TESTING LABORATORY
CERTIFICATE#4323.01

FCC PART 15.247

TEST REPORT

For

JiangSu HuiTong Group Co.,Ltd

24#,2 block TaoHuawu new district,ZhenJiang City, JiangSu,P.R.C ,China

FCC ID: PUW-2K19-YKF473

Report Type:	**Product Type:**
Original Report	Remote Plus

Test Engineer:	Jack Jiao
Report Number:	RSHD190909002-00A
Report Date:	2019-10-10
Reviewed By:	Oscar Ye RF Leader
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road,Kunshan,Jiangsu province,China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	JiangSu HuiTong Group Co.,Ltd
Tested Model	YKF473-001
Series Model	YKF473-00* （* can be 0,2,3…9,a,b,c,…x,y,z）
Product Type	Remote Plus
Dimension	18mm(L)*3.8 mm(W)* 1.6mm(H)
Power Supply	DC 3.7V from battery and DC 5.0V charging by adapter

Note: The model difference was explained in the attached declaration letter in detail.

**All measurement and test data in this report was gathered from production sample serial number: 20190909002. (Assigned by the BACL. The EUT supplied by the applicant was received on 2019-09-09)*

Objective

This report is prepared on behalf of JiangSu HuiTong Group Co.,Ltd in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205,15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part15.247 DSS submissions with FCC ID: PUW-2K19-YKF473.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Channel List for BLE mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	…	…
…	…	…	…
…	…	…	…
18	2438	38	2478
19	2440	39	2480

EUT was tested with channel 0, 19 and 39.

Equipment Modifications

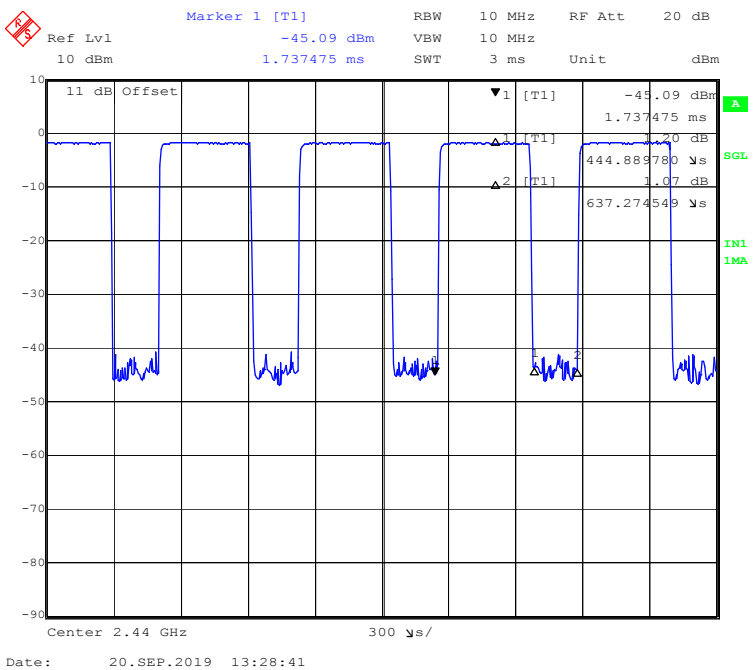
No modification was made to the EUT tested.

EUT Exercise Software

RtlBluetoothMP.dill Version:5.2.2.45,RTLBTAPP Version:5.2.2.29.

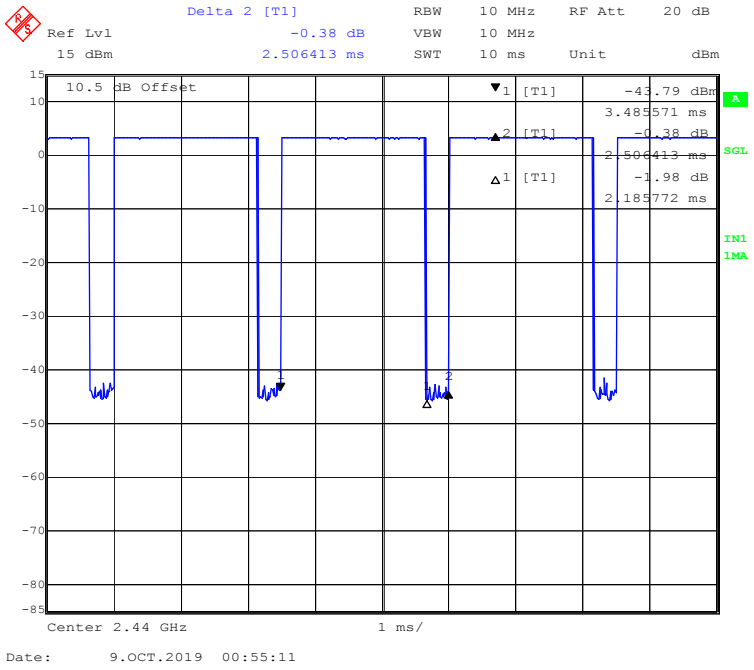
1Mbit/s Duty Cycle:(Chip 1: 8752CJF)

Middle Channel



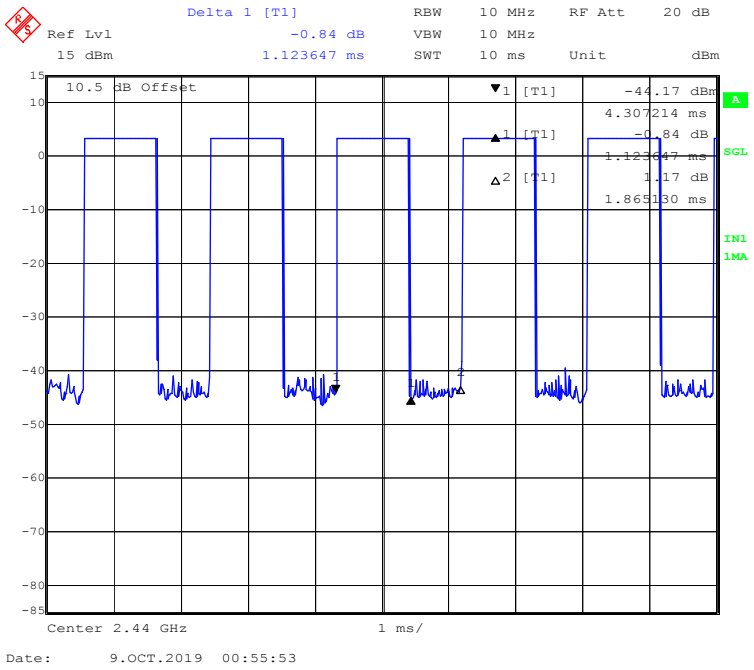
1Mbit/s Duty Cycle:(Chip 2: RTL8763BF)

Middle Channel



2Mbit/s Duty Cycle:(Chip 2: RTL8763BF)

Middle Channel



Mode	Chip model	Date rate	Duty Cycle (%)	T(ms)	1/T(kHz)	10log(1/x)
BLE	8752CJF	1Mbit/s	69.86%	0.445	2.25	1.56
BLE	RTL8763BF	1Mbit/s	87.23%	2.186	0.46	0.59
BLE		2Mbit/s	60.27%	1.124	0.89	2.20

Note: "x" means the Duty Cycle.

Support Equipment List and Details

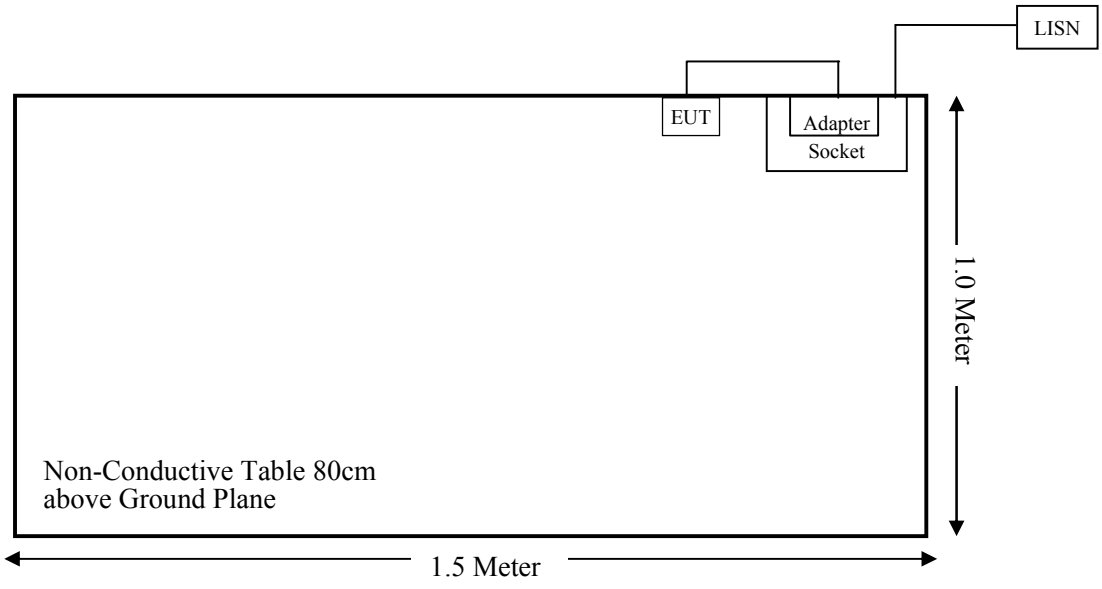
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

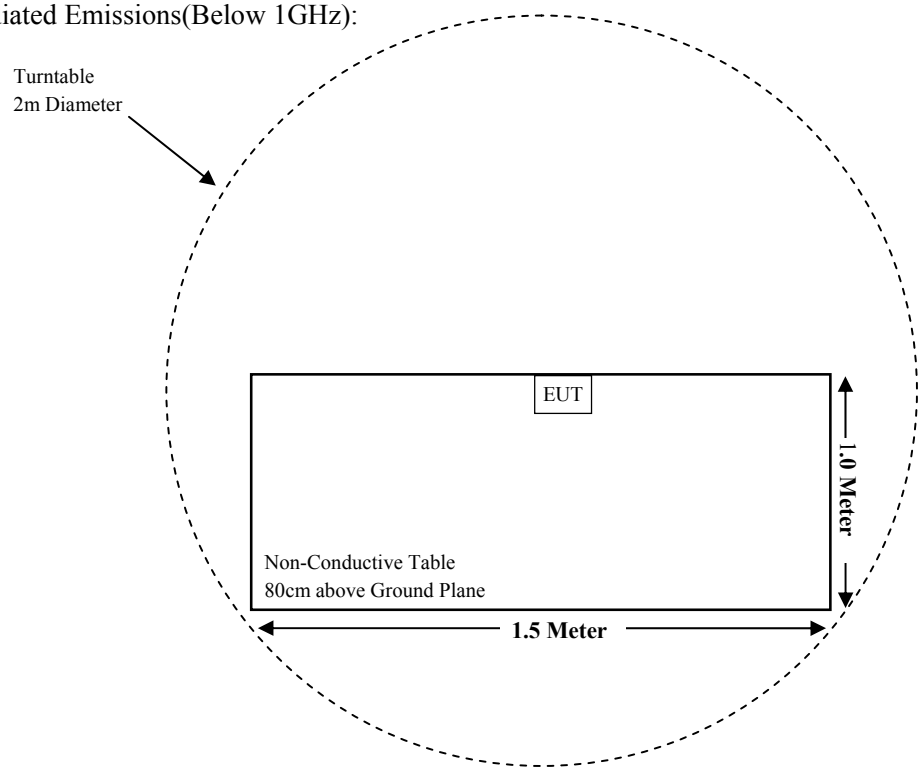
Cable Description	Length (m)	From Port	To
Power Cable	0.8	EUT	Adapter

Block Diagram of Test Setup

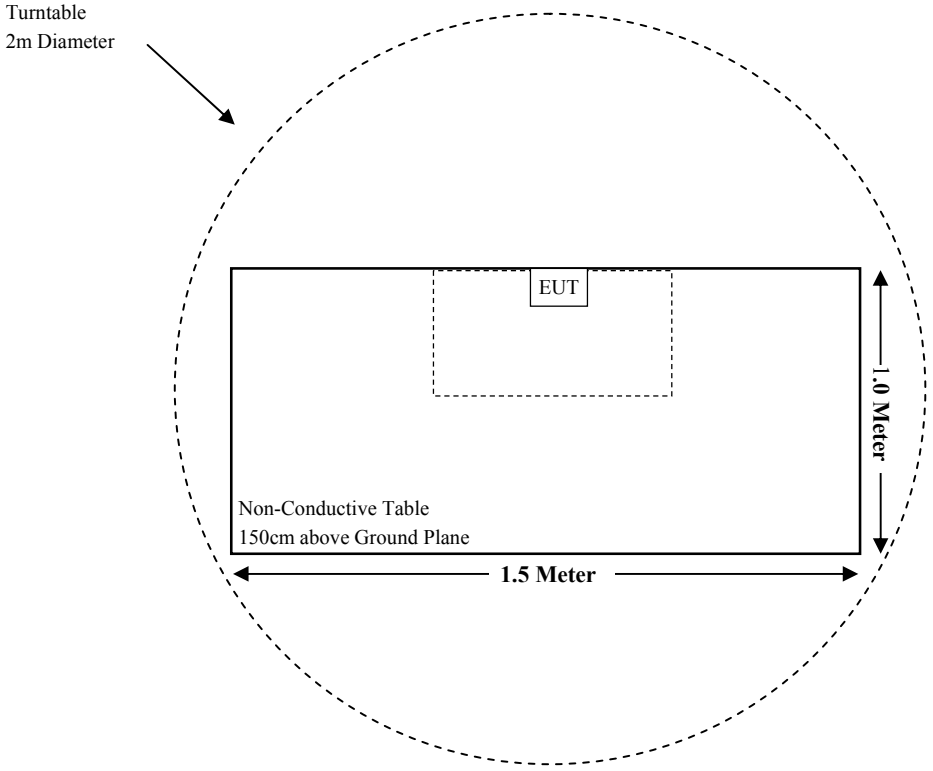
For Conducted Emissions:



For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310 & §2.1093	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	AC Line Conducted Emissions	Compliant
§15.247(d)	Spurious Emissions at Antenna Port	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliant
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(d)	Band Edge	Compliant
§15.247(e)	Power Spectral Density	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-102454-Qd	2019-06-25	2020-06-24
Sunol Sciences	Broadband Antenna	JB3	A040914-2	2019-01-09	2020-01-08
Sonoma Instrunent	Pre-amplifier	310N	171205	2019-08-14	2020-08-13
Audix	Test Software	e3	V9	--	--
MICRO-COAX	Coaxial Cable	Cable-8	008	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2019-08-15	2020-08-14
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2019-08-27	2020-08-26
ETS-LINDGREN	Horn Antenna	3115	6229	2019-01-11	2022-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
A.H.Systems，inc	Preamplifier	2641-1	491	2019-02-20	2020-02-19
EM Electronics Corporation	Amplifier	EM18G40G	060726	2019-03-22	2020-03-21
MICRO-TRONICS	Notch filter	BRM50702	G024	2019-08-05	2020-08-04
Narda	Attenuator/10dB	10dB	010	2019-08-15	2020-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2019-08-15	2020-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2018-09-21	2019-09-20
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2019-09-21	2020-09-20
Rohde & Schwarz	Signal Analyzer	ESIB26	100146	2018-11-30	2019-11-29
Narda	Attenuator	10dB	010	2019-08-15	2020-08-14
SecuRam	RF Cable	SecuRam C01	C01	Each Time	/
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	834115/007	2018-11-30	2019-11-29
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2018-11-30	2019-11-29
BACL	Auto test Software	BACL-EMC	CE001	N/A	N/A
Narda	Attenuator/6dB	10690812-2	26850-6	2019-01-10	2020-01-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2019-08-15	2020-08-14

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (I) & §1.1310 & §2.1093 - RF EXPOSURE

Applicable Standard

According to§15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB447498 D01 General RF Exposure Guidance v06:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

Measurement Result

For worst case:

Mode	Chip model	Frequency Range (MHz)	Max Tune-up Conducted Power		Calculated Distance (mm)	Calculated Value	Threshold (1-g SAR)	SAR Test Exclusion
			(dBm)	(mW)				
BLE	8752CJF	2402-2480	-1.00	0.79	5	0.2	3.0	Yes
BLE	RTL8763BF	2402-2480	4.50	2.82	5	0.9	3.0	Yes
BT3.0	RTL8763BF	2402-2480	6.00	3.98	5	1.3	3.0	Yes

Result: No SAR test is required.

Standalone SAR estimation:

Mode	Chip model	Frequency Range (MHz)	Max tune-up power		Distance (mm)	Estimated $_{1-g}$ (W/kg)
			(dBm)	(mW)		
BLE	8752CJF	2402-2480	-1.00	0.79	5	0.09
BT3.0	RTL8763BF	2402-2480	6.00	3.98	5	0.46

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
[(*max. power of channel, including* ***tune-up tolerance****, mW*)/(*min. test separation distance, mm*)]·[√f(GHz)/*x*] W/kg for *test separation distances* ≤ 50 mm;
where *x* = 7.5 for 1-g SAR.
When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

Simultaneous SAR test exclusion considerations:

Mode (ANT 0+ ANT 1)	**Reported SAR (W/kg)**		**ΣSAR < 1.6W/kg**
BT3.0+BLE	0.09	0.46	0.55

Conclusion: ΣSAR < 1.6 W/kg therefore simultaneous transmission SAR is not required.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, 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 shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has a PCB antenna and a PIFA antenna for BLE, fulfill the requirement of this section. Please refer to the EUT photos.

Chip Model	Antenna Type	Antenna Gain
8752CJF	PCB antenna	0dBi
RTL8763BF	PIFA antenna	0dBi

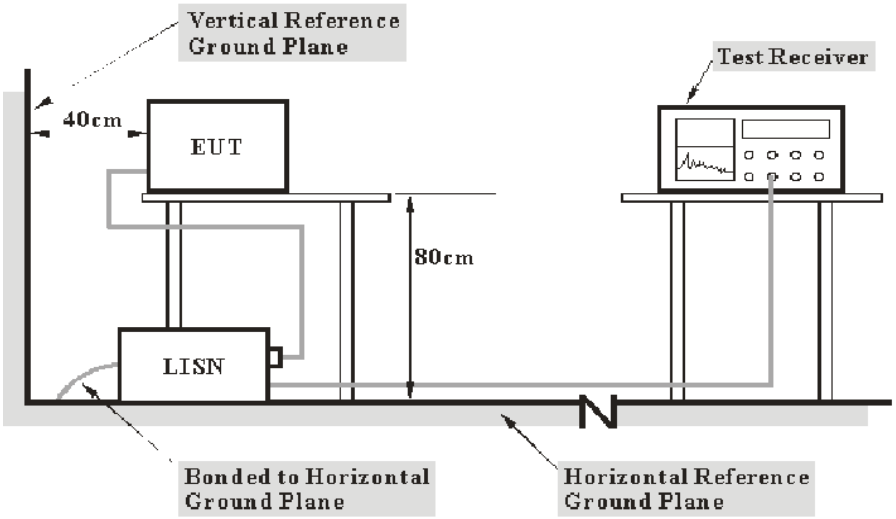
Result: Pass.

FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

ANSI C63.10-2013 clause 6.2

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Factor & Over Limit Calculation

The Factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit of 7 dB means the emission is 7 dB above the limit. The equation for Over Limit calculation is as follows:

Over Limit (dB) = Read level (dBµV) + Factor (dB) - Limit (dBµV)

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

Environmental Conditions

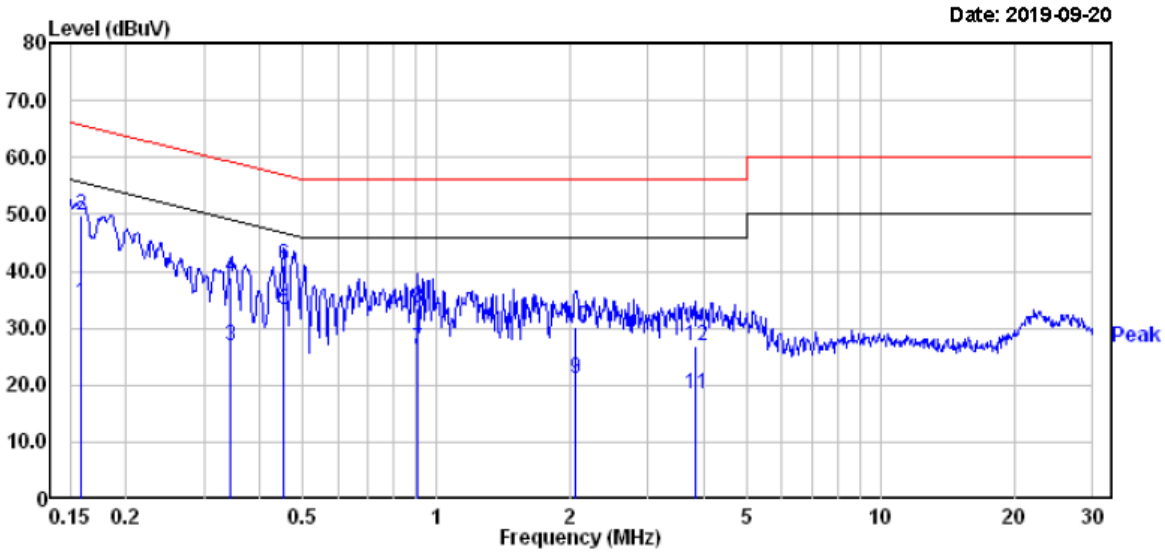
Temperature:	23.2 ℃~23.5 ℃
Relative Humidity:	50 %~52 %
ATM Pressure:	101.1 kPa~103.1 kPa

The testing was performed by Jack Jiao from 2019-09-20 to 2019-09-29.

EUT operation mode: Transmitting in low channel (worst case)

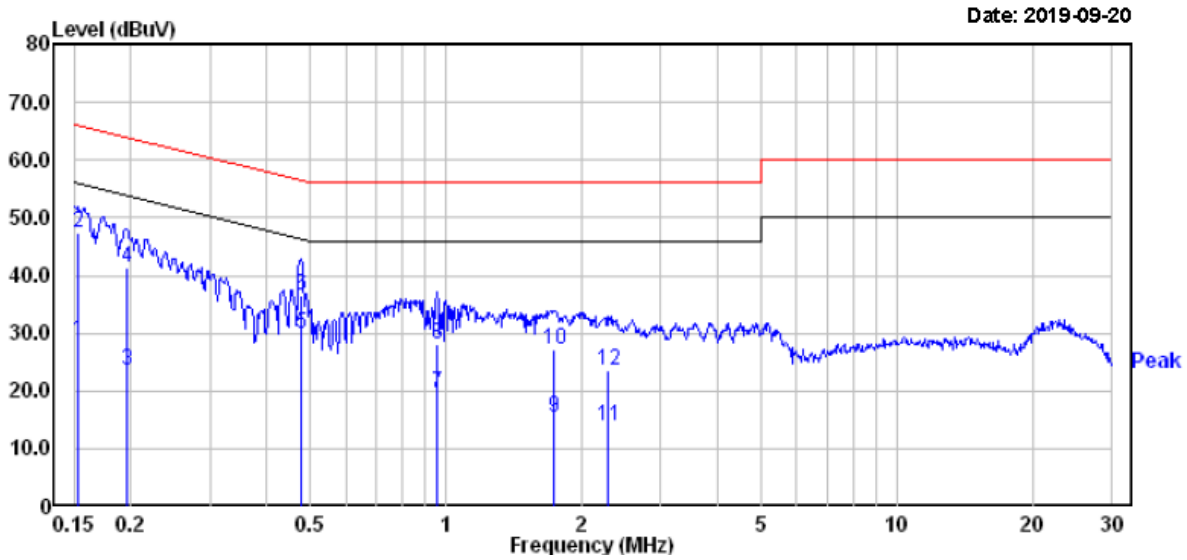
Chip 1: 8752CJF(1Mbit/s)

AC 120V/60 Hz, Line



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.159	14.70	19.82	34.52	55.52	-21.00	Average
2	0.159	29.90	19.82	49.72	65.52	-15.80	QP
3	0.345	7.00	19.81	26.81	49.09	-22.28	Average
4	0.345	19.20	19.81	39.01	59.09	-20.08	QP
5	0.454	13.40	19.75	33.15	46.80	-13.65	Average
6	0.454	21.40	19.75	41.15	56.80	-15.65	QP
7	0.909	6.60	19.74	26.34	46.00	-19.66	Average
8	0.909	13.90	19.74	33.64	56.00	-22.36	QP
9	2.055	1.40	19.79	21.19	46.00	-24.81	Average
10	2.055	10.30	19.79	30.09	56.00	-25.91	QP
11	3.840	-1.10	19.47	18.37	46.00	-27.63	Average
12	3.840	7.50	19.47	26.97	56.00	-29.03	QP

AC 120V/60 Hz, Neutral

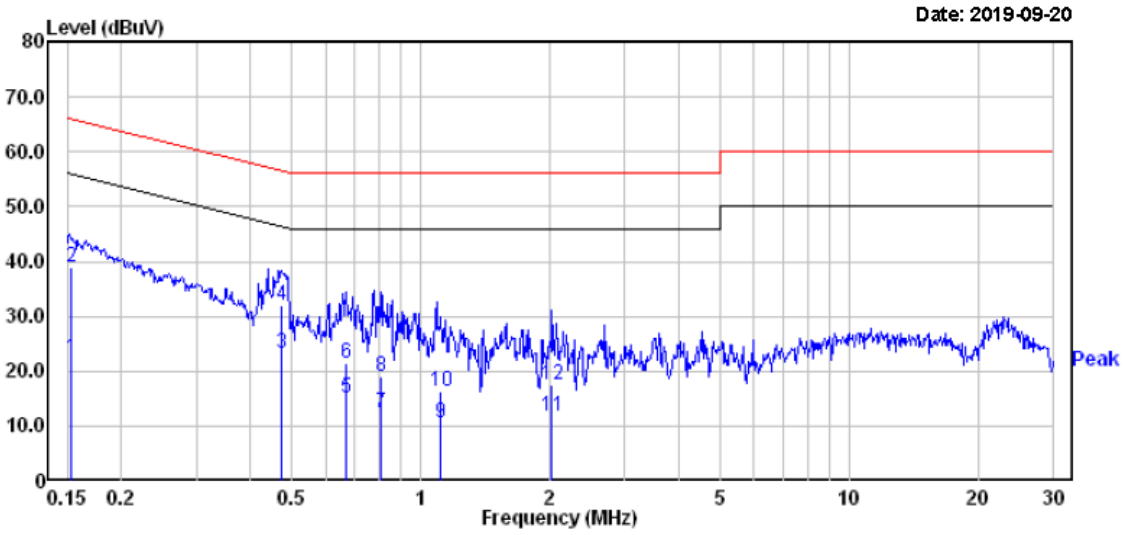


	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.152	8.90	19.82	28.72	55.87	-27.15	Average
2	0.152	27.60	19.82	47.42	65.87	-18.45	QP
3	0.196	3.70	19.82	23.52	53.80	-30.28	Average
4	0.196	21.40	19.82	41.22	63.80	-22.58	QP
5	0.476	10.10	19.76	29.86	46.41	-16.55	Average
6	0.476	16.70	19.76	36.46	56.41	-19.95	QP
7	0.958	-0.20	19.78	19.58	46.00	-26.42	Average
8	0.958	8.40	19.78	28.18	56.00	-27.82	QP
9	1.744	-4.40	19.84	15.44	46.00	-30.56	Average
10	1.744	7.40	19.84	27.24	56.00	-28.76	QP
11	2.297	-5.70	19.61	13.91	46.00	-32.09	Average
12	2.297	3.90	19.61	23.51	56.00	-32.49	QP

Note:
1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
2) Over Limit (dB) = Read level (dBµV) + Factor (dB) - Limit (dBµV)

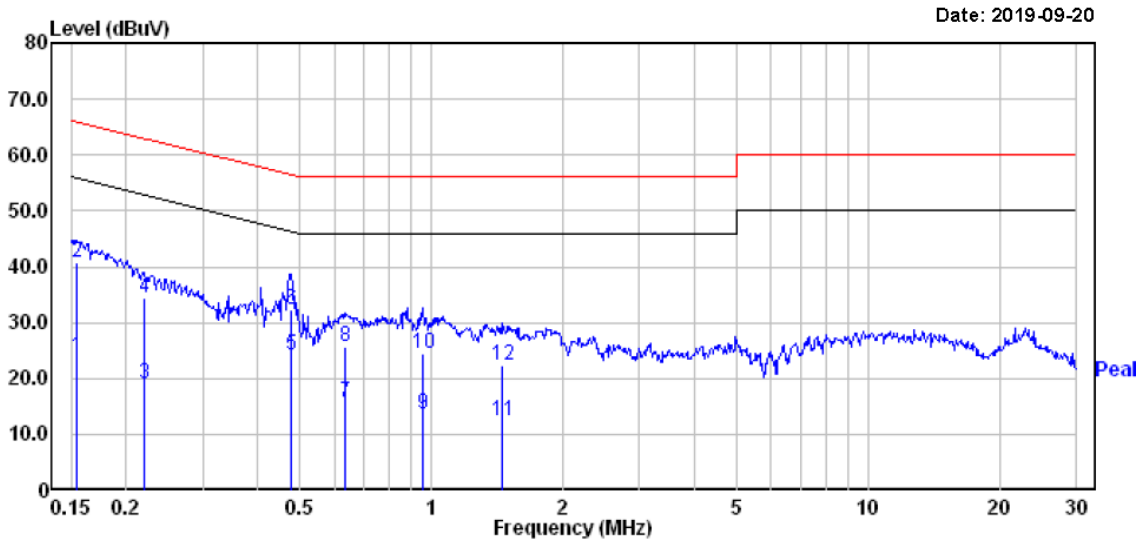
Chip 2: RTL8763BF(1Mbit/s)

AC 120V/60 Hz, Line



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.152	2.50	19.82	22.32	55.87	-33.55	Average
2	0.152	19.20	19.82	39.02	65.87	-26.85	QP
3	0.474	3.40	19.76	23.16	46.45	-23.29	Average
4	0.474	12.20	19.76	31.96	56.45	-24.49	QP
5	0.672	-4.60	19.75	15.15	46.00	-30.85	Average
6	0.672	1.80	19.75	21.55	56.00	-34.45	QP
7	0.804	-7.20	19.70	12.50	46.00	-33.50	Average
8	0.804	-0.70	19.70	19.00	56.00	-37.00	QP
9	1.117	-9.29	19.81	10.52	46.00	-35.48	Average
10	1.117	-3.39	19.81	16.42	56.00	-39.58	QP
11	2.023	-8.10	19.81	11.71	46.00	-34.29	Average
12	2.023	-2.20	19.81	17.61	56.00	-38.39	QP

AC 120V/60 Hz, Neutral

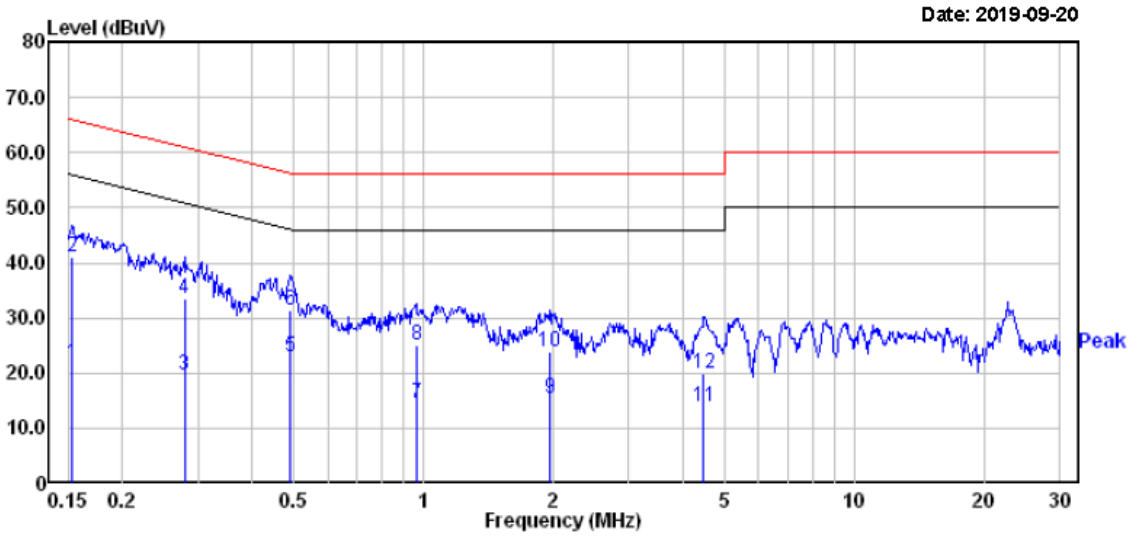


	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.155	3.90	19.82	23.72	55.74	-32.02	Average
2	0.155	20.90	19.82	40.72	65.74	-25.02	QP
3	0.221	-0.80	19.82	19.02	52.79	-33.77	Average
4	0.221	14.70	19.82	34.52	62.79	-28.27	QP
5	0.476	4.30	19.76	24.06	46.41	-22.35	Average
6	0.476	12.60	19.76	32.36	56.41	-24.05	QP
7	0.634	-4.10	19.75	15.65	46.00	-30.35	Average
8	0.634	5.80	19.75	25.55	56.00	-30.45	QP
9	0.953	-6.10	19.78	13.68	46.00	-32.32	Average
10	0.953	4.80	19.78	24.58	56.00	-31.42	QP
11	1.449	-7.50	19.84	12.34	46.00	-33.66	Average
12	1.449	2.50	19.84	22.34	56.00	-33.66	QP

Note:
1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
2) Over Limit (dB) = Read level (dBµV) + Factor (dB) - Limit (dBµV)

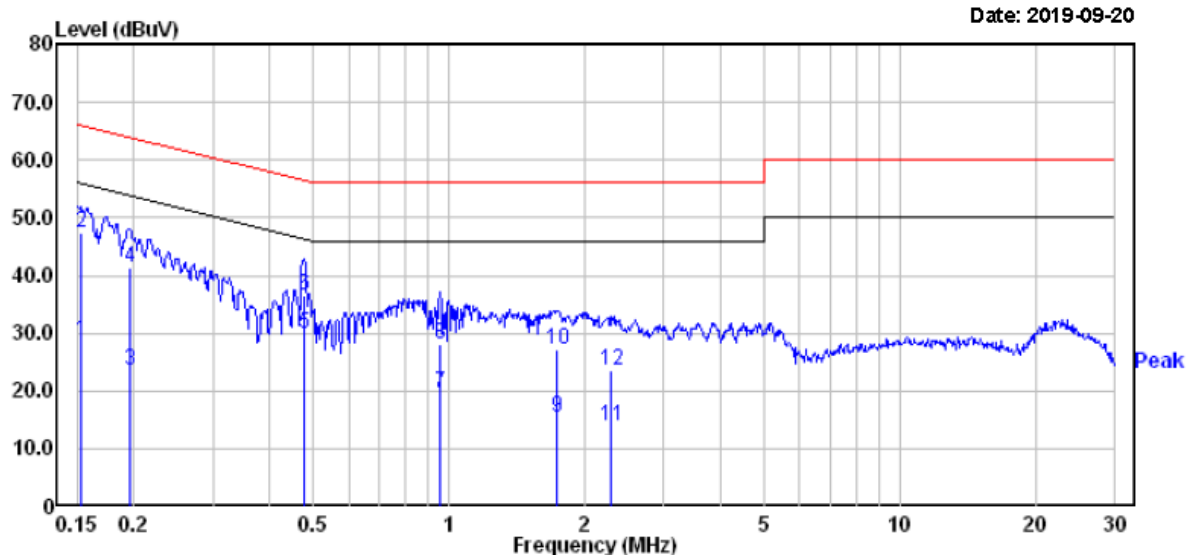
Chip2: RTL8763BF(2Mbit/s)

AC 120V/60 Hz, Line



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.152	1.80	19.82	21.62	55.87	-34.25	Average
2	0.152	21.10	19.82	40.92	65.87	-24.95	QP
3	0.279	-0.30	19.82	19.52	50.85	-31.33	Average
4	0.279	13.60	19.82	33.42	60.85	-27.43	QP
5	0.489	3.30	19.76	23.06	46.19	-23.13	Average
6	0.489	11.60	19.76	31.36	56.19	-24.83	QP
7	0.963	-5.30	19.79	14.49	46.00	-31.51	Average
8	0.963	5.40	19.79	25.19	56.00	-30.81	QP
9	1.959	-4.50	19.83	15.33	46.00	-30.67	Average
10	1.959	4.10	19.83	23.93	56.00	-32.07	QP
11	4.478	-5.70	19.48	13.78	46.00	-32.22	Average
12	4.478	0.40	19.48	19.88	56.00	-36.12	QP

AC 120V/60 Hz, Neutral

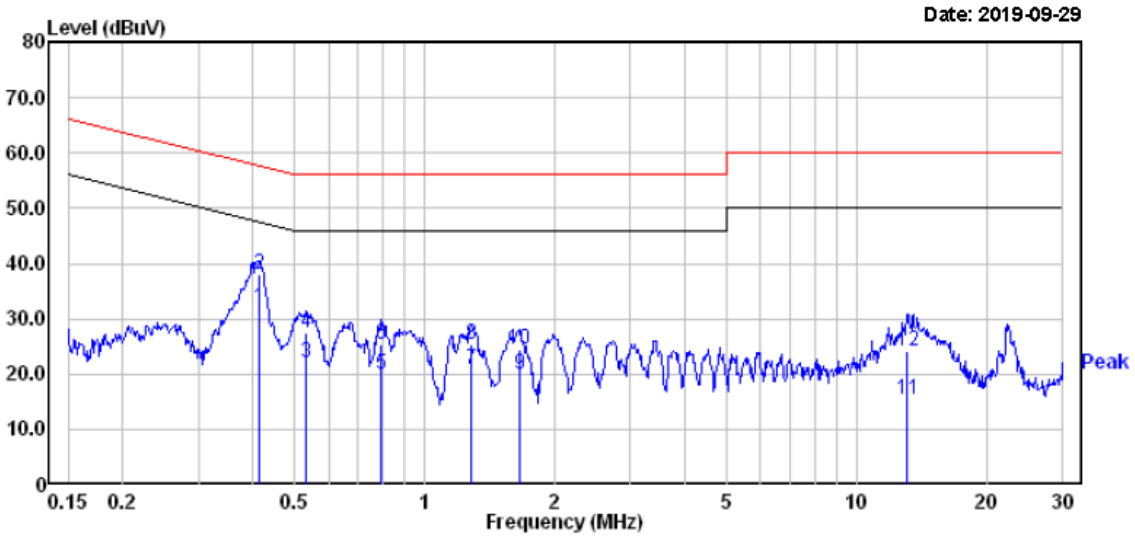


	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.152	8.90	19.82	28.72	55.87	-27.15	Average
2	0.152	27.60	19.82	47.42	65.87	-18.45	QP
3	0.196	3.70	19.82	23.52	53.80	-30.28	Average
4	0.196	21.40	19.82	41.22	63.80	-22.58	QP
5	0.476	10.10	19.76	29.86	46.41	-16.55	Average
6	0.476	16.70	19.76	36.46	56.41	-19.95	QP
7	0.958	-0.20	19.78	19.58	46.00	-26.42	Average
8	0.958	8.40	19.78	28.18	56.00	-27.82	QP
9	1.744	-4.40	19.84	15.44	46.00	-30.56	Average
10	1.744	7.40	19.84	27.24	56.00	-28.76	QP
11	2.297	-5.70	19.61	13.91	46.00	-32.09	Average
12	2.297	3.90	19.61	23.51	56.00	-32.49	QP

Note:
1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
2) Over Limit (dB) = Read level (dBµV) + Factor (dB) - Limit (dBµV)

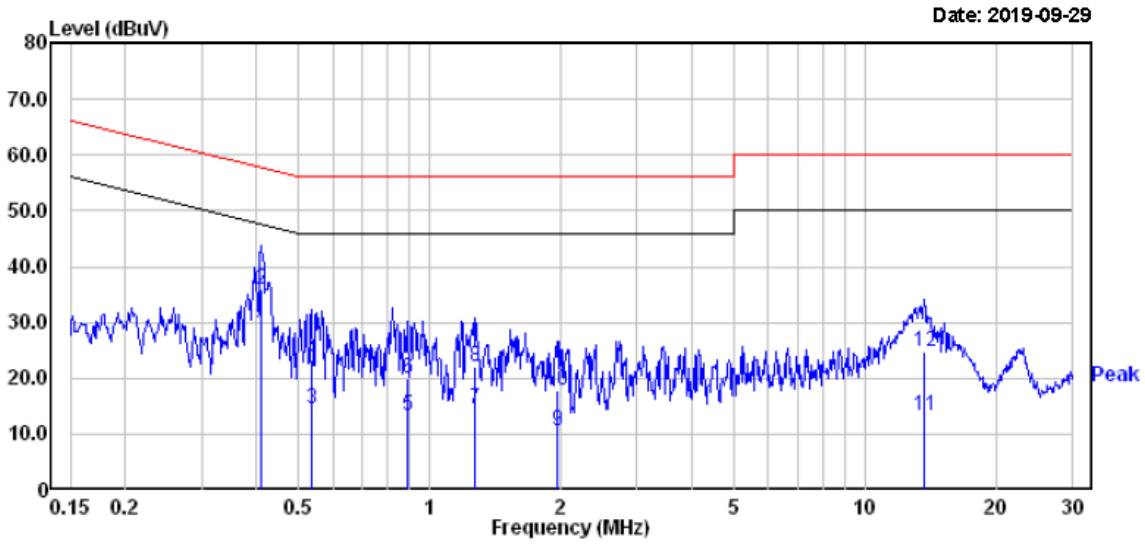
The worst case low channel of BLE(Chip model: 8752CJF) & low channel (*8DPSK *mode)of BT3.0(Chip model:RTL8763BF) transmitting simultaneously :

AC 120V/60 Hz, Line



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.415	12.20	19.74	31.94	47.55	-15.61	Average
2	0.415	18.20	19.74	37.94	57.55	-19.61	QP
3	0.529	2.21	19.75	21.96	46.00	-24.04	Average
4	0.529	7.71	19.75	27.46	56.00	-28.54	QP
5	0.796	0.20	19.70	19.90	46.00	-26.10	Average
6	0.796	5.70	19.70	25.40	56.00	-30.60	QP
7	1.282	0.90	19.82	20.72	46.00	-25.28	Average
8	1.282	5.50	19.82	25.32	56.00	-30.68	QP
9	1.654	0.10	19.84	19.94	46.00	-26.06	Average
10	1.654	4.60	19.84	24.44	56.00	-31.56	QP
11	13.127	-4.10	19.60	15.50	50.00	-34.50	Average
12	13.127	4.50	19.60	24.10	60.00	-35.90	QP

AC 120V/60 Hz, Neutral



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.410	8.20	19.74	27.94	47.64	-19.70	Average
2	0.410	16.20	19.74	35.94	57.64	-21.70	QP
3	0.535	-5.29	19.75	14.46	46.00	-31.54	Average
4	0.535	3.41	19.75	23.16	56.00	-32.84	QP
5	0.890	-6.31	19.73	13.42	46.00	-32.58	Average
6	0.890	0.09	19.73	19.82	56.00	-36.18	QP
7	1.276	-5.20	19.82	14.62	46.00	-31.38	Average
8	1.276	2.30	19.82	22.12	56.00	-33.88	QP
9	1.959	-9.20	19.83	10.63	46.00	-35.37	Average
10	1.959	-1.90	19.83	17.93	56.00	-38.07	QP
11	13.695	-6.20	19.61	13.41	50.00	-36.59	Average
12	13.695	5.10	19.61	24.71	60.00	-35.29	QP

Note:
1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
2) Over Limit (dB) = Read level (dBµV) + Factor (dB) - Limit (dBµV)

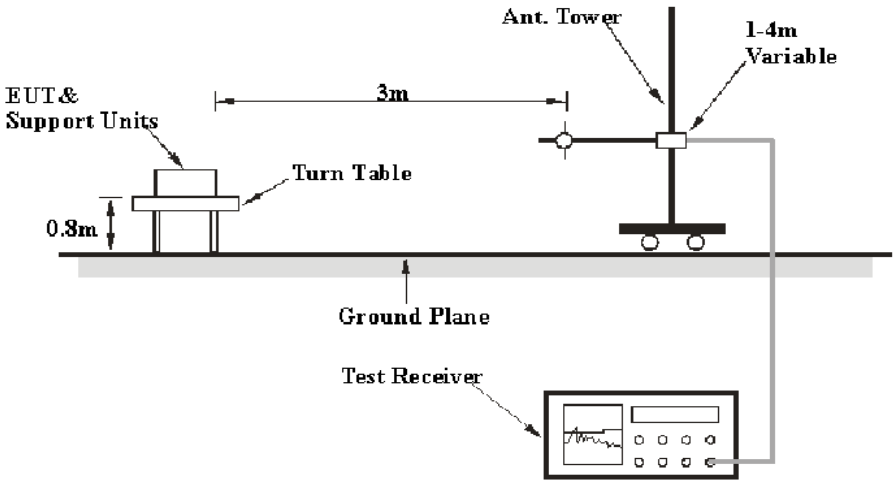
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

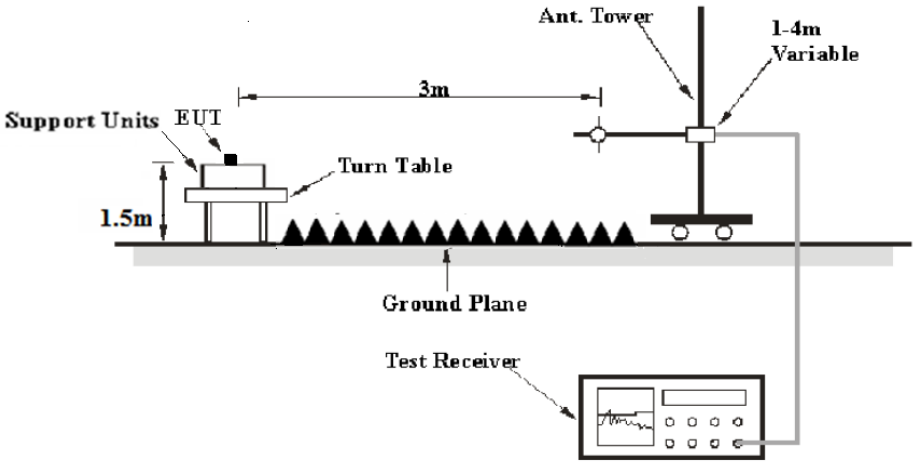
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz - 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1GHz	1MHz	3 MHz	/	PK
	1MHz	3 MHz	/	Ave

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz - 1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Factor & Over Limit Calculation (for below 1GHz)

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit of 7dB means the emission is 7 dB above the limit. The equation for Over Limit calculation is as follows:

Over Limit (dB) = Read level (dBμV) + Factor (dB) - Limit (dBμV)

Corrected Amplitude & Margin Calculation (for above 1GHz)

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude (dBμV/m) = Meter Reading (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin (dB) = Limit (dBμV/m) - Corrected Amplitude (dBμV/m)

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Test Data

Environmental Conditions

Temperature:	21.1-22.3℃
Relative Humidity:	49-50%
ATM Pressure:	101.1-101.2 kPa

The testing was performed by Jack Jiao from 2019-09-20 to 2019-10-09.

EUT operation mode: Transmitting

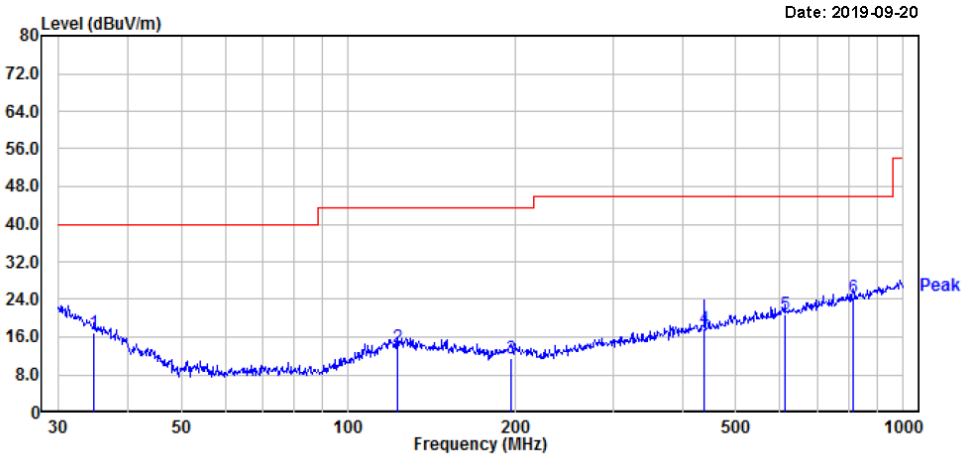
Spurious Emission Test:

Chip 1: 8752CJF(1Mbit/s)

30MHz-1GHz

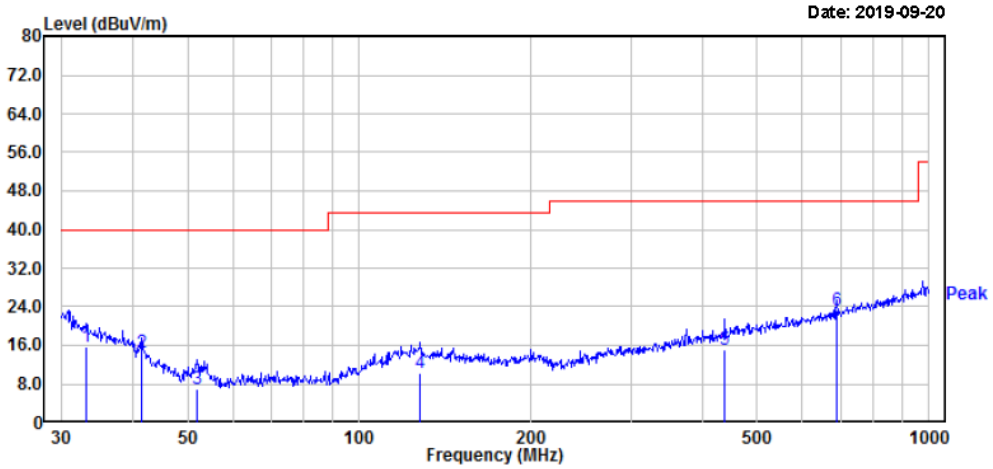
*(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **low channel of operation in X-axis of orientation** was recorded)*

Horizontal:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	34.88	24.19	-7.19	17.00	40.00	-23.00	100	253	QP
2	122.40	24.75	-10.79	13.96	43.50	-29.54	100	91	QP
3	196.51	23.32	-11.85	11.47	43.50	-32.03	100	360	QP
4	438.66	24.71	-6.85	17.86	46.00	-28.14	100	2	QP
5	612.06	24.73	-3.77	20.96	46.00	-25.04	200	102	QP
6	813.11	24.88	-0.57	24.31	46.00	-21.69	200	256	QP

Vertical:



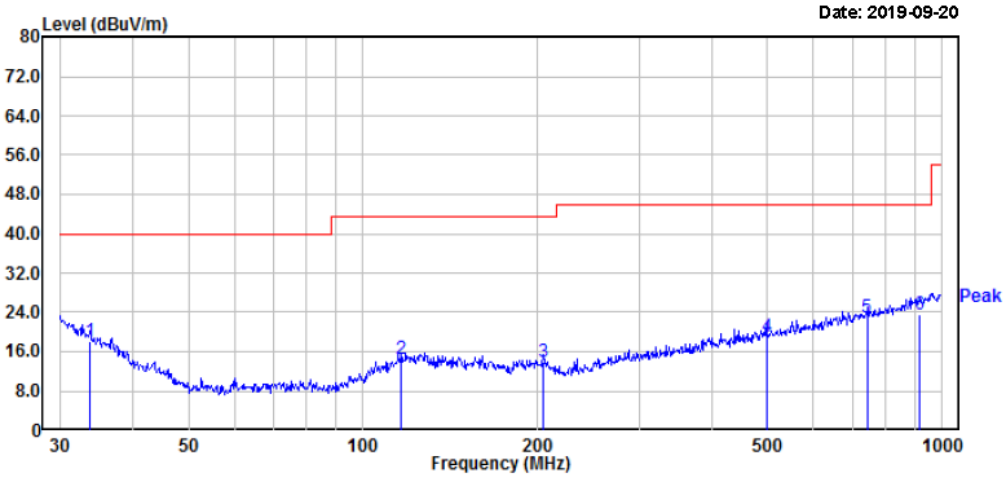
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	33.21	21.60	-5.80	15.80	40.00	-24.20	200	69	QP
2	41.42	26.59	-12.22	14.37	40.00	-25.63	200	32	QP
3	52.03	24.09	-17.06	7.03	40.00	-32.97	200	178	QP
4	128.11	21.30	-11.12	10.18	43.50	-33.32	200	215	QP
5	438.66	22.01	-6.85	15.16	46.00	-30.84	200	38	QP
6	689.57	25.40	-2.28	23.12	46.00	-22.88	200	359	QP

Chip 2: RTL8763BF(1Mbit/s)

30MHz-1GHz

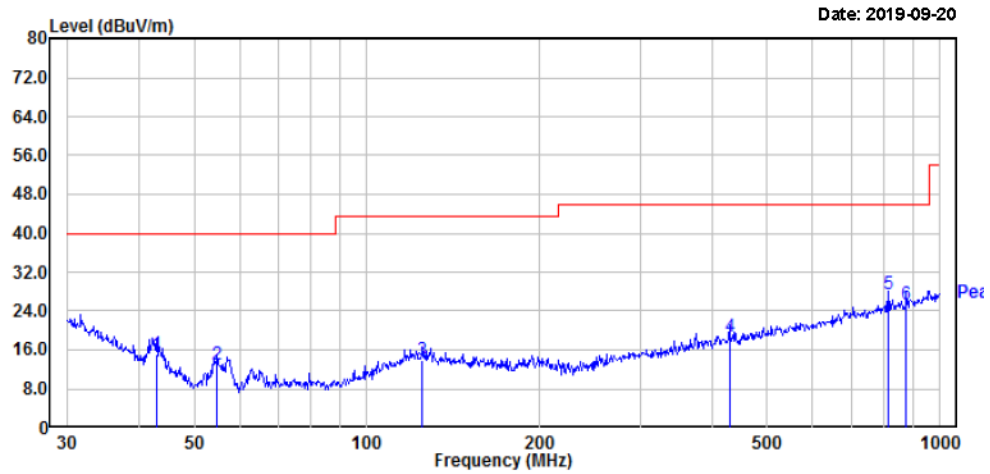
*(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **low channel of operation in X-axis of orientation** was recorded)*

Horizontal:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	33.80	24.47	-6.28	18.19	40.00	-21.81	100	65	QP
2	116.54	25.93	-11.33	14.60	43.50	-28.90	100	302	QP
3	204.96	26.07	-12.08	13.99	43.50	-29.51	200	52	QP
4	497.68	24.62	-5.54	19.08	46.00	-26.92	200	46	QP
5	742.26	24.50	-1.48	23.02	46.00	-22.98	100	83	QP
6	912.86	22.15	1.30	23.45	46.00	-22.55	100	139	QP

Vertical:



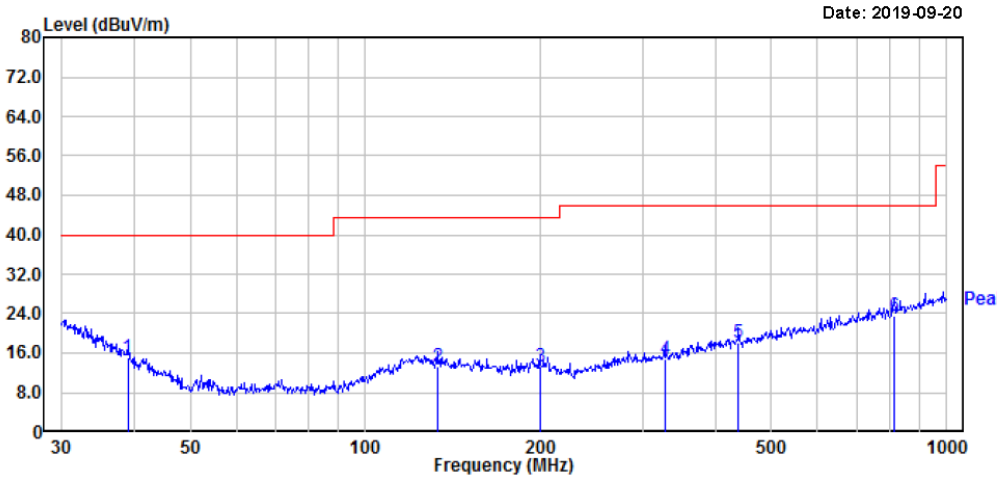
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	42.90	28.26	-13.05	15.21	40.00	-24.79	200	323	QP
2	54.84	30.27	-17.25	13.02	40.00	-26.98	100	221	QP
3	125.01	24.86	-10.94	13.92	43.50	-29.58	100	334	QP
4	429.52	25.79	-7.02	18.77	46.00	-27.23	200	347	QP
5	813.11	27.95	-0.57	27.38	46.00	-18.62	100	178	QP
6	875.25	24.76	0.52	25.28	46.00	-20.72	100	253	QP

Chip 2: RTL8763BF(2Mbit/s)

30MHz-1GHz

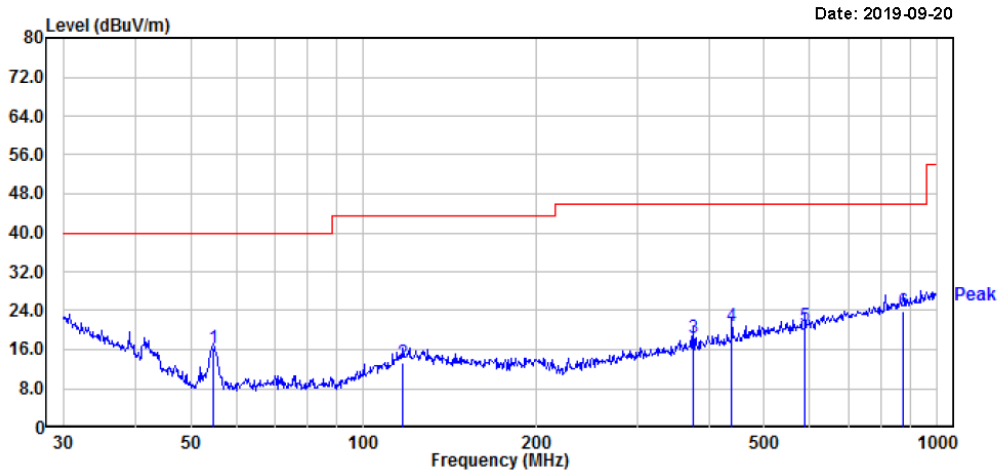
*(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **low channel of operation in X-axis of orientation** was recorded)*

Horizontal:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	39.02	25.65	-10.63	15.02	40.00	-24.98	200	75	QP
2	133.15	24.81	-11.40	13.41	43.50	-30.09	100	298	QP
3	199.99	24.76	-11.62	13.14	43.50	-30.36	100	130	QP
4	327.89	24.56	-9.68	14.88	46.00	-31.12	100	205	QP
5	438.66	24.95	-6.85	18.10	46.00	-27.90	200	359	QP
6	813.11	24.15	-0.57	23.58	46.00	-22.42	200	132	QP

Vertical:

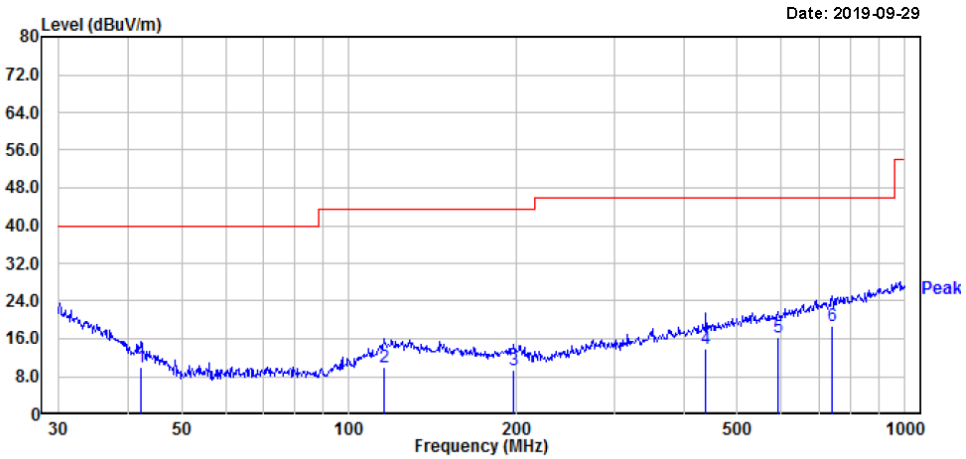


	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	54.64	33.68	-17.24	16.44	40.00	-23.56	100	306	QP
2	117.36	24.54	-11.17	13.37	43.50	-30.13	100	190	QP
3	375.94	26.86	-8.35	18.51	46.00	-27.49	100	359	QP
4	438.66	27.79	-6.85	20.94	46.00	-25.06	100	251	QP
5	588.91	24.88	-4.16	20.72	46.00	-25.28	100	359	QP
6	875.25	23.39	0.52	23.91	46.00	-22.09	100	359	QP

30MHz-1GHz

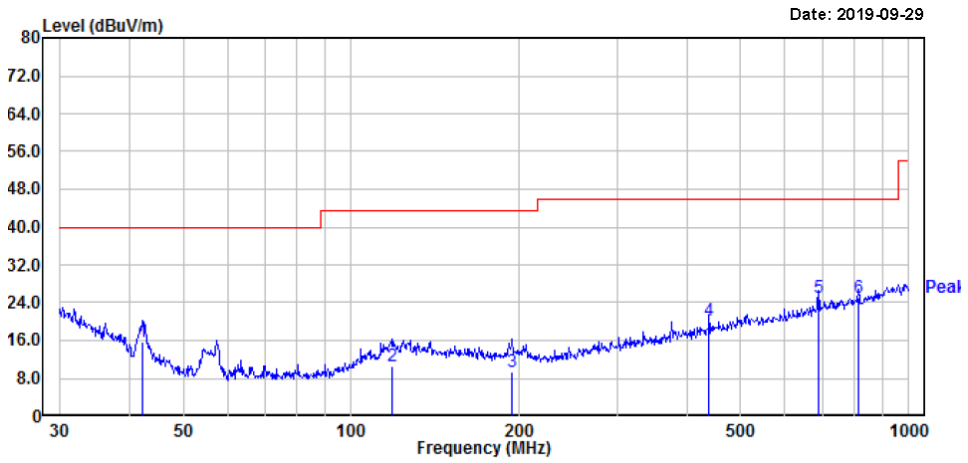
The worst case low channel of BLE(Chip model: 8752CJF) & low channel (8DPSK mode)of BT3.0(Chip model:RTL8763BF) transmitting simultaneously in X-axis of orientation was recorded :

Horizontal:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	42.30	22.80	-12.71	10.09	40.00	-29.91	100	4	QP
2	115.73	21.40	-11.49	9.91	43.50	-33.59	200	180	QP
3	197.89	21.21	-11.77	9.44	43.50	-34.06	100	32	QP
4	438.66	20.61	-6.85	13.76	46.00	-32.24	200	4	QP
5	593.05	20.40	-4.09	16.31	46.00	-29.69	200	279	QP
6	739.66	20.09	-1.51	18.58	46.00	-27.42	100	324	QP

Vertical:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	42.15	28.19	-12.62	15.57	40.00	-24.43	100	274	QP
2	118.19	21.59	-11.00	10.59	43.50	-32.91	200	356	QP
3	194.45	21.40	-11.99	9.41	43.50	-34.09	100	200	QP
4	438.66	27.01	-6.85	20.16	46.00	-25.84	100	311	QP
5	689.57	27.40	-2.28	25.12	46.00	-20.88	100	311	QP
6	813.11	25.70	-0.57	25.13	46.00	-20.87	100	268	QP

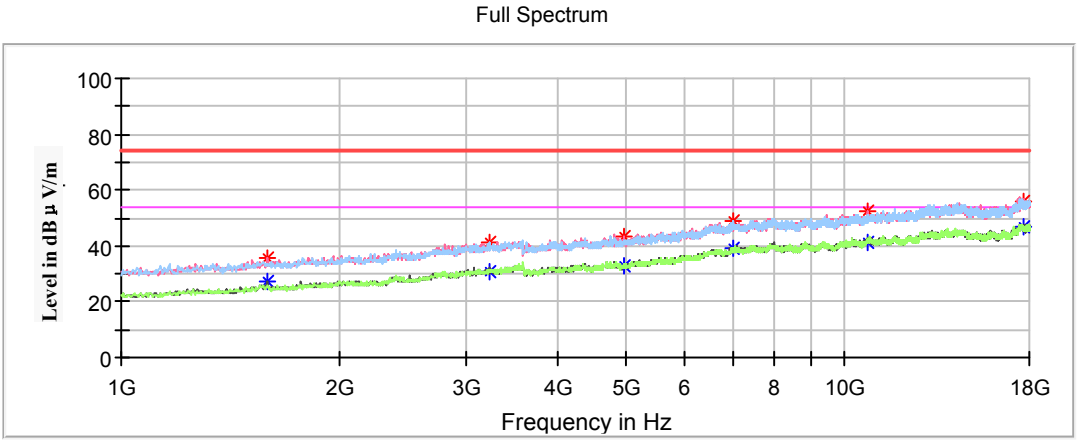
Chip 1: 8752CJF(1Mbit/s)

1GHz-18GHz

*(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded.)*

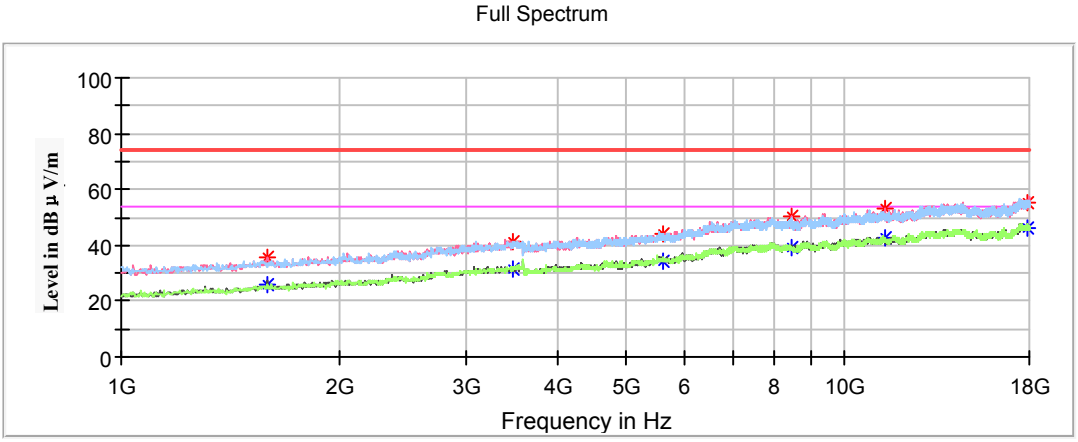
Note:
1. This test was performed with the 2.4 - 2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) - Amplifier Factor (dB)
   Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) - Corrected Amplitude (dBμV /m)

Low Channel: 2402MHz



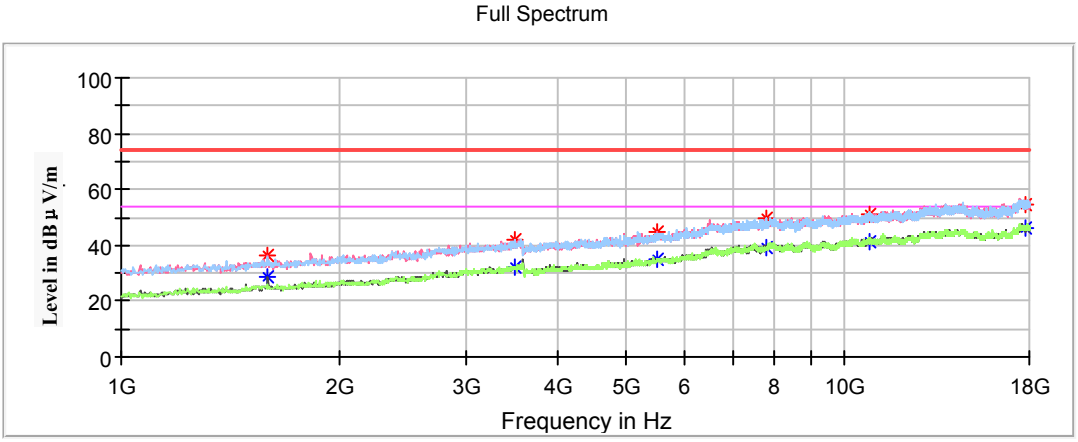
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1591.600000	---	27.32	150.0	V	185.0	-9.6	54.00	26.68
1591.600000	35.62	---	150.0	V	185.0	-9.6	74.00	38.38
3227.000000	---	30.66	200.0	H	215.0	-4.0	54.00	23.34
3227.000000	41.04	---	200.0	H	215.0	-4.0	74.00	32.96
4961.000000	---	32.83	200.0	V	115.0	-0.3	54.00	21.17
4961.000000	43.11	---	200.0	V	115.0	-0.3	74.00	30.89
7011.200000	---	38.92	200.0	H	286.0	5.4	54.00	15.08
7011.200000	49.21	---	200.0	H	286.0	5.4	74.00	24.79
10781.800000	---	41.45	150.0	V	349.0	9.4	54.00	12.55
10781.800000	52.50	---	150.0	V	349.0	9.4	74.00	21.50
17677.000000	---	46.75	200.0	H	4.0	14.0	54.00	7.25
17677.000000	56.07	---	200.0	H	4.0	14.0	74.00	17.93

Middle Channel: 2440MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1595.000000	---	26.13	200.0	V	76.0	-9.6	54.00	27.87
1595.000000	35.62	---	200.0	V	76.0	-9.6	74.00	38.38
3478.600000	---	31.30	150.0	H	263.0	-3.6	54.00	22.70
3478.600000	40.99	---	150.0	H	263.0	-3.6	74.00	33.01
5607.000000	---	34.13	200.0	H	62.0	1.6	54.00	19.87
5607.000000	43.80	---	200.0	H	62.0	1.6	74.00	30.20
8446.000000	---	38.99	200.0	V	0.0	6.3	54.00	15.01
8446.000000	50.01	---	200.0	V	0.0	6.3	74.00	23.99
11370.000000	---	42.57	150.0	V	230.0	9.8	54.00	11.43
11370.000000	53.42	---	150.0	V	230.0	9.8	74.00	20.58
17853.800000	---	46.47	200.0	H	125.0	13.7	54.00	7.53
17853.800000	55.46	---	200.0	H	125.0	13.7	74.00	18.54

High Channel: 2480MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1595.000000	---	28.62	200.0	V	193.0	-9.6	54.00	25.38
1595.000000	36.30	---	200.0	V	193.0	-9.6	74.00	37.70
3502.400000	---	31.95	150.0	H	251.0	-3.5	54.00	22.05
3502.400000	42.09	---	150.0	H	251.0	-3.5	74.00	31.91
5515.200000	---	35.00	200.0	V	0.0	1.4	54.00	19.00
5515.200000	44.90	---	200.0	V	0.0	1.4	74.00	29.10
7810.200000	---	39.10	200.0	H	0.0	6.7	54.00	14.90
7810.200000	49.70	---	200.0	H	0.0	6.7	74.00	24.30
10819.200000	---	41.56	200.0	V	193.0	9.5	54.00	12.44
10819.200000	51.26	---	200.0	V	193.0	9.5	74.00	22.74
17734.800000	---	45.81	150.0	H	254.0	13.9	54.00	8.19
17734.800000	54.76	---	150.0	H	254.0	13.9	74.00	19.24

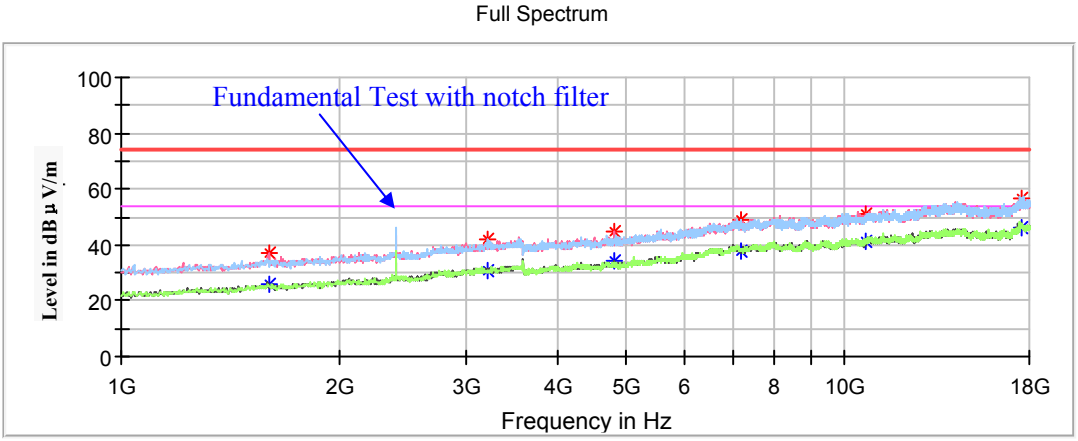
Chip 2: RTL8763BF(1Mbit/s)

1GHz-18GHz

*(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded.)*

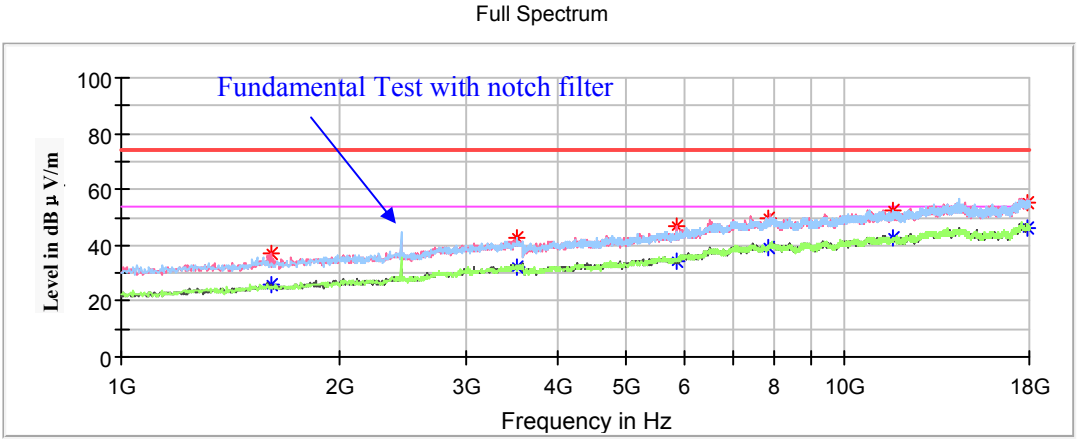
Note:
1. This test was performed with the 2.4 - 2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) - Amplifier Factor (dB)
   Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) - Corrected Amplitude (dBμV /m)

Low Channel: 2402MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1598.400000	---	25.68	200.0	V	90.0	-9.6	54.00	28.32
1598.400000	37.31	---	200.0	V	90.0	-9.6	74.00	36.69
3210.000000	---	30.85	150.0	H	28.0	-4.0	54.00	23.15
3210.000000	41.63	---	150.0	H	28.0	-4.0	74.00	32.37
4804.000000	---	34.08	200.0	V	245.0	-0.6	54.00	19.92
4804.000000	44.70	---	200.0	V	245.0	-0.6	74.00	29.30
7206.000000	---	37.73	200.0	H	36.0	5.6	54.00	16.27
7206.000000	48.78	---	200.0	H	36.0	5.6	74.00	25.22
10662.800000	---	41.01	200.0	V	306.0	9.2	54.00	12.99
10662.800000	50.86	---	200.0	V	306.0	9.2	74.00	23.14
17598.800000	---	45.99	200.0	V	102.0	14.1	54.00	8.01
17598.800000	56.91	---	200.0	V	102.0	14.1	74.00	17.09

Middle Channel: 2440MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1608.600000	---	25.85	200.0	V	92.0	-9.6	54.00	28.15
1608.600000	36.80	---	200.0	V	92.0	-9.6	74.00	37.20
3522.800000	---	32.21	150.0	H	343.0	-3.5	54.00	21.79
3522.800000	43.00	---	150.0	H	343.0	-3.5	74.00	31.00
5862.000000	---	34.42	200.0	V	318.0	2.0	54.00	19.58
5862.000000	46.91	---	200.0	V	318.0	2.0	74.00	27.09
7854.400000	---	39.34	150.0	V	67.0	6.8	54.00	14.66
7854.400000	49.63	---	150.0	V	67.0	6.8	74.00	24.37
11662.400000	---	42.82	150.0	H	28.0	9.9	54.00	11.18
11662.400000	52.62	---	150.0	H	28.0	9.9	74.00	21.38
17847.000000	---	46.25	150.0	H	186.0	13.7	54.00	7.75
17847.000000	55.13	---	150.0	H	186.0	13.7	74.00	18.87

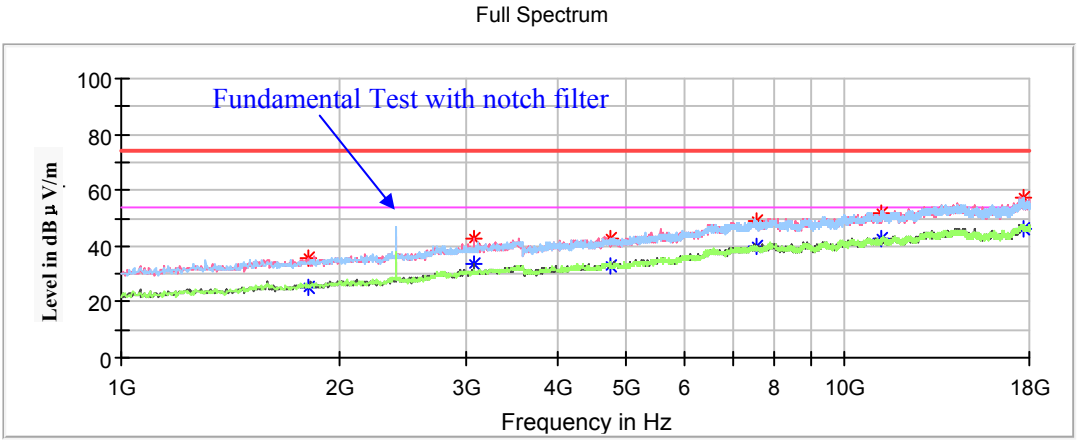
Chip 2: RTL8763BF(2Mbit/s)

1GHz-18GHz

*(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded.)*

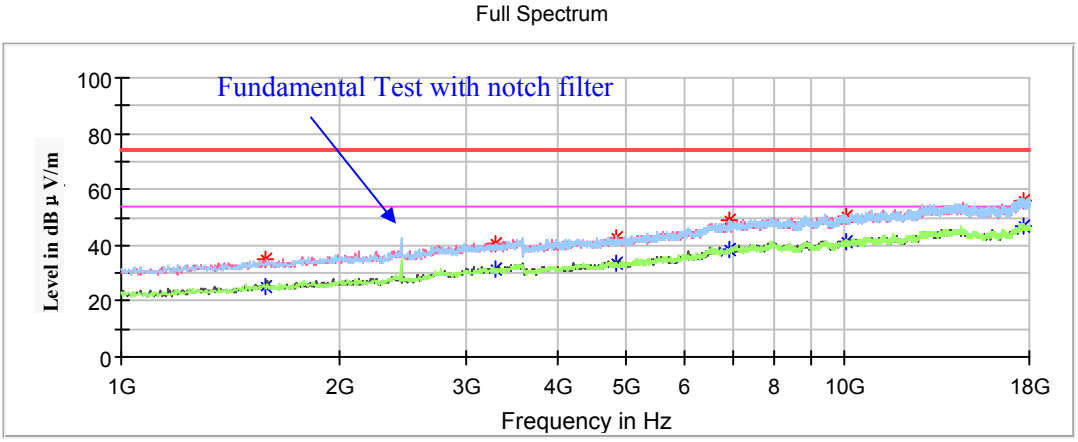
Note:
1. This test was performed with the 2.4 - 2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) - Amplifier Factor (dB)
   Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) - Corrected Amplitude (dBμV /m)

Low Channel: 2402MHz



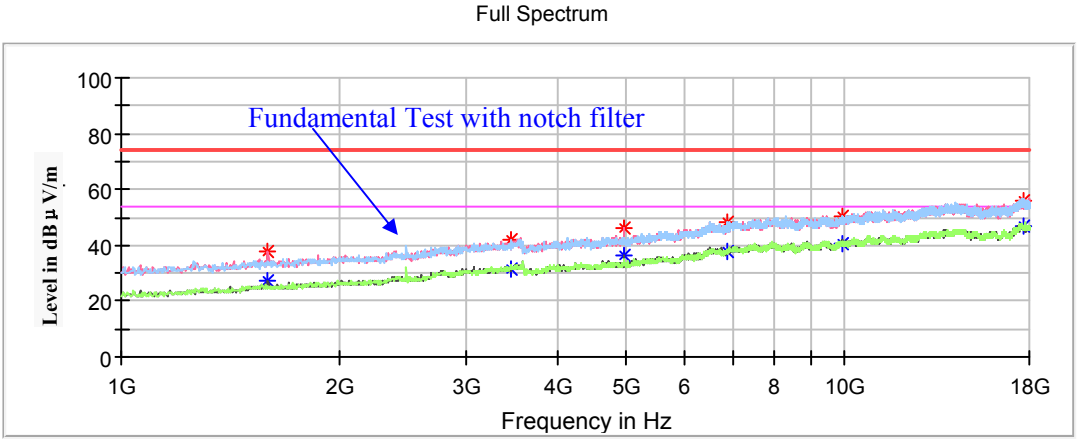
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1819.400000	---	24.97	150.0	V	1.0	-8.9	54.00	29.03
1819.400000	35.90	---	150.0	V	1.0	-8.9	74.00	38.10
3070.600000	---	33.81	200.0	V	295.0	-4.3	54.00	20.19
3070.600000	42.42	---	200.0	V	295.0	-4.3	74.00	31.58
4804.000000	---	32.81	200.0	H	221.0	-0.6	54.00	21.19
4804.000000	42.56	---	200.0	H	221.0	-0.6	74.00	31.44
7565.400000	---	40.08	200.0	H	139.0	6.3	54.00	13.92
7565.400000	48.93	---	200.0	H	139.0	6.3	74.00	25.07
11257.800000	---	43.00	200.0	V	354.0	9.8	54.00	11.00
11257.800000	51.55	---	200.0	V	354.0	9.8	74.00	22.45
17697.400000	---	46.20	150.0	H	76.0	14.0	54.00	7.80
17697.400000	57.06	---	150.0	H	76.0	14.0	74.00	16.94

Middle Channel: 2440MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1584.800000	---	25.27	200.0	V	182.0	-9.6	54.00	28.73
1584.800000	35.13	---	200.0	V	182.0	-9.6	74.00	38.87
3298.400000	---	31.21	200.0	H	31.0	-3.9	54.00	22.79
3298.400000	40.35	---	200.0	H	31.0	-3.9	74.00	33.65
4880.000000	---	33.34	150.0	V	323.0	-0.5	54.00	20.66
4880.000000	43.01	---	150.0	V	323.0	-0.5	74.00	30.99
6946.600000	---	38.52	200.0	H	197.0	5.2	54.00	15.48
6946.600000	48.85	---	200.0	H	197.0	5.2	74.00	25.15
10044.000000	---	40.92	150.0	V	0.0	8.3	54.00	13.08
10044.000000	50.51	---	150.0	V	0.0	8.3	74.00	23.49
17704.200000	---	46.77	200.0	H	220.0	14.0	54.00	7.23
17704.200000	55.93	---	200.0	H	220.0	14.0	74.00	18.07

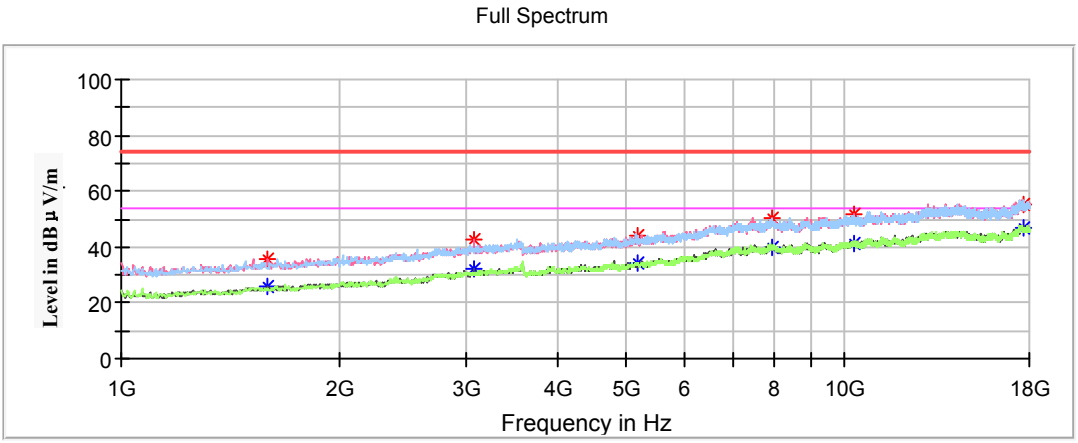
High Channel: 2480MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1595.000000	---	27.13	200.0	V	97.0	-9.6	54.00	26.87
1595.000000	37.87	---	200.0	V	97.0	-9.6	74.00	36.13
3465.000000	---	31.18	200.0	H	116.0	-3.6	54.00	22.82
3465.000000	41.82	---	200.0	H	116.0	-3.6	74.00	32.18
4960.000000	---	36.49	150.0	V	231.0	-0.3	54.00	17.51
4960.000000	46.25	---	150.0	V	231.0	-0.3	74.00	27.75
6868.400000	---	37.62	200.0	H	303.0	5.1	54.00	16.38
6868.400000	47.95	---	200.0	H	303.0	5.1	74.00	26.05
9904.600000	---	40.68	150.0	V	196.0	8.1	54.00	13.32
9904.600000	50.29	---	150.0	V	196.0	8.1	74.00	23.71
17677.000000	---	46.94	150.0	H	199.0	14.0	54.00	7.06
17677.000000	56.00	---	150.0	H	199.0	14.0	74.00	18.00

1GHz-18GHz:

The worst case low channel of BLE(Chip model: 8752CJF) & low channel (8DPSK mode)of BT3.0(Chip model:RTL8763BF) transmitting simultaneously in X-axis of orientation *was recorded* ***:***



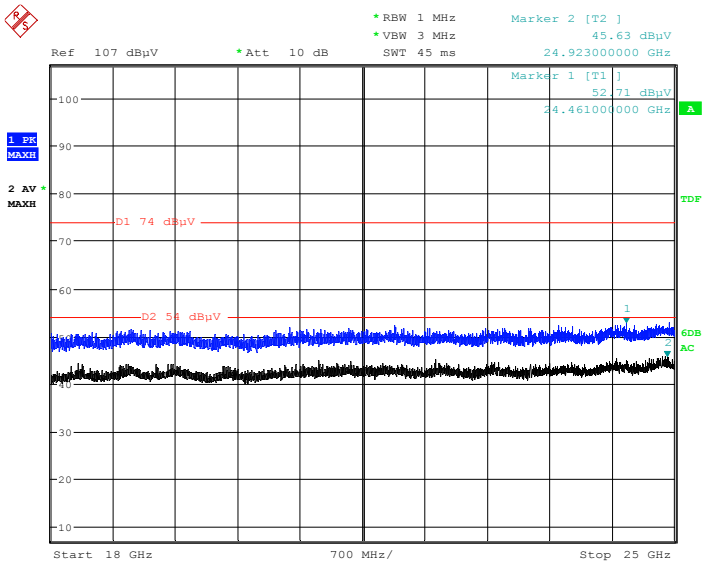
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1595.000000	---	26.16	200.0	V	186.0	-9.6	54.00	27.84
1595.000000	35.80	---	200.0	V	186.0	-9.6	74.00	38.20
3070.600000	---	32.51	200.0	V	293.0	-4.3	54.00	21.49
3070.600000	42.33	---	200.0	V	293.0	-4.3	74.00	31.67
5171.800000	---	33.96	150.0	H	18.0	0.3	54.00	20.04
5171.800000	43.83	---	150.0	H	18.0	0.3	74.00	30.17
7915.600000	---	39.74	150.0	H	324.0	6.9	54.00	14.26
7915.600000	50.24	---	150.0	H	324.0	6.9	74.00	23.76
10292.200000	---	41.18	200.0	V	1.0	8.7	54.00	12.82
10292.200000	51.42	---	200.0	V	1.0	8.7	74.00	22.58
17629.400000	---	46.66	200.0	H	301.0	14.1	54.00	7.34
17629.400000	55.48	---	200.0	H	301.0	14.1	74.00	18.52

Chip 1: 8752CJF(1Mbit/s)

18GHz - 25GHz

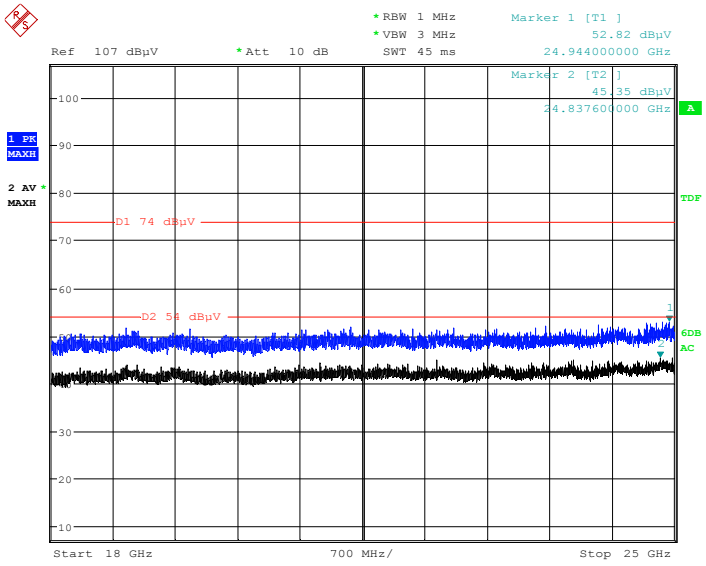
*(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **low channel of operation in X-axis of orientation** was recorded)*

Horizontal



Date: 26.SEP.2019 22:39:14

Vertical



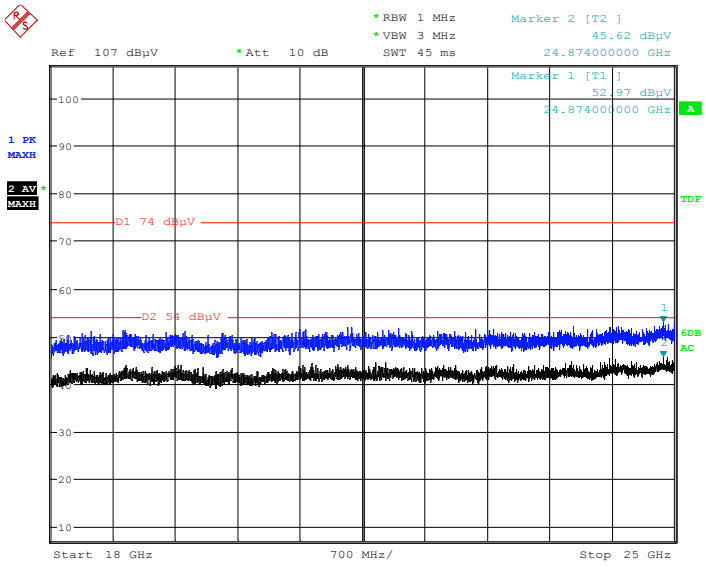
Date: 26.SEP.2019 21:01:06

Chip 2:RTL8763BF(1Mbit/s)

18GHz - 25GHz

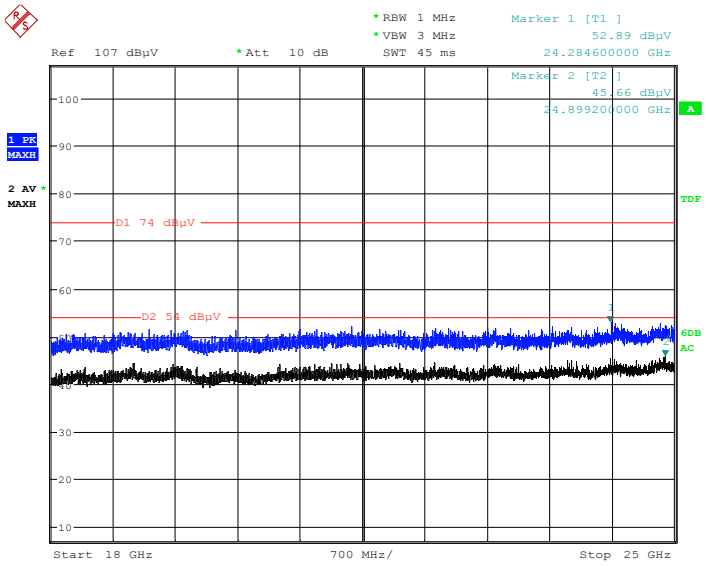
*(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **low channel of operation in X-axis of orientation** was recorded)*

Horizontal



Date: 26.SEP.2019 21:01:29

Vertical



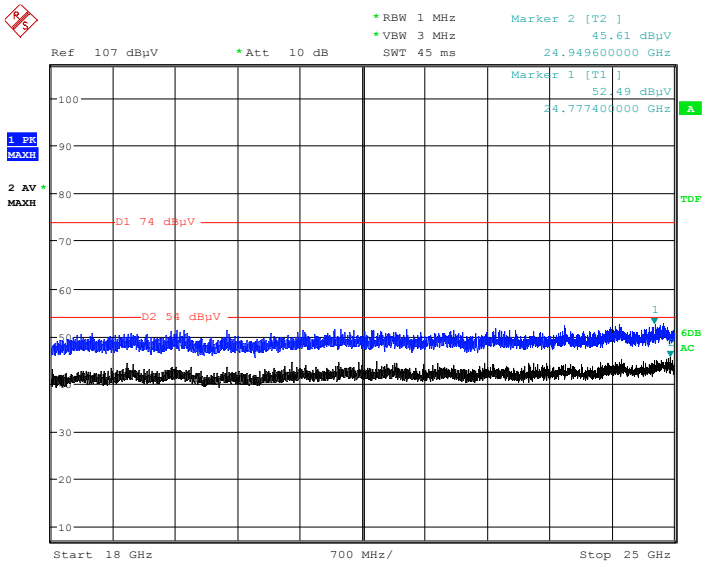
Date: 26.SEP.2019 21:01:56

Chip 2:RTL8763BF(2Mbit/s)

18GHz - 25GHz

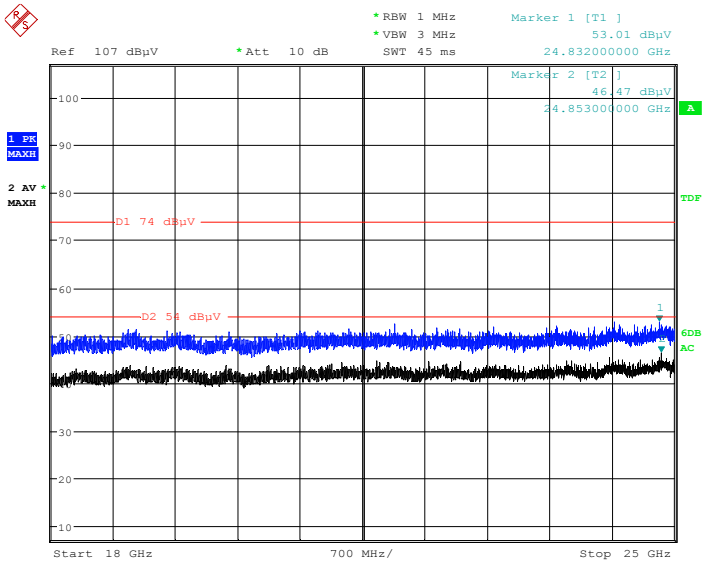
*(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **low channel of operation in X-axis of orientation** was recorded)*

Horizontal



Date: 26.SEP.2019 21:20:26

Vertical

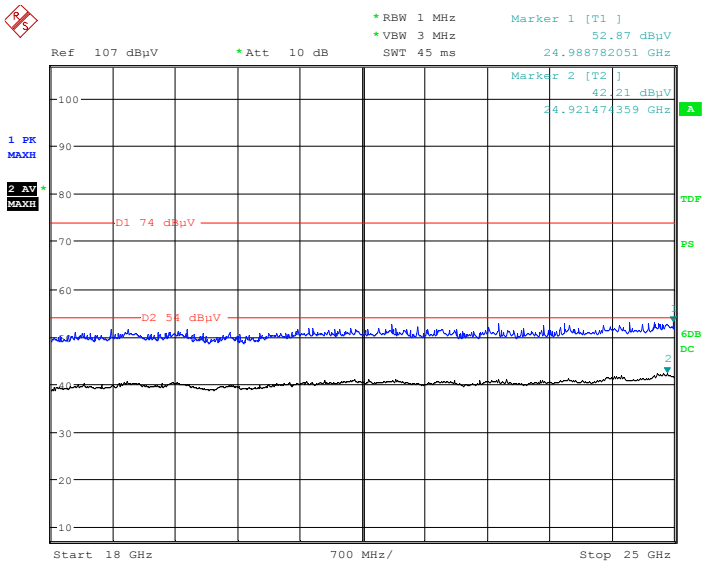


Date: 26.SEP.2019 21:30:51

18GHz - 25GHz

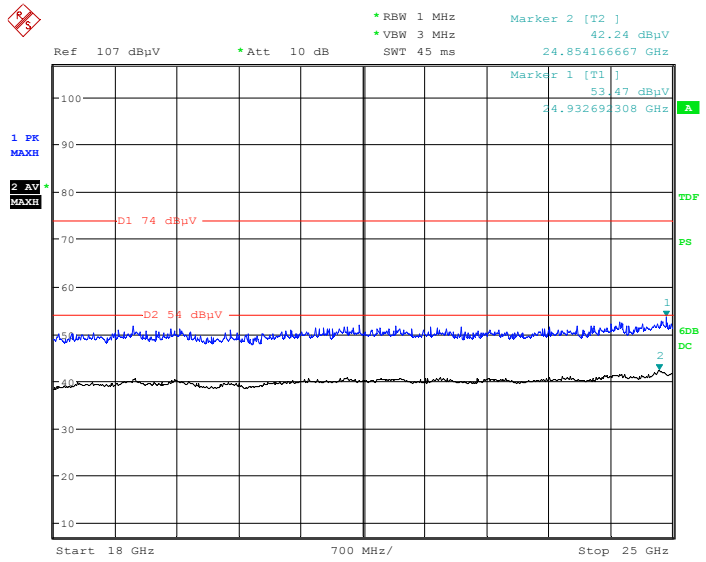
The worst case low channel of BLE(Chip model: 8752CJF) & low channel(8DPSKmode) of BT3.0(Chip model:RTL8763BF) transmitting simultaneously in X-axis of orientation was recorded :

Horizontal



Date: 29.SEP.2019 11:38:08

Vertical



Date: 29.SEP.2019 12:39:18

Restricted Bands Emissions Test:

*(Pre-scan in the X, Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded.)*

Note:
1. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) - Amplifier Factor (dB)
   Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) - Corrected Amplitude (dBμV /m)

Chip 1: 8752CJF(1Mbit/s)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 2402MHz								
2390.00	---	35.59	200.0	H	112.0	2.8	54.00	18.41
2390.00	44.85	---	200.0	H	112.0	2.8	74.00	29.15
2390.00	---	36.91	150.0	V	151.0	2.8	54.00	17.09
2390.00	45.73	---	150.0	V	151.0	2.8	74.00	28.27
High Channel: 2480MHz								
2483.50	---	36.19	200.0	H	303.0	3.0	54.00	17.81
2483.50	46.09	---	200.0	H	303.0	3.0	74.00	27.91
2483.50	---	37.26	200.0	V	205.0	3.0	54.00	16.74
2483.50	46.83	---	200.0	V	205.0	3.0	74.00	27.17

Chip 2: RTL8763BF(1Mbit/s)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 2402MHz								
2390.00	---	36.32	150.0	H	131.0	2.8	54.00	17.68
2390.00	45.89	---	150.0	H	131.0	2.8	74.00	28.11
2390.00	---	36.91	150.0	V	151.0	2.8	54.00	17.09
2390.00	45.73	---	150.0	V	151.0	2.8	74.00	28.27
High Channel: 2480MHz								
2483.50	---	38.26	200.0	H	244.0	3.0	54.00	15.74
2483.50	47.51	---	200.0	H	244.0	3.0	74.00	26.49
2483.50	---	37.45	200.0	V	205.0	3.0	54.00	16.55
2483.50	46.76	---	200.0	V	205.0	3.0	74.00	27.24

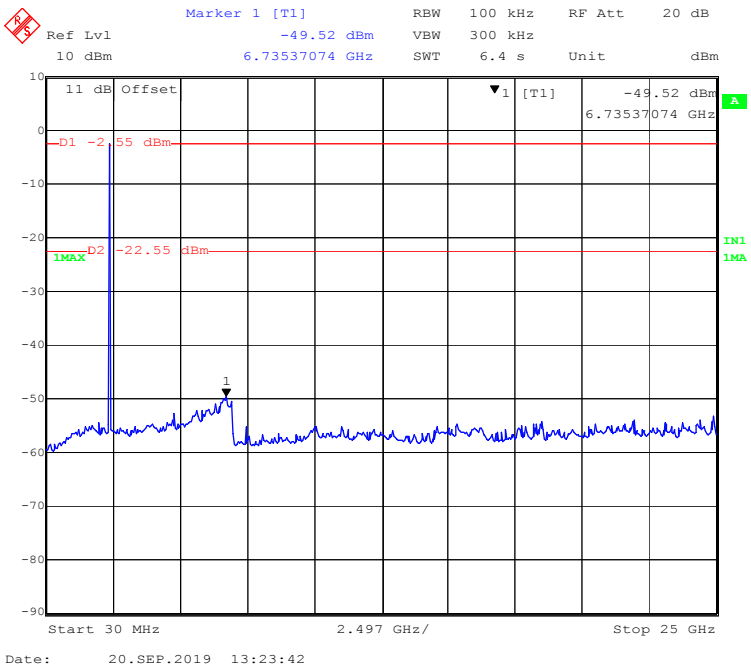
Chip 2: RTL8763BF(2Mbit/s)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 2402MHz								
2390.00	---	36.26	200.0	H	14.0	2.8	54.00	17.74
2390.00	46.64	---	200.0	H	14.0	2.8	74.00	27.36
2390.00	---	36.88	150.0	V	151.0	2.8	54.00	17.12
2390.00	45.63	---	150.0	V	151.0	2.8	74.00	28.37
High Channel: 2480MHz								
2483.50	---	36.82	150.0	H	166.0	3.0	54.00	17.18
2483.50	47.42	---	150.0	H	166.0	3.0	74.00	26.58
2483.50	---	37.54	200.0	V	205.0	3.0	54.00	16.46
2483.50	47.26	---	200.0	V	205.0	3.0	74.00	26.74

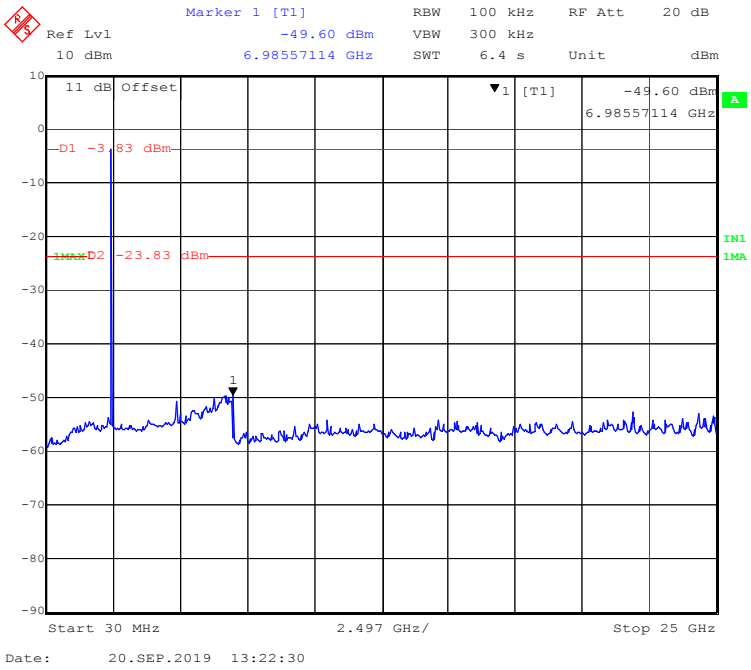
Conducted Spurious Emissions at Antenna Port:

Chip 1: 8752CJF(1Mbit/s)

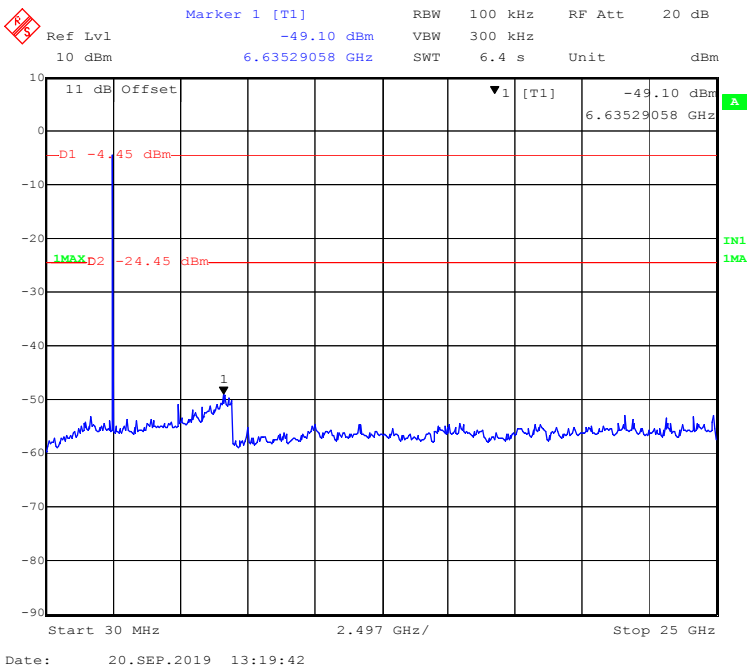
Low Channel



Middle Channel

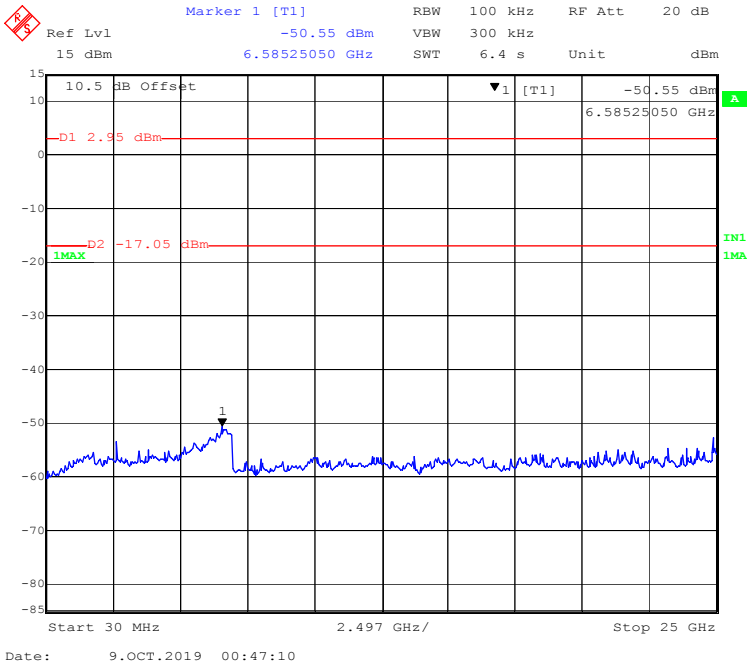


High Channel

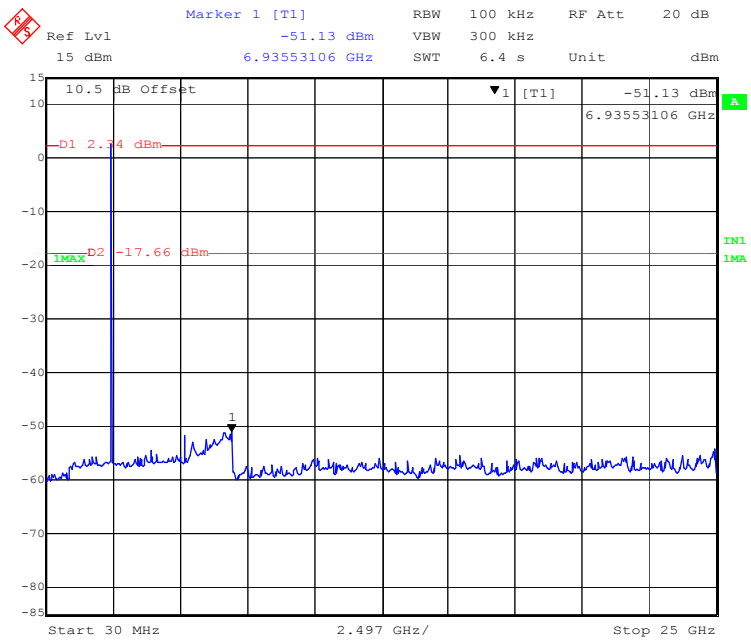


Chip 2: RTL8763BF(1Mbit/s)

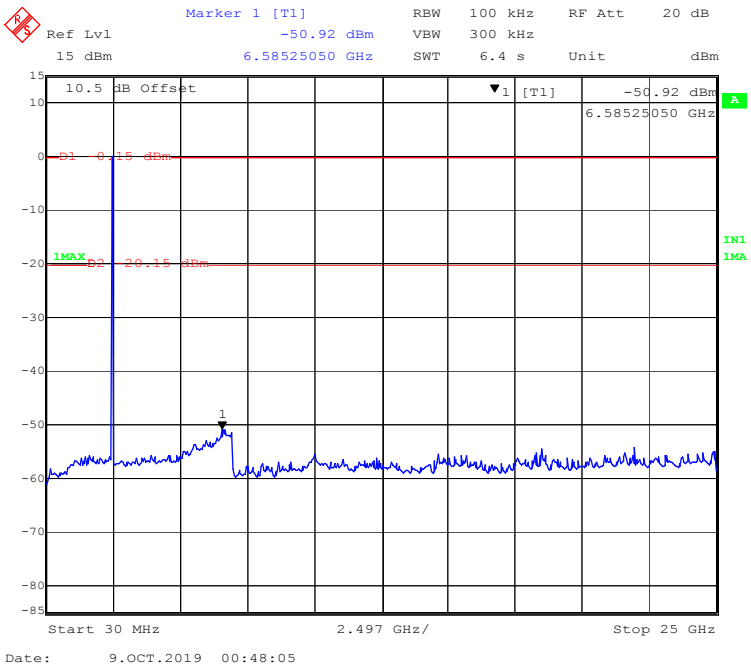
Low Channel



Middle Channel

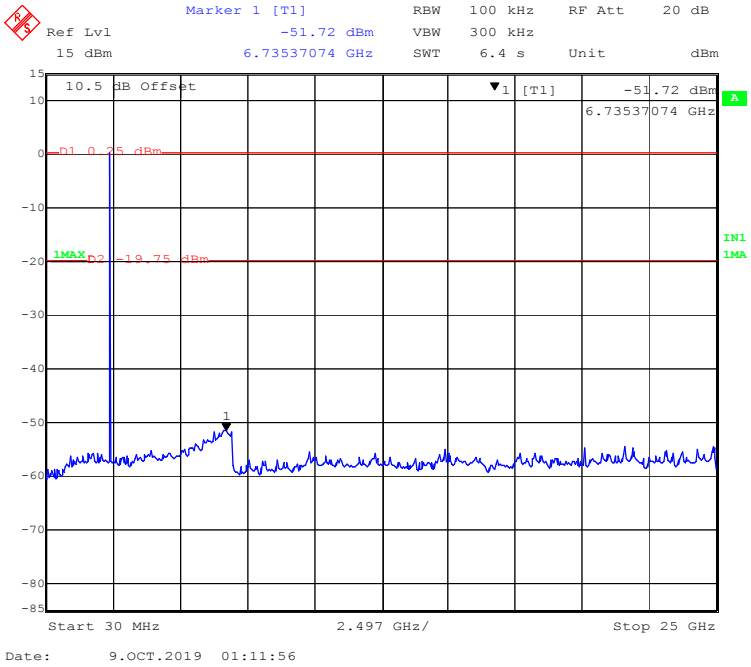


High Channel

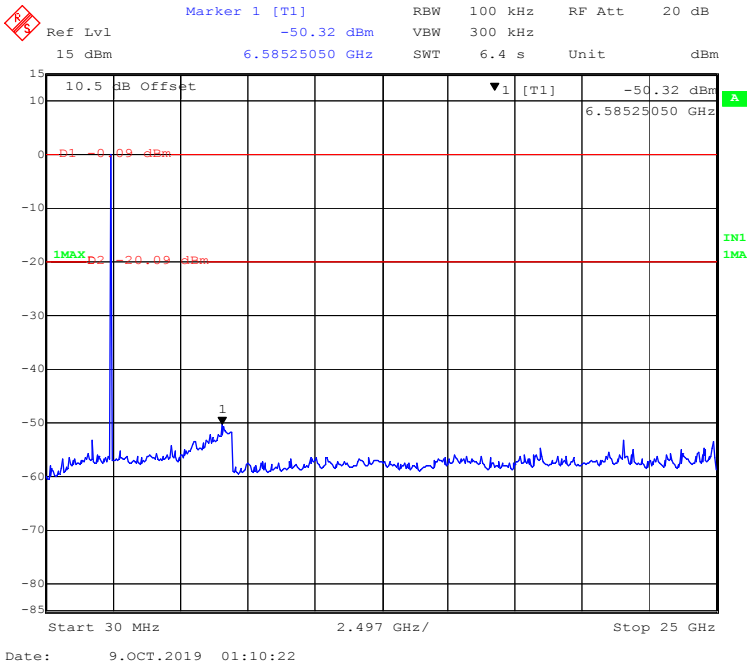


Chip 2: RTL8763BF(2Mbit/s)

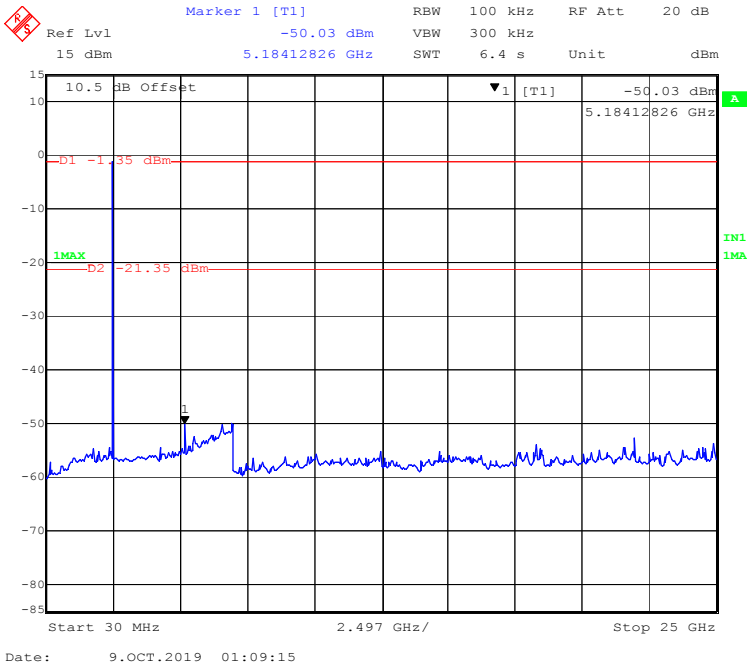
Low Channel



Middle Channel



High Channel



FCC §15.247(a) (2) - 6 dB EMISSION BANDWIDTH

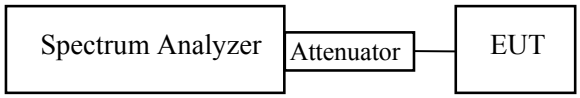
Applicable Standard

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

Test Procedure

According to ANSI C63.10-2013 sub-clause 11.8.1

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to 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.



Test Data

Environmental Conditions

Temperature:	22.3℃~23.3℃
Relative Humidity:	51 %~53 %
ATM Pressure:	101.2 kPa~102.2 kPa

The testing was performed by Jack Jiao from 2019-09-20 to 2019-10-10.

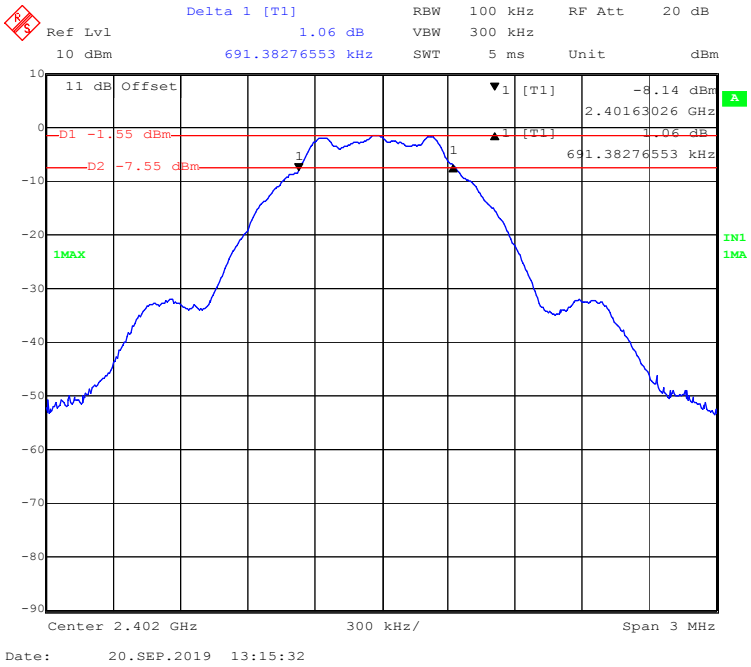
Test Result: Pass.

EUT operation mode: Transmitting

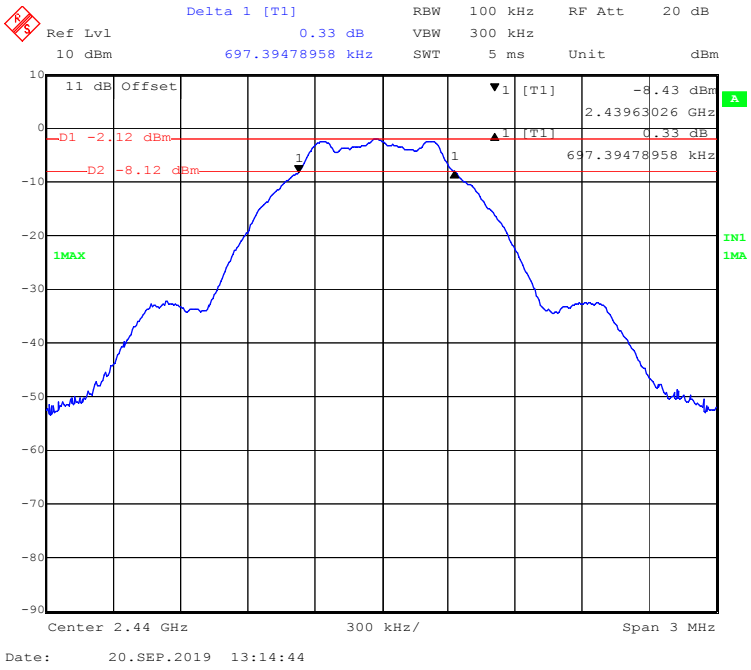
Chip model	Date rate	Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
8752CJF	1Mbit/s	Low	2402	0.691	≥ 0.5
		Middle	2440	0.697	≥ 0.5
		High	2480	0.697	≥ 0.5
RTL8763BF	1Mbit/s	Low	2402	0.703	≥ 0.5
		Middle	2440	0.709	≥ 0.5
		High	2480	0.709	≥ 0.5
	2Mbit/s	Low	2402	1.154	≥ 0.5
		Middle	2440	1.154	≥ 0.5
		High	2480	1.166	≥ 0.5

Chip 1: 8752CJF(1Mbit/s)

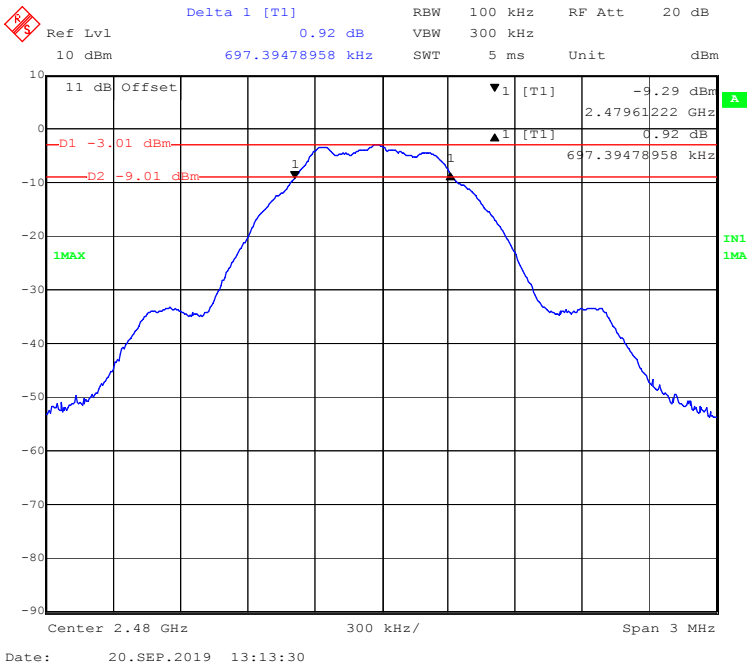
Low Channel



Middle Channel

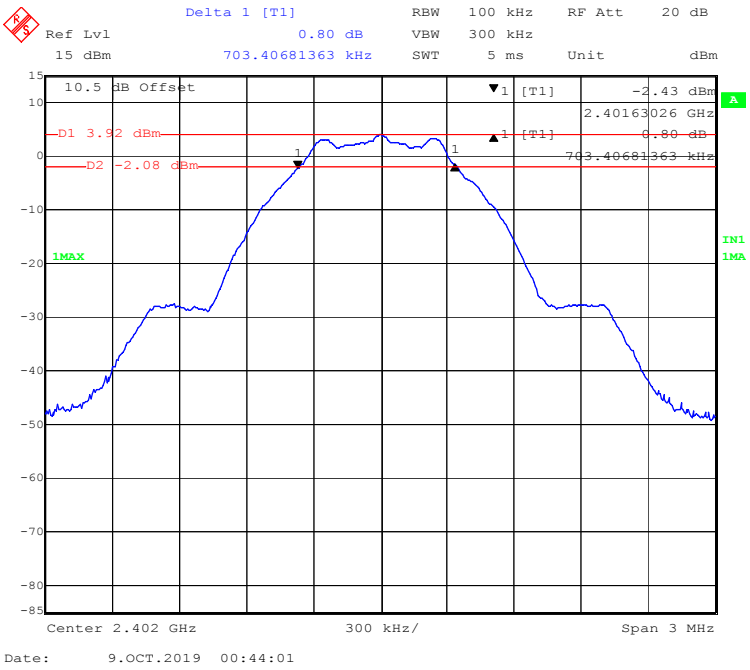


High Channel

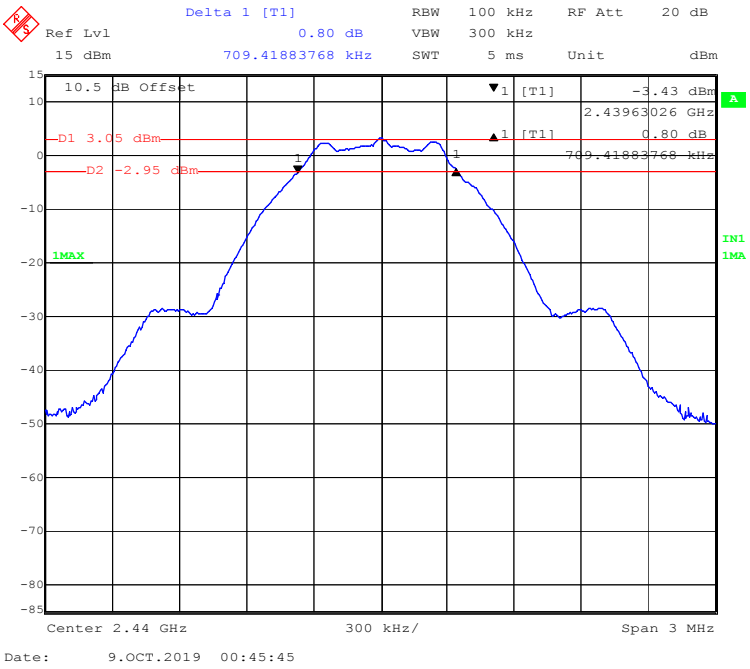


Chip 2: RTL8763BF(1Mbit/s)

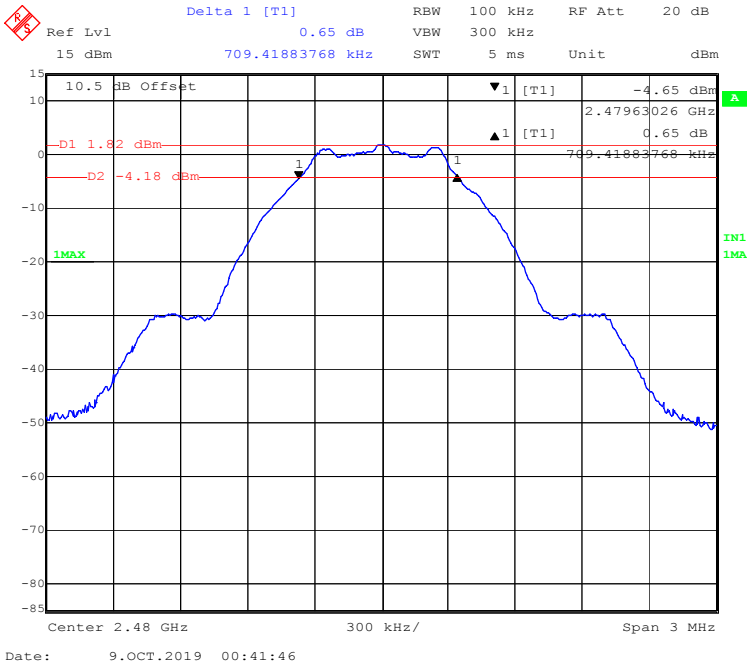
Low Channel



Middle Channel

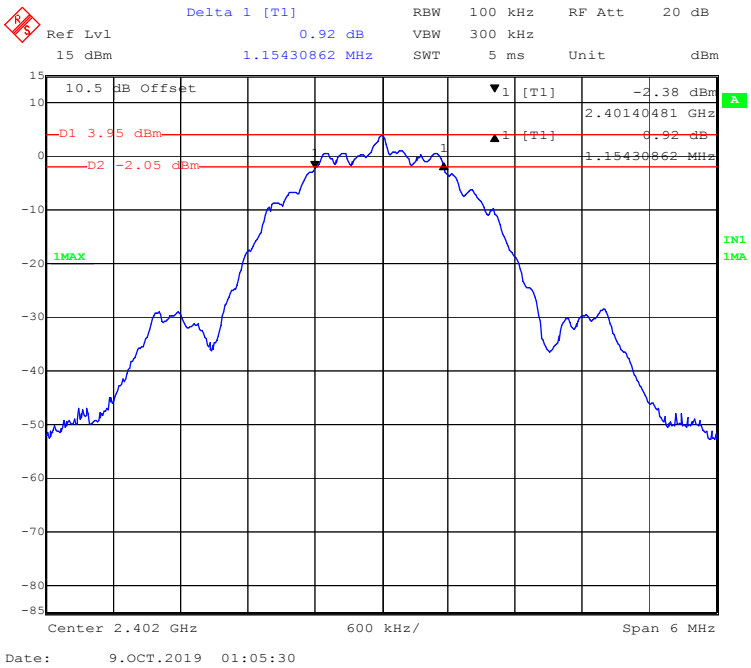


High Channel

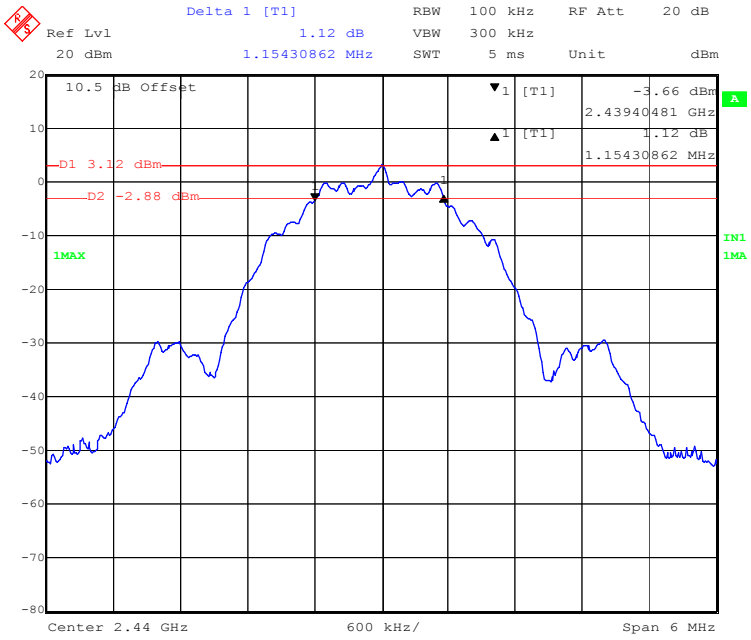


Chip 2: RTL8763BF(2Mbit/s)

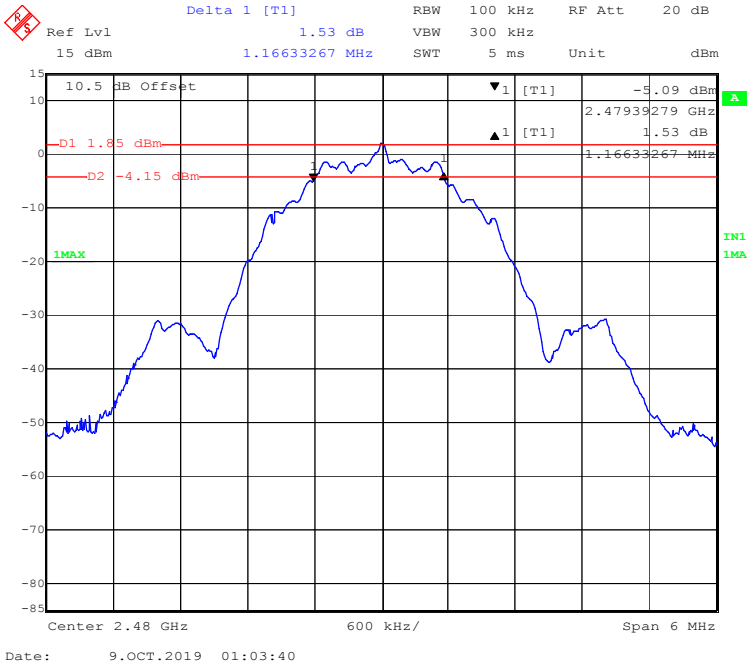
Low Channel



Middle Channel



High Channel



FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

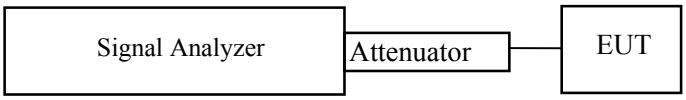
Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

According to ANSI C63.10-2013 sub-clause 11.9.1.1

1. Set the RBW ≥ DTS bandwidth.
2. Set VBW ≥ 3 x RBW.
3. Set span ≥ 3 x 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.



Test Data

Environmental Conditions

Temperature:	24.1℃~24.9℃
Relative Humidity:	50 %~52 %
ATM Pressure:	101.1 kPa~102.1 kPa

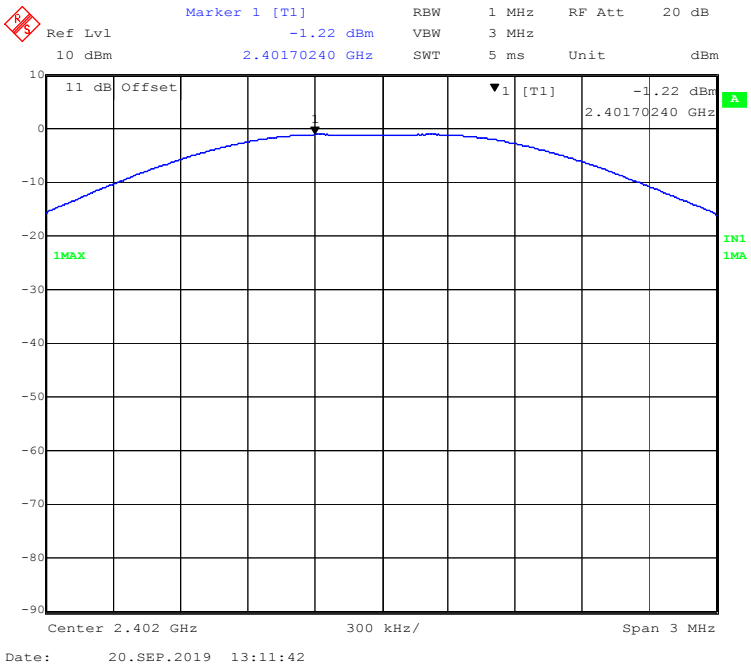
The testing was performed by Jack Jiao from 2019-09-20 to 2019-10-09.

EUT operation mode: Transmitting

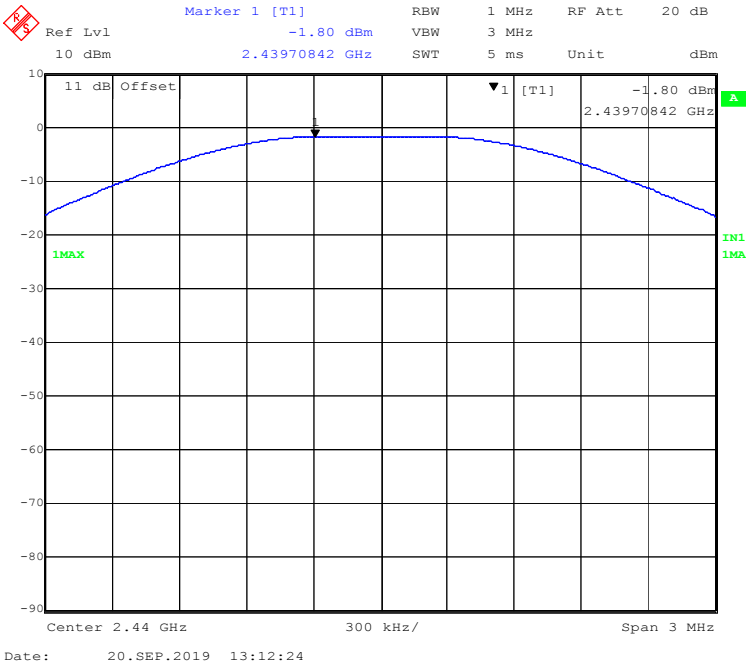
Chip model	Date rate	Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Limit (dBm)	Result
8752CJF	1Mbit/s	Low	2402	-1.22	30	Pass
		Middle	2440	-1.80	30	Pass
		High	2480	-2.72	30	Pass
RTL8763BF	1Mbit/s	Low	2402	4.04	30	Pass
		Middle	2440	3.27	30	Pass
		High	2480	1.98	30	Pass
	2Mbit/s	Low	2402	4.10	30	Pass
		Middle	2440	3.34	30	Pass
		High	2480	2.10	30	Pass

Chip 1: 8752CJF(1Mbit/s)

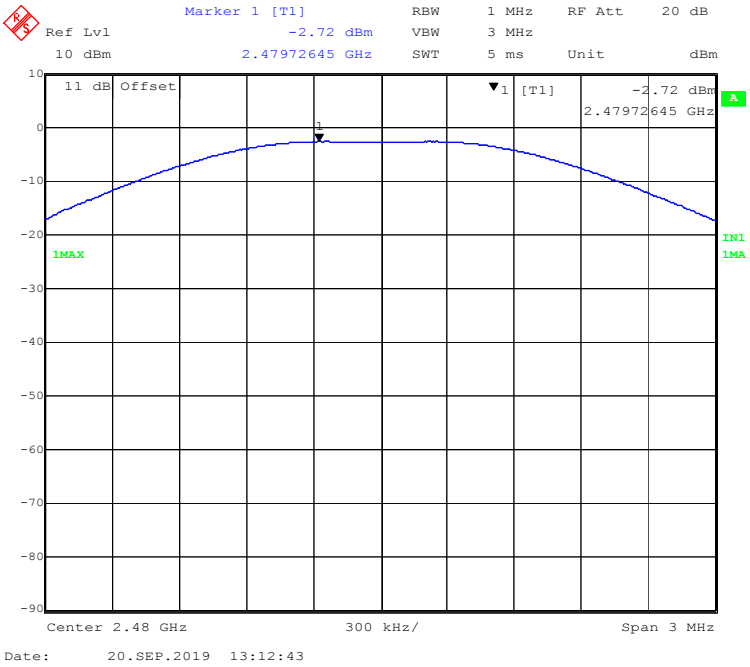
Low Channel



Middle Channel

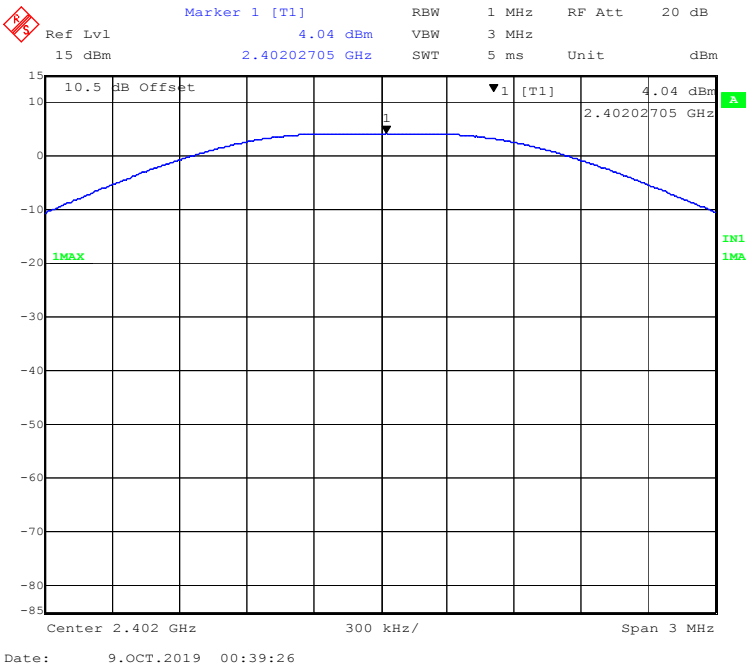


High Channel

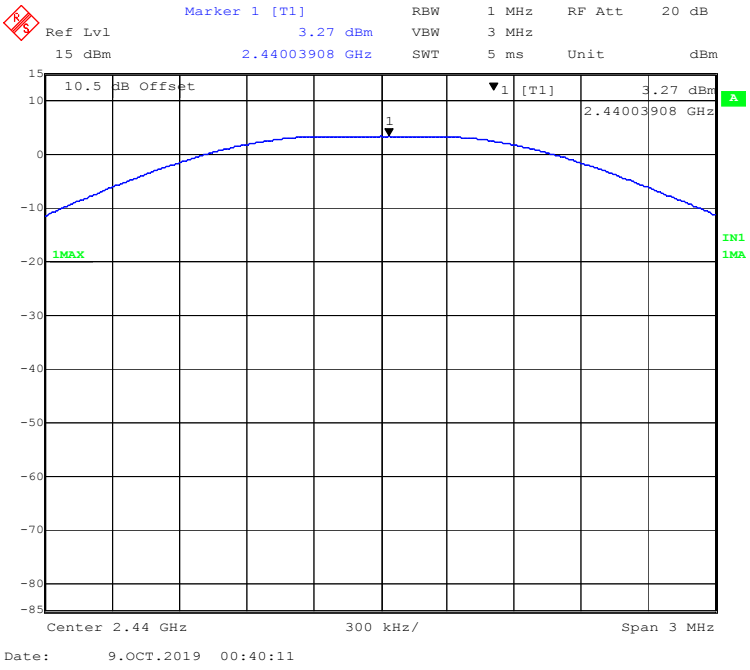


Chip 2: RTL8763BF(1Mbit/s)

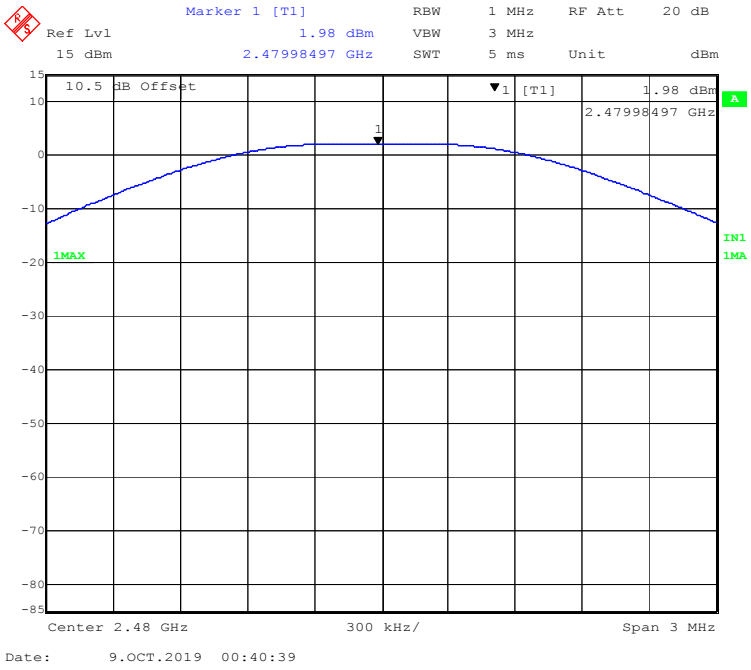
Low Channel



Middle Channel

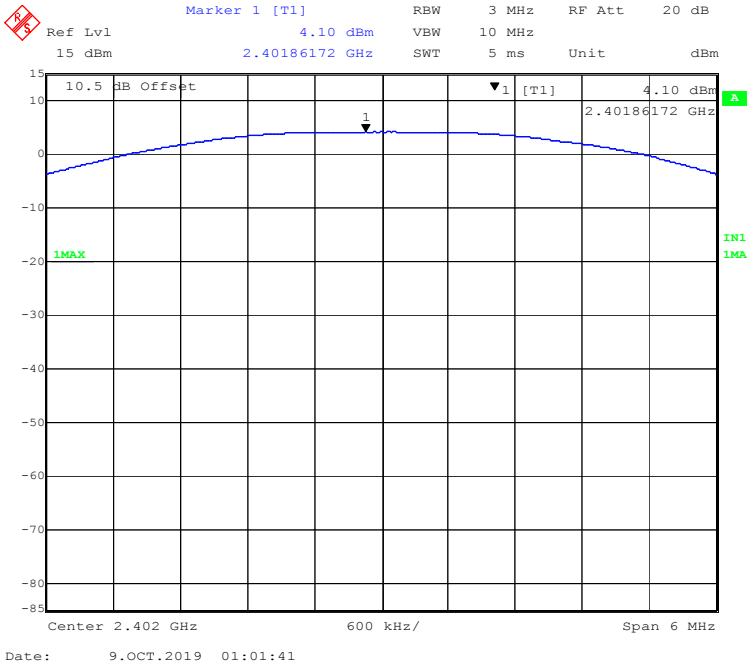


High Channel

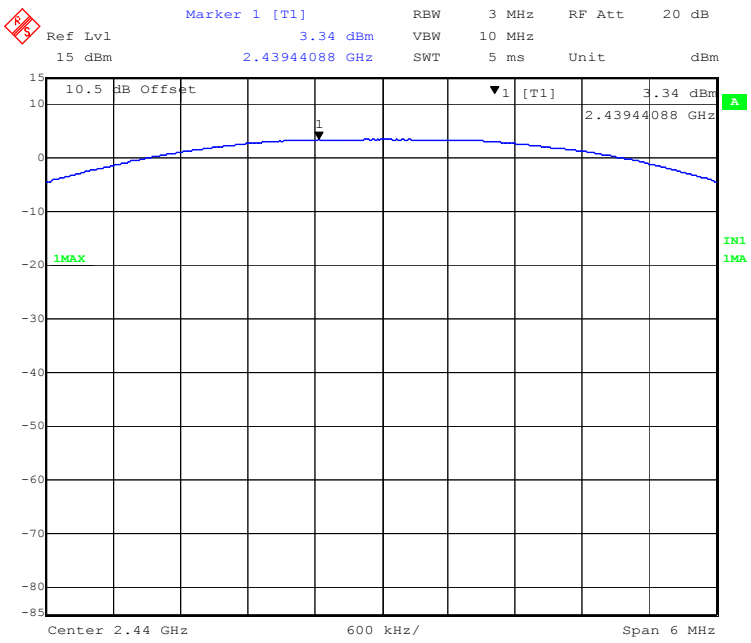


2Mbit/s (Chip 2: RTL8763BF)

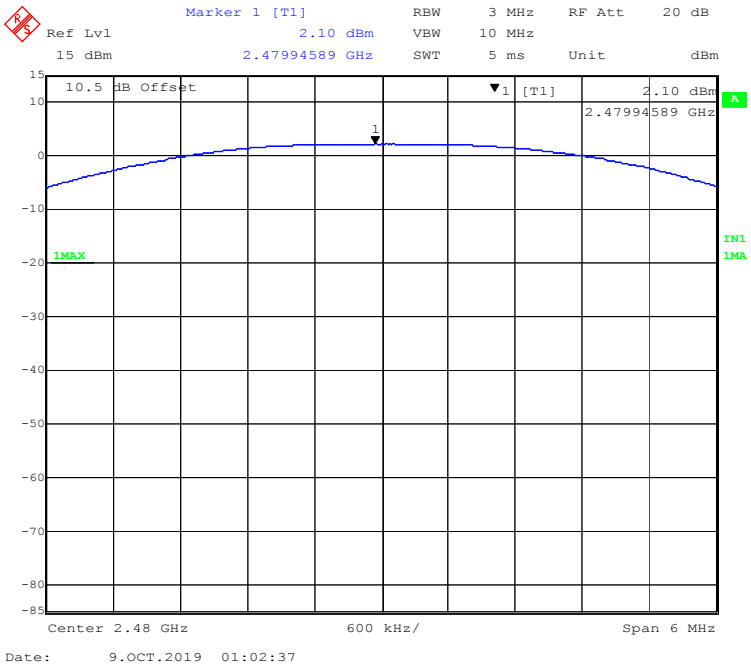
Low Channel



Middle Channel



High Channel



FCC §15.247(d) - BAND EDGE

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

According to ANSI C63.10-2013 sub-clause 6.10.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the middleest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the middleest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Data

Environmental Conditions

Temperature:	23℃~24.1℃
Relative Humidity:	51 %~53 %
ATM Pressure:	101.2 kPa~103.2 kPa

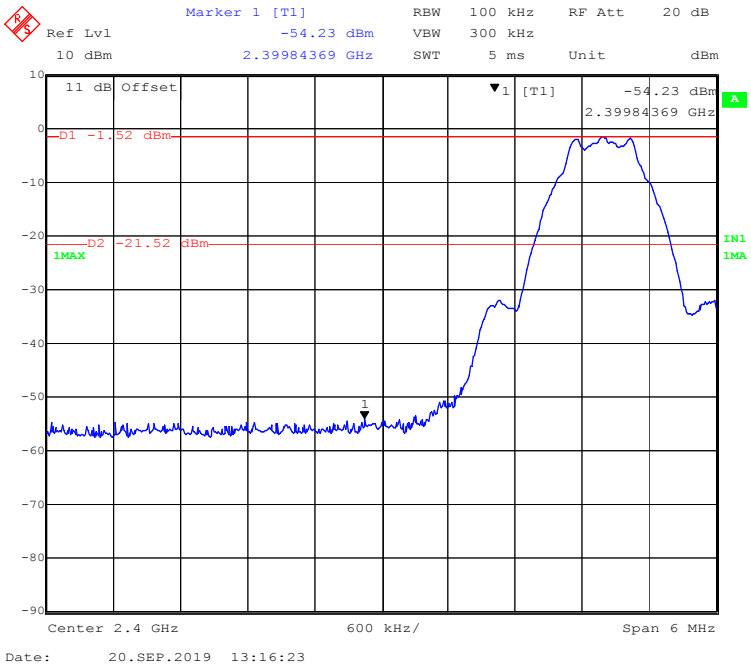
The testing was performed by Jack Jiao from 2019-09-20 to 2019-10-09.

EUT operation mode: Transmitting

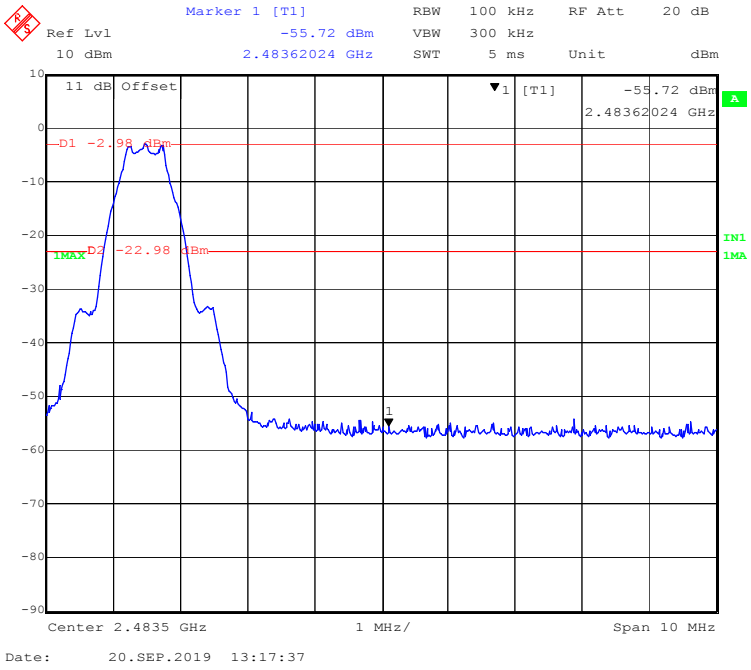
Test Result: Pass

Chip 1: 8752CJF(1Mbit/s)

Left Side

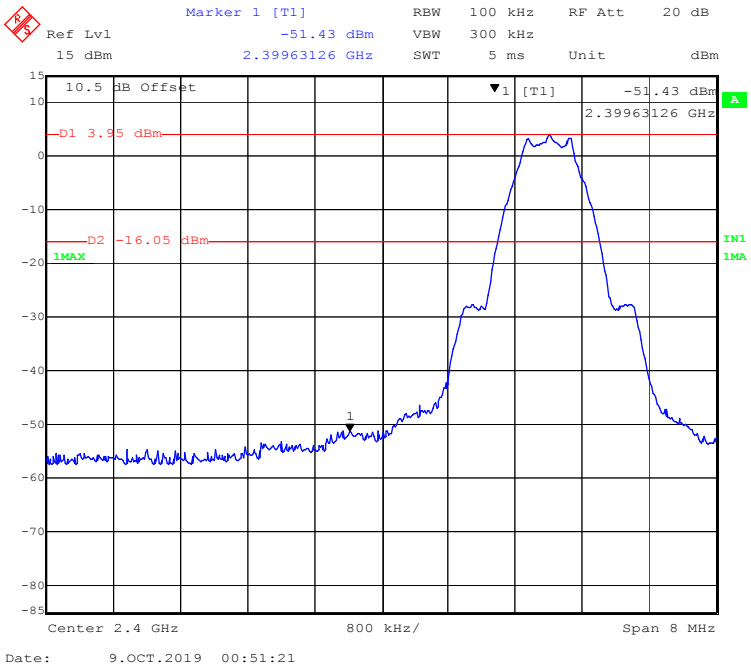


Right Side

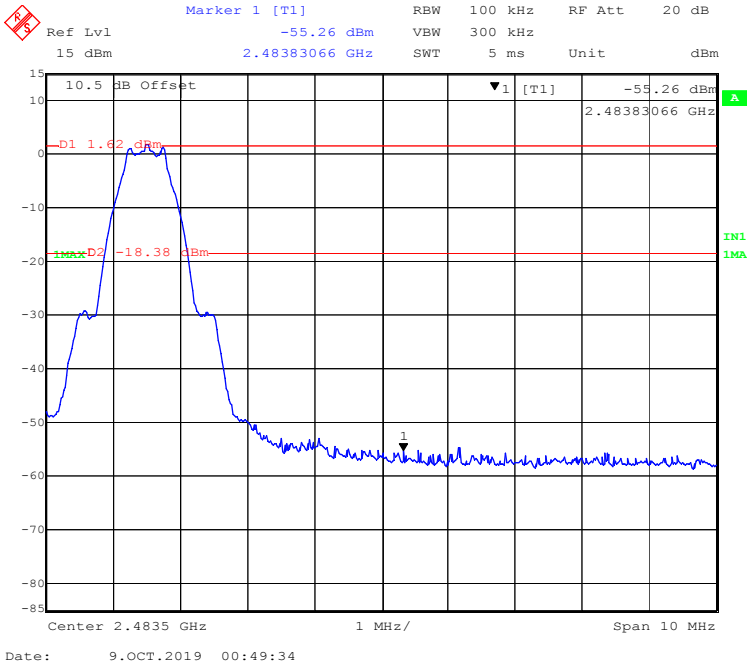


Chip 2:RTL8763BF(1Mbit/s)

Left Side

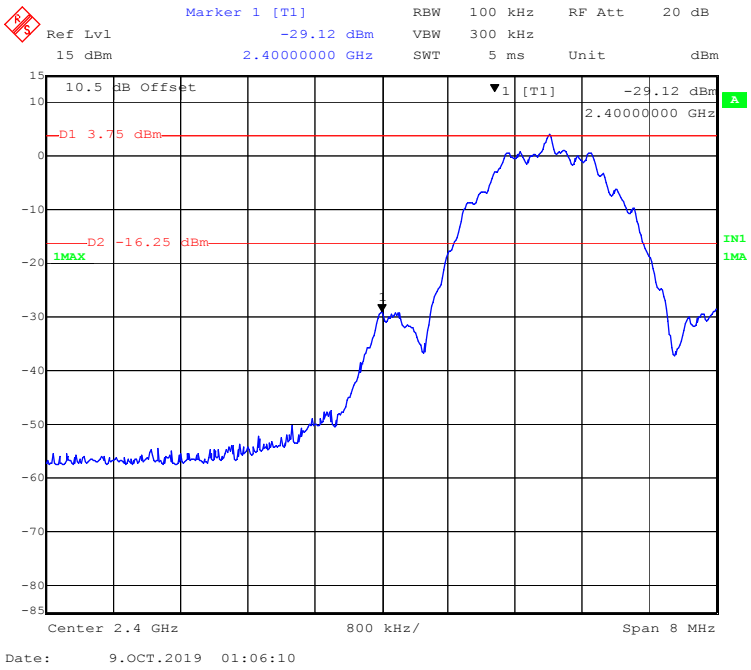


Right Side

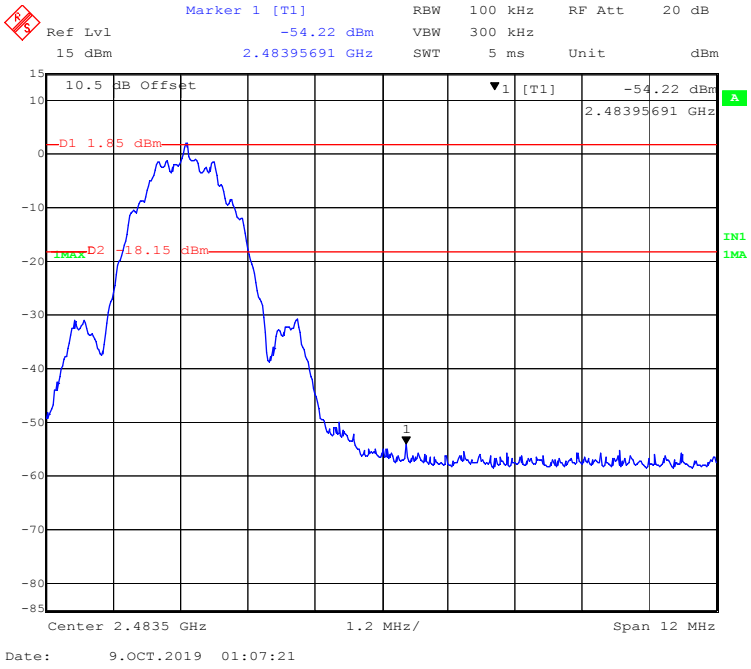


Chip 2:RTL8763BF(2Mbit/s)

Left Side



Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

According to ANSI C63.10-2013 sub-clause 11.10.2

The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:

1. Set the RBW to: 3kHz≤ RBW≤100 kHz.
2. Set the VBW ≥ 3xRBW.
3. Set the span to 1.5 times the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level within the RBW.
9. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Data

Environmental Conditions

Temperature:	23.2℃~24.2℃
Relative Humidity:	51 %~53 %
ATM Pressure:	101.2 kPa~103.2 kPa

The testing was performed by Jack Jiao from 2019-09-20 to 2019-10-09.

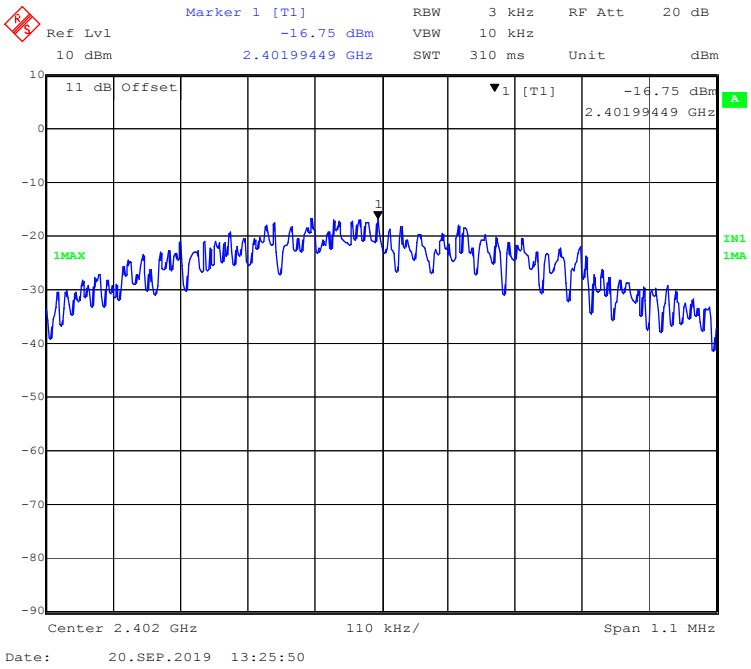
EUT operation mode: Transmitting

Test Result: Pass

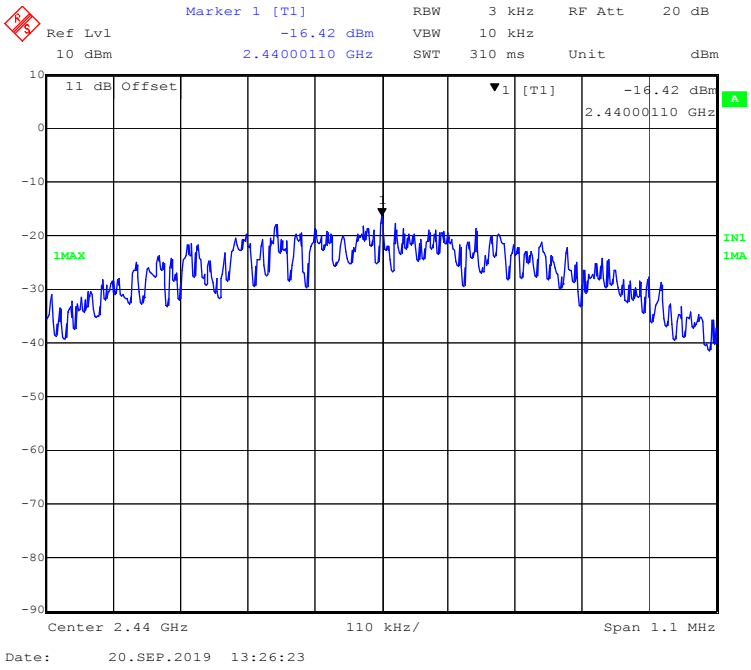
Chip model	Date rate	Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
8752CJF	1Mbit/s	Low	2402	-16.75	≤ 8
		Middle	2440	-16.42	≤ 8
		High	2480	-16.22	≤ 8
RTL8763BF	1Mbit/s	Low	2402	-12.54	≤ 8
		Middle	2440	-12.41	≤ 8
		High	2480	-13.83	≤ 8
	2Mbit/s	Low	2402	-14.35	≤ 8
		Middle	2440	-15.73	≤ 8
		High	2480	-15.91	≤ 8

Chip 1: 8752CJF(1Mbit/s)

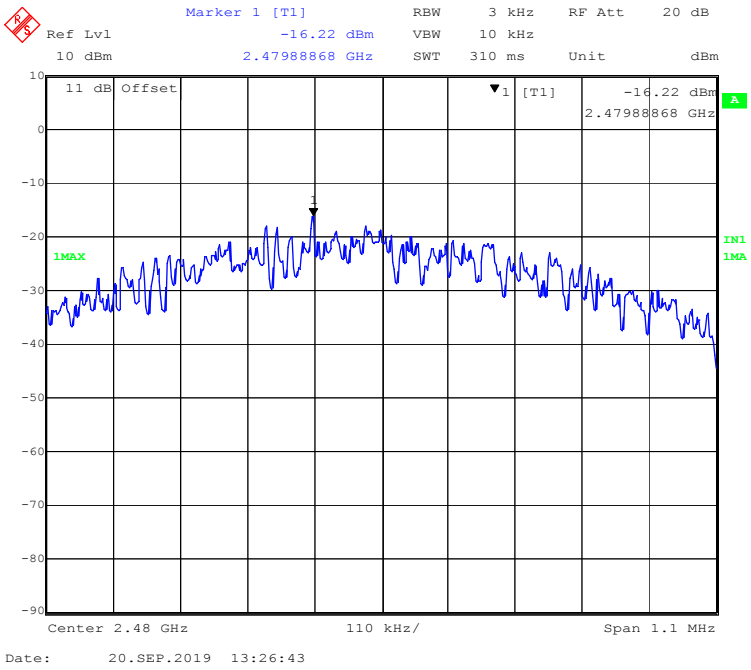
Low Channel



Middle Channel

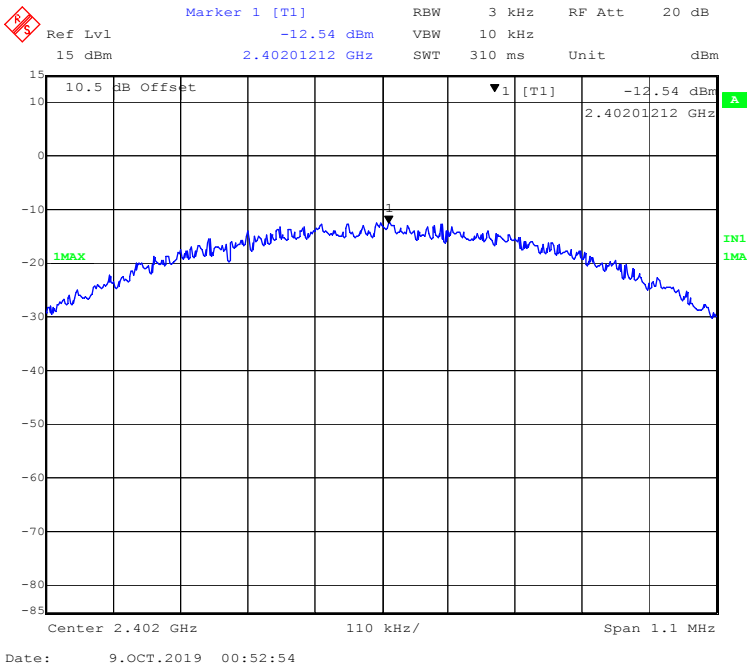


High Channel

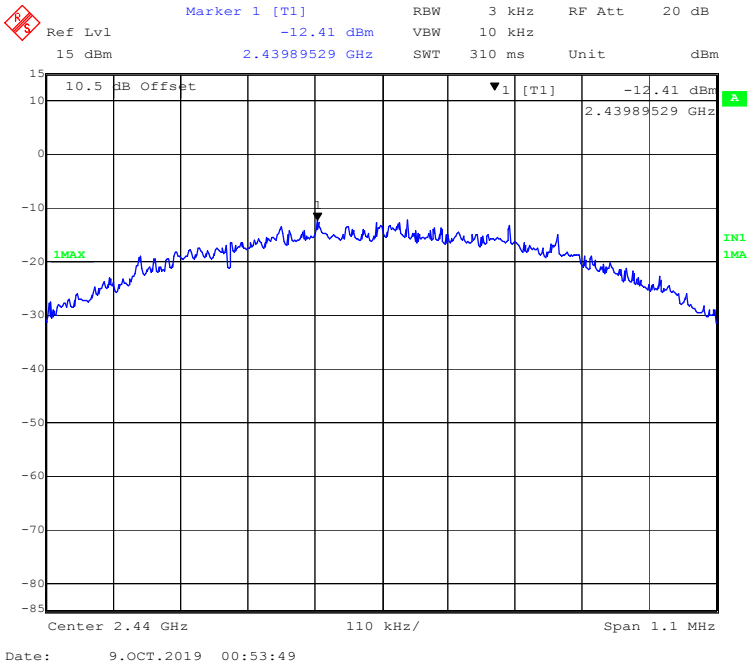


Chip 2: RTL8763BF(1Mbit/s)

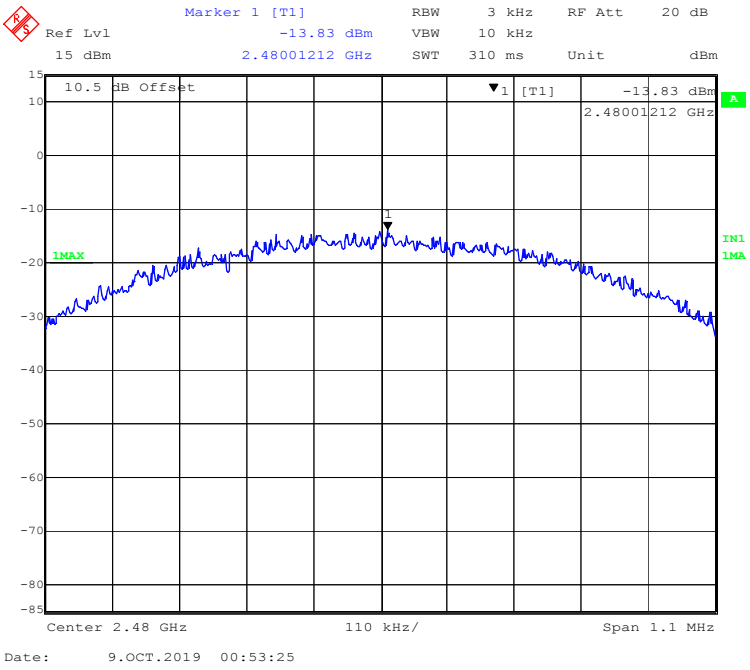
Low Channel



Middle Channel

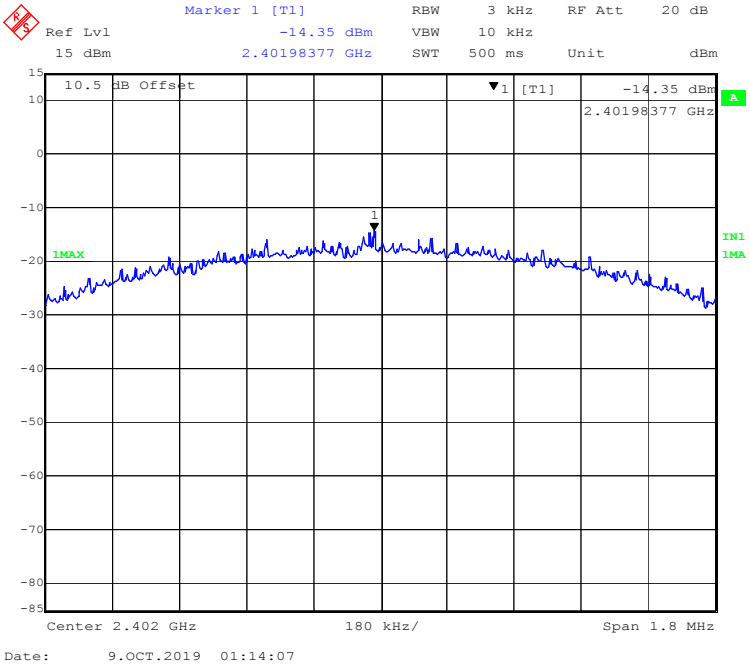


High Channel

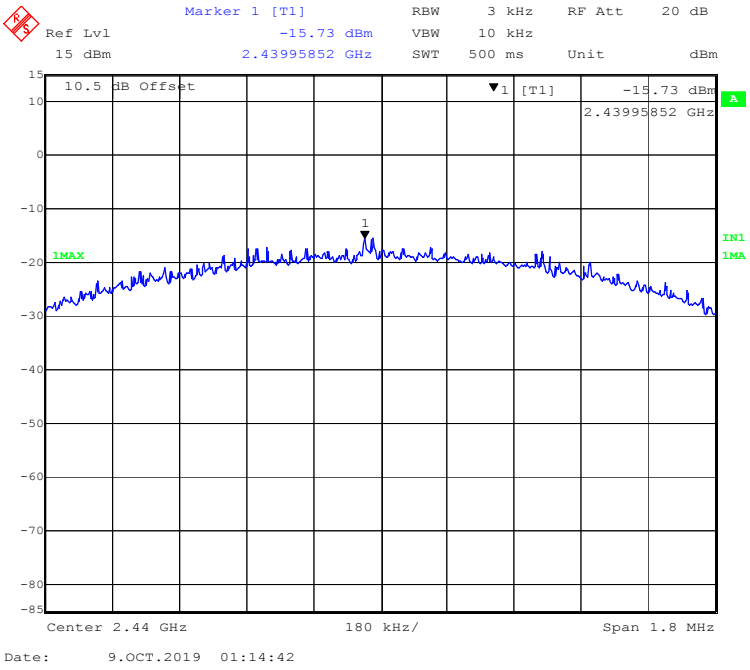


Chip 2: RTL8763BF(2Mbit/s)

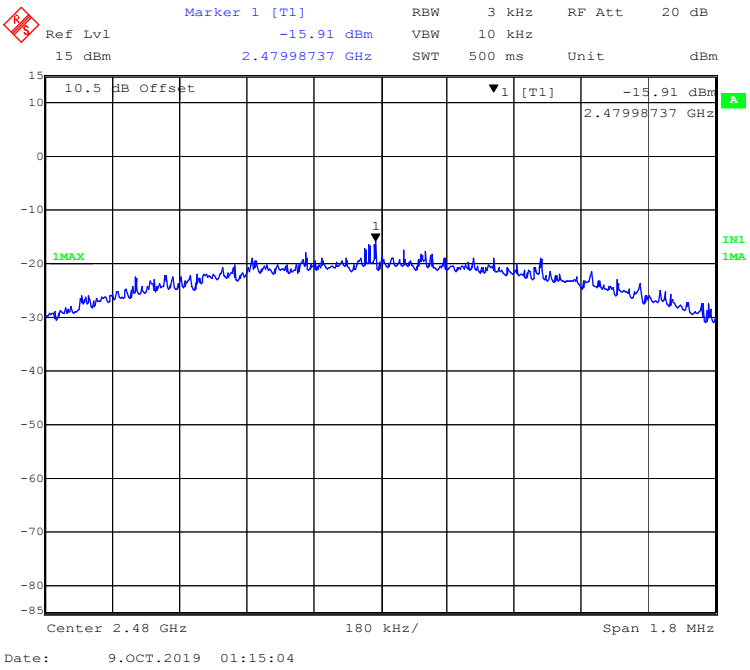
Low Channel



Middle Channel



High Channel



******* END OF REPORT *******