FCC Test Report

Report No.:	RF160923E02E
FCC ID:	U8G-P1811ACPRO
Test Model:	Balance 30 Pro
Series Model:	Peplink Balance 30 Pro, BPL-031-LTEA-W-T, Pismo 811AC, B30 Pro
Received Date:	Mar. 20, 2019
Test Date:	Apr. 27 to May 15, 2019
Issued Date:	May 21, 2019
Applicant:	PISMO LABS TECHNOLOGY LIMITED
Address:	A8, 5/F, HK Spinners Industrial Building, Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Hong Kong
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

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF160923E02E	Original release.	May 21, 2019

1 Certificate of Conformity

Product:	PEPWAVE / peplink Wireless Product
Brand:	PEPWAVE / peplink
Test Model:	Balance 30 Pro
Series Model:	Peplink Balance 30 Pro, BPL-031-LTEA-W-T, Pismo 811AC, B30 Pro
Sample Status:	PROTOTYPE
Applicant:	PISMO LABS TECHNOLOGY LIMITED
Test Date:	Apr. 27 to May 15, 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 : _____ , **Date:** May 21, 2019
Wendy Wu / Specialist

Approved by : _____ , **Date:** May 21, 2019
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 -10.03dB at 0.15000MHz.
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 4874MHz, 2390MHz.
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 R-SMA 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 at mains ports	150kHz ~ 30MHz	1.8 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.8 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.0 dB
	6GHz ~ 18GHz	5.0 dB
	18GHz ~ 40GHz	5.3 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	PEPWAVE / peplink Wireless Product
Brand	PEPWAVE / peplink
Test Model	Balance 30 Pro
Series Model	Peplink Balance 30 Pro, BPL-031-LTEA-W-T, Pismo 811AC, B30 Pro
Status of EUT	PROTOTYPE
Power Supply Rating	10 - 56Vdc from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only
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):11 802.11n (HT40):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:** 997.839mW **5GHz:** **5.18 ~ 5.24GHz:** 511.334mW **5.745 ~ 5.825GHz:** 410.933mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	NA

Note:

1. There are WLAN, WWAN(LTE) technology used for the EUT.
2. EUT contains two WiFi chip as same model, this chip model support dual band operation, but it will be locked to single band operation by firmware. One chip is supported 2.4GHz, other is supported 5GHz.
3. EUT could be applied with a plug in USB cellular device.
4. EUT inside has one WWAN(LTE) module which FCC ID: N7NMC7455.
5. Simultaneously transmission condition.

Condition	Technology			
1	WLAN (2.4GHz)	WLAN (5GHz)	WWAN(LTE) module (FCC ID: N7NMC7455)	-
2	WLAN (2.4GHz)	WLAN (5GHz)	WWAN(LTE) module (FCC ID: N7NMC7455)	3G/LTE (USB cellular device)
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.				

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

Brand	Model	Difference
PEPWAVE / peplink	Balance 30 Pro	For marketing requirement
	Peplink Balance 30 Pro	
	BPL-031-LTEA-W-T	
	Pismo 811AC	
	B30 Pro	
From the above models, model: **Balance 30 Pro** was selected as representative model for the test and its data are recorded in this report.		

7. The EUT must be supplied with a power adapter as following table:

Adapter 1		
Brand	Model No.	Spec.
DVE	DSA-36PFH-12 FUS 120300AN	Input: 100-240Vac, 50/60Hz, 1A Output: 12Vdc, 3A DC output cable (Unshielded, 1.5m)
Adapter 2 (Only for test not for sale)		
Model No.		Spec.
STD-26021		Input: 100-240Vac, 47-63Hz, 1.6A AC input cable (Unshielded, 1.5m with one core) Output: 56Vdc, 2.15A DC output cable (Unshielded, 1.5m)

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

For WLAN

Antenna No.	Brand	Model	Antenna Net Gain (dBi)	Frequency Range (MHz)	Antenna Type	Connector Type
2.4GHz	Master Wave Technology Co., Ltd	98614PRSX000	2.44	2400 ~ 2500	Dipole	R-SMA
5GHz			4.10	5150 ~ 5350	Dipole	R-SMA
			4.73	5725 ~ 5850		

For WWAN(LTE)

Brand	Model	Antenna Net Gain(dBi)	Frequency Range (MHz)	Antenna Type	Connector Type
Master Wave Technology Co., Ltd	98642ZSAX001	2.5	1920~1980	Dipole	SMA
		1.82	880~915		
		1.48	1710~1785		
		3.42	2500~2570		
		2	832~862		
		3.52	2570~2620		
		3.02	2300~2400		
		2.39	1850~1910		
		1.69	699~716		
		2.12	777~787		
		2.39	1850~1915		
		3.52	2496~2690		

9. 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
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. (Final test mode refer section 3.2.1)		

10. 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):

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):

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	√	√	√	√	With Adapter 1
2	-	√	√	-	With Adapter 2 (for support 802.3af POE function)

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:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
2. "-"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.

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

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)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

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
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:

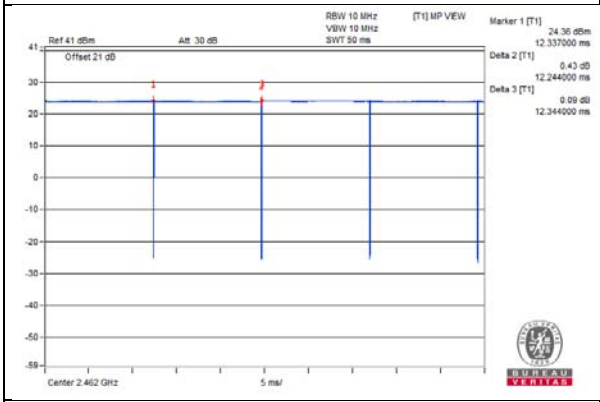
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Robert Cheng
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Nelson Teng
	23deg. C, 69%RH	120Vac, 60Hz	Andy Ho
PLC	25deg. C, 68%RH	120Vac, 60Hz	Andy Ho
	25deg. C, 68%RH	120Vac, 60Hz	Weiwei Lo
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jyunchun Lin

3.3 Duty Cycle of Test Signal

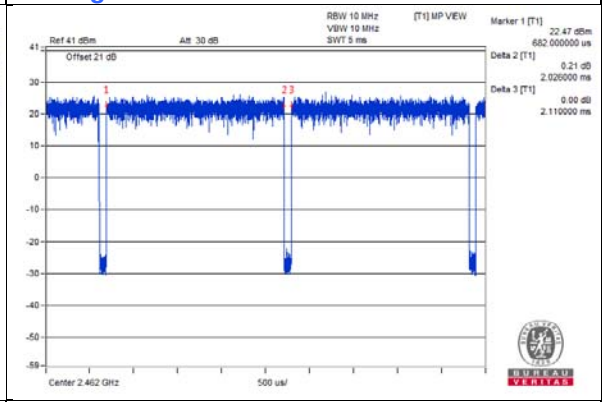
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 12.244/12.344 = 0.992
802.11g: Duty cycle = 2.026/2.11 = 0.96, Duty factor = 10 * log(1/0.96) = 0.18
802.11n (HT20): Duty cycle = 1.885/1.97 = 0.957, Duty factor = 10 * log(1/0.957) = 0.19
802.11n (HT40): Duty cycle = 0.926/1.009 = 0.918, Duty factor = 10 * log(1/0.918) = 0.37

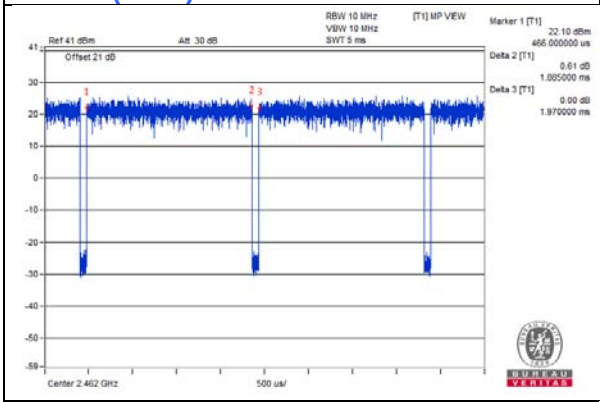
802.11b



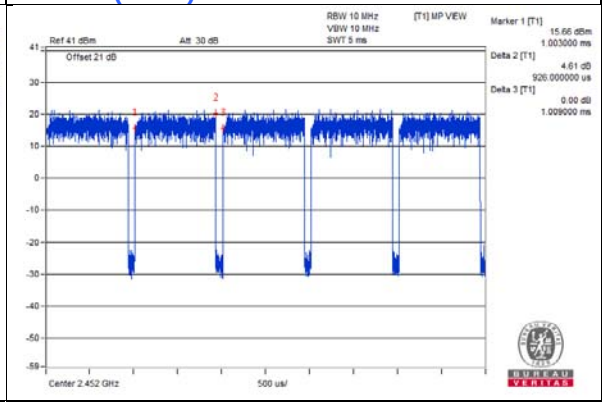
802.11g



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.	3G Donle	D-Link	DWM-156	Q2011A4000812	NA	Provided by Lab
B.	Laptop	DELL	PP32LA	GSLB32S	FCC DoC	Provided by Lab
C.	Laptop	Lenovo	80WG	YD025N5Q	PD93165NGU	Provided by Lab
D.	SIM Card	KeysSight	E7515-10910	NA	NA	Provided by Lab
E.	PoE Load	NA	NA	NA	NA	Provided by Lab
F.	Adapter	NA	STD-26021	NA	NA	Supplied by client

Note:

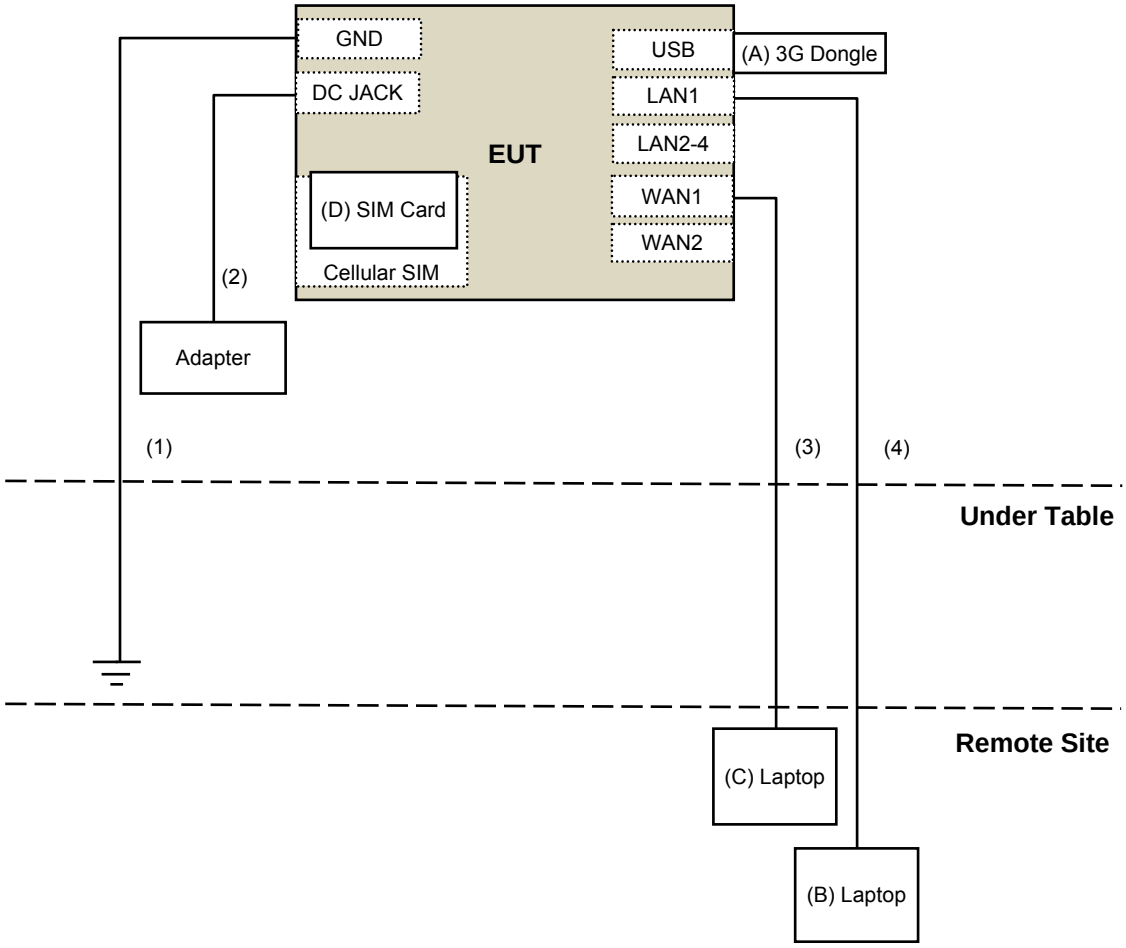
1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	GND Cable	1	3	No	0	Provided by Lab
2.	DC Cable	1	1.5	No	0	Supplied by client
3.	RJ-45 Cable	1	10	No	0	Provided by Lab
4.	RJ-45 Cable	1	10	No	0	Provided by Lab
5.	RJ-45 Cable	1	10	No	0	Provided by Lab
6.	DC Cable	1	1.5	No	1	Supplied by client
7.	AC Cable	1	1.5	No	0	Supplied by client

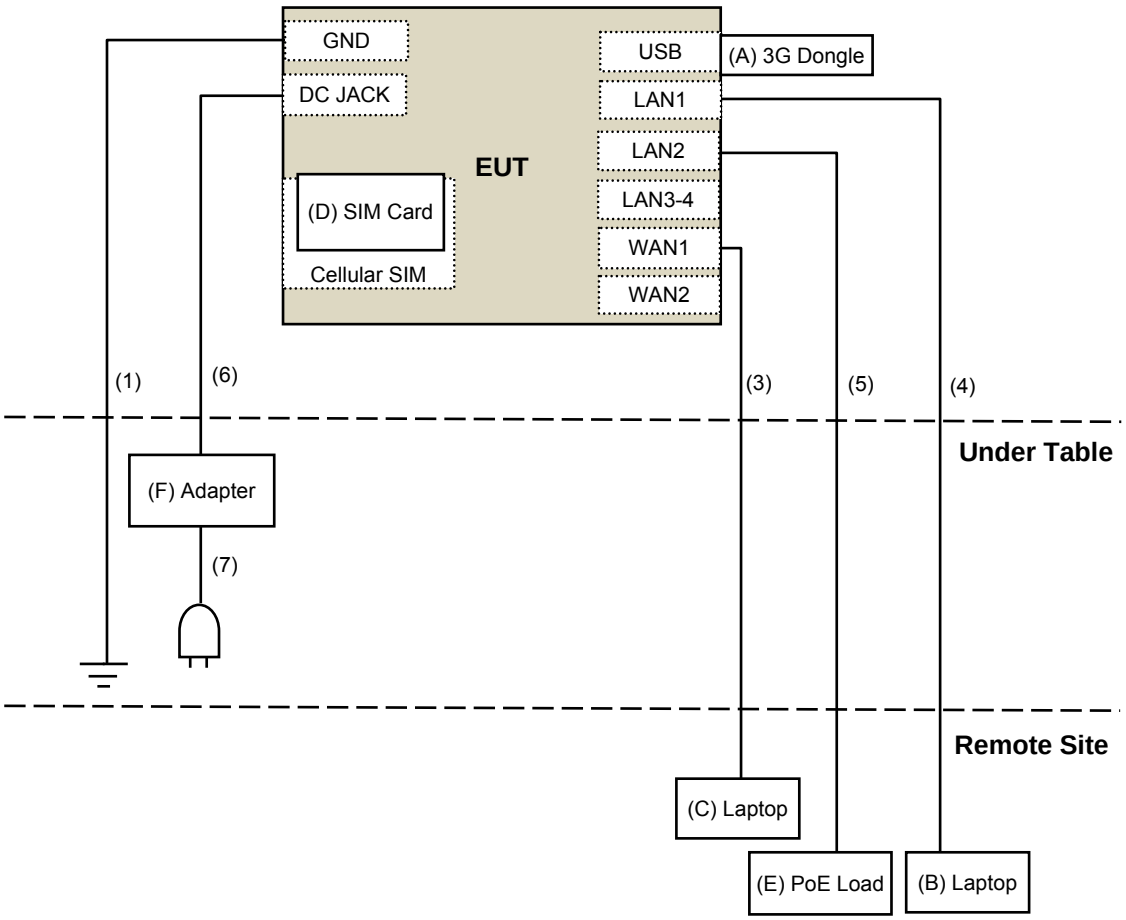
Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test

For Mode 1



For Mode 2


GND
DC JACK
EUT
(D) SIM Card
Cellular SIM
USB
LAN1
LAN2
LAN3-4
WAN1
WAN2
(A) 3G Dongle
(1)
(6)
(3)
(5)
(4)
Under Table
(F) Adapter
(7)
Remote Site
(C) Laptop
(E) PoE Load
(B) Laptop

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 15.247 Meas Guidance v05r02
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least or 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 Mode 1

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ESR7 R&S	ESR7	102026	Apr. 24, 2019	Apr. 23, 2020
Spectrum Analyzer Keysight	N9030B	MY57141948	June 01, 2018	May 31, 2019
Pre-Amplifier EMCI	EMC001340	980142	Jan. 25, 2019	Jan. 24, 2020
Loop Antenna Electro-Metrics	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
RF Cable	NA	LOOPCAB-001	Jan. 14, 2019	Jan. 13, 2020
RF Cable	NA	LOOPCAB-002	Jan. 14, 2019	Jan. 13, 2020
Pre-Amplifier EMCI	EMC330N	980538	May 07, 2018	May 06, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB9168	AMP-ZFL-05	May 07, 2018	May 06, 2019
RF Cable	8D	966-5-1	May 07, 2018	May 06, 2019
RF Cable	8D	966-5-2	May 07, 2018	May 06, 2019
RF Cable	8D	966-5-3	May 07, 2018	May 06, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	Jan. 28, 2019	Jan. 27, 2020
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-1819	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980509	May 07, 2018	May 06, 2019
RF Cable EMCI	EMC104-SM-SM-1500	180503	May 07, 2018	May 06, 2019
RF Cable EMCI	EMC104-SM-SM-2000	180501	May 07, 2018	May 06, 2019
RF Cable EMCI	EMC104-SM-SM-6000	180505	May 07, 2018	May 06, 2019
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
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA
Spectrum Analyzer R&S	FSV40	100964	June 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019
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.
3. The test was performed in 966 Chamber No. 5.
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: Apr. 27 to May. 02, 2019

For Mode 2

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ESR7 R&S	ESR7	102026	Apr. 24, 2019	Apr. 23, 2020
Spectrum Analyzer Keysight	N9030B	MY57141948	June 01, 2018	May 31, 2019
Pre-Amplifier EMCI	EMC001340	980142	Jan. 25, 2019	Jan. 24, 2020
Loop Antenna Electro-Metrics	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
RF Cable	NA	LOOPCAB-001	Jan. 14, 2019	Jan. 13, 2020
RF Cable	NA	LOOPCAB-002	Jan. 14, 2019	Jan. 13, 2020
Pre-Amplifier EMCI	EMC330N	980538	Apr. 30, 2019	Apr. 29, 2020
Trilog Broadband Antenna SCHWARZBECK	VULB9168	9168-0842	Nov. 21, 2018	Nov. 20, 2019
RF Cable	8D	966-5-1	May 03, 2019	May 02, 2020
RF Cable	8D	966-5-2	May 03, 2019	May 02, 2020
RF Cable	8D	966-5-3	May 03, 2019	May 02, 2020
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	Jan. 28, 2019	Jan. 27, 2020
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA

Note:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 5.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: May 15, 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:

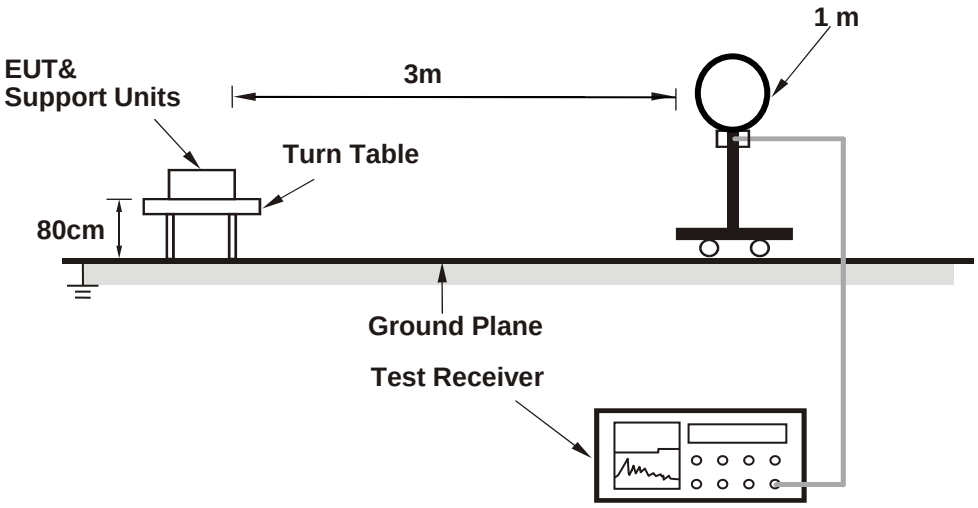
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

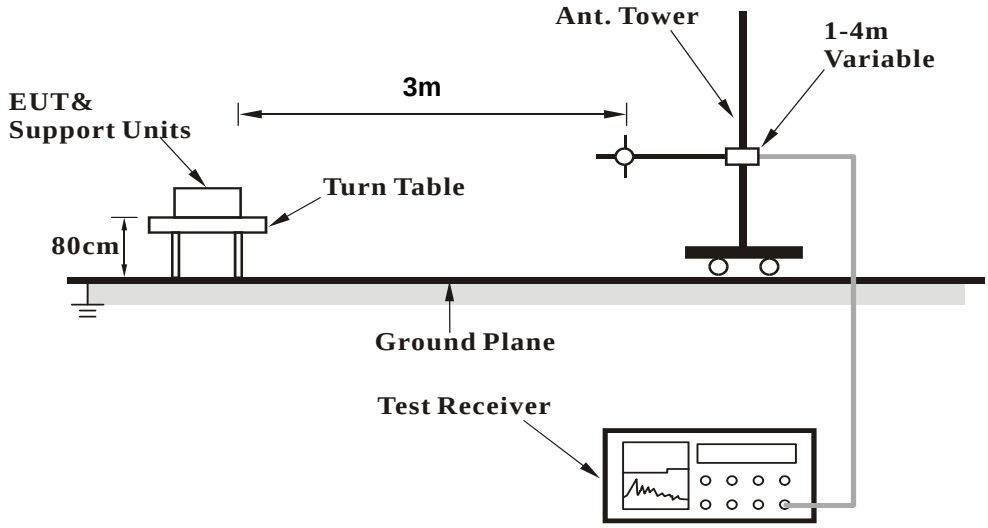
No deviation.

4.1.5 Test Setup

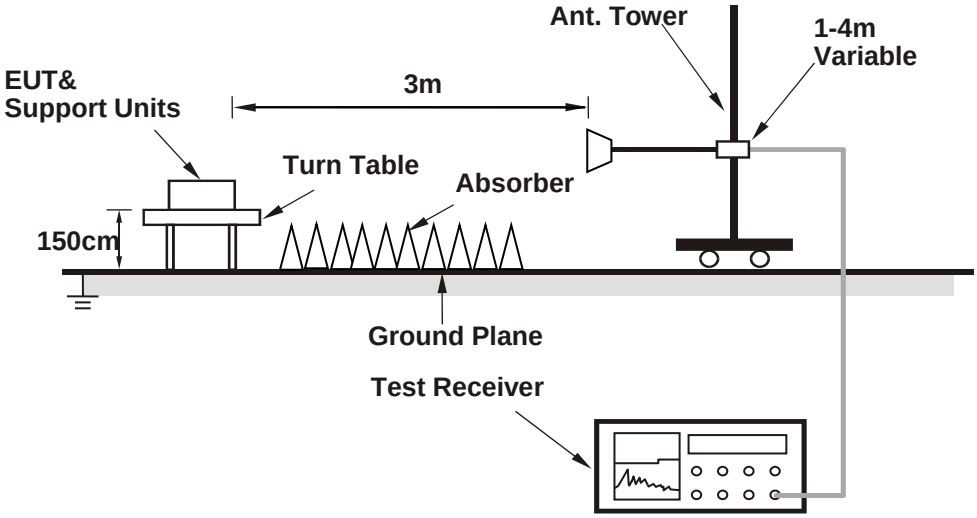
For Radiated emission below 30MHz



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. Placed the EUT on the testing table.
b. Controlling software (Atheros Radio Test 2(ART2-GUI) Version:2.3) has been activated to set the EUT under transmission condition continuously.

4.1.7 Test Results (Mode 1)

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	2386.30	53.7 PK	74.0	-20.3	1.44 H	212	56.9	-3.2
2	2386.30	40.4 AV	54.0	-13.6	1.44 H	212	43.6	-3.2
3	2390.00	54.7 PK	74.0	-19.3	1.50 H	200	57.9	-3.2
4	2390.00	41.8 AV	54.0	-12.2	1.50 H	200	45.0	-3.2
5	*2412.00	102.3 PK			1.53 H	207	105.5	-3.2
6	*2412.00	100.3 AV			1.53 H	207	103.5	-3.2
7	4824.00	41.8 PK	74.0	-32.2	1.17 H	257	41.0	0.8
8	4824.00	38.7 AV	54.0	-15.3	1.17 H	257	37.9	0.8
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	2386.30	59.6 PK	74.0	-14.4	1.95 V	151	62.8	-3.2
2	2386.30	53.7 AV	54.0	-0.3	1.95 V	151	56.9	-3.2
3	2390.00	56.7 PK	74.0	-17.3	1.95 V	151	59.9	-3.2
4	2390.00	47.7 AV	54.0	-6.3	1.95 V	151	50.9	-3.2
5	*2412.00	112.6 PK			1.95 V	151	115.8	-3.2
6	*2412.00	110.7 AV			1.95 V	151	113.9	-3.2
7	4824.00	50.3 PK	74.0	-23.7	1.37 V	156	49.5	0.8
8	4824.00	48.8 AV	54.0	-5.2	1.37 V	156	48.0	0.8

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. 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)
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	54.4 PK	74.0	-19.6	1.50 H	204	57.6	-3.2
2	2390.00	41.5 AV	54.0	-12.5	1.50 H	204	44.7	-3.2
3	*2437.00	102.4 PK			1.50 H	204	105.4	-3.0
4	*2437.00	100.6 AV			1.50 H	204	103.6	-3.0
5	2483.50	55.3 PK	74.0	-18.7	1.50 H	204	58.4	-3.1
6	2483.50	42.2 AV	54.0	-11.8	1.50 H	204	45.3	-3.1
7	2485.30	52.6 PK	74.0	-21.4	1.50 H	204	55.7	-3.1
8	2485.30	39.6 AV	54.0	-14.4	1.50 H	204	42.7	-3.1
9	4874.00	50.4 PK	74.0	-23.6	1.19 H	251	49.7	0.7
10	4874.00	47.1 AV	54.0	-6.9	1.19 H	251	46.4	0.7
11	7311.00	43.7 PK	74.0	-30.3	1.49 H	211	37.0	6.7
12	7311.00	35.0 AV	54.0	-19.0	1.49 H	211	28.3	6.7
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	56.1 PK	74.0	-17.9	1.94 V	156	59.3	-3.2
2	2390.00	46.7 AV	54.0	-7.3	1.94 V	156	49.9	-3.2
3	*2437.00	117.6 PK			1.94 V	156	120.6	-3.0
4	*2437.00	115.7 AV			1.94 V	156	118.7	-3.0
5	2483.50	52.5 PK	74.0	-21.5	1.94 V	156	55.6	-3.1
6	2483.50	44.3 AV	54.0	-9.7	1.94 V	156	47.4	-3.1
7	2485.30	57.5 PK	74.0	-16.5	1.94 V	156	60.6	-3.1
8	2485.30	48.9 AV	54.0	-5.1	1.94 V	156	52.0	-3.1
9	4874.00	54.6 PK	74.0	-19.4	1.50 V	160	53.9	0.7
10	**4874.00**	**53.9 AV**	**54.0**	**-0.1**	**1.50 V**	**160**	**53.2**	**0.7**
11	7311.00	46.9 PK	74.0	-27.1	1.45 V	180	40.2	6.7
12	7311.00	40.4 AV	54.0	-13.6	1.45 V	180	33.7	6.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)
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	*2462.00	102.1 PK			1.48 H	204	105.2	-3.1
2	*2462.00	100.1 AV			1.48 H	204	103.2	-3.1
3	2483.50	53.2 PK	74.0	-20.8	1.48 H	204	56.3	-3.1
4	2483.50	40.1 AV	54.0	-13.9	1.48 H	204	43.2	-3.1
5	2487.70	54.8 PK	74.0	-19.2	1.48 H	204	57.9	-3.1
6	2487.70	41.9 AV	54.0	-12.1	1.48 H	204	45.0	-3.1
7	4924.00	42.5 PK	74.0	-31.5	1.17 H	245	41.7	0.8
8	4924.00	39.1 AV	54.0	-14.9	1.17 H	245	38.3	0.8
9	7386.00	44.0 PK	74.0	-30.0	1.50 H	210	37.0	7.0
10	7386.00	35.0 AV	54.0	-19.0	1.50 H	210	28.0	7.0
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	*2462.00	116.7 PK			1.92 V	189	119.8	-3.1
2	*2462.00	114.6 AV			1.92 V	189	117.7	-3.1
3	2483.50	58.3 PK	74.0	-15.7	1.92 V	189	61.4	-3.1
4	2483.50	51.8 AV	54.0	-2.2	1.92 V	189	54.9	-3.1
5	2487.70	59.8 PK	74.0	-14.2	1.92 V	189	62.9	-3.1
6	2487.70	53.6 AV	54.0	-0.4	1.92 V	189	56.7	-3.1
7	4924.00	50.4 PK	74.0	-23.6	1.40 V	163	49.6	0.8
8	4924.00	48.7 AV	54.0	-5.3	1.40 V	163	47.9	0.8
9	7386.00	47.0 PK	74.0	-27.0	1.45 V	193	40.0	7.0
10	7386.00	40.6 AV	54.0	-13.4	1.45 V	193	33.6	7.0

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.
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	69.8 PK	74.0	-4.2	1.50 H	208	73.0	-3.2
2	2390.00	51.4 AV	54.0	-2.6	1.50 H	208	54.6	-3.2
3	*2412.00	113.7 PK			1.50 H	208	116.9	-3.2
4	*2412.00	102.3 AV			1.50 H	208	105.5	-3.2
5	4824.00	42.8 PK	74.0	-31.2	1.20 H	267	42.0	0.8
6	4824.00	41.6 AV	54.0	-12.4	1.20 H	267	40.8	0.8
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	72.1 PK	74.0	-1.9	1.88 V	175	75.3	-3.2
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**1.88 V**	**175**	**57.1**	**-3.2**
3	*2412.00	117.6 PK			1.88 V	175	120.8	-3.2
4	*2412.00	106.3 AV			1.88 V	175	109.5	-3.2
5	4824.00	42.7 PK	74.0	-31.3	1.33 V	170	41.9	0.8
6	4824.00	41.3 AV	54.0	-12.7	1.33 V	170	40.5	0.8

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. 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)
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	68.7 PK	74.0	-5.3	1.47 H	201	71.9	-3.2
2	2390.00	50.3 AV	54.0	-3.7	1.47 H	201	53.5	-3.2
3	*2437.00	118.9 PK			1.47 H	201	121.9	-3.0
4	*2437.00	107.9 AV			1.47 H	201	110.9	-3.0
5	2483.50	59.8 PK	74.0	-14.2	1.47 H	201	62.9	-3.1
6	2483.50	45.1 AV	54.0	-8.9	1.47 H	201	48.2	-3.1
7	4874.00	42.4 PK	74.0	-31.6	1.21 H	259	41.7	0.7
8	4874.00	39.1 AV	54.0	-14.9	1.21 H	259	38.4	0.7
9	7311.00	44.4 PK	74.0	-29.6	1.55 H	200	37.7	6.7
10	7311.00	35.4 AV	54.0	-18.6	1.55 H	200	28.7	6.7
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	1.73 V	174	74.8	-3.2
2	2390.00	53.2 AV	54.0	-0.8	1.73 V	174	56.4	-3.2
3	*2437.00	122.4 PK			1.73 V	174	125.4	-3.0
4	*2437.00	111.7 AV			1.73 V	174	114.7	-3.0
5	2483.50	62.2 PK	74.0	-11.8	1.73 V	174	65.3	-3.1
6	2483.50	47.7 AV	54.0	-6.3	1.73 V	174	50.8	-3.1
7	4874.00	50.0 PK	74.0	-24.0	1.38 V	170	49.3	0.7
8	4874.00	48.4 AV	54.0	-5.6	1.38 V	170	47.7	0.7
9	7311.00	47.4 PK	74.0	-26.6	1.43 V	183	40.7	6.7
10	7311.00	41.1 AV	54.0	-12.9	1.43 V	183	34.4	6.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	116.7 PK			1.45 H	210	119.8	-3.1
2	*2462.00	105.0 AV			1.45 H	210	108.1	-3.1
3	2483.50	66.6 PK	74.0	-7.4	1.45 H	210	69.7	-3.1
4	2483.50	50.1 AV	54.0	-3.9	1.45 H	210	53.2	-3.1
5	4924.00	42.8 PK	74.0	-31.2	1.20 H	261	42.0	0.8
6	4924.00	41.2 AV	54.0	-12.8	1.20 H	261	40.4	0.8
7	7386.00	44.9 PK	74.0	-29.1	1.56 H	197	37.9	7.0
8	7386.00	38.1 AV	54.0	-15.9	1.56 H	197	31.1	7.0
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	*2462.00	120.6 PK			1.87 V	202	123.7	-3.1
2	*2462.00	109.0 AV			1.87 V	202	112.1	-3.1
3	2483.50	70.0 PK	74.0	-4.0	1.87 V	202	73.1	-3.1
4	2483.50	53.5 AV	54.0	-0.5	1.87 V	202	56.6	-3.1
5	4924.00	42.9 PK	74.0	-31.1	1.35 V	156	42.1	0.8
6	4924.00	41.5 AV	54.0	-12.5	1.35 V	156	40.7	0.8
7	7386.00	44.9 PK	74.0	-29.1	1.38 V	180	37.9	7.0
8	7386.00	38.4 AV	54.0	-15.6	1.38 V	180	31.4	7.0

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.
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	70.0 PK	74.0	-4.0	1.47 H	205	73.2	-3.2
2	2390.00	51.5 AV	54.0	-2.5	1.47 H	205	54.7	-3.2
3	*2412.00	110.6 PK			1.47 H	205	113.8	-3.2
4	*2412.00	99.4 AV			1.47 H	205	102.6	-3.2
5	4824.00	42.2 PK	74.0	-31.8	1.17 H	280	41.4	0.8
6	4824.00	41.3 AV	54.0	-12.7	1.17 H	280	40.5	0.8
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	70.5 PK	74.0	-3.5	1.87 V	213	73.7	-3.2
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**1.87 V**	**213**	**57.1**	**-3.2**
3	*2412.00	113.6 PK			1.87 V	213	116.8	-3.2
4	*2412.00	103.3 AV			1.87 V	213	106.5	-3.2
5	4824.00	43.1 PK	74.0	-30.9	1.32 V	177	42.3	0.8
6	4824.00	41.8 AV	54.0	-12.2	1.32 V	177	41.0	0.8

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. 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)
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	69.2 PK	74.0	-4.8	1.49 H	208	72.4	-3.2
2	2390.00	50.7 AV	54.0	-3.3	1.49 H	208	53.9	-3.2
3	*2437.00	118.6 PK			1.49 H	208	121.6	-3.0
4	*2437.00	107.8 AV			1.49 H	208	110.8	-3.0
5	2483.50	59.8 PK	74.0	-14.2	1.49 H	208	62.9	-3.1
6	2483.50	45.2 AV	54.0	-8.8	1.49 H	208	48.3	-3.1
7	4874.00	42.1 PK	74.0	-31.9	1.12 H	256	41.4	0.7
8	4874.00	38.7 AV	54.0	-15.3	1.12 H	256	38.0	0.7
9	7311.00	44.4 PK	74.0	-29.6	1.44 H	198	37.7	6.7
10	7311.00	35.1 AV	54.0	-18.9	1.44 H	198	28.4	6.7
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	2.07 V	176	74.8	-3.2
2	2390.00	53.1 AV	54.0	-0.9	2.07 V	176	56.3	-3.2
3	*2437.00	121.8 PK			2.07 V	176	124.8	-3.0
4	*2437.00	111.2 AV			2.07 V	176	114.2	-3.0
5	2483.50	64.2 PK	74.0	-9.8	2.07 V	176	67.3	-3.1
6	2483.50	49.3 AV	54.0	-4.7	2.07 V	176	52.4	-3.1
7	4874.00	50.3 PK	74.0	-23.7	1.35 V	182	49.6	0.7
8	4874.00	48.7 AV	54.0	-5.3	1.35 V	182	48.0	0.7
9	7311.00	47.2 PK	74.0	-26.8	1.49 V	195	40.5	6.7
10	7311.00	40.8 AV	54.0	-13.2	1.49 V	195	34.1	6.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	116.6 PK			1.47 H	203	119.7	-3.1
2	*2462.00	104.7 AV			1.47 H	203	107.8	-3.1
3	2483.50	66.7 PK	74.0	-7.3	1.47 H	203	69.8	-3.1
4	2483.50	50.0 AV	54.0	-4.0	1.47 H	203	53.1	-3.1
5	4924.00	42.4 PK	74.0	-31.6	1.13 H	261	41.6	0.8
6	4924.00	41.0 AV	54.0	-13.0	1.13 H	261	40.2	0.8
7	7386.00	45.4 PK	74.0	-28.6	1.40 H	187	38.4	7.0
8	7386.00	38.6 AV	54.0	-15.4	1.40 H	187	31.6	7.0
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	*2462.00	119.8 PK			1.81 V	211	122.9	-3.1
2	*2462.00	108.8 AV			1.81 V	211	111.9	-3.1
3	2483.50	68.2 PK	74.0	-5.8	1.81 V	211	71.3	-3.1
4	2483.50	53.4 AV	54.0	-0.6	1.81 V	211	56.5	-3.1
5	4924.00	42.9 PK	74.0	-31.1	1.32 V	140	42.1	0.8
6	4924.00	41.4 AV	54.0	-12.6	1.32 V	140	40.6	0.8
7	7386.00	44.8 PK	74.0	-29.2	1.38 V	182	37.8	7.0
8	7386.00	38.5 AV	54.0	-15.5	1.38 V	182	31.5	7.0

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.
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	65.1 PK	74.0	-8.9	1.44 H	189	68.3	-3.2
2	2390.00	50.6 AV	54.0	-3.4	1.44 H	189	53.8	-3.2
3	*2422.00	104.4 PK			1.44 H	189	107.6	-3.2
4	*2422.00	94.6 AV			1.44 H	189	97.8	-3.2
5	4844.00	43.2 PK	74.0	-30.8	1.16 H	265	42.4	0.8
6	4844.00	41.6 AV	54.0	-12.4	1.16 H	265	40.8	0.8
7	7266.00	44.2 PK	74.0	-29.8	1.43 H	174	37.5	6.7
8	7266.00	38.0 AV	54.0	-16.0	1.43 H	174	31.3	6.7
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	68.3 PK	74.0	-5.7	2.10 V	182	71.5	-3.2
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**2.10 V**	**182**	**57.1**	**-3.2**
3	*2422.00	108.7 PK			2.10 V	182	111.9	-3.2
4	*2422.00	98.7 AV			2.10 V	182	101.9	-3.2
5	4844.00	42.8 PK	74.0	-31.2	1.37 V	182	42.0	0.8
6	4844.00	41.3 AV	54.0	-12.7	1.37 V	182	40.5	0.8
7	7266.00	44.1 PK	74.0	-29.9	1.42 V	173	37.4	6.7
8	7266.00	38.1 AV	54.0	-15.9	1.42 V	173	31.4	6.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)
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	69.1 PK	74.0	-4.9	1.39 H	180	72.3	-3.2
2	2390.00	50.4 AV	54.0	-3.6	1.39 H	180	53.6	-3.2
3	*2437.00	107.5 PK			1.39 H	180	110.5	-3.0
4	*2437.00	97.7 AV			1.39 H	180	100.7	-3.0
5	2483.50	60.3 PK	74.0	-13.7	1.39 H	180	63.4	-3.1
6	2483.50	45.5 AV	54.0	-8.5	1.39 H	180	48.6	-3.1
7	4874.00	43.2 PK	74.0	-30.8	1.12 H	279	42.5	0.7
8	4874.00	41.7 AV	54.0	-12.3	1.12 H	279	41.0	0.7
9	7311.00	43.8 PK	74.0	-30.2	1.41 H	177	37.1	6.7
10	7311.00	37.6 AV	54.0	-16.4	1.41 H	177	30.9	6.7
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	69.6 PK	74.0	-4.4	2.09 V	179	72.8	-3.2
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**2.09 V**	**179**	**57.1**	**-3.2**
3	*2437.00	111.9 PK			2.09 V	179	114.9	-3.0
4	*2437.00	102.5 AV			2.09 V	179	105.5	-3.0
5	2483.50	68.0 PK	74.0	-6.0	2.09 V	179	71.1	-3.1
6	2483.50	52.0 AV	54.0	-2.0	2.09 V	179	55.1	-3.1
7	4874.00	46.7 PK	74.0	-27.3	1.31 V	177	46.0	0.7
8	4874.00	45.1 AV	54.0	-8.9	1.31 V	177	44.4	0.7
9	7311.00	46.7 PK	74.0	-27.3	1.51 V	208	40.0	6.7
10	7311.00	40.3 AV	54.0	-13.7	1.51 V	208	33.6	6.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	106.2 PK			1.41 H	181	109.3	-3.1
2	*2452.00	96.5 AV			1.41 H	181	99.6	-3.1
3	2483.50	65.8 PK	74.0	-8.2	1.41 H	181	68.9	-3.1
4	2483.50	50.1 AV	54.0	-3.9	1.41 H	181	53.2	-3.1
5	4904.00	43.5 PK	74.0	-30.5	1.14 H	257	42.8	0.7
6	4904.00	41.8 AV	54.0	-12.2	1.14 H	257	41.1	0.7
7	7356.00	44.2 PK	74.0	-29.8	1.44 H	174	37.3	6.9
8	7356.00	38.2 AV	54.0	-15.8	1.44 H	174	31.3	6.9
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	111.2 PK			2.09 V	172	114.3	-3.1
2	*2452.00	101.5 AV			2.09 V	172	104.6	-3.1
3	2483.50	67.2 PK	74.0	-6.8	2.09 V	172	70.3	-3.1
4	2483.50	53.8 AV	54.0	-0.2	2.09 V	172	56.9	-3.1
5	4904.00	42.8 PK	74.0	-31.2	1.38 V	168	42.1	0.7
6	4904.00	41.3 AV	54.0	-12.7	1.38 V	168	40.6	0.7
7	7356.00	44.0 PK	74.0	-30.0	1.48 V	170	37.1	6.9
8	7356.00	38.0 AV	54.0	-16.0	1.48 V	170	31.1	6.9

REMARKS:

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

Below 1GHz Data:

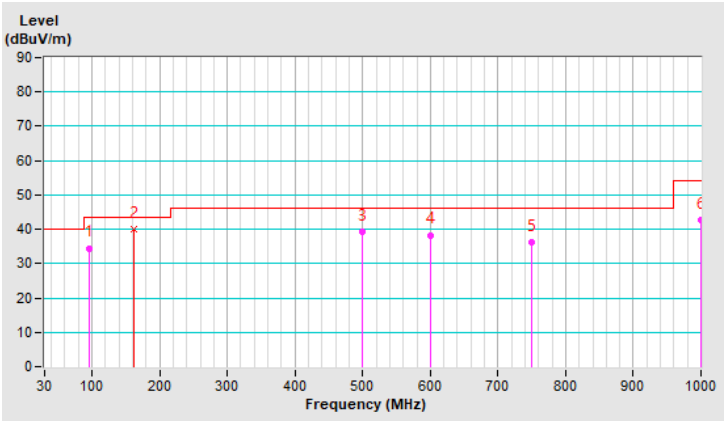
802.11n (HT20)

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	96.45	34.5 QP	43.5	-9.0	2.00 H	237	52.5	-18.0
2	162.51	40.1 QP	43.5	-3.4	1.55 H	146	53.1	-13.0
3	499.99	39.2 QP	46.0	-6.8	2.00 H	138	46.9	-7.7
4	600.00	38.3 QP	46.0	-7.7	1.00 H	309	43.6	-5.3
5	750.02	36.0 QP	46.0	-10.0	2.00 H	360	38.8	-2.8
6	1000.00	42.7 QP	54.0	-11.3	1.00 H	220	43.1	-0.4

REMARKS:

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

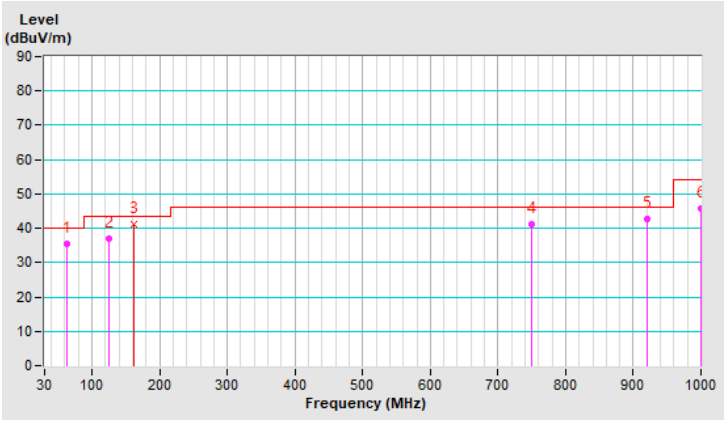


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	62.79	35.5 QP	40.0	-4.5	1.00 V	47	49.5	-14.0
2	124.97	36.9 QP	43.5	-6.6	1.00 V	239	51.7	-14.8
3	162.51	41.1 QP	43.5	-2.4	1.00 V	165	54.1	-13.0
4	750.02	41.3 QP	46.0	-4.7	2.00 V	360	44.1	-2.8
5	920.02	42.6 QP	46.0	-3.4	1.00 V	198	43.5	-0.9
6	1000.00	45.9 QP	54.0	-8.1	1.00 V	177	46.3	-0.4

REMARKS:

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



4.1.8 Test Results (Mode 2)

Below 1GHz Data:

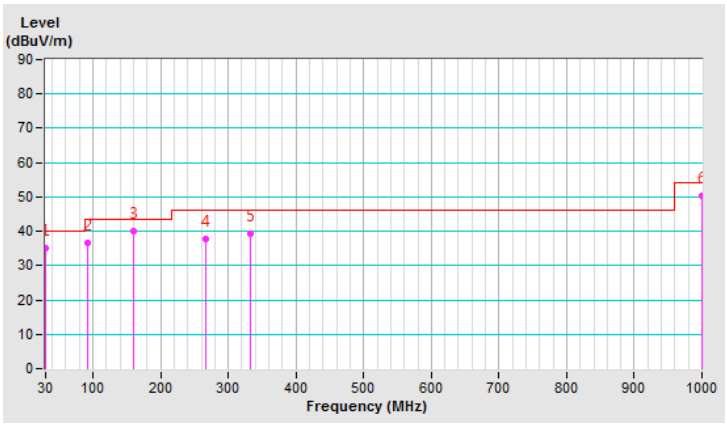
802.11n (HT20)

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	30.63	34.9 QP	40.0	-5.1	2.00 H	221	49.6	-14.7
2	92.30	36.5 QP	43.5	-7.0	2.00 H	296	54.8	-18.3
3	160.00	40.1 QP	43.5	-3.4	2.00 H	120	53.1	-13.0
4	266.68	37.6 QP	46.0	-8.4	1.00 H	12	51.1	-13.5
5	333.00	39.3 QP	46.0	-6.7	1.00 H	126	50.7	-11.4
6	1000.00	50.3 QP	54.0	-3.7	1.00 H	153	50.7	-0.4

REMARKS:

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

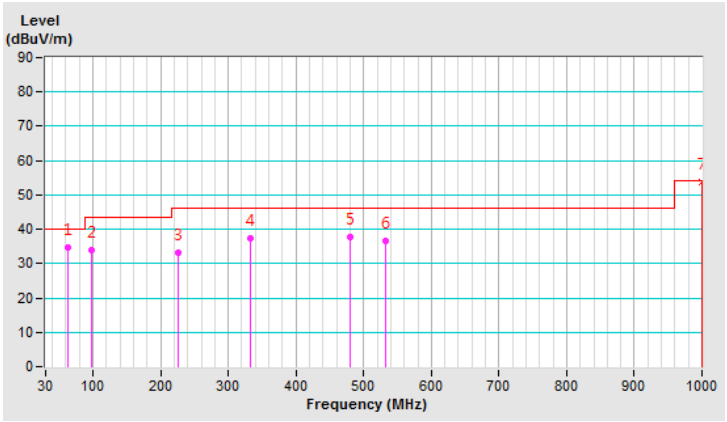


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	62.86	34.8 QP	40.0	-5.2	1.50 V	187	48.8	-14.0
2	97.17	33.8 QP	43.5	-9.7	1.00 V	126	51.8	-18.0
3	225.02	33.3 QP	46.0	-12.7	1.00 V	82	48.7	-15.4
4	333.32	37.5 QP	46.0	-8.5	2.00 V	290	48.9	-11.4
5	479.96	37.7 QP	46.0	-8.3	1.00 V	108	45.7	-8.0
6	533.33	36.5 QP	46.0	-9.5	1.00 V	183	43.6	-7.1
7	999.98	53.8 QP	54.0	-0.2	1.38 V	168	54.2	-0.4

REMARKS:

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



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. 28, 2018	Sep. 27, 2019
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: May 02 to 15 , 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.

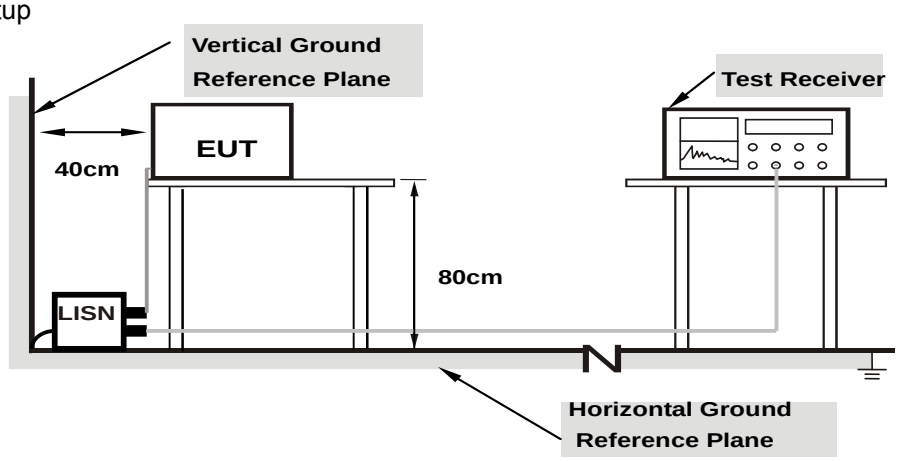
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

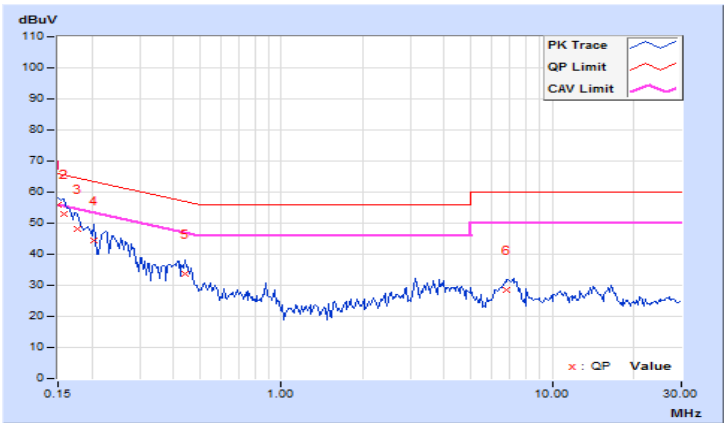
4.2.7 Test Results (Mode 1)

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.03	45.93	27.35	55.96	37.38	66.00	56.00	-10.04	-18.62
2	0.15781	10.03	43.02	23.08	53.05	33.11	65.58	55.58	-12.53	-22.47
3	0.17734	10.04	37.95	16.99	47.99	27.03	64.61	54.61	-16.62	-27.58
4	0.20469	10.05	34.29	14.62	44.34	24.67	63.42	53.42	-19.08	-28.75
5	0.43906	10.08	23.58	14.73	33.66	24.81	57.08	47.08	-23.42	-22.27
6	6.82422	10.50	18.01	12.64	28.51	23.14	60.00	50.00	-31.49	-26.86

Remarks:

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

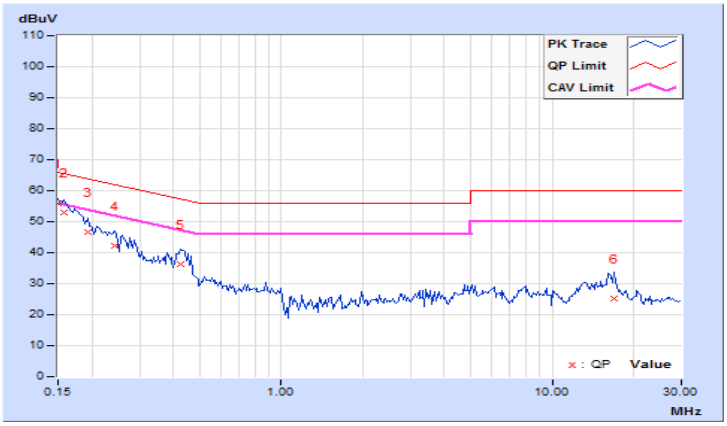


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15000**	**9.94**	**46.03**	**28.16**	**55.97**	**38.10**	**66.00**	**56.00**	**-10.03**	**-17.90**
2	0.15781	9.94	42.93	23.71	52.87	33.65	65.58	55.58	-12.71	-21.93
3	0.19297	9.95	36.83	19.39	46.78	29.34	63.91	53.91	-17.13	-24.57
4	0.24375	9.96	32.09	14.49	42.05	24.45	61.97	51.97	-19.92	-27.52
5	0.42344	9.98	26.48	15.33	36.46	25.31	57.38	47.38	-20.92	-22.07
6	16.94531	10.95	14.27	7.39	25.22	18.34	60.00	50.00	-34.78	-31.66

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



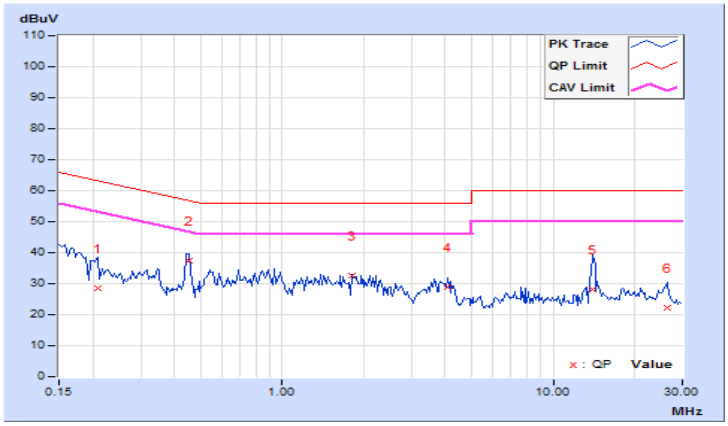
4.2.8 Test Results (Mode 2)

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.20859	10.04	18.48	10.67	28.52	20.71	63.26	53.26	-34.74	-32.55
2	0.45078	10.07	27.31	20.91	37.38	30.98	56.86	46.86	-19.48	-15.88
3	1.81641	10.15	22.35	10.42	32.50	20.57	56.00	46.00	-23.50	-25.43
4	4.07031	10.25	18.58	5.96	28.83	16.21	56.00	46.00	-27.17	-29.79
5	14.04688	10.75	17.29	7.94	28.04	18.69	60.00	50.00	-31.96	-31.31
6	26.31250	11.17	10.97	4.43	22.14	15.60	60.00	50.00	-37.86	-34.40

Remarks:

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

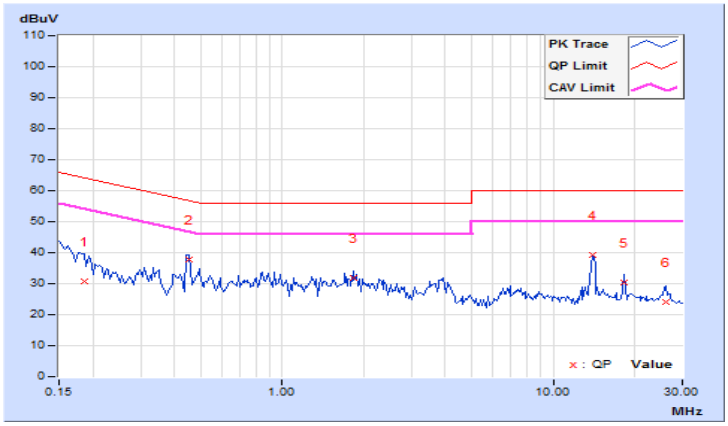


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18516	9.94	20.85	9.87	30.79	19.81	64.25	54.25	-33.46	-34.44
2	0.45078	9.96	27.84	22.92	37.80	32.88	56.86	46.86	-19.06	-13.98
3	1.82422	10.03	21.98	12.64	32.01	22.67	56.00	46.00	-23.99	-23.33
4	14.03516	10.58	28.53	28.06	39.11	38.64	60.00	50.00	-20.89	-11.36
5	18.31641	10.79	19.57	17.25	30.36	28.04	60.00	50.00	-29.64	-21.96
6	26.06250	10.93	13.22	7.29	24.15	18.22	60.00	50.00	-35.85	-31.78

Remarks:

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

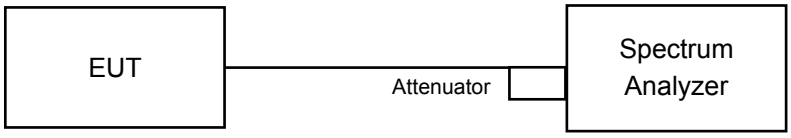


4.3 6dB Bandwidth Measurement

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	9.59	10.07	0.5	PASS
6	2437	9.64	11.11	0.5	PASS
11	2462	10.12	7.59	0.5	PASS

802.11g

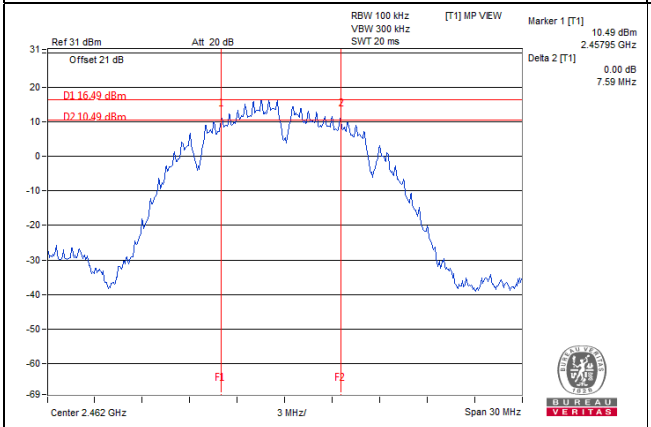
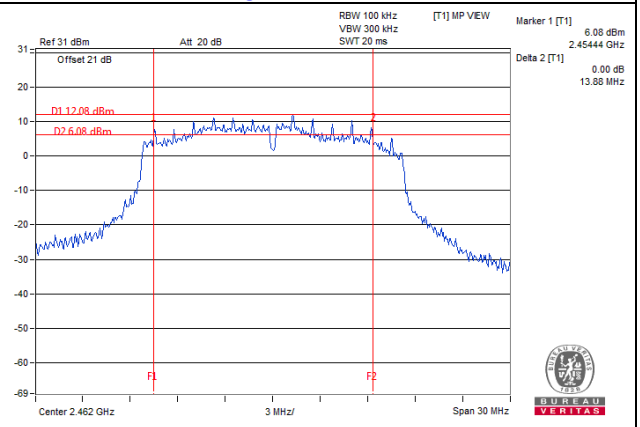
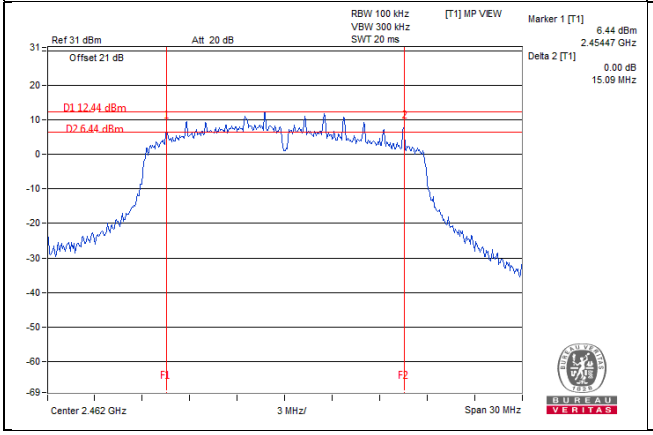
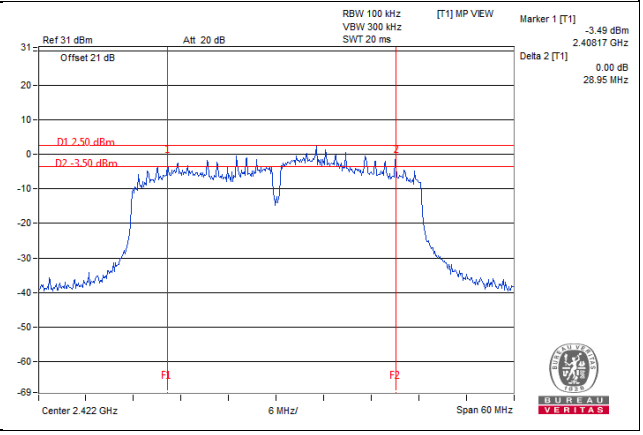
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.54	15.76	0.5	PASS
6	2437	15.77	15.74	0.5	PASS
11	2462	16.02	13.88	0.5	PASS

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.58	16.40	0.5	Pass
6	2437	16.37	16.41	0.5	Pass
11	2462	16.58	15.09	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.90	28.95	0.5	Pass
6	2437	35.20	35.21	0.5	Pass
9	2452	35.29	33.89	0.5	Pass

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

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

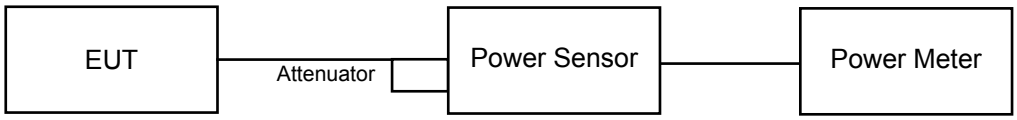
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

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 AVERAGE POWER

802.11b

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	20.75	21.62	264.061	24.22
6	2437	27.15	23.13	724.389	28.60
11	2462	22.71	24.01	438.406	26.42

802.11g

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	18.34	19.50	157.359	21.97
6	2437	28.38	24.83	992.741	29.97
11	2462	21.66	21.38	283.959	24.53

802.11n (HT20)

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	15.29	16.71	80.687	19.07
6	2437	28.34	24.99	997.839	29.99
11	2462	20.76	20.81	239.628	23.80

802.11n (HT40)

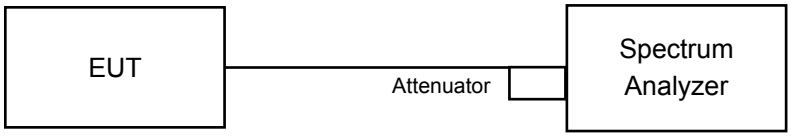
Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	14.74	13.09	50.155	17.00
6	2437	19.37	16.73	133.595	21.26
9	2452	17.21	14.31	79.579	19.01

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) 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	Duty Factor (dB)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-11.69	3.01	0.04	-8.68	8	Pass
	6	2437	-4.84	3.01	0.04	-1.83	8	Pass
	11	2462	-9.28	3.01	0.04	-6.27	8	Pass
1	1	2412	-9.79	3.01	0.04	-6.78	8	Pass
	6	2437	-7.91	3.01	0.04	-4.90	8	Pass
	11	2462	-6.14	3.01	0.04	-3.13	8	Pass

Note: 1. Directional gain = 2.44dBi + 10log(2) = 5.45dBi < 6dBi , so the power density limit shall not be reduced.

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	-13.61	3.01	0.18	-10.42	8	Pass
	6	2437	-5.40	3.01	0.18	-2.21	8	Pass
	11	2462	-11.08	3.01	0.18	-7.89	8	Pass
1	1	2412	-12.00	3.01	0.18	-8.81	8	Pass
	6	2437	-6.88	3.01	0.18	-3.69	8	Pass
	11	2462	-10.68	3.01	0.18	-7.49	8	Pass

Note: 1. Directional gain = 2.44dBi + 10log(2) = 5.45dBi < 6dBi , so the power density limit shall not be reduced.

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

802.11n (HT20)

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	-17.61	3.01	0.19	-14.41	8	Pass
	6	2437	-4.90	3.01	0.19	-1.70	8	Pass
	11	2462	-10.08	3.01	0.19	-6.88	8	Pass
1	1	2412	-15.48	3.01	0.19	-12.28	8	Pass
	6	2437	-7.55	3.01	0.19	-4.35	8	Pass
	11	2462	-10.48	3.01	0.19	-7.28	8	Pass

Note: 1. Directional gain = 2.44dBi + 10log(2) = 5.45dBi < 6dBi , so the power density limit shall not be reduced.

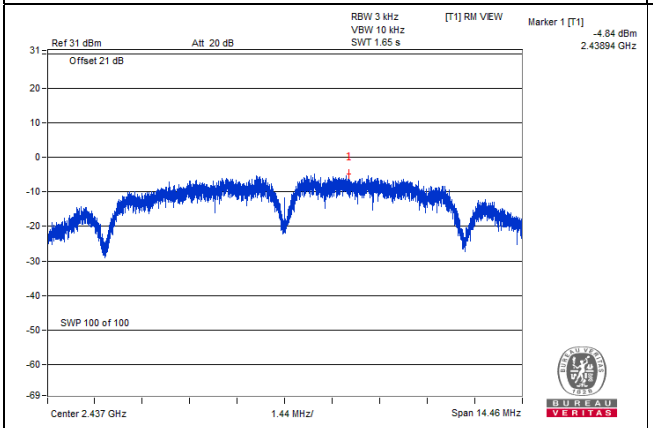
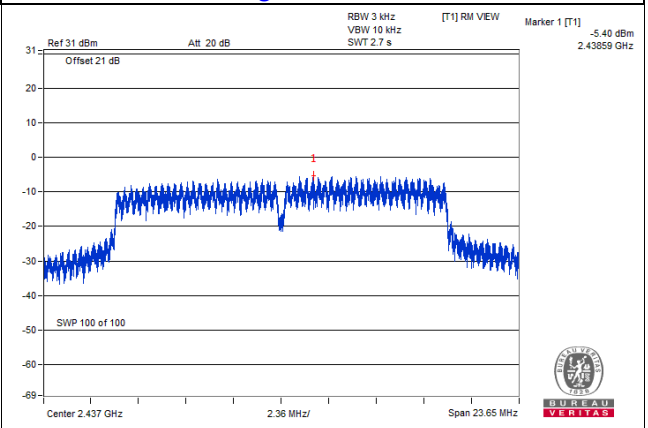
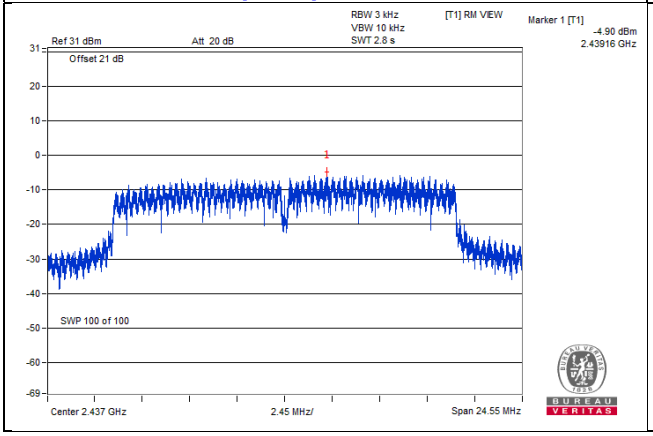
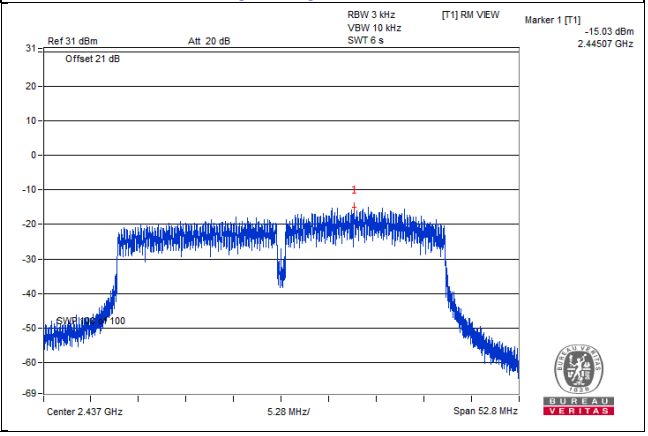
2. Refer to section 3.3 for duty cycle spectrum plot.

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	-19.86	3.01	0.37	-16.48	8	Pass
	6	2437	-15.03	3.01	0.37	-11.65	8	Pass
	9	2452	-16.52	3.01	0.37	-13.14	8	Pass
1	3	2422	-19.61	3.01	0.37	-16.23	8	Pass
	6	2437	-16.29	3.01	0.37	-12.91	8	Pass
	9	2452	-17.41	3.01	0.37	-14.03	8	Pass

Note: 1. Directional gain = 2.44dBi + 10log(2) = 5.45dBi < 6dBi , so the power density limit shall not be reduced.

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

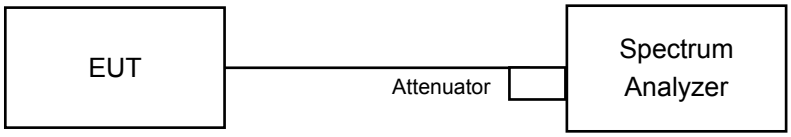
Spectrum Plot of Worst Value	
802.11b / Chain 0 : CH6	**802.11g / Chain 0 : CH6**
	
802.11n (HT20) / Chain 0 : CH6	**802.11n (HT40) / Chain 0 : CH6**
	

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

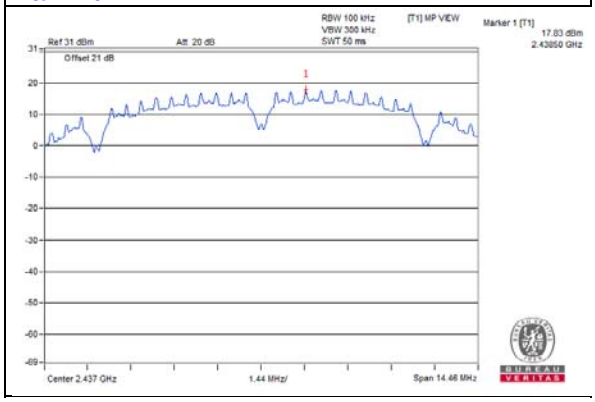
Same as Item 4.3.6

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.

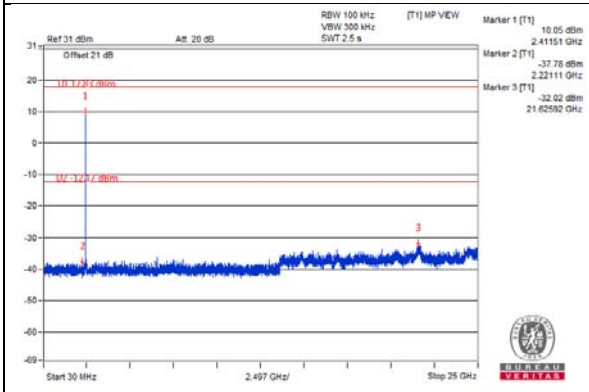
802.11b

Maximum REF

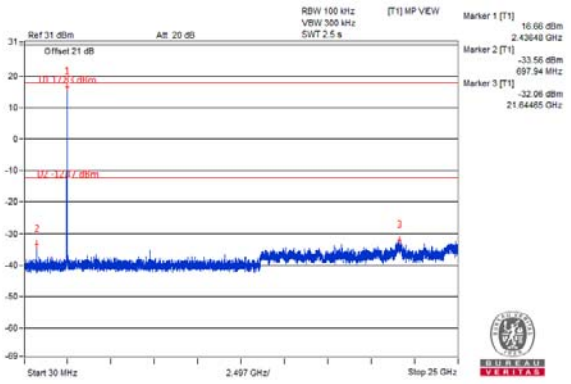


Chain 0

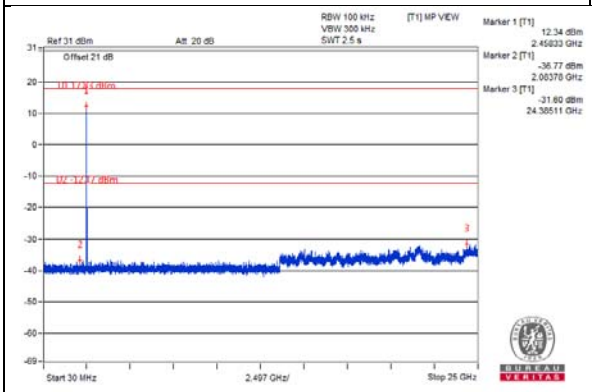
CH 1



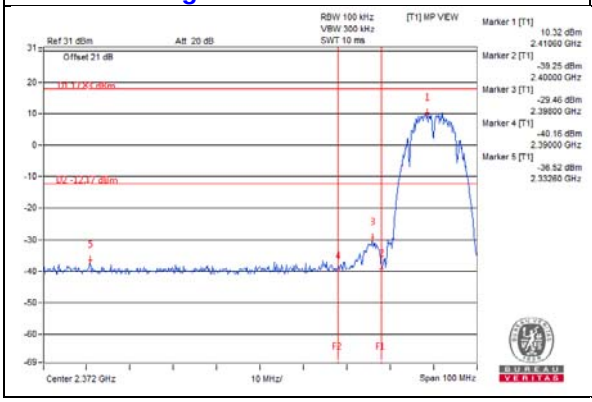
CH 6



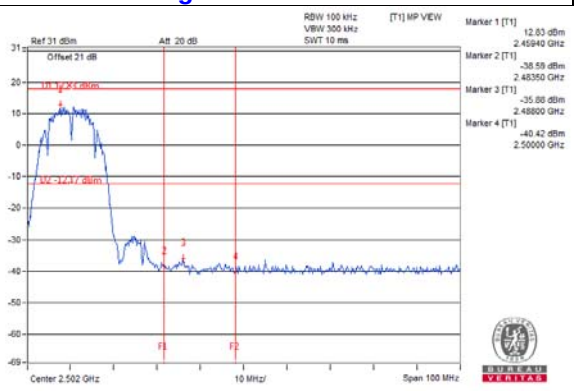
CH 11



CH 1 Band edge

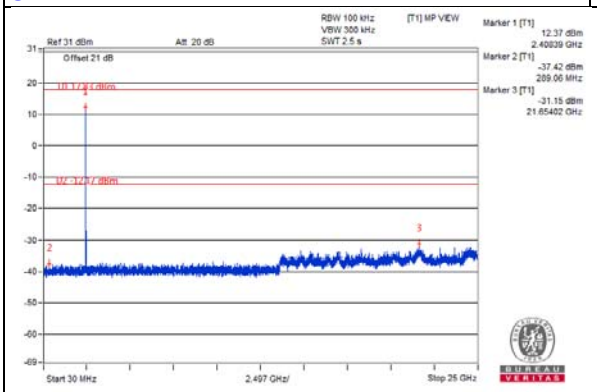


CH 11 Band edge

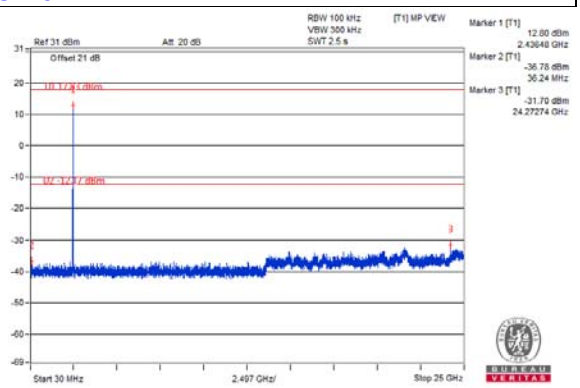


Chain 1

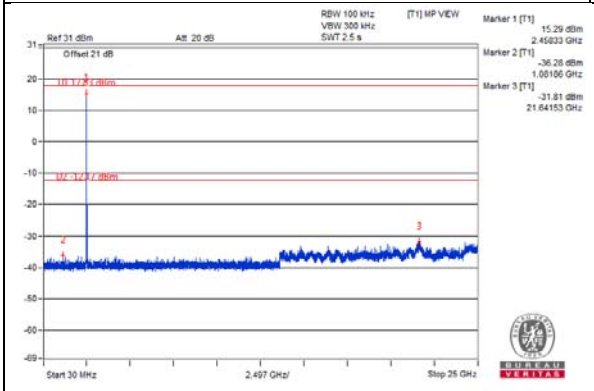
CH 1



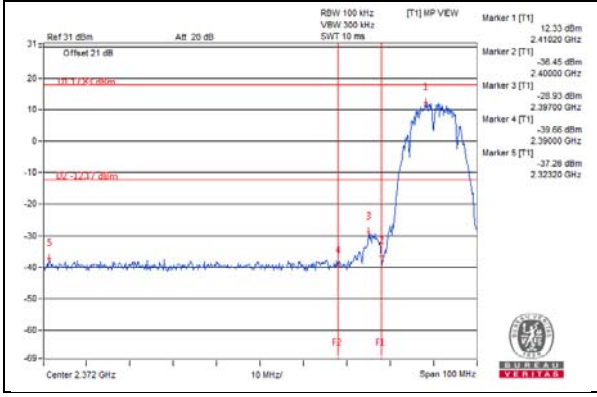
CH 6



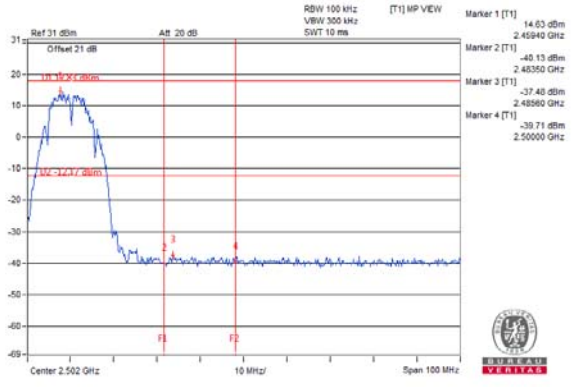
CH 11



CH 1 Band edge

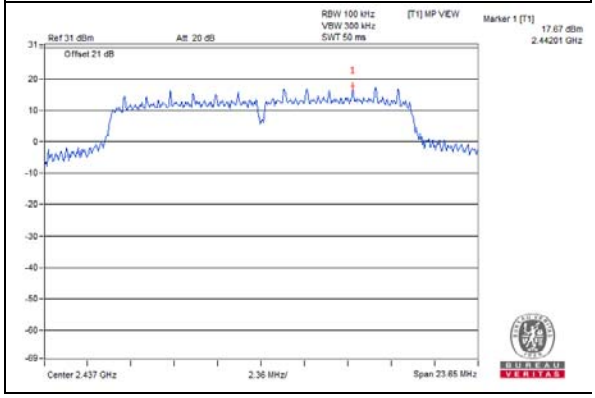


CH 11 Band edge



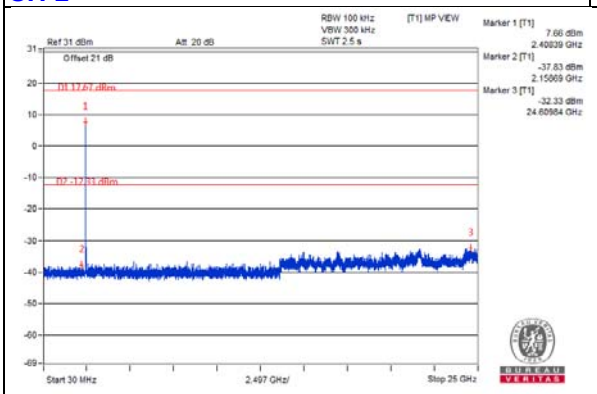
802.11g

Maximum REF

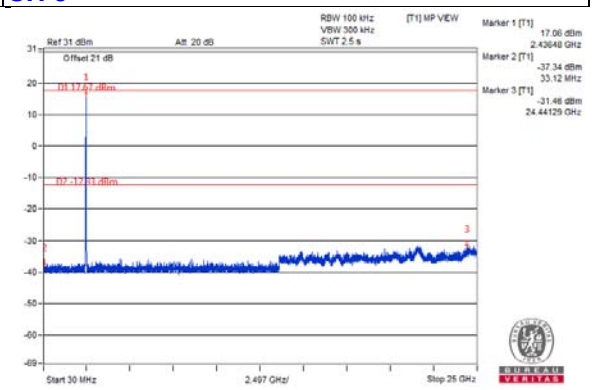


Chain 0

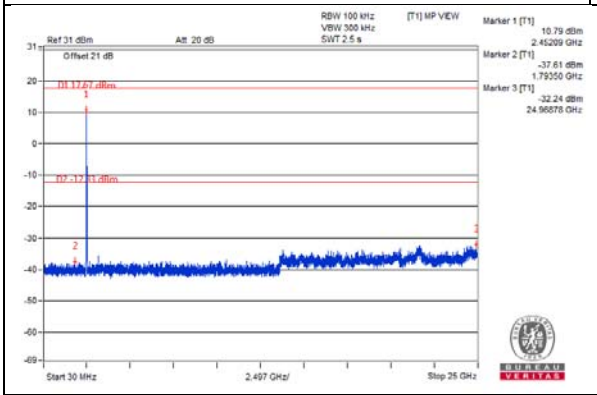
CH 1



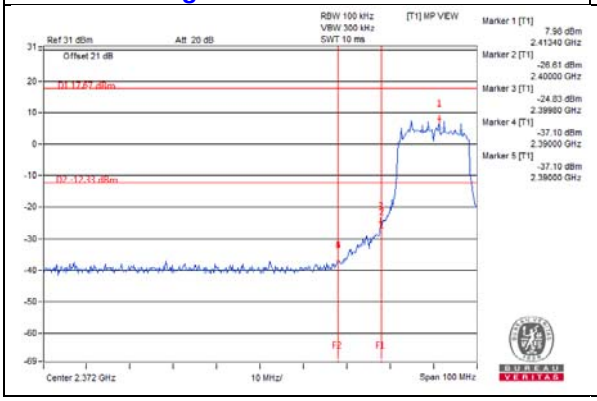
CH 6



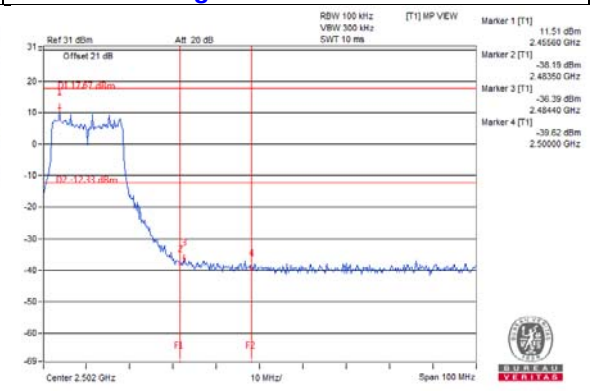
CH 11



CH 1 Band edge

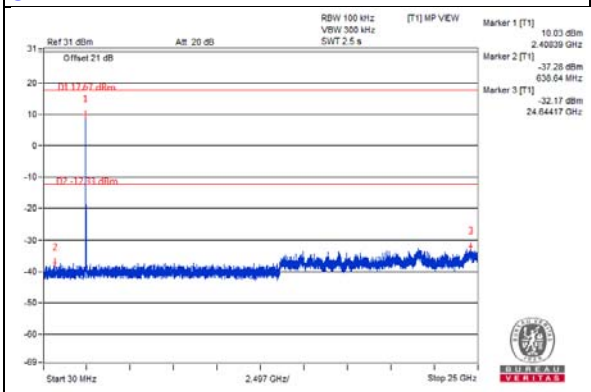


CH 11 Band edge

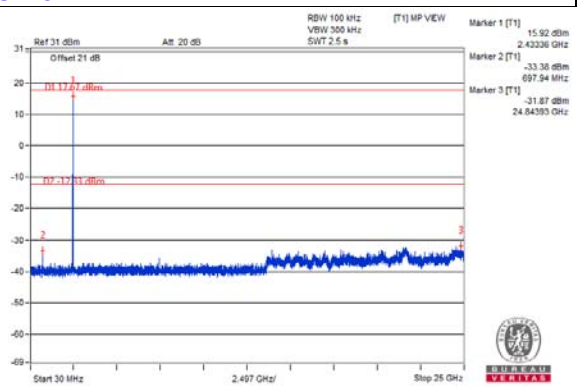


Chain 1

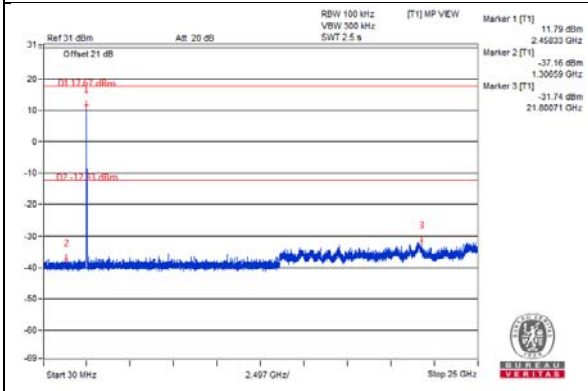
CH 1



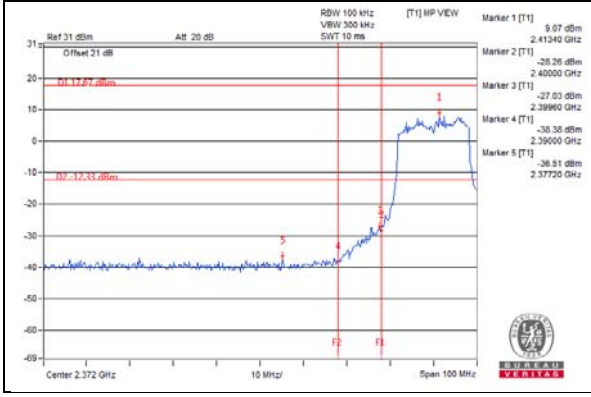
CH 6



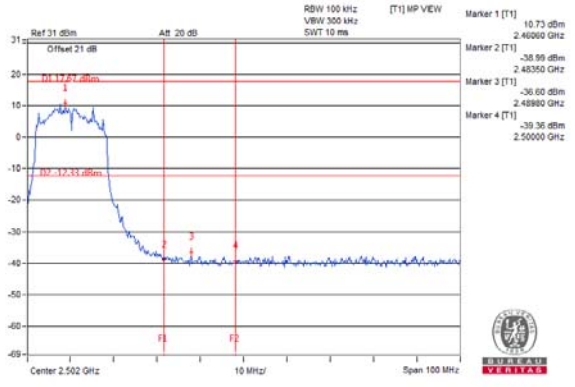
CH 11



CH 1 Band edge

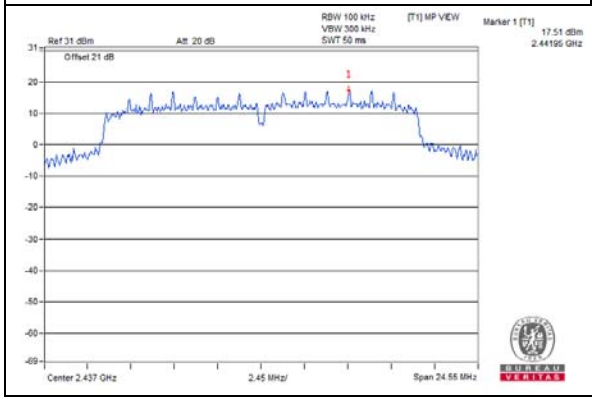


CH 11 Band edge



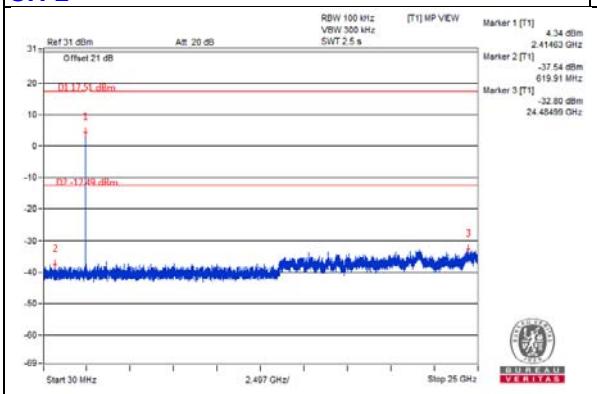
802.11n (HT20)

Maximum REF

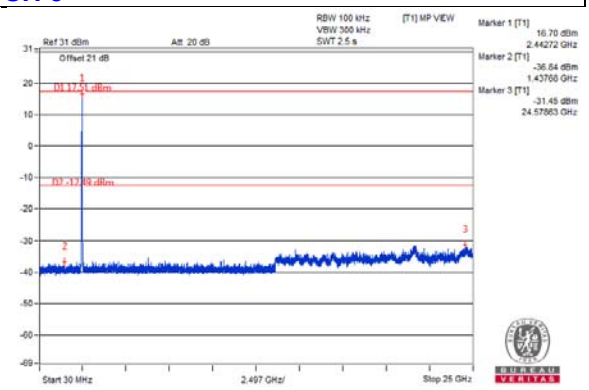


Chain 0

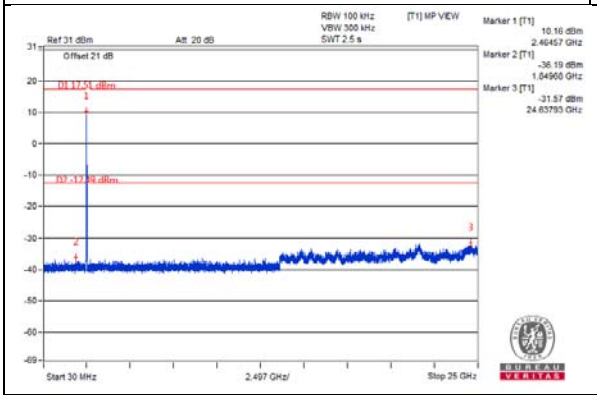
CH 1



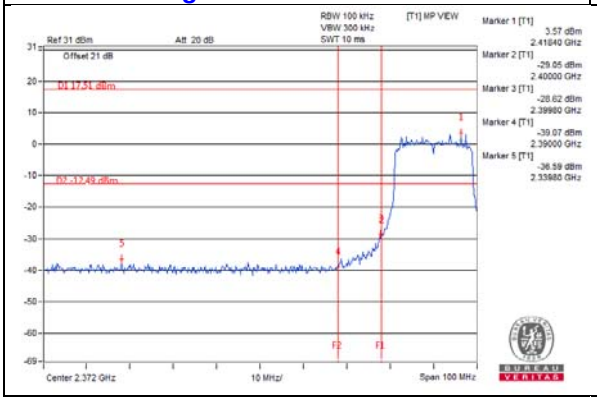
CH 6



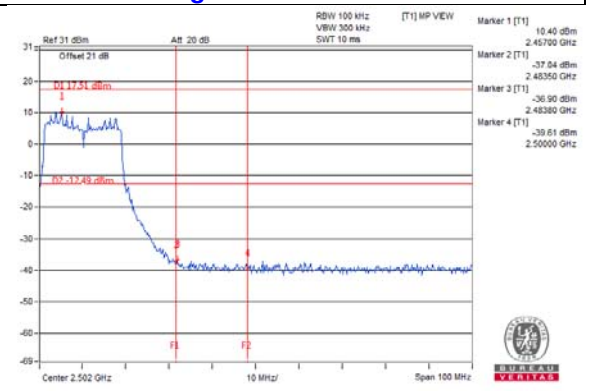
CH 11



CH 1 Band edge

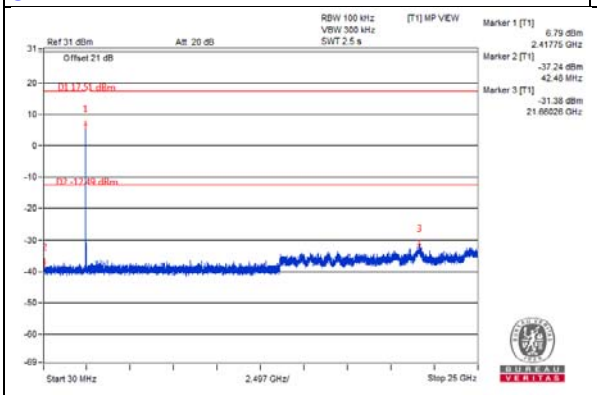


CH 11 Band edge

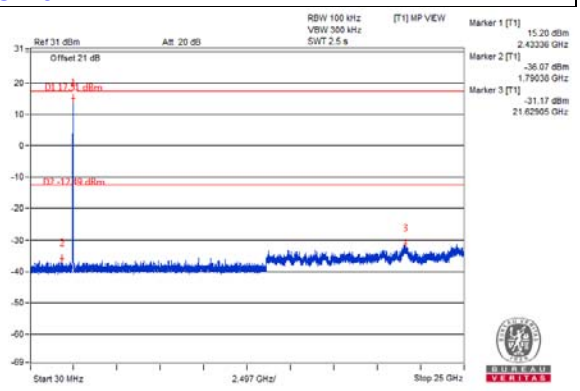


Chain 1

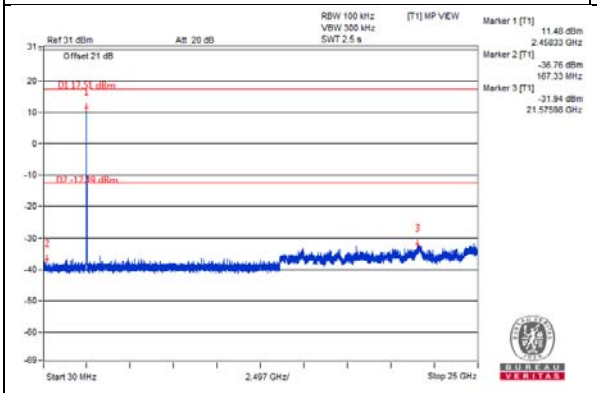
CH 1



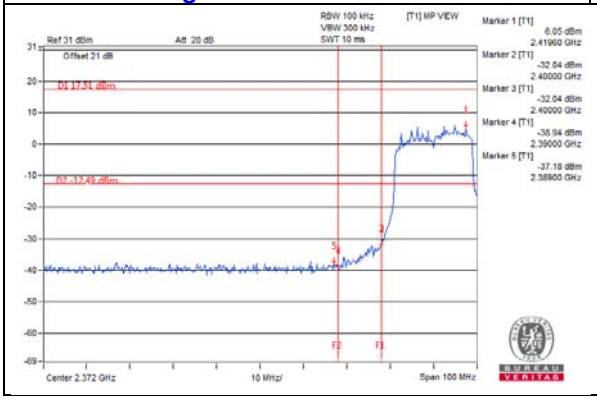
CH 6



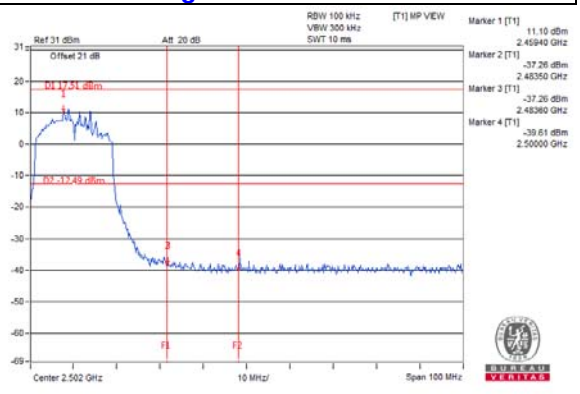
CH 11



CH 1 Band edge

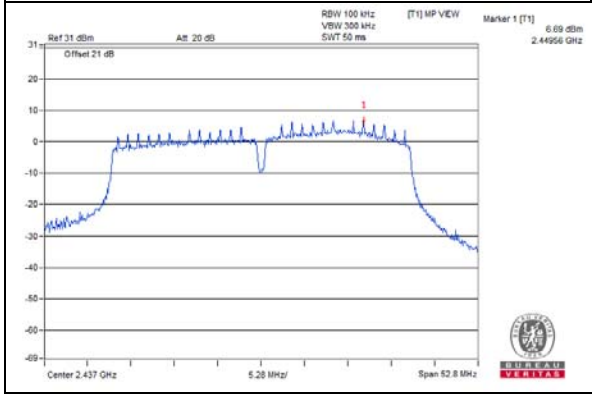


CH 11 Band edge



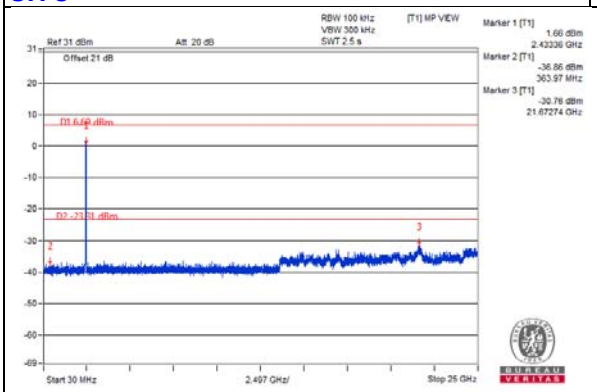
802.11n (HT40)

Maximum REF

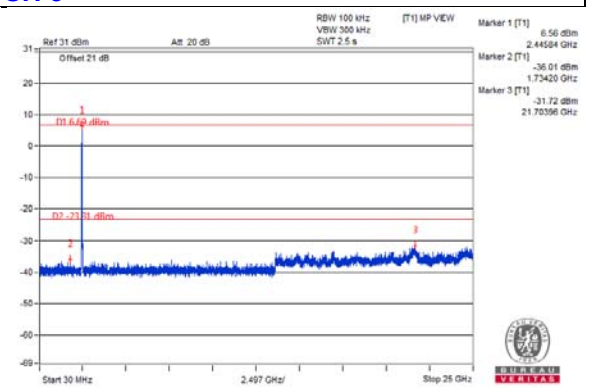


Chain 0

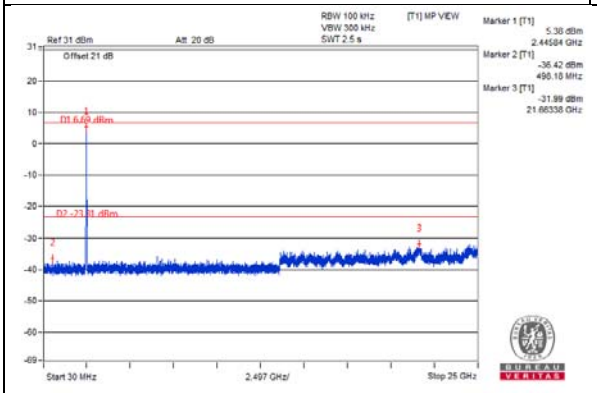
CH 3



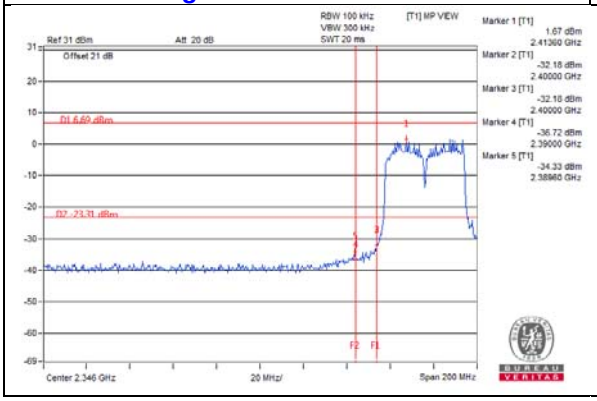
CH 6



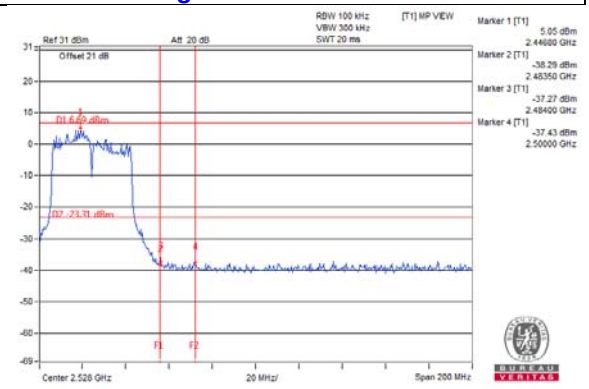
CH 9



CH 3 Band edge

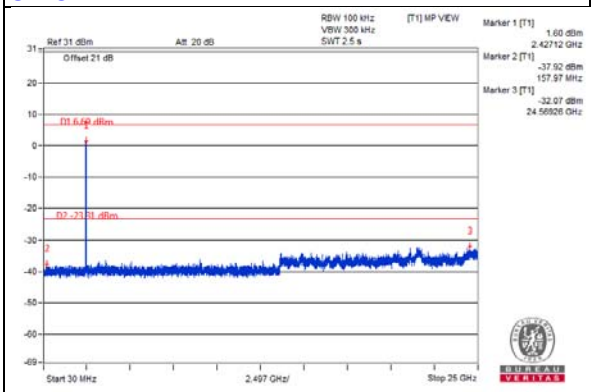


CH 9 Band edge

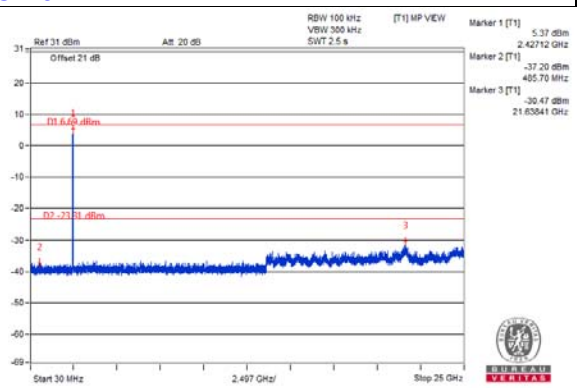


Chain 1

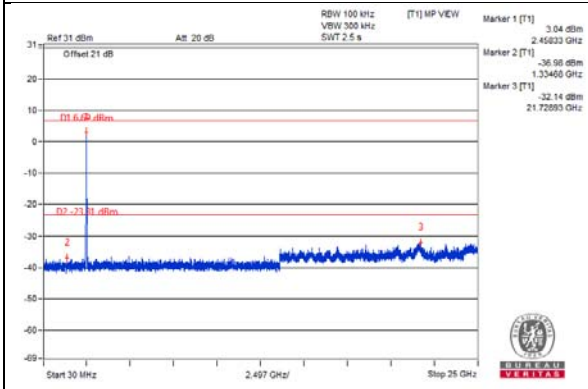
CH 3



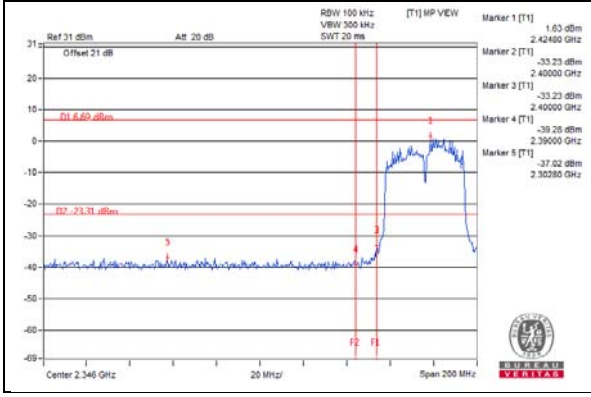
CH 6



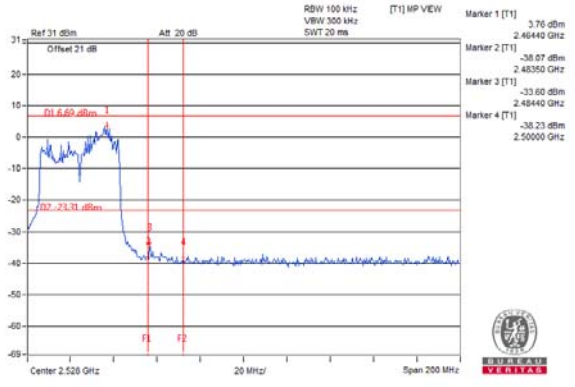
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information 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 ---