

FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

All in One PC

Model: TPC-T011-34

Trade Name: HP

Issued to

INVENTEC CORPORATION
66 Hou-Kang st., Shih-Lin District, Taipei, Taiwan, R.O.C.

Issued by

Compliance Certification Services Inc.
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Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		October 6, 2016		Initial Issue	ALL	Doris Chu

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1. TEST RESULT CERTIFICATION

Applicant: INVENTEC CORPORATION
66 Hou-Kang st., Shih-Lin District, Taipei, Taiwan, R.O.C.

Equipment Under Test: All in One PC

Trade Name: HP

Model: TPC-T011-34

Date of Test: September 19 ~ 26, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15.209	No non-compliance noted

We hereby certify that:

All test results conform to above mentioned standards.

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part15.203, Part15.207, Part15.209, Part15.215.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:



Miller Lee
Section Manager
Compliance Certification Services Inc.

Reviewed by:



Zeus Chen
Engineer
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	All in One PC
Trade Name	HP
Model Number	TPC-T011-34
Model Discrepancy	N/A
Received Date	September 13, 2016
Power Supply	Power form Power Adapter 1. Brand: HP, Model: HSTNN-DA12 I/P: 100-240V, 50-60 Hz, 3.5A O/P: 19.5V, 11.8A 2. Brand: HP, Model: TPC-AA501 I/P: 100-240V, 50-60 Hz, 2.9A O/P: 19.5V, 9.23A
Frequency Band	110k-205kHz
Output Power	Max 5W
Antenna Designation	Integral Antenna

Remark:

1. The sample selected for test was production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **DGI-TPC-T011-34** filing to comply with Section 15.203, 15.207, 15.209 and 15.215 of the FCC Part 15, Subpart C Rules.

3. TEST SUMMERY

Standard Sec.	Chapter	Test Item	Result
15.215	8.1	20dB Bandwidth	Pass
15.209	8.2	Transmitter Radiated Emission	Pass
15.207	8.3	AC Power-line Conducted Emission	Pass
15.203	8.4	Antenna Requirement	Pass

4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 , ANSI 63.4 2014 and FCC CFR 47 Part 15.203, 15.207.15.209,15.215.

4.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.207.15.209, 15.215 under the FCC Rules Part 15 Subpart C and ANSI C63.10: 2013.

4.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in ANSI C63.10: 2013, Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz was using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. The EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in ANSI C63.10: 2013.

4.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in other rules, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided by other rules, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

4.5 DESCRIPTION OF TEST MODES

The EUT (model: TPC-T011-34) had been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting mode was programmed. The worst case data rate is determined as the data rate with highest output power.

After verification, all tests were carried out with the worst case test modes as shown below.

5. INSTRUMENT CALIBRATION

5.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

5.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year and Loop Antenna is scheduled for calibration once three years.

Conducted Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal Due
Spectrum Analyzer	R&S	FSV 40	101073	08/01/16	07/31/17

966 Chamber Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal Due
Spectrum Analyzer	Agilent	E4446A	US42510252	12/08/15	12/07/16
Loop Ant	COM-POWER	AL-130	121051	02/25/16	02/24/17
Bilog Antenna	Sunol Sciences	JB3	A030105	07/03/16	07/02/17
Pre-Amplifier	EMEC	EM330	60609	06/08/16	06/07/17
Horn Antenna	ETC	MCTD 1209	DRH13M02003	09/02/16	09/01/17
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R

Conducted Emissions Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal Due
LISN	SCHWARZBECK	NSLK 8127	8127-541	11/23/15	11/22/16
Receiver	R&S	ESCI	101073	08/20/16	08/19/17

5.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 6dB bandwidth	+/- 1.4003
RF output power, conducted	+/- 1.1372
Power density, conducted	+/- 1.4003
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

6. FACILITIES AND ACCREDITATIONS

6.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

Tel: 886-2-2299-9720 / Fax: 886-2-2299-9721

☐ No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, TAIWAN, R.O.C.

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

7.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Telephone	APPLE	I-PHONE	N/A	CCAI133 G0370T0	N/A	N/A

Remark:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

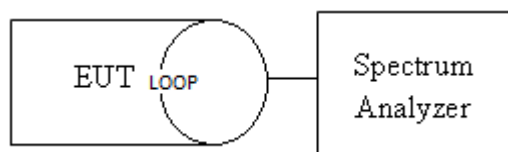
8. TEST REQUIREMENTS

8.1 20DB BANDWIDTH

Definition

According to FCC Part 15.215 (c) ,Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Configuration



TEST PROCEDURE

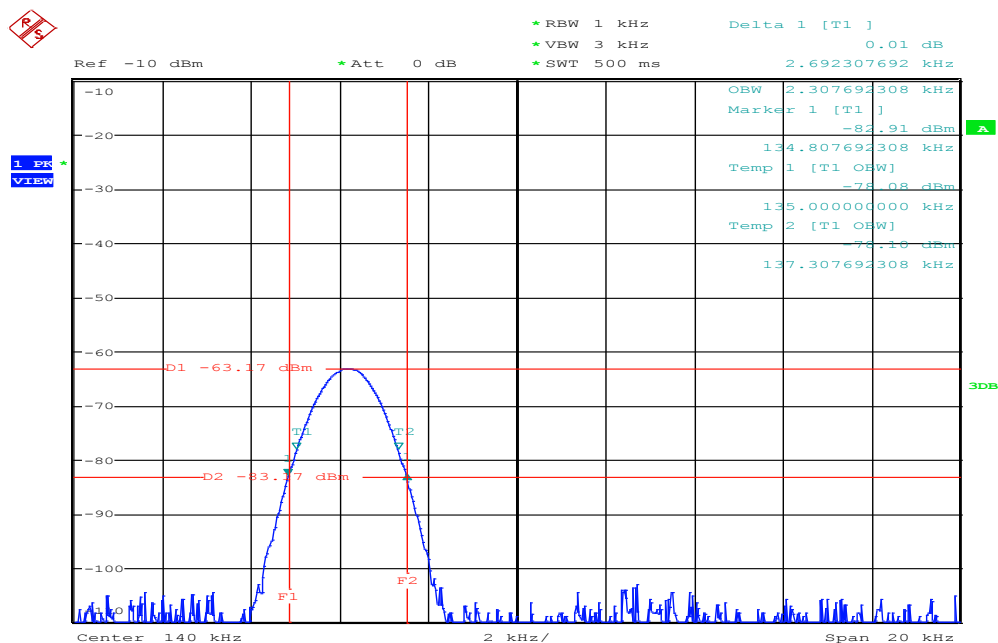
The Loop antenna connected to the spectrum analyzer, was touching to the transmitter antenna. Set the RBW=1KHz, VBW $\geq 3 \times$ RBW, Detector = Peak, Trace mode = Max hold, Sweep = 500ms.Measure the maximum width of the emission that is constrained by the frequencies associated with the Occupied Bandwidth.

TEST RESULTS

No non-compliance noted

Test Condition	Frequency(kHz)	Occupied Bandwidth (kHz)	20dB Bandwidth (kHz)	Limit
Charging mode	110-205	2.3077	2.6923	N/A

Test Data



Date: 20.SEP.2016 14:17:57

8.2 TRANSMITTER RADIATED EMISSION

LIMIT

1. According to FCC PART 15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: Except as provided in other rules, fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the above emission table, the tighter limit applies at the band edges.

Below 30MHz

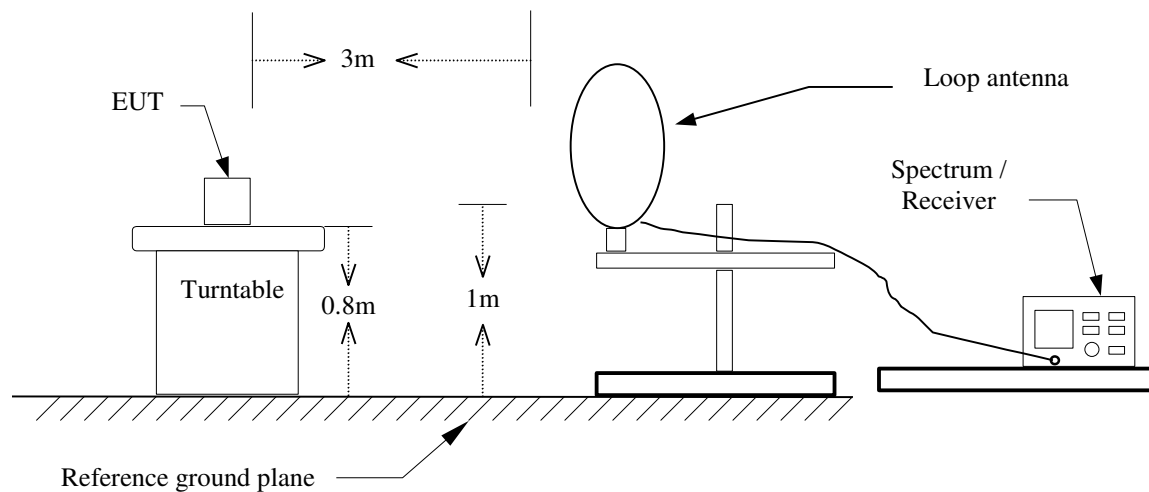
Frequency (MHz)	Field Strength				
	($\mu\text{V/m}$)	(dB $\mu\text{V/m}$)	Measurement Distance (meter)	(dB $\mu\text{V/m}$)	Measurement Distance (meter)
0.009 - 0.490	2400/F(kHz)	48.52 – 13.80	300	128.52–104.84	3
0.490 - 1.705	24000/F(kHz)	33.80 – 22.97	30	73.80– 62.97	3
1.705 – 30.0	30	29.54	30	69.54	3

Above 30MHz

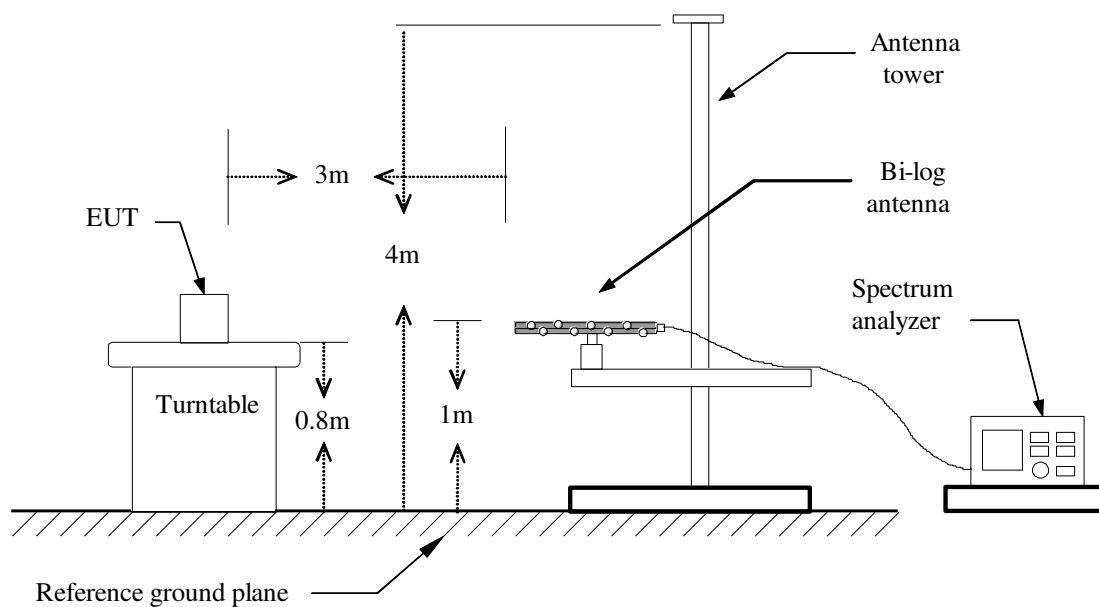
Frequency (MHz)	Field Strength		Measurement Distance (meter)
	($\mu\text{V/m}$)	(dB $\mu\text{V/m}$)	
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Test Configuration

9kHz ~ 30MHz



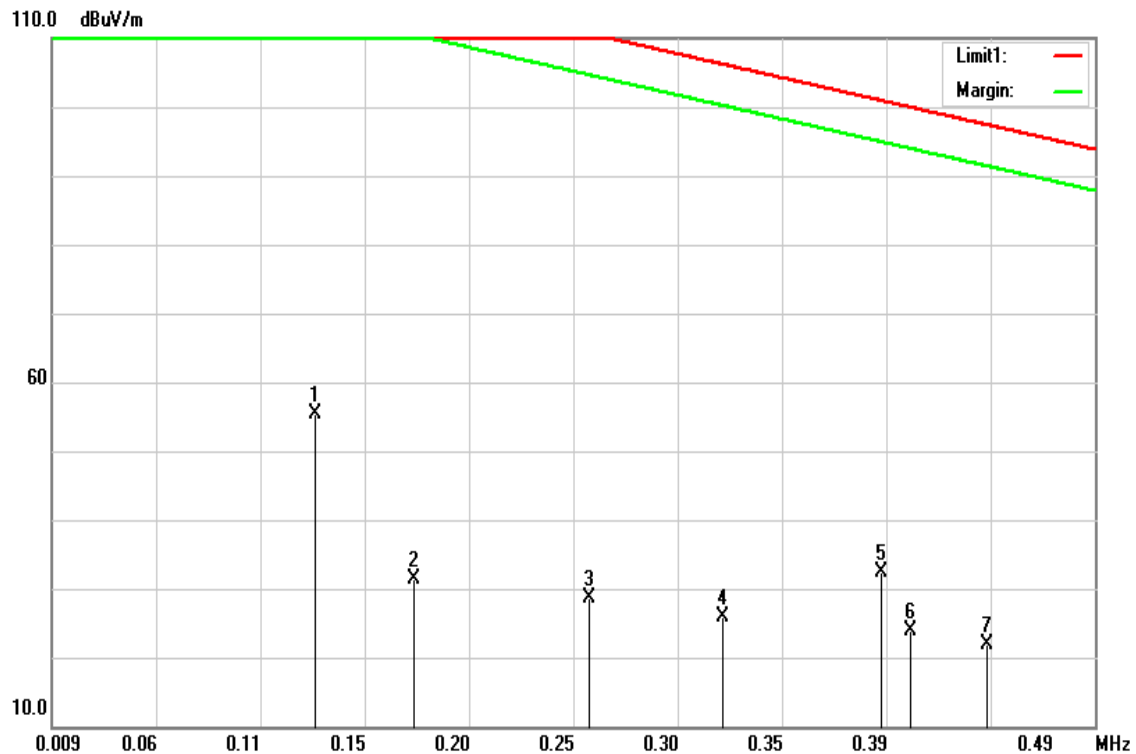
30MHz ~ 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
Below 1GHz:

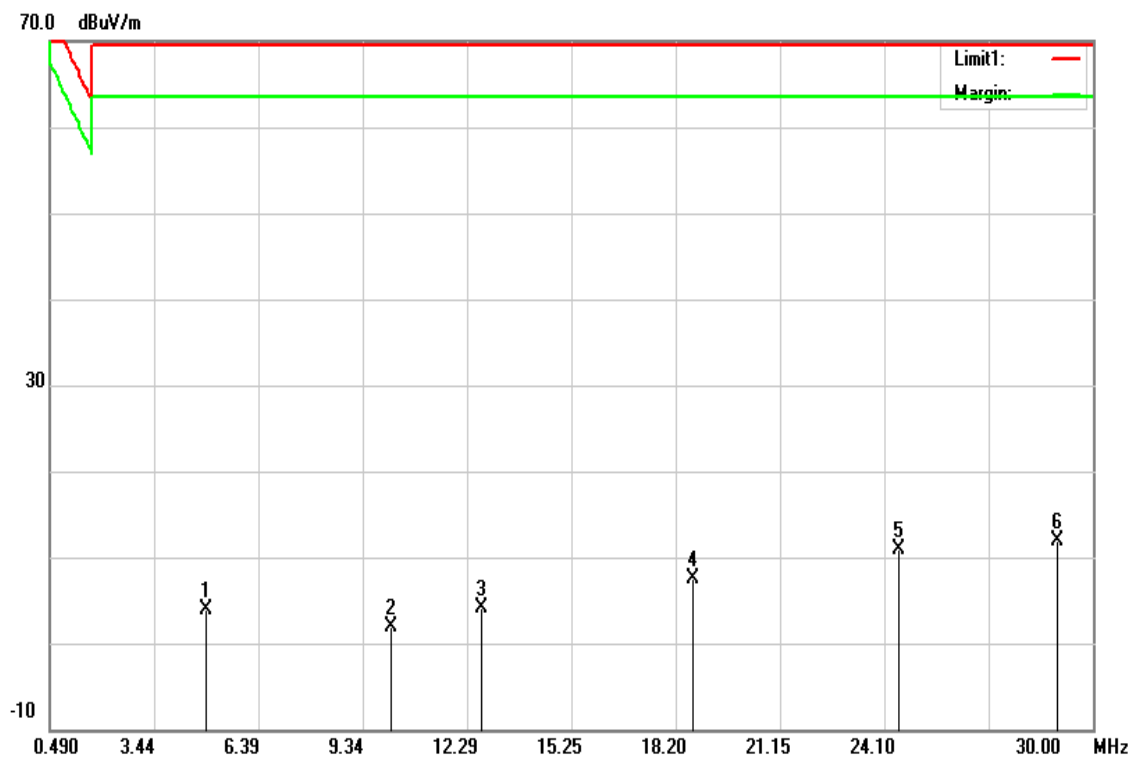
RBW=100kHz / VBW=300kHz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.
8. Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

9 kHz - 490 kHz**Operation Mode:** Charge mode**Test Date:** September 19, 2016**Temperature:** 28°C**Tested by:** Zeus Chen**Humidity:** 53% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
0.1307	72.51	-17.20	55.31	105.28	-49.97	peak
0.1759	48.64	-17.23	31.41	102.70	-71.29	peak
0.2567	45.87	-17.30	28.57	99.42	-70.85	peak
0.3183	43.07	-17.31	25.76	97.55	-71.79	peak
0.3914	49.80	-17.33	32.47	95.75	-63.28	peak
0.4049	41.20	-17.33	23.87	95.46	-71.59	peak
0.4400	39.22	-17.34	21.88	94.74	-72.86	peak

Remark:

- the frequency bands 9-90 kHz, 110-490 kHz measurements employing an average detector and other below 1GHz measurements employing a CISPR quasi-peak detector.

490 kHz - 30 MHz**Operation Mode:** Charge mode**Test Date:** September 19, 2016**Temperature:** 28°C**Tested by:** Zeus Chen**Humidity:** 53% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4.9165	18.54	-14.60	3.94	69.54	-65.60	peak
10.1398	12.62	-10.62	2.00	69.54	-67.54	peak
12.7071	13.18	-8.98	4.20	69.54	-65.34	peak
18.6682	12.74	-5.20	7.54	69.54	-62.00	peak
24.5111	12.63	-1.76	10.87	69.54	-58.67	peak
28.9967	12.06	-0.06	12.00	69.54	-57.54	peak

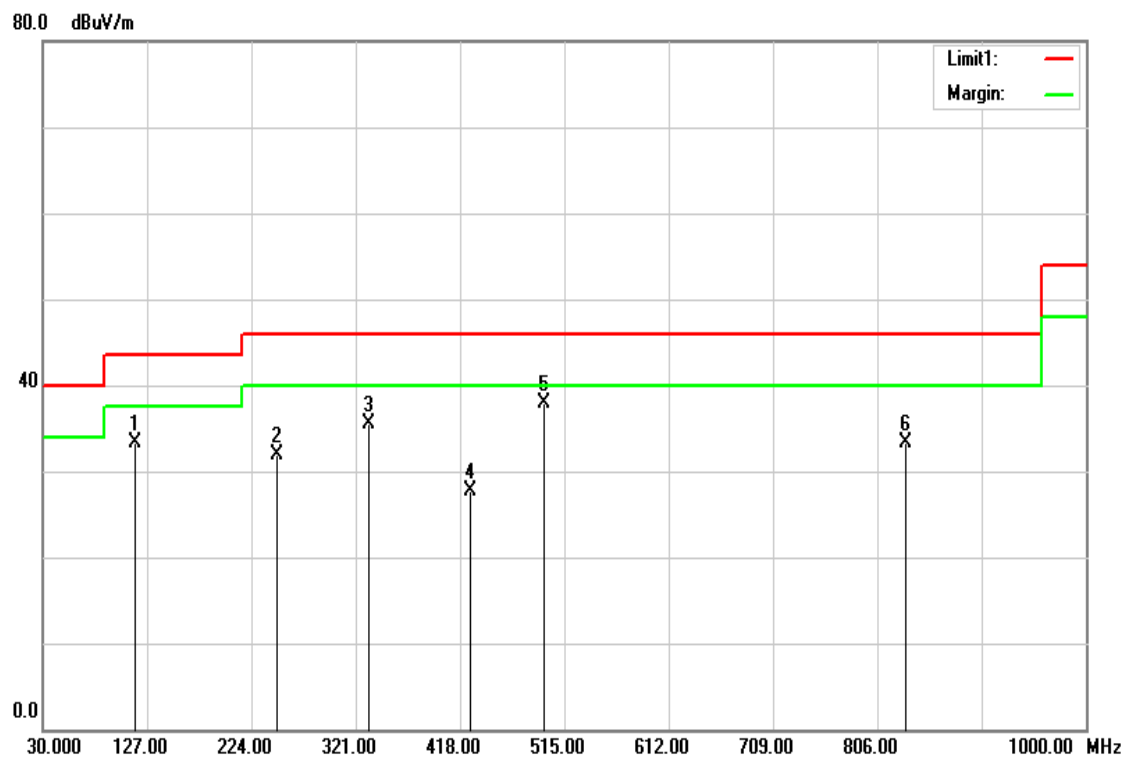
Below 1 GHz**Operation Mode:** Charger Mode**Test Date:** September 19, 2016**Temperature:** 28°C**Tested by:** Zeus Chen**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
115.3600	49.69	-16.32	33.37	43.50	-10.13	peak	V
247.2800	48.31	-16.34	31.97	46.00	-14.03	peak	V
332.6400	48.80	-13.36	35.44	46.00	-10.56	peak	V
427.7000	38.51	-10.86	27.65	46.00	-18.35	QP	V
496.5700	47.17	-9.31	37.86	46.00	-8.14	QP	V
832.1900	37.35	-4.04	33.31	46.00	-12.69	peak	V
159.9800	51.79	-16.36	35.43	43.50	-8.07	peak	H
227.8800	51.53	-16.78	34.75	46.00	-11.25	peak	H
458.7400	44.82	-10.02	34.80	46.00	-11.20	peak	H
820.5500	41.33	-4.20	37.13	46.00	-8.87	peak	H
953.4400	40.81	-2.34	38.47	46.00	-7.53	peak	H
983.5100	43.20	-1.85	41.35	54.00	-12.65	peak	H

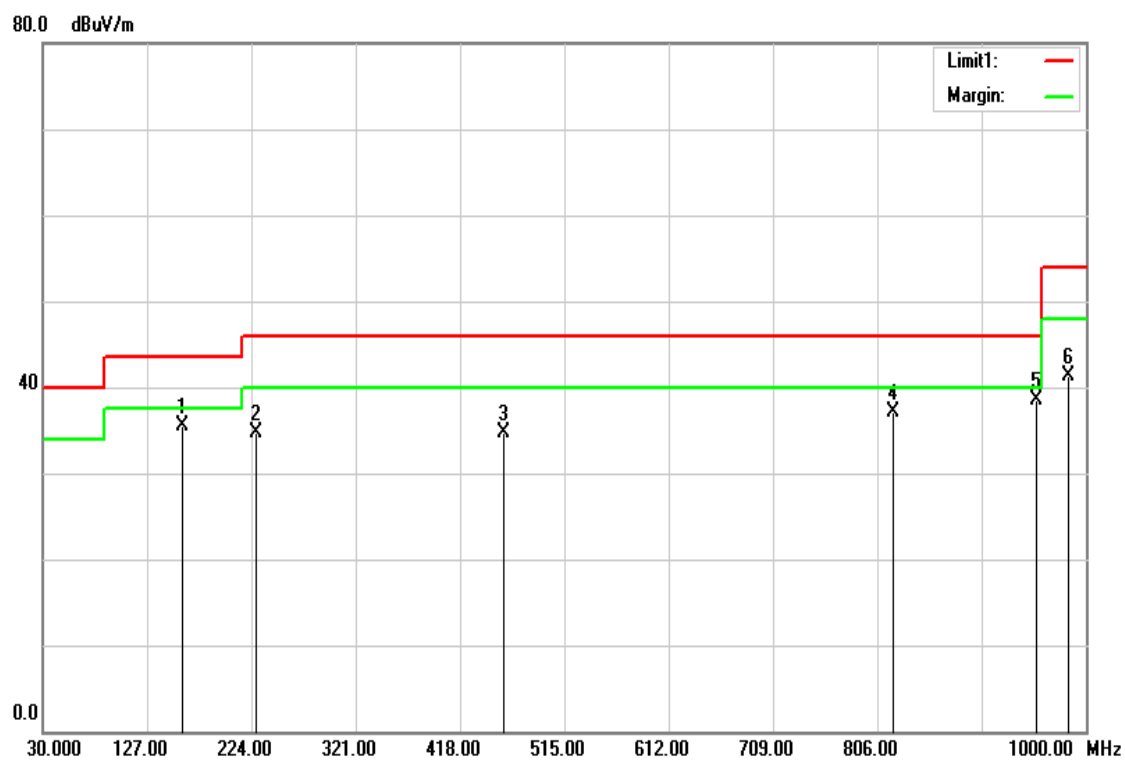
Remark:

1. Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.
2. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
4. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).

Polarity : Vertical



Polarity : Horizontal



8.3 AC CONDUCTED EMISSION

LIMIT

According to §15.207(a) , for an intentional radiator that 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 the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

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

Test Configuration

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete
4. For conduction test, adapter1(Delta) and adapter2(AcBel) were pretest. The worst case was adapter2 in this test report.

TEST RESULTS

No non-compliance noted.

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

TEST RESULTS**Test Data**

Operation Mode: Charger mode **Test Date:** September 26, 2016
Temperature: 24°C **Tested by:** Zeus.Chen
Humidity: 50% RH

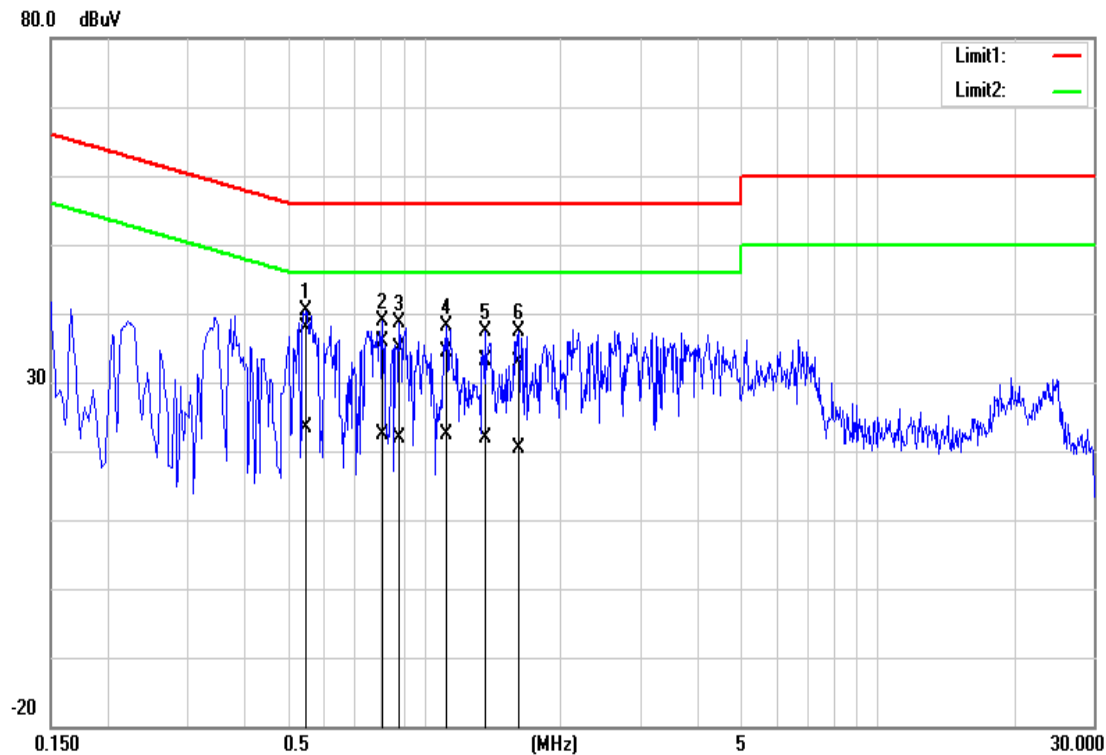
Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB/m)	QP Result (dBuV/m)	AV Result (dBuV/m)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.5500	28.11	13.71	9.70	37.81	23.41	56.00	46.00	-18.19	-22.59	L1
0.8100	26.15	12.73	9.71	35.86	22.44	56.00	46.00	-20.14	-23.56	L1
0.8820	25.07	12.19	9.71	34.78	21.90	56.00	46.00	-21.22	-24.10	L1
1.1220	24.71	12.67	9.71	34.42	22.38	56.00	46.00	-21.58	-23.62	L1
1.3619	23.43	12.04	9.72	33.15	21.76	56.00	46.00	-22.85	-24.24	L1
1.6260	23.15	10.54	9.72	32.87	20.26	56.00	46.00	-23.13	-25.74	L1
0.3780	29.30	18.42	9.76	39.06	28.18	58.32	48.32	-19.26	-20.14	L2
0.5380	29.29	14.02	9.76	39.05	23.78	56.00	46.00	-16.95	-22.22	L2
0.8059	28.07	14.70	9.76	37.83	24.46	56.00	46.00	-18.17	-21.54	L2
0.9020	25.37	14.54	9.76	35.13	24.30	56.00	46.00	-20.87	-21.70	L2
2.6580	23.34	7.77	9.80	33.14	17.57	56.00	46.00	-22.86	-28.43	L2
3.8260	21.40	7.81	9.83	31.23	17.64	56.00	46.00	-24.77	-28.36	L2

Remark:

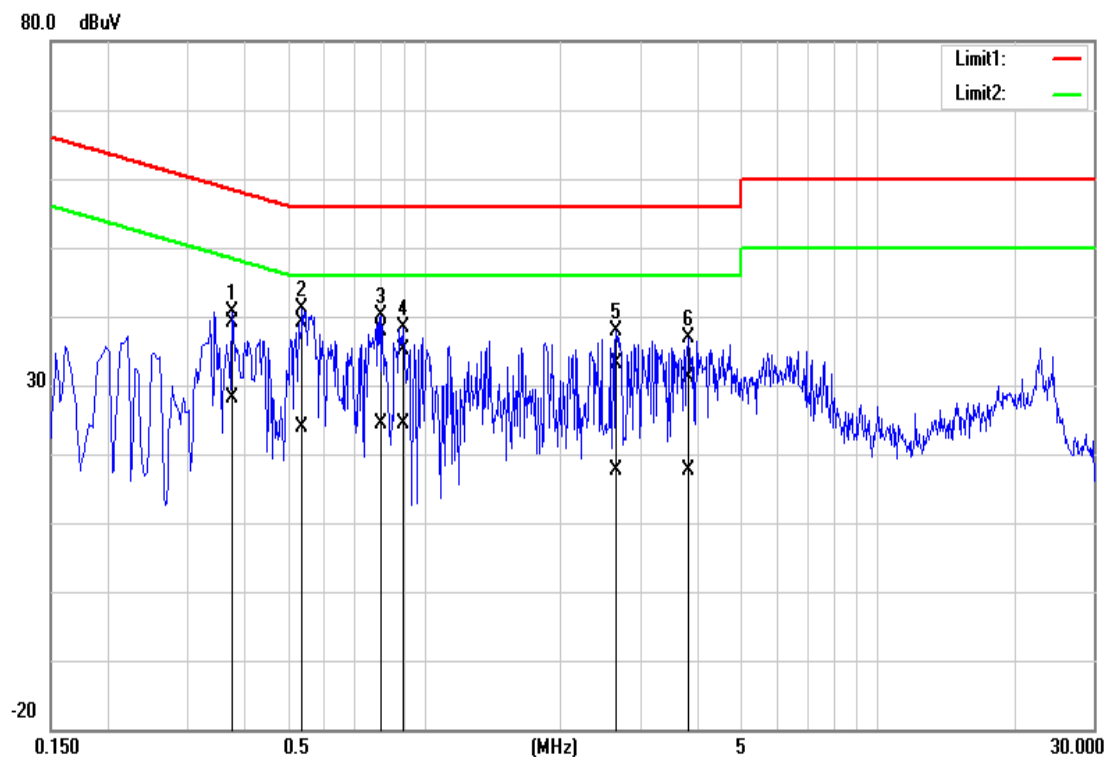
1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

Test Data

Conducted emissions (Line 1)



Conducted emissions (Line 2)



8.4 ANTENNA REQUIREMENT

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.