



FCC/ IC TEST REPORT

According to

CFR47 §15.247/ RSS-247 Issue 1

Applicant	:	Qualcomm Atheros, Inc.
Address	:	1700 Technology Drive, San Jose, CA 95110
Manufacturer	:	Qualcomm Atheros, Inc.
Address	:	1700 Technology Drive, San Jose, CA 95110
Equipment	:	802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card
Brand	:	Qualcomm Atheros
Model No.	:	QCNFA344A
FCC ID	:	PPD-QCNFA344AH
IC ID	:	4104A-QCNFA344A

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of **Cerpass Technology (Suzhou) Co., Ltd.** the test report shall not be reproduced except in full.

I HEREBY CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.10 – 2013** and the energy emitted by this equipment was **passed**.

CISPR PUB. 22 and FCC Part 15 in both radiated and conducted emission class B limits. Testing was carried out on Jul 01,2016~Jul 25,2016 at **Cerpass Technology (Suzhou) Co., Ltd.**

Approved by:

Miro Chueh
EMC/RF Manager

Laboratory Accreditation:

Cerpass Technology Corporation Test Laboratory

☐	NVLAP LAB Code:	200954-0
	TAF LAB Code:	1439

Cerpass Technology (SuZhou) Co., Ltd.

☒	NVLAP LAB Code:	200814-0
	CNAS LAB Code:	L5515



Release History

Attachment No.	Version	Date	Description
SEDI1606081	Rev 01	2016-07-26	Initial release



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1. Report of Measurements and Examinations

1.1 List of Measurements and Examinations

FCC Rule	Description of Test	Result
§ 15.209(a)	Radiated Emission	Pass
§ 15.247(b)	Peak Output Power Measurement Data	Pass
§ 15.247(d)	Band Edges Measurement Data	Pass



2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

BT Specification	3.0HS
BT Frequency	2402~2480MHz
BT Channel Number	79
BT Channel Separation	1MHz
BT Type of Modulation	GFSK, Pi/4 DQPSK, 8DPSK
BT Data Rate	1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps (8DPSK)
Channel Control	Auto
Antenna Type	See antenna requirement

Host Details,

Host Manufacture	Host Type	Host Model
Lenovo	Notebook Computer	Lenovo YOGA 710-11IKB



2.2 Carrier Frequency of Channels

Bluetooth Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2403 MHz	02	2404 MHz	03	2405 MHz
04	2406 MHz	05	2407 MHz	06	2408 MHz	07	2409 MHz
08	2410 MHz	09	2411 MHz	10	2412 MHz	11	2413 MHz
12	2414 MHz	13	2415 MHz	14	2416 MHz	15	2417 MHz
16	2418 MHz	17	2419 MHz	18	2420 MHz	19	2421 MHz
20	2422 MHz	21	2423 MHz	22	2424 MHz	23	2425 MHz
24	2426 MHz	25	2427 MHz	26	2428 MHz	27	2429 MHz
28	2430 MHz	29	2431 MHz	30	2432 MHz	31	2433 MHz
32	2434 MHz	33	2435 MHz	34	2436 MHz	35	2437 MHz
36	2438 MHz	37	2439 MHz	38	2440 MHz	39	2441 MHz
40	2442 MHz	41	2443 MHz	42	2444 MHz	43	2445 MHz
44	2446 MHz	45	2447 MHz	46	2448 MHz	47	2449 MHz
48	2450 MHz	49	2451 MHz	50	2452 MHz	51	2453 MHz
52	2454 MHz	53	2455 MHz	54	2456 MHz	55	2457 MHz
56	2458 MHz	57	2459 MHz	58	2460 MHz	59	2461 MHz
60	2462 MHz	61	2463 MHz	62	2464 MHz	63	2465 MHz
64	2466 MHz	65	2467 MHz	66	2468 MHz	67	2469 MHz
68	2470 MHz	69	2471 MHz	70	2472 MHz	71	2473 MHz
72	2474 MHz	73	2475 MHz	74	2476 MHz	75	2477 MHz
76	2478 MHz	77	2479 MHz	78	2480 MHz	N/A	N/A

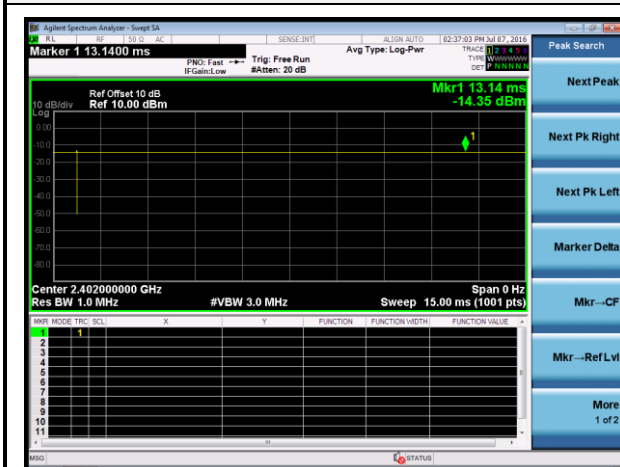


2.3 Duty cycle

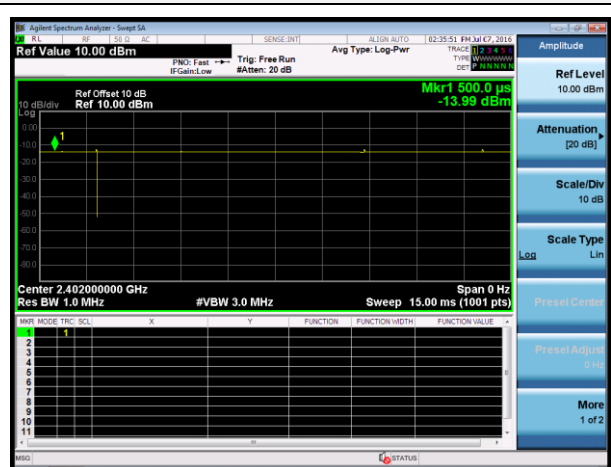
Test Item	Duty cycle
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Mode	Frequency (MHz)	Measurement (%)
DH5	2402	99%
2DH5	2402	99%
3DH5	2402	99%

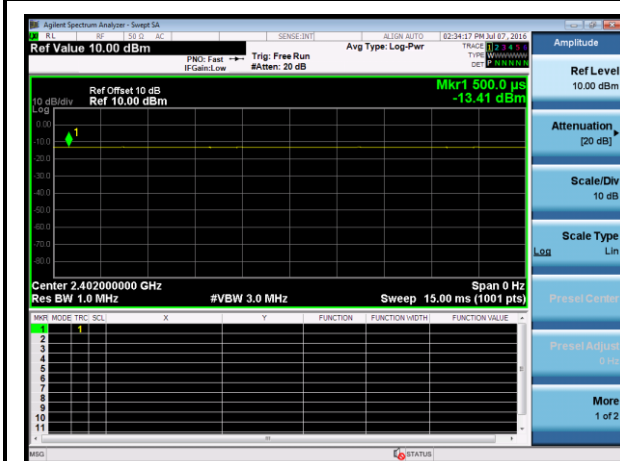
DH5 2402MHz



2DH5 2402MHz



3DH5 2402MHz





2.4 Test Manner

Test Manner	
1	During testing, the interface cables and equipment positions were varied according to RSS-247 Issue 1
2	Adjust the EUT at the test mode and the test channel. Then test.
Test mode	
The following test mode was performed for conduction and radiation test: Mode 1: Transmit by DH5 Mode 2: Transmit by 2DH5 Mode 3: Transmit by 3DH5	



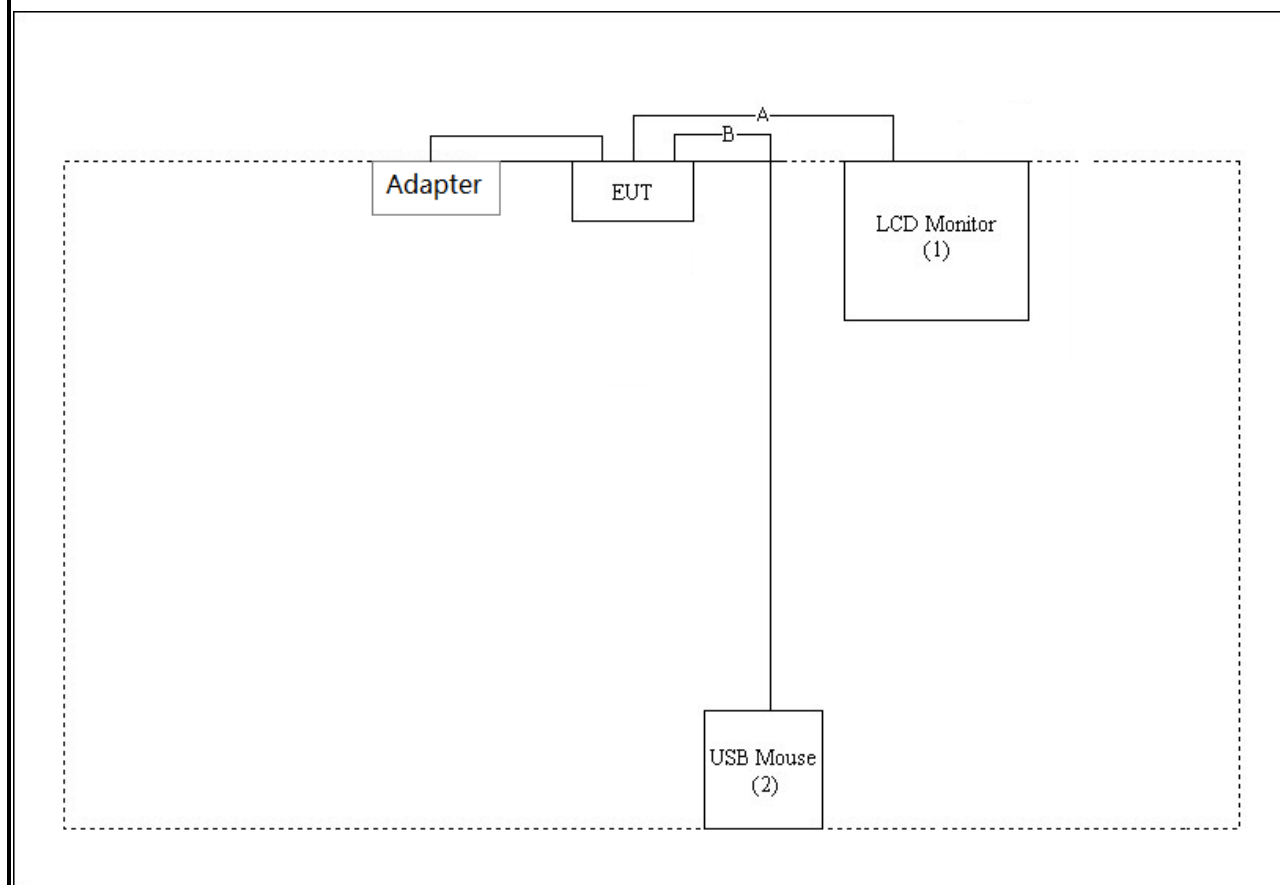
2.5 Description of Test System

Product		Manufacturer	Model No.	Power Cord
1	LCD Monitor	DELL	U2713HMT	Non-Shielded, 1.8m
2	USB Mouse	LENOVO	M-U0025-O	Power by Notebook



2.6 Configuration of Tested System

Connection Diagram



Signal Cable Type		Signal cable Description
A	HDMI Cable	Shielded, 1.8m
B	USB Mouse Cable	Shielded, 1.8m



2.7 General Information of Test

Test Site:	Cerpass Technology Corp.
Performand Location :	No.66,Tangzhuang Road, Suzhou Industrial Park, Jiangsu 215006, China
NVLAP LAB Code :	200814-0
FCC Registration Number :	916572, 331395
IC Registration Number :	7290A-1, 7290A-2

2.8 Measurement Uncertainty

Measurement Item	Measurement Frequency	Polarization	Uncertainty
Radiated Emission	30 MHz ~ 40GHz	Vertical	± 4.11 dB
		Horizontal	± 4.10 dB
Maximum Peak Output Power	---	---	± 1.4 dB



3. Antenna Requirements

3.1 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 (b), 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.

3.2 Antenna Construction and Directional Gain

Antenna	Manufacturer	Part Number	Peak Gain
PIFA Antenna(Main)	Speed	DC33001F300	2400- 2500MHz: 1.46dBi, 5150- 5850MHz: 1.95dBi
PIFA Antenna(Aux)	Speed	DC33001F310	2400- 2500MHz: 0.26dBi, 5150- 5850MHz: 2.82dBi
PIFA Antenna(Main)	HongLin	DC33001F000	2400- 2500MHz: 0.87dBi, 5150- 5850MHz: 0.58dBi
PIFA Antenna(Aux)	HongLin	DC33001F010	2400- 2500MHz: 0.64dBi, 5150- 5850MHz: 0.38dBi

Note: This EUT will collocation two kinds of antenna, we choose one of the high peak gain antenna for all RF testing.



4. Test of Radiated Emission

4.1 Test Limit

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

FREQUENCIES(MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE(meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.2 Test Procedures

- The EUT was placed on a rotatable table top 0.8 meter for frequency below 1GHz and 1.5meter for frequency above 1GHz above ground.
- The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- The table was rotated 360 degrees to determine the position of the highest radiation.
- The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
- For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

4.3 Test Setting

Quasi-Peak Measurements below 1GHz

- Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- Span was set greater than 1MHz



3. RBW = 120 kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Peak Measurements above 1GHz

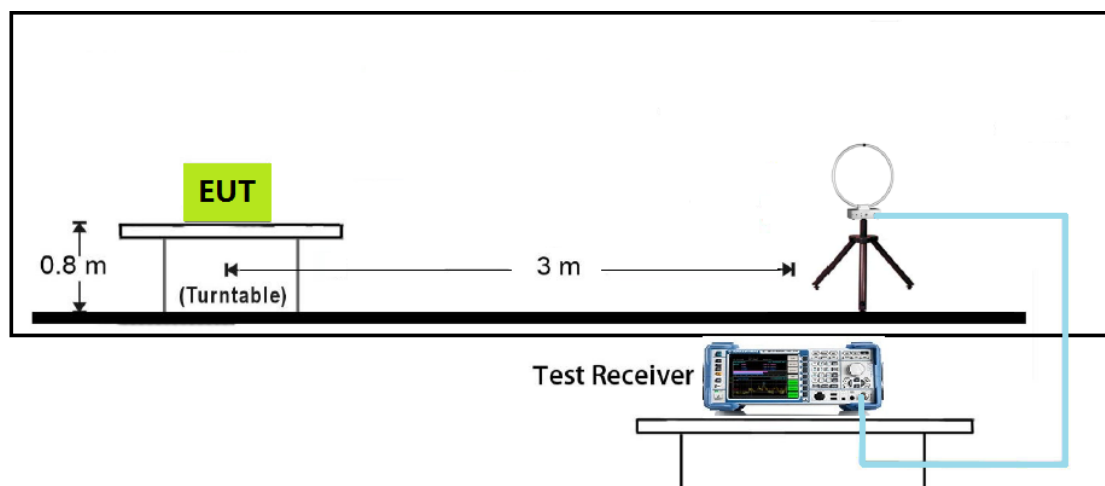
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz

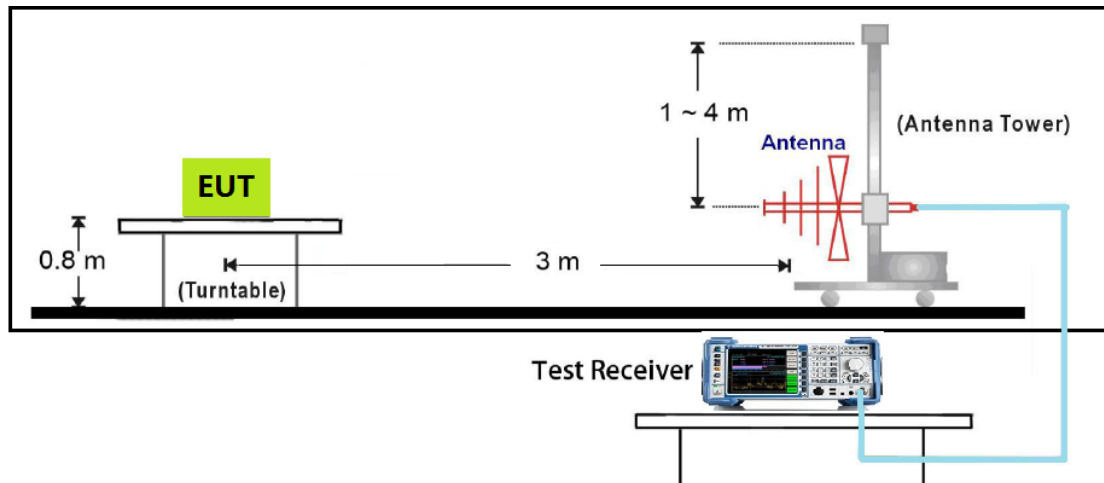
RBW = 1MHz,
VBW = 10Hz,
sweep time = auto,
Trace mode = max hold,
Trace was allowed to stabilize.

4.4 Typical Test Setup

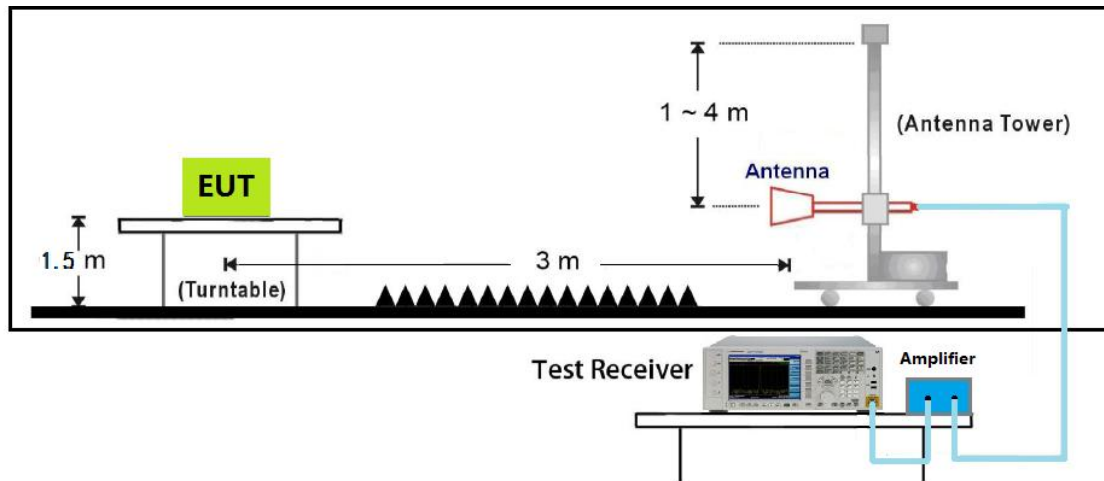
9kHz~30MHz Test Setup



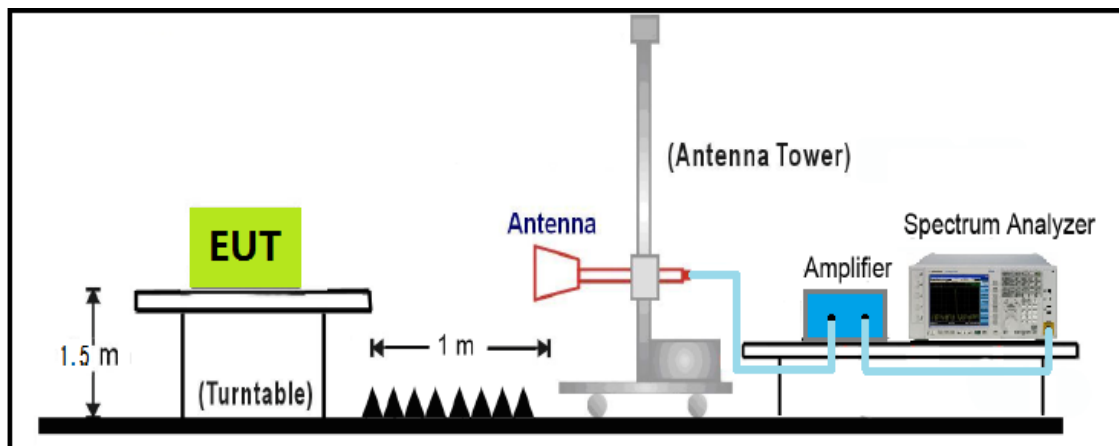
Below 1GHz Test Setup



1GHz~18GHz Test Setup



18GHz~40GHz Test Setup



**4.5 Measurement Equipment**

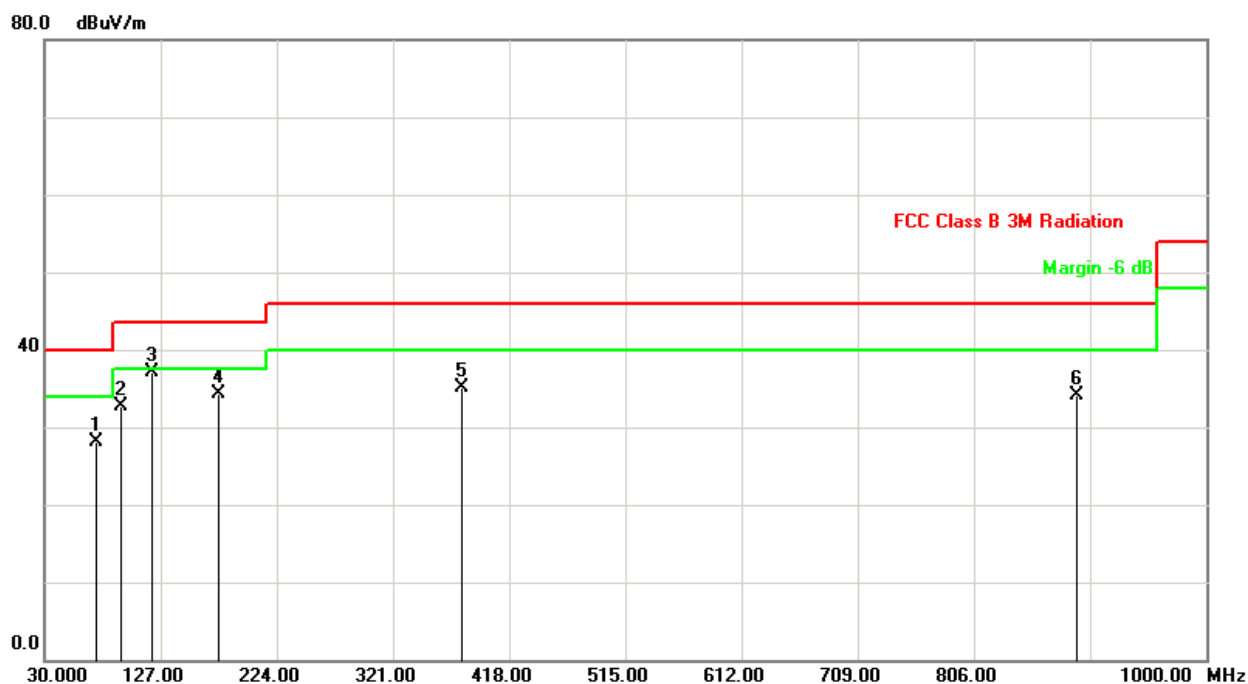
Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
EMI Test Receiver	R&S	ESCI	101183	2016.03.28	2017.03.29
Spectrum Analyzer	N9010A	Agilent	MY53400169	2015.11.11	2016.11.10
Spectrum Analyzer	R&S	FSP40	100324	2016.03.23	2017.03.24
H64 Preamplifier	HP	8447F	3113A05582	2016.03.24	2017.03.23
Preamplifier	songyi	EM330	60618	2016.03.29	2017.03.28
Preamplifier	Agilent	8449B	3008A02342	2016.03.29	2017.03.28
Preamplifier	COM-POWER	PA-840	711885	2016.03.29	2017.03.28
Bilog Antenna	Sunol Science	JB1	A072414-1	2016.04.22	2017.04.21
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-619	2016.04.20	2017.04.19
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	9170-347	2016.04.20	2017.04.19
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-002	2016.03.31	2017.03.30
EZ-EMC	Fala	Ver CT3A1	N/A	N/A	N/A



4.6 Test Result and Data

The worst case of Radiated Emission below 1GHz:

Limit: FCC_Part15.209_RE(3m)	Polarity: Horizontal
EUT: QCNFA344A	Power: 120V/60HZ
Note: Mode1: Transmit at channel 2402MHz by BT	



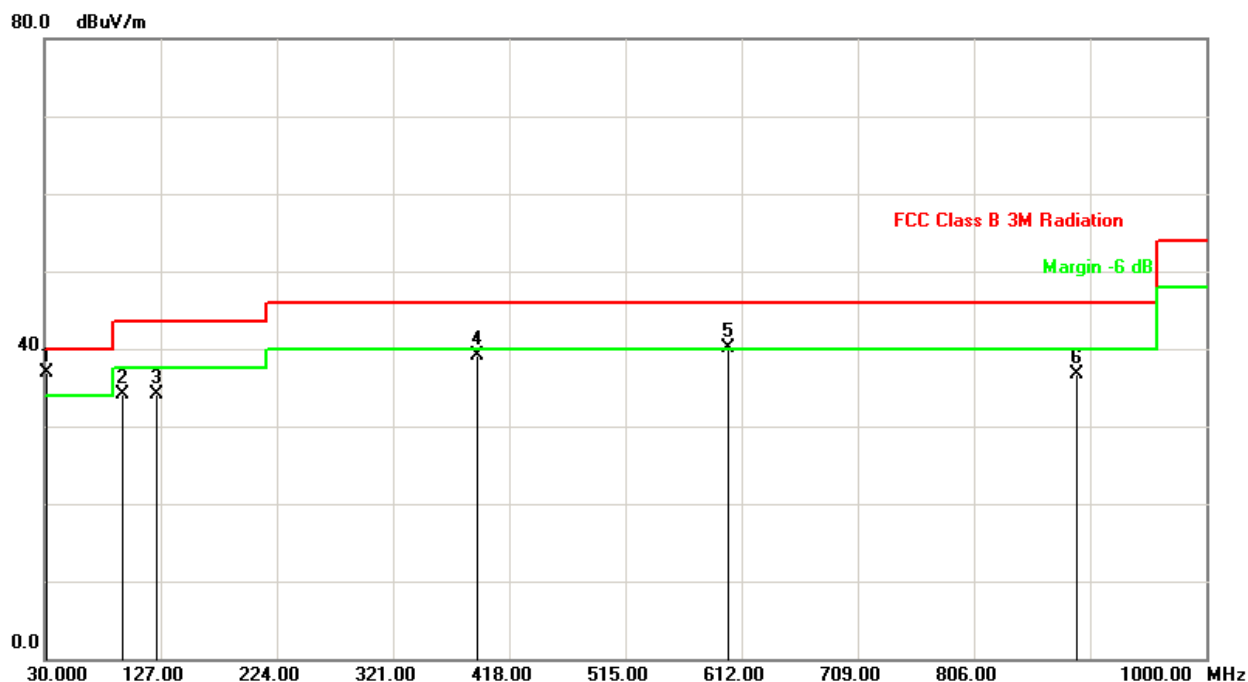
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	72.6800	-16.60	44.80	28.20	40.00	-11.80	QP	H
2	94.0100	-14.75	47.37	32.62	43.50	-10.88	QP	H
3	120.2000	-13.66	50.86	37.20	43.50	-6.30	QP	H
4	175.5000	-14.89	49.10	34.21	43.50	-9.29	QP	H
5	378.2300	-8.27	43.47	35.20	46.00	-10.80	QP	H
6	891.3600	2.87	31.23	34.10	46.00	-11.90	QP	H

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or AVG measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor (Correct Factor= Antenna Factor + Cable Loss – Amplifier)
3. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~40GHz), therefore no data appear in the report.



Limit: FCC_Part15.209_RE(3m)	Polarity: Vertical
EUT: QCNFA344A	Power: 120V/60HZ
Note: Mode1: Transmit at channel 2402MHz by BT	



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	31.9400	-6.22	43.12	36.90	40.00	-3.10	QP	V
2	94.9500	-14.70	48.90	34.20	43.50	-9.30	QP	V
3	124.0600	-13.95	48.15	34.20	43.50	-9.30	QP	V
4	391.8100	-7.83	47.03	39.20	46.00	-6.80	QP	V
5	600.3600	-2.64	42.84	40.20	46.00	-5.80	QP	V
6	891.3600	2.87	33.87	36.74	46.00	-9.26	QP	V

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or AVG measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor (Correct Factor= Antenna Factor + Cable Loss – Amplifier)
3. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~40GHz), therefore no data appear in the report.

**Above 1G:**

Mode 1: Transmitter-1Mbps(GFSK_DH5)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	4804.0	29.2	7.9	37.1	54(Note2)	-16.9	PK
	V	4804.0	31.2	7.8	39.0	54(Note2)	-15.0	PK
	H	7206.0	26.7	10.6	37.3	54(Note2)	-16.7	PK
	V	7206.0	25.1	10.6	35.7	54(Note2)	-18.3	PK
39	H	4882.0	29.9	8.0	37.9	54(Note2)	-16.1	PK
	V	4882.0	30.6	8.1	38.7	54(Note2)	-15.3	PK
	H	7323.0	29.0	10.8	39.8	54(Note2)	-14.2	PK
	V	7323.0	26.5	10.8	37.3	54(Note2)	-16.7	PK
78	H	4960.0	31.1	8.2	39.3	54(Note2)	-14.7	PK
	V	4960.0	28.9	8.3	37.2	54(Note2)	-16.8	PK
	H	7440.0	28.6	10.9	39.5	54(Note2)	-14.5	PK
	V	7440.0	30.5	10.9	41.4	54(Note2)	-12.6	PK

Note 1: The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~40GHz), therefore no data appear in the report.

2: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

3: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)



Mode 2: Transmitter-2Mbps(Pi/4 DQPSK _DH5)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	4804.0	29.6	7.9	37.5	54(Note2)	-16.5	PK
	V	4804.0	30.0	7.8	37.8	54(Note2)	-16.2	PK
	H	7206.0	26.4	10.6	37.0	54(Note2)	-17.0	PK
	V	7206.0	27.3	10.6	37.9	54(Note2)	-16.1	PK
39	H	4882.0	28.5	8.0	36.5	54(Note2)	-17.5	PK
	V	4882.0	31.3	8.1	39.4	54(Note2)	-14.6	PK
	H	7323.0	27.1	10.8	37.9	54(Note2)	-16.1	PK
	V	7323.0	26.1	10.8	36.9	54(Note2)	-17.1	PK
78	H	4960.0	30.1	8.2	38.3	54(Note2)	-15.7	PK
	V	4960.0	28.5	8.3	36.8	54(Note2)	-17.2	PK
	H	7440.0	29.5	10.9	40.4	54(Note2)	-13.6	PK
	V	7440.0	27.8	10.9	38.7	54(Note2)	-15.3	PK

Note 1: The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~40GHz), therefore no data appear in the report.

2: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

3: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)



Mode 3: Transmitter-3Mbps(8DPSK_DH5)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	4804.0	31.4	7.9	39.3	54(Note2)	-14.7	PK
	V	4804.0	30.0	7.8	37.8	54(Note2)	-16.2	PK
	H	7206.0	24.1	10.6	34.7	54(Note2)	-19.3	PK
	V	7206.0	26.6	10.6	37.2	54(Note2)	-16.8	PK
39	H	4882.0	30.7	8.0	38.7	54(Note2)	-15.3	PK
	V	4882.0	28.4	8.1	36.5	54(Note2)	-17.5	PK
	H	7323.0	26.8	10.8	37.6	54(Note2)	-16.4	PK
	V	7323.0	28.1	10.8	38.9	54(Note2)	-15.1	PK
78	H	4960.0	31.1	8.2	39.3	54(Note2)	-14.7	PK
	V	4960.0	30.6	8.3	38.9	54(Note2)	-15.1	PK
	H	7440.0	26.8	10.9	37.7	54(Note2)	-16.3	PK
	V	7440.0	28.9	10.9	39.8	54(Note2)	-14.2	PK

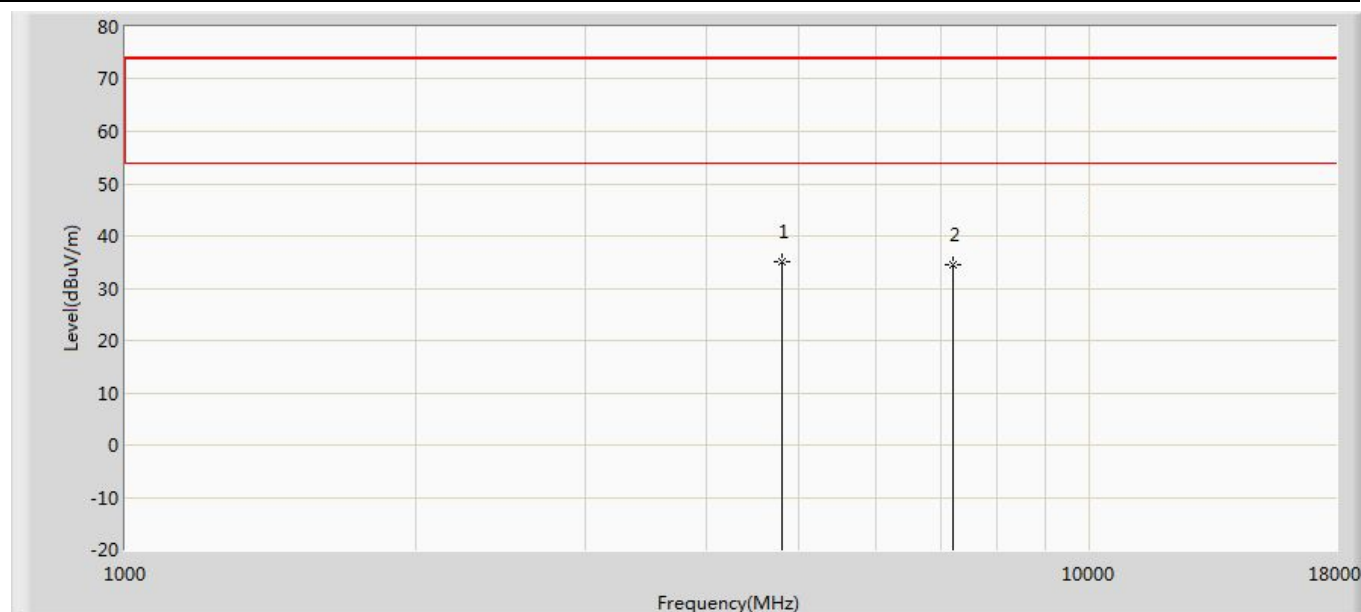
Note 1: The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~40GHz), therefore no data appear in the report.

2: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

3: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)

**The worst case of Radiated Emission 1~18GHz:**

Site: AC102	Time: 2016/07/12
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D(1-18GHz)	Polarity: Horizontal
EUT: QCNFA344A	Power: 120V/60HZ
Note: Transmitter-1Mbps(GFSK_DH5)	



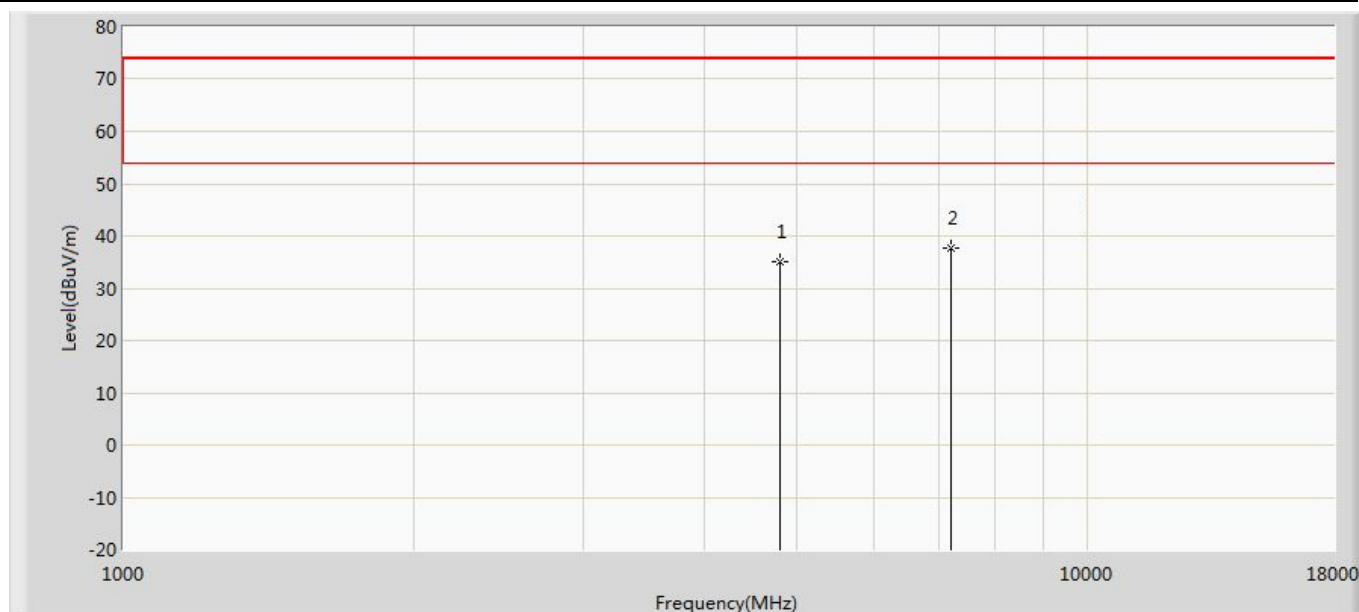
No	Mark	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Type
1		4960.0	31.1	8.2	39.3	54(Note2)	-14.7	PK
2		7440.0	28.6	10.9	39.5	54(Note2)	-14.5	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or AVG measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor (Correct Factor= Antenna Factor + Cable Loss – Amplifier)
3. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~40GHz), therefore no data appear in the report.



Site: AC102	Time: 2016/07/12
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D(1-18GHz)	Polarity: Vertical
EUT: QCNFA344A	Power: 120V/60HZ
Note: Transmitter-1Mbps(GFSK_DH5)	



No	Mark	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Type
1		4960.0	28.9	8.3	37.2	54(Note2)	-16.8	PK
2		7440.0	30.5	10.9	41.4	54(Note2)	-12.6	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or AVG measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor (Correct Factor= Antenna Factor + Cable Loss – Amplifier)
3. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~40GHz), therefore no data appear in the report.



5. Maximum Output Power

5.1 Test Limit

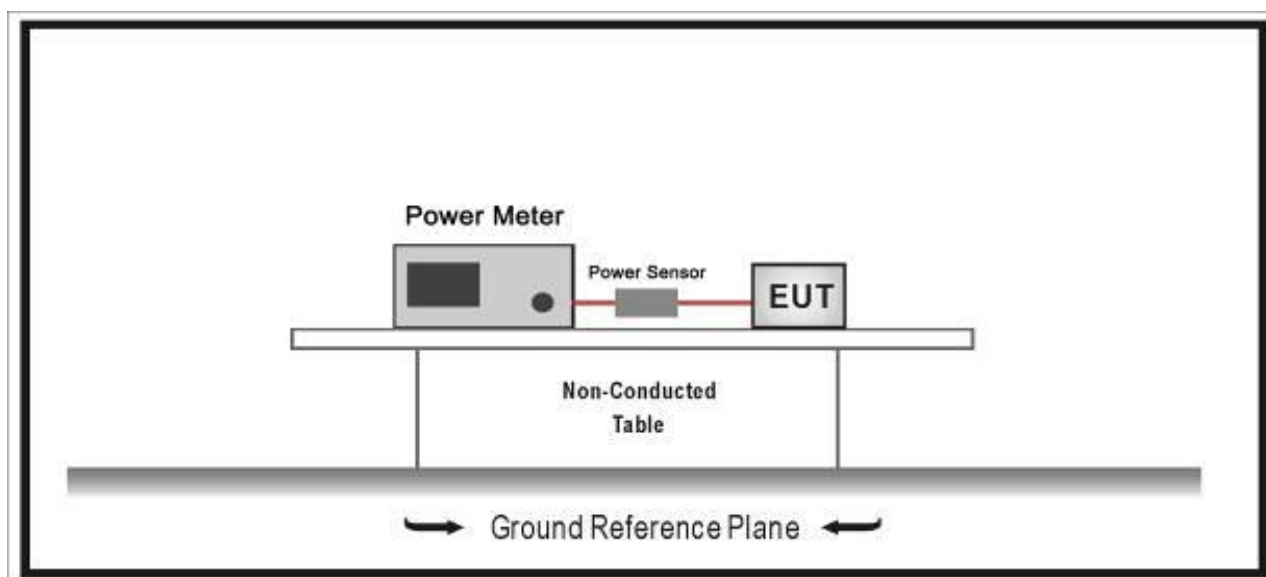
For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

5.2 Test Procedure

According to ANSI C63.10: 2013-7.8.5.

Use peak responding power meter for Peak Power test.

5.3 Test Setup Layout



5.4 Measurement Equipment

Instrument	Manufacturer	Type No.	Serial No.	Calibration Date	Valid Date.
Series Power Meter	ANRITSU	ML2495A	1224005	2016/03/27	2017/03/26
Temperature/Humidity Meter	Zhicheng	ZC1-11	CEP-TH-003	2016/03/31	2017/03/30



5.5 Test Result and Data

Test Item	Power Output
Test Mode	Mode 1: Transmitter-1Mbps (GFSK_DH5)
Test Date	2016-07-14

Channel No.	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Required Limit (dBm)	Result
00	2402	5.1	7.0	30	Pass
39	2441	5.2	7.1	30	Pass
78	2480	5.0	6.9	30	Pass

Test Item	Power Output
Test Mode	Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5)
Test Date	2016-07-14

Channel No.	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Required Limit (dBm)	Result
00	2402	5.2	7.2	30	Pass
39	2441	5.0	7.0	30	Pass
78	2480	5.1	7.1	30	Pass



Test Item	Power Output
Test Mode	Mode 3: Transmitter-3Mbps (8DPSK_DH5)
Test Date	2016-07-14

Channel No.	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Required Limit (dBm)	Result
00	2402	4.8	6.8	30	Pass
39	2441	5.1	7.1	30	Pass
78	2480	4.7	6.7	30	Pass



6. Band Edges Measurement

6.1 Test Limit

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) of FCC part 15.

6.2 Test Procedure

According to ANSI C63.10: 2013.

This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205 of FCC part 15. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b) of FCC part 15.

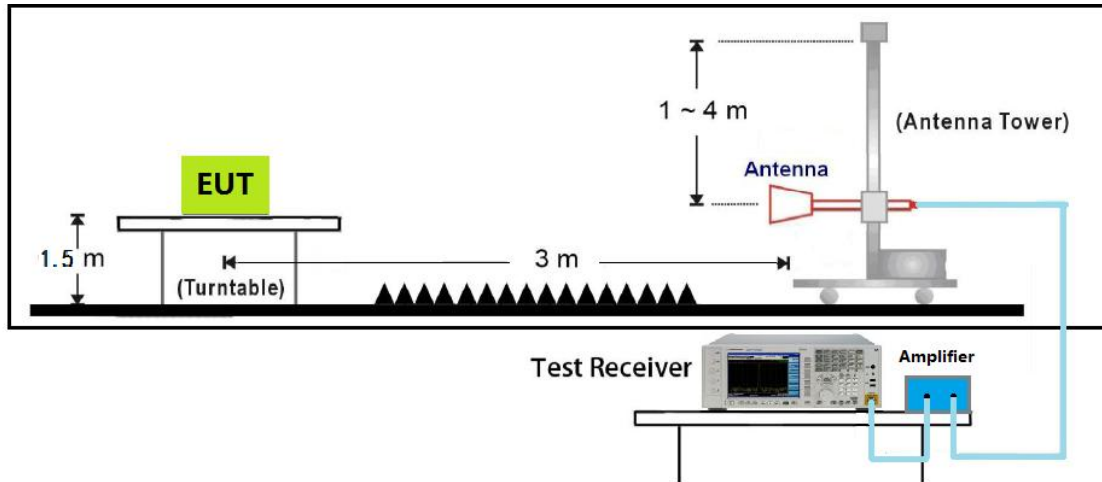
Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209 of FCC Part 15. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW 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 of FCC part 15.

If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative "marker-delta" method may be employed.



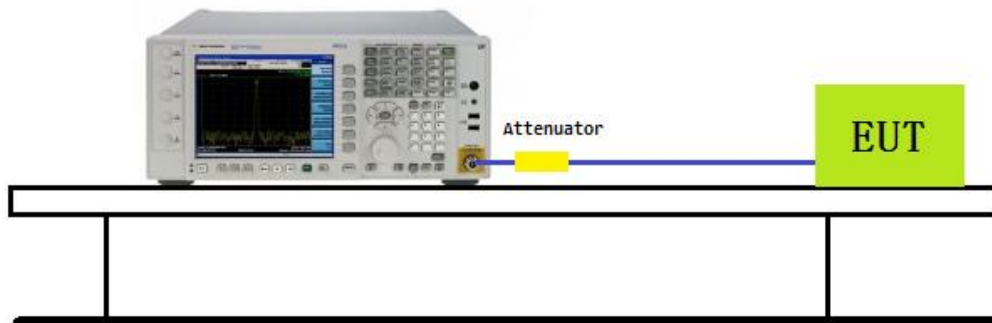
6.3 Test Setup Layout

Radiated



Conducted

Spectrum Analyzer





6.4 Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
EMI Test Receiver	R&S	ESCI	101183	2016.03.28	2017.03.29
Spectrum Analyzer	N9010A	Agilent	MY53400169	2015.11.11	2016.11.10
Spectrum Analyzer	R&S	FSP40	100324	2016.03.23	2017.03.24
H64 Preamplifier	HP	8447F	3113A05582	2016.03.24	2017.03.23
Preamplifier	songyi	EM330	60618	2016.03.29	2017.03.28
Preamplifier	Agilent	8449B	3008A02342	2016.03.29	2017.03.28
Preamplifier	COM-POWER	PA-840	711885	2016.03.29	2017.03.28
Bilog Antenna	Sunol Science	JB1	A072414-1	2016.04.22	2017.04.21
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-619	2016.04.20	2017.04.19
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	9170-347	2016.04.20	2017.04.19
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-002	2016.03.31	2017.03.30



6.5 Test Result and Data

Test Date	:	Jul. 12, 2016
Temperature	:	25°C
Humidity	:	55%
Atmospheric Pressure	:	1020 hPa

Modulation Standard: DH5

Channel 0 Fundamental Frequency: 2402 MHz

No.	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type	Antenna Pole (V/H)
1	2390.00	59.70	26.58	-14.30	74.00	33.11	PK	H
2	2390.00	49.47	16.36	-4.53	54.00	33.11	AV	H
3	2390.00	61.20	28.09	-12.80	74.00	33.11	PK	V
4	2390.00	48.67	15.56	-5.33	54.00	33.11	AV	V

Note 1: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)

Channel 78 Fundamental Frequency: 2480 MHz

No.	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type	Antenna Pole (V/H)
1	2483.50	61.44	27.95	-12.56	74.00	33.49	PK	H
2	2483.50	50.24	16.75	-3.76	54.00	33.49	AV	H
3	2483.50	59.61	26.12	-14.39	74.00	33.49	PK	V
4	2483.50	49.52	16.03	-4.48	54.00	33.49	AV	V

Note 1: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)



Modulation Standard: 2DH5

Channel 0 Fundamental Frequency: 2402 MHz

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type	Antenna Pole (V/H)
1	2390.00	59.10	25.99	-14.90	74.00	33.11	PK	H
2	2390.00	48.85	15.74	-5.15	54.00	33.11	AV	H
3	2390.00	60.67	27.56	-13.33	74.00	33.11	PK	V
4	2390.00	49.27	16.16	-4.73	54.00	33.11	AV	V

Note 1: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)

Channel 78 Fundamental Frequency: 2480 MHz

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type	Antenna Pole (V/H)
1	2483.50	66.60	33.11	-7.40	74.00	33.49	PK	H
2	2483.50	50.31	16.82	-3.69	54.00	33.49	AV	H
3	2483.50	67.23	33.74	-6.77	74.00	33.49	PK	V
4	2483.50	50.02	16.53	-3.98	54.00	33.49	AV	V

Note 1: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)



Modulation Standard: 3DH5

Channel 0 Fundamental Frequency: 2402 MHz

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type	Antenna Pole (V/H)
1	2390.00	64.72	31.61	-9.28	74.00	33.11	PK	H
2	2390.00	48.87	15.76	-5.13	54.00	33.11	AV	H
3	2390.00	66.84	33.73	-7.16	74.00	33.11	PK	V
4	2390.00	50.11	17.00	-3.89	54.00	33.11	AV	V

Note 1: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)

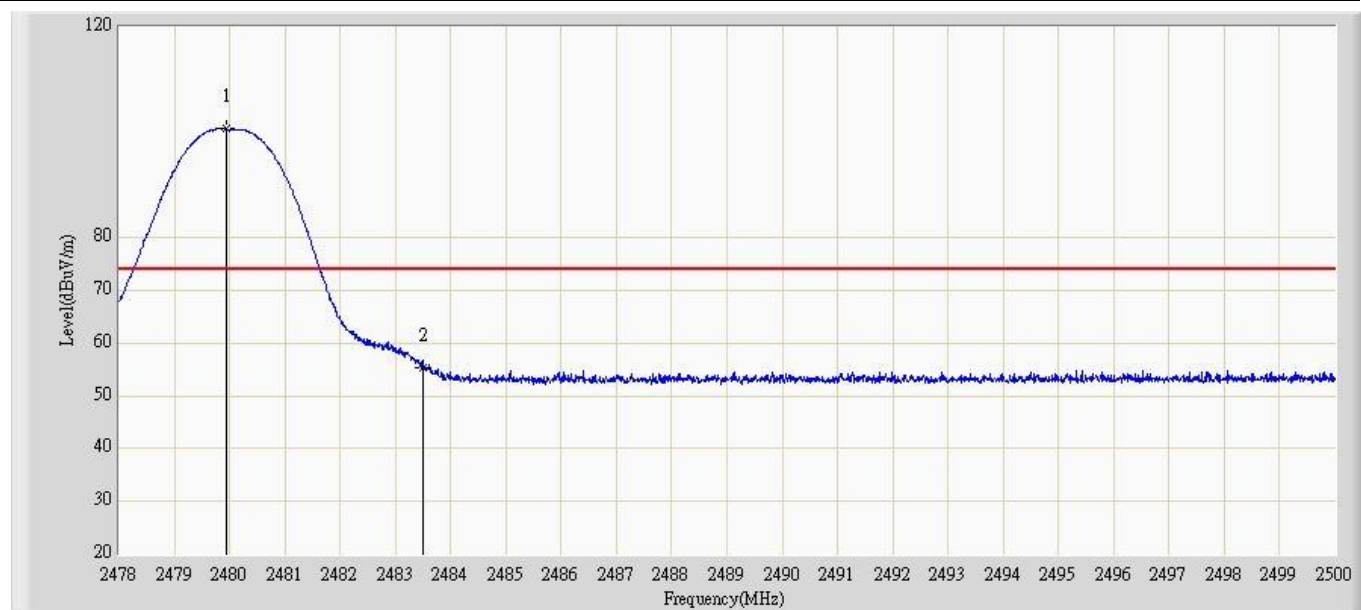
Channel 78 Fundamental Frequency: 2480 MHz

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type	Antenna Pole (V/H)
1	2483.50	66.41	32.91	-7.59	74.00	33.49	PK	H
2	2483.50	49.95	16.46	-4.05	54.00	33.49	AV	H
3	2483.50	63.35	29.85	-10.65	74.00	33.49	PK	V
4	2483.50	50.04	16.54	-3.96	54.00	33.49	AV	V

Note 1: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)

**The worst-case plots of bandedge for each mode in each operating band:**

Site: AC102	Time: 2016/07/12
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:BBHA9120D(1-18GHz)	Polarity: Horizontal
EUT: QCNFA344A	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2480MHz by 2DH5	

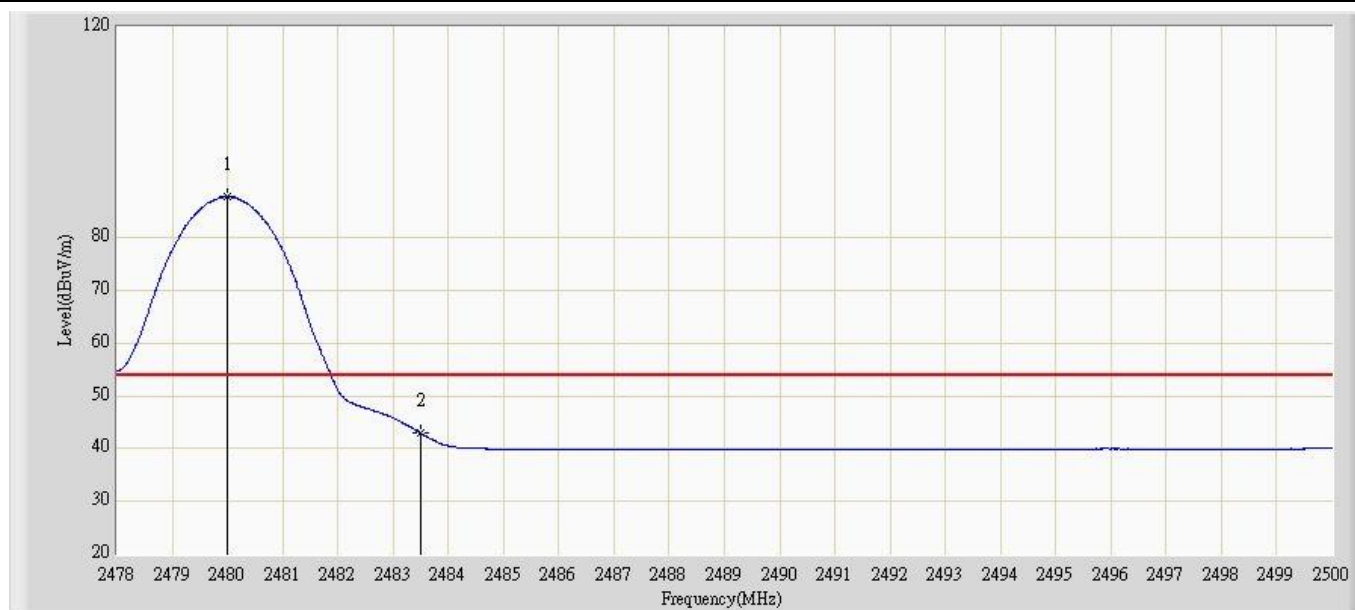


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2479.936	100.614	62.676	N/A	N/A	37.938	PK
2			2483.50	66.60	33.11	-7.40	74.00	33.49	PK

Note 1: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)



Site: AC102	Time: 2016/07/12
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:BBHA9120D(1-18GHz)	Polarity: Horizontal
EUT: QCNFA344A	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2480MHz by 2DH5	

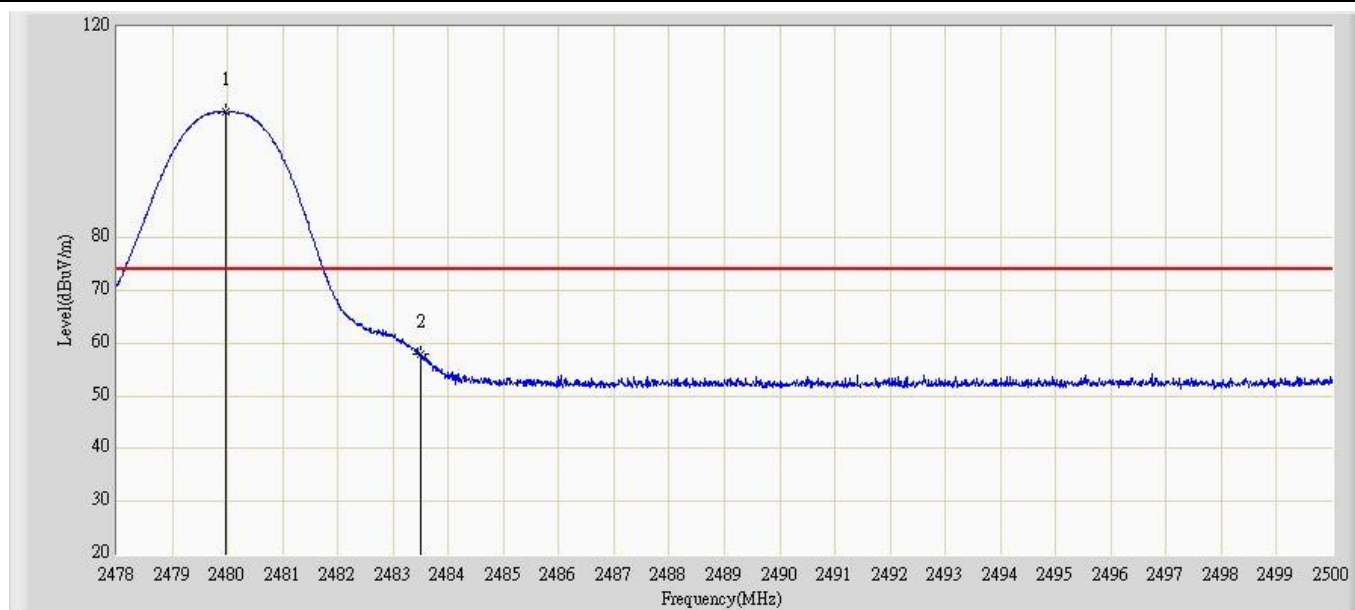


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.002	87.716	49.777	N/A	N/A	37.939	AV
2			2483.50	50.31	16.82	-3.69	54.00	33.49	AV

Note 1: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)



Site: AC102	Time: 2016/07/12
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:BBHA9120D(1-18GHz)	Polarity: Vertical
EUT: QCNFA344A	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2480MHz by DH5	

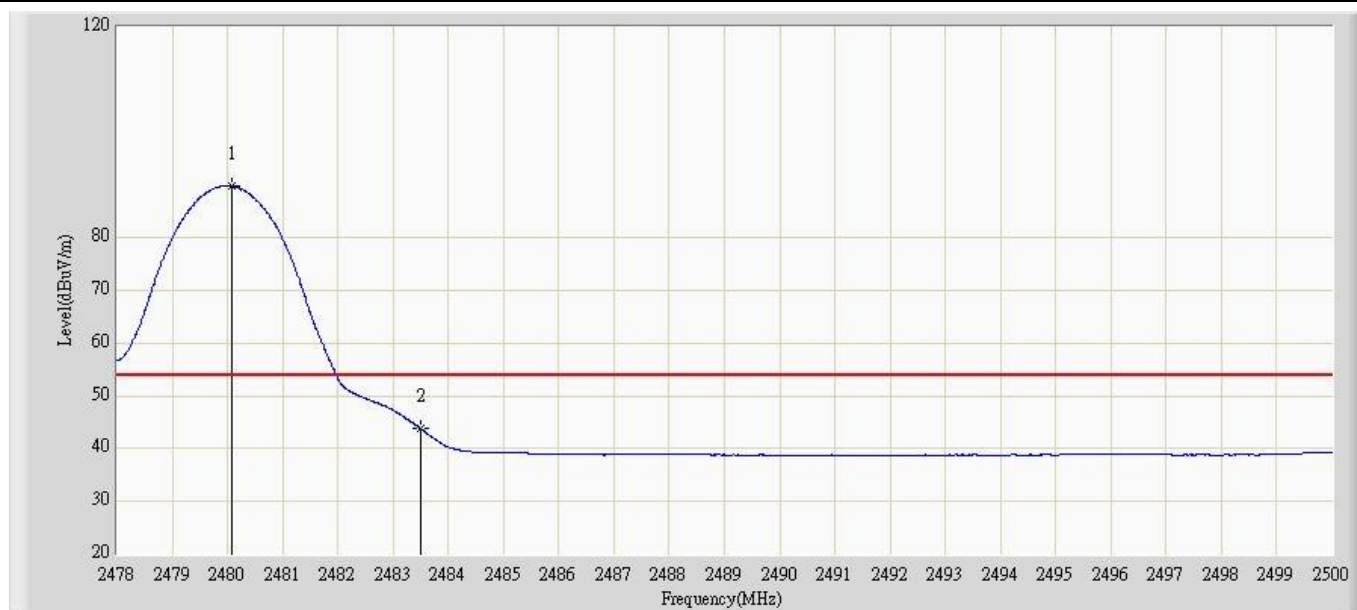


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2479.969	103.769	66.850	N/A	N/A	36.919	PK
2			2483.50	67.23	33.74	-6.77	74.00	33.49	PK

Note 1: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)



Site: AC102	Time: 2016/07/12
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:BBHA9120D(1-18GHz)	Polarity: Vertical
EUT: QCNFA344A	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2480MHz by DH5	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.079	89.838	52.919	N/A	N/A	36.919	AV
2			2483.50	50.02	16.53	-3.98	54.00	33.49	AV

Note 1: Measure Level = Reading Level + Factor. (Factor= Antenna Factor + Cable Loss – Amplifier)



7. Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.250
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

7.1 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.