

TEST REPORT

of

ARIB STD-T66

Equipment Under Test : EVNNE OFFICIAL LIGHT STICK
Model Name : EVNNE-OFLS-2024
Variant Model Name(s) : -
Applicant : FANLIGHT Co.,Ltd.
Manufacturer : FANLIGHT Co.,Ltd.
Date of Receipt : 2023.11.06
Date of Test(s) : 2023.11.13 ~ 2023.11.28
Date of Issue : 2023.11.29

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

- 1) The results of this test report are effective only to the items tested.
 - 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.
- We are responsible for all the information of this test report except for the data(*) provided by the customer.

Tested by:



Juhyeon Lee

Technical
Manager:



Haegyu 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 : FANLIGHT Co.,Ltd.

Address : 22, Nonhyun-ro 128 Gil, Gangnam-gu, Seoul, 06105, KOREA

1.3. Details of Manufacturer

Company : Same as applicant

Address : Same as applicant

1.4. Description of EUT

Kind of Product	EVNNE OFFICIAL LIGHT STICK
Model Name	EVNNE-OFLS-2024
Power Supply	DC 4.5 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	0.15 mW
Antenna Type	PCB Antenna
Antenna Gain[※]	2.75 dB i

1.5. Test Equipment List

Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Authority	Cal. Method
Spectrum Analyzer	R&S	FSV30	103453	Oct. 31, 2023	SICT	c)
Signal Generator	R&S	SMA100B	106887	Oct. 06, 2023	SICT	c)
Attenuator	AEROFLEX / INMET	26A-10 dB	3	Mar. 13, 2023	SICT	c)
DC Power Supply	R&S	HMP2020	102133	Apr. 17, 2023	SICT	c)
DIGITAL MULTIMETER	HIOKI	DT4211	N0301231	Sep. 13, 2023	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-RTL004618	2023.11.29	Initial

1.10. Description of test mode

The EUT supports PHY 1M, 37 bytes.

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 and 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

Measured Frequency (MHz)	Reading Frequency (MHz)	Frequency Tolerance [ppm]
Low Ch. (2 402)	2 402.023	9.58
High Ch. (2 480)	2 480.024	9.68

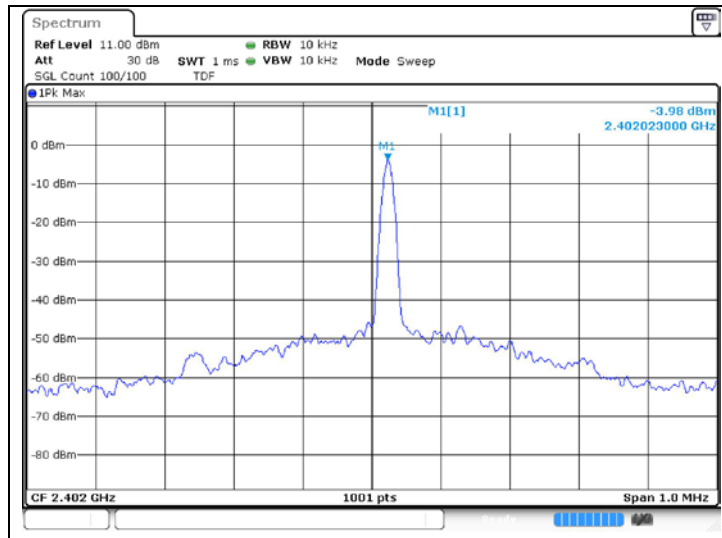
Note;

1. $FT \text{ (ppm)} = [(RF-MF)/MF] \times 10^6$

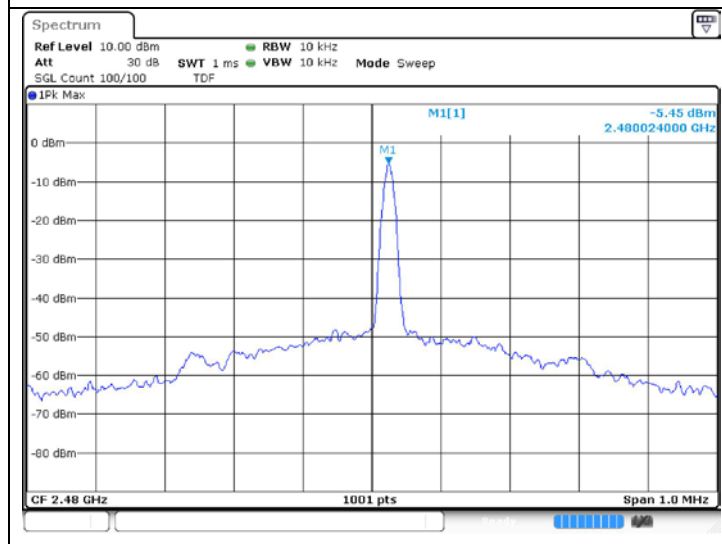
- FT: Frequency Tolerance, RF: Reading Frequency and MF: Measurement Frequency

Test Mode : Un-Modulated

Low Channel



High Channel



3. Occupied Bandwidth (99 %)

3.1. Test Setup



3.2. Limit

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;

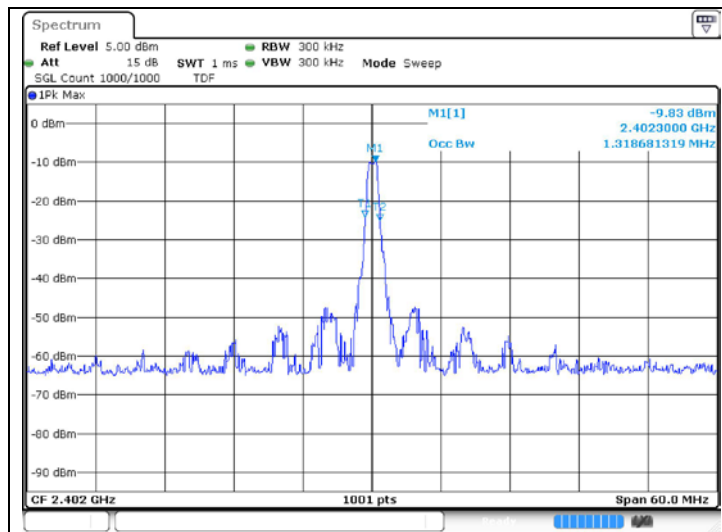
Center frequency:	LE	2 402 MHz, 2 480 MHz
Span:		60 MHz
RBW:		300 kHz
VBW:		300 kHz
Sweep time:		Auto
Sweep data points:		1 001 or greater
Detector mode:		Positive peak
Indication mode:		Max hold
BW setting:		99 %

3.4. Test Result

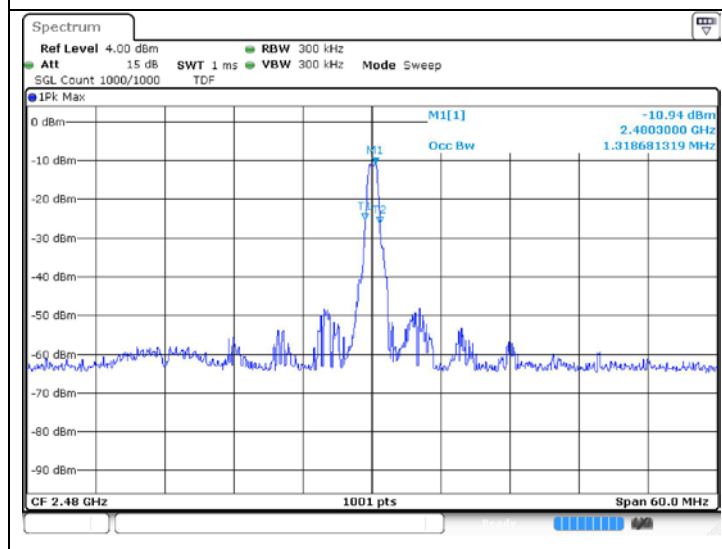
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

Measured Frequency (MHz)	Occupied Bandwidth (MHz)
Low Ch. (2 402)	1.32
High Ch. (2 480)	1.32

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

[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 time:	Minimum time required to make an accurate measurement. For burst type(intermittent) spurious emission, 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

3. After configuring the spectrum analyzer to [Setting 1], search for spurious emissions from 30 MHz to 12.5 GHz. If spurious emissions greater than [Limit – 3 dB] are found, then more detailed measurements are required, go to step (4).

4. 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 (5).

5. Measure the spurious emissions using [Setting 3].

6. 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 = $10 \times \log (\text{Reference Bandwidth} / \text{RBW of measurement}) = 15.2 \text{ [dB]}$

Where: Reference Bandwidth = 1 MHz

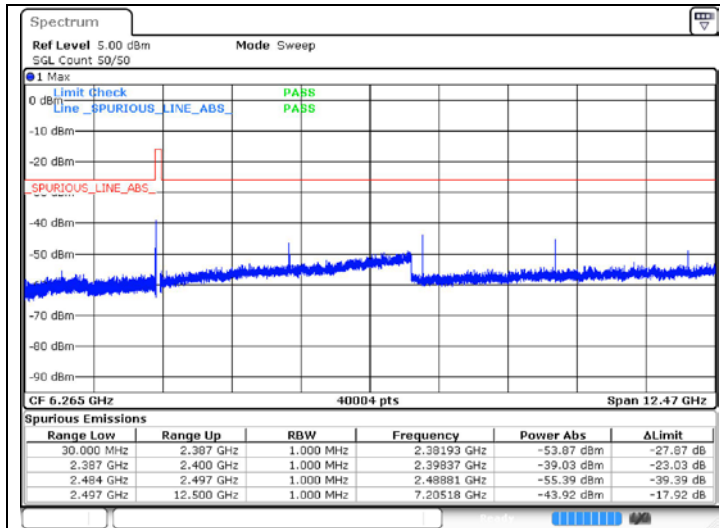
RBW of measurement = 30 kHz

4.4. Test Result

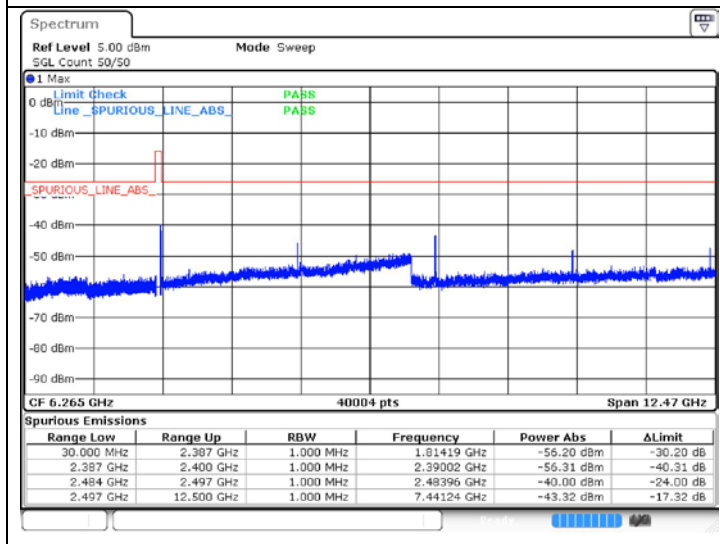
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

Frequency Range (MHz)	Measured	Low Ch. (2 402 MHz)	High Ch. (2 480 MHz)	Limit
Below 2 387	Frequency (GHz)	2.382	1.814	-
	Level (dB m/MHz)	-53.87	-56.20	-26
	Level (μW/MHz)	0.004 102	0.002 399	2.5
2 387 to 2 400	Frequency (GHz)	2.398	2.390	-
	Level (dB m/MHz)	-39.03	-56.31	-16
	Level (μW/MHz)	0.125 026	0.002 339	25.0
2 483.5 to 2 496.5	Frequency (GHz)	2.489	2.484	-
	Level (dB m/MHz)	-55.39	-40.00	-16
	Level (μW/MHz)	0.002 891	0.100 000	25.0
Above 2 496.5	Frequency (GHz)	7.205	7.441	-
	Level (dB m/MHz)	-43.92	-43.32	-26
	Level (μW/MHz)	0.040 551	0.046 559	2.5

Low Channel

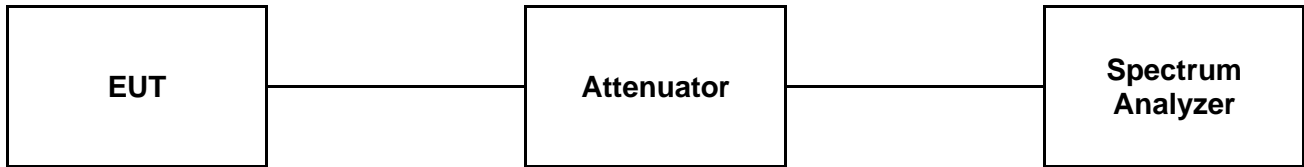


High Channel



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:	LE	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

Find the frequency of maximum transmitted power.

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

Center frequency:	Frequency of peak power found using [Setting 1]
Span:	0 Hz
RBW:	3 MHz
VBW:	3 MHz
Detector mode:	Sample
Sweep time:	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

Measure the Average Burst Power of the frequency.

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.

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)	
Low Ch. (2 402 MHz)	2.75	0.15	-8.24	-5.49	0.099 770	-10.01	-33.49
High Ch. (2 480 MHz)	2.75	0.15	-8.24	-5.49	0.079 433	-11.00	-47.04

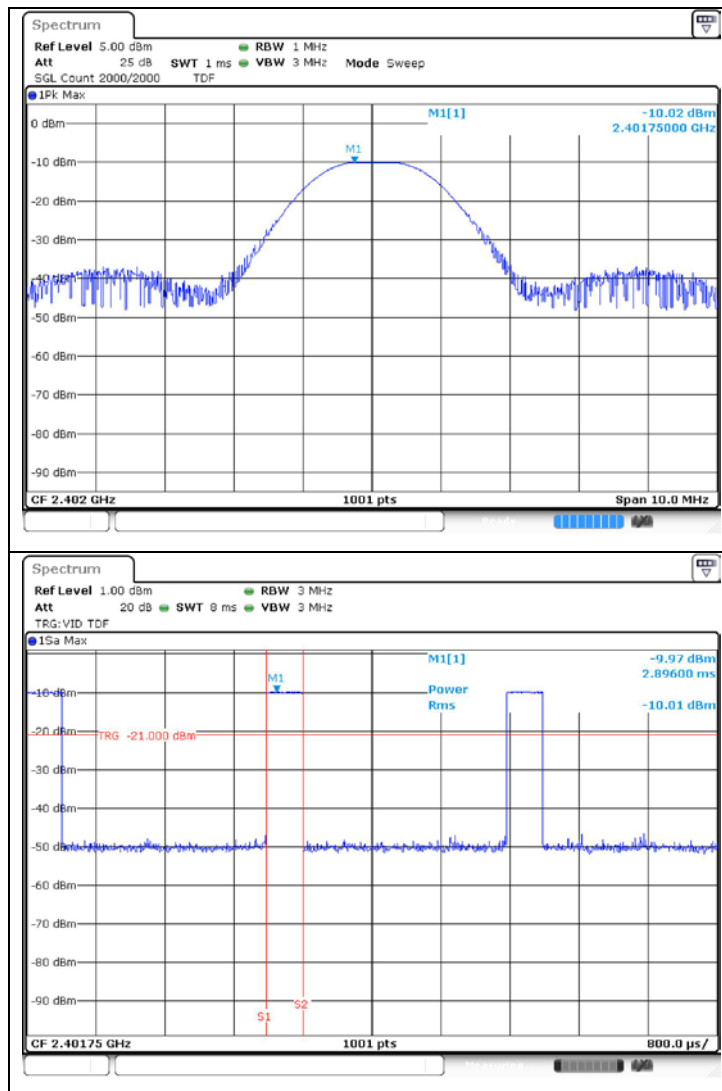
Note;

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

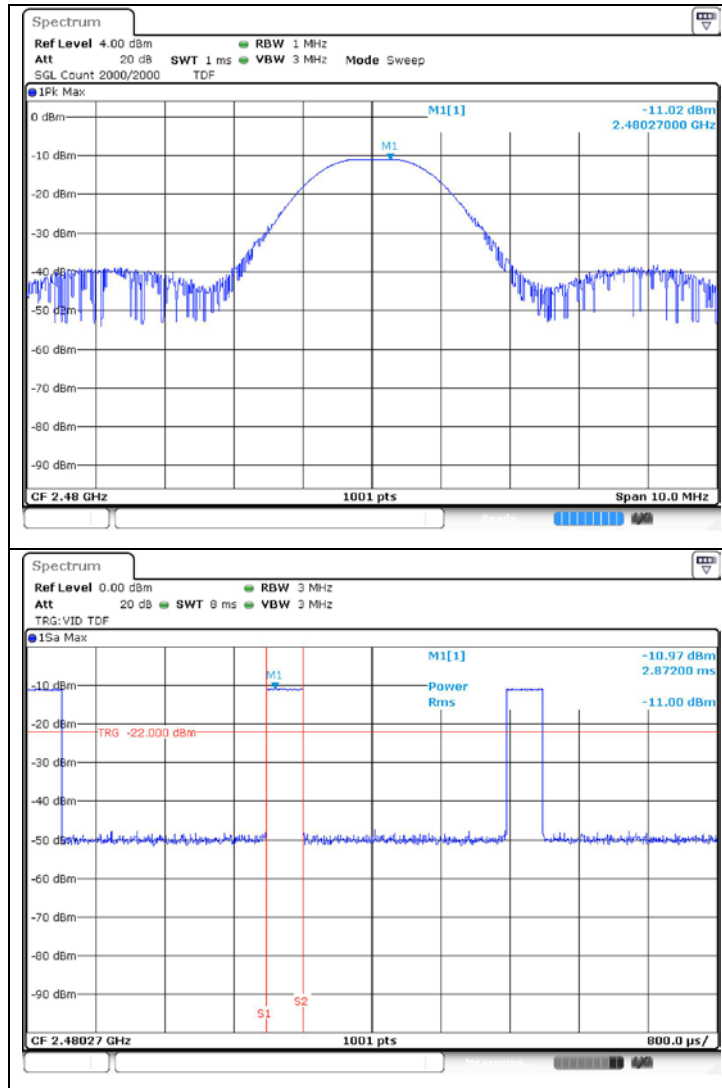
Power Tolerance (%) = {[Antenna Power (mW) - Rated Output Power (mW)] ÷ Rated Output Power (mW)} × 100

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

Low Channel

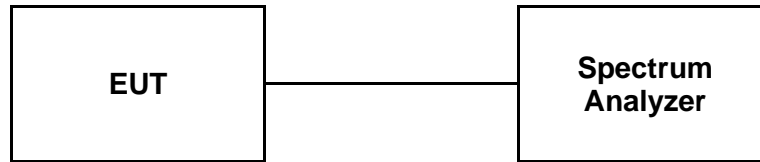


High Channel



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 and 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

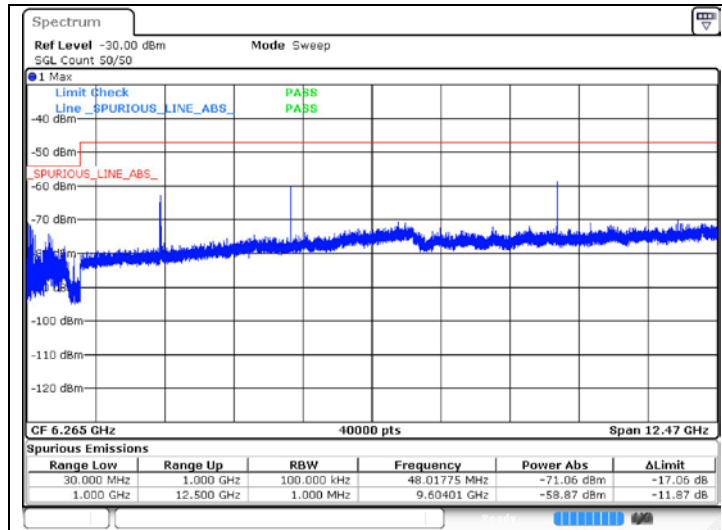
4. Search for spurious emissions in the range 30 MHz to 12.5 GHz.
5. (1) After configuring the spectrum analyzer to [Setting 1], search for spurious emissions from 30 MHz to 12.5 GHz. If the sweep range does not cover the required measurement frequency range then the measurement range will need to be divided into sufficient sections of size [RBW x Sweep Data Points]. If spurious emissions greater than [Limit - 10 dB] are found, then more detailed measurements are required, go to step (2).
(2) Configure the spectrum analyzer using [Setting 2] and measure average signal amplitude. If the spurious emission is burst type (intermittent), then the average value shall not include signal OFF time.

6.4. Test Result

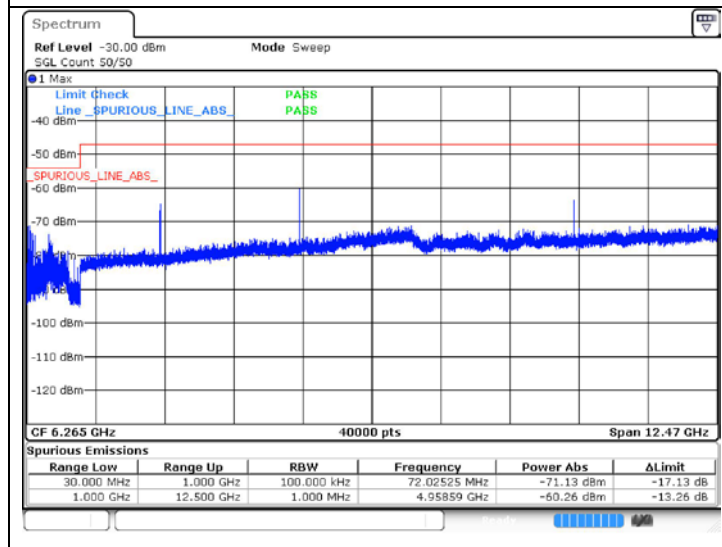
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

Frequency Range	Measured	Low Ch. (2 402 MHz)	High Ch. (2 480 MHz)	Limit
30 MHz to 1 000 MHz	Frequency (GHz)	0.048	0.072	-
	Level (dB m/100 kHz)	-71.06	-71.13	-54.00
	Level (nW/100 kHz)	0.078 343	0.077 090	4.00
1 000 MHz to 12 500 MHz	Frequency (GHz)	9.604	4.959	-
	Level (dB m/MHz)	-58.87	-60.26	-47.00
	Level (nW/MHz)	1.297 179	0.941 890	20.00

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

If the applicant has documentary evidence to show that their EUT complies with the requirements of the Interference Prevent Function then the EUT can be exempt from this test.

7.2. Test Result

EUT Details :

A4:C1:38:30:02:01

The unit does meet the requirements. (Pass)

- End of the Test Report