

RADIO TEST REPORT

The device described below is tested by Dongguan Nore Testing Center Co., Ltd. to determine the maximum emission levels emanating from the device, the severe levels which the device can endure and E.U.T.'s performance criterion. The test results, data evaluation, test procedures, and equipment of configurations shown in this report were made in accordance with the procedures in ANSI C63.10(2013).

Applicant : Les Solutions CycleLabs Inc.
Address : 5445 Av. De Gaspe Montreal Canada H2T3B2
Manufacturer /Factory : ABP Technology
Address : 2/F, 6 Block, No.2 Robot Industrial, 8th rd, Yangchung Industrial Zone,
Shap Community Songgang St., Baoan, Shenzhen, China
E.U.T. : Smarthalo 2 (pcb V4.1)
Brand Name : Smarthalo
Model No. : SH002
FCC ID : 2AHAC-SH002
Measurement Standard : FCC PART 15.247
Date of Receiver : October 16, 2020
Date of Test : October 16, 2020 to November 02, 2020
Date of Report : December 26, 2020

This Test Report is Issued Under the Authority of :

Prepared by



Rose Hu / Engineer

Approved & Authorized Signer



Iori Fan / Authorized Signatory

This test report is for the customer shown above and their specific product only. This report applies to above tested sample only and shall not be reproduced in part without written approval of Dongguan Nore Testing Center Co., Ltd.

Table of Contents

1. GENERAL INFORMATION	5
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST	5
1.2 RELATED SUBMITTAL(S) / GRANT (S)	7
1.3 TEST METHODOLOGY	7
1.4 EQUIPMENT MODIFICATIONS	7
1.5 SUPPORT DEVICE	7
1.6 TEST FACILITY AND LOCATION	8
1.7 SUMMARY OF TEST RESULTS	9
2. SYSTEM TEST CONFIGURATION	10
2.1 EUT CONFIGURATION	10
2.2 SPECIAL ACCESSORIES	10
2.3 DESCRIPTION OF TEST MODES	10
2.4 EUT EXERCISE	10
3. CONDUCTED EMISSIONS TEST	11
3.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	11
3.2 TEST CONDITION	11
3.3 MEASUREMENT RESULTS	11
4. MAX. CONDUCTED OUTPUT POWER	14
4.1 MEASUREMENT PROCEDURE	14
4.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	14
4.3 MEASUREMENT RESULTS	14
5. 6DB BANDWIDTH	15
5.1 MEASUREMENT PROCEDURE	15
5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	15
5.3 MEASUREMENT RESULTS	15
6. POWER SPECTRAL DENSITY	17
6.1 MEASUREMENT PROCEDURE	17
6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	17
6.3 MEASUREMENT RESULTS	17
7. BAND EDGE AND CONDUCTED SPURIOUS EMISSIONS	19
7.1 REQUIREMENT AND MEASUREMENT PROCEDURE	19
7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	19
7.3 MEASUREMENT RESULTS	19



8. RADIATED SPURIOUS EMISSIONS AND RESTRICTED BANDS..... 22

8.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)..... 22

8.2 MEASUREMENT PROCEDURE 23

8.3 LIMIT 24

8.4 MEASUREMENT RESULTS 24

9. ANTENNA APPLICATION 28

9.1 ANTENNA REQUIREMENT..... 28

9.2 MEASUREMENT RESULTS 28

10. TEST EQUIPMENT LIST..... 29

Revision History of This Test Report

Report Number	Description	Issued Date
NTC2010032FV00	Initial Issue	2020-12-26

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test

E.U.T.	: Smarthalo 2 (pcb V4.1)
Main Model Number	: SH002
Additional Model Number	: N/A
Description of Model Difference	: N/A
Brand Name	: Smarthalo
Rating	: DC 3.7V li-ion battery or DC 5V come from USB port
Adapter	: N/A
Test Voltage	: AC 120V/60Hz Adapter input, DC 3.7V (Only the worst case was recorded in this report)
Cable	: N/A
Hardware Version	: V4.1
Software Version	: V1.0
S/N	: 20100002
Note	: N/A
Remark	: N/A
Technical parameters	
Bluetooth Version	: V4.2 (BLE)
Frequency Range	: 2402-2480MHz
Modulation Type	: GFSK
Number of Channel	: 40
Channel Space	: 2MHz
Antenna Type	: Chip antenna
Antenna Gain	: -2 dBi (Declared by manufacturer)

Appendix I - Channel List and Test Channel

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

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
Test SW Version	Signalling

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **2AHAC-SH002** filing to comply with Section 15.247 of the FCC Part 15(2016), Subpart C Rule.

1.3 Test Methodology

The radiated emission measurement was performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in semi-anechoic chamber. 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. DTS KDB 558074 D01 15.247 Meas Guidance v05r02.

1.4 Equipment Modifications

Not available for this EUT intended for grant.

1.5 Support Device

Adapter	:	Manufacturer: HUWEI
		Model No.: HW-050200C01
		Input: AC100-240V 50/60Hz, 0.5A
		Output: DC5V 2A

1.6 Test Facility and Location

Site Description

EMC Lab : Listed by CNAS, August 13, 2018
The certificate is valid until August 13, 2024
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01
The Certificate Registration Number is L5795.

Listed by A2LA, November 01, 2017
The certificate is valid until December 31, 2021
The Laboratory has been assessed and proved to be in compliance with ISO17025
The Certificate Registration Number is 4429.01

Listed by FCC, November 06, 2017
The Designation Number is CN1214
Test Firm Registration Number: 907417

Listed by Industry Canada, June 08, 2017
The Certificate Registration Number. Is 46405-9743

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

Site Location : Building D, Gaosheng Science and Technology park, Hongtu road, Nancheng district, Dongguan city, Guangdong province, China

1.7 Deviations and Abnormalities from Standard Conditions

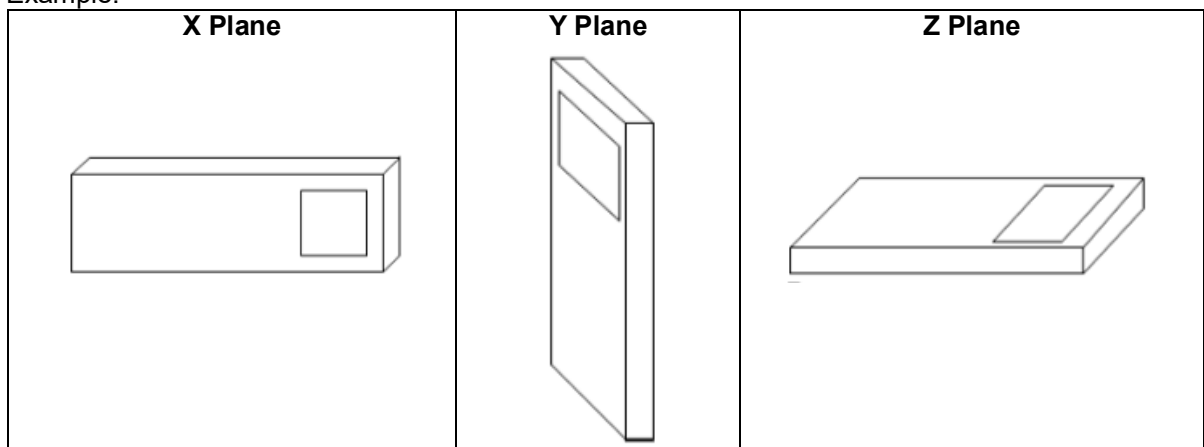
No additions, deviations and exclusions from the standard.

1.8 Summary of Test Results

FCC Rules	Description Of Test	Uncertainty	Result
§15.207 (a)	AC Power Conducted Emission	±1.06dB	Compliant
§15.247(b)(3)	Max. Conducted Output Power	±1.06dB	Compliant
§15.247(a)(2)	6dB Bandwidth	±1.42 x10 ⁻⁴ %	Compliant
§15.247(e)	Power Spectral Density	±1.06dB	Compliant
§15.247(d)	Band Edge and Conducted Spurious Emissions	±1.70dB & ±2.51dB	Compliant
§15.247(d), §15.209, §15.205	Radiated Spurious Emissions and Restricted Bands	Below 1GHz: ±4.6 dB Above 1GHz: ±5.02 dB	Compliant
§15.203	Antenna Requirement	±0.60dB	Compliant

Note: 1. The EUT has been tested as an independent unit. And Continual transmitting in maximum power (The new battery be used during test)
 2. The EUT powered by battery and operating multiple positions, so the EUT shall be performed two or three orthogonal planes. The worst plane is Z.

Example:



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

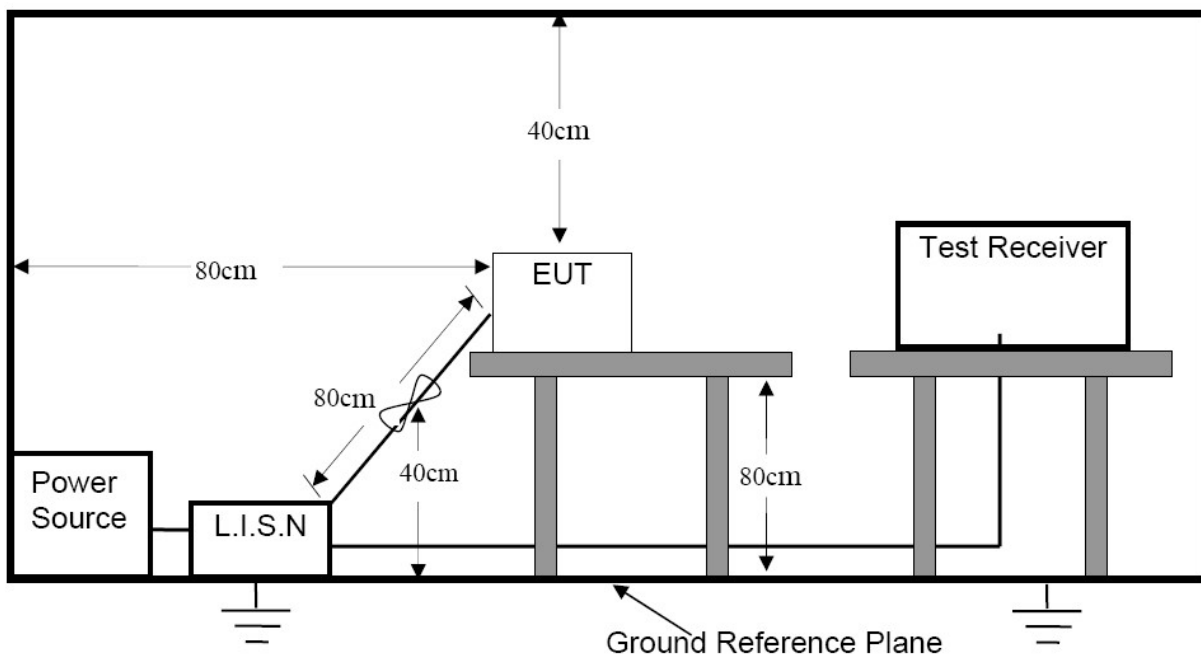
The EUT has been tested under continuous operating condition (The duty cycle >98%). Test program used to control the EUT staying in continuous transmitting mode. The Lowest, Middle and highest channel were chosen for testing, and modulation type GFSK was tested, but only the worst case data is shown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

3.3 Measurement Results

Please refer to following plots of the worst case: Middle channel.



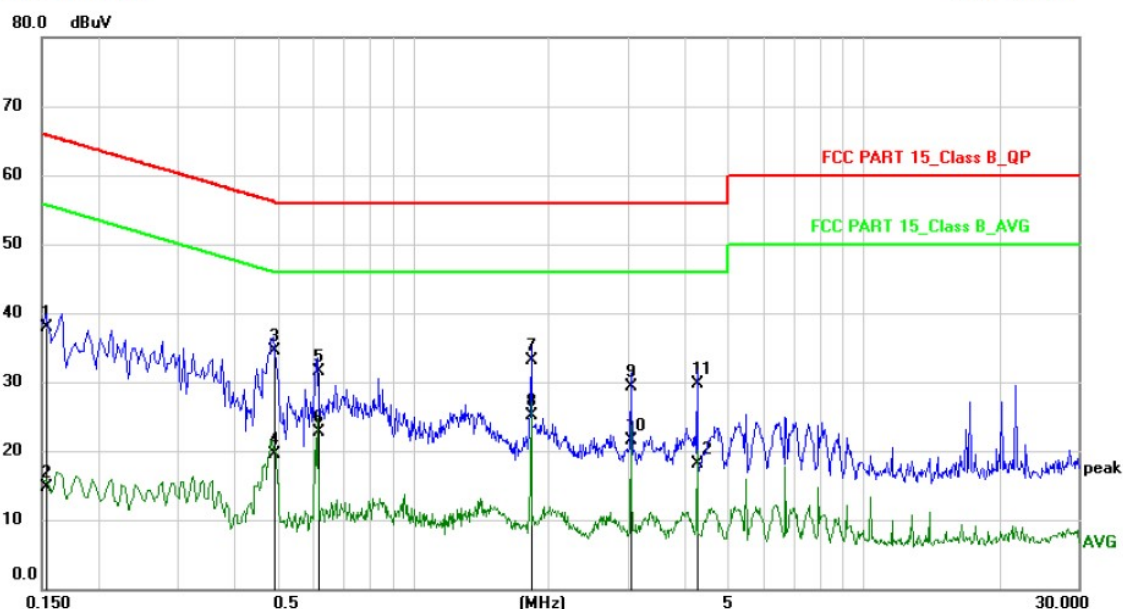
Dongguan NTC Co., Ltd.
Tel: +86-769-22022444 Fax: +86-769-22022799
Web: Http://www.ntc-c.com

Site: Shielding Room Phase: **L1** Temperature: 26
Limit: FCC PART 15_Class B_QP Power: AC120V/60Hz Humidity: 50 %
EUT: Smarthalo 2 (pcb V4.1)
M/N: SH002
Mode: TX
Note:

Conducted Emission Measurement

Date: 2020/10/30

Time: 10:29:54



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.1539	27.30	10.60	37.90	65.79	-27.89	QP	
2	0.1539	4.20	10.60	14.80	55.79	-40.99	AVG	
3	0.4900	23.97	10.63	34.60	56.17	-21.57	QP	
4	0.4900	8.97	10.63	19.60	46.17	-26.57	AVG	
5	0.6140	20.86	10.64	31.50	56.00	-24.50	QP	
6	0.6140	12.06	10.64	22.70	46.00	-23.30	AVG	
7	1.8340	22.40	10.70	33.10	56.00	-22.90	QP	
8 *	1.8340	14.50	10.70	25.20	46.00	-20.80	AVG	
9	3.0540	18.59	10.71	29.30	56.00	-26.70	QP	
10	3.0540	10.89	10.71	21.60	46.00	-24.40	AVG	
11	4.2738	19.09	10.71	29.80	56.00	-26.20	QP	
12	4.2738	7.49	10.71	18.20	46.00	-27.80	AVG	



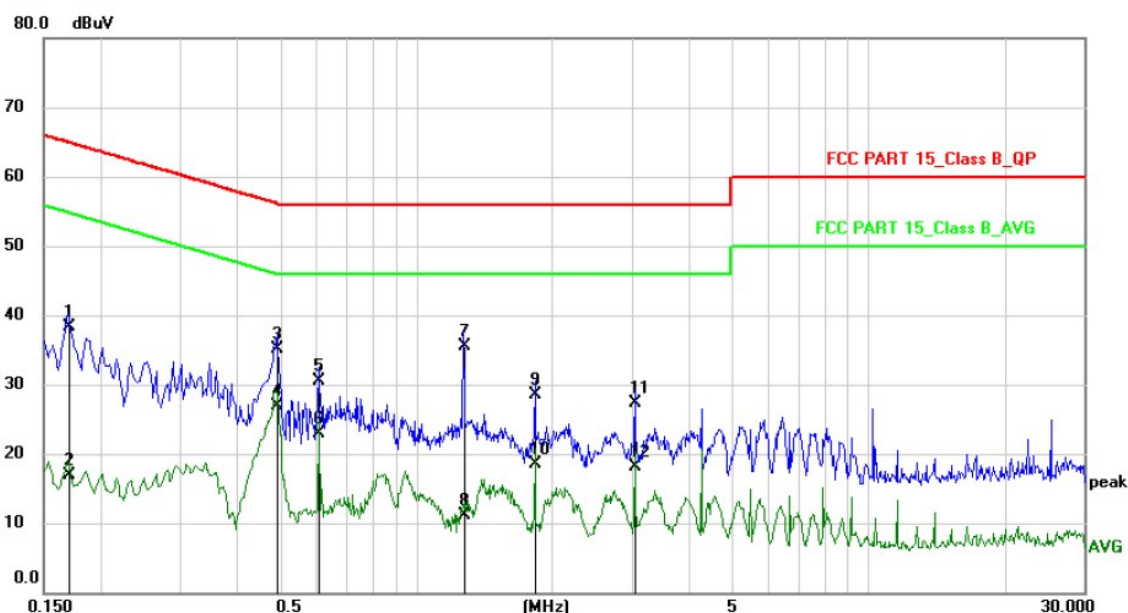
Dongguan NTC Co., Ltd.
Tel: +86-769-22022444 Fax: +86-769-22022799
Web: Http://www.ntc-c.com

Site: Shielding Room	Phase: N	Temperature: 26
Limit: FCC PART 15_Class B_QP	Power: AC120V/60Hz	Humidity: 50 %
EUT: Smarthalo 2 (pcb V4.1)		
M/N: SH002		
Mode: TX		
Note:		

Conducted Emission Measurement

Date: 2020/10/30

Time: 10:36:09



No. Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.1700	27.80	10.60	38.40	64.96	-26.56	QP	
2	0.1700	6.30	10.60	16.90	54.96	-38.06	AVG	
3	0.4940	24.57	10.63	35.20	56.10	-20.90	QP	
4 *	0.4940	16.37	10.63	27.00	46.10	-19.10	AVG	
5	0.6100	19.96	10.64	30.60	56.00	-25.40	QP	
6	0.6100	12.36	10.64	23.00	46.00	-23.00	AVG	
7	1.2700	24.90	10.70	35.60	56.00	-20.40	QP	
8	1.2700	0.40	10.70	11.10	46.00	-34.90	AVG	
9	1.8300	17.80	10.70	28.50	56.00	-27.50	QP	
10	1.8300	7.90	10.70	18.60	46.00	-27.40	AVG	
11	3.0540	16.59	10.71	27.30	56.00	-28.70	QP	
12	3.0540	7.49	10.71	18.20	46.00	-27.80	AVG	

4. Max. Conducted Output Power

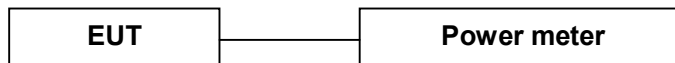
4.1 Measurement Procedure

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.

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

4.2 Test SET-UP (Block Diagram of Configuration)



4.3 Measurement Results

Please refer to following table.

Temperature : 24 °C	Humidity : 50 %	Test Date : October 26, 2020	
Modulation: GFSK	Test by: Sance	Test Result: Pass	
Frequency MHz	Data Rate Mbps	Peak Output Power dBm	Limit dBm
2402	1	5.63	30
2440	1	6.26	30
2480	1	6.08	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 $\geq 3 \times$ 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 relative to the maximum level measured in the fundamental emission.

5.2 Test SET-UP (Block Diagram of Configuration)

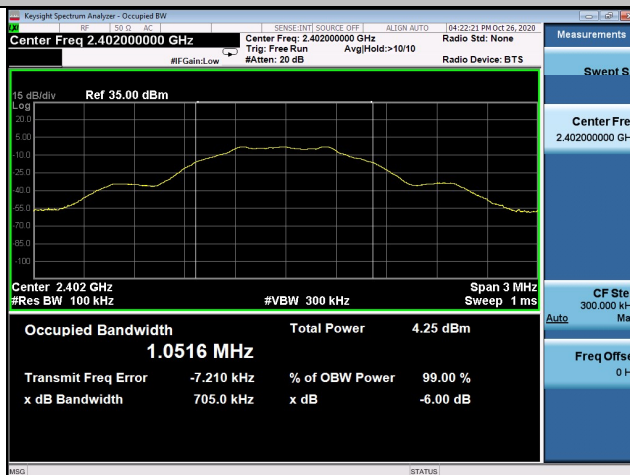


5.3 Measurement Results

Please refer to following table and plots.

Temperature : 24 °C	Humidity : 50 %		Test Date : October 26, 2020
Modulation: GFSK	Test by: Sance		Test Result: Pass
Frequency MHz	Data Rate Mbps	6dB Bandwidth KHz	Limit
2402	1	705	>500KHz
2440	1	704	>500KHz
2480	1	704	>500KHz

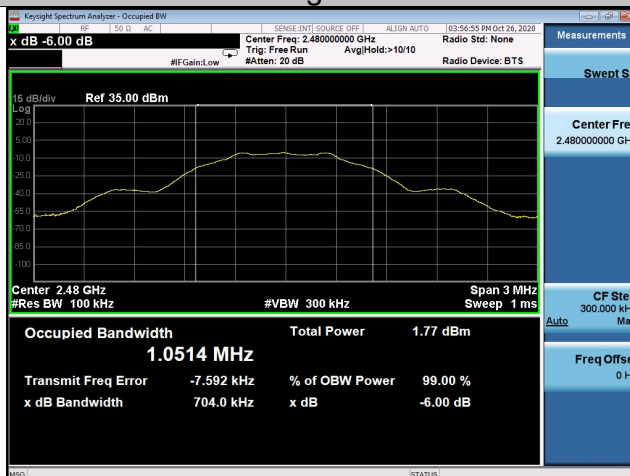
GFSK Lowest Channel



GFSK Middle Channel



GFSK High Channel



6. Power Spectral Density

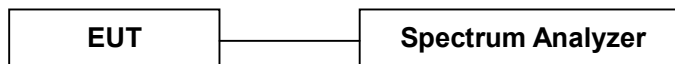
6.1 Measurement Procedure

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: $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$
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)

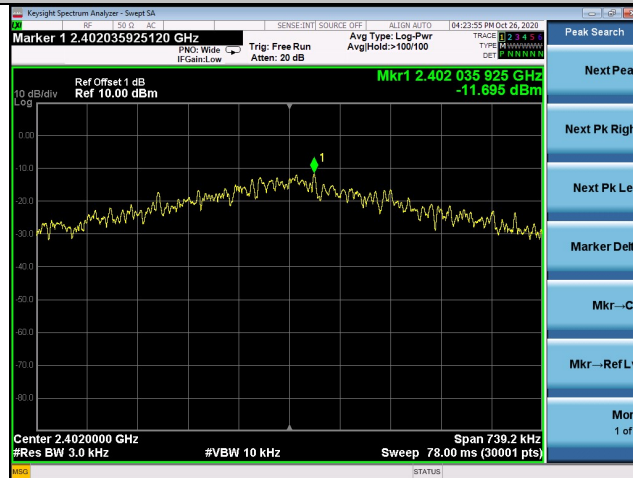


6.3 Measurement Results

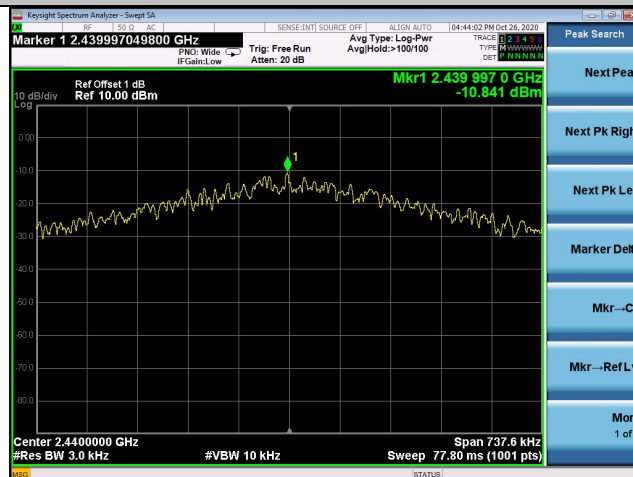
Please refer to following table and plots.

Temperature : 24 °C	Humidity : 50 %		Test Date : October 26, 2020
Modulation: GFSK	Test by: Sance		Test Result: Pass
Frequency MHz	Data Rate Mbps	PSD dBm/3kHz	Limit dBm/3kHz
2402	1	-11.695	8
2440	1	-10.841	8
2480	1	-10.061	8

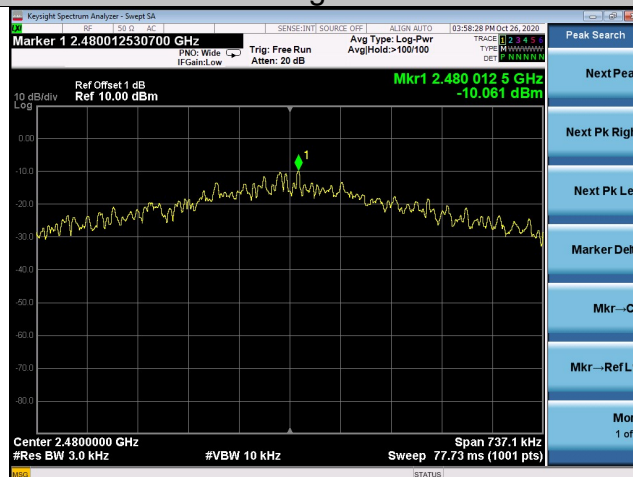
GFSK Lowest Channel



GFSK Middle Channel



GFSK High Channel



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.

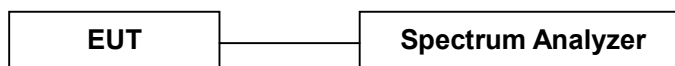
The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below.

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)

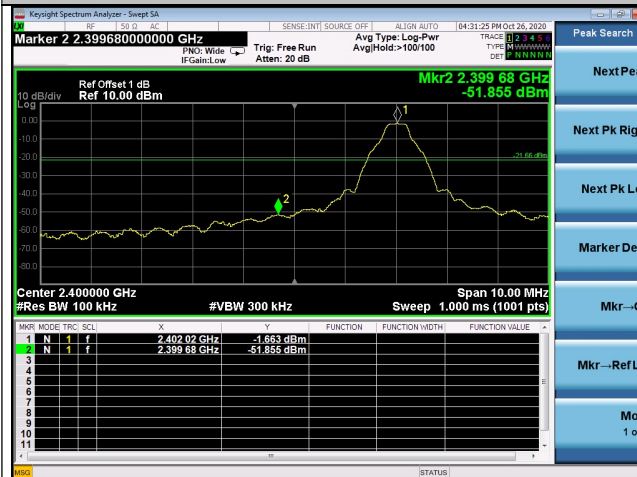


7.3 Measurement Results

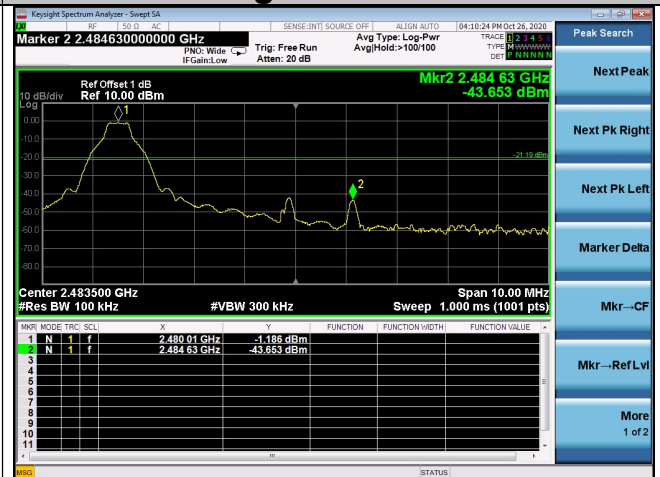
The test plots and table showed all spurious emission and up to the tenth harmonic was measured and they were found to be at least 20dB below the highest level of the desired power in the passband. Please refer to below plots.

Band Edge

Low Channel

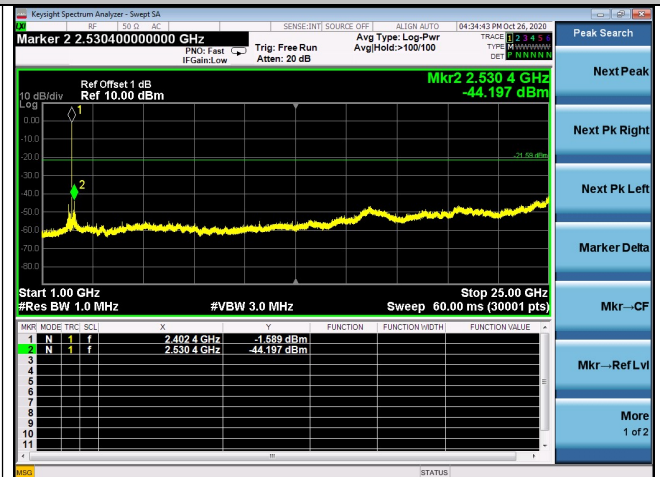
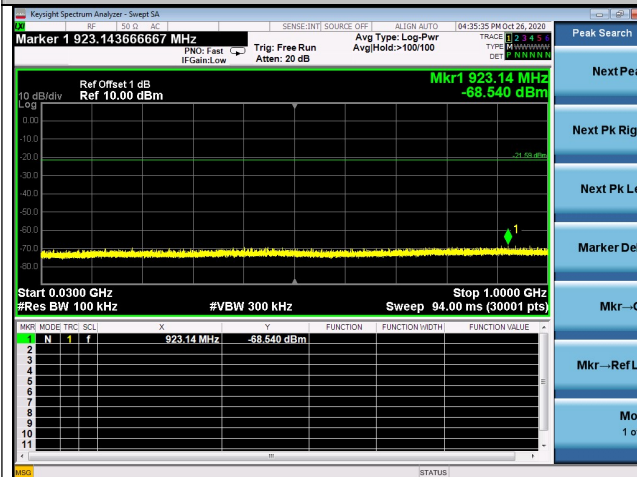


High Channel



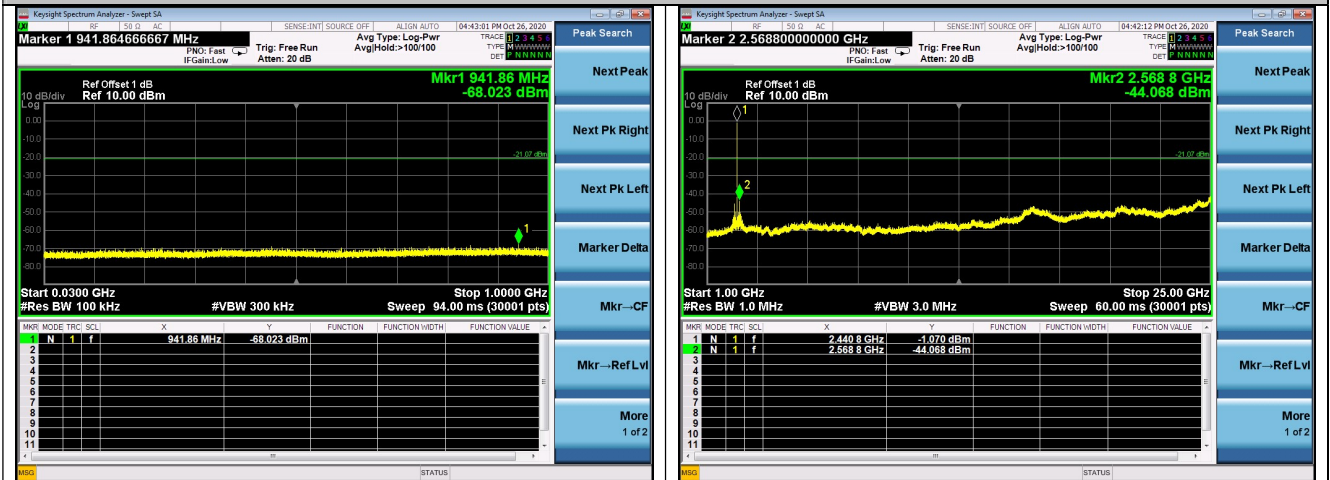
Conducted Spurious Emissions

Low Channel



Note: Sweep points=30001pts

Conducted Spurious Emissions Middle Channel



Conducted Spurious Emissions High Channel

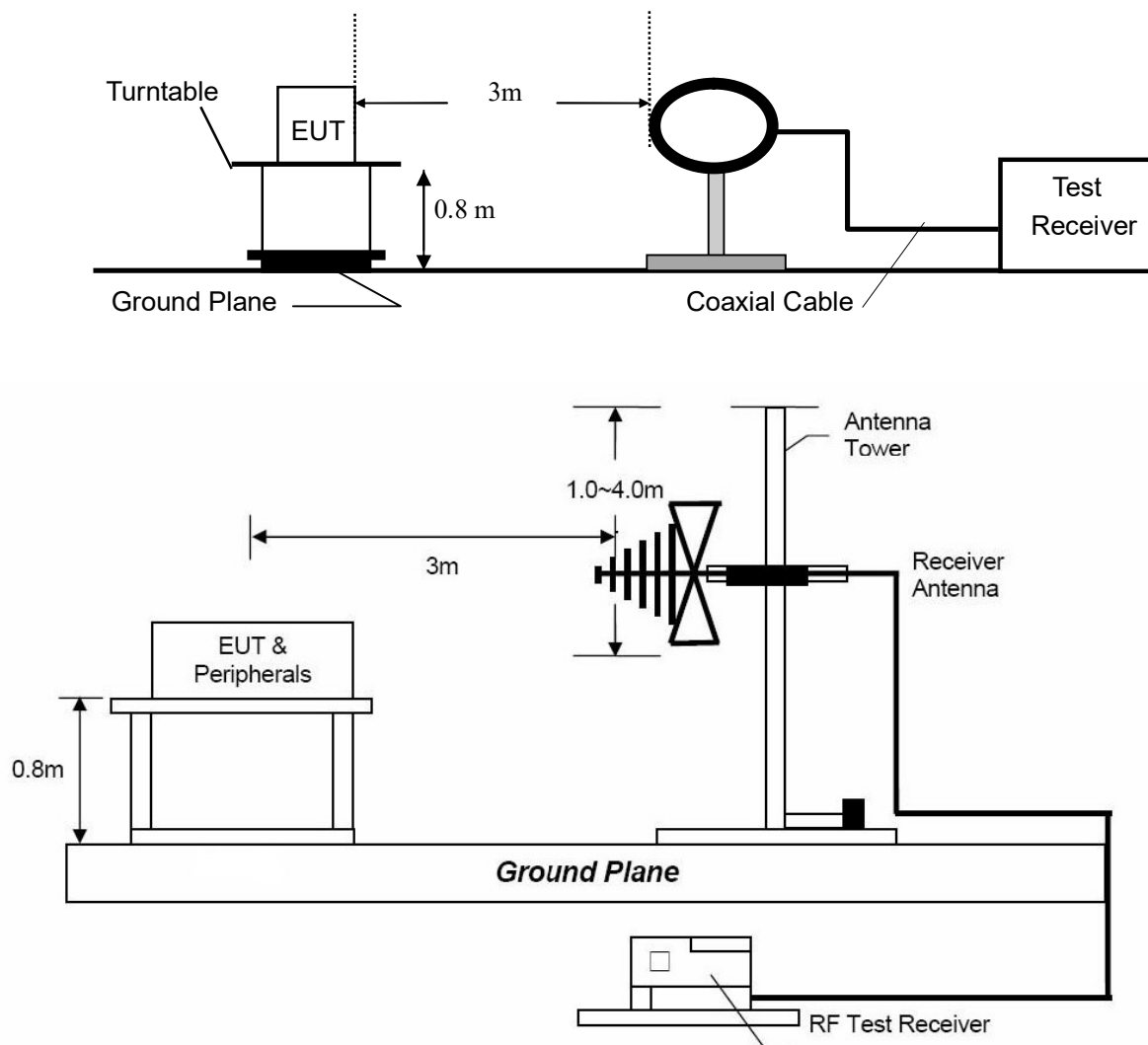


Note: Sweep points=30001pts

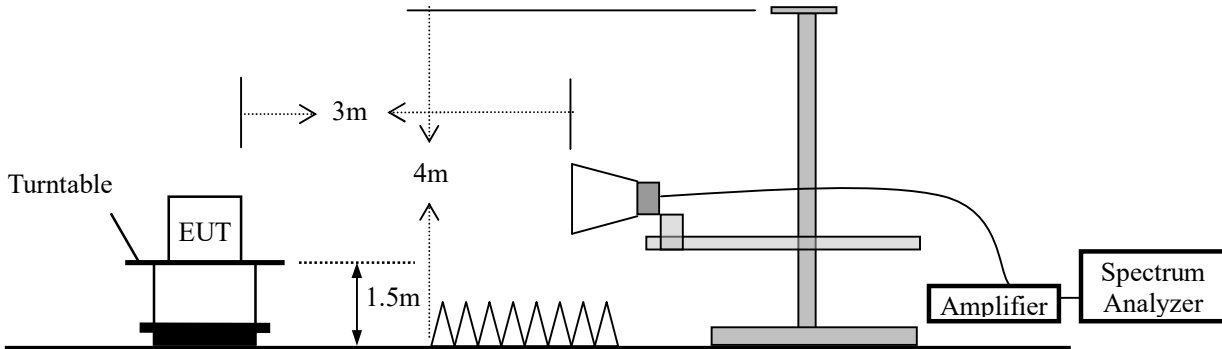
8. Radiated Spurious Emissions and Restricted Bands

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

- 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.
- 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.
- 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.

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) μV = 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 of the worst case: Middle channel.



Dongguan NTC Co., Ltd.
Tel:+86-769-2202 2444
Web: www.ntc-c.com

Fax:+86-769-2202 2799

Site: 3m Chamber

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Part 15_ClassB_3M

Power: AC 120V 60Hz

Humidity: 47 %

EUT: Smarthalo 2(pcb V4.1)

Distance: 3m

M/N: SH002

Mode: TX

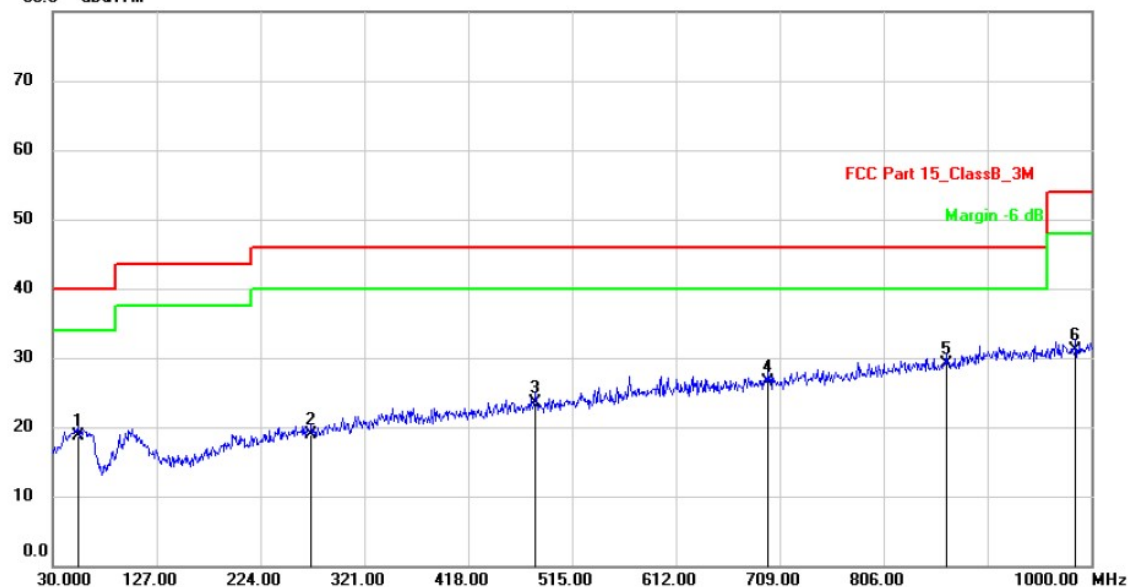
Note:

Radiated Emission Measurement

Date: 2020/10/29

Time: 17:10:10

80.0 dBuV/m



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		53.2800	25.98	-7.28	18.70	40.00	-21.30	QP	
2		271.5300	24.98	-5.98	19.00	46.00	-27.00	QP	
3		481.0500	25.63	-2.03	23.60	46.00	-22.40	QP	
4		697.3600	24.38	2.12	26.50	46.00	-19.50	QP	
5	*	864.2000	24.30	4.90	29.20	46.00	-16.80	QP	
6		985.4500	24.59	6.51	31.10	54.00	-22.90	QP	

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



Dongguan NTC Co., Ltd.
Tel: +86-769-2202 2444
Web: www.ntc-c.com

Fax: +86-769-2202 2799

Site: 3m Chamber

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part 15_ClassB_3M

Power: AC 120V 60Hz

Humidity: 47 %

EUT: Smarthalo 2(pcb V4.1)

Distance: 3m

M/N: SH002

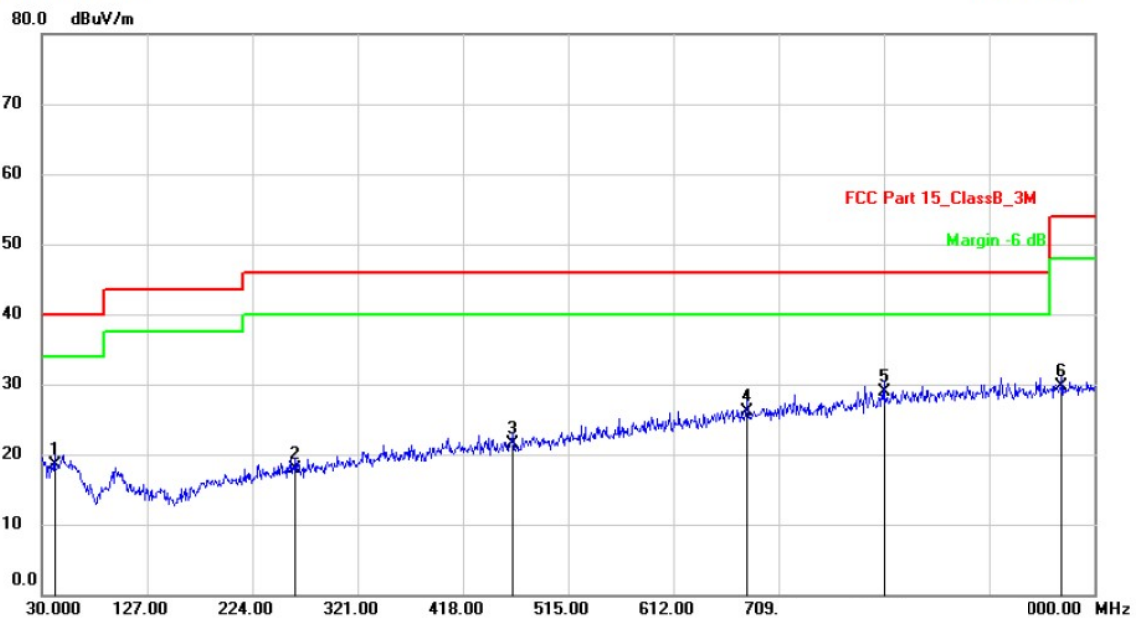
Mode: TX

Note:

Radiated Emission Measurement

Date: 2020/10/29

Time: 17:03:45



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1		41.6400	26.34	-7.78	18.56	40.00	-21.44	QP	
2		263.7700	25.11	-7.11	18.00	46.00	-28.00	QP	
3		463.5900	24.84	-3.34	21.50	46.00	-24.50	QP	
4		679.9000	24.37	1.83	26.20	46.00	-19.80	QP	
5	*	806.0000	24.93	4.07	29.00	46.00	-17.00	QP	
6		969.9300	24.51	5.19	29.70	54.00	-24.30	QP	

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

Temperature : 26 °C				Humidity : 47 %				Test Date: October 29, 2020			
Modulation: GFSK				Test By: Sance				Test Result: PASS			
Frequency Range: 1-25GHz				Measured Distance: 3m							
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	46.76	32.16	6.30	53.06	38.46	74.00	54.00	-20.94	-15.54	
7206	V	45.3	31.07	10.44	55.74	41.51	74.00	54.00	-18.26	-12.49	

4804	H	46.6	31.44	6.30	52.90	37.74	74.00	54.00	-21.1	-16.26	
7206	H	45.46	30.96	10.44	55.90	41.40	74.00	54.00	-18.1	-12.6	

Operation Mode: TX Mode (Mid)											
4880	V	44.6	31.78	6.60	51.20	38.38	74.00	54.00	-22.8	-15.62	
7320	V	44.71	31.33	10.55	55.26	41.88	74.00	54.00	-18.74	-12.12	

4880	H	46.15	30.92	6.60	52.75	37.52	74.00	54.00	-21.25	-16.48	
7320	H	44.19	30.9	10.55	54.74	41.45	74.00	54.00	-19.26	-12.55	

Operation Mode: TX Mode (High)											
4960	V	44.18	31.34	6.89	51.07	38.23	74.00	54.00	-22.93	-15.77	
7440	V	43.59	31.07	10.60	54.19	41.67	74.00	54.00	-19.81	-12.33	

4960	H	44.65	30.98	6.89	51.54	37.87	74.00	54.00	-22.46	-16.13	
7440	H	43.91	30.69	10.60	54.51	41.29	74.00	54.00	-19.49	-12.71	

Spurious Emission in restricted band:											
2390.000	H	48.38	33.47	0.09	48.47	33.56	74.00	54.00	-25.53	-20.44	
2390.000	V	48.69	32.7	0.09	48.78	32.79	74.00	54.00	-25.22	-21.21	
2483.500	H	45.84	33.81	0.35	46.19	34.16	74.00	54.00	-27.81	-19.84	
2483.500	V	46.73	32.04	0.35	47.08	32.39	74.00	54.00	-26.92	-21.61	
Remark:	(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.										

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 Chip antenna and no consideration of replacement, and the best case gain of the antenna is -2 dBi. So, the antenna is consider meet the requirement.

10. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	Mar. 13, 2020	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Mar. 23, 2020	1 Year
3.	Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	Mar. 13, 2020	1 Year
4.	Spectrum Analyzer	Keysight	N9020A	MY54200831	Mar. 13, 2020	1 Year
5.	Spectrum Analyzer	Rohde & Schwarz	FSV40	101094	Mar. 13, 2020	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA9170	9170-172	Mar. 22, 2019	2 Year
7.	Power Sensor	DARE	RPR3006W	15I00041SNO 64	Mar. 13, 2020	1 Year
9.	Communication Tester	Rohde & Schwarz	CMW500	149004	Mar. 13, 2020	1 Year
10.	Horn Antenna	COM-Power	AH-118	071078	Mar. 23, 2020	1 Year
11.	Pre-Amplifier	HP	HP 8449B	3008A00964	Mar. 13, 2020	1 Year
12.	Pre-Amplifier	HP	HP 8447D	1145A00203	Mar. 13, 2020	1 Year
13.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	Mar. 23, 2020	1 Year
14.	Test Receiver	Rohde & Schwarz	ESCI	101152	Mar. 14, 2020	1 Year
15.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 13, 2020	1 Year
16.	L.I.S.N	Rohde & Schwarz	ESH2-Z5	893606/014	Mar. 13, 2020	1 Year
17.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar.13, 2020	1 Year
18.	Temperature & Humidity Chamber	REMAFEE	SYHR225L	N/A	Mar. 13, 2020	1 Year
19.	DC Source	Maynuo	MY8811	N/A	Mar. 13, 2020	1 Year
20.	Temporary antenna connector	TESCOM	SS402	N/A	N/A	N/A
21.	Chamber	SAEMC	9*7*7m	N/A	Jun. 20, 2019	2 Year
22.	Test Software	EZ	EZ_EMC	N/A	N/A	N/A

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---