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检测
TESTING
CNAS L5795

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/Manufacturer	:	Pinsheng technologies Co., Ltd
Address	:	7Floor, No.5 middle Huangshan Avenue, North New Zone, Chongqing
Factory	:	Chongqing Datiejiang Science and Technology Co., Ltd.
Address	:	NO.368, BOE Avenue, Beibei District, Chongqing
E.U.T.	:	Label Printer
Brand Name	:	MakeID
Model No.	:	WB51R-WT (For additional model and model difference refer to section 1)
FCC ID	:	2AVAP-WB51
Measurement Standard	:	FCC PART 15.247
Date of Receiver	:	February 28, 2020
Date of Test	:	February 28, 2020 to June 05, 2020
Date of Report	:	June 05, 2020

This Test Report is Issued Under the Authority of :

Prepared by

Alina Guo / 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.

TEL: +86-769-22022444 FAX: +86-769-22022799 Web: www.ntc-c.com
Address: Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng District, Dongguan City, Guangdong, China

Table of Contents

Revision History of This Test Report

Report Number	Description	Issued Date
NTC2003036FV00	Initial Issue	2020-06-05

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test

Product Name	:	Label Printer
Main Model Number	:	WB51R-WT
Additional Model Number	:	See page 7, 8 of model list.
Description of Model Difference	:	These models have the same circuit schematic, construction, PCB Layout and critical components. The difference are model number, brand name, color of appearance and resolution due to trading purpose.
Brand Name	:	MakeID
Rating	:	DC 24V From adapter
Adapter	:	Model: EA10682P-240 Input: AC 100-240V, 2.0A, 50-60Hz Output: DC 24V, 2.5A
Test voltage	:	AC 120V 60Hz, AC 240V 60Hz (Only the worst case was recorded in this report)
Cable	:	USB Line: 2.51m shielded AC Mains: 1.51m unshielded DC Line: 1.20m with one core unshielded
Hardware Version	:	18L3_Main_ V1.2
Software Version	:	DS51_V1.0_V1.0
Note	:	According to the model difference, all tests were performed on model WB51R-WT.
Remark	:	This report applies to Bluetooth(BLE) function.

Technical Specification:

Bluetooth Version	:	V4.2(BLE)
Frequency Range	:	2402-2480MHz
Modulation Type	:	GFSK
Number of Channel	:	40
Channel Space	:	2MHz
Antenna Gain	:	2 dBi (Declared by manufacturer)
Antenna Type	:	PCB antenna

Model List

WB51-2N	WB51A-2N	WB51B-2N	WB51C-2N	WB51T-2N	WB51S-2N
WB51-3N	WB51A-3N	WB51B-3N	WB51C-3N	WB51T-3N	WB51S-3N
WB51-2F	WB51A-2F	WB51B-2F	WB51C-2F	WB51T-2F	WB51S-2F
WB51-3F	WB51A-3F	WB51B-3F	WB51C-3F	WB51T-3F	WB51S-3F
WB51-2NR	WB51A-2NR	WB51B-2NR	WB51C-2NR	WB51T-2NR	WB51S-2NR
WB51-3NR	WB51A-3NR	WB51B-3NR	WB51C-3NR	WB51T-3NR	WB51S-3NR
WB51-2FR	WB51A-2FR	WB51B-2FR	WB51C-2FR	WB51T-2FR	WB51S-2FR
WB51-3FR	WB51A-3FR	WB51B-3FR	WB51C-3FR	WB51T-3FR	WB51S-3FR
DS51-2N	DS51A-2N	DS51B-2N	DS51C-2N	DS51T-2N	DS51S-2N
DS51-3N	DS51A-3N	DS51B-3N	DS51C-3N	DS51T-3N	DS51S-3N
DS51-2F	DS51A-2F	DS51B-2F	DS51C-2F	DS51T-2F	DS51S-2F
DS51-3F	DS51A-3F	DS51B-3F	DS51C-3F	DS51T-3F	DS51S-3F
DS51-2NR	DS51A-2NR	DS51B-2NR	DS51C-2NR	DS51T-2NR	DS51S-2NR
DS51-3NR	DS51A-3NR	DS51B-3NR	DS51C-3NR	DS51T-3NR	DS51S-3NR
DS51-2FR	DS51A-2FR	DS51B-2FR	DS51C-2FR	DS51T-2FR	DS51S-2FR
DS51-3FR	DS51A-3FR	DS51B-3FR	DS51C-3FR	DS51T-3FR	DS51S-3FR
WD51-2N	WD51A-2N	WD51B-2N	WD51C-2N	WD51T-2N	WD51S-2N
WD51-3N	WD51A-3N	WD51B-3N	WD51C-3N	WD51T-3N	WD51S-3N
WD51-2F	WD51A-2F	WD51B-2F	WD51C-2F	WD51T-2F	WD51S-2F
WD51-3F	WD51A-3F	WD51B-3F	WD51C-3F	WD51T-3F	WD51S-3F
WD51-2NR	WD51A-2NR	WD51B-2NR	WD51C-2NR	WD51T-2NR	WD51S-2NR
WD51-3NR	WD51A-3NR	WD51B-3NR	WD51C-3NR	WD51T-3NR	WD51S-3NR
WD51-2FR	WD51A-2FR	WD51B-2FR	WD51C-2FR	WD51T-2FR	WD51S-2FR
WD51-3FR	WD51A-3FR	WD51B-3FR	WD51C-3FR	WD51T-3FR	WD51S-3FR
HC51-2N	HC51A-2N	HC51B-2N	HC51C-2N	HC51T-2N	HC51S-2N
HC51-3N	HC51A-3N	HC51B-3N	HC51C-3N	HC51T-3N	HC51S-3N
HC51-2F	HC51A-2F	HC51B-2F	HC51C-2F	HC51T-2F	HC51S-2F
HC51-3F	HC51A-3F	HC51B-3F	HC51C-3F	HC51T-3F	HC51S-3F
HC51-2NR	HC51A-2NR	HC51B-2NR	HC51C-2NR	HC51T-2NR	HC51S-2NR
HC51-3NR	HC51A-3NR	HC51B-3NR	HC51C-3NR	HC51T-3NR	HC51S-3NR
HC51-2FR	HC51A-2FR	HC51B-2FR	HC51C-2FR	HC51T-2FR	HC51S-2FR
HC51-3FR	HC51A-3FR	HC51B-3FR	HC51C-3FR	HC51T-3FR	HC51S-3FR
XT51-2N	XT51A-2N	XT51B-2N	XT51C-2N	XT51T-2N	XT51S-2N
XT51-3N	XT51A-3N	XT51B-3N	XT51C-3N	XT51T-3N	XT51S-3N
XT51-2F	XT51A-2F	XT51B-2F	XT51C-2F	XT51T-2F	XT51S-2F
XT51-3F	XT51A-3F	XT51B-3F	XT51C-3F	XT51T-3F	XT51S-3F
XT51-2NR	XT51A-2NR	XT51B-2NR	XT51C-2NR	XT51T-2NR	XT51S-2NR
XT51-3NR	XT51A-3NR	XT51B-3NR	XT51C-3NR	XT51T-3NR	XT51S-3NR
XT51-2FR	XT51A-2FR	XT51B-2FR	XT51C-2FR	XT51T-2FR	XT51S-2FR
XT51-3FR	XT51A-3FR	XT51B-3FR	XT51C-3FR	XT51T-3FR	XT51S-3FR
HS51-2N	HS51A-2N	HS51B-2N	HS51C-2N	HS51T-2N	HS51S-2N
HS51-3N	HS51A-3N	HS51B-3N	HS51C-3N	HS51T-3N	HS51S-3N
HS51-2F	HS51A-2F	HS51B-2F	HS51C-2F	HS51T-2F	HS51S-2F
HS51-3F	HS51A-3F	HS51B-3F	HS51C-3F	HS51T-3F	HS51S-3F
HS51-2NR	HS51A-2NR	HS51B-2NR	HS51C-2NR	HS51T-2NR	HS51S-2NR

HS51-3NR	HS51A-3NR	HS51B-3NR	HS51C-3NR	HS51T-3NR	HS51S-3NR
HS51-2FR	HS51A-2FR	HS51B-2FR	HS51C-2FR	HS51T-2FR	HS51S-2FR
HS51-3FR	HS51A-3FR	HS51B-3FR	HS51C-3FR	HS51T-3FR	HS51S-3FR
WB51	WB51A	WB51B	WB51A-WT	WB51B-WT	WB51R-WT
WB51C	WB51A-BU	WB51B-BU	WB51R-BU	WB51F	WB51R-PK
WB51D	WB51A-GN	WB51B-GN	WB51R-GN	WB51B-PK	WB51A-PK
WB51E					

Channel List

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	**espRFTool**

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **2AVAP-WB51** filing to comply with Section 15.247 of the FCC Part 15, 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	:	Manufacturer: IBM Model: 1834 P/N: 13N5615
Adapter (For Notebook)	:	Manufacturer: Huntkey Model: HKA09019047-6D I/P: AC 100-240V 50-60Hz, 1.5A O/P: DC 19V 4.74A

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 46405-9743A

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	Compliant
§15.247(d),§15.209, §15.205	Radiated Spurious Emissions and Restricted Bands	±3.70dB	Compliant
§15.203	Antenna Requirement	N/A	Compliant

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

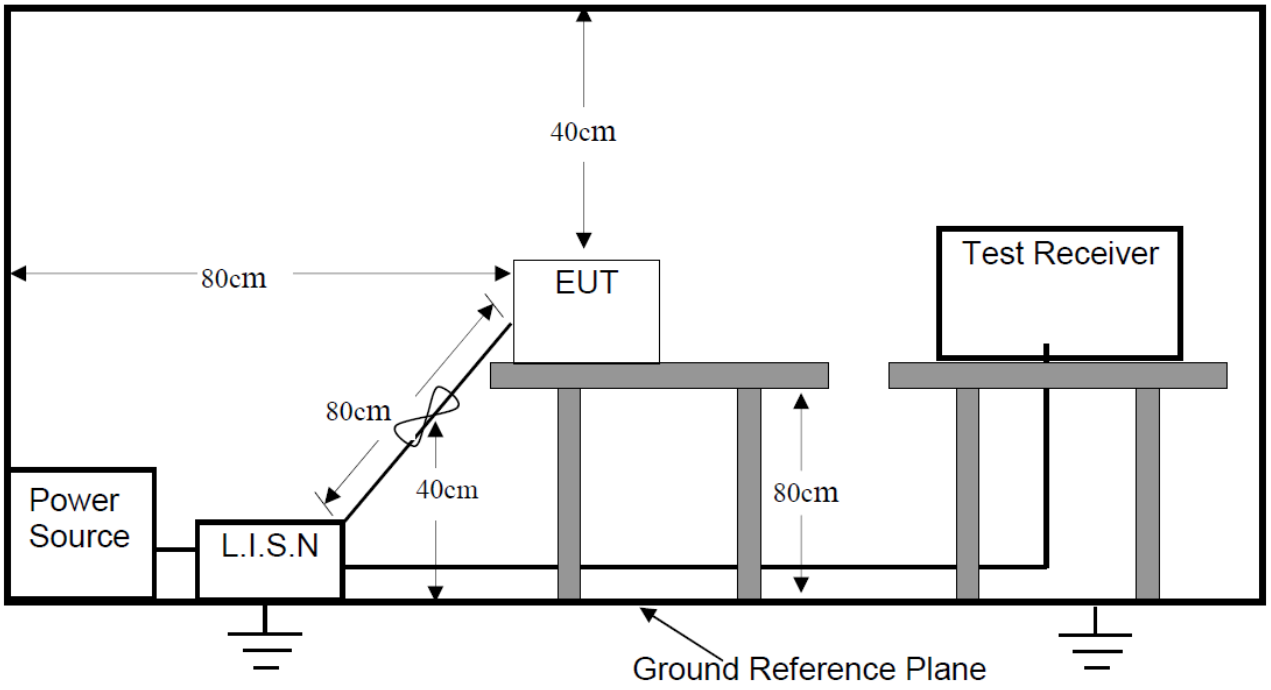
The EUT has been tested under continuous operating condition (The duty cycle >98%). Test program used to control the EUT staying in continuous transmitting mode. The Lowest, Middle and highest channel were chosen for testing, and modulation type GFSK was tested, but only the worst case data is shown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

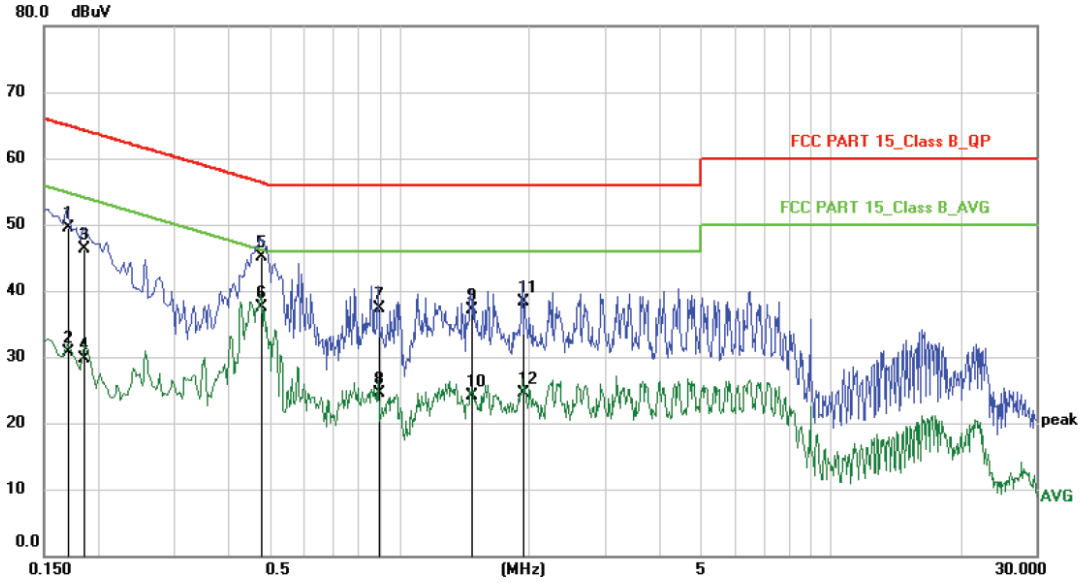
3.3 Measurement Results

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

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

Conducted Emission Measurement

File :MB51R-WT Data :#21 Date: 2020/3/4 Time: 16:58:32



Site
Limit: FCC PART 15_Class B_QP
EUT: Label Printer
M/N: MB51R-WT
Mode: TX(BLE)
Note:

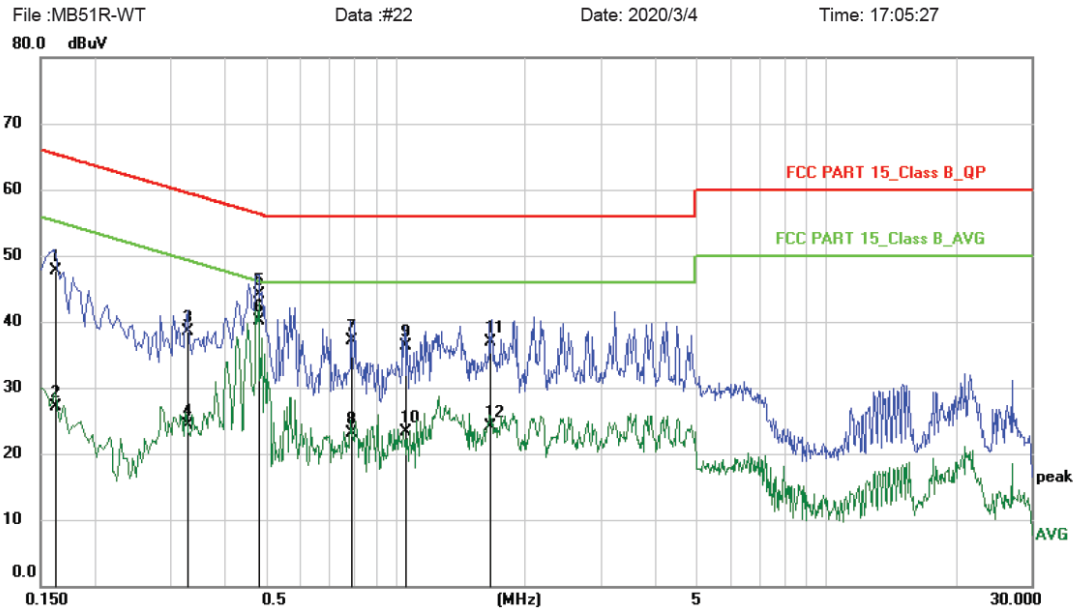
Phase: *L1*
Power: AC120V/60Hz

Temperature: 26
Humidity: 50 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1700	38.90	10.60	49.50	64.96	-15.46	QP	
2		0.1700	20.10	10.60	30.70	54.96	-24.26	AVG	
3		0.1859	35.80	10.60	46.40	64.22	-17.82	QP	
4		0.1859	19.20	10.60	29.80	54.22	-24.42	AVG	
5		0.4778	34.47	10.63	45.10	56.38	-11.28	QP	
6	*	0.4778	26.87	10.63	37.50	46.38	-8.88	AVG	
7		0.8980	26.72	10.68	37.40	56.00	-18.60	QP	
8		0.8980	13.82	10.68	24.50	46.00	-21.50	AVG	
9		1.4697	26.50	10.70	37.20	56.00	-18.80	QP	
10		1.4697	13.50	10.70	24.20	46.00	-21.80	AVG	
11		1.9376	27.70	10.70	38.40	56.00	-17.60	QP	
12		1.9376	13.90	10.70	24.60	46.00	-21.40	AVG	

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

Conducted Emission Measurement



Site
Limit: FCC PART 15_Class B_QP
EUT: Label Printer
M/N: MB51R-WT
Mode: TX(BLE)
Note:

Phase: *N*
Power: AC120V/60Hz

Temperature: 26
Humidity: 50 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1620	37.20	10.60	47.80	65.36	-17.56	QP	
2		0.1620	16.60	10.60	27.20	55.36	-28.16	AVG	
3		0.3300	28.00	10.60	38.60	59.45	-20.85	QP	
4		0.3300	13.70	10.60	24.30	49.45	-25.15	AVG	
5		0.4818	33.47	10.63	44.10	56.31	-12.21	QP	
6	*	0.4818	29.47	10.63	40.10	46.31	-6.21	AVG	
7		0.7900	26.53	10.67	37.20	56.00	-18.80	QP	
8		0.7900	12.53	10.67	23.20	46.00	-22.80	AVG	
9		1.0540	25.70	10.70	36.40	56.00	-19.60	QP	
10		1.0540	12.70	10.70	23.40	46.00	-22.60	AVG	
11		1.6575	26.20	10.70	36.90	56.00	-19.10	QP	
12		1.6575	13.40	10.70	24.10	46.00	-21.90	AVG	

4. Max. Conducted Output Power

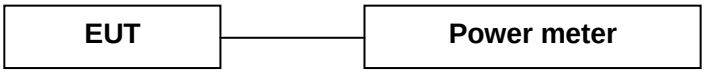
4.1 Measurement Procedure

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.

Modulation:	GFSK		
Temperature :	24 ℃	Humidity :	50 %
Test By:	Sance	Test Date :	March 05, 2020
Test Result:	PASS		

Frequency MHz	Data Rate Mbps	Peak Output Power dBm	Limit dBm
Low Channel: 2402	1	-1.960	30
Middle Channel: 2440	1	-2.345	30
High Channel: 2480	1	-2.590	30

5. 6dB Bandwidth

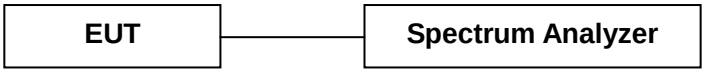
5.1 Measurement Procedure

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 according to FCC KDB558074(v05):

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

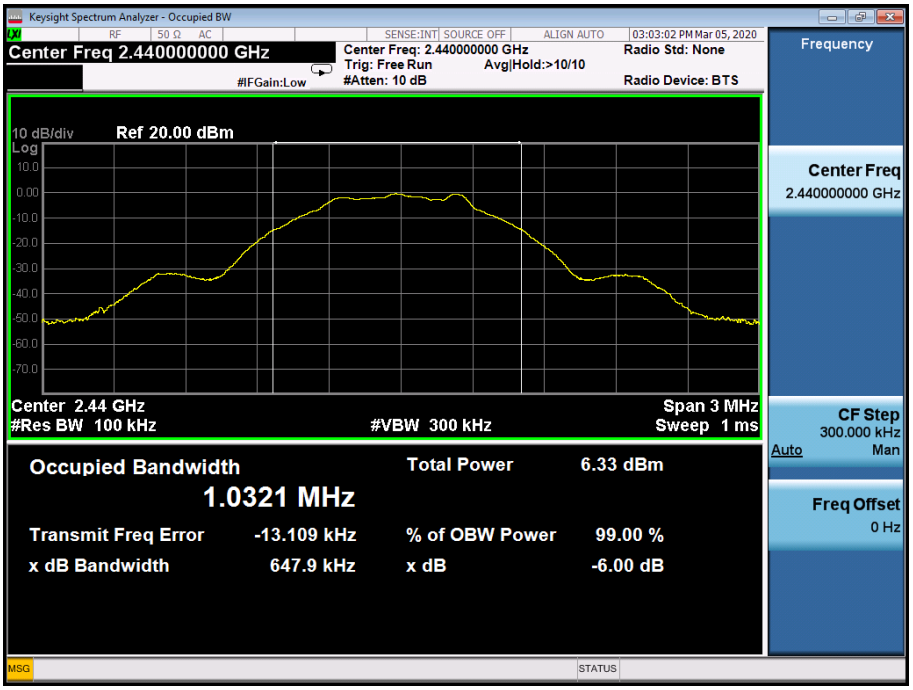
Please refer to following table and plots.

Modulation:	GFSK		
Temperature :	22 ℃	Humidity :	53 %
Test By:	Sance	Test Date :	March 05, 2020
Test Result:	PASS		

Frequency MHz	Data Rate Mbps	6dB Bandwidth MHz	Limit
Low Channel: 2402	1	0.651	>500KHz
Middle Channel: 2440	1	0.648	>500KHz
High Channel: 2480	1	0.647	>500KHz

6dB bandwidth Low Channel

6dB bandwidth Middle Channel



6dB bandwidth High Channel

6. Power Spectral Density

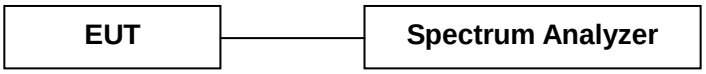
6.1 Measurement Procedure

The power spectral density, FCC Rule 15.247(e):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074 (v05):

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

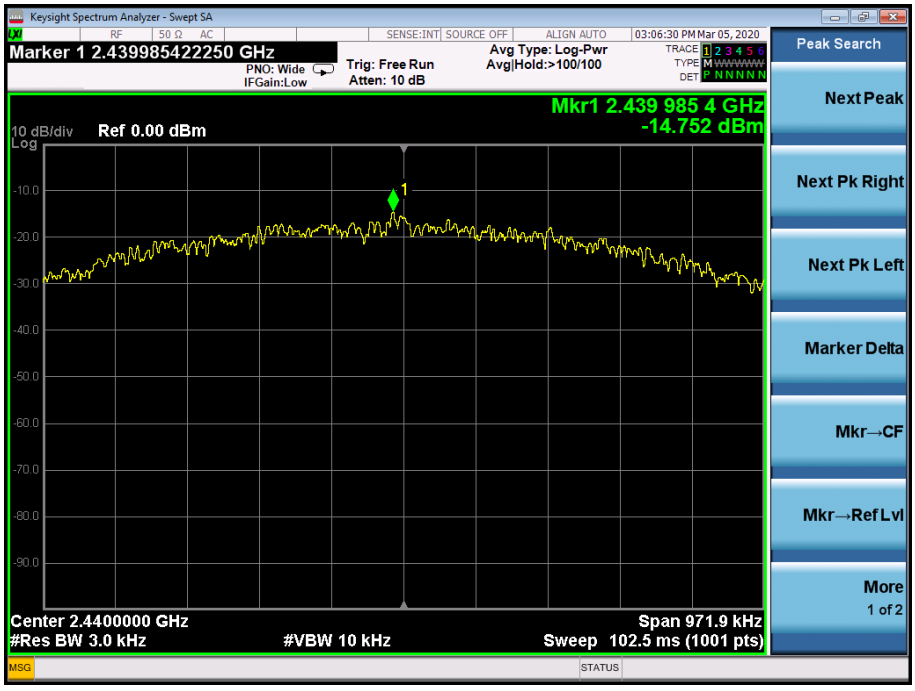
Please refer to following table and plots.

Modulation:	GFSK		
Temperature :	22 ℃	Humidity :	53 %
Test By:	Sance	Test Date :	March 05, 2020
Test Result:	PASS		

Frequency MHz	Data Rate Mbps	PSD dBm/3kHz	Limit dBm/3kHz
Low Channel: 2402	1	-14.771	8
Middle Channel: 2440	1	-14.752	8
High Channel: 2480	1	-15.029	8

Low Channel

Middle Channel



High Channel

7. Band Edge and Conducted Spurious Emissions

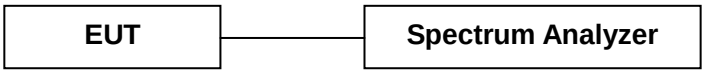
7.1 Requirement and Measurement Procedure

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.

MEASUREMENT PROCEDURE REF
1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE
1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

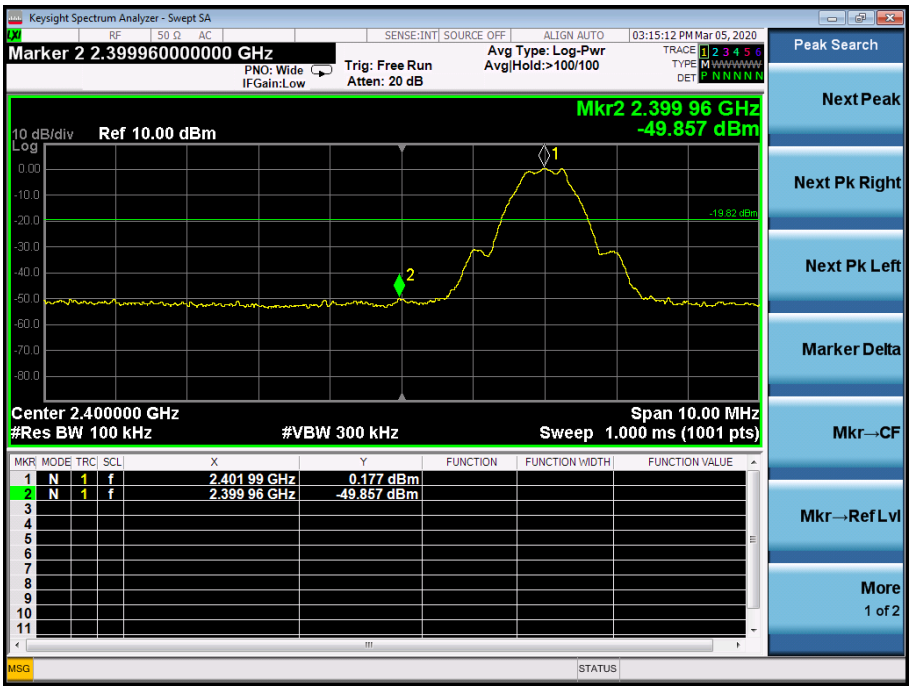
7.2 Test SET-UP (Block Diagram of Configuration)



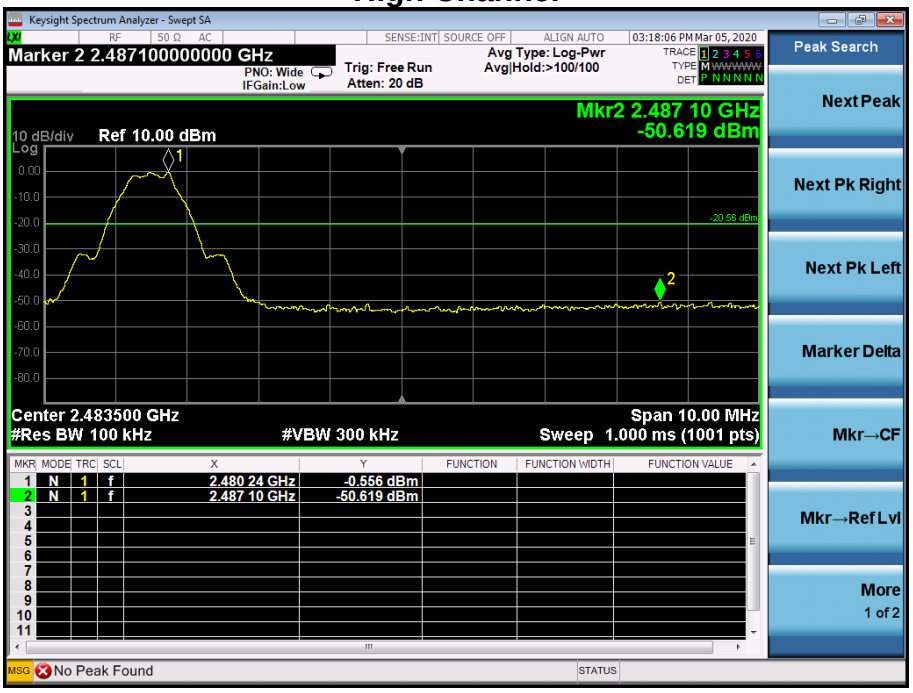
7.3 Measurement Results

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

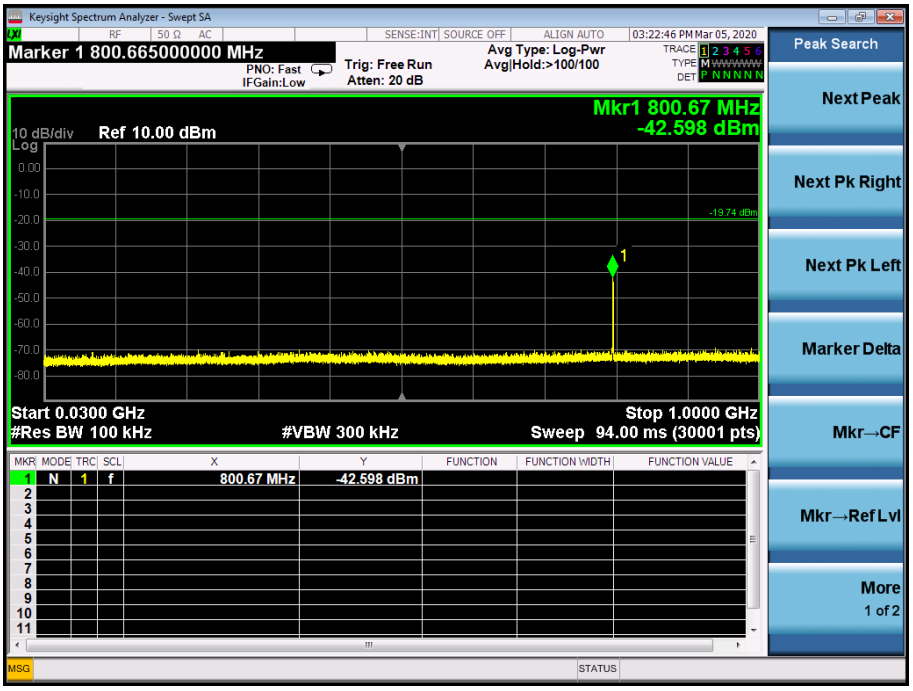


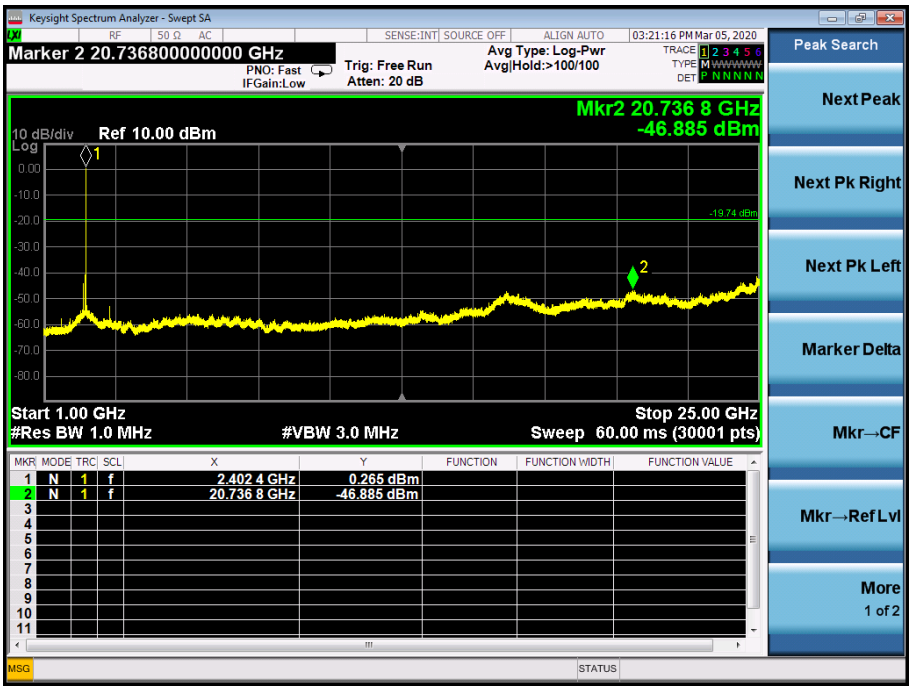
High Channel



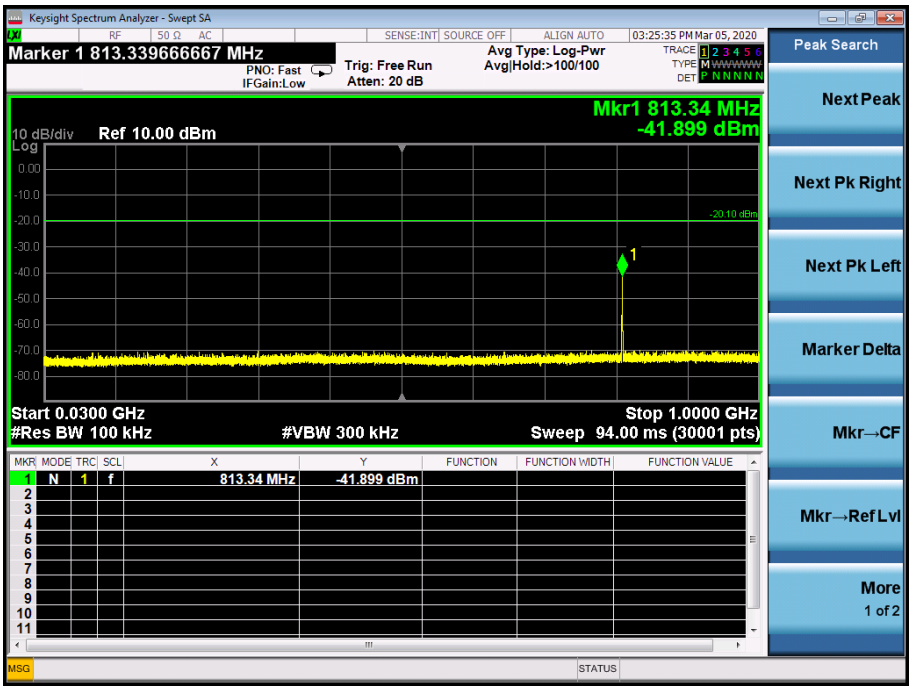
Conducted Spurious Emissions

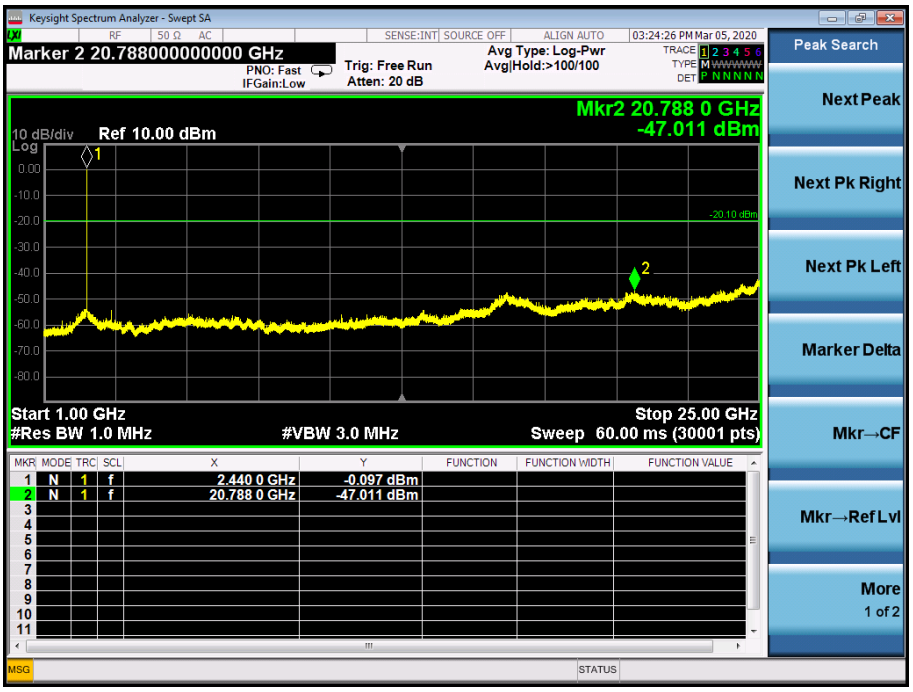
Low Channel



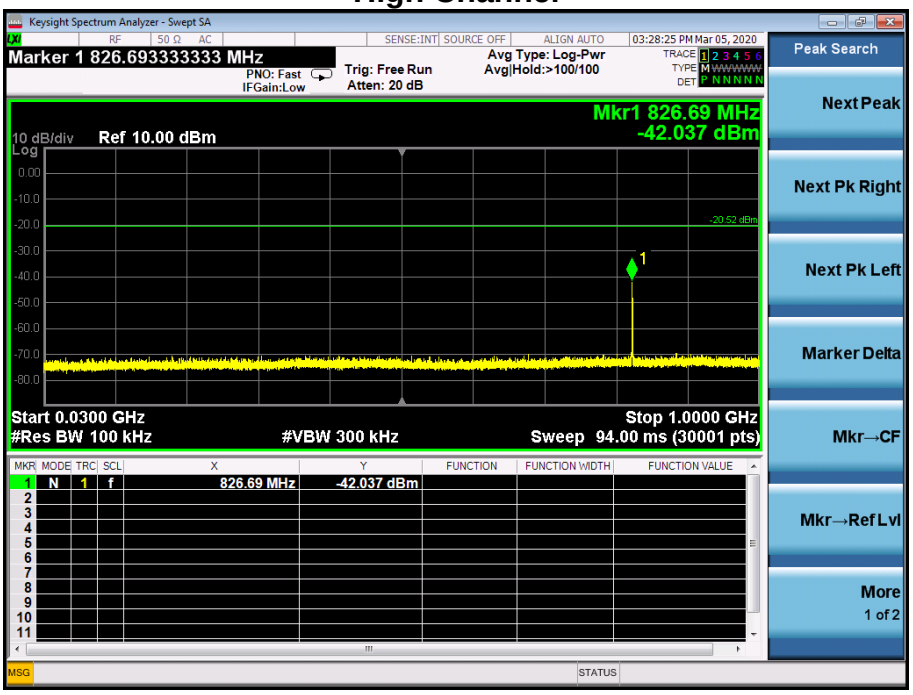


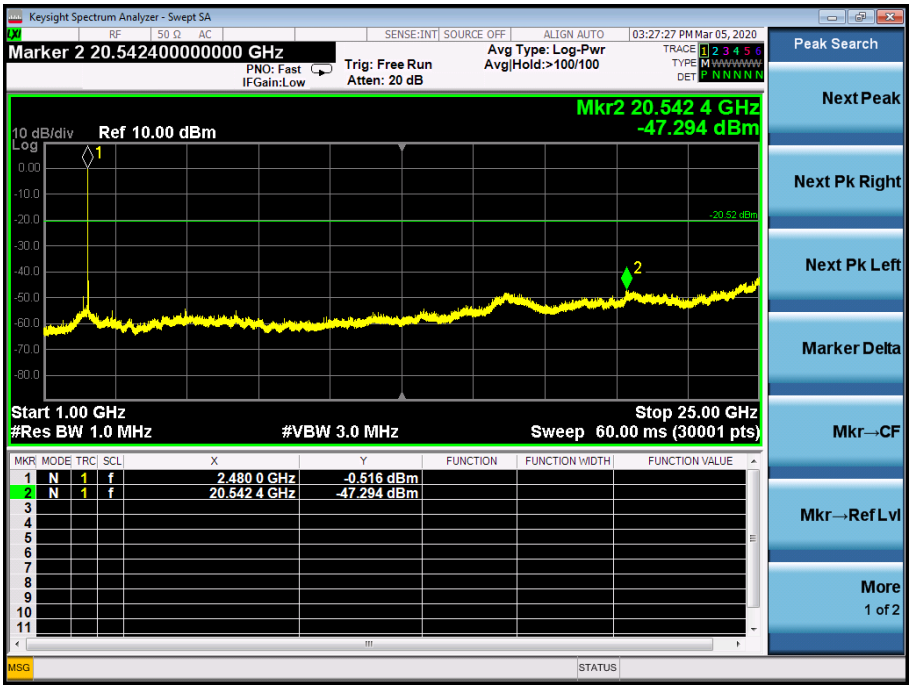
Middle Channel





High Channel



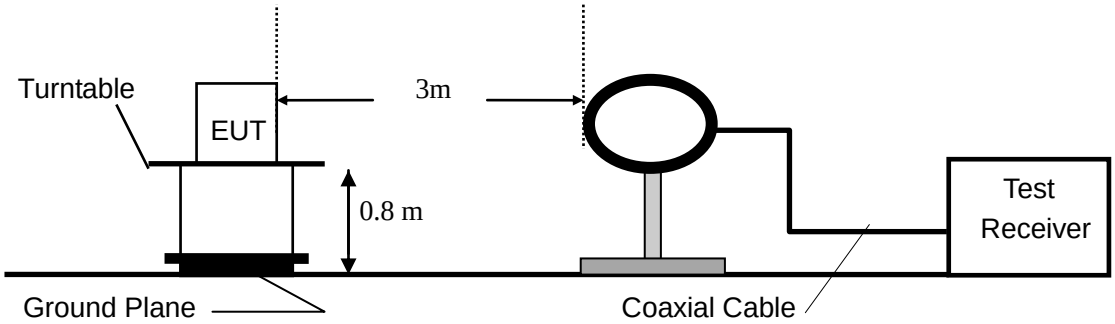


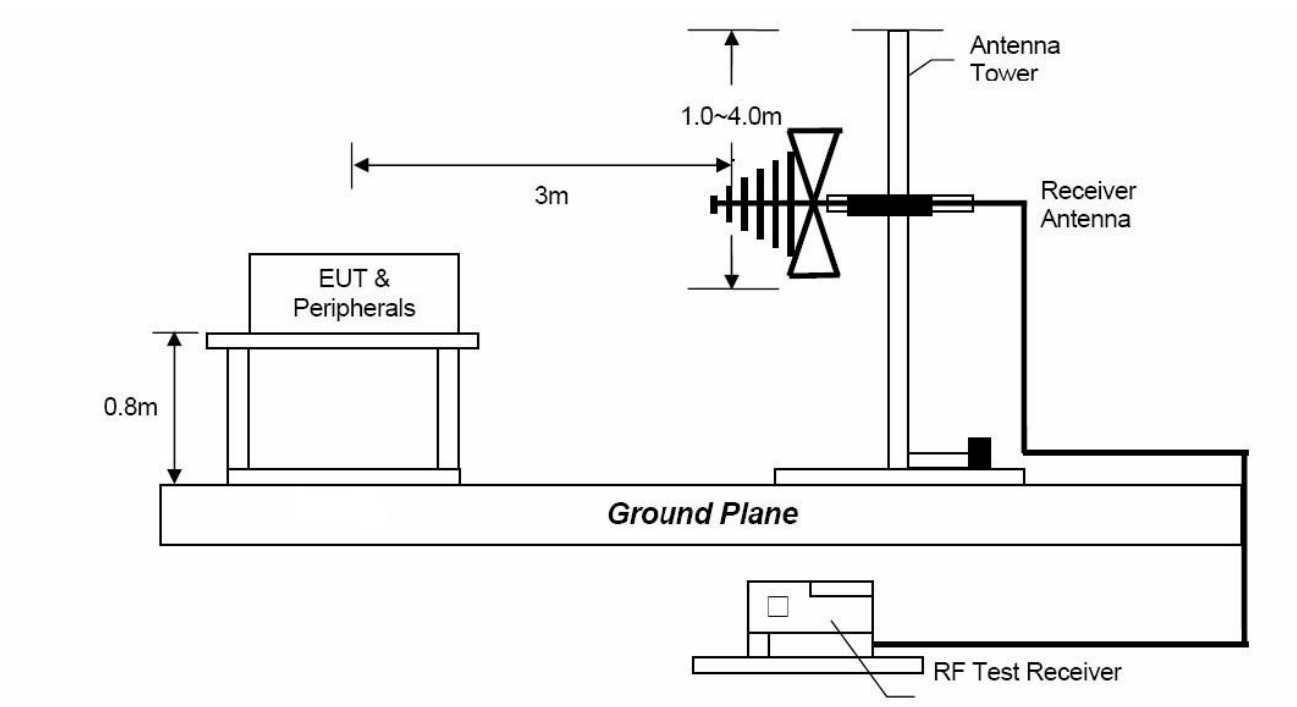
Note: Sweep points=30001pts

8. Radiated Spurious Emissions and Restricted Bands

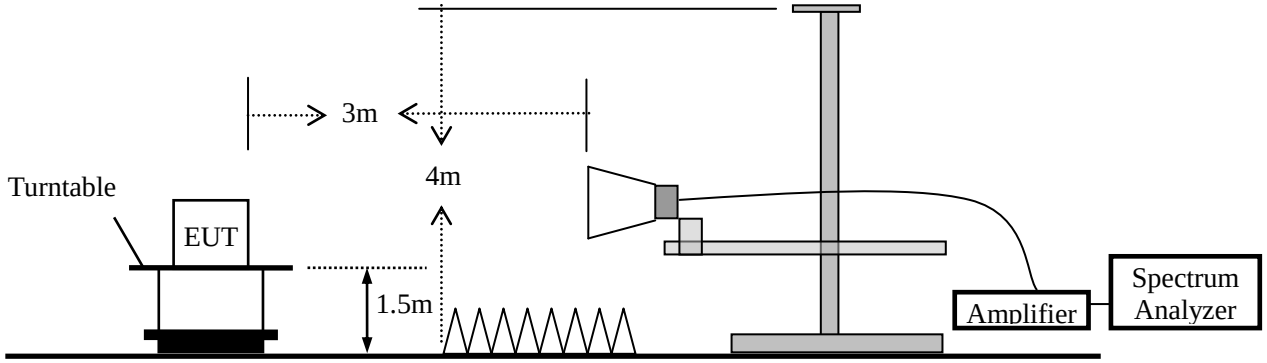
8.1 Test SET-UP (Block Diagram of Configuration)

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

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 (dB)μV = 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.

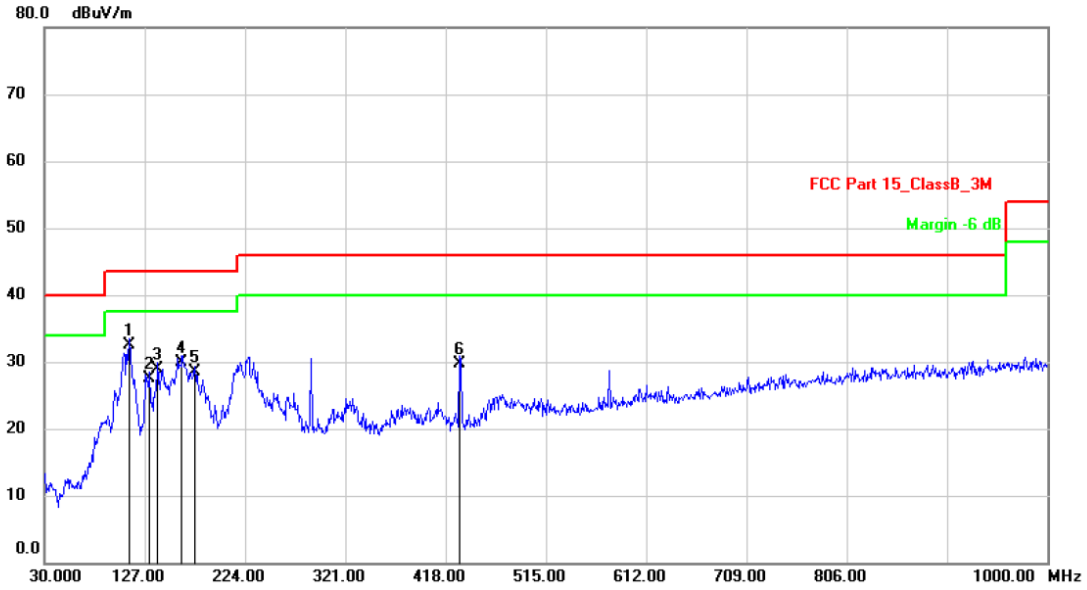
8.4 Measurement Results

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

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

Radiated Emission Measurement

File :WB51R-WT Data :#303 Date: 2020/3/13 Time: 13:14:10



Site: 3m Chamber
Limit: FCC Part 15_ClassB_3M
EUT: Label Printer
M/N: WB51R-WT
Mode: TX(BLE)
Note:

Polarization: ***Horizontal***
Power: AC120V/60Hz
Distance: 3m

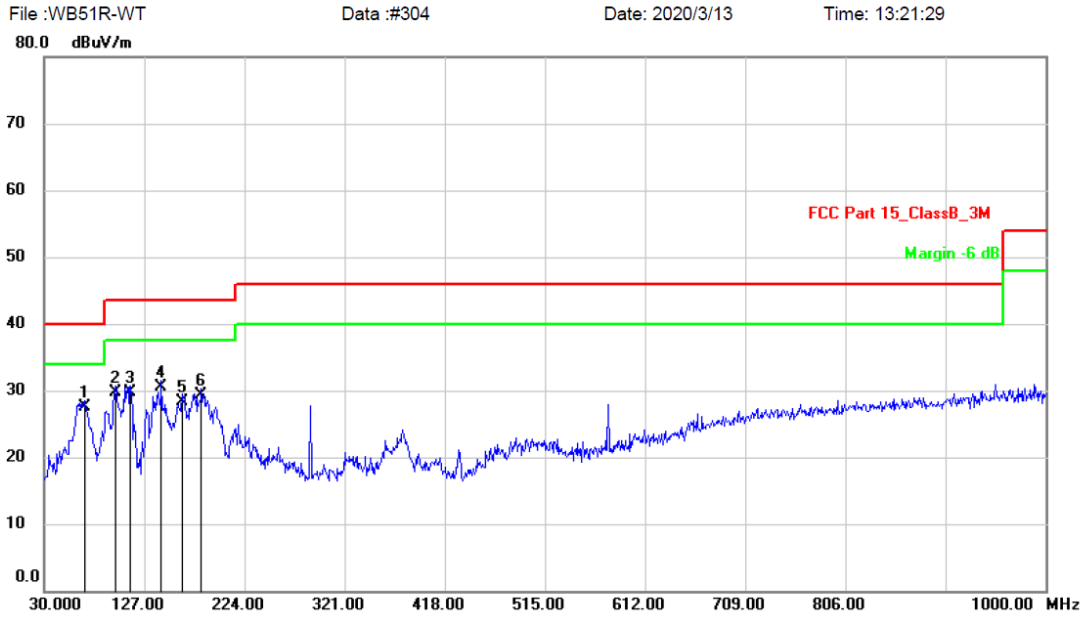
Temperature: 26
Humidity: 47 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	111.4800	44.84	-12.42	32.42	43.50	-11.08	QP	100	193	
2		131.8500	42.78	-15.24	27.54	43.50	-15.96	QP	100	226	
3		139.6100	44.39	-15.57	28.82	43.50	-14.68	QP	100	275	
4		162.8900	44.95	-15.05	29.90	43.50	-13.60	QP	100	110	
5		175.5000	42.97	-14.47	28.50	43.50	-15.00	QP	100	195	
6		431.5800	38.19	-8.39	29.80	46.00	-16.20	QP	100	143	

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

Radiated Emission Measurement



Site: 3m Chamber
Limit: FCC Part 15_ClassB_3M
EUT: Label Printer
M/N: WB51R-WT
Mode: TX(BLE)
Note:

Polarization: *Vertical*
Power: AC120V/60Hz
Distance: 3m

Temperature: 26
Humidity: 47 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	68.8000	44.45	-16.95	27.50	40.00	-12.50	QP	100	174	
2		98.8700	45.85	-16.05	29.80	43.50	-13.70	QP	100	196	
3		113.4200	45.73	-16.03	29.70	43.50	-13.80	QP	100	225	
4		143.4900	49.09	-18.59	30.50	43.50	-13.00	QP	100	230	
5		163.8600	46.42	-18.02	28.40	43.50	-15.10	QP	100	307	
6		182.2899	46.30	-17.00	29.30	43.50	-14.20	QP	100	353	

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

Modulation:	GFSK		
Frequency Range:	1-25GHz	Test Date :	March 10, 2020
Test Result:	PASS	Temperature :	26 ℃
Measured Distance:	3m	Humidity :	47 %
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	48.85	38.60	6.30	55.15	44.90	74.00	54.00	-18.85	-9.10
7206	V	46.22	30.95	10.44	56.66	41.39	74.00	54.00	-17.34	-12.61

4804	H	49.01	39.03	6.30	55.31	45.33	74.00	54.00	-18.69	-8.67
7206	H	46.04	30.90	10.44	56.48	41.34	74.00	54.00	-17.52	-12.66

Operation Mode: TX Mode (Mid)										
4880	V	48.56	36.95	6.60	55.16	43.55	74.00	54.00	-18.84	-10.45
7320	V	45.99	30.73	10.55	56.54	41.28	74.00	54.00	-17.46	-12.72

4880	H	48.32	37.33	6.60	54.92	43.93	74.00	54.00	-19.08	-10.07
7320	H	46.27	31.26	10.55	56.82	41.81	74.00	54.00	-17.18	-12.19

Operation Mode: TX Mode (High)										
4996	V	47.98	36.64	6.89	54.87	43.53	74.00	54.00	-19.13	-10.47
7440	V	46.52	30.67	10.60	57.12	41.27	74.00	54.00	-16.88	-12.73

4996	H	46.74	34.13	6.89	53.63	41.02	74.00	54.00	-20.37	-12.98
7440	H	46.57	31.28	10.60	57.17	41.88	74.00	54.00	-16.83	-12.12

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 : ±4.60dB.
(6) Horn antenna used for the emission over 1000MHz.

Spurious Emission in restricted band:

Operation Mode:	TX	Test Date :	March 10, 2020
Frequency Range:	Above 1GHz	Temperature :	26 ℃
Test Result:	PASS	Humidity :	47 %
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
2390.000	H	49.07	34.06	0.09	49.16	34.15	74.00	54.00	-24.84	-19.85
2390.000	V	50.48	34.13	0.09	50.57	34.22	74.00	54.00	-23.43	-19.78
2483.500	H	49.23	38.24	0.35	49.58	38.59	74.00	54.00	-24.42	-15.41
2483.500	V	48.92	34.23	0.35	49.27	34.58	74.00	54.00	-24.73	-19.42

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) Measurement uncertainty : ±4.60dB

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 that no antenna other than furnished by the responsible party shall be used with the device, and the best case gain of the antenna is 2dBi, 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	15I00041SNO64	Mar. 13, 2020	1 Year
8.	Communication Tester	Rohde & Schwarz	CMW500	149004	Mar. 13, 2020	1 Year
9.	Horn Antenna	COM-Power	AH-118	071078	Mar. 23, 2020	1 Year
10.	Pre-Amplifier	HP	HP 8449B	3008A00964	Mar. 13, 2020	1 Year
11.	Pre-Amplifier	HP	HP 8447D	1145A00203	Mar. 13, 2020	1 Year
12.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	Mar. 23, 2020	1 Year
13.	Test Receiver	Rohde & Schwarz	ESCI	101152	Mar. 14, 2020	1 Year
14.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 13, 2020	1 Year
15.	L.I.S.N	Rohde & Schwarz	ESH2-Z5	893606/014	Mar. 13, 2020	1 Year
16.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar.13, 2020	1 Year
17.	Temperature & Humidity Chamber	REMAFEE	SYHR225L	N/A	Mar. 13, 2020	1 Year
18.	DC Source	Maynuo	MY8811	N/A	Mar. 13, 2020	1 Year
19.	Temporary antenna connector	TESCOM	SS402	N/A	N/A	N/A
20.	Chamber	SAEMC	9*7*7m	N/A	Jun. 20, 2019	2 Year
21.	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---