

**Shenzhen Global Test Service Co.,Ltd.**

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

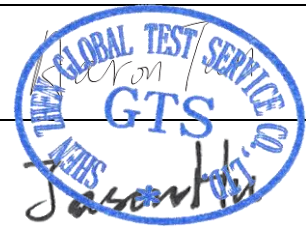
FCC PART 15 SUBPART C TEST REPORT**FCC PART 15.247****Report Reference No.....: GTSR18092031-WLAN****FCC ID..... : 2AQ7LTK1G8GKD5**

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Date of issue.....: Sep. 13, 2018

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

Address: No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

Applicant's name.....: QPS ELECTRONICS CO.,Limited

Address: 5th floor, 64 building, baotian Industrial Zone, qianjin 2nd road, xixiang, bao'an District, Shenzhen, Guangdong, China

Test specificationStandard: **FCC Part 15.247**

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

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

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Test item description TABLET PC

Trade Mark: /

Manufacturer: QPS ELECTRONICS CO.,Limited

Model/Type reference.....: TK1G8GKD5

Listed Models: TK1G8GKD2

Difference: All the same except the model number

Modulation Type.....: 802.11b/802.11g/802.11n

Operation Frequency.....: From 2412MHz to 2462MHz

Rating: AC 120V/60Hz

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

TEST REPORT

Test Report No. : GTSR18092031-WLAN	Sep. 13, 2018 Date of issue
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Equipment under Test : TABLET PC

Model /Type : TK1G8GKD5

Listed Models : TK1G8GKD2

Applicant : QPS ELECTRONICS CO.,Limited

Address : 5th floor, 64 building,baotian Industrial Zone,qianjin 2nd road,xixiang,
bao'an District,Shenzhen,Guangdong,China

Manufacturer : QPS ELECTRONICS CO.,Limited

Address : 5th floor, 64 building,baotian Industrial Zone,qianjin 2nd road,xixiang,
bao'an District,Shenzhen,Guangdong,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 Multiple Transmitter Output v02r01](#): Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Sep. 5, 2018
Testing commenced on	:	Sep. 5, 2018
Testing concluded on	:	Sep. 13, 2018

2.2. Product Description

Name of EUT	TABLET PC
Trade Mark:	/
Model Number	TK1G8GKD5
Listed Models	TK1G8GKD2
WLAN	Supported 802.11b/802.11g/802.11n
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)
Operation frequency	IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz
Antenna Type	Internal Antenna
Antenna gain	1.28dBi

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	<input type="radio"/> 230V / 50 Hz	<input checked="" type="radio"/> 120V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input type="radio"/> Other (specified in blank below)	

___/

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

This is a Wi-Fi INTEGRATED AMPLIFIER.

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.

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		

6	2437		
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: 2AQ7LTK1G8GKD5filing 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.

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

3.2. Test Facility

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

FCC-Registration No.: 165725

Shenzhen Global Test Service Co.,Ltd EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

A2LA-Lab Cert. No.: 4758.01

Shenzhen Global Test Service Co.,Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

CNAS-Lab Code: 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: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories. Date of Registration: Dec. 11, 2015. Valid time is until Dec. 10, 2018.

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	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	802.11b	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(e)	Power spectral density	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(2)	Spectrum bandwidth – 6 dB bandwidth	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(b)(1)	Maximum output power	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d)	Band edge compliance conducted	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.205	Band edge compliance radiated	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d)	TX spurious emissions conducted	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d)	TX spurious emissions radiated	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.109	RX spurious emissions radiated	-/-	-/-	-/-	-/-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	complies
§15.209(a)	TX spurious Emissions radiated < 30 MHz	802.11b	-/-	802.11b	-/-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.107(a) §15.207	Conducted Emissions < 30 MHz	802.11b	-/-	802.11b	-/-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n(20MHz)/OFDM	6.5Mbps	1/6/11
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	6.5Mbps	1/11

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. Equipment Used during the Test

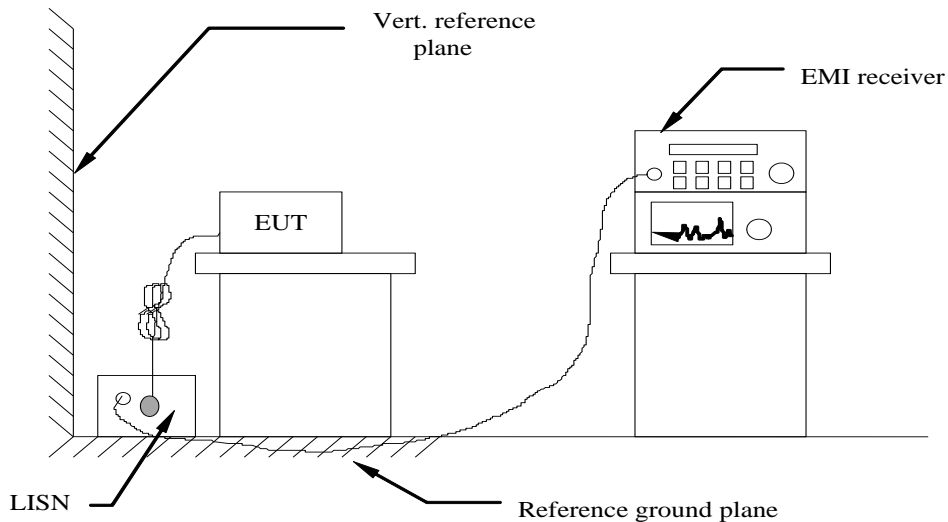
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.08	2017/09/20	2018/09/19
LISN	R&S	ESH2-Z5	893606/008	2017/09/20	2018/09/19
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2017/09/20	2018/09/19
EMI Test Receiver	R&S	ESCI	101102	2017/09/20	2018/09/19
Spectrum Analyzer	Agilent	N9020A	MY48010425	2017/09/20	2018/09/19
Controller	EM Electronics	Controller EM 1000	N/A	2017/09/20	2018/09/19
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2017/09/20	2018/09/19
Active Loop Antenna	SCHWARZBEC K	FMZB1519	1519-037	2017/09/20	2018/09/19
Amplifier	Agilent	8349B	3008A02306	2017/09/20	2018/09/19
Amplifier	Agilent	8447D	2944A10176	2017/09/20	2018/09/19
Temperature/Humidity Meter	Gangxing	CTH-608	02	2017/09/20	2018/09/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2017/09/20	2018/09/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2017/09/20	2018/09/19
Data acquisition card	Agilent	U2531A	TW53323507	2017/09/20	2018/09/19
Power Sensor	Agilent	U2021XA	MY5365004	2017/09/20	2018/09/19
RF Cable	HUBER+SUHNER	RG214	N/A	2017/09/20	2018/09/19

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 AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipment 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

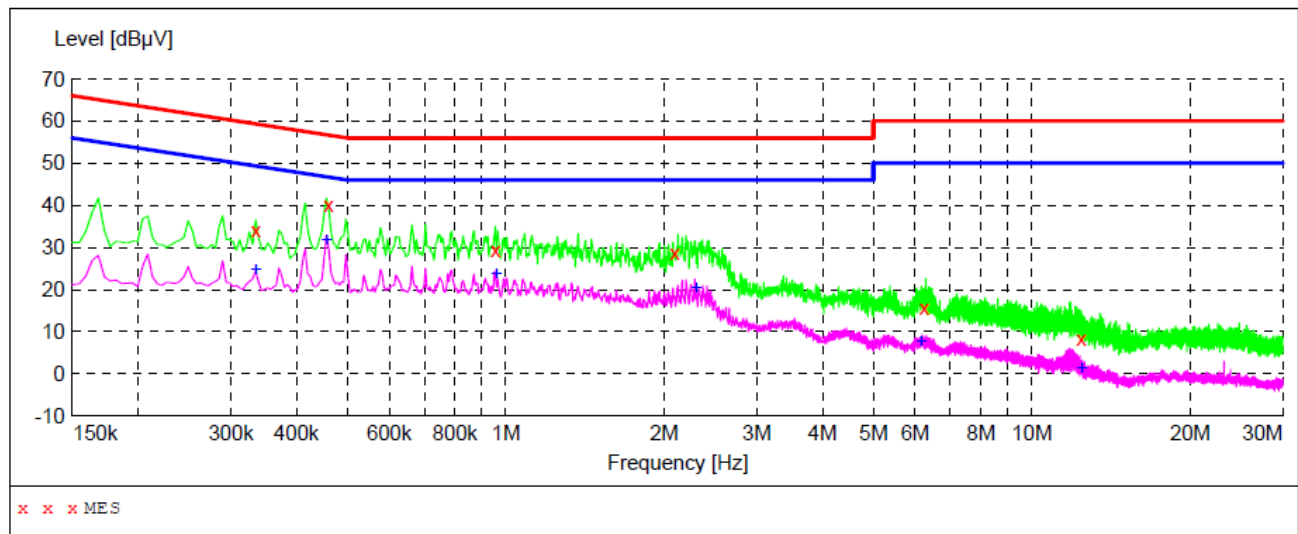
Remark: We measured Conducted Emission at 802.11b/802.11g/802.11n HT20 mode in AC 120V/60Hz, the worst case was recorded .

Power supply:

AC 120V/60Hz

Polarization

L

**MEASUREMENT RESULT:**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.334500	34.10	9.9	59	25.2	QP	L1	GND
0.460500	40.10	9.8	57	16.6	QP	L1	GND
0.955500	29.50	9.6	56	26.5	QP	L1	GND
2.094000	28.60	9.5	56	27.4	QP	L1	GND
6.243000	15.60	9.2	60	44.4	QP	L1	GND
12.412500	8.20	8.5	60	51.8	QP	L1	GND

MEASUREMENT RESULT:

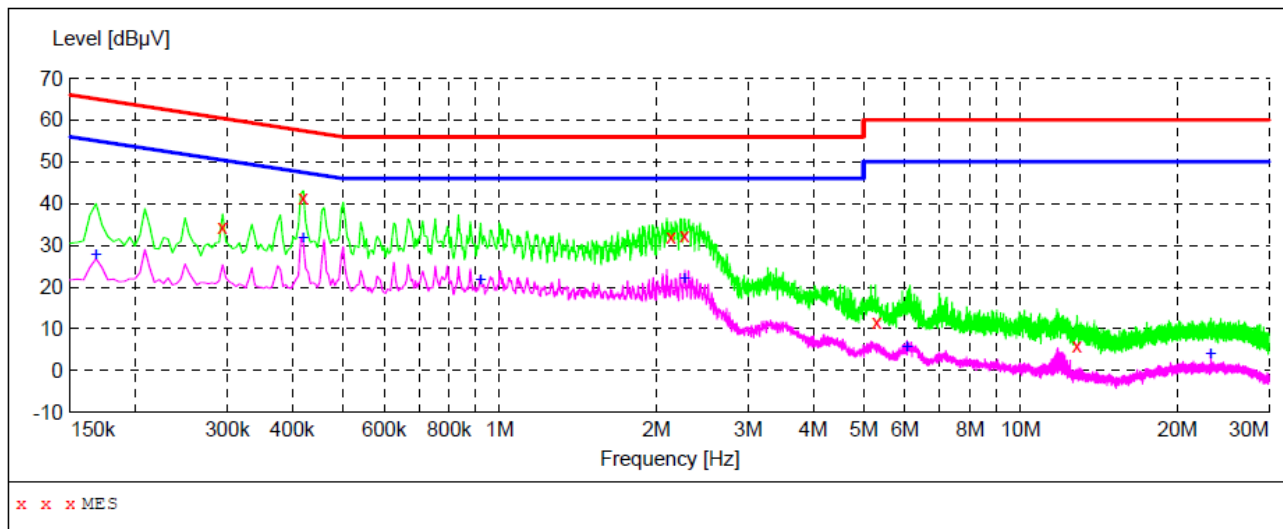
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.334500	24.70	9.9	49	24.6	AV	L1	GND
0.456000	31.70	9.8	47	15.1	AV	L1	GND
0.960000	23.80	9.6	46	22.2	AV	L1	GND
2.301000	20.40	9.5	46	25.6	AV	L1	GND
6.157500	7.70	9.2	50	42.3	AV	L1	GND
12.439500	1.20	8.5	50	48.8	AV	L1	GND

Power supply:

AC 120V/60Hz

Polarization

N

**MEASUREMENT RESULT:**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.294000	34.30	9.9	60	26.1	QP	N	GND
0.420000	41.30	9.8	57	16.1	QP	N	GND
2.134500	32.00	9.5	56	24.0	QP	N	GND
2.265000	32.30	9.5	56	23.7	QP	N	GND
5.298000	11.70	9.3	60	48.3	QP	N	GND
12.840000	5.80	8.5	60	54.2	QP	N	GND

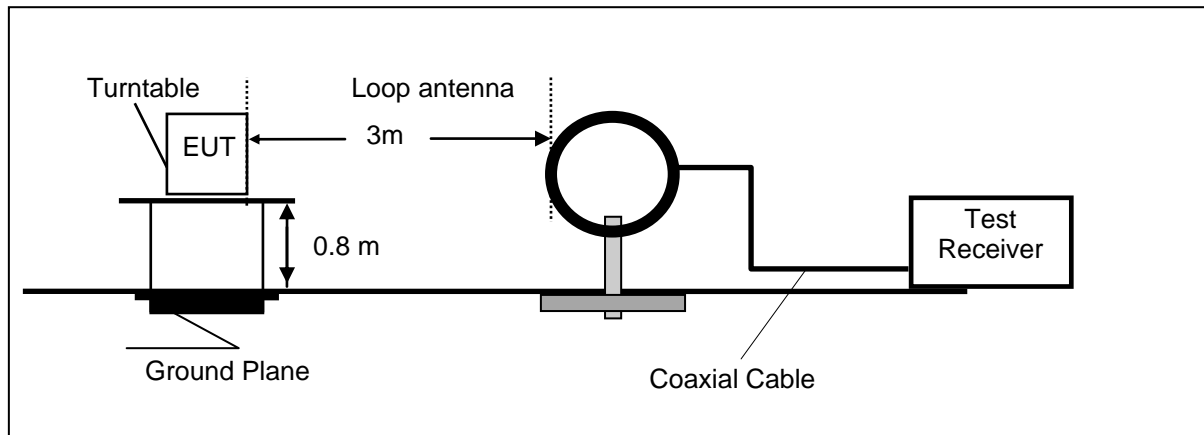
MEASUREMENT RESULT:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.168000	27.50	10.0	55	27.6	AV	N	GND
0.420000	31.70	9.8	47	15.7	AV	N	GND
0.919500	21.80	9.6	46	24.2	AV	N	GND
2.265000	22.00	9.5	46	24.0	AV	N	GND
6.058500	5.60	9.2	50	44.4	AV	N	GND
23.199000	4.00	9.0	50	46.0	AV	N	GND

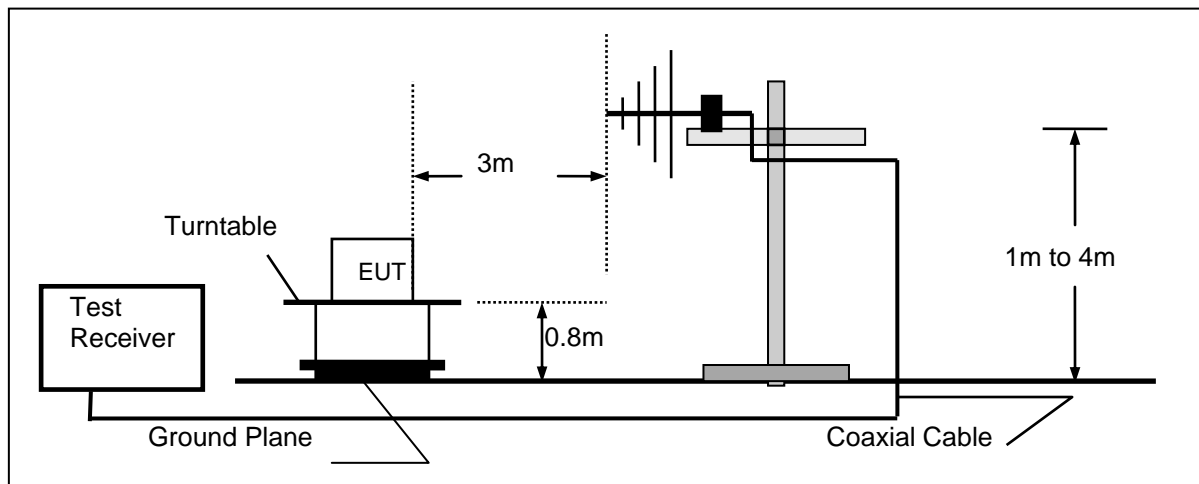
4.2. Radiated Emission

TEST CONFIGURATION

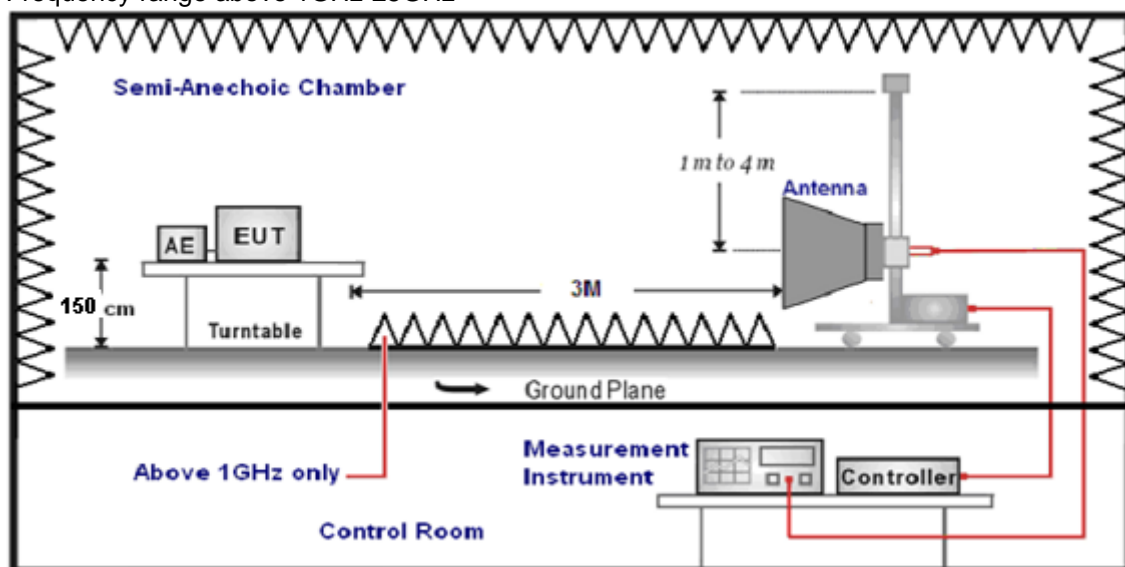
Frequency range 9 kHz – 30MHz



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 9 KHz –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 9KHz 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 tested at all modes at the antenna single transmitting mode in AC 120V/60Hz, and recorded the worst data at the antenna single transmitting mode.

For 9 KHz-30MHz

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

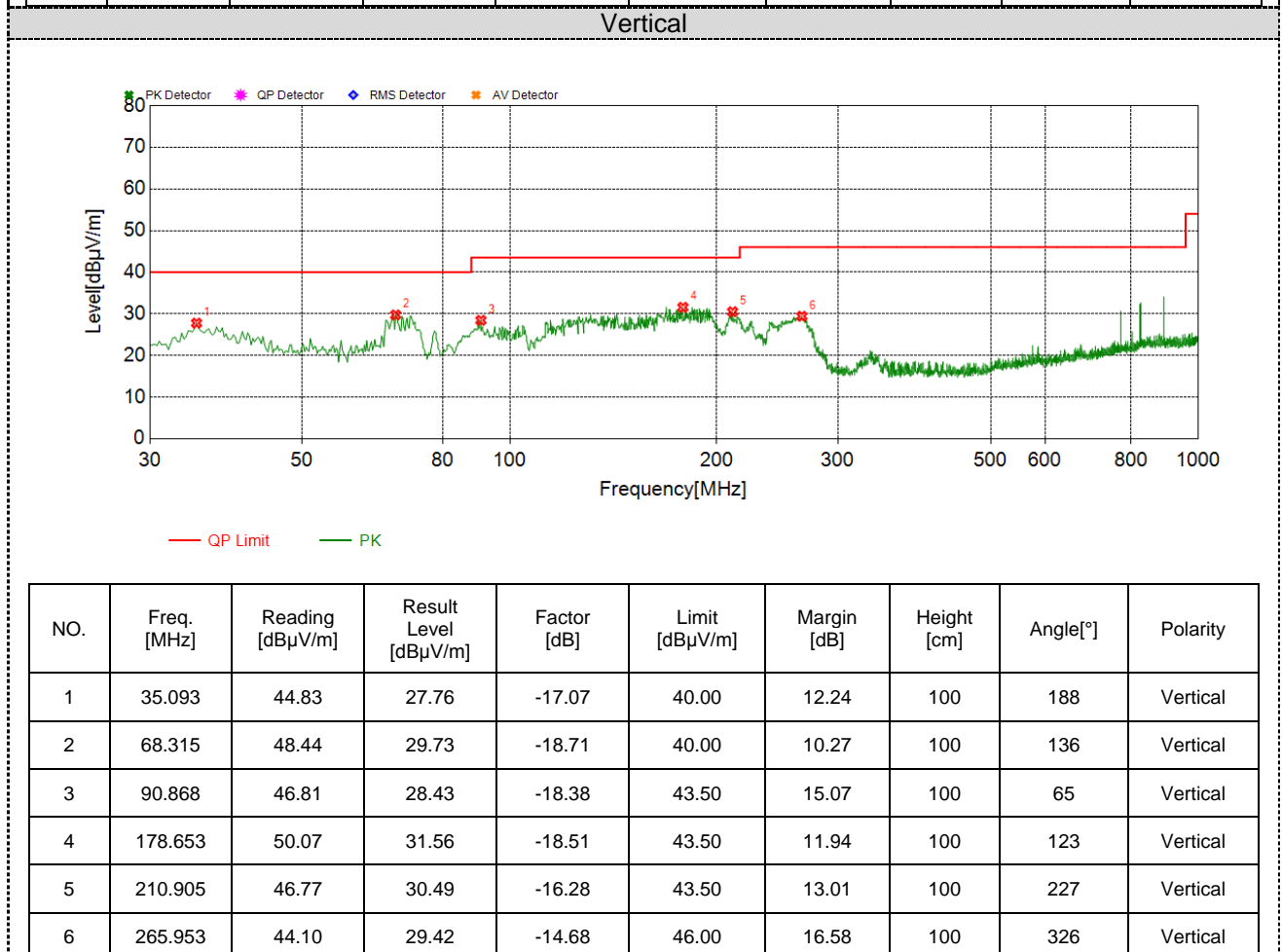
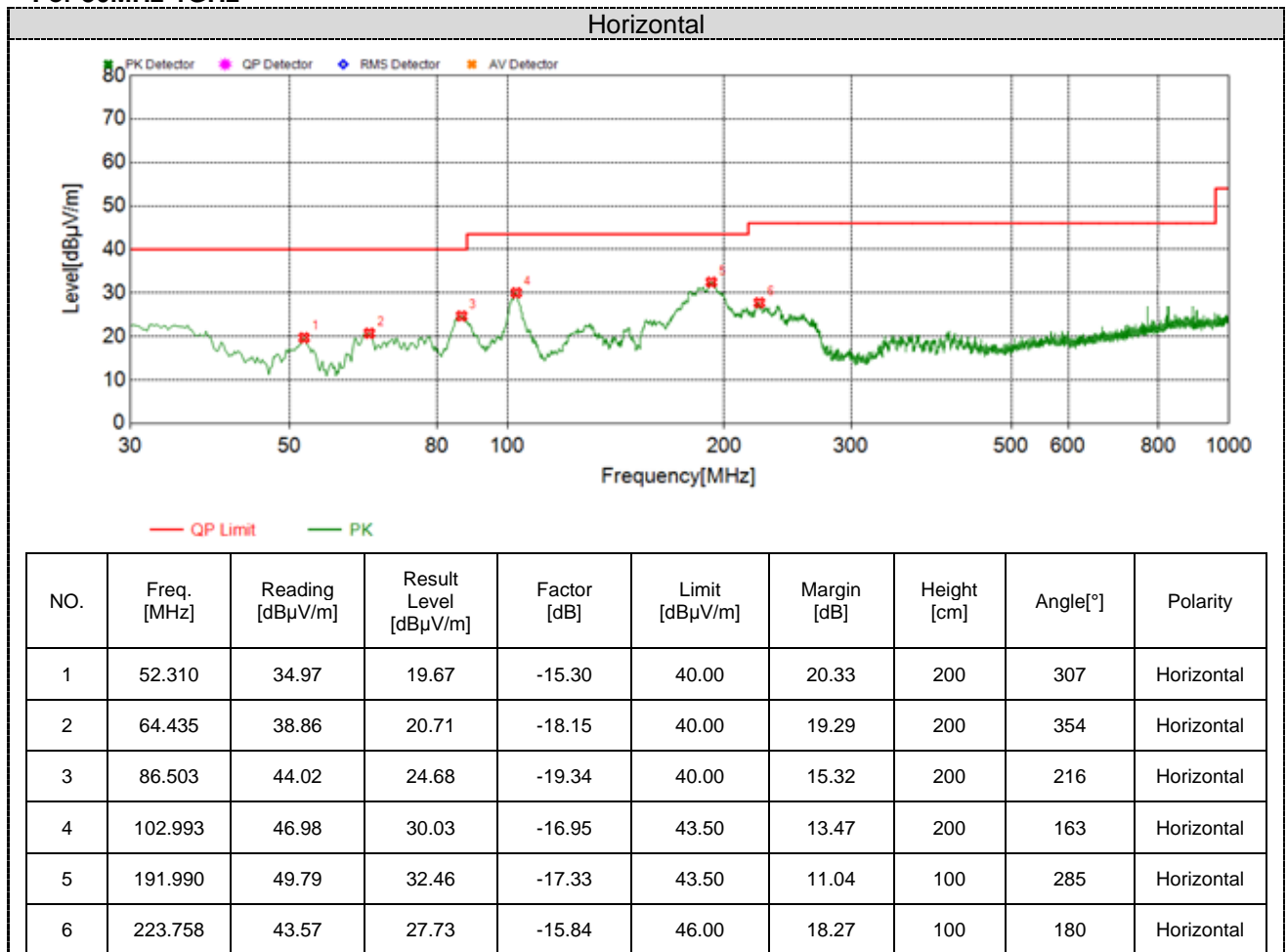
Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

For 30MHz-1GHz



For 1GHz to 25GHz

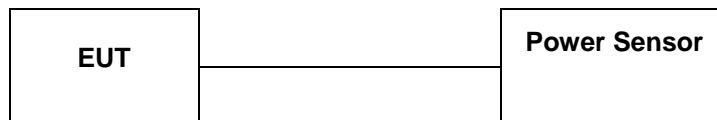
Polar (H/V)	Frequency	Meter Reading	Antenna Factor	Cable loss	Preamp factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
802.11b-2412MHz									
V	4824	36.48	30.28	7.01	26.63	47.14	74	-26.86	Pk
H	4824	35.29	30.28	7.01	26.63	45.95	74	-28.05	PK
V	7236	28.15	36.59	8.91	24.98	48.67	74	-25.33	Pk
H	7236	27.56	36.59	8.91	24.98	48.08	74	-25.92	PK
802.11b-2437MHz									
V	4874	36.29	30.36	7.62	26.63	47.64	74	-26.36	Pk
H	4874	35.48	30.36	7.62	26.63	45.63	74	-28.37	PK
V	7311	26.96	36.61	8.84	24.98	47.85	74	-26.15	Pk
H	7311	26.37	36.61	8.84	24.98	48.33	74	-25.67	PK
802.11b-2462MHz									
V	4924	36.45	30.43	7.94	26.63	48.19	74	-25.81	Pk
H	4924	35.18	30.43	7.94	26.63	46.92	74	-27.08	PK
V	7386	28.41	36.78	8.45	24.98	48.66	74	-25.34	Pk
H	7386	27.24	36.78	8.45	24.98	47.49	74	-26.51	PK

REMARKS:

1. Emission level (dBuV/m) = Meter Reading+ antenna Factor+ cable loss- preamp factor
2. Margin value = Emission level-Limits
3. -- Mean the PK detector measured value is below average limit.
4. The other emission levels were very low against the limit.
5. If the PK measured levels comply with average limit, then the average level were deemed to comply with average 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.

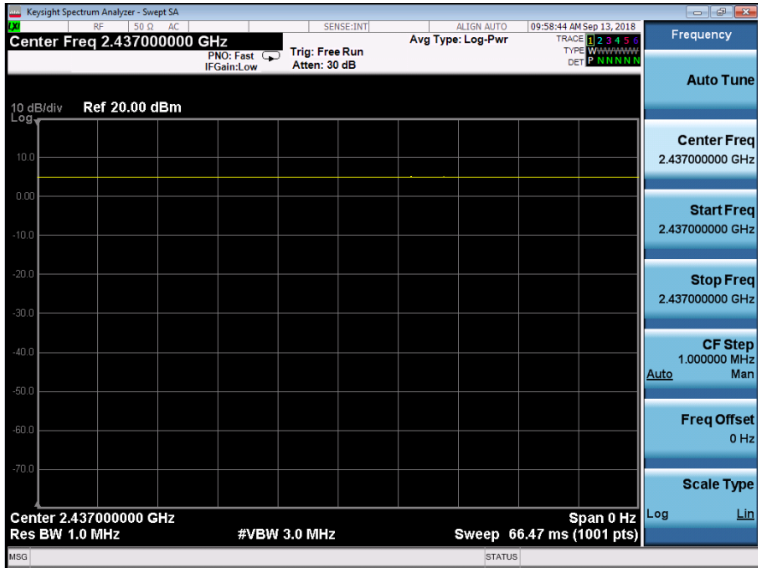
LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

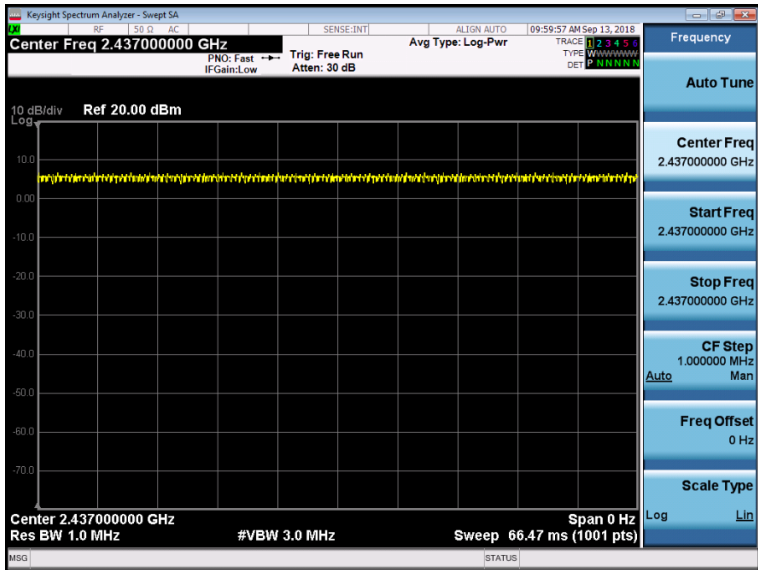
TEST RESULTS

Type	Channel	Output power PK (dBm)	Limit (dBm)	Result
802.11b	01	7.89	30.00	Pass
	06	8.29		
	11	7.45		
802.11g	01	7.38	30.00	Pass
	06	7.43		
	11	7.21		
802.11n(HT20)	01	7.29	30.00	Pass
	06	7.31		
	11	7.26		

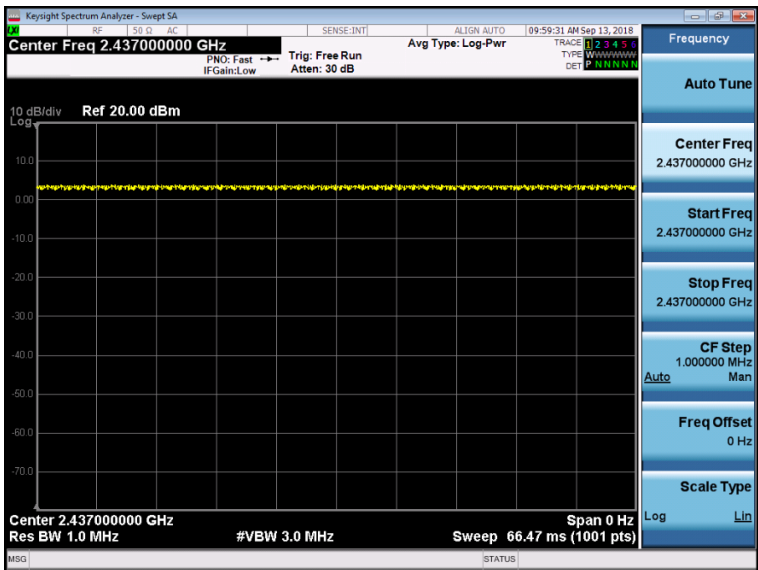
Note: 1.The test results including the cable lose.
Duty cycle used in all test items: 100%.



802.11b-2437MHz



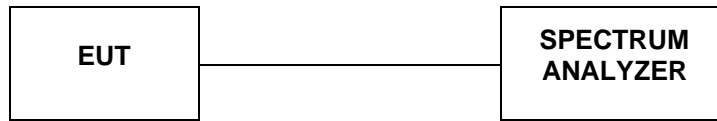
802.11g-2437MHz



802.11n20-2437MHz

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.

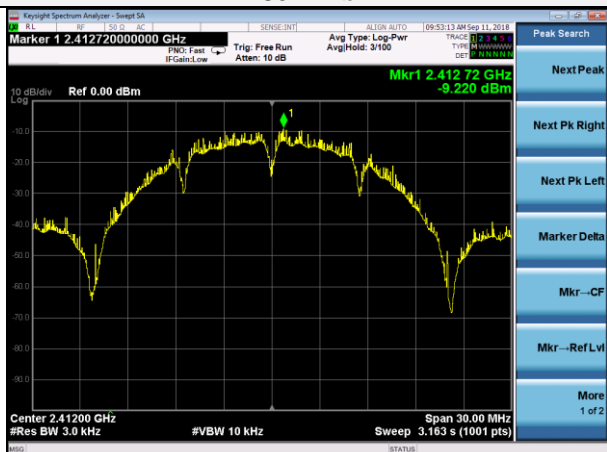
LIMIT

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.

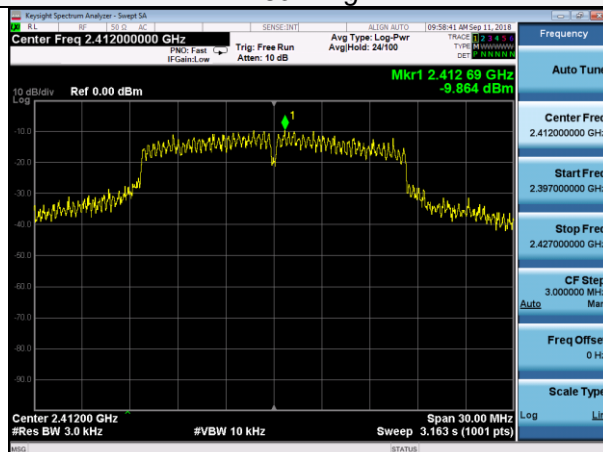
TEST RESULTS

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-9.220	8.00	Pass
	06	-8.230		
	11	-8.609		
802.11g	01	-9.864	8.00	Pass
	06	-10.359		
	11	-9.981		
802.11n(HT20)	01	-9.136	8.00	Pass
	06	-9.822		
	11	-9.500		

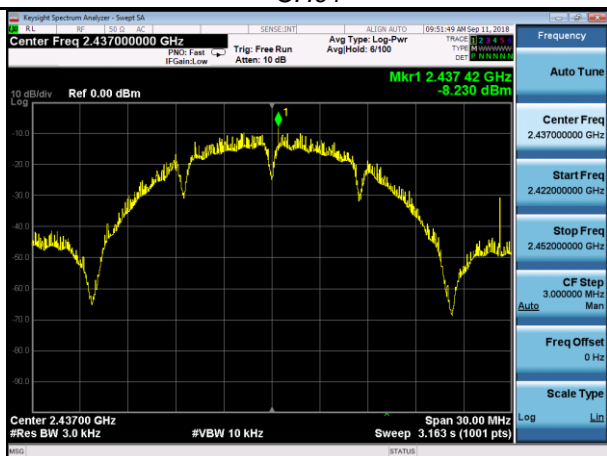
802.11b



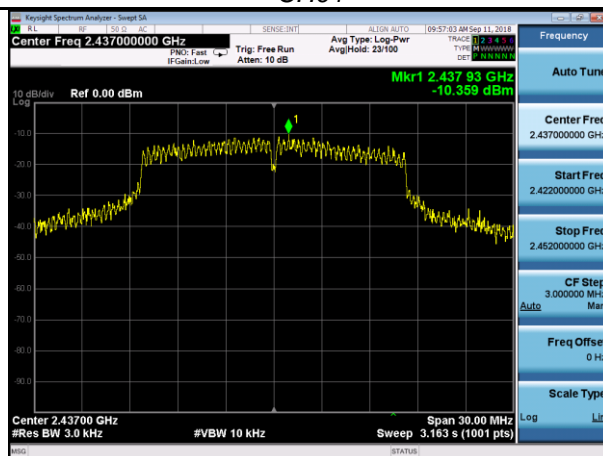
802.11g



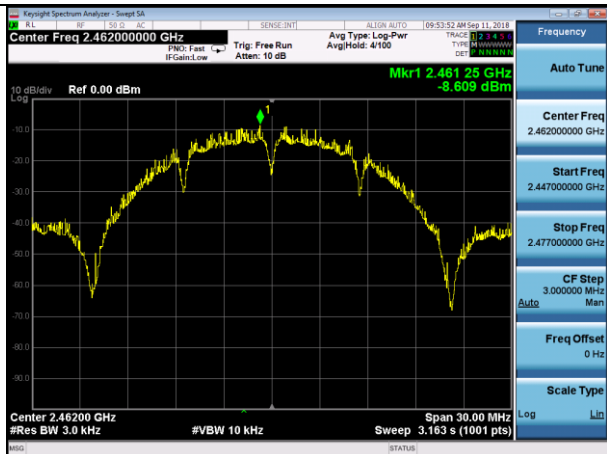
CH01



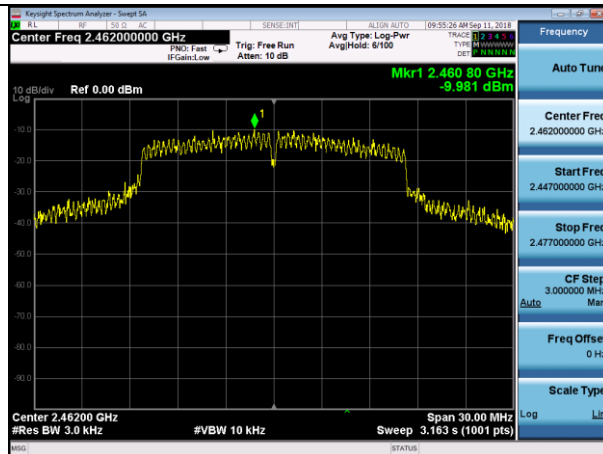
CH01



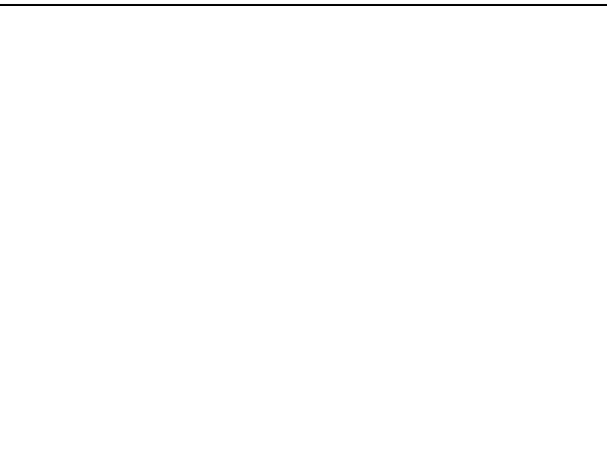
CH06



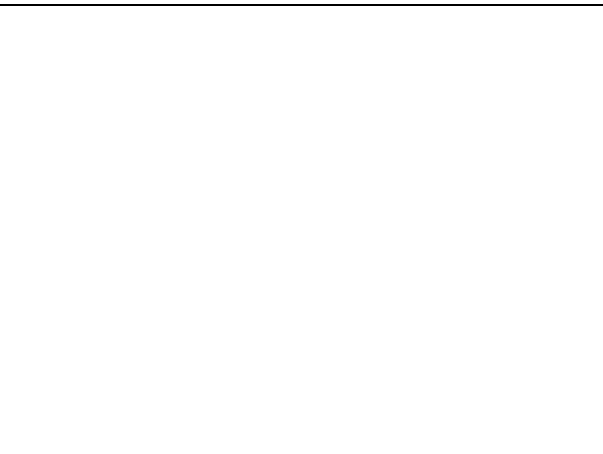
CH06

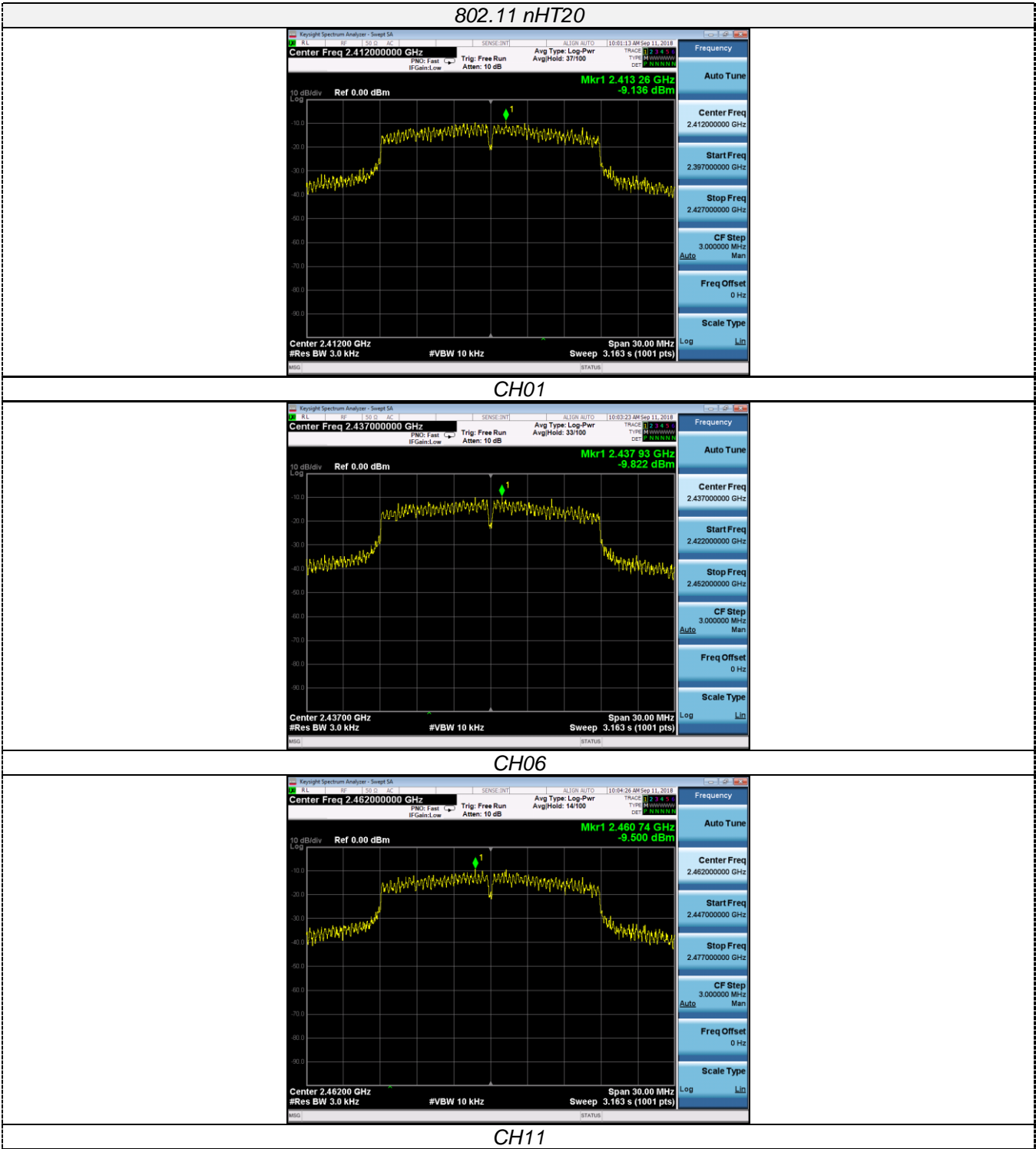


CH11



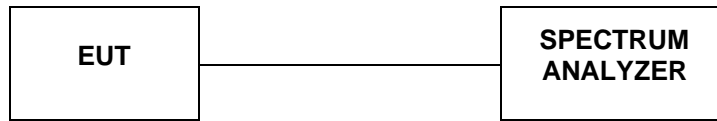
CH11





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

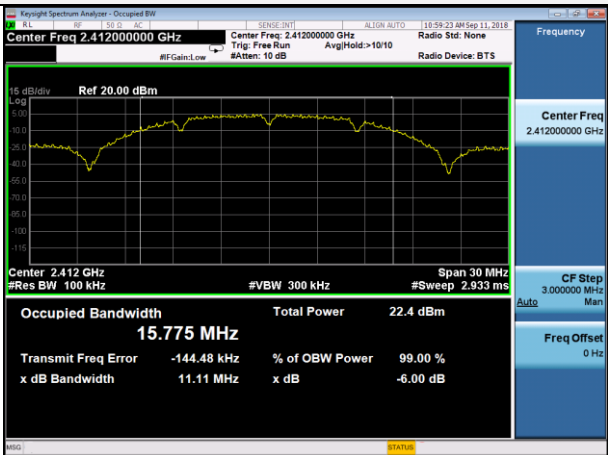
For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

TEST RESULTS

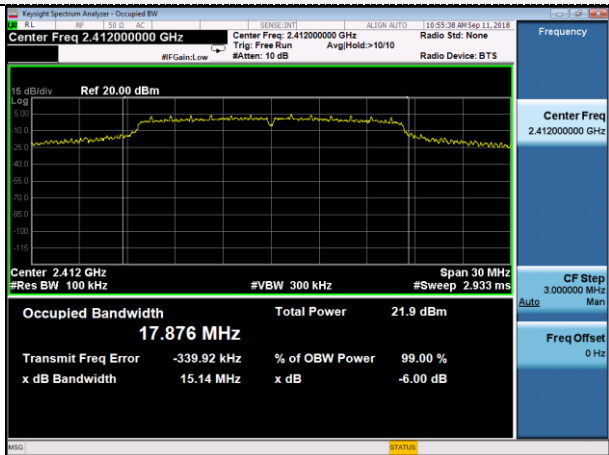
Antenna 1

Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11b	01	11.11	≥ 500	Pass
	06	11.09		
	11	12.06		
802.11g	01	15.14	≥ 500	Pass
	06	15.13		
	11	15.73		
802.11nHT20	01	16.06	≥ 500	Pass
	06	15.13		
	11	15.14		

802.11b

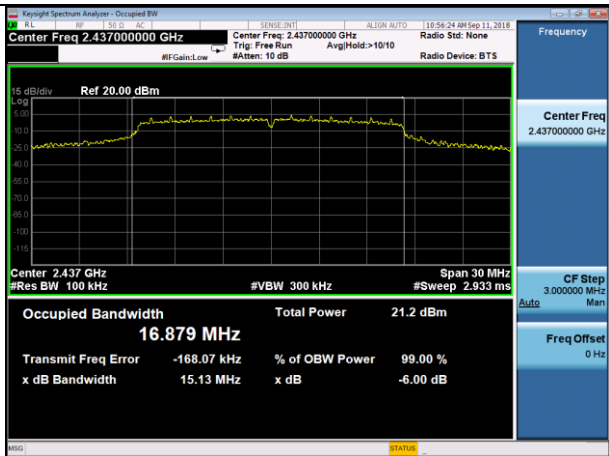


802.11g



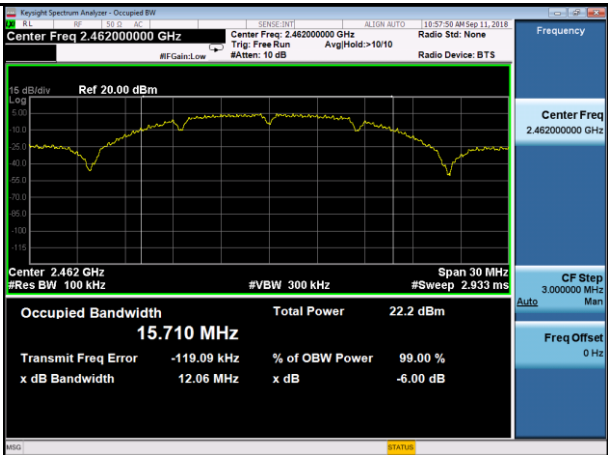
CH01

CH01



CH06

CH06



CH11

CH11



CH06

Keysight Spectrum Analyzer - Occupied BW

Center Freq 2.462000000 GHz

Center Freq: 2.462000000 GHz

Trig: Free Run

Avg/Hold: >10/10

Radio Std: None

#IFGain: Low

#Atten: 10 dB

Radio Device: BTS

10:53:10 AM Sep 11, 2018

15 dB/div

Ref 20.00 dBm

Log

5.00

-10.0

-25.0

-40.0

-55.0

-70.0

-85.0

-100

-115

Center 2.462 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 30 MHz

#Sweep 2.933 ms

Occupied Bandwidth

18.587 MHz

Total Power

22.2 dBm

Transmit Freq Error

-260.80 kHz

% of OBW Power

99.00 %

x dB Bandwidth

15.14 MHz

x dB

-6.00 dB

Frequency

Center Freq

2.462000000 GHz

CF Step

3.000000 MHz

Auto

Man

Freq Offset

0 Hz

MSG

STATUS

CH11

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

Remark: We tested all modes at the antenna single transmitting mode , and recored the worst data at the antenna single transmitting mode.

4.6.1 For Radiated Bandedge Measurement

Frequency	Meter Reading	antenna Factor	cable loss	preamp factor	Level	Limit	Margin	Polar	Result
(MHz)	(dBμV)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	[dB]	(H/V)	
802.11b									
2390	44.85	27.72	3.36	26.32	49.61	74	-24.39	V	Pass
2483.5	45.32	27.79	3.48	26.34	50.25	74	-23.75	V	Pass
2390	43.29	27.72	3.36	26.32	48.05	74	-25.95	H	Pass
2483.5	42.76	27.79	3.48	26.34	47.69	74	-26.31	H	Pass
802.11g									
2390	42.52	27.72	3.36	26.32	47.28	74	-26.72	V	Pass
2483.5	43.58	27.79	3.48	26.34	48.51	74	-25.49	V	Pass
2390	41.19	27.72	3.36	26.32	45.95	74	-28.05	H	Pass
2483.5	40.26	27.79	3.48	26.34	45.19	74	-28.81	H	Pass
802.11n20									
2390	40.25	27.72	3.36	26.32	45.01	74	-28.99	V	Pass
2483.5	40.07	27.79	3.48	26.34	45.00	74	-29.00	V	Pass
2390	41.08	27.72	3.36	26.32	45.84	74	-28.16	H	Pass
2483.5	40.86	27.79	3.48	26.34	45.79	74	-28.21	H	Pass

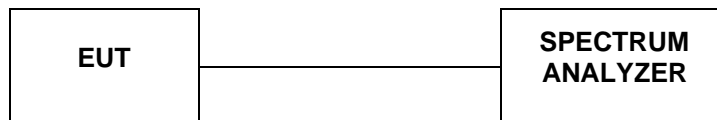
The figure displays six Keysight Spectrum Analyzer screenshots arranged in a 4x2 grid. Each screenshot shows a frequency response plot with a yellow trace, a table of measurement data, and a right-hand control panel. The components are labeled as follows:

- 802.11b-2412**: Start Freq 2.310000000 GHz, Stop Freq 2.420000000 GHz, Mkr1 2.411 53 GHz, 4.433 dBm.
- 802.11b-2462**: Start Freq 2.450000000 GHz, Stop Freq 2.500000000 GHz, Mkr1 2.461 50 GHz, 4.357 dBm.
- 802.11g-2412**: Start Freq 2.310000000 GHz, Stop Freq 2.420000000 GHz, Mkr1 2.413 29 GHz, 3.599 dBm.
- 802.11g-2462**: Start Freq 2.450000000 GHz, Stop Freq 2.500000000 GHz, Mkr1 2.463 25 GHz, 3.478 dBm.
- 802.11n HT20-2412**: Start Freq 2.310000000 GHz, Stop Freq 2.420000000 GHz, Mkr1 2.413 29 GHz, 3.498 dBm.
- 802.11n HT20-2462**: Start Freq 2.450000000 GHz, Stop Freq 2.500000000 GHz, Mkr1 2.463 25 GHz, 3.529 dBm.

Each plot includes a table of measurement data with columns: MNR, MODE, TRC, SCL, X, Y, FUNCTION, FUNCTION WIDTH, and FUNCTION VALUE. The right-hand control panel includes buttons for Auto Tune, Center Freq, Start Freq, Stop Freq, CF Step, Freq Offset, Scale Type, and Log/Linear scale selection.

4.7. Spurious RF Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

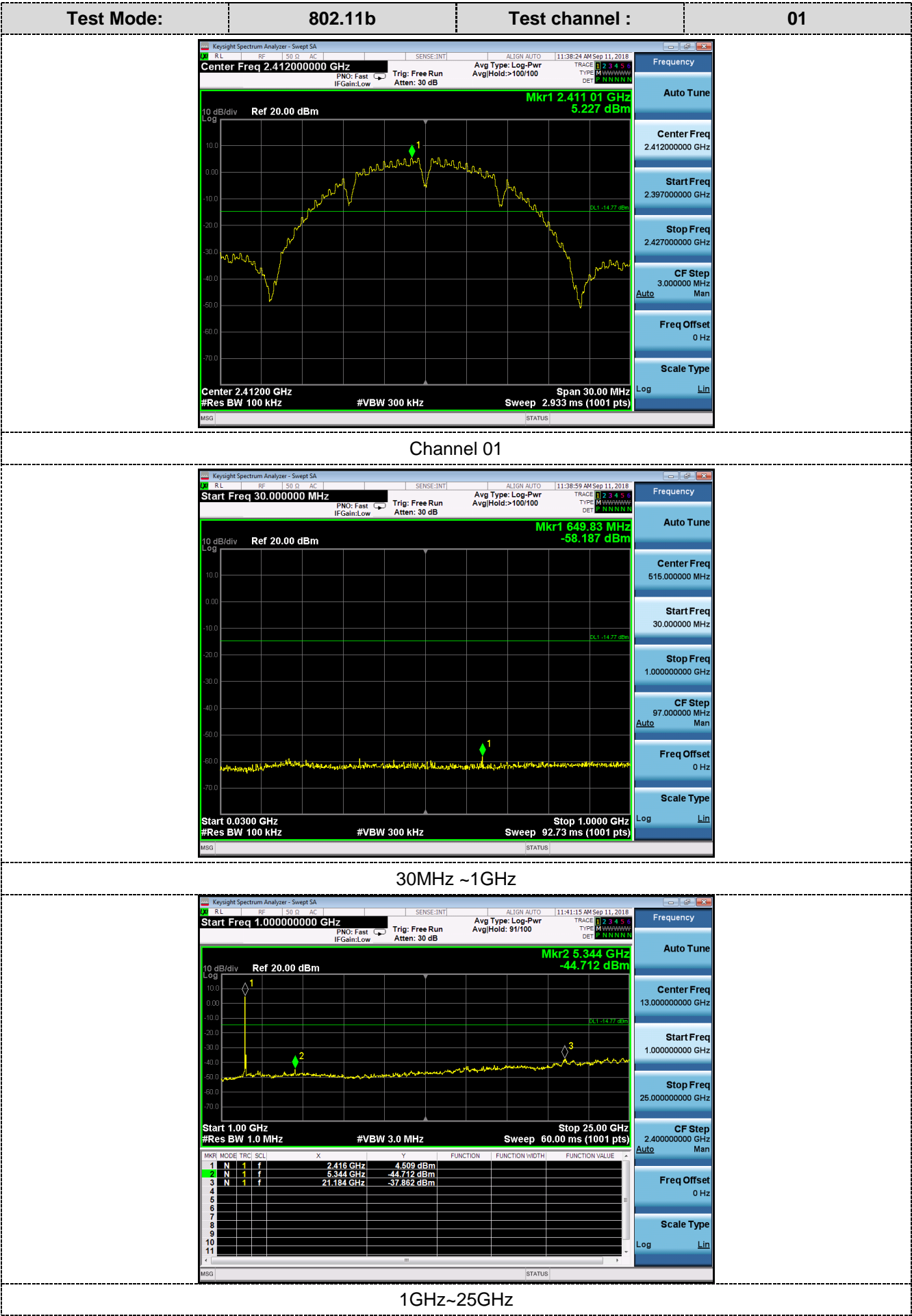
The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013, For 9KHz-150kHz, Set RBW=1kHz and VBW= 3KHz;For 150KHz-10MHz, Set RBW=10kHz and VBW= 30KHz;For 10MHz-25GHz ,Set RBW=100kHz and VBW= 300KHz in order to measure the peak field strength, and measure frequency range from 9KHz to 25GHz.

LIMIT

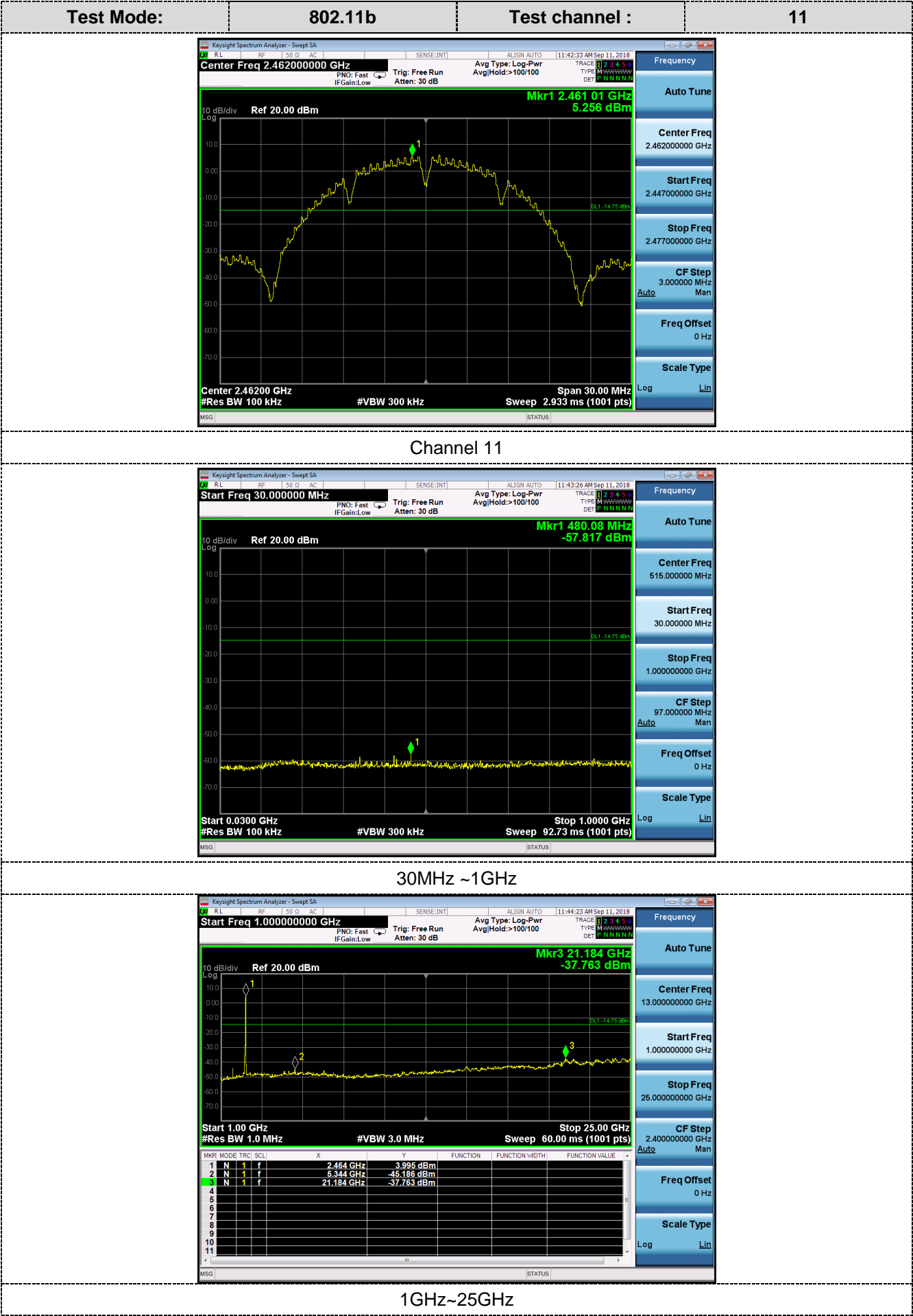
1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.
3. For below 30MHz, For 9KHz-150kHz, 150K-10MHz, We use the RBW 1KHz, 10KHz, So the limit need to be calculated by " $10\lg(BW1/BW2)$ ". for example For 9KHz-150kHz, RBW 1KHz, The Limit= the highest emission level-20-10log(100/1)= the highest emission level-40.

TEST RESULTS

Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and high channels were tested, the worst was the 802.11b mode and record the test plot at this report.







4.8. Antenna Requirement

Standard Applicable

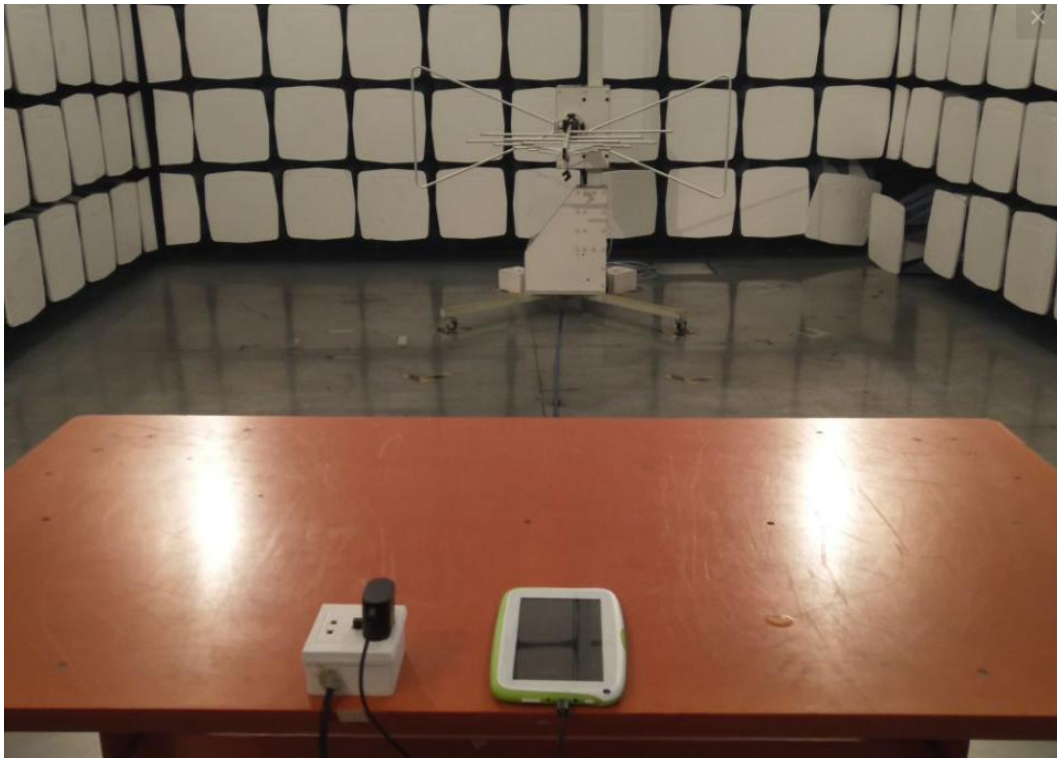
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

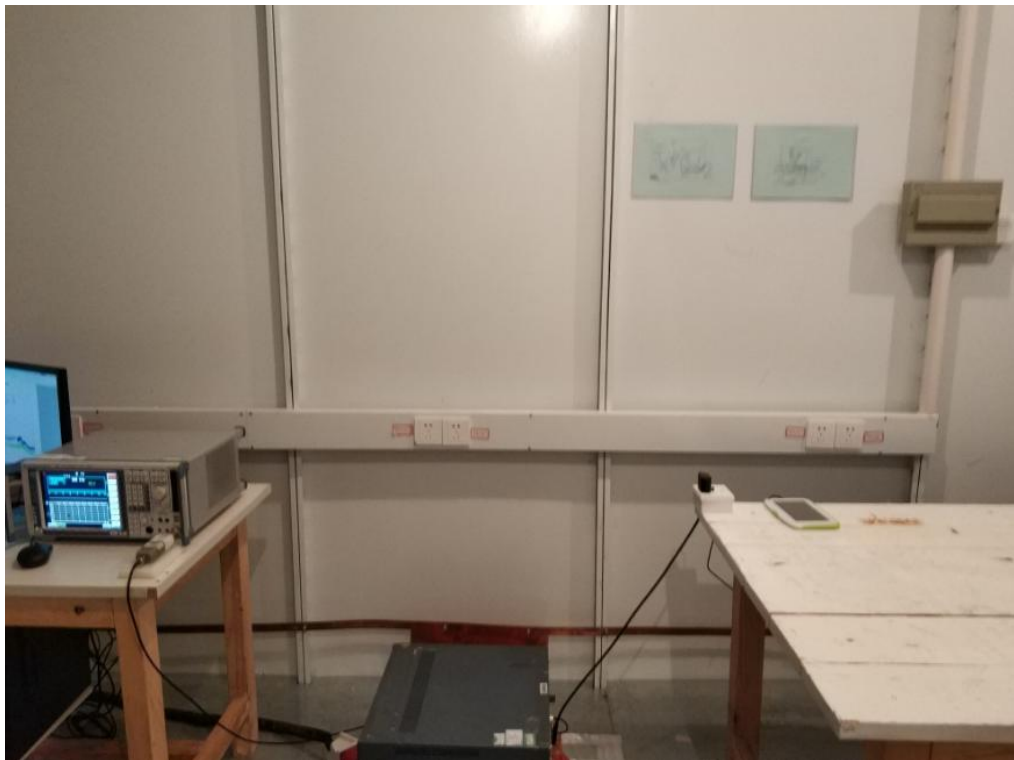
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Test Result

The antenna used for this product is Internal Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 1.28dBi.

5. Test Setup Photos of the EUT





6. External and Internal Photos of the EUT

Reference to the test report No. GTSR18092031-BT.

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