TEST REPORT

Applicant	:	Shanghai Goodview Electronics Technology Co., Ltd.
Address of Applicant	:	Room 866, NO.888, West Huanhu 2 Road, NanhuiXincheng Town, Pudong, Shanghia, China
Product Name	:	LCD DIGITAL DISPLAY
Model No.	:	PF*****
Sample No.	:	E19120045-01#02
FCC ID	:	2AVB8PFHL
Standards	:	FCC CFR47 Part 15, Subpart C
Date of Receipt	:	2020-1-06
Date of Test	:	2020-1-06 ~ 2020-4-23
Date of Issue	:	2020-4-23

Remark:
This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Prepared by: Jennifer Zhou (Jennifer Zhou) Reviewed by: jesse (Jesse) Approved by: Guoyou Chi (Authorized signatory: Guoyou Chi)

TEST REPORT

Revision Record			
Version	**Date**	**Revisions**	**Revised By**
1.0	2019-12-10	Original	shi
2.0	2020-4-10	Update form	jesse

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1 General Information

1.1 Testing Laboratory

Company Name	ICAS Testing Technology Services (Shanghai) Co., Ltd.
Address	155 Pingbei Rd, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Details of Application

Company Name	Shanghai Goodview Electronics Technology Co., Ltd.
Address	Room 866, NO.888, West Huanhu 2 Road, NanhuiXincheng Town, Pudong, Shanghia, China
Contact Person	Hongyue Xu
Telephone	15618060409
Email	xuhongyue@goodview.com

1.3 Details of EUT

Product Name	LCD DIGITAL DISPLAY
Brand Name	GOODVIEW
Model No.	PF*****, (*=A to Z, 0 to 9,blank,just difference in appearance color,sales area customer code)
Mode of Operation	Bluetooth BR/EDR
Frequency Range	2400MHz ~ 2483.5MHz
Number of Channels	79 (at intervals of 1 MHz)
Modulation Type	GFSK, π/4-DQPSK, 8-DPSK
Antenna Type	internal Antenna
Antenna Gain	4 dBi
Extreme Temperature Range	10℃~ +40℃
Test Voltage	AC 100~240V

1.4 Test Methodology

47 CFR Part 15, Subpart C (10-1-16 Edition)	Miscellaneous Wireless Communications Services
KDB Publication 558074 D01 v05r02	15.247 Meas Guidance.
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Note(s):

All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

2 Test Condition

2.1 Environmental conditions

Temperature (°C)	18-25
Humidity (%RH)	40-65
Barometric Pressure (mbar)	960-1060

2.2 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Due Date
Spectrum Analyzer	Keysight	N9020B	MY59260184	2020-07-28
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2020-06-24
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2020-06-19
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2020-06-19
V-network	SCHWARZBECK	NSLK 8127	8127-902	2021-02-20
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	100687	2020-08-22
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2020-06-06
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2020-06-06
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2021-03-19
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2020-07-26
EMC chamber 9*6*6（L*W*H)	CHANGNING	966	N/A	2020-06-26
Shielded Enclosure 8*5*4（L*W*H)	CHANGNING	854	N/A	2020-08-28
Test Software	BL	BL410_E	N/A	N/A

2.3 Measurement Uncertainty

Parameter	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	30 MHz – 1 GHz	± 3 dB
	> 1GHz	± 3 dB

3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software was control EUT work in continuous transmitter and receiver mode. Select test channel as below:

Channel	Frequency
The lowest channel(CH0)	2402MHz
The middle channel(CH39)	2441MHz
The Highest channel(CH78)	2480MHz

The basic operation modes are:

A. On
   1. BR/EDR mode
      a. Transmitting
         i. Low Channel
         ii. Middle Channel
         iii. High Channel
         iv. Hopping mode
      b. Receiving
   2. Normal working with Bluetooth on
B. Standby
C. Off

3.2 Special Accessories and Auxiliary Equipment

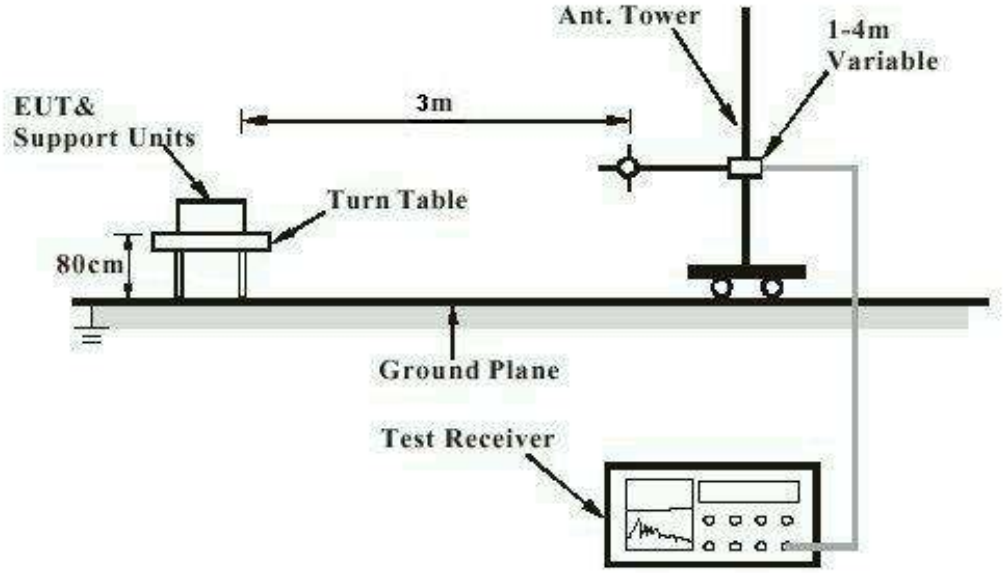
Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	TP00083A	N/A

3.3 Support Software

Description	Manufacturer	Software Name
Software	/	RF Test Tool

3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Conduction Measurement

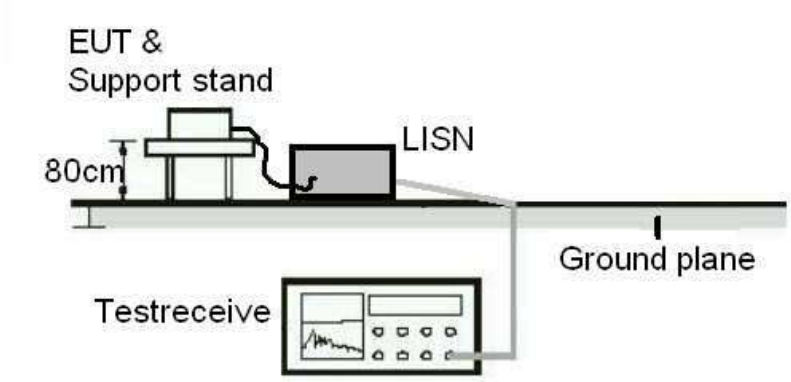
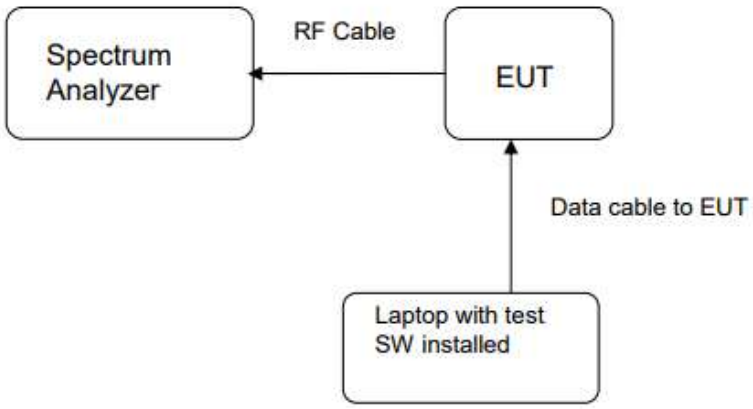


Diagram of Measurement Equipment Configuration for Transmitter Measurement



4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT: **PASS**

Test standard	:	FCC Part 15.247(b)(4), Part 15.203
Requirement	:	The use of approved antennas only with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 4 dBi. The antenna is an internal antenna with no possibility of replacement with a non-approvrd antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

4.1.2 Maximum Conducted Output Power

RESULT: **PASS**

Test standard : FCC Part 15.247(b)(1)
Requirement : ANSI C63.10-2013
Kind of test site : Shielded room

Test setup
Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Table 1: Maximum Conducted Output Power

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(mW)	
GFSK	2402	4.54	2.84	< 1
	2441	3.97	2.49	
	2480	3.69	2.34	
π/4-DQPSK	2402	1.21	1.32	< 0.125
	2441	1.08	1.28	
	2480	0.15	1.04	
8-DPSK	2402	1.15	1.30	< 0.125
	2441	1.00	1.26	
	2480	-0.10	0.98	

Note :
1.Test plots please refer to the annex document “Annex A. Peak Output Power of SHE19120045-01BE”

4.1.3 20dB Bandwidth and 99% Bandwidth

RESULT: **PASS**

Test standard : FCC Part 15.247(a)(1)
Requirement : ANSI C63.10-2013
Kind of test site : Shielded room

Test setup
Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Table 2: 20dB Bandwidth and 99% Bandwidth

Test Mode	Test Channel (MHz)	99% Bandwidth (MHz)	20dB Bandwidth (MHz)
GFSK	2402	0.57	0.77
	2441	0.57	0.76
	2480	0.57	0.76
8-DPSK	2402	1.02	1.04
	2441	1.02	1.04
	2480	1.04	1.02

Note :
1.Test plots please refer to the annex document “Annex A. 20db and 99% bandwidth of SHE19120045-01BE”

4.1.4 Conducted Spurious Emission & Authorized-band band-edge

RESULT: **PASS**

Test standard	:	FCC Part 15.247(d)
Requirement	:	ANSI C63.10-2013
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/Middle/High for spurious, Low/High for Band Edge
Operation Mode	:	A.1.a
Ambient temperature	:	25°C
Relative humidity	:	52%

For details refer to following test plot.

Note :
1.Test plots please refer to the annex document “Annex A. Conducted Spurious Emissions of SHE19120045-01BE”
2.Test plots please refer to the annex document “Annex A. Conducted Spurious Emissions(hopping) of SHE19120045-01BE”
3.Test plots please refer to the annex document “Annex A. Bandedge(H)--CSE of SHE19120045-01BE”
4.Test plots please refer to the annex document “Annex A. Bandedge(L)--CSE of SHE19120045-01BE”
5.Test plots please refer to the annex document “Annex A. Bandedge(hopping)--CSE of SHE19120045-01BE”

4.1.5 Spurious Emission

RESULT: **PASS**

Test standard	:	FCC Part 15.247(d), 15.205, 15.209 RSS-247 5.5
Requirement	:	ANSI C63.10-2013
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/Middle/High
Operation Mode	:	A
Ambient temperature	:	25°C
Relative humidity	:	52%

Notes:
1. Test plots please refer to the annex document “Annex A RADIATED SPURIOUS EMISSION DATA of SHE19120045-01BE”. total 52 page
2. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
3. The spurious above 18GHz is noise only and 20dB below the limit. The value has no need to be reported.
4. The EUT is working in the Normal link mode below 1 GHz.

4.1.6 Band Edge (Restricted-band band-edge)

RESULT: **PASS**

Test standard	:	FCC Part 15.247(d), 15.205, 15.209 RSS-247 5.5
Requirement	:	ANSI C63.10-2013
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/Middle/High
Operation Mode	:	A.1
Ambient temperature	:	25°C
Relative humidity	:	52%

Note:
1. Test plots please refer to the annex document “Annex A WIFI TX RADIATED SPURIOUS EMISSION DATA of SHE19120045-01BE”. total 52 page

4.1.7 Hopping Frequency Separation

RESULT: **PASS**

Test standard	:	FCC Part 15.247(a)(1) RSS-247 5.1(2)
Requirement	:	ANSI C63.10-2013
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Hopping
Operation Mode	:	A.1.a.iv
Ambient temperature	:	25°C
Relative humidity	:	52%

Table 3: Hopping Frequency Separation

Mode	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
GFSK	2441	1	≥ 25kHz or two-thirds of 20dB bandwidth
8-DPSK	2441	1	

Note:
1. Test plots please refer to the annex document “Annex A. Hopping Frequency Separation of SHE19120045-01BE”.

4.1.8 Number of Hopping Frequency

RESULT: **PASS**

Test standard	:	FCC Part 15.247(a)(1)(iii) RSS-247 5.1(4)
Requirement	:	ANSI C63.10-2013
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Hopping
Operation Mode	:	A.1.a.iv
Ambient temperature	:	25°C
Relative humidity	:	52%

Table 4: Number of Hopping Frequency

Mode	Frequency Range	Measured Quantity of Hopping Channel	Limit
GFSK	2400 – 2483.5	79	≥15
8-DPSK	2400 – 2483.5	79	≥15

Note:
1. Test plots please refer to the annex document “Annex A. Number of Hopping Frequency of SHE19120045-01BE”.

4.1.9 Time of Occupancy

RESULT: **PASS**

Test standard : FCC Part 15.247(a)(1)(iii)
RSS-247 5.1(4)
Requirement : ANSI C63.10-2013
Kind of test site : Shielded room

Test setup
Test Channel : Middle
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Table 5: Time of Occupancy

Mode	Packet Type	Pulse Time (ms)	Total of Dwell (ms)	Limit (s)
GFSK	DH1	0.407	130.24	0.4
	DH3	1.660	265.6	0.4
	DH5	2.913	310.72	0.4
8-DPSK	DH1	0.427	136.64	0.4
	DH3	1.660	265.6	0.4
	DH5	2.913	310.72	0.4

Note:
For DH1 package type:
Total of Dwell = Pulse Time*(1600/2)/Number of Hopping Frequency*Period
Period = 0.4* Number of Hopping Frequency
For DH3 package type:
Total of Dwell = Pulse Time*(1600/4)/Number of Hopping Frequency*Period
Period = 0.4* Number of Hopping Frequency
For DH5 package type:
Total of Dwell = Pulse Time*(1600/6)/Number of Hopping Frequency*Period
Period = 0.4* Number of Hopping Frequency
1. Test plots please refer to the annex document “Annex A. Time of Occupancy of SHE19120045-01BE”.

4.2 Mains Emissions

4.2.1 Conducted Emission on AC Mains

RESULT: **PASS**

Test standard	:	FCC Part 15.207(a) RSS-Gen 8.8
Requirement	:	ANSI C63.10-2013
Kind of test site	:	Shielded room

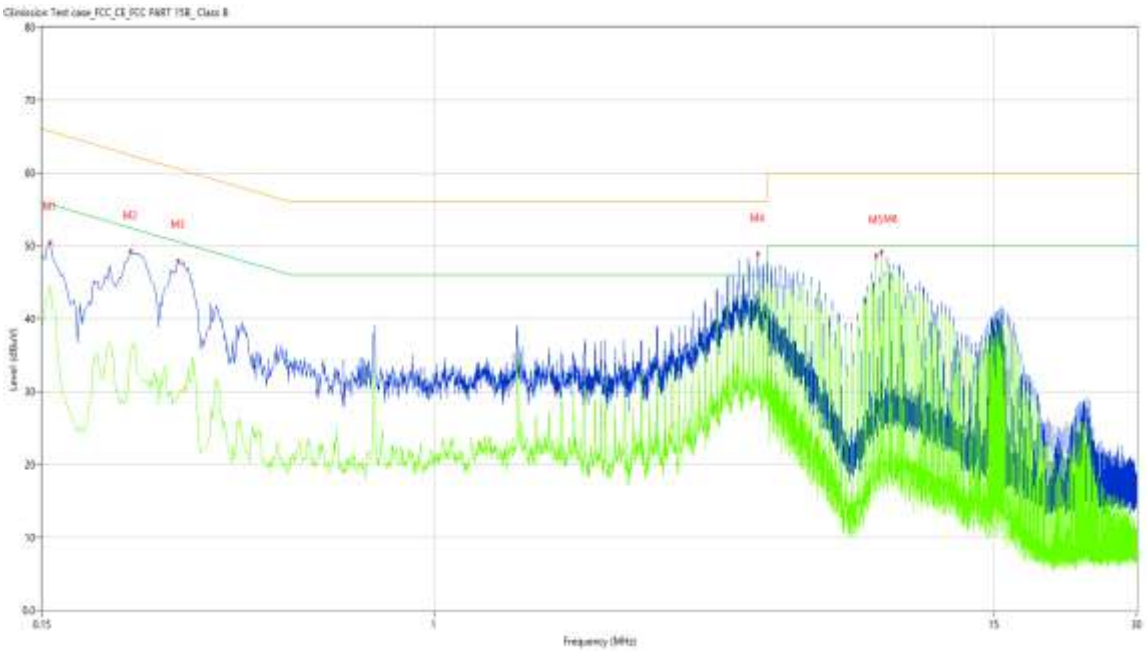
Test setup

Input Voltage	:	AC 120V, 60Hz; AC 240V, 50Hz
Operation Mode	:	A.1.a
Earthing	:	Not Connected
Ambient temperature	:	25°C
Relative humidity	:	52%

For details refer to following test plot.

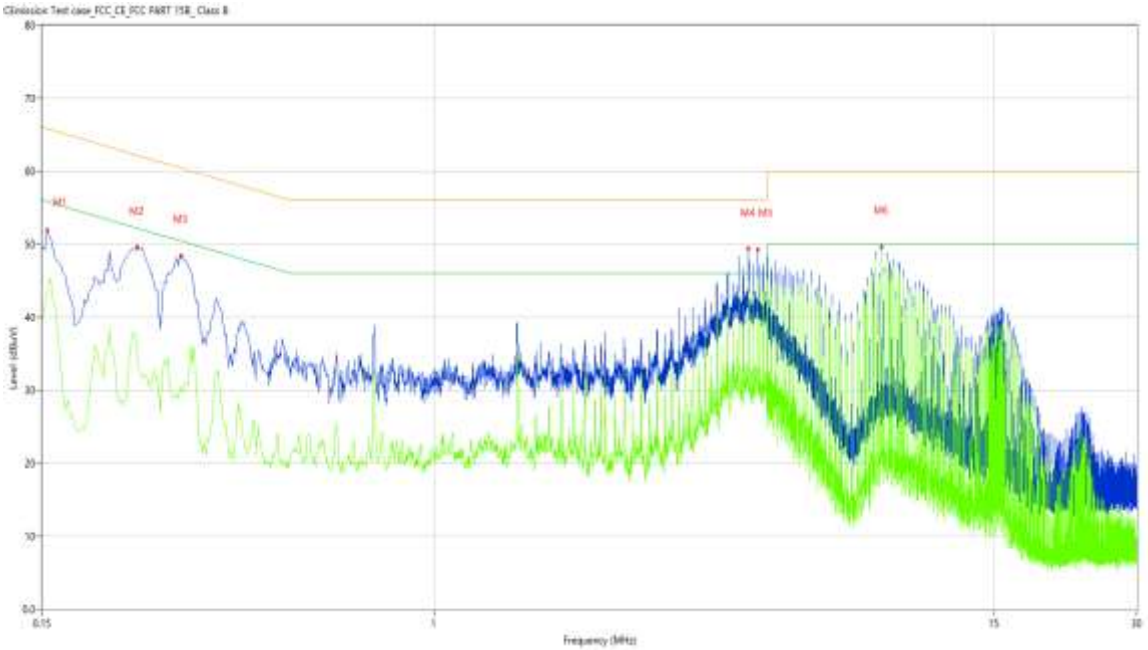
Note:
The all configurations were tested respectively, but only the worst configuration shown here.

Figure 1: Conducted Emission on AC Mains, L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.156	51.45	10.15	65.67	-14.22	Peak	L	Pass
1*	0.156	49.03	10.15	65.67	-16.64	QP	L	Pass
1**	0.156	44.48	10.15	55.67	-11.19	AV	L	Pass
2	0.230	49.80	10.14	62.45	-12.65	Peak	L	Pass
2*	0.230	46.12	10.14	62.45	-16.33	QP	L	Pass
2**	0.230	35.32	10.14	52.45	-17.13	AV	L	Pass
3	0.290	48.69	10.14	60.52	-11.83	Peak	L	Pass
3*	0.290	45.29	10.14	60.52	-15.23	QP	L	Pass
3**	0.290	29.40	10.14	50.52	-21.12	AV	L	Pass
4	4.802	50.01	10.25	56.00	-5.99	Peak	L	Pass
4*	4.802	46.47	10.25	56.00	-9.53	QP	L	Pass
4**	4.802	45.20	10.25	46.00	-0.80	AV	L	Pass
5	8.510	48.87	10.35	60.00	-11.13	Peak	L	Pass
5*	8.510	47.76	10.35	60.00	-12.24	QP	L	Pass
5**	8.510	46.97	10.35	50.00	-3.03	AV	L	Pass
6	8.726	49.60	10.35	60.00	-10.40	Peak	L	Pass
6*	8.726	48.40	10.35	60.00	-11.60	QP	L	Pass
6**	8.726	48.47	10.35	50.00	-1.53	AV	L	Pass

Figure 2: Conducted Emission on AC Mains, N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.150	52.21	10.15	66.00	-13.79	Peak	N	Pass
1*	0.150	48.32	10.15	66.00	-17.68	QP	N	Pass
1**	0.150	39.35	10.15	56.00	-16.65	AV	N	Pass
2	0.238	50.64	10.14	62.17	-11.53	Peak	N	Pass
2*	0.238	47.37	10.14	62.17	-14.80	QP	N	Pass
2**	0.238	34.93	10.14	52.17	-17.24	AV	N	Pass
3	0.294	49.25	10.14	60.41	-11.16	Peak	N	Pass
3*	0.294	46.25	10.14	60.41	-14.16	QP	N	Pass
3**	0.294	30.58	10.14	50.41	-19.83	AV	N	Pass
4	4.582	50.11	10.25	56.00	-5.89	Peak	N	Pass
4*	4.582	47.16	10.25	56.00	-8.84	QP	N	Pass
4**	4.582	44.70	10.25	46.00	-1.30	AV	N	Pass
5	4.802	50.39	10.25	56.00	-5.61	Peak	N	Pass
5*	4.802	47.07	10.25	56.00	-8.93	QP	N	Pass
5**	4.802	45.31	10.25	46.00	-0.69	AV	N	Pass
6	8.726	49.77	10.35	60.00	-10.23	Peak	N	Pass
6*	8.726	48.40	10.35	60.00	-11.60	QP	N	Pass
6**	8.726	48.88	10.35	50.00	-1.12	AV	N	Pass

Annex A. Maximum Conducted Output Power

1. BT3.0_1Mbps_L

1.1. A.2-Peak Output Power(NTNV)_Step19

2. BT3.0_1Mbps_M

2.1. A.2-Peak Output Power(NTNV)_Step19

3. BT3.0_1Mbps_H

3.1. A.2-Peak Output Power(NTNV)_Step19

4. BT3.0_3Mbps_L

4.1. A.2-Peak Output Power(NTNV)_Step19

5. BT3.0_3Mbps_M

5.1. A.2-Peak Output Power(NTNV)_Step19

6. BT3.0_3Mbps_H

6.1. A.2-Peak Output Power(NTNV)_Step19

7. BT3.0_2Mbps_L

7.1. A.2-Peak Output Power(NTNV)_Step19

8. BT3.0_2Mbps_M

8.1. A.2-Peak Output Power(NTNV)_Step19

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9. BT3.0_2Mbps_H

9.1. A.2-Peak Output Power(NTNV)_Step19

Annex A. 20db and 99% bandwidth

1. BT3.0_1Mbps_L

1.1. A.3-20db and 99% bandwidth(NTNV)

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2402	99.00	20	0.01	Peak	7	0.767471	0.568338	Pass

2. BT3.0_1Mbps_M

2.1. A.3-20db and 99% bandwidth(NTNV)

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2441	99.00	20	0.01	Peak	7	0.762602	0.568988	Pass

3. BT3.0_1Mbps_H

3.1. A.3-20db and 99% bandwidth(NTNV)

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2480	99.00	20	0.01	Peak	7	0.764385	0.568358	Pass

4. BT3.0_3Mbps_L

4.1. A.3-20db and 99% bandwidth(NTNV)

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2402	99.00	20	0.01	Peak	7	1.037773	1.024035	Pass

5. BT3.0_3Mbps_M

5.2. A.3-20db and 99% bandwidth(NTNV)

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2441	99.00	20	0.01	Peak	7	1.037625	1.022823	Pass

6. BT3.0_3Mbps_H

6.1. A.3-20db and 99% bandwidth(NTNV)

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2480	99.00	20	0.01	Peak	7	1.036832	1.02222	Pass

Annex A. Conducted Spurious Emissions

1. BT3.0_1Mbps_L

1.1. A.6-Conducted Spurious Emissions(NTNV)_Step20

1.2. A.6-Conducted Spurious Emissions(NTNV)_Step39

1.3. A.6-Conducted Spurious Emissions(NTNV)_Step59

2. BT3.0_1Mbps_M

2.1. A.6-Conducted Spurious Emissions(NTNV)_Step20

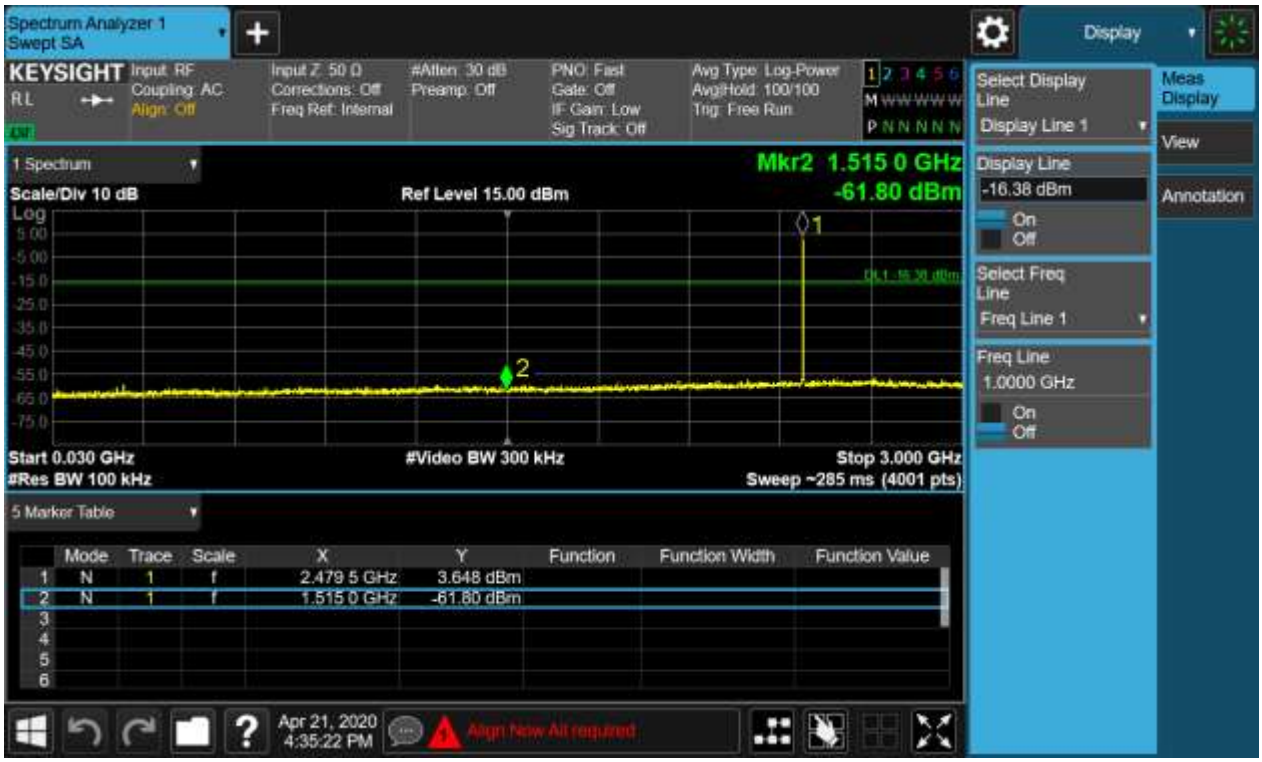
2.2. A.6-Conducted Spurious Emissions(NTNV)_Step39

2.3. A.6-Conducted Spurious Emissions(NTNV)_Step59

3. BT3.0_1Mbps_H

3.1. A.6-Conducted Spurious Emissions(NTNV)_Step20

3.2. A.6-Conducted Spurious Emissions(NTNV)_Step39



3.3. A.6-Conducted Spurious Emissions(NTNV)_Step59

4. BT3.0_3Mbps_L

4.1. A.6-Conducted Spurious Emissions(NTNV)_Step20

4.2. A.6-Conducted Spurious Emissions(NTNV)_Step39

4.3. A.6-Conducted Spurious Emissions(NTNV)_Step59

5. BT3.0_3Mbps_M

5.1. A.6-Conducted Spurious Emissions(NTNV)_Step20

5.2. A.6-Conducted Spurious Emissions(NTNV)_Step39

5.3. A.6-Conducted Spurious Emissions(NTNV)_Step59

6. BT3.0_3Mbps_H

6.1. A.6-Conducted Spurious Emissions(NTNV)_Step20

6.2. A.6-Conducted Spurious Emissions(NTNV)_Step39

6.3. A.6-Conducted Spurious Emissions(NTNV)_Step59

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Annex A. Bandedge(L)—CSE

1. BT3.0_1Mbps_L

1.1. A.6-Bandedge(L)--CSE(NTNV)_Step21

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1.2. A.6-Bandedge(L)--CSE(NTNV)_Step34

2. BT3.0_3Mbps_L

2.1. A.6-Bandedge(L)--CSE(NTNV)_Step21

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2.2. A.6-Bandedge(L)--CSE(NTNV)_Step34

Annex A. Bandedge(H)--CSE1. BT3.0_1Mbps_H

1.1. A.6-Bandedge(H)--CSE(NTNV)_Step21

1.2. A.6-Bandedge(H)--CSE(NTNV)_Step34

2. BT3.0_3Mbps_H

2.1. A.6-Bandedge(H)--CSE(NTNV)_Step21

2.2. A.6-Bandedge(H)--CSE(NTNV)_Step34

Annex A. Hopping Frequency Separation

1. BT3.0_1Mbps_Hopping

1.1. A.4-Hopping Frequency Separation(NTNV)_Step22

2. BT3.0_3Mbps_Hopping

2.1. A.4-Hopping Frequency Separation(NTNV)_Step22

Annex A. Number of Hopping Frequency

1. BT3.0_1Mbps_Hopping

1.1. A.1-Number of Hopping Frequency(NTNV)

RBW (MHz)	Detector	Num of Hopping Freq	Limit (dB)	Verdict
0.1	Peak	42	0	Unknow

2. BT3.0_3Mbps_Hopping

2.1. A.1-Number of Hopping Frequency(NTNV)

RBW (MHz)	Detector	Num of Hopping Freq	Limit (dB)	Verdict
0.1	Peak	74	0	Unknow

Annex A. Time of Occupancy

Time of Occupancy, 2441MHz, GFSK DH1

Time of Occupancy, 2441MHz, GFSK DH3

Time of Occupancy, 2441MHz, GFSK DH5

Time of Occupancy, 2441MHz, 8-DPSK DH1

Time of Occupancy, 2441MHz, 8-DPSK DH3

Time of Occupancy, 2441MHz, 8-DPSK DH5

End of the report