FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Applicant :	**RC Model Fun Ltd.**
Address :	**No. 61, Tingkeng Rd, Tingshan, Houjie, Dongguan, Guangdong**
Product Name :	**2.4GHz LCD Transmitter**
Model Name :	**NASA701, NASAXXX/SKYXXX, NASA702, NASA703, NASA704, NASA705, NASA706, NASA707, NASA708, NASA709, NASA501, NASA502, NASA503, NASA504, NASA505, NASA506, NASA507, NASA508, NASA509, NASA401, NASA402, NASA403, NASA404, NASA405, NASA801, NASA802, NASA803, NASA804, NASA805, NASA806, NASA807, NASA601, NASA602, NASA603, NASA604, NASA605, NASA606**
Brand Name :	**SKYARTEC**
FCC ID :	**WKN-NASA701**
Report No. :	**MTE/DAL/D12111656**
Date of Issue :	**Nov. 28, 2012**

Issued by :	**Most Technology Service Co., Ltd.**
Address :	**No.5, Langshan 2nd Rd., North Hi-Tech Industrial park, Nanshan, Shenzhen, Guangdong, China**
Tel :	**86-755-8617 0306**
Fax :	**86-755-8617 0310**

TABLE OF CONTENTS

1. VERIFICATION OF CONFORMITY

Equipment Under Test:	2.4GHz LCD Transmitter
Brand Name:	SKYARTEC
Model Number:	NASA701
Series Model Number:	NASAXXX/SKYXXX, NASA702, NASA703, NASA704, NASA705, NASA706, NASA707, NASA708, NASA709, NASA501, NASA502, NASA503, NASA504, NASA505, NASA506, NASA507, NASA508, NASA509, NASA401, NASA402, NASA403, NASA404, NASA405, NASA801, NASA802, NASA803, NASA804, NASA805, NASA806, NASA807, NASA601, NASA602, NASA603, NASA604, NASA605, NASA606
FCC ID：	WKN-NASA701
Applicant:	RC Model Fun Ltd.
	No. 61, Tingkeng Rd, Tingshan, Houjie, Dongguan, Guangdong
Manufacturer:	RC Model Fun Ltd.
	No. 61, Tingkeng Rd, Tingshan, Houjie, Dongguan, Guangdong
Technical Standards:	47 CFR Part 15 Subpart C
File Number:	MTE/DAL/D12111656
Date of test:	Nov. 07-28, 2012
Deviation:	None
Condition of Test Sample:	Normal
Test Result:	PASS

The above equipment was tested by *MOST* for compliance with the requirements set forth in FCC rules and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

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

Prepared by (+ signature): Dona

Dona Liu Nov. 15, 2012

Review by (+ signature):

Elva Wong Nov. 28, 2012

Approved by (+ signature):

MOST TECHNOLOGY SERVICE CO., LTD. APPROVED EMC & SAFETY

Yvette Zhou(Manager) Nov. 28, 2012

2. GENERAL INFORMATION

2.1 Product Information

Description:	2.4GHz LCD Transmitter
Model Name:	NASA701
Series Number:	NASAXXX/SKYXXX, NASA702, NASA703, NASA704, NASA705, NASA706, NASA707, NASA708, NASA709, NASA501, NASA502, NASA503, NASA504, NASA505, NASA506, NASA507, NASA508, NASA509, NASA401, NASA402, NASA403, NASA404, NASA405, NASA801, NASA802, NASA803, NASA804, NASA805, NASA806, NASA807, NASA601, NASA602, NASA603, NASA604, NASA605, NASA606
Model Difference description:	All models are electrically identical, only model name is different.
Frequency Range:	2410MHz – 2470MHz
Number of Channels:	61
Modulation Technique:	MSK
Antenna Type:	External
Antenna Gain:	2.42dBi
Power Supply:	DC 12V by battery(AA*8)
Temperature Range:	-20°C ~ +55°C

NOTE:

1. For a more detailed features description about the EUT, please refer to User's Manual.

2.2 Objective

Perform FCC Part 15 Subpart C tests for FCC Marking.

2.3 Test Standards and Results

Test items and the results are as bellow:

No.	Section	Description	Result	Date of Test
1	15.247(a)(2)	6dB Bandwidth	PASS	2012/11/28
2	15.247(b)(3)	Peak Output Power	PASS	2012/11/14
3	15.247(d)	conducted spurious emission	PASS	2012/11/28
4	15.247(d)	Band Edge	PASS	2012/11/14
5	15.247(e)	Power Spectral Density	PASS	2012/11/14
6	15.207	Conducted Emission	N/A	N/A
7	15.247(d) 15.205 15.209	Radiated Emission	PASS	2012/11/13

Note: 1. The test result judgment is decided by the limit of measurement standard
2. The information of measurement uncertainty is available upon the customer's request.

2.4 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35ºC
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

2.5 MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

The report uncertainty of measurement y$\pm$U, where expended uncertainly U is based on a standard uncertainty multiplied by a coverage factor of k=2,Providing a level of confidence of approximately 95%

- Uncertainty of Conducted Emission, Uc = ±1.8dB
- Uncertainty of Radiated Emission, Uc = ±3.2dB

3. TEST FACILITY

Test Site:	Most Technology Service Co., Ltd.
Location:	No.5, Nangshan 2nd Rd., North Hi-Tech Industrial park, Nanshan, Shenzhen, Guangdong, China
Description:	There is one 3m semi-anechoic an area test sites and two line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4 and CISPR 16 requirements. The FCC Registration Number is **490827.**
Site Filing:	The site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.
Instrument Tolerance:	All measuring equipment is in accord with ANSI C63.4 and CISPR 16 requirements that meet industry regulatory agency and accreditation agency requirement.
Ground Plane:	Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz.
558074 D01 DTS Meas Guidance v01：	provides Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under CFR Title 47 15.247

3.2 Test Conditions

The EUT has been tested under normal operating（TX）and standby（RX）condition.

The field strength of radiation emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis).

The following data show only with the worst case setup.

The worst case of Y axis was reported.

Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported by this report.

3.3 Channel List

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2410MHz	30	2439MHz	59	2468MHz
02	2411MHz	31	2440MHz	60	2469MHz
03	2412MHz	32	2441MHz	61	2470MHz
04	2413MHz	33	2442MHz		
05	2414MHz	34	2443MHz		
06	2415MHz	35	2444MHz		
07	2416MHz	36	2445MHz		
08	2417MHz	37	2446MHz		
09	2418MHz	38	2447MHz		
10	2419MHz	39	2448MHz		
11	2420MHz	40	2449MHz		
12	2421MHz	41	2450MHz		
13	2422MHz	42	2451MHz		
14	2423MHz	43	2452MHz		
15	2424MHz	44	2453MHz		
16	2425MHz	45	2454MHz		
17	2426MHz	46	2455MHz		
18	2427MHz	47	2456MHz		
19	2428MHz	48	2457MHz		
20	2429MHz	49	2458MHz		
21	2430MHz	50	2459MHz		
22	2431MHz	51	2460MHz		
23	2432MHz	52	2461MHz		
24	2433MHz	53	2462MHz		
25	2434MHz	54	2463MHz		
26	2435MHz	55	2464MHz		
27	2436MHz	56	2465MHz		
28	2437MHz	57	2466MHz		
29	2438MHz	58	2467MHz		

3.4 Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level, Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively

Pre-test Mode	Description
Mode 1	CH01/CH31/CH61
Mode 2	CH01/CH31/CH61
Mode 3	CH01/CH31/CH61

Note:
(1) The measurements are performed at the highest, middle, lowest available channels.
(2) The measurements are performed at all bit rate of transmitter, the worst data was reported.

3.5 Table of Parameters of Text Software Setting

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level, the RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of WLAN

Test Channel		
2410MHz	2440MHz	2470MHz

4. TEST EQUIPMENT LIST

Instrumentation: The following list contains equipment used at MOST for testing. The equipment conforms to the CISPR 16-1/ANSI C63.2 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10 kHz to 1.0 GHz or above.

No.	Equipment	Manufacturer	Model No.	S/N	Calibration date	Calibration Interval
1	Test Receiver	Rohde & Schwarz	ESCI	100492	2012/03/14	1 Year
2	Spectrum Analyzer	Agilent	E7405A	US44210471	2012/03/14	1 Year
3	L.I.S.N.	Rohde & Schwarz	ENV216	100093	2012/03/14	1 Year
4	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2012/03/14	1 Year
5	Terminator	Hubersuhner	50Ω	No.1	2012/03/14	1 Year
6	RF Cable	SchwarzBeck	N/A	No.1	2012/03/14	1 Year
7	Test Receiver	Rohde & Schwarz	ESPI	101202	2012/03/14	1 Year
8	Bilog Antenna	Sunol	JB3	MT-E116	2012/03/14	1 Year
9	Horn Antenna	SCHWARZBECK	BBHA 9120D	MT-E172	2012/03/14	1 Year
10	Horn Antenna	EM	EM-AH-10180	N/A	2012/03/14	1 Year
11	Cable	Resenberger	N/A	NO.1	2012/03/14	1 Year
12	Cable	SchwarzBeck	N/A	NO.2	2012/03/14	1 Year
13	Cable	SchwarzBeck	N/A	NO.3	2012/03/14	1 Year
14	DC Power Filter	DuoJi	DL2×30B	N/A	2012/03/14	1 Year
15	Single Phase Power Line Filter	DuoJi	FNF 202B30	N/A	2012/03/14	1 Year
16	3 Phase Power Line Filter	DuoJi	FNF 402B30	N/A	2012/03/14	1 Year
17	Test Receiver	Rohde & Schwarz	ESCI	100492	2012/03/14	1 Year
18	Absorbing Clamp	Luthi	MDS21	3635	2012/03/14	1 Year
19	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2012/03/14	1 Year
20	AC Power Source	Kikusui	AC40MA	LM003232	2012/03/14	1 Year
21	Test Analyzer	Kikusui	KHA1000	LM003720	2012/03/14	1 Year
22	Line Impendence Network	Kikusui	LIN40MA-PCR-L	LM002352	2012/03/14	1 Year
23	ESD Tester	Kikusui	KES4021	LM003537	2012/03/14	1 Year
24	EMCPRO System	EM Test	UCS-500-M4	V0648102026	2012/03/14	1 Year
25	Signal Generator	IFR	2032	203002/100	2012/03/14	1 Year
26	Amplifier	A&R	150W1000	301584	2012/03/14	1 Year
27	CDN	FCC	FCC-801-M2-25	47	2012/03/14	1 Year
28	CDN	FCC	FCC-801-M3-25	107	2012/03/14	1 Year
29	EM Injection Clamp	FCC	F-203I-23mm	403	2012/03/14	1 Year
30	RF Cable	MIYAZAKI	N/A	No.1/No.2	2012/03/14	1 Year
31	Universal Radio Communication Tester	ROHDE&SCHWARZ	CMU200	0304789	2012/03/14	1 Year
32	Telecommunication Antenna	European Antennas	PSA 75301R/170	0304213	2012/03/14	1 Year
33	8 Loop Antenna	ARA	PLA-1030/B	1029	2012/02/19	1 Year
34	Power Meter	R&S	NRVS	100444	2012/03/14	1 Year

NOTE: *Equipments listed above have been calibrated and are in the period of validation.*

5. 47 CFR Part 15 C 15.247 Requirements

5.1 6dB Bandwidth

5.1.1 Definition

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.1.2 Limit

FCC Part15(15.247)				
Section	Test Item	Limit	Frequency Range(MHz)	Result
15.247(a)(2)	Bandwidth	>=500KHz (6dB Bandwidth)	2400-2483.5	PASS

5.1. 3 Test Configuration

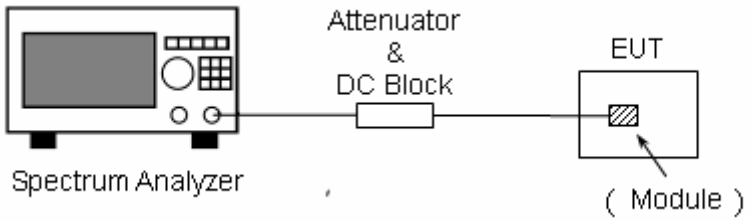


Figure 1: RF Test Setup

5.1.4 Test Procedure

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	>Measurement bandwidth or channel separation
RB	1-5% of the emission bandwidth(EBW)
VB	≧3 x RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

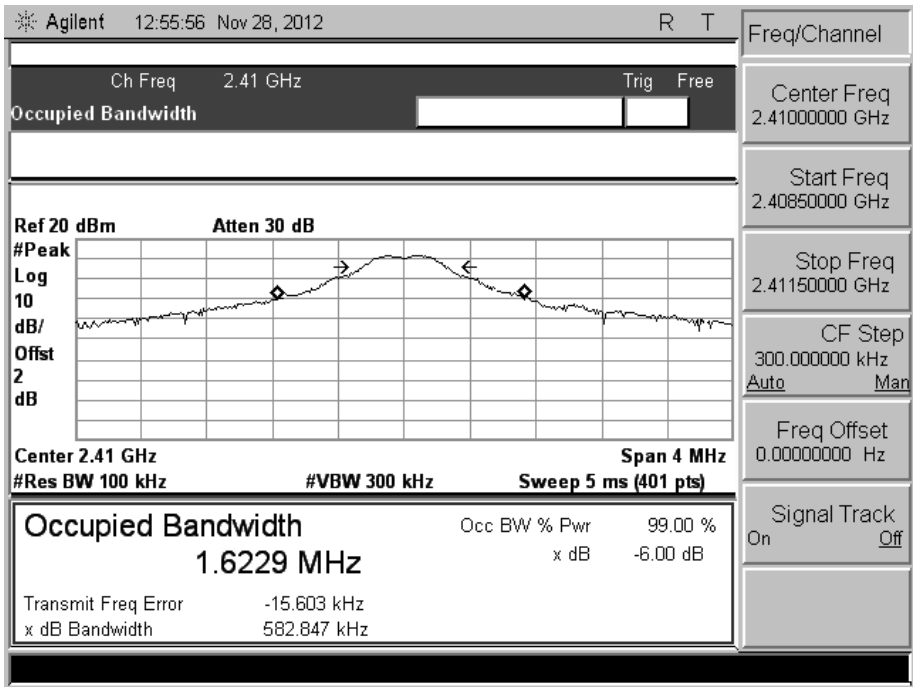
The EUT is powered by the Battery, is coupled to the Spectrum Analyzer (SA) through the Attenuator/DC Block. The path loss as the factor is calibrated to correct the reading. During the measurement, the EUT is activated and is set to operate at maximum power. The RF load attached to the EUT antenna terminal is 50Ohm.

5.1.3 Test Result

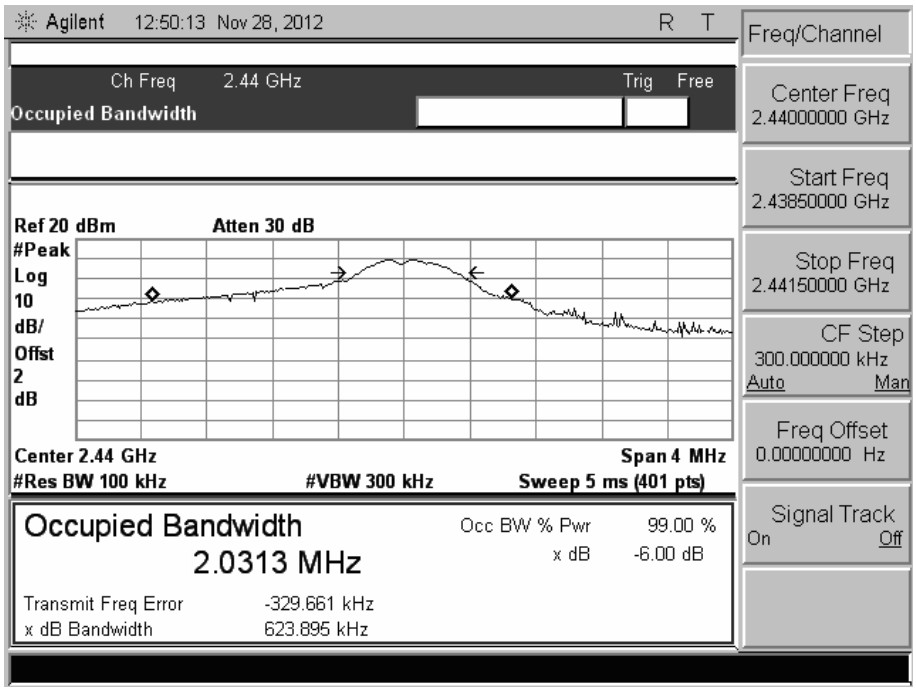
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Result
1	2410	582.847	PASS
31	2440	623.895	PASS
61	2470	587.684	PASS

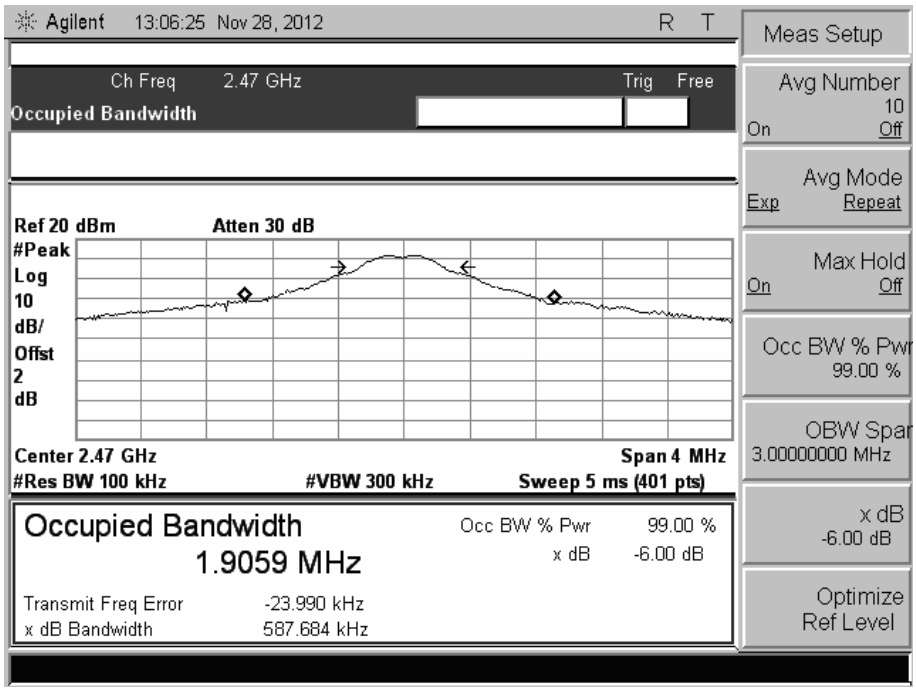
B. Test Plot:


Agilent 12:55:56 Nov 28, 2012
R T
Ch Freq 2.41 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
2
dB
Center 2.41 GHz
Span 4 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
1.6229 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -15.603 kHz
x dB Bandwidth 582.847 kHz
Freq/Channel
Center Freq
2.41000000 GHz
Start Freq
2.40850000 GHz
Stop Freq
2.41150000 GHz
CF Step
300.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off

(CH Low)


Agilent 12:50:13 Nov 28, 2012
R T
Ch Freq 2.44 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
2
dB
Center 2.44 GHz
Span 4 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
2.0313 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -329.661 kHz
x dB Bandwidth 623.895 kHz
Freq/Channel
Center Freq
2.44000000 GHz
Start Freq
2.43850000 GHz
Stop Freq
2.44150000 GHz
CF Step
300.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off

(CH Mid)


Agilent 13:06:25 Nov 28, 2012
R T
Ch Freq 2.47 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
2
dB
Center 2.47 GHz
Span 4 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
1.9059 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -23.990 kHz
x dB Bandwidth 587.684 kHz
Meas Setup
Avg Number
10
On Off
Avg Mode
Exp Repeat
Max Hold
On Off
Occ BW % Pwr
99.00 %
OBW Span
3.00000000 MHz
x dB
-6.00 dB
Optimize
Ref Level

(CH High)

5.2 Peak Output Power

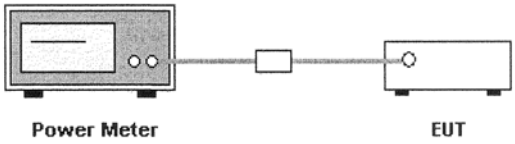
5.2.1 Definition

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

5.2.2 Limit

FCC Part15(15.247)				
Section	Test Item	Limit	Frequency Range(MHz)	Result
15.247(b)(1)	Peak Output Power	30dBm	2400-2483.5	PASS

5.2.3 Test Configuration



5.2.4 Test Procedure

The EUT which is powered by AC adapter, is coupled to the Power Meter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

5.2.5 Test Result

The EUT operates at maximum output power mode. The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

5.2.5.1 Test Mode

The maximum output power for the fundamental frequency 2410MHz is 18.44dBm. This power complies with the FCC requirement.

A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2410	18.44	0.070	30	1	PASS
31	2440	16.42	0.044			PASS
61	2470	15.67	0.037			PASS

5.3 Conducted Spurious Emission

5.3.1 Definition

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

5.3.2 Test Description

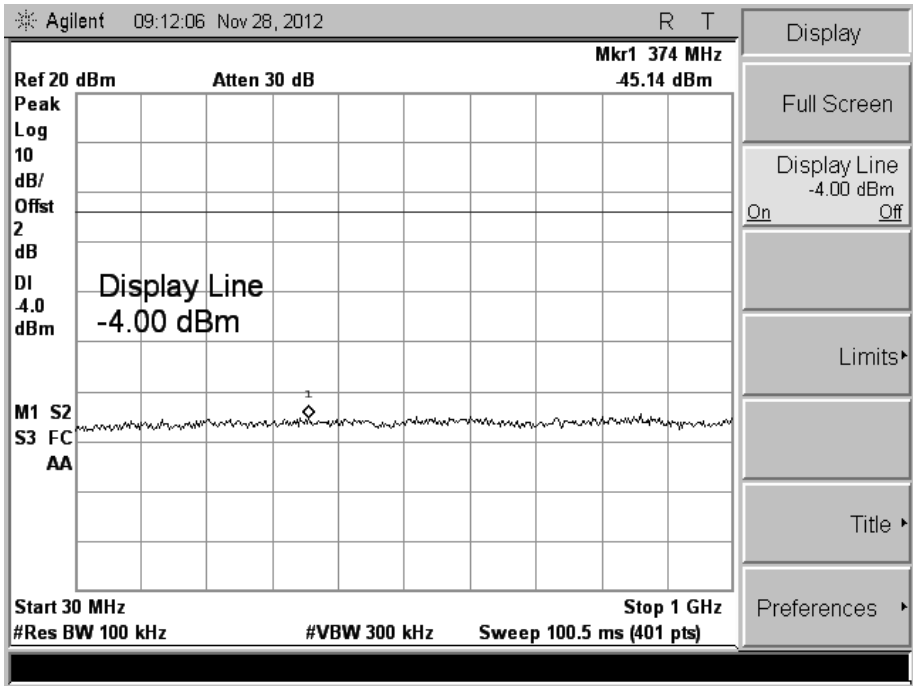
See section 5.1.2 of this report.

5.3.3 Test Result

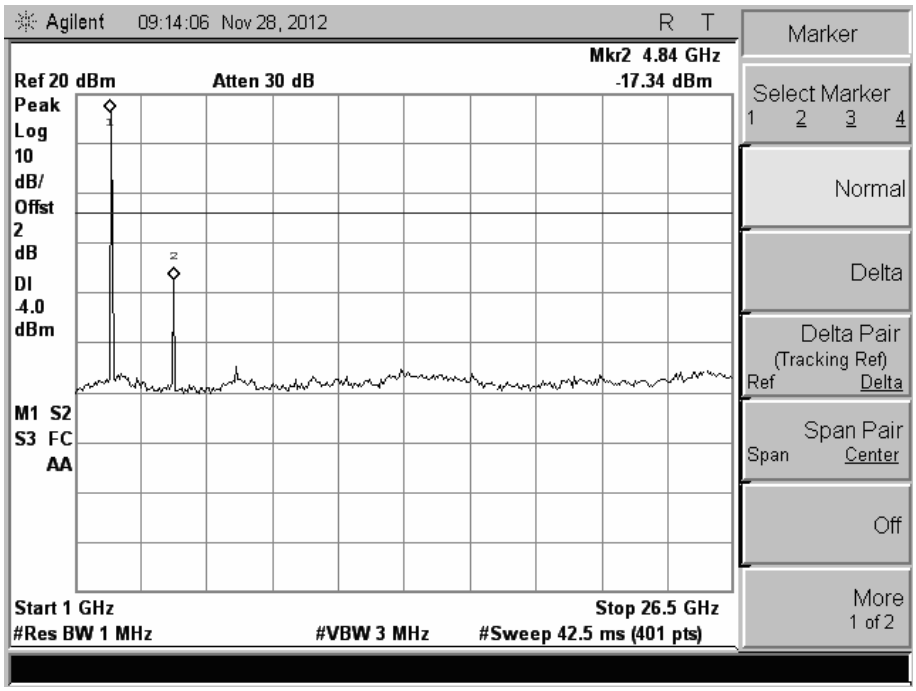
The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

5.3.3.1 Test Mode

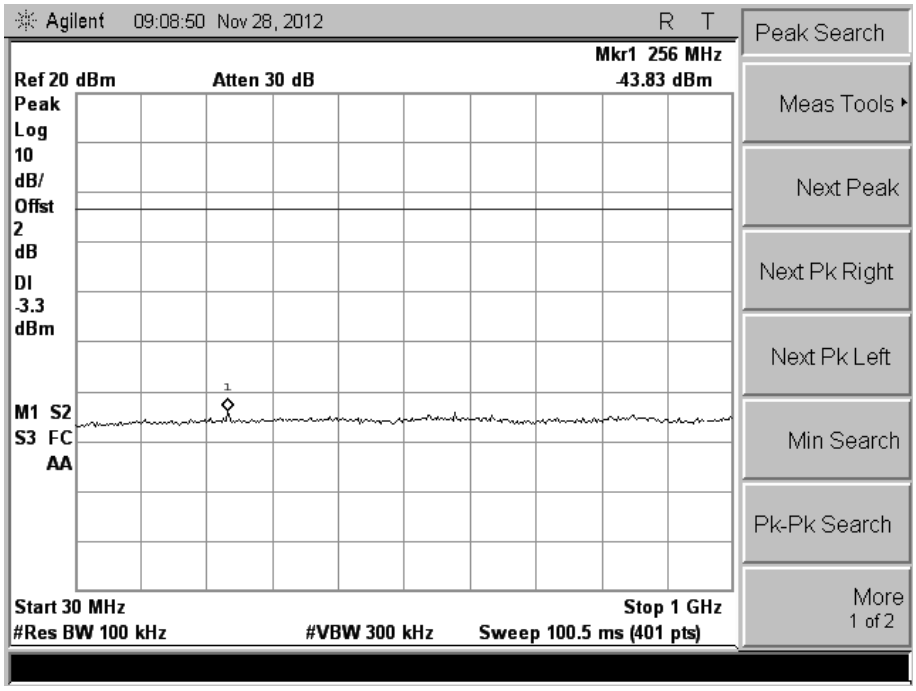
Test Plot:



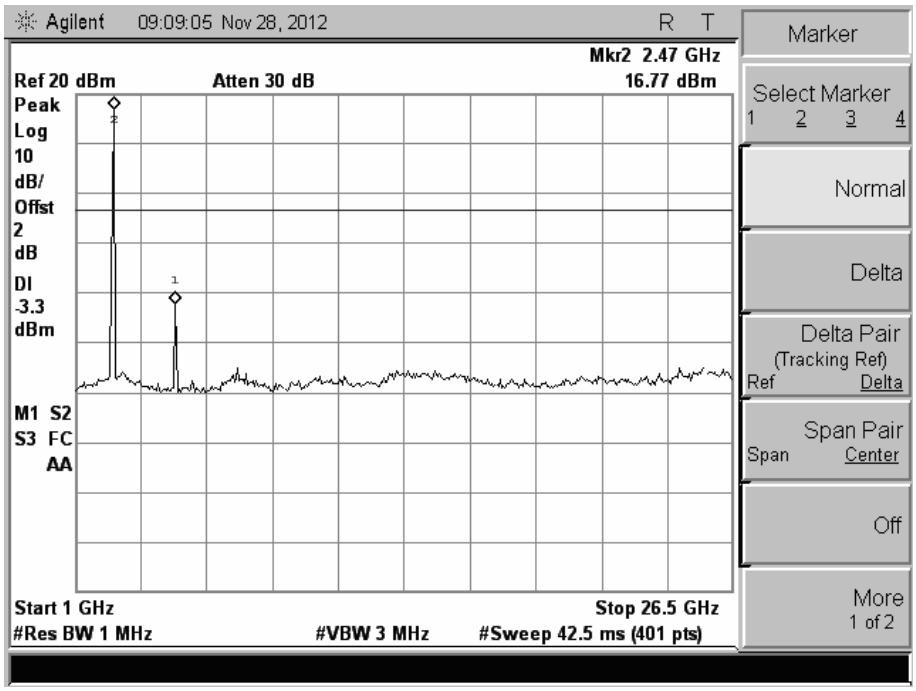
(CH Low , 30kHz to 1GHz)



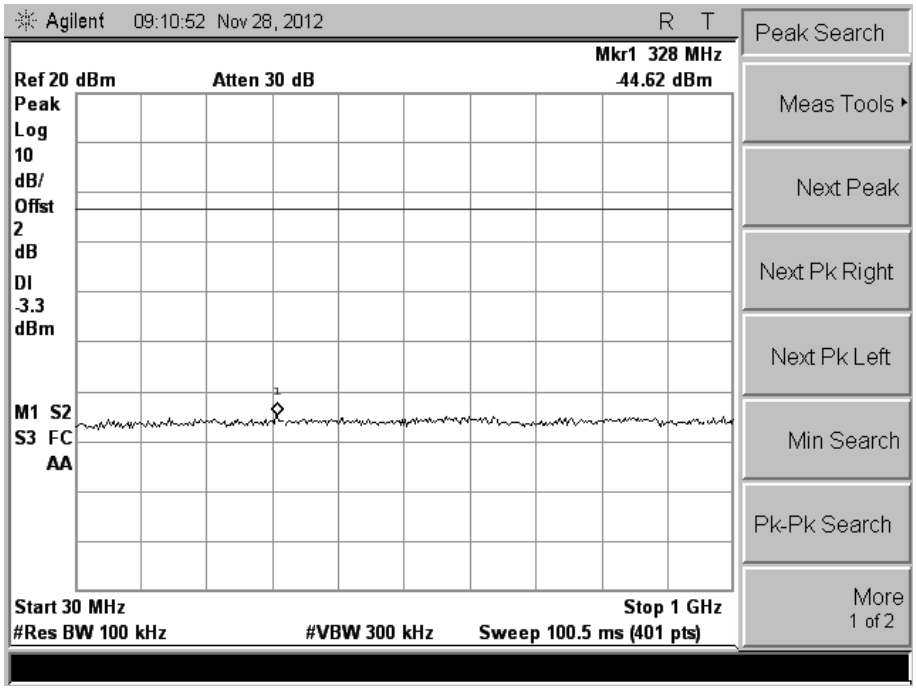
(CH Low, 1GHz to 26.5GHz)



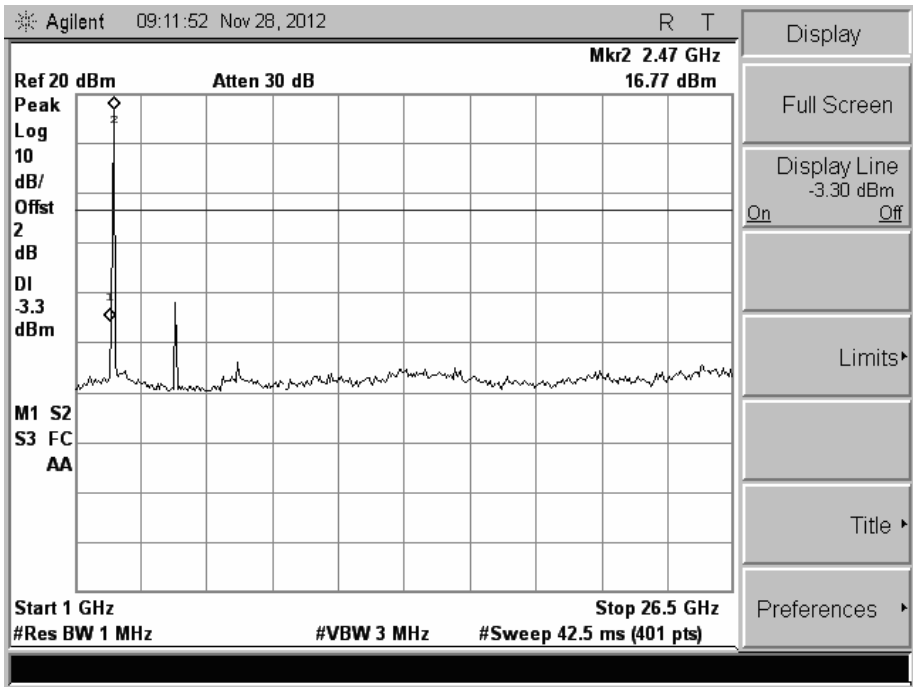
(CH Mid, 30kHz to 1GHz)



(CH MID, 1GHz to 26.5GHz)



(CH High, 30kHz to 1GHz)



(CH High,1GHz to 26.5GHz)

Note:

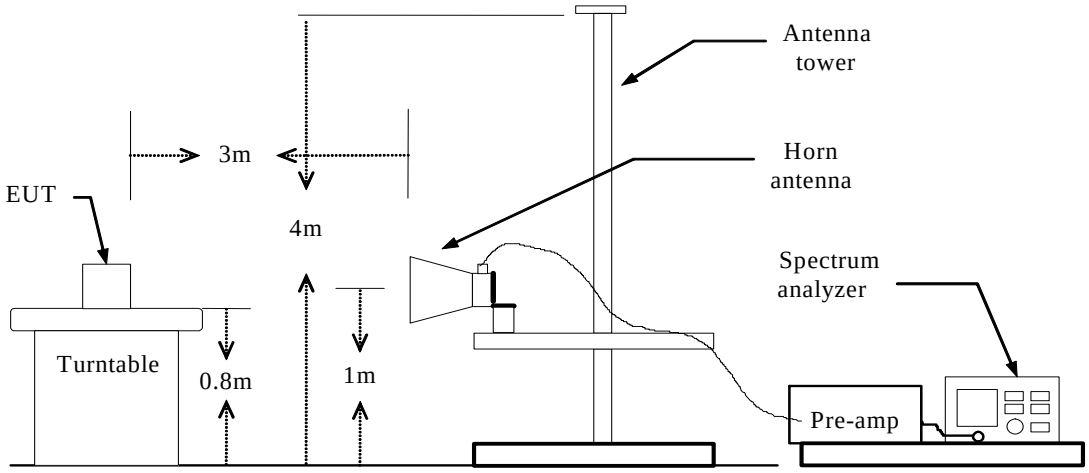
1. The power of the Module transmitting frequency should be ignored.

5.4 Band Edge

5.4.1 Definition

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

5.4.2 Test Configuration



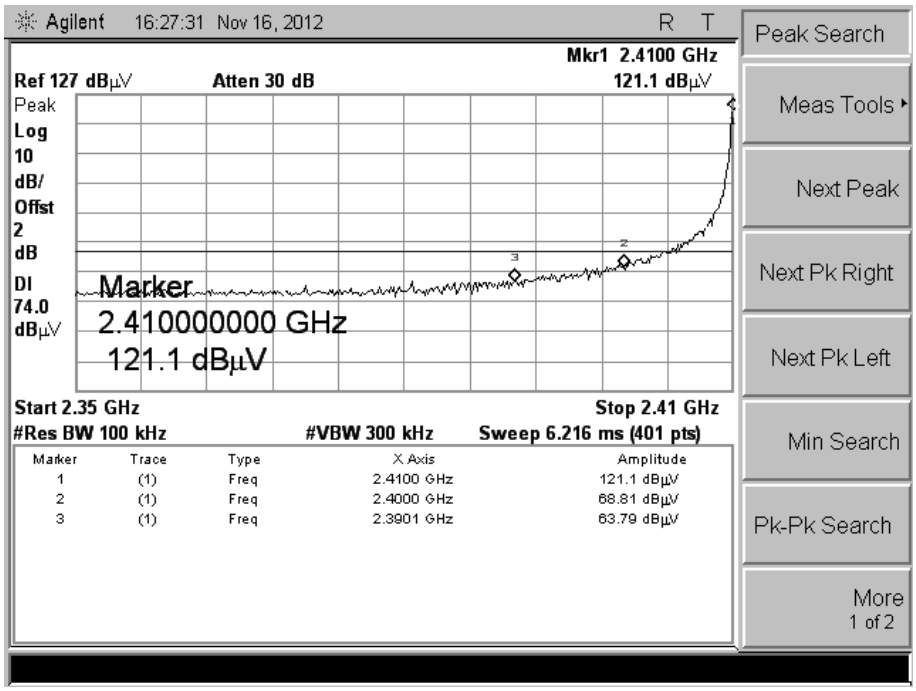
5.4.3 Test Result

The EUT operates at continuous transmit test mode. The lowest and highest channels are tested to verify the band edge emissions.

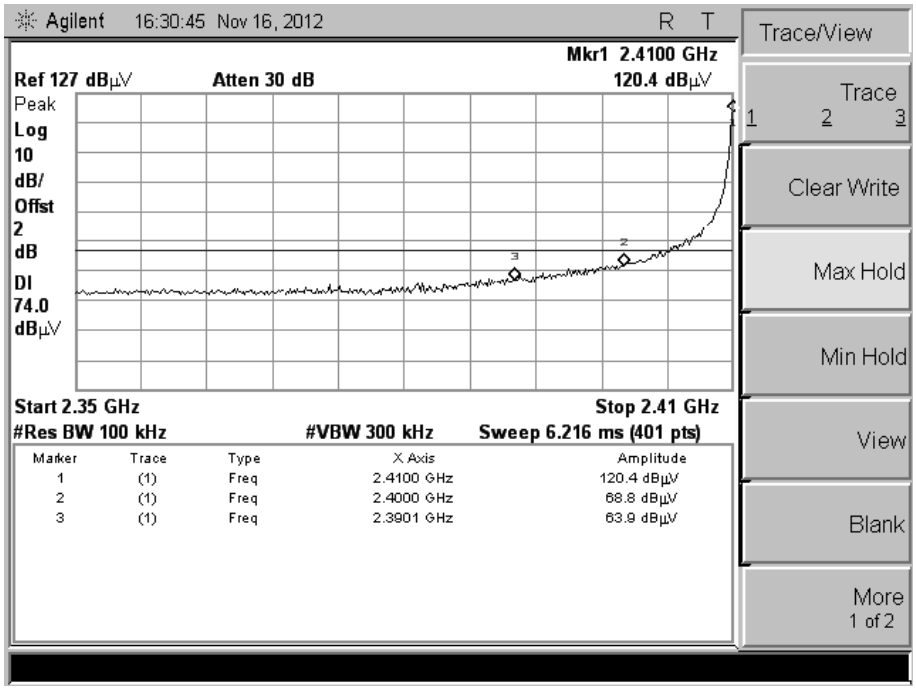
5.4.3.1 Test Mode

Test Mode		Channel Marked Frequency	Limit (dBuv/m)	Test Result Highest Emission (dBuv/m)			
				Vertical		Horizontal	
				Peak	Average	Peak	Average
	Low Channel	2390MHz	74(Peak) 54(Average)	63.79	41.59	63.90	41.69
		2400MHz		68.81	46.98	68.80	46.85
	High Channel	2483.5MHz		66.08	43.58	66.79	45.33
		2500MHz		60.49	40.25	59.58	37.59

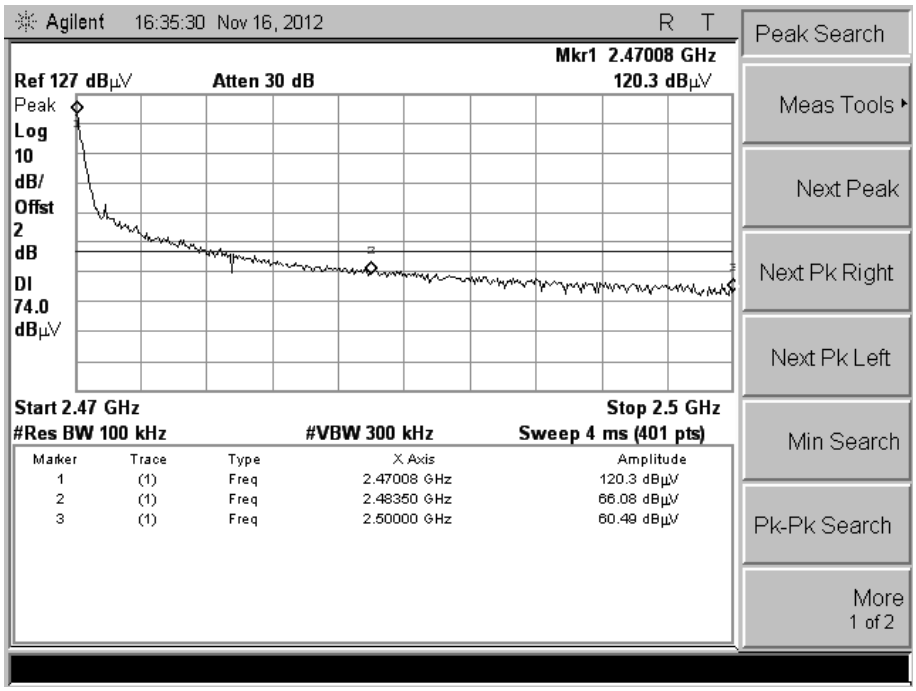
Test Plot:



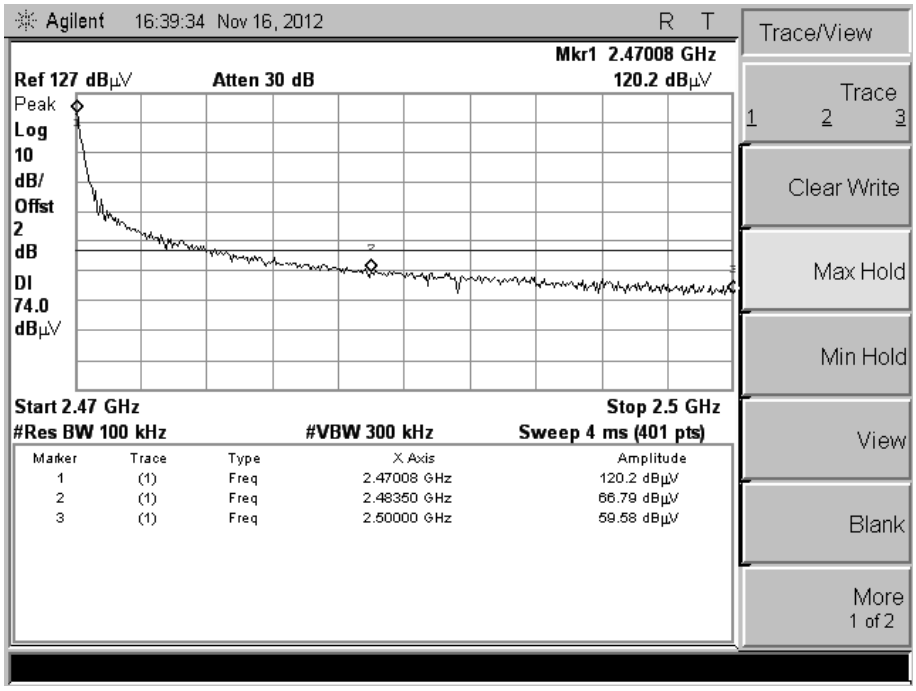
(CH Low, Vertical, Peak)



(CH Low, Horizontal, Peak)



(CH High, Horizontal, Peak)



(CH High, Vertical, Peak)

5.5 Power Spectral Density (PSD)

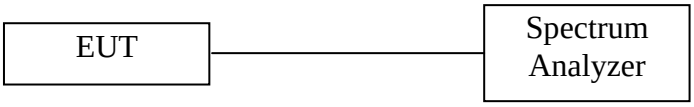
5.5.1 Definition

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band.

5.5.2 Limit

FCC Part15(15.247)				
Section	Test Item	Limit	Frequency Range(MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2402-2483.5	PASS

5.5.4 Test Configuration

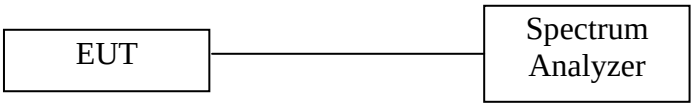


5.5.3 Test Description

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	5-30% greater than the EBW
RB	100kHz
VB	300KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

a. The EUT was directly connectd to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting: RBW=100KHz, VBW=300KHz, Sweep time=Auto. Span to 5-30% greater than EBW
c. Scale the observed power level to an equivalent value in 3kHz by adjusting(reducing) the measured power by a bandwidth correction factor(BWCF) where BWCF=10log(3kHz/100kHz=-15.2dB).
d. Use peak detector+BWCF.
f. The resulting peak PSD level must be ≦8dBm.

5.5.4 Test Configuration



5.5.3 Operation Condition

The EUT tested system was configured as the statements of 2.1 unless otherwise a special operating condition is specified in the follows during the testing.

5.5.6 Test Result

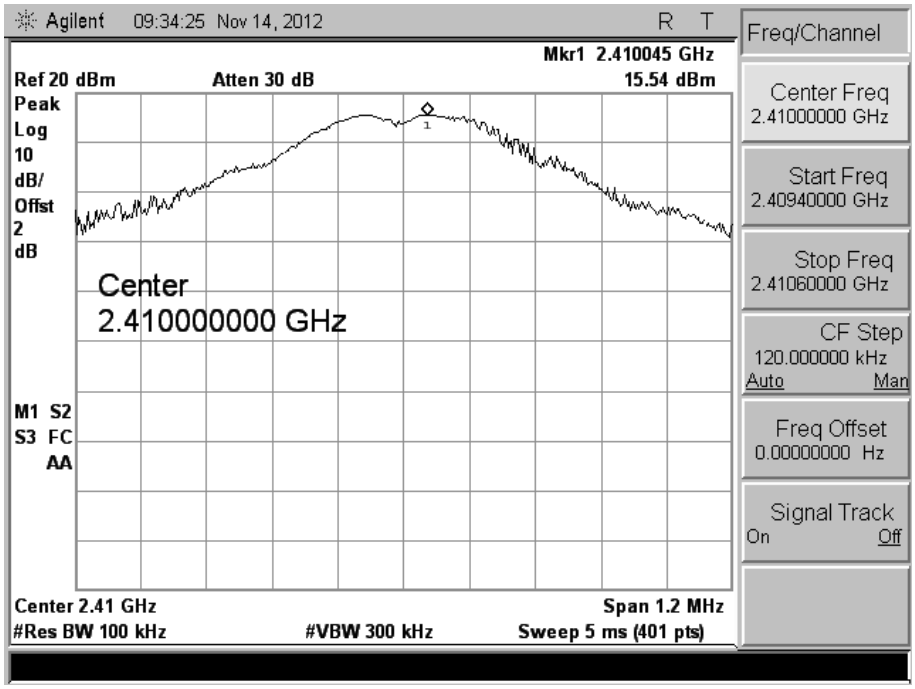
The lowest, middle and highest channels are tested to verify the power spectral density.

5.5.6.1 Test Mode

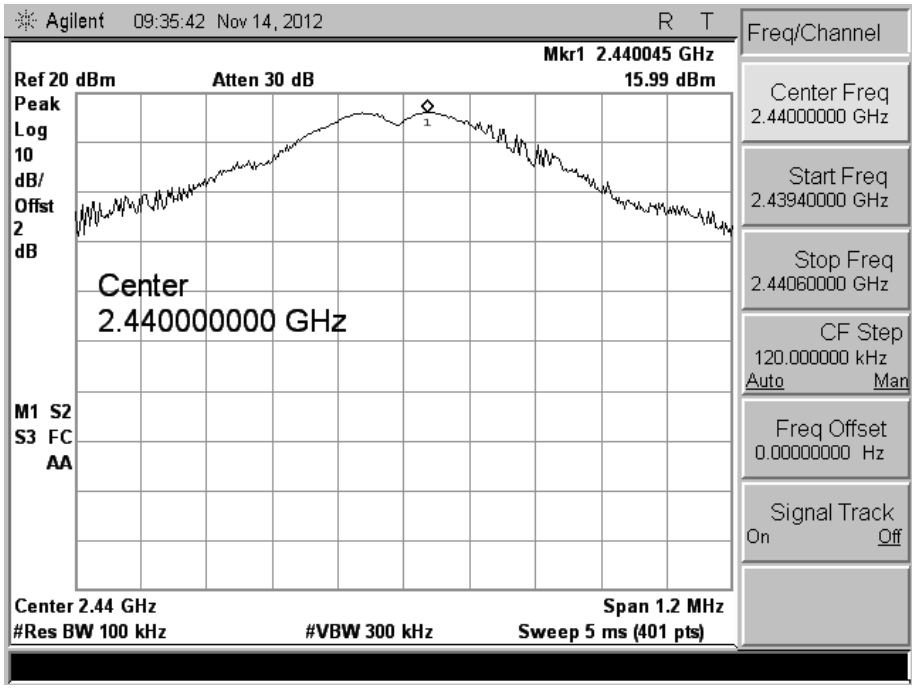
A. Test Verdict:

Channel	Frequency (MHz)	PSD (dBm)	Limits(dBm)	Result
1	2410	0.34	≤8	PASS
31	2440	0.79	≤8	PASS
61	2470	0.11	≤8	PASS

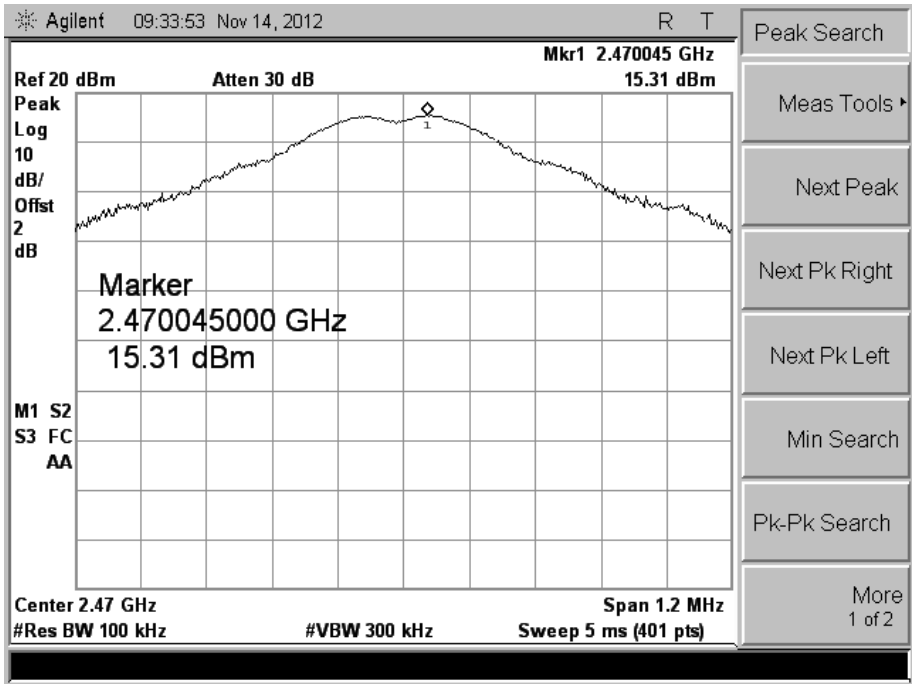
B. Test Plot:



(CH Low)



(CH Mid)


Agilent 09:33:53 Nov 14, 2012
R T
Mkr1 2.470045 GHz
Ref 20 dBm
Atten 30 dB
15.31 dBm
Peak
Log
10
dB/
Offst
2
dB
Marker
2.470045000 GHz
15.31 dBm
M1 S2
S3 FC
AA
Center 2.47 GHz
Span 1.2 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

(CH High)

5.6 Conducted Emission

5.6.1 Definition

According to FCC section 15.207, 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 μH/50 ohms line impedance stabilization network (LISN).

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz-500kHz	66-56	56-46
500kHz-5MHz	56	46
5MHz-30MHz	60	50

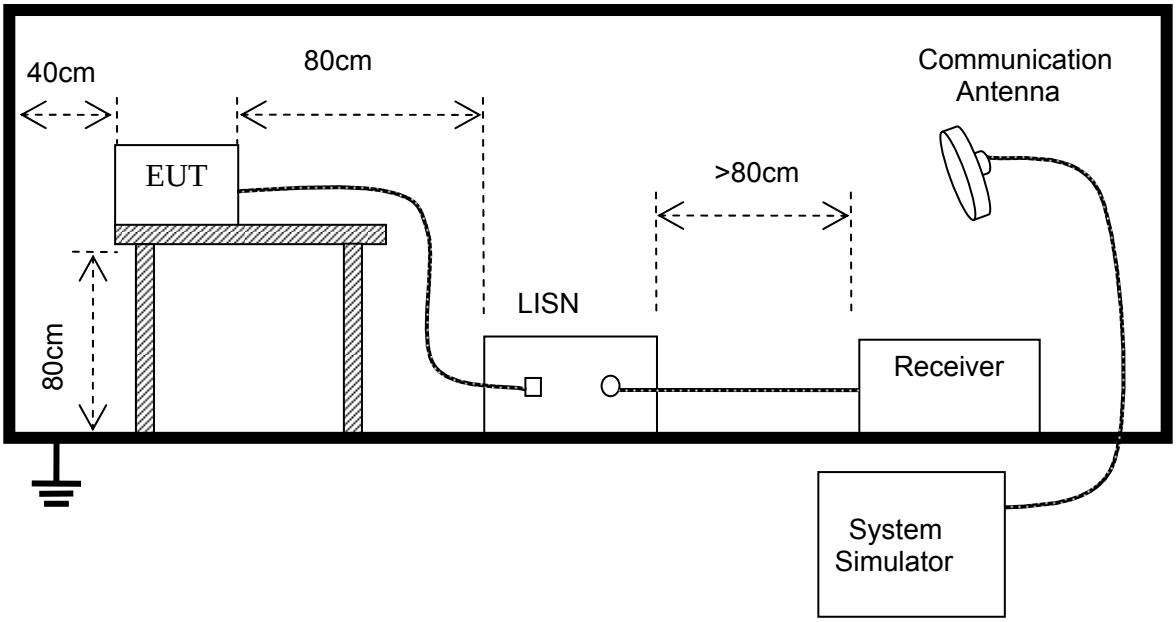
Note:

1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

5.6.2 Test Description

The EUT is powered by the AC Adapter which is powered by 120V, 60Hz AC mains supply. The path loss as the factor is calibrated to correct the reading. During the measurement, the EUT is activated and is set to operate at maximum power.



5.6.3 Test Result

N/A

5.7 Radiated Emission

5.7.1 Definition

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

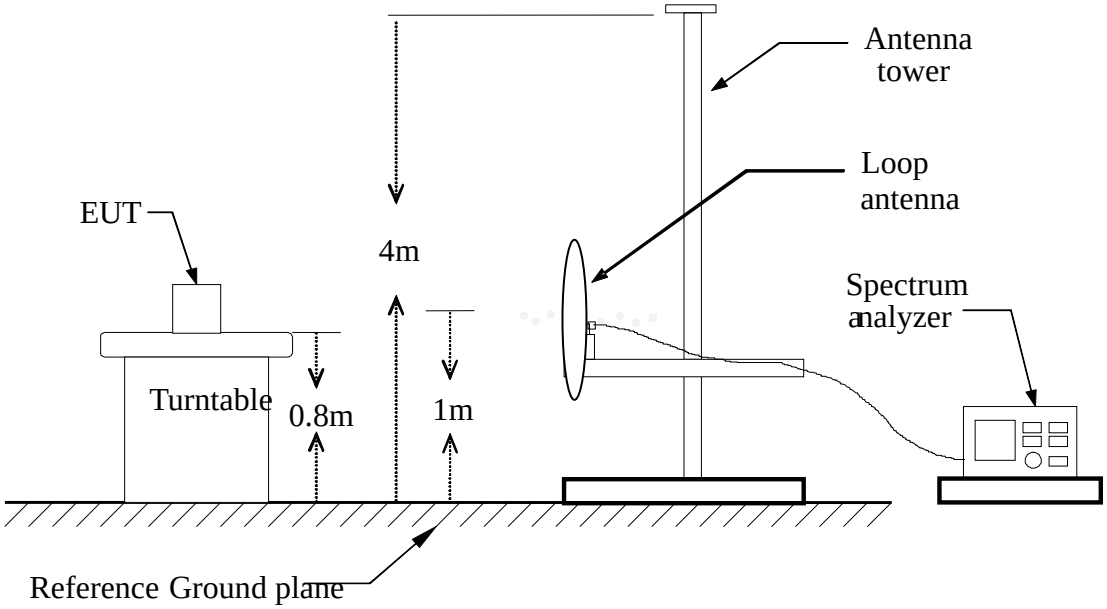
According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
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

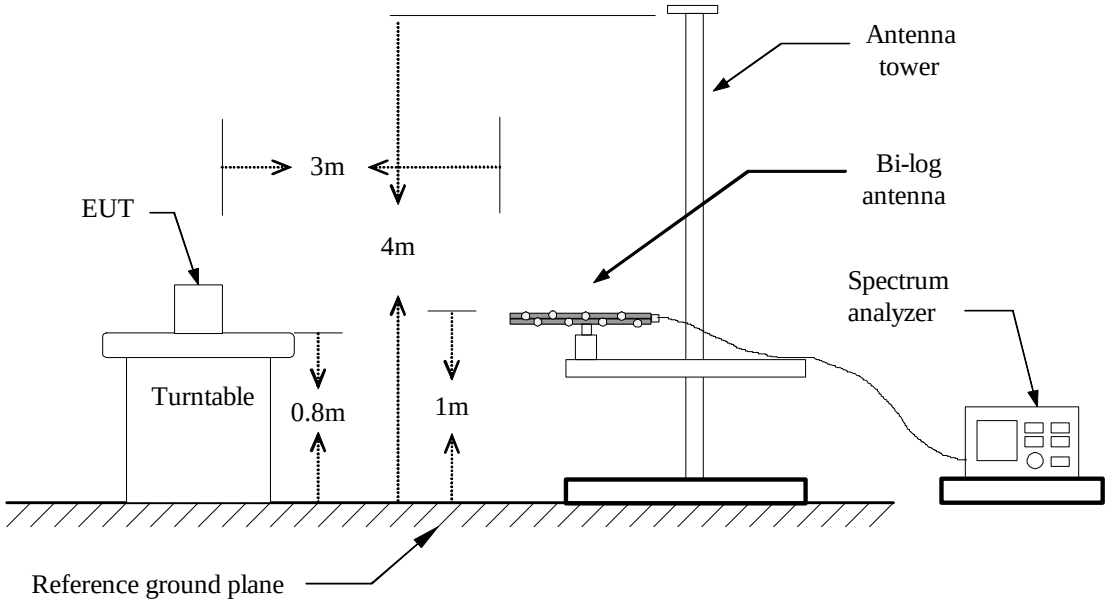
As shown in FCC section 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

5.7.2 Test Description

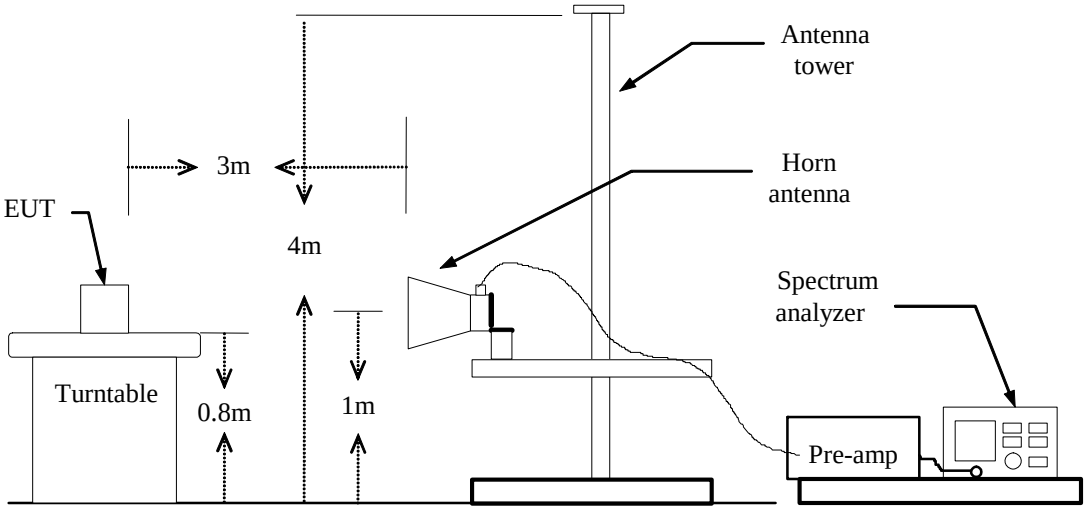
A. Test Configuration:



Below 1GHz:



Above 1GHz:



B. Test procedures

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=100 kHz / VBW=300 kHz / 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.

5.7.3 Test Result

The test data was shown on the summary data page.

From 9KHz to 30MHz:

EUT：	2.4GHZ LCD Transmitter	Model Name. ：	NASA701
Temperature：	20℃	Relative HuMaylong Mobility Tabletity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 12V
Test Mode ：	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =20 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

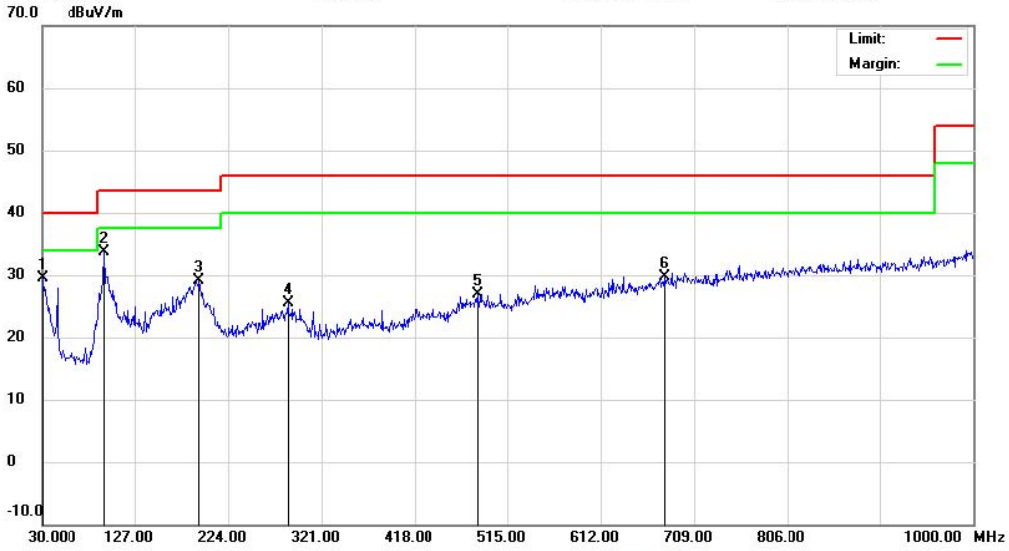
Conclusion: PASS

Below 1 GHz

Compliance Laboratory
Address:No.5,Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong ,China
Tel: 0755-86170306 Fax: 0755-86170310

Radiated Emission Measurement

File :NASA701 Data :#3 Date: 2012-11-13 Time: 13:50:05



Site site MOST 3M
Limit: FCC Part15 B 3M Radiation
EUT: 2.4 GHz LCD Transmitter
M/N: NASA701
Mode: Running
Note:

Polarization: *Horizontal*
Power: DC 12V

Temperature: 26
Humidity: 61 %

Distance:

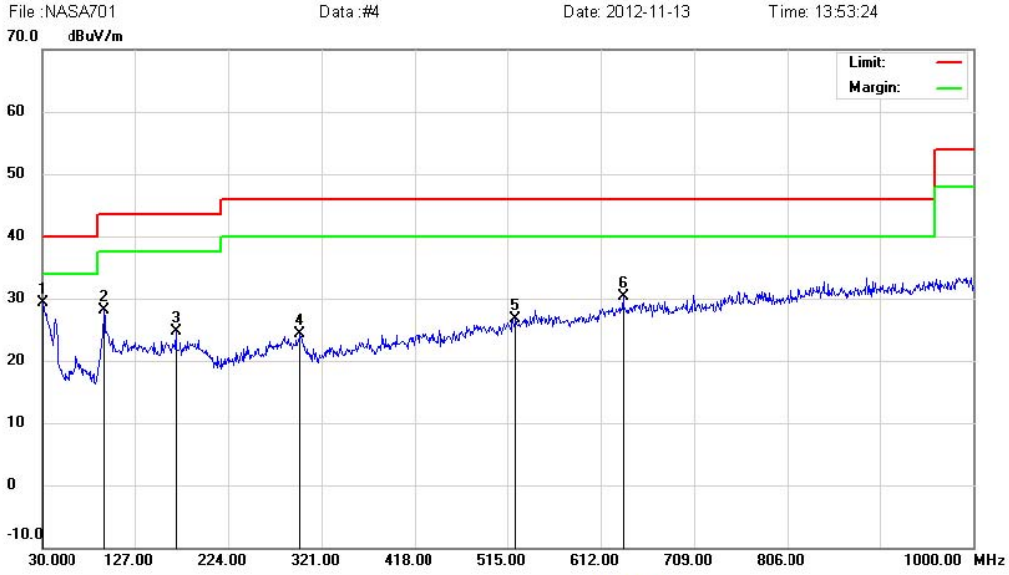
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		30.0000	4.66	24.80	29.46	40.00	-10.54	QP			
2	*	94.9899	21.70	12.05	33.75	43.50	-9.75	QP			
3		193.9299	12.25	16.80	29.05	43.50	-14.45	QP			
4		286.0799	5.97	19.44	25.41	46.00	-20.59	QP			
5		484.9300	5.17	21.80	26.97	46.00	-19.03	QP			
6		677.9600	5.24	24.52	29.76	46.00	-16.24	QP			

*:Maximum data x:Over limit !:over margin

Engineer Signature: Allen

Compliance Laboratory
Address:No.5,Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong ,China
Tel: 0755-86170306 Fax: 0755-86170310

Radiated Emission Measurement



Site site MOST 3M
Limit: FCC Part15 B 3M Radiation
EUT: 2.4 GHz LCD Transmitter
M/N: NASA701
Mode: Running
Note:

Polarization: *Vertical*
Power: DC 12V

Temperature: 26
Humidity: 61 %

Distance:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	30.9699	5.34	24.05	29.39	40.00	-10.61	QP			
2		94.9899	16.02	12.05	28.07	43.50	-15.43	QP			
3		169.6799	7.54	17.20	24.74	43.50	-18.76	QP			
4		298.6899	5.07	19.30	24.37	46.00	-21.63	QP			
5		523.7300	4.78	21.99	26.77	46.00	-19.23	QP			
6		635.2798	6.53	23.81	30.34	46.00	-15.66	QP			

*:Maximum data x:Over limit l:over margin

Engineer Signature: Allen

Above 1 GHz

Operation Mode:	TX/CH Low	**Test Date:**	Nov. 14, 2012
Temperature:	20°C	**Tested by:**	Habby Guo
Humidity:	70 % RH	**Polarity:**	Ver. / Hor.

Freq.	Ant. Pol	Peak	AV	Ant. / CL	Actual Fs		Peak	AV	AV
(MHz)	H/V	Reading	Reading	CF			Limit	Limit	Margin
		(dBuV)	(dBuV)	(dB)	Peak	AV	(dBuV/m)	(dBuV/m)	(dB)
					(dBuV/m)	(dBuV/m)			
4800.0	H	33.21	13.93	23.54	56.75	37.47	74.00	54.00	-16.53
N/A	H								
4800.0	V	32.27	13.48	23.36	55.63	36.84	74.00	54.00	-17.16
N/A	V								

Notes:

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).

Operation Mode:	TX/CH Mid	**Test Date:**	Nov. 14, 2012
Temperature:	20°C	**Tested by:**	Habby Guo
Humidity:	70 % RH	**Polarity:**	Ver. / Hor.

Freq.	Ant. Pol	Peak	AV	Ant. / CL	Actual Fs		Peak	AV	AV
(MHz)	H/V	Reading	Reading	CF			Limit	Limit	Margin
		(dBuV)	(dBuV)	(dB)	Peak	AV	(dBuV/m)	(dBuV/m)	(dB)
					(dBuV/m)	(dBuV/m)			
4880.0	H	36.13	17.45	23.54	59.67	40.99	74.00	54.00	-13.01
N/A	H								
4880.0	V	36.08	16.53	23.36	59.44	39.89	74.00	54.00	-14.11
N/A	V								

Notes:

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).

Operation Mode:	TX/CH High	**Test Date:**	Nov. 14, 2012
Temperature:	20°C	**Tested by:**	Habby Guo
Humidity:	70 % RH	**Polarity:**	Ver. / Hor.

Freq.	Ant. Pol	Peak	AV	Ant. / CL	Actual Fs		Peak	AV	AV
(MHz)	H/V	Reading	Reading	CF			Limit	Limit	Margin
		(dBuV)	(dBuV)	(dB)	Peak	AV	(dBuV/m)	(dBuV/m)	(dB)
					(dBuV/m)	(dBuV/m)			
4940.0	H	32.42	11.37	23.54	55.96	34.91	74.00	54.00	-19.09
N/A	H								
4940.0	V	32.46	13.73	23.36	55.82	37.09	74.00	54.00	-16.91
N/A	V								

Notes:

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).

5.8 Antenna

5.8.1 Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be disigned to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that used a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufactureer may design the unit so that user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.
All supplied antennas meet the requrements of Part15.203 and 15.204.

5.8.2 Antenna requrements

According to FCC Part15C, Section 15.247(b)(4):
The conducted output power limit specified in paragraph(b) of 15.247 is based on the use of antennas with directional gains that do not exceed 6dBi. Except as shown in paragraph(c) of this section, if transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from intentional radiator shall be reduced below the stated values in paragraph(b)(1), (b)(2) and (b)(3) of this section, as appropriate, by the amount in Db that the directional gain of the antenna exceeds 6dBi.

APPENDIX 1

PHOTOGRAPHS OF TEST SETUP

CONDUCTED SPURIOUS EMISSION TEST SETUP

------END OF REPORT------