

# FCC &ISED Radio Test Report

**FCC ID: X5B-500238**  
**IC:8814A-500238**

**The report concerns: Class II Permissive Change**

Report Reference No. .... : 23EFSS04011 02481

Date Sample(s) Received ..... : 2023-12-29

Date of Tested..... : 2023-12-29 to 2024-01-17

Date of issue..... : 2024-01-17

Testing Laboratory ..... : DongGuanShuoXin Electronic Technology Co., Ltd.  
Zone A, 1F, No. 6, XinGang Road YuanGang Street,  
Address ..... : XinAn District, ChangAn Town, DongGuan City,  
GuangDong, China

Applicant's name ..... : PERFORMANCE DESIGNED PRODUCTS, LLC  
Address for ..... : 14144 Ventura Blvd, Suite 200 Sherman. Oaks CA  
91423 United States Of America

Manufacturer ..... : PERFORMANCE DESIGNED PRODUCTS, LLC

Equipment ..... : AFTERGLOW WAVE WIRELESS CONTROLLER  
FOR Nintendo Switch

Trade Mark ..... : /

Model ..... : 500-238

Ratings ..... : I/P: DC 5V Charged  
DC 3.7V Li-ion Battery

**Test Engineer:**

Blue Qiu

**Responsible Engineer :**

Smile Wang

**Authorized Signatory:**

King Wang

<b>Table of Contents</b>	<b>Page</b>
<b>1 TEST REPORT DECLARE</b>	<b>3</b>
<b>2 SUMMARY OF TEST RESULTS</b>	<b>4</b>
<b>2.1 MEASUREMENT UNCERTAINTY</b>	<b>5</b>
<b>3 GENERAL INFORMATION</b>	<b>6</b>
<b>3.1 GENERAL DESCRIPTION OF EUT</b>	<b>6</b>
<b>3.2 DESCRIPTION OF TEST MODES</b>	<b>8</b>
<b>3.3 PARAMETERS OF TEST SOFTWARE</b>	<b>9</b>
<b>3.4 BLOCKDIAGRAMSHOWINGTHECONFIGURATIONOFSYSTEMTESTED</b>	<b>9</b>
<b>3.5 SUPPORT UNITS</b>	<b>9</b>
<b>3.6 TEST ENVIRONMENT CONDITIONS</b>	<b>10</b>
<b>4 RADIATED EMISSION TEST</b>	<b>11</b>
<b>4.1 LIMIT</b>	<b>11</b>
<b>4.2 TEST PROCEDURE AND SETTING</b>	<b>12</b>
<b>4.3 MEASUREMENT INSTRUMENTS LIST</b>	<b>13</b>
<b>4.4 TESTSETUP</b>	<b>13</b>
<b>4.5 EUT OPERATING CONDITIONS</b>	<b>14</b>
<b>4.6 TEST RESULTS - 9 KHZ TO 30MHZ</b>	<b>15</b>
<b>4.7 TEST RESULTS- 30 MHZ TO 1000MHZ</b>	<b>16</b>

**1TEST REPORT DECLARE**

Applicant for FCC	PERFORMANCE DESIGNED PRODUCTS, LLC
Address for FCC	14144 Ventura Blvd, Suite 200 Sherman. Oaks CA 91423 United States Of America
Manufacturer	PERFORMANCE DESIGNED PRODUCTS, LLC
Address	14144 Ventura Blvd, Suite 200 Sherman. Oaks CA 91423 United States Of America
Factory	PERFORMANCE DESIGNED PRODUCTS, LLC
Address	14144 Ventura Blvd, Suite 200 Sherman. Oaks CA 91423 United States Of America
Equipment	AFTERGLOW WAVE WIRELESS CONTROLLER FOR Nintendo Switch
Model No.	500-238
Trade Mark	/
Issue History	This report has changed the battery and PCB based on the original product, the battery has changed from the original 2100mAh to 900mAh, and the PCB has changed the position of some bit numbers, and these changes do not affect the RF performance. In this report, only the radiation interference data less than 1GHz were tested for differences. Please refer to the original report 23EFSS04011 02481 for additional data.
Standard	FCC Part15, Subpart C (15.247) RSS-247 Issue 3, Aug. 2023 RSS-Gen Issue 5, Apr. 2018 ANSI C63.10-2013

**We Declare:**

The equipment described above is tested by DongGuanShuoXin Electronic Technology Co., Ltd(ATT). and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and DongGuanShuoXin Electronic Technology Co., Ltd.(ATT) is assumed of full responsibility for the accuracy and completeness of these tests.

ATT is not responsible for the sampling stage, so the results only apply to the sample as received.

ATT's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. ATT shall have no liability for any declarations, inferences or generalizations drawn by the client or others from ATT issued reports.

**2SUMMARY OF TEST RESULTS**

The EUT have been tested according to the applicable standards as referenced below:

Standard(s) Section		Test Item	Judgment	Remark
FCC	ISED			
15.209(a)	RSS-247 5.5	Radiated Emission	PASS	-----

Note:

- (1) "N/A" denotes test is not applicable in this test report
- (2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.

**2.1 MEASUREMENT UNCERTAINTY**

Test Item	Uncertainty
Uncertainty for Conduction emission test (9kHz-150kHz)	3.7 dB
Uncertainty for Conduction emission test (150kHz-30MHz)	3.3 dB
Uncertainty for Radiation Emission test (30MHz-200MHz)	4.60 dB (Polarize: V)
	4.60 dB (Polarize: H)
Uncertainty for Radiation Emission test (200MHz-1GHz)	6.10 dB (Polarize: V)
	5.08 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz-6GHz)	5.01 dB (Polarize: V)
	5.01 dB (Polarize: H)
Uncertainty for Radiation Emission test (6GHz-18GHz)	5.26 dB (Polarize: V)
	5.26 dB (Polarize: H)
Uncertainty for Radiation Emission test (18GHz-40GHz)	5.06 dB (Polarize: V)
	5.06 dB (Polarize: H)
Uncertainty for radio frequency	±0.048kHz
Uncertainty for conducted RF Power	±0.32dB

**Note:**

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

**Test Facility:**

The Test site used by DongGuanShuoXin Electronic Technology Co., Ltd. to collect test data is located on the Zone A, 1F, No. 6, XinGang Road YuanGang Street, XinAn District, ChangAn Town, DongGuan City, GuangDong, China

The test facility is recognized, certified, or accredited by the following organizations:

Item	Registration No.	Expiration Date
CNAS	L3098	2024-08-27
A2LA	4893.01	2024-06-30
Innovation, Science and Economic Development Canada (ISED)	11033A CAB identifier:CN0083	2024-06-30
Federal Communications Commission (FCC)	171688 Designation No.:CN1235	2024-06-30

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

Equipment	AFTERGLOW WAVE WIRELESS CONTROLLER FOR Nintendo Switch	
Brand Name	/	
Test Model	500-238	
Series Model	N/A	
Model Difference(s)	N/A	
Hardware Version	1.0	
Software Version	1.0	
PowerSource	Battery	
Power Rating	DC 5V Charger DC 3.7V Li-ion Battery	
Operation Frequency	2402 MHz ~ 2480 MHz	
Modulation Technology	GFSK, $\pi/4$ -DQPSK, 8-DPSK	
Bit Rate of Transmitter	1Mbps /2Mbps /3Mbps	
Antenna Information	Antenna Type:PCB	Maximum Peak Gain:1.63dBi

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

### 3.2 DESCRIPTION OF TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1	TX Mode <b>NOTE (1)</b>
Mode 2	TX Mode

Following mode(s) was (were) found to be the worst case(s) and selected for the final test.

<b>Radiated emissions test - Below 1GHz</b>	
Final Test Mode	Description
Mode 2	TX Mode

<b>Conducted test</b>	
Final Test Mode	Description
Mode 1	TX Mode <b>NOTE (1)</b>

Note:

- (1) The measurements are performed at the high, middle, low available channels.
- (2) The measurements for Hopping Channel Separation, Bandwidth and Maximum Output Power were tested during 1Mbps, 2Mbps and 3Mbps, the worst case are 1Mbps and 3Mbps, only worst case was documented.

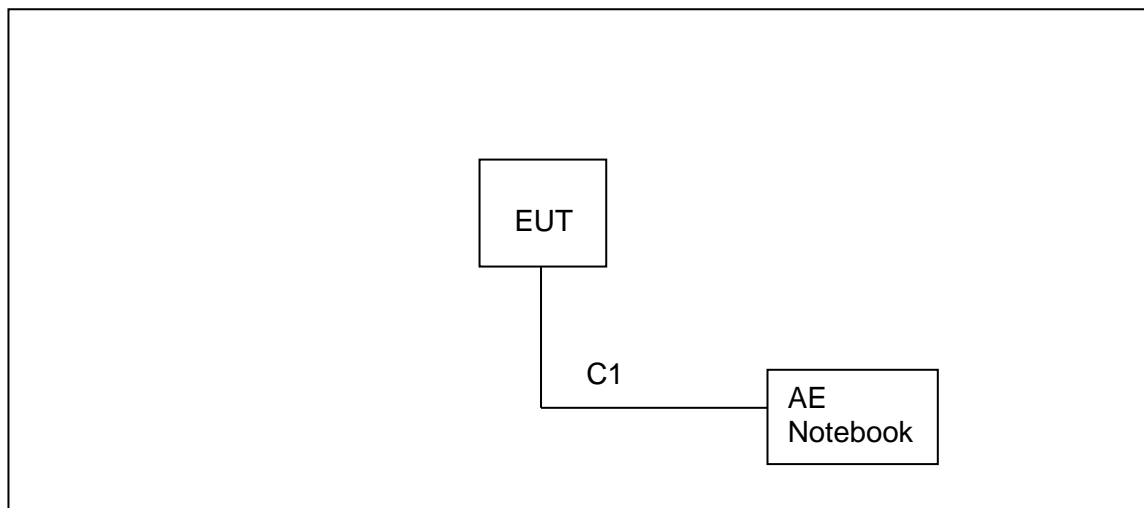


### 3.3PARAMETERS OF TEST SOFTWARE

During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Test Software	N/A		
Frequency (MHz)	2402	2441	2480
Parameters(1Mbps)	Default	Default	Default
Parameters(3Mbps)	Default	Default	Default

### 3.4BLOCKDIAGRAMSHOWINGTHECONFIGURATIONOFSYSTEMTESTED



### 3.5SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.
AE	Notebook	Lenovo	/	/

Item	Cable Type	Shielded Type	Ferrite Core	Length
C1	DC Cable	NO	NO	0.8m

**3.6 TEST ENVIRONMENT CONDITIONS**

Test Item	Temperature	Humidity	Test Voltage
Radiated Emissions-9K-30MHz	25°C	60%	DC 5V
Radiated Emissions-30 MHz to 1GHz	24°C	68%	DC 5V

## 4 RADIATED EMISSION TEST

### 4.1 LIMIT

In case the emission fall within the restricted band specified on 15.205(a) & RSS-Gen 8.10, then the 15.209(a) & RSS-Gen 8.9 limit in the table below has to be followed.

#### LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-1000MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

#### LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-30 MHz)

Frequency (MHz)	Magnetic field strength (H-Field) (μA/m)	Measurement Distance (meters)
0.009-0.490	6.37/F(kHz)	300
0.490-1.705	6.37/F(kHz)	30
1.705-30.0	0.08	30

#### LIMITS OF RADIATED EMISSION MEASUREMENT (30 MHz-1000MHz)

Frequency (MHz)	Field Strength (μV/m at 3m)
30-88	100
88-216	150
216-960	200
Above 960	500

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency (MHz)	(dBuV/m at 3 m)	
	Peak	Average
Above 1000	74	54

**Note:**

- (1) The limit for radiated test was performed according to FCC PART 15C and RSS-247.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

**4.2 TEST PROCEDURE AND SETTING**

- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1GHz)
- h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- i. The test result is calculated as the following:
  - (1) Result = Reading + Correct Factor
  - (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
  - (3) Margin = Result - Limit

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	RBW 1MHz VBW 3MHz peak detector for Pk value RMS detector for AV value

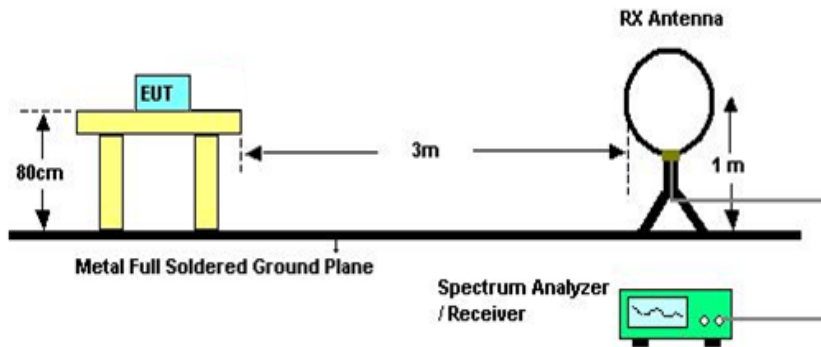
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

### 4.3 MEASUREMENT INSTRUMENTS LIST

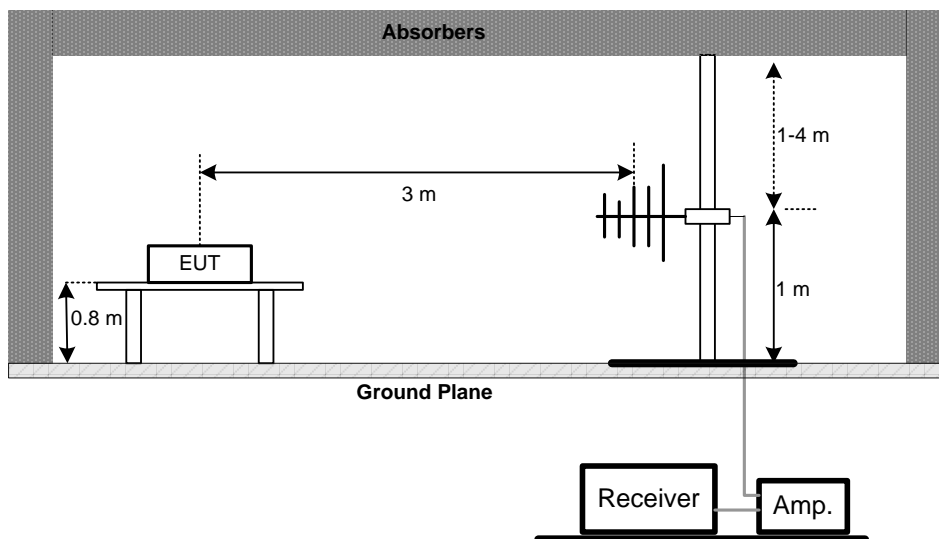
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	101307	11/29/2024
2	Spectrum Analyzer	Agilent	E4407B	US40240708	11/06/2024
3	Loop antenna	SCHWARZBECK K	FMZB1519	1519-062	01/14/2025
4	Broadband antenna	SCHWARZBECK	VULB9168	VULB9168-192	07/02/2024
5	HORN ANTENNA	SCHWARZBECK	BBHA9120D	9120D 1065	04/09/2024
6	Preamplifier Amplifier	HP	8447F	3113A05680	12/04/2024
7	PRE-AMPLIFIER	EMEC	EM01G26G	980136	04/05/2024
8	RF Cable	R&S	Test Cable 4	4	12/04/2024
9	RF Cable	R&S	Test Cable 5	5	12/04/2024
10	RF Cable	R&S	Test Cable 9	8	04/18/2024
11	RF Cable	R&S	Test Cable 10	9	04/18/2024
12	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A

### 4.4 TEST SETUP

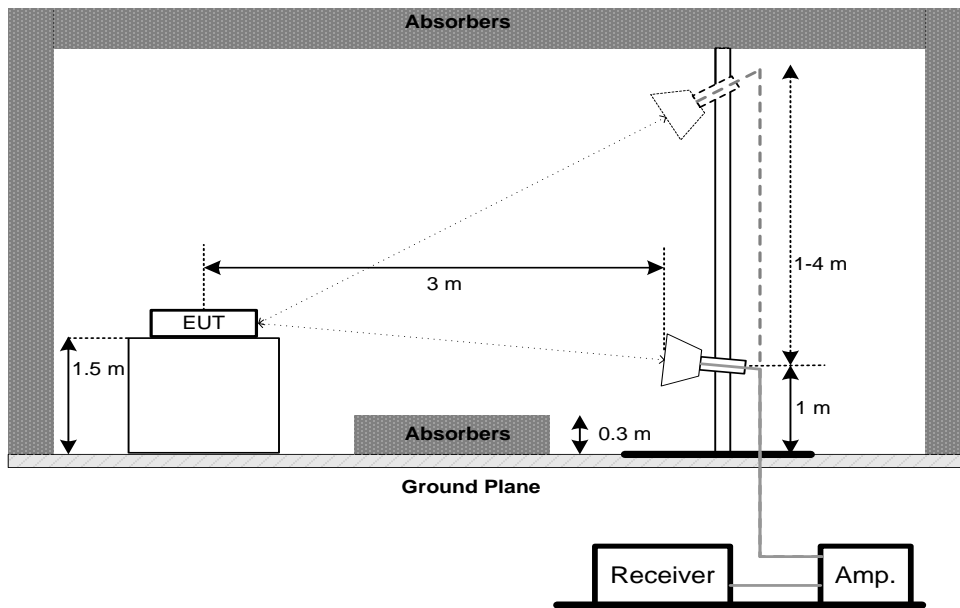
#### 9 kHz-30 MHz



#### 30 MHz to 1 GHz



### Above 1 GHz



### 4.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 4.6 TEST RESULTS - 9 kHz TO 30MHz

Test Mode:	TX Mode Channel 01 _3Mbps
------------	---------------------------

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

**Note:**

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

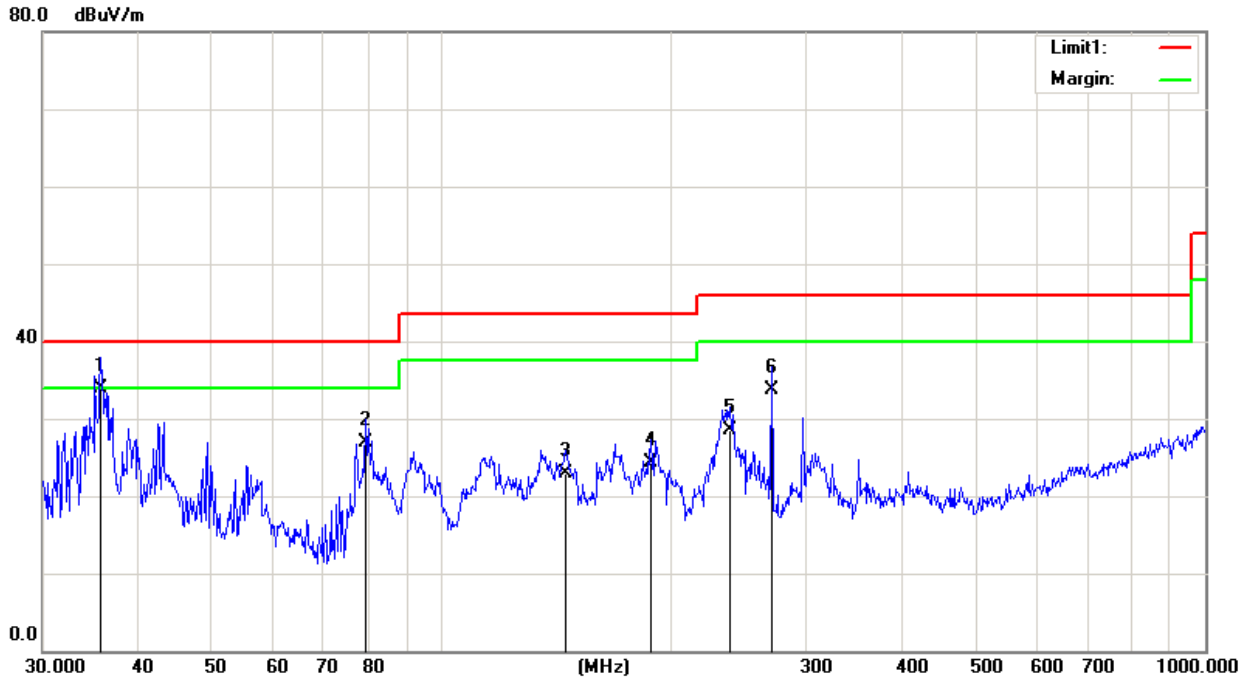
Distance extrapolation factor =  $20 \log(\text{specific distance}/\text{test distance})(\text{dB})$ ;

Limit line = specific limits(dBuv) + distance extrapolation factor

## 4.7TEST RESULTS- 30 MHz TO 1000MHz

Test Mode: TX Mode

### Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1	*	35.8441	47.35	-13.49	33.86	40.00	-6.14	QP	100	113
2		79.5210	42.92	-16.03	26.89	40.00	-13.11	QP	100	129
3		145.3505	36.32	-13.39	22.93	43.50	-20.57	QP	100	351
4		187.7530	37.48	-13.13	24.35	43.50	-19.15	QP	100	64
5		238.3102	38.17	-9.70	28.47	46.00	-17.53	QP	100	19
6		270.3748	43.39	-9.78	33.61	46.00	-12.39	QP	100	287

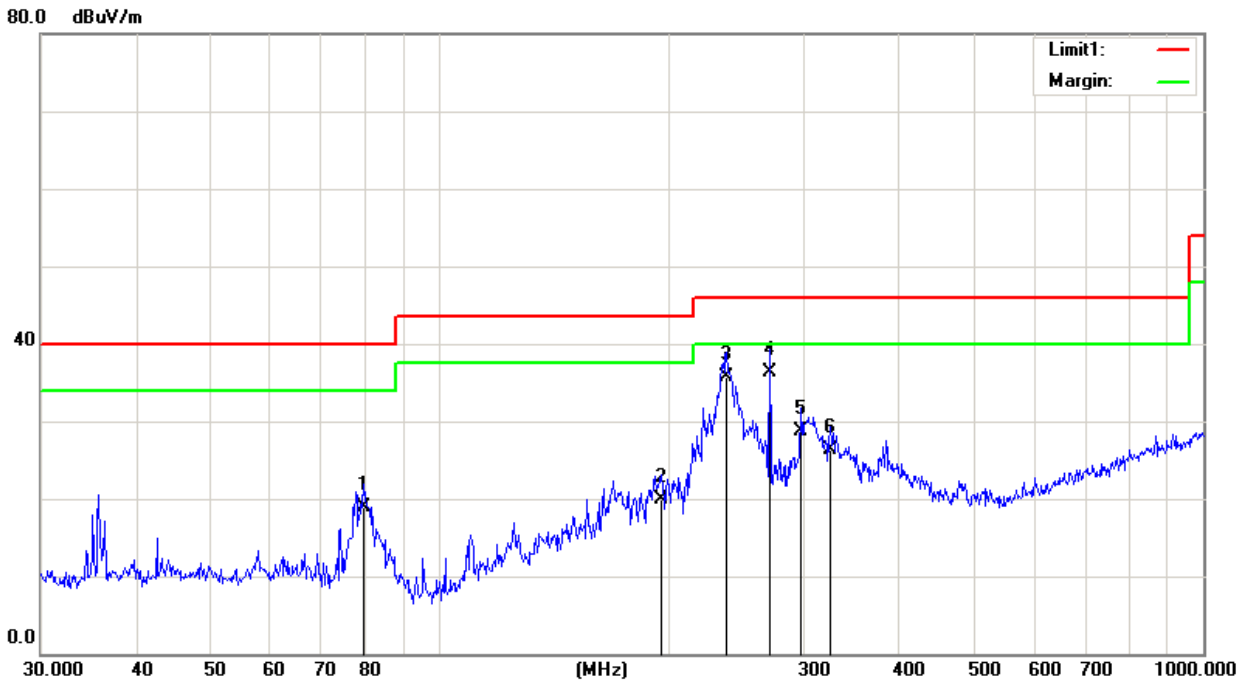
\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only



Test Mode: TX Mode

### Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Antenna Height cm	Table Degree	Comment
1		79.5208	36.89	-18.03	18.86	40.00	-21.14	QP	100	18
2		195.1365	31.51	-11.58	19.93	43.50	-23.57	QP	100	235
3		237.4760	43.66	-7.94	35.72	46.00	-10.28	QP	100	186
4	*	270.3748	43.99	-7.64	36.35	46.00	-9.65	QP	100	136
5		297.2241	36.62	-7.83	28.79	46.00	-17.21	QP	100	58
6		324.4560	35.79	-9.56	26.23	46.00	-19.77	QP	100	332

\*:Maximum data    x:Over limit    !:over margin

(Reference Only)

**END OF TEST REPORT**