EMC Test Report

Report No.: AGC00720180503EE02B

PRODUCT DESIGNATION	:	VoIP Phone
BRAND NAME	:	ATCOM
MODEL NAME	:	A68WAC, A48WAC, A68, A48
APPLICANT	:	ATCOM Technology CO., LTD
DATE OF ISSUE	:	Dec. 17, 2019
STANDARD(S)	:	Draft EN 301 489-1 V2.2.0 (2017-03) Draft EN 301 489-3 V2.1.1 (2017-03) Draft EN 301 489-17 V3.2.0 (2017-03)
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Dec. 17, 2019	Valid	Extension Report

Note:

The original test report Ref.No. AGC00720180503EE02 May 28, 2018 was modified on Dec. 17, 2019 to include the following changes:

Change Series Model;

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1. TEST REPORT CERTIFICATION

Applicant	ATCOM Technology CO., LTD
Address	A2F,Block3,Huangguan Technology Park,#21 Tairan
Manufacturer	ATCOM Technology CO., LTD
Address	A2F,Block3,Huangguan Technology Park,#21 Tairan
Factory	ATCOM Technology CO., LTD
Address	A2F,Block3,Huangguan Technology Park,#21 Tairan
Product Designation	VoIP Phone
Brand Name	ATCOM
Test Model	A68WAC
Series Model	A48WAC, A68, A48
Model Difference	They have the same main board, but different on keypad and LCD, A68/A48 without wifi
Date of test	May 16, 2018 to May 28, 2018
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-EC-IT/AC

We, Attestation of Global Compliance (Shenzhen) Co., Ltd., hereby certify that the submitted samples of the above item, as detailed in chapter 2.1 of this report, has been tested in our facility. The test record, data evaluation and test configuration represented herein are true and accurate accounts of measurements of the sample's EMC characteristics under the conditions herein specified.

Prepared By

Max Zhang
(Project Engineer)
May 28, 2018

Reviewed By

Erik Yang
(Reviewer)
Dec. 17, 2019

Approved By

Forrest Lei(Lei Yonggang)
Authorized Officer
Dec. 17, 2019

2. GENERAL INFORMATION

2.1. DESCRIPTION OF EUT

The EUT is a short range, lower power, WIFI device.

Details of technical specification refer to the description in follows:

Transmitter/Receiver (TX/RX)

Operating Frequency(WIFI)	2412-2472MHz; 5745-5825MHz
Support Channels(WIFI)	13 Channels for 2.4G band 8 Channels for 5G band
Modulation(WIFI)	DBPCK/DQPSK/CCK/BPSK/QPSK/16QAM/64QAM/802.11A/B/G/N/AC
Hardware Version	2V2
Software Version	A6x-V2.5.6.75c5d
Antenna Type	PCB antenna
Antenna Gain	5dBi
Power supply	DC 5V/2A by adapter

Adapter

Band name	N/A
Model name	EP04-050200WXEZ-12, EP04-050200WXBZ-12
Rating Input	AC 100-240V 50/60Hz 0.35A
Rating Output	DC 5V/2A

2.2. OBJECTIVE

Perform Electro Magnetic Interference (EMI) and Electro Magnetic Susceptibility (EMS) tests for CE Marking.

2.3. TEST STANDARDS AND RESULTS

The EUT has been tested according to ETSI EN 301 489-1 V2.2.0 (2017-03), ETSI EN 301 489-3 V2.1.1 (2017-03) and ETSI EN 301 489-17 V3.2.0 (2017-03).

ETSI EN 301 489-1	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU
ETSI EN 301 489-3	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
ETSI EN 301 489-17	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

Note: The standards applied in test are draft.

2.4. TEST ITEMS AND THE RESULTS

No.	Basic Standard	Test Type	Result
EMISSION (EN 301 489-1 §7.1)			
1	EN 55032	Radiated emission	PASS
3	EN 55032	Conducted emission, AC ports	PASS
4	EN 55032	Conducted emission, Telecom ports	PASS
5	EN 61000-3-2	Harmonic current emissions	PASS
6	EN 61000-3-3	Voltage fluctuations & flicker	PASS
IMMUNITY (EN 301 489-1 §7.2)			
7	EN 61000-4-2	Electrostatic discharge immunity	PASS
8	EN 61000-4-3	Radiated RF electromagnetic field immunity	PASS
9	EN 61000-4-4	Electrical fast transient/burst immunity	PASS
10	ISO 7637-1, -2	Transients and surges, DC ports	N/A
11	EN 61000-4-5	Surge immunity, AC ports, Telecom ports	PASS
12	EN 61000-4-6	Immunity to conducted disturbances induced by RF fields	PASS
13	EN 61000-4-11	Voltage dips and short interruptions immunity	PASS

Note:

1. N/A- Not Applicable.
2. The latest versions of basic standards are applied.

2.5. ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

- Temperature: -20-55ºC
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

3. TEST MODE DESCRIPTION

TEST MODE DESCRIPTION		
NO.	**TEST MODE DESCRIPTION**	**WORST**
1	WLAN mode(transmitting and receiving) at 2.4GHz band	V
2	WLAN mode(transmitting and receiving) at 5GHz band	--
3	Standby	--
Note: V means EMI worst mode		

I/O Port Information (☒Applicable ☐Not Applicable)

I/O Port of EUT			
I/O Port Type	**Number**	**Cable Description**	**Tested With**
LAN	1	0.8m Unshielded	1
PC	1	0.8m Unshielded	1
Headset	2	0.8m Unshielded	2
DC In	1	0.8m Unshielded	1

4. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB

5. SUPPORT EQUIPMENT

Device Type	Manufacturer	Model Name	Data Cable
PC	Acer	--	--
Router	TP-Link	--	--

6. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	B112-B113, Building 12, Baoan Building Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen, Guangdong, P.R.China

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun.20, 2017	Jun.19, 2018
LISN	R&S	ESH2-Z5	100086	Aug.21, 2017	Aug.20, 2018
8-Wire ISN CAT 5	Schwarzbeck	CAT5 8158	#158	Dec.08, 2017	Dec.07, 2018

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun.20, 2017	Jun.19, 2018
ANTENNA	SCHWARZBECK	VULB9168	D69250	Mar.01, 2018	Feb.28, 2020
Double-Ridged Waveguide Horn	ETS	3117	00034609	Mar.01, 2018	Feb.28, 2020
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-162	Jun.20, 2017	Jun.19, 2018

TEST EQUIPMENT OF POWER HARMONICS / VOLTAGE FLUCTUATION / FLICKER TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Signal Conditioning Unit	Schaffner	CCN1000-1	72431	Aug.21, 2017	Aug.20, 2018
AC Source	Schaffner	NSG1007	56825	Aug.21, 2017	Aug.20, 2018

TEST EQUIPMENT OF SURGE/EFT/DIPSTEST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
EFT、Surge Generator	Schaffner	Modula 6150	34437	Aug.21, 2017	Aug.20, 2018

TEST EQUIPMENT OF ESD TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
ESD Simulator	TESEQ	NSG 438	1509	Jun.04, 2017	Jun.03, 2018

TEST EQUIPMENT OF RS IMMUNITY TEST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
SIGNAL GENERATOR	R&S	E4421B	MY43351603	May.31, 2017	May.30, 2018
ANTENNA	SCHWARZBECK	VULB9168	D69250	Mar.01, 2018	Feb.28, 2020
POWER SENSOR	R&S	URV5-Z4	100124	May.31, 2017	May.30, 2018
POWER METER	R&S	NRVD	832378/027	Jun.20, 2017	Jun.19, 2018
POWER AMPLIFIER	KALMUS	7100LC	04-02/17-06-001	Jun.20, 2017	Jun.19, 2018
RF AMPLIFIER	Milmega	AS0104-55_55	1004793	Jun.20, 2017	Jun.19, 2018
HORN ANTENNA	ETS LINDGREN	3117	00034609	Mar.01, 2018	Feb.28, 2020

TEST EQUIPMENT OF CS IMMUNITY TEST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Power Amplifier	AR	75A250	18464	Jun.20, 2017	Jun.19, 2018
CDN	Schaffner	M016	21614	Aug.21, 2017	Aug.20, 2018
6dB attenuator	JWF	50FHC-006-50	N/A	Jun.20, 2017	Jun.19, 2018
Electromagnetic Injection Clamp	Luthi	EM101	35773	Aug.21, 2017	Aug.20, 2018
Power Sensor	R&S	URV5-Z4	100124	May.31, 2017	May.30, 2018
Power Meter	R&S	NRVD	8323781027	Jun.20, 2017	Jun.19, 2018
SIGNAL GENERATOR	R&S	E4421B	MY43351603	May.31, 2017	May.30, 2018

7. EMISSION TEST

7.1. MAINS TERMINAL DISTURBANCE VOLTAGE MEASUREMENT

7.1.1 LIMITS OF MAINS TERMINAL DISTURBANCE VOLTAGE

AT MAIN PORT

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz-500kHz	66-56	56-46
500kHz-5MHz	56	46
5MHz-30MHz	60	50

Note:
1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.

AT TELECOMMUNICATION PORT

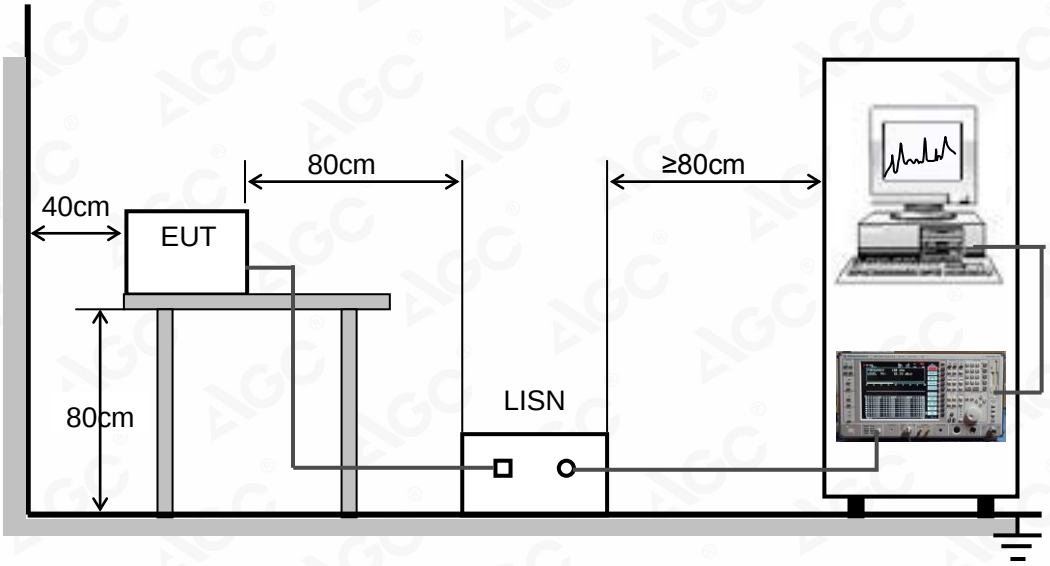
Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz-500kHz	84-74	74-64
500kHz-30MHz	74	64

NOTE 1 The limits decrease linearly with the logarithm of the frequency in the range 0,15 MHz to 0,5 MHz.
NOTE 2 The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is 20 log10 150 / I = 44 dB).

7.1.2 TEST PROCEDURE

1. The EUT was placed 0.4 meters from the conducting wall of shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). The LISN provide 50Ω/50μH of coupling impedance for the measuring instrument.
2. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
3. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 20dB under the prescribed limits are not reported.

7.1.3 TEST SETUP



For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

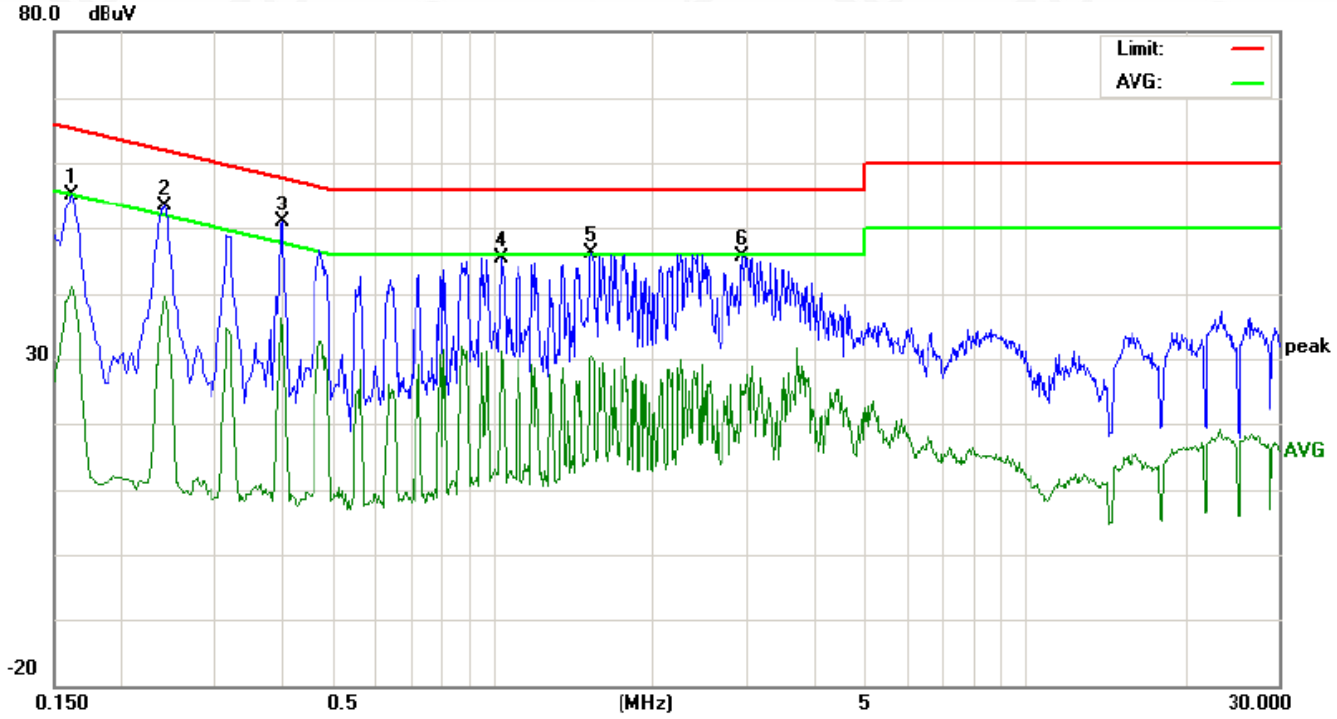
7.1.4 TEST RESULT

The test modes were carried out for all operation modes

The worst test mode of the EUT was Mode 1, and its test data was showed as the follow:

For adapter- **EP04-050200WXEZ-12**

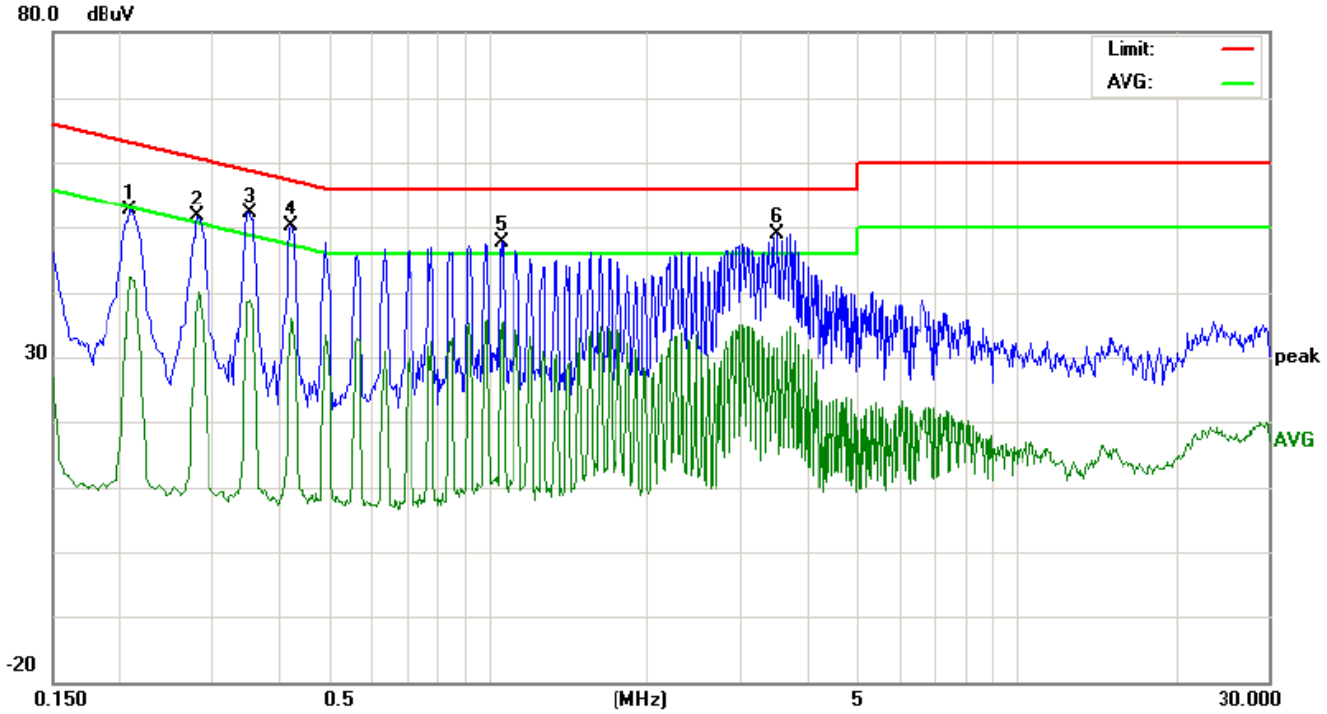
LINE CONDUCTED EMISSION TEST-L



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1620	45.07		30.92	10.17	55.24		41.09	65.36	55.36	-10.12	-14.27	P	
2	0.2419	43.05		29.42	10.26	53.31		39.68	62.03	52.03	-8.72	-12.35	P	
3	0.4020	40.42		24.79	10.33	50.75		35.12	57.81	47.81	-7.06	-12.69	P	
4	1.0420	35.01		20.67	10.37	45.38		31.04	56.00	46.00	-10.62	-14.96	P	
5	1.5339	35.80		19.98	10.37	46.17		30.35	56.00	46.00	-9.83	-15.65	P	
6	2.9500	35.14		14.14	10.54	45.68		24.68	56.00	46.00	-10.32	-21.32	P	

RESULT: PASS

LINE CONDUCTED EMISSION TEST-N

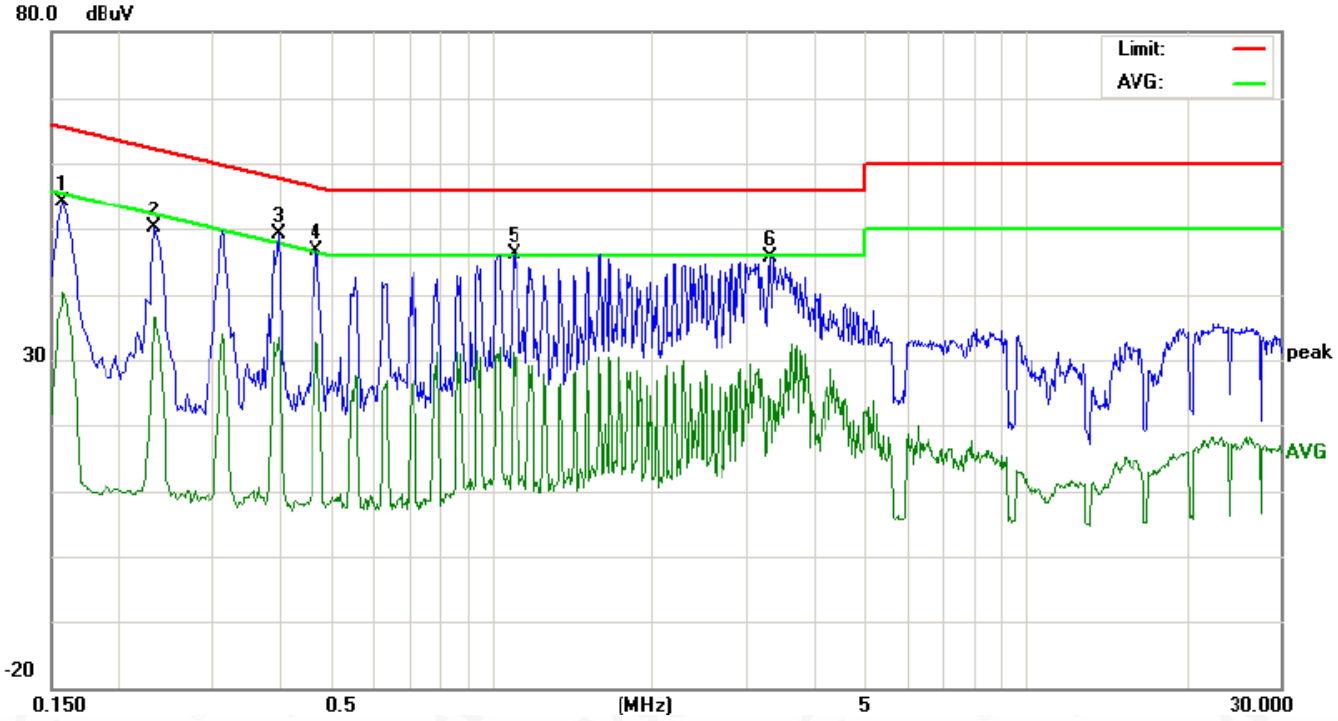


No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2100	42.45		32.13	10.23	52.68		42.36	63.20	53.20	-10.52	-10.84	P	
2	0.2802	41.38		27.59	10.28	51.66		37.87	60.81	50.81	-9.15	-12.94	P	
3	0.3540	41.78		28.61	10.31	52.09		38.92	58.87	48.87	-6.78	-9.95	P	
4	0.4220	39.65		25.59	10.35	50.00		35.94	57.41	47.41	-7.41	-11.47	P	
5	1.0580	37.37		24.84	10.37	47.74		35.21	56.00	46.00	-8.26	-10.79	P	
6	3.5220	38.47		20.83	10.51	48.98		31.34	56.00	46.00	-7.02	-14.66	P	

RESULT: PASS

For adapter- **EP04-050200WXBZ-12**

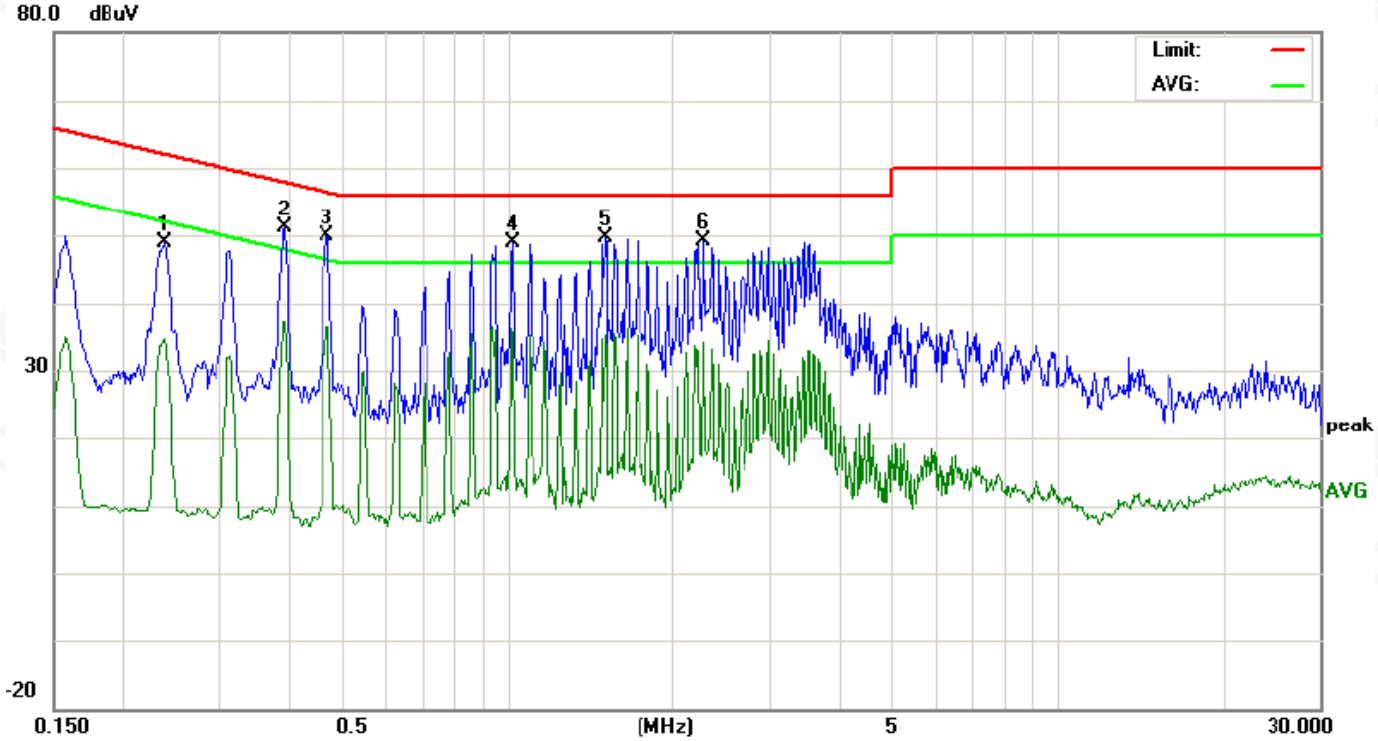
LINE CONDUCTED EMISSION TEST-L



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1580	44.07		30.09	10.17	54.24		40.26	65.56	55.56	-11.32	-15.30	P	
2	0.2340	39.80		26.08	10.25	50.05		36.33	62.30	52.30	-12.25	-15.97	P	
3	0.3980	38.81		23.04	10.33	49.14		33.37	57.89	47.89	-8.75	-14.52	P	
4	0.4699	36.23		22.33	10.38	46.61		32.71	56.52	46.52	-9.91	-13.81	P	
5	1.1100	35.81		19.93	10.37	46.18		30.30	56.00	46.00	-9.82	-15.70	P	
6	3.3300	35.10		13.71	10.52	45.62		24.23	56.00	46.00	-10.38	-21.77	P	

RESULT: PASS

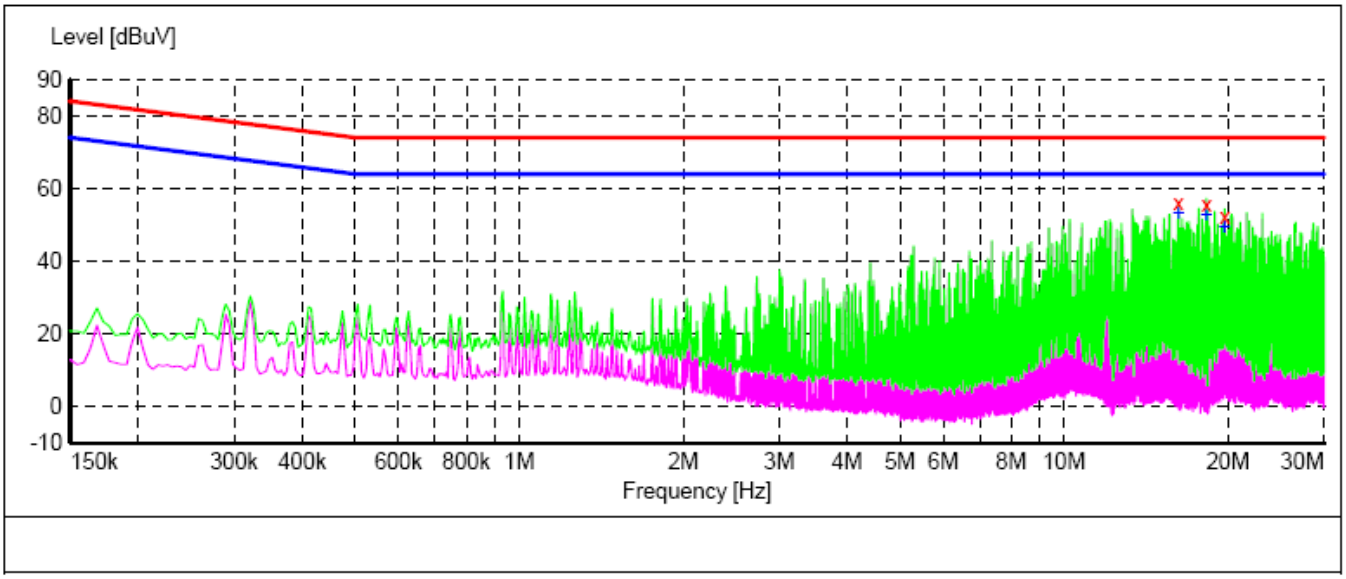
LINE CONDUCTED EMISSION TEST-N



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2379	38.50		24.28	10.26	48.76		34.54	62.17	52.17	-13.41	-17.63	P	
2	0.3940	40.84		26.92	10.33	51.17		37.25	57.98	47.98	-6.81	-10.73	P	
3	0.4699	39.44		25.96	10.38	49.82		36.34	56.52	46.52	-6.70	-10.18	P	
4	1.0220	38.47		25.30	10.37	48.84		35.67	56.00	46.00	-7.16	-10.33	P	
5	1.5060	39.26		24.75	10.38	49.64		35.13	56.00	46.00	-6.36	-10.87	P	
6	2.2780	38.71		23.74	10.34	49.05		34.08	56.00	46.00	-6.95	-11.92	P	

RESULT: PASS

AT TELECOMMUNICATION PORT



MEASUREMENT RESULT

Frequency	Level	Transd	Limit	Margin	Detector
MHz	dBuV	dB	dBuV	dB	
16.228500	56.10	11.3	74	17.9	QP
18.244500	55.80	11.7	74	18.2	QP
19.711500	52.20	12.0	74	21.8	QP

MEASUREMENT RESULT

Frequency	Level	Transd	Limit	Margin	Detector
MHz	dBuV	dB	dBuV	dB	
16.228500	53.10	11.3	64	10.9	AV
18.244500	52.90	11.7	64	11.1	AV
19.711500	49.30	12.0	64	14.7	AV

RESULT: PASS

7.2. RADIATED DISTURBANCE MEASUREMENT

7.2.1. LIMITS OF RADIATED DISTURBANCES

Limits for radiated disturbance 30M to1 GHz at a measurement distance of 3 m

Frequency range (MHz)	Quasi peak limits(dBuV/m), for Class B ITE, at 3m measurement distance
30 - 230	40
230 - 1000	47

Limits for radiated disturbance above 1 GHz at a measurement distance of 3 m

Frequency range (MHz)	Limits (dBuV/m), Class B ITE	
	Peak	Average
1000-3000MHz	70	50
3000-6000MHz	74	54

Notes:

1. The lower limit shall apply at the transition frequency.
2. Additional provisions may be required for cases where interference occurs.

7.2.2. TEST PROCEDURE

(1). The EUT was placed on the top of an insulating table 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

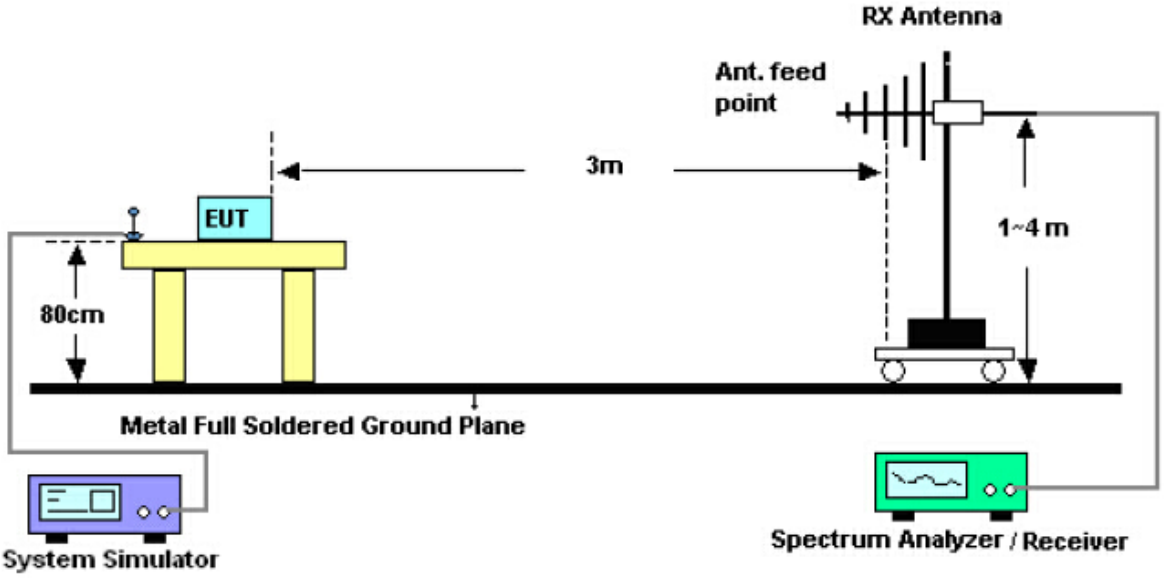
(2). The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

(3).The antenna is a broadband antenna, and its height is varied from 1 to 4 meter above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

(4). For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to the heights from 1 to 4 meters and the ratable table was turned from 0 degrees to 360 degrees to find the maximum reading.

(5).The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emission that did not have 10dB margin would be retested one by one using the quasi-peak method.

7.2.3. BLOCK DIAGRAM OF TEST SETUP



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

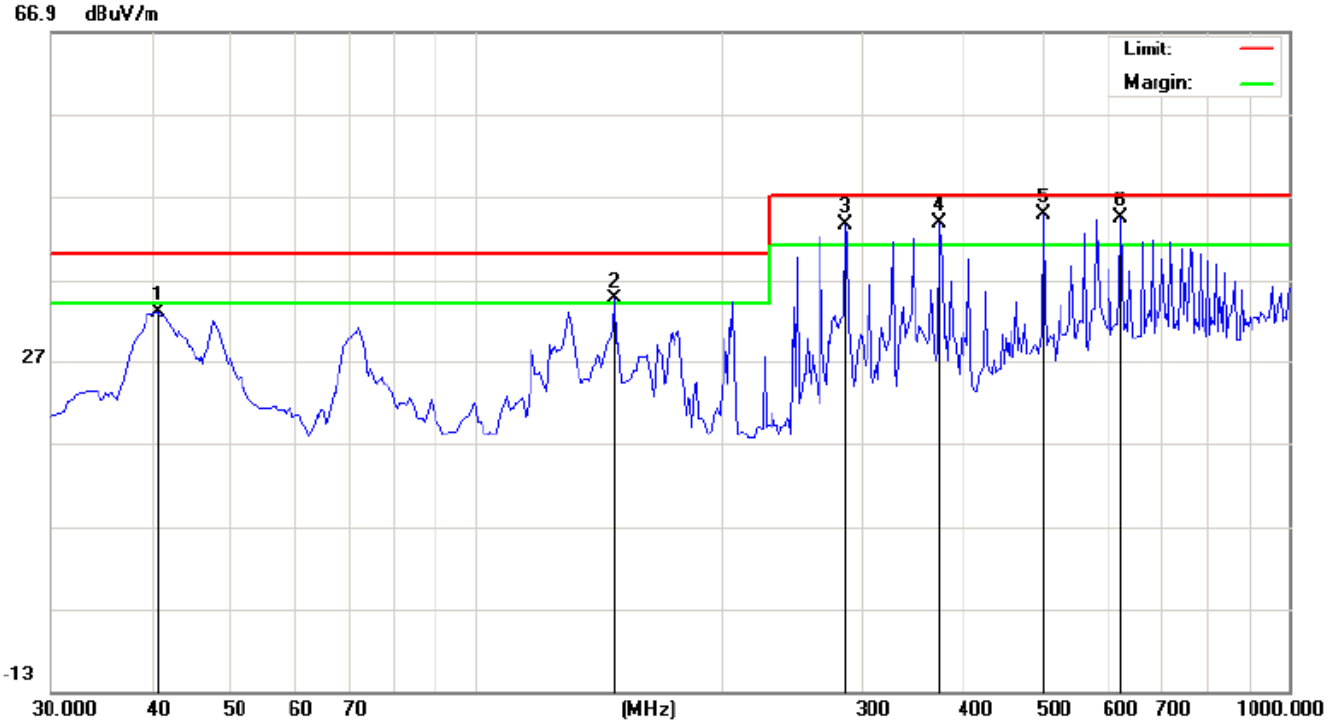
7.2.4 TEST RESULT

The test modes were carried out for all operation modes

The worst test mode of the EUT was Mode 1, and its test data was showed as the follow:

For adapter- **EP04-050200WXEZ-12**

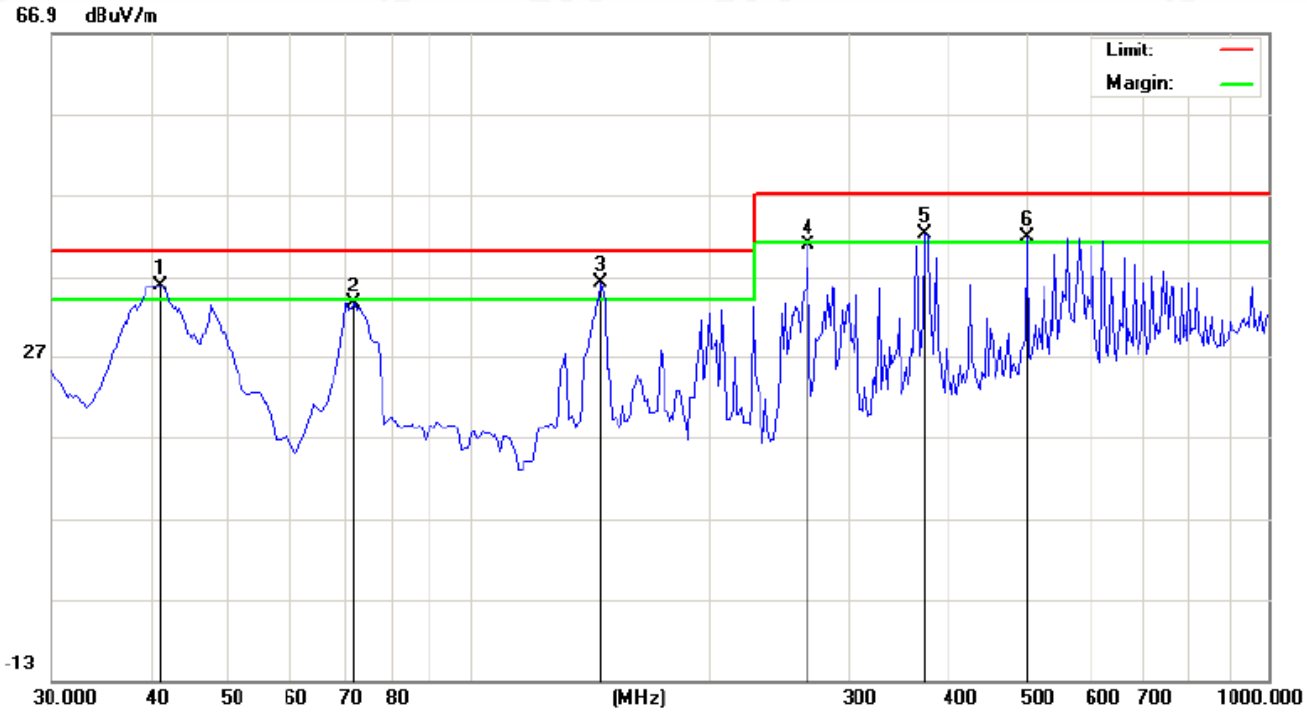
RADIATED EMISSION BELOW 1GHZ– HORIZONTAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		40.6540	21.19	11.86	33.05	40.00	-6.95	peak			
2	!	148.0166	21.36	13.25	34.61	40.00	-5.39	peak			
3	!	285.4331	30.77	12.93	43.70	47.00	-3.30	peak			
4	!	374.3500	24.81	18.90	43.71	47.00	-3.29	peak			
5	*	500.4499	23.65	21.14	44.79	47.00	-2.21	peak			
6	!	624.9333	20.57	23.79	44.36	47.00	-2.64	peak			

RESULT: PASS

RADIATED EMISSION BELOW 1GHZ– VERTICAL

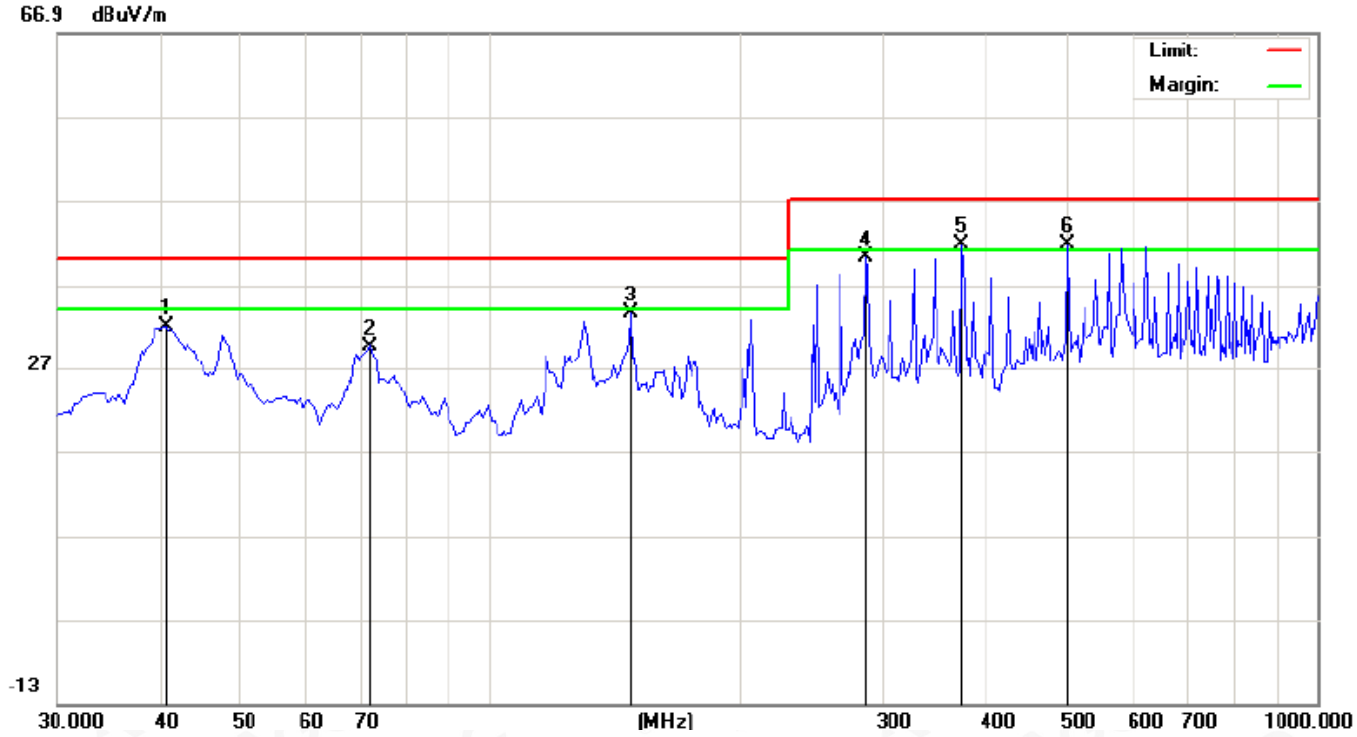


No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	!	41.3166	27.03	8.81	35.84	40.00	-4.16	peak			
2		72.0331	29.84	3.76	33.60	40.00	-6.40	peak			
3	*	146.4000	20.90	15.24	36.14	40.00	-3.86	peak			
4		266.0332	26.38	14.38	40.76	47.00	-6.24	peak			
5	!	374.3500	23.27	18.90	42.17	47.00	-4.83	peak			
6	!	500.4499	20.63	21.14	41.77	47.00	-5.23	peak			

RESULT: PASS

For adapter- **EP04-050200WXBZ-12**

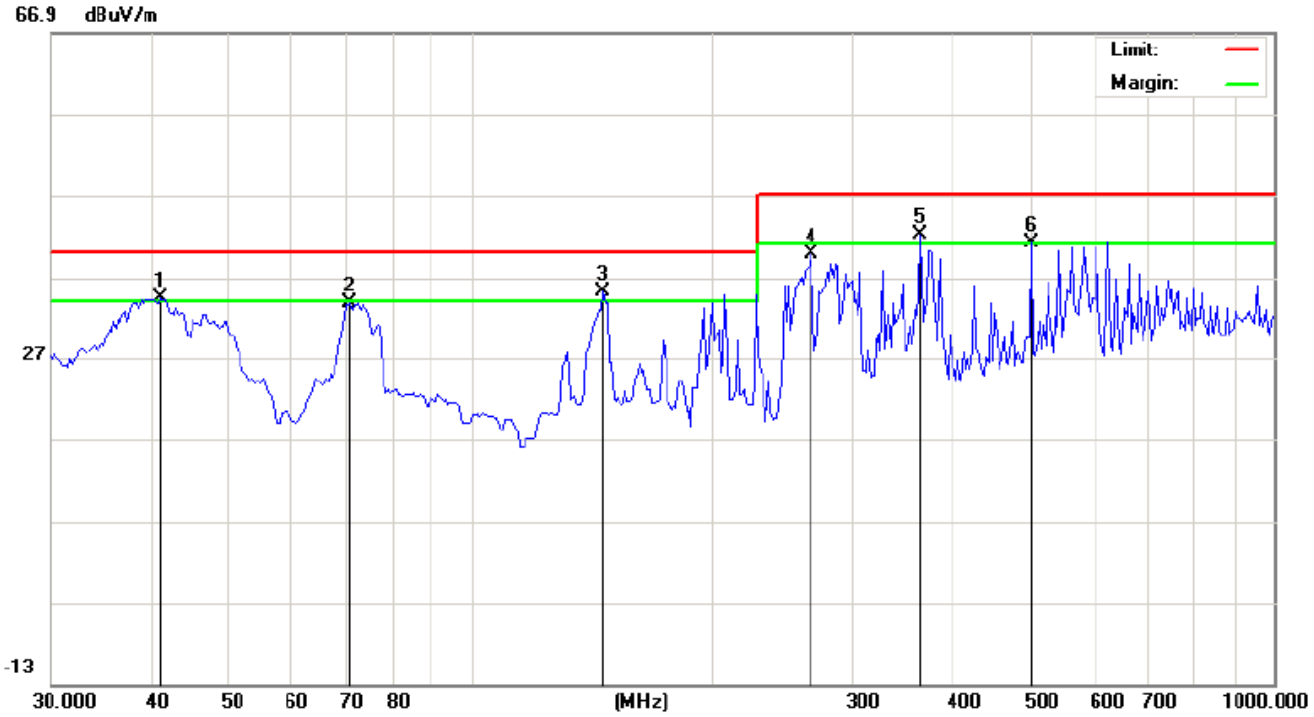
RADIATED EMISSION BELOW 1GHZ– HORIZONTAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		40.6540	20.19	11.86	32.05	40.00	-7.95	peak			
2		72.0331	21.42	8.28	29.70	40.00	-10.30	peak			
3		148.0166	20.36	13.25	33.61	40.00	-6.39	peak			
4		285.4331	27.27	12.93	40.20	47.00	-6.80	peak			
5	!	374.3500	22.81	18.90	41.71	47.00	-5.29	peak			
6	*	500.4499	20.65	21.14	41.79	47.00	-5.21	peak			

RESULT: PASS

RADIATED EMISSION BELOW 1GHZ– VERTICAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	!	41.3166	25.53	8.81	34.34	40.00	-5.66	peak			
2		70.8315	29.74	4.06	33.80	40.00	-6.20	peak			
3	*	146.4000	19.90	15.24	35.14	40.00	-4.86	peak			
4		266.0332	25.38	14.38	39.76	47.00	-7.24	peak			
5	!	364.6499	23.28	18.84	42.12	47.00	-4.88	peak			
6	!	500.4499	20.13	21.14	41.27	47.00	-5.73	peak			

RESULT: PASS

Note:

Remark: which above 1GHz are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

7.3. HARMONIC CURRENT MEASUREMENT

7.3.1 LIMITS OF HARMONIC CURRENT

Limits for Class A Equipment	
Harmonics Order n	**Max. permissible harmonic current (A)**
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15≤n≤39	0.15×15/n
2	1.08
4	0.43
6	0.30
8≤n≤40	0.23×8/n

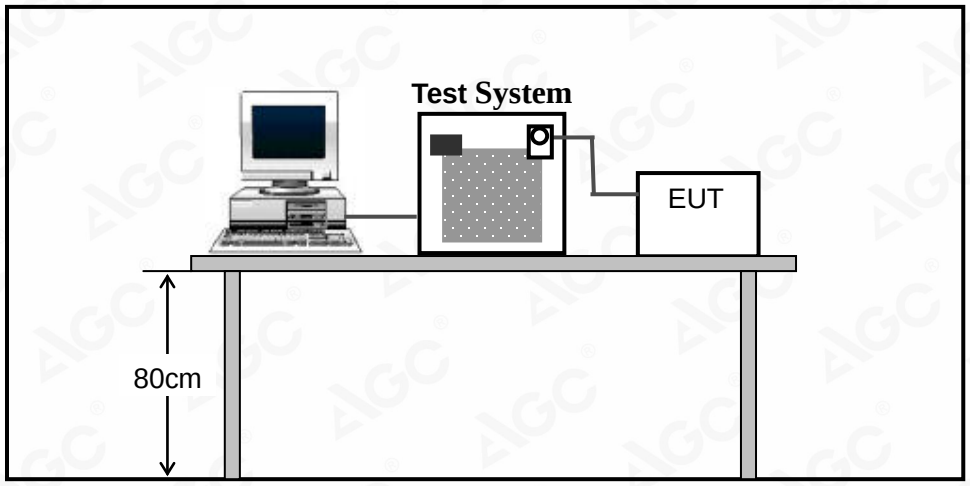
Note:

1. According to section 5 of EN61000-3-2: 2014, the EUT is Class A equipment.
2. The above limits are for all applications having an active input power>75W. No limits apply for equipment with an active input power up to and including 75W.

7.3.2 TEST PROCEDURE

1. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
2. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

7.3.3 TEST SETUP



For the actual test configuration, please refer to Appendix II：Photographs of the Test Configuration.

7.3.4 TEST RESULT

Note: No limits apply for equipment with an active input power up to and including 75W.

7.4. VOLTAGE FLUCTUATIONS AND FLICK MEASUREMENT

7.4.1 LIMITS OF VOLTAGE FLUCTUATIONS AND FLICK

Test Item	Limit	Note
P_{st}	1.0	P_{st} means Short-term flicker indicator
P_{lt}	0.65	P_{lt} means long-term flicker indicator
T_{dt}	0.5	T_{dt} means maximum time that d_t exceeds 3%
d_{max}(%)	4%	d_{max} means maximum relative voltage change.
d_c(%)	3.3%	d_c means relative steady-state voltage change.

7.4.2 TEST PROCEDURE

a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal conditions

b. During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

7.4.3 TEST SETUP

Same as 3.4.3

7.4.4 TEST RESULT

Test Specification

Test Frequency	50Hz	Test Voltage	AC 230V
Waveform	Sine	Test Time	10 minutes(P_{st}); 2 hours (P_{lt})

Test Result

For adapter- **EP04-050200WXEZ-12**

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.73	1.0	Pass
P_{lt}	0.52	0.65	Pass
$T_{dt(s)}$	0.054	0.5	Pass
d_{max}(%)	1.058%	4%	Pass
d_c(%)	1.459%	3.3%	Pass

For adapter- **EP04-050200WXBZ-12**

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.79	1.0	Pass
P_{lt}	0.65	0.65	Pass
$T_{dt(s)}$	0.049	0.5	Pass
d_{max}(%)	1.158%	4%	Pass
d_c(%)	1.395%	3.3%	Pass

8. IMMUNITY TEST

8.1. EUT SETUP AND OPERATING CONDITIONS

The battery was in full voltage and the charger was connected to the EUT to keep the voltage constant during the tests.

Each immunity test was performed according to the requirements of the standard.

8.2. GENERAL PERFORMANCE CRITERIA

1. Performance criteria for Continuous phenomena applied to Transmitter (CT)

For equipment of type II or type III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence.

Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

2. Performance criteria for Transient phenomena applied to Transmitter (TT)

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

3. Performance criteria for Continuous phenomena applied to Receiver (CR)

For equipment of type II or III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

4. Performance criteria for Transient phenomena applied to Receiver (TR)

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

5. Performance Table

Performance criteria		
Criteria	**During Test**	**After Test**
A	Shall operate as intended. May show degradation of performance. Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance. No unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance. Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance.

8.3. ELECTROSTATIC DISCHARGE IMMUNITY TEST

8.3.1 TEST SPECIFICATION

Basic Standard	EN 61000-4-2
Discharge Impedance	330Ω / 150 pF
Discharge Voltage	Air Discharge:8 kV , Contact Discharge:4 kV
Polarity	Positive / Negative
Number of Discharge	Minimum 20 times at each test point
Discharge Mode	Single discharge
Discharge Period	1-second minimum

8.3.2 TEST PROCEDURE

The test procedure was in accordance with EN 61000-4-2:

a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.

b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

c. The time interval between two successive single discharges was at least 1 second.

d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.

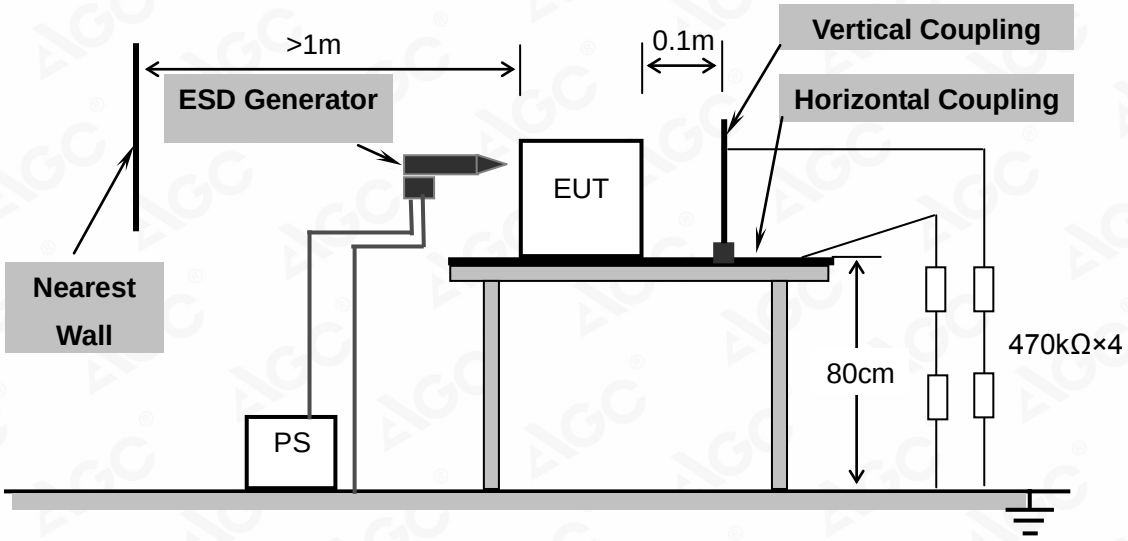
e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were completed.

g. At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator was positioned vertically at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.

h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m×0.5m) was placed vertically to and 0.1 meters from the EUT.

8.3.3 TEST SETUP



For the actual test configuration, please refer to Appendix II：Photographs of the Test Configuration.

8.3.4 TEST RESULT

TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.3.2 and EN 61000-4-2 for the measurement methods.

For adapter- **EP04-050200WXEZ-12**

☒ **MODE 1&MODE 2&MODE 3 (TX/RX)**

Amount of Discharges	Voltage	Coupling	Observation	Result (Criteria meet)
Mini 20 / Point	±2kV;±4kV	contact discharge	TR, TT	A
Mini 20 / Point	±2kV;±4kV;±8kV	Air Discharge	TR, TT	A
Mini 20 / Point	±4kV	Indirect Discharge HCP	TR, TT	A
Mini 20 / Point	±4kV	Indirect Discharge VCP	TR, TT	A

For adapter- **EP04-050200WXBZ-12**

☒ **MODE 1&MODE 2&MODE 3 (TX/RX)**

Amount of Discharges	Voltage	Coupling	Observation	Result (Criteria meet)
Mini 20 / Point	±2kV;±4kV	contact discharge	TR, TT	A
Mini 20 / Point	±2kV;±4kV;±8kV	Air Discharge	TR, TT	A
Mini 20 / Point	±4kV	Indirect Discharge HCP	TR, TT	A
Mini 20 / Point	±4kV	Indirect Discharge VCP	TR, TT	A

8.4. RADIATED, RADIO FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST

8.4.1 TEST SPECIFICATION

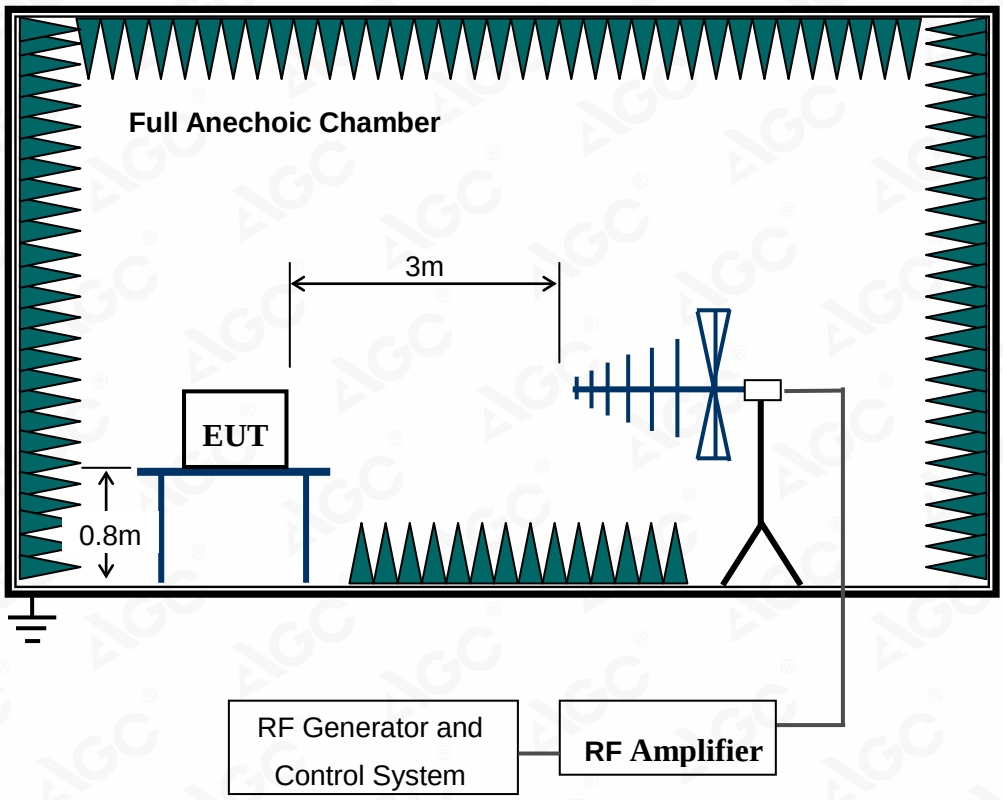
Basic Standard	EN 61000-4-3
Frequency Range	80 MHz – 6000MHz
Field Strength	3V/m
Modulation	1 kHz sine wave, 80%, AM modulation
Frequency Step	1% of fundamental
Polarity of Antenna	Horizontal and Vertical
Test Distance	3m
Antenna Height	1.55m
Dwell Time	3 seconds

8.4.2 TEST PROCEDURE

The test procedure was in accordance with EN 61000-4-3.

a. The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
b. The test signal was 80% amplitude modulated with a 1 kHz sine wave.
c. The frequency range was swept from 80 MHz to 6000MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
d. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
e. The field strength level was 3V/m.
f. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

8.4.3 TEST SETUP



For the actual test configuration, please refer to Appendix II：Photographs of the Test Configuration.

8.4.4 TEST RESULT

TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.2.2, ETSI EN 301 489-3/-17 and EN 61000-4-3 for the measurement methods.

For adapter- **EP04-050200WXEZ-12**

☒ **MODE 1&MODE 2&MODE 3 (TX/RX)**

Freq. Range (MHz)	Field	Modulation	Polarity	Position	Observation	Result (Criteria meet)
80-6000	3V/m	Yes	H	Front	CR, CT	A
80-6000	3V/m	Yes	H	Back	CR, CT	A
80-6000	3V/m	Yes	H	Left	CR, CT	A
80-6000	3V/m	Yes	H	Right	CR, CT	A
80-6000	3V/m	Yes	V	Front	CR, CT	A
80-6000	3V/m	Yes	V	Back	CR, CT	A
80-6000	3V/m	Yes	V	Left	CR, CT	A
80-6000	3V/m	Yes	V	Right	CR, CT	A

For adapter- **EP04-050200WXBZ-12**

☒ **MODE 1&MODE 2&MODE 3 (TX/RX)**

Freq. Range (MHz)	Field	Modulation	Polarity	Position	Observation	Result (Criteria meet)
80-6000	3V/m	Yes	H	Front	CR, CT	A
80-6000	3V/m	Yes	H	Back	CR, CT	A
80-6000	3V/m	Yes	H	Left	CR, CT	A
80-6000	3V/m	Yes	H	Right	CR, CT	A
80-6000	3V/m	Yes	V	Front	CR, CT	A
80-6000	3V/m	Yes	V	Back	CR, CT	A
80-6000	3V/m	Yes	V	Left	CR, CT	A
80-6000	3V/m	Yes	V	Right	CR, CT	A

8.5. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

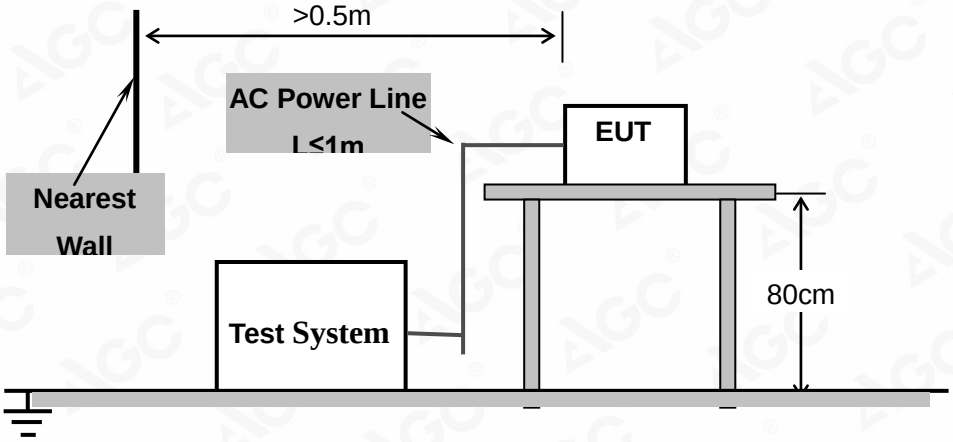
8.5.1 TEST SPECIFICATION

Basic Standard	EN 61000-4-4
Test Voltage	a.c. power port :1 kV LAN port: 0.5kV
Polarity	Positive/Negative
Impulse Frequency	5kHz
Impulse wave shape	5/50ns
Burst Duration	15ms
Burst Period	300ms
Test Duration	Not less than 1 min.

8.5.2 TEST PROCEDURE

a. The EUT was tested with 1000 volt discharges to the AC power input leads.
b. Both positive and negative polarity discharges were applied.
c. The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 1 meter.
d. The duration time of each test sequential was 1 minute.
e. The transient/burst waveform was in accordance with EN 61000-4-4, 5/50ns.

8.5.3 TEST SETUP



For the actual test configuration, please refer to Appendix II：Photographs of the Test Configuration.

8.5.4 TEST RESULT

For adapter- **EP04-050200WXEZ-12**

☒ **MODE 1&MODE 2&MODE 3 (TX/RX)**

Test Point	Polarity	Test Level (kV)	Observation	Conclusion
a.c. port, L	+/-	1	TT,TR	A
a.c. port, N	+/-	1	TT,TR	A
a.c. port, L-N	+/-	1	TT,TR	A
LAN	+/-	0.5	TT,TR	A

For adapter- **EP04-050200WXBZ-12**

☒ **MODE 1&MODE 2&MODE 3 (TX/RX)**

Test Point	Polarity	Test Level (kV)	Observation	Conclusion
a.c. port, L	+/-	1	TT,TR	A
a.c. port, N	+/-	1	TT,TR	A
a.c. port, L-N	+/-	1	TT,TR	A
LAN	+/-	0.5	TT,TR	A

8.6. SURGE IMMUNITY TEST

8.6.1 TEST SPECIFICATION

Basic Standard	EN 61000-4-5
Waveform	Voltage 1.2/50 μs; Current 8/20 μs
Test Voltage	a.c. power port, line to ground 2 kV, line to line 1.0 kV LAN port: 0.5kV
Polarity	Positive/Negative
Phase Angle	0°, 90°, 180°, 270°
Repetition Rate	60sec
Times	5 time/each condition.

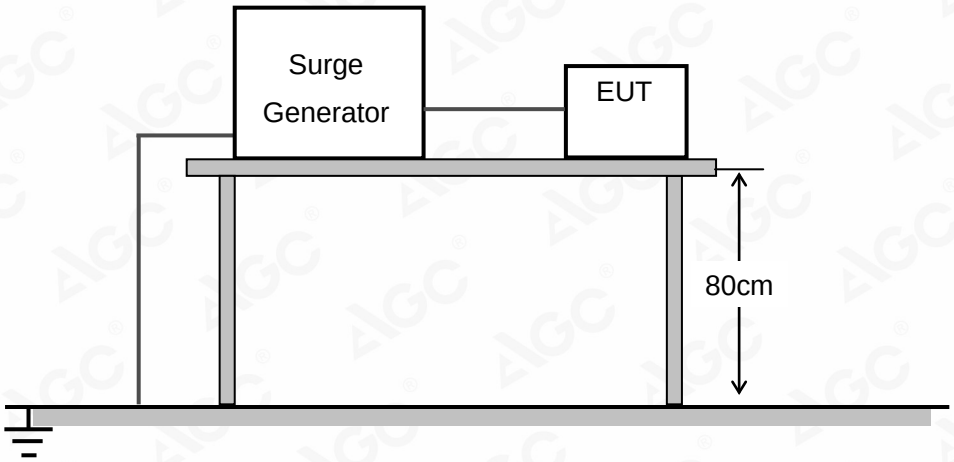
8.6.2 TEST PROCEDURE

a. The EUT and the auxiliary equipment were placed on a table of 0.8m heights above a metal ground reference plane. The size of ground plane is greater than 1m×1m and project beyond the EUT by at least 0.1m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT was less than 2 meters (provided by the manufacturer).

b. The EUT was connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).

c. The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.

8.6.3 TEST SETUP



For the actual test configuration, please refer to Appendix II：Photographs of the Test Configuration.

8.6.4 TEST RESULT

For adapter- **EP04-050200WXEZ-12**

☒ **MODE 1&MODE 2&MODE 3 (TX/RX)**

Coupling Line	Polarity	Voltage (kV)	Observation	Conclusion
a.c. power, L-N	+/-	1.0	TT,TR	A
LAN	+/-	0.5	TT,TR	A

For adapter- **EP04-050200WXBZ-12**

☒ **MODE 1&MODE 2&MODE 3 (TX/RX)**

Coupling Line	Polarity	Voltage (kV)	Observation	Conclusion
a.c. power, L-N	+/-	1.0	TT,TR	A
LAN	+/-	0.5	TT,TR	A

8.7. IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS

8.7.1 TEST SPECIFICATION

Basic Standard	EN 61000-4-6
Frequency Range	0.15 MHz – 80 MHz
Field Strength	3Vrms
Modulation	1 kHz Sine Wave, 80% AM
Frequency Step	1% of fundamental
Coupled Cable	a.c. power line and LAN line
Coupling Device	CDN-M2 and Injection Clamp

8.7.2 TEST PROCEDURE

a. The EUT shall be tested within its intended operating and climatic conditions.

b. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

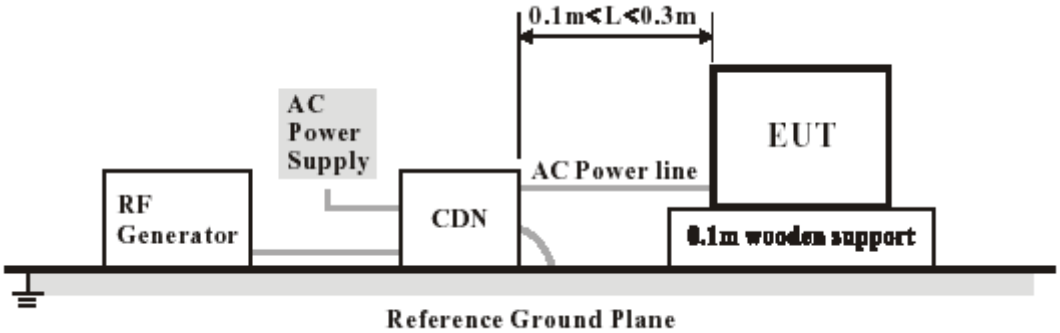
c. The test signal was 80% amplitude modulated with a 1 kHz sine wave

d. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80% amplitude. The sweep rate shall not exceed 1.5×10^{-3} decades/s. The step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value where the frequency is swept incrementally.

e. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequencies and harmonics or frequencies of dominant interest, shall be analyzed separately.

f. Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.

8.7.3 TEST SETUP



For the actual test configuration, please refer to Appendix II：Photographs of the Test Configuration.

8.7.4 TEST RESULT

For adapter- **EP04-050200WXEZ-12**

☒ **MODE 1&MODE 2&MODE 3 (TX/RX)**

Test Point	Frequency (MHz)	Field Strength (Vrms)	Observation	Conclusion
a.c. port	0.15 – 80	3	CT,CR	A
LAN	0.15 – 80	3	CT,CR	A

For adapter- **EP04-050200WXBZ-12**

☒ **MODE 1&MODE 2&MODE 3 (TX/RX)**

Test Point	Frequency (MHz)	Field Strength (Vrms)	Observation	Conclusion
a.c. port	0.15 – 80	3	CT,CR	A
LAN	0.15 – 80	3	CT,CR	A

8.8. VOLTAGE DIPS AND SHORT INTERRUPTIONS IMMUNITY TEST

8.8.1 TEST SPECIFICATION

Basic Standard	EN 61000-4-11
Voltage Dips	100% reduction, 0.5 Cycle 100% reduction, 1.0 Cycle 30% reduction, 25 Cycles
Voltage Interruptions	100% reduction, 250 Cycles
Voltage Phase Angle	0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°

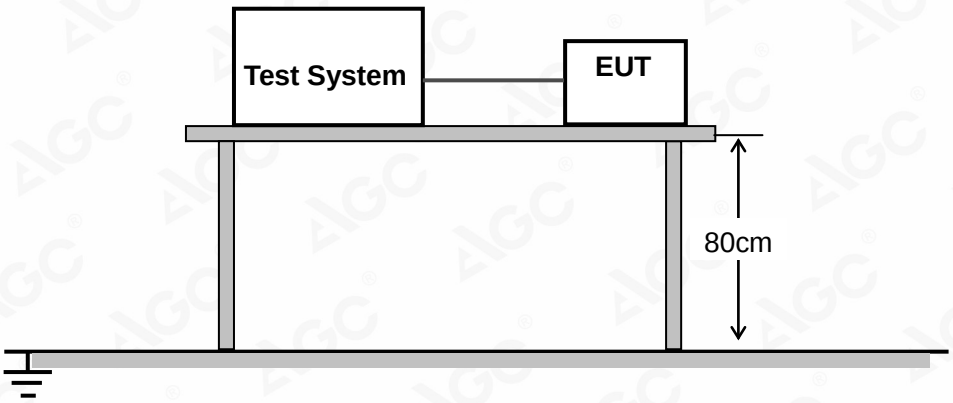
8.8.2 TEST PROCEDURE

a. The power cord was used as supplied by the manufacturer. The EUT was connected to the line output of the Voltage Dips and Interruption Generator.

b. The EUT was tested for (1) 100% voltage dip of supplied voltage with duration of 0.5 cycles, (2)100% voltage dip of supplied voltage and duration 1.0 cycle. (3) 30% voltage dip of supplied voltage and duration 25 cycles. (4) 100% voltage interruption of supplied voltage with duration of 250 Cycles was followed,

c. Voltage reductions occur at 0 degree crossover point of the voltage waveform. The performance of the EUT was checked after the voltage dip or interruption.

8.8.3 TEST SETUP



For the actual test configuration, please refer to Appendix II：Photographs of the Test Configuration.

8.8.4 TEST RESULT

For adapter- **EP04-050200WXEZ-12**

☒ **MODE 1&MODE 2&MODE 3 (TX/RX)**

Test Mode	Voltage Reduction	Duration (cycle)	Times	Interval (Sec)	Observation	Conclusion
Voltage dips	100%	0.5	3	10	TT,TR	A
	100%	1	3	10	TT,TR	A
	30%	25	3	10	TT,TR	A
Voltage interruptions	100%	250	3	10	TT,TR	A

For adapter- **EP04-050200WXBZ-12**

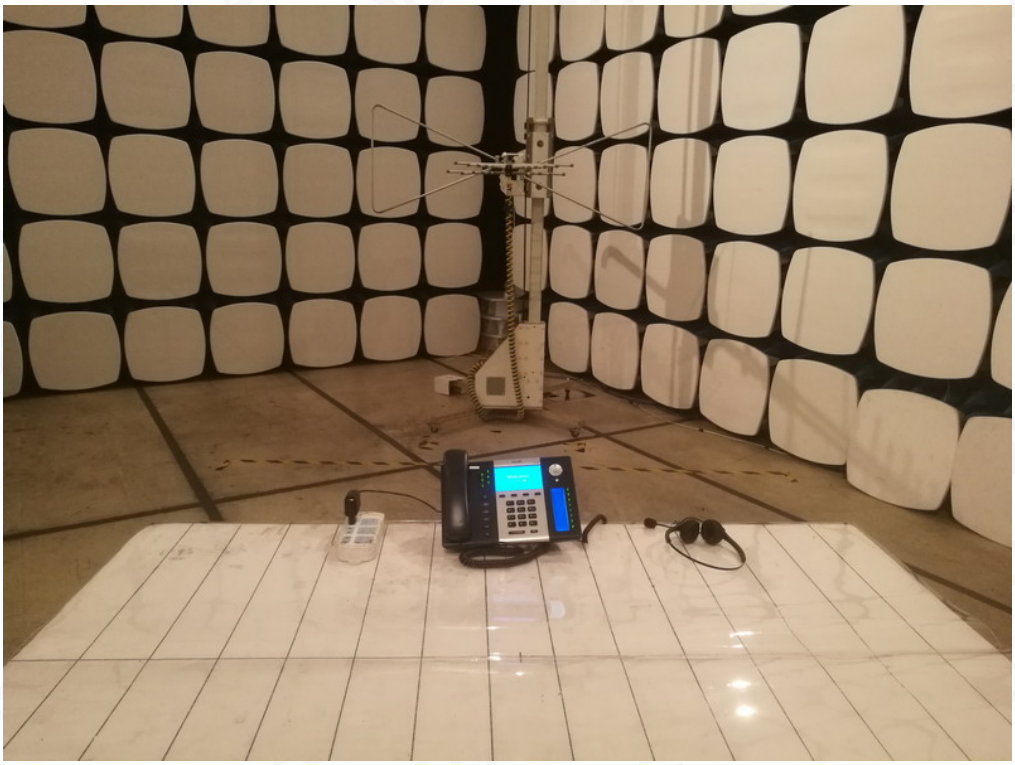
☒ **MODE 1&MODE 2&MODE 3 (TX/RX)**

Test Mode	Voltage Reduction	Duration (cycle)	Times	Interval (Sec)	Observation	Conclusion
Voltage dips	100%	0.5	3	10	TT,TR	A
	100%	1	3	10	TT,TR	A
	30%	25	3	10	TT,TR	A
Voltage interruptions	100%	250	3	10	TT,TR	A

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST SETUP

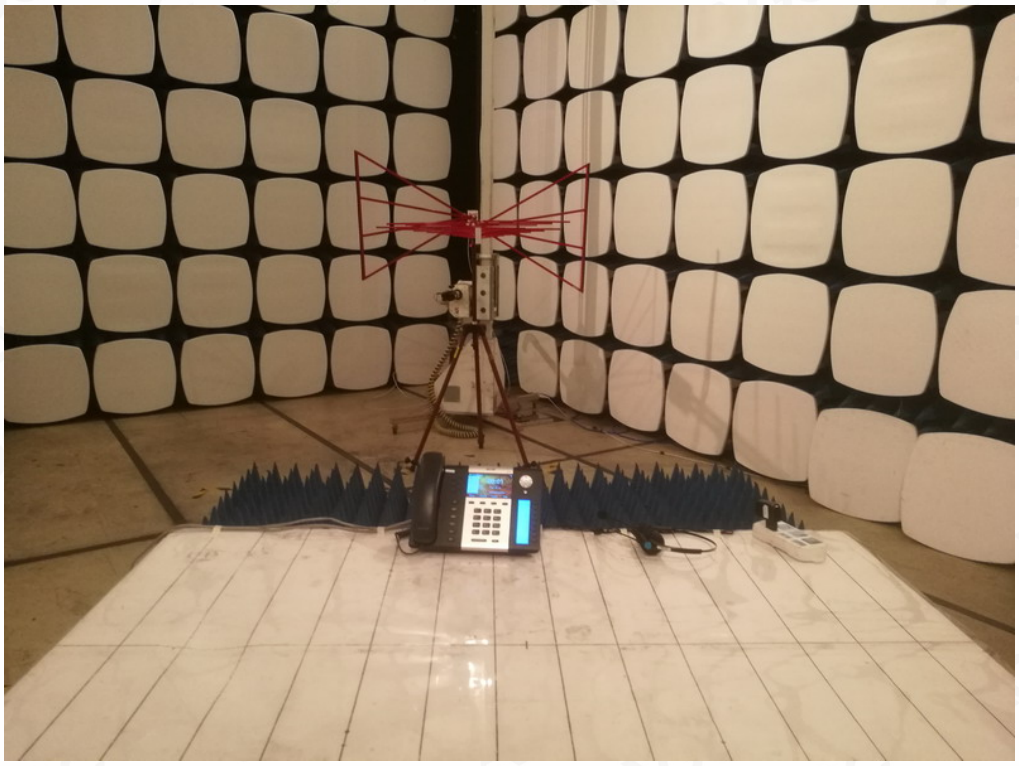
RADIATED EMISSION TEST SETUP



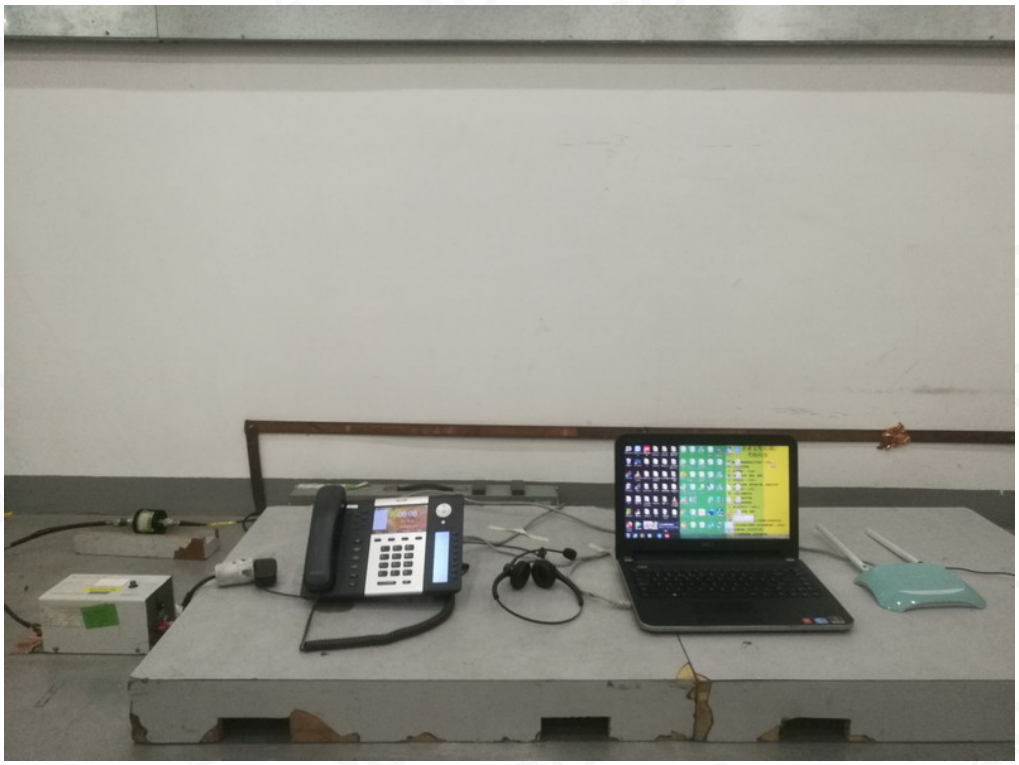
EN 61000-4-2 ESD TEST SETUP

EN61000-3-3 VOLTAGE FLUCTUATION / FLICKER TEST SETUP

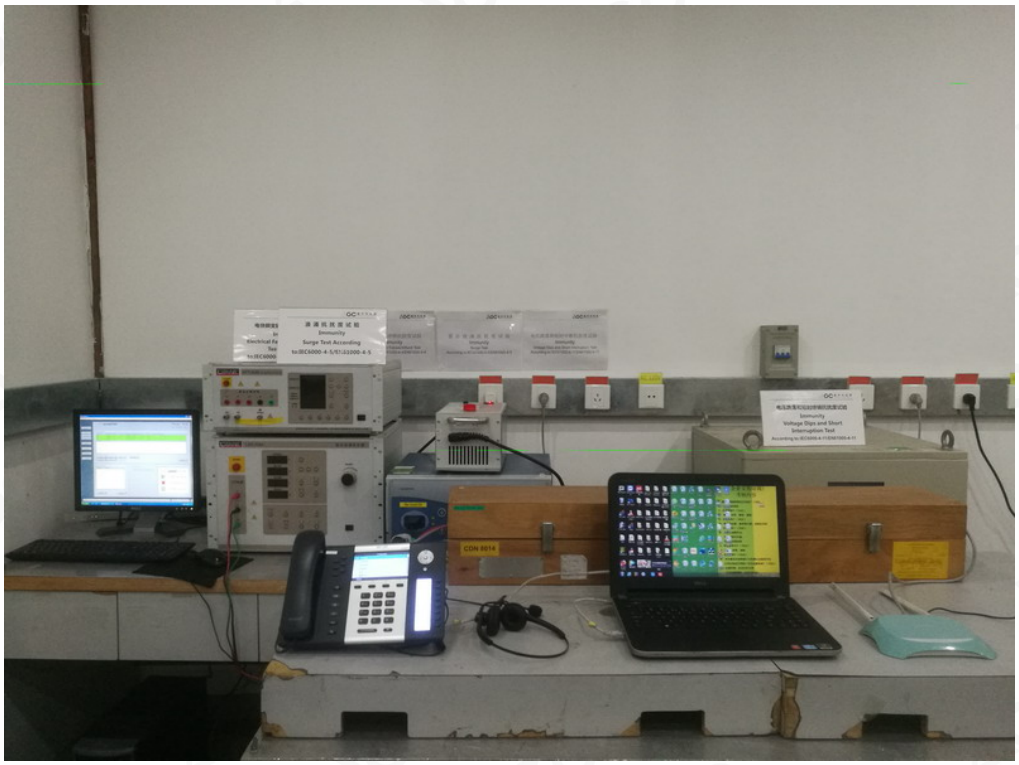
EN 61000-4-3 RS TEST SETUP



EN 61000-4-6 CS IMMUNITY TEST SETUP



EN 61000-4-4/-5/-11 EFT/SURGE/DIPS TEST SETUP



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