

## FCC PART 15 SUBPART C MEASUREMENT AND TEST REPORT

For

Seed Labs, Inc.

620 Folsom St, San Francisco, CA 94107, USA

E.U.T.: Silvair Mesh Module

Model Name: SM41ST, SM41HT, SM41STNW

Trade name: Silvair Mesh Module

FCC ID: 2AC3O-SM41

Report Number: NTC1512015F

Test Date(s): November 20, 2015 to December 06, 2015

Report Date(s): December 06, 2015

Prepared by

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Prepared By

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Rose Hu / Engineer



Sunm Lv / Q.A. Director

Note: This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from Dongguan Nore Testing Center Co., Ltd. The test results referenced from this report are relevant only to the sample tested.

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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment under Test

This device is a Bluetooth Module, it's powered by DC 3.3V come from Support device. For more details features, please refer to User's Manual.

Manufacturer	: Seed Labs, Inc.
Address	: 620 Folsom St, San Francisco, CA 94107, USA
Factory	: FN-LINK TECHNOLOGY LIMITED
Address	: A Building, HuiXin industrial park, No 31, YongHe road, Fuyong town, Bao'an District, Shenzhen City, CHINA
Power Supply	: DC 2.0-3.6V 100mA Current max., 0.36W max power consumption
Test voltage	: AC 120V 60Hz (PC Input) or DC 3.3V
Model name	: SM41ST, SM41HT, SM41STNW We prepare SM41ST for EMC test.
Model difference	: Both of models have the same circuitry, PCB layout, electrical mechanical and physical construction. Their differences in different range of operating temperatures for the components and model number.
HW	: SLBRM0004
SW	: 1.0
Serial number	: N/A

<b>Technical Specification</b>	BT Function
Frequency	: 2402-2480MHz
Bluetooth Version	: 4.0
Modulation	: GFSK
Number of Channel	: 40
Channel space	: 2MHz
Antenna Type	: The device has been designed to operate with a dipole antenna, only this type of antenna may be used.
Antenna Gain	: Permitted 0dBi Max. (Declaration by manufacturer)

### BLE(V4.0) Channel List

Channel	Frequency MHz	Channel	Frequency MHz	Channel	Frequency MHz	Channel	Frequency MHz
1	2402	11	2422	21	2442	31	2462
2	2404	12	2424	22	2444	32	2464
3	2406	13	2426	23	2446	33	2466
4	2408	14	2428	24	2448	34	2468
5	2410	15	2430	25	2450	35	2470
6	2412	16	2432	26	2452	36	2472
7	2414	17	2434	27	2454	37	2474
8	2416	18	2436	28	2456	38	2476
9	2418	19	2438	29	2458	39	2478
10	2420	20	2440	30	2460	40	2480

**Note:** According to section 15.31(m), regards to the operating frequency range over 10MHz, the Lowest, middle, and the Highest frequency of channel were selected to perform the test. The selected frequency see below:

Channel	Frequency MHz
1	2402
20	2440
40	2480

## 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AC3O-SM41 filing to comply with Section 15.247 of the FCC Part 15(2014), Subpart C Rule.

## 1.3 Test Methodology

AC mains line-conducted, antenna port conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10-2013 and KDB558074 (v03r03). Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters. All other measurements were made in accordance with the procedures in 47 CFR part 2.

## 1.4 Equipment Modifications

Not available for this EUT intended for grant.

## 1.5 Support Device

No.	Equipment	Model	Serial No.	Trade name	Data Cable	Power Cord
1.	PC	Vostro 3902	108MY02	DELL	1.8m shielded, with core	1.8m Unshielded, with core
2.	LCD TV	L2061WD	3M04769B1102083	LENOVO	1.8m shielded, with core	N/A
3.	Mouse	MODGUO	PSA1104008298	HP	1.5m Shielded	N/A
4.	Keyboard	PR1101U	BAUWT0AHHZX8BC	HP	1.5m Shielded	N/A
5.	RF test fixture	SM001	V01	Seed	1.5m Shielded	N/A

## 1.6 Test Facility and Location

Listed by FCC, August 02, 2011  
The Certificate Registration Number is 665078.  
Listed by Industry Canada, July 01, 2011  
The Certificate Registration Number is 46405-9743.

Dongguan NTC Co., Ltd.  
(Full Name: Dongguan Nore Testing Center Co., Ltd.)

Building D, Gaosheng Science and Technology Park, Hongtu Road,  
Nancheng District, Dongguan City, Guangdong, China  
(Full Name: Building D, Gaosheng Science & Technology Park,  
Zhouxi Longxi Road, Nancheng District, Dongguan, Guangdong, China.

## 1.7 Summary of Test Results

FCC Rules	Description Of Test	Result
§15.207 (a)	AC Power Conducted Emission	Compliance
§15.247(b)(3)	Max. Conducted Output Power	Compliance
§15.247(a)(2)	6dB &20dB Bandwidth	Compliance
§15.247(e)	Power Spectral Density	Compliance
§15.247(d)	Band Edge and Conducted Spurious Emissions	Compliance
§15.247(d),§15.209, §15.205	Radiated Spurious Emissions and Restricted Bands	Compliance
§15.203	Antenna Requirement	Compliance

Note: The EUT has tested three orthogonal planes(X, Y and Z) for antenna, and the worst case was recorded in the report.

---

## **2. System Test Configuration**

### **2.1 EUT Configuration**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### **2.2 Special Accessories**

Not available for this EUT intended for grant.

### **2.3 Description of test modes**

The EUT has been tested under continuous operating condition (The duty cycle >98%). Test program used to control the EUT staying in continuous transmitting mode. The Lowest, middle and highest channel were chosen for testing, and modulation type GFSK was tested.

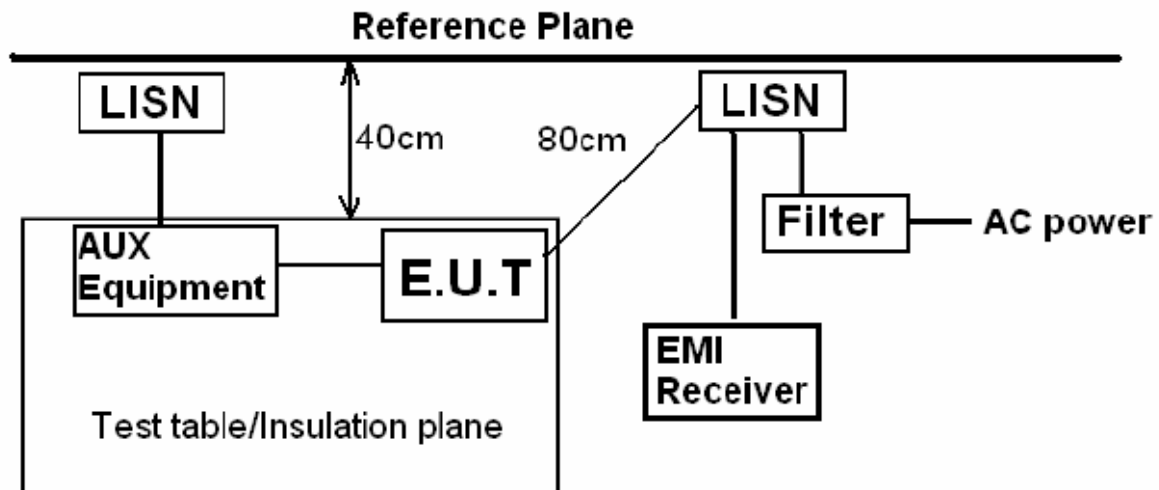
### **2.4 EUT Exercise**

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



### 3. Conducted Emissions Test

#### 3.1 Test SET-UP (Block Diagram of Configuration)



#### 3.2 Test Condition

Test Requirement: FCC Part 15.207

Frequency Range: 150KHz ~ 30MHz

Detector: RBW 9KHz, VBW 30KHz

Operation Mode: BT Mode

#### 3.3 Measurement Results

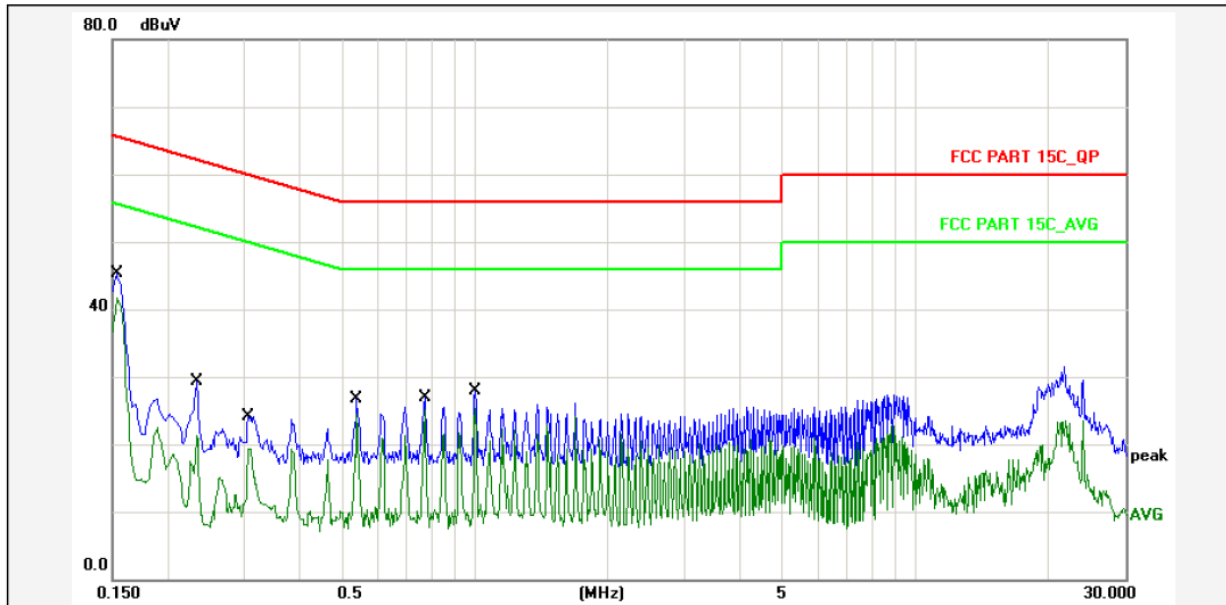
Please refer to following plots



**Dongguan NTC Co., Ltd.**  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: <http://www.ntc-c.com>

Site: Conduction

Test Time: 2015-12-02 10:10:38



Report No.: SM41ST

Test Standard: FCC PART 15C\_QP

Test item: Conducted Emission

Phase: L1

Applicant: Seed Labs, Inc.

Temp.( )/Hum.(%): 26(C) / 46 %

Product: Silvair Mesh Module

Power Rating: AC 120V 60Hz PC input

Model No.: SM41ST

Test Engineer: Jerry

Test Mode: BT Mode

Remark:

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1539	10.80	33.50	44.30	65.78	-21.48	QP	P	
2	0.1539	10.80	29.80	40.60	55.78	-15.18	AVG	P	
3	0.2340	10.80	17.50	28.30	62.30	-34.00	QP	P	
4	0.2340	10.80	9.60	20.40	52.30	-31.90	AVG	P	
5	0.3059	10.80	12.40	23.20	60.08	-36.88	QP	P	
6	0.3059	10.80	7.50	18.30	50.08	-31.78	AVG	P	
7	0.5380	10.80	14.80	25.60	56.00	-30.40	QP	P	
8	0.5380	10.80	12.70	23.50	46.00	-22.50	AVG	P	
9	0.7700	10.80	14.90	25.70	56.00	-30.30	QP	P	
10	0.7700	10.80	13.40	24.20	46.00	-21.80	AVG	P	
11	1.0020	10.80	16.10	26.90	56.00	-29.10	QP	P	
12	1.0020	10.80	13.60	24.40	46.00	-21.60	AVG	P	

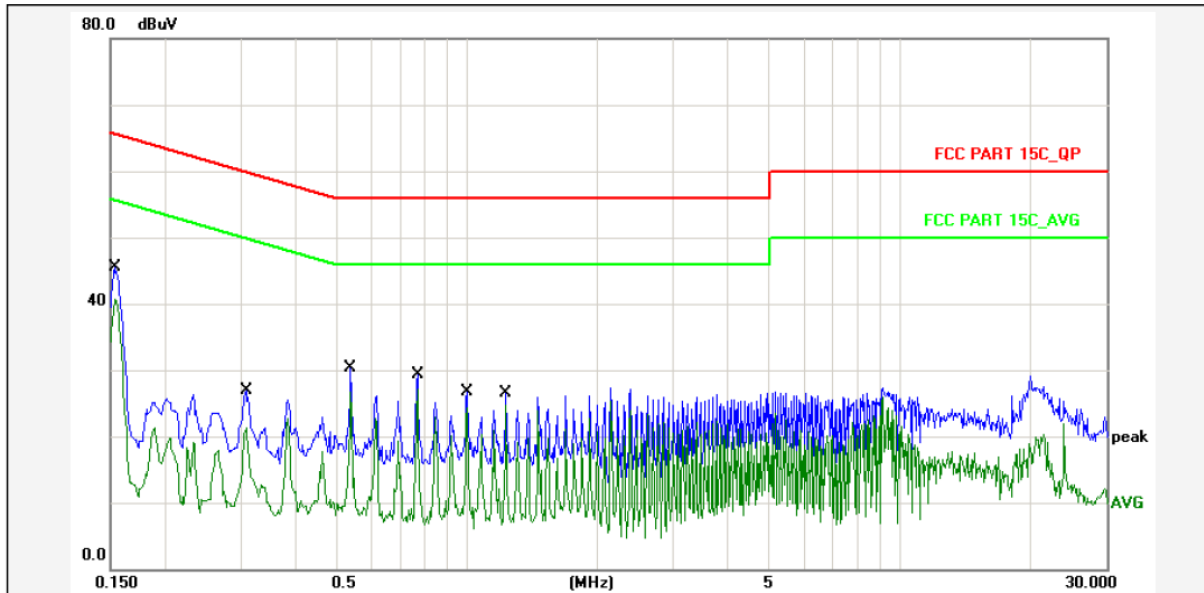
Power rating: powered by the ancillary equipment from PC with 120V/60Hz.



**Dongguan NTC Co., Ltd.**  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

Site: Conduction

Test Time: 2015-12-02 10:16:11



Report No.: SM41ST

Test Standard: FCC PART 15C\_QP

Test item: Conducted Emission

Applicant: Seed Labs, Inc.

Product: Silvair Mesh Module

Model No.: SM41ST

Phase: N

Temp.( )/Hum.(%): 26(C) / 46 %

Power Rating: AC 120V 60Hz PC input

Test Engineer: Jerry

Test Mode: BT Mode

Remark:

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1539	10.80	33.70	44.50	65.78	-21.28	QP	P	
2	0.1539	10.80	28.90	39.70	55.78	-16.08	AVG	P	
3	0.3082	10.80	15.00	25.80	60.02	-34.22	QP	P	
4	0.3082	10.80	9.40	20.20	50.02	-29.82	AVG	P	
5	0.5380	10.80	18.50	29.30	56.00	-26.70	QP	P	
6	0.5380	10.80	15.00	25.80	46.00	-20.20	AVG	P	
7	0.7700	10.80	17.60	28.40	56.00	-27.60	QP	P	
8	0.7700	10.80	15.30	26.10	46.00	-19.90	AVG	P	
9	1.0020	10.80	14.90	25.70	56.00	-30.30	QP	P	
10	1.0020	10.80	12.40	23.20	46.00	-22.80	AVG	P	
11	1.2298	10.80	14.80	25.60	56.00	-30.40	QP	P	
12	1.2298	10.80	12.80	23.60	46.00	-22.40	AVG	P	

Power rating: powered by the ancillary equipment from PC with 120V/60Hz.

## 4. Max. Conducted Output Power

### 4.1 Measurement Procedure

Maximum Conducted Output power at Antenna Terminals, FCC Rules 15.247(b)(3):

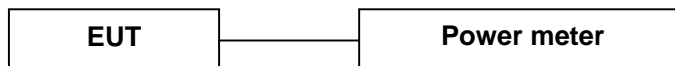
One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

$RBW \geq DTS \text{ bandwidth}$

This procedure shall be used when the measurement instrument has available a resolution bandwidth than is greater than the DTS bandwidth.

1. Set the  $RBW \geq DTS \text{ bandwidth}$ ;
2. Set  $VBW \geq 3 * RBW$ ;
3. Set  $span \geq 3 * RBW$ ;
4. Sweep time = auto couple
5. Detector = peak
6. Trace mode = max hold;
7. Allow trace to fully stabilize;
8. Use peak marker function to determine the peak amplitude level.

### 4.2 Test SET-UP (Block Diagram of Configuration)



### 4.3 Measurement Results

Please refer to following table and plots.

Modulation:	GFSK	Humidity :	50 %
Temperature :	24 °C	Test Date :	December 03, 2015
Test By:	Sance		
Test Result:	PASS		

Frequency MHz	Data Rate Mbps	Peak Output Power dBm	Limit dBm
Low Channel: 2402	1	8.70	30
Middle Channel: 2440	1	8.59	30
High Channel: 2480	1	8.00	30

## 5. 6dB & 20dB Bandwidth

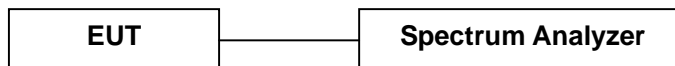
### 5.1 Measurement Procedure

DTS 6dB & 20dB Channel Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074(v03r03):

1. For 6dB bandwidth, Set the RBW = 100KHz.  
For 20dB bandwidth, Set the RBW=1-5% of the OBW, not to exceed 1MHz.
2. Set the VBW  $\geq 3 \times$  RBW
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB & 20dB relative to the maximum level measured in the fundamental emission.

### 5.2 Test SET-UP (Block Diagram of Configuration)



### 5.3 Measurement Results

Please refer to following table and plots.

Modulation:	GFSK		
Temperature :	24 °C	Humidity :	50 %
Test By:	Sance	Test Date :	December 03, 2015
Test Result:	PASS		

Frequency MHz	Data Rate Mbps	6dB Bandwidth KHz	20dB Bandwidth KHz	Limit
Low Channel: 2402	1	755	1192	>500KHz
Middle Channel: 2440	1	764	1188	>500KHz
High Channel: 2480	1	755	1192	>500KHz

Ref 15 dBm Att 40 dB

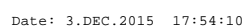
\* RBW 100 kHz Delta 2 [T1 ] 6.62 dB  
 \* VBW 300 kHz  
 SWT 2.5 ms 620.192307689 kHz

Marker 1 [T1 ]  
 2.40159154 GHz  
 Delta 1 [T1 ]  
 0.38 dB  
 754.807692304 kHz

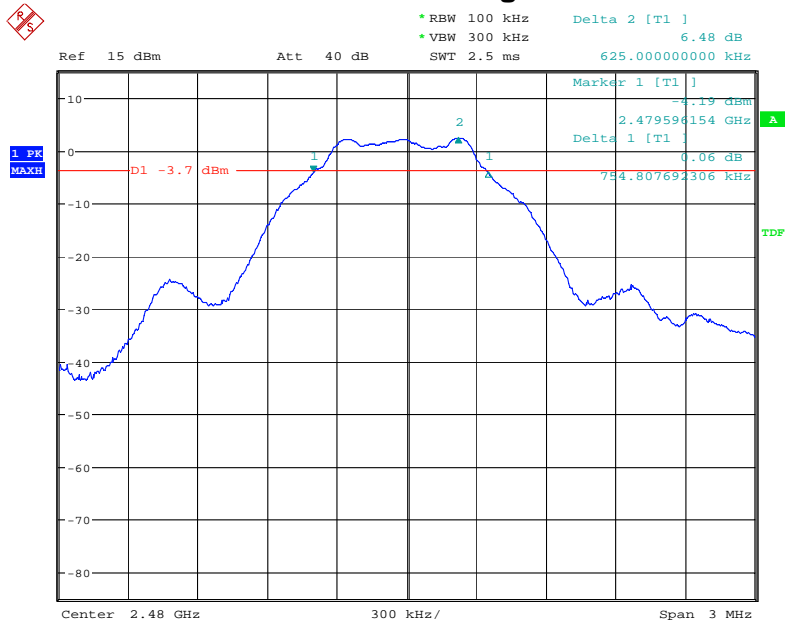
1 PK  
 MAXH

Center 2.402 GHz 300 kHz/ Span 3 MHz

### 6dB bandwidth Middle Channel

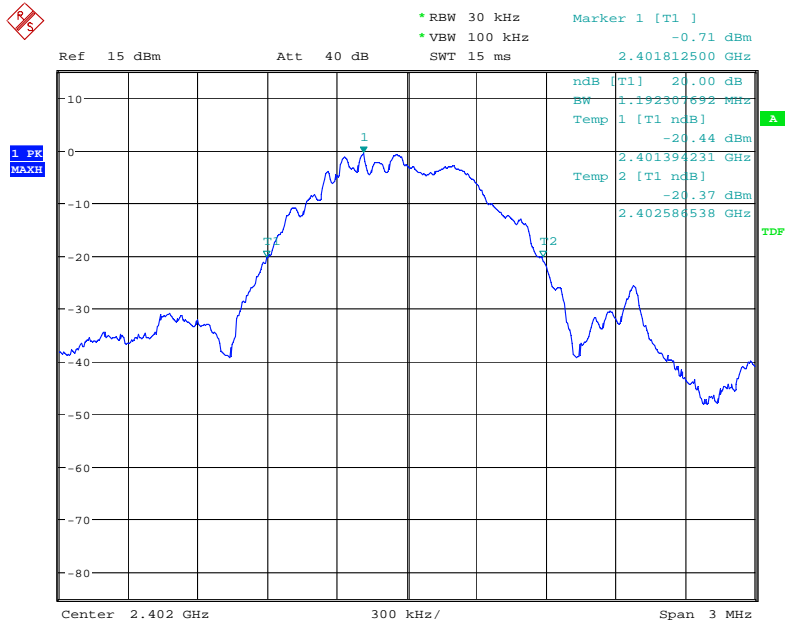


6dB bandwidth High Channel



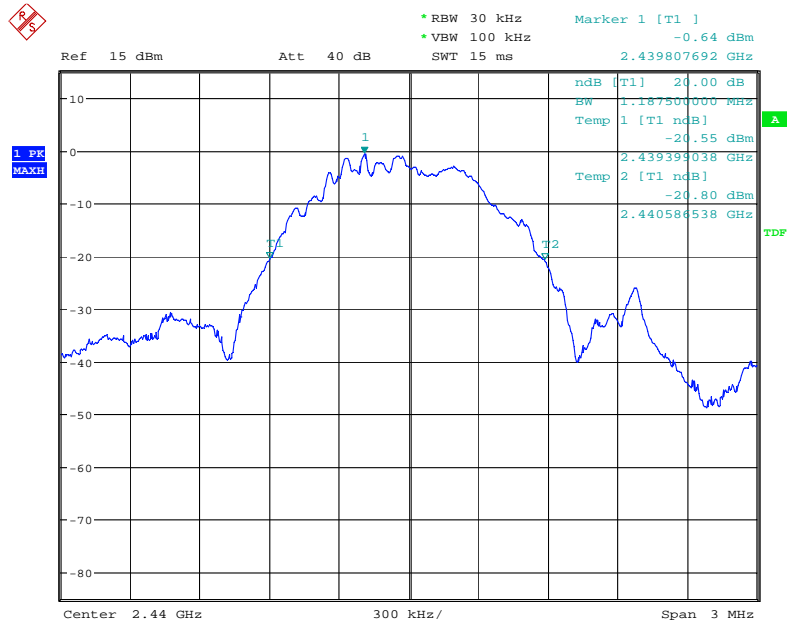
Date: 3.DEC.2015 18:01:46

20dB bandwidth Low Channel



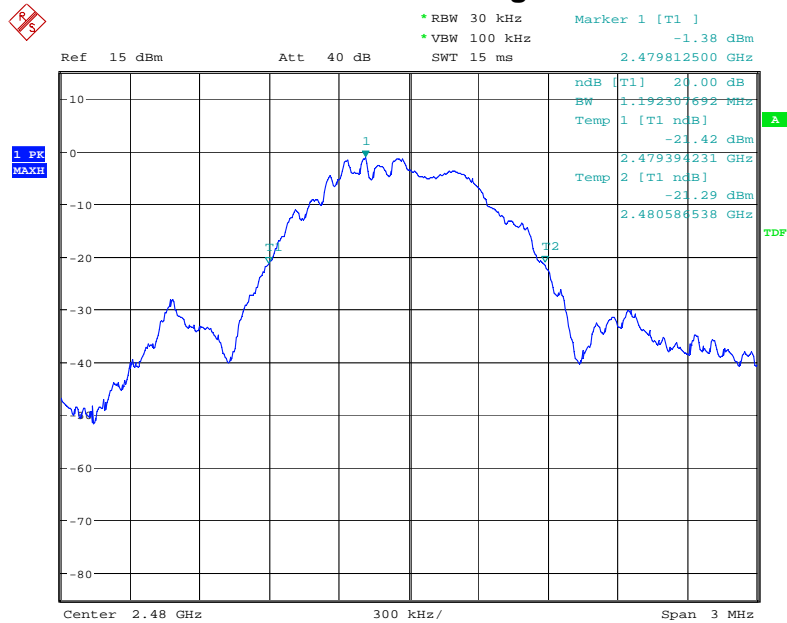
Date: 3.DEC.2015 18:05:54

20dB bandwidth Middle Channel



Date: 3.DEC.2015 18:06:26

20dB bandwidth High Channel



Date: 3.DEC.2015 18:07:05



## 6. Power Spectral Density

### 6.1 Measurement Procedure

DTS 6dB Channel Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074(v03r03):

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to:  $3\text{ kHz} \leq \text{RBW} \leq 100\text{KHz}$
4. Set the VBW  $\geq 3 \times \text{RBW}$ .
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 6.2 Test SET-UP (Block Diagram of Configuration)



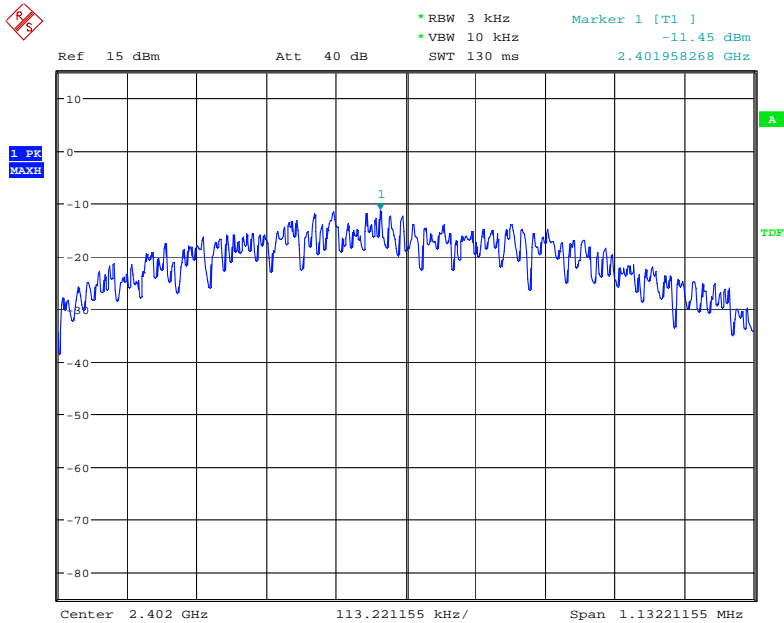
### 6.3 Measurement Results

Please refer to following table and plots.

Modulation:	GFSK		
Temperature :	24 °C	Humidity :	50 %
Test By:	Sance	Test Date :	December 03, 2015
Test Result:	PASS		

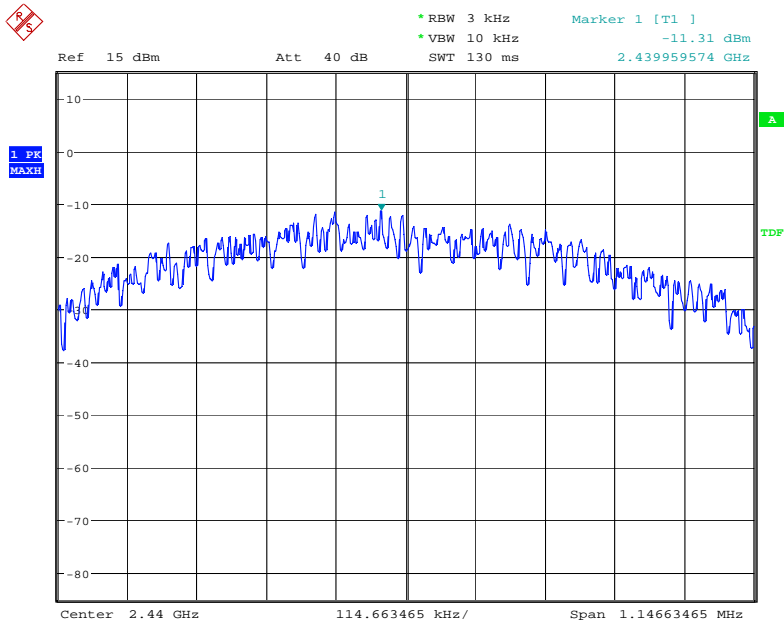
Frequency MHz	Data Rate Mbps	PSD dBm/3kHz	Limit dBm/3kHz
Low Channel: 2402	1	-11.45	8
Middle Channel: 2440	1	-11.31	8
High Channel: 2480	1	-12.06	8

Low Channel



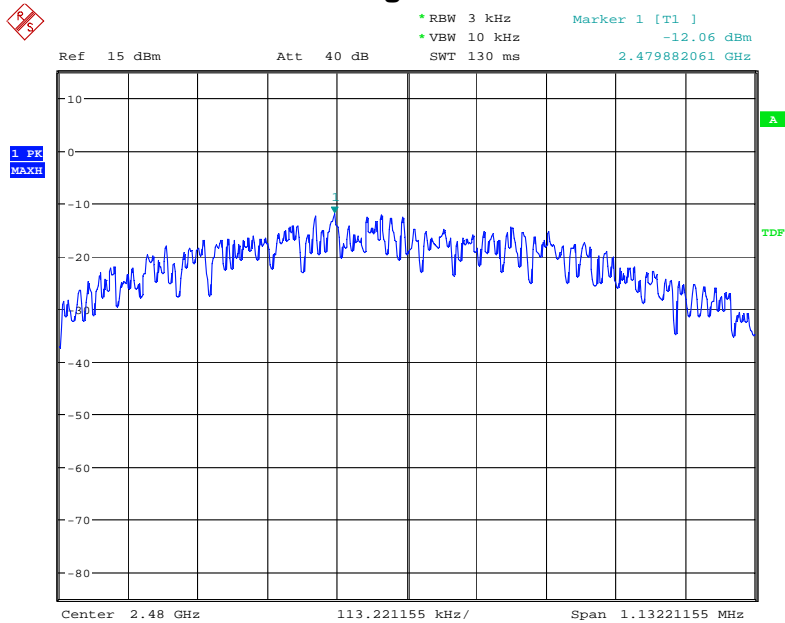
Date: 3.DEC.2015 17:58:01

Middle Channel



Date: 3.DEC.2015 17:59:18

High Channel



Date: 3.DEC.2015 18:02:24

## 7. Band Edge and Conducted Spurious Emissions

### 7.1 Requirement and Measurement Procedure

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

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set according to FCC KDB558074(v03r03) clause 11.3.

### 7.2 Test SET-UP (Block Diagram of Configuration)



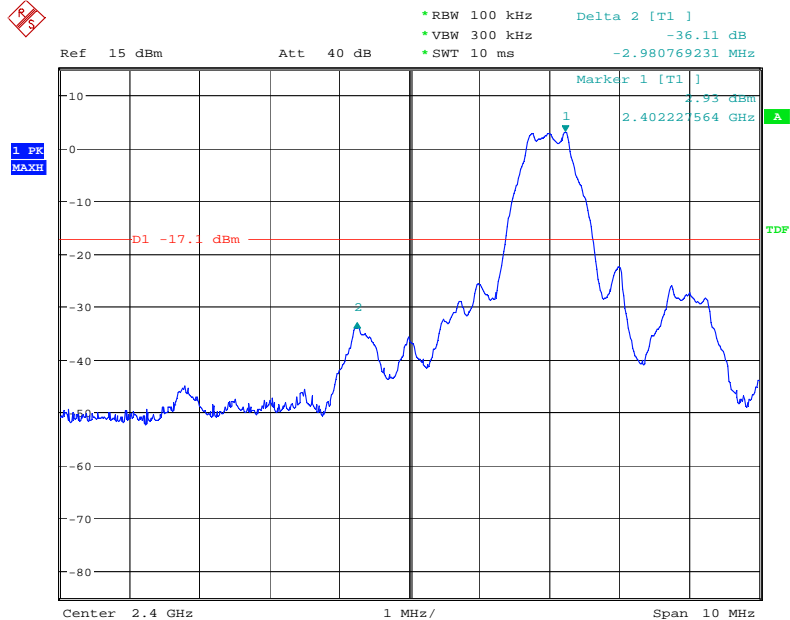
### 7.3 Measurement Results

The test plots and table showed all spurious emission and up to the tenth harmonic was measured and they were found to be at least 20dB below the highest level of the desired power in the passband. Please refer to below plots.

Freq. (MHz)	Ant.Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
2389.450	H	33.92	24.11	8.08	42.00	32.19	74.00	54.00	-32.00	-21.81
2389.450	V	33.03	24.88	8.08	41.11	32.96	74.00	54.00	-32.89	-21.04
2399.990	H	37.40	25.51	8.09	45.49	33.60	74.00	54.00	-28.51	-20.40
2399.990	V	37.87	26.46	8.09	45.96	34.55	74.00	54.00	-28.04	-19.45
2483.660	H	52.18	37.12	8.36	60.54	45.48	74.00	54.00	-13.46	-8.52
2483.660	V	53.17	37.71	8.36	61.53	46.07	74.00	54.00	-12.47	-7.93

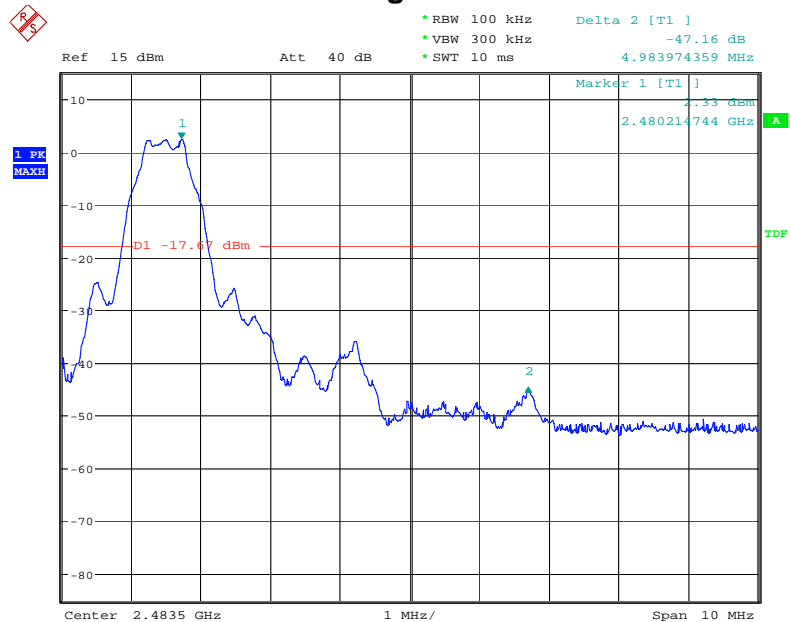
- Note:**
- (1) All Readings are Peak Value and AV.
  - (2) Emission Level= Reading Level+Probe Factor +Cable Loss
  - (3) Measurement uncertainty :  $\pm 3.7$ dB

Band Edge  
Low Channel



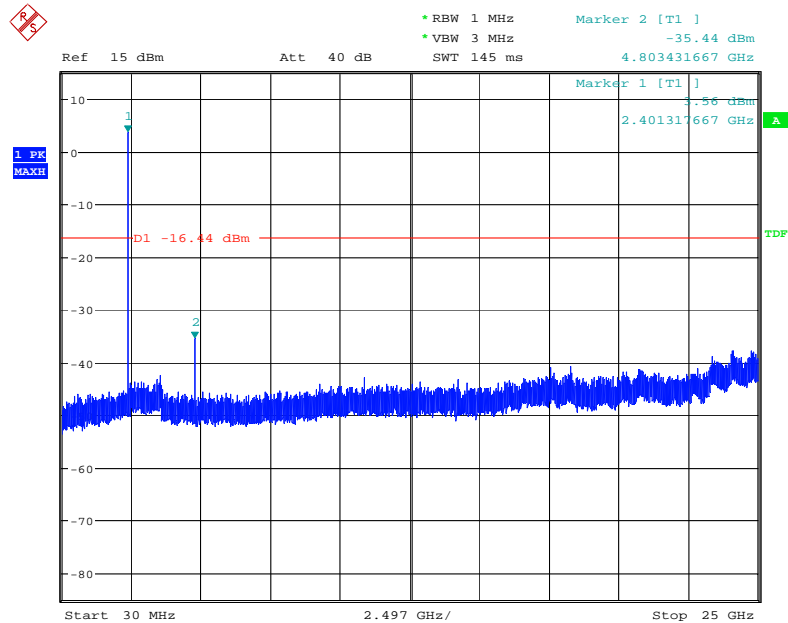
Date: 3.DEC.2015 18:03:57

High Channel



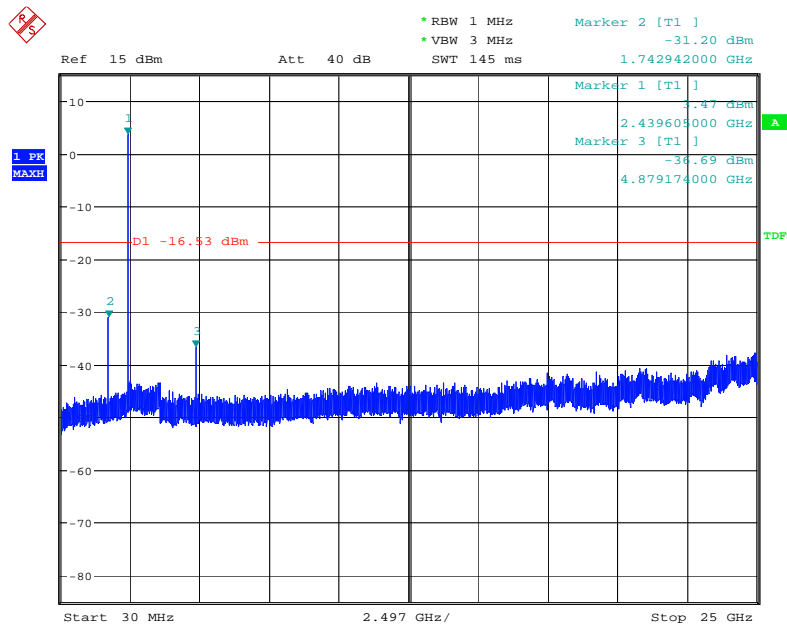
Date: 3.DEC.2015 18:04:38

Conducted Spurious Emissions  
Low Channel



Date: 3.DEC.2015 18:15:38

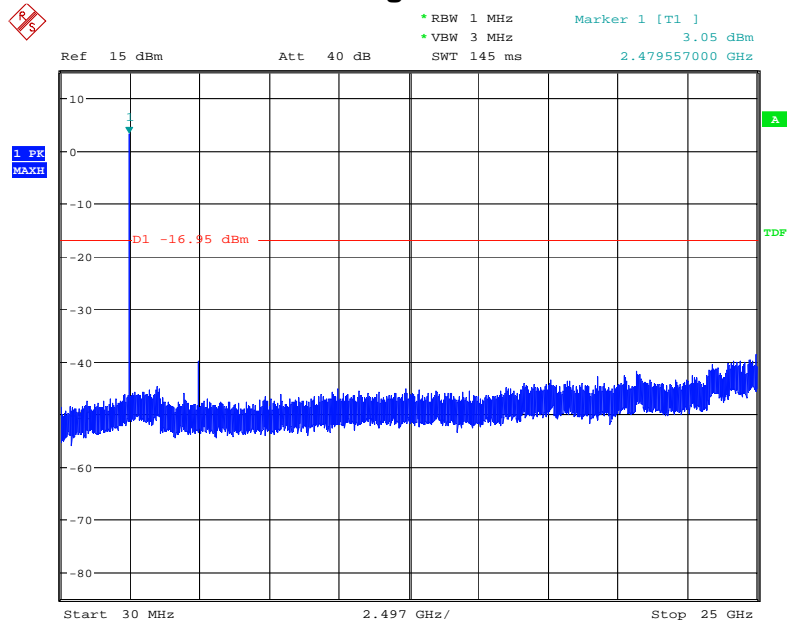
Note: Sweep points=30001pts  
Middle Channel



Date: 3.DEC.2015 18:14:20

Note: Sweep points=30001pts

High Channel



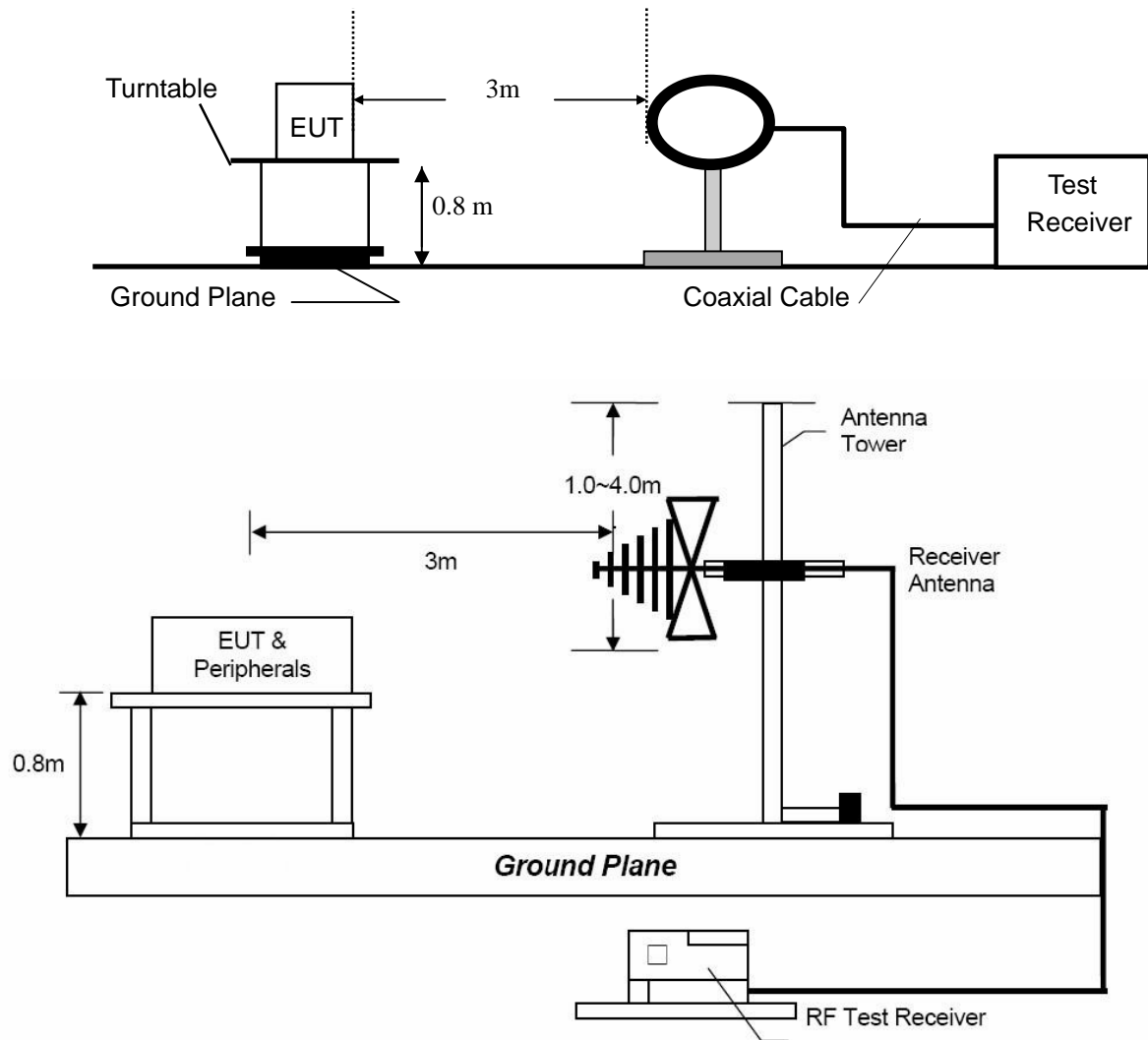
Date: 3.DEC.2015 18:12:35

Note: Sweep points=30001pts

## 8. Radiated Spurious Emissions and Restricted Bands

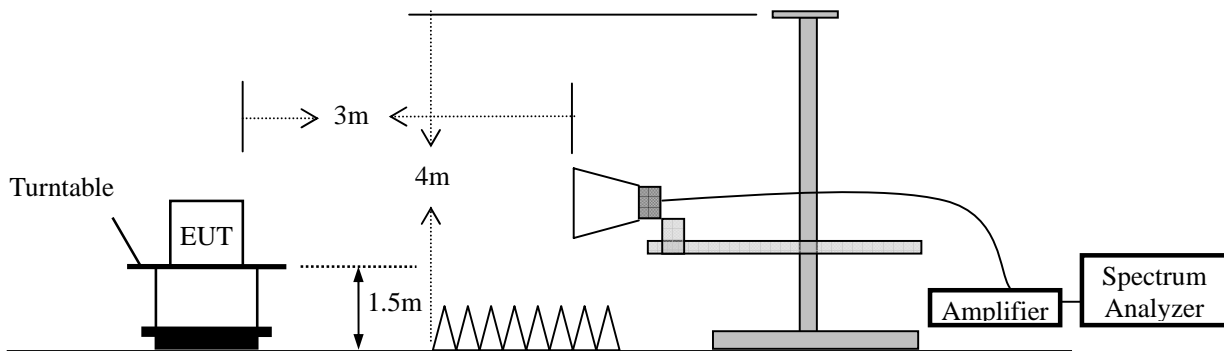
### 8.1 Test SET-UP (Block Diagram of Configuration)

#### 8.1.1 Radiated Emission Test Set-Up, Frequency Below 30MHz





### 8.1.2 Radiated Emission Test Set-Up, Frequency above 1GHz



### 8.2 Measurement Procedure

- Below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room. Above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 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. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

For 30MHz to 1GHz:

Set the spectrum analyzer as: RBW=120kHz, VBW=300kHz, Detector=Quasi-Peak

For Above 1GHz:

Set the spectrum analyzer as: RBW=1MHz, VBW=3MHz, Detector=Peak.

Set the spectrum analyzer as: RBW=1MHz, VBW=10Hz, Detector=Peak.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Band (MHz)	Level	Resolution Bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Average	1 MHz	10 Hz

### 8.3 Limit

Frequency range MHz	Distance Meters	Field Strengths Limit (15.209)
		$\mu\text{V/m}$
0.009 ~ 0.490	300	$2400/F(\text{kHz})$
0.490 ~ 1.705	30	$24000/F(\text{kHz})$
1.705 ~ 30	30	30
30 ~ 88	3	100
88 ~ 216	3	150
216 ~ 960	3	200
Above 960	3	500

- Remark : (1) Emission level (dB) $\mu\text{V}$  = 20 log Emission level  $\mu\text{V/m}$   
(2) The smaller limit shall apply at the cross point between two frequency bands.  
(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) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.  
(5) §15.247(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

### 8.4 Measurement Results

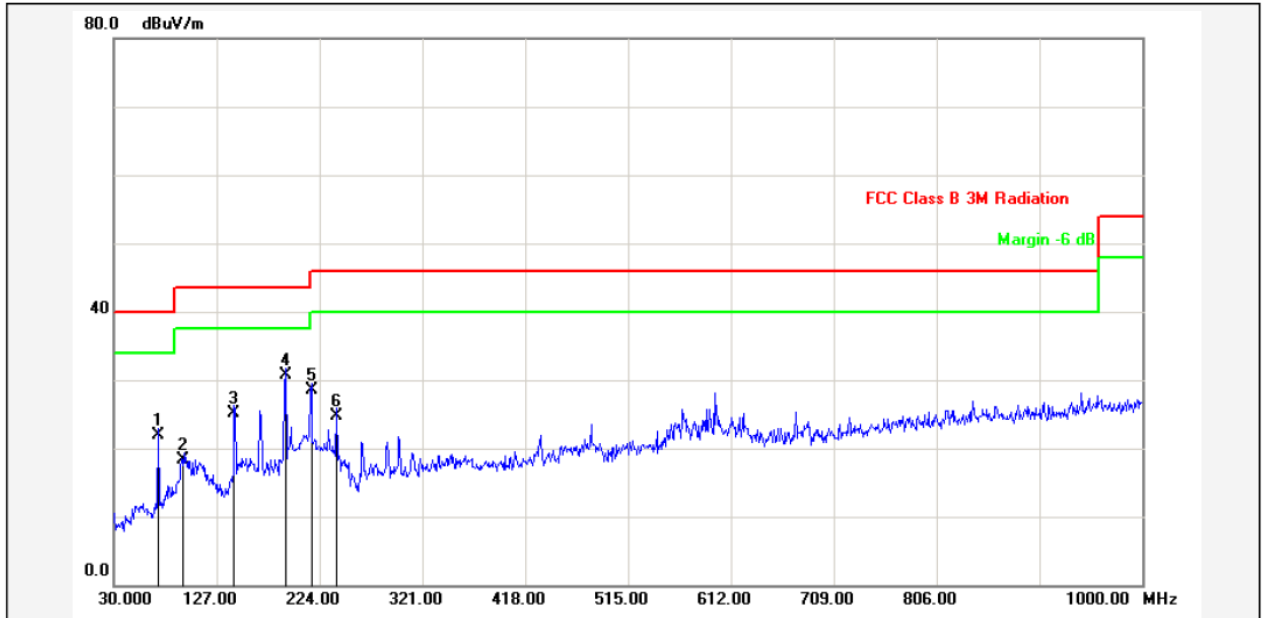
Please refer to following plots.



**Dongguan NTC Co., Ltd.**  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: <http://www.ntc-c.com>

Site: Radiation

Test Time: 2015-12-02 11:07:33



Report No.: SM41ST

Test Standard: FCC Class B 3M Radiation

Test item: Radiation Emission

Applicant: Seed Labs, Inc.

Product: Silvair Mesh Module

Model No.: SM41ST

Test Distance:

Ant. Polarization: Horizontal

Temp.(C)/Hum.(%): 21(C) / 55 %

Power Rating: AC 120V 60Hz PC input

Test Engineer: Gavin

Test Mode: BT Mode

Remark: Lowest channel

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	71.7099	-20.61	42.51	21.90	40.00	-18.10	QP			P	
2	95.9599	-12.65	30.95	18.30	43.50	-25.20	QP			P	
3	143.4900	-15.59	40.79	25.20	43.50	-18.30	QP			P	
4	191.9900	-13.51	44.21	30.70	43.50	-12.80	QP			P	
5	216.2400	-13.08	41.58	28.50	46.00	-17.50	QP			P	
6	240.4900	-12.01	36.81	24.80	46.00	-21.20	QP			P	

**Power rating: powered by the ancillary equipment from PC with 120V/60Hz.**

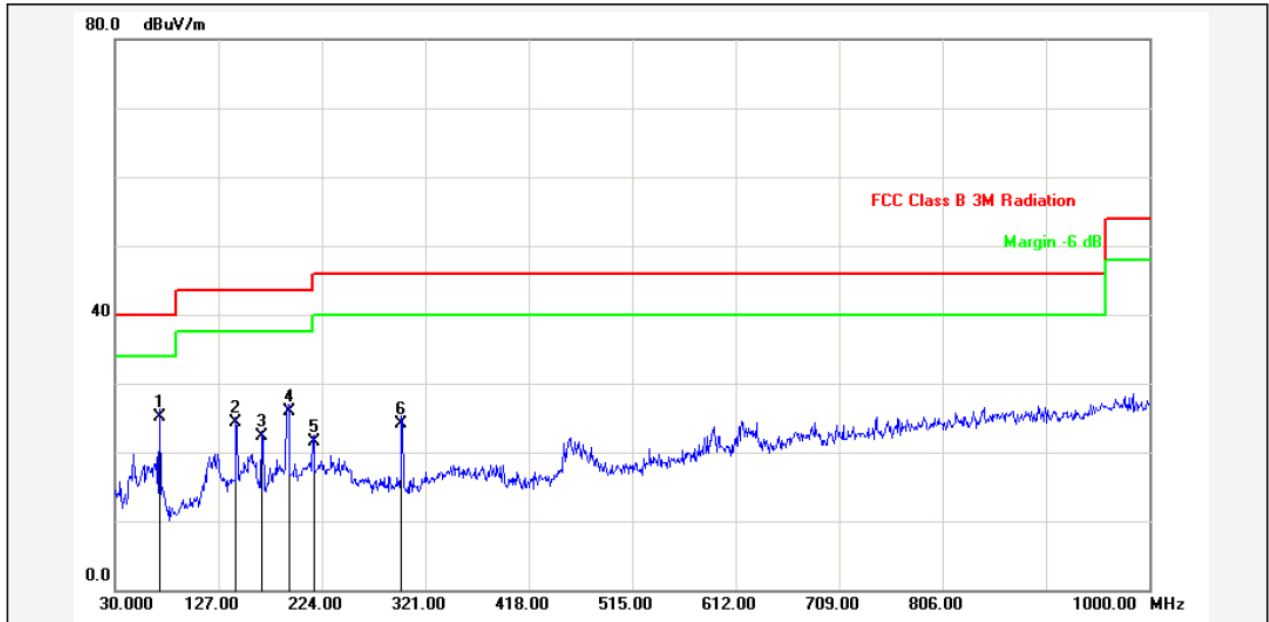
**Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.**



**Dongguan NTC Co., Ltd.**  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: <http://www.ntc-c.com>

Site: Radiation

Test Time: 2015-12-02 11:12:00



Report No.: SM41ST

Test Standard: FCC Class B 3M Radiation

Test item: Radiation Emission

Applicant: Seed Labs, Inc.

Product: Silvoir Mesh Module

Model No.: SM41ST

Test Distance:

Ant. Polarization: Vertical

Temp.(C)/Hum.(%): 21(C) / 55 %

Power Rating: AC 120V 60Hz PC input

Test Engineer: Gavin

Test Mode: BT Mode

Remark: Lowest channel

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	71.7099	-17.95	43.15	25.20	40.00	-14.80	QP			P	
2	143.4900	-18.59	42.89	24.30	43.50	-19.20	QP			P	
3	167.7400	-17.89	40.19	22.30	43.50	-21.20	QP			P	
4	192.9600	-16.48	42.38	25.90	43.50	-17.60	QP			P	
5	216.2400	-16.08	37.58	21.50	46.00	-24.50	QP			P	
6	298.6899	-12.50	36.70	24.20	46.00	-21.80	QP			P	

**Power rating: powered by the ancillary equipment from PC with 120V/60Hz.**

**Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.**

Modulation:	GFSK	Test Date :	December 03, 2015
Frequency Range:	1-25GHz	Temperature :	24 °C
Test Result:	PASS	Humidity :	50 %
Measured Distance:	3m		
Test By:	Sance		

Freq. (MHz)	Ant.Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)										
4804	V	44.18	31.03	14.63	58.81	45.66	74.00	54.00	-15.19	-8.34
7206	V	40.10	26.79	20.68	60.78	47.47	74.00	54.00	-13.22	-6.53
---										
4804	H	42.03	29.45	14.63	56.66	44.08	74.00	54.00	-17.34	-9.92
7206	H	39.77	23.74	20.68	60.45	44.42	74.00	54.00	-13.55	-9.58
---										
Operation Mode: TX Mode (Mid)										
4880	V	45.02	32.37	14.98	60.00	47.35	74.00	54.00	-14.00	-6.65
7320	V	42.05	26.34	20.93	62.98	47.27	74.00	54.00	-11.02	-6.73
---										
4880	H	47.52	30.71	14.98	62.50	45.69	74.00	54.00	-11.50	-8.31
7320	H	41.32	24.13	20.93	62.25	45.06	74.00	54.00	-11.75	-8.94
---										
Operation Mode: TX Mode (High)										
4960	V	46.42	32.13	15.30	61.72	47.43	74.00	54.00	-12.28	-6.57
7440	V	40.29	26.24	21.16	61.45	47.40	74.00	54.00	-12.55	-6.60
---										
4960	H	47.44	30.25	15.30	62.74	45.55	74.00	54.00	-11.26	-8.45
7440	H	41.57	22.84	21.16	62.73	44.00	74.00	54.00	-11.27	-10.00
---										

Other harmonics emissions are lower than 10dB below the allowable limit.

- Note:**
- (1) All Readings are Peak Value and AV.
  - (2) Emission Level= Reading Level + Factor
  - (3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
  - (4) Data of measurement within this frequency range shown “ ---” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
  - (5) Measurement uncertainty :  $\pm 3.7\text{dB}$ .
  - (6) Horn antenna used for the emission over 1000MHz.

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## 9. Antenna Application

### 9.1 Antenna requirement

According to of FCC part 15C section 15.203 and 15.240:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Systems operating in the 2400-2483.5MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

### 9.2 Measurement Results

The antenna is dipole antenna and no consideration of replacement, and the best case gain of the antenna is 0dBi. So, the antenna is consider meet the requirement.

## 10. Test Equipment List

Description	Manufacturer	Model Number	Serial Number	Characteristics	Calibration Date	Calibration Due Date
Test Receiver	Rohde & Schwarz	ESCI7	100837	9KHz~7GHz	Nov. 23, 2015	Nov. 22, 2016
Antenna	Schwarzbeck	VULB9162	9162-010	30MHz~7GHz	Nov. 26, 2015	Nov. 25, 2016
Positioning Controller	UC	UC 3000	N/A	0~360° , 1-4m	N/A	N/A
Color Monitor	SUNSPO	SP-140A	N/A	N/A	N/A	N/A
Single Phase Power Line Filter	SAEMC	PF201A-32	110210	32A	N/A	N/A
3 Phase Power Line Filter	SAEMC	PF401A-200	110318	200A	N/A	N/A
DC Power Filter	SAEMC	PF301A-200	110245	200A	N/A	N/A
Cable	Huber+Suhner	CBL2-NN-1M	22390001	9KHz~7GHz	Nov. 07, 2015	Nov. 06, 2016
Cable	Huber+Suhner	CIL02	N/A	9KHz~7GHz	Nov. 07, 2015	Nov. 06, 2016
Power Amplifier	HP	HP 8447D	1145A00203	100KHz~1.3GHz	Nov. 07, 2015	Nov. 06, 2016
Horn Antenna	Schwarzbeck	BBHA9170	9170-372	15GHz~26.5GHz	Oct.23, 2015	Oct.22, 2016
Horn Antenna	Com-Power	AH-118	071078	1GHz~18GHz	Nov. 05, 2015	Nov. 04, 2016
Loop antenna	Daze	ZA30900A	0708	9KHz~30MHz	Oct.10, 2015	Oct.09, 2016
Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	20Hz~26.5GHz	Sep. 01, 2015	Aug. 31, 2016
Pre-Amplifier	Agilent	8449B	3008A02964	1GHz~26.5GHz	Nov. 03, 2015	Nov. 02, 2016
L.I.S.N.	Rohde & Schwarz	ENV 216	101317	9KHz~30MHz	Nov. 07, 2015	Nov. 06, 2016
Temporary antenna connector	TESCOM	SS402	N/A	1G-18GHz	N/A	N/A
Power Meter	Anritsu	ML2495A	1139001	100k-65GHz	Nov. 05, 2015	Nov. 04, 2016
Power Sensor	Anritsu	MA2411B	100345	300M-40GHz	Nov. 05, 2015	Nov. 04, 2016

---End---