

TEST REPORT

of

ARIB STD-T66

Equipment Under Test : Baby Monitoring Mat
Model Name : BM-01-01
Applicant : MiDAS H&T Inc.
Manufacturer : AXDEN Inc.
Date of Receipt : 2019.11.26
Date of Test(s) : 2019.12.06 ~ 2019.12.11
Date of Issue : 2019.12.11

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

Tested By:



Lily Jung

Date:

2019.12.11

Technical
Manager:



Hyunchae You

Date:

2019.12.11

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RTT5041-19(2019.04.24)(1)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

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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>.

Phone No. : +82 31 688 0901

Fax No. : +82 31 688 0921

1.2. Details of applicant

Applicant : MiDAS H&T Inc.

Address : C5 625, 77, Cheongam-ro, Nam-gu, Pohang-si, Gyeongsangbuk-do, Republic of Korea

Contact Person : Chang, Se-yun

Phone No. : +82 54 279 4438

1.3. Details of manufacturer

Company : AXDEN Inc.

Address : Toegye-ro 36-gil, Jung-gu, Seoul

1.4. Description of EUT

Kind of Product	Baby Monitoring Mat
Model Name	BM-01-01
Power Supply	DC 3.0 V
Frequency Range	2 402 MHz ~ 2 480 MHz
Modulation Technique	GFSK
Number of Channels	40 channels
Antenna Type	Internal Antenna
Antenna Gain	-0.61 dBi

1.5. Declaration of manufacturer

- The EUT only operates PHY 1M, 37 bytes

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1.6. Test Equipment List

Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Authority	Cal. Authority
Spectrum Analyzer	R&S	FSV30	101004	Jun. 19, 2019	SICT	c)
Signal Generator	R&S	SMF100A	102098	Sep. 07, 2019	SICT	c)
Attenuator	MCLI	FAS-12-10	2	Jun. 07, 2019	SICT	c)
DC Power Supply	R&S	HMP2020	020089489	May. 21, 2019	SICT	c)
DIGITAL MULTIMETER	HIOKI	DT4211	N0301231	Sep. 18, 2019	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).

1.7. 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.

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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		
Article Reference	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-RTL000062	2019.12.11	Initial

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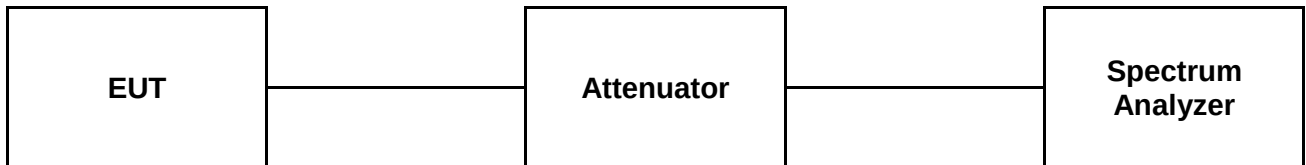
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2. Frequency Tolerance

2.1. Test Setup



2.2. Limit

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

2.3. Test procedure

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

Center frequency: 2 402 MHz, 2 442 MHz, 2 480 MHz (Bluetooth Low Energy)
 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

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

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2.4. Test result

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

- Test mode: Un-Modulated

Test voltage (V _{d.c.})	Measured frequency (MHz)	Reading frequency (MHz)	Frequency tolerance [ppm]
V _{Min} = 2.70	Low Ch. (2 402)	2 401.991 000	-3.75
	Middle Ch. (2 442)	2 441.990 000	-4.10
	High Ch. (2 480)	2 479.990 000	-4.03
V _{Nor} = 3.00	Low Ch. (2 402)	2 401.991 000	-3.75
	Middle Ch. (2 442)	2 441.991 000	-3.69
	High Ch. (2 480)	2 479.991 000	-3.63
V _{Max} = 3.30	Low Ch. (2 402)	2 401.991 000	-3.75
	Middle Ch. (2 442)	2 441.991 000	-3.69
	High Ch. (2 480)	2 479.990 000	-4.03

Note;

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

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

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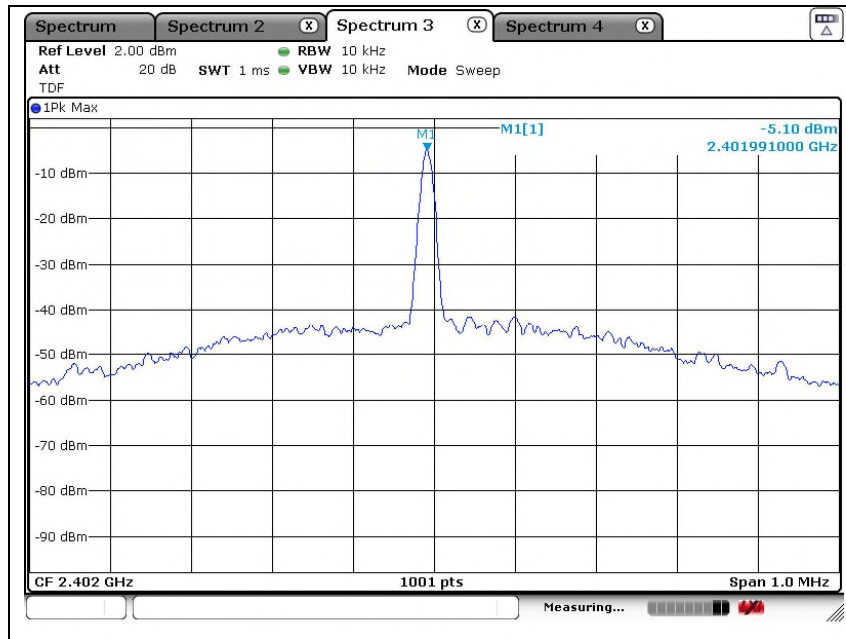
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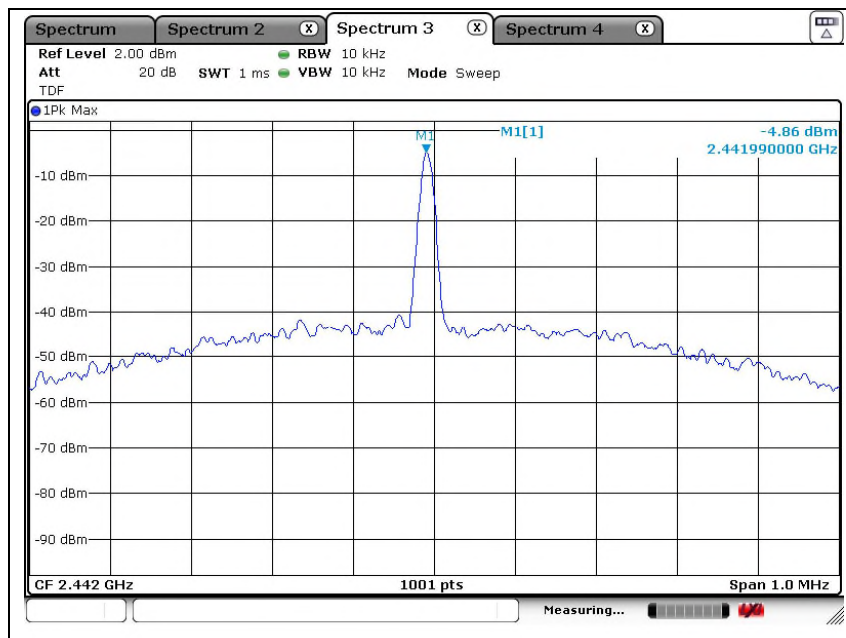
Low voltage

- Test mode: Un-Modulated

Low channel



Middle channel



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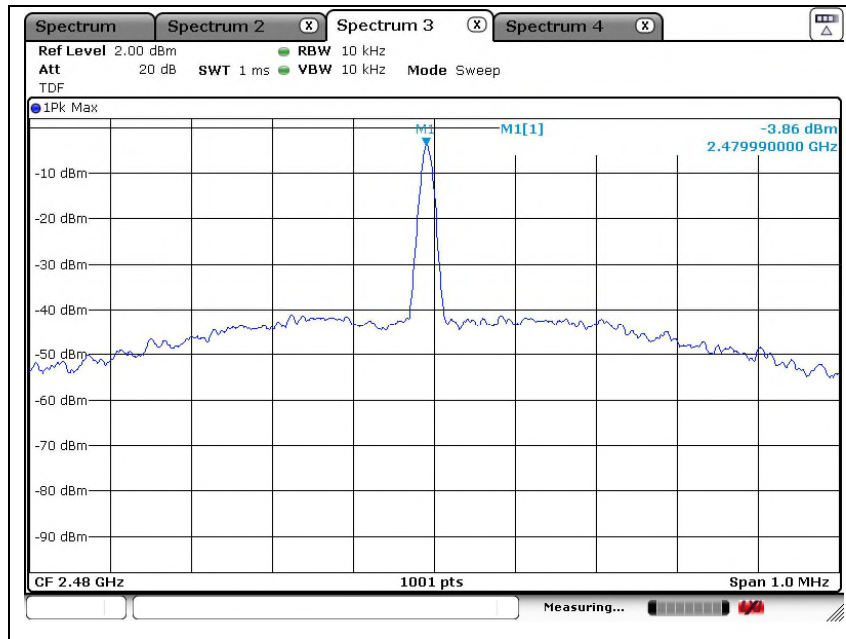
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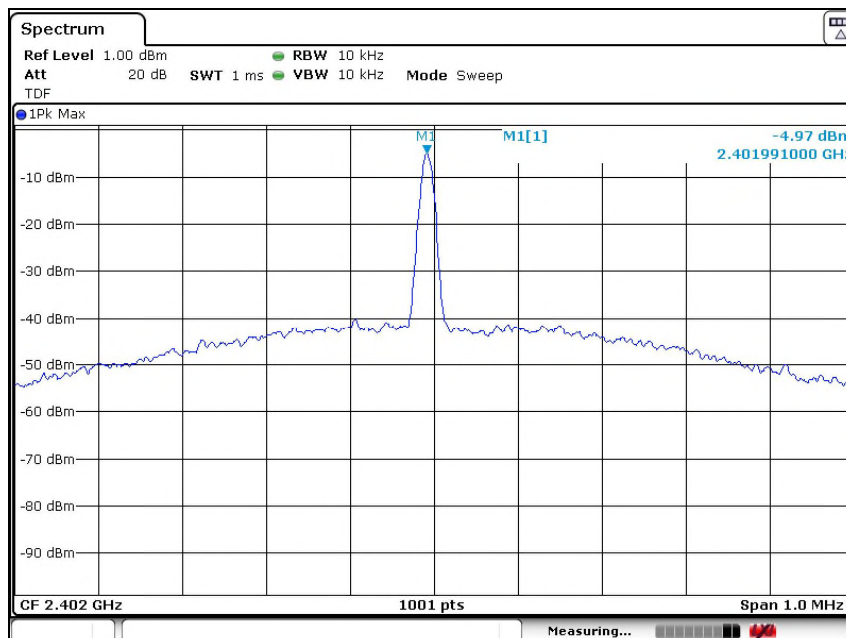
High channel



Normal voltage

- Test mode: Un-Modulated

Low channel



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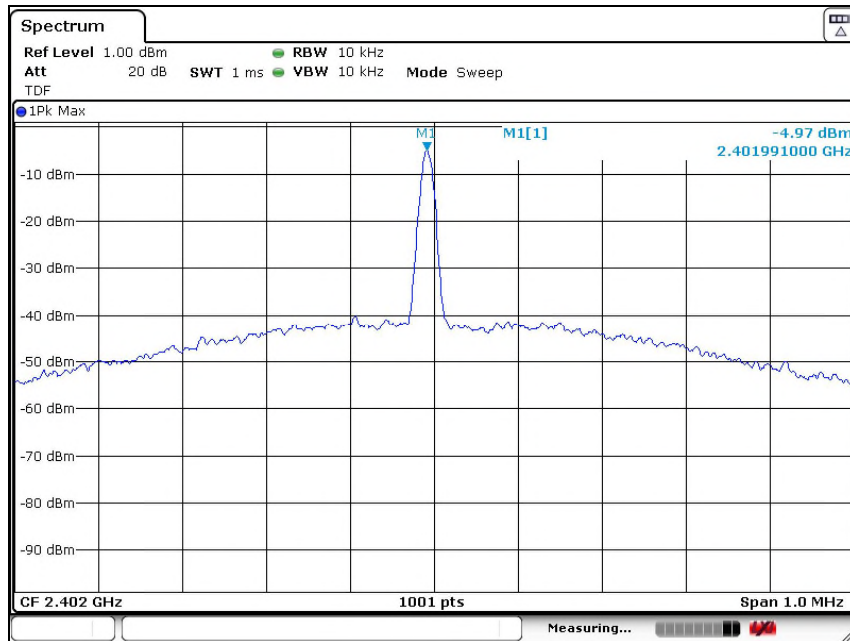
SGS Korea Co., Ltd. (Gunpo Laboratory) 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807 <http://www.sgsgroup.kr>

RTT5041-19(2019.04.24)(1)

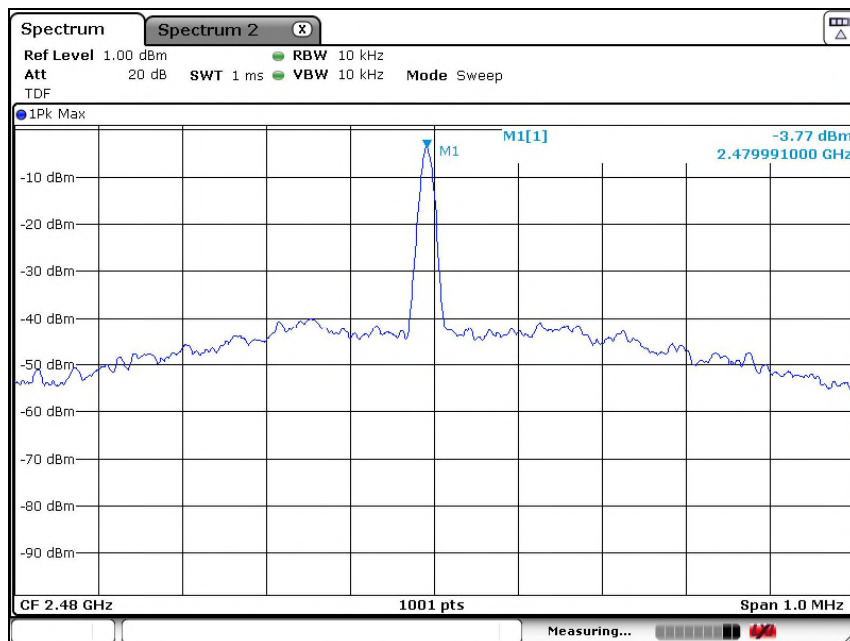
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A4(210 mm x 297 mm)

Middle channel



High channel



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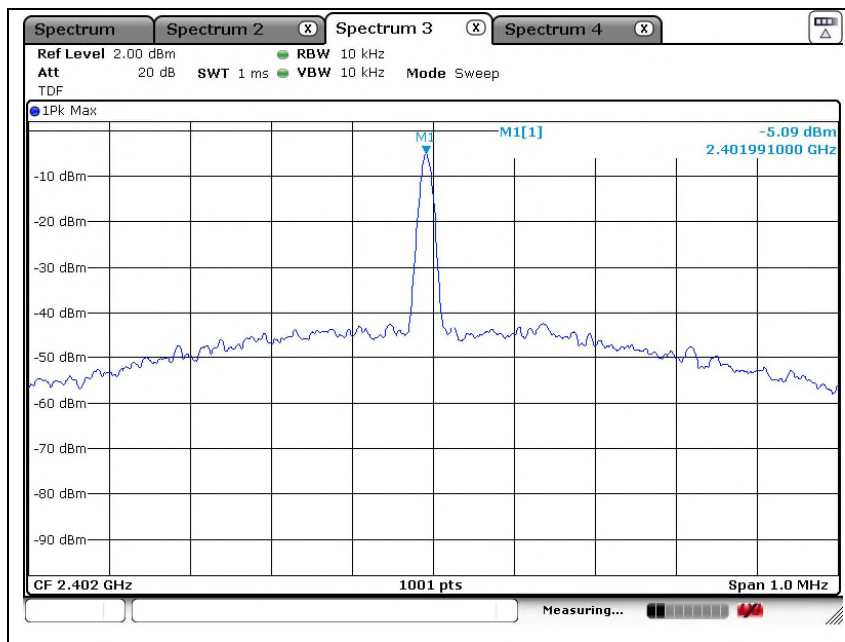
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A4(210 mm x 297 mm)

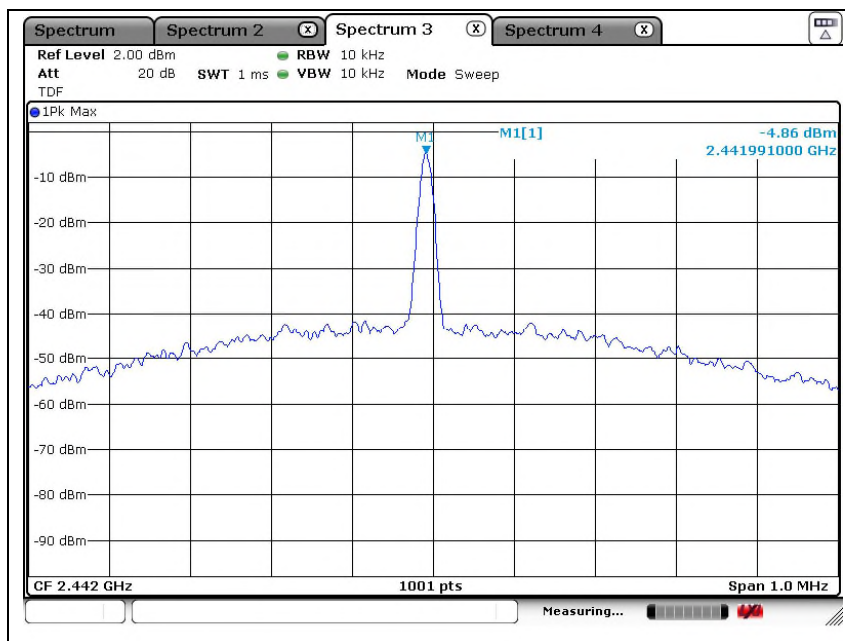
High voltage

- Test mode: Un-Modulated

Low channel



Middle channel



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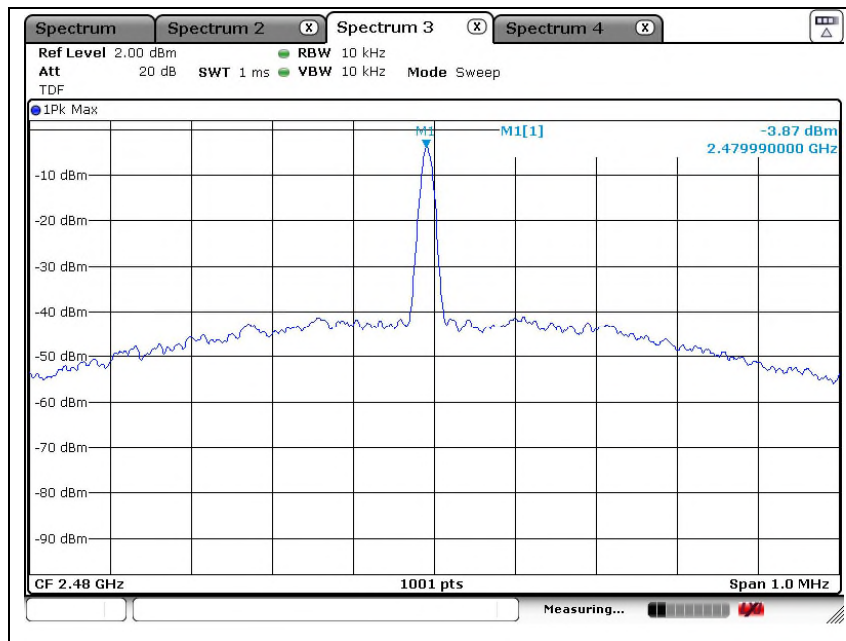
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High channel



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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:	2 402 MHz, 2 442 MHz, 2 480 MHz
Span:	10 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 %

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3.4. Test result

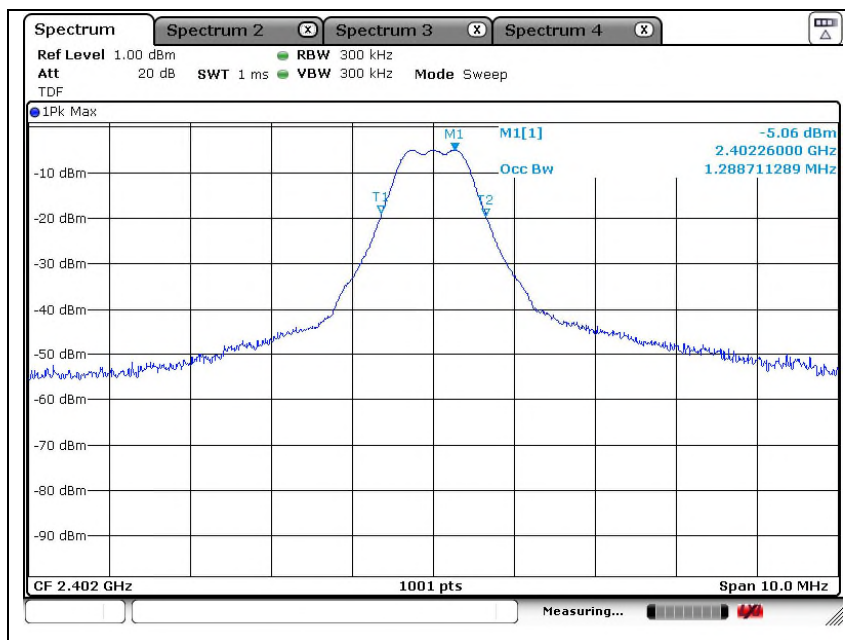
Ambient temperature : (23 ± 1) °C

Relative humidity : 47 % R.H.

Test voltage (V _{d.c.})	Measured frequency (MHz)	Occupied bandwidth (MHz)
V _{Min} = 2.70	Low Ch. (2 402)	1.29
	Middle Ch. (2 442)	1.30
	High Ch. (2 480)	1.29
V _{Nor} = 3.00	Low Ch. (2 402)	1.28
	Middle Ch. (2 442)	1.28
	High Ch. (2 480)	1.30
V _{Max} = 3.30	Low Ch. (2 402)	1.28
	Middle Ch. (2 442)	1.28
	High Ch. (2 480)	1.28

Low voltage

Low channel



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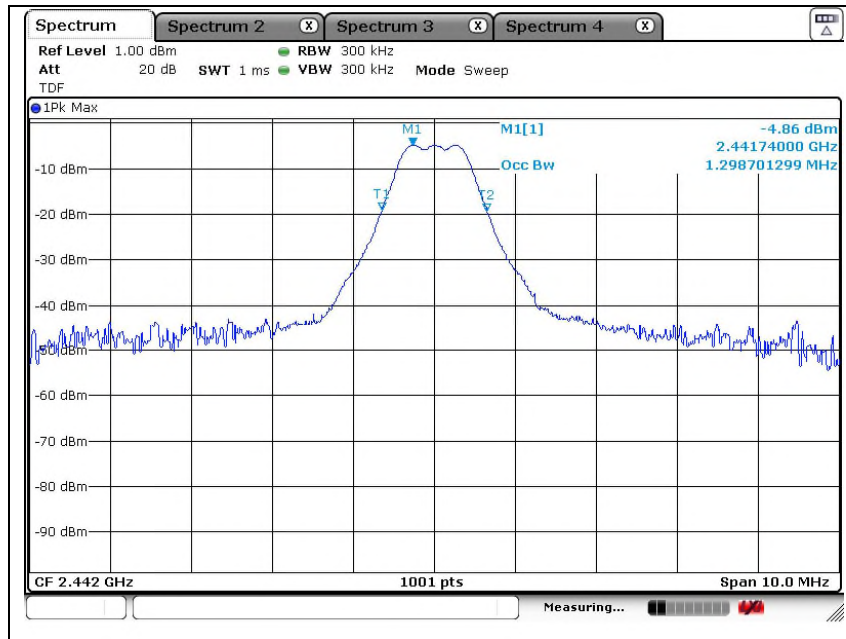
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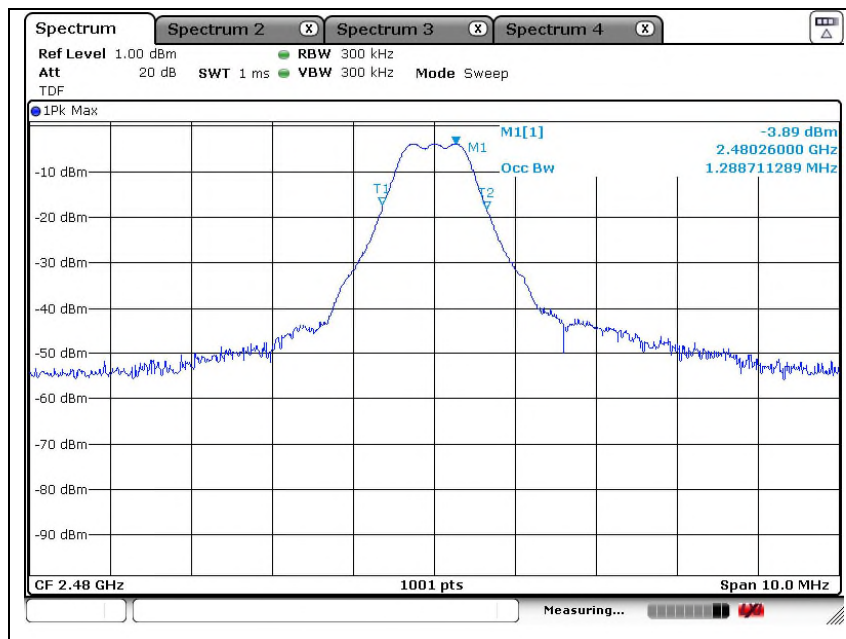
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Middle channel



High channel



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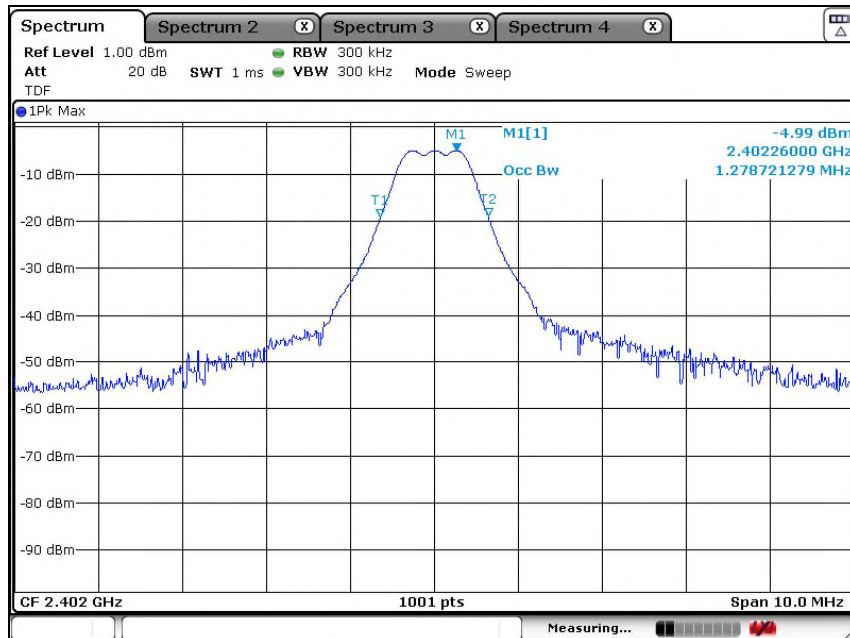
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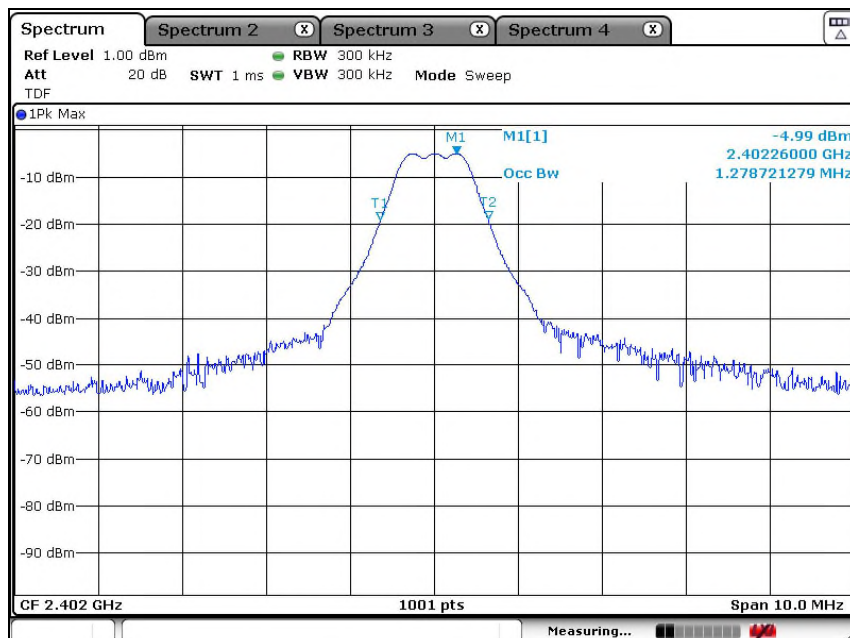
A4(210 mm x 297 mm)

Normal voltage

Low channel



Middle channel



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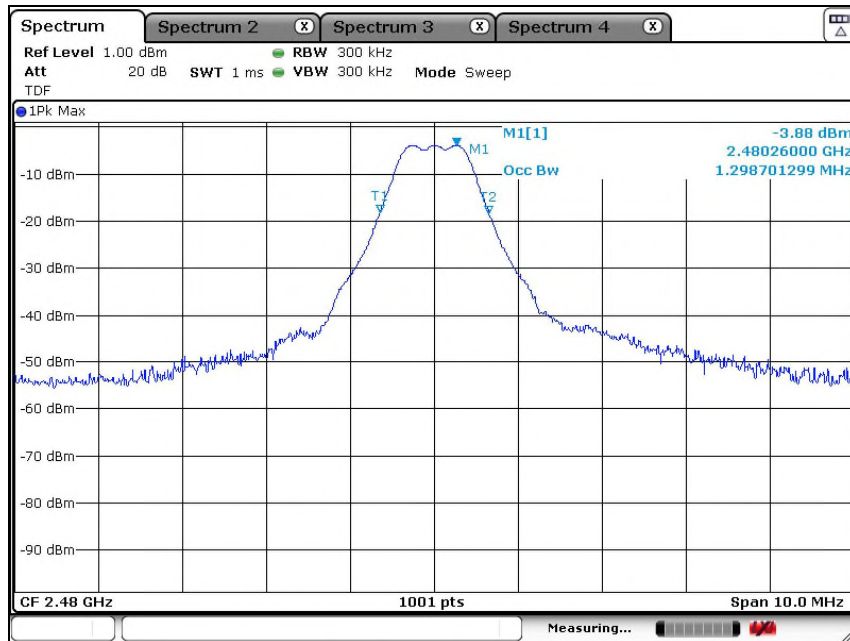
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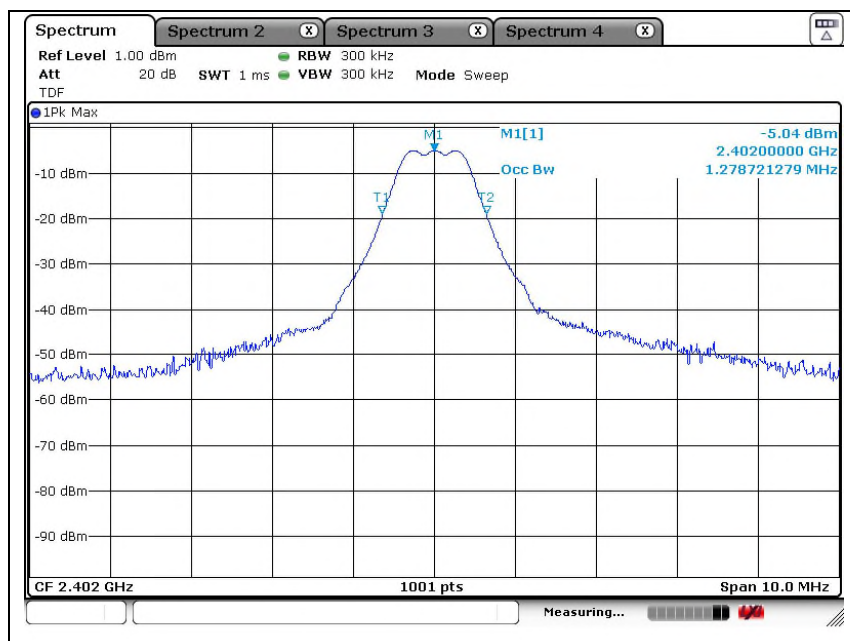
A4(210 mm x 297 mm)

High channel



High voltage

Low channel



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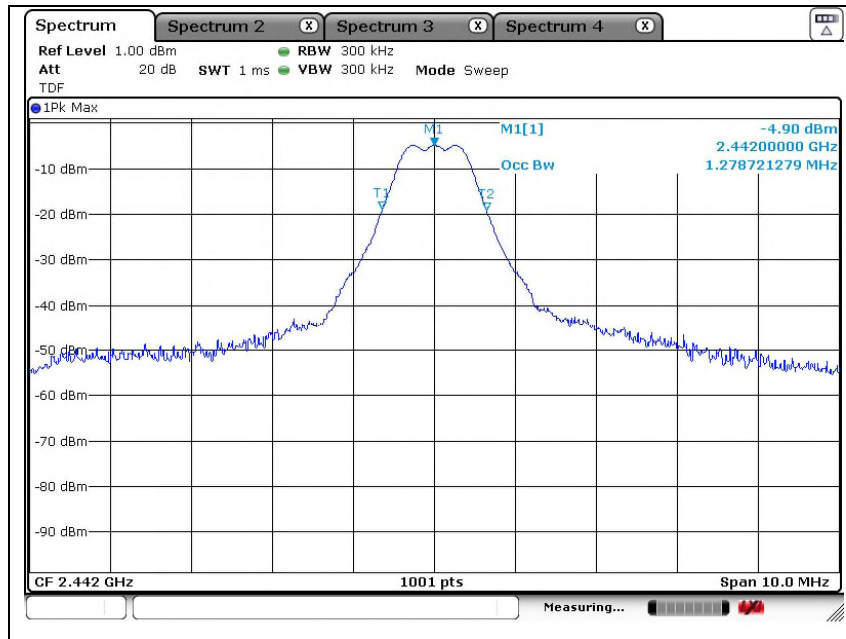
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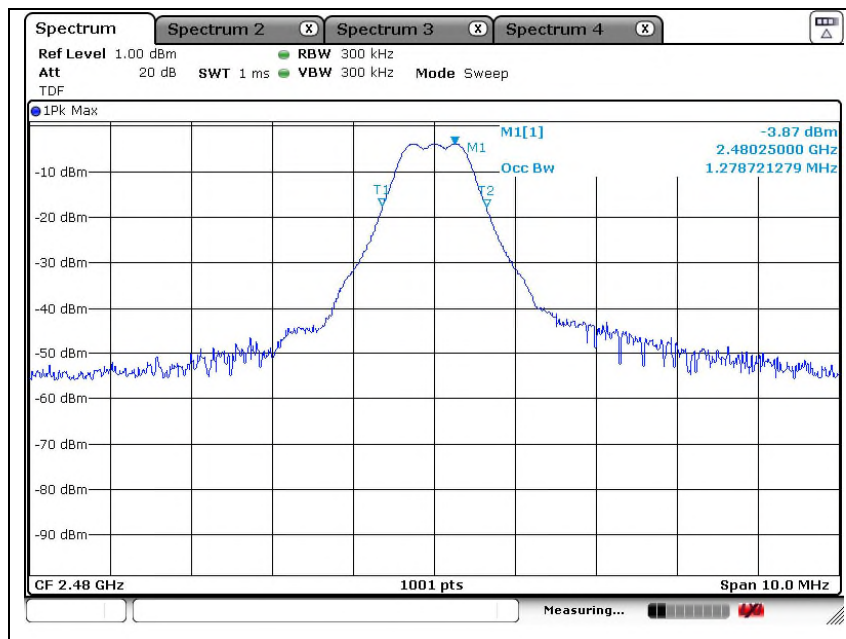
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Middle channel



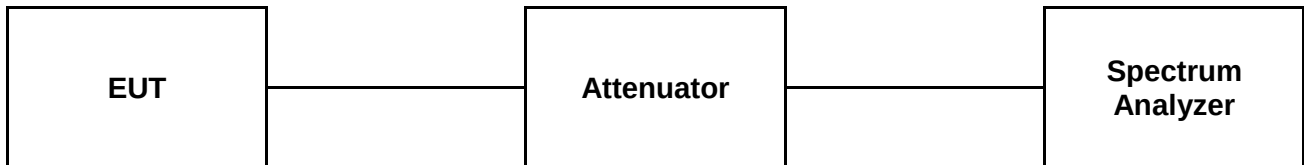
High channel



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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, middle, high

Frequency range:	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 (see note)

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

Search for spurious emissions from 30 MHz to 12.5 GHz.

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4.4. Test result

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

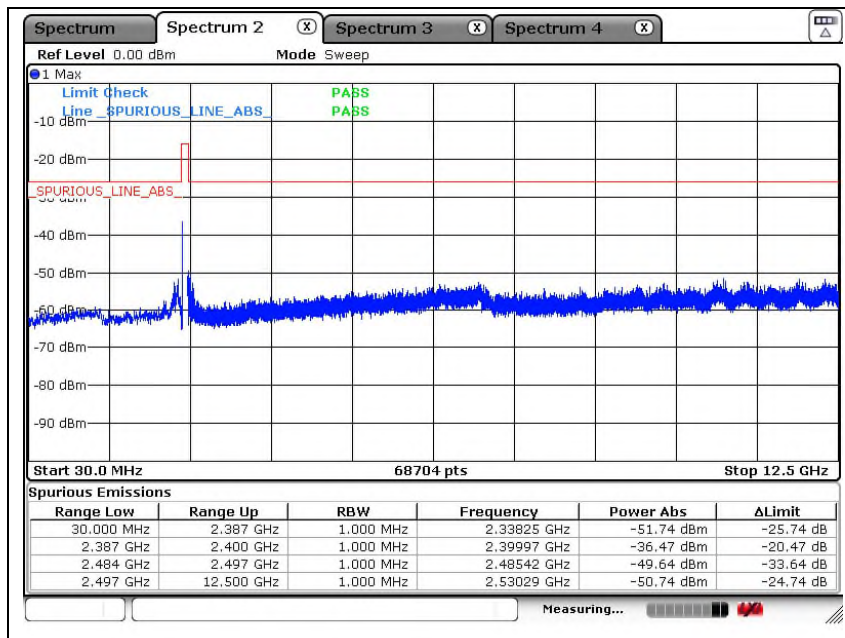
Test voltage (V _{d.c.})	Frequency range (MHz)	Measured	Low Ch. (2 402 MHz)	Middle Ch. (2 442 MHz)	High Ch. (2 480 MHz)	Limit
V _{min} = 2.70	Below 2 387	Frequency (GHz)	2.338	2.379	2.352	-
		Level (dB m/MHz)	-51.74	-51.92	-52.85	-26
		Level (μW/MHz)	0.006 699	0.006 427	0.005 188	2.5
	2 387 to 2 400	Frequency (GHz)	2.400	2.395	2.399	-
		Level (dB m/MHz)	-36.47	-53.94	-51.74	-16
		Level (μW/MHz)	0.225 424	0.004 036	0.006 699	25
	2 483.5 to 2 496.5	Frequency (GHz)	2.485	2.489	2.484	-
		Level (dB m/MHz)	-49.64	-52.54	-42.59	-16
		Level (μW/MHz)	0.010 864	0.005 572	0.005 081	25
	Above 2 496.5	Frequency (GHz)	2.530	2.571	2.608	-
		Level (dB m/MHz)	-50.74	-49.57	-50.64	-26
		Level (μW/MHz)	0.008 433	0.011 041	0.008 630	2.5
V _{nom} = 3.00	Below 2 387	Frequency (GHz)	2.338	2.379	2.352	-
		Level (dB m/MHz)	-52.09	-51.57	-52.72	-26
		Level (μW/MHz)	0.006 180	0.006 966	0.005 346	2.5
	2 387 to 2 400	Frequency (GHz)	2.400	2.395	2.397	-
		Level (dB m/MHz)	-36.75	-54.35	-51.71	-16
		Level (μW/MHz)	0.211 349	0.003 673	0.006 745	25
	2 483.5 to 2 496.5	Frequency (GHz)	2.485	2.488	2.484	-
		Level (dB m/MHz)	-49.44	-52.97	-42.71	-16
		Level (μW/MHz)	0.011 376	0.005 047	0.053 580	25
	Above 2 496.5	Frequency (GHz)	2.530	2.506	2.608	-
		Level (dB m/MHz)	-49.40	-49.79	-50.39	-26
		Level (μW/MHz)	0.011 482	0.010 495	0.009 141	2.5
V _{max} = 3.30	Below 2 387	Frequency (GHz)	1.733	2.379	2.352	-
		Level (dB m/MHz)	-41.38	-51.92	-52.45	-26
		Level (μW/MHz)	0.072 778	0.006 427	0.005 689	2.5
	2 387 to 2 400	Frequency (GHz)	2.400	2.395	2.397	-
		Level (dB m/MHz)	-37.01	-53.60	-51.87	-16
		Level (μW/MHz)	0.199 067	0.004 365	0.006 501	25
	2 483.5 to 2 496.5	Frequency (GHz)	2.485	2.489	2.484	-
		Level (dB m/MHz)	-49.56	-52.64	-42.68	-16
		Level (μW/MHz)	0.011 066	0.005 445	0.053 951	25
	Above 2 496.5	Frequency (GHz)	2.542	2.506	2.608	-
		Level (dB m/MHz)	-45.90	-48.90	-49.78	-26
		Level (μW/MHz)	0.025 704	0.012 882	0.010 520	2.5

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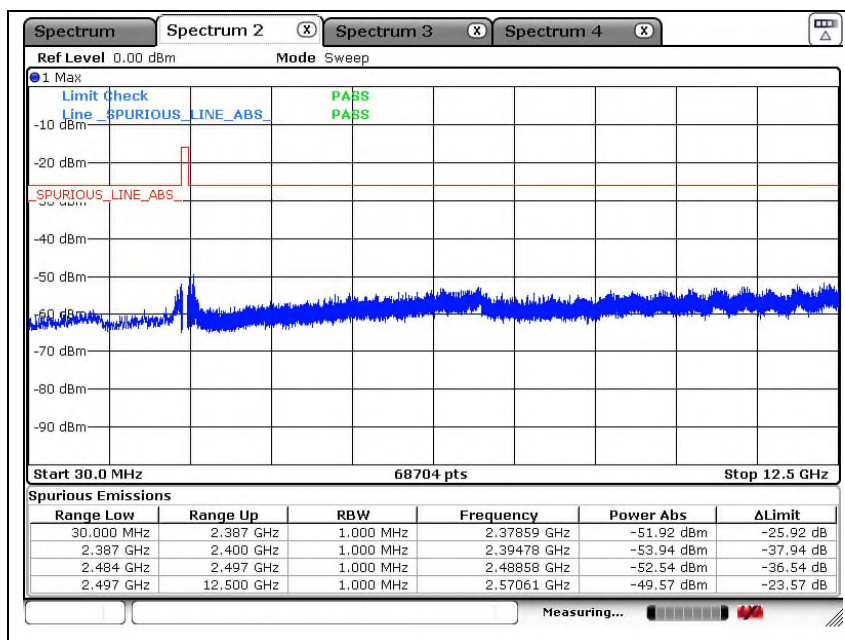
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Low voltage

Low channel



Middle channel



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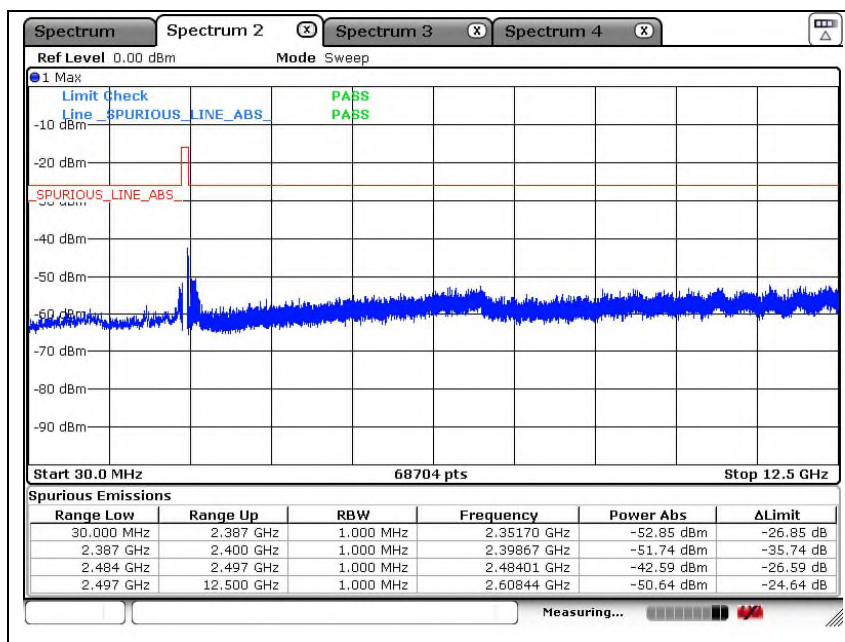
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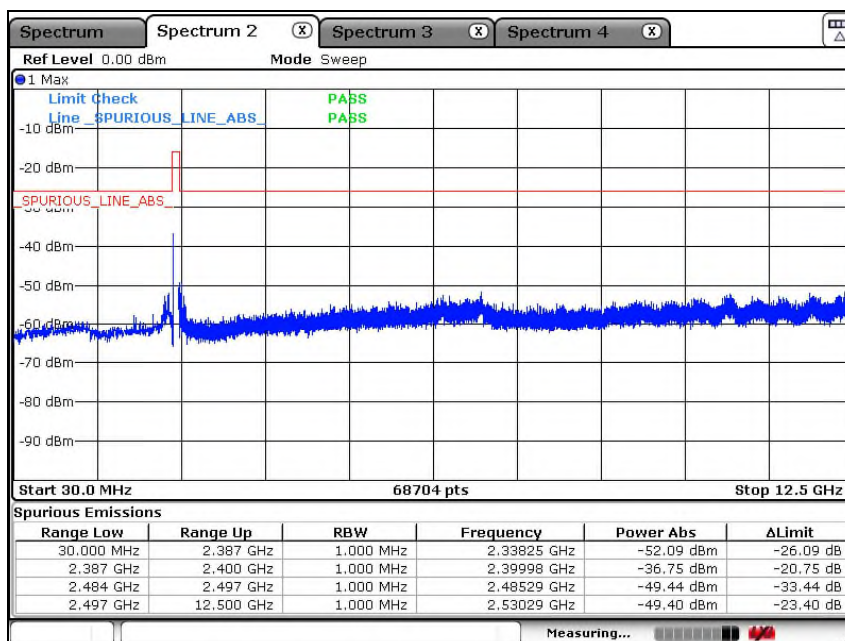
A4(210 mm x 297 mm)

High channel



Normal voltage

Low channel



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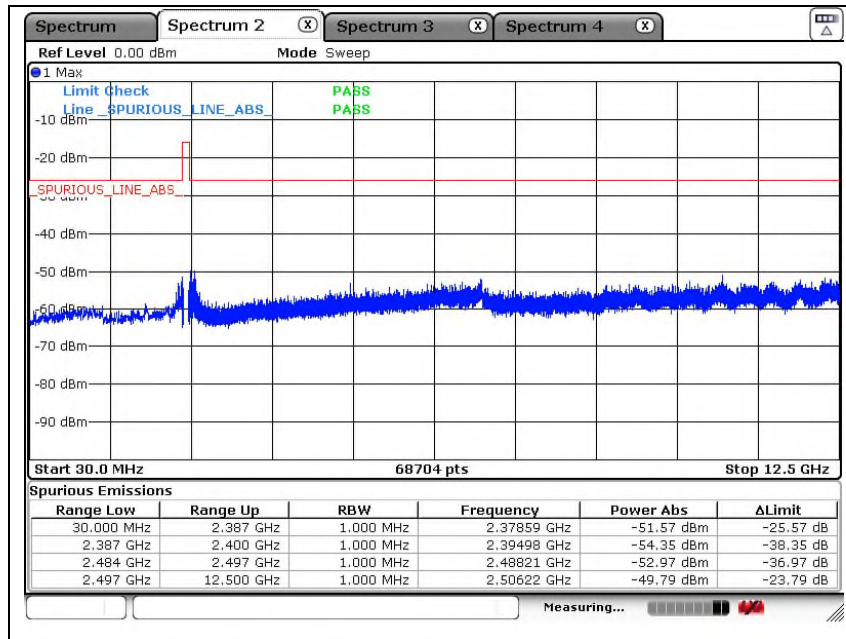
SGS Korea Co., Ltd. (Gunpo Laboratory) 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807 <http://www.sgsgroup.kr>

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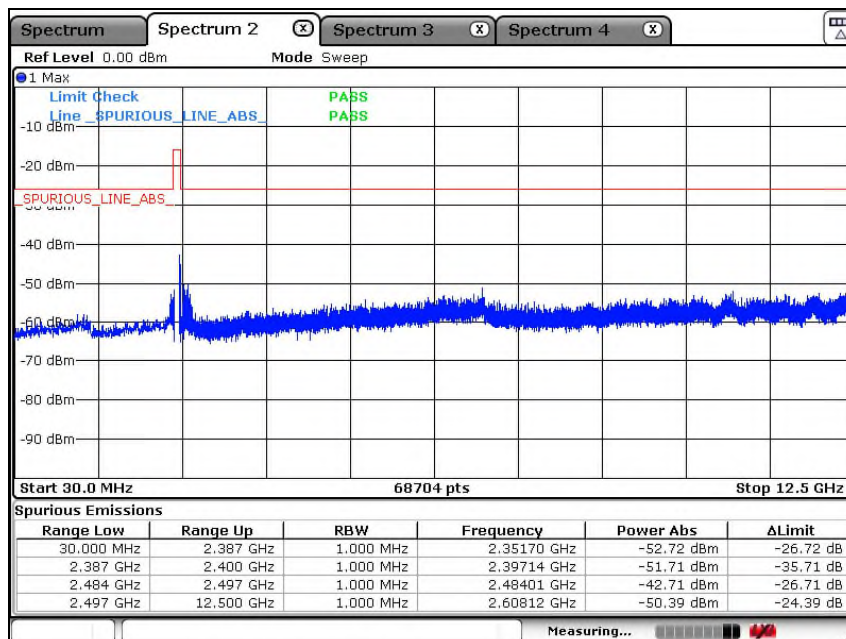
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A4(210 mm x 297 mm)

Middle channel



High channel



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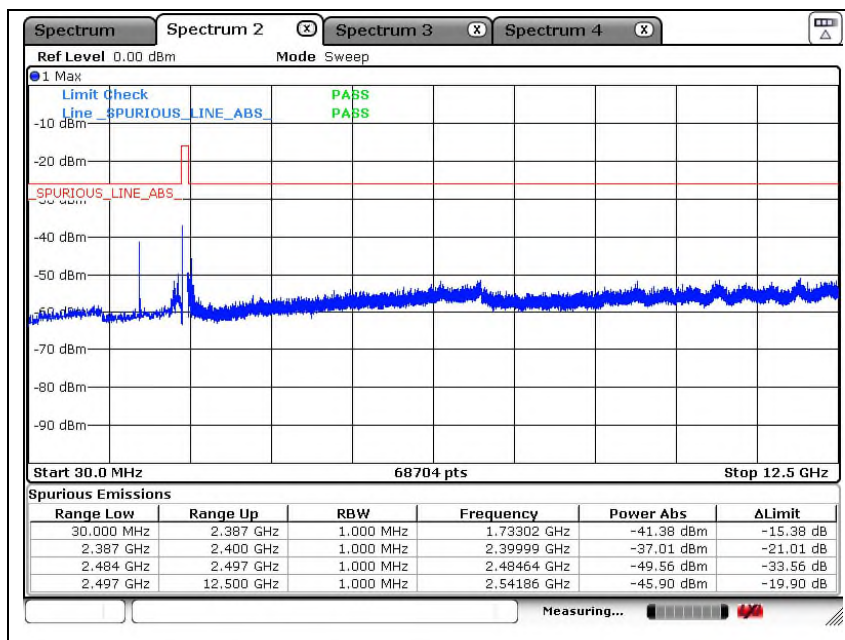
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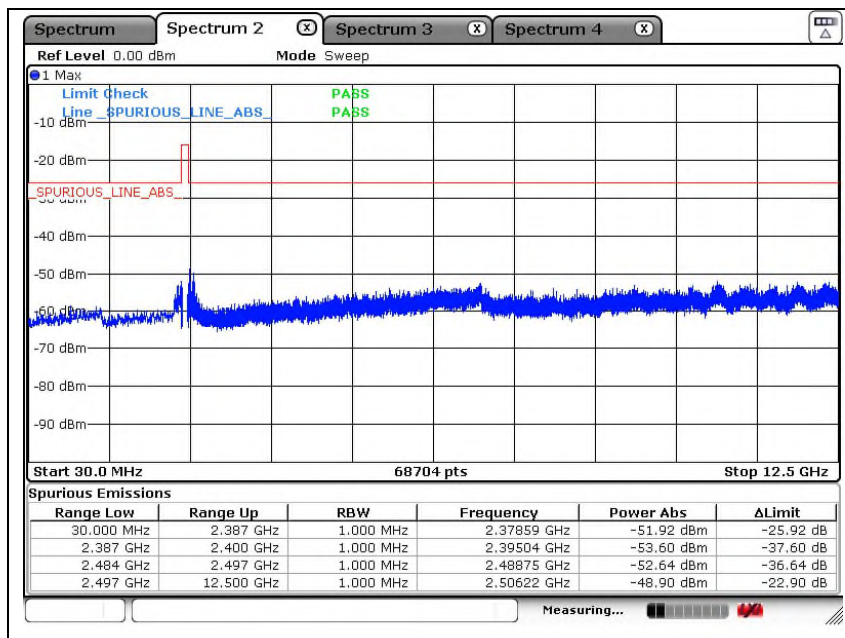
A4(210 mm x 297 mm)

High voltage

Low channel



Middle channel



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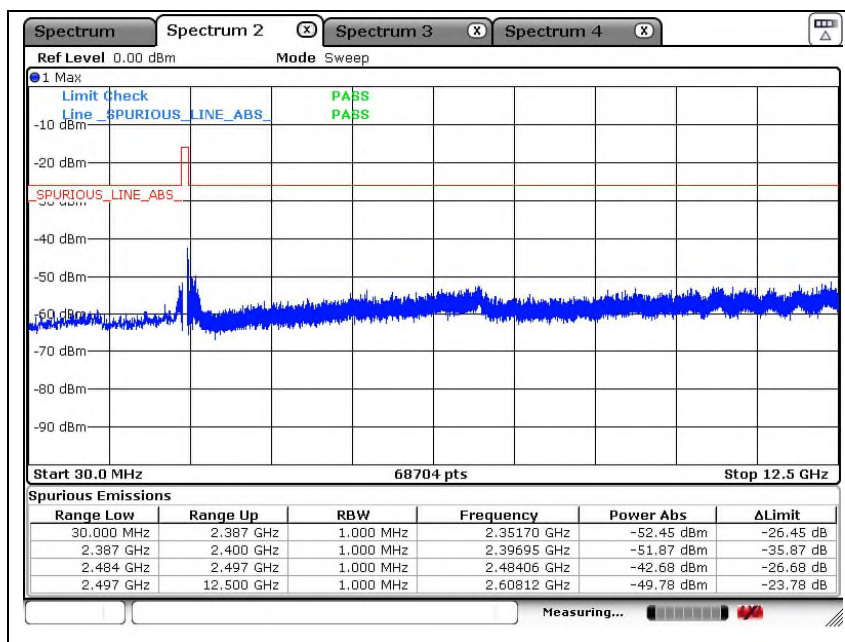
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High channel



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A4(210 mm x 297 mm)

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 % to -80 %. In addition, the rated output power shall not be over the limits shown below.

Limit (rated output power, upper limit)

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

Center frequency: 2 402 MHz, 2 442 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

Find the frequency of maximum transmitted power.

[Setting 2] Measurement of average antenna power for LE

Frequency: Frequency of peak power found using [setting1]
Span: 0 Hz
RBW: 3 MHz
VBW: 3 MHz
Detector mode: Sample
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

Measure the Average Burst Power of the frequency.

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5.4. Test result

Ambient temperature : (23 ± 1) °C

Relative humidity : 47 % R.H.

Test voltage (V _{d.c.})	Channel	Antenna gain (dB i)	Rated Output Power			E.I.R.P. (dB m)	Average Burst Power		Power Tolerance (%)
V _{Min} = 2.70	Low Ch. (2 402 MHz)	-0.61	0.50 mW	-3.01	dB m	-3.62	0.29 mW	-5.40 dB m	-42.00
	Middle Ch. (2 442 MHz)	-0.61	0.50 mW	-3.01	dB m	-3.62	0.31 mW	-5.10 dB m	-38.00
	High Ch. (2 480 MHz)	-0.61	0.50 mW	-3.01	dB m	-3.62	0.38 mW	-4.20 dB m	-24.00
V _{Nor} = 3.00	Low Ch. (2 402 MHz)	-0.61	0.50 mW	-3.01	dB m	-3.62	0.29 mW	-5.37 dB m	-42.00
	Middle Ch. (2 442 MHz)	-0.61	0.50 mW	-3.01	dB m	-3.62	0.31 mW	-5.09 dB m	-38.00
	High Ch. (2 480 MHz)	-0.61	0.50 mW	-3.01	dB m	-3.62	0.38 mW	-4.21 dB m	-24.00
V _{Max} = 3.30	Low Ch. (2 402 MHz)	-0.61	0.50 mW	-3.01	dB m	-3.62	0.29 mW	-5.40 dB m	-42.00
	Middle Ch. (2 442 MHz)	-0.61	0.50 mW	-3.01	dB m	-3.62	0.32 mW	-5.01 dB m	-36.00
	High Ch. (2 480 MHz)	-0.61	0.50 mW	-3.01	dB m	-3.62	0.38 mW	-4.22 dB m	-24.00

Note;

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

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

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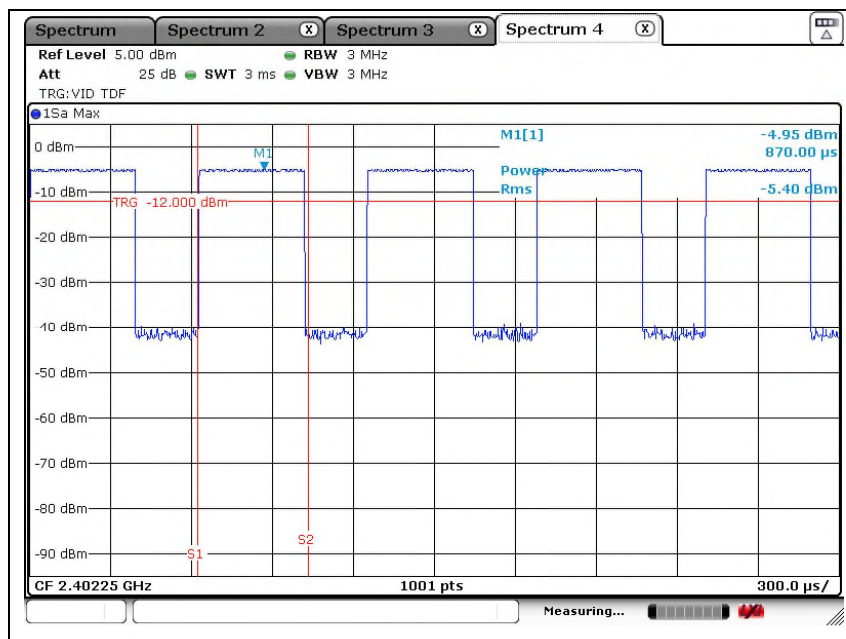
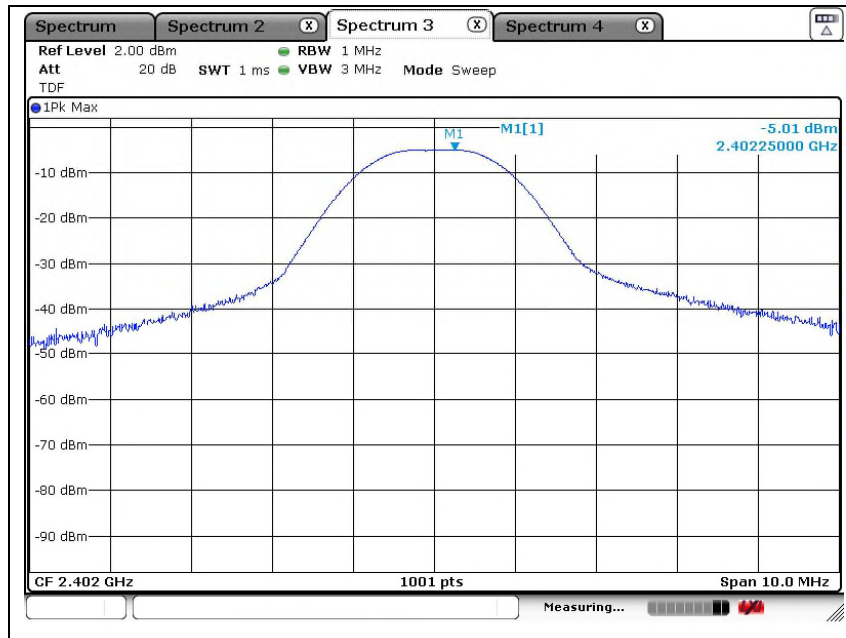
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A4(210 mm × 297 mm)

Low voltage

Low channel



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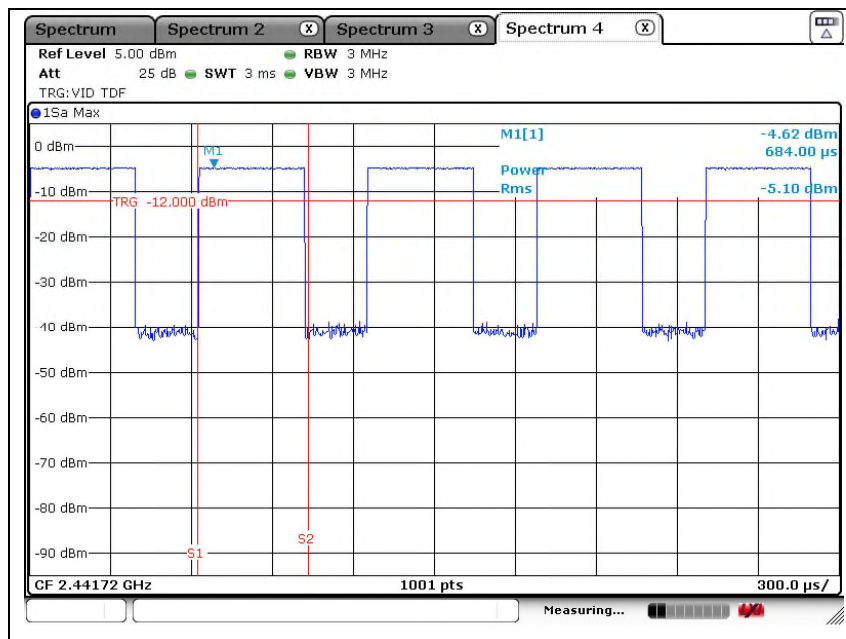
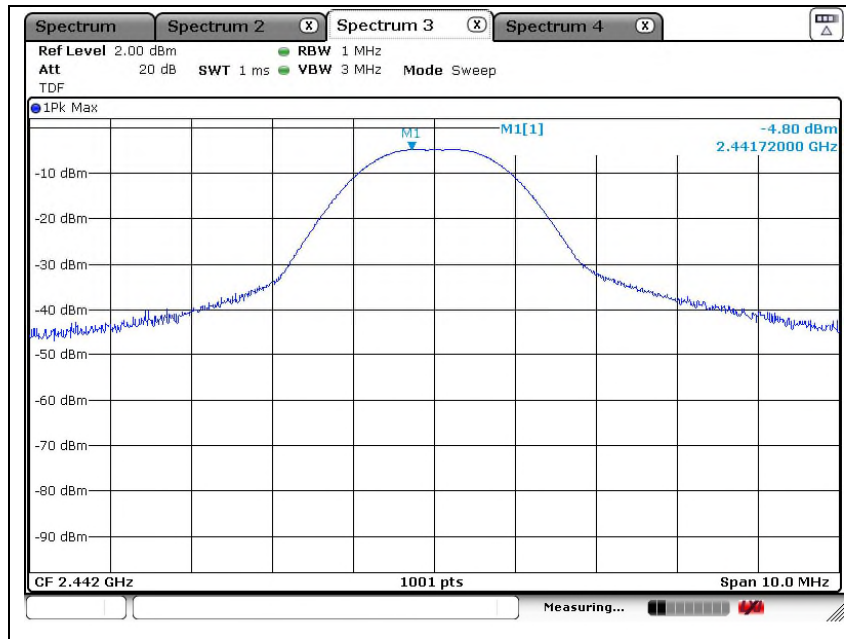
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A4(210 mm x 297 mm)

Middle channel



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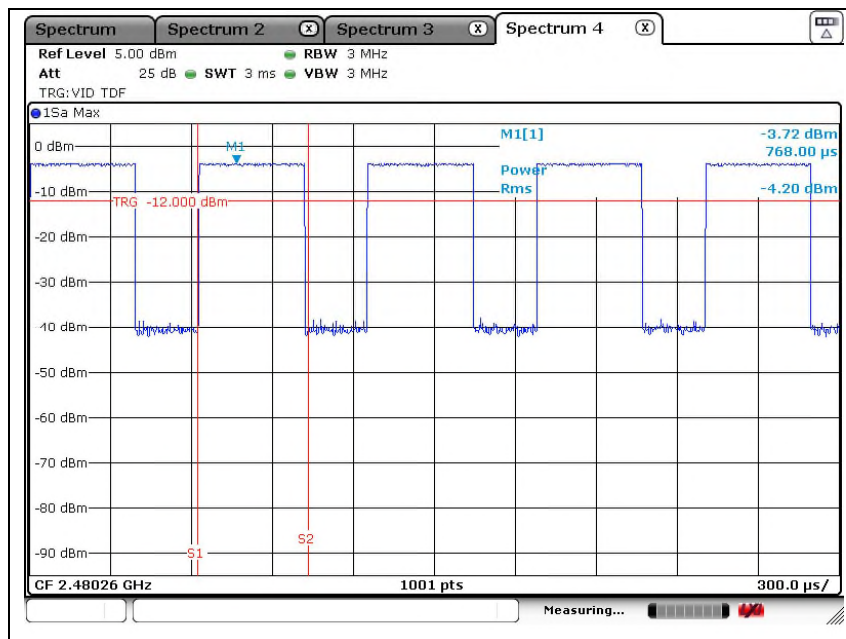
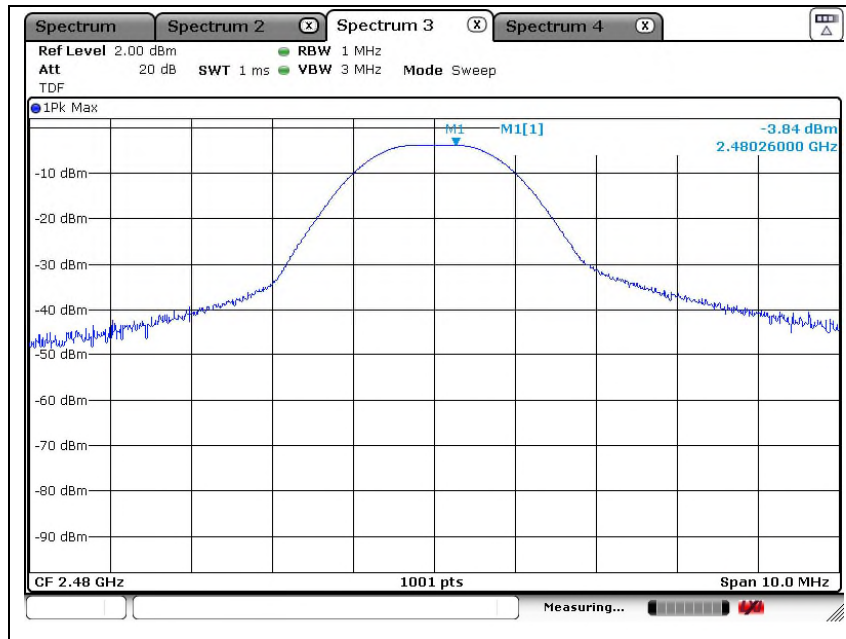
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A4(210 mm x 297 mm)

High channel



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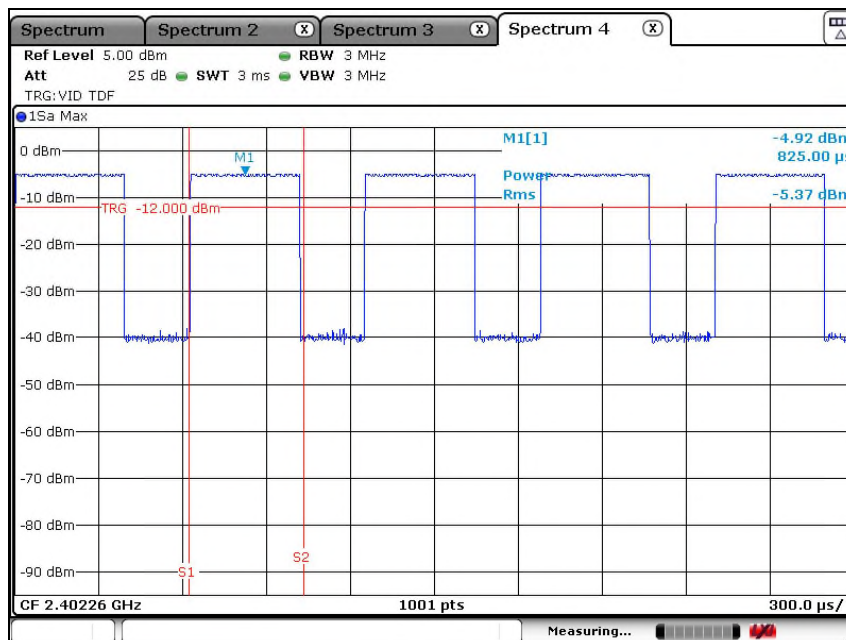
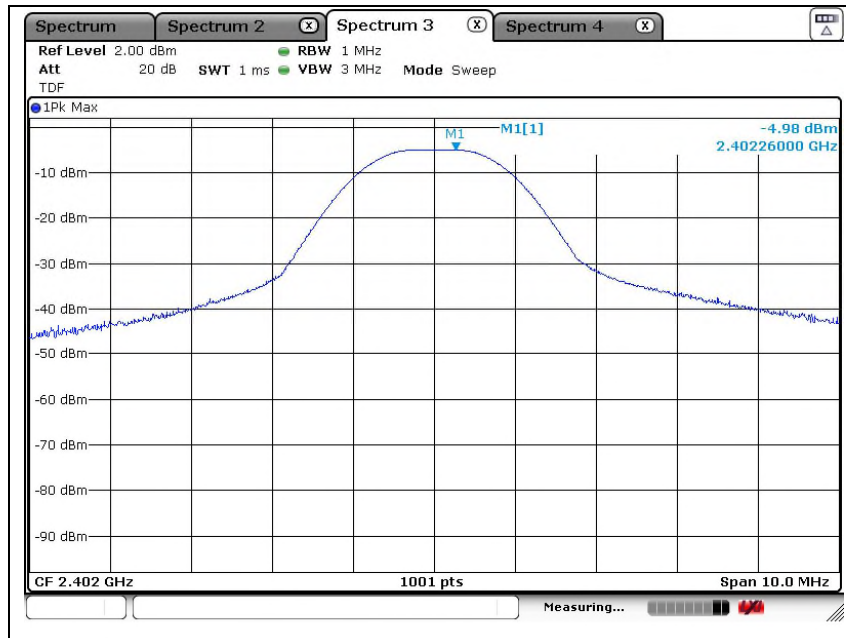
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A4(210 mm x 297 mm)

Normal voltage

Low channel



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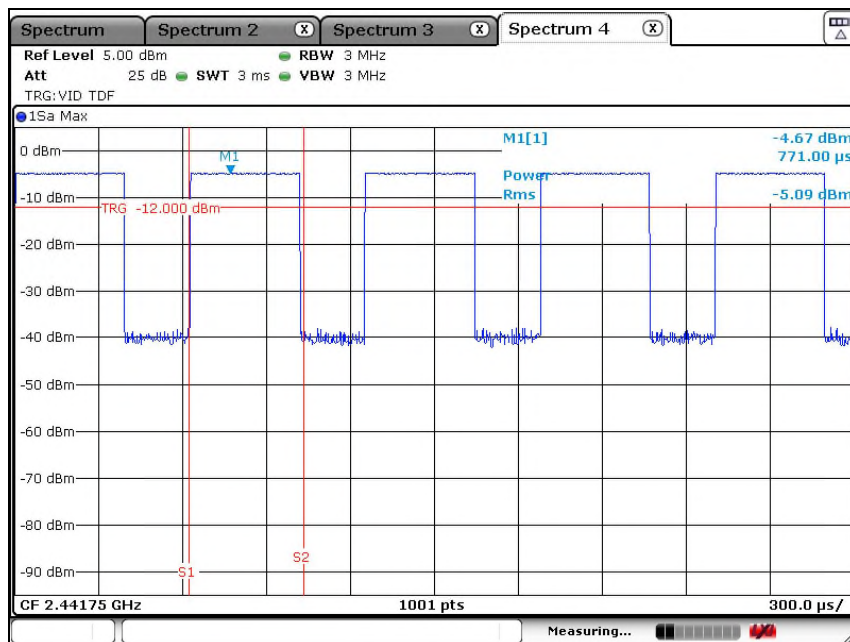
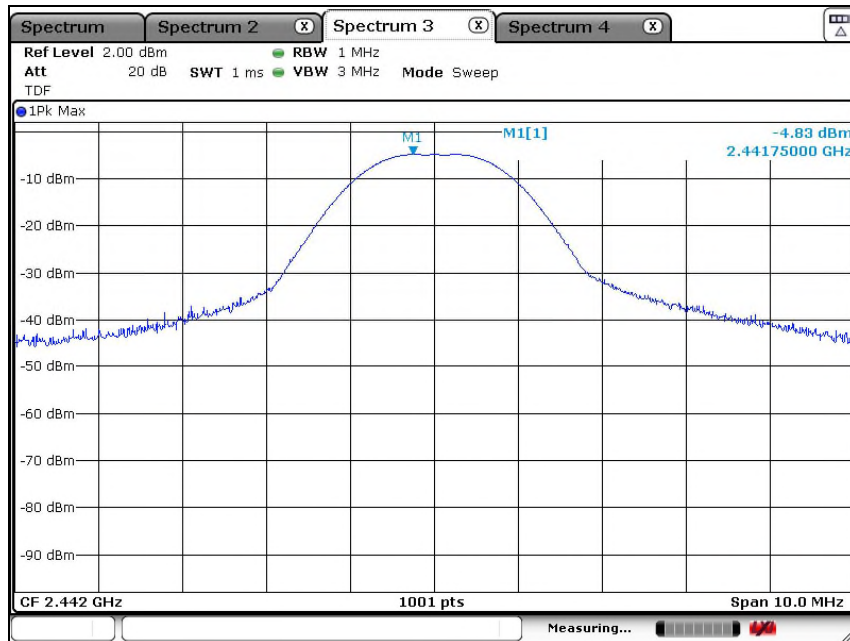
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A4(210 mm x 297 mm)

Middle channel



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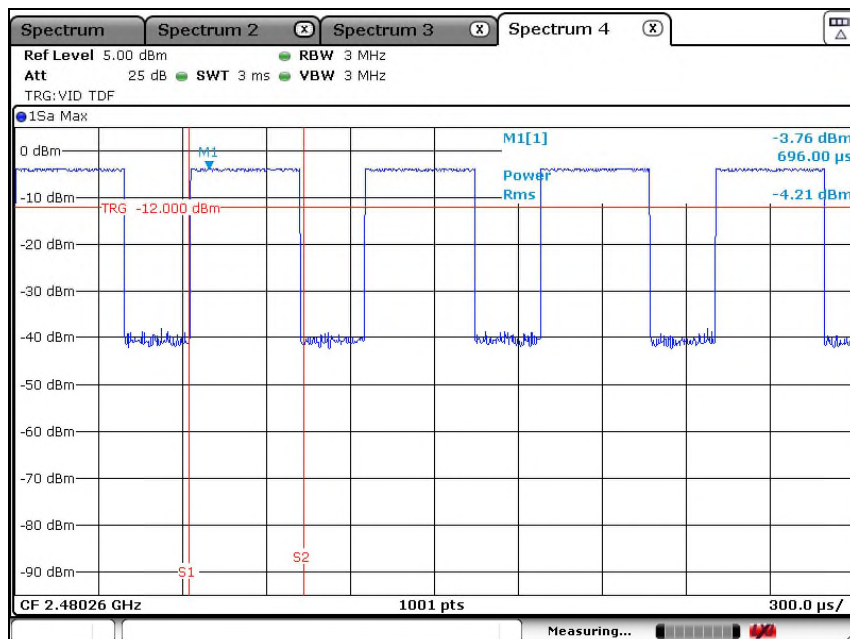
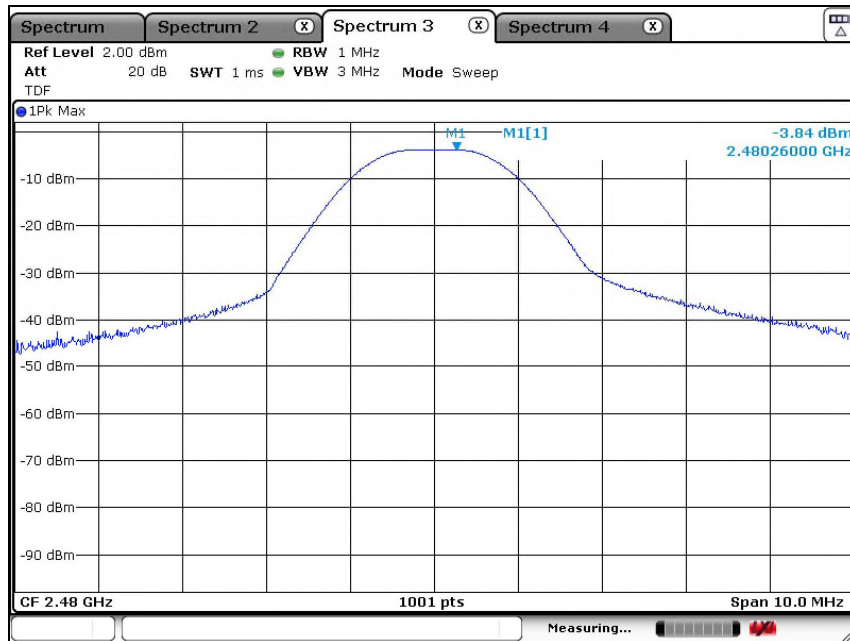
SGS Korea Co., Ltd. (Gunpo Laboratory) 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807 <http://www.sgsgroup.kr>

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A4(210 mm x 297 mm)

High channel



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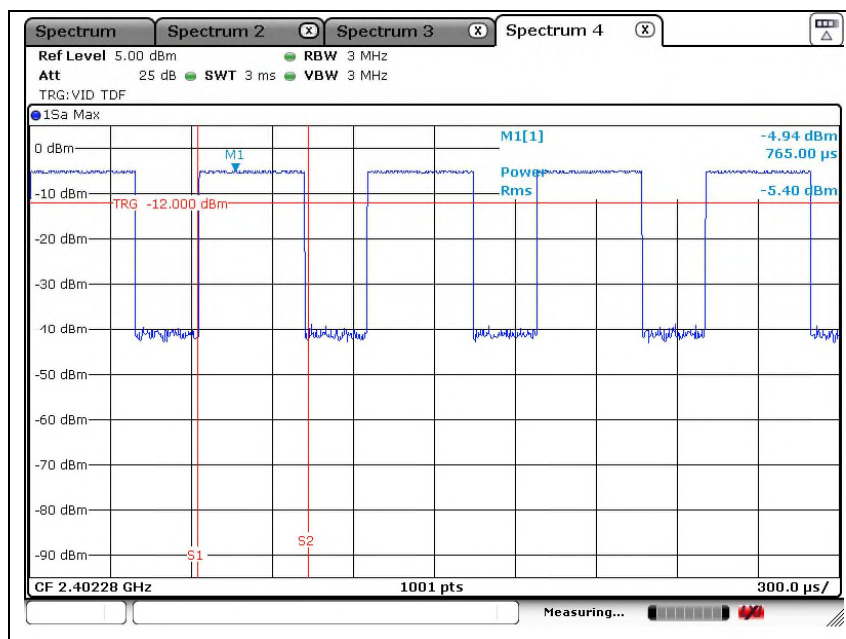
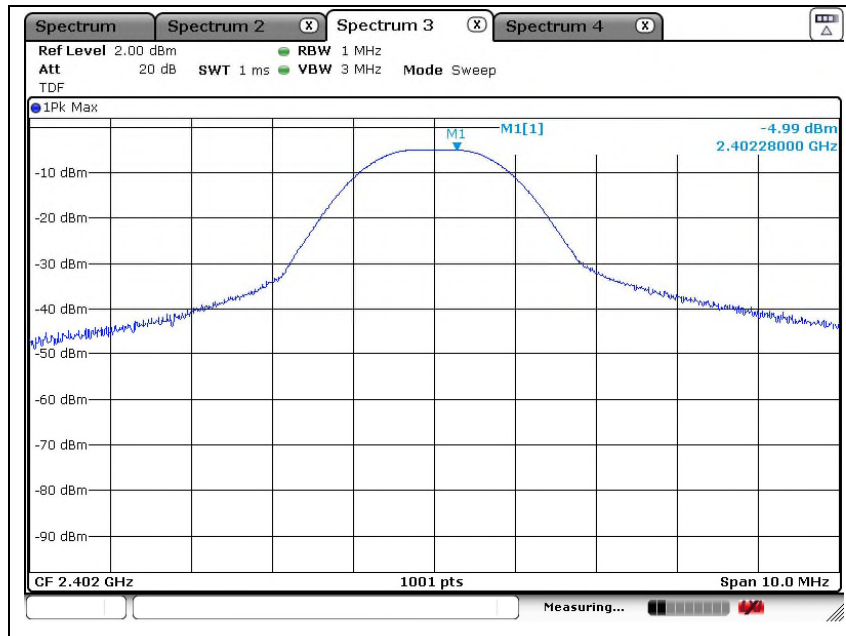
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A4(210 mm x 297 mm)

High voltage

Low channel



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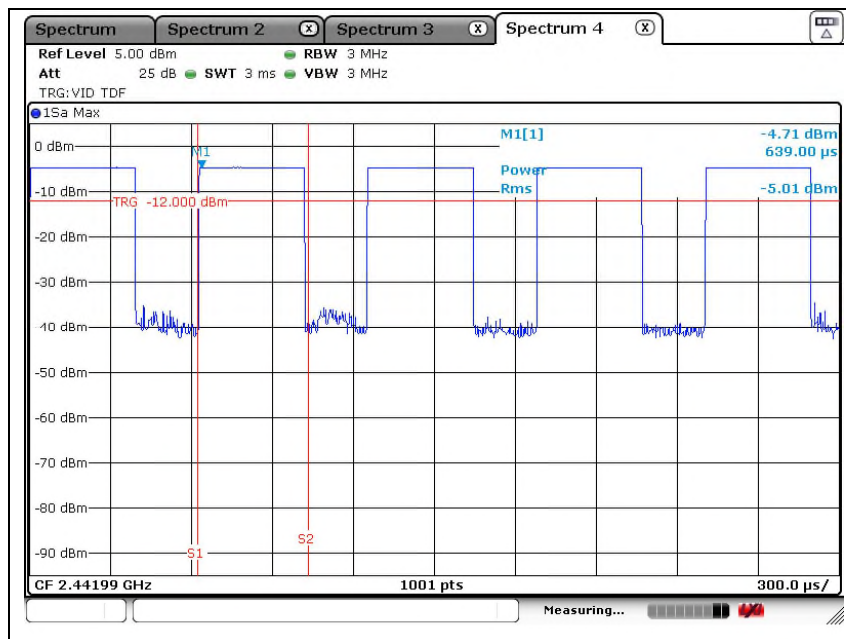
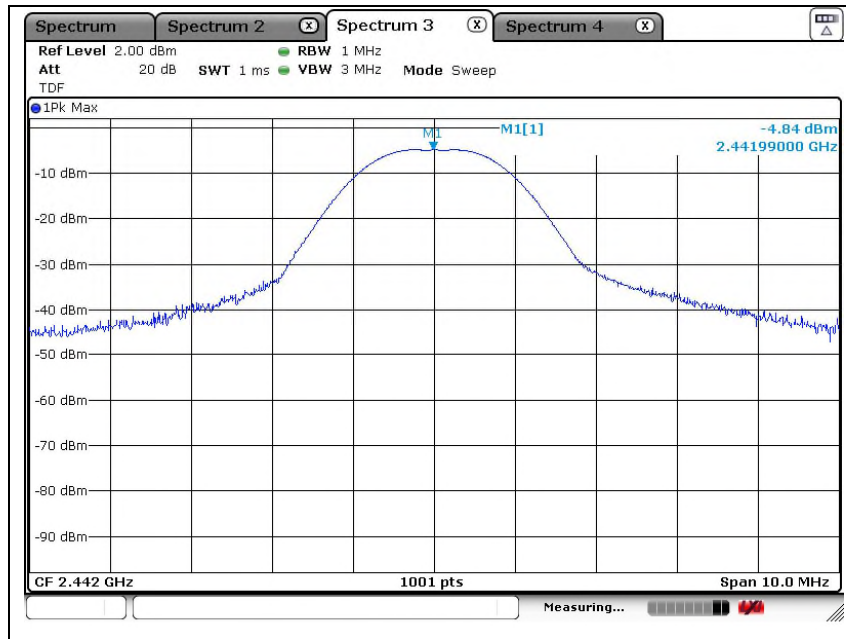
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A4(210 mm x 297 mm)

Middle channel



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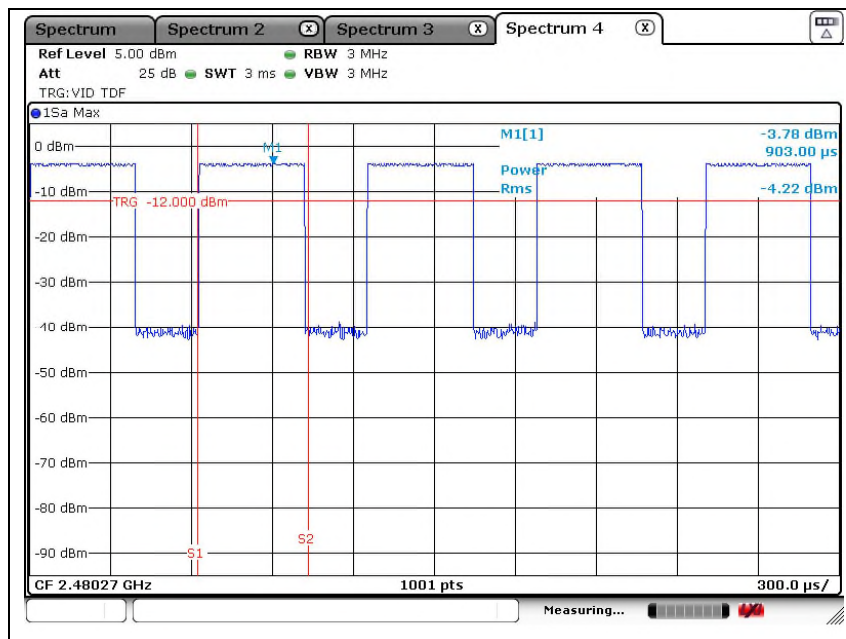
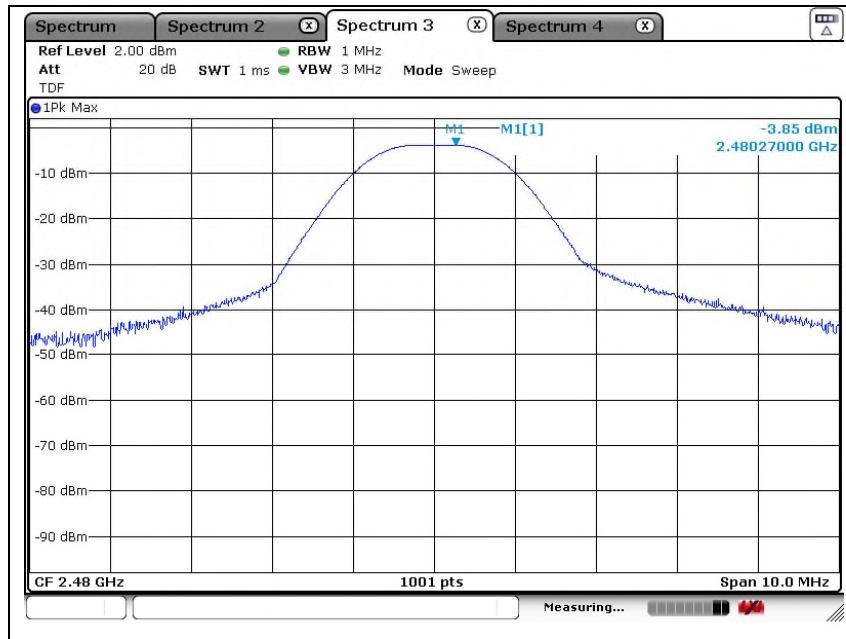
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A4(210 mm x 297 mm)

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

Configure the spectrum analyzer as below;

Frequency range: 30 MHz to 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

Search for spurious emissions in the range 30 MHz to 12.5 GHz.

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A4(210 mm x 297 mm)

6.4. Test result

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

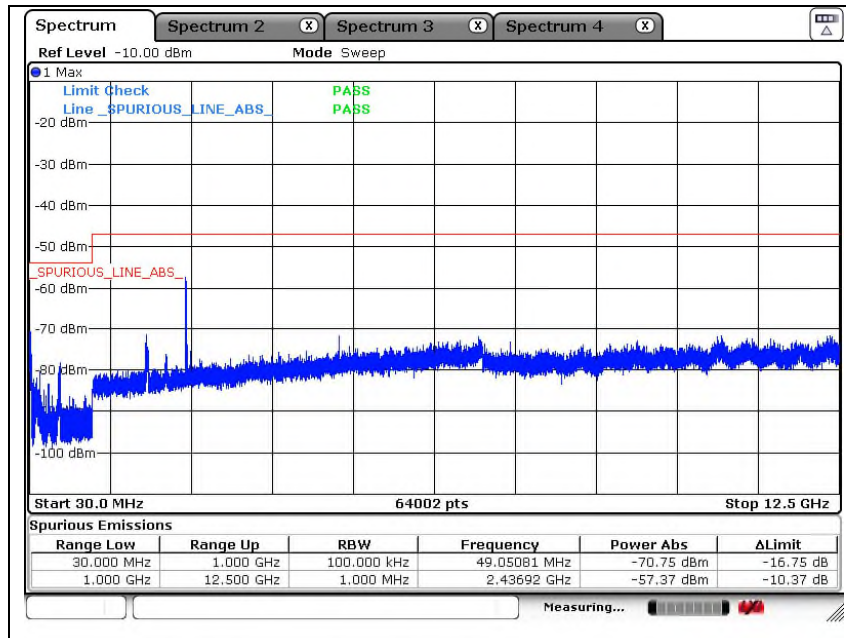
Test voltage (V _{d.c.})	Frequency Range (MHz)	Measured	Low Ch. (2 402 MHz)	Middle Ch. (2 442 MHz)	High Ch. (2 480 MHz)	Limit
V _{min} = 2.70	30 to 1 000	Frequency (GHz)	0.049	0.040	0.040	-
		Level (dB m/100 kHz)	-70.75	-70.73	-71.31	-53.98
		Level (nW/100 kHz)	0.084 140	0.084 528	0.073 961	4.00
	1 000 to 12 500	Frequency (GHz)	2.437	2.437	2.437	-
		Level (dB m/MHz)	-57.37	-59.86	-58.37	-46.99
		Level (nW/MHz)	1.832 314	1.032 761	1.455 459	20.00
V _{nom} = 3.00	30 to 1 000	Frequency (GHz)	0.037	0.050	0.040	-
		Level (dB m/100 kHz)	-70.61	-71.09	-71.07	-53.98
		Level (nW/100 kHz)	0.086 896	0.077 804	0.078 163	4.00
	1 000 to 12 500	Frequency (GHz)	2.436	2.436	2.435	-
		Level (dB m/MHz)	-58.88	-57.92	-58.47	-46.99
		Level (nW/MHz)	1.294 196	1.614 359	1.422 329	20.00
V _{max} = 3.30	30 to 1 000	Frequency (GHz)	0.048	0.048	0.037	-
		Level (dB m/100 kHz)	-70.15	-70.97	-70.63	-53.98
		Level (nW/100 kHz)	0.096 605	0.079 983	0.086 497	4.00
	1 000 to 12 500	Frequency (GHz)	2.436	2.436	2.437	-
		Level (dB m/MHz)	-62.54	-58.55	-58.27	-46.99
		Level (nW/MHz)	0.557 186	1.396 368	1.489 361	20.00

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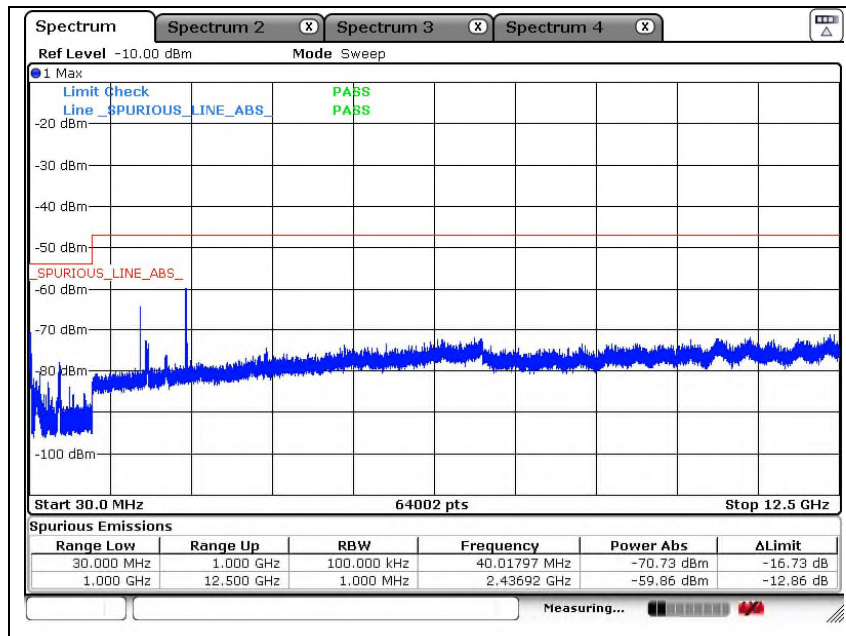
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Low voltage

Low channel



Middle channel



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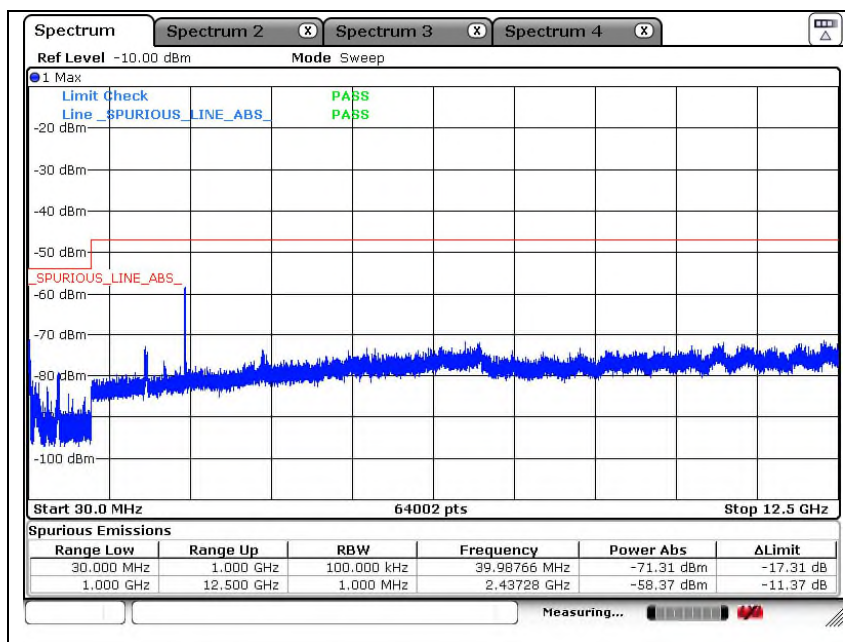
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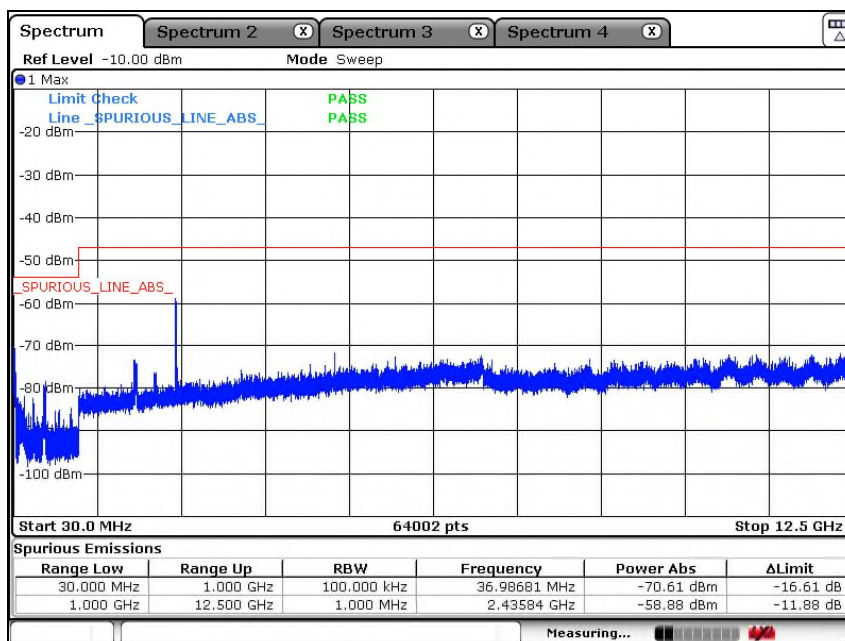
A4(210 mm x 297 mm)

High channel



Normal voltage

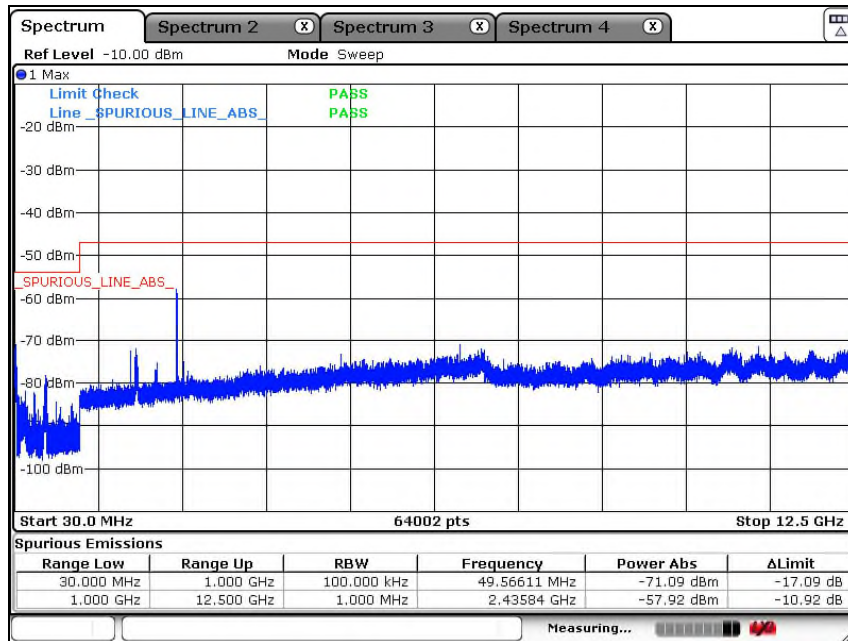
Low channel



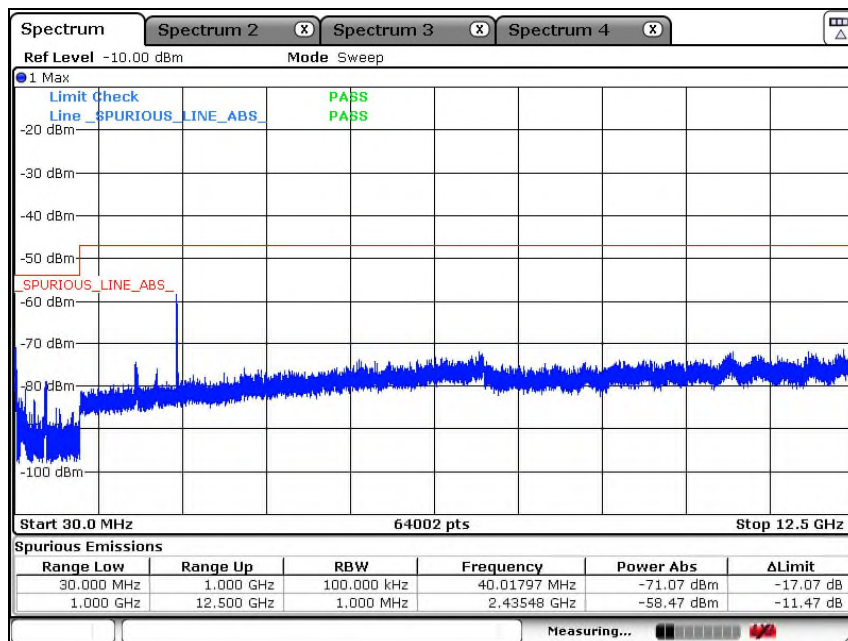
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Middle channel



High channel

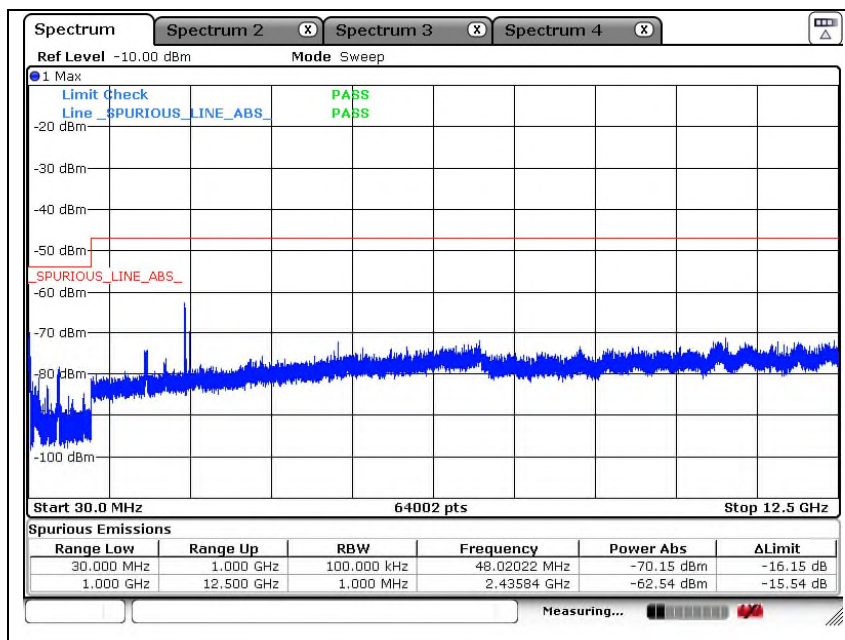


The results of this test report are effective only to the items tested. The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received. This test report cannot be reproduced, except in full, without prior written permission of the Company. This test report does not assure KOLAS accreditation.

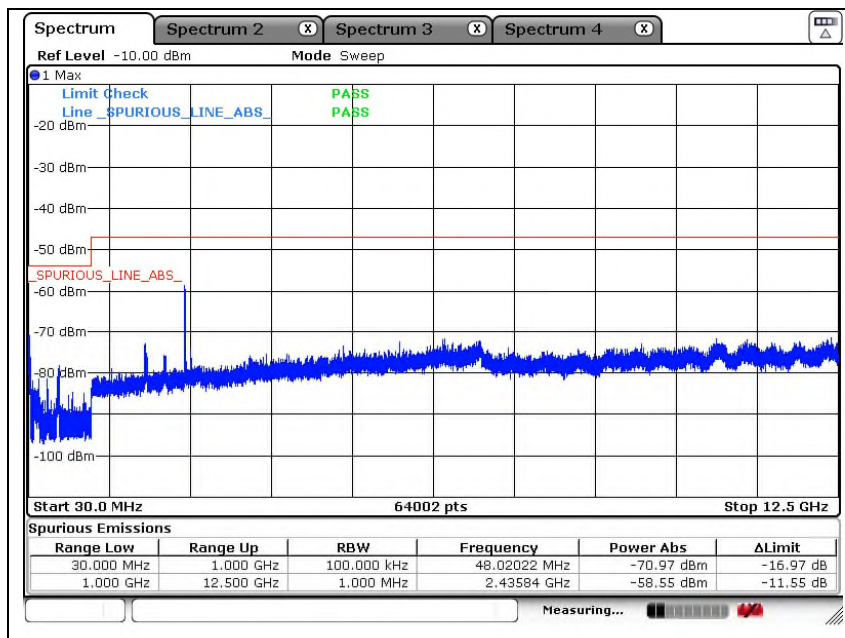
SGS Korea Co., Ltd. (Gunpo Laboratory) 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807 <http://www.sgsgroup.kr>

High voltage

Low channel



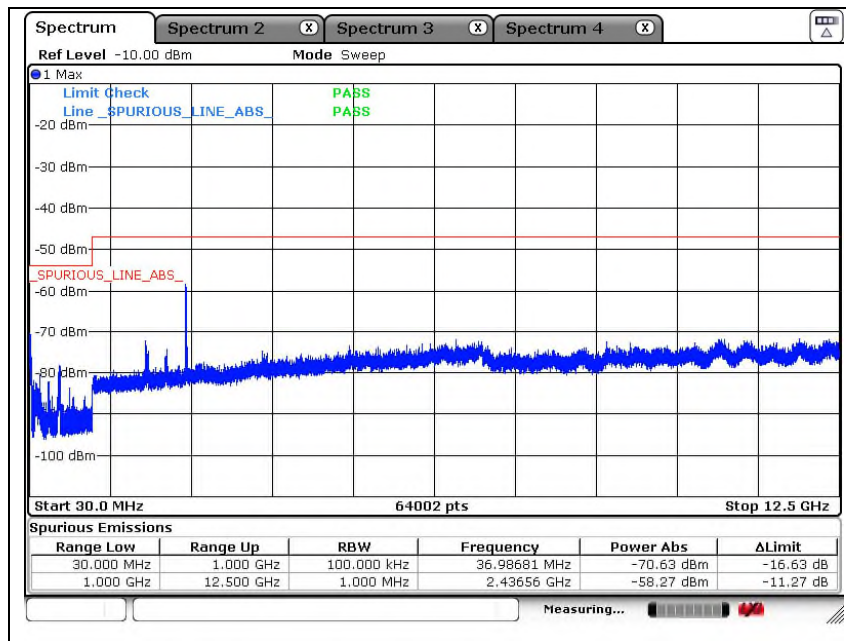
Middle channel



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High channel



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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 :

MAC ADDR : D6:6C:49:9E:03:A2

The unit does meet the requirements. (Pass)

- End of the Test Report -

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RTT5041-19(2019.04.24)(1)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)