

FCC CFR47 PART 15 SUBPART C(15.249)
CERTIFICATION
TEST REPORT

FOR

Hubsan (HK) Industrial Co., Ltd

RC Hobby Series

Model No.: H202F

Prepared for : Hubsan (HK) Industrial Co., Ltd
Address : 4/F Hong Fa Hi-Tech Industrial Park, Tangtou Village, Shiyan Town,
Baoan district, Shenzhen, China

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : 1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd., Bao'an
District, Shenzhen, Guangdong, China

Date of receipt of test sample : February 15, 2012
Number of tested samples : 1
Serial number : Prototype
Date of Test : February 15, 2012 - March 06, 2012
Date of Report : March 06, 2012

TEST REPORT
FCC CFR 47 PART 15 C(15.249)

Report Reference No. : LCS120215072TF

Date of issue : March 06, 2012

Testing Laboratory Name : **Shenzhen LCS Compliance Testing Laboratory Ltd.**

Address : 1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd.,
Bao'an District, Shenzhen, Guangdong, China

Testing location/ procedure : Full application of Harmonised standards
Partial application of Harmonised standards
Other standard testing method

Applicant's name : **Hubsan (HK) Industrial Co., Ltd**

Address : 4/F Hong Fa Hi-Tech Industrial Park, Tangtou Village, Shiyan
Town, Baoan district, Shenzhen, China

Test specification

Standard : FCC CFR 47 PART 15 Subpart C: 2011; ANSI C63.4-2003;

Test Report Form No. : LCSEMC-1.0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

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Test item description : **RC Hobby Series**

Trade Mark : HUBSAN

Manufacturer : Hubsan (HK) Industrial Co., Ltd

Model/Type reference : H202F

Ratings : DC 8-12V(2.4GHz); DC 6.5-8.4(5.8GHz)

Result : **Positive**

Compiled by:



Bobo Li/ File administrators

Supervised by:



Vito Cao/ Technique principal

Approved by:



Gavin Liang/ Manager

EMC -- TEST REPORT

Test Report No. : LCS120215072TF

March 06, 2012

Date of issue

Type / Model..... : H202F

EUT..... : RC Hobby Series

Applicant..... : Hubsan (HK) Industrial Co., LtdAddress..... : 4/F Hong Fa Hi-Tech Industrial Park, Tangtou Village, Shiyan
Town, Baoan district, Shenzhen, China

Telephone..... : /

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Manufacturer..... : Hubsan (HK) Industrial Co., LtdAddress..... : 4/F Hong Fa Hi-Tech Industrial Park, Tangtou Village, Shiyan
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Factory..... : Hubsan (HK) Industrial Co., LtdAddress..... : 4/F Hong Fa Hi-Tech Industrial Park, Tangtou Village, Shiyan
Town, Baoan district, Shenzhen, China

Telephone..... : /

Fax..... : /

Test Result:**Positive**

The test report merely corresponds to the test sample.

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

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1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : RC Hobby Series

Model Number : H202F

Power Supply : DC 8-12V(2.4GHz); DC 6.5-8.4(5.8GHz)

Frequency Range/
Modulation Type : 2410.00-2465.00MHz/GFSK (Channel Number: 12, Channel Frequency=2410+5(K-1), K=1, 2, 312)
5735.00-5855.00MHz/GFSK (Channel Number: 7, Channel Frequency=5735+20(K-1), K=1, 2, 37)

1.2. Description of Test Facility

Site Description
EMC Lab. : Accredited by CNAS, June 04, 2010
The Certificate Registration Number. is L4595.

Accredited by FCC, July 14, 2011
The Certificate Registration Number. is 899208.

Accredited by Industry Canada, May. 02, 2011
The Certificate Registration Number. is 9642A-1

1.3. Statement of the measurement uncertainty

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

1.4. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Radiation Uncertainty :	30MHz~200MHz	±2.96dB	(1)
	200MHz~1000MHz	±3.10dB	(1)
	1GHz~26.5GHz	±4.20dB	(1)
Conduction Uncertainty :	150kHz~30MHz	±1.63dB	(1)
Power disturbance :	30MHz~300MHz	±1.60dB	(1)

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

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd..

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 , 15.249 under the FCC Rules Part 15 Subpart C; ANSI C63.4-2003.

2.3. General Test Procedures

2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4

2.4. Description Of Test Modes

The EUT was set to continuous transmitting mode.

Freq. Range :	30MHz-10000MHz	10000MHz-26500MHz	26500MHz-40000MHz
Test Distance:	3m	1m	0.5m
EUT Position:	Tabletop		
Operation Mode:	Transmitting		

This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.

GFSK modulation 2.4GHz mode the worst case is Channel Low (2410MHz), Mid Channel (2440MHz) and High Channel (2465MHz), these were chosen for full testing. GFSK modulation 5.8GHz mode the worst case is Channel Low (5735MHz), Mid Channel (5795MHz) and High Channel (5855MHz), these were chosen for full testing.

3. SUMMARY OF TEST RESULTS

FCC CFR 47 Part 2 and 15	DESCRIPTION OF TEST	RESULT
§2.1046(a)	Conducted output power	N/A
§2.202(a)	Occupied bandwidth	Recorded
§15.215(c)	Bandwidth of the emission	Compliant
§15.35(c)	Pulse train measurement for pulsed operation	N/A
§15.207(a)	Conduction Emissions	N/A
§15.205(a)	Restricted bands of operation	Compliant
§15.205(b), §15.249	Radiated emission 9kHz to 30 MHz	Compliant
§15.205(b), §15.215(b), §15.249	Radiated emission 30 MHz to 40 GHz	Compliant
§15.203	Antenna requirement	Compliant

4. OCCUPIED BANDWIDTH

4.1. Standard Applicable

The occupied bandwidth according to CFR 47 Part 2, section 2.202(a), is measured as the 99% emission bandwidth, i.e. below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.

The occupied bandwidth according to ANSI C63.4, annex H.6, is measured as the frequency range defined by the points that are 26 dB down relative to the maximum level of the modulated carrier.

The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used:

Fundamental frequency	Minimum resolution bandwidth
9kHz to 30MHz	1kHz
30MHz to 1000MHz	10kHz
1000MHz to 40GHz	100kHz

The video bandwidth shall be at least three times greater than resolution bandwidth.

4.2. Test Procedures

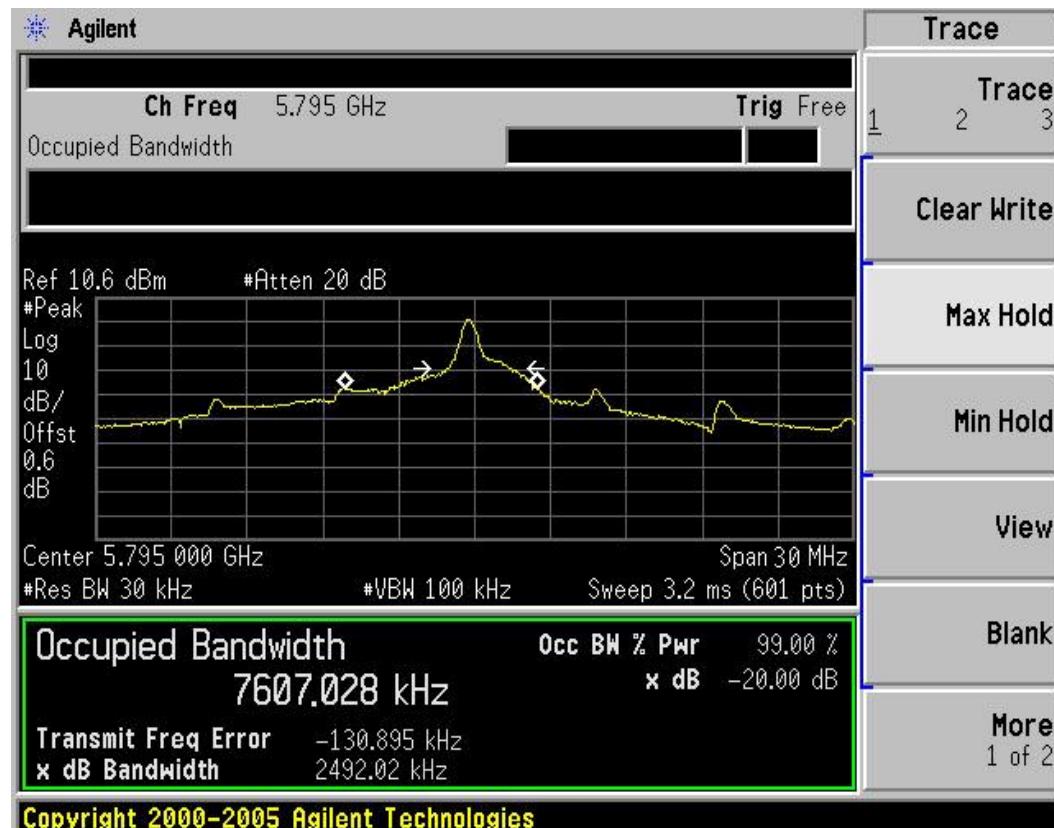
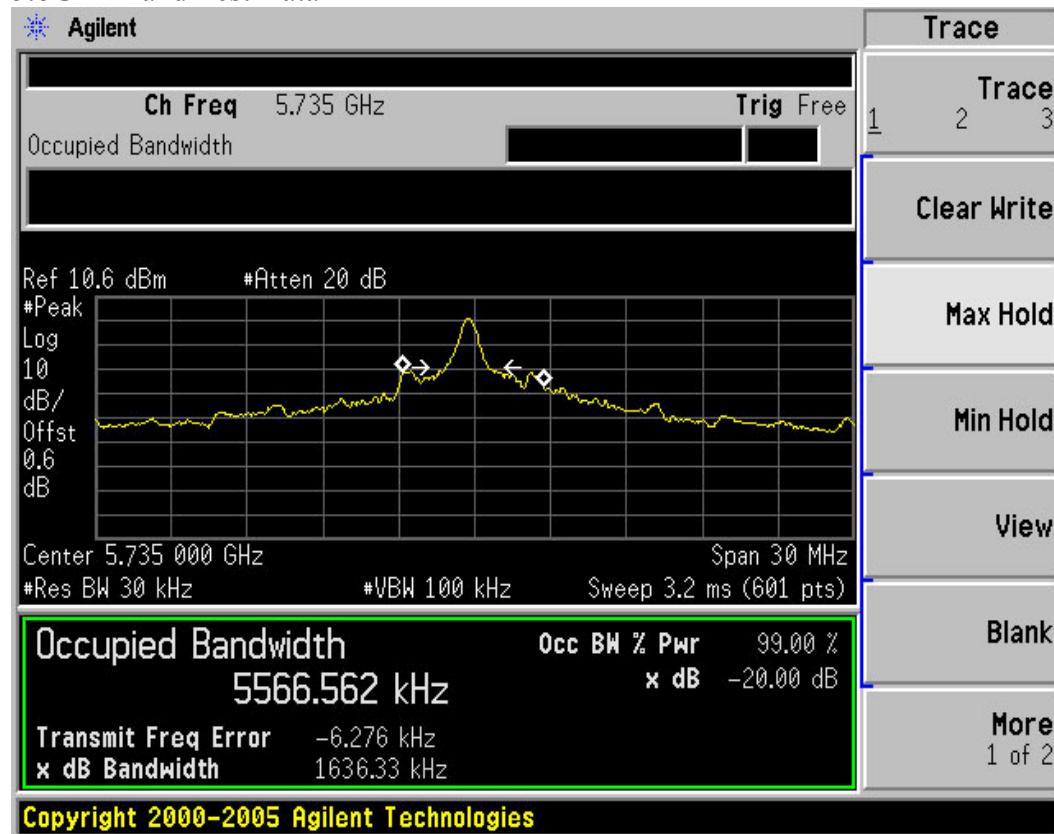
If antenna is detachable bandwidth measurements shall be performed at the antenna connector (conducted measurement) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The RF output terminals are connected to a spectrum analyzer. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable.

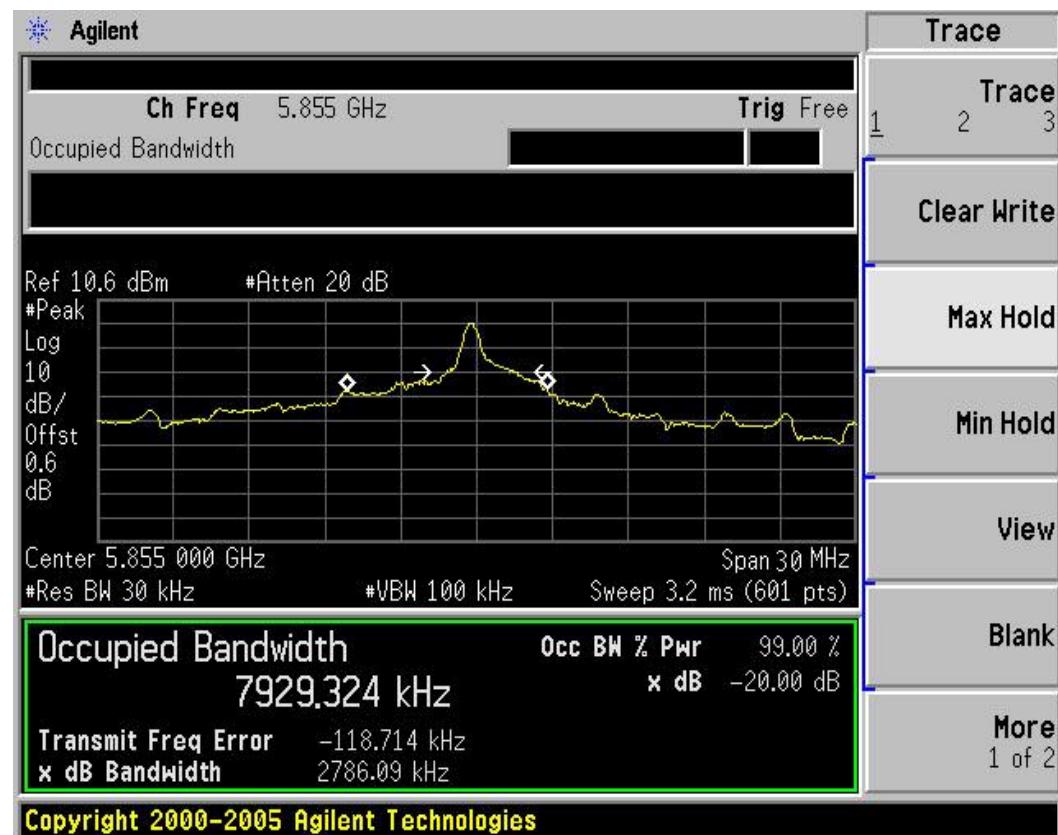
If radiated measurements are performed the same test setups and instruments are used as with radiated emission measurements for the appropriate frequency range.

The analyzer settings are specified by the test description of the appropriate test record(s).

4.3. Test Results

5.8GHz Band Test Data





Frequency	99 % Occupied bandwidth (KHz)	Limit (KHz)
5735	5566.562	---
5795	7607.028	---
5855	7929.324	---
Conclusion:		PASS

5. BANDWIDTH OF THE EMISSION

5.1. Standard Applicable

The 20 dB bandwidth of the emission is measured as the frequency range defined by the points that are 20 dB down relative to the maximum level of the modulated carrier.

For intentional radiators operating under the alternative provisions to the general emission limits the requirement to contain the 20 dB bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used:

Fundamental frequency	Minimum resolution bandwidth
9kHz to 30MHz	1kHz
30MHz to 1000MHz	10kHz
1000MHz to 40GHz	100kHz

5.2. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
1	Test Receiver	Rohde & Schwarz	ESMI	839379/013	2011/06/21	2012/06/20
2	Power Sensor	Agilent	E9327A	US40441788	2011/06/21	2012/06/20
3	Power Meter	Agilent	E4416A	QB41292714	2011/06/21	2012/06/20
4	DC Filter	MPE	23872C	N/A	2011/06/21	2012/06/20

5.3. Test Procedures

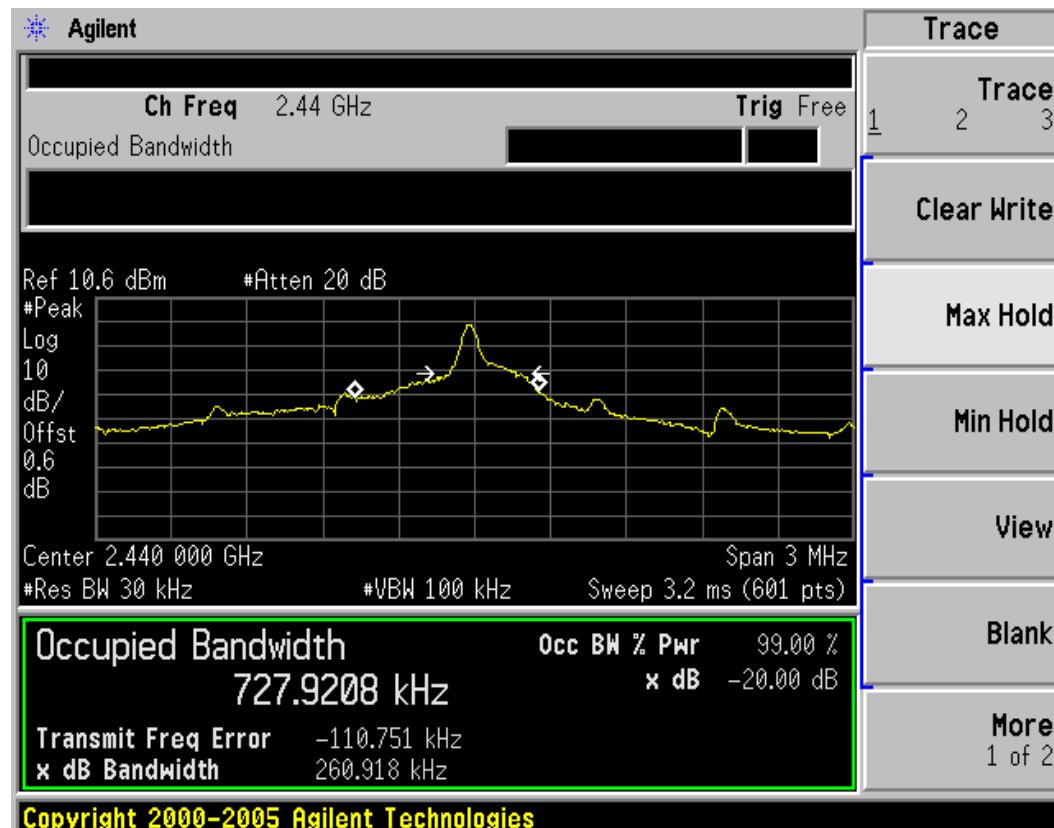
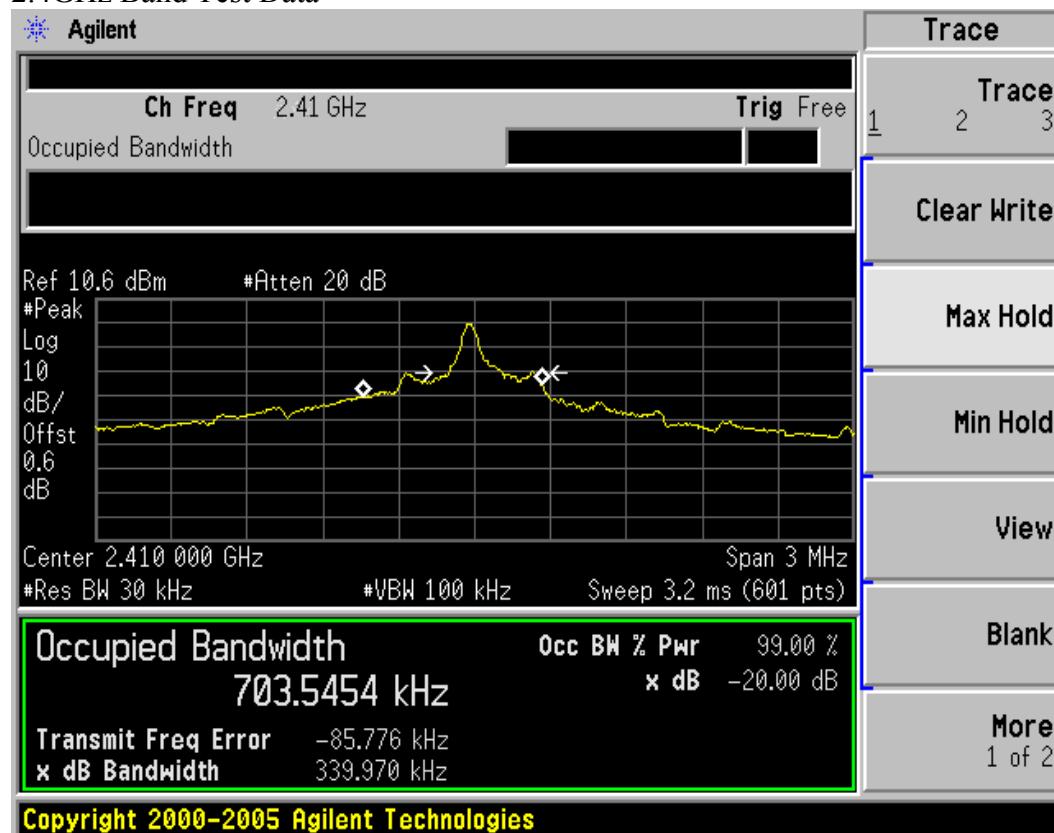
If antenna is detachable bandwidth measurements shall be performed at the antenna connector (conducted measurement) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The RF output terminals are connected to a spectrum analyzer. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable.

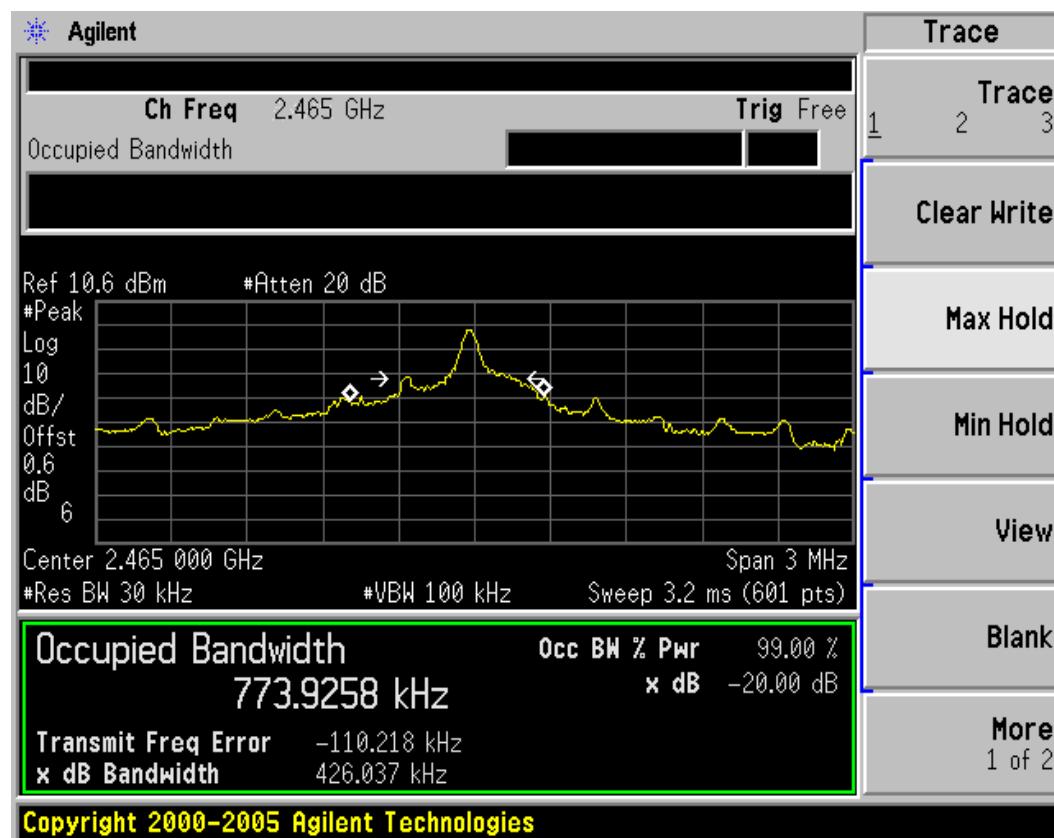
If radiated measurements are performed the same test setups and instruments are used as with radiated emission measurements for the appropriate frequency range.

The analyzer settings are specified by the test description of the appropriate test record(s).

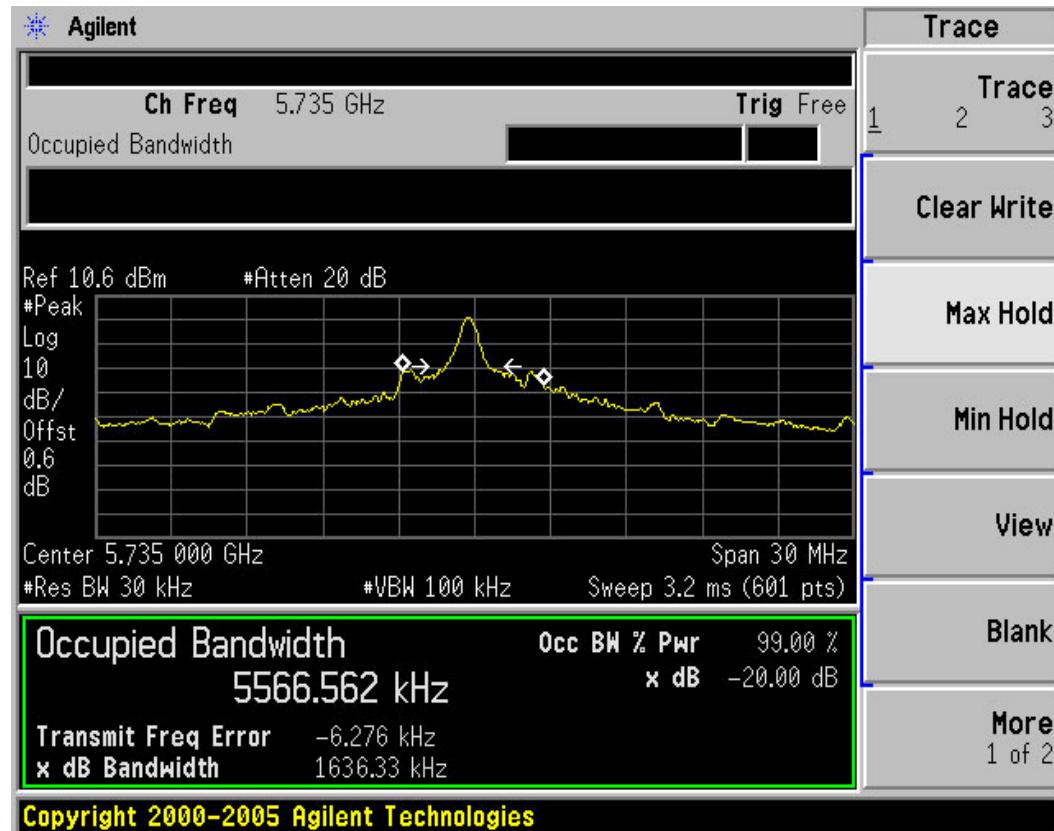
5.4. Test Results

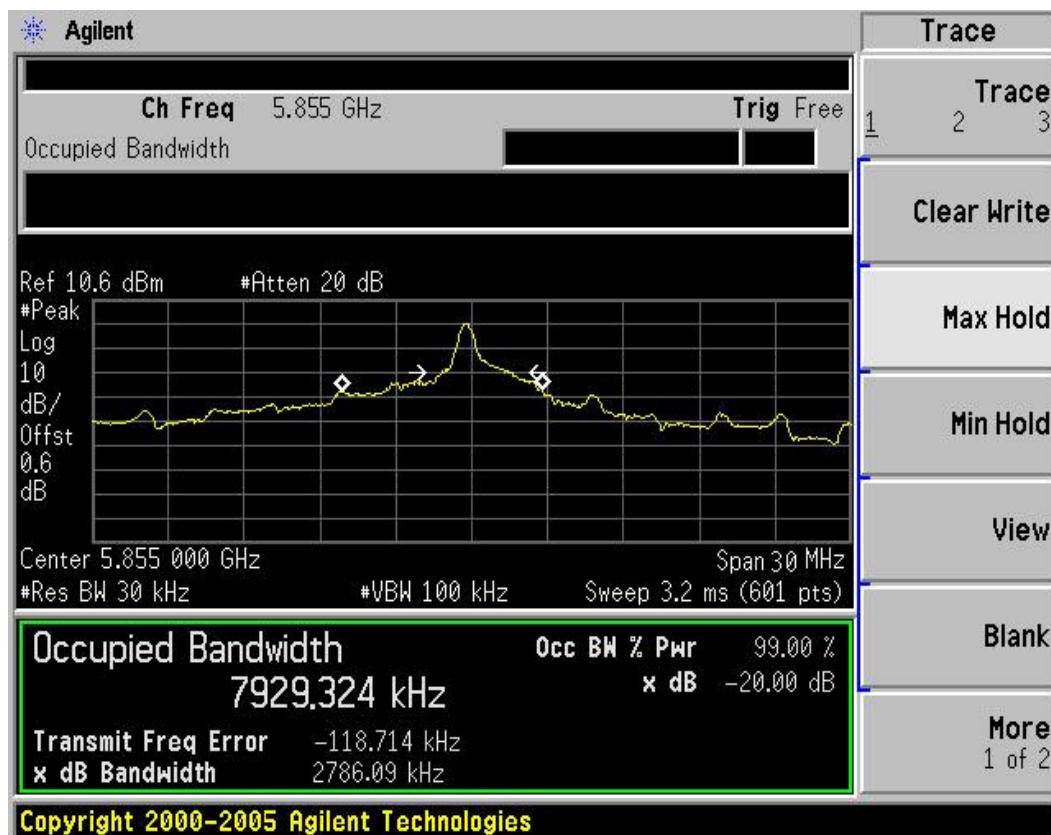
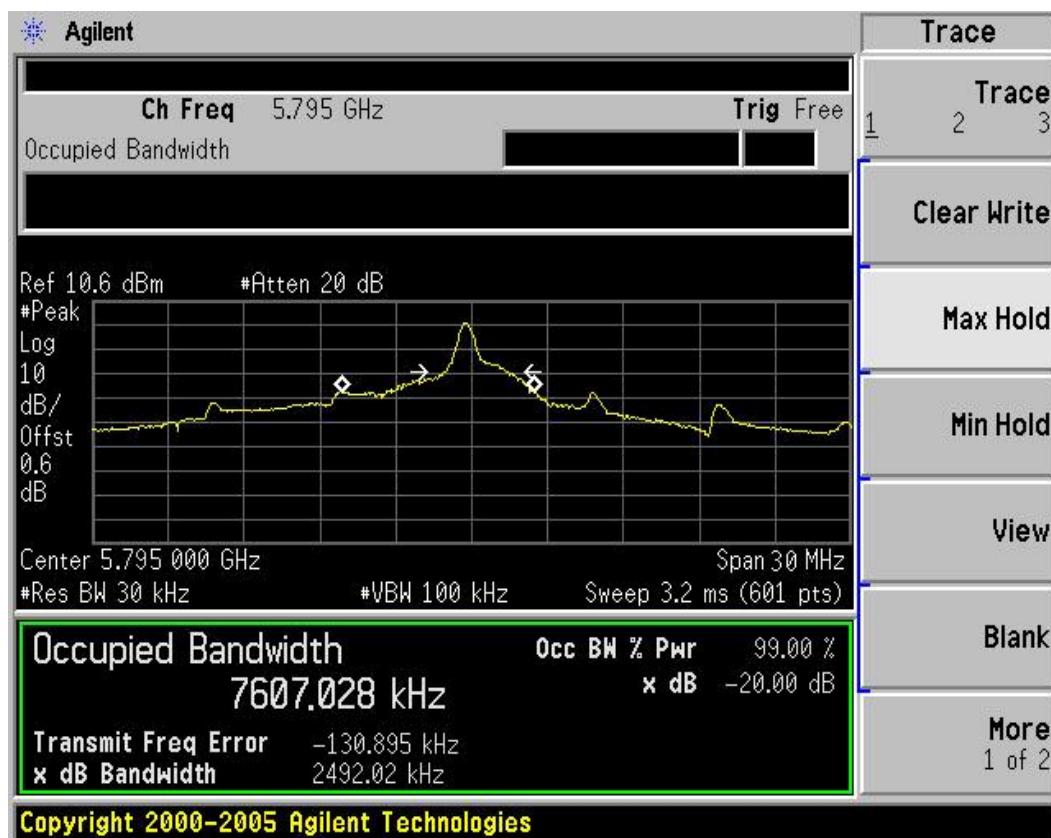
2.4GHz Band Test Data





5.8GHz Band Test Data





“*” If a frequency stability is not specified, it is recommended that the fundamental emission is kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

6. §15.249 BAND EDGES MEASUREMENT

6.1. Standard Applicable

Only spurious emissions are permitted in any of the frequency bands listed in CFR 47 Part 15, section 15.205(a).

6.2. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
1	Spectrum Analyzer	Rohde & Schwarz	FSP40	100063	2011/06/21	2012/06/20
2	Test Receiver	Rohde & Schwarz	ESPI7	101018	2011/06/21	2012/06/20
3	Loop antenna	EMCO	6502	0042963	2011/06/21	2012/06/20
4	Horn-antenna	EMCO	3115	0042856	2011/06/21	2012/06/20
5	Log per Antenna	Schwarzbeck	VULB9163	142	2011/06/21	2012/06/20
6	Horn-antenna	Schwarzbeck	BBHA9120D	D:266	2011/06/21	2012/06/20
7	Horn Antenna	Schwarzbeck	3160-09	D:461	2011/06/21	2012/06/20
8	Horn Antenna	Schwarzbeck	3160-10	D:489	2011/06/21	2012/06/20
9	DC Filter	MPE	23872C	N/A	2011/06/21	2012/06/20

6.3. Test Procedures

Radiated emission in fully or semi anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33.

Measurements are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).

Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used.

All tests below 8.2 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance may be reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is

determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

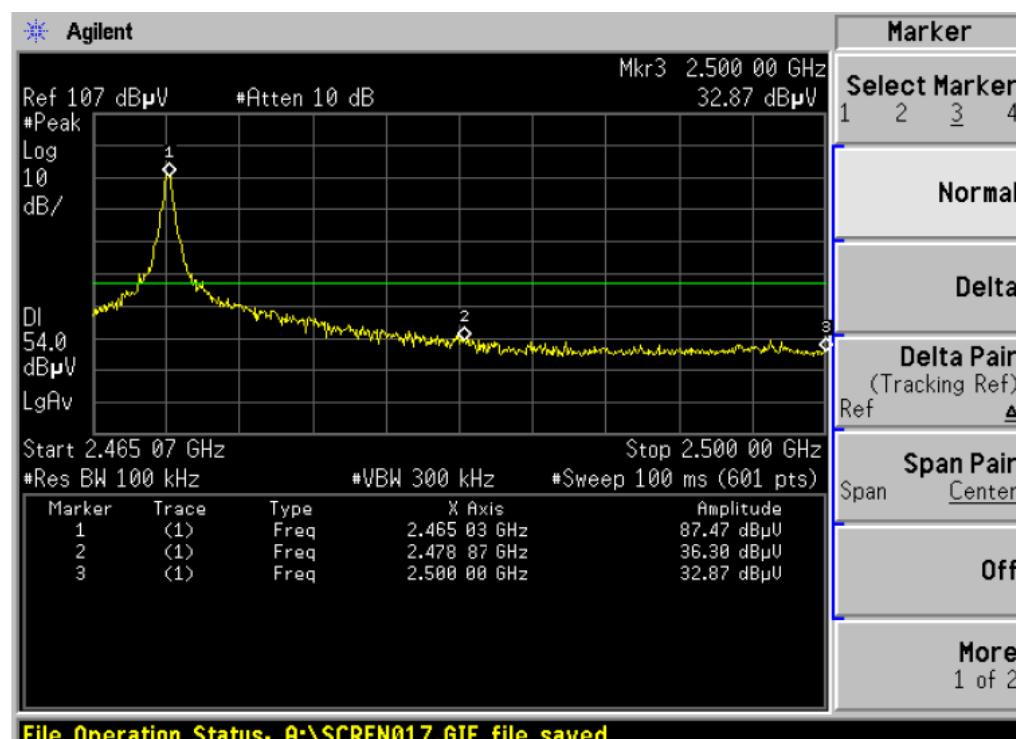
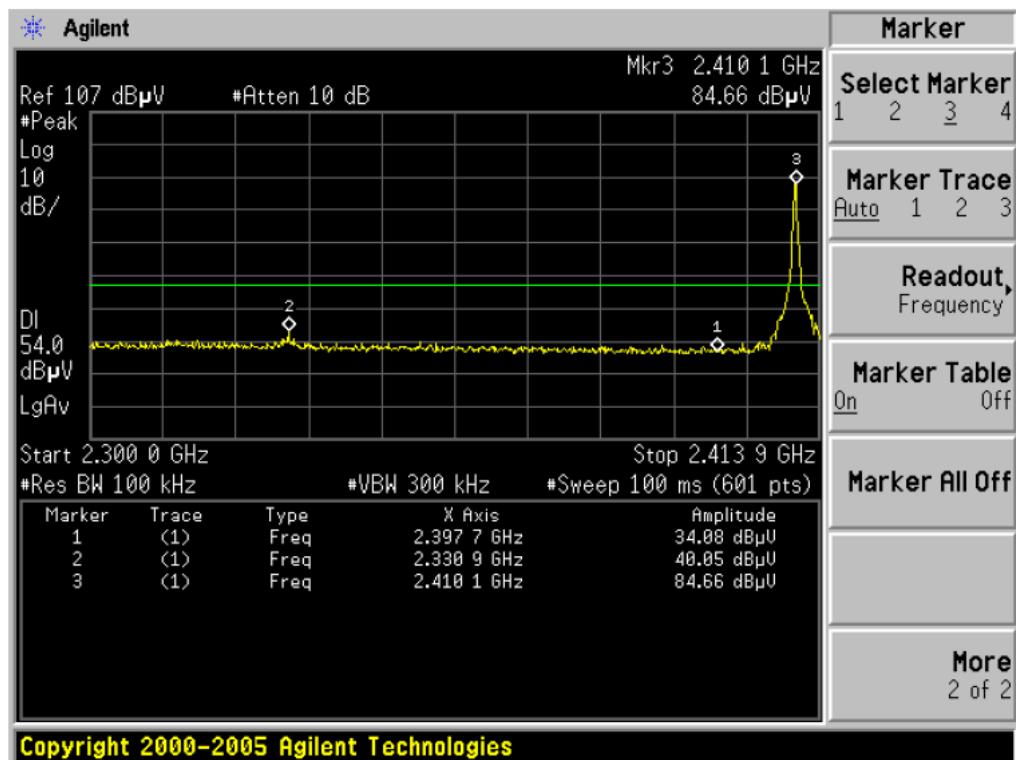
Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

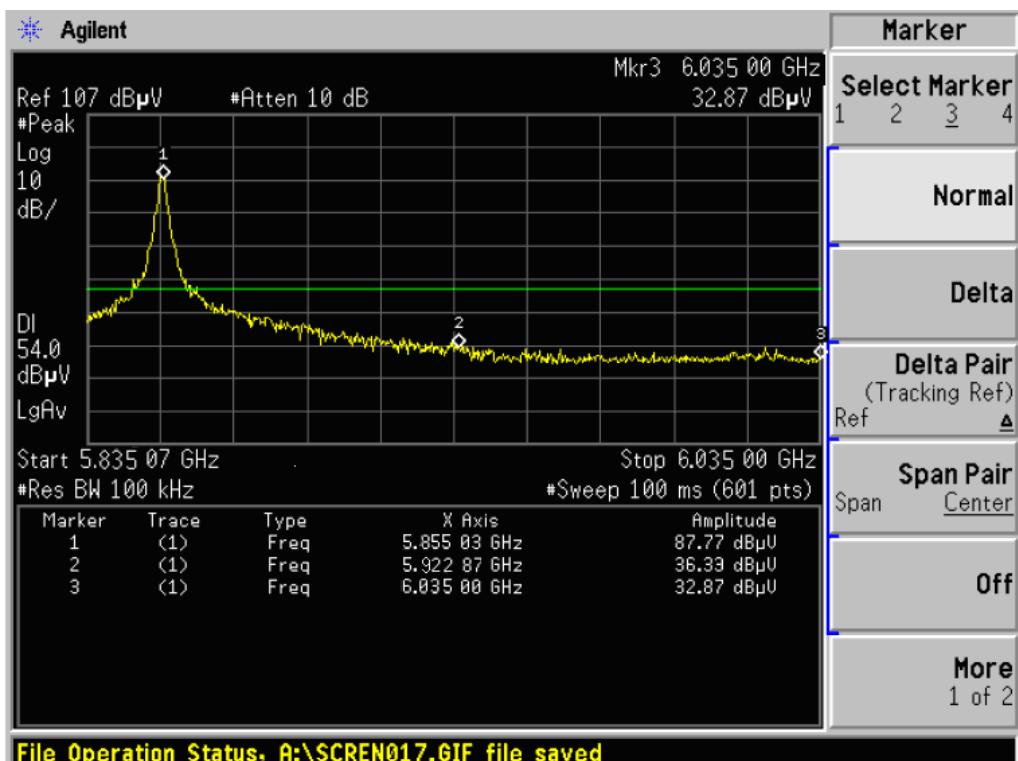
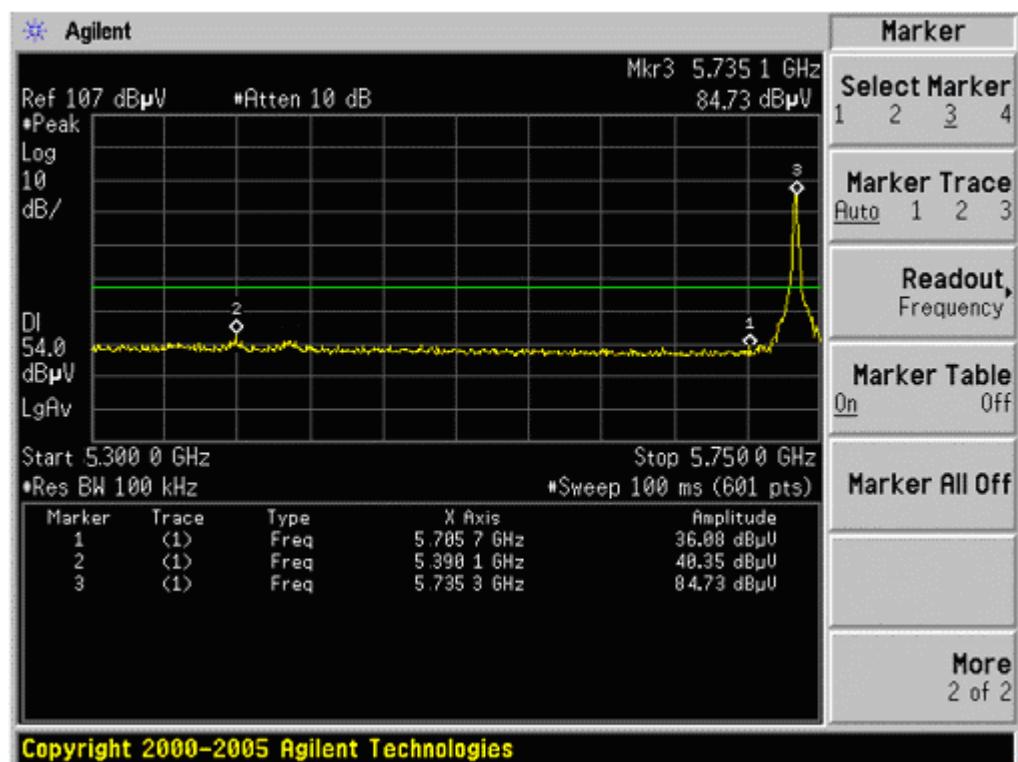
For final testing below 1 GHz an open field test-site is used and the plots recorded in the fully or semi anechoic room are indicated as prescans.

6.4. Test Results

2.4GHz Band Test Data



5.8GHz Band Test Data



Test results

Pass

7. RADIATED EMISSIONS

7.1. Standard Applicable

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.

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a), and 15.249 limit in the table below has to be followed.

Fundamental Frequency	Field Strength of fundamental (millivolts/meter)	Field Strength of harmonics (micorvolts/meter)
902-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Frequencies (MHz)	Field Strength (micorvolts/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

7.2. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
1	Spectrum Analyzer	Rohde&Schwarz	FSP40	100063	2011/06/21	2012/06/20
2	Test Receiver	Rohde&Schwarz	ESMI	839379/013	2011/06/21	2012/06/20
3	Loop antenna	EMCO	6502	0042963	2011/06/21	2012/06/20
4	Horn-antenna	EMCO	3115	0042856	2011/06/21	2012/06/20
5	Log per Antenna	Schwarzbeck	VULB9163	142	2011/06/21	2012/06/20
6	Horna Antenna	Schwarzbeck	3160-10	D:489	2011/06/21	2012/06/20
7	Preamplifier	CTT	ACO/180	32641	2011/06/21	2012/06/20
8	DC Filter	MPE	23872C	N/A	2011/06/21	2012/06/20

7.3. Measuring Instruments and Setting

The following table is the setting of spectrum analyzer and receiver.

Frequency	Test distance(m)
Frequencies ≤ 8.2 GHz:	3
Frequencies > 8.2 GHz and ≤ 18 GHz:	1
Frequencies > 18 GHz and ≤ 26.5 GHz:	0.5
Frequencies > 26.5 GHz:	0.25

Spectrum Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1000KHz / 1000KHz for peak

7.4. Test Procedures

Radiated emission in the frequency range 9 kHz to 30 MHz is measured using an active loop antenna. First the whole spectrum of emission caused by the equipment is recorded at a distance of 3 meters in a fully or semi anechoic room with the detector of the spectrum analyzer or EMI receiver set to peak. This configuration is also used for recording the spectrum of intentional radiators.

Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

If worst case emission of the EUT cannot be recorded with EUT in standard position and loop antenna in vertical polarization the EUT (or the radiating part of the EUT) is rotated by 90 degrees instead of changing the loop antenna to horizontal polarization. This procedure is selected to minimize the influence of the environment (e.g. effects caused by the floor especially with longer distances).

Final measurement is performed at a test distance D of 30 meters using an open field test site. In case the regulation requires testing at other distances, the result is extrapolated by

either making measurements at an additional distance D of 10 meters to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). In cases of very low emissions measurements are performed at shorter distances and results are extrapolated to the required distance. The provisions of CFR 47 Part 15 sections 15.31(d) and (f)(2) apply. According to CFR 47 Part 15 section 15.209(d) final measurement is performed with detector function set to quasi-peak except for the frequency bands 9 to 90 kHz and 110 to 490 kHz where, for non-pulsed operation, average detector is employed.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Radiated emission in fully or semi anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33.

Measurements are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).

Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used.

All tests below 8.2 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance may be reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary.

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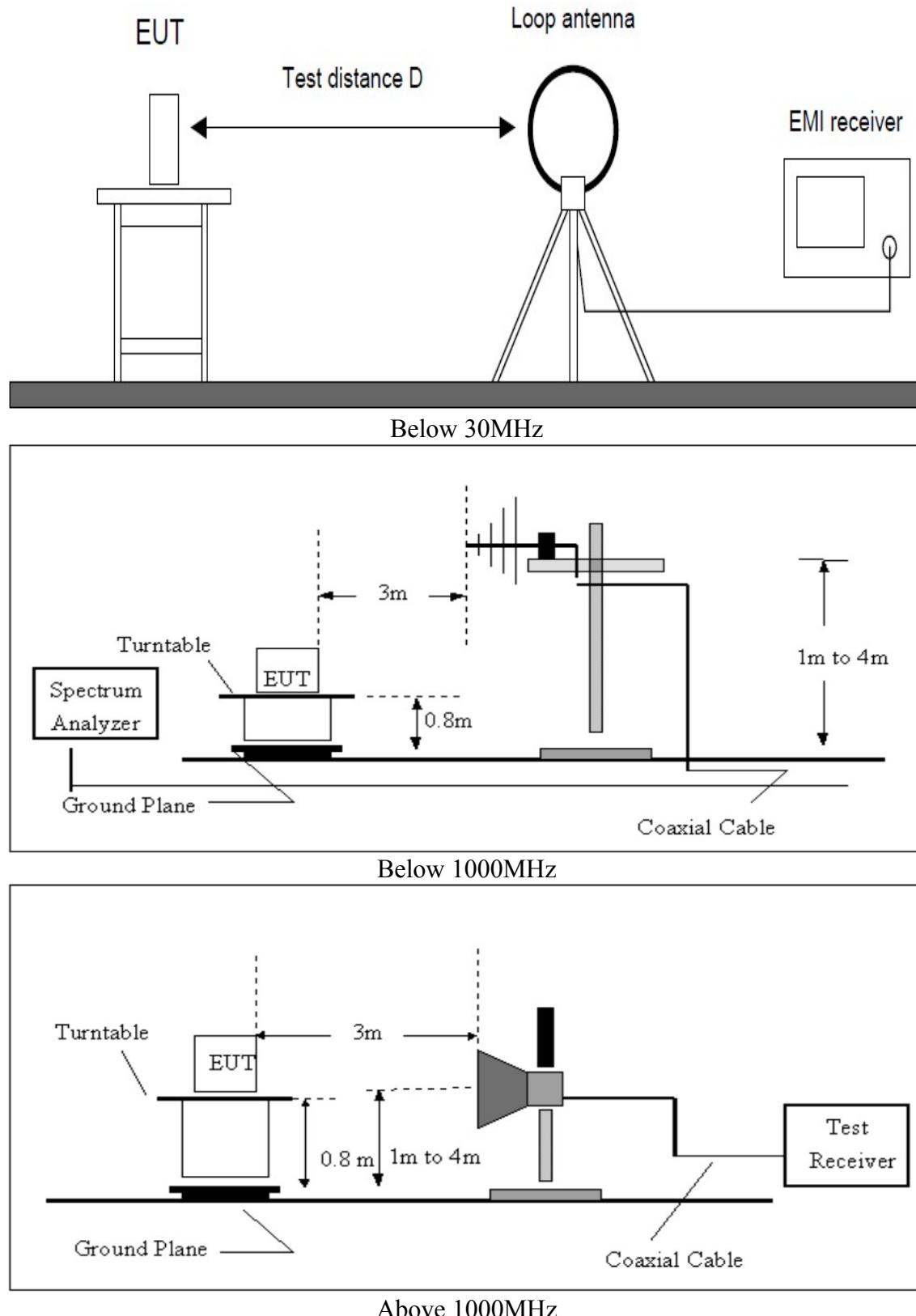
Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

During testing the EUT is rotated all around to find the maximum levels of emissions.

Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

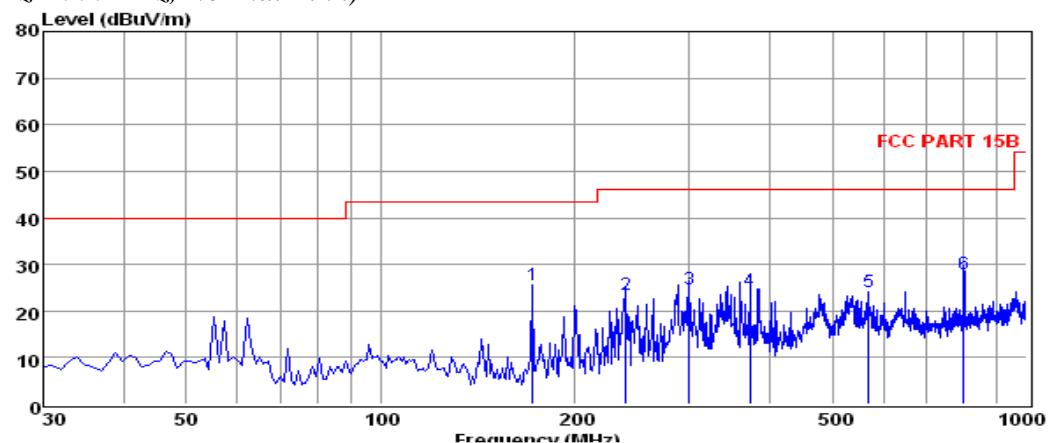
For final testing below 1 GHz an open field test-site is used and the plots recorded in the fully or semi anechoic room are indicated as pre-scans.

7.5. Test Setup



7.6. Test Results

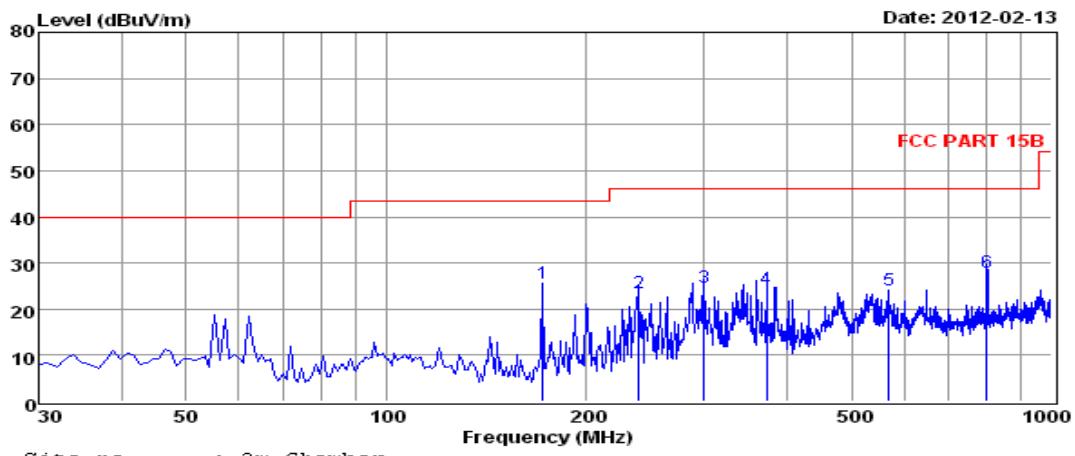
(9kHz-1000MHz, Normal Link)



Site no. : 3m Chamber
 Limit : FCC PART 15 C (3M) Ant. pol. : HORIZONTAL
 Env. / Ins. : 24°C/56% Engineer : Willis

Freq.	Reading	CabLoss	AntFac	PreFac	Measured	Limit	Over	Remark
MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1 171.62	45.86	0.91	9.09	30.20	25.66	43.50	-17.84	QP
2 239.52	40.47	1.01	12.07	30.18	23.37	46.00	-22.63	QP
3 300.63	40.53	1.13	13.07	30.15	24.58	46.00	-21.42	QP
4 372.41	38.76	1.20	14.53	30.11	24.38	46.00	-21.62	QP
5 569.32	34.78	1.43	17.88	30.02	24.07	46.00	-21.93	QP
6 800.18	36.24	1.68	20.06	30.10	27.88	46.00	-18.12	QP

Note: 1. All readings are Quasi-peak values.
 2. Measured = Reading + Antenna Factor + Cable Loss - Amp Factor.
 3. The emission levels that are 20dB below the official limit are not reported.

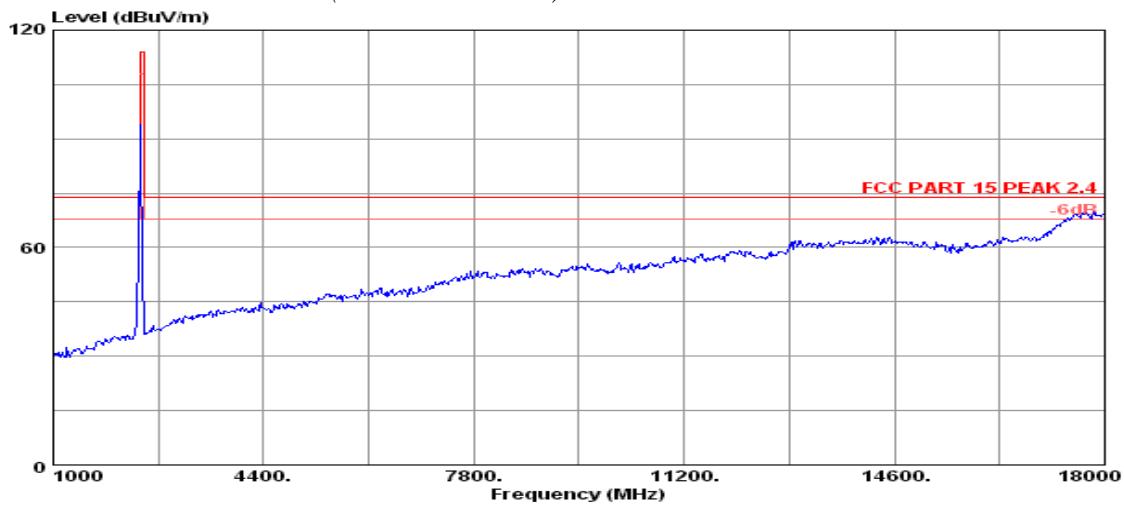


Site no. : 3m Chamber
 Limit : FCC PART 15 C (3M) Ant. pol. : VERTICAL
 Env. / Ins. : 24°C/56% Engineer : Willis

Freq.	Reading	CabLoss	AntFac	PreFac	Measured	Limit	Over	Remark
MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1 171.62	45.86	0.91	9.09	30.20	25.66	43.50	-17.84	QP
2 239.52	40.47	1.01	12.07	30.18	23.37	46.00	-22.63	QP
3 300.63	40.53	1.13	13.07	30.15	24.58	46.00	-21.42	QP
4 372.41	38.76	1.20	14.53	30.11	24.38	46.00	-21.62	QP
5 569.32	34.78	1.43	17.88	30.02	24.07	46.00	-21.93	QP
6 800.18	36.24	1.68	20.06	30.10	27.88	46.00	-18.12	QP

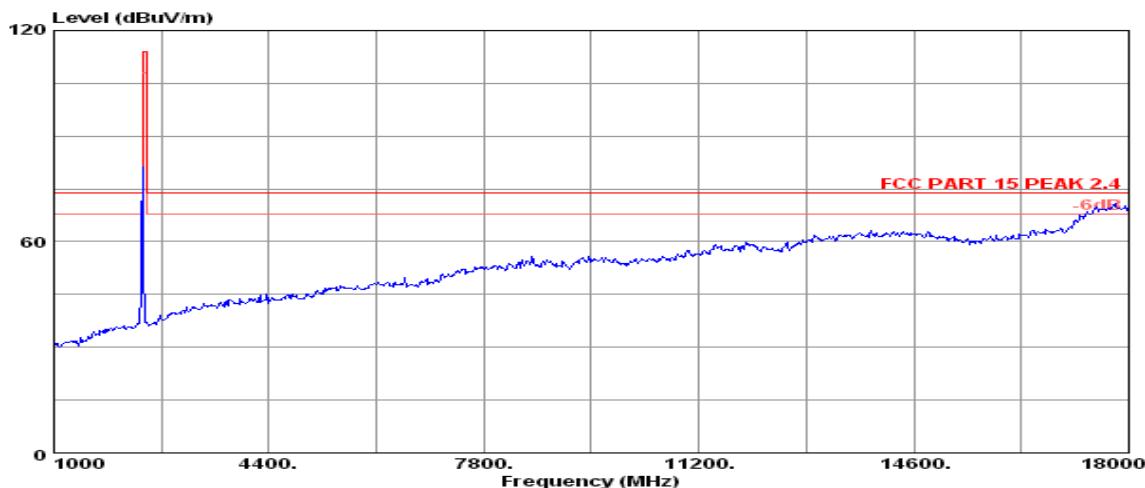
Note: 1. All readings are Quasi-peak values.
 2. Measured = Reading + Antenna Factor + Cable Loss - Amp Factor.
 3. The emission levels that are 20dB below the official limit are not reported.

2.4GHz Band Low channel (above 1000MHz)



Site no. : RF Chamber Data no. : 1
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : HORIZONTAL
 Env. / Ins. : 23°C/54% Engineer : Willis

	Ant.	Cable	Amp.	Emission			
Freq.	Factor	loss	Factor	Reading	Level	Limits	Margin
(MHz)	(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
1	1850.000	28.36	6.37	36.79	49.26	47.20	26.80
2	2410.000	29.45	7.43	36.62	86.94	87.20	26.80
3	4820.000	34.30	10.62	35.10	45.78	55.60	18.40

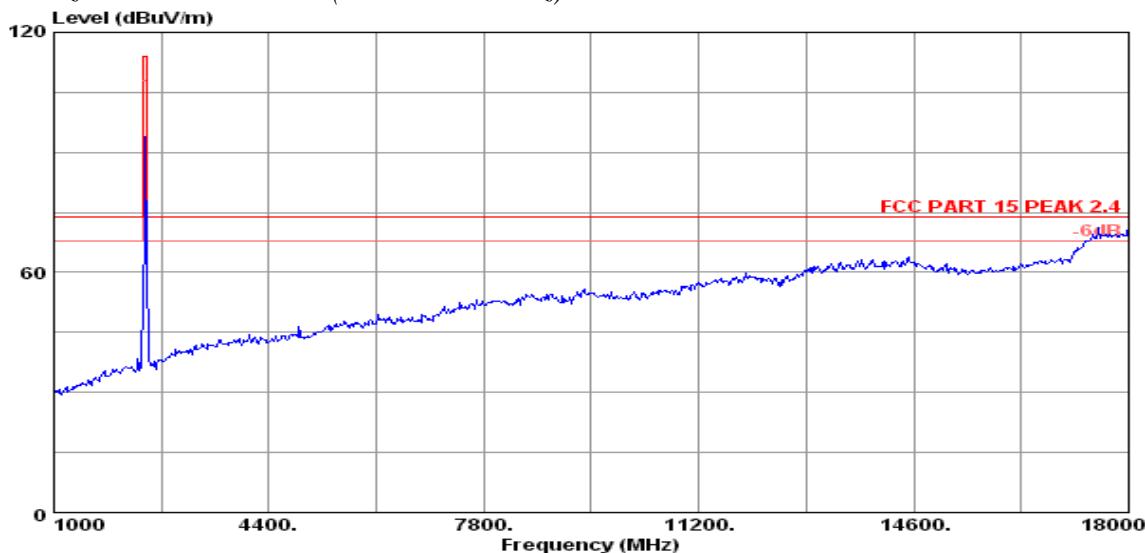


Site no. : RF Chamber Data no. : 3
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : VERTICAL
 Env. / Ins. : 23°C/54% Engineer : Willis

	Ant.	Cable	Amp.	Emission			
Freq.	Factor	loss	Factor	Reading	Level	Limits	Margin
(MHz)	(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
1	1850.000	28.36	6.37	36.79	41.34	39.28	34.72
2	2410.000	29.45	7.43	36.62	73.95	74.21	39.79
3	4820.000	34.30	10.62	35.10	35.12	44.94	29.06

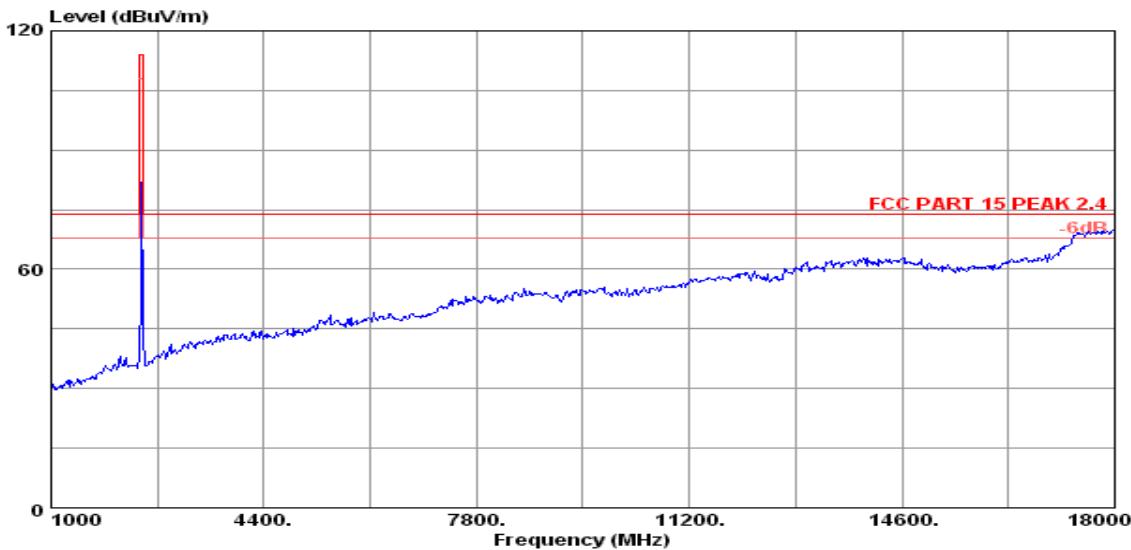
Remark: No emission be detected above 18GHz.

2.4GHz Band Mid channel (above 1000MHz)



Site no. : RF Chamber Data no. : 5
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : HORIZONTAL
 Env. / Ins. : 23°C/54% Engineer : Willis

	Ant.	Cable	Amp.	Emission				
	Freq.	Factor	loss	Factor	Reading	Level	Limits Margin	Remark
	(MHz)	(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
1	2020.000	29.21	6.71	36.69	43.32	42.55	74.00	31.45 Peak
2	2440.000	29.47	7.50	36.61	73.10	73.46	114.00	40.54 Peak
3	4880.000	34.43	10.74	35.00	44.83	55.00	74.00	19.00 Peak

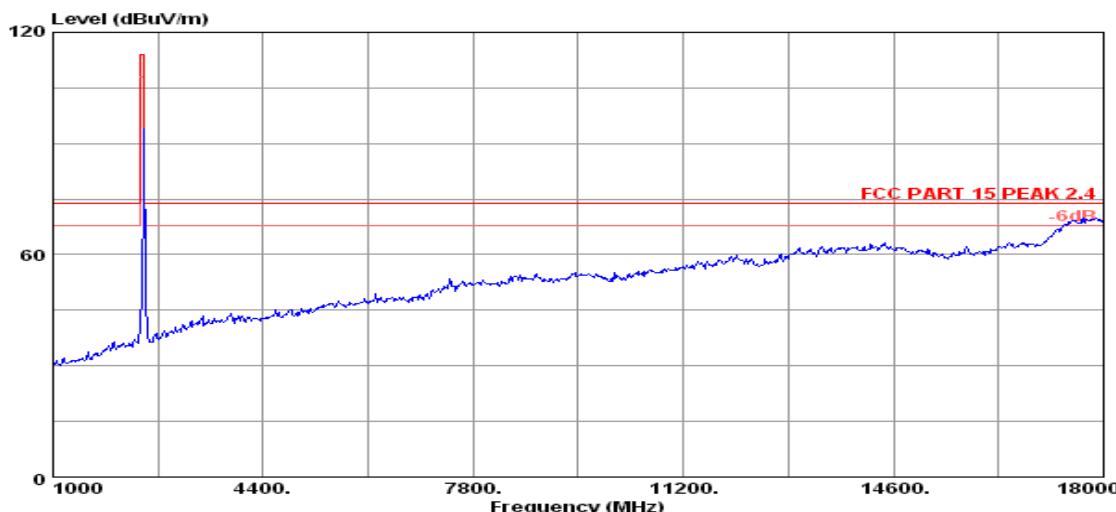


Site no. : RF Chamber Data no. : 7
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : VERTICAL
 Env. / Ins. : 23°C/54% Engineer : Willis

	Ant.	Cable	Amp.	Emission				
	Freq.	Factor	loss	Factor	Reading	Level	Limits Margin	Remark
	(MHz)	(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
1	2020.000	29.21	6.71	36.69	49.27	48.50	74.00	25.50 Peak
2	2440.000	29.47	7.50	36.61	86.53	86.89	114.00	27.11 Peak
3	4880.000	34.43	10.74	35.00	45.62	55.79	74.00	18.21 Peak

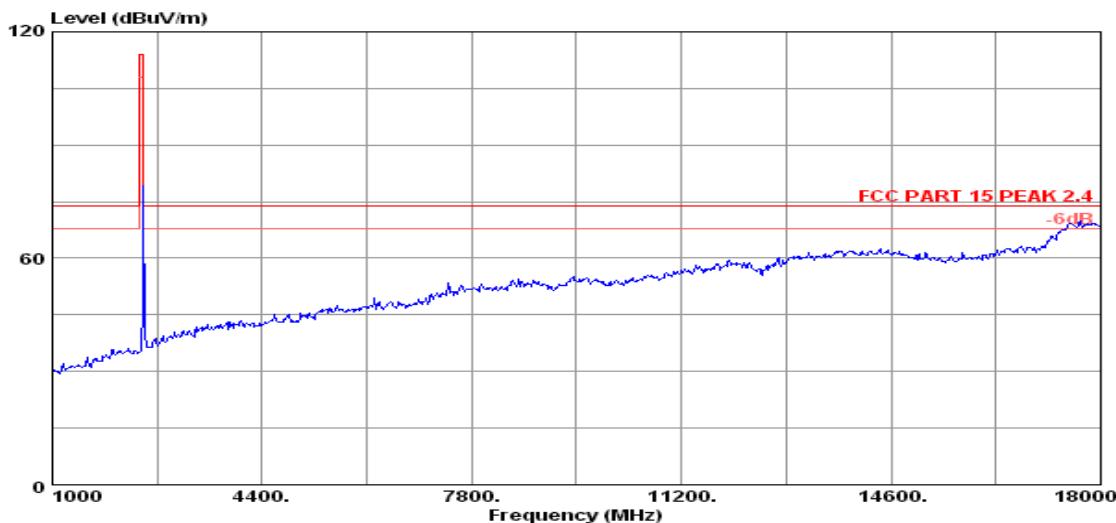
Remark: No emission be detected above 18GHz

2.4GHz Band High channel (above 1000MHz)



Site no. : RF Chamber Data no. : 11
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : HORIZONTAL
 Env. / Ins. : 23°C/54% Engineer : Willis

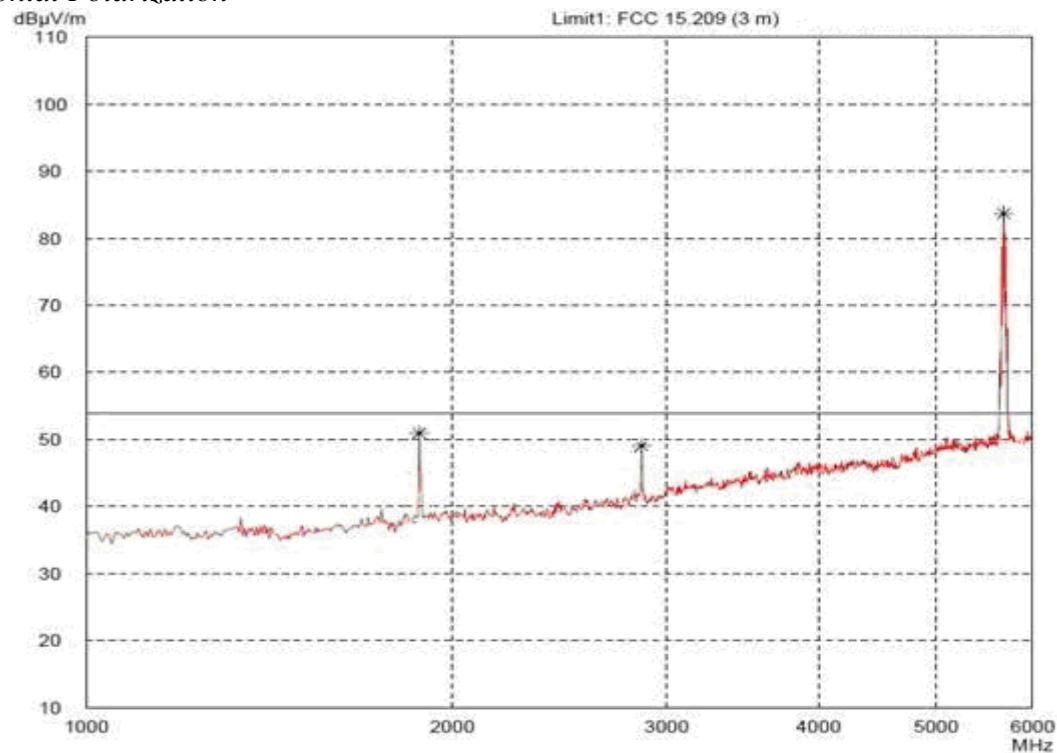
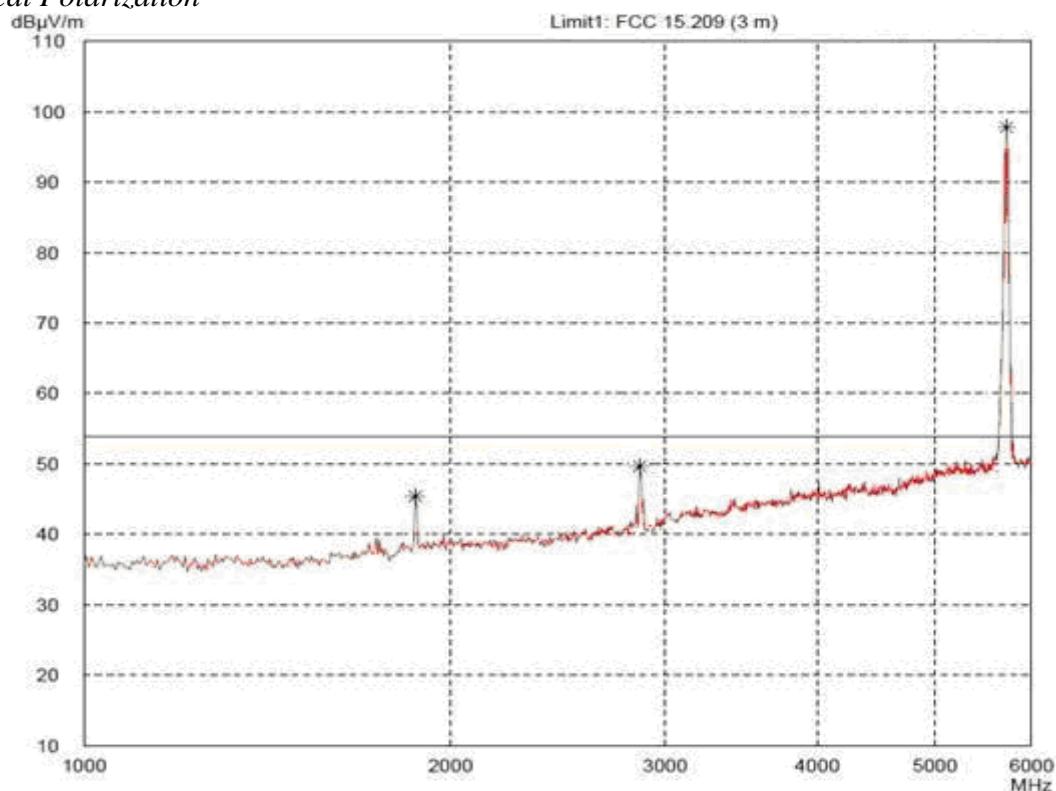
	Ant.	Cable	Amp.	Emission				
	Freq.	Factor	loss	Factor	Reading	Level	Limits Margin	Remark
	(MHz)	(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
1	2020.000	29.21	6.71	36.69	48.01	47.24	74.00	26.76 Peak
2	2465.000	29.49	7.54	36.60	88.14	88.57	114.00	25.43 Peak
3	4930.000	34.52	10.78	34.95	45.48	55.83	74.00	18.17 Peak



Site no. : RF Chamber Data no. : 9
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : VERTICAL
 Env. / Ins. : 23°C/54% Engineer : Willis

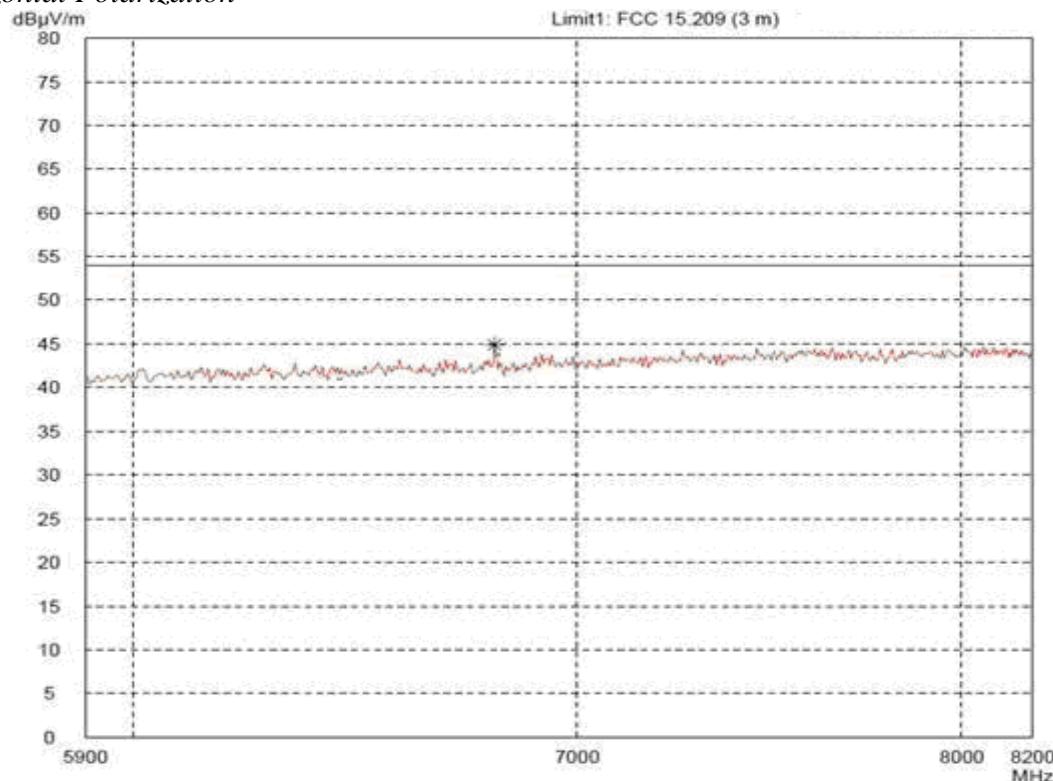
	Ant.	Cable	Amp.	Emission				
	Freq.	Factor	loss	Factor	Reading	Level	Limits Margin	Remark
	(MHz)	(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
1	2020.000	29.21	6.71	36.69	47.92	47.15	74.00	26.85 Peak
2	2465.000	29.49	7.54	36.60	74.88	75.31	114.00	38.69 Peak
3	4930.000	34.52	10.78	34.95	44.25	54.60	74.00	19.40 Peak

Remark: No emission be detected above 18GHz

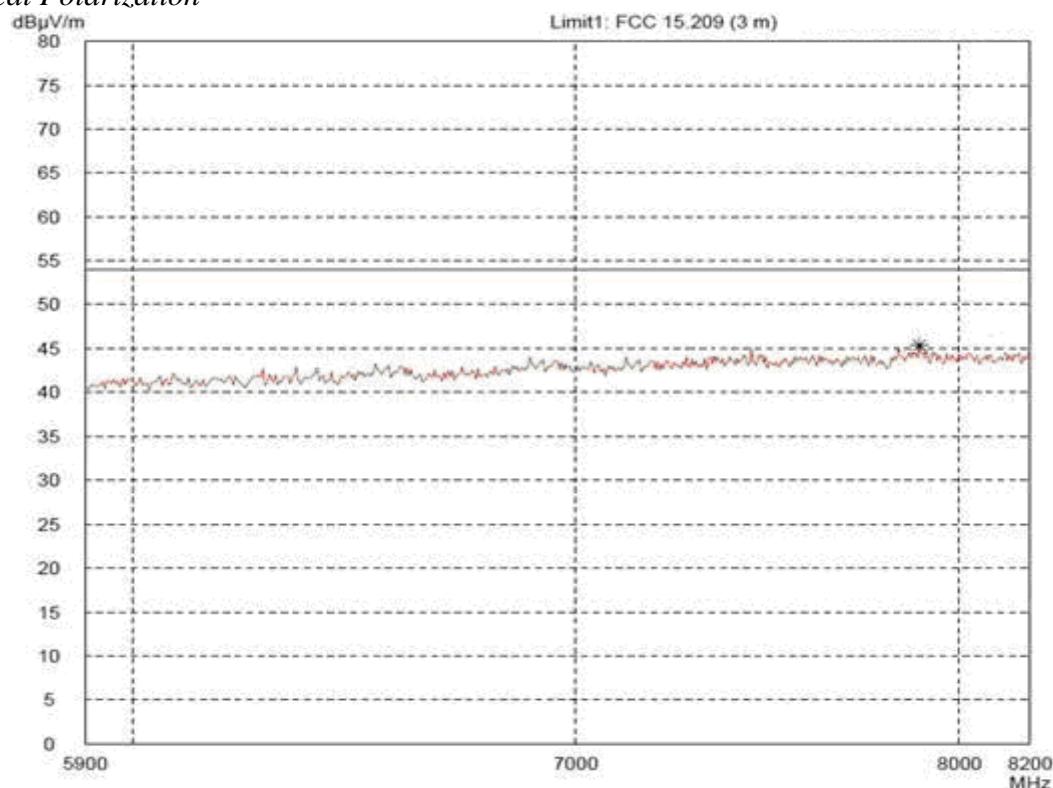
*5.8GHz Band Low Channel**1GHz~6GHz(Distance: 3 m)**Horizontal Polarization**Vertical Polarization*

6GHz~8.2GHz(Distance: 3 m)

Horizontal Polarization

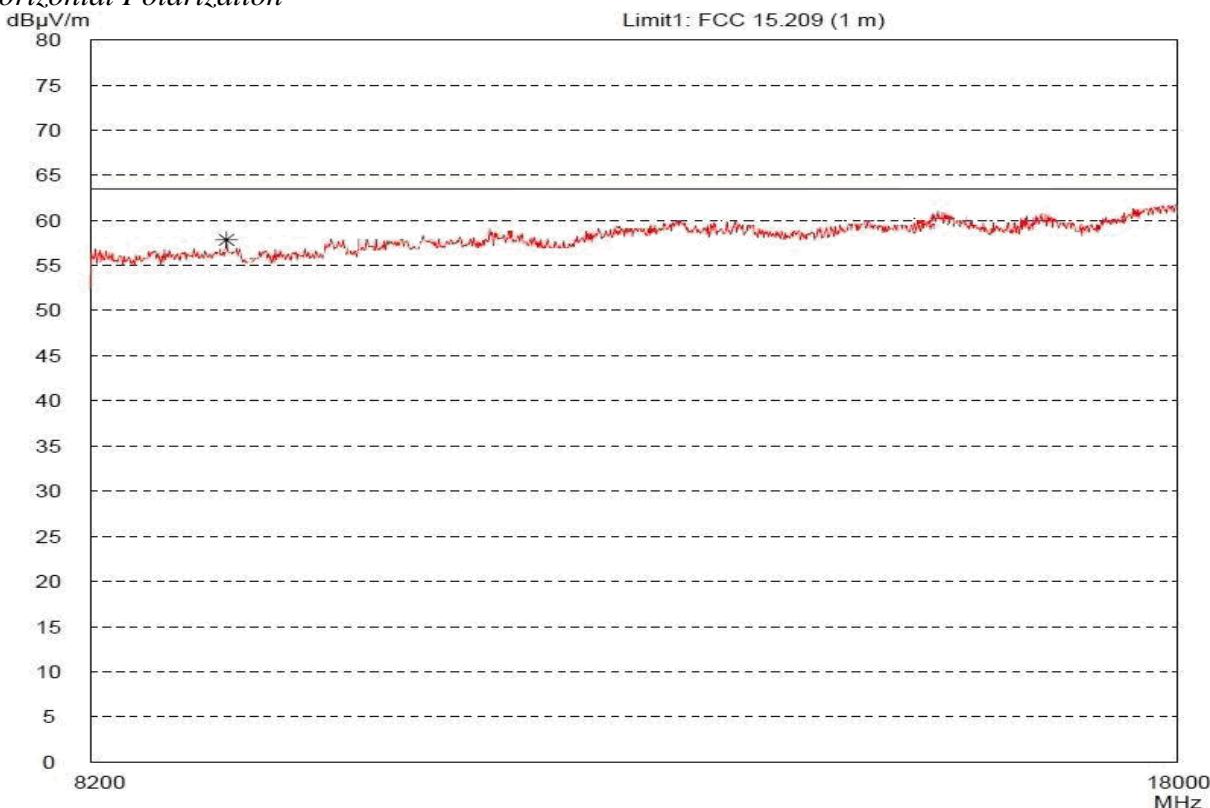


Vertical Polarization

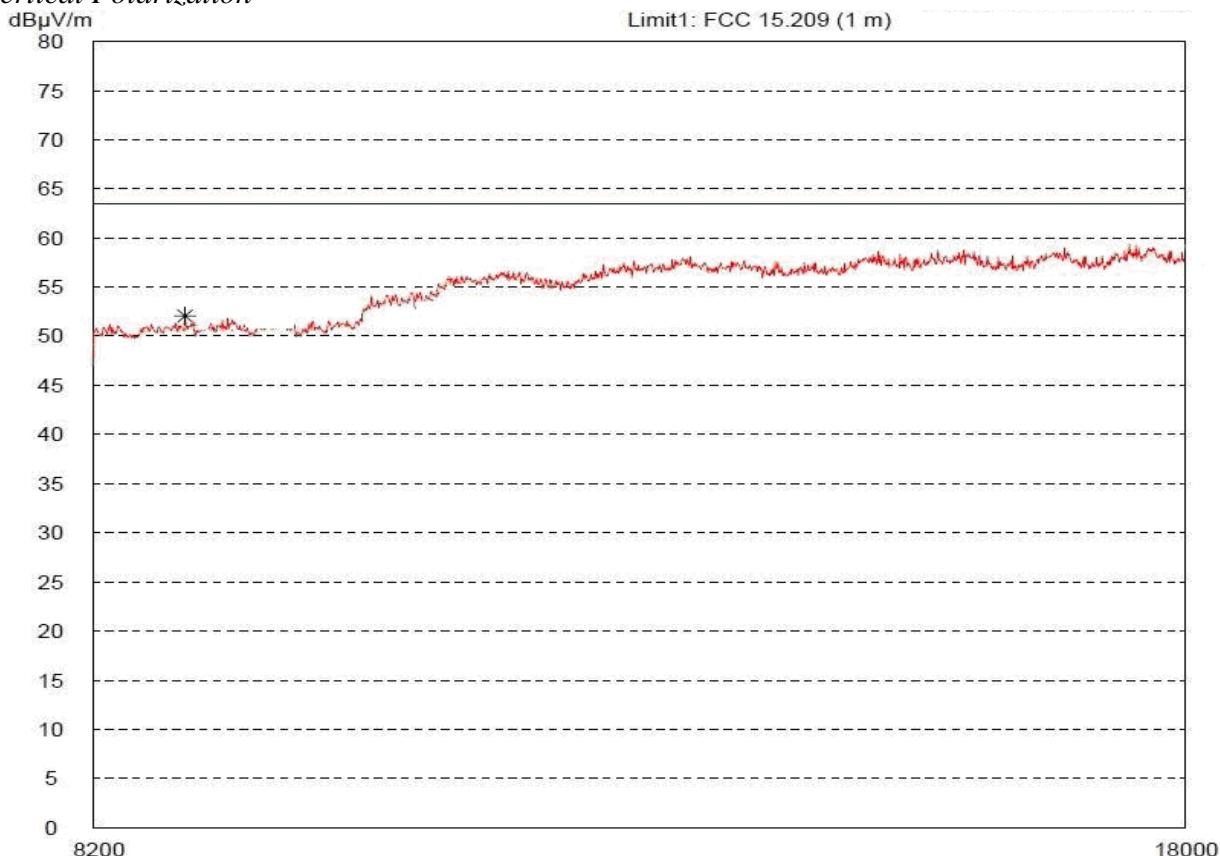


8.2GHz~18GHz(Distance: 1 m)

Horizontal Polarization

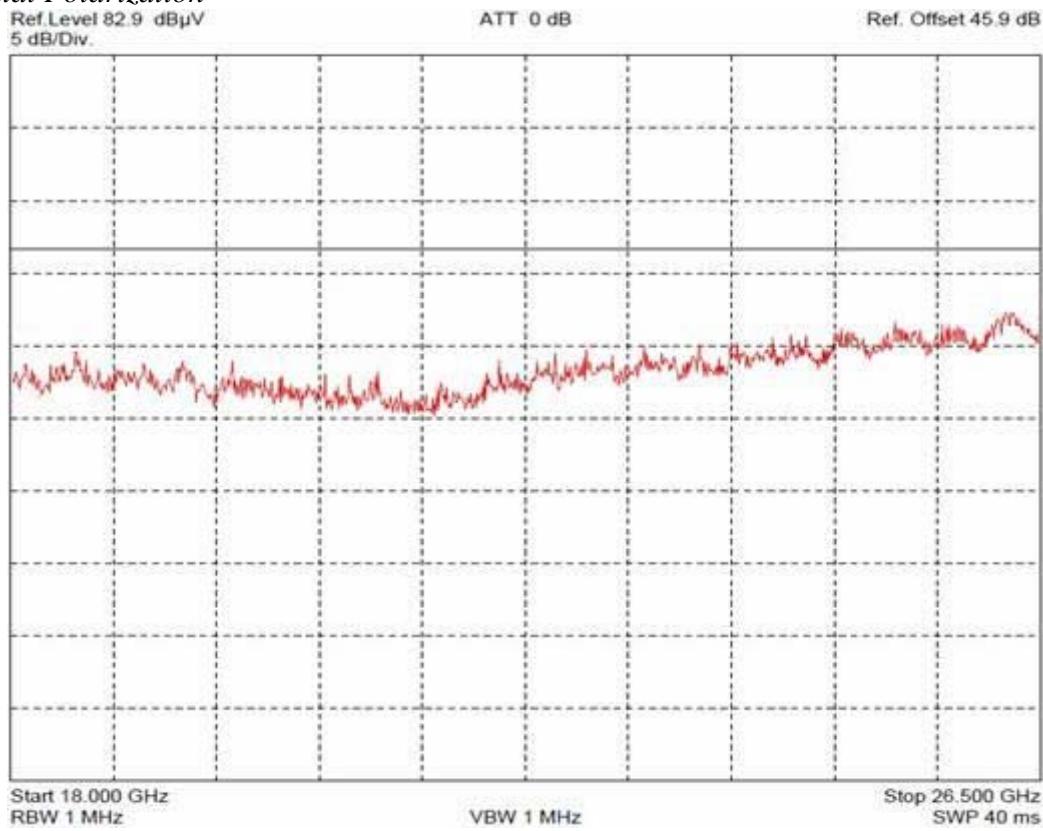


Vertical Polarization

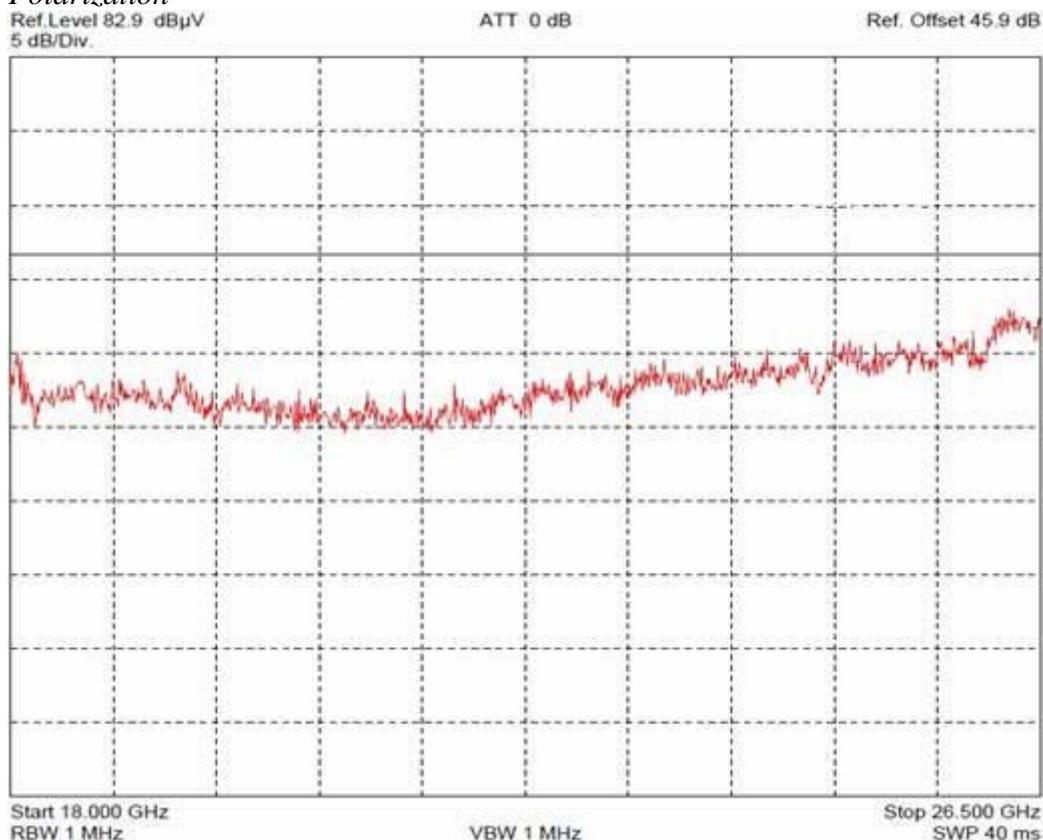


18GHz~26.5 GHz(Distance: 0.5 m)

Horizontal Polarization



Vertical Polarization

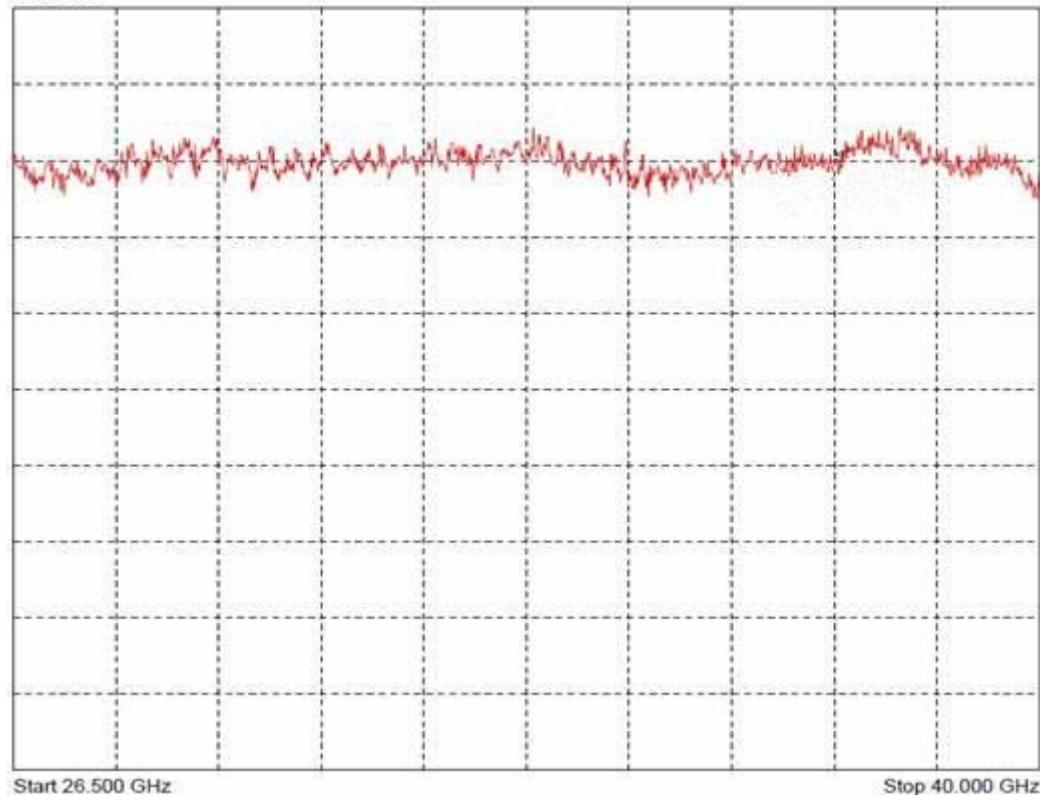


26.5GHz~40GHz(Distance: 0.25 m)

Horizontal Polarization

Ref.Level 27 dB μ V
5 dB/Div.

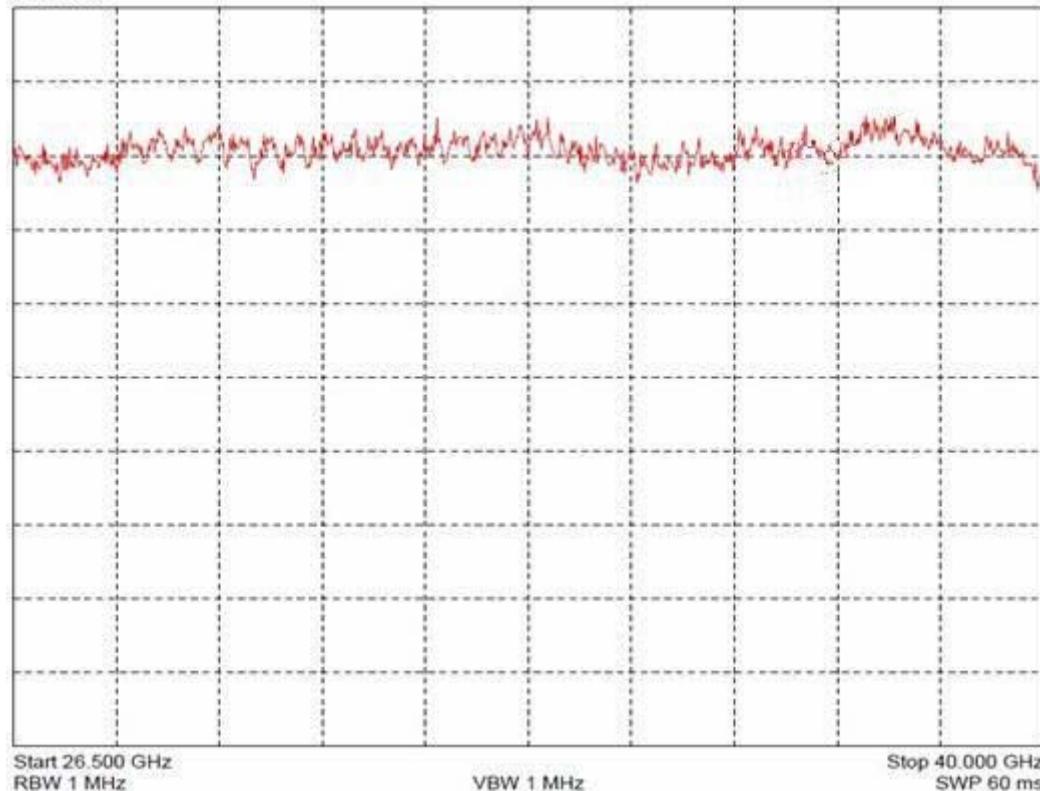
ATT 0 dB



Vertical Polarization

Ref.Level 27 dB μ V
5 dB/Div.

ATT 0 dB



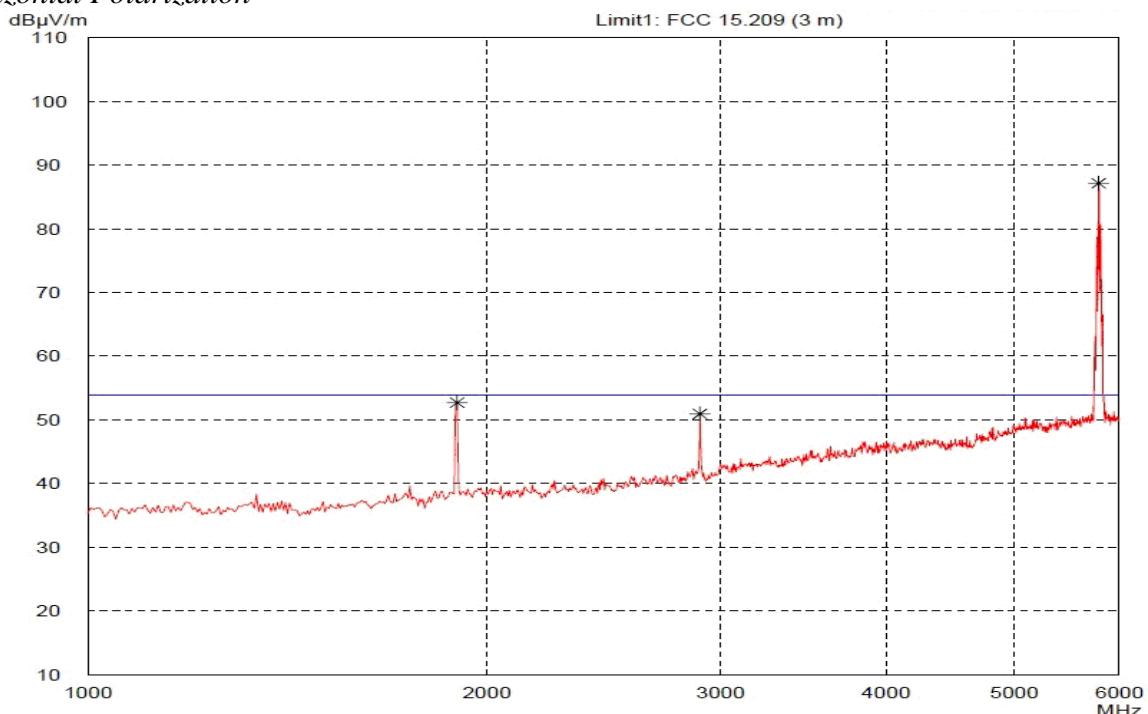
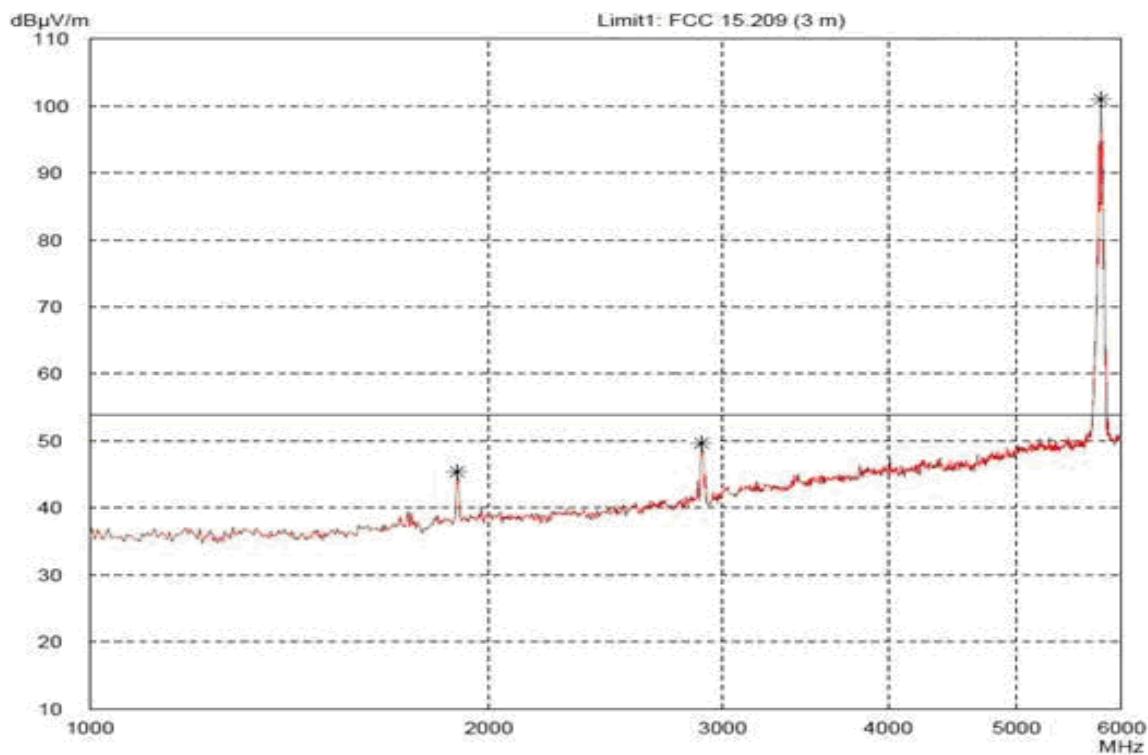
Freq. (MHz)	Read Level (dB μ V)	Correction Factor (dB/m)	Final Value (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark	Pol/Phase
1911.8	12.7	31.8	44.5	54.0	9.5	Average	Horizontal
1911.1	8.5	31.8	40.3	54.0	13.7	Average	Vertical
2867.7	8.0	40.9	48.9	54.0	5.1	Average	Horizontal
2867.2	8.1	41.0	49.1	54.0	4.9	Average	Vertical
5935.2	32.4	41.0	73.4	94.0	20.6	Average	Horizontal
5935.9	46.2	41.0	87.2	94.0	6.8	Average	Vertical
6836.5	2.8	41.0	43.8	54.0	10.2	Average	Horizontal
7893.6	3.7	41.0	44.7	54.0	9.3	Average	Vertical
9134.9	8.6	43.6	52.2	63.5	11.3	Average	Horizontal
8776.3	5.3	43.6	48.9	63.5	14.6	Average	Vertical

Sample calculation of final values:

$$\text{Final Value (dB}\mu\text{V/m)} = \text{Reading Value (dB}\mu\text{V)} + \text{Correction Factor (dB/m)}$$

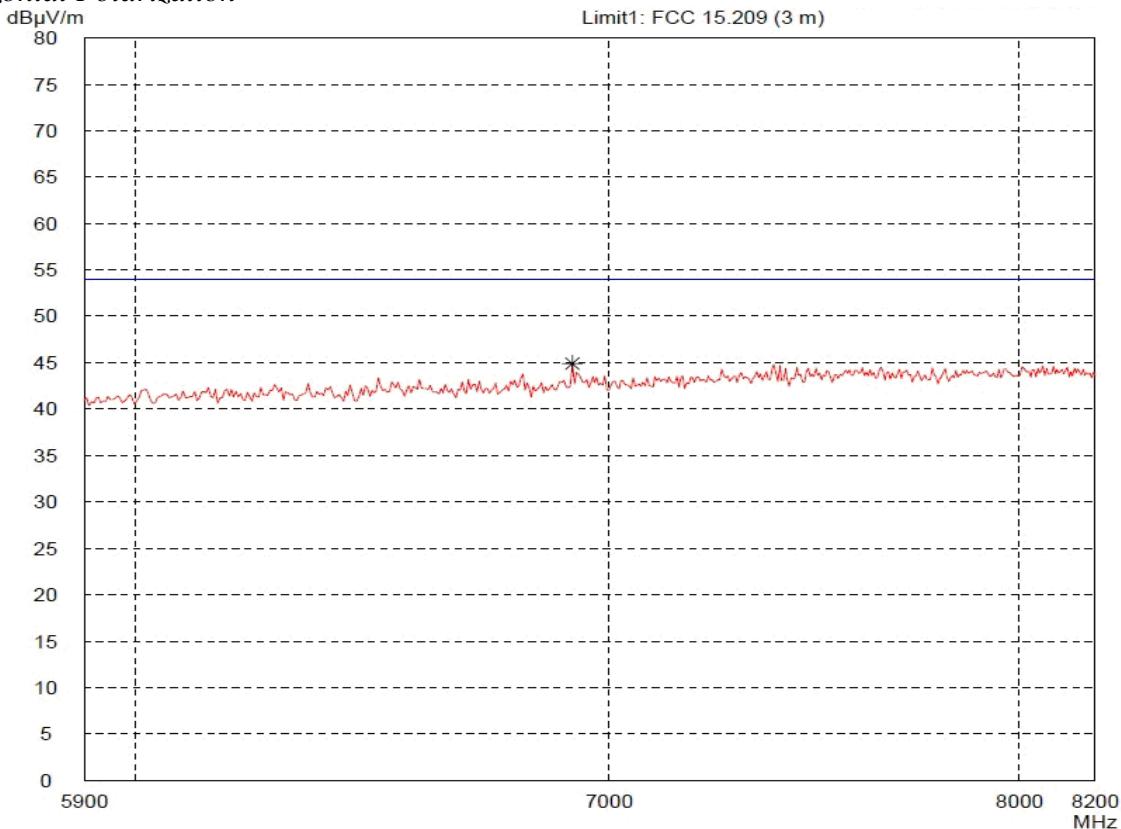
Note: 1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported. Measuring frequencies from 9 kHz to the 40GHz. No emission found between lowest internal used/generated frequency to 30 MHz.

- 2. Radiated emissions measured in frequency range from 9 kHz to 40GHz were made with an instrument using Peak detector mode.*
- 3. Measurements above show only up to 6 maximum emissions noted.*
- 4. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB. No emission found above 18GHz.*

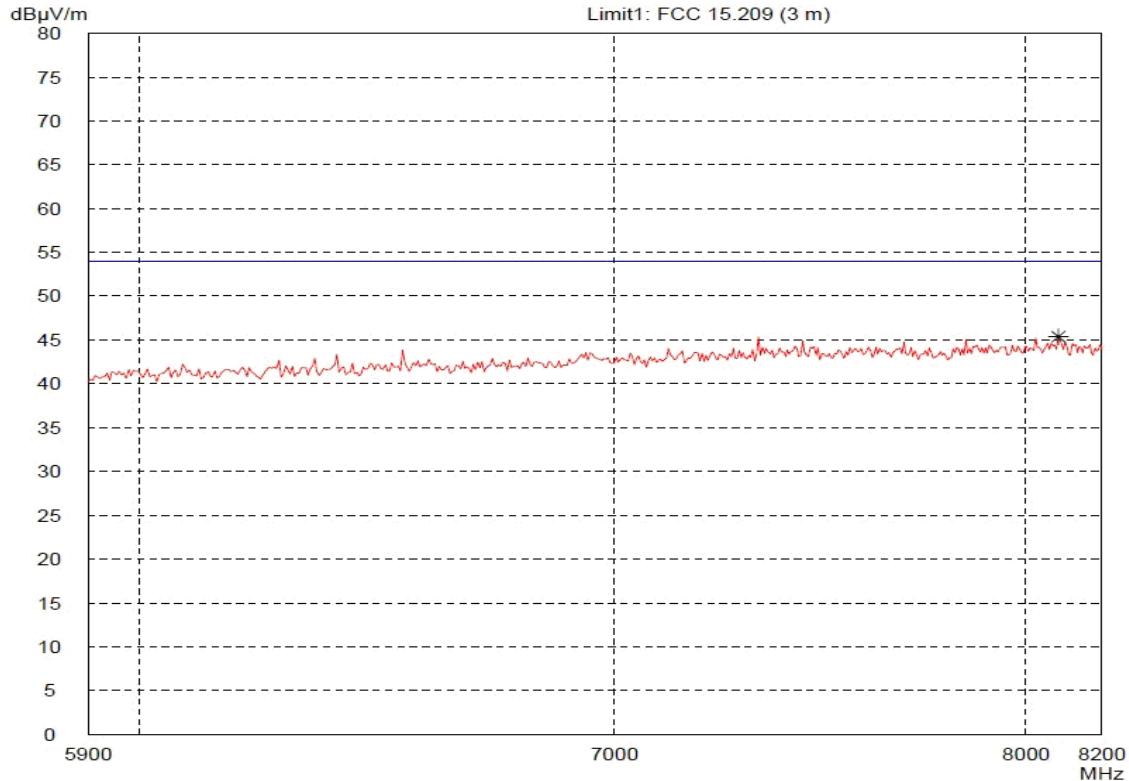
*5.8GHz Band Middle Channel**1GHz~6GHz(Distance: 3 m)**Horizontal Polarization**Vertical Polarization*

6GHz~8.2GHz(Distance: 3 m)

Horizontal Polarization

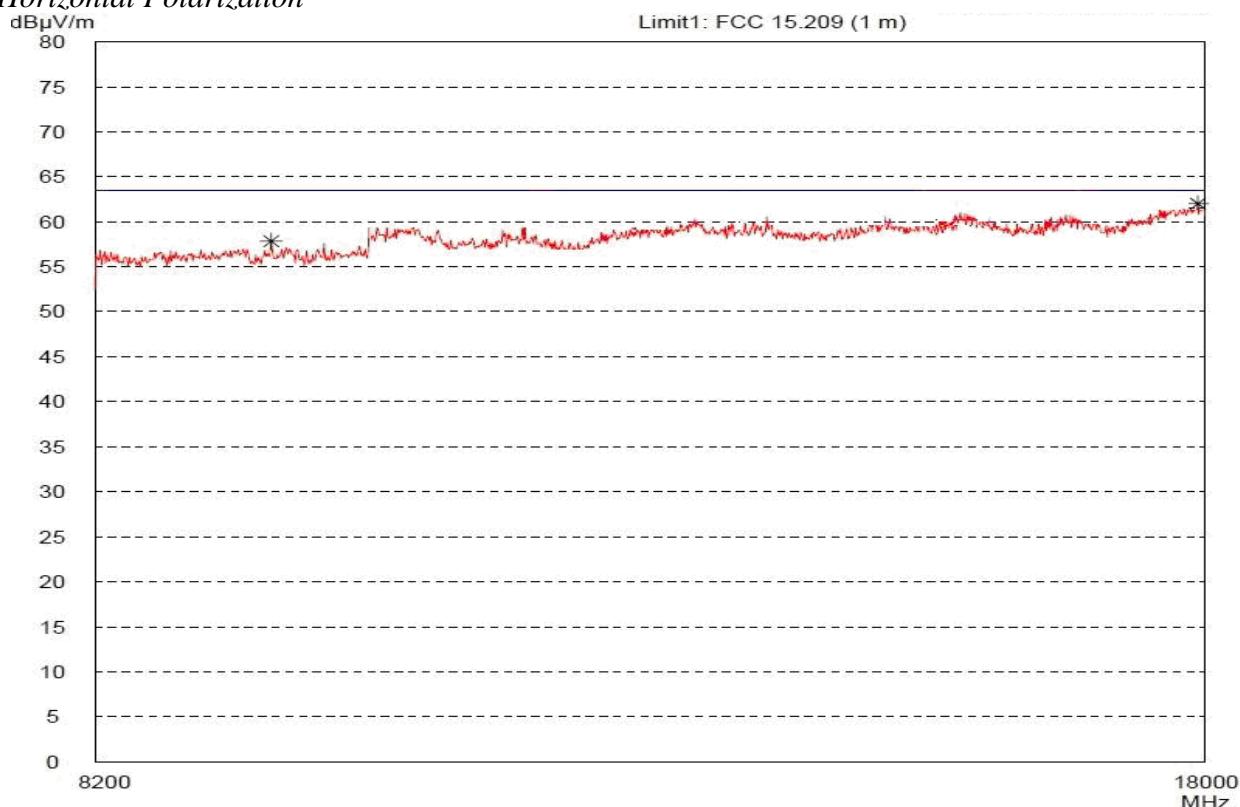


Vertical Polarization

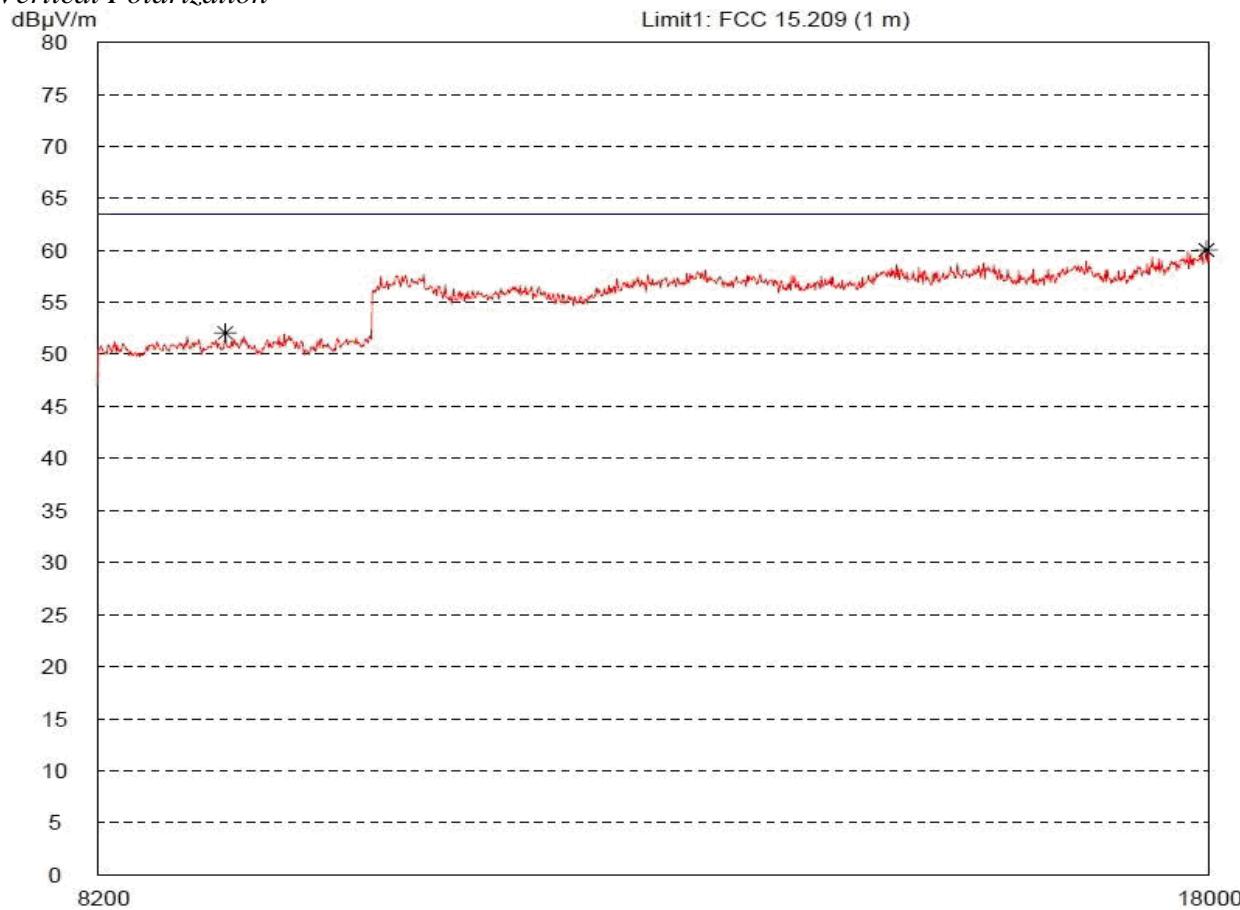


8.2GHz~18GHz(Distance: 1 m)

Horizontal Polarization



Vertical Polarization



18GHz~26.5GHz(Distance: 0.5 m)

Horizontal Polarization

Ref.Level 82.9 dB μ V
5 dB/Div.

ATT 0 dB

Ref. Offset 45.9 dB

Start 18.000 GHz
RBW 1 MHz

VBW 1 MHz

Stop 26.500 GHz
SWP 40 ms

Marker
26.452778 GHz
67.28 dB μ V

Vertical Polarization
Ref.Level 82.9 dB μ V
5 dB/Div.

ATT 0 dB

Ref. Offset 45.9 dB

Start 18.000 GHz
RBW 1 MHz

VBW 1 MHz

Stop 26.500 GHz
SWP 40 ms

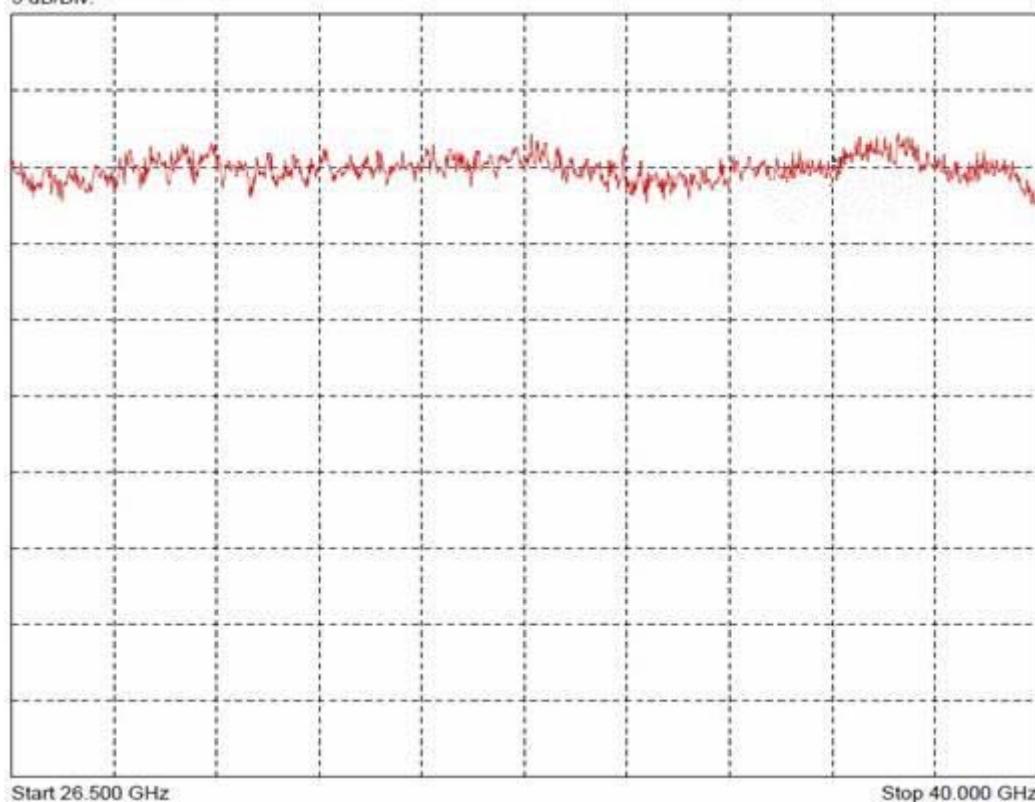
Marker
26.433889 GHz
67.24 dB μ V

26.5GHz~40GHz(Distance: 0.25 m)

Horizontal Polarization

Ref.Level 27 dB μ V
5 dB/Div.

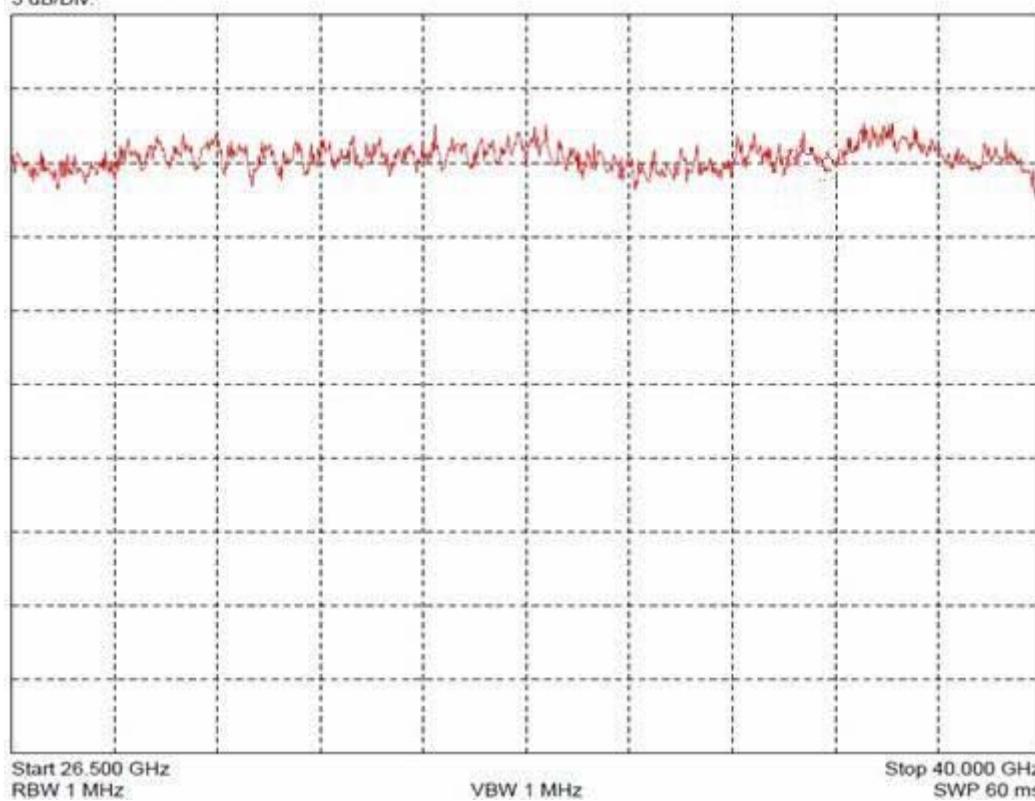
ATT 0 dB



Vertical Polarization

Ref.Level 27 dB μ V
5 dB/Div.

ATT 0 dB



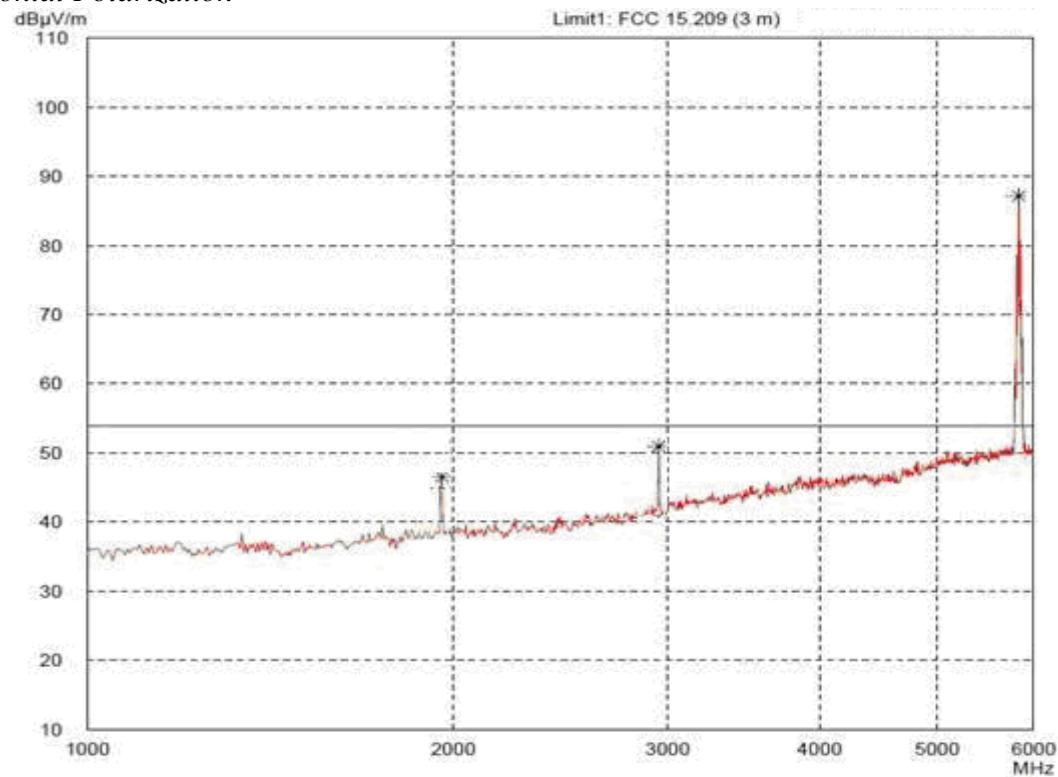
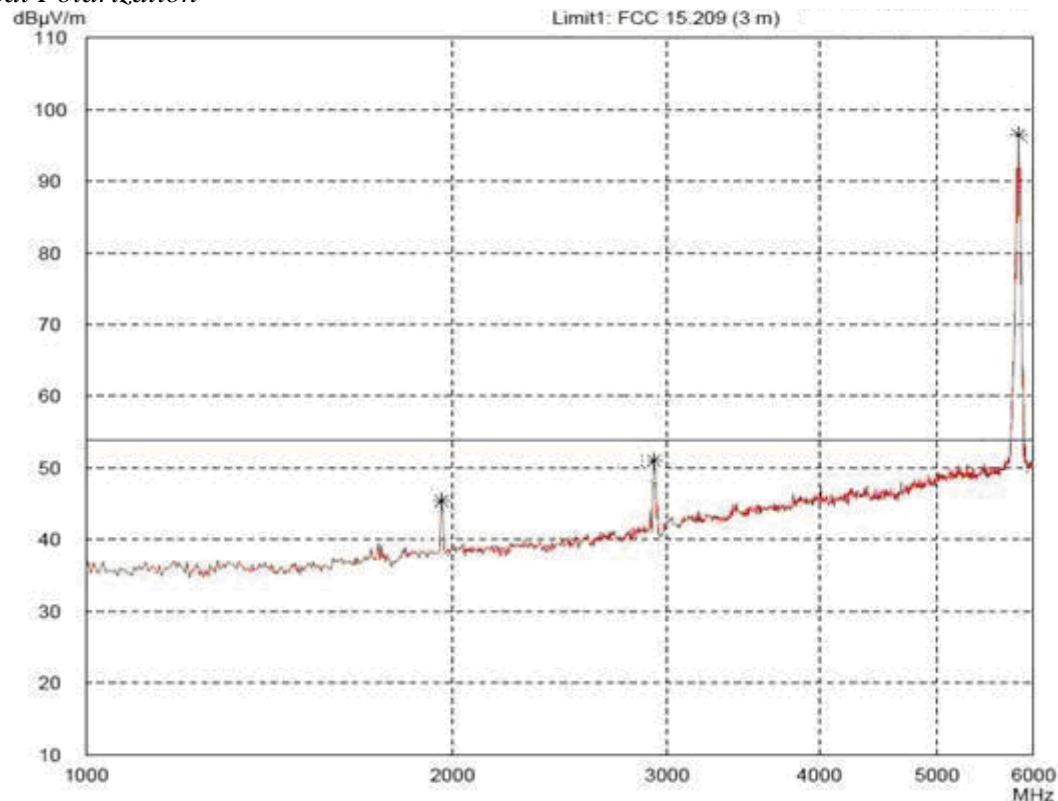
Freq. (MHz)	Read Level (dB μ V)	Correction Factor (dB/m)	Final Value (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark	Pol/Phase
1930.2	20.3	31.8	52.1	74.0	21.9	Peak	Horizontal
1930.2	16.0	31.8	47.8	54.0	6.2	Average	Vertical
2897.5	9.9	40.9	50.8	54.0	3.2	Average	Horizontal
2897.9	8.1	41.0	49.1	54.0	4.9	Average	Vertical
5795.3	36.2	41.0	77.2	94.0	16.8	Average	Horizontal
5795.6	49.3	41.0	90.3	94.0	3.7	Average	Vertical
6897.3	3.6	41.0	44.6	54.0	9.4	Average	Horizontal
8097.6	4.1	41.0	45.1	54.0	8.9	Average	Vertical
9702.3	13.7	43.6	57.3	63.5	6.2	Average	Horizontal
9324.6	8.8	43.6	52.4	63.5	11.1	Average	Vertical
26452.8	11.48	43.6	55.08	63.5	8.42	Average	Horizontal
26433.9	10.63	43.6	54.23	63.5	9.27	Average	Vertical

Sample calculation of final values:

$$\text{Final Value (dB}\mu\text{V/m)} = \text{Reading Value (dB}\mu\text{V)} + \text{Correction Factor (dB/m)}$$

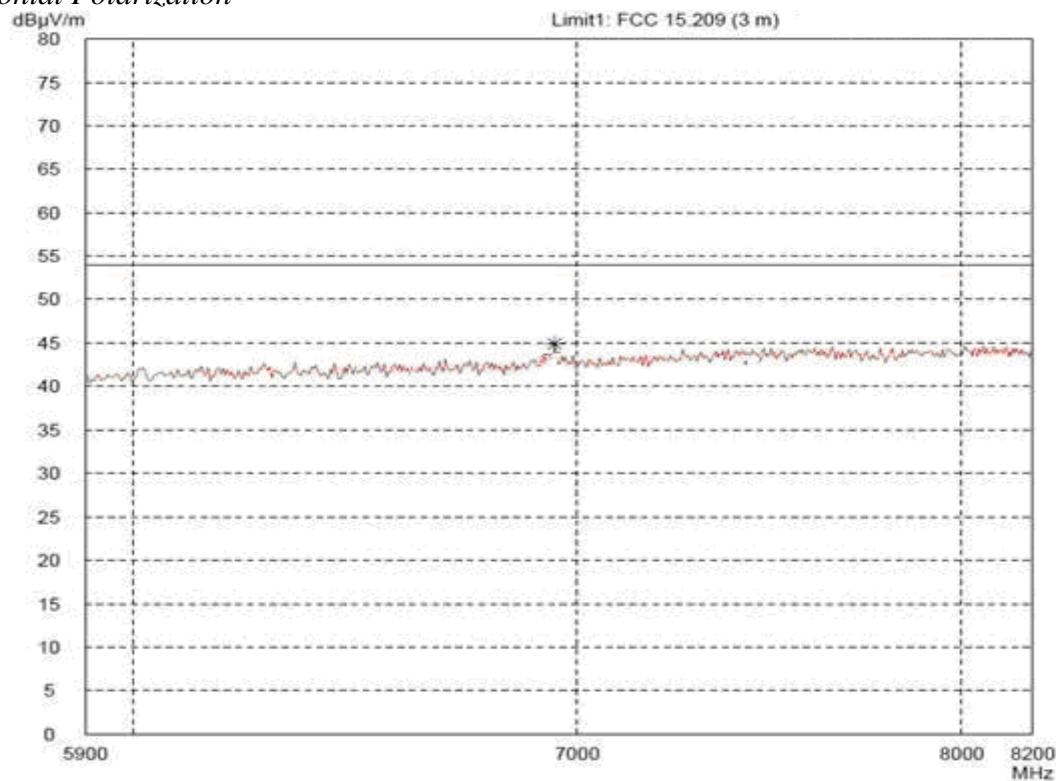
Note: 1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported. Measuring frequencies from 9 kHz to the 40GHz. No emission found between lowest internal used/generated frequency to 30 MHz.

- 2. Radiated emissions measured in frequency range from 9 kHz to 40GHz were made with an instrument using Peak detector mode.*
- 3. Measurements above show only up to 6 maximum emissions noted.*
- 4. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB. No emission found above 18GHz.*

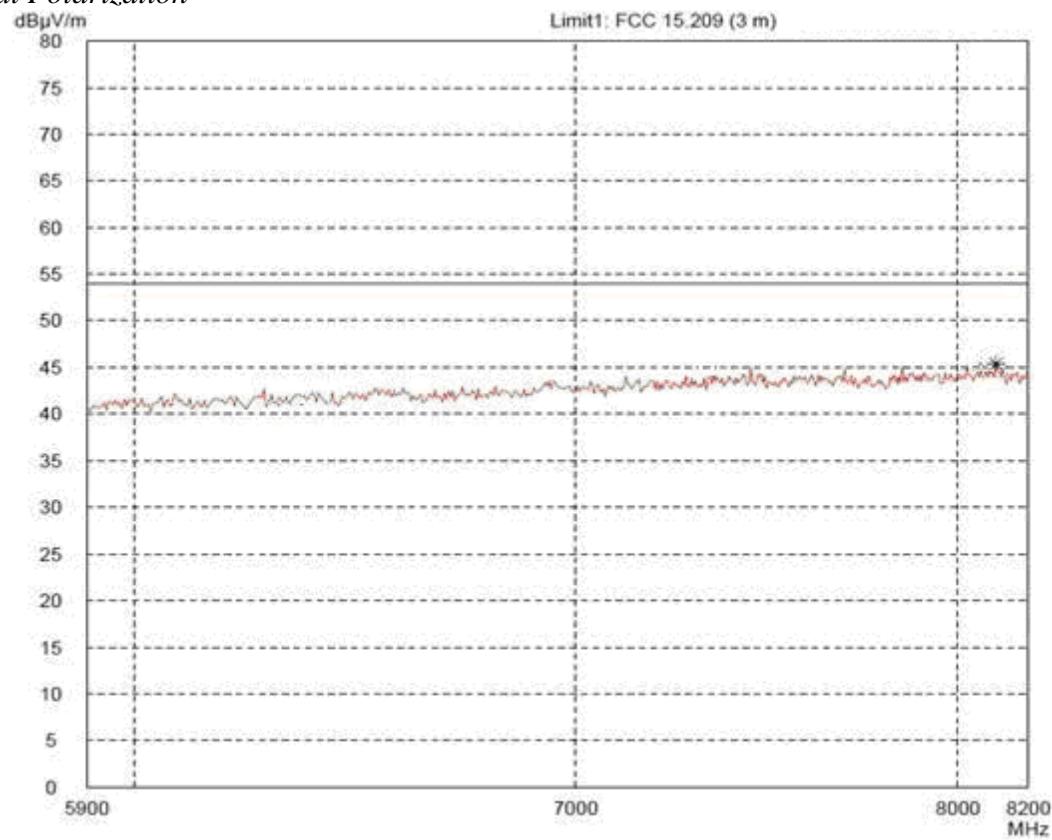
*5.8GHz Band High Channel**1GHz~6GHz(Distance: 3 m)**Horizontal Polarization**Vertical Polarization*

6GHz~8.2GHz(Distance: 3 m)

Horizontal Polarization

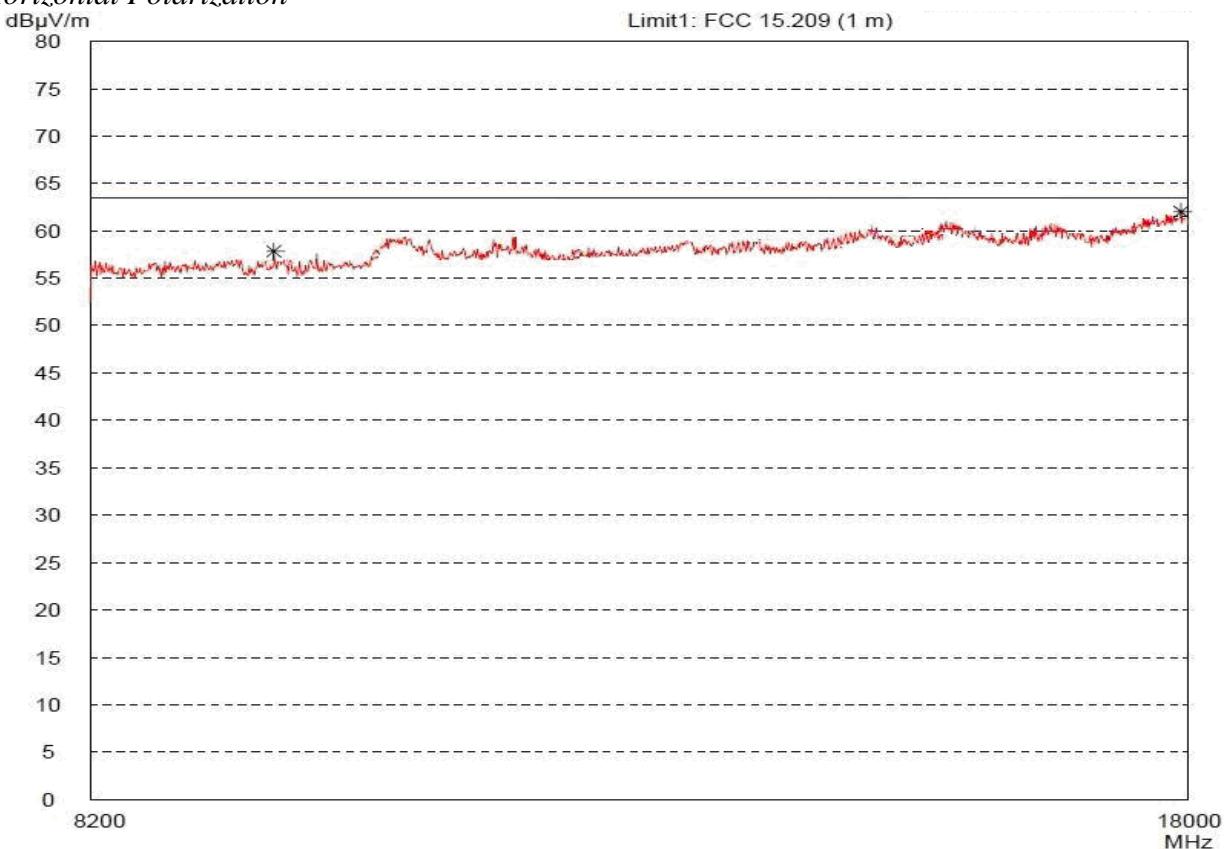


Vertical Polarization

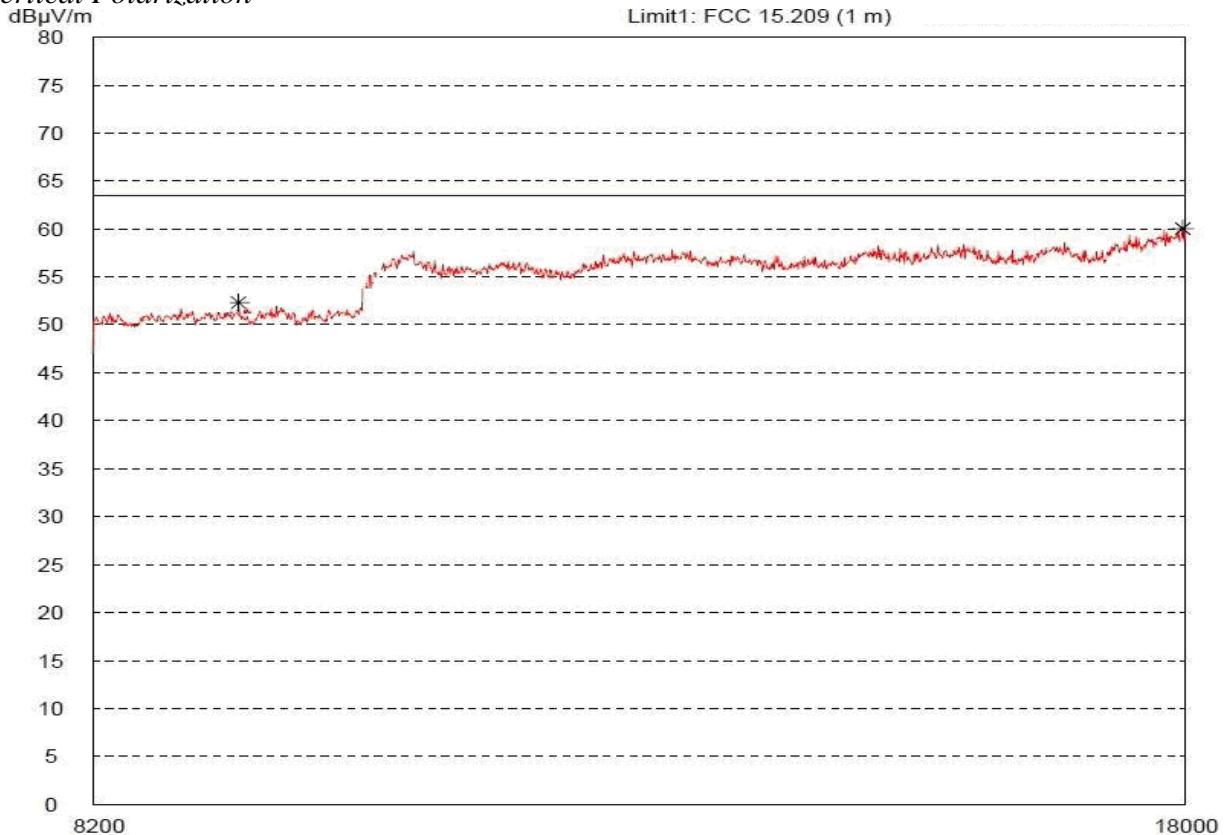


8.2GHz~18GHz(Distance: 1 m)

Horizontal Polarization



Vertical Polarization



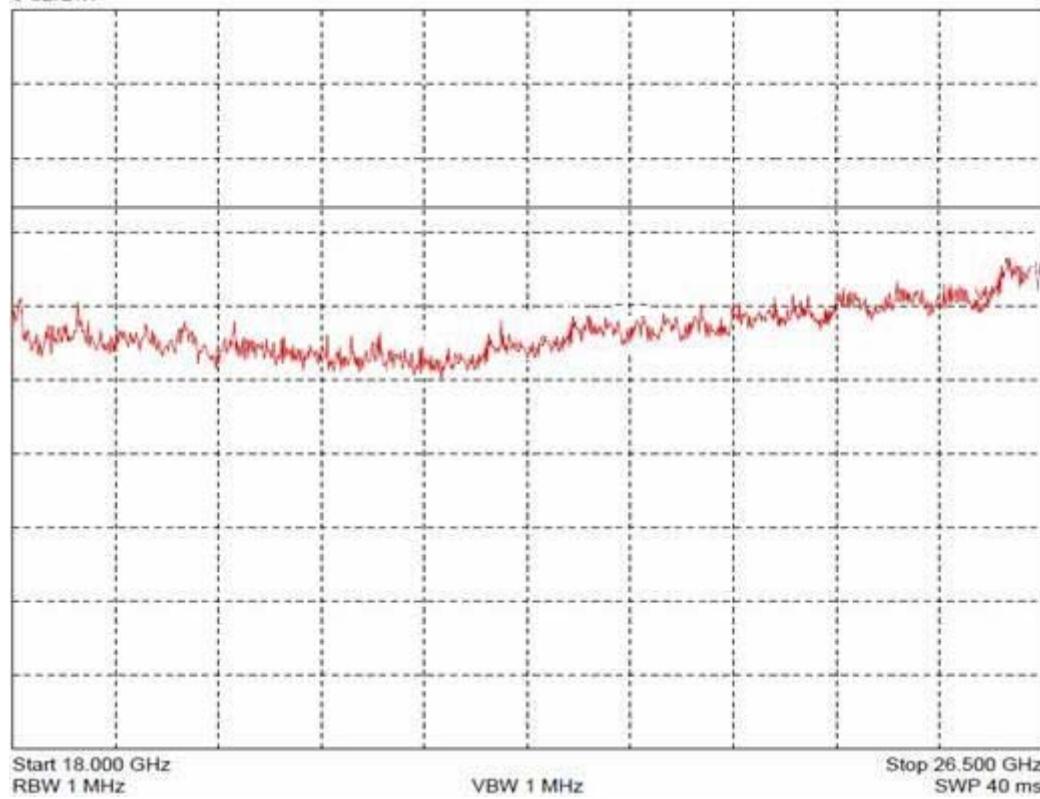
18GHz~26.5GHz(Distance: 0.5 m)

Horizontal Polarization

Ref.Level 82.9 dB μ V
5 dB/Div.

ATT 0 dB

Ref. Offset 45.9 dB



Start 18.000 GHz
RBW 1 MHz

VBW 1 MHz

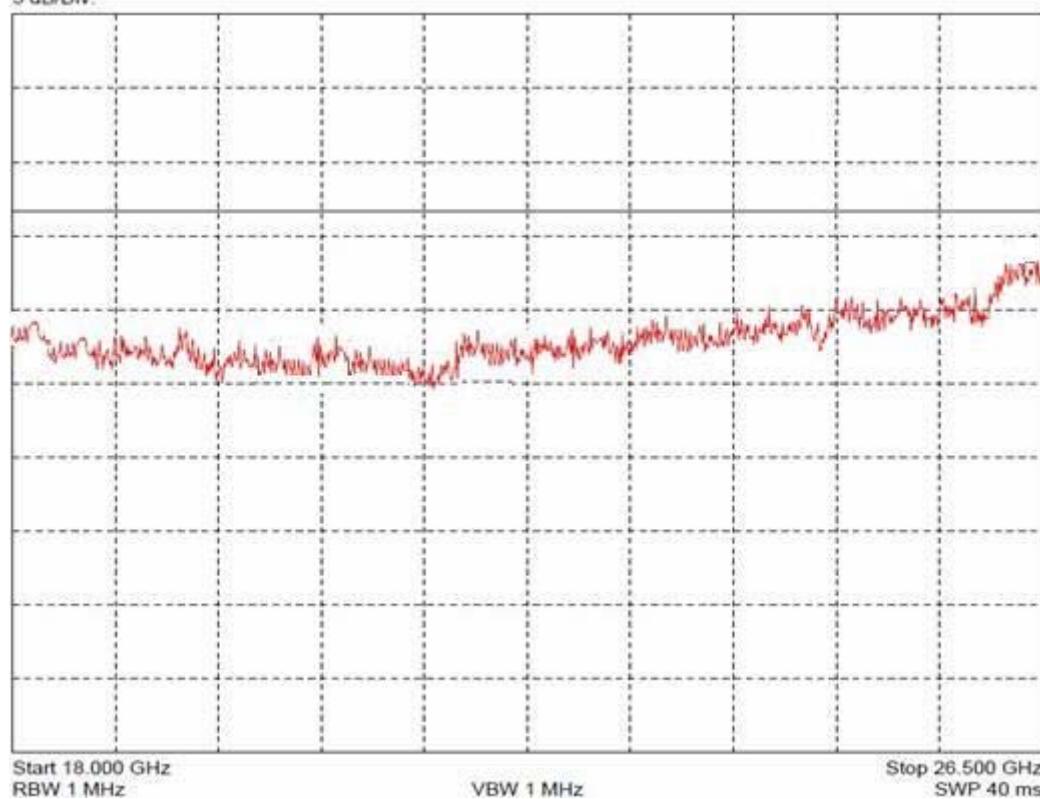
Stop 26.500 GHz
SWP 40 ms

Vertical Polarization

Ref.Level 82.9 dB μ V
5 dB/Div.

ATT 0 dB

Ref. Offset 45.9 dB



Start 18.000 GHz
RBW 1 MHz

VBW 1 MHz

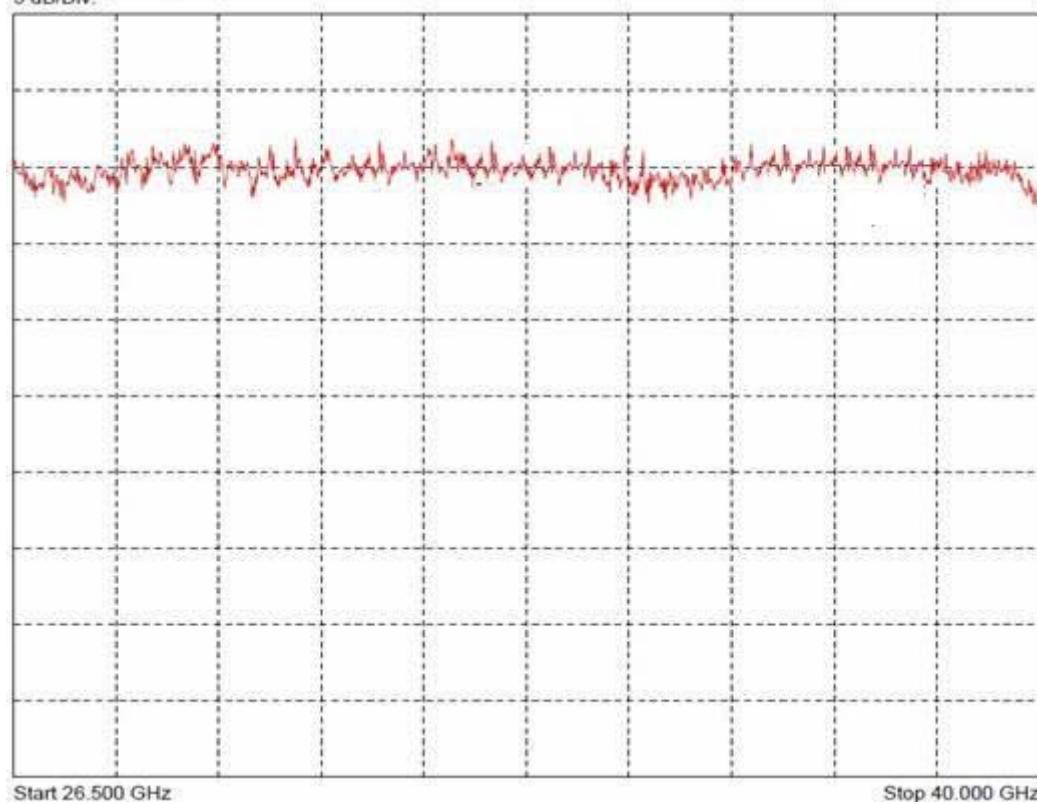
Stop 26.500 GHz
SWP 40 ms

26.5GHz~40GHz(Distance: 0.25 m)

Horizontal Polarization

Ref.Level 27 dB μ V
5 dB/Div.

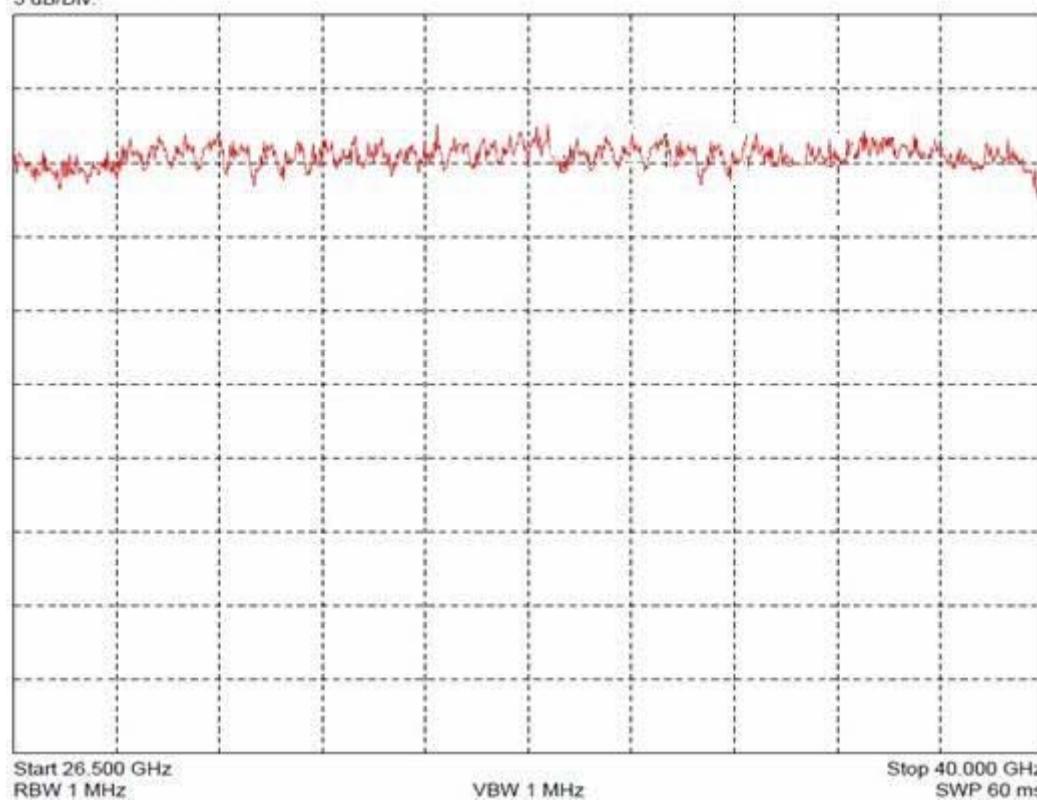
ATT 0 dB



Vertical Polarization

Ref.Level 27 dB μ V
5 dB/Div.

ATT 0 dB



Freq. (MHz)	Read Level (dB _u V)	Correction Factor (dB/m)	Final Value (dB _u V/m)	Limits (dB _u V/m)	Margin (dB)	Remark	Pol/Phase
1951.4	15.6	31.8	47.4	54.0	6.6	Peak	Horizontal
1951.6	13.5	31.8	45.3	54.0	8.7	Average	Vertical
2927.8	4.7	40.9	45.6	54.0	8.4	Average	Horizontal
2927.2	4.8	41.0	45.8	54.0	8.2	Average	Vertical
5855.7	30.5	41.0	71.5	94.0	22.5	Average	Horizontal
5855.9	45.9	41.0	86.9	94.0	7.1	Average	Vertical
6910.3	2.7	41.0	43.7	54.0	10.3	Average	Horizontal
8107.6.	3.5	41.0	44.5	54.0	9.5	Average	Vertical

Sample calculation of final values:

$$\text{Final Value (dB}_\mu\text{V/m)} = \text{Reading Value (dB}_\mu\text{V)} + \text{Correction Factor (dB/m)}$$

- Note: 1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported. Measuring frequencies from 9 kHz to the 40GHz. No emission found between lowest internal used/generated frequency to 30 MHz.*
- 2. Radiated emissions measured in frequency range from 9 kHz to 40GHz were made with an instrument using Peak detector mode.*
- 3. Measurements above show only up to 6 maximum emissions noted.*
- 4. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB. No emission found above 18GHz.*

8. §15.203 ANTENNA REQUIREMENT

8.1. Standard Applicable

According to §15.203, Antenna requirement.

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

8.2. Antenna Connected Construction

The directional gains of antenna used for transmitting is 1.80dBi, and the antenna connector is de-signed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

Result: Compliance.

9. MANUFACTURER/ APPROVAL HOLDER DECLARATION

The following identical model(s):

H101(A-F)	H102(A-F)	H201(A-F)	H202F(A-F)	H301(A-F)
H302(A-F)	H303(A-F)	H304(A-F)	H305(A-F)	H306(A-F)
H307(A-F)	H308(A-F)	H309(A-F)	H310(A-F)	H311(A-F)
H312(A-F)	H313(A-F)	H314(A-F)	H315(A-F)	H316(A-F)
H317(A-F)	H318(A-F)	H319(A-F)	H320(A-F)	--

Belong to the tested device:

Product description : RC Hobby Series
Model name : H202F

No additional models were tested.

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