



## Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR240900187701

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# TEST REPORT

**Application No.:** KSCR2409001877AT  
**FCC ID:** 2ATCK-TMSS8B4  
**IC:** 25126-TMSS8B4  
**Name of Testing Laboratory preparing the Report:** Compliance Certification Services (Kunshan) Inc.  
**Address of Testing Laboratory preparing the Report:** No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.  
**Applicant:** Baolong Huf Shanghai Electronics Co., Ltd.  
**Address of Applicant:** 1st Floor, Building 5, 5500 Shenzhuan Rd, Songjiang, Shanghai  
**Manufacturer:** Baolong Huf Shanghai Electronics Co., Ltd.  
**Address of Manufacturer:** 1st Floor, Building 5, 5500 Shenzhuan Rd, Songjiang, Shanghai  
**Factory:** Baolong Huf Shanghai Electronics Co., Ltd.  
**Address of Factory:** 1st Floor, Building 5, 5500 Shenzhuan Rd, Songjiang, Shanghai  
**Equipment Under Test (EUT):**  
**EUT Name:** TPMS SENSOR  
**Model No.:** TMSS8B4  
**Trade Mark:** BH SENS  
**Standard(s) :** 47 CFR Part 15, Subpart C 15.231  
RSS-210 issue 11  
RSS-Gen Issue 5 Amendment 2(February 2021)  
**Date of Receipt:** 2024-09-20  
**Date of Test:** 2024-09-29 to 2024-10-22  
**Date of Issue:** 2024-10-23

<b>Test Result:</b>	<b>Pass*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.



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Revision Record			
Version	Description	Date	Remark
00	Original	2024-10-23	/

Authorized for issue by:			
Tested By		Maker Qi	
		Maker_Qi/Project Engineer	
Approved By		Terry Hou	
		Terry Hou /Reviewer	



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## 2 Test Summary

Radio Spectrum Technical Requirement				
Item	FCC Requirement	IC Requirement	Method	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.203	RSS-Gen Section 8.1.3	N/A	Customer Declaration

N/A: Not applicable

Radio Spectrum Matter Part				
Item	FCC Requirement	IC Requirement	Method	Result
20dB Bandwidth	47 CFR Part 15, Subpart C 15.231(c)	-	ANSI C63.10 (2020) Section 6.9	Pass
Dwell Time (15.231(e))	47 CFR Part 15, Subpart C 15.231(e)	RSS-210 A1.5	ANSI C63.10 (2020) Section 7.8.4	Pass
Field Strength of the Fundamental Signal (15.231(e))	47 CFR Part 15, Subpart C 15.231(e)	RSS-210 A1.5	ANSI C63.10 (2020) Section 6.5	Pass
Radiated Emissions below 1GHz	47 CFR Part 15, Subpart C 15.231(e) and 15.209	RSS-210 A1.5	ANSI C63.10 (2020) Section 6.4&6.5&6.6	Pass
Radiated Emissions above 1GHz	47 CFR Part 15, Subpart C 15.231(e) and 15.209	RSS-210 A1.5	ANSI C63.10 (2020) Section 6.6	Pass
99% Bandwidth	-	RSS-210 A1.4	RSS-Gen Section 6.7	Pass



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## 4 General Information

### 4.1 Details of E.U.T.

Power supply:	DC 3V by Battery Battery model:CR2450 Output: DC 3V
Operation Frequency	433.92MHz
Channel Numbers:	1
Modulation Type:	FSK
Antenna Type:	Monopole antenna
Transmitter type:	Periodicity

### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
SmarTool	/	/	/

### 4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$8.4 \times 10^{-8}$
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Radiated Power	5.2dB (Below 1GHz) 5.9dB (Above 1GHz)
6	Radiated Spurious Emission Test	4.2dB (Below 30MHz) 4.5dB (30MHz-1GHz) 5.1dB (1GHz-18GHz) 5.4dB (Above 18GHz)
7	Temperature Test	1°C
8	Humidity Test	3%
9	Supply Voltages	1.5%
10	Time	3%

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

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### 4.4 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

Note:

1. SGS is not responsible for wrong test results due to incorrect information (e.g., max. internal working frequency, antenna gain, cable loss, etc) is provided by the applicant. (If applicable).
2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (If applicable).
3. Sample source: sent by customer.

### 4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### • A2LA

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

#### • FCC

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

#### • ISED

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

#### • VCCI

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

### 4.6 Deviation from Standards

None

### 4.7 Abnormalities from Standard Conditions

None



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### 5 Equipment List

Item	Equipment	Manufacturer	Model	Inventory No	Cal Date	Cal. Due Date
RF Radiated Test						
1	Spectrum Analyzer	R&S	FSV40	KUS1806E003	08/06/2024	08/05/2025
2	Universal Radio Communication Tester	R&S	CMW500	KSEM009-1	03/19/2024	03/18/2025
4	Loop Antenna	COM-POWER	AL-130R	KUS1806E001	03/18/2023	03/17/2025
5	Bilog Antenna	TESEQ	CBL 6112D	KUS1806E005	06/29/2023	06/28/2025
6	Bilog Antenna	TESEQ	CBL 6112D	KUS1806E006	03/19/2024	03/18/2025
7	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	KS301079	03/23/2024	08/22/2026
8	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	KS301186	04/07/2023	04/06/2025
9	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	CZ301058	01/07/2024	01/06/2026
10	Amplifier(30MHz~18GHz)	PANSHAN TECHNOLOGY	LNA:1~18G	KSEM010-1	01/15/2024	01/14/2025
11	Amplifier(18~40GHz)	PANSHAN TECHNOLOGY	LNA180400G40	KSEM038	08/12/2024	08/11/2025
12	RE Test Cable	REBES MICROWAVE	/	CZ301097	08/12/2024	08/11/2025
13	Temperature & Humidity Recorder	Renke Control	RS-WS-N01-6J	KSEM024-4	03/21/2024	03/20/2025
14	Software	Faratronic	EZ_EMC-v 3A1	/	NCR	NCR
15	Software	ESE	E3_V 6.111221a	/	NCR	NCR



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## **6 Radio Spectrum Technical Requirement**

### **6.1 Antenna Requirement**

#### **6.1.1 Test Requirement:**

47 CFR Part 15, Subpart C 15.203

#### **6.1.2 Conclusion**

15.203 requirement:

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, 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.

EUT Antenna:

The antenna is Monopole antenna and no consideration of replacement.

Antenna location: Refer to Internal photos

## 7 Radio Spectrum Matter Test Results

### 7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.231(c)  
Test Method: ANSI C63.10 (2013) Section 6.9

Limit:

Frequency range(MHz)	Limit
70-900	No wider than 0.25% of the center frequency
Above 900	No wider than 0.5% of the center frequency

#### 7.1.1 E.U.T. Operation

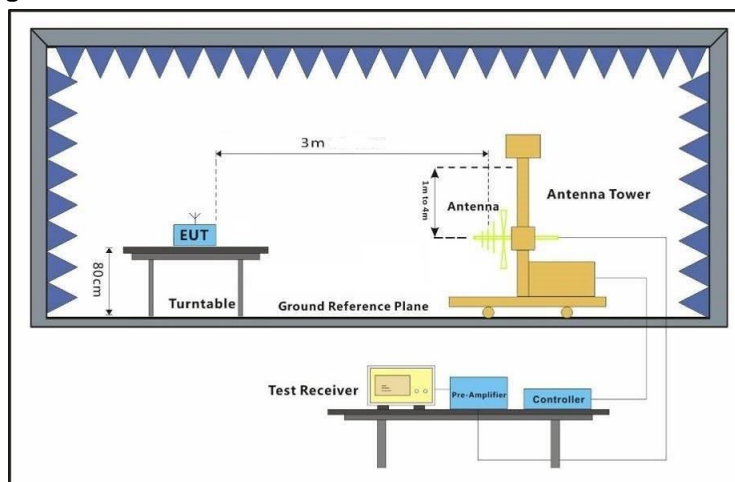
Operating Environment:

Temperature: 23.3 °C Humidity: 45.2 % RH Atmospheric Pressure: 1010 mbar

#### 7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting mode

#### 7.1.3 Test Setup Diagram



#### 7.1.4 Measurement Procedure and Data

Please Refer to Appendix for Details

### 7.2 Dwell Time (15.231(e))

Test Requirement 47 CFR Part 15, Subpart C 15.231(e)

Test Method: ANSI C63.10 (2013) Section 7.8.4

Measurement Distance: 3m

Limit:

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

#### 7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23.3 °C

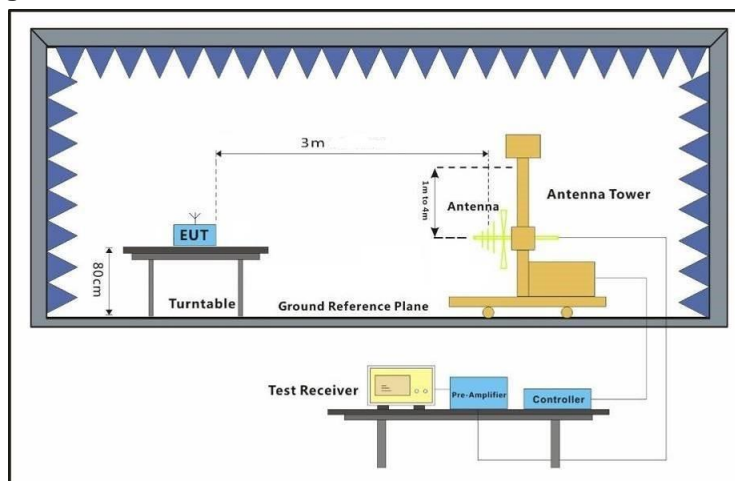
Humidity: 45.2 % RH

Atmospheric Pressure: 1010 mbar

#### 7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting mode

#### 7.2.3 Test Setup Diagram



#### 7.2.4 Measurement Procedure and Data

Please Refer to Appendix for Details

### 7.3 Field Strength of the Fundamental Signal (15.231(e))

Test Requirement Field Strength of the Fundamental Signal (15.231(e))

Test Method: ANSI C63.10 (2013) Section 6.5

Measurement Distance: 3m

Limit:

Fundamental frequency(MHz)	Field strength of fundamental(microvolts/meter)	Field strength of spurious emissions(microvolts/meter)
40.66-40.70	1000	100
70-130	500	50
130-174	500 to 1500	50 to 150
174-260	1500	150
260-470	1500 to 5000	150 to 500
Above 470	5000	500

Remark: the emission limit is based on measurement instrumentation employing an average detector at a distance of 3 meters. The frequencies above 1000MHz are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

#### 7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23.3 °C

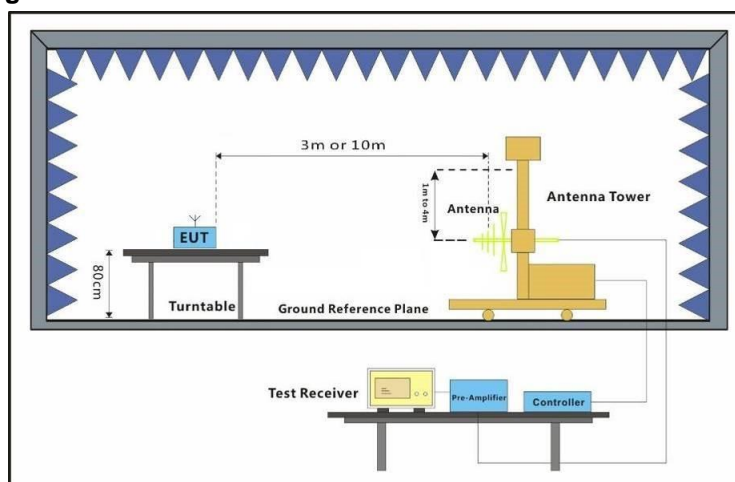
Humidity: 45.2 % RH

Atmospheric Pressure: 1010 mbar

#### 7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting mode

#### 7.3.3 Test Setup Diagram



**7.3.4 Measurement Procedure and Data**

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark:  $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamp Factor}$

Please Refer to Appendix for Details

### 7.4 Radiated Emissions below 1GHz

Test Requirement 47 CFR Part 15C Section 15.231(b) and 15.209

Test Method: ANSI C63.10 (2013) Section 6.4&6.5

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

#### 7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23.3 °C

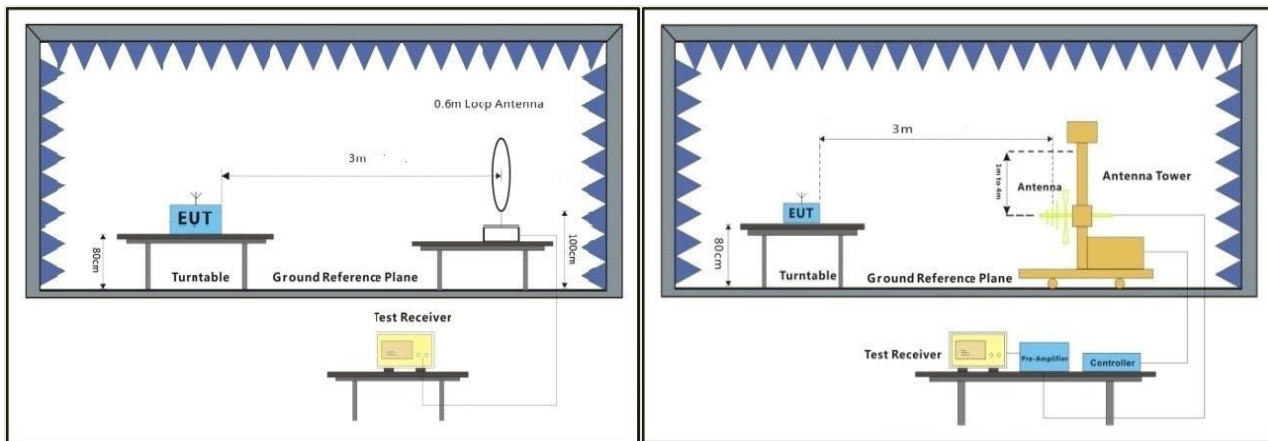
Humidity: 45.2 % RH

Atmospheric Pressure: 1010 mbar

#### 7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting mode

#### 7.4.3 Test Setup Diagram



Below 30MHz

30MHz-1GHz

**7.4.4 Measurement Procedure and Data**

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

**Remark:**

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor
- 2) Scan from 9kHz to 1GHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

Please Refer to Appendix for Details

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### 7.5 Radiated Emissions above 1GHz

Test Requirement 47 CFR Part 15C Section 15.231(b) and 15.209

Test Method: ANSI C63.10 (2013) Section 6.6

Limit:

For Restricted bands

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

For Other bands

Fundamental Frequency MHz	Field Strength of Fundamental (dBμV/m @ 3 m)	Field Strength of Hasrmonics and Spurious Emissions (dBμV/m @ 3 m)
40.66 to 40.70	60.00	40.00
70 to 130	53.98	33.98
130 to 174	**53.98 to 63.52	33.98 to 43.52
174 to 260	63.52	43.52
260 to 470	**63.52 to 73.98	43.52 to 53.98
Above 470	73.98	53.98
<b>Detector:</b>	Peak for pre-scan	
	QP for 30MHz to1000 MHz:120 kHz resolution bandwidth	
	Peak for Above 1 GHz: 1 MHz resolution bandwidth	

\*\* linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

for the band 130-174 MHz, uV/m at 3 meters =  $(22.73 \times f) - 2454.55$ ;

for the band 260-470 MHz, uV/m at 3 meters =  $(16.67 \times f) - 2833.33$ .

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

The fundamental frequency of the EUT is 433.92 MHz

The limit for average or QP field strength dBuv/m for the fundamental emission= 72.87 dBμV/m

No fundamental is allowed in the restricted bands.

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The limit for average field strength dBuV/m for the spurious emission=52.87 dBuV/m. Spurious in the restricted bands must be less than 52.87 dBuV/m or 15.209, whichever limit permits a higher field strength.

### 7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 23.3 °C

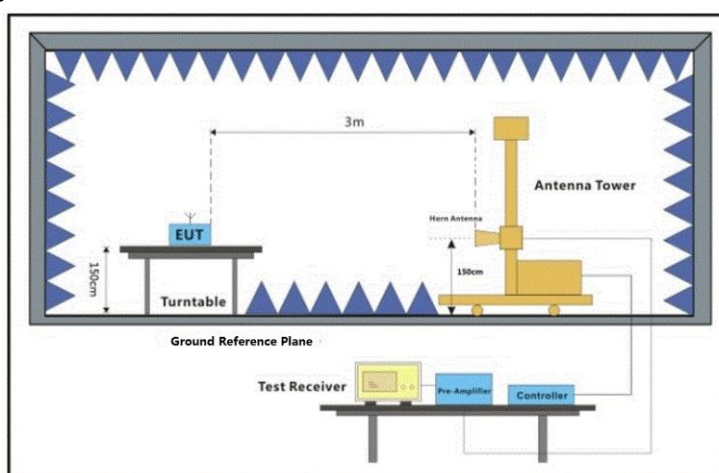
Humidity: 45.2 % RH

Atmospheric Pressure: 1010 mbar

### 7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting mode

### 7.5.3 Test Setup Diagram



**7.5.4 Measurement Procedure and Data**

- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

**Remark:**

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor
- 2) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Please Refer to Appendix for Details



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**7.6 99% Bandwidth**

Test Requirement            RSS-210 A1.4  
Test Method:                RSS-Gen February 2021 Amendment 2 Section 6.7  
Measurement Distance: 3m

**7.6.1 E.U.T. Operation**

Operating Environment:  
Temperature:        23.3 °C                    Humidity:    45.2 % RH            Atmospheric Pressure: 1010 mbar

**7.6.2 Test Mode Description**

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting mode

**7.6.3 Measurement Procedure and Data**

Please Refer to Appendix for Details



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### **8 Test Setup Photo**

Refer to Appendix - Test Setup Photo for KSCR2409001877AT

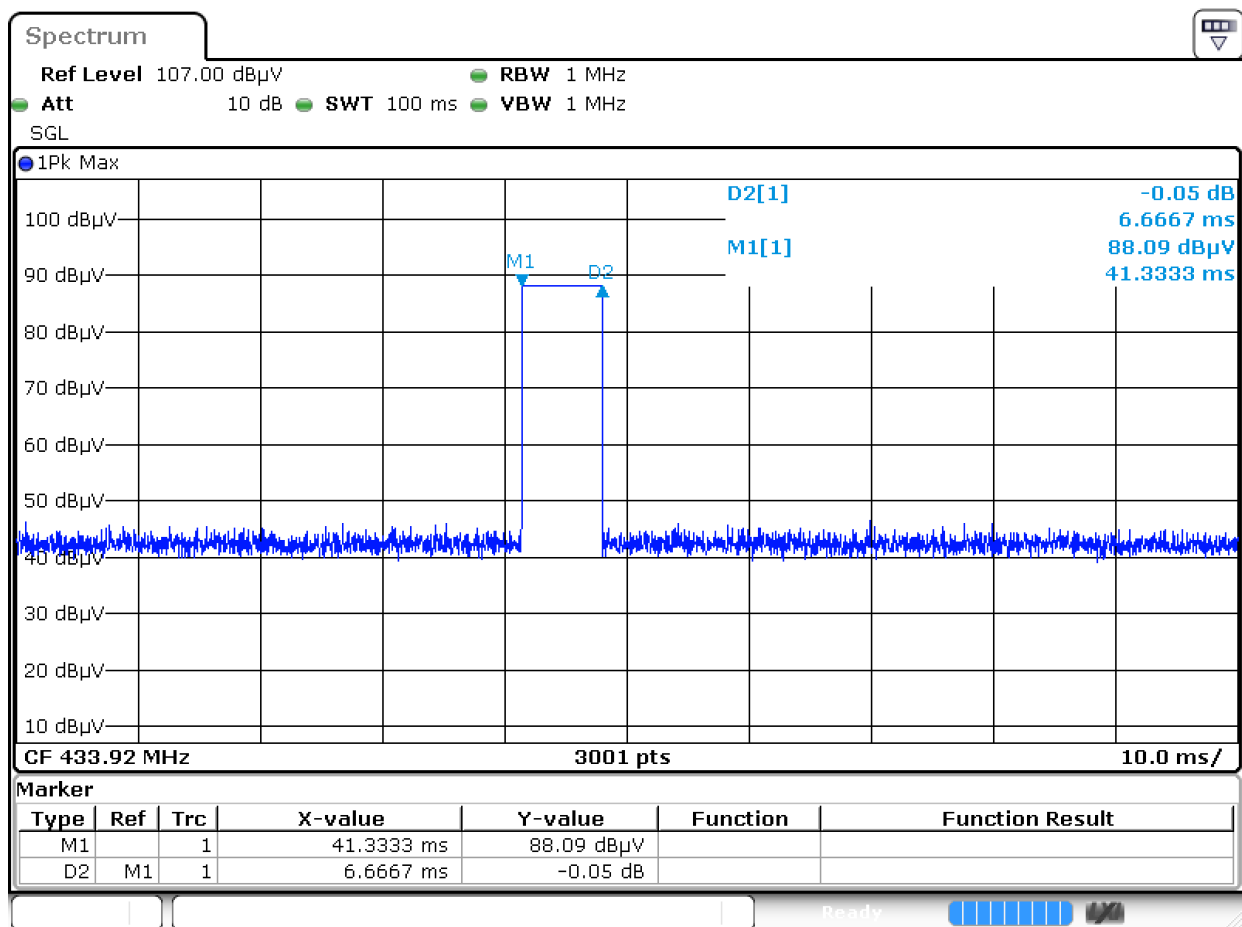
### **9 EUT Constructional Details (EUT Photos)**

Refer to Appendix - Photographs of EUT Constructional Details for KSCR2409001877AT

## 10 Appendix

### 10.1 Field Strength of the Fundamental Signal

Test channel	Freq. (MHz)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
Channel 1	433.92	47.27	92.87	-45.60	Peak	Vertical
		80.49	92.87	-12.38	Peak	Horizontal
		27.27	72.87	-45.60	AVG	Vertical
		60.49	72.87	-12.38	AVG	Horizontal



Remark:

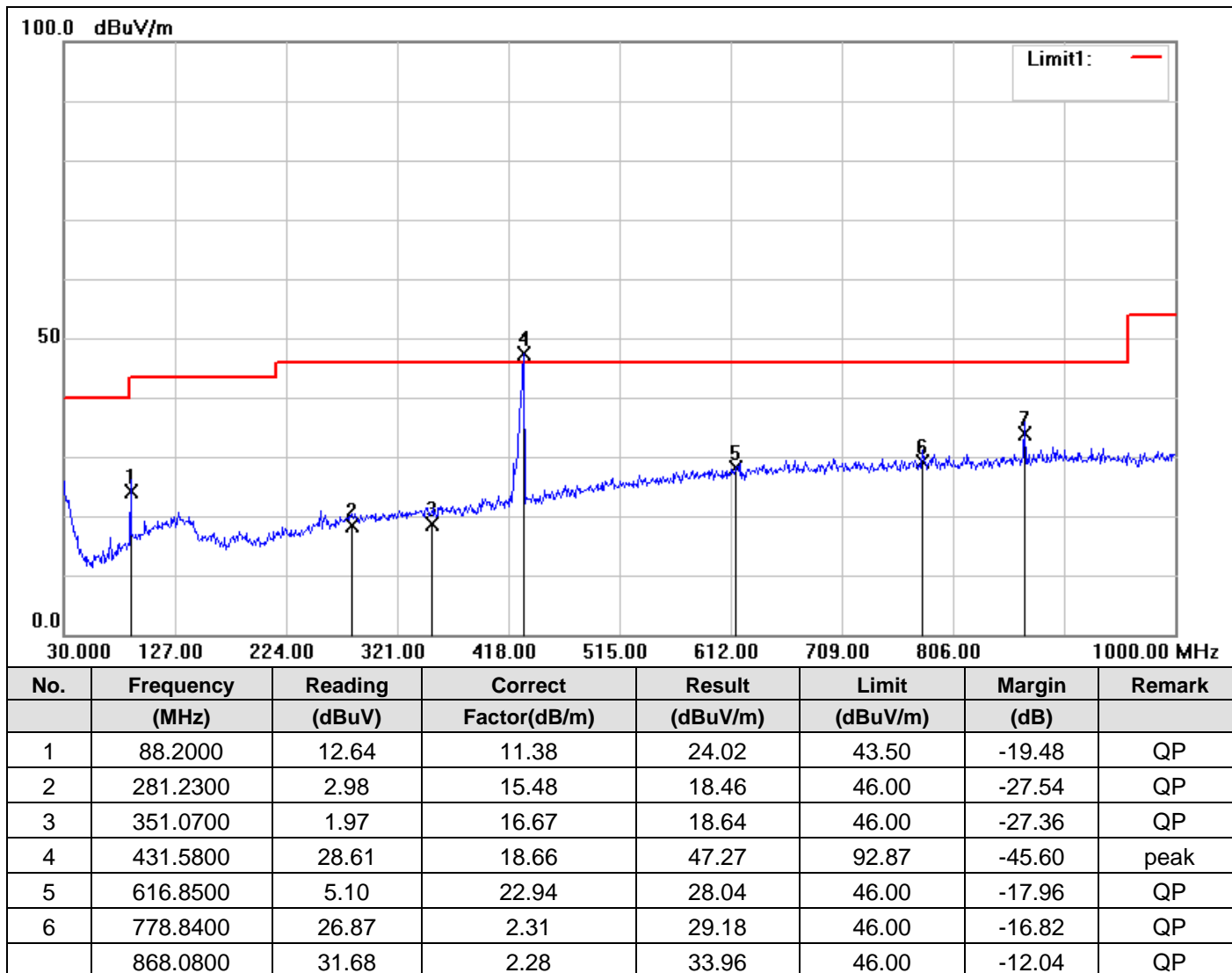
1. If the Peak value below the AV Limit, the AV test doesn't perform for this submission.
2. Average level = Peak level - Duty Cycle Factor
3. Duty Cycle Factor =  $20 \times \log(\text{Duty Cycle}) = -23.52\text{dB}$ , will limit the correction factor to 20dB.

### 10.2 Spurious Emissions

Below 1GHz:

433.92MHz:

Vertical:



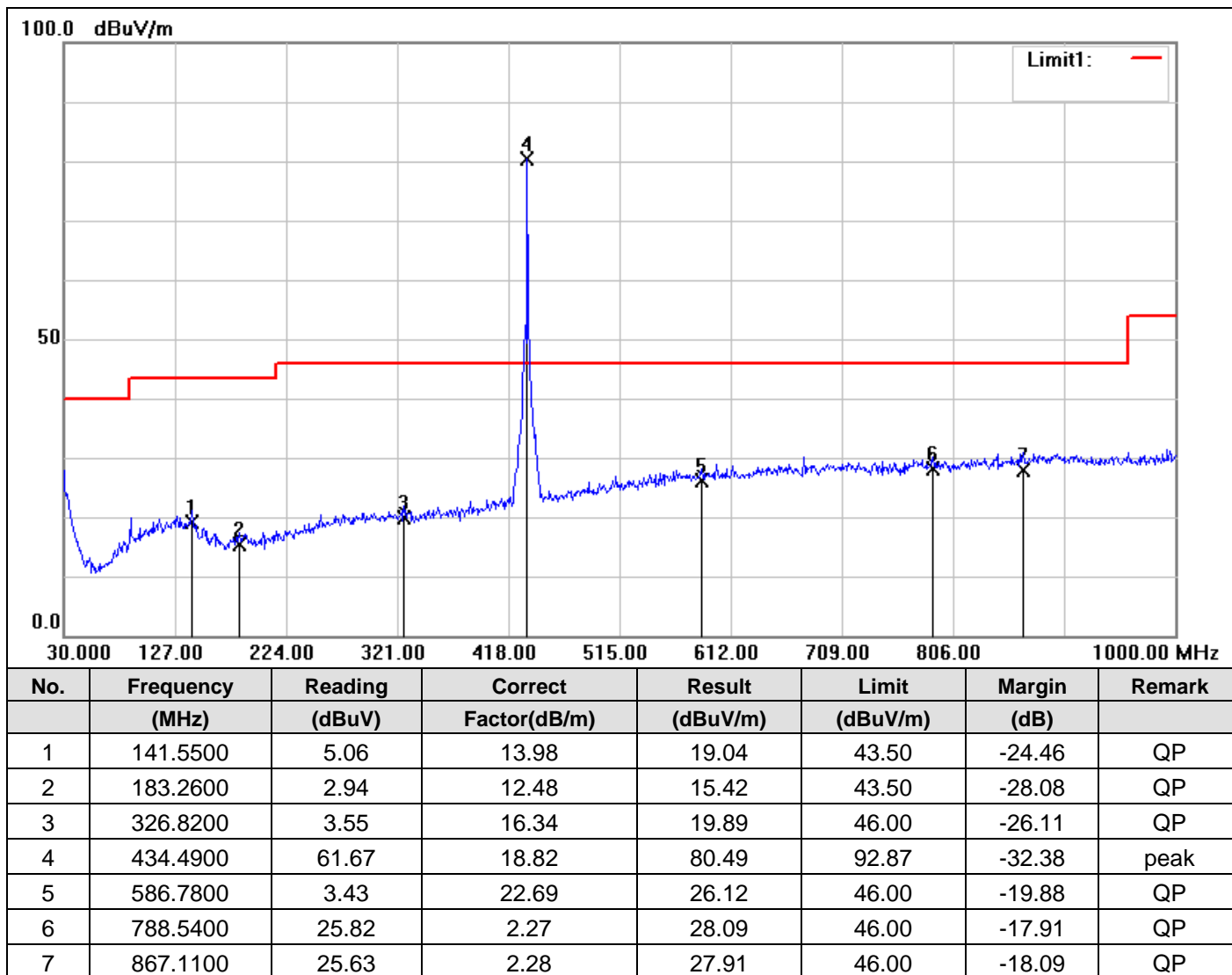
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Horizontal:





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Above 1GHz

433.92MHz:

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	polarization
1	2945.000	60.64	-23.19	37.45	54.00	-16.55	peak	Vertical
2	3865.000	57.90	-20.59	37.31	54.00	-16.69	peak	Vertical
3	4515.000	56.82	-18.92	37.90	54.00	-16.10	peak	Vertical
4	3115.000	59.14	-23.23	35.91	54.00	-18.09	peak	Horizontal
5	4125.000	57.28	-20.00	37.28	54.00	-16.72	peak	Horizontal
6	4810.000	56.62	-18.56	38.06	54.00	-15.94	peak	Horizontal

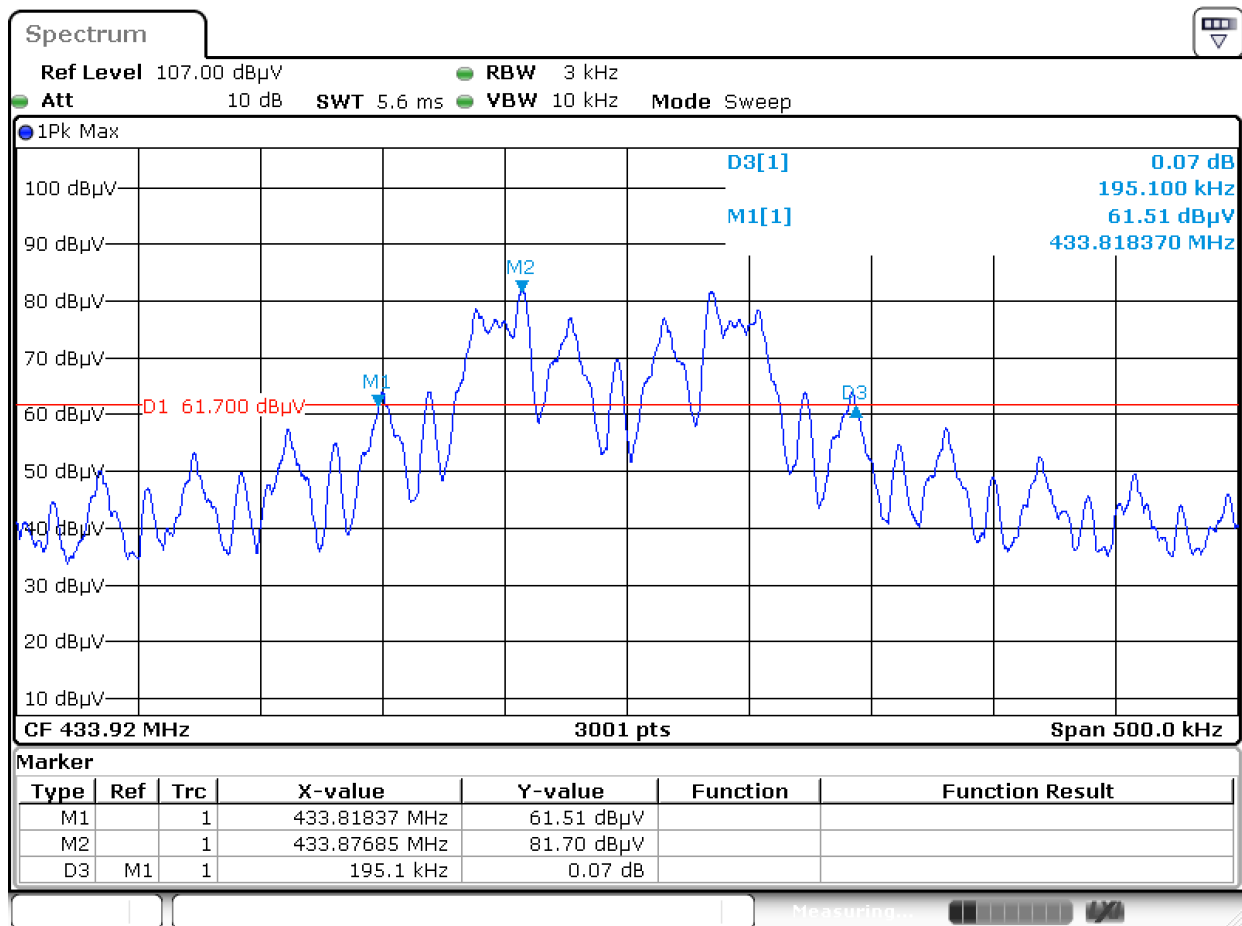
Remark: If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

### 10.3 20dB Bandwidth

#### Measurement Data:

Frequency (MHz)	20dB bandwidth (kHz)	Limit (kHz)	Results
433.92	195.1	1084.8	Pass

#### Test plot as follows:

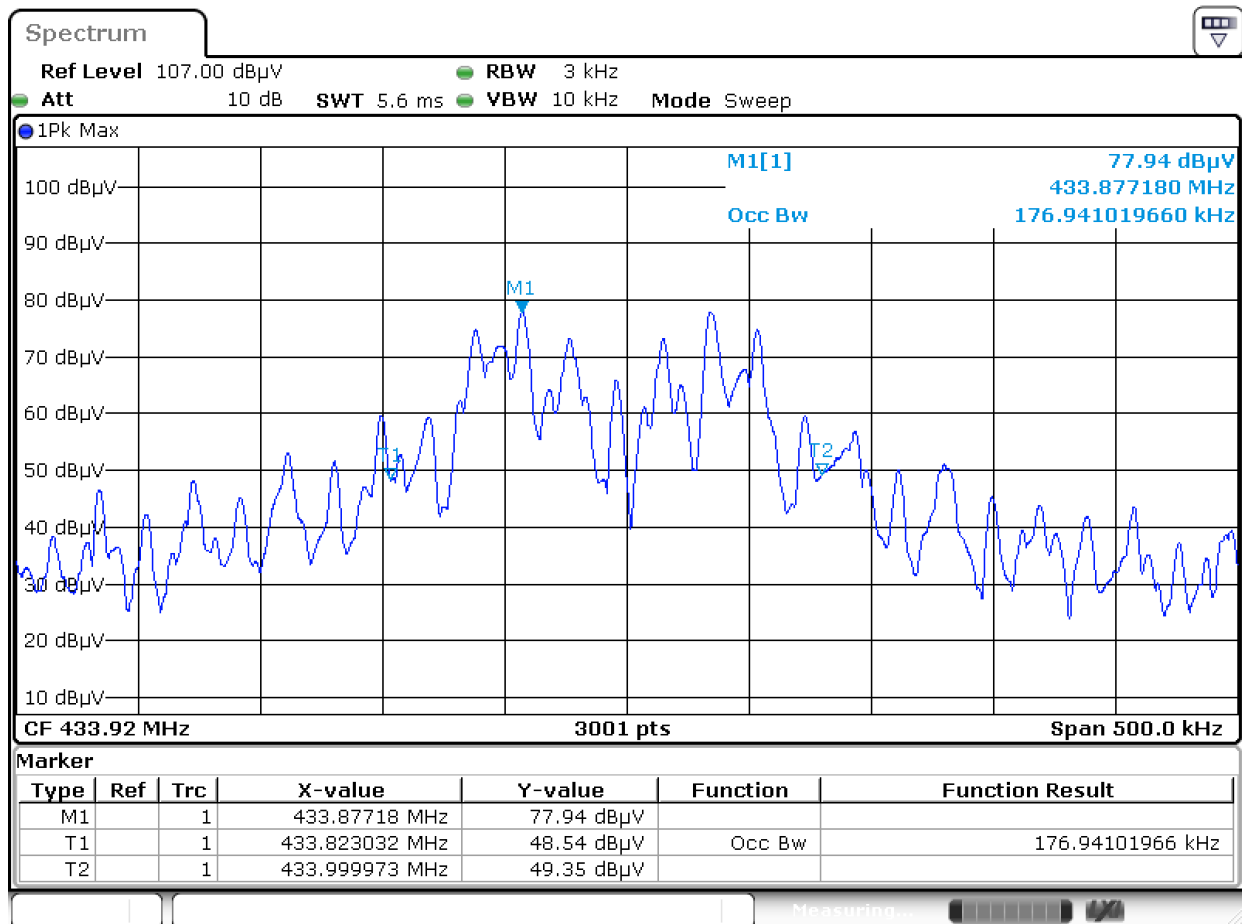


### 10.4 99% Bandwidth

Measurement Data:

Frequency (MHz)	99% bandwidth (kHz)	Limit(MHz)	Result
433.92	176.94	/	Pass

Test plot as follows:

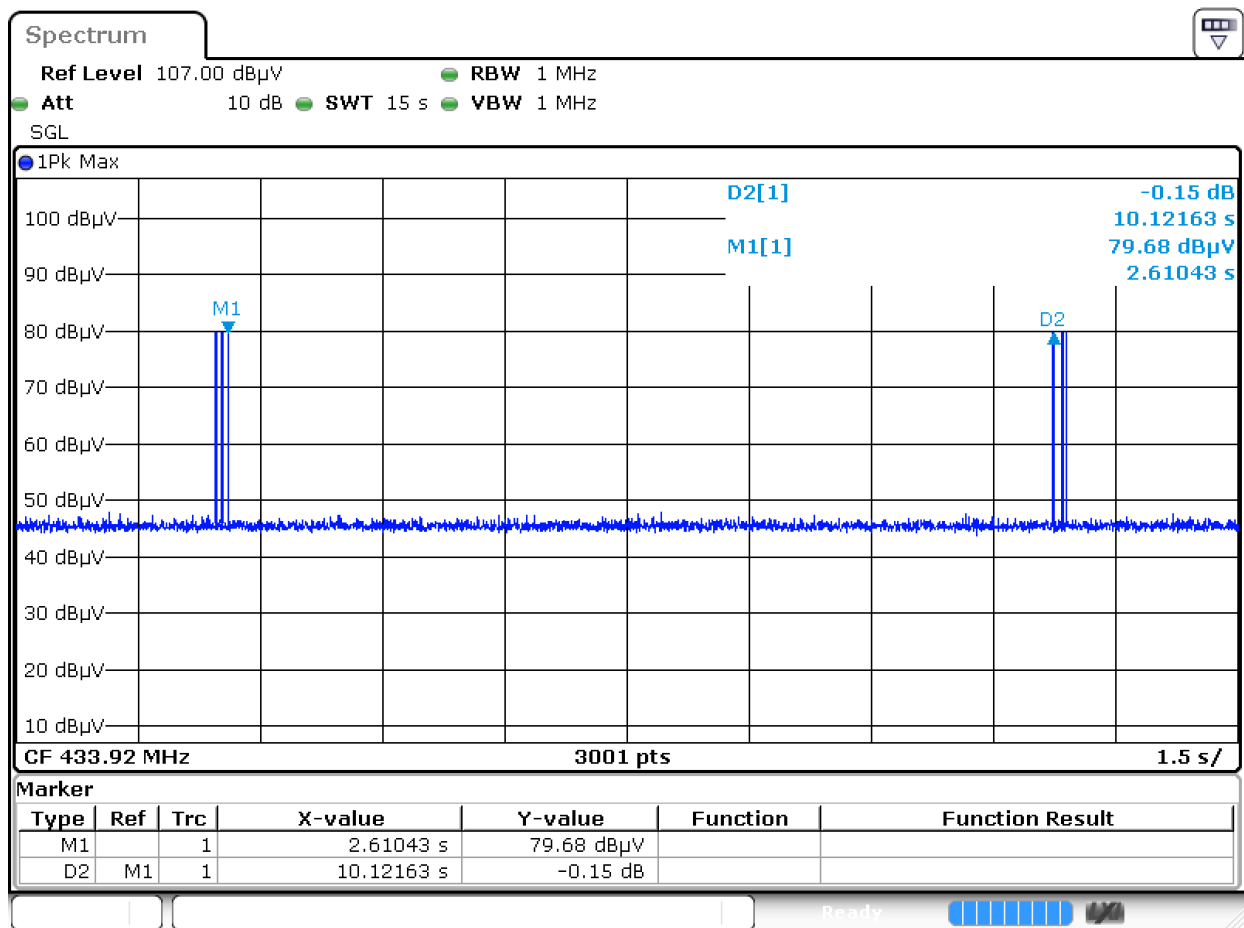


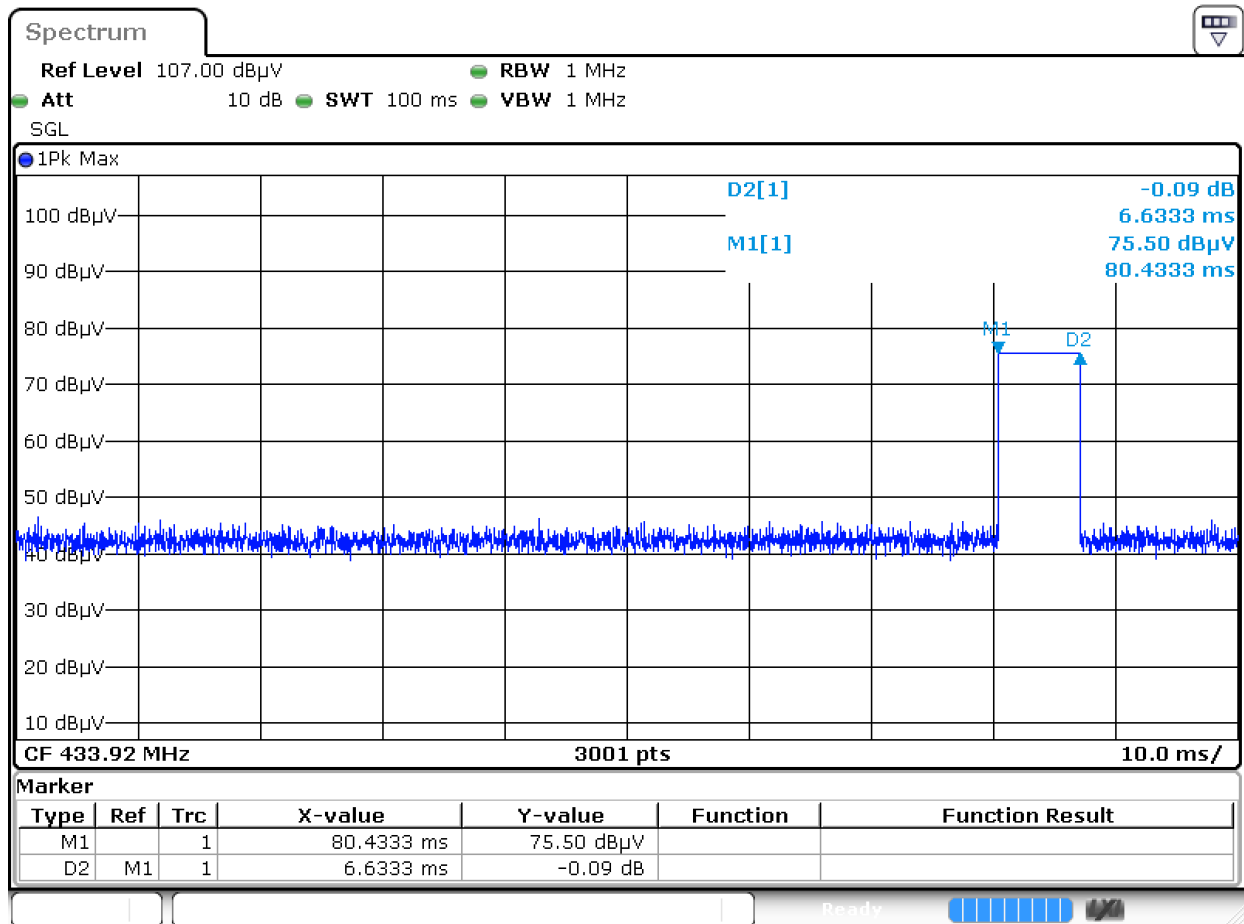
### 10.5 Dwell Time

#### Measurement Data:

Test item	Test result	Limit (s)	Results
Silent period	10.12s	$\geq 10s$	Pass
Duration of each transmission	6.63ms	$\leq 1S$	Pass

Test plot as follows:





- End of the Report -