



Part 15C

TEST REPORT

Product Name	Access Router
Model Name	AR169-P-M9
FCC ID	QIS-AR169PM9
Client	Huawei Technologies Co., Ltd
Manufacturer	Huawei Technologies Co., Ltd
Date of issue	July 22, 2015

TA Technology (Shanghai) Co., Ltd.

TA Technology (Shanghai) Co., Ltd.
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GENERAL SUMMARY

Reference Standard(s)	<p>FCC CFR47 Part 15C (2013) Radio Frequency Devices</p> <p>15.205 Restricted bands of operation;</p> <p>15.207 Conducted limits;</p> <p>15.209 Radiated emission limits; general requirements;</p> <p>15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz.</p> <p>ANSI C63.4 Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 KHz to 40GHz. (2009)</p> <p>KDB 558074 D01 DTS Meas Guidance v03r03 Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247</p>
Conclusion	<p>This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 2 of this test report are below limits specified in the relevant standards.</p> <p>General Judgment: Pass</p>
Comment	<p>The test result only responds to the measured sample.</p>

Approved by Kai Xu
Kai Xu
Director

Revised by Lingling Kang
Lingling Kang
RF Manager

Performed by Changxu Wan
Changxu Wan
RF Engineer

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1. General Information

1.1. Notes of the test report

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L2264.

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 428261.

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 8510A.

TA Technology (Shanghai) Co., Ltd. guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

TA Technology (Shanghai) Co., Ltd. is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the items under test and the results of the test. This report only refers to the item that has undergone the test.

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of **TA Technology (Shanghai) Co., Ltd.**

If the electronic report is inconsistent with the printed one, it should be subject to the latter.

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1.2. Testing laboratory

Company: TA Technology (Shanghai) Co., Ltd.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City: Shanghai
Post code: 201201
Country: P. R. China
Contact: Xu Kai
Telephone: +86-021-50791141/2/3
Fax: +86-021-50791141/2/3-8000
Website: <http://www.ta-shanghai.com>
E-mail: xukai@ta-shanghai.com

1.3. Applicant Information

Company: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R. China

1.4. Manufacturer Information

Company: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R. China

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1.5. Information of EUT

General information

Product IMEI:	/
Hardware Version:	VER.D
Software Version:	V200R006C10B350
Antenna Type:	External Antenna
Antenna Connector:	RP-SMA-J(meet with the standard FCC Part 15.203 requirement)
Device Operating Configurations:	
Test Mode	Bluetooth(Low Energy)
Modulation Type:	GFSK
Packet Type:(Maximum Payload)	1Mbps
Max. Conducted Power	8.34dBm
Power Supply:	Charger (AC Adapter)
Operating Frequency Range(s)	2400 ~ 2483.5 MHz

1.6. Test Date

The test is performed from March 17, 2015 to March 22, 2015.

2. Test Information

2.1. Test Mode

During the process of the testing, The EUT is max power transmission with proper modulation.

EUT is stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.

Test Modes		
Band	Radiated Test Cases	Conducted Test Cases
Bluetooth(Low Energy)	Channel 19	Channel 0/19/39

Note: All modes of operation were investigated. The test results shown in the following sections represent the worst case emissions.

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2.2. Summary of test results

Number	Summary of measurements of results	Clause in FCC rules	Verdict
1	Peak Power Output -Conducted	15.247(b)(1)	PASS
2	Occupied Bandwidth (6dB)	15.247(a)(2)	PASS
3	Band Edge Compliance	15.247(d)	PASS
4	Power Spectral Density	15.247(e)	PASS
5	Spurious Radiated Emissions in the restricted band	15.247(d),15.205,15.209	PASS
6	Spurious RF Conducted Emissions	15.247(d)	PASS
7	Radiates Emission	15.247(d),15.205,15.209	PASS
8	AC Power Line Conducted Emission	15.207	PASS

2.3. Peak Power Output –Conducted

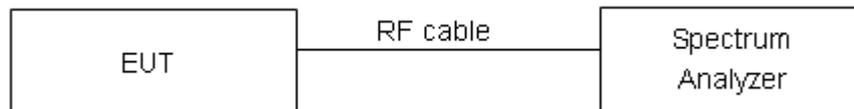
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

During the process of the testing, The EUT was connected to the spectrum analyzer with a known loss. The EUT is max power transmission with proper modulation. The peak detector is used. RBW is set to 2 MHz; VBW is set to 6 MHz. These measurements have been tested at following channels: 0, 19 and 39 of Bluetooth (Low Energy).

Test Setup



Limits

Rule Part 15.247 (b) (1) specifies that " For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts."

Peak Output Power	$\leq 0.125W$ (21dBm)
-------------------	-----------------------

Measurement Uncertainty

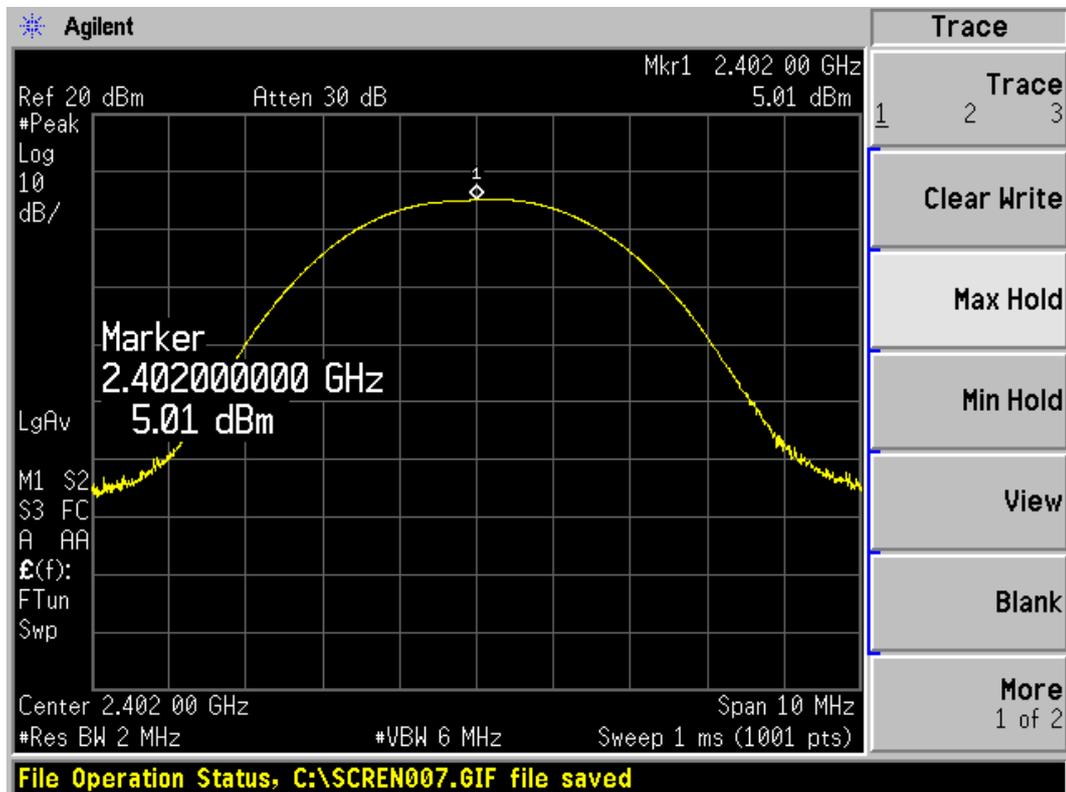
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.44$ dB.

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Test Results

Bluetooth (Low Energy)

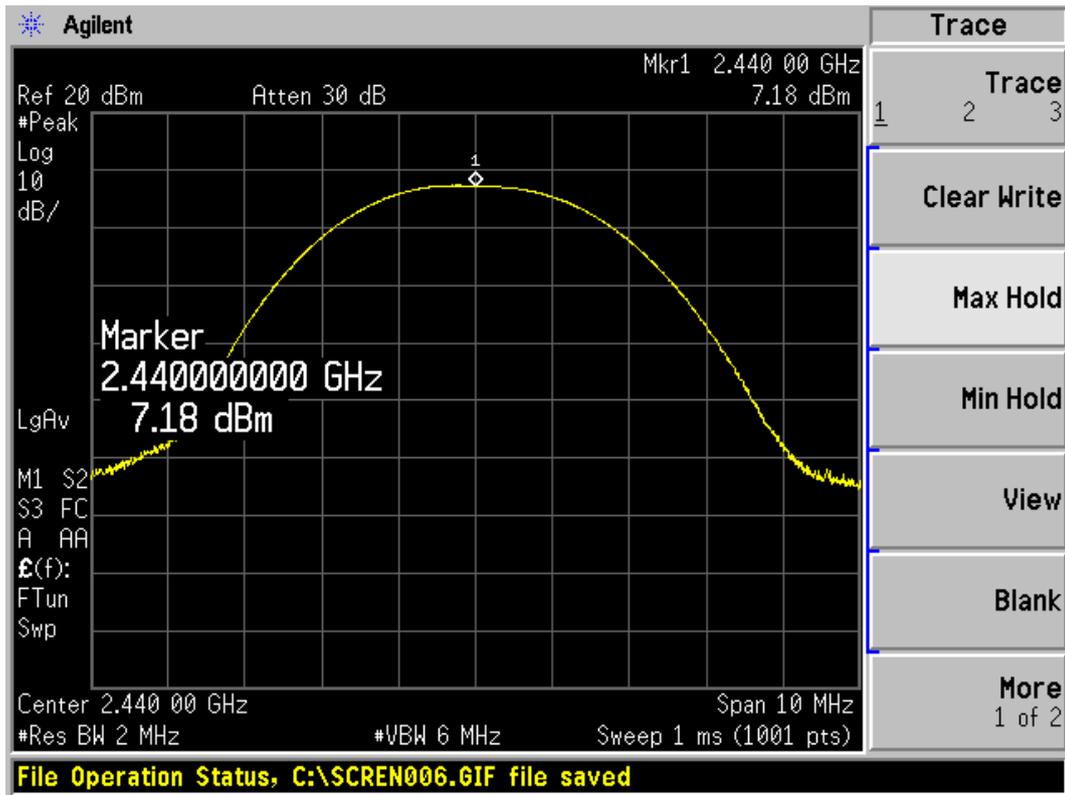
Channel	Frequency (MHz)	Peak Output Power (dBm)	Conclusion
		1Mbps	
0	2402	5.01	PASS
19	2440	7.18	PASS
39	2480	8.34	PASS



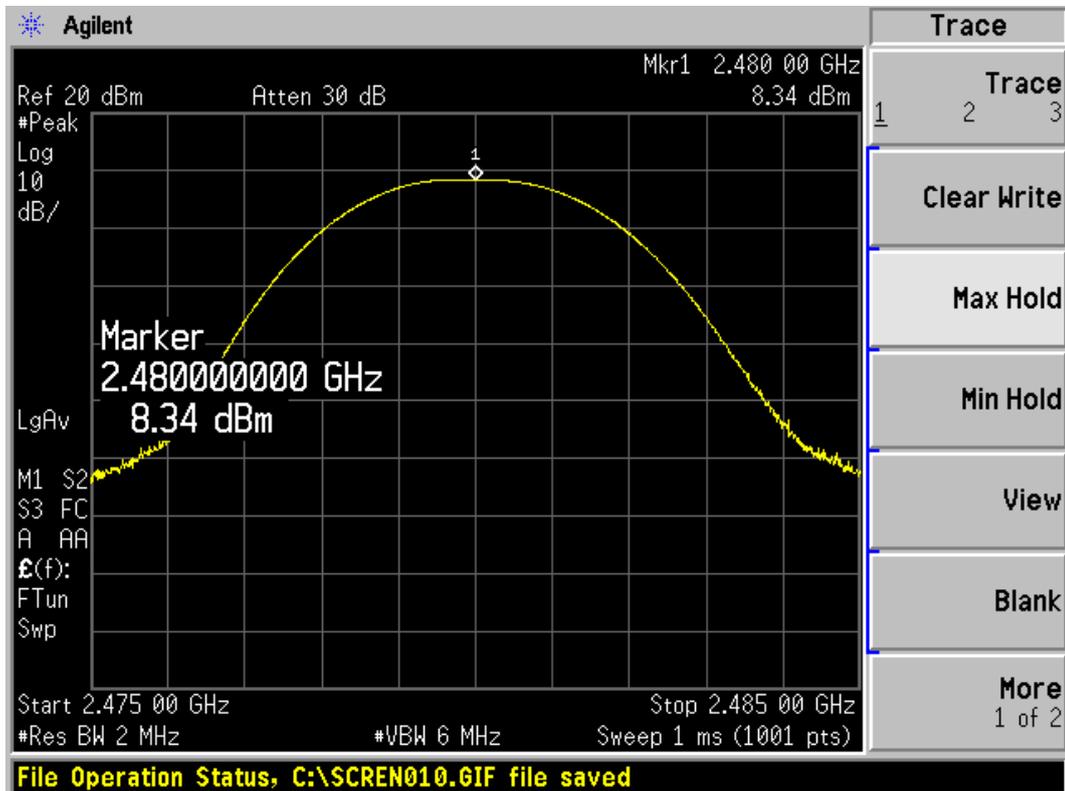
Carrier frequency (MHz): 2402

Channel No.:0

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Carrier frequency (MHz): 2440
Channel No.:19



Carrier frequency (MHz): 2480
Channel No.:39

2.4. 6dB Occupied Bandwidth

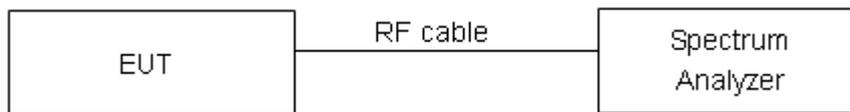
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer with a known loss. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 100 kHz, VBW is set to 300 kHz on spectrum analyzer.

Test Setup



Limits

Rule Part 15.247 (a) (2) specifies that “Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.”

minimum 6 dB bandwidth	≥ 500 kHz
------------------------	-----------

Measurement Uncertainty

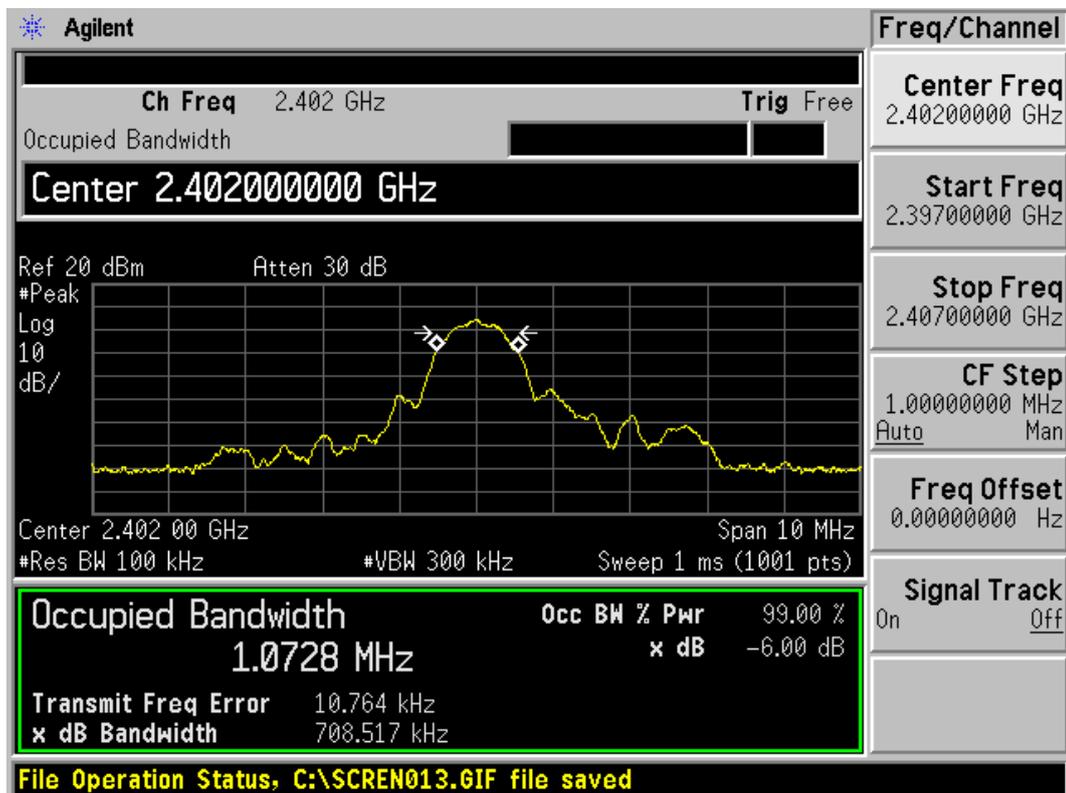
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 936$ Hz.

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Test Results:

Bluetooth (Low Energy)

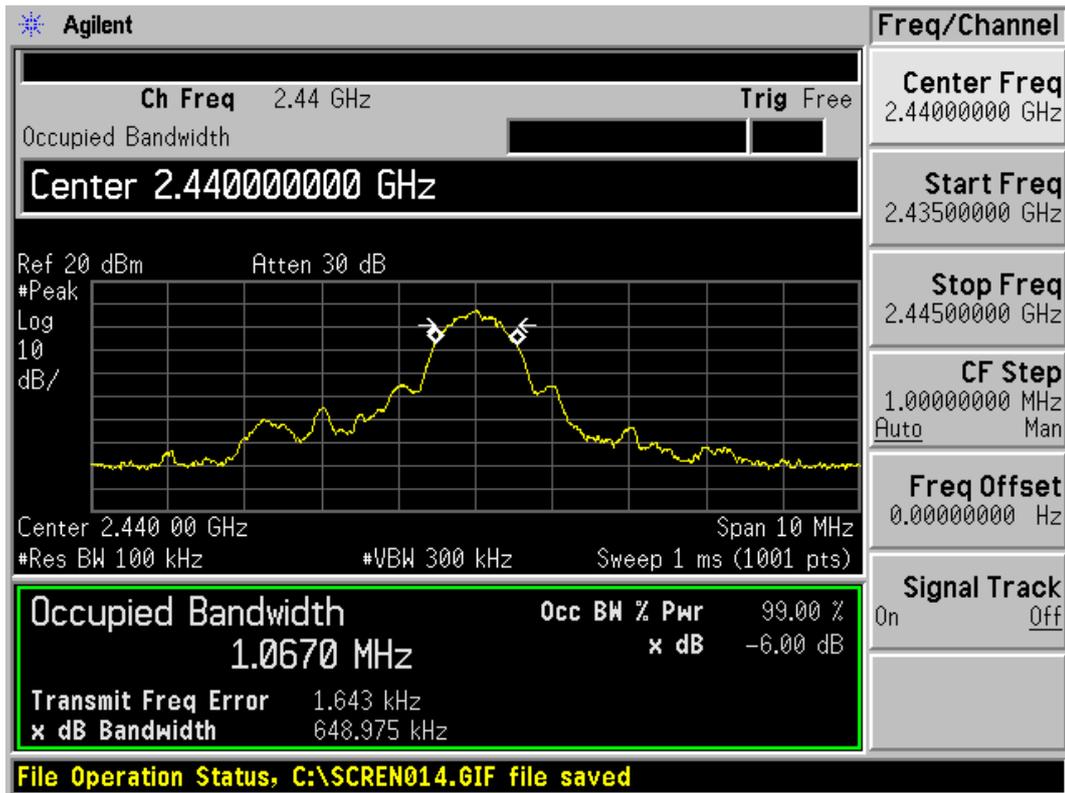
Channel	Frequency (MHz)	6dB Bandwidth (kHz)
0	2402	708.517
19	2440	648.975
39	2480	674.256



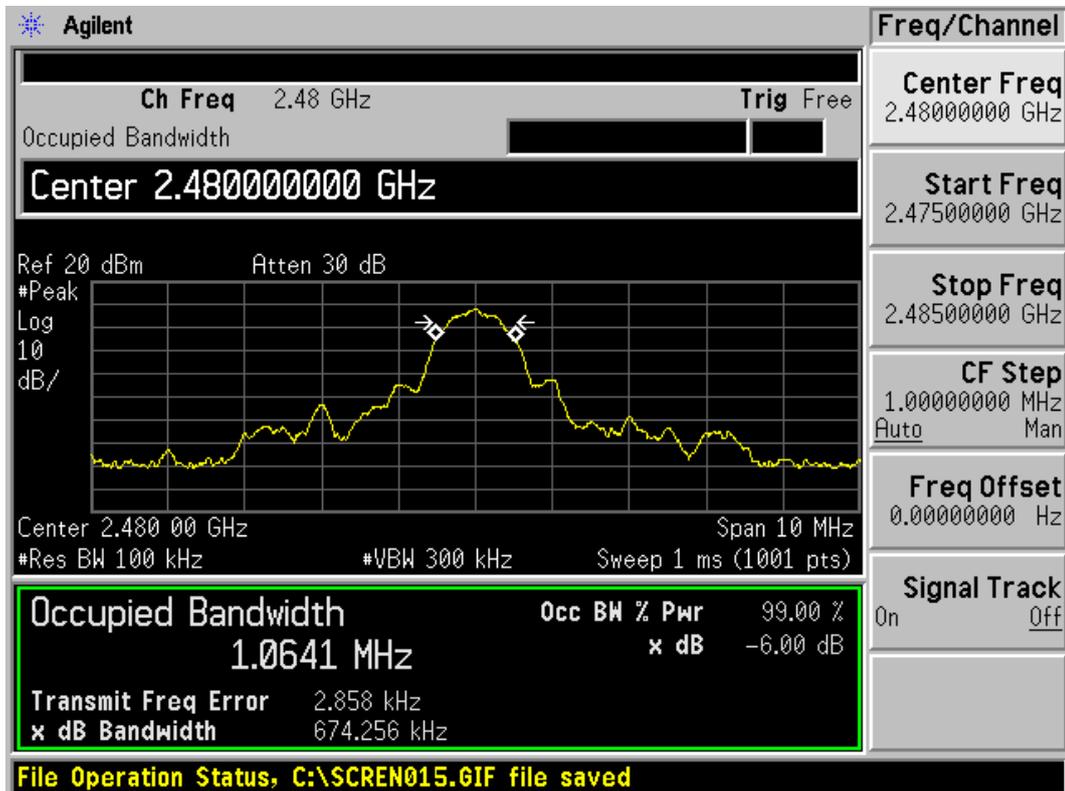
Carrier frequency (MHz): 2402

Channel No.:0

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Carrier frequency (MHz): 2440
Channel No.:19



Carrier frequency (MHz): 2480
Channel No.:39

2.5. Band Edge Compliance

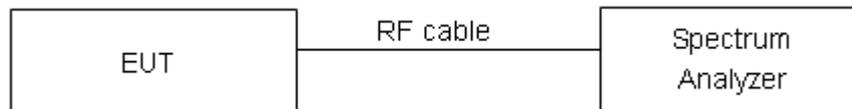
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer with a known loss. The lowest and highest channels were measured. The peak detector is used. RBW is set to 100 kHz and VBW is set to 300 kHz on spectrum analyzer.

Test Setup



Limits

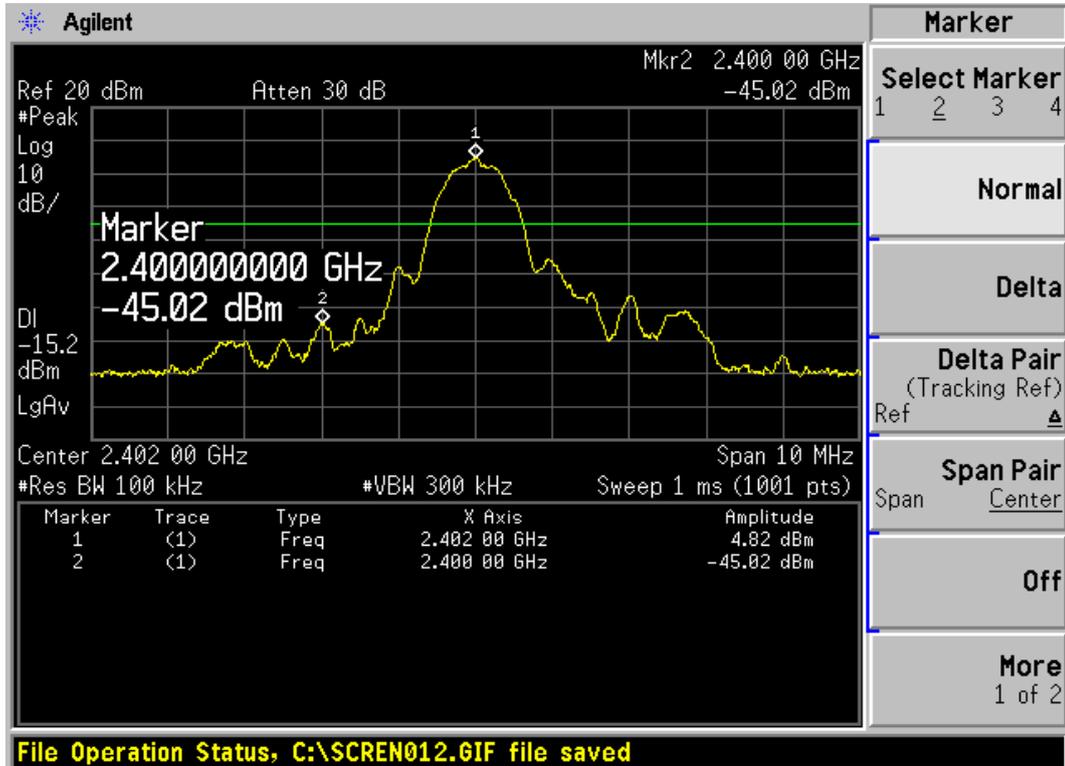
Rule Part 15.247(d) specifies that “In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth 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.”

Measurement Uncertainty

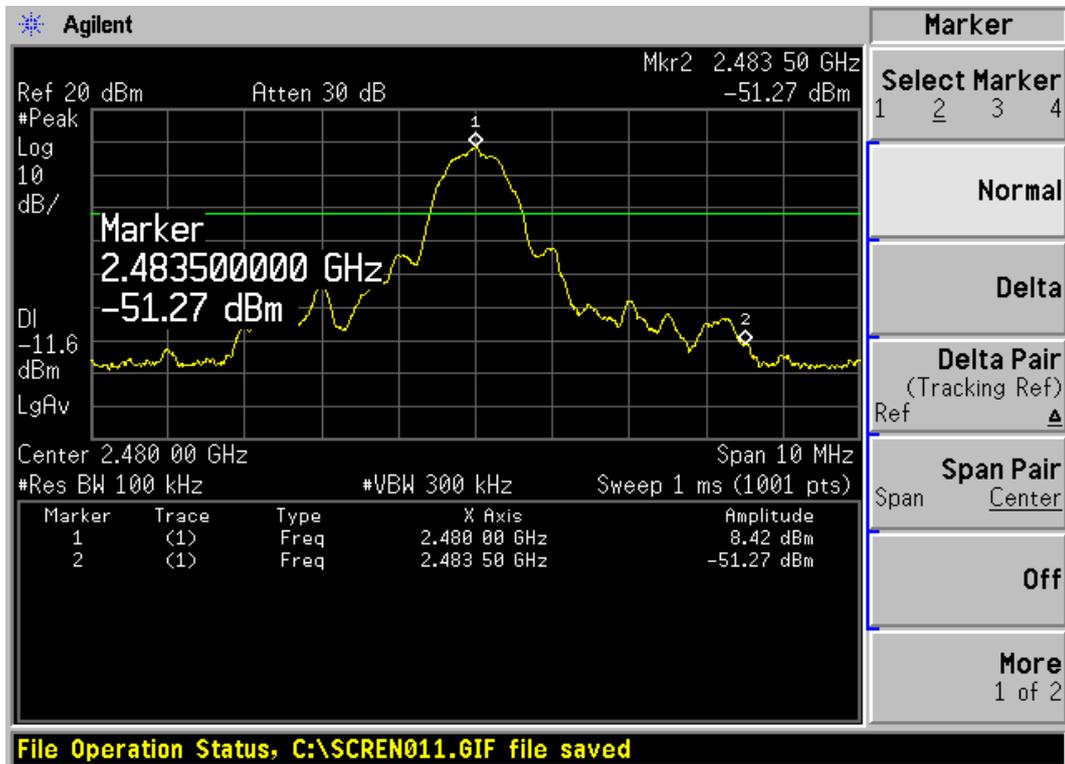
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

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Test Results: PASS
Low Energy



Carrier frequency (MHz): 2402
Channel No.:0



Carrier frequency (MHz): 2480
Channel No.:39

2.6. Power Spectral Density

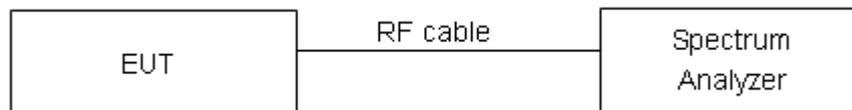
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer with a known loss. RBW is set to 100 kHz and VBW is set to 300 kHz on spectrum analyzer. Set the span to at least 1.5 times the Low Energy channel bandwidth. The peak power spectral density is recorded. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(3\text{ kHz}/100\text{kHz}) = -15.2\text{ dB}$.

Test setup



Limits

Rule Part 15.247(e) specifies that " 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. "

Limits	$\leq 8\text{ dBm} / 3\text{kHz}$
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Measurement Uncertainty

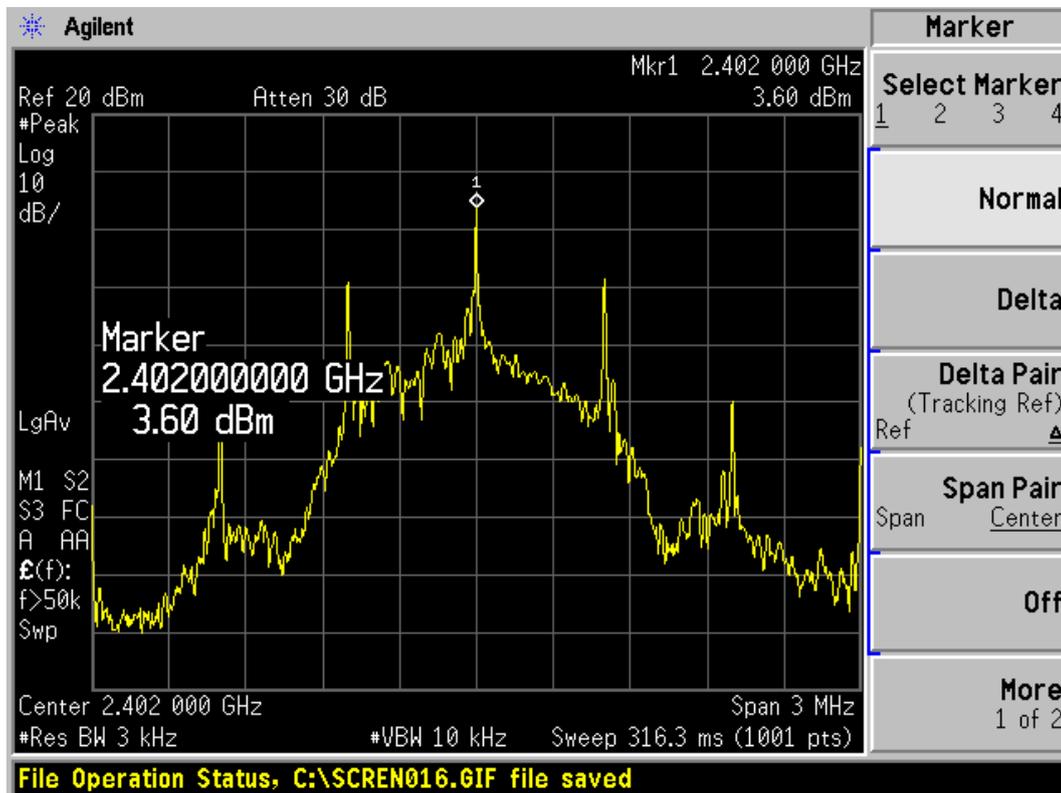
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.75\text{dB}$.

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Test Results:

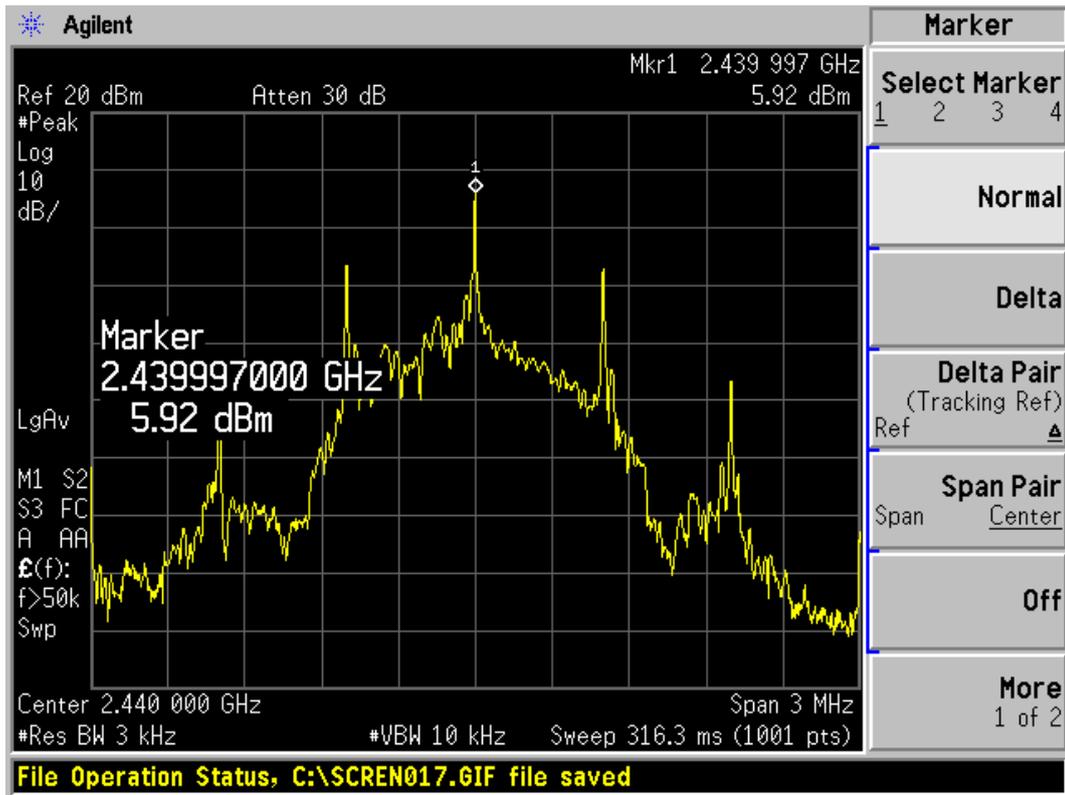
Bluetooth (Low Energy)

Channel Number	Power Spectral Density dBm / 3kHz	Conclusion
0	3.60	PASS
19	5.92	PASS
39	7.09	PASS

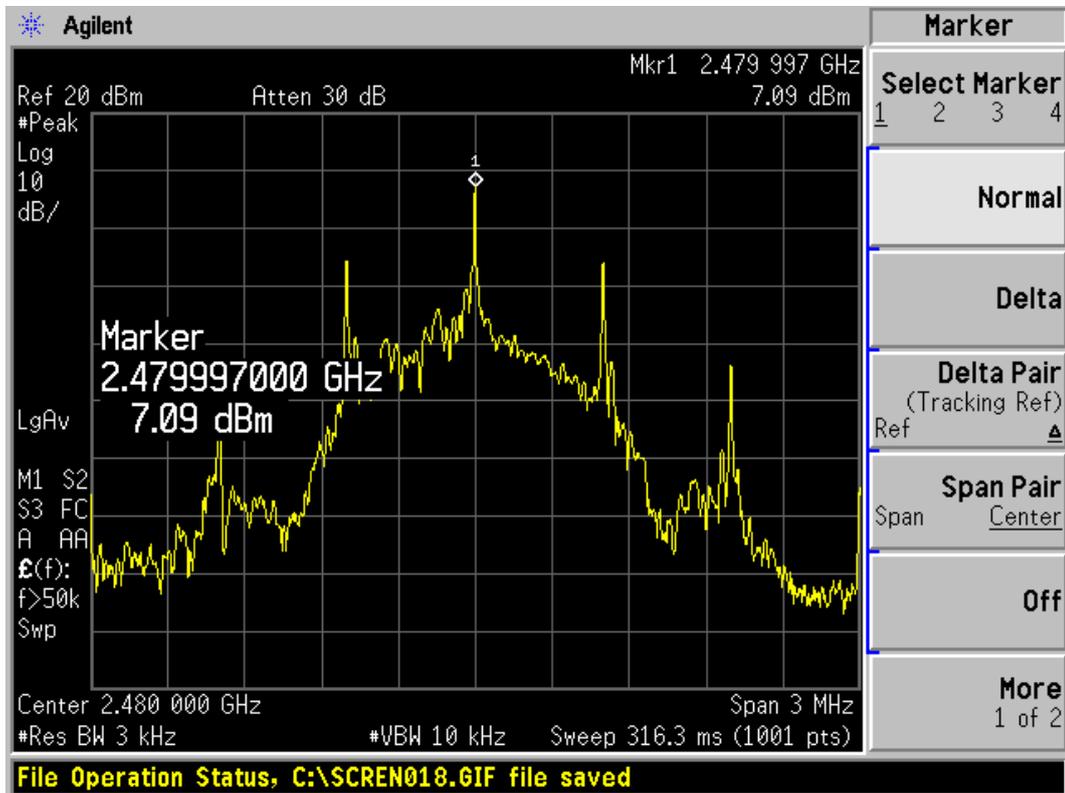


Low energy, Channel No.: 0

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Low energy, Channel No.: 19



Low energy, Channel No.: 39

2.7. Spurious Radiated Emissions in the Restricted Band

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

Set the spectrum analyzer in the following:

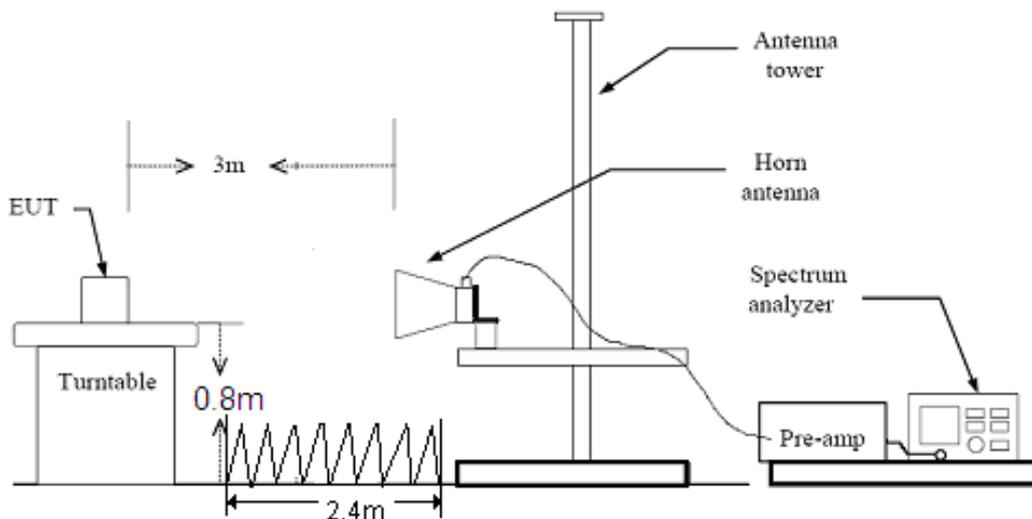
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) The dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit.

If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak- average correction factor, derived from the appropriate duty cycle calculation.

This setting method can refer to KDB 558074.

Test setup



Note: Area side: 2.4mX3.6m

Limits

Spurious Radiated Emissions are permitted in any of the frequency bands listed below:

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MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

Limit in restricted band

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above960	500	54

§15.35(b)

There is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

Peak Limit=74 dBuV/m

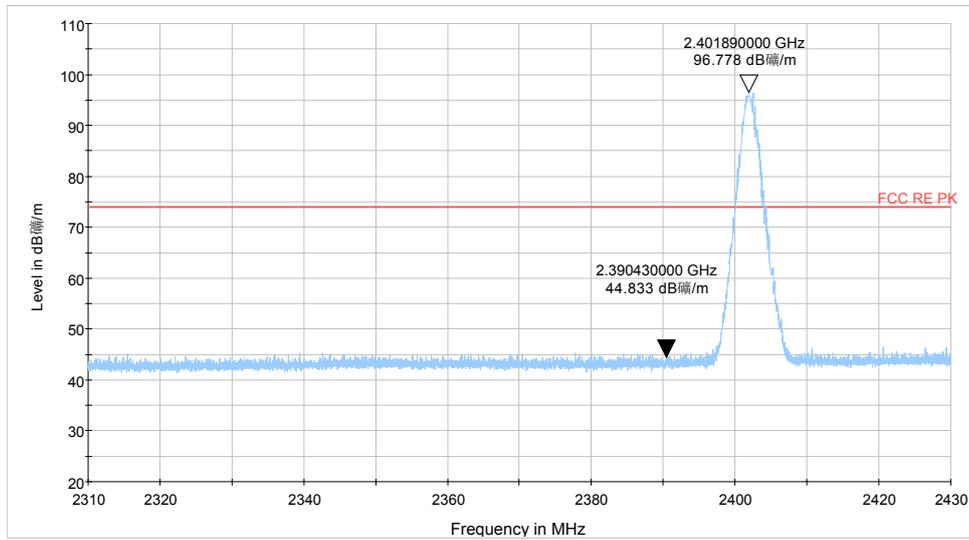
Average Limit=54 dBuV/m

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$, $U = 3.55$ dB.

Channel 0

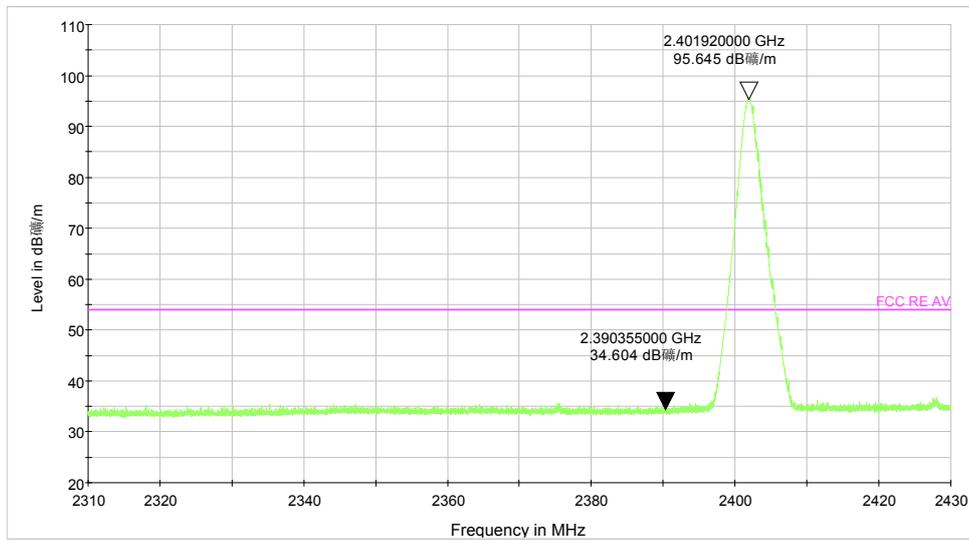
Peak



— FCC RE PK — Preview Result 1-PK+ * Data Reduction Result 1 [2]-PK+

Note: The signal beyond the limit is carrier, a font (Level in dBμV/m) in the test plot =(level in dBuV/m)

Average

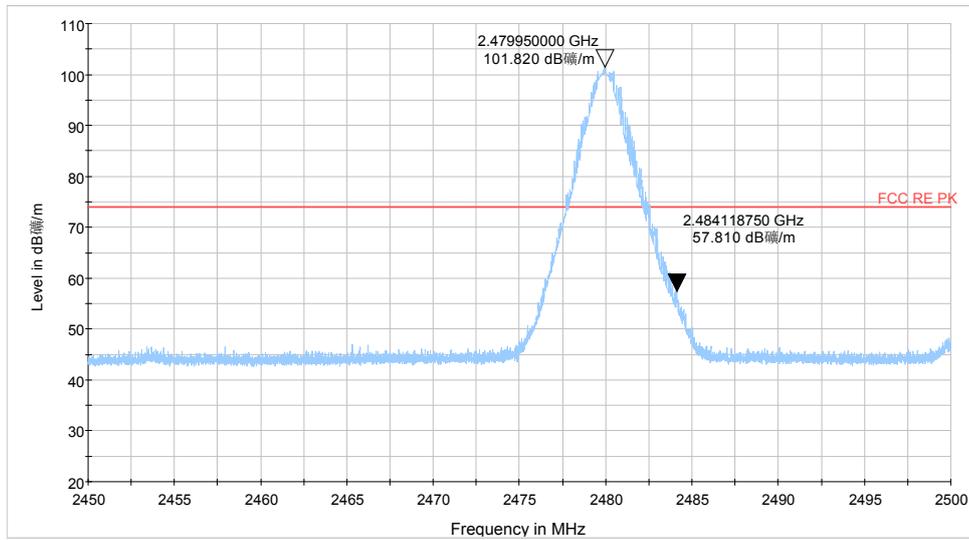


— FCC RE AV — Preview Result 2-AVG * Data Reduction Result 2 [2]-AVG

Note: The signal beyond the limit is carrier, a font (Level in dBμV/m) in the test plot =(level in dBuV/m)

Channel 39

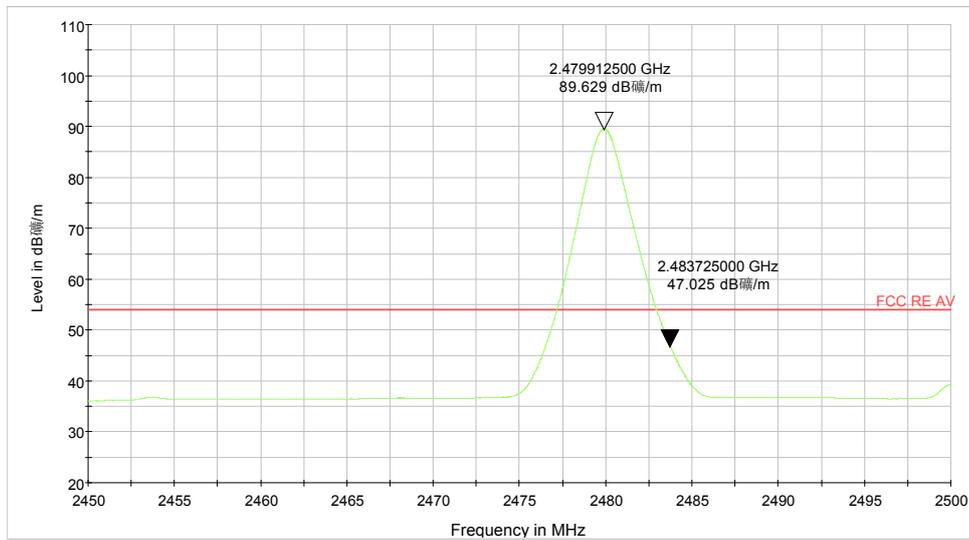
Peak



— FCC RE PK — Preview Result 1-PK+ * Data Reduction Result 1 [2]-PK+

Note: The signal beyond the limit is carrier, a font (Level in dB μ V/m) in the test plot =(level in dBuV/m)

Average



— FCC RE AV — Preview Result 2-AVG * Data Reduction Result 2 [2]-AVG

Note: The signal beyond the limit is carrier, a font (Level in dB μ V/m) in the test plot =(level in dBuV/m)

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2.8. Spurious RF Conducted Emissions

Ambient condition

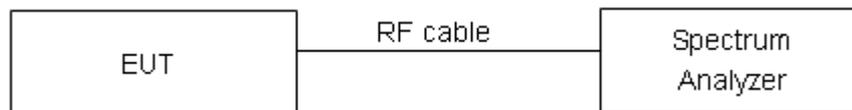
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer with a known loss. The spectrum analyzer scans from 30MHz to the 10th harmonic of the carrier. The peak detector is used. RBW and VBW are set to 100 kHz, Sweep is set to ATUO.

The test is in transmitting mode.

Test setup



Limits

Rule Part 15.247(d) pacifies that “In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.”

Mode	Carrier frequency (MHz)	Reference value (dBm)	Limit
Bluetooth(Low Energy)	2402	5.01	≤ -14.99
	2440	7.18	≤ -12.82
	2480	8.34	≤ -11.66

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

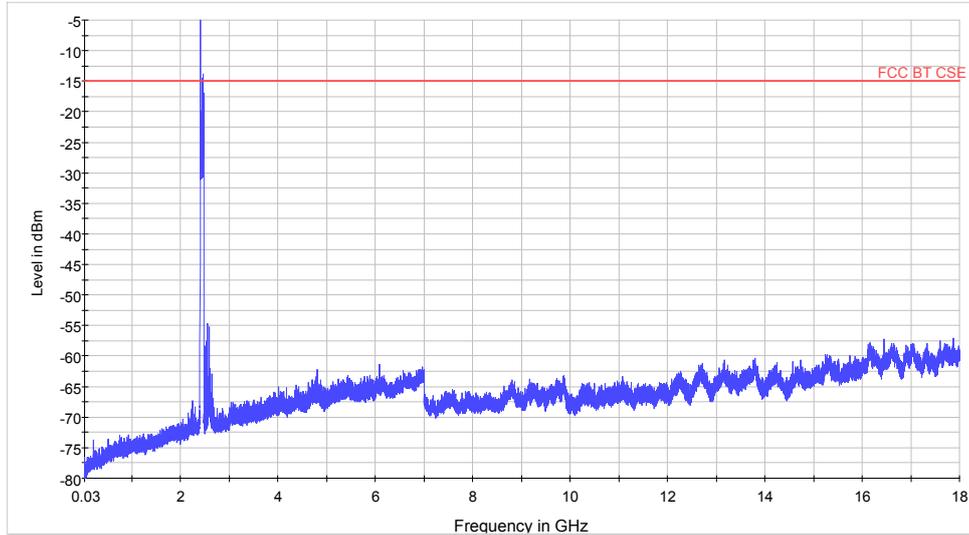
Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-26GHz	1.407 dB

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Test Results:

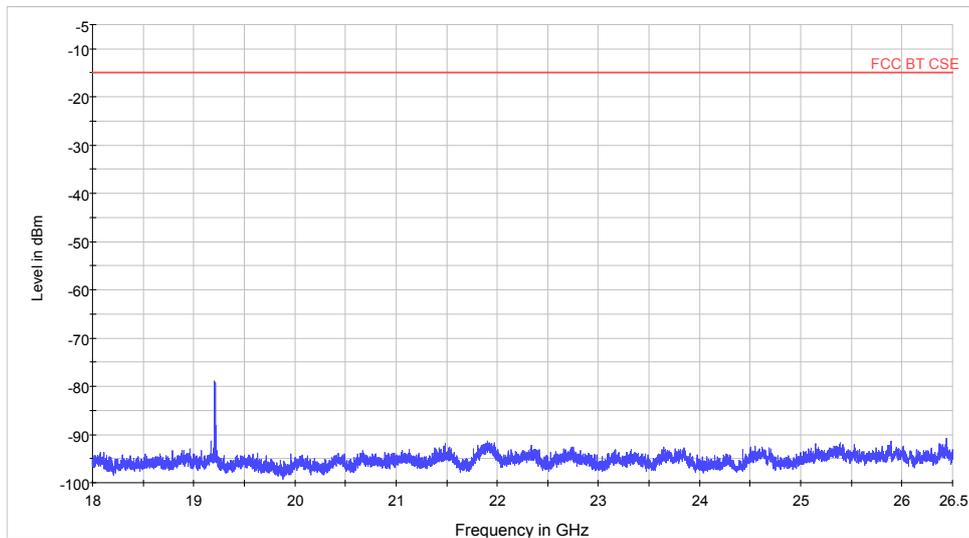
Bluetooth (Low Energy)

CH0:



MaxPeak-MaxHold-PK+ FCC BT CSE

Note: The signal beyond the limit is carrier. Carrier frequency (MHz): 2402
Spurious RF conducted emissions from 30MHz to 18GHz

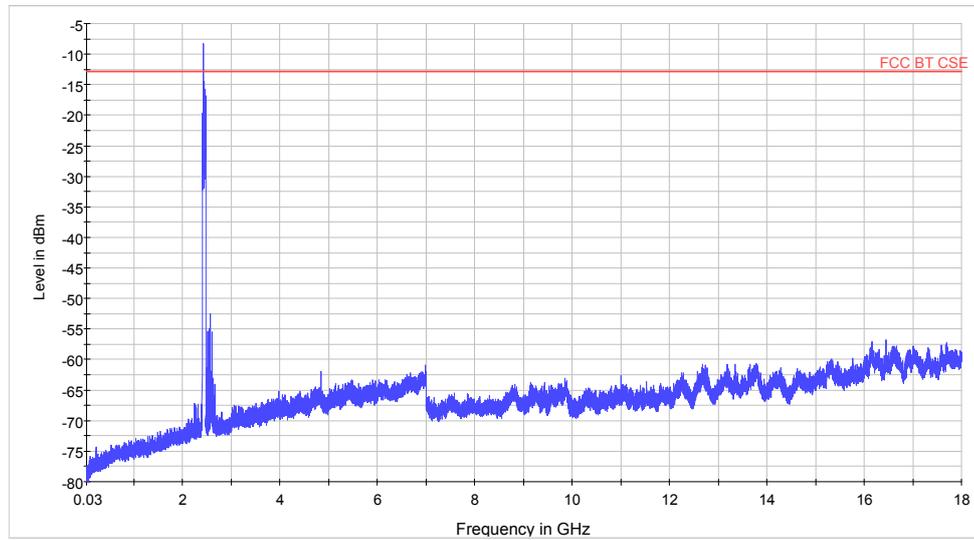


MaxPeak-MaxHold-PK+ FCC BT CSE

Spurious RF conducted emissions from 18GHz to 26.5GHz

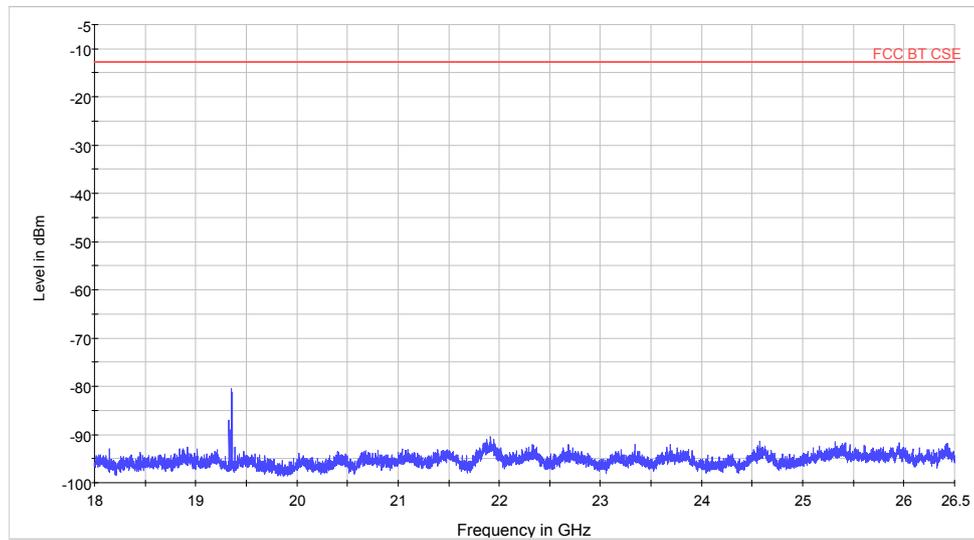
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CH19:



MaxPeak-MaxHold-PK+ FCC BT CSE

Note: The signal beyond the limit is carrier. Carrier frequency (MHz): 2440
Spurious RF conducted emissions from 30MHz to 18GHz

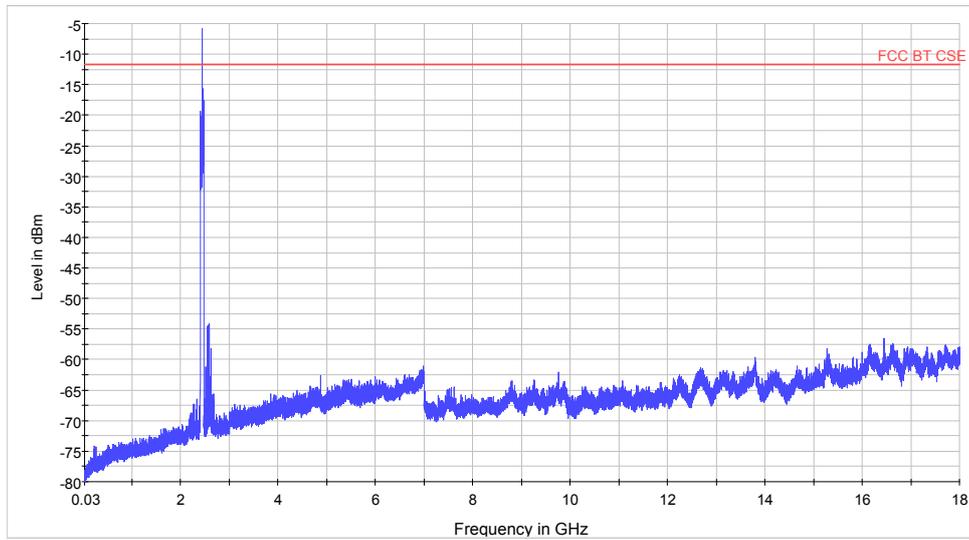


MaxPeak-MaxHold-PK+ FCC BT CSE

Spurious RF conducted emissions from 18GHz to 26.5GHz

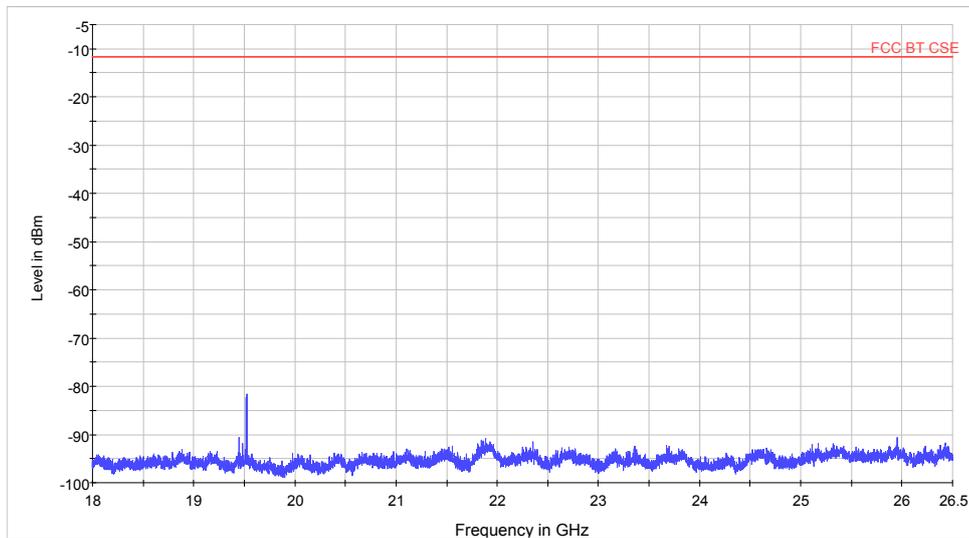
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CH39:



MaxPeak-MaxHold-PK+ FCC BT CSE

Note: The signal beyond the limit is carrier. Carrier frequency (MHz): 2480
Spurious RF conducted emissions from 30MHz to 18GHz



MaxPeak-MaxHold-PK+ FCC BT CSE

Spurious RF conducted emissions from 18GHz to 26.5GHz

2.9. Radiates Emission

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	102.5kPa

Method of Measurement

The test set-up was made in accordance to the general provisions of ANSI C63.4-2009. The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.

Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.

During the test, below 30MHz, the center of the loop shall be 1 meters; above 30MHz, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

Set the spectrum analyzer in the following:

Below 1GHz (detector: Peak and Quasi-Peak)

RBW=100 kHz / VBW=300 kHz / Sweep=AUTO

Above 1GHz (detector: Peak):

(a) PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO

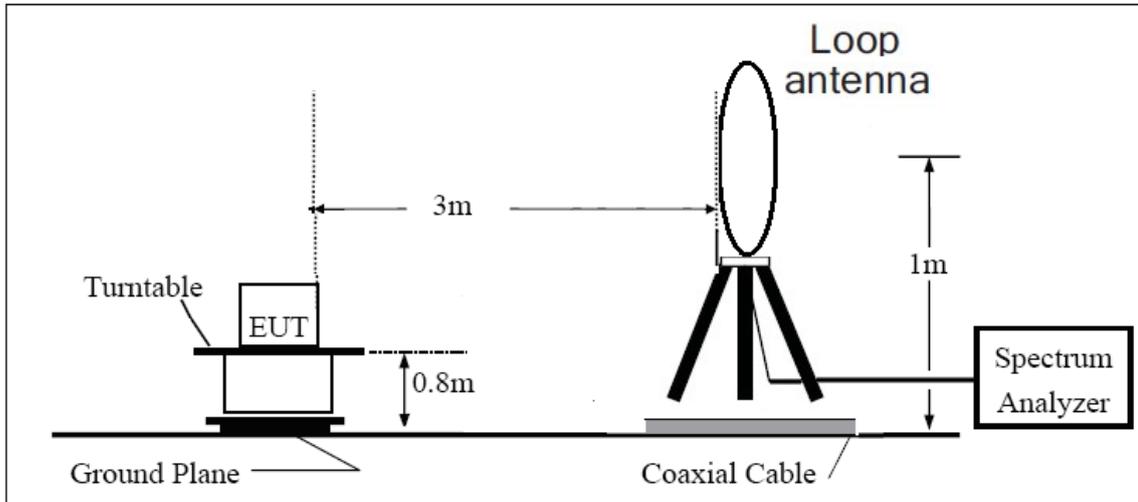
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

The test is in transmitting mode.

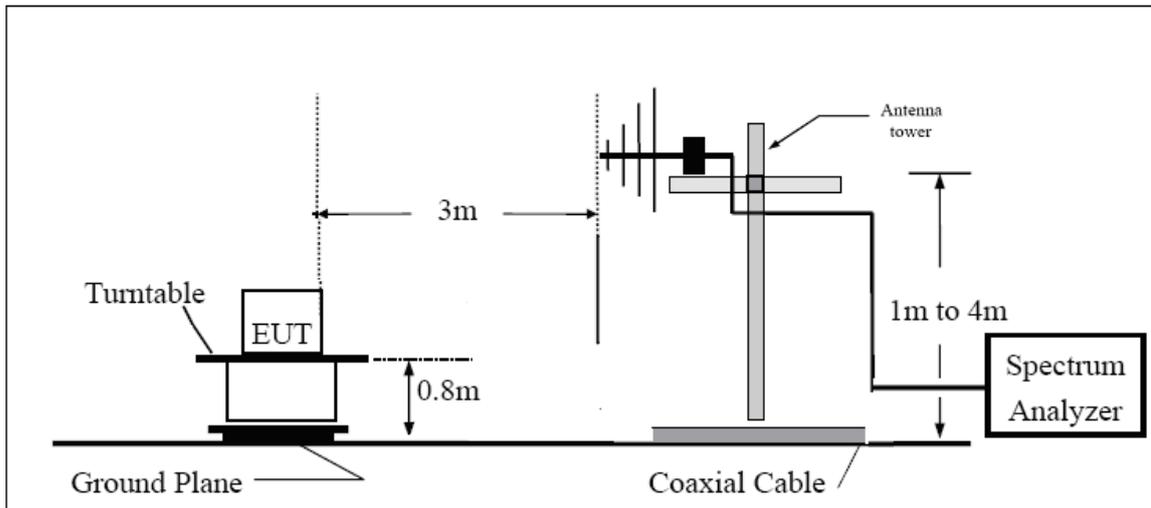
TA Technology (Shanghai) Co., Ltd. Test Report

Test setup

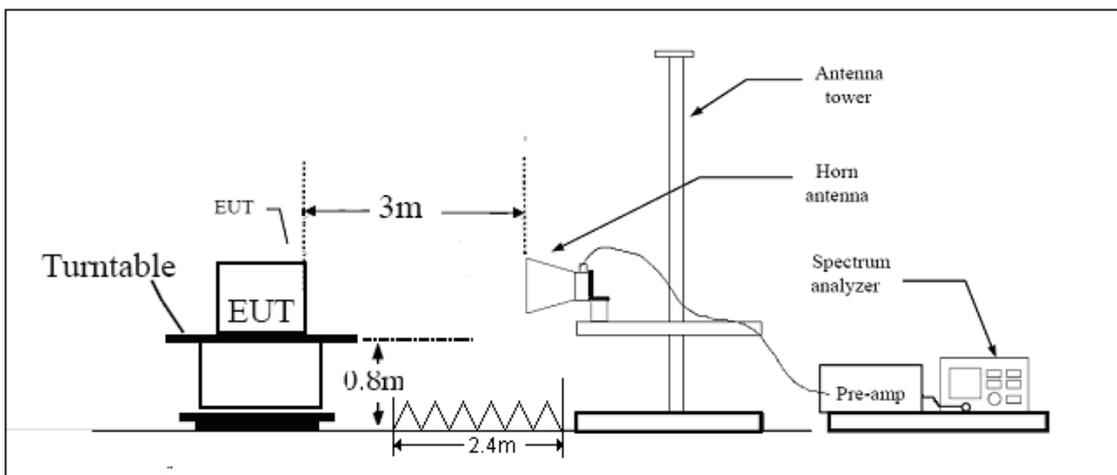
9KHz~~~ 30MHz



30MHz~~~ 1GHz



Above 1GHz



Note: Area side: 2.4mX3.6m

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Limits

Rule Part 15.247(d) specifies that “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)).”

Limit in restricted band

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
0.009–0.490	2400/F(kHz)	/
0.490–1.705	24000/F(kHz)	/
1.705–30.0	30	/
30-88	100	40
88-216	150	43.5
216-960	200	46
Above960	500	54

§15.35(b)

There is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

Frequency	Uncertainty
9KHz-30MHz	3.55 dB
30MHz-200MHz	4.19 dB
200MHz-1GHz	3.63 dB
Above 1GHz	3.68 dB

TA Technology (Shanghai) Co., Ltd.

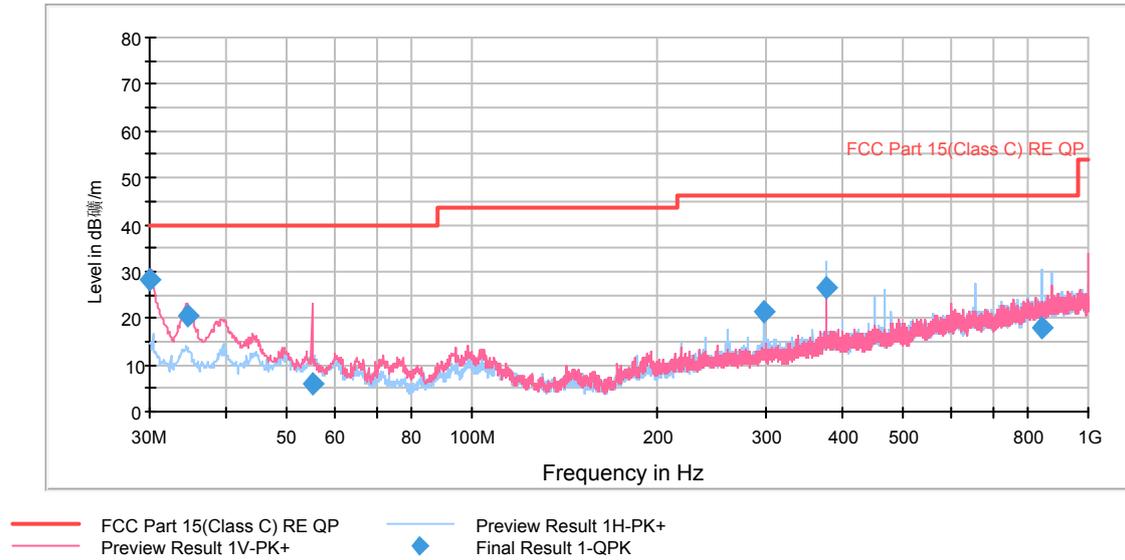
Test Report

Test result

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, and 9KHz-30MHz, 18GHz-26GHz, the emissions more than 20 dB below the permissible value are not reported.

CH0

RE 30M-1GHz (PART15 C) QP



Note: This graph displays the maximum values of horizontal and vertical by software

Note: a font (Level in dB μ V/m) in the test plot =(level in dBuV/m)

Radiates Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
30.000000	28.4	100.0	V	305.0	45.4	-17.0	11.6	40.0
34.546250	20.7	100.0	V	312.0	39.7	-19.0	19.3	40.0
54.998750	6.0	100.0	V	319.0	28.6	-22.6	34.0	40.0
297.013750	21.5	127.0	H	346.0	44.5	-23.0	24.5	46.0
375.016250	26.5	100.0	H	266.0	47.6	-21.1	19.5	46.0
843.690000	18.0	100.0	H	282.0	30.8	-12.8	28.0	46.0

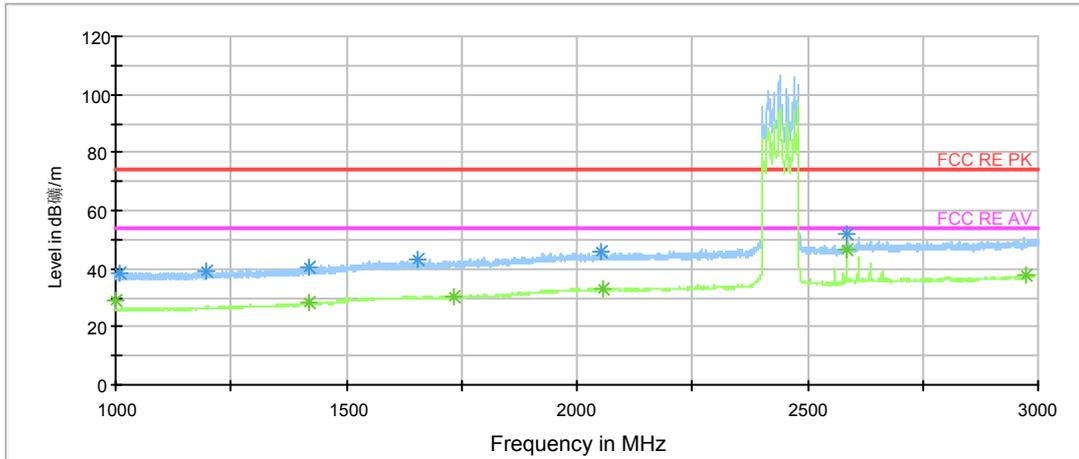
Remark: 1. Quasi-Peak = Reading value + Correction factor

2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

3. Margin = Limit – Quasi-Peak

TA Technology (Shanghai) Co., Ltd. Test Report

RE 1G-3GHz PK+AV



- FCC RE PK
— Preview Result 1-PK+
* Data Reduction Result 1 [2]-PK+
- FCC RE AV
— Preview Result 2-AVG
* Data Reduction Result 2 [2]-AVG

Note: This graph displays the maximum values of horizontal and vertical by software

Note: a font (Level in dBuV/m) in the test plot =(level in dBuV/m)

Note: The signal beyond the limit is carrier.

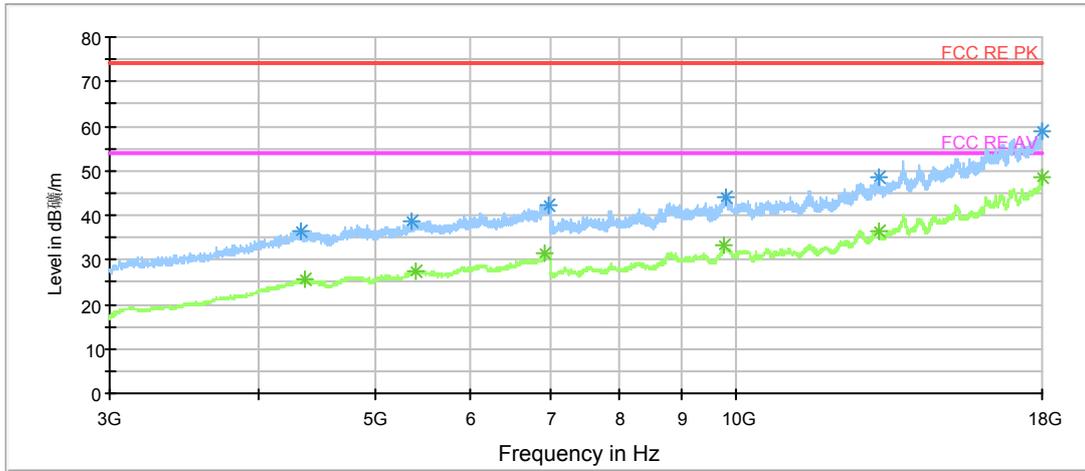
Radiates Emission from 1GHz to 3GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1000.000000	38.3	101.0	V	84.0	47.8	-9.5	35.7	74
1418.250000	39.4	101.0	H	184.0	46.5	-7.1	34.6	74
1732.000000	41.0	101.0	H	0.0	44.5	-3.5	33.0	74
2056.250000	43.9	101.0	V	0.0	45.4	-1.5	30.1	74
2584.000000	51.8	101.0	V	0.0	52.4	0.6	22.2	74
2975.250000	48.4	101.0	H	0.0	51.2	2.8	25.6	74

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1000.000000	29.3	101.0	V	84.0	38.8	-9.5	24.7	54
1418.250000	28.5	101.0	H	184.0	35.6	-7.1	25.5	54
1732.000000	30.6	101.0	H	0.0	34.1	-3.5	23.4	54
2056.250000	33.1	101.0	V	0.0	34.6	-1.5	20.9	54
2584.000000	46.3	101.0	V	0.0	46.9	0.6	7.7	54
2975.250000	37.5	101.0	H	0.0	40.3	2.8	16.5	54

TA Technology (Shanghai) Co., Ltd. Test Report

RE 3-18GHz PK+AV



- FCC RE PK
- FCC RE AV
- Preview Result 1-PK+
- Preview Result 2-AVG
- * Data Reduction Result 1 [1]-PK+
- * Data Reduction Result 2 [1]-AVG

Note: This graph displays the maximum values of horizontal and vertical by software

Note: a font (Level in dB_{μV/m}) in the test plot =(level in dBuV/m)

Radiates Emission from 3GHz to 18GHz

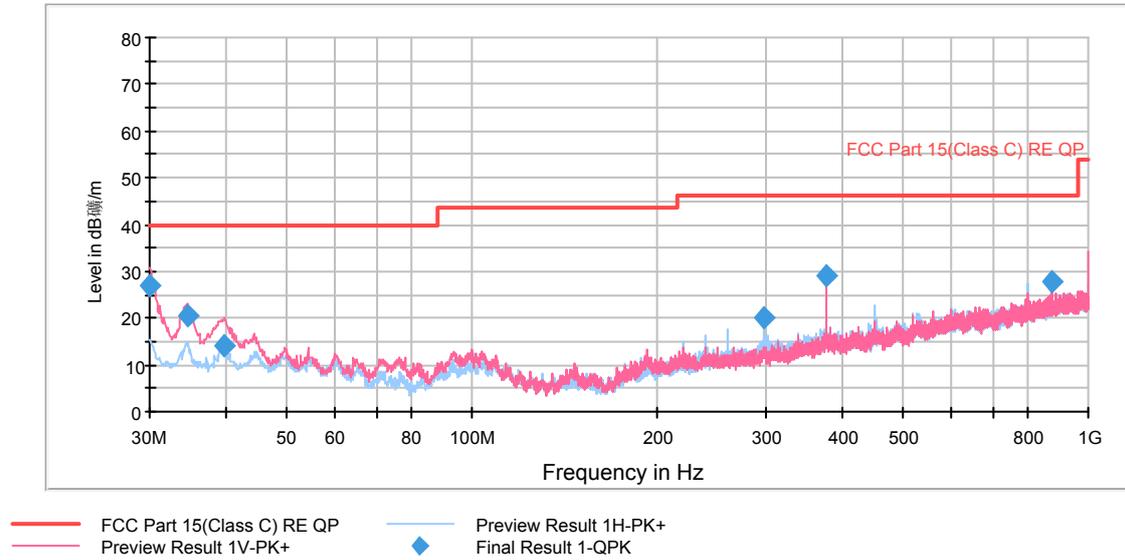
Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
4368.750000	35.2	101.0	H	0.0	37.9	2.7	38.8	74
5392.500000	37.0	101.0	H	234.0	40.0	3.0	37.0	74
6924.375000	40.8	101.0	H	304.0	46.5	5.7	33.2	74
9781.875000	43.0	101.0	H	304.0	54.1	11.1	31.0	74
13143.750000	46.0	101.0	H	296.0	60.0	14.0	28.0	74
18000.000000	58.3	101.0	H	330.0	83.0	24.7	15.7	74

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
4368.750000	25.7	101.0	H	0.0	28.4	2.7	28.3	54
5392.500000	27.5	101.0	H	234.0	30.5	3.0	26.5	54
6924.375000	31.3	101.0	H	304.0	37.0	5.7	22.7	54
9781.875000	33.0	101.0	H	304.0	44.1	11.1	21.0	54
13143.750000	36.6	101.0	H	296.0	50.6	14.0	17.4	54
18000.000000	48.5	101.0	H	330.0	73.2	24.7	5.5	54

TA Technology (Shanghai) Co., Ltd. Test Report

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RE 30M-1GHz (PART15 C) QP



Note: This graph displays the maximum values of horizontal and vertical by software
 Note: a font (Level in dBuV/m) in the test plot =(level in dBuV/m)
 Radiates Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
30.000000	26.8	101.0	V	0.0	43.8	-17.0	13.2	40.0
34.506250	20.7	100.0	V	296.0	39.7	-19.0	19.3	40.0
39.640000	14.3	100.0	V	161.0	33.6	-19.3	25.7	40.0
297.012500	20.3	129.0	H	255.0	43.3	-23.0	25.7	46.0
375.016250	28.9	129.0	V	0.0	50.0	-21.1	17.1	46.0
875.012500	27.9	100.0	H	28.0	40.2	-12.3	18.1	46.0

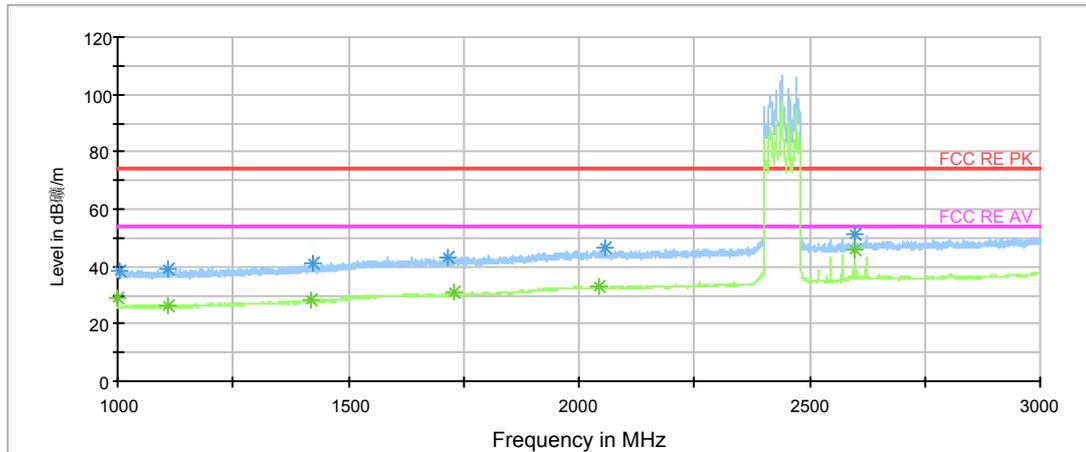
- Remark: 1. Quasi-Peak = Reading value + Correction factor**
2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)
3. Margin = Limit – Quasi-Peak

TA Technology (Shanghai) Co., Ltd. Test Report

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RE 1G-3GHz PK+AV



- FCC RE PK
— Preview Result 1-PK+
* Data Reduction Result 1 [2]-PK+
- FCC RE AV
— Preview Result 2-AVG
* Data Reduction Result 2 [2]-AVG

Note: This graph displays the maximum values of horizontal and vertical by software

Note: a font (Level in dBuV/m) in the test plot =(level in dBuV/m)

Note: The signal beyond the limit is carrier.

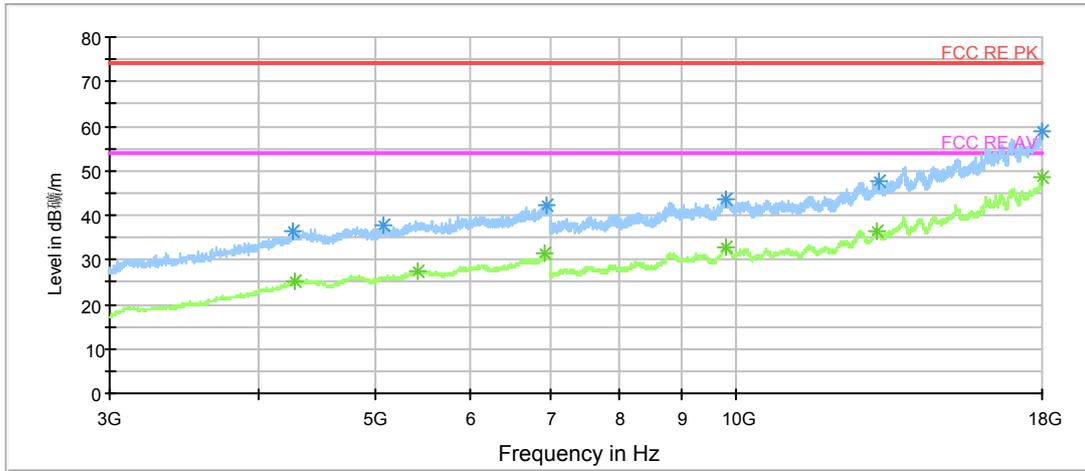
Radiates Emission from 1GHz to 3GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1000.000000	37.9	101.0	V	248.0	47.4	-9.5	36.1	74
1109.250000	36.2	101.0	H	0.0	45.3	-9.1	37.8	74
1417.500000	38.5	101.0	H	0.0	45.6	-7.1	35.5	74
1730.750000	41.5	101.0	V	0.0	45.1	-3.6	32.5	74
2045.250000	43.3	101.0	V	0.0	45.2	-1.9	30.7	74
2597.000000	51.1	101.0	V	0.0	52.1	1.0	22.9	74

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1000.000000	29.2	101.0	V	248.0	38.7	-9.5	24.8	54
1109.250000	26.3	101.0	H	0.0	35.4	-9.1	27.7	54
1417.500000	28.2	101.0	H	0.0	35.3	-7.1	25.8	54
1730.750000	30.8	101.0	V	0.0	34.4	-3.6	23.2	54
2045.250000	33.1	101.0	V	0.0	35.0	-1.9	20.9	54
2597.000000	45.9	101.0	V	0.0	46.9	1.0	8.1	54

TA Technology (Shanghai) Co., Ltd. Test Report

RE 3-18GHz PK+AV



- FCC RE PK
— Preview Result 1-PK+
* Data Reduction Result 1 [1]-PK+
- FCC RE AV
— Preview Result 2-AVG
* Data Reduction Result 2 [1]-AVG

Note: This graph displays the maximum values of horizontal and vertical by software

Note: a font (Level in dB_{uV/m}) in the test plot =(level in dBuV/m)

Radiates Emission from 3GHz to 18GHz

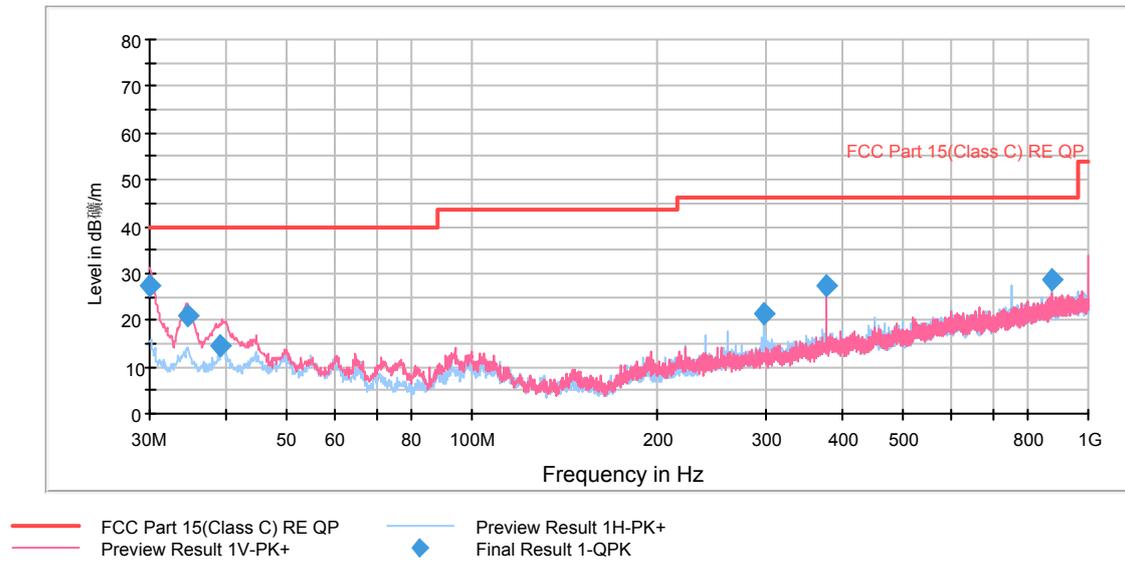
Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
4290.000000	34.5	101.0	H	0.0	37.4	2.9	39.5	74
5430.000000	38.3	101.0	H	0.0	41.4	3.1	35.7	74
6926.250000	40.1	101.0	H	0.0	45.8	5.7	33.9	74
9800.625000	41.5	101.0	V	136.0	52.9	11.4	32.5	74
13121.250000	46.5	101.0	V	57.0	60.7	14.2	27.5	74
18000.000000	57.9	101.0	V	111.0	82.6	24.7	16.1	74

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
4290.000000	25.2	101.0	H	0.0	28.1	2.9	28.8	54
5430.000000	27.4	101.0	H	0.0	30.5	3.1	26.6	54
6926.250000	31.3	101.0	H	0.0	37.0	5.7	22.7	54
9800.625000	32.8	101.0	V	136.0	44.2	11.4	21.2	54
13121.250000	36.6	101.0	V	57.0	50.8	14.2	17.4	54
18000.000000	48.5	101.0	V	111.0	73.2	24.7	5.5	54

TA Technology (Shanghai) Co., Ltd. Test Report

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RE 30M-1GHz (PART15 C) QP



Note: This graph displays the maximum values of horizontal and vertical by software

Note: a font (Level in dBuV/m) in the test plot =(level in dBuV/m)

Radiates Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
30.000000	27.5	100.0	V	8.0	44.5	-17.0	12.5	40.0
34.505000	20.8	100.0	V	304.0	39.8	-19.0	19.2	40.0
39.156250	14.7	100.0	V	7.0	34.0	-19.3	25.3	40.0
297.012500	21.3	127.0	H	353.0	44.3	-23.0	24.7	46.0
375.016250	27.2	100.0	H	259.0	48.3	-21.1	18.8	46.0
875.012500	28.7	100.0	H	20.0	41.0	-12.3	17.3	46.0

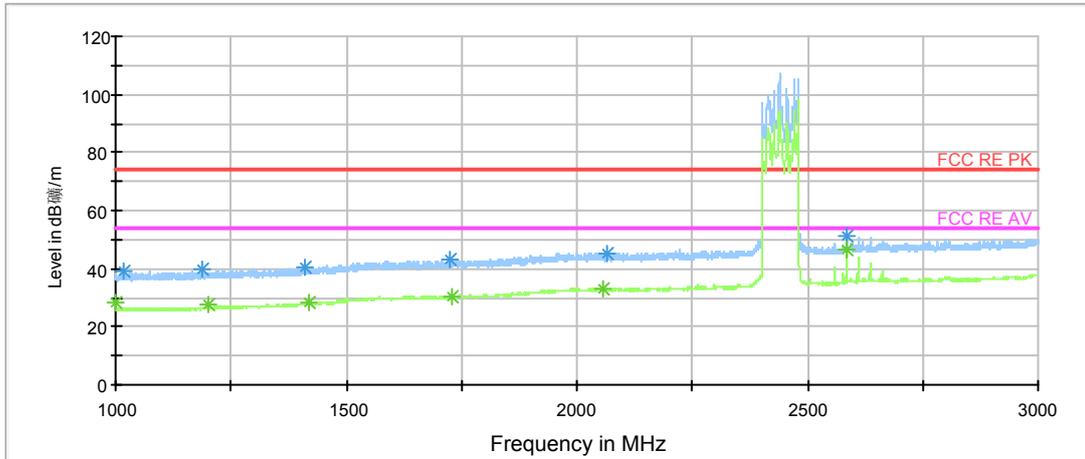
Remark: 1. Quasi-Peak = Reading value + Correction factor

2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

3. Margin = Limit – Quasi-Peak

TA Technology (Shanghai) Co., Ltd. Test Report

RE 1G-3GHz PK+AV



- FCC RE PK
- Preview Result 1-PK+
- * Data Reduction Result 1 [2]-PK+
- FCC RE AV
- Preview Result 2-AVG
- * Data Reduction Result 2 [2]-AVG

Note: This graph displays the maximum values of horizontal and vertical by software

Note: a font (Level in dBuV/m) in the test plot =(level in dBuV/m)

Note: The signal beyond the limit is carrier.

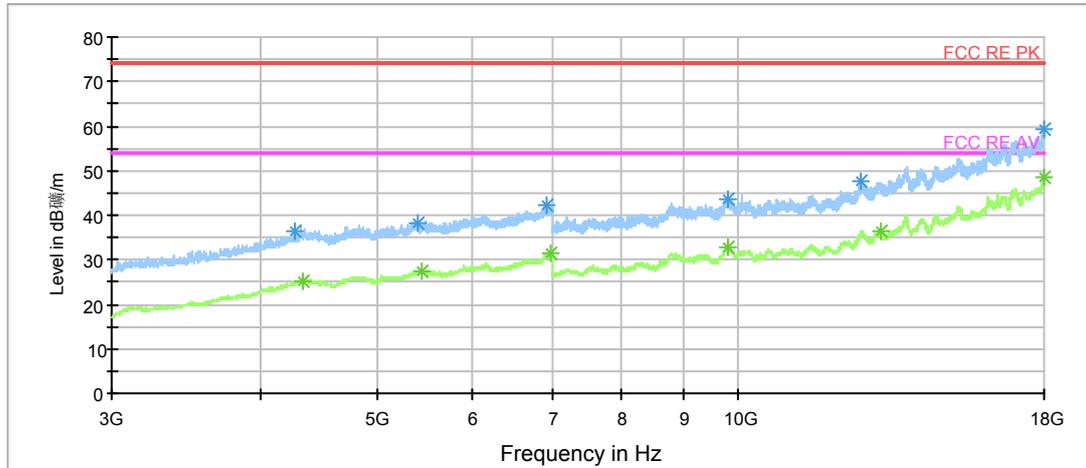
Radiates Emission from 1GHz to 3GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1000.000000	38.1	101.0	V	232.0	47.6	-9.5	35.9	74
1200.000000	37.7	101.0	V	0.0	46.8	-9.1	36.3	74
1418.250000	39.2	101.0	V	66.0	46.3	-7.1	34.8	74
1728.750000	42.0	101.0	H	0.0	45.8	-3.8	32.0	74
2056.000000	44.0	101.0	H	331.0	45.5	-1.5	30.0	74
2584.000000	51.3	101.0	V	0.0	51.9	0.6	22.7	74

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1000.000000	28.5	101.0	V	232.0	38.0	-9.5	25.5	54
1200.000000	27.3	101.0	V	0.0	36.4	-9.1	26.7	54
1418.250000	28.3	101.0	V	66.0	35.4	-7.1	25.7	54
1728.750000	30.6	101.0	H	0.0	34.4	-3.8	23.4	54
2056.000000	33.1	101.0	H	331.0	34.6	-1.5	20.9	54
2584.000000	46.3	101.0	V	0.0	46.9	0.6	7.7	54

TA Technology (Shanghai) Co., Ltd. Test Report

RE 3-18GHz PK+AV



- FCC RE PK
- FCC RE AV
- Preview Result 1-PK+
- Preview Result 2-AVG
- * Data Reduction Result 1 [1]-PK+
- * Data Reduction Result 2 [1]-AVG

Note: This graph displays the maximum values of horizontal and vertical by software

Note: a font (Level in dB_{μV/m}) in the test plot =(level in dBuV/m)

Radiates Emission from 3GHz to 18GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
4340.625000	35.8	101.0	H	198.0	38.6	2.8	38.2	74
5450.625000	36.6	101.0	V	0.0	39.8	3.2	37.4	74
6965.625000	40.8	101.0	H	155.0	46.3	5.5	33.2	74
9808.125000	42.1	101.0	H	309.0	53.4	11.3	31.9	74
13145.625000	47.0	101.0	V	26.0	61.0	14.0	27.0	74
17996.250000	57.9	101.0	H	0.0	82.5	24.6	16.1	74

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
4340.625000	25.3	101.0	H	198.0	28.1	2.8	28.7	54
5450.625000	27.6	101.0	V	0.0	30.8	3.2	26.4	54
6965.625000	31.4	101.0	H	155.0	36.9	5.5	22.6	54
9808.125000	33.0	101.0	H	309.0	44.3	11.3	21.0	54
13145.625000	36.5	101.0	V	26.0	50.5	14.0	17.5	54
17996.250000	48.4	101.0	H	0.0	73.0	24.6	5.6	54

2.10. Conducted Emission

Ambient condition

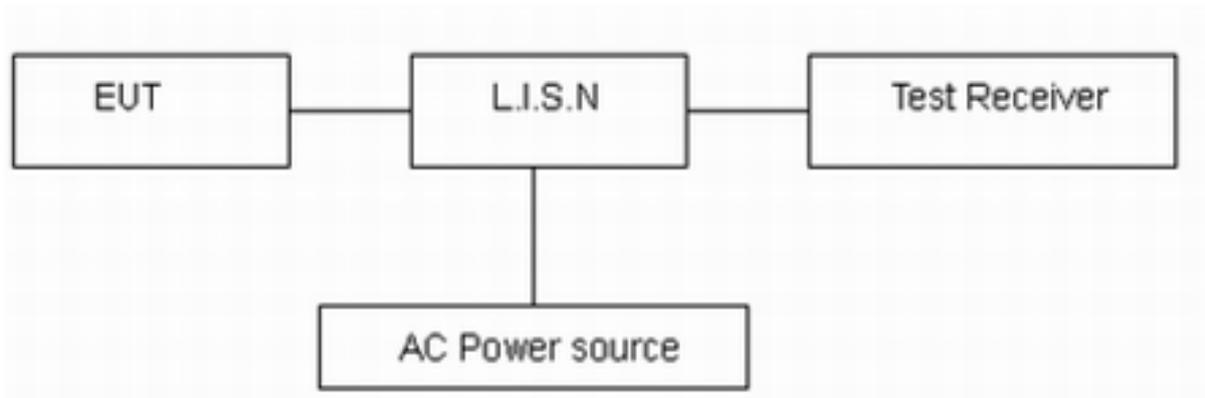
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2009. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

The test is in transmitting mode.

Test Setup



Note: AC Power source is used to change the voltage from 110V/60Hz.

Limits

TA Technology (Shanghai) Co., Ltd.
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Frequency (MHz)	Conducted Limits(dB μ V)	
	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.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$, $U = 2.69$ dB.

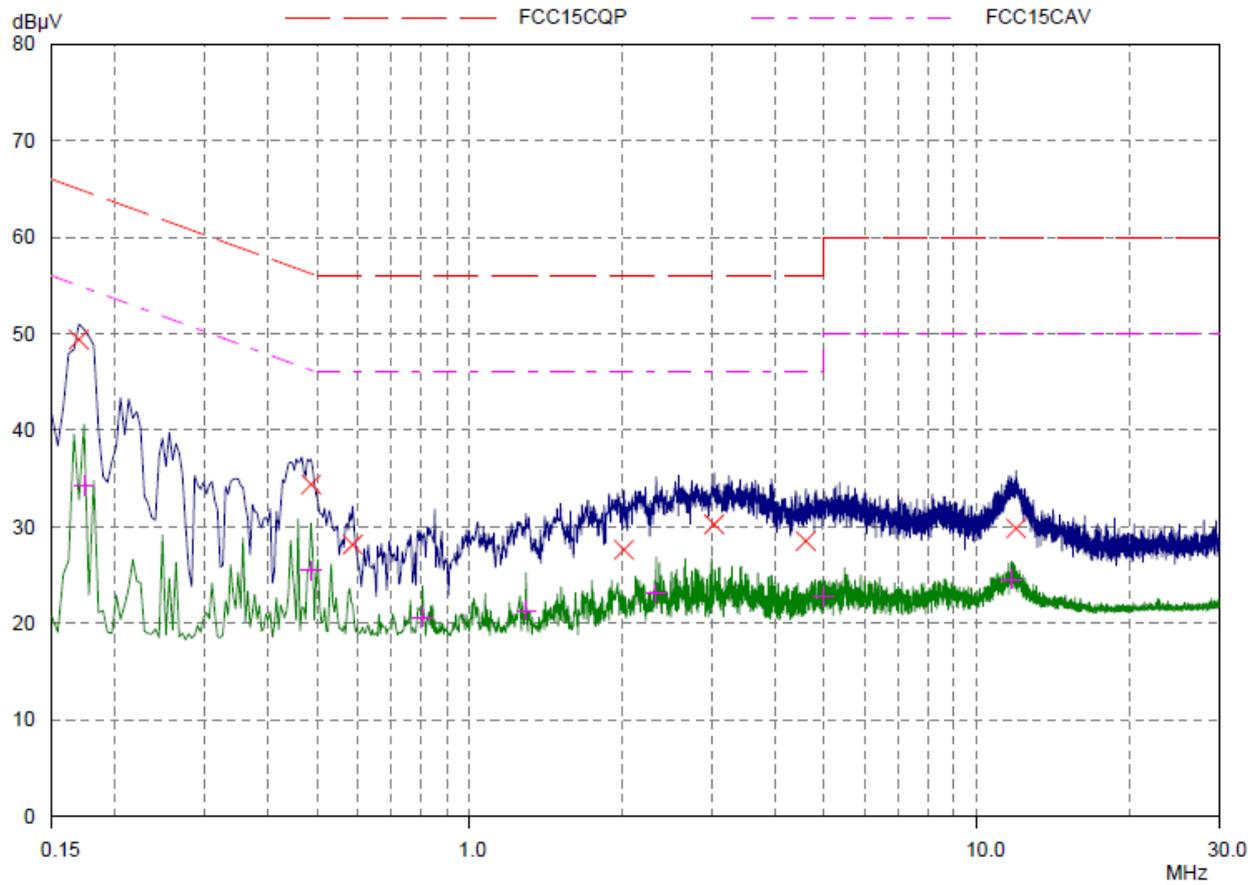
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Test Results:

CH0



Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Phase -	PE -
0.16953	49.38	64.98	15.60	L1	gnd
0.48593	34.39	56.24	21.85	L1	gnd
0.5875	28.17	56.00	27.83	L1	gnd
2.01328	27.64	56.00	28.36	L1	gnd
3.03281	30.26	56.00	25.74	L1	gnd
4.59531	28.52	56.00	27.48	L1	gnd
11.94687	29.83	60.00	30.17	L1	gnd

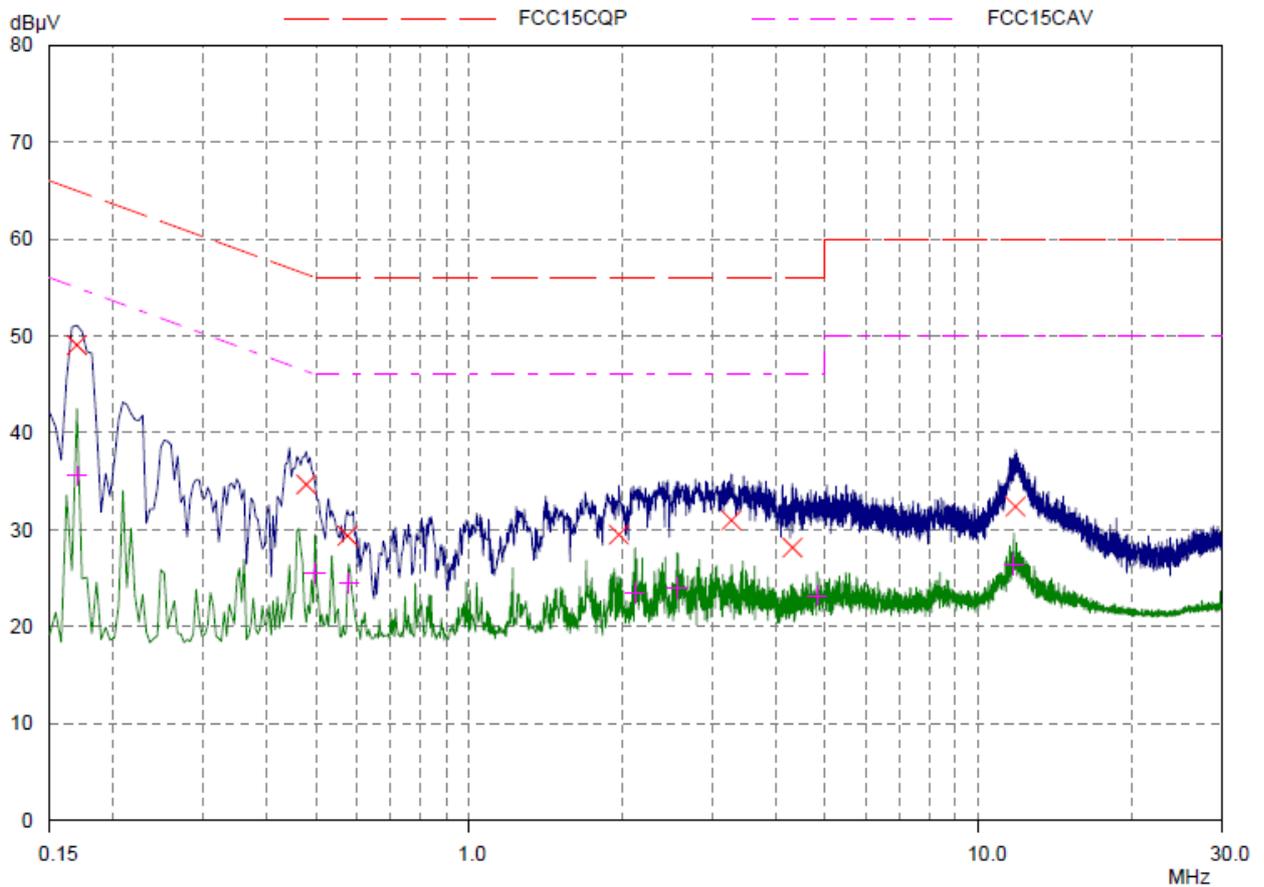
Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB	Phase -	PE -
0.17343	34.26	54.79	20.53	L1	gnd
0.48593	25.48	46.24	20.76	L1	gnd
0.80625	20.61	46.00	25.39	L1	gnd
1.29062	21.32	46.00	24.68	L1	gnd
2.32968	23.07	46.00	22.93	L1	gnd
4.97031	22.77	46.00	23.23	L1	gnd
11.69296	24.60	50.00	25.40	L1	gnd

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Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Phase -	PE -
0.16953	49.06	64.98	15.92	N	gnd
0.47812	34.68	56.37	21.69	N	gnd
0.57578	29.38	56.00	26.62	N	gnd
1.9664	29.50	56.00	26.50	N	gnd
3.27109	30.98	56.00	25.02	N	gnd
4.31015	28.17	56.00	27.83	N	gnd
11.82187	32.40	60.00	27.60	N	gnd

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB	Phase -	PE -
0.16953	35.57	54.98	19.41	N	gnd
0.49765	25.56	46.04	20.48	N	gnd
0.57968	24.50	46.00	21.50	N	gnd
2.11484	23.51	46.00	22.49	N	gnd
2.55625	24.00	46.00	22.00	N	gnd
4.81796	23.20	46.00	22.80	N	gnd
11.73203	26.42	50.00	23.58	N	gnd

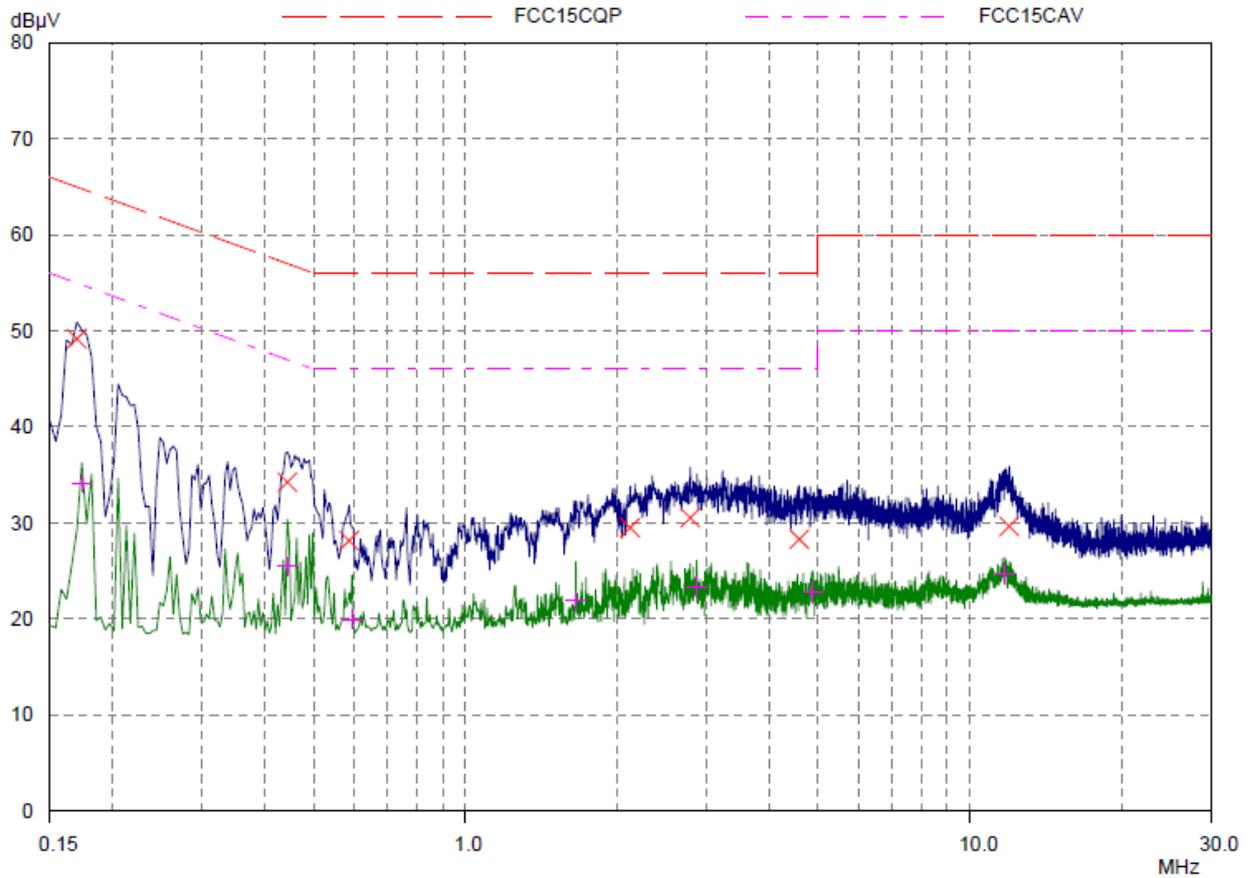
N Line

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Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Phase -	PE -
0.16953	49.18	64.98	15.80	L1	gnd
0.44296	34.25	57.01	22.76	L1	gnd
0.5875	28.17	56.00	27.83	L1	gnd
2.11875	29.52	56.00	26.48	L1	gnd
2.79062	30.52	56.00	25.48	L1	gnd
4.58359	28.31	56.00	27.69	L1	gnd
11.95078	29.63	60.00	30.37	L1	gnd

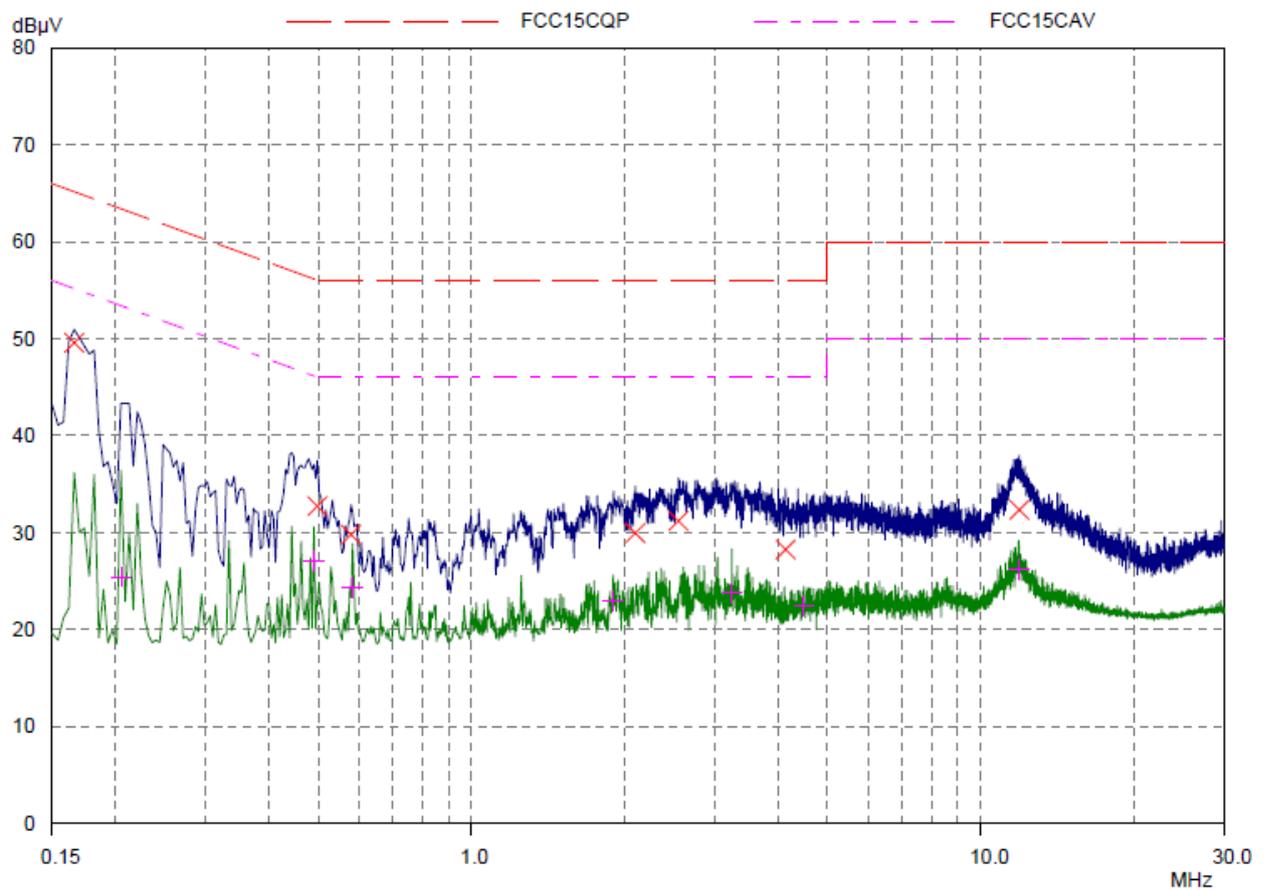
Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB	Phase -	PE -
0.17343	34.15	54.79	20.64	L1	gnd
0.44296	25.46	47.01	21.55	L1	gnd
0.59531	19.96	46.00	26.04	L1	gnd
1.6539	21.90	46.00	24.10	L1	gnd
2.86875	23.33	46.00	22.67	L1	gnd
4.88046	22.81	46.00	23.19	L1	gnd
11.72031	24.71	50.00	25.29	L1	gnd

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Final Measurement Results

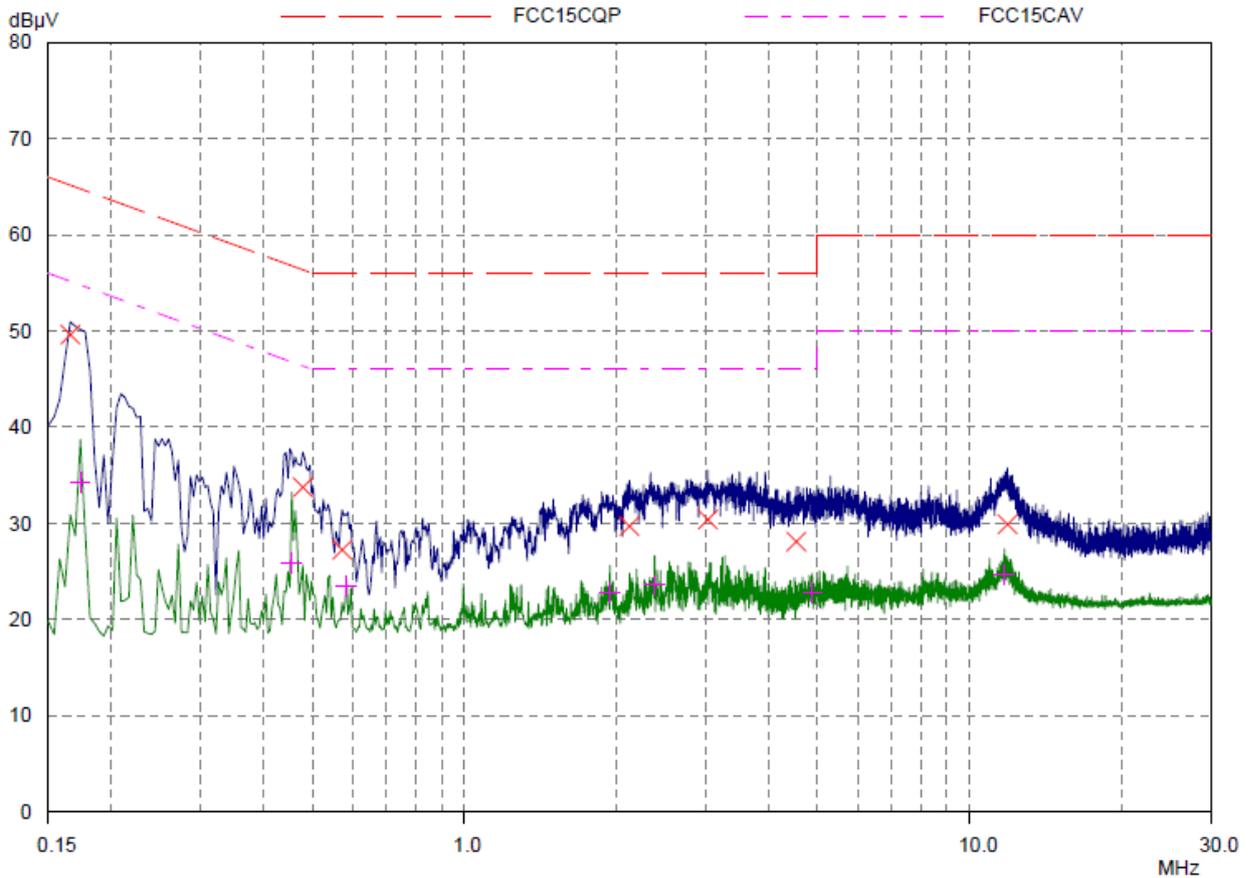
Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Phase -	PE -
0.16562	49.60	65.18	15.58	N	gnd
0.49765	32.73	56.04	23.31	N	gnd
0.57968	29.80	56.00	26.20	N	gnd
2.09531	29.96	56.00	26.04	N	gnd
2.54843	31.20	56.00	24.80	N	gnd
4.13436	28.26	56.00	27.74	N	gnd
11.9039	32.35	60.00	27.65	N	gnd

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB	Phase -	PE -
0.20468	25.42	53.42	28.00	N	gnd
0.48984	27.08	46.17	19.09	N	gnd
0.58359	24.32	46.00	21.68	N	gnd
1.89609	22.99	46.00	23.01	N	gnd
3.24375	23.76	46.00	22.24	N	gnd
4.49375	22.44	46.00	23.56	N	gnd
11.86093	26.21	50.00	23.79	N	gnd

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Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Phase -	PE -
0.16562	49.64	65.18	15.54	L1	gnd
0.47812	33.76	56.37	22.61	L1	gnd
0.57187	27.26	56.00	28.74	L1	gnd
2.11875	29.72	56.00	26.28	L1	gnd
3.0289	30.40	56.00	25.60	L1	gnd
4.53671	28.11	56.00	27.89	L1	gnd
11.87656	29.91	60.00	30.09	L1	gnd

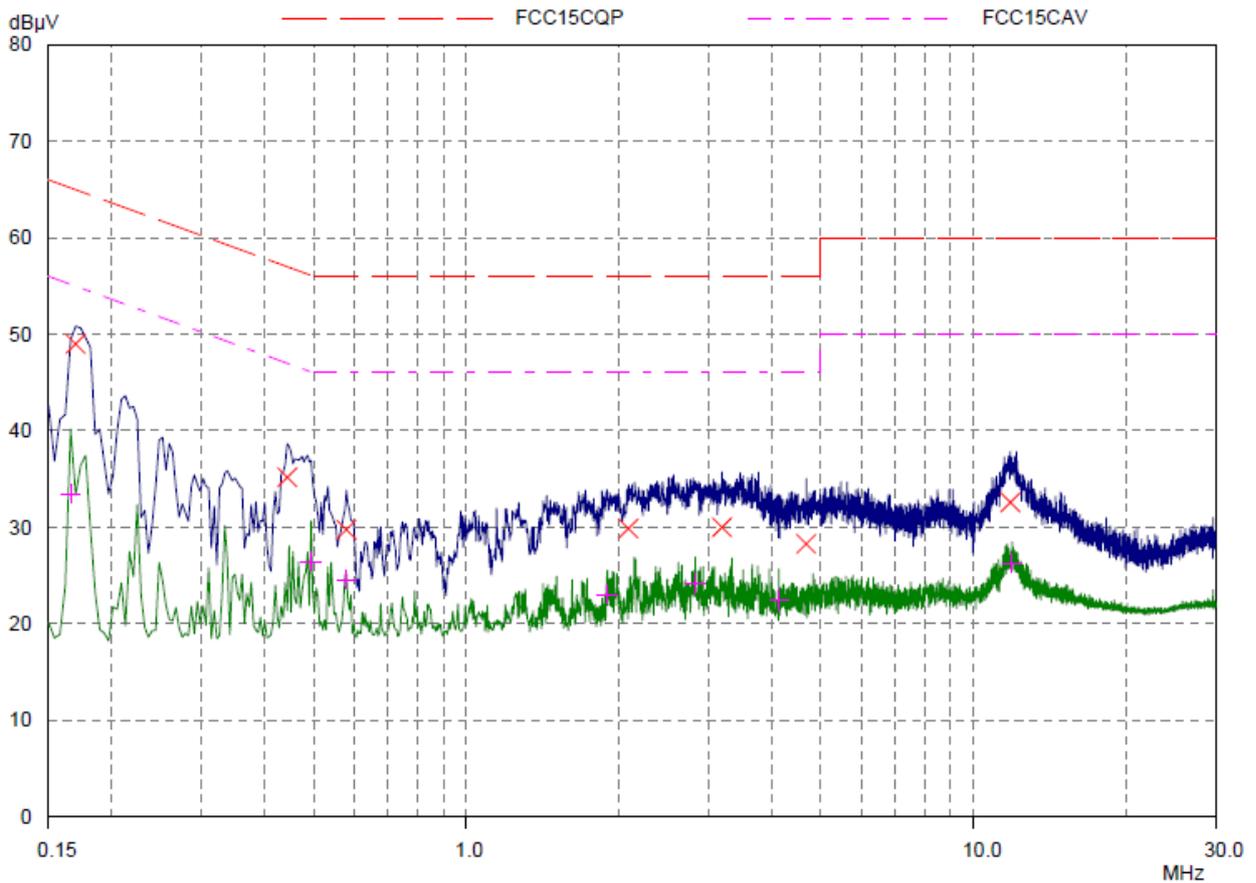
Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB	Phase -	PE -
0.17343	34.26	54.79	20.53	L1	gnd
0.45468	25.85	46.79	20.94	L1	gnd
0.58359	23.50	46.00	22.50	L1	gnd
1.93906	22.84	46.00	23.16	L1	gnd
2.37656	23.62	46.00	22.38	L1	gnd
4.88046	22.81	46.00	23.19	L1	gnd
11.70859	24.71	50.00	25.29	L1	gnd

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Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Phase -	PE -
0.16953	49.00	64.98	15.98	N	gnd
0.44296	35.17	57.01	21.84	N	gnd
0.57968	29.76	56.00	26.24	N	gnd
2.0875	29.88	56.00	26.12	N	gnd
3.18906	30.00	56.00	26.00	N	gnd
4.67734	28.29	56.00	27.71	N	gnd
11.81796	32.58	60.00	27.42	N	gnd

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB	Phase -	PE -
0.16562	33.47	55.18	21.71	N	gnd
0.49375	26.46	46.10	19.64	N	gnd
0.57968	24.59	46.00	21.41	N	gnd
1.89609	23.05	46.00	22.95	N	gnd
2.82578	24.14	46.00	21.86	N	gnd
4.13046	22.45	46.00	23.55	N	gnd
11.91171	26.30	50.00	23.70	N	gnd

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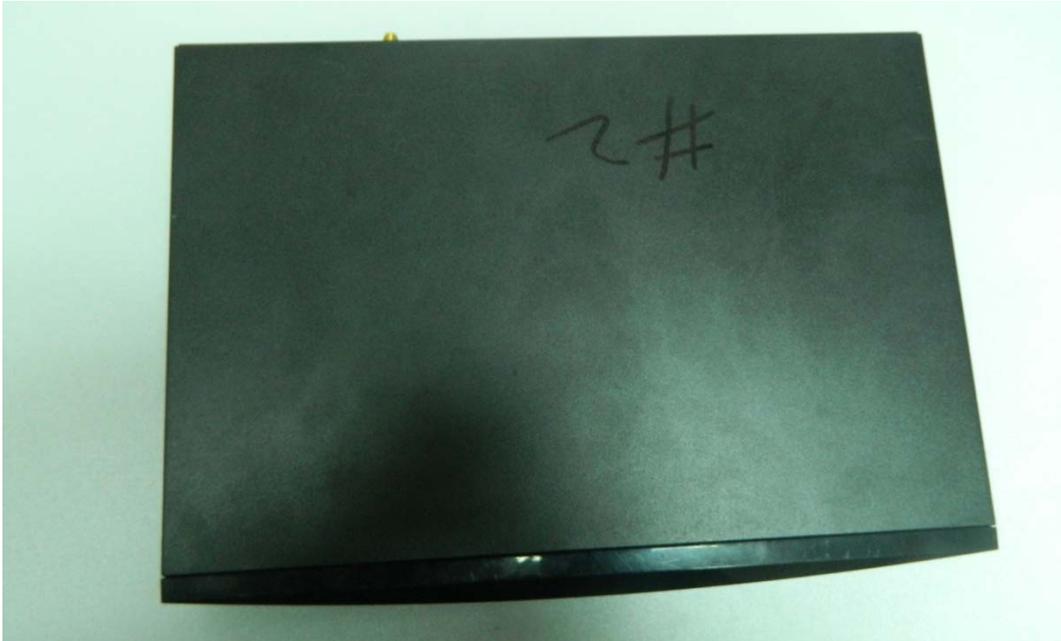
3. Main Test Instruments

No.	Name	Type	Manufacturer	Serial Number	Calibration Date	Expiration Time	Valid Period
01	EMI Test Receiver	ESCS30	R&S	100138	2014-12-17	2015-12-16	1 year
02	Loop Antenna	FMZB1516	SCHWARZBECK	237	2014-06-29	2016-06-28	2 years
03	LISN	ENV216	R&S	101171	2014-12-17	2015-12-16	1 year
04	EMI Test Receiver	ESCI	R&S	100948	2014-05-26	2015-05-25	1 year
05	TRILOG Broadband Antenna	VULB 9163	Schwarzbeck	9163-201	2013-11-25	2016-11-24	3 years
06	Double Ridged Waveguide Horn Antenna	HF907	R&S	100126	2012-07-02	2015-07-01	3 years
07	PSG Analog Signal Generator	E8257D	Agilent	MY49281 101	2014-05-26	2015-05-25	1 year
08	ESG Vector Signal Generator	E4438C	Agilent	MY49070 900	2014-05-26	2015-05-25	1 year
09	Spectrum Analyzer	E4445A	Agilent	MY46181 146	2014-05-26	2015-05-25	1 year
10	Power Splitter	SHX-GF2-2-13	Hua Xiang	1012010 1	NA	NA	NA
11	MOB COMMS DC SUPPLY	66319D	Agilent	MY43004 105	2014-05-26	2015-05-25	1 year
12	Power Sensor	E9304A	Agilent	MY50220 022	2014-05-26	2015-05-25	1 year
13	Power Meter	E4418B	Agilent	MY50000 623	2014-05-26	2015-05-25	1 year
14	Vibration table	ESS-050-120	dongling	D100712 6	2013-08-21	2016-08-20	3 years
15	Spectrum Analyzer	FSV30	R&S	100815	2014-12-18	2015-12-17	1 year
16	Standard Gain Horn	3160-09	ETS-Lindgren	0010264 4	2012-05-20	2015-05-19	3 years
17	RF Cable	SMA 15cm	Agilent	0001	2015-02-09	2015-04-08	2 Months

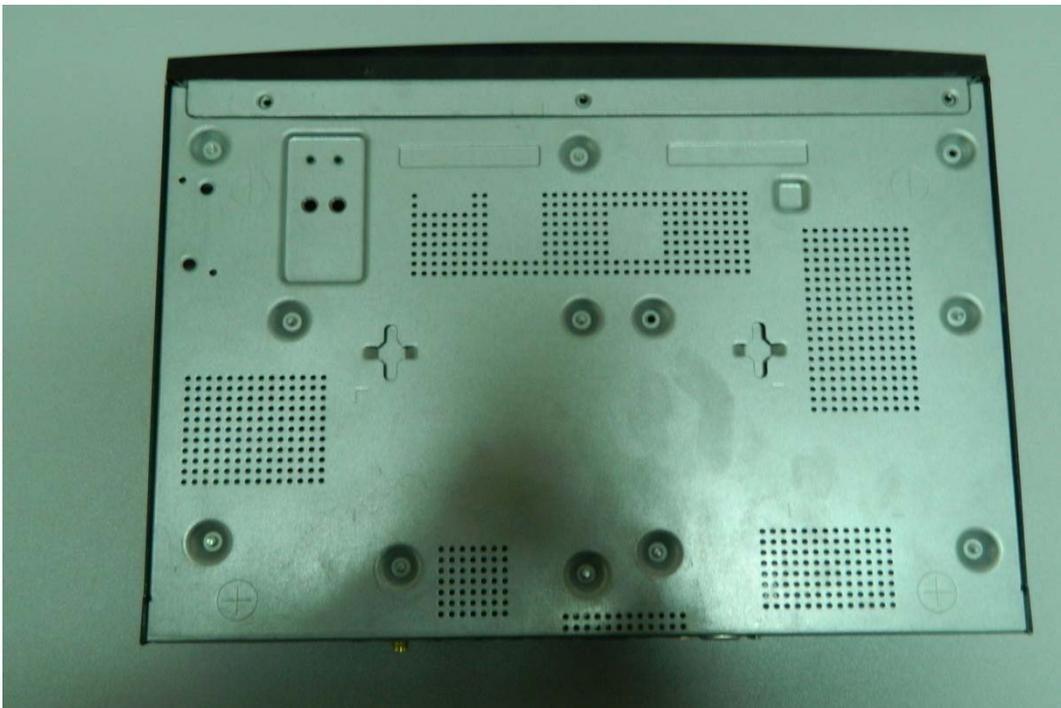
*****END OF REPORT *****

ANNEX A: EUT Appearance and Test Setup

A.1 EUT Appearance



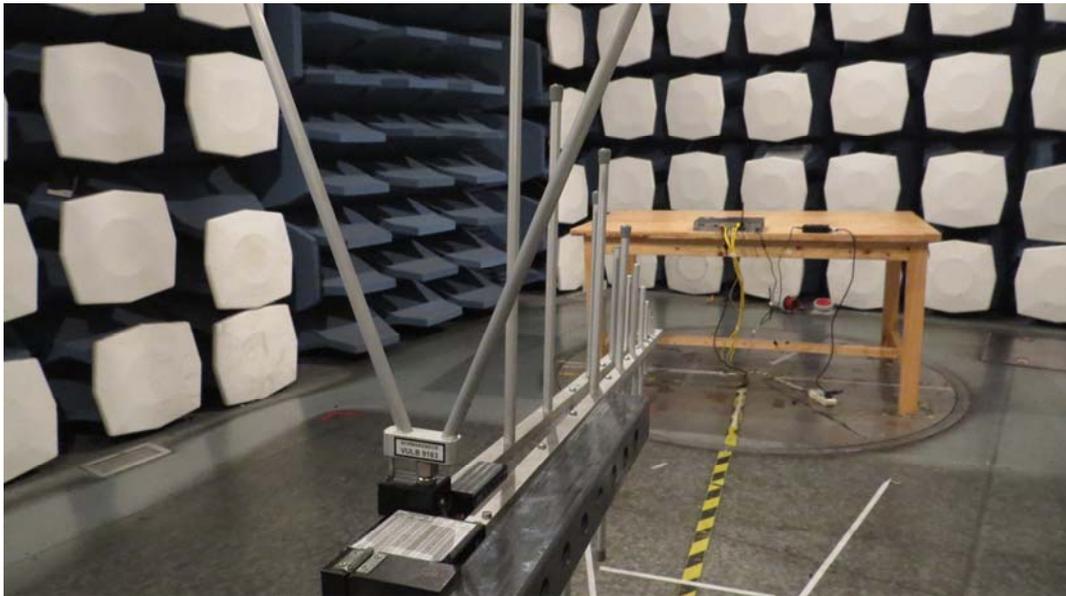
Picture 1-1: EUT



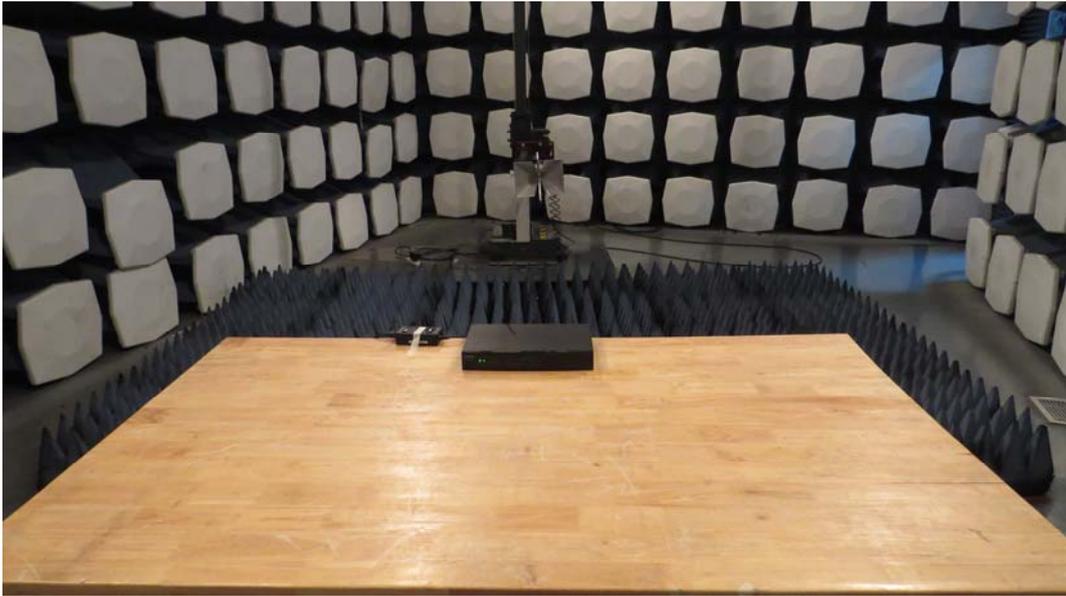
Picture 1-2: EUT

Picture 1 EUT

A.2 Test Setup



30M Hz-1GHz



Above 1GHz

Picture 2 Radiated Emission Test Setup



Picture 3 Conducted Emission Test Setup