FCC Test Report

FCC ID: LNQSBT200DI

Product: Wireless LAN equipment

Trade Name: Actiontec

Model Number: SBT200DI

Serial Model: N/A

Report No.: NTEK- 2016NT08308666F3

Prepared for

Actiontec Electronics Inc

760 North Mary Ave.,Sunnyvale, CA 94086,USA

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.

1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street,
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TEST RESULT CERTIFICATION

Applicant's name	:	Actiontec Electronics Inc
Address	:	760 North Mary Ave., Sunnyvale, CA 94086, USA
Manufacturer's Name	:	Actiontec Electronics Inc
Address	:	760 North Mary Ave., Sunnyvale, CA 94086, USA

Product description

Product name	:	Wireless LAN equipment
Model and/or type reference	:	SBT200DI
Standards	:	FCC Part15B:23 Sep.2016 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	:	30 Aug. 2016 ~ 29 Sep.2016
Date of Issue	:	29 Sep.2016
Test Result	:	**Pass**

Testing Engineer : Lebron Wang

(Lebron Wang)

Technical Manager : Jason Chen

(Jason Chen)

Authorized Signatory : Sam. Chen

(Sam Chen)

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Revision History

Report No.	Version	Description	Issued Date
NTEK-2016NT08308666F3	Rev.01	Initial issue of report	Sep 29, 2016

1. TEST SUMMARY

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
FCC Part15B:2016 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	3.2	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
NTEKA01	ANSI	30MHz ~ 1000MHz	4.7	
		1GHz ~12.4GHz	5.0	

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Wireless LAN equipment
Trade Name	Actiontec
Model Name	SBT200DI
Serial Model	N/A
Model Difference	N/A
Product Description	The EUT is a Wireless LAN equipment. Connecting I/O port: USB Operation Frequency: WIFI 2.4G: 802.11b/g/n(20MHz): 2412~2462MHz 802.11n(40MHz):2422~2452MHz WIFI 5.2G/5.8G 802.11a/AC20/n(20M): 5180 MHz ~ 5240 MHz, 5745 ~ 5825 MHz; 802.11 AC40/n(40M):5190MHz~5230MHz, 5755~5795MHz 802.11 AC80:5755MHz Modulation Type: IEEE 802.11b : DSSS (CCK, QPSK, DBPSK) IEEE 802.11g/n (HT20/HT40) : OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11a /n(20M/40M)/ AC(20M/40M/80M): OFDM With BPSK/QPSK/16QAM/64QAM/256QAM
Power Source	DC 5V from PC
Adapter	N/A
Battery	N/A

2.1.1 DESCRIPTION OF TEST MODES

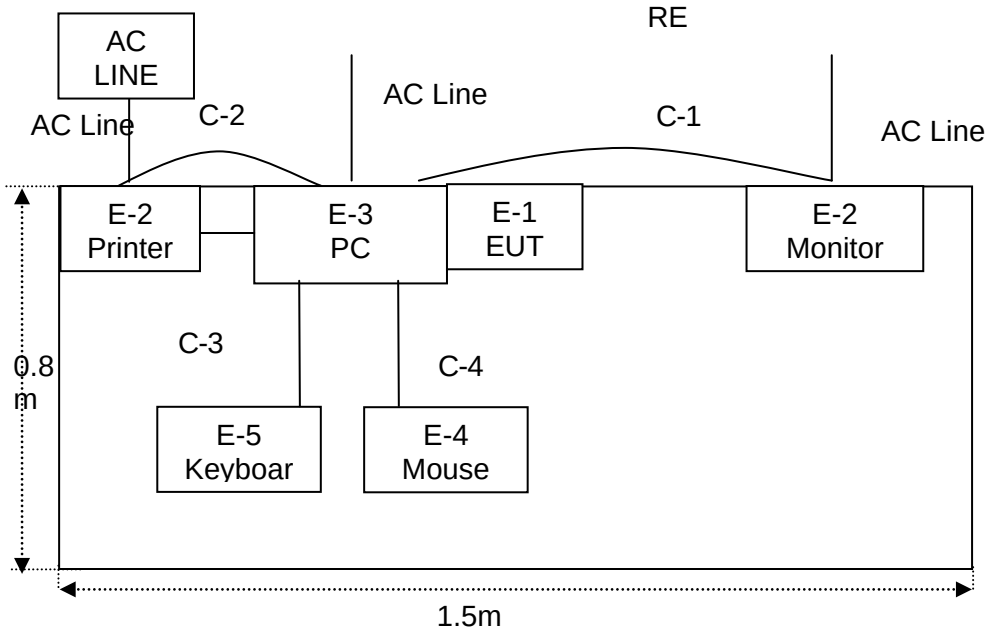
To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration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

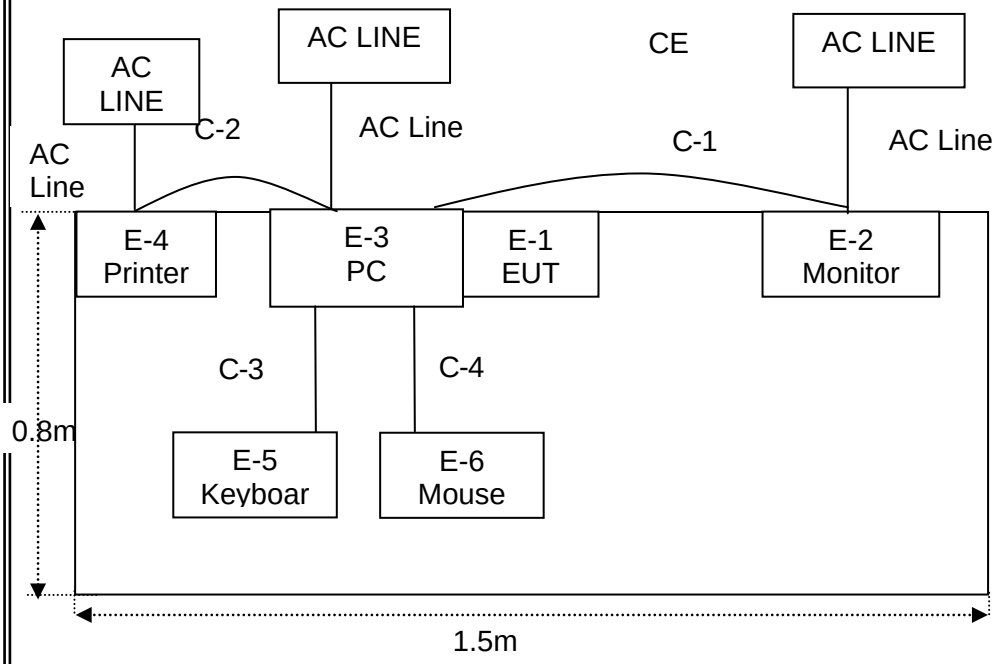
Pretest Mode	Description
Mode 1	Data transfer mode

For Conducted Test	
Final Test Mode	Description
Mode 1	Data transfer mode

For Radiated Test	
Final Test Mode	Description
Mode 1	Data transfer mode

2.2 DESCRIPTION OF TEST SETUP





2.3 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	Wireless LAN equipment	Actiontec	SBT200DI	LNQSBT200DI	EUT
E-2	Monitor	DELL	IN2020MB	cn-0y6mhx-74261-11f-67e s	
E-3	PC	DELL	FT4Y23X	34413561645	
E-4	Printer	Canon	L11121E	LBP2900	
E-5	Keyboar	DELL	SK-8185	OY526KUS	
E-6	Mouse	DELL	MS111-P	cn-011d3v-71581-11e-1th7	

Item	Cable Type	Shielded Type	Ferrite Core	Length	Note
C-1	VGA	unshielded	NO	1.0m	
C-2	USB Cable	unshielded	NO	1.2m	
C-3	USB Cable	unshielded	NO	1.2m	
C-4	USB Cable	unshielded	NO	1.2m	

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”.

2.4 MEASUREMENT INSTRUMENTS LIST

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2016.07.06	2017.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2016.06.07	2017.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2016.07.06	2017.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.06.07	2017.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2016.06.07	2017.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2016.07.06	2017.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.07.06	2017.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2016.07.06	2017.07.05	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2016.06.08	2017.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2016.07.06	2017.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2016.07.06	2017.07.05	1 year
12	Test Cable	N/A	R-01	N/A	2016.07.06	2017.07.05	1 year
13	Test Cable	N/A	R-02	N/A	2016.07.06	2017.07.05	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2016.06.07	2017.06.06	1 year
2	LISN	R&S	ENV216	101313	2016.08.24	2017.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2016.08.24	2017.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.06.07	2017.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2016.06.07	2017.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2016.06.08	2017.06.07	1 year
7	Test Cable	N/A	C01	N/A	2016.06.08	2017.06.07	1 year
8	Test Cable	N/A	C02	N/A	2016.06.08	2017.06.07	1 year
9	Test Cable	N/A	C03	N/A	2016.06.08	2017.06.07	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 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.

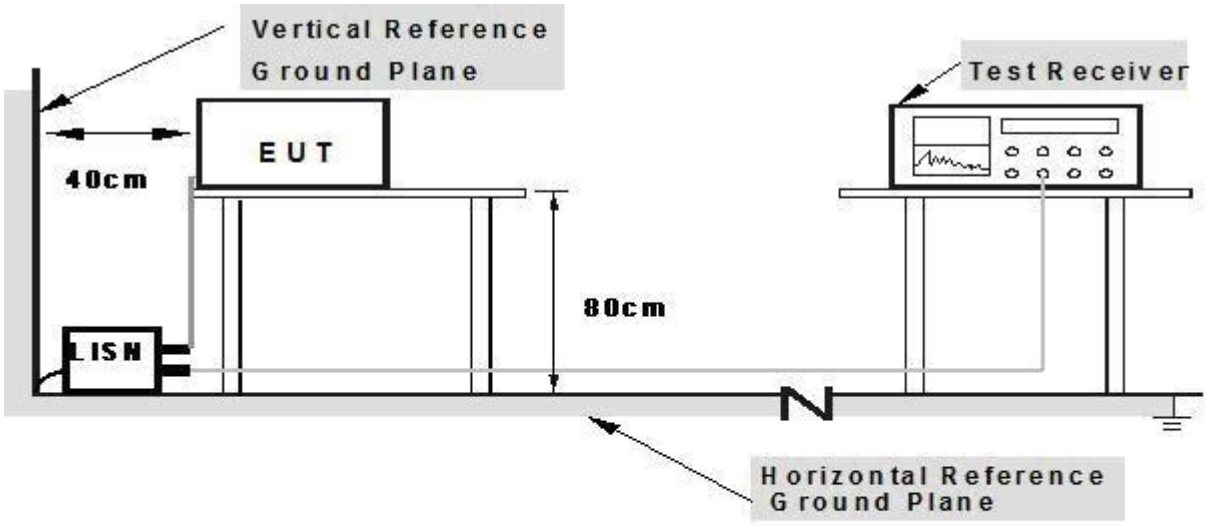
The following table is the setting of the receiver

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

3.1.2 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.

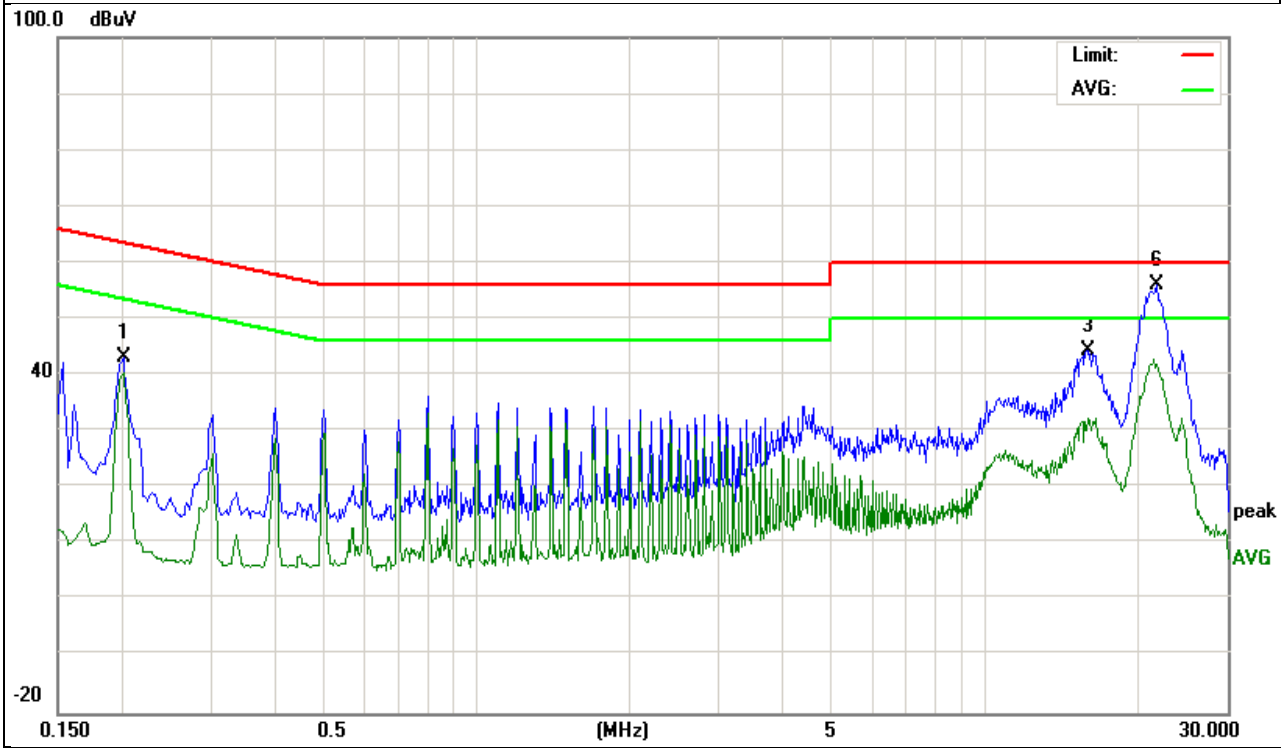
3.1.5 TEST RESULTS

EUT:	Wireless LAN equipment	Model Name. :	SBT200DI
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2016-9-28
Test Mode:	Mode 1	Phase :	L
Test Voltage:	DC 5V from PC AC 120V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.2020	32.92	10.13	43.05	63.52	-20.47	QP
0.2020	30.42	10.13	40.55	53.52	-12.97	AVG
15.9259	34.48	10.00	44.48	60.00	-15.52	QP
15.9259	22.35	10.00	32.35	50.00	-17.65	AVG
21.5139	32.62	10.11	42.73	50.00	-7.27	AVG
21.7899	45.87	10.11	55.98	60.00	-4.02	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

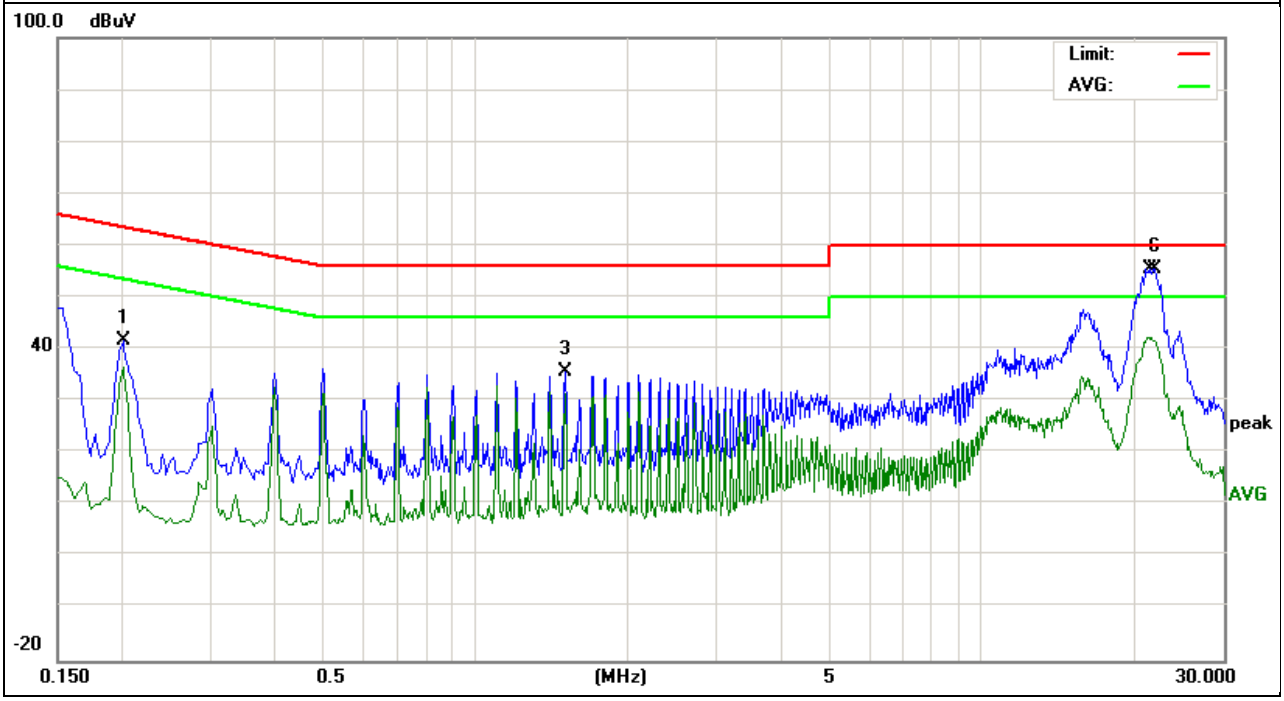


EUT:	Wireless LAN equipment	Model Name. :	SBT200DI
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2016-9-28
Test Mode:	Mode 1	Phase :	N
Test Voltage:	DC 5V from PC AC 120V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.2020	31.51	10.02	41.53	63.52	-21.99	QP
0.2020	26.60	10.02	36.62	53.52	-16.90	AVG
1.5060	25.69	9.83	35.52	56.00	-20.48	QP
1.5060	21.58	9.83	31.41	46.00	-14.59	AVG
21.4020	32.26	10.09	42.35	50.00	-7.65	AVG
22.0259	45.32	10.09	55.41	60.00	-4.59	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 3m)
	dBuV/m	dBuV/m
30 ~ 88	39.0	40.0
88 ~ 216	43.5	43.5
216 ~ 960	46.5	46.0
Above 960	49.5	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 (dBuV/m)=20log Emission level (uV/m).

3.2.2 TEST PROCEDURE

Test Arrangement for Radiated Emissions up to 1 GHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency below 1GHz.

Test Arrangement for Radiated Emissions above 1 GHz.

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength.Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

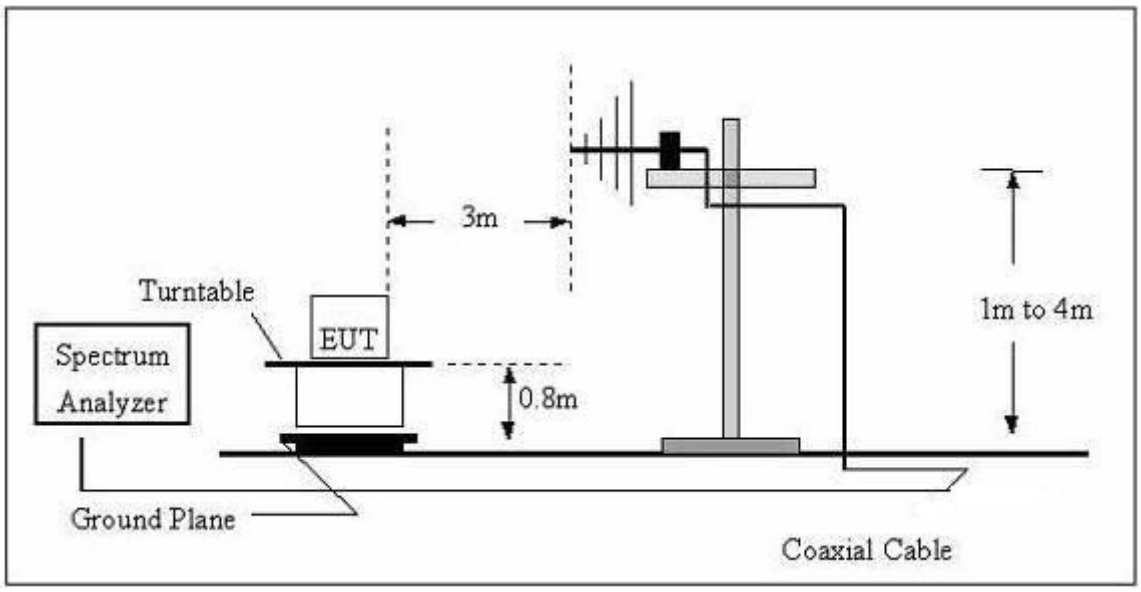
Note：For the hand-held device, the EUT should be measured for all 3 axes and only the worst case is recorded in the report

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

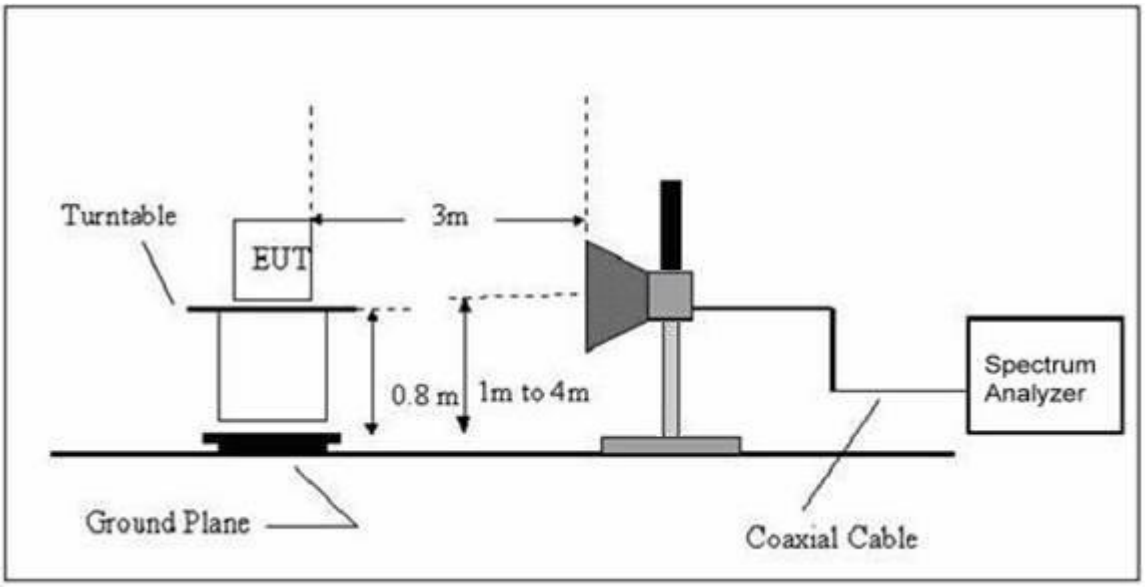
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Avg	1 MHz	10 Hz

3.2.3 TEST SETUP

For Radiated Emission 30~1000MHz



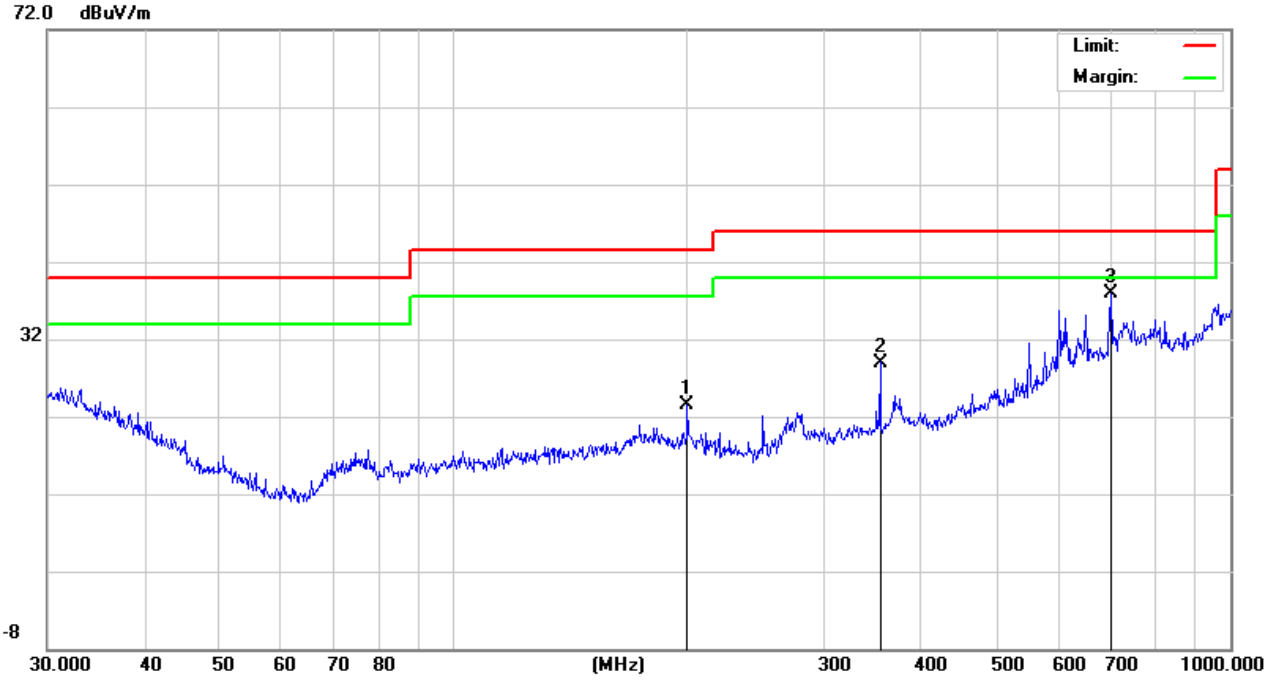
(B) Radiated Emission Test Set-Up Frequency Above 1GHz



3.2.4 TEST RESULTS

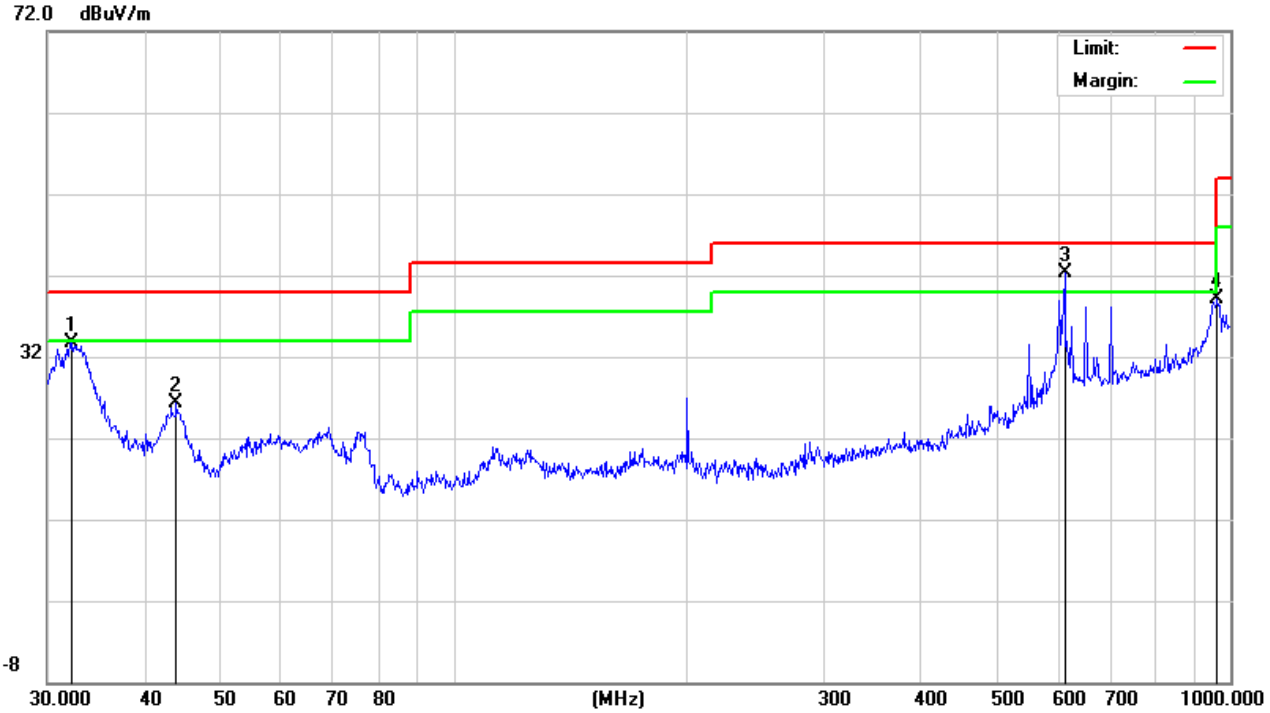
TEST RESULTS (30~1000 MHz)

EUT:	Wireless LAN equipment	Model Name. :	SBT200DI
Temperature:	24 ℃	Relative Humidity:	54%
Pressure:	1010 hPa	Test Date :	2016-9-28
Test Mode :	Mode 1	Polarization :	Horizontal
Test Power :	DC 5V from PC AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark
1	199.9856	10.71	12.75	23.46	43.50	-20.04	QP
2	354.1831	13.49	15.51	29.00	46.00	-17.00	QP
3	701.7610	15.66	22.32	37.98	46.00	-8.02	QP

EUT:	Wireless LAN equipment	Model Name. :	SBT200DI
Temperature:	24 ℃	Relative Humidity:	54%
Pressure:	1010 hPa	Test Date :	2016-9-28
Test Mode :	Mode 1	Polarization :	Vertical
Test Power :	DC 5V From PC AC 120V/60Hz		



No.	Frequency	Reading	Correct	Result	Limit	Over Limit	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	32.2925	14.42	19.34	33.76	40.00	-6.24	QP
2	43.9658	12.89	13.38	26.27	40.00	-13.73	QP
3	612.0642	21.33	20.98	42.31	46.00	-3.69	QP
4	962.1623	10.88	28.13	39.01	54.00	-14.99	QP

3.2.5 TEST RESULTS(Above 1GHz)

The Testing have been conformed to 6*5825MHz=34950MHz, and the worst result was report as below:

Polar (H/V)	Frequency	Read Level	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Remark	
	(MHz)	(dBμV)	(dB)	dB/m	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
V	2512.25	60.23	2.35	26.46	39.15	49.89	74	-24.11	Pk	Vertical
V	2512.25	40.32	2.35	26.46	39.15	29.98	54	-24.02	AV	Vertical
V	4366.02	58.11	4.12	36.22	41.6	56.85	74	-17.15	Pk	Vertical
V	4366.02	39.65	4.12	36.22	41.6	38.39	54	-15.61	AV	Vertical
H	2405.34	60.12	2.18	24.36	39.13	47.53	74	-26.47	Pk	Horizontal
H	2405.34	41.05	2.18	24.36	39.13	28.46	54	-25.54	AV	Horizontal
H	3211.25	59.33	3.42	31.75	41.21	53.29	74	-20.71	Pk	Horizontal
H	3211.25	38.25	3.42	31.75	41.21	32.21	54	-21.79	AV	Horizontal

END OF REPORT