FCC RADIO TEST REPORT
FCC ID: LNQSBWD960B

Product : ScreenBeam 960
Trade Mark : Actiontec
Model Name : SBWD960B
Family Model : N/A
Report No. : S19082001504003

Prepared for

Actiontec Electronics Inc

3301 Olcott St Santa Clara, CA 95054 United States

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.
1/F, Building E, Fenda Science Park, Sanwei Community,
Xixiang Street Bao'an District, Shenzhen 518126 P.R. China
Tel.: +86-755-6115 6588
Fax.: +86-755-6115 6599
Website:http://www.ntek.org.cn

TEST RESULT CERTIFICATION

Applicant's name ..... : Actiontec Electronics Inc

Address ..... : 3301 Olcott St Santa Clara, CA 95054 United States

Manufacturer's Name ..... : Actiontec Electronics Inc

Address ..... : 3301 Olcott St Santa Clara, CA 95054 United States

Product description..... : ScreenBeam 960

Product name..... : ScreenBeam 960

Model and/or type reference : SBWD960B

Family Model..... : N/A

Standards ..... : FCC Part15.407

Test procedure ..... ANSI C63.10-2013 and KDB 789033 D02 General UNII Test Procedures New Rules v02r01
FCC KDB 662911 D01 Multiple Transmitter Output v02r01
FCC KDB 662911 D02 MIMO With Cross Polarized Antenna V01

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

This report shall not be reproduced except in full, without the written approval of NTEK, this document may be altered or revised by NTEK, personnel only, and shall be noted in the revision of the document.

Date of Test .....

Date (s) of performance of tests..... 23 Aug. 2019 ~ 16 Sep. 2019

Date of Issue..... 18 Sep. 2019

Test Result..... **Pass**

Testing Engineer : Eileen Liu.

(Eileen Liu)

Technical Manager : Jason chen

(Jason Chen)

Authorized Signatory : Sam. Chen

(Sam Chen)

Table of Contents

	Page
1 . SUMMARY OF TEST RESULTS	6
1.1 FACILITIES AND ACCREDITATIONS	7
1.2 MEASUREMENT UNCERTAINTY	7
2 . GENERAL INFORMATION	8
2.1 GENERAL DESCRIPTION OF EUT	8
2.2 DESCRIPTION OF TEST MODES	12
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	13
2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	14
2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS	15
3 . EMC EMISSION TEST	17
3.1 CONDUCTED EMISSION MEASUREMENT	17
3.1.1 APPLICABLE STANDARD	17
3.1.2 CONFORMANCE LIMIT	17
3.1.3 TEST CONFIGURATION	17
3.1.4 TEST PROCEDURE	17
3.2 RADIATED EMISSION MEASUREMENT	22
3.2.1 APPLICABLE STANDARD	22
3.2.2 CONFORMANCE LIMIT	22
3.2.3 MEASURING INSTRUMENTS	22
3.2.4 TEST CONFIGURATION	23
3.2.5 TEST PROCEDURE	24
3.2.6 TEST RESULTS (9KHZ – 30 MHZ)	25
3.2.7 TEST RESULTS (30MHZ – 1GHZ)	26
3.2.8 TEST RESULTS (1GHZ-18GHZ)	30
3.2.9 TEST RESULTS (18GHZ-40GHZ)	34
3.2.10 SPURIOUS EMISSION IN RESTRICTED BAND 4.5GHZ~5.150 GHZ& 5.350GHZ~5460GHZ	42
4 . POWER SPECTRAL DENSITY TEST	44
4.1 APPLIED PROCEDURES / LIMIT	44
4.2 TEST PROCEDURE	45
4.3 DEVIATION FROM STANDARD	45
4.4 TEST SETUP	45
4.5 EUT OPERATION CONDITIONS	45
4.6 TEST RESULTS	46
5 . 26DB & 99% EMISSION BANDWIDTH	47
5.1 APPLIED PROCEDURES / LIMIT	47
5.2 TEST PROCEDURE	47
5.3 EUT OPERATION CONDITIONS	48

Table of Contents

	Page
5.4 TEST RESULTS	49
6 . MINIMUM 6 DB BANDWIDTH	50
6.1 APPLIED PROCEDURES / LIMIT	50
6.2 TEST PROCEDURE	50
6.3 DEVIATION FROM STANDARD	50
6.4 TEST SETUP	50
6.5 EUT OPERATION CONDITIONS	50
6.6 TEST RESULTS	51
7 . MAXIMUM CONDUCTED OUTPUT POWER	52
7.1 PPLIED PROCEDURES / LIMIT	52
7.2 TEST PROCEDURE	52
7.3 DEVIATION FROM STANDARD	54
7.4 TEST SETUP	54
7.5 EUT OPERATION CONDITIONS	54
7.6 TEST RESULTS	55
8 . OUT OF BAND EMISSIONS	56
8.1 APPLICABLE STANDARD	56
8.2 TEST PROCEDURE	56
8.3 DEVIATION FROM STANDARD	56
8.4 TEST SETUP	56
8.5 EUT OPERATION CONDITIONS	57
8.6 TEST RESULTS	58
9.SPURIOUS RF CONDUCTED EMISSIONS	59
9.1CONFORMANCE LIMIT	59
9.2MEASURING INSTRUMENTS	59
9.3TEST SETUP	59
9.4TEST PROCEDURE	59
9.5TEST RESULTS	59
10. FREQUENCY STABILITY MEASUREMENT	60
10.1 LIMIT	60
10.2 TEST PROCEDURES	60
10.3 TEST SETUP LAYOUT	60
10.4 EUT OPERATION DURING TEST	60
10.5 TEST RESULTS	61
11. ANTENNA REQUIREMENT	67
11.1 STANDARD REQUIREMENT	67
11.2 EUT ANTENNA	67

Revision History

Report No.	Version	Description	Issued Date
S19082001504003	Rev.01	Initial issue of report	Sep 18, 2019

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.207	AC Power Line Conducted Emissions	PASS	
15.209(a), 15.407 (b)(1) 15.407 (b)(4) 15.407 (b)(6) 15.205	Spurious Radiated Emissions& Restricted bands Emissions	PASS	
15.407 (a)(1) 15.407 (a)(3) 15.1049	26 dB and 99% Emission Bandwidth	PASS	
15.407(e)	Minimum 6 dB bandwidth	PASS	
15.407 (a)(1) 15.407 (a)(3)	Maximum Conducted Output Power	PASS	
2.1051, 15.407(b)(1) 15.407(b)(4)	Band Edge	PASS	
15.407 (a)(1) 15.407 (a)(3)	Power Spectral Density	PASS	
2.1051, 15.407(b)	Spurious Emissions at Antenna Terminals	PASS	
15.407(g)	Frequency Stability	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

1.1 FACILITIES AND ACCREDITATIONS

FACILITIES

All measurement facilities used to collect the measurement data are located at

1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

CNAS-Lab.	:	The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005) The Certificate Registration Number is L5516.
IC-Registration		The Certificate Registration Number is 9270A. CAB identifier:CN0074
FCC- Accredited		Test Firm Registration Number: 463705. Designation Number: CN1184
A2LA-Lab.		The Certificate Registration Number is 4298.01 This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).
Name of Firm	:	Shenzhen NTEK Testing Technology Co., Ltd.
Site Location	:	1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.

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 %.

No.	Item	Uncertainty
1	Conducted Emission Test	±2.80dB
2	RF power, conducted	±0.16dB
3	Spurious emissions, conducted	±0.21dB
4	All emissions, radiated(30MHz~1GHz)	±2.64dB
5	All emissions, radiated(1GHz~6GHz)	±2.40dB
6	All emissions, radiated(＞6GHz)	±2.52dB
7	Temperature	±0.5℃
8	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>ScreenBeam 960</td></tr>
<tr><td>Trade Mark</td><td>Actiontec</td></tr>
<tr><td>Model Name</td><td>SBWD960B</td></tr>
<tr><td>FCC ID</td><td>LNQSBWD960B</td></tr>
<tr><td>Product Description</td><td>
<table>
<tr><td>Mode Supported</td><td>802.11a/n(HT20, HT40)/ac(VHT20, VHT40, VHT80) For 8812 Module;
802.11a/n(HT20, HT40) For 8192 Module;</td></tr>
<tr><td>Data Rate</td><td>802.11a: 6,9,12,18,24,36,48,54Mbps;
802.11n(HT20/HT40):MCS0~MCS15;
802.11ac(VHT20): NSS1/NSS2, MCS0~MCS8 ;
802.11ac(VHT40/80): NSS1/NSS2, MCS0~MCS9</td></tr>
<tr><td>Modulation</td><td>OFDM with BPSK/QPSK/16QAM/64QAM/256QAM</td></tr>
<tr><td>Operating Frequency Range</td><td>☒ U-NII-1: 5150 MHz ~5250MHz
☐ U-NII-2A: 5250MHz~5350MHz
☐ U-NII-2C: 5470MHz~5725MHz
☒ U-NII-3: 5725 MHz ~5850 MHz</td></tr>
<tr><td>Function:</td><td>☐Outdoor AP ☒Indoor AP(8812 Module)
☐Fixed P2P ☒Client device(8192 Module)</td></tr>
<tr><td>Antenna Type</td><td>See Table for Filed Antenna</td></tr>
<tr><td>Smart system</td><td>☒SISO for 802.11a/n/ac
☒MIMO for 802.11n/ac</td></tr>
<tr><td>Antenna Gain</td><td>See Table for Filed Antenna</td></tr>
</table>
Based on the application, features, or specification exhibited in User's Manual, More details of EUT technical specification, please refer to the User's Manual.
</td></tr>
<tr><td>Ratings</td><td>DC 5V from Adapter.</td></tr>
<tr><td>Adapter</td><td>Model: WB-10E05FU
Input: 100-240V~50-60Hz 0.4A Max
Output: 5V⎓2A</td></tr>
<tr><td>Battery</td><td>N/A</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
<tr><td>HW Version</td><td>2A</td></tr>
<tr><td>SW Version</td><td>9.15.x.0</td></tr>
</table>

Note:

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

2. Frequency and Channel list:

Band	20MHz		40MHz		80MHz	
	Channel	Frequency	Channel	Frequency	Channel	Frequency
U-NII-1	36	5180 MHz	38	5190 MHz	42	5210 MHz
	40	5200 MHz	46	5230 MHz	-	-
	44	5220 MHz				
	48	5240 MHz				
U-NII-3	149	5745 MHz	151	5755 MHz	155	5775 MHz
	153	5765 MHz	159	5795 MHz		
	157	5785 MHz				
	161	5805 MHz				
	165	5825 MHz				

The EUT has two modules, module A (8812), module B (8192), four of the same type of antenna, as shown in Figure A shows:

Antenna	Antenna Type	Antenna Gain(dBi)	
		5.2G	5.8G
1	PCB	4.86	3.36
2	PCB	4.40	4.30
3	PCB	5.22	5.11
4	PCB	4.83	4.93

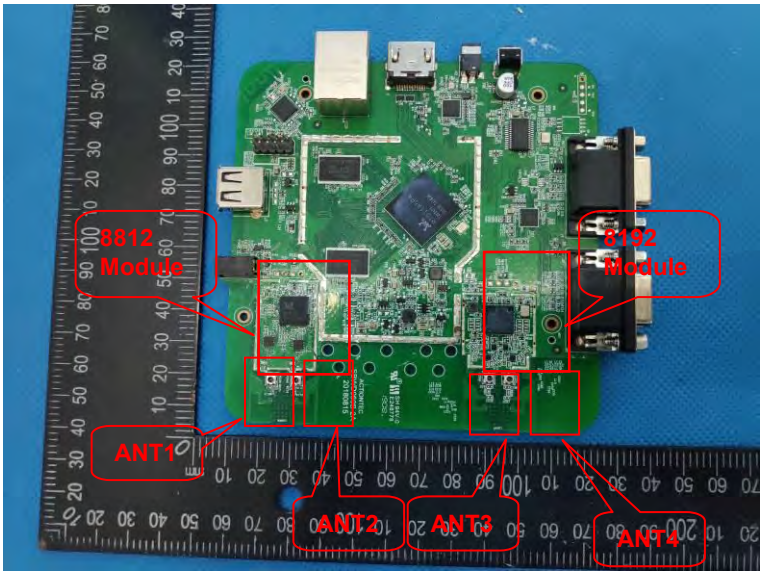


Figure A

Mode	Tx/Rx
802.11a	1Tx, 2Rx
802.11n/ac	1Tx/2Tx, 2Rx

Modules 8812 For 5G Band:

For IEEE 802.11a mode (1TX, 2RX): The EUT can support both 1TX and 2TX functions.
For 1TX Only Chain 1 can be used as transmitting antenna. Chain 1 and Chain 2 could receive simultaneously.
For IEEE 802.11n mode (1TX/2TX, 2RX): The EUT can support both 1TX and 2TX functions.
For 1TX Only Chain 1 can be used as transmitting antenna. When MCS 0~7 enable without TX-Beamforming/STBC. Chain 1 and Chain 2 could receive simultaneously.
For 2TX Both Chain 1 and Chain 2 can be used as transmitting/receiving antenna.
When TX-Beamforming/STBC enalbe/MCS 8~15 enable.
Chain 1 and Chain 2 could both transmit/receive simultaneously.
Only 2TX function was selected to test and record in the report, the 1TX test results were covered by 2TX Test results.
For IEEE 802.11ac mode (1TX/2TX, 2RX): The EUT can support both 1TX and 2TX functions.
For 1TX Only Chain 1 can be used as transmitting antenna. When 1SS MCS 0~9 enable without TX-Beamforming/STBC. Chain 1 and Chain 2 could receive simultaneously.
For 2TX Both Chain 1 and Chain 2 can be used as transmitting/receiving antenna.
When TX-Beamforming/STBC enalbe/2SS MCS 0~9 enable. Chain 1 and Chain 2 could both transmit/receive simultaneously. Only 2TX function was selected to test and record in the report, the 1TX test results were covered by 2TX Test results.

Modules 8192 For 5G Band:

For IEEE 802.11a mode (1TX, 2RX): The EUT can support both 1TX and 2TX functions.
For 1TX Only Chain 1 can be used as transmitting antenna.
Chain 1 and Chain 2 could receive simultaneously.
For IEEE 802.11n mode (1TX/2TX, 2RX): The EUT can support both 1TX and 2TX functions.
For 1TX Only Chain 1 can be used as transmitting antenna. When MCS 0~7 enable without TX-Beamforming/STBC. Chain 1 and Chain 2 could receive simultaneously.
For 2TX Both Chain 1 and Chain 2 can be used as transmitting/receiving antenna. When TX-Beamforming/STBC enalbe/MCS 8~15 enable.
Chain 1 and Chain 2 could both transmit/receive simultaneously.
Only 2TX function was selected to test and record in the report, the 1TX test results were covered by 2TX Test results.

Module 8812 and module 8192 are used for different purposes, where 8812 is responsible for Miracast and 8192 are responsible for wireless communication with CMS. When the 8812 is in a Miracast session, the CMS can still access the receiver's settings through the 8192 wireless adapter.

The Control software(tool_WIFI.exe) can control Modules 8812/8192 antenna 1, 2,3,4 ,
For 2.4GHz mode, antenna 1, 2, 3, 4, are transmitting, antenna 1 and 2 or antenna 3 and 4 May simultaneously transmit.
And the data is recorded for radiated emission and band edge.
Modules 8812 For MIMO mode: Directional gain
$= [10\log(10^{G1/20}+10^{G2/20})^2/N_{ANT}]$ dBi =7.64dbi in 5.2GHz
$= [10\log(10^{G1/20}+10^{G2/20})^2/N_{ANT}]$ dBi =6.85dbi in 5.8GHz
802.11 n/ac 5.0GHz has MIMO mode.
Modules 8192 For MIMO mode: Directional gain
$= [10\log(10^{G3/20}+10^{G4/20})^2/N_{ANT}]$ dBi =8.04dbi in 5.2GHz
$= [10\log(10^{G3/20}+10^{G4/20})^2/N_{ANT}]$ dBi =8.03dbi in 5.8GHz
802.11n/ac 5.0GHz has MIMO mode.
Note: G1 means antenna gain for ANT 1 in dBi.
G2 means antenna gain for ANT 2 in dBi.
G3 means antenna gain for ANT 3 in dBi.
G4 means antenna gain for ANT 4 in dBi.
N_{ANT} means the number of Antennas.

There are two modes of EUT for 8812 module, one is beamforming mode, and the other is non-beamforming mode for n/ac, after evaluating, beamforming mode has been evaluated to be the worst case, so it was selected to test and record in this test report. The 8192 module has no beamforming mode.

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.

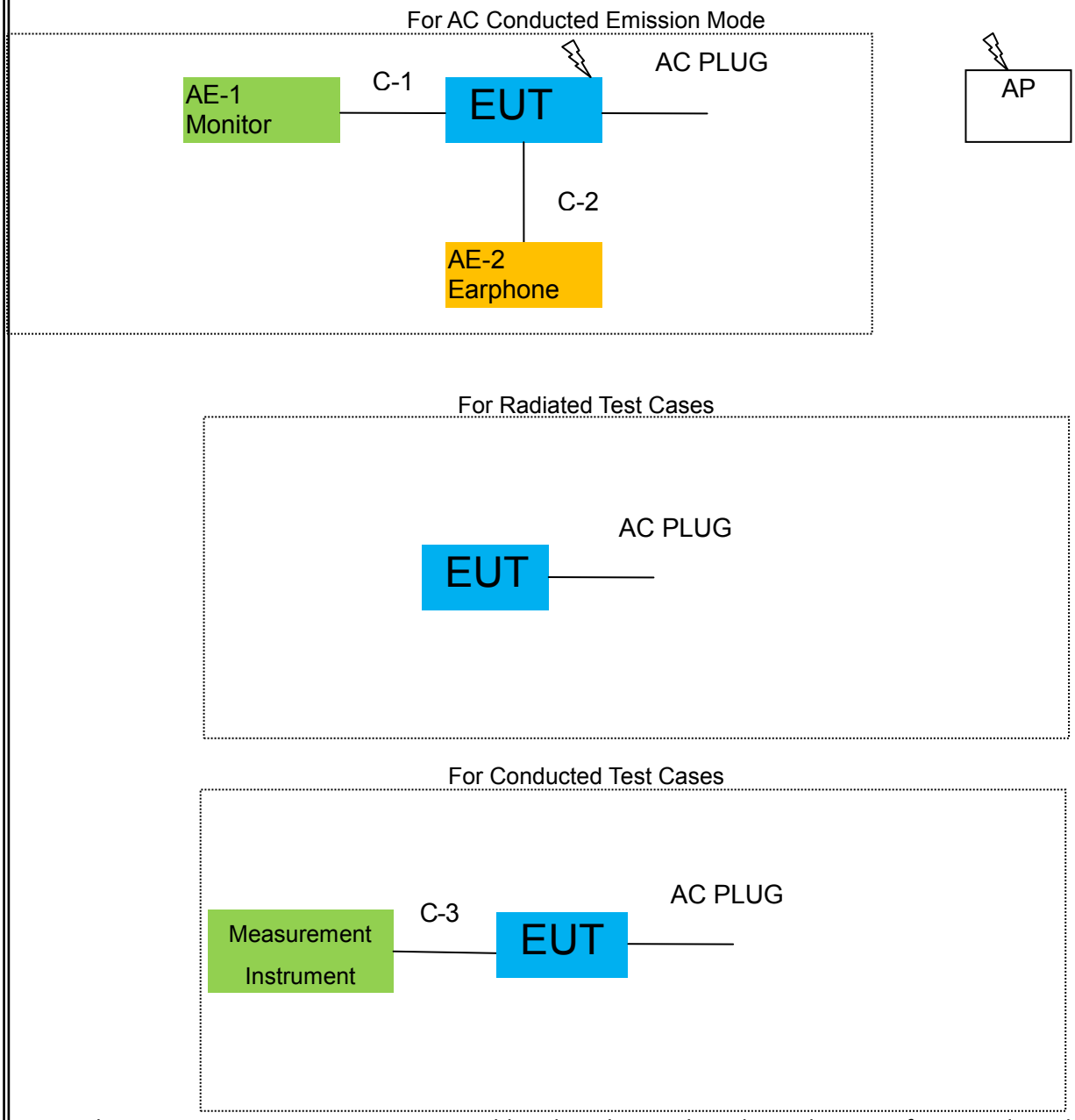
Test Items	Mode	Data Rate	Channel	Ant
AC Power Line Conducted Emissions	Normal Link	-	-	-
Maximum Conducted Output Power	11a/n(20)/ac(20)	6 Mbps/ MCS0/ VHT1MCS0	36/40/48/149/157/165	1/2 3/4
	11n(40)/ac(40)	MCS0/ VHT1MCS0	38/46/151/159	1/2 3/4
	11ac(80)	MCS0/ VHT1MCS0	42/155	1/2 3/4
Power Spectral Density	11a/n(20)/ac(20)	6 Mbps/ MCS0	36/40/48/149/157/165	1/2 3/4
	11n(40)/ac(40)	MCS0	38/46/151/159	1/2 3/4
	11ac(80)	MCS0	42/155	1/2 3/4
26 dB and 99% Emission Bandwidth	11a/n(20)/ac(20)	6 Mbps/ MCS0	36/40/48/149/157/165	1/2 3/4
	11n(40)/ac(40)	MCS0	38/46/151/159	1/2 3/4
	11ac(80)	MCS0	42/155	1/2 3/4
Minimum 6 dB bandwidth	11a/n(20)/ac(20)	6 Mbps/ MCS0	36/40/48/149/157/165	1/2 3/4
	11n(40)/ac(40)	MCS0	38/46/151/159	1/2 3/4
	11ac(80)	MCS0	42/155	1/2 3/4
Radiated Emissions Below 1GHz	Normal Link	-	-	-
Radiated Emissions Above 1GHz	11a/n(20)/ac(20)	6 Mbps/ MCS0	36/40/48/149/157/165	-
	11n(40)/ac(40)	MCS0	38/46/151/159	-
	11ac(80)	MCS0	42/155	-
Band Edge Emissions	11a/n(20)/ac(20)	6 Mbps/ MCS0	36/40/48/149/157/165	1/2 3/4
	11n(40)/ac(40)	MCS0	38/46/151/159	1/2 3/4
	11ac(80)	MCS0	42/155	1/2 3/4

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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
AE-1	Monitor	SHARP	LCD-32MS46A	09426089241597	Peripherals
AE-2	Earphone	N/A	N/A	N/A	Peripherals

Item	Cable Type	Shielded Type	Ferrite Core	Length	Note
C-1	HDMI Cable	YES	NO	0.9m	
C-2	Earphone Cable	NO	NO	1.2m	
C-3	RF Cable	YES	NO	0.1m	

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.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation& Conducted Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Aglient	E4440A	MY41000130	2019.05.13	2020.05.12	1 year
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	2018.10.08	2019.10.07	1 year
3	Spectrum Analyzer	R&S	FSV40	101417	2018.10.08	2019.10.07	1 year
4	Test Receiver	R&S	ESPI7	101318	2019.05.13	2020.05.12	1 year
5	Bilog Antenna	TESEQ	CBL6111D	31216	2019.04.15	2020.04.14	1 year
6	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2018.05.19	2020.05.18	2 year
7	Horn Antenna	EM	EM-AH-10180	2011071402	2019.04.15	2020.04.14	1 year
8	Amplifier	EMC	EMC051835SE	980246	2019.08.06	2020.08.05	1 year
9	Active Loop Antenna	SCHWARZBECK	FMZB 1519 B	055	2018.12.11	2019.12.10	1 year
10	Power Meter	DARE	RPR3006W	15I00041SNO84	2019.08.06	2020.08.05	1 year
11	Test Cable (9KHz-30MHz)	N/A	R-01	N/A	2017.04.21	2020.04.20	3 year
12	Test Cable (30MHz-1GHz)	N/A	R-02	N/A	2017.04.21	2020.04.20	3 year
13	High Test Cable(1G-40GHz)	N/A	R-03	N/A	2017.04.21	2020.04.20	3 year
14	High Test Cable(1G-40GHz)	N/A	R-04	N/A	2017.04.21	2020.04.20	3 year
15	Filter	TRILTHIC	2400MHz	29	2017.04.19	2020.04.18	3 year
16	temporary antenna connector (Note)	NTS	R001	N/A	N/A	N/A	N/A
17	Low Noise Amplifier	B&Z	BZ-P540-550850-452727	16476-11729	2019.04.15	2020.04.14	1 year
18	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	803	2018.12.11	2019.12.10	1 year

Note:
We will use the temporary antenna connector (soldered on the PCB board) When conducted test
And this temporary antenna connector is listed within the instrument list

AC 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	2019.05.13	2020.05.12	1 year
2	LISN	R&S	ENV216	101313	2019.04.15	2020.04.14	1 year
3	LISN	SCHWARZBECK	NNLK 8129	8129245	2019.05.13	2020.05.12	1 year
4	50Ω Coaxial Switch	ANRITSU CORP	MP59B	6200983704	2018.05.19	2020.05.18	2 year
5	Test Cable (9KHz-30MHz)	N/A	C01	N/A	2017.04.21	2020.04.20	3 year
6	Test Cable (9KHz-30MHz)	N/A	C02	N/A	2017.04.21	2020.04.20	3 year
7	Test Cable (9KHz-30MHz)	N/A	C03	N/A	2017.04.21	2020.04.20	3 year

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable& Aux Equipment which is scheduled for calibration every 3 years.

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

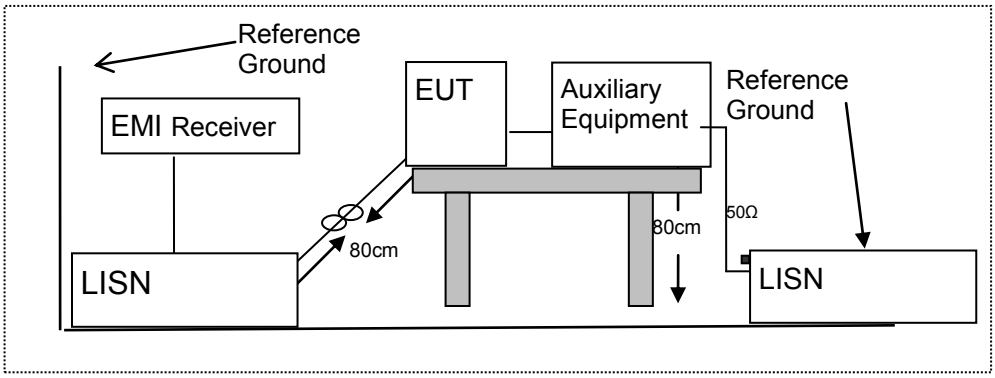
3.1.1 APPLICABLE STANDARD

According to FCC Part 15.207(a) and KDB 174176 D01 Line Conducted FAQ v01r01

3.1.2 CONFORMANCE LIMIT

Frequency(MHz)	Conducted Emission Limit	
	Quasi-peak	Average
0.15-0.5	66-56*	56-46*
0.5-5.0	56	46
5.0-30.0	60	50
Note: 1. *Decreases with the logarithm of the frequency 2. The lower limit shall apply at the transition frequencies 3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.		

3.1.3 TEST CONFIGURATION



3.1.4 TEST PROCEDURE

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

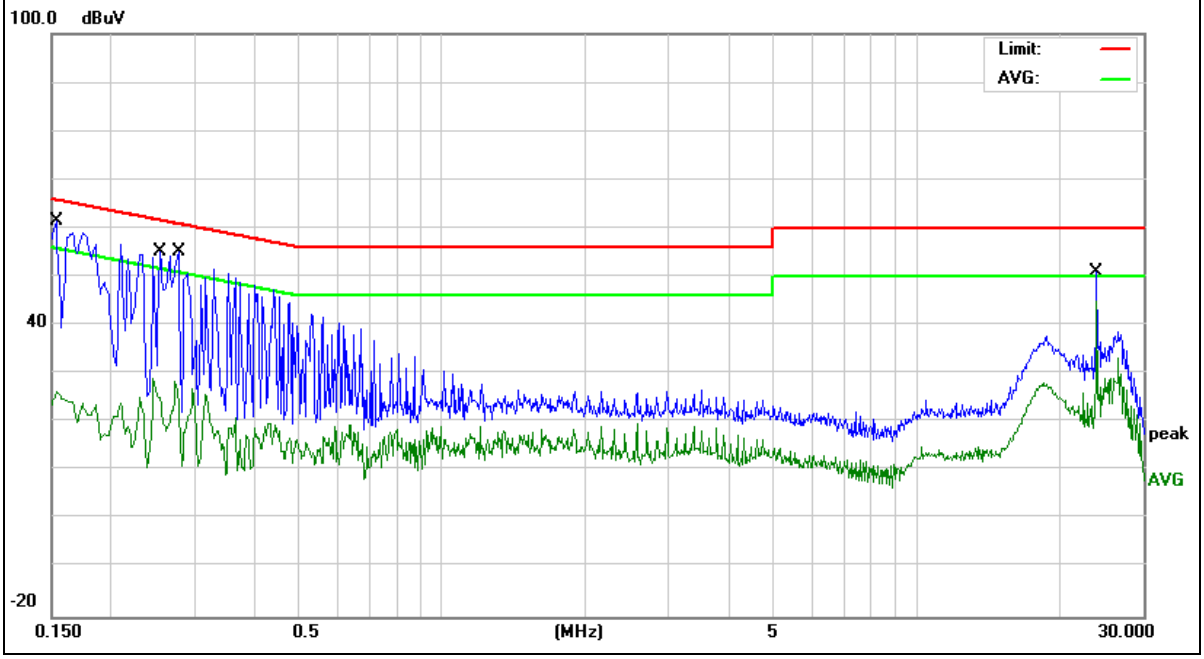
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room.
2. The EUT was placed on a table which is 0.8m above ground plane.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
4. 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 40cm long.
5. 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.
6. LISN at least 80 cm from nearest part of EUT chassis.
7. The frequency range from 150KHz to 30MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth(IF bandwidth=9KHz) with Maximum Hold Mode
9. For the actual test configuration, please refer to the related Item –EUT Test Photos.

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5V from Adapter AC 120V/60Hz	Test Mode：	Normal link

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1539	51.62	9.75	61.37	65.78	-4.41	QP
0.1539	16.53	9.75	26.28	55.78	-29.50	AVG
0.2540	45.53	9.76	55.29	61.62	-6.33	QP
0.2540	19.27	9.76	29.03	51.62	-22.59	AVG
0.2779	45.35	9.75	55.10	60.88	-5.78	QP
0.2779	18.64	9.75	28.39	50.88	-22.49	AVG
24.0020	40.35	10.62	50.97	60.00	-9.03	QP
24.0020	34.27	10.62	44.89	50.00	-5.11	AVG

Remark:

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

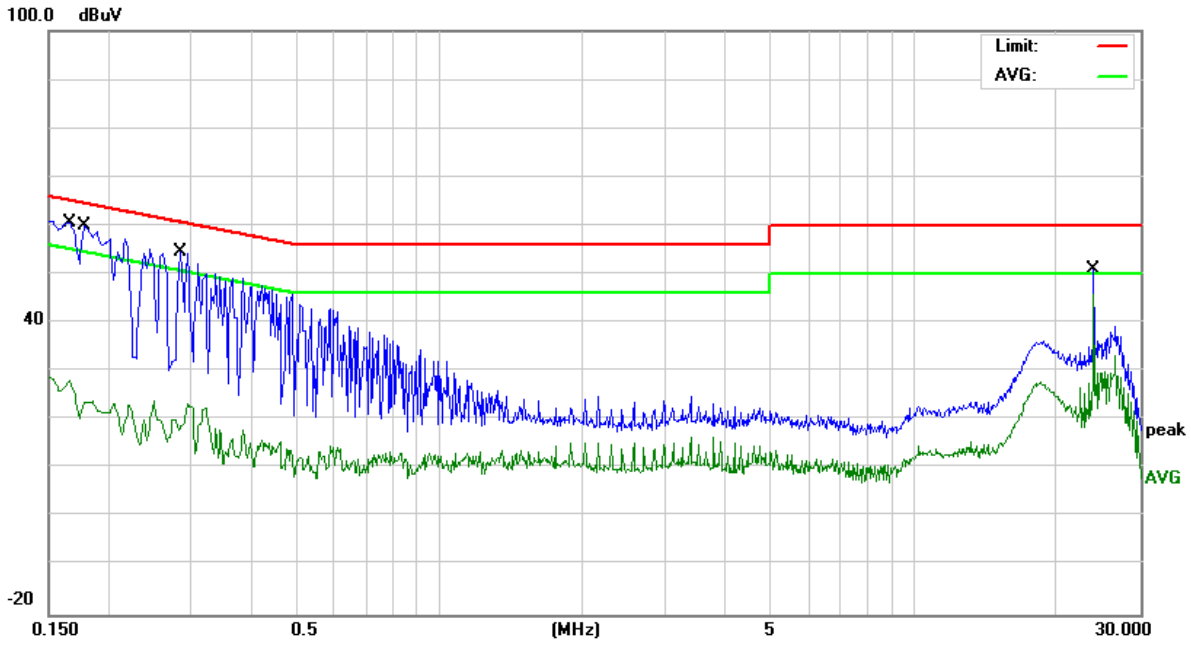


EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5V from Adapter AC 120V/60Hz	Test Mode：	Normal link

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1660	50.93	9.73	60.66	65.15	-4.49	QP
0.1660	18.33	9.73	28.06	55.15	-27.09	AVG
0.1779	50.20	9.73	59.93	64.58	-4.65	QP
0.1779	14.09	9.73	23.82	54.58	-30.76	AVG
0.2859	44.87	9.74	54.61	60.64	-6.03	QP
0.2859	13.68	9.74	23.42	50.64	-27.22	AVG
24.0019	40.37	10.57	50.94	60.00	-9.06	QP
24.0019	35.41	10.57	45.98	50.00	-4.02	AVG

Remark:

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

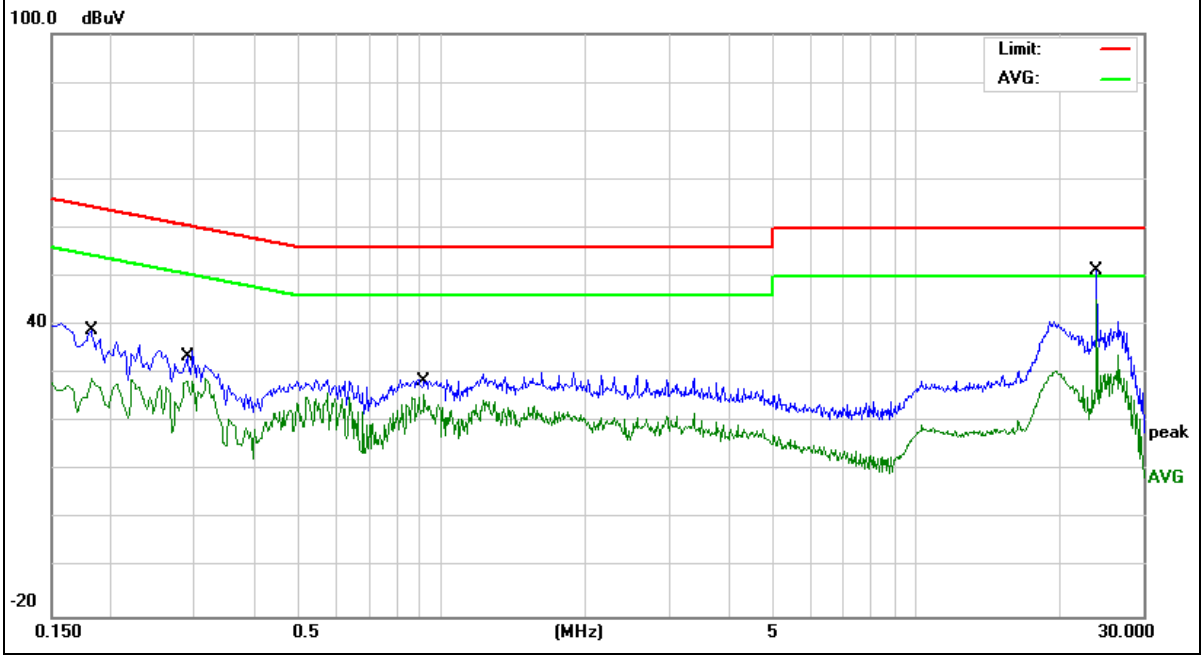


EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5V from Adapter AC 240V/60Hz	Test Mode：	Normal link

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1819	29.29	9.76	39.05	64.39	-25.34	QP
0.1819	19.24	9.76	29.00	54.39	-25.39	AVG
0.2899	25.07	9.74	34.81	60.52	-25.71	QP
0.2899	18.82	9.74	28.56	50.52	-21.96	AVG
0.9180	19.05	9.74	28.79	56.00	-27.21	QP
0.9180	16.04	9.74	25.78	46.00	-20.22	AVG
24.0019	40.62	10.62	51.24	60.00	-8.76	QP
24.0019	34.50	10.62	45.12	50.00	-4.88	AVG

Remark:

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

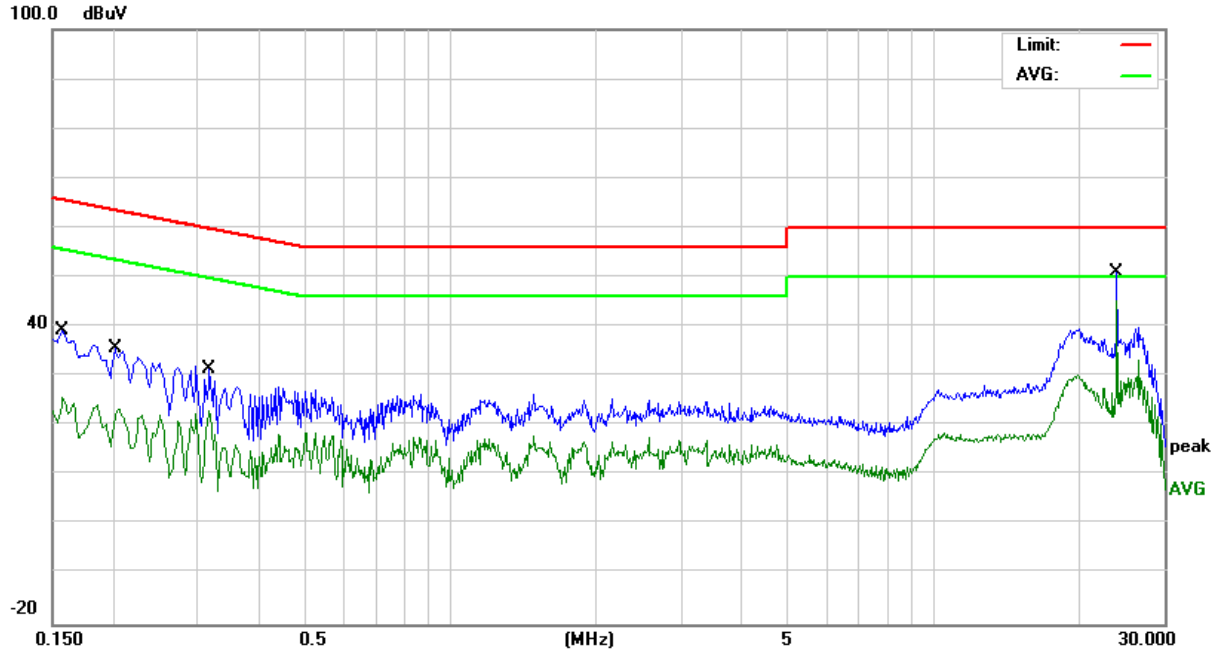


EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5V from Adapter AC 240V/60Hz	Test Mode：	Normal link

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1580	29.62	9.74	39.36	65.56	-26.20	QP
0.1580	15.98	9.74	25.72	55.56	-29.84	AVG
0.2020	26.04	9.73	35.77	63.52	-27.75	QP
0.2020	13.55	9.73	23.28	53.52	-30.24	AVG
0.3180	21.62	9.74	31.36	59.76	-28.40	QP
0.3180	13.28	9.74	23.02	49.76	-26.74	AVG
24.0019	40.30	10.57	50.87	60.00	-9.13	QP
24.0019	34.80	10.57	45.37	50.00	-4.63	AVG

Remark:

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



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 APPLICABLE STANDARD

According to FCC Part 15.407(d) and 15.209

3.2.2 CONFORMANCE LIMIT

According to FCC Part 15.407(b)(7): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
According to FCC Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
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	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	2690-2900	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			

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009~0.490	2400/F(KHz)	20 log (uV/m)	300
0.490~1.705	24000/F(KHz)	20 log (uV/m)	30
1.705~30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Limits of Radiated Emission Measurement(Above 1000MHz)

Frequency(MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

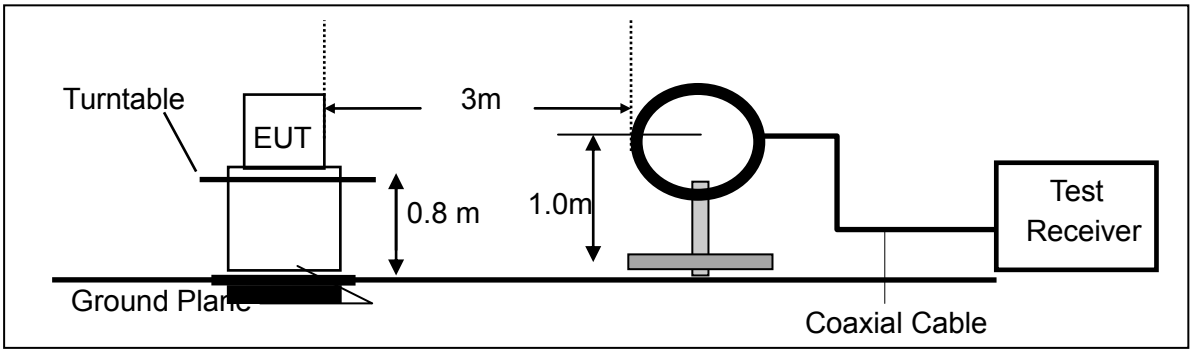
Remark :1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. For Frequency 9kHz~30MHz:
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.
For Frequency above 30MHz:
Distance extrapolation factor =20log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

3.2.3 MEASURING INSTRUMENTS

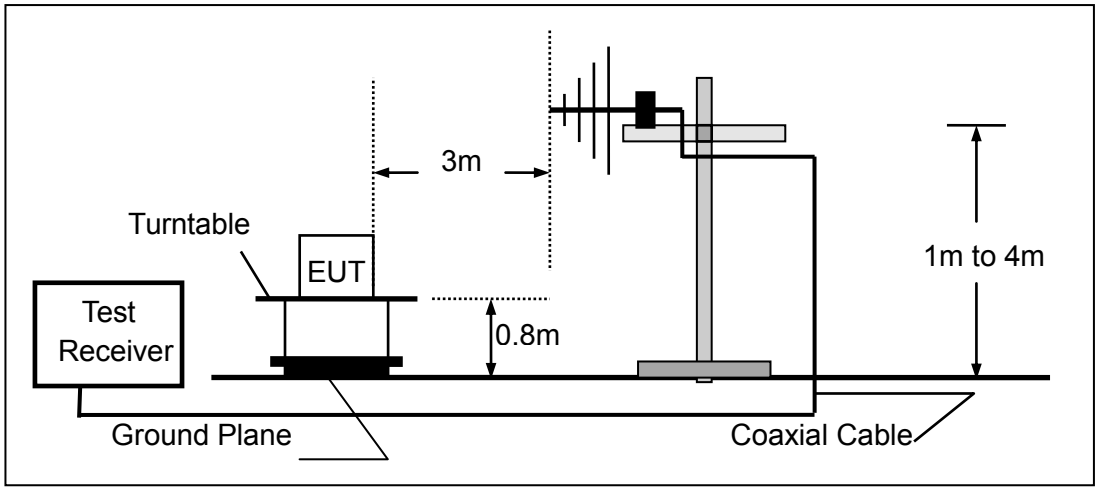
The Measuring equipment is listed in the section 6.3 of this test report.

3.2.4 TEST CONFIGURATION

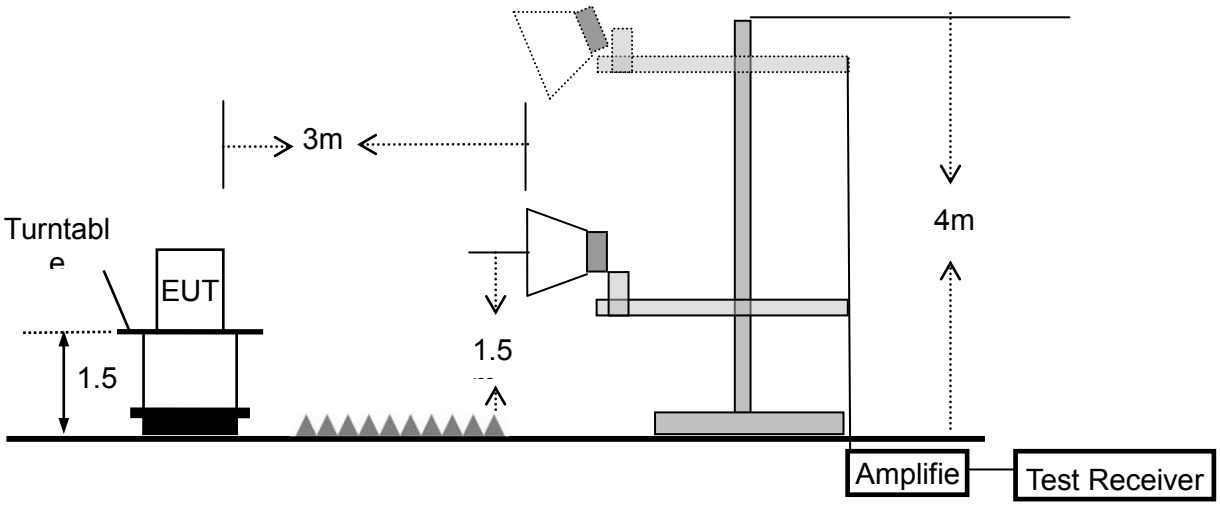
(a) For radiated emissions below 30MHz



(b) For radiated emissions from 30MHz to 1000MHz



(c) For radiated emissions above 1000MHz



3.2.5 TEST PROCEDURE

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.
This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205.
It must be performed with the highest gain of each type of antenna proposed for use with the EUT.
Use the following spectrum analyzer settings:

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

a. The measuring distance of at 3 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 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. 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 for below 1GHz and 1.5m for above 1GHz; 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.
e. 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.
f. 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

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
	Average	1 MHz	10 Hz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

3.2.6 TEST RESULTS (9KHZ – 30 MHZ)

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	N/A
--	--	--	--	N/A

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

3.2.7 TEST RESULTS (30MHZ – 1GHZ)

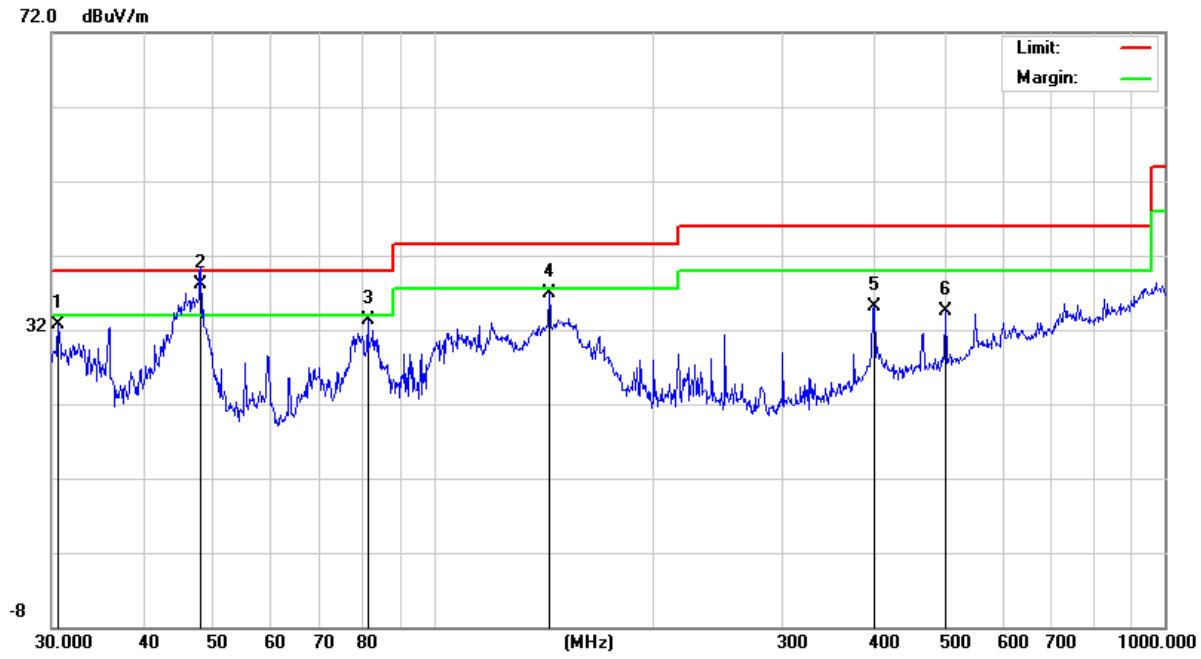
EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX(5.2G&5.8G)- 8812 module		

Note: “802.11n20 (5.2G)” MIMO mode is the worst mode.
All the modulation modes have been tested, and the worst result was report as below:

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	30.6377	13.97	18.67	32.64	40.00	-7.36	QP
V	47.9940	26.77	11.33	38.10	40.00	-1.90	QP
V	81.2117	24.51	8.85	33.36	40.00	-6.64	QP
V	143.8295	23.79	13.18	36.97	43.50	-6.53	QP
V	400.4319	15.39	19.64	35.03	46.00	-10.97	QP
V	501.1790	12.31	22.16	34.47	46.00	-11.53	QP

Remark:

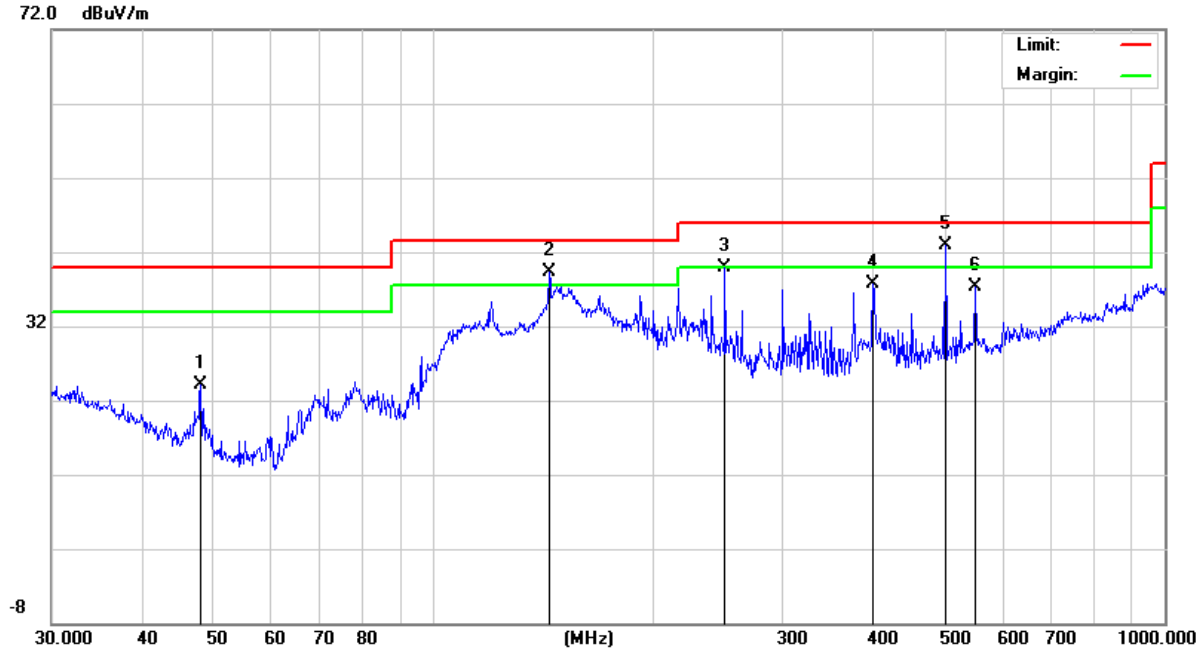
Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	47.9940	12.83	11.33	24.16	40.00	-15.84	QP
H	143.8295	26.22	13.18	39.40	43.50	-4.10	QP
H	250.3012	24.98	14.95	39.93	46.00	-6.07	QP
H	399.0300	18.07	19.57	37.64	46.00	-8.36	QP
H	501.1790	20.70	22.16	42.86	46.00	-3.14	QP
H	550.9479	12.74	24.56	37.30	46.00	-8.70	QP

Remark:

Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit



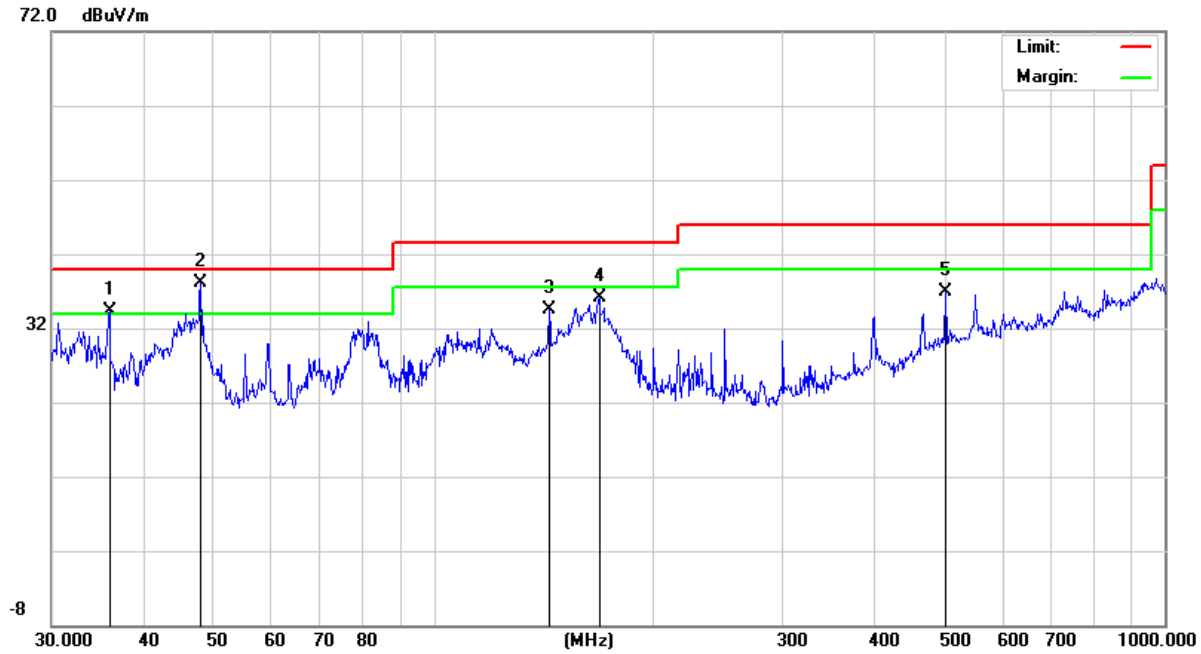
EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX(5.2G&5.8G)- 8192 module		

Note: “802.11n40 (5.2G)” MIMO mode is the worst mode.
All the modulation modes have been tested, and the worst result was report as below:

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	36.0007	17.92	16.33	34.25	40.00	-5.75	QP
V	47.9938	26.70	11.33	38.03	40.00	-1.97	QP
V	143.8291	21.29	13.18	34.47	43.50	-9.03	QP
V	168.4138	24.69	11.38	36.07	43.50	-7.43	QP
V	501.1788	14.81	22.16	36.97	46.00	-9.03	QP

Remark:

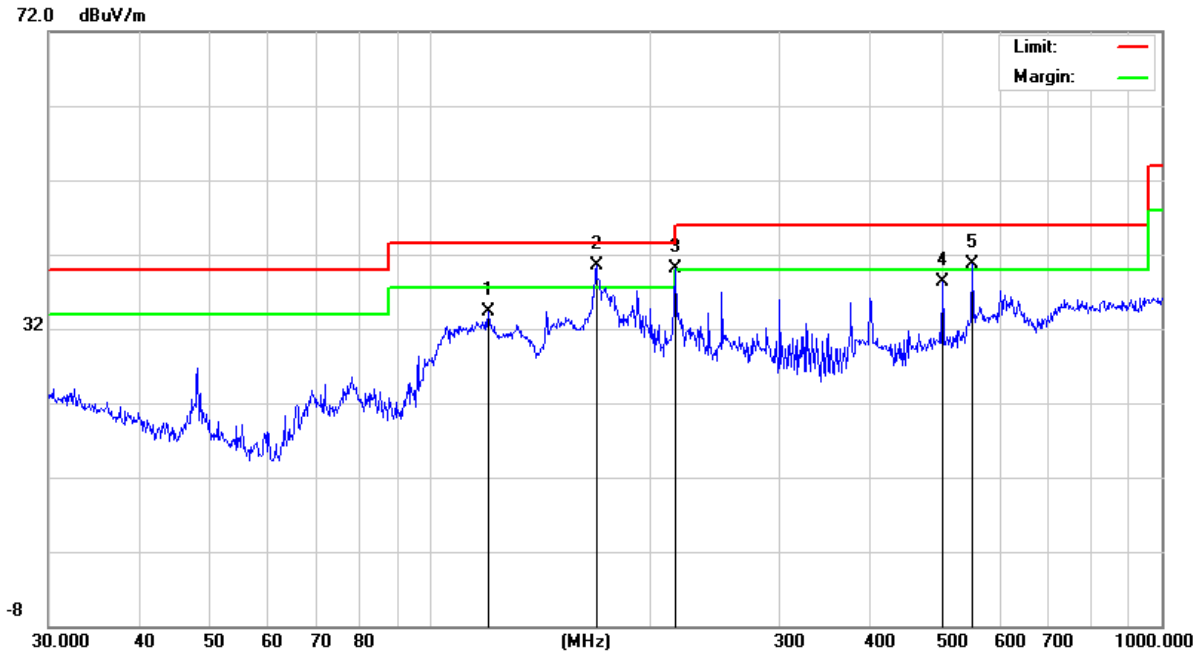
Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	119.8555	21.03	13.18	34.21	43.50	-9.29	QP
H	168.4138	29.14	11.38	40.52	43.50	-2.98	QP
H	216.0240	28.91	11.10	40.01	46.00	-5.99	QP
H	501.1788	16.20	22.16	38.36	46.00	-7.64	QP
H	550.9479	16.24	24.56	40.80	46.00	-5.20	QP

Remark:

Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit



3.2.8 TEST RESULTS (1GHz-18GHz)

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX(5.2G) - 802.11n20-8812 module		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5180 MHz)-Above 1G									
Vertical	3024.62	59.69	5.94	35.40	44.00	57.03	74.00	-16.97	Pk
Vertical	3024.62	45.52	5.94	35.40	44.00	42.86	54.00	-11.14	AV
Vertical	10360	58.67	8.46	39.75	44.50	62.38	74.00	-11.62	Pk
Vertical	10360	43.12	8.46	39.75	44.50	46.83	54.00	-7.17	AV
Vertical	15540	56.66	10.12	38.80	44.10	61.48	74.00	-12.52	Pk
Vertical	15540	38.41	10.12	38.80	42.70	44.63	54.00	-9.37	AV
Horizontal	2978.95	62.23	5.94	35.18	44.00	59.35	74.00	-14.65	Pk
Horizontal	2978.91	43.18	5.94	35.18	44.00	40.30	54.00	-13.70	AV
Horizontal	10360	57.89	8.46	38.71	44.50	60.56	74.00	-13.44	Pk
Horizontal	10360	37.44	8.46	38.71	44.50	40.11	54.00	-13.89	AV
Horizontal	15540	56.62	10.12	38.38	44.10	61.02	74.00	-12.98	Pk
Horizontal	15540	38.92	10.12	38.38	44.10	43.32	54.00	-10.68	AV
Middle Channel (5200 MHz)-Above 1G									
Vertical	2997.63	59.69	5.94	35.4	44.00	57.03	74.00	-16.97	Pk
Vertical	2997.63	43.14	5.94	35.4	44.00	40.48	54.00	-13.52	AV
Vertical	10400	58.56	8.46	39.75	44.50	62.27	74.00	-11.73	Pk
Vertical	10400	40.03	8.46	39.75	44.50	43.74	54.00	-10.26	AV
Vertical	15600	57.41	10.12	38.80	44.10	62.23	74.00	-11.77	Pk
Vertical	15600	39.98	10.12	38.80	42.70	46.2	54.00	-7.80	AV
Horizontal	2814.14	63.23	5.94	35.18	44.00	60.35	74.00	-13.65	Pk
Horizontal	2814.14	43.38	5.94	35.18	44.00	40.5	54.00	-13.50	AV
Horizontal	10400	58.42	8.46	38.71	44.50	61.09	74.00	-12.91	Pk
Horizontal	10400	39.15	8.46	38.71	44.50	41.82	54.00	-12.18	AV
Horizontal	15600	56.14	10.12	38.38	44.10	60.54	74.00	-13.46	Pk
Horizontal	15600	39.76	10.12	38.38	44.10	44.16	54.00	-9.84	AV
High Channel (5240 MHz)-Above 1G									
Vertical	2047.49	59.96	7.10	37.24	43.50	60.8	74.00	-13.2	Pk
Vertical	2047.49	41.12	7.10	37.24	43.50	41.96	54.00	-12.04	AV
Vertical	10480	59.66	8.46	37.68	44.50	61.3	74.00	-12.7	Pk
Vertical	10480	39.97	8.46	37.68	44.50	41.61	54.00	-12.39	AV
Vertical	15720	57.74	10.12	38.8	44.10	62.56	74.00	-11.44	Pk
Vertical	15720	36.62	10.12	38.8	42.70	42.84	54.00	-11.16	AV
Horizontal	2968.85	61.11	7.10	37.24	43.50	61.95	74.00	-12.05	Pk
Horizontal	2968.85	42.03	7.10	37.24	43.50	42.87	54.00	-11.13	AV
Horizontal	10480	56.96	8.46	38.57	44.50	59.49	74.00	-14.51	Pk
Horizontal	10480	39.97	8.46	38.57	44.50	42.5	54.00	-11.5	AV
Horizontal	15720	59.85	10.12	38.38	44.10	64.25	74.00	-9.75	Pk
Horizontal	15720	37.62	10.12	38.38	44.10	42.02	54.00	-11.98	AV

Note: “802.11n20 (5.2G)” MIMO mode is the worst mode.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX(5.2G) - 802.11n40-8192 module		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5190 MHz)-Above 1G									
Vertical	2869.94	59.85	5.94	35.40	44.00	57.19	74.00	-16.81	Pk
Vertical	2869.94	42.61	5.94	35.40	44.00	39.95	54.00	-14.05	AV
Vertical	10380	60.63	8.46	39.75	44.50	64.34	74.00	-9.66	Pk
Vertical	10380	43.29	8.46	39.75	44.50	47.00	54.00	-7.00	AV
Vertical	15570	58.47	10.12	38.80	44.10	63.29	74.00	-10.71	Pk
Vertical	15570	37.42	10.12	38.80	42.70	43.64	54.00	-10.36	AV
Horizontal	2887.41	61.23	5.94	35.18	44.00	58.35	74.00	-15.65	Pk
Horizontal	2887.41	40.23	5.94	35.18	44.00	37.35	54.00	-16.65	AV
Horizontal	10380	56.96	8.46	38.71	44.50	59.63	74.00	-14.37	Pk
Horizontal	10380	37.48	8.46	38.71	44.50	40.15	54.00	-13.85	AV
Horizontal	15570	58.55	10.12	38.38	44.10	62.95	74.00	-11.05	Pk
Horizontal	15570	39.62	10.12	38.38	44.10	44.02	54.00	-9.98	AV
High Channel (5230 MHz)-Above 1G									
Vertical	2903.63	58.13	7.10	37.24	43.50	58.97	74.00	-15.03	Pk
Vertical	2903.63	41.14	7.10	37.24	43.50	41.98	54.00	-12.02	AV
Vertical	10460	57.48	8.46	37.68	44.50	59.12	74.00	-14.88	Pk
Vertical	10460	38.92	8.46	37.68	44.50	40.56	54.00	-13.44	AV
Vertical	15690	56.01	10.12	38.80	44.10	60.83	74.00	-13.17	Pk
Vertical	15690	36.69	10.12	38.80	42.70	42.91	54.00	-11.09	AV
Horizontal	2874.65	59.55	7.10	37.24	43.50	60.39	74.00	-13.61	Pk
Horizontal	2874.65	39.97	7.10	37.24	43.50	40.81	54.00	-13.19	AV
Horizontal	10460	58.65	8.46	38.57	44.50	61.18	74.00	-12.82	Pk
Horizontal	10460	36.61	8.46	38.57	44.50	39.14	54.00	-14.86	AV
Horizontal	15690	59.97	10.12	38.38	44.10	64.37	74.00	-9.63	Pk
Horizontal	15690	40.54	10.12	38.38	44.10	44.94	54.00	-9.06	AV

Note: “802.11n40 (5.2G)” MIMO mode is the worst mode.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5.8G) -- 802.11n20-8812 module		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5745 MHz)-Above 1G									
Vertical	2819.960	63.14	5.94	35.40	44.00	60.48	74.00	-13.52	Pk
Vertical	2819.930	42.58	5.94	35.40	44.00	39.92	54.00	-14.08	AV
Vertical	11490.000	61.97	8.46	39.75	44.50	65.68	74.00	-8.32	Pk
Vertical	11490.000	41.01	8.46	39.75	44.50	44.72	54.00	-9.28	AV
Vertical	17235.000	52.85	10.12	38.80	44.10	57.67	74.00	-16.33	Pk
Vertical	17235.000	35.59	10.12	38.80	42.70	41.81	54.00	-12.19	AV
Horizontal	2822.410	60.92	5.94	35.18	44.00	58.04	74.00	-15.96	Pk
Horizontal	2822.310	43.11	5.94	35.18	44.00	40.23	54.00	-13.77	AV
Horizontal	11490.000	59.96	8.46	38.71	44.50	62.63	74.00	-11.37	Pk
Horizontal	11490.000	40.32	8.46	38.71	44.50	42.99	54.00	-11.01	AV
Horizontal	17235.000	59.52	10.12	38.38	44.10	63.92	74.00	-10.08	Pk
Horizontal	17235.000	43.26	10.12	38.38	44.10	47.66	54.00	-6.34	AV
middle Channel (5785 MHz)-Above 1G									
Vertical	2901.130	60.31	6.48	36.35	44.05	59.09	74.00	-14.91	Pk
Vertical	2901.130	42.27	6.48	36.35	44.05	41.05	54.00	-12.95	AV
Vertical	11570.000	59.86	8.47	37.88	44.51	61.70	74.00	-12.30	Pk
Vertical	11570.000	41.23	8.47	37.88	44.51	43.07	54.00	-10.93	AV
Vertical	17355.000	59.96	10.12	38.80	44.10	64.78	74.00	-9.22	Pk
Vertical	17355.000	40.33	10.12	38.80	42.70	46.55	54.00	-7.45	AV
Horizontal	2903.450	60.62	6.48	36.37	44.05	59.42	74.00	-14.58	Pk
Horizontal	2903.450	42.27	6.48	36.37	44.05	41.07	54.00	-12.93	AV
Horizontal	11570.000	61.01	8.47	38.64	44.50	63.62	74.00	-10.38	Pk
Horizontal	11570.000	39.97	8.47	38.64	44.50	42.58	54.00	-11.42	AV
Horizontal	17355.000	59.85	10.12	38.38	44.10	64.25	74.00	-9.75	Pk
Horizontal	17355.000	40.02	10.12	38.38	44.10	44.42	54.00	-9.58	AV
High Channel (5825 MHz)-Above 1G									
Vertical	2902.280	59.36	7.10	37.24	43.50	60.20	74.00	-13.80	Pk
Vertical	2902.280	42.25	7.10	37.24	43.50	43.09	54.00	-10.91	AV
Vertical	11650.000	60.13	8.46	37.68	44.50	61.77	74.00	-12.23	Pk
Vertical	11650.000	42.27	8.46	37.68	44.50	43.91	54.00	-10.09	AV
Vertical	17475.000	58.82	10.12	38.80	44.10	63.64	74.00	-10.36	Pk
Vertical	17475.000	40.21	10.12	38.80	42.70	46.43	54.00	-7.57	AV
Horizontal	2911.370	57.78	7.10	37.24	43.50	58.62	74.00	-15.38	Pk
Horizontal	2911.370	39.61	7.10	37.24	43.50	40.45	54.00	-13.55	AV
Horizontal	11650.000	57.84	8.46	38.57	44.50	60.37	74.00	-13.63	Pk
Horizontal	11650.000	41.02	8.46	38.57	44.50	43.55	54.00	-10.45	AV
Horizontal	17475.000	58.56	10.12	38.38	44.10	62.96	74.00	-11.04	Pk
Horizontal	17475.000	36.62	10.12	38.38	44.10	41.02	54.00	-12.98	AV

Note: “802.11n20 (5.8G)” MIMO mode is the worst mode.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5.8G) -- 802.11n20-8192 module		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5745 MHz)-Above 1G									
Vertical	2819.470	64.47	5.94	35.40	44.00	61.81	74.00	-12.19	Pk
Vertical	2819.470	42.95	5.94	35.40	44.00	40.29	54.00	-13.71	AV
Vertical	11490.000	60.29	8.46	39.75	44.50	64.00	74.00	-10.00	Pk
Vertical	11490.000	39.67	8.46	39.75	44.50	43.38	54.00	-10.62	AV
Vertical	17235.000	55.58	10.12	38.80	44.10	60.40	74.00	-13.60	Pk
Vertical	17235.000	36.74	10.12	38.80	42.70	42.96	54.00	-11.04	AV
Horizontal	2903.260	59.97	5.94	35.18	44.00	57.09	74.00	-16.91	Pk
Horizontal	2903.260	44.26	5.94	35.18	44.00	41.38	54.00	-12.62	AV
Horizontal	11490.000	59.63	8.46	38.71	44.50	62.30	74.00	-11.70	Pk
Horizontal	11490.000	41.14	8.46	38.71	44.50	43.81	54.00	-10.19	AV
Horizontal	17235.000	60.37	10.12	38.38	44.10	64.77	74.00	-9.23	Pk
Horizontal	17235.000	40.25	10.12	38.38	44.10	44.65	54.00	-9.35	AV
middle Channel (5785 MHz)-Above 1G									
Vertical	2904.210	61.13	6.48	36.35	44.05	59.91	74.00	-14.09	Pk
Vertical	2904.210	43.89	6.48	36.35	44.05	42.67	54.00	-11.33	AV
Vertical	11570.000	60.36	8.47	37.88	44.51	62.20	74.00	-11.80	Pk
Vertical	11570.000	41.17	8.47	37.88	44.51	43.01	54.00	-10.99	AV
Vertical	17355.000	58.95	10.12	38.80	44.10	63.77	74.00	-10.23	Pk
Vertical	17355.000	41.13	10.12	38.80	42.70	47.35	54.00	-6.65	AV
Horizontal	2903.580	60.28	6.48	36.37	44.05	59.08	74.00	-14.92	Pk
Horizontal	2903.580	42.33	6.48	36.37	44.05	41.13	54.00	-12.87	AV
Horizontal	11570.000	62.74	8.47	38.64	44.50	65.35	74.00	-8.65	Pk
Horizontal	11570.000	40.19	8.47	38.64	44.50	42.80	54.00	-11.20	AV
Horizontal	17355.000	60.52	10.12	38.38	44.10	64.92	74.00	-9.08	Pk
Horizontal	17355.000	39.97	10.12	38.38	44.10	44.37	54.00	-9.63	AV
High Channel (5825 MHz)-Above 1G									
Vertical	2911.760	60.33	7.10	37.24	43.50	61.17	74.00	-12.83	Pk
Vertical	2911.760	42.21	7.10	37.24	43.50	43.05	54.00	-10.95	AV
Vertical	11650.000	61.67	8.46	37.68	44.50	63.31	74.00	-10.69	Pk
Vertical	11650.000	43.55	8.46	37.68	44.50	45.19	54.00	-8.81	AV
Vertical	17475.000	59.92	10.12	38.80	44.10	64.74	74.00	-9.26	Pk
Vertical	17475.000	39.62	10.12	38.80	42.70	45.84	54.00	-8.16	AV
Horizontal	2911.450	58.63	7.10	37.24	43.50	59.47	74.00	-14.53	Pk
Horizontal	2911.450	40.13	7.10	37.24	43.50	40.97	54.00	-13.03	AV
Horizontal	11650.000	59.98	8.46	38.57	44.50	62.51	74.00	-11.49	Pk
Horizontal	11650.000	40.67	8.46	38.57	44.50	43.20	54.00	-10.80	AV
Horizontal	17475.000	59.92	10.12	38.38	44.10	64.32	74.00	-9.68	Pk
Horizontal	17475.000	37.74	10.12	38.38	44.10	42.14	54.00	-11.86	AV

Note: “802.11n20 (5.8G)” MIMO mode is the worst mode.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

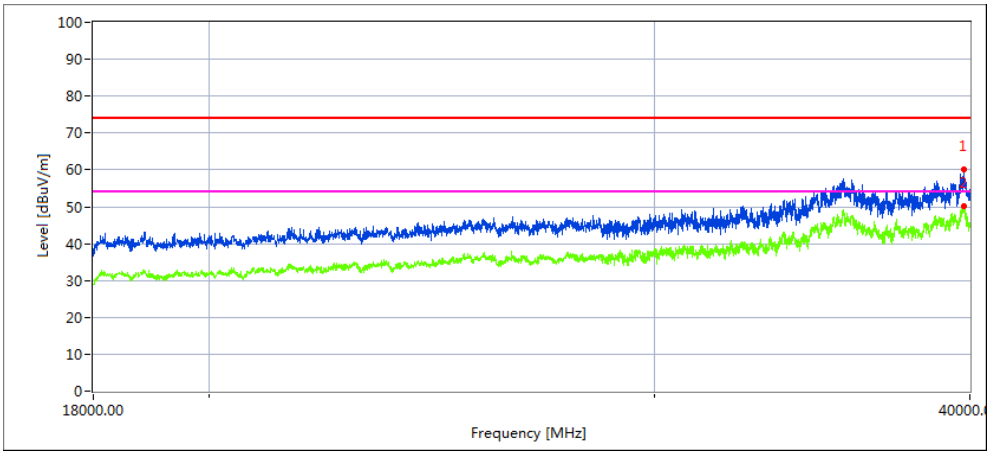
3.2.9 TEST RESULTS (18GHZ-40GHZ)

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5.2G)-5150 MHz ~5250MHz(802.11n20 MIMO mode is the worst mode); TX (5.8G)-5725 MHz ~5850 MHz(802.11n20 MIMO mode is the worst mode) -8812 module		

All the modulation modes have been tested, and the worst mode data was report as below:

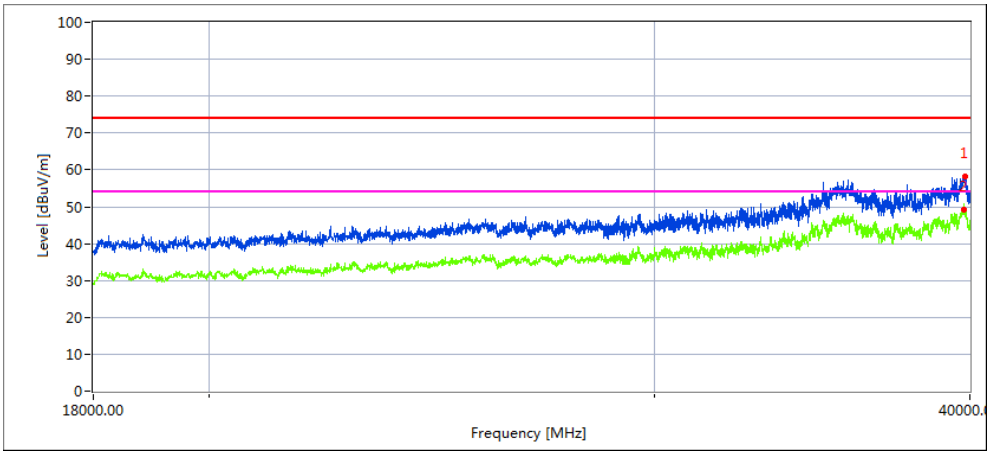
Low Channel (5180 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39798.096	60.2	56.8	74.0	17.2
39792.504	50.2	49.1	54.0	4.9

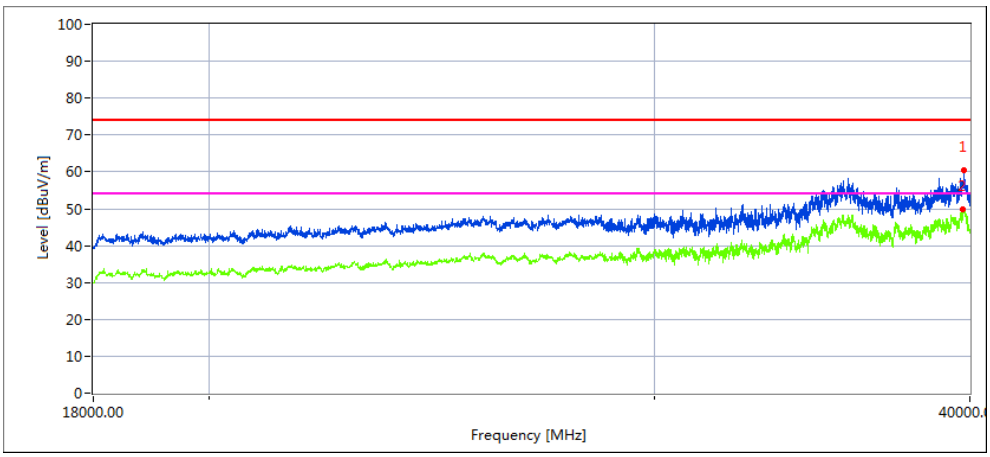
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39810.600	58.3	56.3	74.0	17.7
39776.004	50.3	47.9	54.0	6.1

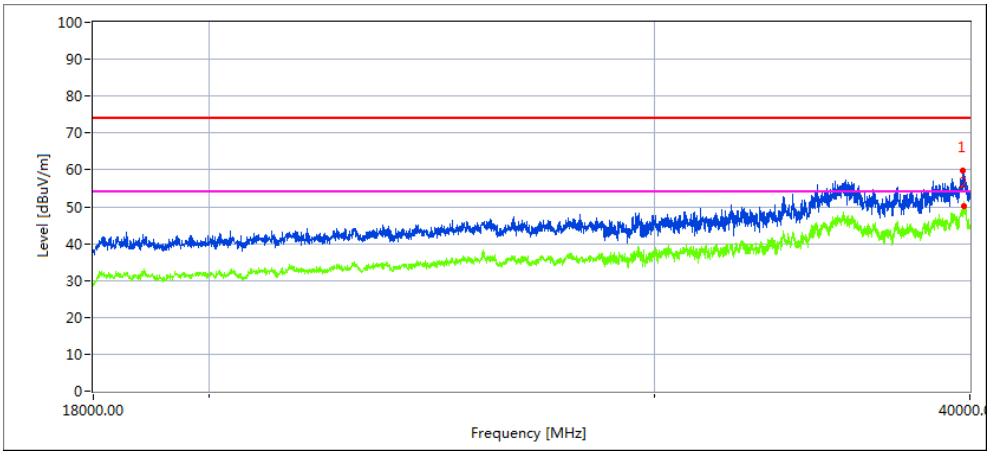
High Channel (5240 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39776.004	60.3	52.6	74.0	21.4
39749.838	49.6	48.7	54.0	5.3

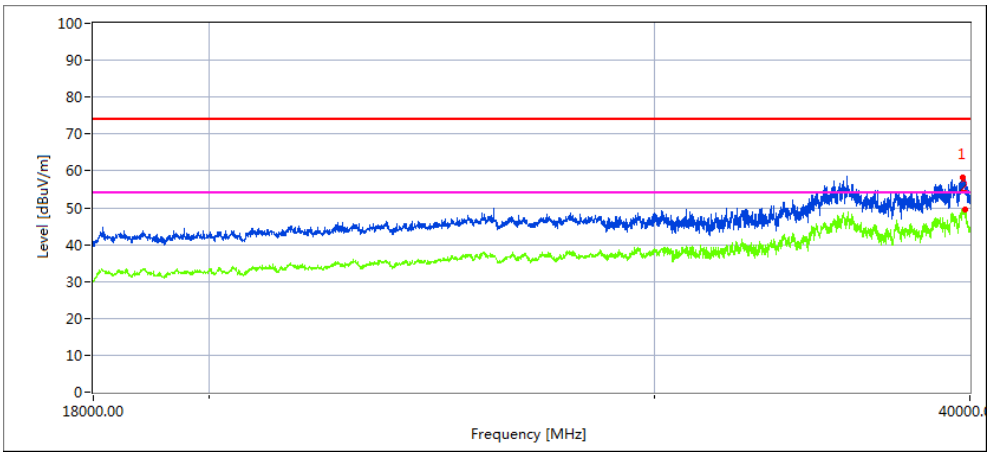
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39759.504	59.7	49.0	74.0	25.0
39792.504	46.9	42.4	54.0	11.6

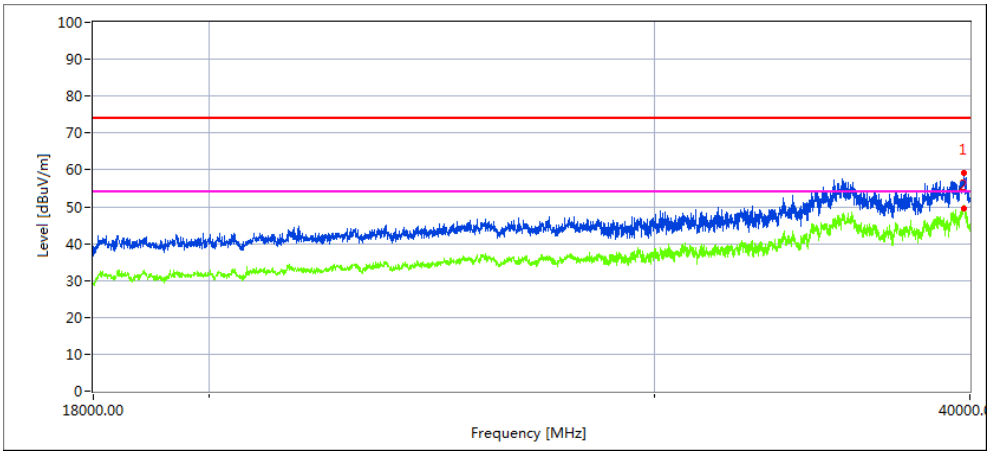
Low Channel (5745 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39748.504	58.2	56.1	74.0	17.9
39817.034	46.9	46.6	54.0	7.4

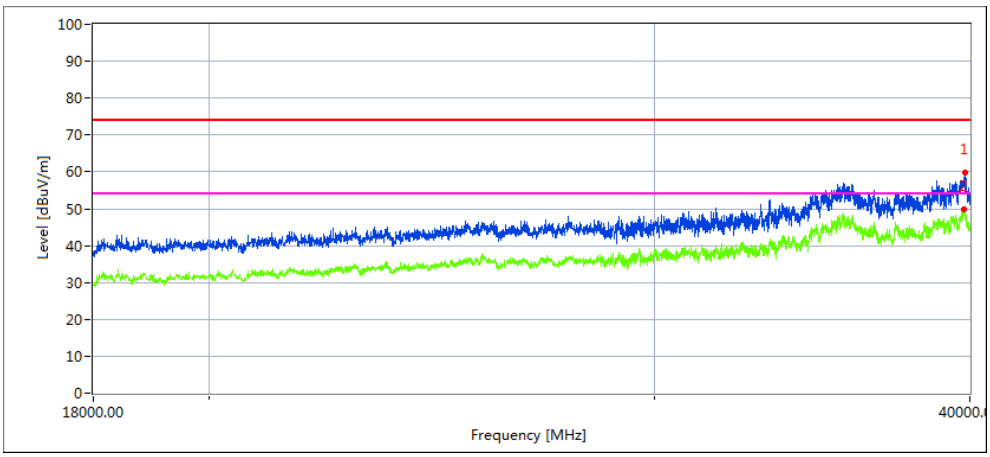
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39775.462	59.2	56.6	74.0	17.4
39796.800	50.7	48.0	54.0	6.0

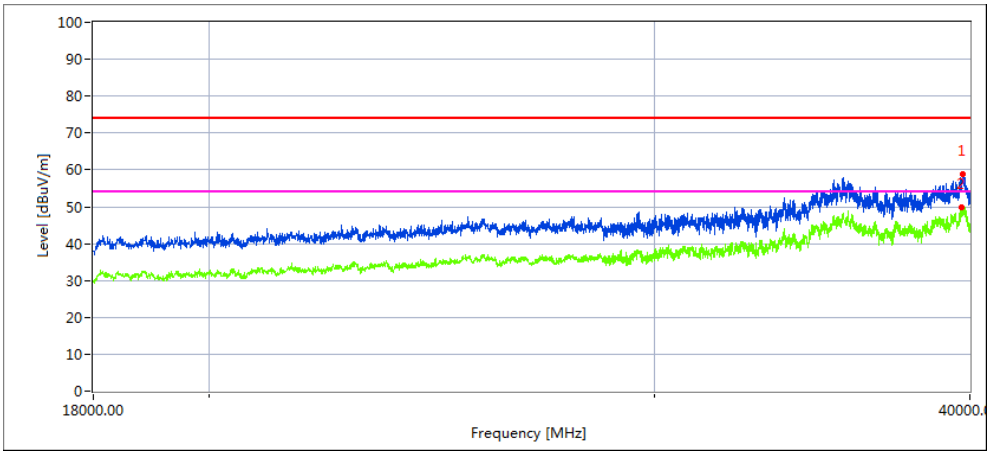
High Channel (5825 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39803.596	59.7	55.4	74.0	18.6
39792.504	47.6	47.5	54.0	6.5

Vertical



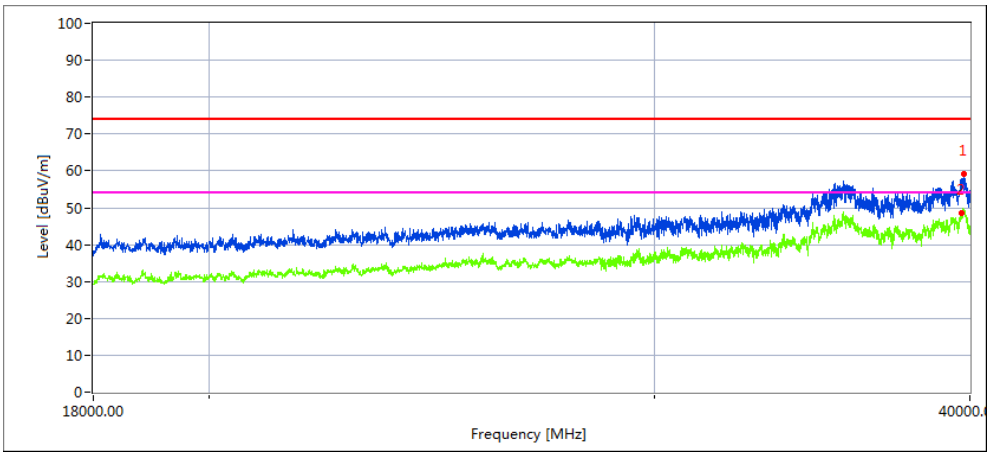
Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39750.760	58.7	57.0	74.0	17.0
39719.492	50.8	47.1	74.0	6.9

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5.2G)-5150 MHz ~5250MHz(802.11n40 SISO mode is the worst mode); TX (5.8G)-5725 MHz ~5850 MHz(802.11n20 MIMO mode is the worst mode) -8192 module		

All the modulation modes have been tested, and the worst mode data was report as below:

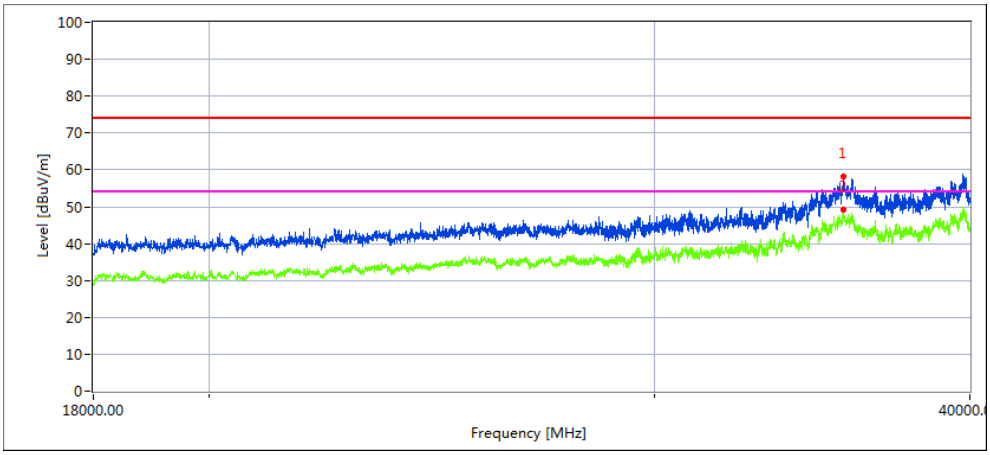
Low Channel (5190 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39788.406	59.0	56.8	74.0	17.2
39718.060	50.7	46.6	74.0	7.4

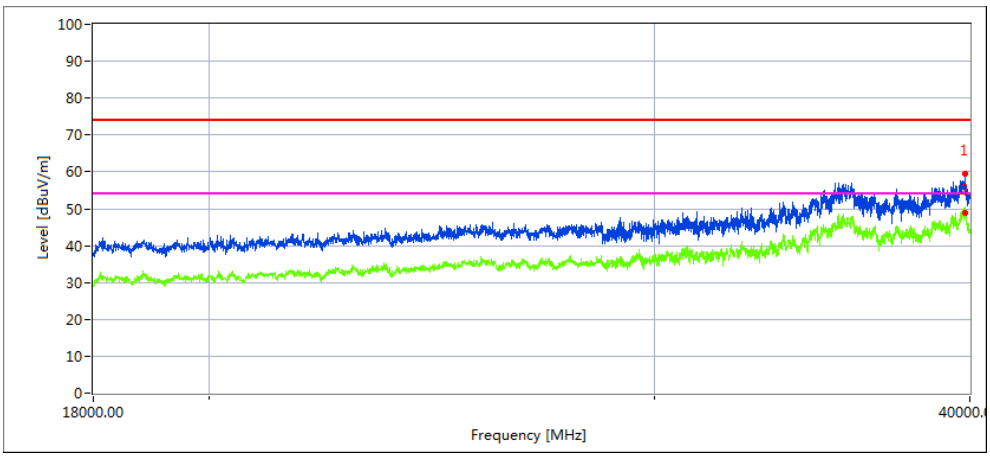
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
35662.004	58.2	49.1	74.0	24.9
35643.184	50.7	44.0	54.0	10.0

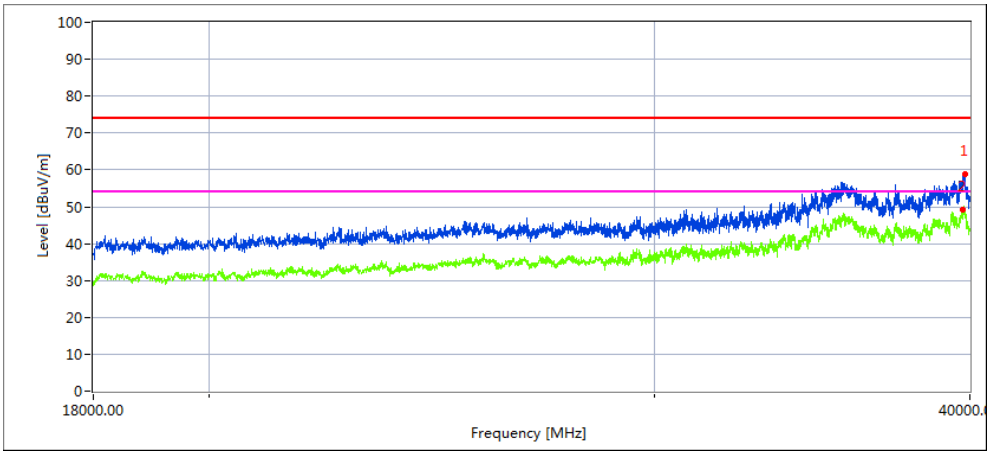
High Channel (5230 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39804.188	59.3	54.5	74.0	19.5
39820.852	50.4	47.0	54.0	7.0

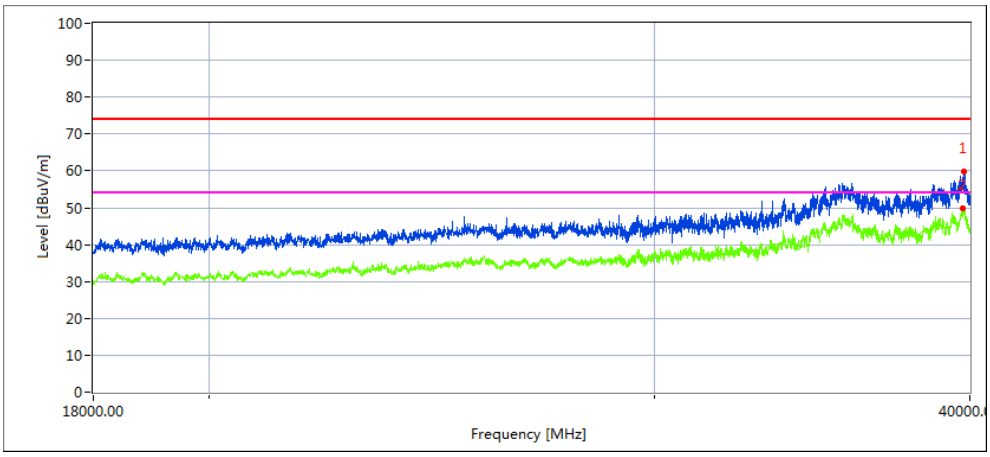
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39816.930	58.8	56.6	74.0	17.4
39732.004	50.9	42.3	54.0	11.7

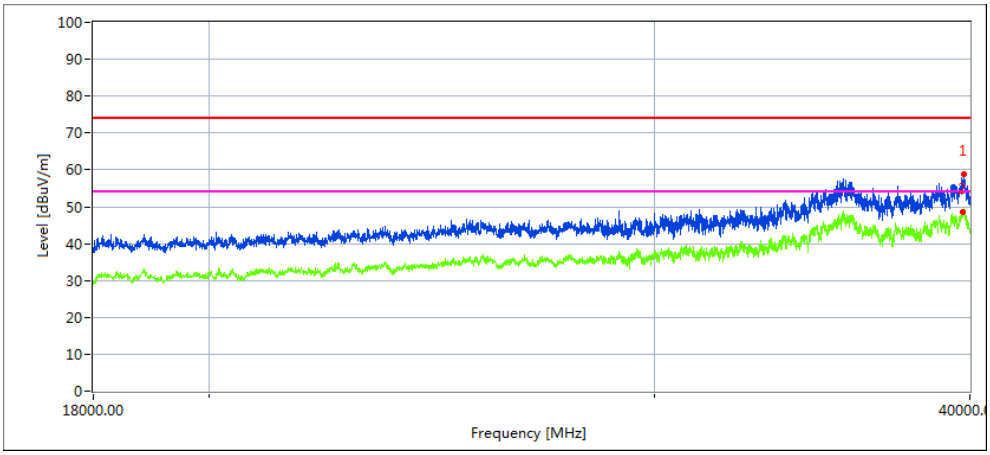
Low Channel (5745 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39793.264	59.8	55.6	74.0	18.4
39755.424	50.0	47.5	54.0	6.5

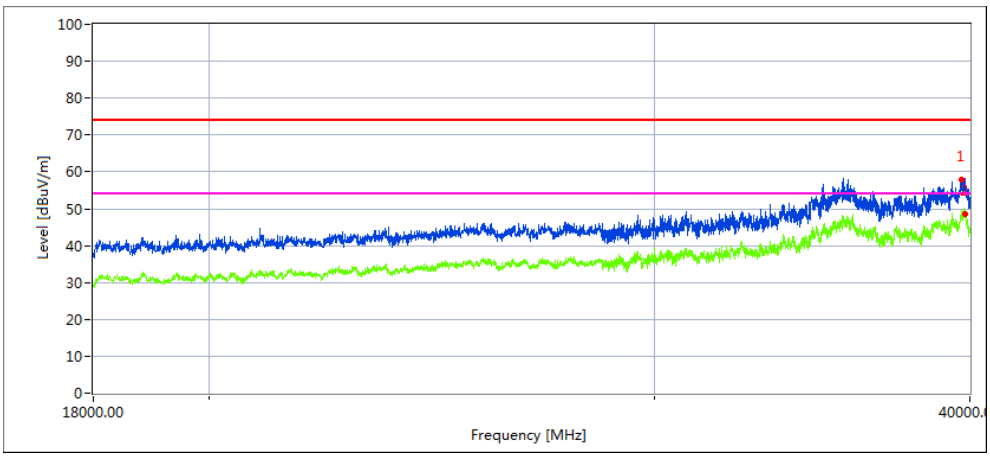
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39795.968	58.8	56.1	74.0	17.9
39744.430	49.2	46.6	54.0	7.4

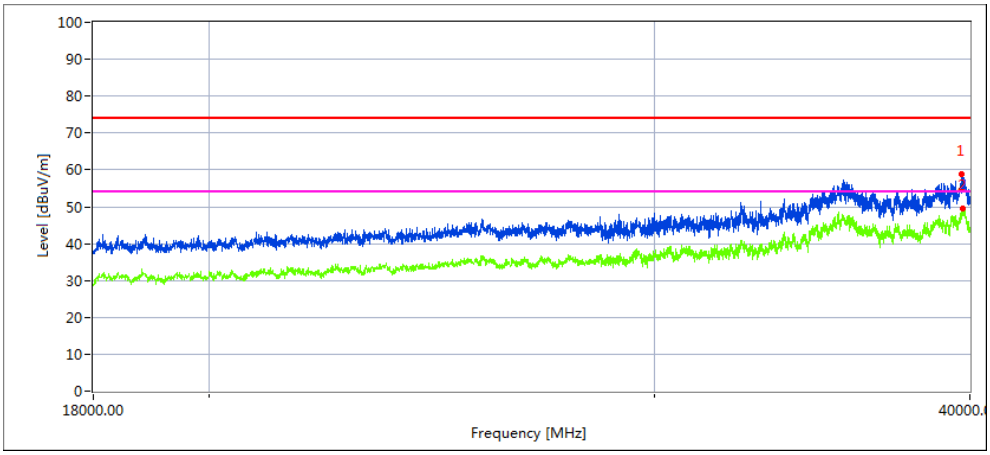
High Channel (5825 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39703.444	57.7	54.2	74.0	19.8
39810.708	48.2	45.4	54.0	8.6

Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39695.222	58.7	57.5	74.0	16.5
39727.584	50.7	48.7	54.0	5.3

3.2.10 SPURIOUS EMISSION IN RESTRICTED BAND 4.5GHZ~5.150 GHZ& 5.350GHZ~5460GHZ

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX(5.2G) - 802.11n20 _5150~5250MHz-8812 module		

All the modulation modes have been tested, The report just record the worst data mode.

Frequency (MHz)	Meter Reading (dBμV)	Cable Loss (dB)	Antenna Factor dB/m	Preamp Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
5.2G WIFI-802.11n20 MIMO Mode									
4500.00	45.14	5.20	35.60	44.20	41.74	74	-32.26	Pk	Horizontal
4500.00	28.43	5.20	35.60	44.20	25.03	54	-28.97	AV	Horizontal
4500.00	44.18	5.20	35.60	44.20	40.78	74	-33.22	Pk	Vertical
4500.00	29.66	5.20	35.60	44.20	26.26	54	-27.74	AV	Vertical
5150.00	65.89	5.36	35.66	44.22	62.69	74	-11.31	Pk	Horizontal
5150.00	52.46	5.36	35.66	44.22	49.26	54	-4.74	AV	Horizontal
5150.00	67.51	5.36	35.66	44.22	64.31	74	-9.69	Pk	Vertical
5150.00	52.07	5.36	35.66	44.22	48.87	54	-5.13	AV	Vertical
5350.00	46.88	5.68	35.68	44.22	44.02	74	-29.98	Pk	Vertical
5350.00	30.31	5.68	35.68	44.22	27.45	54	-26.55	AV	Vertical
5350.00	49.12	5.68	35.68	44.22	46.26	74	-27.74	Pk	Horizontal
5350.00	29.90	5.68	35.68	44.22	27.04	54	-26.96	AV	Horizontal

Note: (1) Emission Level= Antenna Factor + Cable Loss + Read Level - Preamp Factor
(2) “802.11n20 MIMO ” mode is the worst mode. When PK value is lower than the Average value limit, average don't record.

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX(5.2G) - 802.11n40 _5150~5250MHz-8192 module		

Frequency (MHz)	Meter Reading (dBμV)	Cable Loss (dB)	Antenna Factor dB/m	Preamp Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
5.2G WIFI-802.11n40 MIMO Mode									
4500.00	45.81	5.20	35.60	44.20	42.41	74	-31.59	Pk	Horizontal
4500.00	27.66	5.20	35.60	44.20	24.26	54	-29.74	AV	Horizontal
4500.00	45.29	5.20	35.60	44.20	41.89	74	-32.11	Pk	Vertical
4500.00	28.85	5.20	35.60	44.20	25.45	54	-28.55	AV	Vertical
5150.00	63.87	5.36	35.66	44.22	60.67	74	-13.33	Pk	Horizontal
5150.00	50.58	5.36	35.66	44.22	47.38	54	-6.62	AV	Horizontal
5150.00	63.94	5.36	35.66	44.22	60.74	74	-13.26	Pk	Vertical
5150.00	51.68	5.36	35.66	44.22	48.48	54	-5.52	AV	Vertical
5350.00	46.58	5.68	35.68	44.22	43.72	74	-30.28	Pk	Vertical
5350.00	29.39	5.68	35.68	44.22	26.53	54	-27.47	AV	Vertical
5350.00	46.88	5.68	35.68	44.22	44.02	74	-29.98	Pk	Horizontal
5350.00	29.04	5.68	35.68	44.22	26.18	54	-27.82	AV	Horizontal

Note: (1) Emission Level= Antenna Factor + Cable Loss + Read Level - Preamp Factor

(2) “802.11n40 MIMO ” mode is the worst mode. When PK value is lower than the Average value limit, average don't record.

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(a)

For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz

(3)For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

,

4.2 TEST PROCEDURE

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/T, where T is defined in section II.B.I.a).

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

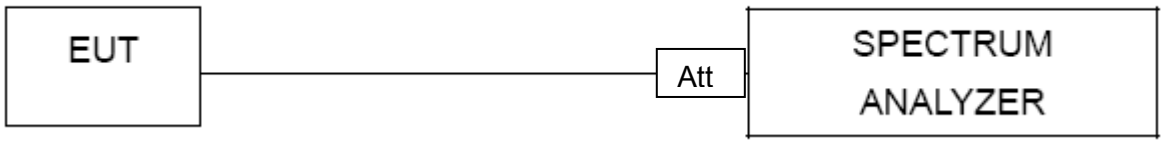
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since RBW=100 KHZ is available on nearly all spectrum analyzers.

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP



4.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

4.6 TEST RESULTS

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1015 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX Frequency Band I (5150-5250MHz) &Band 3 (5725-5850MHz)		

Note: The EUT has two modules, module A (8812), module B (8192), four of the same type of antenna, and different modes support different transmit mode what describe as Following form:

Mode	Tx/Rx
802.11a	1Tx, 2Rx
802.11n/ac	1Tx /2Tx, 2Rx

Test data reference attachment.

5. 26DB & 99% EMISSION BANDWIDTH

5.1 APPLIED PROCEDURES / LIMIT

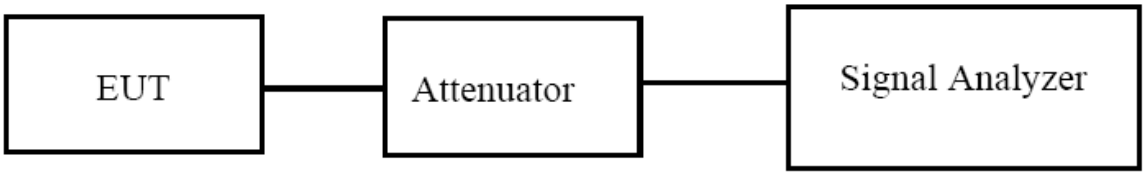
The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

5.2 TEST PROCEDURE

a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 · RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.



5.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.4 TEST RESULTS

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX Frequency Band I (5150-5250MHz) & Band 3(5725-5850MHz)		

Test data reference attachment.

6. MINIMUM 6 DB BANDWIDTH

6.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(e)
(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

6.2 TEST PROCEDURE

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.

b) Set the video bandwidth (VBW) ≥ 3 × RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

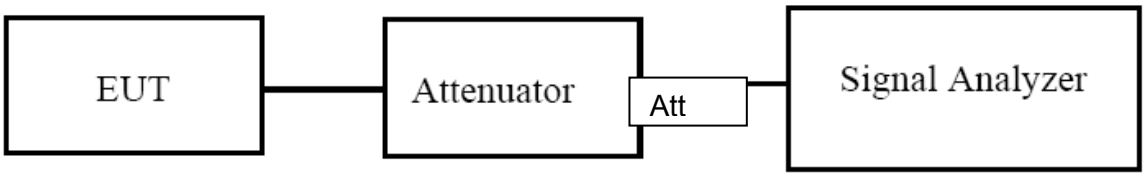
f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX Frequency Band 3(5725-5850MHz)		

Test data reference attachment.

7. MAXIMUM CONDUCTED OUTPUT POWER

7.1 PPLIED PROCEDURES / LIMIT

According to FCC §15.407

The maximum conduced output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	1W(For an indoor access point)
5725~5850	1W

Note: where B is the 26 dB emission bandwidth in megahertz.

7.2 TEST PROCEDURE

· Maximum conducted output power may be measured using a spectrum analyzer/EMI receiver or an RF power meter.

1. Device Configuration

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).

a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)

Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.1 However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).

a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:

• The EUT transmits continuously (or with a duty cycle ≥ 98 percent).

• Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration T of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.

(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than ± 2 percent.

(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.

b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(ii) Set RBW = 1 MHz.

(iii) Set VBW ≥ 3 MHz.

(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".

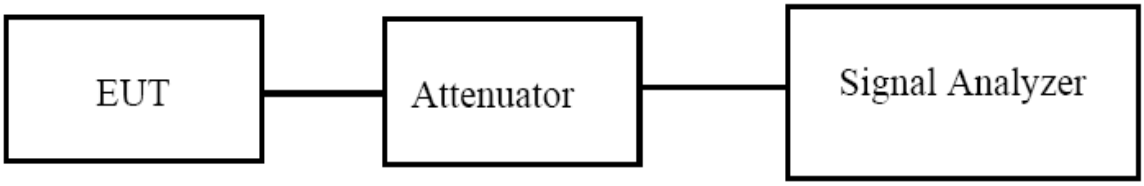
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULTS

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5G) Mode Frequency Band 1 (5150-5250MHz) &Band 3 (5725-5850MHz)		

Note: The EUT has two modules, module A (8812), module B (8192), four of the same type of antenna, and different modes support different transmit mode what describe as Following form:

Mode	Tx/Rx
802.11a	1Tx, 2Rx
802.11n/ac	1Tx /2Tx, 2Rx

Test data reference attachment.

8. OUT OF BAND EMISSIONS

8.1 APPLICABLE STANDARD

According to FCC §15.407(b)

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

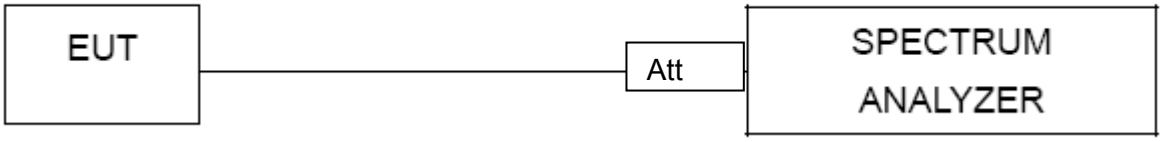
8.2 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.6 TEST RESULTS

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 5V

Test data reference attachment.

9.SPURIOUS RF CONDUCTED EMISSIONS

9.1CONFORMANCE LIMIT

1. Below -27dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

9.2MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

9.3TEST SETUP

Please refer to Section 6.1 of this test report.

9.4TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following 789033 D02 General U-NII Test Procedures New Rules v02r01, maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=1MHz and VBW= 3MHz to measure the peak field strength , and mwasure frequeny range from 1GHz to 40GHz.

9.5TEST RESULTS

Remark: The measurement frequency range is from 1GHz to the 40GHz. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

Test data reference attachment.

10. Frequency Stability Measurement

10.1 LIMIT

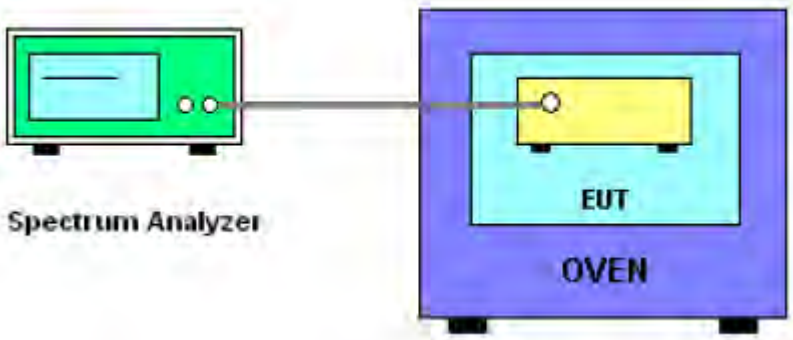
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

10.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10_6 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is 0°C~40°C(Declared by the manufacturer).

10.3 TEST SETUP LAYOUT



10.4 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously un-modulation transmitting mode.

10.5 TEST RESULTS

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX Frequency Band I (5150-5250MHz)-8812 Module		

Note: All the modulation modes have been tested, Only record the worst mode 802.11ac80 data.

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5210MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5209.9200	5210	0.0800	15.3551
		V max (V)	5.75	5209.9231	5210	0.0769	14.7601
		V min (V)	4.25	5209.9211	5210	0.0789	15.1440
Limits				Within 5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5210MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	0	5209.9217	5210	0.0783	15.0288
		T (°C)	10	5209.9352	5210	0.0648	12.4376
		T (°C)	30	5209.9418	5210	0.0582	11.1708
		T (°C)	40	5209.9461	5210	0.0539	10.3455
Limits				Within 5150-5250MHz			
Result				Complies			

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX Frequency Band III (5725-5850MHz) -8812 Module		

Note: All the modulation modes have been tested, Only record the worst mode 802.11ac80 data.

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5775MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5774.92000	5775	0.08000	13.8528
		V max (V)	5.75	5774.96000	5775	0.04000	6.9264
		V min (V)	4.25	5774.95000	5775	0.05000	8.6580
Limits				Within 5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5775MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	0	5774.92800	5775	0.07200	12.4675
		T (°C)	10	5774.93000	5775	0.07000	12.1212
		T (°C)	30	5774.93700	5775	0.06300	10.9091
		T (°C)	40	5774.94800	5775	0.05200	9.0043
Limits				Within 5725-5850MHz			
Result				Complies			

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX Frequency Band I (5150-5250MHz)-8192 Module		

Note: All the modulation modes have been tested, Only record the worst mode 802.11n40 data.

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5190MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5190.0000	5190	0.0000	0.0000
		V max (V)	5.75	5190.0004	5190	0.0004	-0.0771
		V min (V)	4.25	5190.0013	5190	0.0013	-0.2505
Limits				Within 5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5190MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	0	5190.0021	5190	0.0021	-0.4046
		T (°C)	10	5190.0001	5190	0.0001	-0.0193
		T (°C)	30	5190.0007	5190	0.0007	-0.1349
		T (°C)	40	5190.0011	5190	0.0011	-0.2119
Limits				Within 5150-5250MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5230MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5230.0400	5230	0.0400	-7.6482
		V max (V)	5.75	5230.0395	5230	0.0395	-7.5526
		V min (V)	4.25	5230.0384	5230	0.0384	-7.3423
Limits				Within 5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5230MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	0	5230.0374	5230	0.0374	-7.1511
		T (°C)	10	5230.0369	5230	0.0369	-7.0554
		T (°C)	30	5230.0417	5230	0.0417	-7.9732
		T (°C)	40	5230.0407	5230	0.0407	-7.7820
Limits				Within 5150-5250MHz			
Result				Complies			

EUT：	ScreenBeam 960	Model Name. ：	SBWD960B
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX Frequency Band III (5725-5850MHz) -8192 Module		

Note: All the modulation modes have been tested, Only record the worst mode 802.11n40 data.

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5755MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5755.04000	5755	0.04000	-6.9505
		V max (V)	5.75	5755.04700	5755	0.04700	-8.1668
		V min (V)	4.25	5755.03900	5755	0.03900	-6.7767
Limits				Within 5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5755MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	0	5755.04000	5755	0.04000	-6.9505
		T (°C)	10	5755.04110	5755	0.04110	-7.1416
		T (°C)	30	5755.04260	5755	0.04260	-7.4023
		T (°C)	40	5755.03970	5755	0.03970	-6.8983
Limits				Within 5725-5850MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5795MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5795.00000	5795	0.00000	0.0000
		V max (V)	5.75	5795.00020	5795	0.00020	-0.0345
		V min (V)	4.25	5795.00080	5795	0.00080	-0.1381
Limits				Within 5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	0	5795.00061	5795	0.00061	-0.1053
		T (°C)	10	5795.00000	5795	0.00000	0.0000
		T (°C)	30	5795.00070	5795	0.00070	-0.1208
		T (°C)	40	5795.00008	5795	0.00008	-0.0138
Limits				Within 5725-5850MHz			
Result				Complies			

11. ANTENNA REQUIREMENT

11.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, 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.

11.2 EUT ANTENNA

The EUT has two modules, module A (8812), module B (8192), four of the same type of antenna, as shown in Figure A shows:

Antenna	Antenna Type	Antenna Gain(dBi)	
		5.2G	5.8G
1	PCB	4.86	3.36
2	PCB	4.40	4.30
3	PCB	5.22	5.11
4	PCB	4.83	4.93

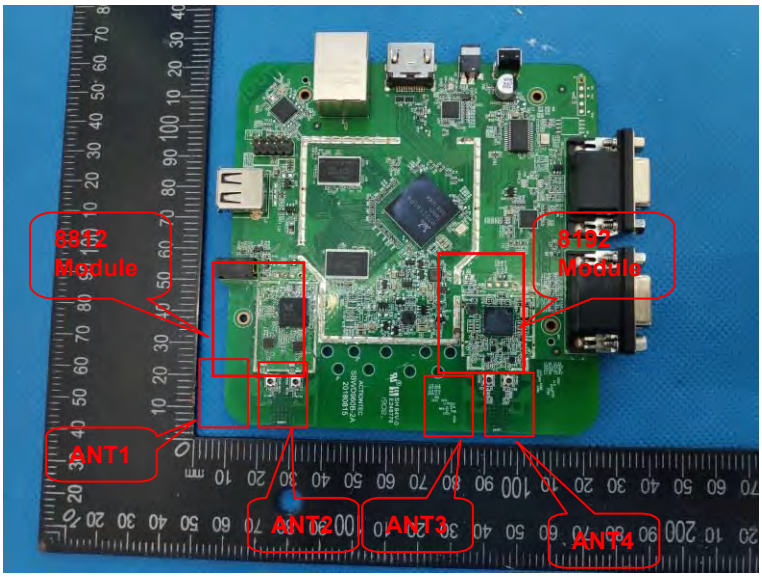


Figure A

It comply with the standard requirement.

END OF REPORT