FCC PART 15.247

TEST REPORT

For

Thundercomm Technology Co., Ltd

4F, Taixiang Building, 1A Longxiang Rd Haidian Dist, Beijing, China,100191

FCC ID: 2AOHHTURBOXSOMD820

Report Type:	**Product Type:**
Class II Permissive Change	Thundersoft TurboX-D820-SoM

Report Number: RSZ190131004-00CA1

Report Date: 2019-03-01

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Thundersoft TurboX-D820-SoM
Tested Model	TurboX-D820
Multiple Model#	TurboX
Frequency Range	Bluetooth LE: 2402~2480MHz WI-FI: 2412~2462MHz
Transmit Power	Bluetooth LE: 0.001 W WIFI: 802.11b:0.032 W, 802.11G:0.07 W, 802.11N20: 0.136 W, 802.11N40: 0.155 W
Modulation Technique	Bluetooth LE: GFSK WIFI: DSSS, OFDM
Antenna Specification	IPEX3, 2 dBi
Voltage Range	DC 4.0V
Date of Test	Feb 21, 2019
Sample serial number	190131004
Received date	2019-01-31
Sample/EUT Status	Good condition

Notes: This series products model: TurboX and TurboX-D820 are electrically identical; the differences between them are the model number. Model TurboX-D820 was selected for fully testing, the detailed information can be referred to the declaration which was stated and guaranteed by the applicant.

Objective

This report is prepared on behalf of *Thundercomm Technology Co., Ltd* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's 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.

This is a CIIPC application of the device; the differences between the original device and the current one are as follows:

1. Change some capacitance in main board which don't effect RF characteristic.
2. Adding an BT&WIFI antenna, change the antenna type to FPC.

For the change made to the device, the test item "Spurious Emissions" were performed.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS and Part 15.407 NII submissions with FCC ID: 2AOHHTURBOXSOMD820.

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 KDB 558074 D01 15.247 Meas Guidance v05.

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

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Output Power with Power meter		±0.5dB
RF conducted test with spectrum		±1.5dB
AC Power Lines Conducted Emissions		±1.95dB
Radiated Emissions	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±3℃
Humidity		±6%
Supply voltages		±0.4%

Note: 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. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For 802.11b, 802.11g and 802.11n-HT20 mode, 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	/	/
6	2437	/	/
7	2442	/	/

For 802.11b, 802.11g, 802.11n-HT20 mode, EUT was tested with Channel 1, 6 and 11.

For 802.11n-HT40 mode, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2422	6	2447
2	2427	7	2452
3	2432	/	/
4	2437	/	/
5	2442	/	/

EUT was tested with Channel 1, 4 and 7.

For wifi testing, 802.11b and 802.11g mode only support SISO mode, 802.11n-HT20 and 802.11n-HT40 can support SISO and MIMO mode, pre-scan the output power of both modes, the result of both modes was almost identical, so the MIMO mode was chosen for testing.

For BLE mode, 40 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
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

“QRCT” software was used.

The device was tested with the worst case was performed as below:

Mode	Data rate	Power level		
		Low channel	Middle channel	High channel
802.11b	1 Mbps	12	12	12
802.11g	6 Mbps	11	11	11
802.11n-HT20	MCS0	11	11	11
802.11n-HT40	MCS0	10	10	10
BLE	/	Default	Default	Default

Pre-scan with all the data rates, the above data rate is the worst case for Wi-Fi test.

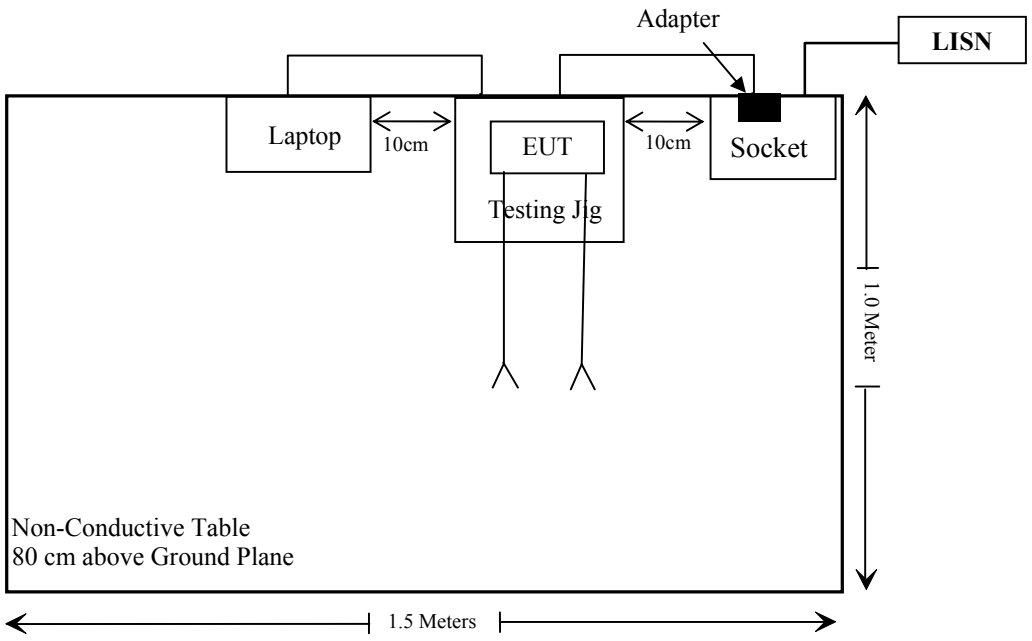
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Thundersoft	Testing Jig	N/A	N/A
STH	Adapter	P24120200	N/A
BULL	Socket	GN-415K	5503290068073
Compaq	Laptop	CQ45	CND9524JMW
N/A	Antenna 0	N/A	N/A
N/A	Antenna 1	N/A	N/A

External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded un-detachable AC cable	1.2	Socket	mains
Unshielded un-detachable DC cable	1.4	Adapter	Testing Jig
Unshielded un-detachable DC cable	1.4	Testing Jig	Laptop

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §2.1091	Maximum Permissible Exposure(MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance*
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance*
§15.247(b)(3)	Maximum Conducted Output Power	Compliance*
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance*
§15.247(e)	Power Spectral Density	Compliance*

Compliance*: Please referred to FCC ID: 2AOHHTURBOXSOMD820 granted on 2018-09-19.Report No.: RSZ180710003-00C, which was tested by Bay Area Compliance Laboratories Corp. (Shenzhen).

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2019-01-11	2020-01-11
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
Sonoma instrument	Amplifier	310N	186238	2018-11-12	2019-11-12
Rohde & Schwarz	Signal Analyzer	FSEM	845987/005	2018-06-23	2019-06-23
COM-POWER	Pre-amplifier	PA-122	181919	2018-11-12	2019-11-12
A.H. System	Horn Antenna	SAS-200/571	135	2018-09-01	2021-08-31
UTiFLEX MICRO-C0AX	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-07-11	2021-07-10
Ducommun technologies	RF Cable	104PEA	218124002	2018-11-12	2019-11-12
Ducommun technologies	RF Cable	RG-214	1	2018-11-19	2019-05-21
Ducommun technologies	RF Cable	RG-214	2	2018-11-12	2019-11-12
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Heatsink Required	Amplifier	QLW-18405536-J0	15964001002	2018-11-12	2019-11-12
Sinoscite	Band Reject Filter	BSF2402-2480MN-0898-001	99632	2018-11-12	2019-11-12
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) 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) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (Minutes)**
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Frequency (MHz)	Antenna Gain		Turn up conducted power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
2402-2480	2	1.58	0	1	20	0.0003	1
2412-2462	2	1.58	22	158.49	20	0.05	1

Simultaneous transmitting consideration: (referring to the DSS report, the highest MPE for Bluetooth is 0.004mW/cm^2)

The ratio=MPE/limit$_{DSS}$+MPE/limit$_{DTS}$=0.004+0.05=0.054＜1.0, simultaneous exposure is not required.

Note: 2.4GHz and 5GHz WiFi can't transmit simultaneously for this device.

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliance

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 two FPC antennas arrangement, which were connected to board with an unique connector and the antenna gain is 2 dBi, one for Bluetooth and wifi(antenna 0), the other for wifi only(antenna 1), fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

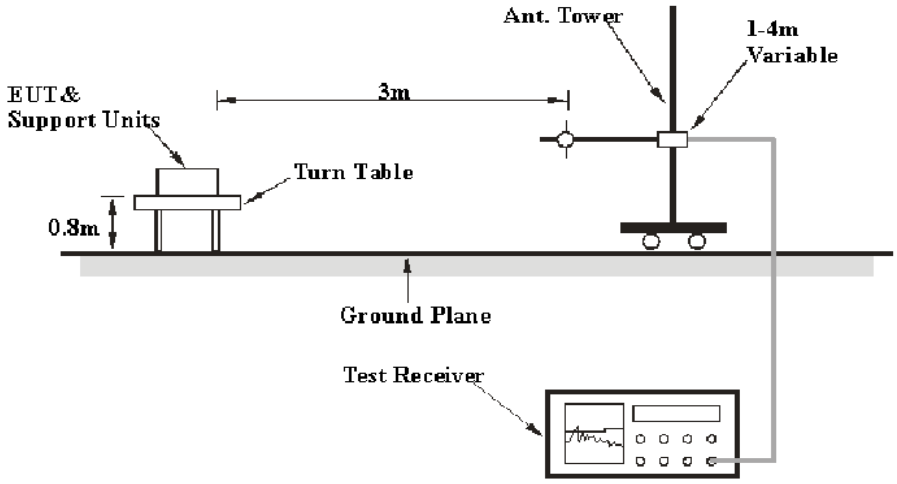
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

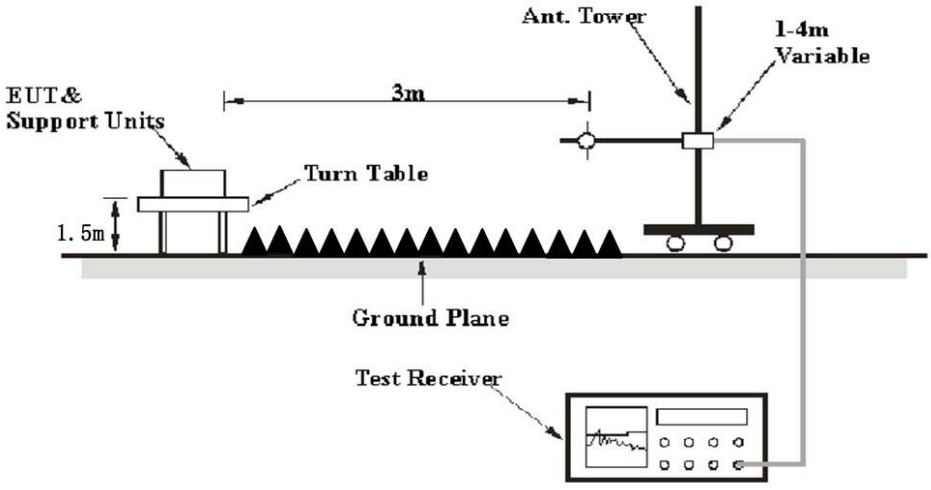
FCC §15.247 (d); §15.209; §15.205;

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 & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz Note 1	/	Average
	1MHz	＞1/T Note 2	/	Average

Note 1: when duty cycle is no less than 98%
Note 2: when duty cycle is less than 98%

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 Amplitude & Margin Calculation

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 = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

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 = Limit – Corrected Amplitude

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.

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

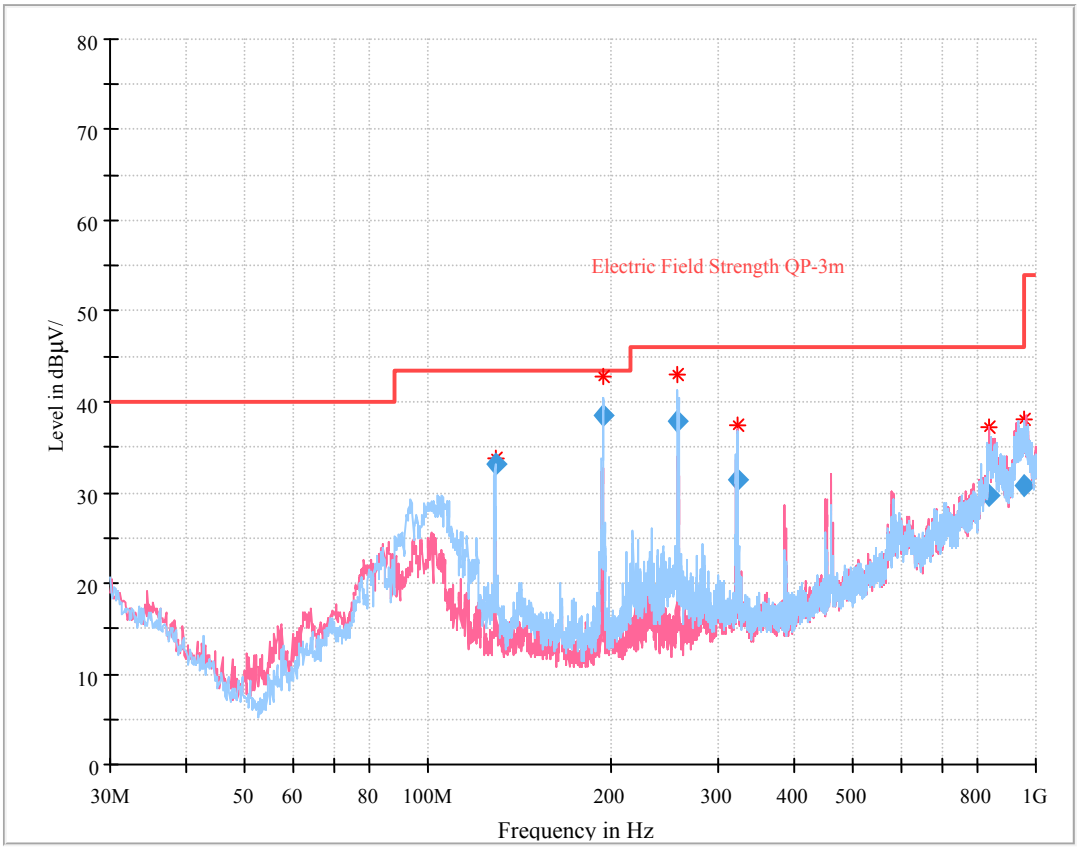
Temperature:	25 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Baston Chen on 2019-02-21.

EUT operation mode: Transmitting
Note: For wifi 802.11b and 802.11g mode, the worst case is antenna 1, for 802.11n-HT20 and 802.11n-HT40 mode, the two antennas transmitting simultaneously.

Wi-Fi 802.11b Mode antenna 1 low channel:

30 MHz~1 GHz:



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
128.990875	33.06	186.0	H	95.0	-13.7	43.50	10.44
193.769000	38.55	103.0	H	96.0	-14.7	43.50	4.95
257.891500	37.94	102.0	H	87.0	-13.6	46.00	8.06
323.468250	31.42	146.0	V	14.0	-10.7	46.00	14.58
839.126500	29.77	214.0	V	242.0	5.9	46.00	16.23
957.114750	30.70	189.0	H	355.0	9.4	46.00	15.30

1 GHz-25 GHz(BLE):

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
Low Channel (2402 MHz)									
2390.00	27.44	PK	284	1.1	H	33.00	60.44	74	13.56
2390.00	13.58	Ave.	284	1.1	H	33.00	46.58	54	7.42
2483.50	27.33	PK	99	1.2	H	33.20	60.53	74	13.47
2483.50	13.40	Ave.	99	1.2	H	33.20	46.60	54	7.40
4804.00	43.20	PK	11	2.5	H	7.88	51.08	74	22.92
4804.00	28.66	Ave.	11	2.5	H	7.88	36.54	54	17.46
Middle Channel (2440 MHz)									
4880.00	42.35	PK	156	1.4	H	9.21	51.56	74	22.44
4880.00	28.77	Ave.	156	1.4	H	9.21	37.98	54	16.02
High Channel (2480 MHz)									
2388.00	27.95	PK	146	2.2	H	33.00	60.95	74	13.05
2388.00	13.74	Ave.	146	2.2	H	33.00	46.74	54	7.26
2483.50	27.69	PK	69	1.8	H	33.20	60.89	74	13.11
2483.50	13.58	Ave.	69	1.8	H	33.20	46.78	54	7.22
4960.00	42.39	PK	116	1.2	H	9.07	51.46	74	22.54
4960.00	28.10	Ave.	116	1.2	H	9.07	37.17	54	16.83

1 GHz-25 GHz(WIFI):
802.11b Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
Low Channel (2412 MHz)									
2389.00	27.56	PK	12	1.7	H	33.00	60.56	74	13.44
2389.00	13.74	Ave.	12	1.7	H	33.00	46.74	54	7.26
2483.50	27.35	PK	269	1.3	H	33.20	60.55	74	13.45
2483.50	13.60	Ave.	269	1.3	H	33.20	46.80	54	7.20
4824.00	42.60	PK	329	1.2	H	7.88	50.48	74	23.52
4824.00	28.55	Ave.	329	1.2	H	7.88	36.43	54	17.57
Middle Channel (2437MHz)									
4874.00	41.65	PK	282	2.3	H	9.21	50.86	74	23.14
4874.00	27.90	Ave.	282	2.3	H	9.21	37.11	54	16.89
High Channel (2462 MHz)									
2389.00	27.35	PK	253	1.2	H	33.00	60.35	74	13.65
2389.00	13.28	Ave.	253	1.2	H	33.00	46.28	54	7.72
2483.50	27.94	PK	253	2.0	H	33.20	61.14	74	12.86
2483.50	13.36	Ave.	253	2.0	H	33.20	46.56	54	7.44
4924.00	42.10	PK	258	1.0	H	9.21	51.31	74	22.69
4924.00	28.33	Ave.	258	1.0	H	9.21	37.54	54	16.46

802.11g Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
Low Channel (2412 MHz)									
2386.00	27.84	PK	115	2.2	H	33.00	60.84	74	13.16
2386.00	13.52	Ave.	115	2.2	H	33.00	46.52	54	7.48
2483.50	27.99	PK	247	1.9	H	33.20	61.19	74	12.81
2483.50	13.60	Ave.	247	1.9	H	33.20	46.80	54	7.20
4824.00	42.51	PK	67	2.0	H	7.88	50.39	74	23.61
4824.00	28.30	Ave.	67	2.0	H	7.88	36.18	54	17.82
Middle Channel (2437MHz)									
4874.00	42.50	PK	264	1.5	H	9.21	51.71	74	22.29
4874.00	28.31	Ave.	264	1.5	H	9.21	37.52	54	16.48
High Channel (2462 MHz)									
2390.00	27.33	PK	85	1.2	H	33.00	60.33	74	13.67
2390.00	13.58	Ave.	85	1.2	H	33.00	46.58	54	7.42
2485.00	27.49	PK	241	2.1	H	33.20	60.69	74	13.31
2485.00	13.40	Ave.	241	2.1	H	33.20	46.60	54	7.40
4924.00	42.61	PK	328	1.1	H	9.21	51.82	74	22.18
4924.00	28.35	Ave.	328	1.1	H	9.21	37.56	54	16.44

802.11n-HT20 Mode:

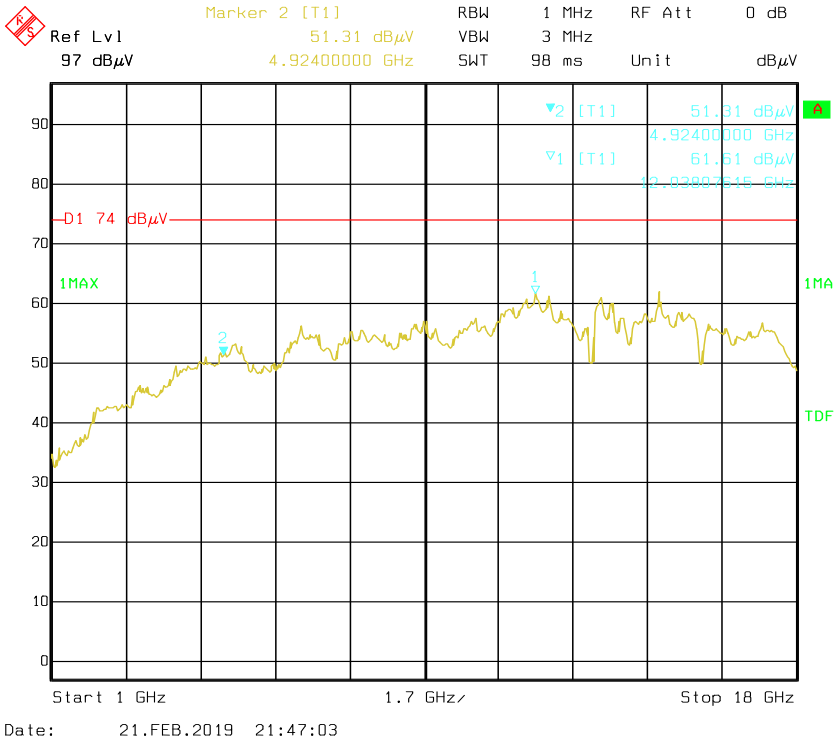
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
Low Channel (2412 MHz)									
2390.00	27.34	PK	266	2.4	H	33.92	61.26	74	12.74
2390.00	13.24	Ave.	266	2.4	H	33.92	47.16	54	6.84
2483.50	27.46	PK	234	1.7	H	34.08	61.54	74	12.46
2483.50	13.34	Ave.	234	1.7	H	34.08	47.42	54	6.58
4824.00	42.87	PK	200	1.4	H	7.88	50.75	74	23.25
4824.00	29.03	Ave.	200	1.4	H	7.88	36.91	54	17.09
Middle Channel (2437MHz)									
4874.00	42.10	PK	193	1.1	H	9.21	51.31	74	22.69
4874.00	28.06	Ave.	193	1.1	H	9.21	37.27	54	16.73
High Channel (2462 MHz)									
2390.00	27.58	PK	16	1.5	H	33.00	60.58	74	13.42
2390.00	13.57	Ave.	16	1.5	H	33.00	46.57	54	7.43
2485.00	27.60	PK	243	1.0	H	33.20	60.80	74	13.20
2485.00	13.61	Ave.	243	1.0	H	33.20	46.81	54	7.19
4924.00	42.38	PK	242	1.4	H	9.21	51.59	74	22.41
4924.00	28.15	Ave.	242	1.4	H	9.21	37.36	54	16.64

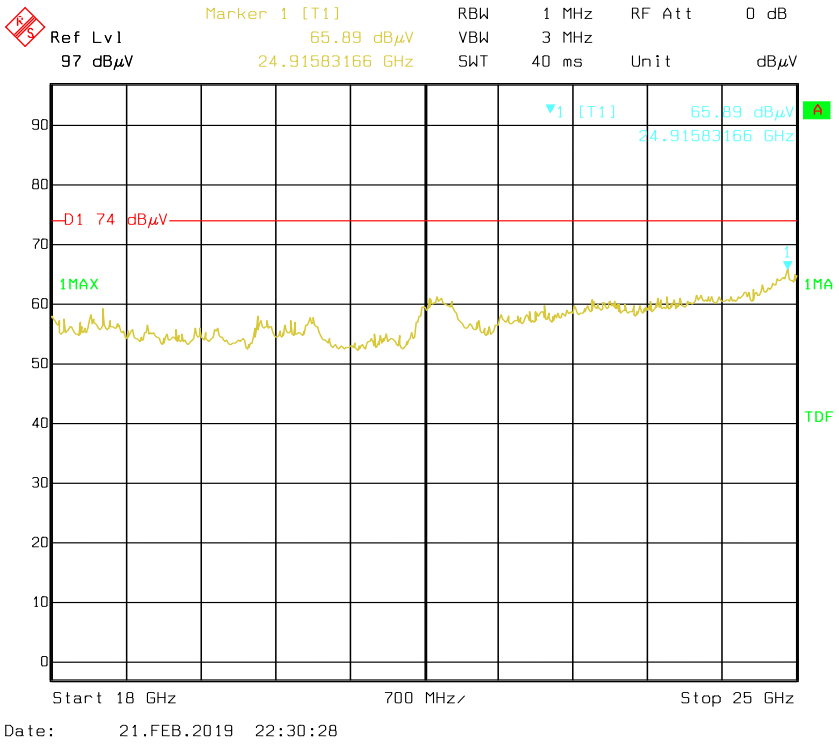
802.11n-HT40 Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
Low Channel (2422 MHz)									
2390.00	27.65	PK	180	1.1	H	33.00	60.65	74	13.35
2390.00	13.44	Ave.	180	1.1	H	33.00	46.44	54	7.56
2485.00	27.82	PK	14	1.5	H	33.20	61.02	74	12.98
2485.00	13.70	Ave.	14	1.5	H	33.20	46.90	54	7.10
4844.00	42.71	PK	75	1.5	H	7.88	50.59	74	23.41
4844.00	28.40	Ave.	75	1.5	H	7.88	36.28	54	17.72
Middle Channel (2437MHz)									
4874.00	42.51	PK	10	2.0	H	9.21	51.72	74	22.28
4874.00	28.42	Ave.	10	2.0	H	9.21	37.63	54	16.37
High Channel (2452 MHz)									
2389.00	27.84	PK	23	1.4	H	33.00	60.84	74	13.16
2389.00	13.64	Ave.	23	1.4	H	33.00	46.64	54	7.36
2485.00	27.59	PK	45	1.1	H	33.20	60.79	74	13.21
2485.00	13.55	Ave.	45	1.1	H	33.20	46.75	54	7.25
4904.00	42.31	PK	166	2.3	H	9.21	51.52	74	22.48
4904.00	28.26	Ave.	166	2.3	H	9.21	37.47	54	16.53

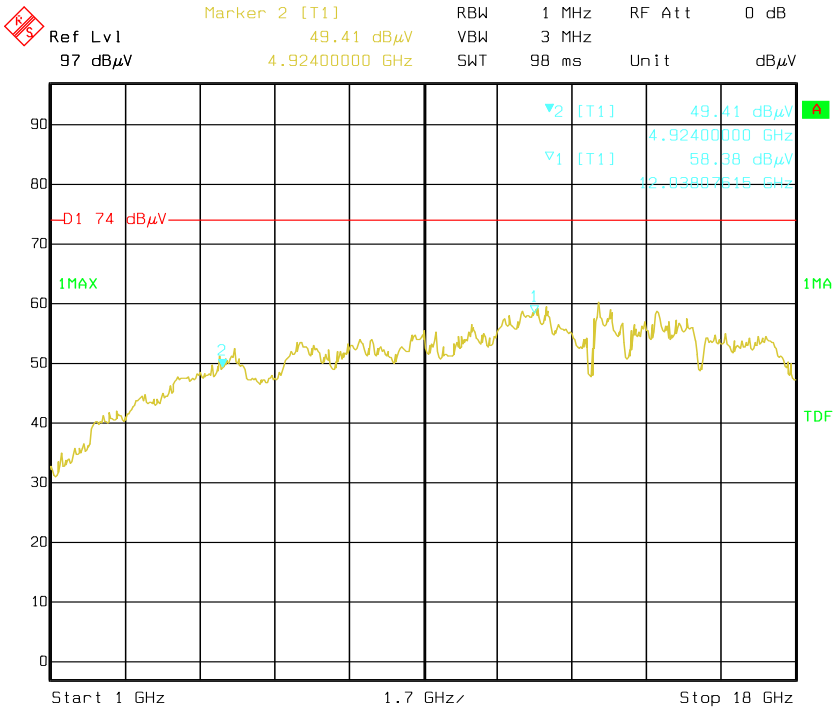
Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Limit - Corrected. Amplitude
The other spurious emission which is 20dB to the limit was not recorded.
And for the pre-scan is performed with the 2400-2483.5MHz band filter.

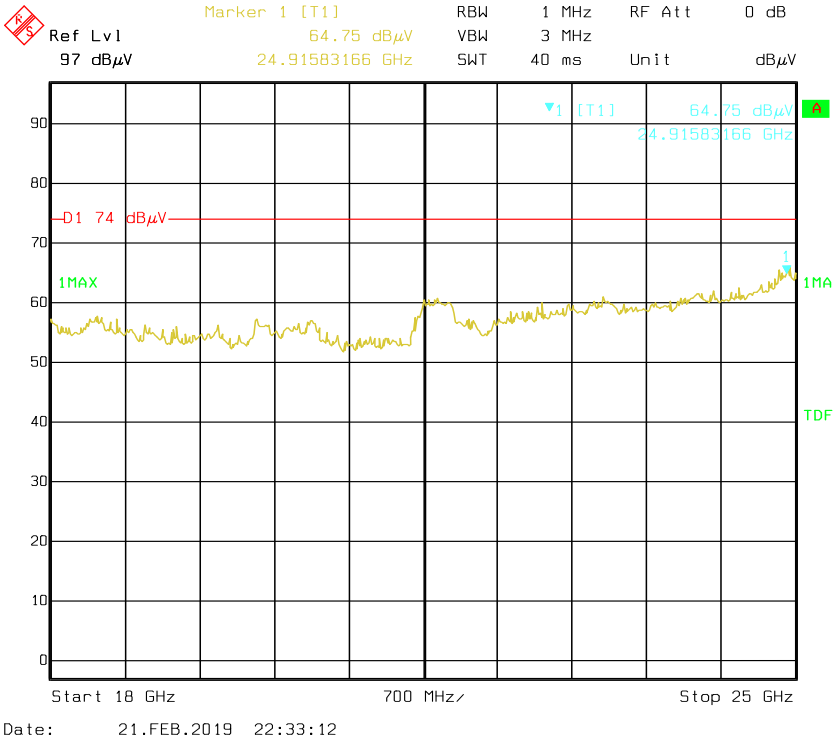
Pre-scan with 802.11G Mode, High channel
Horizontal



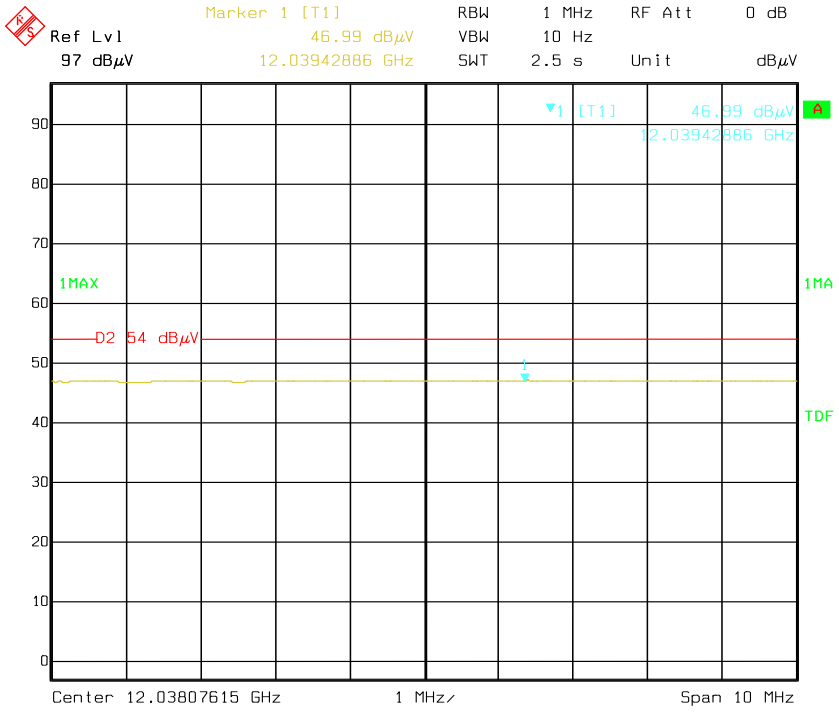


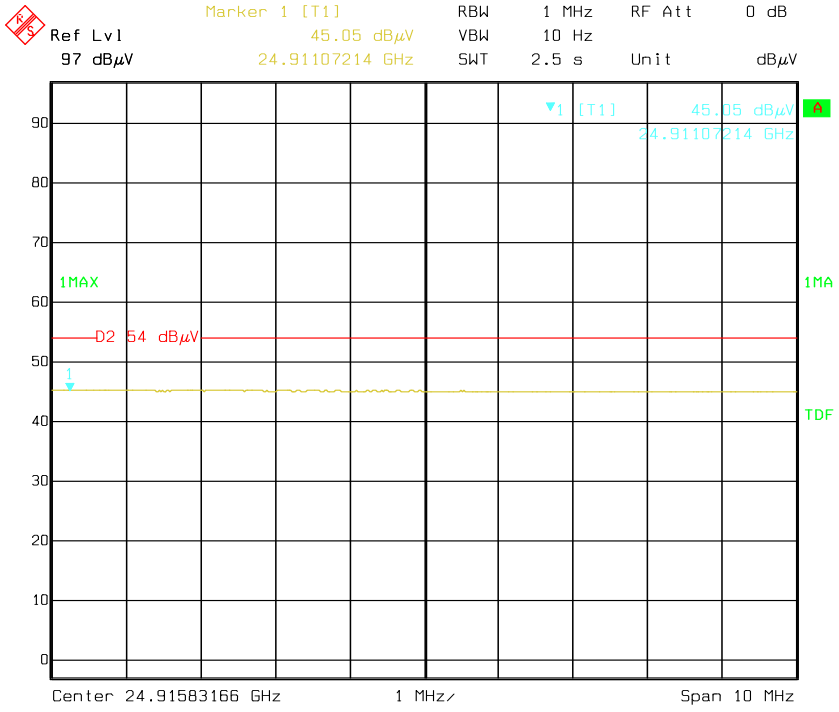
Vertical


Marker 2 [T1]
Ref Lvl
97 dBµV
49.41 dBµV
4.92400000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 98 ms
RF Att 0 dB
Unit dBµV
▼2 [T1] 49.41 dBµV
4.92400000 GHz
▽1 [T1] 58.38 dBµV
D1 74 dBµV
1MAX
1MA
TDF
Start 1 GHz
1.7 GHz/
Stop 18 GHz
Date: 21.FEB.2019 21:50:10

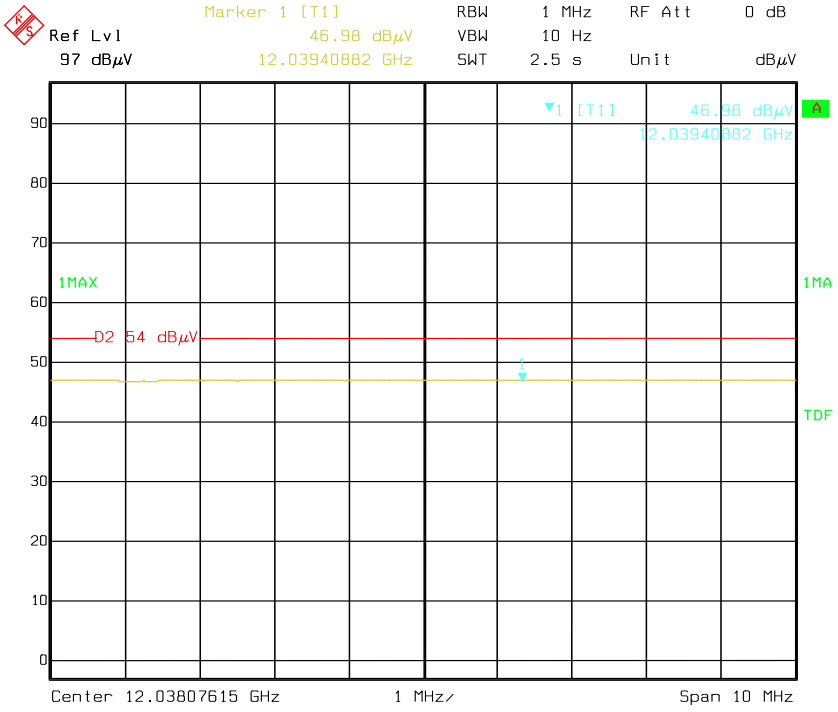

Marker 1 [T1]
Ref Lvl
97 dBµV
64.75 dBµV
24.91583166 GHz
RBW 1 MHz
VBW 3 MHz
SWT 40 ms
RF Att 0 dB
Unit dBµV
▼1 [T1] 64.75 dBµV
24.91583166 GHz
D1 74 dBµV
1MAX
1MA
TDF
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 21.FEB.2019 22:33:12

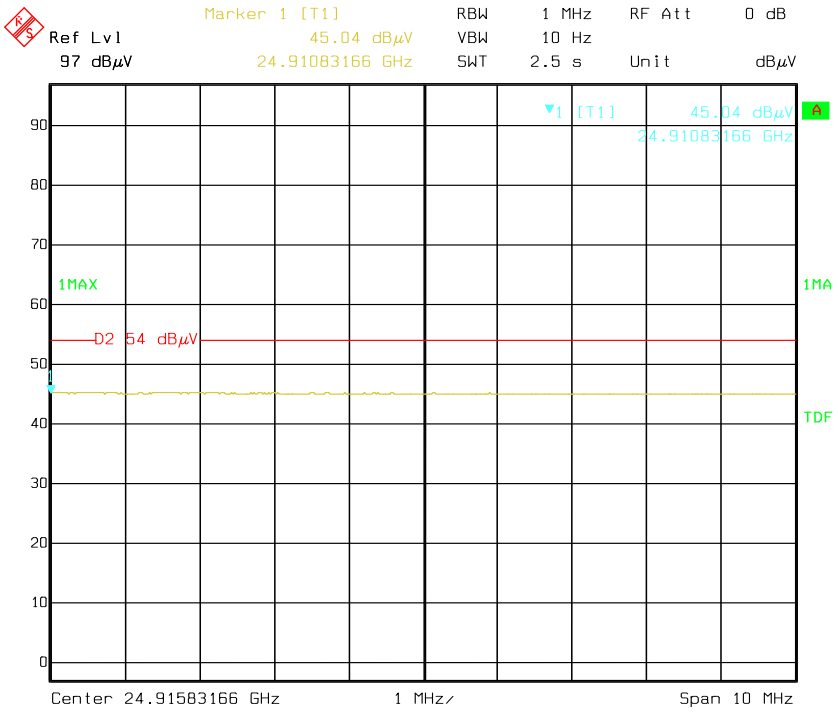
Pre-scan for Average
Horizontal





Vertical





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