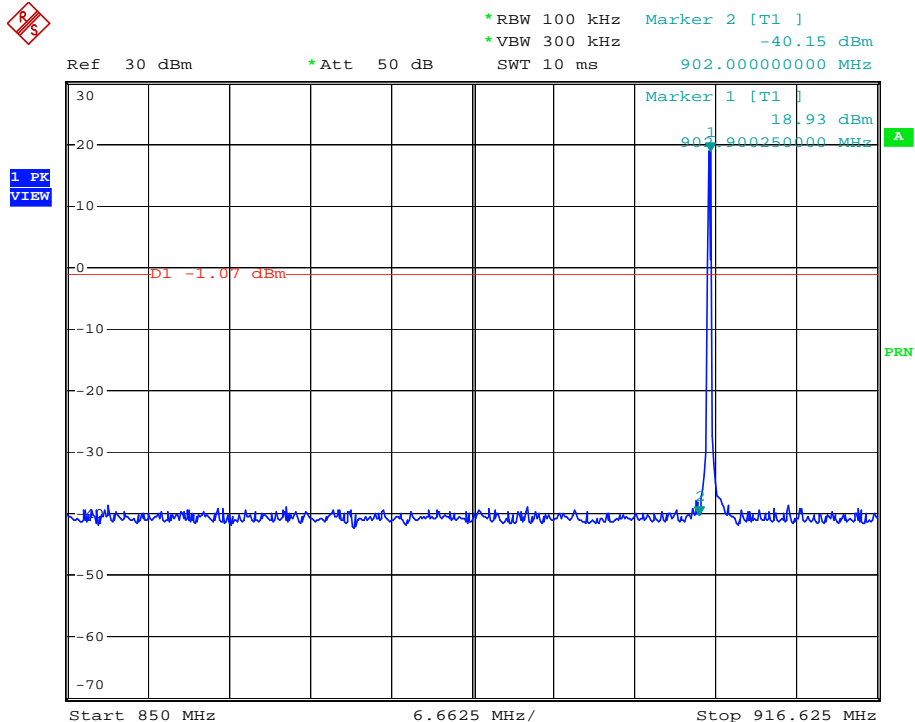
No deviation.

#### 4.8.5 EUT OPERATING CONDITION

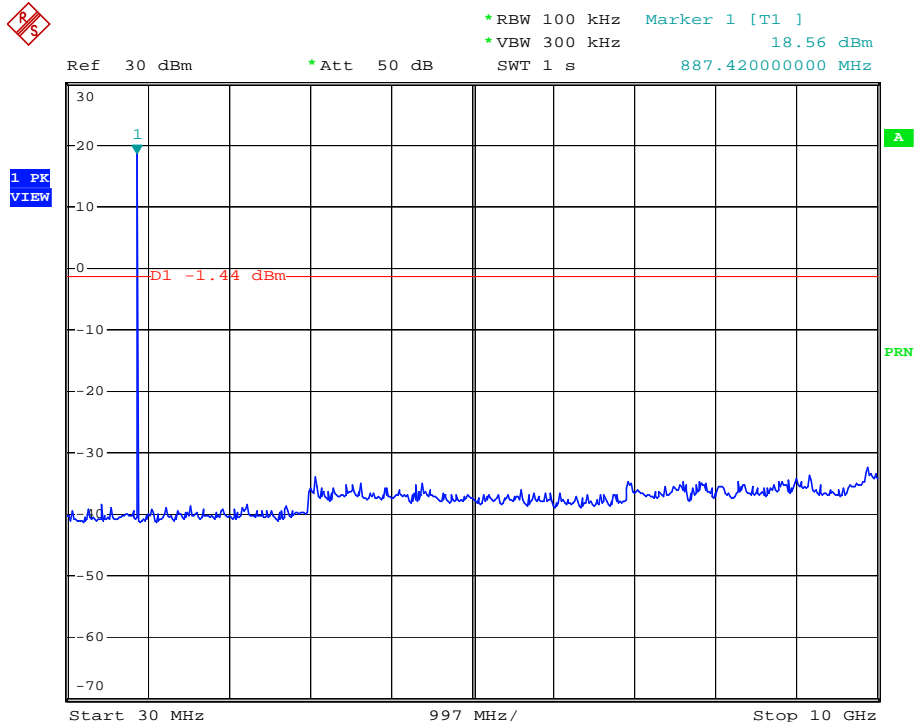
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.8.6 TEST RESULTS

The spectrum plots are attached on the following 4 images. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

**MODE 1**  
**CH 0**

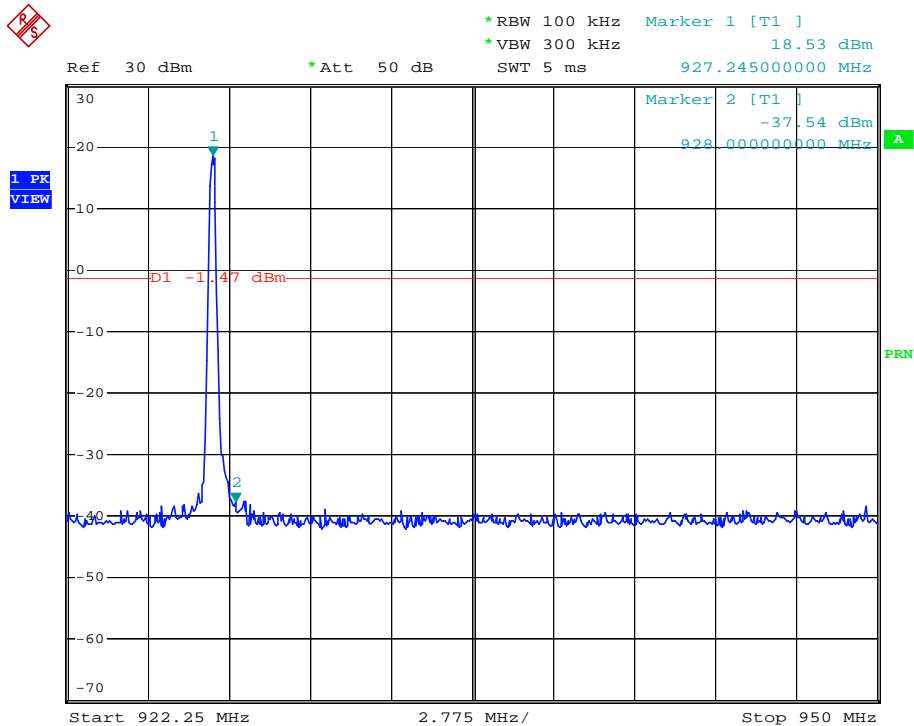
Date: 23.JUL.2009 15:28:18



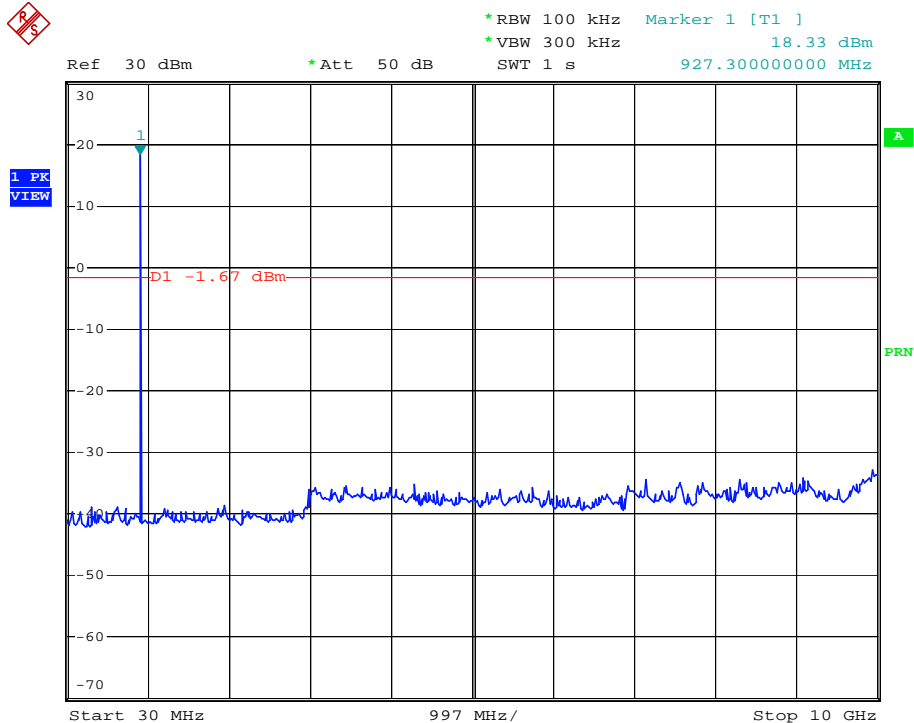
Date: 23.JUL.2009 15:13:24



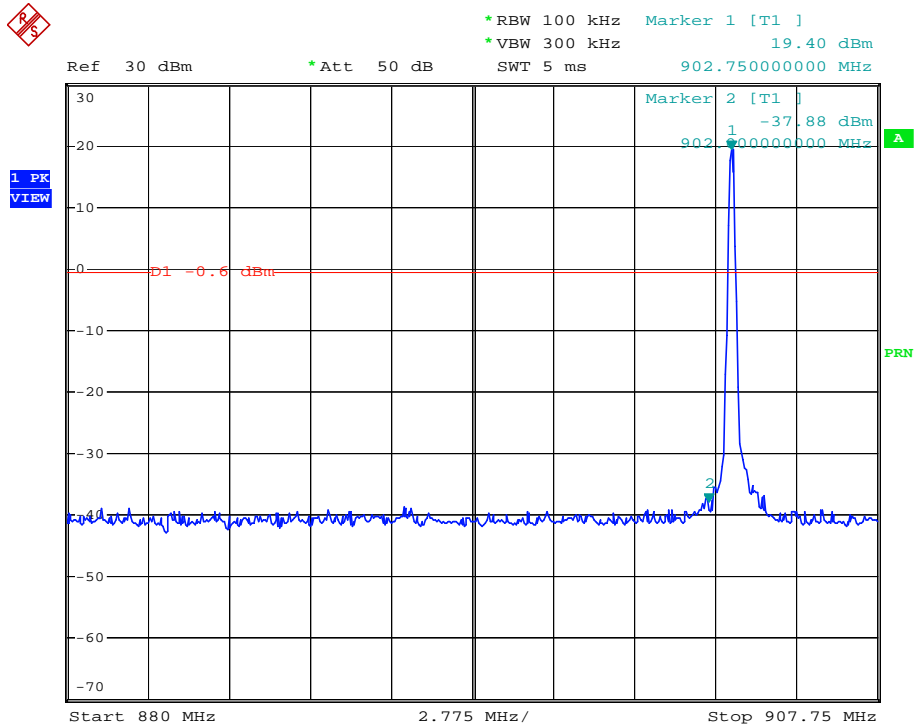
## CH 49



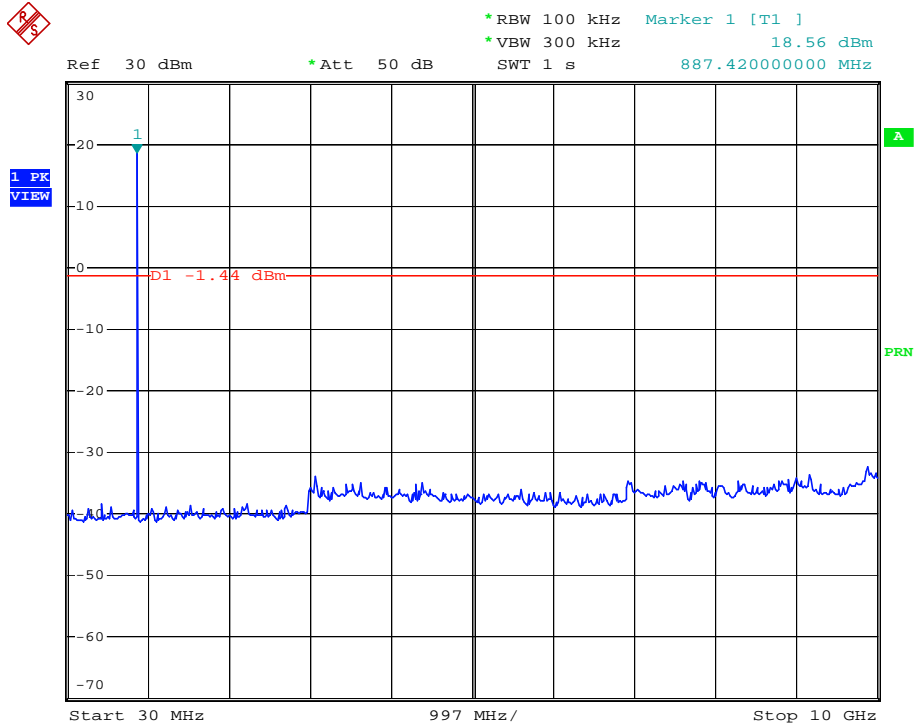
Date: 23.JUL.2009 15:17:13



Date: 23.JUL.2009 15:29:23

**MODE 2**  
**CH 0**

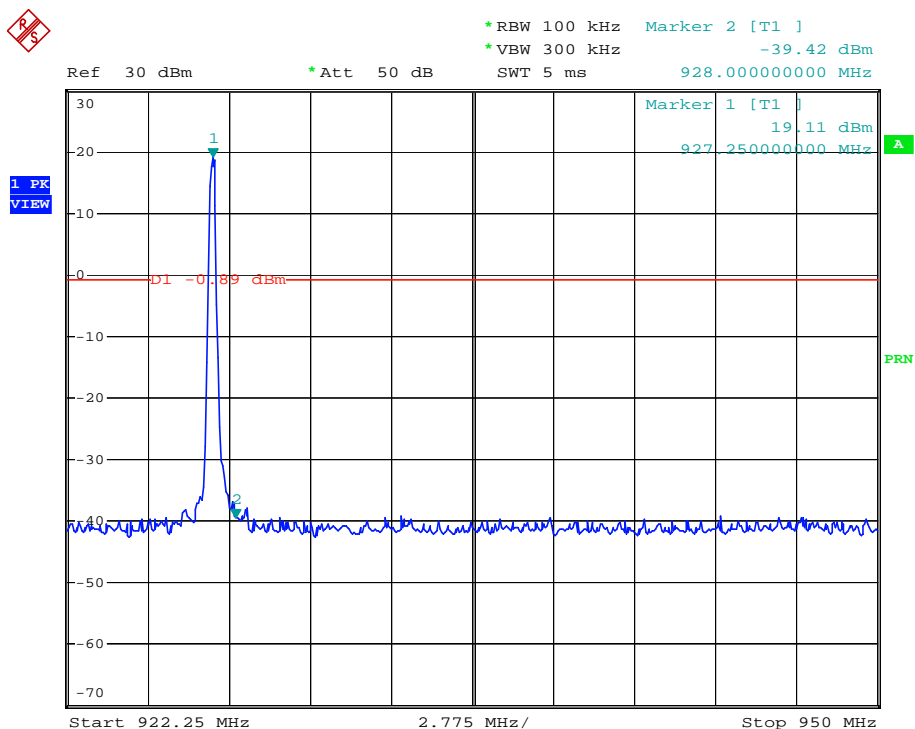
Date: 23.JUL.2009 16:02:15



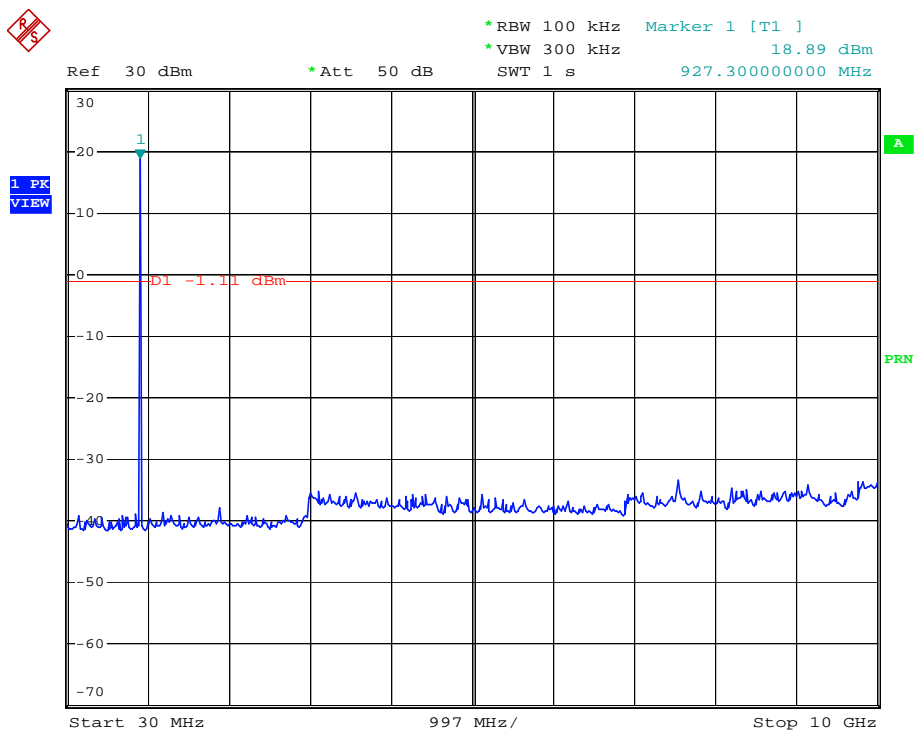
Date: 23.JUL.2009 15:13:24



## CH49



Date: 23.JUL.2009 16:05:51



Date: 23.JUL.2009 16:04:14



## **4.9 ANTENNA REQUIREMENT**

### **4.9.1 STANDARD APPLICABLE**

For intentional device, according to FCC 47 CFR Section 15.203, 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.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **4.9.2 ANTENNA CONNECTED CONSTRUCTION**

The internal antenna used in this product is a patch type antenna with 3dBi gain, with a male MMCX connector.

The external antenna for test in this report is a panel type antenna with 6dBi gain, with a male RP-TNC connector.

## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

### RADIATED EMISSION MEASUREMENT







## CONDUCTED EMISSION MEASUREMENT





## 6. PHOTOGRAPHS OF THE EUT













## 7. APPENDIX - INFORMATION ON THE TESTING LABORATORIES

We, ADT (Shanghai) Corporation, were founded in 2004 to provide our best service in EMC, Radio and Vehicle consultation. Our laboratories are accredited by the following accreditation bodies according to ISO/IEC 17025 (2005) .

<b>USA</b>	A2LA Certificate No.: 2343.01
<b>China</b>	CNAS Certificate No.: L2810

Copies of accreditation certificates could be inquired from our office. If you have any comments, please feel free to contact us at the following:

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Email: [bvadtshmail@cn.bureauveritas.com](mailto:bvadtshmail@cn.bureauveritas.com)

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