

FCC Test Report (Co-Located)

Report No.: RF180920C22-6

FCC ID: A4RG020C

Model Name: G020C

Received Date: Sep. 21, 2018

Test Date: Nov. 01 ~ Dec. 19, 2018

Issued Date: Dec. 20, 2018

Applicant: Google LLC

Address: 1600 Amphitheatre Parkway, Mountain View, CA 94043, USA

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

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

Test Location (1): No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

Test Location (2): E-2, No. 1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan (R.O.C.)

FCC Registration / Designation Number (1): 788550 / TW0003

FCC Registration / Designation Number (2): 723255 / TW2022



This report is 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. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, 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. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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	8
3.2.1 Test Mode Applicability and Tested Channel Detail.....	11
3.3 Description of Support Units	13
3.3.1 Configuration of System under Test	13
3.4 General Description of Applied Standards	13
4 Test Types and Results	14
4.1 Radiated Emission and Bandedge Measurement.....	14
4.1.1 Limits of Radiated Emission and Bandedge Measurement	14
4.1.2 Test Instruments	15
4.1.3 Test Procedures.....	16
4.1.4 Deviation from Test Standard	16
4.1.5 Test Setup.....	17
4.1.6 EUT Operating Conditions.....	18
4.1.7 Test Results for Fundamental and Harmonic above 1GHz	19
4.1.8 Test Results for Bandedge above 1GHz	25
4.1.9 Test Results for below 1GHz	35
4.2 Conducted Out of Band Emission Measurement.....	41
4.2.1 Limits of Conducted Out of Band Emission Measurement	41
4.2.2 Test Setup.....	41
4.2.3 Test Instruments	41
4.2.4 Test Procedure	41
4.2.5 Deviation from Test Standard	41
4.2.6 EUT Operating Condition	41
4.2.7 Test Results	42
5 Pictures of Test Arrangements.....	43
Appendix – Information on the Testing Laboratories	44

Release Control Record

Issue No.	Description	Date Issued
RF180920C22-6	Original release	Dec. 20, 2018

1 Certificate of Conformity

Product: Smartphone
Model Name: G020C
Sample Status: Identical Prototype
Applicant: Google LLC
Test Date: Nov. 01 ~ Dec. 19, 2018
Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
47 CFR FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10-2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Polly Chien , **Date:** Dec. 20, 2018
Polly Chien / Specialist

Approved by : Bruce Chen , **Date:** Dec. 20, 2018
Bruce Chen / Project Engineer

2 Summary of Test Results

Applied Standard:	47 CFR FCC Part 15, Subpart C (Section 15.247) 47 CFR FCC Part 15, Subpart E (Section 15.407)		
FCC Clause	Test Item	Result	Remarks
15.205 / 15.209 / 15.247(d) 15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -4.0dB at 30.00MHz.

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) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions	30MHz ~ 1GHz	5.31 dB
	1 GHz ~ 6 GHz	3.40 dB
	6GHz ~ 18GHz	3.73 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Smartphone
Model Name	G020C
Status of EUT	Identical Prototype
Power Supply Rating	3.85Vdc (Battery) 5Vdc or 9Vdc (Adapter) 5Vdc (Host equipment)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Transfer Rate	802.11b: 11/5.5/2/1Mbps 802.11a/g: 54/48/36/24/18/12/9/6Mbps 802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300Mbps 802.11ac: 867Mbps
Operating Frequency	2.4GHz: 2412 ~ 2472MHz 5.0GHz: 5180 ~ 5240MHz, 5260 ~ 5320MHz, 5500 ~ 5720MHz, 5745 ~ 5825MHz
Number of Channel	2412 ~ 2472MHz: 802.11b, 802.11g, 802.11n (HT20): 11 5180 ~ 5240MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1 5260 ~ 5320MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1 5500 ~ 5720MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 12 802.11n (HT40), 802.11ac (VHT40): 6 802.11ac (VHT80): 3 5745 ~ 5825MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 5 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1
Output Power	2412 ~ 2472MHz: 307.610mW 5180 ~ 5240MHz: 111.568mW 5260 ~ 5320MHz: 109.656mW 5500 ~ 5720MHz: 111.952mW 5745 ~ 5825MHz: 109.414mW

Antenna Type	Refer to Note as below
Antenna Connector	Refer to Note as below
Accessory Device	Refer to Note as below
Cable Supplied	Refer to Note as below

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

Band	Modulation Mode	TX Function
2.4GHz	802.11g	1TX(SISO)/2TX(MIMO)
	802.11b	1TX(SISO)/2TX(MIMO)
	802.11n (HT20)	1TX(SISO)/2TX(MIMO)
	802.11ac (VHT20)	1TX(SISO)/2TX(MIMO)
5GHz	802.11a	1TX(SISO)/2TX(MIMO)
	802.11n (HT20)	1TX(SISO)/2TX(MIMO)
	802.11n (HT40)	1TX(SISO)/2TX(MIMO)
	802.11ac (VHT20)	1TX(SISO)/2TX(MIMO)
	802.11ac (VHT40)	1TX(SISO)/2TX(MIMO)
	802.11ac (VHT80)	1TX(SISO)/2TX(MIMO)

* The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz and 802.11ac mode for 20MHz/40MHz, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

* SISO mode and MIMO mode are presented in power output test item. For other test items, MIMO mode is the worst case for final tests after pretesting.

2. There're 2 configurations for the EUT listed as below.

- Main Sample: EUT + Battery 1
- 2nd Sample: EUT + Battery 2

After pre-tested with the EUT, only the worst configuration (main sample) was chosen for the final test.

3. The EUT accessories list refers to EUT Photo.pdf.

4. The following antennas were provided to the EUT.

No.	Type	Connector	Gain (dBi)				
			2.4-2.4835GHz	5.15-5.25 GHz	5.25-5.35 GHz	5.47-5.725 GHz	5.725-5.85 GHz
0	PIFA	NA	-0.6	-2.2	-2.5	-3.6	-3.0
1	PIFA	NA	0	-0.5	-0.5	-1.2	-2.2

3.2 Description of Test Modes

For 2.4GHz

13 channels are provided for 802.11b, 802.11g, 802.11n (HT20) and 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
1	2412MHz	8	2447MHz
2	2417MHz	9	2452MHz
3	2422MHz	10	2457MHz
4	2427MHz	11	2462MHz
5	2432MHz	12	2467MHz
6	2437MHz	13	2472MHz
7	2442MHz		

For 5180 ~ 5240MHz:

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

For 5260 ~ 5320MHz:

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
58	5290MHz

For 5500 ~ 5720MHz:

12 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz	144	5720 MHz

6 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz	142	5710 MHz

3 channels are provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
106	5530 MHz	122	5610 MHz
138	5690 MHz		

For 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

For Bluetooth EDR:

79 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

For Bluetooth LE:

40 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to			Description
	RE $\geq$ 1G	RE<1G	OB	
-	√	√	√	-

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

RE<1G: Radiated Emission below 1GHz

OB: Conducted Out-Band Emission Measurement

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

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	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Technology
-	802.11b (SISO Ant. 0) + 802.11ac (VHT20) (SISO Ant. 1)	2412 ~ 2472	1 to 11	6 + 36	DSSS
		5180 ~ 5240	38 to 46		OFDM
		5260 ~ 5320	52 to 64		OFDM
		5500 ~ 5720	100 to 144		OFDM
		5745 ~ 5825	149 to 165		OFDM
-	BT GFSK (Ant. 0) + 802.11b (SISO Ant. 1)	2402 ~ 2480	0 to 78	0 + 6	FHSS
		2412 ~ 2472	1 to 11		DSSS
-	BT GFSK (Ant. 0) + 802.11ac (VHT20) (MIMO Ant. 0+1)	2402 ~ 2480	0 to 78	0 + 100	FHSS
		5180 ~ 5240	38 to 46		OFDM
		5260 ~ 5320	52 to 64		OFDM
		5500 ~ 5720	100 to 144		OFDM
		5745 ~ 5825	149 to 165		OFDM

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	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Technology
-	802.11b (SISO Ant. 0) + 802.11ac (VHT20) (SISO Ant. 1)	2412 ~ 2472	1 to 11	6 + 36	DSSS
		5180 ~ 5240	38 to 46		OFDM
		5260 ~ 5320	52 to 64		OFDM
		5500 ~ 5720	100 to 144		OFDM
		5745 ~ 5825	149 to 165		OFDM
-	BT GFSK (Ant. 0) + 802.11b (SISO Ant. 1)	2402 ~ 2480	0 to 78	0 + 6	FHSS
		2412 ~ 2472	1 to 11		DSSS
-	BT GFSK (Ant. 0) + 802.11ac (VHT20) (MIMO Ant. 0+1)	2402 ~ 2480	0 to 78	0 + 100	FHSS
		5180 ~ 5240	38 to 46		OFDM
		5260 ~ 5320	52 to 64		OFDM
		5500 ~ 5720	100 to 144		OFDM
		5745 ~ 5825	149 to 165		OFDM

Conducted Out-Band Emission Measurement

- ☒ 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	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Technology
-	BT GFSK (Ant. 0) + 802.11ac (VHT20) (MIMO Ant. 0+1)	2402 ~ 2480	0 to 78	0 + 100	FHSS
		5180 ~ 5240	38 to 46		OFDM
		5260 ~ 5320	52 to 64		OFDM
		5500 ~ 5720	100 to 144		OFDM
		5745 ~ 5825	149 to 165		OFDM

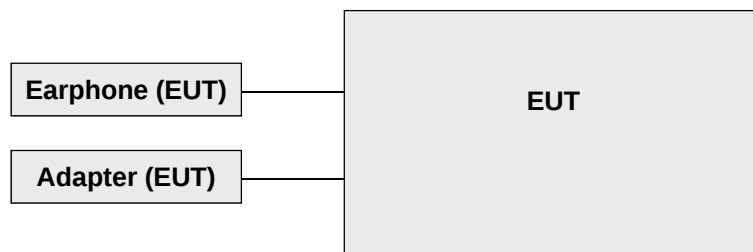
Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	22 deg. C, 68% RH 22 deg. C, 69% RH	120Vac, 60Hz	Rey Chen
RE<1G	23 deg. C, 68% RH	120Vac, 60Hz	Weiwei Lo
OB	25 deg. C, 75% RH	120Vac, 60Hz	Weiwei Lo

3.3 Description of Support Units

The EUT has been tested as an independent unit.

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specification of the EUT declared by the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

FCC Part 15, Subpart E (15.407)

ANSI C63.10-2013

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

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 30dB 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.

Limits of unwanted emission out of the restricted bands

Applicable To		Limit	
789033 D02 General UNII Test Procedure New Rules v02r01		Field Strength at 3m	
		PK: 74 (dBμV/m)	AV: 54 (dBμV/m)
Frequency Band	Applicable To	EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.2(dBμV/m)
5250~5350 MHz	15.407(b)(2)		
5470~5725 MHz	15.407(b)(3)		
5725~5850 MHz	☒ 15.407(b)(4)(i)	PK: -27 (dBm/MHz) ^{*1} PK: 10 (dBm/MHz) ^{*2} PK: 15.6 (dBm/MHz) ^{*3} PK: 27 (dBm/MHz) ^{*4}	PK: 68.2(dBμV/m) ^{*1} PK: 105.2 (dBμV/m) ^{*2} PK: 110.8(dBμV/m) ^{*3} PK: 122.2 (dBμV/m) ^{*4}
	☐ 15.407(b)(4)(ii)	Emission limits in section 15.247(d)	
^{*1} beyond 75 MHz or more above of the band edge.		^{*2} below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.	
^{*3} below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.		^{*4} from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.	

Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver Agilent	N9038A	MY50010156	July 12, 2018	July 11, 2019
Pre-Amplifier EMCI (Below 30MHz)	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna(*) Electro-Metrics (Below 30MHz)	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable (Below 30MHz)	NA	LOOPCAB-001	Jan. 15, 2018	Jan. 14, 2019
RF Cable (Below 30MHz)	NA	LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits (30MHz~1GHz)	ZFL-1000VH2B	AMP-ZFL-05	May 05, 2018	May 04, 2019
Trilog Broadband Antenna SCHWARZBECK (30MHz~1GHz)	VULB 9168	9168-361	Jan. 15, 2018	Jan. 14, 2019
RF Cable (30MHz~1GHz)	8D	966-3-1	Mar. 20, 2018	Mar. 19, 2019
RF Cable (30MHz~1GHz)	8D	966-3-2	Mar. 20, 2018	Mar. 19, 2019
RF Cable (30MHz~1GHz)	8D	966-3-3	Mar. 20, 2018	Mar. 19, 2019
Fixed attenuator Mini-Circuits (30MHz~1GHz)	UNAT-5+	PAD-3m-3-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK (1GHz~18GHz)	BBHA9120-D	9120D-406	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier EMCI (1GHz~18GHz)	EMC12630SE	980384	Jan. 29, 2018	Jan. 28, 2019
RF Cable (1GHz~18GHz)	EMC104-SM-SM-1200	160922	Jan. 29, 2018	Jan. 28, 2019
RF Cable (1GHz~18GHz)	EMC104-SM-SM-2000	150317	Jan. 29, 2018	Jan. 28, 2019
RF Cable (1GHz~18GHz)	EMC104-SM-SM-5000	150322	Jan. 29, 2018	Jan. 28, 2019
Spectrum Analyzer Keysight (18GHz~40GHz)	N9030A	MY54490679	July 23, 2018	July 22, 2019
Pre-Amplifier EMCI (18GHz~40GHz)	EMC184045SE	980386	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK (18GHz~40GHz)	BBHA 9170	BBHA9170519	Jan. 15, 2018	Jan. 14, 2019
RF Cable (18GHz~40GHz)	EMC102-KM-KM-1200	160924	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture (1GHz~18GHz)	FBA-01	FBA-SIP01	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months (24 months for Loop Antenna) and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Hsinchu 966 Chamber No. 3.
4. The Industry Canada Reference No. 20331-1.

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:

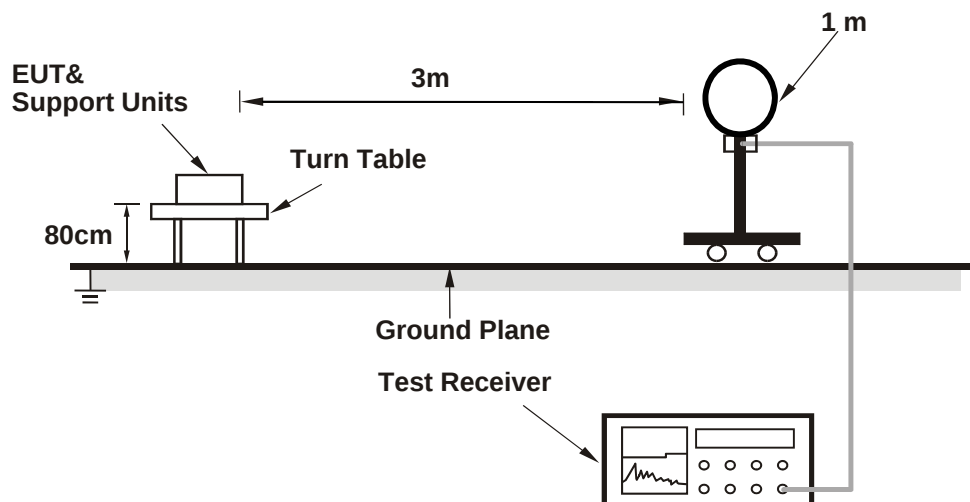
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

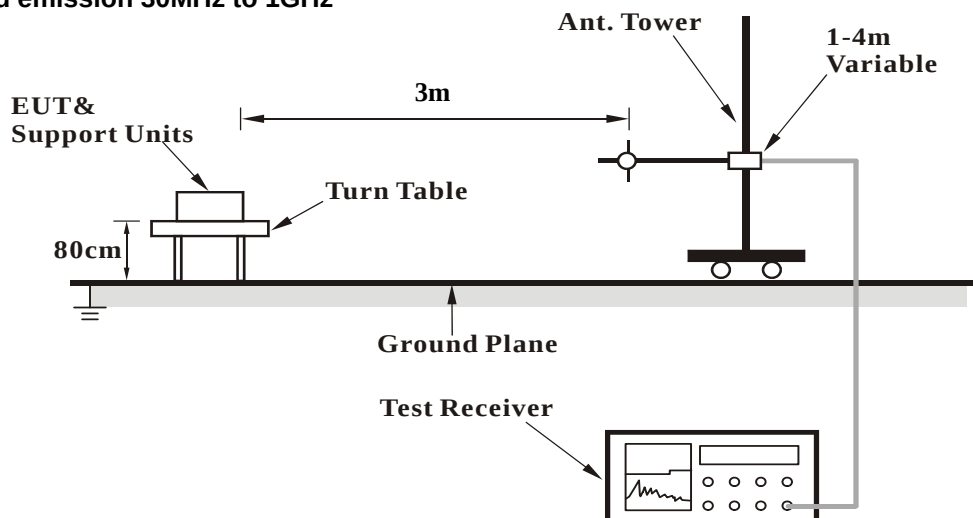
No deviation.

4.1.5 Test Setup

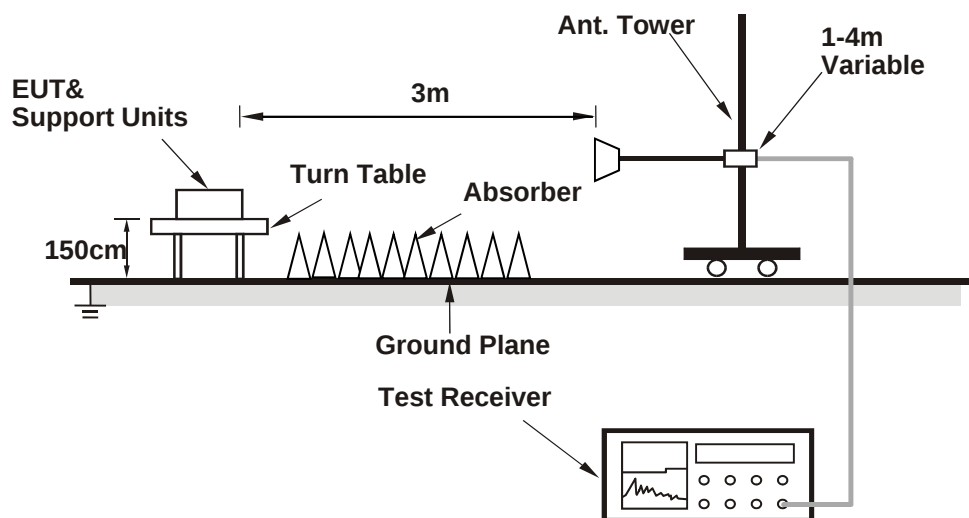
For Radiated emission below 30MHz



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 for Fundamental and Harmonic above 1GHz

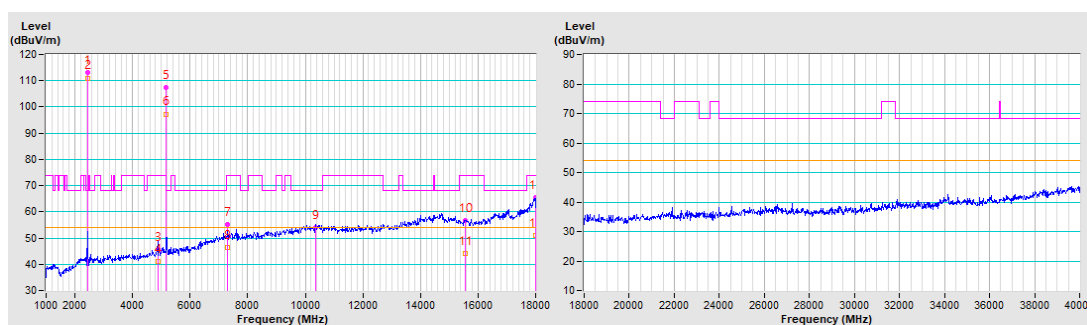
802.11b (SISO Ant. 0) + 802.11ac (VHT20) (SISO Ant. 1)

CHANNEL	CH 6 + CH 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	113.2 PK			1.54 H	173	116.2	-3.0
2	*2437.00	111.0 AV			1.54 H	173	114.0	-3.0
3	4874.00	45.6 PK	74.0	-28.4	1.59 H	189	44.0	1.6
4	4874.00	40.9 AV	54.0	-13.1	1.59 H	189	39.3	1.6
5	*5180.00	107.3 PK			1.29 H	276	104.8	2.5
6	*5180.00	97.3 AV			1.29 H	276	94.8	2.5
7	7311.00	55.1 PK	74.0	-18.9	1.14 H	267	47.4	7.7
8	7311.00	46.4 AV	54.0	-7.6	1.14 H	267	38.7	7.7
9	#10360.00	53.9 PK	68.2	-14.3	1.65 H	142	42.0	11.9
10	15540.00	56.6 PK	74.0	-17.4	1.73 H	193	44.2	12.4
11	15540.00	44.0 AV	54.0	-10.0	1.73 H	193	31.6	12.4
12	17991.92	65.3 PK	74.0	-8.7	1.46 H	255	43.5	21.8
13	17991.92	50.8 AV	54.0	-3.2	1.46 H	255	29.0	21.8

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

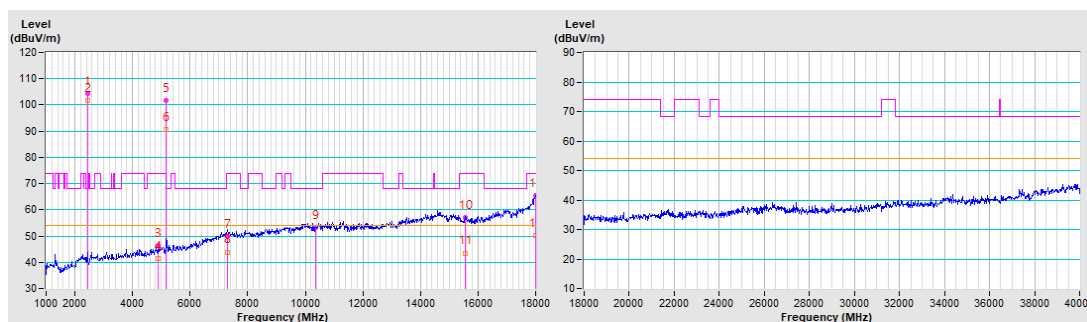


CHANNEL	CH 6 + CH 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	104.3 PK			2.06 V	155	107.3	-3.0
2	*2437.00	101.8 AV			2.06 V	155	104.8	-3.0
3	4874.00	46.3 PK	74.0	-27.7	1.37 V	62	44.7	1.6
4	4874.00	41.5 AV	54.0	-12.5	1.37 V	62	39.9	1.6
5	*5180.00	101.6 PK			1.29 V	160	99.1	2.5
6	*5180.00	90.6 AV			1.29 V	160	88.1	2.5
7	7311.00	49.9 PK	74.0	-24.1	1.55 V	360	42.2	7.7
8	7311.00	43.9 AV	54.0	-10.1	1.55 V	360	36.2	7.7
9	#10360.00	53.1 PK	68.2	-15.1	1.62 V	294	41.2	11.9
10	15540.00	57.0 PK	74.0	-17.0	2.07 V	190	44.6	12.4
11	15540.00	43.5 AV	54.0	-10.5	2.07 V	190	31.1	12.4
12	17999.58	65.6 PK	74.0	-8.4	2.17 V	265	43.7	21.9
13	17999.58	50.2 AV	54.0	-3.8	2.17 V	265	28.3	21.9

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



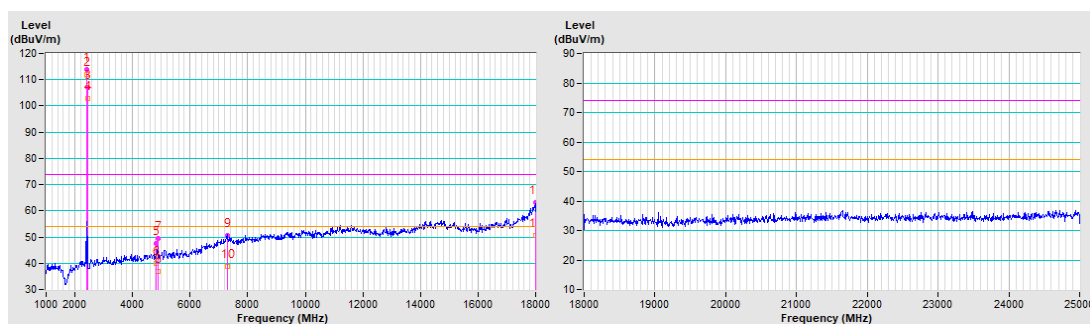
BT GFSK (Ant. 0) + 802.11b (SISO Ant. 1)

CHANNEL	CH 0 + CH 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2402.00	113.8 PK			1.51 H	169	116.5	-2.7
2	*2402.00	112.1 AV			1.51 H	169	114.8	-2.7
3	*2437.00	107.1 PK			1.47 H	306	110.1	-3.0
4	+2437.00	102.7 AV			1.47 H	306	105.7	-3.0
5	4804.00	47.4 PK	74.0	-26.6	1.51 H	185	45.8	1.6
6	4804.00	39.9 AV	54.0	-14.1	1.51 H	185	38.3	1.6
7	4874.00	49.4 PK	74.0	-24.6	1.09 H	151	47.8	1.6
8	4874.00	37.0 AV	54.0	-17.0	1.09 H	151	35.4	1.6
9	7311.00	50.5 PK	74.0	-23.5	1.73 H	142	42.8	7.7
10	7311.00	38.9 AV	54.0	-15.1	1.73 H	142	31.2	7.7
11	17989.80	63.2 PK	74.0	-10.8	1.88 H	201	41.4	21.8
12	17989.80	50.7 AV	54.0	-3.3	1.88 H	201	28.9	21.8

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

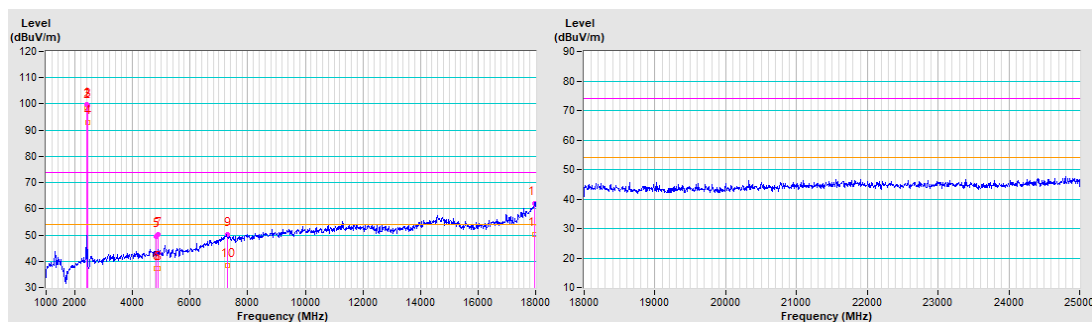


CHANNEL	CH 0 + CH 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2402.00	99.6 PK			1.60 V	170	102.3	-2.7
2	*2402.00	98.8 AV			1.60 V	170	101.5	-2.7
3	*2437.00	99.4 PK			1.09 V	360	102.4	-3.0
4	*2437.00	92.9 AV			1.09 V	360	95.9	-3.0
5	4804.00	49.6 PK	74.0	-24.4	1.61 V	318	48.0	1.6
6	4804.00	37.3 AV	54.0	-16.7	1.61 V	318	35.7	1.6
7	4874.00	50.2 PK	74.0	-23.8	1.15 V	163	48.6	1.6
8	4874.00	37.3 AV	54.0	-16.7	1.15 V	163	35.7	1.6
9	7311.00	50.3 PK	74.0	-23.7	1.64 V	152	42.6	7.7
10	7311.00	38.5 AV	54.0	-15.5	1.64 V	152	30.8	7.7
11	17971.53	62.1 PK	74.0	-11.9	1.41 V	102	40.7	21.4
12	17971.53	50.2 AV	54.0	-3.8	1.41 V	102	28.8	21.4

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



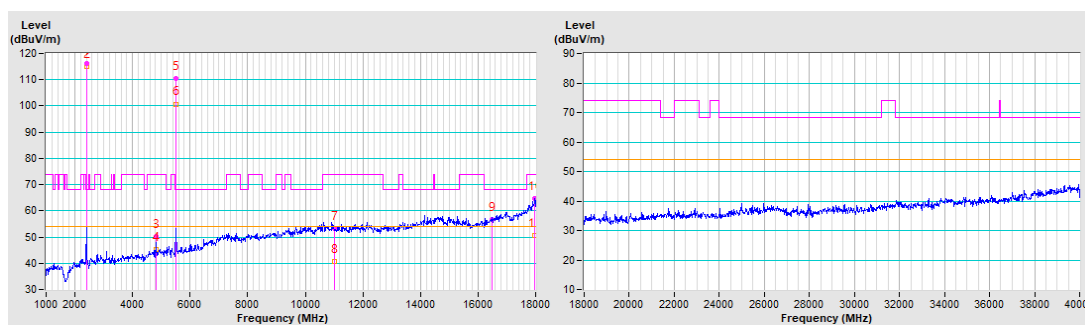
BT GFSK (Ant. 0) + 802.11ac (VHT20) (MIMO Ant. 0+1)

CHANNEL	CH 0 + CH 100	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2402.00	116.1 PK			3.09 H	165	118.8	-2.7
2	*2402.00	115.1 AV			3.09 H	165	117.8	-2.7
3	4804.00	50.1 PK	74.0	-23.9	1.33 H	187	48.5	1.6
4	4804.00	45.2 AV	54.0	-8.8	1.33 H	187	43.6	1.6
5	*5500.00	110.6 PK			1.42 H	165	108.1	2.5
6	*5500.00	100.7 AV			1.42 H	165	98.2	2.5
7	11000.00	53.4 PK	74.0	-20.6	1.63 H	164	41.2	12.2
8	11000.00	40.7 AV	54.0	-13.3	1.63 H	164	28.5	12.2
9	#16500.00	56.8 PK	68.2	-11.4	1.79 H	179	43.1	13.7
10	17966.85	64.6 PK	74.0	-9.4	1.54 H	114	43.2	21.4
11	17966.85	50.6 AV	54.0	-3.4	1.54 H	114	29.2	21.4

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

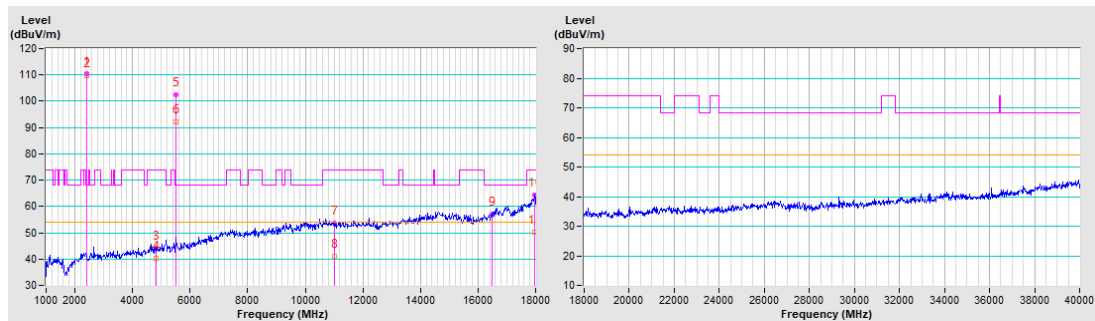


CHANNEL	CH 0 + CH 100	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2402.00	110.5 PK			3.96 V	199	113.2	-2.7
2	*2402.00	109.8 AV			3.96 V	199	112.5	-2.7
3	4804.00	44.2 PK	74.0	-29.8	3.01 V	171	42.6	1.6
4	4804.00	40.4 AV	54.0	-13.6	3.01 V	171	38.8	1.6
5	*5500.00	102.6 PK			3.18 V	291	100.1	2.5
6	*5500.00	92.2 AV			3.18 V	291	89.7	2.5
7	11000.00	53.6 PK	74.0	-20.4	1.69 V	307	41.4	12.2
8	11000.00	41.0 AV	54.0	-13.0	1.69 V	307	28.8	12.2
9	#16500.00	57.0 PK	68.2	-11.2	2.03 V	171	43.3	13.7
10	17982.58	64.3 PK	74.0	-9.7	1.47 V	255	42.7	21.6
11	17982.58	50.1 AV	54.0	-3.9	1.47 V	255	28.5	21.6

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



4.1.8 Test Results for Bandedge above 1GHz

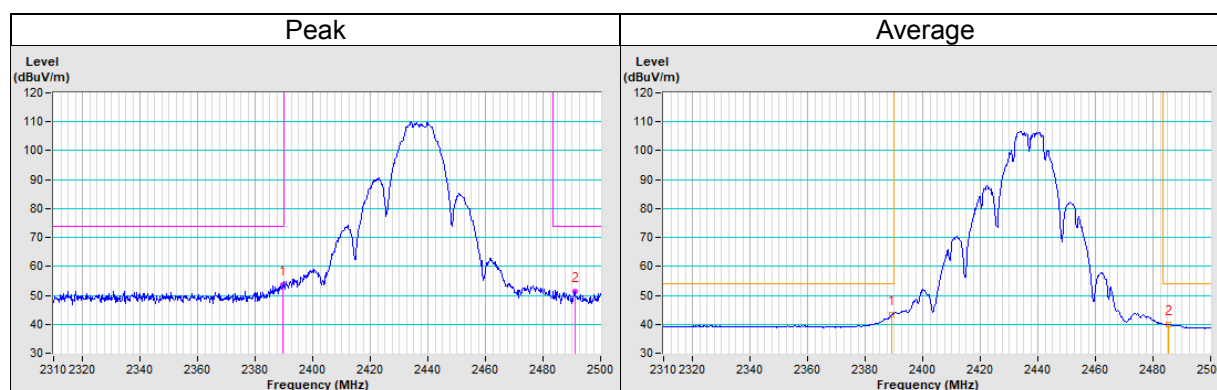
802.11b (SISO Ant. 0) + 802.11ac (VHT20) (SISO Ant. 1)

CHANNEL	CH 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	2310MHz ~ 2500MHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
PK.1	2389.69	53.5 PK	74.0	-20.5	1.54 H	173	56.2	-2.7
PK.2	2491.07	51.4 PK	74.0	-22.6	1.54 H	173	54.3	-2.9
AV.1	2389.22	43.3 AV	54.0	-10.7	1.54 H	173	46.0	-2.7
AV.2	2485.26	40.0 AV	54.0	-14.0	1.54 H	173	42.9	-2.9

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.

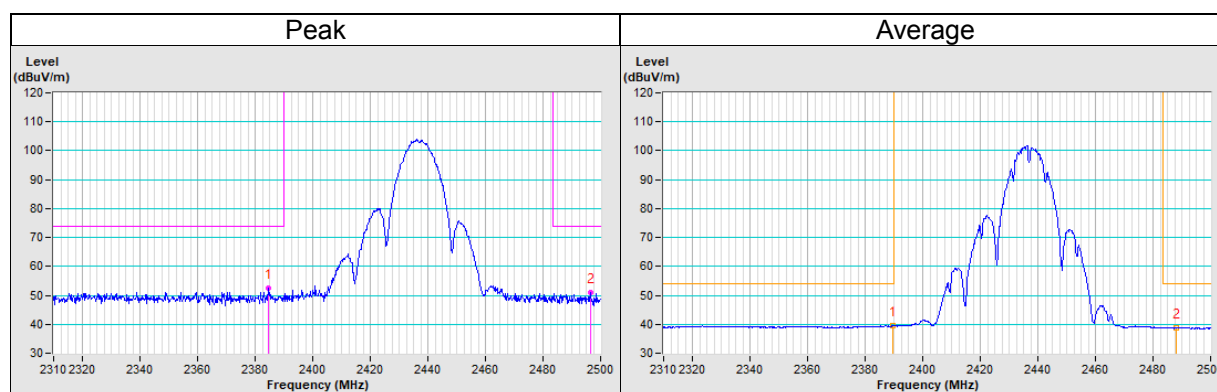


CHANNEL	CH 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	2310MHz ~ 2500MHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
PK.1	2384.45	52.4 PK	74.0	-21.6	2.06 V	155	55.1	-2.7
PK.2	2496.54	51.1 PK	74.0	-22.9	2.06 V	155	54.0	-2.9
AV.1	2389.56	39.5 AV	54.0	-14.5	2.06 V	155	42.2	-2.7
AV.2	2487.91	38.9 AV	54.0	-15.1	2.06 V	155	41.8	-2.9

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.

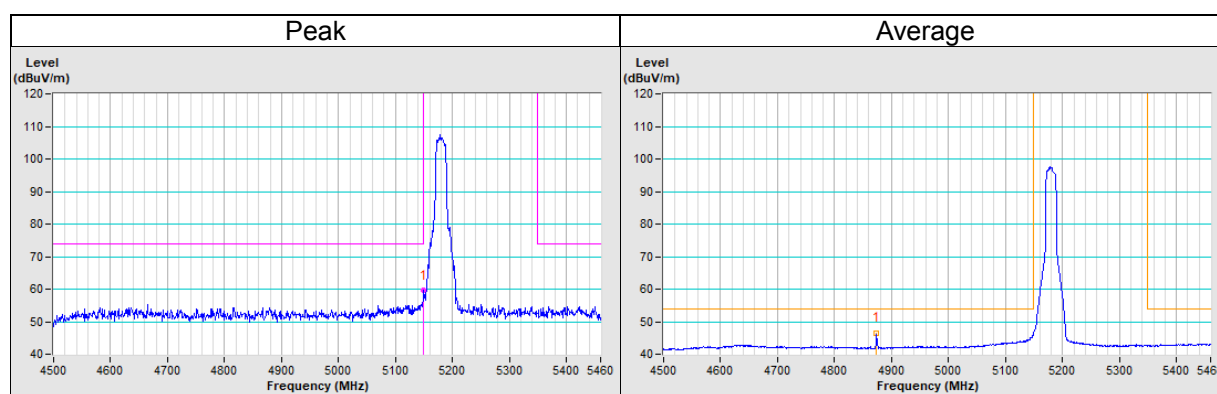


CHANNEL	CH 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	4500MHz ~ 5460MHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
PK.1	5149.13	59.5 PK	74.0	-14.5	1.29 H	276	56.9	2.6
AV.1	4874.04	46.4 AV	54.0	-7.6	1.29 H	276	44.8	1.6

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.

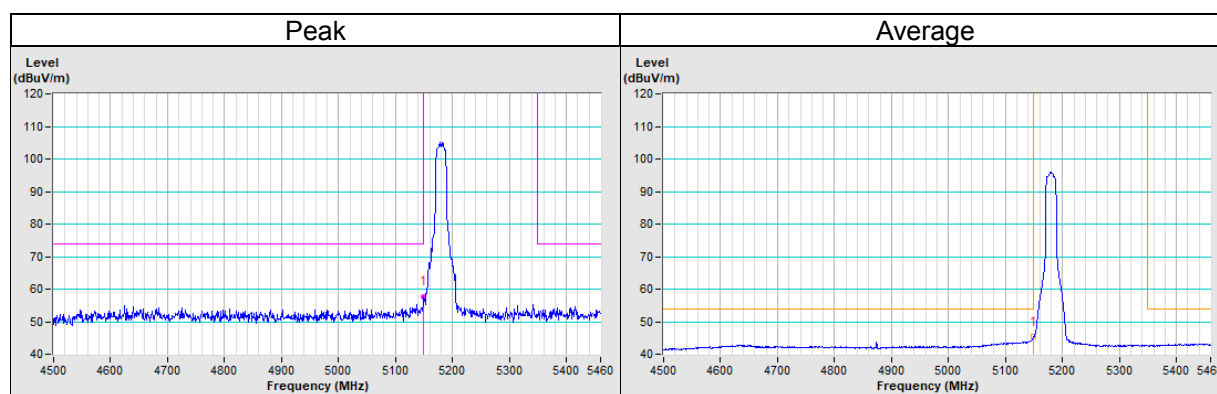


CHANNEL	CH 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	4500MHz ~ 5460MHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
PK.1	5149.46	57.7 PK	74.0	-16.3	1.29 V	160	55.1	2.6
AV.1	5149.75	45.3 AV	54.0	-8.7	1.29 V	160	42.7	2.6

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.



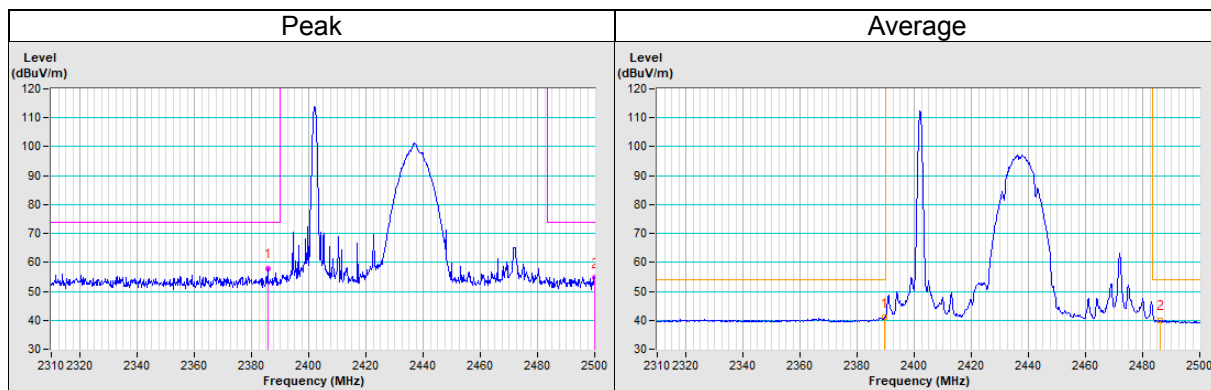
BT GFSK (Ant. 0) + 802.11b (SISO Ant. 1)

CHANNEL	CH 0 + CH 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	2310MHz ~ 2500MHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
PK.1	2385.72	58.0 PK	74.0	-16.0	1.51 H	169	60.7	-2.7
PK.2	2499.91	54.9 PK	74.0	-19.1	1.51 H	169	57.8	-2.9
AV.1	2389.77	41.2 AV	54.0	-12.8	1.51 H	169	43.9	-2.7
AV.2	2486.06	40.1 AV	54.0	-13.9	1.51 H	169	43.0	-2.9

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

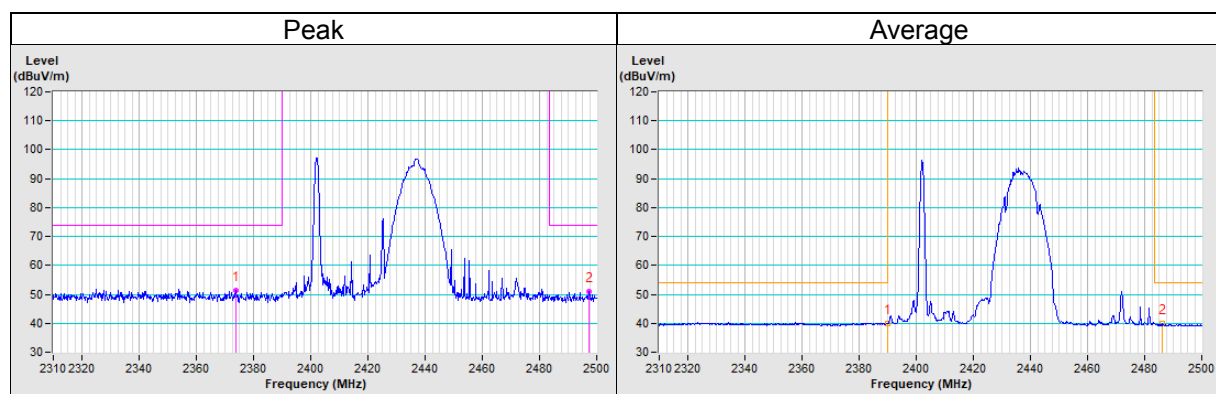


CHANNEL	CH 0 + CH 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	2310MHz ~ 2500MHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
PK.1	2373.83	51.2 PK	74.0	-22.8	1.60 V	170	53.8	-2.6
PK.2	2497.14	50.9 PK	74.0	-23.1	1.60 V	170	53.8	-2.9
AV.1	#2390.06	40.0 AV	130.0	-90.0	1.60 V	170	42.7	-2.7
AV.2	2486.30	39.9 AV	54.0	-14.1	1.60 V	170	42.8	-2.9

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



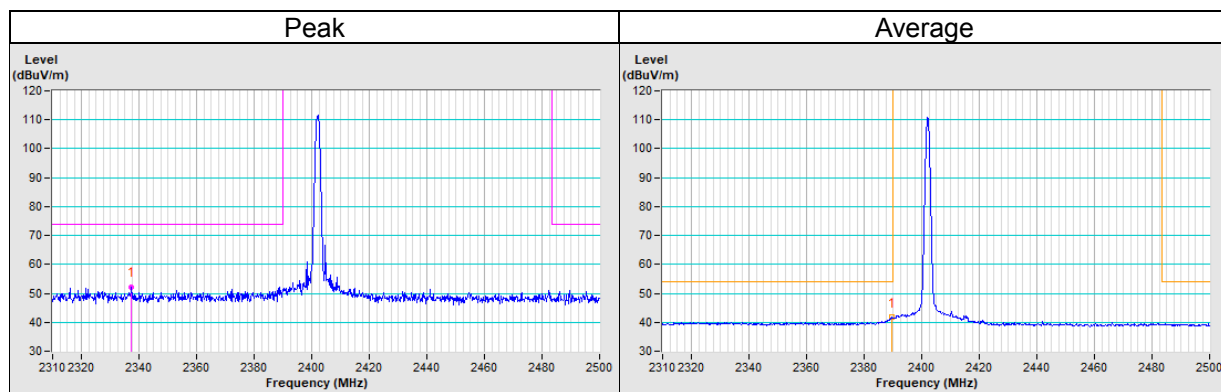
BT GFSK (Ant. 0) + 802.11ac (VHT20) (MIMO Ant. 0+1)

CHANNEL	CH 0	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	2310MHz ~ 2500MHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
PK.1	2337.36	52.3 PK	74.0	-21.7	3.09 H	165	54.8	-2.5
AV.1	2389.65	41.7 AV	54.0	-12.3	3.09 H	165	44.4	-2.7

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.

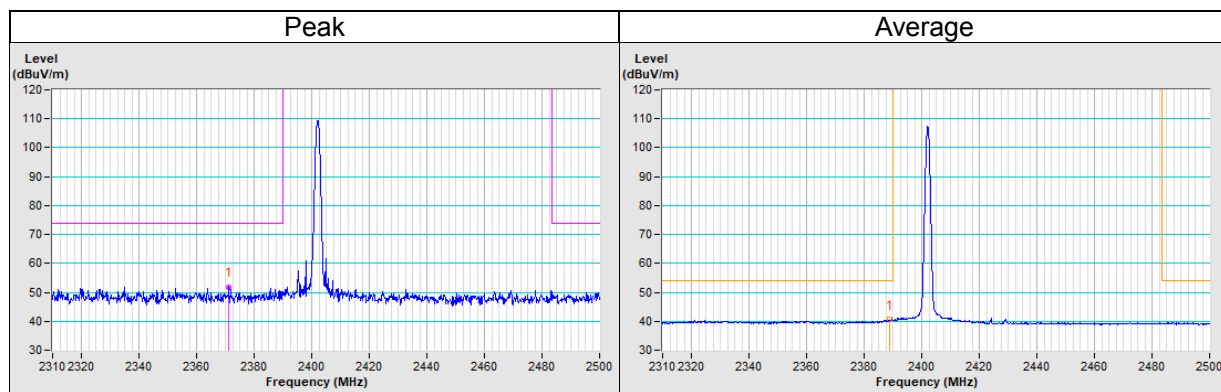


CHANNEL	CH 0	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	2310MHz ~ 2500MHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
PK.1	2371.07	51.9 PK	74.0	-22.1	3.96 V	199	54.5	-2.6
AV.1	2388.98	40.5 AV	54.0	-13.5	3.96 V	199	43.2	-2.7

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.

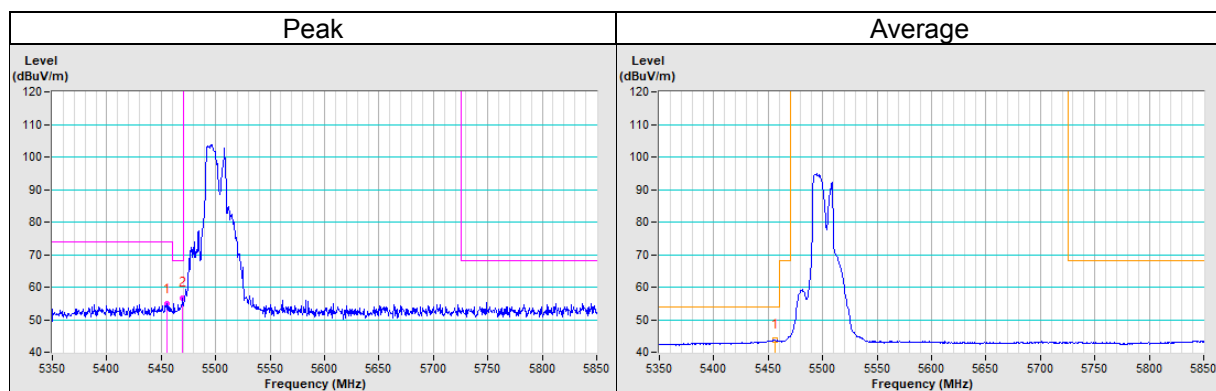


CHANNEL	CH 100	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	5350MHz ~ 5850MHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
PK.1	5455.30	54.8 PK	74.0	-19.2	1.42 H	165	52.1	2.7
PK.2	#5469.06	56.6 PK	68.2	-11.6	1.42 H	165	54.0	2.6
AV.1	5456.41	43.8 AV	54.0	-10.2	1.42 H	165	41.1	2.7

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

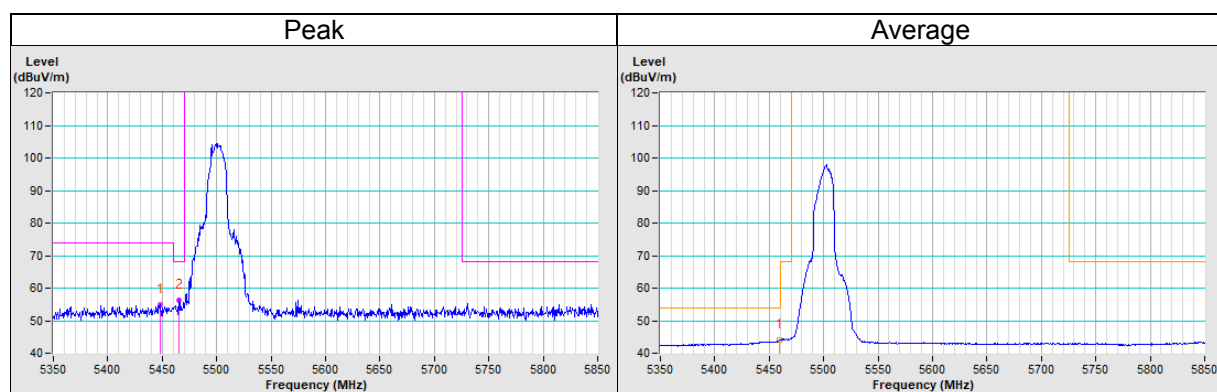


CHANNEL	CH 100	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	5350MHz ~ 5850MHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
PK.1	5447.69	54.9 PK	74.0	-19.1	3.18 V	291	52.2	2.7
PK.2	#5465.34	56.4 PK	68.2	-11.8	3.18 V	291	53.8	2.6
AV.1	5458.98	44.0 AV	54.0	-10.0	3.18 V	291	41.3	2.7

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



4.1.9 Test Results for below 1GHz

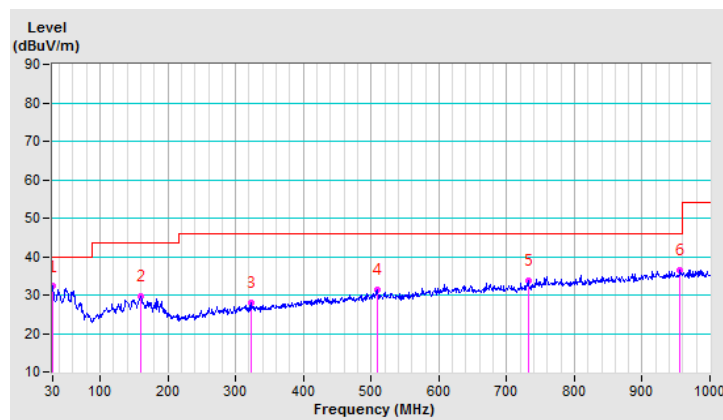
802.11b (SISO Ant. 0) + 802.11ac (VHT20) (SISO Ant. 1)

CHANNEL	CH 6 + CH 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (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	32.2 PK	40.0	-7.8	2.50 H	0	41.8	-9.6
2	159.35	29.7 PK	43.5	-13.8	1.00 H	64	38.0	-8.3
3	323.04	27.9 PK	46.0	-18.1	1.50 H	143	34.2	-6.3
4	509.64	31.4 PK	46.0	-14.6	3.00 H	360	33.1	-1.7
5	731.55	33.7 PK	46.0	-12.3	1.50 H	88	31.6	2.1
6	955.45	36.5 PK	46.0	-9.5	1.50 H	234	31.1	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. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
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
6. The PK detector measurement value is much smaller than the limit QP value, so the pass is determined

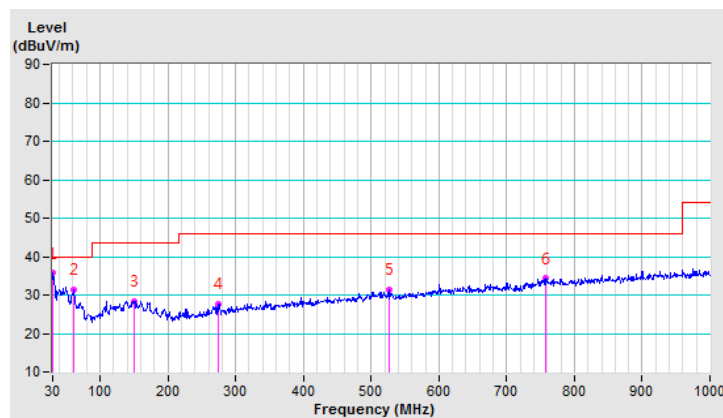


CHANNEL	CH 6 + CH 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.02	35.6 PK	40.0	-4.4	1.50 V	10	45.3	-9.7
2	61.11	31.3 PK	40.0	-8.7	1.00 V	4	40.7	-9.4
3	150.74	28.3 PK	43.5	-15.2	1.00 V	146	36.3	-8.0
4	274.95	27.7 PK	46.0	-18.3	3.50 V	360	35.7	-8.0
5	526.37	31.3 PK	46.0	-14.7	2.50 V	296	33.1	-1.8
6	757.35	34.3 PK	46.0	-11.7	3.00 V	134	31.3	3.0

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. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
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
6. The PK detector measurement value is much smaller than the limit QP value, so the pass is determined



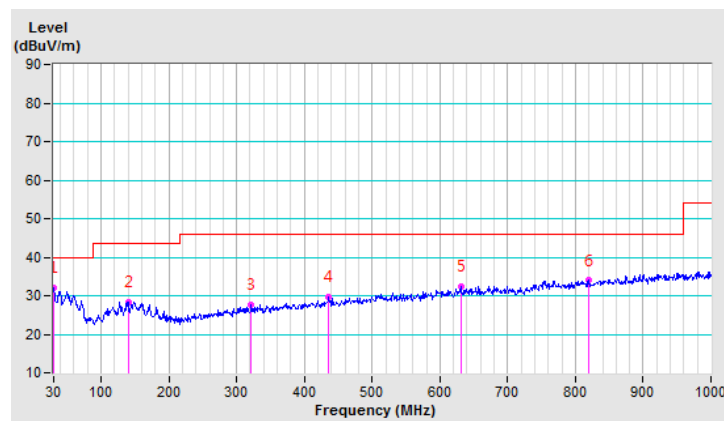
BT GFSK (Ant. 0) + 802.11b (SISO Ant. 1)

CHANNEL	CH 0 + CH 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (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	32.2 PK	40.0	-7.8	1.00 H	239	41.8	-9.6
2	140.51	28.4 PK	43.5	-15.1	1.00 H	56	36.9	-8.5
3	321.75	27.6 PK	46.0	-18.4	2.00 H	104	34.0	-6.4
4	435.73	29.6 PK	46.0	-16.4	2.00 H	345	33.3	-3.7
5	630.96	32.4 PK	46.0	-13.6	2.00 H	101	31.5	0.9
6	819.24	33.9 PK	46.0	-12.1	1.50 H	347	30.3	3.6

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. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
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
6. The PK detector measurement value is much smaller than the limit QP value, so the pass is determined

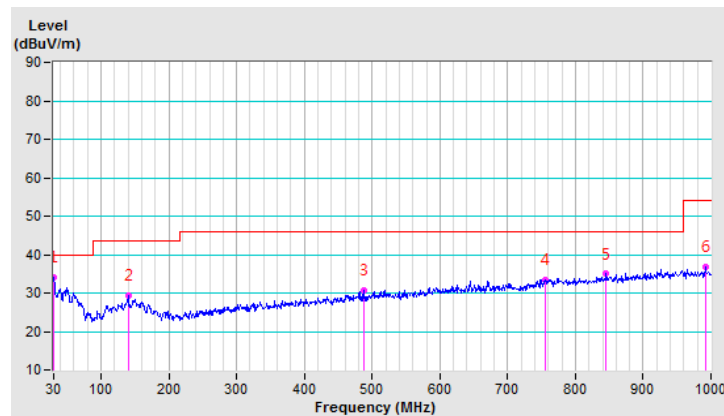


CHANNEL	CH 0 + CH 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.12	34.1 PK	40.0	-5.9	1.50 V	289	43.8	-9.7
2	139.76	29.3 PK	43.5	-14.2	1.00 V	252	37.9	-8.6
3	488.08	30.8 PK	46.0	-15.2	1.00 V	316	33.2	-2.4
4	755.44	33.5 PK	46.0	-12.5	2.00 V	252	30.5	3.0
5	845.31	35.0 PK	46.0	-11.0	1.00 V	118	30.9	4.1
6	991.54	36.8 PK	54.0	-17.2	1.00 V	360	31.1	5.7

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. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
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
6. The PK detector measurement value is much smaller than the limit QP value, so the pass is determined



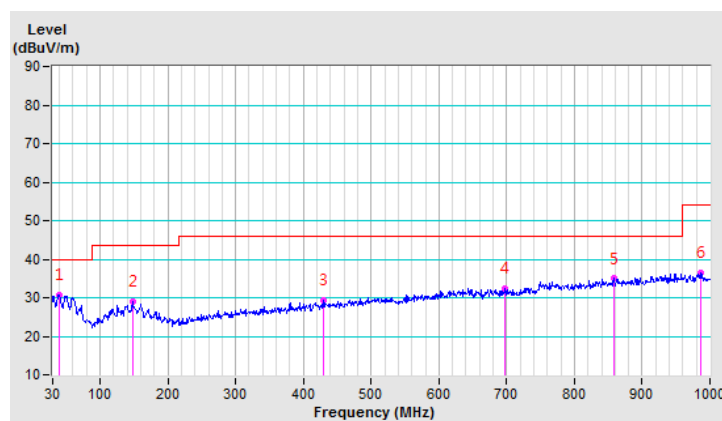
BT GFSK (Ant. 0) + 802.11ac (VHT20) (MIMO Ant. 0+1)

CHANNEL	CH 0 + CH 100	DETECTOR FUNCTION	Quasi-Peak (PK)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	39.68	30.8 PK	40.0	-9.2	1.00 H	192	40.4	-9.6
2	147.64	29.1 PK	43.5	-14.4	1.50 H	360	37.2	-8.1
3	429.79	29.4 PK	46.0	-16.6	1.00 H	360	33.2	-3.8
4	697.46	32.5 PK	46.0	-13.5	1.50 H	308	30.8	1.7
5	858.53	35.0 PK	46.0	-11.0	2.00 H	0	30.8	4.2
6	986.15	36.4 PK	54.0	-17.6	2.00 H	350	30.6	5.8

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. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
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
6. The PK detector measurement value is much smaller than the limit QP value, so the pass is determined

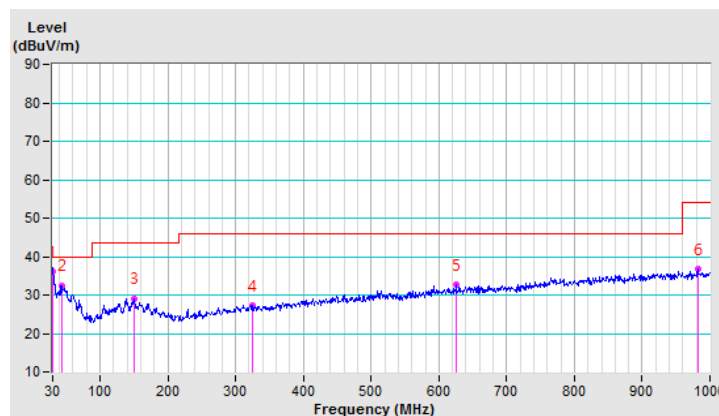


CHANNEL	CH 0 + CH 100	DETECTOR FUNCTION	Quasi-Peak (PK)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (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	36.0 PK	40.0	-4.0	1.00 V	300	45.6	-9.6
2	44.48	32.4 PK	40.0	-7.6	1.00 V	360	41.6	-9.2
3	149.46	29.0 PK	43.5	-14.5	3.50 V	166	37.0	-8.0
4	325.37	27.2 PK	46.0	-18.8	2.50 V	274	33.5	-6.3
5	624.63	32.6 PK	46.0	-13.4	1.50 V	0	32.0	0.6
6	982.25	36.6 PK	54.0	-17.4	2.50 V	220	30.8	5.8

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. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
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
6. The PK detector measurement value is much smaller than the limit QP value, so the pass is determined

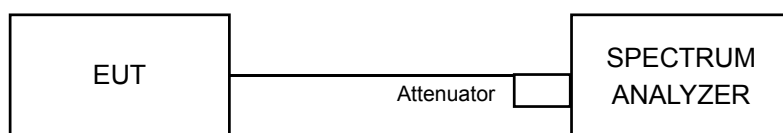


4.2 Conducted Out of Band Emission Measurement

4.2.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedure

MEASUREMENT PROCEDURE REF

- Set the RBW = 100 kHz.
- Set the VBW $\geq$ 300 kHz.
- Detector = average.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOB

- Set RBW = 100 kHz.
- Set VBW $\geq$ 300 kHz.
- Detector = average.
- Sweep = auto couple.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

4.2.5 Deviation from Test Standard

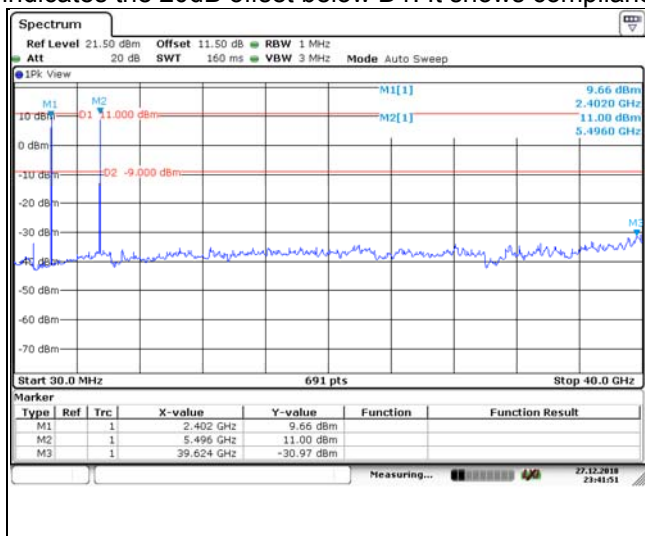
No deviation.

4.2.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.2.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



5 Pictures of Test Arrangements

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

Appendix – Information on 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:

Linko 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 ---