FCC PART 15 SUBPART C MEASUREMENT AND TEST REPORT

For

Twin-Star International Inc.

12/F Taiwanese Trade Association Building, De Zheng Road, ChangAn Town, Dongguan City, China

E.U.T.: SOUND SYSTEM

Model Name: TS-2611

Brand Name: TWIN STAR

FCC ID: QCD-TS-2611

Report Number: NTC1606042F-1

Test Date(s): June 08, 2016 to June 17, 2016

Report Date(s): June 17, 2016

Prepared by

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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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Revision History of This Test Report

Report Number	Description	Issued Date
NTC1606042F-1	Initial Issue	2016-06-17

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test

This device is a SOUND SYSTEM, it's powered by DC 15V come from Adapter.
For more details features, please refer to User's Manual.

Manufacturer & Factory	:	Zhongshan Senjia Electrical Appliances Co., Ltd.
Address	:	No.35, Wenming Road, Nanqu, Zhongshan, Guangdong, China
Power Supply	:	M/N: WT1502000 Input: AC100-240V 50/60Hz 1.6A Output: DC 15V 2.0A
Test voltage	:	AC 120V 60Hz, AC 240V 60Hz Only the worst case was recorded in the report
Model name	:	TS-2611
Model difference	:	None
Hardware version	:	RE V02
Software version	:	V1.0
Serial number	:	N/A
Note	:	This report only applies to modulation technology DTS(BLE).

For BT function
BT Version: BLE(V4.0) and backward compatible 3.0+EDR version.
We prepare version BLE(V4.0) and 3.0+EDR for RF test.

Item	BT3.0+EDR	BLE(V4.0)
Frequency	2402-2480MHz	2402-2480MHz
Modulation	GFSK, π/4-DQPSK, 8DPSK	GFSK
Number of Channel	79	40
Channel space	1MHz	2MHz
Antenna Type	PCB antenna	PCB antenna
Antenna Gain	0 dBi (declared by manufacturer)	0 dBi (declared 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
21	2442
40	2480

Test SW version	BlueTest 3

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: QCD-TS-2611 filing to comply with Section 15.247 of the FCC Part 15(2016), Subpart C Rule.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). 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

Notebook PC	:	Manufacturer: IBM Corporation M/N: R50e S/N: L3-HZNGO P/N: 1834KDC
Adapter	:	Manufacturer: IBM Corporation M/N: 08K8210 Input: AC100-240V 50/60Hz 0.5-1.0A Output: DC 16V 4.5A

1.6 Test Facility and Location

Listed by FCC, July 03, 2014
The Certificate Registration Number is 665078.
Listed by Industry Canada, June 18, 2014
The Certificate Registration Number is 9743A.

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 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

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

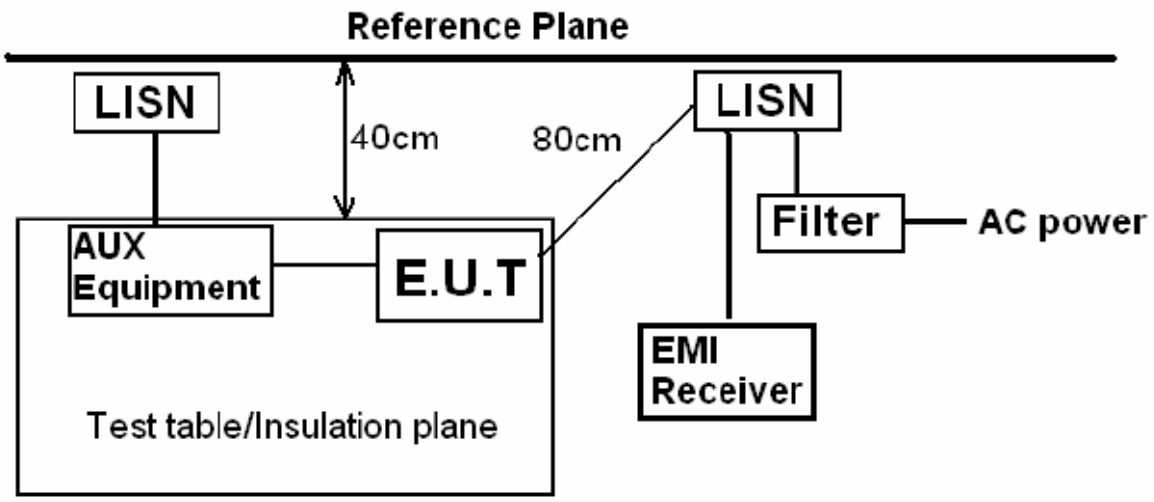
The EUT has been tested under continuous operating condition (The duty cycle >98%). Test program used to control the EUT staying in continuous transmitting mode. The Lowest, Middle and highest channel were chosen for testing, and modulation type GFSK was tested, but only the worst case data is shown in this report.

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

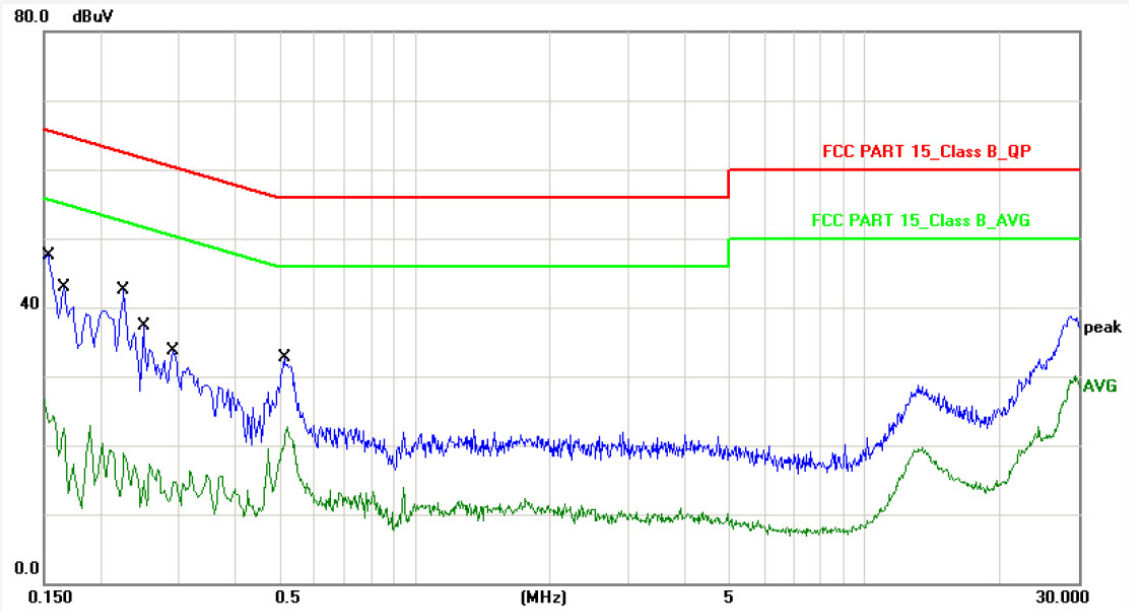
3.3 Measurement Results

Please refer to following plots of the worst case.

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

Site: Conduction

Test Time: 2016-6-12 9:50:47



Report No.: TS-2611
Test Standard: FCC PART 15_Class B_QP
Test item: Conducted Emission
Phase: L1
Applicant: TwinStar
Temp.( )/Hum.(%): 22(C) / 55 %
Product: SOUND SYSTEM
Power Rating: AC 120V/60Hz
Model No.: TS-2611
Test Engineer: chilaw

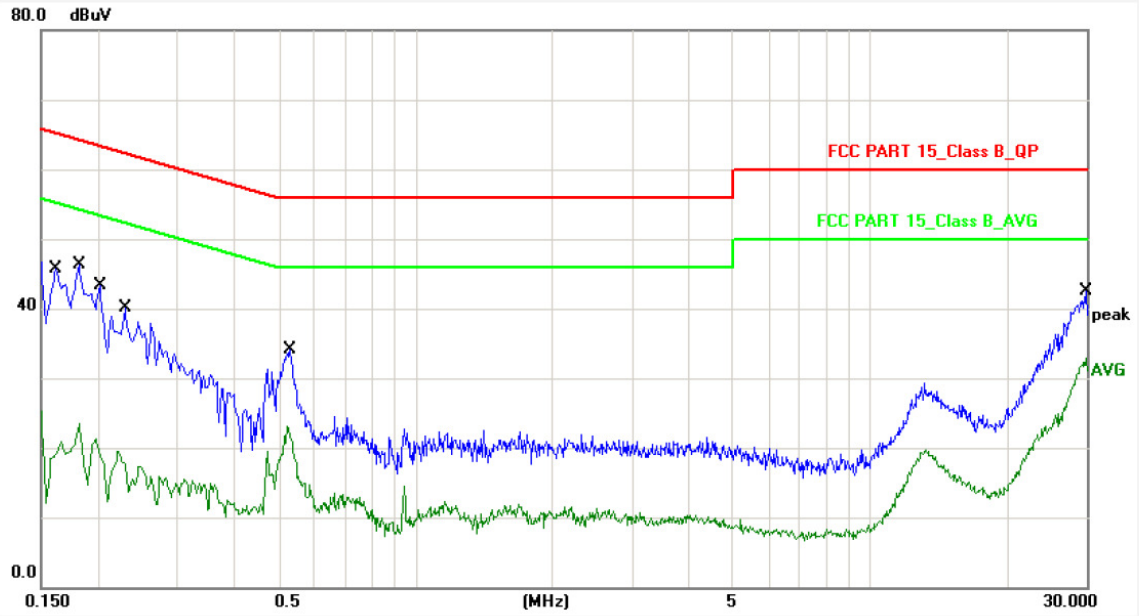
Test Mode: BT Mode
Remark: Highest channel

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1539	10.80	34.70	45.50	65.78	-20.28	QP	P	
2	0.1539	10.80	13.80	24.60	55.78	-31.18	AVG	P	
3	0.1660	10.80	30.00	40.80	65.15	-24.35	QP	P	
4	0.1660	10.80	9.70	20.50	55.15	-34.65	AVG	P	
5	0.2260	10.80	29.70	40.50	62.59	-22.09	QP	P	
6	0.2260	10.80	6.10	16.90	52.59	-35.69	AVG	P	
7	0.2500	10.80	24.40	35.20	61.75	-26.55	QP	P	
8	0.2500	10.80	4.40	15.20	51.75	-36.55	AVG	P	
9	0.2900	10.80	20.90	31.70	60.52	-28.82	QP	P	
10	0.2900	10.80	1.90	12.70	50.52	-37.82	AVG	P	
11	0.5140	10.80	19.90	30.70	56.00	-25.30	QP	P	
12	0.5140	10.80	9.90	20.70	46.00	-25.30	AVG	P	

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

Site: Conduction

Test Time: 2016-6-12 9:42:34



Report No.: TS-2611
Test Standard: FCC PART 15_Class B_QP
Test item: Conducted Emission
Phase: N
Applicant: TwinStar
Temp.( )/Hum.(%): 22(C) / 55 %
Product: SOUND SYSTEM
Power Rating: AC 120V/60Hz
Model No.: TS-2611
Test Engineer: chilaw

Test Mode: BT Mode
Remark: Highest channel

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1620	10.80	32.80	43.60	65.36	-21.76	QP	P	
2	0.1620	10.80	8.00	18.80	55.36	-36.56	AVG	P	
3	0.1819	10.80	33.40	44.20	64.39	-20.19	QP	P	
4	0.1819	10.80	10.70	21.50	54.39	-32.89	AVG	P	
5	0.2020	10.80	30.40	41.20	63.52	-22.32	QP	P	
6	0.2020	10.80	8.40	19.20	53.52	-34.32	AVG	P	
7	0.2300	10.80	27.20	38.00	62.45	-24.45	QP	P	
8	0.2300	10.80	6.20	17.00	52.45	-35.45	AVG	P	
9	0.5299	10.80	21.20	32.00	56.00	-24.00	QP	P	
10	0.5299	10.80	10.20	21.00	46.00	-25.00	AVG	P	
11	29.8420	10.80	29.70	40.50	60.00	-19.50	QP	P	
12	29.8420	10.80	20.00	30.80	50.00	-19.20	AVG	P	

4. Max. Conducted Output Power

4.1 Measurement Procedure

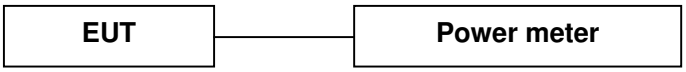
Maximum Conducted Output power at Antenna Terminals, FCC Rules 15.247(b)(3):

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

RBW≥DTS 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≥DTS bandwidth;
2. Set VBW≥3*RBW;
3. Set span≥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.

Modulation:	GFSK		
Temperature :	24 ℃	Humidity :	50 %
Test By:	Sance	Test Date :	June 15, 2016
Test Result:	PASS		

Frequency MHz	Data Rate Mbps	Peak Output Power dBm	Limit dBm
Low Channel: 2402	1	5.59	30
Middle Channel: 2442	1	6.41	30
High Channel: 2480	1	6.67	30

5. 6dB Bandwidth

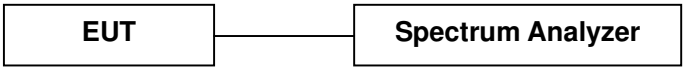
5.1 Measurement Procedure

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:

1. For 6dB bandwidth, Set the RBW = 100KHz.
2. Set the VBW ≥ 3 x 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 relative to the maximum level measured in the fundamental emission.

5.2 Test SET-UP (Block Diagram of Configuration)



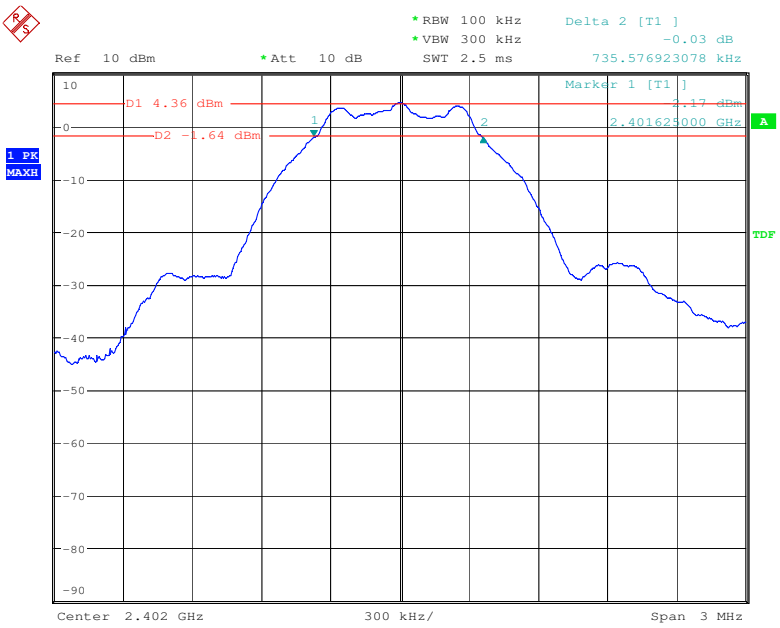
5.3 Measurement Results

Please refer to following table and plots.

Modulation:	GFSK		
Temperature :	24 ℃	Humidity :	50 %
Test By:	Sance	Test Date :	June 15, 2016
Test Result:	PASS		

Frequency MHz	Data Rate Mbps	6dB Bandwidth KHz	Limit
Low Channel: 2402	1	736	>500KHz
Middle Channel: 2442	1	736	>500KHz
High Channel: 2480	1	736	>500KHz

6dB bandwidth Low Channel



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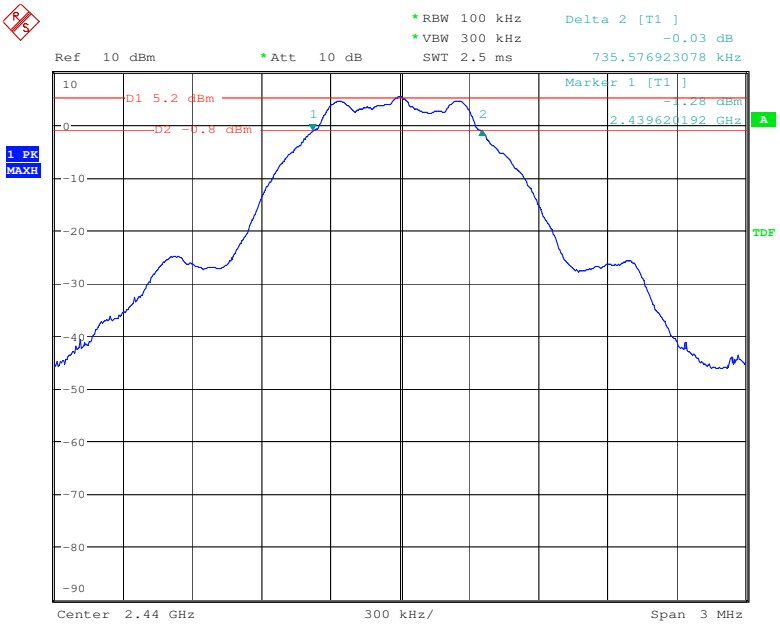
6dB bandwidth Middle Channel



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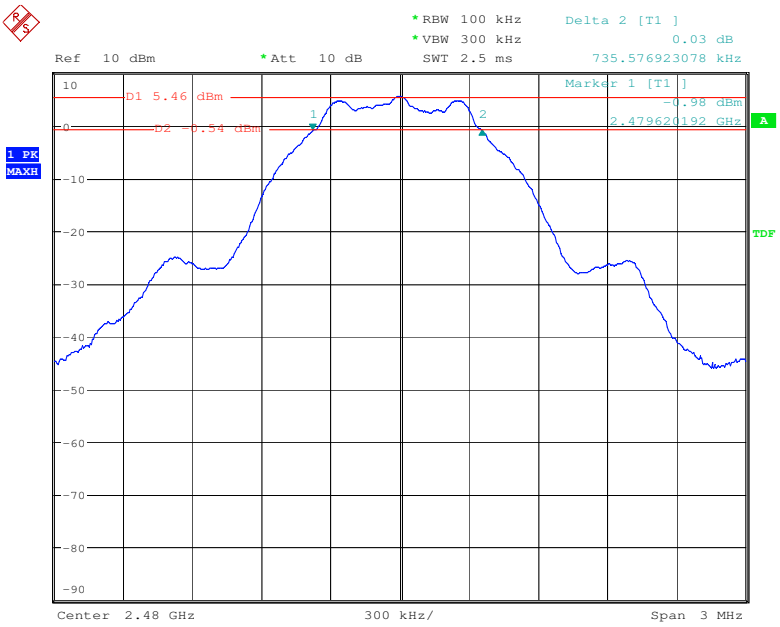
6dB bandwidth High Channel



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6. Power Spectral Density

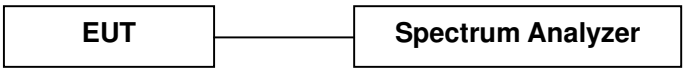
6.1 Measurement Procedure

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:

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 kHz≤RBW≤100KHz
4. Set the VBW ≥ 3 x 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)



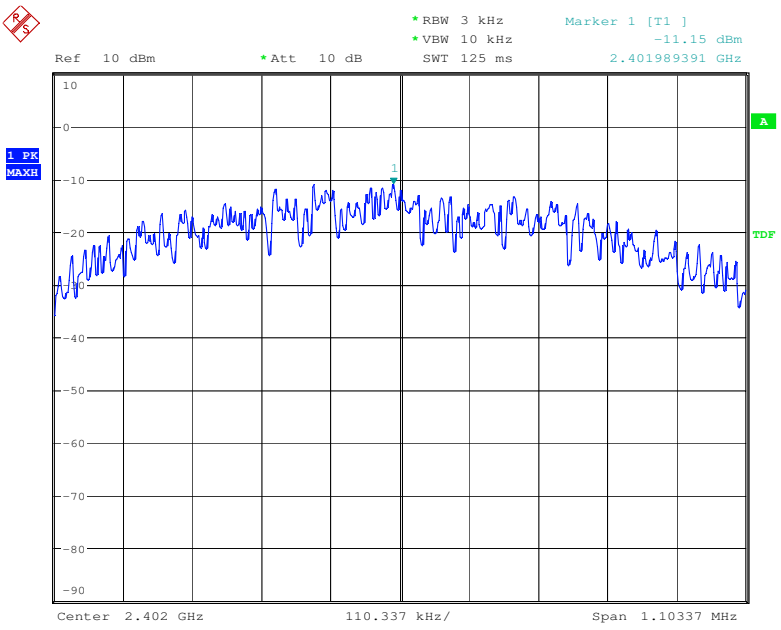
6.3 Measurement Results

Please refer to following table and plots.

Modulation:	GFSK		
Temperature :	24 ℃	Humidity :	50 %
Test By:	Sance	Test Date :	June 15, 2016
Test Result:	PASS		

Frequency MHz	Data Rate Mbps	PSD dBm/3kHz	Limit dBm/3kHz
Low Channel: 2402	1	-11.15	8
Middle Channel: 2442	1	-10.19	8
High Channel: 2480	1	-9.69	8

Low Channel



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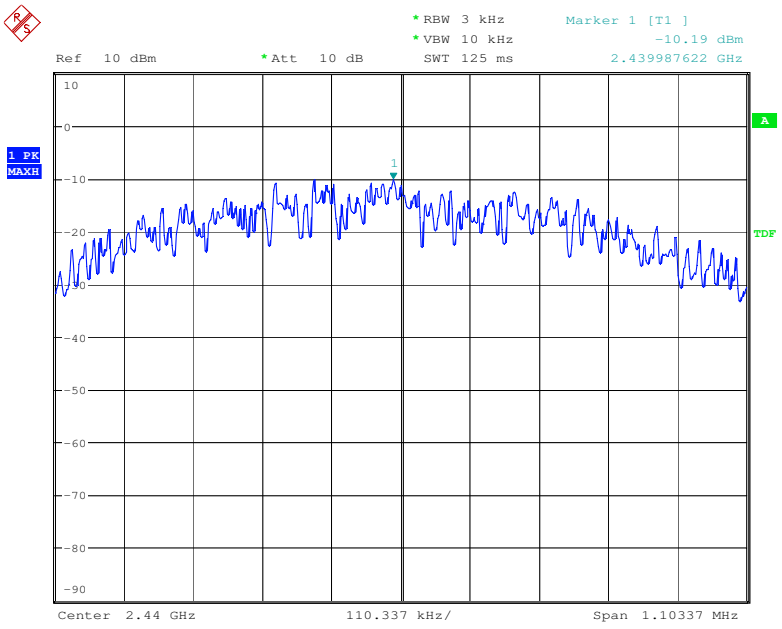
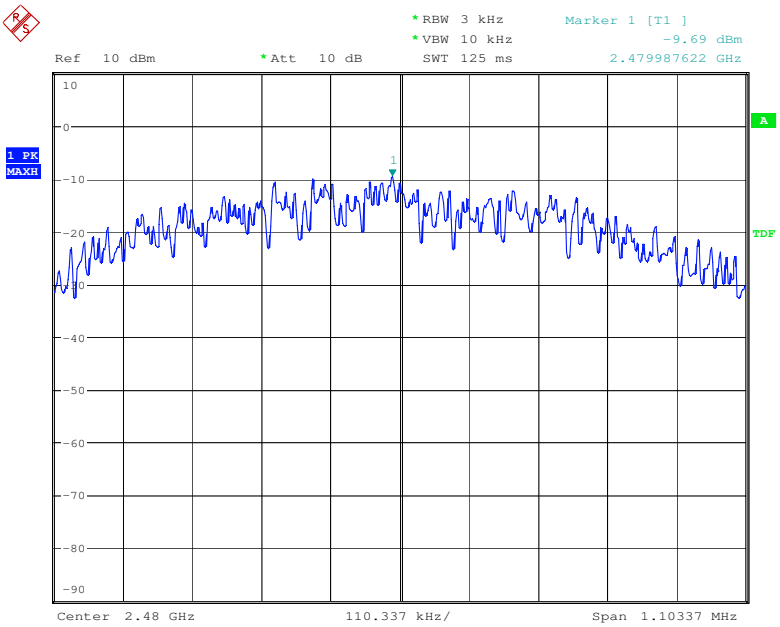
Middle Channel



Date: 15.JUN.2016 19:13:29

High Channel



Date: 15.JUN.2016 19:14:01

7. Band Edge and Conducted Spurious Emissions

7.1 Requirement and Measurement Procedure

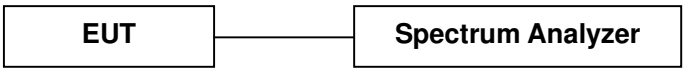
In any 100KHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired 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 as below.

A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

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

7.2 Test SET-UP (Block Diagram of Configuration)



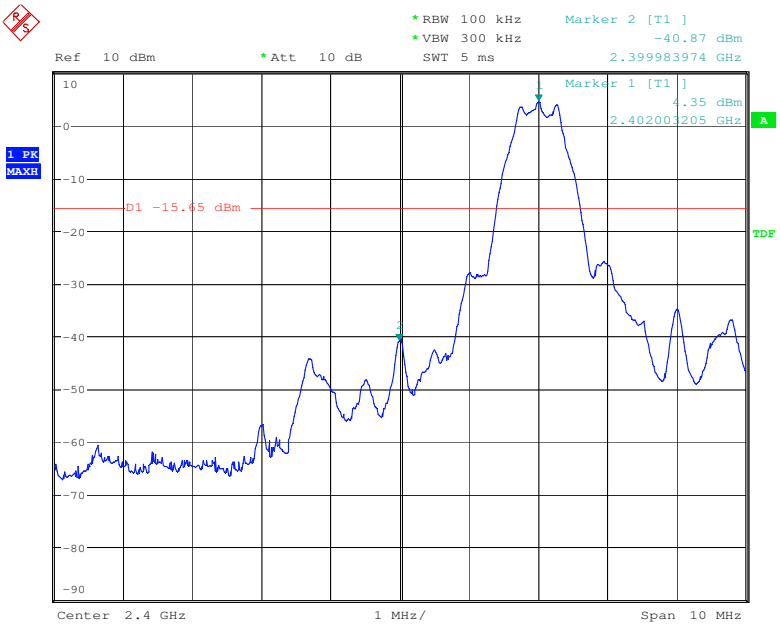
7.3 Measurement Results

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
2390.000	H	50.04	40.25	8.09	58.13	48.34	74.00	54.00	-15.87	-5.66
2390.000	V	50.12	38.68	8.09	58.21	46.77	74.00	54.00	-15.79	-7.23
2483.500	H	38.70	28.32	8.35	47.05	36.67	74.00	54.00	-26.95	-17.33
2483.500	V	45.37	34.61	8.35	53.72	42.96	74.00	54.00	-20.28	-11.04

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

Band Edge
Low Channel



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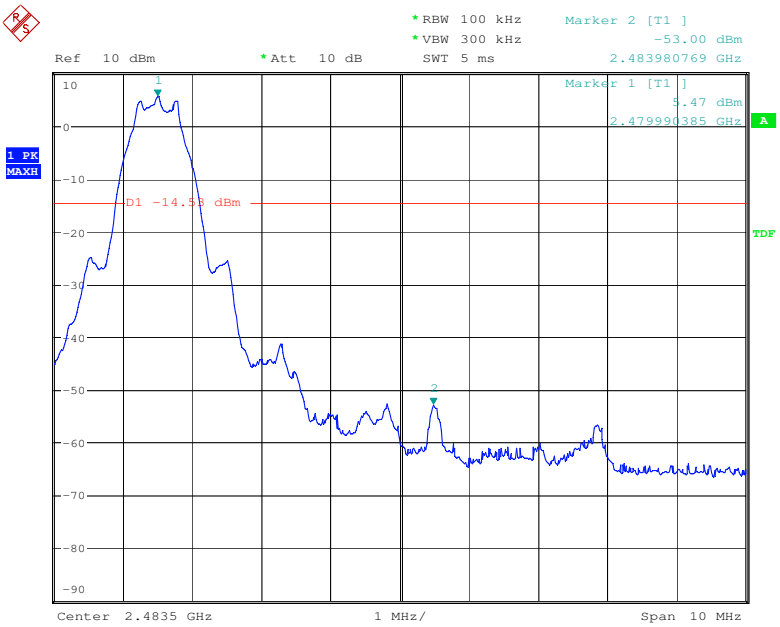
High Channel



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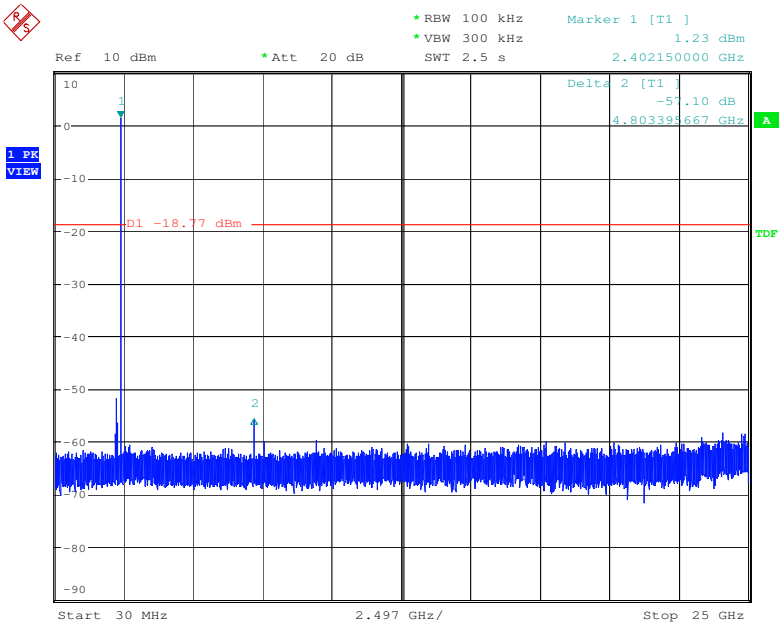
Conducted Spurious Emissions

Low Channel



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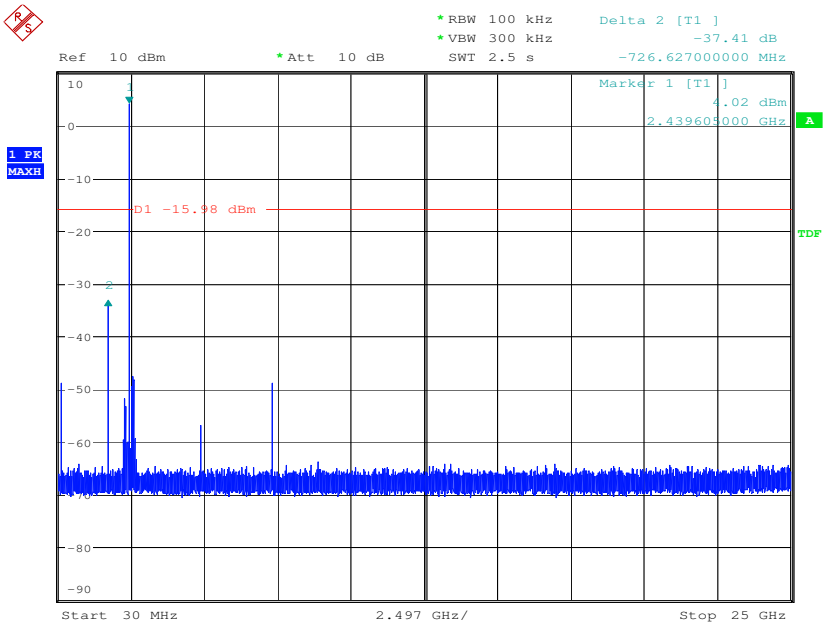
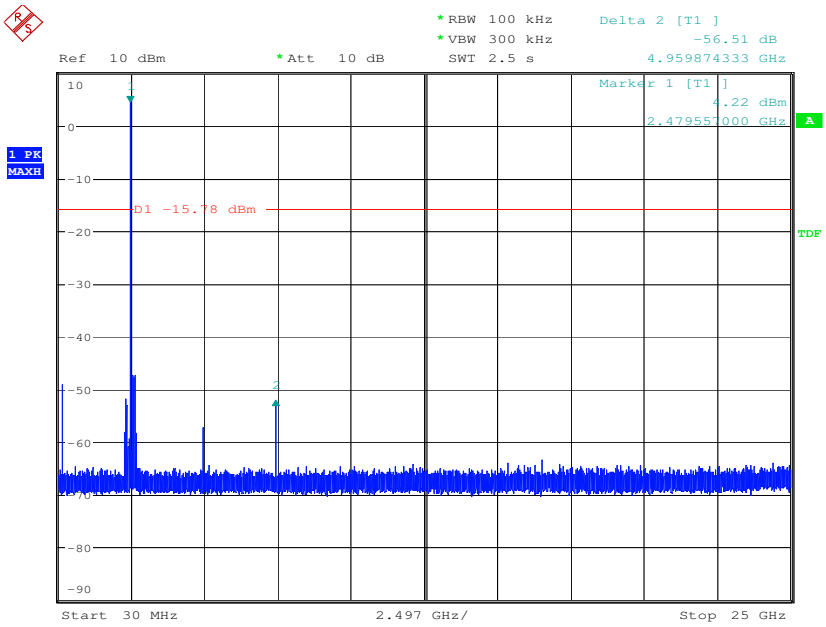
Middle Channel



Date: 15.JUN.2016 19:19:12

High Channel



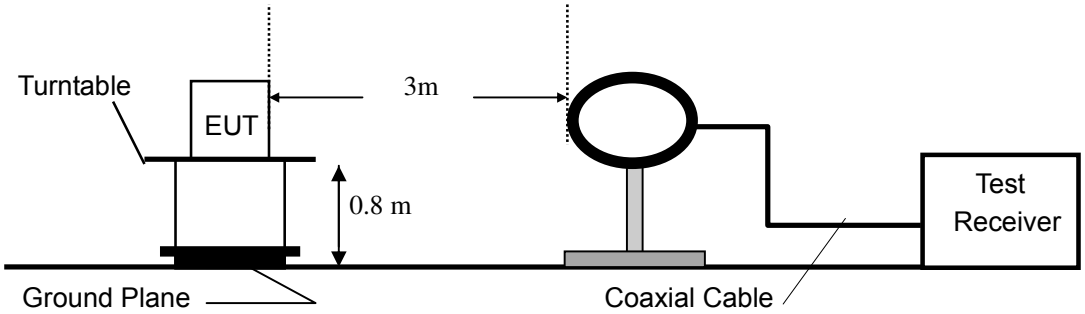
Date: 15.JUN.2016 19:20:37

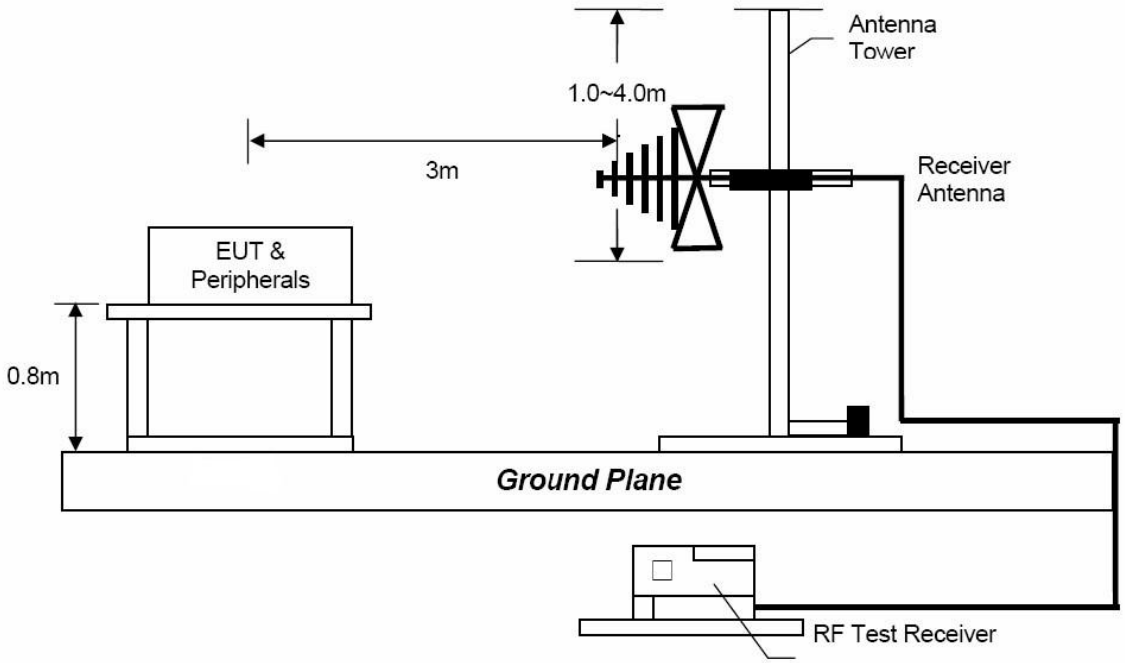
Note: Sweep points=30001pts

8. Radiated Spurious Emissions and Restricted Bands

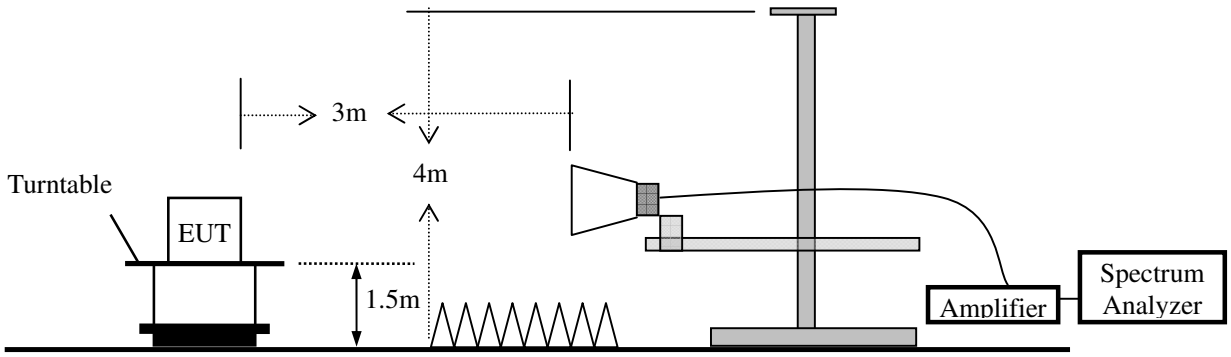
8.1 Test SET-UP (Block Diagram of Configuration)

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

a. Blow 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.
b. For the radiated emission test 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. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
d. 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.
e. 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.
f. A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

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) μV/m
0.009 ~ 0.490	300	2400/F(kHz)
0.490 ~ 1.705	30	24000/F(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 (dBμV = 20 log Emission level μV/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 of the worst case.

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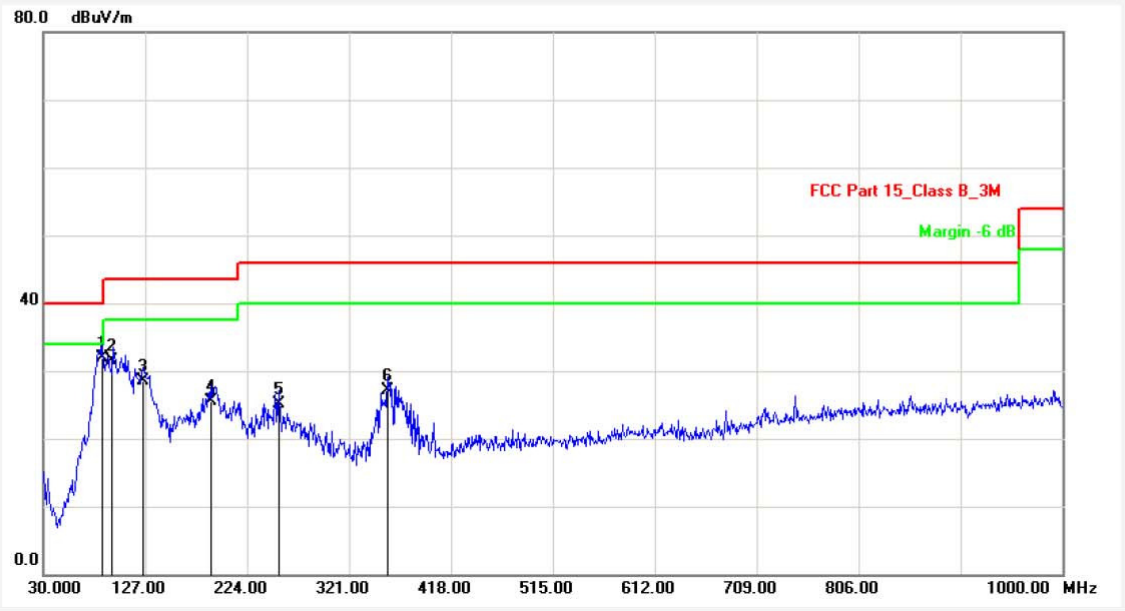
Dongguan NTC Co., Ltd.
Tel:+86-769-22022444 Fax:+86-769-22022799
Web: Http://www.ntc-c.com

Site: Radiation

Test Time: 2016-6-14 9:46:17



Report No.:	TS-2611		
Test Standard:	FCC Part 15_Class B_3M	Test Distance:	3m
Test item:	Radiation Emission	Ant. Polarization:	Horizontal
Applicant:	TwinStar	Temp.(C)/Hum.(%):	22(C) / 54 %
Product:	Sound System	Power Rating:	AC 120V/60Hz
Model No.:	TS-2611	Test Engineer:	Anson

Test Mode: BT Mode

Remark: Highest channel

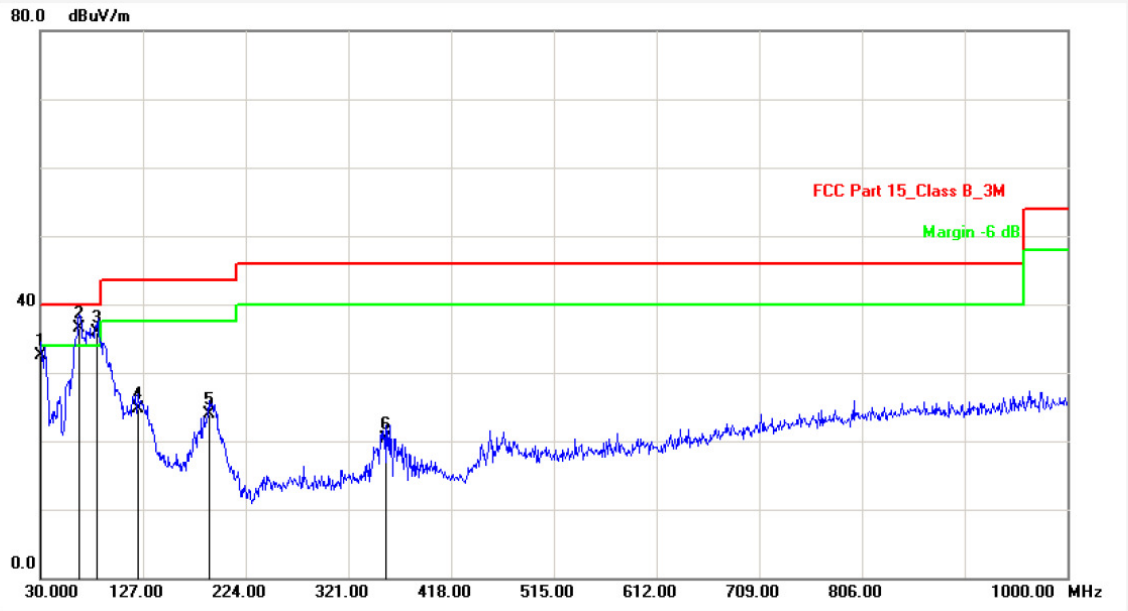
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	86.2600	-14.87	46.77	31.90	40.00	-8.10	QP			P	
2	95.9599	-12.65	44.15	31.50	43.50	-12.00	QP			P	
3	125.0600	-14.62	43.12	28.50	43.50	-15.00	QP			P	
4	189.0800	-13.63	39.23	25.60	43.50	-17.90	QP			P	
5	254.0698	-11.59	36.69	25.10	46.00	-20.90	QP			P	
6	357.8599	-9.13	36.23	27.10	46.00	-18.90	QP			P	

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: 2016-6-14 9:38:19



Report No.:	TS-2611		
Test Standard:	FCC Part 15_Class B_3M	Test Distance:	3m
Test item:	Radiation Emission	Ant. Polarization:	Vertical
Applicant:	TwinStar	Temp.(C)/Hum.(%):	22(C) / 54 %
Product:	Sound System	Power Rating:	AC 120V/60Hz
Model No.:	TS-2611	Test Engineer:	Anson

Test Mode: BT Mode

Remark: Highest 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	30.0000	-15.90	48.40	32.50	40.00	-7.50	QP			P	
2	66.8600	-16.24	52.84	36.60	40.00	-3.40	QP			P	
3	84.3198	-18.31	54.21	35.90	40.00	-4.10	QP			P	
4	122.1500	-17.29	42.09	24.80	43.50	-18.70	QP			P	
5	189.0800	-16.63	40.53	23.90	43.50	-19.60	QP			P	
6	355.9200	-11.14	31.44	20.30	46.00	-25.70	QP			P	

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

Modulation:	GFSK		
Frequency Range:	1-25GHz	Test Date :	June 16, 2016
Test Result:	PASS	Temperature :	22 ℃
Measured Distance:	3m	Humidity :	54 %
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	38.87	27.03	14.05	52.92	41.08	74.00	54.00	-21.08	-12.92
7206	V	43.29	32.67	18.18	61.47	50.85	74.00	54.00	-12.53	-3.15

4804	H	39.14	29.37	14.05	53.19	43.42	74.00	54.00	-20.81	-10.58
7206	H	50.02	40.89	8.09	58.11	48.98	74.00	54.00	-15.89	-5.02

Operation Mode: TX Mode (Mid)										
4884	V	38.84	27.73	14.42	53.26	42.15	74.00	54.00	-20.74	-11.85
7326	V	38.21	26.91	18.36	56.57	45.27	74.00	54.00	-17.43	-8.73

4884	H	39.16	29.57	14.42	53.58	43.99	74.00	54.00	-20.42	-10.01
7326	H	34.94	25.31	18.36	53.30	43.67	74.00	54.00	-20.70	-10.33

Operation Mode: TX Mode (High)										
4960	V	40.27	29.47	14.76	55.03	44.23	74.00	54.00	-18.97	-9.77
7440	V	35.00	25.23	18.55	53.55	43.78	74.00	54.00	-20.45	-10.22

4960	H	41.09	30.07	14.76	55.85	44.83	74.00	54.00	-18.15	-9.17
7440	H	36.40	26.47	18.55	54.95	45.02	74.00	54.00	-19.05	-8.98

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 : ±3.7dB.
(6) Horn antenna used for the emission over 1000MHz.

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 PCB 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
RF Cable	Huber+Suhner	SF-104	MY16559/4	9KHz~25GHz	Mar. 06, 2016	Mar. 05, 2017
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	9KHz-25GHz	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

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

---End---