



FCC 47 CFR PART 15 SUBPART B

TEST REPORT

For

Applicant: ARCTIC (HK) LTD

Address: Unit 2703-04, Nina Tower 2, 8 Yeung Uk Road, Tsuen Wan, Hong Kong

Product Name: MC101

Model Number: MC101

Brand Name: ARCTIC

FCC ID: Z3AMC101

Report No.: MTE/DAL/D12070969

Date of Issue: Aug. 01, 2012

Issued by: Most Technology Service Co., Ltd.

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2. GENERAL INFORMATION

2.1 PRODUCT INFORMATION

Description:	MC101
Model Name:	MC101
Series Number:	N/A
Model Difference description:	N/A
I/O Ports:	Output Port: Microphone Port, Earphone Port, HDMI Port, USB Port, Optical Out Port. Input Port: USB Port, DC Power Port
Antenna Type:	Internal Fixed
Antenna Gain:	2.0dBi
Power Supply:	DC 12V by AC adapter 100~240V 50/60Hz
Temperature Range:	0°C ~ +40°C

NOTE:

1. For a more detailed features description about the EUT, please refer to User's Manual.

2.2 OBJECTIVE

Perform FCC Part 15 Subpart B tests for FCC Marking.

2.3 TEST STANDARDS AND RESULTS

Test items and the results are as bellow:

EMISSION			
Standard	Item	Result	Remarks
FCC 47 CFR Part 15 Subpart B	Conducted	PASS	Meet Class B limit
	Radiated	PASS	Meet Class B limit

- Note:
1. The test result judgment is decided by the limit of measurement standard
 2. The information of measurement uncertainty is available upon the customer’s request.

2.4 ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

2.5 MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in Measurement” (GUM) published by ISO.

The report 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%

- Uncertainty of Conducted Emission, $U_c = \pm 1.8\text{dB}$
- Uncertainty of Radiated Emission, $U_c = \pm 3.2\text{dB}$

3. TEST METHODOLOGY

3.1 TEST FACILITY

Test Site:	Most Technology Service Co., Ltd.
Location:	No.5, Langshan 2nd Rd, North Hi-Tech Industrial park, Nanshan, Shenzhen, Guangdong, China
Description:	There is one 3m semi-anechoic an area test sites and two line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009 and CISPR 16 requirements. The FCC Registration Number is 490827 . The CNAS Registration Number is CNAS L3573 .
Site Filing:	The site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.
Instrument Tolerance:	All measuring equipment is in accord with ANSI C63.4:2009 and CISPR 16 requirements that meet industry regulatory agency and accreditation agency requirement.
Ground Plane:	Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz.

3.2 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 Section 13.1.4.1 of ANSI C63.4:2009,Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz 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. 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 Section 13.1.4.1 of ANSI C63.4:2009.

3.3 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, 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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

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

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), 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 SETUP OF EQUIPMENT UNDER TEST

4.1 SETUP CONFIGURATION OF EUT

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

4.2 SUPPORT EQUIPMENT

Device Type	Manufacturer	Model Name	Serial No.	Data Cable	Power Cable
Personal Computer	Dell	Dell E520	5P3B42X	1.6m Un-shielded	1.8m Un-shielded
Keyboard	Dell	SK-8115	CN-0DJ313-71616-73D-0RNP	1.6m Un-shielded	1.8m Un-shielded
Mouse	Dell	DC8649	E1D00TYN	1.6m Un-shielded	1.8m Un-shielded
AC Adapter	ARCTIC	ST-C-120-120008 00CT	N/A	N/A	1.0m Un-shielded

Remark:

All the equipment/cables were placed in the worst-case [-configuration to maximize the emission during the test.

Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4. 3 TEST EQUIPMENT LIST

Instrumentation: The following list contains equipment used at MOST for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10 kHz to 1.0 GHz or above.

No.	Equipment	Manufacturer	Model No.	S/N	Calibration due date
1	Test Receiver	Rohde & Schwarz	ESCI	100492	2013/03/14
2	L.I.S.N.	Rohde & Schwarz	ENV216	100093	2013/03/14
3	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2013/03/14
4	Terminator	Hubersuhner	50Ω	No.1	2013/03/14
5	RF Cable	SchwarzBeck	N/A	No.1	2013/03/14
6	Test Receiver	Rohde & Schwarz	ESPI	101202	2013/03/14
7	Bilog Antenna	Sunol	JB3	A121206	2013/03/14
8	Test Antenna - Horn	Schwarzbeck	BBHA 9120C	--	2013/03/14
9	Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	--	2013/03/14
10	Cable	Resenberger	N/A	NO.1	2013/03/14
11	Cable	SchwarzBeck	N/A	NO.2	2013/03/14
12	Cable	SchwarzBeck	N/A	NO.3	2013/03/14
13	DC Power Filter	DuoJi	DL2×30B	N/A	2013/03/14
14	Single Phase Power Line Filter	DuoJi	FNF 202B30	N/A	2013/03/14
15	3 Phase Power Line Filter	DuoJi	FNF 402B30	N/A	2013/03/14
16	Test Receiver	Rohde & Schwarz	ESCI	100492	2013/03/14
17	Absorbing Clamp	Luthi	MDS21	3635	2013/03/14
18	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2013/03/14
19	AC Power Source	Kikusui	AC40MA	LM003232	2013/03/14
20	Test Analyzer	Kikusui	KHA1000	LM003720	2013/03/14
21	Line Impedence Network	Kikusui	LIN40MA-PCR-L	LM002352	2013/03/14
22	ESD Tester	Kikusui	KES4021	LM003537	2013/03/14
23	EMC PRO System	EM Test	UCS-500-M4	V0648102026	2013/03/14
24	Signal Generator	IFR	2032	203002/100	2013/03/14
25	Amplifier	A&R	150W1000	301584	2013/03/14
26	CDN	FCC	FCC-801-M2-25	47	2013/03/14
27	CDN	FCC	FCC-801-M3-25	107	2013/03/14
28	EM Injection Clamp	FCC	F-203I-23mm	403	2013/03/14
29	RF Cable	MIYAZAKI	N/A	No.1/No.2	2013/03/14
30	Universal Radio Communication Tester	ROHDE&SCHWARZ	CMU200	0304789	2013/03/14
31	Telecommunication Antenna	European Antennas	PSA 75301R/170	0304213	2013/03/14

NOTE: Equipments listed above have been calibrated and are in the period of validation.

5. 47 CFR PART 15B REQUIREMENTS

5.1 GENERAL INFORMATION

The EUT has been tested under normal operating (TX) and standby (RX) condition.

The field strength of radiation emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis).

The following data show only with the worst case setup.

The worst case of Y axis was reported.

Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported by this report.

EUT Test Procedure:

1. Put EUT on the test table.
2. Power on the EUT.
3. Make sure the EUT operates normally during the test.

Mode 1: Idle Mode

The EUT configuration of the emission test was **EUT+ Charger**.

Mode 2: Running PC System

During the test, the EUT was playing the USB function continuously.

The EUT configuration of the emission test was **EUT+ Charger+ Monitor**.

6. LINE CONDUCTED EMISSION TEST

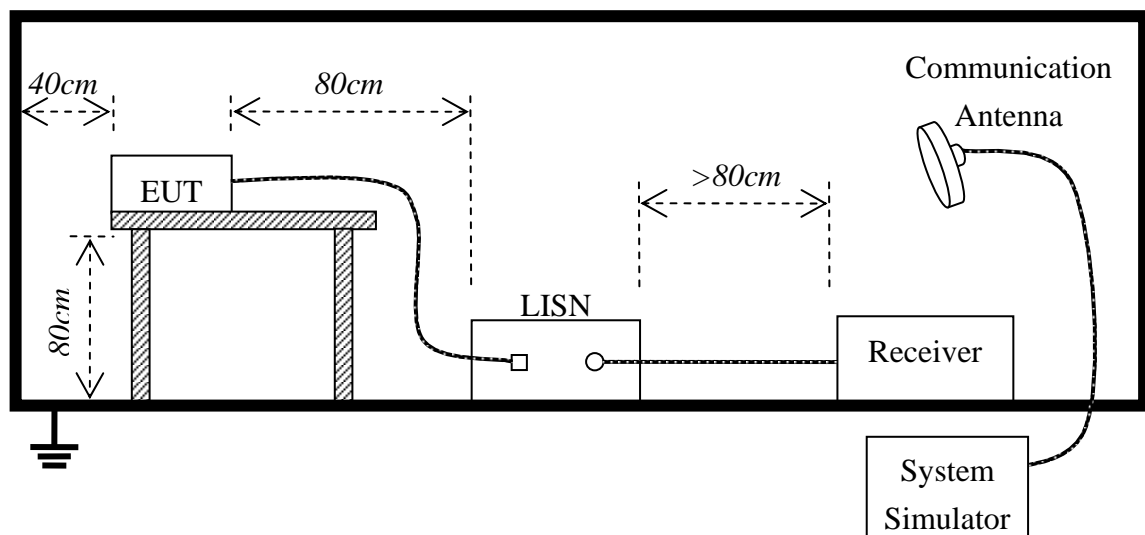
6.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz-500kHz	66-56	56-46
500kHz-5MHz	56	46
5MHz-30MHz	60	50

****Note:** 1. the lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

6.2. BLOCK DIAGRAM OF TEST SETUP



6.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user’s manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per FCC Part 15 (see Test Facility for the dimensions of the ground plane used). When the EUT is floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per FCC Part 15.
- 3) All I/O cables were positioned to simulate typical actual usage as per FCC Part 15.
- 4) The EUT through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5) All support equipments received power from a second LISN supplying power of AC 120V/60Hz, if any.
- 6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7) Analyzer / Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.
- 8) During the above scans, the emissions were maximized by cable manipulation.
- 9) The following test mode(s) were scanned during the preliminary test:

Preliminary Conducted Emission Test				
Frequency Range Investigated		150KHz TO 30 MHz		
Mode of operation	Date	Report No.	Data#	Worst Mode
Idle Mode	2012-07-23	MTE/DAL/D12070969	MC101_1_(L, N)	<input type="checkbox"/>
Running PC System	2012-07-23	MTE/DAL/D12070969	MC101_2_(L, N)	<input checked="" type="checkbox"/>

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

6.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

EUT and support equipment was set up on the test bench as per step 9 of the preliminary test. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -20dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.

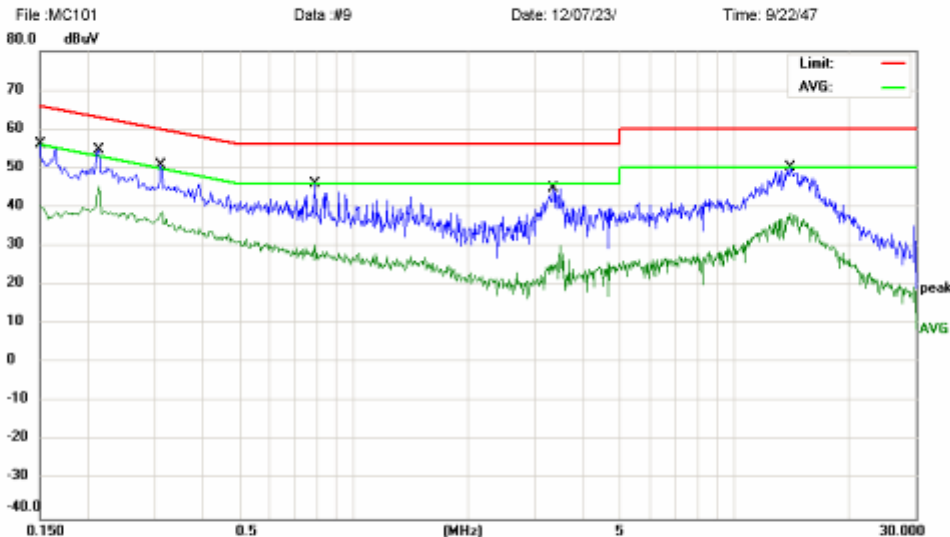
The test modes were carried out for all operation modes, The worst data was shown as the follow.

6.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park
 Guangdong, China
 Tel: 0755-86170306 Fax: 0755-86170310

Conducted Emission Measurement



Site: Chamber #1
 Limit: FCC Part15 B Class B QP
 EUT: MC101
 M/N: MC101
 Mode: Running PC system
 Note:

Phase: **L1**
 Power: DV 12V Adapter AC 120V/60Hz
 Temperature: 26
 Humidity: 60 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	47.20	9.01	56.21	65.99	-9.78	QP	
2	*	0.2140	42.81	11.91	54.72	63.04	-8.32	QP	
3		0.3100	39.46	11.27	50.73	59.97	-9.24	QP	
4		0.7940	35.96	10.00	45.96	56.00	-10.04	QP	
5		3.3460	34.48	10.35	44.83	56.00	-11.17	QP	
6		14.0260	41.03	9.00	50.03	60.00	-9.97	QP	

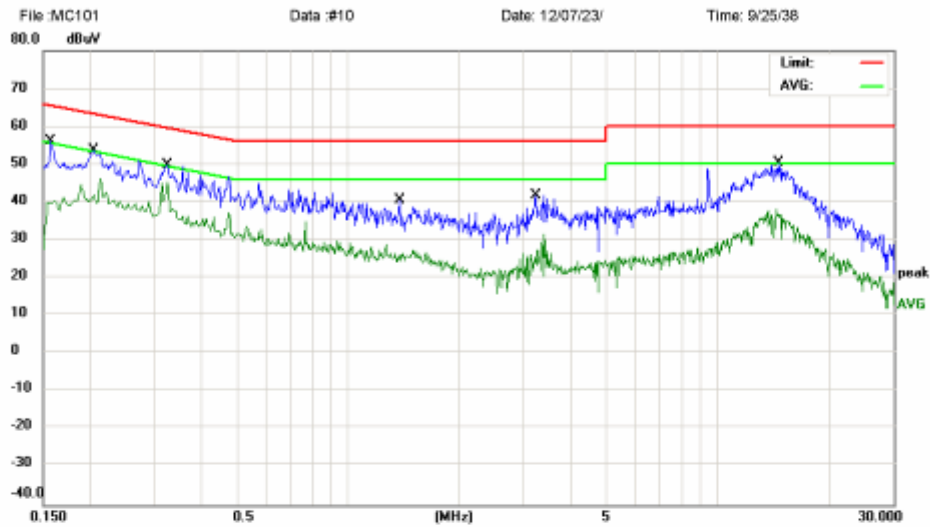
*:Maximum data x:Over limit !:over margin

Engineer Signature:



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park
 Guangdong, China
 Tel: 0755-86170306 Fax: 0755-86170310

Conducted Emission Measurement



Site: Chamber #1 Phase: **N** Temperature: 26
 Limit: FCC Part15 B Class B QP Power: DV 12V Adapter AC 120V/60Hz Humidity: 60 %
 EUT: MC101
 M/N: MC101
 Mode: Running PC system
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1580	46.67	9.49	56.16	65.56	-9.40	QP	
2		0.2060	41.77	11.96	53.73	63.36	-9.63	QP	
3		0.3260	38.69	11.16	49.85	59.55	-9.70	QP	
4		1.3860	30.81	9.61	40.42	56.00	-15.58	QP	
5		3.2300	31.60	10.23	41.83	56.00	-14.17	QP	
6		14.6700	41.51	9.00	50.51	60.00	-9.49	QP	

*:Maximum data x:Over limit !:over margin

Engineer Signature:

7. RADIATED EMISSION TEST

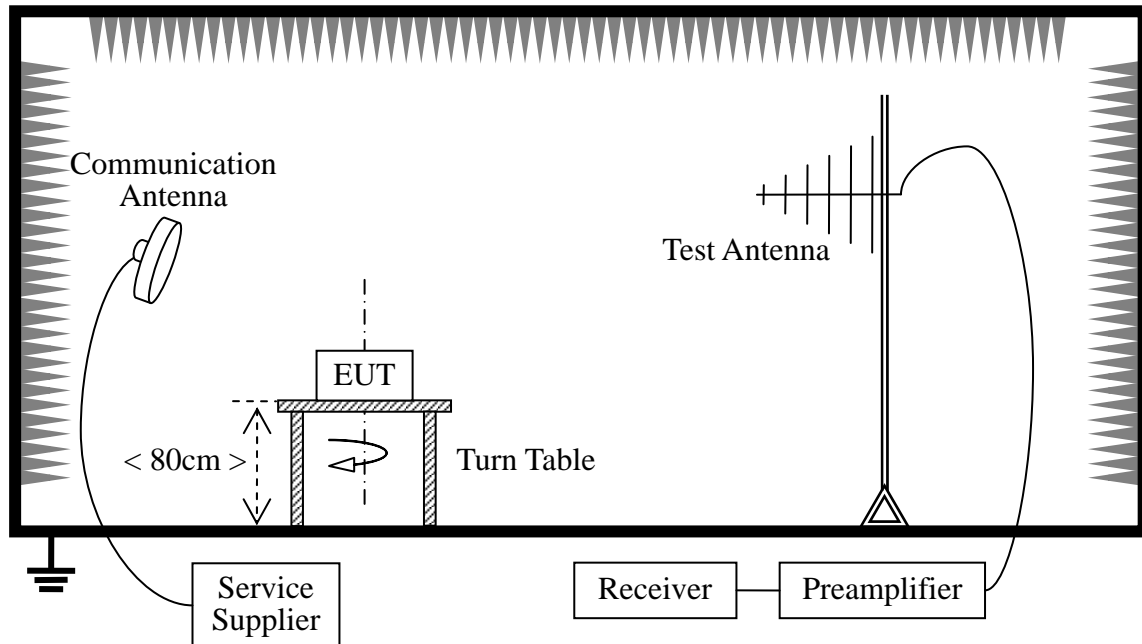
7.1. LIMITS OF RADIATED DISTURBANCES AT 3M DISTANCES FOR CLASS B

According to FCC section 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 ($\mu\text{V}/\text{m}$)	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

As shown in FCC section 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

7.2 TEST DESCRIPTION



- (1) The EUT was placed on a turntable with 0.8 meter above ground.
- (2) The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- (3) The table was rotated 360 degrees to determine the position of the highest radiation.
- (4) The antenna is a Bi-Log antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
- (5) For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1m to 4m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
- (6) Set the test-receiver system to Peak Detect Function and specified bandwidth with maximum hold mode.
- (7) If the emission level of the EUT in peak mode was 3Db lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the quasi-peak method and reported.
- (8) Emission level(dBuV/m) = $20 \log$ Emission level(uv/m).
- (9) Corrected reading: Antenna Factor + cable loss + read level - Preamp Factor = level

7.3 TEST RESULT

Preliminary Radiated Emission Test				
Frequency Range Investigated			30 MHz TO 1000 MHz	
Mode of operation	Date	Report No.	Data#	Worst Mode
Idle Mode	2012-07-23	MTE/DAL/D12070969	MC101_1_(L, N)	<input type="checkbox"/>
Running PC System	2012-07-23	MTE/DAL/D12070969	MC101_2_(L, N)	<input checked="" type="checkbox"/>

Note:

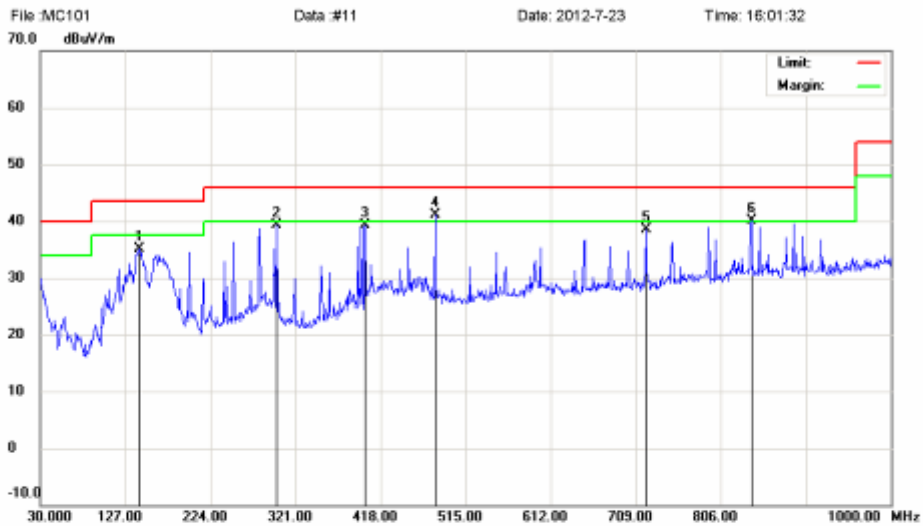
The test modes were carried out for all operation modes, The worst data was shown as the follow.

Below 1GHz



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park
 Guangdong, China
 Tel: 0755-86170306 Fax: 0755-86170310

Radiated Emission Measurement



Site Chamber #1 Polarization: **Horizontal** Temperature: 26
 Limit: FCC Part 15 B 3M Radiation Power: DV 12V Adapter AC 120V/60Hz Humidity: 61 %
 EUT: MC101 Distance:
 M/N: MC101
 Mode: Running PC System
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		142.5200	18.08	17.05	35.13	43.50	-8.37	QP		
2		299.6600	19.92	19.30	39.22	46.00	-6.78	QP		
3		400.5400	20.54	18.71	39.25	46.00	-6.75	QP		
4	*	480.0800	19.33	21.70	41.03	46.00	-4.97	QP		
5		720.6399	13.78	24.71	38.49	46.00	-7.51	QP		
6	!	840.9200	12.92	27.11	40.03	46.00	-5.97	QP		

*:Maximum data x:Over limit !:over margin

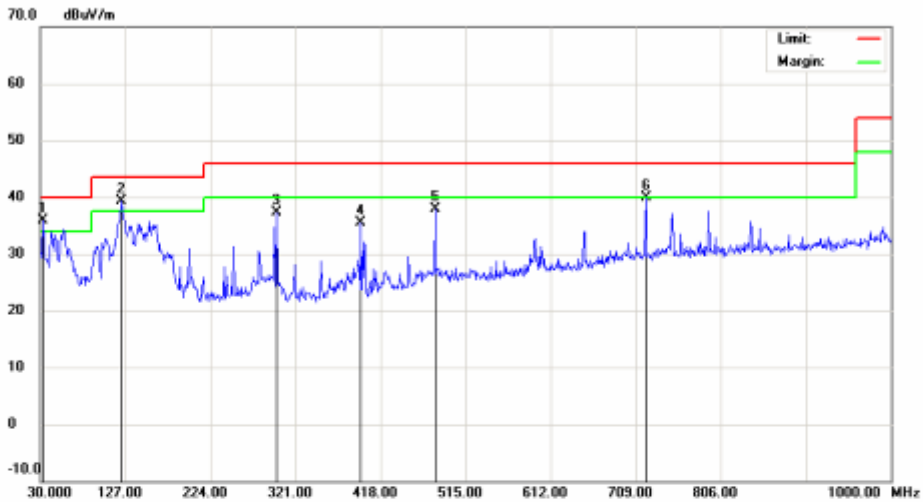
Engineer Signature: Allen



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park
 Guangdong, China
 Tel: 0755-86170306 Fax: 0755-86170310

Radiated Emission Measurement

File: MC101 Data #12 Date: 2012-7-23 Time: 16:03:48



Site Chamber #1 Polarization: **Vertical** Temperature: 26
 Limit: FCC Part 15 B 3M Radiation Power: DV 12V Adapter AC 120V/60Hz Humidity: 61 %
 EUT: MC101 Distance:
 M/N: MC101
 Mode: Running PC System
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	32.9099	13.33	22.56	35.89	40.00	-4.11	QP		
2	!	122.1500	21.63	17.59	39.22	43.50	-4.28	QP		
3		299.6600	18.08	19.30	37.38	46.00	-8.62	QP		
4		395.6899	16.84	18.57	35.41	46.00	-10.59	QP		
5		480.0800	16.27	21.70	37.97	46.00	-8.03	QP		
6		720.6399	15.27	24.71	39.98	46.00	-6.02	QP		

*:Maximum data x:Over limit !:over margin

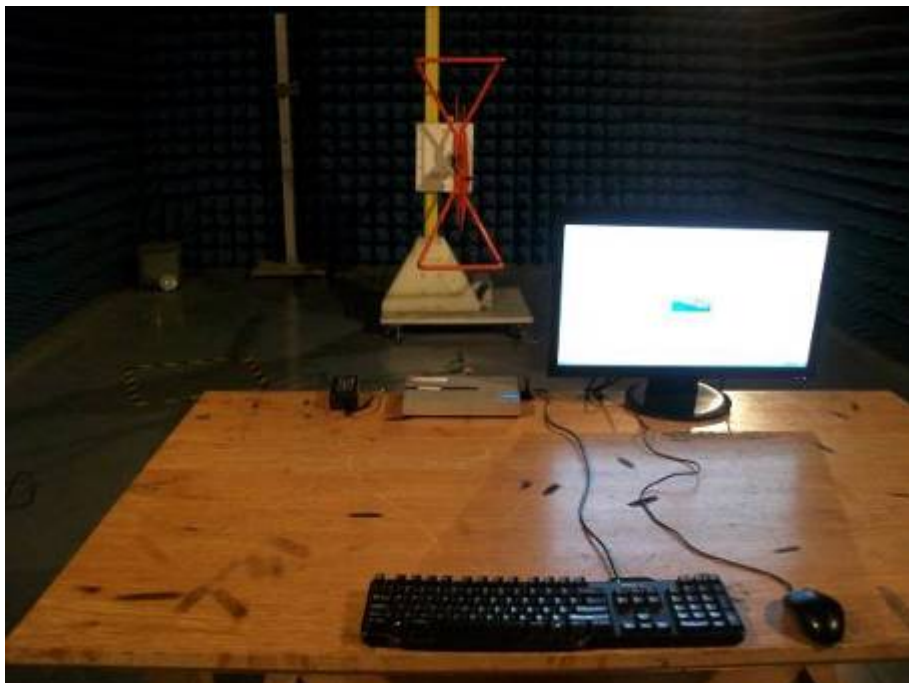
Engineer Signature: Allen

APPENDIX 1
PHOTOGRAPHS OF TEST SETUP

CE TEST SETUP



RE TEST SETUP



-----END OF REPORT-----