FCC Test Report (WLAN)

Report No.:	RF171208E04
FCC ID:	Q87-08011
Test Model:	WHW03 V2
Series Model:	A03 V2
Received Date:	Dec. 08, 2017
Test Date:	Dec. 20, 2017 to Feb. 05, 2018
Issued Date:	Feb. 13, 2018
Applicant:	Linksys LLC
Address:	121 Theory Drive, Irvine, CA 92617, 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 R.O.C.
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
FCC Registration / Designation Number:	723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
RF171208E04	Original release.	Feb. 13, 2018

1 Certificate of Conformity

Product:	WHOLE HOME WI-FI
Brand:	Linksys
Test Model:	WHW03 V2
Series Model:	A03 V2
Sample Status:	ENGINEERING SAMPLE
Applicant:	Linksys LLC
Test Date:	Dec. 20, 2017 to Feb. 05, 2018
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 : _____ , **Date:** Feb. 13, 2018

Wendy Wu / Specialist

Approved by : _____ , **Date:** Feb. 13, 2018

May Chen / 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 -5.27dB at 0.43516MHz.
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 2483.50MHz, 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 i-pex(MHF) not a standard connector.

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	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.30 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.16 dB
	6GHz ~ 18GHz	4.91 dB
	18GHz ~ 40GHz	5.30 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT (WLAN)

Product	WHOLE HOME WI-FI
Brand	Linksys
Test Model	WHW03 V2
Series Model	A03 V2
Status of EUT	ENGINEERING SAMPLE
Driver version	WNC_VELOP_V2_20180206_V0.9
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
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: 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, 5.745 ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20), VHT20: 11 802.11n (HT40), VHT40: 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	**2.4GHz:** **CDD Mode:** 813.837mW **Beamforming Mode:** 790.263mW **5GHz:** **CDD Mode:** **5.18 ~ 5.24GHz:** 729.665mW **5.745 ~ 5.825GHz:** 993.777mW **Beamforming Mode:** **5.18 ~ 5.24GHz:** 729.665mW **5.745 ~ 5.825GHz:** 843.554mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	NA

Note:

1. There are WLAN, Bluetooth and Zigbee technology used for the EUT. The EUT has below radios as following table:

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

2. The EUT has below model names, which are identical to each other in all aspects except for the following table:

Brand	Model Name	Different
Linksys	WHW03 V2	For maketing request
	A03 V2	

From the above models, model: **WHW03 V2** was selected as representative model for the test and its data

was recorded in this report.

3. Simultaneously transmission condition.

Condition	Technology				
1	WLAN 2.4GHz	WLAN 5GHz (low band)	WLAN 5GHz (high band)	Bluetooth	Zigbee
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.					

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

No.	Brand	Model No.	Spec.	Plug
1	LEI	IU24-6120200-WP	Input: 100-240Vac, 0.7A, 50-60Hz Output: 12Vdc, 2A DC output cable (Unshielded, 1.8m)	Universal
2	LEI	MU24A6120200-A1	Input: 100-240Vac, 0.7A, 50-60Hz Output: 12Vdc, 2A DC output cable (Unshielded, 1.8m)	FCC
3	Ktec	KSA-24H-120200D5	Input: 100-240Vac, 0.7A, 50-60Hz Output: 12Vdc, 2A DC output cable (Unshielded, 1.8m)	Universal
4	Ktec	KSA-24H-120200HU	Input: 100-240Vac, 0.7A, 50-60Hz Output: 12Vdc, 2A DC output cable (Unshielded, 1.8m)	FCC
Note: From the above models, the worst radiated emission test was found in **Adapter 1**. Therefore only the test data of the modes were recorded in this report.				

5. The DDR3 Memory of EUT as following table

Item	Brand	Model No.	Different
Main source	SK HYNIX	H5TC4G63CFR-PBA	1. For maketing request. 2. DDR3 Memory.
Second source	NANYA	NT5CC256M16EP-EK	
Note: From the above models, the worst case was found in **Main source**. Therefore only the test data of the modes were recorded in this report.			

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

Bluetooth						
Ant No.	Brand	Model	Antenna Gain (dBi)	Frequency rang (GHz)	Antenna type	Connector type
1	Aristotle	RFA-BT-9267	1.69	2.4~2.4835	Dipole	i-pex(MHF)
Zigbee						
Ant No.	Brand	Model	Antenna Gain (dBi)	Frequency rang (GHz)	Antenna type	Connector type
1	Aristotle	RFA-ZB-9267	0.85	2.4~2.4835	Dipole	i-pex(MHF)
WLAN						
Ant No.	Brand	Model	Antenna Gain (dBi)	Frequency rang (GHz)	Antenna type	Connector type
1	Aristotle	RFA-05-9267-L	3.55	5.5~5.825	Dipole	i-pex(MHF)
2	Aristotle	RFA-05-9267-R	3.87	5.5~5.825	Dipole	i-pex(MHF)
3	Aristotle	RFA-25-9267-B-V2	3.12	2.4~2.4835	Dipole	i-pex(MHF)
			3.77	5.18~5.320		
4	Aristotle	RFA-25-9267-F-V2	3.26	2.4~2.4835	Dipole	i-pex(MHF)
			3.68	5.18~5.320		

7. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
VHT20	MCS0~8 Nss=1	2TX	2RX
	MCS0~8 Nss=2	2TX	2RX
VHT40	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS0~8 Nss=1	2TX	2RX
	MCS0~8 Nss=2	2TX	2RX
802.11ac (VHT40)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX
802.11ac (VHT80)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX
Note: 1. All of modulation mode support beamforming function except 802.11b modulation mode.			

8. 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.

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20), 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	
1	√	√	√	√	Power from Adapter 1
2	-	-	√	-	Power from Adapter 2
3	-	-	√	-	Power from Adapter 3
4	-	-	√	-	Power from Adapter 4

Where **RE≥1G**: Radiated Emission above 1GHz & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission
APCM: Antenna Port Conducted Measurement

NOTE: "-"means no effect.

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.

CDD Mode					
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
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	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.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	11	DSSS	DBPSK	1

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.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	11	DSSS	DBPSK	1

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.

CDD Mode					
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
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
Beamforming Mode (output power only)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

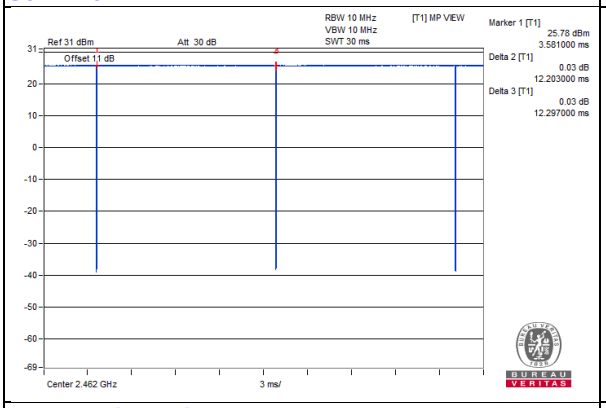
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	21deg. C, 65%RH	120Vac, 60Hz	Frank Chuang
RE<1G	22deg. C, 67%RH	120Vac, 60Hz	Steven Chiang
PLC	24deg. C, 73%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 65%RH	120Vac, 60Hz	Robert Cheng

3.3 Duty Cycle of Test Signal

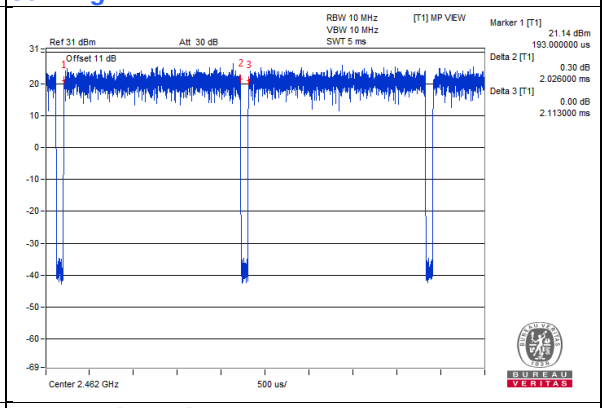
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 12.203/12.297 = 0.992
802.11g: Duty cycle = 2.026/2.113 = 0.959, Duty factor = 10 * log(1/0.959) = 0.18
802.11n (HT20): Duty cycle = 4.955/5.058 = 0.98
802.11n (HT40): Duty cycle = 2.404/2.496 = 0.963, Duty factor = 10 * log(1/0.963) = 0.16

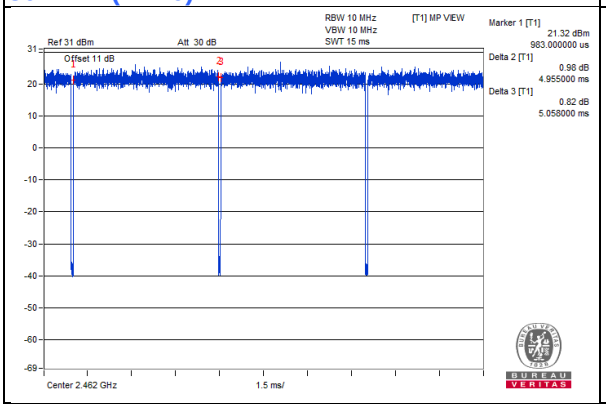
802.11b



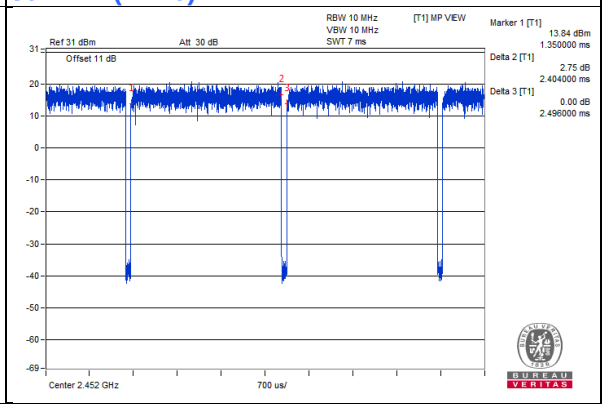
802.11g



802.11n (HT20)



802.11n (HT40)



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.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab
B.	Laptop	DELL	E6420	482T3R1	FCC DoC	Provided by Lab

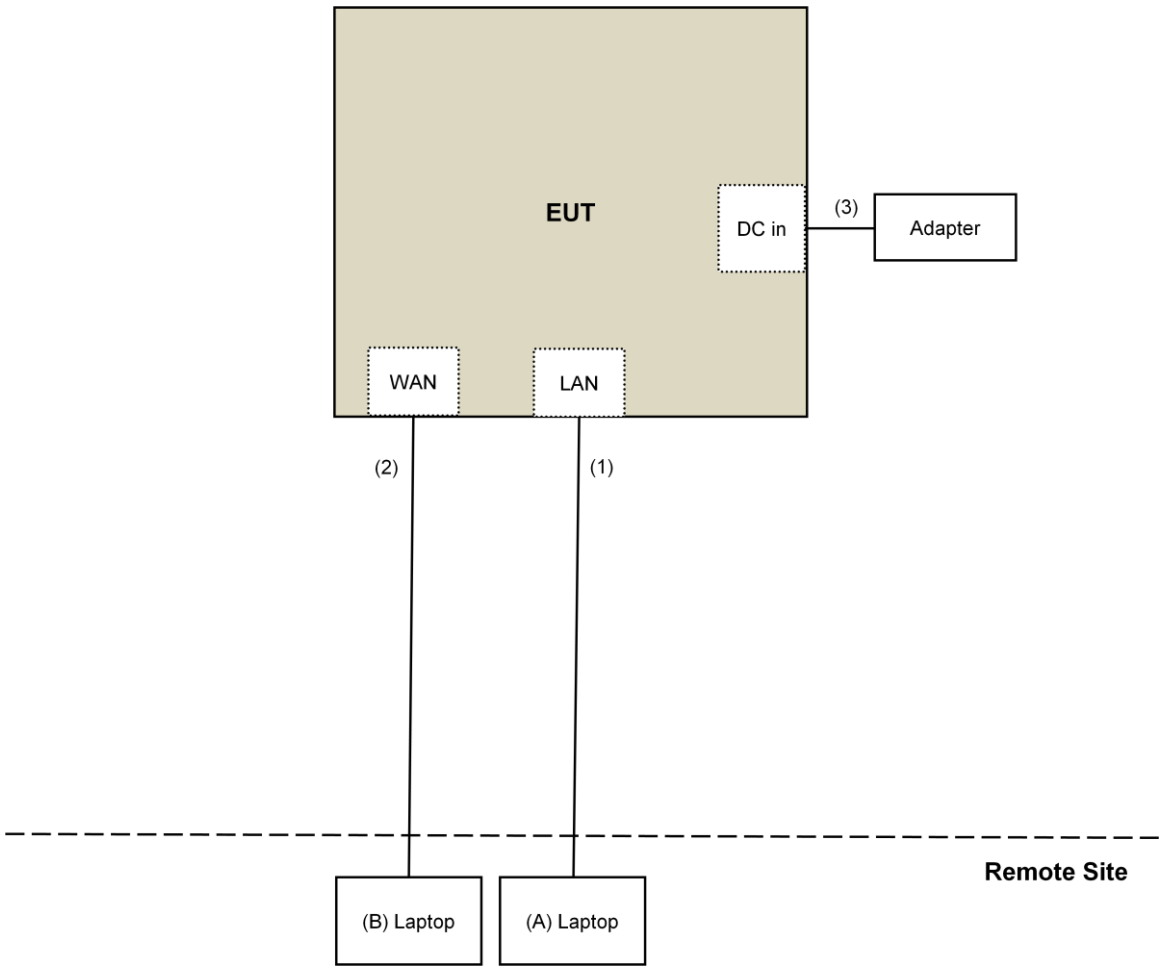
Note:

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.	RJ-45 Cable	1	10	No	0	Provided by Lab
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	DC Cable	1	1.8	No	0	Supplied by client

Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)
KDB 558074 D01 DTS Meas Guidance v04
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30dB below the highest level of the desired power:

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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

For Radiated Emission: (except for 802.11b, 802.11g (CH6), 802.11n (HT20) (CH6) above 1GHz emission)

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 08, 2017	July 07, 2018
Pre-Amplifier(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 17, 2017	Jan. 16, 2018
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 09, 2017	Nov. 08, 2018
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 29, 2017	Nov. 28, 2018
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Oct. 03, 2017	Oct. 02, 2018
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier EMCI	EMC12630SE	980385	Feb. 02, 2017	Feb. 01, 2018
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160923 150318 150321	Feb. 02, 2017 Mar. 29, 2017 Mar. 29, 2017	Feb. 01, 2018 Mar. 28, 2018 Mar. 28, 2018
Pre-Amplifier EMCI	EMC184045SE	980387	Feb. 02, 2017	Feb. 01, 2018
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	SUCOFLEX 102	36432/2 36433/2	Jan. 15, 2017	Jan. 14, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208410	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP02	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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 4.
4. The CANADA Site Registration No. is 20331-2
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: Dec. 20, 2017 to Jan. 03, 2018

For Other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 08, 2017	July 07, 2018
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier EMCI	EMC12630SE	980385	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160923 150318 150321	Jan. 29, 2018 Jan. 29, 2018 Jan. 29, 2018	Jan. 28, 2019 Jan. 28, 2019 Jan. 28, 2019
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	EMC102-KM-KM-1200	160925	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208410	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP02	NA	NA
Spectrum Analyzer R&S	FSV40	100964	July 01, 2017	June 30, 2018
Power meter Anritsu	ML2495A	1014008	May 11, 2017	May 10, 2018
Power sensor Anritsu	MA2411B	0917122	May 11, 2017	May 10, 2018

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. 4.
3. The CANADA Site Registration No. is 20331-2
4. Tested Date: Jan. 29 to Feb. 02, 2018

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. Both X and Y axes 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:

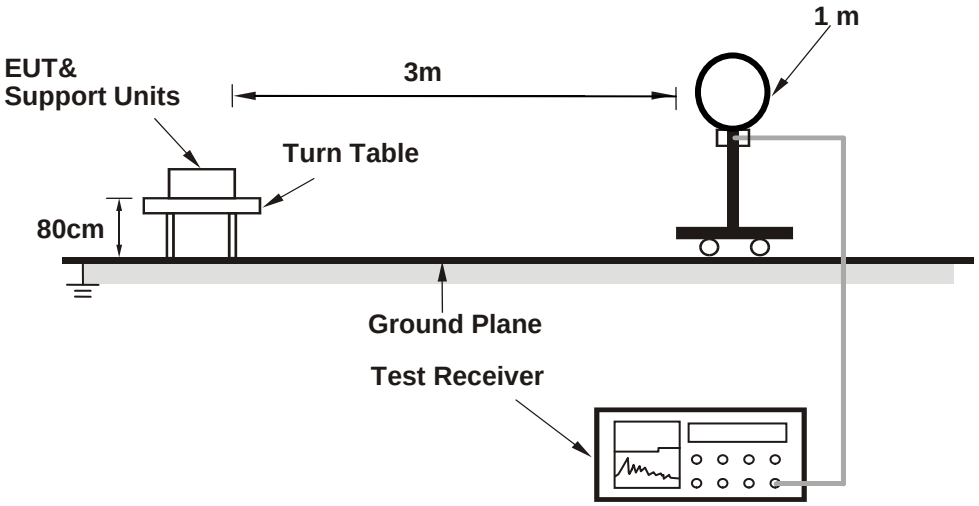
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

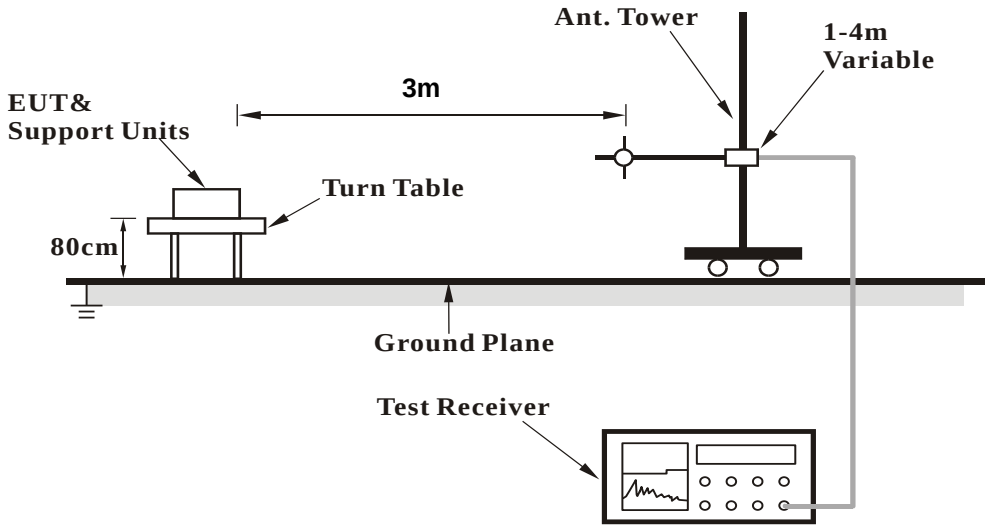
No deviation.

4.1.5 Test Setup

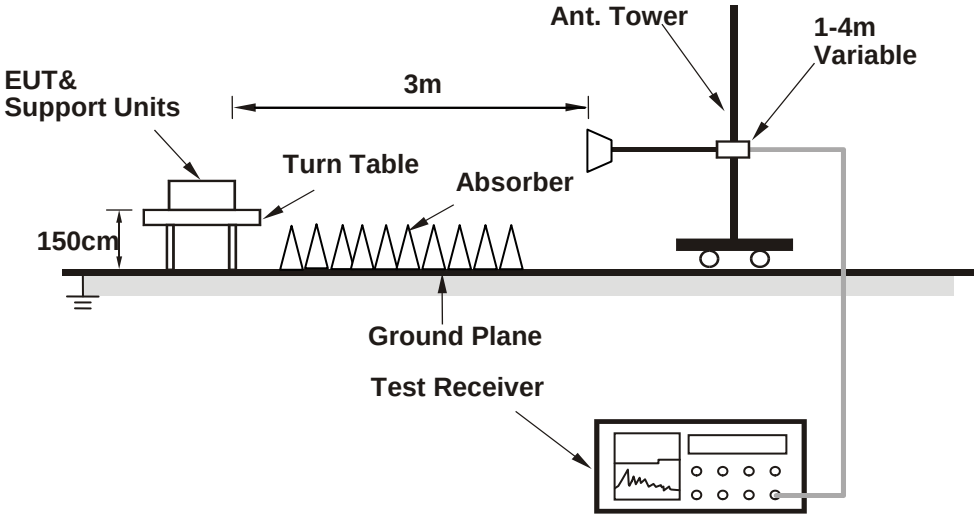
For Radiated emission below 30MHz



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 (QDART_1.0.38) has been activated to set the EUT on specific status.

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	2385.00	58.1 PK	74.0	-15.9	1.07 H	232	59.1	-1.0
2	2385.00	47.1 AV	54.0	-6.9	1.07 H	232	48.1	-1.0
3	*2412.00	114.5 PK			1.07 H	232	115.5	-1.0
4	*2412.00	112.0 AV			1.07 H	232	113.0	-1.0
5	4824.00	44.2 PK	74.0	-29.8	1.99 H	181	41.1	3.1
6	4824.00	40.7 AV	54.0	-13.3	1.99 H	181	37.6	3.1
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	2385.00	60.5 PK	74.0	-13.5	1.52 V	169	61.5	-1.0
2	2385.00	53.8 AV	54.0	-0.2	1.52 V	169	54.8	-1.0
3	*2412.00	117.2 PK			1.52 V	169	118.2	-1.0
4	*2412.00	114.8 AV			1.52 V	169	115.8	-1.0
5	4824.00	43.6 PK	74.0	-30.4	1.37 V	225	40.5	3.1
6	4824.00	40.3 AV	54.0	-13.7	1.37 V	225	37.2	3.1

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	56.8 PK	74.0	-17.2	1.13 H	237	57.8	-1.0
2	2390.00	44.5 AV	54.0	-9.5	1.13 H	237	45.5	-1.0
3	*2437.00	117.7 PK			1.10 H	251	119.1	-1.4
4	*2437.00	114.7 AV			1.10 H	251	116.1	-1.4
5	2496.00	57.8 PK	74.0	-16.2	1.11 H	238	58.9	-1.1
6	2496.00	45.5 AV	54.0	-8.5	1.11 H	238	46.6	-1.1
7	4874.00	44.7 PK	74.0	-29.3	1.95 H	169	41.4	3.3
8	4874.00	41.3 AV	54.0	-12.7	1.95 H	169	38.0	3.3
9	7311.00	47.5 PK	74.0	-26.5	1.74 H	202	37.5	10.0
10	7311.00	40.3 AV	54.0	-13.7	1.74 H	202	30.3	10.0
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	56.2 PK	74.0	-17.8	1.43 V	353	57.2	-1.0
2	2390.00	45.2 AV	54.0	-8.8	1.43 V	353	46.2	-1.0
3	*2437.00	120.2 PK			1.43 V	360	121.6	-1.4
4	*2437.00	117.3 AV			1.43 V	360	118.7	-1.4
5	2496.00	57.5 PK	74.0	-16.5	1.44 V	360	58.6	-1.1
6	2496.00	47.8 AV	54.0	-6.2	1.44 V	360	48.9	-1.1
7	4874.00	44.7 PK	74.0	-29.3	1.39 V	220	41.4	3.3
8	4874.00	40.9 AV	54.0	-13.1	1.39 V	220	37.6	3.3
9	7311.00	47.0 PK	74.0	-27.0	1.49 V	182	37.0	10.0
10	7311.00	39.8 AV	54.0	-14.2	1.49 V	182	29.8	10.0

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	114.4 PK			1.05 H	245	115.8	-1.4
2	*2462.00	112.1 AV			1.05 H	245	113.5	-1.4
3	2483.50	58.6 PK	74.0	-15.4	1.05 H	245	59.8	-1.2
4	2483.50	46.8 AV	54.0	-7.2	1.05 H	245	48.0	-1.2
5	4924.00	44.8 PK	74.0	-29.2	1.91 H	163	41.3	3.5
6	4924.00	41.5 AV	54.0	-12.5	1.91 H	163	38.0	3.5
7	7386.00	47.7 PK	74.0	-26.3	1.76 H	215	37.5	10.2
8	7386.00	40.6 AV	54.0	-13.4	1.76 H	215	30.4	10.2
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	*2462.00	117.8 PK			2.22 V	189	119.2	-1.4
2	*2462.00	115.6 AV			2.22 V	189	117.0	-1.4
3	2483.50	61.4 PK	74.0	-12.6	2.22 V	189	62.6	-1.2
4	2483.50	53.8 AV	54.0	-0.2	2.22 V	189	55.0	-1.2
5	4924.00	43.9 PK	74.0	-30.1	1.39 V	206	40.4	3.5
6	4924.00	40.2 AV	54.0	-13.8	1.39 V	206	36.7	3.5
7	7386.00	46.3 PK	74.0	-27.7	1.46 V	183	36.1	10.2
8	7386.00	39.2 AV	54.0	-14.8	1.46 V	183	29.0	10.2

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	67.3 PK	74.0	-6.7	1.51 H	45	68.3	-1.0
2	2390.00	51.8 AV	54.0	-2.2	1.51 H	45	52.8	-1.0
3	*2412.00	115.0 PK			1.51 H	45	116.0	-1.0
4	*2412.00	102.4 AV			1.51 H	45	103.4	-1.0
5	4824.00	49.1 PK	74.0	-24.9	1.48 H	21	46.0	3.1
6	4824.00	47.4 AV	54.0	-6.6	1.48 H	21	44.3	3.1
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	69.7 PK	74.0	-4.3	1.35 V	360	70.7	-1.0
2	2390.00	53.6 AV	54.0	-0.4	1.35 V	360	54.6	-1.0
3	*2412.00	117.1 PK			1.35 V	360	118.1	-1.0
4	*2412.00	103.7 AV			1.35 V	360	104.7	-1.0
5	4824.00	49.2 PK	74.0	-24.8	1.20 V	343	46.1	3.1
6	4824.00	46.9 AV	54.0	-7.1	1.20 V	343	43.8	3.1

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	63.5 PK	74.0	-10.5	1.57 H	66	64.5	-1.0
2	2390.00	47.7 AV	54.0	-6.3	1.57 H	66	48.7	-1.0
3	*2437.00	111.6 PK			1.57 H	66	113.0	-1.4
4	*2437.00	108.5 AV			1.57 H	66	109.9	-1.4
5	2483.50	68.1 PK	74.0	-5.9	1.57 H	66	69.3	-1.2
6	2483.50	49.0 AV	54.0	-5.0	1.57 H	66	50.2	-1.2
7	4874.00	51.2 PK	74.0	-22.8	2.91 H	228	47.9	3.3
8	4874.00	46.1 AV	54.0	-7.9	2.91 H	228	42.8	3.3
9	7311.00	46.8 PK	74.0	-27.2	1.20 H	188	36.8	10.0
10	7311.00	33.6 AV	54.0	-20.4	1.20 H	188	23.6	10.0
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	66.0 PK	74.0	-8.0	1.10 V	359	67.0	-1.0
2	2390.00	49.9 AV	54.0	-4.1	1.10 V	359	50.9	-1.0
3	*2437.00	123.7 PK			1.10 V	359	125.1	-1.4
4	*2437.00	110.2 AV			1.10 V	359	111.6	-1.4
5	2483.50	69.7 PK	74.0	-4.3	1.10 V	359	70.9	-1.2
6	2483.50	50.1 AV	54.0	-3.9	1.10 V	359	51.3	-1.2
7	4874.00	50.8 PK	74.0	-23.2	1.46 V	341	47.5	3.3
8	4874.00	45.5 AV	54.0	-8.5	1.46 V	341	42.2	3.3
9	7311.00	47.1 PK	74.0	-26.9	1.60 V	183	37.1	10.0
10	7311.00	33.2 AV	54.0	-20.8	1.60 V	183	23.2	10.0

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	114.0 PK			1.61 H	48	115.4	-1.4
2	*2462.00	101.8 AV			1.61 H	48	103.2	-1.4
3	2483.50	68.5 PK	74.0	-5.5	1.61 H	48	69.7	-1.2
4	2483.50	51.5 AV	54.0	-2.5	1.61 H	48	52.7	-1.2
5	4924.00	50.1 PK	74.0	-23.9	2.89 H	229	46.6	3.5
6	4924.00	45.0 AV	54.0	-9.0	2.89 H	229	41.5	3.5
7	7386.00	45.7 PK	74.0	-28.3	1.30 H	207	35.5	10.2
8	7386.00	32.0 AV	54.0	-22.0	1.30 H	207	21.8	10.2
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	*2462.00	116.3 PK			1.62 V	357	117.7	-1.4
2	*2462.00	103.7 AV			1.62 V	357	105.1	-1.4
3	2483.50	71.0 PK	74.0	-3.0	1.62 V	357	72.2	-1.2
4	2483.50	53.4 AV	54.0	-0.6	1.62 V	357	54.6	-1.2
5	4924.00	49.7 PK	74.0	-24.3	1.50 V	347	46.2	3.5
6	4924.00	44.9 AV	54.0	-9.1	1.50 V	347	41.4	3.5
7	7386.00	45.5 PK	74.0	-28.5	1.70 V	203	35.3	10.2
8	7386.00	32.0 AV	54.0	-22.0	1.70 V	203	21.8	10.2

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

802.11n (HT20)

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	66.2 PK	74.0	-7.8	1.32 H	40	67.2	-1.0
2	2390.00	49.0 AV	54.0	-5.0	1.32 H	40	50.0	-1.0
3	*2412.00	114.3 PK			1.32 H	40	115.3	-1.0
4	*2412.00	102.1 AV			1.32 H	40	103.1	-1.0
5	4824.00	48.0 PK	74.0	-26.0	2.09 H	115	44.9	3.1
6	4824.00	45.9 AV	54.0	-8.1	2.09 H	115	42.8	3.1
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	70.0 PK	74.0	-4.0	1.19 V	356	71.0	-1.0
2	2390.00	53.8 AV	54.0	-0.2	1.19 V	356	54.8	-1.0
3	*2412.00	116.0 PK			1.19 V	356	117.0	-1.0
4	*2412.00	104.4 AV			1.19 V	356	105.4	-1.0
5	4824.00	47.5 PK	74.0	-26.5	1.30 V	358	44.4	3.1
6	4824.00	45.5 AV	54.0	-8.5	1.30 V	358	42.4	3.1

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	63.6 PK	74.0	-10.4	1.49 H	34	64.6	-1.0
2	2390.00	45.8 AV	54.0	-8.2	1.49 H	34	46.8	-1.0
3	*2437.00	117.4 PK			1.49 H	34	118.8	-1.4
4	*2437.00	105.9 AV			1.49 H	34	107.3	-1.4
5	2483.50	64.4 PK	74.0	-9.6	1.49 H	34	65.6	-1.2
6	2483.50	46.7 AV	54.0	-7.3	1.49 H	34	47.9	-1.2
7	4874.00	53.7 PK	74.0	-20.3	3.01 H	334	50.4	3.3
8	4874.00	50.5 AV	54.0	-3.5	3.01 H	334	47.2	3.3
9	7311.00	45.6 PK	74.0	-28.4	2.01 H	45	35.6	10.0
10	7311.00	32.8 AV	54.0	-21.2	2.01 H	45	22.8	10.0
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	65.4 PK	74.0	-8.6	1.17 V	360	66.4	-1.0
2	2390.00	47.4 AV	54.0	-6.6	1.17 V	360	48.4	-1.0
3	*2437.00	119.1 PK			1.17 V	360	120.5	-1.4
4	*2437.00	107.0 AV			1.17 V	360	108.4	-1.4
5	2483.50	65.0 PK	74.0	-9.0	1.17 V	360	66.2	-1.2
6	2483.50	47.3 AV	54.0	-6.7	1.17 V	360	48.5	-1.2
7	4874.00	52.6 PK	74.0	-21.4	1.58 V	206	49.3	3.3
8	4874.00	50.0 AV	54.0	-4.0	1.58 V	206	46.7	3.3
9	7311.00	44.8 PK	74.0	-29.2	1.88 V	213	34.8	10.0
10	7311.00	32.2 AV	54.0	-21.8	1.88 V	213	22.2	10.0

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	113.7 PK			1.72 H	37	115.1	-1.4
2	*2462.00	101.4 AV			1.72 H	37	102.8	-1.4
3	2483.50	68.5 PK	74.0	-5.5	1.72 H	37	69.7	-1.2
4	2483.50	52.4 AV	54.0	-1.6	1.72 H	37	53.6	-1.2
5	4924.00	47.8 PK	74.0	-26.2	1.98 H	122	44.3	3.5
6	4924.00	45.5 AV	54.0	-8.5	1.98 H	122	42.0	3.5
7	7386.00	43.8 PK	74.0	-30.2	2.02 H	145	33.6	10.2
8	7386.00	31.4 AV	54.0	-22.6	2.02 H	145	21.2	10.2
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	*2462.00	120.7 PK			1.11 V	352	122.1	-1.4
2	*2462.00	107.3 AV			1.11 V	352	108.7	-1.4
3	2483.50	71.7 PK	74.0	-2.3	1.11 V	352	72.9	-1.2
4	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**1.11 V**	**352**	**55.1**	**-1.2**
5	4924.00	47.4 PK	74.0	-26.6	1.33 V	220	43.9	3.5
6	4924.00	45.0 AV	54.0	-9.0	1.33 V	220	41.5	3.5
7	7386.00	44.1 PK	74.0	-29.9	1.12 V	325	33.9	10.2
8	7386.00	31.6 AV	54.0	-22.4	1.12 V	325	21.4	10.2

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

802.11n (HT40)

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	66.7 PK	74.0	-7.3	1.48 H	40	67.7	-1.0
2	2390.00	51.6 AV	54.0	-2.4	1.48 H	40	52.6	-1.0
3	*2422.00	109.8 PK			1.48 H	40	111.1	-1.3
4	*2422.00	98.3 AV			1.48 H	40	99.6	-1.3
5	4844.00	37.8 PK	74.0	-36.2	1.68 H	320	34.7	3.1
6	4844.00	25.4 AV	54.0	-28.6	1.68 H	320	22.3	3.1
7	7266.00	43.7 PK	74.0	-30.3	1.83 H	177	33.9	9.8
8	7266.00	31.6 AV	54.0	-22.4	1.83 H	177	21.8	9.8
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	68.0 PK	74.0	-6.0	2.57 V	360	69.0	-1.0
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**2.57 V**	**360**	**54.9**	**-1.0**
3	*2422.00	111.8 PK			2.57 V	360	113.1	-1.3
4	*2422.00	99.1 AV			2.57 V	360	100.4	-1.3
5	4844.00	37.9 PK	74.0	-36.1	1.43 V	17	34.8	3.1
6	4844.00	25.7 AV	54.0	-28.3	1.43 V	17	22.6	3.1
7	7266.00	44.3 PK	74.0	-29.7	1.84 V	143	34.5	9.8
8	7266.00	32.2 AV	54.0	-21.8	1.84 V	143	22.4	9.8

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	63.9 PK	74.0	-10.1	1.20 H	43	64.9	-1.0
2	2390.00	49.9 AV	54.0	-4.1	1.20 H	43	50.9	-1.0
3	*2437.00	112.1 PK			1.20 H	43	113.5	-1.4
4	*2437.00	99.8 AV			1.20 H	43	101.2	-1.4
5	2483.50	63.4 PK	74.0	-10.6	1.20 H	43	64.6	-1.2
6	2483.50	47.2 AV	54.0	-6.8	1.20 H	43	48.4	-1.2
7	4874.00	37.2 PK	74.0	-36.8	1.69 H	242	33.9	3.3
8	4874.00	25.1 AV	54.0	-28.9	1.69 H	242	21.8	3.3
9	7311.00	44.6 PK	74.0	-29.4	2.24 H	306	34.6	10.0
10	7311.00	31.5 AV	54.0	-22.5	2.24 H	306	21.5	10.0
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	67.7 PK	74.0	-6.3	2.84 V	356	68.7	-1.0
2	2390.00	53.7 AV	54.0	-0.3	2.84 V	356	54.7	-1.0
3	*2437.00	113.8 PK			2.84 V	356	115.2	-1.4
4	*2437.00	101.9 AV			2.84 V	356	103.3	-1.4
5	2483.50	65.6 PK	74.0	-8.4	2.84 V	356	66.8	-1.2
6	2483.50	49.4 AV	54.0	-4.6	2.84 V	356	50.6	-1.2
7	4874.00	37.7 PK	74.0	-36.3	1.48 V	23	34.4	3.3
8	4874.00	25.7 AV	54.0	-28.3	1.48 V	23	22.4	3.3
9	7311.00	44.1 PK	74.0	-29.9	1.86 V	148	34.1	10.0
10	7311.00	31.7 AV	54.0	-22.3	1.86 V	148	21.7	10.0

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	110.3 PK			1.46 H	43	111.7	-1.4
2	*2452.00	98.2 AV			1.46 H	43	99.6	-1.4
3	2483.50	67.1 PK	74.0	-6.9	1.46 H	43	68.3	-1.2
4	2483.50	50.5 AV	54.0	-3.5	1.46 H	43	51.7	-1.2
5	4904.00	37.8 PK	74.0	-36.2	1.70 H	304	34.3	3.5
6	4904.00	25.3 AV	54.0	-28.7	1.70 H	304	21.8	3.5
7	7356.00	43.3 PK	74.0	-30.7	1.81 H	181	33.1	10.2
8	7356.00	31.1 AV	54.0	-22.9	1.81 H	181	20.9	10.2
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	112.2 PK			2.56 V	360	113.6	-1.4
2	*2452.00	100.1 AV			2.56 V	360	101.5	-1.4
3	2483.50	69.3 PK	74.0	-4.7	2.56 V	360	70.5	-1.2
4	2483.50	53.6 AV	54.0	-0.4	2.56 V	360	54.8	-1.2
5	4904.00	38.1 PK	74.0	-35.9	1.39 V	228	34.6	3.5
6	4904.00	25.8 AV	54.0	-28.2	1.39 V	228	22.3	3.5
7	7356.00	44.1 PK	74.0	-29.9	1.26 V	155	33.9	10.2
8	7356.00	32.0 AV	54.0	-22.0	1.26 V	155	21.8	10.2

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

Below 1GHz Data:

802.11b

CHANNEL	TX Channel 11	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	30.90	31.2 QP	40.0	-8.8	1.00 H	112	40.0	-8.8
2	81.60	33.1 QP	40.0	-6.9	2.00 H	360	46.0	-12.9
3	148.19	28.5 QP	43.5	-15.0	2.00 H	283	36.2	-7.7
4	292.94	22.5 QP	46.0	-23.5	1.00 H	360	29.9	-7.4
5	554.60	28.8 QP	46.0	-17.2	1.50 H	125	30.1	-1.3
6	940.54	32.9 QP	46.0	-13.1	1.00 H	2	27.6	5.3
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	36.91	36.9 QP	40.0	-3.1	1.00 V	149	45.5	-8.6
2	85.90	31.0 QP	40.0	-9.0	3.00 V	247	44.6	-13.6
3	241.00	27.6 QP	46.0	-18.4	2.00 V	208	37.0	-9.4
4	554.50	32.8 QP	46.0	-13.2	1.00 V	70	34.1	-1.3
5	750.95	30.6 QP	46.0	-15.4	1.00 V	57	27.9	2.7
6	924.32	32.9 QP	46.0	-13.1	1.50 V	315	28.0	4.9

REMARKS:

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

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	Nov. 01, 2017	Oct. 31, 2018
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Nov. 15, 20167	Nov. 14, 2018
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 03, 2017	June 02, 2018
50 ohms Terminator	N/A	EMC-02	Sep. 22, 2017	Sep. 21, 2018
RF Cable	5D-FB	COCCAB-001	Sep. 29, 2017	Sep. 28, 2018
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 18, 2017	June 17, 2018
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 Shielded Room No. 1.
3 Tested Date: Dec. 21 to 22, 2017

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.

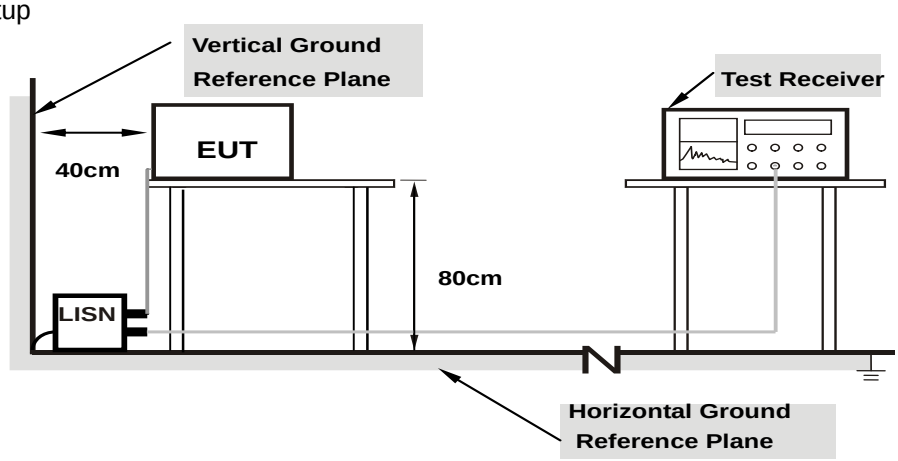
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

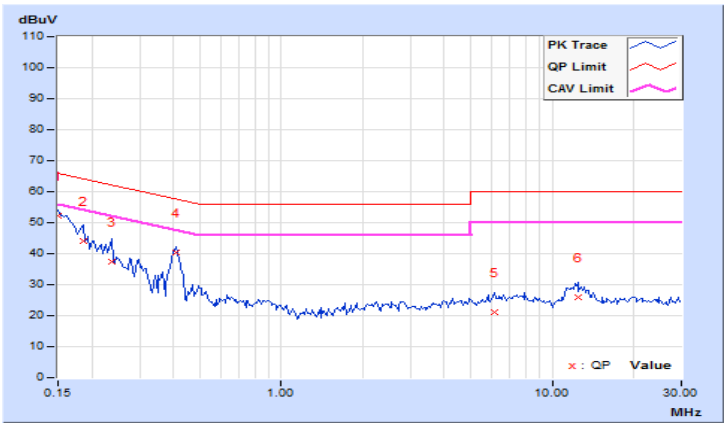
4.2.7 Test Results (Mode 1)

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	10.09	42.05	27.06	52.14	37.15	66.00	56.00	-13.86	-18.85
2	0.18516	10.07	33.94	21.05	44.01	31.12	64.25	54.25	-20.24	-23.13
3	0.23594	10.08	27.23	16.82	37.31	26.90	62.24	52.24	-24.93	-25.34
4	0.41172	10.12	30.30	26.34	40.42	36.46	57.61	47.61	-17.19	-11.15
5	6.14453	10.51	10.45	4.99	20.96	15.50	60.00	50.00	-39.04	-34.50
6	12.47656	10.99	14.91	10.00	25.90	20.99	60.00	50.00	-34.10	-29.01

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.

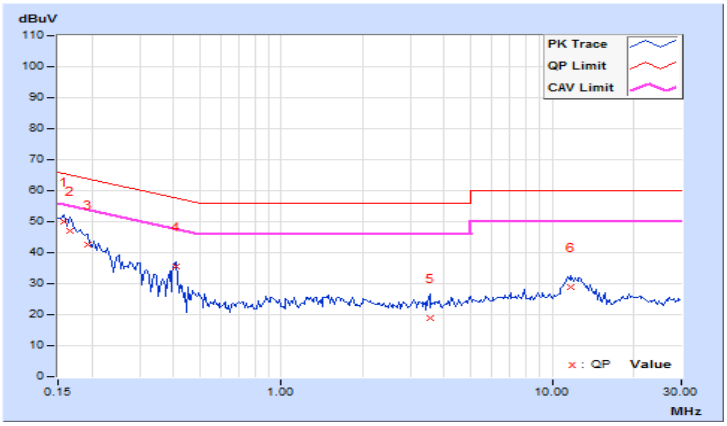


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. 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	0.15781	10.07	40.10	25.10	50.17	35.17	65.58	55.58	-15.41	-20.41
2	0.16562	10.06	36.94	23.67	47.00	33.73	65.18	55.18	-18.18	-21.45
3	0.19297	10.04	32.70	17.98	42.74	28.02	63.91	53.91	-21.17	-25.89
4	0.40781	10.12	25.31	23.75	35.43	33.87	57.69	47.69	-22.26	-13.82
5	3.52734	10.25	8.60	2.45	18.85	12.70	56.00	46.00	-37.15	-33.30
6	11.72266	10.81	18.18	13.13	28.99	23.94	60.00	50.00	-31.01	-26.06

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.



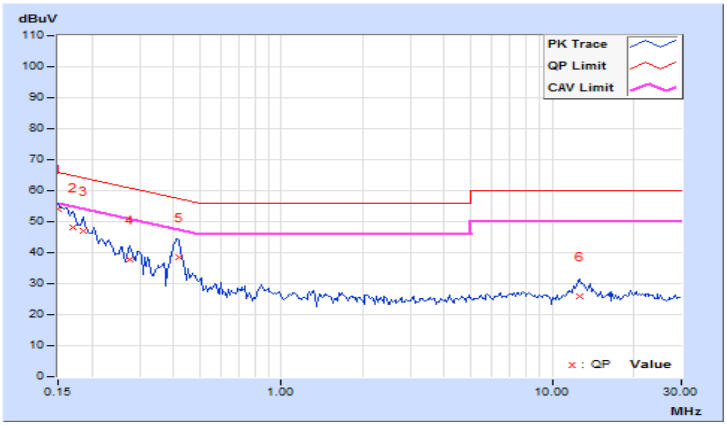
4.2.8 Test Results (Mode 2)

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	10.09	43.82	29.11	53.91	39.20	66.00	56.00	-12.09	-16.80
2	0.16953	10.08	38.11	25.86	48.19	35.94	64.98	54.98	-16.79	-19.04
3	0.18516	10.07	37.05	23.08	47.12	33.15	64.25	54.25	-17.13	-21.10
4	0.27500	10.09	27.66	20.73	37.75	30.82	60.97	50.97	-23.22	-20.15
5	0.41953	10.12	28.54	17.07	38.66	27.19	57.46	47.46	-18.80	-20.27
6	12.67578	11.01	15.02	10.22	26.03	21.23	60.00	50.00	-33.97	-28.77

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.

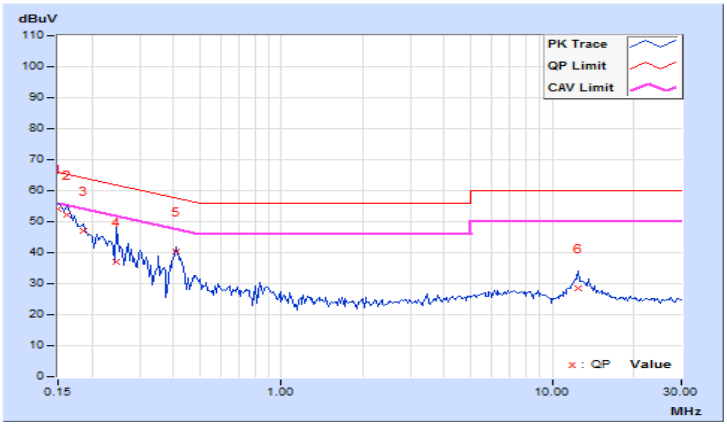


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. 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	10.08	43.82	29.00	53.90	39.08	66.00	56.00	-12.10	-16.92
2	0.16172	10.07	42.16	27.17	52.23	37.24	65.38	55.38	-13.15	-18.14
3	0.18516	10.05	36.95	22.55	47.00	32.60	64.25	54.25	-17.25	-21.65
4	0.24766	10.06	26.81	14.75	36.87	24.81	61.84	51.84	-24.97	-27.03
5	0.41172	10.12	30.42	29.49	40.54	39.61	57.61	47.61	-17.07	-8.00
6	12.53906	10.86	17.62	12.58	28.48	23.44	60.00	50.00	-31.52	-26.56

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.



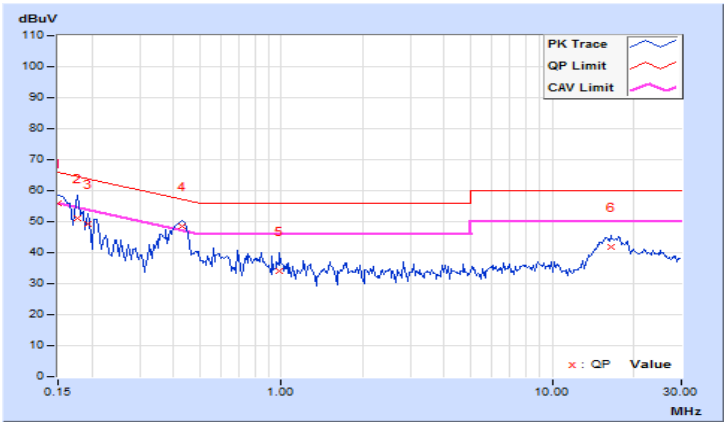
4.2.9 Test Results (Mode 3)

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	10.09	45.91	29.53	56.00	39.62	66.00	56.00	-10.00	-16.38
2	0.17734	10.08	41.04	25.68	51.12	35.76	64.61	54.61	-13.49	-18.85
3	0.19297	10.07	39.22	25.96	49.29	36.03	63.91	53.91	-14.62	-17.88
4	0.43125	10.12	38.24	30.22	48.36	40.34	57.23	47.23	-8.87	-6.89
5	0.98594	10.17	23.72	15.22	33.89	25.39	56.00	46.00	-22.11	-20.61
6	16.48047	11.32	30.62	25.30	41.94	36.62	60.00	50.00	-18.06	-13.38

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.

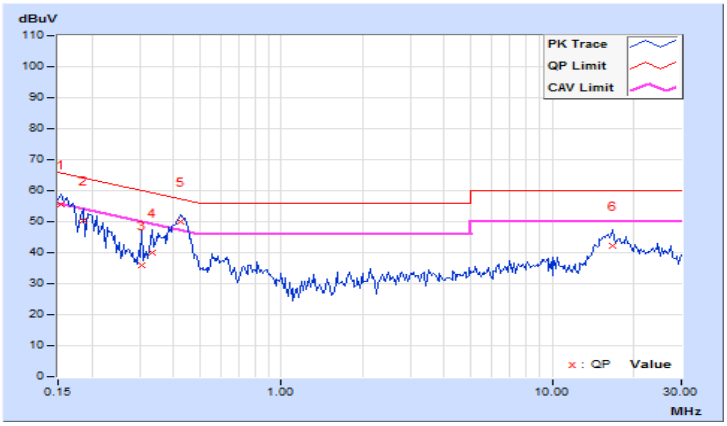


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. 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	0.15391	10.07	45.52	29.92	55.59	39.99	65.79	55.79	-10.20	-15.80
2	0.18516	10.05	40.50	26.81	50.55	36.86	64.25	54.25	-13.70	-17.39
3	0.30625	10.08	25.83	13.24	35.91	23.32	60.07	50.07	-24.16	-26.75
4	0.33359	10.09	30.02	19.37	40.11	29.46	59.36	49.36	-19.25	-19.90
5	0.42734	10.12	39.96	31.38	50.08	41.50	57.30	47.30	-7.22	-5.80
6	16.75781	11.11	30.94	25.73	42.05	36.84	60.00	50.00	-17.95	-13.16

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.



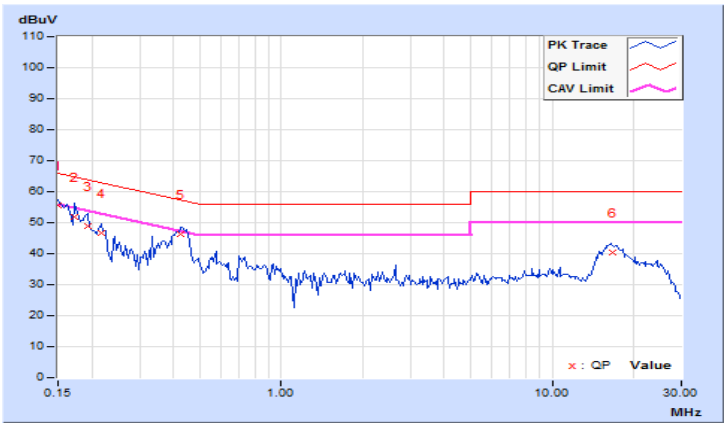
4.2.10 Test Results (Mode 4)

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	10.09	45.64	29.37	55.73	39.46	66.00	56.00	-10.27	-16.54
2	0.17344	10.08	41.77	26.99	51.85	37.07	64.79	54.79	-12.94	-17.72
3	0.19297	10.07	38.85	25.41	48.92	35.48	63.91	53.91	-14.99	-18.43
4	0.21641	10.07	36.42	23.58	46.49	33.65	62.96	52.96	-16.47	-19.31
5	0.42344	10.12	36.08	27.52	46.20	37.64	57.38	47.38	-11.18	-9.74
6	16.71094	11.33	28.95	23.38	40.28	34.71	60.00	50.00	-19.72	-15.29

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.

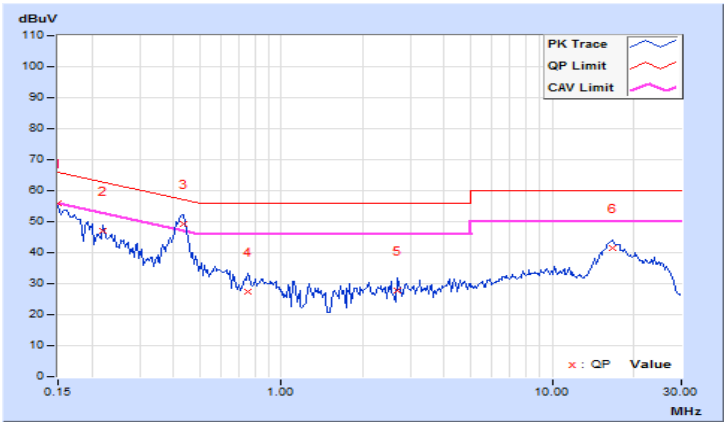


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. 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	10.08	45.79	30.60	55.87	40.68	66.00	56.00	-10.13	-15.32
2	0.22031	10.05	37.07	24.96	47.12	35.01	62.81	52.81	-15.69	-17.80
3	**0.43516**	**10.12**	**39.09**	**31.76**	**49.21**	**41.88**	**57.15**	**47.15**	**-7.94**	**-5.27**
4	0.75156	10.13	17.25	7.91	27.38	18.04	56.00	46.00	-28.62	-27.96
5	2.67969	10.23	17.53	9.23	27.76	19.46	56.00	46.00	-28.24	-26.54
6	16.61719	11.10	30.20	24.65	41.30	35.75	60.00	50.00	-18.70	-14.25

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.

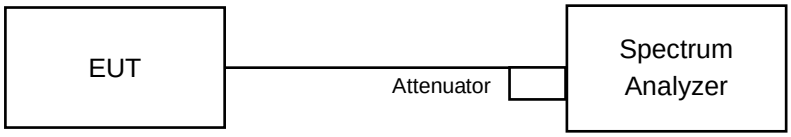


4.3 6dB Bandwidth Measurement

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	8.55	8.57	0.5	PASS
6	2437	10.09	14.09	0.5	PASS
11	2462	8.12	8.10	0.5	PASS

802.11g

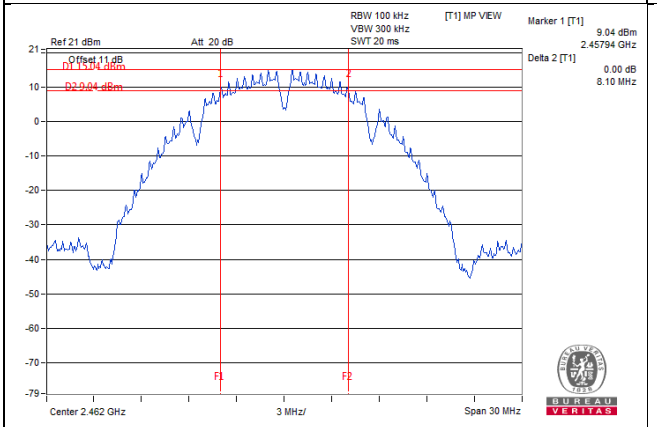
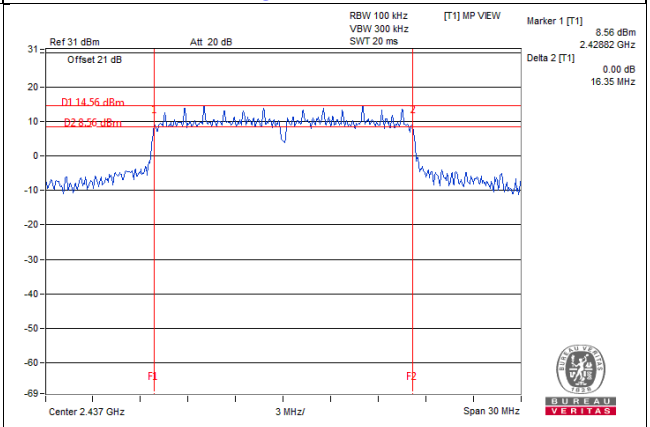
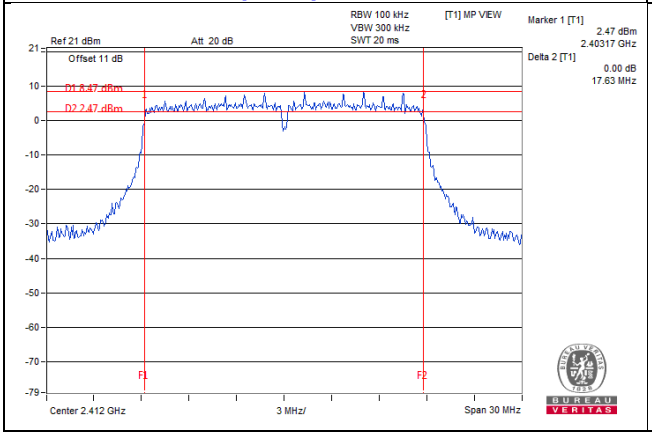
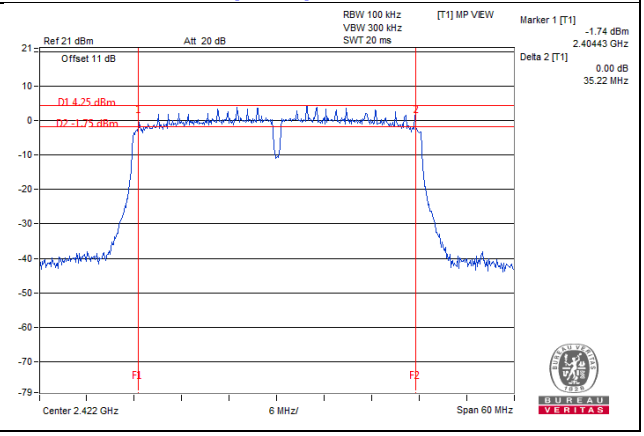
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.40	16.40	0.5	PASS
6	2437	16.35	16.36	0.5	PASS
11	2462	16.38	16.39	0.5	PASS

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.63	17.64	0.5	Pass
6	2437	17.66	17.65	0.5	Pass
11	2462	17.66	17.67	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.22	35.30	0.5	Pass
6	2437	35.25	35.36	0.5	Pass
9	2452	35.34	35.40	0.5	Pass

Spectrum Plot of Worst Value	
802.11b / Chain 1 : CH11	**802.11g / Chain 0 : CH6**
	
802.11n (HT20) / Chain 0 : CH1	**802.11n (HT40) / Chain 0 : CH3**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

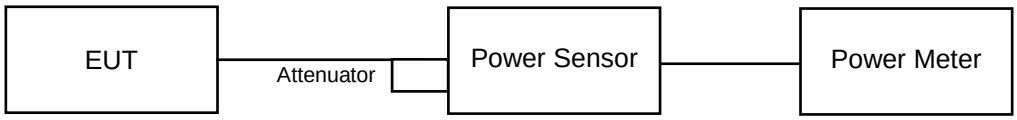
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

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

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

CDD Mode

802.11b

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	24.18	24.35	534.088	27.28	30.00	Pass
6	2437	26.07	26.12	813.837	29.11	30.00	Pass
11	2462	24.10	24.55	542.142	27.34	30.00	Pass

802.11g

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.32	19.33	171.211	22.34	30.00	Pass
6	2437	25.82	26.11	790.263	28.98	30.00	Pass
11	2462	19.17	19.56	172.969	22.38	30.00	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.23	19.35	169.852	22.30	30.00	Pass
6	2437	25.80	26.07	784.765	28.95	30.00	Pass
11	2462	19.10	19.31	166.593	22.22	30.00	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	17.53	17.50	112.858	20.53	30.00	Pass
6	2437	19.47	19.69	181.623	22.59	30.00	Pass
9	2452	17.34	17.49	110.305	20.43	30.00	Pass

Beamforming Mode

802.11g

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.32	19.33	171.211	22.34	29.80	Pass
6	2437	25.82	26.11	790.263	28.98	29.80	Pass
11	2462	19.17	19.56	172.969	22.38	29.80	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 6.20dBi > 6dBi , so the power limit shall be reduced to 30-(6.20-6) = 29.80dBm.

802.11n (HT20)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.23	19.35	169.852	22.30	29.80	Pass
6	2437	25.80	26.07	784.765	28.95	29.80	Pass
11	2462	19.10	19.31	166.593	22.22	29.80	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 6.20dBi > 6dBi , so the power limit shall be reduced to 30-(6.20-6) = 29.80dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	17.53	17.50	112.858	20.53	29.80	Pass
6	2437	19.47	19.69	181.623	22.59	29.80	Pass
9	2452	17.34	17.49	110.305	20.43	29.80	Pass

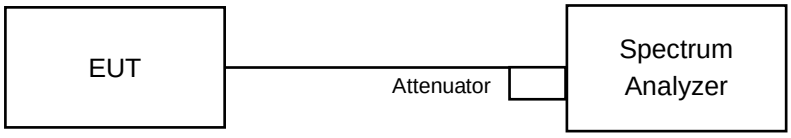
Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 6.20dBi > 6dBi , so the power limit shall be reduced to 30-(6.20-6) = 29.80dBm.

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

802.11b, 802.11n (HT20)
a) Set instrument center frequency to DTS channel center frequency.
b) Set span to at least 1.5 times the OBW.
c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. .
d) Set VBW ≥3 x RBW.
e) Detector = power averaging (RMS) or sample detector (when RMS not available).
f) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g) Sweep time = auto couple.
h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
i) Use the peak marker function to determine the maximum amplitude level.

802.11g, 802.11n (HT40)
a) Measure the duty cycle (x).
b) Set instrument center frequency to DTS channel center frequency.
c) Set span to at least 1.5 times the OBW.
d) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz..
e) Set VBW ≥3 x RBW.
f) Detector = power averaging (RMS) or sample detector (when RMS not available).
g) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h) Sweep time = auto couple.
i) Do not use sweep triggering. Allow sweep to “free run”.
j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
k) Use the peak marker function to determine the maximum amplitude level.
l) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.

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	-7.51	3.01	-4.50	7.80	Pass
	6	2437	-4.31	3.01	-1.30	7.80	Pass
	11	2462	-7.58	3.01	-4.57	7.80	Pass
1	1	2412	-6.91	3.01	-3.90	7.80	Pass
	6	2437	-4.67	3.01	-1.66	7.80	Pass
	11	2462	-7.85	3.01	-4.84	7.80	Pass

Note: 1. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 6.20dBi > 6dBi , so the power density limit shall be reduced to 8-(6.20-6) = 7.80dBm.

802.11g

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=2) dB	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-13.91	3.01	0.18	-10.72	7.80	Pass
	6	2437	-7.41	3.01	0.18	-4.22	7.80	Pass
	11	2462	-14.05	3.01	0.18	-10.86	7.80	Pass
1	1	2412	-13.37	3.01	0.18	-10.18	7.80	Pass
	6	2437	-7.11	3.01	0.18	-3.92	7.80	Pass
	11	2462	-13.03	3.01	0.18	-9.84	7.80	Pass

Note: 1. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 6.20dBi > 6dBi , so the power density limit shall be reduced to 8-(6.20-6) = 7.80dBm.

2. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

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	-13.57	3.01	-10.56	7.80	Pass
	6	2437	-7.53	3.01	-4.52	7.80	Pass
	11	2462	-13.03	3.01	-10.02	7.80	Pass
1	1	2412	-13.23	3.01	-10.22	7.80	Pass
	6	2437	-7.33	3.01	-4.32	7.80	Pass
	11	2462	-13.18	3.01	-10.17	7.80	Pass

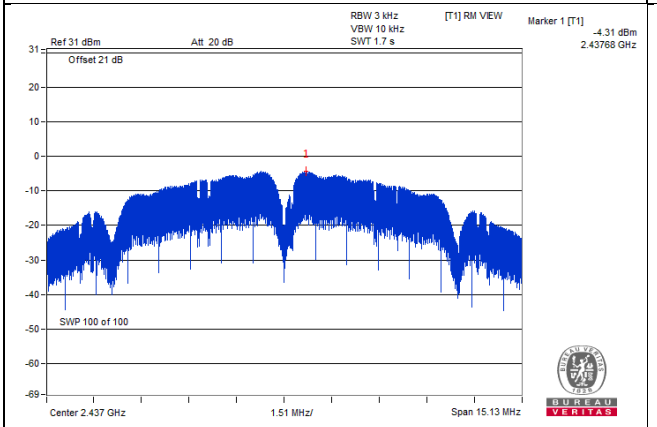
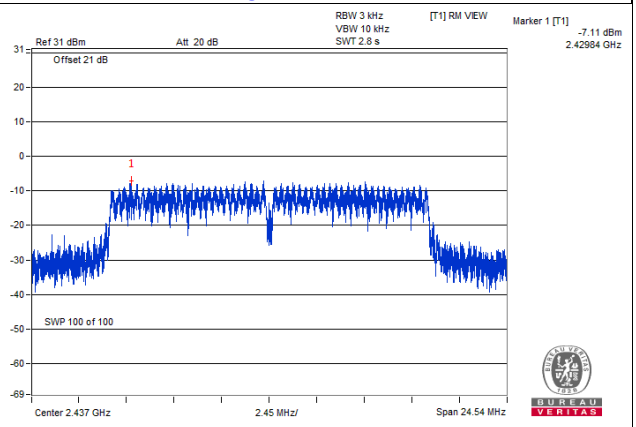
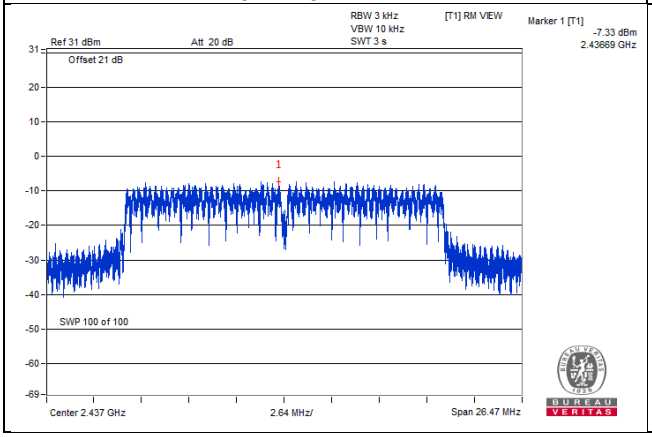
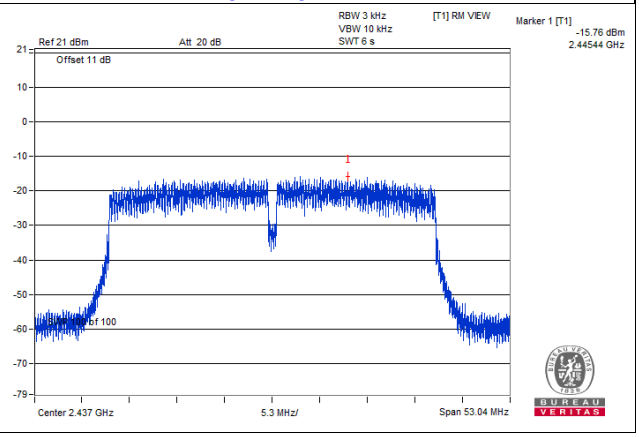
Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 6.20dBi > 6dBi , so the power density limit shall be reduced to 8-(6.20-6) = 7.80dBm.

802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=2) dB	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-17.22	3.01	0.16	-14.05	7.80	Pass
	6	2437	-15.83	3.01	0.16	-12.66	7.80	Pass
	9	2452	-17.83	3.01	0.16	-14.66	7.80	Pass
1	3	2422	-17.54	3.01	0.16	-14.37	7.80	Pass
	6	2437	-15.76	3.01	0.16	-12.59	7.80	Pass
	9	2452	-17.41	3.01	0.16	-14.24	7.80	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 6.20dBi > 6dBi , so the power density limit shall be reduced to 8-(6.20-6) = 7.80dBm.

2. Refer to section 3.3 for duty cycle spectrum plot.

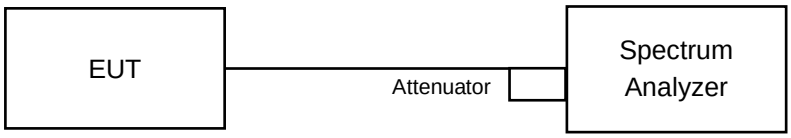
Spectrum Plot of Worst Value	
802.11b / Chain 0 : CH6	**802.11g / Chain 1 : CH6**
	
802.11n (HT20) / Chain 1 : CH6	**802.11n (HT40) / Chain 1 : CH6**
	

4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below -30dB 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

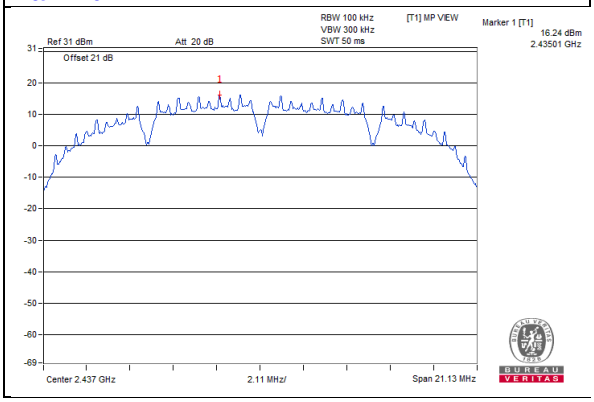
Same as Item 4.3.6

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 30dB offset below D1. It shows compliance with the requirement.

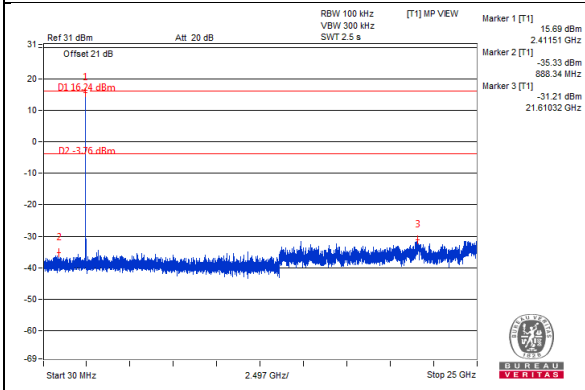
802.11b

Maximum REF

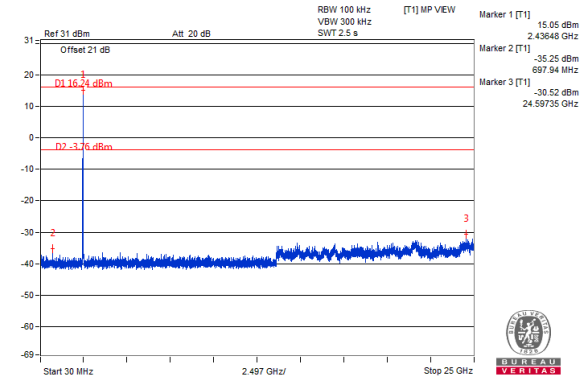


Chain 0

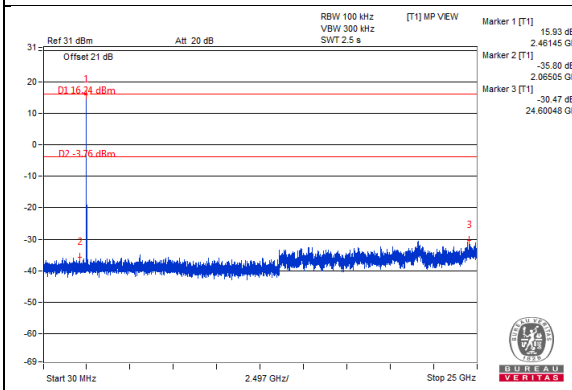
CH 1



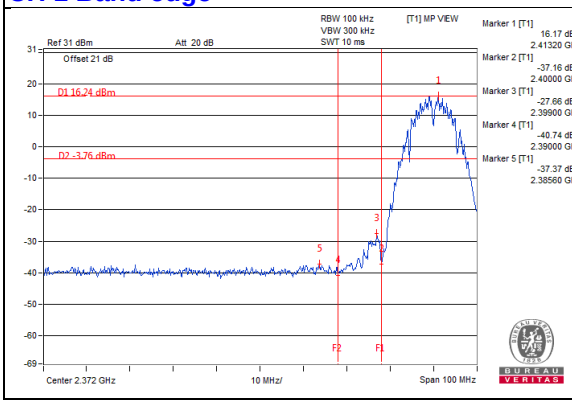
CH 6



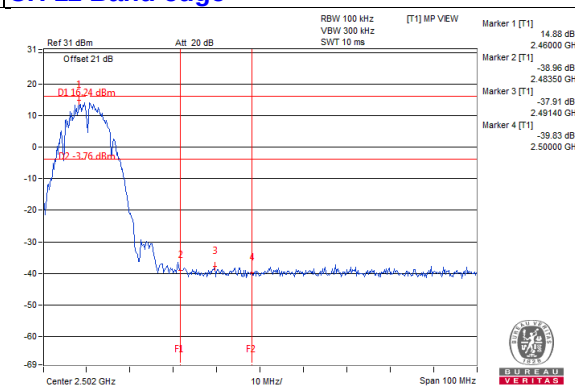
CH 11



CH 1 Band edge

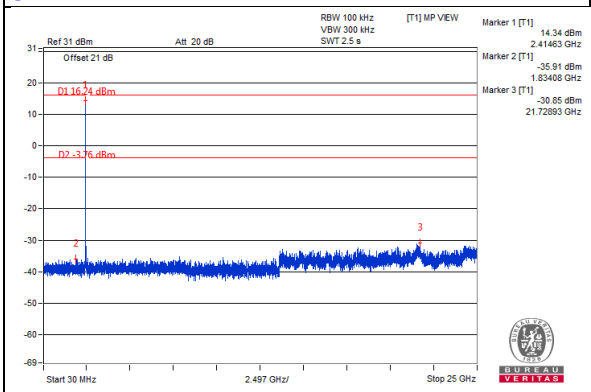


CH 11 Band edge

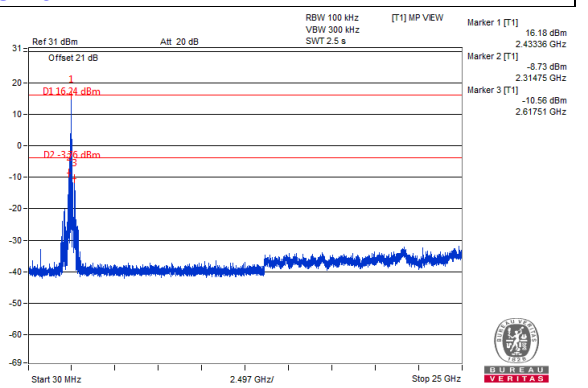


Chain 1

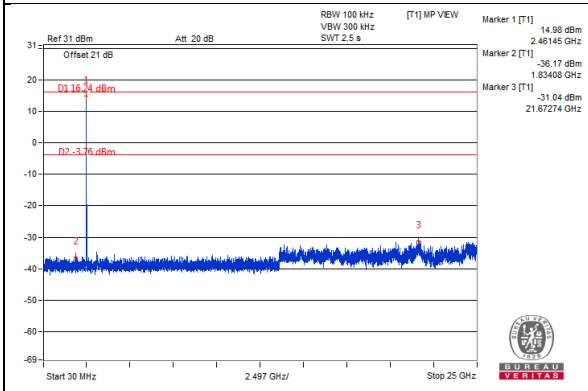
CH 1



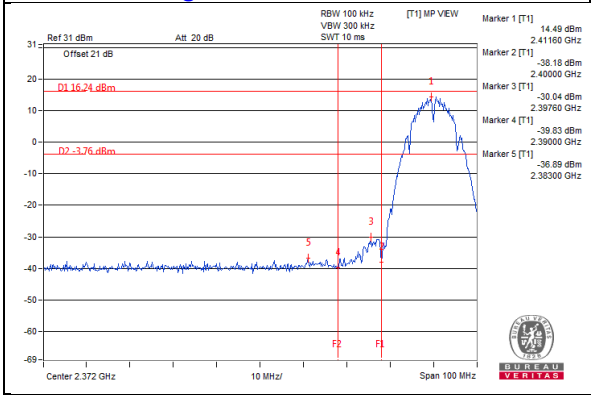
CH 6



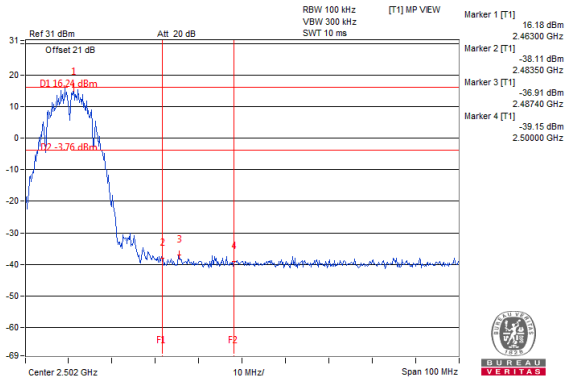
CH 11



CH 1 Band edge

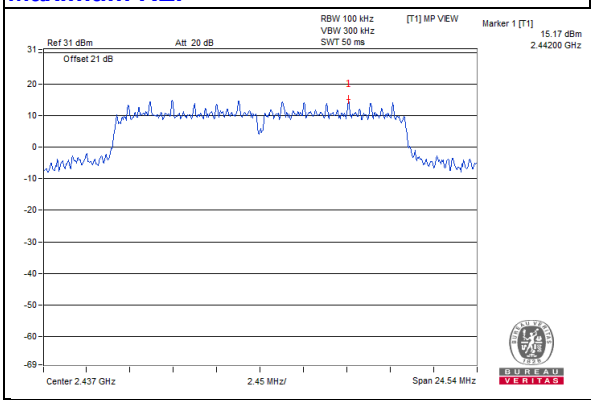


CH 11 Band edge



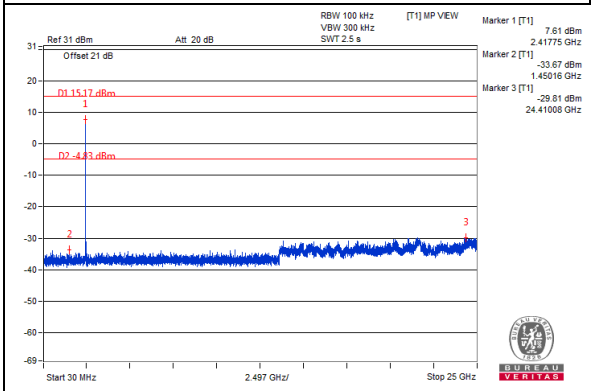
802.11g

Maximum REF

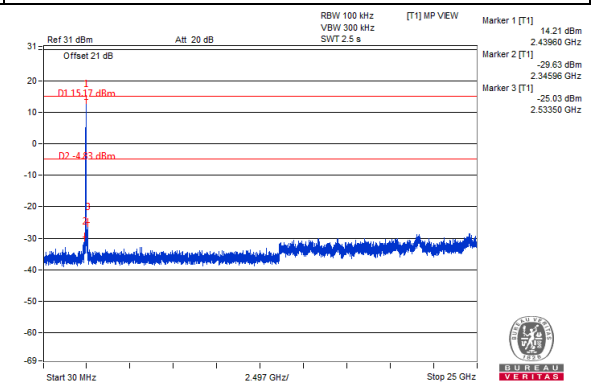


Chain 0

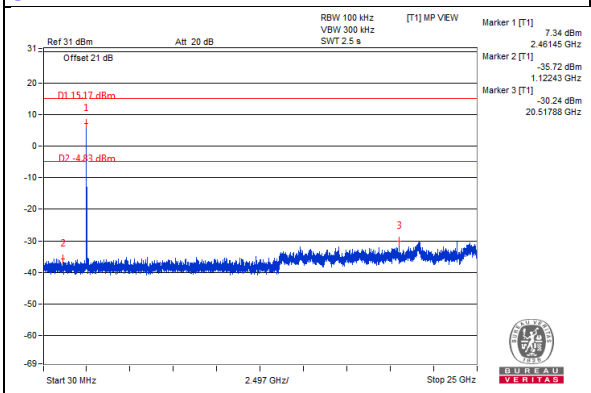
CH 1



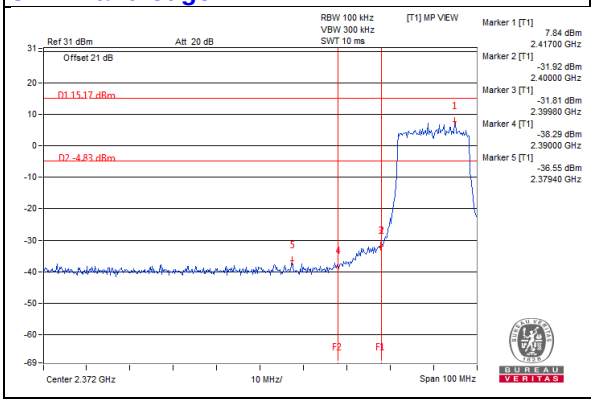
CH 6



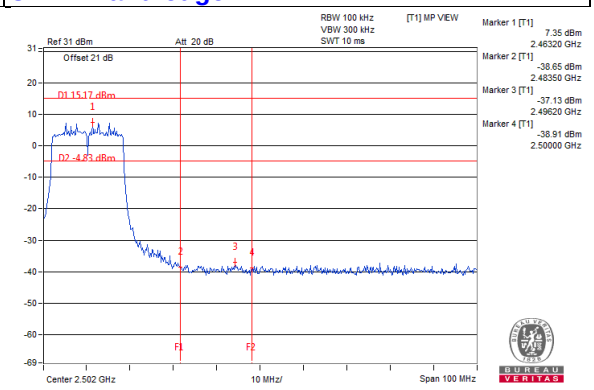
CH 11



CH 1 Band edge

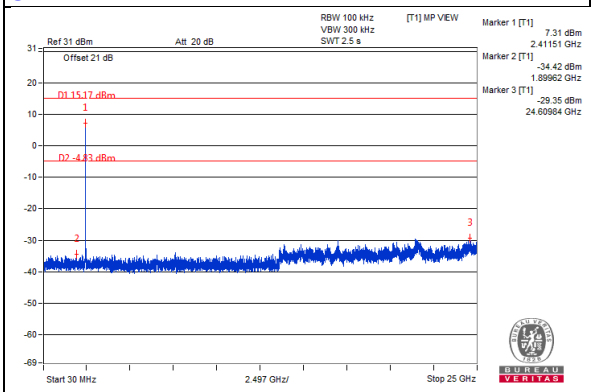


CH 11 Band edge

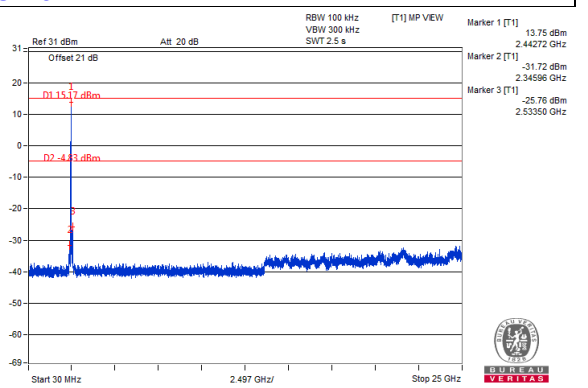


Chain 1

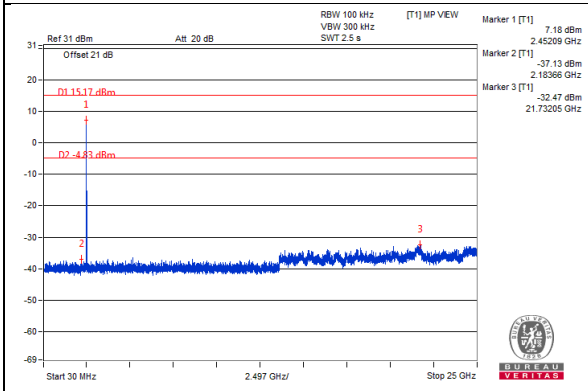
CH 1



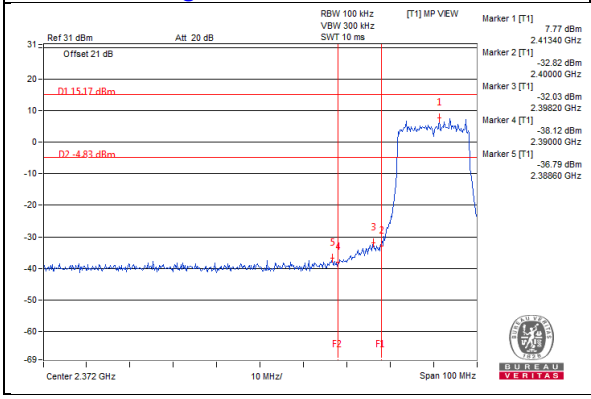
CH 6



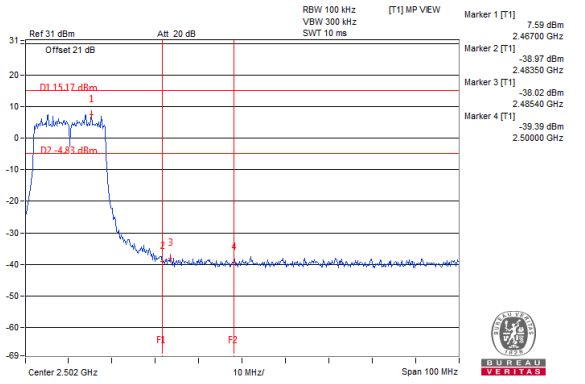
CH 11



CH 1 Band edge

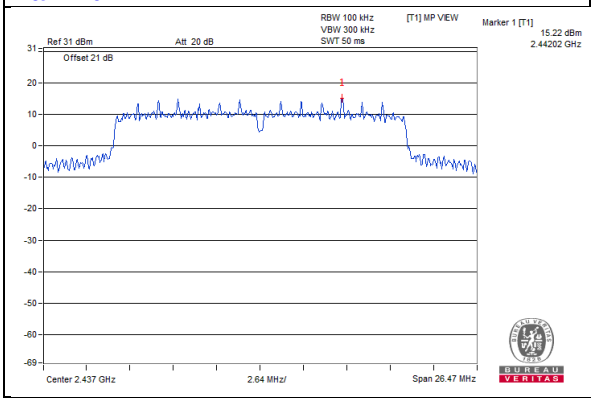


CH 11 Band edge



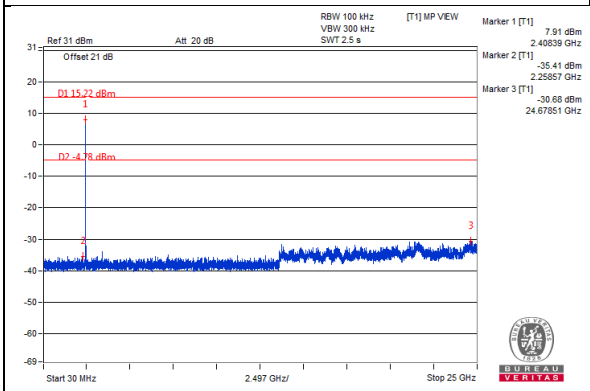
802.11n (HT20)

Maximum REF

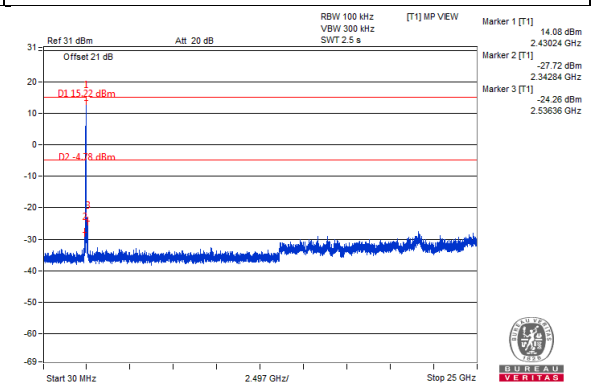


Chain 0

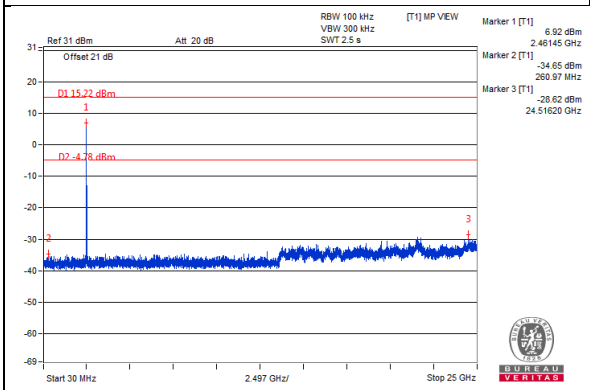
CH 1



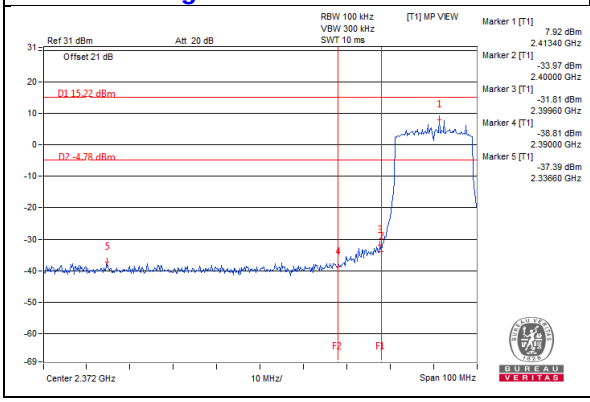
CH 6



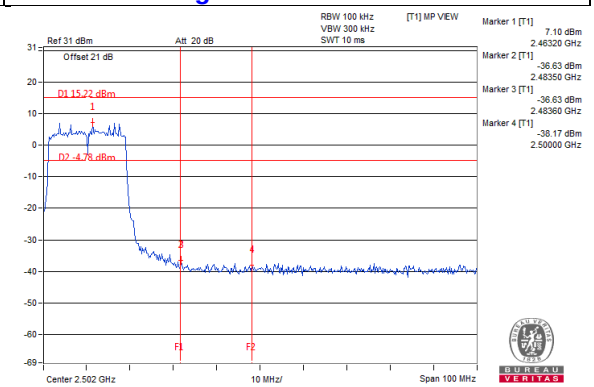
CH 11



CH 1 Band edge

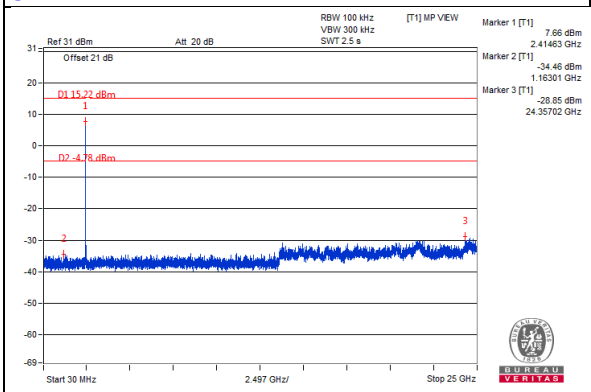


CH 11 Band edge

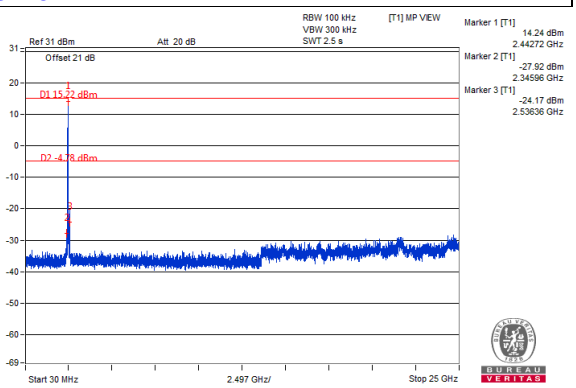


Chain 1

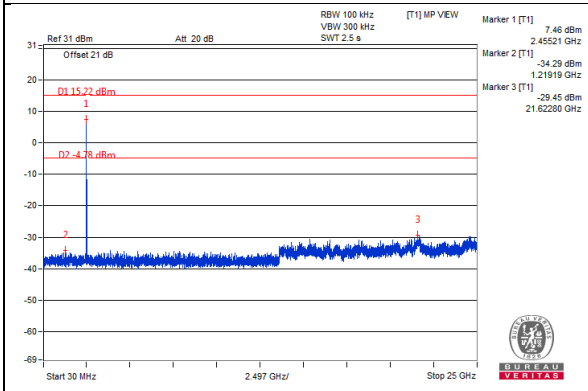
CH 1



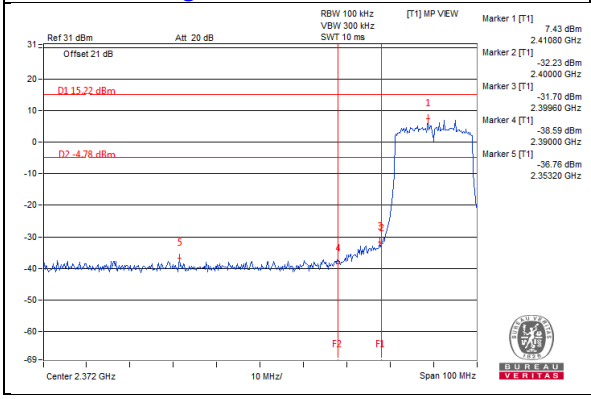
CH 6



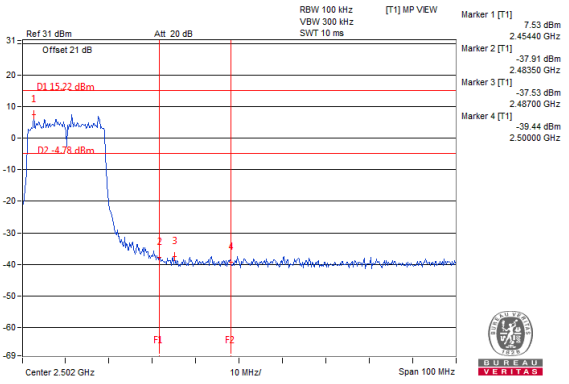
CH 11



CH 1 Band edge

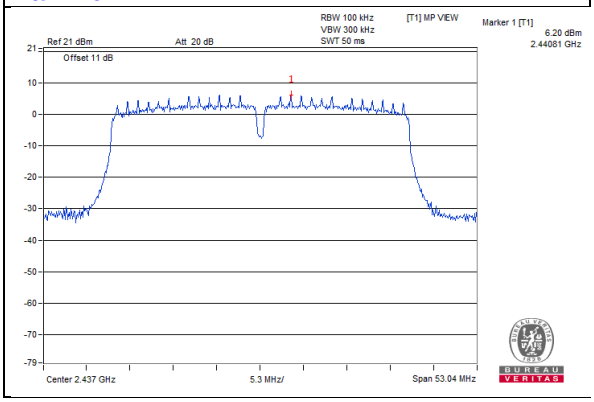


CH 11 Band edge



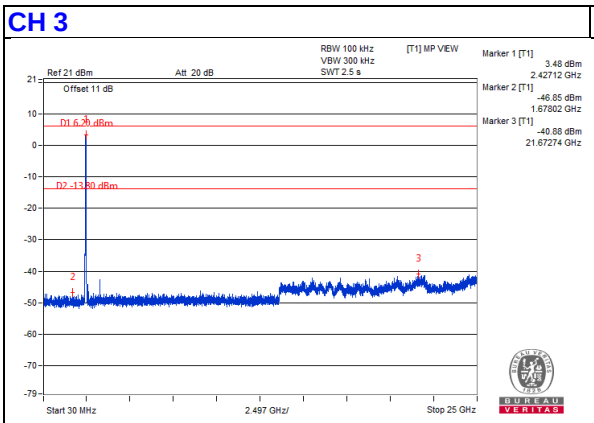
802.11n (HT40)

Maximum REF

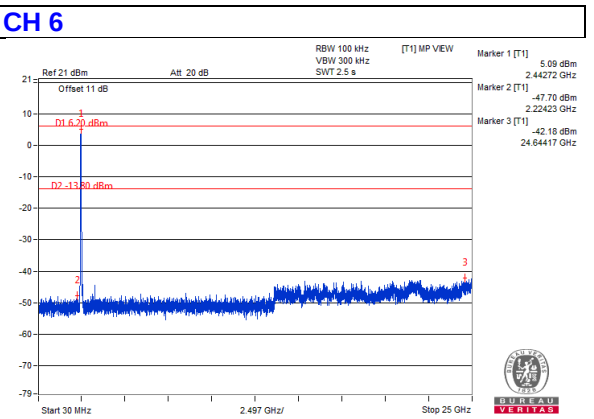


Chain 0

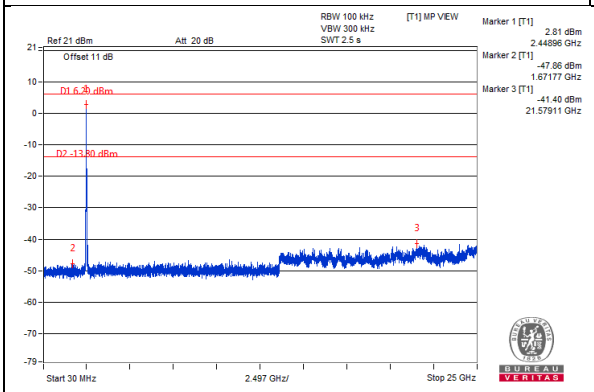
CH 3



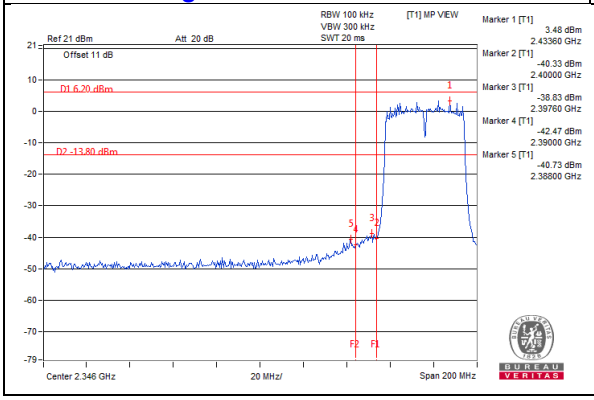
CH 6



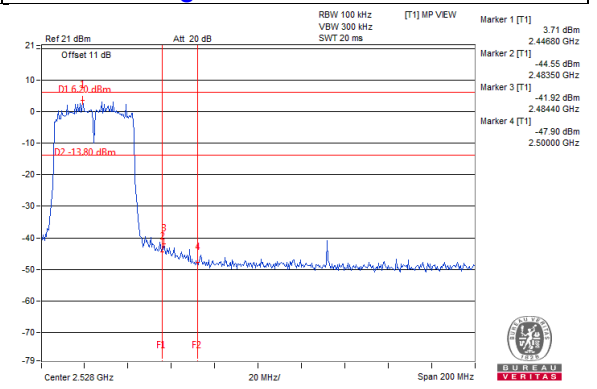
CH 9



CH 3 Band edge

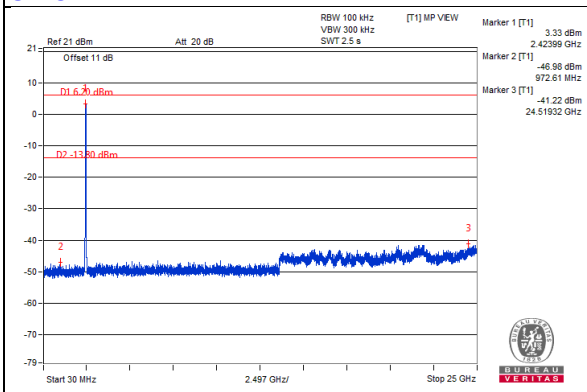


CH 9 Band edge

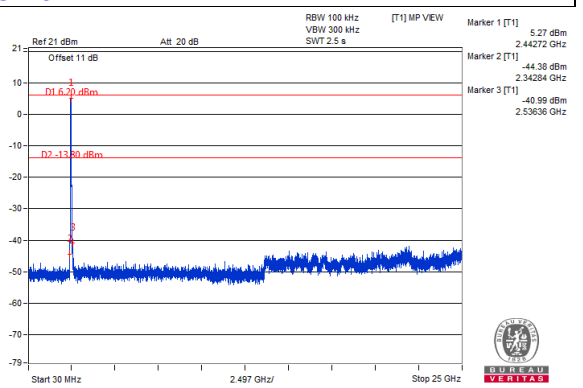


Chain 1

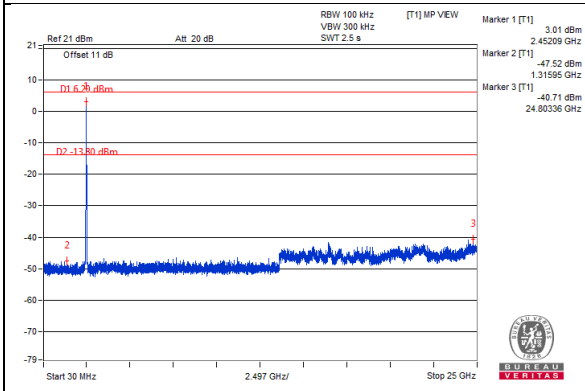
CH 3



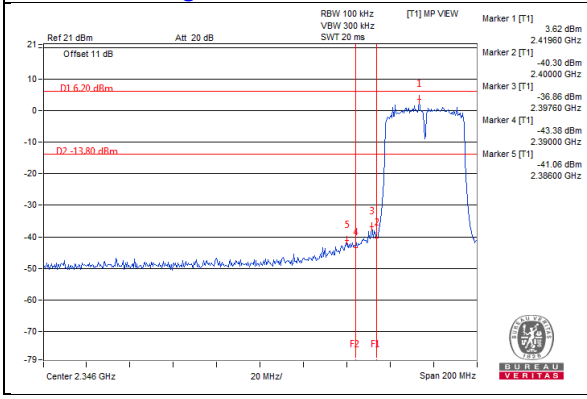
CH 6



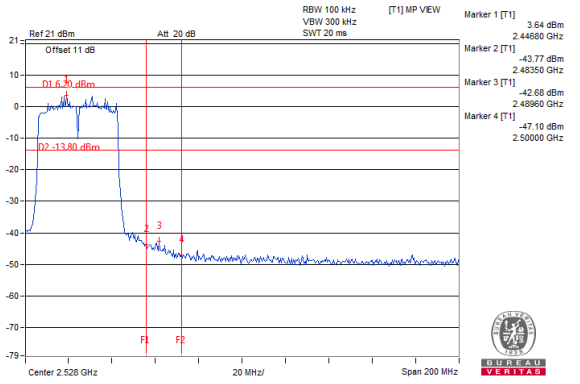
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

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

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

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Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

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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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