



Shenzhen Global Test Service Co.,Ltd.

1F, Building No. 13A, Zhonghaixin Science and Technology City, No.12,6 Road, Ganli Industrial Park, Buji Street, Longgang District, Shenzhen, Guangdong

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No......: **GTS20190429006-1-5**

FCC ID.....: **2ATMSSP3SP4SP5**

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Date of issue.....: Jun. 13, 2019

Representative Laboratory Name .: **Shenzhen Global Test Service Co.,Ltd.**

Address.....: 1F, Building No. 13A, Zhonghaixin Science and Technology City,
No.12,6 Road, Ganli Industrial Park, Buji Street, Longgang District,
Shenzhen, Guangdong

Applicant's name.....: **Chengdu Intelligent Star Technology Co.,Ltd**

Address: No.7, Zijin West Road, Hi-tech Zone, Chengdu, Sichuan, China

Test specification

Standard: **FCC Part 15.247: Operation within the bands 902-928 MHz,
2400-2483.5 MHz and 5725-5850 MHz**

TRF Originator.....: Shenzhen Global Test Service Co.,Ltd.

Master TRF.....: Dated 2014-12

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Test item description: LEVIATHAN/ Poseidon

Trade Mark: N/A

Manufacturer: **Chengdu Intelligent Star Technology Co.,Ltd**

Model/Type reference.....: S-P3

Listed Models: S-P4、 S-P5

Operation Frequency.....: From 2412MHz to 2472MHz

Rating: DC 24/36V from adapter

Result.....: **PASS**

TEST REPORT

Test Report No. : GTS20190429006-1-5	Jun. 13, 2019 Date of issue
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Equipment under Test : LEVIATHAN/ Poseidon

Model /Type : S-P3

Listed Models : S-P4、 S-P5

Applicant : **Chengdu Intelligent Star Technology Co.,Ltd**

Address : No.7, Zijin West Road, Hi-tech Zone, Chengdu, Sichuan, China

Manufacturer : **Chengdu Intelligent Star Technology Co.,Ltd**

Address : No.7, Zijin West Road, Hi-tech Zone, Chengdu, Sichuan, China

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices

[KDB558074 D01 v05r02](#): Guidance for Compliance Measurements on Digital Transmission Systems (DTS) ,Frequency Hopping Spread Spectrum System(HFSS), and Hybrid System Devices Operating Under §15.247 of The FCC rules.

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	May. 10, 2019
Testing commenced on	:	May. 29, 2019
Testing concluded on	:	Jun. 13, 2019

2.2. Product Description

Name of EUT	LEVIATHAN/ Poseidon
Trade Mark:	N/A
Model Number	S-P3
Listed Models	S-P4、 S-P5
FCC ID	2ATMSSP3SP4SP5
Power Supply	DC 24/36V from adapter
Adapter information:	1.Model: GST60A24 Input: 100-240V~50/60Hz 1.4A Max Output:DC 24.0V 2.5A 2.Model:GST40A24 Input: 100-240V~50/60Hz 1.0A Max Output:DC 24.0V 1.67A 3.Model:HLG-150H-36A Input: 100-240V~50/60Hz 1.7A Max 277V 0.7AMax Output:DC 36.0V 4.2A 4.Model:HLG-100H-36A Input: 100-240V~50/60Hz 1.2A Max 277V 0.5AMax Output:DC 36.0V 2.65A
WLAN	Supported 802.11b/802.11g/802.11n HT20/802.11n HT40
Modulation Type	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)
Operation frequency	IEEE 802.11b:2412-2472MHz IEEE 802.11g:2412-2472MHz IEEE 802.11n HT20:2412-2472MHz IEEE 802.11n HT40:2422-2462MHz
Antenna Type	Internal Antenna
Antenna gain	3.0dBi
Remark: The products are identical in interior structure, electrical circuits and components, just model names and antenna numbers are different.	

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	☐ 230V / 50 Hz	☐ 120V / 60Hz
		☐ 12 V DC	☐ 24 V DC
		☒ Other (specified in blank below)	

DC 24/36V From Adapter AC 120V/60Hz

2.4. Short description of the Equipment under Test (EUT)

This is a LEVIATHAN/ Poseidon.

For more details, refer to the user's manual of the EUT.

2.5. EUT operation mode

The application provider specific test software to control sample in continuous TX and RX (Duty Cycle >98%) for testing meet KDB558074 test requirement.

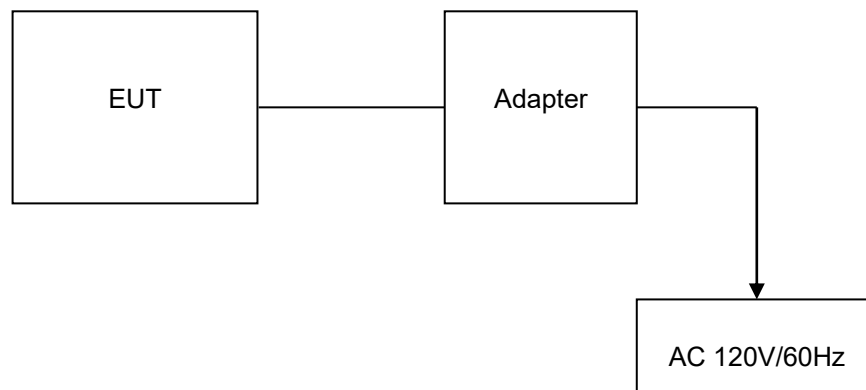
NOTE:

Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used.

IEEE 802.11b/g/n: Thirteen channels are provided to the EUT.

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

2.6. Block Diagram of Test Setup



2.7. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2ATMSSP3SP4SP5** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.8. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.

1F, Building No. 13A, Zhonghaixin Science and Technology City, No.12,6 Road, Ganli Industrial Park, Buji Street, Longgang District, Shenzhen, Guangdong

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS (No. CNAS L8169)

Shenzhen Global Test Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA (Certificate No. 4758.01)

Shenzhen Global Test Service Co., Ltd. has been assessed by the American Association for Laboratory Accreditation (A2LA). Certificate No. 4758.01.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Test Description

Test Specification clause	Test case	Test Mode	Test Channel	Recorded In Report		Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	802.11b	☒ Lowest ☒ Middle ☒ Highest	802.11b	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(e)	Power spectral density	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(a)(2)	Spectrum bandwidth – 6 dB bandwidth	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(b)(1)	Maximum output power	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	☒ ☒ ☒	☐	☐	☐	complies
§15.247(d)	Band edge compliance conducted	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.205	Band edge compliance radiated	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Highest	☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions conducted	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions radiated	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.109	RX spurious emissions radiated	-/-	-/-	-/-	-/-	☐	☐	☒	☐	complies
§15.209(a)	TX spurious Emissions radiated < 30 MHz	802.11b	-/-	802.11b	-/-	☒	☐	☐	☐	complies
§15.107(a) §15.207	Conducted Emissions < 30 MHz	802.11b	-/-	802.11b	-/-	☒	☐	☐	☐	complies

Remark:

1. The measurement uncertainty is not included in the test result.
2. NA = Not Applicable; NP = Not Performed

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
Maximum Peak Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission Radiated Emission 9kHz~1GHz& Radiated Emission 1GHz~10 th Harmonic	11b/DSSS	1 Mbps	1/7/13
	11g/OFDM	6 Mbps	1/7/13
	11n(20MHz)/OFDM	6.5Mbps	1/7/13
	11n(40MHz)/OFDM	13.5Mbps	3/7/11
Band Edge	11b/DSSS	1 Mbps	1/13
	11g/OFDM	6 Mbps	1/13
	11n(20MHz)/OFDM	6.5Mbps	1/13
	11n(40MHz)/OFDM	13.5Mbps	3/11

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Global Test Service Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6. Equipments Used during the Test

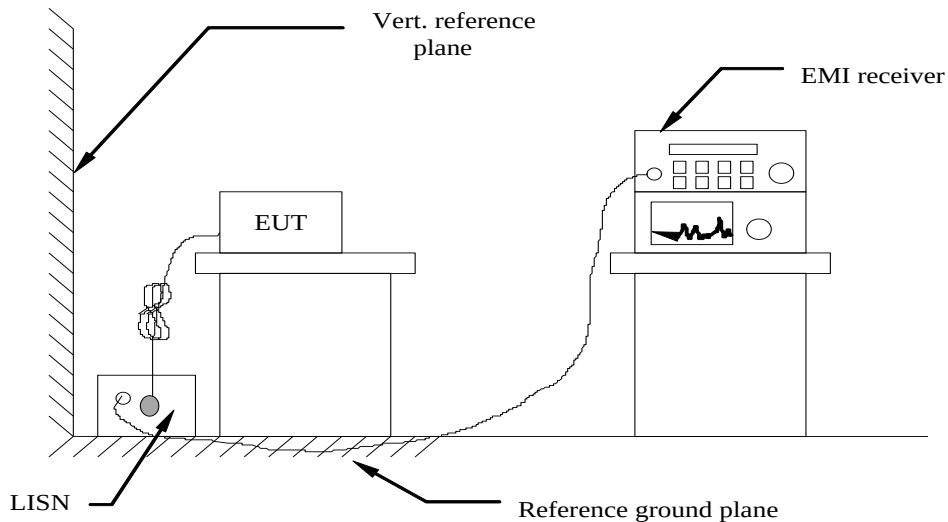
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.08	2018/09/28	2019/09/27
LISN	R&S	ESH2-Z5	893606/008	2018/09/27	2019/09/26
By-log Antenna	SCHWARZBECK	VULB9163	000976	2018/09/29	2019/09/28
EMI Test Receiver	R&S	ESCI	101102	2018/09/26	2019/09/25
Spectrum Analyzer	Agilent	N9020A	MY48010425	2018/09/17	2019/09/16
Spectrum Analyzer	R&S	FSV40-N	101800	2018/09/17	2019/09/16
Controller	EM Electronics	Controller EM 1000	N/A	2018/09/21	2019/09/20
Double Ridged Horn Antenna (1~18GHz)	SCHWARZBECK	BBHA 9120D	01622	2018/09/19	2019/09/18
Double Ridged Horn Antenna	Rohde&Schwarz	HF907	100265	2018/09/19	2019/09/18
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2018/09/19	2019/09/18
Horn Antenna (18GHz~40GHz)	ETS	3116	00086467	2018/12/29	2019/12/28
Amplifier (26.5GHz~40GHz)	EMCI	EMC2654045	980028	2018/09/18	2019/09/17
Amplifier (0.1GHz~26.5GHz)	EMCI	EMC012645SE	980355	2018/09/19	2019/09/18
Temperature/Humidity Meter	Gangxing	CTH-608	02	2018/09/20	2019/09/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2018/09/20	2019/09/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2018/09/20	2019/09/19
Data acquisition card	Agilent	U2531A	TW53323507	2018/09/20	2019/09/19
Power Sensor	Agilent	U2021XA	MY5365004	2018/09/20	2019/09/19
RF Cable	HUBER+SUHNER	RG214	N/A	2018/09/20	2019/09/19
Broadband Antenna	SCHWARZBECK	VULB 9163	00976	2018//9/29	2018//9/28
Conducted Emission	ES-K1	V1.71	N/A	N/A	N/A
Radiated Emission	JS32-RE	V2.5.0.9	N/A	N/A	N/A

Note: The Cal.Interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
- 4 The EUT received DC 12V power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST RESULTS

Remark: We measured Conducted Emission at 802.11b/802.11g/802.11n HT20/802.11n HT40 mode in AC 120V/60Hz , the worst case was recorded .

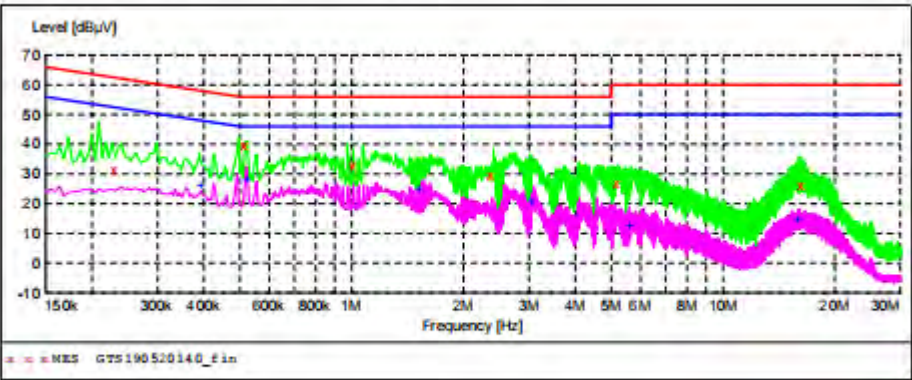
Power supply:

Adapter 1

Polarization

L

SCAN TABLE: "Voltage (9K-30M) FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTS190520140_fin"

5/20/2019 6:22PM								
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	FE	
0.231000	31.50	10.0	62	30.9	QP	L1	GND	
0.519000	39.40	9.8	56	16.6	QP	L1	GND	
1.009500	32.80	9.6	56	23.2	QP	L1	GND	
2.377500	29.70	9.5	56	26.3	QP	L1	GND	
5.194500	26.80	9.3	60	33.2	QP	L1	GND	
16.183500	25.90	7.9	60	34.1	QP	L1	GND	

MEASUREMENT RESULT: "GTS190520140_fin2"

5/20/2019 6:22PM								
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	FE	
0.393000	25.90	9.8	48	22.1	AV	L1	GND	
0.523500	27.90	9.8	46	18.1	AV	L1	GND	
1.527000	25.10	9.6	46	20.9	AV	L1	GND	
3.048000	20.40	9.4	46	25.6	AV	L1	GND	
5.581500	12.90	9.2	50	37.1	AV	L1	GND	
15.994500	15.00	7.9	50	35.0	AV	L1	GND	

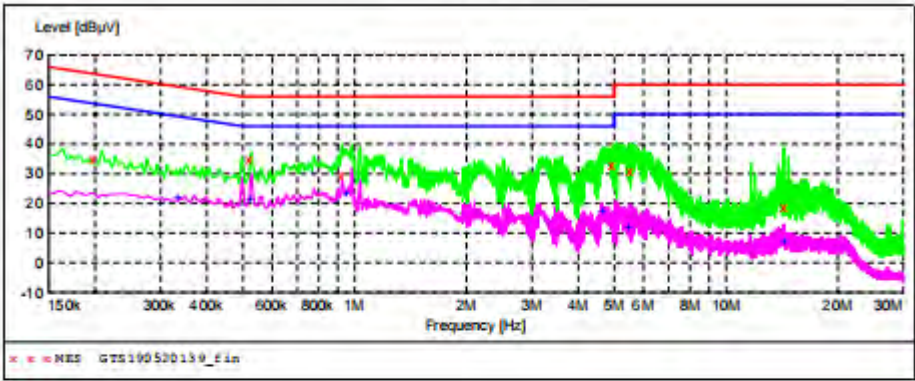
Power supply:

Adapter 1

Polarization

N

SCAN TABLE: "Voltage (9K-30M) fin"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTS190520139_fin"

5/20/2019 6:19PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	FE
0.199500	35.10	10.0	64	28.5	QP	N	GND
0.523500	35.00	9.8	56	21.0	QP	N	GND
0.924000	29.80	9.6	56	26.2	QP	N	GND
4.920000	32.70	9.3	56	23.3	QP	N	GND
5.518500	30.90	9.2	60	29.1	QP	N	GND
14.334000	18.80	8.3	60	41.2	QP	N	GND

MEASUREMENT RESULT: "GTS190520139_fin2"

5/20/2019 6:19PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	FE
0.334500	21.80	9.9	49	27.5	AV	N	GND
0.523500	21.70	9.8	46	24.3	AV	N	GND
0.951000	23.70	9.6	46	22.3	AV	N	GND
4.636500	17.10	9.3	46	28.9	AV	N	GND
5.505000	12.00	9.3	50	38.0	AV	N	GND
14.343000	7.40	8.3	50	42.6	AV	N	GND

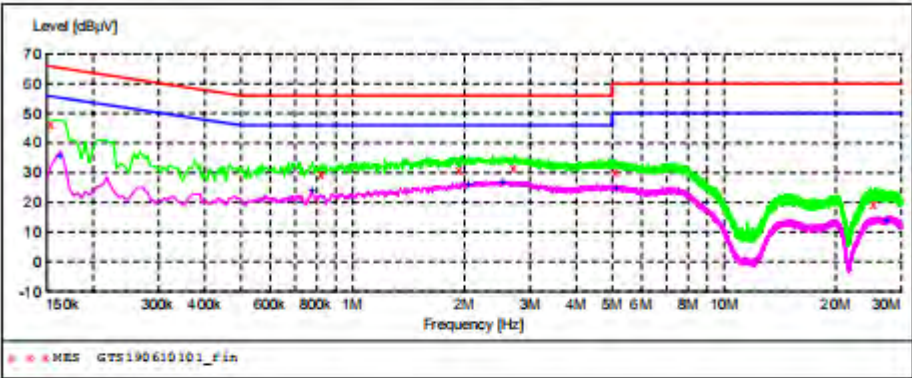
Power supply:

Adapter 2

Polarization

L

SCAN TABLE: "Voltage (9K-30M) fin"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTS190610101_fin"

6/10/2019 9:00AM

Frequency MHz	Level dBV	Transd dB	Limit dBV	Margin dB	Detector	Line	PE
0.154500	46.30	10.1	66	19.5	QP	L1	GND
0.825000	29.20	9.6	56	26.8	QP	L1	GND
1.950000	31.20	9.5	56	24.8	QP	L1	GND
2.706000	31.50	9.5	56	24.5	QP	L1	GND
5.127000	30.00	9.3	60	30.0	QP	L1	GND
25.561500	19.70	7.0	60	40.3	QP	L1	GND

MEASUREMENT RESULT: "GTS190610101_fin2"

6/10/2019 9:00AM

Frequency MHz	Level dBV	Transd dB	Limit dBV	Margin dB	Detector	Line	PE
0.163500	35.50	10.0	55	19.8	AV	L1	GND
0.775500	24.10	9.7	46	21.9	AV	L1	GND
2.058000	26.00	9.5	46	20.0	AV	L1	GND
2.548500	26.50	9.5	46	19.5	AV	L1	GND
5.118000	25.00	9.3	50	25.0	AV	L1	GND
27.483000	13.90	6.9	50	36.1	AV	L1	GND

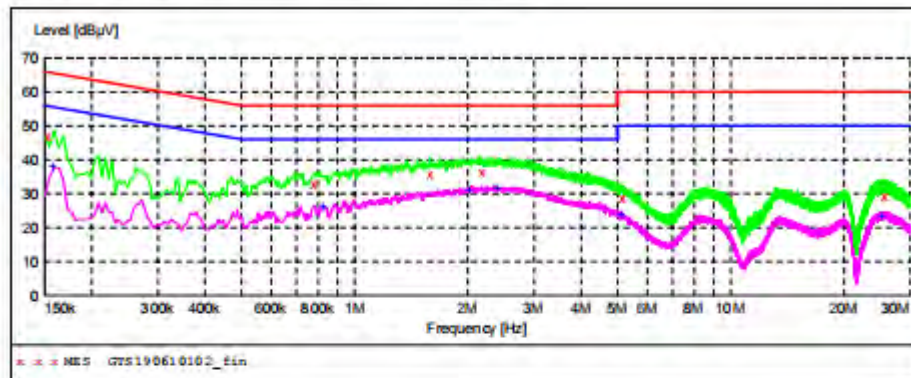
Power supply:

Adapter 2

Polarization

N

SCAN TABLE: "Voltage (9K-30M)_fin"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTS190610102_fin"

6/10/2019 9:04AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.154500	46.90	10.1	66	18.9	QP	N	GND
0.780000	32.90	9.7	56	23.1	QP	N	GND
1.590000	35.70	9.5	56	20.3	QP	N	GND
2.184000	36.40	9.5	56	19.6	QP	N	GND
5.163000	28.50	9.3	60	31.5	QP	N	GND
25.867500	29.20	7.0	60	30.8	QP	N	GND

MEASUREMENT RESULT: "GTS190610102_fin2"

6/10/2019 9:04AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.159000	38.40	10.0	56	17.1	AV	N	GND
0.825000	26.50	9.6	46	19.5	AV	N	GND
2.026500	31.10	9.5	46	14.9	AV	N	GND
2.400000	31.40	9.5	46	14.6	AV	N	GND
5.127000	23.70	9.3	50	26.3	AV	N	GND
25.246500	23.50	7.0	50	26.5	AV	N	GND

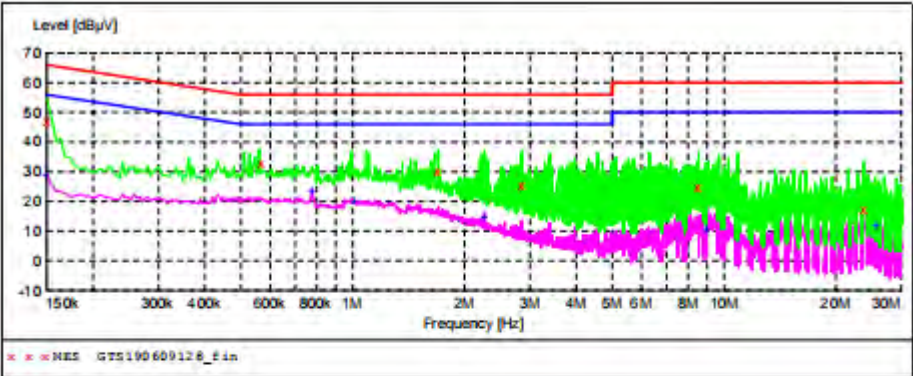
Power supply:

Adapter 3

Polarization

L

SCAN TABLE: "Voltage (9K-30M) FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTS190609128_fin"

6/6/2019 3:00PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	47.40	10.1	66	18.6	QP	L1	GND
0.568500	33.10	9.7	56	22.9	QP	L1	GND
1.707000	30.30	9.5	56	25.7	QP	L1	GND
2.841000	25.60	9.5	56	30.4	QP	L1	GND
8.524500	24.90	9.0	60	35.1	QP	L1	GND
23.779500	17.30	7.0	60	42.7	QP	L1	GND

MEASUREMENT RESULT: "GTS190609128_fin2"

6/6/2019 3:00PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	29.10	10.1	56	26.9	AV	L1	GND
0.775500	23.40	9.7	46	22.6	AV	L1	GND
1.009500	19.90	9.6	46	26.1	AV	L1	GND
2.274000	14.70	9.5	46	31.3	AV	L1	GND
9.046500	10.90	9.0	50	39.1	AV	L1	GND
25.795500	11.90	7.0	50	38.1	AV	L1	GND

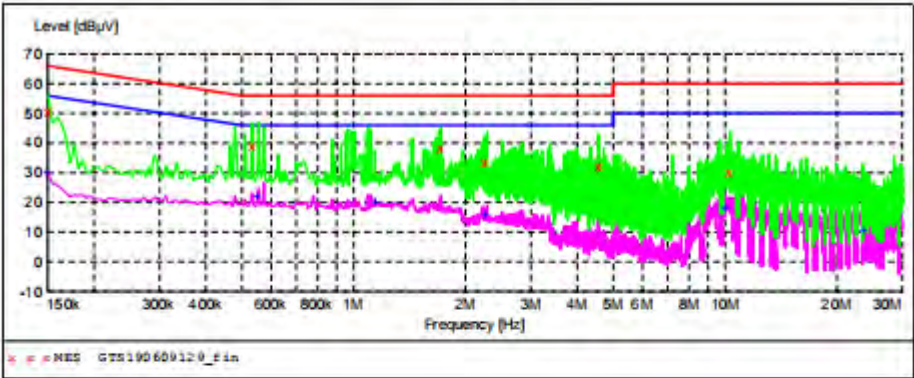
Power supply:

Adapter 3

Polarization

N

SCAN TABLE: "Voltage (9K-30M) fin"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTS190609129_fin"

6/6/2019 3:03PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	FE
0.150000	50.20	10.1	66	15.8	QP	N	GND
0.537000	39.20	9.8	56	16.8	QP	N	GND
1.711500	38.20	9.5	56	17.8	QP	N	GND
2.269500	33.70	9.5	56	22.3	QP	N	GND
4.560000	32.00	9.3	56	24.0	QP	N	GND
10.297500	30.30	8.8	60	29.7	QP	N	GND

MEASUREMENT RESULT: "GTS190609129_fin2"

6/6/2019 3:03PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	FE
0.150000	30.50	10.1	56	25.5	AV	N	GND
0.550500	21.90	9.8	46	24.1	AV	N	GND
1.140000	20.30	9.6	46	25.7	AV	N	GND
2.278500	16.00	9.5	46	30.0	AV	N	GND
10.009500	18.30	8.9	50	31.7	AV	N	GND
23.595000	10.60	7.0	50	39.4	AV	N	GND

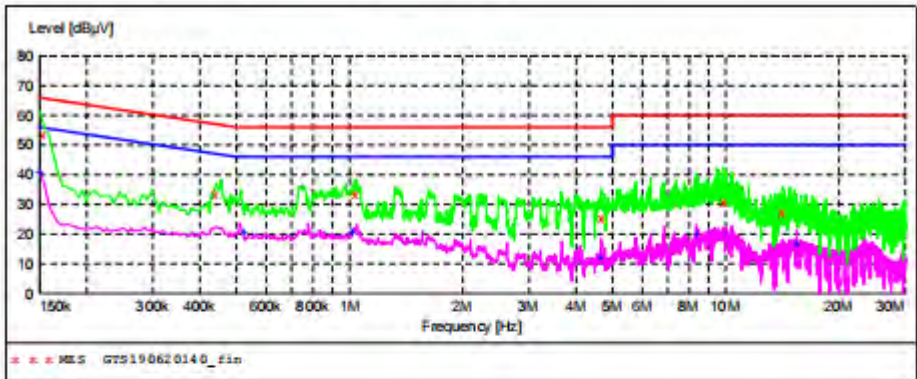
Power supply:

Adapter 4

Polarization

L

SCAN TABLE: "Voltage (9K-30M) fin"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTS190620140_fin"

6/20/2019 12:40PM							
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	FE
0.154500	53.70	10.1	66	12.1	QP	L1	GND
0.442500	33.30	9.8	57	23.7	QP	L1	GND
1.045500	33.10	9.6	56	22.9	QP	L1	GND
4.704000	25.40	9.3	56	30.6	QP	L1	GND
9.856500	31.00	8.9	60	29.0	QP	L1	GND
14.131500	27.10	8.3	60	32.9	QP	L1	GND

MEASUREMENT RESULT: "GTS190620140_fin2"

6/20/2019 12:40PM							
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	FE
0.150000	40.90	10.1	56	15.1	AV	L1	GND
0.528000	20.50	9.8	46	25.5	AV	L1	GND
1.014000	20.70	9.6	46	25.3	AV	L1	GND
4.641000	11.90	9.3	46	34.1	AV	L1	GND
8.367000	20.00	9.0	50	30.0	AV	L1	GND
15.414000	16.30	8.1	50	33.7	AV	L1	GND

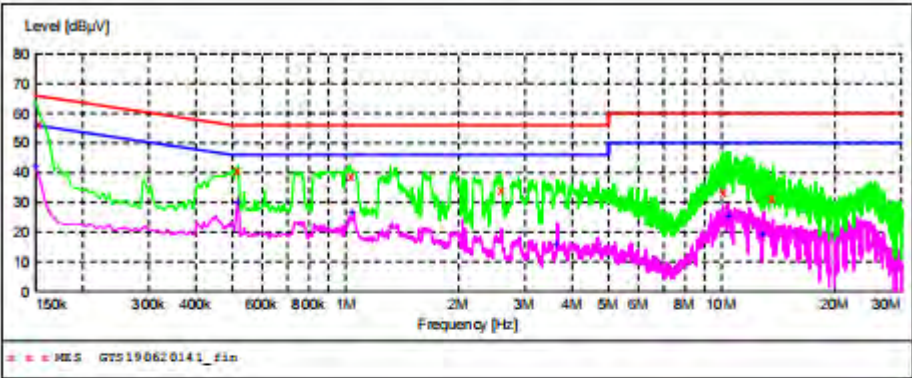
Power supply:

Adapter 4

Polarization

N

SCAN TABLE: "Voltage (9K-30M) FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTS190620141_fin"

6/20/2019 12:54PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.154500	56.50	10.1	66	9.3	QP	N	GND
0.514500	40.60	9.8	56	15.4	QP	N	GND
1.041000	38.90	9.6	56	17.1	QP	N	GND
2.611500	34.40	9.5	56	21.6	QP	N	GND
10.113000	33.70	8.9	60	26.3	QP	N	GND
13.636500	31.40	8.4	60	28.6	QP	N	GND

MEASUREMENT RESULT: "GTS190620141_fin2"

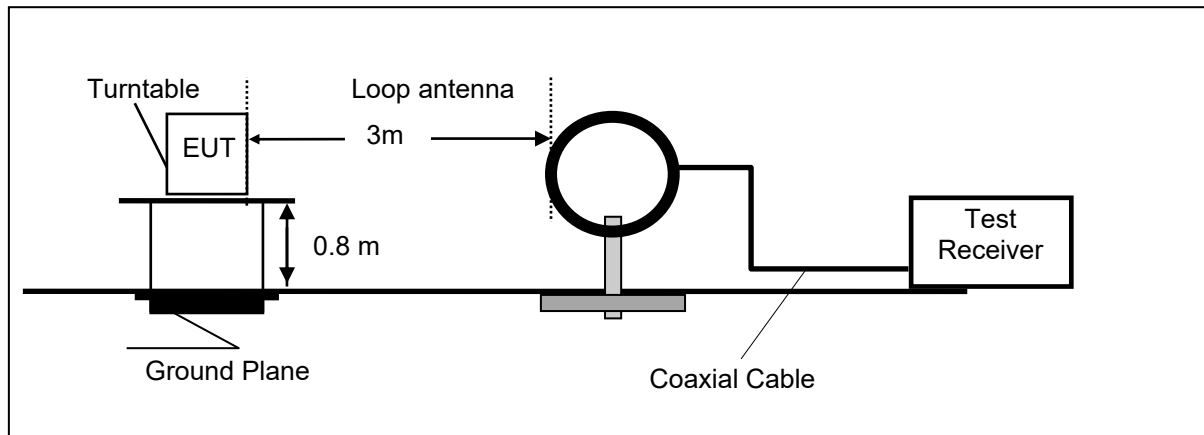
6/20/2019 12:54PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	42.30	10.1	56	13.7	AV	N	GND
0.519000	30.10	9.8	46	15.9	AV	N	GND
1.045500	26.70	9.6	46	19.3	AV	N	GND
3.651000	15.80	9.4	46	30.2	AV	N	GND
10.392000	25.40	8.8	50	24.6	AV	N	GND
12.943500	19.50	8.4	50	30.5	AV	N	GND

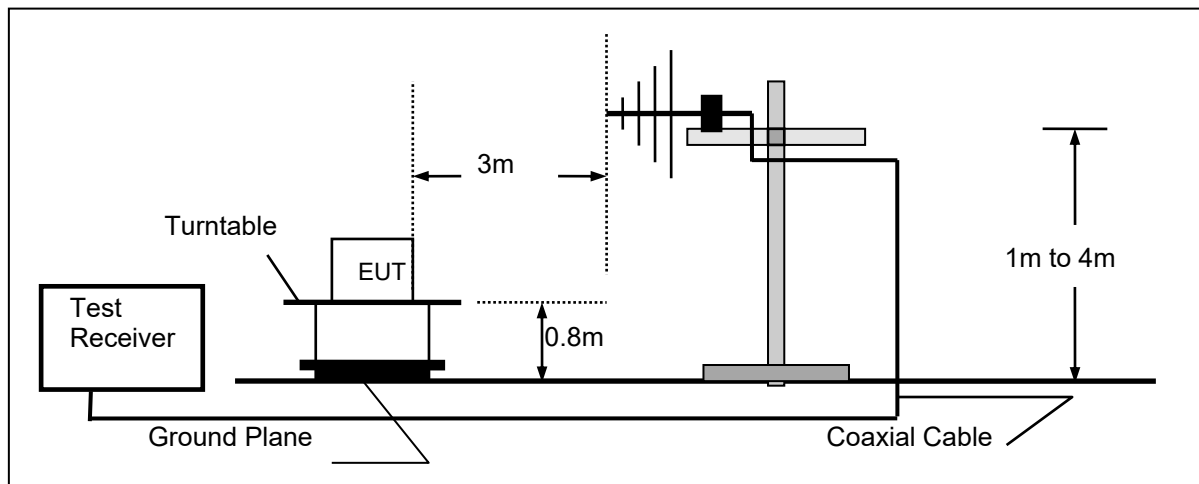
4.2. Radiated Emission

TEST CONFIGURATION

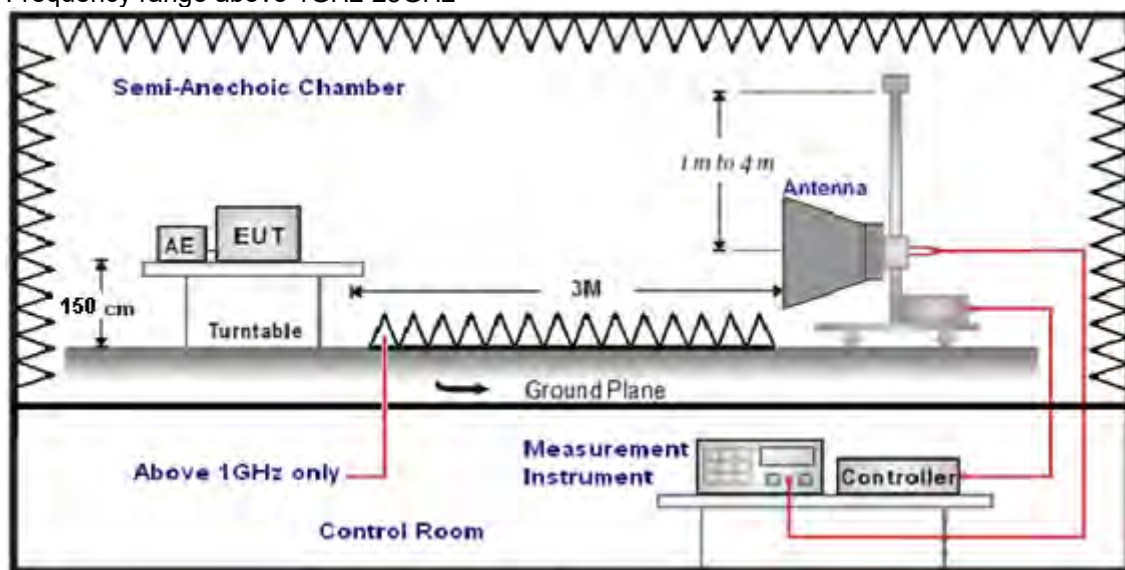
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 30MHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 30MHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Antenna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz, Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz, Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz, Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

$$\text{Transd}=AF +CL-AG$$

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

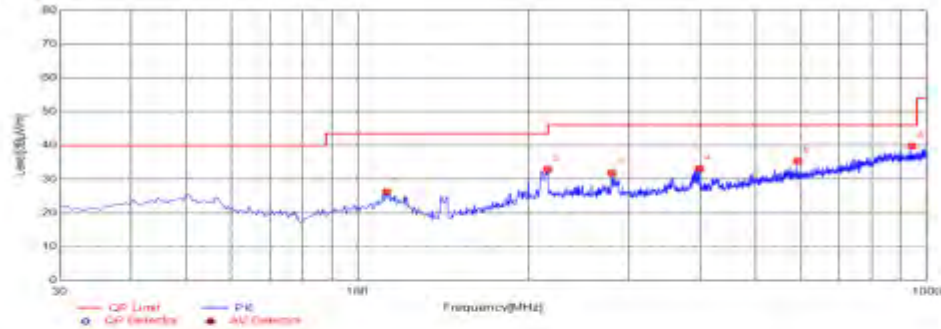
Frequency (MHz)	Distance (Meters)	Radiated (dBµV/m)	Radiated (µV/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

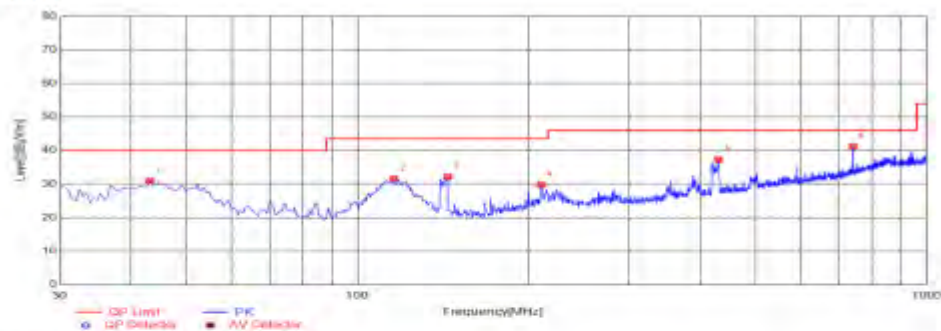
Remark: We measured Radiated Emission at 802.11b/802.11g/802.11n HT20/802.11n HT40 mode from 30 MHz to 25GHz in AC 120V/60Hz and the worst case was recorded.

For 30MHz-1GHz

Adapter 1

Horizontal**Test Graph****Suspected List**

NO.	Freq. [MHz]	Polarity	Height [cm]	Angle [°]	Limit [dBμV/m]	Level [dBμV/m]	Factor [dB]	Readin d [dBμV/m]	Margin [dB]
1	112.450	Horizontal	100	50	43.50	26.28	-17.39	43.67	17.22
2	215.755	Horizontal	100	222	43.50	32.94	-16.11	49.05	10.56
3	279.775	Horizontal	100	183	46.00	31.80	-14.49	46.29	14.20
4	398.600	Horizontal	100	82	46.00	33.08	-11.91	44.99	12.92
5	593.570	Horizontal	100	89	46.00	35.33	-7.89	43.22	10.67
6	941.315	Horizontal	100	171	46.00	39.76	-3.62	43.38	6.24

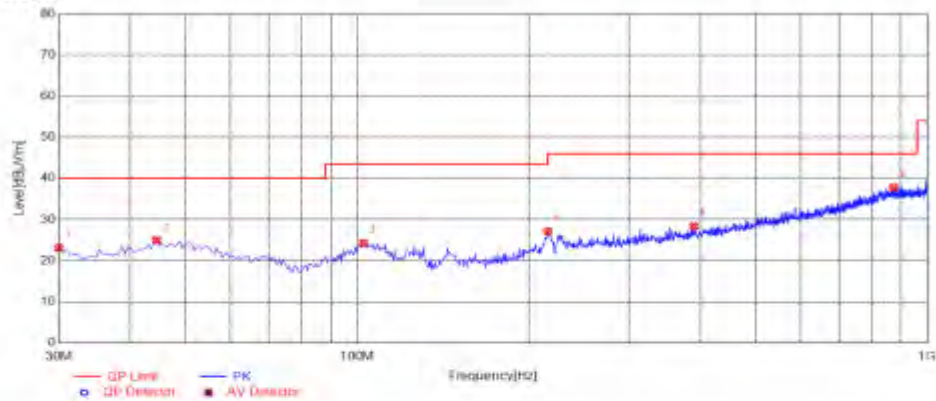
Vertical**Test Graph****Suspected List**

NO.	Freq. [MHz]	Polarity	Height [cm]	Angle [°]	Limit [dBμV/m]	Level [dBμV/m]	Factor [dB]	Readin d [dBμV/m]	Margin [dB]
1	43.0950	Vertical	100	169	40.00	30.94	-15.22	46.16	9.06
2	115.845	Vertical	100	87	43.50	31.58	-17.89	49.47	11.92
3	143.975	Vertical	100	189	43.50	32.18	-20.06	52.24	11.32
4	209.935	Vertical	100	1	43.50	29.75	-16.31	46.06	13.75
5	430.610	Vertical	100	347	46.00	37.26	-11.17	48.43	8.74
6	741.980	Vertical	100	297	46.00	41.22	-6.00	47.22	4.78

Adapter 2

Horizontal

Test Graph



Suspected List

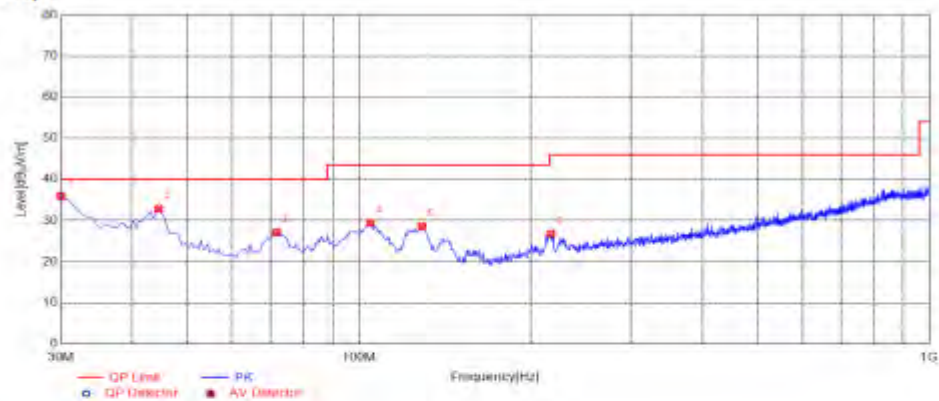
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	30.0000	40.46	-17.37	23.09	40.00	16.91	100	147	PK	Horizontal	PASS
2	44.5500	39.85	-14.87	24.98	40.00	15.02	100	158	PK	Horizontal	PASS
3	102.7500	41.22	-16.95	24.27	43.50	19.23	100	285	PK	Horizontal	PASS
4	216.2400	43.24	-16.10	27.14	46.00	18.86	100	76	PK	Horizontal	PASS
5	389.8700	40.22	-11.86	28.36	46.00	17.64	100	338	PK	Horizontal	PASS
6	873.4150	41.80	-4.02	37.78	46.00	8.22	100	54	PK	Horizontal	PASS

Note: 1. Result (dBµV/m) = Reading (dBµV/m) + Factor (dB).

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB).

Vertical

Test Graph



Suspected List

NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	30.0000	53.31	-17.37	35.94	40.00	4.06	100	224	PK	Vertical	PASS
2	44.5500	47.68	-14.87	32.81	40.00	7.19	100	214	PK	Vertical	PASS
3	71.7100	46.40	-19.28	27.12	40.00	12.88	100	205	PK	Vertical	PASS
4	104.6900	46.36	-16.95	29.41	43.50	14.09	100	31	PK	Vertical	PASS
5	128.9400	48.55	-19.98	28.57	43.50	14.93	100	2	PK	Vertical	PASS
6	217.2100	42.82	-16.06	26.76	46.00	19.24	100	214	PK	Vertical	PASS

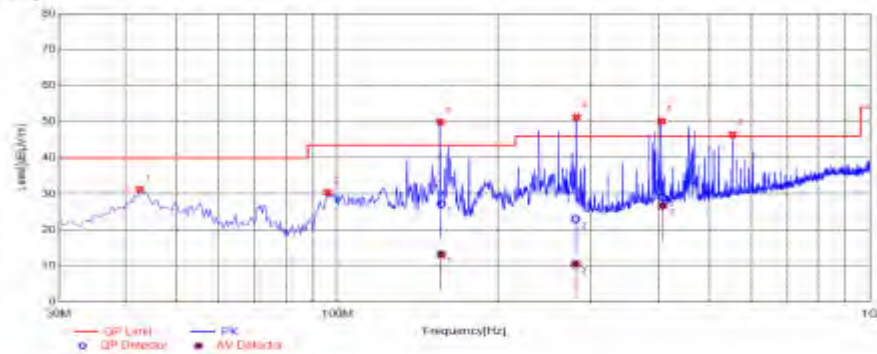
Note: 1. Result (dBµV/m) = Reading (dBµV/m) + Factor (dB).

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB).

Adapter 3

Horizontal

Test Graph



Suspected List

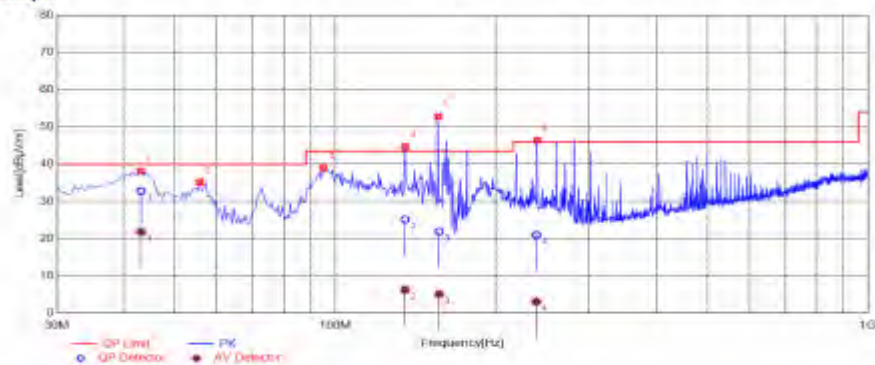
NO.	Frequency [MHz]	Reading [dBuV/m]	Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	42.6100	46.52	-15.33	31.19	40.00	8.81	100	72	PK	Horizontal	PASS
2	95.9600	47.88	-17.42	30.46	43.50	13.04	100	268	PK	Horizontal	PASS
3	156.1000	69.30	-19.41	49.89	43.50	-6.39	100	345	PK	Horizontal	FAIL
4	281.2300	65.73	-14.47	51.26	46.00	-5.26	100	345	PK	Horizontal	FAIL
5	406.3600	61.71	-11.57	50.14	46.00	-4.14	100	146	PK	Horizontal	FAIL
6	552.3450	55.33	-8.92	46.41	46.00	-0.41	100	101	PK	Horizontal	FAIL

Quasi-peak Final Data List

NO.	Frequency [MHz]	Reading [dBuV/m]	Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Remark
1	156.6932	46.57	-19.41	27.16	43.50	16.34	194.6	115.3	Horizontal	PASS
2	280.1557	37.52	-14.49	23.03	46.00	22.97	140	210	Horizontal	PASS
3	408.0017	40.52	-11.47	29.05	46.00	16.95	110	320	Horizontal	PASS

Vertical

Test Graph



Suspected List

NO.	Frequency [MHz]	Reading [dBuV/m]	Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	43.0950	53.36	-15.22	38.14	40.00	1.86	100	144	PK	Vertical	PASS
2	55.7050	51.19	-16.03	35.16	40.00	4.84	100	176	PK	Vertical	PASS
3	94.9900	56.49	-17.54	38.95	43.50	4.55	100	192	PK	Vertical	PASS
4	135.2450	65.05	-20.33	44.72	43.50	-1.22	100	185	PK	Vertical	FAIL
5	156.1000	72.23	-19.41	52.82	43.50	-9.32	100	185	PK	Vertical	FAIL
6	239.5200	61.76	-15.32	46.44	46.00	-0.44	100	185	PK	Vertical	FAIL

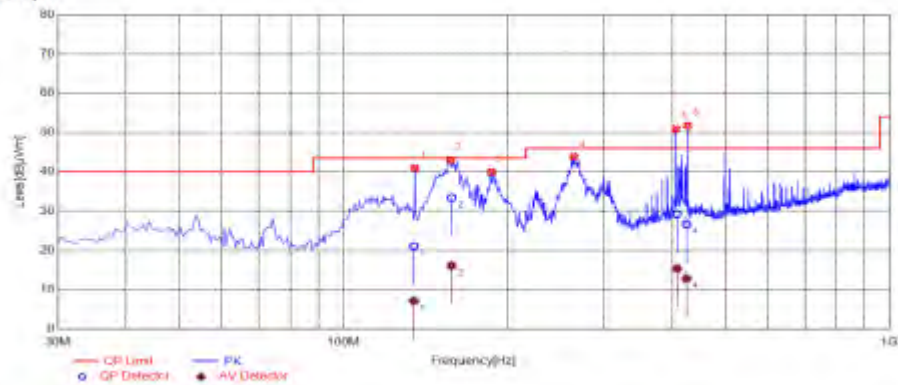
Quasi-peak Final Data List

NO.	Frequency [MHz]	Reading [dBuV/m]	Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Remark
1	43.1691	47.99	-15.20	32.79	40.00	7.21	110	140	Vertical	PASS
2	135.1801	45.49	-20.33	25.16	43.50	18.34	130	350	Vertical	PASS
3	156.7525	41.37	-19.41	21.96	43.50	21.54	110	70	Vertical	PASS
4	238.6098	36.36	-15.36	21.00	46.00	25.00	140	10	Vertical	PASS

Adapter 4

Horizontal

Test Graph



Suspected List

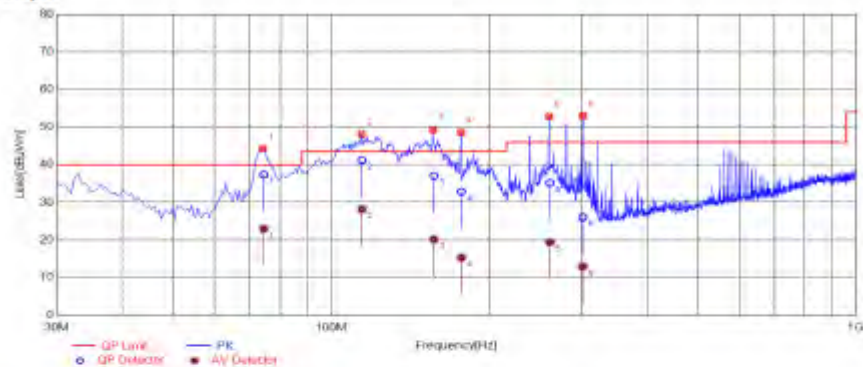
NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	135.2450	61.28	-20.33	40.95	43.50	2.55	100	320	PK	Horizontal	PASS
2	157.0700	62.45	-19.41	43.04	43.50	0.46	100	175	PK	Horizontal	PASS
3	186.6550	57.75	-17.87	39.88	43.50	3.62	100	274	PK	Horizontal	PASS
4	264.2550	58.61	-14.76	43.85	46.00	2.15	100	210	PK	Horizontal	PASS
5	406.3600	62.46	-11.57	50.89	46.00	-4.89	100	284	PK	Horizontal	FAIL
6	427.2150	63.09	-11.31	51.78	46.00	-5.78	100	284	PK	Horizontal	FAIL

Quasi-peak Final Data List

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Remark
1	134.7148	41.39	-20.32	21.07	40.00	18.93	200	90	Horizontal	PASS
2	157.8522	52.81	-19.40	33.41	40.00	6.59	200	320	Horizontal	PASS
3	408.1886	40.71	-11.46	29.25	47.00	17.75	150	300	Horizontal	PASS
4	425.0875	38.08	-11.42	26.66	47.00	20.34	120	240	Horizontal	PASS

Vertical

Test Graph



Suspected List

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	74.1350	63.98	-19.73	44.25	40.00	-4.25	100	150	PK	Vertical	FAIL
2	114.3900	65.77	-17.69	48.08	43.50	-4.58	100	309	PK	Vertical	FAIL
3	156.5850	68.69	-19.41	49.28	43.50	-5.78	100	65	PK	Vertical	FAIL
4	176.9550	67.21	-18.61	48.60	43.50	-5.10	100	303	PK	Vertical	FAIL
5	260.3750	67.73	-14.94	52.79	46.00	-6.79	100	309	PK	Vertical	FAIL
6	302.0850	67.05	-14.09	52.96	46.00	-6.96	100	303	PK	Vertical	FAIL

Quasi-peak Final Data List

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Remark
1	74.4404	57.14	-19.78	37.36	40.00	2.64	130	60	Vertical	PASS
2	114.5318	58.89	-17.71	41.18	43.50	2.32	180	110	Vertical	PASS
3	157.0735	56.45	-19.40	37.05	43.50	6.45	180	210	Vertical	PASS
4	177.2063	51.40	-18.59	32.81	43.50	10.69	110	140	Vertical	PASS
5	261.2499	50.05	-14.90	35.15	46.00	10.85	130	200	Vertical	PASS
6	301.7527	40.12	-14.09	26.03	46.00	19.97	130	90	Vertical	PASS

For 1GHz to 25GHz

802.11b Mode (above 1GHz)

Frequency(MHz):				2412			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4824	50.82	PK	74	23.18	1	138	48.72	31.6	7.00	36.5	2.10
1	4824	40.93	AV	54	13.07	1	138	38.83	31.6	7.00	36.5	2.10

Frequency(MHz):				2442			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4884.00	49.74	PK	74	24.26	1	113	47.62	31.02	7.60	36.5	2.12
1	4884.00	41.85	AV	54	12.15	1	113	39.73	31.02	7.60	36.5	2.12

Frequency(MHz):				2472			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4944.00	51.38	PK	74	22.62	1	183	48.18	31.58	7.82	36.2	3.20
1	4944.00	42.14	AV	54	11.86	1	183	38.94	31.58	7.82	36.2	3.20

802.11g Mode (above 1GHz)

Frequency(MHz):				2412			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4824	50.68	PK	74	23.32	1	180	48.58	31.6	7.00	36.5	2.10
1	4824	40.98	AV	54	13.02	1	180	38.88	31.6	7.00	36.5	2.10

Frequency(MHz):				2442			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4884.00	49.55	PK	74	24.45	1	130	47.43	31.02	7.60	36.5	2.12
1	4884.00	41.45	AV	54	12.55	1	130	39.33	31.02	7.60	36.5	2.12

Frequency(MHz):				2472			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4944.00	51.91	PK	74	22.09	1	159	48.71	31.58	7.82	36.2	3.20
1	4944.00	41.65	AV	54	12.35	1	159	38.45	31.58	7.82	36.2	3.20

802.11n HT20 Mode (above 1GHz)

Frequency(MHz):				2412			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4824	50.43	PK	74	23.57	1	120	48.33	31.6	7.00	36.5	2.10
1	4824	40.83	AV	54	13.17	1	120	38.73	31.6	7.00	36.5	2.10

Frequency(MHz):				2442			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4884.00	49.99	PK	74	24.01	1	92	47.87	31.02	7.60	36.5	2.12
1	4884.00	40.94	AV	54	13.06	1	92	38.82	31.02	7.60	36.5	2.12

Frequency(MHz):				2472			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4944.00	51.23	PK	74	22.77	1	177	48.03	31.58	7.82	36.2	3.20
1	4944.00	41.64	AV	54	12.36	1	177	38.44	31.58	7.82	36.2	3.20

802.11n HT40 Mode (above 1GHz)

Frequency(MHz):				2422			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4844	49.61	PK	74	24.39	1	141	47.51	31.62	7.02	36.5	2.14
1	4844	41.14	AV	54	12.86	1	141	39.04	31.62	7.02	36.5	2.14

Frequency(MHz):				2442			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4874.00	50.56	PK	74	23.44	1	94	48.44	31.02	7.60	36.5	2.12
1	4874.00	40.29	AV	54	13.71	1	94	38.17	31.02	7.60	36.5	2.12

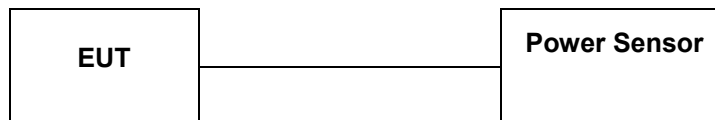
Frequency(MHz):				2462			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4924.00	51.65	PK	74	22.35	1	178	48.45	31.55	7.80	36.2	3.15
1	4924.00	42.99	AV	54	11.01	1	178	39.79	31.55	7.80	36.2	3.15

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
3. Margin value = Limit value - Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to KDB558074 D01 DTS Measurement Guidance Section 9.1 Maximum peak conducted output power, 9.1.2. and Average conducted output power, 9.2.3.1.

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The maximum Average conducted output power may be measured using a wideband RF power meter with a thermocouple detector or equivalent. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

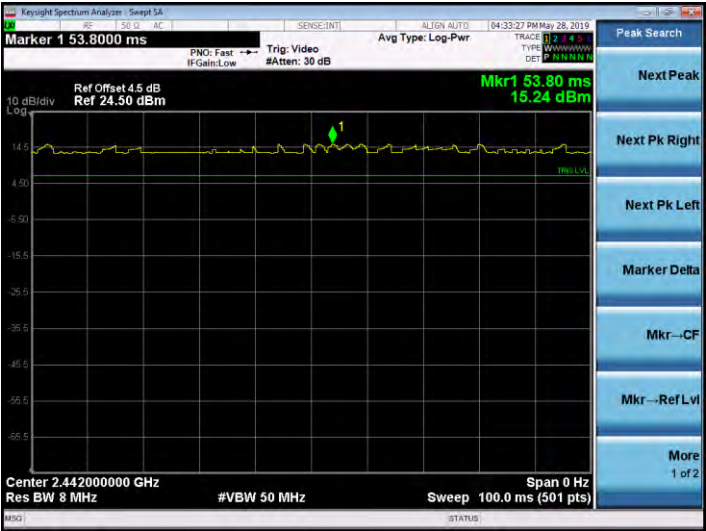
TEST RESULTS

Antenna 0

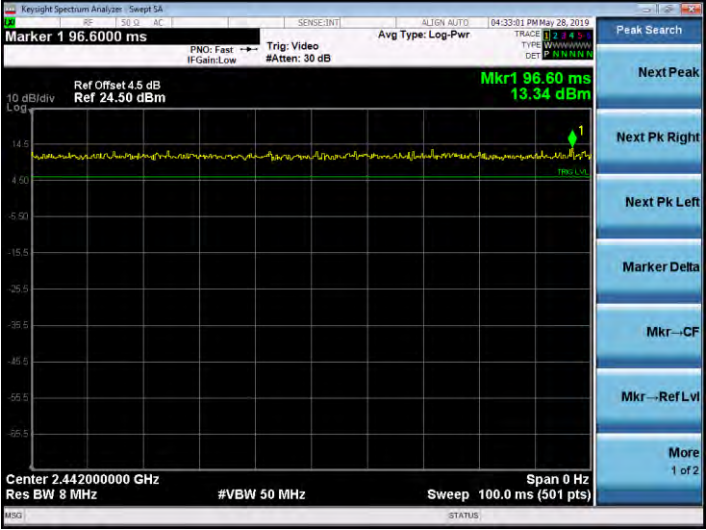
Type	Channel	Output power PK (dBm)	Output power AV (dBm)	Limit (dBm)	Result
802.11b	01	13.39	8.89	30.00	Pass
	07	13.69	8.92		
	13	13.58	8.92		
802.11g	01	13.28	8.97	30.00	Pass
	07	13.81	8.99		
	13	13.22	8.87		
802.11n(HT20)	01	13.61	8.92	30.00	Pass
	07	13.53	8.86		
	13	13.26	8.91		
802.11n(HT40)	03	13.09	8.81	30.00	Pass
	07	13.74	8.98		
	11	13.78	8.99		

Note: 1.The test results including the cable lose.
Duty cycle used in all test items: 100%

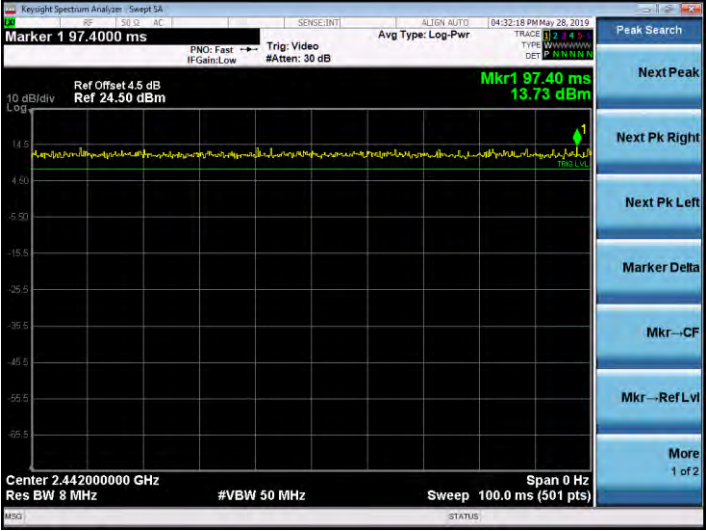
802.11b



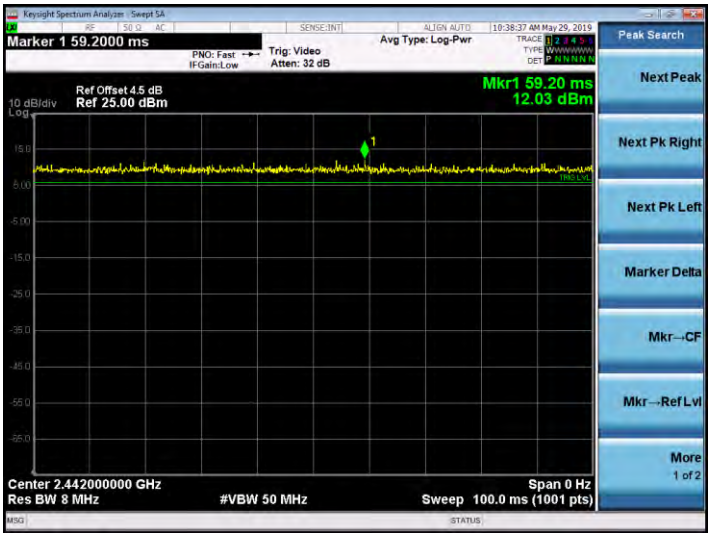
802.11g



802.11n20

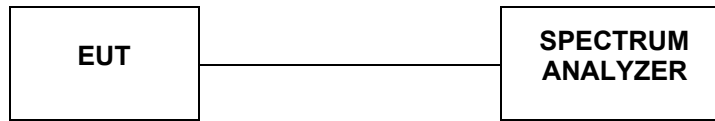


802.11n40



4.4. Power Spectral Density

TEST CONFIGURATION



TEST PROCEDURE

According to KDB 558074 D01 Method PKPSD (peak PSD) This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \text{ RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

LIMIT

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST RESULTS

Antenna 0:

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-16.864	8.00	Pass
	07	-16.886		
	13	-15.101		
802.11g	01	-21.078	8.00	Pass
	07	-20.499		
	13	-20.812		
802.11n(HT20)	01	-21.418	8.00	Pass
	07	-20.735		
	13	-18.576		
802.11n(HT40)	03	-23.347	8.00	Pass
	07	-22.798		
	11	-23.621		

802.11b



CH01

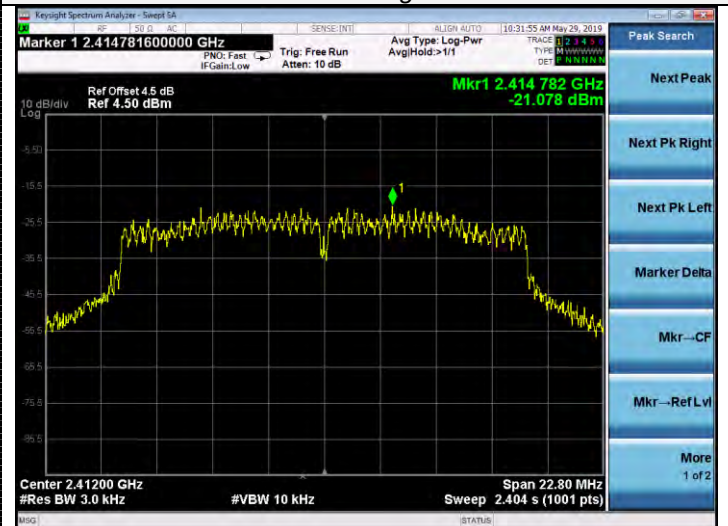


CH07

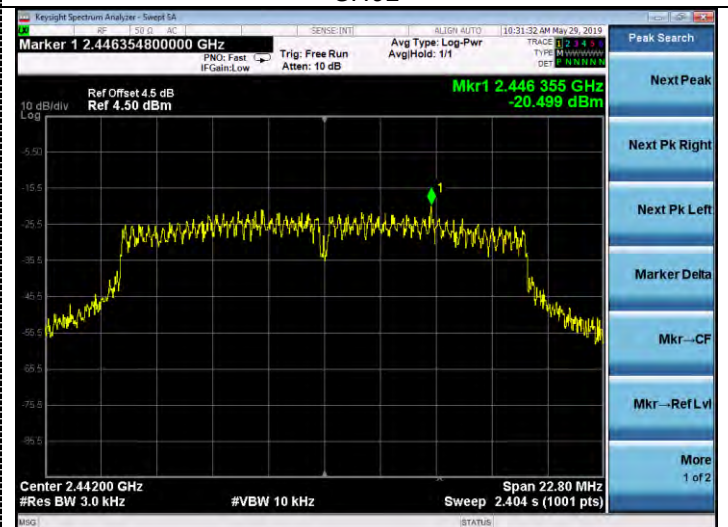


CH13

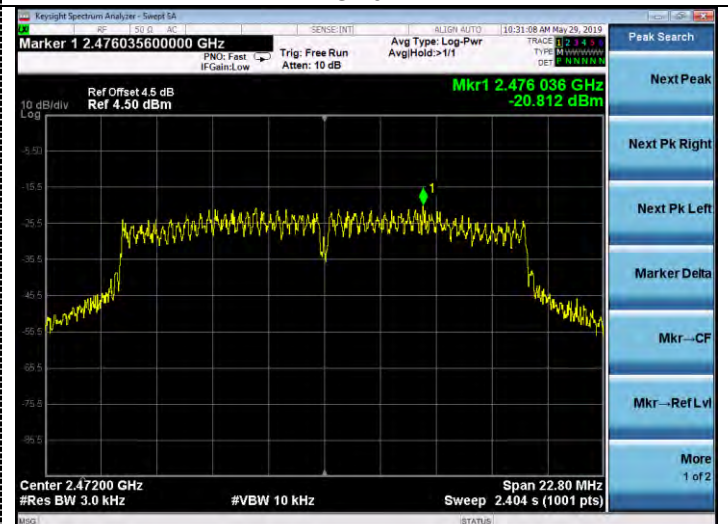
802.11g



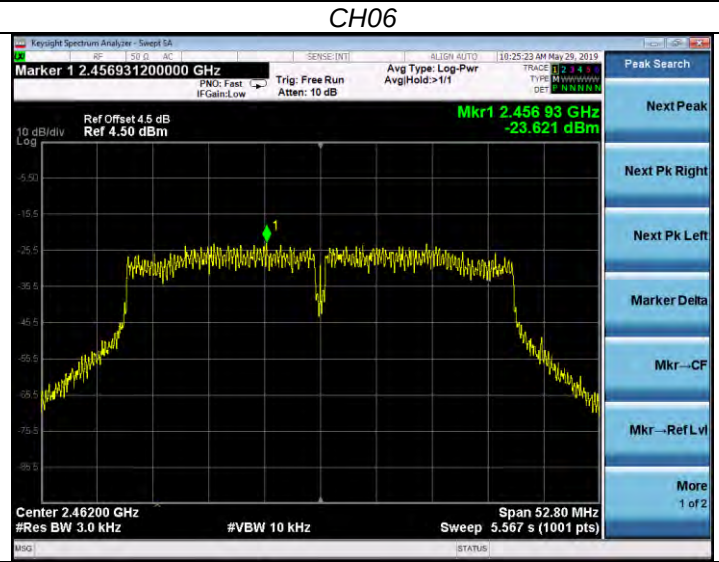
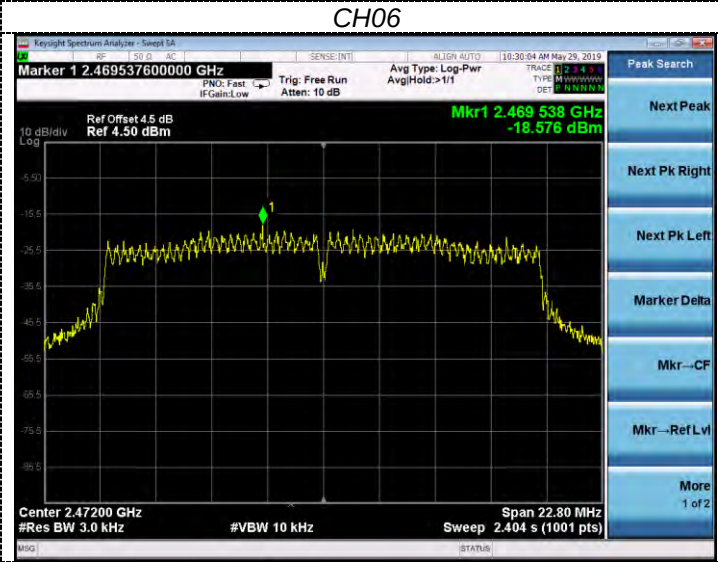
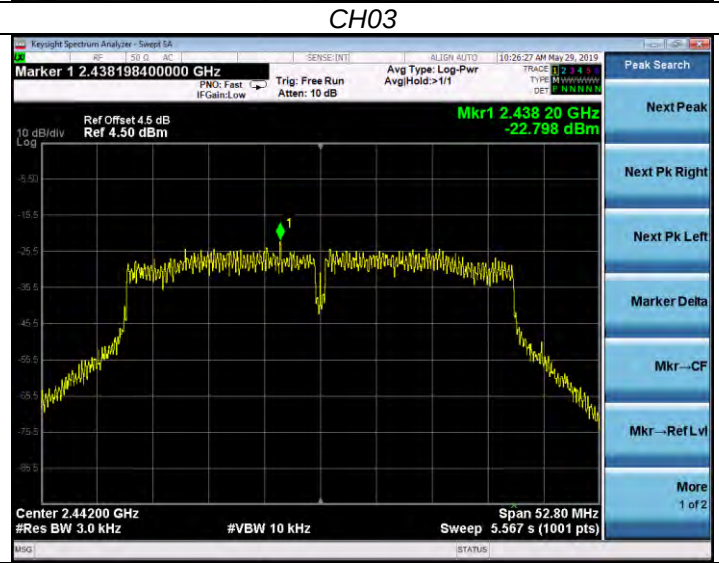
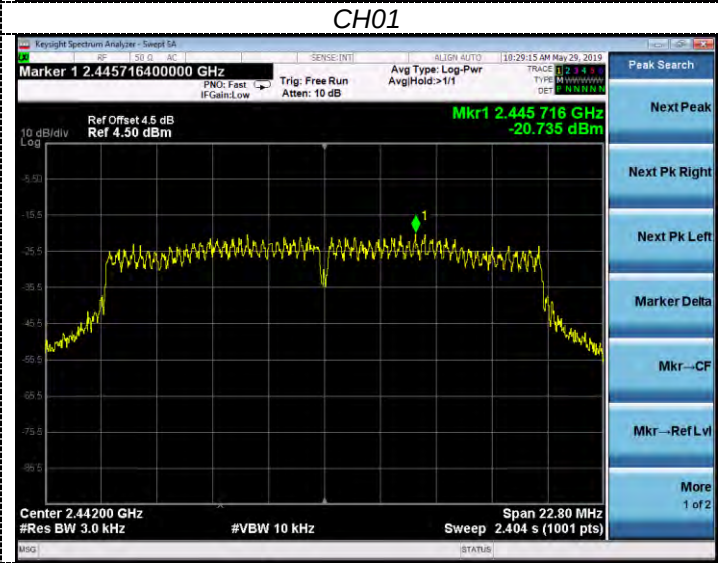
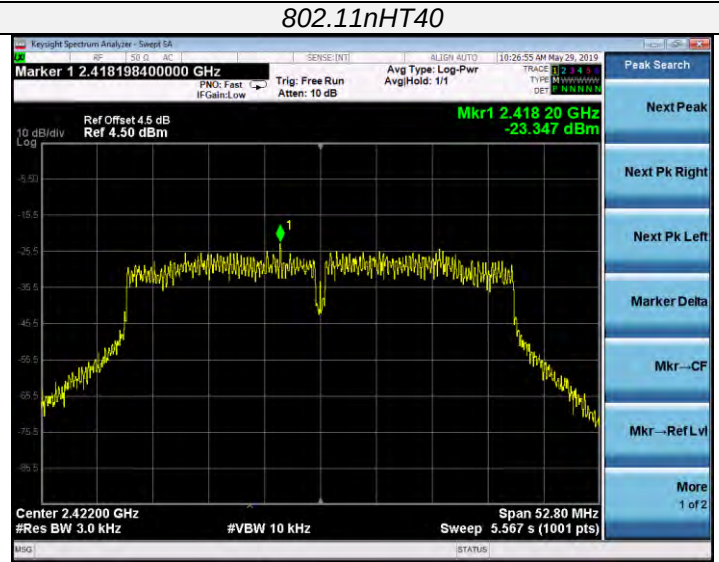
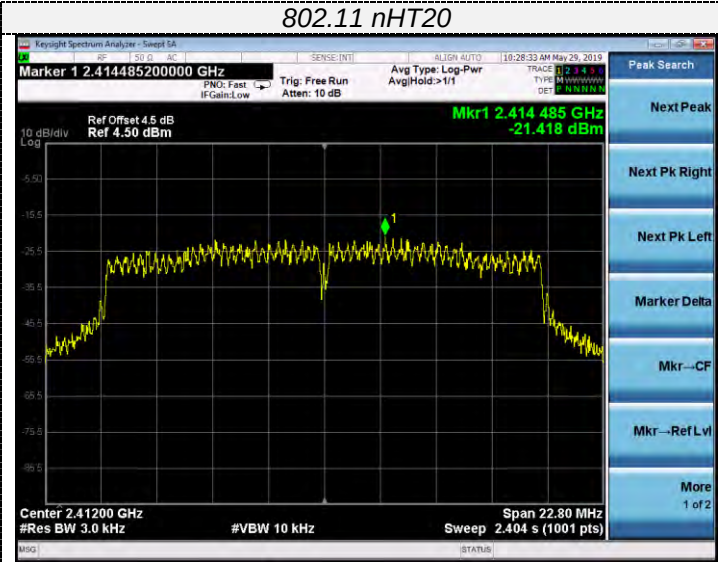
CH01



CH07



CH13

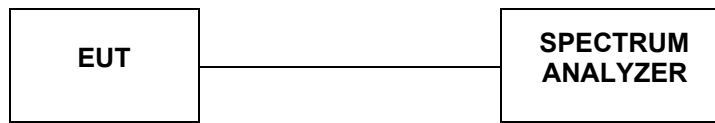


CH11

CH09

4.5. 6dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB. According to KDB558074 D01 for one of the following procedures may be used to determine the modulated DTS device signal bandwidth.

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

LIMIT

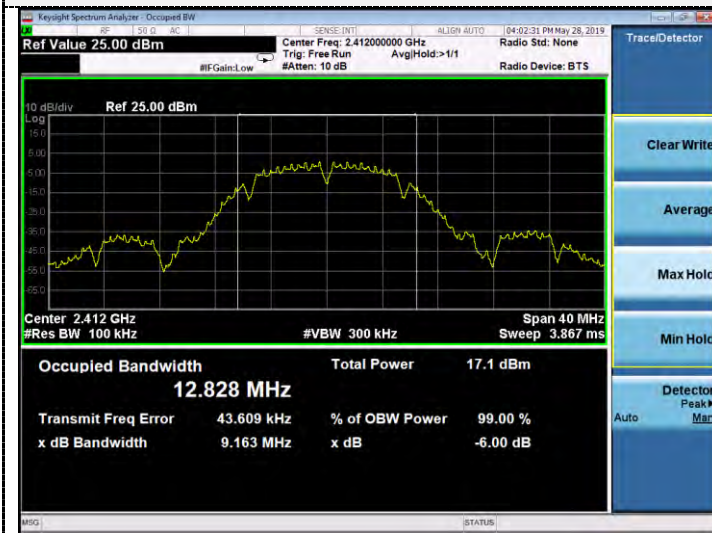
For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

TEST RESULTS

Antenna 0

Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11b	01	9.16	≥ 500	Pass
	07	9.16		
	13	9.59		
802.11g	01	15.06	≥ 500	Pass
	07	15.12		
	13	15.14		
802.11nHT20	01	15.13	≥ 500	Pass
	07	15.17		
	13	15.17		
802.11nHT40	03	35.18	≥ 500	Pass
	07	33.17		
	11	35.13		

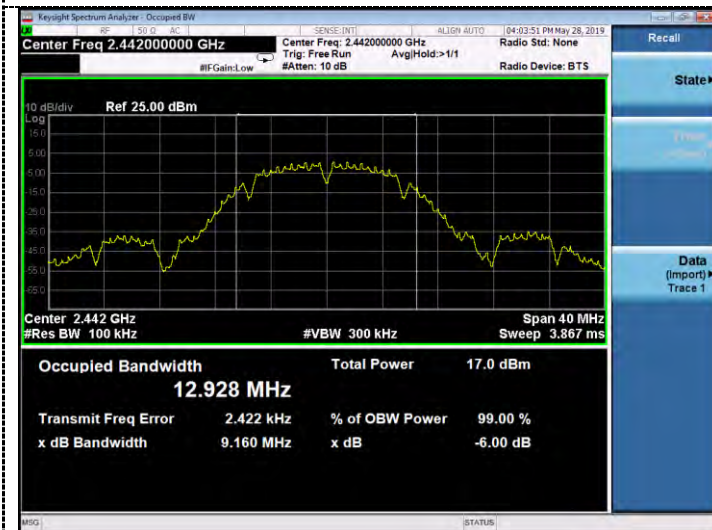
802.11b



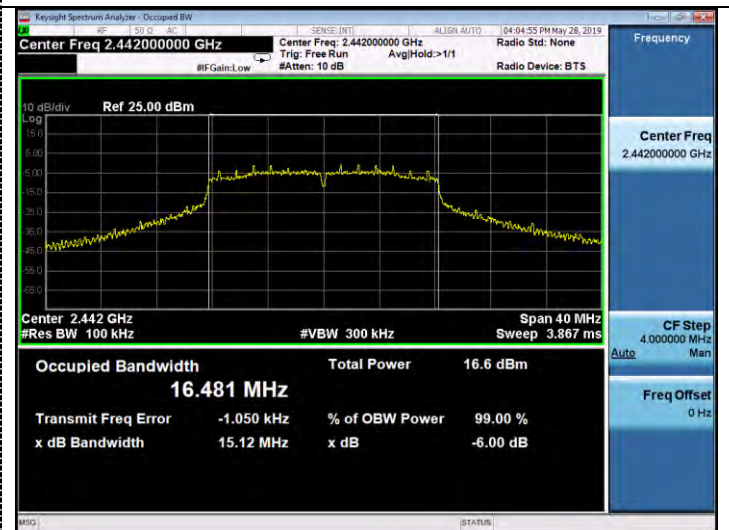
802.11g



CH01



CH01



CH07



CH07



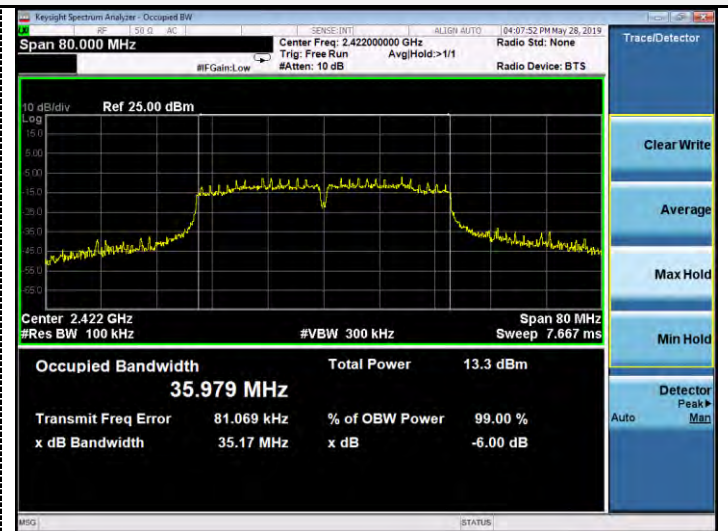
CH13

CH13

802.11n HT20



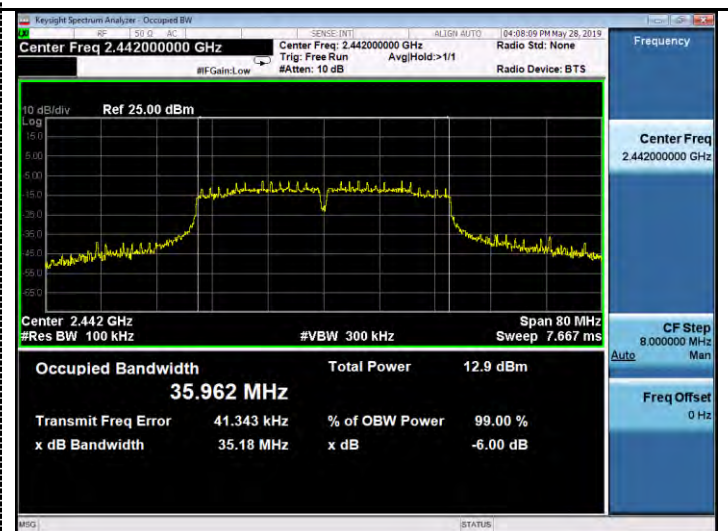
802.11n HT40



CH01



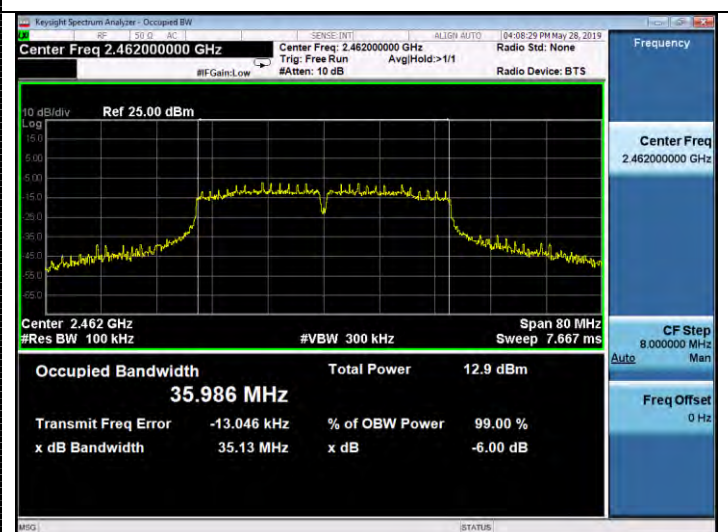
CH03



CH07



CH07



CH13

CH011

4.6. Band Edge Compliance of RF Emission

TEST REQUIREMENT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

According to KDB 558074 D01 for Antenna-port conducted measurement. Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz for peak detector and RBW=1MHz, VBW=10Hz for average detector.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.
6. Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 12.2.2, 12.2.3, and 12.2.4 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
7. Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain)
8. Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).
9. For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).
10. Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20\log D + 104.8$$

where:

E = electric field strength in dB μ V/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

11. Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.
12. Compare the resultant electric field strength level to the applicable regulatory limit.
13. Perform radiated spurious emission test dures until all measured frequencies were complete.

LIMIT

Below -20dB of the highest emission level in operating band.

Radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a).

TEST RESULTS**4.6.1 For Radiated Bandedge Measurement****802.11b**

Frequency(MHz):			2412			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2390.00	48.15	PK	74	25.85	1	183	53.46	27.49	3.32	36.12	-5.31
2390.00	39.11	AV	54	14.89	1	183	44.42	27.49	3.32	36.12	-5.31
Frequency(MHz):			2412			Polarity:			VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2390.00	48.27	PK	74	25.73	1	320	53.58	27.49	3.32	36.12	-5.31
2390.00	37.97	AV	54	16.03	1	320	43.28	27.49	3.32	36.12	-5.31
Frequency(MHz):			2472			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2483.50	48.26	PK	74	24.67	1	110	53.98	27.45	3.38	36.55	-5.72
2483.50	38.15	AV	54	12.37	1	110	43.87	27.45	3.38	36.55	-5.72
Frequency(MHz):			2472			Polarity:			VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2483.50	48.61	PK	74	24.67	1	153	54.33	27.45	3.38	36.55	-5.72
2483.50	37.94	AV	54	12.37	1	153	43.66	27.45	3.38	36.55	-5.72

802.11g

Frequency(MHz):			2412			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2390.00	48.95	PK	74	25.05	1	143	54.26	27.49	3.32	36.12	-5.31
2390.00	39.41	AV	54	14.59	1	143	44.72	27.49	3.32	36.12	-5.31
Frequency(MHz):			2412			Polarity:			VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2390.00	48.76	PK	74	25.24	1	141	54.07	27.49	3.32	36.12	-5.31
2390.00	38.39	AV	54	15.61	1	141	43.7	27.49	3.32	36.12	-5.31
Frequency(MHz):			2472			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2483.50	48.07	PK	74	24.67	1	104	53.79	27.45	3.38	36.55	-5.72
2483.50	37.82	AV	54	12.37	1	104	43.54	27.45	3.38	36.55	-5.72
Frequency(MHz):			2472			Polarity:			VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2483.50	48.41	PK	74	24.67	1	211	54.13	27.45	3.38	36.55	-5.72
2483.50	37.77	AV	54	12.37	1	211	43.49	27.45	3.38	36.55	-5.72

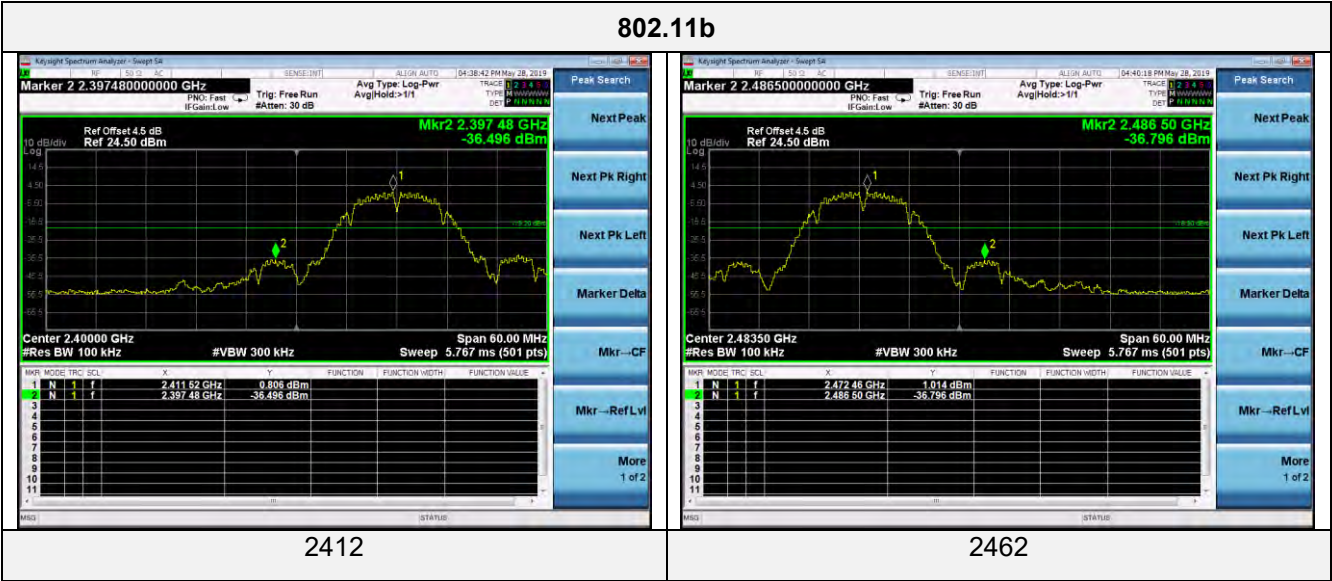
802.11n HT20

Frequency(MHz):			2412			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2390.00	48.65	PK	74	25.35	1	179	53.96	27.49	3.32	36.12	-5.31
2390.00	38.07	AV	54	15.93	1	179	43.38	27.49	3.32	36.12	-5.31
Frequency(MHz):			2412			Polarity:			VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2390.00	48.5	PK	74	25.5	1	312	53.81	27.49	3.32	36.12	-5.31
2390.00	38.85	AV	54	15.15	1	312	44.16	27.49	3.32	36.12	-5.31
Frequency(MHz):			2472			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2483.50	48.37	PK	74	24.67	1	101	54.09	27.45	3.38	36.55	-5.72
2483.50	37.76	AV	54	12.37	1	101	43.48	27.45	3.38	36.55	-5.72
Frequency(MHz):			2472			Polarity:			VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2483.50	48.46	PK	74	24.67	1	175	54.18	27.45	3.38	36.55	-5.72
2483.50	38.4	AV	54	12.37	1	175	44.12	27.45	3.38	36.55	-5.72

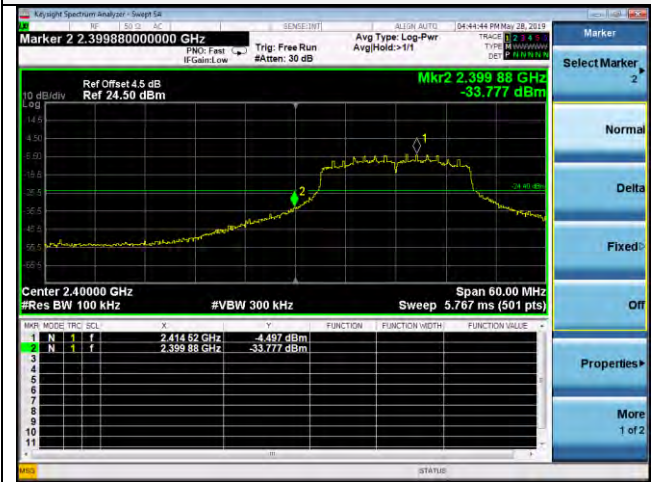
802.11n HT40

Frequency(MHz):			2422			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2390.00	48.47	PK	74	25.53	1	102	53.78	27.49	3.32	36.12	-5.31
2390.00	38.83	AV	54	15.17	1	102	44.14	27.49	3.32	36.12	-5.31
Frequency(MHz):			2422			Polarity:			VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2390.00	48.59	PK	74	25.41	1	298	53.9	27.49	3.32	36.12	-5.31
2390.00	39.63	AV	54	14.37	1	298	44.94	27.49	3.32	36.12	-5.31
Frequency(MHz):			2462			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2483.50	48.93	PK	74	24.67	1	107	54.65	27.45	3.38	36.55	-5.72
2483.50	38.36	AV	54	12.37	1	107	44.08	27.45	3.38	36.55	-5.72
Frequency(MHz):			2462			Polarity:			VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2483.50	48.17	PK	74	24.67	1	219	53.89	27.45	3.38	36.55	-5.72
2483.50	38.18	AV	54	12.37	1	219	43.9	27.45	3.38	36.55	-5.72

4.6.2 For Conducted Bandedge Measurement



802.11n HT20



2412



2462

802.11n HT40



2422



2452

4.7. Antenna Requirement

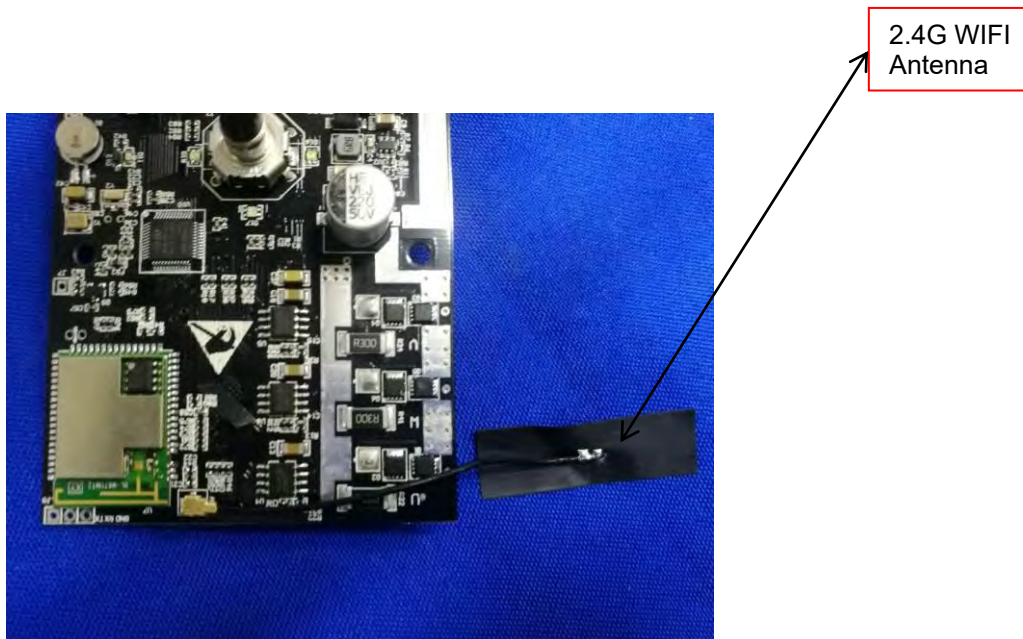
Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

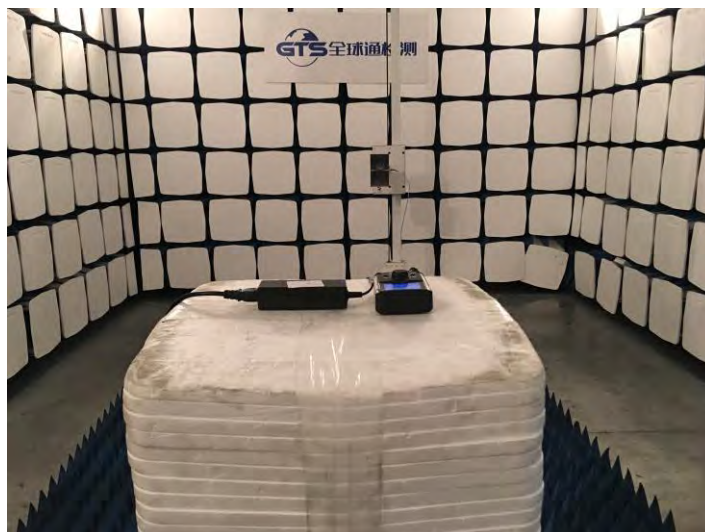
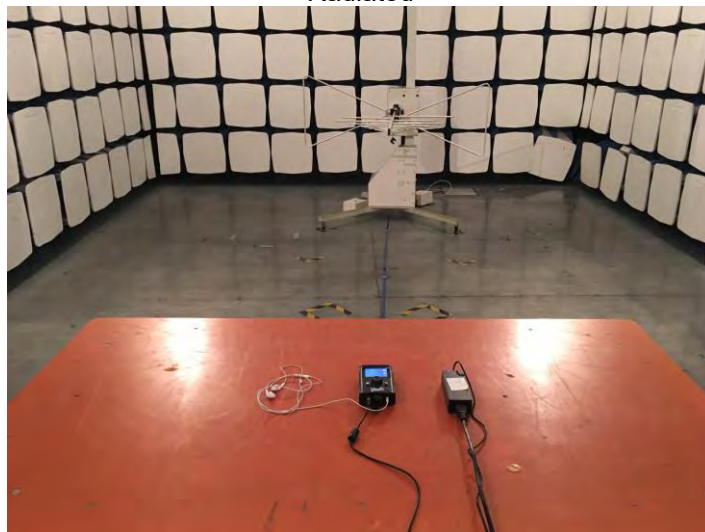
Antenna Information

The antenna is FPC antenna, through the buckle stretched out, The directional gains of antenna used for transmitting is 3.0dBi.



5. Test Setup Photos of the EUT

Radiated



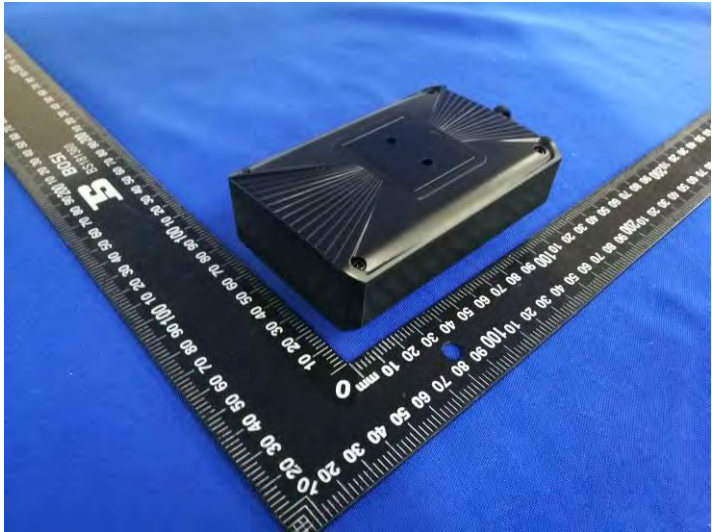
conducted



6. External and Internal Photos of the EUT

External Photos





Adapter 1



Adapter 1 label



Adapter 2



Adapter 2 label



Adapter 3



Adapter 3 label

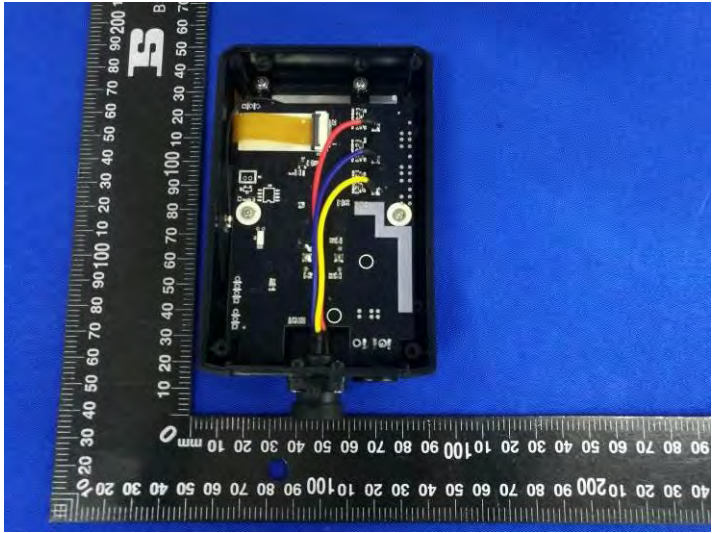


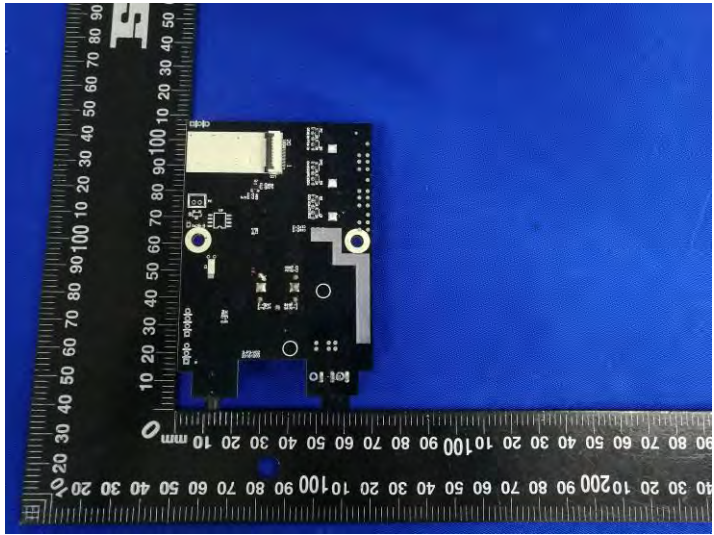
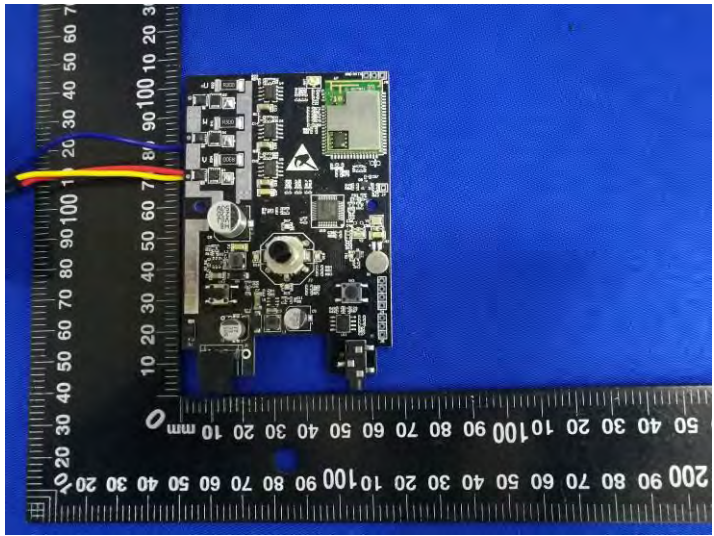
Adapter 4 label

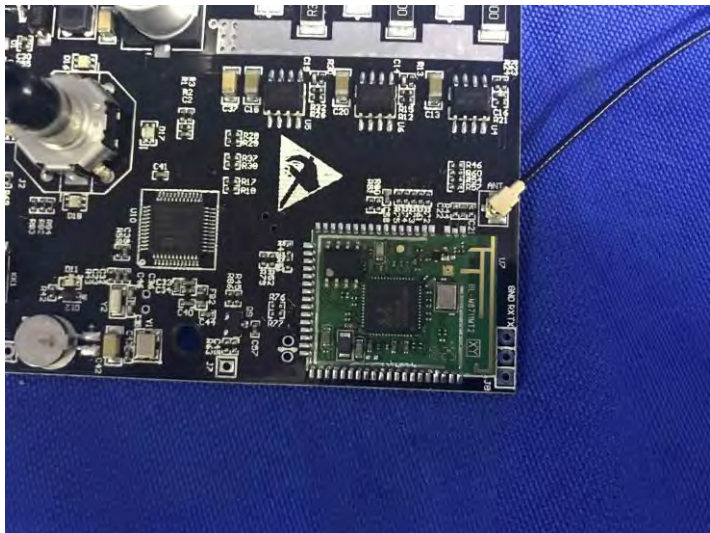
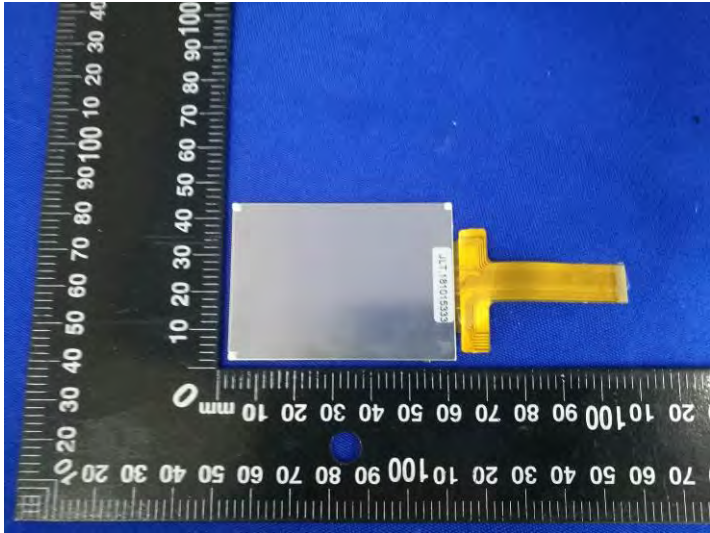
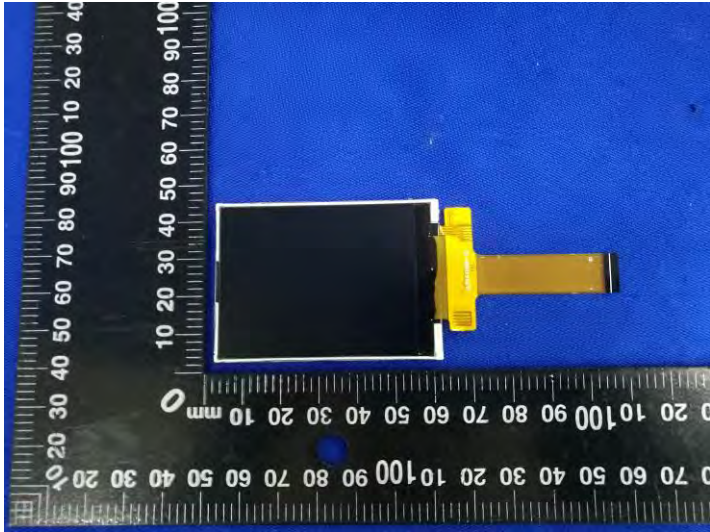


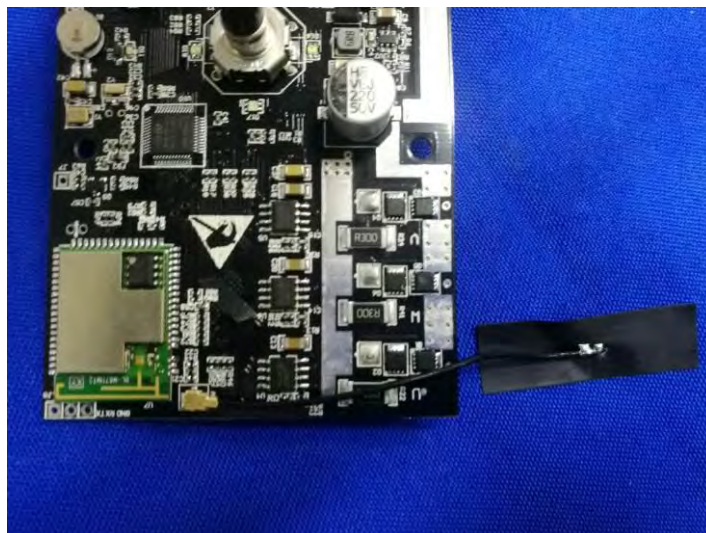


Internal Photos









.....End of Report.....