

FCC 15B Test Report

FCC ID: 2AE46-RX

Original Grant

Report No. : TB-FCC144562
Applicant : Yantai Hengtai Electronics Co., Ltd.
Equipment Under Test (EUT)
EUT Name : Wireless receiving and calling system
Model No. : APE9300
Serial Model No. : Please see page 4.
Brand Name : SINGCALL
Receipt Date : 2015-06-18
Test Date : 2015-06-18 to 2015-06-23
Issue Date : 2015-06-23
Standards : FCC Part 15: 2014, Subpart B, Class B
Test Method : ANSI C63.4-2014
Conclusions : **PASS**

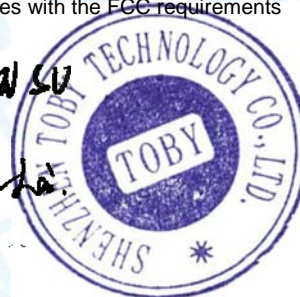
In the configuration tested, the EUT complied with the standards specified above,
The EUT technically complies with the FCC requirements

Test/Witness Engineer

: *Ivan Su*

Approved & Authorized

: *Ray Su*



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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1. General Information about EUT

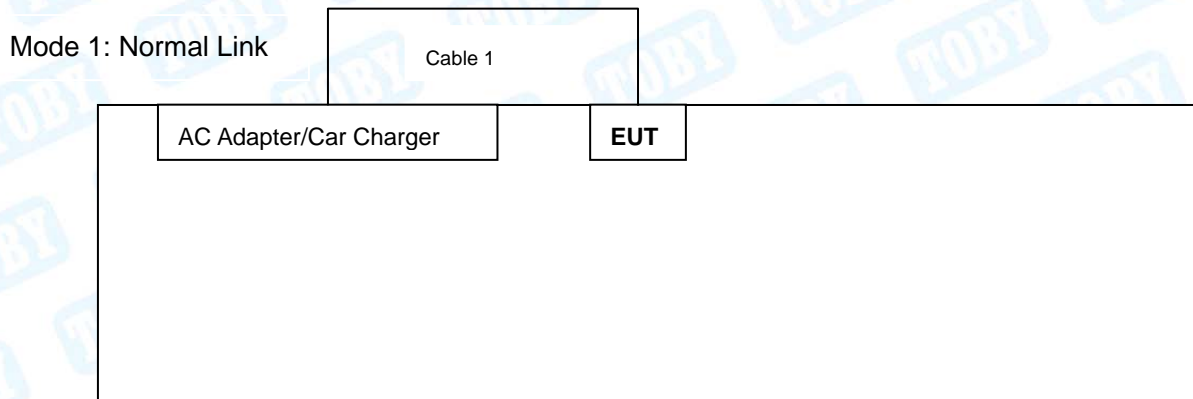
1.1 Client Information

Applicant	:	Yantai Hengtai Electronics Co., Ltd.
Address	:	Room 201, Building E, Yeda Industry and Technology Park, No. 300, Changjiang Road, Development Zone, Yantai City, Shandong Province, China
Manufacturer	:	Yantai Hengtai Electronics Co., Ltd.
Address	:	Room 201, Building E, Yeda Industry and Technology Park, No. 300, Changjiang Road, Development Zone, Yantai City, Shandong Province, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Wireless receiving and calling system
Brand Name	:	SINGCALL
Model No.	:	APE9300, APE9500, APE6600, APE6800, APE9600, APE1300, APE1500, APE2900, SC-R10, SC-R18
Model difference	:	All models are identical in the same PCB layout, interior structure and electrical circuits, The only difference is model name for commercial purpose.
Modulation	:	ASK
Operating Frequency	:	433.92MHz Receive with Integral Antenna
Power Supply	:	DC Voltage supplied from AC/DC adapter
Power Rating	:	AC/DC Adapter: Input: AC 100~240V, 50/60 Hz Output: DC 12V 1A
Note: For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.		

1.3 Block Diagram Showing the Configuration of System Tested



Note: During Testing the EUT was in receiving mode.

1.4 Description of Support Units

Equipment Information				
Name	Model	DOC/FCC ID	Manufacturer	Used “√”
Cable Information				
Number	Shielded Type	Ferrite Core	Length	Note
Cable 1	YES	NO	3.0M	Accessorise

1.5 Description of Test Mode

Mode	Description
Mode 1	AC Charger with Normal Link

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of the EUT operation mode, and the maximum emission levels of the conducted and radiated emissions are compared to the FCC Part 15 Subpart B (Class B) limits.

1.6 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U_{Lab})
Conducted Emission	Level Accuracy: 9kHz~150kHz	± 3.42 dB
	150kHz to 30MHz	± 3.42 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	± 4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	± 4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	± 4.20 dB

1.7 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

FCC List No.: (811562)

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

May 22, 2014 certificated by TUV Rheinland(China) Co., Ltd. with TUV certificate No.: UA 50282953 0001 and report No.: 17026822 002. The certificate is valid until the next scheduled audit or up to 18 months, at the discretion of TUV Rhineland.

2. Test Summary

FCC Part15, Subpart B				
Section	Test Method	Test Item	Limit	Judgment
15.109	ANSI C63.4:2014	Radiated Emission (30M~1GHz)	Class B	PASS
15.107	ANSI C63.4:2014	Conducted Emission (150KHz to 30MHz)	Class B	PASS

Note: N/A is an abbreviation for Not Applicable.

3. Test Equipment

Conducted Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Aug. 08, 2014	Aug. 07, 2015
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Aug. 08, 2014	Aug. 07, 2015
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Aug. 08, 2014	Aug. 07, 2015
LISN	Rohde & Schwarz	ENV216	101131	Aug. 08, 2014	Aug. 07, 2015
Radiation Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Sep. 01, 2014	Aug. 31, 2015
EMI Test Receiver	Rohde & Schwarz	ESCI	100010/007	Aug. 08, 2014	Aug. 07, 2015
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 28, 2015	Mar. 27, 2016
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 28, 2015	Mar. 27, 2016
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 28, 2015	Mar. 27, 2016
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 28, 2015	Mar. 27, 2016
Pre-amplifier	Sonoma	310N	185903	Mar. 28, 2015	Mar. 27, 2016
Pre-amplifier	HP	8447B	3008A00849	Mar. 28, 2015	Mar. 27, 2016
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 28, 2015	Mar. 27, 2016
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A

4. Conducted Emission Test

4.1 Test Standard and Limit

4.1.1 Test Standard
FCC Part 15.107

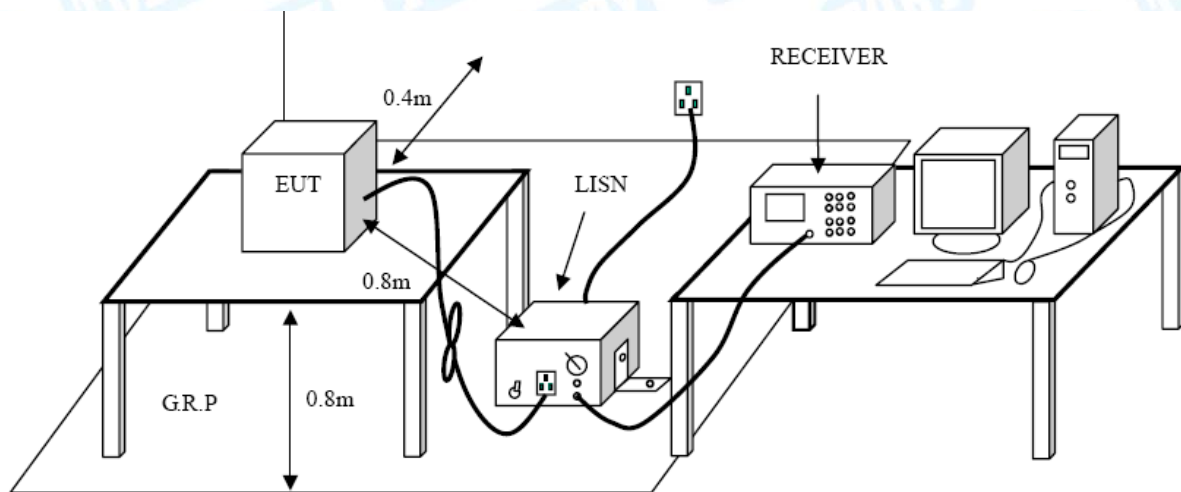
4.1.2 Test Limit

Conducted Emission Test Limit

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak Level	Average Level
0.15~0.5	66 ~ 56 *	56 ~ 46 *
0.5~5.0	56.00	46.00
5.0~30.0	60.00	50.00

Notes: (1) *Decreasing linearly with logarithm of the frequency.
(2) The lower limit shall apply at the transition frequencies.

4.2 Test Setup



4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance.

The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

For the actual test configuration, please refer to the EUT test Photos.

4.4 EUT Operating Mode

(1) Setup the EUT and peripherals refer to the description of test mode.

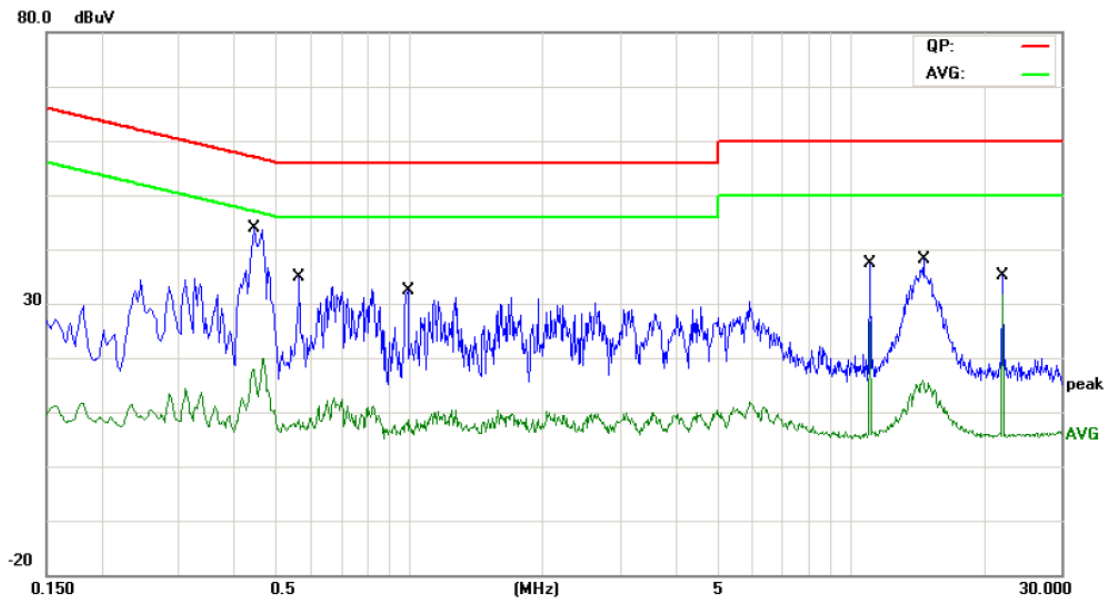
4.5 Deviation

The test is no deviation from the standard.

4.5 Test Data

Please see the next page.

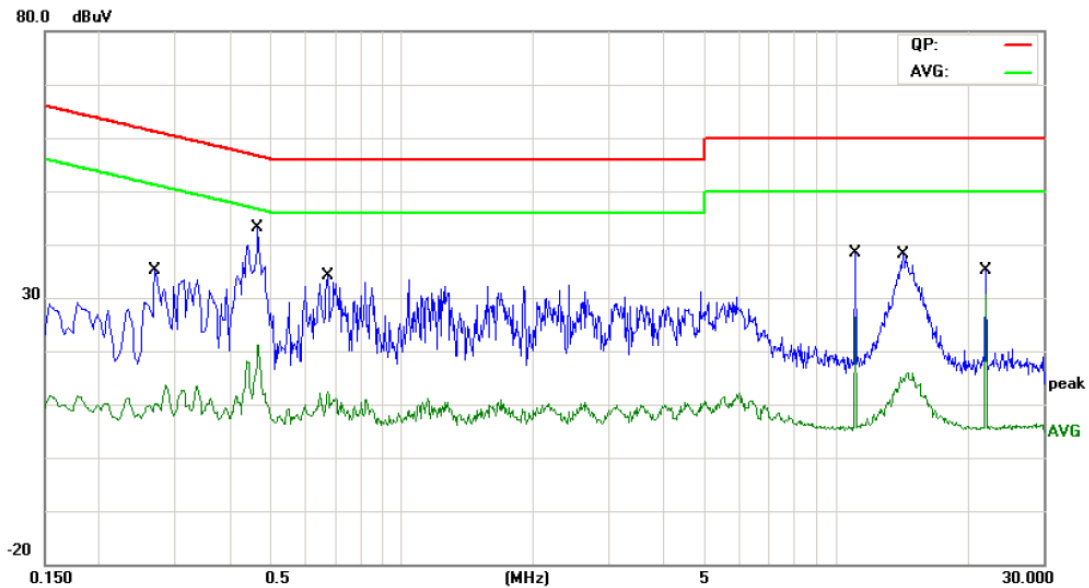
EUT:	Wireless receiving and calling system	Model Name :	APE9300
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Terminal:	Line		
Test Mode:	AC Charger with Normal Link		
Remark:	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.4460	20.12	10.02	30.14	56.95	-26.81	QP	
2		0.4460	3.42	10.02	13.44	46.95	-33.51	AVG	
3		0.5620	7.81	10.05	17.86	56.00	-38.14	QP	
4		0.5620	-3.74	10.05	6.31	46.00	-39.69	AVG	
5		0.9900	6.62	10.06	16.68	56.00	-39.32	QP	
6		0.9900	-3.45	10.06	6.61	46.00	-39.39	AVG	
7		11.0580	24.59	10.18	34.77	60.00	-25.23	QP	
8		11.0580	16.54	10.18	26.72	50.00	-23.28	AVG	
9		14.6100	19.77	10.25	30.02	60.00	-29.98	QP	
10		14.6100	4.05	10.25	14.30	50.00	-35.70	AVG	
11		22.1180	23.86	10.16	34.02	60.00	-25.98	QP	
12	*	22.1180	21.35	10.16	31.51	50.00	-18.49	AVG	

Emission Level= Read Level+ Correct Factor

EUT:	Wireless receiving and calling system	Model Name :	APE9300
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Terminal:	Neutral		
Test Mode:	AC Charger with Normal Link		
Remark:	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2700	10.22	10.10	20.32	61.12	-40.80	QP	
2		0.2700	-3.03	10.10	7.07	51.12	-44.05	AVG	
3		0.4660	25.47	10.03	35.50	56.58	-21.08	QP	
4		0.4660	9.29	10.03	19.32	46.58	-27.26	AVG	
5		0.6740	15.58	10.02	25.60	56.00	-30.40	QP	
6		0.6740	1.04	10.02	11.06	46.00	-34.94	AVG	
7		11.0580	24.61	10.14	34.75	60.00	-25.25	QP	
8		11.0580	16.55	10.14	26.69	50.00	-23.31	AVG	
9		14.2380	19.08	10.08	29.16	60.00	-30.84	QP	
10		14.2380	2.58	10.08	12.66	50.00	-37.34	AVG	
11		22.1180	23.86	10.06	33.92	60.00	-26.08	QP	
12	*	22.1180	21.35	10.06	31.41	50.00	-18.59	AVG	

Emission Level= Read Level+ Correct Factor

5. Radiated Emission Test

5.1 Test Standard and Limit

5.1.1 Test Standard

FCC Part 15.109

5.1.2 Test Limit

Radiated Emission Limit

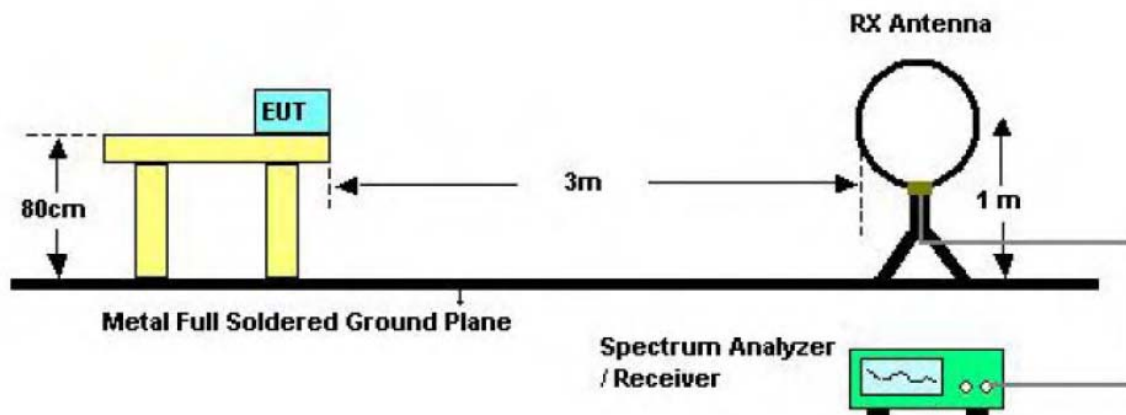
Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (meters)
30~88	40	3
88~216	43.5	3
216~960	46	3
Above 960	54	3
Note: Emission Level(dBuV/m)=20log Emission Level(uV/m)		

For unintentional radiators (FCC Part 15, section 15.33(1)):

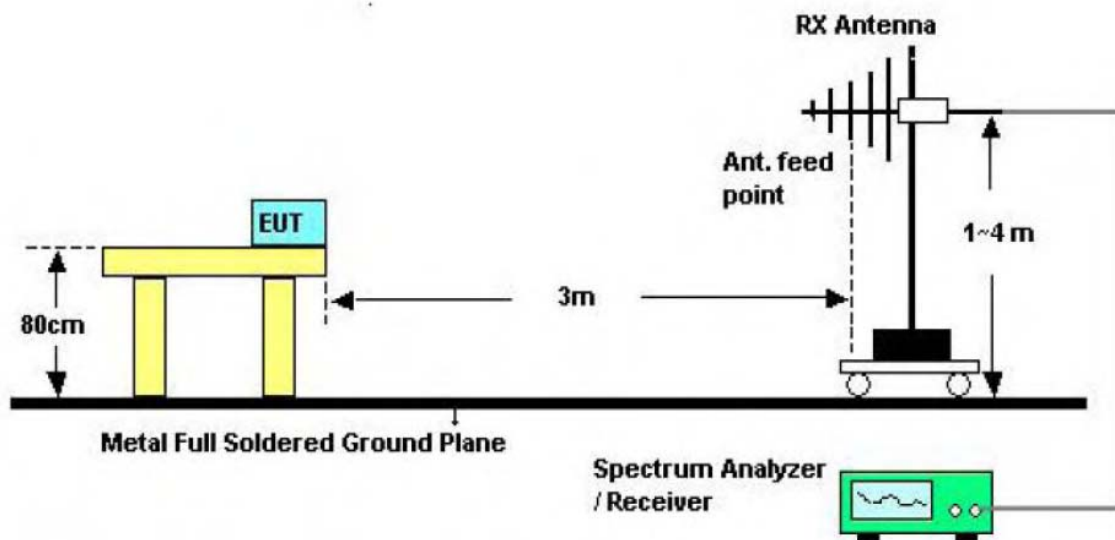
Except as otherwise indicated in paragraphs (b)(2) or (b)(3), for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit 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	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

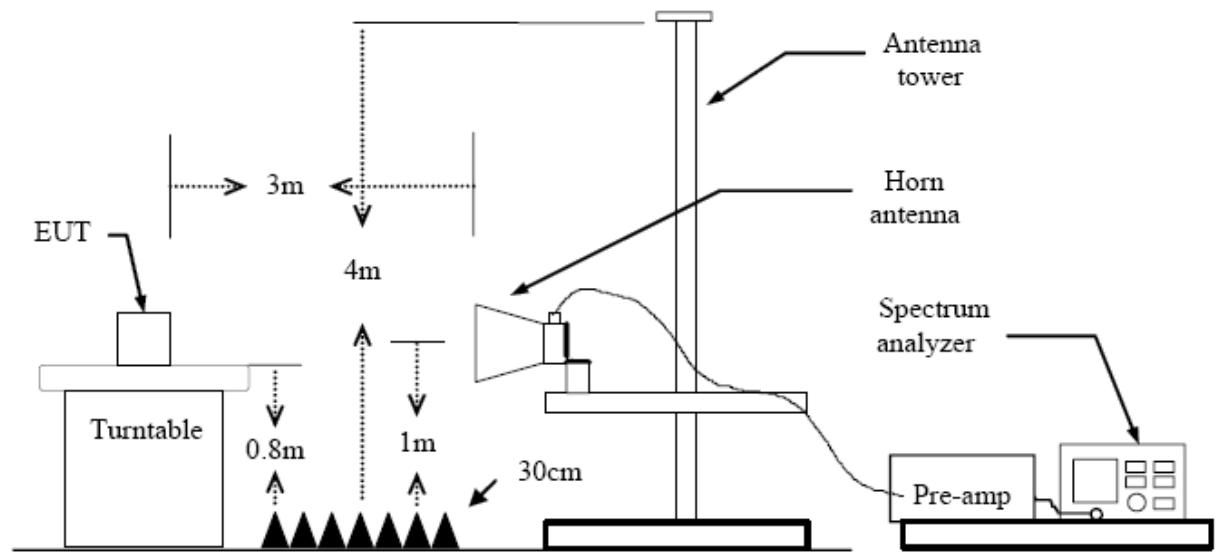
5.2 Test Setup



Bellow 30MHz Test Setup



30MHz to 1000MHz Test Setup



Above 1GHz Test Setup

5.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 0.8m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

5.4 EUT Operating Condition

(1) Setup the EUT and peripherals refer to the description of test mode.

5.5 Deviation

The test is no deviation from the standard.

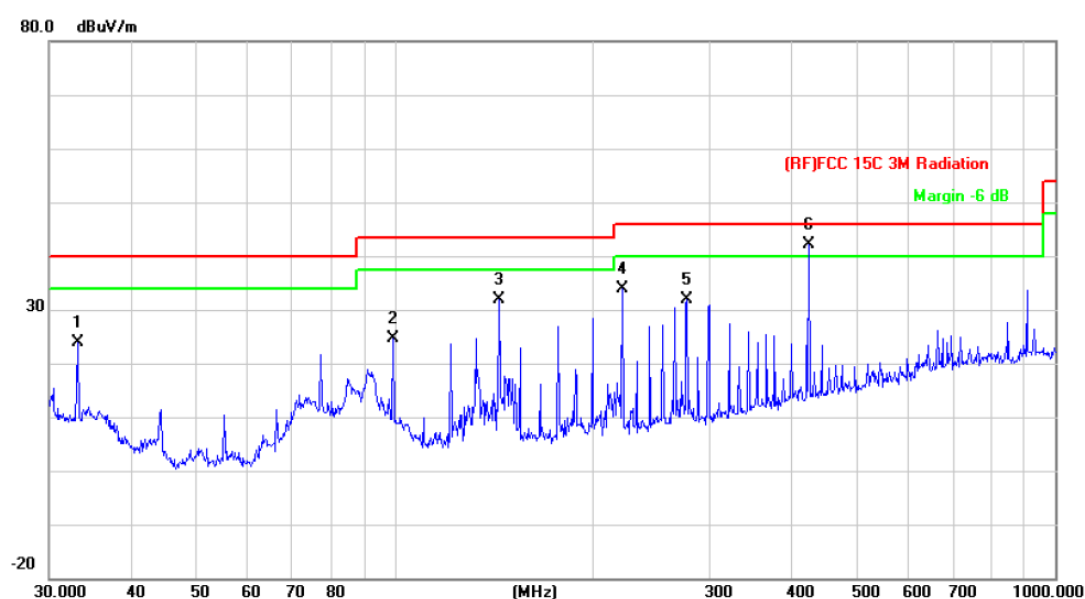
5.6 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10Hz with Peak Detector for Average Values.

Test data please refer the following pages.

(1) Bellow 1GHz

EUT:	Wireless receiving and calling system	Model Name :	APE9300
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	AC Charger with Normal Link		
Remark:	Only worse case is reported		

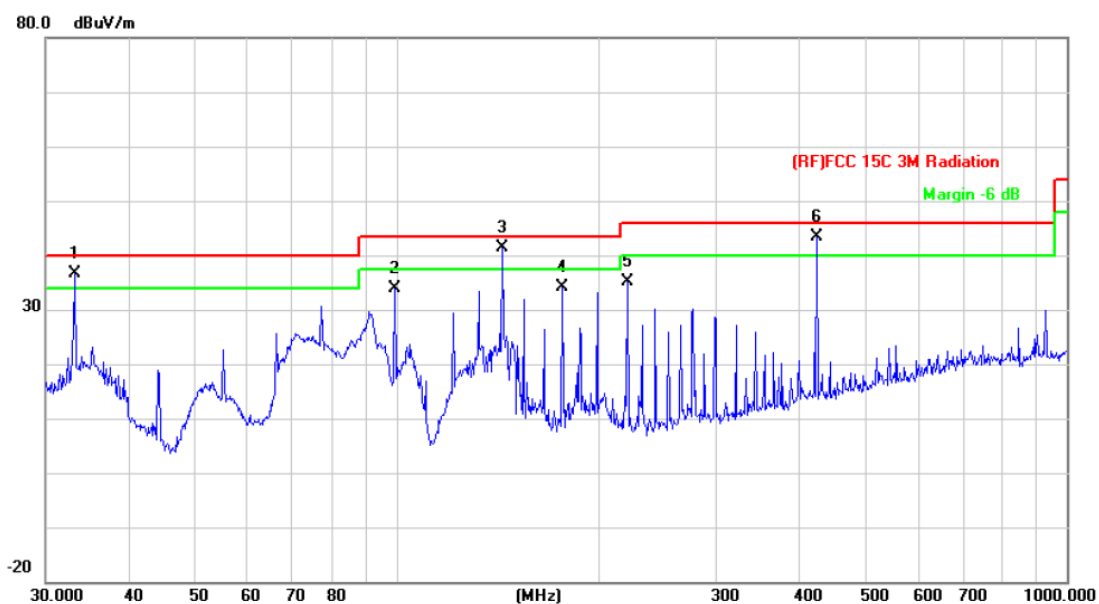


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		33.0950	39.80	-15.88	23.92	40.00	-16.08	peak
2		99.5281	46.49	-21.86	24.63	43.50	-18.87	peak
3		143.8295	53.57	-21.67	31.90	43.50	-11.60	peak
4		221.3921	53.22	-19.46	33.76	46.00	-12.24	peak
5		277.0935	49.42	-17.54	31.88	46.00	-14.12	peak
6	*	423.5403	55.10	-12.92	42.18	46.00	-3.82	peak

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

Emission Level= Read Level+ Correct Factor

EUT:	Wireless receiving and calling system	Model Name :	APE9300
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	AC Charger with Normal Link		
Remark:	Only worse case is reported		



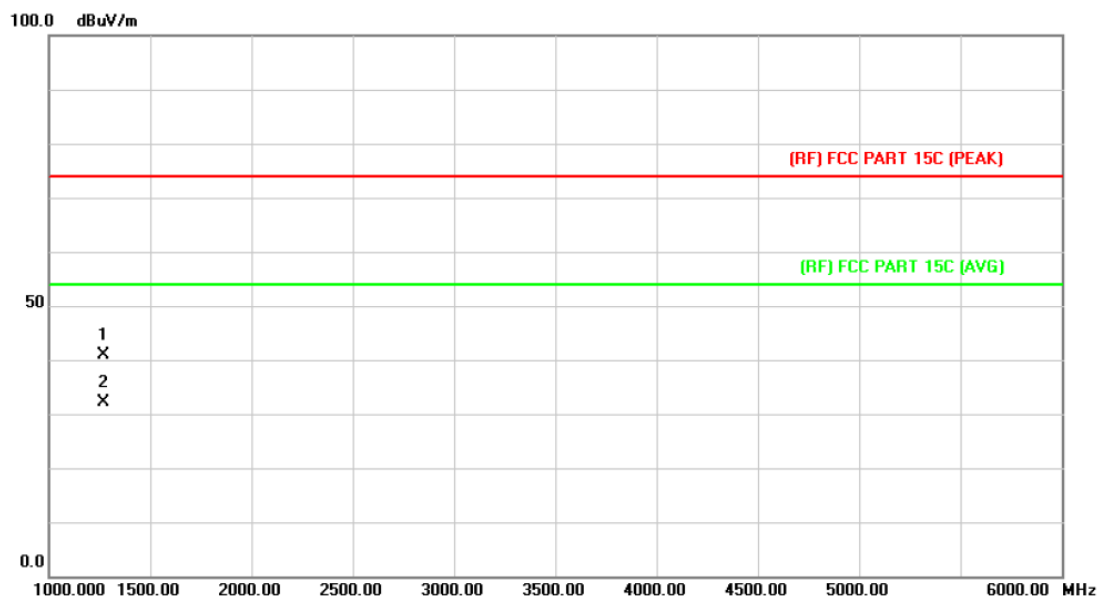
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	!	33.0950	52.41	-15.88	36.53	40.00	-3.47	peak
2		99.5281	55.77	-21.86	33.91	43.50	-9.59	peak
3	*	143.8295	62.99	-21.67	41.32	43.50	-2.18	peak
4		176.8878	54.93	-20.76	34.17	43.50	-9.33	peak
5		221.3921	54.60	-19.46	35.14	46.00	-10.86	peak
6	!	423.5403	56.23	-12.92	43.31	46.00	-2.69	peak

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

Emission Level= Read Level+ Correct Factor

Above 1 GHz

EUT:	Wireless receiving and calling system	Model Name :	APE9300
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	Normal Link		
Remark:	Only worse case is reported		

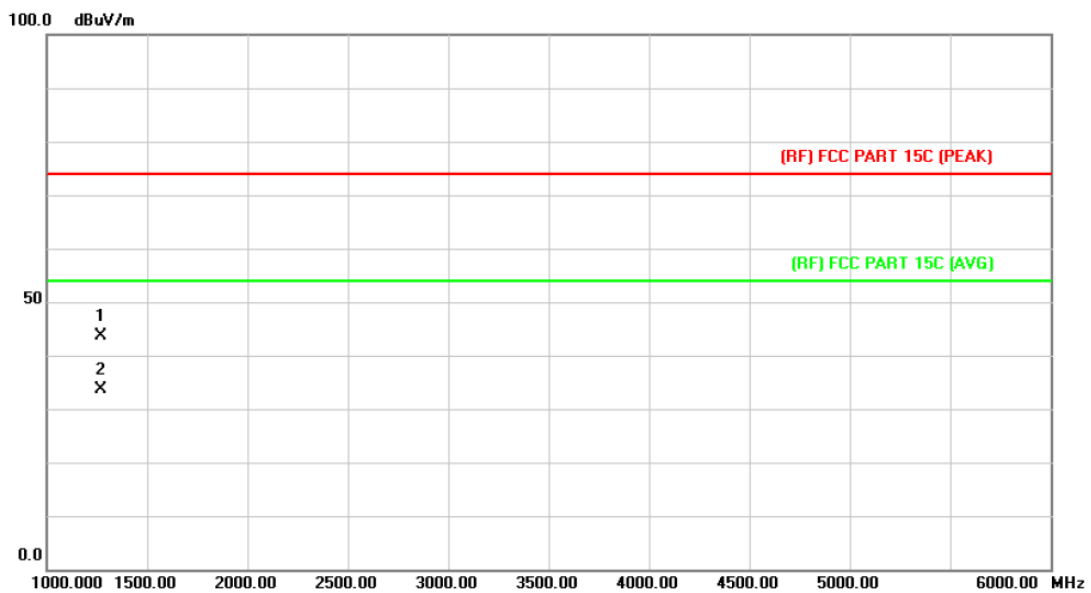


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		1270.000	46.31	-5.31	41.00	74.00	-33.00	peak
2	*	1270.000	37.45	-5.31	32.14	54.00	-21.86	AVG

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

Emission Level= Read Level+ Correct Factor

EUT:	Wireless receiving and calling system	Model Name :	APE9300
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	Normal Link		
Remark:	Only worse case is reported		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB Detector
1		1270.000	48.96	-5.31	43.65	74.00	-30.35 peak
2	*	1270.000	38.95	-5.31	33.64	54.00	-20.36 AVG

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

Emission Level= Read Level+ Correct Factor