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Report No.: 1605RSU02103
Report Version: V02
Issue Date: 08-17-2016

MEASUREMENT REPORT
FCC Part 15B

FCC ID:	QISHG8247HA
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)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

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.

Revision History

Report No.	Version	Description	Issue Date	Note
1605RSU02103	Rev. 01	Initial report	07-25-2016	Invalid
1605RSU02103	Rev. 02	Modify the FCC rule version	08-17-2016	Valid

CONTENTS

§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 ☐ 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.**

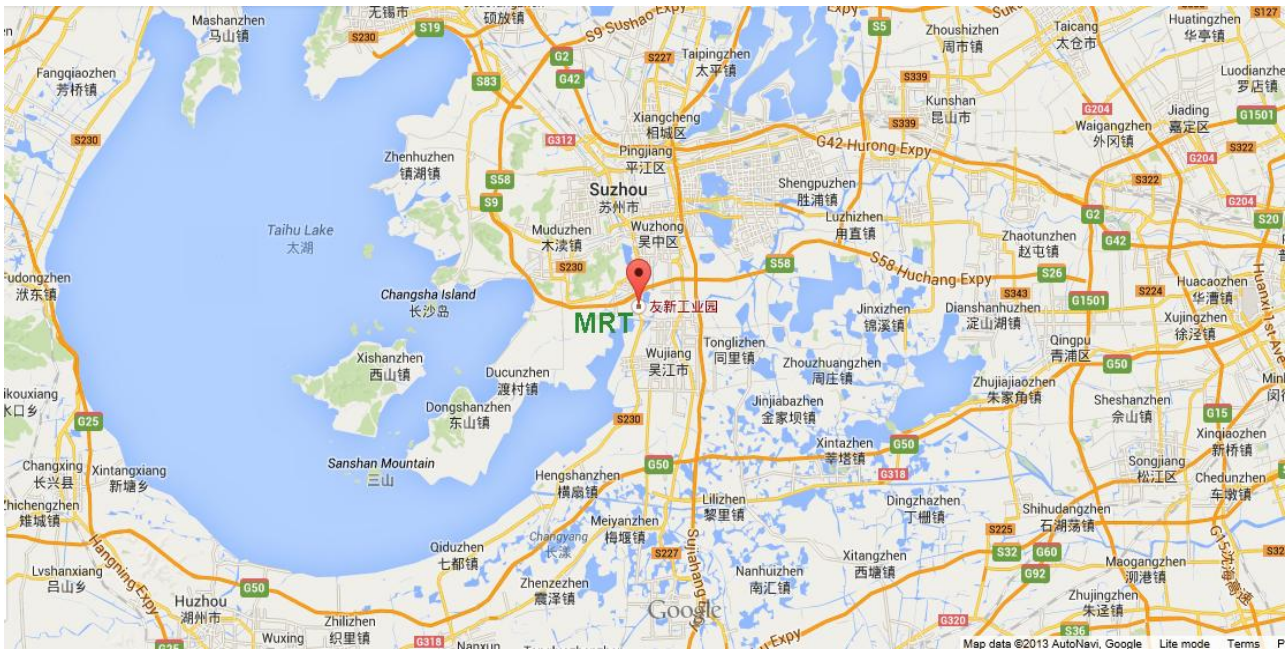
1. INTRODUCTION

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 C63.4-2014 on September 30, 2013.



2. PRODUCT INFORMATION

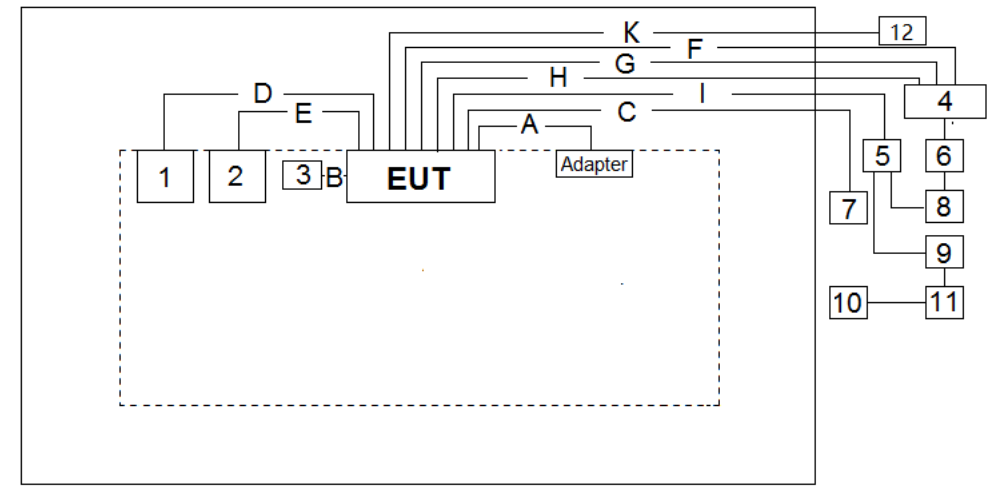
2.1. Equipment Description

Product Name	GPON Terminal
Model No.	EchoLife HG8247H
Brand Name	HUAWEI
Antenna Type	Dipole Antenna
Component	
Adapter	M/N: HW-120200E5W Input: 100-240V ~ 0.8A, 50/60Hz 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	N/A
2	Telephone	N/A	N/A	N/A	N/A
3	Terminal Load	N/A	N/A	N/A	N/A
4	Ethernet Switch	H3C	S5016P	N/A	N/A
5	WDM	Agilecom	N/A	N/A	N/A
6	Network tester	Xena Networks	C1-M1CFP100	N/A	N/A
7	Television	Sony	KDL-40RM10B	N/A	N/A
8	Mini OLT	HUAWEI	MA5680	N/A	N/A
9	Optical Transmitter	HUATAI	HT1510A-10	N/A	N/A
10	DVD Player	Sony	BDP-S380	N/A	N/A
11	RF Modulator	N/A	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 C63.4-2009) 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: ±3.5dB
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: **QISHG8247HA**

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

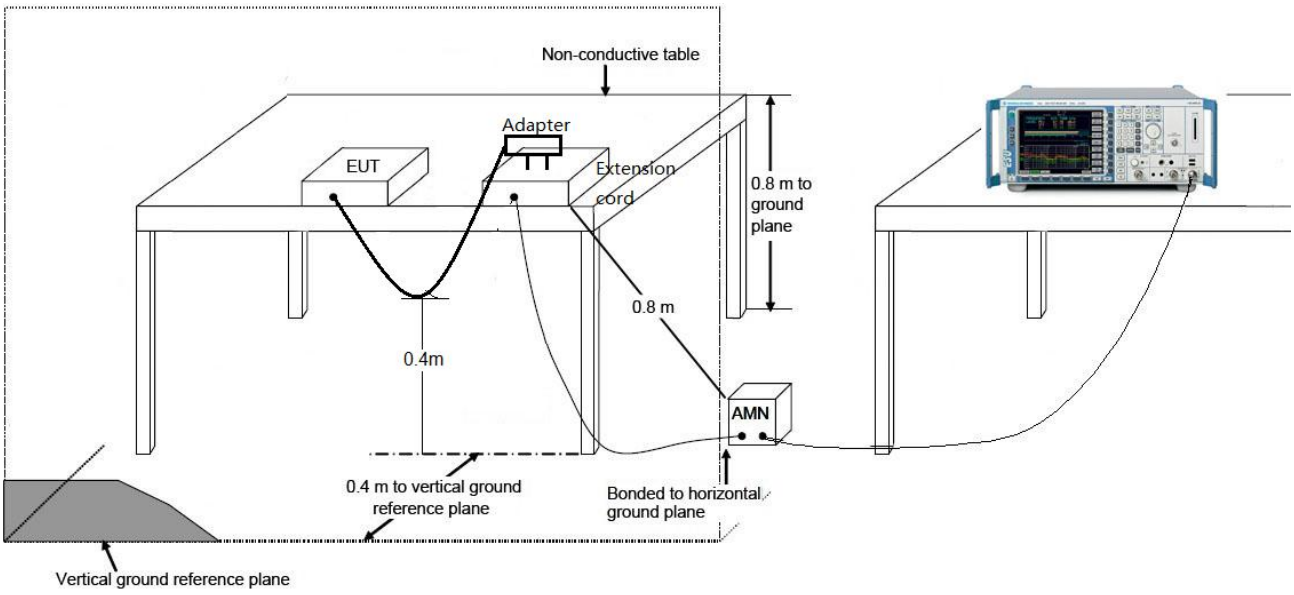
6.2.1. Test Limit

FCC Part 15.107 Limits		
Frequency (MHz)	QP (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.

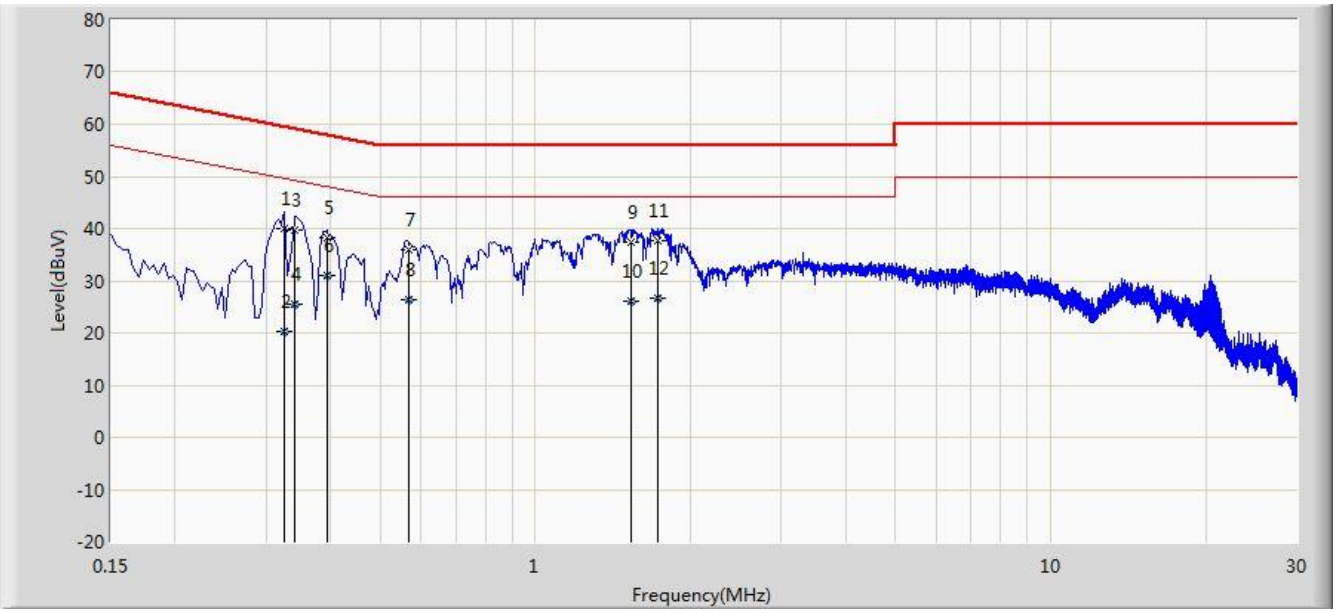
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.2.2. Test Setup



6.2.3. Test Result of Conducted Emissions

Site: SR2	Time: 2016/05/17 - 11:30
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	

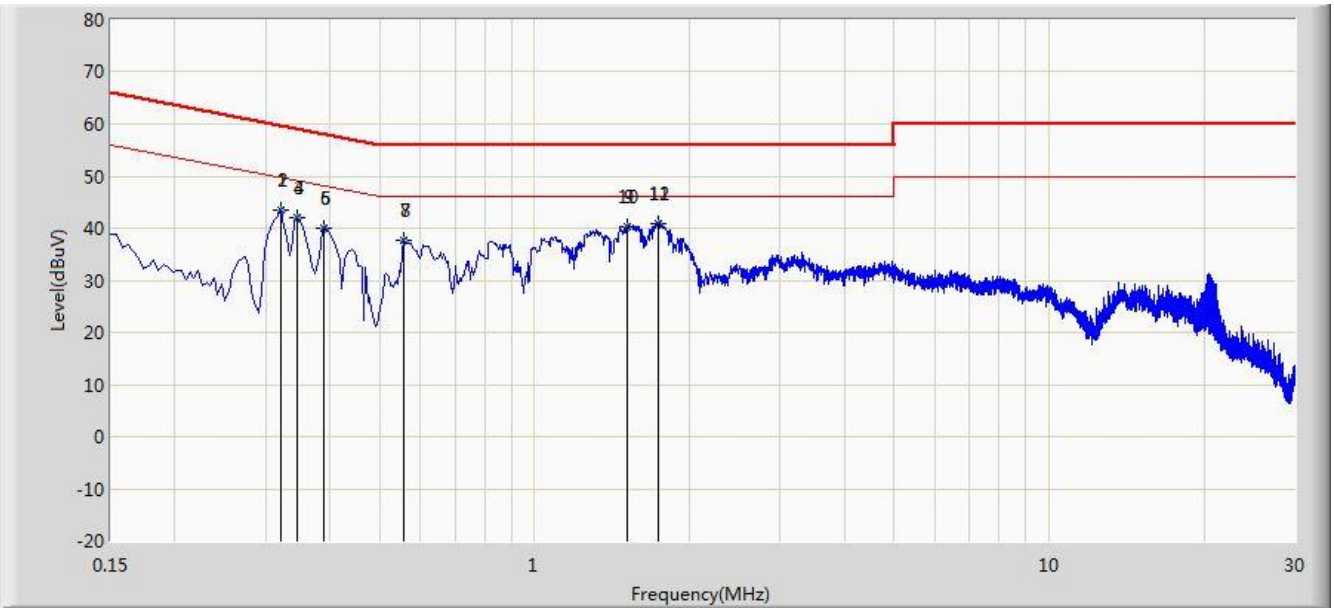


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.326	39.947	29.923	-19.605	59.552	10.025	QP
2			0.326	20.323	10.299	-29.229	49.552	10.025	AV
3			0.342	39.816	29.779	-19.338	59.155	10.038	QP
4			0.342	25.413	15.375	-23.741	49.155	10.038	AV
5			0.394	38.138	28.058	-19.841	57.979	10.080	QP
6		*	0.394	31.058	20.978	-16.921	47.979	10.080	AV
7			0.566	35.991	25.858	-20.009	56.000	10.132	QP
8			0.566	26.380	16.248	-19.620	46.000	10.132	AV
9			1.530	37.356	27.468	-18.644	56.000	9.887	QP
10			1.530	26.099	16.212	-19.901	46.000	9.887	AV
11			1.726	37.593	27.713	-18.407	56.000	9.880	QP
12			1.726	26.545	16.665	-19.455	46.000	9.880	AV

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

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

Site: SR2	Time: 2016/05/17 - 13:06
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			0.322	43.487	30.921	-16.168	59.655	10.054	QP
2			0.322	43.487	15.482	-6.168	49.655	10.054	AV
3			0.346	42.078	30.911	-16.980	59.058	10.071	QP
4			0.346	42.078	20.534	-6.980	49.058	10.071	AV
5			0.390	39.955	28.675	-18.109	58.064	10.105	QP
6			0.390	39.955	18.893	-8.109	48.064	10.105	AV
7			0.558	37.542	24.822	-18.458	56.000	10.154	QP
8			0.558	37.542	10.669	-8.458	46.000	10.154	AV
9			1.514	40.382	28.234	-15.618	56.000	9.890	QP
10			1.514	40.382	17.445	-5.618	46.000	9.890	AV
11			1.734	40.966	28.584	-15.034	56.000	9.883	QP
12		*	1.734	40.966	17.479	-5.034	46.000	9.883	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

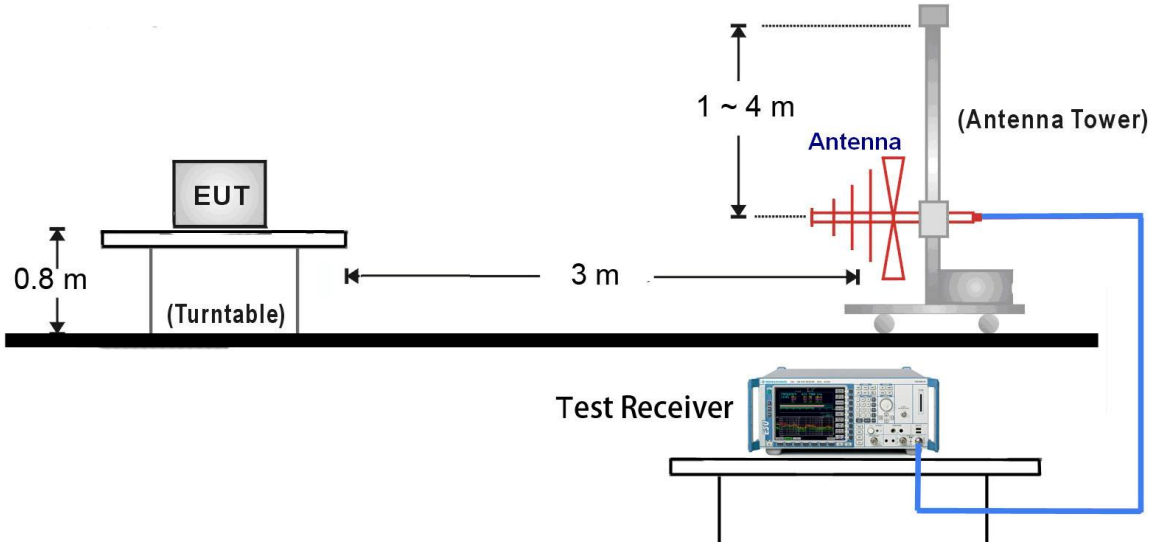
Note 1: The lower limit shall apply at the transition frequency.

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.

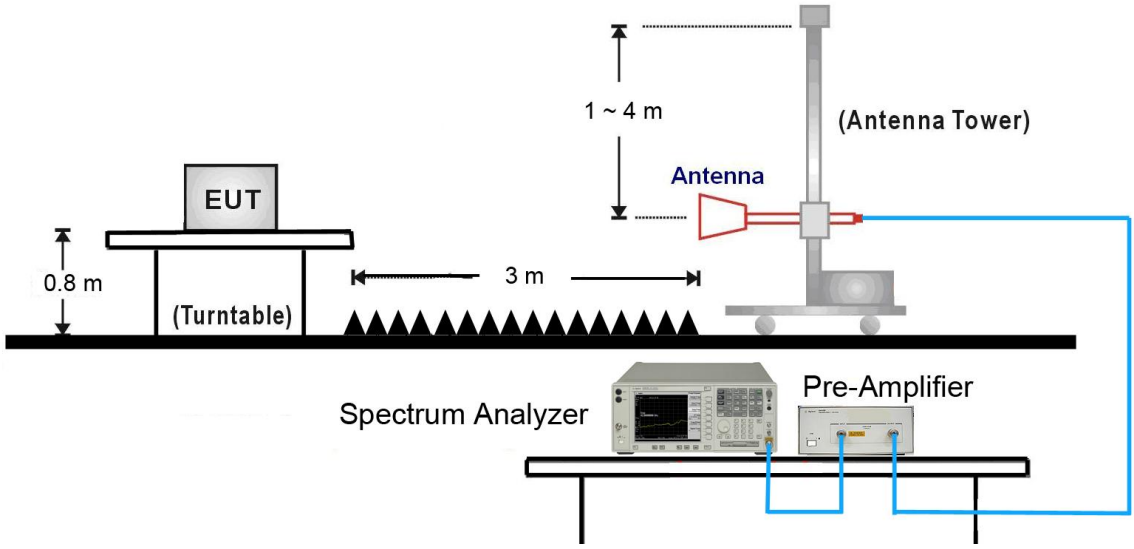
Note 3: E field strength (dBμV/m) = 20 log E field strength (uV/m)

6.3.2. Test Setup

30MHz ~ 1GHz Test Setup:

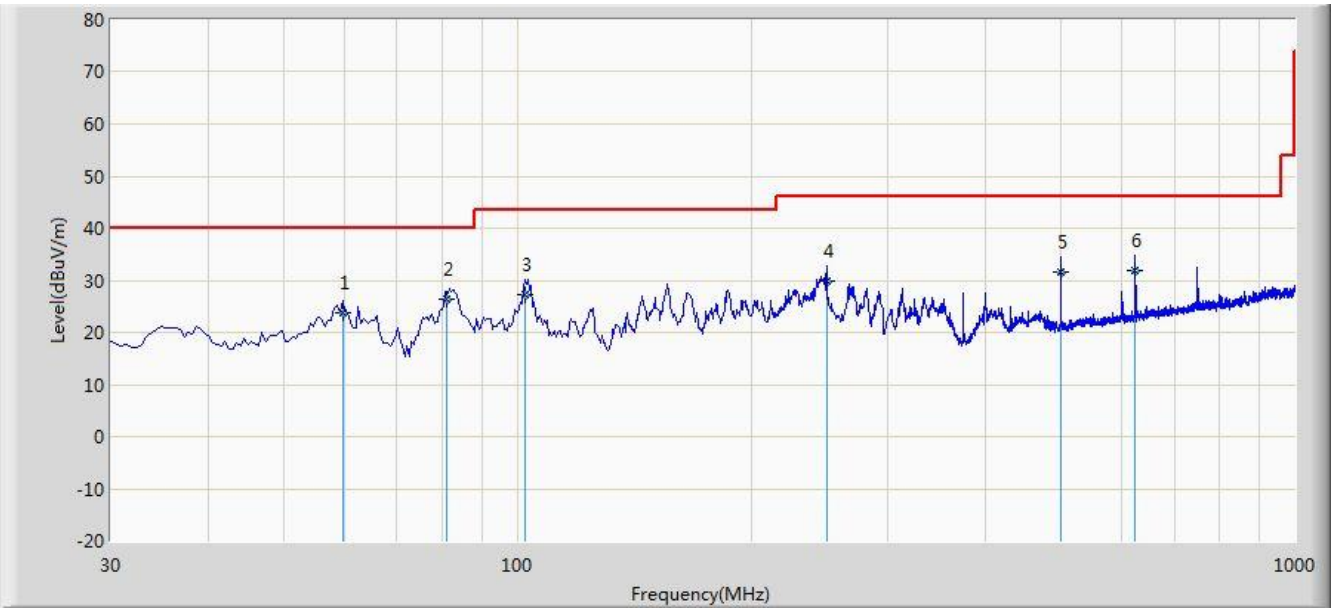


1GHz ~18GHz Test Setup:



6.3.3. Test Result of Radiated Emissions

Site: AC1	Time: 2016/05/17 - 10:53
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	

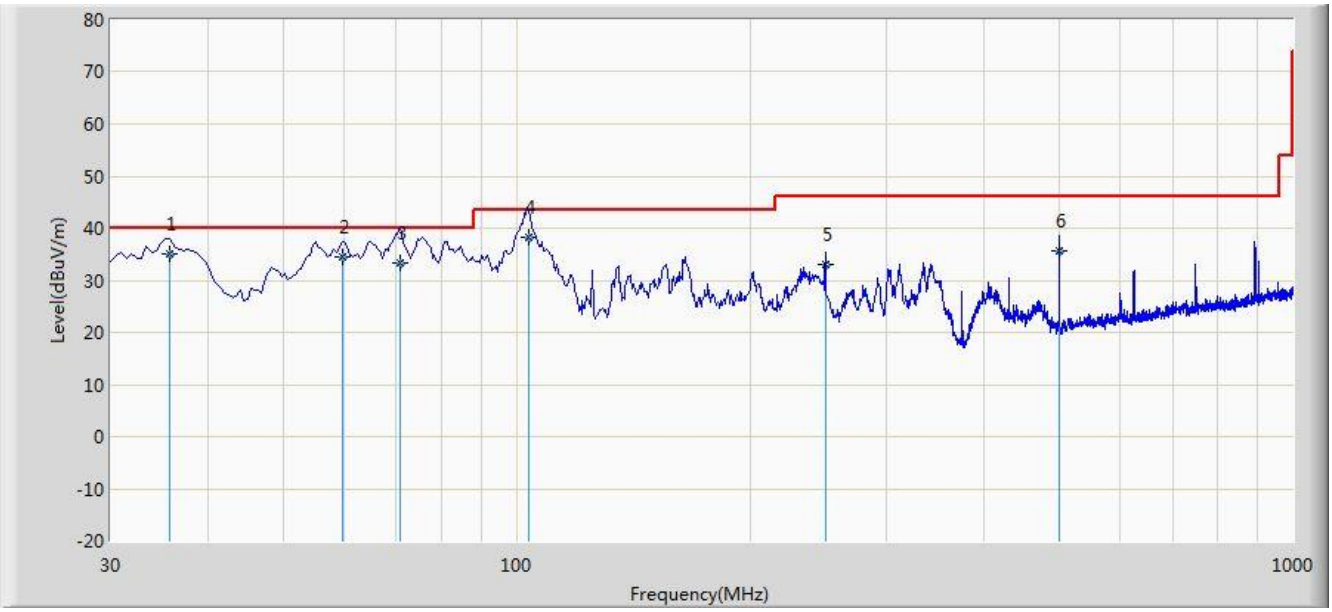


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			59.574	23.636	10.247	-16.364	40.000	13.389	QP
2		*	81.248	26.341	16.291	-13.659	40.000	10.050	QP
3			102.261	27.120	15.924	-16.380	43.500	11.196	QP
4			250.190	29.803	16.867	-16.197	46.000	12.936	QP
5			499.956	31.472	12.990	-14.528	46.000	18.481	QP
6			622.185	31.776	10.813	-14.224	46.000	20.963	QP

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

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

Site: AC1	Time: 2016/05/17 - 10:59
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	

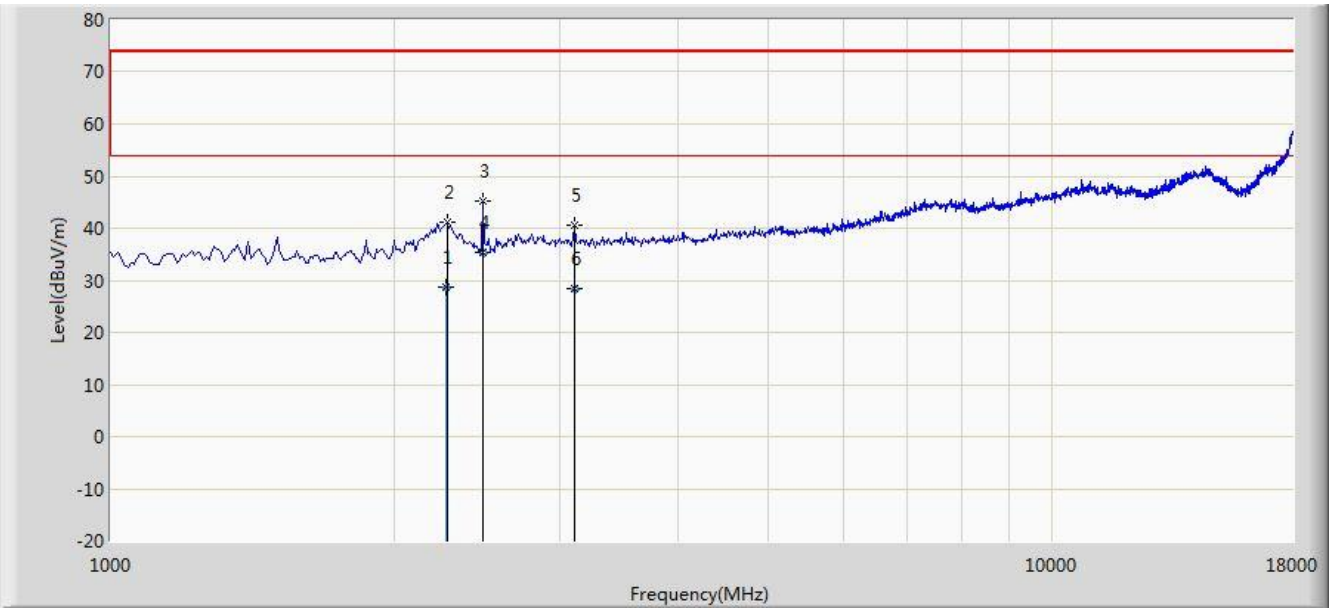


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	35.810	35.052	21.121	-4.948	40.000	13.931	QP
2			59.585	34.501	21.113	-5.499	40.000	13.388	QP
3			70.800	33.476	22.100	-6.524	40.000	11.376	QP
4			103.490	38.117	26.790	-5.383	43.500	11.327	QP
5			250.190	32.948	20.012	-13.052	46.000	12.936	QP
6			499.650	35.637	17.161	-10.363	46.000	18.476	QP

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

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

Site: AC1	Time: 2016/05/17 - 10:38
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	

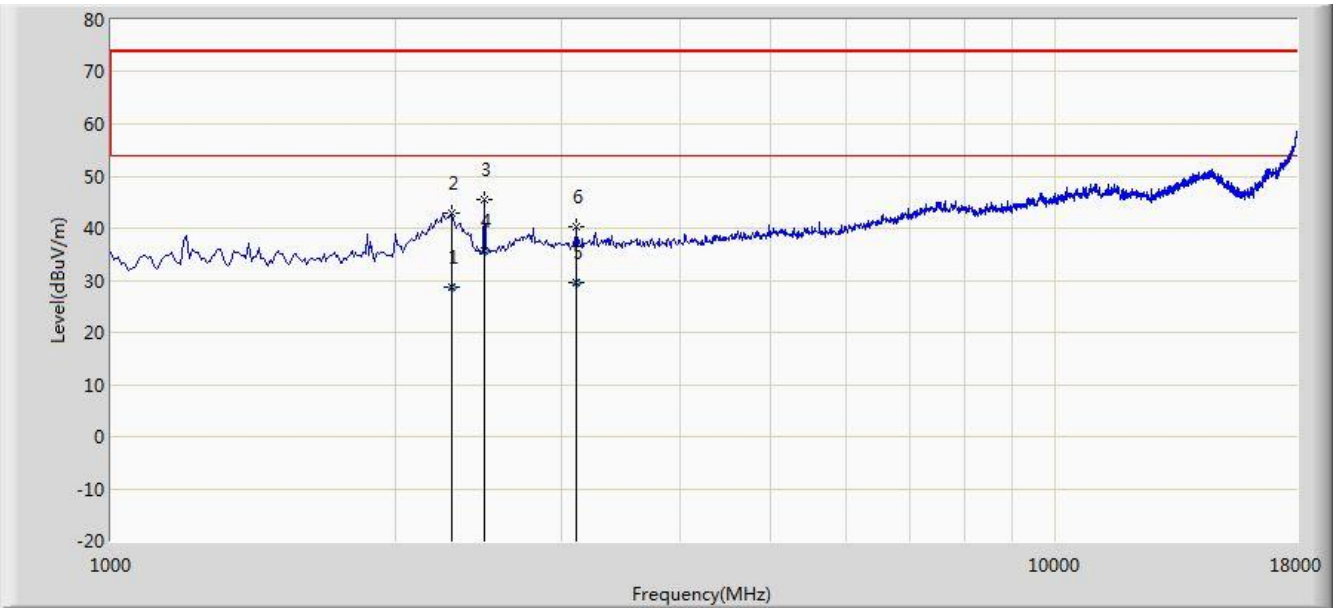


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2274.540	28.742	32.187	-25.258	54.000	-3.444	AV
2			2275.000	41.146	44.591	-32.854	74.000	-3.445	PK
3			2487.500	45.267	48.944	-28.733	74.000	-3.677	PK
4		*	2487.500	35.480	39.157	-18.520	54.000	-3.677	AV
5			3108.000	40.470	42.210	-33.530	74.000	-1.740	PK
6			3108.725	28.393	30.129	-25.607	54.000	-1.735	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: 2016/05/17 - 10:41
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			2291.458	28.733	32.187	-25.267	54.000	-3.454	AV
2			2292.000	42.992	46.446	-31.008	74.000	-3.454	PK
3			2487.500	45.629	49.306	-28.371	74.000	-3.677	PK
4		*	2487.500	35.580	39.257	-18.420	54.000	-3.677	AV
5			3107.580	29.515	31.257	-24.485	54.000	-1.742	AV
6			3108.000	40.345	42.085	-33.655	74.000	-1.740	PK

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

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

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The End