



MEASUREMENT REPORT

FCC Part 15B

FCC ID: QISHG8247HB
APPLICANT: Huawei Technologies Co., Ltd.
Application Type: Certification
Product: GPON Terminal
Model No.: EchoLife HG8247H
Brand Name: HUAWEI
FCC Classification: FCC Class B Digital Device (JBP)
Standards: FCC Part 15 Subpart B: 2015
Test Procedure(s): ANSI C63.4: 2014
Test Date: May 15 ~ June 26, 2016

Reviewed By : Robin Wu
(Robin Wu)
Approved By : Marlin Chen
(Marlin Chen)



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2014. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
1605RSU02203	Rev. 01	Initial report	07-25-2016	Invalid
1605RSU02203	Rev. 02	Modify the FCC rule version	08-17-2016	Valid

CONTENTS

Description	Page
§2.1033 General Information	4
1. INTRODUCTION	5
1.1. Scope	5
1.2. MRT Test Location	5
2. PRODUCT INFORMATION	6
2.1. Equipment Description.....	6
2.2. Test Configuration	7
2.3. Test System Details.....	8
2.4. Test Software	8
2.5. EMI Suppression Device(s)/Modifications.....	8
2.6. Labeling Requirements.....	8
3. DESCRIPTION OF TEST	9
3.1. Evaluation Procedure	9
3.2. AC Line Conducted Emissions.....	9
3.3. Radiated Emissions.....	10
4. TEST EQUIPMENT CALIBRATION DATE	11
5. MEASUREMENT UNCERTAINTY.....	12
6. TEST RESULT	13
6.1. Summary	13
6.2. Conducted Emission Measurement	14
6.2.1. Test Limit	14
6.2.2. Test Setup.....	14
6.2.3. Test Result of Conducted Emissions.....	15
6.3. Radiated Emission Measurement.....	17
6.3.1. Test Limit	17
6.3.2. Test Setup.....	17
6.3.3. Test Result of Radiated Emissions.....	19

§2.1033 General Information

Applicant:	Huawei Technologies Co., Ltd.
Applicant Address:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, 518129 Shenzhen, PEOPLE'S REPUBLIC OF CHINA
Manufacturer:	Huawei Technologies Co., Ltd.
Manufacturer Address:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, 518129 Shenzhen, PEOPLE'S REPUBLIC OF 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 Registration No.:	809388
FCC Rule Part(s):	FCC Part 15 Subpart B
Model No.:	EchoLife HG8247H
Test Device Serial No.:	N/A <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering
FCC Classification:	FCC Class B Digital Device (JBP)

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 C63.4-2014 on September 30, 2013.



2. PRODUCT INFORMATION

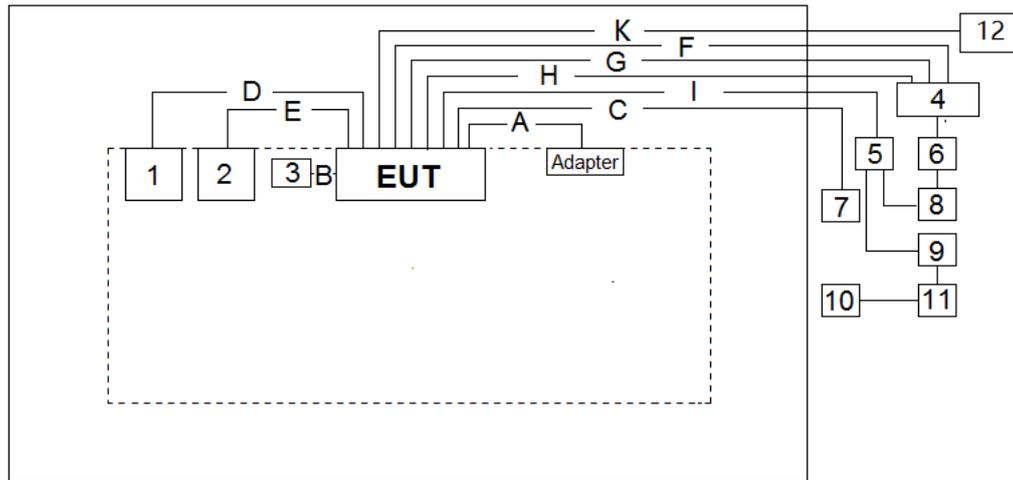
2.1. Equipment Description

Product Name	GPON Terminal
Model No.	EchoLife HG8247H
Brand Name	HUAWEI
Antenna Type	Dipole Antenna
Component	
Adapter	M/N: HW-120200E1W Input: 100-240V ~ 50/60Hz, 0.8A Max Output: 12Vdc, 2.0A

2.2. Test Configuration

The EUT was tested per the guidance FCC Part 15 Subpart B: 2015 and ANSI C63.4: 2014 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

Connection Diagram (Mode 1)



Signal Cable Type	Signal cable Description	
A	Power Cable	Non-shielding, 1.5m
B	USB Cable	Non-shielding, 0.1m
C	Coaxial Cable	Shielding, > 10m
D	Telecom Cable	Non-shielding, 1.5m
E	Telecom Cable	Non-shielding, 1.5m
F	LAN Cable	Non-shielding, > 10m
G	LAN Cable	Non-shielding, > 10m
H	LAN Cable	Non-shielding, > 10m
I	Optical Fiber Cable	Non-shielding, > 10m
K	LAN Cable	Non-shielding, > 10m

2.3. Test System Details

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

Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Telephone	N/A	N/A	N/A
2	Telephone	N/A	N/A	N/A
3	Terminal Load	N/A	N/A	N/A
4	Ethernet Switch	H3C	S5016P	N/A
5	WDM	Agilecom	N/A	N/A
6	Network tester	Xena Networks	C1-M1CFP100	N/A
7	Television	Sony	KDL-40RM10B	N/A
8	Mini OLT	HUAWEI	MA5680	N/A
9	Optical Transmitter	HUATAI	HT1510A-10	N/A
10	DVD Player	Sony	BDP-S380	N/A
11	RF Modulator	N/A	N/A	N/A
12	Notebook	Lenovo	X201	3626AM3 Non-Shielded, 1.8m

2.4. Test Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of all equipment.
3	Make the EUT communicate with notebook and make phone call.

2.5. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.6. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase.

However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

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 C63.4-2014) was used in the measurement of the **GPON Terminal**.

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 - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2016/11/03
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2016/11/03
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2016/11/03
Temperature/Humidity Meter	Yuhuaze	N/A	MRTSUE06182	1 year	2016/12/20

Radiated Disturbance - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2017/05/07
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2017/03/28
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2016/12/11
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2016/11/07
Temperature/ Meter Humidity	Yuhuaze	N/A	MRTSUE06181	1 year	2016/12/20

Software	Version	Function
e3	V8.3.5	EMI Test Software

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 - SR2
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 150kHz~30MHz: ± 3.5 dB
Radiated Emission Measurement - AC1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): Horizontal: 30MHz~1GHz: 4.07dB 1GHz~18GHz: 4.16 dB Vertical: 30MHz~1GHz: 4.18 dB 1GHz~18GHz: 4.76 dB

6. TEST RESULT

6.1. Summary

Company Name: GPON Terminal
FCC ID: QISHG8247HB
Test Mode: Communication

Normative References	Test Description	Test Result
FCC Part 15 Subpart B: 2015 ANSI C63.4: 2014	Conducted Emissions	Pass
FCC Part 15 Subpart B: 2015 ANSI C63.4: 2014	Radiated Emissions	Pass

6.2. Conducted Emission Measurement

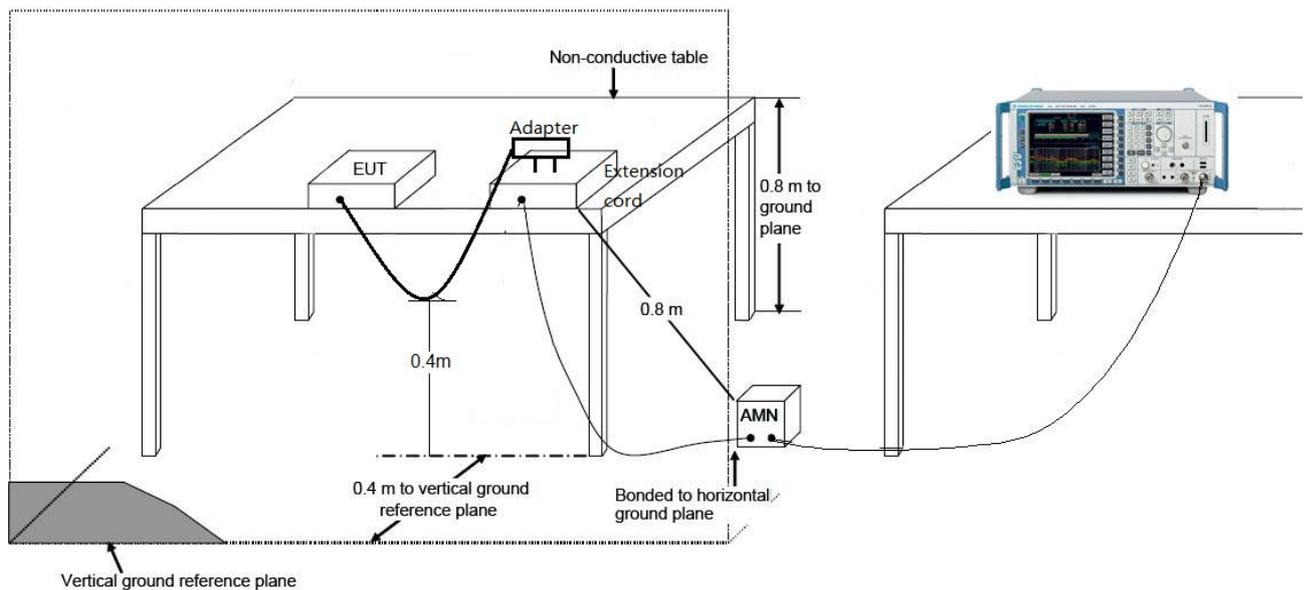
6.2.1. Test Limit

FCC Part 15.107 Limits		
Frequency (MHz)	QP (dB μ V)	AV (dB μ V)
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.

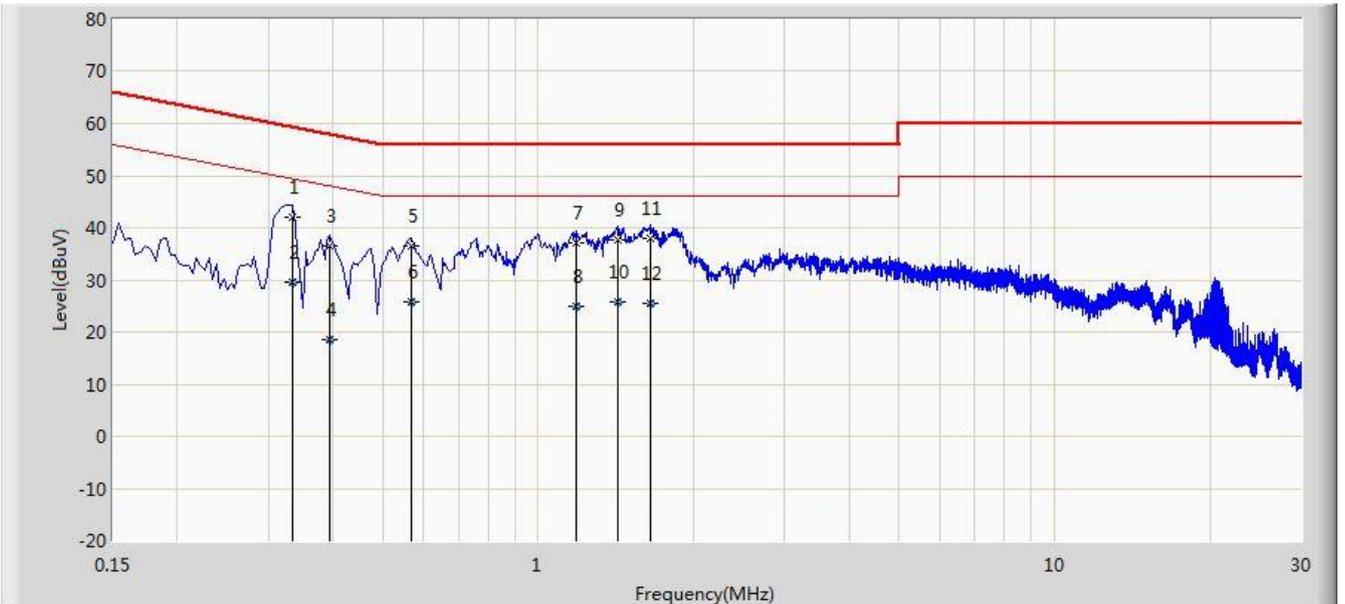
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.2.2. Test Setup



6.2.3. Test Result of Conducted Emissions

Site: SR2	Time: 2016/05/17 - 13:08
Limit: FCC_Part15.107_CE_AC Power_Class B	Engineer: Zero Cao
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: GPON Terminal	Power: AC 120V/60Hz
Note: Mode 1	

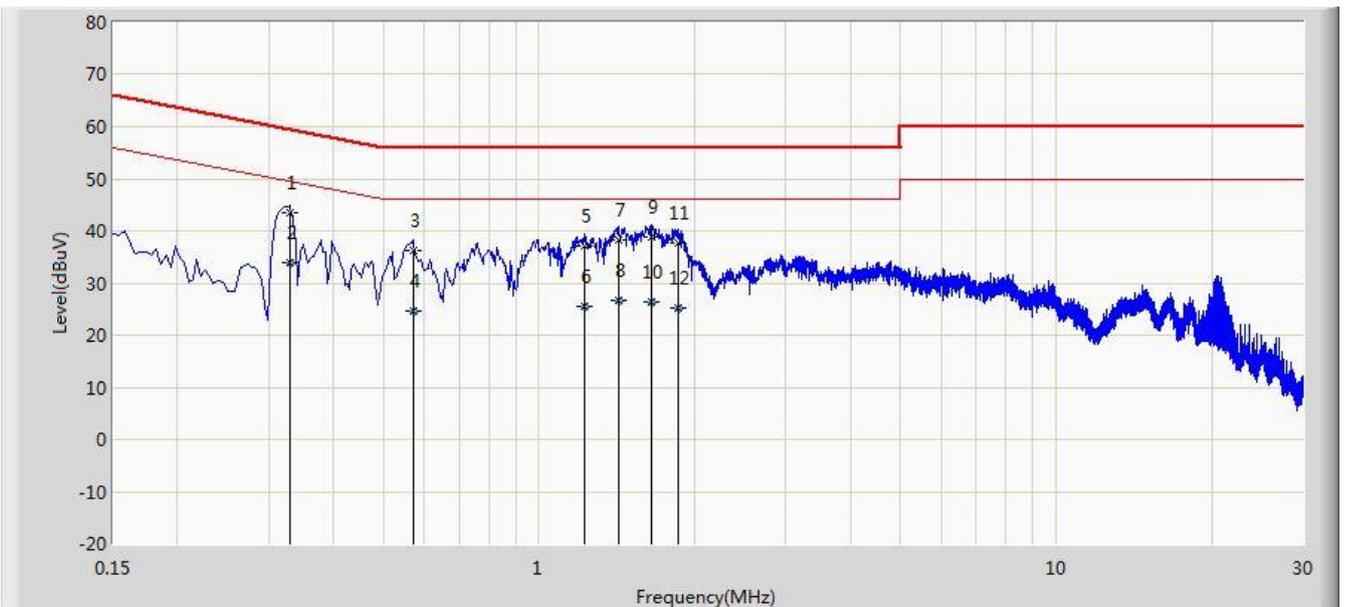


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		*	0.334	42.036	32.004	-17.315	59.351	10.031	QP
2			0.334	29.504	19.473	-19.847	49.351	10.031	AV
3			0.394	36.404	26.324	-21.574	57.979	10.080	QP
4			0.394	18.576	8.496	-29.403	47.979	10.080	AV
5			0.566	36.546	26.414	-19.454	56.000	10.132	QP
6			0.566	25.676	15.544	-20.324	46.000	10.132	AV
7			1.186	37.101	27.199	-18.899	56.000	9.902	QP
8			1.186	25.010	15.109	-20.990	46.000	9.902	AV
9			1.426	37.680	27.788	-18.320	56.000	9.892	QP
10			1.426	25.878	15.986	-20.122	46.000	9.892	AV
11			1.654	37.856	27.973	-18.144	56.000	9.883	QP
12			1.654	25.417	15.534	-20.583	46.000	9.883	AV

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

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

Site: SR2	Time: 2016/05/17 - 13:10
Limit: FCC_Part15.107_CE_AC Power_Class B	Engineer: Zero Cao
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: GPON Terminal	Power: AC 120V/60Hz
Note: Mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.330	43.574	33.514	-15.878	59.451	10.060	QP
2		*	0.330	33.867	23.807	-15.584	49.451	10.060	AV
3			0.570	36.312	26.165	-19.688	56.000	10.148	QP
4			0.570	24.529	14.381	-21.471	46.000	10.148	AV
5			1.226	36.990	27.089	-19.010	56.000	9.901	QP
6			1.226	25.494	15.593	-20.506	46.000	9.901	AV
7			1.422	38.319	28.426	-17.681	56.000	9.893	QP
8			1.422	26.729	16.836	-19.271	46.000	9.893	AV
9			1.654	38.784	28.898	-17.216	56.000	9.885	QP
10			1.654	26.487	16.602	-19.513	46.000	9.885	AV
11			1.854	37.539	27.662	-18.461	56.000	9.878	QP
12			1.854	25.103	15.226	-20.897	46.000	9.878	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 (dB μ V/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

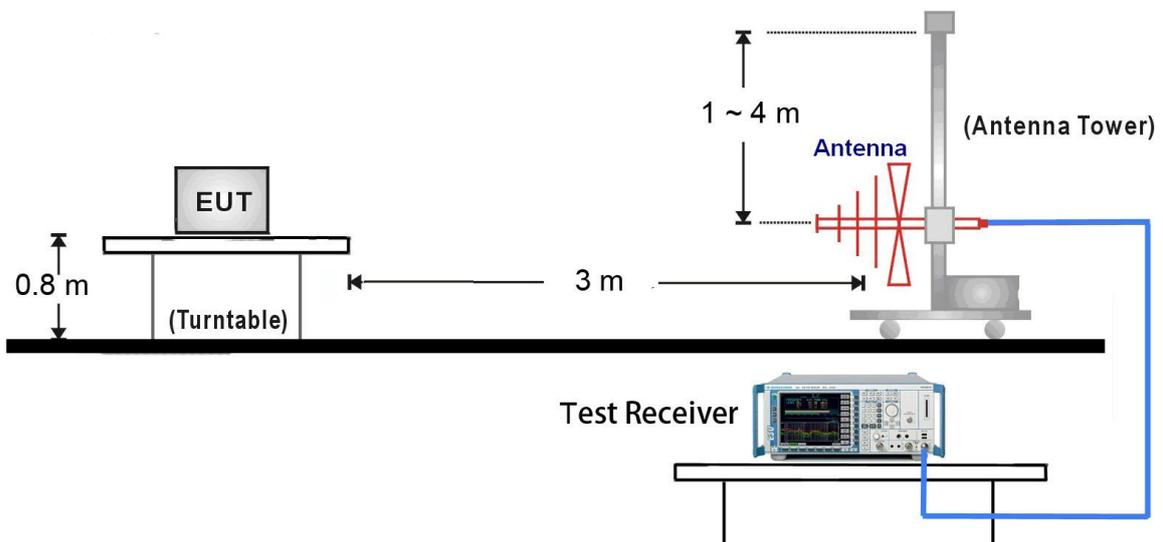
Note 1: The lower limit shall apply at the transition frequency.

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.

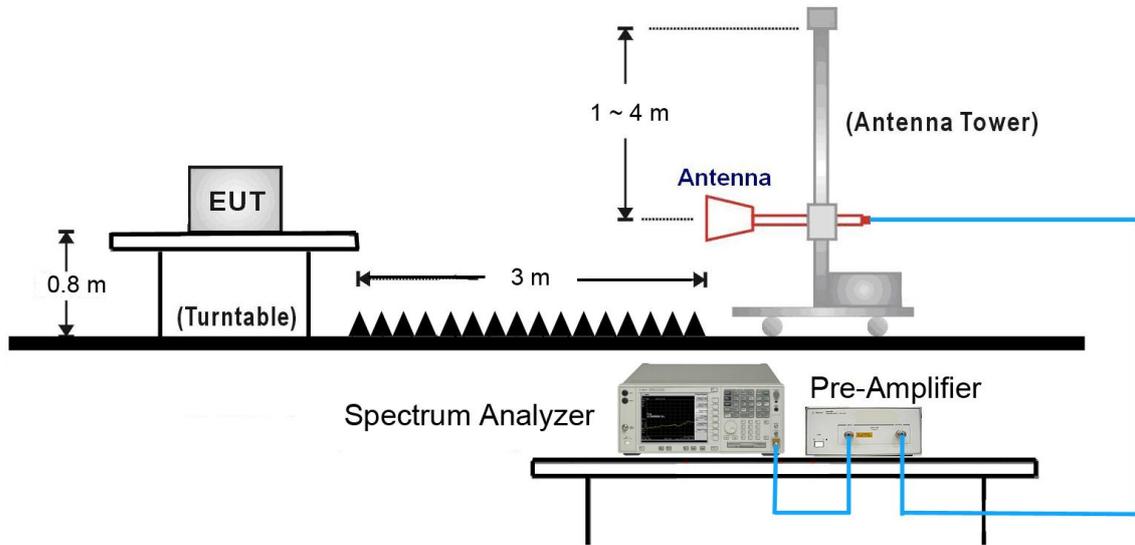
Note 3: E field strength (dB μ V/m) = 20 log E field strength (uV/m)

6.3.2. Test Setup

30MHz ~ 1GHz Test Setup:

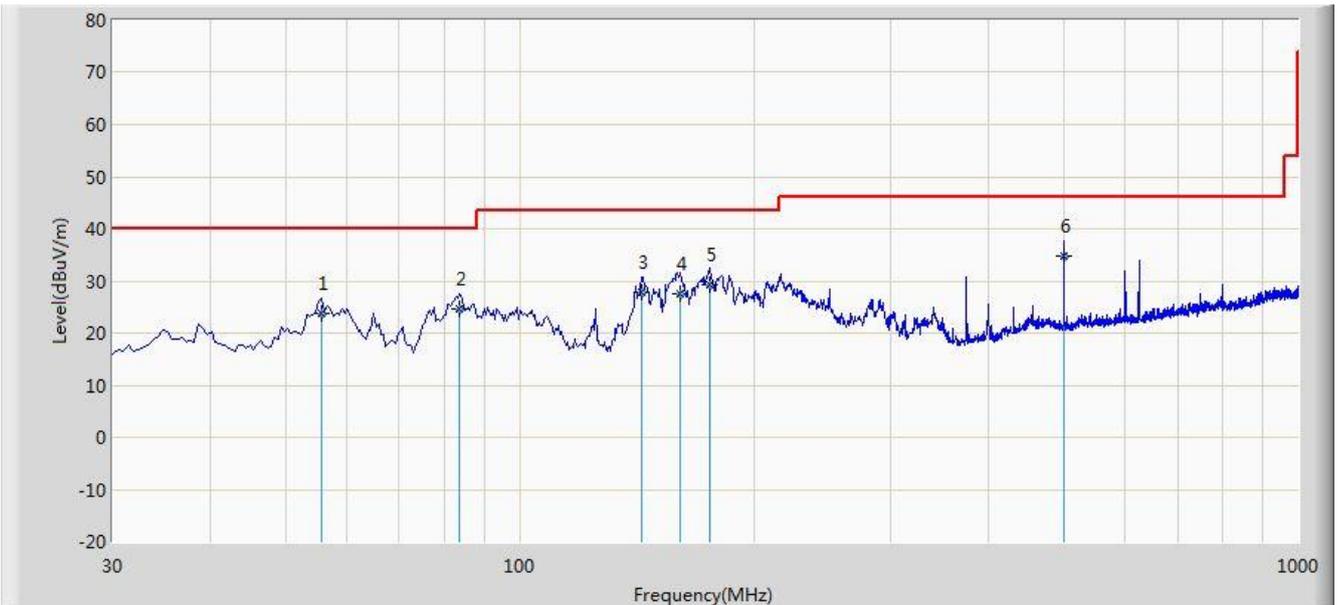


1GHz ~18GHz Test Setup:



6.3.3. Test Result of Radiated Emissions

Site: AC1	Time: 2016/05/17 - 11:11
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Vince Yu
Probe: VULB 9168 _20-2000MHz	Polarity: Horizontal
EUT: GPON Terminal	Power: AC 120V/60Hz
Test Mode: Mode 1	

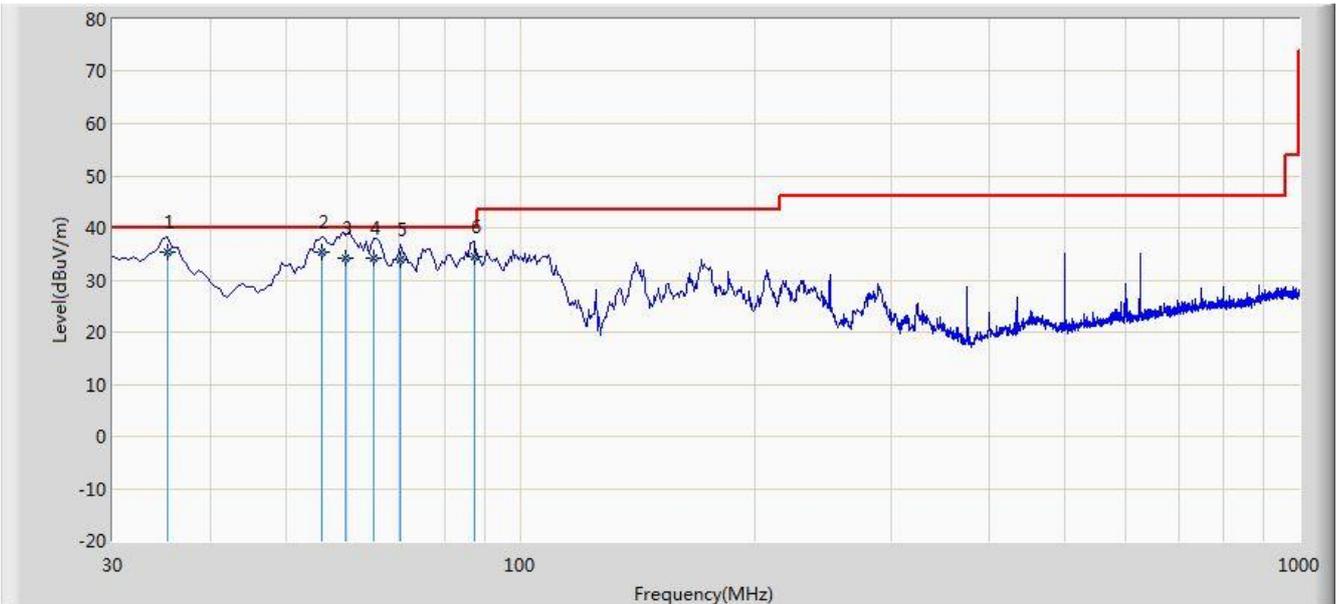


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			55.725	23.678	10.013	-16.322	40.000	13.665	QP
2			83.835	24.677	14.583	-15.323	40.000	10.094	QP
3			143.490	27.852	13.123	-15.648	43.500	14.729	QP
4			160.580	27.517	12.383	-15.983	43.500	15.134	QP
5			175.500	29.404	15.925	-14.096	43.500	13.479	QP
6		*	499.965	34.658	16.176	-11.342	46.000	18.482	QP

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

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

Site: AC1	Time: 2016/05/17 - 11:17
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Vince Yu
Probe: VULB 9168 _20-2000MHz	Polarity: Vertical
EUT: GPON Terminal	Power: AC 120V/60Hz
Test Mode: Mode 1	

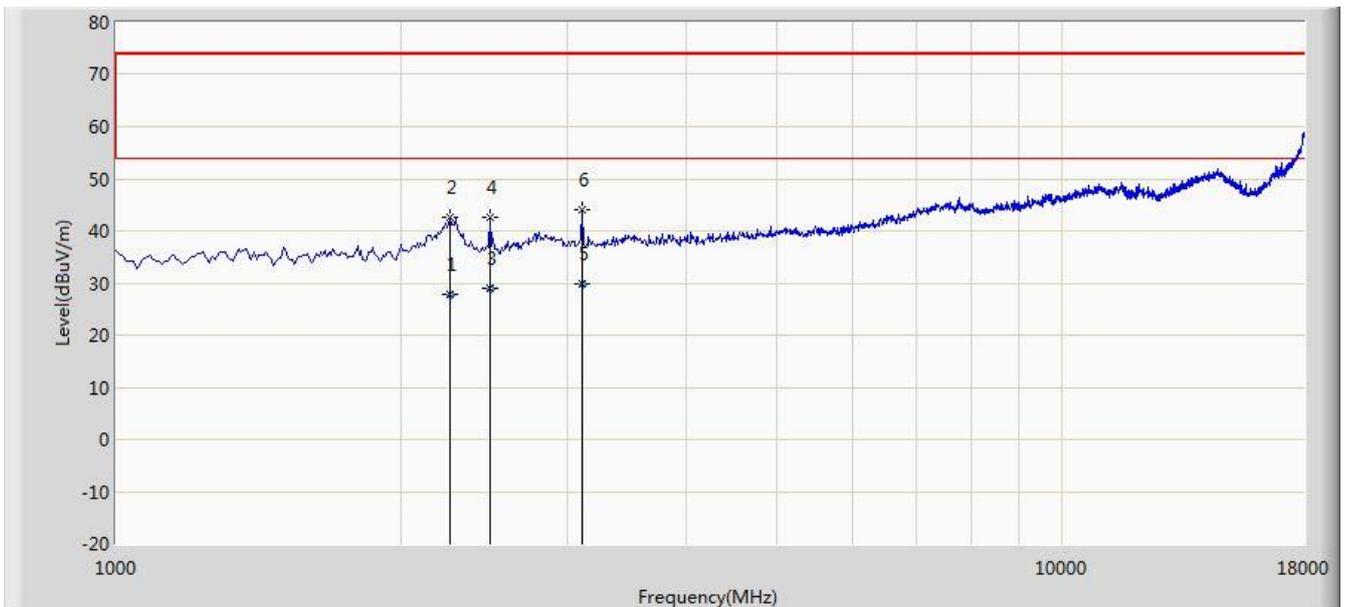


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	35.335	35.295	21.405	-4.705	40.000	13.890	QP
2			55.705	35.241	21.575	-4.759	40.000	13.667	QP
3			59.590	34.288	20.900	-5.712	40.000	13.388	QP
4			64.920	34.079	21.619	-5.921	40.000	12.460	QP
5			70.255	33.805	22.341	-6.195	40.000	11.464	QP
6			87.230	34.439	24.280	-5.561	40.000	10.159	QP

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

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

Site: AC1	Time: 2016/05/17 - 09:52
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Vince Yu
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: GPON Terminal	Power: AC 120V/60Hz
Test Mode: Mode 1	

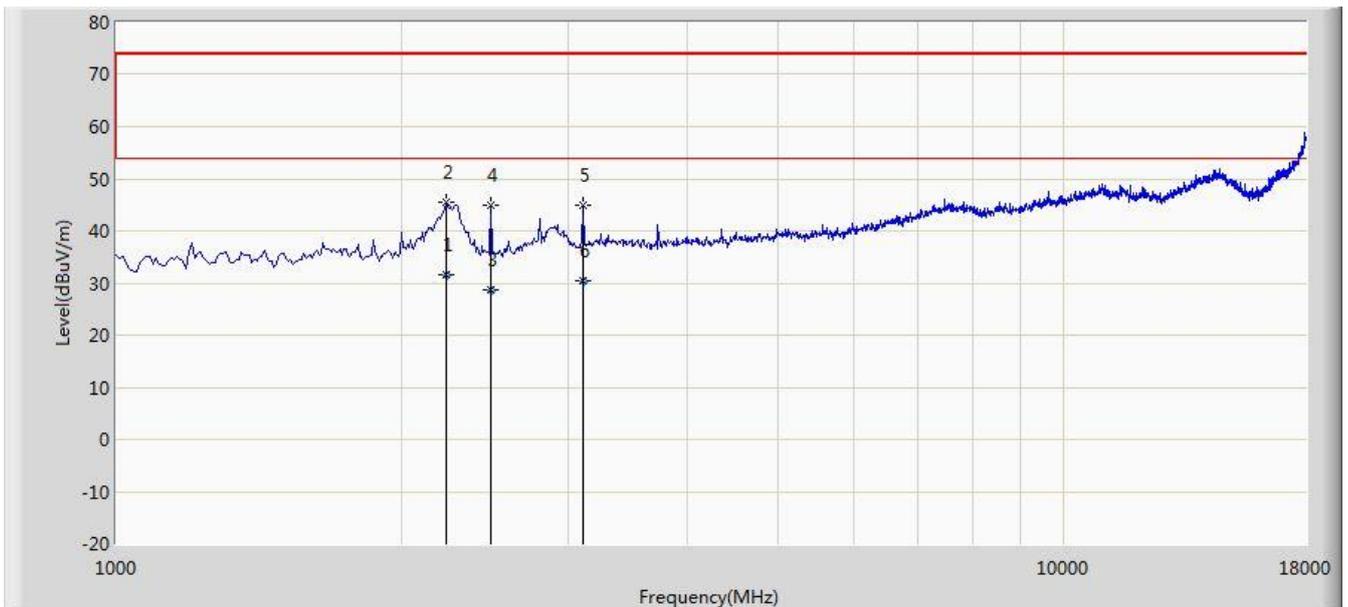


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2257.145	27.818	31.258	-26.182	54.000	-3.440	AV
2			2258.000	42.566	46.005	-31.434	74.000	-3.439	PK
3			2487.145	28.900	32.578	-25.100	54.000	-3.678	AV
4			2487.500	42.575	46.252	-31.425	74.000	-3.677	PK
5		*	3107.852	29.846	31.587	-24.154	54.000	-1.740	AV
6			3108.000	43.929	45.669	-30.071	74.000	-1.740	PK

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

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

Site: AC1	Time: 2016/05/17 - 10:22
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Vince Yu
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: GPON Terminal	Power: AC 120V/60Hz
Test Mode: Mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2231.858	31.714	35.218	-22.286	54.000	-3.504	AV
2			2232.500	45.374	48.876	-28.626	74.000	-3.503	PK
3			2486.156	28.567	32.248	-25.433	54.000	-3.682	AV
4			2487.500	44.828	48.505	-29.172	74.000	-3.677	PK
5			3108.000	44.792	46.532	-29.208	74.000	-1.740	PK
6			3108.254	30.449	32.187	-23.551	54.000	-1.739	AV

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

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

The End