

FCC Test Report

Report No.: RFBHKB-WTW-P22041038

FCC ID: S4L4GF41

Test Model: 4GF41

Received Date: Apr. 29, 2022

Test Date: Jun. 25 ~ Jun. 28, 2022

Issued Date: Nov. 29, 2022

Applicant: TomTom International B.V.

Address: De Ruijterkade 154, 1011 AC Amsterdam The Netherlands

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
33383, TAIWAN

**FCC Registration /
Designation Number:** 788550 / TW0003



This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. Statements of conformity are based on simple acceptance criteria without taking measurement uncertainty into account, unless otherwise requested in writing. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 Summary of Test Results	5
2.1 Measurement Uncertainty.....	5
2.2 Modification Record.....	5
3 General Information	6
3.1 General Description of EUT.....	6
3.2 Description of Test Modes.....	7
3.2.1 Test Mode Applicability and Tested Channel Detail.....	8
3.3 Duty Cycle of Test Signal.....	9
3.4 Description of Support Units.....	10
3.4.1 Configuration of System under Test.....	10
3.5 General Description of Applied Standards and References.....	11
4 Test Types and Results	12
4.1 Radiated Emission and Bandedge Measurement.....	12
4.1.1 Limits of Radiated Emission and Bandedge Measurement.....	12
4.1.2 Test Instruments.....	13
4.1.3 Test Procedures.....	14
4.1.4 Deviation from Test Standard.....	14
4.1.5 Test Setup.....	15
4.1.6 EUT Operating Conditions.....	16
4.1.7 Test Results.....	17
Annex A - Band Edge Measurement	31
5 Pictures of Test Arrangements	32
Appendix – Information of the Testing Laboratories	33

Release Control Record

Issue No.	Description	Date Issued
RFBHKB-WTW-P22041038	Original release	Nov. 29, 2022

1 Certificate of Conformity

Product: GPS Navigation System

Brand: TOMTOM

Test Model: 4GF41

Sample Status: Mass product

Applicant: TomTom International B.V.

Test Date: Jun. 25 ~ Jun. 28, 2022

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

This report is issued as a supplementary report of RF171213C12. This report shall be used combined together with its original report.

Prepared by : Celine Chou , **Date:** Nov. 29, 2022
Celine Chou / Senior Specialist

Approved by : Jeremy Lin , **Date:** Nov. 29, 2022
Jeremy Lin / Project Engineer

Note: Radiated emissions and band edge are performed for the addendum. Refer to original report for the other test data.

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	N/A	EUT is powered from DC
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -2.2dB at 30.29MHz.
15.247(d)	Antenna Port Emission	N/A	Refer to Note 1
15.247(a)(2)	6dB bandwidth	N/A	Refer to Note 1
15.247(b)	Conducted power	N/A	Refer to Note 1
15.247(e)	Power Spectral Density	N/A	Refer to Note 1
15.203	Antenna Requirement	Pass	No antenna connector is used.

Note:

1. Radiated emissions and band edge are performed for the addendum. Refer to original report for the other test data.
2. For 2.4G band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A. Test Procedures refer to report 4.1.3.
3. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (\pm)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.59 dB
	200MHz ~ 1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	GPS Navigation System
Brand	TOMTOM
Test Model	4GF41
Sample Status	Mass product
Power Supply Rating	3.6Vdc (Battery) 5Vdc (Car Charger or Bike Docking or Car Docking)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 65Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11
Output Power	58.479mW
Antenna Type	Chip antenna with -1.2dBi gain
Antenna Connector	NA
Accessory Device	Refer to note
Cable Supplied	Refer to note

Note:

1. This report is prepared for FCC class II permissive change. The differences compared with the original report no.: RF171213C12 are changing display bridge IC, minor changing of layout, DDR changing and FW changing (Does not affect RF characteristics). Therefore, only radiated emissions and band edge for worst channel are performed for the addendum. Refer to original report for the other test data.
2. The EUT provides 1 completed transmitter and 1 receiver.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	1TX

3. The EUT has two kinds of capacities for sale (8GB and 16GB), after pre-tested found 16GB was the worse, therefore chosen for final test and presented in the test report.

4. The EUT contains the following accessories.

Item	Brand	Model	Specification	Remark
Car Charger	TOMTOM	4UUC3Z	Input: 12/24Vdc, 1A Output: 5Vdc, 1.2A	Option
Bike Docking	TOMTOM	4GF01	Input: 12/24Vdc, 1.3A Output: 5Vdc, 2A	Accessory
Bike Power Cable	TOMTOM	4GE0.001.04	1.9m \pm 1cm non-shielded power cable without core	Accessory
Car Docking	TOMTOM	4GF02	Input: 5Vdc Output: pass through to output directly	Option
USB Cable	TOMTOM	4UUC.001.04B	1.5m shielded USB cable without core	Accessory
Battery	TOMTOM (Skypower)	VF3W	Power rating: 3.6Vdc , 3220mAh	Accessory

5. WLAN, BT and BT LE technology cannot transmit simultaneously.

6. Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to		Description
	RE \geq 1G	RE<1G	
A	√	√	EUT + USB Cable + Car Charger (12Vdc)
B	-	√	EUT + USB Cable + Car Charger (24Vdc)
C	-	√	EUT + Bike Docking + Bike Power Cable (12Vdc)
D	-	√	EUT + Bike Docking + Bike Power Cable (24Vdc)
E	-	√	EUT + Car Docking + USB Cable + Car Charger (12Vdc)
F	-	√	EUT + Car Docking + USB Cable + Car Charger (24Vdc)

Where RE \geq 1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
2. No need to concern of PLC due to the EUT is powered from DC.

Radiated Emission Test (Above 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
C	802.11n (HT20)	1 to 11	11	OFDM	BPSK	6.5

Radiated Emission Test (Below 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A, B, C, D, E, F	802.11n (HT20)	1 to 11	11	OFDM	BPSK	6.5

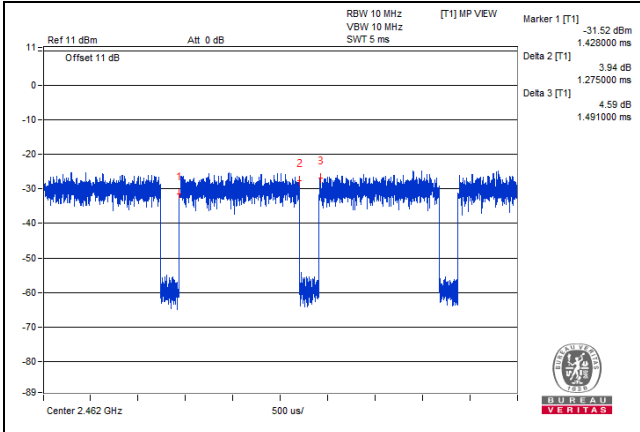
Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE \geq 1G	19 deg. C, 65% RH	12Vdc	Rex Wang
RE<1G	19 deg. C, 65% RH	12Vdc 24Vdc	Rex Wang

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is < 98%.

Duty cycle = $1.275/1.491 = 0.855$, Duty factor = $10 * \log(1/0.855) = 0.68$



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

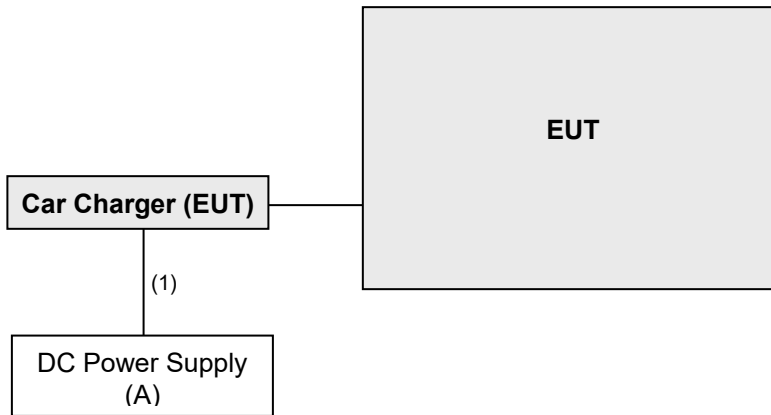
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	DC Power Supply	Keysight	U8002A	MY56330015	NA	-

Note: All power cords of the above support units are non-shielded (1.8m).

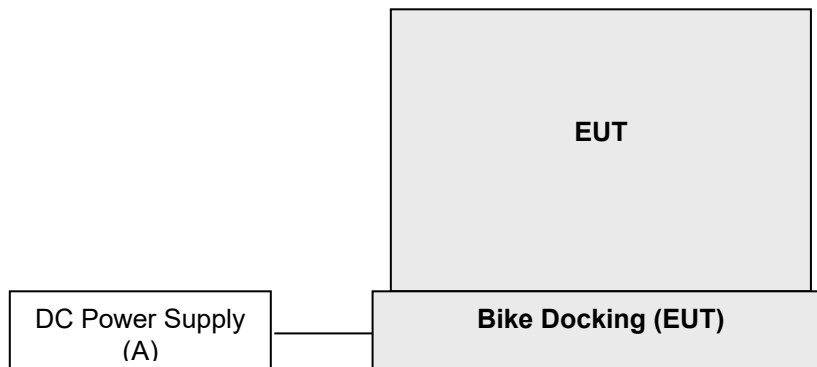
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC	1	0.5	N	0	-

3.4.1 Configuration of System under Test

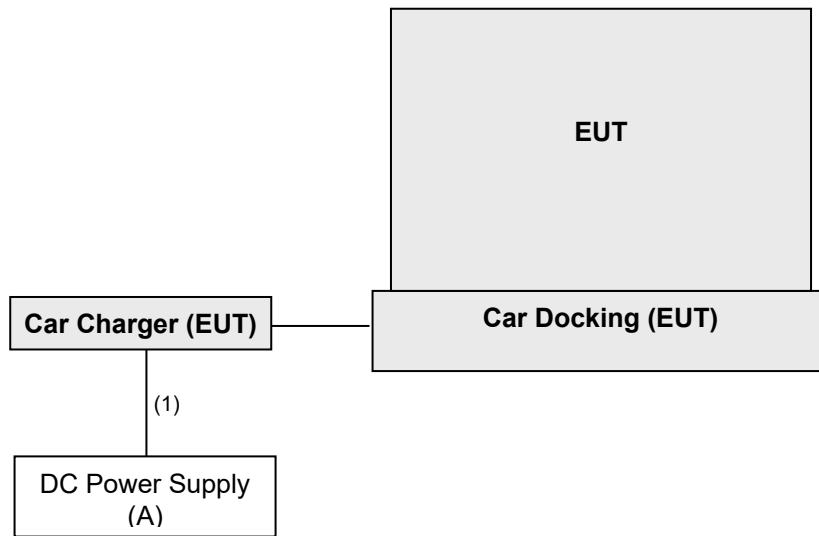
Test Mode A and B



Test Mode C and D



Test Mode E and F



3.5 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test standard:

FCC Part 15, Subpart C (15.247)

ANSI C63.10:2013

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 558074 D01 15.247 Meas Guidance v05r02

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. 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.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 27, 2022	Apr. 26, 2023
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 15, 2021	Sep. 14, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Oct. 28, 2021	Oct. 27, 2022
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Oct. 26, 2021	Oct. 25, 2022
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	May 14, 2022	May 13, 2023
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 16, 2022	Feb. 15, 2023
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM800 0	CABLE-CH9-02 (248780+171006)	Jan. 15, 2022	Jan. 14, 2023
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/ 4)	Jan. 15, 2022	Jan. 14, 2023
RF signal cable Woken	8D-FB	Cable-CH9-01	May 14, 2022	May 13, 2023
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower & Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HY - 966 chamber 4.

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

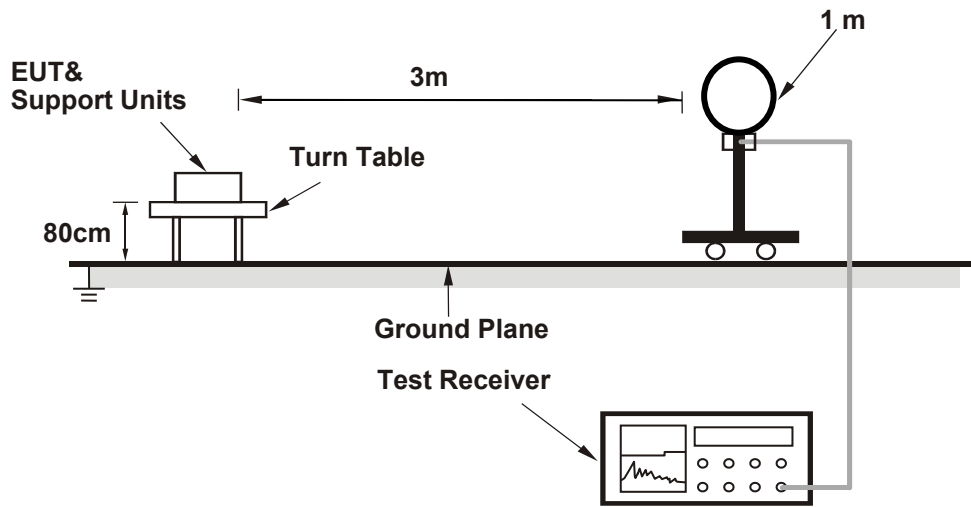
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz. (RBW = 1MHz, VBW = 1kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

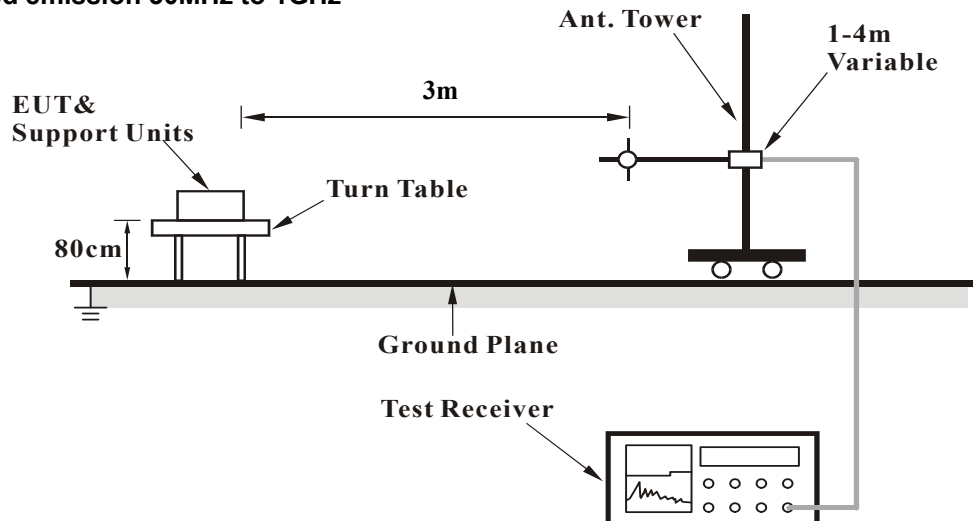
No deviation.

4.1.5 Test Setup

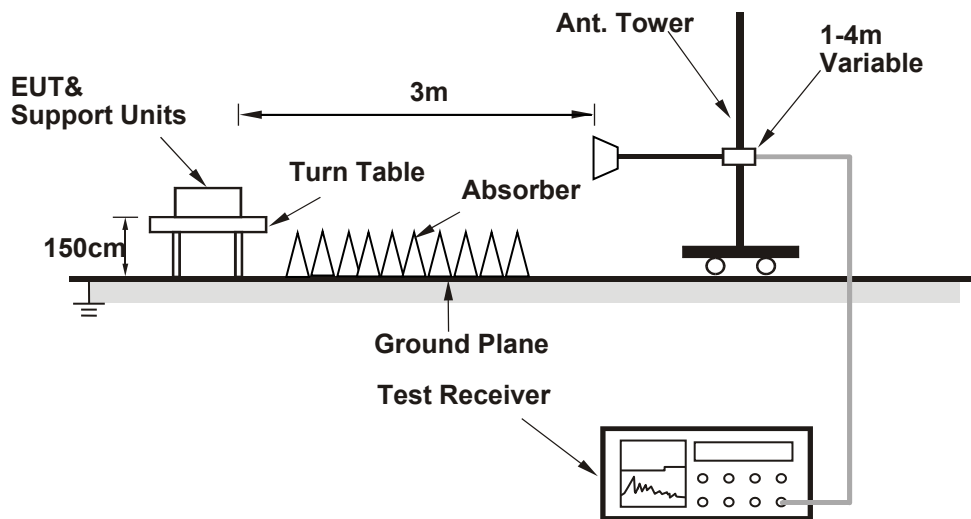
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

- Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

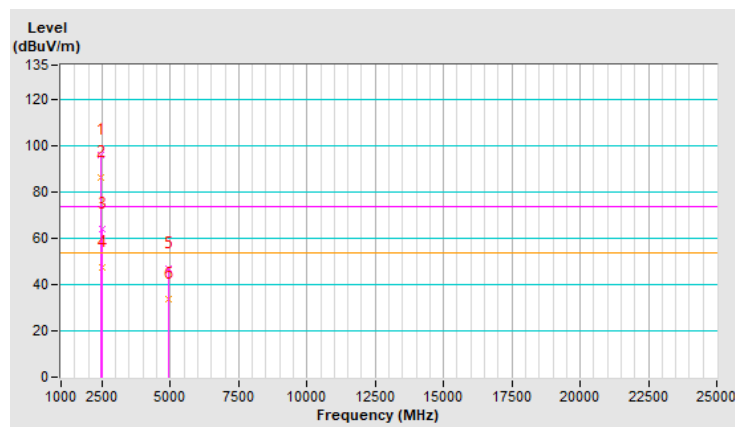
Above 1GHz Data:

RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	96.0 PK			1.63 H	157	63.2	32.8
2	*2462.00	86.3 AV			1.63 H	157	53.5	32.8
3	2483.50	63.8 PK	74.0	-10.2	1.63 H	157	30.9	32.9
4	2483.50	47.5 AV	54.0	-6.5	1.63 H	157	14.6	32.9
5	4924.00	47.1 PK	74.0	-26.9	1.66 H	150	41.7	5.4
6	4924.00	33.8 AV	54.0	-20.2	1.66 H	150	28.4	5.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.

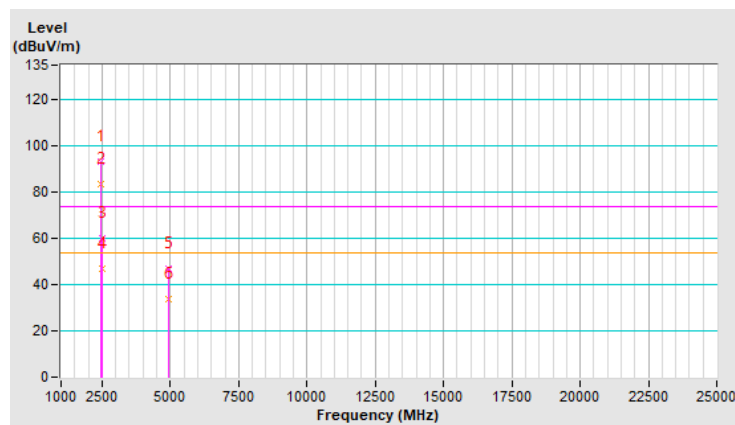


RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	93.5 PK			4.00 V	307	60.7	32.8
2	*2462.00	83.6 AV			4.00 V	307	50.8	32.8
3	2483.50	60.3 PK	74.0	-13.7	4.00 V	307	27.4	32.9
4	2483.50	46.9 AV	54.0	-7.1	4.00 V	307	14.0	32.9
5	4924.00	46.7 PK	74.0	-27.3	3.46 V	303	41.3	5.4
6	4924.00	33.6 AV	54.0	-20.4	3.46 V	303	28.2	5.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.



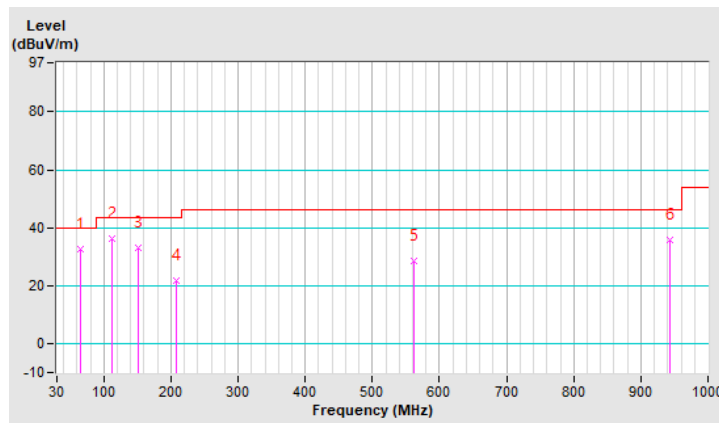
Below 1GHz worst-case data:

RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	A		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	64.92	32.7 QP	40.0	-7.3	1.00 H	157	43.1	-10.4
2	112.45	36.1 QP	43.5	-7.4	1.00 H	324	48.0	-11.9
3	152.22	33.2 QP	43.5	-10.3	1.50 H	316	42.1	-8.9
4	208.48	21.9 QP	43.5	-21.6	1.50 H	116	33.3	-11.4
5	561.56	28.4 QP	46.0	-17.6	1.00 H	233	29.7	-1.3
6	943.74	35.8 QP	46.0	-10.2	1.25 H	206	29.6	6.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

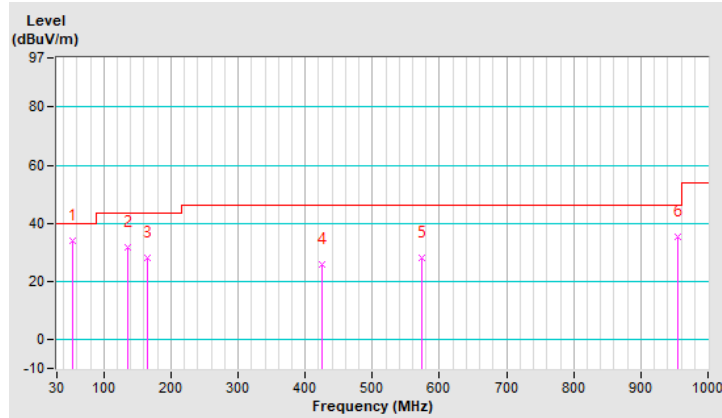


RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	A		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	53.28	34.1 QP	40.0	-5.9	1.00 V	213	43.2	-9.1
2	135.73	31.7 QP	43.5	-11.8	1.00 V	19	41.4	-9.7
3	164.83	28.2 QP	43.5	-15.3	1.25 V	255	37.0	-8.8
4	425.76	25.7 QP	46.0	-20.3	1.00 V	18	29.8	-4.1
5	573.20	28.2 QP	46.0	-17.8	1.00 V	188	29.3	-1.1
6	954.41	35.4 QP	46.0	-10.6	1.50 V	5	29.2	6.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

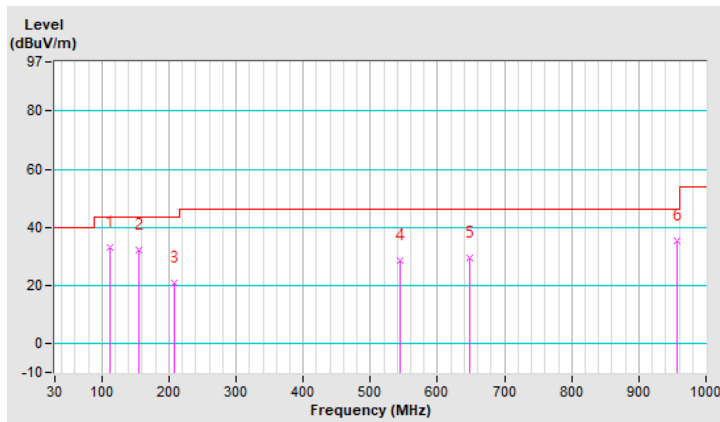


RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	B		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	112.45	32.9 QP	43.5	-10.6	1.00 H	291	44.8	-11.9
2	155.13	32.0 QP	43.5	-11.5	1.50 H	98	40.7	-8.7
3	208.48	20.7 QP	43.5	-22.8	2.00 H	5	32.1	-11.4
4	545.07	28.4 QP	46.0	-17.6	1.00 H	15	30.0	-1.6
5	647.89	29.4 QP	46.0	-16.6	2.00 H	166	29.1	0.3
6	956.35	35.4 QP	46.0	-10.6	1.00 H	186	29.1	6.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

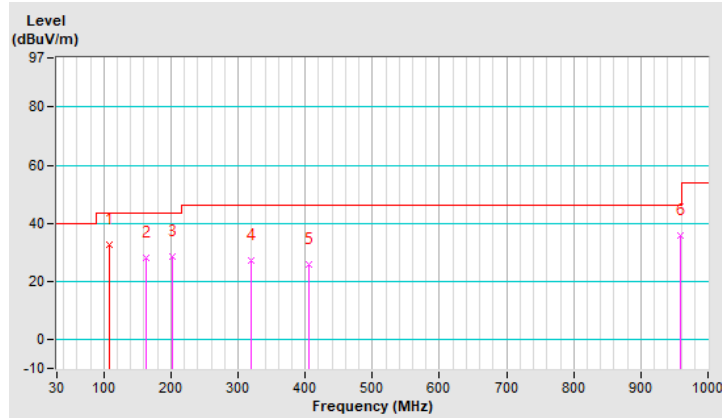


RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	B		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	107.85	32.7 QP	43.5	-10.8	1.00 V	188	45.0	-12.3
2	162.89	28.3 QP	43.5	-15.2	1.50 V	93	36.9	-8.6
3	201.69	28.6 QP	43.5	-14.9	1.50 V	25	40.1	-11.5
4	320.03	27.1 QP	46.0	-18.9	1.00 V	222	33.5	-6.4
5	406.36	26.0 QP	46.0	-20.0	1.00 V	218	30.8	-4.8
6	959.26	35.7 QP	46.0	-10.3	1.25 V	201	29.3	6.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

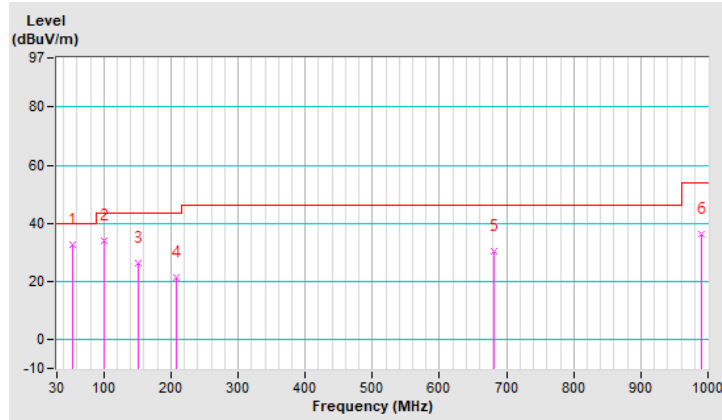


RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	C		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	53.28	32.6 QP	40.0	-7.4	1.25 H	245	41.7	-9.1
2	100.81	34.1 QP	43.5	-9.4	1.25 H	28	47.5	-13.4
3	152.22	26.4 QP	43.5	-17.1	1.00 H	132	35.3	-8.9
4	207.51	21.3 QP	43.5	-22.2	1.50 H	2	32.7	-11.4
5	681.84	30.5 QP	46.0	-15.5	1.00 H	223	29.8	0.7
6	990.30	36.2 QP	54.0	-17.8	1.25 H	116	30.1	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

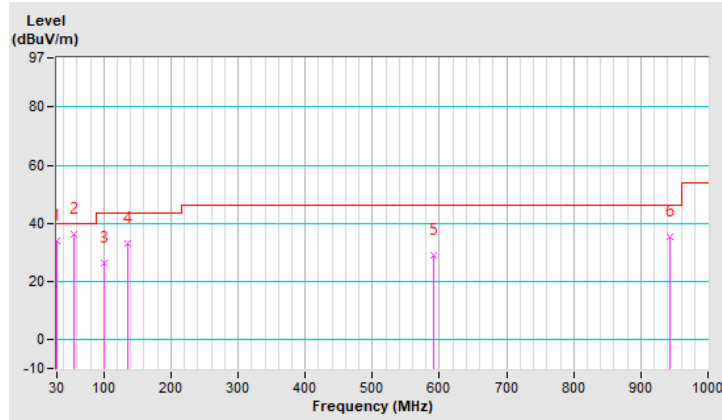


RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	C		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.00	34.0 QP	40.0	-6.0	1.50 V	194	44.2	-10.2
2	56.19	36.4 QP	40.0	-3.6	1.00 V	225	45.7	-9.3
3	100.81	26.2 QP	43.5	-17.3	1.25 V	202	39.6	-13.4
4	135.73	33.0 QP	43.5	-10.5	1.00 V	19	42.7	-9.7
5	590.66	28.8 QP	46.0	-17.2	1.00 V	252	29.4	-0.6
6	943.74	35.3 QP	46.0	-10.7	1.50 V	123	29.1	6.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

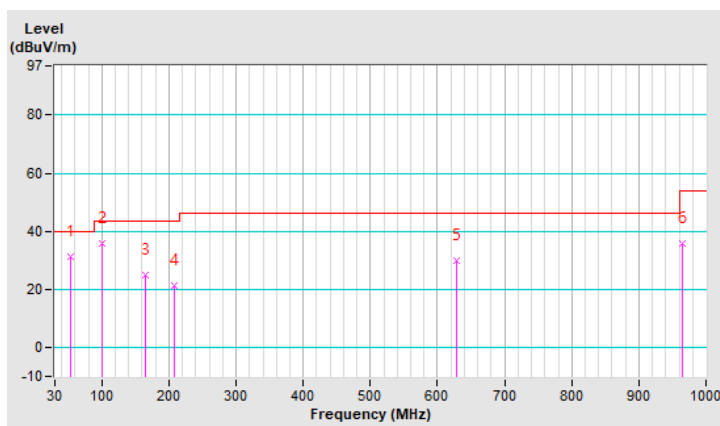


RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	D		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	54.25	31.1 QP	40.0	-8.9	1.25 H	157	40.3	-9.2
2	100.81	35.6 QP	43.5	-7.9	1.00 H	332	49.0	-13.4
3	164.83	24.9 QP	43.5	-18.6	1.00 H	16	33.7	-8.8
4	207.51	21.5 QP	43.5	-22.0	1.50 H	5	32.9	-11.4
5	628.49	30.1 QP	46.0	-15.9	2.00 H	16	30.0	0.1
6	964.11	35.8 QP	54.0	-18.2	1.00 H	270	29.3	6.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

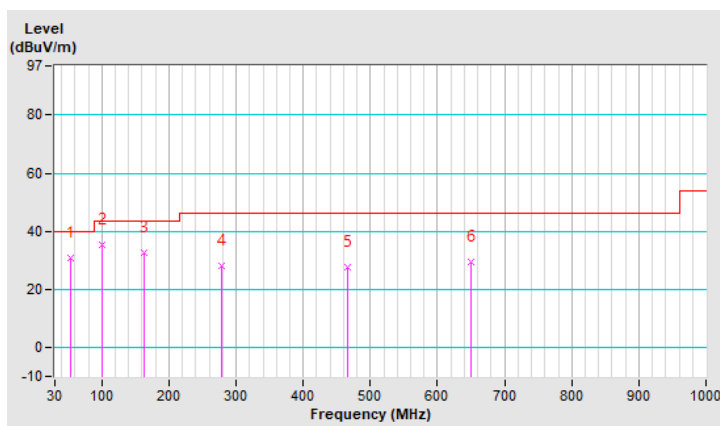


RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	D		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	53.28	30.7 QP	40.0	-9.3	1.00 V	85	39.8	-9.1
2	100.81	35.5 QP	43.5	-8.0	1.50 V	93	48.9	-13.4
3	162.89	32.6 QP	43.5	-10.9	1.00 V	213	41.2	-8.6
4	279.29	28.0 QP	46.0	-18.0	1.00 V	222	35.5	-7.5
5	465.53	27.5 QP	46.0	-18.5	1.25 V	37	30.7	-3.2
6	650.80	29.5 QP	46.0	-16.5	1.50 V	64	29.2	0.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

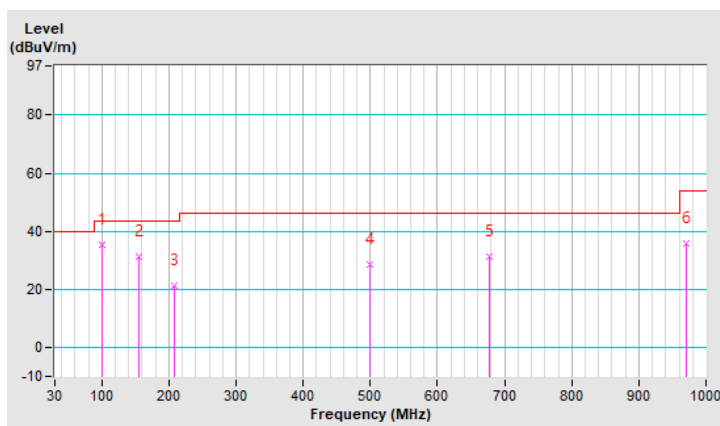


RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	E		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	100.81	35.4 QP	43.5	-8.1	1.00 H	7	48.8	-13.4
2	156.10	31.4 QP	43.5	-12.1	1.00 H	102	40.2	-8.8
3	207.51	21.4 QP	43.5	-22.1	1.00 H	13	32.8	-11.4
4	499.48	28.4 QP	46.0	-17.6	1.50 H	16	30.9	-2.5
5	676.99	31.2 QP	46.0	-14.8	1.50 H	63	30.6	0.6
6	969.93	35.9 QP	54.0	-18.1	1.25 H	312	29.7	6.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

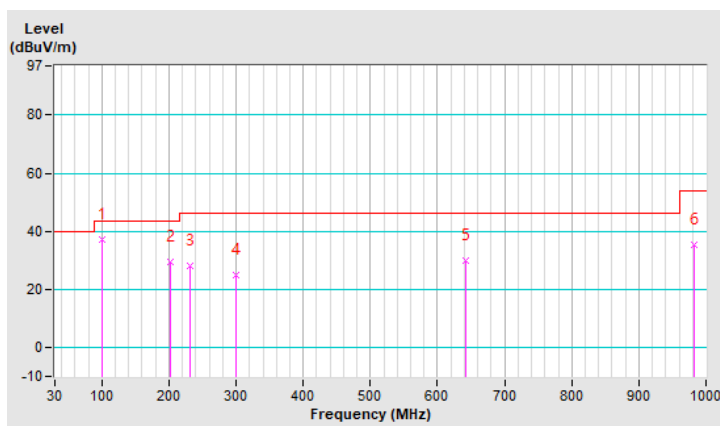


RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	E		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	100.81	37.0 QP	43.5	-6.5	1.25 V	47	50.4	-13.4
2	201.69	29.4 QP	43.5	-14.1	1.25 V	105	40.9	-11.5
3	230.79	28.1 QP	46.0	-17.9	1.00 V	175	38.8	-10.7
4	299.66	25.1 QP	46.0	-20.9	1.50 V	188	32.0	-6.9
5	642.07	29.9 QP	46.0	-16.1	1.00 V	192	29.5	0.4
6	981.57	35.5 QP	54.0	-18.5	1.25 V	291	29.2	6.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

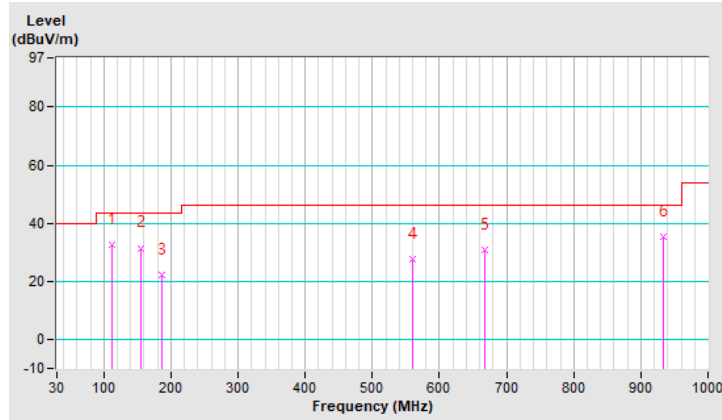


RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	F		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	112.45	32.6 QP	43.5	-10.9	1.00 H	306	44.5	-11.9
2	155.13	31.5 QP	43.5	-12.0	1.00 H	117	40.2	-8.7
3	186.17	22.0 QP	43.5	-21.5	1.50 H	113	32.9	-10.9
4	560.59	27.6 QP	46.0	-18.4	1.25 H	52	28.9	-1.3
5	667.29	31.0 QP	46.0	-15.0	1.00 H	303	30.6	0.4
6	934.04	35.2 QP	46.0	-10.8	1.50 H	47	29.1	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

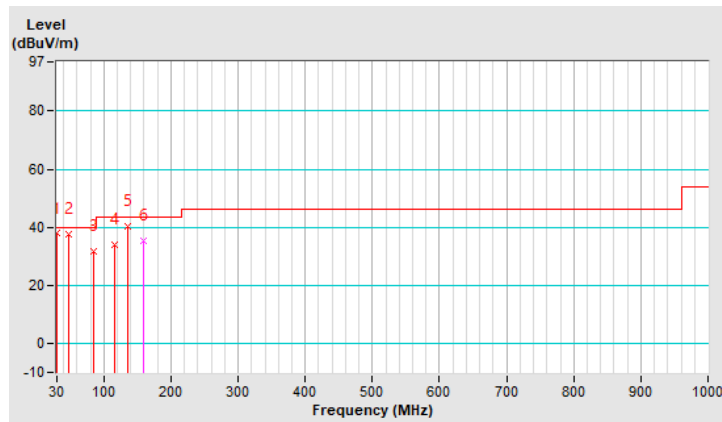


RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	F		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.29	37.8 QP	40.0	-2.2	1.24 V	1	48.1	-10.3
2	48.39	37.6 QP	40.0	-2.4	2.00 V	33	46.6	-9.0
3	85.19	31.8 QP	40.0	-8.2	1.50 V	12	46.3	-14.5
4	115.25	33.9 QP	43.5	-9.6	1.24 V	14	45.6	-11.7
5	136.00	40.1 QP	43.5	-3.4	2.00 V	13	49.8	-9.7
6	159.98	35.3 QP	43.5	-8.2	1.00 V	288	43.9	-8.6

Remarks:

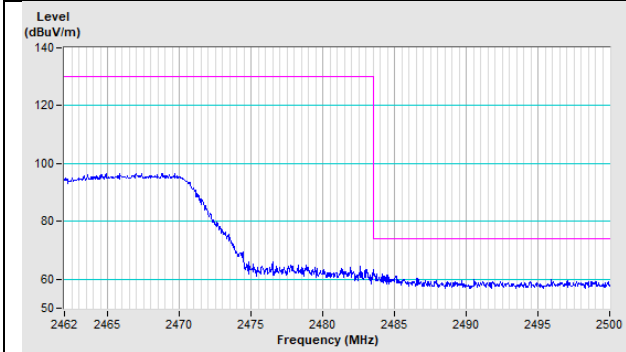
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



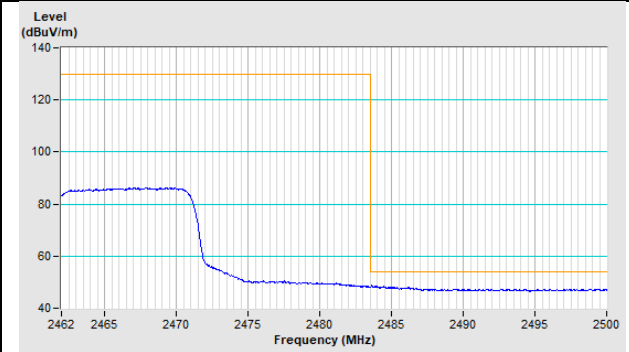
Annex A - Band Edge Measurement

802.11n (HT20) Channel 11

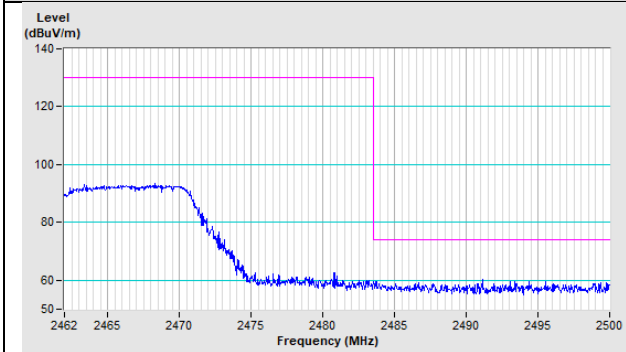
Horizontal (Peak)



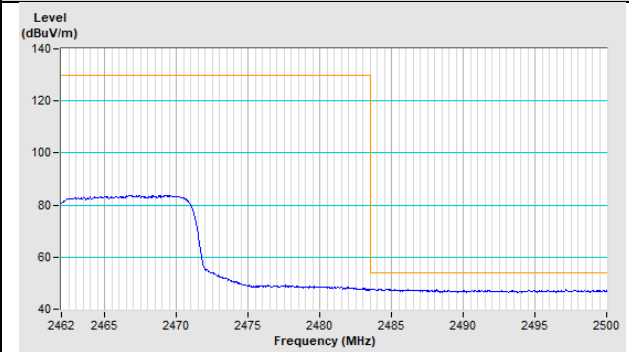
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

--- END ---