FCC EMC Test Report

FCC ID:2AG5U-BIS6380E

Product: Embedded computer

Trade Name: NORCO

Model Number: BIS-6380E, HR-6566

Prepared for

ShenZhen NORCO Intelligent Technology Co.,LTD.

6th Fl., Blg A,Taohuayuan Hi-tech Innovation Park, XiXiang, Shenzhen 518102,China

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name	:	ShenZhen NORCO Intelligent Technology Co.,LTD
Address	:	6th Fl., Blg A, Taohuayuan Hi-tech Innovation Park, XiXiang, Shenzhen 518102, China
Manufacturer's Name	:	ShenZhen NORCO Intelligent Technology Co.,LTD
Address	:	6th Fl., Blg A, Taohuayuan Hi-tech Innovation Park, XiXiang, Shenzhen 518102, China

Product description

Product name	:	Embedded computer
Model and/or type reference	:	BIS-6380E, HR-6566
Standards	:	47 CFR FCC part15 subpart B, 10-1-2015 ANSI C63.4:2014

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with Part 15 of FCC Rules. And it is applicable only to the tested sample identified in the report.

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Date of Test	:	
Date (s) of performance of tests	:	19 Nov. 2015~08 Dec. 2015
Date of Issue	:	08 Dec. 2015
Test Result	:	**Pass**

Testing Engineer : Bing He

(Bing He)

Technical Manager : Jane Lv

(Jane Lv)

Authorized Signatory : Sam. Chen

(Sam Chen)

Table of Contents **Page**

1. TEST SUMMARY

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
FCC part15 subpart B, 10-1-2015 ANSI C63.4: 2014	Conducted Emission	Class B	PASS	
	Radiated Emission	Class B	PASS	

NOTE:

(1) 'N/A' denotes test is not applicable in this Test Report

(2) For client's request and manual description, the test will not be executed.

1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd
Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.
FCC Registration Number:238937; IC Registration Number:9270A-1
CNAS Registration Number:L5516

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **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** %.

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U，(dB)	NOTE
NTEKC01	ANSI	150 kHz ~ 30MHz	3.6	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	U，(dB)	NOTE
NTEKA01	ANSI	30MHz ~ 1000MHz	4.8	
		1GHz ~13GHz	4.5	

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>Embedded computer</td></tr>
<tr><td>Model Name</td><td>BIS-6380E</td></tr>
<tr><td>Additional Model Number(s)</td><td>HR-6566</td></tr>
<tr><td>Model Difference</td><td>All the model are the same circuit and RF module, except the model name.</td></tr>
<tr><td>Product Description</td><td>The EUT is an Embedded computer.
<table><tr><td>Operating frequency:</td><td>2.462GHz</td></tr><tr><td>Connecting I/O port:</td><td>COM, USB, OTG, LAN, MIC, VGA, HDMI</td></tr></table>Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.</td></tr>
<tr><td>Power Source</td><td>AC Voltage</td></tr>
<tr><td>Power Rating</td><td>Input: AC 100-240V, 50/60Hz, 2A
Output: DC 12V, 5A</td></tr>
</table>

2.2 DESCRIPTION OF TEST MODES

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

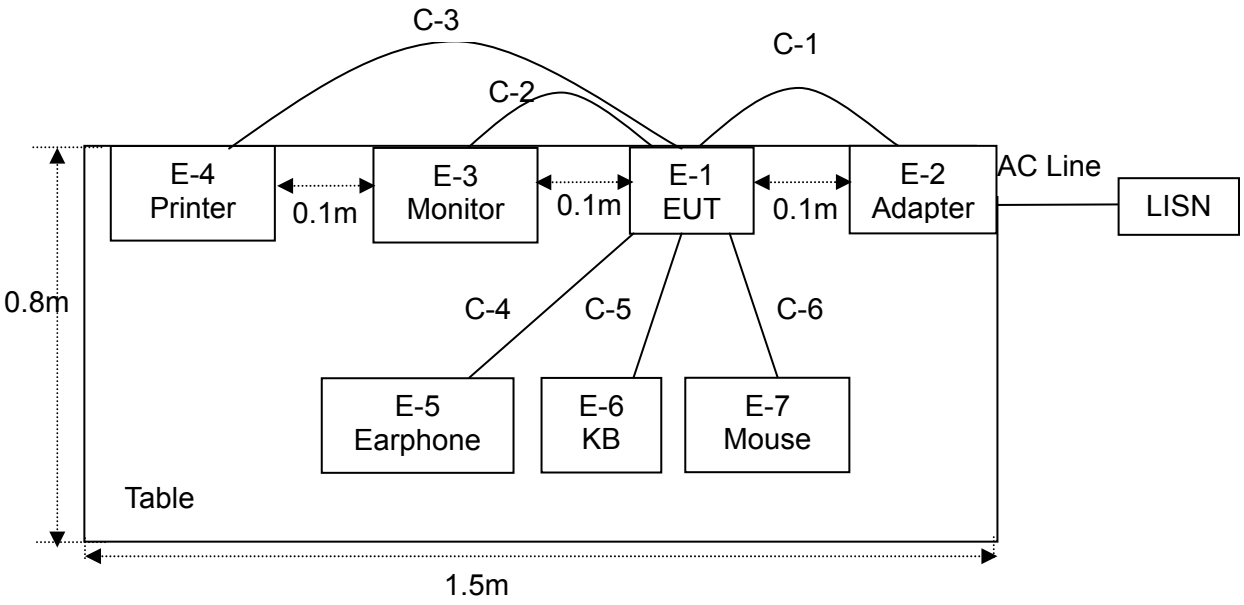
Pretest Mode	Description
Mode 1	Working

For Conducted Test	
Final Test Mode	Description
Mode 1	Working

For Radiated Test	
Final Test Mode	Description
Mode 1	Working

2.3 DESCRIPTION OF TEST SETUP

Mode CE: Working



2.4 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

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	Brand	Model/Type No.	Series No.	Note
E-1	Embedded computer	NORCO	BIS-6380E	N/A	EUT
E-2	Adapter	N/A	GA60SC2-1205000	N/A	
E-3	Monitor	Lenovo	L197wA	OMO4345C1062034	
E-4	Printer	Canon	L11121E	LBP2900	
E-5	Earphone	N/A	N/A	N/A	
E-6	Keyboard	HP	KB-0318	434820-AA2SVH	
E-7	Mouse	HP	MS-SBF96	417441-002REV.OC	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	80cm	
C-2	NO	NO	100cm	
C-3	NO	NO	100cm	
C-4	NO	NO	120cm	
C-5	NO	NO	120cm	
C-6	NO	NO	120cm	

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.
(3) “YES” means “shielded” “with core”; “NO” means “unshielded” “without core”.

2.5 MEASUREMENT INSTRUMENTS LIST

2.5.1 CONDUCTED TEST SITE

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	LISN	R&S	ENV216	101490	Jun. 28, 2015	Jun. 27, 2016	1 year
2	LISN	R&S	ENV216	101313	Jun. 28, 2015	Jun. 27, 2016	1 year
3	50Ω Switch	ANRITSU CORP	MP59B	6200983704	Jun. 28, 2015	Jun. 27, 2016	1 year
4	Low frequency cable	N/A	C-2	C-2	Jun. 28, 2015	Jun. 27, 2016	1 year
5	EMI Test Receiver	R&S	ESCI	101160	Jun. 28, 2015	Jun. 27, 2016	1 year

2.5.2 RADIATED TEST SITE

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Bilog Antenna	TESEQ	CBL6111D	31216	Jun. 26, 2015	Jun. 25, 2016	1 year
2	Test Cable	N/A	R-01	N/A	Jun. 28, 2015	Jun. 27, 2016	1 year
3	Test Cable	N/A	R-02	N/A	Jun. 28, 2015	Jun. 27, 2016	1 year
4	EMI Test Receiver	R&S	ESCI-7	101318	Jun. 28, 2015	Jun. 27, 2016	1 year
5	Antenna Mast	EM	SC100_1	N/A	N/A	N/A	N/A
6	Turn Table	EM	SC100	060531	N/A	N/A	N/A
7	50Ω Switch	Anritsu	MP59B	6200983705	Jun. 28, 2015	Jun. 27, 2016	1 year
8	Horn Antenna	EM	EM-AH-10180	60538	Jun. 26, 2015	Jun. 25, 2016	1 year
9	BBV9718 Broadband Preamplifier 0.15-18GHz	SCHWARZBECK	9718-218	N/A	Jun. 28, 2015	Jun. 27, 2016	1 year

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150kHz-30MHz)

FREQUENCY (MHz)	☐Class A (dBμV)		☒Class B (dBμV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	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.

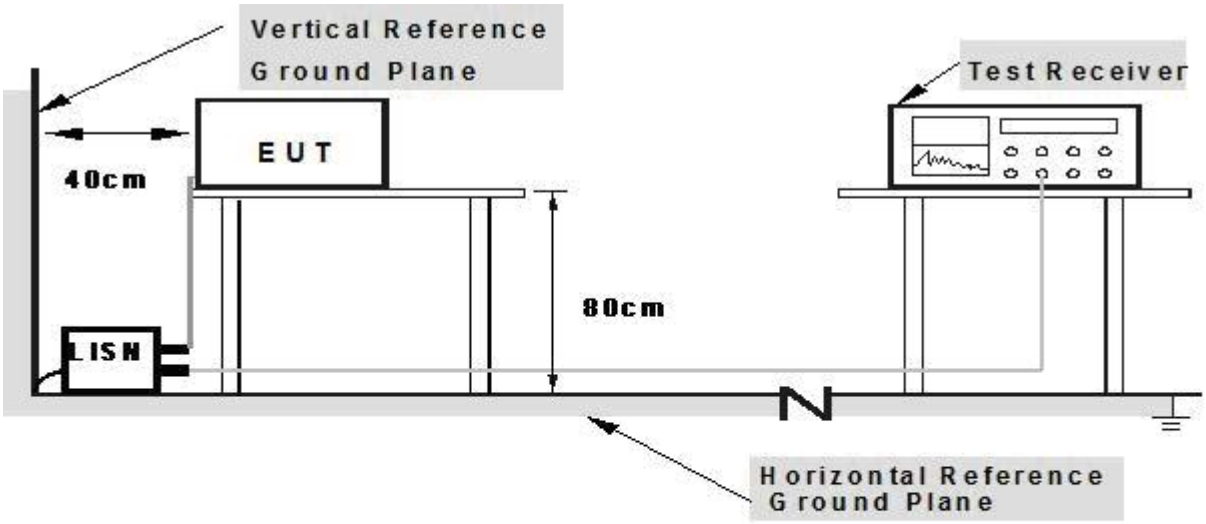
The following table is the setting of the receiver

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

3.1.2 TEST PROCEDURE

a. 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.
b. 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.
c. 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.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 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

3.1.4 EUT OPERATING CONDITIONS

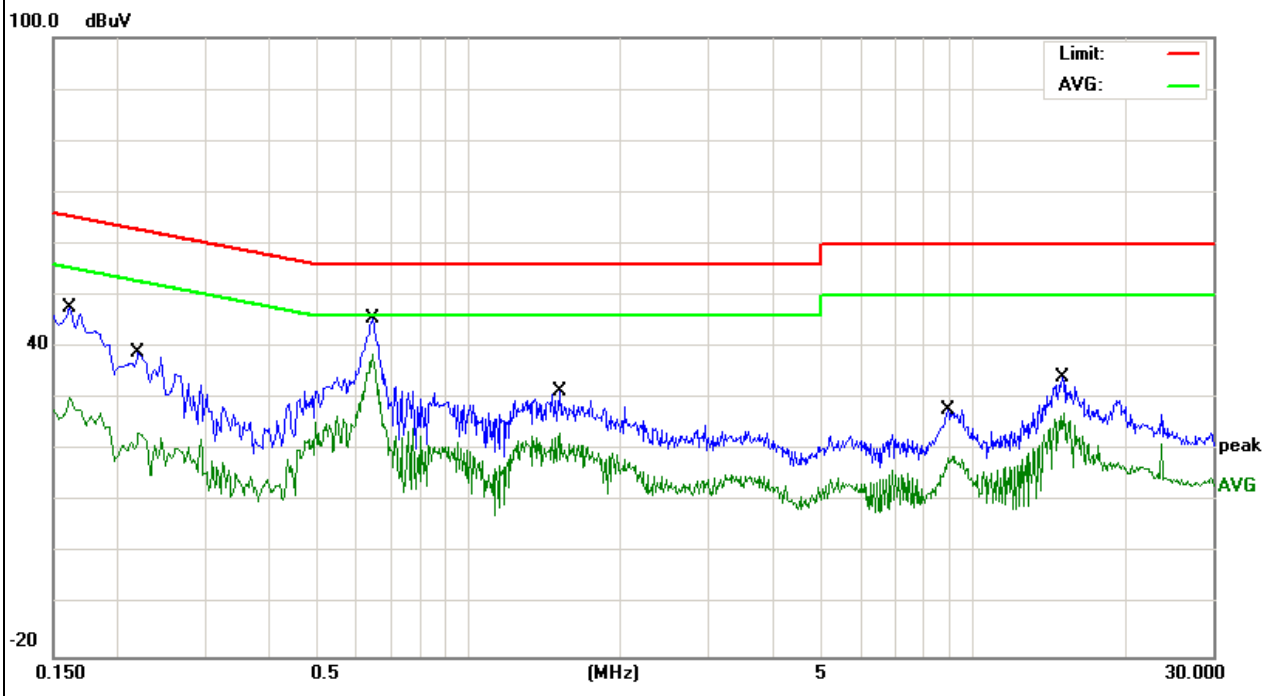
The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

3.1.5 TEST RESULTS

EUT:	Embedded computer	Model Name. :	BIS-6380E
Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2015-12-04
Test Mode:	Working	Phase:	L
Test Voltage:	DC 12V from Adapter AC 120V/60Hz		

Freq. (MHz)	Reading (dBμV)	Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Over (dB)	Detector
0.1620	38.04	9.48	47.52	65.36	-17.84	QP
0.1620	20.71	9.48	30.19	55.36	-25.17	AVG
0.2220	29.37	9.48	38.85	62.74	-23.89	QP
0.2220	13.89	9.48	23.37	52.74	-29.37	AVG
0.6460	35.99	9.56	45.55	56.00	-10.45	QP
0.6460	29.08	9.56	38.64	46.00	-7.36	AVG
1.5260	21.77	9.56	31.33	56.00	-24.67	QP
1.5260	13.89	9.56	23.45	46.00	-22.55	AVG
8.9458	18.12	9.73	27.85	60.00	-32.15	QP
8.9458	9.01	9.73	18.74	50.00	-31.26	AVG
15.1296	24.24	9.82	34.06	60.00	-25.94	QP
15.1296	17.44	9.82	27.26	50.00	-22.74	AVG

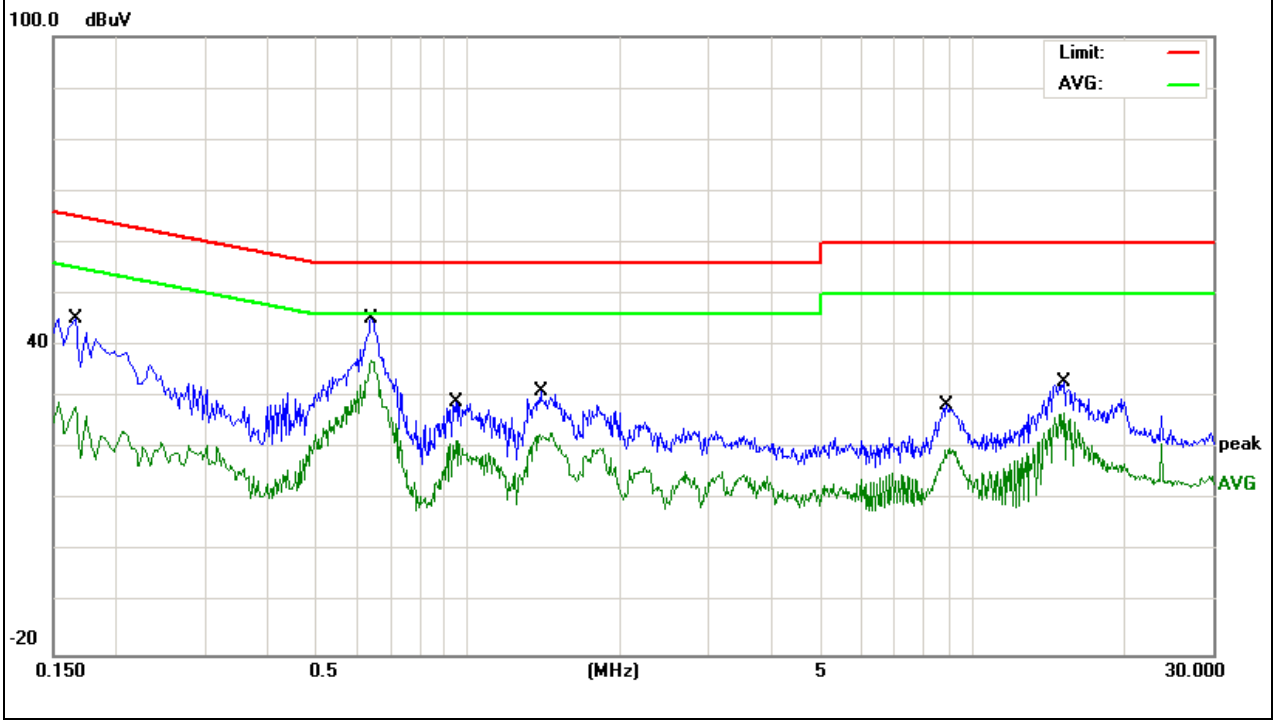
Remark:
Factor = Insertion Loss + Cable Loss.



EUT:	Embedded computer	Model Name. :	BIS-6380E
Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2015-12-04
Test Mode:	Working	Phase:	N
Test Voltage:	DC 12V from Adapter AC 120V/60Hz		

Freq. (MHz)	Reading (dBμV)	Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Over (dB)	Detector
0.1660	35.87	9.48	45.35	65.15	-19.80	QP
0.1660	18.73	9.48	28.21	55.15	-26.94	AVG
0.6419	35.67	9.56	45.23	56.00	-10.77	QP
0.6419	27.49	9.56	37.05	46.00	-8.95	AVG
0.9458	19.61	9.56	29.17	56.00	-26.83	QP
0.9458	11.95	9.56	21.51	46.00	-24.49	AVG
1.3898	21.66	9.57	31.23	56.00	-24.77	QP
1.3898	13.52	9.57	23.09	46.00	-22.91	AVG
8.8739	18.74	9.73	28.47	60.00	-31.53	QP
8.9739	10.19	9.73	19.92	50.00	-30.08	AVG
15.2217	23.15	9.83	32.98	60.00	-27.02	QP
15.2217	17.05	9.83	26.88	50.00	-23.12	AVG

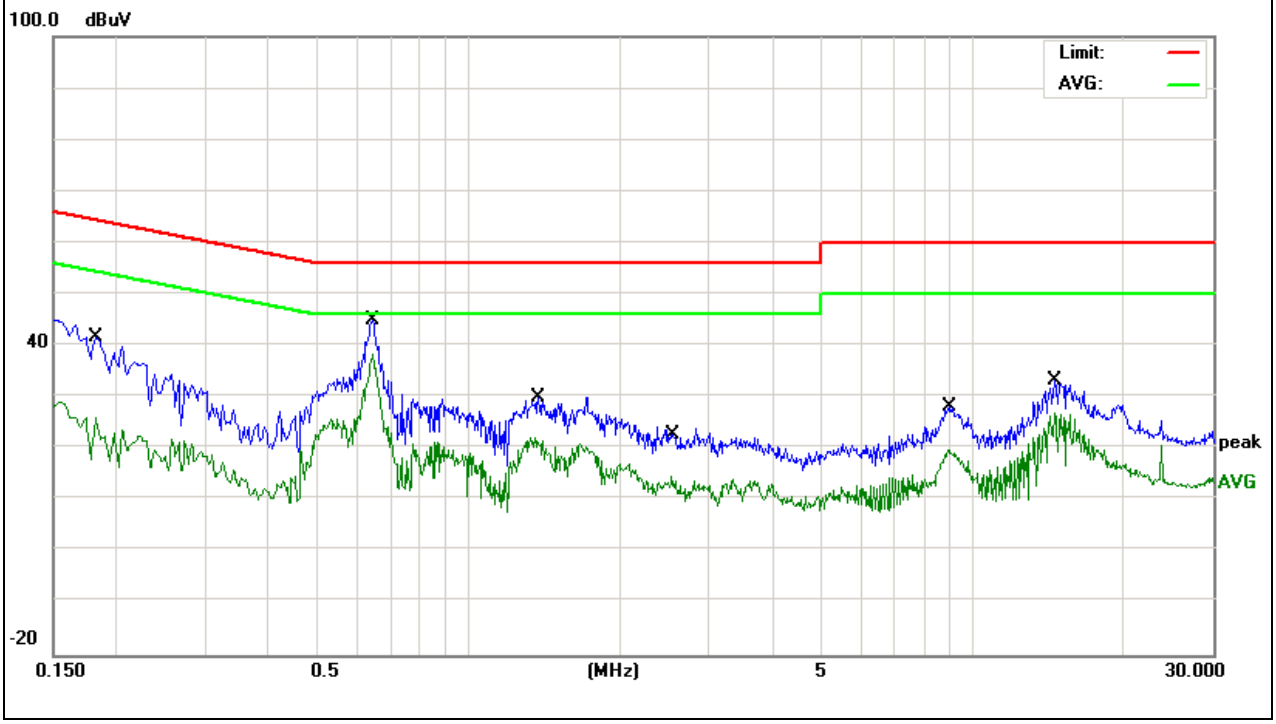
Remark:
Factor = Insertion Loss + Cable Loss.



EUT：	Embedded computer	Model Name:	BIS-6380E
Temperature：	26℃	Relative Humidity：	54%
Pressure：	1010hPa	Test Date：	2015-12-04
Test Mode：	Working	Phase：	L
Test Voltage:	DC 12V from Adapter AC 230V/50Hz		

Freq. (MHz)	Reading (dBμV)	Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Over (dB)	Detector
0.1819	32.26	9.46	41.72	64.39	-22.67	QP
0.1819	16.62	9.46	26.08	54.39	-28.31	AVG
0.6460	35.53	9.44	44.97	56.00	-11.03	QP
0.6460	28.81	9.44	38.25	46.00	-7.75	AVG
1.3740	20.50	9.45	29.95	56.00	-26.05	QP
1.3740	12.82	9.45	22.27	46.00	-23.73	AVG
2.5339	14.34	9.47	23.81	56.00	-32.19	QP
2.5339	5.12	9.47	14.59	46.00	-31.41	AVG
9.0297	18.50	9.62	28.12	60.00	-31.88	QP
9.0297	10.11	9.62	19.73	50.00	-30.27	AVG
14.5539	23.39	9.77	33.16	60.00	-26.84	QP
14.5539	17.08	9.77	26.85	50.00	-23.15	AVG

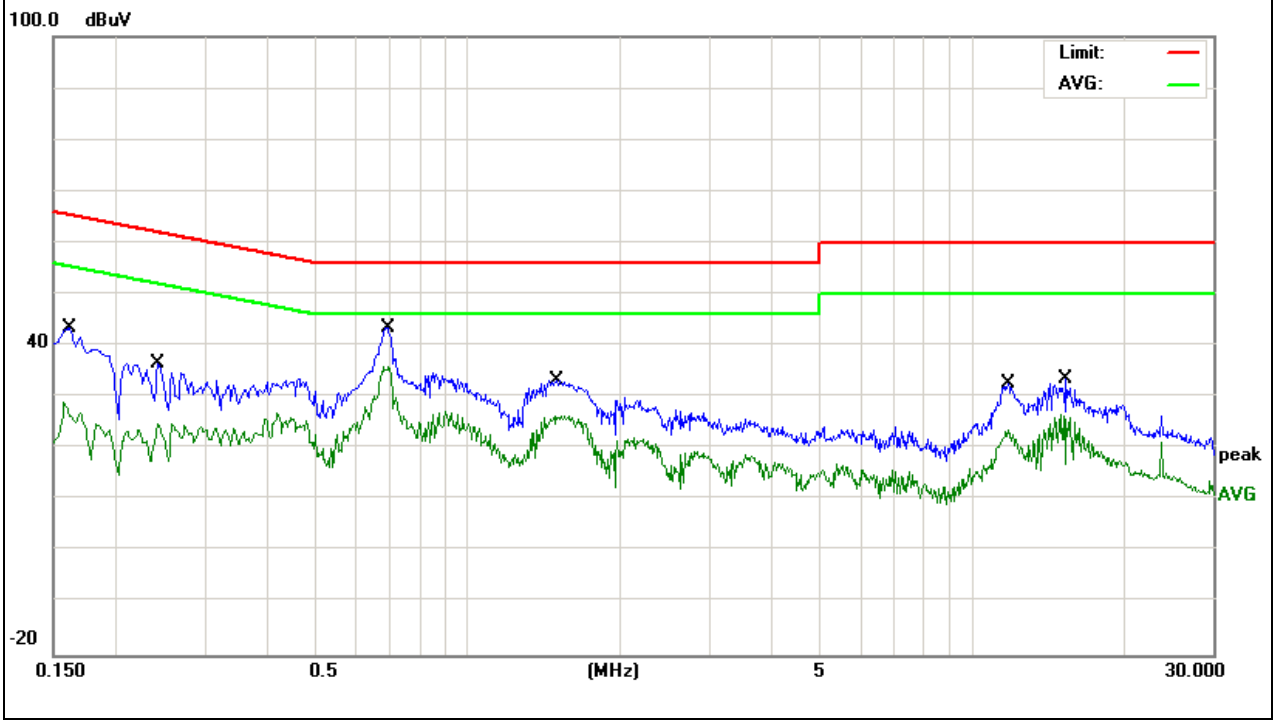
Remark:
Factor = Insertion Loss + Cable Loss.



EUT：	Embedded computer	Model Name:	BIS-6380E
Temperature：	26℃	Relative Humidity：	54%
Pressure：	1010hPa	Test Date：	2015-12-04
Test Mode：	Working	Phase：	N
Test Voltage:	DC 12V from Adapter AC 230V/50Hz		

Freq. (MHz)	Reading (dBμV)	Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Over (dB)	Detector
0.1620	34.07	9.46	43.53	65.36	-21.83	QP
0.1620	19.45	9.46	28.91	55.36	-26.45	AVG
0.2419	27.06	9.45	36.51	62.03	-25.52	QP
0.2419	15.39	9.45	24.84	52.03	-27.19	AVG
0.6896	33.99	9.43	43.42	56.00	-12.58	QP
0.6896	26.52	9.43	35.95	46.00	-10.05	AVG
1.5020	23.95	9.45	33.40	56.00	-22.60	QP
1.5020	16.82	9.45	26.27	46.00	-19.73	AVG
11.7939	22.84	9.72	32.56	60.00	-27.44	QP
11.7939	13.99	9.72	23.71	50.00	-26.29	AVG
15.3178	23.82	9.78	33.60	60.00	-26.40	QP
15.3178	16.89	9.78	26.67	50.00	-23.33	AVG

Remark:
Factor = Insertion Loss + Cable Loss.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	☐Class A (at 3m)	☒Class B (at 3m)
	dBμV/m	dBμV/m
30 ~ 88	49.0	40.0
88 ~ 216	53.5	43.5
216 ~ 960	56.5	46.0
Above 960	59.5	54.0

Notes:

(1) The limit for radiated test was performed according to as following: FCC PART 15B /ICES-003.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBμV/m)=20log Emission level (uV/m).

3.2.2 TEST PROCEDURE

a. The measuring distance of at 10 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.

b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter test site. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. 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, above 1G Average detector mode will be instead.

e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP(AV) Limits and then no additional QP Mode measurement performed.

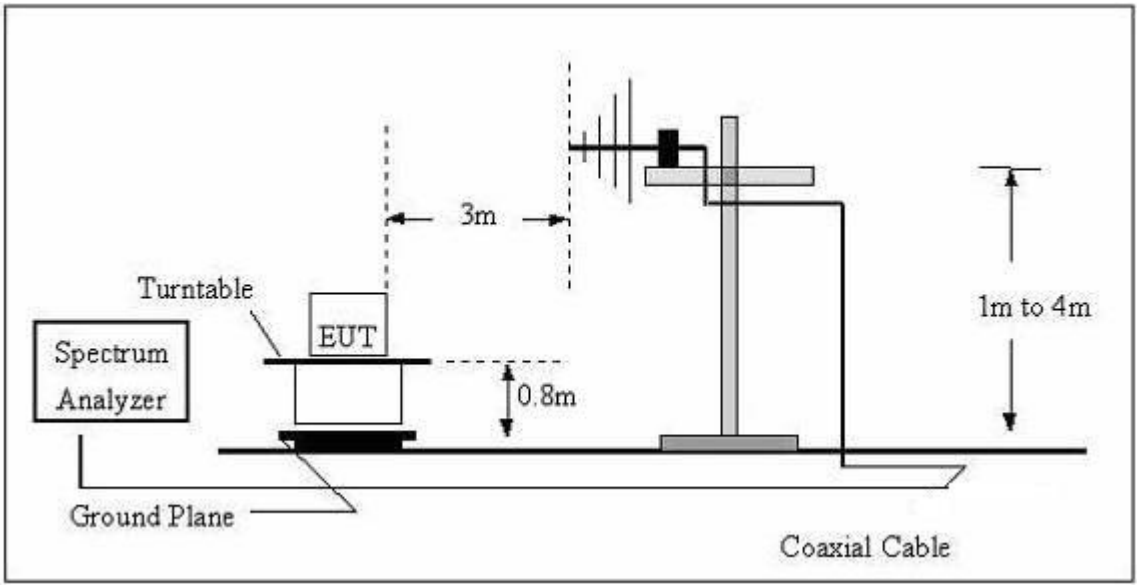
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

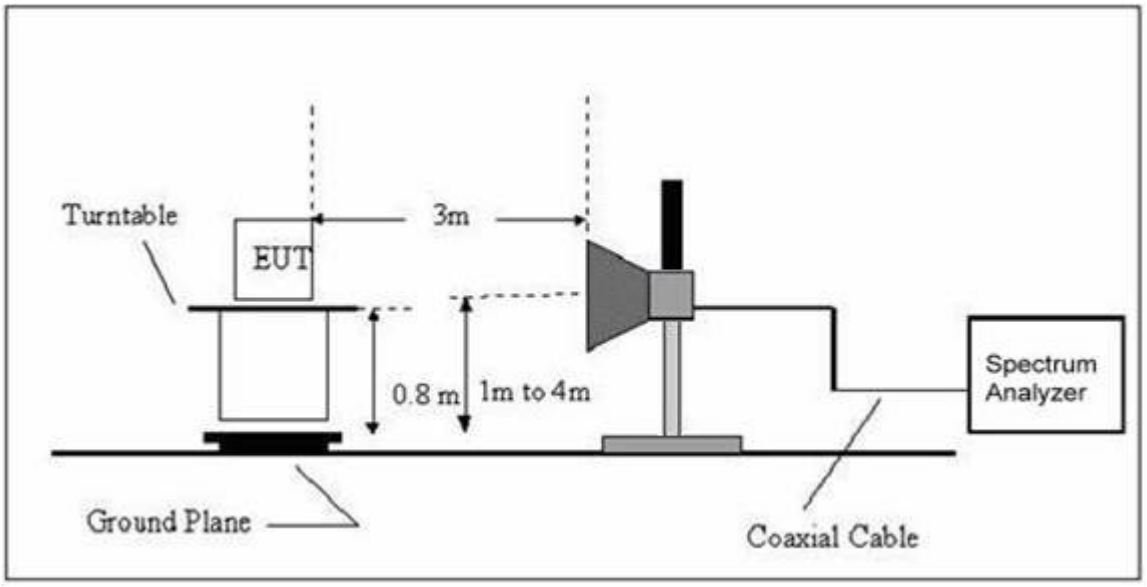
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Peak	100 kHz	100 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

3.2.3 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1GHz



3.2.4 EUT OPERATING CONDITIONS

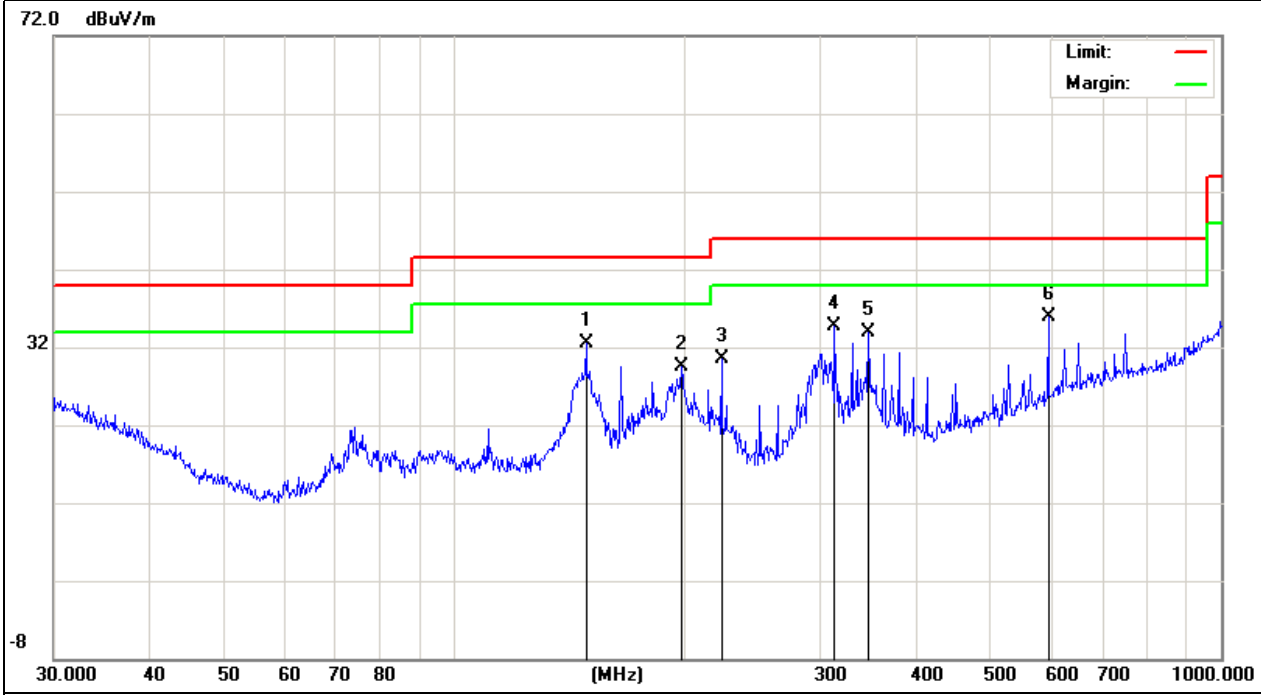
The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.5 TEST RESULTS

EUT:	Embedded computer	Model Name :	BIS-6380E
Temperature:	24℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2015-12-04
Test Mode:	Working	Polarization:	Horizontal
Test Power:	DC 12V from Adapter AC 120V/60Hz		

Freq. (MHz)	Reading (dBμV/m)	Factor (dB)	Measurement (dBμV/m)	Limit (dBμV/m)	Over (dB)	Detector
148.4410	20.96	11.57	32.53	43.50	-10.97	QP
197.8926	18.07	11.45	29.52	43.50	-13.98	QP
222.9500	19.62	10.89	30.51	46.00	-15.49	QP
313.2760	21.61	13.08	34.69	46.00	-11.31	QP
346.8091	19.95	14.05	34.00	46.00	-12.00	QP
595.1327	16.79	19.21	36.00	46.00	-10.00	QP

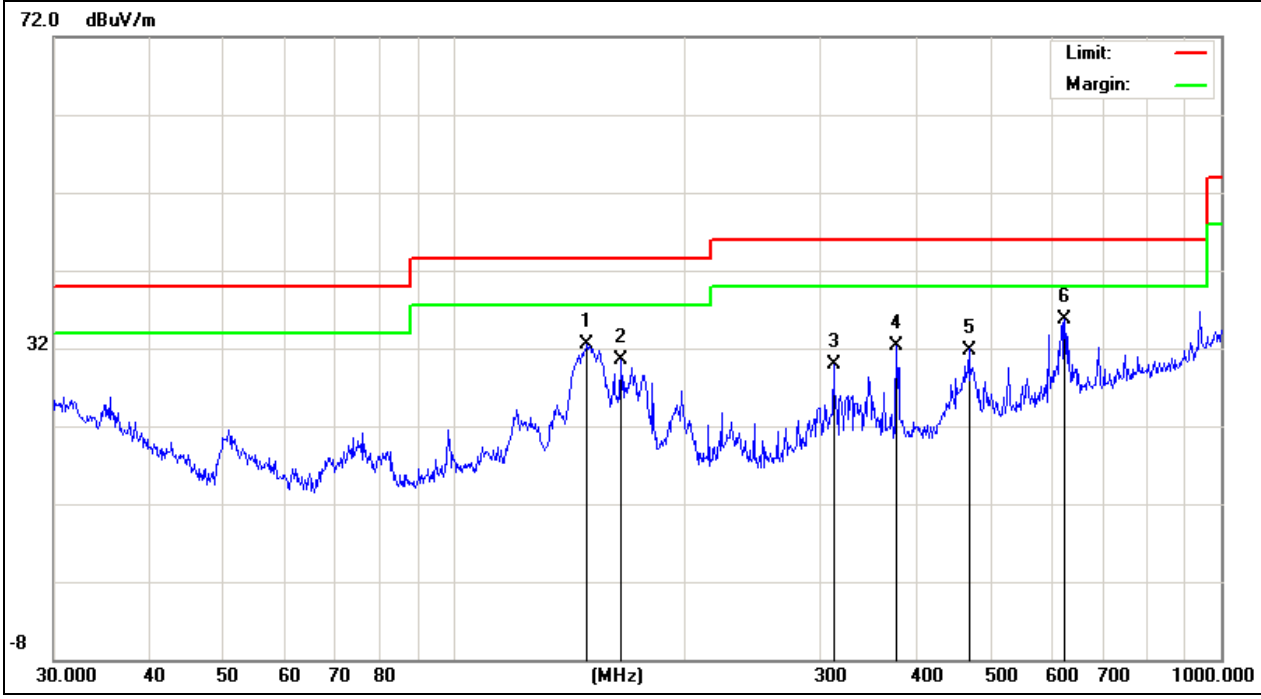
Remark:
Factor = Antenna Factor + Cable Loss.



EUT:	Embedded computer	Model Name :	BIS-6380E
Temperature:	24℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2015-12-04
Test Mode:	Working	Polarization:	Vertical
Test Power:	DC 12V from Adapter AC 120V/60Hz		

Freq. (MHz)	Reading (dBμV/m)	Factor (dB)	Measurement (dBμV/m)	Limit (dBμV/m)	Over (dB)	Detector
148.9625	20.80	11.61	32.41	43.50	-11.09	QP
164.9071	18.78	11.74	30.52	43.50	-12.98	QP
312.1792	16.92	13.05	29.97	46.00	-16.03	QP
377.2590	17.49	14.91	32.40	46.00	-13.60	QP
468.8761	15.47	16.33	31.80	46.00	-14.20	QP
625.0779	15.84	19.92	35.76	46.00	-10.24	QP

Remark:
Factor = Antenna Factor + Cable Loss.



3.2.6 TEST RESULTS(1GHz~13GHz)

EUT:	Embedded computer	Model Name :	BIS-6380E
Temperature:	24℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2015-12-04
Test Mode:	Working	Polarization:	Horizontal
Test Power:	DC 12V from Adapter AC 120V/60Hz		

Freq. (MHz)	Reading (dBμV/m)	Factor (dB)	Measurement (dBμV/m)	Limit (dBμV/m)	Over (dB)	Detector
1559.4860	62.08	-10.96	51.12	74.00	-22.88	peak
1559.4860	40.76	-10.96	29.80	54.00	-24.20	AVG
1868.8510	61.91	-9.45	52.46	74.00	-21.54	peak
1868.8510	39.48	-9.45	30.03	54.00	-23.97	AVG
4804.6360	52.06	1.78	53.84	74.00	-20.16	peak
4804.6360	31.74	1.78	33.52	54.00	-20.48	AVG

Remark:
Factor = Antenna Factor + Cable Loss.

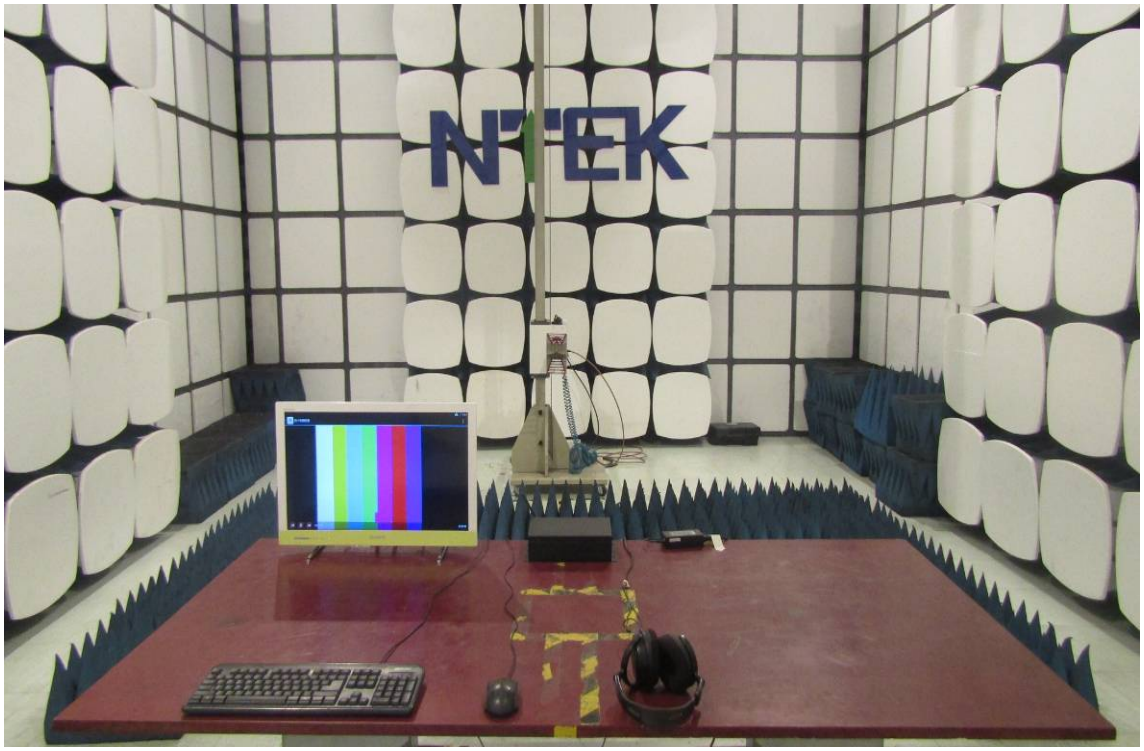
EUT:	Embedded computer	Model Name :	BIS-6380E
Temperature:	24℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2015-12-04
Test Mode:	Working	Polarization:	Vertical
Test Power:	DC 12V from Adapter AC 120V/60Hz		

Freq. (MHz)	Reading (dBμV/m)	Factor (dB)	Measurement (dBμV/m)	Limit (dBμV/m)	Over (dB)	Detector
1559.4860	68.68	-10.96	57.72	74.00	-16.28	peak
1559.4860	46.25	-10.96	35.29	54.00	-18.71	AVG
1717.9150	62.40	-10.18	52.22	74.00	-21.78	peak
1717.9150	40.25	-10.18	30.07	54.00	-23.93	AVG
4753.2600	55.98	1.01	56.99	74.00	-17.01	peak
4753.2600	33.27	1.01	34.28	54.00	-19.72	AVG

Remark:
Factor = Antenna Factor + Cable Loss.

4. EUT TEST PHOTO

Radiated Measurement Photos



Conducted Measurement Photos