



CTK Co., Ltd.
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CTK Co., Ltd.

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TEST REPORT For FCC

Test Report No. : 2008070004
Date of Issue : July 8, 2008
FCC ID : V6Q8015-2R
Model/Type No. : 8015-2R
Kind of Product : Training PAD Remote System
Applicant : Alchemy Systems LP
Applicant Address : 8015 Shoal Creek Blvd., Suit 100 Austin , TX78757, USA
Manufacturer : Tianjin Samji Electronics Co., LTD.
Manufacturer Address : Gangbei Road, Dagang Qu, Tianjin China
Contact Person : Mr.Archie Barrett / CTO
Telephone : 512-637-5100
Received Date : June 30, 2008
Test period : Start : June 30, 2008 End : July 8, 2008
Test Results : ☒ In Compliance ☐ Not in Compliance

The test results presented in this report relate only to the object tested.

Tested by

Hyun-Chae, You
Test Engineer
Date: July 8, 2008

Reviewed by

Young-Joon, Park
Technical Manager
Date: July 8, 2008



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REPORT REVISION HISTORY

Date	Revision	Page No
July 8, 2008	Issued (2008070004)	All

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1.0 General Product Description

Equipment model name : 8015-2R
Serial number : Prototype
EUT condition : Pre-production, not damaged
Antenna type : Pattern antenna Gain -1.41dBi
Frequency Range : 2405 ~ 2480 MHz
Number of channels : 16
Channel Spacing : 3MHz
Type of Modulation : GFSK
Power Source : Alkaline Battery (AAA size *2) - (DC 3V)

1.1 Tested Frequency

	LOW	MID	HIGH
Frequency (MHz)	2405	2444	2480

1.2 Model Differences

Not applicable

1.3 Device Modifications

Not applicable



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1.4 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
-	-	-	-	-






1.5 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.6 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea.

1.7 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	 93250
JAPAN	VCCI	10 meter Open Area Test Site and one conducted site.	 R-948, C-986
KOREA	MIC	EMI (10 meter Open Area Test Site and two conducted sites) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 No. 51, KR0025
International	KOLAS	EMC	
Europe	GLAS	EMC EN 55011, EN 55022, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2, EN 50130-4, EN 55024, EN 61204-3, EN 60601-1-2, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11	 No.13000796-02

2.0 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.249 /15.209	Field Strength of Harmonics	< 54 dBuV (at 3m)	Radiated	C
15.207 /15.107	AC Conducted Emissions	EN 55022	Line Conducted	N/A

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:
- FCC Part 15.247, ANSI C63.4-2003

2.1.1 Band-edge

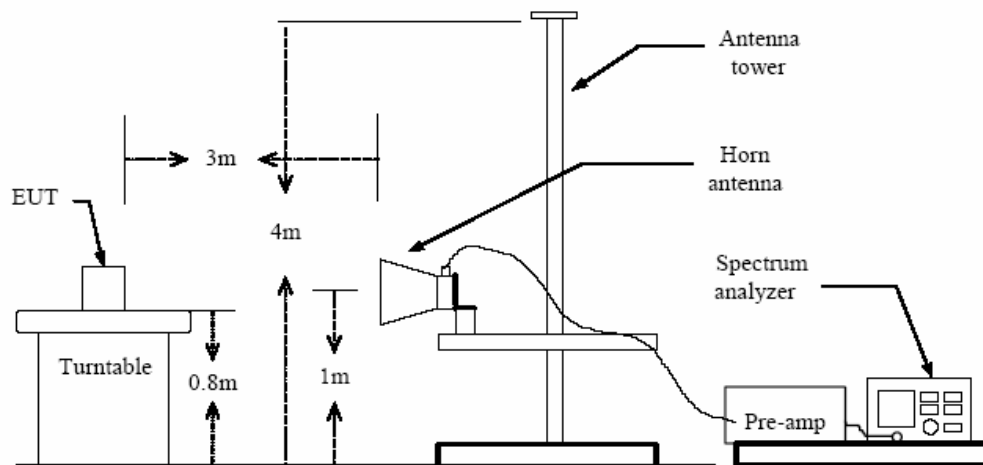
Test Location

Testing was performed at a test distance of 3 meter Open Area Test Site

Test Procedures

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The EUT is placed on a turntable, which is 0.8m above the ground plane.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
5. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
PEAK: RBW/VBW=1MHz / Sweep=AUTO/SPAN=3MHz;
AVERAGE: RBW=1MHz/VBW=10Hz/Sweep=AUTO/SPAN=3MHz
7. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured. with highest data rate (worst case) are chosen for full testing.

Test Configuration



Limit

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

Test Results

Refer to attached spectrum analyzer data chart



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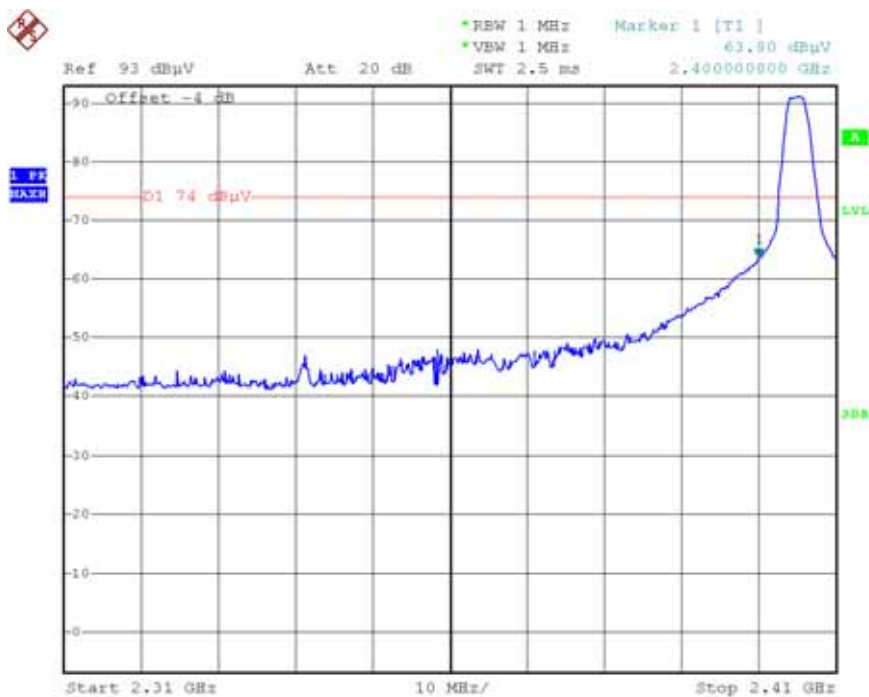
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Band – edge(CH Low)

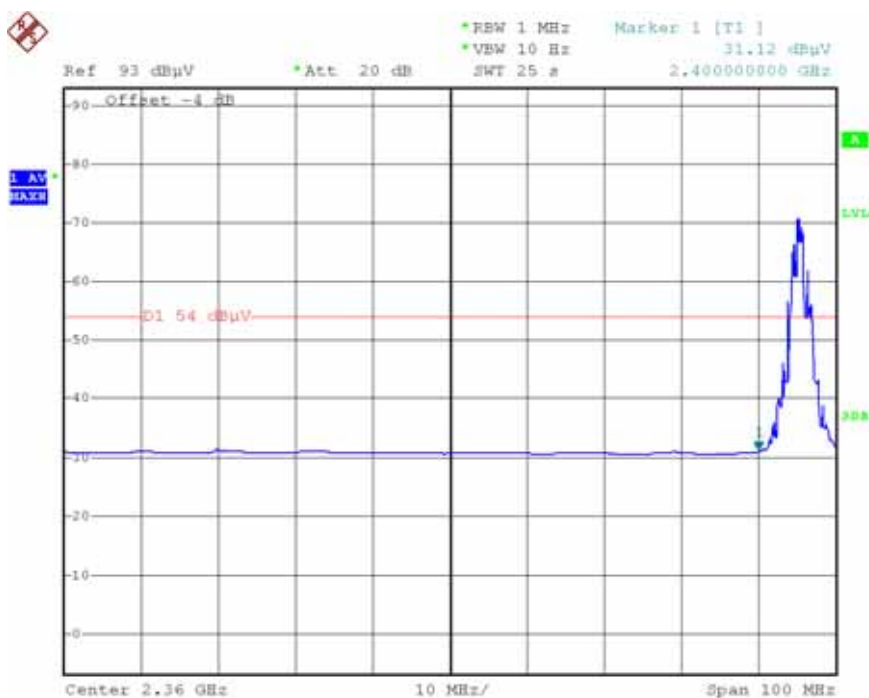
Detector mode : peak

Polarity: Vertical



Detector mode : Average

Polarity: Vertical





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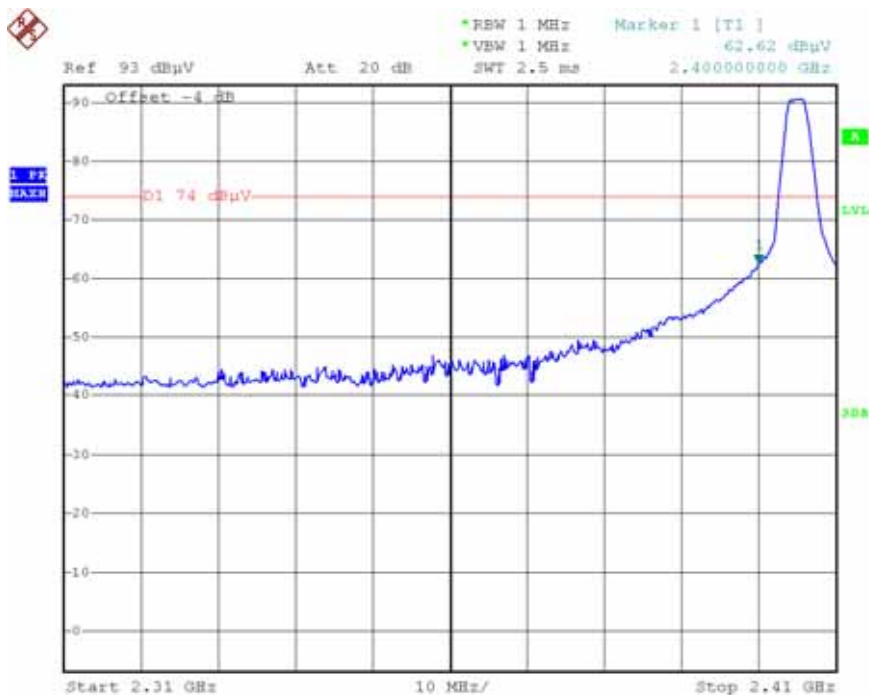
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Band – edge(CH Low)

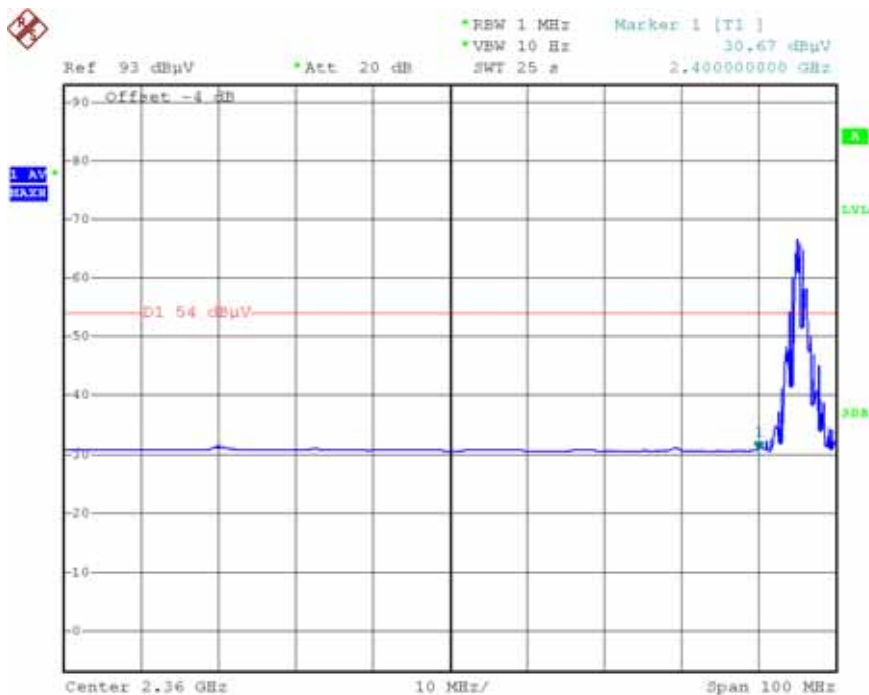
Detector mode : peak

Polarity: Horizontal



Detector mode : Average

Polarity: Horizontal





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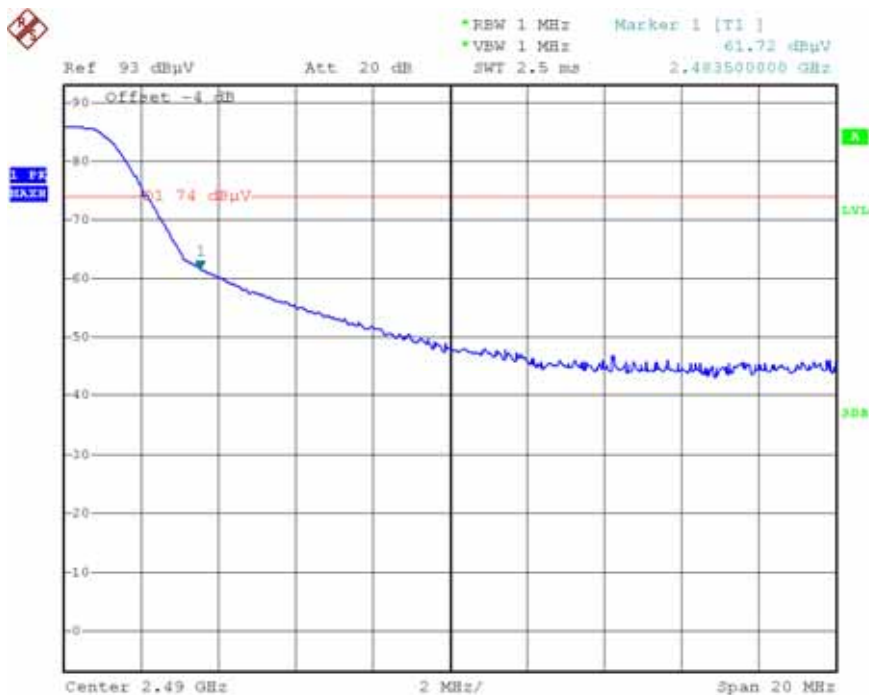
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Band – edge(CH high)

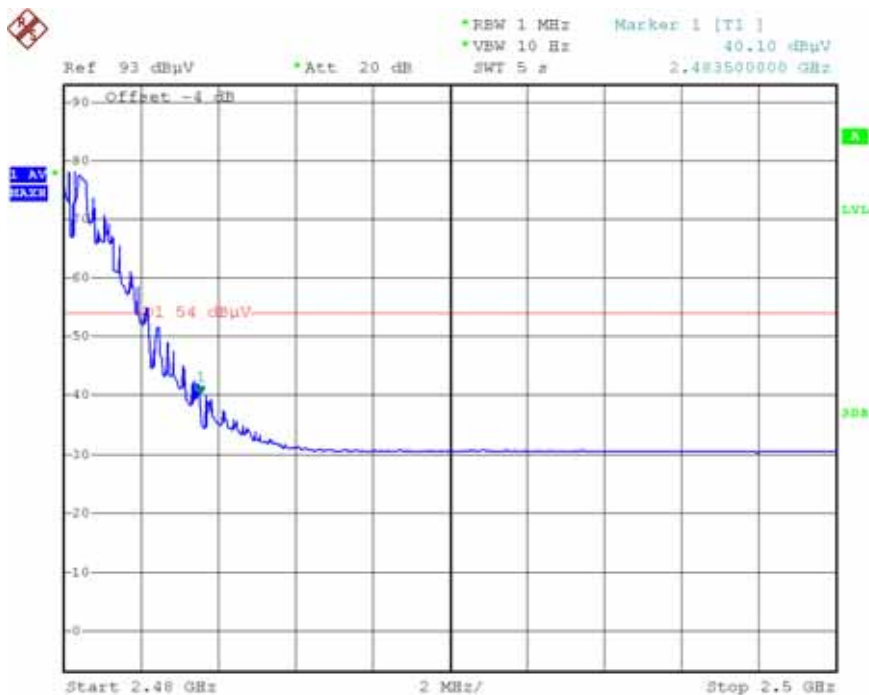
Detector mode : peak

Polarity: Vertical



Detector mode : Average

Polarity: Vertical





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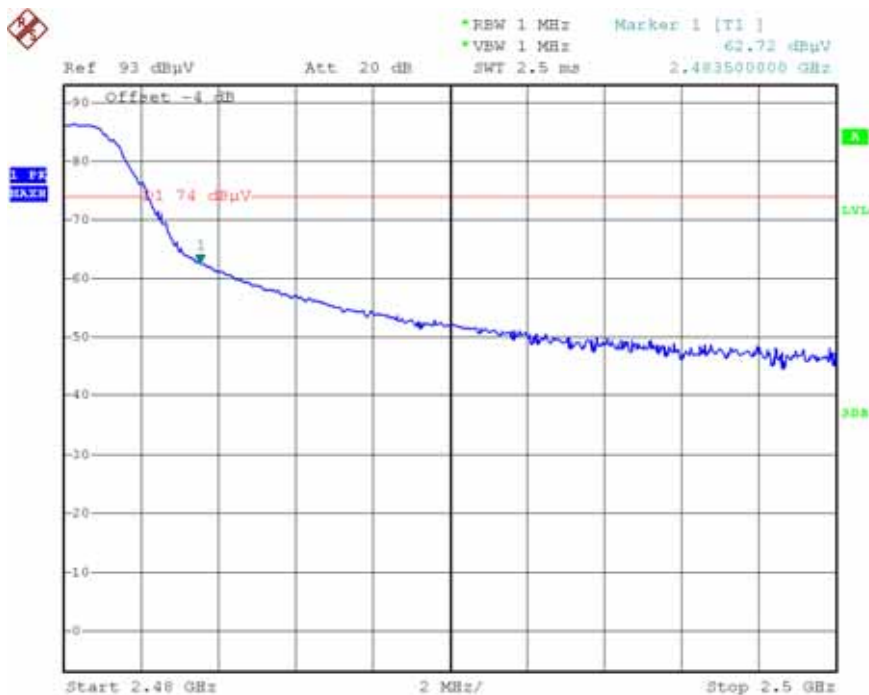
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Band – edge(CH high)

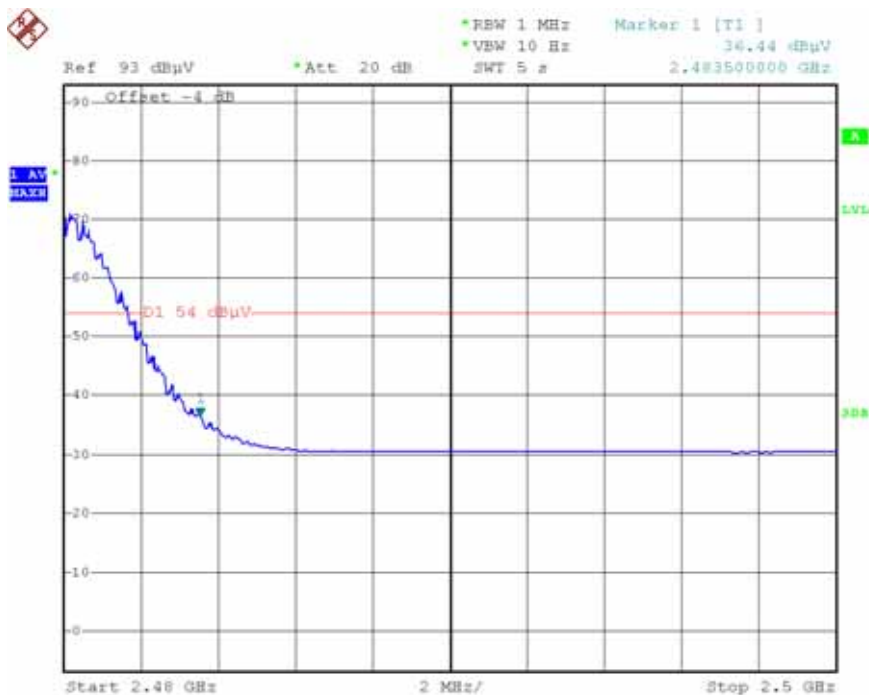
Detector mode : peak

Polarity: Horizontal



Detector mode : Average

Polarity: Horizontal



2.1.2 Field Strength of Emissions

Test Location

☒ Testing was performed at a test distance of 3 meter Open Area Test Site

Test Procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10th harmonic

RBW = 120 kHz (30 MHz ~ 1 GHz) VBW RBW

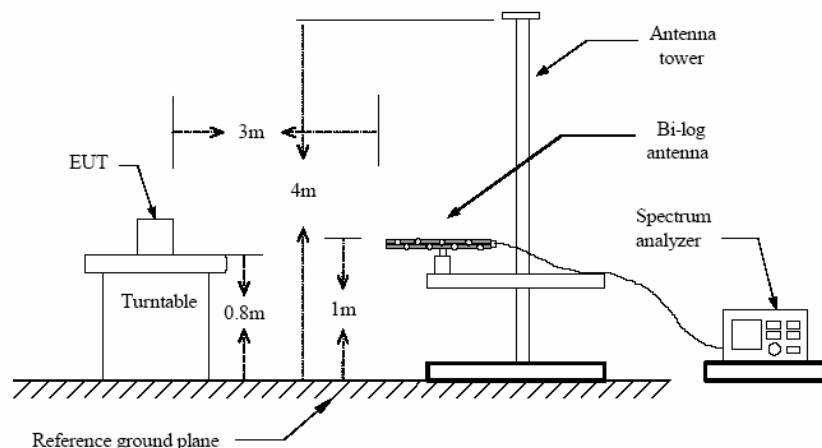
= 1 MHz (1 GHz ~ 10th harmonic)

Span = 100 MHz

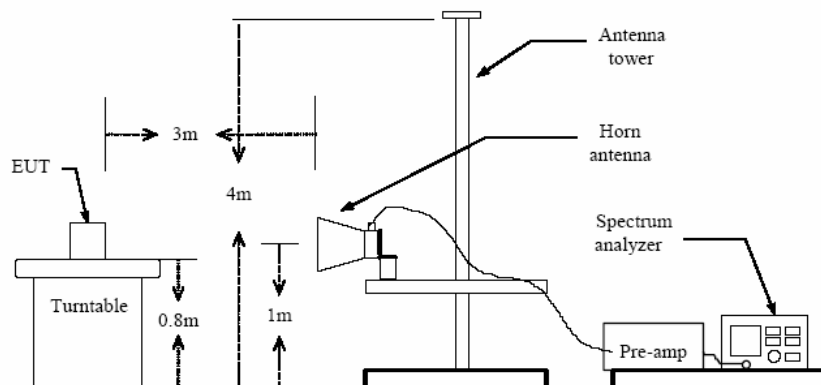
Detector function = Quasi-peak

Trace = max hold

Below 1 GHz



Above 1 GHz





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Limit

- 15.209(a)

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m
30-88	100**	40
88-216	150**	43.5
216-960	200**	46
Above 960	500	54

** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Test Results

EUT	Training PAD Remote System	Measurement Detail	
Model	8015-2R	Frequency Range	Below 1000MHz
Channel	-	Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
108.23	27.3	16.2	Quasi-Peak

Test Data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
30.12	2.8	V	1.0	20.2	0.2	40.0	23.2	16.8
33.42	2.2	V	2.0	18.7	0.2	40.0	21.1	18.9
52.12	15.0	V	1.8	7.0	0.3	40.0	22.3	17.7
63.24	16.7	H	1.2	5.0	0.4	40.0	22.1	17.9
103.25	14.6	H	1.0	9.6	0.9	43.5	25.1	18.4
108.23	16.7	H	1.5	9.7	0.9	43.5	27.3	16.2

H : Horizontal, V : Vertical

Remark :

The field strength of spurious emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.



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Test Results

EUT	Training PAD Remote System	Measurement Detail	
Model	8015-2R	Frequency Range	1-25GHz
Channel	Channel 5	Detector function	Peak, Average

Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak		Pol.	Correction Factor			Limits [dBuV/m] AV / Peak		Result [dBuV/m] AV / Peak		Margin [dB] AV / Peak	
				Antenna	Amp. Gain	Cable						
1265.00	46.1	51.4	V	23.6	36.0	5.2	54.0	74.0	38.9	44.2	15.1	29.8
2760.00	33.5	39.2	V	28.5	35.4	8.1	54.0	74.0	34.7	40.4	19.3	33.6
2405.00	90.1	91.5	V	28.2	35.3	7.4	94.0	114.0	90.4	91.8	3.6	22.2

Frequency [MHz]	Reading [dBuV/m] AV / Peak		Pol.	Correction Factor			Limits [dBuV/m] AV / Peak		Result [dBuV/m] AV / Peak		Margin [dB] AV / Peak	
				Antenna	Amp. Gain	Cable						
1265.00	44.9	50.8	H	23.6	36.0	5.2	54.0	74.0	37.7	43.6	16.3	30.4
2760.00	33.4	37.3	H	28.5	35.4	8.1	54.0	74.0	34.6	38.5	19.4	35.5
2405.00	89.0	90.8	H	28.2	35.3	7.4	94.0	114.0	89.3	91.1	4.7	22.9

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.

Test Results

EUT	Training PAD Remote System	Measurement Detail	
Model	8015-2R	Frequency Range	1-25GHz
Channel	Channel 44	Detector function	Peak, Average

Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak		Pol.	Correction Factor			Limits [dBuV/m] AV / Peak		Result [dBuV/m] AV / Peak		Margin [dB] AV / Peak	
				Antenna	Amp. Gain	Cable						
1290.00	45.8	49.3	V	23.6	36.0	5.2	54.0	74.0	38.6	42.1	15.4	31.9
2798.00	34.4	38.2	V	28.5	35.4	8.1	54.0	74.0	35.6	39.4	18.4	34.6
2444.00	87.2	90.0	V	28.2	35.3	7.4	94.0	114.0	87.5	90.3	6.5	23.7

Frequency [MHz]	Reading [dBuV/m] AV / Peak		Pol.	Correction Factor			Limits [dBuV/m] AV / Peak		Result [dBuV/m] AV / Peak		Margin [dB] AV / Peak	
				Antenna	Amp. Gain	Cable						
1290.00	45.7	50.1	H	23.6	36.0	5.2	54.0	74.0	38.5	42.9	15.5	31.1
2798.00	33.7	37.9	H	28.5	35.4	8.1	54.0	74.0	34.9	39.1	19.1	34.9
2444.00	87.3	88.7	H	28.2	35.3	7.4	94.0	114.0	87.6	89.0	6.4	25.0

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.



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Test Results

EUT	Training PAD Remote System	Measurement Detail	
Model	8015-2R	Frequency Range	1-25GHz
Channel	Channel 80	Detector function	Peak, Average

Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak		Pol.	Correction Factor			Limits [dBuV/m] AV / Peak		Result [dBuV/m] AV / Peak		Margin [dB] AV / Peak	
				Antenna	Amp. Gain	Cable						
1320.00	48.0	50.5	V	23.6	36.0	5.2	54.0	74.0	40.8	43.3	13.2	30.7
2850.00	34.2	37.5	V	28.5	35.4	8.1	54.0	74.0	35.4	38.7	18.6	35.3
2480.00	88.4	89.5	V	28.2	35.3	7.4	94.0	114.0	88.7	89.8	5.3	24.2

Frequency [MHz]	Reading [dBuV/m] AV / Peak		Pol.	Correction Factor			Limits [dBuV/m] AV / Peak		Result [dBuV/m] AV / Peak		Margin [dB] AV / Peak	
				Antenna	Amp. Gain	Cable						
1320.00	46.6	49.9	H	23.6	36.0	5.2	54.0	74.0	39.4	42.7	14.6	31.3
2850.00	32.8	36.9	H	28.5	35.4	8.1	54.0	74.0	34.0	38.1	20.0	35.9
2480.00	86.9	88.2	H	28.2	35.3	7.4	94.0	114.0	87.2	88.5	6.8	25.5

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.



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2.1.2 AC Conducted Emissions

Test Location

Shielded Room

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

- 15.207(a)

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency.

Test Results

N/A



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APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Spectrum Analyzer	Agilent	8564E	3551A0041	2008-11-01
2	Spectrum Analyzer	HP	E4403B	US39440619	2008-09-03
3	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2008-11-19
4	EMI Test Receiver	Rohde & Schwarz	ESVS30	826638/008	2009-03-07
5	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2009-06-12
6	LOOP ANTENNA	EMCO	6502	9107-2652	2008-10-17
7	LOOP ANTENNA	EMCO	6502	9607-3020	2009-03-06
8	System Power Supply	HP	6032A	3440A-10521	2008-07-16
9	EPM Series Power Meter	HP	E4418A	GB38272734	2008-11-03
10	Power Sensor	HP	8481A	331BA92056	2008-11-03
11	Power Sensor	HP	8482B	331BA05406	2008-11-03
12	Audio Analyzer	HP	8903B	2747A03432	2008-11-01
13	ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2008-11-01
14	SYNTHESIZED SWEEPER	HP	8341B	2819A01563	2008-11-22
15	Modulation Analyzer	HP	8901B	3438A05228	2008-11-08
16	Attenuator	HP	8494A	3308A33351	2008-11-06
17	Attenuator	HP	8496A	3308A15142	2008-11-06
18	Temp&Humi Chamber	Kunpoong	KP-1000	2002KP050041	2009-01-21
19	Temp&Humi Chamber	Kunpoong	KP-RC2000	2002KP650042	2009-01-21
20	EMC Analyzer	Agilent	E7405A	MY45110859	2008-01-09
21	Horn Antenna	ETS-Lindgren	3115	00078894	2008-11-29
22	Horn Antenna	ETS-Lindgren	3115	00078895	2008-11-29
23	Horn Antenna	ETS-Lindgren	3116	00062504	2008-11-27
24	Horn Antenna	ETS-Lindgren	3116	00062916	2008-11-27
25	Dipole Antenna	SCHWARZBECK	VHA 9103	VHA91032557	2009-11-27
26	Dipole Antenna	SCHWARZBECK	UHA 9105	UHA91052417	2009-11-27
27	OPT H64 AMPLIFIER	HP	8447F	3113A06814	2009-02-28
28	PREAMPLIFIER	Agilent	8449B	3008A02307	2008-11-05
29	Radio Communication Tester	Rohde & Schwarz	CMU200	106765	2009-02-09
30	Band Reject Filter	Wainwright Instruments	WRCG824	-	2009-04-16
31	Band Reject Filter	Wainwright Instruments	WRCG1750	-	2009-04-13