

FCC TEST REPORT
FOR
Shenzhen Kelvin Electronics Co., Ltd.
Receiver
Model No.: CG2CH16RX433

Prepared for : Shenzhen Kelvin Electronics Co., Ltd.
Address : Floor3 Block7 Huaxing district Shilongkeng Village
Shuijing Buji Street Longgang District Shenzhen
Guangdong P.R China

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : March 03, 2016
Number of tested samples : 1
Serial number : CG2CH16RX433
Date of Test : March 03, 2016 - March 10, 2016
Date of Report : March 10, 2016

FCC TEST REPORT**FCC CFR 47 PART 15 Subpart B: 2015****Report Reference No. : LCS1603030312E**

Date Of Issue : March 10, 2016

Testing Laboratory Name : Shenzhen LCS Compliance Testing Laboratory Ltd.Address : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue,
Bao'an District, Shenzhen, Guangdong, ChinaTesting Location/ Procedure : Full application of Harmonised standards ☒
Partial application of Harmonised standards ☐
Other standard testing method ☐**Applicant's Name : Shenzhen Kelvin Electronics Co., Ltd.**Address : Floor3 Block7 Huaxing district Shilongkeng Village Shuijing Buji
Street Longgang District Shenzhen Guangdong P.R China**Test Specification**

Standard : FCC CFR 47 PART 15 Subpart B: 2015, ANSI C63.4-2015

Test Report Form No. : LCSEMC-1.0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

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Test Item Description..... : Receiver

Trade Mark : N/A

Model/Type Reference : CG2CH16RX433

Ratings : Input: DC 5-12V

Result : Positive**Compiled by:**

Aking Jin/ File administrators

Supervised by:

Glin Lu/ Technique principal

Approved by:

Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : LCS1603030312EMarch 10, 2016

Date of issue

Type / Model..... : CG2CH16RX433

EUT..... : Receiver

Applicant..... : Shenzhen Kelvin Electronics Co., Ltd.Address..... : Floor3 Block7 Huaxing district Shilongkeng Village Shuijing
Buji Street Longgang District Shenzhen Guangdong P.R China

Telephone..... : /

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Manufacturer..... : Shenzhen Kelvin Electronics Co., Ltd.Address..... : Floor3 Block7 Huaxing district Shilongkeng Village Shuijing
Buji Street Longgang District Shenzhen Guangdong P.R China

Telephone..... : /

Fax..... : /

Factory..... : Shenzhen Kelvin Electronics Co., Ltd.Address..... : Floor3 Block7 Huaxing district Shilongkeng Village Shuijing
Buji Street Longgang District Shenzhen Guangdong P.R China

Telephone..... : /

Fax..... : /

Test Result according to the standards on page 5: **Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION			
Description of Test Item	Standard	Limits	Results
Conducted disturbance at mains terminals	FCC CFR 47 PART 15 Subpart B: 2015	Class B	PASS
Radiated disturbance	FCC CFR 47 PART 15 Subpart B: 2015	Class B	PASS

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : Receiver

Model Number : CG2CH16RX433

Power Supply : Input: DC 5-12V

Frequency Range : 433.92MHz

Modulation Technology : ASK

Antenna Type and Gain : Integral Antenna, 3.0dBi (Max.)

2.2. Description of Test Facility

EMC Lab. : CNAS Registration Number. is L4595.

FCC Registration Number. is 899208.

Industry Canada Registration Number. is 9642A-1.

VCCI Registration Number. is C-4260 and R-3804.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001

There is one 3m semi-anechoic chamber and one line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4:2014, CISPR 22/EN 55022 and CISPR16-1-4:2010 SVSWR requirements.

2.3.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 LCS 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.

2.4.Measurement Uncertainty

Test Item	Frequency Range	Expanded uncertainty (U _{lab})	Expanded uncertainty (U _{cispr})
Conducted Emission	(9kHz to 150kHz)	2.63 dB	4.0 dB
	(150kHz to 30MHz)	2.35 dB	3.6 dB
Radiated Emission	(9kHz to 30MHz)	3.68 dB	N/A
Radiated Emission	(30MHz to 1000MHz)	3.48 dB	5.2 dB
Radiated Emission	(above 1000MHz)	3.90 dB	N/A

- (1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.
- (2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

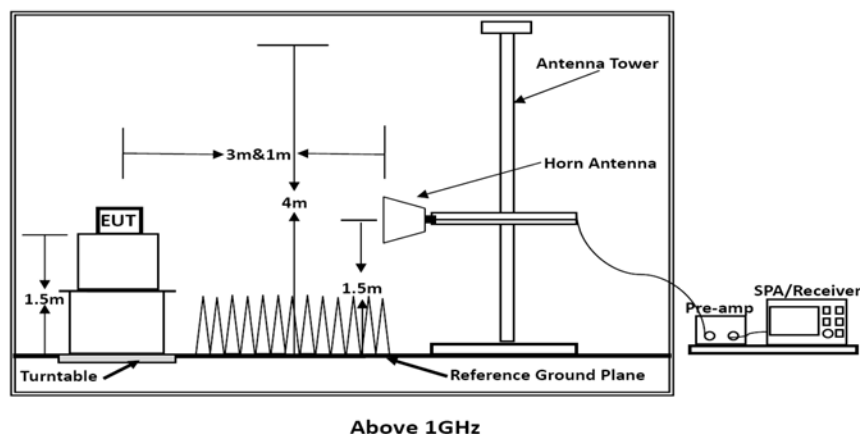
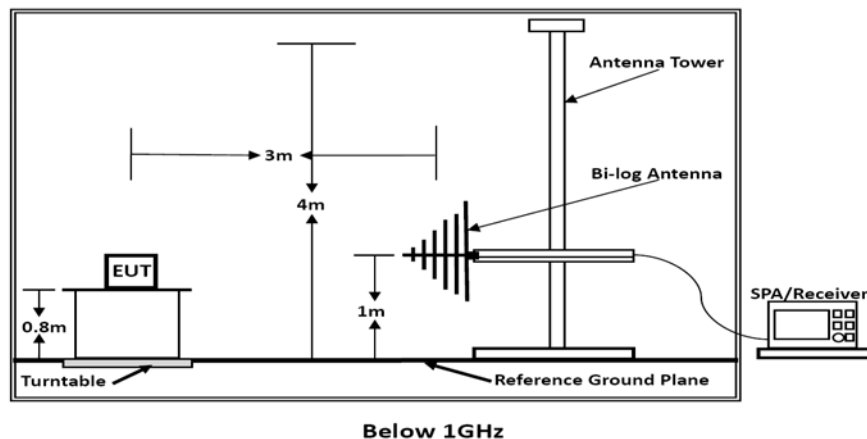
3. RADIATED EMISSION MEASUREMENT

3.1. Test Equipment

The following test equipments are used during the radiated emission measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2016/02/04
2	EMI Test Receiver	ROHDE & SCHWARZ	ESPI	101840	2016/06/18
3	Log per Antenna	SCHWARZBECK	VULB9163	9163-470	2016/06/18
4	EMI Test Software	AUDIX	E3	N/A	2016/06/18
5	Positioning Controller	MF	MF-7082	/	2016/06/18

3.2. Block Diagram of Test Setup



3.3. Radiated Emission Limit (Class B)

Limits for radiated disturbance Blow 1GHz

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46
960 ~ 1000	3	500	54
Remark : (1) Emission level $(\text{dB})\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$ (2) The smaller limit shall apply at the cross point between two frequency bands. (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.			

3.4. EUT Configuration on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

3.5. Operating Condition of EUT

4.5.1. Setup the EUT as shown in Section 4.2.

4.5.2. Let the EUT work in test mode (on) and measure it.

3.6. Test Procedure

EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated by-log antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2009 on radiated emission measurement. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Below 1G:

The bandwidth of the EMI test receiver is set at 120kHz, 1000kHz.

The frequency range from 30MHz to 1000MHz is checked.

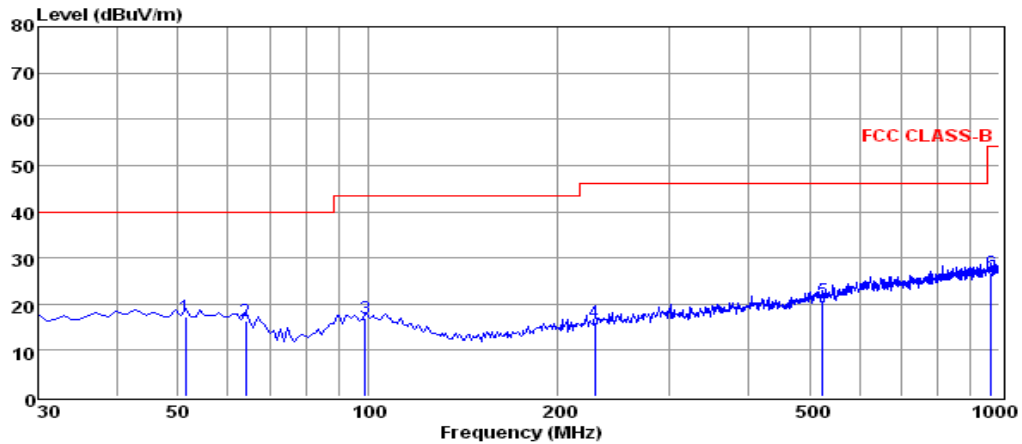
Above 1G:

The bandwidth of the EMI test receiver is set at 1MHz, 3MHz for Peak detector.

The bandwidth of the EMI test receiver is set at 1MHz, 10Hz for Average detector

The frequency range from 1GHz to 26.5GHz is checked.

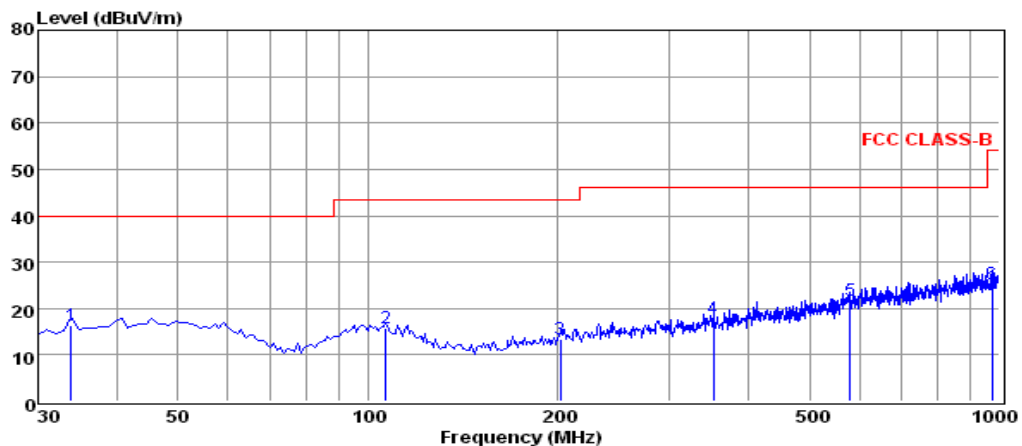
3.7. Radiated Emission Noise Measurement Result PASS.



Env./Ins: 24°C/56%
pol: VERTICAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	51.34	3.41	0.54	13.19	17.14	40.00	-22.86	QP
2	63.95	4.60	0.48	11.13	16.21	40.00	-23.79	QP
3	98.87	3.20	0.61	13.09	16.90	43.50	-26.60	QP
4	228.85	3.68	0.93	11.59	16.20	46.00	-29.80	QP
5	524.70	2.28	1.45	17.04	20.77	46.00	-25.23	QP
6	969.93	3.31	1.91	21.54	26.76	54.00	-27.24	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the official limit are not reported



Env./Ins: 24°C/56%
pol: HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	33.88	3.55	0.37	12.31	16.23	40.00	-23.77	QP
2	106.63	2.63	0.68	12.56	15.87	43.50	-27.63	QP
3	201.69	1.99	0.82	10.62	13.43	43.50	-30.07	QP
4	352.04	2.32	1.15	14.31	17.78	46.00	-28.22	QP
5	579.99	2.11	1.44	18.08	21.63	46.00	-24.37	QP
6	972.84	1.59	2.04	21.56	25.19	54.00	-28.81	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the official limit are not reported

Test Mode: Receive	Tested by: Aking
Test voltage: DC 5V	Test Distance: 3m
Detector Function: Peak+AV	Test Results: Passed

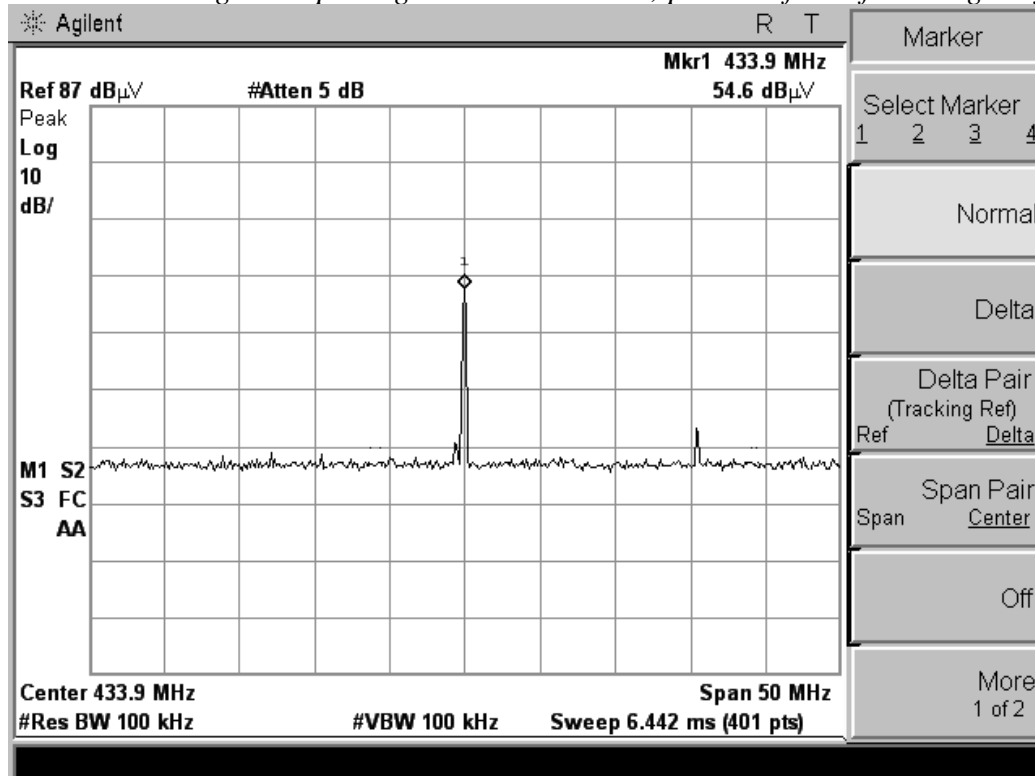
Polarization	Frequency MHz	Emission Level dB μ V/m		Limits dB μ V/m		Margin dB μ V/m	
		Peak	AVG	Peak	AVG	Peak	AVG
Horizontal	1257.23	57.25	44.26	74.00	54.00	-16.75	-9.74
	2963.61	55.36	42.12	74.00	54.00	-18.64	-11.88
	4820.87	58.23	43.25	74.00	54.00	-15.68	-10.75
Vertical	1357.26	55.32	41.32	74.00	54.00	-18.68	-12.68
	3257.38	60.12	41.64	74.00	54.00	-13.88	-12.36
	5102.46	55.47	41.46	74.00	54.00	-18.53	-12.54

Notes:

1. Measuring frequencies from 9k~26.5GHz , No emission found between lowest internal used/generated frequency to 30MHz.
2. Radiated emissions measured in frequency range from 9k~26.5GHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measure

Receiver Type:

The receiver not belongs to Super regenerative Receiver; please refer to following confirm plots.



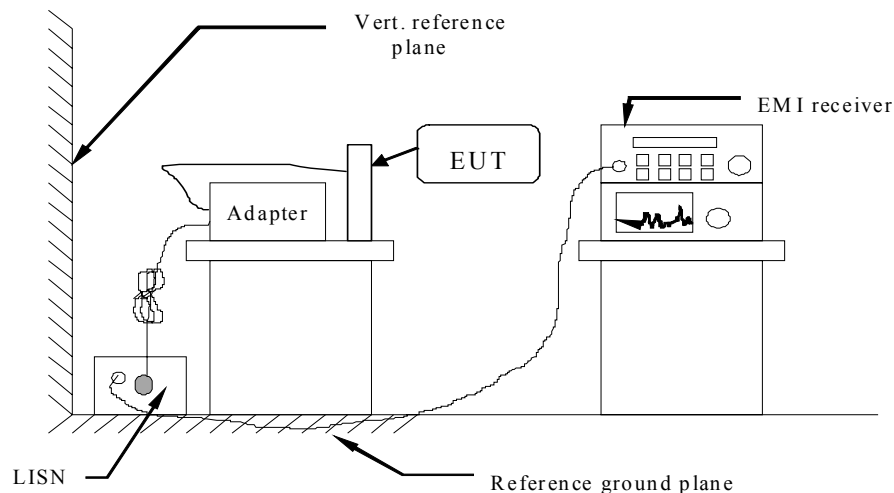
4. POWER LINE CONDUCTED EMISSIONS

4.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

4.2 Block Diagram of Test Setup

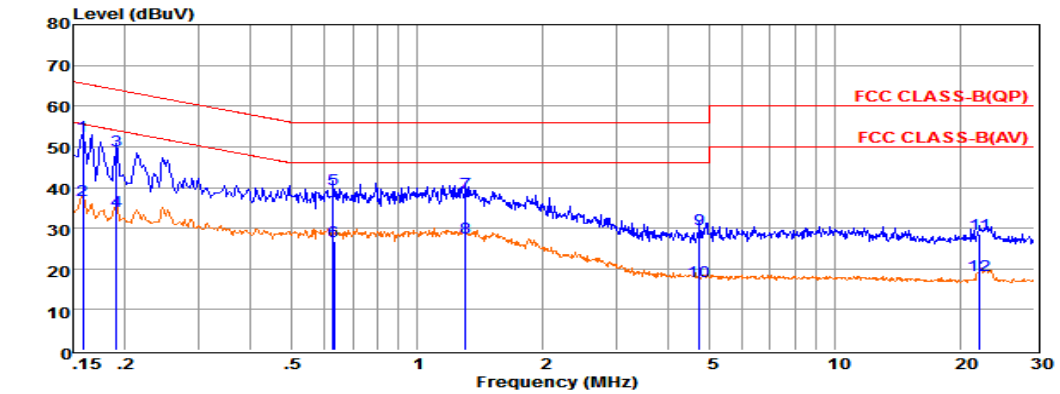


4.3 Test Results

PASS.

The test data please refer to following page.

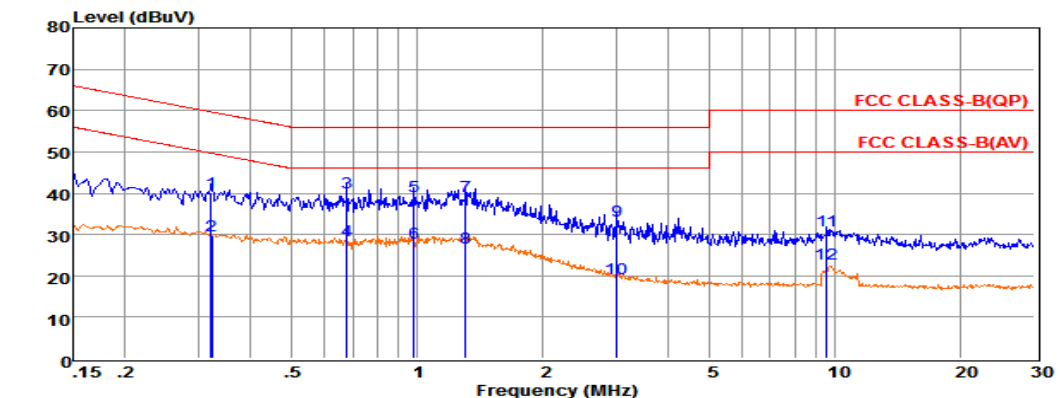
Test plot for AC 120V



Env. Ins: 24*/56%
Power Rating: AC 120V/60Hz
Pol: LINE

	Freq	Reading	LisnFac	CabLos	Atten_Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.15816	33.08	9.58	0.02	10.00	52.68	65.56	-12.88	QP
2	0.15826	17.17	9.58	0.02	10.00	36.77	55.55	-18.78	Average
3	0.19039	29.33	9.62	0.02	10.00	48.97	64.02	-15.05	QP
4	0.19049	14.65	9.62	0.02	10.00	34.29	54.02	-19.73	Average
5	0.63048	19.98	9.63	0.04	10.00	39.65	56.00	-16.35	QP
6	0.63058	7.05	9.63	0.04	10.00	26.72	46.00	-19.28	Average
7	1.30290	19.07	9.63	0.05	10.00	38.75	56.00	-17.25	QP
8	1.30390	8.04	9.63	0.05	10.00	27.72	46.00	-18.28	Average
9	4.74638	10.14	9.65	0.06	10.00	29.85	56.00	-26.15	QP
10	4.74738	-2.64	9.65	0.06	10.00	17.07	46.00	-28.93	Average
11	122.18005	8.72	9.71	0.12	10.00	28.55	60.00	-31.45	QP
12	122.18105	-1.32	9.71	0.12	10.00	18.51	50.00	-31.49	Average

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss+Atten_Fac.
2. The emission levels that are 20dB below the official limit are not reported.

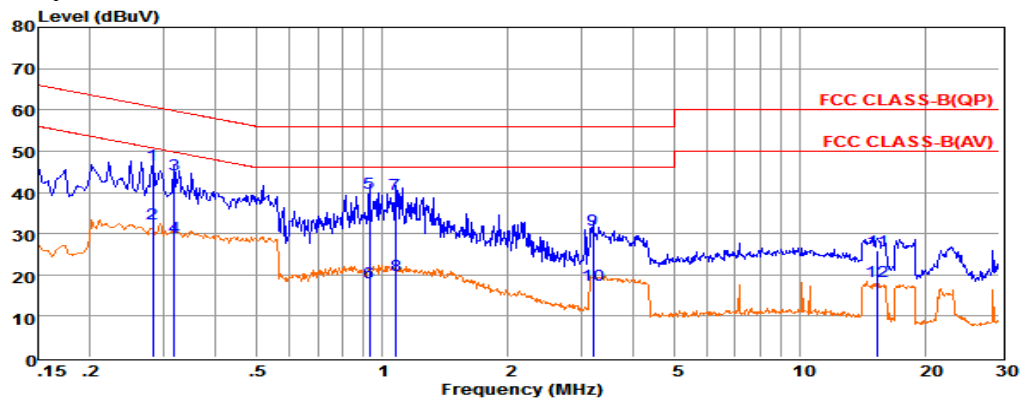


Env. Ins: 24*/56%
Power Rating: AC 120V/60Hz
Pol: NEUTRAL

	Freq	Reading	LisnFac	CabLos	Atten_Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.32169	20.63	9.61	0.03	10.00	40.27	59.66	-19.39	QP
2	0.32179	10.19	9.61	0.03	10.00	29.83	49.66	-19.83	Average
3	0.67902	20.54	9.63	0.04	10.00	40.21	56.00	-15.79	QP
4	0.67912	9.01	9.63	0.04	10.00	28.68	46.00	-17.32	Average
5	0.98391	19.66	9.63	0.05	10.00	39.34	56.00	-16.66	QP
6	0.98401	8.34	9.63	0.05	10.00	28.02	46.00	-17.98	Average
7	1.30290	19.47	9.63	0.05	10.00	39.15	56.00	-16.85	QP
8	1.30390	7.23	9.63	0.05	10.00	26.91	46.00	-19.09	Average
9	3.00936	13.48	9.64	0.06	10.00	33.18	56.00	-22.82	QP
10	3.01036	-0.47	9.64	0.06	10.00	19.23	46.00	-26.77	Average
11	9.55210	11.17	9.72	0.08	10.00	30.97	60.00	-29.03	QP
12	9.55310	3.09	9.72	0.08	10.00	22.89	50.00	-27.11	Average

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss+Atten_Fac.
2. The emission levels that are 20dB below the official limit are not reported.

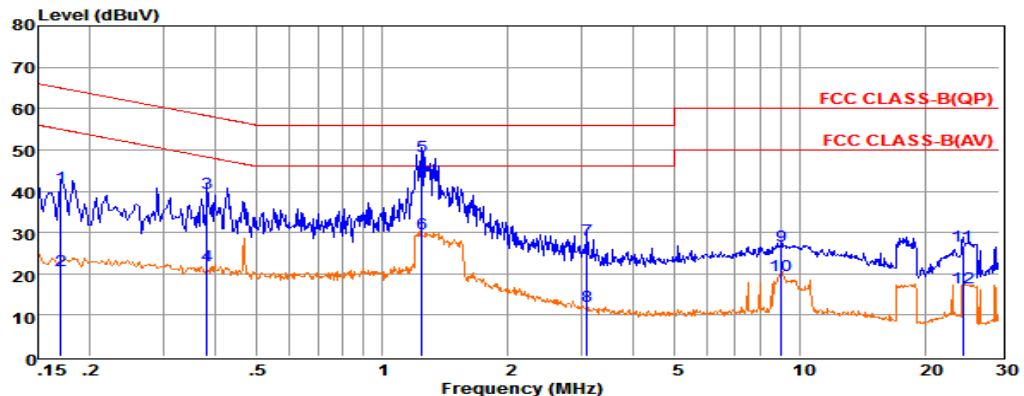
Test plot for AC 240V



Env. Ins: 24*/56%
Power Rating: AC 240V/60Hz
Pol: NEUTRAL

	Freq	Reading	LisnFac	CabLos	Atten_Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.28178	26.99	9.60	0.03	10.00	46.62	60.76	-14.14	QP
2	0.28188	12.64	9.60	0.03	10.00	32.27	50.76	-18.49	Average
3	0.31830	24.72	9.61	0.03	10.00	44.36	59.75	-15.39	QP
4	0.31840	9.61	9.61	0.03	10.00	29.25	49.75	-20.50	Average
5	0.93314	20.12	9.63	0.05	10.00	39.80	56.00	-16.20	QP
6	0.93324	-1.59	9.63	0.05	10.00	18.09	46.00	-27.91	Average
7	1.07665	19.81	9.63	0.05	10.00	39.49	56.00	-16.51	QP
8	1.07765	0.13	9.63	0.05	10.00	19.81	46.00	-26.19	Average
9	3.18996	11.36	9.65	0.06	10.00	31.07	56.00	-24.93	QP
10	3.19096	-2.25	9.65	0.06	10.00	17.46	46.00	-28.54	Average
11	115.30701	6.11	9.74	0.10	10.00	25.95	60.00	-34.05	QP
12	115.30801	-1.29	9.74	0.10	10.00	18.55	50.00	-31.45	Average

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss+Atten_Fac.
2. The emission levels that are 20dB below the official limit are not reported.



Env. Ins: 24*/56%
Power Rating: AC 240V/60Hz
Pol: LINE

	Freq	Reading	LisnFac	CabLos	Atten_Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.17034	21.29	9.60	0.02	10.00	40.91	64.94	-24.03	QP
2	0.17044	1.31	9.60	0.02	10.00	20.93	54.94	-34.01	Average
3	0.38113	19.85	9.62	0.04	10.00	39.51	58.25	-18.74	QP
4	0.38123	2.21	9.62	0.04	10.00	21.87	48.25	-26.38	Average
5	1.24223	28.78	9.63	0.05	10.00	48.46	56.00	-7.54	QP
6	1.24323	10.20	9.63	0.05	10.00	29.88	46.00	-16.12	Average
7	3.09015	8.60	9.64	0.06	10.00	28.30	56.00	-27.70	QP
8	3.09115	-7.45	9.64	0.06	10.00	12.25	46.00	-33.75	Average
9	9.01130	6.95	9.69	0.08	10.00	26.72	60.00	-33.28	QP
10	9.01230	-0.03	9.69	0.08	10.00	19.74	50.00	-30.26	Average
11	1124.52913	7.06	9.71	0.13	10.00	26.90	60.00	-33.10	QP
12	1124.53013	-3.21	9.71	0.13	10.00	16.63	50.00	-33.37	Average

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss+Atten_Fac.
2. The emission levels that are 20dB below the official limit are not reported.

-----THE END OF TEST REPORT-----