MRT Technology (Suzhou) Co., Ltd
Phone: +86-512-66308358
Fax: +86-512-66308368
Web: www.mrt-cert.com

Report No.: 1502ESU01701
Report Version: V03
Issue Date: 03-31-2015

MEASUREMENT REPORT
FCC Part 15B

FCC ID:	2AC7P-SI-BDM-2250
APPLICANT:	X-Z LAB, INC.

Application Type:	Certification
Product:	Digital PET detector
Model No.:	Si-BDM-2250
FCC Classification:	FCC Class B Digital Device (JBP)
FCC Rule Part(s):	FCC Part 15 Subpart B
Test Procedure(s):	ANSI C63.4: 2009
Test Date:	Feb. 26 ~ Mar. 26, 2015

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

Revision History

Report No.	Version	Description	Issue Date
1502ESU01701	Rev. 01	Initial report	03-22-2015
1502ESU01701	Rev. 02	Corrected the FCC ID	03-26-2015
1502ESU01701	Rev. 03	Corrected the Manufacturer of Adapter and Global Clock Board	03-31-2015

CONTENTS

Description Page

§2.1033 General Information

Applicant:	X-Z LAB, INC.
Applicant Address:	2440 Camino Ramon, Suite 264 San Ramon, CA 94583
Manufacturer:	Raycan Technology Co., Ltd.(Su Zhou)
Manufacturer Address:	Bldg17,8 jinfeng Rd, Suzhou New District, Suzhou, 215163, China
Test Site:	MRT Technology (Suzhou) Co., Ltd.
Test Site Address:	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
MRT FCC Registration No.:	809388
Model No.:	Si-BDM-2250
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Reg. No. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**

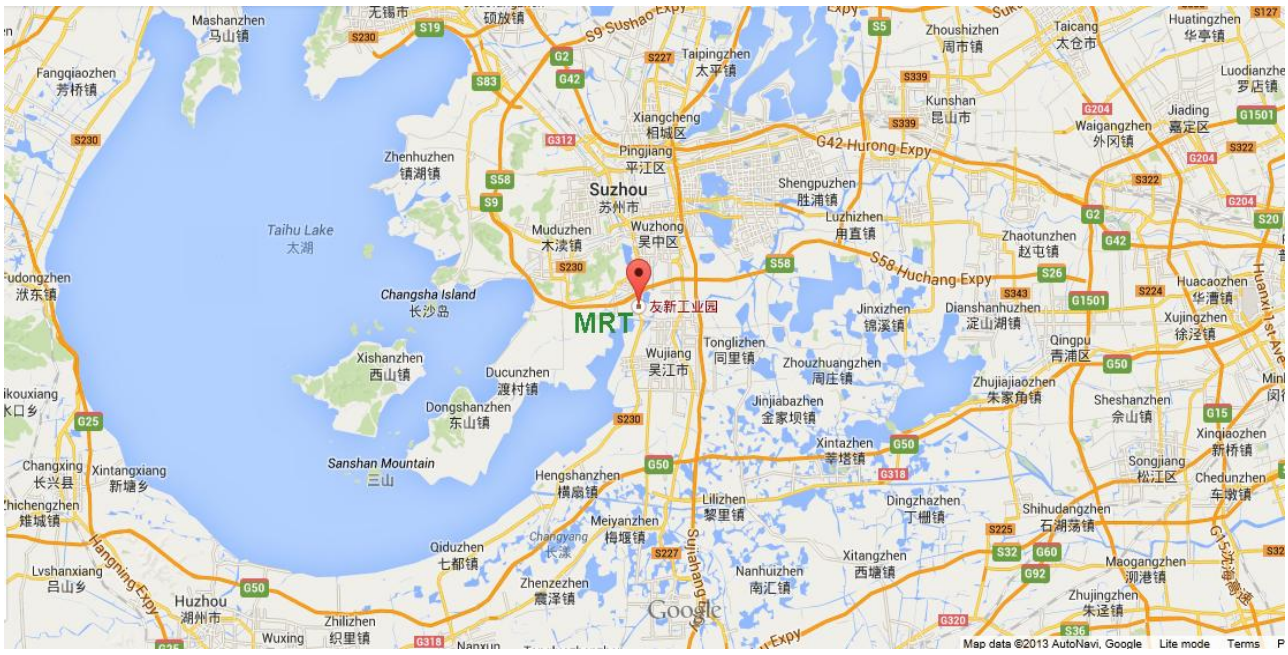
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



2. PRODUCT INFORMATION

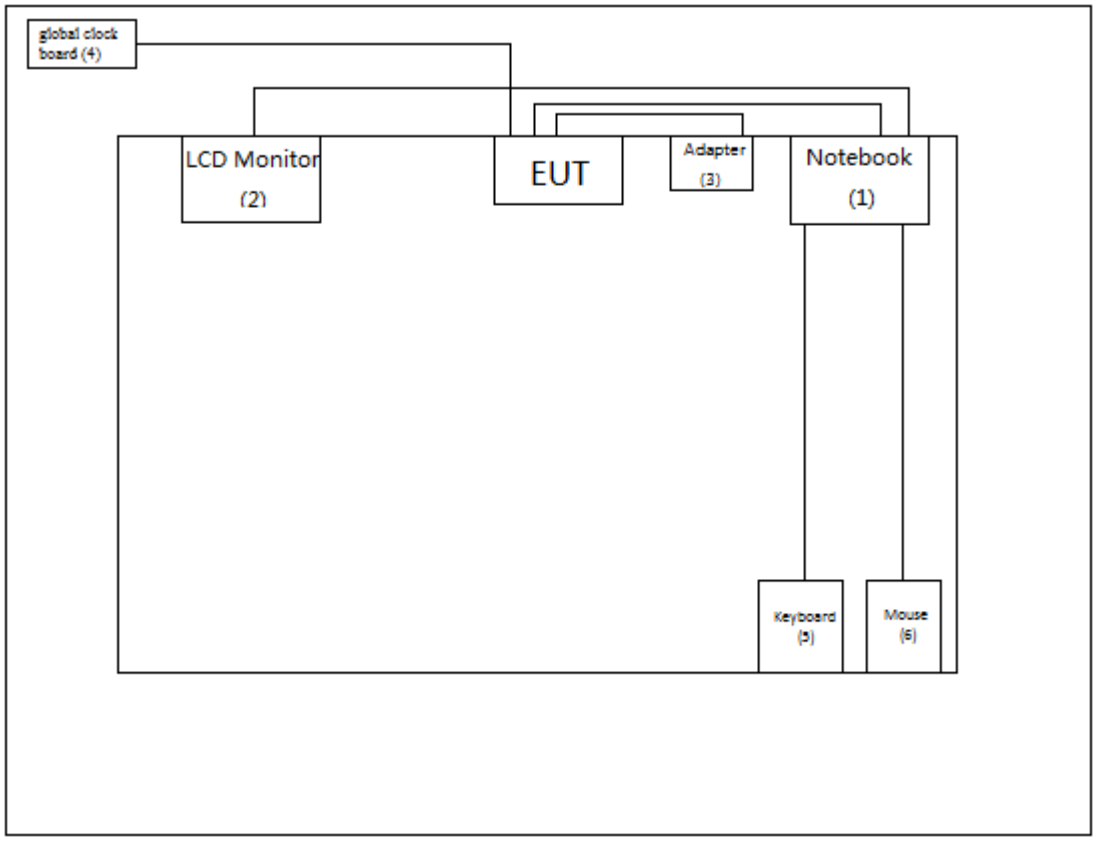
2.1. Equipment Description

Product Name	Digital PET detector
Model No.	Si-BDM-2250

2.2. Test Configuration

The EUT was tested per the guidance FCC Part 15 Subpart B: 2013 and ANSI C63.4: 2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

Connection Diagram



	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook	Lenovo	E430c	MP-4CFX213/10	Non-Shielded, 1.8m
2	LCD Monitor	DELL	E1912Hf	N/A	N/A
3	Adapter	Raycan	ZF120A-1204000	N/a	N/A
4	Global Clock Board	Raycan	N/A	N/A	N/A
5	Keyboard	DELL	KB4021	N/A	N/A
6	Mouse	DELL	MS111-T	N/A	N/A

2.3. Test Software

The test utility software used during testing was “BDM Configurator”.

3. DESCRIPTION of TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2009) was used in the measurement of the Equipment under test.
Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.
The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.
Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150 kHz to 30 MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site.
Line conducted emissions test results are shown in Section 6.2.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.
For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30 MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30 MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.
Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB beam-width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	1 year	2015/11/08
Two-Line V-Network	R&S	ENV216	101683	1 year	2015/11/08
Two-Line V-Network	R&S	ENV216	101684	1 year	2015/11/08
Temperature/ Meter Humidity	Anymetre	TH101B	SR2-01	1 year	2015/11/15

Radiated Emission

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	1 year	2015/11/08
Spectrum Analyzer	Agilent	E4447A	MY45300136	1 year	2015/10/09
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2015/11/08
Preamplifier	MRT	AP01G18	S-001	1 year	2015/12/13
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	1 year	2015/11/15

5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 3.5dB
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 18GHz: 4.76dB

6. TEST RESULT

6.1. Summary

Product Name: **Digital PET detector**

Test Mode: **Normal Operation**

FCC Part Section(s)	Test Description	Test Result
15.107	Conducted Emissions	Pass
15.109	Radiated Emissions	Pass

6.2. Conducted Emission Measurement

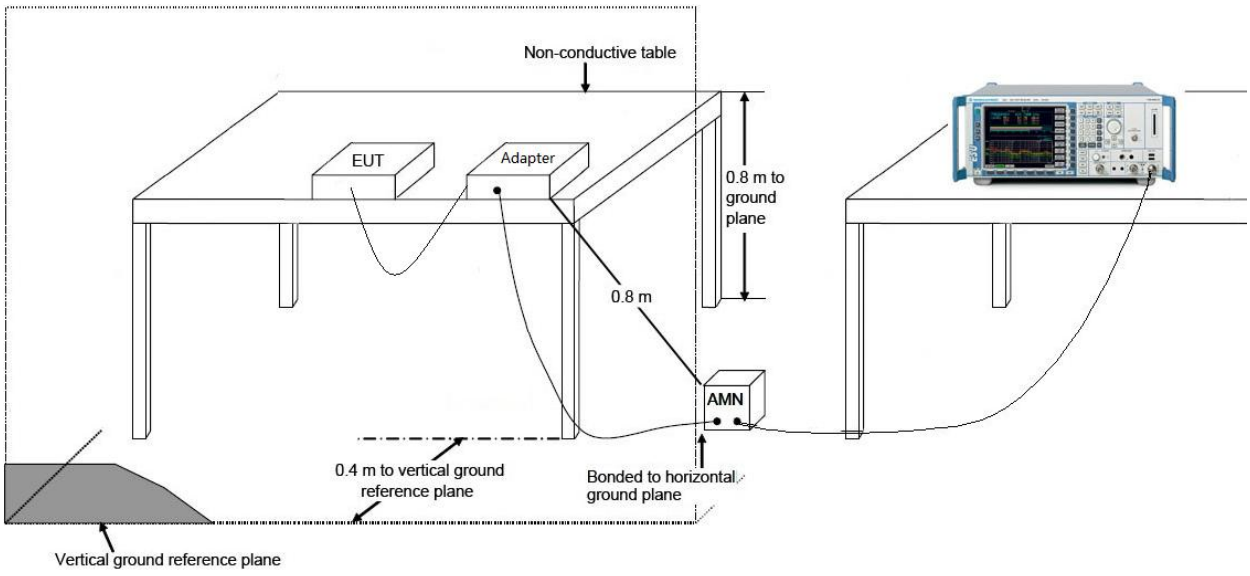
6.2.1. Test Limit

FCC Part 15.107 Limits		
Frequency (MHz)	QP (dBμV)	AV (dBμV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

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

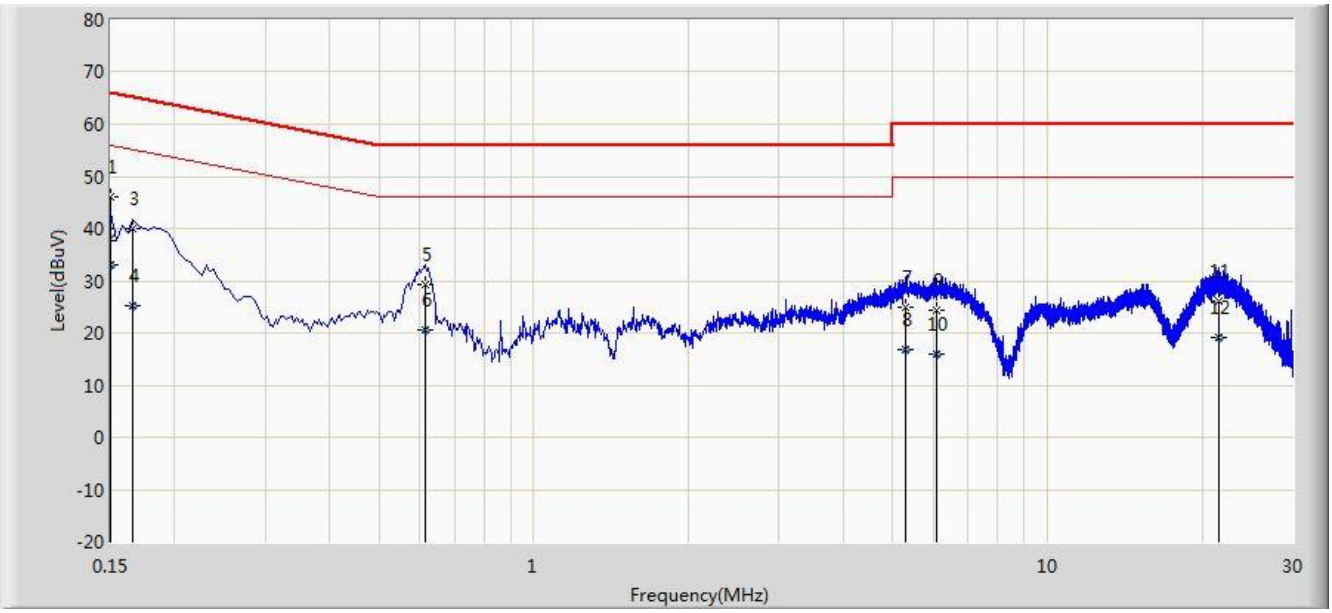
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.2.2. Test Setup



6.2.3. Test Result of Conducted Emissions

Site: SR2	Time: 2015/03/26 - 20:23
Limit: FCC_Part15.107_CE_Class B	Engineer: Roy Cheng
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: Digital PET detector	Power: AC 120V/60Hz
Note: Normal Operation	

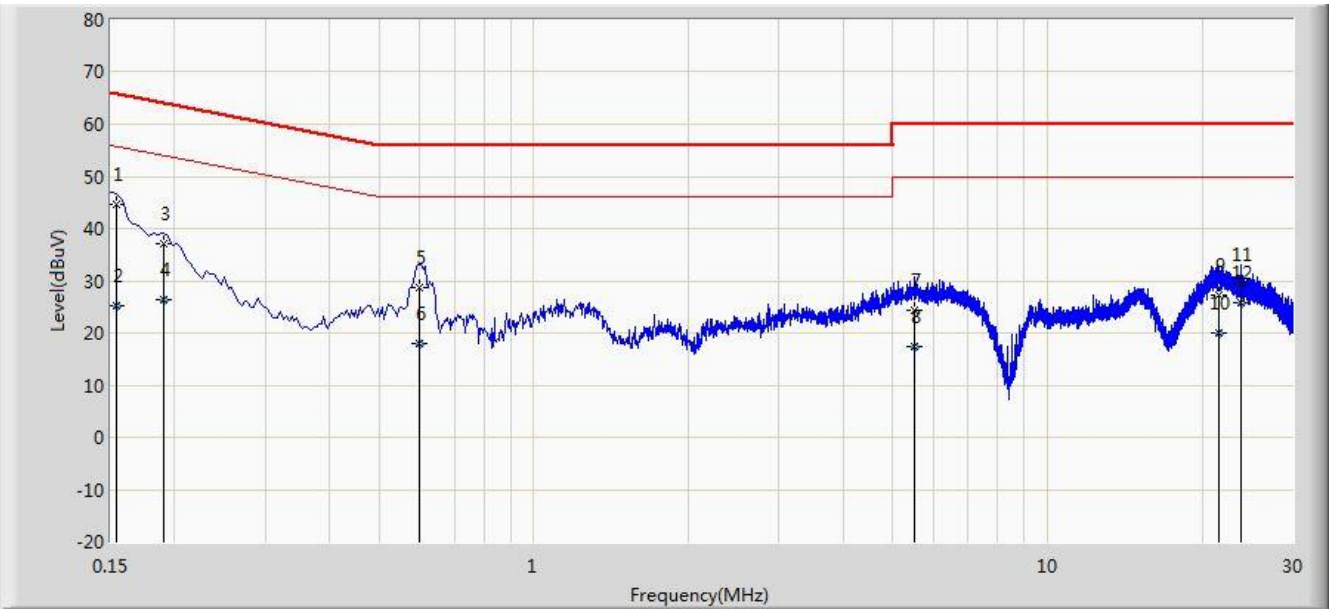


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		*	0.150	46.156	34.988	-19.844	66.000	11.168	QP
2			0.150	33.134	21.966	-22.866	56.000	11.168	AV
3			0.166	39.873	29.785	-25.285	65.158	10.087	QP
4			0.166	25.336	15.249	-29.822	55.158	10.087	AV
5			0.614	29.213	19.105	-26.787	56.000	10.108	QP
6			0.614	20.440	10.333	-25.560	46.000	10.108	AV
7			5.294	24.953	14.902	-35.047	60.000	10.050	QP
8			5.294	16.744	6.693	-33.256	50.000	10.050	AV
9			6.074	24.267	14.148	-35.733	60.000	10.118	QP
10			6.074	15.889	5.771	-34.111	50.000	10.118	AV
11			21.514	25.992	15.827	-34.008	60.000	10.165	QP
12			21.514	19.267	9.101	-30.733	50.000	10.165	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

Site: SR2	Time: 2015/03/26 - 20:28
Limit: FCC_Part15.107_CE_Class B	Engineer: Roy Cheng
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: Digital PET detector	Power: AC 120V/60Hz
Note: Normal Operation	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		*	0.154	44.598	33.883	-21.183	65.781	10.716	QP
2			0.154	25.245	14.529	-30.537	55.781	10.716	AV
3			0.190	37.077	27.049	-26.960	64.037	10.028	QP
4			0.190	26.394	16.366	-27.642	54.037	10.028	AV
5			0.598	28.624	18.492	-27.376	56.000	10.132	QP
6			0.598	17.894	7.761	-28.106	46.000	10.132	AV
7			5.510	24.418	14.335	-35.582	60.000	10.083	QP
8			5.510	17.336	7.253	-32.664	50.000	10.083	AV
9			21.574	27.177	16.958	-32.823	60.000	10.219	QP
10			21.574	19.864	9.645	-30.136	50.000	10.219	AV
11			23.830	29.368	19.095	-30.632	60.000	10.274	QP
12			23.830	25.835	15.561	-24.165	50.000	10.274	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

6.3. Radiated Emission Measurement

6.3.1. Test Limit

FCC Part 15.109 Limits		
Frequency (MHz)	Distance (m)	Level (dBμV/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

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

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

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

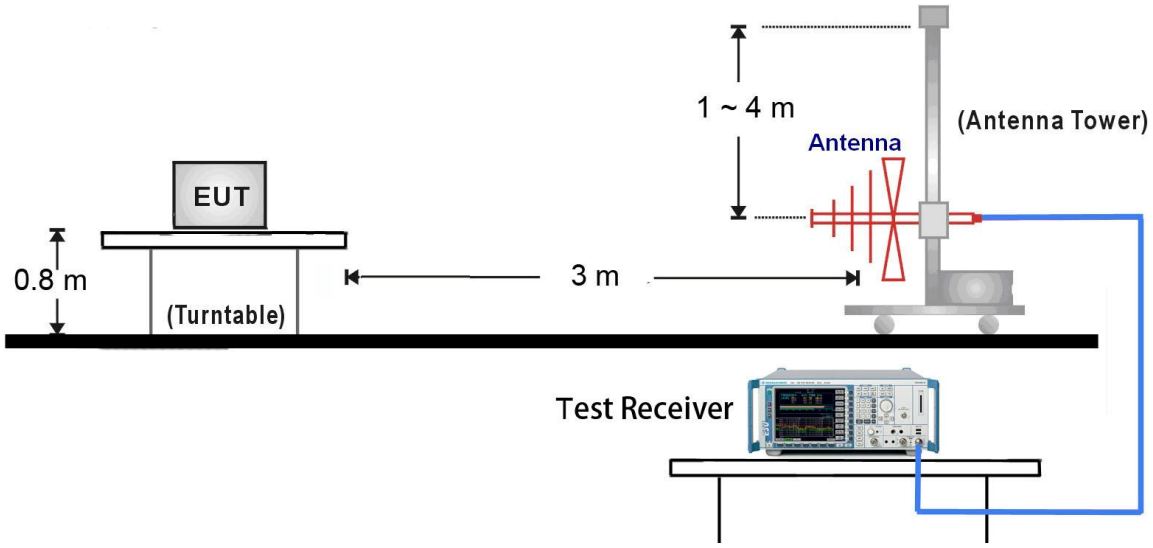
6.3.2. Test Frequency selected

For an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

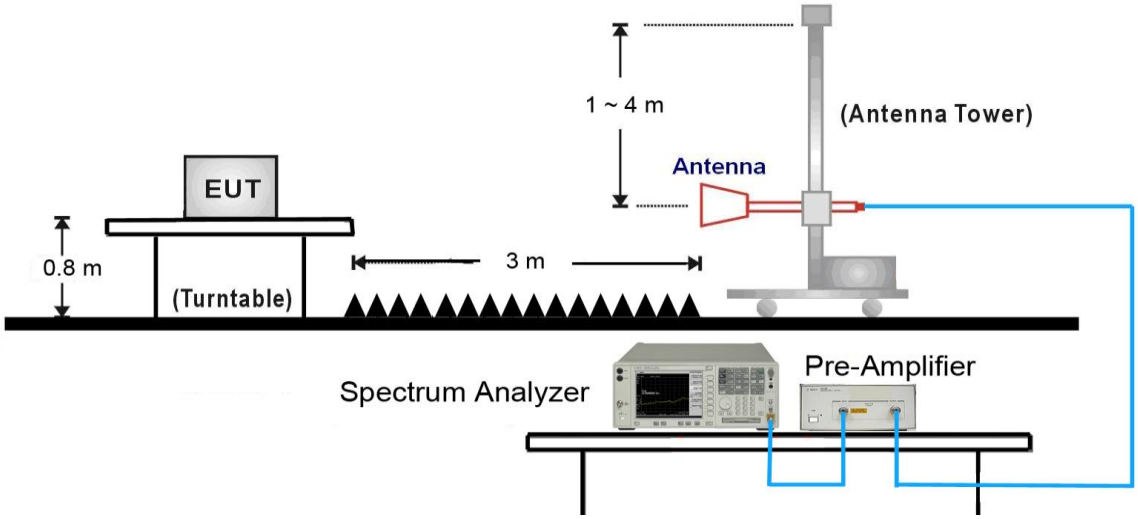
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 - 108	1000
108 - 500	2000
500 - 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

6.3.3. Test Setup

30MHz ~ 1GHz Test Setup:

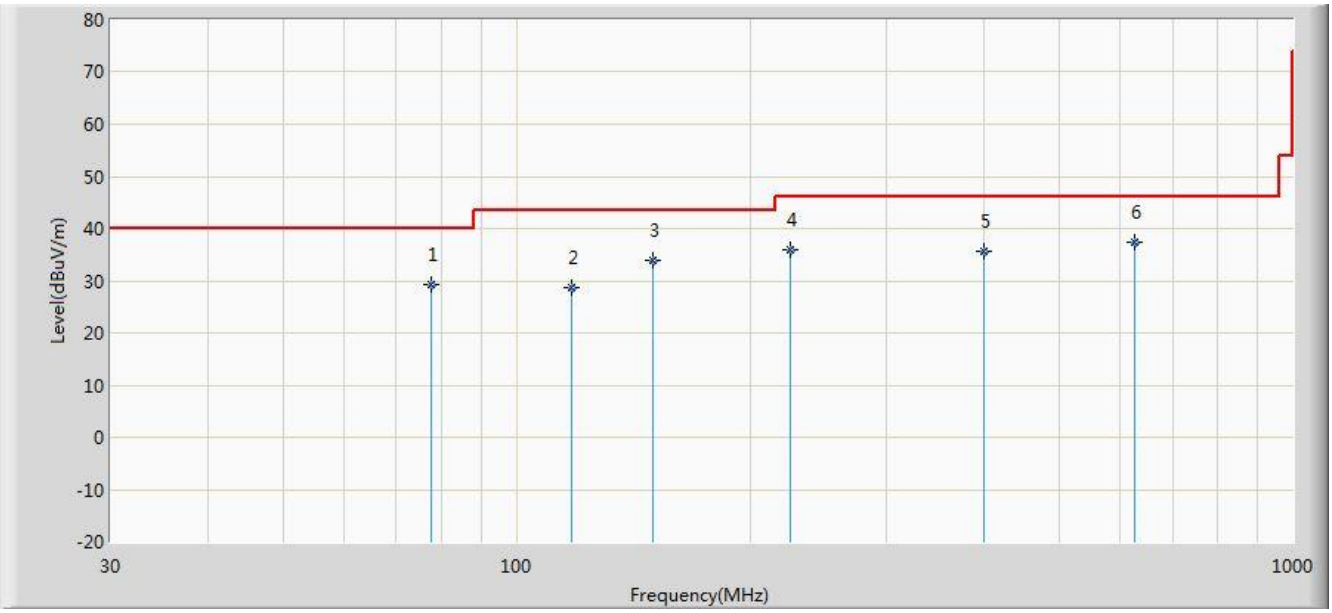


1GHz ~18GHz Test Setup:



6.3.4. Test Result of Radiated Emissions

Site: AC1	Time: 2015/03/26 - 21:09
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Roy Cheng
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: Digital PET detector	Power: AC 120V/60Hz
Note: Normal Operation	

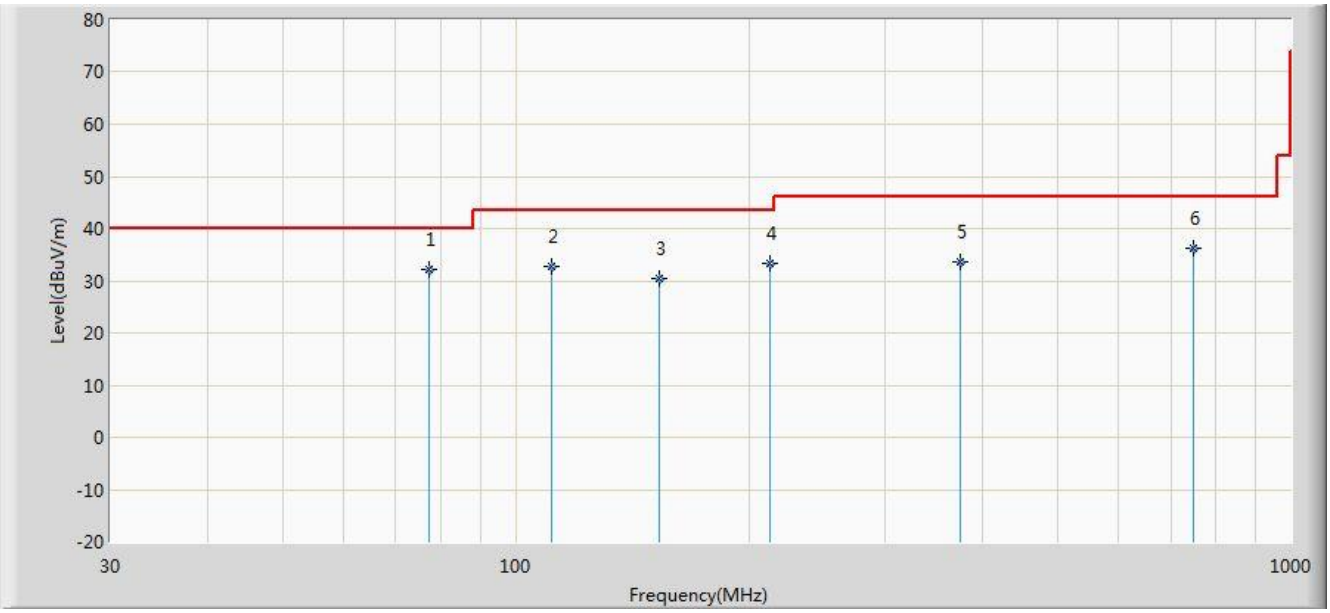


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			77.530	29.378	20.254	-10.622	40.000	9.124	QP
2			117.785	28.836	17.254	-14.664	43.500	11.582	QP
3			150.025	33.942	24.500	-9.558	43.500	9.442	QP
4			225.025	35.826	23.025	-10.174	46.000	12.801	QP
5			400.024	35.583	18.930	-10.417	46.000	16.654	QP
6		*	625.020	37.281	17.020	-8.719	46.000	20.261	QP

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2015/03/26 - 21:09
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Roy Cheng
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: Digital PET detector	Power: AC 120V/60Hz
Note: Normal Operation	

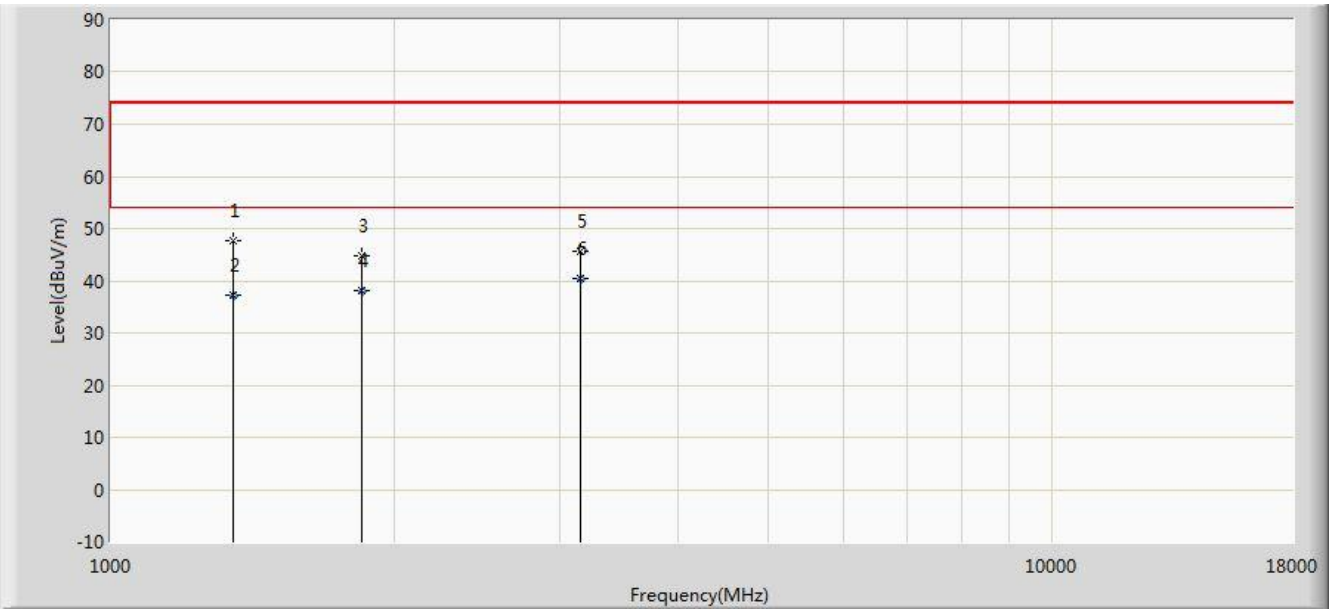


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	77.452	32.252	23.110	-7.748	40.000	9.142	QP
2			111.160	32.675	19.988	-10.825	43.500	12.686	QP
3			153.255	30.514	20.952	-12.986	43.500	9.561	QP
4			212.482	33.381	20.952	-10.119	43.500	12.430	QP
5			375.024	33.741	17.588	-12.259	46.000	16.152	QP
6			750.201	36.372	14.255	-9.628	46.000	22.117	QP

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2015/03/26 - 21:10
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Digital PET detector	Power: AC 120V/60Hz
Note: Normal Operation	

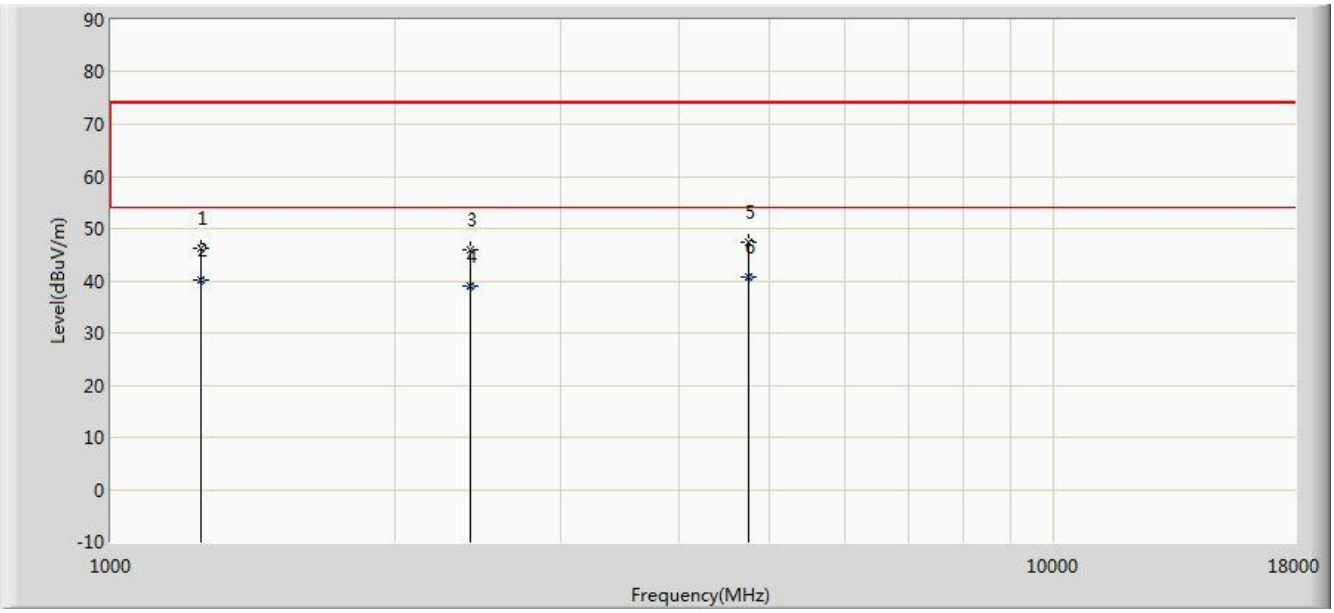


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			1348.500	47.665	55.538	-26.335	74.000	-7.874	PK
2			1348.523	37.274	45.147	-16.726	54.000	-7.872	AV
3			1850.000	44.890	51.512	-29.110	74.000	-6.622	PK
4			1850.020	38.140	44.762	-15.860	54.000	-6.622	AV
5			3150.500	45.554	47.086	-28.446	74.000	-1.533	PK
6		*	3150.622	40.299	41.830	-13.701	54.000	-1.530	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Site: AC1	Time: 2015/03/26 - 21:10
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Digital PET detector	Power: AC 120V/60Hz
Note: Normal Operation	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			1246.500	46.296	54.880	-27.704	74.000	-8.583	PK
2			1246.536	40.186	48.770	-13.814	54.000	-8.583	AV
3			2402.500	46.048	49.804	-27.952	74.000	-3.756	PK
4			2402.526	39.079	42.835	-14.921	54.000	-3.756	AV
5			4748.500	47.518	44.974	-26.482	74.000	2.544	PK
6		*	4748.522	40.698	38.154	-13.302	54.000	2.545	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

7. CONCLUSION

The data collected relate only the item(s) tested and show that the **Digital PET detector FCC ID: 2AC7P-SI-BDM-2250** is in compliance with Part 15B of the FCC Rules.

The End