FCC Test Report

Report No.: RF190904E03

FCC ID: 2AP7A-AMBERX

Test Model: AL11

Received Date: Sep. 04, 2019

Test Date: Oct. 02 to 07, 2019

Issued Date: Apr. 22, 2020

Applicant: LatticeWork, Inc.

Address: 2210 O'Toole Ave, Suite 250, San Jose. CA 95131

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

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 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 **4**

1 Certificate of Conformity **5**

2 Summary of Test Results **6**

2.1 Measurement Uncertainty 6
2.2 Modification Record 6

3 General Information **7**

3.1 General Description of EUT 7
3.2 Description of Test Modes 10
3.2.1 Test Mode Applicability and Tested Channel Detail 11
3.3 Duty Cycle of Test Signal 13
3.4 Description of Support Units 14
3.4.1 Configuration of System under Test 15
3.5 General Description of Applied Standards and References 16

4 Test Types and Results **17**

4.1 Radiated Emission and Bandedge Measurement 17
4.1.1 Limits of Radiated Emission and Bandedge Measurement 17
4.1.2 Test Instruments 18
4.1.3 Test Procedures 19
4.1.4 Deviation from Test Standard 20
4.1.5 Test Setup 20
4.1.6 EUT Operating Conditions 21
4.1.7 Test Results 22
4.2 Conducted Emission Measurement 36
4.2.1 Limits of Conducted Emission Measurement 36
4.2.2 Test Instruments 36
4.2.3 Test Procedures 37
4.2.4 Deviation from Test Standard 37
4.2.5 Test Setup 37
4.2.6 EUT Operating Conditions 37
4.2.7 Test Results 38
4.3 6dB Bandwidth Measurement 40
4.3.1 Limits of 6dB Bandwidth Measurement 40
4.3.2 Test Setup 40
4.3.3 Test Instruments 40
4.3.4 Test Procedure 40
4.3.5 Deviation fromTest Standard 40
4.3.6 EUT Operating Conditions 40
4.3.7 Test Result 41
4.4 Conducted Output Power Measurement 43
4.4.1 Limits of Conducted Output Power Measurement 43
4.4.2 Test Setup 43
4.4.3 Test Instruments 43
4.4.4 Test Procedures 43
4.4.5 Deviation from Test Standard 43
4.4.6 EUT Operating Conditions 43
4.4.7 Test Results 44
4.5 Power Spectral Density Measurement 46
4.5.1 Limits of Power Spectral Density Measurement 46
4.5.2 Test Setup 46
4.5.3 Test Instruments 46
4.5.4 Test Procedure 46
4.5.5 Deviation from Test Standard 46
4.5.6 EUT Operating Condition 46

4.5.7 Test Results 47
4.6 Conducted Out of Band Emission Measurement 49
4.6.1 Limits of Conducted Out of Band Emission Measurement 49
4.6.2 Test Setup 49
4.6.3 Test Instruments 49
4.6.4 Test Procedure 49
4.6.5 Deviation from Test Standard 49
4.6.6 EUT Operating Condition 49
4.6.7 Test Results 49

5 Pictures of Test Arrangements 58

Appendix – Information of the Testing Laboratories 59

Release Control Record

Issue No.	Description	Date Issued
RF190904E03	Original release.	Apr. 22, 2020

1 Certificate of Conformity

Product: Amber X

Brand: Latticework

Test Model: AL11

Sample Status: ENGINEERING SAMPLE

Applicant: LatticeWork, Inc.

Test Date: Oct. 02 to 07, 2019

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
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 : Vivian Huang , **Date:** Apr. 22, 2020
Vivian Huang / Specialist

Approved by : , **Date:** Apr. 22, 2020
Clark Lin / Technical Manager

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	PASS	Meet the requirement of limit. Minimum passing margin is -7.38dB at 0.15391MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2390.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is IPEX not a standard connector.

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	-	3.1 dB
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.8 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.0 dB
	30MHz ~ 1GHz	5.1 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.1 dB
	6GHz ~ 18GHz	5.0 dB
	18GHz ~ 40GHz	5.2 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Amber X
Brand	Latticework
Test Model	AL11
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	12Vdc from power adapter
Modulation Type	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 band
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.18~ 5.24GHz, 5.26GHz ~ 5.32GHz, 5.50GHz ~ 5.72GHz, 5.745 ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20), VHT 20: 11 802.11n (HT40), VHT 40: 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 25 802.11n (HT40), 802.11ac (VHT40): 12 802.11ac (VHT80): 6
Output Power	**2.4GHz:** 975.486 mW **5.18 ~ 5.24GHz:** 244.669 mW **5.26 ~ 5.32GHz:** 177.977 mW **5.5 ~ 5.72GHz:** 243.839 mW **5.745 ~ 5.825GHz:** 353.643 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x1
Data Cable Supplied	NA

Note:

1. 2.4GHz & 5GHz technology can't transmit at same time.
2. The EUT power needs to be supplied from a power adapter, the information is as below table:

No.	Brand	Model No.	Spec.
1	Jiangsu Chenyang	CYCQ24-120200U	Input: 100-240Vac, 50/60Hz, 0.6A Output: 12V, 2.0A DC Output Cable: unshielded, 1.5 m
2	TUE	A3P-1200200VU	Input: 100-240Vac, 50/60Hz, 1.0A Output: 12V, 2.0A DC Output Cable: unshielded, 1.2 m
3	APD	WB-24J12FU	Input: 100-240Vac, 50/60Hz, 0.7A Output: 12V, 2.0A DC Output Cable: unshielded, 1.2 m
Note: From the above adapters, the worst AC power conducted emission test was found in **Adapter 2;** the worst radiated emission test was found in **Adapter 3**. Therefore only the test data of the modes were recorded in this report.			

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

Ant. No.	Antenna Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
WiFi-1	3.19	2.4~2.4835	PIFA	IPEX
	3.57	5.15~5.25		
	3.29	5.25~5.35		
	4.28	5.47~5.725		
	4.37	5.725~5.85		
WiFi-2 / BT	3.14	2.4~2.4835	PIFA	IPEX
	4.69	5.15~5.25		
	4.21	5.25~5.35		
	3.81	5.47~5.725		
	4.55	5.725~5.85		

4. The EUT could be supplied with components and following different brand names could be chosen:

Item	Brand		
eMMc	KSI	Toshiba	Samsung
DDR	Samsung	Hynix	--
SSD	Kingston SATA	Liteon PCIe	Seagate
Note: From the above condiction, Toshiba eMMc, Hynix DDR and Liteon PCIe SSD was selected as representative model for the test and its data was recorded in this report.			

5. The EUT incorporates a MIMO function:

2.4GHz Band		
MODULATION MODE	**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
5GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11a	2TX	2RX
802.11n (HT20)	2TX	2RX
802.11n (HT40)	2TX	2RX
802.11ac (VHT20)	2TX	2RX
802.11ac (VHT40)	2TX	2RX
802.11ac (VHT80)	2TX	2RX
Note: 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.		

6. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

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

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		

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

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

3.2.1 Test Mode Applicability and Tested Channel Detail

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

RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
VHT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5
VHT40	3 to 9	3, 6, 9	OFDM	BPSK	13.5

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6

Power Line Conducted Emission Test:

☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
VHT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5
VHT40	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

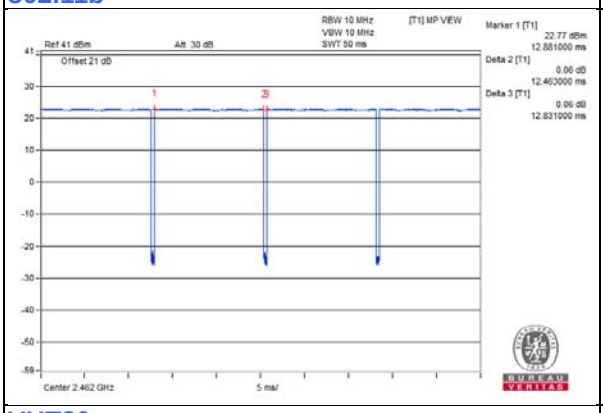
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	23deg. C, 68%RH	120Vac, 60Hz	Ryan Du
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Nelson Teng
PLC	23deg. C, 76%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

3.3 Duty Cycle of Test Signal

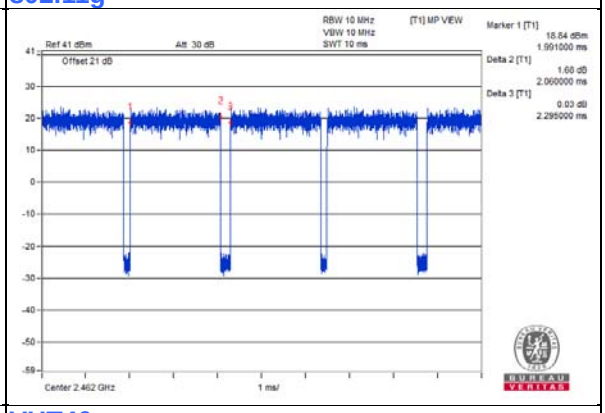
Duty cycle of test signal is < 98 %, duty factor shall be considered.

802.11b: Duty cycle = 12.463 ms/12.831 ms= 0.971, Duty factor = 10 * log (1/Duty cycle) = 0.13
802.11g: Duty cycle = 2.06 ms/2.295 ms= 0.898, Duty factor = 10 * log (1/Duty cycle) = 0.47
VHT20: Duty cycle = 2.064 ms /2.179 ms = 0.947, Duty factor = 10 * log (1/Duty cycle) = 0.24
VHT40: Duty cycle = 0.95 ms /1.217 ms = 0.781, Duty factor = 10 * log (1/Duty cycle) = 1.08

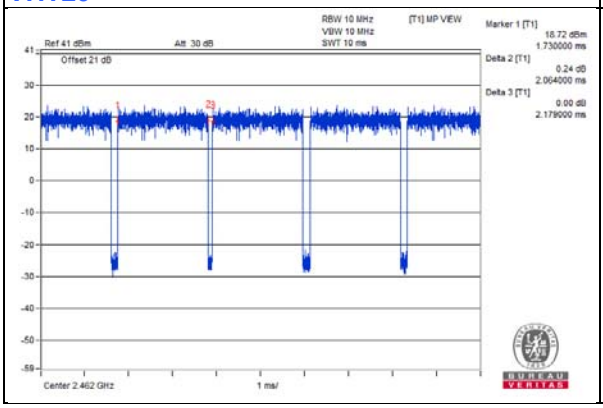
802.11b



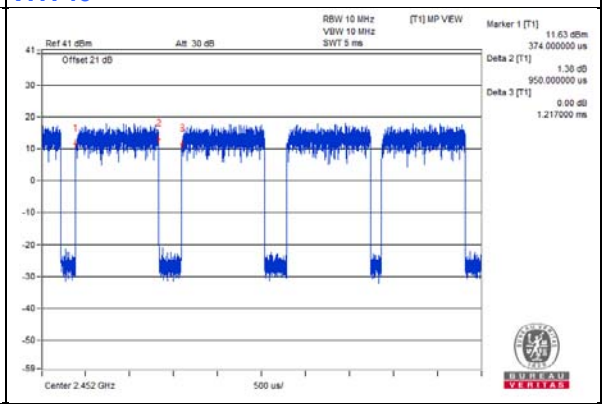
802.11g



VHT20



VHT40



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.

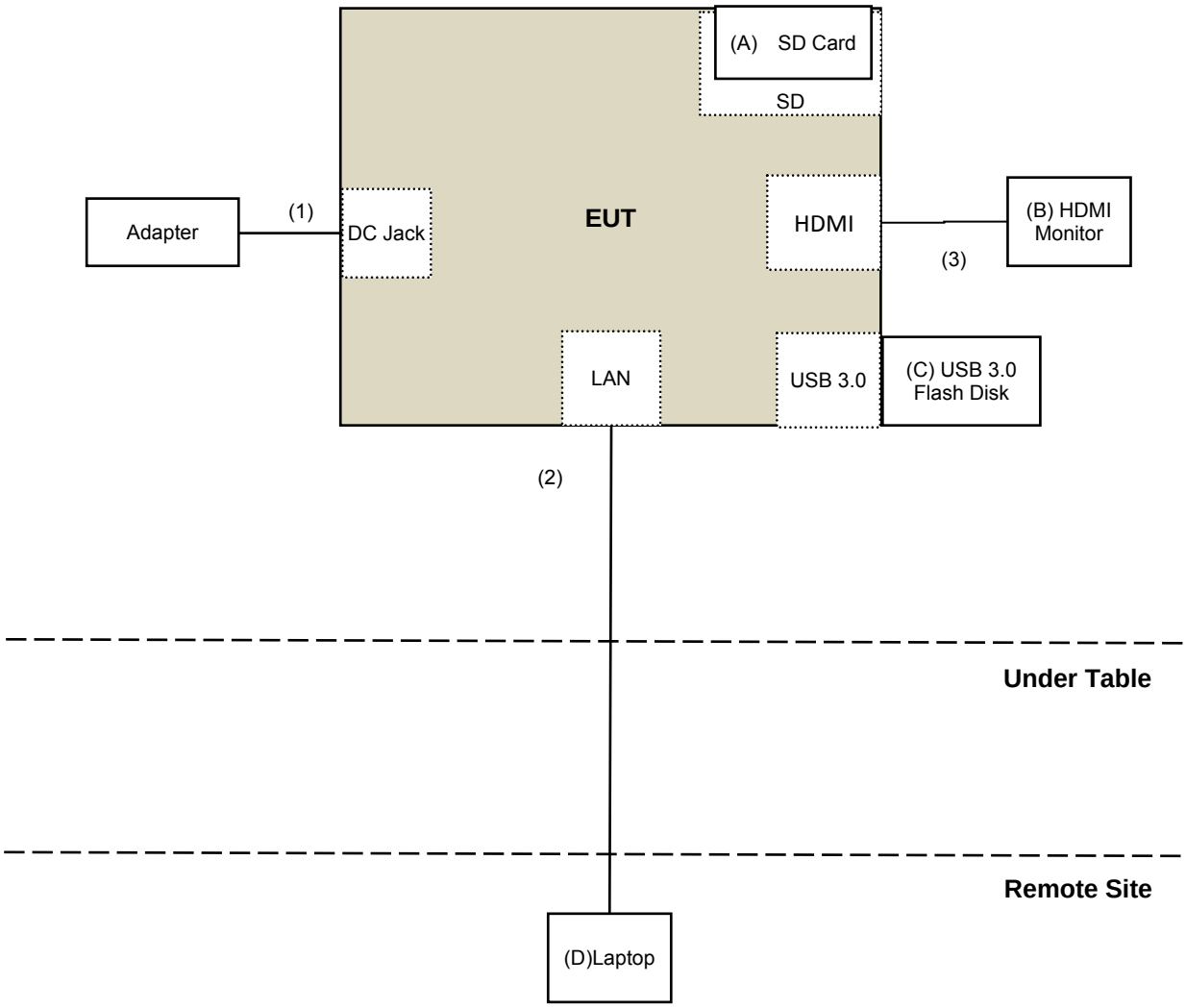
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	SD Card	Transcend	4GB	GM1SKV1	FCC DoC	Provided by Lab
B.	HDMI Monitor	DELL	P2415Q	CN-0J1P7F-QDC00-85L-13GB-A09	FCC DoC	Provided by Lab
C.	USB 3.0 Flash Disk	SanDisk	SDCZ73-064G-G46	NA	NA	Provided by Lab
D.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided 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	1.2	No	0	Supplied by client
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	HDMI Cable	1	2	Yes	0	Provided by Lab (Brand:amber, Model:HM-AA120)

3.4.1 Configuration of System under Test



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

KDB 662911 D01 Multiple Transmitter Output v02r01

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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 17, 2019	July 16, 2020
Pre-Amplifier EMCI	EMC001340	980142	May 30, 2019	May 29, 2020
Loop Antenna Electro-Metrics	EM-6879	264	Jan. 22, 2019	Jan. 21, 2020
RF Cable	NA	LOOPCAB-001	Jan. 14, 2019	Jan. 13, 2020
RF Cable	NA	LOOPCAB-002	Jan. 14, 2019	Jan. 13, 2020
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	Apr. 30, 2019	Apr. 29, 2020
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 22, 2018	Nov. 21, 2019
RF Cable	8D	966-3-1	Mar. 18, 2019	Mar. 17, 2020
RF Cable	8D	966-3-2	Mar. 18, 2019	Mar. 17, 2020
RF Cable	8D	966-3-3	Mar. 18, 2019	Mar. 17, 2020
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 26, 2019	Sep. 25, 2020
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC104-SM-SM-1200	160922	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC104-SM-SM-2000	180601	June 10, 2019	June 09, 2020
RF Cable	EMC104-SM-SM-6000	180602	June 10, 2019	June 09, 2020
Spectrum Analyzer Keysight	N9030A	MY54490679	July 17, 2019	July 16, 2020
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 28, 2019	Jan. 27, 2020
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160924	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC102-KM-KM-1200	160925	Jan. 28, 2019	Jan. 27, 2020
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
Spectrum Analyzer R&S	FSV40	100964	June 04, 2019	June 03, 2020
Power meter Anritsu	ML2495A	1014008	May 13, 2019	May 12, 2020
Power sensor Anritsu	MA2411B	0917122	May 13, 2019	May 12, 2020
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020

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. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: Oct. 02 to 07, 2019

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 detects 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:

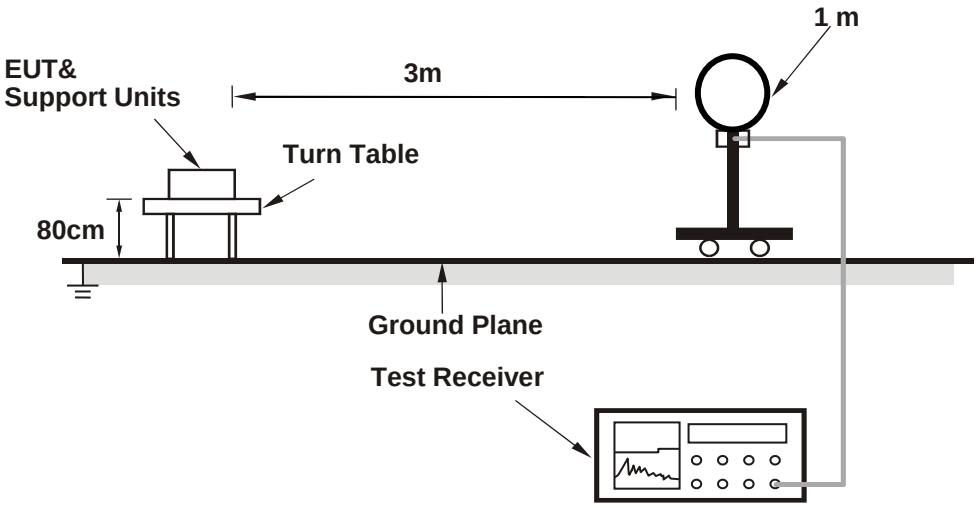
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

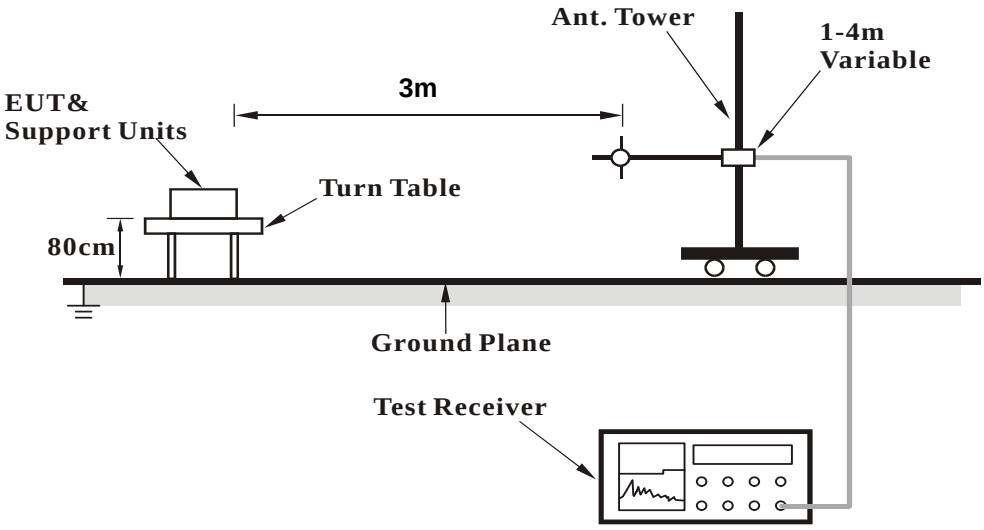
No deviation.

4.1.5 Test Setup

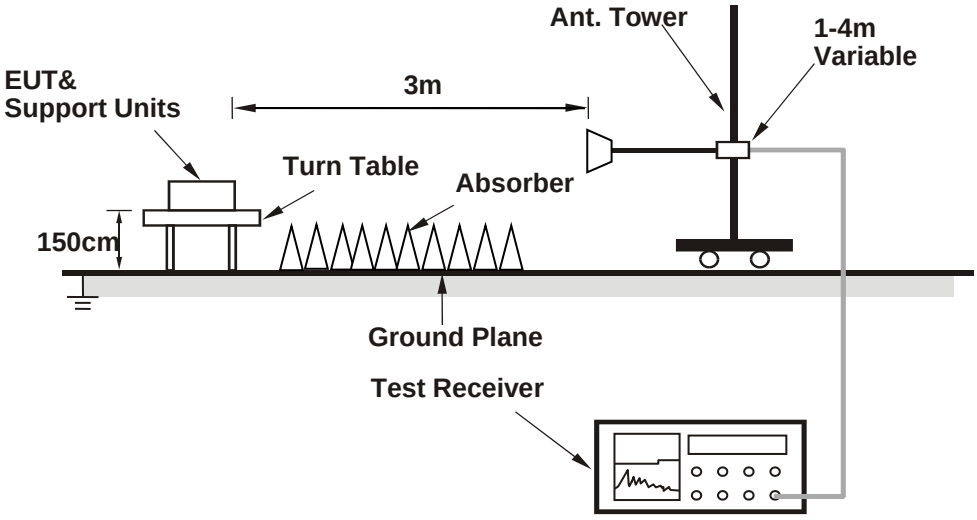
For Radiated emission below 30MHz



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. Connected the EUT with the Laptop which is placed on remote site.
b. Controlling software (HyperTerminal paste BB8_BLE_SOP.doc command) has been activated to set the EUT under transmission condition continuously at specific channel frenquency.

4.1.7 Test Results

Above 1GHz Data：

802.11b

CHANNEL	TX Channel 1	**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	2390.00	58.9 PK	74.0	-15.1	1.30 H	331	60.9	-2.0
2	2390.00	51.2 AV	54.0	-2.8	1.30 H	331	53.2	-2.0
3	*2412.00	108.8 PK			1.30 H	331	110.8	-2.0
4	*2412.00	106.4 AV			1.30 H	331	108.4	-2.0
5	4824.00	38.9 PK	74.0	-35.1	3.22 H	252	36.6	2.3
6	4824.00	32.9 AV	54.0	-21.1	3.22 H	252	30.6	2.3
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	2390.00	59.3 PK	74.0	-14.7	2.38 V	273	61.3	-2.0
2	2390.00	53.8 AV	54.0	-0.2	2.38 V	273	55.8	-2.0
3	*2412.00	110.3 PK			2.38 V	273	112.3	-2.0
4	*2412.00	108.0 AV			2.38 V	273	110.0	-2.0
5	4824.00	39.5 PK	74.0	-34.5	2.34 V	130	37.2	2.3
6	4824.00	34.1 AV	54.0	-19.9	2.34 V	130	31.8	2.3

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.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 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	2390.00	54.0 PK	74.0	-20.0	1.34 H	332	56.0	-2.0
2	2390.00	45.1 AV	54.0	-8.9	1.34 H	332	47.1	-2.0
3	*2437.00	113.0 PK			1.34 H	332	115.1	-2.1
4	*2437.00	110.6 AV			1.34 H	332	112.7	-2.1
5	2483.50	55.8 PK	74.0	-18.2	1.34 H	332	58.0	-2.2
6	2483.50	47.1 AV	54.0	-6.9	1.34 H	332	49.3	-2.2
7	4874.00	42.4 PK	74.0	-31.6	3.17 H	247	40.1	2.3
8	4874.00	36.4 AV	54.0	-17.6	3.17 H	247	34.1	2.3
9	7311.00	48.2 PK	74.0	-25.8	2.96 H	116	39.9	8.3
10	7311.00	42.2 AV	54.0	-11.8	2.96 H	116	33.9	8.3
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	2390.00	56.4 PK	74.0	-17.6	2.63 V	274	58.4	-2.0
2	2390.00	47.6 AV	54.0	-6.4	2.63 V	274	49.6	-2.0
3	*2437.00	114.9 PK			2.63 V	274	117.0	-2.1
4	*2437.00	112.6 AV			2.63 V	274	114.7	-2.1
5	2483.50	58.2 PK	74.0	-15.8	2.63 V	274	60.4	-2.2
6	2483.50	49.5 AV	54.0	-4.5	2.63 V	274	51.7	-2.2
7	4874.00	42.5 PK	74.0	-31.5	2.40 V	128	40.2	2.3
8	4874.00	37.0 AV	54.0	-17.0	2.40 V	128	34.7	2.3
9	7311.00	53.5 PK	74.0	-20.5	3.55 V	10	45.2	8.3
10	7311.00	49.1 AV	54.0	-4.9	3.55 V	10	40.8	8.3

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.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 11	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	*2462.00	108.6 PK			1.37 H	339	110.8	-2.2
2	*2462.00	106.1 AV			1.37 H	339	108.3	-2.2
3	2483.50	58.3 PK	74.0	-15.7	1.37 H	339	60.5	-2.2
4	2483.50	50.8 AV	54.0	-3.2	1.37 H	339	53.0	-2.2
5	4924.00	40.4 PK	74.0	-33.6	3.22 H	262	37.9	2.5
6	4924.00	34.6 AV	54.0	-19.4	3.22 H	262	32.1	2.5
7	7386.00	47.4 PK	74.0	-26.6	3.02 H	127	39.1	8.3
8	7386.00	41.7 AV	54.0	-12.3	3.02 H	127	33.4	8.3
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	*2462.00	109.8 PK			2.54 V	269	112.0	-2.2
2	*2462.00	107.5 AV			2.54 V	269	109.7	-2.2
3	2483.50	60.7 PK	74.0	-13.3	2.54 V	269	62.9	-2.2
4	2483.50	53.6 AV	54.0	-0.4	2.54 V	269	55.8	-2.2
5	4924.00	42.4 PK	74.0	-31.6	2.41 V	120	39.9	2.5
6	4924.00	37.2 AV	54.0	-16.8	2.41 V	120	34.7	2.5
7	7386.00	52.4 PK	74.0	-21.6	3.51 V	20	44.1	8.3
8	7386.00	47.9 AV	54.0	-6.1	3.51 V	20	39.6	8.3

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.
5. " * ": Fundamental frequency.

802.11g

CHANNEL	TX Channel 1	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	2390.00	67.6 PK	74.0	-6.4	1.32 H	331	69.6	-2.0
2	2390.00	50.4 AV	54.0	-3.6	1.32 H	331	52.4	-2.0
3	*2412.00	110.1 PK			1.32 H	331	112.1	-2.0
4	*2412.00	101.0 AV			1.32 H	331	103.0	-2.0
5	4824.00	38.8 PK	74.0	-35.2	3.19 H	256	36.5	2.3
6	4824.00	32.6 AV	54.0	-21.4	3.19 H	256	30.3	2.3
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	2390.00	72.5 PK	74.0	-1.5	2.62 V	236	74.5	-2.0
2	2390.00	53.7 AV	54.0	-0.3	2.62 V	236	55.7	-2.0
3	*2412.00	111.8 PK			2.62 V	236	113.8	-2.0
4	*2412.00	102.9 AV			2.62 V	236	104.9	-2.0
5	4824.00	39.2 PK	74.0	-34.8	2.33 V	115	36.9	2.3
6	4824.00	33.6 AV	54.0	-20.4	2.33 V	115	31.3	2.3

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.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 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	2390.00	68.0 PK	74.0	-6.0	1.32 H	325	70.0	-2.0
2	2390.00	50.2 AV	54.0	-3.8	1.32 H	325	52.2	-2.0
3	*2437.00	115.9 PK			1.32 H	325	118.0	-2.1
4	*2437.00	105.7 AV			1.32 H	325	107.8	-2.1
5	2483.50	67.6 PK	74.0	-6.4	1.32 H	325	69.8	-2.2
6	2483.50	48.5 AV	54.0	-5.5	1.32 H	325	50.7	-2.2
7	4874.00	41.0 PK	74.0	-33.0	3.19 H	267	38.7	2.3
8	4874.00	35.0 AV	54.0	-19.0	3.19 H	267	32.7	2.3
9	7311.00	44.7 PK	74.0	-29.3	3.07 H	136	36.4	8.3
10	7311.00	39.2 AV	54.0	-14.8	3.07 H	136	30.9	8.3
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	2390.00	71.6 PK	74.0	-2.4	2.62 V	274	73.6	-2.0
2	2390.00	53.8 AV	54.0	-0.2	2.62 V	274	55.8	-2.0
3	*2437.00	117.4 PK			2.62 V	274	119.5	-2.1
4	*2437.00	107.6 AV			2.62 V	274	109.7	-2.1
5	2483.50	73.2 PK	74.0	-0.8	2.62 V	274	75.4	-2.2
6	2483.50	51.7 AV	54.0	-2.3	2.62 V	274	53.9	-2.2
7	4874.00	41.8 PK	74.0	-32.2	2.41 V	125	39.5	2.3
8	4874.00	36.3 AV	54.0	-17.7	2.41 V	125	34.0	2.3
9	7311.00	50.3 PK	74.0	-23.7	3.50 V	32	42.0	8.3
10	7311.00	45.8 AV	54.0	-8.2	3.50 V	32	37.5	8.3

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.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 11	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	*2462.00	110.4 PK			1.36 H	339	112.6	-2.2
2	*2462.00	101.1 AV			1.36 H	339	103.3	-2.2
3	2483.50	67.1 PK	74.0	-6.9	1.36 H	339	69.3	-2.2
4	2483.50	50.0 AV	54.0	-4.0	1.36 H	339	52.2	-2.2
5	4924.00	39.2 PK	74.0	-34.8	3.18 H	240	36.7	2.5
6	4924.00	33.3 AV	54.0	-20.7	3.18 H	240	30.8	2.5
7	7386.00	40.5 PK	74.0	-33.5	3.02 H	145	32.2	8.3
8	7386.00	35.3 AV	54.0	-18.7	3.02 H	145	27.0	8.3
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	*2462.00	112.3 PK			2.55 V	270	114.5	-2.2
2	*2462.00	102.6 AV			2.55 V	270	104.8	-2.2
3	2483.50	72.1 PK	74.0	-1.9	2.55 V	270	74.3	-2.2
4	2483.50	53.7 AV	54.0	-0.3	2.55 V	270	55.9	-2.2
5	4924.00	39.5 PK	74.0	-34.5	2.30 V	143	37.0	2.5
6	4924.00	34.1 AV	54.0	-19.9	2.30 V	143	31.6	2.5
7	7386.00	45.3 PK	74.0	-28.7	3.46 V	23	37.0	8.3
8	7386.00	40.9 AV	54.0	-13.1	3.46 V	23	32.6	8.3

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.
5. " * ": Fundamental frequency.

VHT20

CHANNEL	TX Channel 1	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	2390.00	66.8 PK	74.0	-7.2	1.29 H	333	68.8	-2.0
2	2390.00	49.5 AV	54.0	-4.5	1.29 H	333	51.5	-2.0
3	*2412.00	108.8 PK			1.29 H	333	110.8	-2.0
4	*2412.00	99.2 AV			1.29 H	333	101.2	-2.0
5	4824.00	39.1 PK	74.0	-34.9	3.15 H	232	36.8	2.3
6	4824.00	33.2 AV	54.0	-20.8	3.15 H	232	30.9	2.3
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	2390.00	71.3 PK	74.0	-2.7	2.66 V	275	73.3	-2.0
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**2.66 V**	**275**	**55.9**	**-2.0**
3	*2412.00	110.7 PK			2.66 V	275	112.7	-2.0
4	*2412.00	101.3 AV			2.66 V	275	103.3	-2.0
5	4824.00	39.3 PK	74.0	-34.7	2.36 V	120	37.0	2.3
6	4824.00	33.8 AV	54.0	-20.2	2.36 V	120	31.5	2.3

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.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 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	2390.00	66.8 PK	74.0	-7.2	1.28 H	317	68.8	-2.0
2	2390.00	49.8 AV	54.0	-4.2	1.28 H	317	51.8	-2.0
3	*2437.00	114.8 PK			1.28 H	317	116.9	-2.1
4	*2437.00	105.2 AV			1.28 H	317	107.3	-2.1
5	2483.50	66.1 PK	74.0	-7.9	1.28 H	317	68.3	-2.2
6	2483.50	48.6 AV	54.0	-5.4	1.28 H	317	50.8	-2.2
7	4874.00	39.6 PK	74.0	-34.4	3.13 H	251	37.3	2.3
8	4874.00	33.7 AV	54.0	-20.3	3.13 H	251	31.4	2.3
9	7311.00	41.1 PK	74.0	-32.9	2.99 H	156	32.8	8.3
10	7311.00	35.8 AV	54.0	-18.2	2.99 H	156	27.5	8.3
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	2390.00	70.6 PK	74.0	-3.4	2.63 V	275	72.6	-2.0
2	2390.00	53.8 AV	54.0	-0.2	2.63 V	275	55.8	-2.0
3	*2437.00	116.2 PK			2.63 V	275	118.3	-2.1
4	*2437.00	106.8 AV			2.63 V	275	108.9	-2.1
5	2483.50	70.5 PK	74.0	-3.5	2.63 V	275	72.7	-2.2
6	2483.50	50.3 AV	54.0	-3.7	2.63 V	275	52.5	-2.2
7	4874.00	41.1 PK	74.0	-32.9	2.41 V	121	38.8	2.3
8	4874.00	35.7 AV	54.0	-18.3	2.41 V	121	33.4	2.3
9	7311.00	45.0 PK	74.0	-29.0	3.46 V	23	36.7	8.3
10	7311.00	40.4 AV	54.0	-13.6	3.46 V	23	32.1	8.3

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.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 11	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	*2462.00	109.1 PK			1.32 H	323	111.3	-2.2
2	*2462.00	99.7 AV			1.32 H	323	101.9	-2.2
3	2483.50	67.1 PK	74.0	-6.9	1.32 H	323	69.3	-2.2
4	2483.50	49.8 AV	54.0	-4.2	1.32 H	323	52.0	-2.2
5	4924.00	39.7 PK	74.0	-34.3	3.14 H	236	37.2	2.5
6	4924.00	33.6 AV	54.0	-20.4	3.14 H	236	31.1	2.5
7	7386.00	40.3 PK	74.0	-33.7	3.03 H	133	32.0	8.3
8	7386.00	35.0 AV	54.0	-19.0	3.03 H	133	26.7	8.3
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	*2462.00	111.2 PK			2.54 V	273	113.4	-2.2
2	*2462.00	102.4 AV			2.54 V	273	104.6	-2.2
3	2483.50	73.5 PK	74.0	-0.5	2.54 V	273	75.7	-2.2
4	2483.50	53.0 AV	54.0	-1.0	2.54 V	273	55.2	-2.2
5	4924.00	39.0 PK	74.0	-35.0	2.40 V	143	36.5	2.5
6	4924.00	33.6 AV	54.0	-20.4	2.40 V	143	31.1	2.5
7	7386.00	44.1 PK	74.0	-29.9	3.49 V	37	35.8	8.3
8	7386.00	39.4 AV	54.0	-14.6	3.49 V	37	31.1	8.3

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.
5. " * ": Fundamental frequency.

VHT40

CHANNEL	TX Channel 3	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	2390.00	67.3 PK	74.0	-6.7	1.39 H	340	69.3	-2.0
2	2390.00	50.3 AV	54.0	-3.7	1.39 H	340	52.3	-2.0
3	*2422.00	105.1 PK			1.39 H	340	107.1	-2.0
4	*2422.00	95.6 AV			1.39 H	340	97.6	-2.0
5	4844.00	39.0 PK	74.0	-35.0	3.15 H	241	36.7	2.3
6	4844.00	33.0 AV	54.0	-21.0	3.15 H	241	30.7	2.3
7	7266.00	40.4 PK	74.0	-33.6	3.05 H	160	32.0	8.4
8	7266.00	35.3 AV	54.0	-18.7	3.05 H	160	26.9	8.4
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	2390.00	72.8 PK	74.0	-1.2	2.57 V	272	74.8	-2.0
2	2390.00	53.7 AV	54.0	-0.3	2.57 V	272	55.7	-2.0
3	*2422.00	107.4 PK			2.57 V	272	109.4	-2.0
4	*2422.00	98.0 AV			2.57 V	272	100.0	-2.0
5	4844.00	39.7 PK	74.0	-34.3	2.34 V	137	37.4	2.3
6	4844.00	34.3 AV	54.0	-19.7	2.34 V	137	32.0	2.3
7	7266.00	42.7 PK	74.0	-31.3	3.59 V	23	34.3	8.4
8	7266.00	37.5 AV	54.0	-16.5	3.59 V	23	29.1	8.4

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.

CHANNEL	TX Channel 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	2390.00	67.0 PK	74.0	-7.0	1.30 H	342	69.0	-2.0
2	2390.00	50.0 AV	54.0	-4.0	1.30 H	342	52.0	-2.0
3	*2437.00	105.5 PK			1.30 H	342	107.6	-2.1
4	*2437.00	95.7 AV			1.30 H	342	97.8	-2.1
5	2483.50	67.1 PK	74.0	-6.9	1.30 H	342	69.3	-2.2
6	2483.50	50.1 AV	54.0	-3.9	1.30 H	342	52.3	-2.2
7	4874.00	39.7 PK	74.0	-34.3	3.22 H	238	37.4	2.3
8	4874.00	33.6 AV	54.0	-20.4	3.22 H	238	31.3	2.3
9	7311.00	40.2 PK	74.0	-33.8	3.01 H	157	31.9	8.3
10	7311.00	34.8 AV	54.0	-19.2	3.01 H	157	26.5	8.3
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	2390.00	70.1 PK	74.0	-3.9	2.58 V	273	72.1	-2.0
2	2390.00	53.1 AV	54.0	-0.9	2.58 V	273	55.1	-2.0
3	*2437.00	108.5 PK			2.58 V	273	110.6	-2.1
4	*2437.00	99.4 AV			2.58 V	273	101.5	-2.1
5	2483.50	70.4 PK	74.0	-3.6	2.58 V	273	72.6	-2.2
6	2483.50	53.8 AV	54.0	-0.2	2.58 V	273	56.0	-2.2
7	4874.00	39.7 PK	74.0	-34.3	2.37 V	123	37.4	2.3
8	4874.00	34.6 AV	54.0	-19.4	2.37 V	123	32.3	2.3
9	7311.00	42.5 PK	74.0	-31.5	3.43 V	42	34.2	8.3
10	7311.00	37.9 AV	54.0	-16.1	3.43 V	42	29.6	8.3

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.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 9	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	*2452.00	104.8 PK			1.37 H	320	107.0	-2.2
2	*2452.00	95.6 AV			1.37 H	320	97.8	-2.2
3	2483.50	66.7 PK	74.0	-7.3	1.37 H	320	68.9	-2.2
4	2483.50	49.9 AV	54.0	-4.1	1.37 H	320	52.1	-2.2
5	4904.00	39.5 PK	74.0	-34.5	3.23 H	243	37.1	2.4
6	4904.00	33.7 AV	54.0	-20.3	3.23 H	243	31.3	2.4
7	7356.00	40.7 PK	74.0	-33.3	3.06 H	160	32.5	8.2
8	7356.00	35.2 AV	54.0	-18.8	3.06 H	160	27.0	8.2
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	*2452.00	108.3 PK			2.54 V	274	110.5	-2.2
2	*2452.00	98.4 AV			2.54 V	274	100.6	-2.2
3	2483.50	72.9 PK	74.0	-1.1	2.54 V	274	75.1	-2.2
4	2483.50	53.8 AV	54.0	-0.2	2.54 V	274	56.0	-2.2
5	4904.00	40.1 PK	74.0	-33.9	2.29 V	116	37.7	2.4
6	4904.00	34.5 AV	54.0	-19.5	2.29 V	116	32.1	2.4
7	7356.00	42.3 PK	74.0	-31.7	3.54 V	29	34.1	8.2
8	7356.00	37.4 AV	54.0	-16.6	3.54 V	29	29.2	8.2

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.
5. " * ": Fundamental frequency.

Below 1GHz Data:

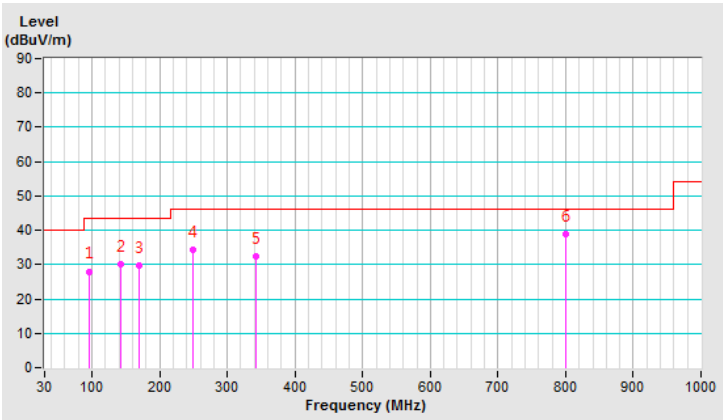
802.11g

CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Quasi-Peak (QP)
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	95.35	28.0 QP	43.5	-15.5	2.00 H	154	40.8	-12.8
2	143.25	30.1 QP	43.5	-13.4	2.00 H	257	38.0	-7.9
3	169.24	29.8 QP	43.5	-13.7	2.00 H	267	38.3	-8.5
4	249.73	34.4 QP	46.0	-11.6	1.00 H	347	42.8	-8.4
5	342.92	32.3 QP	46.0	-13.7	1.00 H	11	37.8	-5.5
6	800.01	38.8 QP	46.0	-7.2	2.00 H	47	34.7	4.1

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.

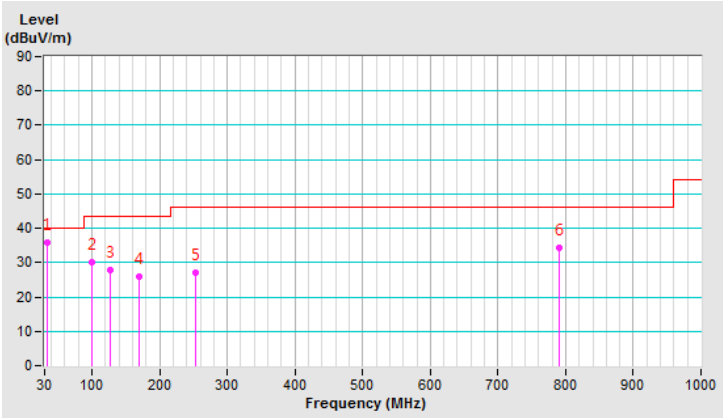


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	34.32	35.7 QP	40.0	-4.3	2.00 V	316	45.1	-9.4
2	99.67	30.0 QP	43.5	-13.5	3.00 V	33	42.1	-12.1
3	127.19	27.7 QP	43.5	-15.8	1.00 V	342	37.3	-9.6
4	170.09	26.0 QP	43.5	-17.5	1.00 V	248	34.6	-8.6
5	252.42	26.9 QP	46.0	-19.1	2.00 V	23	35.2	-8.3
6	790.07	34.3 QP	46.0	-11.7	1.00 V	94	30.3	4.0

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. 24, 2018	Oct. 23, 2019
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 22, 2018	Oct. 21, 2019
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 17, 2019	Mar. 16, 2020
50 ohms Terminator	N/A	3	Oct. 22, 2018	Oct. 21, 2019
RF Cable	5D-FB	COCCAB-001	Sep. 27, 2019	Sep. 26, 2020
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 14, 2019	Mar. 13, 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: Oct. 07, 2019

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.

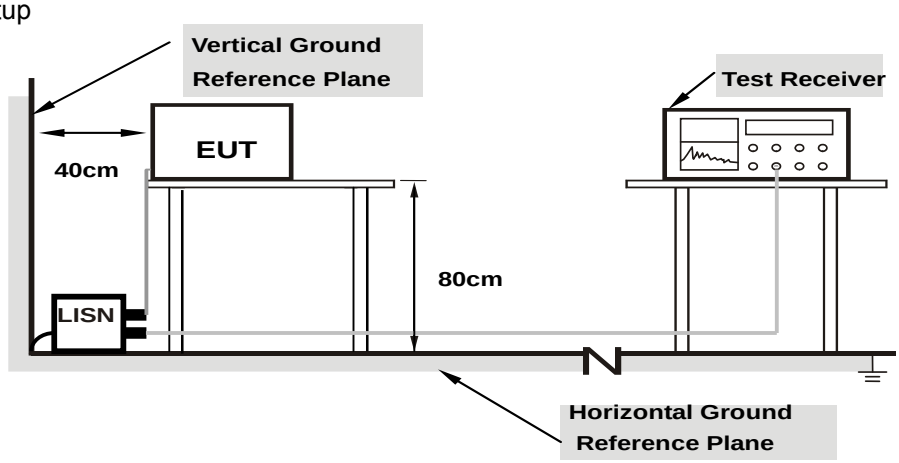
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

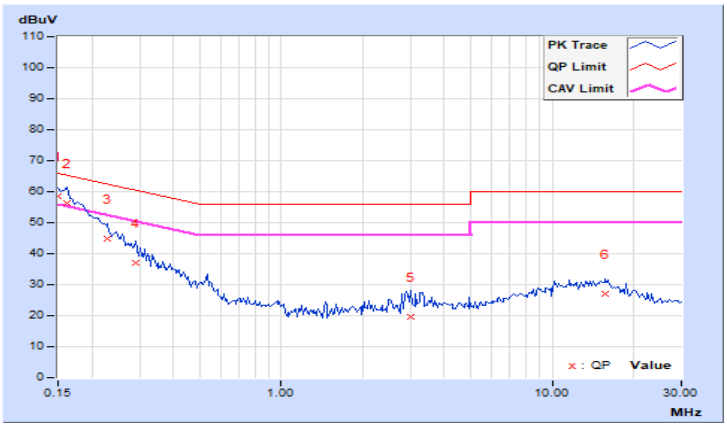
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.97	48.40	32.40	58.37	42.37	66.00	56.00	-7.63	-13.63
2	0.16172	9.97	46.26	29.61	56.23	39.58	65.38	55.38	-9.15	-15.80
3	0.22812	9.98	34.74	19.12	44.72	29.10	62.52	52.52	-17.80	-23.42
4	0.29063	9.98	27.01	11.83	36.99	21.81	60.51	50.51	-23.52	-28.70
5	3.01953	10.20	9.38	0.43	19.58	10.63	56.00	46.00	-36.42	-35.37
6	15.76563	11.07	16.10	10.39	27.17	21.46	60.00	50.00	-32.83	-28.54

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.

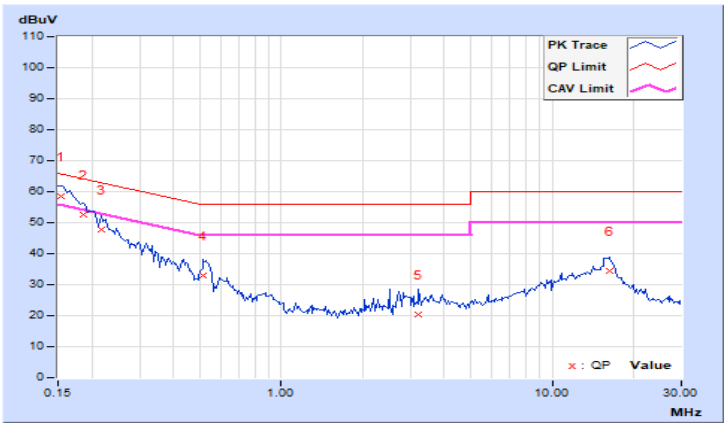


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15391**	**9.95**	**48.46**	**32.12**	**58.41**	**42.07**	**65.79**	**55.79**	**-7.38**	**-13.72**
2	0.18516	9.96	42.73	27.26	52.69	37.22	64.25	54.25	-11.56	-17.03
3	0.21641	9.96	37.65	22.48	47.61	32.44	62.96	52.96	-15.35	-20.52
4	0.51719	9.99	22.97	16.04	32.96	26.03	56.00	46.00	-23.04	-19.97
5	3.21875	10.16	10.18	1.55	20.34	11.71	56.00	46.00	-35.66	-34.29
6	16.26953	10.90	23.41	17.49	34.31	28.39	60.00	50.00	-25.69	-21.61

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.

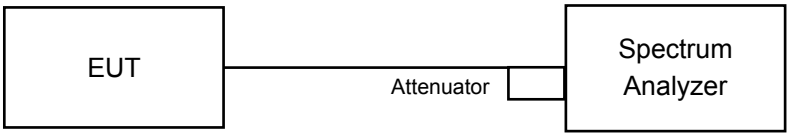


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

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 Procedure

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation fromTest 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 Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	10.16	10.14	0.5	PASS
6	2437	10.14	10.13	0.5	PASS
11	2462	10.14	10.13	0.5	PASS

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.86	16.37	0.5	PASS
6	2437	16.10	16.01	0.5	PASS
11	2462	16.30	16.33	0.5	PASS

VHT20

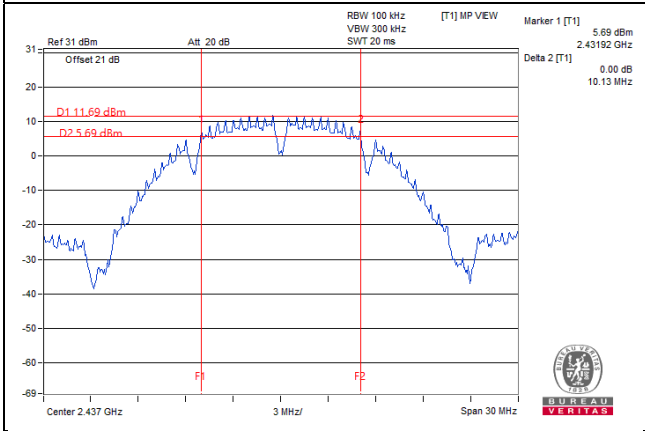
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.09	16.87	0.5	Pass
6	2437	16.30	16.96	0.5	Pass
11	2462	16.70	16.95	0.5	Pass

VHT40

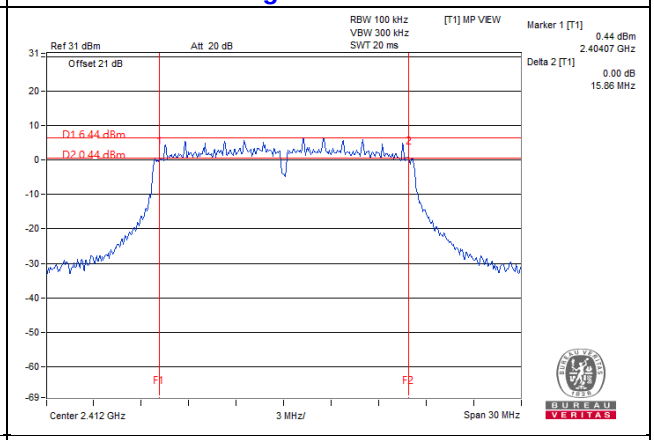
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.40	35.27	0.5	Pass
6	2437	35.44	35.52	0.5	Pass
9	2452	35.44	35.42	0.5	Pass

Spectrum Plot of Worst Value

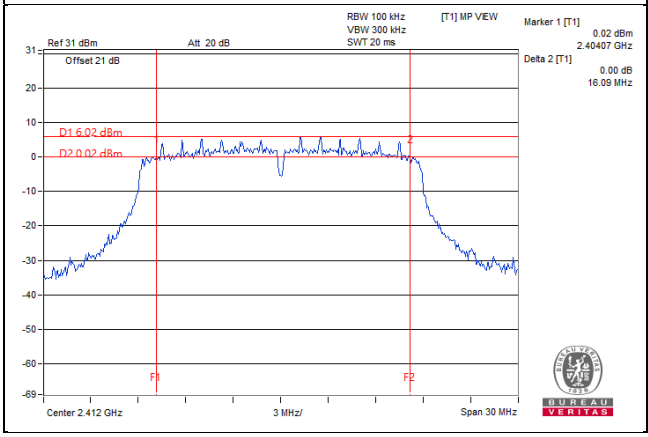
802.11b / Chain 1 : CH6



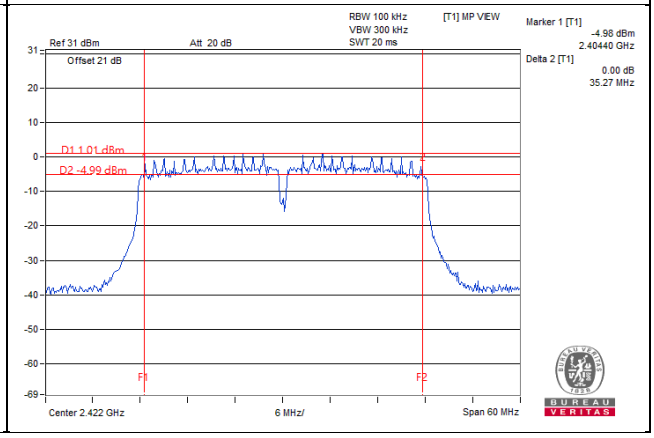
802.11g / Chain 0 : CH1



VHT20 / Chain 0 : CH1



VHT40 / Chain 1 : CH3



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

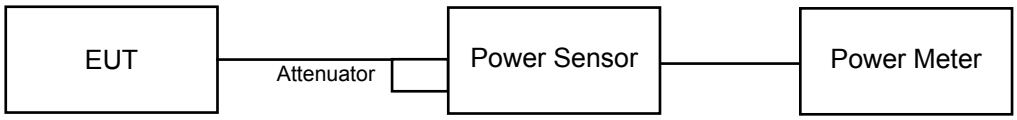
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value..

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

FOR PEAK POWER

802.11b

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.16	20.26	236.787	23.74	30	Pass
6	2437	24.47	23.59	508.458	27.06	30	Pass
11	2462	22.53	22.07	340.126	25.32	30	Pass

802.11g

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	26.43	25.88	826.8	29.17	30	Pass
6	2437	27.12	26.63	975.486	29.89	30	Pass
11	2462	26.68	24.85	771.078	28.87	30	Pass

VHT20

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	24.78	24.82	603.997	27.81	30	Pass
6	2437	27.02	26.53	953.281	29.79	30	Pass
11	2462	25.03	24.43	595.752	27.75	30	Pass

VHT40

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	25.14	24.34	598.232	27.77	30	Pass
6	2437	25.56	24.75	658.287	28.18	30	Pass
9	2452	24.96	24.12	571.555	27.57	30	Pass

FOR AVERAGE POWER

802.11b

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	19.23	18.35	152.144	21.82
6	2437	22.63	21.78	333.892	25.24
11	2462	20.67	20.11	219.246	23.41

802.11g

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	17.85	17.02	111.304	20.47
6	2437	21.83	21.43	291.4	24.64
11	2462	17.42	16.16	96.513	19.85

VHT20

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	16.67	16.53	91.43	19.61
6	2437	21.77	21.05	277.664	24.44
11	2462	17.07	15.98	90.561	19.57

VHT40

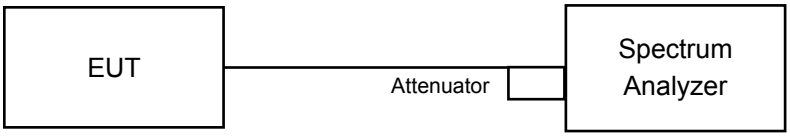
Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	16.22	15.34	76.077	18.81
6	2437	16.53	15.81	83.085	19.20
9	2452	15.94	14.96	70.597	18.49

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

a. Set analyzer center frequency to DTS channel center frequency.
b. Set the span to 1.5 times the DTS bandwidth.
c. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d. Set the VBW ≥ 3 × RBW.
e. Detector = peak.
f. Sweep time = auto couple.
g. Trace mode = max hold.
h. Allow trace to fully stabilize.
i. Use the peak marker function to determine the maximum amplitude level within the RBW.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-4.76	3.01	-1.75	7.82	Pass
	6	2437	-1.83	3.01	1.18	7.82	Pass
	11	2462	-3.85	3.01	-0.84	7.82	Pass
1	1	2412	-4.37	3.01	-1.36	7.82	Pass
	6	2437	-2.56	3.01	0.45	7.82	Pass
	11	2462	-3.24	3.01	-0.23	7.82	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 6.18dBi > 6dBi , so the power density limit shall be reduced to 8-(6.18-6) = 7.82dBm.

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-7.87	3.01	-4.86	7.82	Pass
	6	2437	-3.18	3.01	-0.17	7.82	Pass
	11	2462	-8.74	3.01	-5.73	7.82	Pass
1	1	2412	-9.05	3.01	-6.04	7.82	Pass
	6	2437	-4.20	3.01	-1.19	7.82	Pass
	11	2462	-9.85	3.01	-6.84	7.82	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 6.18dBi > 6dBi , so the power density limit shall be reduced to 8-(6.18-6) = 7.82dBm.

VHT20

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-7.98	3.01	-4.97	7.82	Pass
	6	2437	-4.26	3.01	-1.25	7.82	Pass
	11	2462	-8.22	3.01	-5.21	7.82	Pass
1	1	2412	-9.10	3.01	-6.09	7.82	Pass
	6	2437	-5.13	3.01	-2.12	7.82	Pass
	11	2462	-9.53	3.01	-6.52	7.82	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 6.18dBi > 6dBi , so the power density limit shall be reduced to 8-(6.18-6) = 7.82dBm.

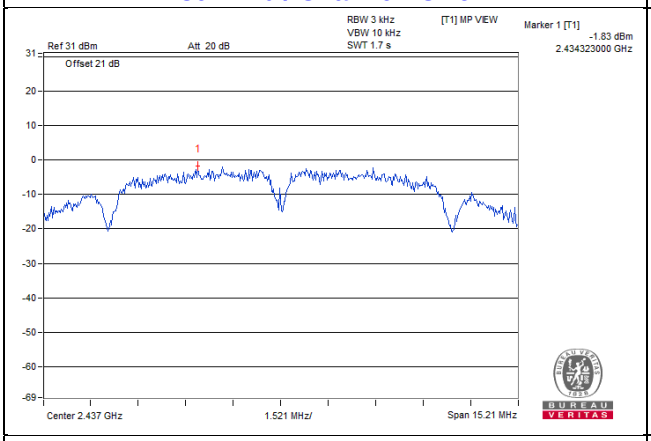
VHT40

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-13.56	3.01	-10.55	7.82	Pass
	6	2437	-12.45	3.01	-9.44	7.82	Pass
	9	2452	-13.11	3.01	-10.10	7.82	Pass
1	3	2422	-13.90	3.01	-10.89	7.82	Pass
	6	2437	-13.87	3.01	-10.86	7.82	Pass
	9	2452	-14.37	3.01	-11.36	7.82	Pass

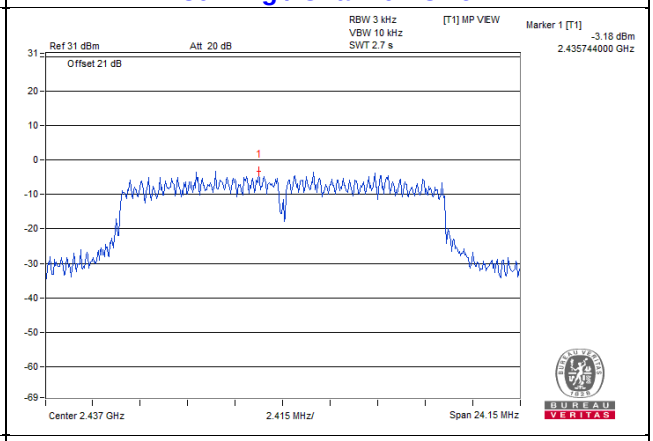
Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 6.18dBi > 6dBi , so the power density limit shall be reduced to 8-(6.18-6) = 7.82dBm.

Spectrum Plot of Worst Value

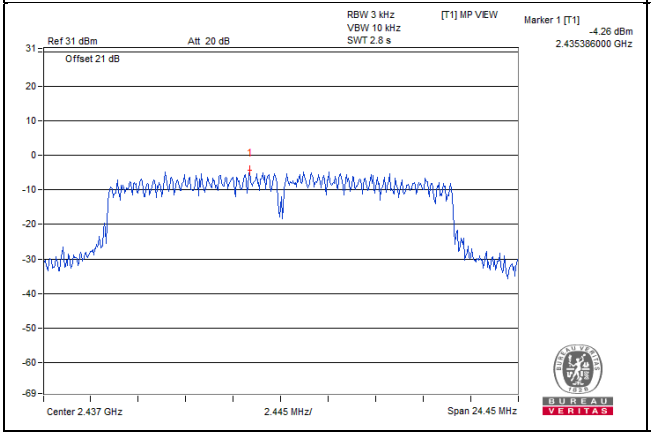
802.11b / Chain 0 : CH6



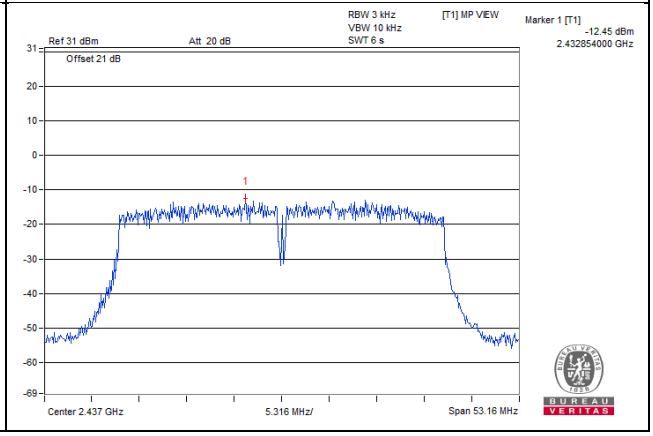
802.11g / Chain 0 : CH6



VHT20 / Chain 0 : CH6



VHT40 / Chain 0 : CH6

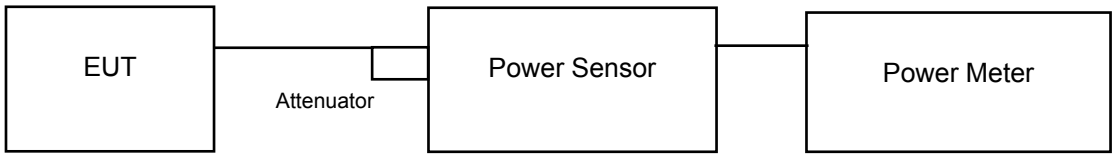


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

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.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

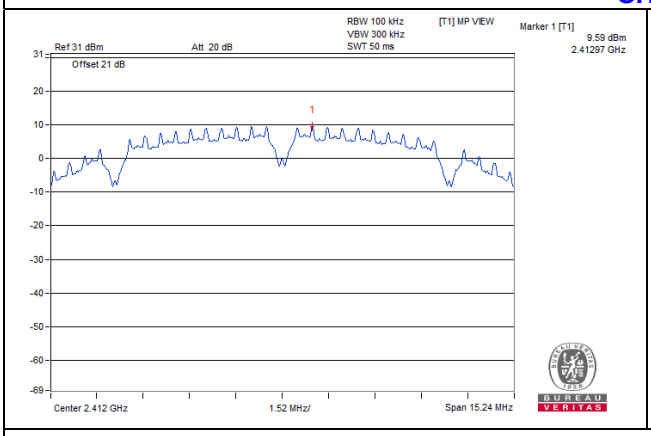
Same as Item 4.3.6

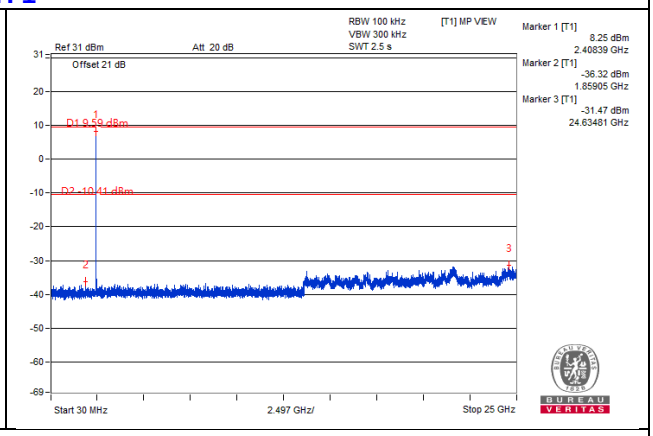
4.6.7 Test Results

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.

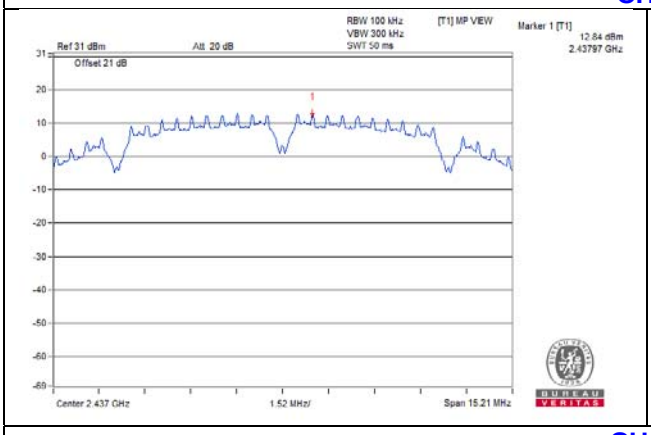
802.11b
Chain 0

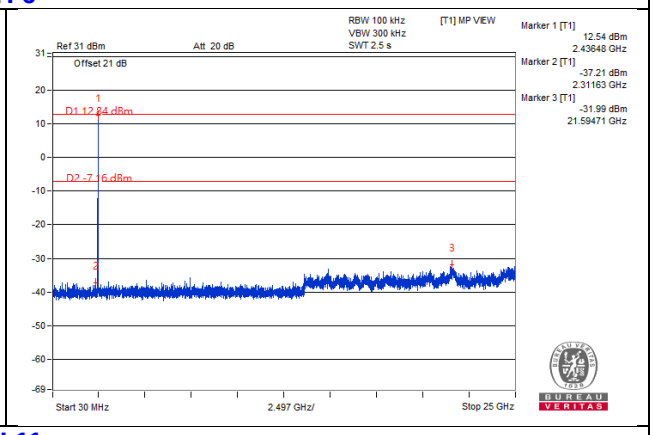
CH 1



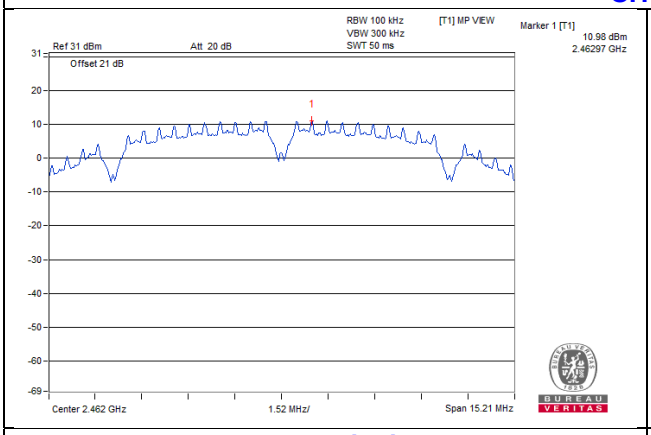


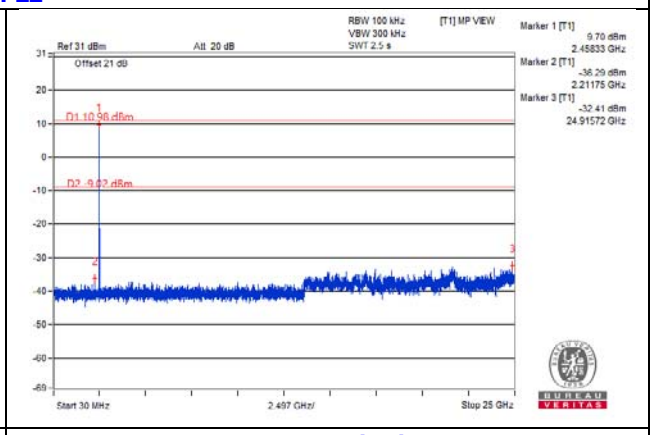
CH 6



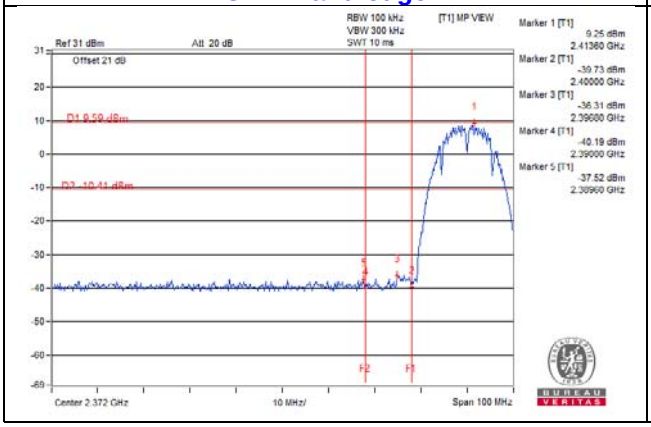


CH 11

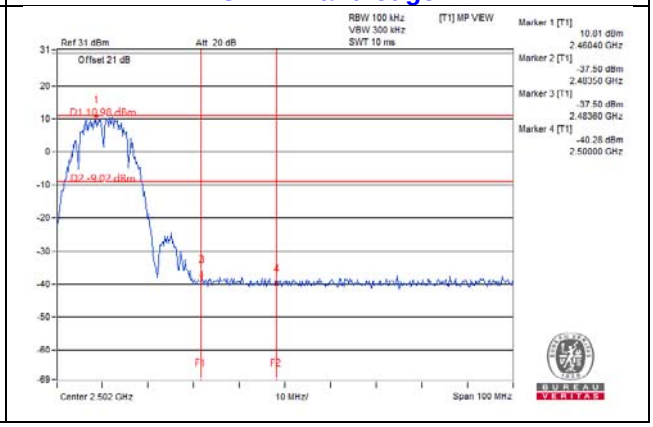




CH 1 Band edge

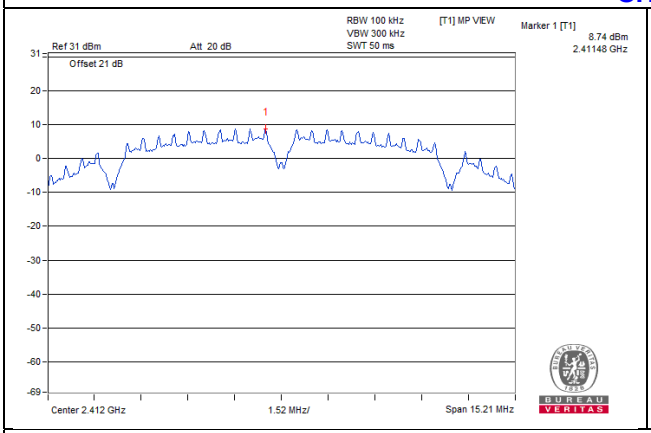


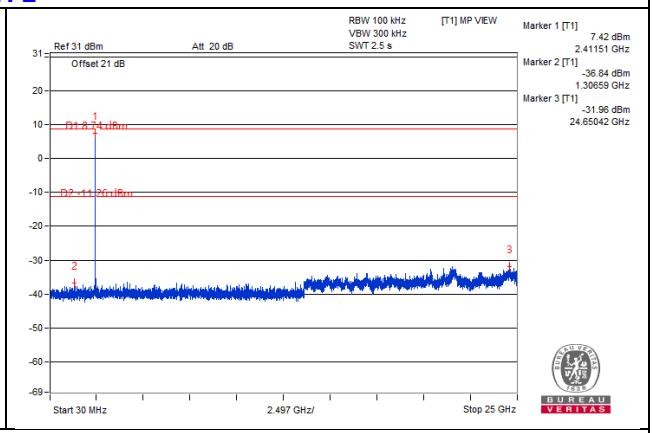
CH 11 Band edge



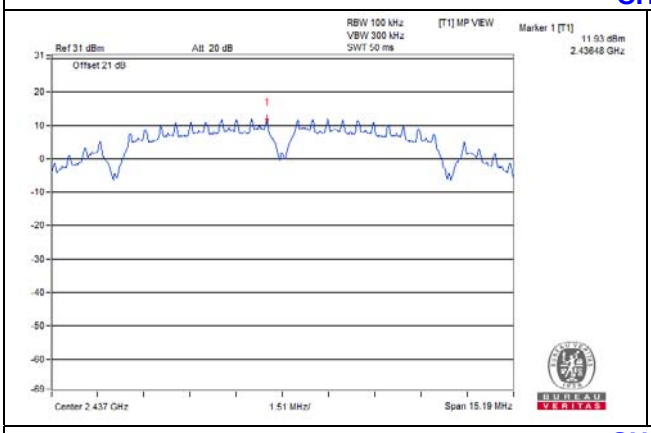
Chain 1

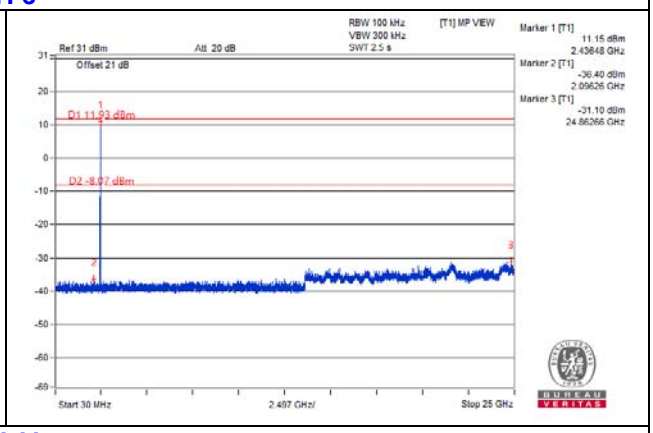
CH 1



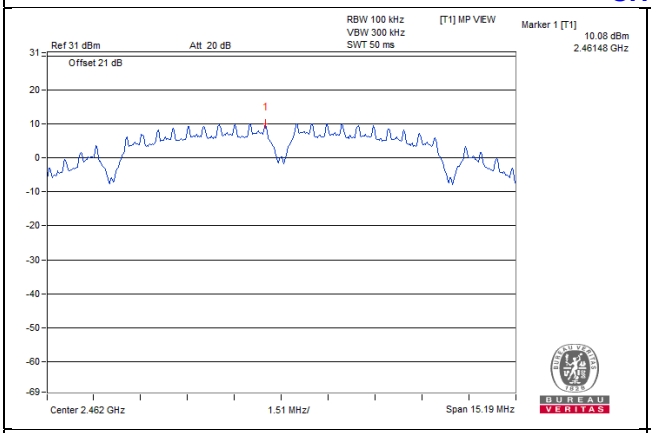


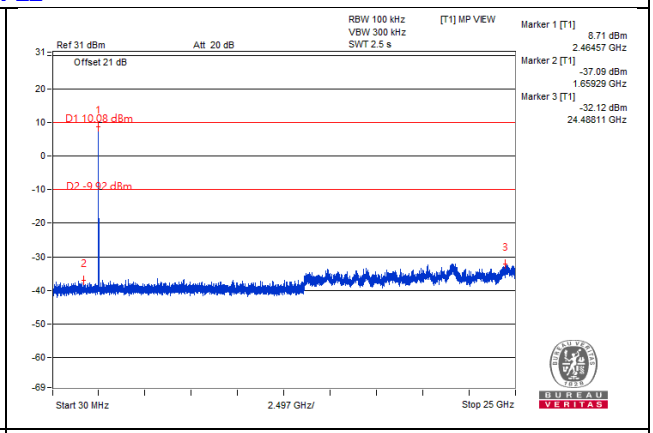
CH 6



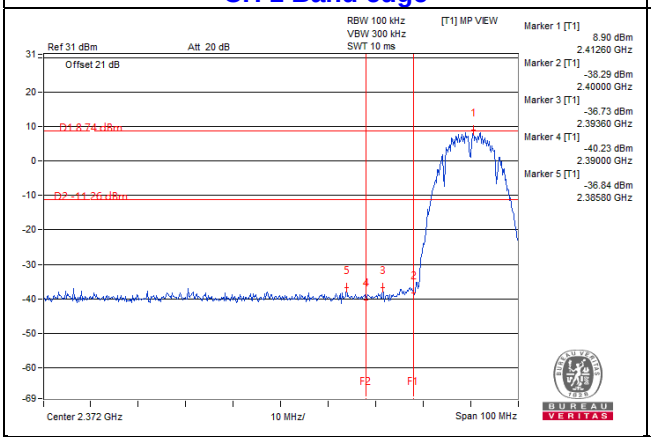


CH 11

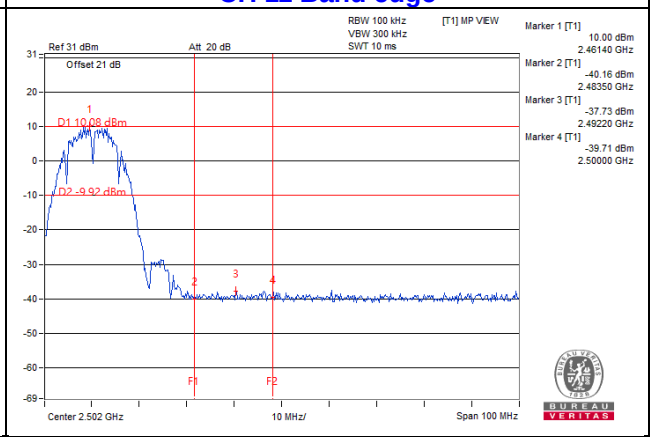




CH 1 Band edge

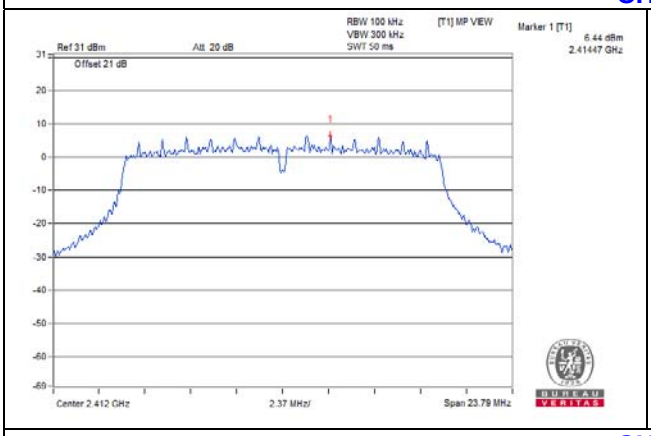


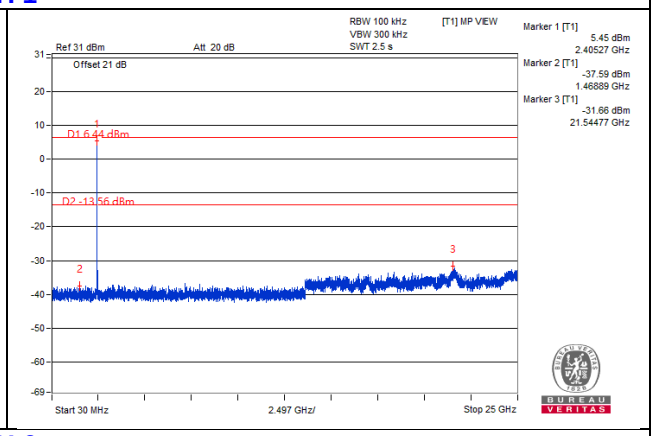
CH 11 Band edge



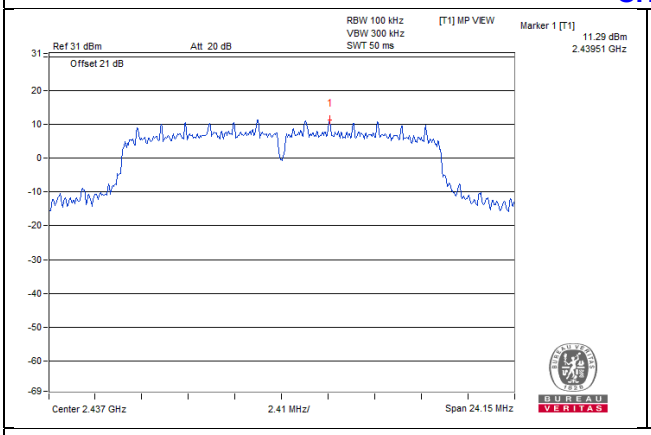
802.11g
Chain 0

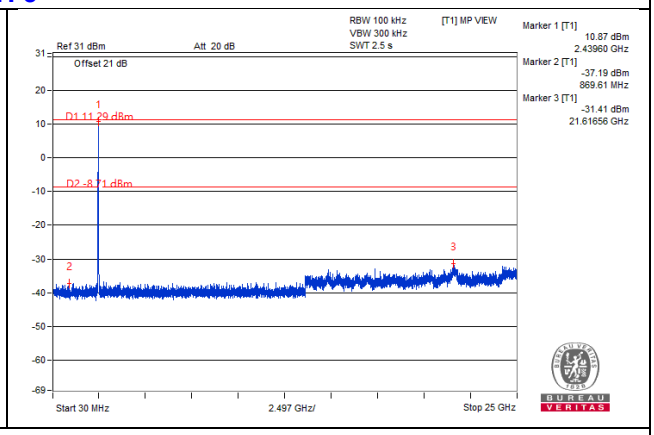
CH 1



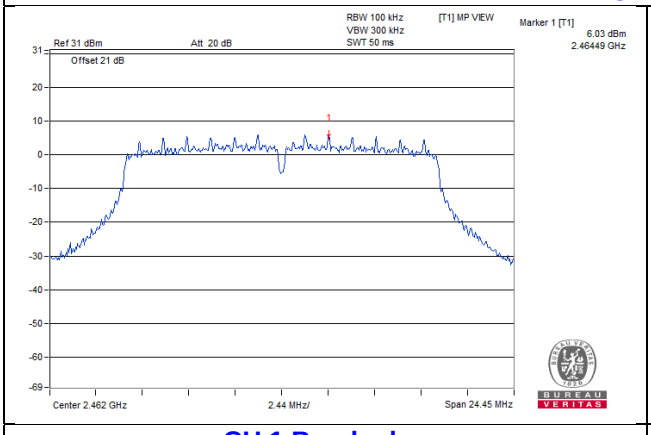


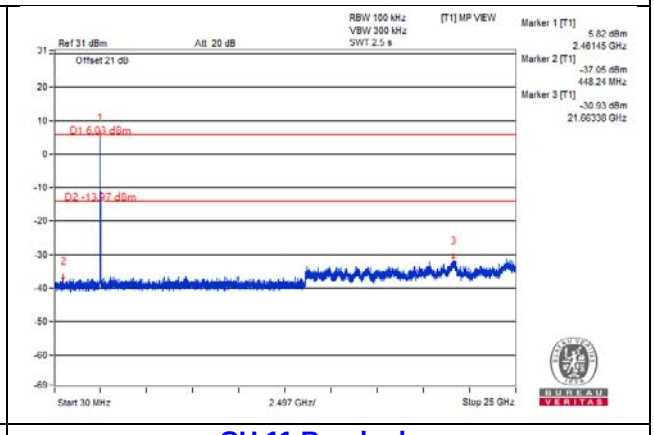
CH 6



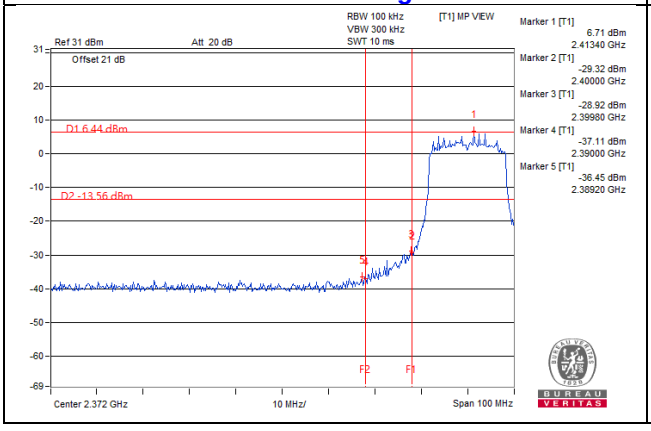


CH 11

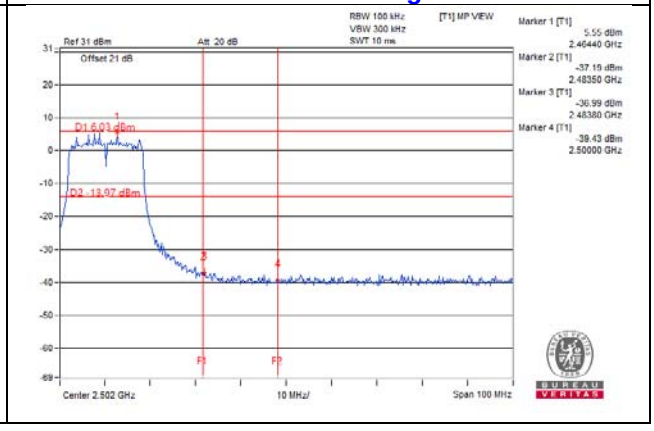




CH 1 Band edge

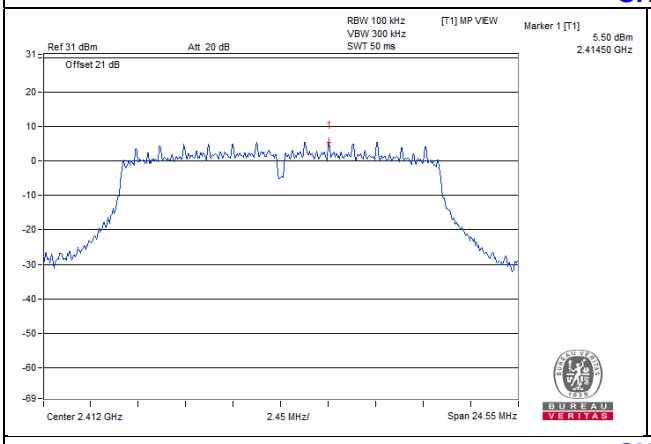


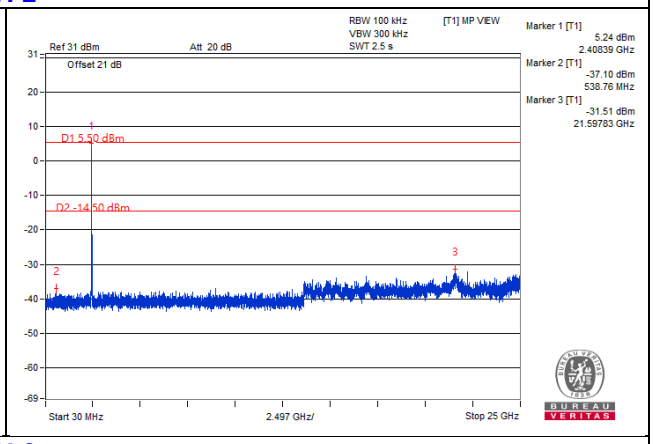
CH 11 Band edge



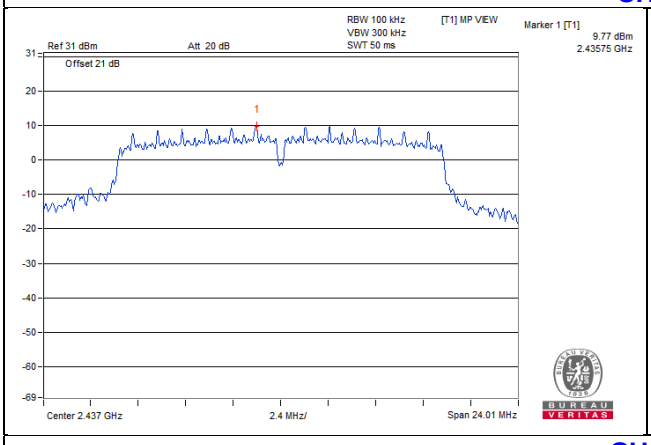
Chain 1

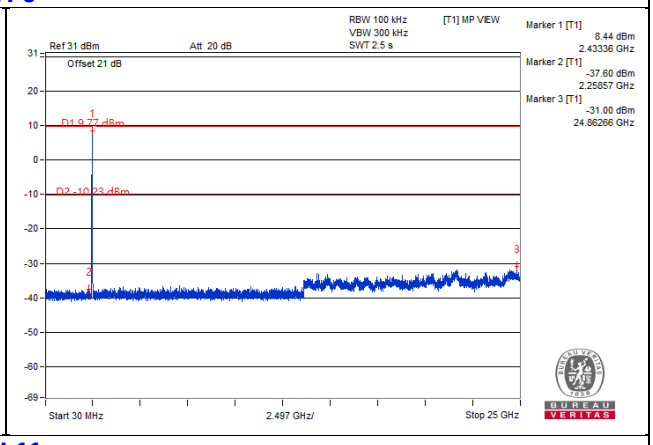
CH 1



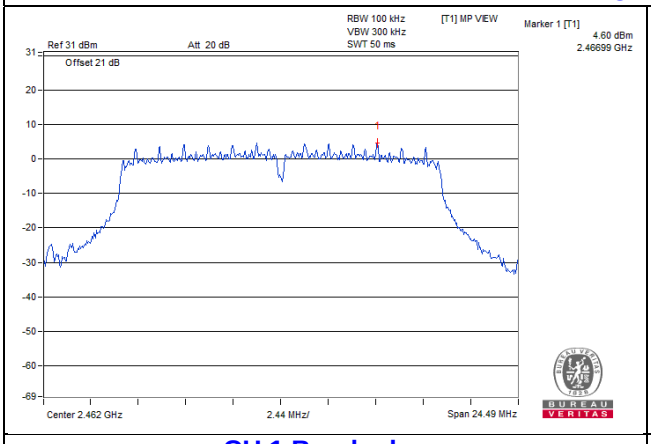


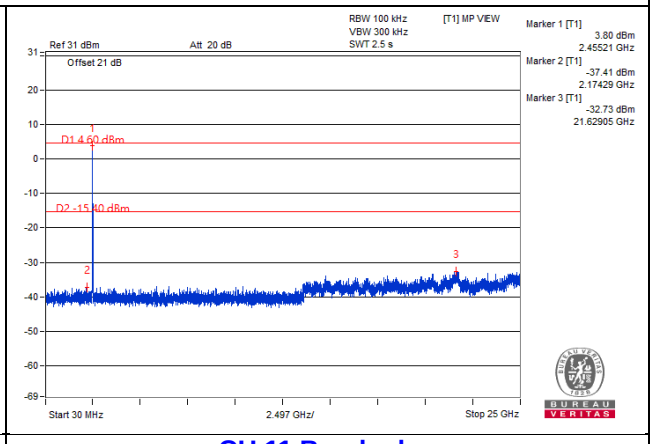
CH 6



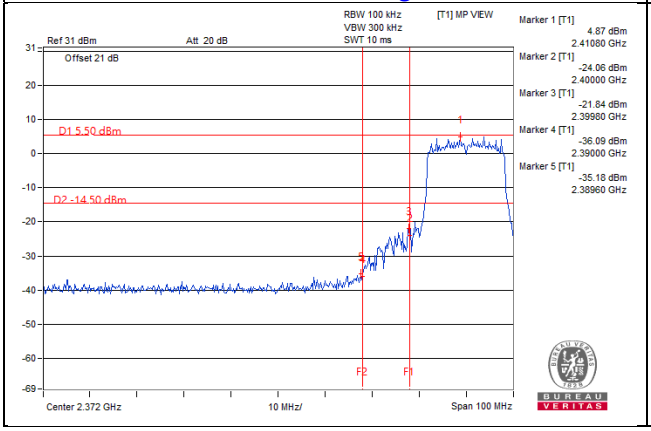


CH 11

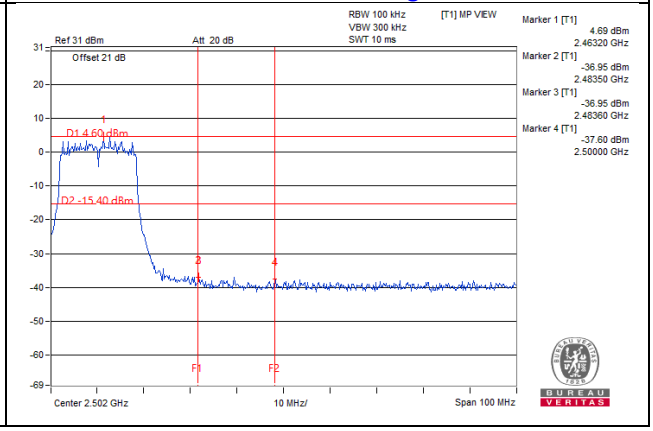




CH 1 Band edge

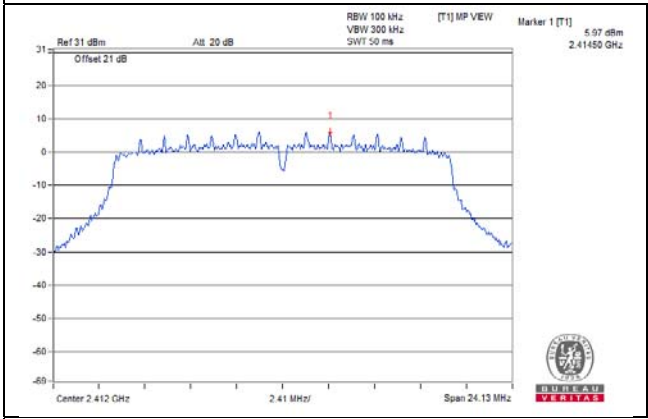


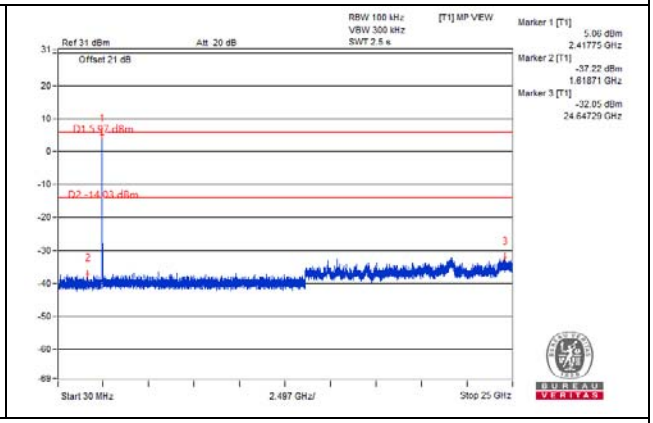
CH 11 Band edge



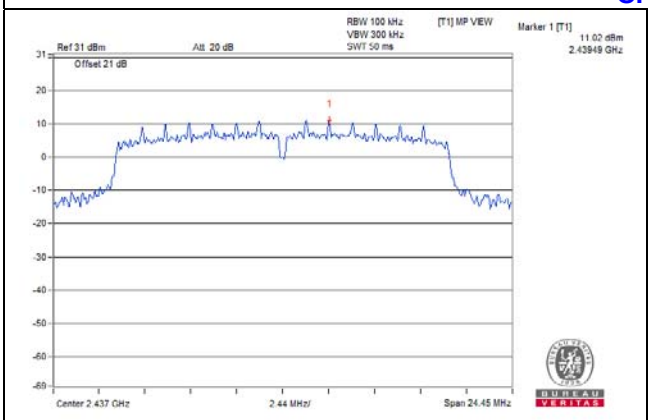
VHT20
Chain 0

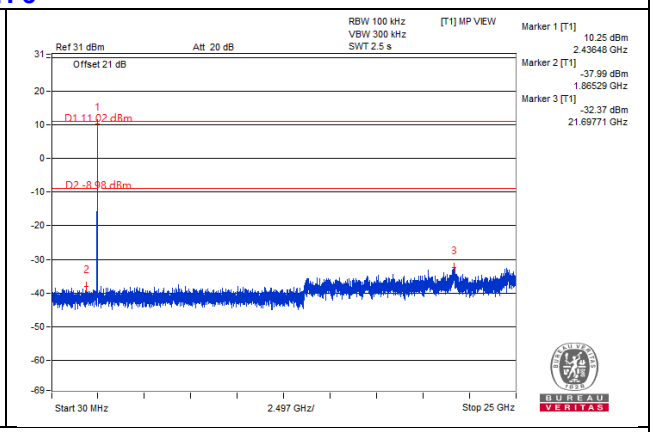
CH 1



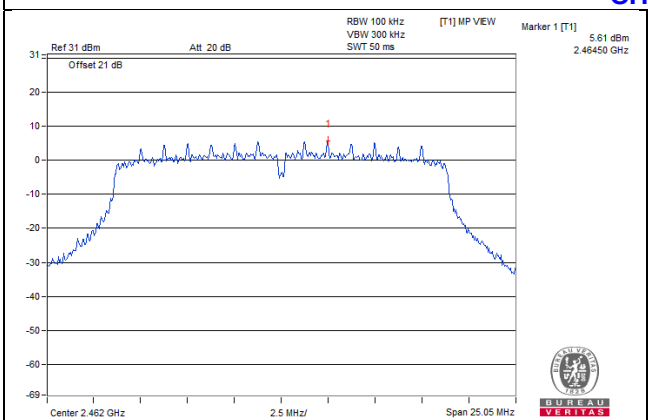


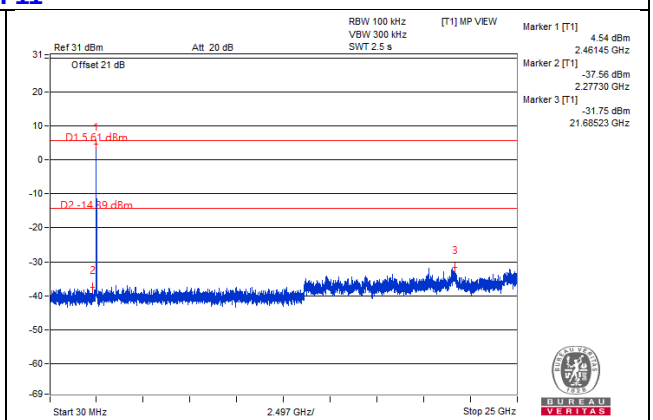
CH 6



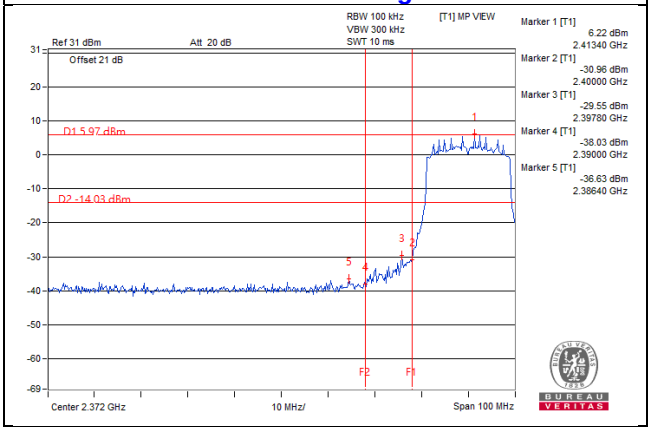


CH 11

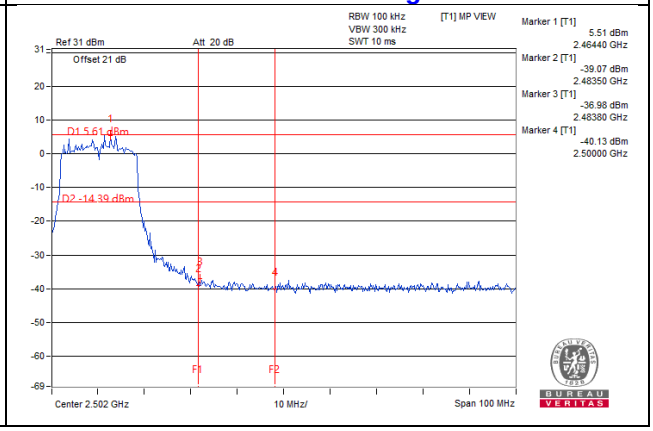




CH 1 Band edge

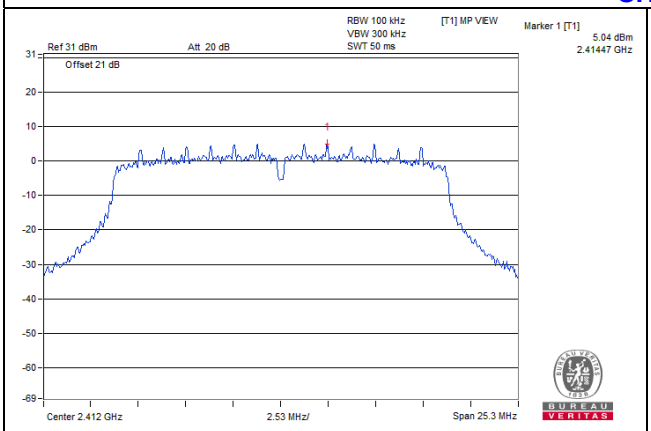


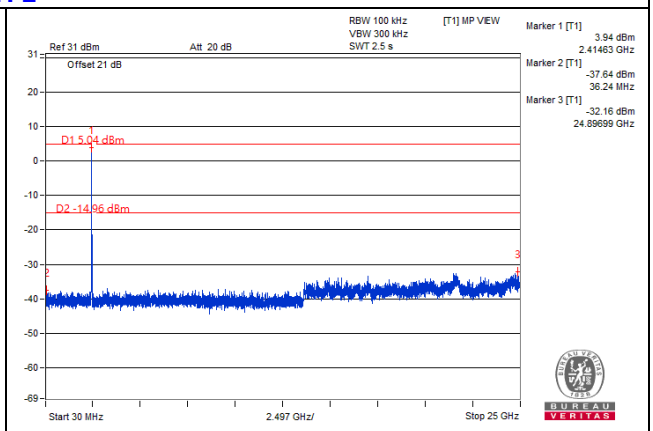
CH 11 Band edge



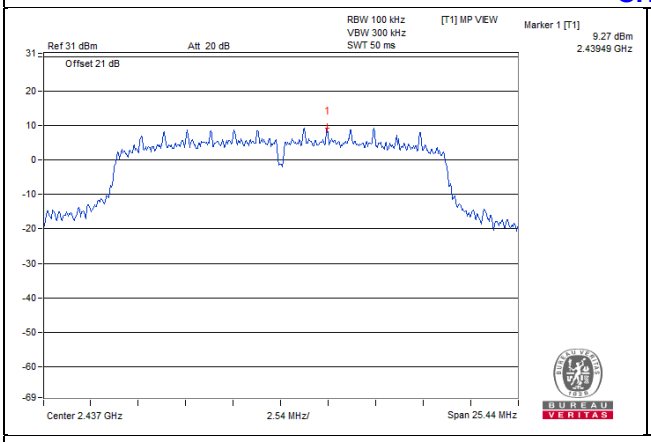
Chain 1

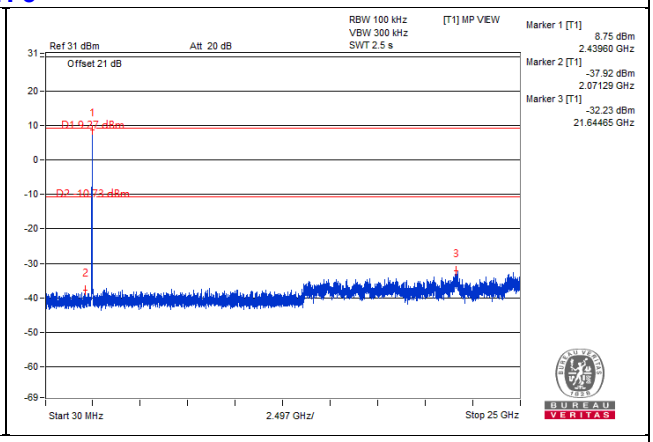
CH 1



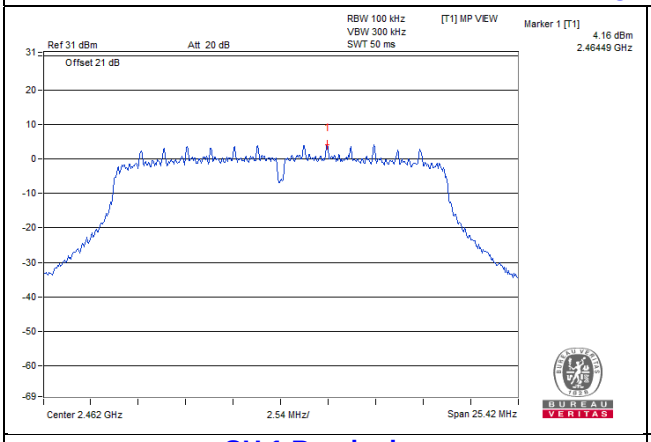


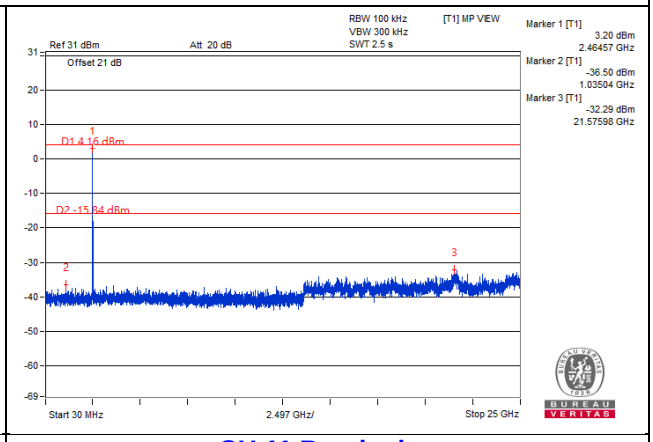
CH 6



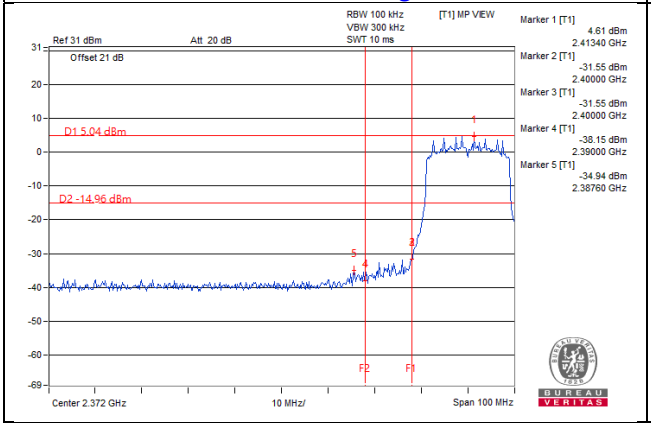


CH 11

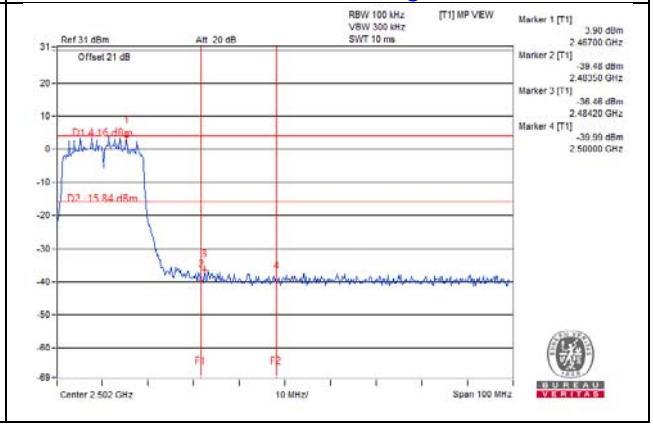




CH 1 Band edge

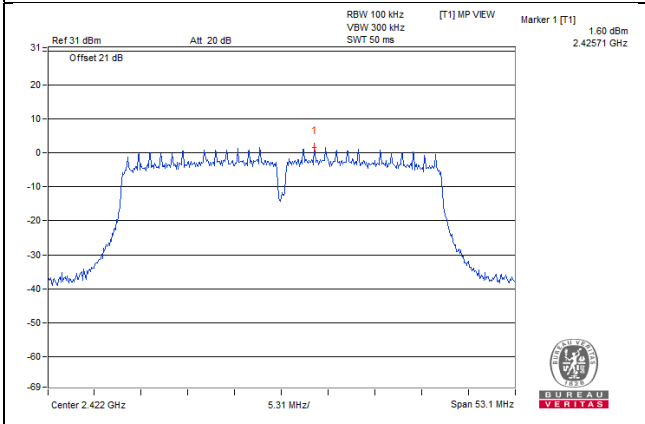


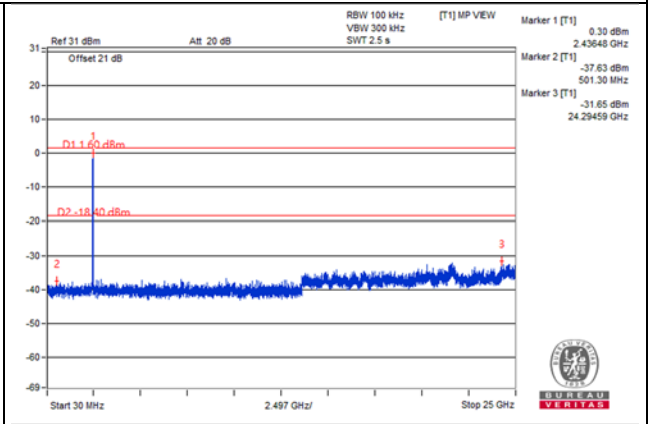
CH 11 Band edge



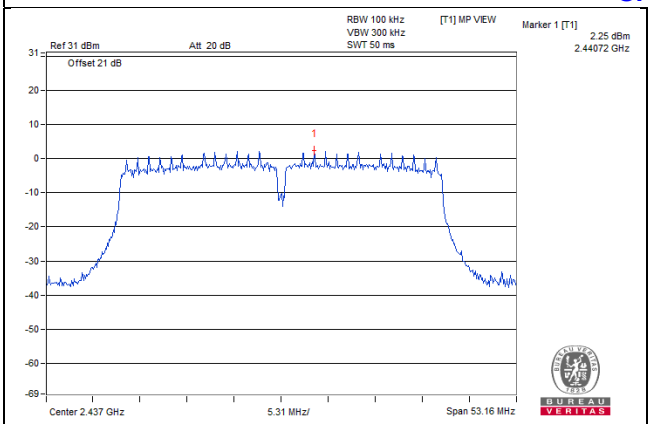
VHT40
Chain 0

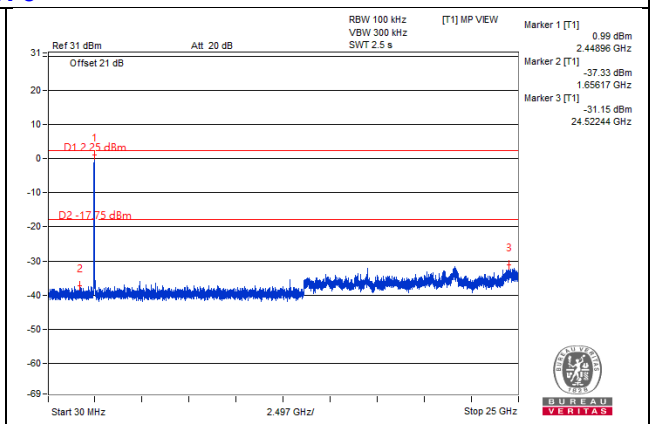
CH 3



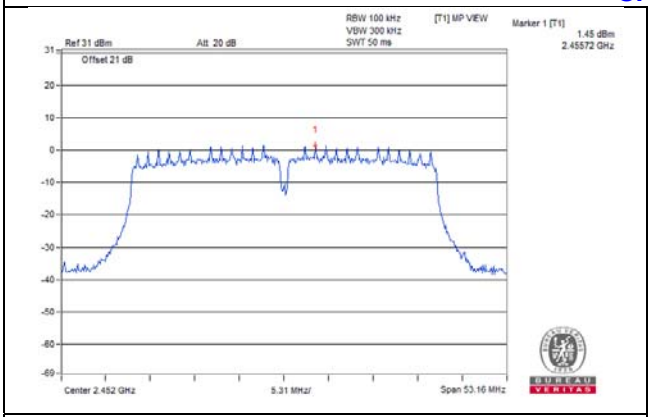


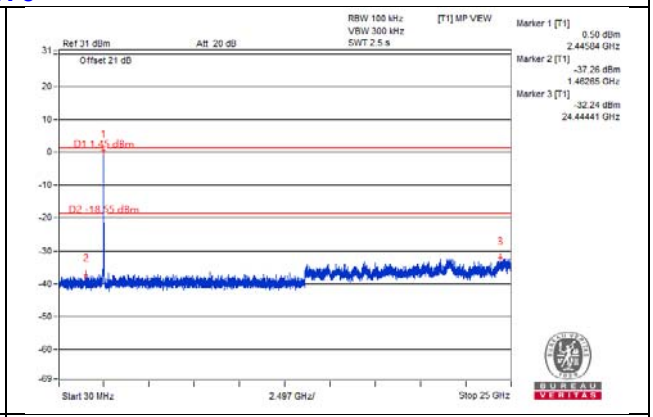
CH 6



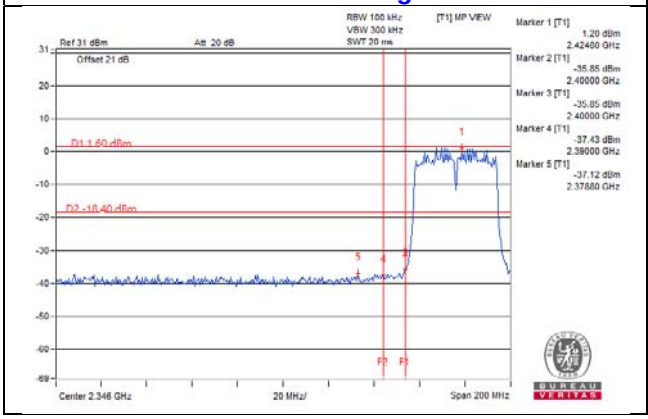


CH 9

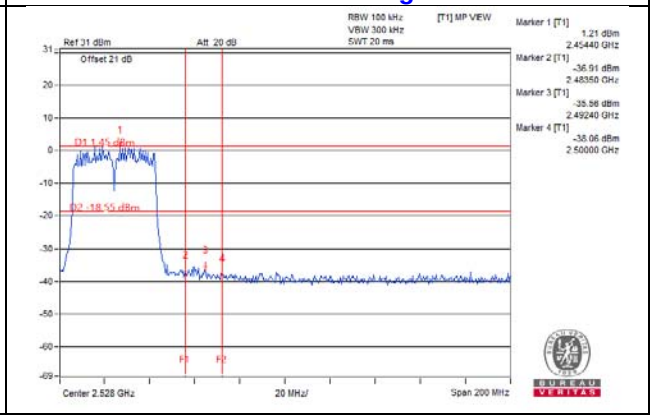




CH 3 Band edge

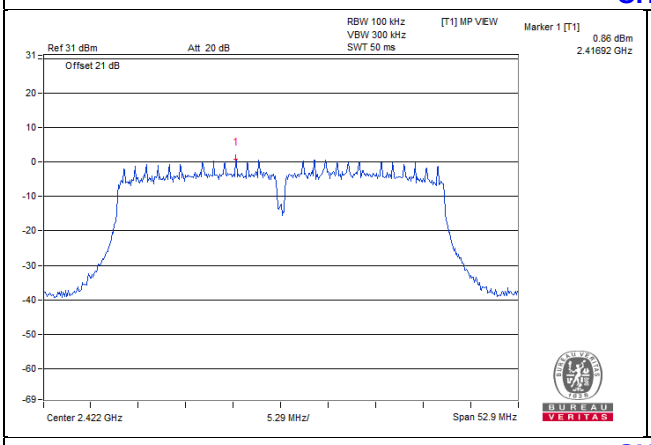


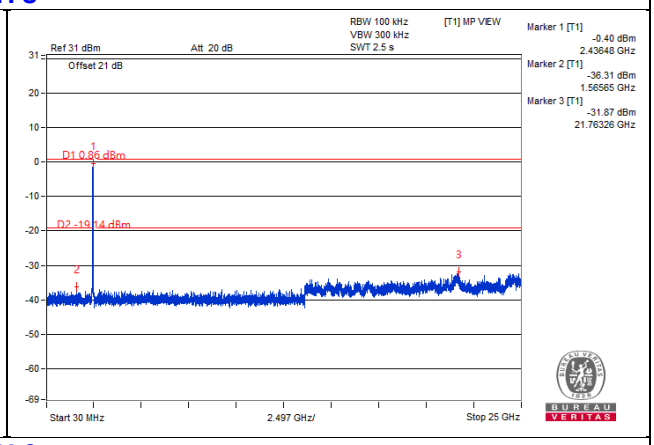
CH 9 Band edge



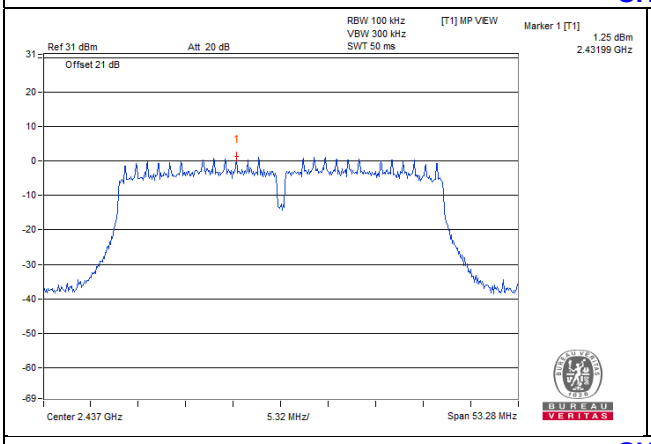
Chain 1

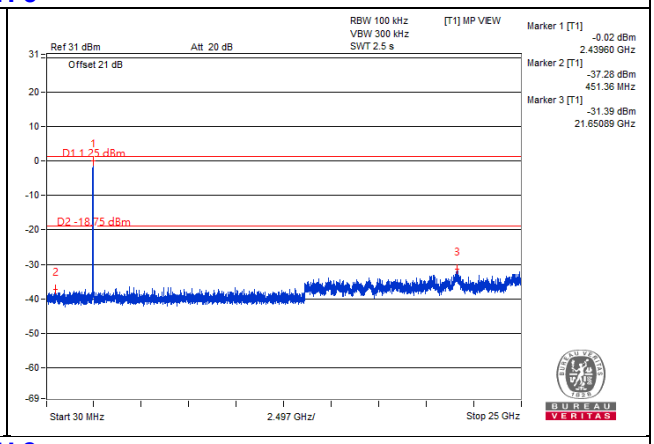
CH 3



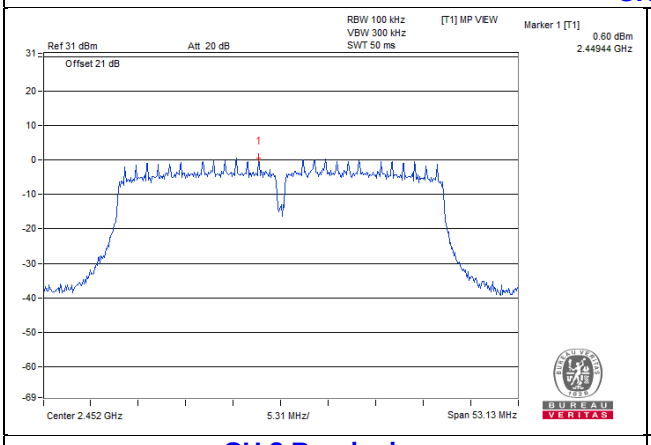


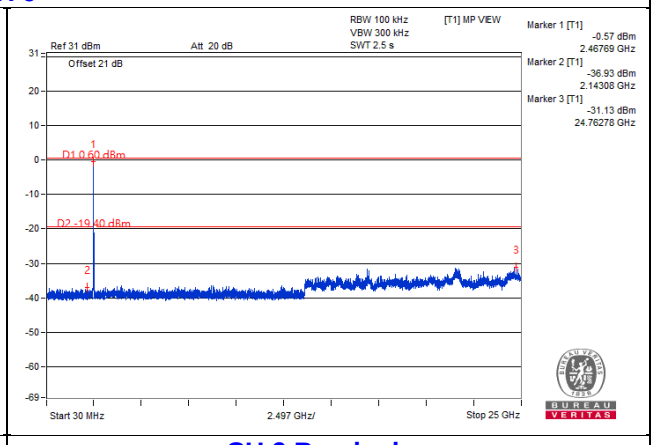
CH 6



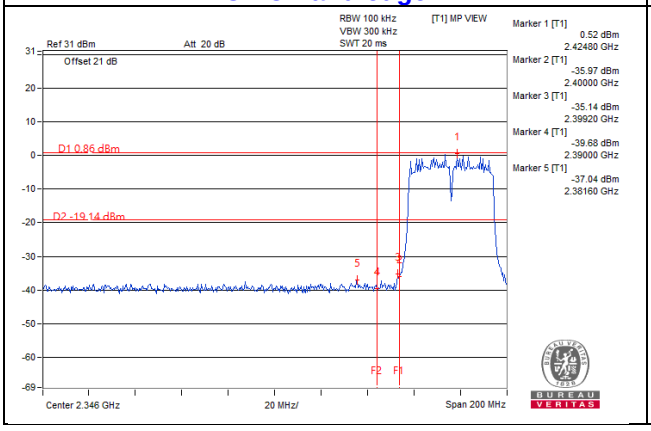


CH 9

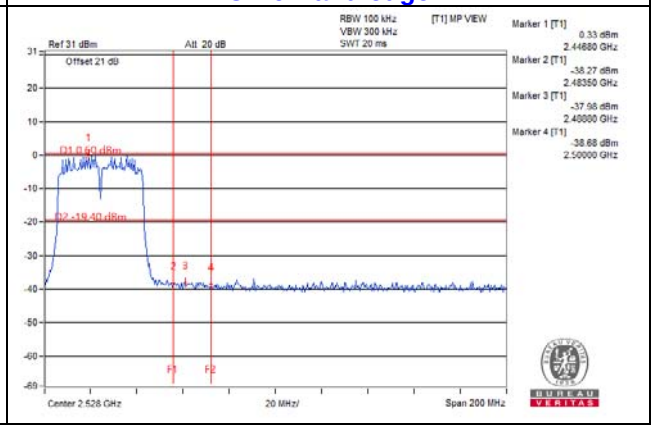




CH 3 Band edge



CH 9 Band edge



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:

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 ---