

Test Report

FCC Part15.249

Product Name : SR12E
Model No. : SR12E
FCC ID : 2ACS5-SR12E
IC : 11554B-SR12E

Applicant : Yuneec Technology Co., Limited
Address : 2/F Man Shung Industrial Building, 7 Lai Yip Street, Kwun
Tong, Hong Kong

Date of Receipt : Sep. 25, 2014
Test Date : Oct. 08, 2014~Nov. 11, 2014
Issued Date : Dec. 22, 2014
Report No. : 1490564R-RF-US-P06V01
Report Version : V1.1



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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Test Report Certification

Issued Date : Dec. 22, 2014

Report No. : 1490564R-RF-US-P06V01



Product Name : SR12E

Applicant : Yuneec Technology Co., Limited

Address : 2/F Man Shung Industrial Building, 7 Lai Yip Street, Kwun Tong, Hong Kong

Manufacturer : Good Power Technology Co., Ltd.

Address : No.388 East Zhengwei Road, Jinxi Town, Kunshan, Jiangsu 215324, China

Model No. : SR12E

FCC ID : 2ACS5-SR12E

IC : 11554B-SR12E

Brand Name : Yuneec

EUT Voltage : DC: 5V

Applicable Standard : FCC CFR Title 47 Part 15 Subpart C: 2014
ANSI C63.4: 2009, ANSI C63.10:2009
Industry Canada RSS-Gen Issue 4/RSS-210 Issue

Test Result : Complied

Performed Location : Suzhou EMC Laboratory
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FCC Registration Number: 800392; IC Lab Code: 4075B

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Laboratory Information

We, **Quietek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

Taiwan R.O.C.	:	BSMI, NCC, TAF
Germany	:	TUV Rheinland
Norway	:	Nemko, DNV
USA	:	FCC
Japan	:	VCCI
China	:	CNAS

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site :<http://www.quietek.com/tw/ctg/cts/accreditations.htm>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :
<http://www.quietek.com/>

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
1490564R-RF-US-P06V01	V1.0	Initial Issued Report	Nov. 19, 2014
1490564R-RF-US-P06V01	V1.1	Added test data	Dec. 22, 2014

1. General Information**1.1. EUT Description**

Product Name	SR12E
Model No.	SR12E
Working Voltage	DC:5V
Frequency Range	2405~2480MHz
Channel Number	16
Type of Modulation	QPSK
Date Rate	250kbps
Channel Control	Auto
Antenna Type	Dipole antenna
Antenna #1 Gain	0dBi
Antenna #2 Gain	0dBi

Channel List

Working Frequency of Each Channel:							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2405	4	2425	8	2445	12	2465
1	2410	5	2430	9	2450	13	2470
2	2415	6	2435	10	2455	14	2475
3	2420	7	2440	11	2460	15	2480

1.2. Mode of Operation

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmit

Note:

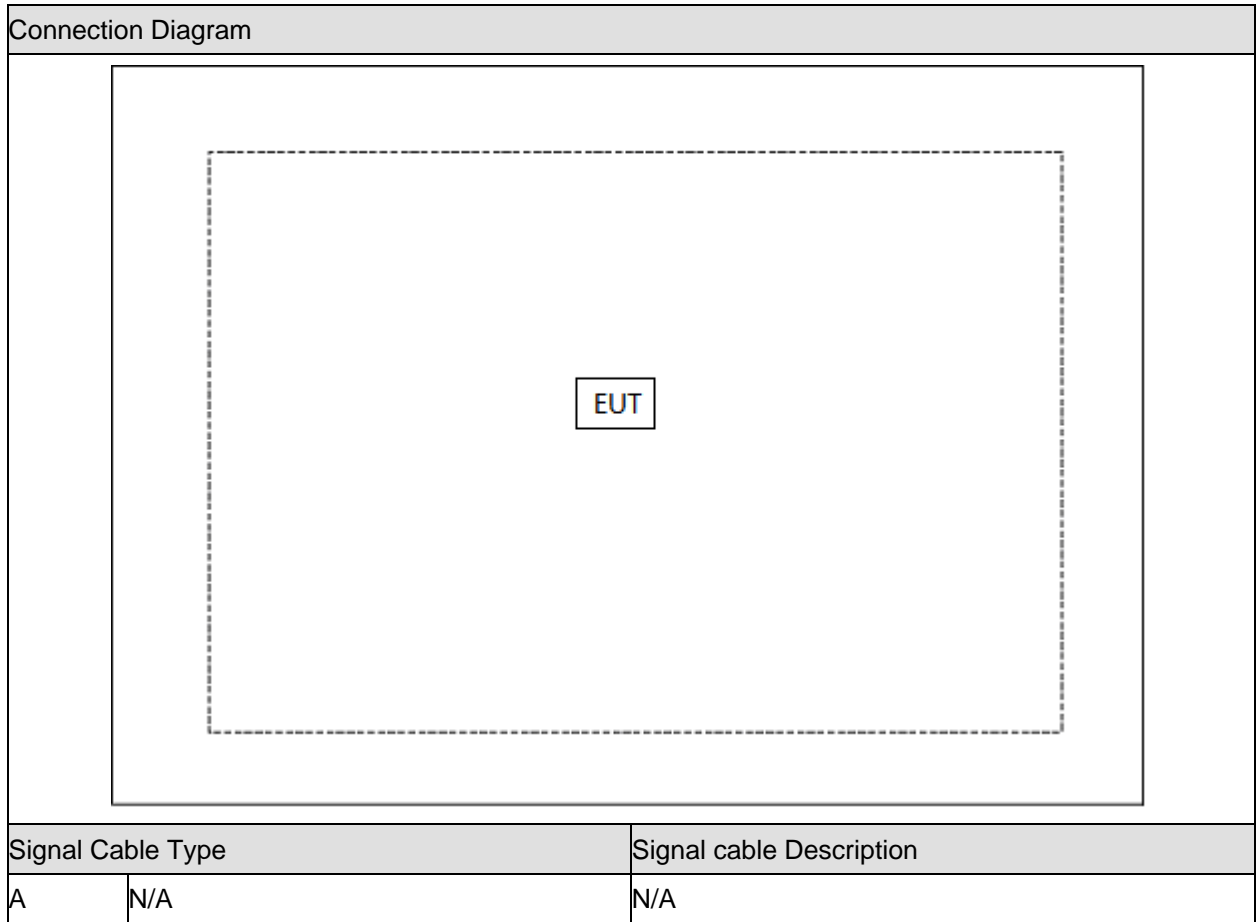
1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.

1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	N/A	N/A	N/A	N/A	N/A

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of equipment.
3	Select the channel and start to test.

2. Technical Test

2.1. Summary of Test Result

No deviations from the test standards

Deviations from the test standards as below description:

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.207 RSS-Gen Issue 3 December 2010 Section 7.2.2	N/A	No
20dB&99% Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.215(c)	Yes	No
Radiated Emission	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.209 and 15.249 Issue 10 November 2014 Section 6.13 and Section 7.1.2	Yes	No
Band-edge Compliance of RF Conducted Emissions	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.215(c)	Yes	No

2.2. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

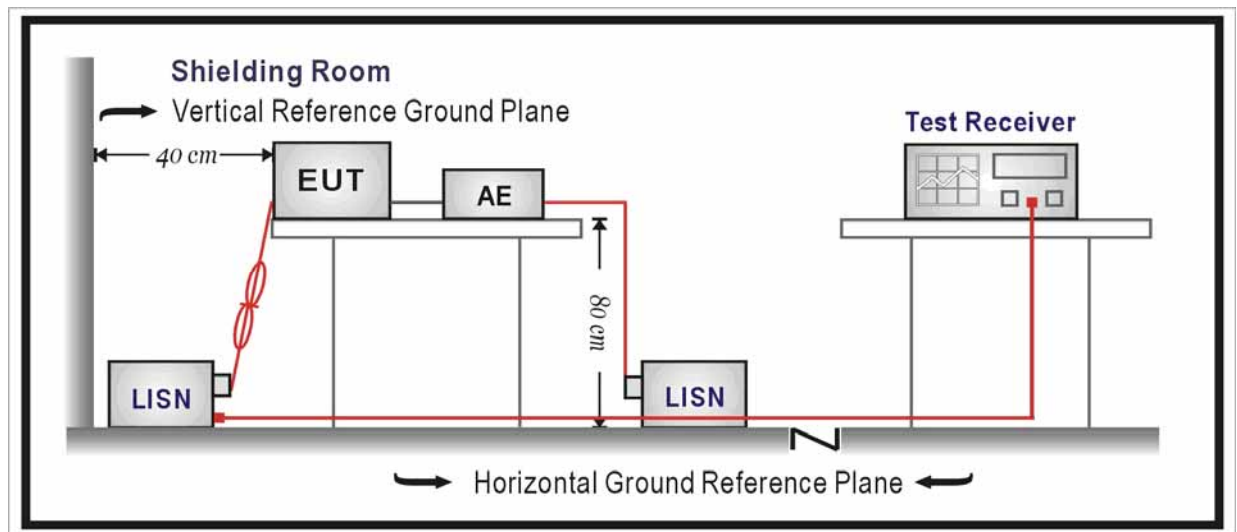
3.1. Test Equipment

Conducted Emission / TR-1

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
EMI Test Receiver	R&S	ESCI	100726	2015.03.28
Two-Line V-Network	R&S	ENV216	101043	2015.03.28
Two-Line V-Network	R&S	ENV216	101044	2015.09.16
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2015.03.01
50ohm Termination	SHX	TF2	07081401	2015.09.16
Temperature/Humidity Meter	zhicheng	ZC1-2	TR1-TH	2015.01.08

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

3.2. Test Setup



3.3. Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

3.4. Test Procedure

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

3.5. Uncertainty

The measurement uncertainty is defined as ± 2.02 dB

3.6. Test Result

Not applicable.

4. 20dB Bandwidth

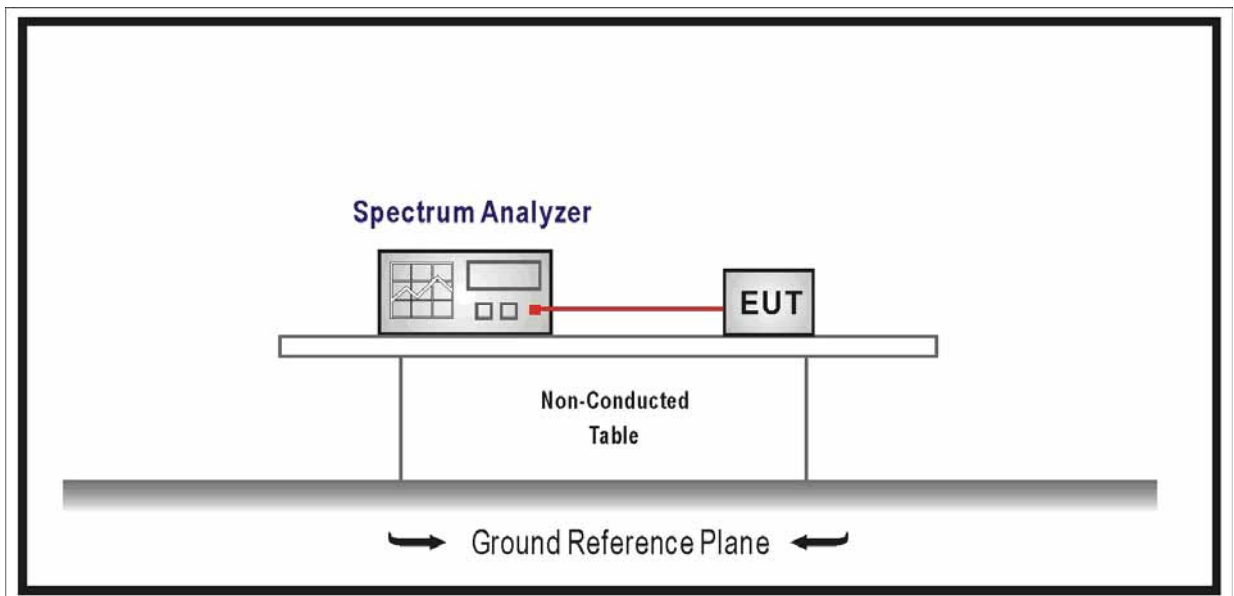
4.1. Test Equipment

20dB Bandwidth / TR8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2015.01.07
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2015.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

4.2. Test Setup



4.3. Limit

- For frequency hopping systems operating in 2400-2483.5 MHz band, no limitation.
- For frequency hopping systems operating in 902-928 MHz band, the maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- For frequency hopping systems operating in 5725-5850 MHz band, the maximum 20 dB bandwidth of the hopping channel is 1 MHz.

4.4. Test Procedure

According to ANSI C63.10: 2009.

Use the following spectrum analyzer settings:

Span = shall be between two times and five times the OBW

RBW \cong 1% of the 20dB bandwidth

VBW \cong RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize.

Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

4.5. Uncertainty

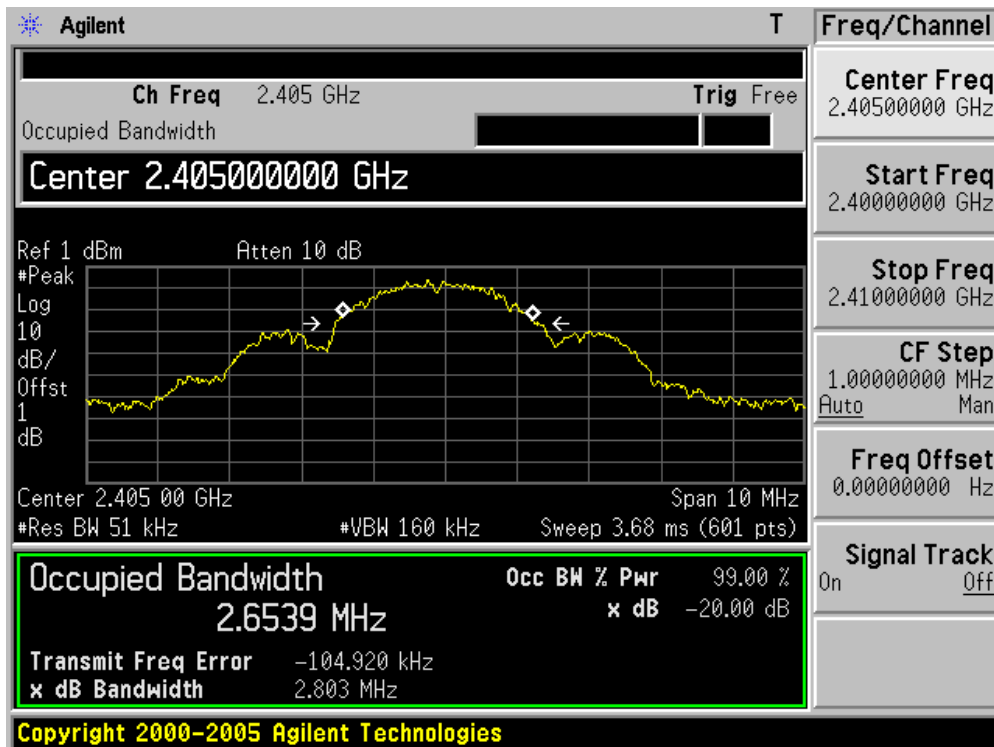
The measurement uncertainty is defined as ± 1 kHz

4.6. Test Result

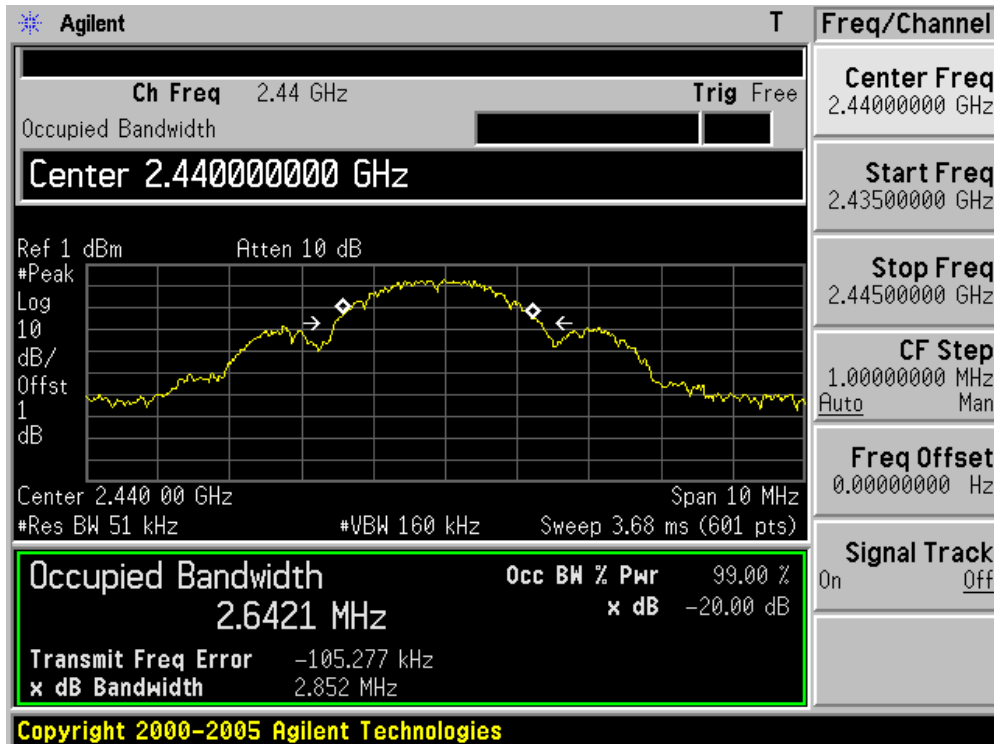
Product	:	SR12E
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmitter Ant 1

Channel No.	Frequency(MHz)	20dB Bandwidth (kHz)	99% Bandwidth (MHz)
00	2405	2803	2.6539
07	2440	2852	2.6421
15	2480	2748	2.6130

Channel 00 (2405MHz)



Channel 07 (2440MHz)



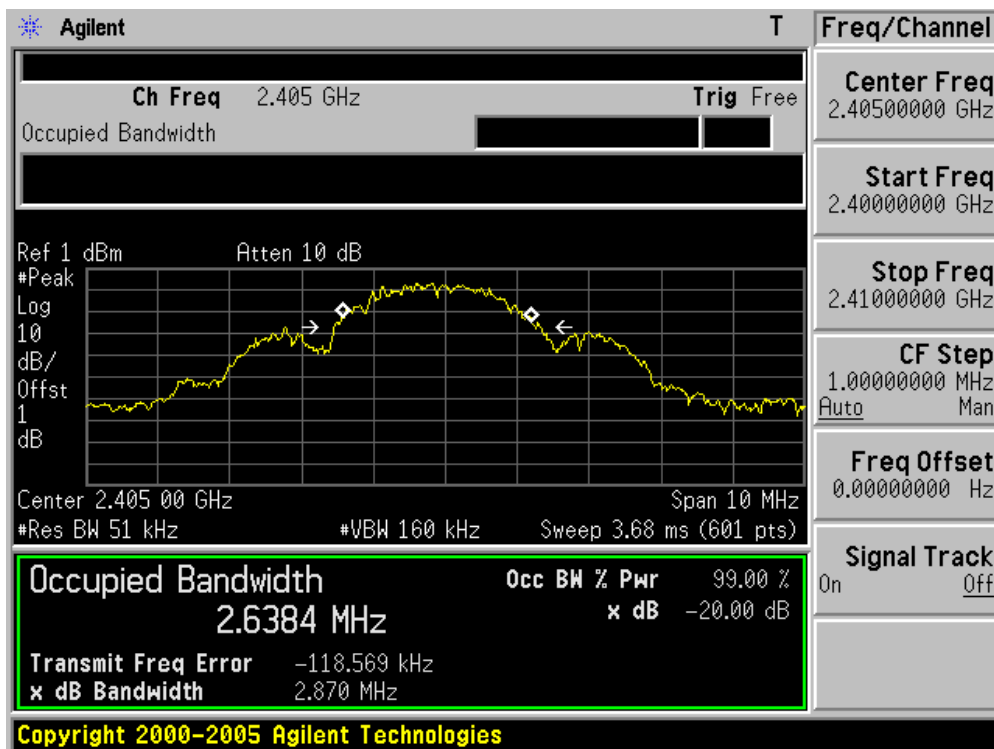
Channel 15 (2480MHz)



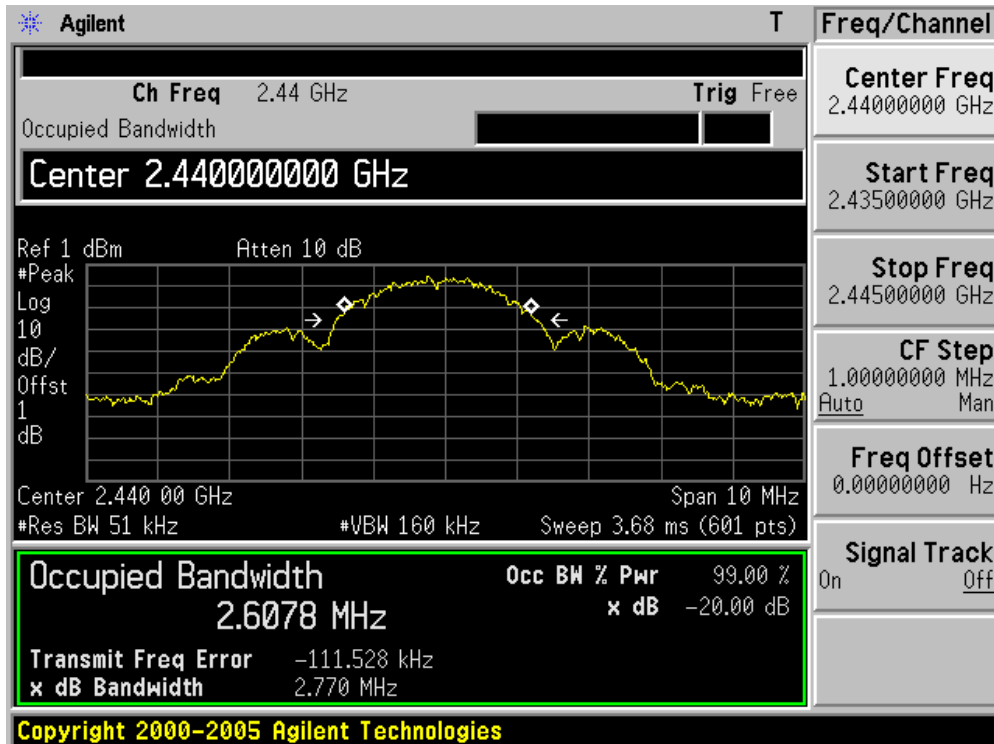
Product	:	SR12E
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmitter Ant 2

Channel No.	Frequency(MHz)	20dB Bandwidth (kHz)	99% Bandwidth (MHz)
00	2405	2870	2.6384
07	2440	2770	2.6078
15	2480	2834	2.6147

Channel 00 (2405MHz)



Channel 07 (2440MHz)



Channel 15 (2480MHz)



5. Radiated Emission

5.1. Test Equipment

Radiated Emission / AC-2

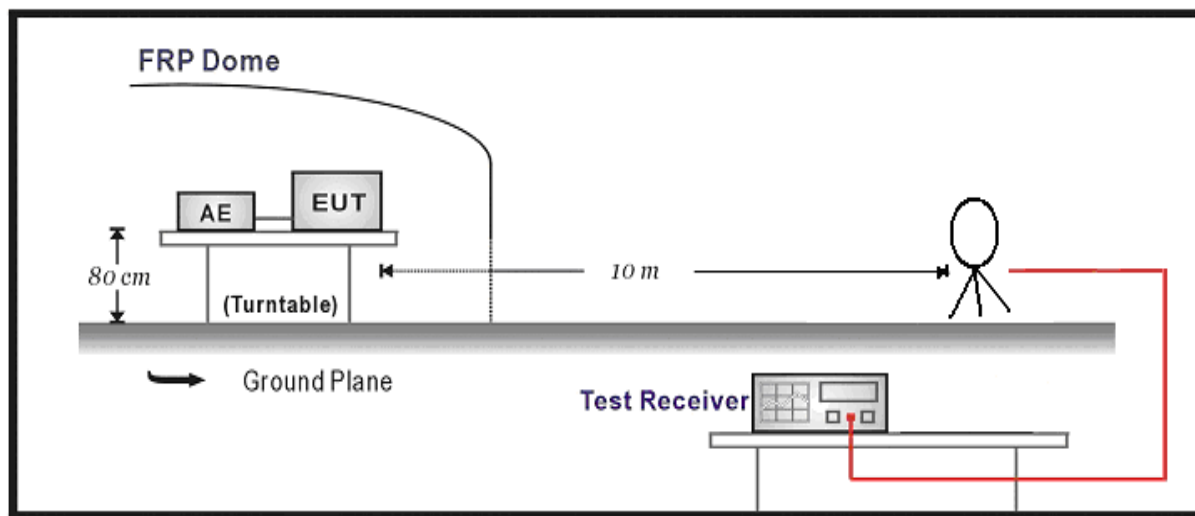
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
EMI Test Receiver	R&S	ESCI	100573	2015.03.28
Loop Antenna	R&S	HFH2-Z2	833799/003	2015.11.16
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2015.10.15
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2015.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2015.04.09

Radiated Emission / AC-5

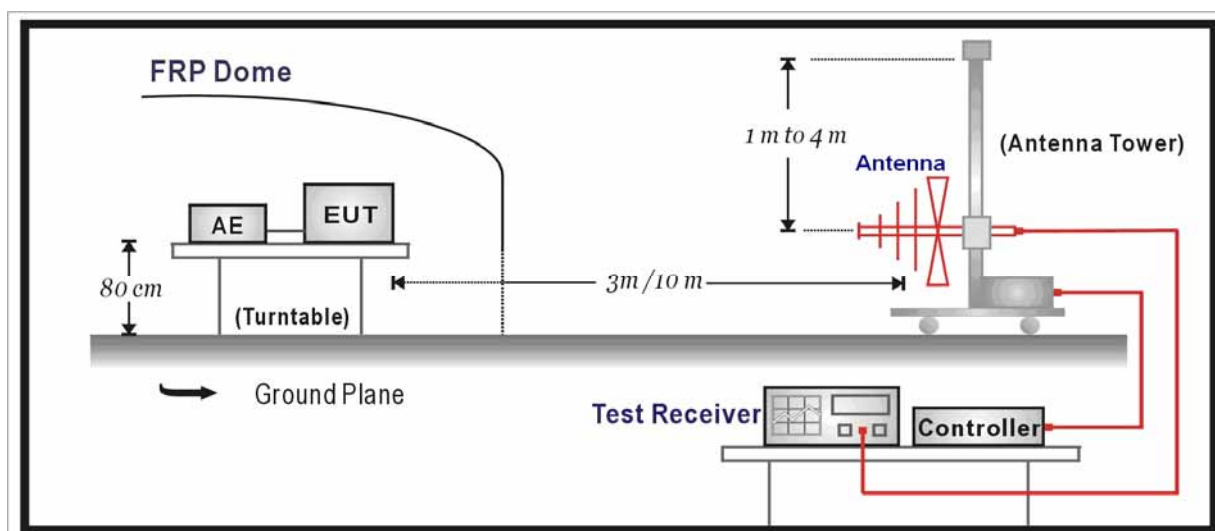
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2015.03.28
Preamplifier	QuieTek	AP-025C	CHM-0602008	2015.05.03
Preamplifier	Miteq	NSP1800-25	1364185	2015.05.03
Preamplifier	QuieTek	AP-040G	CHM-0906001	2015.05.03
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2015.10.15
DRG Horn	ETS-Lindgren	3117	00123988	2015.01.07
Horn Antenna	Schwarzbeck	BBHA9170	294	2015.04.10
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2015.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2015.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2015.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC5-TH	2015.01.08

5.2. Test Setup

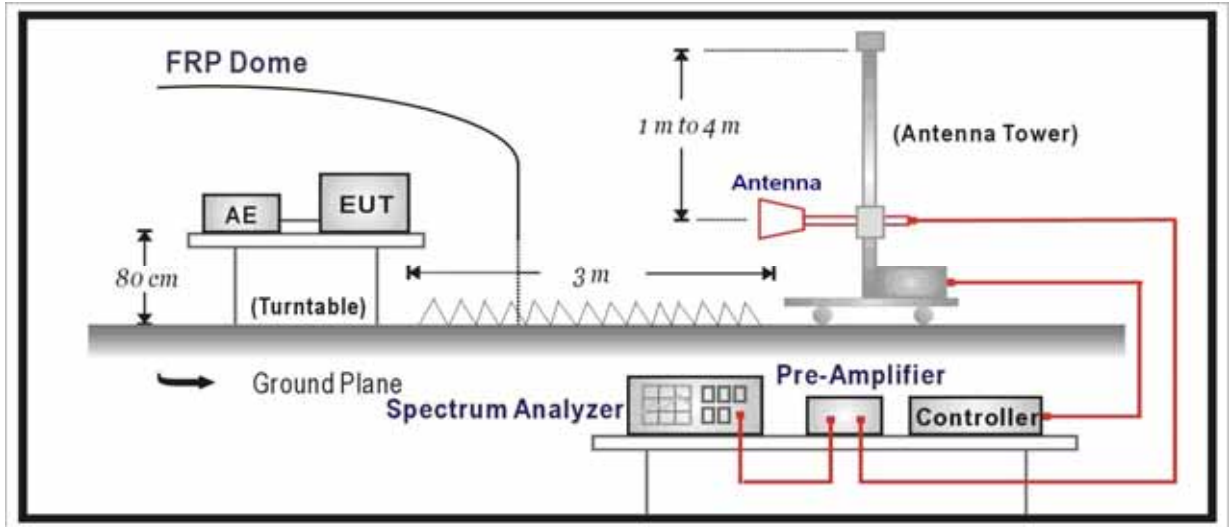
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



5.3. Limit

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (uV/m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-80	100**	3
80-216	150**	3
216-960	200**	3
Above 960	500	3

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m).

FCC Part 15 Subpart C Paragraph 15.249		
Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902-928(MHz)	50	500
2400-2483.5(MHz)	50	500
5725-5875(MHz)	50	500
24.0-24.25(GHz)	250	2500

- FCC Part 15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

5.4. Test Procedure

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2009 / ANSI C63.10: 2009 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 30MHz to 10th harmonic is checked.

Note: When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the “cone of radiation” of EUT. The 3dB beamwidth is 60~10 degrees for H-plane and 90~10 degrees for E-plane.

5.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB
 below 1G is defined as ± 3.8 dB

5.6. Test Result

All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

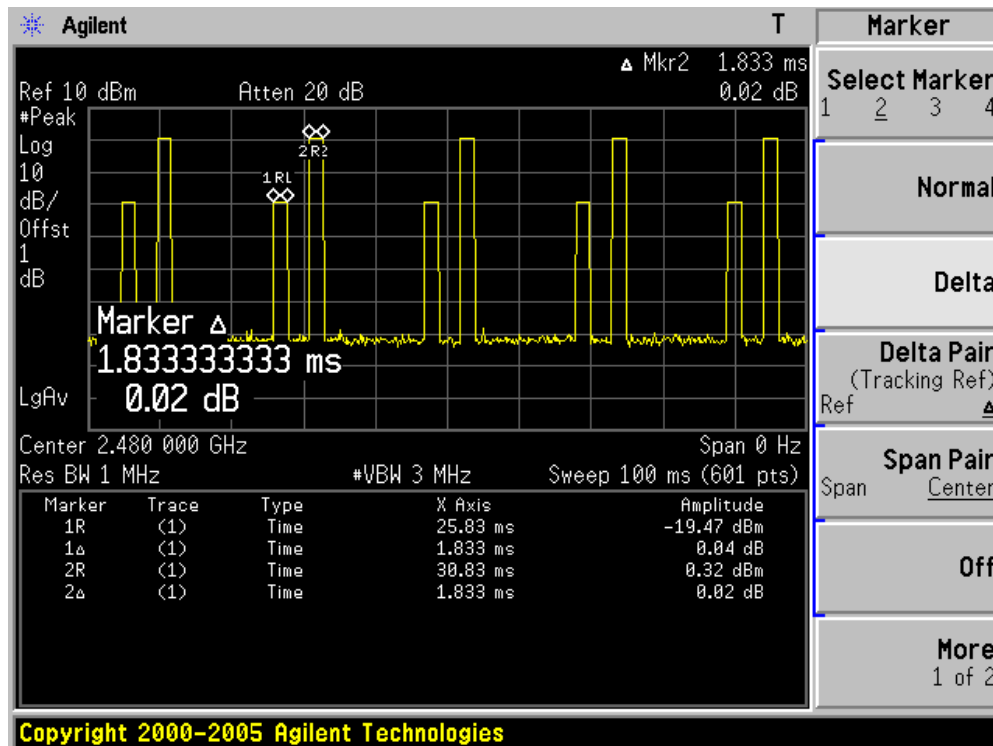
Peak detector: RBW = 3MHz, VBW = 3MHz, sweep time = 200ms;

Average detector = Peak detector - 20*Log(1/Duty Cycle)

The maximum duty cycle plot is as the following:

$$\text{Duty cycle correction factor (DCCF)} = 20 * \text{Log}(1.833 * 10 / 100) = -14.74 \text{ dB}$$

Duty cycle



Fundamental Radiated Emission

Product	:	SR12E
Test Item	:	Fundamental Radiated Emission
Test Site	:	AC-5
Test Mode	:	Mode 1: Transmitting (Ant 1)

Frequency (MHz)	Antenna	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Type
2405	H	61.3	37.8	99.1	114	-14.9	PK
	V	53.4	37.8	91.2	114	-22.8	PK
2440	H	65.2	37.9	103.1	114	-10.9	PK
	V	56.3	37.9	94.2	114	-19.8	PK
2480	H	66.2	38.1	104.3	114	-9.7	PK
	V	54.7	38.1	92.8	114	-21.2	PK

Note: 1. Measure Level = Reading Level + Factor.

2. Factor = Antenna factor + cable loss factor - preamp factor

Frequency (MHz)	Antenna	Peak Measure (dBuV/m)	Duty Cycle Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Type
2405	H	99.1	-14.74	84.36	94	-9.64	AV
	V	91.2	-14.74	76.46	94	-17.54	AV
2440	H	103.1	-14.74	88.36	94	-5.64	AV
	V	94.2	-14.74	79.46	94	-14.54	AV
2480	H	104.3	-14.74	89.56	94	-4.44	AV
	V	92.8	-14.74	78.06	94	-15.94	AV

Note: 1. Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

Product	:	SR12E
Test Item	:	Fundamental Radiated Emission
Test Site	:	AC-5
Test Mode	:	Mode 1: Transmitting (Ant 2)

Frequency (MHz)	Antenna	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Type
2405	H	63.4	37.8	101.2	114	-12.8	PK
	V	51.2	37.8	89.0	114	-25.0	PK
2440	H	65.4	37.9	103.3	114	-10.7	PK
	V	55.6	37.9	93.5	114	-20.5	PK
2480	H	65.7	38.1	103.8	114	-10.2	PK
	V	53.9	38.1	92.0	114	-22.0	PK

Note: 1. Measure Level = Reading Level + Factor.

2. Factor = Antenna factor + cable loss factor - preamp factor

Frequency (MHz)	Antenna	Peak Measure (dBuV/m)	Duty Cycle Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Type
2405	H	101.2	-14.74	86.5	94	-7.5	AV
	V	89.0	-14.74	74.3	94	-19.7	AV
2440	H	103.3	-14.74	88.6	94	-5.4	AV
	V	93.5	-14.74	78.8	94	-15.2	AV
2480	H	103.8	-14.74	89.1	94	-4.9	AV
	V	92.0	-14.74	77.3	94	-16.7	AV

Note: 1. Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

Harmonic Radiated Emission

PK: Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 500ms;

For average, use peak measure level + Duty Cycle Correct Factor.

Product	:	SR12E
Test Item	:	Harmonic Radiated Emission
Test Site	:	AC-5
Test Mode	:	Mode 1: Transmit at Low Channel

Ant	Frequency (MHz)	Antenna	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Type
Ant 1	4810.0	H	35.3	9.7	45.0	74	-29.0	PK
	4810.0	V	34.9	9.7	44.6	74	-29.4	PK
	7215.0	H	29.9	11.9	41.8	74	-32.2	PK
	7205.0	V	38.6	11.9	50.5	74	-23.5	PK
Ant 2	4810.0	H	35.7	9.7	45.4	74	-28.6	PK
	4810.0	V	35.1	9.7	44.8	74	-29.2	PK
	7215.0	H	29.8	11.9	41.7	74	-32.3	PK
	7205.0	V	39.5	11.9	51.4	74	-22.6	PK

Note: Measure Level = Reading Level + Factor.

Ant	Frequency (MHz)	Antenna	Peak Measure (dBuV/m)	Duty Cycle Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Type
Ant 1	4810.0	H	45.0	-14.74	30.26	54	-23.74	AV
	4810.0	V	44.6	-14.74	29.86	54	-24.14	AV
	7215.0	H	41.8	-14.74	27.06	54	-26.94	AV
	7215.0	V	50.5	-14.74	35.76	54	-18.24	AV
Ant 2	4810.0	H	45.4	-14.74	30.7	54	-23.3	AV
	4810.0	V	44.8	-14.74	30.1	54	-23.9	AV
	7215.0	H	41.7	-14.74	27.0	54	-27.0	AV
	7215.0	V	51.4	-14.74	36.7	54	-17.3	AV

Note: Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

Product	:	SR12E
Test Item	:	Harmonic Radiated Emission
Test Site	:	AC-5
Test Mode	:	Mode 1: Transmit at Mid Channel

Ant	Frequency (MHz)	Antenna	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Type
Ant 1	4880.0	H	34.5	10.2	44.7	74	-29.3	PK
	4880.0	V	33.1	10.2	43.3	74	-30.7	PK
	7320.0	H	30.5	12.0	42.5	74	-31.5	PK
	7324.0	V	39.2	12.0	51.2	74	-22.8	PK
Ant 2	4880.0	H	35.2	10.2	45.4	74	-28.6	PK
	4880.0	V	33.8	10.2	44.0	74	-30.0	PK
	7320.0	H	31.3	12.0	43.3	74	-30.7	PK
	7324.0	V	38.9	12.0	50.9	74	-23.1	PK

Note: Measure Level = Reading Level + Factor.

Ant	Frequency (MHz)	Antenna	Peak Measure (dBuV/m)	Duty Cycle Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Type
Ant 1	4880.0	H	44.7	-14.74	29.96	54	-24.04	AV
	4880.0	V	43.3	-14.74	28.56	54	-25.44	AV
	7320.0	H	42.5	-14.74	27.76	54	-26.24	AV
	7320.0	V	51.2	-14.74	36.46	54	-17.54	AV
Ant 2	4880.0	H	45.4	-14.74	30.7	54	-23.3	AV
	4880.0	V	44.0	-14.74	29.3	54	-24.7	AV
	7320.0	H	43.3	-14.74	28.6	54	-25.4	AV
	7320.0	V	50.9	-14.74	36.2	54	-17.8	AV

Note: Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

Product	:	SR12E
Test Item	:	Harmonic Radiated Emission
Test Site	:	AC-5
Test Mode	:	Mode 1: Transmit at High Channel

Ant	Frequency (MHz)	Antenna	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Type
Ant 1	4960.0	H	33.0	10.5	43.5	74	-30.5	PK
	4961.0	V	34.6	10.5	45.1	74	-28.9	PK
	7440.0	H	28.7	12.1	40.8	74	-33.2	PK
	7443.0	V	36.3	12.1	48.4	74	-25.6	PK
Ant 2	4960.0	H	32.9	10.5	43.4	74	-30.6	PK
	4961.0	V	35.3	10.5	45.8	74	-28.2	PK
	7440.0	H	29.5	12.1	41.6	74	-32.4	PK
	7443.0	V	35.8	12.1	47.9	74	-26.1	PK

Note: Measure Level = Reading Level + Factor.

Ant	Frequency (MHz)	Antenna	Peak Measure (dBuV/m)	Duty Cycle Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Type
Ant 1	4960.0	H	43.5	-14.74	28.76	54	-25.24	AV
	4960.0	V	45.1	-14.74	30.36	54	-23.64	AV
	7440.0	H	40.8	-14.74	26.06	54	-27.94	AV
	7440.0	V	48.4	-14.74	33.66	54	-20.34	AV
Ant 2	4960.0	H	43.4	-14.74	28.7	54	-25.3	AV
	4960.0	V	45.8	-14.74	31.1	54	-22.9	AV
	7440.0	H	41.6	-14.74	26.9	54	-27.1	AV
	7440.0	V	47.9	-14.74	33.2	54	-20.8	AV

Note: Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

General Radiated Emission

Product	:	SR12E
Test Item	:	General Radiated Emission
Test Mode	:	Mode 1: Transmit at Mid Channel (Ant 1)

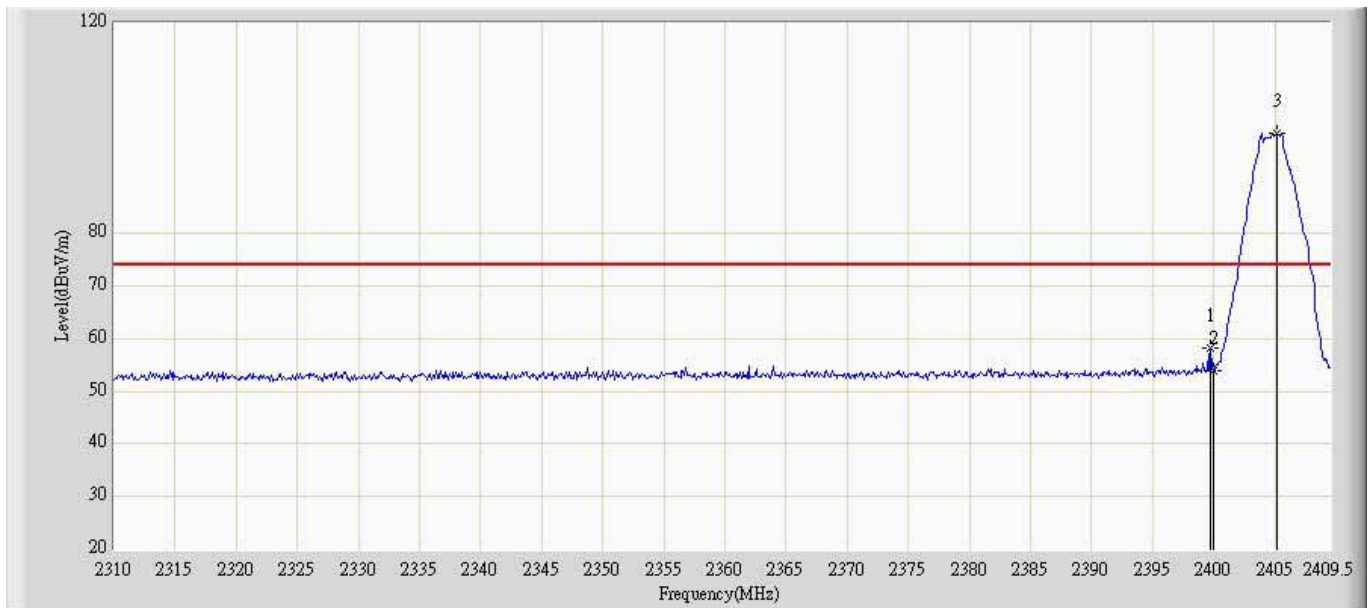
Frequency (MHz)	Antenna	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
132.8	H	3.9	11.8	15.7	43.5	-27.8	QP
127.5	V	3.0	12.0	15.0	43.5	-28.5	QP
300.1	H	5.5	13.4	18.9	46.0	-27.1	QP
230.8	V	5.0	10.6	15.6	46.0	-30.4	QP
4880.0	H	34.5	10.2	44.7	74	-29.3	PK
4880.0	V	33.1	10.2	43.3	74	-30.7	PK
7320.0	H	30.5	12.0	42.5	74	-31.5	PK
7324.0	V	39.2	12.0	51.2	74	-22.8	PK

Note:

1. Measure Level = Reading Level + Factor.
2. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.
3. The middle channel is the worst case among all test modes.

Restricted Band Result:

Site: AC5	Time: 2014/10/11 - 14:47
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: SR12E	Power: DC 5V
Note: Mode1: Transmit at channel 2405MHz Ant 1	

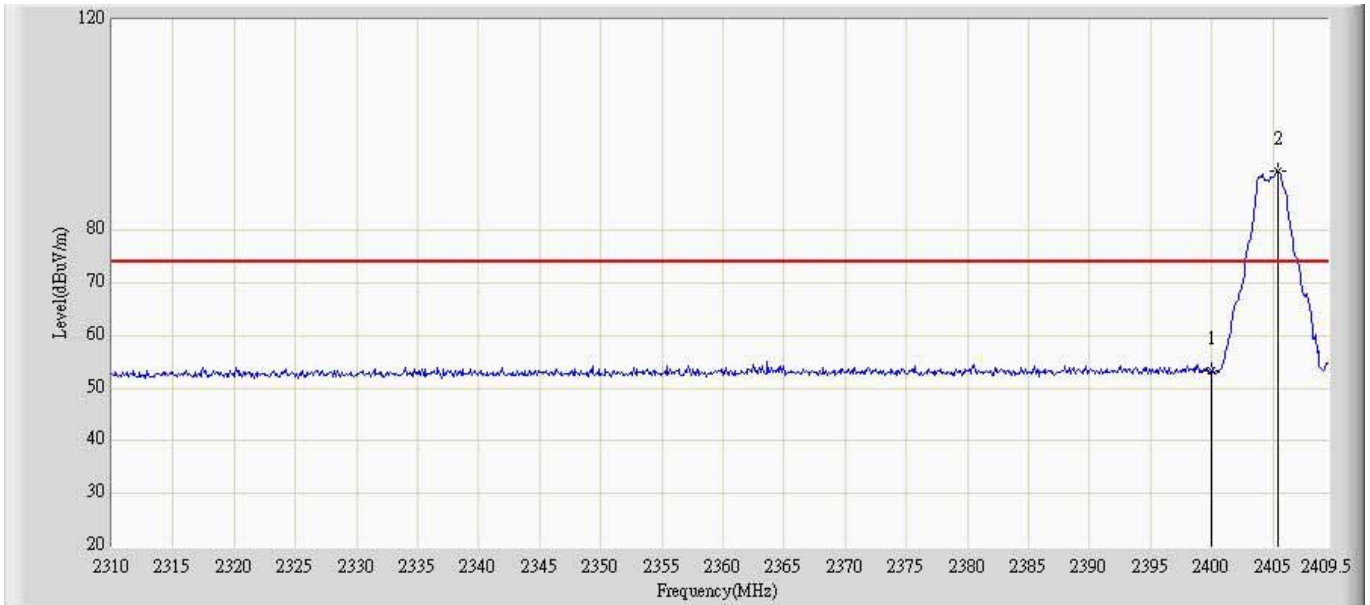


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2399.749	58.161	20.420	-15.839	74.000	37.741	PK
2			2400.000	53.994	16.252	-20.006	74.000	37.742	PK
3		*	2405.122	99.023	61.255	25.023	74.000	37.768	PK

No	Flag	Mark	Frequency (MHz)	Peak Measure Level (dBuV/m)	Average Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Cycle Correction Factor	Type
1			2399.749	58.161	29.441	-24.559	54	-28.72	AV
2			2400.000	53.994	25.274	-28.726	54	-28.72	AV
3			2405.122	99.023	70.303	16.303	54	-28.72	AV

Note: Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

Site: AC5	Time: 2014/10/11 - 15:01
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: SR12E	Power: DC 5V
Note: Mode1: Transmit at channel 2405MHz Ant 1	

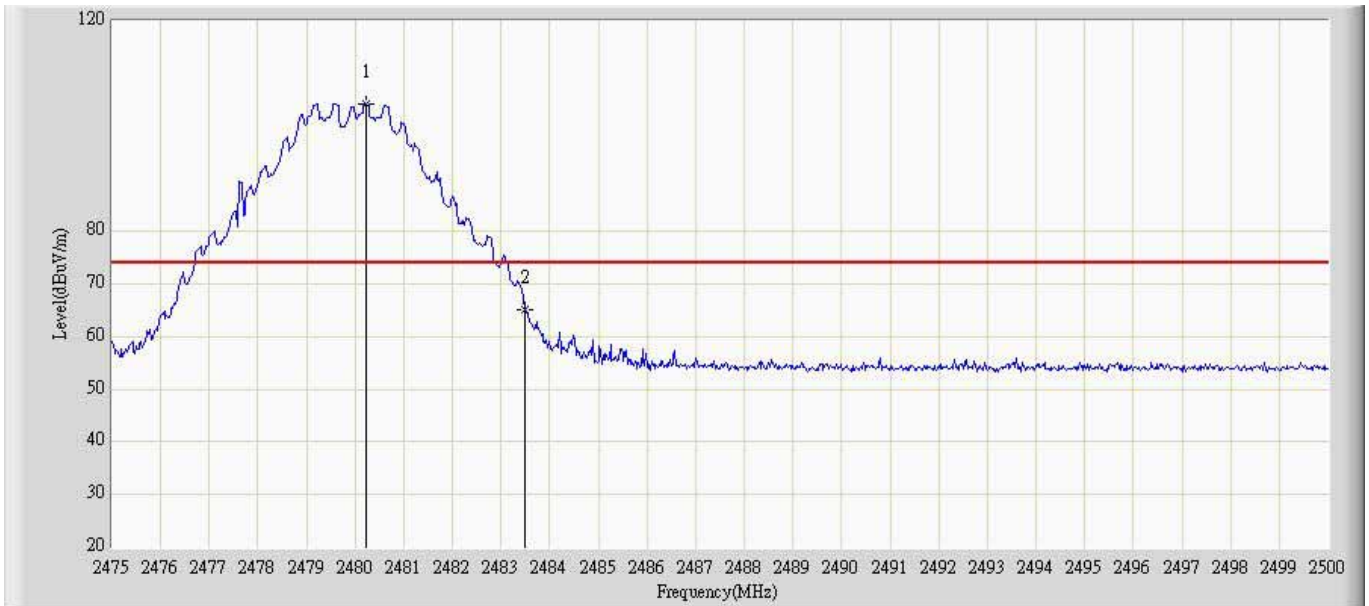


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2400.000	53.427	15.685	-20.573	74.000	37.742	PK
2		*	2405.420	91.173	53.404	17.173	74.000	37.770	PK

No	Flag	Mark	Frequency (MHz)	Peak Measure Level (dBuV/m)	Average Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Cycle Correction Factor	Type
1			2400.000	53.427	24.707	-29.293	54.000	-28.72	AV
2			2405.420	91.173	62.453	8.453	54.000	-28.72	AV

Note: Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

Site: AC5	Time: 2014/10/11 - 15:11
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: SR12E	Power: DC 5V
Note: Mode1: Transmit at channel 2480MHz Ant 1	

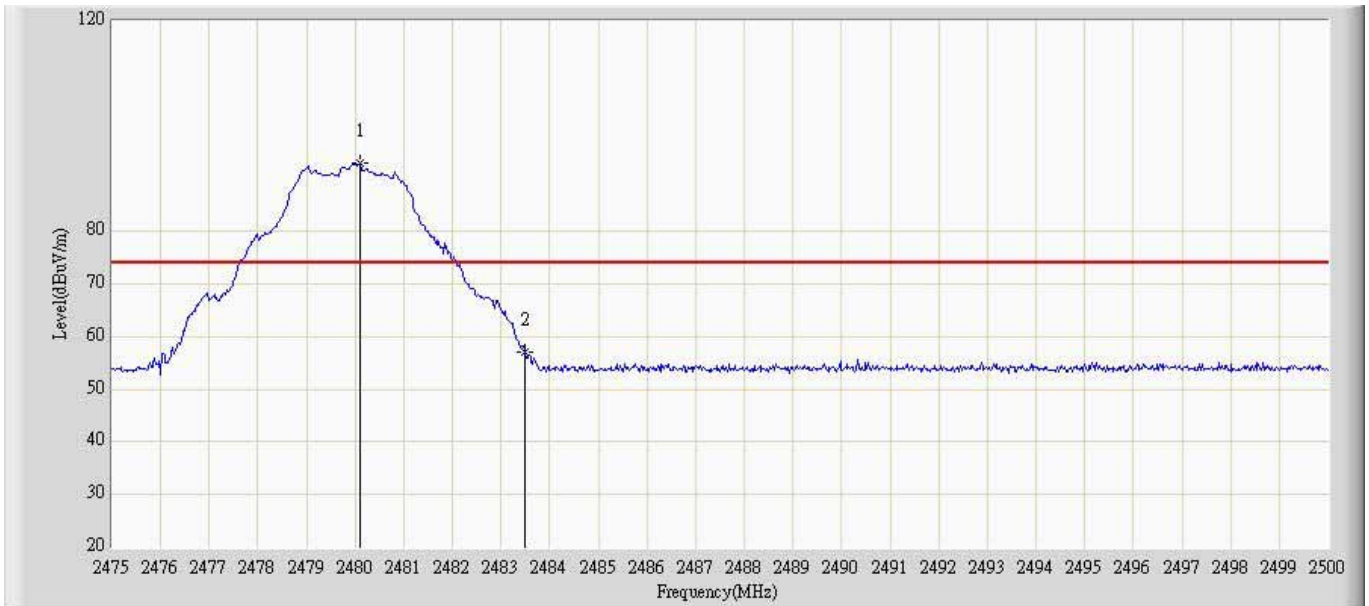


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.225	104.328	66.193	30.328	74.000	38.134	PK
2			2483.500	65.235	27.084	-8.765	74.000	38.150	PK

No	Flag	Mark	Frequency (MHz)	Peak Measure Level (dBuV/m)	Average Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Cycle Correction Factor	Type
1		*	2480.225	104.328	75.608	21.608	54.000	-28.72	AV
2			2483.500	65.235	36.515	-17.485	54.000	-28.72	AV

Note: Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

Site: AC5	Time: 2014/10/11 - 15:23
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: SR12E	Power: DC 5V
Note: Mode1: Transmit at channel 2480MHz Ant 1	

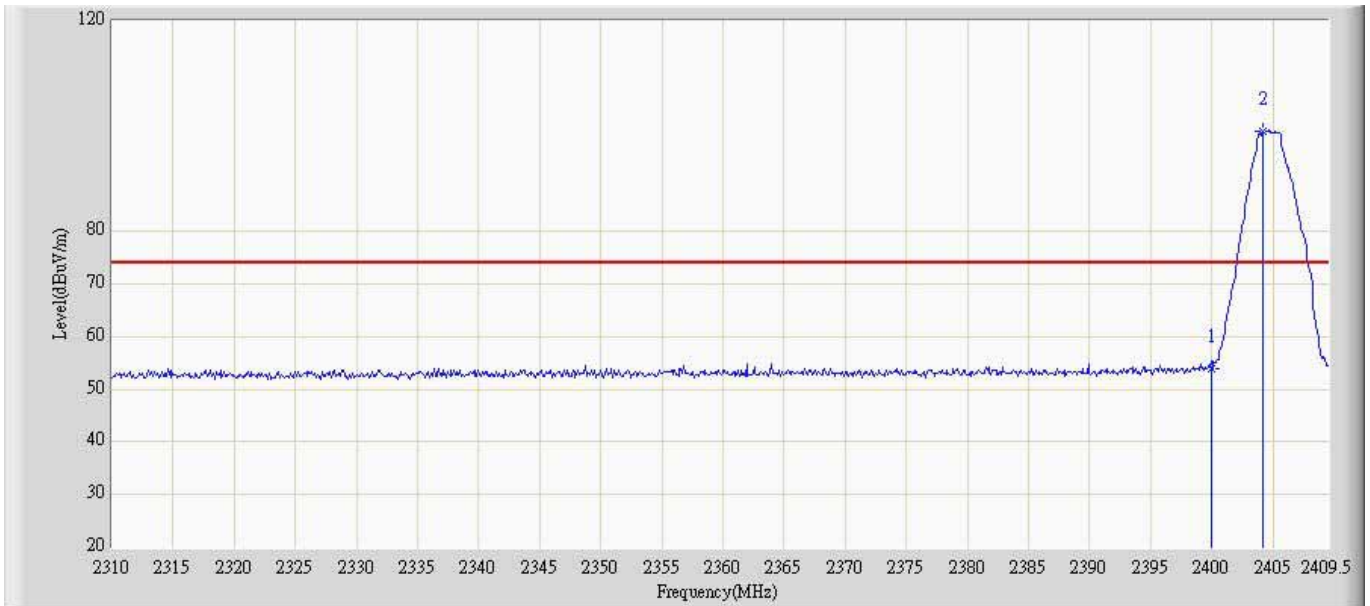


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.100	92.851	54.717	18.851	74.000	38.134	PK
2			2483.500	56.955	18.805	-17.045	74.000	38.150	PK

No	Flag	Mark	Frequency (MHz)	Peak Measure Level (dBuV/m)	Average Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Cycle Correction Factor	Type
1		*	2480.100	92.851	64.131	10.131	54.000	-28.720	AV
2			2483.500	56.955	28.235	-25.765	54.000	-28.720	AV

Note: Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

Site: AC5	Time: 2014/12/22 - 11:21
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: SR12E	Power: DC 5V
Note: Mode1: Transmit at channel 2405MHz Ant 2	

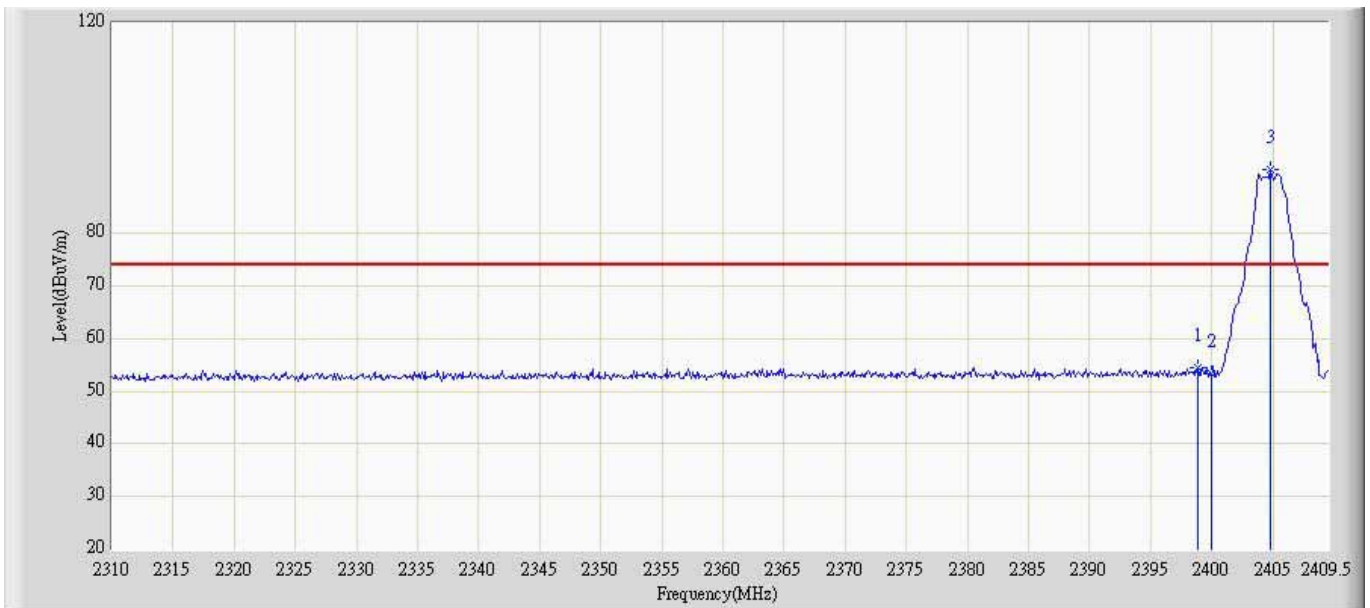


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2400.000	53.994	16.252	-20.006	74.000	37.742	PK
2	*	2404.227	99.097	61.334	N/A	N/A	37.763	PK

No	Flag	Mark	Frequency (MHz)	Peak Measure Level (dBuV/m)	Average Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Cycle Correction Factor	Type
1		*	2400.000	53.994	25.274	-28.726	54.000	-28.72	AV
2			2404.227	99.097	70.377	N/A	N/A	-28.72	AV

Note: Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

Site: AC5	Time: 2014/12/22 - 11:23
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: SR12E	Power: DC 5V
Note: Mode1: Transmit at channel 2405MHz Ant 2	

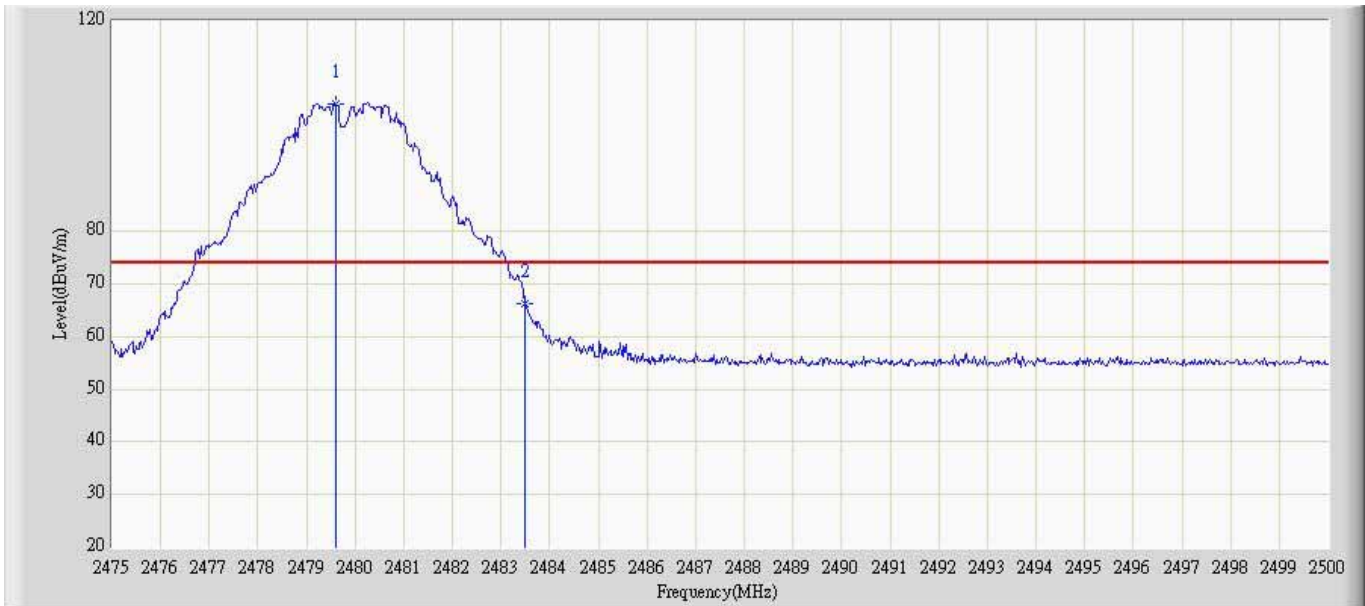


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2398.854	54.567	16.831	-19.433	74.000	37.737	PK
2		2400.000	53.427	15.685	-20.573	74.000	37.742	PK
3	*	2404.823	92.141	54.375	N/A	N/A	37.766	PK

No	Flag	Mark	Frequency (MHz)	Peak Measure Level (dBuV/m)	Average Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Cycle Correction Factor	Type
1			2398.854	54.567	25.847	-28.153	54.000	-28.72	AV
2			2400.000	53.427	24.707	-29.293	54.000	-28.72	AV
3		*	2404.823	92.141	63.421	N/A	N/A	-28.72	AV

Note: Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

Site: AC5	Time: 2014/12/22 - 11:28
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: SR12E	Power: DC 5V
Note: Mode1: Transmit at channel 2480MHz Ant 2	

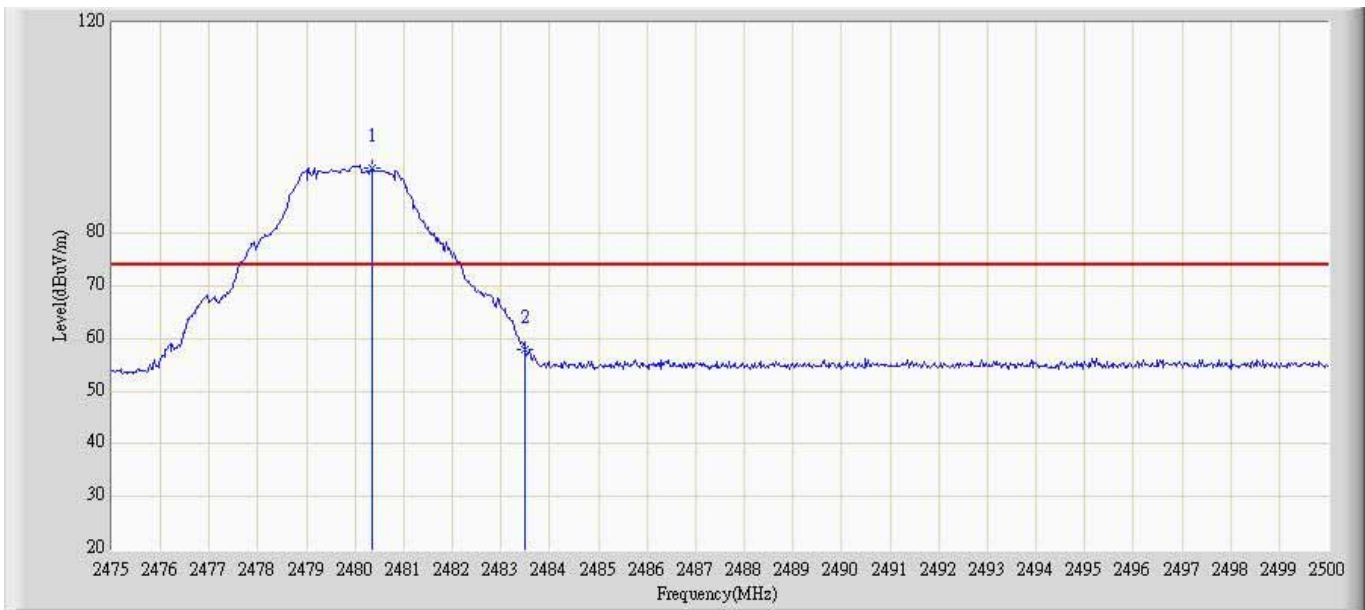


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2479.600	104.078	65.946	N/A	N/A	38.132	PK
2		2483.500	66.235	28.085	-7.765	74.000	38.150	PK

No	Flag	Mark	Frequency (MHz)	Peak Measure Level (dBuV/m)	Average Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Cycle Correction Factor	Type
1			2479.600	104.078	75.358	N/A	N/A	-28.72	AV
2			2483.500	66.235	37.515	-16.485	54.000	-28.72	AV

Note: Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

Site: AC5	Time: 2014/12/22 - 11:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: SR12E	Power: DC 5V
Note: Mode1: Transmit at channel 2480MHz Ant 2	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.350	92.276	54.140	N/A	N/A	38.136	PK
2		2483.500	57.955	19.805	-16.045	74.000	38.150	PK

No	Flag	Mark	Frequency (MHz)	Peak Measure Level (dBuV/m)	Average Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Duty Cycle Correction Factor	Type
1			2480.350	92.276	63.556	N/A	N/A	-28.72	AV
2			2483.500	57.955	29.235	-24.765	54.000	-28.72	AV

Note: Average Measure Level = Peak Measure Level + Duty Cycle Correct Factor.

6. Band-edge Compliance of RF Conducted Emissions

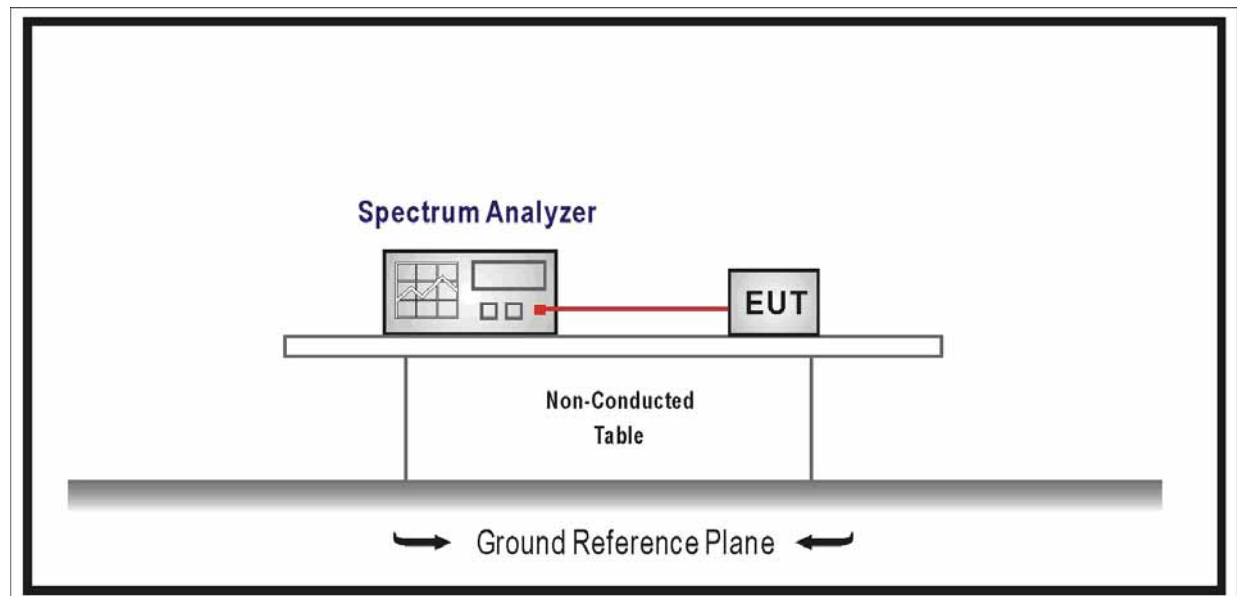
6.1. Test Equipment

Band-edge Compliance of RF Conducted Emissions / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2015.01.07
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2015.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

6.2. Test Setup



6.3. Limit

- FCC Part 15.215 (c), Intentional radiators operating under the alternative provisions to the general emission limits as contained in 15.217 through 15.257 and in Subpart E of FCC part 15, must be designed to ensure that 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

6.4. Test Procedure

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation.

RBW \geq 1% of the span

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge.

Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section.

Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

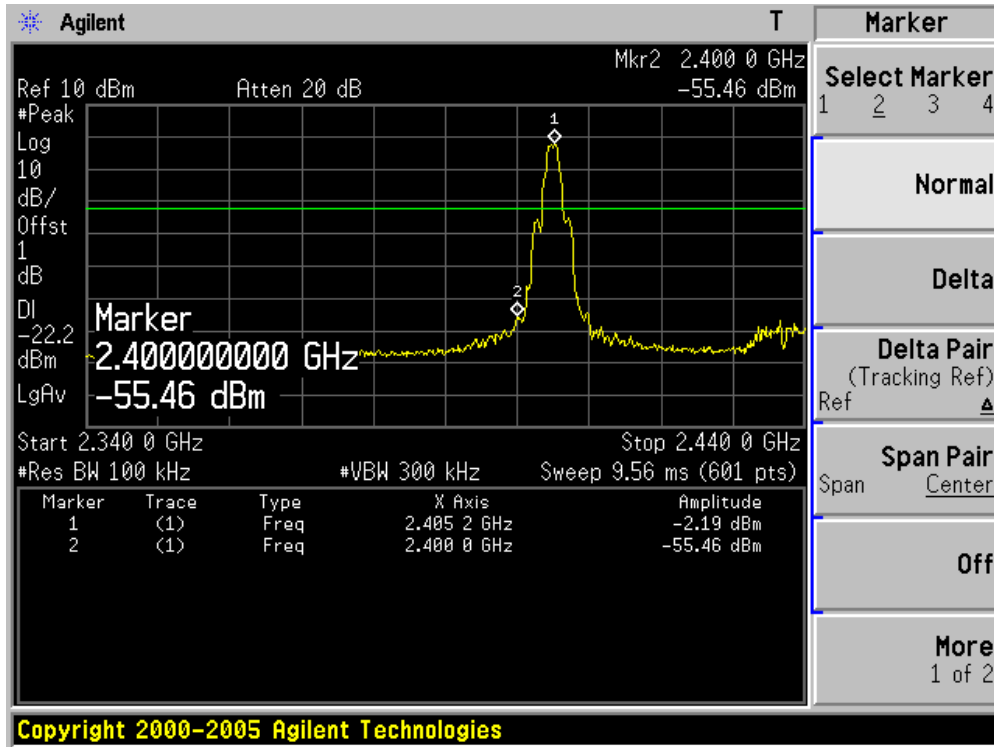
6.5. Uncertainty

The measurement uncertainty is defined as ± 1.0 dB

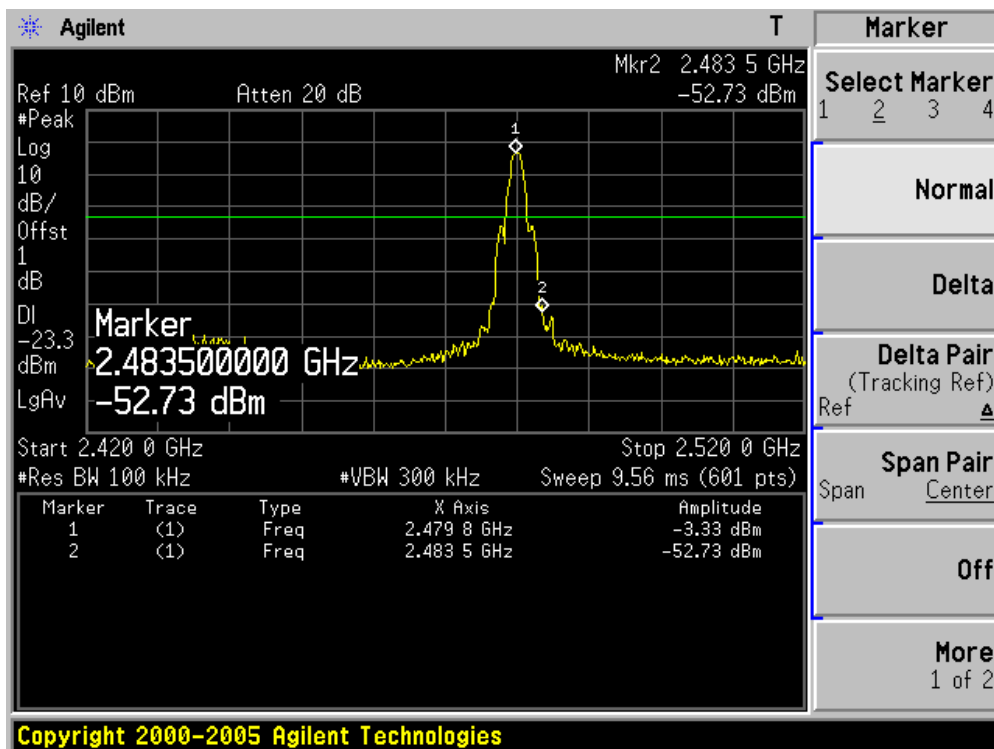
6.6. Test Result

Product	:	SR12E
Test Item	:	Band-edge Compliance of RF Conducted Emissions for FCC Part15.215
Test Mode	:	Mode 1: Transmit Ant 1

Channel 00 (2405MHz)

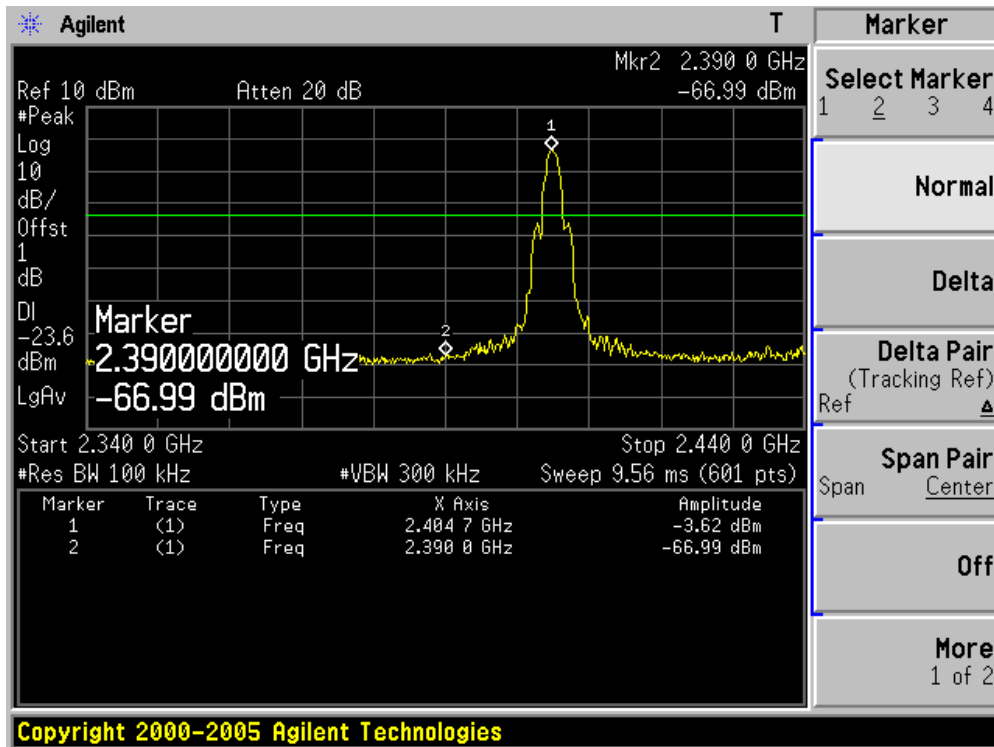


Channel 15 (2480MHz)

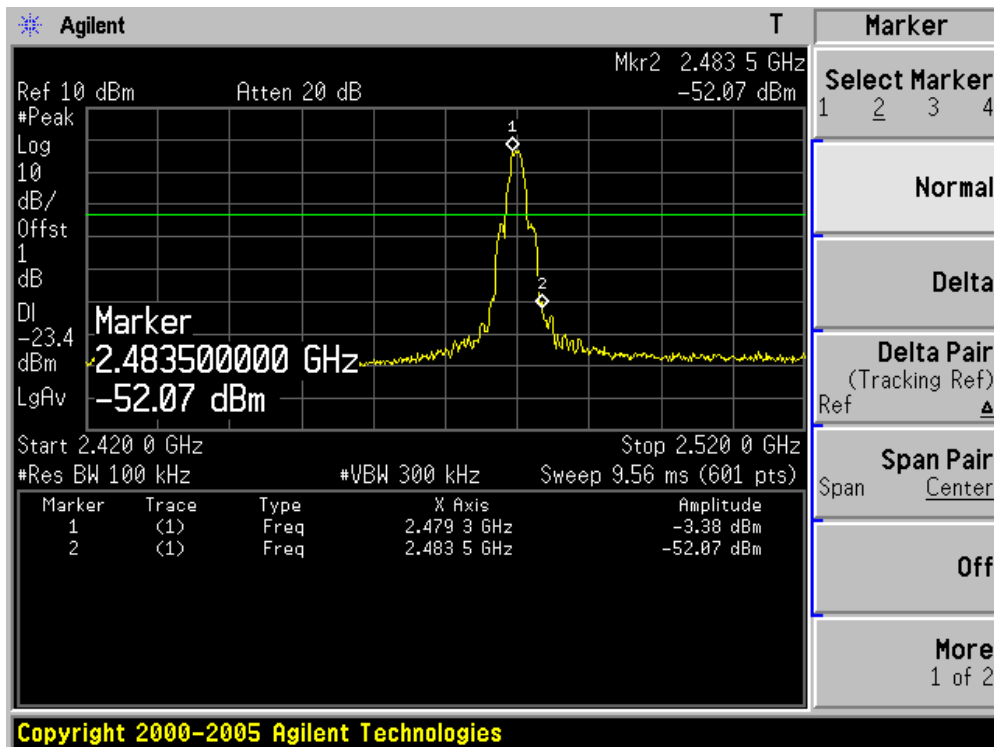


Product	: SR12E
Test Item	: Band-edge Compliance of RF Conducted Emissions for FCC Part15.215
Test Mode	: Mode 1: Transmit Ant 2

Channel 00 (2405MHz)



Channel 15 (2480MHz)



7. Receiver Spurious Emission for Industry Canada RSS-Gen Requirement

7.1. Test Equipment

Radiated Emission / AC-2

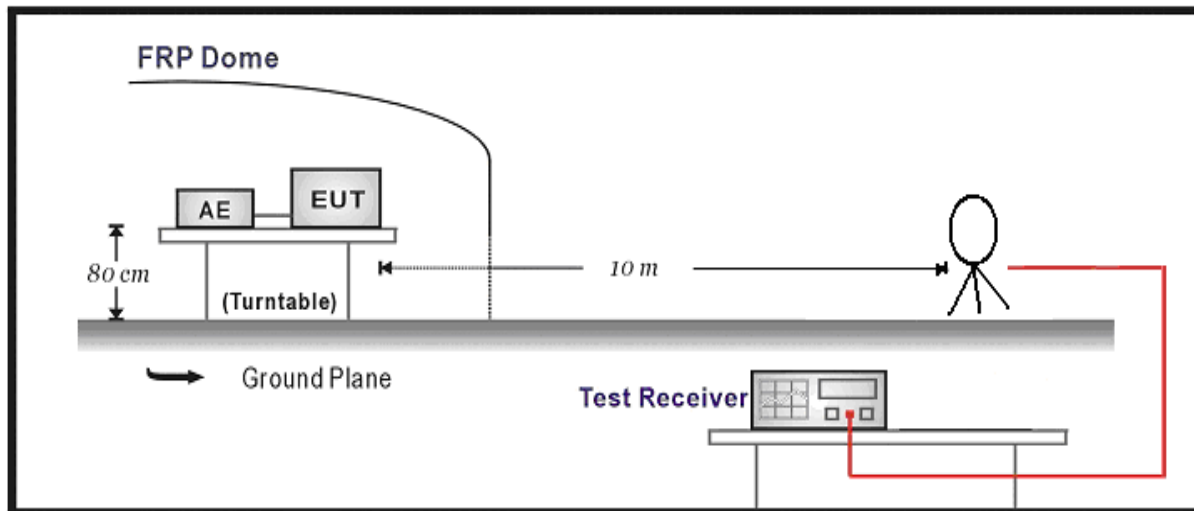
Instrument	Manufacturer	Type No.	Serial No.	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100573	2015.03.28
Loop Antenna	R&S	HFH2-Z2	833799/003	2015.11.17
Bilog Chainenna	Teseq GmbH	CBL6112D	27611	2015.10.15
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2015.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2015.01.08

Radiated Emission / AC-5

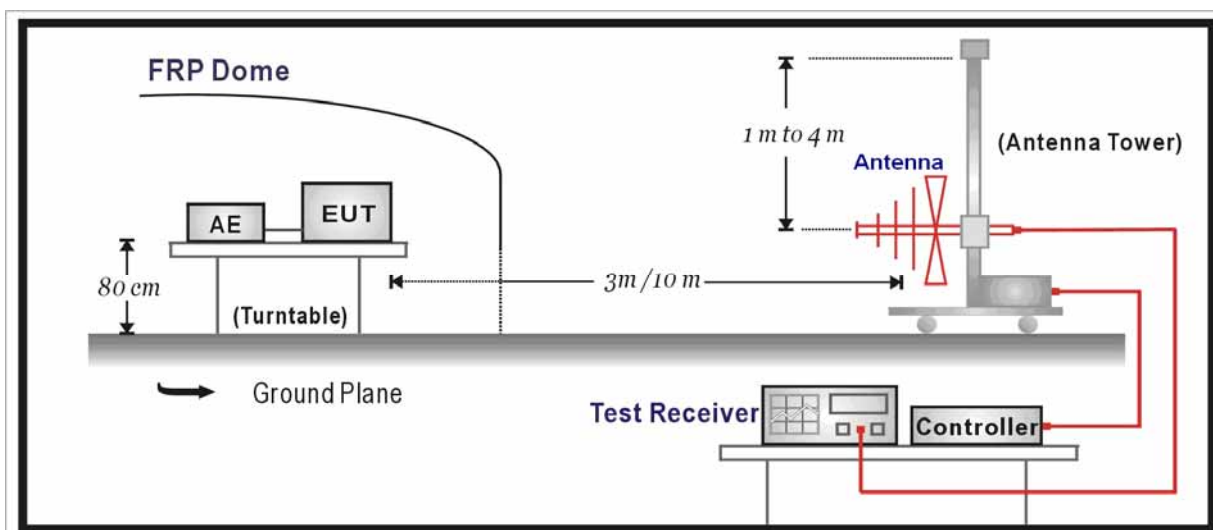
Instrument	Manufacturer	Type No.	Serial No.	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MY49100159	2015.03.28
Spectrum Analyzer	Agilent	E4446A	MY45300103	2015.01.07
Preamplifier	Miteq	NSP1800-25	1364185	2015.05.05
Preamplifier	QuieTek	AP-040G	CHM-0906001	2015.05.05
DRG Horn	ETS-Lindgren	3117	00123988	2015.01.21
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2015.11.24
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2015.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2015.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2015.03.01
EMI Receiver	Agilent	N9038A	MY51210196	2015.06.09
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2015.01.08

7.2. Test Setup

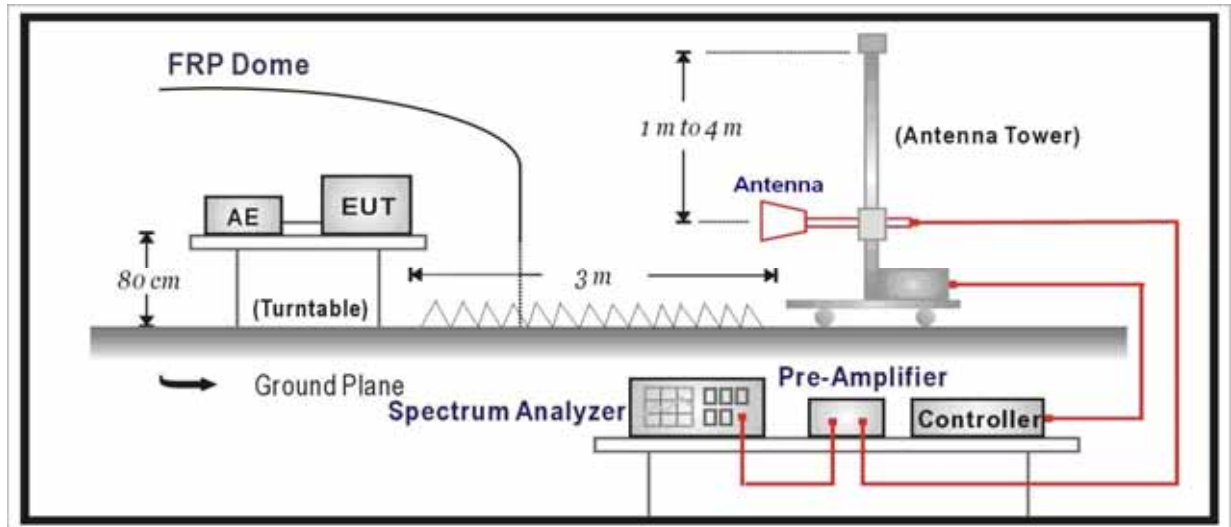
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



7.3. Limit

FCC Part 15 Subpart B Paragraph 15.109		
Frequency (MHz)	Distance (m)	Level (dBuV/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: $E \text{ field strength (dBuV/m)} = 20 \log E \text{ field strength (uV/m)}$

7.4. Test Procedure

According to ANSI C63.10: 2009.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2009 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 9kHz to 10th harmonic is checked.

Note: When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the "cone of radiation" of EUT. The 3dB beamwidth is 60~10 degrees for H-plane and 90~10 degrees for E-plane.

7.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB
below 1G is defined as ± 3.8 dB

7.6. Test Result

All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 200ms;

Average detector: RBW = 1MHz, VBW = 10Hz, sweep time = auto.

Measure Level = Reading Level + Cable Loss + Antenna Factor - Preamplifier Gain

Mode 1: Receive by ant 1

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
00	H	3507.0	50.5	-15.4	35.1	54(Note)	-18.9	PK
	H	3507.5	50.9	-15.4	35.5	54(Note)	-18.5	PK
	V	5887.5	49.9	-10.0	39.9	54(Note)	-14.1	PK
	V	5887.5	50.9	-10.0	40.9	54(Note)	-13.1	PK
07	H	3269.5	52.2	-16.1	36.1	54(Note)	-17.9	PK
	H	3269.0	50.9	-16.1	34.8	54(Note)	-19.2	PK
	V	5811.0	50.7	-10.2	40.5	54(Note)	-13.5	PK
	V	5811.0	49.7	-10.2	39.5	54(Note)	-14.5	PK
15	H	3558.0	50.7	-15.2	35.5	54(Note)	-18.5	PK
	H	3558.5	52.7	-15.2	37.5	54(Note)	-16.5	PK
	V	6253.0	49.6	-8.6	41.0	54(Note)	-13.0	PK
	V	6253.0	50.5	-8.6	41.9	54(Note)	-12.1	PK

Note: 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.

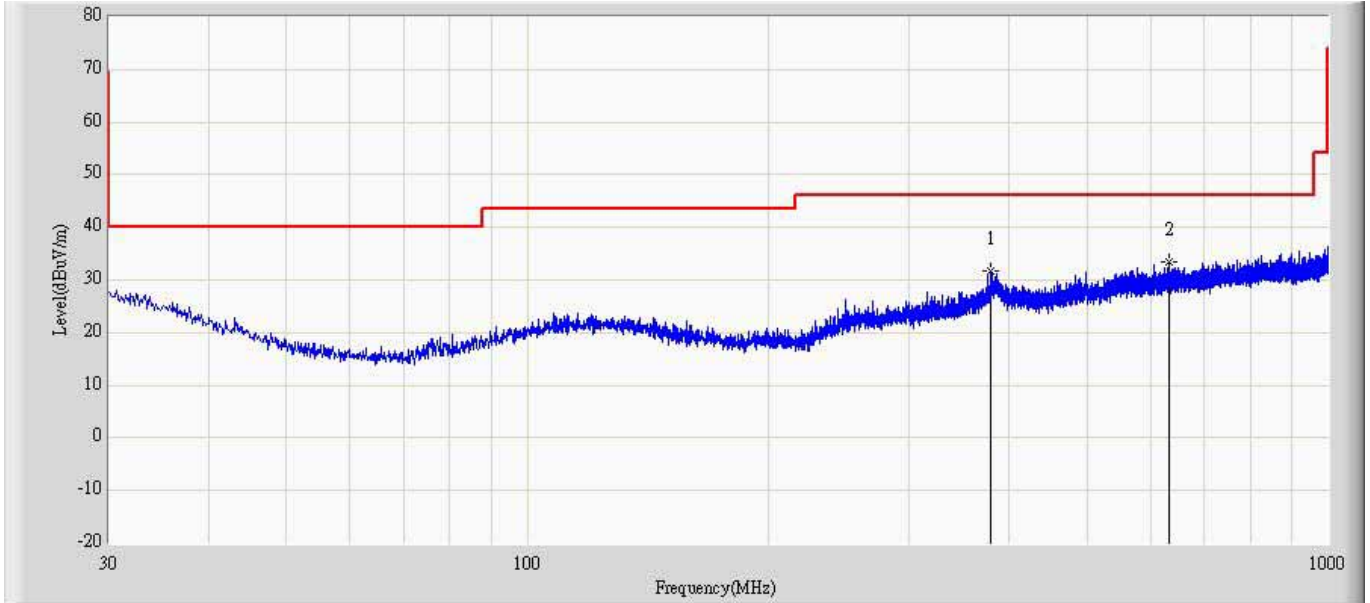
Mode 1: Receive by ant 2

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
00	H	10480.0	28.9	14.7	43.6	54(Note)	-10.4	PK
	H	15720.0	22.2	23.2	45.4	54(Note)	-8.6	PK
	V	10480.0	29.5	14.7	44.2	54(Note)	-9.8	PK
	V	15720.0	22.9	23.1	46.0	54(Note)	-8.0	PK
07	H	10360.0	30.7	14.6	45.3	54(Note)	-8.7	PK
	H	15540.0	23.5	23.6	47.1	54(Note)	-6.9	PK
	V	10360.0	29.9	14.6	44.5	54(Note)	-9.5	PK
	V	15540.0	23.7	23.4	47.1	54(Note)	-6.9	PK
15	H	10440.0	30.3	14.7	45.0	54(Note)	-9.0	PK
	H	15660.0	24.5	23.4	47.9	54(Note)	-6.1	PK
	V	10440.0	29.7	14.7	44.4	54(Note)	-9.6	PK
	V	15660.0	24.9	23.3	48.2	54(Note)	-5.8	PK

Note: 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.

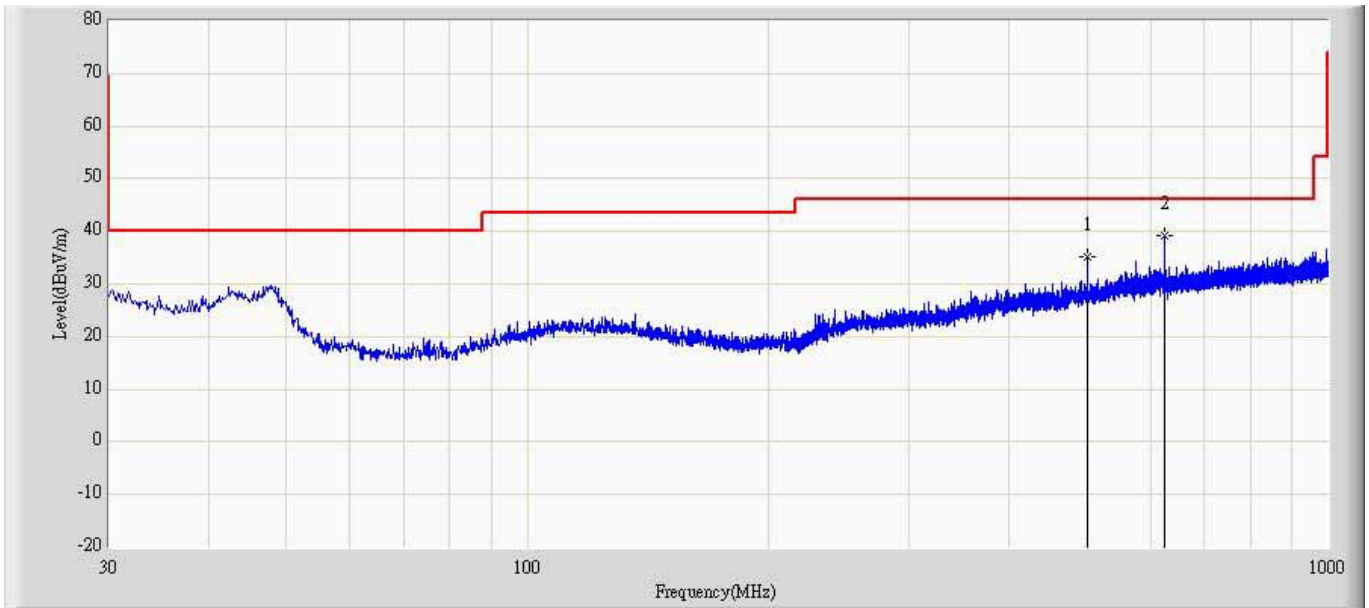
The worst case of Radiated Emission below 1GHz:

Site: AC2	Time: 2014/11/12 - 10:41
Limit: FCC_Part15.109_RE(3m)	Margin: 0
Probe: CBL6112D_(30-2000MHz)	Polarity: Vertical
EUT: SR12E	Power: DC 5V
Note: Mode: Receive at channel 2405 by ant 2	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		378.715	31.586	8.686	-14.414	46.000	22.900	QP
2	*	634.431	33.380	5.948	-12.620	46.000	27.432	QP

Site: AC2	Time: 2014/11/12 - 10:43
Limit: FCC_Part15.109_RE(3m)	Margin: 0
Probe: CBL6112D_(30-2000MHz)	Polarity: Vertical
EUT: SR12E	Power: DC 5V
Note: Mode: Receive at channel 2405 by ant 2	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		499.965	35.107	9.667	-10.893	46.000	25.440	QP
2	*	624.974	39.142	11.744	-6.858	46.000	27.398	QP

————— The End —————