

RADIO TEST REPORT FCC ID: LNQSBWD3100

Product:ScreenBeam OPS Wireless Display
ModuleTrade Mark:ScreenBeamModel No.:SBWD3100Family Model:N/AReport No.:S19052104007001Issue Date:Jul 11, 2019

Prepared for

Actiontec Electronics Inc 3301 Olcott St Santa Clara, CA 95054 United States

Prepared by

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1 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 OPS Wireless Display Module
Product name:	ScreenBeam OPS Wireless Display Module
Model and/or type reference:	SBWD3100
Family Model:	N/A

Measurement Procedure Used:

APPLICABLE STANDARDS

APPLICABLE STANDARD/ TEST PROCEDURE	TEST RESULT
FCC 47 CFR Part 2, Subpart J	
FCC 47 CFR Part 15, Subpart C	
KDB 174176 D01 Line Conducted FAQ v01r01	Complied
ANSI C63.10-2013	
KDB 558074 D01 15.247 Meas Guidance v05r02	

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

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The test results of this report relate only to the tested sample identified in this report.

Date of Test	: 13 Feb. 2019 ~ 08 Jul. 2019	
Testing Engineer	hrang. Hu	
	(Mary Hu)	
Technical Manager	Jason chen	
	(Jason Chen)	
	Sam. Chen	
Authorized Signatory	:	
	(Sam Chen)	



2 SUMMARY OF TEST RESULTS							
FCC Part15 (15.247), Subpart C							
Standard Section	Standard Section Test Item Verdict Remark						
15.207	Conducted Emission	PASS					
15.247 (a)(2)	6dB Bandwidth	PASS					
15.247 (b)	Peak Output Power	PASS					
15.209 (a) 15.205 (a)	Radiated Spurious Emission	PASS					
15.247 (e)	Power Spectral Density	PASS					
15.247 (d)	Band Edge Emission	PASS					
15.247 (d)	15.247 (d) Spurious RF Conducted Emission						
15.203	15.203 Antenna Requirement						

Remark:

 "N/A" denotes test is not applicable in this Test Report.
 All test items were verified and recorded according to the standards and without any deviation during the test.



3 FACILITIES AND ACCREDITATIONS

3.1 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.

3.2 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.

3.3 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y\pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

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°C
8	Humidity	±2%



4 GENERAL DESCRIPTION OF EUT

Product Feature and Specification				
Equipment	ScreenBeam OPS Wireless Display Module			
Trade Mark	ScreenBeam			
FCC ID	LNQSBWD3100			
Model No.	SBWD3100			
Family Model	N/A			
Model Difference	N/A			
Operating Frequency	2402MHz~2480MHz			
Modulation	GFSK			
Number of Channels	40 Channels			
Bluetooth Version	BT4.2& BT V5.0(BLE)			
Antenna Type	PCB Antenna			
Antenna Gain	-2.38dBi			
Power supply	DC supply: DC 12V-19V, 3A			
	Adapter supply:			
HW Version	1AD			
SW Version	11.0.x.0			

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Note: Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.



Revision History					
Report No.	Version	Description	Issued Date		
S19052104007001	Rev.01	Initial issue of report	Jul 11, 2019		

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5 DESCRIPTION OF TEST MODES

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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.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (1Mbps& 2Mbps for GFSK modulation) were used for all test.

The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement -X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

Carrier Frequency and Channel list:

Channel	Frequency(MHz)
0	2402
1	2404
19	2440
20	2442
38	2478
39	2480

Note: fc=2402MHz+k×2MHz k=0 to 39

The following summary table is showing all test modes to demonstrate in compliance with the standard.

	Test Cases	
Test Item	Data Rate/ Modulation	
Test item	Bluetooth 4.2& 5.0_LE / GFSK	
AC Conducted Emission Mode 1: normal link mode		
	Mode 1: normal link mode	
Radiated Test	Mode 2: Bluetooth Tx Ch00_2402MHz_1Mbps&2Mbps	
Cases	Mode 3: Bluetooth Tx Ch19_2440MHz_1Mbps&2Mbps	
	Mode 4: Bluetooth Tx Ch39_2480MHz_1Mbps&2Mbps	
Conducted Test	Mode 2: Bluetooth Tx Ch00_2402MHz_1Mbps&2Mbps	
Conducted Test	Mode 3: Bluetooth Tx Ch19_2440MHz_1Mbps&2Mbps	
Cases	Mode 4: Bluetooth Tx Ch39_2480MHz_1Mbps&2Mbps	

Note:

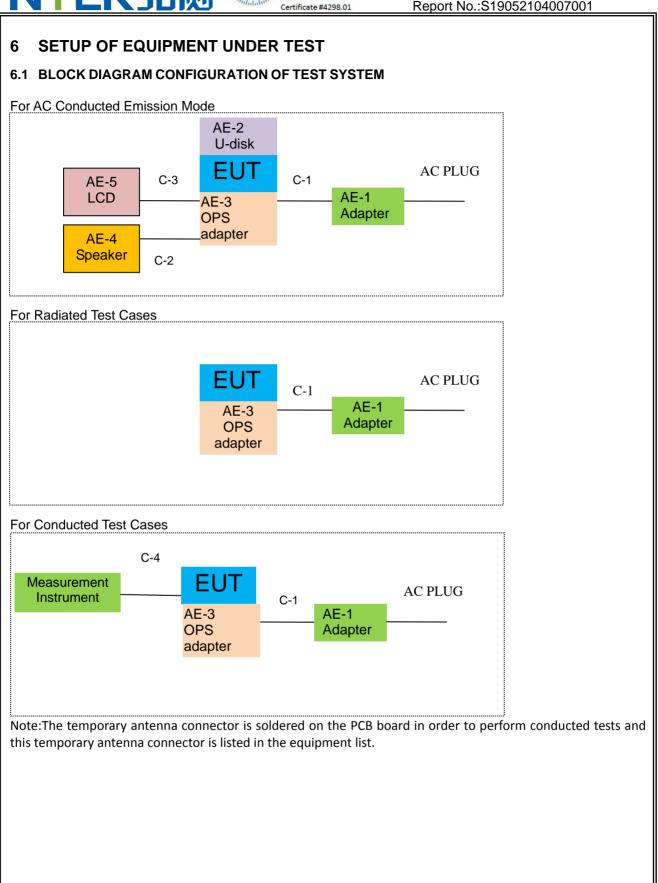
1. The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.

2. AC power line Conducted Emission was tested under maximum output power.

3. For radiated test cases, the worst mode data rate 2Mbps was reported only, because this data rate has the highest RF output power at preliminary tests, and no other significantly frequencies found in conducted spurious emission.

4. EUT is set to continuous transmission mode. duty cycle greater than 98%.

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6.2 SUPPORT EQUIPMENT

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	Mfr/Brand	Model/Type No.	Series No.	Note
AE-1	Adapter	N/A	N/A	N/A	
AE-2	U-disk	N/A	N/A	N/A	
AE-3	OPS adapter board	N/A	N/A	N/A	
AE-4	Speaker	N/A	N/A	N/A	
AE-5	LCD	N/A	N/A	N/A	

Item	Cable Type	Shielded Type	Ferrite Core	Length
C-1	Power Cable	NO	NO	1.2m
C-2	Audio Cable	NO	NO	1.2m
C-3	HDMI Cable	YES	YES	1.2m
C-4	RF Cable	YES	NO	0.1m

Notes:

- (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" is means "shielded" "with core"; "NO" is means "unshielded" "without core".





6.3 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation& Conducted Test equipment

aululic		lest equipment					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibrati on period
1	Spectrum Analyzer	Aglient	E4407B	MY45108040	2018.05.19 2019.05.13	2019.05.18 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	2018.05.19 2019.05.13	2019.05.18 2020.05.12	1 year
5	Bilog Antenna	TESEQ	CBL6111D	31216	2018.04.19 2019.04.15	2019.04.18 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-1018 0	2011071402	2018.04.19 2019.04.15	2019.04.18 2020.04.14	1 year
8	Broadband Horn Antenna	SCHWARZBE CK	BBHA 9170	803	2018.12.11	2019.12.10	1 year
9	Amplifier	EMC	EMC051835 SE	980246	2018.08.05	2019.08.04	1 year
10	Active Loop Antenna	SCHWARZBE CK	FMZB 1519 B	055	2018.12.11	2019.12.10	1 year
11	Power Meter	DARE	RPR3006W	15I00041SN 084	2018.08.05	2019.08.04	1 year
12	Test Cable (9KHz-30MHz)	N/A	R-01	N/A	2017.04.21	2020.04.20	3 year
13	Test Cable (30MHz-1GHz)	N/A	R-02	N/A	2017.04.21	2020.04.20	3 year
14	High Test Cable(1G-40G Hz)	N/A	R-03	N/A	2017.04.21	2020.04.20	3 year
15	High Test Cable(1G-40G Hz)	N/A	R-04	N/A	2017.04.21	2020.04.20	3 year
16	Filter	TRILTHIC	2400MHz	29	2017.04.19	2020.04.18	3 year
17	temporary antenna connector (Note)	NTS	R001	N/A	N/A	N/A	N/A

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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 Co	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	2018.05.19 2019.05.13	2019.05.18 2020.05.12	1 year
2	LISN	R&S	ENV216	101313	2018.10.08	2019.10.07	1 year
3	LISN	SCHWARZBE CK	NNLK 8129	8129245	2018.05.19 2019.05.13	2019.05.18 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-30MH z)	N/A	C01	N/A	2017.04.21	2020.04.20	3 year
6	Test Cable (9KHz-30MH z)	N/A	C02	N/A	2017.04.21	2020.04.20	3 year
7	Test Cable (9KHz-30MH z)	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 Aux Equipment & Test Cable which is scheduled for calibration every 2 or 3 years.



7 TEST REQUIREMENTS

7.1 CONDUCTED EMISSIONS TEST

7.1.1 Applicable Standard

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

7.1.2 Conformance Limit

	Conducted Emission Limit				
Frequency(MHz)	Quasi-peak	Average			
0.15-0.5	66-56*	56-46*			
0.5-5.0	56	46			
5.0-30.0	60	50			

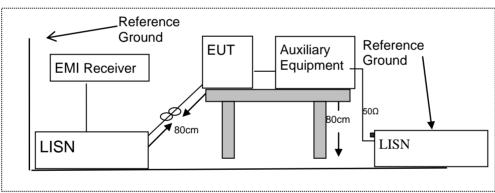
Note: 1. *Decreases with the logarithm of the frequency

- 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.

7.1.3 Measuring Instruments

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

7.1.4 Test Configuration



7.1.5 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.



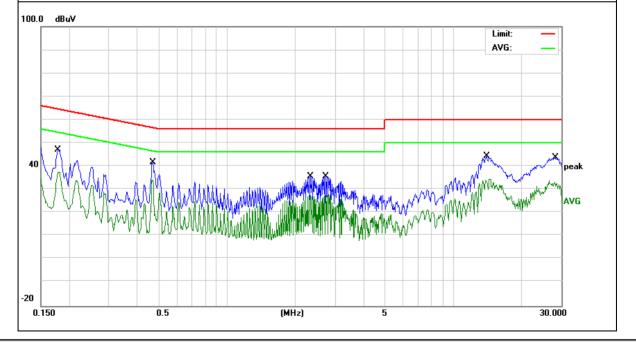
7.1.6 Test Results

EUT:	ScreenBeam Module	ScreenBeam OPS Wireless Display Module			el Name :	SBWD3100	
Temperature:	26 ℃			Relat	tive Humidity:	54%	
Pressure:	1010hPa			Phas	e:	L	
Test Voltage:	DC 19V from	Adapter AC 12	20V/60Hz	Test	Mode:	Mode 1	
Frequency	Reading Level	Correct Factor	Measure-n	nent	Limits	Margin	Remark
(MHz)	(dBµV)	(dB)	(dBµ∖	()	(dBµV)	(dB)	- Remark
0.1779	37.29	9.76	47.05	5	64.58	-17.53	QP
0.1779	27.70	9.76	37.46	5	54.58	-17.12	AVG
0.4697	31.88	9.74	41.62	2	56.52	-14.90	QP
0.4697	24.33	9.74	34.07	,	46.52	-12.45	AVG
2.3380	25.89	9.79	35.68	}	56.00	-20.32	QP
2.3380	17.86	9.79	27.65	5	46.00	-18.35	AVG
2.7339	25.91	9.80	35.71		56.00	-20.29	QP
2.7339	17.94	9.80	27.74	ļ	46.00	-18.26	AVG
14.0219	34.17	10.09	44.26	5	60.00	-15.74	QP
14.0219	24.45	10.09	34.54	Ļ	50.00	-15.46	AVG
28.1935	33.28	10.53	43.81		60.00	-16.19	QP
28.1935	22.68	10.53	33.21		50.00	-16.79	AVG

Remark:

1. All readings are Quasi-Peak and Average values.

2. Factor = Insertion Loss + Cable Loss.





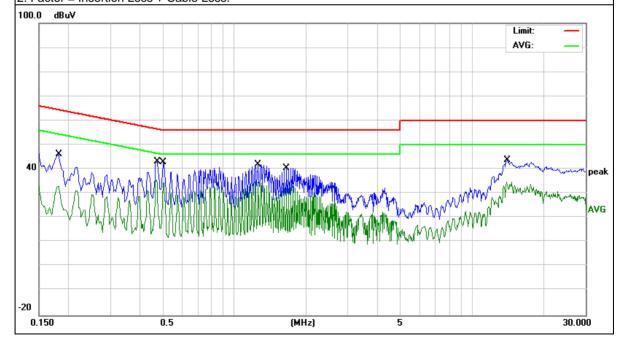
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Report No.:S19052104007001

EUT:	ScreenBeam C Module	ScreenBeam OPS Wireless Display Module			el Name :	SBWD3100		
Temperature:	26 °C			Relat	tive Humidity:	54%	54%	
Pressure:	1010hPa			Phas	e:	Ν		
Test Voltage:	DC 19V from A	dapter AC 240)V/60Hz	Test	Mode:	Mode 1		
Frequency	Reading Level	Correct Factor	Measure-m	nent	Limits	Margin	Remark	
(MHz)	(dBµV)	(dB)	(dBµV	['])	(dBµV)	(dB)		
0.1819	36.37	9.73	46.10)	64.39	-18.29	QP	
0.1819	23.19	9.73	32.92	2	54.39	-21.47	AVG	
0.4737	33.45	9.75	43.20)	56.45	-13.25	QP	
0.4737	25.83	9.75	35.58	}	46.45	-10.87	AVG	
0.5020	33.08	9.75	42.83	3	56.00	-13.17	QP	
0.5020	24.72	9.75	34.47	7	46.00	-11.53	AVG	
1.2579	32.15	9.75	41.90)	56.00	-14.10	QP	
1.2579	24.93	9.75	34.68	}	46.00	-11.32	AVG	
1.6532	30.75	9.78	40.53	3	56.00	-15.47	QP	
1.6532	23.25	9.78	33.03	3	46.00	-12.97	AVG	
14.1295	33.52	10.09	43.61		60.00	-16.39	QP	
14.1295	24.68	10.09	34.77	7	50.00	-15.23	AVG	

Remark:

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



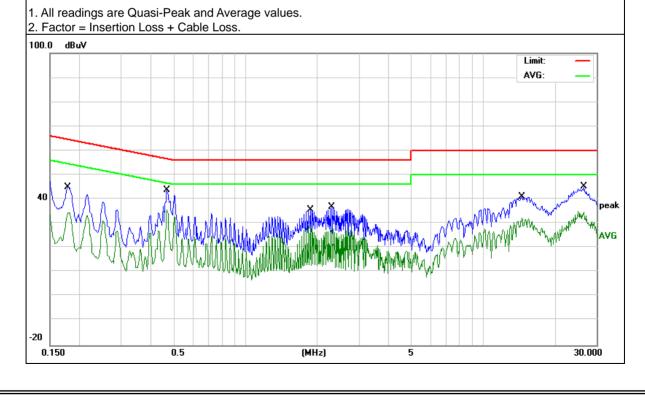


EUT:	ScreenBeam Module	ScreenBeam OPS Wireless Display Module			el Name :	SBWD3100	
Temperature:	26 ℃			Rela	tive Humidity:	54%	
Pressure:	1010hPa			Phas	se :	N	
Test Voltage:	DC 19V from	Adapter AC 12	20V/60Hz	Test	Mode:	Mode 1	
Frequency	Reading Level	Correct Factor	Measure-r	nent	Limits	Margin	Derrorent
(MHz)	(dBµV)	(dB)	(dBµ\	/)	(dBµV)	(dB)	- Remark
0.1779	35.27	9.76	45.03	3	64.58	-19.55	QP
0.1779	24.66	9.76	34.42	2	54.58	-20.16	AVG
0.4661	33.99	9.74	43.7	3	56.58	-12.85	QP
0.4661	25.80	9.74	35.5	4	46.58	-11.04	AVG
1.8700	25.73	9.78	35.5	1	56.00	-20.49	QP
1.8700	19.13	9.78	28.9	1	46.00	-17.09	AVG
2.3020	26.97	9.79	36.7	6	56.00	-19.24	QP
2.3020	18.12	9.79	27.9	1	46.00	-18.09	AVG
14.5297	31.02	10.09	41.1 ⁻	1	60.00	-18.89	QP
14.5297	22.14	10.09	32.2	3	50.00	-17.77	AVG
26.6097	34.62	10.63	45.2	5	60.00	-14.75	QP
26.6097	24.26	10.63	34.8	9	50.00	-15.11	AVG

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Remark:





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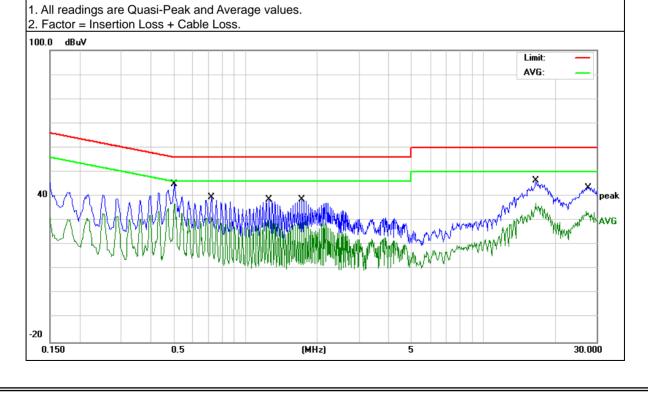
Report No.:S19052104007001

EUT:	ScreenBeam C Module	ScreenBeam OPS Wireless Display Module			el Name :	SBWD3100	
Temperature:	26 ℃			Rela	tive Humidity:	54%	
Pressure:	1010hPa			Phas	se :	N	
Test Voltage:	DC 19V from A	dapter AC 120)V/60Hz	Test	Mode:	Mode 1	
Frequency	Reading Level	Correct Factor	Measure-m	nent	Limits	Margin	Demeril
(MHz)	(dBµV)	(dB)	(dBµV)	(dBµV)	(dB)	- Remark
0.5020	35.10	9.75	44.85	5	56.00	-11.15	QP
0.502	26.96	9.75	36.71		46.00	-9.29	AVG
0.7177	29.65	9.75	39.40)	56.00	-16.60	QP
0.7177	21.73	9.75	31.48	3	46.00	-14.52	AVG
1.2579	28.94	9.75	38.69)	56.00	-17.31	QP
1.2579	20.48	9.75	30.23	3	46.00	-15.77	AVG
1.7258	28.74	9.78	38.52	2	56.00	-17.48	QP
1.7258	20.02	9.78	29.80)	46.00	-16.20	AVG
16.6493	36.24	10.13	46.37	7	60.00	-13.63	QP
16.6493	27.17	10.13	37.30)	50.00	-12.70	AVG
27.6539	33.04	10.53	43.57	7	60.00	-16.43	QP
27.6539	23.37	10.53	33.90)	50.00	-16.10	AVG

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Remark:





7.2 RADIATED SPURIOUS EMISSION

7.2.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and ANSI C63.10-2013

7.2.2 Conformance Limit

According to FCC Part 15.247(d): 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

According to FOC Fait 15.200, Restlicted ballus				
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
Γ	0.009~0.490	2400/F(KHz)	20 log (uV/m)	300
Γ	0.490~1.705	24000/F(KHz)	20 log (uV/m)	30
Γ	1.705~30.0	30	29.5	30
Γ	30-88	100	40	3
Γ	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)			
Frequency(MHz)	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.

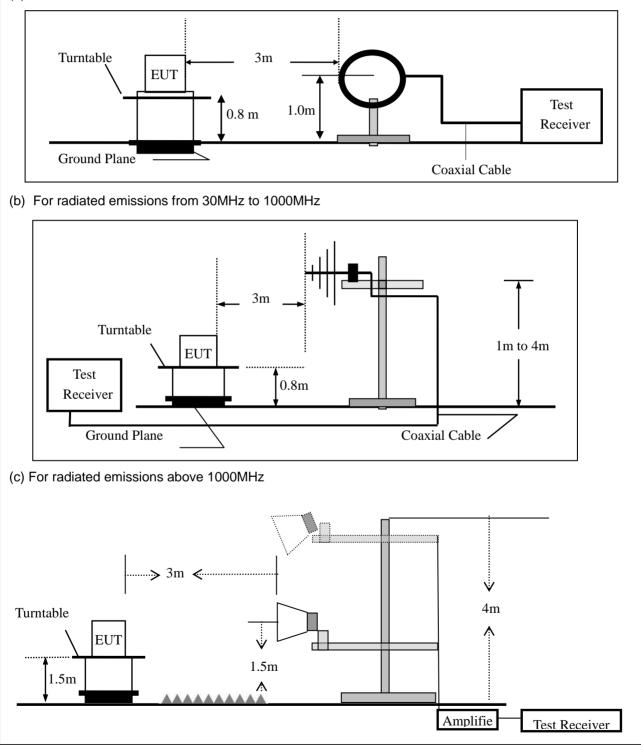


7.2.3 Measuring Instruments

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

7.2.4 Test Configuration

(a) For radiated emissions below 30MHz





7.2.5 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. For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- e. 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.
- f. 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.
- g. 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 t	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								
Above 1000	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.

7.2.6 Test Results

Spurious Emission	 Spurious Emission below 30MHz (9KHz to 30MHz) 								
EUT:	ScreenBeam OPS Wireless Display Module	Model No.:	SBWD3100						
Temperature:	20 ℃	Relative Humidity:	48%						
Test Mode:	Mode2/Mode3/Mode4	Test By:	Mary Hu						

Freq.	Ant.Pol.	Emission L	.evel(dBuV/m)	Limit 3	m(dBuV/m)	Over(dB)		
(MHz)	H/V	PK	AV	PK	AV	PK	AV	

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.



Spurious Emission below 1GHz (30MHz to 1GHz) All the modulation modes have been tested, and the worst result was report as below:

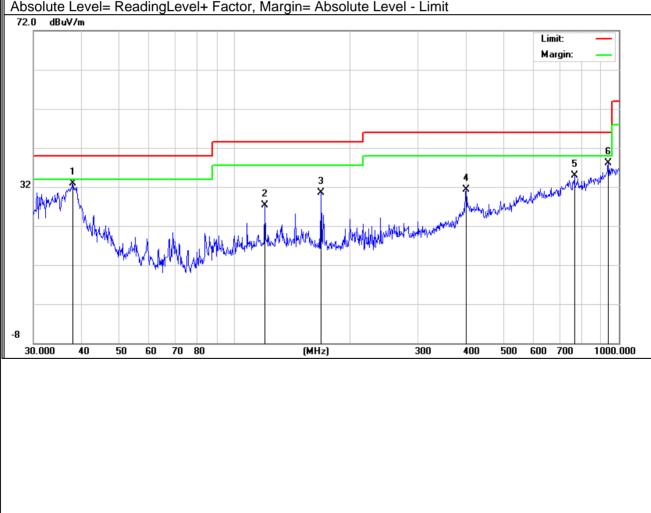
ΈΚΊ

	All the modulation modes have been tested, and the worst result was report as below.									
	ScreenBeam OPS Wireless Display Module	Model Name :	SBWD3100							
Temperature:	20 ℃	Relative Humidity:	48%							
Pressure:	1010hPa Test Mode: Mode 1									
Test Voltage :	DC 19V from Adapter AC 120V/60Hz									

Polar	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark	
Polar (H/V)	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)		
V	37.945	17.67	15.27	32.94	40.00	-7.06	QP	
V	119.8555	14.11	13.18	27.29	43.50	-16.21	QP	
V	167.8242	19.06	11.38	30.44	43.50	-13.06	QP	
V	400.4318	11.63	19.64	31.27	46.00	-14.73	QP	
V	766.0570	7.33	27.50	34.83	46.00	-11.17	QP	
V	938.8324	7.17	30.85	38.02	46.00	-7.98	QP	

Remark:

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





	F	Meter	Feeter	Emission	Limite	BA a marine	
Polar (H/V)	Frequency	Reading	Factor	Level	Limits	Margin	Remark
(117)	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Н	119.8556	21.27	13.18	34.45	43.50	-9.05	QP
Н	143.8295	19.33	13.18	32.51	43.50	-10.99	QP
H H	167.8243 239.9874	26.90 18.43	11.38 12.88	38.28 31.31	43.50 46.00	-5.22 -14.69	QP QP
H	400.4319	17.07	12.66	36.71	46.00	-14.09 -9.29	QP QP
H	948.7609	6.74	31.09	37.83	46.00	-8.17	QP
Remark:							
	Level= Reading	Level+ Facto	r, Margin= /	Absolute Level	- Limit		
72.0 dBu	JV/m						
						Limit: Margin:	
						Maryin.	
32				3 X	Junth Juntahan Mary Mary		<u> </u>
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52					1 Lington I	Allongeneral	
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	Nuclear States	MAN AND AND AND AND AND AND AND AND AND A					
-8							
-8 30.000	40 50 60	70 80	(Mł	 	300 400	500 600 700	1000.000
30.000	40 30 00	10 00	(m)	12)	300 400	300 000 100	1000.000



EUT:	us Emissic	Screen	Beam OPS	S		,			SBWD3100		
Temperatur	re:	20 ℃			Rela	tive Humidi	ity:	48%	%		
Test Mode:	:	Mode2	/Mode3/Mc	ode4	Test	By:		Ma	ry Hu		
Frequenc		Cable	Antenna	Prea		Emission	Limit	ts	Margin		
У	Level	loss	Factor	Fact		Level				Remark	Comment
(MHz)	(dBµV)	(dB)	dB/m	(dB	/				(dB)		
			<u> </u>			annel (2402	· · · ·		г г		 '
4803.054	60.29	5.21	35.59	44.3		56.79	74.0		-17.21	Pk	Vertical
4803.054	40.04	5.21	35.59	44.3		36.54	54.0		-17.46	AV	Vertical
7206.81	60.88	6.48	36.27	44.6	60	59.03	74.0	10	-14.97	Pk	Vertical
7206.81	41.45	6.48	36.27	44.6		39.60	54.0	10	-14.40	AV	Vertical
4803.886	61.26	5.21	35.55	44.3	30	57.72	74.00		-16.28	Pk	Horizontal
4803.886	41.16	5.21	35.55	44.3	30	37.62	54.0	0	-16.38	AV	Horizontal
7206.049	60.25	6.48	36.27	44.5	52	58.48	74.0	0	-15.52	Pk	Horizontal
7206.049	39.94	6.48	36.27	44.5	-	38.17	54.0		-15.83	AV	Horizontal
		;	2Mbps-GF	SK-Mid	I Cha	annel (2440	MHz)-	Abo	ve 1G		
4880.621	61.57	5.21	35.66	44.2	20	58.24	74.0)0	-15.76	Pk	Vertical
4880.621	40.50	5.21	35.66	44.2	20	37.17	54.0	0	-16.83	AV	Vertical
7320.497	60.28	7.10	36.50	44.4	43	59.45	74.0	0	-14.55	Pk	Vertical
7320.497	40.12	7.10	36.50	44.4	43	39.29	54.0	0	-14.71	AV	Vertical
4880.998	61.53	5.21	35.66	44.2	20	58.20	74.0	0	-15.80	Pk	Horizontal
4880.998	41.14	5.21	35.66	44.2	20	37.81	54.0	0	-16.19	AV	Horizontal
7320.09	59.52	7.10	36.50	44.4	43	58.69	74.0	0	-15.31	Pk	Horizontal
7320.09	42.42	7.10	36.50	44.4	43	41.59	54.0	0	-12.41	AV	Horizontal
		2	Mbps-GFS	K-High،	າ Cha	annel (2480	MHz)-	Abc	ove 1G		
4960.179	62.43	5.21	35.52	44.2	21	58.95	74.0	0	-15.05	Pk	Vertical
4960.179	41.45	5.21	35.52	44.2	21	37.97	54.0	0	-16.03	AV	Vertical
7440.239	60.53	7.10	36.53	44.6	60	59.56	74.0	0	-14.44	Pk	Vertical
7440.239	42.98	7.10	36.53	44.6	60	42.01	54.0	0	-11.99	AV	Vertical
4960.602	62.18	5.21	35.52	44.2		58.70	74.0	0	-15.30	Pk	Horizontal
4960.602	40.71	5.21	35.52	44.2	21	37.23	54.0	0	-16.77	AV	Horizontal
7440.255	60.98	7.10	36.53	44.6	60	60.01	74.0	00	-13.99	Pk	Horizontal
7440.255	42.21	7.10	36.53	44.6		41.24	54.0		-12.76	AV	Horizontal

Note:

(1) Emission Level= Antenna Factor + Cable Loss + Read Level - Preamp Factor (2)All other emissions more than 20dB below the limit.



Spurious Emission	Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz								
EUT: ScreenBeam OPS Wireless Display Model No.: SBWD3100 Module									
Temperature:	20 ℃	Relative Humidity:	48%						
Test Mode:	Mode2/ Mode4	Test By:	Mary Hu						

Frequenc y	Meter Reading	Cable Loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBµV)	(dB)	dB/m	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	
				2Mbps	-GFSK				
2310.00	59.47	2.97	27.80	43.80	46.44	74	-27.56	Pk	Horizontal
2310.00	42.35	2.97	27.80	43.80	29.32	54	-24.68	AV	Horizontal
2310.00	60.69	2.97	27.80	43.80	47.66	74	-26.34	Pk	Vertical
2310.00	42.08	2.97	27.80	43.80	29.05	54	-24.95	AV	Vertical
2390.00	59.79	3.14	27.21	43.80	46.34	74	-27.66	Pk	Vertical
2390.00	41.87	3.14	27.21	43.80	28.42	54	-25.58	AV	Vertical
2390.00	59.87	3.14	27.21	43.80	46.42	74	-27.58	Pk	Horizontal
2390.00	42.54	3.14	27.21	43.80	29.09	54	-24.91	AV	Horizontal
2483.50	61.19	3.58	27.70	44.00	48.47	74	-25.53	Pk	Vertical
2483.50	41.47	3.58	27.70	44.00	28.75	54	-25.25	AV	Vertical
2483.50	60.16	3.58	27.70	44.00	47.44	74	-26.56	Pk	Horizontal
2483.50	42.89	3.58	27.70	44.00	30.17	54	-23.83	AV	Horizontal

Note: (1) All other emissions more than 20dB below the limit.



UT: ScreenBeam OPS Wireless Display Module			Model N	Model No.:			SBWD3100				
Temperature:		20 °	С		Relative	e Humidity:	4	18%			
Test Mode:		Mod	le2/ Mod	e4	Test By	:	Ν	Mary ⊦	Hu		
					_					_	
Frequen y		adin evel	Cable Loss	Antenn a	Preamp Factor	Emission Level	Limi	its M	argin	Detect or	Commont
(MHz)	(dB	βµV)	(dB)	dB/m	(dB)	(dBµ V/m)	(dB) V/m		(dB)	Туре	Comment
3260	60	.31	4.04	29.57	44.70	49.22	74	-2	24.78	Pk	Vertical
3260	49	.64	4.04	29.57	44.70	38.55	54	-1	15.45	AV	Vertical
3260	60	.56	4.04	29.57	44.70	49.47	74	-2	24.53	Pk	Horizontal
3260	50	.66	4.04	29.57	44.70	39.57	54	-1	14.43	AV	Horizontal
3332	62	.31	4.26	29.87	44.40	52.04	74	-2	21.96	Pk	Vertical
3332	50	.43	4.26	29.87	44.40	40.16	54	-1	13.84	AV	Vertical
3332	60	.72	4.26	29.87	44.40	50.45	74	-2	23.55	Pk	Horizontal
3332	49	.59	4.26	29.87	44.40	39.32	54	-1	14.68	AV	Horizontal
17797	39	.85	10.99	43.95	43.50	51.29	74	-2	22.71	Pk	Vertical
17797	29	.61	10.99	43.95	43.50	41.05	54	-1	12.95	AV	Vertical
17788	41	.36	11.81	43.69	44.60	52.26	74	-2	21.74	Pk	Horizontal
17788	29	.96	11.81	43.69	44.60	40.86	54	-1	13.14	AV	Horizontal

Note: (1) All other emissions more than 20dB below the limit.



7.3 6DB BANDWIDTH

7.3.1 Applicable Standard

According to FCC Part 15.247(a)(2) and KDB 558074 D01 15.247 Meas Guidance v05r02 Section 8.2.

7.3.2 Conformance Limit

The minimum permissible 6dB bandwidth is 500 kHz.

7.3.3 Measuring Instruments

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

7.3.4 Test Setup

Please refer to Section 6.1 of this test report.

7.3.5 Test Procedure

The testing follows Subclause 11.8 of ANSI C63.10

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) \ge 3*RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.

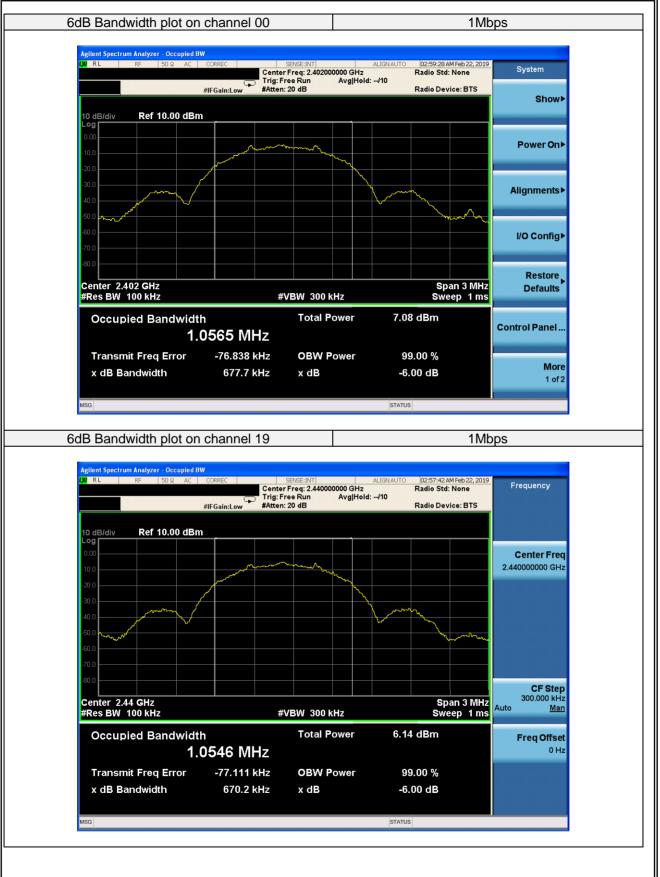
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.3.6 Test Results

	ScreenBeam OPS Wireless Display Module	Model No.:	SBWD3100
Temperature:	20 ℃	Relative Humidity:	48%
Test Mode:	Mode2/Mode3/Mode4	Test By:	Mary Hu

Channel	Frequency (MHz)	6dB bandwidth-1Mbps (kHz)	6dB bandwidth-2Mbps (kHz)	Limit (kHz)	Result
Low	2402	677.7	1386	≥500	Pass
Middle	2440	670.2	1404	≥500	Pass
Middle High	2480	687.2	1410	≥500	Pass















7.4 PEAK OUTPUT POWER

7.4.1 Applicable Standard

According to FCC Part 15.247(b)(3) and KDB 558074 D01 15.247 Meas Guidance v05r02 Section 8.3.1.

7.4.2 Conformance Limit

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 2400 - 2483.5 MHz bands shall not exceed: 1 Watt (30dBm). If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

7.4.3 Measuring Instruments

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

7.4.4 Test Setup

Please refer to Section 6.1 of this test report.

7.4.5 Test Procedure

The testing follows Subclause 11.9.1.1 of ANSI C63.10

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Set the RBW \geq DTS bandwidth.

Set VBW =3*RBW.

Set the span \geq 3*RBW

Set Sweep time = auto couple.

Set Detector = peak.

Set Trace mode = max hold.

Allow trace to fully stabilize.

Use peak marker function to determine the peak amplitude level.

7.4.6 Test Results

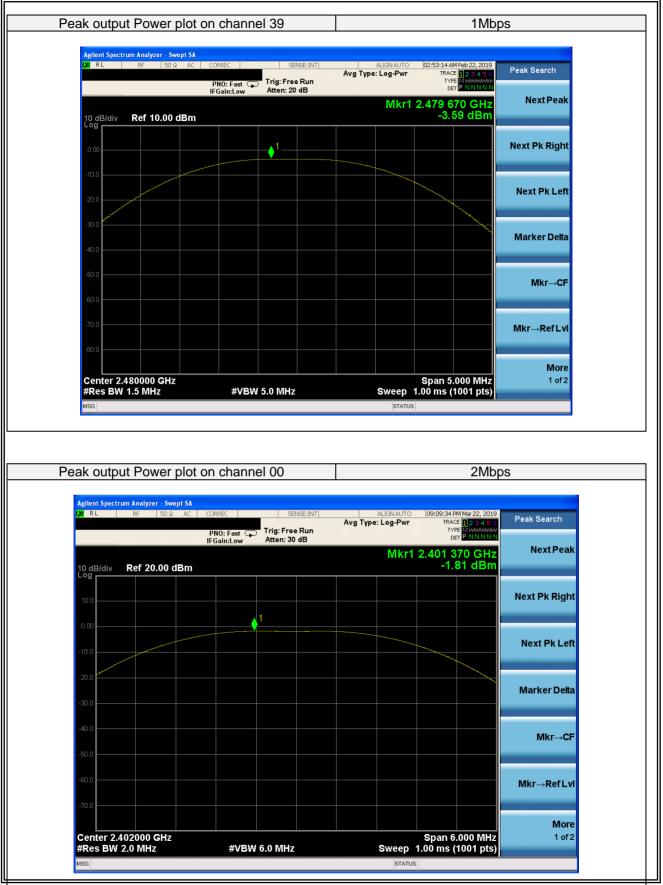
	ScreenBeam OPS Wireless Display Module	Model No.:	SBWD3100
Temperature:	20 ℃	Relative Humidity:	48%
Test Mode:	Mode2/Mode3/Mode4	Test By:	Mary Hu

Test	Frequency	Power	Peak Output Power	Peak Output Power	LIMIT	Verdict
Channel	(MHz)	Setting	(dBm)- 1Mbps	(dBm)- 2Mbps	(dBm)	Verdici
00	2402	Default	-1.98	-1.81	30	PASS
19	2440	Default	-2.71	-2.31	30	PASS
39	2480	Default	-3.59	-3.50	30	PASS



ak output Power plot	on channel 00	1	Mbps
Agilent Spectrum Analyzer - Swept SA	CORREC SENSE:INT PNO: Fast Free Run IFGain:Low Atten: 20 dB	ALIGNAUTO 02:50:45 AM Feb 22 Avg Type: Log-Pwr TRACE 12 3 TYPE MWW DET P NN Mkr1 2.401 665 C -1.98 dl	4 5 6 NNN HZ Next Peak
10 dB/div Ref 10.00 dBm	1		Next Pk Right
-20.0			Next Pk Left
-40.0			Marker Delta Mkr→CF
-60.0			Mkr→RefLvi
		Span 5.000 M	More AHz 1 of 2
Center 2.402000 GHz #Res BW 1.5 MHz	#VBW 5.0 MHz	Sweep 1.00 ms (1001	pts)
#Res BW 1.5 MHz		Sweep 1.00 ms (1001	nts) Mbps
#Res BW 1.5 MHz	on channel 19	Sweep 1.00 ms (1001 STATUS 1 ALIGNAUTO 02:51:35 AM Feb 22 Avg Type: Log-Pwr TRACE 123 TYPE Window DET P NN DET P NN Mkr1 2.439 675 C	2019 Peak Search Next Peak
#Res BW 1.5 MHz MSG ak output Power plot of Agilent Spectrum Analyzer - Swept SA		Sweep 1.00 ms (1001 STATUS 1 ALIGNAUTO 02:51:35 AM Feb 22 Avg Type: Log-Pwr TRACE TPACE 1	2019 Peak Search Next Peak
#Res BW 1.5 MHz MSG ak output Power plot of Agilent Spectrum Analyzer - Swept SA Agilent Spectrum Analyzer - Swept SA Agilent Spectrum Analyzer - Swept SA OV RL RE 50 Q AC	ON CHANNEL 19	Sweep 1.00 ms (1001 STATUS 1 ALIGNAUTO 02:51:35 AM Feb 22 Avg Type: Log-Pwr TRACE 123 TYPE Window DET P NN DET P NN Mkr1 2.439 675 C	2019 Peak Search Next Peak Bm
#Res BW 1.5 MHz MSG ak output Power plot o Agilent Spectrum Analyzer - Swept SA Agile	ON CHANNEL 19	Sweep 1.00 ms (1001 STATUS 1 ALIGNAUTO 02:51:35 AM Feb 22 Avg Type: Log-Pwr TRACE 123 TYPE Window DET P NN DET P NN Mkr1 2.439 675 C	2019 455 455 455 455 455 455 455 45
#Res BW 1.5 MHz MSG ak output Power plot of Agilent Spectrum Analyzer - Swept SA M RL RF SOR AC OM RL RF SOR AC OM Ref 10.00 dBm OM	ON CHANNEL 19	Sweep 1.00 ms (1001 STATUS 1 ALIGNAUTO 02:51:35 AM Feb 22 Avg Type: Log-Pwr TRACE 123 TYPE Window DET P NN DET P NN Mkr1 2.439 675 C	2019 Peak Search Next Peak Next Pk Right Next Pk Left
#Res BW 1.5 MHz MSG ak output Power plot of Agilent Spectrum Analyzer - Swept SA V RL 10 dB/div Ref 10.00 dBm 0.00	ON CHANNEL 19	Sweep 1.00 ms (1001 STATUS 1 ALIGNAUTO 02:51:35 AM Feb 22 Avg Type: Log-Pwr TRACE 123 TYPE Window DET P NN DET P NN Mkr1 2.439 675 C	Def S) Peak Search Peak Search Peak Search Next Peak Next Pk Right Next Pk Left Marker Defta Mkr→CF Mkr→Ref Lvi More 1 of 2







eak output Power plot	t on channel 19	2Mb	ps
Agilent Spectrum Analyzer - Swept SA XI RL RF 50Ω AC	CORREC SENSE:INT PNO: Fast Trig: Free Run IFGain:Low Atten: 30 dB	ALIGNAUTO 09:10:43 PM Mar 22, 2010 Avg Type: Log-Pwr TRACE 1 2 3:4 5 TYPE MUNICIPAL DET P NNINN	Peak Search
10 dB/div Ref 20.00 dBm		Mkr1 2.439 352 GHz -2.31 dBm	Next Peak
10.0	.1		Next Pk Right
.10.0			Next Pk Left
30.0			Marker Delta
40.0			Mkr→CF
60.0			Mkr→RefLvl
70.0 Center 2.440000 GHz #Res BW 2.0 MHz	#VBW 6.0 MHz	Span 6.000 MHz Sweep 1.00 ms (1001 pts)	More 1 of 2
G		STATUS	
ak output Power plo	t on channel 39	2Mb	ps
gilent Spectrum Analyzer - Swept SA		2Mb	·
Agilent Spectrum Analyzer - Swept SA		ALIGNAUTO 09:11:20 PM Mar 22, 2019 Avg Type: Log-Pwr TRACE 12 3 4 5 G TYPE MANAGE DET PNNNN Mkr1 2.479 346 GHz	Peak Search
<mark>Agilent Spectrum Analyzer - Swept SA</mark> XI RL RF 50 Ω AC	CORREC SENSE:INT	2Mb	Peak Search
Agilent Spectrum Analyzer - Swept SA R RL RF 50 Ω AC 10 dB/div Ref 20.00 dBm 10.0	CORREC SENSE:INT	ALIGNAUTO 09:11:20 PM Mar 22, 2019 Avg Type: Log-Pwr TRACE 12 3 4 5 G TYPE MANAGE DET PNNNN Mkr1 2.479 346 GHz	Peak Search
<mark>Agilent Spectrum Analyzer - Swept SA</mark> XI RL RF SOΩ AC	CORREC SENSE:INT	ALIGNAUTO 09:11:20 PM Mar 22, 2019 Avg Type: Log-Pwr TRACE 12 3 4 5 G TYPE MANAGE DET PNNNN Mkr1 2.479 346 GHz	Peak Search Next Peak
Agilent Spectrum Analyzer - Swept SA [X] RL RF 50 Ω AC 10 dB/div Ref 20.00 dBm 10 0 000	CORREC SENSE:INT	ALIGNAUTO 09:11:20 PM Mar 22, 2019 Avg Type: Log-Pwr TRACE 12 3 4 5 G TYPE MANAGE DET PNNNN Mkr1 2.479 346 GHz	Peak Search Next Peak Next Pk Right
X RL RF 50 Q AC 10 dB/div Ref 20.00 dBm 10.0	CORREC SENSE:INT	ALIGNAUTO 09:11:20 PM Mar 22, 2019 Avg Type: Log-Pwr TRACE 12 3 4 5 G TYPE MANAGE DET PNNNN Mkr1 2.479 346 GHz	Peak Search Next Peak Next Pk Right Next Pk Left
Agilent Spectrum Analyzer - Swept SA Q RL RF 50 Ω AC 10 dB/div Ref 20.00 dBm 10.0	CORREC SENSE:INT	ALIGNAUTO 09:11:20 PM Mar 22, 2019 Avg Type: Log-Pwr TRACE 12 3 4 5 G TYPE MANAGE DET PNNNN Mkr1 2.479 346 GHz	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta



7.5 POWER SPECTRAL DENSITY

7.5.1 Applicable Standard

According to FCC Part 15.247(e) and KDB 558074 D01 15.247 Meas Guidance v05r02 Section 8.4.

7.5.2 Conformance Limit

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

7.5.3 Measuring Instruments

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

7.5.4 Test Setup

Please refer to Section 6.1 of this test report.

7.5.5 Test Procedure

The testing follows Measurement Procedure Subclause 11.10.2 of ANSI C63.10 This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

a) Set analyzer center frequency to DTS channel center frequency.

- b) Set the span to 1.5*DTS bandwidth.
- c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW \geq 3 RBW.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

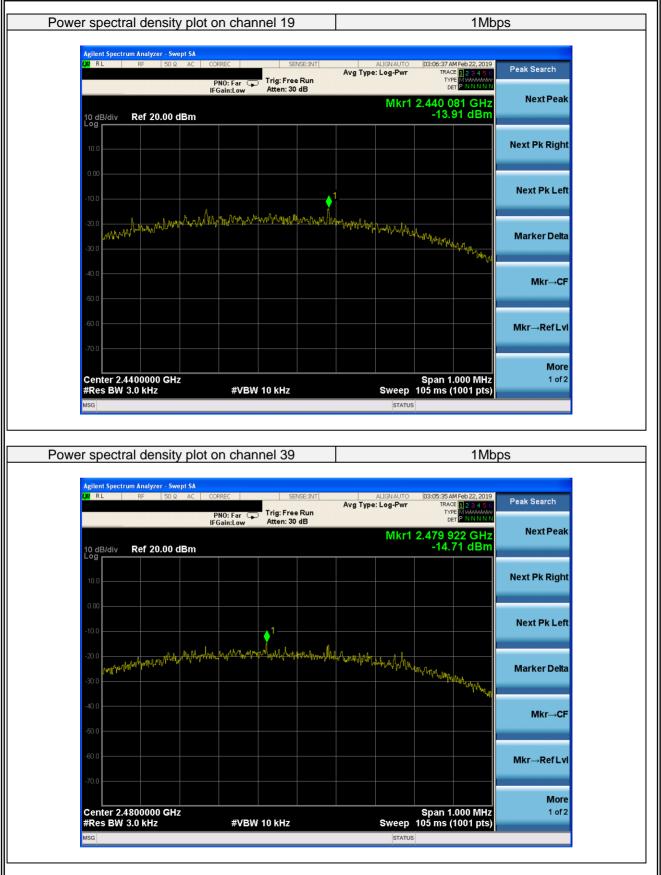


7.5.6 Test Results

UT:				Model No.:		SBWD3100	
Temperature:	20 ℃		Relative Hur	midity:	48%		
Test Mode:	Mode2/Mode	e3/Mode4	Test By:		Mary Hu		
				_			
Test Channel	Frequency (MHz)		r Density n/3KHz)	(d	Limit Bm/3KHz)	Verdic	
		(UDII	1Mbps	[(u	DIT/SKLIZ)		
00	2402	-1	3.96		8	PASS	
19	2440		3.91		8	PASS	
39	2480	-1	4.71		8	PASS	
Test Channel	Frequency (MHz)		r Density n/3KHz)	(d	Limit Bm/3KHz)	Verdic	
			2Mbps				
00	2402		7.00		8	PASS	
19 39	2440 2480		9.08 9.44		8	PASS PASS	
Agilent Spi	ctral density plot of	n channel C			1Mbp		
Agilent Sp (x) RL	ectrum Analyzer - Swept SA RF 50 Ω AC COR IFG	REC	SENSE:INT	alignauto 'ype: Log-Pwr Wikr1	03:06:07 AM Feb 22, 2019 TRACE 12 3 4 5 6 TYPE M WWWWW DET P NNNNN 2.402 082 GHz	DS Peak Search Next Peak	
Agilent Sp	ectrum Analyzer - Swept SA RF 50 Ω AC COR IFG	REC Trig: F	SENSE:INT Avg T	'ype: Log-Pwr	03:06:07 AM Feb 22, 2019 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P NNNNN	Peak Search	
Agilent Sp (x) RL 10 dB/di 10.0 -10.0	ectrum Analyzer - Swept SA RF 50 Ω AC COR IFG V Ref 20.00 dBm	REC Trig: F ain:Low Atten	SENSE:INT Avg T Free Run : 30 dB	ype: Log-Pwr Mkr1	03:06:07 AM Feb 22, 2019 TRACE 12 3 4 5 TYPE MYWWW DET PNNNNN 2.402 082 GHz -13.96 dBm	Peak Search Next Peak	
Agilent Sp (x) RL 10 dB/di 10.0 -10.0	ectrum Analyzer - Swept SA RF 50 Ω AC COR IFG V Ref 20.00 dBm	REC Trig: F ain:Low Atten	SENSE:INT Avg T	ype: Log-Pwr Mkr1	03:06:07 AM Feb 22, 2019 TRACE 12 3 4 5 TYPE MYWWW DET PNNNNN 2.402 082 GHz -13.96 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta	
Agilent Sp (x) RL 10 dB/di 10.0 -10.0 -20.0 -30.0	ectrum Analyzer - Swept SA RF 50 Ω AC COR IFG V Ref 20.00 dBm	REC Trig: F ain:Low Atten	SENSE:INT Avg T Free Run : 30 dB	ype: Log-Pwr Mkr1	03:06:07 AM Feb 22, 2019 TRACE 12 3 4 5 TYPE MUSANWAY DET PNNNNN 2.402 082 GHz -13.96 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF	
Apilent Spr (x) R L 10.0 -10.0 -10.0 -20.0 -40.0 -40.0 -50.0 -60.0	ectrum Analyzer - Swept SA RF 50 2 AC COR IFG V Ref 20.00 dBm	REC Trig: F ain:Low Atten	SENSE:INT Avg T Free Run : 30 dB	ype: Log-Pwr Mkr1	03:06:07 AM Feb 22, 2019 TRACE 12:34 5 6 TYPE MUNUMU DET PNNNNN 2.402:082 GHz -13.96 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr->CF Mkr->Ref Lvl More	
Agilent Sp (x) RL 10.0 10.0 -10.0 -20.0 -20.0 -40.0 -50.0 -50.0 -60.0 -70.0 -70.0	ectrum Analyzer - Swept SA RF 50 Ω AC COR IFG V Ref 20.00 dBm	REC Trig: F ain:Low Atten	SENSE:INT Avg T ree Run : 30 dB	ype: Log-Pwr Mkr1	03:06:07 AM Feb 22, 2019 TRACE 12 3 4 5 TYPE MUSANWAY DET PNNNNN 2.402 082 GHz -13.96 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF Mkr→Ref Lvl	



Report No.:S19052104007001





ver spectral density pl	ot on channel 00		2Mbps
Agilent Spectrum Analyzer - Swept SA (X RL RF 50 Q AC	PNO: Far 😱 Trig: Free Run	ALIGNAUTO 10:23:37 PI Avg Type: Log-Pwr TRACI TYP	Mar22, 2019 12 3 4 5 6 March P NNN N N
10 dB/div Ref 10.00 dBm	IFGain:Low Atten: 20 dB	Mkr1 2.401 9	
0.00			Next Pk Right
-10.0	1		Next Pk Left
-20.0 -30.0	ydy Lymanadichelwydai Kophlhalinesma	and which have been and all good and and an and a	
-40.0			^{۱۳ Kijna / Nutrer Delta}
-50.0			Mkr→CF
-70.0			Mkr→RefLvl
-80.0			More
Center 2.402000 GHz #Res BW 3.0 kHz	#VBW 10 kHz	Span 2. Sweep 211 ms (* status	000 MHz 1 of 2 1001 pts)
er spectral density pl	ot on channel 19		2Mbps
er spectral density pl Agilent Spectrum Analyzer - Swept SA CM RL RF 50 Q AC	CORREC SENSE:INT	ALIGNAUTO 10:24:38 P Avg Type: Log-Pwr TRAC	1 Mar 22, 2019
Agilent Spectrum Analyzer - Swept SA (χμ RL RF 50 Ω AC		Avg Type: Log-Pwr TRACL TYP DE Mkr1 2.439 9	Mar 22, 2019 10 29 4 5 6 10 20 4 5 6 10 2
Agilent Spectrum Analyzer - Swept SA W RL RF 50Ω AC 10 dB/div Ref 10.00 dBm	CORREC SENSE:INT PNO: Far	Avg Type: Log-Pwr TRACL TYP DE Mkr1 2.439 9	1Mar 22, 2019 12 3 4 5 6 Wather Search
Agilent Spectrum Analyzer - Swept SA Va RL RF 50 Ω AC 10 dB/div Ref 10.00 dBm	CORREC SENSE:INT PNO: Far	Avg Type: Log-Pwr TRACL TYP DE Mkr1 2.439 9	AMar 22, 2019 12 3 4 5 6 P NNN NN 26 GHZ 18 dBm Next Pk Right
Agilent Spectrum Analyzer - Swept SA M RL RF 50 Ω AC 10 dB/div Ref 10.00 dBm 0.00	CORREC SENSE:INT PNO: Far IFGain:Low Atten: 20 dB	Avg Type: Log-Pwr TRAC TYP DE Mkr1 2.439 9 -19.0	AMar 22, 2019 D 2 3 4 5 6 PNNNNN 26 GHz 08 dBm Next Pk Right Next Pk L off
Agilent Spectrum Analyzer - Swept SA 01 RL RF 50 Ω AC 10 dB/div Ref 10.00 dBm AC -0.00	CORREC SENSE:INT PNO: Far IFGain:Low Atten: 20 dB	Avg Type: Log-Pwr TRAC TYP DE Mkr1 2.439 9 -19.0	AMar 22, 2019 D 2 3 4 5 6 PNNNNN 26 GHz 08 dBm Next Pk Right Next Pk L off
M RL RF S0 Ω AC 10 dB/div Ref 10.00 dBm 0.00	CORREC SENSE:INT PNO: Far IFGain:Low Atten: 20 dB	Avg Type: Log-Pwr TRAC TYP DE Mkr1 2.439 9 -19.0	AMar 22, 2019 D 2 3 4 5 6 PNNNNN 26 GHz 08 dBm Next Pk Right Next Pk L off
Agilent Spectrum Analyzer - Swept SA Dd RL RF 50 Ω AC 10 dB/div Ref 10.00 dBm -00 - - - -10.0 - - - - -10.0 - - - - -10.0 - - - - -10.0 - - - - -10.0 - - - - -10.0 - - - - -10.0 - - - - -10.0 - - - - -10.0 - - - - -10.0 - - - - -10.0 - - - - -10.0 - - - - -10.0 - - - - -10.0 - - - - -10.0	CORREC SENSE:INT PNO: Far IFGain:Low Atten: 20 dB	Avg Type: Log-Pwr TRAC TYP DE Mkr1 2.439 9 -19.0	Mar 22, 2019 D 23 4 5 6 P NNNNN 26 GHZ 8 dBm Next Pk Right Next Pk Left Marker Delta
Agilent Spectrum Analyzer - Swept SA XQ RL RF S0 Ω AC 10 dB/div Ref 10.00 dBm 0.00	CORREC SENSE:INT PNO: Far IFGain:Low Atten: 20 dB	Avg Type: Log-Pwr TRAC TYP DE Mkr1 2.439 9 -19.0	Mar 22, 2019 Peak Search Next Peak 8 dBm Next Pk Right Next Pk Left Marker Delta Mkr→CF



<mark>Agilent Spectrum Analyzer - Swept S</mark> I <mark>XI</mark> RL RF 50Ω A	C CORREC SENSE:INT	ALIGN AUTO 10:26:29 PM Mar 22, Avg Type: Log-Pwr TRACE	2019 Peak Search
	PNO: Far 🍙 Trig: Free Run IFGain:Low Atten: 20 dB	Avg Type: Log-Pwr TRACE 2 3 4 TYPE MWWW DET P NIN	
10 dB/div Ref 10.00 dBr	n	Mkr1 2.479 920 G -19.44 dE	Hz NextPeak Sm
			Next Pk Right
0.00			, in the second s
-10.0	1		Next Pk Left
-20.0	and any man man hand man	upper and a second	Next PR Leit
-30.0 Hond Walk and a walk a		and the second of the second o	Marker Date
-40.0			Marker Delta
-50.0			
-60.0			Mkr→CF
-70.0			Mkr→RefLvl
-80.0			
Center 2.480000 GHz		Span 2.000 M	More Hz 1 of 2
#Res BW 3.0 kHz	#VBW 10 kHz	Sweep 211 ms (1001 p	ots)
MSG		STATUS	



7.6 CONDUCTED BAND EDGE MEASUREMENT

7.6.1 Applicable Standard

According to FCC Part 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 Section 8.7.

7.6.2 Conformance Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

7.6.3 Measuring Instruments

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

7.6.4 Test Setup

Please refer to Section 6.1 of this test report.

7.6.5 Test Procedure

The testing follows FCC KDB 558074 D01 15.247 Meas Guidance v05r02 Section 8.7.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.

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.

Repeat above procedures until all measured frequencies were complete.

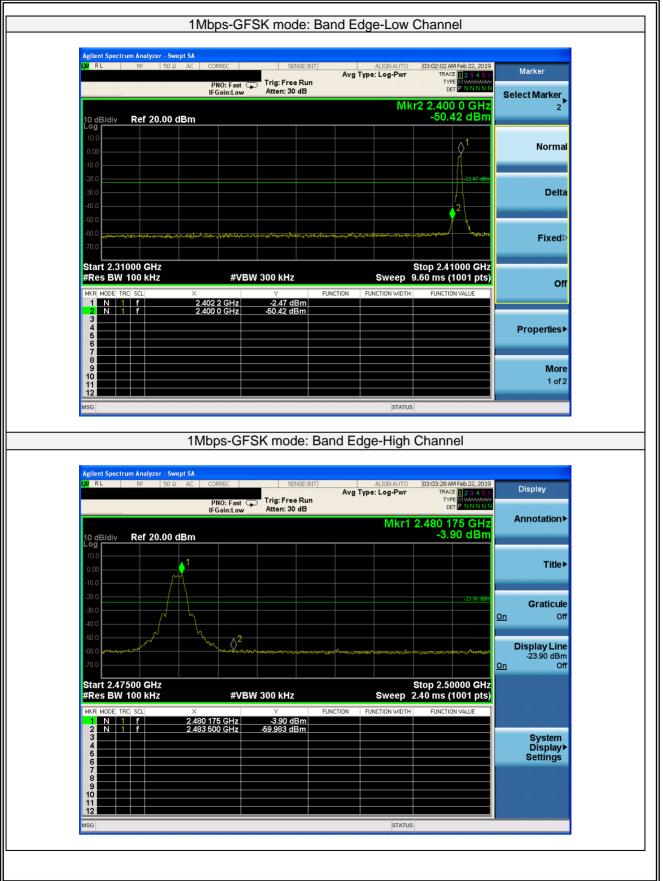
7.6.6 Test Results

	ScreenBeam OPS Wireless Display Module	Model No.:	SBWD3100
Temperature:	20 ℃	Relative Humidity:	48%
Test Mode:	Mode2/Mode4	Test By:	Mary Hu

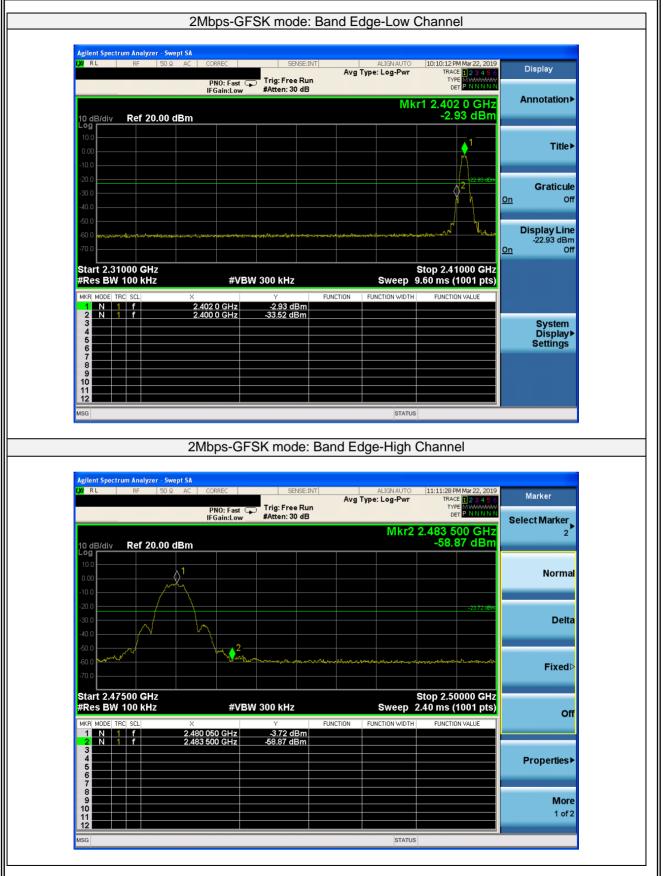
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7.7 SPURIOUS RF CONDUCTED EMISSIONS

7.7.1 Conformance Limit

1. Below -20dB 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.

7.7.2 Measuring Instruments

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

7.7.3 Test Setup

Please refer to Section 6.1 of this test report.

7.7.4 Test Procedure

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to 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=100kHz and VBW= 300KHz to measure the peak field strength , and measure frequeny range from 9KHz to 26.5GHz.

7.7.5 Test Results

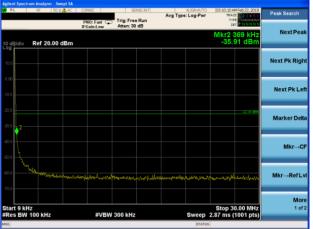
Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.



Test Plot-1Mbps



GFSK on channel 00



GFSK on channel 00

RL	RF	50 🔉	AC C	ORREC	SE	NSE:INT	Aug Tur	e: Log-Pwr	03:10:26 AM F TRACE		Peak Search
				PNO: Fast 🕞 FGain:Low	Trig: Fre	dB	A18 199	e. Log-r wi	TYPE	NNNNN	
0 dB/div	Ref 2	0.00 di	Зm					Mk	r2 300.6 -56.24	3 MHz dBm	NextPea
10.0											Next Pk Rig
10.00											Next Pk Le
30.0										-777-35 dBm	Marker De
40.0											Mkr→0
60.0	فلنبغ والمرا	K. V. WAR	ورحملول	2	ولارا وارساران	معالمه	de to Altour	hente hieron	والمؤلمة	under and a	Mkr→RefL
70.0	Allen of the										Мо
tart 30. Res BW		z		#VBV	V 300 kHz			Sweep 9	Stop 1.00 2.7 ms (10	00 GHz 001 pts)	1 0
ASG								STATUS			



Test Plot-1Mbps

ACCREDITED

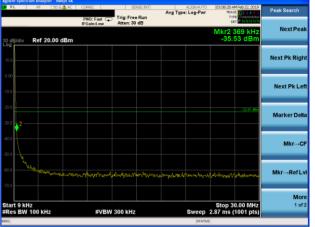
Certificate #4298.01

ilac-ME



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GFSK on channel 19



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 Peak Search

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 Aplent Spectrum Analyzer - Swept 54
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Test Plot-1Mbps



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GFSK on channel 39

RL	RF	50 £	AC COR	REC	SE	NSE:INT		ALIGNAUTO		M Feb 22, 2019	Peak Search
			PN	0:Fast G	Trig: Fre	Run	Avg Type	e: Log-Pwr	TRA	CE 1 2 3 4 5 6 PE MWWWWW ET P N N N N N	Feak Search
			IFG	ain:Low	Atten: 30	dB		M		33 MHz	NextPea
10 dB/div	Ref 2	0.00 dE	3m					IVII	-56.	22 dBm	
og											
10.0											Next Pk Rig
0.00											
-10.0											Next Pk Le
20.0											
-20.0										-23.81 dBn	Marker Del
-30.0											
-40.0											
											Mkr→C
-50.0										1	
-81.0			Y								
of-mark)	epperares.	AN AVAILAT	Projeznaji (dar	his planty	Alersfor Ball Child	pinet trains	reel modern the	وهاور روموسها ورا	and the second	hin a galadian and the	Mkr→RefL
-70.0											
											Mo
Start 30. #Res BW		lz		#VBV	V 300 kHz			Sweep	Stop 1. 92.7 ms	0000 GHz (1001 pts)	1 of
ASG								STATUS	_		







Span 4.000 MHz Sweep 1.00 ms (1001 pts)

Test Plot-2Mbps

System Display Settings



GFSK on channel 00

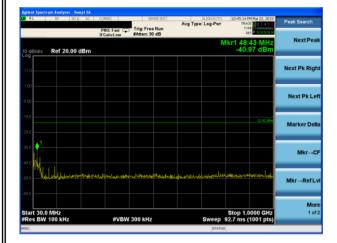
Ref 21.00 dBm

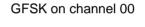
enter 2.402000 GHz Res BW 100 kHz



GFSK on channel 00

#VBW 300 kHz









Test Plot-2Mbps





GFSK on channel 19

X RL RF 50 Ω		SENSE:INT Arig: Free Run Atten: 30 dB	ALIGNAUTO	10:41:58 PM Mar 22, 2019 TRACE 2 2 4 5 6 TVPE DET P N N N N	Peak Search
10 dB/div Ref 20.00 dE	ii Guilleon	Atten: 30 dB	N	1kr1 48.43 MHz -41.61 dBm	Next Pea
10.0					Next Pk Righ
-10.0					Next Pk Le
30.0				-22.70 dBm	Marker Del
40.0 +1					Mkr→C
60.0	nkartust itt kanniken järt inge hetteralle		ann an	elinessityseryselsess _{eles}	Mkr→RefL
Start 30.0 MHz #Res BW 100 kHz	#VBW 30	0 kHz	Sweep	Stop 1.0000 GHz 92.7 ms (1001 pts)	Mor 1 of





Test Plot-2Mbps





GFSK on channel 39

RL RF 50 Q AC		SENSE:INT Avg Free Run	ALIGNAUTO Type: Log-Pwr	10:47:55 PM Mar 22, 2019 TRACE 2 3 4 5 6 TYPE	Peak Search
10 dB/div Ref 20.00 dBm	IFGain:Low #Atte	en:30 dB	м	kr1 48.43 MHz -42.85 dBm	NextPea
10.0					Next Pk Rig
10.0					Next Pk Le
30.0				-24.50 dBn	Marker Del
					Mkr→C
	aton haigiyo ay ya wiliyo a ay a	eripele-al-growing-energy-active	etherskammed to the	และสุประวญญามีสารแรงสุมปลาญ	Mkr→RefL
Start 30.0 MHz Res BW 100 kHz	#VBW 3001	kHz	Sweep 9	Stop 1.0000 GHz 2.7 ms (1001 pts)	Mor 1 of





7.8 ANTENNA APPLICATION

7.8.1 Antenna 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.

7.8.2 Result

The EUT antenna is permanent attached PCB antenna (Gain:-2.38dBi). It comply with the standard requirement.

END OF REPORT