TEST REPORT

Application No.:	SZCR2507003176AT
Applicant:	Elfatek Elektronik Ltd. Co.
Address of Applicant:	Modesa Sanayi Sitesi 10735 Sk. N0 : 10, 42050 Karatay-TüRKiYE
Manufacturer:	Elfatek Elektronik Ltd. Co.
Address of Manufacturer:	Modesa Sanayi Sitesi 10735 Sk. N0 : 10, 42050 Karatay-TüRKiYE
Factory:	Elfatek Elektronik Ltd. Co.
Address of Factory:	Modesa Sanayi Sitesi 10735 Sk. N0 : 10, 42050 Karatay-TüRKiYE
Equipment Under Test (EUT):	
EUT Name:	EN MAX-EN MID-EN ESX-EN Q-EN EKO-EN X- Telem Mote
Model No.:	EN MAX-EN MID-EN ESX-EN Q-EN EKO-EN X- Telem Mote
Trade Mark:	ELFATEK
Standard(s) :	EN 300 328 V2.2.2
Directive:	2014/53/EU
Date of Receipt:	2025-08-21
Date of Test:	2025 08-30 to 2025-10-15
Date of Issue:	2025-10-21
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		*2025-10-21*		*Original*

Authorized for issue by:				
		Gebin Sun		
		Gebin Sun/Project Engineer		
		Eric Fu		
		Eric Fu/Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Geo-location capability	EN 300 328 V2.2.2	N/A	EN 300 328 V2.2.2 Clause 4.3.2.12.3	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Transmitter unwanted emissions in the spurious domain	EN 300 328 V2.2.2	EN 300 328 V2.2.2 Clause 5.4.9.2	EN 300 328 V2.2.2 Clause 4.3.2.9.3	Pass
Receiver spurious emissions		EN 300 328 V2.2.2 Clause 5.4.10.2	EN 300 328 V2.2.2 Clause 4.3.2.10.3	Pass
RF Output Power		EN 300 328 V2.2.2 Clause 5.4.2.2.1.2	EN 300 328 V2.2.2 Clause 4.3.2.2.3	Pass
Power Spectral Density		EN 300 328 V2.2.2 Clause 5.4.3.2.1	EN 300 328 V2.2.2 Clause 4.3.2.3.3	Pass
Occupied Channel Bandwidth		EN 300 328 V2.2.2 Clause 5.4.7.2.1	EN 300 328 V2.2.2 Clause 4.3.2.7.3	Pass
Transmitter unwanted emissions in the OOB domain		EN 300 328 V2.2.2 Clause 5.4.8.2.1	EN 300 328 V2.2.2 Clause 4.3.2.8.3	Pass
Receiver Blocking		EN 300 328 V2.2.2 Clause 5.4.11.2.1	EN 300 328 V2.2.2 Clause 4.3.2.11.4	Pass

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	DC 3V by 2x1.5V "AA" batteries
Operation Frequency:	2403MHz to 2480MHz
Modulation Type:	GFSK
Channel Spacing:	1MHz
Number of Channels:	78
Antenna Type	Ceramic Chip Antenna
Antenna Gain:	2dBi
Cable Loss (for RF conducted test):	0.7dB

Remark:The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

4.2 Environment Parameter

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Value	Temperature(°C)	Voltage(V)
NTNV	25	DC3V
LTNV	0	DC3V
HTNV	45	DC3V
Note: NV:Normal Voltage LT:Low Extreme Test Temperature HT:High Extreme Test Temperature NT:Normal Temperature		

4.3 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
--	--	--	--
The EUT has been tested as an independent unit.			

4.4 Measurement Uncertainty

Test Item	Measurement Uncertainty
Transmitter unwanted emissions in the spurious domain	± 4.5dB (Below 1GHz), ± 4.8dB (Above 1GHz)
Receiver spurious emissions	± 4.5dB (Below 1GHz), ± 4.8dB (Above 1GHz)
RF Output Power	± 0.75dB
Power Spectral Density	± 2.84dB
Occupied Channel Bandwidth	± 3%
Transmitter unwanted emissions in the OOB domain	± 0.75dB
Receiver Blocking	± 3%
Remark: The U_{lab} (lab Uncertainty) is less than $U_{cispr/ETSI}$ (CISPR/ETSI Uncertainty), so the test results – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit; – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.	

4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.6 Test Facility

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

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI (Member No. 1937)

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1336

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

5 Equipment List

Transmitter unwanted emissions in the spurious domain					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Fully-Anechoic Chamber 1	SAEMC	MFAC	SEM001-04	2024-03-26	2027-03-25
Spectrum Analyzer	Rohde&Schwarz	FSU43	SEM004-08	2025-03-04	2026-03-03
BiConiLog Antenna	Schwarzbeck	VULB9163	SEM003-05	2025-08-29	2027-08-28
Horn Antenna	Rohde&Schwarz	HF907	SEM003-06	2024-08-03	2026-08-02
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2025-07-22	2027-07-21
Amplifier	Shanghai Steed Automation Instrument Co.,Ltd	YX28980935	SEM005-26	2025-07-23	2026-07-22
Signal Conditioning Unit	Rohde&Schwarz	SCU-18	SEM005-18	2025-03-04	2026-03-03
Pre-Amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2025-03-21	2026-03-20
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2025-03-21	2026-03-20
Measurement Software	AUDIX	e3 V8.2014-6-27a	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM027-01	2025-07-05	2026-07-04

Receiver spurious emissions					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Fully-Anechoic Chamber 1	SAEMC	MFAC	SEM001-04	2024-03-26	2027-03-25
Spectrum Analyzer	Rohde&Schwarz	FSU43	SEM004-08	2025-03-04	2026-03-03
BiConiLog Antenna	Schwarzbeck	VULB9163	SEM003-05	2025-08-29	2027-08-28
Horn Antenna	Rohde&Schwarz	HF907	SEM003-06	2024-08-03	2026-08-02
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2025-07-22	2027-07-21
Amplifier	Shanghai Steed Automation Instrument Co.,Ltd	YX28980935	SEM005-26	2025-07-23	2026-07-22
Signal Conditioning Unit	Rohde&Schwarz	SCU-18	SEM005-18	2025-03-04	2026-03-03
Pre-Amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2025-03-21	2026-03-20
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2025-03-21	2026-03-20
Measurement Software	AUDIX	e3 V8.2014-6-27a	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM027-01	2025-07-05	2026-07-04

RF Conducted Test					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Shielding Room	AUDIX	N/A	SEM001-08	2025-05-16	2028-05-15
EXA Signal Analyzer	KEYSIGHT	N9010A	SEM004-09	2025-03-03	2026-03-02
DC Power Supply	KEYSIGHT	E3642A	SEM011-07	2025-02-26	2026-02-25
Manual Step Attenuator	KEYSIGHT	8494B	SEM021-05	2025-03-03	2026-03-02
Manual Step Attenuator	KEYSIGHT	8496B	SEM021-06	2025-03-03	2026-03-02
Power Sensor	TST PASS	TSPS2023R	SEM009-26	2025-03-04	2026-03-03
Power Sensor	TST PASS	TSPS2023R	SEM009-27	2025-03-04	2026-03-03
Power Sensor	TST PASS	TSPS2023R	SEM009-28	2025-03-04	2026-03-03
Power Sensor	TST PASS	TSPS2023R	SEM009-29	2025-03-04	2026-03-03
Programmable Temperature&Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2025-02-26	2026-02-25
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM028-01	2025-07-05	2026-07-04
Signal Generator	KEYSIGHT	N5171B	SEM006-13	2025-03-03	2026-03-02
Universal Radio Communication Tester	Rohde&Schwarz	CMW500	SEM010-08	2025-03-04	2026-03-03

General used equipment					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Humidity/ Temperature Indicator	deli	8838	SEM002-32	2025-07-23	2026-07-22
Humidity/ Temperature Indicator	deli	8838	SEM002-33	2025-07-23	2026-07-22
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2025-03-03	2026-03-02

6 Radio Spectrum Technical Requirement

6.1 Geo-location capability

6.1.1 Test Requirement:

EN 300 328 V2.2.2 Clause 4.3.2.12.3

Limit:

The geographical location determined by the non-FHSS equipment as defined in clause 4.3.2.12.2 shall not be accessible to the user in a way that would allow the user to alter it.

Definition:

Geo-location capability is a feature of the equipment to determine its geographical location with the purpose to configure itself according to the regulatory requirements applicable at the geographical location where it operates.

The geo-location capability may be present in the equipment or in an external device (temporary) associated with the equipment operating at the same geographical location during the initial power up of the equipment. The geographical location may also be available in equipment already installed and operating at the same geographical location.

6.1.2 Conclusion

The applicant declares:The product does not have the geo-location function.

7 Radio Spectrum Matter Test Results

7.1 Transmitter unwanted emissions in the spurious domain

Test Requirement EN 300 328 V2.2.2 Clause 4.3.2.9.3

Test Method: EN 300 328 V2.2.2 Clause 5.4.9.2

Limit:

Table 1: Transmitter limits for spurious emissions

Frequency range	Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36dBm	100 kHz
47 MHz to 74 MHz	-54dBm	100 kHz
74 MHz to 87,5 MHz	-36dBm	100 kHz
87,5 MHz to 118 MHz	-54dBm	100 kHz
118 MHz to 174 MHz	-36dBm	100 kHz
174 MHz to 230 MHz	-54dBm	100 kHz
230 MHz to 470 MHz	-36dBm	100 kHz
470 MHz to 694 MHz	-54dBm	100 kHz
694 MHz to 1 GHz	-36dBm	100 kHz
1 GHz to 12,75 GHz	-30dBm	1MHz

7.1.1 E.U.T. Operation

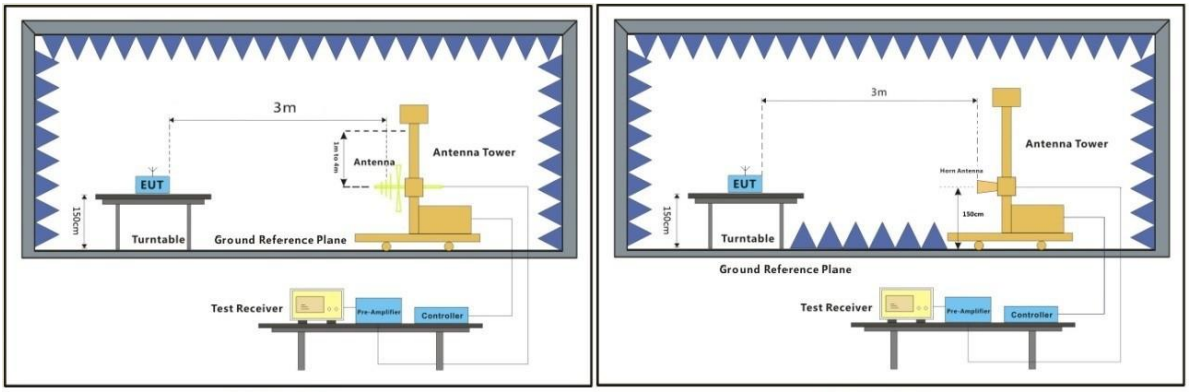
Operating Environment:

Temperature: 21.5 °C Humidity: 45.2 % RH Atmospheric Pressure: 1020 mbar

7.1.2 Test Mode Description

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

7.1.3 Test Setup Diagram



30MHz-1GHz　　Above 1GHz

7.1.4 Measurement Procedure and Data

1. Using test software to set up the lowest channel, the middle channel and the highest channel.

2. Scan from 30MHz to 12.75GHz, find the maximum radiation frequency to measure. No Standby Mode apply for the EUT.

3. The technique used to find the Spurious Emissions of the transmitter was a pre-calibration method which is measure the path loss from the measurement antenna to the substitution antenna and subtract this from the signal generator level to reach the measurement result. The method was performed to determine the actual ERP/EIRP emission levels of the EUT.

Test procedure as below:

1) The EUT was powered ON and placed on a table in the chamber. The antenna of the transmitter was extended to its maximum length. Receiver mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.

2) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

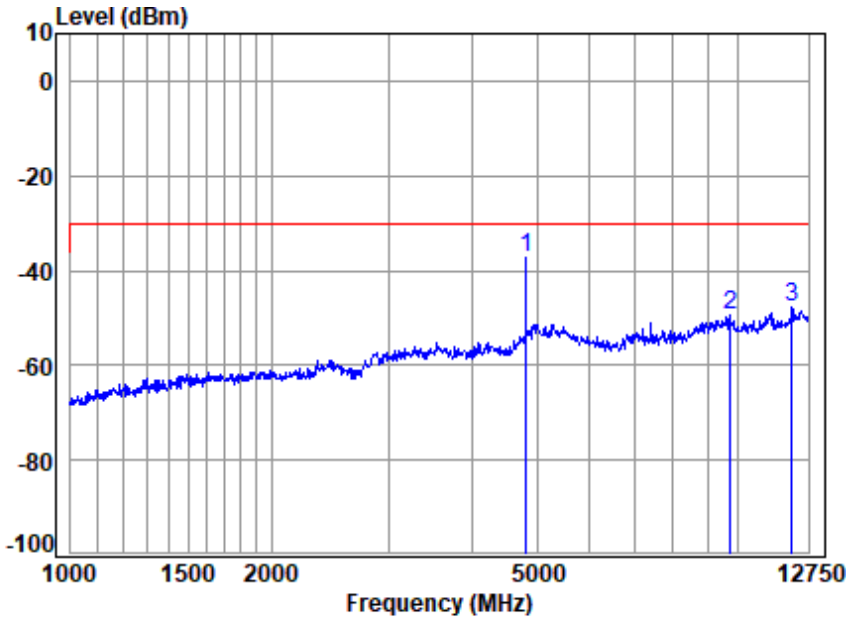
3) The test antenna shall be raised or lowered again, if necessary, through the specified height range until a maximum is obtained. This level shall be recorded.

4) This measurement shall be repeated for horizontal and vertical polarization.

Remark:

The disturbance below 1GHz was very low and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

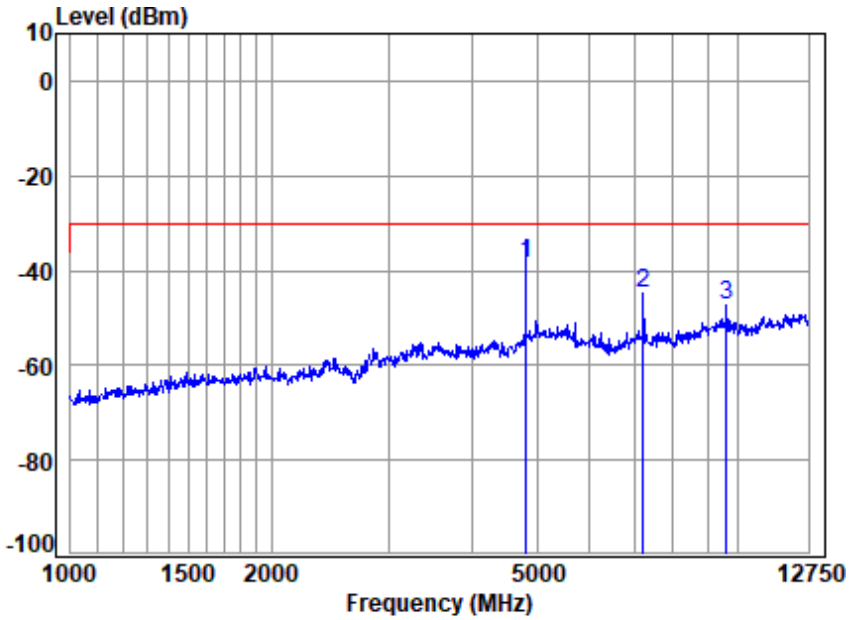
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Condition: 3m HORIZONTAL
Job No.: 03176AT
Test mode: TX RSE
: 2403

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	4809.50	-37.43	-30.00	-7.43
2	9710.03	-49.50	-30.00	-19.50
3	12024.96	-47.90	-30.00	-17.90

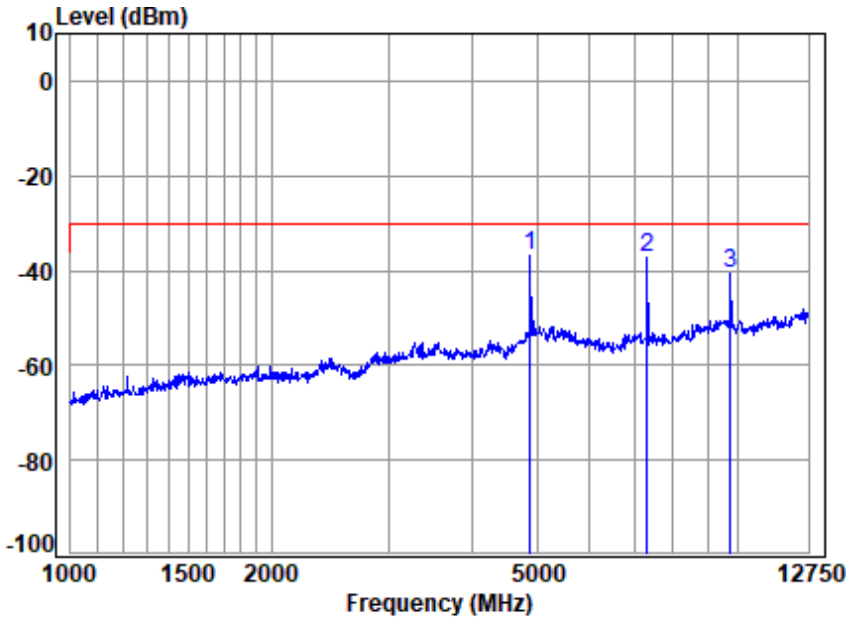
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



Condition: 3m VERTICAL
Job No.: 03176AT
Test mode: TX RSE
: 2403

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	4809.50	-38.37	-30.00	-8.37
2	7209.02	-44.69	-30.00	-14.69
3	9611.66	-47.46	-30.00	-17.46

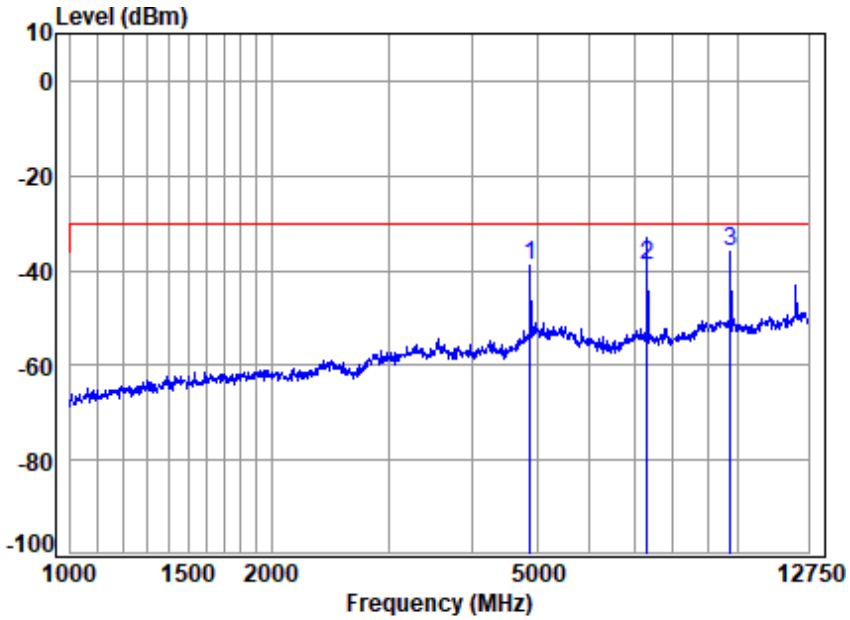
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Condition: 3m HORIZONTAL
Job No.: 03176AT
Test mode: TX RSE
: 2440

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	4883.52	-36.75	-30.00	-6.75
2	7319.96	-37.06	-30.00	-7.06
3	9759.59	-40.69	-30.00	-10.69

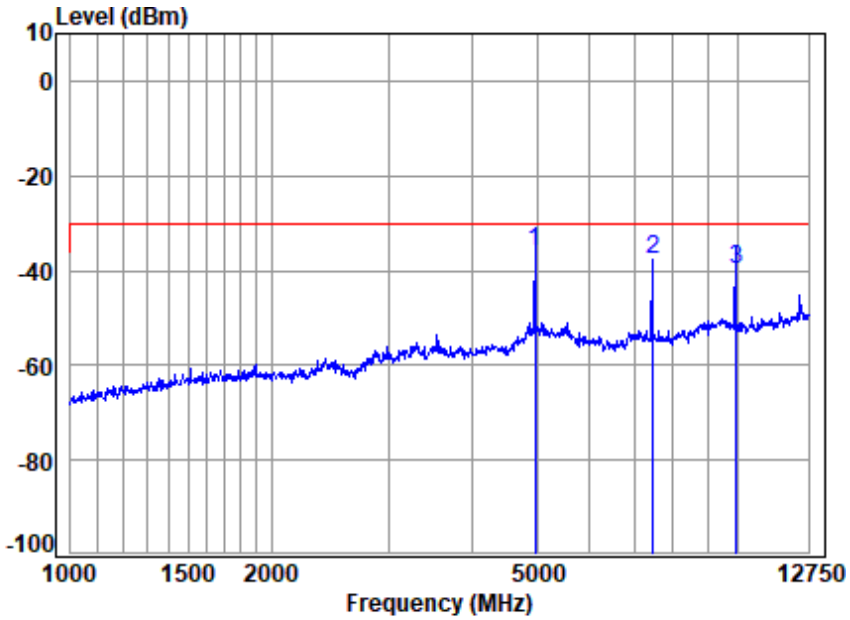
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:middle



Condition: 3m VERTICAL
Job No.: 03176AT
Test mode: TX RSE
: 2440

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	4883.52	-38.77	-30.00	-8.77
2	7319.96	-39.01	-30.00	-9.01
3	9759.59	-36.08	-30.00	-6.08

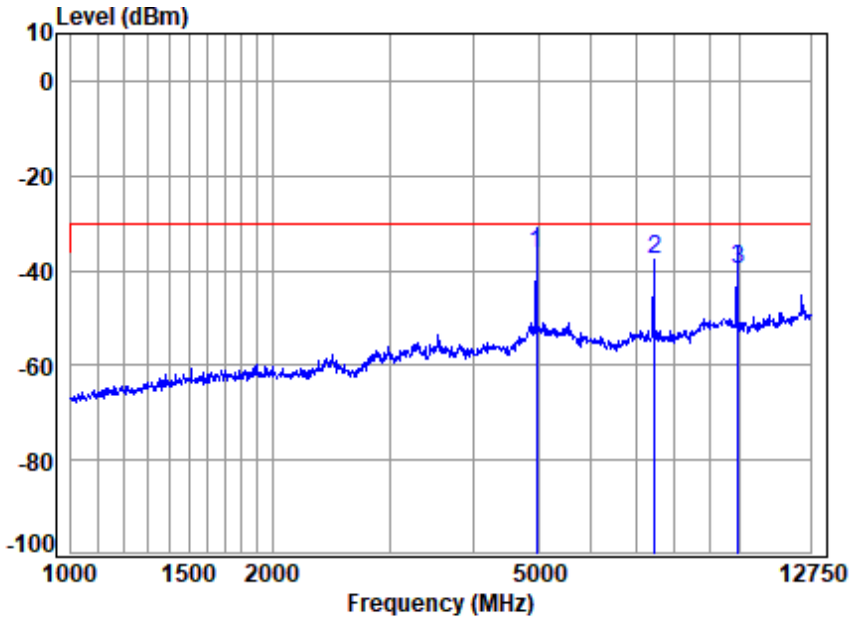
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:High



Condition: 3m HORIZONTAL
Job No.: 03176AT
Test mode: TX RSE
: 2480

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	4958.68	-36.07	-30.00	-6.07
2	7432.62	-37.84	-30.00	-7.84
3	9909.80	-39.64	-30.00	-9.64

Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:High



Condition: 3m VERTICAL
Job No.: 03176AT
Test mode: TX RSE
: 2480

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	4958.68	-36.40	-30.00	-6.40
2	7432.62	-37.84	-30.00	-7.84
3	9909.80	-39.93	-30.00	-9.93

7.2 Receiver spurious emissions

Test Requirement EN 300 328 V2.2.2 Clause 4.3.2.10.3
Test Method: EN 300 328 V2.2.2 Clause 5.4.10.2

Limit:

The spurious emissions of the receiver shall not exceed the values in tables in the indicated bands:

Frequency Range	Limit
30 MHz to 1 GHz	2nW(-57dBm)
Above 1GHz	20nW(-47dBm)

7.2.1 E.U.T. Operation

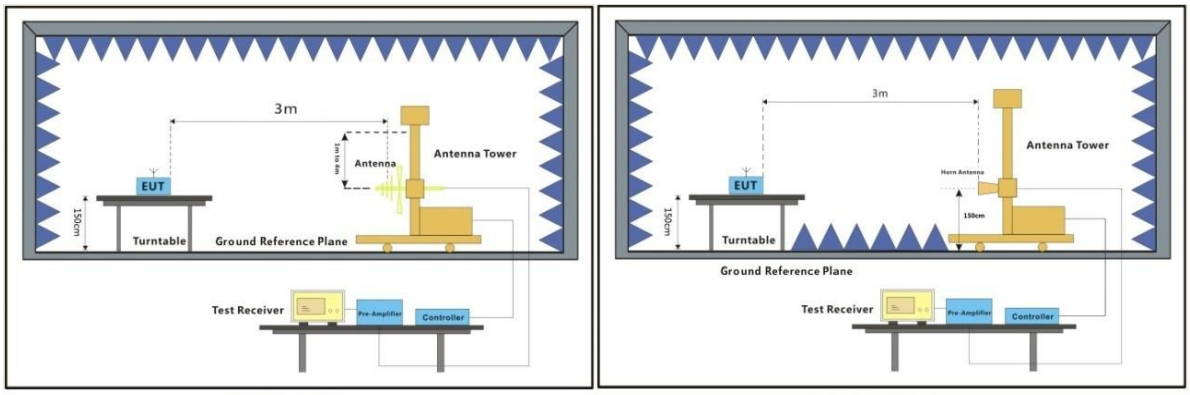
Operating Environment:

Temperature: 21.5 °C Humidity: 41.5 % RH Atmospheric Pressure: 1020 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	RX_Keep the EUT in receiving mode with GFSK modulation.

7.2.3 Test Setup Diagram



30MHz-1GHz Above 1GHz

7.2.4 Measurement Procedure and Data

1. Using test software to set up the lowest channel, the middle channel and the highest channel.

2. Scan from 30MHz to 12.75GHz, find the maximum radiation frequency to measure. No Standby Mode apply for the EUT.

3. The technique used to find the Spurious Emissions of the transmitter was a pre-calibration method which is measure the path loss from the measurement antenna to the substitution antenna and subtract this from the signal generator level to reach the measurement result. The method was performed to determine the actual ERP/EIRP emission levels of the EUT.

Test procedure as below:

1) The EUT was powered ON and placed on a table in the chamber. The antenna of the transmitter was extended to its maximum length. Receiver mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.

2) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

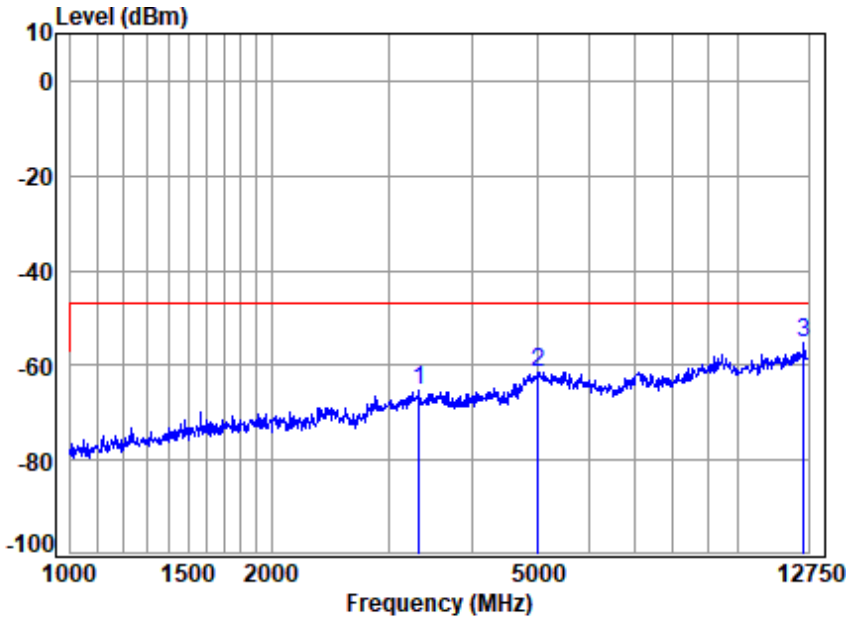
3) The test antenna shall be raised or lowered again, if necessary, through the specified height range until a maximum is obtained. This level shall be recorded.

4) This measurement shall be repeated for horizontal and vertical polarization.

Remark:

The disturbance below 1GHz was very low and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

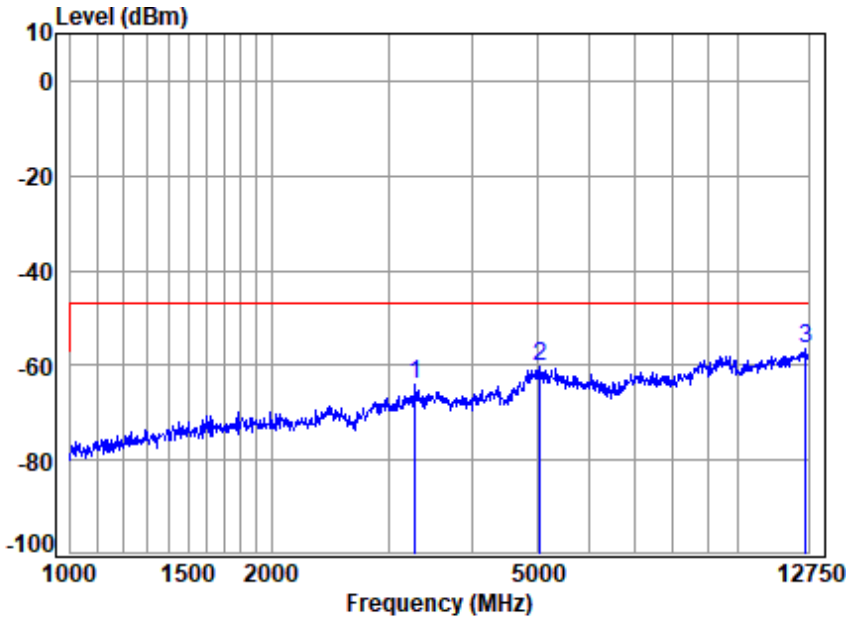
Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Condition: 3m HORIZONTAL
Job No.: 03176AT
Test mode: RX RSE
: 2403

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	3333.55	-65.21	-47.00	-18.21
2	4996.69	-61.42	-47.00	-14.42
3	12556.75	-55.42	-47.00	-8.42

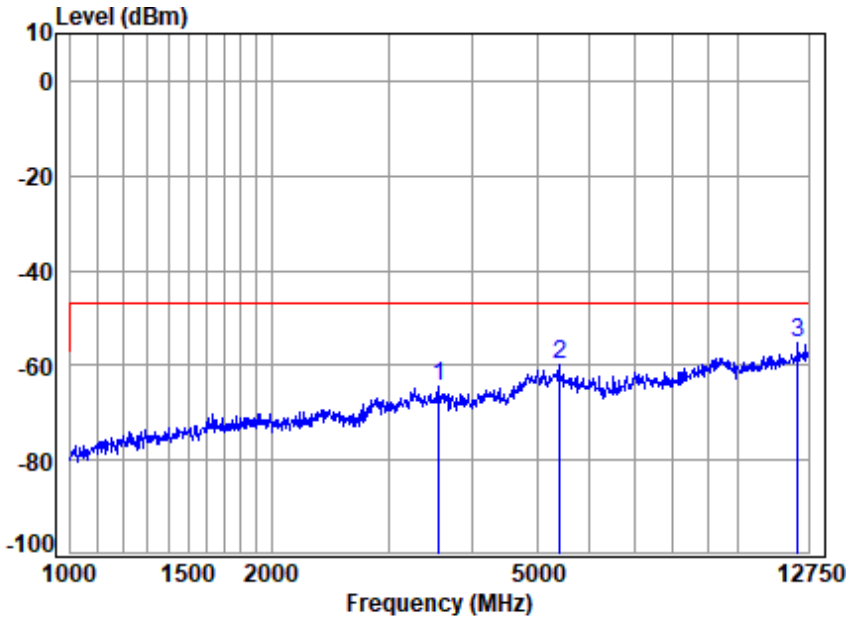
Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low



Condition: 3m VERTICAL
Job No.: 03176AT
Test mode: RX RSE
: 2403

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	3283.02	-64.11	-47.00	-17.11
2	5034.99	-60.27	-47.00	-13.27
3	12588.75	-56.55	-47.00	-9.55

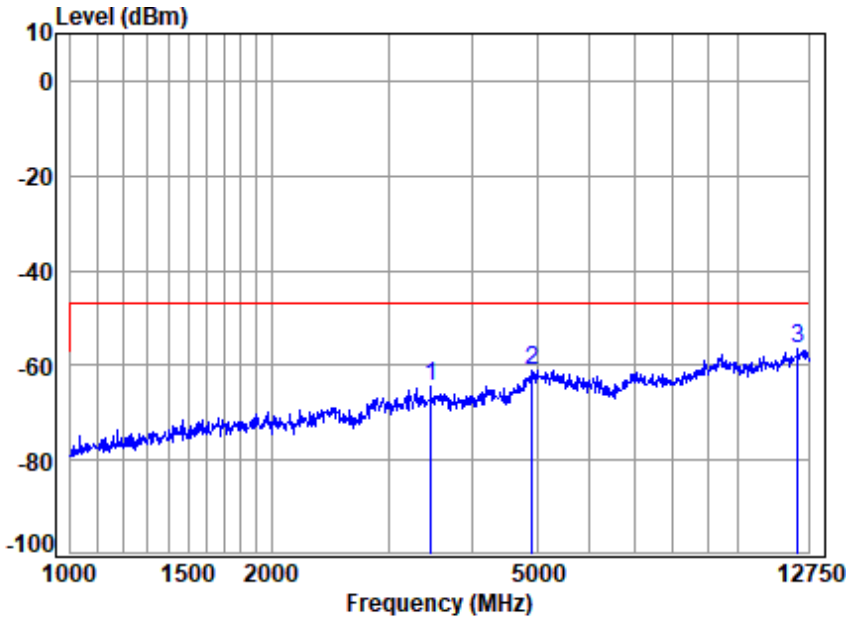
Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Condition: 3m HORIZONTAL
Job No.: 03176AT
Test mode: RX RSE
: 2440

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	3570.71	-64.58	-47.00	-17.58
2	5393.22	-60.04	-47.00	-13.04
3	12303.62	-55.14	-47.00	-8.14

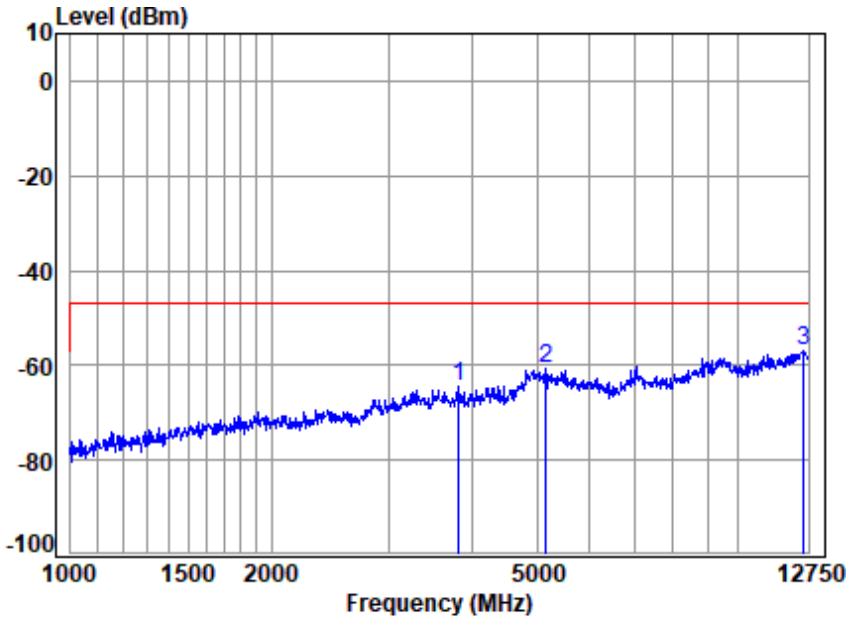
Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:middle



Condition: 3m VERTICAL
Job No.: 03176AT
Test mode: RX RSE
: 2440

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	3463.29	-64.41	-47.00	-17.41
2	4895.97	-60.97	-47.00	-13.97
3	12272.34	-56.45	-47.00	-9.45

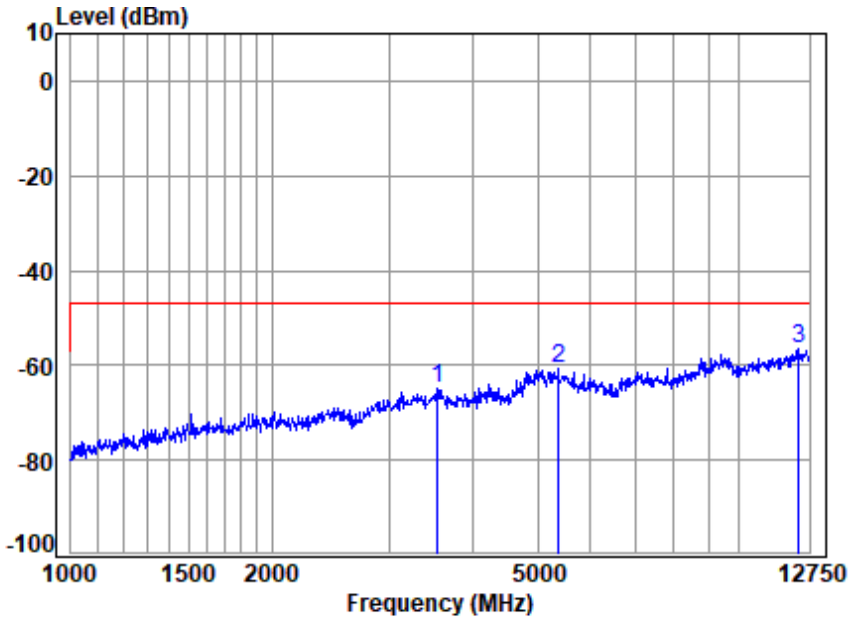
Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:High



Condition: 3m HORIZONTAL
Job No.: 03176AT
Test mode: RX RSE
: 2480

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	3815.03	-64.38	-47.00	-17.38
2	5138.58	-60.79	-47.00	-13.79
3	12556.75	-56.74	-47.00	-9.74

Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High



Condition: 3m VERTICAL
Job No.: 03176AT
Test mode: RX RSE
: 2480

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	3525.56	-64.99	-47.00	-17.99
2	5365.83	-60.72	-47.00	-13.72
3	12241.14	-56.69	-47.00	-9.69

7.3 RF Output Power

Test Requirement EN 300 328 V2.2.2 Clause 4.3.2.2.3

Test Method: EN 300 328 V2.2.2 Clause 5.4.2.2.1.2

Limit:

Frequency band(MHz)	Limit
2400-2483.5	20dBm/(100mw) (e.i.r.p)

7.3.1 E.U.T. Operation

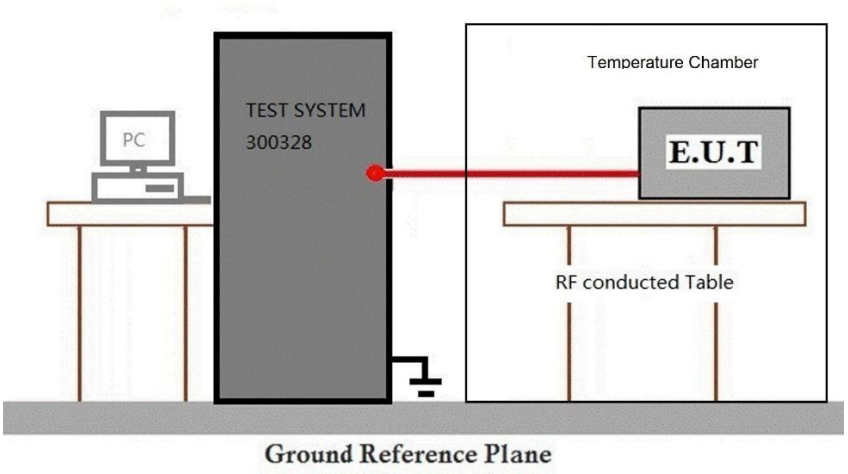
Operating Environment:

Temperature: 25.7 °C Humidity: 40.8 % RH Atmospheric Pressure: 1020 mbar

7.3.2 Test Mode Description

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

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.4 Power Spectral Density

Test Requirement EN 300 328 V2.2.2 Clause 4.3.2.3.3

Test Method: EN 300 328 V2.2.2 Clause 5.4.3.2.1

Limit:

Frequency band(MHz)	Limit
2400～2483.5	≤10dBm per MHz

7.4.1 E.U.T. Operation

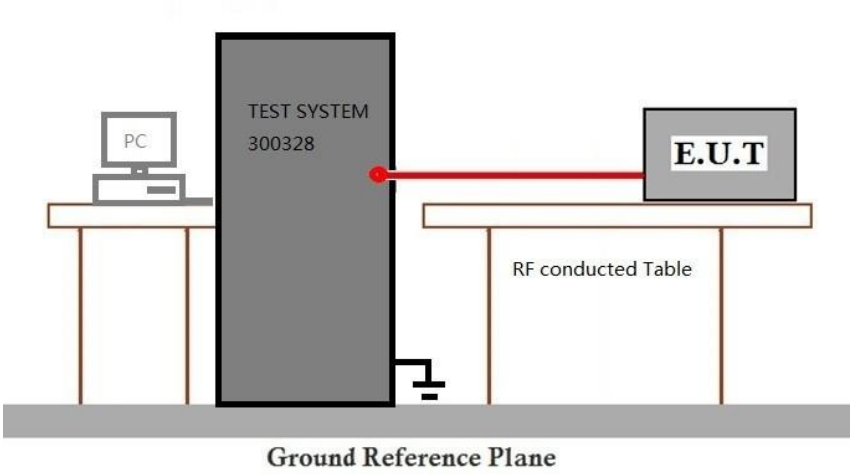
Operating Environment:

Temperature: 25.7 °C Humidity: 40.8 % RH Atmospheric Pressure: 1020 mbar

7.4.2 Test Mode Description

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

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.5 Occupied Channel Bandwidth

Test Requirement EN 300 328 V2.2.2 Clause 4.3.2.7.3

Test Method: EN 300 328 V2.2.2 Clause 5.4.7.2.1

Limit:

The Occupied Channel Bandwidth shall be within the band given in table 1.

In addition, for non-adaptive non-FHSS equipment with e.i.r.p. greater than 10 dBm, the Occupied Channel Bandwidth shall be equal to or less than 20 MHz.

7.5.1 E.U.T. Operation

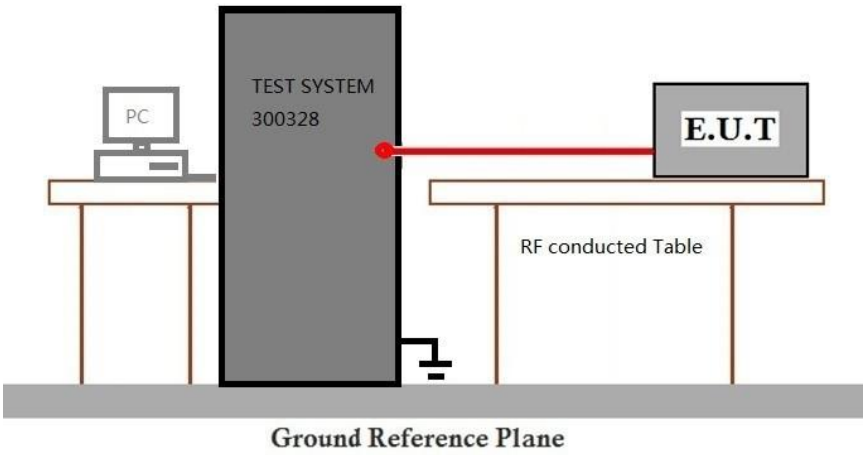
Operating Environment:

Temperature: 25.7 °C Humidity: 40.8 % RH Atmospheric Pressure: 1020 mbar

7.5.2 Test Mode Description

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

7.5.3 Test Setup Diagram



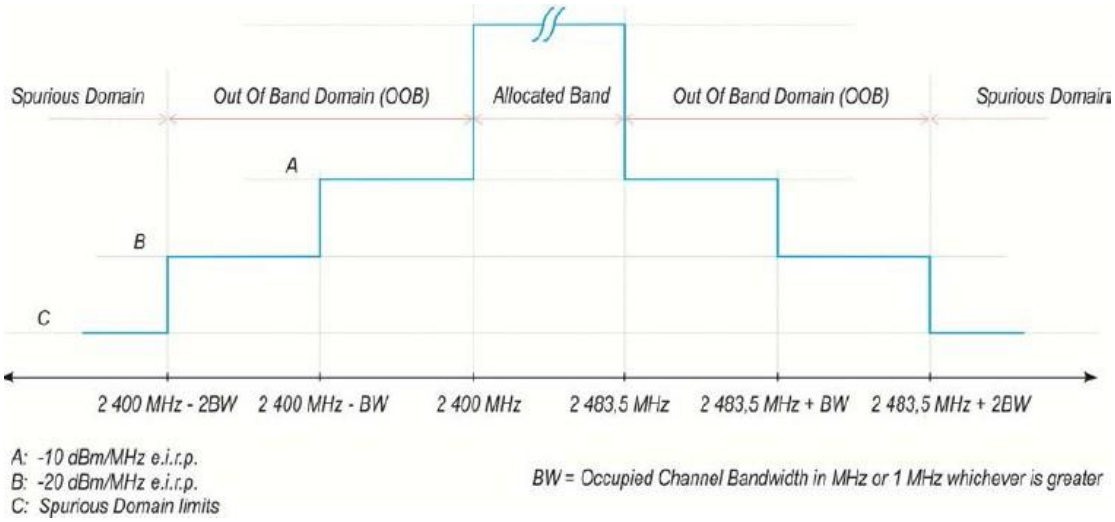
7.5.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.6 Transmitter unwanted emissions in the OOB domain

Test Requirement EN 300 328 V2.2.2 Clause 4.3.2.8.3
Test Method: EN 300 328 V2.2.2 Clause 5.4.8.2.1

Limit:



7.6.1 E.U.T. Operation

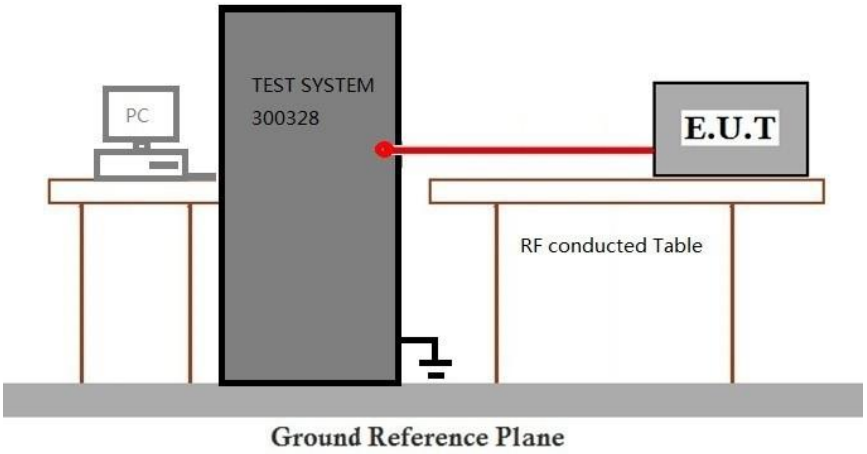
Operating Environment:

Temperature: 25.7 °C Humidity: 40.8 % RH Atmospheric Pressure: 1020 mbar

7.6.2 Test Mode Description

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

7.6.3 Test Setup Diagram



7.6.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.7 Receiver Blocking

Test Requirement EN 300 328 V2.2.2 Clause 4.3.2.11.4

Test Method: EN 300 328 V2.2.2 Clause 5.4.11.2.1

Limit:

For equipment that supports a PER or FER test to be performed, the minimum performance criterion shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER test to be performed, the minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment.

The blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided below table.

Receiver Blocking parameters for Receiver Category 1 equipment			
Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × log10(OCBW)) or -68 dBm whichever is less (see note 2)	2380 2504	-34	CW
(-139 dBm + 10 × log10(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		

NOTE 1: OCBW is in Hz.

NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 20 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Receiver Blocking parameters for Receiver Category 2 equipment			
Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × log10(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Receiver Blocking parameters for Receiver Category 3 equipment			
Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × log10(OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 30 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

7.7.1 E.U.T. Operation

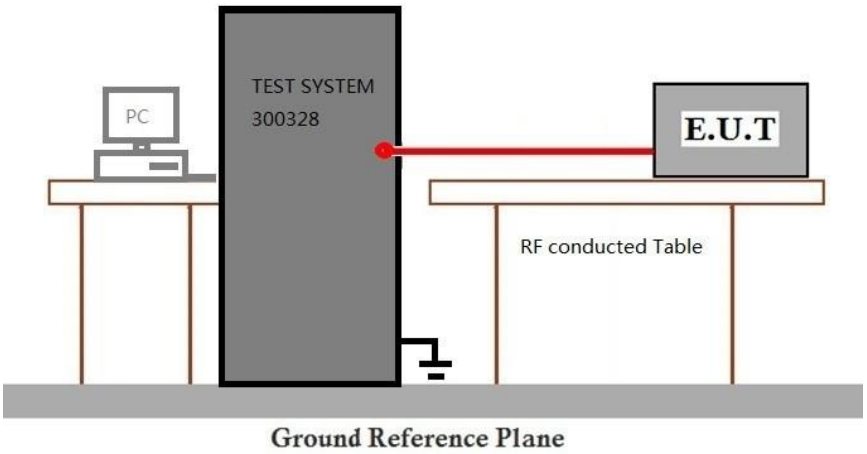
Operating Environment:

Temperature: 25.7 °C Humidity: 40.8 % RH Atmospheric Pressure: 1020 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	Normal operating_Keep the EUT communication with the companion device.

7.7.3 Test Setup Diagram

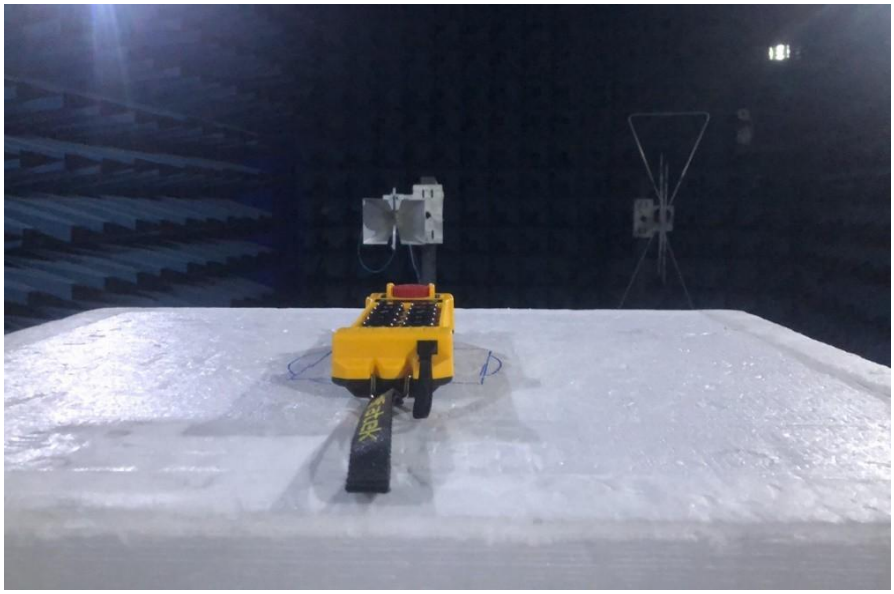


7.7.4 Measurement Procedure and Data

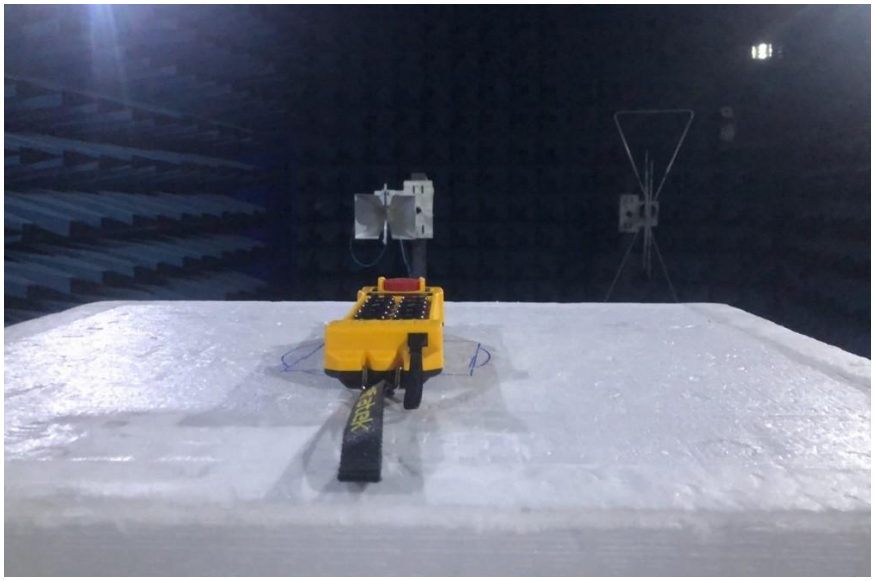
During and after the test, the EUT shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the EUT as intended.

8 Test Setup Photo

Transmitter unwanted emissions in the spurious domain



Receiver spurious emissions



9 EUT Constructional Details (EUT Photos)

Refer to Appendix_Photographs of EUT Constructional Details for SZCR2507003176AT

10 Appendix

1. RF Output Power

1.1 Test Result

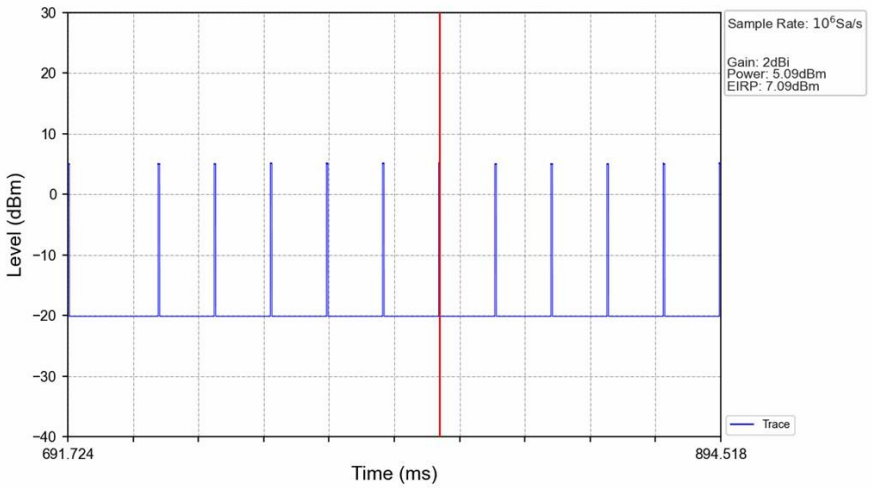
1.1.1 Power

ENV	Mode	TX Type	Frequency (MHz)	ANT	Gain (dBi)	Power (dBm)	EIRP (dBm)	Limit (dBm)	Verdict
NTNV	TX	SISO	2403	1	2.00	5.09	7.09	<=20	Pass
			2440	1	2.00	5.67	7.67	<=20	Pass
			2480	1	2.00	5.56	7.56	<=20	Pass
HTNV	TX	SISO	2403	1	2.00	5.08	7.08	<=20	Pass
			2440	1	2.00	5.25	7.25	<=20	Pass
			2480	1	2.00	5.71	7.71	<=20	Pass
LTNV	TX	SISO	2403	1	2.00	4.88	6.88	<=20	Pass
			2440	1	2.00	4.94	6.94	<=20	Pass
			2480	1	2.00	5.41	7.41	<=20	Pass
Note1: E.I.R.P = Measured Power + Antenna Gain									

1.2 Test Graph

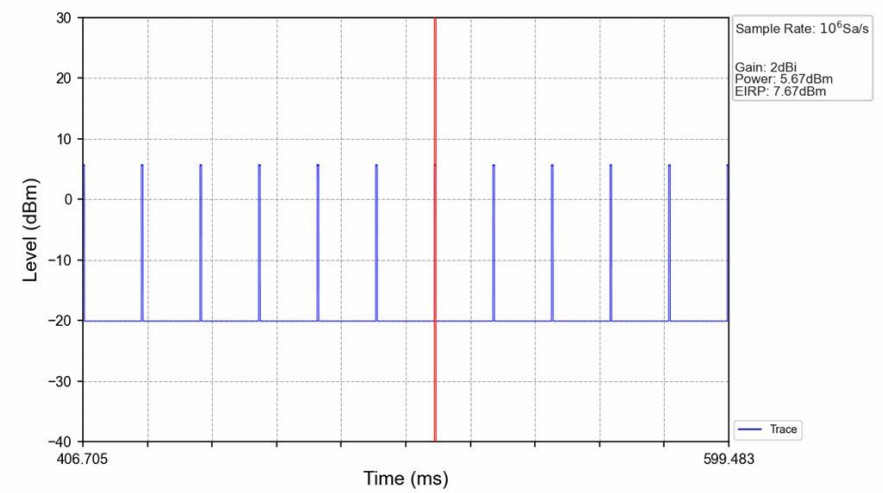
1.2.1 Power

TX_2403MHz_Ant1_NTNV



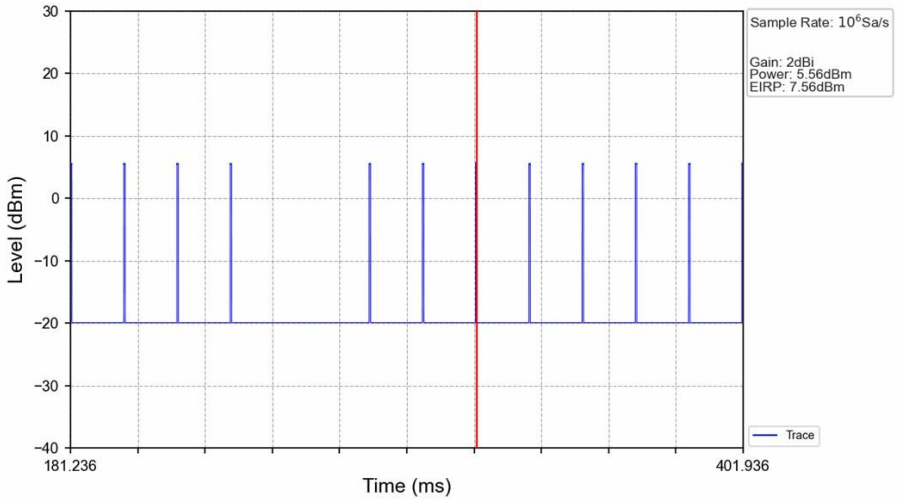
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.449	0.449	0.450	0.450	0.449	0.450	**0.449**	0.450	0.450	0.450	0.449	0.449
Power (dBm)	5.01	5.02	5.01	5.08	5.09	5.08	**5.09**	5.01	5.02	5.01	5.02	5.08
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

TX_2440MHz_Ant1_NTNV



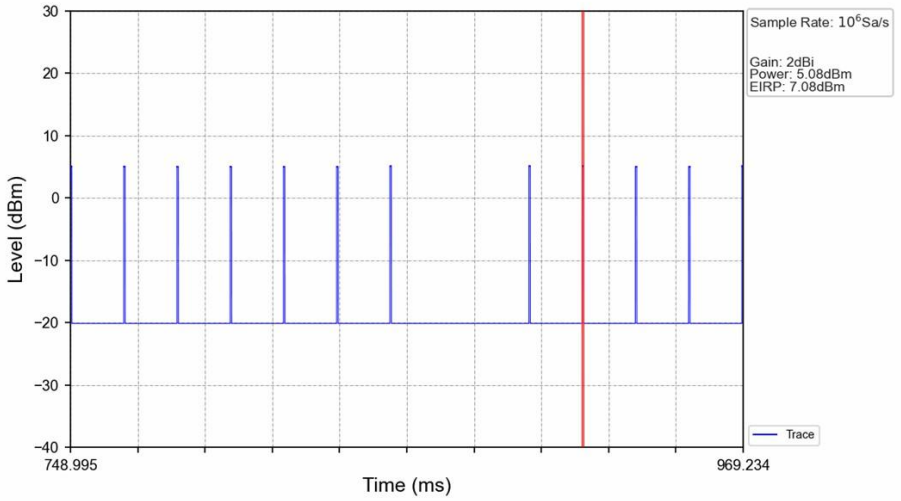
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.449	0.450	0.449	0.450	0.449	0.450	**0.450**	0.450	0.450	0.450	0.449	0.449
Power (dBm)	5.62	5.60	5.61	5.66	5.67	5.66	**5.67**	5.61	5.60	5.60	5.60	5.66
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

TX_2480MHz_Ant1_NTNV



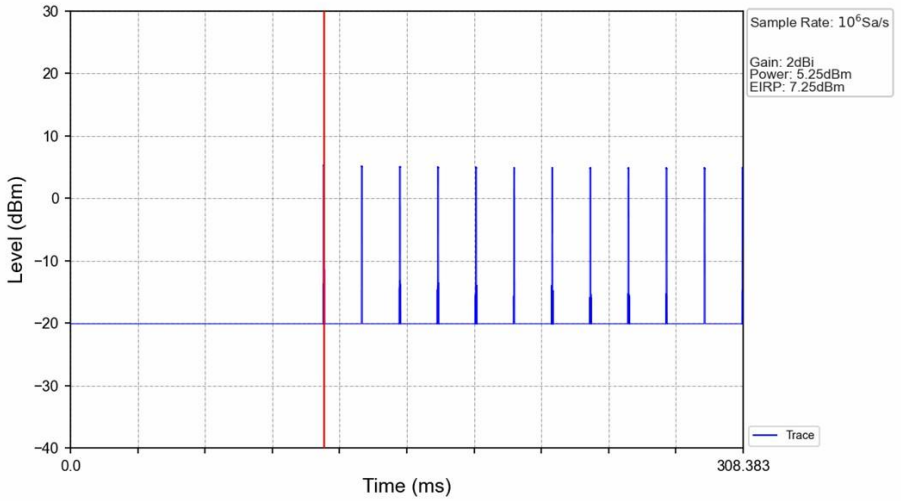
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.450	0.450	0.450	0.449	0.449	0.449	**0.450**	0.449	0.450	0.450	0.450	0.449
Power (dBm)	5.49	5.49	5.51	5.53	5.54	5.50	**5.56**	5.49	5.50	5.52	5.54	5.55
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

TX_2403MHz_Ant1_HTNV



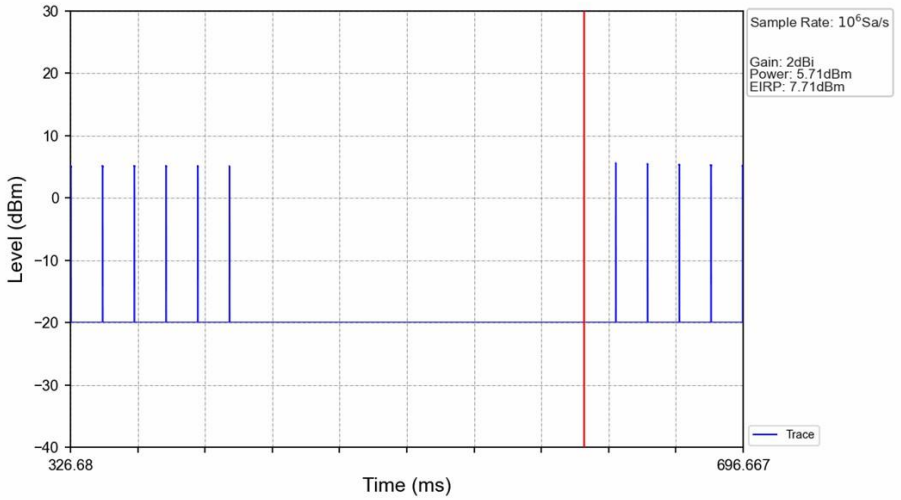
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.450	0.450	0.450	0.449	0.450	0.450	0.450	0.450	**0.450**	0.450	0.450	0.449
Power (dBm)	5.06	5.06	4.99	4.99	4.99	5.00	5.08	5.08	**5.08**	5.02	5.01	5.02
Remark	/	/	/	/	/	/	/	/	**Max**	/	/	/

TX_2440MHz_Ant1_HTNV



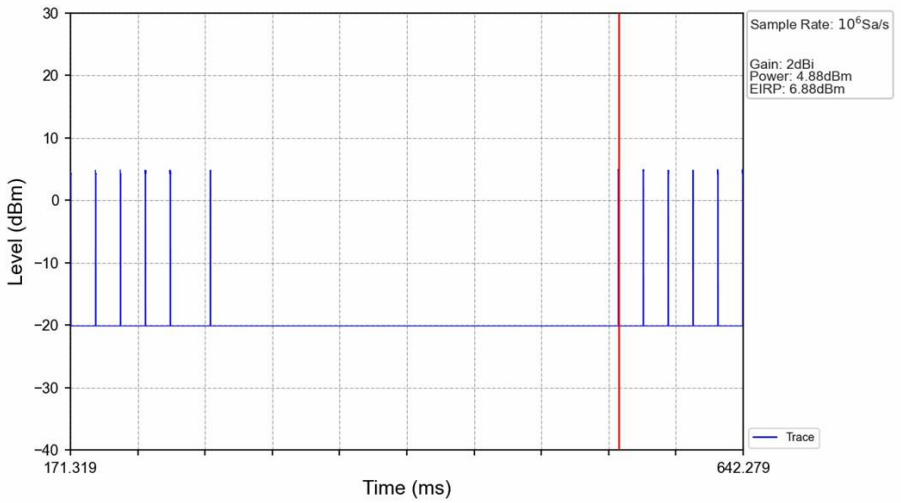
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	**0.450**	0.450	0.449	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.449	0.450
Power (dBm)	**5.25**	5.10	5.03	4.95	4.90	4.86	4.86	4.81	4.81	4.78	4.82	4.86
Remark	**Max**	/	/	/	/	/	/	/	/	/	/	/

TX_2480MHz_Ant1_HTNV



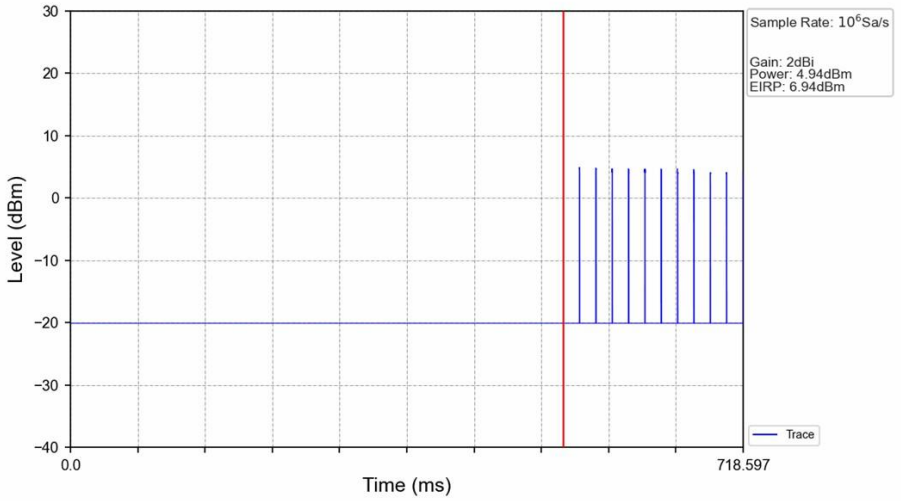
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.449	0.450	0.450	0.450	0.450	0.449	**0.449**	0.450	0.450	0.449	0.449	0.450
Power (dBm)	5.05	5.06	5.08	5.07	5.03	4.99	**5.71**	5.54	5.40	5.29	5.21	5.13
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

TX_2403MHz_Ant1_LTNV



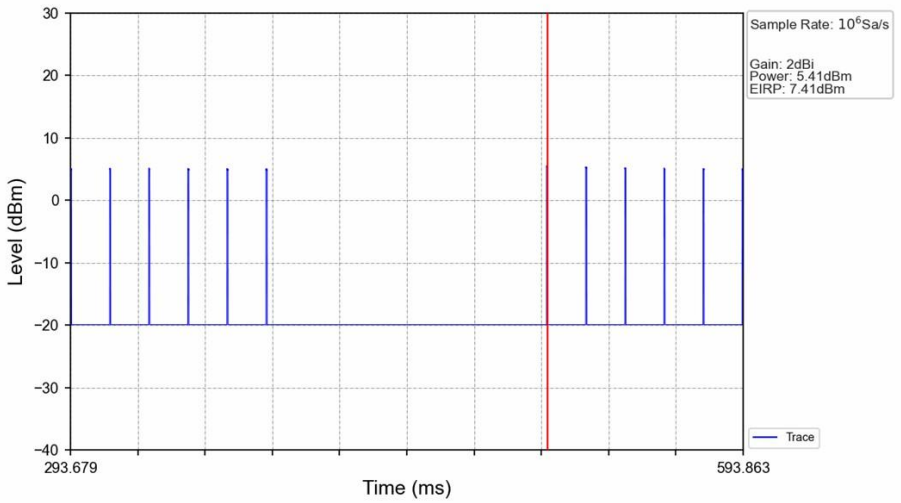
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.450	0.449	0.449	0.450	0.450	0.450	**0.449**	0.450	0.450	0.450	0.449	0.449
Power (dBm)	4.26	4.27	4.27	4.50	4.34	4.34	**4.88**	4.81	4.43	4.32	4.29	4.51
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

TX_2440MHz_Ant1_LTNV



Burst No.	**1**	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	**0.450**	0.449	0.450	0.449	0.450	0.450	0.450	0.450	0.449	0.450	0.450	0.449
Power (dBm)	**4.94**	4.78	4.65	4.38	4.11	4.14	4.05	4.02	4.01	3.96	3.99	4.01
Remark	**Max**	/	/	/	/	/	/	/	/	/	/	/

TX_2480MHz_Ant1_LTNV



Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.449	0.450	0.450	0.450	0.450	0.450	**0.450**	0.449	0.450	0.450	0.450	0.450
Power (dBm)	4.97	4.97	4.98	4.96	4.91	4.87	**5.41**	5.21	5.07	4.98	4.95	4.89
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

2. Power Spectral Density

2.1 Test Result

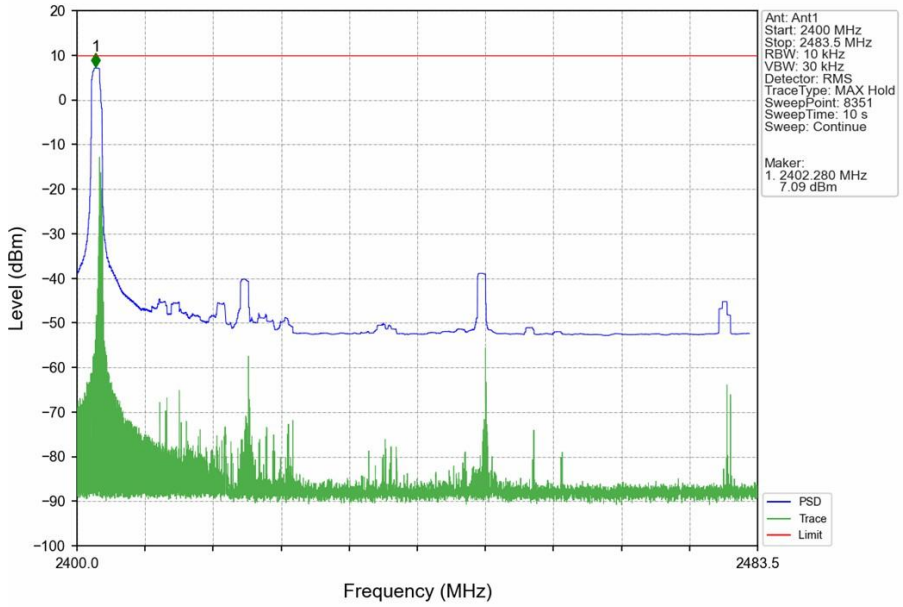
2.1.1 PSD

ENV	Mode	TX Type	Frequency (MHz)	ANT	E.I.R.PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NTNV	TX	SISO	2403	1	7.09	<=10	Pass
			2440	1	7.67	<=10	Pass
			2480	1	7.56	<=10	Pass

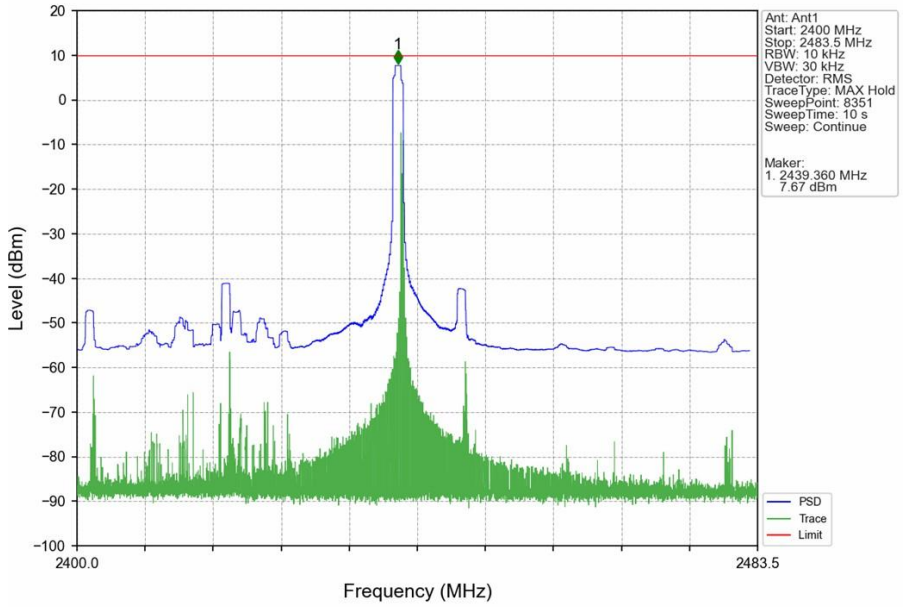
2.2 Test Graph

2.2.1 PSD

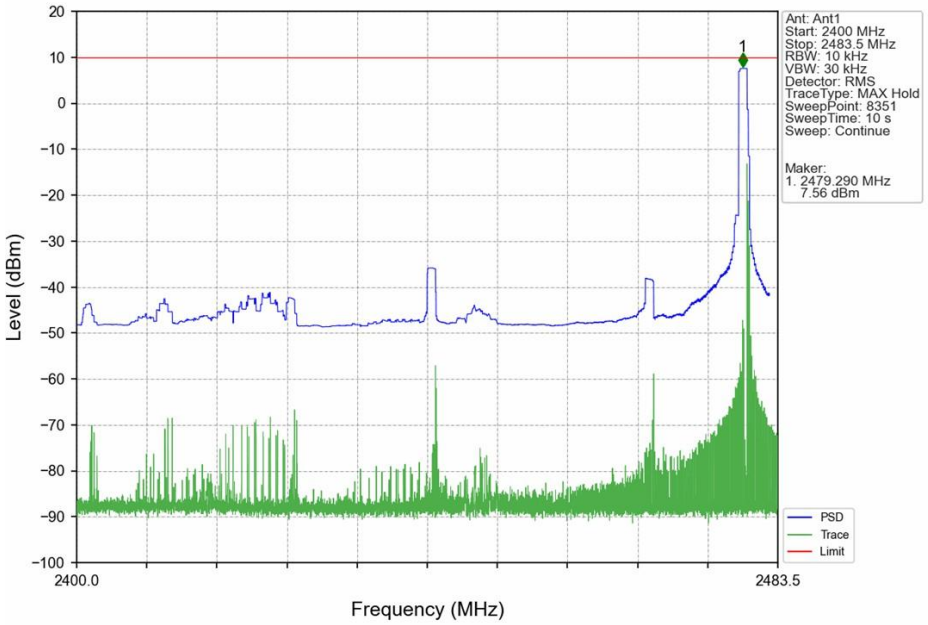
TX_2403MHz_Ant1_NTNV



TX_2440MHz_Ant1_NTNV



TX_2480MHz_Ant1_NTNV



3. Occupied Channel Bandwidth

3.1 Test Result

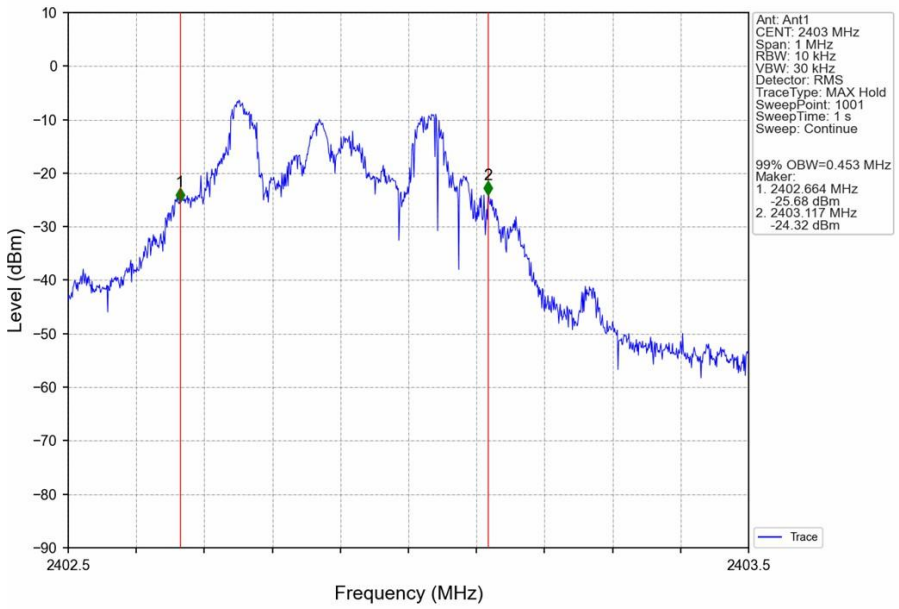
3.1.1 OBW_Ant1

Ant1								
ENV	Mode	TX Type	Frequency (MHz)	OBW (MHz)	Frequency Range (MHz)			Verdict
				Result	FL	FH	Limit	
NTNV	TX	SISO	2403	0.453	2402.664	/	>=2400	Pass
			2480	0.444	/	2480.091	<=2483.5	Pass

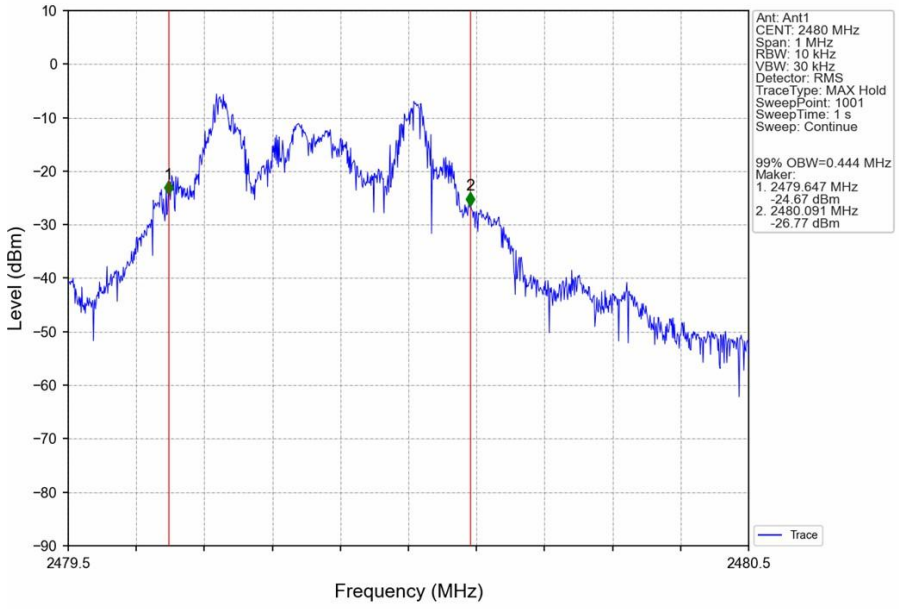
3.2 Test Graph

3.2.1 OBW_Ant1

TX_2403MHz_Ant1_NTNV



TX_2480MHz_Ant1_NTNV



4. Transmitter Unwanted Emissions In The Out-Of-Band Domain

4.1 Test Result

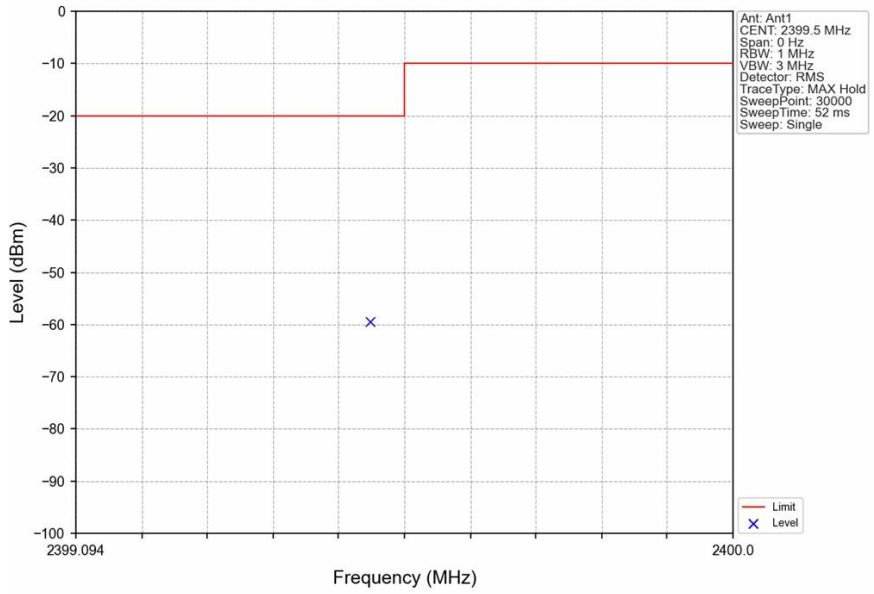
4.1.1 TX-Ant1

TX Ant1 NTNV							
Mode	TX Type	Frequency (MHz)	ANT	Test Freq. (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
TX	SISO	2403	1	2398.500	-61.04	<=-20	Pass
				2399.500	-59.44	<=-10	Pass
		2480	1	2484.000	-61.42	<=-10	Pass
				2485.000	-62.64	<=-20	Pass

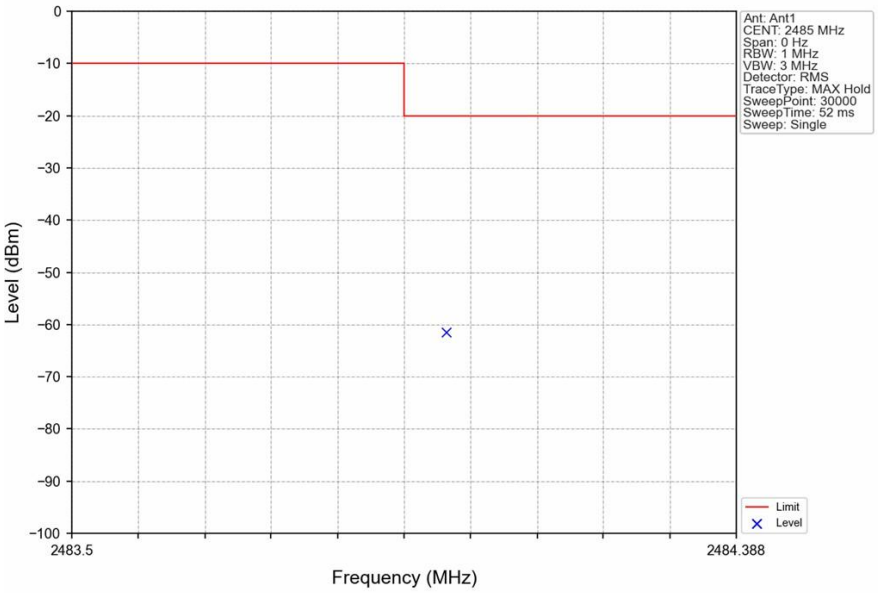
4.2 Test Graph

4.2.1 TX-Ant1

TX_2403MHz_Ant1_NTNV



TX_2480MHz_Ant1_NTNV



- End of the Report -