

TEST REPORT

Article 2 Clause 1 Item19

Equipment under test LiveCare Gateway

Model name LG-XSGKR5991

Applicant uLikekorea Co.,Inc

Manufacturer uLikekorea Co.,Inc

Date of test(s) 2021.04.26 ~ 2021.05.07

Date of issue 2021.06.17

Issued to

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Test and report completed by :	Report approval by :
	
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Revision history

Revision	Date of issue	Test report No.	Description
-	2021.06.17	KES-RF1-21T0107	Initial

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1. General information

Applicant: uLikekorea Co.,Inc
Applicant address: 04541 86, Cheonggyecheon-ro, Jung-gu, Seoul, Republic of Korea
Test site: KES Co., Ltd.
Test site address: 3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si,
Gyeonggi-do, 14057, Korea
473-21, Gayeo-ro, Yeosu-si, Gyeonggi-do, Korea
Standard ARIB STD-T66
J-MIC Radio law Article 2

1.1. EUT description

Equipment under test LiveCare Gateway
Frequency range **2 402 MHz ~ 2 480 MHz (1 Mbps, 2 Mbps)**
920.7 MHz
1 922.6 ~ 1 977.4 MHz
902.6 ~ 912.4 MHz
832.4 ~ 842.6 MHz
Model: LG-XSGKR5991
Modulation technique GFSK
Number of channels 2 402 MHz ~ 2 480 MHz (1 Mbps, 2 Mbps) : 40
Antenna specification Antenna type(2.4GHz) : Meander antenna, Peak gain : -0.61 dBi
Power source DC 5.0 V
H/W version: 2.3
S/W version: 2.0.0

1.2. Information about derivative model

N/A

1.3. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
-	-	-	-	-

1.4. Frequency/channel operations

Ch.	Frequency (MHz)	Rate(Mbps)
01	2402	1
.	.	.
20	2442	1
.	.	.
40	2480	1

Note.

This test report is prepared according to the requirements of ISO/IEC 17025.

1.5. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- Article 49-20 and the relevant articles of the Ordinance Regulating Radio Equipment

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The measurement was implemented in accordance with MIC Notice No. 88 Appendix No. 43

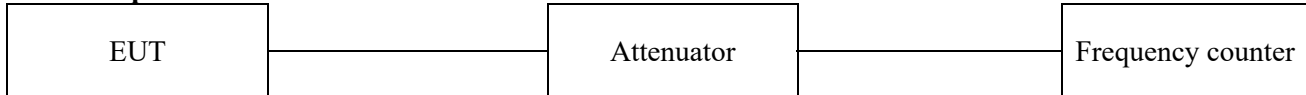
2. Summary of tests

ARIB STD-T66 Clause	Parameter	Verdict
Clause 3.2(2).(4)	Frequency Tolerance	Pass
Clause 3.2(2).(7)	Occupied Bandwidth	Pass
Clause 3.2(2).(8)	Spread Bandwidth	Pass
Clause 3.2(2).(3)	Antenna Power and Tolerances for antenna power	Pass
Clause 3.2(6)	Spurious emission intensity	Pass
Clause 3.3(1)	Secondary radiated emissions	Pass
Clause 3.4(1)	Interference prevention function	Pass

3. Test results

3.1. Frequency tolerance

Test setup



Limit

Permission deviation $\pm 50 \times 10^{-6}$

Test results

Mode: BLE 1 Mbps

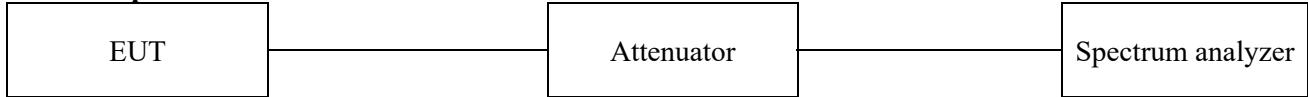
Test voltage (%)	Test voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Frequency deviation (Hz)	Deviation (ppm)	Verdict
90	DC 4.50	2 402	2 402.001 932	1 932	0.80	PASS
		2 442	2 442.001 873	1 873	0.77	PASS
		2 480	2 480.001 820	1 820	0.73	PASS
100	DC 5.00	2 402	2 402.002 053	2 053	0.85	PASS
		2 442	2 442.001 843	1 843	0.75	PASS
		2 480	2 480.001 841	1 841	0.74	PASS
110	DC 5.50	2 402	2 402.001 896	1 896	0.79	PASS
		2 442	2 442.001 914	1 914	0.78	PASS
		2 480	2 480.001 799	1 799	0.73	PASS

Mode: BLE 2 Mbps

Test voltage (%)	Test voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Frequency deviation (Hz)	Deviation (ppm)	Verdict
90	DC 4.50	2 402	2 402.002 020	2 020	0.84	PASS
		2 442	2 442.001 739	1 739	0.71	PASS
		2 480	2 480.001 729	1 729	0.70	PASS
100	DC 5.00	2 402	2 402.002 101	2 101	0.87	PASS
		2 442	2 442.001 707	1 707	0.70	PASS
		2 480	2 480.001 715	1 715	0.69	PASS
110	DC 5.50	2 402	2 402.001 979	1 979	0.82	PASS
		2 442	2 442.001 787	1 789	0.73	PASS
		2 480	2 480.001 751	1 751	0.71	PASS

3.2. Occupied Bandwidth

Test setup



Limit

Equal or less than 26 MHz(DSSS).

Test results

Mode: BLE 1Mbps

Test voltage (%)	Nominal Voltage(V)	Occupied Bandwidth (MHz)			Verdict
		Frequency (2 402 MHz)	Frequency (2 442 MHz)	Frequency (2 480 MHz)	
90	DC 4.50	1.04	1.04	1.04	Pass
100	DC 5.00	1.04	1.04	1.04	Pass
110	DC 5.50	1.04	1.10	1.04	Pass

Mode: BLE 2Mbps

Test voltage (%)	Nominal Voltage(V)	Occupied Bandwidth (MHz)			Verdict
		Frequency (2 402 MHz)	Frequency (2 442 MHz)	Frequency (2 480 MHz)	
90	DC 4.50	2.05	2.05	2.05	Pass
100	DC 5.00	2.05	2.06	2.05	Pass
110	DC 5.50	2.05	2.06	2.05	Pass

Test plots

BLE 1Mbps - Test voltage (100 %)



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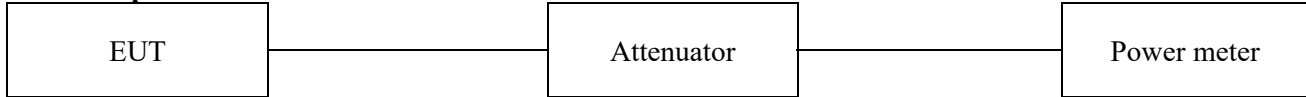
BLE 2Mbps - Test voltage (100 %)



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3.3. Spread Bandwidth

Test setup



Limit

Spread Bandwidth shall be 500 kHz or more.

Test results

Mode: BLE 1Mbps

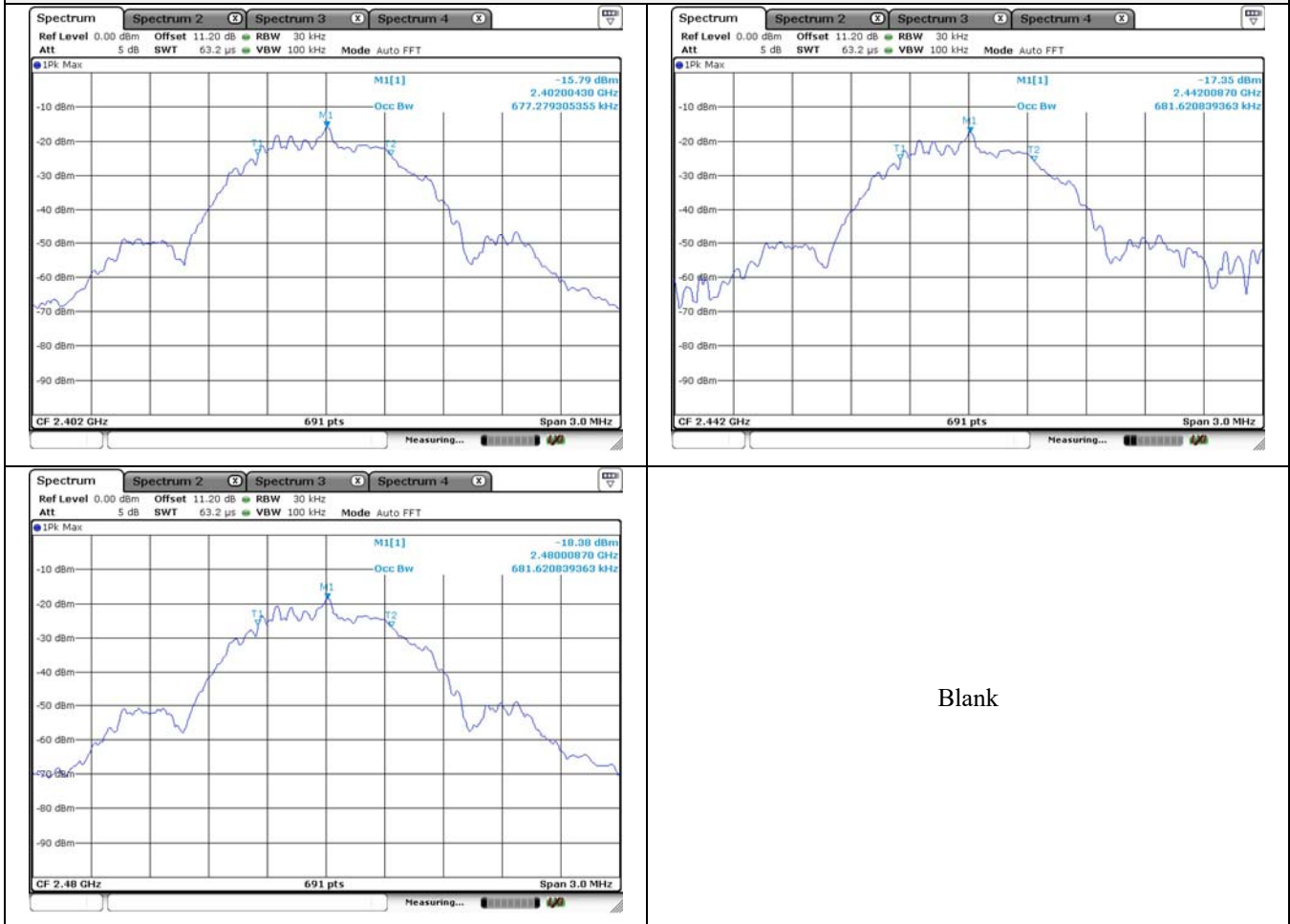
Test voltage (%)	Nominal Voltage(V)	Spread Bandwidth (MHz)			Verdict
		Frequency (2 402 MHz)	Frequency (2 442 MHz)	Frequency (2 480 MHz)	
90	DC 4.50	0.68	0.68	0.68	Pass
100	DC 5.00	0.68	0.68	0.68	Pass
110	DC 5.50	0.68	0.68	0.68	Pass

Mode: BLE 2Mbps

Test voltage (%)	Nominal Voltage(V)	Spread Bandwidth (MHz)			Verdict
		Frequency (2 402 MHz)	Frequency (2 442 MHz)	Frequency (2 480 MHz)	
90	DC 4.50	1.29	1.30	1.30	Pass
100	DC 5.00	1.29	1.30	1.30	Pass
110	DC 5.50	1.28	1.30	1.30	Pass

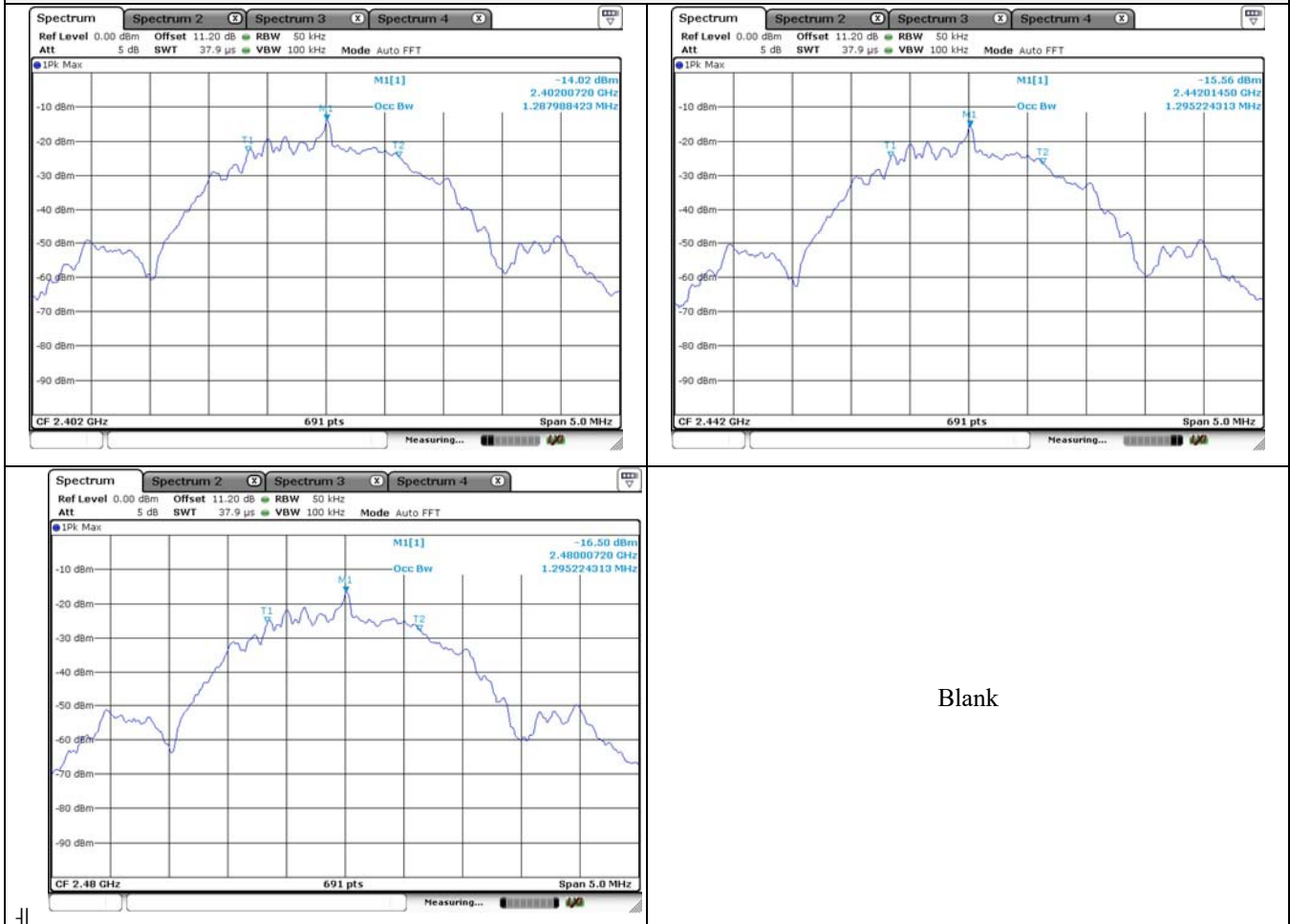
Test plots

BLE 1Mbps - Test voltage (100 %)



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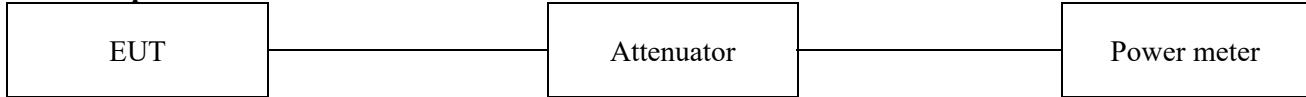
BLE 2Mbps - Test voltage (100 %)



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3.4. Antenna Power and Tolerances for antenna power

Test setup



Limit

Rate power : 0.05 mW (+20%, -80%)

Upper : 0.06 mW

Lower : 0.01 mW

Test results

Mode: BLE 1Mbps

Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Output power (dBm/MHz)	Output power (mW)	E.I.R.P (dBm/MHz)	Output power Deviation (%)
90	DC 4.50	2 402	-16.30	0.023	-16.91	-53.12
		2 442	-15.65	0.027	-16.26	-45.55
		2 480	-15.14	0.031	-15.75	-38.76
100	DC 5.00	2 402	-16.27	0.024	-16.88	-52.79
		2 442	-15.63	0.027	-16.24	-45.29
		2 480	-15.14	0.031	-15.75	-38.76
110	DC 5.50	2 402	-16.34	0.023	-16.95	-53.55
		2 442	-15.60	0.028	-16.21	-44.92
		2 480	-15.10	0.031	-15.71	-38.19

Mode: BLE 2Mbps

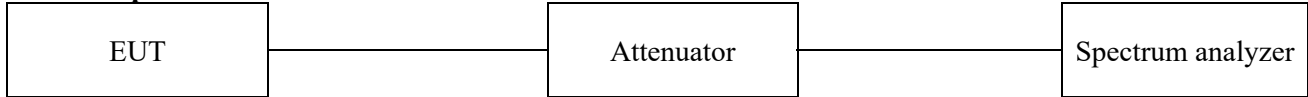
Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Output power (dBm/MHz)	Output power (mW)	E.I.R.P (dBm/MHz)	Output power Deviation (%)
90	DC 4.50	2 402	-16.40	0.023	-17.01	-54.18
		2 442	-15.63	0.027	-16.24	-45.29
		2 480	-15.15	0.031	-15.76	-38.90
100	DC 5.00	2 402	-16.36	0.023	-16.97	-53.76
		2 442	-15.58	0.028	-16.19	-44.66
		2 480	-15.13	0.031	-15.74	-38.62
110	DC 5.50	2 402	-16.35	0.023	-16.96	-53.65
		2 442	-15.55	0.028	-16.16	-44.28
		2 480	-15.12	0.031	-15.73	-38.48

Note.

1. Output power is the result which the Burst Ratio is calculated.
2. E.I.R.P : Output power data + Ant. Max peak gain
3. Antenna gain : -0.61 dBi

3.5. Spurious emission intensity

Test setup



Limit

1. Less than 2387 MHz : Equal or less than $2.5 \mu\text{W}/\text{MHz}$ ($\approx -26 \text{ dBm}$)
2. 2387 MHz ~ 2400 MHz : Equal or less than $25 \mu\text{W}/\text{MHz}$ ($\approx -16 \text{ dBm}$)
3. 2483.5 MHz ~ 2496.5 MHz : Equal or less than $25 \mu\text{W}/\text{MHz}$ ($\approx -16 \text{ dBm}$)
4. More than 2496.5 MHz : Equal or less than $2.5 \mu\text{W}/\text{MHz}$ ($\approx -26 \text{ dBm}$)

Test results

Mode: BLE 1Mbps

Test item: Less than 2387 MHz

Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Level (dBm)	Verdict
90	DC 4.50	2 402	2 274.36	-55.04	Pass
		2 442	142.64	-60.90	Pass
		2 480	142.64	-61.58	Pass
100	DC 5.00	2 402	142.64	-61.10	Pass
		2 442	142.34	-61.38	Pass
		2 480	142.64	-61.02	Pass
110	DC 5.50	2 402	142.64	-60.98	Pass
		2 442	142.64	-61.64	Pass
		2 480	146.00	-60.45	Pass

Mode: BLE 1Mbps

Test item: 2387 MHz ~ 2400 MHz

Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Level (dBm)	Verdict
90	DC 4.50	2 402	2 399.99	-38.17	Pass
		2 442	2 393.27	-67.38	Pass
		2 480	2 392.36	-65.83	Pass
100	DC 5.00	2 402	2 399.99	-38.17	Pass
		2 442	2 398.41	-66.52	Pass
		2 480	2 394.53	-65.91	Pass
110	DC 5.50	2 402	2 399.99	-38.32	Pass
		2 442	2 393.89	-66.34	Pass
		2 480	2 393.87	-66.07	Pass

Mode: BLE 1Mbps

Test item: 2483.5 MHz ~ 2496.5 MHz

Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Level (dBm)	Verdict
90	DC 4.50	2 402	2 486.75	-63.51	Pass
		2 442	2 491.24	-65.91	Pass
		2 480	2 483.51	-50.46	Pass
100	DC 5.00	2 402	2 487.39	-64.05	Pass
		2 442	2 484.11	-65.16	Pass
		2 480	2 483.53	-51.13	Pass
110	DC 5.50	2 402	2 487.31	-64.31	Pass
		2 442	2 484.92	-66.02	Pass
		2 480	2 483.62	-50.56	Pass

Mode: BLE 1Mbps

Test item: More than 2496.5 MHz

Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Level (dBm)	Verdict
90	DC 4.50	2 402	2 530.47	-60.38	Pass
		2 442	4 884.17	-61.62	Pass
		2 480	4 959.99	-60.71	Pass
100	DC 5.00	2 402	6 572.88	-63.63	Pass
		2 442	4 884.17	-62.59	Pass
		2 480	4 960.31	-59.94	Pass
110	DC 5.50	2 402	12 012.87	-62.37	Pass
		2 442	4 888.76	-61.62	Pass
		2 480	4 959.66	-60.58	Pass

Mode: BLE 2Mbps

Test item: Less than 2387 MHz

Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Level (dBm)	Verdict
90	DC 4.50	2 402	2 274.36	-61.57	Pass
		2 442	146.00	-62.12	Pass
		2 480	142.34	-61.73	Pass
100	DC 5.00	2 402	142.64	-61.50	Pass
		2 442	142.34	-61.41	Pass
		2 480	142.34	-62.57	Pass
110	DC 5.50	2 402	2 274.36	-61.02	Pass
		2 442	146.00	-61.87	Pass
		2 480	146.00	-60.90	Pass

Mode: BLE 2Mbps

Test item: 2387 MHz ~ 2400 MHz

Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Level (dBm)	Verdict
90	DC 4.50	2 402	2 399.93	-45.05	Pass
		2 442	2 389.12	-67.47	Pass
		2 480	2 394.74	-66.27	Pass
100	DC 5.00	2 402	2 399.94	-44.70	Pass
		2 442	2 387.55	-67.30	Pass
		2 480	2 396.04	-66.58	Pass
110	DC 5.50	2 402	2 399.95	-45.05	Pass
		2 442	2 392.34	-66.16	Pass
		2 480	2 391.90	-65.79	Pass

Mode: BLE 2Mbps

Test item: 2483.5 MHz ~ 2496.5 MHz

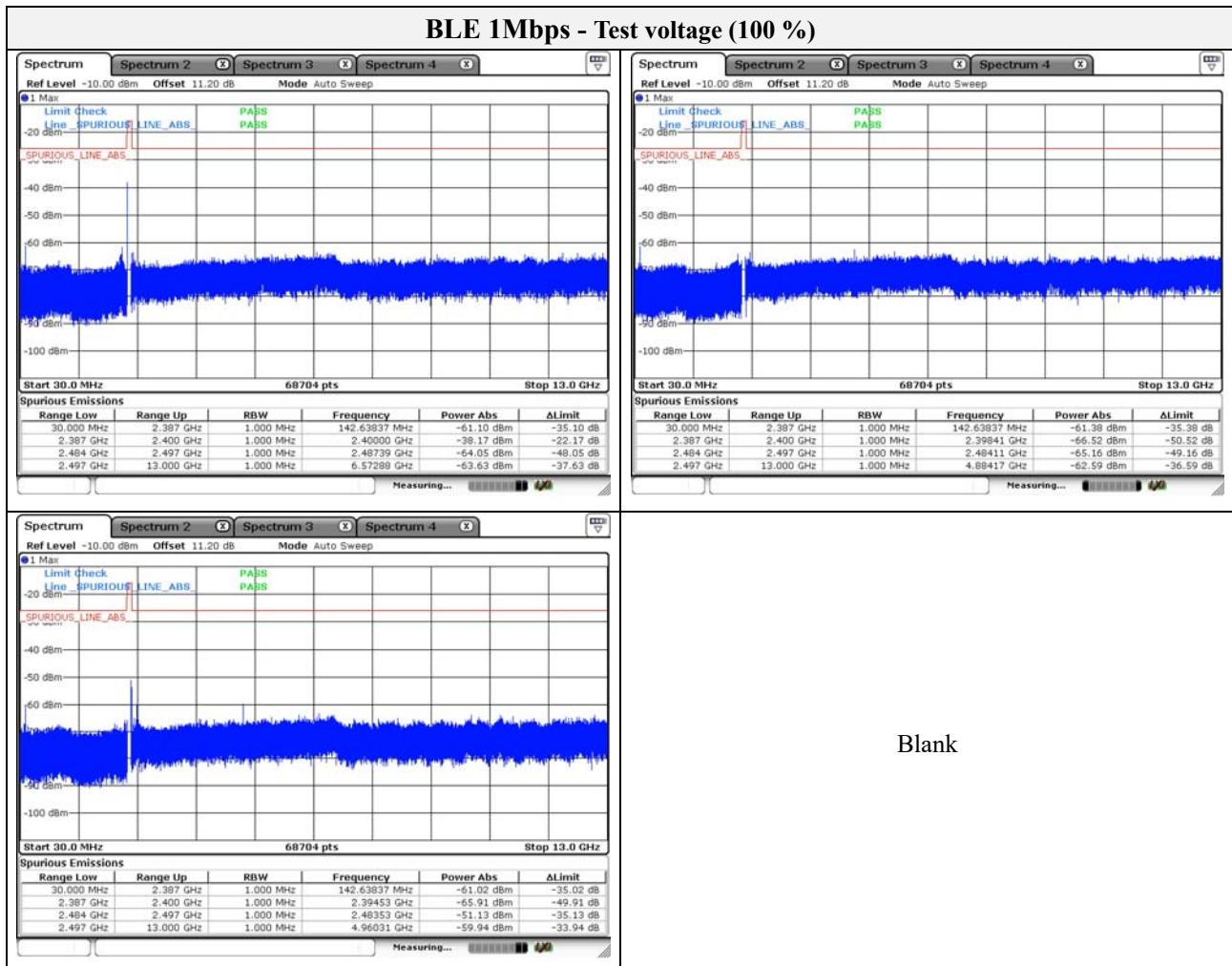
Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Level (dBm)	Verdict
90	DC 4.50	2 402	2 487.66	-64.51	Pass
		2 442	2 485.70	-65.72	Pass
		2 480	2 483.52	-49.54	Pass
100	DC 5.00	2 402	2 488.30	-64.03	Pass
		2 442	2 493.70	-66.32	Pass
		2 480	2 483.52	-49.86	Pass
110	DC 5.50	2 402	2 489.72	-64.60	Pass
		2 442	2 485.76	-65.63	Pass
		2 480	2 483.56	-49.61	Pass

Mode: BLE 2Mbps

Test item: More than 2496.5 MHz

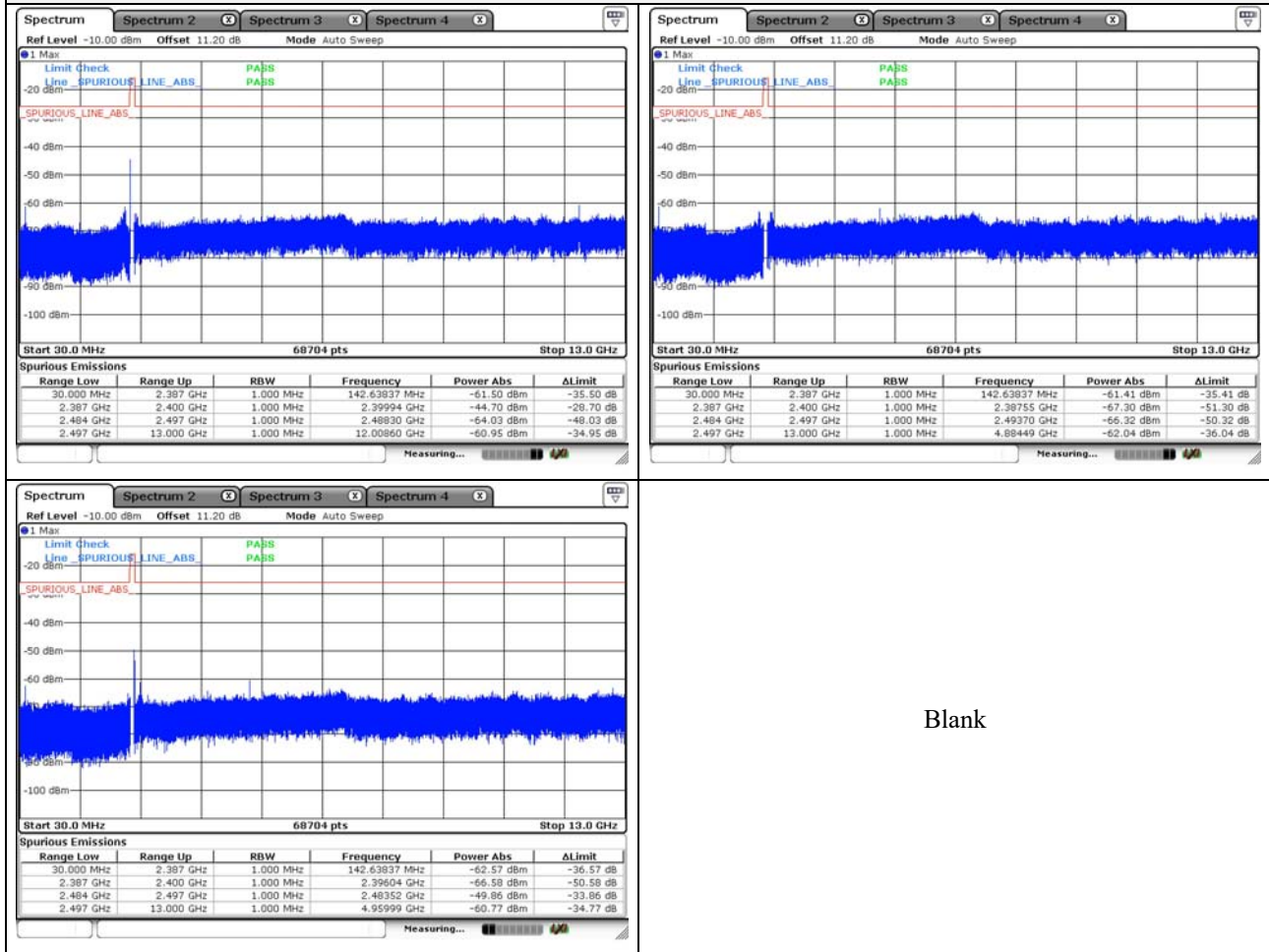
Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Level (dBm)	Verdict
90	DC 4.50	2 402	12 009.26	-60.85	Pass
		2 442	2 570.19	-61.93	Pass
		2 480	4 959.66	-60.32	Pass
100	DC 5.00	2 402	12 008.60	-60.95	Pass
		2 442	4 884.49	-62.04	Pass
		2 480	4 959.99	-60.77	Pass
110	DC 5.50	2 402	12 011.22	-60.73	Pass
		2 442	4 883.84	-61.74	Pass
		2 480	2 608.26	-57.28	Pass

Test plots



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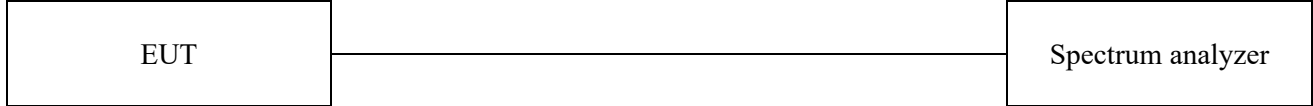
BLE 2Mbps - Test voltage (100 %)



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3.6. Secondary radiated emissions

Test setup



Limit

1. Less than 1GHz : Equal or less than 4 nW(≒ -53.97 dBm)
2. 1GHz ~ less than 12.75 GHz : Equal or less than 20 nW(≒ -46.98 dBm)

Test results

Mode: BLE 1Mbps

Test item: Less than ~ 1 GHz

Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Level (dBm)	Verdict
90	DC 4.50	2 402	144.16	-67.92	Pass
		2 442	144.16	-67.88	Pass
		2 480	144.16	-68.20	Pass
100	DC 5.00	2 402	144.16	-68.04	Pass
		2 442	144.16	-68.85	Pass
		2 480	144.16	-67.90	Pass
110	DC 5.50	2 402	144.16	-67.99	Pass
		2 442	144.16	-67.88	Pass
		2 480	144.16	-66.78	Pass

Mode: BLE 1Mbps

Test item: 1 GHz ~ less than 12.75 GHz

Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Level (dBm)	Verdict
90	DC 4.50	2 402	2417.15	-56.05	Pass
		2 442	2417.15	-55.34	Pass
		2 480	2417.15	-52.15	Pass
100	DC 5.00	2 402	6952.01	-64.22	Pass
		2 442	2417.15	-56.08	Pass
		2 480	2447.14	-54.32	Pass
110	DC 5.50	2 402	2417.15	-56.26	Pass
		2 442	2417.15	-55.00	Pass
		2 480	2414.15	-55.69	Pass

Mode: BLE 2Mbps

Test item: Less than ~ 1 GHz

Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Level (dBm)	Verdict
90	DC 4.50	2 402	192.59	-68.50	Pass
		2 442	192.59	-67.88	Pass
		2 480	192.56	-68.29	Pass
100	DC 5.00	2 402	192.59	-67.10	Pass
		2 442	192.59	-68.51	Pass
		2 480	144.16	-68.99	Pass
110	DC 5.50	2 402	144.16	-67.81	Pass
		2 442	192.56	-68.69	Pass
		2 480	192.59	-67.84	Pass

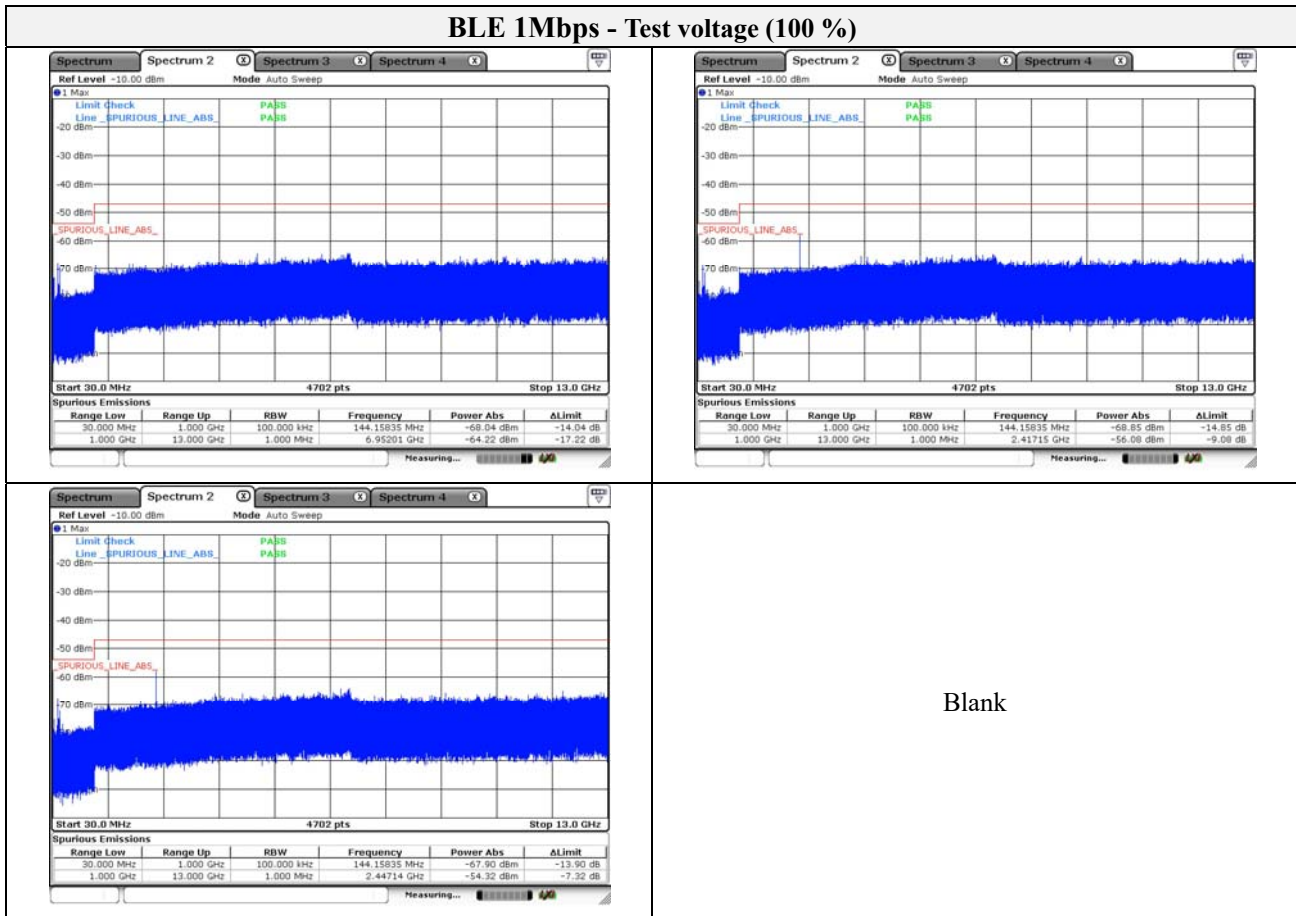
Mode: BLE 2Mbps

Test item: 1 GHz ~ less than 12.75 GHz

Test voltage (%)	Nominal Voltage (V)	Frequency (MHz)	Measure frequency (MHz)	Level (dBm)	Verdict
90	DC 4.50	2 402	2 450.14	-60.27	Pass
		2 442	2 417.15	-60.19	Pass
		2 480	12 680.58	-64.96	Pass
100	DC 5.00	2 402	4 957.51	-60.74	Pass
		2 442	4 882.53	-61.73	Pass
		2 480	4 801.55	-64.19	Pass
110	DC 5.50	2 402	4 957.51	-60.53	Pass
		2 442	4 882.53	-62.34	Pass
		2 480	6 187.20	-64.76	Pass

Test plots

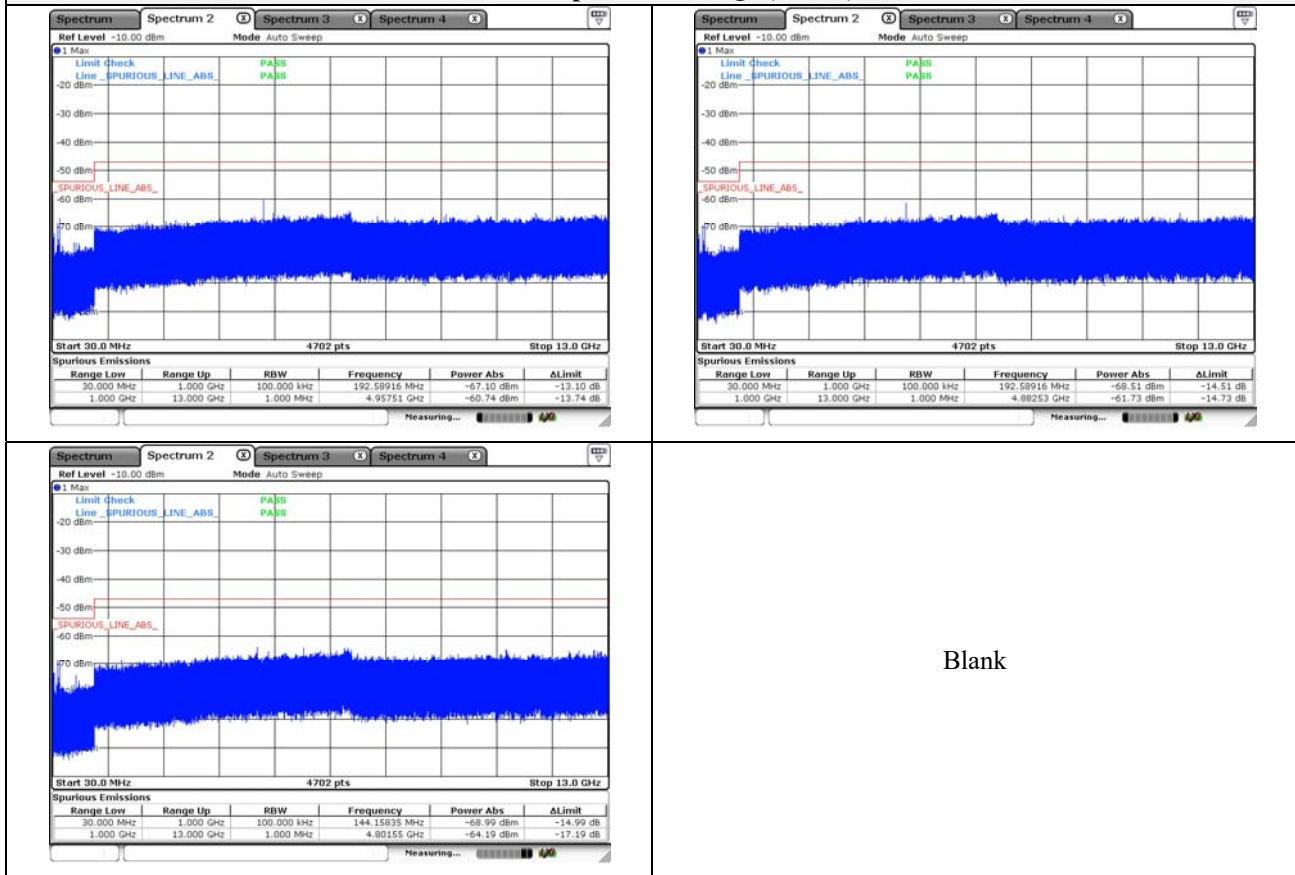
BLE 1Mbps - Test voltage (100 %)



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Mode: BLE

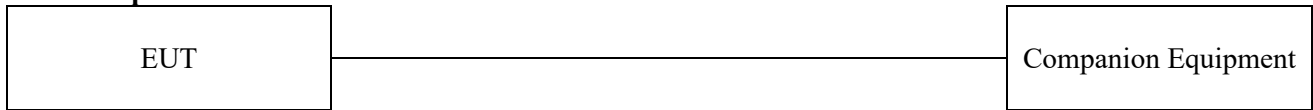
BLE 2Mbps - Test voltage (100 %)



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3.6. Interference prevention function

Test setup



Limit

The identification code shall be 48 bits long.

Test results

Test voltage (%)	Nominal Voltage (V)	Mode	Identification code	Verdict
100	DC 5.00	BLE	4E:1A:0F:5A:12:9E	Pass

Appendix A. Measurement equipment

Equipment 24-2 paragraph4 「ハ」	Manufacturer	Model	Serial No.	Calibration Interval	Calibration Lab	Calibration due.
Spectrum Analyzer	R&S	FSV30	101389	1 year	HCT	2022.01.14
Signal Generator	ANRITSU	68369B	992113	1 year	HCT	2022.01.15
Power Meter	Anritsu	ML2495A	1438001	1 year	HCT	2022.01.14
Pulse Power Sensor	Anritsu	MA2411B	1339205	1 year	HCT	2022.01.14
Attenuator	KEYSIGHT	8493C	82506	1 year	HCT	2022.01.15
DC Power Supply	Agilent	6632B	MY43004114	1 year	MICRO PRECISION	2021.06.22
Frequency Counter	HP	5352B	3049A01336	1 year	HCT	2022.01.16

Peripheral devices

Device	Manufacturer	Model No.	Serial No.
Notebook computer	LG Electronics Inc.,	15ND530-GX50K	311QCFT567147

The end of test report.