中认信通
CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)

ACCREDITED
TESTING LABORATORY
CERTIFICATE # 6356.01

TEST REPORT

Applicant: **olibra llc**

Address: 45 legion dr CRESSKILL New Jersey United States 07626

FCC ID: **2AME8SKS-5**

Product Name: **Bond Sidekick for Shades**

Model Number: **SKS-500**

Standard(s): **47 CFR Part 15, Subpart C(15.231)**
ANSI C63.10-2013

The above equipment has been tested and found compliance with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: **CR22050013-00**

Date Of Issue: **2022-06-13**

Reviewed By: **Sun Zhong**

Sun Zhong

Title: Manager

Test Laboratory: **China Certification ICT Co., Ltd (Dongguan)**
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Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 442868, the FCC Designation No. : CN1314.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0123.

Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	Bond Sidekick for Shades
EUT Model:	SKS-500
Operation Frequency:	431-437 MHz
Modulation Type:	OOK, GFSK
Rated Input Voltage:	DC 3.0V from battery
Serial Number:	CR22050013-RF-S1
EUT Received Date:	2022.05.16
EUT Received Status:	Good

Operation Frequency Detail:

Channel	Frequency(MHz)
1	431
2	434
3	437
Any frequency in that range could be setup by the user. They will have a code for different communication protocols and they can choose the one they need to use	

Per section 15.31(m), the frequency were performed the test as below:

Test Channel	Frequency (MHz)
1	431
2	434
3	437

Antenna Information Detail▲:

Antenna Manufacturer	Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range	§15.203 Requirement
olibra llc	Chip	50	0 dBi/430~440 MHz	**Compliance**
The Method of §15.203 Compliance: ☒Antenna must be permanently attached to the unit. ☐Antenna must use a unique type of connector to attach to the EUT. ☐Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.				

Accessory Information:

No Accessory.

1.2 Description of Test Configuration

1.2.1 EUT Operation Condition:

EUT Operation Mode:	The system was configured for testing in Engineering Mode, which was provided by the manufacturer.
Equipment Modifications:	No
EUT Exercise Software:	No
Engineering Mode was provided by manufacturer▲. The maximum power was configured default setting.	

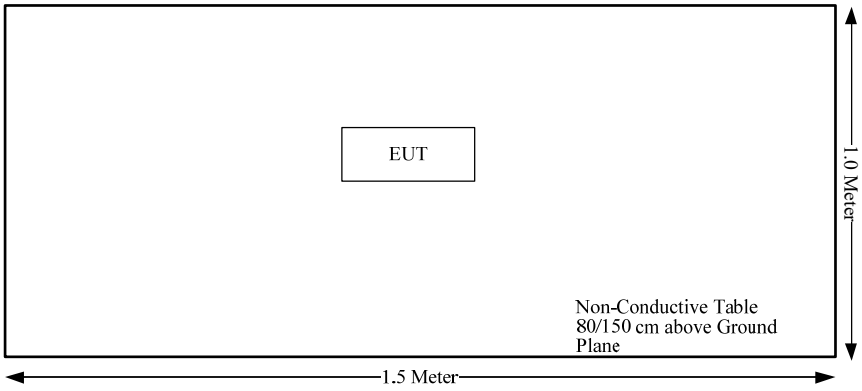
1.2.2 Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

1.2.3 Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
/	/	/	/	/	/

1.2.4 Block Diagram of Test Setup



1.3 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
Unwanted Emissions, radiated	30M~200MHz: 4.15 dB,200M~1GHz: 5.61 dB,1G~6GHz: 5.14 dB, 6G~18GHz: 5.93 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions, conducted	±1.26 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	2.8 dB (150 kHz to 30 MHz)

2. SUMMARY OF TEST RESULTS

Standard(s) Section	Test Items	Result
§15.207 (a)	Conducted Emissions	Not applicable
§15.205, §15.209, §15.231 (b)	Radiated Emissions	Compliance
§15.231 (c)	20dB Bandwidth	Compliance
§15.231 (a)	Deactivation Testing	Compliance
§15.203	Antenna Requirement	Compliance
§ 1.1307	RF Exposure Evaluation	Compliance

3. REQUIREMENTS AND TEST PROCEDURES

3.1 AC Line Conducted Emissions

3.1.1 Applicable Standard

FCC§15.207(a).

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

	Conducted limit (dBµV)	
Frequency of emission (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

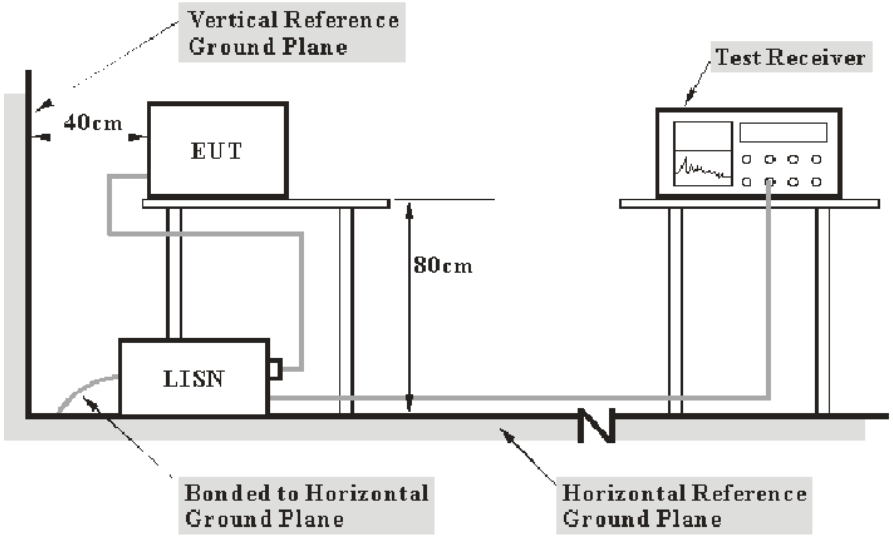
(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 µV within the frequency band 535-1705 kHz, as measured using a 50 µH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtainig their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

3.1.2 EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter or EUT was connected to the main LISN with a 120 V/60 Hz AC power source.

3.1.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

3.1.4 Test Procedure

The frequency and amplitude of the six highest ac power-line conducted emissions relative to the limit, measured over all the current-carrying conductors of the EUT power cords, and the operating frequency or frequency to which the EUT is tuned (if appropriate), should be reported, unless such emissions are more than 20 dB below the limit. AC power-line conducted emissions measurements are to be separately carried out only on each of the phase ("hot") line(s) and (if used) on the neutral line(s), but not on the ground [protective earth] line(s). If less than six emission frequencies are within 20 dB of the limit, then the noise level of the measuring instrument at representative frequencies should be reported. The specific conductor of the power-line cord for each of the reported emissions should be identified. Measure the six highest emissions with respect to the limit on each current-carrying conductor of each power cord associated with the EUT (but not the power cords of associated or peripheral equipment that are part of the test configuration). Then, report the six highest emissions with respect to the limit from among all the measurements identifying the frequency and specific current-carrying conductor identified with the emission. The six highest emissions should be reported for each of the current-carrying conductors, or the six highest emissions may be reported over all the current-carrying conductors.

3.1.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor
Factor = attenuation caused by cable loss + voltage division factor of AMN

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

3.2 Radiation Spurious Emissions

3.2.1 Applicable Standard

FCC §15.231 (b);

In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

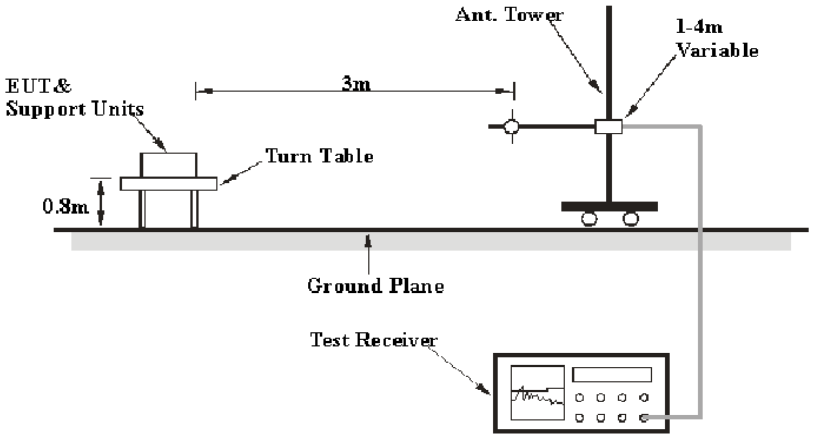
Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	[1]1,250 to 3,750	[1]125 to 375
174-260	3,750	375
260-470	[1]3,750 to 12,500	[1]375 to 1,250
Above 470	12,500	1,250

1Linear interpolations.

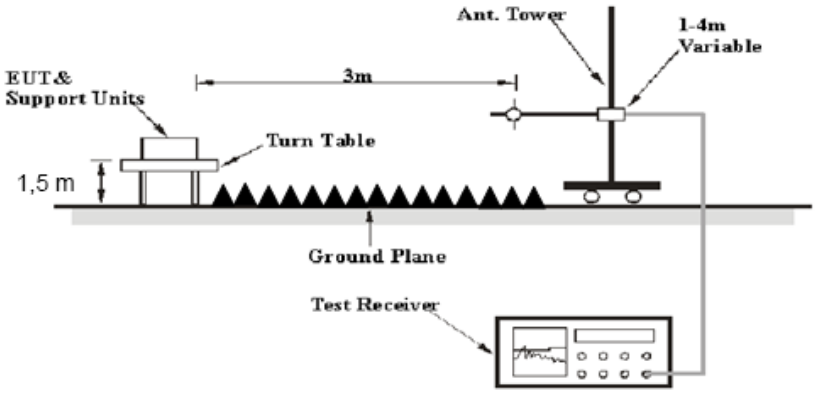
(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.
(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.
(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

3.2.2 EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emissions were performed in the 3 meters distance, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.205, 15.209, and FCC 15.231 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

For portable device, test should be performed at X.Y.Z Axis:

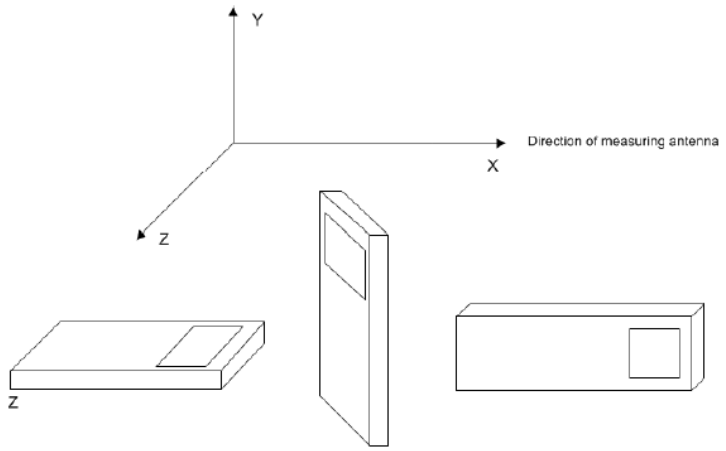


Figure 8—EUT configuration positions (see 6.3.1)

3.2.3 EMI Test Receiver & Spectrum Analyzer Setup

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

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	100 kHz	PK
Above 1 GHz	1 MHz	3 MHz	/	PK

3.2.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

According to §15.231, Intentional radiators operating under the provisions of this Section shall demonstrate compliance with the limits on the field strength of emissions, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector

3.2.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor
Factor = Antenna Factor + Cable Loss- Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

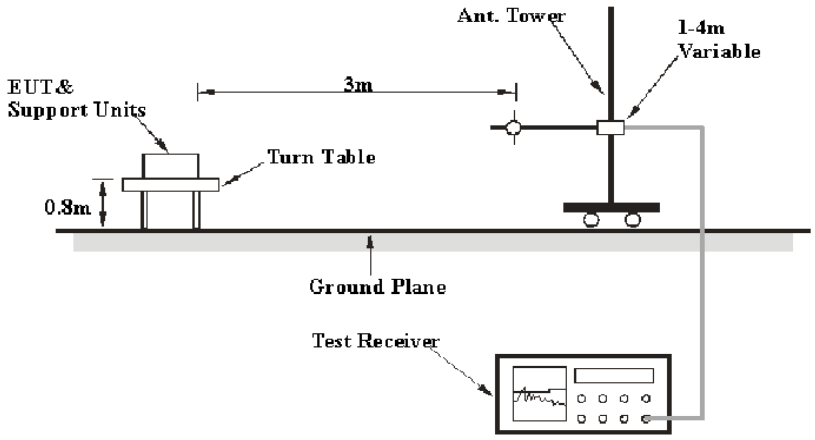
3.3 20 dB Emission Bandwidth:

3.3.1 Applicable Standard

FCC §15.231(c)

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

3.3.2 EUT Setup



3.3.3 Test Procedure

a) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, unless otherwise specified by the applicable requirement.
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 20 dB relative to the maximum level measured in the fundamental emission.

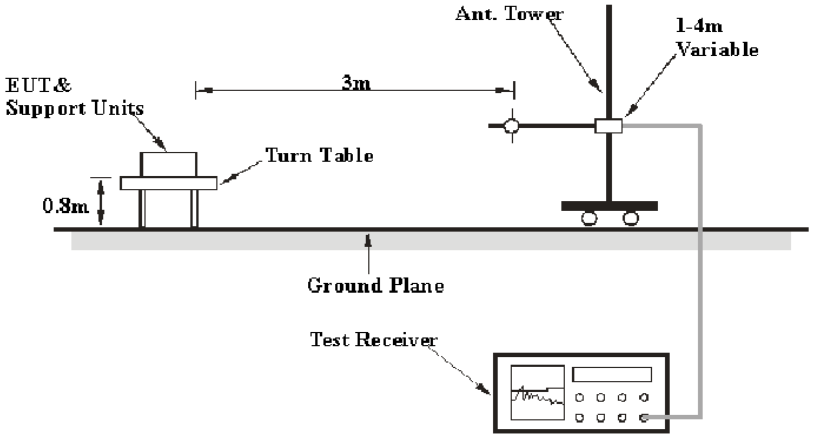
3.4 DEACTIVATION TESTING

3.4.1 Applicable Standard

FCC §15.231 (a)(1)

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

3.4.2 EUT Setup



3.4.3 Test Procedure

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:
1) Set the center frequency of the instrument to the center frequency of the transmission.
2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.
3) Set VBW ≥ RBW. Set detector = peak or average.

3.5 Antenna Requirement

3.5.1 Applicable Standard

FCC §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

3.5.2 Judgment

Please refer to the Antenna Information detail in Section 1.

4. Test DATA AND RESULTS

4.1 AC Line Conducted Emissions

Not Applicable. The device is powered by battery.

4.2 Radiation Spurious Emissions

Serial Number:	CR22050013-RF-S1	Test Date:	2022-05-24~2022-06-09
Test Site:	966-1, 966-2	Test Mode:	Transmitting
Tester:	Nick Tang, Gary Ling	Test Result:	Pass

Environmental Conditions:

Temperature: (℃)	23.8~24.5	Relative Humidity: (%)	66~72	ATM Pressure: (kPa)	100~100.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB6	A082520-5	2020-10-19	2023-10-18
R&S	EMI Test Receiver	ESR3	102724	2021-07-22	2022-07-21
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2021-07-18	2022-07-17
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2021-07-18	2022-07-17
Audix	Test Software	E3	201021 (V9)	N/A	N/A
ETS-Lindgren	Horn Antenna	3115	9912-5985	2020-10-13	2023-10-12
R&S	Spectrum Analyzer	FSV40	101591	2021-07-22	2022-07-21
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2021-08-08	2022-08-07
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2021-08-08	2022-08-07
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2021-11-10	2022-11-09

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Please refer to the below table and plots.

Note: The device can be mounted in multiple orientations, test was performed with X,Y, Z Axis according to C63.10 figure 8, the worst orientation was photographed and it`s data was recorded.

Test Data:

1) 30-5000MHz (Note: per pretest, the worst key: button 3 was recorded):

Peak Strength

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
GFSK Mode Test Frequency: 431 MHz							
431.00	70.13	PK	H	23.53	93.66	100.73	7.07
431.00	68.85	PK	V	23.53	92.38	100.73	8.35
862.00	26.56	PK	H	29.36	55.92	80.73	24.81
862.00	22.35	PK	V	29.36	51.71	80.73	29.02
1293.00	50.17	PK	H	-1.73	48.44	80.73	32.29
1293.00	52.36	PK	V	-1.73	50.63	80.73	30.10
1724.00	60.94	PK	H	0.84	61.78	80.73	18.95
1724.00	64.57	PK	V	0.84	65.41	80.73	15.32
2155.00	54.16	PK	H	2.82	56.98	80.73	23.75
2155.00	57.28	PK	V	2.82	60.10	80.73	20.63
2586.00	54.67	PK	H	4.16	58.83	80.73	21.90
2586.00	50.13	PK	V	4.16	54.29	80.73	26.44
3017.00	54.01	PK	H	6.14	60.15	80.73	20.58
3017.00	53.47	PK	V	6.14	59.61	80.73	21.12
3448.00	50.41	PK	H	7.47	57.88	80.73	22.85
3448.00	49.52	PK	V	7.47	56.99	80.73	23.74
3879.00	63.55	PK	H	8.93	72.48	74.00	1.52
3879.00	60.14	PK	V	8.93	69.07	74.00	4.93
4310.00	53.47	PK	H	9.68	63.15	74.00	10.85
4310.00	60.04	PK	V	9.68	69.72	74.00	4.28
OOK Mode Test Frequency: 431 MHz							
431.00	68.99	PK	H	23.53	92.52	100.73	8.21
431.00	68.36	PK	V	23.53	91.89	100.73	8.84
862.00	27.36	PK	H	29.36	56.72	80.73	24.01
862.00	25.80	PK	V	29.36	55.16	80.73	25.57
1293.00	49.30	PK	H	-1.73	47.57	80.73	33.16
1293.00	51.69	PK	V	-1.73	49.96	80.73	30.77
1724.00	60.21	PK	H	0.84	61.05	80.73	19.68
1724.00	64.15	PK	V	0.84	64.99	80.73	15.74
2155.00	53.97	PK	H	2.82	56.79	80.73	23.94
2155.00	57.53	PK	V	2.82	60.35	80.73	20.38
2586.00	54.41	PK	H	4.16	58.57	80.73	22.16
2586.00	50.27	PK	V	4.16	54.43	80.73	26.30

3017.00	54.01	PK	H	6.14	60.15	80.73	20.58
3017.00	52.64	PK	V	6.14	58.78	80.73	21.95
3448.00	50.54	PK	H	7.47	58.01	80.73	22.72
3448.00	48.84	PK	V	7.47	56.31	80.73	24.42
3879.00	63.01	PK	H	8.93	71.94	74.00	2.06
3879.00	59.79	PK	V	8.93	68.72	74.00	5.28
4310.00	52.53	PK	H	9.68	62.21	74.00	11.79
4310.00	59.91	PK	V	9.68	69.59	74.00	4.41

Average Strength

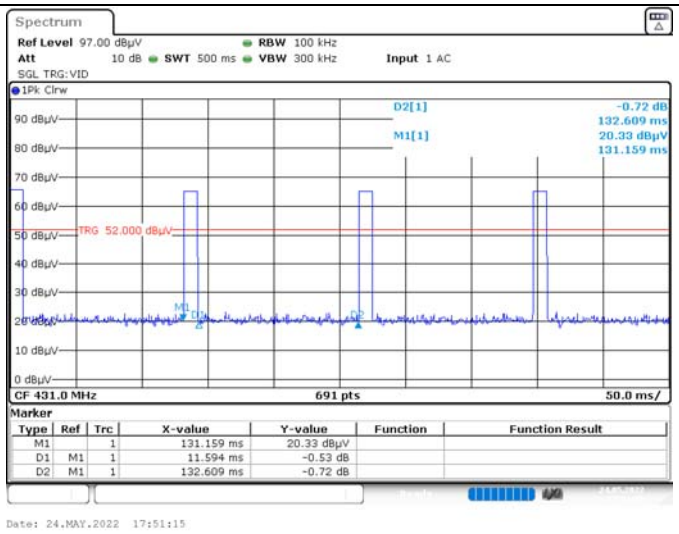
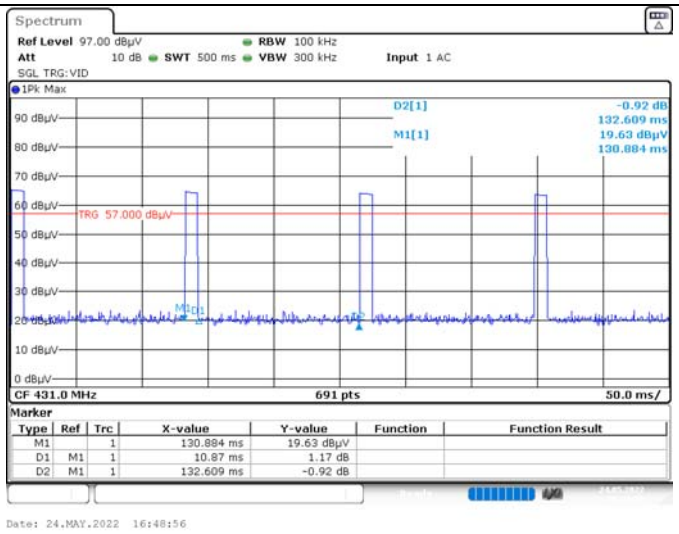
Frequency (MHz)	Peak (dBμV/m)	Polar (H/V)	Duty Cycle Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
GFSK Mode Test Frequency: 431 MHz						
431.00	93.66	H	-18.72	74.94	80.73	5.79
431.00	92.38	V	-18.72	73.66	80.73	7.07
862.00	55.92	H	-18.72	37.20	60.73	23.53
862.00	51.71	V	-18.72	32.99	60.73	27.74
1293.00	48.44	H	-18.72	29.72	60.73	31.01
1293.00	50.63	V	-18.72	31.91	60.73	28.82
1724.00	61.78	H	-18.72	43.06	60.73	17.67
1724.00	65.41	V	-18.72	46.69	60.73	14.04
2155.00	56.98	H	-18.72	38.26	60.73	22.47
2155.00	60.10	V	-18.72	41.38	60.73	19.35
2586.00	58.83	H	-18.72	40.11	60.73	20.62
2586.00	54.29	V	-18.72	35.57	60.73	25.16
3017.00	60.15	H	-18.72	41.43	60.73	19.30
3017.00	59.61	V	-18.72	40.89	60.73	19.84
3448.00	57.88	H	-18.72	39.16	60.73	21.57
3448.00	56.99	V	-18.72	38.27	60.73	22.46
3879.00	72.48	H	-18.72	53.76	54.00	0.24
3879.00	69.07	V	-18.72	50.35	54.00	3.65
4310.00	63.15	H	-18.72	44.43	54.00	9.57
4310.00	69.72	V	-18.72	51.00	54.00	3.00
OOK Mode Test Frequency: 431 MHz						
431.00	92.52	H	-19.28	73.24	80.73	7.49
431.00	91.89	V	-19.28	72.61	80.73	8.12
862.00	56.72	H	-19.28	37.44	60.73	23.29
862.00	55.16	V	-19.28	35.88	60.73	24.85
1293.00	47.57	H	-19.28	28.29	60.73	32.44
1293.00	49.96	V	-19.28	30.68	60.73	30.05
1724.00	61.05	H	-19.28	41.77	60.73	18.96
1724.00	64.99	V	-19.28	45.71	60.73	15.02
2155.00	56.79	H	-19.28	37.51	60.73	23.22
2155.00	60.35	V	-19.28	41.07	60.73	19.66
2586.00	58.57	H	-19.28	39.29	60.73	21.44

2586.00	54.43	V	-19.28	35.15	60.73	25.58
3017.00	60.15	H	-19.28	40.87	60.73	19.86
3017.00	58.78	V	-19.28	39.50	60.73	21.23
3448.00	58.01	H	-19.28	38.73	60.73	22.00
3448.00	56.31	V	-19.28	37.03	60.73	23.70
3879.00	71.94	H	-19.28	52.66	54.00	1.34
3879.00	68.72	V	-19.28	49.44	54.00	4.56
4310.00	62.21	H	-19.28	42.93	54.00	11.07
4310.00	69.59	V	-19.28	50.31	54.00	3.69

For GFSK mode:
Duty cycle=Ton/Ton+off = 11.594/100=11.59%
Duty Cycle Factor= 20*log(Duty cycle)= -18.72 dB

For OOK mode:
Duty cycle=Ton/Ton+off = 10.87/100 =10.87%
Duty Cycle Factor= 20*log(Duty cycle)= -19.28dB

Average Strength=Peak+duty cycle Factor

Duty Cycle	
GFSK Mode On+Off= 132.609ms On= 11.594ms	
OOK Mode On+Off= 132.609ms On= 10.87ms	

Peak Strength

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
GFSK Mode Test Frequency: 434 MHz							
434.00	70.25	PK	H	23.65	93.90	100.83	6.93
434.00	70.26	PK	V	23.65	93.91	100.83	6.92
868.00	25.61	PK	H	29.32	54.93	80.83	25.90
868.00	19.39	PK	V	29.32	48.71	80.83	32.12
1302.00	53.26	PK	H	-1.71	51.55	74.00	22.45
1302.00	50.31	PK	V	-1.71	48.60	74.00	25.40
1736.00	57.34	PK	H	0.90	58.24	80.83	22.59
1736.00	62.57	PK	V	0.90	63.47	80.83	17.36
2170.00	55.35	PK	H	2.86	58.21	80.83	22.62
2170.00	57.13	PK	V	2.86	59.99	80.83	20.84
2604.00	55.31	PK	H	4.26	59.57	80.83	21.26
2604.00	51.66	PK	V	4.26	55.92	80.83	24.91
3038.00	52.14	PK	H	6.19	58.33	80.83	22.50
3038.00	48.20	PK	V	6.19	54.39	80.83	26.44
3472.00	52.06	PK	H	7.53	59.59	80.83	21.24
3472.00	48.11	PK	V	7.53	55.64	80.83	25.19
3906.00	59.10	PK	H	9.04	68.14	74.00	5.86
3906.00	53.78	PK	V	9.04	62.82	74.00	11.18
4340.00	53.71	PK	H	9.77	63.48	74.00	10.52
4340.00	57.64	PK	V	9.77	67.41	74.00	6.59
OOK Mode Test Frequency: 434 MHz							
434.00	70.24	PK	H	23.65	93.89	100.83	6.94
434.00	70.08	PK	V	23.65	93.73	100.83	7.10
868.00	24.70	PK	H	29.32	54.02	80.83	26.81
868.00	20.02	PK	V	29.32	49.34	80.83	31.49
1302.00	53.16	PK	H	-1.71	51.45	74.00	22.55
1302.00	49.78	PK	V	-1.71	48.07	74.00	25.93
1736.00	56.60	PK	H	0.90	57.50	80.83	23.33
1736.00	62.23	PK	V	0.90	63.13	80.83	17.70
2170.00	54.90	PK	H	2.86	57.76	80.83	23.07
2170.00	57.38	PK	V	2.86	60.24	80.83	20.59
2604.00	55.53	PK	H	4.26	59.79	80.83	21.04
2604.00	51.01	PK	V	4.26	55.27	80.83	25.56
3038.00	51.23	PK	H	6.19	57.42	80.83	23.41
3038.00	47.74	PK	V	6.19	53.93	80.83	26.90
3472.00	51.11	PK	H	7.53	58.64	80.83	22.19

3472.00	47.77	PK	V	7.53	55.30	80.83	25.53
3906.00	58.80	PK	H	9.04	67.84	74.00	6.16
3906.00	53.97	PK	V	9.04	63.01	74.00	10.99
4340.00	53.16	PK	H	9.77	62.93	74.00	11.07
4340.00	56.95	PK	V	9.77	66.72	74.00	7.28

Average Strength

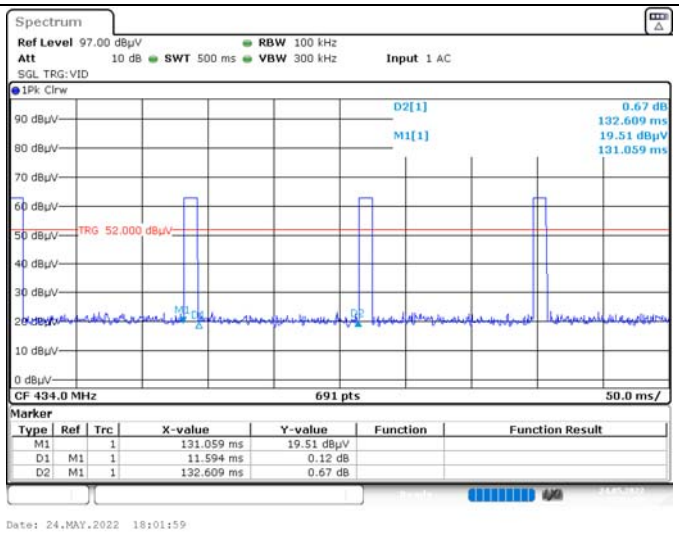
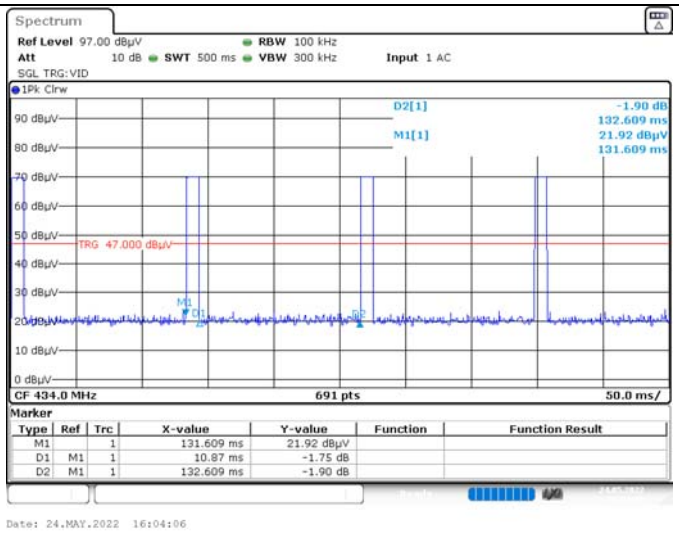
Frequency (MHz)	Peak (dBμV/m)	Polar (H/V)	Duty Cycle Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
GFSK Mode Test Frequency: 434 MHz						
434.00	93.90	H	-18.72	75.18	80.83	5.65
434.00	93.91	V	-18.72	75.19	80.83	5.64
868.00	54.93	H	-18.72	36.21	60.83	24.62
868.00	48.71	V	-18.72	29.99	60.83	30.84
1302.00	51.55	H	-18.72	32.83	54.00	21.17
1302.00	48.60	V	-18.72	29.88	54.00	24.12
1736.00	58.24	H	-18.72	39.52	60.83	21.31
1736.00	63.47	V	-18.72	44.75	60.83	16.08
2170.00	58.21	H	-18.72	39.49	60.83	21.34
2170.00	59.99	V	-18.72	41.27	60.83	19.56
2604.00	59.57	H	-18.72	40.85	60.83	19.98
2604.00	55.92	V	-18.72	37.20	60.83	23.63
3038.00	58.33	H	-18.72	39.61	60.83	21.22
3038.00	54.39	V	-18.72	35.67	60.83	25.16
3472.00	59.59	H	-18.72	40.87	60.83	19.96
3472.00	55.64	V	-18.72	36.92	60.83	23.91
3906.00	68.14	H	-18.72	49.42	54.00	4.58
3906.00	62.82	V	-18.72	44.10	54.00	9.90
4340.00	63.48	H	-18.72	44.76	54.00	9.24
4340.00	67.41	V	-18.72	48.69	54.00	5.31
OOK Mode Test Frequency: 434 MHz						
434.00	93.89	H	-19.28	74.61	80.83	6.22
434.00	93.73	V	-19.28	74.45	80.83	6.38
868.00	54.02	H	-19.28	34.74	60.83	26.09
868.00	49.34	V	-19.28	30.06	60.83	30.77
1302.00	51.45	H	-19.28	32.17	54.00	21.83
1302.00	48.07	V	-19.28	28.79	54.00	25.21
1736.00	57.50	H	-19.28	38.22	60.83	22.61
1736.00	63.13	V	-19.28	43.85	60.83	16.98
2170.00	57.76	H	-19.28	38.48	60.83	22.35
2170.00	60.24	V	-19.28	40.96	60.83	19.87
2604.00	59.79	H	-19.28	40.51	60.83	20.32
2604.00	55.27	V	-19.28	35.99	60.83	24.84
3038.00	57.42	H	-19.28	38.14	60.83	22.69
3038.00	53.93	V	-19.28	34.65	60.83	26.18
3472.00	58.64	H	-19.28	39.36	60.83	21.47

3472.00	55.30	V	-19.28	36.02	60.83	24.81
3906.00	67.84	H	-19.28	48.56	54.00	5.44
3906.00	63.01	V	-19.28	43.73	54.00	10.27
4340.00	62.93	H	-19.28	43.65	54.00	10.35
4340.00	66.72	V	-19.28	47.44	54.00	6.56

For GFSK mode:
Duty cycle=Ton/Ton+off = 11.594/100 =11.59%
Duty Cycle Factor= 20*log(Duty cycle)= -18.72 dB

For OOK mode:
Duty cycle=Ton/Ton+off = 10.87/100 =10.87%
Duty Cycle Factor= 20*log(Duty cycle)= -19.28 dB

Average Strength=Peak+duty cycle Factor

Duty Cycle	
GFSK Mode On+Off= 132.609ms On= 11.594ms	
OOK Mode On+Off= 132.609ms On= 10.87ms	

Peak Strength

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
GFSK Mode Test Frequency: 437 MHz							
437.00	69.48	PK	H	23.74	93.22	100.93	7.71
437.00	70.66	PK	V	23.74	94.40	100.93	6.53
874.00	23.31	PK	H	29.36	52.67	80.93	28.26
874.00	20.79	PK	V	29.36	50.15	80.93	30.78
1311.00	57.01	PK	H	-1.62	55.39	74.00	18.61
1311.00	53.24	PK	V	-1.62	51.62	74.00	22.38
1748.00	63.52	PK	H	0.96	64.48	80.93	16.45
1748.00	59.67	PK	V	0.96	60.63	80.93	20.30
2185.00	54.83	PK	H	2.89	57.72	80.93	23.21
2185.00	56.03	PK	V	2.89	58.92	80.93	22.01
2622.00	54.14	PK	H	4.33	58.47	80.93	22.46
2622.00	50.06	PK	V	4.33	54.39	80.93	26.54
3059.00	55.11	PK	H	6.25	61.36	80.93	19.57
3059.00	51.09	PK	V	6.25	57.34	80.93	23.59
3496.00	47.03	PK	H	7.58	54.61	80.93	26.32
3496.00	42.34	PK	V	7.58	49.92	80.93	31.01
3933.00	62.07	PK	H	9.16	71.23	74.00	2.77
3933.00	56.71	PK	V	9.16	65.87	74.00	8.13
4370.00	54.84	PK	H	9.82	64.66	74.00	9.34
4370.00	50.16	PK	V	9.82	59.98	74.00	14.02
OOK Mode Test Frequency: 437 MHz							
437.00	69.45	PK	H	23.74	93.19	100.93	7.74
437.00	70.87	PK	V	23.74	94.61	100.93	6.32
874.00	22.47	PK	H	29.36	51.83	80.93	29.10
874.00	21.08	PK	V	29.36	50.44	80.93	30.49
1311.00	49.42	PK	H	-1.62	47.80	74.00	26.20
1311.00	50.79	PK	V	-1.62	49.17	74.00	24.83
1748.00	59.66	PK	H	0.96	60.62	80.93	20.31
1748.00	64.15	PK	V	0.96	65.11	80.93	15.82
2185.00	53.23	PK	H	2.89	56.12	80.93	24.81
2185.00	57.06	PK	V	2.89	59.95	80.93	20.98
2622.00	53.81	PK	H	4.33	58.14	80.93	22.79
2622.00	49.49	PK	V	4.33	53.82	80.93	27.11
3059.00	54.24	PK	H	6.25	60.49	80.93	20.44
3059.00	52.37	PK	V	6.25	58.62	80.93	22.31
3496.00	50.57	PK	H	7.58	58.15	80.93	22.78

3496.00	48.45	PK	V	7.58	56.03	80.93	24.90
3933.00	62.08	PK	H	9.16	71.24	74.00	2.76
3933.00	59.94	PK	V	9.16	69.10	74.00	4.90
4370.00	51.54	PK	H	9.82	61.36	74.00	12.64
4370.00	59.62	PK	V	9.82	69.44	74.00	4.56

Average Strength

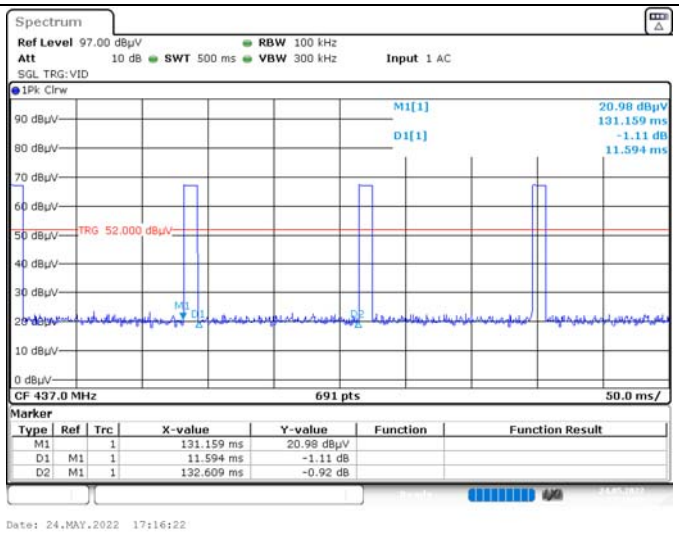
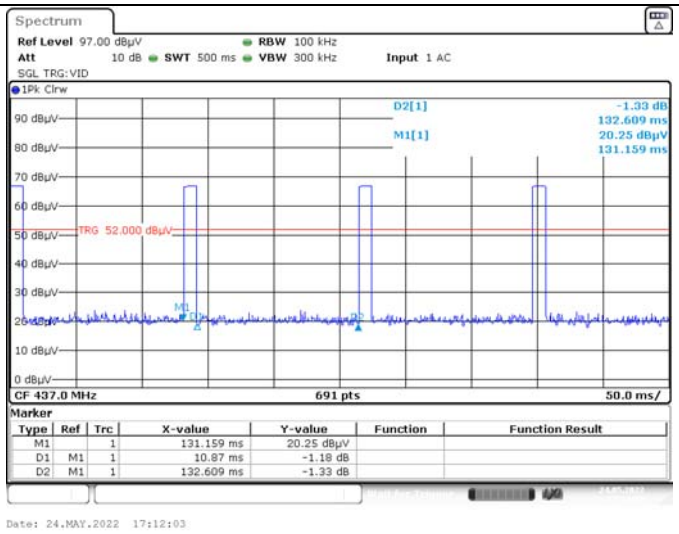
Frequency (MHz)	Peak (dBμV/m)	Polar (H/V)	Duty Cycle Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
GFSK Mode Test Frequency: 437 MHz						
437.00	93.22	H	-18.72	74.50	80.93	6.43
437.00	94.40	V	-18.72	75.68	80.93	5.25
874.00	52.67	H	-18.72	33.95	60.93	26.98
874.00	50.15	V	-18.72	31.43	60.93	29.50
1311.00	55.39	H	-18.72	36.67	54.00	17.33
1311.00	51.62	V	-18.72	32.90	54.00	21.10
1748.00	64.48	H	-18.72	45.76	60.93	15.17
1748.00	60.63	V	-18.72	41.91	60.93	19.02
2185.00	57.72	H	-18.72	39.00	60.93	21.93
2185.00	58.92	V	-18.72	40.20	60.93	20.73
2622.00	58.47	H	-18.72	39.75	60.93	21.18
2622.00	54.39	V	-18.72	35.67	60.93	25.26
3059.00	61.36	H	-18.72	42.64	60.93	18.29
3059.00	57.34	V	-18.72	38.62	60.93	22.31
3496.00	54.61	H	-18.72	35.89	60.93	25.04
3496.00	49.92	V	-18.72	31.20	60.93	29.73
3933.00	71.23	H	-18.72	52.51	54.00	1.49
3933.00	65.87	V	-18.72	47.15	54.00	6.85
4370.00	64.66	H	-18.72	45.94	54.00	8.06
4370.00	59.98	V	-18.72	41.26	54.00	12.74
OOK Mode Test Frequency: 437 MHz						
437.00	93.19	H	-19.28	73.91	80.93	7.02
437.00	94.61	V	-19.28	75.33	80.93	5.60
874.00	51.83	H	-19.28	32.55	60.93	28.38
874.00	50.44	V	-19.28	31.16	60.93	29.77
1311.00	47.80	H	-19.28	28.52	54.00	25.48
1311.00	49.17	V	-19.28	29.89	54.00	24.11
1748.00	60.62	H	-19.28	41.34	60.93	19.59
1748.00	65.11	V	-19.28	45.83	60.93	15.10
2185.00	56.12	H	-19.28	36.84	60.93	24.09
2185.00	59.95	V	-19.28	40.67	60.93	20.26
2622.00	58.14	H	-19.28	38.86	60.93	22.07
2622.00	53.82	V	-19.28	34.54	60.93	26.39
3059.00	60.49	H	-19.28	41.21	60.93	19.72
3059.00	58.62	V	-19.28	39.34	60.93	21.59
3496.00	58.15	H	-19.28	38.87	60.93	22.06

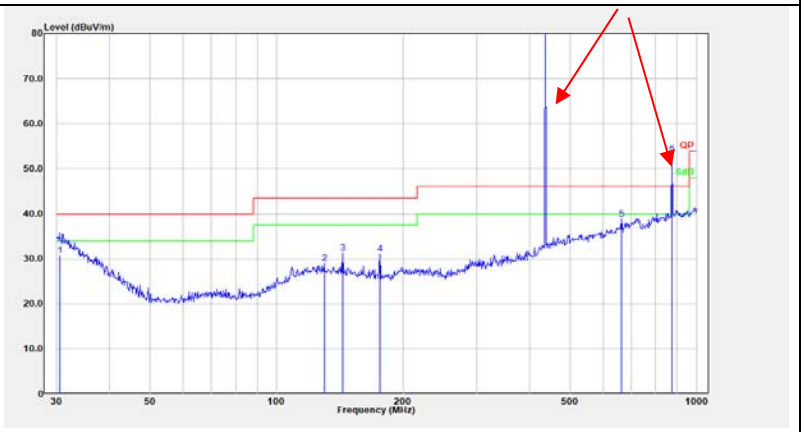
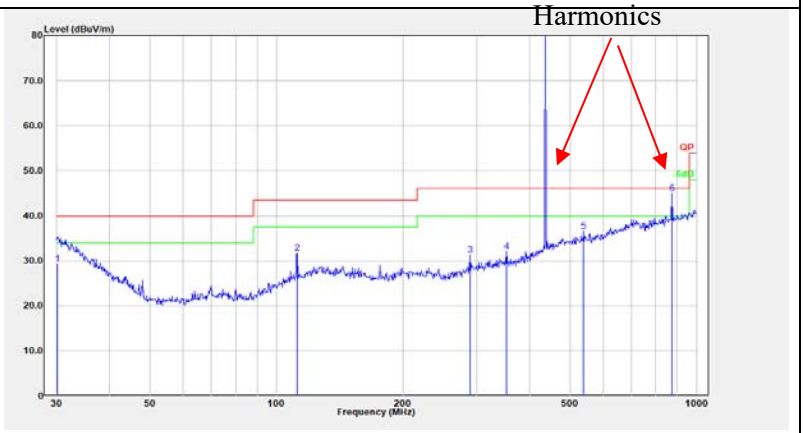
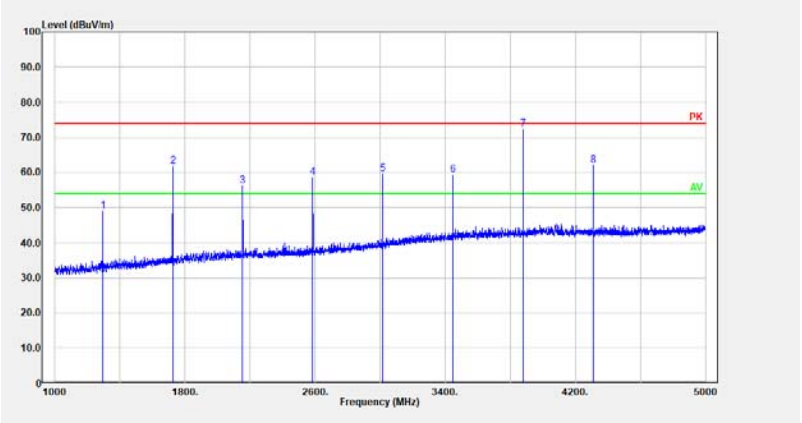
3496.00	56.03	V	-19.28	36.75	60.93	24.18
3933.00	71.24	H	-19.28	51.96	54.00	2.04
3933.00	69.10	V	-19.28	49.82	54.00	4.18
4370.00	61.36	H	-19.28	42.08	54.00	11.92
4370.00	69.44	V	-19.28	50.16	54.00	3.84

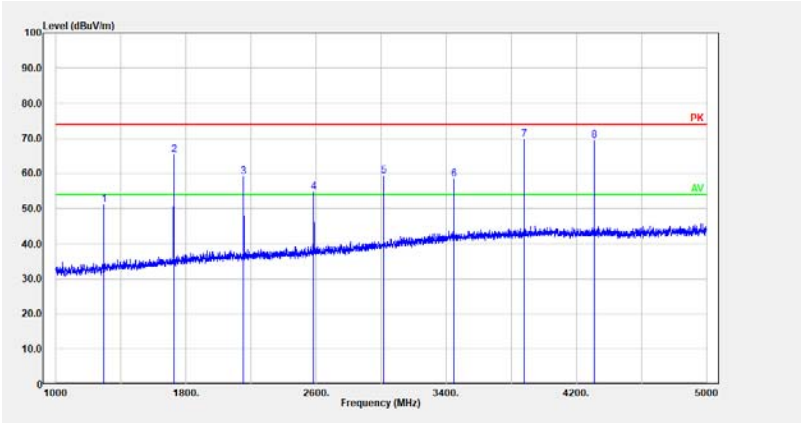
For GFSK mode:
Duty cycle=Ton/Ton+off = 11.594/100 =11.59%
Duty Cycle Factor= 20*log(Duty cycle)= -18.72 dB

For OOK mode:
Duty cycle=Ton/Ton+off = 10.87/100 =10.87%
Duty Cycle Factor= 20*log(Duty cycle)= -19.28 dB

Average Strength=Peak+duty cycle Factor

Duty Cycle	
GFSK Mode On+Off= 132.609ms On= 11.594ms	
OOK Mode On+Off= 132.609ms On= 10.87ms	

Worst Test Plots (GFSK Mode 431 MHz)	
30MHz-1GHz Horizontal	Fundamental and Harmonics 
30MHz-1GHz Vertical	Fundamental and Harmonics 
1GHz-5GHz Horizontal	

1GHz -5GHz Vertical	

4.3 20 dB Emission Bandwidth:

Serial Number:	CR22050013-RF-S1	Test Date:	2022-05-24
Test Site:	966-2	Test Mode:	Transmitting
Tester:	Gary Ling	Test Result:	Pass

Environmental Conditions:

Temperature: (℃)	18.1	Relative Humidity: (%)	53	ATM Pressure: (kPa)	101.0

Test Equipment List and Details:

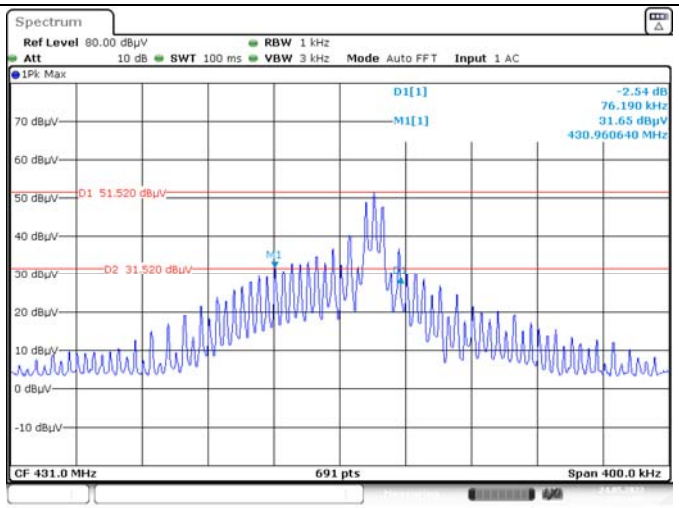
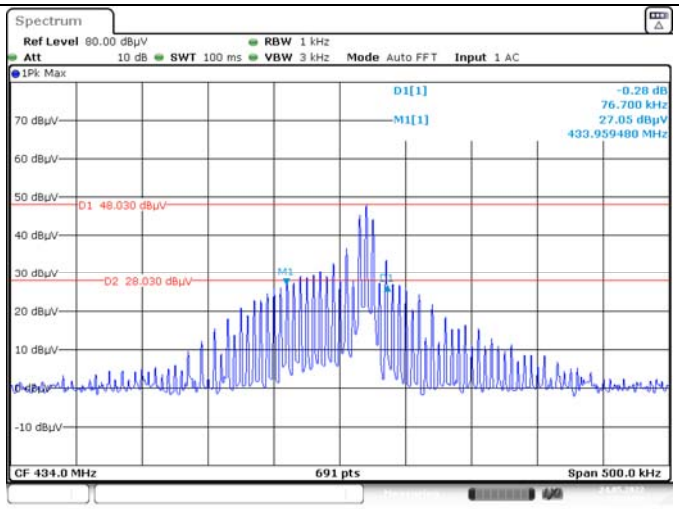
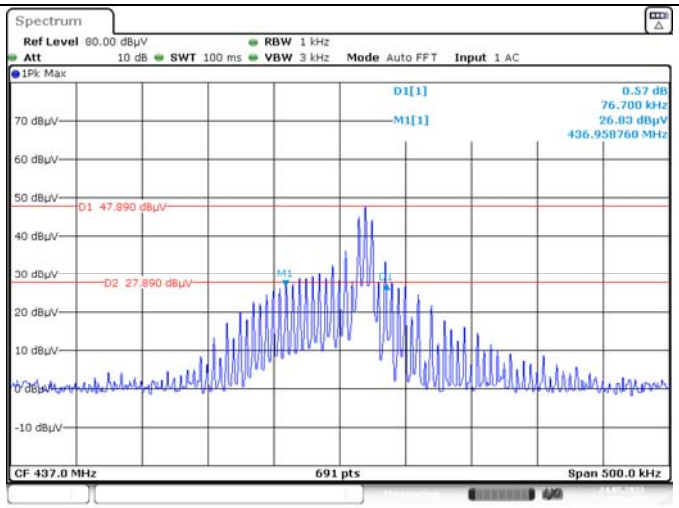
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB6	A082520-5	2020-10-19	2023-10-18
R&S	EMI Test Receiver	ESR3	102724	2021-07-22	2022-07-21
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2021-07-18	2022-07-17
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2021-07-18	2022-07-17
Audix	Test Software	E3	201021 (V9)	N/A	N/A

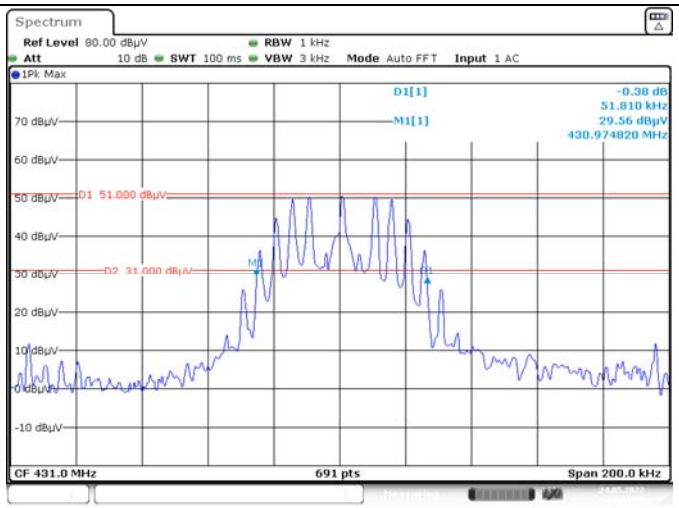
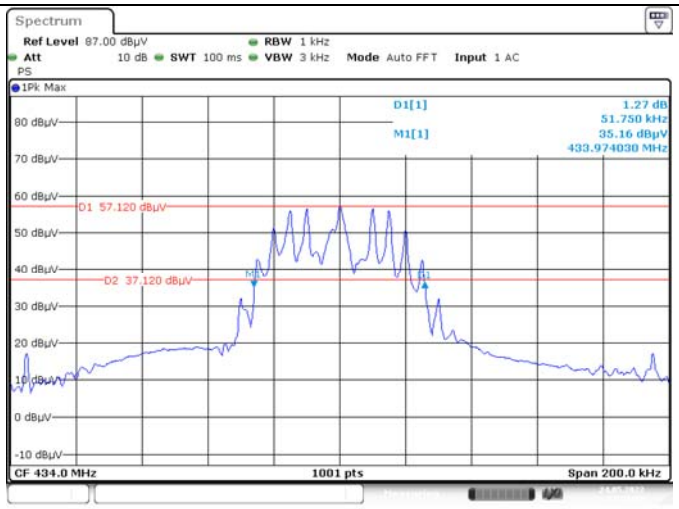
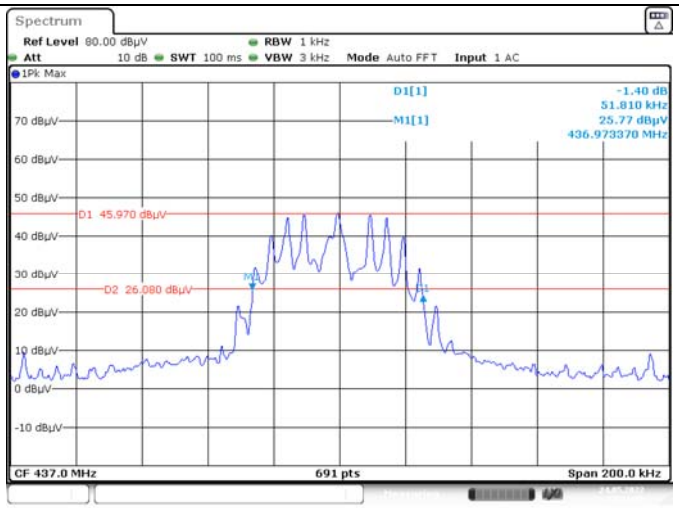
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Per pretest, the worst key: button 3 was recorded:

Test Frequency (MHz)	Mode	2dB Bandwidth (kHz)	Limit (kHz)
431	OOK	76.190	1077.500
434	OOK	76.700	1085.000
437	OOK	76.700	1092.500
431	GFSK	51.810	1077.500
434	GFSK	51.750	1085.000
437	GFSK	51.810	1092.500

OOK, 20dB Emission Bandwidth	
431 MHz	
434 MHz	
437 MHz	

GFSK, 20dB Emission Bandwidth	
431 MHz	
434 MHz	
437 MHz	

4.4 DEACTIVATION TESTING:

Serial Number:	CR22050013-RF-S1	Test Date:	2022-05-24
Test Site:	966-2	Test Mode:	Transmitting
Tester:	Gary Ling	Test Result:	Pass

Environmental Conditions:

Temperature: (℃)	24.5	Relative Humidity: (%)	66	ATM Pressure: (kPa)	100.3

Test Equipment List and Details:

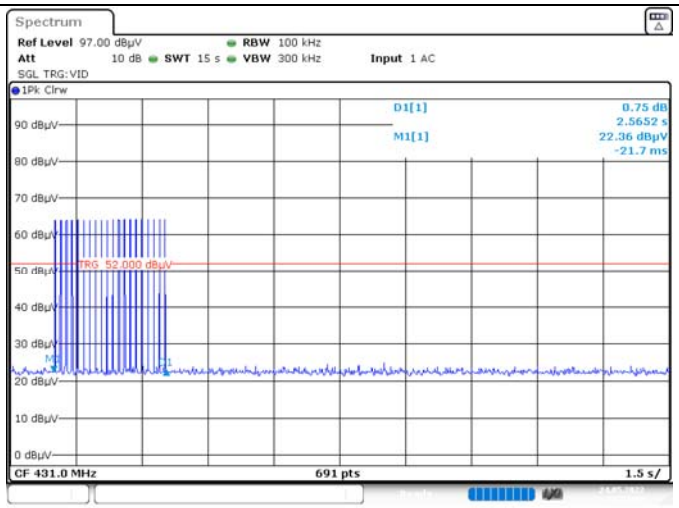
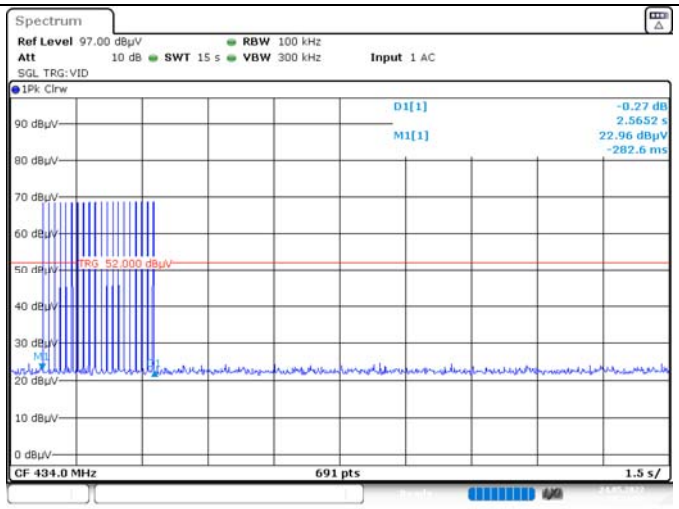
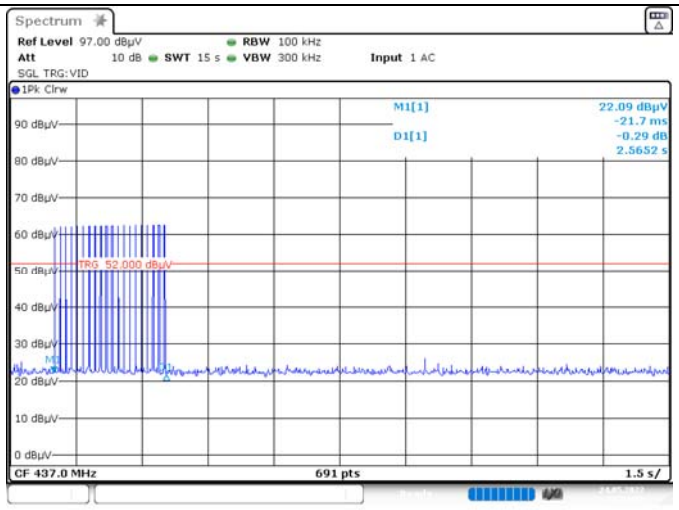
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB6	A082520-5	2020-10-19	2023-10-18
R&S	EMI Test Receiver	ESR3	102724	2021-07-22	2022-07-21
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2021-07-18	2022-07-17
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2021-07-18	2022-07-17
Audix	Test Software	E3	201021 (V9)	N/A	N/A

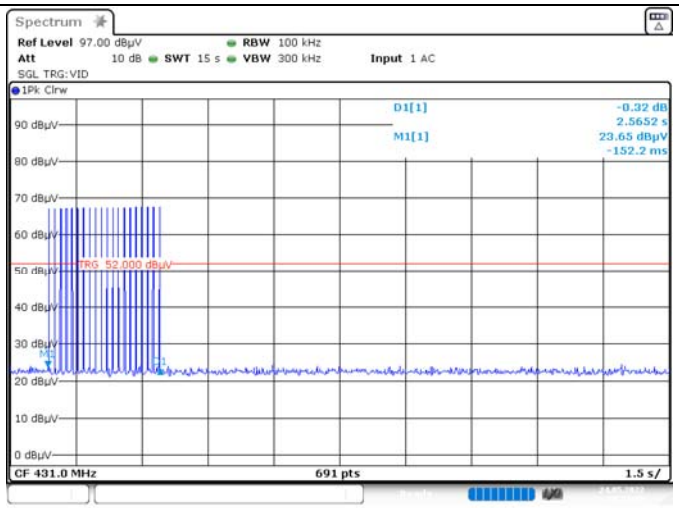
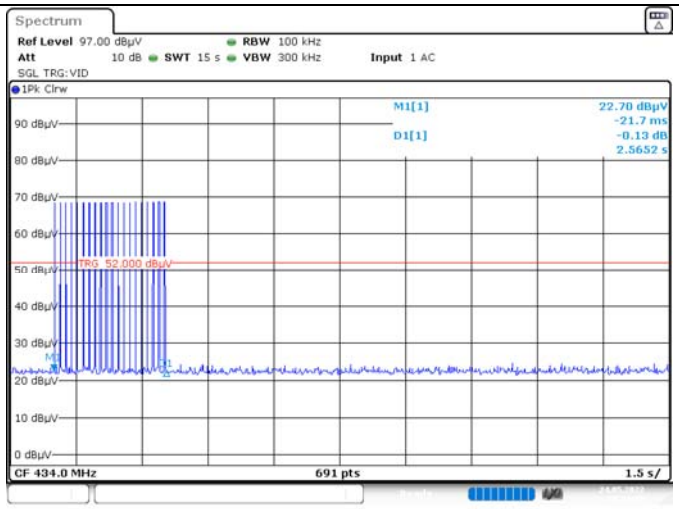
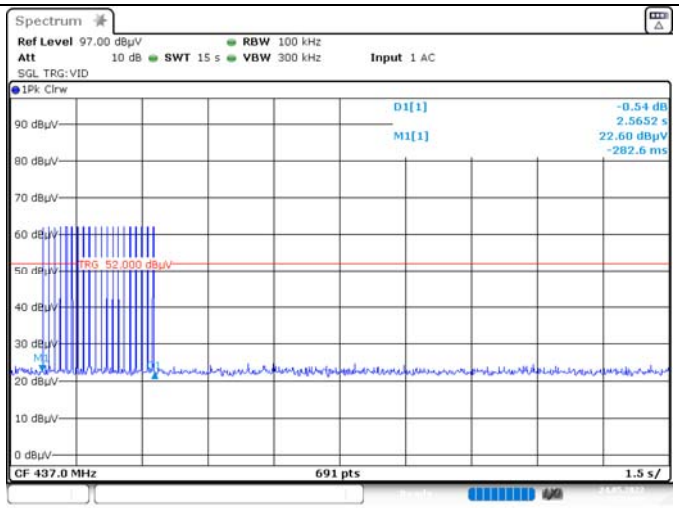
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Per pretest, the worst key: button 3 was recorded:

Test Frequency (MHz)	Mode	Maximum Deactivate Time (s)	Limit (s)
431	OOK	2.565	<5
434	OOK	2.565	<5
437	OOK	2.565	<5
431	GFSK	2.565	<5
434	GFSK	2.565	<5
437	GFSK	2.565	<5

OOK, DEACTIVATION TESTING	
431 MHz	
434 MHz	
437 MHz	

GFSK, DEACTIVATION TESTING	
431 MHz	
434 MHz	
437 MHz	

5. RF EXPOSURE EVALUATION

5.1 Applicable Standard

FCC §1.1307(b)(3)(i)(A)

a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance.

5.2 Procedure

According to 447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.2- 1-mW Test Exemption:

Per §1.1307(b)(3)(i)(A), a single RF source is *exempt RF device* (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance.

This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions. This is a standalone exemption, and it cannot be applied in conjunction with any other test exemption.

5.3 Measurement Result

Frequency (MHz)	Maximum Conducted power including Tune-up Tolerance▲		1-mW Test Exemption
	dBm	mW	
431-437	-0.5	0.89	Compliant

Note:
The Maximum Conducted power including Tune-up Tolerance was declared by manufacturer.
Maximum Antenna gain is 0dBi (-2.15dBd). So Conducted power was used for evaluation

Result: Compliant. RF Exposure is exemption**.**

===== END OF REPORT =====