



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

FOR

Product Name: Dust Collector Remote Control

Model : IC-315

Issued to

CHANG TIER MACHINERY CO., LTD.
No. 195-12, CHUNG CHENG RD., TA YA DIST., TAICHUNG, 42850, TAIWAN,
R.O.C.

Issued by

Global Certification Corp.

EMC Test Site	Xizhi Office and Lab	No.146, Sec. 2, Xiangzhang Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)
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APPENDIX 1

PHOTOS OF TEST CONFIGURATION

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PHOTOS OF EUT



1. GENERAL INFORMATION

Applicant : CHANG TJER MACHINERY CO., LTD.
Address : No. 195-12, CHUNG CHENG RD., TA YA DIST., TAICHUNG,
42850, TAIWAN, R.O.C.
Manufacturer : CHANG TJER MACHINERY CO., LTD.
Address : No. 195-12, CHUNG CHENG RD., TA YA DIST., TAICHUNG,
42850, TAIWAN, R.O.C.
EUT : Dust Collector Remote Control
Model Name : IC-315
Model Differences : N/A

Is here with confirmed to comply with the requirements set out in the FCC Rules and Regulations Part 15 Subpart C and the measurement procedures were according to ANSI C63.4-2003. The said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

FCC part 15 subpart C

Receipt Date : 12/14/2011

Final Test Date : 01/13/2012

Tested by:

Reviewed by:

Jan. 13, 2012

Jan. 13, 2012

(Date)

S.K.Chang/ Test personnel.

(Date)

Alex Chou / Manager



1.1 DESCRIPTION OF THE TESTED SAMPLES

EUT Name : Dust Collector Remote Control
Model Number : IC-315
FCC ID : ANZ-IC-315
Input Voltage : 9Vdc
Equipment Type : Transmitter
Operate Frequency : 315MHz
Antenna Type : integral antenna: a short metal soldered wire



2. TEST SPECIFICATION, PROCEDURE & RESULT

2.1 TEST SPECIFICATION

Test Specification: FCC Part 15 Subpart C
Title: FCC 47CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators Section 15.231
Periodic operation in the band 40.66~40.70MHz and above 70MHz

2.2 TEST RESULTS

No.	Item	Test Procedure	Specification	Remarks	Result
1	Field Strength of Fundamental Emissions & Spurious Emission	ANSI C63.4:2003	FCC Section 15.231(b)	Radiated	Passed
2	Radiated Emission 30MHz to 1GHz Above 1GHz	ANSI C63.4:2003	FCC Section 15.231(b)	Radiated	Passed
3	-20dB Bandwidth	ANSI C63.4:2003	FCC Section 15.231(c)	Radiated	Passed
4	Conducted Emission 0.15MHz to 30MHz	ANSI C63.4:2003	FCC Section 15.207	AC Mains	N/A
5	Release Time Measurement	ANSI C63.4:2003	FCC Section 15.231(a)(1)	N/A	Passed
6	Antenna Requirement	ANSI C63.4:2003	FCC Section 15.203	N/A	Passed

2.3 TEST PROCEDURES

Conducted Emissions

The EUT is placed on a wood table, which is at 0.8 m above ground plane according to clause 15.207 and requirements of ANSI C63.4:2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz are using CISPR Quasi-Peak / Average detectors.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable was rotated through 360 degrees to determine the position of maximum emission level. The EUT is placed at 3m away from the

receiving antenna, which varied from 1m to 4m to find out the highest emission. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

2.4 DESCRIPTION OF TEST MODES

The EUT was tested under following modes:

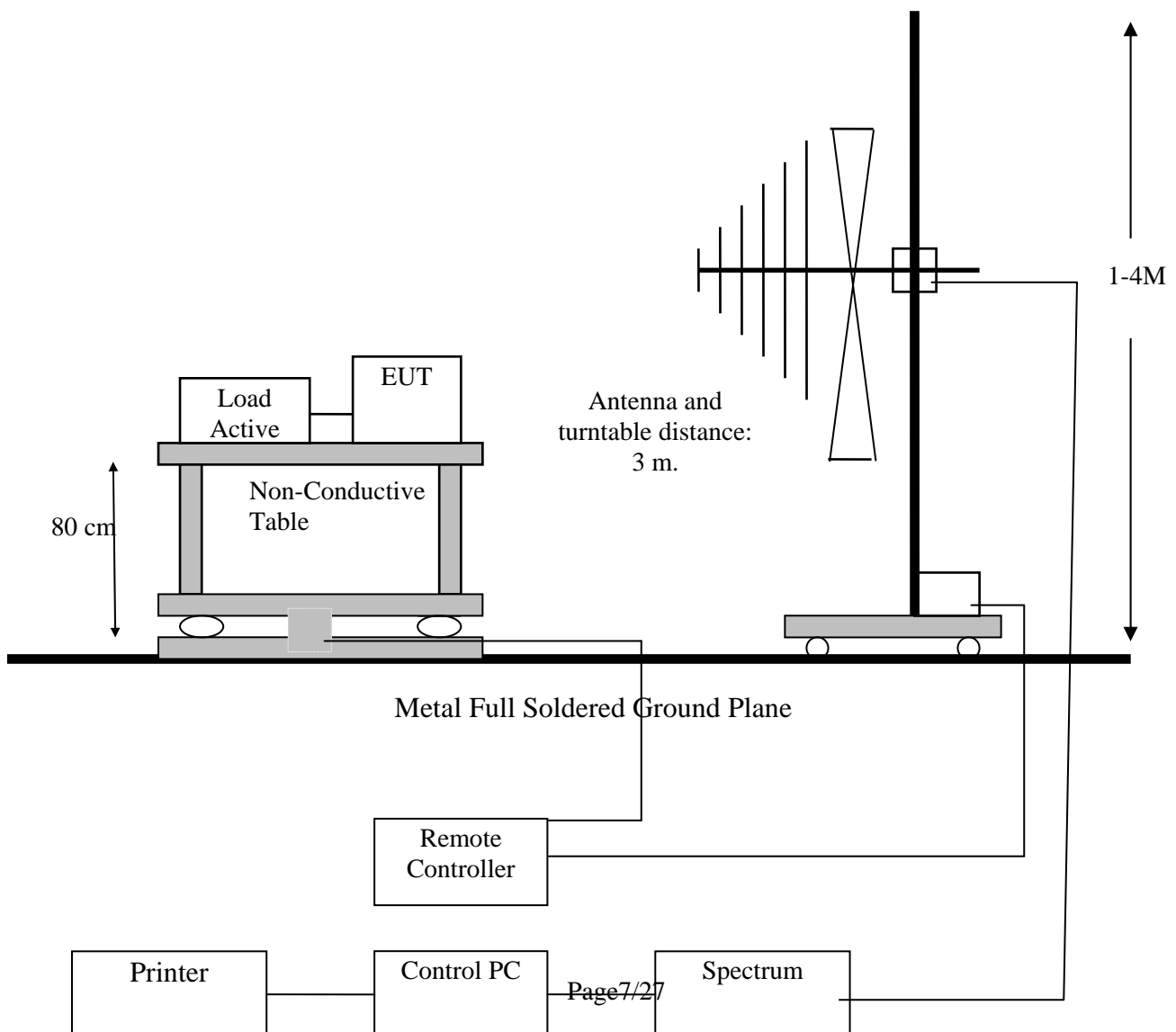
Modes:

1. Continuous transmitting
2. Normal mode

2.5 DESCRIPTION OF THE SUPPORT EQUIPMENTS

Setup Diagram

See test photographs attached in appendix 1 for the actual connections between EUT and support equipment.





Support Equipment

Peripherals Devices:

OUTSIDE SUPPORT EQUIPMENT							
No.	Equipment	Model	Serial No.	FCC ID/ BSMI ID	Trade name	Data Cable	Power Cord
	N/A						

Note: All the above equipment /cable were placed in worse case position to maximize emission signals during emission test
Grounding: Grounding was in accordance with the manufacturer's requirement and conditions for the intended use.



3. TEST AND MEASUREMENT EQUIPMENT

3.1 CALIBRATION

The measuring equipment utilized to perform the tests documented in the report has been calibrated once a year or in accordance with the manufacturer’s recommendations, and is traceable to recognized national standards.

3.2 EQUIPMENT

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of CISPR 16-1, ANSI C63.2 and. Other required standards.

Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective.

TABLE LIST OF TEST AND MEASUREMENT EQUIPMENT

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date	Note
EMC Test Receiver	R&S	ESCI	100438	Jun 30, 2011	Jun 29, 2012	
Bilog Antenna	SUNOL	JB1	A052204	Nov 07, 2011	Nov 06, 2012	
Turn table	EMCO	2080	9508-1805	N/A	N/A	
Controller	EMCO	2090	9804-1328	N/A	N/A	
Amplifier	G.W	GAP-801	EF150001	Jul.19, 2011	Jul.18, 2012	
Amplifier	Schwarzbeck	BBV 9718	9718-008	May 12, 2011	May 11, 2012	
Spectrum Analyzer	NEX1	Ns-265	5044006	May 12, 2011	May 11, 2012	
RF Cable	BELDEN	RG-8/U	28M-002	Nov 03, 2011	Nov 02, 2012	
RF Cable	Huber Suhner	SUCOFLEX 104	293864/4	Nov. 14, 2011	Nov. 13, 2012	
Thermo-Hygro meter	WISEWIND	4-IN-1	050100378	Apr 09, 2011	Apr 08, 2012	
Loop Antenna	TESEO	HLA6120	26349	Sep.12, 2011	Sep.11, 2012	
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-491	Aug. 06, 2011	Aug. 05, 2012	

※ Calibration interval of instruments listed above is one year



4. SECTION 15.231(b) REQUIREMENTS (FUNDAMENTAL AND SPURIOUS EMISSION)

4.1 LIMIT

Limits for Field Strength of Fundamental Emissions [FCC 47 CFR 15.231b]:

Frequency Range of Fundamental (MHz)	Field Strength of Fundamental Emission (Peak) (μV/m)	Field Strength of Fundamental Emission (Average) (μV/m)
40.66-40.70	1,000	300
70-130	500	30
130-174	500 to 1,500*	30
174-260	1,500	3
260-470	1,500 to 5,000*	3
Above 470	5,000	3

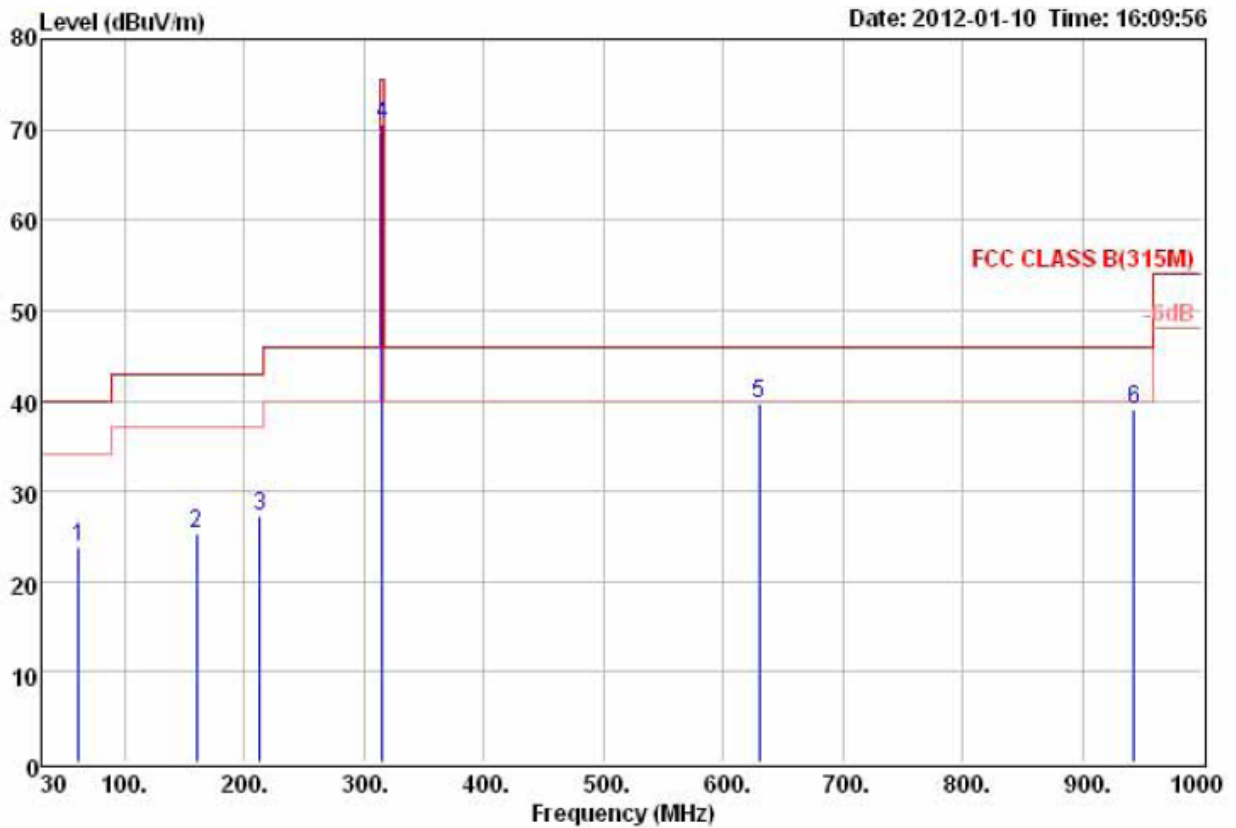
**Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follow: for the band 130-174 MHz, μ V/m at 3meters= $56.81818(F)-6136.3636$; for the band 260-470 MHz, μ V/m at 3 meters= $41.6667(F)-7083.3333$. The maximum permitted unwanted emission level is 20dB below the maximum permitted fundamental level .*



4.2 RESULT: PASSED

4.3 TEST DATA:

Horizontal

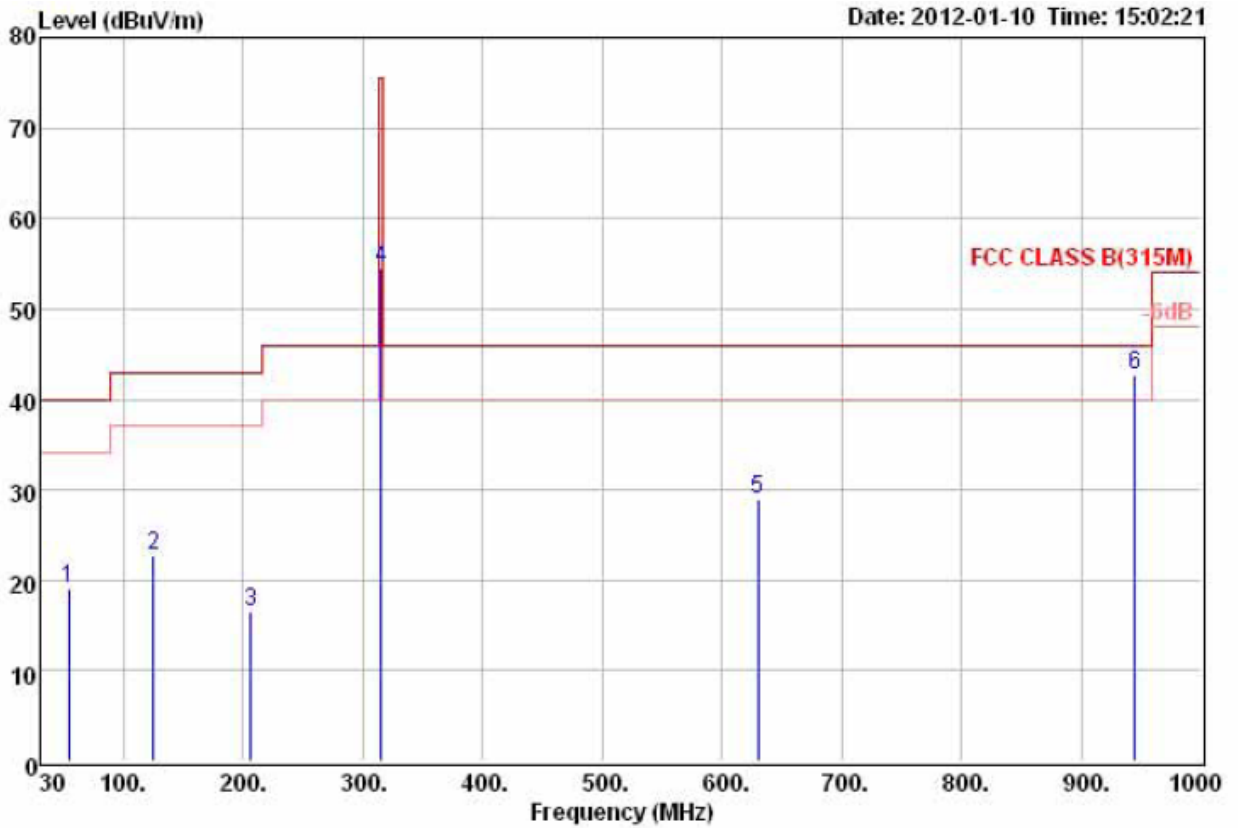


T/H : 17°C /69%

	Freq	Level	Read Level	Factor	Over Limit	Limit	Line	Remark
	MHz	dBUV/m	dBUV	dB/m	dB	dBUV/m		
1	61.04	23.78	42.57	-18.79	-16.22	40.00	Peak	
2	159.98	25.21	38.40	-13.19	-17.79	43.00	Peak	
3	212.36	27.24	41.70	-14.46	-15.76	43.00	Peak	
4 !	315.18	70.48	81.34	-10.86	-5.12	75.60	Peak	
5	630.43	39.68	43.50	-3.82	-6.32	46.00	Peak	
6	943.74	38.97	36.12	2.85	-7.03	46.00	Peak	



Vertical

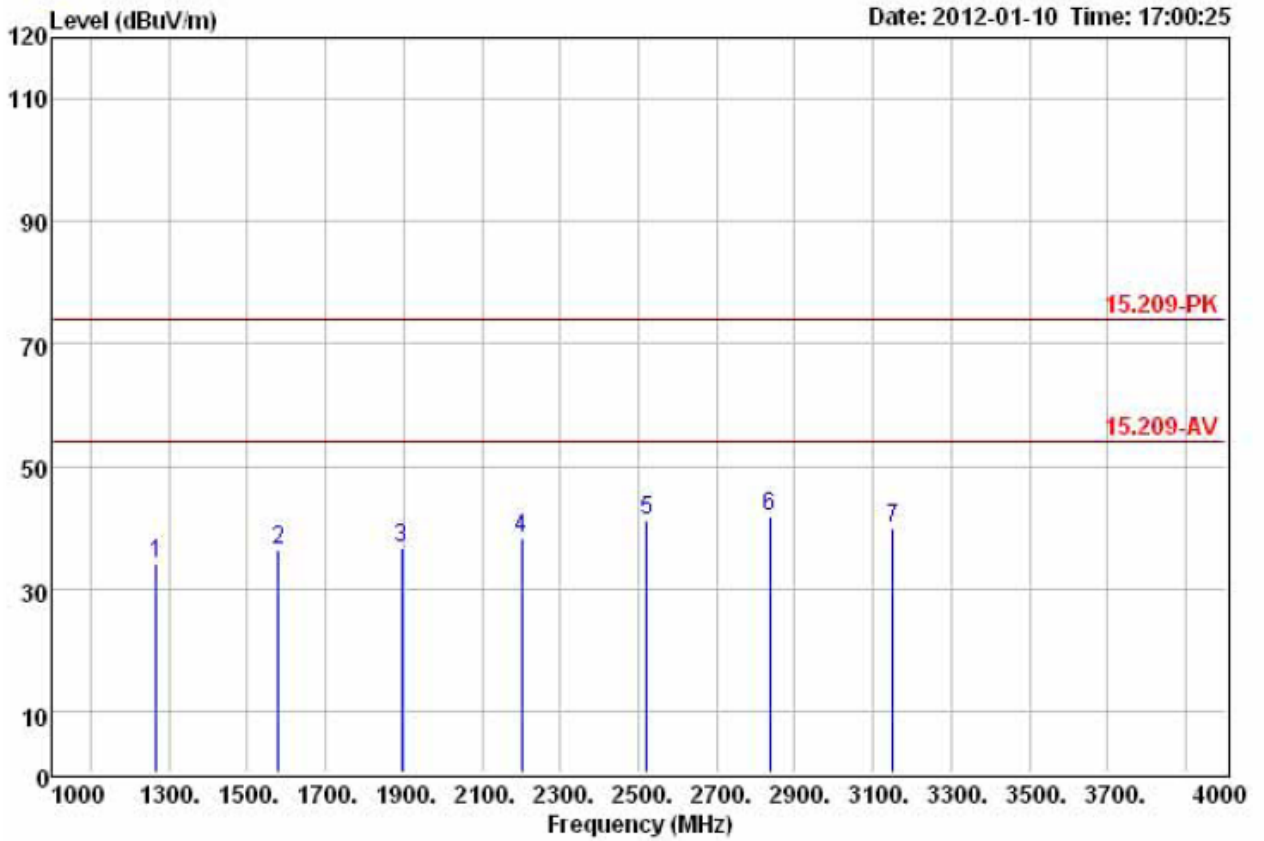


T/H : 17°C /69%

	Freq	Level	Read	Over	Limit	Limit	Remark
	MHz	dBuV/m	Level	Factor	Limit	Line	
			dBuV	dB/m	dB	dBuV/m	
1	54.25	19.17	37.77	-18.60	-20.83	40.00	Peak
2	125.06	22.77	34.68	-11.91	-20.23	43.00	Peak
3	206.54	16.52	30.20	-13.68	-26.48	43.00	Peak
4	315.18	54.41	65.27	-10.86	-21.19	75.60	Peak
5	630.43	29.03	32.85	-3.82	-16.97	46.00	Peak
6 !	944.71	42.73	39.86	2.87	-3.27	46.00	Peak



Horizontal

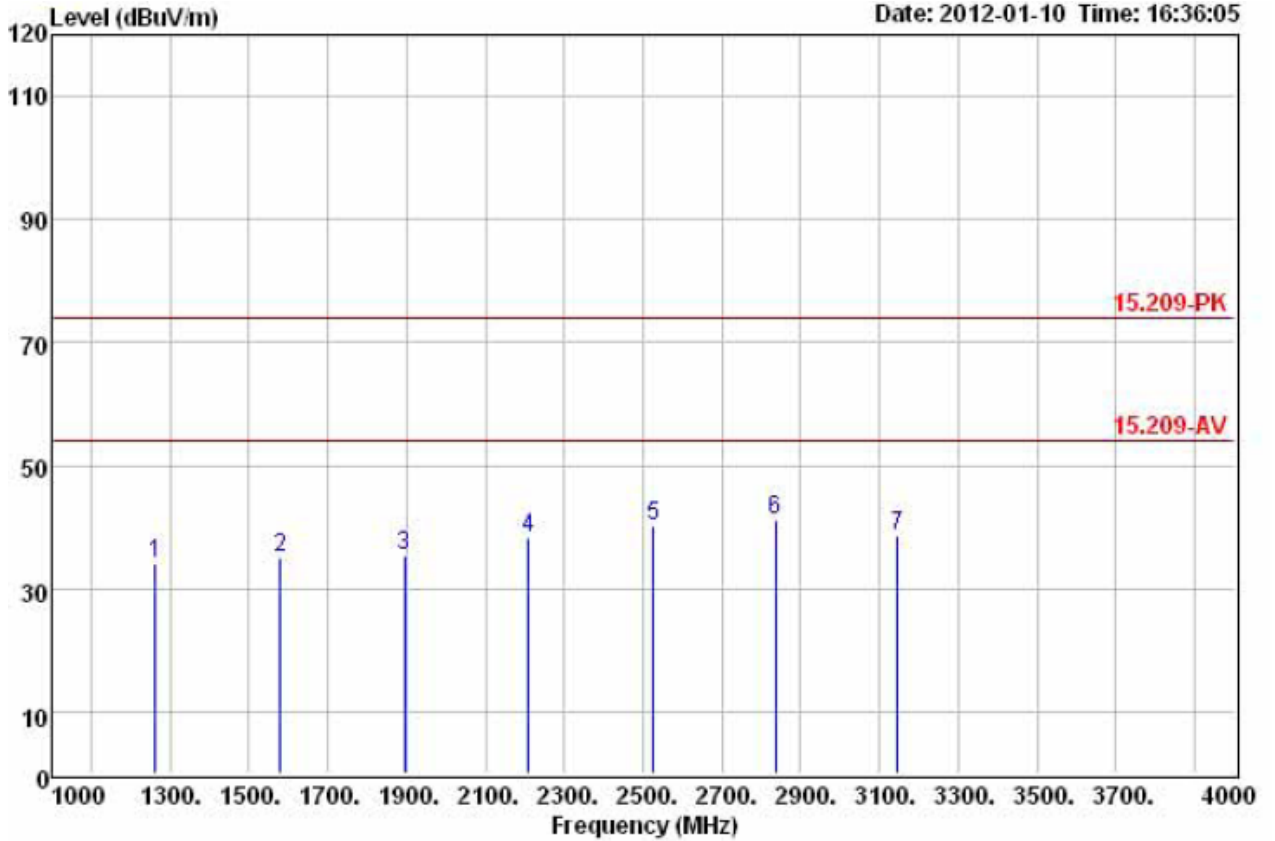


T/H : 17°C /69%

	Freq	Level	Read Level	Factor	Over Limit	Limit Line	Remark
	MHz	dBuV/m	dBuV	dB/m	dB	dBuV/m	
1	1267.00	34.23	61.82	-27.59	-39.77	74.00	Peak
2	1579.00	36.34	63.28	-26.94	-37.66	74.00	Peak
3	1894.00	36.83	62.96	-26.13	-37.17	74.00	Peak
4	2203.00	38.24	63.30	-25.06	-35.76	74.00	Peak
5	2521.00	41.20	65.03	-23.83	-32.80	74.00	Peak
6	2836.00	41.92	65.03	-23.11	-32.08	74.00	Peak
7	3151.00	39.93	62.52	-22.59	-34.07	74.00	Peak



Vertical

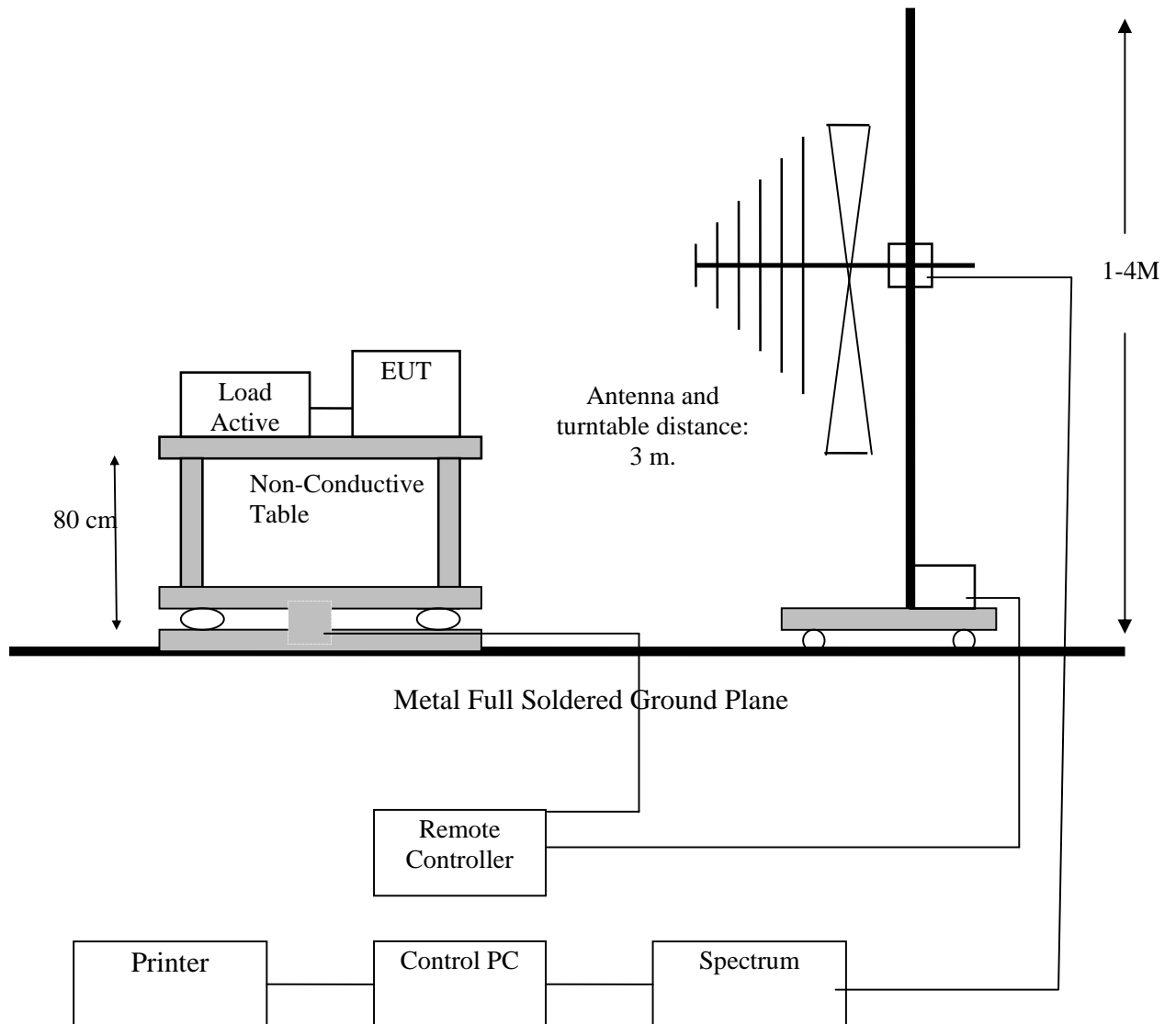


T/H : 17°C /69%

	Freq	Level	Read	Over	Limit	Limit	Remark
	MHz	dBuV/m	Level	Factor	Limit	Line	
			dBuV	dB/m	dB	dBuV/m	
1	1264.00	33.99	61.57	-27.58	-40.01	74.00	Peak
2	1579.00	35.17	62.11	-26.94	-38.83	74.00	Peak
3	1894.00	35.44	61.57	-26.13	-38.56	74.00	Peak
4	2209.00	38.34	63.36	-25.02	-35.66	74.00	Peak
5	2527.00	40.25	64.06	-23.81	-33.75	74.00	Peak
6	2836.00	41.10	64.21	-23.11	-32.90	74.00	Peak
7	3145.00	38.57	61.16	-22.59	-35.43	74.00	Peak

5. SECTION 15.231(b) REQUIREMENTS (GENERAL RADIATED EMISSION)

5.1 TEST SETUP





5.2 LIMIT

Limits for Field Strength of Fundamental Emissions [FCC 47 CFR 15.209 Class B]:

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
1.705-30	30	30
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500*	3

**Except as provided in paragraph (g), 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.*

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

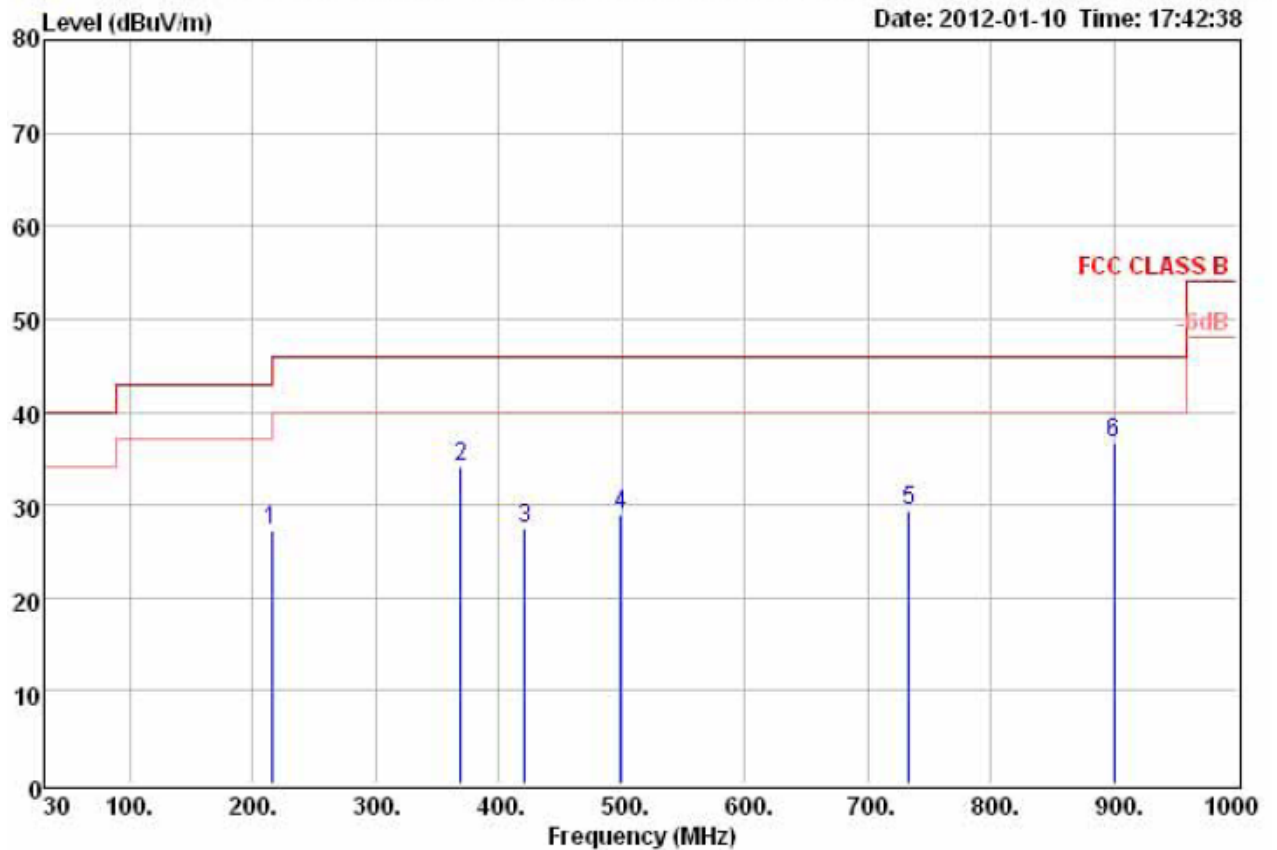
Frequency (Hz)	Field Strength (μ V/m at 3-meter)	Field Strength (dB μ V/m at 3-meter)
1.705-30	30 (at 30-meter)	49.5
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

5.3 RESULT: PASSED



5.4 TEST DATA:

Horizontal

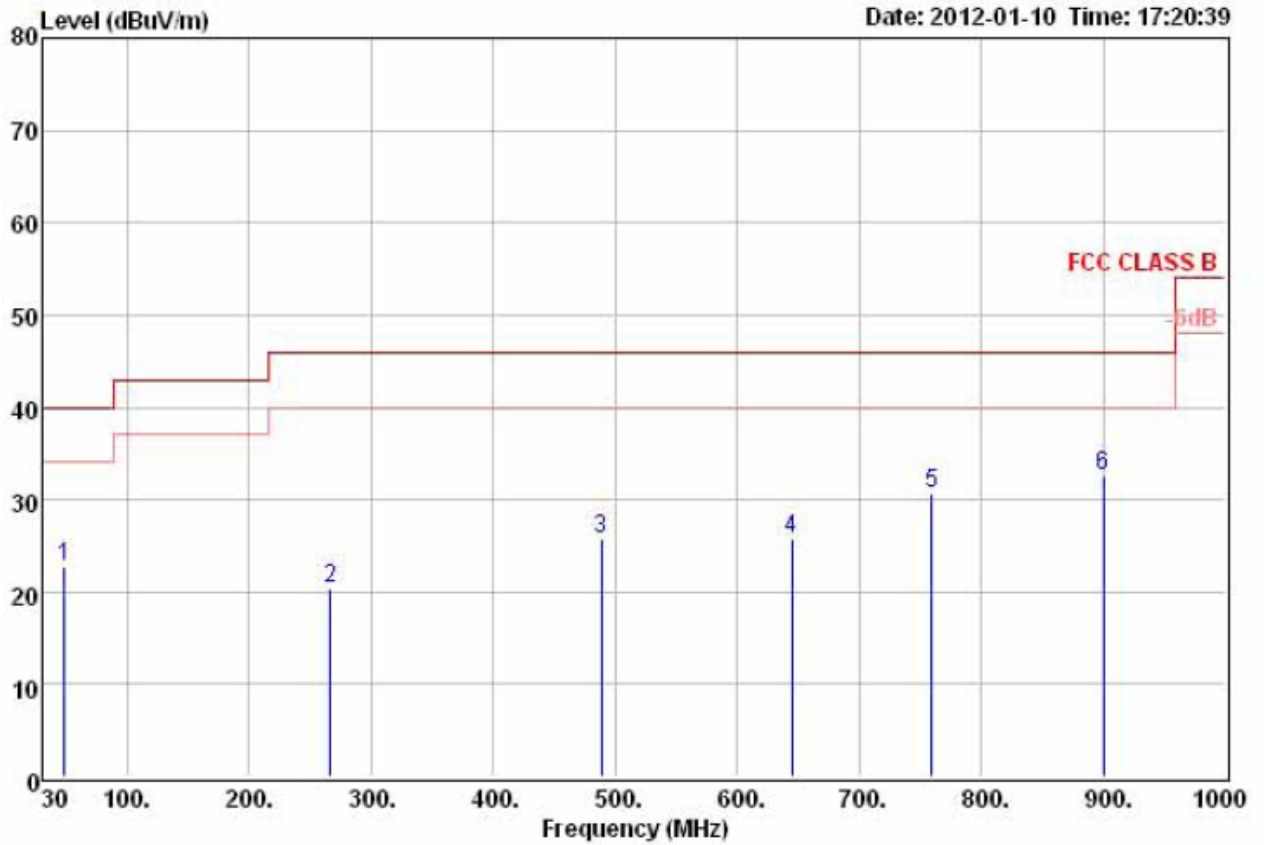


T/H : 17°C /69%

	Freq	Level	Read Level	Over Factor	Limit	Limit Line	Remark
	MHz	dBuV/m	dBuV	dB/m	dB	dBuV/m	
1	215.27	27.34	41.66	-14.32	-15.66	43.00	QP
2	368.53	34.09	43.48	-9.39	-11.91	46.00	QP
3	420.91	27.40	35.55	-8.15	-18.60	46.00	QP
4	499.48	29.03	35.33	-6.30	-16.97	46.00	QP
5	733.25	29.39	31.15	-1.76	-16.61	46.00	QP
6	900.09	36.70	34.86	1.84	-9.30	46.00	QP



Vertical



T/H : 17°C /69%

	Freq	Level	Read Level	Factor	Over Limit	Limit Line	Remark
	MHz	dBuV/m	dBuV	dB/m	dB	dBuV/m	
1	48.43	22.79	40.56	-17.77	-17.21	40.00	QP
2	266.68	20.36	32.32	-11.96	-25.64	46.00	QP
3	488.81	25.84	32.39	-6.55	-20.16	46.00	QP
4	644.98	25.65	29.13	-3.48	-20.35	46.00	QP
5	759.44	30.61	31.80	-1.19	-15.39	46.00	QP
6	900.09	32.67	30.83	1.84	-13.33	46.00	QP



6. SECTION 15.231(c) REQUIREMENTS (20dB BANDWIDTH)

6.1 TEST METHOS

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

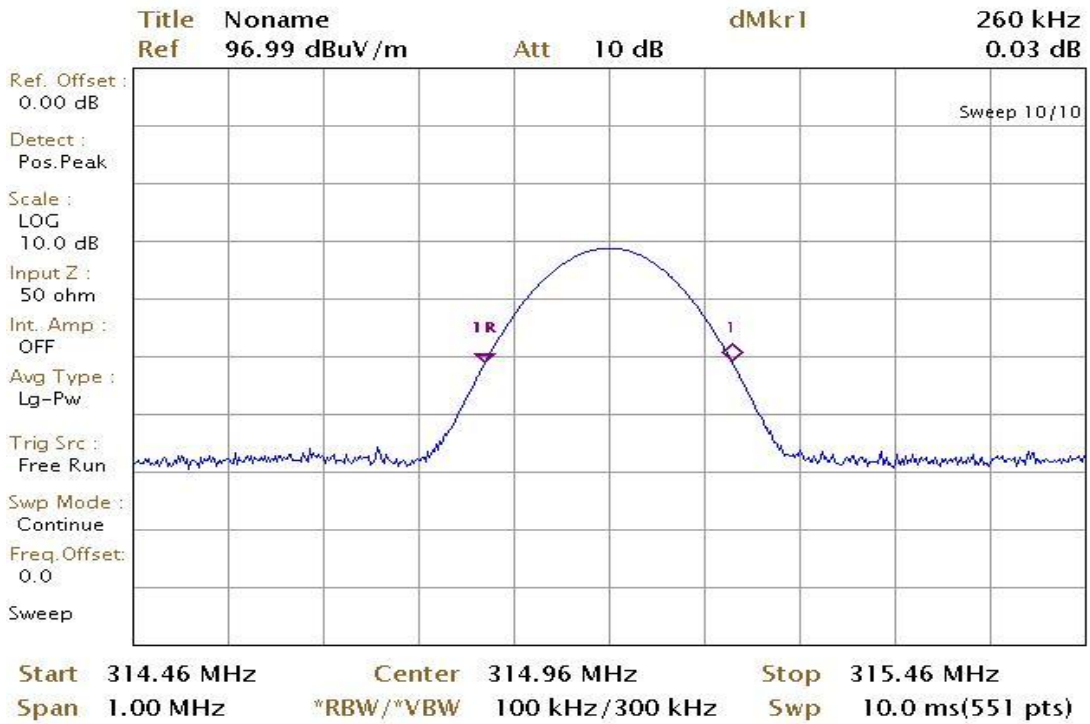
6.2 LIMIT:

Frequency Range (MHz)	20dB Bandwidth (kHz)	FCC Limits* (kHz)
315	260	787

6.3 RESULT: PASSED

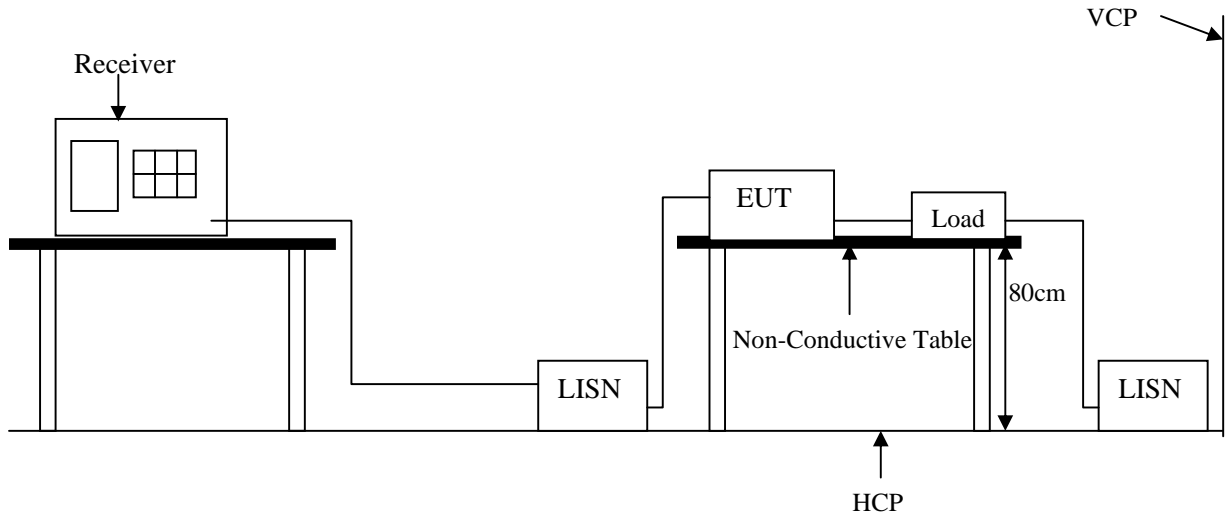


6.4 TEST DATA:



7. SECTION 15.207 REQUIREMENTS (POWERLINE CONDUCTED EMISSIONS)

7.1 TEST SETUP



7.2 TEST SETUP

7.3 LIMIT

Frequency range (MHz)	CLASS A		CLASS B	
	QP dB(uV)	Average dB(uV)	QP dB(uV)	Average dB(uV)
0.15-0.5	79 dBuV	66 dBuV	66 - 56 dBuV	56 - 46 dBuV
0.5-5.0	73 dBuV	60 dBuV	56 dBuV	46 dBuV
5.0-30.0	73 dBuV	60 dBuV	60 dBuV	50 dBuV

Remark: In the above table, the tighter limit applies at the band edges.

7.4 TEST PROCEDURE

The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). It provides a 50 ohm / 50 μ H coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm / 50 μ H coupling impedance with 50 ohm termination. (Please refer to the block diagram of the test setup and photograph.)

Both sides of AC line are checked for the maximum conducted emission interference. In order to find the maximum emissions, the relating positions of equipment and all of the interference cables must be changed according to EN 55022 regulations: The measurement procedure on conducted emission interference.

The resolution bandwidth of the field strength meter is set at 9 KHz.



7.5 TEST SPECIFICATION

According to PART15.207

7.6 RESULT: NOT AVALIABLE FOR THIS EUT

7.7 TEST DATA: N/A



8. DUTY CYCLE (AVERAGE FACTOR MEASUREMENT)

8.1 DUTY CYCLE CORRECTION DURING 100MSEC

$$1. \left[\frac{\text{Pulse duration}}{\text{Pulse period}} \right] = 66\% \text{ (worst case, customer declaration)}$$

$$2. \text{Burst duration} = 64 + 27 = 91 \text{ msec}$$

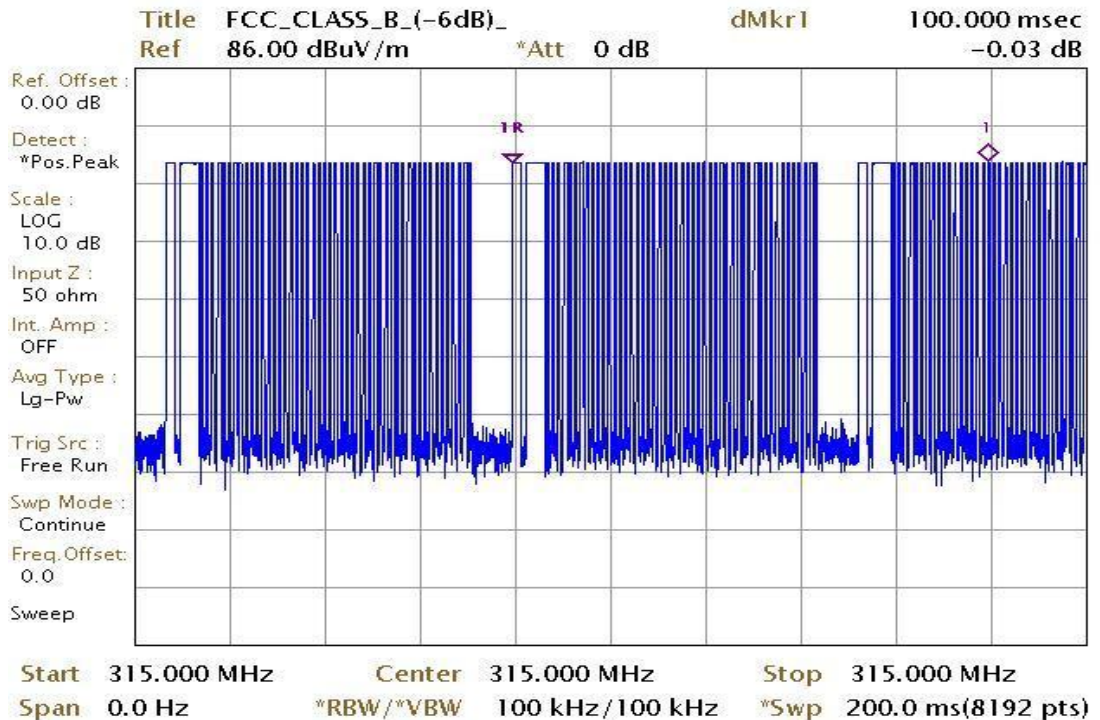
$$3. \text{Time between bursts} = 9 \text{ msec}$$

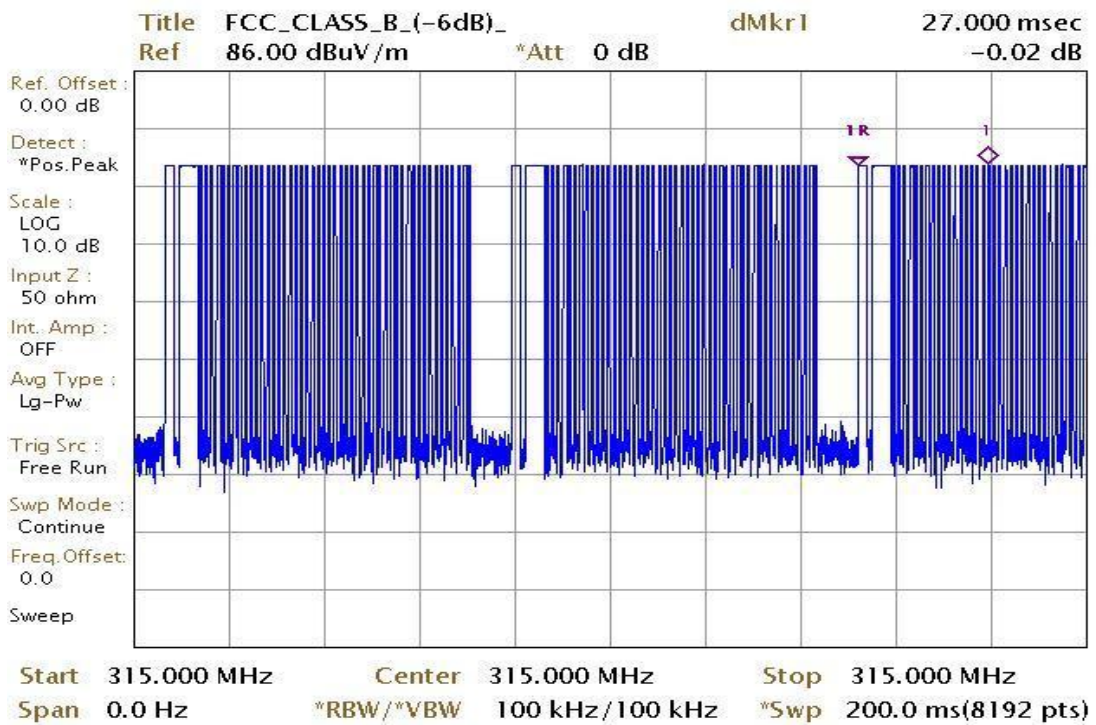
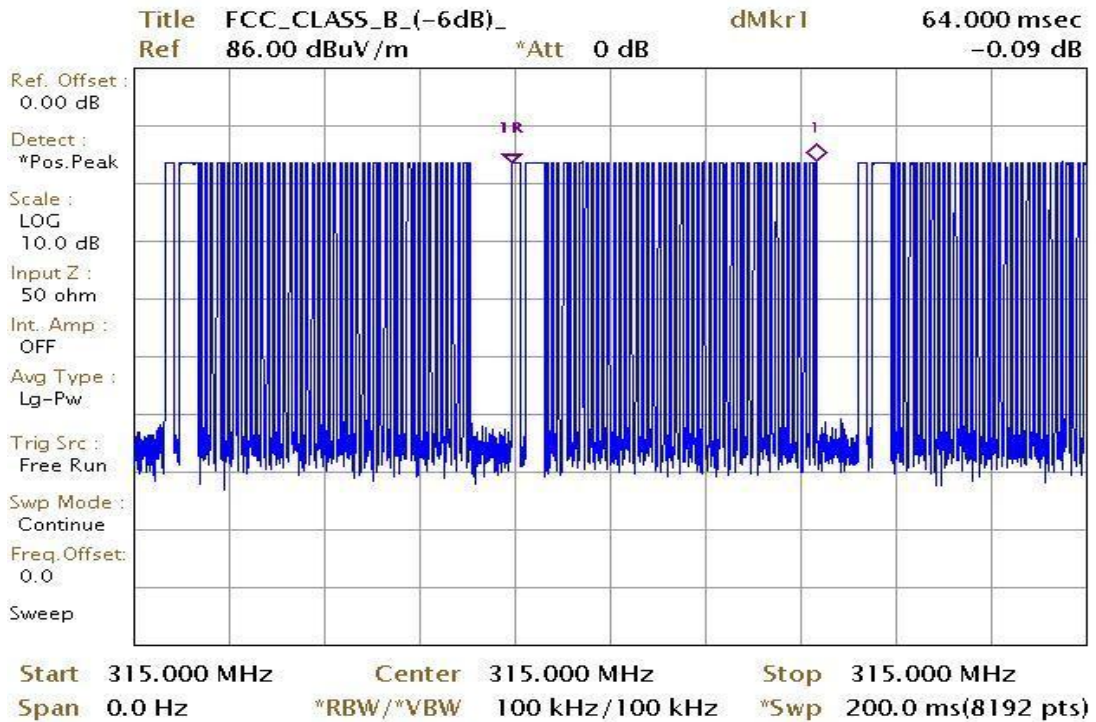
$$4. \text{Duty Cycle} = 20 \log \left[\frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{burst duration}}{100\text{msec}} \right]$$

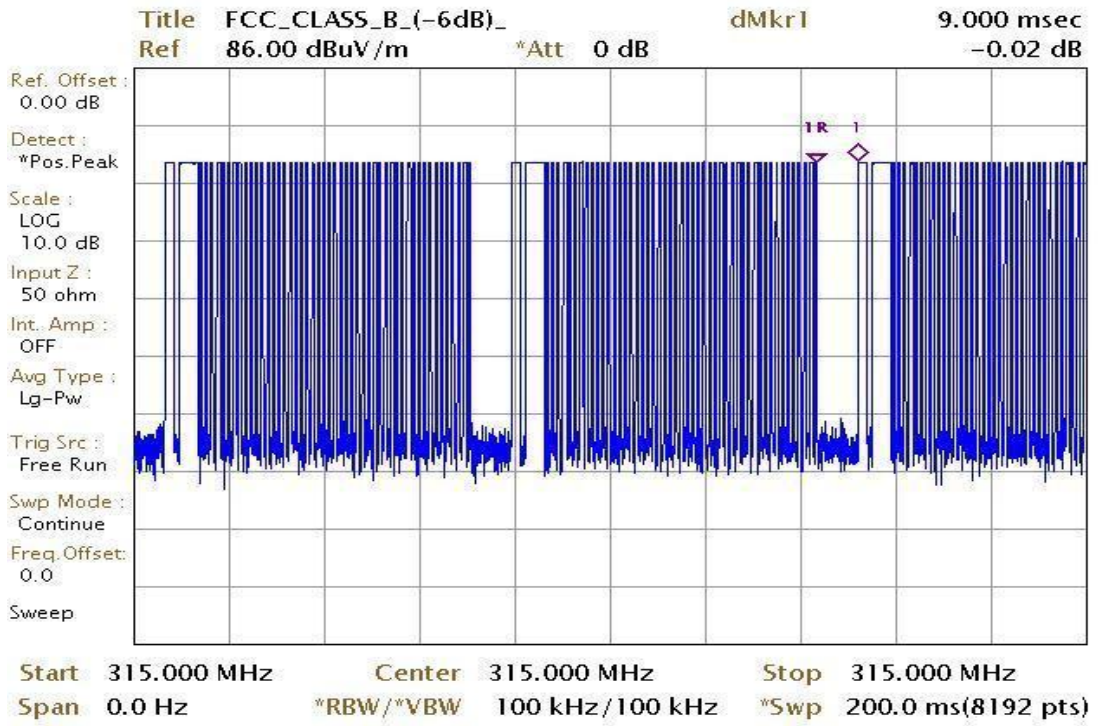
$$\text{Duty Cycle} = 20 \log \left[\frac{2}{3} \times \frac{91}{100} \right] = -4.34 \text{ dB}$$

8.2 RESULT: PASSED

8.3 TEST DATA:









9. SECTION 15.231(a)(1) REQUIREMENTS (RELEASE TIME MEASUREMENT)

9.1 TEST PROCEDURE

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

Set center frequency=315.0MHz

Set SPAN=0Hz

Set RBW=10kHz

Set VBW=30kHz

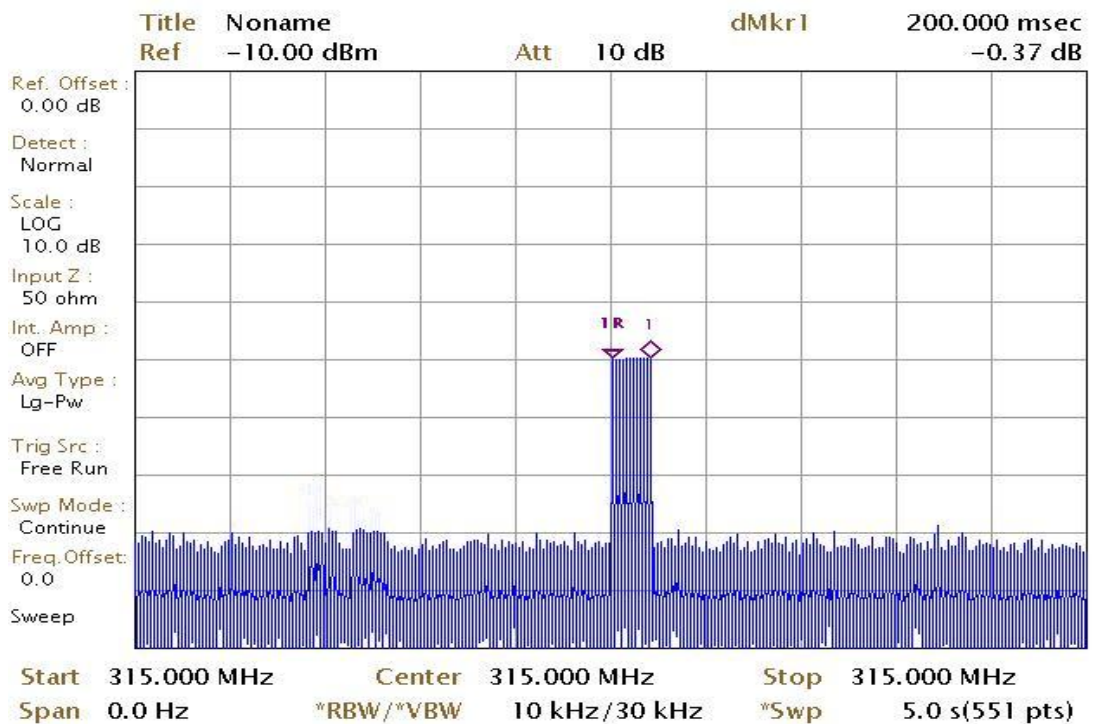
Set SWEET TIME=5s

9.2 RELEASE TIME REQUIREMENT

Per 15.231(a) (1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

9.3 RESULT: PASSED

9.4 TEST DATA:





10. SECTION 15.203 REQUIREMENTS (ANTENNA REQUIREMENT)

10.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, 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.

10.2 ANTENNA CONNECTED CONSTRUCTION

According to § 15.203, 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.

The antenna used for this product is a short metal soldered wire. The antenna is permanently attached. Refer to the product photo.

10.3. RESULT: PASSED



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Appendix 1

PHOTOS OF TEST CONFIGURATION



Radiated Emission



X axis



Y axis



Z axis