Underwriters Laboratories Inc.

www.ul.com/emc
www.ulk.co.kr

Project: 11CA21447
File: TC8389
Report: 11CA21447-CE
Date: October 11,2011
Model: FireCR (Basic) and VetCR

FCC Part 15 Subpart C Test Report

For

Computed Radiography Scanner

3D Imaging & Simulations Corp.
815, Tamnip-Dong, Daedeok-Gu, Daejeon, Korea

Summary of test results:

The following tests were performed on a sample submitted for evaluation of compliance with FCC Part 15 C Section 15.225: 2007				
Test #	Test Name Test Requirement/Specification	Compliant	Not Compliant	See Remark
1	Antenna requirement and Directional gain of the antenna	X	-	-
2	20 dB Bandwidth	X	-	-
3	In-Band Emissions	X	-	-
4	Out-of Band Emissions	X	-	-
5	Frequency Stability Tolerance	X	-	-
6	AC Conducted Emissions	X	-	-

Conclusion:

The tests listed in the Summary of Testing section of this report have been performed as a witness testing and the results recorded by UL Korea Ltd. in accordance with the procedures stated in each test requirement and specification. The test list was determined by the Applicant as being applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

The equipment under test has

☒ Met the technical requirements
☐ Not met the technical requirements

Tested by
Sung Hoon Baek, Project Engineer
Conformity Assessment Services – 3014ASEO
UL Korea Ltd.
October 11,2011

Reviewed by
Jeawoon, Choi, Senior Project Engineer
Conformity Assessment Services – 3014ASEO
UL Korea Ltd.
October 11,2011

Test Report Details

Test report No:	11CA21447-CE
Tests Performed By:	UL Korea Ltd. 33rd FL. Gangnam Finance Center, 737 Yeoksam-dong, Kangnam-ku, Seoul, 135-984, Korea
Test site:	Digital EMC Co., Ltd 683-3, Yuban-Dong, Cheoin-Gu, Yongin-Si, Kyunggi-Do, 449-080 Korea The test facility was deemed to have the environment and capabilities necessary to perform the tests included in the test package
Applicant:	3D Imaging & Simulation Corp. 815, Tamnip-Dong, Daedeok-Gu, Daejeon, Korea
Manufacturer:	3D Imaging & Simulation Corp. 815, Tamnip-Dong, Daedeok-Gu, Daejeon, Korea
Factory:	3D Imaging & Simulation Corp. 815, Tamnip-Dong, Daedeok-Gu, Daejeon, Korea
Applicant Contact:	Jungkook, Kim
Title:	General Manager
Phone:	+82-42-931-2100
E-mail:	jkkim@3-disc.com

Product Type:	Computed Radiography Scanner
Trademark:	3DISC 3D Imaging & Simulations
Model Number:	FireCR
Multi-listing model number:	VetCR The manufacturer has declared to all the multiple model names into the basic model without any further evaluation by UL.
Product standards	FCC Part 15.225
Test Procedure	ANSI C63.4 : 2003
Sample Serial Number:	None (Proto type)
Sample Receive Date:	August 1, 2011
Testing Start Date:	August 1, 2011
Date Testing Complete:	September 26, 2011
Overall Results:	**PASS**

UL Korea Ltd. reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. UL Korea Ltd. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from UL Korea Ltd. issued reports.

REPORT DIRECTORY

1. GENERAL PRODUCT DESCRIPTION

1.1 Report Revision History:

Revision Date	Description	Remarks	Revision reviewed By
N/A	N/A	N/A	N/A

1.2 Equipment Description:

Description:
This device is a Computed Radiography System and intended for use in producing digital X-Ray images for general radiography purposes. It comprises of scanner, two kinds of cassettes with reusable imaging plate and workstation software. It scans X-Ray exposed image plate and produces X-Ray image in digital form. Then, digital image is transferred to workstation for further processing and routing. This device distinguishes the size of cassettes, the scan speed of scanner and whether the function of DICOM print is used or not from RFID tags.

1.3 Details of Test Equipment (EUT):

Equipment Configuration:				
No.	Product Type	Manufacturer	Model	Comments
1	Computed Radiography Scanner	3D Imaging & Simulation Corp.	FireCR	-
2	AC to DC Adapter	Bridge power corp.	BPM150S24F06	-

1.4 Technical Data:

Specifications		
Sampling Pixel Pitch	Standard	200um
	High	100um
Pixel Matrix	Standard	1750 x 2150
	High	3500 x 4300
Scanning Time	Standard	19 sec
	High	38 sec
Accepted Cassette Size		14” x 17”, 14” x 10”
Gray Scale Resolution		16 bit
Eraser		Embedded
Erasing Time		30 sec (User Settable)
Scanning & Erasing Cycle Time	Standard	49 sec
	High	78 sec

Computer Interface	USB 2.0
Dimensions	120 (H) x 460 (W) x 703 (D) mm 4.8 (H) x 18.3 (W) x 27.7 (D) inch
Weight	30kg (65lbs)
Power Requirement	100 ~ 240V / 50 ~ 60Hz
System Configuration	Tabletop or Wall Mount
Application Software	Included
Image File Format	DICOM 3.0

1.5 EUT Internal operating frequency:

Frequency (MHz)	Description	Frequency (MHz)	Description
50.00 MHz	System reference Clock	83.00 MHz	System Clock
83.00 MHz	Memory Clock	13.56MHz	RFID frequency

1.6 Technical descriptions and documents:

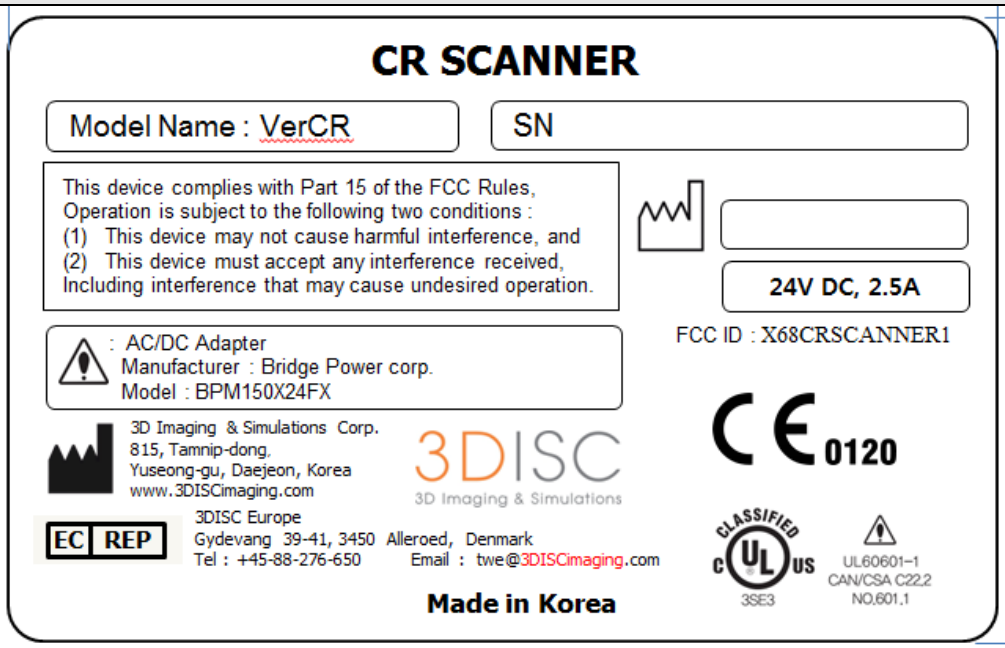
No.	Document Title and Description
1	FireCR User Manual and specification
***Note:** The manufacturer provided the following document.	

1.7 Details information of Muliti-listing model:

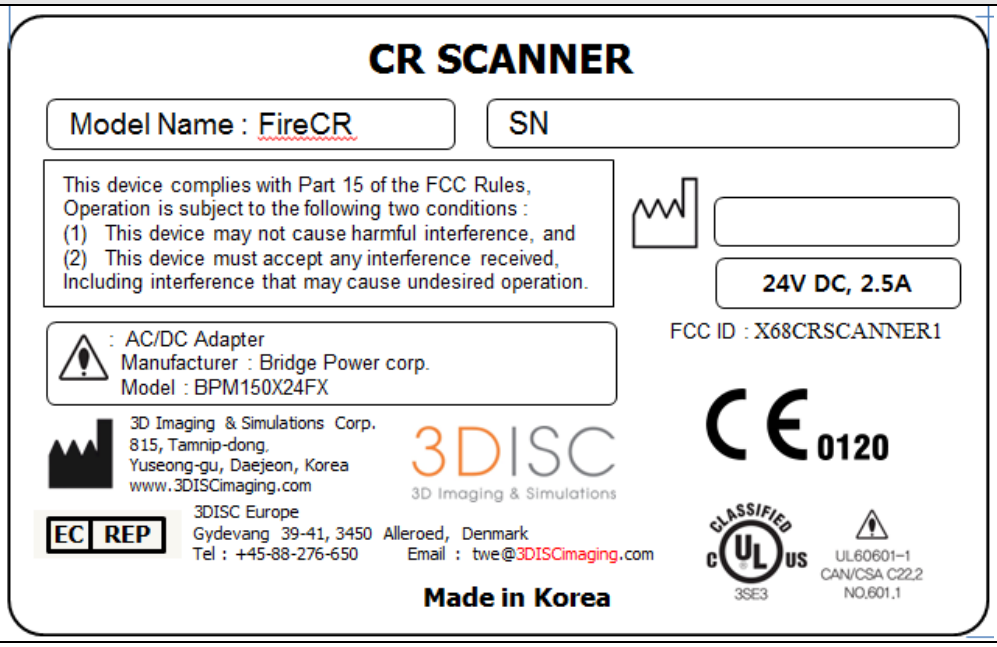
Model name	Description:
FireCR	Basic Model
VetCR	Same as Basic model except model name
***Note:** The manufacturer has declared to all the multiple model names into the basic model without any further evaluation by UL.	

1.8 Equipment Marking Plate:

Label of VetCR



Label of FireCR



2. TEST CONDITION

2.1 Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Computed Radiography Scanner	3D Imaging & Simulation Corp.	FireCR	-
EUT	A.C. to D.C. Adapter	Bridge power corp.	BPM150S24F06	-
***Note:** EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment, SIM - Simulator (Not Subjected to Test)				

2.2 Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
1	Mains	AC	1.8m	Unshielded	-
2	USB	I/O	1.5m	Shielded	-

***Note:** LAN Port (RJ45) of EUT Not Connected with Public Network
*AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

2.3 Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Comments
Rated	100-240Vac	2.5A	-	50-60Hz	Rated of A.C. to D.C. Adapter
1	120 V	-	-	60 Hz	

2.4 Test Mode:

Mode #	Description
Continuous transmitting mode	The measurement has been performed in the representative operation mode Computed Radiography Scanner (EUT) was powered by A.C. to D.C. adapter and Computed Radiography Scanner (EUT) has been performed under continuous transmitting mode
***Note:** The manufacturer provided the following test program and test method.	

2.5 Tested Frequency

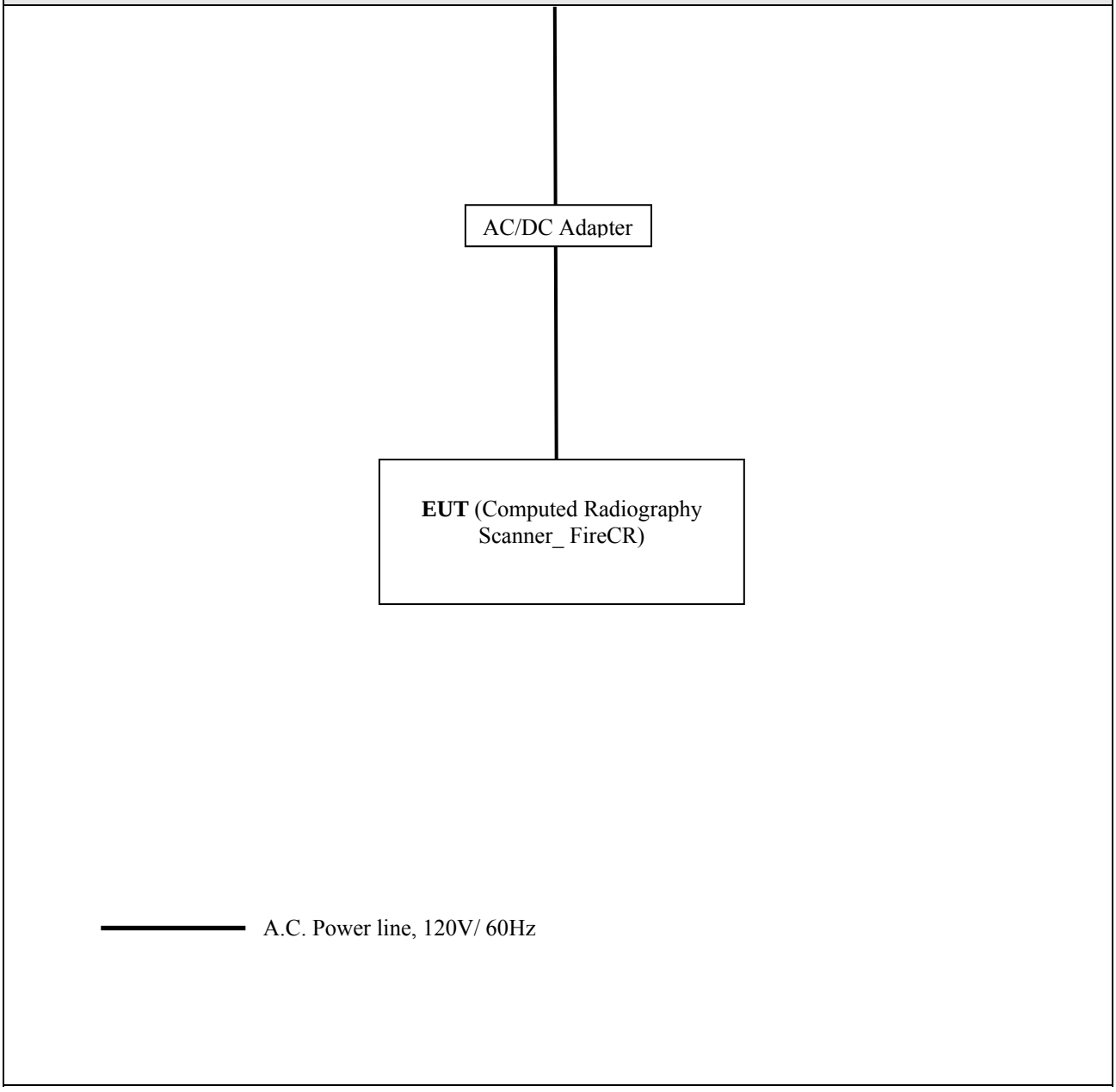
Channel	TX Frequency (MHz)	RX Frequency (MHz)
Continuous transmitting mode	13.56	13.56

2.6 Test Environment

Temperature	Relative humidity content	Details of power supply
23 ~ 25°C	38 ~ 42% R.H.	AC 120V, 60Hz

2.7 Test Configuration:

Description



2.8 Result of Testing:

FCC Part Section(s)	Parameter	Limit	Verdict
15.203	Antenna Requirement	Met Limit	**Complied**
2.1049	20 dB Bandwidth	N/A	**Complied**
15.225 (a)	In-Band Emissions	15.848 μV/m @ 30m, 15.553 – 13.567 MHz	**Complied**
15.225 (b)	In-Band Emissions	334 μV/m @ 30m, 13.410 – 13.553 MHz, 13.567 – 13.710 MHz	**Complied**
15.225 (c)	In-Band Emissions	106 μV/m @ 30m, 13.110 – 13.410 MHz, 13.710 – 14.010 MHz	**Complied**
15.225 (d) 15.205 15.209	Out-of Band Emissions	Emissions outside of the specified band (13.110-14.010 MHz) must meet the radiated limits detailed in 15.209	**Complied**
15.225 (e)	Frequency Stability Tolerance	±0.001% of operating frequency	**Complied**
15.207	AC Conducted Emissions	Met Limit	**Complied**

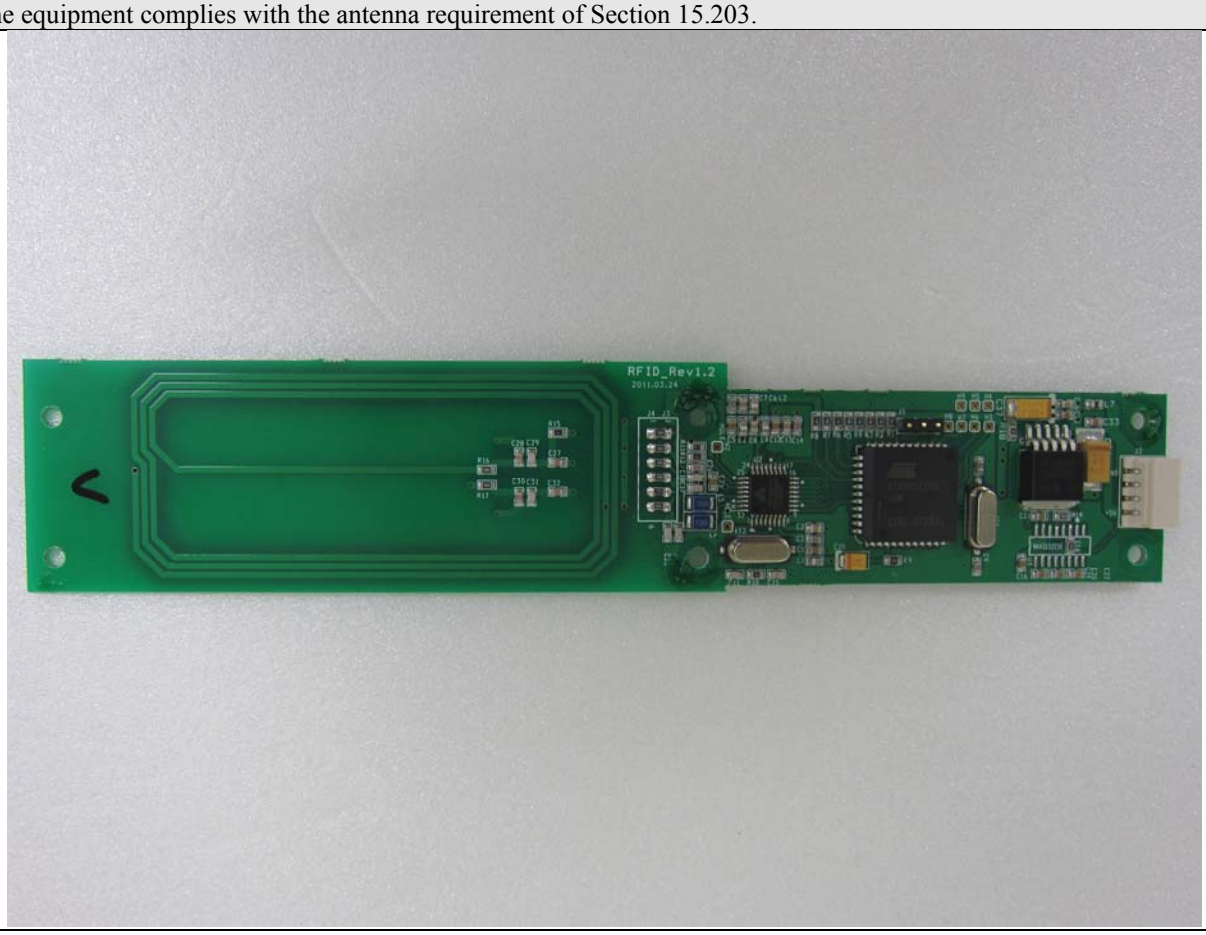
3. TEST CONDITION AND RESULTS

3.1 ANTENNA REQUIREMENT

According to 15.203 and 15.247(b) (4) of FCC Part 15			
According to §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. 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 replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.			
Test Result Description:			
Item	Requirement	Description	Result
Antenna Requirement	Section 15.203	The transmitter has a permanently attached internal antenna	Pass

Figure 1. Photo of Antenna Port

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

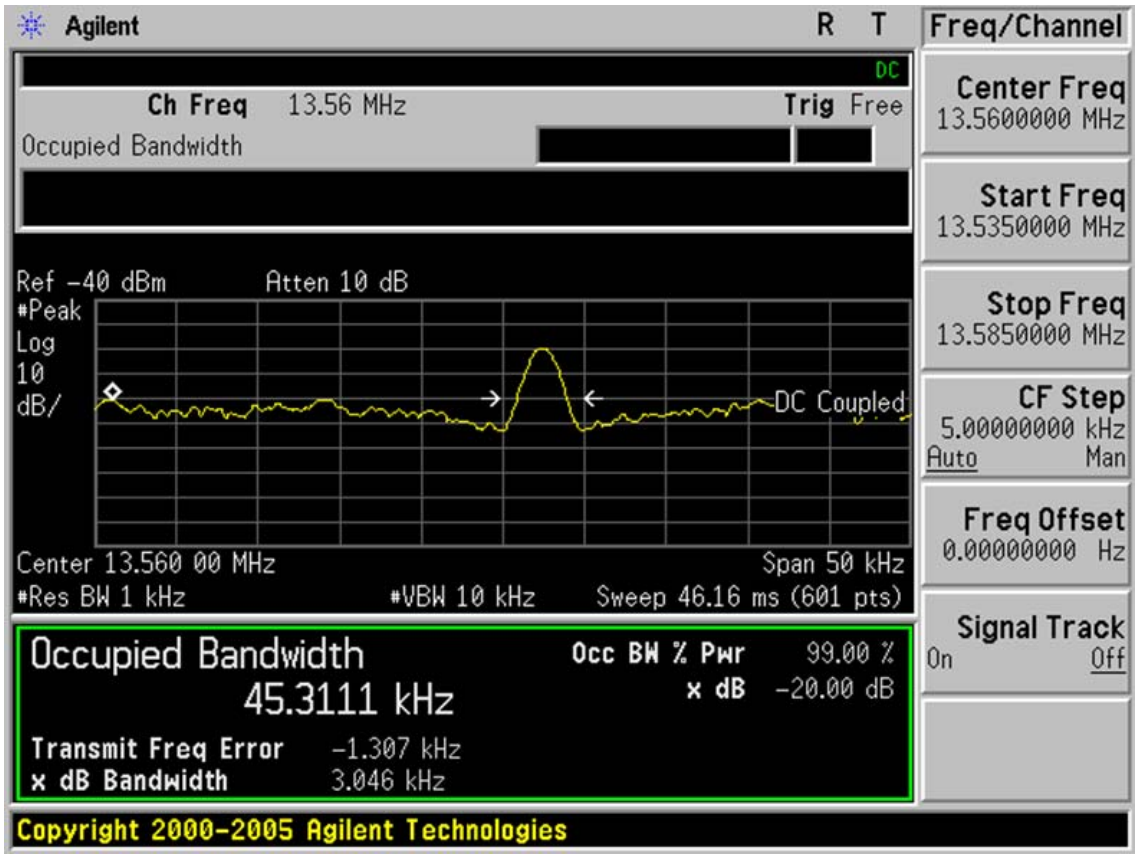


3.2 20dB BANDWIDTH MEASUREMENT (§2.1049)

TEST: Bandwidth Measurement (§2.1049)		
Method	The 20dB Bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.	
Parameters recorded during the test	Laboratory Ambient Temperature	23°C
	Relative Humidity	40%
Tested Frequency (MHz)	13.56 (MHz)	

EUT Configuration Settings:		
Power Interface Mode # (See Section 2.3)	EUT Operation Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.7)
1	1	1

Figure 2. Graphical representation of 20dB Bandwidth



***Note:** x dB Bandwidth is 20dB Bandwidth

Table 1. Test data for 20dB Bandwidth

Test Frequency (MHz)	20dB Bandwidth	Test Result
13.56	3.046	Pass

3.3 IN-BAND RADIATED SPURIOUS EMISSION (§15.225(a), (b), (c))

TEST: In-Band Radiated Spurious Emission (§15.225(a), (b), (c))			
Method	The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions. And this test item was performed for vertical (Angle of loop antenna: 0, 45, 90 and 135 degree).		
Parameters recorded during the test	Laboratory Ambient Temperature		23°C
	Relative Humidity		40%
-	Frequency range (MHz)		Measurement Point
Sample scanned over the following frequency range	13.553-13.567, 13.410-13.553, 13.567-13.710, 13.110-13.410 and 13.710-14.010.		3 meter measurement distance
Limit			
Frequency	[uV/m]	[dBuV/m]	Results
13.553-13.567	15,848	84.00	**Pass**
13.410-13.553 and 13.567-13.710	334	50.47	**Pass**
13.110-13.410 and 13.710-14.010	106	40.51	**Pass**
EUT Configuration Settings:			
Power Interface Mode # (See Section 2.3)	EUT Operation Mode # (See Section 2.4)		EUT Configurations Mode # (See Section 2.7)
1	1		1

Figure 3, Graphical representation of In-Band Radiated Spurious Emission

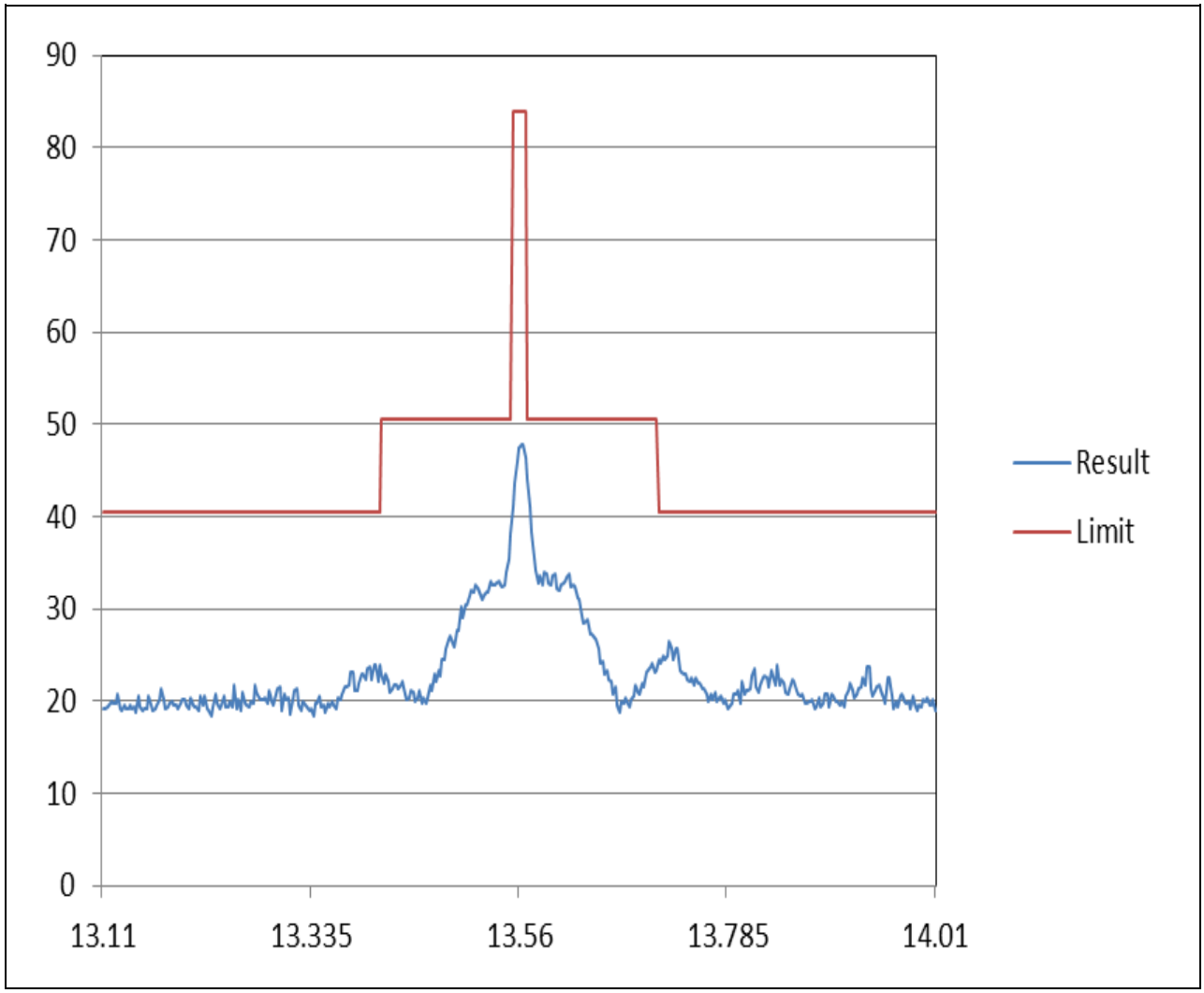


Table 2. In-Band Radiated Spurious Emission Test data

Frequency Band [MHz]	Frequency [MHz]	EUT Posi.	Reading Level [dBuV]	T.F	Field Strength @3m [dBuV/m]	Field Strength @30m [dBuV/m]	Limit [dBuV/m]	Margin [dB]
13.110 ~ 13.410	13.409	Z	37.00	-13.00	24.00	-16.00	40.51	56.51
13.410 ~ 13.553	13.553	Z	54.10	-13.00	41.10	1.10	50.47	49.37
13.553 ~ 13.567	13.564	Z	60.80	-13.00	47.80	7.80	84.00	76.20
13.567 ~ 13.710	13.569	Z	57.10	-13.00	44.10	4.10	50.47	46.37
13.710 ~ 14.010	13.722	Z	39.50	-13.00	26.50	-13.50	40.51	54.01

***Note:** The worst radiated measurement data was recorded

Note 1. This test item was performed using a loop antenna.

Note 2. This test item was performed at 3m and the data were extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in §15.31(f)2.

- Extrapolation Factor = 20 $\log_{10}(30/3)^2$ = 40dB

Note 3. All data were recorded using a spectrum analyzer employing a peak detector.
PK results were meet Quasi-peak limit. So Quasi-peak measurements were omitted.

Note 4. Sample Calculation.
Margin = Limit – Field Strength @ 30m / Field Strength @ 30m = Field Strength @ 3m – 40
Field Strength @ 3m = Reading + T.F / T.F = AF + CL – AG
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

3.4 RADIATED SPURIOUS EMISSION MEASUREMENTS, OUT-OF-BAND (§15.225(d) / §15.205 and 209)

TEST: Radiated Spurious Emission Measurements, Out-of-Band (§ 15.225(d) / § 15.205 and 209)		
Method	The EUT was tested from 9kHz up to the 1GHz excluding the band 13.110-14.010MHz. All measurements were recorded with spectrum analyzer employing a peak detector for emissions below 30MHz. Above 30MHz a Quasi-peak detector was used. All out-of-band emissions must not exceed the limits §15.209. A loop antenna was used for searching for emissions below 30MHz. And this test item was performed for vertical (Angle of loop antenna: 0, 45, 90 and 135 degree).	
Parameters recorded during the test	Laboratory Ambient Temperature	23°C
	Relative Humidity	40%

FCC Part 15.205 (a): Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	3.6 ~ 4.4	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	4.5 ~ 5.15	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	5.35 ~ 5.46	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~ 156.52525	1660 ~ 1710	7.25 ~ 7.75	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.7 ~ 156.9	1718.8 ~ 1722.2	8.025 ~ 8.5	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	162.0125 ~ 167.17	2200 ~ 2300	9.0 ~ 9.2	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	167.72 ~ 173.2	2310 ~ 2390	9.3 ~ 9.5	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	240 ~ 285	2483.5 ~ 2500	10.6 ~ 12.7	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	322 ~ 335.4	2655 ~ 2900	13.25 ~ 13.4	-
8.291 ~ 8.294	37.5 ~ 38.25	399.90 ~ 410	3260 ~ 3267	-	-
8.362 ~ 8.366	73 ~ 74.6	608 ~ 614	3332 ~ 3339	-	-
8.37625 ~ 8.38675	74.8 ~ 75.2	960 ~ 1240	3345.8 ~ 3358	-	-

FCC Part 15.205(b):

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

FCC Part 15.209(a):		
Frequency [MHz]	Field Strength [uV/m]	Measurement Distance [Meters]
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100**	3
88 ~ 216	150**	3
216 ~ 960	200**	3
Above 960	200	3
***Note:** ** Except as provided in 15.209 (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.		
FCC Part 15.209(b):		
In the emission table above, the tighter limit applies at the band edges.		
EUT Configuration Settings:		
Power Interface Mode # (See Section 2.3)	EUT Operation Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.7)
1	1	1

Figure 4. Graphical representation of Radiated Spurious Emission Measurements

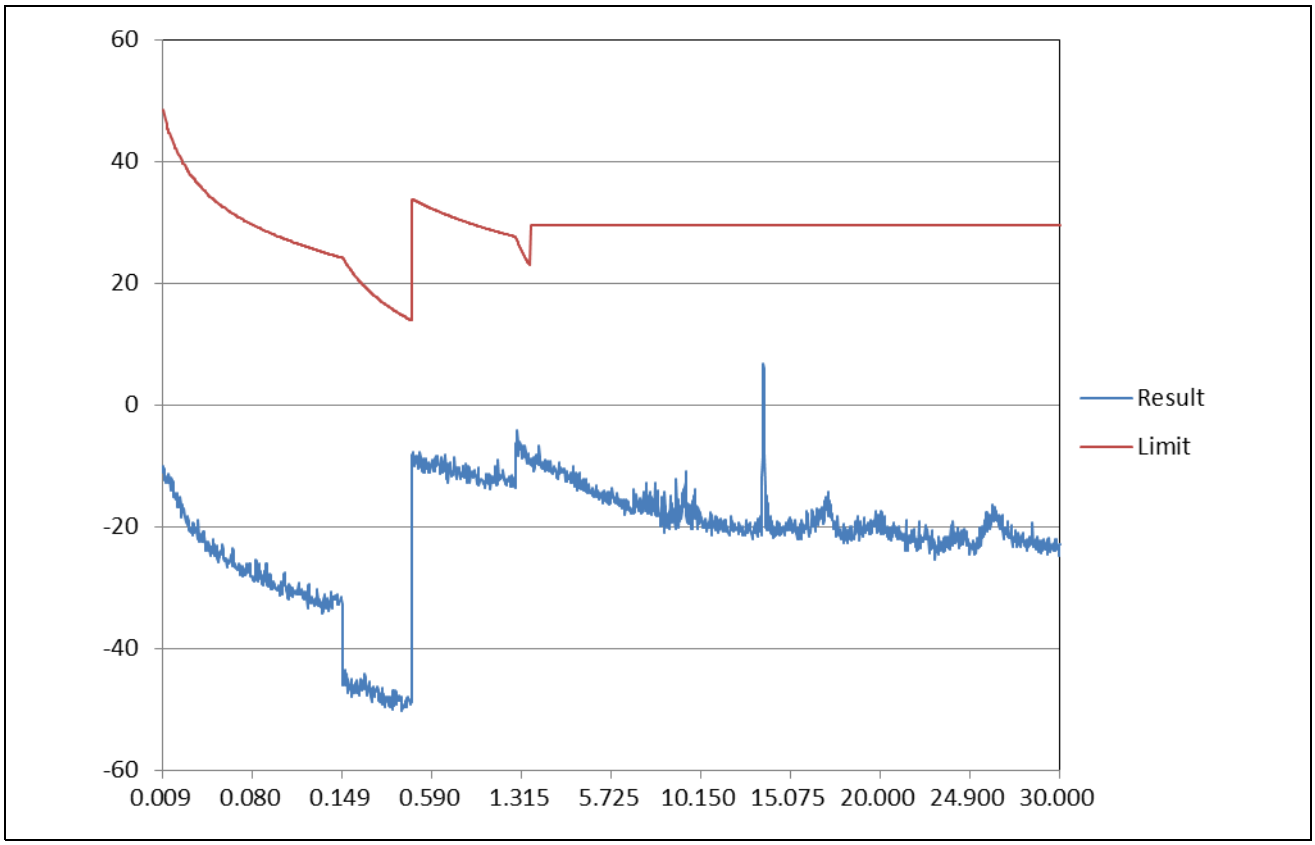


Figure 5. Graphical representation of Radiated Spurious Emission Measurements, Out-of-Band, X Position

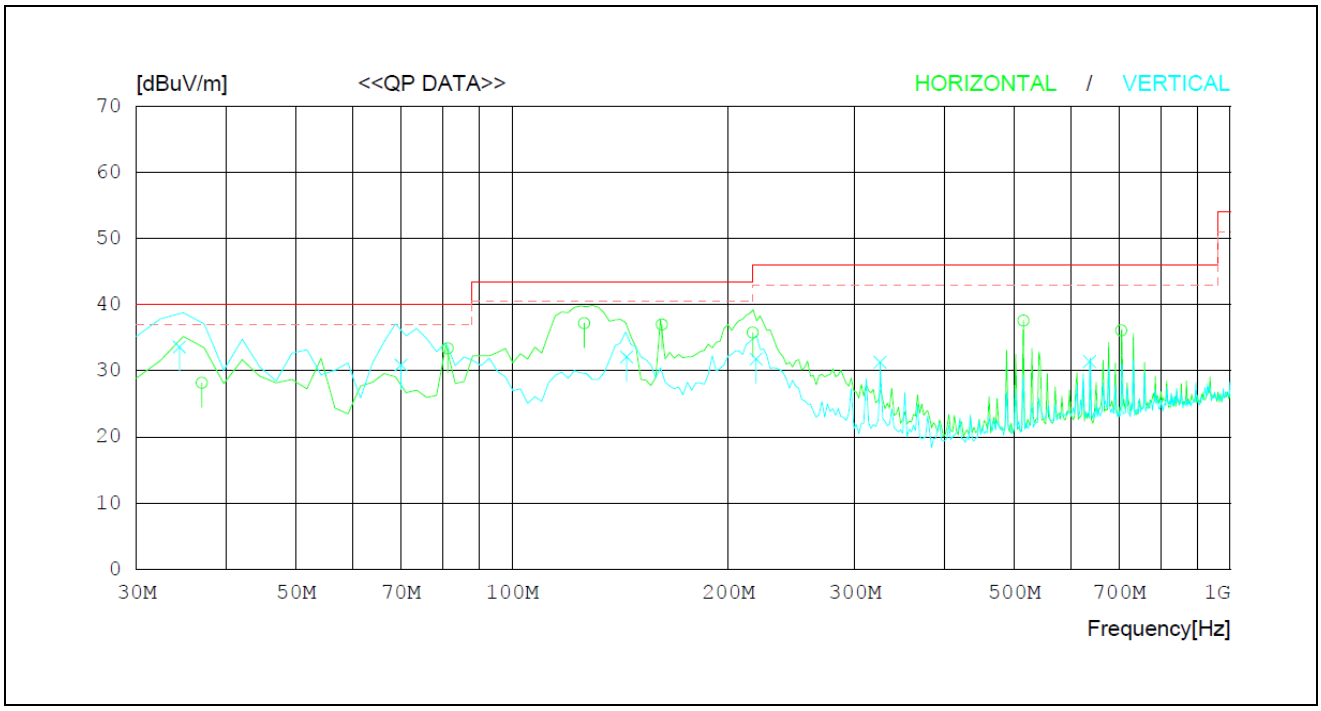


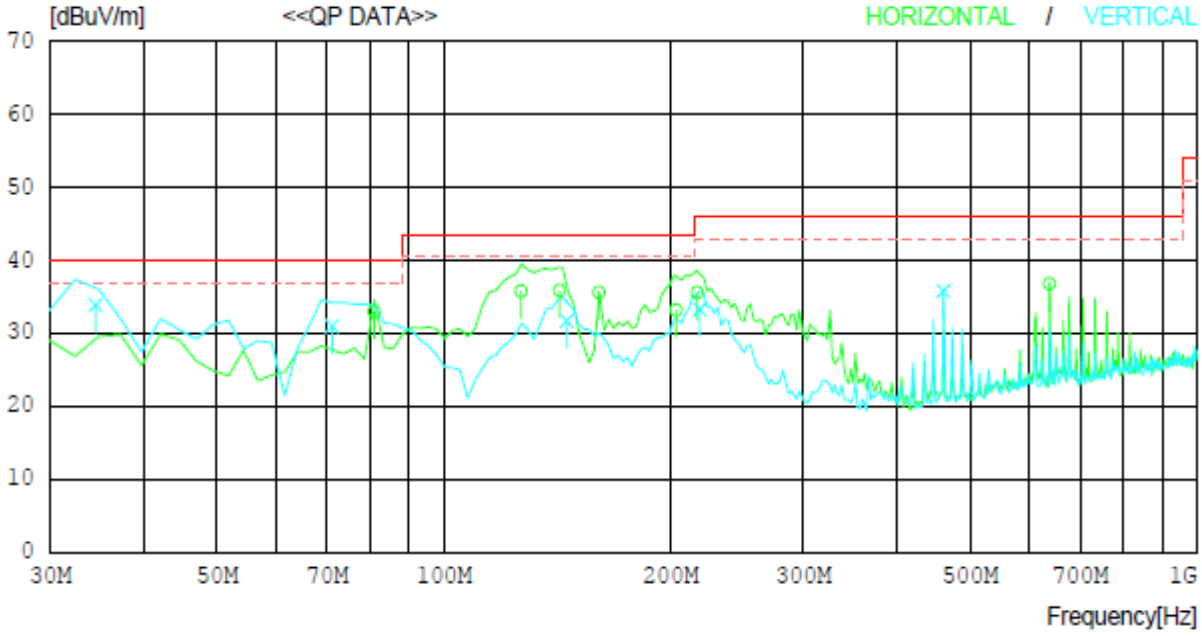
Figure 6. Graphical representation of Radiated Spurious Emission Measurements, Out-of-Band

Model Name : FireCR
Model No. :
Serial No. : Identical prototype
Test Condition : X axis

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi : 25 ' C 39 % R. H.
Operator : S.K.RYU

Memo : NFC

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	80.825	47.0	7.3	1.3	22.6	33.0	40.0	7.0	230	360
2	126.770	45.4	11.7	1.6	22.9	35.8	43.5	7.7	191	16
3	142.510	46.5	10.8	1.6	23.0	35.9	43.5	7.6	178	13
4	160.762	46.7	10.2	1.8	23.1	35.6	43.5	7.9	202	22
5	203.653	44.5	9.9	2.1	23.3	33.2	43.5	10.3	100	4
6	217.250	45.9	10.8	2.2	23.3	35.6	46.0	10.4	166	163
7	637.425	38.2	18.8	4.0	24.2	36.8	46.0	9.2	114	320
----- Vertical ------										
8	34.500	38.8	16.8	0.9	22.6	33.9	40.0	6.1	184	40
9	71.112	46.0	6.4	1.2	22.6	31.0	40.0	9.0	100	62
10	145.750	42.3	10.7	1.7	23.0	31.7	43.5	11.8	111	64
11	218.875	43.5	10.9	2.2	23.3	33.3	46.0	12.7	100	225
12	461.125	40.0	17.0	3.3	24.5	35.8	46.0	10.2	100	271

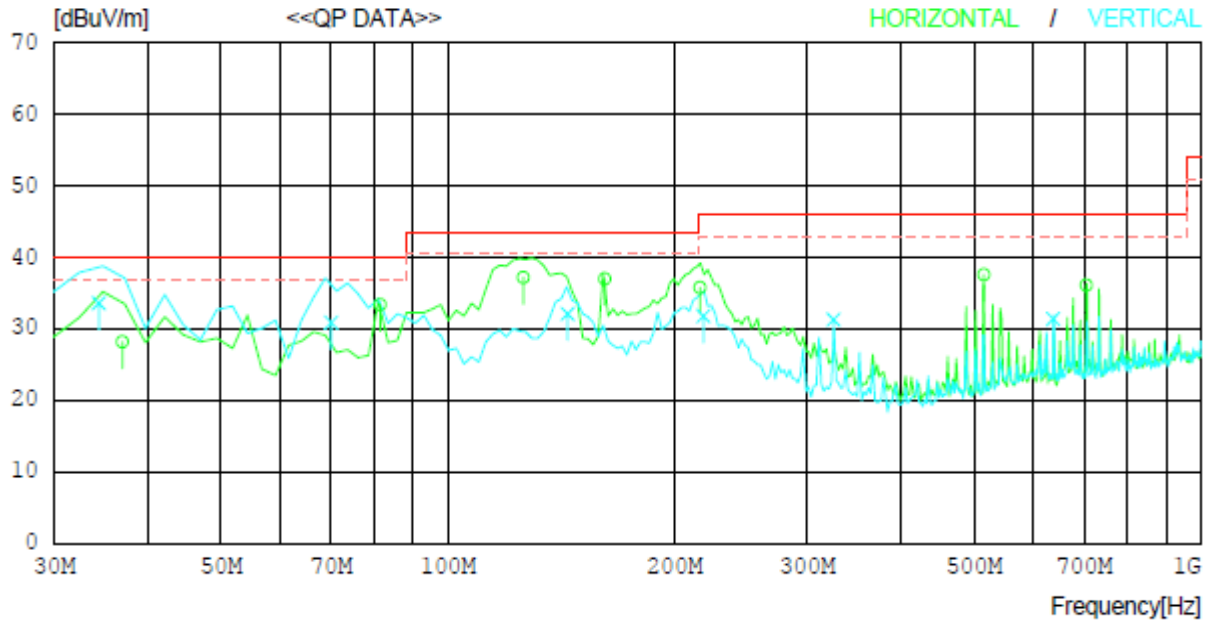
Figure 7. Graphical representation of Radiated Spurious Emission Measurements, Out-of-Band

Model Name : FireCR
Model No. :
Serial No. : Identical prototype
Test Condition : Z

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi : 25 ' C 39 % R. H.
Operator : S.K.RYU

Memo : NFC

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	37.012	34.3	15.6	0.9	22.6	28.2	40.0	11.8	121	273
2	81.387	47.3	7.4	1.3	22.6	33.4	40.0	6.6	231	189
3	126.050	46.8	11.7	1.6	22.9	37.2	43.5	6.3	223	16
4	161.750	48.1	10.2	1.8	23.1	37.0	43.5	6.5	100	360
5	216.375	46.2	10.8	2.1	23.3	35.8	46.0	10.2	100	0
6	515.400	41.0	17.8	3.4	24.6	37.6	46.0	8.4	119	227
7	705.237	36.8	19.0	4.3	24.0	36.1	46.0	9.9	213	240
----- Vertical ------										
8	34.437	38.5	16.8	0.9	22.6	33.6	40.0	6.4	100	289
9	70.075	46.0	6.3	1.2	22.6	30.9	40.0	9.1	100	161
10	144.375	42.8	10.7	1.6	23.0	32.1	43.5	11.4	100	325
11	218.662	42.0	10.9	2.2	23.3	31.8	46.0	14.2	100	323
12	325.480	38.2	14.4	2.7	24.0	31.3	46.0	14.7	133	267
13	637.405	32.8	18.8	4.0	24.2	31.4	46.0	14.6	157	282

Table 3. Test data of Radiated Spurious Emission Measurements, Out-of-Band

Frequency [MHz]	ANT Pol	Reading [dBuV]	T.F [dB/m]	Distance factor	Field Strength [dBuV/m]	Limit [dBuV/m]	Margin [dB]
37.012	H	34.30	-6.10	N/A	28.20	40.00	11.80
34.437	V	38.50	-4.90	N/A	33.60	40.00	6.40
70.075	V	46.00	-15.10	N/A	30.90	40.00	9.10
81.387	H	47.30	-13.90	N/A	33.40	40.00	6.60
126.050	H	46.80	-9.60	N/A	37.20	43.50	6.30
144.375	V	42.80	-10.70	N/A	32.10	43.50	11.40
161.750	H	48.10	-11.10	N/A	37.00	43.50	6.50
216.375	H	46.20	-10.40	N/A	35.80	46.00	10.20
218.662	V	42.00	-10.20	N/A	31.80	46.00	14.20
325.480	V	38.20	-6.90	N/A	31.30	46.00	14.70
515.400	H	41.00	-3.40	N/A	37.60	46.00	8.40
637.405	V	32.80	-1.40	N/A	31.40	46.00	14.60
705.237	H	36.80	-0.70	N/A	36.10	46.00	9.90

Note 1. All measurements were recorded using a spectrum analyzer employing a peak detector for blew 30MHz and a Quasi-peak detector for above 30MHz.
Note 2. Both Vertical and Horizontal polarities of the receiver antenna were evaluated with the worst case emissions being reported.
Note 3. The worst-case emissions are reported.
Note 4. No other spurious and harmonic were detected at level greater than 20dB below limit.
Note 5. Sample calculation

Margin = Limit – Field Strength / T.F = AF + CL – AG

Distance factor = 20log(Measurement distance / The measured distance)

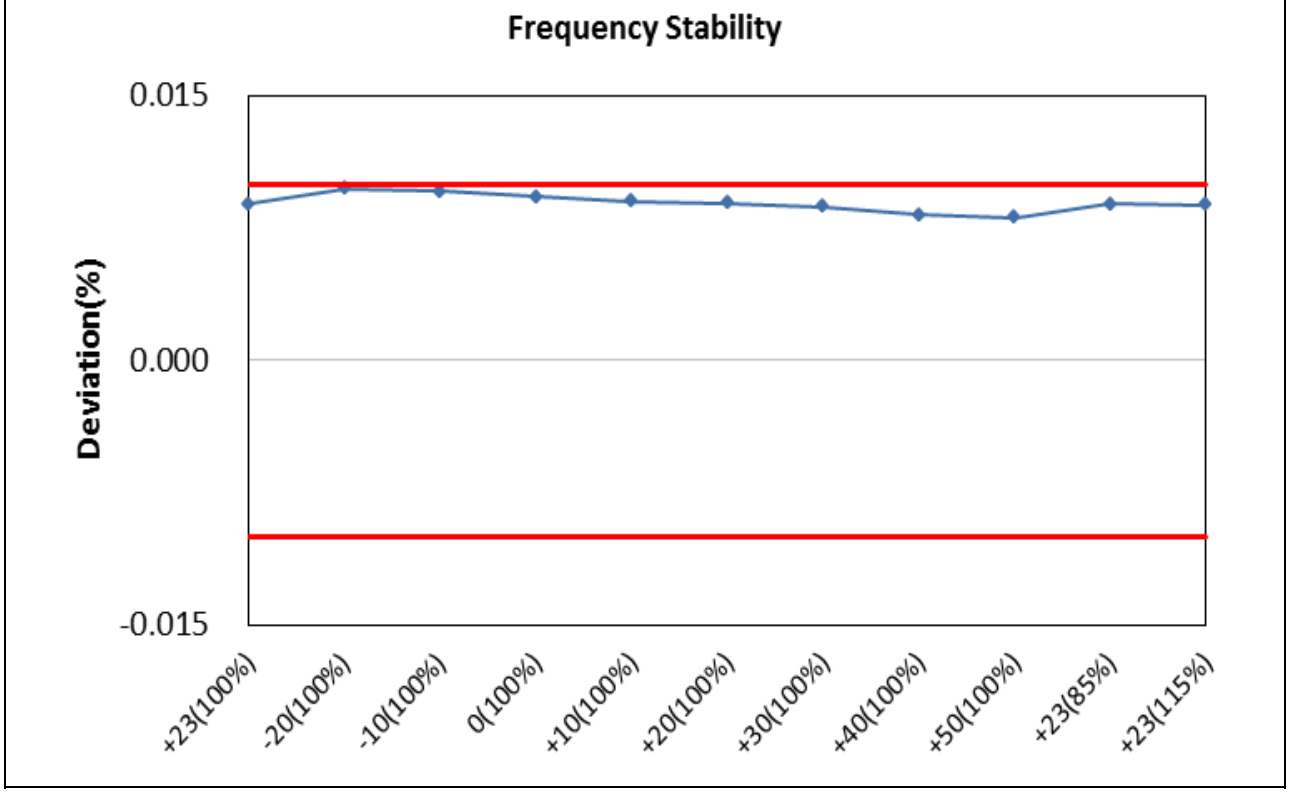
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

3.5 FREQUENCY STABILITY (§15.225(e))

TEST: Frequency Stability (§ 15.225(e))		
Method	Part 15.225 requires that devices operating in the 13.553 – 13.567 MHz shall maintain the carrier frequency within 0.01% of the operating frequency over the temperature variation of -20 degrees to + 50 degrees C at normal supply voltage.	
Test supply voltage specifications		
Operating Frequency	13560000Hz	
Reference Voltage	120VAC	
Limit		
The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency.		
EUT Configuration Settings:		
Power Interface Mode # (See Section 2.3)	EUT Operation Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.7)
1	1	1

Table 4. Test data of Frequency Stability

Voltage (%)	Power (VAC)	Temp (℃)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100%	120	+23(ref)	13,561,201	1201	0.008856
100%		-20	13,561,317	1317	0.009711
100%		-10	13,561,297	1297	0.009564
100%		0	13,561,256	1256	0.009262
100%		10	13,561,224	1224	0.009026
100%		20	13,561,208	1208	0.008908
100%		30	13,561,182	1182	0.008716
100%		40	13,561,119	1119	0.008252
100%		50	13,561,096	1096	0.008082
85%	102	23	13,561,204	1204	0.008878
115%	138	23	13,561,197	1197	0.008827
BATT.ENDPOINT	N/A	N/A	N/A	N/A	N/A



3.6 MAINS TERMINAL DISTURBANCE VOLTAGE TEST

TEST: Limits of mains terminal disturbance voltage		
Method	The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.21(m). Emissions closest to the limit are measured in the quasi-peak and average detector mode with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.	
Basic Standard	FCC Part 15.207(a)/EN 55022	
Parameters recorded during the test	Laboratory Ambient Temperature	25°C
	Relative Humidity	39%
-	Frequency range on each side of line	Measurement Point
Fully configured sample scanned over the following frequency range	150 kHz to 30 MHz	A.C. Input port of A.C. to D.C. adapter.

Limits - Class B

Frequency (MHz)	Limit (dBμV)			
	Quasi-Peak	Result	Average	Result
0.15 to 0.50	66	Pass	56	Pass
0.5 to 5	56	Pass	46	Pass
5 to 30	60	Pass	50	Pass

EUT Configuration Settings:

Power Interface Mode # (See Section 2.3)	EUT Operation Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.7)
1	1	1

Figure 8. Graphical representation of Conducted Emission

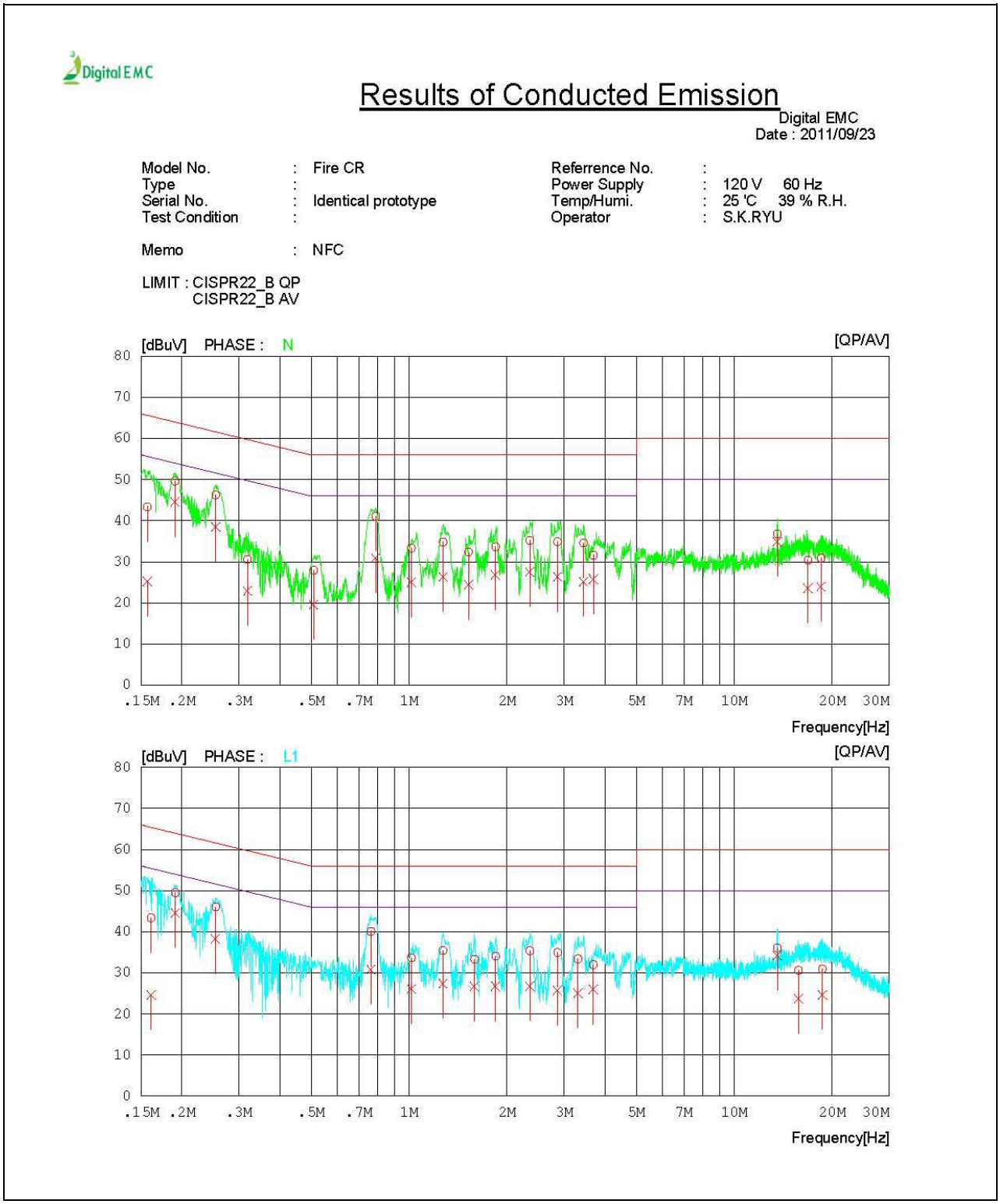


Table 5. Test data for conducted emission

Results of Conducted Emission

Digital EMC
Date : 2011/09/23

Model No.	:	Fire CR	Referrence No.	:	
Type	:		Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	25 'C 39 % R.H.
Test Condition	:		Operator	:	S.K.RYU

Memo : NFC

LIMIT : CISPR22_B QP
CISPR22_B AV

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15668	43.3	25.1	0.1	43.4	25.2	65.6	55.6	22.2	30.4	N
2	0.19070	49.5	44.4	0.1	49.6	44.5	64.0	54.0	14.4	9.5	N
3	0.25424	46.2	38.4	0.1	46.3	38.5	61.6	51.6	15.3	13.1	N
4	0.31850	30.5	22.8	0.1	30.6	22.9	59.7	49.7	29.1	26.8	N
5	0.50879	27.8	19.5	0.1	27.9	19.6	56.0	46.0	28.1	26.4	N
6	0.78901	40.9	30.7	0.2	41.1	30.9	56.0	46.0	14.9	15.1	N
7	1.01600	33.1	24.9	0.2	33.3	25.1	56.0	46.0	22.7	20.9	N
8	1.27100	34.6	26.1	0.2	34.8	26.3	56.0	46.0	21.2	19.7	N
9	1.52400	32.2	24.3	0.2	32.4	24.5	56.0	46.0	23.6	21.5	N
10	1.84400	33.5	26.6	0.2	33.7	26.8	56.0	46.0	22.3	19.2	N
11	2.35050	34.9	27.2	0.3	35.2	27.5	56.0	46.0	20.8	18.5	N
12	2.85950	34.6	26.0	0.3	34.9	26.3	56.0	46.0	21.1	19.7	N
13	3.43750	34.2	24.7	0.4	34.6	25.1	56.0	46.0	21.4	20.9	N
14	3.68750	31.2	25.4	0.4	31.6	25.8	56.0	46.0	24.4	20.2	N
15	13.56200	36.0	34.1	0.8	36.8	34.9	60.0	50.0	23.2	15.1	N
16	16.84200	29.6	22.8	0.8	30.4	23.6	60.0	50.0	29.6	26.4	N
17	18.49100	30.0	23.0	0.9	30.9	23.9	60.0	50.0	29.1	26.1	N
18	0.16090	43.3	24.6	0.1	43.4	24.7	65.4	55.4	22.0	30.7	L1
19	0.19088	49.4	44.5	0.1	49.5	44.6	64.0	54.0	14.5	9.4	L1
20	0.25398	46.0	38.2	0.1	46.1	38.3	61.6	51.6	15.5	13.3	L1
21	0.76301	39.9	30.6	0.2	40.1	30.8	56.0	46.0	15.9	15.2	L1
22	1.01650	33.5	25.9	0.2	33.7	26.1	56.0	46.0	22.3	19.9	L1
23	1.27150	35.2	27.2	0.2	35.4	27.4	56.0	46.0	20.6	18.6	L1
24	1.58900	33.1	26.5	0.2	33.3	26.7	56.0	46.0	22.7	19.3	L1
25	1.84400	33.9	26.6	0.2	34.1	26.8	56.0	46.0	21.9	19.2	L1
26	2.35100	35.1	26.5	0.3	35.4	26.8	56.0	46.0	20.6	19.2	L1
27	2.86200	34.7	25.4	0.3	35.0	25.7	56.0	46.0	21.0	20.3	L1
28	3.30450	33.0	24.7	0.4	33.4	25.1	56.0	46.0	22.6	20.9	L1
29	3.68550	31.6	25.5	0.4	32.0	25.9	56.0	46.0	24.0	20.1	L1
30	13.56150	35.2	33.4	0.8	36.0	34.2	60.0	50.0	24.0	15.8	L1
31	15.76200	29.8	23.0	0.8	30.6	23.8	60.0	50.0	29.4	26.2	L1
32	18.67850	30.0	23.7	0.9	30.9	24.6	60.0	50.0	29.1	25.4	L1

Appendix_ Test Equipment for Tests

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

	Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
☒	Spectrum Analyzer	Agilent	E4440A	10/09/30	11/09/30	MY45304199
☐	Spectrum Analyzer	Rohde Schwarz	FSQ26	11/01/11	12/01/11	200445
☐	Spectrum analyzer	Agilent	E4404B	11/03/08	12/03/08	US41061134
☐	Spectrum Analyzer(RE)	H.P	8563E	10/10/04	11/10/04	3551A04634
☐	MXA Signal Analyzer	Agilent Technologies, Inc	N9020A	11/01/07	12/01/07	MY49100833
☐	Power Meter	H.P	EPM-442A	11/07/01	12/07/01	GB37170413
☐	Power Sensor	H.P	8481A	11/07/01	12/07/01	3318A96332
☐	Wideband Power Sensor	Rohde Schwarz	NRP-Z81	11/06/04/	12/06/04	1137.9009.02-101001
☐	Power Divider	Agilent	11636B	10/10/05	11/10/05	56471
☐	4-Way Power Divider	ET Industries	D-0526-4	10/12/24	11/12/24	210195001
☐	Power Splitter	Anritsu	K241B	10/10/05	11/10/05	020611
☐	Power Splitter	Anritsu	K241B	11/07/01	12/07/01	017060
☐	Power Splitters & Dividers	Aeroflex/Weinschel	1594	11/02/21	12/02/21	1177
☐	Frequency Counter	H.P	5342A	11/07/01	12/07/01	2119A04450
☒	TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	10/10/04	11/10/04	30604493/021031
☒	Digital Multimeter	H.P	34401A	11/03/07	12/03/07	3146A13475, US36122178
☐	Multifunction Synthesizer	HP	8904A	10/10/11	11/10/11	3633A08404
☐	Signal Generator	Rohde Schwarz	SMR20	11/03/08	12/03/08	101251
☐	Signal Generator	H.P	ESG-3000A	11/07/01	12/07/01	US37230529
☐	Vector Signal Generator	Rohde Schwarz	SMJ100A	11/01/11	12/01/11	100148
☐	Vector Signal Generator	Rohde Schwarz	SMBV100A	11/01/11	12/01/11	255571
☐	Audio Analyzer	H.P	8903B	11/07/02	12/07/02	3011A09448
☐	Modulation Analyzer	H.P	8901B	11/07/01	12/07/01	3028A03029

☐	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	11/03/07	12/03/07	GB43461134
☐	Universal Radio communication Tester	Rohde Schwarz	CMU200	11/03/07	12/03/07	106760
☐	Bluetooth Tester	TESCOM	TC-3000B	11/07/01	12/07/01	3000B000268
☐	Thermo hygrometer	BODYCOM	BJ5478	11/01/13	12/01/13	090205-3
☒	Thermo hygrometer	BODYCOM	BJ5478	11/01/13	12/01/13	090205-2
☐	Thermo hygrometer	BODYCOM	BJ5478	11/01/13	12/01/13	090205-4
☒	AC Power supply	DAEKWANG	5KVA	11/03/08	12/03/08	20060321-1
☐	DC Power Supply	HP	6622A	11/03/07	12/03/07	3448A03760
☐	DC Power Supply	HP	6633A	11/03/07	12/03/07	3524A06634
☐	DC Power Supply	Protek	PWS-3010D	10/10/04	11/10/04	4072702
☐	DC Power Supply	SM techno	SDP30-5D	11/05/20	12/05/20	305DKA013
☐	BAND Reject Filter	Microwave Circuits	N0308372	10/10/05	11/10/05	3125-01DC0352
☐	BAND Reject Filter	Wainwright	WRCG1750	10/10/05	11/10/05	2
☐	High-Pass Filter	ANRITSU	MP526D	10/10/04	11/10/04	M27756
☐	High-pass filter	Wainwright	WHNX2.1	N/A	N/A	1
☐	High-pass filter	Wainwright	WHNX3.0	N/A	N/A	9
☐	High-pass filter	Wainwright	WHNX5.0	N/A	N/A	8
☐	High-Pass Filter	Wainwright	WHKX8.5	N/A	N/A	1
☐	High-Pass Filter	Wainwright	D82346	N/A	N/A	9
☐	Tunable Notch Filter	Wainwright	WRCT800.0 /960.0-0.2/40-8SSK	N/A	N/A	32
☐	Tunable Notch Filter	Wainwright	WRCD1700.0 /2000.0-0.2/40-10SSK	N/A	N/A	53
☐	Tunable Notch Filter	Wainwright	WRCT1900.0/ 2200.0-5/40-10SSK	N/A	N/A	30
☐	HORN ANT	ETS	3115	10/10/04	11/10/04	21097
☐	HORN ANT	ETS	3115	11/03/22	12/03/22	6419
☐	HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	154

☐	HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	155
☐	HORN ANT	SCHWARZBECK	BBHA9120A	10/04/13	12/04/13	322
☐	Dipole Antenna	Schwarzbeck	VHA9103	10/11/29	11/11/29	2116
☐	Dipole Antenna	Schwarzbeck	VHA9103	10/11/29	11/11/29	2117
☐	Dipole Antenna	Schwarzbeck	UHA9105	10/11/29	11/11/29	2261
☐	Dipole Antenna	Schwarzbeck	UHA9105	10/11/29	11/11/29	2262
☒	LOOP Antenna	ETS	6502	10/10/29	11/10/29	3471
☐	Coaxial Fixed Attenuators	Agilent	8491B	11/07/02	12/07/02	MY39260700
☐	Attenuator (3dB)	WEINSCHEL	56-3	10/10/05	11/10/05	Y2342
☐	Attenuator (3dB)	WEINSCHEL	56-3	10/10/05	11/10/05	Y2370
☐	Attenuator (10dB)	WEINSCHEL	23-10-34	10/10/01	11/10/01	BP4386
☐	Attenuator (10dB)	WEINSCHEL	23-10-34	11/01/11	12/01/11	BP4387
☐	Attenuator (10dB)	WEINSCHEL	86-10-11	10/10/05	11/10/05	446
☐	Attenuator (10dB)	WEINSCHEL	86-10-11	10/10/05	11/10/05	408
☐	Attenuator (20dB)	WEINSCHEL	86-20-11	10/10/05	11/10/05	432
☐	Attenuator (30dB)	JFW	50FH-030-300	11/03/07	12/03/07	060320-1
☐	Attenuator (40dB)	WEINSCHEL	57-40-33	10/10/01	11/10/01	NN837
☐	Termination	H.P	HP-909D	11/07/02	12/07/02	02750
☐	Termination	H.P	HP-909D	11/07/02	12/07/02	02702
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0088CAN	11/07/01	12/07/01	788
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0185CAN	11/07/01	12/07/01	790
☐	Amplifier (30dB)	Agilent	8449B	11/03/07	12/03/07	3008A01590
☐	Amplifier (30dB)	H.P	8449B	11/03/07	12/03/07	3008A00370
☐	Amplifier	EMPOWER	BBS3Q7ELU	10/10/04	11/10/04	1020
☐	RF Power Amplifier	OPHIRRF	5069F	11/07/01	12/07/01	1006
☒	EMI TEST RECEIVER	R&S	ESU	11/01/20	12/01/20	100014

	Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
☒	BILOG ANTENNA	SCHAFFNER	CBL6112B	10/07/14	12/07/14	2737
☒	Amplifier (22dB)	H.P	8447E	11/01/11	12/01/11	2945A02865
☐	EMI TEST RECEIVER	R&S	ESCI	11/03/08	12/03/08	100364
☐	BICONICAL ANT.	Schwarzbeck	VHA 9103	10/11/29	11/11/29	91032789
☐	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A1	10/11/29	12/11/29	1098
☐	BICONICAL ANT.	Schwarzbeck	VHA 9103	10/12/21	12/12/21	91031946
☐	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A1	10/07/07	12/07/07	0590
☐	Low Noise Pre Amplifier	TSJ	MLA-100K01-B01-2	11/03/07	12/03/07	1252741
☐	Low Noise Pre Amplifier	TSJ	MLA-00108-B02-36	11/01/11	12/01/11	1518831
☐	Amplifier (25dB)	Agilent	8447D	11/03/07	12/03/07	2944A10144
☐	Amplifier (25dB)	Agilent	8447D	11/07/01	12/07/01	2648A04922
☒	Spectrum Analyzer(CE)	H.P	8591E	11/03/07	12/03/07	3649A05889
☒	LISN	Kyoritsu	KNW-407	11/01/11	12/01/11	8-317-8
☒	LISN	Kyoritsu	KNW-242	11/07/02	12/07/02	8-654-15
☒	CVCF	NF Electronic	4420	11/03/08	12/03/08	304935/337980
☒	50 ohm Terminator	HME	CT-01	11/01/11	12/01/11	N/A
☒	RFI/FIELD Intensity Meter	Kyoritsu	KNM-2402	11/07/02	12/07/02	4N-170-3
☐	Wideband Radio Communication Tester	R&S	CMW500	10/10/21	11/10/21	100988