

TEST REPORT

Applicant: CENTRAK, INC.
Address: 826 Newtown Yardley Road, Newtown, Pennsylvania
a 18940, United States
Equipment Type: Man Down
Model Name: 5-MDT00433-0
Brand Name: Elpas
FCC ID: ST2-5MDT000371
ISED Number: 6012A-5MDT000371
Test Standard: 47 CFR Part 15 Subpart C
RSS-Gen Issue 5
RSS-210 Issue 10
(refer section 3.1)
Test Date: Nov. 15, 2021 - Dec. 28, 2021
Date of Issue: Apr. 01, 2022

ISSUED BY:

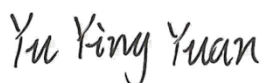
Shenzhen BALUN Technology Co., Ltd.

Tested by: Yu Yingyuan

Checked by: Ye Hongji

Approved by: Liao Jianming

(Technical Director)



Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Mar. 24, 2022</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>Apr. 01, 2022</u>	<u>Updated section 1.2</u>

TABLE OF CONTENTS

1	Administrative Data (GENERAL INFORMATION)	4
1.1	Identification of the Testing Laboratory	4
1.2	Identification of the Responsible Testing Location	4
2	PRODUCT INFORMATION	5
2.1	Applicant Information	5
2.2	Manufacturer Information	5
2.3	Factory Information	5
2.4	General Description for Equipment under Test (EUT)	5
2.5	Technical Information	6
3	SUMMARY OF TEST RESULTS	7
3.1	Test Standards	7
3.2	Test Verdict	7
4	GENERAL TEST CONFIGURATIONS	8
4.1	Test Environments	8
4.2	Test Equipment List	8
4.3	Measurement Uncertainty	9
4.4	Description of Test Setup	9
5	TEST ITEMS	12
5.1	Antenna Requirements	12
5.2	Conducted Emission	13
5.3	20 dB Bandwidth	14
5.4	Field Strength of Fundamental Emissions and Radiated Emissions	15
5.5	Transmitting Time	17
ANNEX A	TEST RESULT	18

A.1	Conducted Emissions	18
A.2	20 dB Bandwidth	19
A.3	Duty cycle.....	20
A.4	Field Strength of Fundamental Emissions.....	21
A.5	Radiated Emission.....	22
A.6	Transmitter Time.....	26
ANNEX B	TEST SETUP PHOTOS	27
ANNEX C	EUT EXTERNAL PHOTOS	27
ANNEX D	EUT INTERNAL PHOTOS.....	27

1 Administrative Data (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park Shahe Xi Road, Nanshan District Shenzhen, Guangdong Province, People's Republic of China
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park Shahe Xi Road, Nanshan District Shenzhen, Guangdong Province, People's Republic of China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A.
Description	All measurement facilities used to collect the measurement data are located at Block B, 1/F, Baisha Science and Technology Park Shahe Xi Road, Nanshan District Shenzhen, Guangdong Province, People's Republic of China

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	CENTRAK, INC.
Address	826 Newtown Yardley Road, Newtown, Pennsylvania 18940, United States

2.2 Manufacturer Information

Manufacturer	CENTRAK, INC.
Address	826 Newtown Yardley Road, Newtown, Pennsylvania 18940, United States

2.3 Factory Information

Factory	Concord Intelligent Technology (Huizhou) Ltd.
Address	25, Ping An Rd, Shuikou Street, Hui Cheng District, Huizhou City, Guangdong Province, China

2.4 General Description for Equipment under Test (EUT)

EUT Name	Man Down
Model Name Under Test	5-MDT00433-0
Series Model Name	N/A
Description of Model name differentiation	N/A
Serial Number	64243919
Hardware Version	RevD
Software Version	B00
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Technical Information

Network and Wireless connectivity	WIFI 802.11b, 802.11g, 802.11n 433.92 MHz
-----------------------------------	--

The requirement for the following technical information of the EUT was tested in this report:

Modulation Type	ASK
Product Type	<input type="checkbox"/> Mobile <input checked="" type="checkbox"/> Portable <input type="checkbox"/> Fix Location
Operating Frequency	433.92 MHz.
Antenna Type	Ceramic Antenna
Antenna Gain	0 dBi (In test items related to antenna gain, the final results reflect this figure. This value is provided by the applicant.)

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	RSS-Gen Issue 5	General Requirements for Compliance of Radio Apparatus
4	RSS-210 Issue 10	Licence-Exempt Radio Apparatus: Category I Equipment

3.2 Test Verdict

No.	Description	FCC Part No.	ISED Part No.	Test Result	Verdict
1	Antenna Requirement	15.203	RSS-Gen 6.8	--	Pass ^{Note1}
2	Conducted Emission	15.207	RSS-Gen 8.8	ANNEX A.1	N/A ^{Note2}
3	20 dB Bandwidth	15.231(c)	RSS-Gen 6.7	ANNEX A.2	Pass
4	Duty Cycle	15.35	--	ANNEX A.3	Pass
5	Field Strength of Fundamental Emissions	15.231(b)	RSS-210 8.9	ANNEX A.4	Pass
6	Radiated Emissions	15.209 15.231(b)	RSS-Gen 8.9	ANNEX A.5	Pass
7	Transmitting Time	15.231(a)	--	ANNEX A.6	Pass

Note 1: Please refer to section 5.1.

Note 2: The EUT only powered by battery, so the Conducted Emission test is not applicable.

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	45% to 55%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22°C to +25°C
Working Voltage of the EUT	NV (Normal Voltage)	3 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-40	101544	2021.04.01	2022.03.31
Signaling Unit	ROHDE&SCHWARZ	CMW500	142028	2021.06.01	2022.05.31
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2021.06.01	2022.05.31
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2021.06.01	2022.05.31
LISN	SCHWARZBECK	NSLK 8127	8127-687	2021.06.01	2022.05.31
Test Antenna- Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2021.04.16	2024.04.15
Test Antenna- Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2021.08.20	2024.08.19
Test Antenna- Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1917	2019.07.02	2022.07.01
Test Antenna- Horn (18-40 GHz)	A-INFO	LB- 180400KF	J211060273	2021.07.02	2023.07.01
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2022.02.20
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60 *7.35m	N/A	2019.08.08	2022.08.07
Shielded Enclosure	ChangNing	CN-130701	130703	--	--

4.3 Measurement Uncertainty

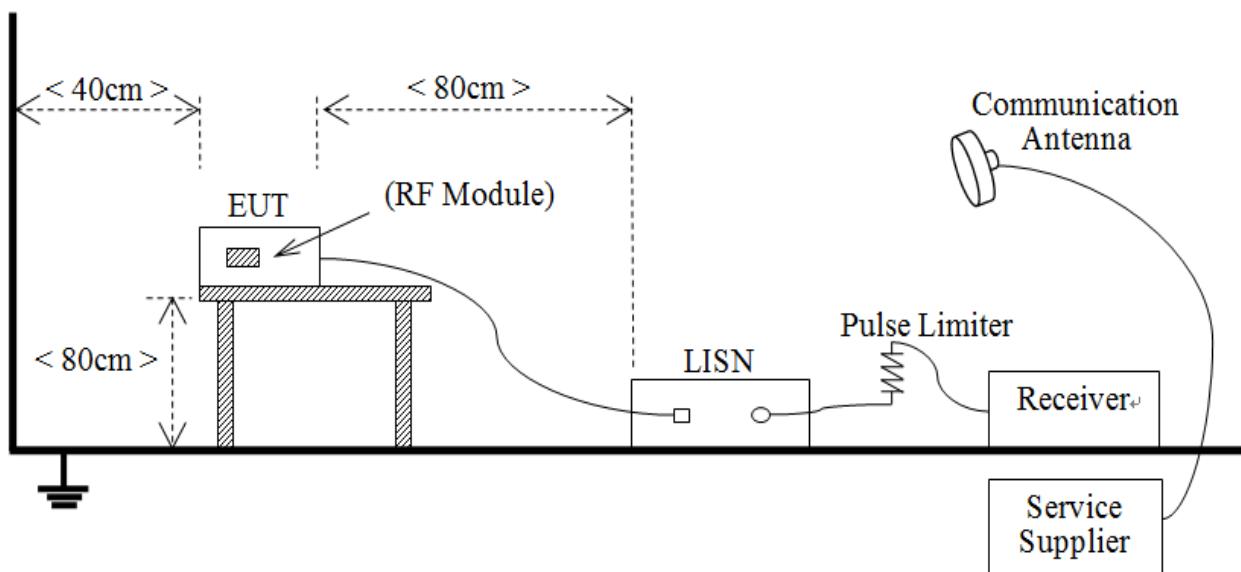
The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Parameters	Uncertainty
Occupied Channel Bandwidth	2.8%
RF output power, conducted	1.28 dB
Power Spectral Density, conducted	1.30 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.36 dB
Temperature	0.82°C
Humidity	4.1%

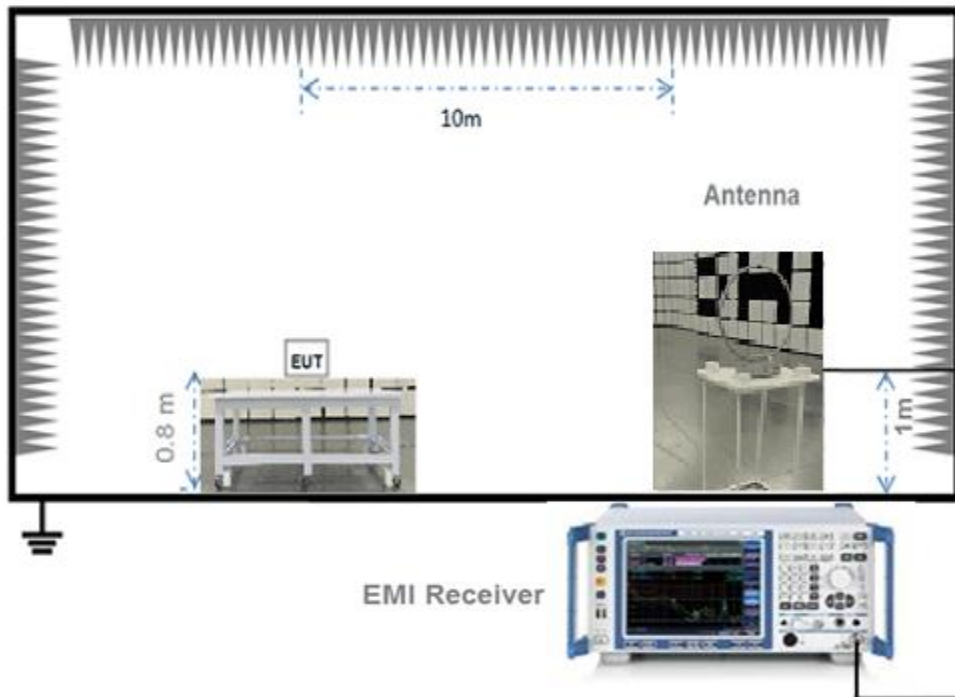
4.4 Description of Test Setup

4.4.1 For AC Power Supply Port Test



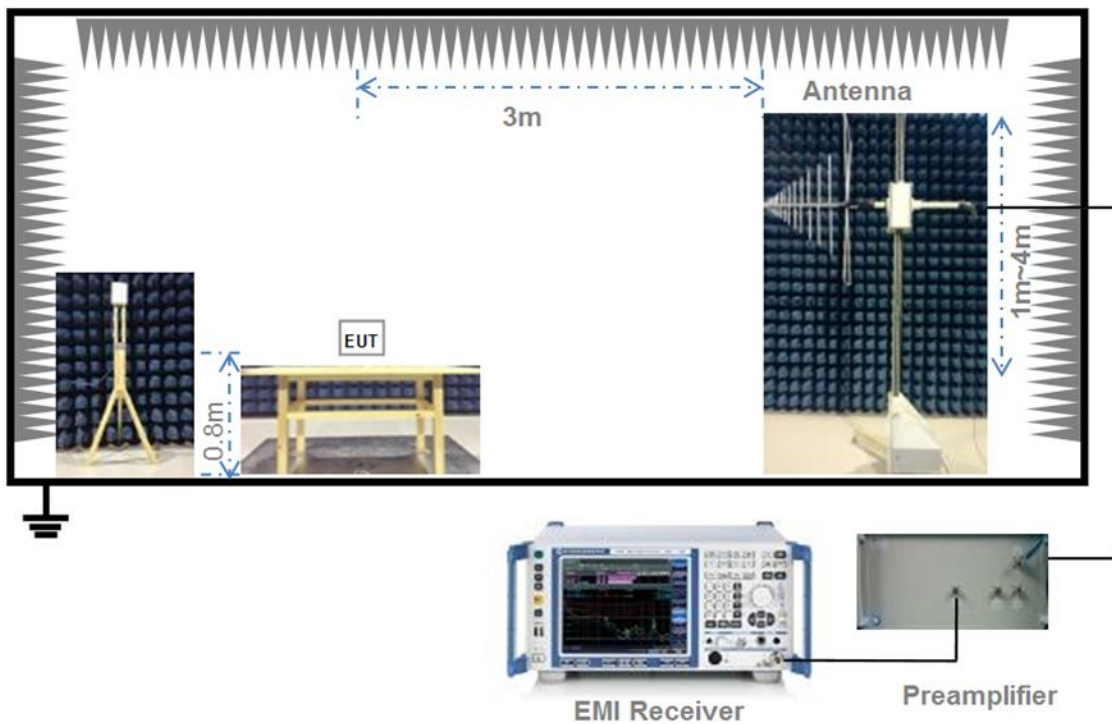
(Diagram 2)

4.4.2 For Radiated Test (Below 30 MHz)



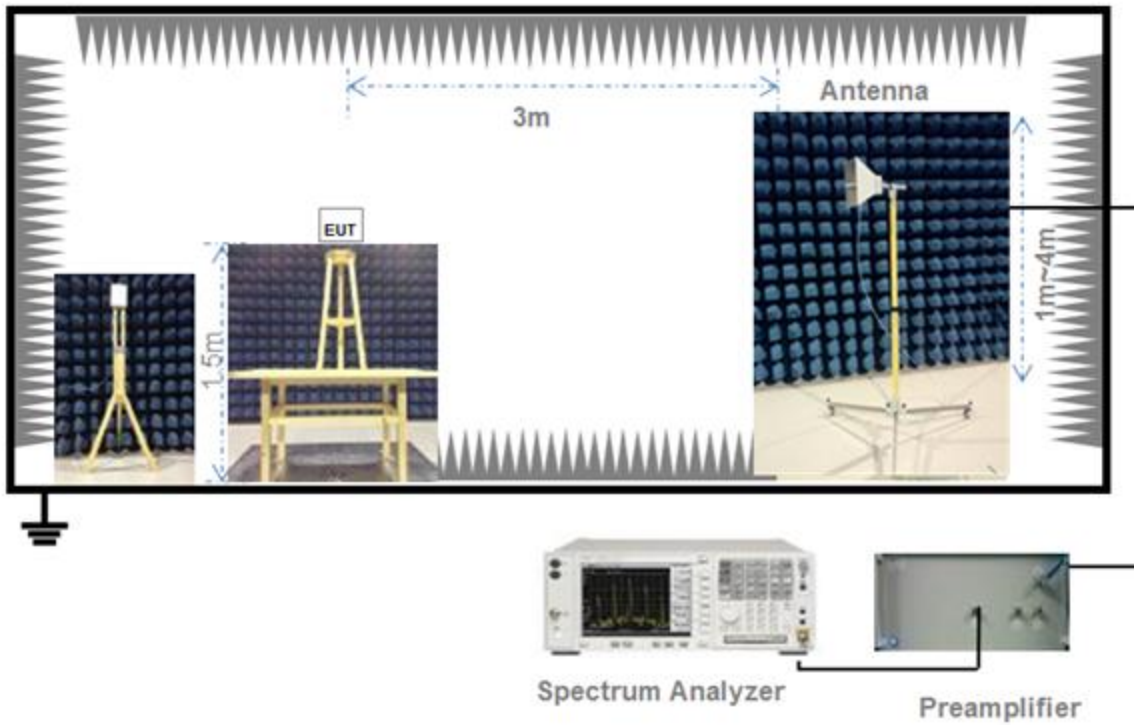
(Diagram 3)

4.4.3 For Radiated Test (30 MHz-1 GHz)



(Diagram 4)

4.4.4 For Radiated Test (Above 1 GHz)



(Diagram 5)

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Relevant Standards

FCC §15.203 & 15.247(b); RSS -Gen 6.8

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, or § 15.221. 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.

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is embedded in the product.	An embedded-in antenna design is used.

Reference Documents	Item
Photo	Please refer to the EUT Photo documents.

5.1.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5.2 Conducted Emission

5.2.1 Limit

FCC §15.207; RSS-Gen 8.8

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 within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

5.2.2 Test Setup

See section 4.4.1 for test setup description for the AC power supply port. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.2.4 Test Result

Please refer to ANNEX A.1.

5.3 20 dB Bandwidth

5.3.1 Limit

FCC §15.231; RSS-Gen 6.7

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. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.3.2 Test Setup

See section 4.4.3 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

Use the following spectrum analyzer settings:

Span = two times and five times the OBW

RBW = 1% to 5% of the OBW

VBW \geq three times RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.3.4 Test Result

Please refer to ANNEX A.2.

5.4 Field Strength of Fundamental Emissions and Radiated Emissions

5.4.1 Limit

FCC §15.231 & §15.209; RSS-210 8.9

According to FCC section 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	2250	225
70-130	1250	125
130-174	¹ 1250 to 3750	125 to 375
174-260	3750	375
260-470	¹ 3750 to 12500	375 to 1250
Above 470	12500	1250

¹Linear interpolations.

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$)
0.009 - 0.490	2400/F (kHz)
0.490 - 1.705	24000/F (kHz)
1.705 - 30.0	30
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

Note:

- For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
- For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.4.2 Test Setup

See section 4.4.2 to 4.4.4 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

The measurement frequency range is from 30 MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented. The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.4.4 Test Result

Please refer to ANNEX A.4 & A.5.

5.5 Transmitting Time

5.5.1 Limit

FCC §15.231

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

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

5.5.2 Test Setup

See section 4.4.3 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

The EUT transmitter was activated, the spectrum analyzer single sweep was triggered while a command on the EUT was activated and plots were captured

5.5.4 Test Result

Please refer to ANNEX A.6.

ANNEX A TEST RESULT

A.1 Conducted Emissions

Note: Not applicable.

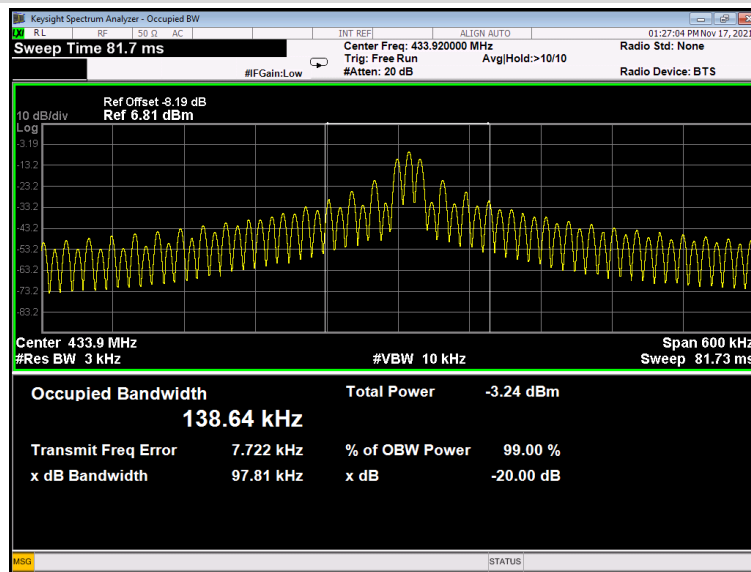
A.2 20 dB Bandwidth

Test Data

Frequency (MHz)	20 dB Bandwidth (kHz)	Limit (kHz)	Verdict
433.92	97.81	1084.8	Pass

Test plots

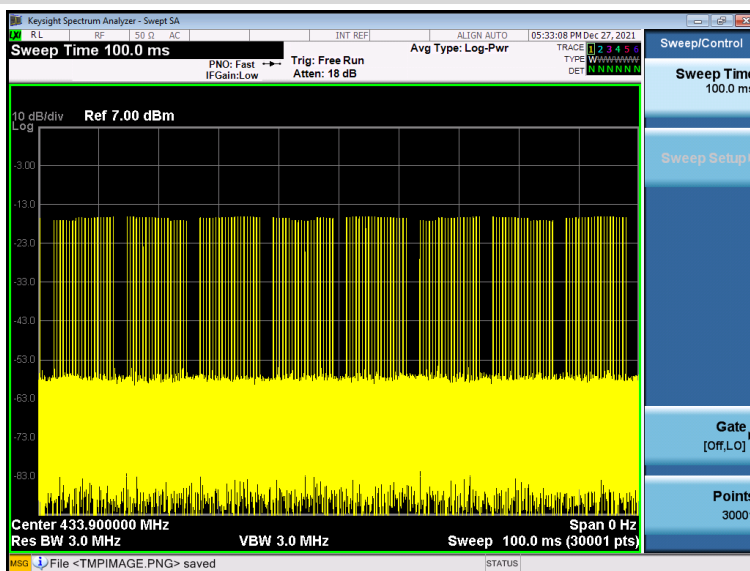
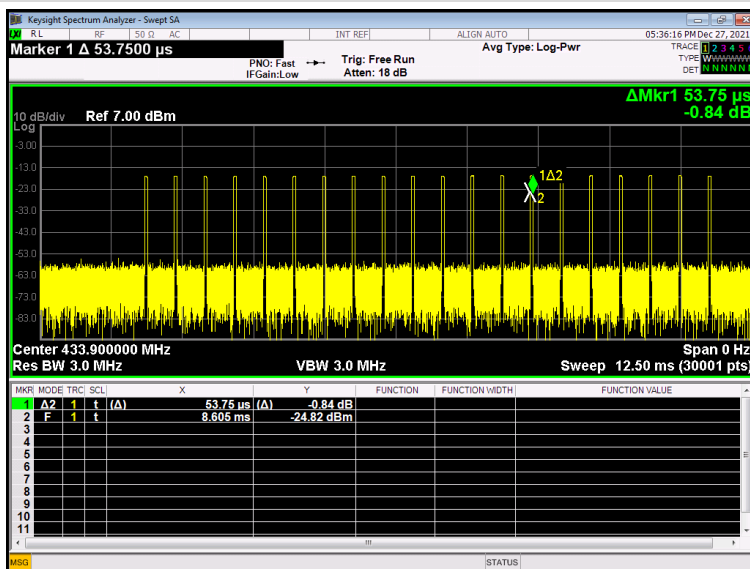
20 dB Bandwidth



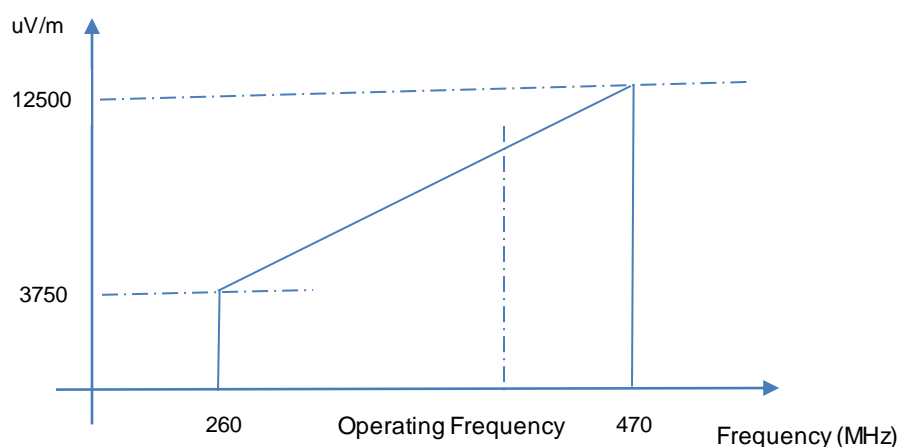
A.3 Duty cycle

Test Data and Plot

Data Transmissions	Number of pulses
Duty cycle correction factor	$20 \cdot \log(0.086) = -21.31 \text{ dB}$



A.4 Field Strength of Fundamental Emissions



The Field Strength of Fundamental Emissions (Operating Frequency) is:

$$3750 \text{ uV/m} = 20 \cdot \log(3750) \text{ dBuV/m} = 71.48 \text{ dBuV/m}$$

$$12500 \text{ uV/m} = 20 \cdot \log(12500) \text{ dBuV/m} = 81.94 \text{ dBuV/m}$$

Test Data

Field Strength of Fundamental Emissions and Field strength of spurious emissions Value					
Operating Frequency (MHz)	Field Strength (dBuV/m)	Detector	Limit @3m (dBuV/m)	Margin (dB)	Antenna
433.9	100.12	PEAK	100.8	0.68	Vertical
	100.76	PEAK	100.8	0.04	Horizontal
	78.81	AVERAGE	80.8	1.99	Vertical
	79.45	AVERAGE	80.8	1.35	Horizontal
867.8	49.37	PEAK	80.8	31.43	Vertical
	60.48	PEAK	80.8	20.32	Horizontal
	28.06	AVERAGE	60.8	32.74	Vertical
	39.17	AVERAGE	60.8	21.63	Horizontal

A.5 Radiated Emission

Note 1: The symbol of "--" in the table which means not application.

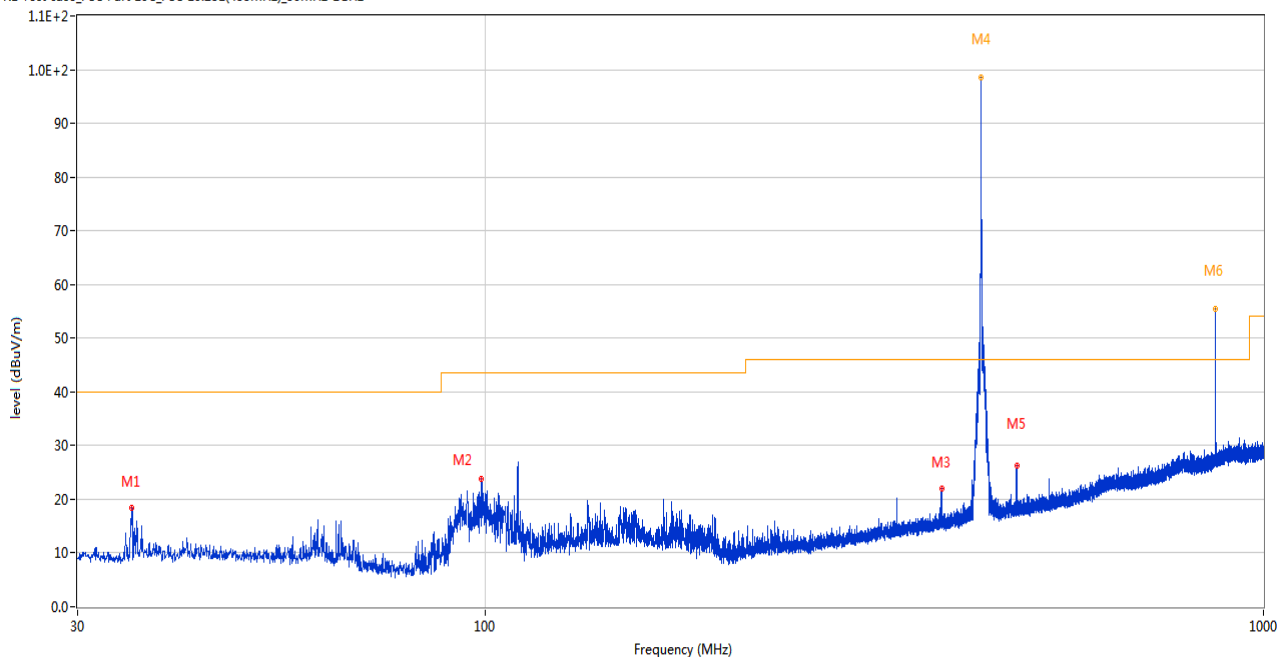
Note 2: The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Note 4: The verdict please refer to the A.3 field strength of fundamental emissions and field strength of spurious emissions value.

Test Data and Plots

30 MHz to 1 GHz, ANT H

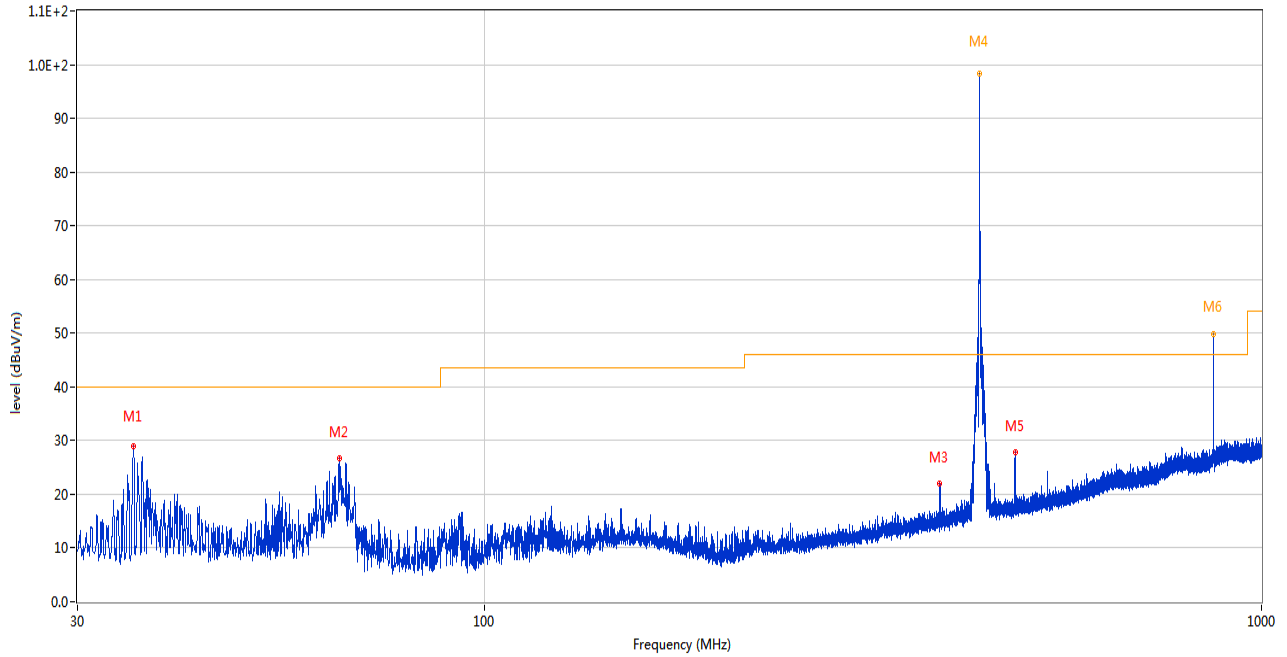
RE Test case_FCC Part 15C_FCC 15.231(433MHz)_30MHz-1GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	35.238	18.40	-26.58	40.0	-21.60	Peak	316.00	100	Horizontal	Pass
2	99.016	23.75	-28.84	43.5	-19.75	Peak	187.00	200	Horizontal	Pass
3	385.942	21.89	-21.53	46.0	-24.11	Peak	128.00	100	Horizontal	Pass
4	433.908	100.76	-19.84	46.0	-0.04	Peak	278.00	100	Horizontal	N/A
5	481.923	26.34	-18.74	46.0	-19.66	Peak	248.00	200	Horizontal	Pass
6	867.838	60.48	-8.97	46.0	-20.32	Peak	337.00	100	Horizontal	N/A

30 MHz to 1 GHz, ANT V

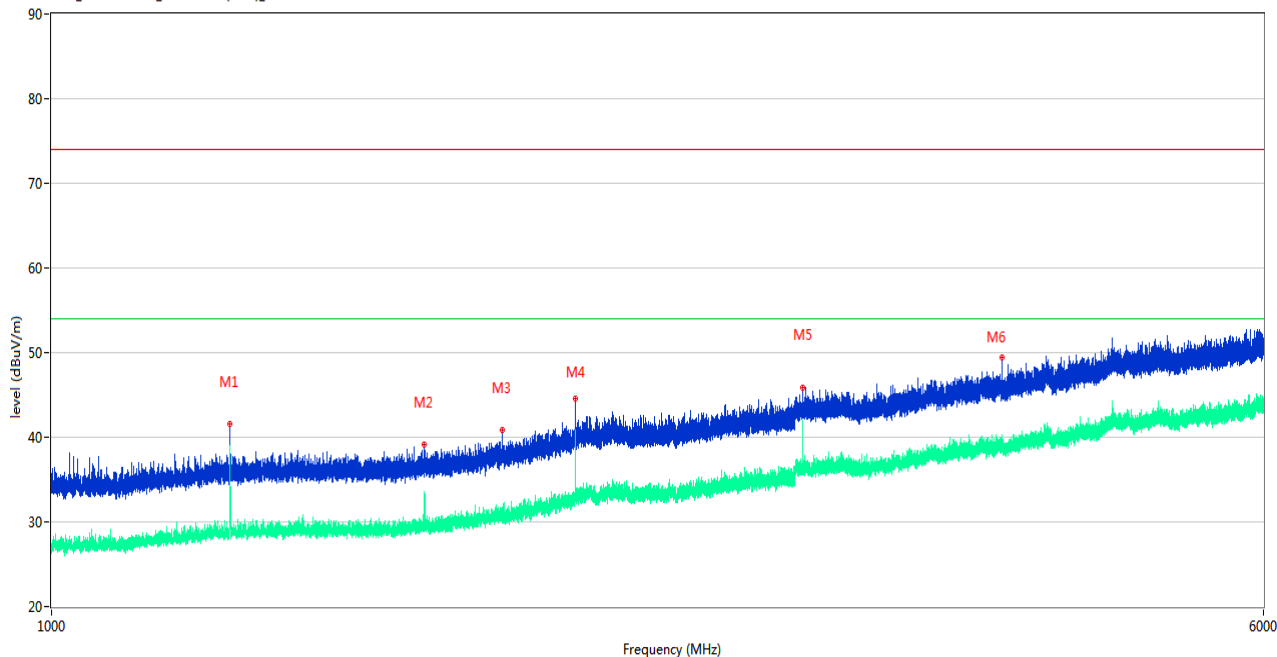
RE Test case_FCC Part 15C_FCC 15.231(433MHz)_30MHz-1GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	35.432	29.05	-26.56	40.0	-10.95	Peak	202.00	100	Vertical	Pass
2	65.114	26.73	-27.62	40.0	-13.27	Peak	76.00	100	Vertical	Pass
3	385.893	21.92	-21.53	46.0	-24.08	Peak	150.00	100	Vertical	Pass
4	433.908	100.12	-19.84	46.0	-0.68	Peak	360.00	100	Vertical	N/A
5	481.923	27.75	-18.74	46.0	-18.25	Peak	30.00	100	Vertical	Pass
6	867.838	49.37	-8.97	46.0	-31.43	Peak	139.00	100	Vertical	N/A

1 GHz to 6 GHz, ANT H

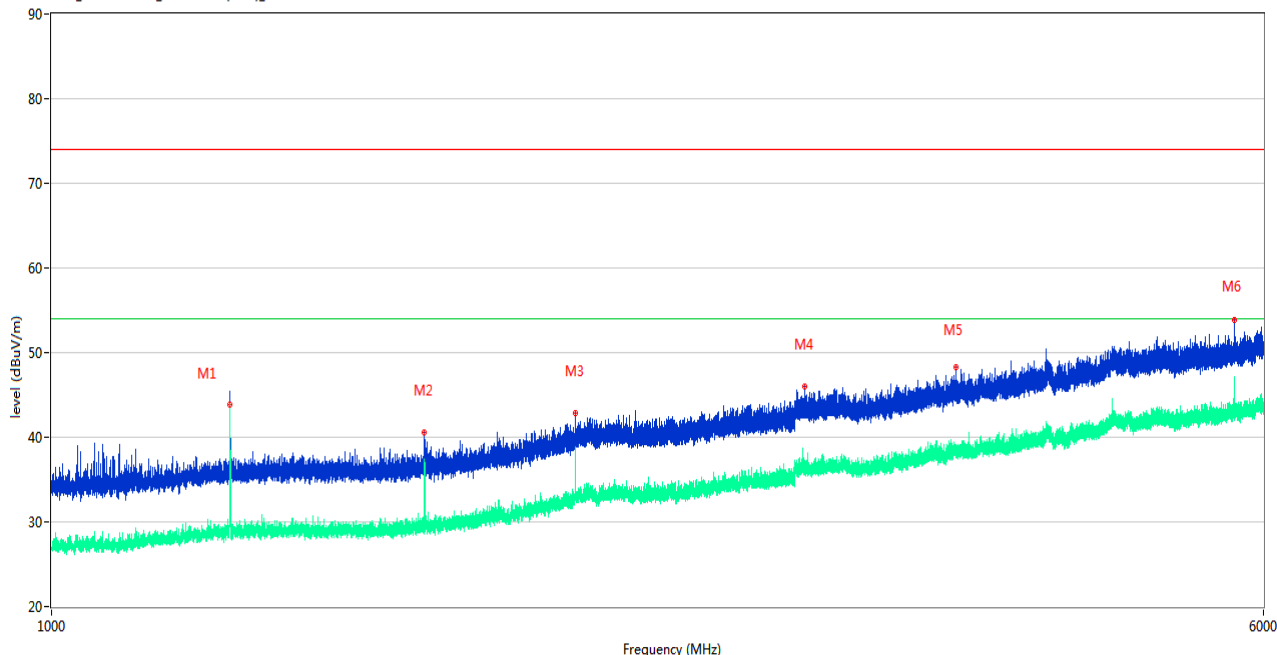
RE Test case_FCC Part 15C_FCC 15.249(2.4G)_1GHz-6GHz



No.	Frequency (MHz)	Results (dBUV/m)	Factor (dB)	Limit (dBUV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1301.800	41.64	-17.35	74.0	-32.36	Peak	188.00	150	Horizontal	Pass
1**	1301.800	39.07	-17.35	54.0	-14.93	AV	188.00	150	Horizontal	Pass
2	1735.900	39.13	-17.10	74.0	-34.87	Peak	0.00	150	Horizontal	Pass
2**	1735.900	33.08	-17.10	54.0	-20.92	AV	0.00	150	Horizontal	Pass
3	1947.500	40.87	-15.87	74.0	-33.13	Peak	348.00	150	Horizontal	Pass
3**	1947.500	30.68	-15.87	54.0	-23.32	AV	348.00	150	Horizontal	Pass
4	2169.800	44.58	-13.49	74.0	-29.42	Peak	148.00	150	Horizontal	Pass
4**	2169.800	40.50	-13.49	54.0	-13.50	AV	148.00	150	Horizontal	Pass
5	3037.950	46.19	-8.69	74.0	-27.81	Peak	125.00	150	Horizontal	Pass
5**	3037.950	41.06	-8.69	54.0	-12.94	AV	125.00	150	Horizontal	Pass
6	4077.600	49.36	-5.38	74.0	-24.64	Peak	360.00	150	Horizontal	Pass
6**	4077.600	38.83	-5.38	54.0	-15.17	AV	360.00	150	Horizontal	Pass

1 GHz to 6 GHz, ANT V

RE Test case_FCC Part 15C_FCC 15.249(2.4G)_1GHz-6GHz

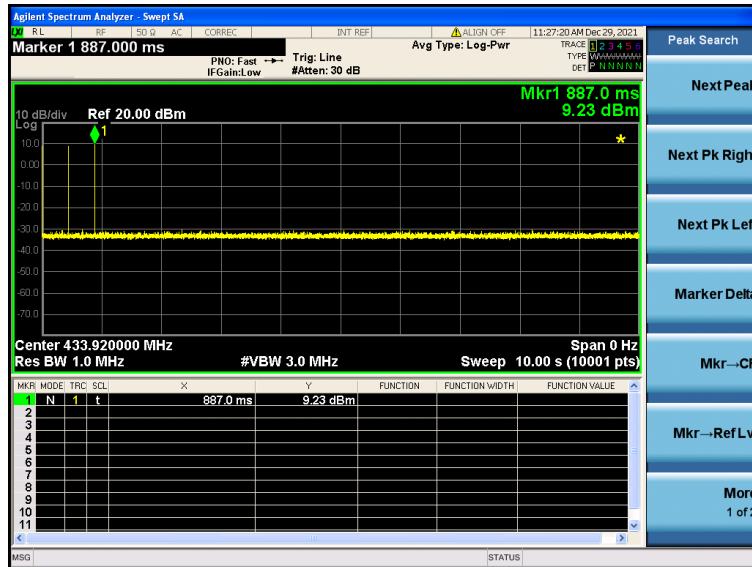


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1301.800	45.42	-17.35	74.0	-28.58	Peak	133.00	150	Vertical	Pass
1**	1301.800	43.83	-17.35	54.0	-10.17	AV	133.00	150	Vertical	Pass
2	1735.800	40.52	-17.11	74.0	-33.48	Peak	207.00	150	Vertical	Pass
2**	1735.800	36.38	-17.11	54.0	-17.62	AV	207.00	150	Vertical	Pass
3	2169.300	42.90	-13.49	74.0	-31.10	Peak	292.00	150	Vertical	Pass
3**	2169.300	36.17	-13.49	54.0	-17.83	AV	292.00	150	Vertical	Pass
4	3043.950	45.97	-8.21	74.0	-28.03	Peak	239.00	150	Vertical	Pass
4**	3043.950	36.79	-8.21	54.0	-17.21	AV	239.00	150	Vertical	Pass
5	3807.150	48.27	-5.51	74.0	-25.73	Peak	274.00	150	Vertical	Pass
5**	3807.150	39.08	-5.51	54.0	-14.92	AV	274.00	150	Vertical	Pass
6	5746.200	53.89	-2.46	74.0	-20.11	Peak	204.00	150	Vertical	Pass
6**	5746.200	47.09	-2.46	54.0	-6.91	AV	204.00	150	Vertical	Pass

A.6 Transmitter Time

Test Data and Plot

The active time is less than 1 seconds



ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ21B0190-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ21B0190-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ21B0190-AI.PDF”.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
3. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
4. The test data and results are only valid for the tested samples provided by the customer.
5. This report shall not be partially reproduced without the written permission of the laboratory.
6. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--