

Safe Space Scan Technology LLC

TEST REPORT

SCOPE OF WORK

FCC TESTING–ThunderBeat

REPORT NUMBER

240704035SZN-004

ISSUE DATE

24 October 2024

[REVISED DATE]

[-----]

PAGES

25

DOCUMENT CONTROL NUMBER

FCC 15C_Tx_b

© 2017 INTERTEK



RF TEST REPORT

Report No. : 240704035SZN-004

Product : Dongle

Model No. : ThunderBeat

FCC ID : 2BF6V-HT512DE

Applicant: Safe Space Scan Technology LLC
9169 W ATLANTIC AVE SUITE 118 DELRAY BEACH, FL 33446 US

**Test Method/
Standard:** FCC Part 15 Subpart E;
KDB 789033 D02 v02r01;
KDB 662911 D01 v02r01;
KDB 905462 D02 v02;
ANSI C63.10-2013

Test By: Intertek Testing Services Shenzhen Ltd. Longhua Branch
101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community,
GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.

Prepared and Checked by:

Mandy Chen
Engineer

Approved by:

Johnny Wang
Project Engineer
Date: 24 October 2024

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results referenced from this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
- For Terms And Conditions of the services, it can be provided upon request.
- The evaluation data of the report will be kept for 3 years from the date of issuance.

Intertek Testing Service Shenzhen Ltd. Longhua Branch

101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen.
Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751

Table of Contents

Summary of Tests	3
1. General information	4
1.1 Identification of the EUT	4
1.2 Additional information about the EUT	5
1.3 Antenna description (15.203)	5
1.4 Peripherals equipment.....	5
2. Test specifications	5
2.1 Test standard	6
2.2 Operation mode.....	6
2.3 EUT Exercising Software.....	7
3. Maximum Output Power test (FCC 15.407)	8
3.1 Operating environment.....	8
3.2 Test setup & procedure.....	8
3.3 Limit	8
3.4 Measured data of Maximum Output Power test results	8
4. Power Spectrum Density test (FCC 15.407).....	9
4.1 Operating environment.....	9
4.2 Test setup & procedure.....	9
4.3 Limit	9
4.4 Measured data of Power Spectrum Density test results.....	9
5. Minimum 6 dB RF Bandwidth (FCC 15.407)	10
5.1 Operating environment.....	10
5.2 Test setup & procedure.....	10
5.3 Limit	11
5.4 Measured data of 26dB down Emission Bandwidth test results.....	11
6. Radiated Emission test (FCC 15.205 & 15.209 & 15.407)	12
6.1 Operating environment.....	12
6.2 Test setup & procedure.....	12
6.3 Limit	14
6.4 Radiated spurious emission test data	16
6.4.1 Measurement results: frequencies equal to or less than 1 GHz	16
6.4.2 Measurement results: frequency above 1GHz	18
7. Power Line Conducted Emission test	20
7.1 Operating environment.....	20
7.2 Test setup & procedure.....	20
7.3 Limit	20
7.4 Power Line Conducted Emission test data	21
8. Frequency Stability Test	23
8.1 Test setup & procedure.....	23
8.2 Frequency Stability Test Data	24

Summary of Tests

FCC Parts	Test	Section	Results
15.203	Antenna Requirement	1.3	Pass
15.407 a (1)/(3)	Maximum output power test	3	Pass
15.407 a (1)/(3)	Power Spectrum Density test	4	Pass
15.407 e	6dB Bandwidth	5	Pass
15.407 b, 15.205, 15.209	Radiated spurious emission test	6	Pass
15.207	AC line conducted emission test	7	Pass
15.407 g	Frequency Stability	8	Pass

1. General information

1.1 Identification of the EUT

Product: Dongle

Model No.: ThunderBeat

Type of Device: N/A

Nominal Channel Bandwidth: 6MHz

Frequency range: 5155MHz~5245 MHz

Channel Number and Operating Frequency: 91 channels for 5155 MHz ~ 5245 MHz

Modulation: GFSK

Rated Power: DC 5V/1.2A from adapter

Test Date(s): 04 July 2024 to 18 September 2024

Note 1: This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Note 2: When determining the test conclusion, the Measurement Uncertainty of test has been considered.

1.2 Additional information about the EUT

The equipment under test (EUT) is a Dongle with Bluetooth 5.3 (dual-mode) function operating in 2402-2480MHz, 5.2GHz function operating in 5155-5245MHz and 5.8GHz function operating in 5730-5848MHz. The EUT is powered by DC 5V/1.2A from adapter. For more detail information pls. refer to the user manual.

For more detail features, please refer to User's description as file name "descri.pdf".

Related Submittal(s) Grants

This is an application for certification of 5G transceiver device

For the BT classic function was tested and demonstrated in report 240704035SZN-001.

For the BT BLE function was tested and demonstrated in report 240704035SZN-002.

For the 5.8GHz function was tested and demonstrated in report 240704035SZN-003.

1.3 Antenna description (15.203)

The EUT uses PCB Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

Antenna1 Gain: 2.44 dBi Max for 5.2G.

Antenna2 Gain: 1.97 dBi Max for 5.2G.

(This information is provided by applicant, and the applicant is responsible for the authenticity of the provided information.)

1.4 Peripherals equipment

Description	Manufacturer	Remark
mobile phone	Samsung (provided by Intertek)	S7
AC/DC Adapter	N/A (provided by Client)	Model: DK12-050-1200-SU Input: 100-240V~ 50/60Hz 0.25A Max Output: DC 5V,1.2A(6.0W)
Dummy Load	N/A (provided by Intertek)	Audio Port: 1000Ω Video Port: 75 Ω HDMI Port: 100 Ω
Audio Cable	N/A (provided by Client)	3.5mm to 3.5mm Unshielded, Length 100cm
Audio Cable	N/A (provided by Client)	3.5mm to 2.5mm Unshielded, Length 100cm
HDMI Extension Cable	N/A (provided by Client)	Detachable, Length 50cm
USB-C Cable	N/A (provided by Client)	Unshielded, Length 100cm

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 E, Section 15.203, 15.207, 15.209, 15.407 and ANSI C63.10/2013, method of measurement: KDB 789033.

The test of radiated measurements according to FCC Part 15 Section 15.33(a) had been conducted and the field strength of this frequency band was all meet limit requirement, thus we evaluate the EUT pass the specified test.

The AC power conducted emissions was invested over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz (15.207 paragraph).

Radiated emissions were invested cover the frequency range from 9KHz to 30MHz using a receiver RBW of 9kHz, from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency over 1 GHz using a spectrum analyzer RBW of 1 MHz, VBW of 3MHz, Detector=Peak record for Peak reading, RBW of 1 MHz, VBW of 3MHz, Detector=RMS record for Average reading recorded on the report.

The EUT setup configurations please refer to the photo of radiated setup photos.pdf & conducted setup photos.pdf.

2.2 Operation mode

The EUT was supplied by and it was run in TX mode that was controlled by client provided RF testing program.

The EUT was transmitted continuously during the test. The worst case test result was showed in the report.

2.3 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Test software: sscom.5.13.1

3. Maximum Output Power test (FCC 15.407)**3.1 Operating environment**

Temperature: 25 °C

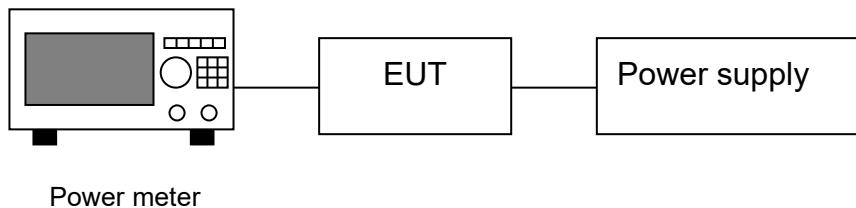
Relative Humidity: 55 %

Atmospheric Pressure: 1011 hPa

3.2 Test setup & procedure

The power output per FCC §15.407(a) was measured on the EUT using a 50 ohm SMA cable connected to Average Power Meter and the measurement method refer to 789033 D02. Power was read directly and cable loss correction (0.5dB) was added to the reading to obtain power at the EUT antenna terminals.

Block Diagram:



Power meter

3.3 Limit

Frequency range (MHz)	Max Conducted TX Power	Max EIRP
5150~5250	30dBm (1W) for master device 24dBm (250mW) for client device	4W (36dBm) with 6dBi antenna

Remark: 1) *Where B is the 26dB emission Bandwidth in MHz.
2) The device was declared as Slave device.
3) Tx Power Reduction (dBm-by-dBi) required when antenna exceeds 6dBi.

3.4 Measured data of Maximum Output Power test results**Max Conducted TX Power**

The more detail please refer to "Appendix of 240704035SZN-004" Appendix B.

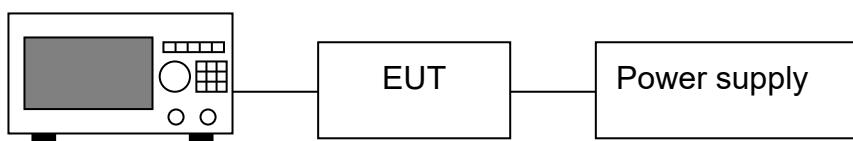
4. Power Spectrum Density test (FCC 15.407)**4.1 Operating environment**

Temperature: 25 °C
Relative Humidity: 50 %
Atmospheric Pressure: 1013 hPa

4.2 Test setup & procedure**Method of Measurement:**

The power spectrum density per FCC §15.407(a) was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 1MHz/500KHz, the video bandwidth set at 3 MHz/2MHz (measurement method refer to KDB 789033 D02). Power spectrum density was read directly and cable loss reading to obtain power at the EUT antenna terminals.

Block Diagram:



Spectrum Analyzer

4.3 Limit

Frequency range(MHz)	Max Conducted Power Spectral Density
5150~5250	*17dBm/MHz for master device
	11dBm/MHz for mobile/portable client device

Remark: 1) The device was declared as Slave device.
2) Tx Power Reduction (dBm-by-dBi) required when antenna exceeds 6dBi.

4.4 Measured data of Power Spectrum Density test results

The more detail please refer to "Appendix of 240704035SZN-004" Appendix C.

5. Minimum 6 dB RF Bandwidth (FCC 15.407)

5.1 Operating environment

Temperature: 25 °C
Relative Humidity: 50 %
Atmospheric Pressure: 1011 hPa

5.2 Test setup & procedure

The Minimum 6 dB RF Bandwidth per 789033 D02 was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100KHz, and set the video bandwidth (VBW) $\geq 3 \times$ RBW. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

For 26dB down Emission Bandwidth

The 26dB down Emission Bandwidth per 789033 D02 was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set RBW = approximately 1% of the emission bandwidth. Set the VBW $>$ RBW, Detector = Peak, Trace mode = max hold (Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%).

For 99% Occupied Bandwidth

The 99% Occupied Bandwidth per 789033 D02 was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set center frequency to the nominal EUT channel center frequency, set span = 1.5 times to 5.0 times the OBW, set RBW = 1 % to 5 % of the OBW, set VBW $\geq 3 \times$ RBW, The 99% occupied bandwidth was determined from where the channel output spectrum intersected the display line.

Block Diagram:



Spectrum Analyzer

5.3 Limit

Frequency range(MHz)	Minimum 6 dB RF Bandwidth Limit
5150~5250	N/A

5.4 Measured data of 26dB down Emission Bandwidth test results

The more detail please refer to “Appendix of 240704035SZN-004” Appendix A1.

Note: 99% Occupied Bandwidth for reference. The more detail please refer to “Appendix of 240704035SZN-004” Appendix A2.

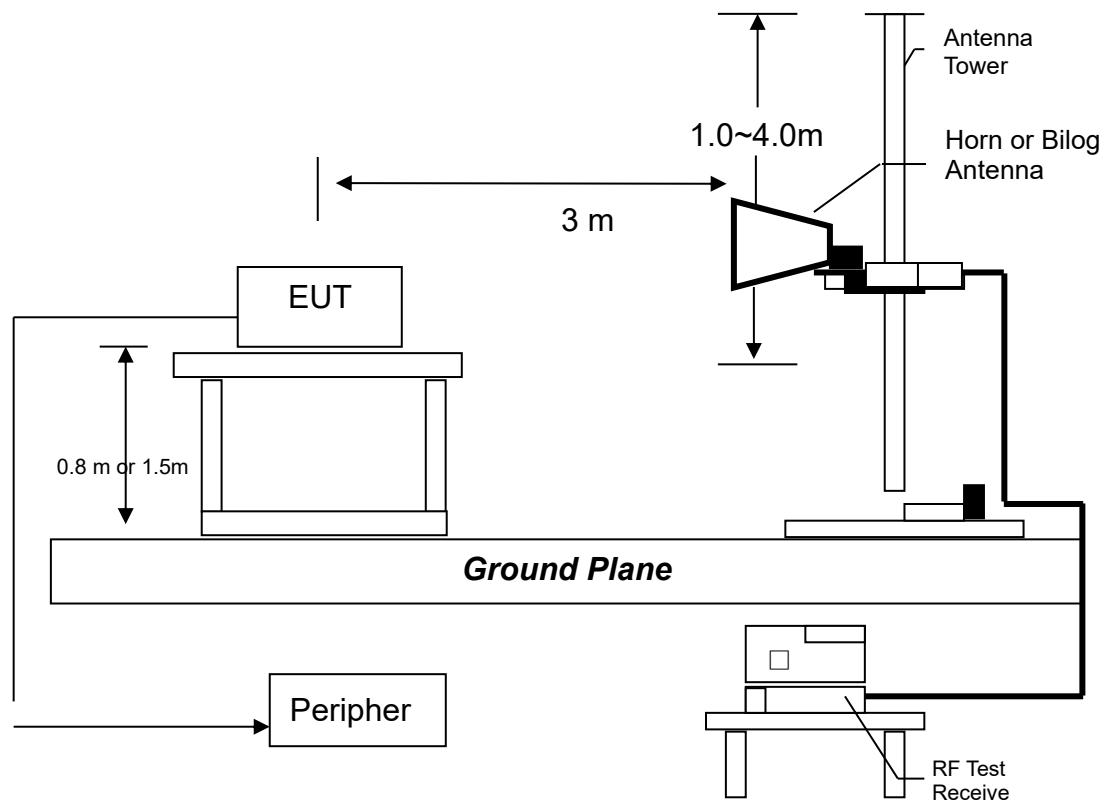
6. Radiated Emission test (FCC 15.205 & 15.209 & 15.407)

6.1 Operating environment

Temperature: 23 °C
Relative Humidity: 56 %
Atmospheric Pressure 1011 hPa

6.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emission measurements were performed from 9KHz to tenth harmonic or 40GHz.

The EUT for testing is arranged on a styrene turntable with the height of 0.8m up to 1GHz and 1.5m above 1GHz. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

Testing settings (refer to KDB 789033 D02)

Peak Measurements below 1GHz

- 1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
- 2, Span=encompass the entire emission
- 3, RBW=120KHz
- 4, Detector=Quasi-Peak
- 5, Trace was allowed to stabilize

Peak Measurements above 1GHz

- 1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
- 2, Span=encompass the entire emission
- 3, RBW=1MHz
- 4, VBW=3MHz
- 4, Detector= Peak (Max-hold)
- 5, Trace was allowed to stabilize

Average Measurements above 1GHz

- 1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
- 2, Span=encompass the entire emission
- 3, RBW=1MHz
- 4, VBW=3MHz
- 4, Detector= RMS (Max-hold)
- 5, Trace was allowed to stabilize

6.3 Limit

The spurious Emission shall test through the 10th harmonic or 40GHz (whichever is lower). In addition, 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).

Notes:

- 1, All emission out-side of the 5.15-5.35GHz band shall not exceed an EIRP of -27dBm/MHz (68.2dBuV/m, test distance: 3 meter).
- 2, The spectrum is measured from 9KHz to the 10th harmonic of the fundamental frequency of the transmitter using QP detector below 1GHz, above 1GHz, average & peak measurements were taken using for test. The worst-case emission are reported however emission whose levels were not within 20dB of the respective limited were not reported.
- 3, The test was performed on EUT under GFSK continuously transmitting mode. Simultaneous transmitting was considered during the testing. All mode had been tested, but only the worst-case is recorded in the following graph and table.

6.3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD$$

Where FS = Field Strength in dB μ V/m

 RA = Receiver Amplitude (including preamplifier) in dB μ V

 CF = Cable Attenuation Factor in dB

 AF = Antenna Factor in dB

 AG = Amplifier Gain in dB

 PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD$$

Example

Assume a receiver reading of 62.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 62.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$PD = 0 \text{ dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 \text{ dB}\mu\text{V/m}$$

$$\text{Level in mV/m} = \text{Common Antilogarithm} [(42 \text{ dB}\mu\text{V/m})/20] = 125.9 \mu\text{V/m}$$

6.4 Radiated spurious emission test data**6.4.1 Measurement results: frequencies equal to or less than 1 GHz**

Applicant: Safe Space Scan Technology LLC

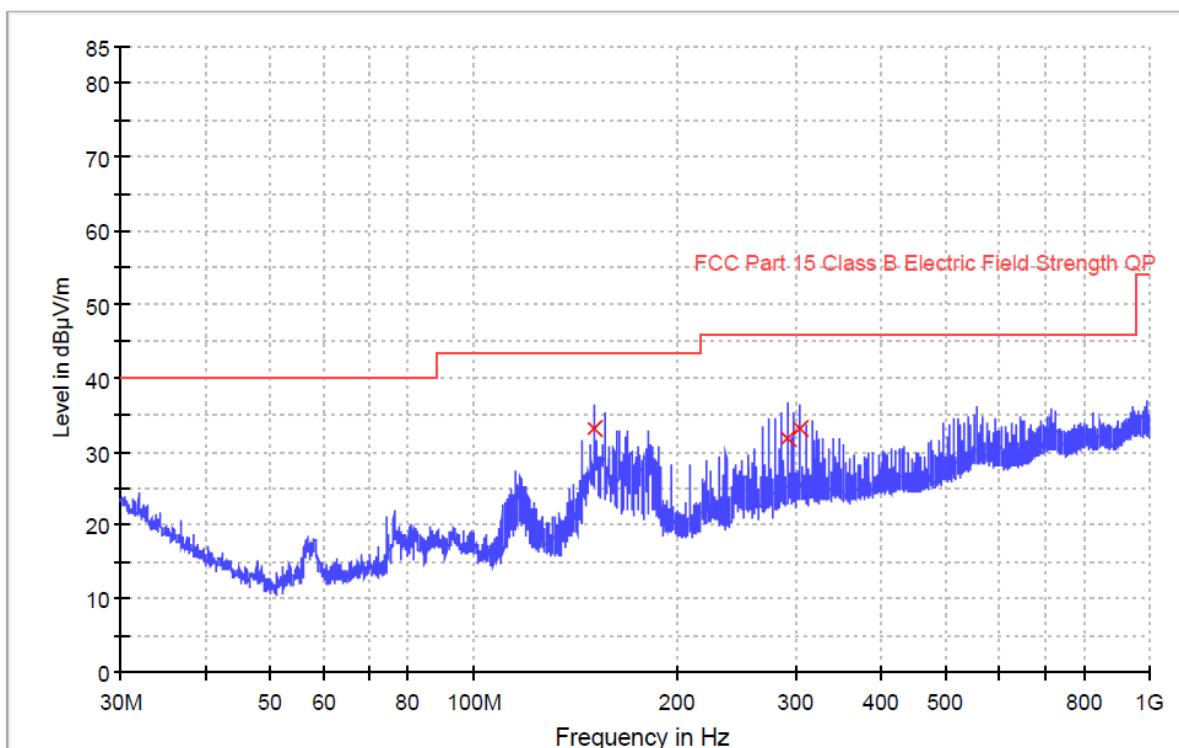
Date of Test: 16 July 2024

Model: ThunderBeat

Worst Case Operating Mode: Simultaneous Transmission

Radiated Emissions

ANT Polarity: Horizontal



Frequency (MHz)	Quasi Peak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit – QPK (dB μ V/m)
150.538667	33.0	1000.0	120.000	H	16.4	10.5	43.5
291.803000	31.7	1000.0	120.000	H	20.1	14.3	46.0
304.154333	33.1	1000.0	120.000	H	20.4	12.9	46.0

NOTES:

1. Quasi-Peak detector is used for frequency below 1GHz.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. All emissions are below the QP limit.

Applicant: Safe Space Scan Technology LLC

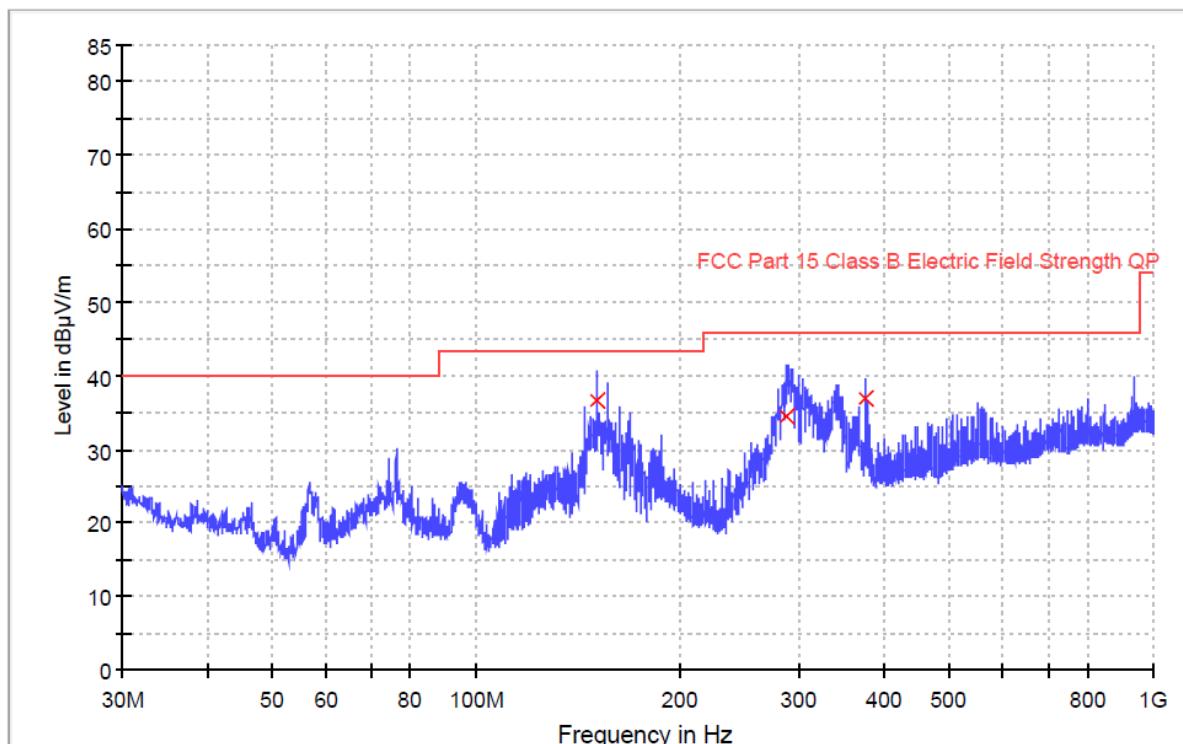
Date of Test: 16 July 2024

Model: ThunderBeat

Worst Case Operating Mode: Simultaneous Transmission

Radiated Emissions

ANT Polarity: Vertical



Frequency (MHz)	Quasi Peak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit – QPK (dB μ V/m)
150.474000	36.7	1000.0	120.000	V	16.3	6.8	43.5
287.632000	34.6	1000.0	120.000	V	20.0	11.4	46.0
377.292333	36.8	1000.0	120.000	V	24.3	9.2	46.0

NOTES:

1. Quasi-Peak detector is used for frequency below 1GHz.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. All emissions are below the QP limit.

6.4.2 Measurement results: frequency above 1GHz

The worst case occurred at Ant 1

Channel 5155MHz

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	10310.000	43.2	36.3	38.9	45.8	68.2	-22.4
Horizontal	15465.000	42.4	34.7	41.0	48.7	68.2	-19.5
Horizontal	5150.000	47.9	33.5	32.9	47.3	68.2	-20.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	10310.000	27.8	36.3	38.9	30.4	54.0	-23.6
Horizontal	15465.000	29.3	34.7	41.0	35.6	54.0	-18.4

Channel 5195MHz

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	10390.000	42.0	36.3	38.9	44.6	68.2	-23.6
Horizontal	15585.000	44.4	34.7	41.0	50.7	68.2	-17.5

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	10390.000	28.6	36.3	38.9	31.2	54.0	-22.8
Horizontal	15585.000	32.4	34.7	41.0	38.7	54.0	-15.3

Channel 5245MHz

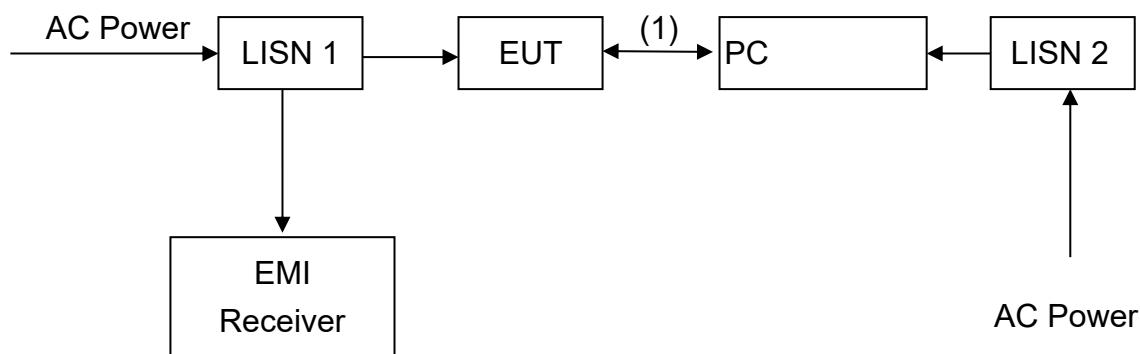
Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	10490.000	43.2	36.3	38.9	45.8	68.2	-22.4
Horizontal	15735.000	44.0	34.7	41.0	50.3	68.2	-17.9
Horizontal	5350.000	49.1	33.4	33.2	48.9	68.2	-19.3

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	10490.000	29.1	36.3	38.9	31.7	54.0	-22.3
Horizontal	15735.000	29.5	34.7	41.0	35.8	54.0	-18.2

- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function. All unwanted emissions outside of the 5.15-5.35GHz bands is complied with the limit.

7. Power Line Conducted Emission test**7.1 Operating environment**

Temperature: 24 °C
Relative Humidity: 55 %
Atmospheric Pressure 1011 hPa

7.2 Test setup & procedure

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50 uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm/50 uH coupling impedance with 50 ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10/2013 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCI 30) is set at 9 kHz.

7.3 Limit

Frequency (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

7.4 Power Line Conducted Emission test data

Applicant: Safe Space Scan Technology LLC

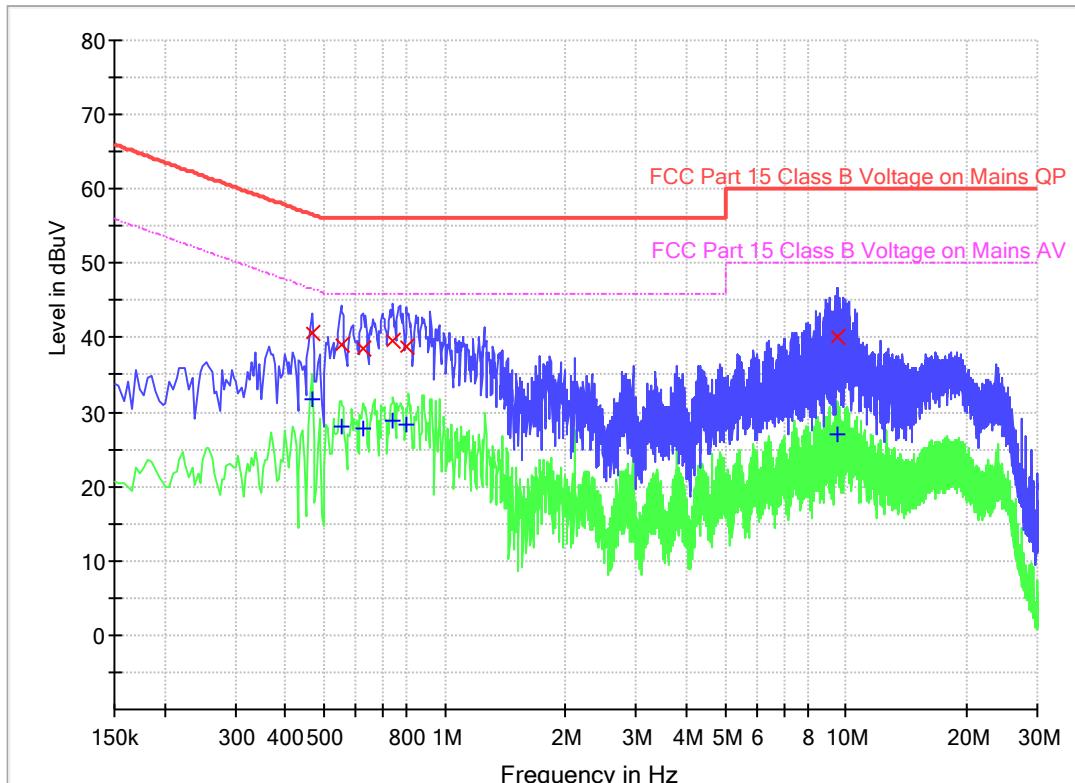
Date of Test: 16 July 2024

Model: ThunderBeat

Worst Case Operating Mode:

Simultaneous Transmission

Phase: Live



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.466000	40.6	9.000	L1	9.6	16.0	56.6
0.550000	39.1	9.000	L1	9.6	16.9	56.0
0.626000	38.5	9.000	L1	9.6	17.5	56.0
0.742000	39.7	9.000	L1	9.6	16.3	56.0
0.802000	38.9	9.000	L1	9.6	17.1	56.0
9.538000	40.2	9.000	L1	9.9	19.8	60.0

Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.466000	31.7	9.000	L1	9.6	14.9	46.6
0.550000	28.1	9.000	L1	9.6	17.9	46.0
0.626000	27.8	9.000	L1	9.6	18.2	46.0
0.742000	28.7	9.000	L1	9.6	17.3	46.0
0.802000	28.2	9.000	L1	9.6	17.8	46.0
9.538000	27.1	9.000	L1	9.9	22.9	50.0

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

Applicant: Safe Space Scan Technology LLC

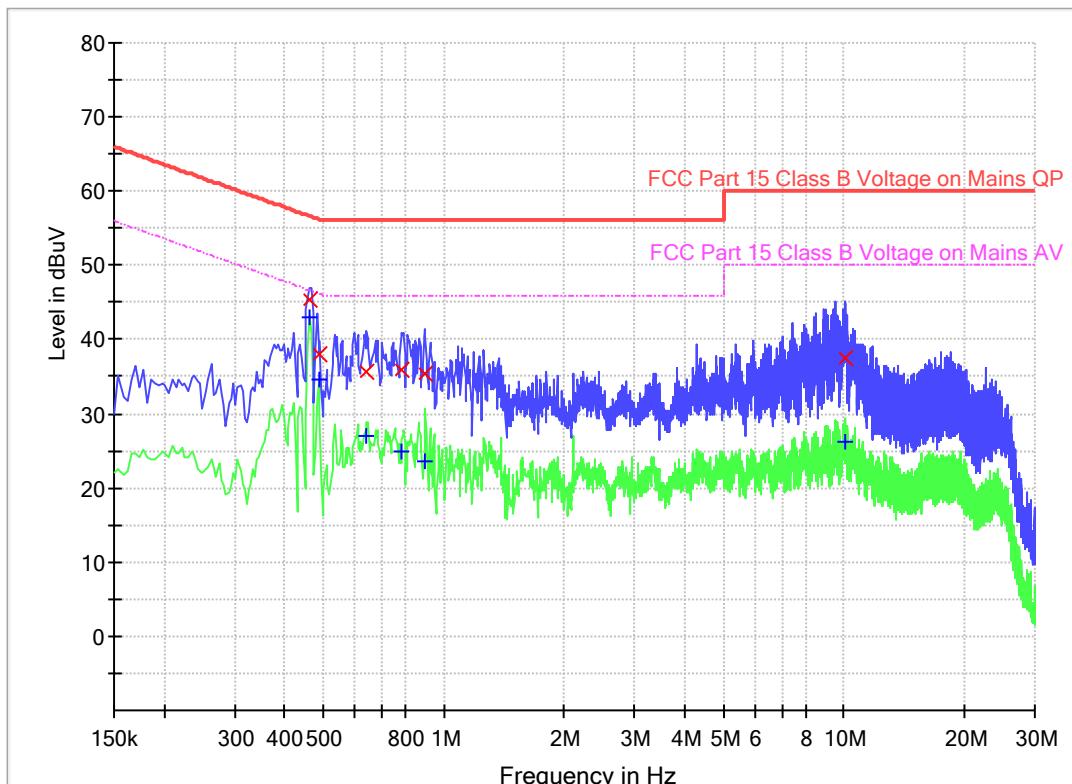
Date of Test: 16 July 2024

Worst Case Operating Mode:

Phase: Neutral

Model: ThunderBeat

Simultaneous Transmission



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.462000	45.4	9.000	N	9.6	11.3	56.7
0.486000	38.0	9.000	N	9.6	18.2	56.2
0.642000	35.7	9.000	N	9.6	20.3	56.0
0.786000	35.9	9.000	N	9.6	20.1	56.0
0.894000	35.4	9.000	N	9.6	20.6	56.0
10.078000	37.4	9.000	N	9.9	22.6	60.0

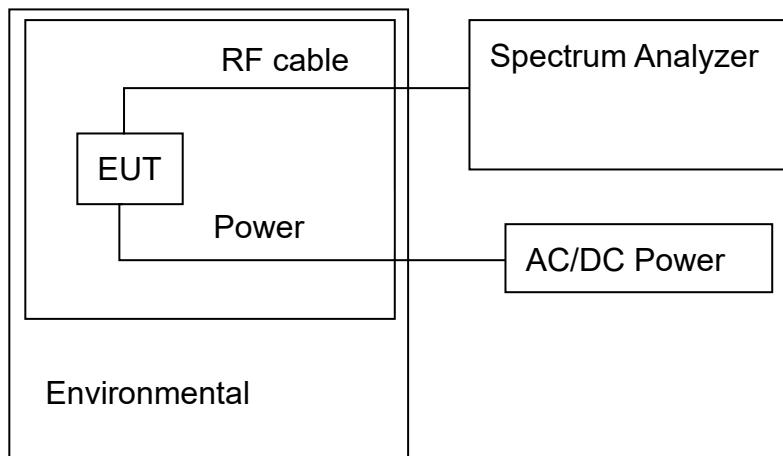
Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.462000	43.0	9.000	N	9.6	3.7	46.7
0.486000	34.7	9.000	N	9.6	11.5	46.2
0.642000	27.0	9.000	N	9.6	19.0	46.0
0.786000	24.9	9.000	N	9.6	21.1	46.0
0.894000	23.5	9.000	N	9.6	22.5	46.0
10.078000	26.2	9.000	N	9.9	23.8	50.0

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)

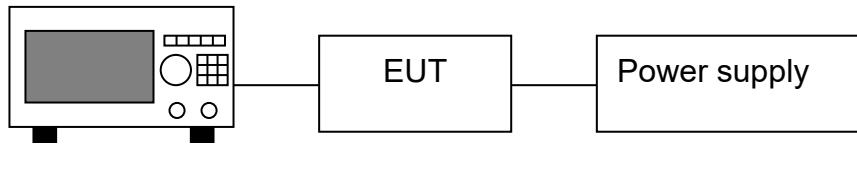
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

8. Frequency Stability Test**8.1 Test setup & procedure**

Note1: The frequency stability is measured with the temperature variation range of -20°C to +70°C, and voltage supply variation range of 85% to 115% of nominal AC supply voltage.

Note2: To ensure emission at the band-edge is maintained within the authorized band, the frequency channel 0-90 are selected to test and the worst case was reported.

Block Diagram:



Spectrum Analyzer

8.2 Frequency Stability Test Data

20°C is taken as temperature in normal condition (NT).

120.0 VAC is normal voltage (NV)

102.0 VAC is low voltage (LV)

138 VAC is high voltage (HV)

The more detail please refer to "Appendix of 240704035SZN-004" Appendix D.

Note: All emissions are maintained within the band of operation under all conditions of normal operation as specified in the user manual. It fulfills the requirement of 15.407(g).

Appendix A: Test equipment list

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ182-02	RF Power Meter	Anritsu	ML2496A	1302005	2024-04-22	2025-04-22
SZ182-02-01	Pulse Power Sensor	Anritsu	MA2411B	1207429	2024-04-22	2025-04-22
SZ070-20	Combiner	Mini-Circuits	ZN2PD-63-S+	---	2024-04-23	2025-04-23
SZ070-21	Combiner	Mini-Circuits	ZN2PD-63-S+	---	2024-04-23	2025-04-23
SZ056-05	Spectrum Analyzer	Agilent	E4407B	US40522113	2023-12-13	2024-12-13
SZ180-13	MXG Vector Signal Generator	Keysight	N5182B	MY53051328	2023-09-25	2024-09-25
SZ061-03	BiConiLog Antenna	ETS	3142E	00217919	2021-07-07 2024-07-07	2024-07-07 2027-07-07
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	2024-05-05	2027-05-05
SZ061-09	Horn Antenna	ETS	3115	00092346	2022-10-14	2025-10-14
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	2022-08-31	2025-05-31
SZ185-03	EMI Receiver	R&S	ESR7	101975	2024-04-23	2025-04-23
SZ056-07	Signal Analyzer	R&S	FSV40	101214	2023-12-13	2024-12-13
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	2024-04-22	2025-04-22
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	2021-12-12	2024-12-12
SZ062-02	RF Cable	RADIALL	RG 213U	--	2024-05-10	2024-11-10
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	2024-05-10	2024-11-10
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	2024-05-10	2024-11-10
SZ067-25	Notch Filter	Micro-Tronics	BRM50716	--	2024-02-28	2025-02-28
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	2024-04-23	2025-04-23
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	2023-07-11 2024-07-09	2024-07-11 2025-07-09
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	2022-12-20	2025-12-20
SZ188-03	Shielding Room	ETS	RFD-100	4100	2022-12-20	2025-12-20
SZ016-12	Programmable Temperature & Humidity Chamber	Taili	MHK-120NK	AB0105	2023-12-14	2024-12-14

 Expanded uncertainty of radiated emission measurement is ± 4.9 dB.

 Expanded uncertainty of conducted emission measurement is ± 3.6 dB.

**** End of Report ****