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FCC TEST REPORT

Report No:STS1807101W01

Issued for

Dongguan Aohai Technology Co.,Ltd.

Zhenlong East Road No.6, Jiaoyitang, Tangxia
Town, Dongguan,Guangdong,523723,China

Product Name:	Qi Wireless Charging Pad
Brand Name:	INSIGNIA
Model Name:	NS-MWPC10CU
Series Model:	N/A
FCC ID:	2AP4XNS-MWPC10CU
Test Standard:	FCC Part 15 Subpart C

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**TEST RESULT CERTIFICATION**

Applicant's name: Dongguan Aohai Technology Co.,Ltd.
Address.....: Zhenlong East Road No.6, Jiaoyitang, Tangxia
Town, Dongguan,Guangdong,523723,China
Manufacture's Name: Dongguan Aohai Technology Co.,Ltd.
Address.....: Zhenlong East Road No.6, Jiaoyitang, Tangxia
Town, Dongguan,Guangdong,523723,China

Product description

Product Name: Qi Wireless Charging Pad
Brand Name: INSIGNIA
Model Name.....: NS-MWPC10CU
Series Model: N/A
Test Standards.....: FCC Part 15 Subpart C
Test Procedure : ANSI C63.10-2013

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Date of performance of tests: 12 Jul. 2018 ~ 15 Jul. 2018
Date of Issue : 16 July 2018
Test Result : **Pass**

Testing Engineer :

(Chris chen)

Technical Manager :

(Sean she)

Authorized Signatory :

(Vita Li)





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**Revision History**

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	16 Jul. 2018	STS1807101W01	ALL	Initial Issue



1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.203	Antenna Requirement	Pass	--
15.207	Conducted Emission	PASS	--
15.209 (a)	Radiated emission, Spurious Emission	PASS	--
15.215 (c)	20 dB Bandwidth	PASS	--

1.1 TEST FACTORY

Shenzhen STS Test Services Co., Ltd.

Add. : 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong, China

CNAS Registration No.: L7649; FCC Registration No.: 625569

IC Registration No.: 12108A; A2LA Certificate No.: 4338.01;

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95** %.

No.	Item	Uncertainty
1	Conducted Emission (9KHz-150KHz)	$\pm 2.88\text{dB}$
2	Conducted Emission (150KHz-30MHz)	$\pm 2.67\text{ dB}$
3	All emissions,radiated(<1G) 30MHz-200MHz	$\pm 2.83\text{dB}$
4	All emissions,radiated(<1G) 200MHz-1000MHz	$\pm 2.94\text{dB}$
5	Temperature	$\pm 0.5^{\circ}\text{C}$
6	Humidity	$\pm 2\%$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name	Qi Wireless Charging Pad
Trade Name	INSIGNIA
Model Name	NS-MWPC10CU
Series Model	N/A
Model Difference	N/A
Channel List	Please refer to the Note 2.
Equipemnt Category	Non-ISM frequency
Operating frequency	111KHz-205KHz
Modulation Type	ASK
Power Ratings	Input: DC 5V/2A, DC 9V/2A, DC 12V/1.5A Ouput: 10W max
AC/DC Adapter	Model: A138A-120150U-US2 Input: AC 100-240V~50/60Hz, 0.5A output: DC 5V/2.5A, DC 9V/2A, DC 12V/1.5A (Provided by the applicant)
Hardware version number	N/A
Software version number	N/A
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.

Channel List					
Channel	Frequency (KHz)	Channel	Frequency (KHz)	Channel	Frequency (KHz)
01	127	--	--	--	--

3. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	NOTE
1	N/A	NS-MWPC10CU	Coil	NA	Antenna

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	DC 5V Charging+TX Mode
Mode 2	DC 9V Charging+TX Mode
Mode 3	DC 12V Charging+TX Mode

For Conducted Emission	
Final Test Mode	Description
Mode 1	DC 5V Charging+TX Mode
Mode 2	DC 9V Charging+TX Mode
Mode 3	DC 12V Charging+TX Mode

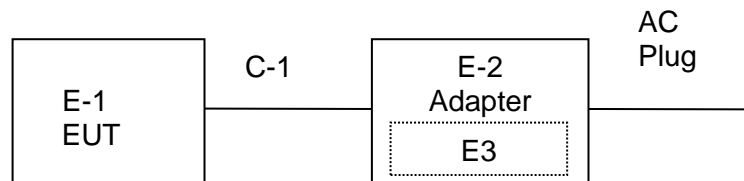
For Radiated Emission	
Final Test Mode	Description
Mode 1	DC 5V Charging+TX Mode
Mode 2	DC 9V Charging+TX Mode
Mode 3	DC 12V Charging+TX Mode

Note: The test modes were carried out of all operation modes. Only the worst case will be shown in this report.

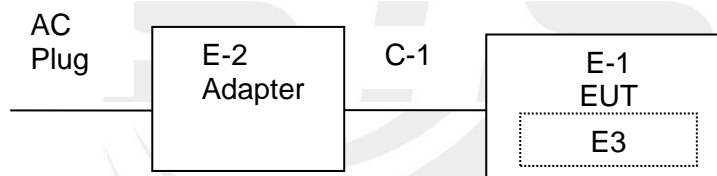
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters

Radiated Emission Test



Conducted Emission Test





2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-2	Adapter	Aohai	A138A-120150U-US2	N/A	N/A
E-3	Mobile phone	SAMSUNG	SM-N9500	R28JA1170ZR	N/A

Item	Shielded Type	Ferrite Core	Length	Note
C-1	USB Cable	No	80cm	N/A



2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2017.10.15	2018.10.14
Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2018.11.01
50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2017.10.15	2018.10.14
PreAmplifier	Agilent	8449B	60538	2017.10.15	2018.10.14
Loop Antenna	EMCO	6502	9003-2485	2017.10.15	2018.10.14
USB RF power sensor	DARE	RPR3006W	15I00041SNO03	2017.10.15	2018.10.14

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2017.10.15	2018.10.14
LISN	R&S	ENV216	101242	2017.10.15	2018.10.14
LISN	EMCO	3810/2NM	000-23625	2017.10.15	2018.10.14





3. ANTENNA REQUIREMENT

15.203 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, 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.

EUT Ant:

This product has a permanent antenna, fulfill the requirement of this section.



4. CONDUCTED EMISSION TEST RESULT (SECTION 15.207)

3.1 POWER LINE CONDUCTED EMISSION LIMITS

Operating frequency band. In case the emission fall within the restricted band specified on Part 15.207 limit in the table below has to be followed.

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

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

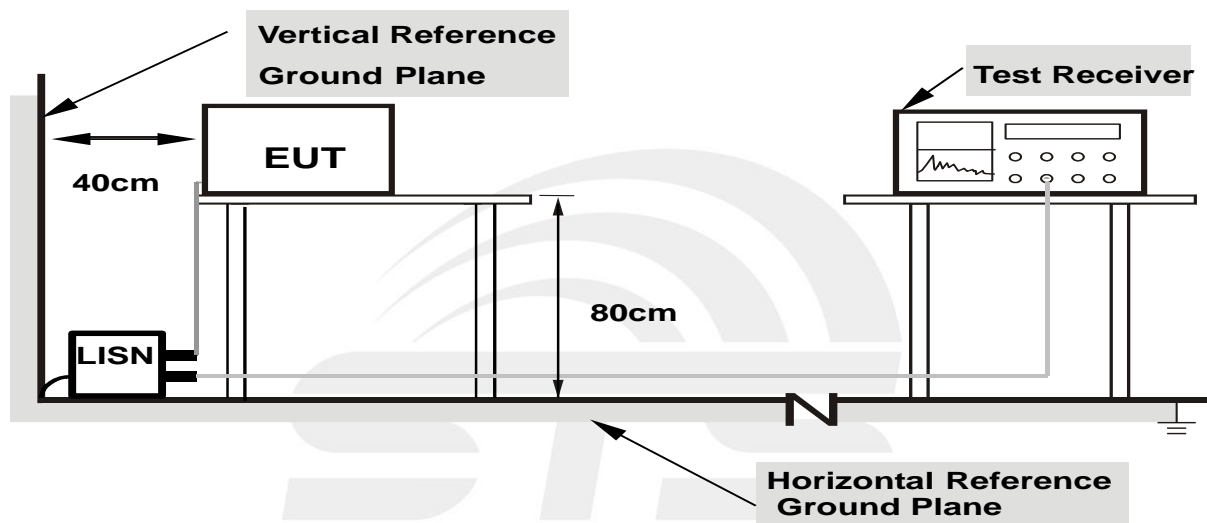
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.2 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



3.5 TEST RESULTS

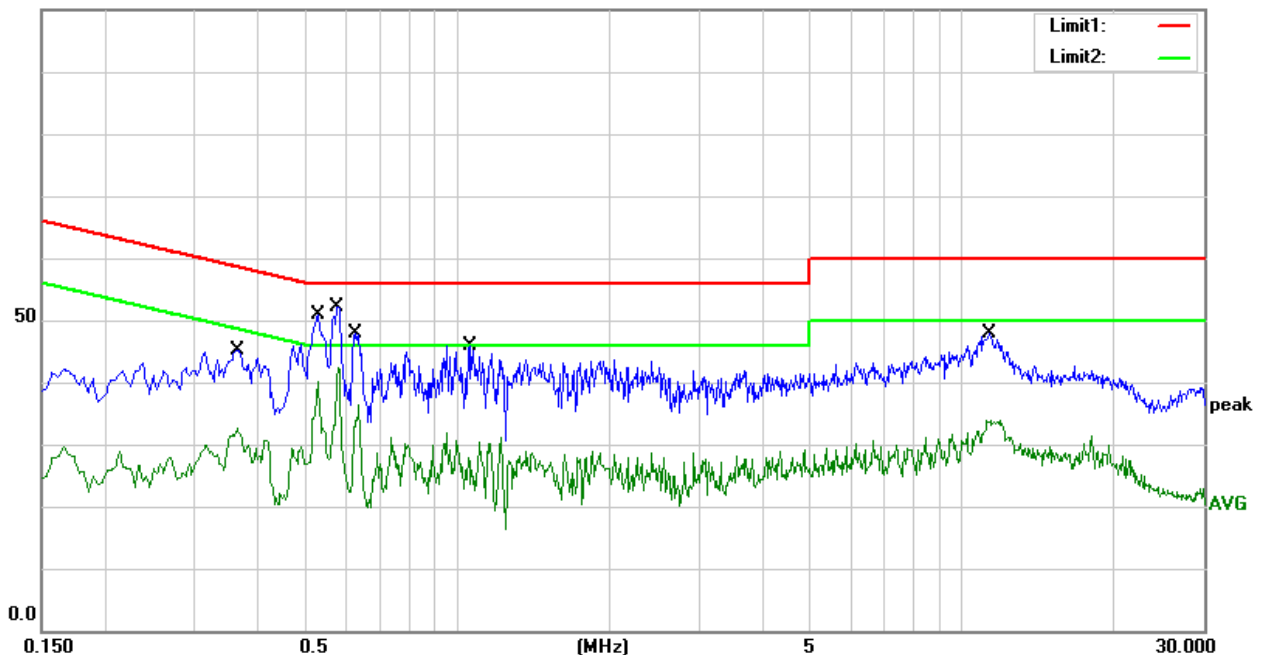
Temperature:	24 °C	Relative Humidity:	62.5%
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 3 (worst case)		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.3660	35.12	10.10	45.22	58.59	-13.37	QP
2	0.3660	22.55	10.10	32.65	48.59	-15.94	AVG
3	0.5300	40.95	10.00	50.95	56.00	-5.05	QP
4	0.5300	30.05	10.00	40.05	46.00	-5.95	AVG
5	0.5780	42.29	9.96	52.25	56.00	-3.75	QP
6	0.5780	32.54	9.96	42.50	46.00	-3.50	AVG
7	0.6300	37.91	9.91	47.82	56.00	-8.18	QP
8	0.6300	26.51	9.91	36.42	46.00	-9.58	AVG
9	1.0500	36.04	9.80	45.84	56.00	-10.16	QP
10	1.0500	18.19	9.80	27.99	46.00	-18.01	AVG
11	11.1860	37.59	10.22	47.81	60.00	-12.19	QP
12	11.1860	23.70	10.22	33.92	50.00	-16.08	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result = Reading + Factor) – Limit

100.0 dBuV





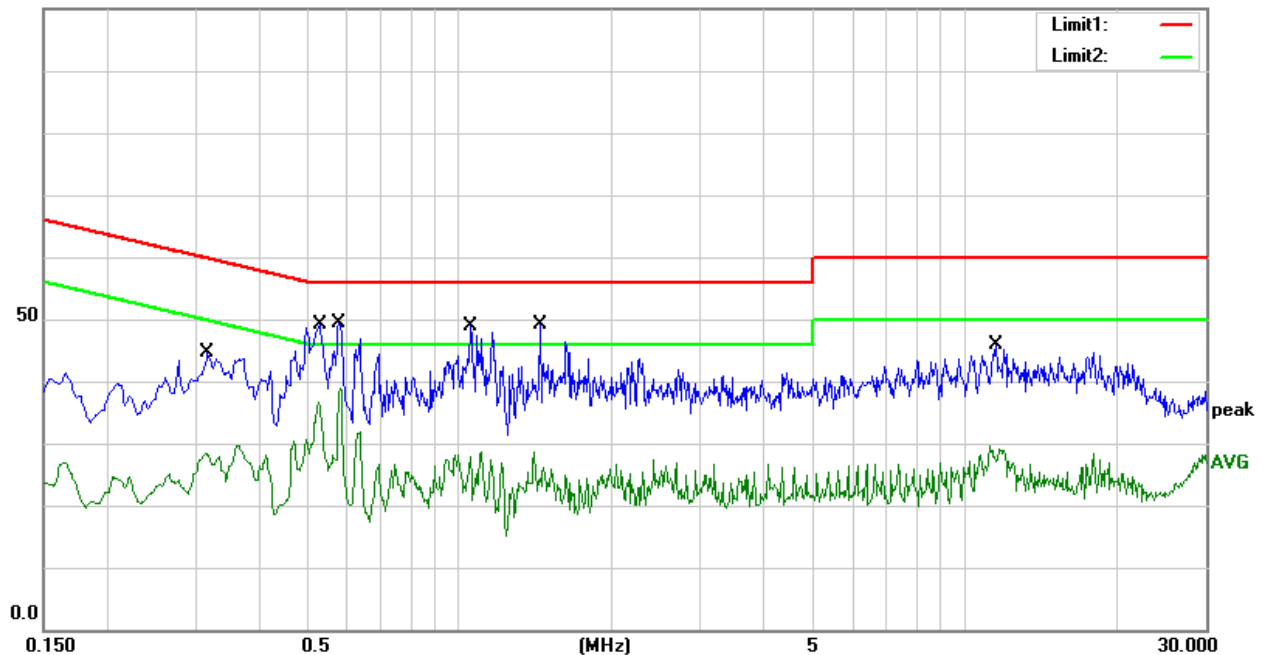
Temperature:	24°C	Relative Humidity:	62.5%
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 3 (worst case)		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.3140	34.51	10.20	44.71	59.86	-15.15	QP
2	0.3140	18.22	10.20	28.42	49.86	-21.44	AVG
3	0.5260	39.02	10.01	49.03	56.00	-6.97	QP
4	0.5260	26.56	10.01	36.57	46.00	-9.43	AVG
5	0.5780	39.44	9.96	49.40	56.00	-6.60	QP
6	0.5780	28.99	9.96	38.95	46.00	-7.05	AVG
7	1.0500	39.18	9.80	48.98	56.00	-7.02	QP
8	1.0500	18.00	9.80	27.80	46.00	-18.20	AVG
9	1.4420	39.37	9.79	49.16	56.00	-6.84	QP
10	1.4420	16.25	9.79	26.04	46.00	-19.96	AVG
11	11.5380	35.68	10.22	45.90	60.00	-14.10	QP
12	11.5380	18.84	10.22	29.06	50.00	-20.94	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result = Reading + Factor) - Limit

100.0 dBuV



4. RADIATED& FIELD EMISSION TEST RESULT (SECTION 15.209)

4.1 Limit

Frequency [MHz]	Field Strength [uV/m]	Measurement Distance [Meters]
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

§ 15.209(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

4.2 TEST PROCEDURE

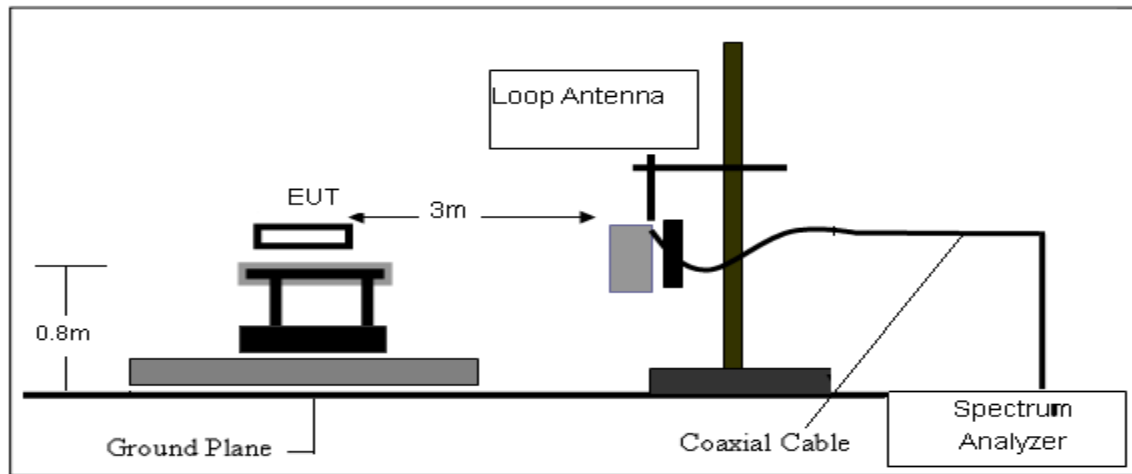
- a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- d. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

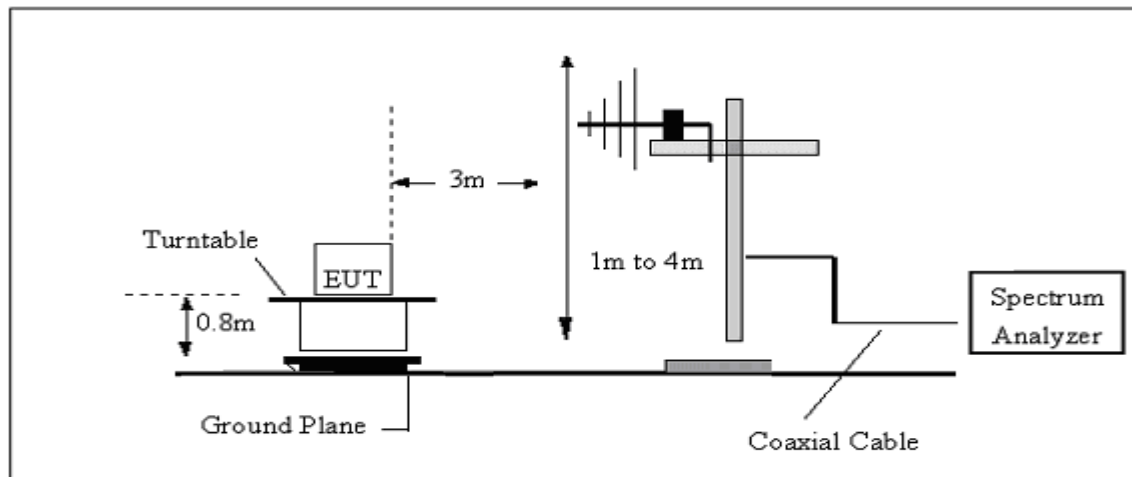
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

4.3 TEST SETUP

(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz





4.4 TEST RESULTS

4.4.1 Spurious Radiated Emission Below 30 MHz

Temperature :	26.2 °C	Relative Humidity :	59%
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 3 (worst case)

Frequency (KHz)	Reading (dBμV/m)	Detector	Ant. Factor	Cable Loss	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin
15	75.18	Peak	26.27	0.1	101.55	144.08	-42.53
15	59.5	Average	26.27	0.1	85.87	124.08	-38.21
36	70.39	Peak	22.03	0.1	92.52	136.48	-43.96
36	55.5	Average	22.03	0.1	77.63	116.48	-38.85
110	77.48	Peak	10.04	0.1	87.62	126.78	-39.16
110	62.45	Average	10.04	0.1	72.59	106.78	-34.19
127	96.34	Peak	9.43	0.1	105.87	125.53	-19.66
127	80.63	Average	9.43	0.1	90.16	105.53	-15.37
554	54.59	Peak	-16.36	0.1	38.33	72.73	-34.40
554	43.42	Average	-16.36	0.1	27.16	72.73	-45.60

1. “*” Means Fundamental frequency
2. Emission Level [dBμV/m] = Reading [dBμV] + Ant. Factor [dB/m] + Cable Loss [dB]
3. Margin [dB] = Emission Level [dBμV/m] – Limit [dBμV/m]
4. Limit calculation: Limit at specified distance + $40\log(300/3)$ = Limit + 80 dB for up to 0.49 MHz
Limit at specified distance + $40\log(30/3)$ = Limit + 40 dB for above 0.49 MHz, Below 30 MHz.



4.4.2 Spurious Radiated Emission below 1 GHz

Temperature :	26.2 °C	Relative Humidity :	59%
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 3 (worst case)

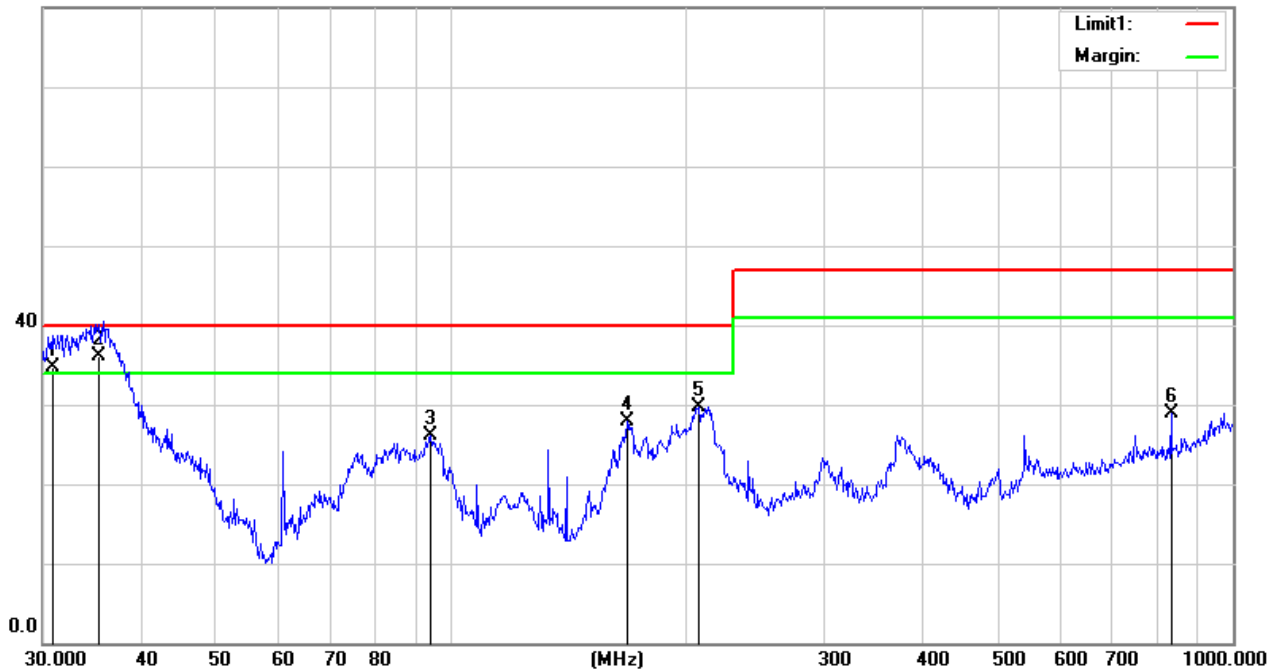
The following table shows the highest levels of radiated emissions on polarizations of vertical

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
30.8535	46.23	-11.62	34.61	40.00	-5.39	QP
35.4623	50.05	-13.99	36.06	40.00	-3.94	QP
94.0980	45.91	-19.78	26.13	40.00	-13.87	QP
167.8243	46.96	-19.15	27.81	40.00	-12.19	QP
207.1226	49.54	-19.87	29.67	40.00	-10.33	QP
833.3171	31.91	-3.01	28.90	47.00	-18.10	QP

Remark:

1. Margin = Result (Result = Reading + Factor) – Limit

80.0 dBuV/m





Temperature :	26.2 °C	Relative Humidity :	59%
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 3 (worst case)

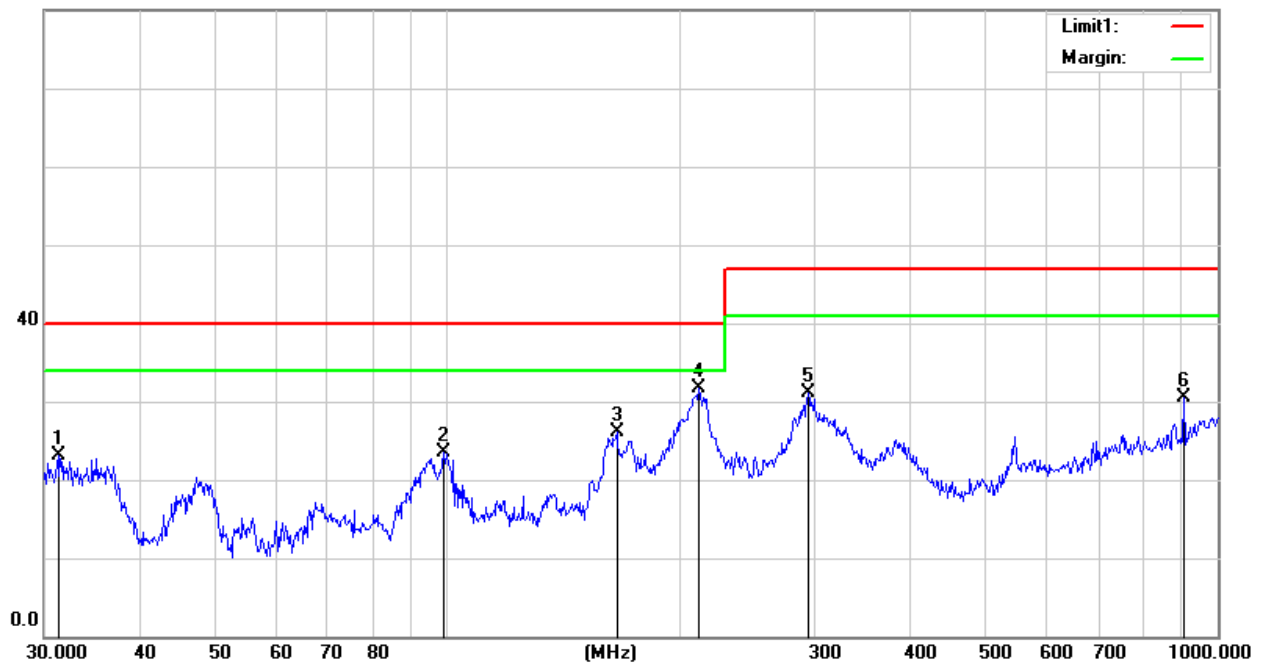
The following table shows the highest levels of radiated emissions on polarizations of horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
31.2893	34.87	-11.85	23.02	40.00	-16.98	QP
98.8326	42.79	-19.32	23.47	40.00	-16.53	QP
166.0680	45.02	-19.00	26.02	40.00	-13.98	QP
212.2695	51.27	-19.60	31.67	40.00	-8.33	QP
294.1137	46.17	-15.16	31.01	47.00	-15.99	QP
903.3094	32.70	-2.14	30.56	47.00	-16.44	QP

Remark:

1. Margin = Result (Result = Reading + Factor) – Limit

80.0 dBuV/m





5. 20 dB BANDWIDTH TEST

5.1 Limit

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 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equip compliance with the 20dB attenuation specification may base on measurement at the intentional radiator's antenna output terminal unless the intentional radiator uses a permanently attached antenna, in which case compliance shall be. Demonstrated by measuring the radiated emissions.

5.2 TEST SETUP

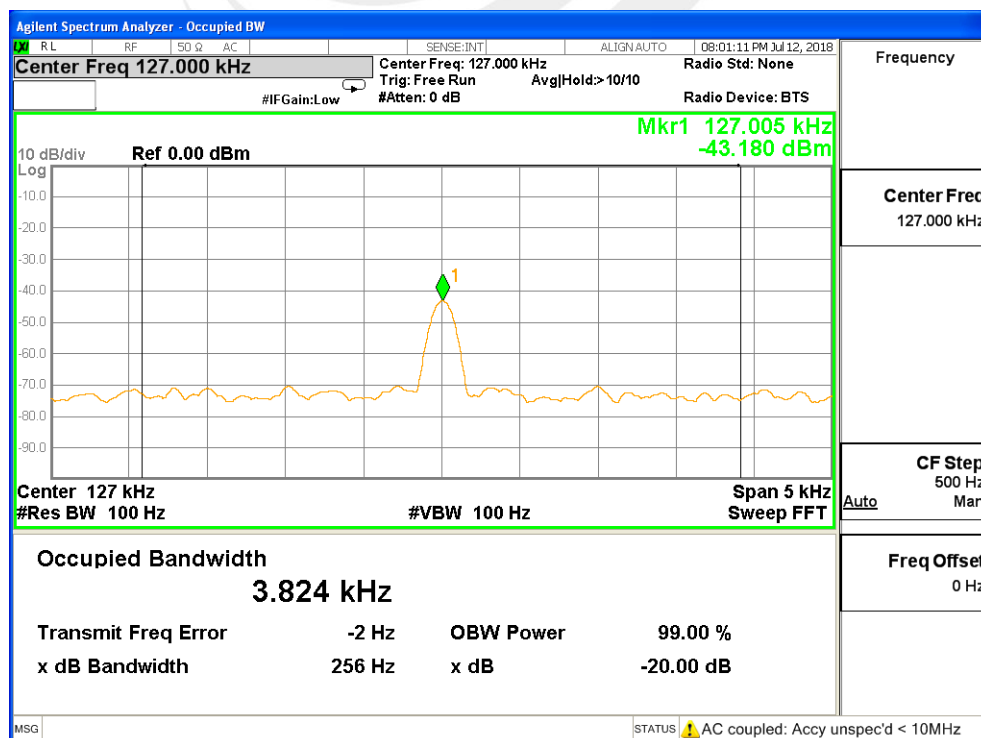
Spectrum Parameter	Setting
Span Frequency	approximately 2 to 3 times the 20 dB bandwidth
RB	greater than 1 % of the 20 dB bandwidth,
VB	equal to the RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

The test program and configuration, Refer to 4.2 and 4.3

5.3 TEST RESULTS

Operating Frequency (kHz)	20 dB Bandwidth (Hz)
127.005	256

CH01



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