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Shenzhen POCE Technology Co.,Ltd.

H Building, Hongfa Science and Technology Park,
Tangtou, Shiyan, Bao'an District, Shenzhen, China

CERTIFICATE OF CONFORMITY

Certificate No. : POCE200413039MCW

Applicant : Allterco Robotics

Address : 103 Cherni Vrah Blvd, Sofia 1407, Bulgaria

Manufacturer : Allterco Robotics

Address : 103 Cherni Vrah Blvd, Sofia 1407, Bulgaria

Product Name : LED Lamps

Model Name : Shelly Vintage A60, Shelly Vintage ST64

Trade Name : N/A

Essential Requirement		Applied Specification /Standards	Documentary Evidence	Result
Art.3.1(a)	Safety	EN 62560: 2012+A1: 2015	Test Report: POCE200413057ERS	Conform
Art.3.1(b)	EMC	ETSI EN 301 489-1 V2.2.3 ETSI EN 301 489-17 V3.2.2	Test Report: POCE200413040GRW	Conform
Art.3.1(a)	Health	EN 62311: 2008	Test Report: POCE200413041MRW	Conform
Art.3.2	Radio	ETSI EN 300 328 V2.2.2	Test Report: POCE200413042GRW	Conform

The certificate is issued in accordance with the Radio Equipment Directive 2014/53/EU of 16 April 2014.

CE

SHEN ZHEN POCE TECHNOLOGY CO.,LTD

Chief Executive / Bill Yuan
Date: Apr. 21, 2020

This certificate of conformity is based on a single evaluation of the submitted sample(s) of the above mentioned product. It does not imply an assessment of the whole production and other relevant directives have to be observed.

Web: http://www.poce-cert.com Tel: +86-755-29113252 E-mail: service@poce-cert.com

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H Building, Hongfa Science and Technology Park,
Tangtou, Shiyan, Bao'an District, Shenzhen, China

CERTIFICATE OF CONFORMITY

Certificate No.	:	POCE200418008PCR
Applicant	:	Allterco Robotics
Address	:	103 Cherni Vrah Blvd, Sofia 1407, Bulgaria
Manufacturer	:	Allterco Robotics
Address	:	103 Cherni Vrah Blvd, Sofia 1407, Bulgaria
Product	:	LED Lamps
Trade Name	:	N/A
Model(s)	:	Shelly Vintage A60, Shelly Vintage ST64
Test Report No.	:	POCE200418006VRR
Test Standards	:	**IEC 62321-3-1:2013; IEC 62321-4:2013; IEC 62321-5:2013; IEC 62321-6:2015; IEC 62321-7-1:2015; IEC 62321-8:2017**

The EUT described above has been tested by us with the listed standards and found in compliance with the council **RoHS Directive(EU) 2015/863 amending Annex II to Directive 2011/65/EU.** It is possible to use **CE** marking to demonstrate the compliance with this **RoHS** Directive.

RoHS
POCE
CE

SHEN ZHEN POCE TECHNOLOGY CO.,LTD. APPROVED

For Chief Executive / Jerry Yang
Date: Apr. 18, 2020

This certificate of conformity is based on a single evaluation of the submitted sample(s) of the above mentioned product. It does not imply an assessment of the whole production and other relevant directives have to be observed.

EMC TEST REPORT

ETSI EN 301 489-1 V2.2.3 (2019-11)

Draft ETSI EN 301 489-17 V3.2.2 (2019-12)

Report Reference No.	:	**POCE200413040GRW**
Applicant's Name	:	Allterco Robotics
Address of Applicant	:	103 Cherni Vrah Blvd, Sofia 1407, Bulgaria
Test Firm	:	Shenzhen POCE Technology Co., Ltd.
Address of Test Firm	:	H Building, Hongfa Science and Technology Park, Tangtou, Shiyan, Bao'An District, Shenzhen, China
Test Specification Standard	:	**ETSI EN 301 489-1 V2.2.3 (2019-11)** **Draft ETSI EN 301 489-17 V3.2.2 (2019-12)**
Product Name	:	LED Lamps
Model/Type Reference	:	Shelly Vintage A60
Listed Models	:	Shelly Vintage ST64
Date of Receipt	:	Dec. 27, 2019
Date of Test	:	Dec. 27, 2019 - Apr. 20, 2020
Data of Issue	:	Apr. 21, 2020
Result	:	**PASS**

Compiled by:

Amy Zhu/ File administrators

Supervised by:

Stone Yin/ Technique principal

Approved by:

Bill Yuan/ Manager

Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	POCE200413040GRW	Apr. 21, 2020

NOTE1:
The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EU Directives.

CE

NOTE2:
The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

CONTENTS

1. TEST SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

ETSI EN 301 489-1 V2.2.3 (2019-11) —ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility

Draft ETSI EN 301 489-17 V3.2.2 (2019-12) —ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility)

1.2 Summary of Test Result

ETSI EN 301 489-1/ Requirements		
Emission		
Conducted Emission(AC Mains)	ETSI EN301 489-1 V2.2.3 Clause 7.1	PASS
Radiated Emission	ETSI EN301 489-1 V2.2.3 Clause 7.1	PASS
Conducted Emission (Telecommunication Ports)	ETSI EN301 489-1 V2.2.3 Clause 7.1	N/A
Harmonic Current Emissions	ETSI EN301 489-1 V2.2.3 Clause 7.1	N/A
Voltage Fluctuations and Flicker	ETSI EN301 489-1 V2.2.3 Clause 7.1	PASS
Immunity		
Electrostatic Discharge	ETSI EN301 489-1 V2.2.3 Clause 7.2	PASS
RF Electromagnetic Field	ETSI EN301 489-1 V2.2.3 Clause 7.2	PASS
Fast Transients Common Mode	ETSI EN301 489-1 V2.2.3 Clause 7.2	PASS
Surges	ETSI EN301 489-1 V2.2.3 Clause 7.2	PASS
RF Common Mode 0,15 MHz to 80 MHz	ETSI EN301 489-1 V2.2.3 Clause 7.2	PASS
Transients and Surges	ETSI EN301 489-1 V2.2.3 Clause 7.2	N/A
Voltage Dips and Interruptions	ETSI EN301 489-1 V2.2.3 Clause 7.2	PASS

Note1: N/A means this test item is not applicable for this device.
Note2: This device also belong to information technology equipment, and most of EN55032 and EN55035's test items are same with ETSI EN301 489's.so most of EN55032 and EN55035's tests were performed together with EN301 489's test.

2. GENERAL INFORMATION

2.1 Client Information

Applicant : **Allterco Robotics**

Address : 103 Cherni Vrah Blvd, Sofia 1407, Bulgaria

Manufacturer : **Allterco Robotics**

Address : 103 Cherni Vrah Blvd, Sofia 1407, Bulgaria

2.2 TEST Environmental Conditions

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

Normal Temperature:	15°C - 35°C
Relative Humidity	35%-55 %
Air Pressure	101KPa

2.3 Description of Device (EUT)

Equipment	LED Lamps
Trade Mark	N/A
Model Name	Shelly Vintage A60
Series model	Shelly Vintage ST64
Model Difference	All models have the same functionality, software and electronics, only the color, front frame shape and model names may differ. Test sample model: Shelly Vintage A60
Power Source	AC 230V/ 50Hz
2.4G WIFI	
Supported type:	IEEE 802.11b/802.11g/802.11n(H20)
Operation frequency	IEEE 802.11b/g/n20: 2412-2472MHz
Modulation Type	IEEE 802.11b/g/n(HT20): CCK/DSSS
Number of Channels	IEEE 802.11b/802.11g/802.11n(HT20): 13
Channels Separation	5MHz
Antenna type	PCB Antenna
Antenna gain	0 dBi

Note: For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.4 Description of Test Modes

The EUT has been tested under typical operating condition. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode		
EMI	Mode 1: Transmitting	
EMS	Mode 1: Transmitting	Mode 2: Standby

NOTE: For DC (battery-powered equipment, no adapter) equipment, we tested the conducted Emission using HP notebook, notebook model:HP-CQ45, notebook adapter model: 0713A1990 INPUT:100-240V~1.5A 50-60Hz OUTPUT:19V⎓4.74A

2.5 Equipments Used During The Test

Conducted Emission

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	Test Receiver	Rohde & Schwarz	ESCI TEST RECEIVER	ID:1164.6607 K03-102109-MH	Dec. 11, 2019	1 Year
2	L.I.S.N	Rohde & Schwarz	ESH3-Z5.831 .5518.52	9561-G071	Dec. 11, 2019	1 Year
3	50ΩCoaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
4	Pulse Limiter	SCHWARZ BECK	VTSD 9561-F Pulse limiter 10dB Ateennator	561-G071	Dec. 11, 2019	1 Year
5	Cable	SCHWARZ BECK	N/A	N/A	Dec. 11, 2019	1 Year

Radiated Emission

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Test Receiver	Rohde & Schwarz	ESCI TEST RECEIVER	ID:1164.6607 K03-102109-MH	Dec. 11, 2019	1 Year
2	Bilog Antenna	Sunol Sciences	Model JB6 Antenna	A090414	Dec. 11, 2019	1 Year
3	HF Antenna	Sunol Sciences	Model DRH-118	A091114	Dec. 11, 2019	1 Year
4	50ΩCoaxial Switch	Anritsu	MP59B	M20531	N/A	1 Year
5	control	Positioning Controller	Model MF-7802	MF780208362	Dec. 11, 2019	1 Year
6	Cable(LF)	SCHWARZ BECK	N/A	N/A	Dec. 11, 2019	1 Year
7	Cable(HF)	SCHWARZ BECK	N/A	N/A	Dec. 11, 2019	1 Year
8	Amplifier (LF)	SCHWARZ BECK	BBV9743	9743-151	Dec. 11, 2019	1 Year
9	Amplifier(HF)	SCHWARZ BECK	BBV9718	9718-282	Dec. 11, 2019	1 Year
10	Spectrum analyzer	Agilent	E4408B	56110	Dec. 11, 2019	1 Year

Harmonic Test / Flicker Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.	1 Year
2	Harmonic Current / Flicker Measurement	SCHAFFNER	AC 2000A	20812	Dec. 11, 2019	1 Year

Electrostatic Discharge

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	ESD Tester	PRIMA	61002AG	PR14042705	Dec.11, 2019	1 Year
2	Audio Analyzer	R&S	UPV	100419	Dec.11, 2019	1 Year

Electrical Fast Transients Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Burst Tester	HTEC	HEFT 51	144303	Dec. 11, 2019	1 Year
2	Coupling Clamp	HTEC	IP-4A	147147	Dec. 11, 2019	1 Year

Surges Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Surge Tester	Prima	ESD61002AG	PR14042705	Dec. 11, 2019	1 Year

Conducted Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	Simulator	EMTEST	CWS500C	0900-12	Dec. 11, 2019	1 Year
2	CDN	EMTEST	CDN-M2	5100100100	Dec. 11, 2019	1 Year
3	CDN	EMTEST	CDN-M3	0900-11	Dec. 11, 2019	N/A
4	Injection Clamp	EMTEST	F-2031-23MM	368	Dec. 11, 2019	1 Year
5	Attenuator	EMTEST	ATT6	0010222A	Dec. 11, 2019	1 Year

Voltage Dips and Interruptions Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Dips Tester	HTEC	HPFS	144304	Dec. 11, 2019	1 Year

RF Electromagnetic Field

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Signal Generator	HP	8648A	3625U00573	Dec.11, 2019	1 Year
2	Amplifier	AR	500A100	17034	NCR	NCR
3	Amplifier	AR	100W/1000M	17028	NCR	NCR
4	Isotropic Field Monitor	AR	FM2000	16829	NCR	NCR
5	Isotropic Field Probe	AR	FP2000	16755	Dec.11, 2019	1 Year
6	Biconic Antenna	EMCO	3108	9507-2534	NCR	NCR
7	Log-periodic Antenna	AR	AT1080	16812	NCR	NCR
8	Audio Analyzer	R&S	UPV	100419	Dec.11, 2019	1 Year

2.6 Test Lab Information

CNAS Registration Number is L8229

Shenzhen POCE Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: Jan. 06, 2016.

VCCI Membership No.: 3941

The 3m Semi-anechoic chamber of Shenzhen POCE Technology Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.:R-3941. Date of Registration: Oct. 22, 2018.

2.7 Statement Of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented .quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for POCE laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	±2.50dB	(1)
Radiated Emission	1~12.75GHz	±3.20dB	(1)
Conducted Emission	0.15~30MHz	±2.64dB	(1)

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

Harmonic Current Emission Voltage Fluctuations and Flicker
The measurement uncertainty is evaluated as ± 1.4 %.
Flicker: The measurement uncertainty is evaluated as ± 1.2 %.

Electrostatic Discharge

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025: 1999[2], the requirements for measurement uncertainty in ESD testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant ESD standards. The immunity test signal from the ESD system meet the required specifications in IEC 61000-4-2 through the calibration report with the calibrated uncertainty for the waveform of voltage and timing as being 1.22% and 2.36%.

RF Electromagnetic Field

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025: 1999[2], the requirements for measurement uncertainty in RS testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant RS standards. The immunity test signal from the RS system meet the required specifications in IEC 61000-4-3 through the calibration for the uniform field strength and monitoring for the test level with the uncertainty evaluation report for the electrical filed strength as being 2.50 dB.

Fast Transients Common Mode

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025: 1999[2], the requirements for measurement uncertainty in EFT/Burst testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant EFT/Burst standards. The immunity test signal from the EFT/Burst system meet the required specifications in IEC 61000-4-4 through the calibration report with the calibrated uncertainty for the waveform of voltage. Frequency and timing as being 1.33% and 2.50%.

Surges

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025: 1999[2], the requirements for measurement uncertainty in Surge testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant Surge standards. The immunity test signal from the Surge system meet the required specifications in IEC 61000-4-5 through the calibration report with the calibrated uncertainty for the waveform of voltage and timing as being 1.63% and 2.76%.

RF Common Mode

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025: 1999[2], the requirements for measurement uncertainty in CS testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant CS standards. The immunity test signal from the CS system meet the required specifications in IEC 61000-4-6 through the calibration for unmodulated signal and monitoring for the test level with the uncertainty evaluation report for the injected modulated signal level through CDN and EM Clamp/Direct Injection as being 2.46 dB and 2.85 dB.

Voltage Dips and Interruption

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025: 1999[2], the requirements for measurement uncertainty in DIP testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant DIP standards. The immunity test signal from the DIP system meet the required specifications in IEC 61000-4-11 through the calibration report with the calibrated uncertainty for the waveform of voltage and timing as being 1.95% and 3.24%.

Transients and Surges

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025: 1999[2], the requirements for measurement uncertainty in Transients and Surges testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant Surges standards. The immunity test signal from the Transients and Surges system meet the required specifications in ISO 7637-2 through the calibration report with the calibrated uncertainty for the waveform of voltage and timing as being 1.25% and 2.75%.

3. TEST CONDITIONS AND RESULTS

3.1 EMC EMISSION TEST

3.1.1 Conducted Emission (AC Mains)

LIMIT

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

Note: (1)The tighter limit applies at the band edges.

(2)The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

TEST PROCEDURE

a) The EUT was placed 0.4 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.

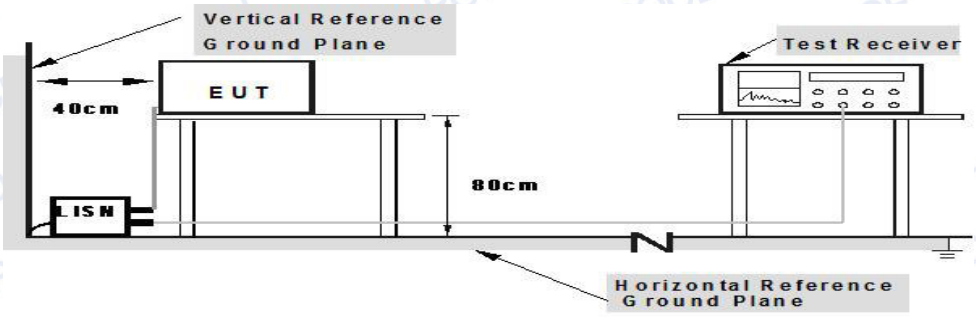
b) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

c) 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.

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

e) For the actual test configuration, please refer to the related Item –EUT Test Photos.

Block diagram of RS test setup



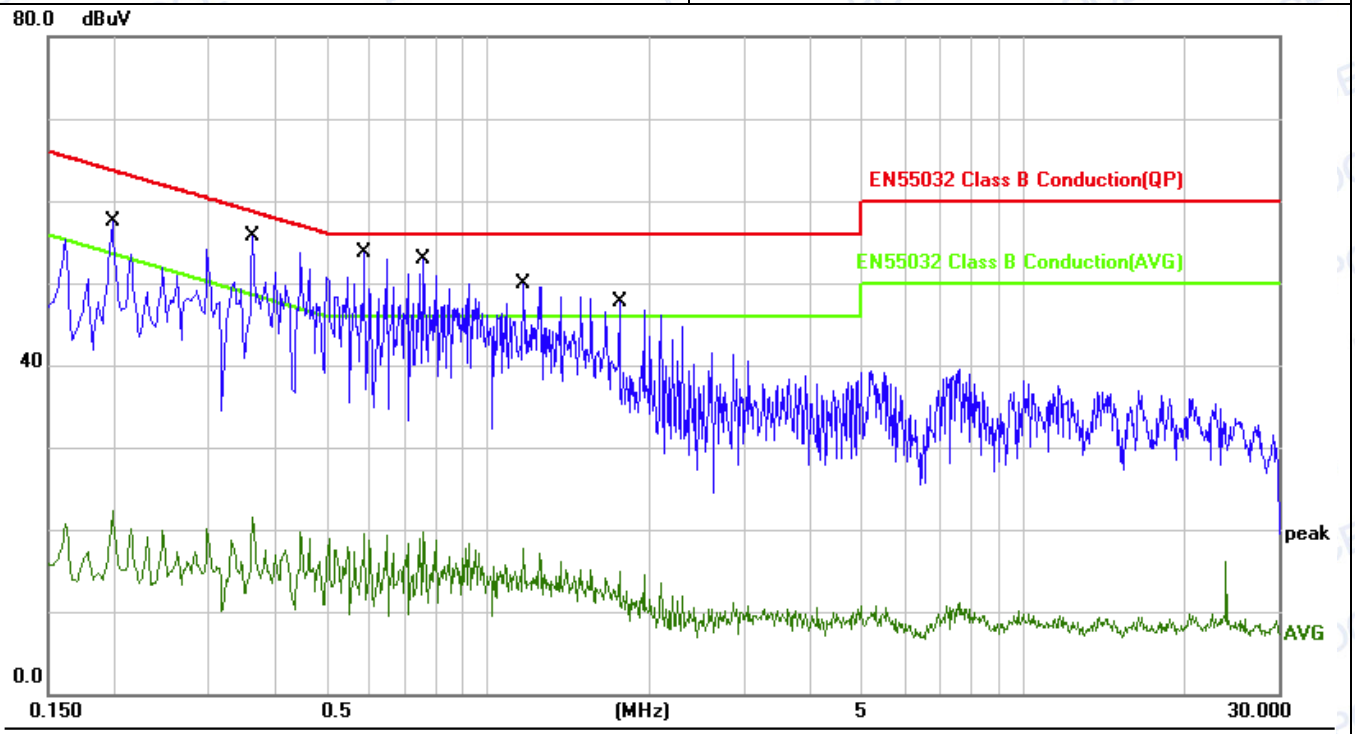
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

TEST RESULTS

---PASS---

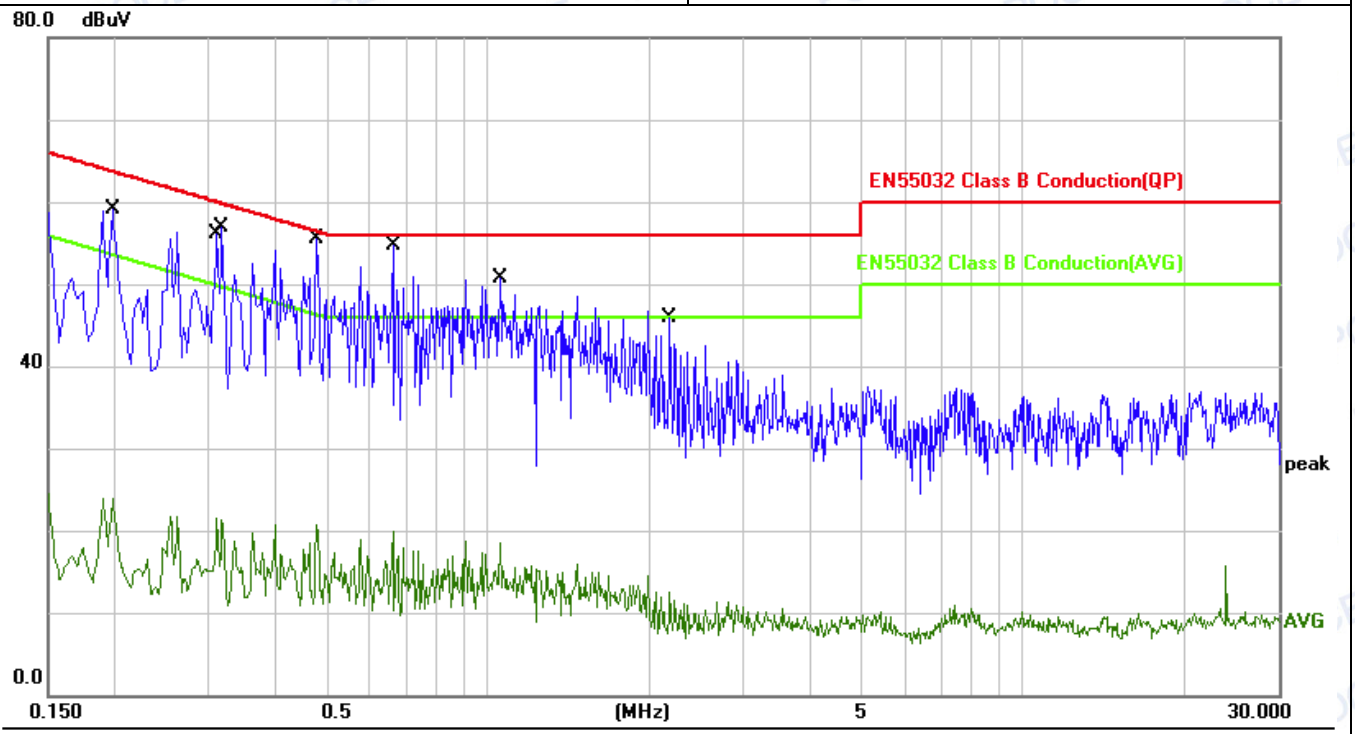
Please refer to the below test data:

Line	L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1980	57.73	-0.13	57.60	63.69	-6.09	QP	
2		0.1980	22.41	-0.13	22.28	53.69	-31.41	AVG	
3		0.3619	55.80	-0.02	55.78	58.68	-2.90	QP	
4		0.3619	21.60	-0.02	21.58	48.68	-27.10	AVG	
5	*	0.5859	53.77	-0.04	53.73	56.00	-2.27	QP	
6		0.5859	19.58	-0.04	19.54	46.00	-26.46	AVG	
7		0.7539	52.93	-0.07	52.86	56.00	-3.14	QP	
8		0.7539	19.71	-0.07	19.64	46.00	-26.36	AVG	
9		1.1619	50.08	-0.14	49.94	56.00	-6.06	QP	
10		1.1619	17.75	-0.14	17.61	46.00	-28.39	AVG	
11		1.7540	47.97	-0.21	47.76	56.00	-8.24	QP	
12		1.7540	15.09	-0.21	14.88	46.00	-31.12	AVG	

Line	N



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1980	59.15	-0.13	59.02	63.69	-4.67	QP	
2		0.1980	23.98	-0.13	23.85	53.69	-29.84	AVG	
3		0.3100	21.45	-0.01	21.44	49.97	-28.53	AVG	
4		0.3180	56.87	-0.01	56.86	59.76	-2.90	QP	
5	*	0.4780	55.50	-0.03	55.47	56.37	-0.90	QP	
6		0.4780	20.80	-0.03	20.77	46.37	-25.60	AVG	
7		0.6620	54.79	-0.05	54.74	56.00	-1.26	QP	
8		0.6620	20.03	-0.05	19.98	46.00	-26.02	AVG	
9		1.0500	50.77	-0.13	50.64	56.00	-5.36	QP	
10		1.0500	18.70	-0.13	18.57	46.00	-27.43	AVG	
11		2.1820	46.12	-0.24	45.88	56.00	-10.12	QP	
12		2.1820	12.70	-0.24	12.46	46.00	-33.54	AVG	

3.1.2 Radiated Emission

LIMIT

LIMITS OF RADIATED EMISSION MEASUREMENT (Below 1000MHz)

FREQUENCY (MHz)	Class B(at 10m)	Class B (at 3m)
	dBuV/m	dBuV/m
30 – 230	30	40
230 – 1000	37	47

LIMITS OF RADIATED EMISSION MEASUREMENT(Above 1000MHz)

FREQUENCY (MHz)	Class A (at 10m) dBuV/m		Class B (at 3m) dBuV/m	
	Peak	Avg	Peak	Avg
1000-3000	76	56	70	50
3000-6000	80	60	74	54

Notes: (1)The limit for radiated test was performed according to as following:
ETSI EN 301 489-1/EN 55022
(2)The tighter limit applies at the band edges.

TEST PROCEDURE

a) The EUT was placed on the top of a rotating table 3 meters away from the receiver antenna and 0.8 meters above the ground at a 9X9X6 anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b) The height of the equipment shall be 0.8 m; 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.

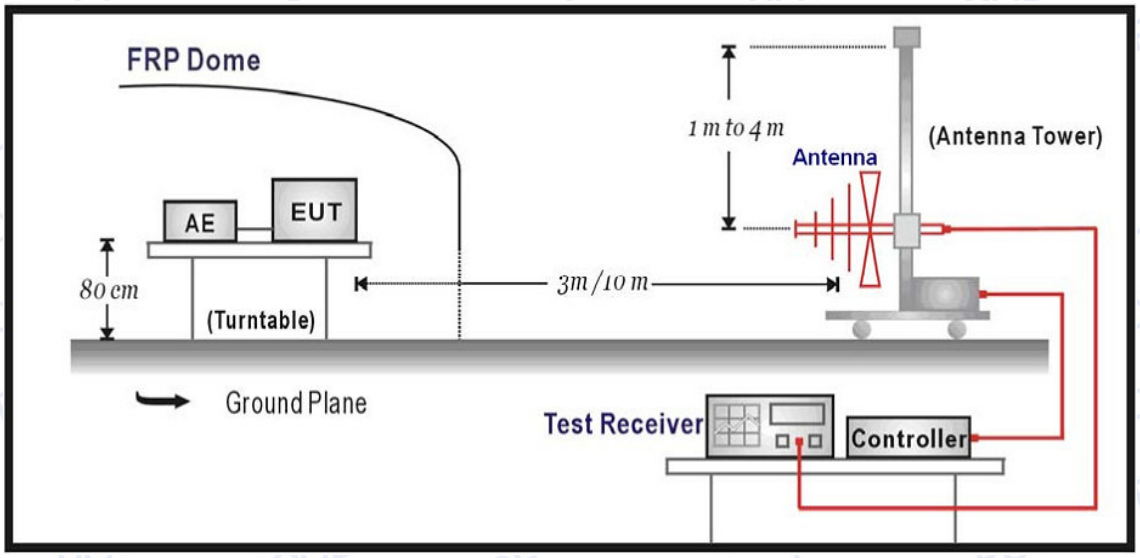
c) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak/Average detector mode re-measured.

d) If the Peak Mode measured value compliance with and lower than Quasi Peak/Average Mode Limit, the EUT shall be deemed to meet QP/AV Limits and then no additional QP/AV Mode measurement performed.

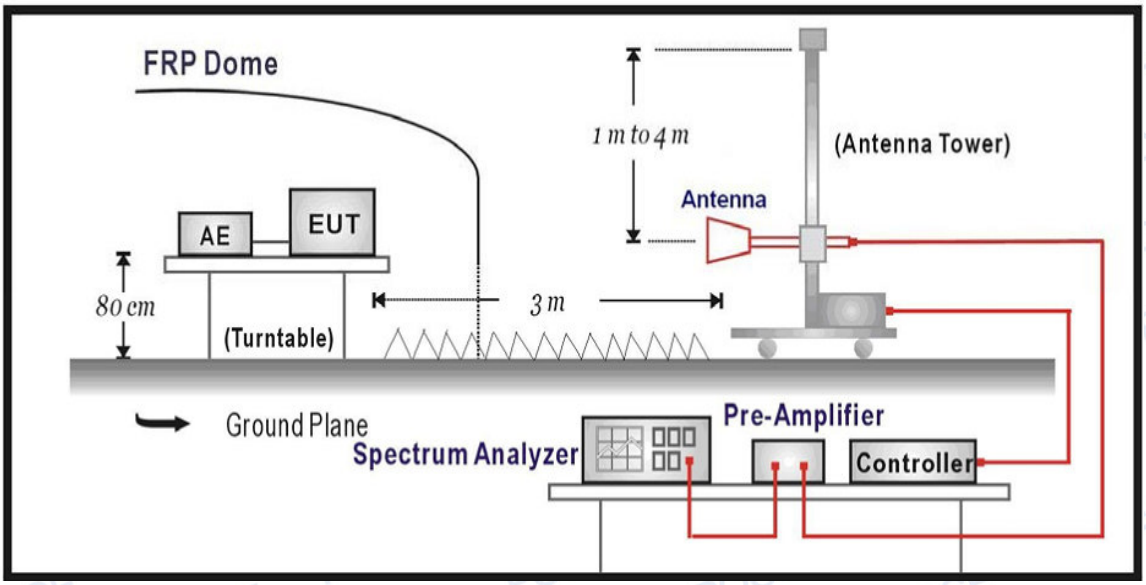
e) For the actual test configuration, please refer to the related Item –EUT Test Photos.

Block diagram of RS test setup

Below 1GHz



Above 1GHz

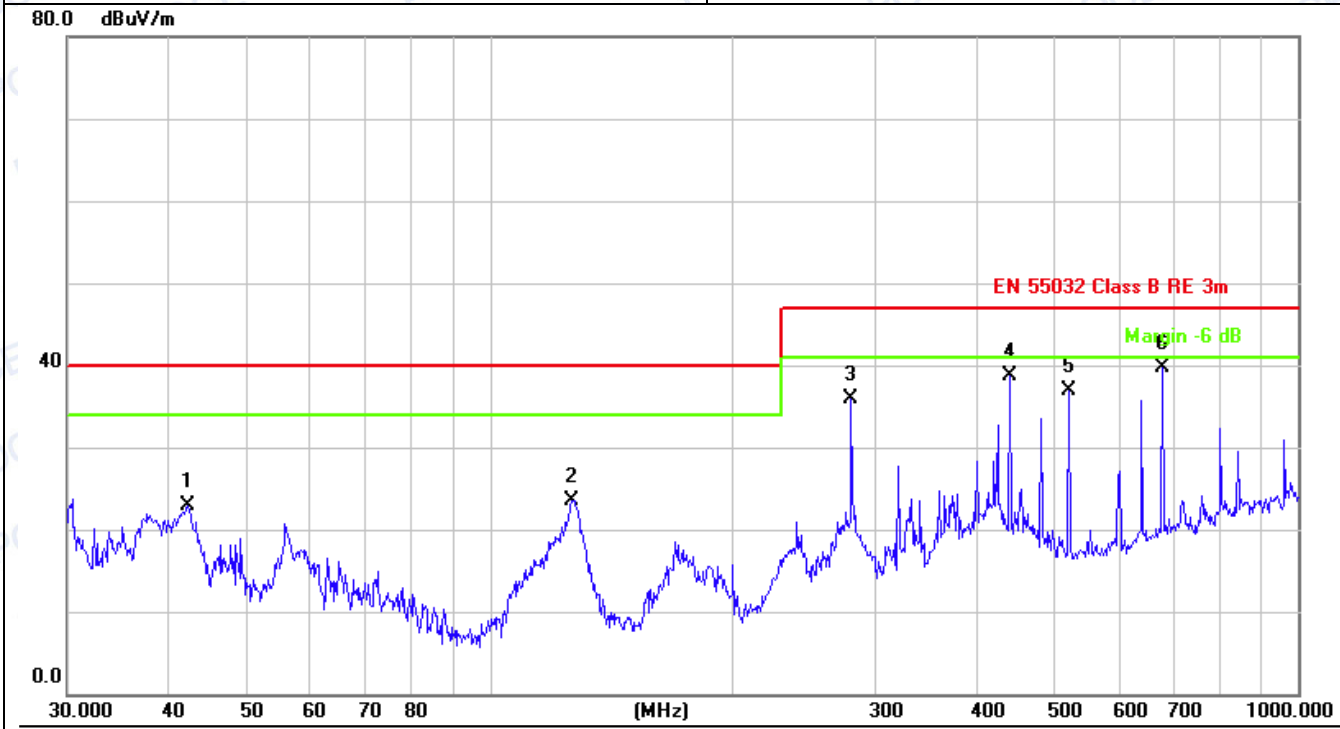


TEST RESULTS

---PASS---

Please refer to the below test data:

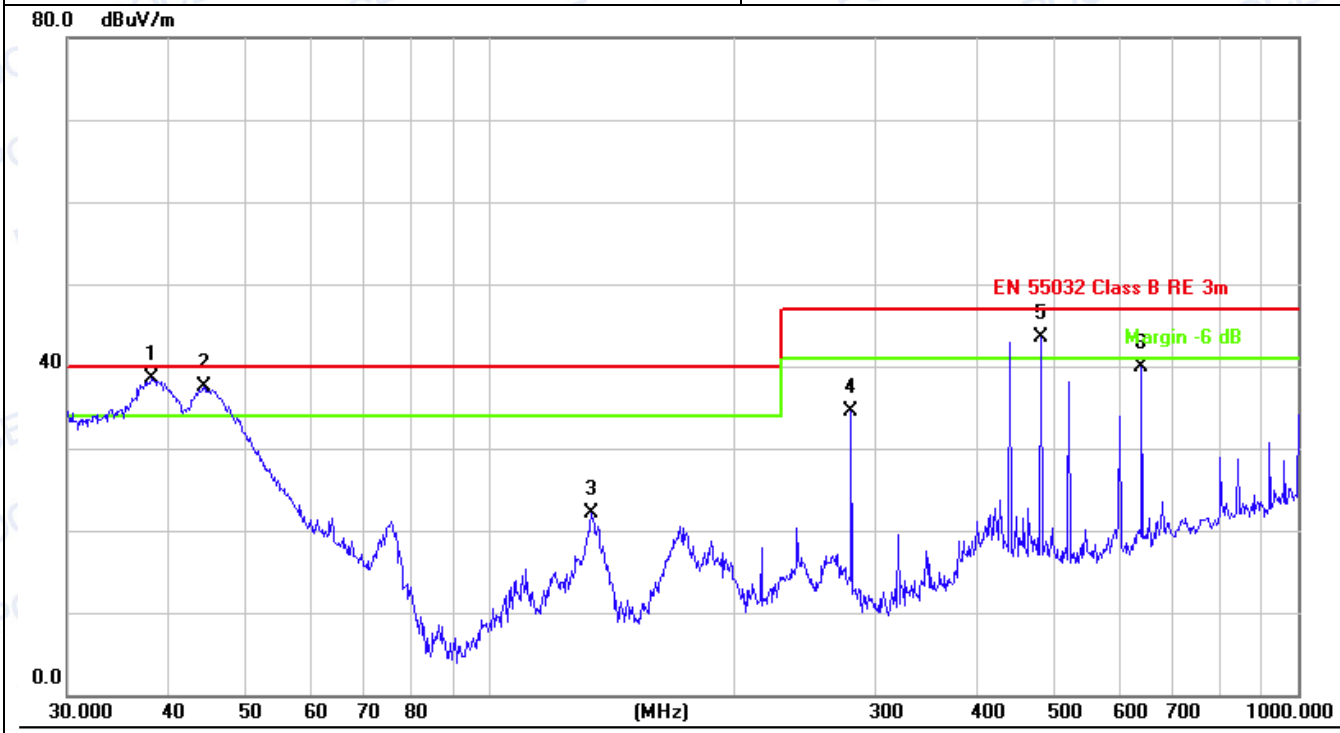
Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		42.3022	36.40	-13.46	22.94	40.00	-17.06	QP			
2		126.3286	36.04	-12.51	23.53	40.00	-16.47	QP			
3		280.0237	47.42	-11.44	35.98	47.00	-11.02	QP			
4		440.1963	46.26	-7.59	38.67	47.00	-8.33	QP			
5		520.8882	42.64	-5.80	36.84	47.00	-10.16	QP			
6	*	679.9600	42.69	-2.96	39.73	47.00	-7.27	QP			

Note: Above 1-6GHz have been tested and found no emission except floor noise.

Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	38.0783	49.95	-11.52	38.43	40.00	-1.57	QP			
2	!	44.2752	53.21	-15.78	37.43	40.00	-2.57	QP			
3		133.6188	34.63	-12.57	22.06	40.00	-17.94	QP			
4		280.0237	46.06	-11.64	34.42	47.00	-12.58	QP			
5	!	480.5276	50.46	-6.89	43.57	47.00	-3.43	QP			
6		640.6110	44.00	-4.12	39.88	47.00	-7.12	QP			

Note: Above 1-6GHz have been tested and found no emission except floor noise.

3.1.3 Harmonic Current Emissions

LIMITS

IEC 555-2					
Table - I			Table - II		
Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in Ampers)	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in Ampers)
Non Portable Tools or TV Receivers	Odd Harmonics		TV Receivers	Odd Harmonics	
	3	2.30		3	0.80
	5	1.14		5	0.60
	7	0.77		7	0.45
	9	0.40		9	0.30
	11	0.33		11	0.17
	13	0.21		13	0.12
	15≤n≤39	0.15 · 15/n		15≤n≤39	0.10 · 15/n
	Even Harmonics			Even Harmonics	
	2	1.08		2	0.30
	4	0.43		4	0.15
	8	0.30			
	8≤n≤40	0.23 · 8/n		DC	0.05

EN 61000-3-2/IEC 61000-3-2					
Equipment Category	Max. Permissible Harmonic Current (in Ampers)	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in A)	(mA/w)
Class A	Same as Limits Specified in 4-2.1, Table - I, but only odd harmonics required	Class D	3	2.30	3.4
			5	1.14	1.9
			7	0.77	1.0
			9	0.40	0.5
			11	0.33	0.35
			13≤n≤39	see Table I	3.85/n
			only odd harmonics required		

TEST PROCEDURE

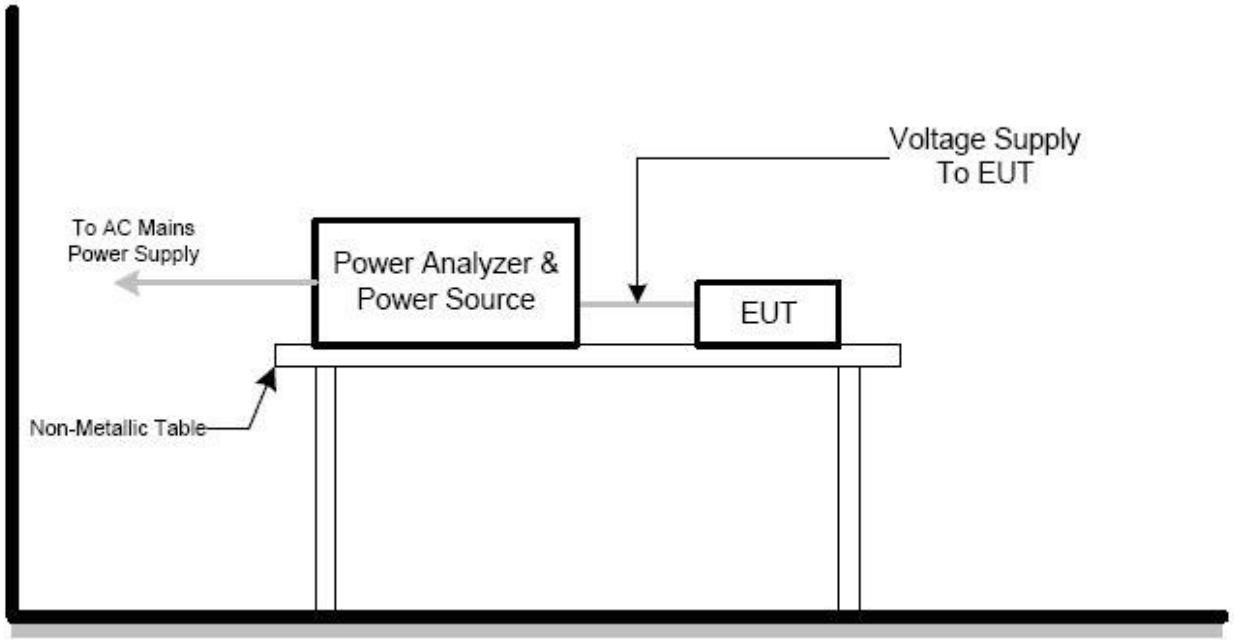
a) The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.

b) The classification of EUT is according to section 5 of EN 61000-3-2: 2000.The EUT is classified as follows:
Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.
Class B: Portable tools. Portable tools. Arc welding equipment which is not professional equipment.
Class C: Lighting equipment.
Class D: Equipment having a specified power less than or equal to600 W of the following types: Personal computers and personal computer monitors and television receivers.

c) 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 time necessary for the EUT to be exercised.

d) For the actual test configuration, please refer to the related item –EUT Test Photos.

Block diagram of RS test setup



TEST RESULTS

Not applicable to this device, which output power is less than 75W.

3.1.4 Voltage Fluctuations and Flicker

LIMITS

Tests	Limits		Descriptions
	IEC555-3	IEC/EN 61000-3-3	
Pst	≤ 1.0, Tp= 10 min.	≤ 1.0, Tp= 10 min.	Short Term Flicker Indicator
Plt	N/A	≤ 0.65, Tp=2 hr.	Long Term Flicker Indicator
dc	≤ 3%	≤ 3.3%	Relative Steady-State V-Chang
dmax	≤ 4%	≤ 4%	Maximum Relative V-change
d (t)	N/A	≤ 3.3% for > 500 ms	Relative V-change characteristic

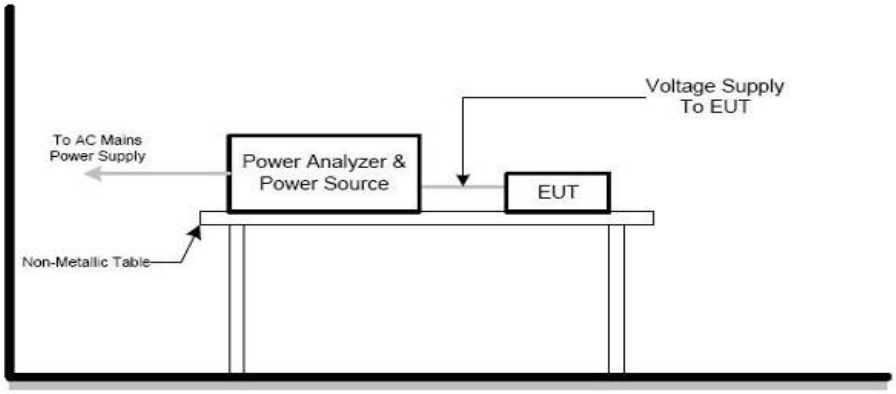
TEST PROCEDURE

a) Fluctuation and Flickers Test:
Tests was performed according to the Test Conditions Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.

b) All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

c) For the actual test configuration, please refer to the related Item –EUT Test Photos.

Block diagram of RS test setup



TEST RESULTS

---PASS---

Please reference to the following:

EN 61000-3-3:2013 - Voltage reduction is positive

Voltage Variations
Nominal Voltage: 230 Vrms
Highest Half-cycle level: +0.04%
Lowest Half-cycle level: +0.12%

d(max): 0.00% Limit: 4% PASS
t(max): 0.00seconds Limit: 500ms PASS

Steady State definition: >1000ms within +/- 0.2%
Largest d(c) change down: 0.00%
Largest d(c) change up: +0.00%
Largest d(c) change: 0.00% Limit: 3.3% PASS

3.2 EMC IMMUNITY TEST

3.2.1 Immunity Performance criteria

A. General Requirements (ETSI EN 301489-1):

The performance criteria criteria are used to take a decision on whether radio equipment passes or fails immunity tests.

For the purpose of the present document four categories of performance criteria apply:

- Performance criteria for continuous phenomena applied to transmitters and receivers
- Performance criteria for transient phenomena applied to transmitters and receivers
- Performance criteria for equipment which does not provide a continuous communication link
- Performance criteria for ancillary equipment tested on a stand alone basis

(1) Performance criteria for continuous phenomena applied to transmitters and receivers

If no further details are given in the relevant part of ETSI EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for continuous phenomena shall apply.

During and after the test, the equipment shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the equipment is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

(2) Performance criteria for transient phenomena applied to transmitters and receivers

If no further details are given in the relevant part of ETSI EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for transient phenomena shall apply.

For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

f) For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A SW reboot is not allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

g) For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. A SW reboot is not allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

For all other ports the following applies:

h) After the test, the equipment shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the equipment is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

i) During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.

j) If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

(3) Performance criteria for equipment which does not provide a continuous communication link

For radio equipment which does not provide a continuous communication link, the performance criteria described in clauses 6.1 and 6.2 are not appropriate, in these cases the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 have also to be taken into account.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses 6.1 and 6.2.

(4) Performance criteria for ancillary equipment tested on a stand alone basis

If ancillary equipment is intended to be tested on a stand alone basis, the performance criteria described in clauses 6.1 and 6.2 are not appropriate, in these cases the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 have also to be taken into account.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses 6.1 and 6.2.

B. EN301489-17

General performance criteria

• Performance criteria A for immunity tests with phenomena of a continuous nature;

• Performance criteria B for immunity tests with phenomena of a transient nature;

• Performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following.

Criteria	During test	After test
A	Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3) 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 (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3) 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 (see note 3).

NOTE 1:
Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2:
Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 3:
No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

Performance criteria for Continuous phenomena applied to Transmitters (CT)
The performance criteria A shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied toTransmitters (TT)
The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Continuous phenomena applied to Receivers (CR)
The performance criteria A shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Receivers (TR)
The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test.

In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

3.2.2 Electrostatic Discharge

TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Required Performance	B
Discharge Voltage:	Air Discharge:2kV/4kV/8kV (Direct) Contact Discharge:2kV/4kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 200 times in total
Discharge Period:	1 second minimum

Block diagram of RS test setup

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

Severity Levels and Performance Criterion

Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1	±2	±2
2	±4	±4
3	±6	±8
4	±8	±15
X	Special	Special

The test method shall be in accordance with CENELEC EN 61000-4-2 [2], clause 8.

Test Procedure

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

a) Contact discharge was applied to conductive surfaces and coupling planes of the EUT. During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second. The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges.

If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

b) Air discharges at insulation surfaces of the EUT. It was at least ten single discharges with positive and negative at the same selected point.

Test Results

---PASS---

Please refer to the following :

Direct discharge				
Type of discharge	Discharge voltage (KV)	Observations Performance	Criteria Level	Result
Contact discharge	±2	A	B	Pass
	±4	B	B	
Air discharge	±2	A	B	
	±4	B	B	
	±8	B	B	
Indirect discharge				
Type of discharge	Discharge voltage (KV)	Observations Performance	Criteria Level	Result
HCP (6 sides)	±2	A	B	Pass
	±4	A	B	
VCP (4 sides)	±2	A	B	
	±4	A	B	

Note1: The EUT loss communication link a while and it can self-recoverable after test.

3.2.3 RF Electromagnetic Field

TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-3
Required Performance	A
Frequency Range:	80 MHz - 6000 MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Dwell Time:	at least 3 seconds

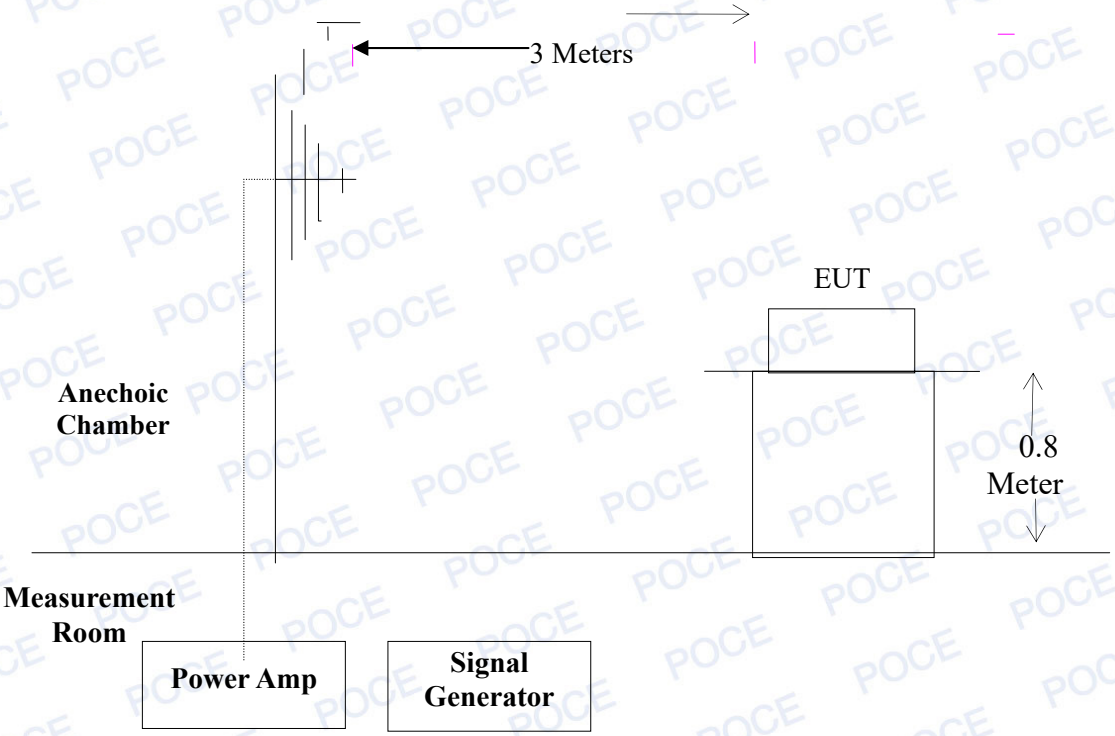
TEST PROCEDURE

The EUT are placed on a table which is 0.8 meter high above the ground. The
EUT is set 3 meters away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the six sides of the EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a audio analyzer is used to monitor SINAD values.
All the scanning conditions are as following:

Condition of Test	Remark
1. Fielded Strength	3V/m (Severity Level 2)
2. Radiated Signal	Modulated
3. Scanning Frequency	80-1000MHz 1400MHz~2700MHz
4. Sweep time of radiated	0.0015 Decade/s
2. Dwell Time	1 Sec.

Block diagram of RS test setup



Note:

TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

TEST RESULTS

---PASS---

Please refer to the below test data:

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Observations Performance	Perform. Criteria	Result
80~6000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Top	A	A	PASS
			Front			
			Rear			
			Left			
			Right			
			Bottom			

Note1: The EUT can maintain communication link and not operate unintentionally during the test also can operate without any loss of user control functions after test.

3.2.4 Fast Transients Common Mode

TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-4
Required Performance	B
Test Voltage:	Power Line:1 kV Signal/Control Line:0.5 KV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Wave shape :	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	Not less than 1 min.

TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min. The other condition as following manner:

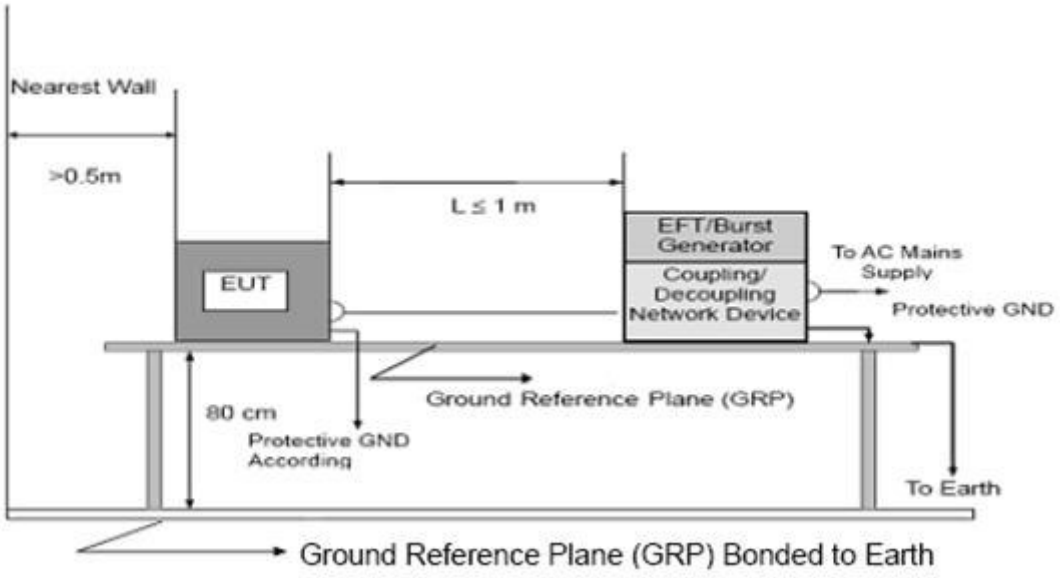
a) The length of power cord between the coupling device and the EUT should not exceed 1 meter.

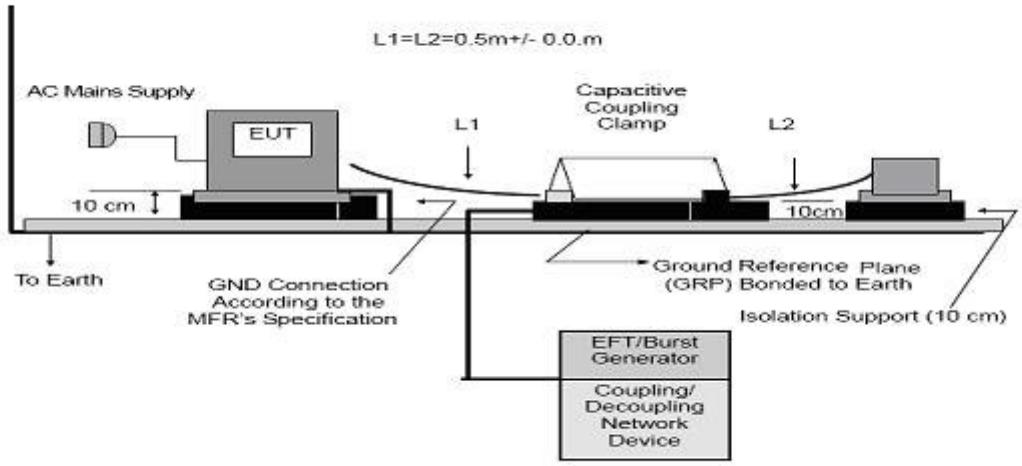
b) Both positive and negative polarity discharges were applied.

c) The duration time of each test sequential was 1 minute

d) For the actual test configuration, please refer to the related Item –EUT Test Photos.

Block diagram of RS test setup





Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

TEST RESULTS

---PASS---

Please refer to the below test data:

Lead under Test	Level (±kV)	Coupling Direct/Clamp	Observations (Performance Criterion)	Result
L	±1	Direct	A	Pass
N	±1	Direct	A	Pass
L+N	±1	Direct	A	Pass

Note1: The EUT can maintain communication link and not operate unintentionally during the test also can operate without any loss of user control functions after test.

3.2.5 Surge Testing

TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-5
Required Performance	B
Wave-Shape:	Combination Wave 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current
Test Voltage:	Power Port ~ Line to line: 1kV
Surge Input /Output:	L~N
Generator Source:	2 ohm between networks
Impedance:	12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0 /90/180/270
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

TEST PROCEDURE

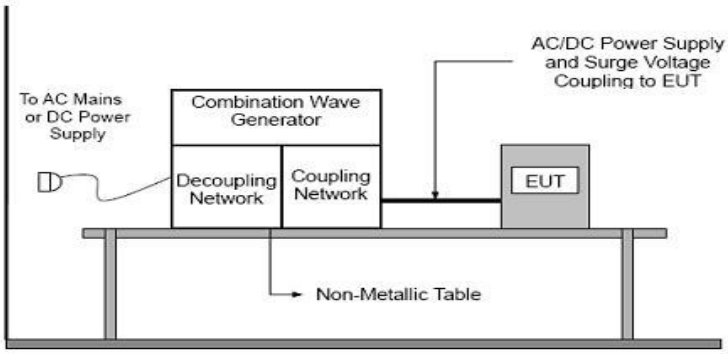
a) For EUT power supply:
The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2meters in length (or shorter).

b) For test applied to unshielded unsymmetrical operated interconnection lines of EUT:
The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

c) For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT: The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

d) For the actual test configuration, please refer to the related Item –EUT Test Photos.

Block diagram of RS test setup



TEST RESULTS

---PASS---

Please refer to the below test data:

Location	Level (kV)	Pulse No	Surge Interval	Phase (deg)	Observations (Performance Criterion)	Result
L-N	± 1	5	60s	0°	A	Pass
				90°	A	Pass
				180°	A	Pass
				270°	A	Pass

Note1: The EUT can maintain communication link and not operate unintentionally during the test also can operate without any loss of user control functions after test.

3.2.6 RF Common Mode

TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-6
Required Performance	A
Frequency Range:	0.15 MHz - 80 MHz
Field Strength:	3 V rms
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Dwell Time:	at least 3 seconds

TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min. The other condition as following manner:

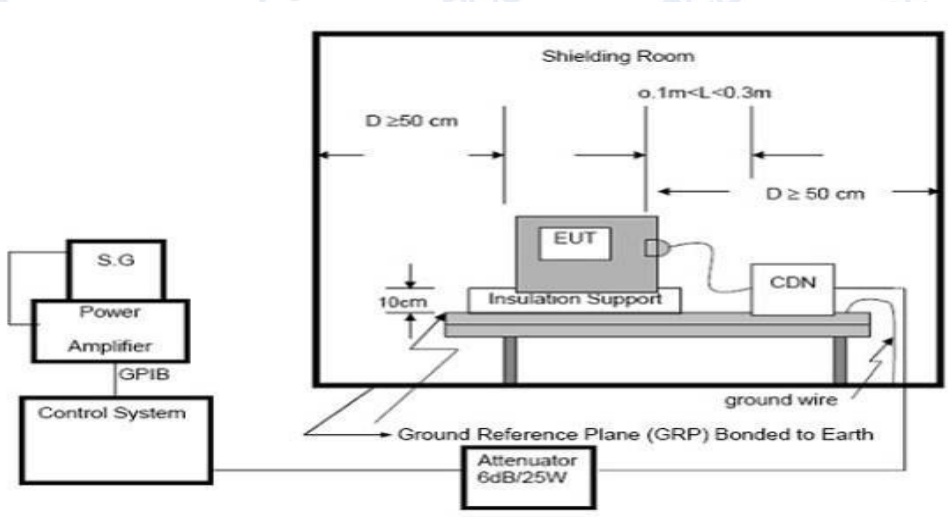
a) The field strength level was 3V.

b) The frequency range is swept from 150 KHz to 80 MHz, with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

c) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

d) For the actual test configuration, please refer to the related Item –EUT Test Photos.

Block diagram of RS test setup



For the actual test configuration, please refer to the related Item –EUT Test Photos.

NOTE:

FLOOR-STANDING EQUIPMENT

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

TEST RESULTS

---PASS---

Please refer to the below test data:

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	Coupling type	Observations Performance	Perform. Criteria	Results
Input/ Output AC. Power Port	0.15-80	3V(rms) AM Modulated 1000Hz, 80%	CDN	A	A	PASS
Input/ Output DC. Power Port			CDN	N/A	N/A	N/A

Note1: The EUT can maintain communication link and not operate unintentionally during the test also can operate without any loss of user control functions after test.

3.2.7 Voltage Dips and Interruptions

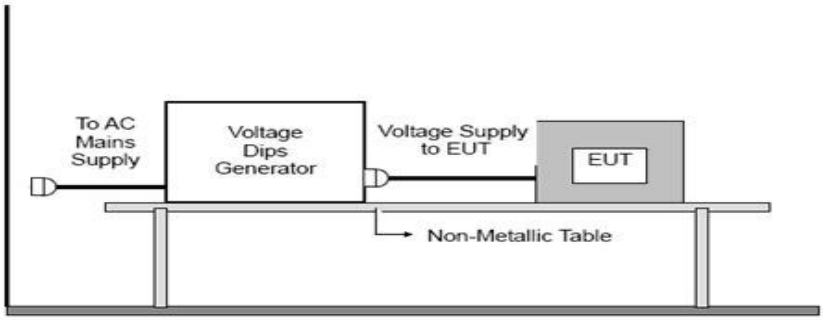
TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-11
Required Performance	B (For 0% Voltage Dips) C (For 70% Voltage Dips) C (For 0% Voltage Interruptions)
Test Duration Time:	Minimum three test events in sequence
Interval between Event:	Minimum ten seconds
Phase Angle:	0°/45°/90°/135°/180°/225°/270°/315°/360°
Test Cycle:	3 times

TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

Block diagram of RS test setup



For the actual test configuration, please refer to the related Item –EUT Test Photos.

TEST RESULTS

---PASS---

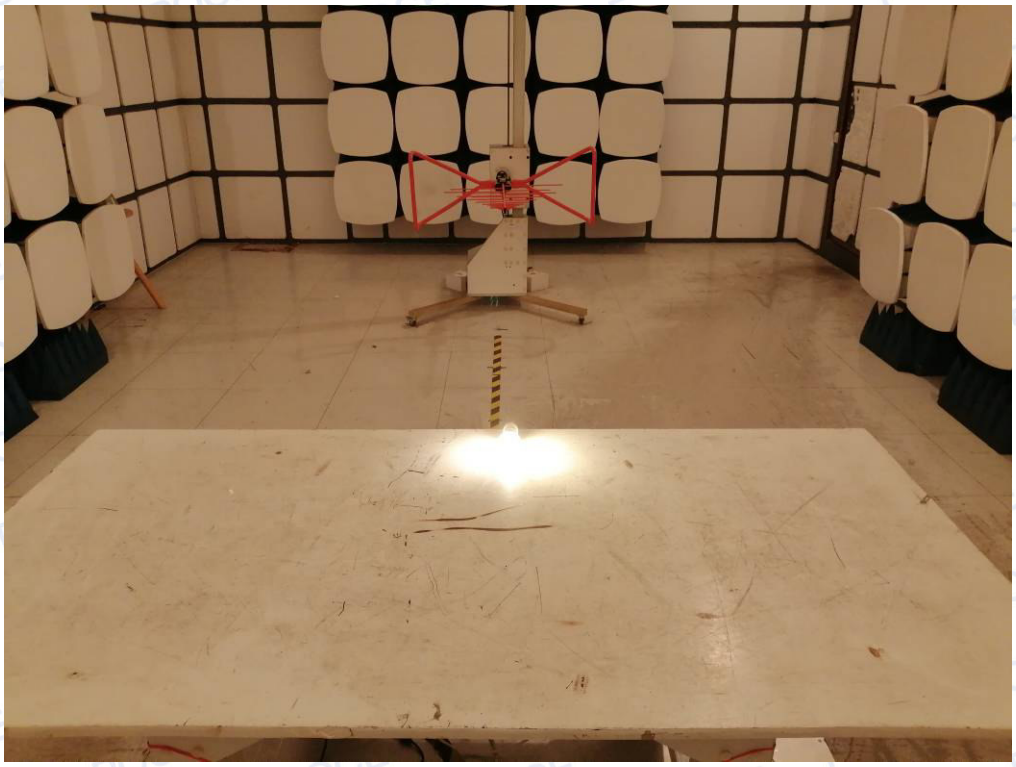
Please refer to the below test data:

Voltage Reduction	Duration (ms)	Perform Criteria	Observations Performance	Results
Voltage dip 0%	10	B	A	PASS
Voltage dip 0%	20	B	B	PASS
Voltage dip 70%	500	B	B	PASS
Voltage interruptions	5000	C	c	PASS

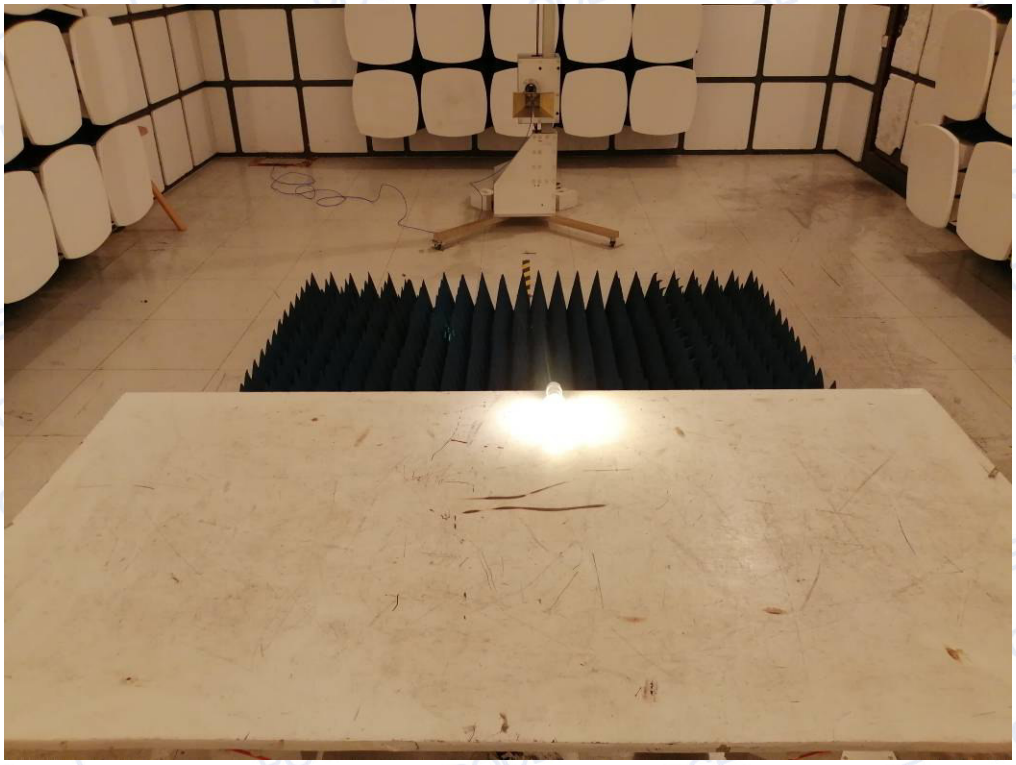
Note: The EUT loss communication link a while and it can self-recoverable after test.

4. TEST SETUP PHOTOS

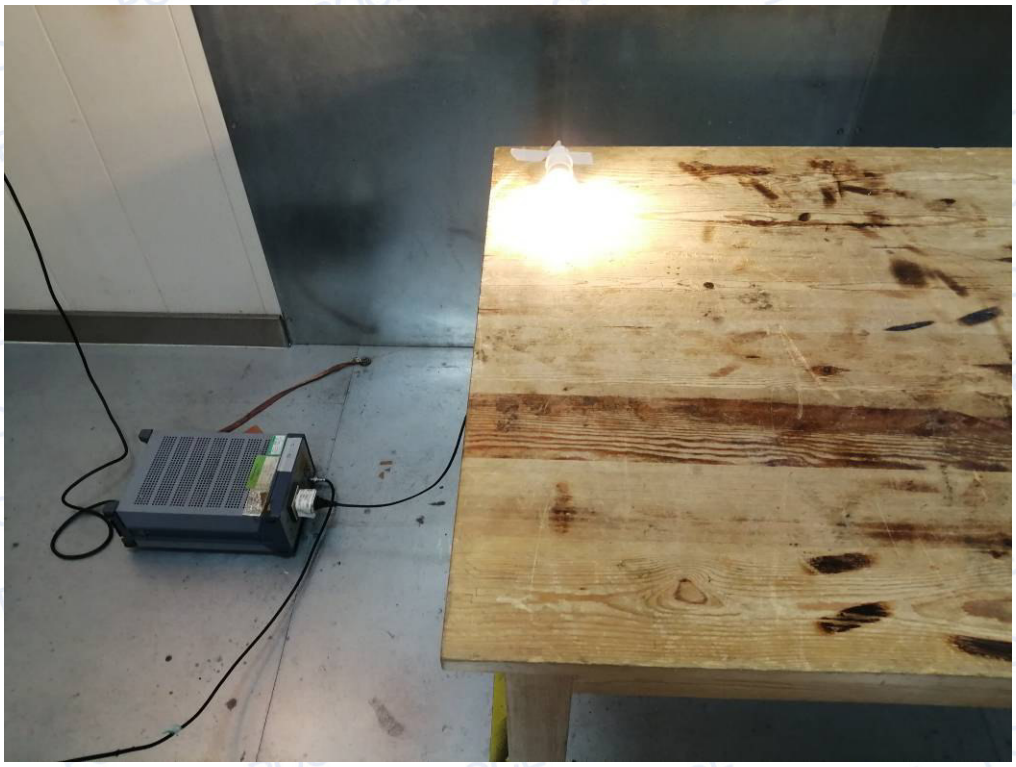
Radiated Emission 30MHz-1GHZ



Radiated Emission 1GHZ-6GHz



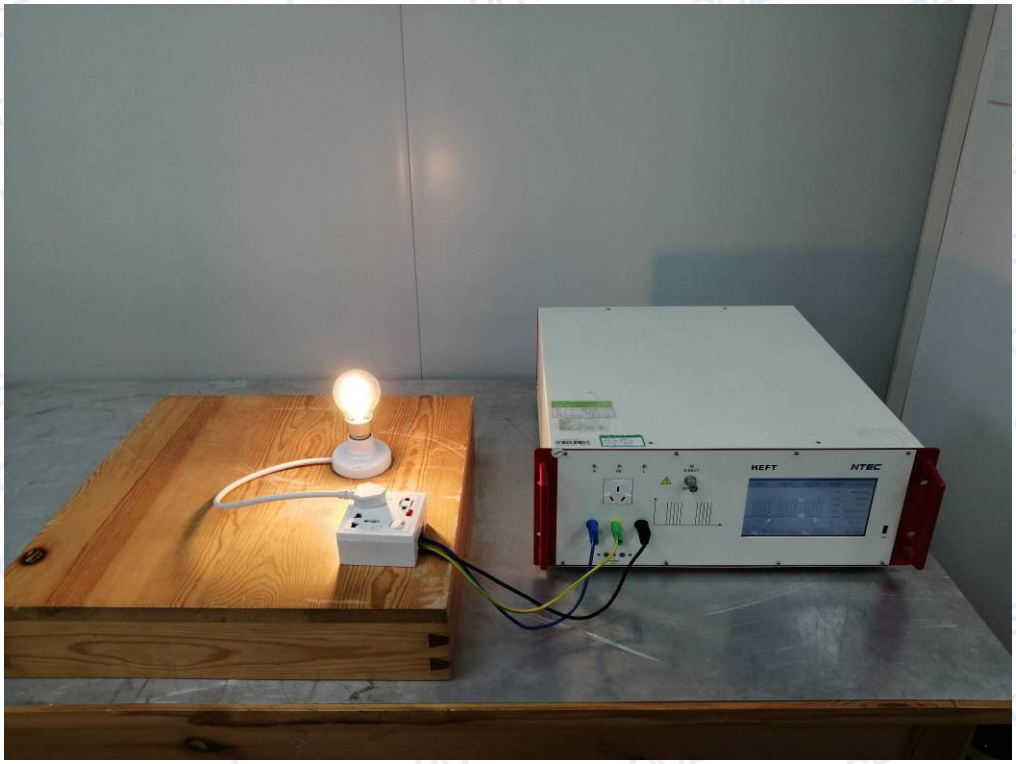
Conducted disturbance (AC main)



Harmonic Current Emission and Voltage Fluctuation and Flicker

Electrostatic discharge

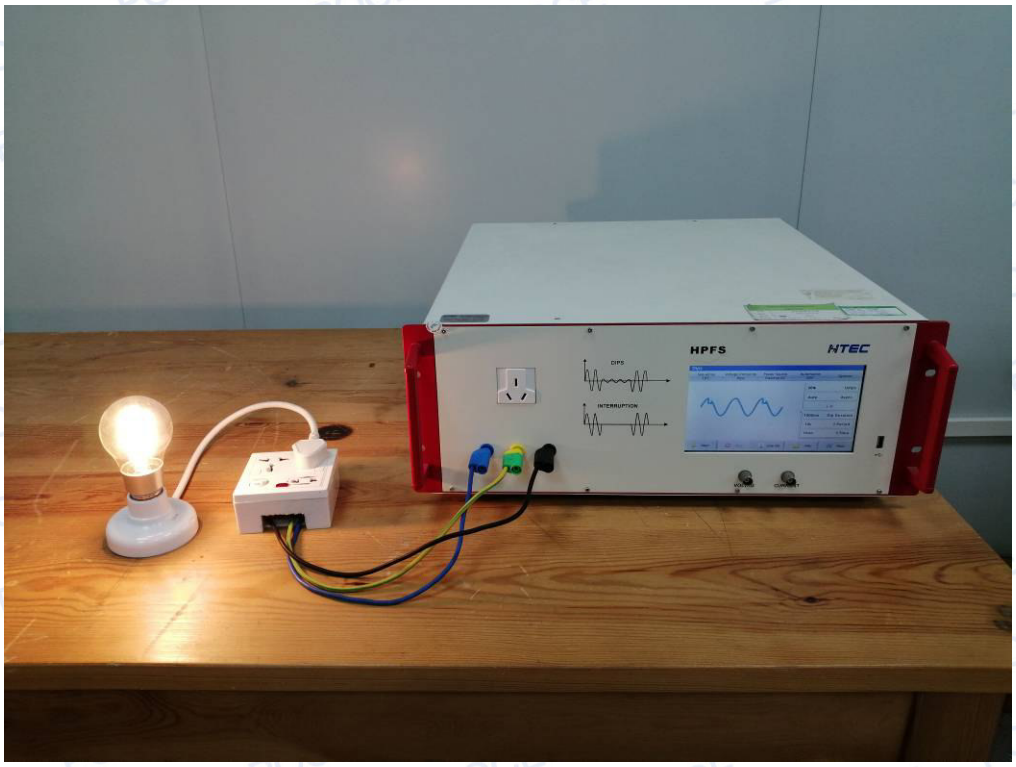
Fast Transients Common Mode



RF Common Mode 0,15 MHz to 80 MHz

Surges

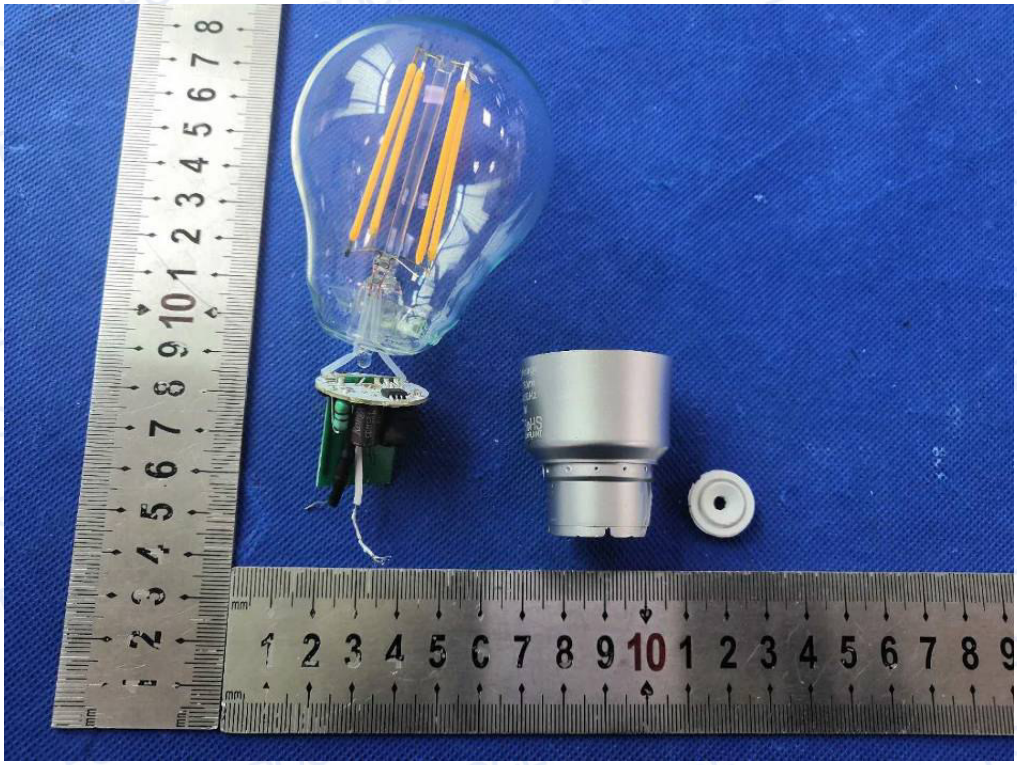
Voltage Dips and Interruptions

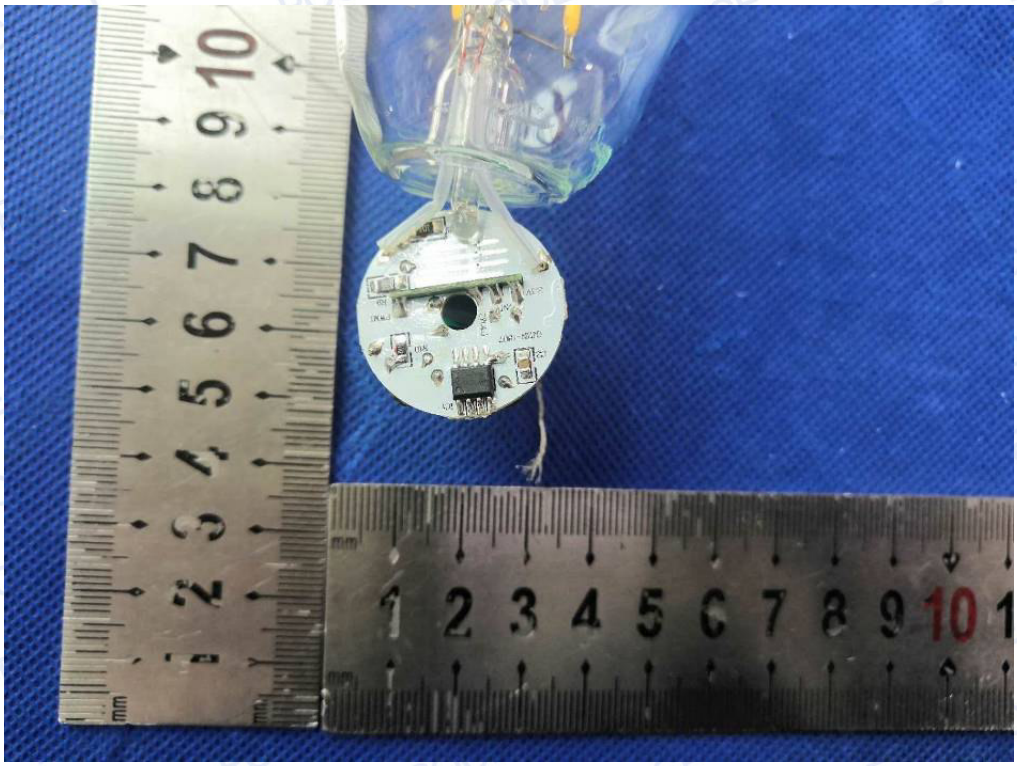


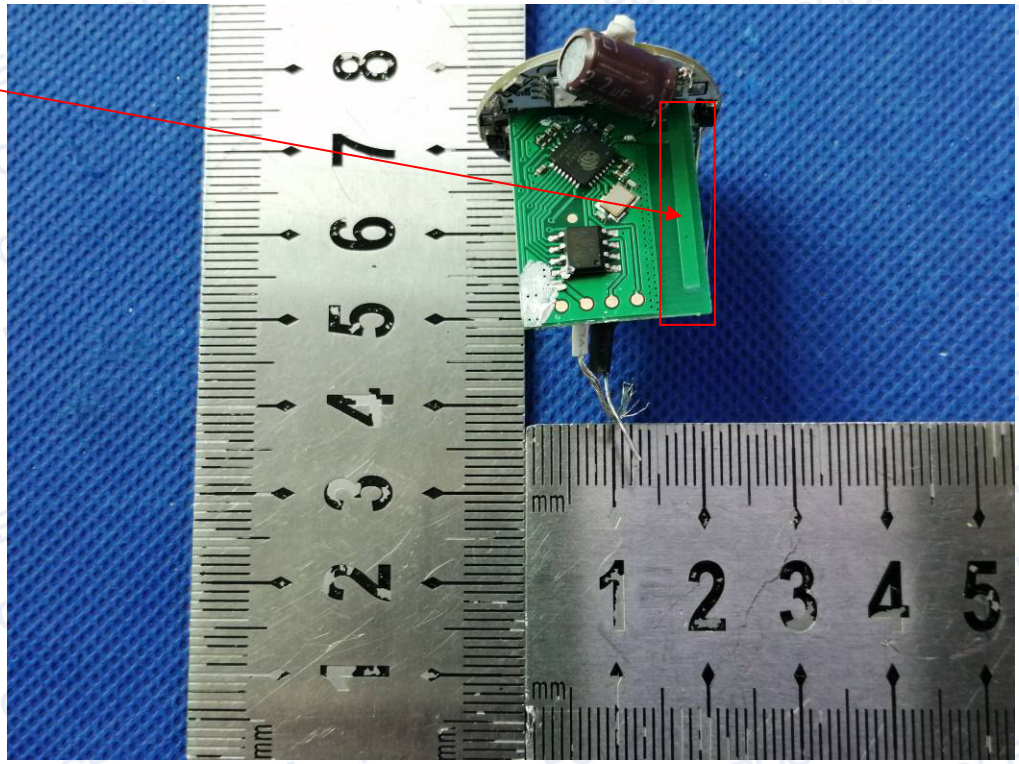
5. PHOTOS OF THE EUT

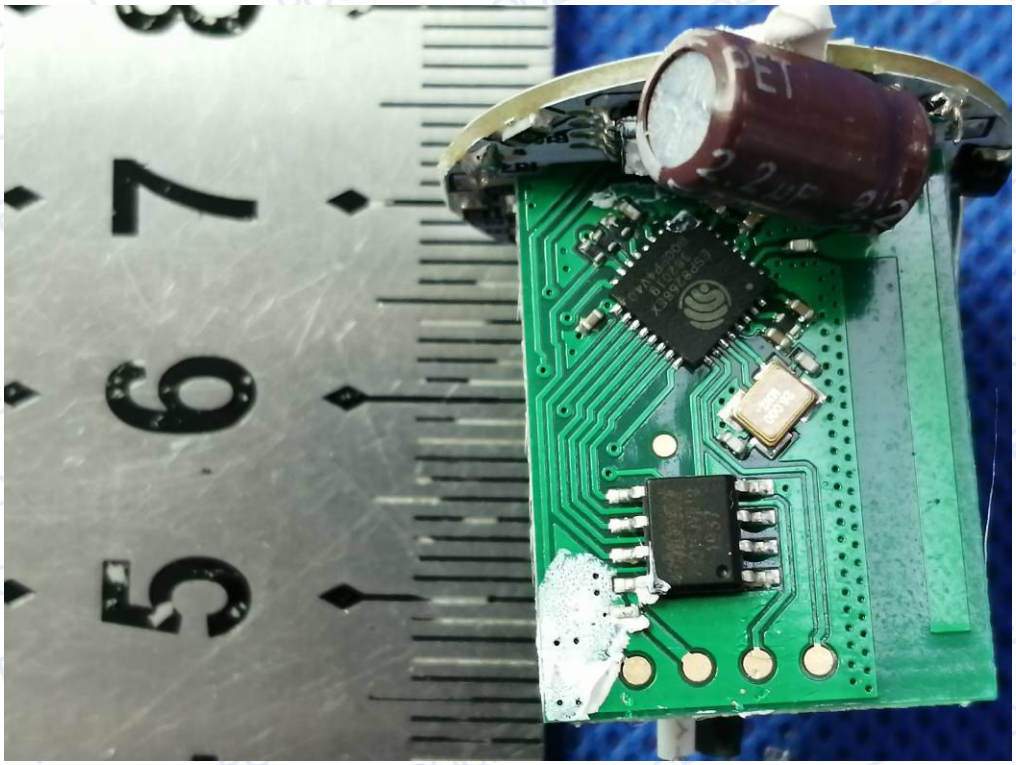
External Photos of EUT

Internal Photos of EUT






WiFi Antenna



********** End of Report **********

HEALTH TEST REPORT

EN 62311: 2008

Report Reference No.	:	**POCE200413041MRW**
Applicant's Name	:	Allterco Robotics
Address of Applicant	:	103 Cherni Vrah Blvd, Sofia 1407, Bulgaria
Test Firm	:	Shenzhen POCE Technology Co., Ltd.
Address of Test Firm	:	H Building, Hongfa Science and Technology Park, Tangtou, Shiyan, Bao'An District, Shenzhen, China
Test Specification Standard	:	**EN 62311: 2008**
Product Name	:	LED Lamps
Model/ Type Reference	:	Shelly Vintage A60
Listed Models	:	Shelly Vintage ST64
Date of Receipt	:	Dec. 27, 2019
Date of Test	:	Dec. 27, 2019 - Apr. 20, 2020
Data of Issue	:	Apr. 21, 2020
Result	:	**PASS**

Compiled by:

Amy Zhu/ File administrators

Supervised by:

Stone Yin/ Technique principal

Approved by:

SHEN ZHEN POCE TECHNOLOGY CO.,LTD APPROVED

Bill Yuan/ Manager

Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	POCE200413041MRW	Apr. 21, 2020

NOTE1:
The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EU Directives.

CE

NOTE2:
The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

Contents

1. TEST SUMMARY

1.1 TEST STANDARDS

EN 62311: Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)

Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0Hz to 300GHz) (Official Journal L 197 of 30 July 1999).

1.2 TEST FACILITY

1.2.1 Address of the test laboratory

Shenzhen POCE Technology Co., Ltd.
Add. : H Building, Hongfa science and Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.2.2 Laboratory accreditation

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

CNAS Registration Number. is L8229

Shenzhen POCE Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories,
Date of Registration: Jan. 06, 2016.

VCCI Membership No.: 3941

The 3m Semi-anechoic chamber of Shenzhen POCE Technology Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.:R-3941.
Date of Registration: Oct. 22, 2018.

2. GENERAL INFORMATION

2.1 CLIENT INFORMATION

Applicant : **Allterco Robotics**

Address : 103 Cherni Vrah Blvd, Sofia 1407, Bulgaria

Manufacturer : **Allterco Robotics**

Address : 103 Cherni Vrah Blvd, Sofia 1407, Bulgaria

2.2 ENVIRONMENTAL CONDITIONS

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

Normal Temperature:	15°C -35°C
Relative Humidity	35%-55 %
Air Pressure	101KPa

2.3 PRODUCT DESCRIPTION

Equipment	LED Lamps
Trade Mark	N/A
Model Name	Shelly Vintage A60
Series model	Shelly Vintage ST64
Model Difference	All models have the same functionality, software and electronics, only the color, front frame shape and model names may differ. Test sample model: Shelly Vintage A60
Power Source	AC 230V/ 50Hz
2.4G WIFI	
Supported type:	IEEE 802.11b/802.11g/802.11n(H20)
Operation frequency	IEEE 802.11b/g/n20: 2412-2472MHz
Modulation Type	IEEE 802.11b/g/n(HT20): CCK/DSSS
Number of Channels	IEEE 802.11b/802.11g/802.11n(HT20): 13
Channels Separation	5MHz
Antenna type	PCB Antenna
Antenna gain	0 dBi

Note: For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3. Method of measurement

Limit

Basic restriction for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	Magnetic flux density (mT)	Current density (mA/m^2)	Whole body average SAR(W/kg)	Localised SAR (head and trunk)(W/kg)	Localised SAR (limbs) (W/kg)	Power density, S (W/m^2)
0Hz	40	--	--	--	--	--
>0-1Hz	--	8	--	--	--	--
1-4Hz	--	8/f	--	--	--	--
4-1000Hz	--	2	--	--	--	--
1000Hz-100kHz	--	f/500	--	--	--	--
100kHz-10MHz	--	f/500	0.08	2	4	--
10MHz-10GHz	--	--	0.08	2	4	--
10-300GHz	--	--	--	--	--	10

Notes:
1. f is the frequency in Hz.
2. The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.
3. Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1cm2 perpendicular to the current direction.
4. For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by $\sqrt{2}$(=1.414). For pulses of duration t_p the equivalent frequency to apply in the basic restrictions should be calculated as=1/ ($2t_p$)
5. For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.
6. All SAR values are to be averaged over any six-minute period.
7. Localised SAR averaging mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognised that this concept can be used in computational dosimetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used provided that the calculated dosimetric quantities have conservation values relative to the exposure guidelines.
8. For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/($2t_p$). Additionally, for pulsed exposures, in the frequency range 0,3 to 10GHz and for localised exposure of the head, in order to limit and avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that SA should not exceed 2mJ kg-1 averaged over 10g of tissue.

Reference levels for electric, magnetic and electromagnetic fields (0Hz to 300GHz,unperturbed rms values)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (uT)	Equivalent plane wave power density S_{eq}(W/m^2)
0-1Hz	--	3.2×10^4	4×10^4	--
1-8Hz	10000	$3.2\times10^4/f^2$	$4\times10^4/f^2$	--
8-25Hz	10000	4000/f	5000/f	--
0.025-0.8KHz	250/f	4/f	5/f	--
0.8-3KHz	250/f	5	6.25	--
3-150KHz	87	5	6.25	--
0.15-1MHz	87	0.73/f	0.92/f	--
1-10MHz	$87/f^{1/2}$	0.73/f	0.92/f	--
10-400MHz	28	0.073	0.092	2
400-2000MHz	$1.375f^{1/2}$	$0.0037f^{1/2}$	$0.0046f^{1/2}$	f/200
2-300GHz	61	0.16	0.20	10

Notes: 1. As indicated in the frequency range column.

2. For frequencies between 100kHz and 10GHz, S_{eq}, E^2, H^2 and B^2 are to be averaged over any six-minute period.

3. For frequencies exceeding 10GHz, S_{eq}, E^2, H^2 and B^2 are to be averaged over any $68/f^{1.05}$-minute period (.in GHz).

4. No E-field value is provided for frequencies <1Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 20kV/m. Spark discharges causing stress or annoyance should be avoided.

EMF Assessment Model

Predication of EMF limit at a given distance
Equation from page 26 of EN 62311, Edition 2008

$$E=\eta_0 H=\frac{\sqrt{30PG(\theta,\phi)}}{r}$$

Where:
E: E-field strength (V/m)
P: power input to antenna (Watt)
G: is the antenna gain relative to an isotropic antenna;
θ,ϕ: are elevation and azimuth angles to point of investigation;
r: is the distance from observation point to the antenna;
η_0: is the characteristic impedance of free space.

Test Result

Note: Please refer to the report NO.: POCE200413042GRW.

WIFI 802.11b

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (W)	Antenna Gain (Nemeric)	E-field strength Limit (V/m)	E-field strength At 20 cm (V/m)
2412	20	14.61	0.0289	1.0000	61	4.6562
2442	20	14.02	0.0252	1.0000	61	4.3504
2472	20	14.08	0.0256	1.0000	61	4.3806

WIFI 802.11g

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (W)	Antenna Gain (Nemeric)	E-field strength Limit (V/m)	E-field strength At 20 cm (V/m)
2412	20	12.46	0.0176	1.0000	61	3.6352
2442	20	12.44	0.0175	1.0000	61	3.6269
2472	20	12.65	0.0184	1.0000	61	3.7156

WIFI 802.11n(H20)

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (W)	Antenna Gain (Nemeric)	E-field strength Limit (V/m)	E-field strength At 20 cm (V/m)
2412	20	11.78	0.0151	1.0000	61	3.3615
2442	20	11.52	0.0142	1.0000	61	3.2624
2472	20	11.21	0.0132	1.0000	61	3.1480

**************************THE END**************************

APPLICATION FOR CE LVD TEST REPORT

On Behalf of

Prepared For	:	**Allterco Robotics** 103 Cherni Vrah Blvd, Sofia 1407, Bulgaria
Product Name	:	LED Lamps
Model	:	Shelly Vintage A60, Shelly Vintage ST64
Prepared By	:	**SHENZHEN POCE TECHNOLOGY CO., LTD.** H Building, Hongfa Science And Technology Park, Tangtou, Shiyan, Bao'An District, Shenzhen, China
Test Date	:	Apr. 07, 2020 - Apr. 14, 2020
Date of Report	:	Apr. 14, 2020
Report No.	:	POCE200413057ERS

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Shenzhen POCE Technology Co., Ltd.

TEST REPORT

EN 62560
Self -ballasted LED -lamps for general lighting services by voltage > 50V – Safety specifications

Report reference No. ..... :	POCE200413057ERS
Compiled by (+ signature) ..... :	Eva
Approved by (+ signature) ..... :	Machael Mo
Date of issue ..... :	Apr. 14, 2020

Testing laboratory

Name..... :	SHENZHEN POCE TECHNOLOGY CO., LTD.
Address.....	H Building, HongFa Science and Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, China
Testing location ..... :	As above

Client

Name ..... :	Allterco Robotics
Address..... :	103 Cherni Vrah Blvd, Sofia 1407, Bulgaria

Manufacturer

Name ..... :	Allterco Robotics
Address..... :	103 Cherni Vrah Blvd, Sofia 1407, Bulgaria

Test specification

Standard..... :	EN 62560:2012+A1:2015
Test procedure ..... :	LVD
Procedure deviation ..... :	N.A.
Non-standard test method ..... :	N.A.

Test item

Description ..... :	LED Lamps
Trademark ..... :	N/A
Model and/or type reference ..... :	Shelly Vintage A60, Shelly Vintage ST64
Rating(s) ..... :	AC230V, 50Hz, 7W

Test case verdicts

Test case does not apply to the test object : N(.A.)

Test item does meet the requirement .....: P(ass)

Test item does not meet the requirement ...: F(ail)

Testing

Date of receipt of test item ……..…: Apr. 07, 2020

Date(s) of performance of test ……...: Apr. 07, 2020 - Apr. 14, 2020

General remarks

This report shall not be reproduced except in full without the written approval of the testing laboratory.

The test results presented in this report relate only to the item tested.

Clause numbers between brackets refer to clauses in EN 62560:2012+A1:2015

"(see remark #)" refers to a remark appended to the report.

"(see Annex #)" refers to an annex appended to the report.

Throughout this report a comma is used as the decimal separator.

General product information:

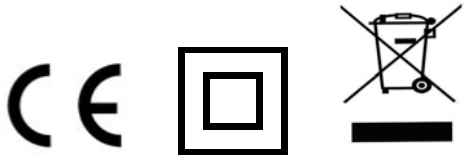
The all models are same except their model number and appearance , and all testes are based on Shelly Vintage A60

Copy of marking plate

LED Lamps

Model No.: Shelly Vintage A60

Rating: AC230V, 50Hz, 7W



Importer: xxxx
Address: xxxx

Manufacturer: Allterco Robotics
Address: 103 Cherni Vrah Blvd, Sofia 1407, Bulgaria

Made in China

Note: Due to the similar of rating label, only above label is listed.

EN 62560			
Clause	Requirement - Test	Result - Remark	Verdict
4	**GENERAL REQUIREMENTS**		---
4.1	The lamp shall be so designed and constructed that in normal use cause no danger to the user.	No Danger	P
4.2	Self-ballasted LED-Lamp are non-repairable.	Non-Repairable	P
5	**MARKING**		---
5.1	Mandatory marking		P
	- mark of origin		N
	- rated supply voltage (V).	AC230V	P
	- rated wattage (W)	7W	P
	- rated frequency (Hz)	50Hz	P
5.2	Addition marking		P
	a) burning position		N
	b) rated current (A)		N
	c) weight significantly higher		N
	e) not suitable for dimming Symbol used.		N
	d) eye protection	See separate test requirement of EN 62560:2012+A1:2015	P
	Marking durable and legible		P
5.3	Rubbing 15 s water, 15 s petroleum; marking legible		P
6	**INTERCHANGEABILITY**		---
6.1	Cap interchangeability in accordance with EN 62560：2012+A1:2015	Complied	P
	Gauge in accordance with EN 62560：2012+A1:2015		P
6.2	Bending moment		P
	Bending moment imparted by the lamp at the lampholder	E27 Bending moment < 0.1Nm	P
7	**PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS**		**---**
	Internal, basic insulated or live metal parts not accessible		P
	Tested with a test finger with a force of 10 N	10N, no hazards	P
	Compliance checked with appropriate gauges	Compliance with requirement	P
8	**INSULATION RESISTANCE AND ELECTRIC STRENGTH**		**---**
8.2	After storage 48 h at 91-95% relative humidity and 20-	92% , 30°C	P

EN 62560			
Clause	Requirement - Test	Result - Remark	Verdict
	30 ℃ measuring of insulation resistance with d.c. 500 V (M Ω):		
	≥ 4 M Ω for double or reinforced insulation .	>100MΩ	P
8.3	Immediately after clause 8.2 el ectric strength test for 1 min		P
	Double or reinforced insulation, 4U + 2000 V	2920V	P
	No flashover or breakdown		P
9	**MECHANICAL STRENGTH**		---
	Torsion resistance of unused lamps		P
9.1	Torque test		P
	B15dCap .. .. 1,15 Nm		N
	B22d Cap .... 3,0 Nm		N
	E11 Cap ..... 0,8 Nm		N
	E12 Cap..... .0,8 Nm		N
	E14 Cap .....1,15 Nm		N
	E17 Cap ....1,5 Nm		N
	E26 or E27 Cap..... 3,0 Nm	E27 Cap: 3,0 Nm	P
	GX 53 Cap .....3,0 Nm		N
9.2	Torsion resistance of lamps after a defined time of usage		P
	Torsion resistance of used lamp		P
9.3	Repetition of clause 8		P
	Clause 8 shall comply after the mechanical strength test.		P
10	**CAP TEMPERATURE RISE**		---
	The cap temperature rise Δt_s of the lamp shall not exceed 120 K.	<120K	P
11	**RESISTANCE TO HEAT**		---
	Parts of insulating material retaining live parts in position, ball-pressure test:		P
	- part; test temperature (℃) .....:	PCB:125℃	P
	- part; test temperature (℃) .....:	Plastic part:80℃	P
12	**RESISTANCE TO FLAME AND IGNITION**		**---**
	External parts of insulating material preventing electric shock glow-wire test 650 ℃		P

EN 62560			
Clause	Requirement - Test	Result - Remark	Verdict
	- flame extinguished within 30 s		P
	- no flaming drops igniting tissue paper		P
13	**FAULT CONDITIONS**		---
13.2	Extreme electrical conditions (dimmable lamps)		N
	Lamp withstands overpower condition >15 min.		N
	Lamp fails safe after 15 min overpower condition		N
	Lamp with automatic protective device or power limiter, test performed 15 min. at limit.		N
13.3	Extreme electrical conditions (non-dimmable lamps)		P
	Tested according 13.2 (as far as possible)		P
13.4	Short-circuit across capacitors	(see appended table)	P
13.5	Fault conditions: where diagram indicates fault condition impairs safety, electronic components have been short-circuited or disconnected	(see appended table)	P
13.6	When operated under fault conditions the lamp		P
	- does not emit flames or molten material		P
	- does not produce flammable gases or smoke		P
	- live parts not accessible		P
	After the tests the insulation resistance with d.c. 1000 V complies with requirements of Cl. 8.1 ..... :		P
14 (16)	**CREEPAGE DISTANCES AND CLEARANCES**		**---**
	Creep age distances and clearances according to Table 3 and 4 of EN 62560：2012+A1:2015, as appropriate	(see appended table)	P
	Printed boards see clause 14 of EN 62560：2012+A1:2015		P
	Insulating lining of metallic enclosures		P

Tables

Table 12.4 a)	**Thermal tests (normal operation) of Section 12.4**		**P**
	Lamp used .....:……	Self-ballasted lamp	--
	Mounting position of luminaire .....:	As in normal use	--
	Test Voltage (V) .....:	243.8V, 50Hz	--
	Remark: measured temperatures corrected for Ta = 25 ℃:		--

Temperature (℃) of part	Testing temperature (℃)	limit (℃)
Plastic part	32.6	80
Internal wire	49.0	200
PCB near IC	61.2	130
LED PCB	56.3	130
C1	73.8	105
C3	74.2	105
C5	69.7	105
Ambient	25.0	--
Supplementary information:		

14(16)	**TABLE: Clearance And Creep age Distance Measurements**					**P**
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
L to N	<420	230	1.36	1.81	1.36	1.81

Tables

TABLE: Critical components information					**P**
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity
Plastic part	CIXI FALAIXIN PLASTIC FACTORY	6170	80℃; V-0	UL 94	UL E303538
Alt.	Various	Various	80℃; V-0	UL 94	UL
PCB	SHANDONG JINBAO TECH-INNOV CORPORATION	ZD-16F	V-0; 130°C	UL 746 UL 94	UL E141940
Alt.	Various	Various	V-0; 130°C	UL 746 UL 94	UL
LED PCB	SHENZHEN KAZ CIRCUIT CO LTD	KZ-1	V-0; 130°C	UL796	UL E337072
Alt.	Various	Various	V-0; 130°C	UL796	UL
Internal wire	JIANGYIN HAOCHENG ELECTRIC APPLIANCE WIRE & CABLE MFG CO LTD	3135	600V, 200°C; 18AWG	UL 758	UL E227587
Alt.	Various	Various	600V, 200°C; 18AWG	UL 758	UL
Heat shrinkable sleeve	SHENZHEN WOER HEAT-SHRINKABLE MATERIAL CO LTD	RSFR	600V 125℃, VW-1	UL 224	UL E203950
Alt.	Various	Various	600V 125℃, VW-1	UL 224	UL

Product of photo

Photo 1 view ☐front ☐back ☒side ☐top ☐internal ☐bottom Model: Shelly Vintage ST64	
Photo 2 view ☐front ☐back ☒side ☐top ☐internal ☐bottom Model: Shelly Vintage ST64	

Photo 3 view ☐front ☐back ☒side ☐top ☐internal ☐bottom Model: Shelly Vintage A60	
Photo 4 view ☐front ☐back ☐side ☐top ☒internal ☐bottom Model: Shelly Vintage A60	

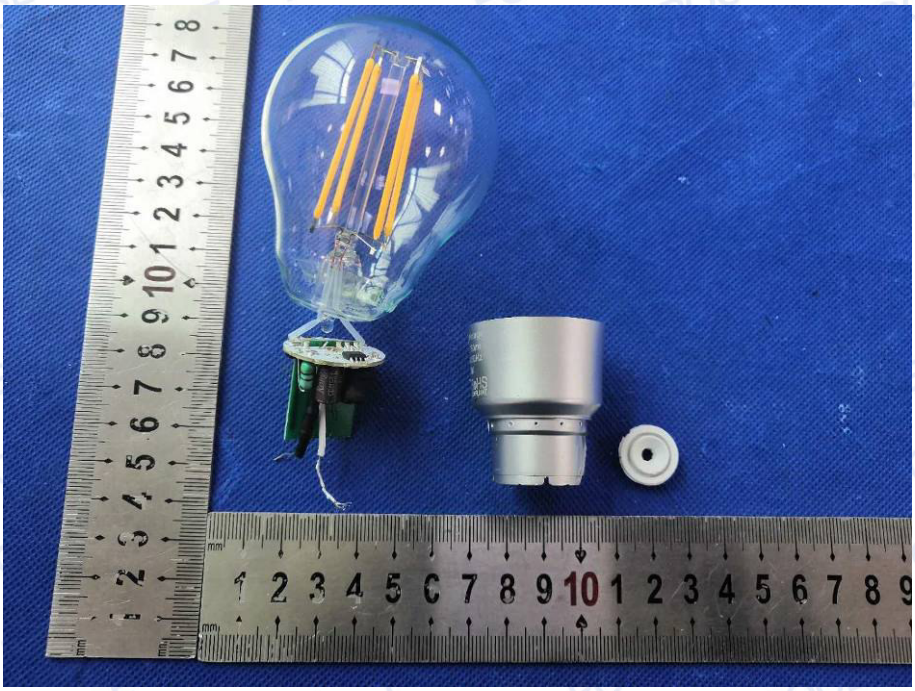
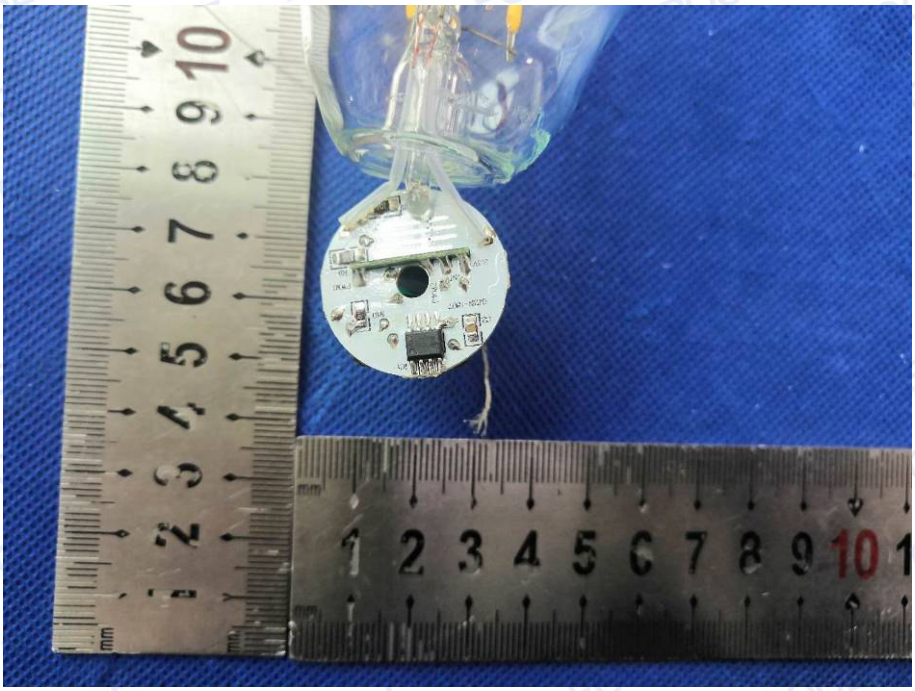
Photo 5 view ☐front ☐back ☐side ☐top ☒internal ☐bottom Model: Shelly Vintage A60	
Photo 6 view ☐front ☐back ☐side ☐top ☒internal ☐bottom Model: Shelly Vintage A60	

Photo 7 view ☐front ☐back ☐side ☐top ☒internal ☐bottom	
Photo 8 view ☐front ☐back ☐side ☐top ☒internal ☐bottom	

*** THE END OF REPORT ***

RADIO TEST REPORT

ETSI EN 300 328 V2.2.2 (2019-07)

Report Reference No.	:	**POCE200413042GRW**
Applicant's Name	:	Allterco Robotics
Address of Applicant	:	103 Cherni Vrah Blvd, Sofia 1407, Bulgaria
Test Firm	:	Shenzhen POCE Technology Co., Ltd.
Address of Test Firm	:	H Building, Hongfa Science and Technology Park, Tangtou, Shiyan, Bao'An District, Shenzhen, China
Test Standard	:	**ETSI EN 300 328 V2.2.2 (2019-07)**
Product Name	:	LED Lamps
Model/Type Reference	:	Shelly Vintage A60
Listed Models	:	Shelly Vintage ST64
Date of Receipt	:	Dec. 27, 2019
Date of Test	:	Dec. 27, 2019 - Apr. 20, 2020
Data of Issue	:	Apr. 21, 2020
Test Result	:	**PASS**

Compiled by:	Supervised by:	Approved by:
Amy Zhu/ File administrators	Stone Yin/ Technique principal	Bill Yuan/ Manager

Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	POCE200413042GRW	Apr. 21, 2020

NOTE1:
The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EU Directives.

NOTE2:
The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

CONTENTS

1 TEST SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

ETSI EN 300 328 V2.2.2 (2019-07) --- Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum.

1.2 Summary of Test Result

Item	Reference	Result
RF output power	ETSI EN 300 328 V2.2.2 Sub-clause 4.3.2.2	PASS
Power Spectral Density	ETSI EN 300 328 V2.2.2 Sub-clause 4.3.2.3	PASS
Duty Cycle, Tx-sequence, Tx-gap	ETSI EN 300 328 V2.2.2 Sub-clause 4.3.2.4	N/A_{note1}
Medium Utilisation (MU) factor	ETSI EN 300 328 V2.2.2 Sub-clause 4.3.2.5	N/A_{note1}
Adaptivity (non-FHSS)	ETSI EN 300 328 V2.2.2 Sub-clause 4.3.2.6	PASS
Occupied Channel Bandwidth	ETSI EN 300 328 V2.2.2 Sub-clause 4.3.2.7	PASS
Transmitter unwanted emissions in the out-of-band domain	ETSI EN 300 328 V2.2.2 Sub-clause 4.3.2.8	PASS
Transmitter unwanted emissions in the spurious domain	ETSI EN 300 328 V2.2.2 Sub-clause 4.3.2.9	PASS
Receiver spurious emissions	ETSI EN 300 328 V2.2.2 Sub-clause 4.3.2.10	PASS
Receiver Blocking	ETSI EN 300 328 V2.2.2 Sub-clause 4.3.2.11	PASS
Geo-location capability	ETSI EN 300 328 V2.2.2 Sub-clause 4.3.2.12	N/A_{note2}

Note1: This requirement does not apply to adaptive equipment.
Note2: This equipment without geo-location capability function.

2 GENERAL INFORMATION

2.1 Client Information

Applicant : **Allterco Robotics**

Address : 103 Cherni Vrah Blvd, Sofia 1407, Bulgaria

Manufacturer : **Allterco Robotics**

Address : 103 Cherni Vrah Blvd, Sofia 1407, Bulgaria

2.2 Test Environmental conditions

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

Temperature	Normal Temperature:	25°C
Voltage	Normal Voltage	AC 230V
Other	Relative Humidity	55 %
	Air Pressure	101 kPa

Note: The environmental conditions and voltage of this test are in accordance with the specifications of the standard sub-clause 5.1.2., All test results shall only be performed at normal test conditions.

2.3 Description of Support Units

The EUT has been tested with support equipments as below:

Description	Information	Manufacturer	Remark	Certificate
/	/	/	/	/
/	/	/	/	/

2.4 Description of EUT

Equipment	LED Lamps
Trade Mark	N/A
Model Name	Shelly Vintage A60
Series model	Shelly Vintage ST64
Model Difference	All models have the same functionality, software and electronics, only the color, front frame shape and model names may differ. Test sample model: Shelly Vintage A60
Power Source	AC 230V/ 50Hz
2.4G WIFI	
Supported type:	IEEE 802.11b/802.11g/802.11n(H20)
Operation frequency	IEEE 802.11b/g/n20: 2412-2472MHz
Modulation Type	IEEE 802.11b/g/n(HT20): CCK/DSSS
Number of Channels	IEEE 802.11b/802.11g/802.11n(HT20): 13
Channels Separation	5MHz
Antenna type	PCB Antenna
Antenna gain	0 dBi

Note: For more detailed parameters and information, please refer to the manual.

2.5 Test Frequency and Description of Test Modes

Frequency list

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	**2412**	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	**13**	**2472**
7	**2442**		

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

Through Preliminary tests were performed in all tests in different data rata and antenna configurations at lowest channel, the data rates of worse case as above were chosen for final test.

Channel	802.11 b/g/n(HT20)				
	No.	Frequency	Data Rate		
			B	G	N20
Lowest	CH01	2412MHz	1Mbps	6Mbps	MCS0
Middle	CH07	2442MHz	1Mbps	6Mbps	MCS0
Hightest	CH13	2472MHz	1Mbps	6Mbps	MCS0

2.6 Test Facility

CNAS Registration Number is L8229
Shenzhen POCE Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories,
Date of Registration: Jan. 06, 2016.

VCCI Membership No.: 3941
The 3m Semi-anechoic chamber of Shenzhen POCE Technology Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.:R-3941.
Date of Registration: Oct. 22, 2018.

2.7 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.
The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.
The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen POCE Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025.
Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

No.	Item	Uncertainty
1	Radio Frequency	$< \pm 1 \times 10^{-5}$
	RF power density, conducted	±2.5dB
2	RF power, conducted	±1.5dB
3	Spurious emissions,conducted	±2.5dB
4	All emissions,radiated(<1G)	±3.38dB
5	All emissions,radiated(>1G)	±3.38dB
6	Frequency Stability	$\pm 1.3 \times 10^{-6}$
7	Humidity	± 4%

2.8 Measurement Instruments List

No.	Equipment	Manufacturer	Type No.	Serial No.		Calibration Date
1	Spectrum Analyzer	Agilent	E4408B	56110	POCE-EY-002	2019/12/11
2	Spectrum Analyzer	Keysight	N9020A	MY53420323	POCE-EY-032	2019/12/11
3	Power Sensor	Keysight	U2002H	MY51190005	POCE-EY-049	2019/12/11
4	Power Meter	Keysight	E4416A	MY5303506	POCE-EY-048	2019/12/11
5	Signal generator	Keysight	N5182A	MY50143455	POCE-EY-034	2019/12/11
6	Vector signal generator	Keysight	N5181A	MY48180415	POCE-EY-040	2019/12/11
7	Horn Antenna	Schwarzbeck	JB1	A091114	POCE-EY-037	2019/12/11
8	Broadband Antenna	Sunol Sciences Corp	DRH-118	A062013	POCE-EY-036	2019/12/11
9	Wideband radio communicatio n tester	R&S	CMW500	113410	POCE-EY-033	2019/12/11
10	Power amplifier(HF)	Schwarzbeck	BBV9718	9718-282	POCE-EY-011	2019/12/11
11	Power amplifier(LF)	Schwarzbeck	BBV9743	9743-151	POCE-EY-016	2019/12/11
12	LF Line 2	Germany	/	/	POCE-EY-020	2019/12/11
13	LF Line 1	Germany	/	/	POCE-EY-017	2019/12/11
14	Thermometer	/	CTH-608	/	POCE-EY-027	2019/12/11
15	HF line 1	/	/	/	POCE-EY-018	2019/12/11
16	HF line 2	/	/	/	POCE-EY-019	2019/12/11
17	Humidity Chamber	/	WHTH-800-40-880	/	POCE-SY-062	2019/08/26

Note: Calibration is valid for one year.

3 TEST ITEM AND RESULTS

3.1 RF output power

Limit

ETSI EN 300 328 V2.2.2 -- Sub-clause 4.3.2.2 : be equal to or less than 20 dBm

Test method

Step 1:

- Use a fast power sensor with a minimum sensitivity of -40 dBm and capable of minimum 1 MS/s.
- Use the following settings:
  - Sample speed 1 MS/s or faster.
  - The samples shall represent the RMS power of the signal.
  - Measurement duration: For non-adaptive equipment: equal to the observation period defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) is captured.

For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used.

Step 2:

- For conducted measurements on devices with one transmit chain:
  - Connect the power sensor to the transmit port, sample the transmit signal and store the raw data. Use these stored samples in all following steps

- For conducted measurements on devices with multiple transmit chains:
  - Connect one power sensor to each transmit port for a synchronous measurement on all transmit ports.
  - Trigger the power sensors so that they start sampling at the same time. Make sure the time difference between the samples of all sensors is less than 500 ns.
  - For each individual sampling point (time domain), sum the coincident power samples of all ports and store them. Use these summed samples as the new stored data set.

Step 3:

- Find the start and stop times of each burst in the stored measurement samples.

The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples in step 2.

In case of insufficient sensitivity of the power sensor (e.g. in case of radiated measurements), the value of 30 dB may need to be reduced appropriately.

Step 4:

- Between the start and stop times of each individual burst calculate the RMS power over the burst using the formula below. The start and stop points shall be included. Save these Pburst values, as well as the start and stop times for each burst.

$$P_{burst} = \frac{1}{k}\sum_{n=1}^{k} P_{sample}(n)$$

with k being the total number of samples and n the actual sample number.

Step 5:

- The highest of all Pburst values (value A in dBm) will be used for maximum e.i.r.p. calculations.

Step 6:

- Add the (stated) antenna assembly gain G in dBi of the individual antenna.
- In case of smart antenna systems operating in mode with beamforming (see clause 5.3.2.2.4), add the additional beamforming gain Y in dB.
- If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used.
- The RF Output Power (Pout) shall be calculated using the formula below:

$$P_{out} = A + G + Y$$

- This value, which shall comply with the limit given in clause 4.3.1.2.3 or clause 4.3.2.2.3, shall be recorded in the test report.

Test Results

Wifi

802.11b mode							
Test conditions		**Channel**	**Measured power (dBm)**	**Antenna Gain (dBi)**	**EIRP (dBm)**	**Limit (dBm)**	**Result**
Voltage (V)	**Temperature (℃)**						
230	25	CH01	14.61	0.00	14.61	20.00	Pass
		CH07	14.02	0.00	14.02		
		CH13	14.08	0.00	14.08		
	-20	CH01	13.59	0.00	13.59		
		CH07	13.42	0.00	13.42		
		CH13	13.56	0.00	13.56		
	+55	CH01	13.72	0.00	13.72		
		CH07	13.66	0.00	13.66		
		CH13	13.47	0.00	13.47		

802.11g mode							
Test conditions		**Channel**	**Measured power (dBm)**	**Antenna Gain (dBi)**	**EIRP (dBm)**	**Limit (dBm)**	**Result**
Voltage (V)	**Temperature (℃)**						
230	25	CH01	12.46	0.00	12.46	20.00	Pass
		CH07	12.44	0.00	12.44		
		CH13	12.65	0.00	12.65		
	-20	CH01	12.07	0.00	12.07		
		CH07	12.15	0.00	12.15		
		CH13	12.22	0.00	12.22		
	+55	CH01	12.11	0.00	12.11		
		CH07	12.15	0.00	12.15		
		CH13	12.27	0.00	12.27		

802.11n(H20) mode							
Test conditions		**Channel**	**Measured power (dBm)**	**Antenna Gain (dBi)**	**EIRP (dBm)**	**Limit (dBm)**	**Result**
Voltage (V)	**Temperature (℃)**						
230	25	CH01	11.78	0.00	11.78	20.00	Pass
		CH07	11.52	0.00	11.52		
		CH13	11.21	0.00	11.21		
	-20	CH01	11.01	0.00	11.01		
		CH07	11.12	0.00	11.12		
		CH13	11.08	0.00	11.08		
	+55	CH01	11.13	0.00	11.13		
		CH07	11.03	0.00	11.03		
		CH13	11.24	0.00	11.24		

Note: 1. Measured Power includes the cable loss.
2. Captured 30 bursts for each mode and recorded the maximum average power.

3.2 Power Spectral Density

Limit

ETSI EN 300 328 V2.2.2 -- Sub-clause 4.3.2.3 : 10 dBm/ MHz.

Test method

Step 1: Connect the UUT to the spectrum analyser and use the following settings:

Start Frequency:	2400 MHz
Stop Frequency:	2483.5 MHz
Resolution BW:	10 kHz
Video BW:	30 kHz
Sweep Points:	>8350; for spectrum analysers not supporting this number of sweep points, the frequency band may be segmented
Detector:	RMS
Trace Mode:	Max Hold
Sweep time:	10s

Step 2:
For conducted measurements on smart antenna systems using either operating mode 2 or operating mode 3 (see clause 5.3.2.2), repeat the measurement for each of the transmit ports. For each sampling point (frequency domain), add up the coincident power values (in mW) for the different transmit chains and use this as the new data set.

Step 3:
Add up the values for power for all the samples in the file using the formula below.

$$P_{Sum} = \sum_{n=1}^{k} P_{sample}(n)$$

with k being the total number of samples and n the actual sample number

Step 4:
Normalize the individual values for power (in dBm) so that the sum is equal to the RF Output Power (e.i.r.p.) measured in clause 5.4.2 and save the corrected data. The following formulas can be used:

$$C_{Corr} = P_{Sum} - P_{e.i.r.p.}$$

$$P_{Samplecorr}(n) = P_{Sample}(n) - C_{Corr}$$

with n being the actual sample number

Step 5:
Starting from the first sample PSamplecorr(n) (lowest frequency), add up the power (in mW) of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to sample #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 6: Shift the start point of the samples added up in step 5 by one sample and repeat the procedure in step 5 (i.e. sample #2 to sample #101).

Step 7:
Repeat step 6 until the end of the data set and record the Power Spectral Density values for each of the 1 MHz segments.
From all the recorded results, the highest value is the maximum Power Spectral Density (PSD) for the UUT. This value, which shall comply with the limit given in clause 4.3.2.3.3, shall be recorded in the test report.

Test Results

WIFI				
Mode	**Channel**	**Measured value (dBm/MHz)**	**Limit (dBm/MHz)**	**Result**
802.11b	CH01	2.34	10.00	Pass
	CH07	2.04		
	CH13	2.03		
802.11g	CH01	1.22		
	CH07	1.28		
	CH13	1.25		
802.11n(H20)	CH01	0.32		
	CH07	0.26		
	CH13	0.38		

Remark: Duty Cycle(x)= 100%
PSD= Reading Value+ 10 log (1/x) + Cable loss + Antenna Gain

3.3 Duty Cycle, Tx-sequence, Tx-gap

Limit

ETSI EN 300 328 V2.2.2 -- Sub-clause 4.3.2.4 :
Non-adaptive FHSS equipment shall comply with the following:

- The Duty Cycle shall be equal to or less than the maximum value declared by the manufacturer.
- The maximum Tx-sequence time shall be 5 ms.
- The minimum Tx-gap time shall be 5 ms.

Test method

Step 1:

- Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2.
- The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples. In case of insufficient sensitivity of the power sensor (e.g. in case of radiated measurements), the value of 30 dB may need to be reduced appropriately.

Step 2:

- Between the saved start and stop times of each individual burst, calculate the TxOn time. Save these TxOn values.

Step 3:

- Duty Cycle (DC) is the sum of all TxOn times between the end of the first gap (which is the start of the first burst within the observation period) and the start of the last burst (within this observation period) divided by the observation period. The observation period is defined in clause 4.3.1.3.2 or clause 4.3.2.4.2.

Step 4:

- For FHSS equipment using blacklisting, the TxOn time measured for a single (and active) hopping frequency shall be multiplied by the number of blacklisted frequencies. This value shall be added to the sum calculated in step 3 above. If the number of blacklisted frequencies cannot be determined, the minimum number of hopping frequencies (N) as defined in clause 4.3.1.4.3 shall be assumed.
- The calculated value for Duty Cycle (DC) shall be recorded in the test report. This value shall be equal to or less than the maximum value declared by the manufacturer.

Step 5:

- Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2.
- Identify any TxOff time that is equal to or greater than the minimum Tx-gap time as defined in clause 4.3.1.3.3 or clause 4.3.2.4.3. These are the potential valid gap times to be further considered in this procedure.
- Starting from the second identified gap, calculate the time from the start of this gap to the end of the preceding gap. This time is the Tx-sequence time for this transmission. Repeat this procedure until the last identified gap within the observation period is reached.
- A combination of consecutive Tx-sequence times and Tx-gap times followed by a Tx-gap time, which is at least as long as the duration of this combination, may be considered as a single Tx-sequence time and in which case it shall comply with the limits defined in clause 4.3.1.3.3 or clause 4.3.2.4.3.
- It shall be noted in the test report whether the UUT complies with the limits for the maximum Tx-sequence time and minimum Tx-gap time as defined in clause 4.3.1.3.3 or clause 4.3.2.4.3.

Test Results

N/A

Not applicable to this device

3.4 Medium Utilization (MU) factor

Limit

ETSI EN 300 328 V2.2.2 -- Sub-clause 4.3.2.5 :
The maximum Medium Utilization factor for non-adaptive FHSS equipment shall be 10 %.

Test method

Step 1:

- Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2.

Step 2:

- For each burst calculate the product of (Pburst / 100 mW) and the TxOn time. Pburst is expressed in mW. TxOn time is expressed in ms

Step 3:

- Medium Utilization is the sum of all these products divided by the observation period (expressed in ms) which is defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. This value, which shall comply with the limit given in clause 4.3.1.6.3 or clause 4.3.2.5.3, shall be recorded in the test report. If, in case of FHSS equipment, operation without blacklisted frequencies is not possible, the power of the bursts on blacklisted hopping frequencies (for the calculation of the Medium Utilization) is assumed to be equal to the average value of the RMS power of the bursts on all active hopping frequencies.

Test Results

N/A

Not applicable to this device

3.5 Adaptivity (non-FHSS)

Limits

ETSI EN 300 328 V2.2.2 -- Sub-clause 4.3.2.6 : Adaptive non-FHSS using DAA: Sub-clause 4.3.2.6.2 , or Adaptive non-FHSS using LBT: Sub-clause 4.3.2.6.3

Requirements & Limits

LBT based Detect and Avoid is a mechanism by which equipment using wide band modulations other than FHSS, avoids transmissions in a channel in the presence of other transmissions in that channel.

Frame Based Equipment shall comply with the following requirements:

1) Before transmission, the equipment shall perform a Clear Channel Assessment (CCA) check using energy detect. The equipment shall observe the operating channel for the duration of the CCA observation time which shall be not less than 18 µs. The channel shall be considered occupied if the energy level in the channel exceeds the threshold given in step 5 below. If the equipment finds the channel to be clear, it may transmit immediately. See figure 2.
2) If the equipment finds the channel occupied, it shall not transmit on this channel during the next Frame Period. The equipment is allowed to switch to a non-adaptive mode and to continue transmissions on this channel providing it complies with the requirements applicable to non-adaptive equipment. See clause 4.3.2.6.1. Alternatively, the equipment is also allowed to continue Short Control Signalling Transmissions on this channel providing it complies with the requirements given in clause 4.3.2.6.4.
3) The total time during which an equipment has transmissions on a given channel without re-evaluating the availability of that channel, is defined as the Channel Occupancy Time. The Channel Occupancy Time shall be in the range 1 ms to 10 ms followed by an Idle Period of at least 5 % of the Channel Occupancy Time used in the equipment for the current Frame Period.
4) An equipment, upon correct reception of a transmission which was intended for this equipment can skip CCA and immediately (see also next paragraph) proceed with the transmission of management and control frames. A consecutive sequence of such transmissions by the equipment without a new CCA shall not exceed the maximum Channel Occupancy Time. For the purpose of multi-cast, the ACK transmissions (associated with the same data packet) of the individual devices are allowed to take place in a sequence.
5) The energy detection threshold for the CCA shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the CCA threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive) antenna assembly gain (G); however, beamforming gain (Y) shall not be taken into account. For power levels less than 20 dBm e.i.r.p. the CCA threshold level may be relaxed to:

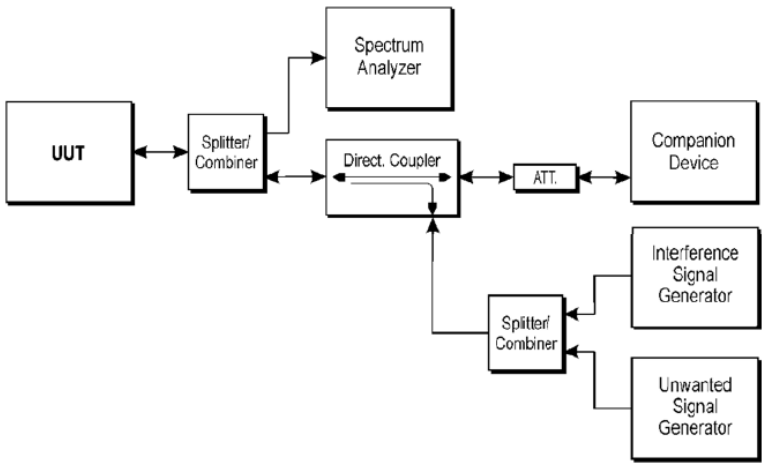
$$TL = -70\ \text{dBm/MHz} + 10 \times \log_{10}(100\ \text{mW} / P_{out})$$

6) The equipment shall comply with the requirements defined in step 1 to step 4 in the present clause in the presence of an unwanted CW signal as defined in table 10.

Table 10: Unwanted Signal parameters

Wanted signal mean power from companion device	Unwanted signal frequency (MHz)	Unwanted signal power (dBm)
sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 3)
NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1. NOTE 2: A typical conducted value which can be used in most cases is -50 dBm/MHz. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density in front of the UUT antenna.		

Test Configuration

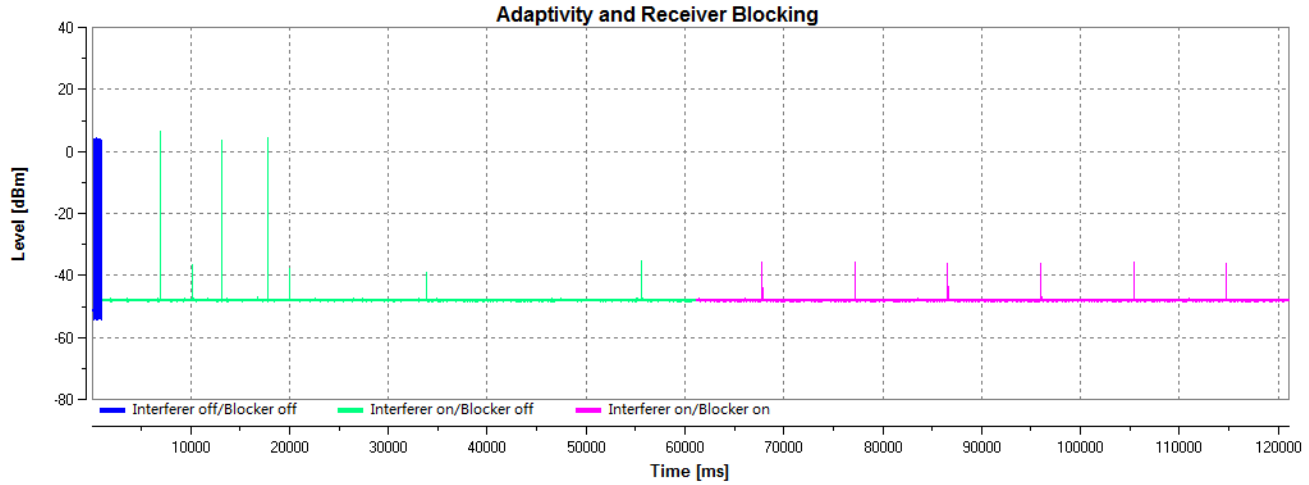


Test Results

Declaration of manufacturer

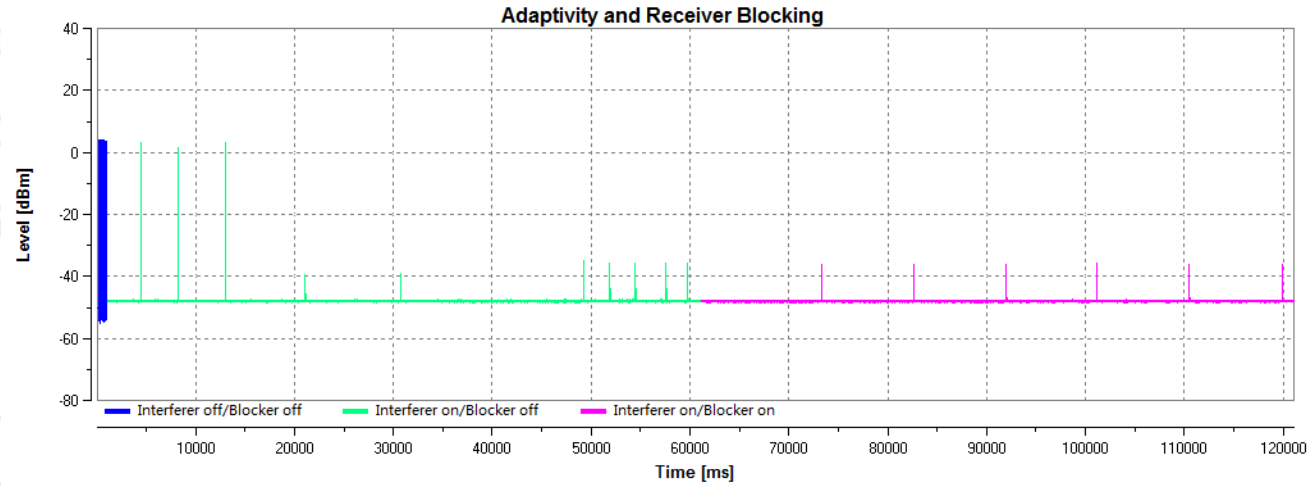
Item	Values	Requirement
CCA (Clear Channel Assessment) Time	24μs	⩾18 μs
q factor	32	4 ~ 32
Maximum Channel Occupancy Time	13ms	(13/32)*q ms

Mode:	802.11b	Channel:	01



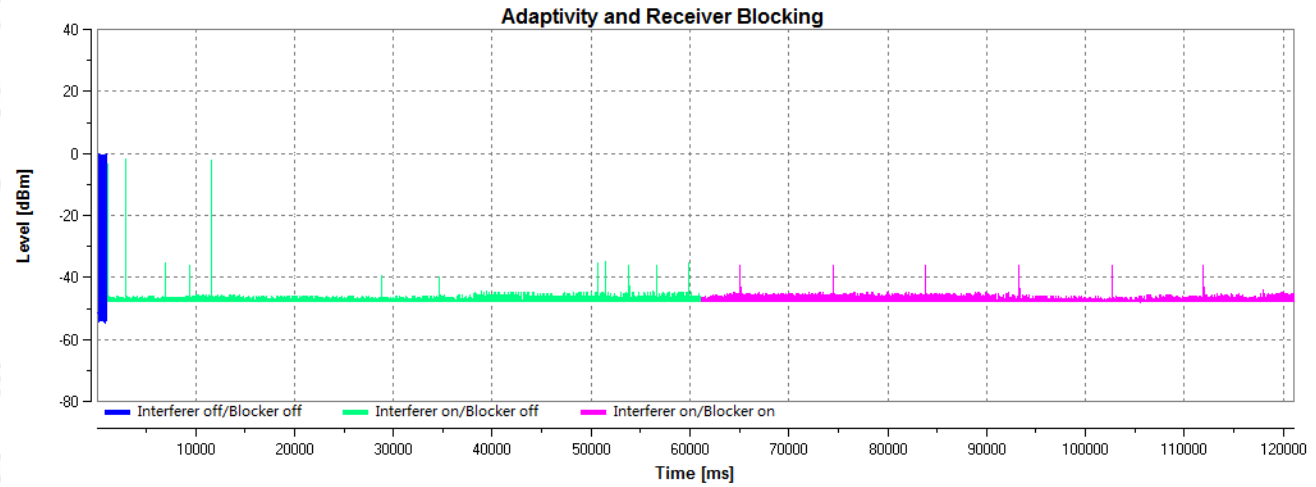
Step1	Interferer signal	Blocking single	COT (ms)	CCA Time(ms)	Result	Comment
	OFF	OFF	0.265	0.037	PASS	Sequence<13 ms
Step2	Interferer signal	Blocking single	Burst observation(ms)		Result	Comment
	ON	OFF	0.445		PASS	Burst< 5 ms; Short Signaling ok
Step3	ON	ON	0.00		PASS	Power<10dBm; no bursts found

Mode:	802.11b	Channel:	13



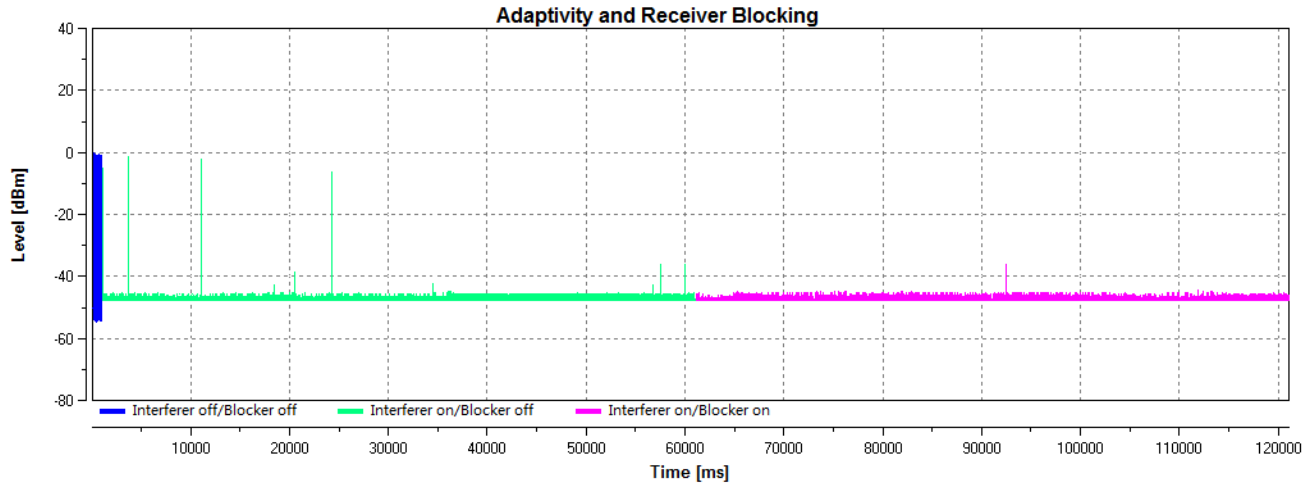
Step1	Interferer signal	Blocking single	COT (ms)	CCA Time(ms)	Result	Comment
	OFF	OFF	0.292	0.035	PASS	Sequence<13 ms
Step2	Interferer signal	Blocking single	Burst observation(ms)		Result	Comment
	ON	OFF	0.441		PASS	Burst<5 ms; Short Signaling ok
Step3	ON	ON	0		PASS	Power<10dBm; no bursts found

Mode:	802.11g	Channel:	01



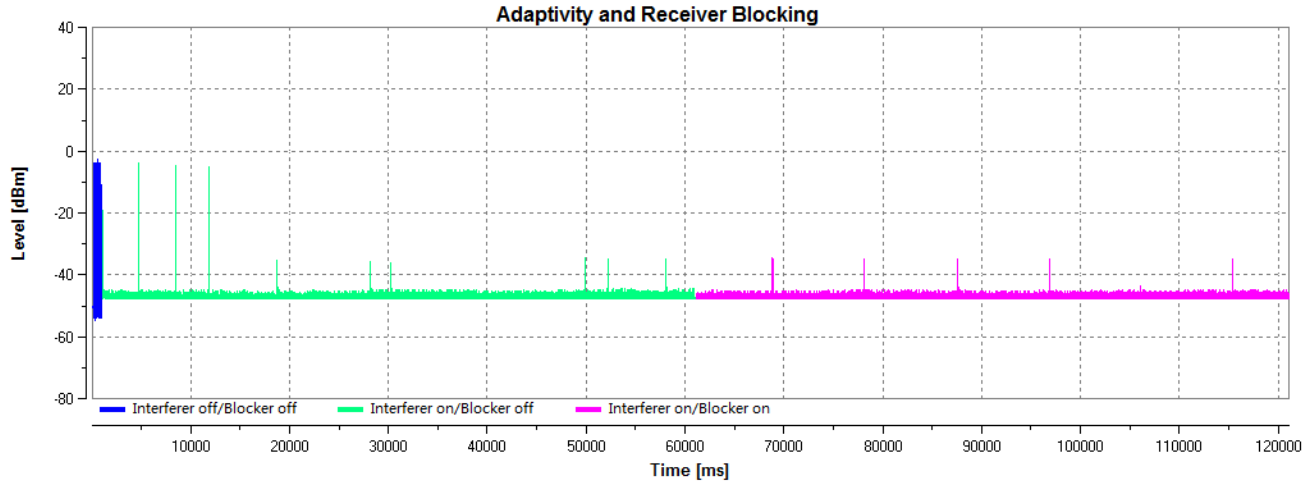
Step1	Interferer signal	Blocking single	COT (ms)	CCA Time(ms)	Result	Comment
	OFF	OFF	0.221	0.0327	PASS	Sequence<13 ms
Step2	Interferer signal	Blocking single	Burst observation(ms)		Result	Comment
	ON	OFF	0.457		PASS	Burst < 5 ms; Short Signaling ok
Step3	ON	ON	0		PASS	Power < 10dBm; no bursts found

Mode:	802.11g	Channel:	13



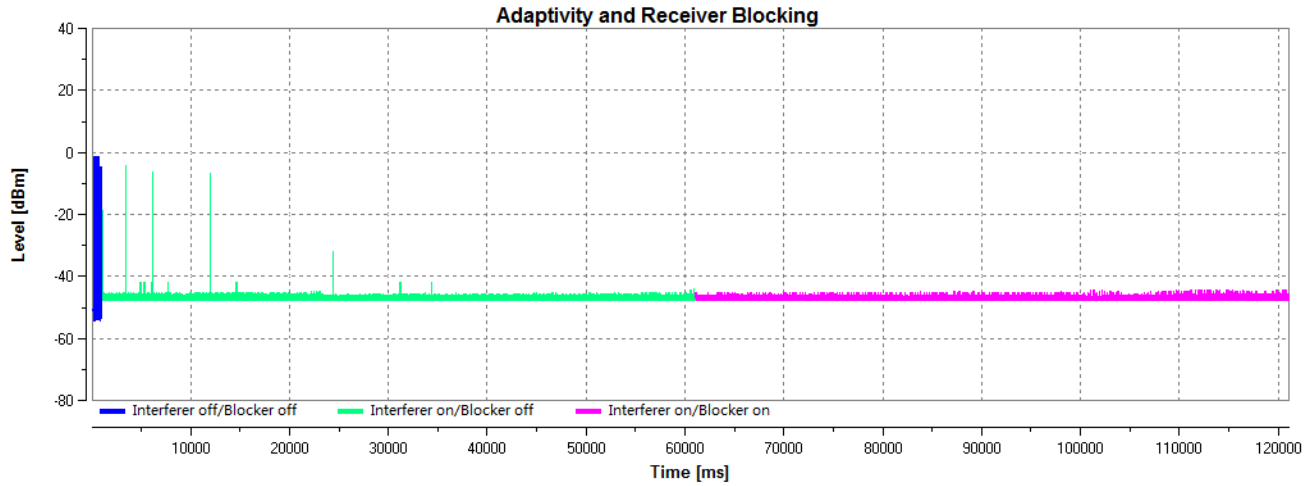
Step1	Interferer signal	Blocking single	COT (ms)	CCA Time(ms)	Result	Comment
	OFF	OFF	0.122	0.032	PASS	Sequence < 13 ms
Step2	Interferer signal	Blocking single	Burst observation(ms)		Result	Comment
	ON	OFF	0.614		PASS	Burst < 5 ms; Short Signaling ok
Step3	ON	ON	0		PASS	Power < 10dBm; no bursts found

Mode:	802.11n(20MHz)	Channel:	01



Step1	Interferer signal	Blocking single	COT (ms)	CCA Time(ms)	Result	Comment
	OFF	OFF	0.354	0.042	PASS	Sequence < 13 ms
Step2	Interferer signal	Blocking single	Burst observation(ms)		Result	Comment
	ON	OFF	0.436		PASS	Burst < 5 ms; Short Signaling ok
Step3	ON	ON	0		PASS	Power < 10dBm; no bursts found

Mode:	802.11n(20MHz)	Channel:	13



Step1	Interferer signal	Blocking single	COT (ms)	CCA Time(ms)	Result	Comment
	OFF	OFF	0.374	0.039	PASS	Sequence < 13 ms
Step2	Interferer signal	Blocking single	Burst observation(ms)		Result	Comment
	ON	OFF	0.538		PASS	Burst < 5 ms; Short Signaling ok
Step3	ON	ON	0		PASS	Power < 10dBm; no bursts found

3.6 Occupied Channel Bandwidth

Limit

ETSI EN 300 328 V2.2.2 -- Sub-clause 4.3.2.7 : The Occupied Channel Bandwidth for each hopping frequency shall be within the band given in table 1.

In addition, for non-adaptive FHSS equipment with e.i.r.p. greater than 10 dBm, the Occupied Channel Bandwidth for every occupied hopping frequency shall be equal to or less than 5 MHz.

table 1.

Transmit	2 400 MHz to 2 483.5 MHz
Receive	2 400 MHz to 2 483.5 MHz

Test method

- Step1:

  Connect the UUT to the spectrum analyzer and use the following settings

Centre Frequency:	The centre frequency of the channel under test
Resolution BW:	~ 1% of the span without going below 1 %
Video BW:	3 × RBW
Frequency Span:	2 × Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
Detector Mode:	RMS
Trace Mode:	MaxHold
Sweep time:	1s

- Step 2:

  Wait for the trace to stabilize.

  Find the peak value of the trace and place the analyser marker on this peak

- Step 3:

  Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left andright from the power envelope being taken into account by this measurement.

Test Results

Mode	Channel	Occupied Channel Bandwidth (MHz)	f_L (MHz)	f_H (MHz)	Limit	Result
802.11b	CH01	10.914	2406.480	2477.440	$f_L \geqq 2.4GHz$ and $f_H \leqq 2.4835GHz$	Pass
	CH13	10.912				
802.11g	CH01	16.820	2403.480	2480.320		
	CH13	16.732				
802.11n(HT20)	CH01	17.947	2402.920	2480.960		
	CH13	17.917				

Test plot as follows:

802.11b

CH01

CH13

802.11g

CH01

CH13

802.11n(HT20)

CH01

CH13

3.7 Transmitter unwanted emissions in the out-of-band domain

Limit

ETSI EN 300 328 V2.2.2 -- Sub-clause 4.3.2.8 :
The transmitter unwanted emissions in the out-of-band domain shall not exceed the values provided by the mask in figure 1.

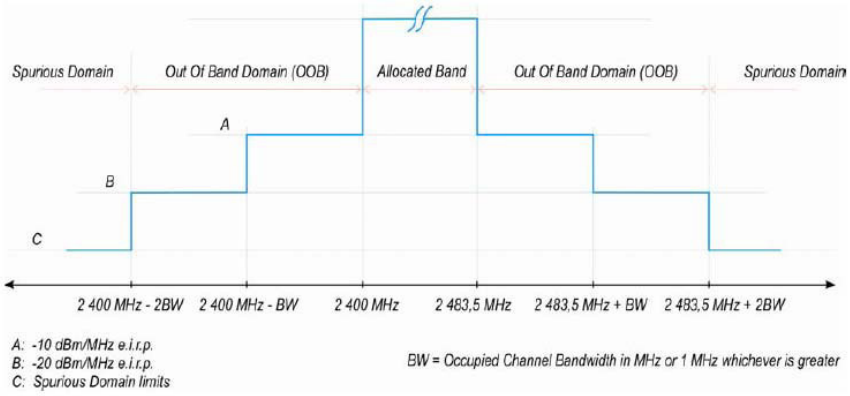


Figure 1: Transmit mask

Test Conditions

These measurements shall only be performed at normal test conditions.
For FHSS equipment, the measurements shall be performed during normal operation (hopping).
For non-FHSS equipment, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These operating channels shall be recorded.
The equipment shall be configured to operate under its worst case situation with respect to output power.
If the equipment can operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz), then each channel bandwidth shall be tested separately.

Test method

The applicable mask is defined by the measurement results from the tests performed under clause 5.4.7 (Occupied Channel Bandwidth).

The Out-of-band emissions within the different horizontal segments of the mask provided in figure 1 and figure 3 shall be measured using the procedure in step 1 to step 6 below. This method assumes the spectrum analyser is equipped with the Time Domain Power option.

Step 1:

- Connect the UUT to the spectrum analyser and use the following settings:

Measurement Mode:	Time Domain Power
Centre Frequency:	2 484 MHz
Frequency Span:	0 Hz
RBW:	1M
VBW:	3M
Filter mode:	Channel filter
Trace Mode:	Max Hold
Detector Mode:	RMS

Sweep mode:	Single Sweep
Sweep Points:	Sweep time [µs] / (1 µs) with a maximum of 30 000
Trigger Mode:	Video
Sweep Time:	> 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

Step 2 (segment 2 483,5 MHz to 2 483,5 MHz + BW):

- The measurement shall be performed and repeated while the trigger level is increased until no triggering takes place.
- For FHSS equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.
- Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.
- Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.
- Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3 (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2 BW):

- Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2 BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 4 (segment 2 400 MHz - BW to 2 400 MHz):

- Change the centre frequency of the analyser to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 5 (segment 2 400 MHz - 2 BW to 2 400 MHz - BW):

- Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2 BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2 BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 6

- In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain G in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figure 1 or figure 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.
- In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain G in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:

  - Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain Y in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figure 1 or figure 3.
  - Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by 10 × log10(Ach) and the additional beamforming gain Y in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

NOTE: Ach refers to the number of active transmit chains.

It shall be recorded whether the equipment complies with the mask provided in figure 1 or figure 3.

Test Result

Remark:

1. We test all modulation type, and recorded the worst case at 802.11b mode.
2. The datum recorded below represents the worst emission level in each segment compared with the limit.

WIFI

802.11b CH01								
Test Condition			OOB Frequency (MHz)	Measured Level (dBm)	Antenna Gain (dBi)	Results (dBm)	Limit (dBm)	Result
BW (MHz)	Voltage (V)	Temperature (℃)						
10.914	230	25	2377.238	-49.51	0.00	-49.51	-20	PASS
			2392.500	-47.54	0.00	-47.54	-10	PASS
			2495.262	-56.67	0.00	-56.67	-10	PASS
			2496.262	-57.52	0.00	-57.52	-20	PASS

802.11b CH13								
Test Condition			OOB Frequency (MHz)	Measured Level (dBm)	Antenna Gain (dBi)	Results (dBm)	Limit (dBm)	Result
BW (MHz)	Voltage (V)	Temperature (℃)						
10.912	230	25	2375.884	-55.75	0.00	-55.75	-20	PASS
			2392.500	-56.25	0.00	-56.25	-10	PASS
			2494.000	-49.08	0.00	-49.08	-10	PASS
			2501.308	-52.22	0.00	-52.22	-20	PASS

3.8 Transmitter unwanted emissions in the spurious domain

Limit

ETSI EN 300 328 V2.2.2 -- Sub-clause 4.3.2.9 :
The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 4. In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.

Table 4: Transmitter limits for spurious emissions

Frequency range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 694 MHz	-54 dBm	100 kHz
694 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

Test Conditions

The level of spurious emissions shall be measured as, either:

a) their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation); or
b) their effective radiated power when radiated by cabinet and antenna in case of integral antenna equipment with no antenna connectors.

For FHSS equipment, the measurements may be performed when normal hopping is disabled. In this case measurements need to be performed when operating at the lowest and the highest hopping frequency. When this is not possible, the measurement shall be performed during normal operation (hopping).

For non-FHSS equipment, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These operating channels shall be recorded.

The equipment shall be configured to operate under its worst case situation with respect to output power.

If the equipment can operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz), then the equipment shall be configured to operate under its worst case situation with respect to spurious emissions.

Test Method

Substitution method was performed to determine the actual spurious emission levels of the EUT.
The following test procedure as below:

- Below 1GHz test procedure:
  1) On the test site as test setup graph above, the EUT shall be placed at the 1.5m support on the turntable and in the position closest to normal use as declared by the provider.
  2) The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the test frequency of the transmitter. The output of the test antenna shall be connected to the measuring receiver.

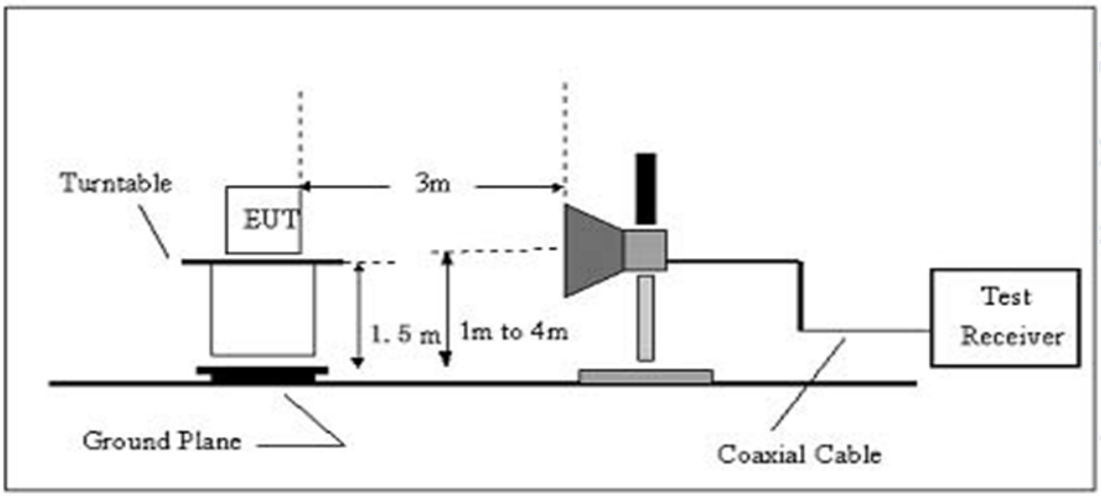
3) The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the test frequency of the transmitter under test.
4) The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
5) Repeat step 4 for test frequency with the test antenna polarized horizontally.
6) Remove the transmitter and replace it with a substitution antenna (the antenna should be halfwavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
7) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a no radiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
8) Repeat step 7 with both antennas horizontally polarized for each test frequency.
9) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

where: Pg is the generator output power into the substitution antenna.

- above 1GHz test procedure:
  Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber, and the test antenna do not need to raise from 1 to 4m, just test in 1.5m height.

Test Setup



Test Result

Remark: We test all modulation type, and recorded the worst case at 802.11b mode.

Test Mode：802.11b 2412MHz Tx					
Frequency (MHz)	ANT polarization	Result (dBm)	Limit (dBm)	Margin (dB)	Result
305.42	H	-67.45	-36	31.27	PASS
522.30	H	-65.44	-36	29.47	PASS
4824.21	H	-45.63	-30	15.71	PASS
--	--	--	--	--	--
305.42	V	-66.35	-36	30.85	PASS
522.30	V	-64.78	-36	29.68	PASS
4824.21	V	-48.53	-30	20.51	PASS

Test Mode：802.11b 2472MHz Tx					
Frequency (MHz)	ANT polarization	Result (dBm)	Limit (dBm)	Margin (dB)	Result
301.52	H	-66.43	-36	30.54	PASS
546.27	H	-65.77	-36	29.63	PASS
4944.11	H	-44.35	-30	15.44	PASS
--	--	--	--	--	--
301.52	V	-62.35	-36	26.13	PASS
546.27	V	-64.26	-36	28.11	PASS
4944.11	V	-45.68	-30	15.72	PASS

3.9 Receiver spurious emissions

Limit

ETSI EN 300 328 V2.2.2 -- Sub-clause 4.3.2.10 :
The receiver spurious emissions shall not exceed the values given in table 5.
In case of FHSS equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.

Table 5: Spurious emission limits for receivers

Frequency range	Maximum power	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12,75 GHz	-47 dBm	1 MHz

Test Method

Substitution method was performed to determine the actual spurious emission levels of the EUT.
The following test procedure as below:

- Below 1GHz test procedure:
  a) On the test site as test setup graph above, the EUT shall be placed at the 1.5m support on the turntable and in the position closest to normal use as declared by the provider.
  b) The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the test frequency of the transmitter. The output of the test antenna shall be connected to the measuring receiver.
  c) The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the test frequency of the transmitter under test.
  d) The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
  e) Repeat step 4 for test frequency with the test antenna polarized horizontally.
  f) Remove the transmitter and replace it with a substitution antenna (the antenna should be halfwavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
  g) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a no radiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
  h) Repeat step 7 with both antennas horizontally polarized for each test frequency.
  i) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

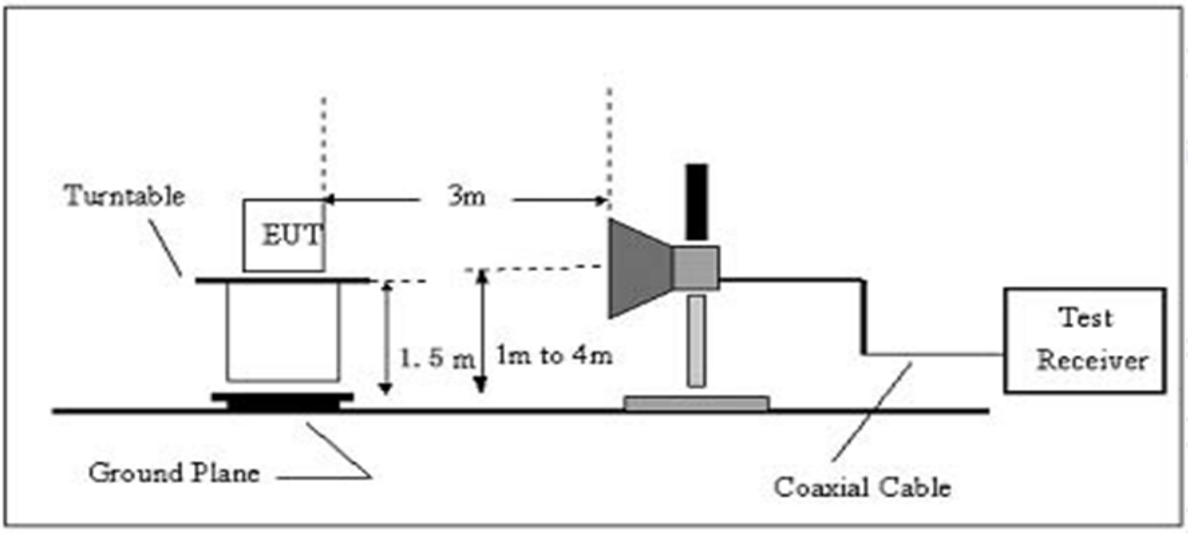
$$ERP(dBm) = Pg(dBm) – cable\ loss\ (dB) + antenna\ gain\ (dBd)$$

where: Pg is the generator output power into the substitution antenna.

- 2) above 1GHz test procedure:

Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber, and the test antenna do not need to raise from 1 to 4m, just test in 1.5m height.

Test Setup



Test results

Remark: We test all modulation type, and recorded the worst case at 802.11b mode.

Test Mode：802.11b 2412MHz Rx					
Frequency (MHz)	**ANT polarization**	**Result (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Result**
165.35	H	-70.26	-57	13.26	PASS
560.98	H	-65.37	-57	8.37	PASS
2656.67	H	-55.34	-47	8.34	PASS
--	--	--	--	--	--
165.35	H	-71.38	-57	14.38	PASS
560.98	H	-67.46	-57	10.46	PASS
2656.67	H	-56.48	-47	9.48	PASS

Test Mode：802.11b 2472MHz Rx					
Frequency (MHz)	**ANT polarization**	**Result (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Result**
177.23	V	-71.45	-57	14.45	PASS
574.36	V	-69.35	-57	12.35	PASS
2425.79	V	-55.64	-47	8.64	PASS
--	--	--	--	--	--
177.23	V	-72.27	-57	15.27	PASS
574.36	V	-68.51	-57	11.51	PASS
2425.79	V	-56.77	-47	9.77	PASS

3.10 Receiver Blocking

Limits

ETSI EN 300 328 V2.2.2 -- Sub-clause 4.3.2.11 :
Performance Criteria:
For equipment that supports a PER or FER test to be performed, the minimum performance criterion shall be a PER or FER less than or equal to 10 %.
For equipment that does not support a PER or a FER test to be performed, the minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment.

While maintaining the minimum performance criteria as defined in clause 4.3.1.12.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 6, table 7 or table 8.

Table 14: Receiver Blocking parameters for Receiver Category 1

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × $\log_{10}$(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × $\log_{10}$(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Table 15: Receiver Blocking parameters receiver Category 2

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

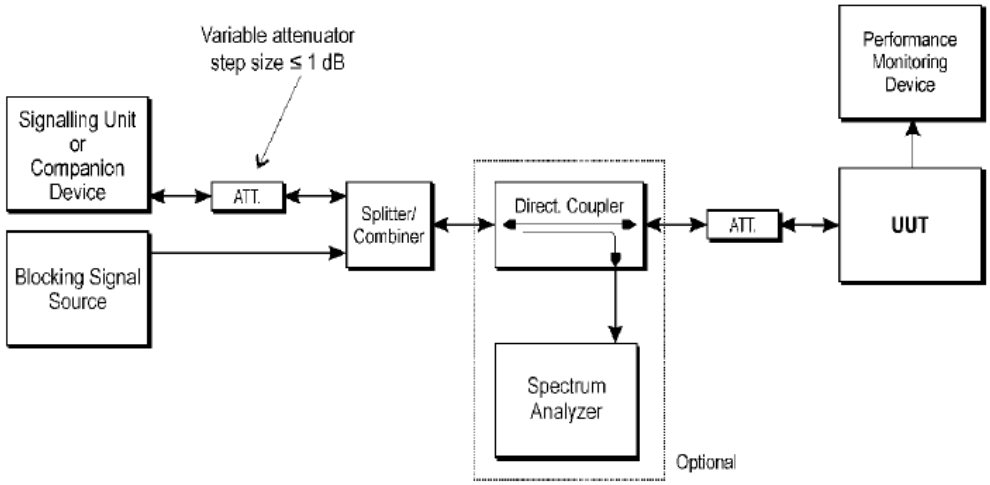
NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Table 8: Receiver Blocking parameters receiver Category 3

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 30 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Test Configuration



Test Procedure

Step 1:
For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

Step 2:
- The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:
- With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6.
- Unless the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the level of the wanted signal shall be set to the value provided in the table corresponding to the receiver category and type of equipment. The test procedure defined in clause 5.4.2, and more in particular clause 5.4.2.2.1.2, can be used to measure the (conducted) level of the wanted signal however no correction shall be made for antenna gain of the companion device (step 6 in clause 5.4.2.2.1.2 shall be ignored). This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT.
- When the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met.

The resulting level for the wanted signal at the input of the UUT is Pmin. This signal level (Pmin) is increased by the value provided in note 2 of the applicable table corresponding to the receiver category and type of equipment.

Step 4:

- The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment. Where the manufacturer has declared the actual antenna gain for each of the applicable blocking frequencies (see clause 5.4.1 m) ii)) this blocking level shall be adjusted for the difference between the in-band antenna assembly gain (G) and the actual antenna gain for the blocking frequency being tested. See also note 5 in table 6, note 4 in table 7 and note 4 in table 8 or note 5 in table 14, note 4 in table 15 and note 4in table 16. Where the actual antenna gains at the blocking frequencies have not been declared, then the antenna gain at the blocking frequencies shall be assumed identical to the in-band antenna gain.
- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is met then proceed to step 6.

Step 5:

- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been increased with a value equal to the occupied channel bandwidth except: - For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB. - For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.
- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been decreased with a value equal to the occupied channel bandwidth except: - For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB. - For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB
- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, the UUT fails to comply with the Receiver Blocking requirement and step 6 and step 7 are no longer required.
- It shall be recorded in the test report whether the shift of blocking frequencies as described in the present step was used.

Step 6:

- Repeat step 4 and step 5 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 7:

- For non-FHSS equipment, repeat step 2 to step 6 with the UUT operating at the highest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

Step 8:

- It shall be assessed and recorded in the test report whether the UUT complies with the Receiver Blocking requirement.

Test result

WIFI

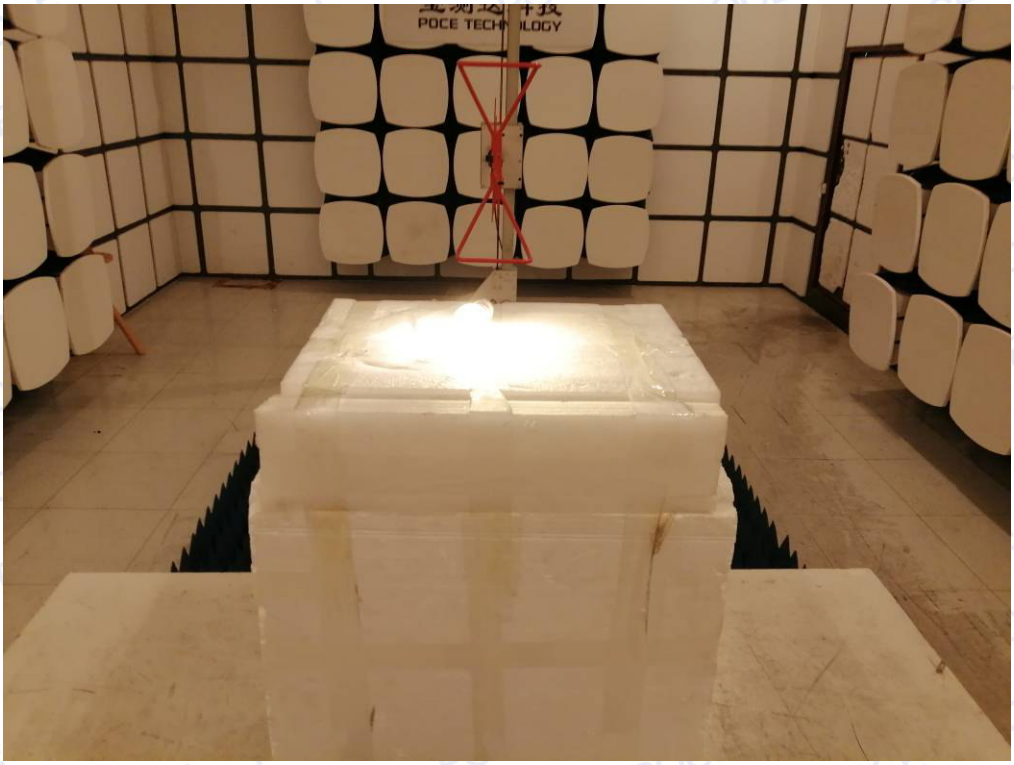
Test Mode	802.11b					
Wanted signal Mean power From companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal Power (dBm)	Type of blocking signal	PER (%)	PER (%) Limit	Result
-68	2380.0	-34	CW	3.05	≦10	Pass
	2503.5			2.46		Pass
	2300.0	-34	CW	0.51	≦10	Pass
	2583.5			0.39		Pass

Test Mode	802.11g					
Wanted signal Mean power From companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal Power (dBm)	Type of blocking signal	PER (%)	PER (%) Limit	Result
-68	2380.0	-34	CW	1.05	≦10	Pass
	2503.5			2.44		Pass
	2300.0	-34	CW	0.84	≦10	Pass
	2583.5			0.36		Pass

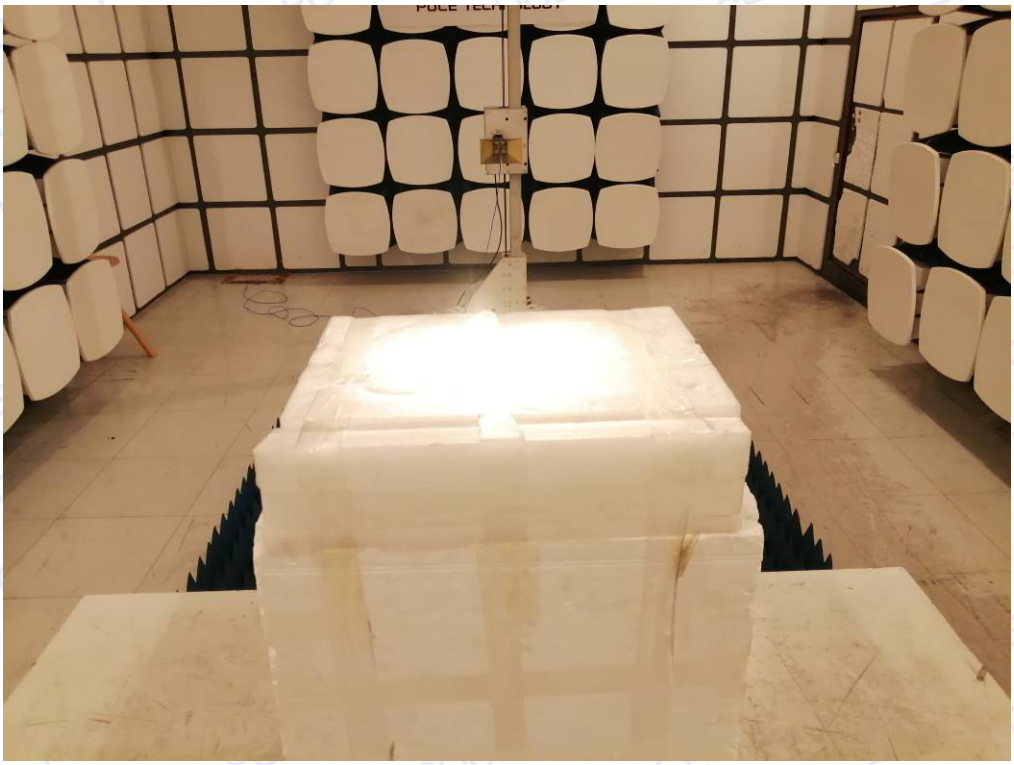
Test Mode	802.11n20					
Wanted signal Mean power From companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal Power (dBm)	Type of blocking signal	PER (%)	PER (%) Limit	Result
-68	2380.0	-34	CW	065	≦10	Pass
	2503.5			1.32		Pass
	2300.0	-34	CW	2.10	≦10	Pass
	2583.5			1.21		Pass

Remark:
1 According to the Power measurement the device belongs to Receiver category 1.
2 (-139 dBm + 10 ×log10(OCBW)) or -68 dBm whichever is less

4 PHOTOGRAPHS OF TEST



Below1G



Above 1G

5 PHOTOGRAPHS OF EUT

Please refer to the report NO.: POCE200413040GRW

********** THE END **********

6 ANNEX E

Information as required by EN 300 328 V2.2.2, clause 5.4.1

In accordance with EN 300 328, clause 5.4.1, the following information is provided by the supplier.

a) The type of modulation used by the equipment:

☐FHSS

☒Other forms of modulation

b) In case of FHSS modulation:

- In case of non-Adaptive Frequency Hopping equipment:
  The number of Hopping Frequencies:
- In case of Adaptive Frequency Hopping Equipment:
  The maximum number of Hopping Frequencies:
  The minimum number of Hopping Frequencies:
- The (average) Dwell Time:

c) Adaptive / non-adaptive equipment:

☐Non-adaptive Equipment

☒Adaptive Equipment without the possibility to switch to a non-adaptive mode

☐Adaptive Equipment which can also operate in a non-adaptive mode

d) In case of adaptive equipment:

The Channel Occupancy Time implemented by the equipment: 13ms

☒The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

☐The equipment is Frame Based equipment

☒The equipment is Load Based equipment

☐The equipment can switch dynamically between Frame Based and Load Based equipment

The CCA time implemented by the equipment: 15

☐The equipment has implemented an non-LBT based DAA mechanism

☐The equipment can operate in more than one adaptive mode

e) In case of non-adaptive Equipment:

The maximum RF Output Power (e.i.r.p.): dBm

The maximum (corresponding) Duty Cycle: %

Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):

f) The worst case operational mode for each of the following tests:

- RF Output Power
  802.11b 1Mbps, 802.11g 6Mbps, 802.11(HT20) 6.5Mbps
- Power Spectral Density
  802.11b 1Mbps, 802.11g 6Mbps, 802.11(HT20) 6.5Mbps
- Duty cycle, Tx-Sequence, Tx-gap
  N/A
- Dwell time, Minimum Frequency Occupation & Hopping Sequence (only for FHSS equipment)
  N/A
- Hopping Frequency Separation (only for FHSS equipment)
  N/A
- Medium Utilisation
  N/A
- Adaptivity

802.11b 1Mbps, 802.11g 6Mbps, 802.11(HT20) 6.5Mbps

- Occupied Channel Bandwidth
  802.11b 1Mbps, 802.11g 6Mbps, 802.11(HT20) 6.5Mbps
- Transmitter unwanted emissions in the OOB domain
  802.11b 1Mbps, 802.11g 6Mbps, 802.11(HT20) 6.5Mbps
- Transmitter unwanted emissions in the spurious domain
  802.11b 1Mbps
- Receiver spurious emissions
  802.11b 1Mbps
- Receiver Blocking
  802.11b 1Mbps

g) The different transmit operating modes (tick all that apply):

☐Operating mode 1: Single Antenna Equipment
☐Equipment with only 1 antenna
☐Equipment with 2 diversity antennas but only 1 antenna active at any moment in time
☐Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)
☐Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming
☐Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)
☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1
☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
☒Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming
☒Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)
☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1
☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

h) In case of Smart Antenna Systems:

- The number of Receive chains:
- The number of Transmit chains:

☐Symmetrical power distribution
☐Asymmetrical power distribution

In case of beam forming, the maximum (additional) beam forming gain:

i) Operating Frequency Range(s) of the equipment:

- Operating Frequency Range 1: 2412MHz to2472MHz
- Operating Frequency Range 2: MHz to MHz

NOTE: Add more lines if more Frequency Ranges are supported.

j) Occupied Channel Bandwidth(s):

- Occupied Channel Bandwidth 1: 20MHz
- Occupied Channel Bandwidth 2: MHz

k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):

☒Stand-alone
☐Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)
☐Plug-in radio device (Equipment intended for a variety of host systems)
☐Other

l) The extreme operating conditions that apply to the equipment:

Operating temperature range: -20° C to +55° C
Operating voltage range: 207V to 253V ☒AC ☐DC
Details provided are for the: ☒stand-alone equipment
☐Combined (or host) equipment

☐Test jig

m) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:

- Antenna Type:

☒ PCB Antenna

Antenna Gain: 0 dBi

If applicable, additional beamforming gain (excluding basic antenna gain): dB

☒Temporary RF connector provided

☐No temporary RF connector provided

☐Dedicated Antennas (equipment with antenna connector)

☐Single power level with corresponding antenna(s)

☐Multiple power settings and corresponding antenna(s)

Number of different Power Levels:

Power Level 1:		dBm
Power Level 2:		dBm
Power Level 3:		dBm

n) For each of the Power Levels, provide the intended antenna assemblies, their corresponding gains (G) and the resulting e.i.r.p. levels also taking into account the beamforming gain (Y) if applicable

Power Level 1: dBm

Number of antenna assemblies provided for this power level:

Assembly #	**Gain (dBi)**	**e.i.r.p. (dBm)**	**Part number or model name**
1			
2			
3			
4			

Power Level 2: dBm

Number of antenna assemblies provided for this power level:

Assembly #	**Gain (dBi)**	**e.i.r.p. (dBm)**	**Part number or model name**
1			
2			
3			
4			

Power Level 3: dBm

Number of antenna assemblies provided for this power level:

Assembly #	**Gain (dBi)**	**e.i.r.p. (dBm)**	**Part number or model name**
1			
2			
3			
4			

o) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:

Details provided are for the: ☒stand-alone equipment
☐combined (or host) equipment
☐test jig

Supply Voltage ☒AC mains State AC voltage 230V/50Hz
☐DC State DC voltage V

In case of DC, indicate the type of power source
☒Internal Power Supply
☐External Power Supply or AC/DC adapter
☐Battery
☐Other: DC 5V from PC

p) Describe the test modes available which can facilitate testing:

q) The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):
IEEE 802.11™ [i.3]

r) Geo-location capability supported by the equipment:
☐Yes
☐The geographical location determined by the equipment as defined in clause 4.3.1.13.2 or clause 4.3.2.12.2 is not accessible to the user
☒No

s) Describe the minimum performance criteria that apply to the equipment (see clause 4.3.1.12.3 or clause 4.3.2.11.3):
N/A

TEST REPORT

Applicant	:	Allterco Robotics
Address	:	103 Cherni Vrah Blvd, Sofia 1407, Bulgaria

Report on the submitted sample said to be:

Sample name	:	LED Lamps
Trade Name	:	N/A
Model	:	Shelly Vintage A60, Shelly Vintage ST64
Manufacturer	:	Allterco Robotics
Address	:	103 Cherni Vrah Blvd, Sofia 1407, Bulgaria
Test conclusion	:	Based on the performed tests on submitted samples, the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs). Polybrominated diphenyl ethers (PBDEs), Bis (2-ethylhexyl) phthalate (DEHP), Benzyl butyl phthalate (BBP), Dibutyl phthalate (DBP), Di Iso Butyl Ortho Phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.
Testing period	:	Apr. 12, 2020 to Apr. 18, 2020
Date of report	:	Apr. 18, 2020

Testing Requested:	**Results**
Selected test(s) as requested by client	**Pass**

Prepared by: Matilda

Matilda

Examine By: Calvin Chen

Calvin Chen

Approved(Manager): Maohael Mo

Maohael Mo

SHENZHEN POCE TECHNOLOGY CO., LTD. APPROVED

Testing method:

1. With reference to IEC 62321-1:2013, review was performed for the samples disjointed from the submitted articles submitted by the Applicant
2. Tests were performed for the samples indicated by the photos in the report with test methods reference to IEC 62321-1:2013, Procedures for the determination of Levels of Six regulated Substances in Electrotechnical Products
   (1) With reference to IEC 62321-3-1:2013, Screening by XRF spectrometry
   (2) Wet Chemical Test Method
   a. With reference to IEC 62321-5:2013, Determination of Lead &Cadmium by ICP-OES or AAS
   b. With reference to IEC 62321-4:2013, Determination of Mercury by ICP-OES
   c. With reference to IEC 62321-7-1:2015, Determination of Hexavalent Chromium by Spot or Colorimetic Method
   d. With reference to IEC 62321-6:2015, Determination of PBBs and PBDEs by GC-MS
   e. With reference to IEC 62321-8:2017, Determination of DEHP, DIBP, DBP and BBP by GC-MS

Note: The test results are related only to the tested items. The report shall note be reproduced excpt in full without the written approval of the testing laboratory.

Part No.	Part Description	Restricted Substance	Results of EDXRF	Result of wet Chemical Testing (2mg/kg)	Conclusion on RoHS	Sample submitted/ Resubmitted Date
1	Glass	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	BL	-	Comply	
		DEHP	IN	ND	Comply	
		BBP	IN	ND	Comply	
		DBP	IN	ND	Comply	
		DIBP	IN	ND	Comply	
2	Tungsten filament	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	-	-	-	
		DEHP	-	-	-	
		BBP	-	-	-	
		DBP	-	-	-	
		DIBP	-	-	-	
3	White wire	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	BL	-	Comply	
		DEHP	IN	ND	Comply	
		BBP	IN	ND	Comply	
		DBP	IN	ND	Comply	
		DIBP	IN	ND	Comply	
4	Black casing	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	BL	-	Comply	
		DEHP	IN	ND	Comply	
		BBP	IN	ND	Comply	
		DBP	IN	ND	Comply	
		DIBP	IN	ND	Comply	

Part No.	Part Description	Restricted Substance	Results of EDXRF	Result of wet Chemical Testing (2mg/kg)	Conclusion on RoHS	Sample submitted/ Resubmitted Date
5	Electrolytic capacitor	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	BL	-	Comply	
		DEHP	IN	ND	Comply	
		BBP	IN	ND	Comply	
		DBP	IN	ND	Comply	
		DIBP	IN	ND	Comply	
6	Inductor	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	BL	-	Comply	
		DEHP	IN	ND	Comply	
		BBP	IN	ND	Comply	
		DBP	IN	ND	Comply	
		DIBP	IN	ND	Comply	
7	IC	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	BL	-	Comply	
		DEHP	IN	ND	Comply	
		BBP	IN	ND	Comply	
		DBP	IN	ND	Comply	
		DIBP	IN	ND	Comply	
8	Diode	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	BL	-	Comply	
		DEHP	IN	ND	Comply	
		BBP	IN	ND	Comply	
		DBP	IN	ND	Comply	
		DIBP	IN	ND	Comply	

Part No.	Part Description	Restricted Substance	Results of EDXRF	Result of wet Chemical Testing (2mg/kg)	Conclusion on RoHS	Sample submitted/ Resubmitted Date
9	White glue	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	BL	-	Comply	
		DEHP	IN	ND	Comply	
		BBP	IN	ND	Comply	
		DBP	IN	ND	Comply	
		DIBP	IN	ND	Comply	
10	Tin solder	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	-	-	-	
		DEHP	-	-	-	
		BBP	-	-	-	
		DBP	-	-	-	
		DIBP	-	-	-	
11	Silver metal	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	-	-	-	
		DEHP	-	-	-	
		BBP	-	-	-	
		DBP	-	-	-	
		DIBP	-	-	-	
12	SMD capacitor	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	BL	-	Comply	
		DEHP	IN	ND	Comply	
		BBP	IN	ND	Comply	
		DBP	IN	ND	Comply	
		DIBP	IN	ND	Comply	

Part No.	Part Description	Restricted Substance	Results of EDXRF	Result of wet Chemical Testing (2mg/kg)	Conclusion on RoHS	Sample submitted/ Resubmitted Date
13	SMD resistor	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	BL	-	Comply	
		DEHP	IN	ND	Comply	
		BBP	IN	ND	Comply	
		DBP	IN	ND	Comply	
		DIBP	IN	ND	Comply	
14	Crystal oscillator	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	BL	-	Comply	
		DEHP	IN	ND	Comply	
		BBP	IN	ND	Comply	
		DBP	IN	ND	Comply	
		DIBP	IN	ND	Comply	
15	PCB	Pb	BL	-	Comply	Apr. 18, 2020
		Cd	BL	-	Comply	
		Hg	BL	-	Comply	
		Cr(Ⅵ)	BL	-	Comply	
		Br	IN	PBBs=ND PBDEs=ND	Comply	
		DEHP	IN	ND	Comply	
		BBP	IN	ND	Comply	
		DBP	IN	ND	Comply	
		DIBP	IN	ND	Comply	

Remark:

(1) (a) It is the result on total Br while test item on restricted is PBBs\PBDEs. It is the result on total Cr6+ while test item on restricted substances is Cr^{6+}.

(b) Results are obtained by EDXRF for primary screening ,and further chemical testing by ICP(for Cd, Pb, Hg), UV-VIS(for Cr^{6+}) and GC\MS (for PBBs, PBDEs) is recommended to be performed , if the concentration exceeds the below warning value according to IEC62321(unit: mg\kg)

Element	Polymer	Metal	Composite Materals
Cd	BL≤（70-3σ）<X<(130+3σ) ≤OL	BL≤（70-3σ）<X<(130+3σ) ≤OL	LOD<X<(150+3σ) ≤OL
Pb	BL≤（700-3σ）<X<(1300+3σ) ≤OL	BL≤（700-3σ）<X<(1300+3σ) ≤OL	BL≤（500-3σ）<X<(1500+3σ) ≤OL
Hg	BL≤（700-3σ）<X<(1300+3σ) ≤OL	BL≤（700-3σ）<X<(1300+3σ) ≤OL	BL≤（500-3σ）<X<(1500+3σ) ≤OL
Br	BL≤（300-3σ）<X	--	BL≤（250-3σ）<X
Cr	BL≤（700-3σ）<X	BL≤（700-3σ）<X	BL≤（500-3σ）<X

(c)BL=Below Limit, OL=Over Limit, IN=Inconclusive, LOD=Limit of Detection,-=Not Regulated,

Negative = A negative test result indicated above positive observation was not found at the time of testing. When the spot-test showed a negative result, the boiling-water-extraction procedure shall be used to verify the result.

(#1) = As claimed by the declaration submitted by the client, the Lead content of the components is coming from the constituent of ceramic part of the electronic component only. According to EU RoHS Directive, Lead in electronic ceramic parts of this component can be exempted.

(d)The XRF screening test for RoHS elements-The reading may be different to the actual content in the sample be of non-uniformity composition,

(2) (a) mg\kg=ppm=0.0001%, ND=Not Detected{<MDL)),

(b)Unit and Method Detection Limit(MDL)in wet chemical test

Test Items	Units	MDL	EU RoHS Limit
Pb	mg/kg	2	1000
Cd	mg/kg	2	100
Hg	mg/kg	2	1000
Cr(VI)	mg/kg	0.02 mg/50 cm^2(Metal) 2	1000
PBBs	mg/kg	5	1000
PBDEs	mg/kg	5	1000
DEHP	mg/kg	5	1000
BBP	mg/kg	5	1000
DBP	mg/kg	5	1000
DIBP	mg/kg	5	1000

(c) According to IEC 62321, result on Cr for metal sample is shown as Positive\Negative, Negative=Absence of Cr6+ costing, Positive=Prosence of Cr 6+ coating.

(d) ▲As declared by the client the materials fall into exemption items according to RoHS Directive 2011\65\EU recasting 2002\95\EC

Photograph of sample

POCE authenticate the photo on original report only

Photo 1

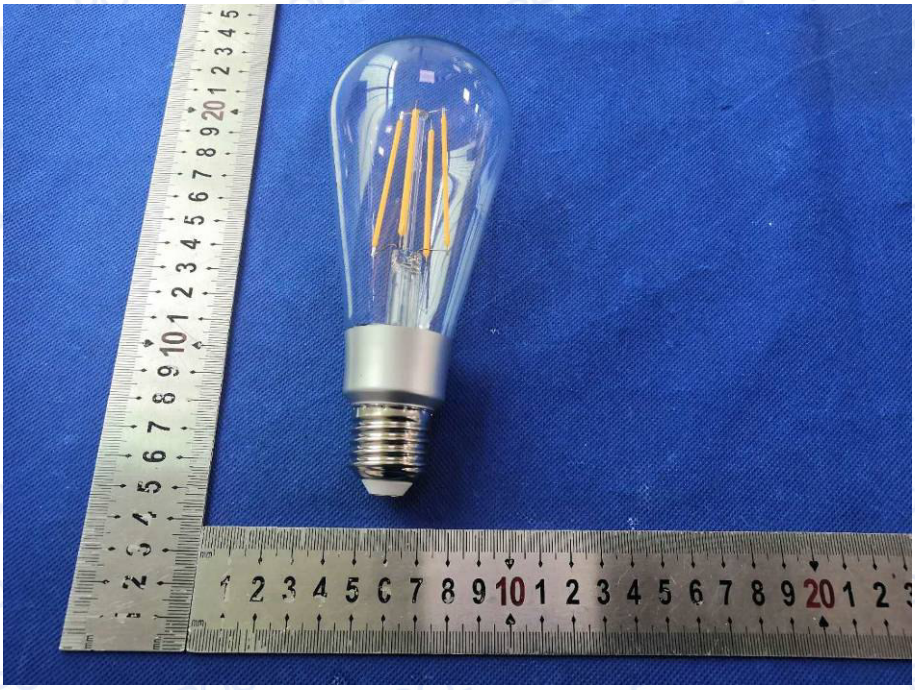


Photo 2

Photo 3

Photo 4

Photo 5

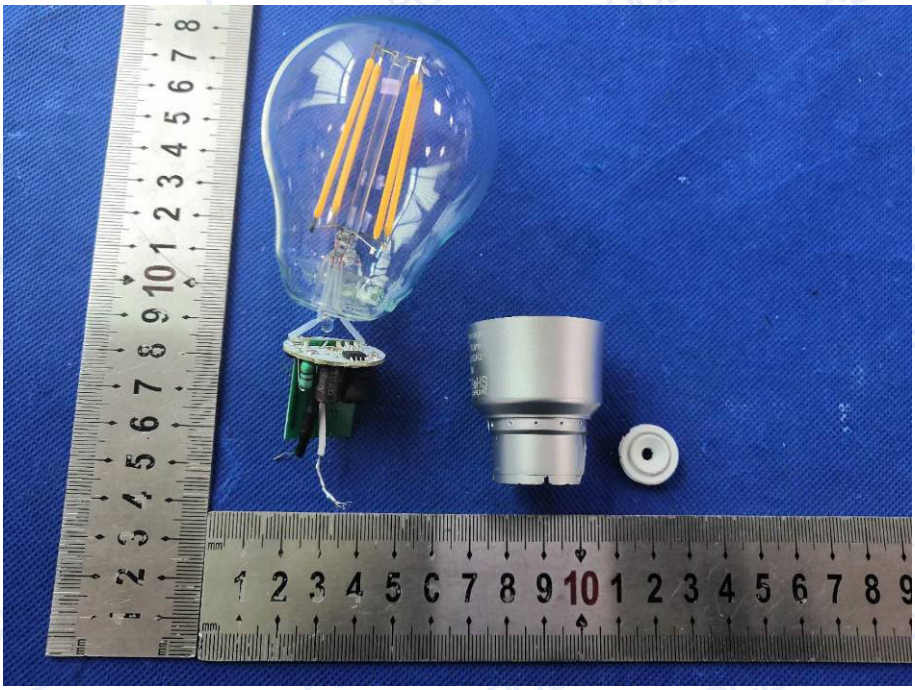


Photo 6

Photo 7

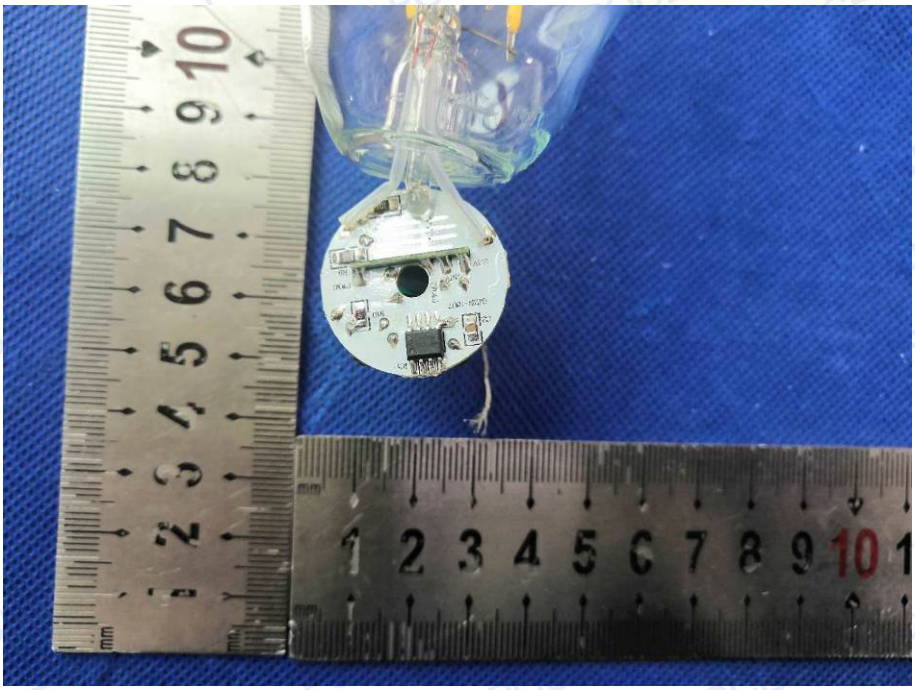


Photo 8

※※※※※END OF REPORT※※※※※