ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-17 V3.2.2 (2019-12)

TEST REPORT

For

SHENZHEN TENDA TECHNOLOGY CO.,LTD

6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052

Model: OS3

Report Type: Original Report	**Product Type:** 5GHz 11ac 867Mbps 12dBi Outdoor CPE
Report Number:	RDG200416001-02
Report Date:	2020-05-27
Reviewed By:	Dean Lau RF Supervisor
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		5GHz 11ac 867Mbps 12dBi Outdoor CPE
EUT Model:		OS3
Rated Input Voltage:		DC 12V from adapter & DC 48V from POE
Adapter 1 Information	**Model:**	BN073-A12012E
	Input:	100-240V~50/60Hz 0.4A
	Output:	DC 12.0V; 1.0A
Serial Number:		RDG200416001-RF-S1
EUT Received Date:		2020.04.20
EUT Received Status:		Good

Objective

This report is prepared on behalf of *SHENZHEN TENDA TECHNOLOGY CO.,LTD* in accordance with 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; 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 covering the essential requirements of article 3.1(b) of Directive 2014/53/EU.

The objective is to determine the compliance of EUT with: ETSI EN 301 489-1&17.

Test Methodology

All measurements contained in this report were conducted with 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; 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 covering the essential requirements of article 3.1(b) of Directive 2014/53/EU.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "△". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a typical fashion (as Wireless link by a typical user).

Normal operating: Wi-Fi transferring data with mobile phone by software “Lan test.exe”

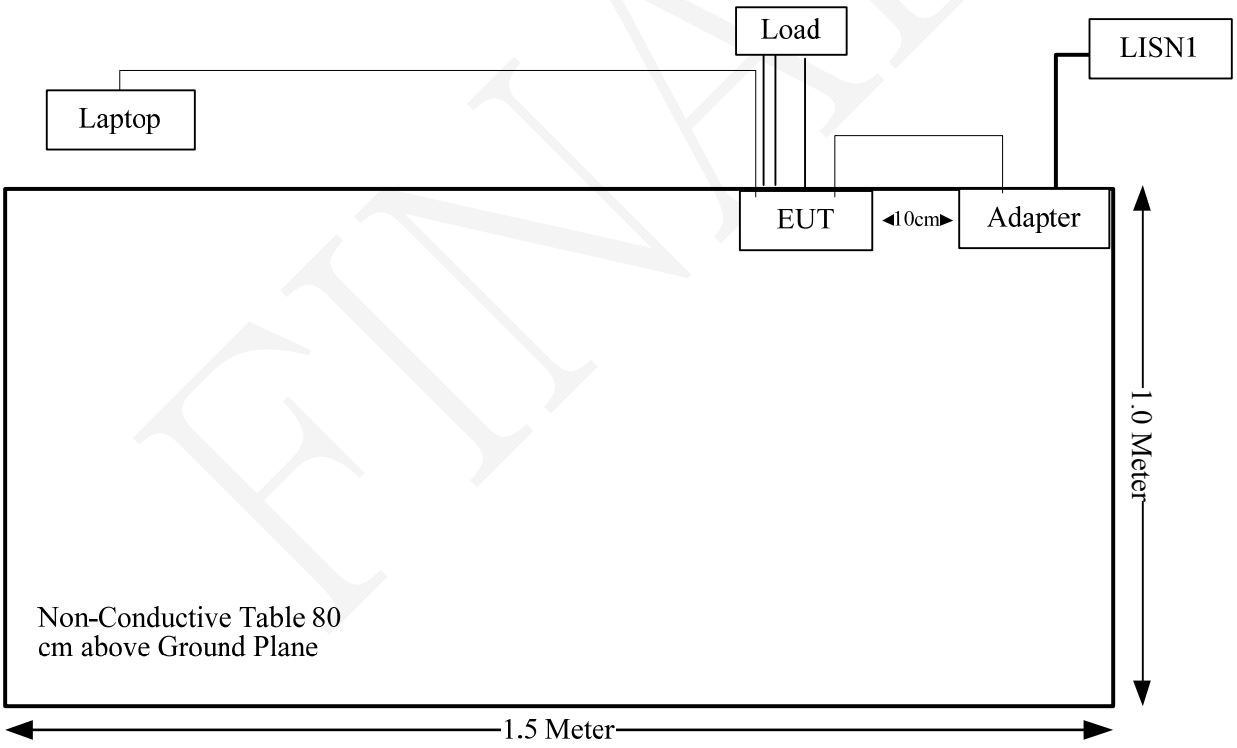
Equipment Modifications

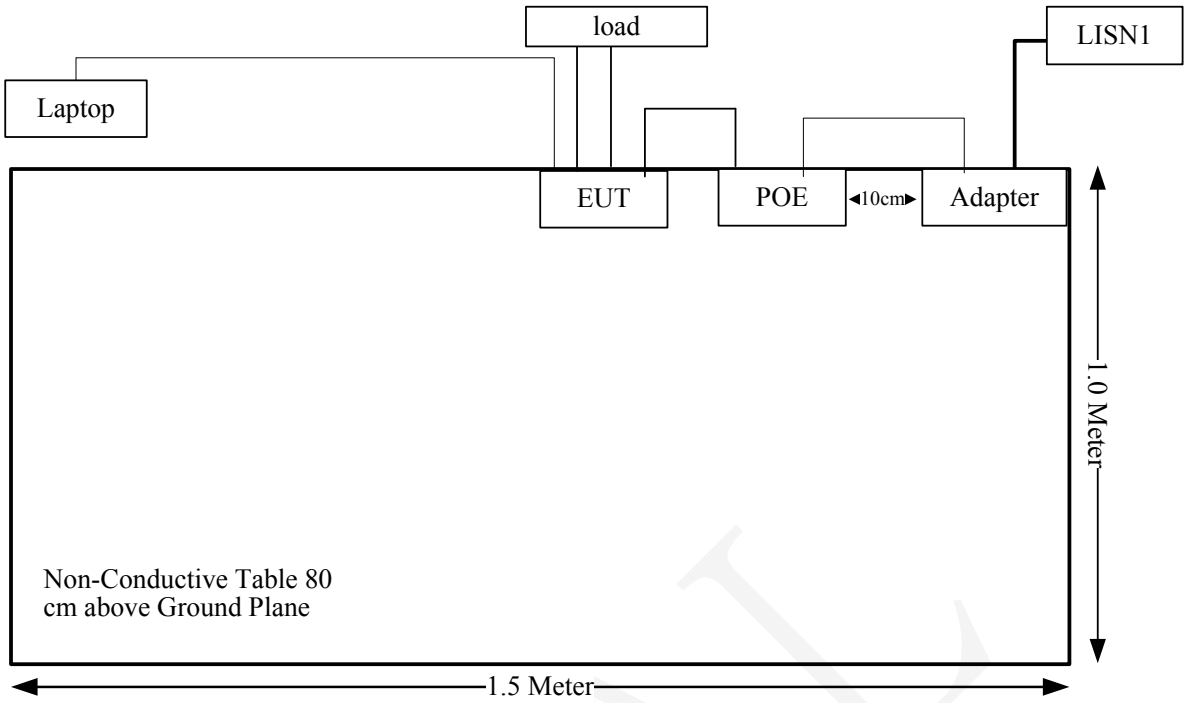
No modification was made to the EUT.

EUT Exercise Software

The EUT exercise software “Lan test.exe” was used for testing.

Block Diagram of Test Setup





Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
Unknown	Load	/	/

Support Cable List and Details

Cable Description	Shielding Cable	Ferrite Core	Length (m)	From Port	To
RJ45 Cable	yes	No	1.2	Ethernet port of POE	EUT
RJ45 Cable	yes	No	10	EUT	Laptop/Load
Adapter Cable	Yes	No	1	Adapter	EUT
RJ45 Cable	yes	No	1.2	ISN	EUT

Test Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted emission					
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2019-09-05	2020-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2019-09-12	2020-09-12
R&S	EMI Test Receiver	ESCI	101121	2019-05-09	2020-05-09
R&S	EMI Test Receiver	ESCI	101121	2020-05-09	2021-05-09
TESEQ	ISN	T800	34379	2019/9/12	2020/9/12
Radiated emissions below 1GHz					
R&S	EMI Test Receiver	ESR3	102453	2019-09-12	2020-09-12
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2019-05-06	2020-05-06
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2020-05-06	2021-05-06
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05
Radiated emissions above 1GHz					
R&S	Spectrum Analyzer	FSP 38	100478	2019-05-09	2020-05-09
R&S	Spectrum Analyzer	FSP 38	100478	2020-05-09	2021-05-09
TDK RF	Horn Antenna	HRN-0118	130 084	2018-10-12	2021-10-12
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2019-09-05	2020-09-05
Sinoscite	Bandstop Filters	BSF5150-5850MN-0899-003	0899003	2019-05-06	2020-05-06
Sinoscite	Bandstop Filters	BSF5150-5850MN-0899-003	0899003	2020-05-06	2021-05-06
E-Microwave	Band-stop Filters	OBSF-2400-2483.5-S	OE01601525	2019-06-16	2020-06-16
Flicker & Harmonic					
ELGAR	AC Power Source	1751SX	5611	2019-09-10	2020-09-10
EM TEST	Harmonic & Flicker Analyzer	DPA 500	303278	2019-12-14	2020-12-14
CS					
Werlatone	Dual Directional Coupler	C5091-10	113192	2020-02-09	2021-02-09
HP	Power Meter	HP EPM-441A	GB37481494	2019-09-12	2020-09-12
Agilent	8482A Power sensor	8482A	US37296108	2019-09-12	2020-09-12
HP	Signal Generator	8648A	3246A00831	2019-09-12	2020-09-12
R&S	Power Amplifier	15A250	12934	N/A	N/A
NARDA	Attenuator	769-6	2754	N/A	N/A
COM-POWER	CDN	M325E	521064	2019/9/12	2020/9/12
COM-POWER	CDN	T8ES	511413	2019/5/9	2022/5/9
EFT & Surge & Dips					
EM TEST	Ultra Compact Generator	UCS500-M6	V6016101357	2020-05-09	2021-05-09
EM TEST	Auto Transformer	MV2616	0403-16	N/A	N/A
EM TEST	CDN	CNV508 S1	311137	2019/11/14	2020/11/14
EM TEST	EFT Clamp	N/A	300886	2019/11/13	2020/11/13
ESD					

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
TESEQ	ESD Generator	NSG 438	1019	2019-09-18	2020-09-17
RS					
Sunol Sciences	Antenna	JB3	A060611-2	2017-08-25	2020-08-25
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2019-09-05	2020-09-05
AR	Power Amplifier	100W1000M1	13410	N/A	N/A
AR	Power Amplifier	60S1G6	348711	N/A	N/A
PASTERNACK	Dual Directional Coupler	PE2239-30	1711	2019-07-16	2020-07-16
Microwave	Directional Coupler	441490	488Z	2019-07-16	2020-07-16
Agilent	EPM Series Power Meter	E4419B	MY45103907	2019-05-09	2020-05-09
Agilent	EPM Series Power Meter	E4419B	MY45103907	2020-05-09	2021-05-09
Agilent	E-Series Avg Power Sensor	E9301A	MY41497625	2019-05-09	2020-05-09
Agilent	E-Series Avg Power Sensor	E9301A	MY41497628	2020-05-09	2021-05-09
Agilent	EPM Series Power Meter	E4419B	MY45103907	2019-05-09	2020-05-09
Agilent	EPM Series Power Meter	E4419B	MY45103907	2020-05-09	2021-05-09
HP	Signal Generator	8665B	3438a00584	2019-09-12	2020-09-12

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Environmental Conditions

Temperature:	23.9~27.4 °C
Relative Humidity:	60~64%
ATM Pressure:	100.6-101.8kPa
Tester:	Nayley Lao, Randy Shi
Test Date:	2020.04.27-2020-05-11

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SUMMARY OF TEST RESULTS

SN	Rule and Clause	Description of Test	Test Result
1	EN 301 489 Clause 8.2	Enclosure of ancillary equipment measured on a stand alone basis	Compliance
2	EN 301 489 Clause 8.3	DC power input/output ports	Not applicable*
3	EN 301 489 Clause 8.4	AC mains power input/output ports	Compliance
4	EN 301 489 Clause 8.5	Harmonic current emissions (AC mains input port)	Compliance
5	EN 301 489 Clause 8.6	Voltage fluctuations and flicker (AC mains input port)	Not applicable*
6	EN 301 489 Clause 8.7	Wired network ports	Compliance
7	EN 301 489 Clause 9.2	Radio frequency electromagnetic fields (80 MHz to 6 000 MHz) (IEC 61000-4-3)	Compliance
8	EN 301 489 Clause 9.3	Electrostatic discharges (IEC 61000-4-2)	Compliance
9	EN 301 489 Clause 9.4	Fast transients, common mode (IEC 61000-4-4)	Compliance
10	EN 301 489 Clause 9.5	Radio frequency, common mode (IEC 61000-4-6)	Compliance
11	EN 301 489 Clause 9.6	Transients and surges in the vehicular environment (ISO 7637-2)	Not applicable***
12	EN 301 489 Clause 9.7	Voltage dips and short interruptions (IEC 61000-4-11)	Compliance
13	EN 301 489 Clause 9.8	Surges (IEC 61000-4-5)	Compliance

Note:
Not applicable*: Test voltage is AC 230V/50Hz.
Not applicable**: This device has no wired network ports.
Not applicable***: This device is not for vehicular use.

1 – ENCLOSURE OF ANCILLARY EQUIPMENT MEASURED ON A STAND ALONE BASIS

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
– non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of Table 1, then:
– compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
– non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

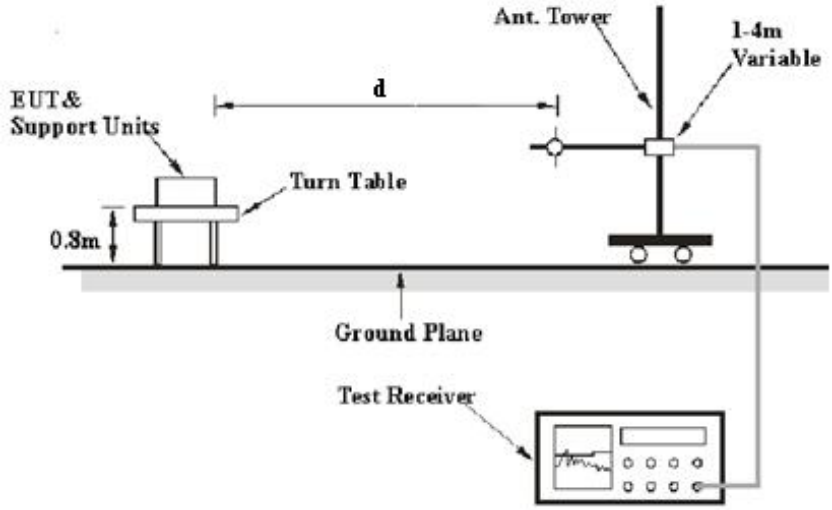
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 10m at Bay Area Compliance Laboratories Corp. (Dongguan) is:30M~200MHz: 4.55 dB for Horizontal, 4.57 dB for Vertical; 200M~1GHz: 4.66 dB for Horizontal, 4.56 dB for Vertical; measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical; 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical; 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB

Table 1 – Values of U_{cispr}

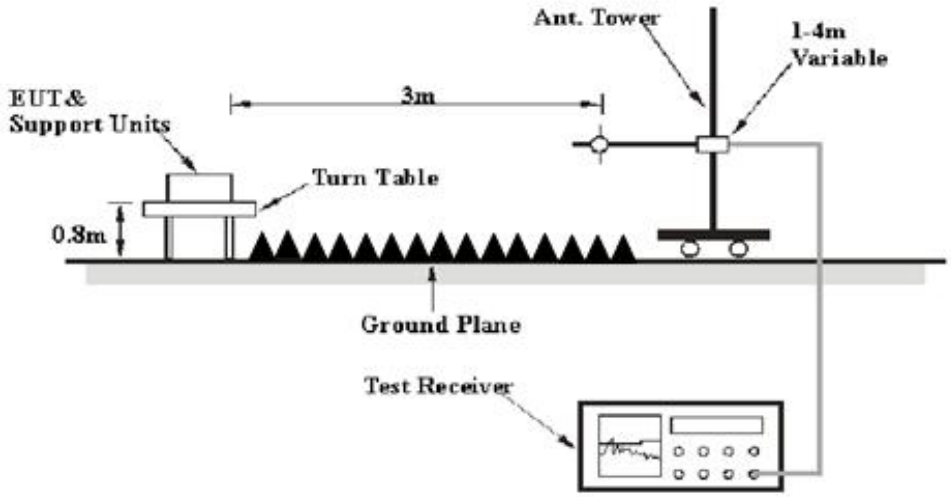
Measurement		U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC)	(30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR)	(1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR)	(6 GHz to 18 GHz)	5.5 dB

Test System Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests below 1GHz were performed in 3 meters, above 1GHz were performed in the 3 meters. The specification used was EN 55032 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 6 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	Peak
	1MHz	10Hz	/	Peak

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak and average detection mode above 1 GHz.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Meter Reading+ Corrected

Note:
Corrected = Antenna Factor + Cable Loss - Amplifier Gain
or

Corrected = Antenna Factor + Cable Loss + Insertion loss of attenuator - Amplifier Gain

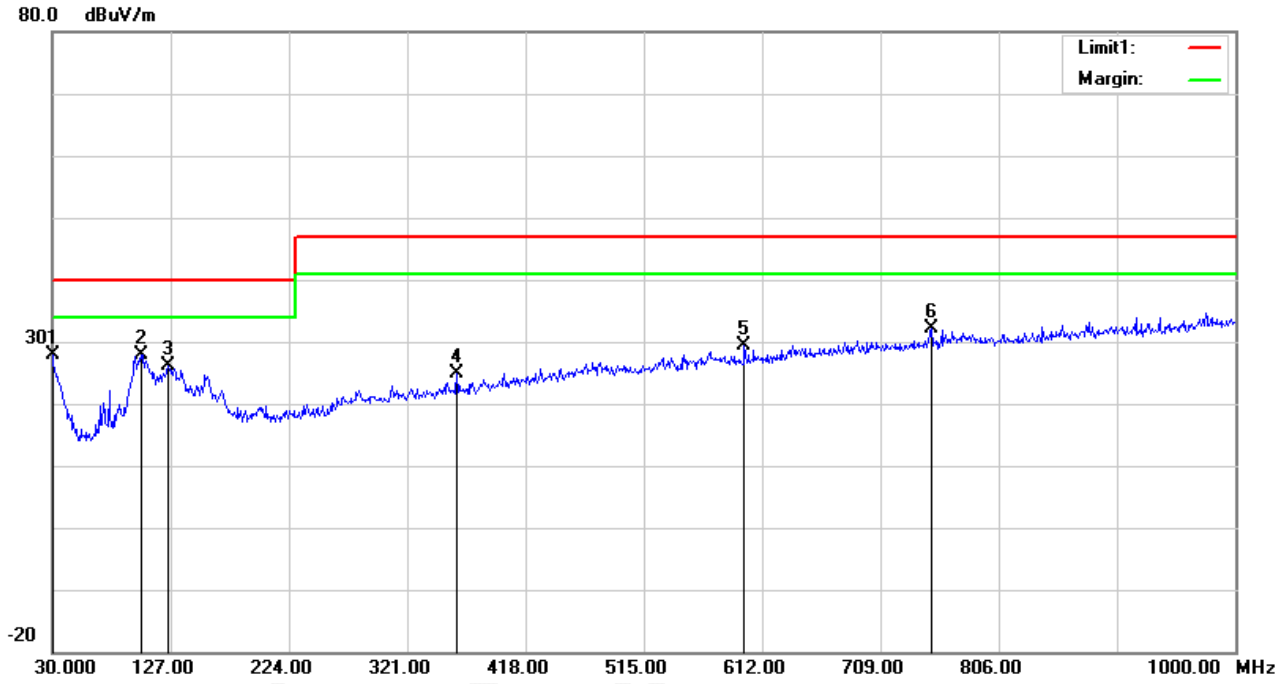
The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Result

Test Data

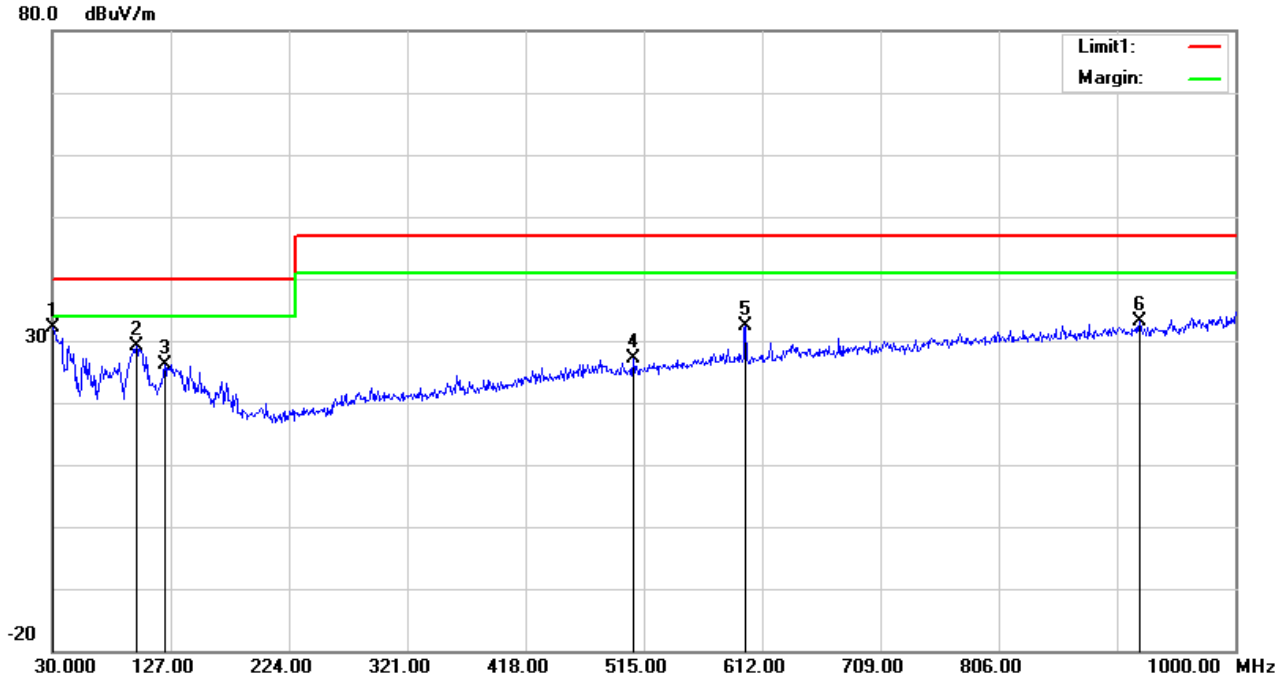
Please refer to following table and plots:

Condition:	**EN 301 489 Class B**	**Polarization:**	**Horizontal**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 230V/50Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**Operating**		
Note:	**POE**		



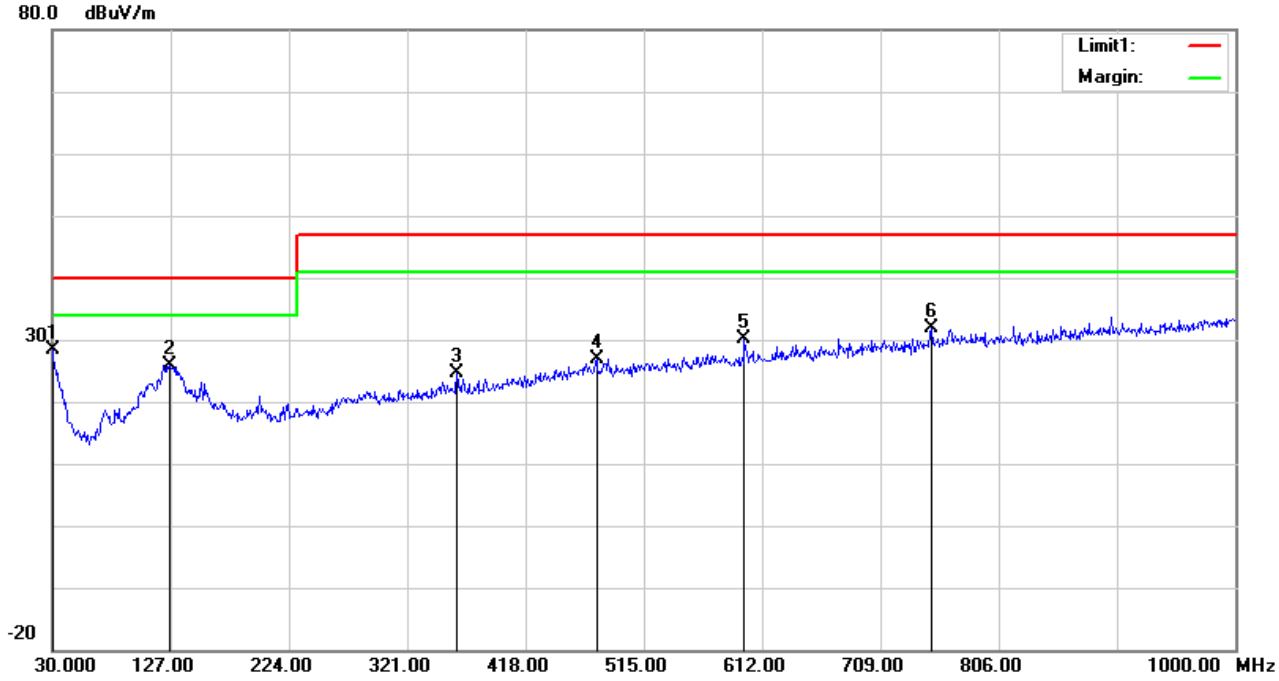
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	30.0000	26.15	peak	1.72	27.87	40.00	12.13
2	102.7500	35.96	peak	-8.10	27.86	40.00	12.14
3	125.0600	30.73	peak	-4.64	26.09	40.00	13.91
4	361.7400	27.58	peak	-2.80	24.78	47.00	22.22
5	597.4500	28.35	peak	0.93	29.28	47.00	17.72
6	750.7100	28.41	peak	3.66	32.07	47.00	14.93

Condition:	**EN 301 489 Class B**	**Polarization:**	**Vertical**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 230V/50Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**Operating**		
Note:	**POE**		



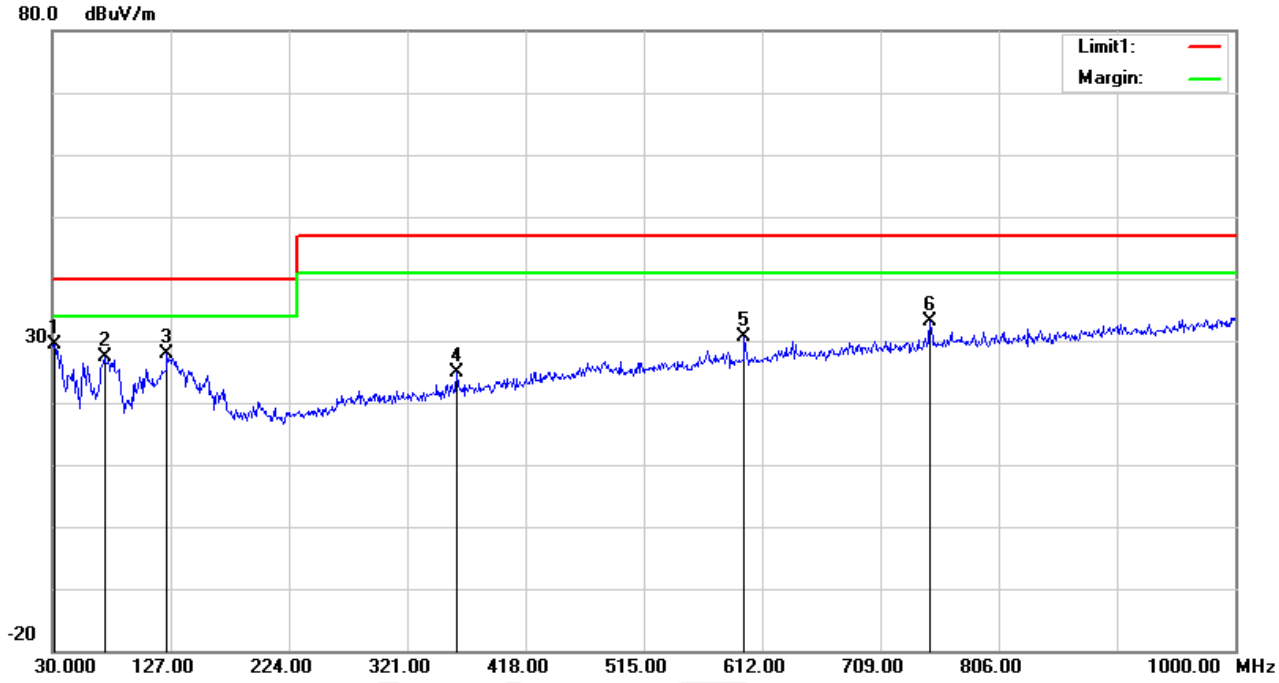
No.	Frequency (MHz)	Reading (dBµV)	Detector	Corrected (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	30.0000	30.51	peak	1.72	32.23	40.00	7.77
2	98.8700	38.42	peak	-9.20	29.22	40.00	10.78
3	122.1500	30.79	peak	-4.57	26.22	40.00	13.78
4	506.2700	27.29	peak	-0.28	27.01	47.00	19.99
5	598.4200	31.39	peak	0.97	32.36	47.00	14.64
6	921.4300	32.62	peak	0.39	33.01	47.00	13.99

Condition:	**EN 301 489 Class B**	**Polarization:**	**Horizontal**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 230V/50Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**Operating**		
Note:			



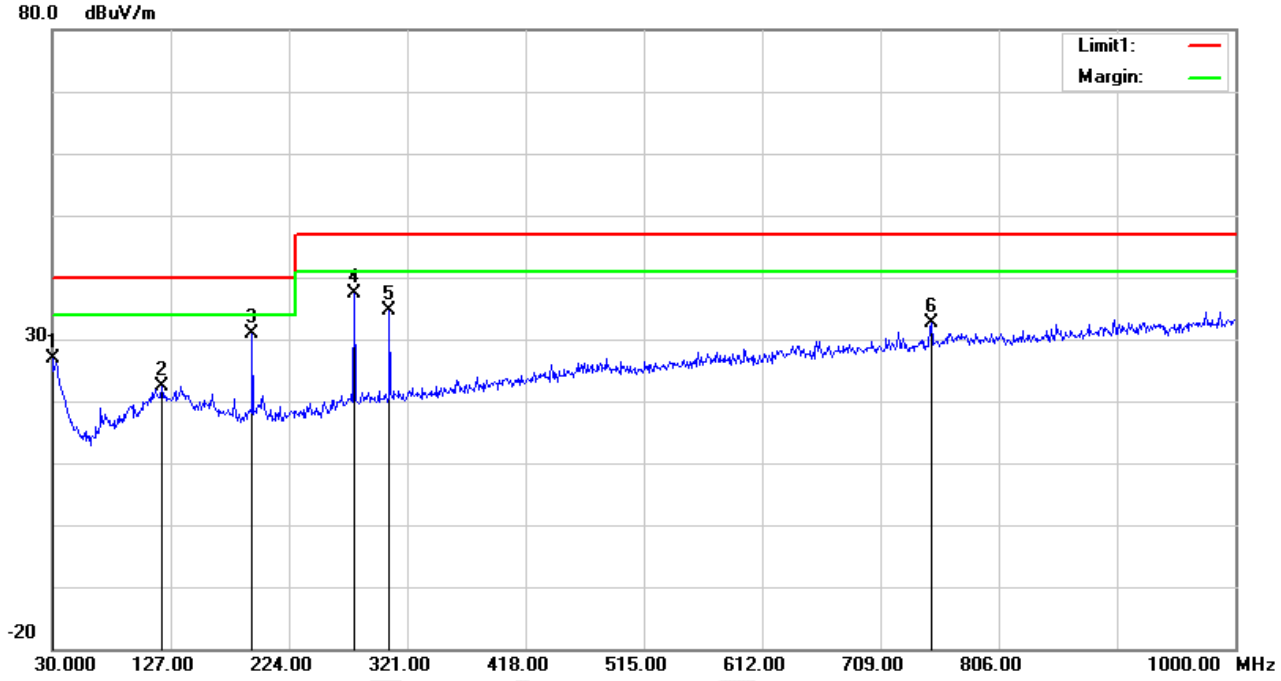
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	30.0000	26.55	peak	1.72	28.27	40.00	11.73
2	126.0300	30.68	peak	-4.69	25.99	40.00	14.01
3	361.7400	27.50	peak	-2.80	24.70	47.00	22.30
4	476.2000	27.23	peak	-0.36	26.87	47.00	20.13
5	597.4500	29.19	peak	0.93	30.12	47.00	16.88
6	750.7100	28.32	peak	3.66	31.98	47.00	15.02

Condition:	**EN 301 489 Class B**	**Polarization:**	**Vertical**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 230V/50Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**Operating**		
Note:			



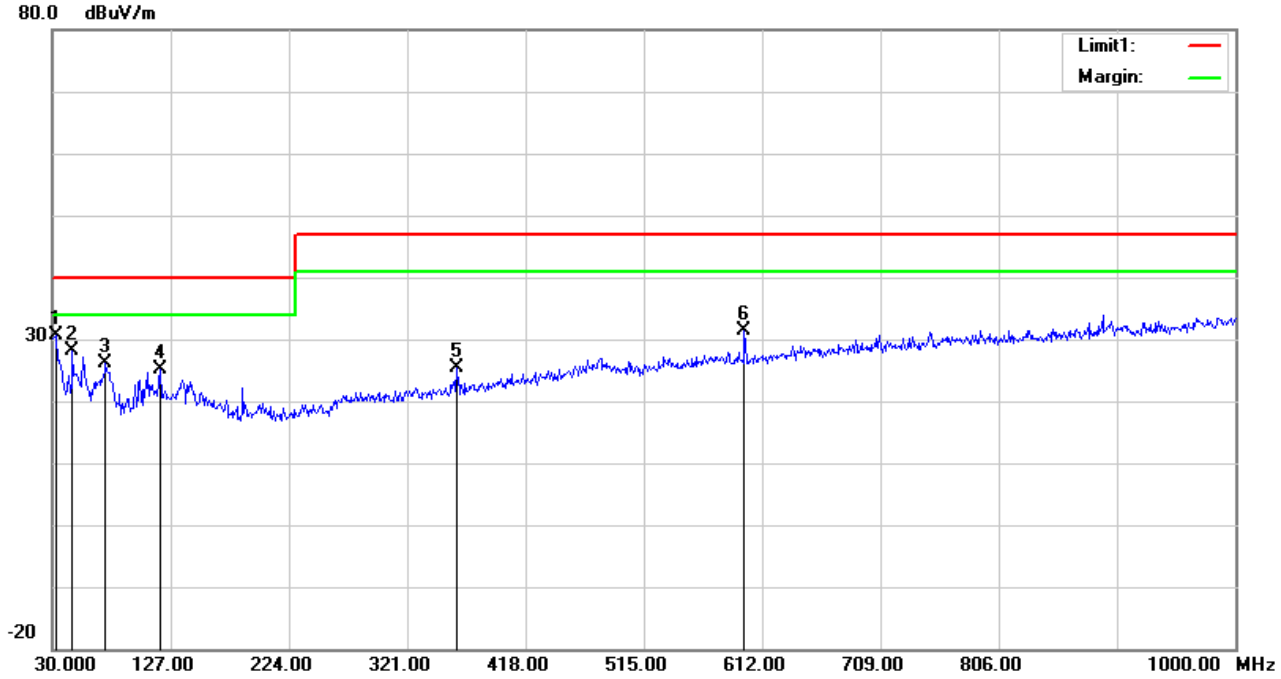
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	31.9400	29.25	peak	0.19	29.44	40.00	10.56
2	72.6800	38.48	peak	-11.04	27.44	40.00	12.56
3	124.0900	32.35	peak	-4.56	27.79	40.00	12.21
4	361.7400	27.63	peak	-2.80	24.83	47.00	22.17
5	597.4500	29.80	peak	0.93	30.73	47.00	16.27
6	749.7400	29.40	peak	3.62	33.02	47.00	13.98

Condition:	**EN 301 489 Class B**	**Polarization:**	**Horizontal**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 110V/60Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**Operating**		
Note:			



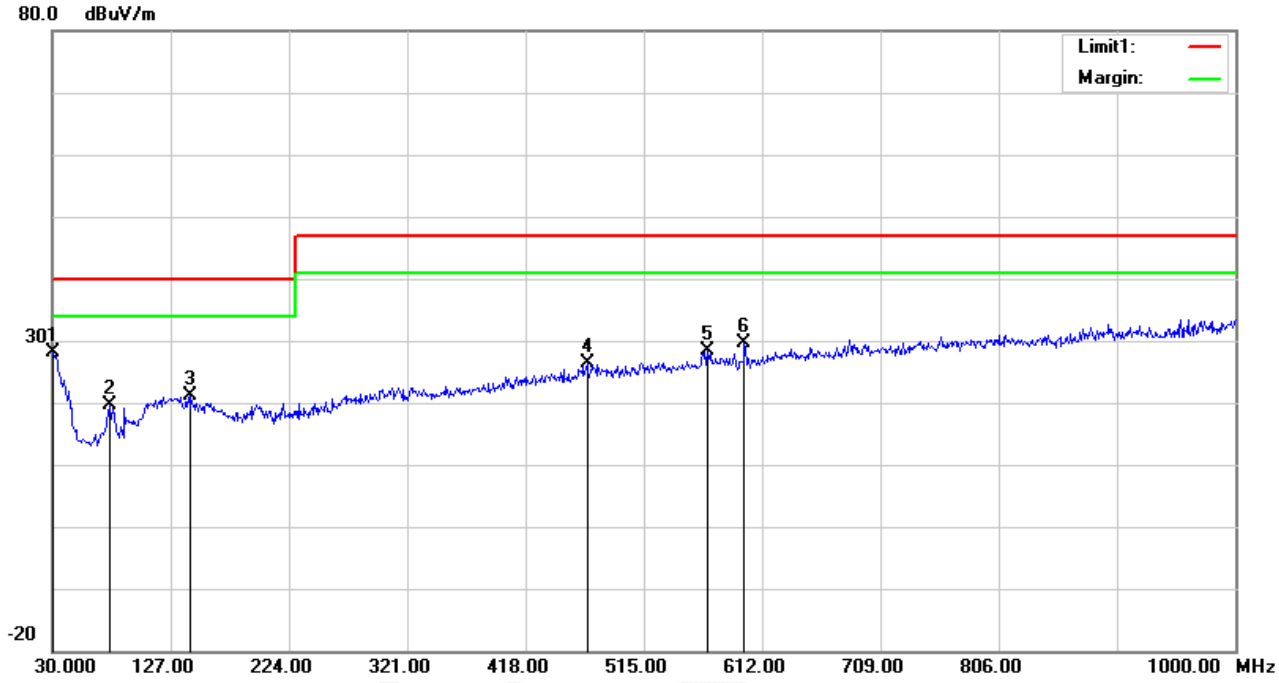
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	30.0000	25.08	peak	1.72	26.80	40.00	13.20
2	120.2100	27.22	peak	-4.83	22.39	40.00	17.61
3	193.9300	37.69	peak	-6.80	30.89	40.00	9.11
4	277.3500	41.60	peak	-4.12	37.48	47.00	9.52
5	306.4500	38.39	peak	-3.68	34.71	47.00	12.29
6	750.7100	28.90	peak	3.66	32.56	47.00	14.44

Condition:	**EN 301 489 Class B**	**Polarization:**	**Vertical**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 110V/60Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**Operating**		
Note:			



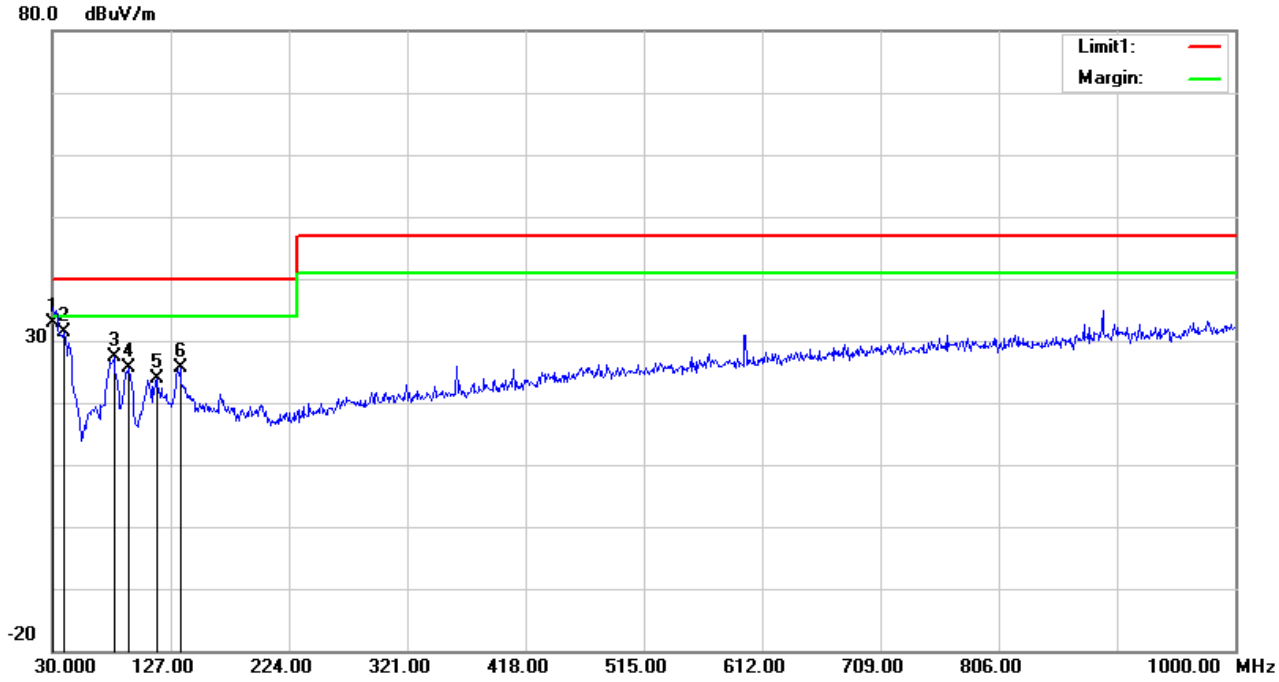
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	32.9100	31.20	peak	-0.56	30.64	40.00	9.36
2	46.4900	38.00	peak	-9.92	28.08	40.00	11.92
3	73.6500	37.04	peak	-11.02	26.02	40.00	13.98
4	118.2700	29.99	peak	-4.82	25.17	40.00	14.83
5	361.7400	28.09	peak	-2.80	25.29	47.00	21.71
6	597.4500	30.47	peak	0.93	31.40	47.00	15.60

Condition:	**EN 301 489 Class B**	**Polarization:**	**Horizontal**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 110V/60Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**Operating**		
Note:	**POE**		



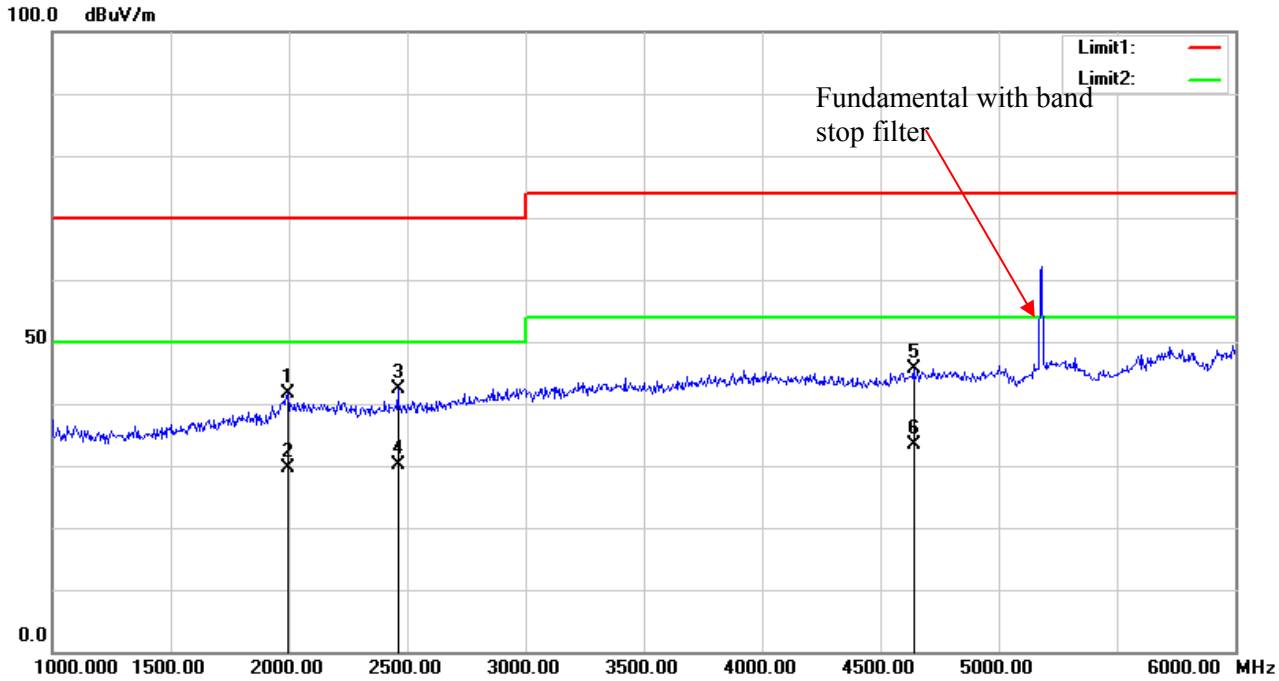
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	30.0000	26.52	peak	1.72	28.24	40.00	11.76
2	77.5300	30.80	peak	-11.10	19.70	40.00	20.30
3	143.4900	27.16	peak	-5.95	21.21	40.00	18.79
4	468.4400	26.92	peak	-0.45	26.47	47.00	20.53
5	567.3800	27.33	peak	0.95	28.28	47.00	18.72
6	597.4500	28.60	peak	0.93	29.53	47.00	17.47

Condition:	**EN 301 489 Class B**	**Polarization:**	**Vertical**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 110V/60Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**Operating**		
Note:	**POE**		



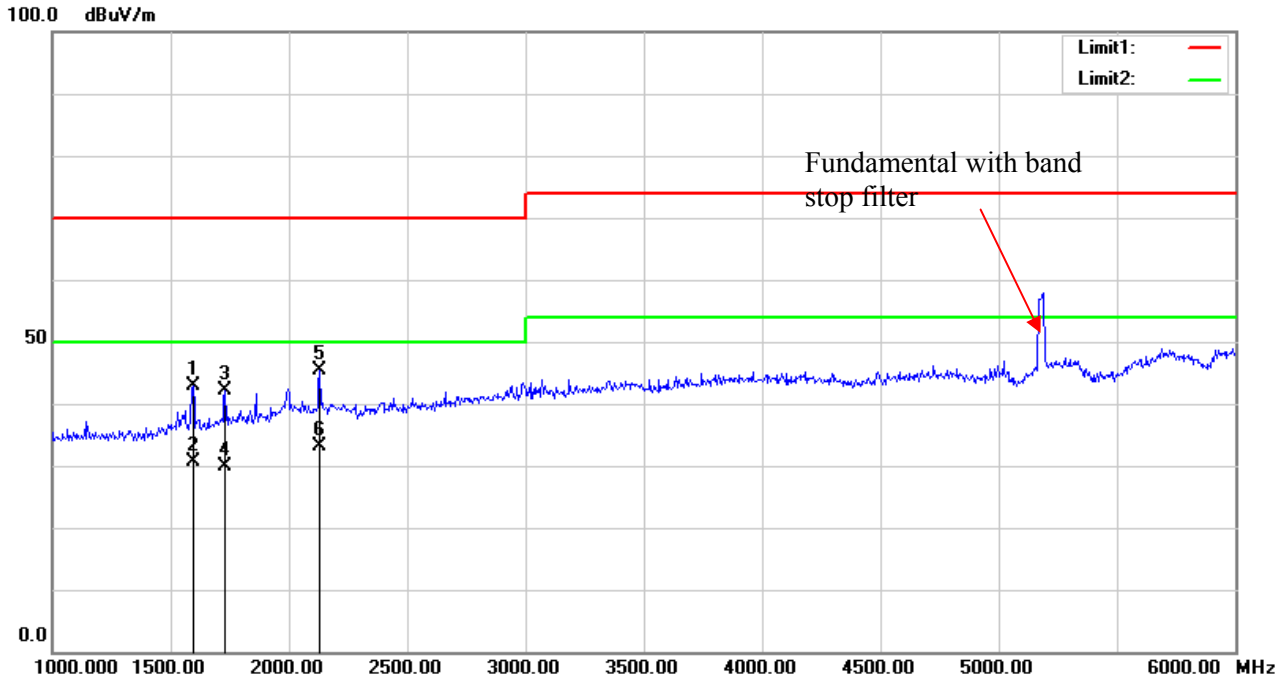
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	30.9700	32.02	QP	0.91	32.93	40.00	7.07
2	39.7000	37.08	peak	-5.66	31.42	40.00	8.58
3	80.4400	38.58	peak	-11.24	27.34	40.00	12.66
4	93.0500	36.38	peak	-10.73	25.65	40.00	14.35
5	115.3600	29.25	peak	-5.26	23.99	40.00	16.01
6	134.7600	30.75	peak	-5.11	25.64	40.00	14.36

Condition:	**EN 301 489 Class B**	**Polarization:**	**Horizontal**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 230V/50Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**Operating**		
Note:			



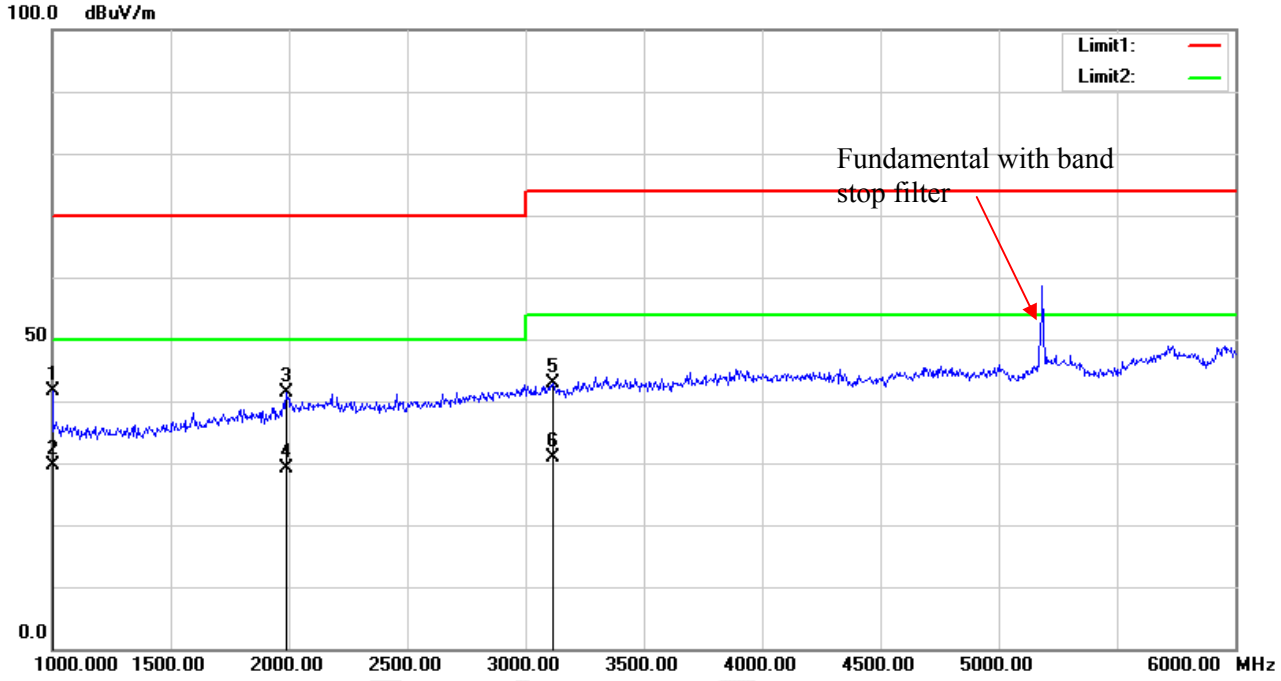
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	1995.000	38.00	peak	3.63	41.63	70.00	28.37
2	1995.000	25.88	AVG	3.63	29.51	50.00	20.49
3	2462.500	38.48	peak	3.79	42.27	70.00	27.73
4	2462.500	26.35	AVG	3.79	30.14	50.00	19.86
5	4640.000	35.66	peak	9.90	45.56	74.00	28.44
6	4640.000	23.49	AVG	9.90	33.39	54.00	20.61

Condition:	**EN 301 489 Class B**	**Polarization:**	**Vertical**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 230V/50Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**Operating**		
Note:			



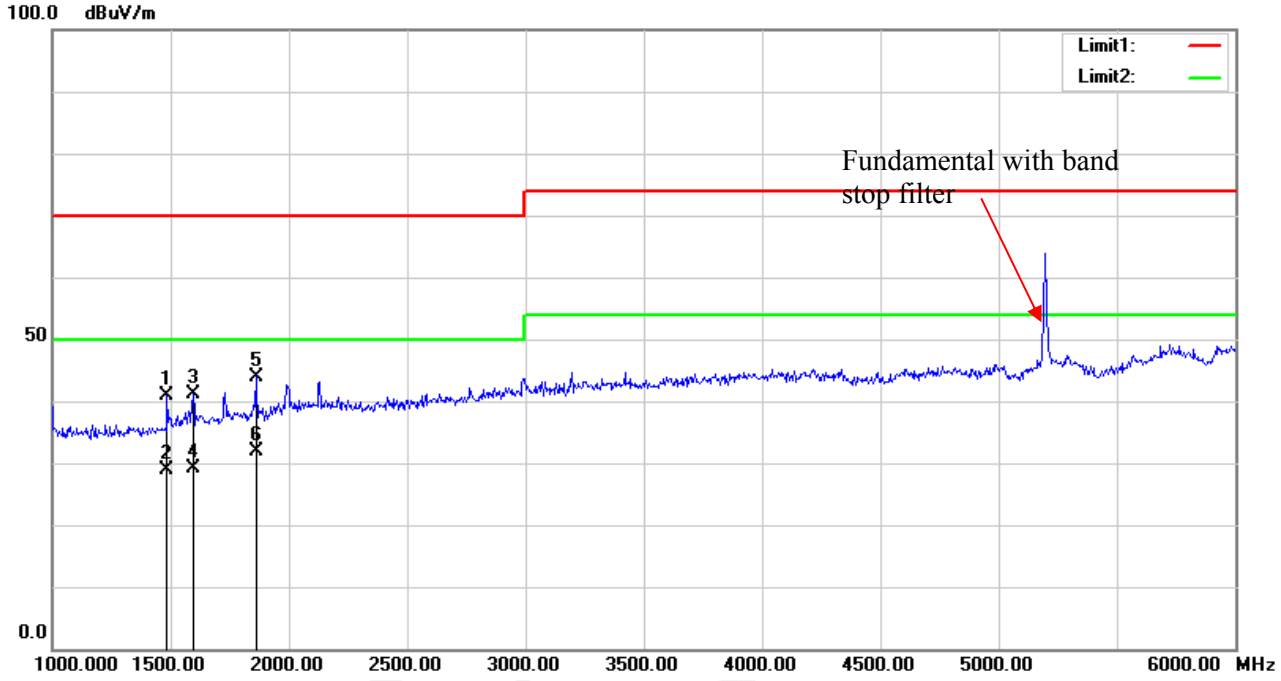
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	1595.000	41.39	peak	1.43	42.82	70.00	27.18
2	1595.000	29.19	AVG	1.43	30.62	50.00	19.38
3	1732.500	40.05	peak	2.02	42.07	70.00	27.93
4	1732.500	27.86	AVG	2.02	29.88	50.00	20.12
5	2130.000	41.47	peak	3.82	45.29	70.00	24.71
6	2130.000	29.31	AVG	3.82	33.13	50.00	16.87

Condition:	**EN 301 489 Class B**	**Polarization:**	**Horizontal**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 110V/60Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**Operating**		
Note:			



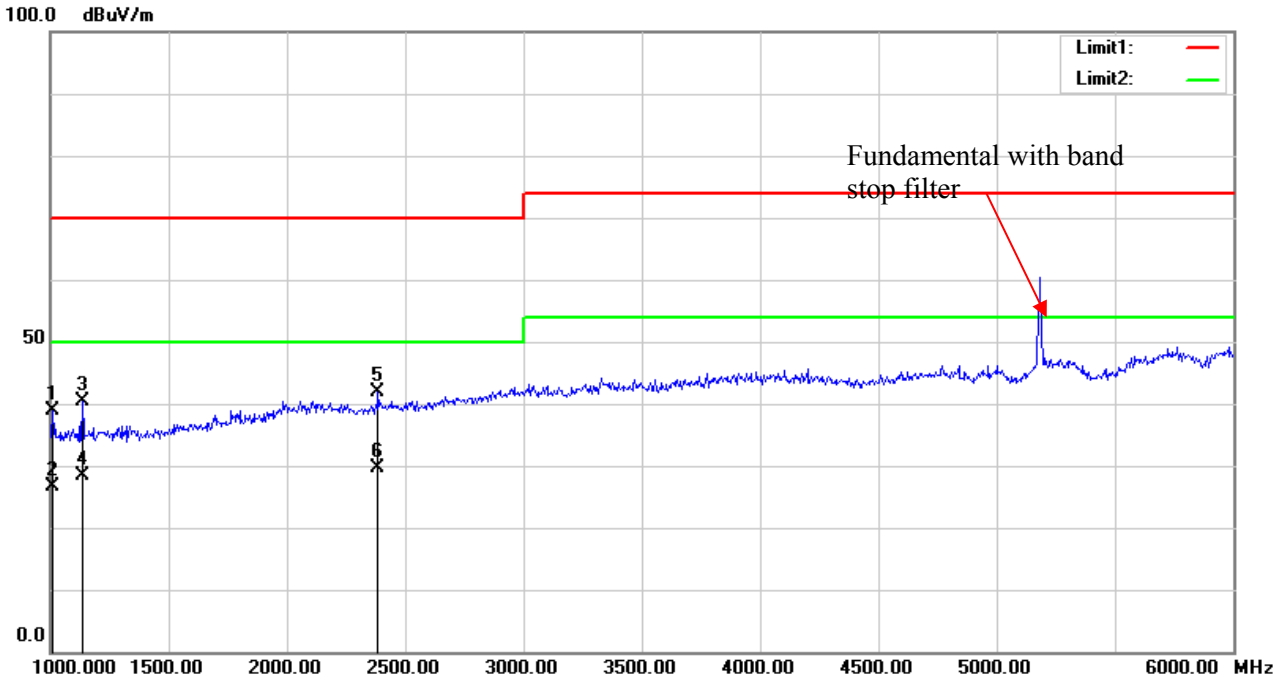
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	1000.0000	42.63	peak	-0.89	41.74	70.00	28.26
2	1000.0000	30.52	AVG	-0.89	29.63	50.00	20.37
3	1992.500	37.70	peak	3.59	41.29	70.00	28.71
4	1992.500	25.58	AVG	3.59	29.17	50.00	20.83
5	3117.500	36.17	peak	6.71	42.88	74.00	31.12
6	3117.500	24.05	AVG	6.71	30.76	54.00	23.24

Condition:	**EN 301 489 Class B**	**Polarization:**	**Vertical**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 110V/60Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**Operating**		
Note:			



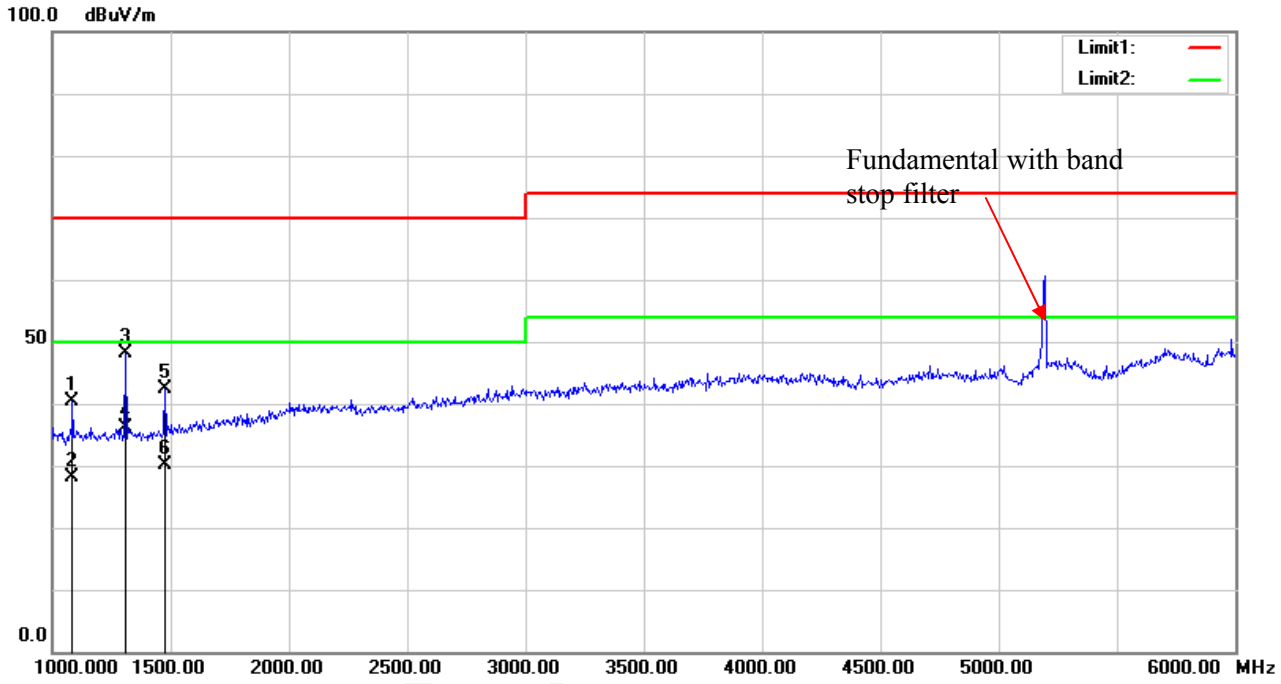
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	1487.500	39.80	peak	1.11	40.91	70.00	29.09
2	1487.500	27.72	AVG	1.11	28.83	50.00	21.17
3	1597.500	39.70	peak	1.43	41.13	70.00	28.87
4	1597.500	27.69	AVG	1.43	29.12	50.00	20.88
5	1862.500	41.66	peak	2.34	44.00	70.00	26.00
6	1862.500	29.54	AVG	2.34	31.88	50.00	18.12

Condition:	**EN 301 489 Class B**	**Polarization:**	**Horizontal**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 230V/50Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**POE Operating**		
Note:			



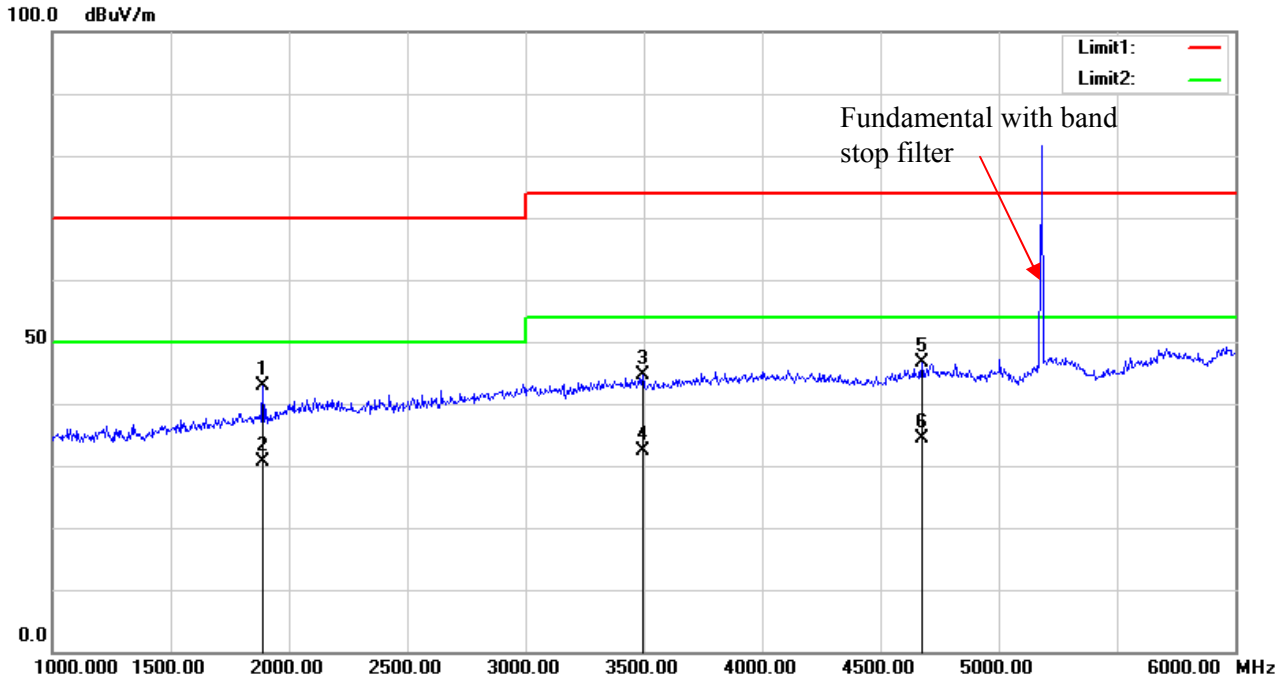
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	1012.500	39.73	peak	-0.86	38.87	70.00	31.13
2	1012.500	27.56	AVG	-0.86	26.70	50.00	23.30
3	1137.500	40.87	peak	-0.52	40.35	70.00	29.65
4	1137.500	28.79	AVG	-0.52	28.27	50.00	21.73
5	2387.500	38.22	peak	3.57	41.79	70.00	28.21
6	2387.500	26.13	AVG	3.57	29.70	50.00	20.30

Condition:	**EN 301 489 Class B**	**Polarization:**	**Vertical**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 230V/50Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**POE Operating**		
Note:			



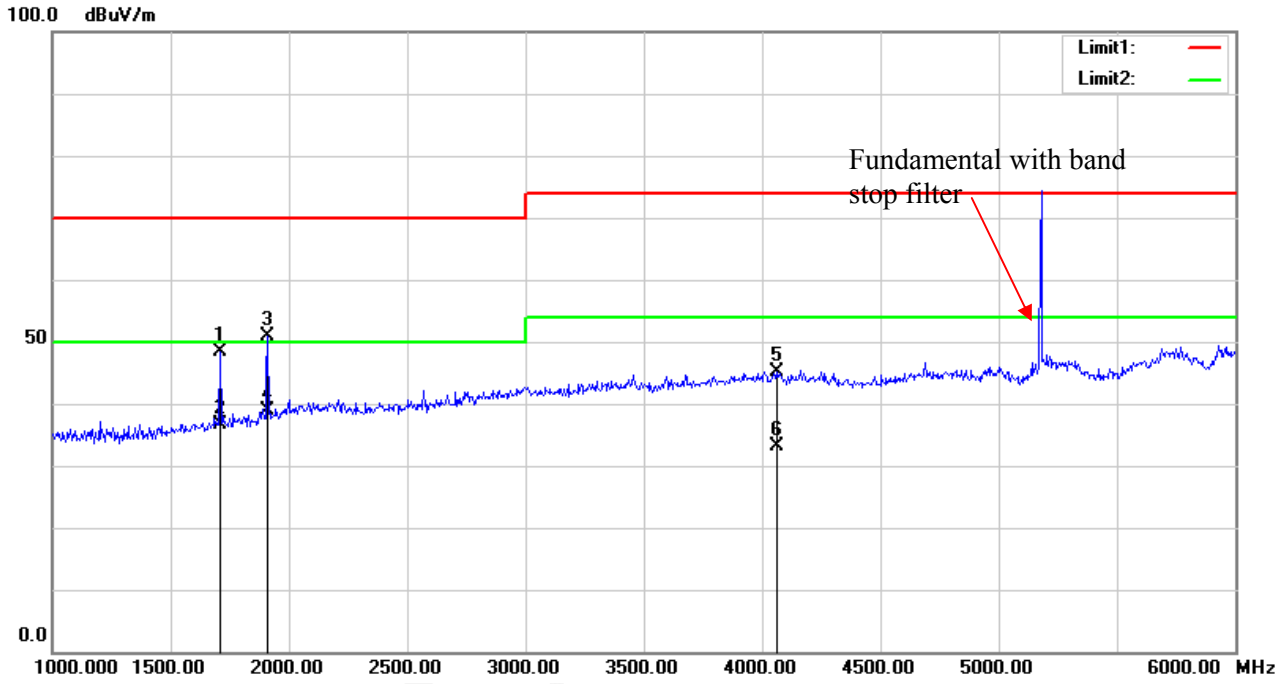
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	1087.500	40.92	peak	-0.66	40.26	70.00	29.74
2	1087.500	28.87	AVG	-0.66	28.21	50.00	21.79
3	1312.500	48.11	peak	-0.02	48.09	70.00	21.91
4	1312.500	36.09	AVG	-0.02	36.07	50.00	13.93
5	1475.000	41.29	peak	0.98	42.27	70.00	27.73
6	1475.000	29.16	AVG	0.98	30.14	50.00	19.86

Condition:	**EN 301 489 Class B**	**Polarization:**	**Horizontal**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 110V/60Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**POE Operating**		
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	1890.000	40.47	peak	2.34	42.81	70.00	27.19
2	1890.000	28.34	AVG	2.34	30.68	50.00	19.32
3	3497.500	36.75	peak	7.81	44.56	74.00	29.44
4	3497.500	24.66	AVG	7.81	32.47	54.00	21.53
5	4677.500	36.55	peak	9.97	46.52	74.00	27.48
6	4677.500	24.37	AVG	9.97	34.34	54.00	19.66

Condition:	**EN 301 489 Class B**	**Polarization:**	**Vertical**
EUT:	5GHz 11ac 867Mbps 12dBi Outdoor CPE	**Power:**	**AC 110V/60Hz**
Model:	**OS3**	**Distance:**	3m
Test Mode:	**POE Operating**		
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	1712.500	46.48	peak	1.91	48.39	70.00	21.61
2	1712.500	34.63	AVG	1.91	36.54	50.00	13.46
3	1910.000	48.50	peak	2.48	50.98	70.00	19.02
4	1910.000	36.45	AVG	2.48	38.93	50.00	11.07
5	4062.500	36.11	peak	9.08	45.19	74.00	28.81
6	4062.500	24.03	AVG	9.08	33.11	54.00	20.89

3 – AC MAINS POWER INPUT/OUTPUT PORTS

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

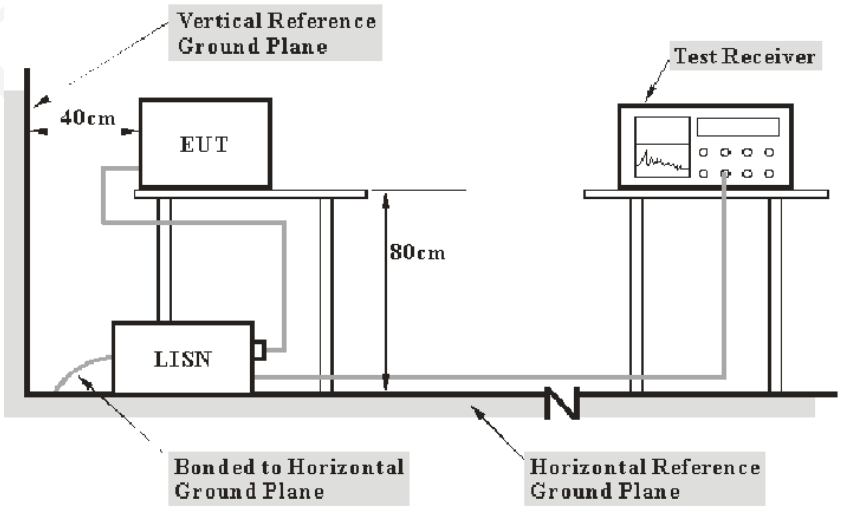
If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
–compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of Table 1, then:
–compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

Based on CISPR 16-4-2-2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.12 dB (150 kHz to 30 MHz), and conducted disturbance at telecommunication port using AAN is 5.0 dB (150 kHz to 30 MHz).

Table 1 – Values of U_{cispr}

Measurement	U_{cispr}
Conducted disturbance at mains port using AMN (9 kHz to 150 kHz)	3.8 dB
(150 kHz to 30 MHz)	3.4 dB
Conducted disturbance at mains port using voltage probe (9 kHz to 30 MHz)	2.9 dB
Conducted disturbance at telecommunication port using AAN (150 kHz to 30 MHz)	5.0 dB
Conducted disturbance at telecommunication port using CVP (150 kHz to 30 MHz)	3.9 dB
Conducted disturbance at telecommunication port using CP (150 kHz to 30 MHz)	2.9 dB

EUT Setup



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

The setup of EUT is according with per EN 301 489-1 measurement procedures. The specification used was with the EN 301 489-1 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to AC230V/50Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

If the QP/Average value complies with the limit more than 10dB, then they were not recorded.

Test Procedure

During the conducted emissions test, the adapter was connected to the main outlet of the first LISN and the other support equipments were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result (QuasiPeak or Average) = Meter Reading + Corr.

Note:
Corr. = Cable loss + Factor of coupling device

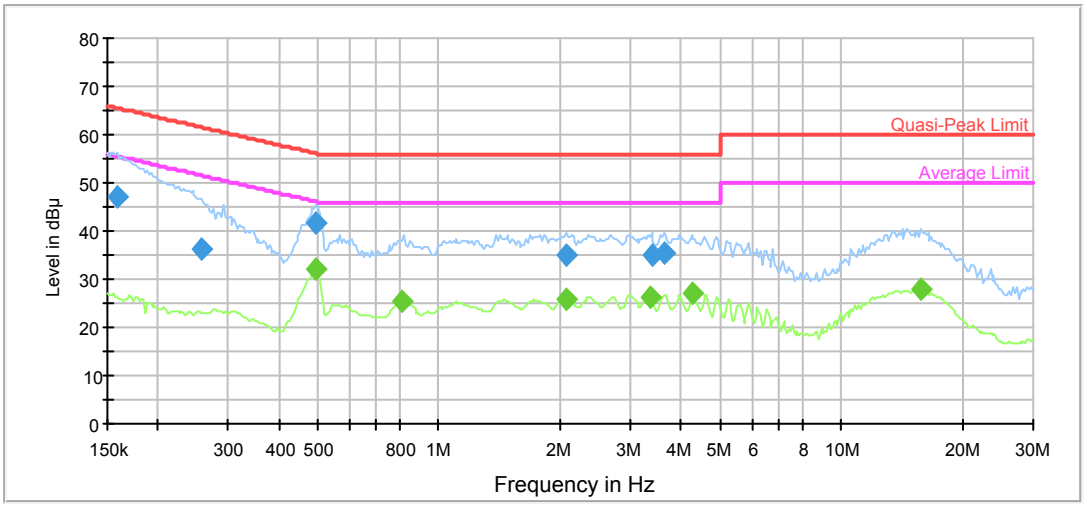
The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Result

Test Data

Please refer to following table and plots:

Port:	L
Test Mode:	Normal operating
Power Source:	AC 110V/60Hz
Note:	



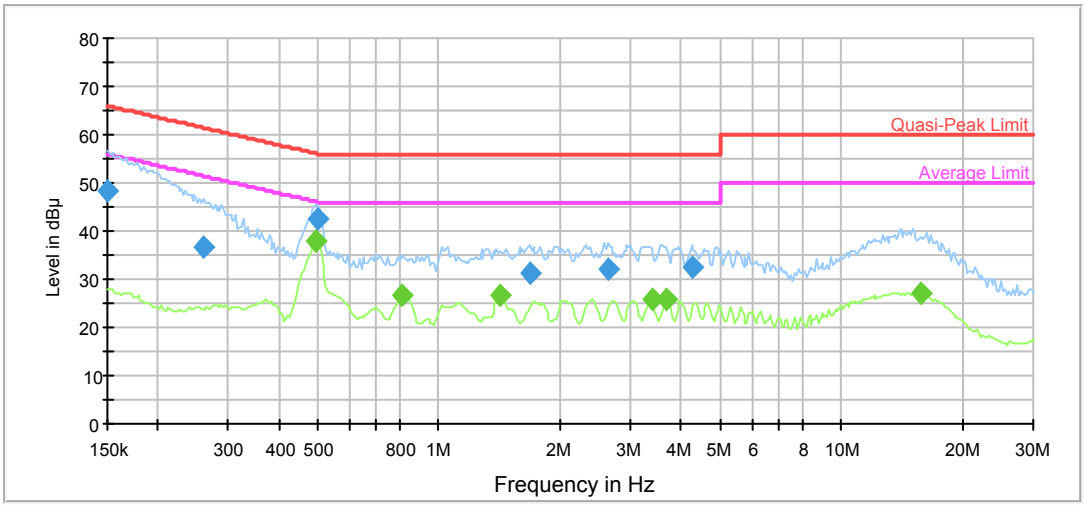
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.159228	47.0	9.000	L1	9.7	18.5	65.5
0.256712	36.1	9.000	L1	9.7	25.4	61.5
0.495058	41.5	9.000	L1	9.7	14.6	56.1
2.074599	35.0	9.000	L1	9.8	21.0	56.0
3.378170	35.0	9.000	L1	9.8	21.0	56.0
3.621856	35.5	9.000	L1	9.8	20.5	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.495058	32.0	9.000	L1	9.7	14.1	46.1
0.806127	25.4	9.000	L1	9.7	20.6	46.0
2.074599	25.9	9.000	L1	9.8	20.1	46.0
3.344723	26.4	9.000	L1	9.8	19.6	46.0
4.246911	26.9	9.000	L1	9.8	19.1	46.0
15.794085	28.0	9.000	L1	10.3	22.0	50.0

Port:	N
Test Mode:	Normal operating
Power Source:	AC 110V/60Hz
Note:	



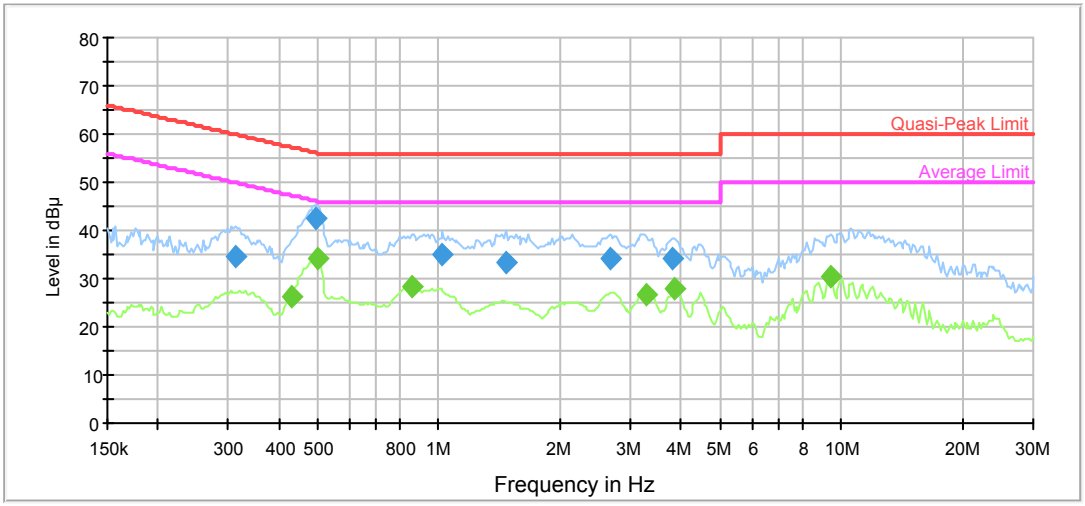
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	48.3	9.000	N	9.7	17.7	66.0
0.259279	36.7	9.000	N	9.7	24.8	61.5
0.500009	42.6	9.000	N	9.6	13.4	56.0
1.683392	31.2	9.000	N	9.6	24.8	56.0
2.634191	32.0	9.000	N	9.6	24.0	56.0
4.246911	32.7	9.000	N	9.7	23.3	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.495058	38.1	9.000	N	9.6	8.0	46.1
0.814189	26.6	9.000	N	9.6	19.4	46.0
1.421419	26.5	9.000	N	9.6	19.5	46.0
3.378170	25.9	9.000	N	9.6	20.1	46.0
3.658074	25.7	9.000	N	9.6	20.3	46.0
15.794085	27.1	9.000	N	10.0	22.9	50.0

Port:	L
Test Mode:	Normal operating
Power Source:	AC 230V/50Hz
Note:	



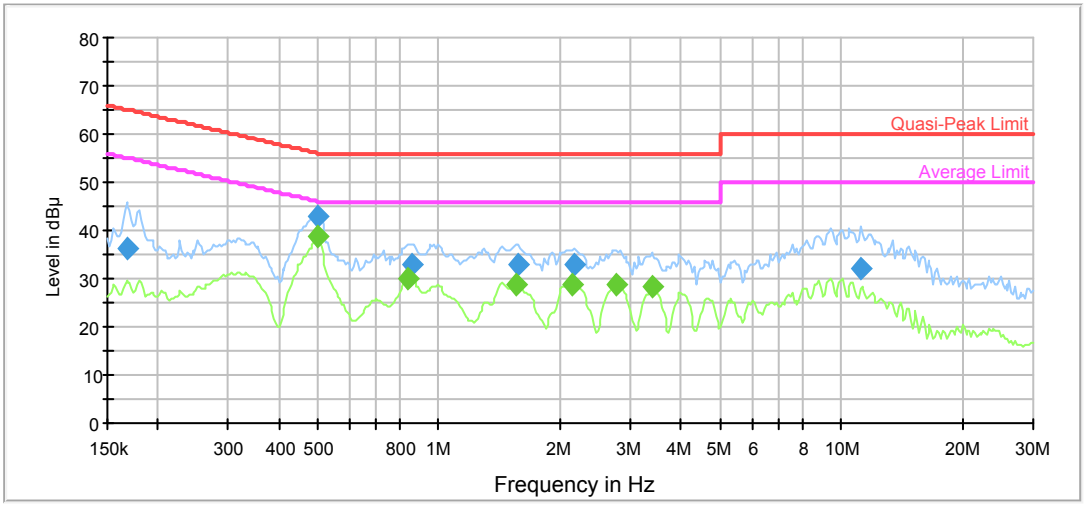
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.313237	34.7	9.000	L1	9.7	25.2	59.9
0.495058	42.6	9.000	L1	9.7	13.5	56.1
1.023568	35.1	9.000	L1	9.7	20.9	56.0
1.464489	33.5	9.000	L1	9.7	22.5	56.0
2.660533	34.2	9.000	L1	9.8	21.8	56.0
3.806607	34.4	9.000	L1	9.8	21.6	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.430682	26.2	9.000	L1	9.7	21.0	47.2
0.500009	34.3	9.000	L1	9.7	11.7	46.0
0.855721	28.1	9.000	L1	9.7	17.9	46.0
3.278819	26.5	9.000	L1	9.8	19.5	46.0
3.844673	27.8	9.000	L1	9.8	18.2	46.0
9.414192	30.2	9.000	L1	9.9	19.8	50.0

Port:	N
Test Mode:	Normal operating
Power Source:	AC 230V/50Hz
Note:	



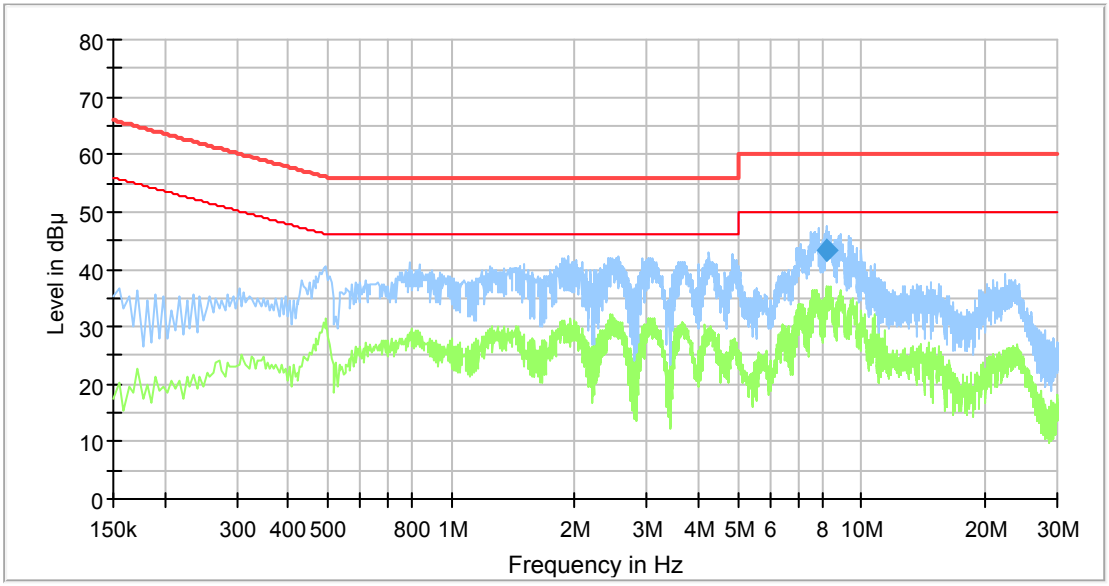
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.167350	36.3	9.000	N	9.7	28.8	65.1
0.500009	42.8	9.000	N	9.6	13.2	56.0
0.855721	33.1	9.000	N	9.6	22.9	56.0
1.570131	33.0	9.000	N	9.6	23.0	56.0
2.180425	33.0	9.000	N	9.6	23.0	56.0
11.149269	32.2	9.000	N	9.8	27.8	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.500009	38.8	9.000	N	9.6	7.2	46.0
0.838859	30.0	9.000	N	9.6	16.0	46.0
1.554585	28.7	9.000	N	9.6	17.3	46.0
2.137462	28.6	9.000	N	9.6	17.4	46.0
2.768561	28.7	9.000	N	9.6	17.3	46.0
3.378170	28.3	9.000	N	9.6	17.7	46.0

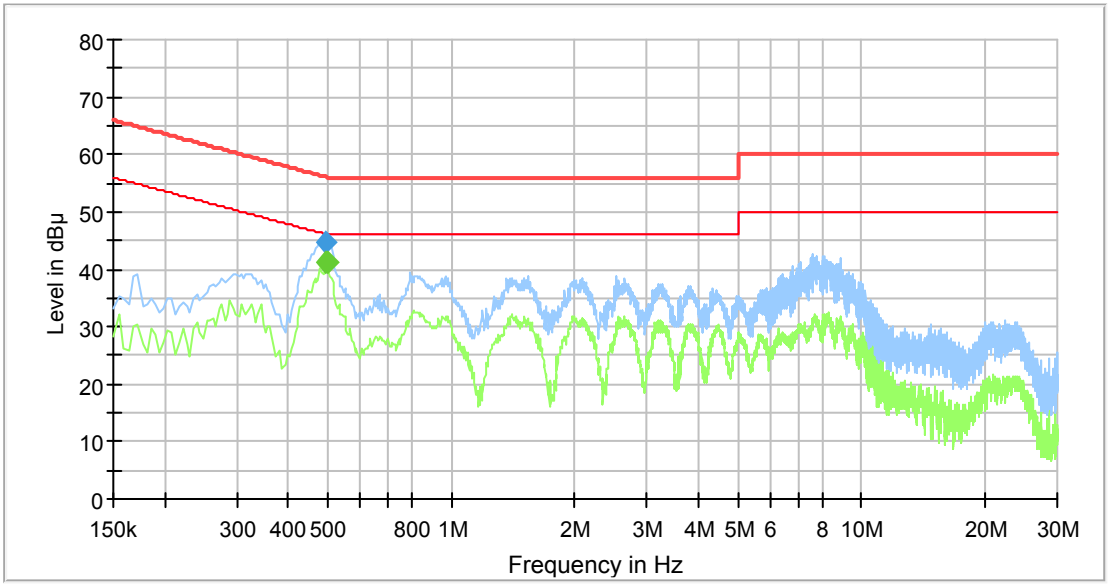
Port:	L
Test Mode:	Normal operating
Power Source:	AC 230V/50Hz
Note:	POE



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter
8.250660	43.48	---	60.00	16.52	9.000	L1	ON

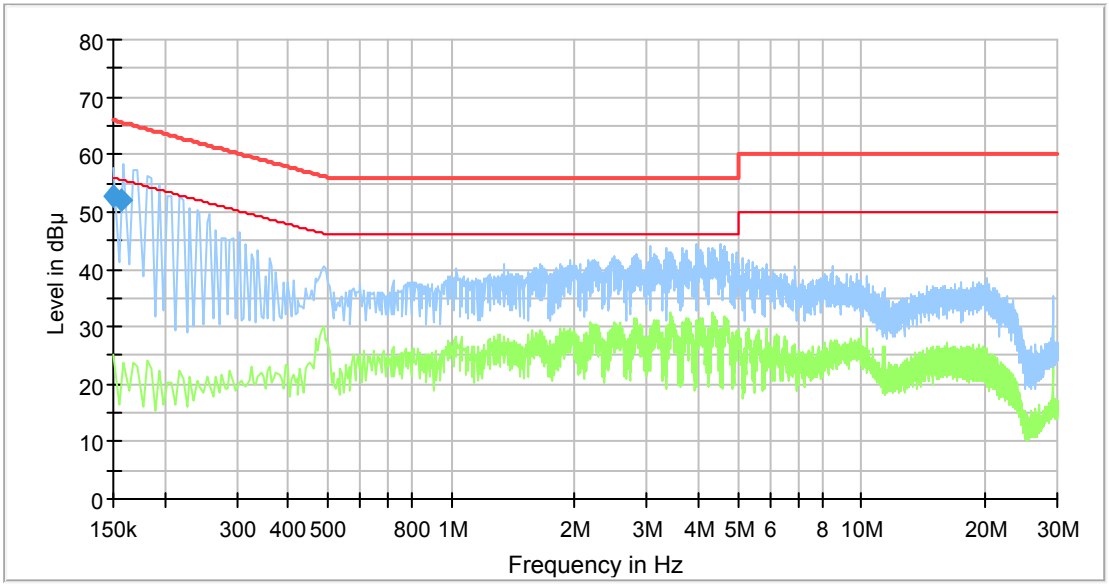
Port:	N
Test Mode:	Normal operating
Power Source:	AC 230V/50Hz
Note:	POE



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter
0.493052	44.81	---	56.12	11.31	9.000	N	ON
0.495228	---	41.07	46.08	5.01	9.000	N	ON
0.498230	---	41.36	46.03	4.67	9.000	N	ON

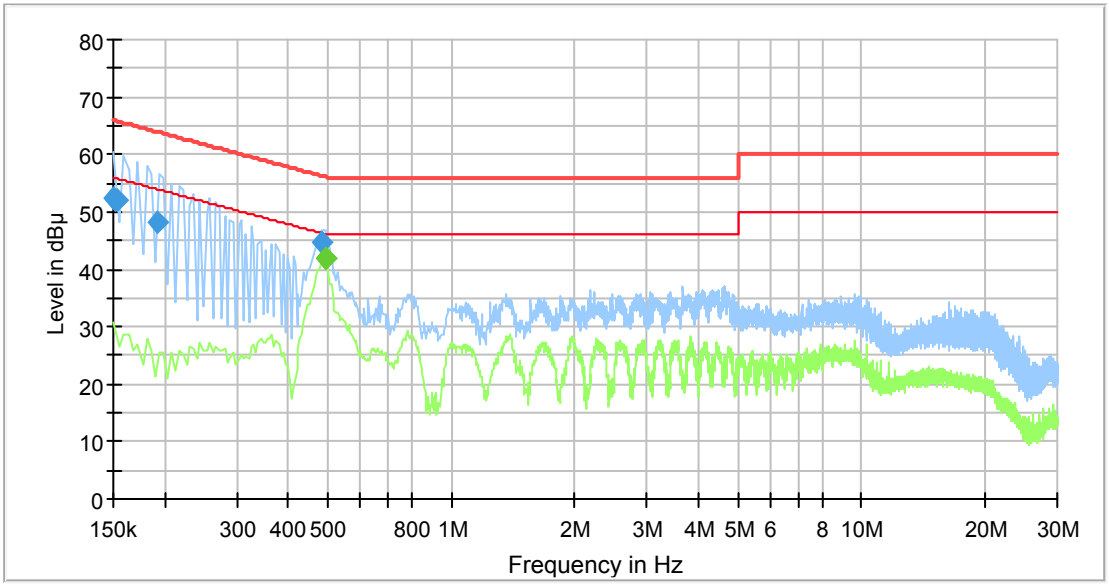
Port:	L
Test Mode:	Normal operating
Power Source:	AC 110V/60Hz
Note:	POE



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter
0.150750	52.63	---	65.96	13.33	9.000	L1	ON
0.156887	51.93	---	65.63	13.70	9.000	L1	ON

Port:	L
Test Mode:	Normal operating
Power Source:	AC 110V/60Hz
Note:	POE

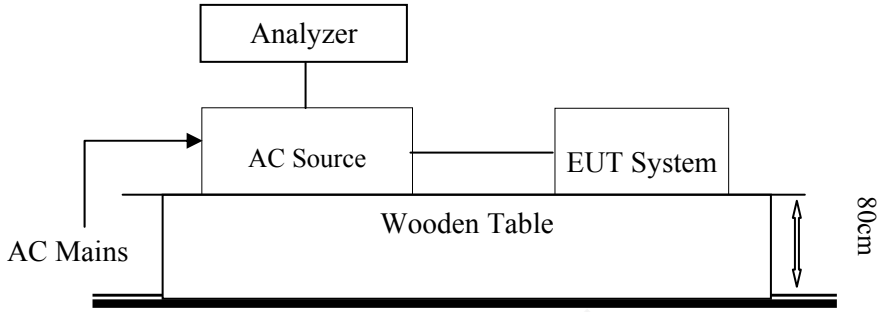


Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter
0.150750	52.27	---	65.96	13.69	9.000	L1	ON
0.152261	51.93	---	65.88	13.95	9.000	L1	ON
0.153023	52.07	---	65.83	13.76	9.000	L1	ON
0.191452	48.17	---	63.97	15.80	9.000	L1	ON
0.482987	44.81	---	56.29	11.48	9.000	L1	ON
0.492647	---	41.99	46.12	4.13	9.000	L1	ON
0.492912	---	42.09	46.12	4.03	9.000	L1	ON

5 - VOLTAGE FLUCTUATIONS AND FLICKER (AC MAINS INPUT PORT)

Test System Setup



Test Standard

EN 61000-3-3:2013

Flicker Test Limits：

The limits shall be applicable to voltage fluctuations and flicker at the supply terminals of the equipment under test, measured or calculated according to clause 4 under test conditions described in clause 6 and annex A. Tests made to prove compliance with the limits are considered to be type tests.
The following limits apply:
– the value of Pst shall not be greater than 1,0;
– the value of Plt shall not be greater than 0,65;
– the value of d(t) during a voltage change shall not exceed 3,3 % for more than 500 ms;
– the relative steady-state voltage change, dc, shall not exceed 3,3 %;
– the maximum relative voltage change dmax, shall not exceed
a) 4 % without additional conditions;
b) 6 % for equipment which is:
– switched manually, or
– switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.
Note: The cycling frequency will be further limited by the Pst and Plt limit. For example: a dmax of 6 % producing a rectangular voltage change characteristic twice per hour will give a Plt of about 0,65.
c) 7 % for equipment which is
– attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
– switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

In the case of equipment having several separately controlled circuits in accordance with 6.6, limits b) and c) shall apply only if there is delayed or manual restart after a power supply interruption; for all equipment with automatic switching which is energized immediately on restoration of supply after a power supply interruption, limits a) shall apply; for all equipment with manual switching, limits b) or c) shall apply depending on the rate of switching. Pst and Plt requirements shall not be applied to voltage changes caused by manual switching. The limits shall not be applied to voltage changes associated with emergency switching or emergency interruptions.

Test Data

Please refer to following tables:

Short time (Pst):	10 min
Observation time:	120 min(12 Flicker measurement)
Test Mode:	Normal operating
Power Source:	AC 230V/50Hz
Test Result	PASS

Maximum Flicker results-Adapter

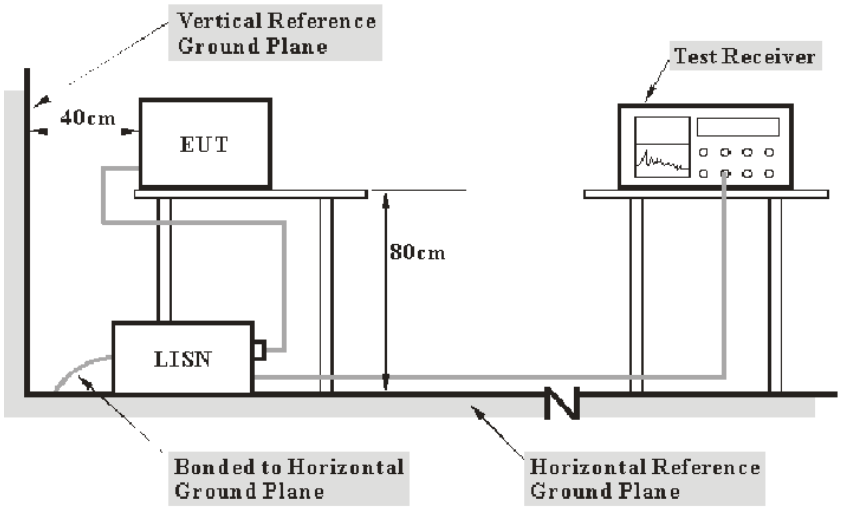
	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.146	3.30	PASS
dmax [%]	0.349	4.00	PASS
dt [s]	0.000	0.50	PASS

Maximum Flicker results-POE

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.152	3.30	PASS
dmax [%]	0.378	4.00	PASS
dt [s]	0.000	0.50	PASS

6 - WIRED NETWORK PORTS

EUT Setup



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

The setup of EUT is according with per EN 301 489-1 measurement procedures. The specification used was with the EN 301 489-1 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to AC230V/50Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emissions test, the adapter was connected to the main outlet of the first LISN and the other support equipments were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result (QuasiPeak or Average) = Meter Reading + Corr.

Note:
Corr. = Cable loss + Factor of coupling device

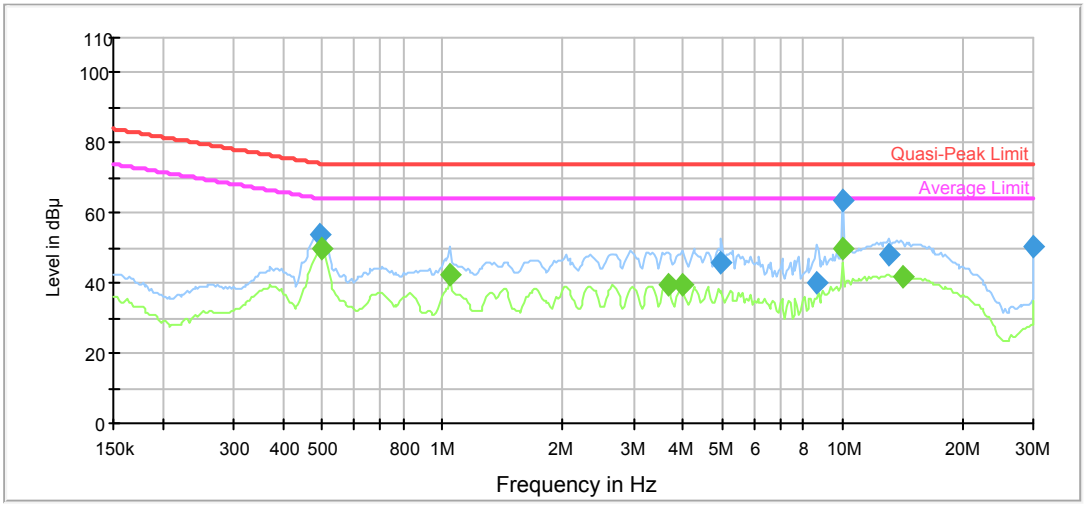
The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Result

Test Data

Please refer to following table and plots:

Port:	RJ45 Port
Test Mode:	ISN 10Mbps
Power Source:	AC 110V/60Hz
Note:	



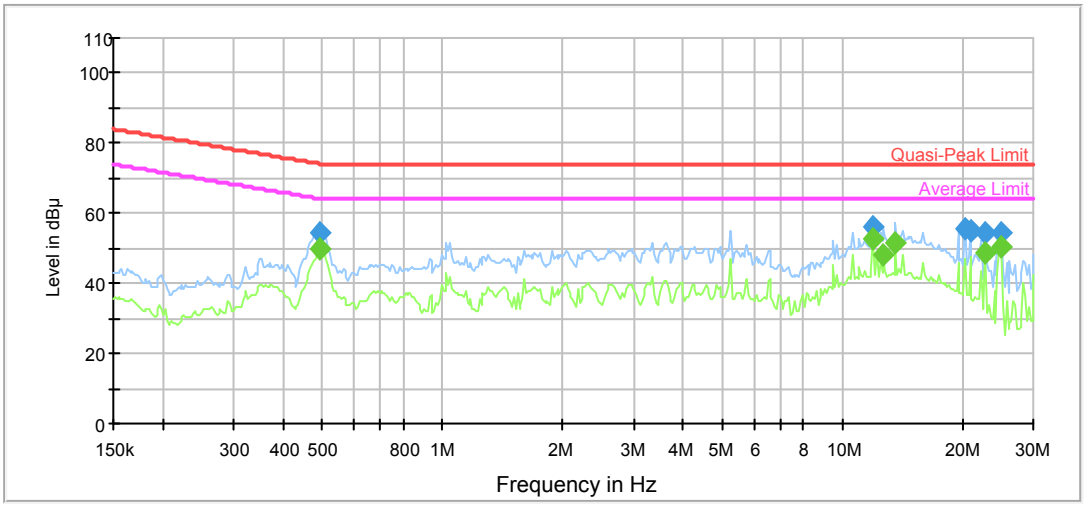
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.495058	54.1	9.000	9.9	20.0	74.1	
4.979834	46.1	9.000	9.5	27.9	74.0	
8.607765	40.0	9.000	9.5	34.0	74.0	
9.993348	63.4	9.000	9.5	10.6	74.0	
13.073386	48.4	9.000	9.5	25.6	74.0	
30.000000	50.5	9.000	9.6	23.5	74.0	

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.500009	50.0	9.000	9.9	14.0	64.0	
1.044141	42.7	9.000	9.7	21.3	64.0	
3.658072	39.6	9.000	9.5	24.4	64.0	
3.961168	39.6	9.000	9.5	24.4	64.0	
9.993348	49.6	9.000	9.5	14.4	64.0	
14.156604	42.1	9.000	9.5	21.9	64.0	

Port:	RJ45 Port
Test Mode:	ISN 100Mbps
Power Source:	AC 110V/60Hz
Note:	



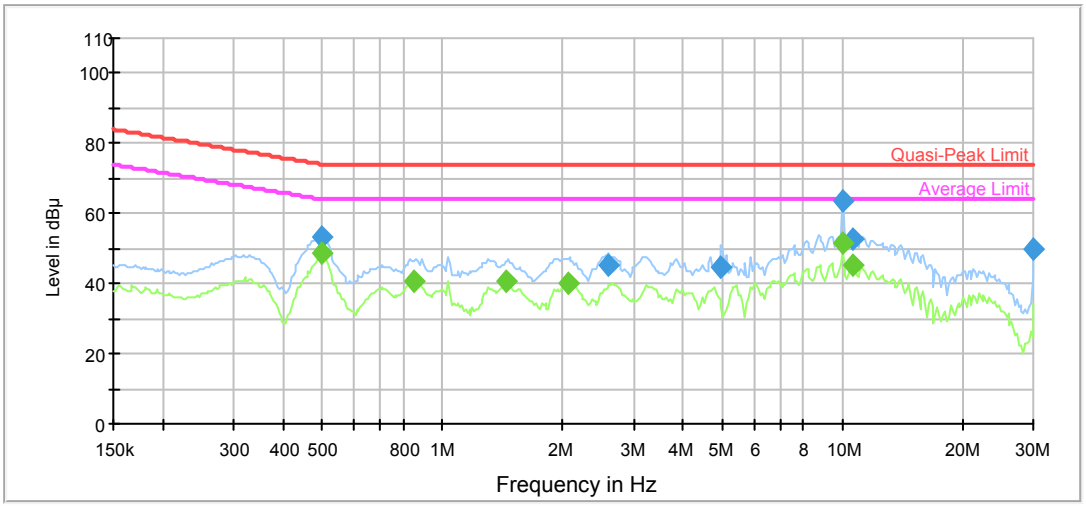
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.495058	54.5	9.000	9.9	19.6	74.1	
11.953518	56.1	9.000	9.5	17.9	74.0	
20.254827	55.6	9.000	9.5	18.4	74.0	
20.868568	54.8	9.000	9.5	19.2	74.0	
22.823646	54.3	9.000	9.5	19.7	74.0	
24.961885	54.4	9.000	9.5	19.6	74.0	

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.495058	50.1	9.000	9.9	14.0	64.1	
11.953518	52.6	9.000	9.5	11.4	64.0	
12.688900	48.1	9.000	9.5	15.9	64.0	
13.604218	51.3	9.000	9.5	12.7	64.0	
22.823646	48.6	9.000	9.5	15.4	64.0	
24.961885	50.6	9.000	9.5	13.4	64.0	

Port: RJ45 Port
Test Mode: ISN 10Mbps
Power Source: AC 230V/50Hz
Note:



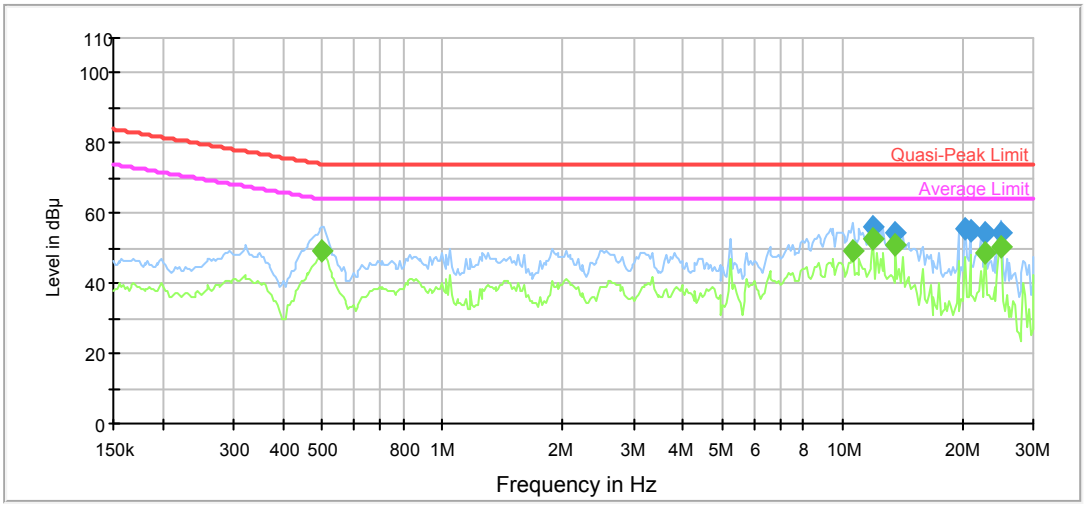
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.500009	53.5	9.000	9.9	20.5	74.0	
2.608108	45.0	9.000	9.6	29.0	74.0	
4.979834	44.7	9.000	9.5	29.3	74.0	
9.993348	63.3	9.000	9.5	10.7	74.0	
10.608140	52.8	9.000	9.5	21.2	74.0	
30.000000	49.8	9.000	9.6	24.2	74.0	

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.500009	48.8	9.000	9.9	15.2	64.0	
0.847248	40.9	9.000	9.8	23.1	64.0	
1.435632	40.8	9.000	9.6	23.2	64.0	
2.054057	40.0	9.000	9.6	24.0	64.0	
9.993348	51.4	9.000	9.5	12.6	64.0	
10.608140	45.0	9.000	9.5	19.0	64.0	

Port:	RJ45 Port
Test Mode:	ISN 100Mbps
Power Source:	AC 230V/50Hz
Note:	



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
11.953518	56.0	9.000	9.5	18.0	74.0	
13.604218	54.3	9.000	9.5	19.7	74.0	
20.254827	55.3	9.000	9.5	18.7	74.0	
20.868568	54.8	9.000	9.5	19.2	74.0	
22.823646	54.3	9.000	9.5	19.7	74.0	
24.961885	54.7	9.000	9.5	19.3	74.0	

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.500009	49.0	9.000	9.9	15.0	64.0	
10.608140	49.2	9.000	9.5	14.8	64.0	
11.953518	52.6	9.000	9.5	11.4	64.0	
13.604218	51.0	9.000	9.5	13.0	64.0	
22.823646	48.8	9.000	9.5	15.2	64.0	
24.961885	50.3	9.000	9.5	13.7	64.0	

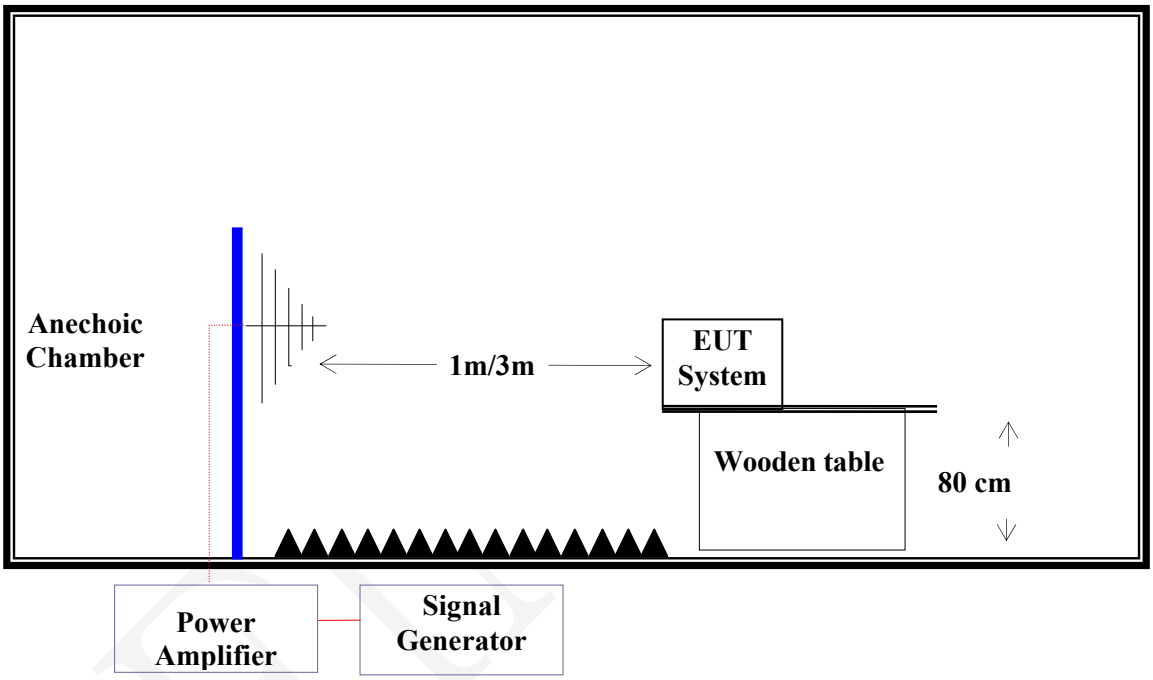
7 – RADIO FREQUENCY ELECTROMAGNETIC FIELDS (80 MHZ TO 6 000 MHZ) (IEC 61000-4-3)

Measurement Uncertainty

U_{lab} (measurement uncertainty of lab) and U_{EN} (measurement uncertainty of EN 61000-4-3) please refer to the following:

Parameter	U_{EN}	U_{lab}
Calibration process	1.88 dB	1.88 dB
Level setting	2.19 dB	2.19 dB

Test System Setup



Test Level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X.	Special

Performance Criterion: A

Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above the ground. The EUT is set 3 meters (Below 1GHz) or 1 meters (Above 1GHz) away from the antenna which is mounted on an antenna tower. Both horizontal and vertical polarizations of the antenna are set on test. Each of the four sides of EUT must be faced the antenna and measured individually.
In order to judge the EUT performance, a CCD camera was used to monitor the EUT.

Test Data

Please refer to following table and plots:

Test Mode: Operating
Note: Adapter; POE

Condition of Test	Remarks
Field Strength	3 V/m (Test Level 2)
RF Signal	1 kHz, 80% AM, sine wave
Sweep Frequency Step	1%, logarithmic
Dwell Time	1 Sec

Frequency Range (MHz)	Front Side		Rear Side		Left Side		Right Side	
	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	A	A	A	A	A	A	A	A
1000-6000	A	A	A	A	A	A	A	A

Performance criteria "A"

The EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained.

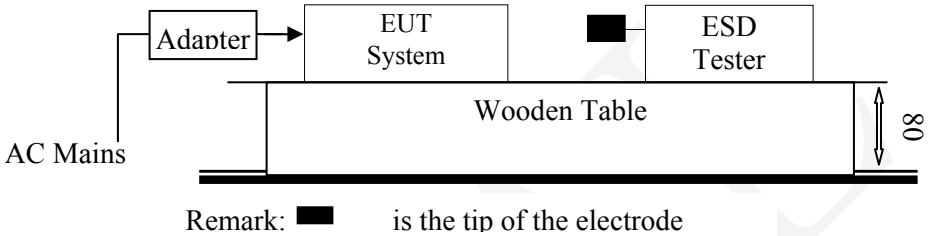
8 - ELECTROSTATIC DISCHARGES (IEC 61000-4-2)

Measurement Uncertainty

U_{lab} (measurement uncertainty of lab) and U_{EN} (measurement uncertainty of EN 61000-4-2) please refer to the following:

Parameter	U_{EN}	U_{lab}
Rise time t_r	≤15%	15%
Peak current I_p	≤7%	6.30%
Current at 30 ns	≤7%	6.30%
Current at 60 ns	≤7%	6.30%

Test System Setup



Remark: ■ is the tip of the electrode

EN 61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.6 by 0.8-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by *0.5-millimeter* thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

Test 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

Test Level 3 for Air Discharge at ±8 kV
Test Level 2 for Direct Discharge at ±4 kV

Performance criterion: B

Test Procedure

Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Contact Discharge:

All the procedure shall be same as Section 8.3.1 of EN 61000-4-2, except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

Indirect discharge for horizontal coupling plane

At least 50 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

Indirect discharge for vertical coupling plane

At least 50 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

Test Data

Please refer to following tables:

Test Mode: Operating
Note: Adapter; POE

Table 1: Electrostatic Discharge Immunity (Air Discharge)

Test Points Location	Test Level							
	-2 kV	+2 kV	-4 kV	+4 kV	-8 kV	+8 kV	-15 kV	+15 kV
Plastic Shell	A	A	A	A	A	A	/	/
DC Port	A	A	A	A	A	A	/	/
RJ45 Port	A	A	A	A	A	A	/	/
Button	A	A	A	A	A	A	/	/
Seam	A	A	A	A	A	A	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

Test Points Location	Test Level							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
/	/	/	/	/	/	/	/	/

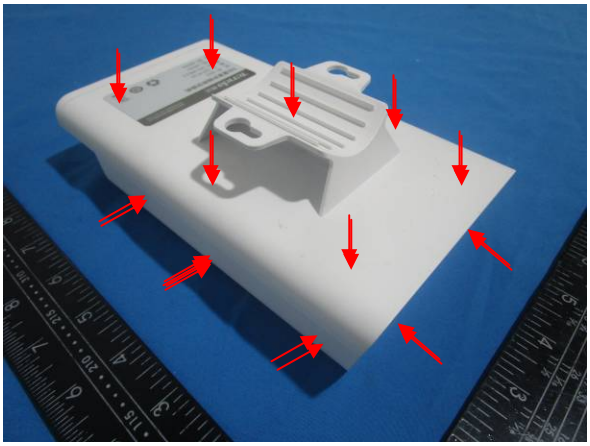
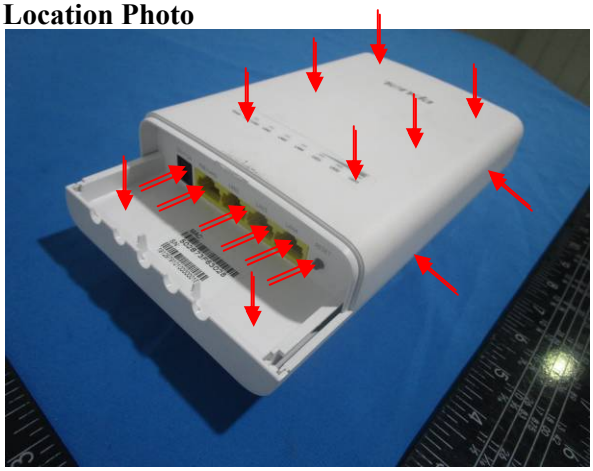
Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

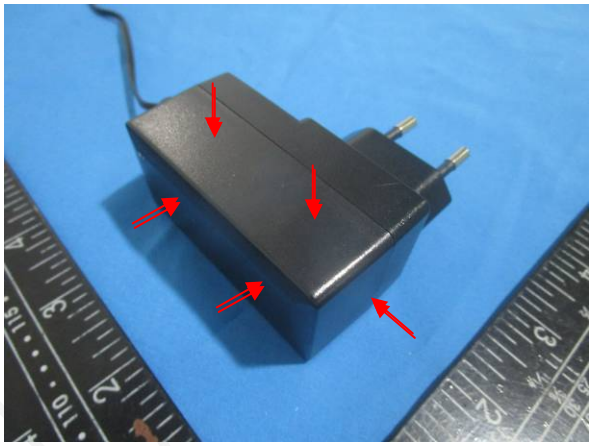
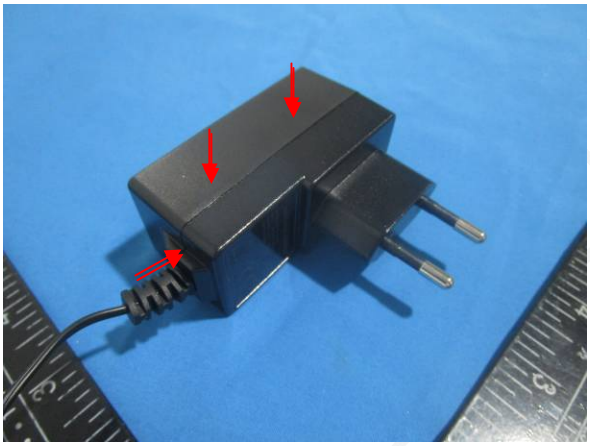
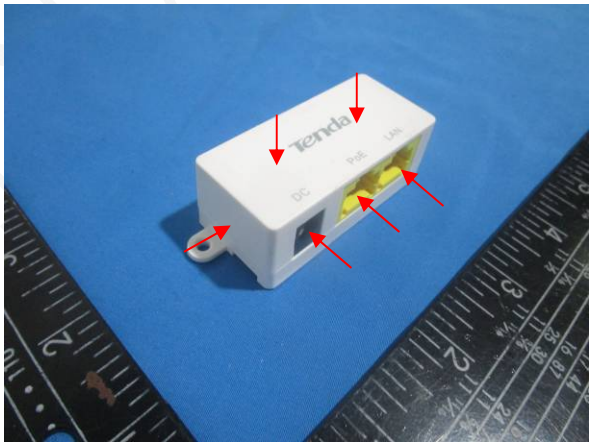
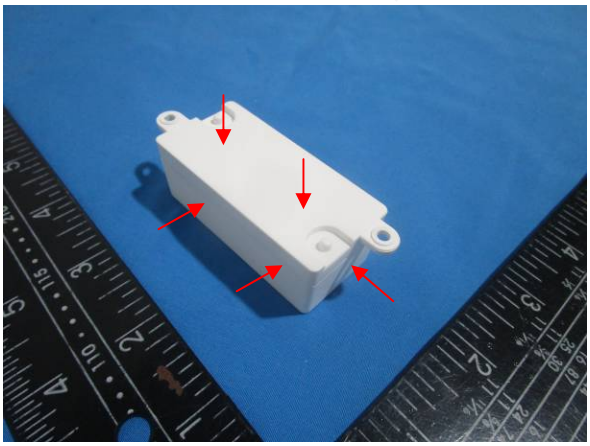
Test Points Location	Test Level							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

Test Points Location	Test Level							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

ESD Location Photo

Air Discharge: → Direct Contact: →

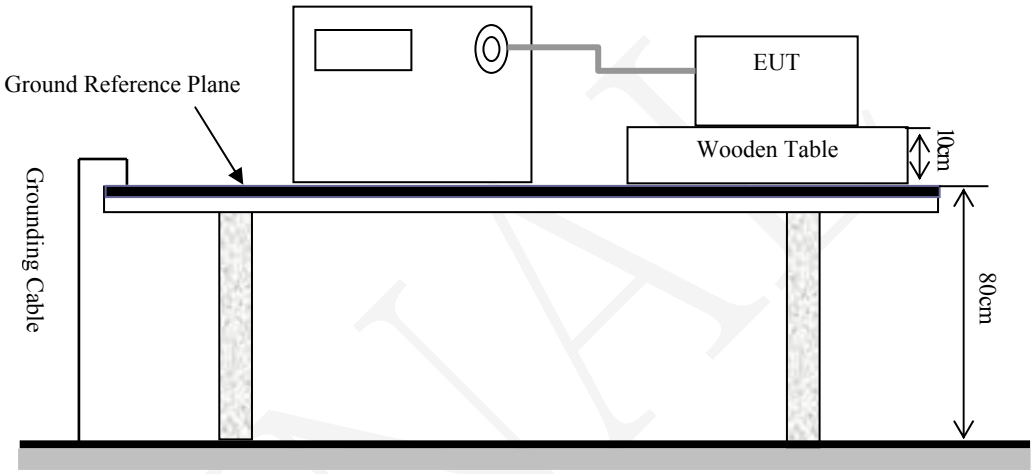
9 - FAST TRANSIENTS, COMMON MODE (IEC 61000-4-4)

Measurement Uncertainty

U_{lab} (measurement uncertainty of lab) and U_{EN} (measurement uncertainty of EN 61000-4-4) please refer to the following:

Parameter	U_{EN}	U_{lab}
Rise time t_r	6.20%	6.20%
Peak voltage value V_p	8.60%	8.60%
Voltage pulse width t_w	5.90%	5.90%

Test System Setup



Test Level

Open Circuit Output Test Voltage ±10%		
Level	**On Power Supply Lines**	**On I/O (Input/Output) Signal data and control lines**
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

Test Level 2 for AC power supply lines at 1 kV
Test Level 1 for DC power supply lines at 0.5 kV
Test Level 2 for signal dada and control lines at 0.5 kV

Performance Criterion: B

Test Procedure

The EUT was arranged for Power Line Coupling and for I/O Line Coupling through a capacitive clamp, where applicable. (Note: The I/O coupling test using a capacitive clamp is performed on the I/O interface cables that are longer in length than 3 meters.) A metal ground plane 2.4 meter by 2.0 meter was placed between the floor and the table and is connected to the earth by a 2.0 meter ground rod. The ground rod is connected to the test facility's electrical earth.

Test Data

Please refer to following tables:

Test Mode: Normal operating
Note: Adapter, POE

Test Points		Test Level (kV)							
		+0.5	-0.5	+1.0	-1.0	+2.0	-2.0	+4.0	-4.0
AC mains power input ports	L	A	A	A	A	/	/	/	/
	N	A	A	A	A	/	/	/	/
	Earth	/	/	/	/	/	/	/	/
	L+N	A	A	A	A	/	/	/	/
	L + Earth	/	/	/	/	/	/	/	/
	N + Earth	/	/	/	/	/	/	/	/
	L+N+Earth	/	/	/	/	/	/	/	/
Signal ports	RJ45	A	A	/	/	/	/	/	/

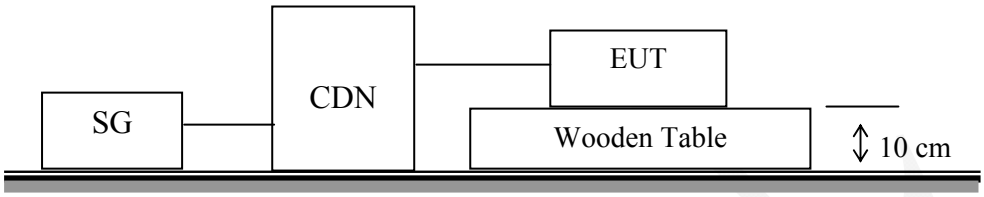
10 – RADIO FREQUENCY, COMMON MODE (IEC 61000-4-6)

Measurement Uncertainty

U_{lab} (measurement uncertainty of lab) and U_{EN} (measurement uncertainty of EN 61000-4-6) please refer to the following:

Parameter	U_{EN}	U_{lab}
CDN calibration process	1.27 dB	1.27 dB
CDN test process	1.36 dB	1.36 dB

Test Setup



Test Level

Level	Voltage Level (r.m.s.) (U_0)
1	1
2	3
3	10
X	Special

Test level 2 at 3 V (r.m.s.)

Performance Criterion: A

Test Procedure

1) Let the EUT work in test mode and test it.
2) The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3 m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
3) The disturbance signal described below is injected to EUT through CDN.
4) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
5) The frequency range is swept from 150 kHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.
6) Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5 s.
7) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

Test Data

Please refer to following tables:

Test Mode: Normal operating
Note: Adapter, POE

Table 1: AC mains power input port

Frequency range: 150 kHz to 80 MHz
■Modulated: Amplitude 80%, 1kHz sine wave □ Unmodulated □ Other:
Severity Level: 3 V Unmodulated , r.m.s

Level	Voltage Level (e.m.f.) U_0	Pass	Fail
1	1	/	/
2	3	A	/
3	10	/	/
X	Special	/	/

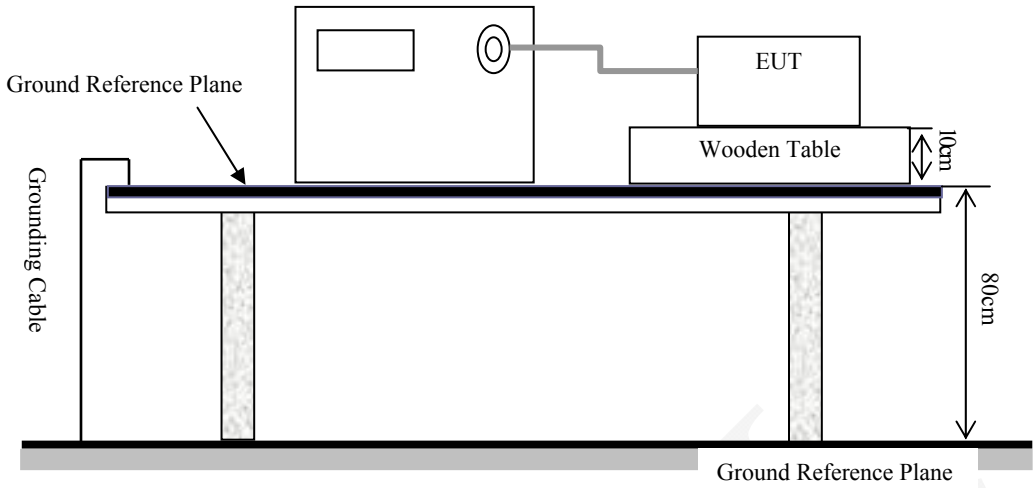
Table 2: Signal Port : RJ45

Frequency range: 150 kHz to 80 MHz
■Modulated: Amplitude 80%, 1kHz sine wave □Unmodulated □ Other:
Severity Level: 3 V Unmodulated , r.m.s

Level	Voltage Level (e.m.f.) U_0	Pass	Fail
1	1	/	/
2	3	A	/
3	10	/	/
X	Special	/	/

12 – VOLTAGE DIPS AND SHORT INTERRUPTIONS (IEC 61000-4-11)

Test Setup



Test Level and Performance Criterion

Test Level	Voltage dip and short interruptions (%) Residual	Duration (in period)	Performance criterion
1	0	0.5	B
2	0	1	B
3	70	25	C
4	0	250	C

Test Procedure

1) The interruption is introduced at selected phase angles with specified duration.
2) Record any degradation of performance.

Test Data

Please refer to following tables:

Test Mode: Normal operating
Adapter, POE

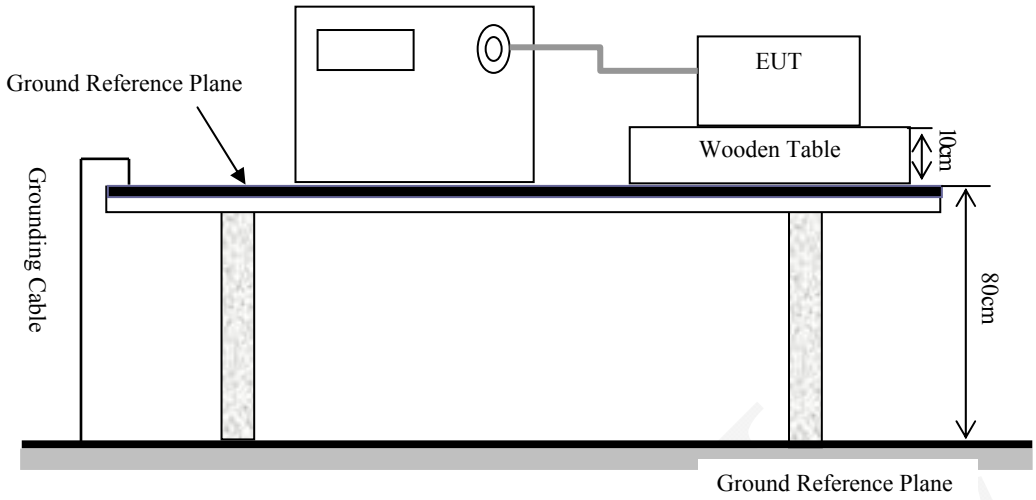
Note: B indicates that the EUT was power off when it was tested, but it could recover normal use after test be finished.

Table 1: Voltage Dips/Interruptions Test

U2 (% Reduction)	Td (Periods)	Phase Angle	N	Result
100	0.5	0/90/180/270	3	A
100	1	0/90/180/270	3	A
30	25	0/90/180/270	3	A
100	250	0/90/180/270	3	B

13 – SURGES (IEC 61000-4-5)

Test System Setup



Test Level

Level	Open Circuit Output Test Voltage ±10%
1	0.5 kV
2	1 kV
3	2 kV
4	4 kV
X	Special

AC Mains: L-N: Test level 2 at 1 kV

Performance Criterion: B

Test Procedure

1) For line to line coupling mode, provide a 0.5 kV 1.2/50us voltage surge (at open-circuit condition).
2) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
3) Different phase angles are done individually.
4) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

Test Data

Please refer to following tables:

Test Mode: Normal operating,M2
Note: Adapter, POE

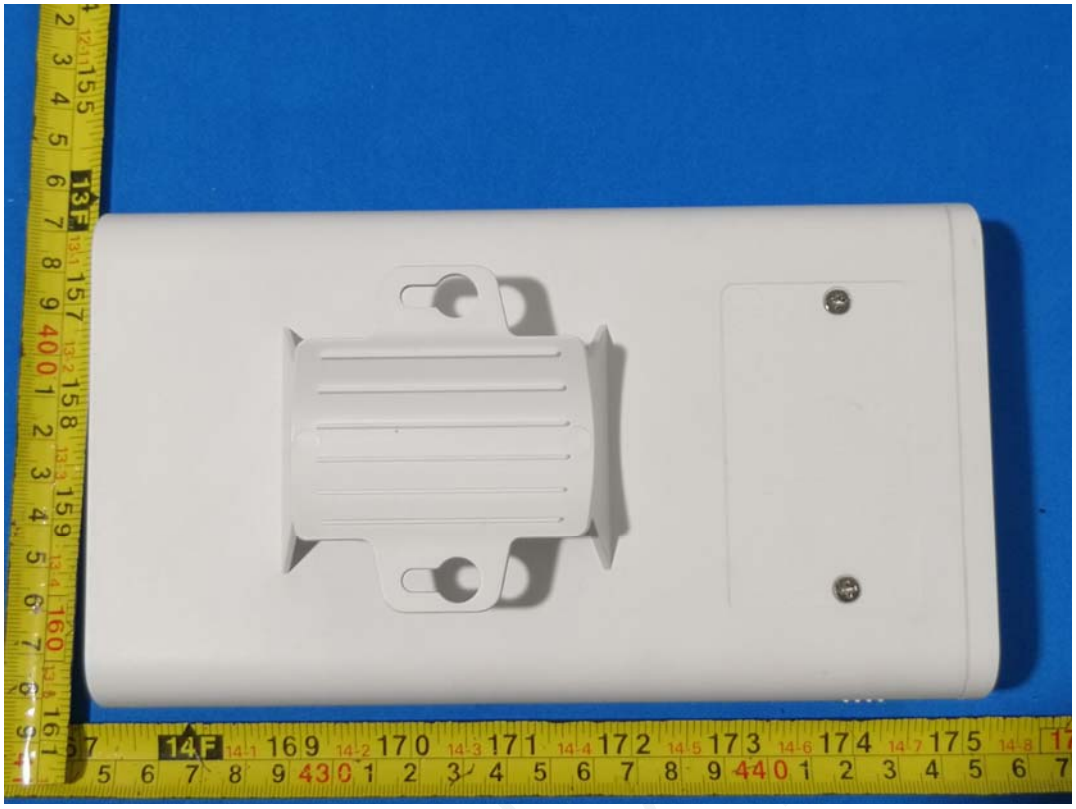
Table 1: AC mains power input port

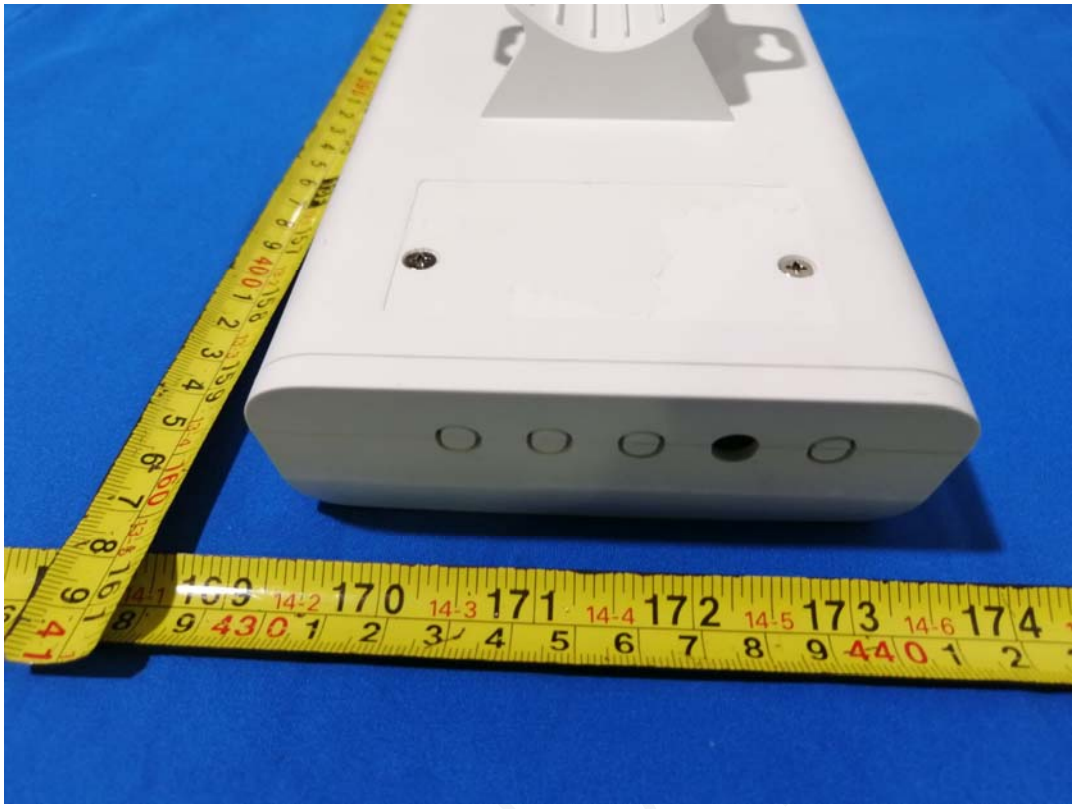
Level	Voltage	Poll	Path	Pass	Fail
1	0.5kV	±	Line-Line	A	/
2	1kV	±	Line-Line	A	/
3	2kV	±	/	/	/
4	4kV	±	/	/	/

Table 2: RJ45 I/O Circuit and Lines

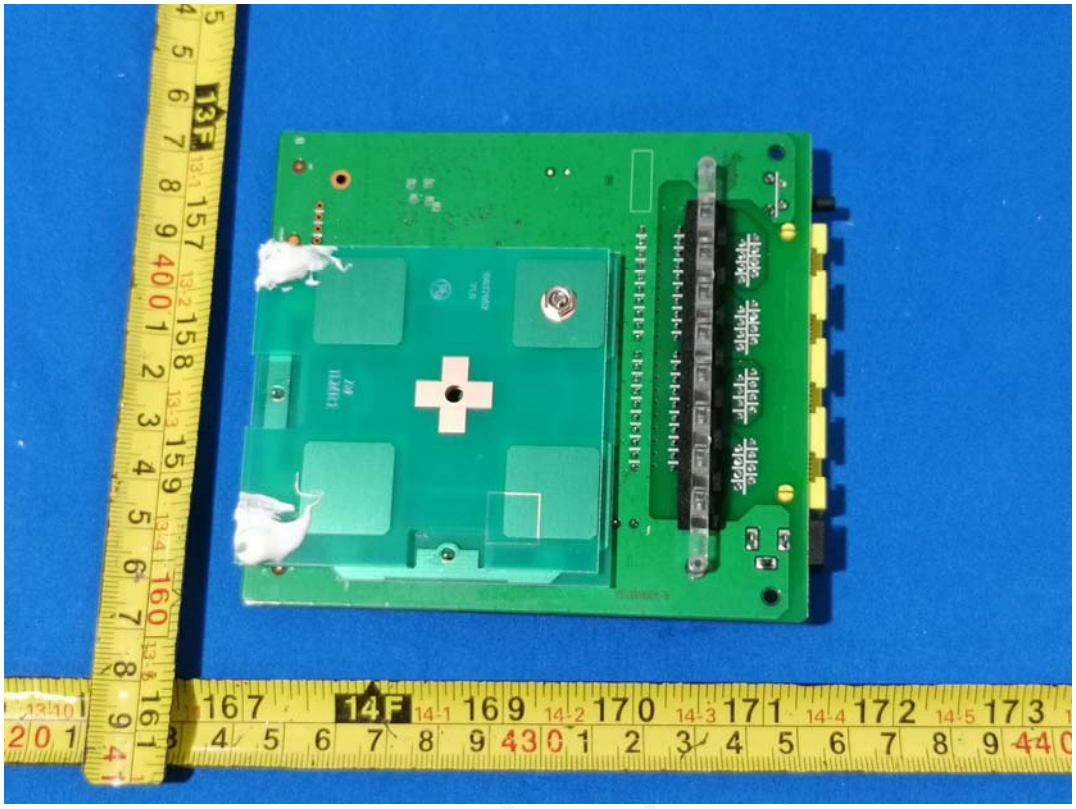
Level	Voltage	Poll	Path	Pass	Fail
1	0.5kV	±	Line-Ground	A	/
2	1kV	±	Line-Ground	A	/
3	2kV	±	Line-Ground	/	/

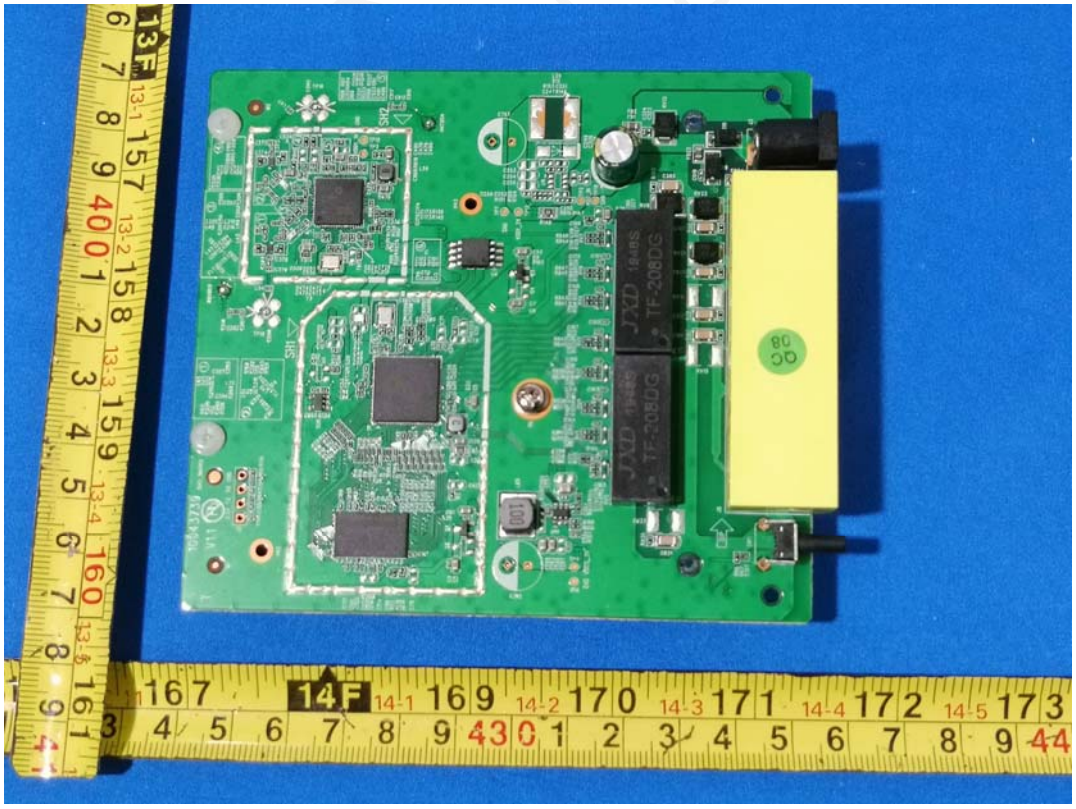
EXHIBIT A – EUT PHOTOGRAPHS

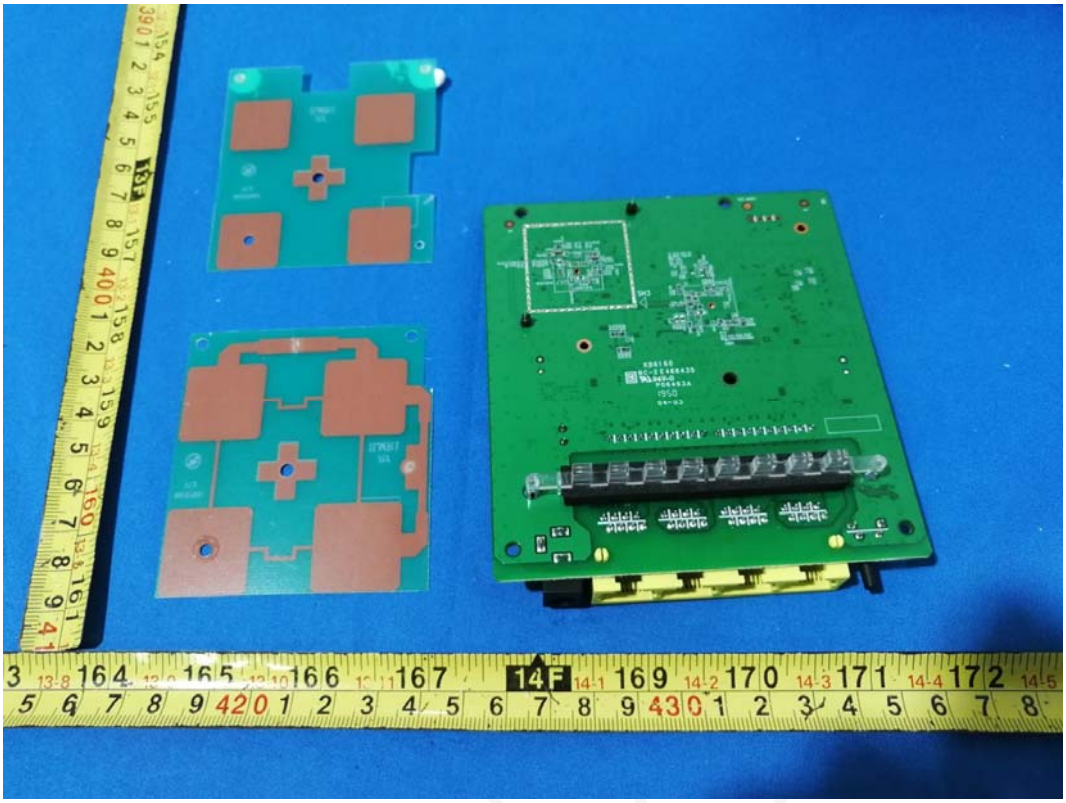


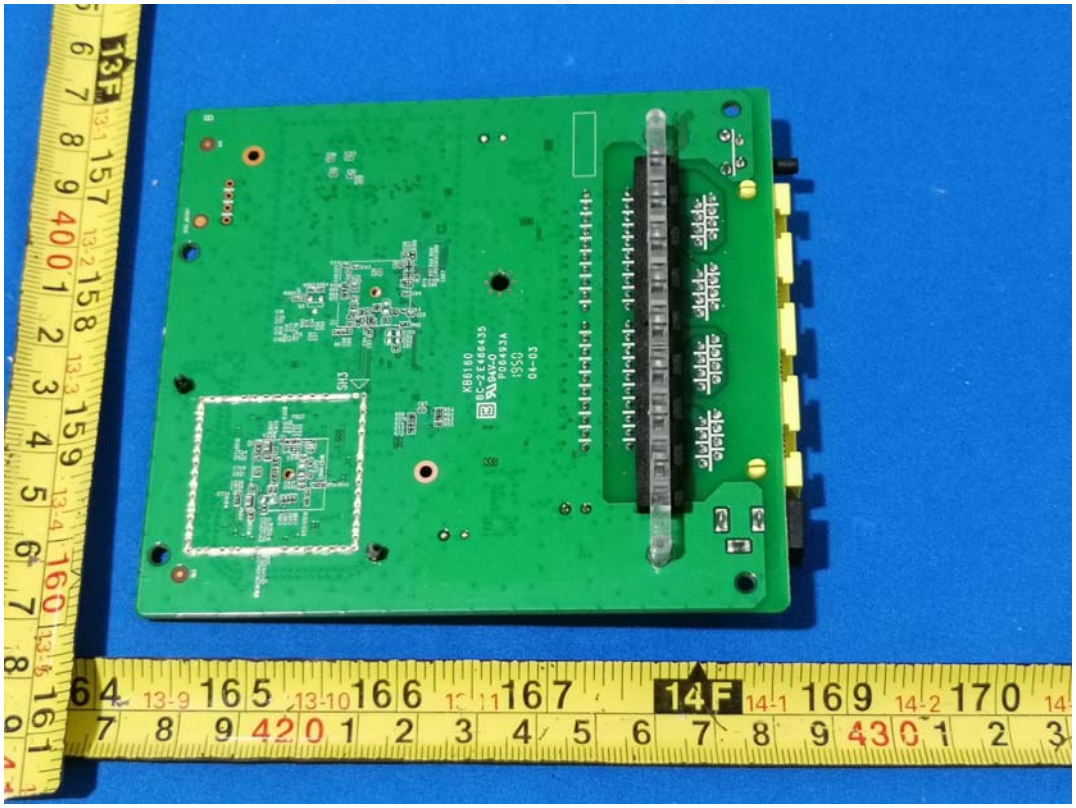



Tenda





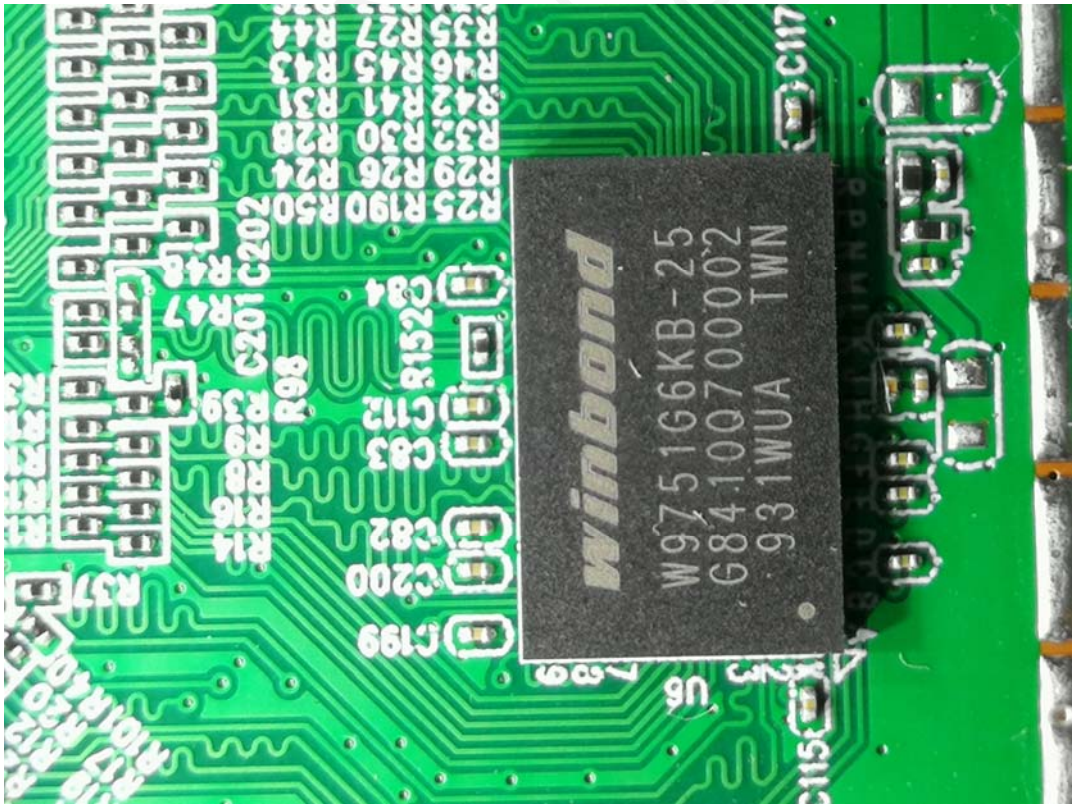




chip


TAIWAN
1922
PE922M4G
OCA9531-BL3A
U1

chip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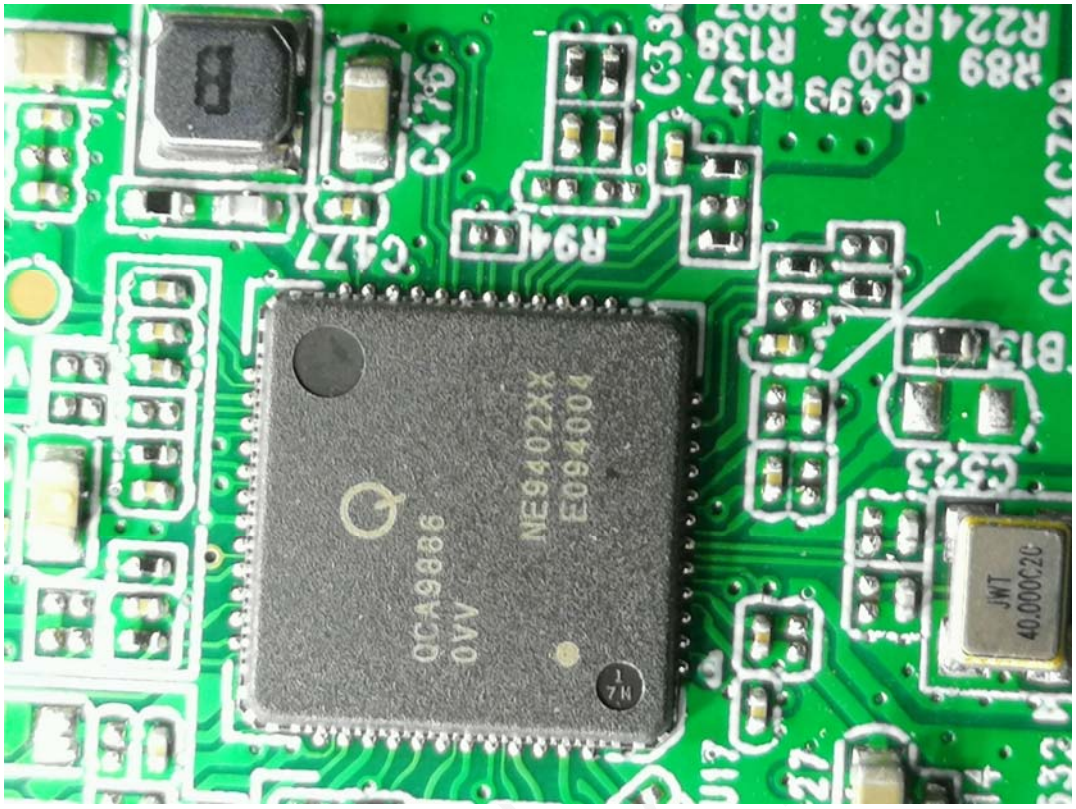
931WUA TWN
U6

chip



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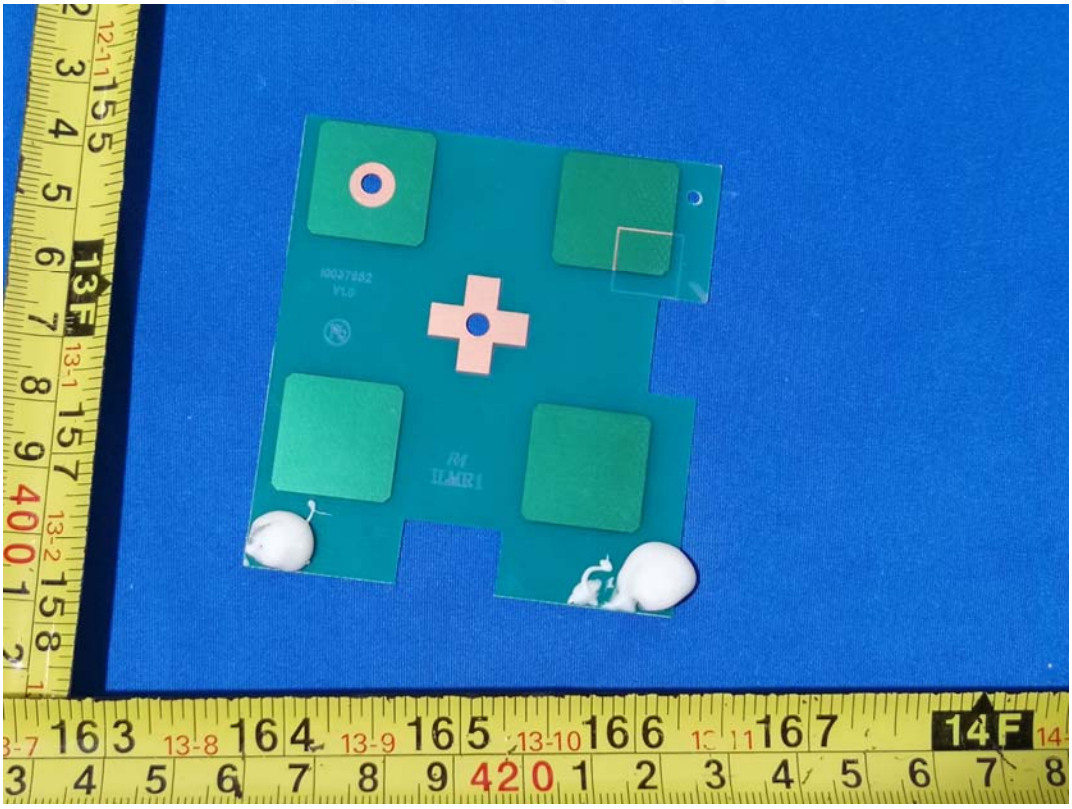

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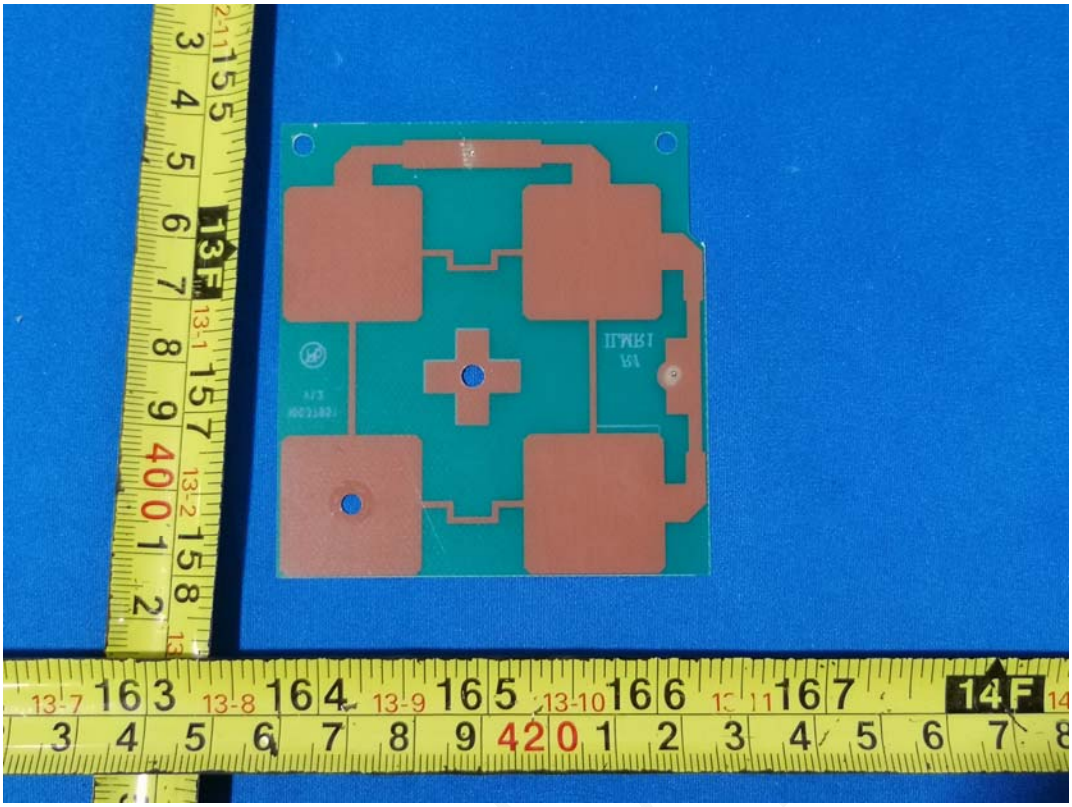

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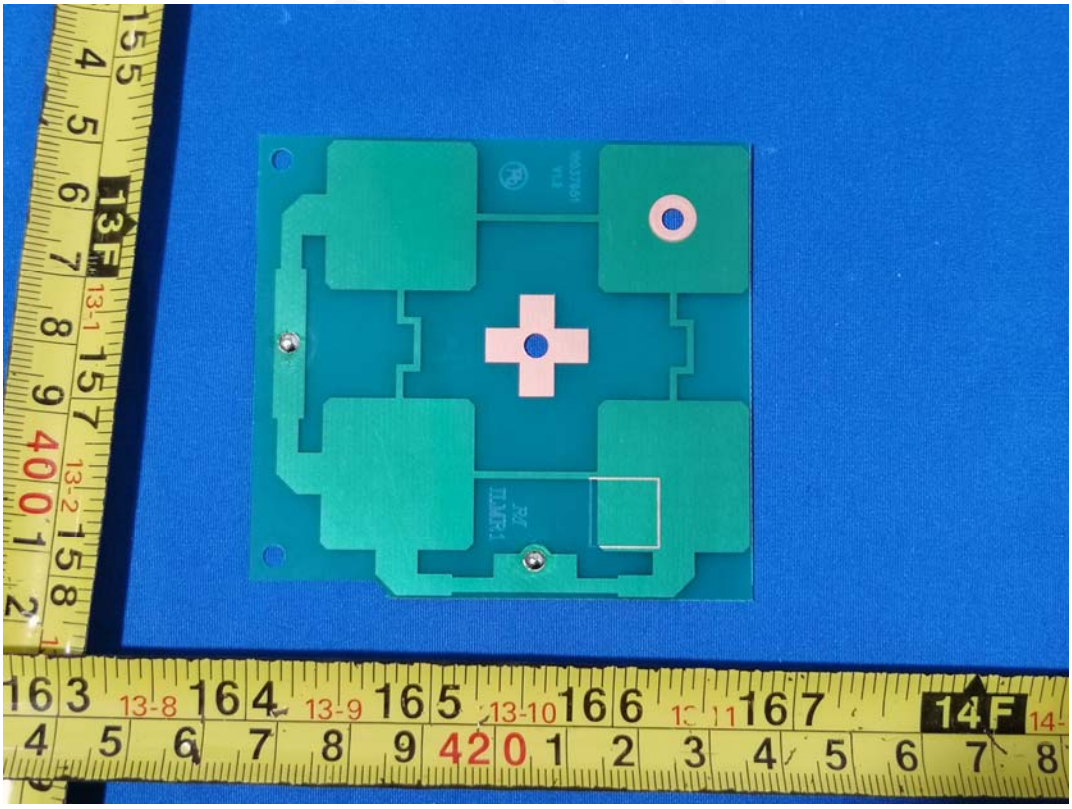

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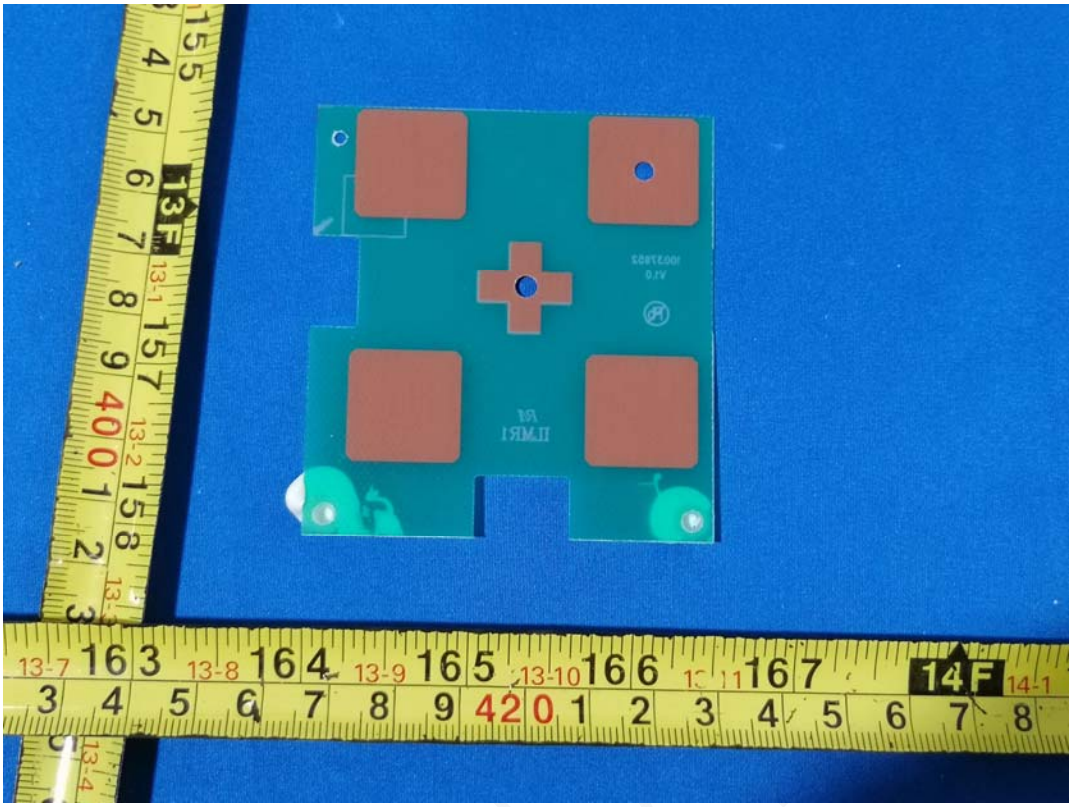
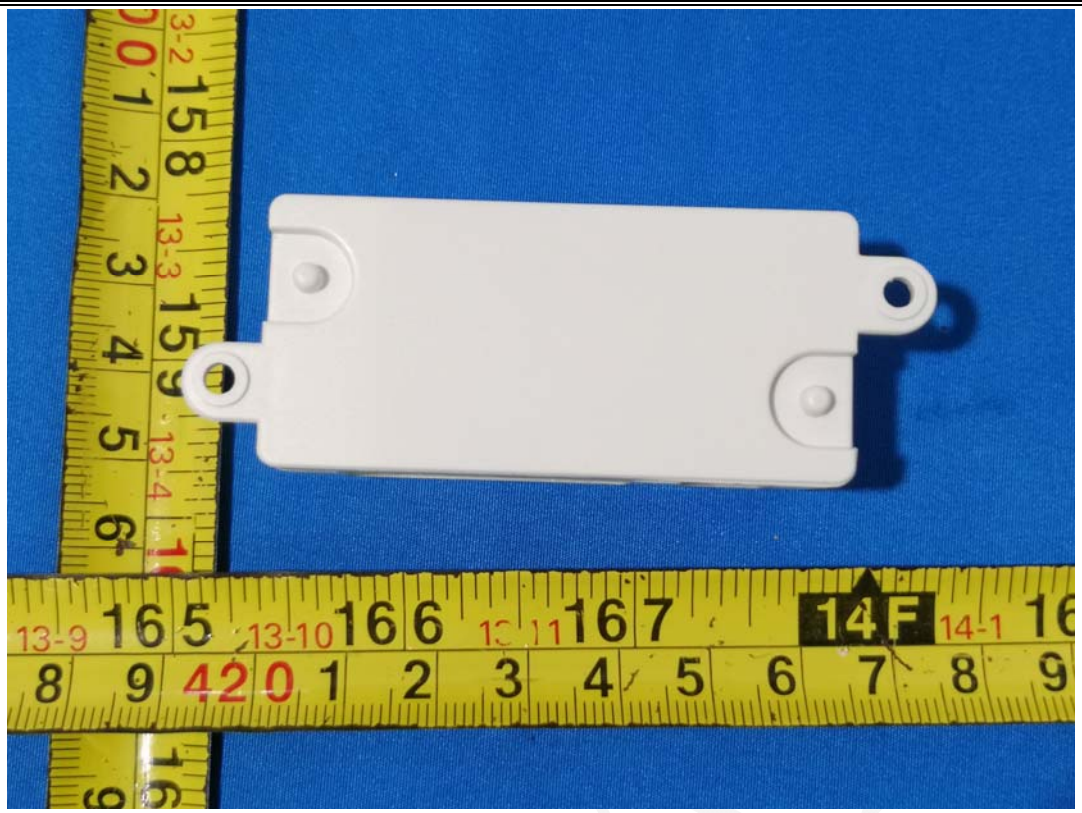
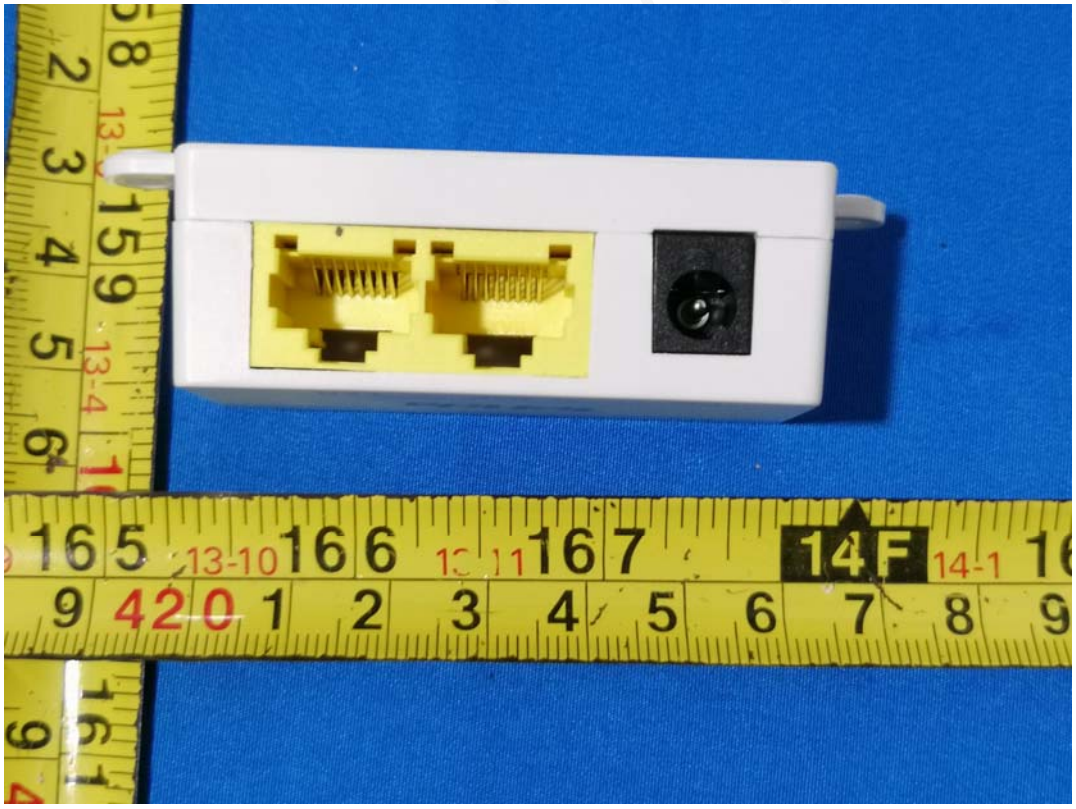


Chip3

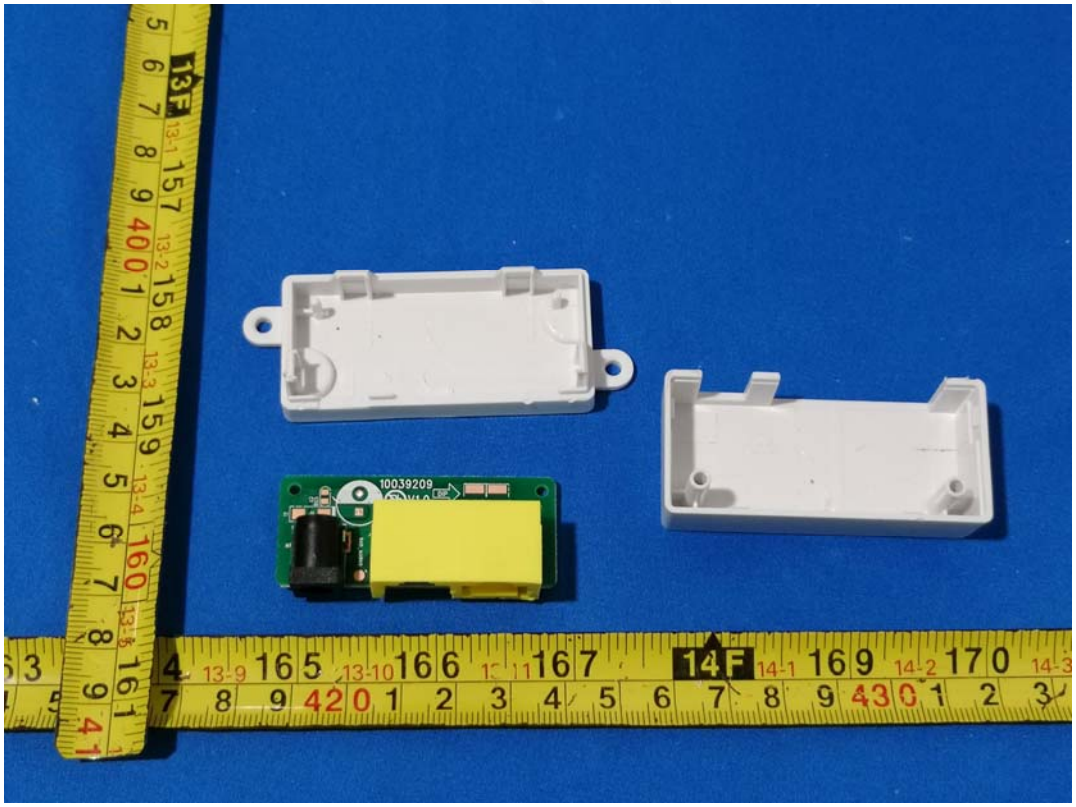





14F


Tenda
LAN
PoE
DC
14F


DC
PoE
LAN
Tenda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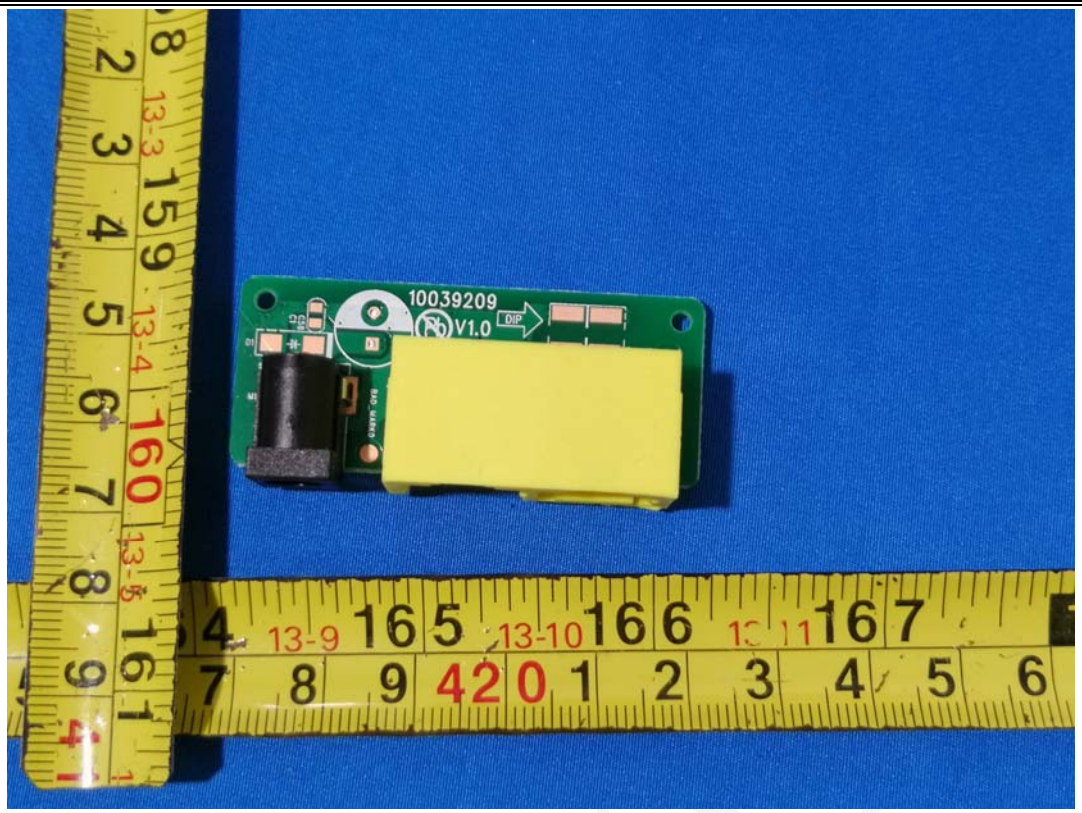
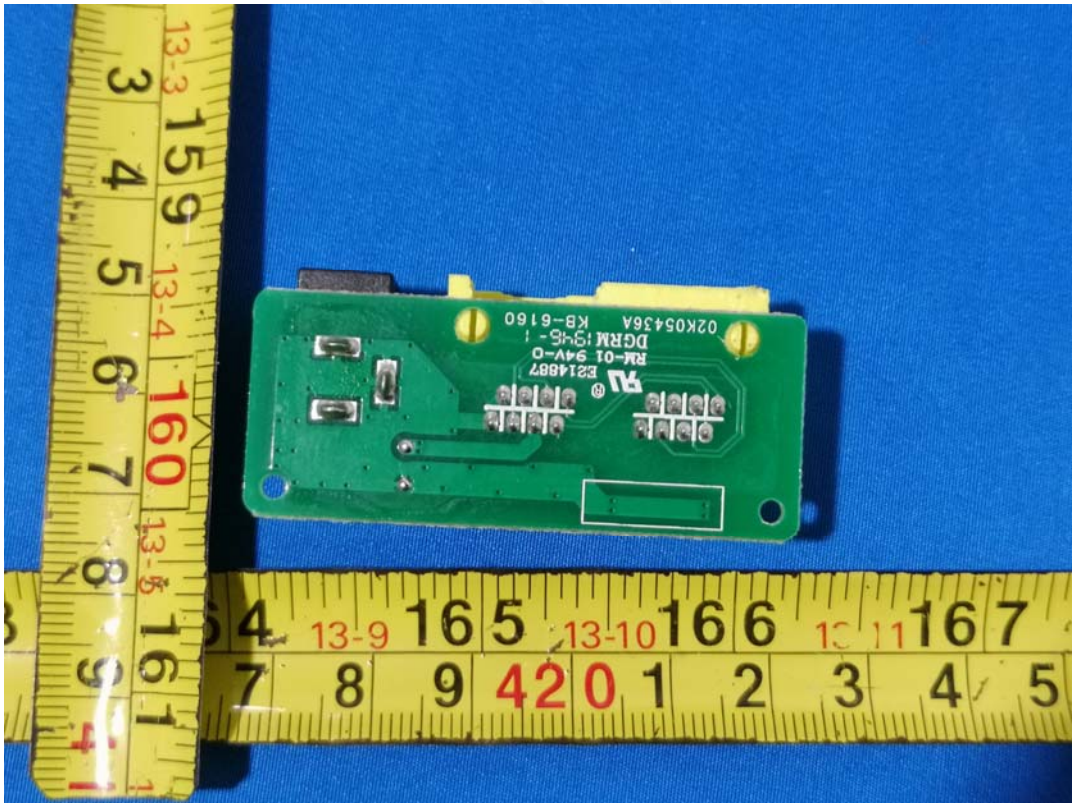

10039209
V1.0
DIP


E214887
02K0543-6A KB-6160

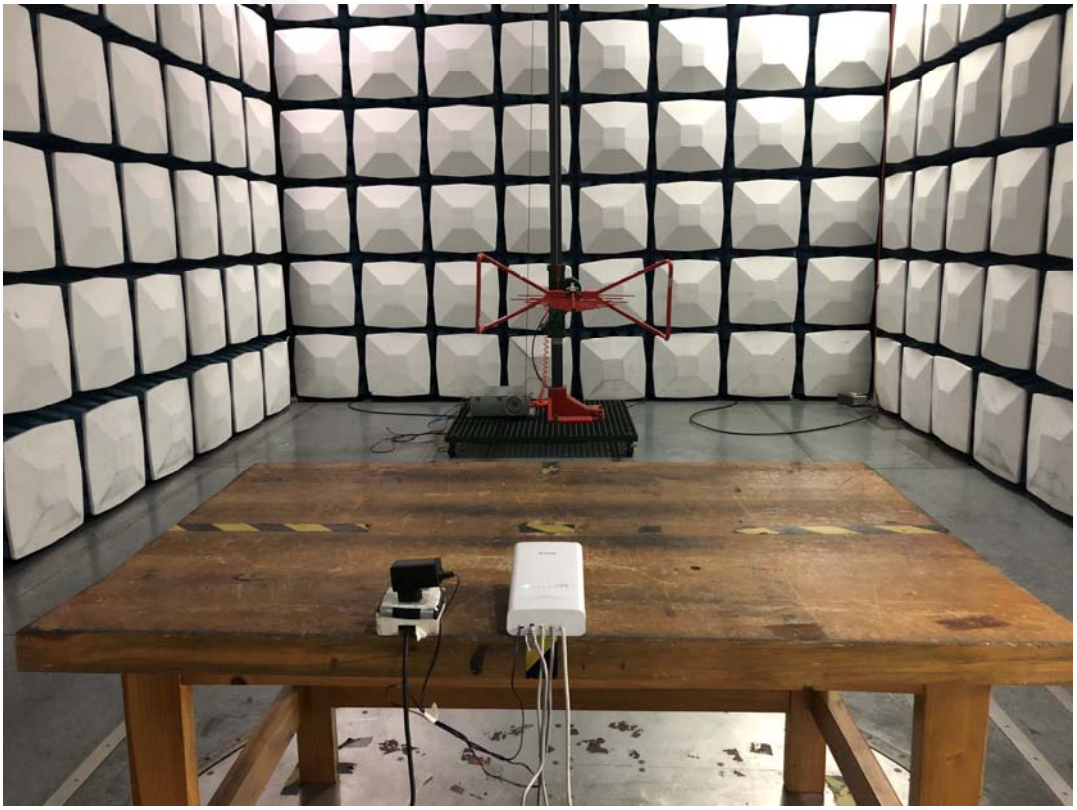

SWITCHING ADAPTER
MODEL: BN073-A12012E
INPUT : 100-240V~50/60Hz 0.4A
OUTPUT: 12.0V⎓ 1.0A 12.0W
MADE IN CHINA
RoHS
COMPLIANT
SHENZHEN HEWEISHUN NETWORK TECHNOLOGY CO.,LTD

EXHIBIT B – TEST SETUP PHOTOGRAPHS

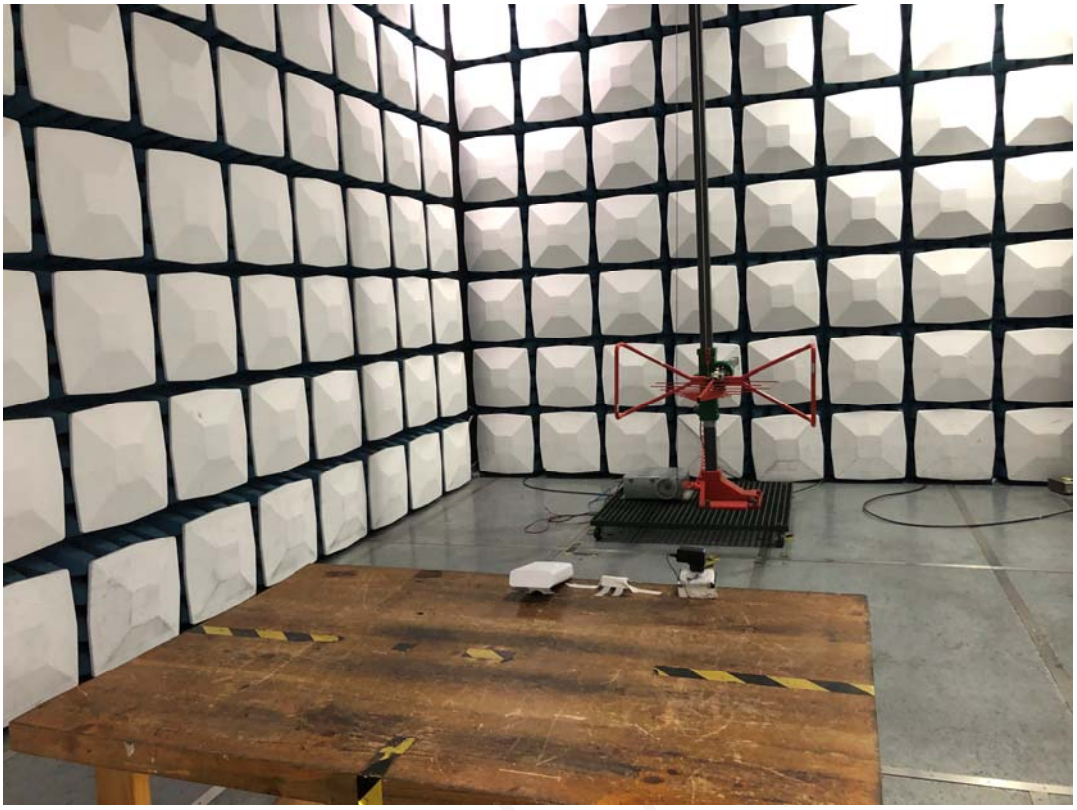
RE

RE Below 1G front View

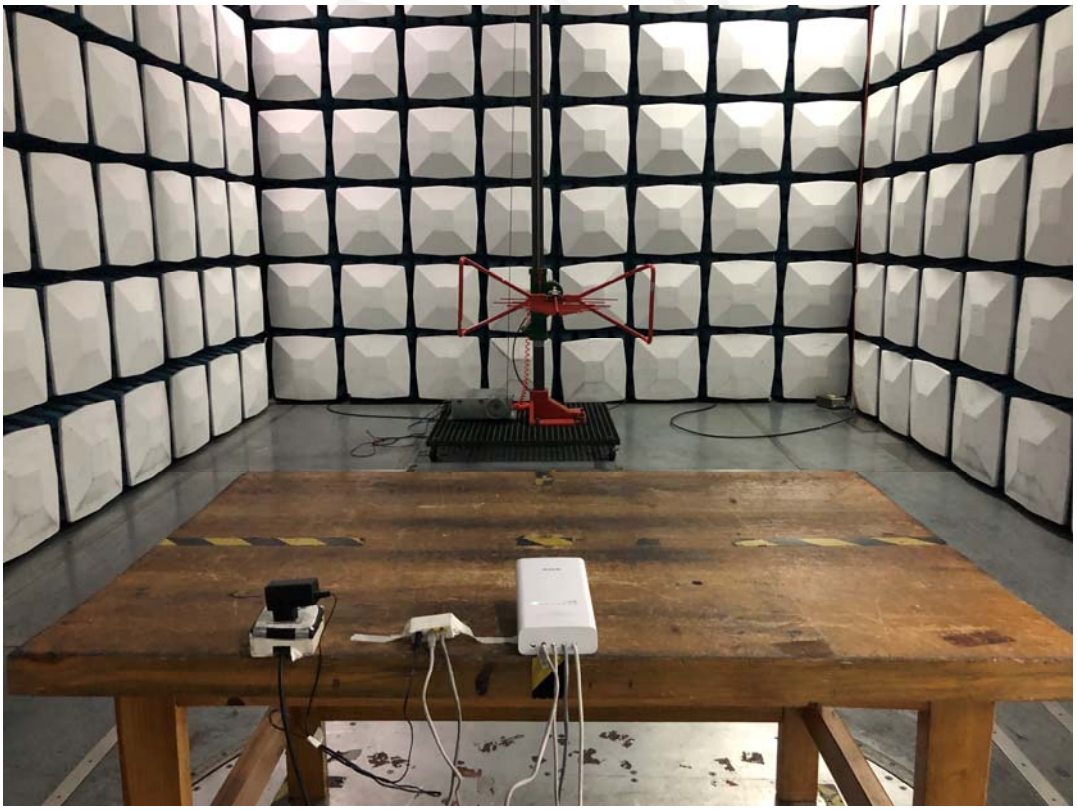
RE Below 1G rear View



RE Below 1G front View-POE



RE Below 1G rear View-POE



RE above 1G front View

RE above 1G rear View

RE above 1G front View-POE

RE above 1G rear View-POE

CE_AC

CE front View

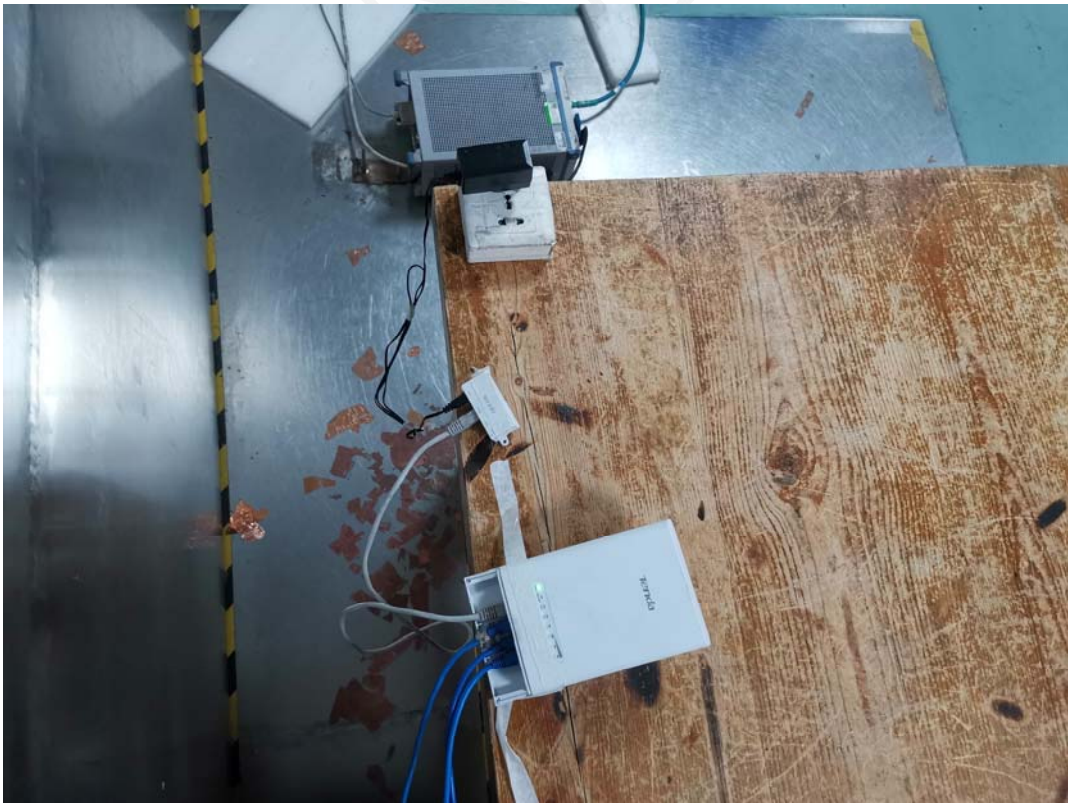
CE side View

CE front View-ISN

CE side View-ISN

CE front View-POE

CE side View- POE



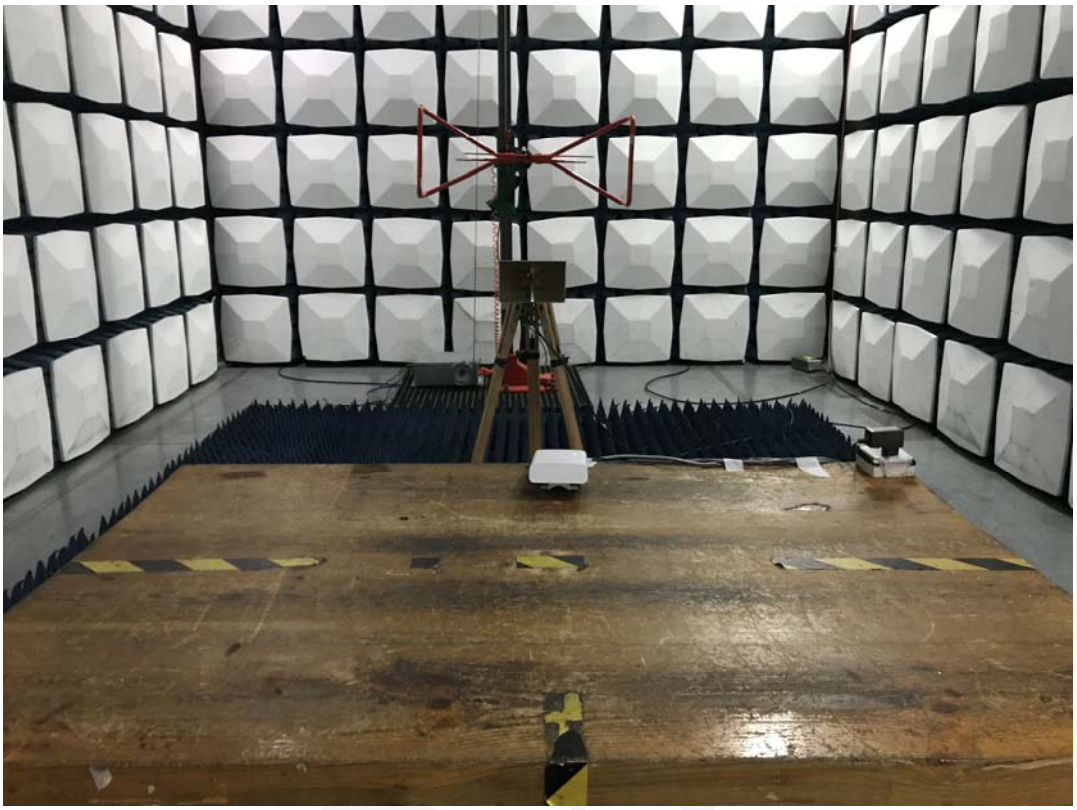
Flicker

Test Setup Photo View

POE

RS

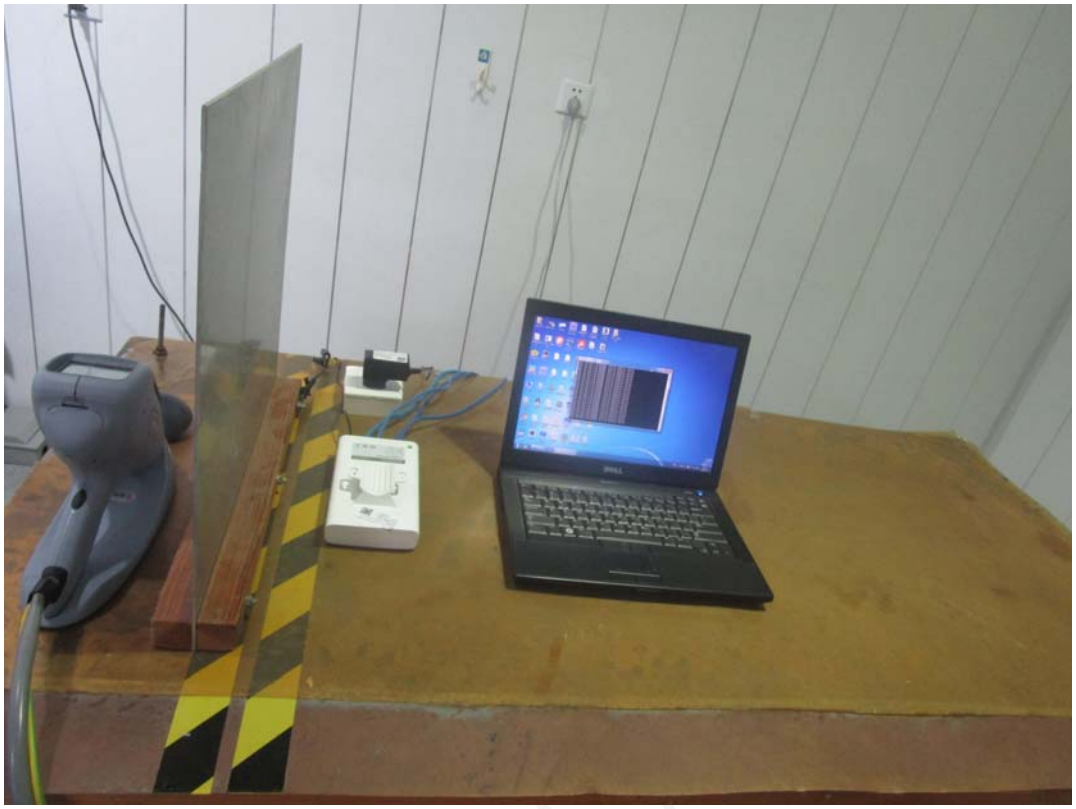
Test Setup Photo View



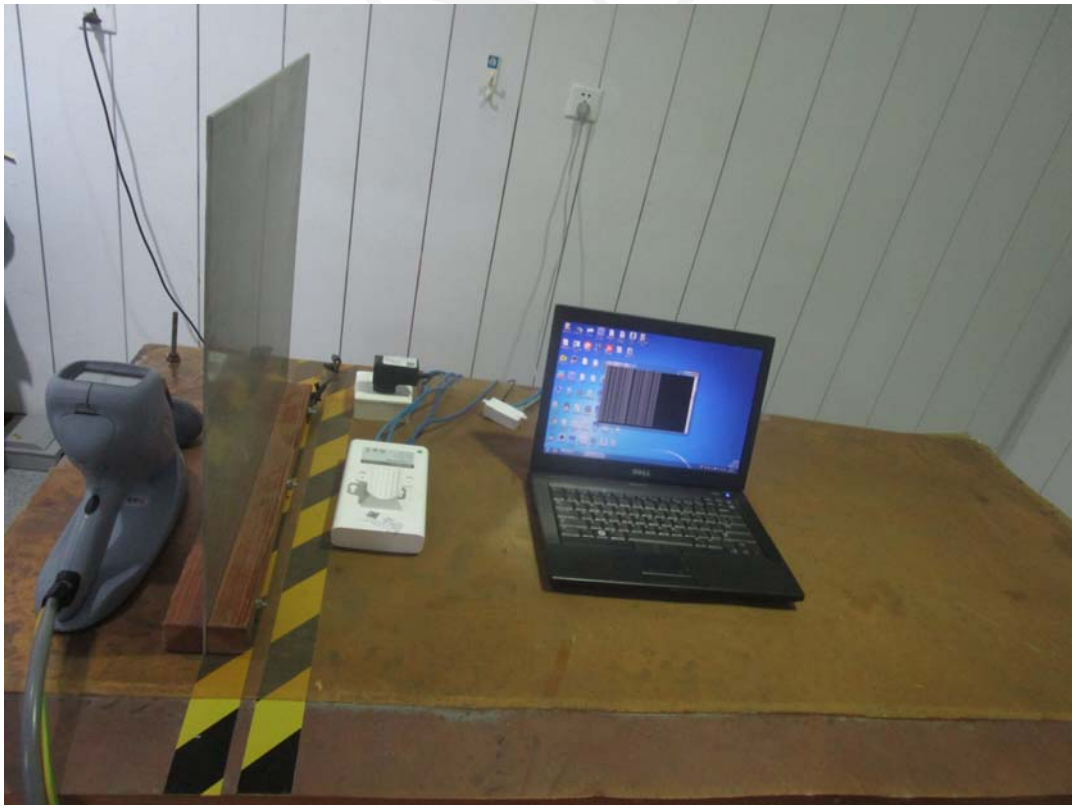
POE

ESD

Test Setup Photo View



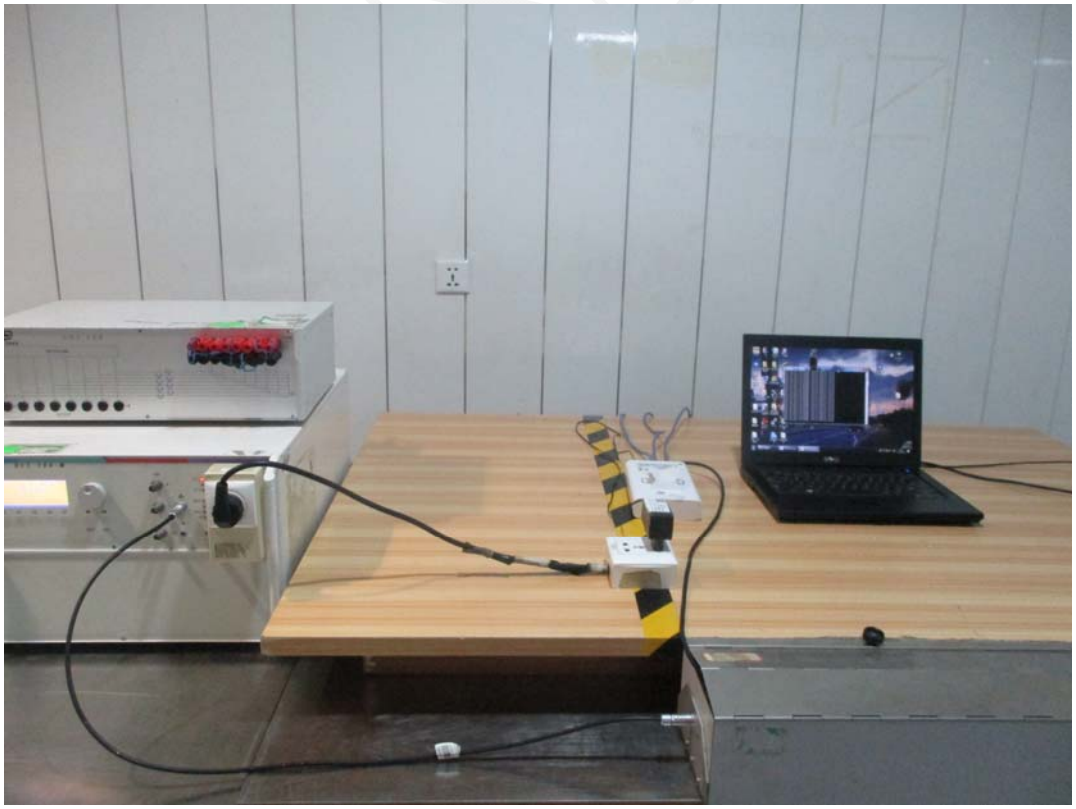
POE



EFT

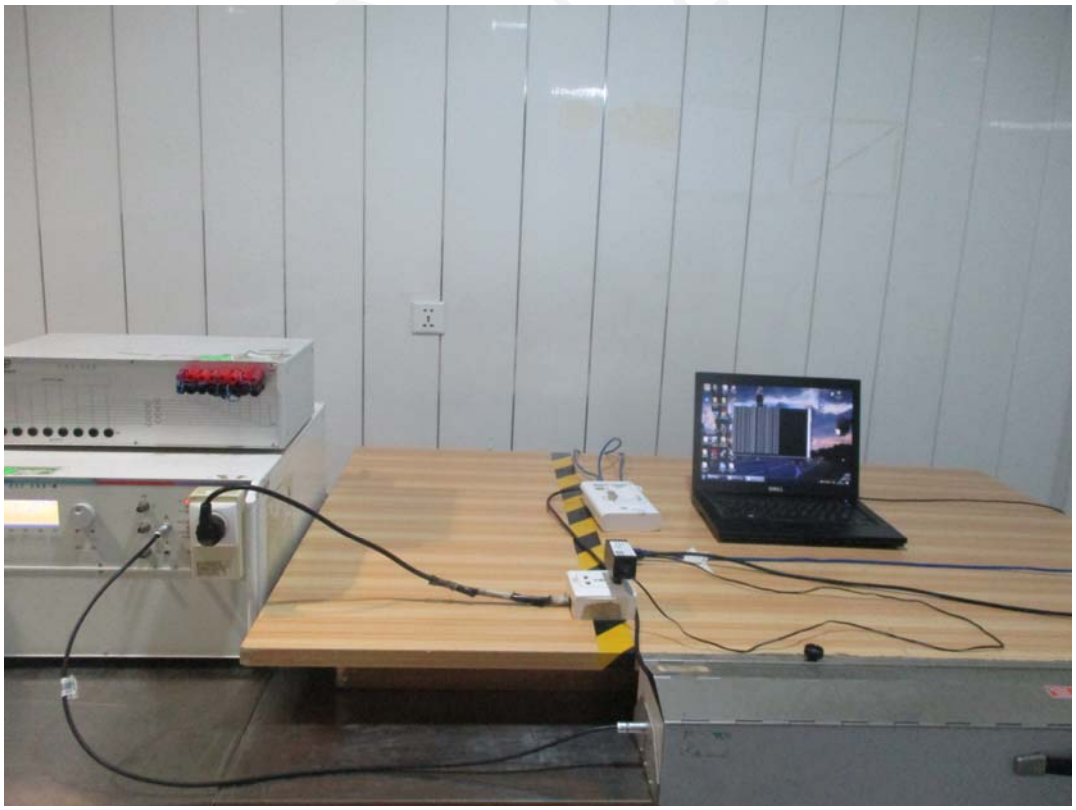
AC Port Test Setup Photo View

Signal Port Test Setup Photo



AC Port Test Setup Photo View-POE

Signal Port Test Setup Photo-POE



CS

AC Port Test Setup Photo View

Signal Port Test Setup Photo

AC Port Test Setup Photo View-POE

Signal Port Test Setup Photo-POE

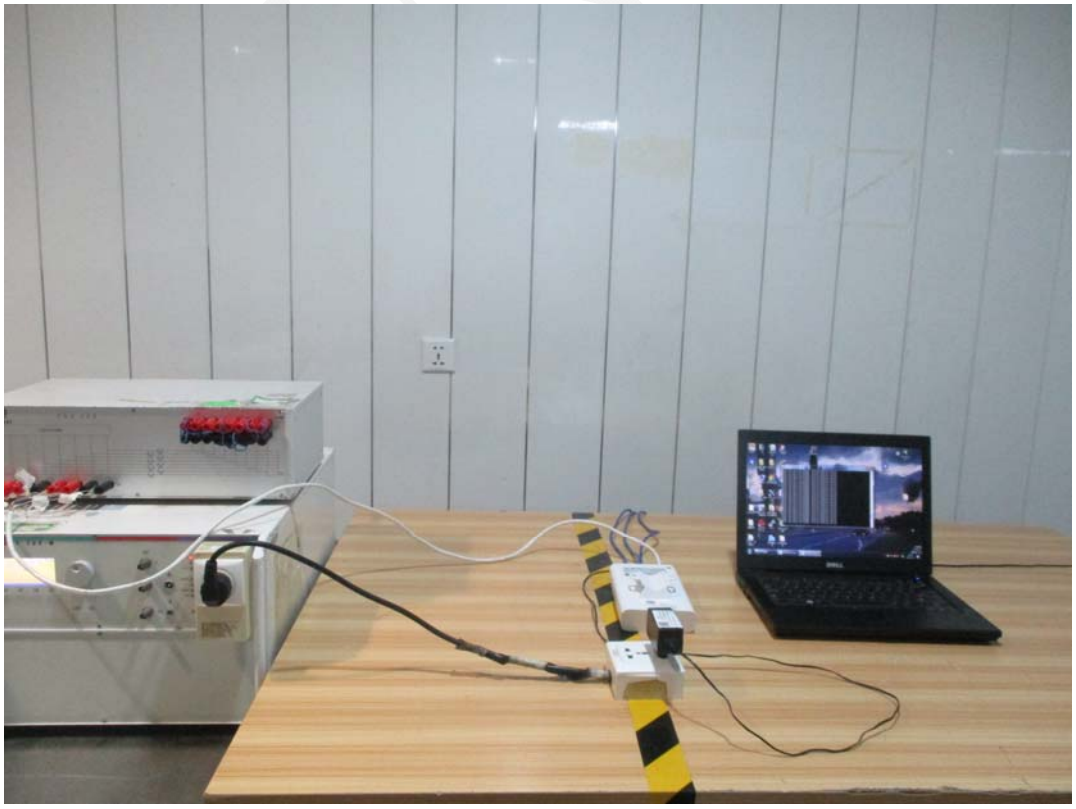
Dips

Test Setup Photo View

Surge

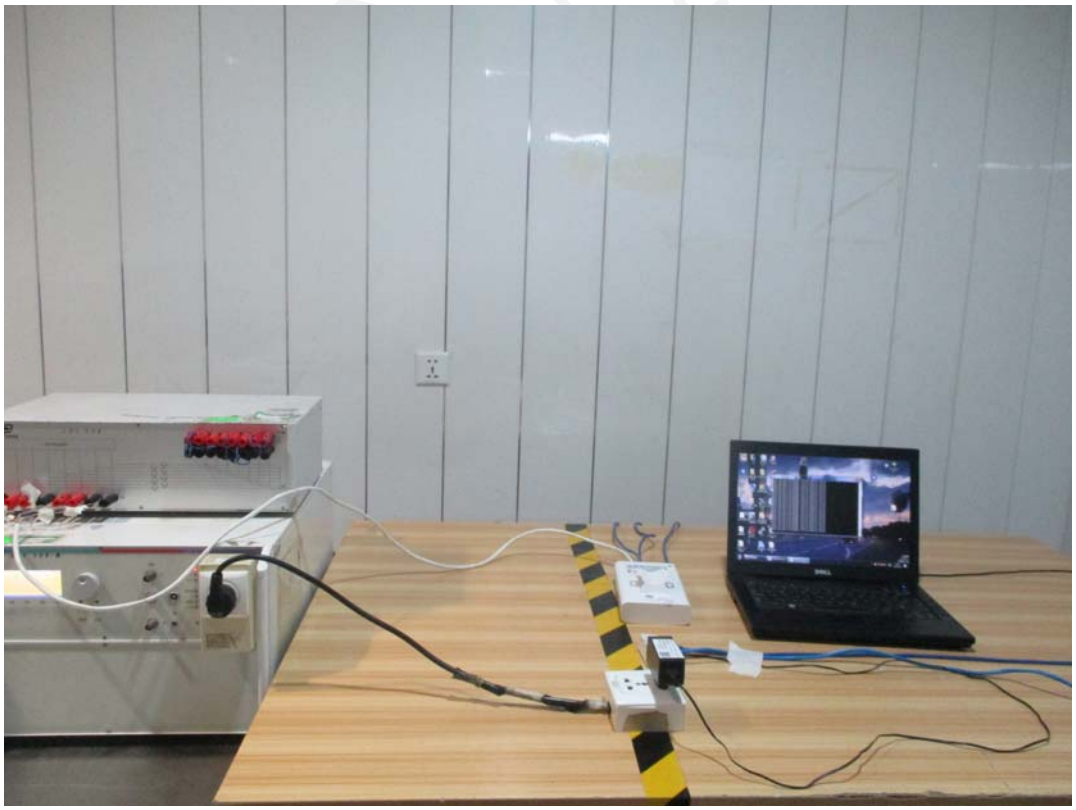
AC Port Test Setup Photo View

Signal Port Test Setup Photo



AC Port Test Setup Photo View-POE

Signal Port Test Setup Photo-POE



*******END OF REPORT*******