

FCC&ISED RF TEST REPORT

No. 170201711SHA-006

Applicant : Alcatel-Lucent Shanghai Bell Co., Ltd.
388-389#, Ningqiao Road, Pudong Jinqiao, Shanghai, China

Manufacturing site : Alcatel-Lucent Shanghai Bell Co., Ltd.
388-389#, Ningqiao Road, Pudong Jinqiao, Shanghai, China

Product Name : Digital Home CPE

Type/Model : A-240Z-A

EMA Code : 3FE 46615 AAAA

TEST RESULT : PASS

SUMMARY

The equipment complies with the requirements according to the following standard(s) or specification:

47CFR Part 15 (2016): Radio Frequency Devices (Subpart C)

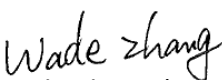
ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

RSS-210 Issue 9 (August 2016): Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

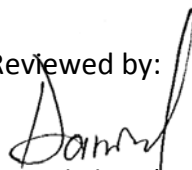
RSS-Gen Issue 4 (November 2014): General Requirements for Compliance of Radio Apparatus

Date of issue: June 7, 2017

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1 GENERAL INFORMATION

1.1 Description of Client

Applicant : Alcatel-Lucent Shanghai Bell Co., Ltd.
388-389#, Ningqiao Road, Pudong Jinqiao, Shanghai, China
Manufacturer : Alcatel-Lucent Shanghai Bell Co., Ltd.
388-389#, Ningqiao Road, Pudong Jinqiao, Shanghai, China

1.2 Identification of the EUT

Product Name : Digital Home CPE
Type/model : A-240Z-A
FCC ID : 2ADZRA240ZA
IC : 21694-A240ZA

1.3 Technical Specification

Operation Frequency : 902-928MHz
Band
Modulation : FSK
Channel Frequency : 908.4MHz, 916.0MHz
Description of EUT : The EUT is a digital home CPE, it support WIFI, ZigBee and Z-Wave, and there have only one model, we test it and listed the Z-Wave results in this report.
Antenna : PCB antenna, 3dBi max Peak gain, FAF connector
Rating : 100-240V, 50/60Hz
Category of EUT : Class B
EUT type : ☒ Table top
☐ Floor standing
Sample received date : March 6, 2017
Date of test : March 6, 2017 to April 18, 2017

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2016)
ANSI C63.10 (2013)
RSS-210 Issue 9 (August 2016)
RSS-Gen Issue 4 (November 2014)

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.

The EUT can working at 2 frequency, and we tested data rate R1 and R3 as representatively.

Center frequency (MHz)		Data rate (*)	Bit rate	Symbol rate	Channel Bandwidth (KHz)
F1	916.00	R3	100 Kbps	100 Kbaud	400
F2	908.40	R2	40 Kbps	40 Kbaud	300
		R1	9.6 Kbps	19.2 Kbaud	300

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	HP, EliteBook 2530P	-

2.5 Instrument list

Selected	Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
☒	PXA Analyzer	N9030A	Agilent	EC5338	2017/3/3	2018/3/2
☒	Vector SG	N5182B	Agilent	EC5175	2017/3/3	2018/3/2
☒	Power sensor	U2021XA	Agilent	EC5338-1	2017/3/3	2018/3/2
☒	MXG Analog SG	N5181A	Agilent	EC5338-2	2017/3/3	2018/3/2
☒	Power meter	N1911A/N1921A	Agilent	EC4318	2016/5/18	2017/5/17
☒	EMI Receiver	ESCS 30	R&S	EC 2107	2016/10/19	2017/10/18
☒	A.M.N.	ESH2-Z5	R&S	EC 3119	2015/12/16	2017/12/15
☒	I.S.N.	FCC-TLISN-T8-02	FCC	EC3756	2017/2/15	2018/2/14
☒	EMI chamber	3m	Albatross	EC 3048	2016/9/10	2017/9/9
☒	Test Receiver	ESIB 26	R&S	EC 3045	2016/10/19	2017/10/18
☒	Test Receiver	ESCI 7	R&S	EC4501	2017/2/23	2018/2/22
☒	Bilog Antenna	CBL 6112D	TESEQ	EC 4206	2016/6/2	2017/6/1
☒	Horn antenna	HF 906	R&S	EC 3049	2016/9/24	2017/9/23
☒	Horn antenna	HAP18-26W	TOYO	EC 4792-3	2016/6/12	2017/6/11
☒	Pre-amplifier	Pre-amp 18	R&S	EC 5262	2016/6/30	2017/6/29
☒	Pre-amplifier	Tpa0118-40	R&S	EC 4792-2	2017/4/10	2018/4/9
☒	Shielded room	-	Zhongyu	EC 2838	2017/1/8	2018/1/7

2.6 Test Summary

This report applies to tested sample only. The test results have been compared directly with the limits, and the measurement uncertainty is recorded. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERENCE	RESULT
Radiated emission	15.249 & 15.209	Pass
Assigned bandwidth (20dB bandwidth)	15.215(c)	Pass
Power line conducted emission	15.207	Pass

Notes: 1: NA =Not Applicable

2: This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

2.7 Measurement uncertainty

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

Test item	Measurement uncertainty
Maximum peak output power	$\pm 0.74\text{dB}$
Radiated Emissions in restricted frequency bands below 1GHz	$\pm 4.90\text{dB}$
Radiated Emissions in restricted frequency bands above 1GHz	$\pm 5.02\text{dB}$
Emission outside the frequency band	$\pm 2.89\text{dB}$
Power line conducted emission	$\pm 3.19\text{dB}$

3 Radiated emission

Test result: Pass

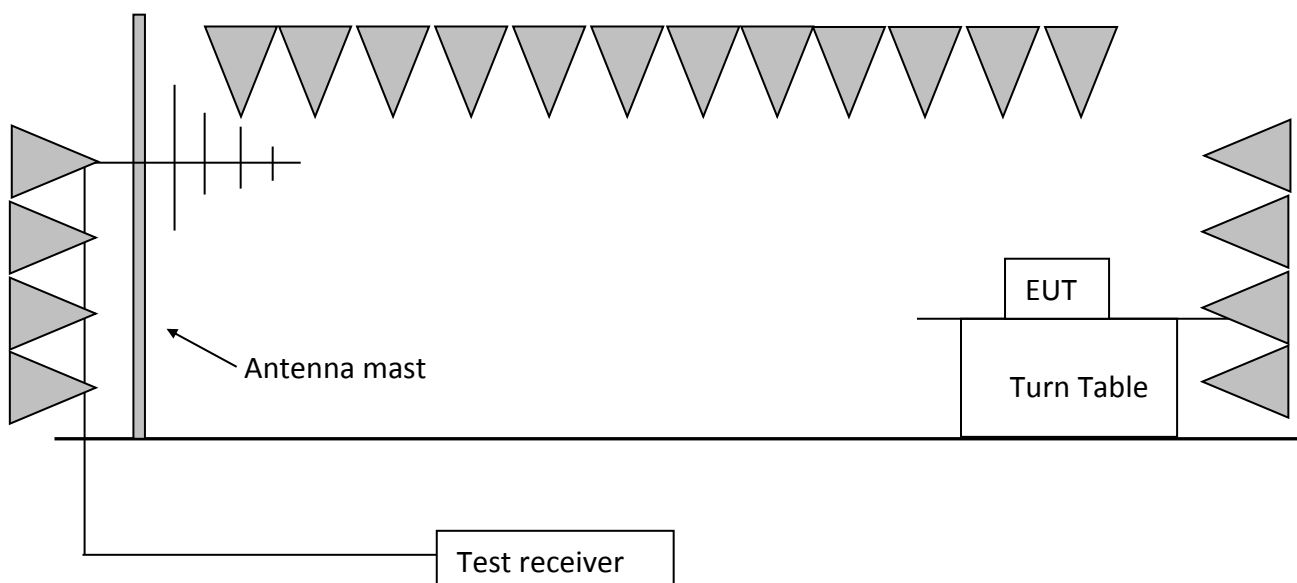
3.1 Test limit

Fundamental Frequency (MHz)	Fundamental limit (dBuV/m)	Harmonic limit (dBuV/m)
☒ 902 - 928	94	54
☐ 2400 - 2483.5	94	54
☐ 5725 - 5875	94	54
☐ 24000 - 24250	108	68

The radiated emissions which fall outside allocated band, must also comply with the radiated emission limits specified in §15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

3.2 Test Configuration



3.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.

Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m.

The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

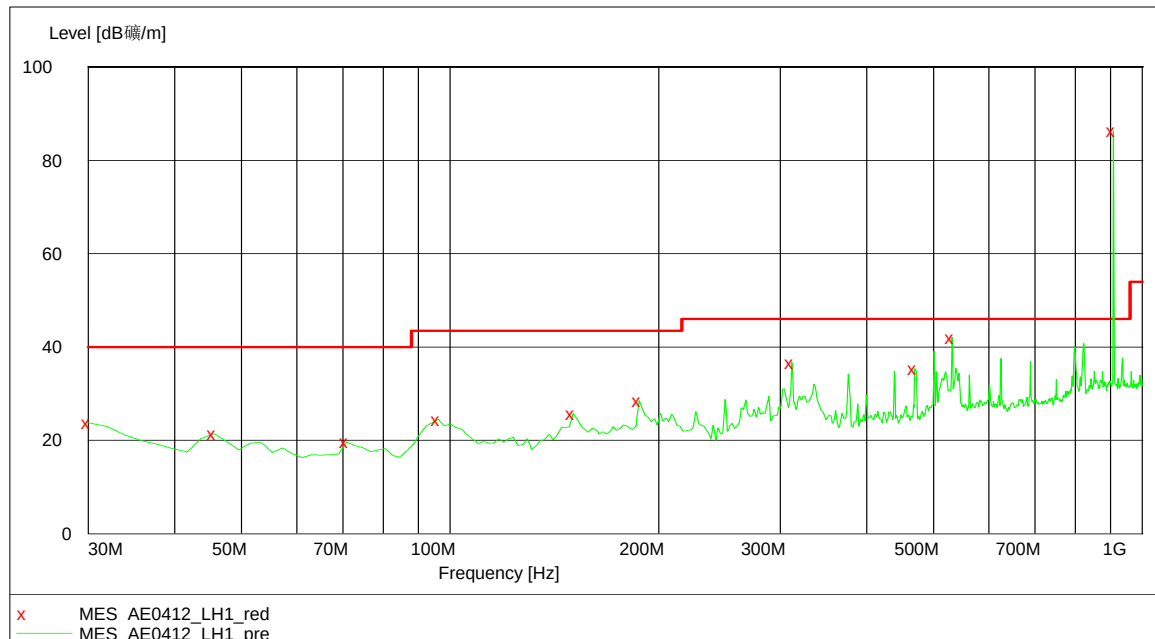
RBW = 300 Hz, VBW = 1 kHz (9 kHz~150 kHz);
RBW = 10 kHz, VBW = 30 kHz (150 kHz~30MHz);
RBW = 100 kHz, VBW = 300 kHz (30MHz~1GHz for PK)
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

3.4 Test protocol

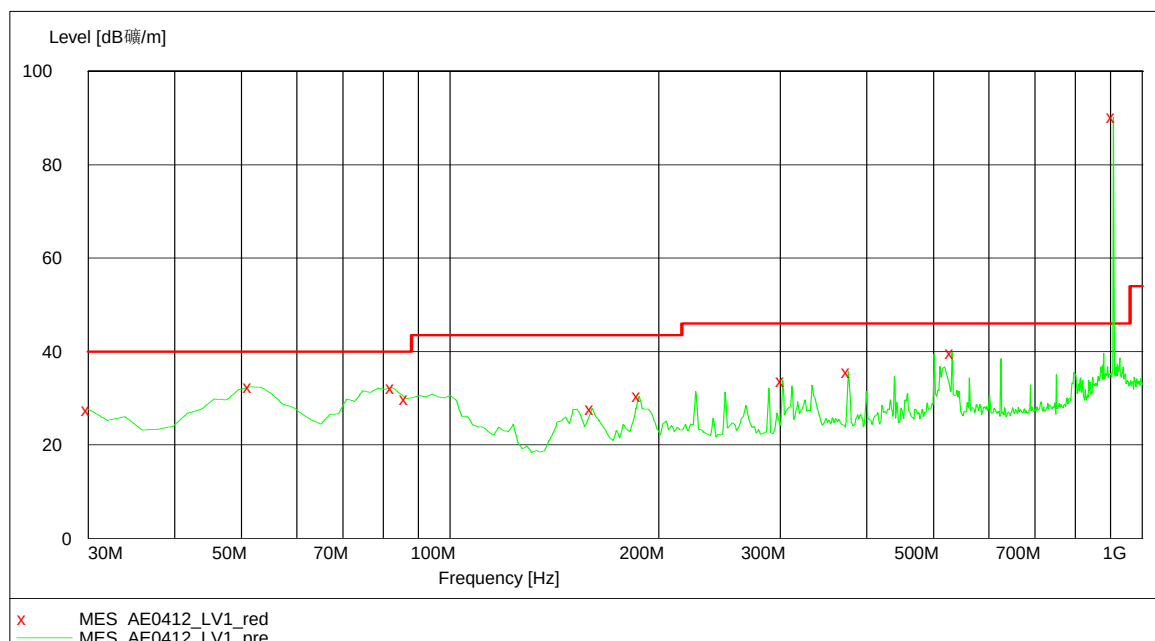
Temperature : 20 °C
Relative Humidity : 52 %

Working at 908.4MHz:

Horizontal



Vertical

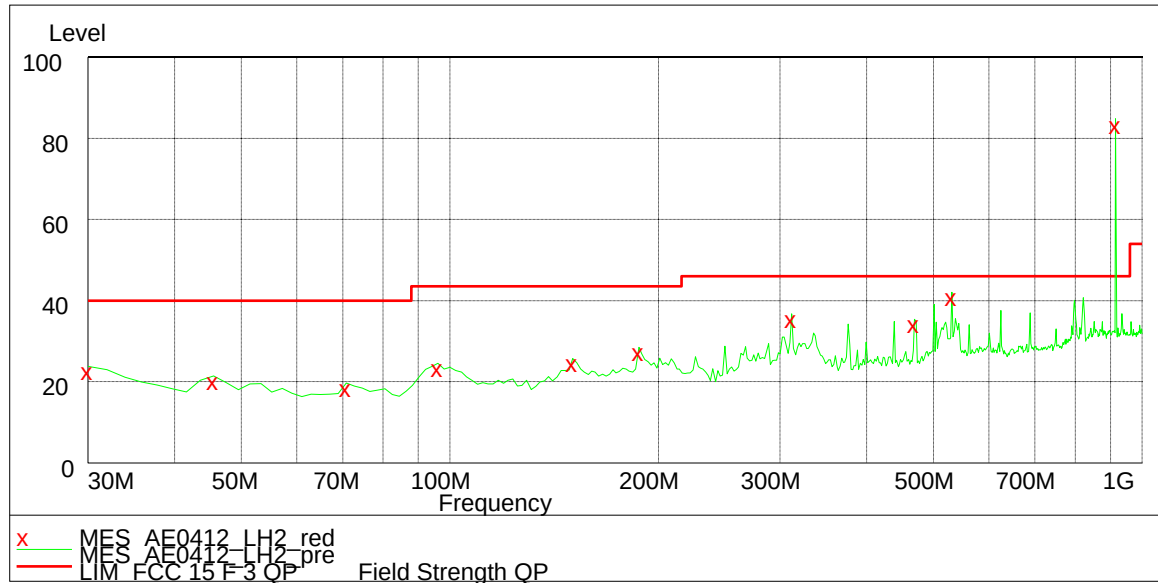


Test data:

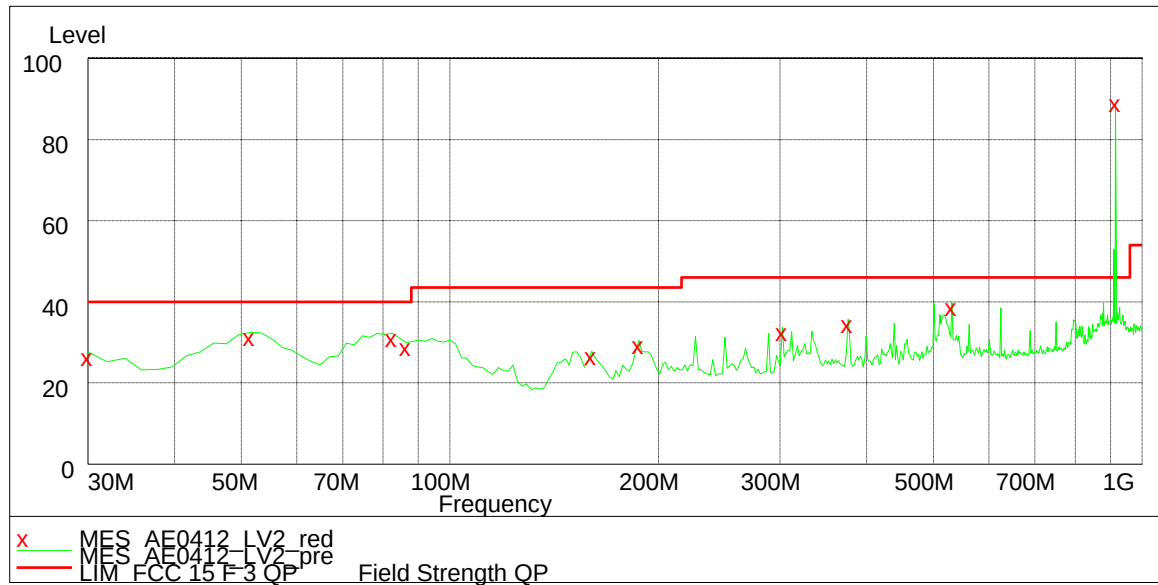
CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
-	H	30.00	23.80	21.00	40.00	16.20	PK
	H	311.86	36.70	15.90	46.00	9.30	PK
	H	531.52	42.10	20.70	46.00	3.90	PK
	H	908.44	86.30	25.00	94.00	7.70	PK
	H	1816.26	49.30	29.30	54.00	4.70	PK
	V	30.00	27.60	21.00	40.00	12.40	PK
	V	51.38	32.40	9.20	40.00	7.60	PK
	V	531.52	39.80	20.70	46.00	6.20	PK
	V	908.44	90.20	25.00	94.00	3.80	PK
	V	1816.26	49.40	29.30	54.00	4.60	PK

Working at 916.0MHz:

Horizontal



Vertical



Test data:

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
-	H	30.00	23.80	21.00	40.00	16.20	PK
	H	311.86	36.70	15.90	46.00	9.30	PK
	H	531.52	42.10	20.70	46.00	3.90	PK
	H	916.40	85.30	25.00	94.00	8.70	PK
	H	1832.58	48.20	29.30	54.00	5.80	PK
	V	30.00	27.60	21.00	40.00	12.40	PK
	V	51.38	32.40	9.20	40.00	7.60	PK
	V	531.52	39.80	20.70	46.00	6.20	PK
	V	916.25	88.20	25.00	94.00	5.80	PK
	V	1832.60	48.30	29.30	54.00	5.70	PK

Remark:

1. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed);
2. Corrected Reading = Original Receiver Reading + Correct Factor;
3. Margin = Limit – Corrected Reading;
4. If the PK Corrected reading is lower than AV limit, the AV test can be elided;

Example:

Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV,
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m,
Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m,
Assuming limit = 54dBuV/m, Corrected Reading = 10.20dBuV/m,
Then Margin = 54 - 10.20 = 43.80dBuV/m.

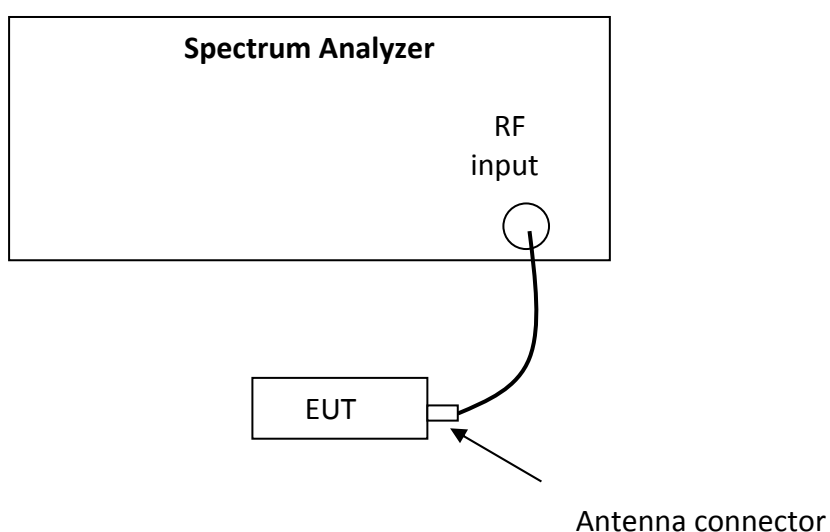
4 Assigned bandwidth (20dB bandwidth)

Test result: Pass

4.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission is contained within the allocated frequency band.

4.2 Test Configuration



4.3 Test procedure and test setup

The 20dB Bandwidth per FCC §15.215(c) is measured using the Spectrum Analyzer. Set Span = 2 to 3 times the 20 dB bandwidth, RBW = approximately 1% of the 20 dB bandwidth, VBW>RBW, Sweep = auto, Detector = peak, Trace = max hold. The test was performed at 3 channels (lowest, middle and highest channel).

4.4 Test protocol

Temperature : 20°C
Relative Humidity : 52 %

Mode	Channel Frequency	20dB Bandwidth (kHz)	F _L (MHz)	F _H (MHz)
1	908.4MHz	83.15	> 902	< 928



Mode	Channel Frequency	20dB Bandwidth (kHz)	F _L (MHz)	F _H (MHz)
2	916.0MHz	83.28	> 902	< 928



5 Power line conducted emission

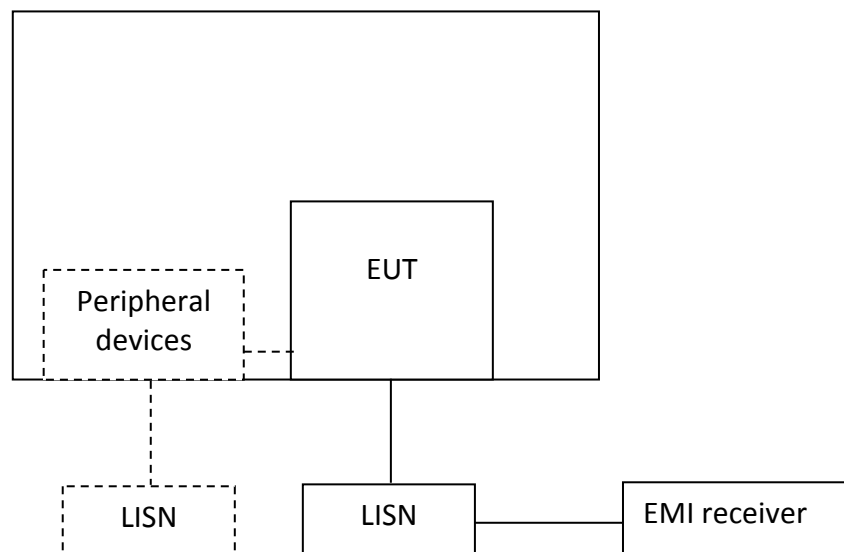
Test result: Pass

5.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

5.2 Test configuration



☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

5.3 Test procedure and test set up

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

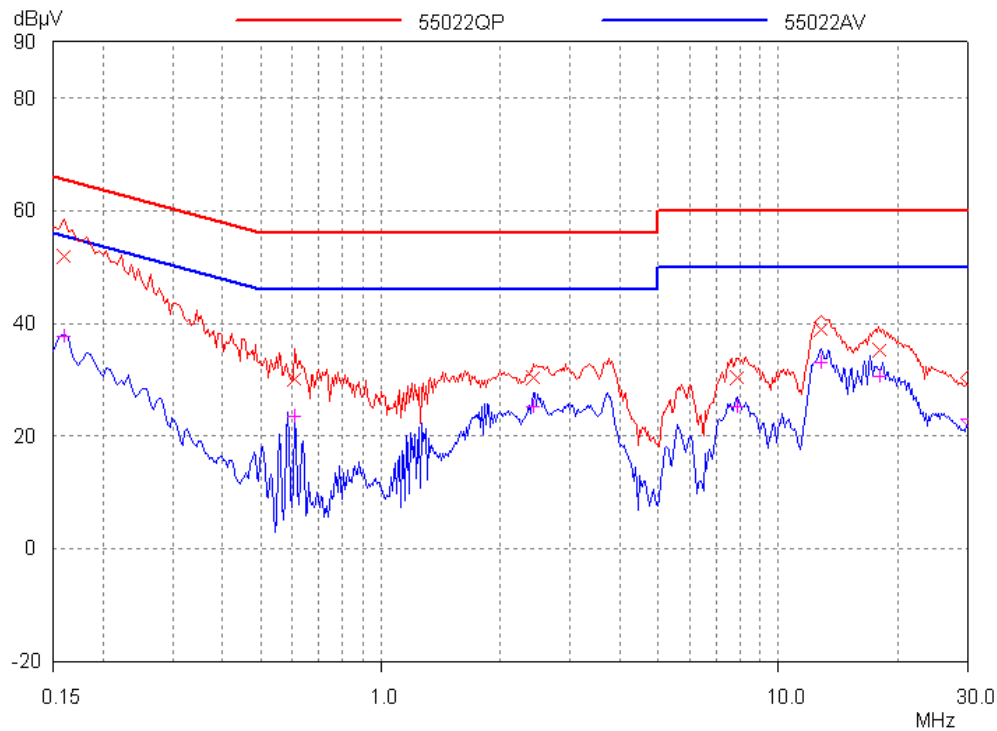
The bandwidth of the test receiver is set at 9 kHz.

5.4 Test protocol

Temperature : 20°C
Relative Humidity : 54%

L line:

Test Curve:

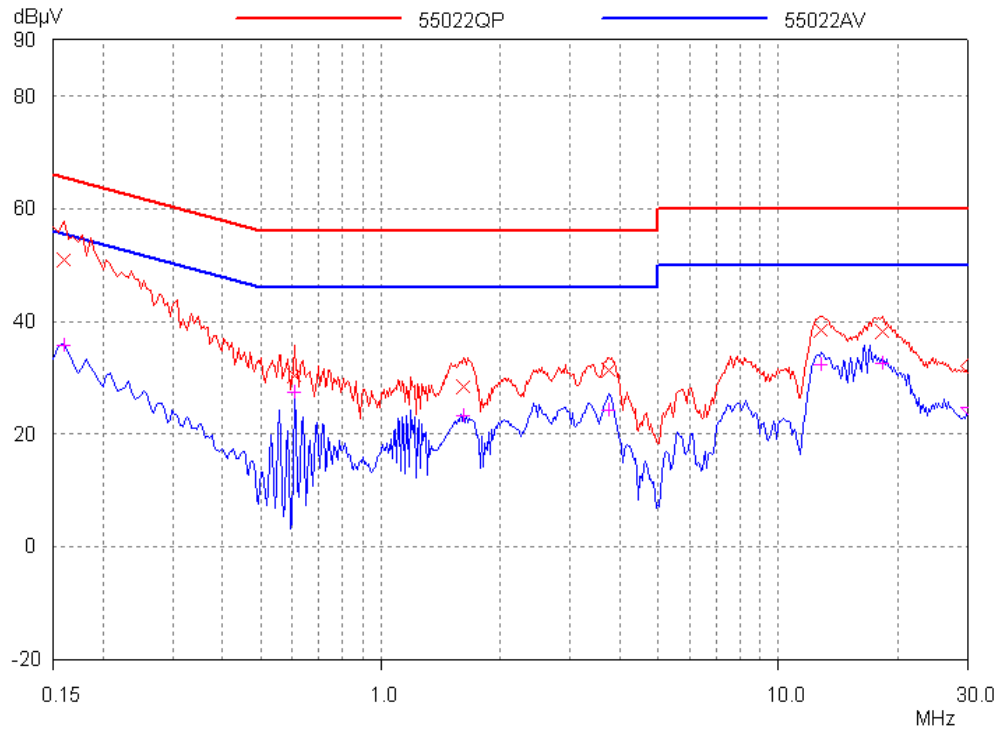


Test Data:

Frequency (MHz)	Quasi-peak			Frequency (MHz)	Average		
	Level dB(μV)	Limit dB(μV)	Margin dB		Level dB(μV)	Limit dB(μV)	Margin dB
0.159	52.00	65.52	13.52	0.159	37.66	55.52	17.86
0.6045	30.03	56.00	25.97	0.6045	23.60	46.00	22.40
2.4045	30.43	56.00	25.57	2.4045	25.16	46.00	20.84
7.8225	30.41	60.00	29.59	7.8225	25.28	50.00	24.72
12.714	38.89	60.00	21.11	12.714	32.96	50.00	17.04
17.889	35.15	60.00	24.85	17.889	30.52	50.00	19.48

N line:

Test Curve:



Test Data:

Frequency (MHz)	Quasi-peak			Frequency (MHz)	Average		
	Level dB(μV)	Limit dB(μV)	Margin dB		Level dB(μV)	Limit dB(μV)	Margin dB
0.159	51.01	65.52	14.51	0.159	35.72	0.159	35.72
0.609	30.45	56.00	25.55	0.609	27.35	0.609	27.35
1.6125	28.50	56.00	27.50	1.6125	23.23	1.6125	23.23
3.723	31.45	56.00	24.55	3.723	24.31	3.723	24.31
12.777	38.36	60.00	21.64	12.777	32.27	12.777	32.27
18.276	38.14	60.00	21.86	18.276	32.44	18.276	32.44

Note: The worst mode working frequency at 908.4MHz was chosen to list in the report as representative.