Supplemental “Transmit Simultaneously” Test Report

Report No.:	RF200603E15-2
FCC ID:	K7S-03580
Test Model:	MX4200
Series Model:	MX4050, MX4000, MX4200C
Received Date:	June 03, 2020
Test Date:	June 26 to July 02, 2020
Issued Date:	July 17, 2020
Applicant:	Belkin International, Inc.
Address:	12045 East Waterfront Drive Playa Vista, CA. 90094, USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
RF200603E15-2	Original release.	July 17, 2020

1 Certificate of Conformity

Product:	Velop AX4200 WiFi 6 System
Brand:	Linksys
Test Model:	MX4200
Series Model:	MX4050, MX4000, MX4200C
Sample Status:	ENGINEERING SAMPLE
Applicant:	Belkin International, Inc.
Test Date:	June 26 to July 02, 2020
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 EMC characteristics under the conditions specified in this report.

Prepared by : Phoenix Huang / Specialist , **Date:** July 17, 2020

Approved by : Clark Lin / Technical Manager , **Date:** July 17, 2020

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C, E (SECTION 15.247, 15.407)			
FCC Clause	Test Item	Result	Remarks
15.207 15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -13.42 dB at 0.15000 MHz.
15.205 / 15.209 / 15.247(d) 15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -3.8 dB at 34.18 MHz.

Note:
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) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.9 dB
Conducted emissions	-	2.5 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.1 dB
	30MHz ~ 1GHz	5.4 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.0 dB
	18GHz ~ 40GHz	5.3 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Velop AX4200 WiFi 6 System
Brand	Linksys
Test Model	MX4200
Series Model	MX4050, MX4000, MX4200C
Status of EUT	ENGINEERING SAMPLE
Driver version	2.2
Power Supply Rating	12Vdc from power adapter
Modulation Type	**WLAN:** CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz 1024QAM for OFDMA in 11ax HE mode
Modulation Technology	**WLAN:** DSSS, OFDM, OFDMA
Transfer Rate	**WLAN:** 802.11b: up to 11 Mbps 802.11a/g: up to 54 Mbps 802.11n: up to 600 Mbps 802.11ac: up to 1733.3 Mbps 802.11ax: up to 2401.9 Mbps **BT_LE:** up to 2 Mbps
Operating Frequency	**WLAN (2.4GHz):** 2.412 ~ 2.462 GHz **WLAN (5GHz):** 5.18~ 5.24 GHz, 5.745 ~ 5.825 GHz **BT_LE-1M:** 2.402 ~ 2.480 GHz **BT_LE-2M:** 2.404 ~ 2.478 GHz
Number of Channel	**WLAN (2.4GHz):** 802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 11 802.11n (HT40), VHT40, 802.11ax (HE40): 7 **WLAN (5GHz):** 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 9 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 4 802.11ac (VHT80), 802.11ax (HE80): 2 **BT_LE-1M:** 40 **BT_LE-2M:** 37
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	NA

Note:

1. All models are listed as below.

Brand	Model	Difference
Linksys	MX4200	for marketing request
	MX4050	
	MX4000	
	MX4200C	
Note: From the above models, model: MX4200 was selected as representative model for the test and its data was recorded in this report.		

2. There are WLAN and Bluetooth technology used for the EUT. The EUT has four radios as following table:

Radio 1	Radio 2	Radio 3	Radio 4
WLAN 2.4GHz	WLAN 5GHz (low band)	WLAN 5GHz (high band)	Bluetooth

3. Simultaneously transmission condition.

Condition	Technology			
1	WLAN 2.4GHz	WLAN 5GHz (low band)	WLAN 5GHz (high band)	Bluetooth

4. The EUT must be supplied power adapter and following different models could be chosen as following table:

No.	Brand	Model No.	Spec.	Plug
1	APD	WA-36N12R	Input: 100-240Vac, 0.9A, 50-60Hz Output: 12Vdc, 3.0A DC Output cable: Unshielded, 1.5m	Interchangeable
2	APD	WA-36N12FU	Input: 100-240Vac, 0.9A, 50-60Hz Output: 12Vdc, 3.0A DC Output cable: Unshielded, 1.5m	US
3	LEI	MU36B1120300-A1	Input: 100-240Vac, 1A, 50/60Hz Output: 12Vdc, 3.0A DC Output cable: Unshielded, 1.5m	US
Note: From the above adapters, the worst Radiated Emissions and AC Power Conducted Emission was found in **Adapter 2.** Therefore only the test data of the mode was recorded in this report.				

5. The antennas provided to the EUT, please refer to the following table:

Ant. No.	Transmitter Circuit	Ant.Net Gain (dBi)	Freq. Range (GHz)	Ant. Type	Connector Type
WIFi LB_1	Dual A	3.1	2.4~2.4835	PCB	i-pex(MHF)
		3.5	5.15~5.25		
		5	5.25~5.35		
		3.7	5.47~5.725		
		4.6	5.725~5.85		
WIFi LB_2	Dual B	2.8	2.4~2.4835	PCB	i-pex(MHF)
		4.8	5.15~5.25		
		5.1	5.25~5.35		
		5	5.47~5.725		
		4.7	5.725~5.85		
WIFi HB_1	5/6G A	3	5.15~5.25	PCB	i-pex(MHF)
		3.8	5.25~5.35		
		3.7	5.47~5.725		
		3.7	5.725~5.85		
WIFi HB_2	5/6G B	3.3	5.15~5.25	PCB	i-pex(MHF)
		4.1	5.25~5.35		
		3.3	5.47~5.725		
		3.3	5.725~5.85		
WIFi HB_3	5/6G C	2.6	5.15~5.25	PCB	i-pex(MHF)
		3.6	5.25~5.35		
		4.1	5.47~5.725		
		3.9	5.725~5.85		
WIFi HB_4	5/6G D	2.4	5.15~5.25	PCB	i-pex(MHF)
		2.9	5.25~5.35		
		2.6	5.47~5.725		
		3.8	5.725~5.85		
BT	-	2.1	2.4~2.4835	PCB	i-pex(MHF)

6. The EUT incorporates a MIMO function.

MODULATION MODE	Radio 1 - 2.4GHz Band TX & RX CONFIGURATION			
802.11b	2TX		2RX	
802.11g	2TX		2RX	
802.11n (HT20)	2TX		2RX	
802.11n (HT40)	2TX		2RX	
VHT20	2TX		2RX	
VHT40	2TX		2RX	
802.11ax (HE20)	2TX		2RX	
802.11ax (HE40)	2TX		2RX	
MODULATION MODE	**Radio 2 - 5GHz Band (low band) TX & RX CONFIGURATION**		**Radio 3 - 5GHz Band (high band) TX & RX CONFIGURATION**	
802.11a	2TX	2RX	4TX	4RX
802.11n (HT20)	2TX	2RX	4TX	4RX
802.11n (HT40)	2TX	2RX	4TX	4RX
802.11ac (VHT20)	2TX	2RX	4TX	4RX
802.11ac (VHT40)	2TX	2RX	4TX	4RX
802.11ac (VHT80)	2TX	2RX	4TX	4RX
802.11ax (HE20)	2TX	2RX	4TX	4RX
802.11ax (HE40)	2TX	2RX	4TX	4RX
802.11ax (HE80)	2TX	2RX	4TX	4RX
Note: All of modulation mode support beamforming function except 802.11a/b/g modulation mode.				

7. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.
8. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.1.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	OB	
-	√	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1GHz & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission
OB: Conducted Out-Band Emission Measurement

Radiated Emission Test (Above 1GHz):

☒ The tested configurations represent the worst-case mode from all possible combinations by the maximum power.
☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11b + 802.11a (Low Band) + 802.11a (High Band) + BT-LE	1 to 11	6	DSSS	DBPSK
	36 to 48 149 to 165	40	OFDM	BPSK
	36 to 48 149 to 165	165	OFDM	BPSK
	1 to 38	19	-	GFSK

Radiated Emission Test (Below 1GHz):

☒ The tested configurations represent the worst-case mode from all possible combinations by the maximum power.
☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11b + 802.11a (Low Band) + 802.11a (High Band) + BT-LE	1 to 11	6	DSSS	DBPSK
	36 to 48 149 to 165	40	OFDM	BPSK
	36 to 48 149 to 165	165	OFDM	BPSK
	1 to 38	19	-	GFSK

Power Line Conducted Emission Test:

☒ The tested configurations represent the worst-case mode from all possible combinations by the maximum power.

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11b + 802.11a (Low Band) + 802.11a (High Band) + BT-LE	1 to 11	6	DSSS	DBPSK
	36 to 48 149 to 165	40	OFDM	BPSK
	36 to 48 149 to 165	165	OFDM	BPSK
	1 to 38	19	-	GFSK

Conducted Out-Band Emission Measurement:

☒ The tested configurations represent the worst-case mode from all possible combinations by the maximum power.

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11b + 802.11a (Low Band)	1 to 11	6	DSSS	DBPSK
	36 to 48 149 to 165	40	OFDM	BPSK

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	23deg. C, 67%RH	120Vac, 60Hz	Nelson Teng
RE<1G	23deg. C, 67%RH	120Vac, 60Hz	Ryan Du
PLC	25deg. C, 75%RH	120Vac, 60Hz	Nick Lo
OB	24deg. C, 60%RH	120Vac, 60Hz	Jyunchun Lin

3.2 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.

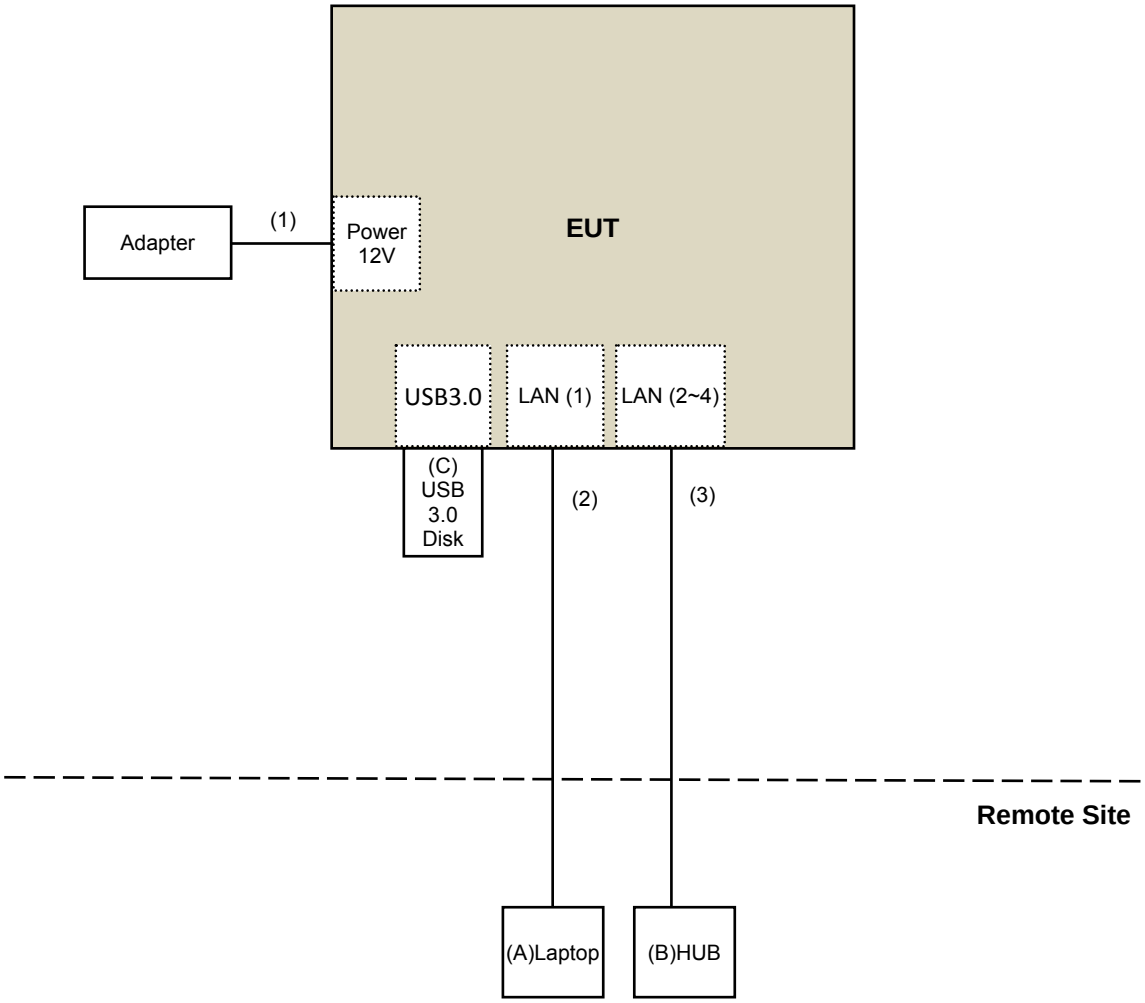
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	Lenovo	81A4	YD02YN76	PD93165NGU	Provided by Lab
B.	HUB	ZyXEL	GS1100-16	S150H44000046	DoC	Provided by Lab
C.	USB 3.0 Disk	SanDisk	Ultra Flalr USB 3.0	NA	NA	Provided by Lab

Note:

1. 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 Cable	1	1.5	No	0	Supplied by client
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	RJ-45 Cable	3	10	No	0	Provided by Lab

3.2.1 Configuration of System under Test



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.

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

*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:

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

4.1.2 Test Instruments

For Radiated Emission test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 03, 2019	July 02, 2020
Pre-Amplifier EMCI	EMC001340	980142	May 25, 2020	May 24, 2021
Loop Antenna Electro-Metrics	EM-6879	264	Feb. 18, 2020	Feb. 17, 2021
RF Cable	NA	LOOPCAB-001	Jan. 08, 2020	Jan. 07, 2021
RF Cable	NA	LOOPCAB-002	Jan. 08, 2020	Jan. 07, 2021
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	Apr. 28, 2020	Apr. 27, 2021
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 11, 2019	Nov. 10, 2020
RF Cable	8D	966-3-1	Mar. 17, 2020	Mar. 16, 2021
RF Cable	8D	966-3-2	Mar. 17, 2020	Mar. 16, 2021
RF Cable	8D	966-3-3	Mar. 17, 2020	Mar. 16, 2021
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 26, 2019	Sep. 25, 2020
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 24, 2019	Nov. 23, 2020
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC104-SM-SM-1200	160922	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC104-SM-SM-2000	180601	June 09, 2020	June 08, 2021
RF Cable	EMC104-SM-SM-6000	180602	June 09, 2020	June 08, 2021
Spectrum Analyzer Keysight	N9030A	MY54490679	July 17, 2019	July 16, 2020
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 15, 2020	Jan. 14, 2021
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 24, 2019	Nov. 23, 2020
RF Cable	EMC102-KM-KM-1200	160924	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC-KM-KM-4000	200214	Mar. 11, 2020	Mar. 10, 2021
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	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 966 Chamber No. 3.
3. Tested Date: June 26 to July 02, 2020

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:

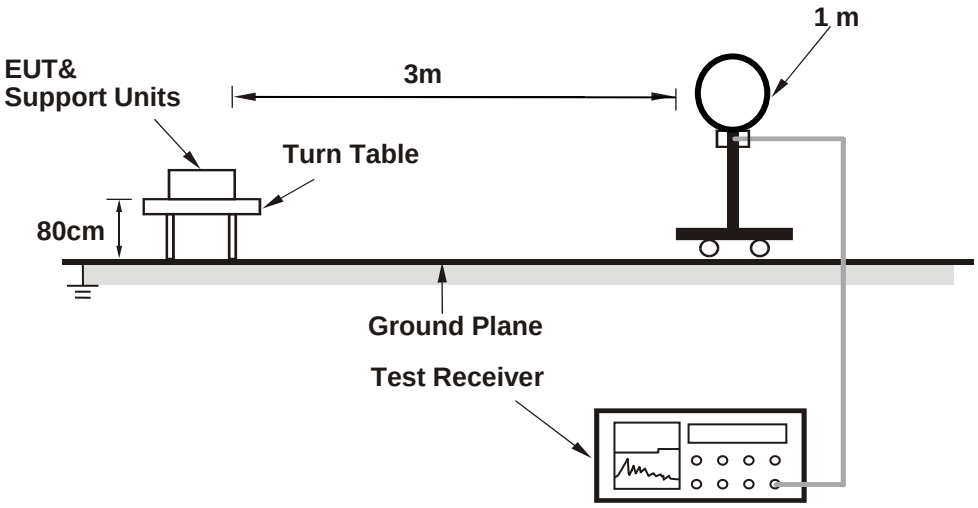
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 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

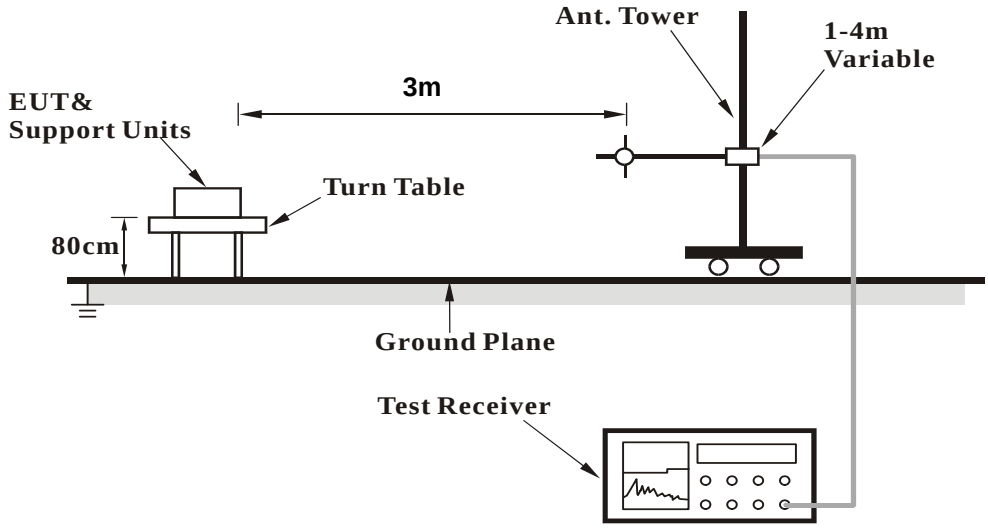
No deviation.

4.1.5 Test Setup

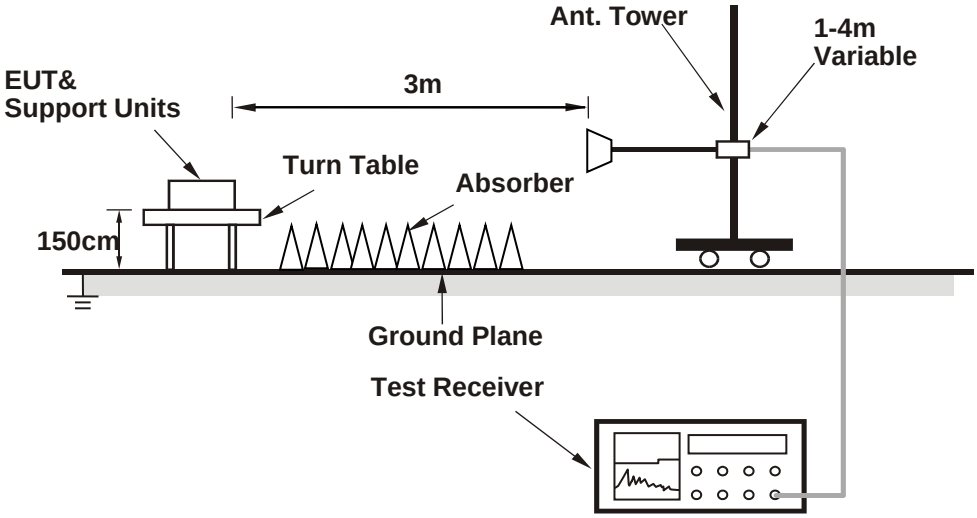
For Radiated emission below 30MHz



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

a. Placed the EUT on the testing table.
b. Controlling software (QDART-Connectivity1.0-00074.1) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

Frequency Range	1GHz ~ 40GHz	**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	4874.00	40.5 PK	74.0	-33.5	1.57 H	360	37.7	2.8
2	4874.00	32.4 AV	54.0	-21.6	1.57 H	360	29.6	2.8
3	4880.00	44.2 PK	74.0	-29.8	1.74 H	142	41.4	2.8
4	4880.00	38.6 AV	54.0	-15.4	1.74 H	142	35.8	2.8
5	7311.00	46.5 PK	74.0	-27.5	1.97 H	180	37.6	8.9
6	7311.00	39.0 AV	54.0	-15.0	1.97 H	180	30.1	8.9
7	7320.00	50.3 PK	74.0	-23.7	1.64 H	119	41.4	8.9
8	7320.00	43.9 AV	54.0	-10.1	1.64 H	119	35.0	8.9
9	#10400.00	48.3 PK	68.2	-19.9	1.70 H	313	35.5	12.8
10	15600.00	58.0 PK	74.0	-16.0	1.85 H	360	44.5	13.5
11	15600.00	47.4 AV	54.0	-6.6	1.85 H	360	33.9	13.5
12	#17475.00	58.1 PK	68.2	-10.1	1.98 H	360	40.2	17.9
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	4874.00	40.0 PK	74.0	-34.0	1.64 V	142	37.2	2.8
2	4874.00	31.0 AV	54.0	-23.0	1.64 V	142	28.2	2.8
3	4880.00	40.9 PK	74.0	-33.1	2.19 V	354	38.1	2.8
4	4880.00	32.7 AV	54.0	-21.3	2.19 V	354	29.9	2.8
5	7311.00	44.7 PK	74.0	-29.3	2.08 V	182	35.8	8.9
6	7311.00	35.3 AV	54.0	-18.7	2.08 V	182	26.4	8.9
7	7320.00	53.3 PK	74.0	-20.7	2.78 V	98	44.4	8.9
8	7320.00	47.3 AV	54.0	-6.7	2.78 V	98	38.4	8.9
9	#10400.00	50.4 PK	68.2	-17.8	1.50 V	6	37.6	12.8
10	11650.00	49.6 PK	74.0	-24.4	1.49 V	12	36.3	13.3
11	11650.00	40.1 AV	54.0	-13.9	1.49 V	12	26.8	13.3
12	15600.00	49.5 PK	74.0	-24.5	1.89 V	264	36.0	13.5
13	15600.00	39.5 AV	54.0	-14.5	1.89 V	264	26.0	13.5
14	#17475.00	48.7 PK	68.2	-19.5	1.87 V	234	30.8	17.9

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

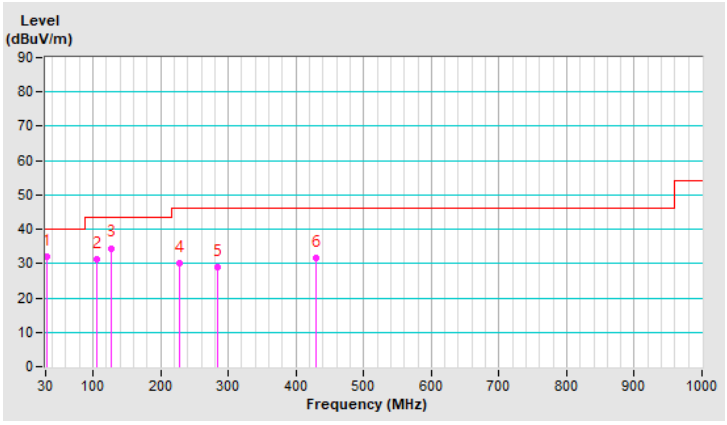
Below 1GHz Data:

Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	32.86	32.1 QP	40.0	-7.9	2.50 H	92	40.9	-8.8
2	105.24	31.2 QP	43.5	-12.3	2.50 H	257	41.9	-10.7
3	127.79	34.5 QP	43.5	-9.0	1.50 H	142	42.8	-8.3
4	227.19	30.1 QP	46.0	-15.9	1.50 H	299	39.5	-9.4
5	284.48	28.9 QP	46.0	-17.1	1.00 H	331	35.3	-6.4
6	428.87	31.8 QP	46.0	-14.2	2.50 H	328	33.8	-2.0

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. 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.

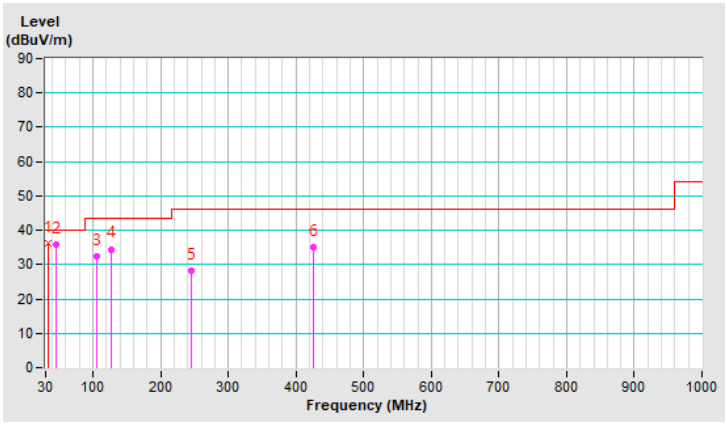


Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	**34.18**	**36.2 QP**	**40.0**	**-3.8**	**1.00 V**	**279**	**44.9**	**-8.7**
2	44.71	35.7 QP	40.0	-4.3	1.00 V	90	43.4	-7.7
3	105.99	32.5 QP	43.5	-11.0	1.50 V	316	43.1	-10.6
4	127.77	34.5 QP	43.5	-9.0	1.00 V	72	42.8	-8.3
5	245.66	28.3 QP	46.0	-17.7	2.00 V	116	36.3	-8.0
6	425.87	35.1 QP	46.0	-10.9	1.50 V	167	37.1	-2.0

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. 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.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1.The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 19, 2020	Mar. 18, 2021
50 ohms Terminator	50	3	Oct. 23, 2019	Oct. 22, 2020
RF Cable	5D-FB	COCCAB-001	Sep. 27, 2019	Sep. 26, 2020
Fixed attenuator EMCI	STI02-2200-10	005	Aug. 30, 2019	Aug. 29, 2020
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:
1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
3 Tested Date: July 01, 2020

4.2.3 Test Procedures

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

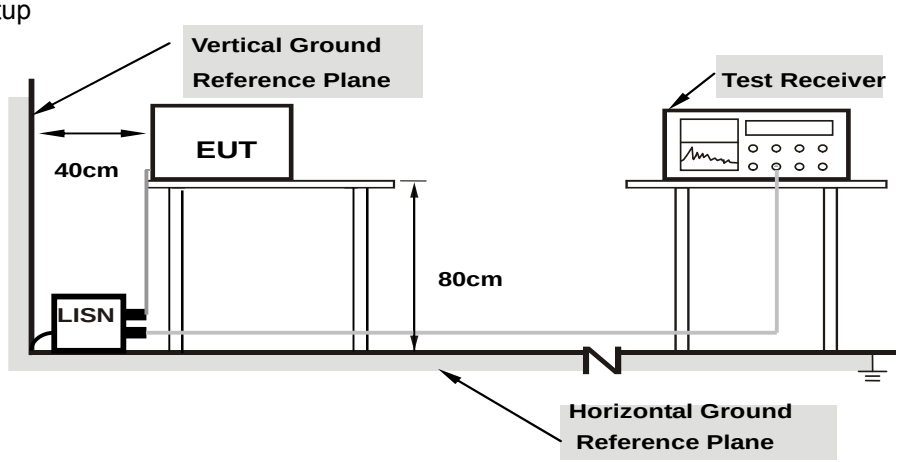
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

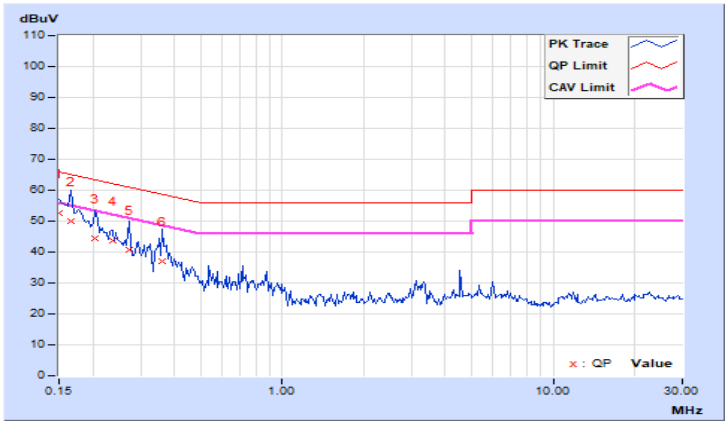
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15000**	**9.98**	**42.60**	**28.93**	**52.58**	**38.91**	**66.00**	**56.00**	**-13.42**	**-17.09**
2	0.16562	9.98	39.84	26.90	49.82	36.88	65.18	55.18	-15.36	-18.30
3	0.20469	9.99	34.50	21.85	44.49	31.84	63.42	53.42	-18.93	-21.58
4	0.23594	9.99	33.56	19.56	43.55	29.55	62.24	52.24	-18.69	-22.69
5	0.27109	10.00	30.72	20.03	40.72	30.03	61.08	51.08	-20.36	-21.05
6	0.36094	10.01	27.19	15.90	37.20	25.91	58.71	48.71	-21.51	-22.80

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

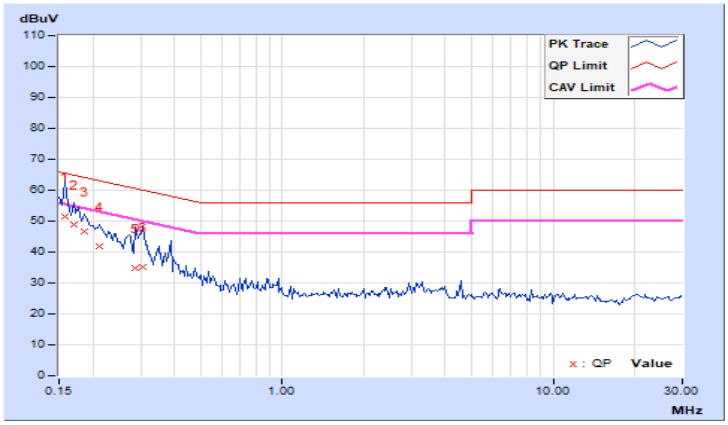


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.99	41.46	26.34	51.45	36.33	65.58	55.58	-14.13	-19.25
2	0.16953	9.99	39.08	24.71	49.07	34.70	64.98	54.98	-15.91	-20.28
3	0.18516	10.00	36.66	22.33	46.66	32.33	64.25	54.25	-17.59	-21.92
4	0.21250	10.00	32.01	19.45	42.01	29.45	63.11	53.11	-21.10	-23.66
5	0.28672	10.01	24.93	13.62	34.94	23.63	60.62	50.62	-25.68	-26.99
6	0.30625	10.02	25.05	7.27	35.07	17.29	60.07	50.07	-25.00	-32.78

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

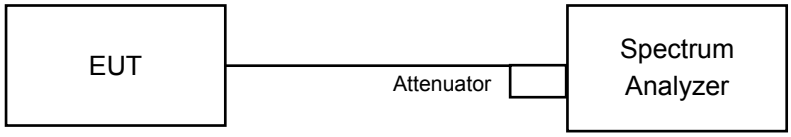


4.3 Conducted Out of Band Emission Measurement

4.3.1 Limits of Conducted Out of Band Emission Measurement

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedures

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

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

4.3.5 Deviation from Test Standard

No deviation.

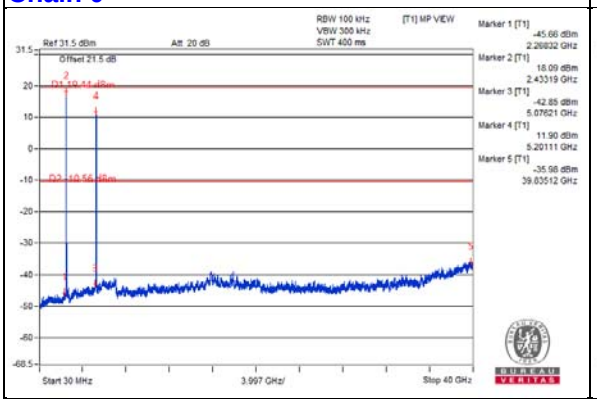
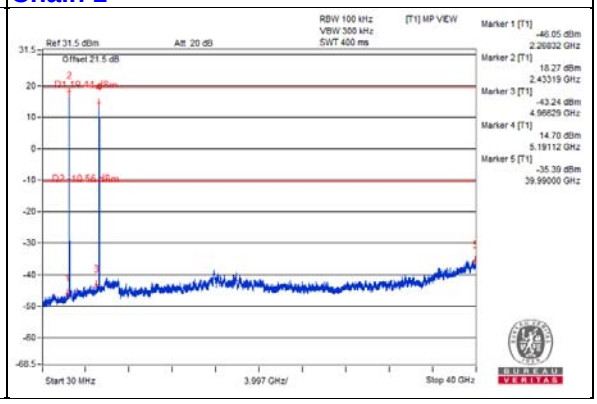
4.3.6 EUT Operating Conditions

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

4.3.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

2.4GHz_802.11b CH6 + 5GHz (Low Band)_802.11a CH40

Chain 0	Chain 1
	

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 according to ISO/IEC 17025.

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

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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.

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