

TEST REPORT

of

ARIB STD-T66

Equipment Under Test : BLE module
Model Name : UTO-NBL-54L
Variant Model Name(s) : UTO-NBL-54LA
Applicant : UTOVERTEK
Manufacturer : UTOVERTEK
Date of Receipt : 2026.03.10
Date of Test(s) : 2026.03.23 ~ 2026.03.24
Date of Issue : 2026.03.27

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

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 - 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.
 - 3) This test report cannot be reproduced, except in full, without prior written permission of the Company.
 - 4) The data marked ※ in this report was provided by the customer and may affect the validity of the test results.
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Tested by:



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Technical
Manager:



Haegyung Park

SGS Korea Co., Ltd. Gunpo Laboratory

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- Wireless Div. 2FL, 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.

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1.2. Details of Applicant

Applicant : UTOVERTEK

Address : RM1111, 24, Dunchon-daero 388 beon-gil, Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea

1.3. Details of Manufacturer

Company : Same as applicant

Address : Same as applicant

1.4. Description of EUT

Kind of Product	BLE module
Model Name	UTO-NBL-54L
Power Supply	DC 3 V
Frequency Range	2 402 MHz ~ 2 480 MHz (Bluetooth Low Energy)
Modulation Technique	GFSK
Number of Channels	40 channels (Bluetooth Low Energy)
Rated Output Power	5 mW
Antenna Type	Dipole Antenna
Antenna Gain[※]	4.97 dB i

1.5. Test Equipment List

Date of Test	2026.03.23~2026.03.24					
Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Authority	Cal. Method
Spectrum Analyzer	R&S	FSV30	103100	Mar. 04, 2026	SICT	c)
Signal Generator	R&S	SMA100B	106887	Oct. 20, 2025	SICT	c)
Attenuator	MCLI	FAS-12-10	A1	Jun. 10, 2025	SICT	c)
DC Power Supply	R&S	HMP2020	102132	Apr. 28, 2025	SICT	c)
DIGITAL MULTIMETER	HIOKI	DT4211	N0301231	Sep. 18, 2025	SICT	c)

Note;

- a): Calibration conducted by the National Institute of Information and Communications Technology or a designated calibration agency under Article 102-18 paragraph (1).
- b): Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law. (Law No. 51 of 1992)
- c): Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).
- d): Calibration conducted by using other equipment that listed above from a) to c).

1.6. Test Method

Measurement was conducted by the following test method:

The test method of Ordinance Concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment in Annex 1, the Ministry of Internal Affairs and Communication notification in Annex 43 of Article 88, Paragraph 1 or the test method more than equivalent.

1.7. The reason why the tests are performed only at rated voltage

We confirm that there is the regulator inside of the EUT.

1.8. Summary of Test Results

The EUT has been tested according to the following specifications:

Applied Standard : Radio equipment regulations and ARIB STD-T66		
Section	Test item	Result
STD-T66 3.2	Frequency Tolerance	Complied
STD-T66 3.2	Occupied Bandwidth (99 %)	Complied
STD-T66 3.2	Spurious Emission Intensity	Complied
STD-T66 3.2	Antenna Power	Complied
STD-T66 3.3	Secondary Radiated Emissions	Complied
STD-T66 3.4	Interference Prevention Function	Complied

1.9. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL006809	2026.03.27	Initial

1.10. Description of test mode

Mode		Frequency (MHz)	Packet length (Byte)	Average Power (dB m)
PHY 1M	Uncoded	2 402	37	6.49
			255	6.51
	125k coded	2 402	37	6.46
			255	6.49
PHY 2M	Uncoded	2 402	37	6.10
			255	6.17

Note;

All modes were investigated.

For PHY 1M, Uncoded 255 bytes was performed as worst case.

For PHY 2M, Uncoded 255 bytes was performed as worst case.

1.11. Description of Variant model

Mode	Information
UTO-NBL-54L	- Basic model
UTO-NBL-54LA	The only difference between UTO-NBL-54L and UTO-NBL-54LA is: - PCB Dimension - Antenna : Chip antenna (Max Peak Gain : 1.90 dB i)

2. Frequency Tolerance

2.1. Test Setup



2.2. Limit

Tolerance of frequency: $\pm 50 \times 10^{-6}$ or less.

2.3. Test Procedure

1. Connect transmitter output to the spectrum analyzer input port.
2. The EUT should be transmitting at low, high channels.
3. Set the spectrum analyzer as below;

Center frequency:	LE	2 402 MHz, 2 480 MHz
Span:		1 MHz
RBW:		10 kHz
VBW:		10 kHz
Sweep time:		Auto
Sweep data points:		1 001 or greater
Detector mode:		Positive peak
Indication mode:		Max hold

4. Find the peak carrier signal and measure its frequency.

2.4. Test Result

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

- Test mode: Un-Modulated

Test Voltage (V)	Measured Frequency (MHz)	Reading Frequency (MHz)	Frequency Tolerance [ppm]
V _{nor} = 3.0	Low Ch. (2 402)	2 401.994	-2.50
	High Ch. (2 480)	2 479.994	-2.42

Note;

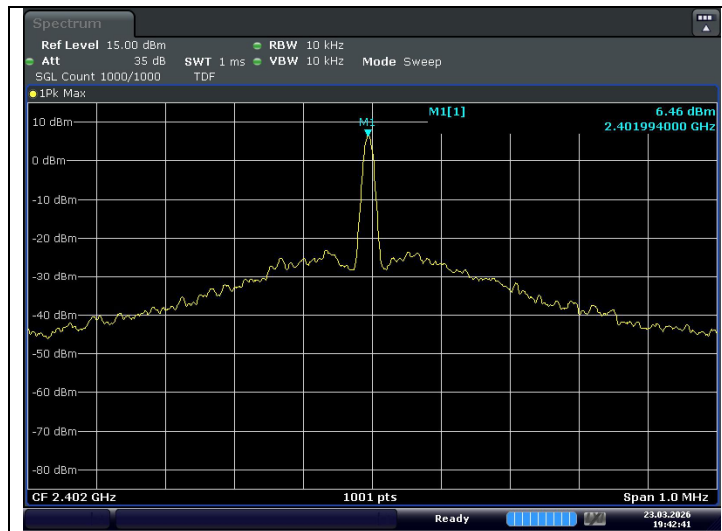
1. FT (ppm) = [(RF-MF)/MF] × 10⁶

- FT: Frequency Tolerance, RF: Reading Frequency and MF: Measurement Frequency

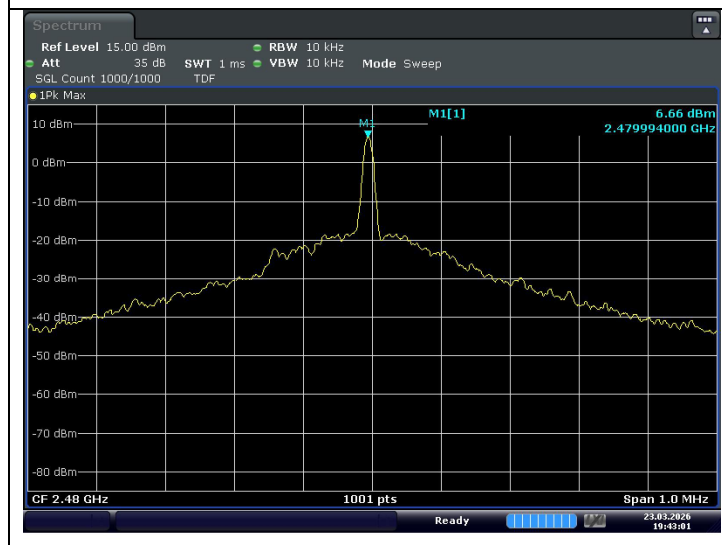
2. The Frequency Tolerance do not depend on the modulation mode because it was tested without modulation.

Test Mode : Un-Modulated

Low Channel



High Channel



3. Occupied Bandwidth (99 %)

3.1. Test Setup



3.2. Limit

The measured bandwidth at the low and high channels shall meet the following requirements:

- The lowest frequency of the measured bandwidth shall not be less than 2 400 MHz
- The highest frequency of the measured bandwidth shall not be greater than 2 483.5 MHz

The measured bandwidth shall meet the following requirements:

[Occupied Bandwidth]

26 MHz or less

3.3. Test Procedure

1. Connect transmitter output to the spectrum analyzer input port.
2. Measure the signal bandwidth using a spectrum analyzer.
3. Set the spectrum analyzer as below;

Center frequency:	LE	2 402 MHz, 2 480 MHz
Span:	LE	60 MHz
RBW:		300 kHz
VBW:		300 kHz
Sweep time:		Auto
Sweep data points:		1 001 or greater
Detector mode:		Positive peak
Indication mode:		Max hold
BW setting:		99 %

3.4. Test Result

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

PHY 1M

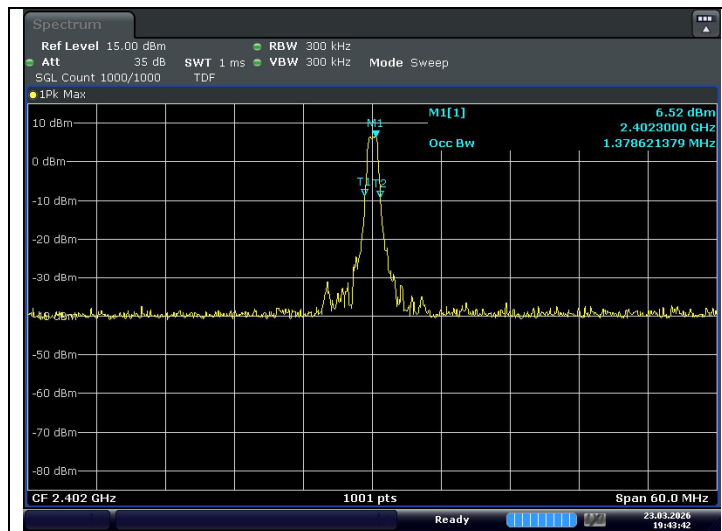
Test Voltage (V)	Measured Frequency (MHz)	Occupied Bandwidth (MHz)
V _{nor} = 3.0	Low Ch. (2 402)	1.38
	High Ch. (2 480)	1.38

PHY 2M

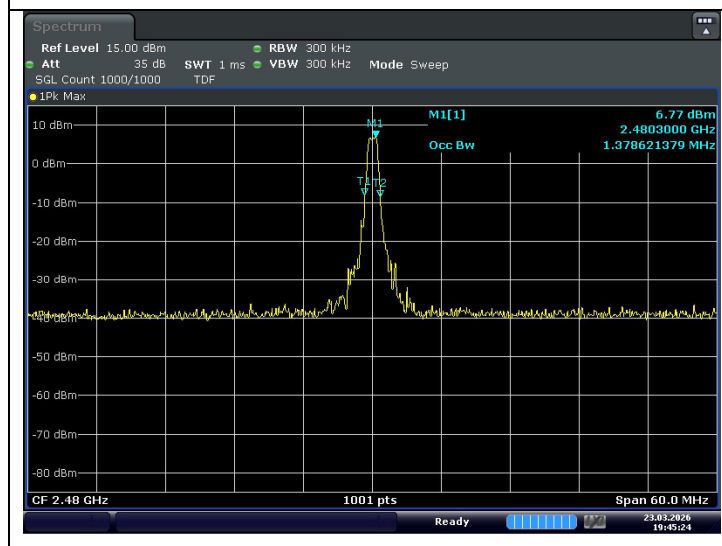
Test Voltage (V)	Measured Frequency (MHz)	Occupied Bandwidth (MHz)
V _{nor} = 3.0	Low Ch. (2 402)	2.28
	High Ch. (2 480)	2.28

PHY 1M

Low Channel

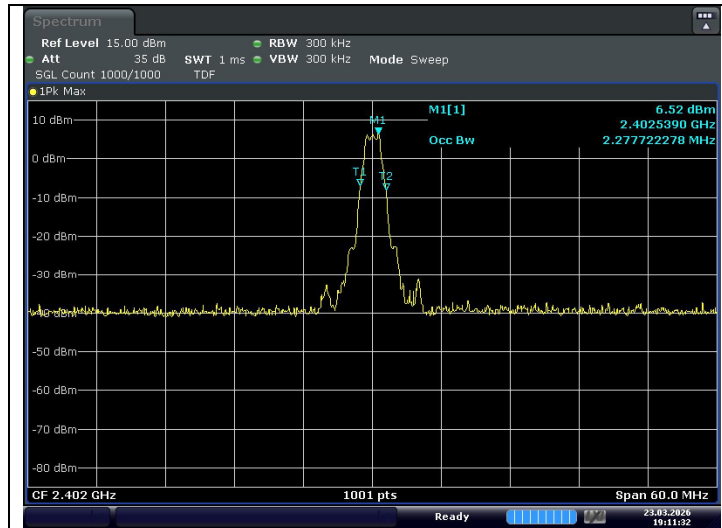


High Channel

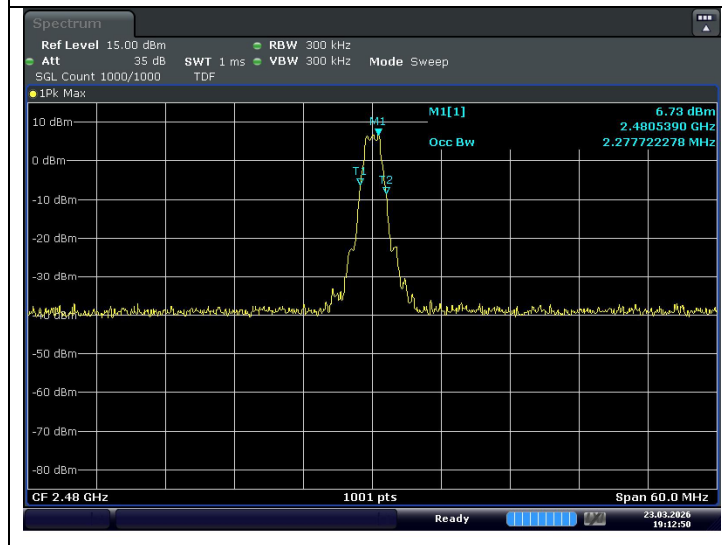


PHY 2M

Low Channel

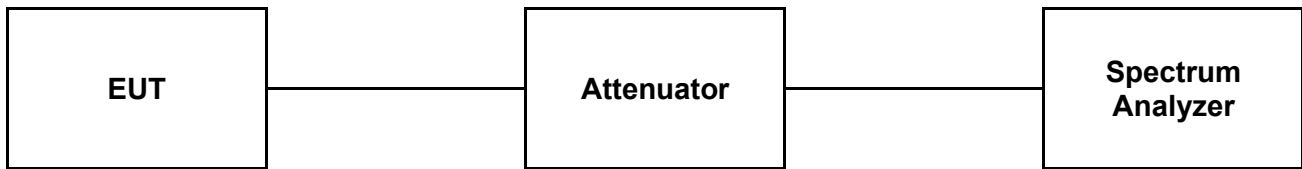


High Channel



4. Spurious Emission Intensity

4.1. Test Setup



4.2. Limit

Below 2 387 MHz:	2.5 μ W (-26 dB m)/MHz or less
2 387 to 2 400 MHz:	25.0 μ W (-16 dB m)/MHz or less
2 483.5 to 2 496.5 MHz:	25.0 μ W (-16 dB m)/MHz or less
Over 2 496.5 MHz:	2.5 μ W (-26 dB m)/MHz or less

4.3. Test Procedure

1. Connect transmitter output to the spectrum analyzer input port.
2. Configure the EUT
 - Test channels: low, high
 - Modulated
3. Set the S/A as below.

[Setting 1]

Frequency range:	LE	30 MHz to 12.5 GHz, except for 2 400 MHz to 2 483.5 MHz
RBW:		1 MHz
VBW:		1 MHz
Sweep time:		Minimum time required to make an accurate measurement
Sweep data points:		1 001 or greater
Detector mode:		Positive peak
Indication mode:		Max hold

Note: sweep shall be repeated until the max hold waveform is stable.

[Setting 2]

Center frequency:	Frequency of spurious emission found using [Setting 1]
Span:	0 Hz
RBW:	1 MHz
VBW:	1 MHz
Sweep:	Minimum time required to make an accurate measurement. For burst type (intermittent) spurious, sweep time shall be greater than one burst interval
Sweep data points:	1 001 or greater
Detector mode:	Sample or RMS

[Setting 3]

Frequency range:	2 374 MHz to 2 400 MHz 2 483.5 MHz to 2 509.5 MHz
RBW:	30 kHz
VBW:	30 kHz
Sweep time:	Minimum time required to make an accurate measurement.
Sweep data points:	1 001 or greater
Detector mode:	Positive peak
Indication mode:	Max hold

4. After configuring the spectrum analyzer to [Setting 1], search for spurious emissions from 30 MHz to 12.5 GHz. If the sweep range does not cover the required measurement frequency range then the measurement range will need to be divided into sufficient sections of size [RBW x Sweep Data Points]. If spurious emissions greater than [Limit -3 dB] are found, then more detailed measurements are required, go to step (5).
5. Configure the spectrum analyzer using [Setting 2] and measure the average signal amplitude. If the spurious emission is burst type (intermittent), then the average value shall not include signal OFF time.
If spurious emissions ranging from 30 MHz to 2 374 MHz and from 2 509.5 MHz to 12.5 GHz are over the limit, then the test result is 'Fail'.
If spurious emissions ranging 2 374 MHz to 2 400 MHz and 2 483.5 MHz to 2 509.5 MHz are over the limit, then further detailed measurements are required, go to step (6).
6. In the following cases, measure the spurious emissions using [Setting 3]
 - Case1 : FHSS, FHSS+DSSS, FHSS+OFDM
 - **Case2 : Other than FHSS, FHSS+DSSS, FHSS+OFDM, and the spurious emissions in step (5) are over the limit**
7. Calculate the spurious value (Calculated Value) using following formula:
Calculated Value = (Measured Value using [Setting 3] + 15.2 dB)
Note: 15.2 dB adjustment is derived from the Conversion Factor of RBW
Conversion Factor of RBW = 10 x Log (Reference Bandwidth / RBW of measurement) = 15.2 [dB]
Where: Reference Bandwidth = 1 MHz
RBW of measurement = 30 kHz
8. If the calculated value using (7) is over the limit, go to (9)
9. Configure the spectrum analyzer to [Setting 3] then make the following changes:
Frequency: Frequency of spurious emission
Span: 1 MHz
10. After sweep, send the span data set to the PC
11. Convert measured data from dBm to Watts
12. Sum all the data using the formula below. If the sum is within the limit, the test result is Pass, otherwise Fail

$$P_s = \sum_{i=1}^n E_i \times \frac{S_w}{RBW \times k \times n} \quad (\text{Equation 4.1})$$

P _s :	Sum (Watts)
E _i :	Measured value at each point in the Span (Watts)
S _w :	Span (1 MHz)
n:	Number of measurement points in the span
k:	Correction factor for Equivalent Noise Bandwidth, specific to each spectrum analyzer, check the instrument user guide
RBW:	Resolution Bandwidth (MHz)

4.4. Test Result

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

PHY 1M

Test Voltage (V)	Frequency Range (MHz)	Measured	Low Ch. (2 402 MHz)	High Ch. (2 480 MHz)	Limit
V _{nor} = 3.0	Below 2 387	Frequency (MHz)	2 385.94	2 351.77	-
		Level (dB m/MHz)	-49.98	-50.46	-26
		Level (μW/MHz)	0.010 046	0.008 995	2.5
	2 387 to 2 400	Frequency (MHz)	2 399.91	2 391.93	-
		Level (dB m/MHz)	-21.83	-51.90	-16
		Level (μW/MHz)	6.561 453	0.006 457	25.0
	2 483.5 to 2 496.5	Frequency (MHz)	2 490.39	2 483.62	-
		Level (dB m/MHz)	-51.30	-30.43	-16
		Level (μW/MHz)	0.007 413	0.905 733	25.0
	Above 2 496.5	Frequency (MHz)	6 998.13	6 992.12	-
		Level (dB m/MHz)	-46.89	-47.18	-26
		Level (μW/MHz)	0.020 464	0.019 143	2.5

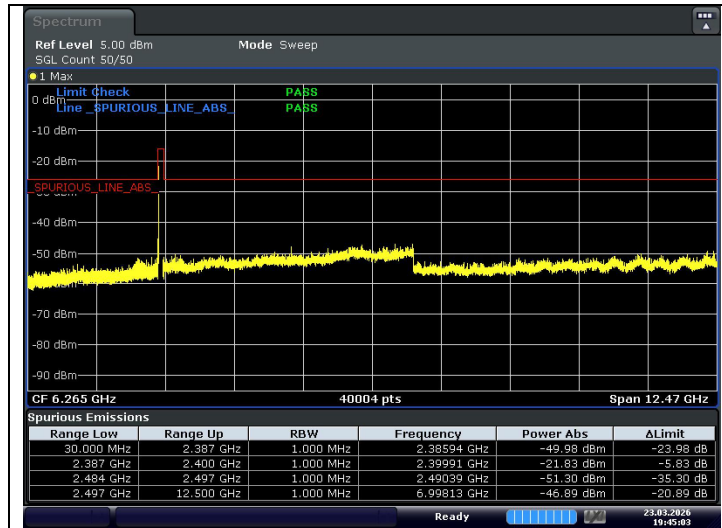
PHY 2M

Test Voltage (V)	Frequency Range (MHz)	Measured	Low Ch. (2 402 MHz)	High Ch. (2 480 MHz)	Limit
V _{nor} = 3.0	Below 2 387	Frequency (MHz)	2 386.65	2 119.39	-
		Level (dB m/MHz)	-50.20	-52.18	-26
		Level (μW/MHz)	0.009 550	0.006 053	2.5
	2 387 to 2 400	Frequency (MHz)	2 400.00	2 392.11	-
		Level (dB m/MHz)	-19.92*	-51.86	-16
		Level (μW/MHz)	33.036 954	0.006 516	25.0
	2 483.5 to 2 496.5	Frequency (MHz)	2 490.06	2 483.58	-
		Level (dB m/MHz)	-51.40	-29.38	-16
		Level (μW/MHz)	0.007 244	1.153 453	25.0
	Above 2 496.5	Frequency (MHz)	4 803.58	6 917.10	-
		Level (dB m/MHz)	-46.23	-47.22	-26
		Level (μW/MHz)	0.023 823	0.018 967	2.5

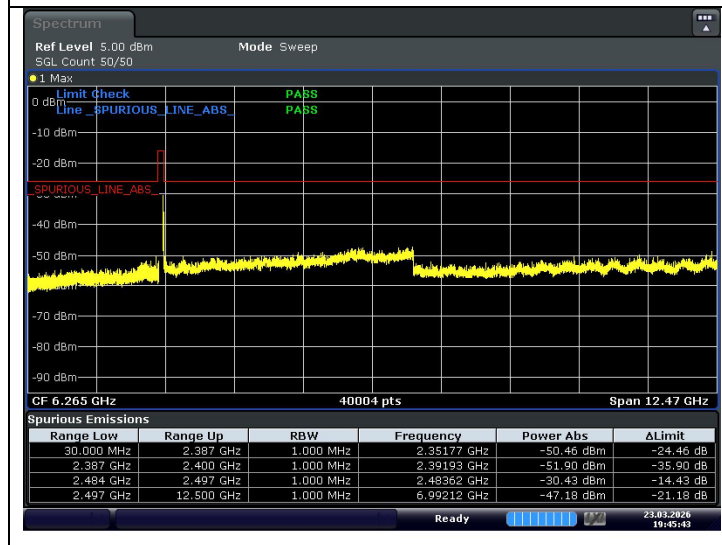
- '*' means Setting 2 results

PHY 1M

Low Channel

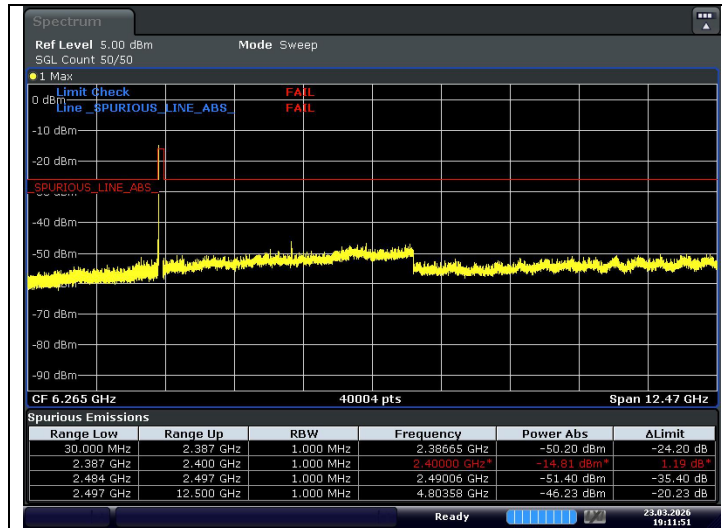


High Channel

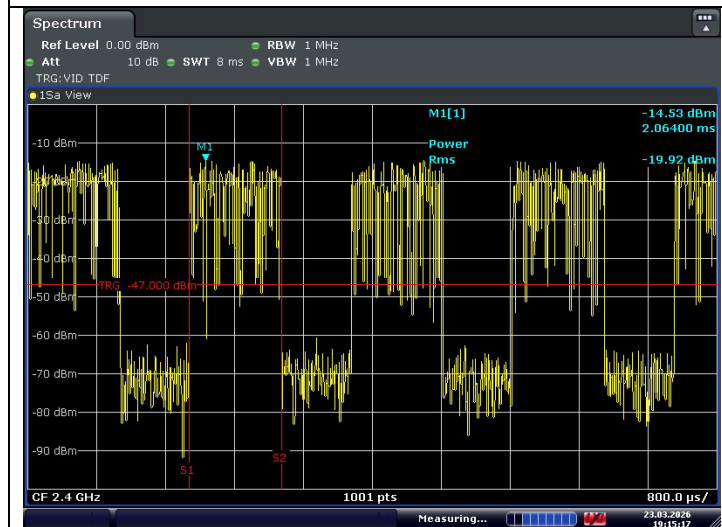


PHY 2M

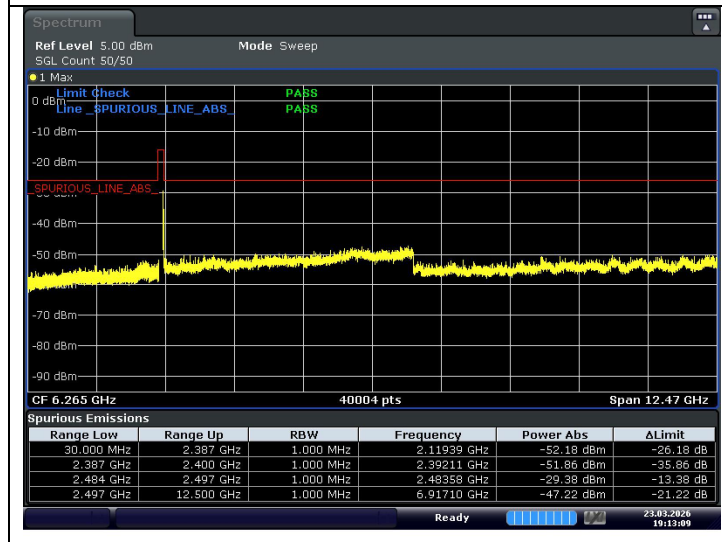
Low Channel



Setting 2

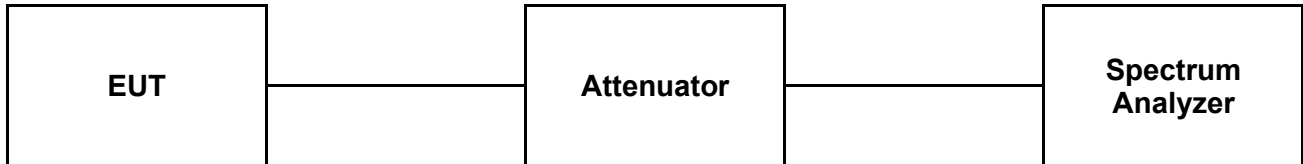


High Channel



5. Antenna Power

5.1. Test Setup



5.2. Limit

The difference between measured output power and the rated output power shall be within a tolerance of +20 % or less. In addition, the rated output power shall not be over the limits shown below.

Limit (rated output power, upper limit)

- LE 10 mW or less

5.3. Test Procedure

1. Connect transmitter output to the spectrum analyzer input port.
2. Configure the spectrum analyzer as below;

[Setting 1]–Search for peak power frequency according to below settings

Center frequency:	LE	2 402 MHz, 2 480 MHz
Span:		10 MHz
RBW:		1 MHz
VBW:		3 MHz
Sweep time:		Auto
Sweep data points:		1 001 or greater
Detector mode:		Positive peak
Indication mode:		Max hold

[Setting 2]–Measurement of average antenna power according to below settings

Center frequency:	Frequency of peak power
Span:	0 Hz
RBW:	3 MHz
VBW:	3 MHz
Sweep:	Minimum time required to make an accurate measurement. For burst type (intermittent) transmission, sweep time shall be greater than one burst Interval.
Sweep data points:	1 001 or greater
Detector mode:	Sample

3. After configuring the spectrum analyzer to [Setting 1], find the frequency of maximum transmitted power.
4. After configuring the spectrum analyzer to [Setting 2], measure the Average Burst Power of the frequency Found in (3)

5.4. Test Result

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

PHY 1M

Test Voltage (V)	Channel	Antenna Gain (dB i)	Rated Output Power		E.I.R.P. (dB m)	Average Burst Power		Power Tolerance (%)
			(mW)	(dB m)		(mW)	(dB m)	
V _{nor} = 3.0	Low Ch. (2 402 MHz)	4.97	5.00	6.99	11.96	4.385 307	6.42	-12.29
	High Ch. (2 480 MHz)	4.97	5.00	6.99	11.96	4.666 594	6.69	-6.67

PHY 2M

Test Voltage (V)	Channel	Antenna Gain (dB i)	Rated Output Power		E.I.R.P. (dB m)	Average Burst Power		Power Tolerance (%)
			(mW)	(dB m)		(mW)	(dB m)	
V _{nor} = 3.0	Low Ch. (2 402 MHz)	4.97	5.00	6.99	11.96	4.102 041	6.13	-17.96
	High Ch. (2 480 MHz)	4.97	5.00	6.99	11.96	4.436 086	6.47	-11.28

Note;

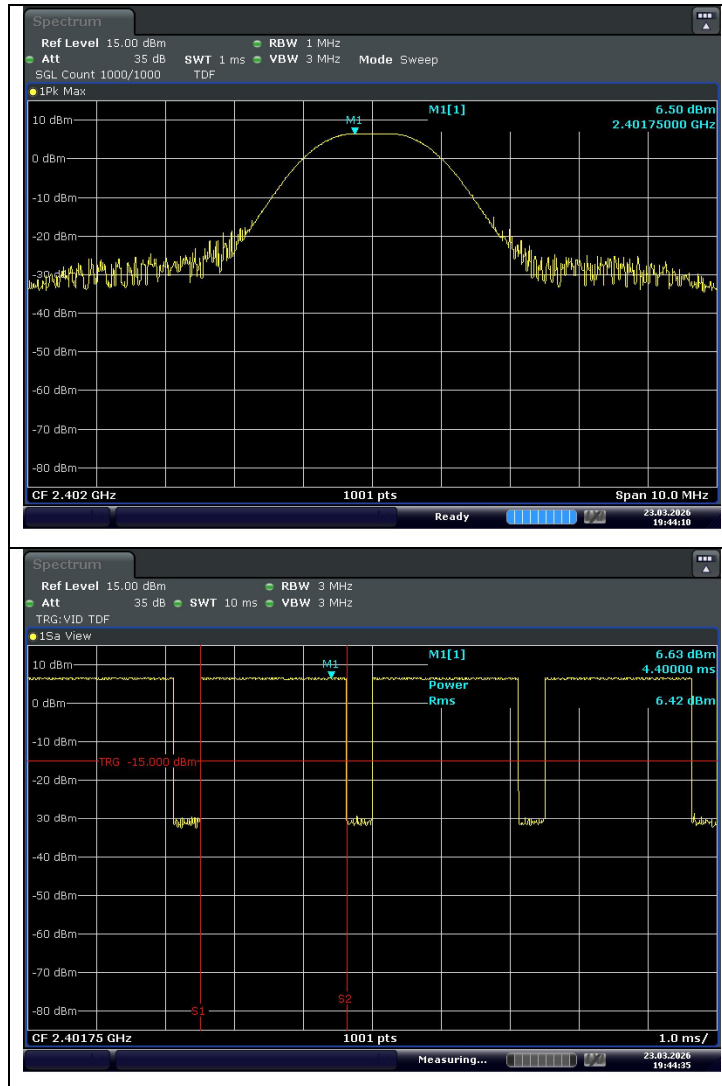
Antenna Power (mW) = Average Burst Power (mW)

Power Tolerance (%) = {[Antenna Power (mW) - Rated Output Power (mW)] ÷ Rated Output Power (mW)} × 100

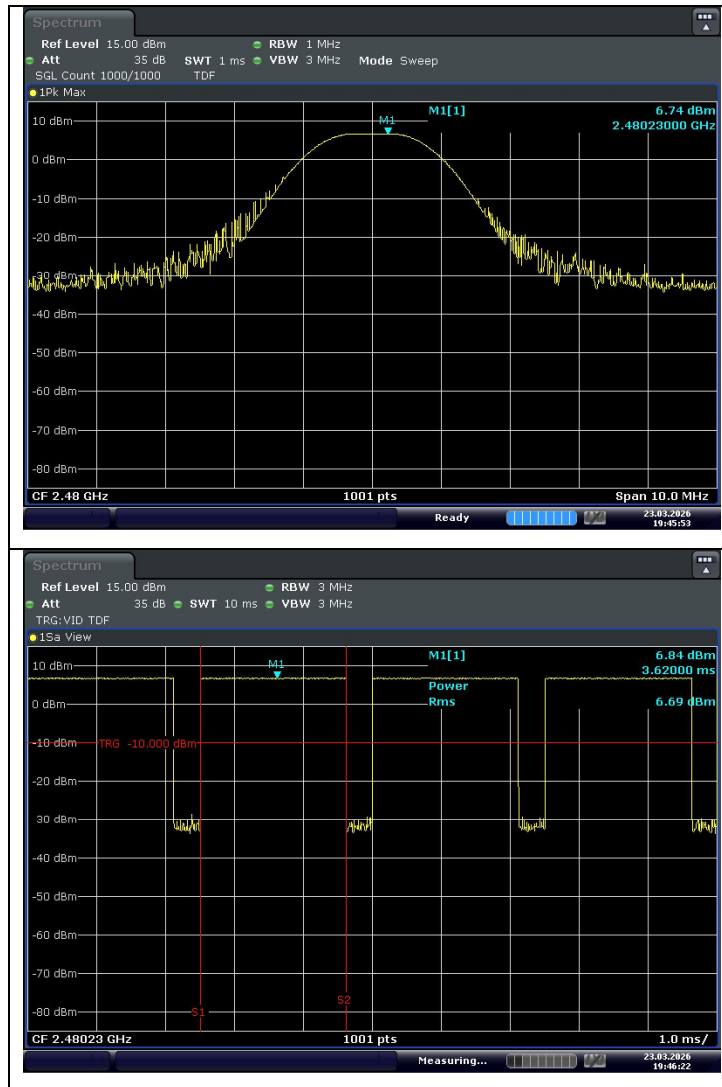
E.I.R.P. (dB m) = Antenna gain (dB i) + Rated Output Power (dB m)

PHY 1M

Low Channel

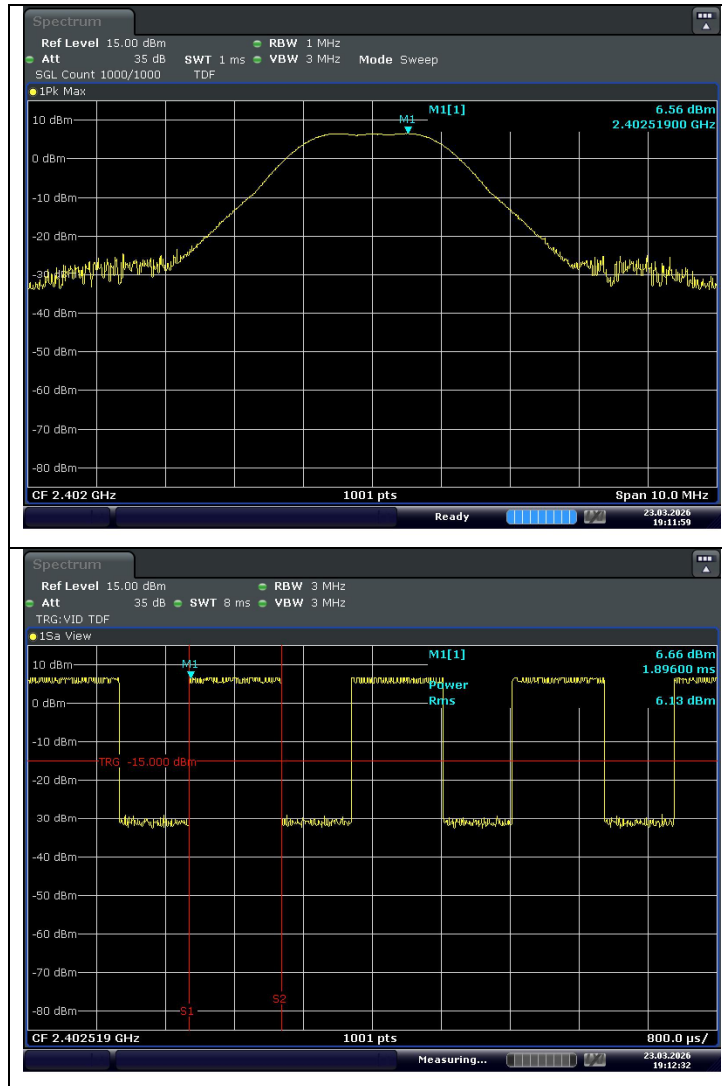


High Channel

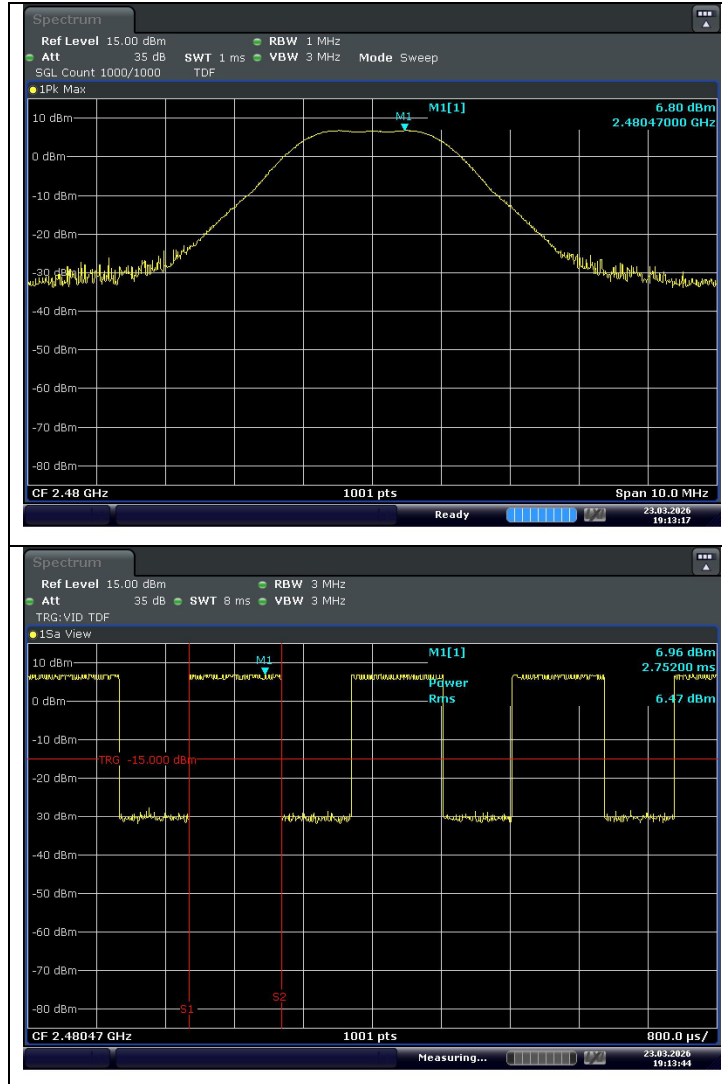


PHY 2M

Low Channel

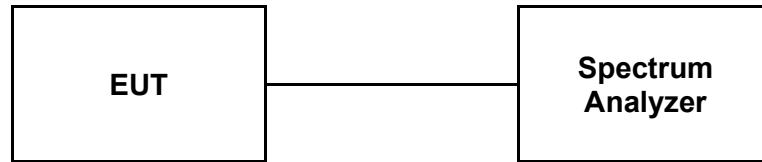


High Channel



6. Secondary Radiated Emissions

6.1. Test Setup



6.2. Limit

Below 1 GHz : 4 nW (-54 dB m) or less
 Above 1 GHz : 20 nW (-47 dB m) or less

6.3. Test Procedure

1. Connect transmitter output to the spectrum analyzer input port.
2. The EUT should be receiver at low, high channel.
3. Secondary Radiated Emissions is measured by following setting:

[Setting 1]

Frequency range: 30 MHz - 12.5 GHz
 RBW: Below 1 GHz: 100 kHz
 Above 1 GHz: 1 MHz
 VBW: Below 1 GHz: 100 kHz
 Above 1 GHz: 1 MHz
 Sweep time: Auto
 Sweep data points: 1 001 or greater
 Detector mode: Positive peak
 Indication mode: Max hold

[Setting 2]

Center Frequency: Frequency of spurious emission found using [Setting 1]
 Span: 0 Hz
 RBW: Below 1 GHz: 100 kHz
 Above 1 GHz: 1 MHz
 VBW: Below 1 GHz: 100 kHz
 Above 1 GHz: 1 MHz
 Sweep time: Auto
 Sweep data points: 1 001 or greater
 Detector mode: Sample

4. Configure the spectrum analyzer to [Setting 1] and then search for spurious emissions in the range 30 MHz to 12.5 GHz. If the sweep range does not cover the required measurement frequency range then the measurement range will need to be divided into sufficient sections of size [RBW x Sweep Data Points].
5. If spurious emissions are found with an amplitude greater than [Limit – 10dB] then perform further detailed measurements as described in (6)
6. Configure the spectrum analyzer using [Setting 2] and measure the average signal amplitude. If the spurious emission is burst type (intermittent), then the average value shall not include signal OFF time Multiple Antenna Systems.

6.4. Test Result

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

PHY 1M

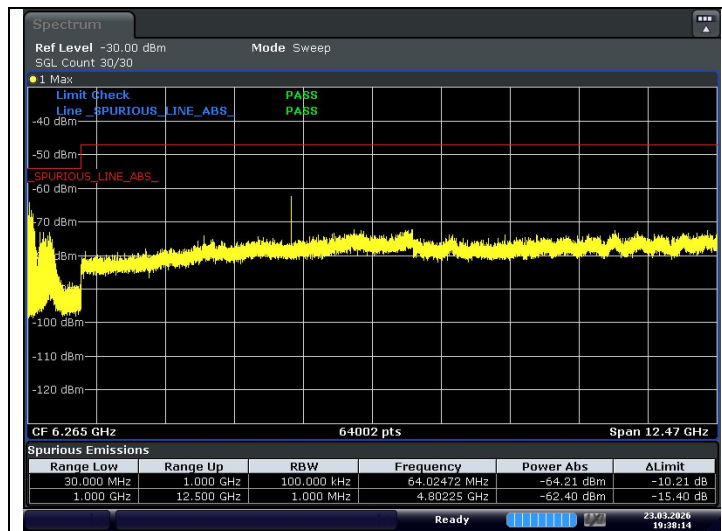
Test Voltage (V)	Frequency Range	Measured	Low Ch. (2 402 MHz)	High Ch. (2 480 MHz)	Limit
V _{nor} = 3.0	30 MHz to 1 000 MHz	Frequency (MHz)	64.024 72	64.024 72	-
		Level (dB m/100 kHz)	-64.21	-64.32	-54.00
		Level (nW/100 kHz)	0.379 315	0.369 828	4.00
	1 000 MHz to 12.5 GHz	Frequency (MHz)	4 802.25	4 958.21	-
		Level (dB m/MHz)	-62.40	-64.71	-47.00
		Level (nW/MHz)	0.575 440	0.338 065	20.00

PHY 2M

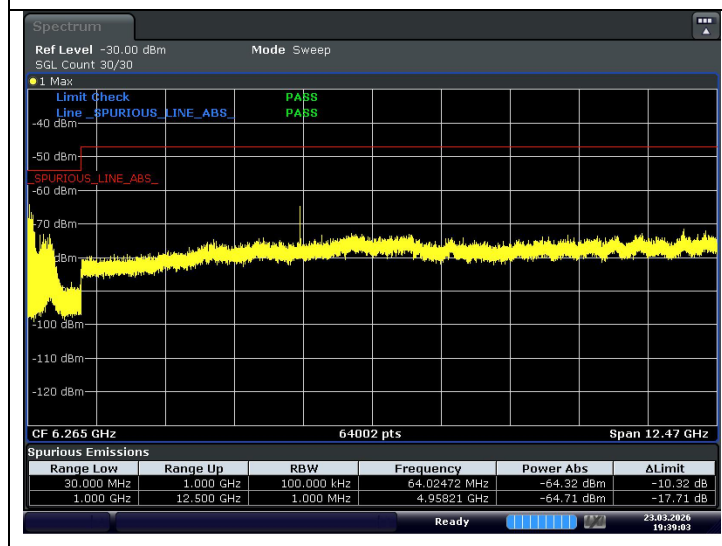
Test Voltage (V)	Frequency Range	Measured	Low Ch. (2 402 MHz)	High Ch. (2 480 MHz)	Limit
V _{nor} = 3.0	30 MHz to 1 000 MHz	Frequency (MHz)	64.024 72	63.994 41	-
		Level (dB m/100 kHz)	-64.38	-64.00	-54.00
		Level (nW/100 kHz)	0.364 754	0.398 107	4.00
	1 000 MHz to 12.5 GHz	Frequency (MHz)	4 801.89	4 958.21	-
		Level (dB m/MHz)	-62.74	-63.84	-47.00
		Level (nW/MHz)	0.532 108	0.413 048	20.00

PHY 1M

Low Channel

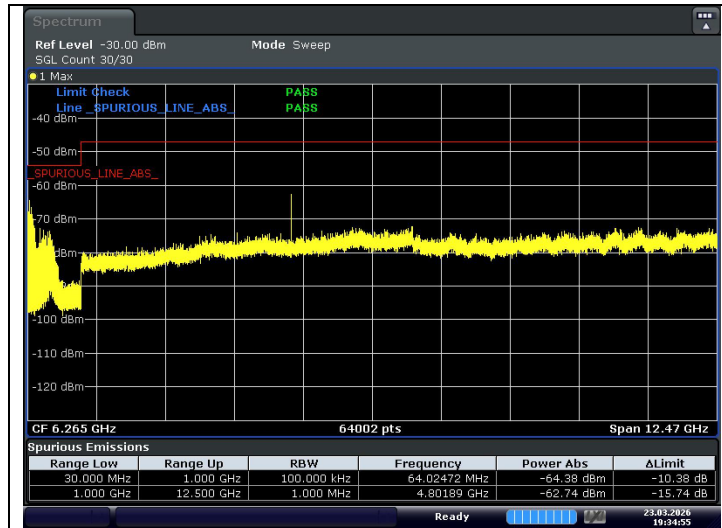


High Channel

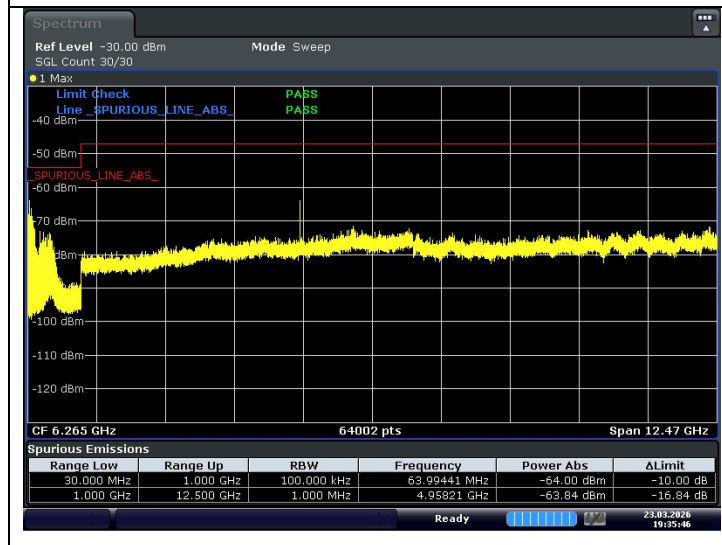


PHY 2M

Low Channel



High Channel



7. Interference Prevention Function

7.1. Test Procedure

- (1) For EUTs capable of automatically transmitting identification data
 - a. Transmit identification data from EUT to Demodulator
 - b. Confirm identification data is correctly received by Demodulator
- (2) For EUTs capable of automatically receiving identification data
 - c. Transmit identification data from Link Partner to EUT
 - d. Confirm communication link is established
 - e. Link Partner shall respond by transmitting different identification data back to the EUT
 - f. Confirm EUT stops transmitting, or confirm EUT recognizes that the two identification data are different

7.2. Test Result

The unit does meet the requirements. (Pass)

Note;

Each Bluetooth device shall be allocated a unique 48-bit Bluetooth Device Address (BD_ADDR)

- End of the Test Report -