中认信通
CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)

ACCREDITED
TESTING LABORATORY
CERTIFICATE # 6356.01

TEST REPORT

Applicant: **Signify (China) Investment Co., Ltd**

Address: Building no.9, Lane 888, Tianlin Road, Minhang District Shanghai, 200233 China

FCC ID: **2AGBW9290036666X**

Product Name: **LED lamp**

Standard(s): **47 CFR Part 15, Subpart C (15.247)**
ANSI C63.10-2013
KDB 558074 D01 15.247 Meas Guidance v05r02

The above device has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: **CR231058894-00**

Date Of Issue: **2023/11/14**

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Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 442868, the FCC Designation No. : CN1314.

Declarations

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	CR231058894-00	Original Report	2023/11/14

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	LED lamp
EUT Model:	9290036666
Operation Frequency:	2402-2480MHz(BLE) 2405-2480MHz(ZigBee)
Maximum Peak Output Power (Conducted):	10.64dBm(BLE) 10.58dBm(ZigBee)
Modulation Type:	GFSK(BLE) O-QPSK(ZigBee)
Rated Input Voltage:	110-130Vac, 50/60Hz
Serial Number:	2C3R-1(for AC Line Conducted Emission Test and Radiated Spurious Emissions Test) 2C3R-3(for RF Conducted Test)
EUT Received Date:	2023/10/13
EUT Received Status:	Good

Operation Frequency Detail:
For BLE:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

Per section 15.31(m), the below frequencies were performed the test as below:

Test Channel	Frequency (MHz)
Lowest	2402
Middle	2440
Highest	2480

For ZigBee:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	**2405**	19	2445
12	2410	20	2450
13	2415	21	2455
14	2420	22	2460
15	2425	23	2465
16	2430	24	2470
17	2435	25	2475
18	**2440**	26	**2480**

Per section 15.31(m), the below frequencies were performed the test as below:

Test Channel	Frequency (MHz)
Lowest	2405
Middle	2440
Highest	2480

Antenna Information Detail▲:

Antenna Type	Antenna Gain
PCB	0.7dBi

The Method of §15.203 Compliance:

☒Antenna was permanently attached to the unit.

☐Antenna use a unique type of connector to attach to the EUT.

☐Unit was professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Accessory Information:

Accessory Description	Manufacturer	Model
/	/	/

1.2 Description of Test Configuration

1.2.1 EUT Operation Condition:

EUT Operation Mode:	The system was configured for testing in Engineering Mode, which was provided by the manufacturer.
Equipment Modifications:	No
EUT Exercise Software:	Hue Approbation Tool.exe

The software was provided by manufacturer. The maximum power was configured as below, that was provided by the manufacturer▲:

Test Modes	Power Level Setting		
	Lowest Channel	Middle Channel	Highest Channel
BLE 125kbps	10	10	10
BLE 500kbps	10	10	10
BLE 1Mbps	10	10	10
BLE 2Mbps	10	10	10
ZigBee	10	10	10

1.2.2 Support Equipment List and Details

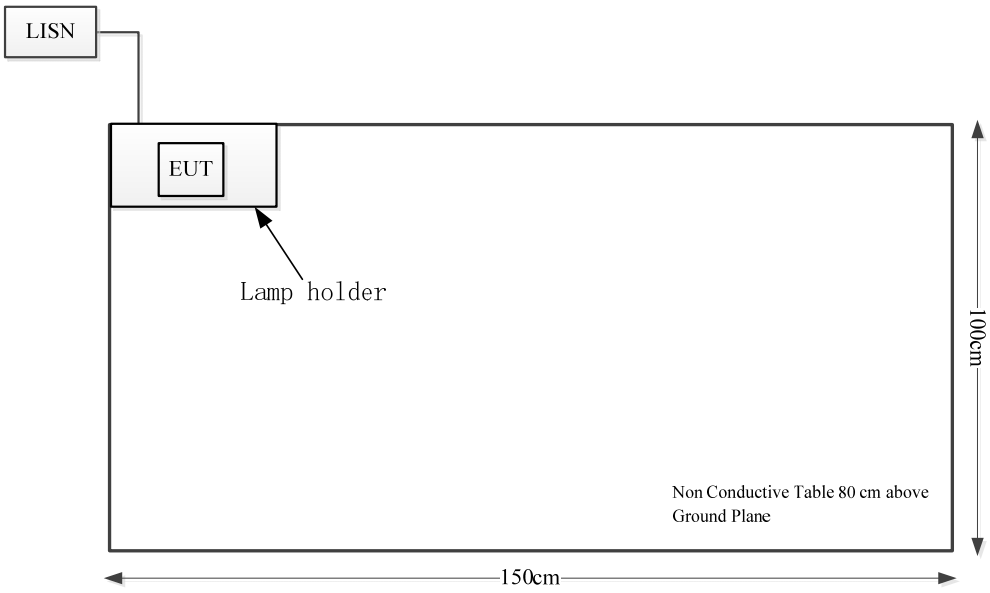
Manufacturer	Description	Model	Serial Number
BULL	Lamp holder	Unknown	Unknown

1.2.3 Support Cable List and Details

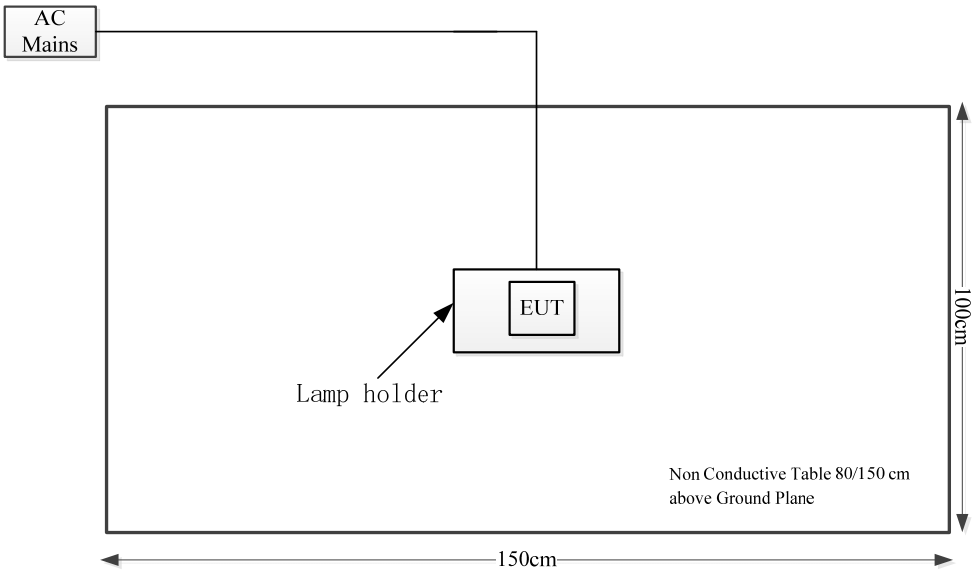
Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Power Cable	No	No	1.2	Lamp holder	LISN

1.2.4 Block Diagram of Test Setup

AC line conducted emissions:



Radiated Spurious Emissions:



1.3 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	9kHz~30MHz: 4.12 dB 30M~200MHz: 4.15 dB,200M~1GHz: 5.61 dB,1G~6GHz: 5.14 dB, 6G~18GHz: 5.93 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions, conducted	±1.26 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	2.8 dB (150 kHz to 30 MHz)

2. SUMMARY OF TEST RESULTS

Standard(s) Section	Test Items	Result
§15.207(a)	AC line conducted emissions	Compliant
§15.205, §15.209, §15.247(d)	Radiated Spurious Emissions	Compliant
§15.247 (a)(2)	Minimum 6 dB Bandwidth	Compliant
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.203	Antenna Requirement	Compliant
FCC§15.247 (i) & §1.1307& §2.1091	RF Exposure Evaluation	Compliant

3. REQUIREMENTS AND TEST PROCEDURES

3.1 AC Line Conducted Emissions

3.1.1 Applicable Standard

FCC§15.207(a).

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

	Conducted limit (dBµV)	
Frequency of emission (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

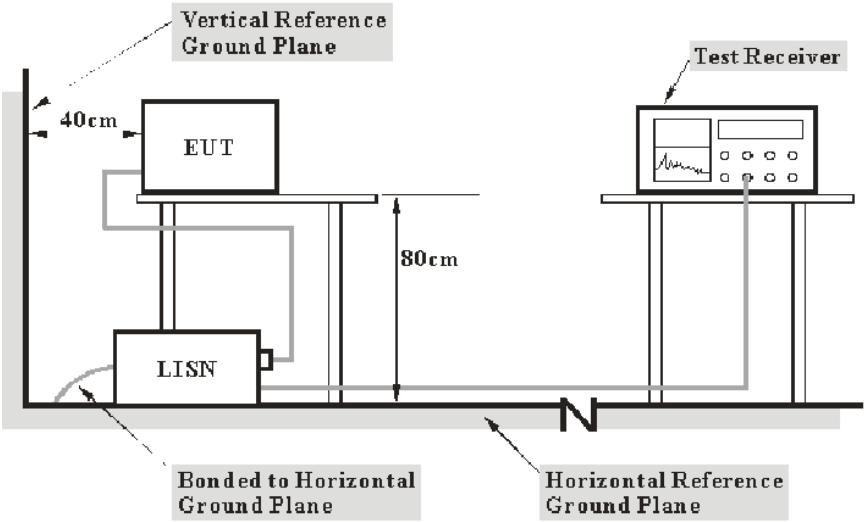
(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 µV within the frequency band 535-1705 kHz, as measured using a 50 µH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtainig their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

3.1.2 EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

3.1.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

3.1.4 Test Procedure

The frequency and amplitude of the six highest ac power-line conducted emissions relative to the limit, measured over all the current-carrying conductors of the EUT power cords, and the operating frequency or frequency to which the EUT is tuned (if appropriate), should be reported, unless such emissions are more than 20 dB below the limit. AC power-line conducted emissions measurements are to be separately carried out only on each of the phase ("hot") line(s) and (if used) on the neutral line(s), but not on the ground [protective earth] line(s). If less than six emission frequencies are within 20 dB of the limit, then the noise level of the measuring instrument at representative frequencies should be reported. The specific conductor of the power-line cord for each of the reported emissions should be identified. Measure the six highest emissions with respect to the limit on each current-carrying conductor of each power cord associated with the EUT (but not the power cords of associated or peripheral equipment that are part of the test configuration). Then, report the six highest emissions with respect to the limit from among all the measurements identifying the frequency and specific current-carrying conductor identified with the emission. The six highest emissions should be reported for each of the current-carrying conductors, or the six highest emissions may be reported over all the current-carrying conductors.

3.1.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor
Factor = attenuation caused by cable loss + voltage division factor of AMN

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

3.2 Radiation Spurious Emissions

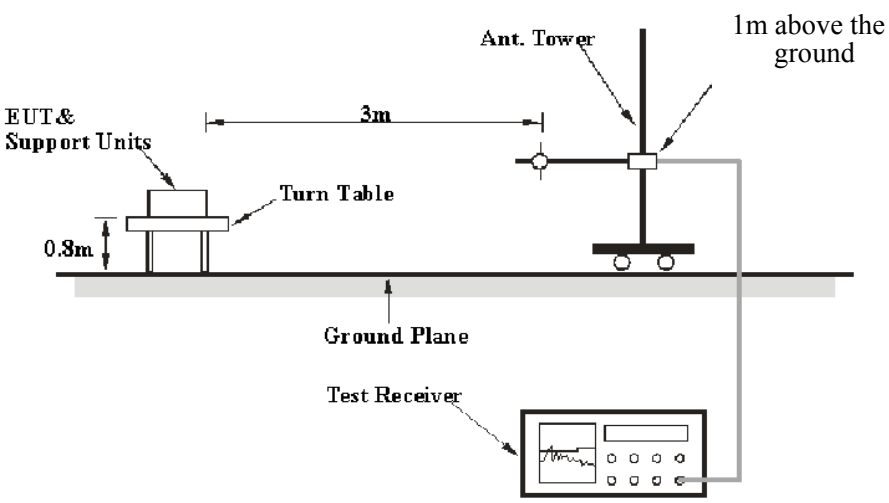
3.2.1 Applicable Standard

FCC §15.247 (d);

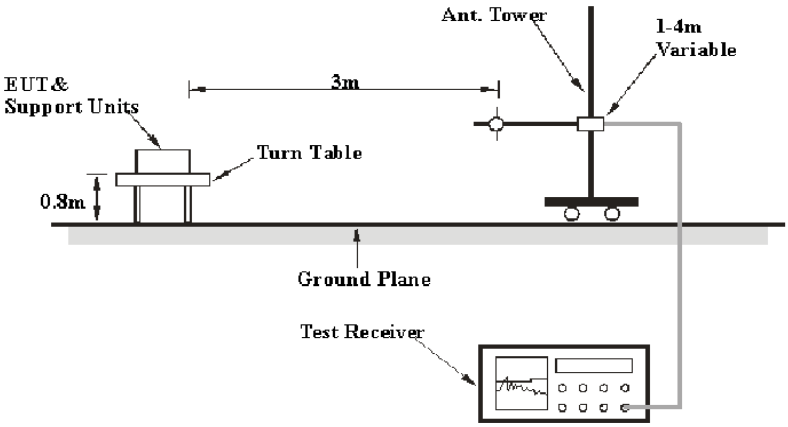
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

3.2.2 EUT Setup

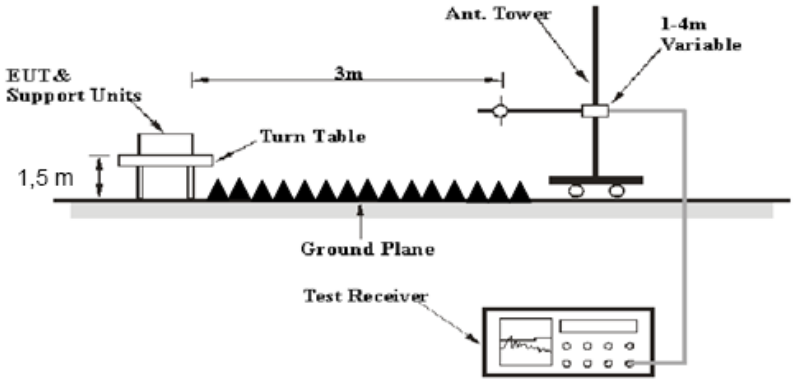
9kHz-30MHz:



30MHz-1GHz:



Above 1GHz:



The radiated emissions were performed in the 3 meters distance, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

For 9kHz-30MHz test, the lowest height of the magnetic antenna shall be 1 m above the ground and three antenna orientations (parallel, perpendicular, and ground-parallel) shall be measured.

3.2.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

9 kHz-1000 MHz

Frequency Range	RBW	Video B/W	IF B/W	Measurement
9 kHz – 150 kHz	300 Hz	1 kHz	/	PK
	/	/	200 Hz	QP/AV
150 kHz – 30 MHz	10 kHz	30 kHz	/	PK
	/	/	9 kHz	QP/AV
30 MHz – 1000 MHz	100 kHz	300 kHz	/	PK
	/	/	120 kHz	QP

1GHz- 25GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
Ave.	>98%	1MHz	10 Hz
	<98%	1MHz	≥1/T

Note: T is minimum transmission duration

If the maximized peak measured value is under the QP/Average limit by more than 6dB, then it is unnecessary to perform an QP/Average measurement.

The spurious emissions which below the limit more than 20dB was not be recorded.

3.2.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 9 kHz-1 GHz except 9–90 kHz, 110–490 kHz, employing an average detector, peak and Average detection modes for frequencies above 1 GHz.

All emissions under the average limit and under the noise floor have not recorded in the report.

3.2.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor
Factor = Antenna Factor + Cable Loss- Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

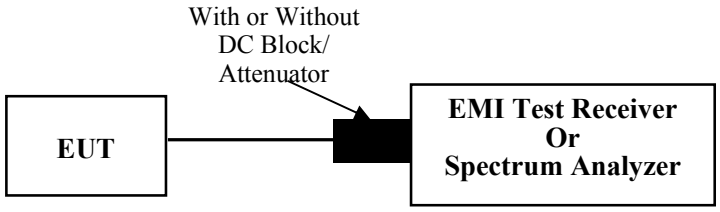
3.3 Minimum 6 dB Bandwidth

3.3.1 Applicable Standard

FCC §15.247 (a)(2)

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

3.3.2 EUT Setup



3.3.3 Test Procedure

According to ANSI C63.10-2013 Section 11.8

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

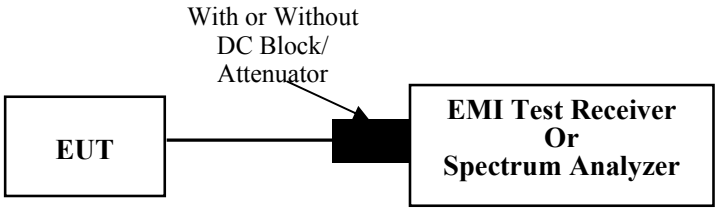
3.4 Maximum Conducted Output Power

3.4.1 Applicable Standard

FCC §15.247 (b)(3)

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

3.4.2 EUT Setup



3.4.3 Test Procedure

According to ANSI C63.10-2013 Section 11.9.1.1

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:
a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ [3 × RBW].
c) Set span ≥ [3 × RBW].
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

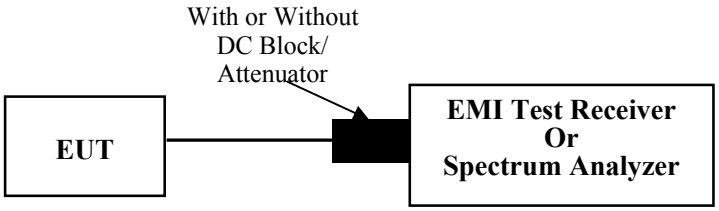
3.5 Maximum power spectral density

3.5.1 Applicable Standard

FCC §15.247 (e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

3.5.2 EUT Setup



3.5.3 Test Procedure

According to ANSI C63.10-2013 Section 11.10.2

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

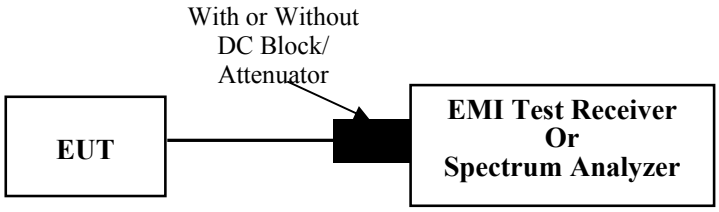
3.6 100 kHz Bandwidth of Frequency Band Edge

3.6.1 Applicable Standard

FCC §15.247 (d);

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

3.6.2 EUT Setup



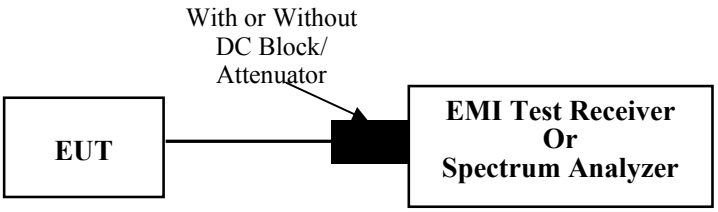
3.6.3 Test Procedure

According to ANSI C63.10-2013 Section 11.11

a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

3.7 Duty Cycle

3.7.1 EUT Setup



3.7.2 Test Procedure

According to ANSI C63.10-2013 Section 11.6

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:
1) Set the center frequency of the instrument to the center frequency of the transmission.
2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.
3) Set VBW ≥ RBW. Set detector = peak or average.
4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if T ≤ 16.7 μs.)

3.8 Antenna Requirement

3.8.1 Applicable Standard

FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

3.8.2 Judgment

Compliant. Please refer to the Antenna Information detail in Section 1.

4. Test DATA AND RESULTS

4.1 AC Line Conducted Emissions

Serial Number:	2C3R-1	Test Date:	2023/11/07
Test Site:	CE	Test Mode:	Transmitting
Tester:	David Huang	Test Result:	Pass

Environmental Conditions:

Temperature: (℃)	25.5	Relative Humidity: (%)	52	ATM Pressure: (kPa)	101

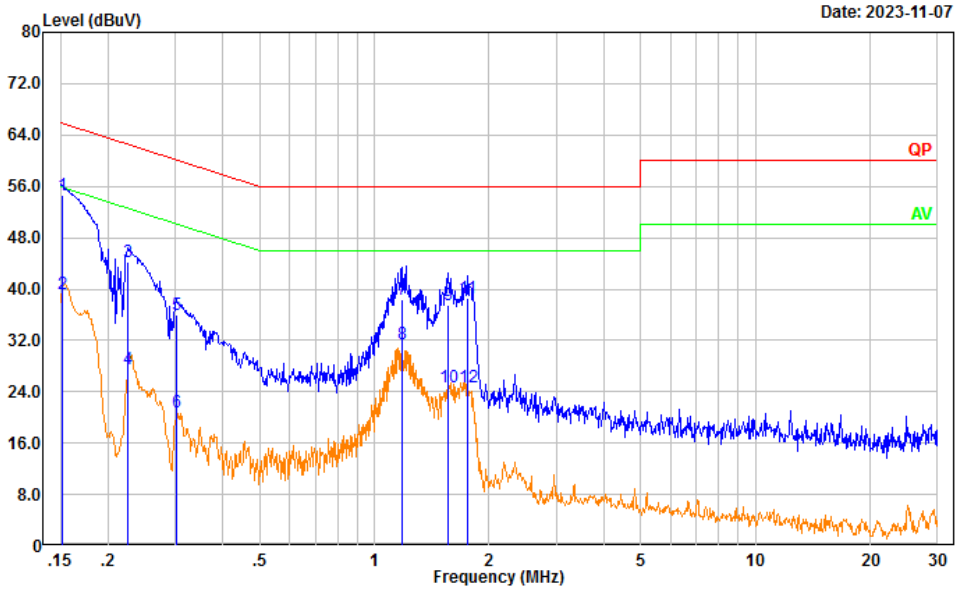
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	LISN	ENV216	101134	2023/03/31	2024/03/30
R&S	EMI Test Receiver	ESR3	102726	2023/03/31	2024/03/30
MICRO-COAX	Coaxial Cable	UTIFLEX	C-0200-01	2023/08/06	2024/08/05
Audix	Test Software	E3	190306 (V9)	N/A	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

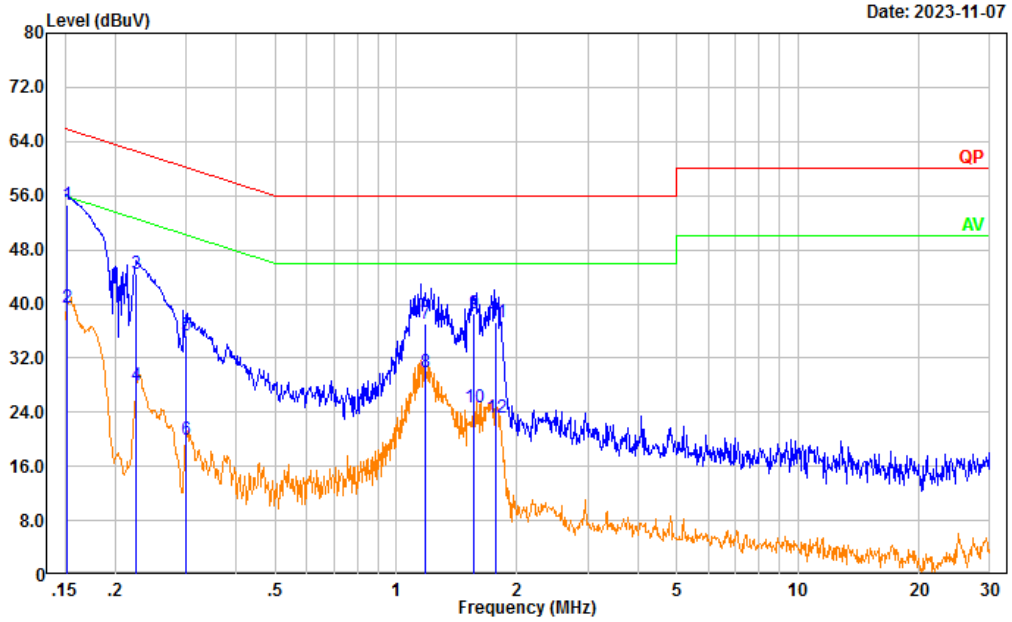
BLE(maximum output power mode, 1Mbps low channel):

Project No.: CR231058894-RF
Tester: David Huang
Port: Line
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.151	45.02	9.61	54.63	65.92	11.29	QP
2	0.151	29.64	9.61	39.25	55.92	16.67	Average
3	0.226	34.65	9.61	44.26	62.61	18.35	QP
4	0.226	17.85	9.61	27.46	52.61	25.15	Average
5	0.301	26.48	9.61	36.09	60.20	24.11	QP
6	0.301	11.15	9.61	20.76	50.20	29.44	Average
7	1.179	28.70	9.62	38.32	56.00	17.68	QP
8	1.179	21.77	9.62	31.39	46.00	14.61	Average
9	1.561	27.98	9.63	37.61	56.00	18.39	QP
10	1.561	15.17	9.63	24.80	46.00	21.20	Average
11	1.752	28.94	9.63	38.57	56.00	17.43	QP
12	1.752	15.13	9.63	24.76	46.00	21.24	Average

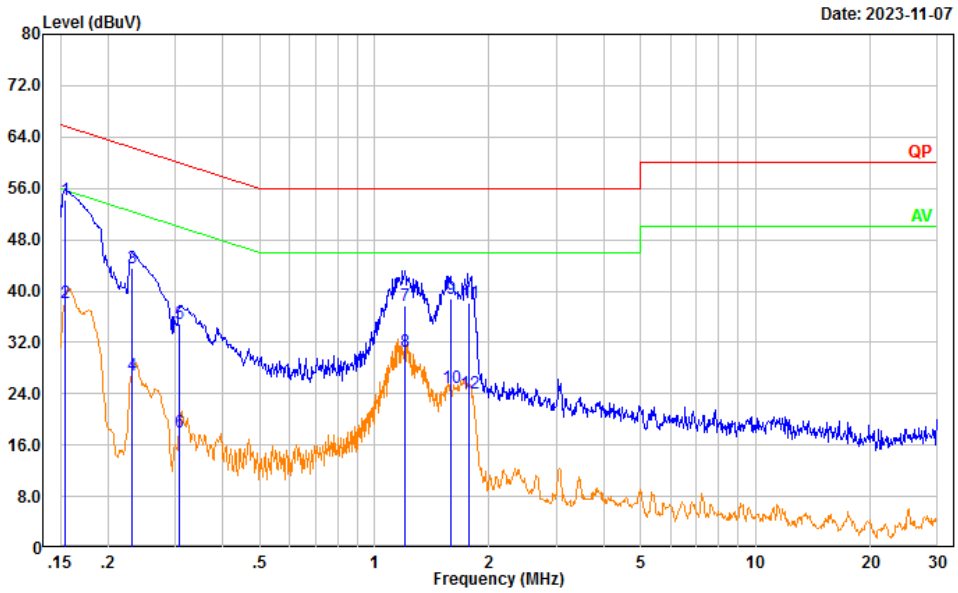
Project No.: CR231058894-RF
Tester: David Huang
Port: neutral
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.151	45.04	9.61	54.65	65.92	11.27	QP
2	0.151	29.88	9.61	39.49	55.92	16.43	Average
3	0.226	34.88	9.61	44.49	62.59	18.10	QP
4	0.226	18.27	9.61	27.88	52.59	24.71	Average
5	0.301	25.73	9.61	35.34	60.21	24.87	QP
6	0.301	10.34	9.61	19.95	50.21	30.26	Average
7	1.179	27.43	9.62	37.05	56.00	18.95	QP
8	1.179	20.27	9.62	29.89	46.00	16.11	Average
9	1.561	29.04	9.63	38.67	56.00	17.33	QP
10	1.561	15.11	9.63	24.74	46.00	21.26	Average
11	1.775	27.74	9.63	37.37	56.00	18.63	QP
12	1.775	13.54	9.63	23.17	46.00	22.83	Average

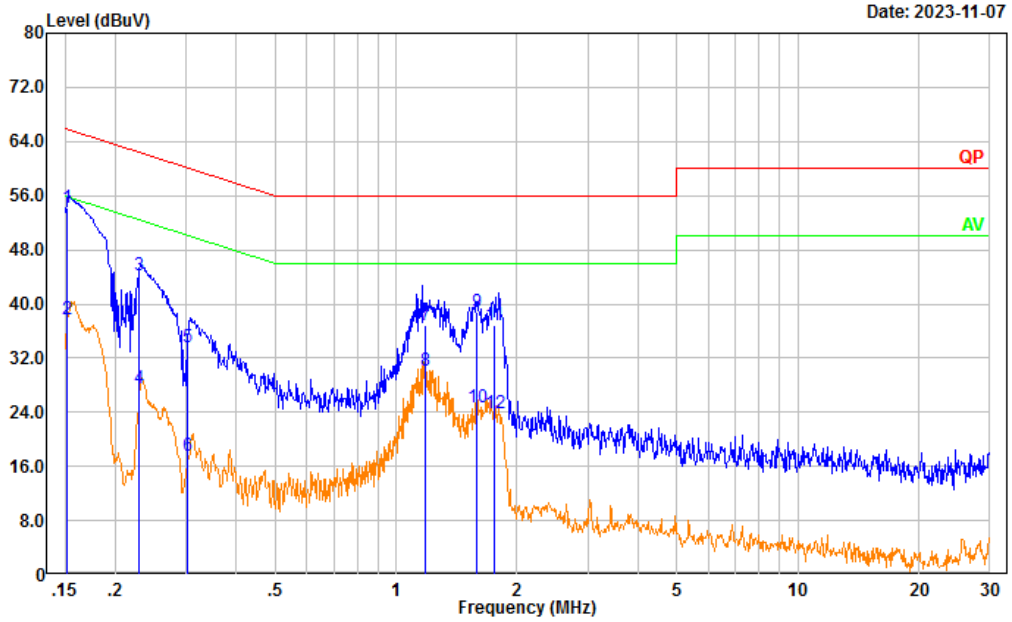
ZigBee(maximum output power mode, low channel):

Project No.: CR231058894-RF
Tester: David Huang
Port: Line
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.154	44.56	9.61	54.17	65.79	11.62	QP
2	0.154	28.60	9.61	38.21	55.79	17.58	Average
3	0.231	33.90	9.61	43.51	62.43	18.92	QP
4	0.231	17.27	9.61	26.88	52.43	25.55	Average
5	0.307	25.32	9.61	34.93	60.04	25.11	QP
6	0.307	8.46	9.61	18.07	50.04	31.97	Average
7	1.202	28.13	9.62	37.75	56.00	18.25	QP
8	1.202	21.03	9.62	30.65	46.00	15.35	Average
9	1.584	29.26	9.63	38.89	56.00	17.11	QP
10	1.584	15.33	9.63	24.96	46.00	21.04	Average
11	1.776	28.53	9.63	38.16	56.00	17.84	QP
12	1.776	14.35	9.63	23.98	46.00	22.02	Average

Project No.: CR231058894-RF
Tester: David Huang
Port: neutral
Note:



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.152	44.52	9.61	54.13	65.88	11.75	QP
2	0.152	28.18	9.61	37.79	55.88	18.09	Average
3	0.229	34.54	9.61	44.15	62.49	18.34	QP
4	0.229	17.97	9.61	27.58	52.49	24.91	Average
5	0.304	24.07	9.61	33.68	60.15	26.47	QP
6	0.304	7.95	9.61	17.56	50.15	32.59	Average
7	1.178	27.33	9.62	36.95	56.00	19.05	QP
8	1.178	20.55	9.62	30.17	46.00	15.83	Average
9	1.584	29.27	9.63	38.90	56.00	17.10	QP
10	1.584	15.15	9.63	24.78	46.00	21.22	Average
11	1.753	27.18	9.63	36.81	56.00	19.19	QP
12	1.753	14.23	9.63	23.86	46.00	22.14	Average

4.2 Radiation Spurious Emissions

Serial Number:	2C3R-1	Test Date:	2023/10/23~2023/11/3
Test Site:	966-1, 966-2	Test Mode:	Transmitting
Tester:	Jeff Luo ,coco Tian	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.8~26.5	Relative Humidity: (%)	54~67	ATM Pressure: (kPa)	100.7~101.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB6	A082520-6	2023/9/18	2026/9/17
BACL	Loop Antenna	1313-1P	3092721	2023/10/20	2026/10/19
R&S	EMI Test Receiver	ESR3	102724	2023/3/31	2024/3/30
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2023/7/16	2024/7/15
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2023/7/16	2024/7/15
Sonoma	Amplifier	310N	186165	2023/7/16	2024/7/15
Audix	Test Software	E3	201021 (V9)	N/A	N/A
AH	Double Ridge Guide Horn Antenna	SAS-571	1394	2023/2/22	2026/2/21
R&S	Spectrum Analyzer	FSV40	101591	2023/3/31	2024/3/30
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2023/8/6	2024/8/5
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2023/8/6	2024/8/5
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2022/11/9	2023/11/8
PASTERNACK	Horn Antenna	PE9852/2F-20	112002	2021/2/5	2024/2/4
Quinstar	Preamplifier	QLW-18405536-JO	15964001005	2023/9/15	2024/9/14
MICRO-COAX	Coaxial Cable	UFB142A-1-2362-200200	235772-001	2023/8/6	2024/8/5
E-Microwave	Band Rejection Filter	2400-2483.5MHz	OE01902424	2023/8/6	2024/8/5
Mini Circuits	High Pass Filter	VHF-6010+	31119	2023/8/6	2024/8/5

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Please refer to the below table and plots.

After pre-scan in the X, Y and Z axes of orientation, the worst case is below:

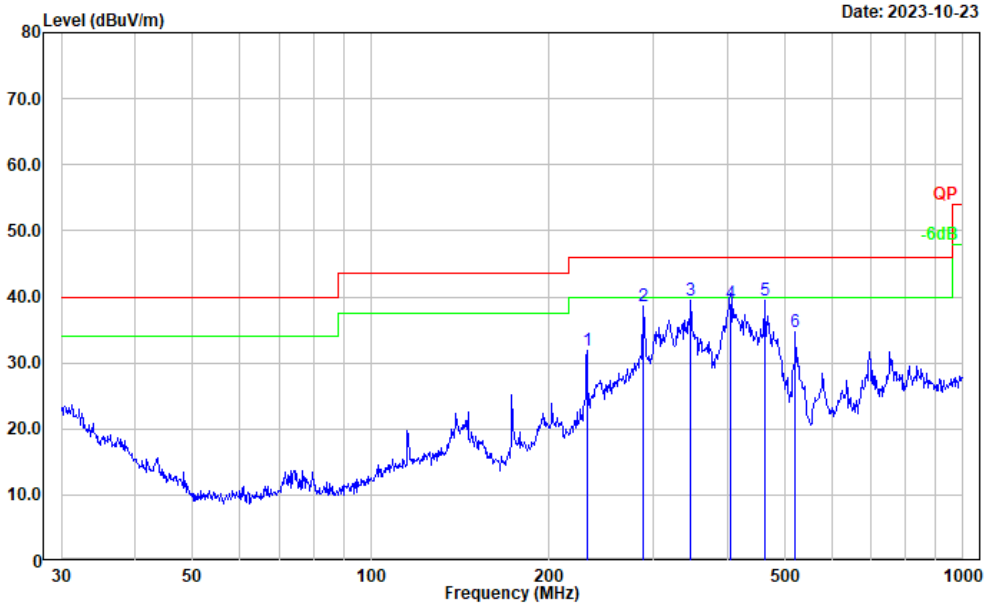
For 9kHz-30MHz, The amplitude of spurious emissions attenuated more than 20 dB below the limit was not be recorded.

1) 30MHz-1GHz

BLE:(Maximum Conducted Output Power Mode 1Mbps)

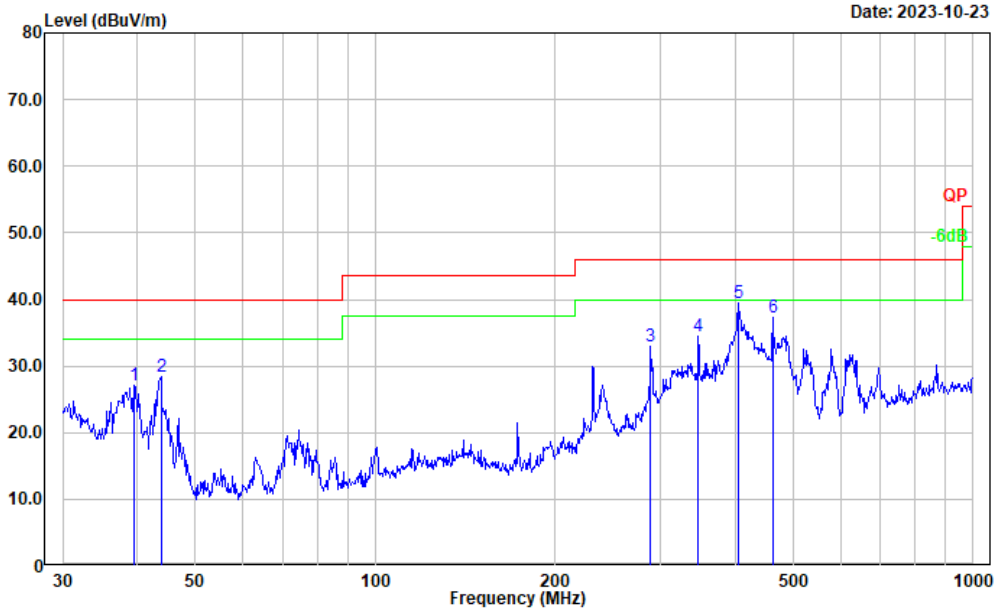
Low Channel:

Project No.: CR231058894-RF
Tester: Jeff Luo
Polarization: horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	231.718	44.84	-13.08	31.76	46.00	14.24	Peak
2	289.002	49.80	-11.12	38.68	46.00	7.32	Peak
3	346.809	49.54	-10.03	39.51	46.00	6.49	Peak
4	404.715	47.61	-8.64	38.97	46.00	7.03	QP
5	462.346	46.09	-6.58	39.51	46.00	6.49	Peak
6	520.888	40.49	-5.85	34.64	46.00	11.36	Peak

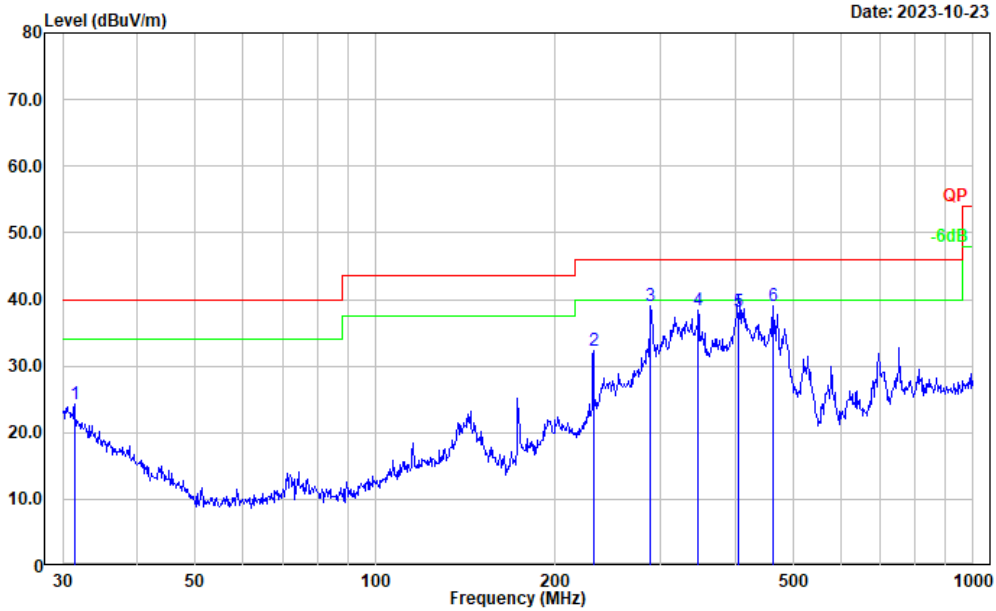
Project No.: CR231058894-RF
Tester: Jeff Luo
Polarization: vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	39.437	38.16	-10.98	27.18	40.00	12.82	Peak
2	43.812	42.06	-13.58	28.48	40.00	11.52	Peak
3	289.002	44.13	-11.12	33.01	46.00	12.99	Peak
4	346.809	44.40	-10.03	34.37	46.00	11.63	Peak
5	404.667	48.15	-8.64	39.51	46.00	6.49	Peak
6	462.346	43.91	-6.58	37.33	46.00	8.67	Peak

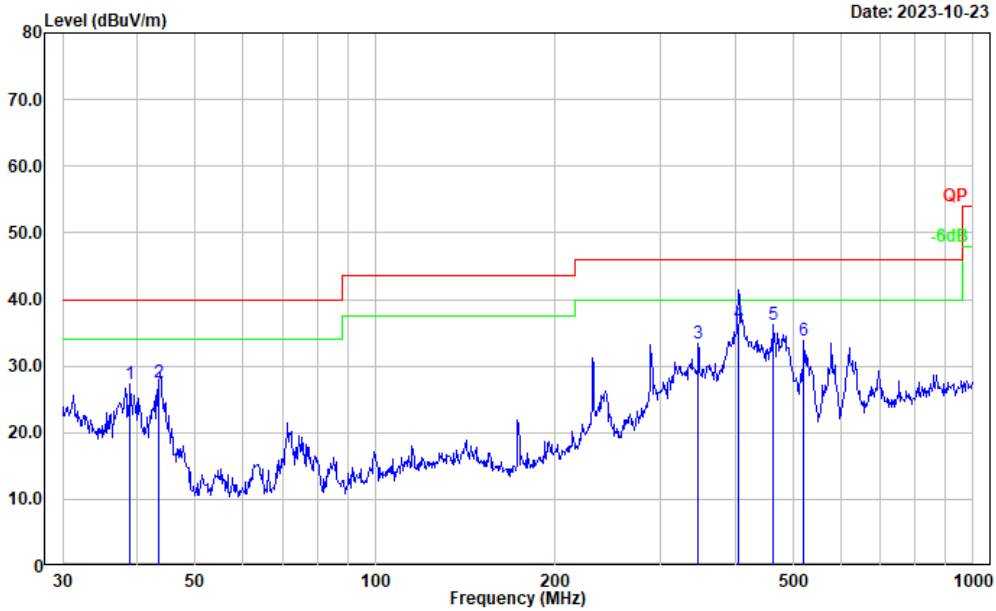
Middle Channel:

Project No.: CR231058894-RF
Tester: Jeff Luo
Polarization: horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	31.399	29.18	-4.86	24.32	40.00	15.68	Peak
2	231.718	45.37	-13.08	32.29	46.00	13.71	Peak
3	289.002	50.18	-11.12	39.06	46.00	6.94	Peak
4	346.809	48.39	-10.03	38.36	46.00	7.64	Peak
5	404.619	46.87	-8.64	38.23	46.00	7.77	QP
6	462.346	45.54	-6.58	38.96	46.00	7.04	Peak

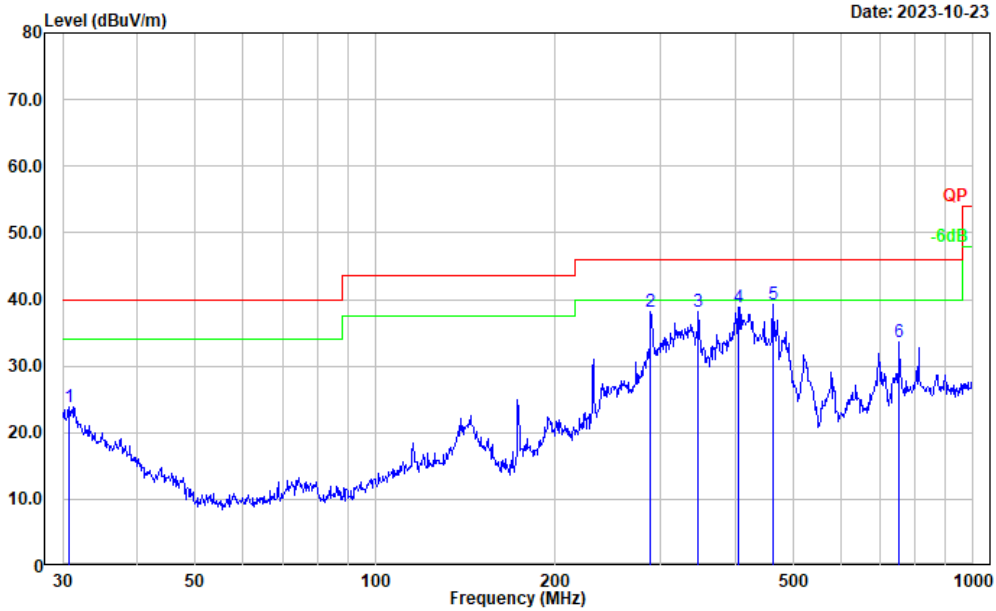
Project No.: CR231058894-RF
Tester: Jeff Luo
Polarization: vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	38.888	37.94	-10.54	27.40	40.00	12.60	Peak
2	43.353	40.83	-13.32	27.51	40.00	12.49	Peak
3	346.809	43.41	-10.03	33.38	46.00	12.62	Peak
4	404.052	45.01	-8.65	36.36	46.00	9.64	QP
5	463.970	42.82	-6.51	36.31	46.00	9.69	Peak
6	520.888	39.58	-5.85	33.73	46.00	12.27	Peak

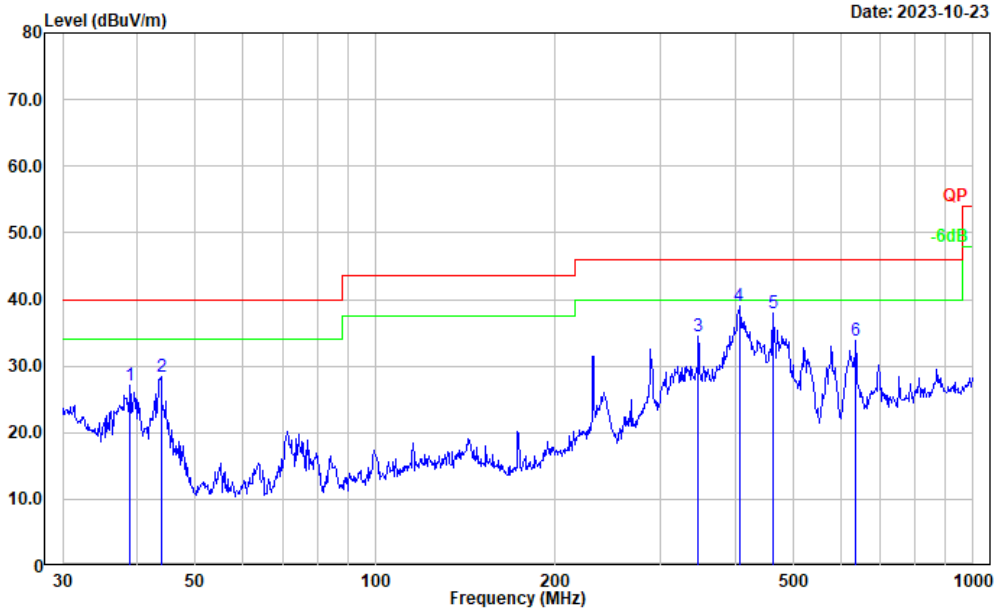
High Channel:

Project No.: CR231058894-RF
Tester: Jeff Luo
Polarization: horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	30.745	28.26	-4.36	23.90	40.00	16.10	Peak
2	289.002	49.26	-11.12	38.14	46.00	7.86	Peak
3	346.809	48.22	-10.03	38.19	46.00	7.81	Peak
4	404.667	47.53	-8.64	38.89	46.00	7.11	Peak
5	462.346	45.78	-6.58	39.20	46.00	6.80	Peak
6	752.743	36.69	-3.09	33.60	46.00	12.40	Peak

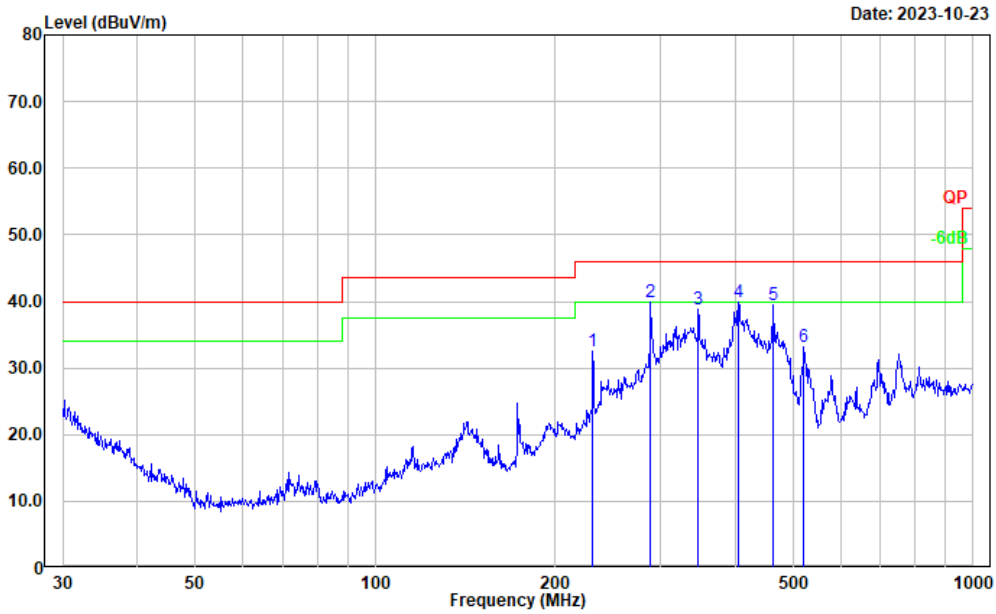
Project No.: CR231058894-RF
Tester: Jeff Luo
Polarization: vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	38.888	37.73	-10.54	27.19	40.00	12.81	Peak
2	43.812	42.00	-13.58	28.42	40.00	11.58	Peak
3	346.809	44.44	-10.03	34.41	46.00	11.59	Peak
4	406.088	47.55	-8.58	38.97	46.00	7.03	Peak
5	463.970	44.40	-6.51	37.89	46.00	8.11	Peak
6	636.134	38.38	-4.56	33.82	46.00	12.18	Peak

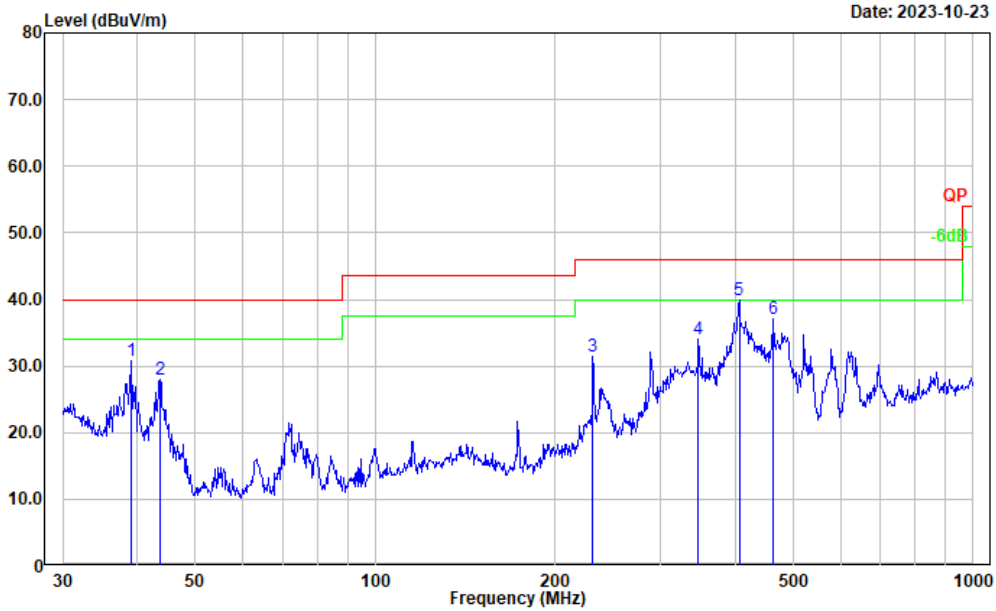
ZigBee
Low Channel:

Project No.: CR231058894-RF
Tester: Jeff Luo
Polarization: horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	230.907	45.58	-13.07	32.51	46.00	13.49	Peak
2	289.002	51.03	-11.12	39.91	46.00	6.09	Peak
3	346.809	48.73	-10.03	38.70	46.00	7.30	Peak
4	404.667	48.54	-8.64	39.90	46.00	6.10	Peak
5	463.970	46.04	-6.51	39.53	46.00	6.47	Peak
6	520.888	39.01	-5.85	33.16	46.00	12.84	Peak

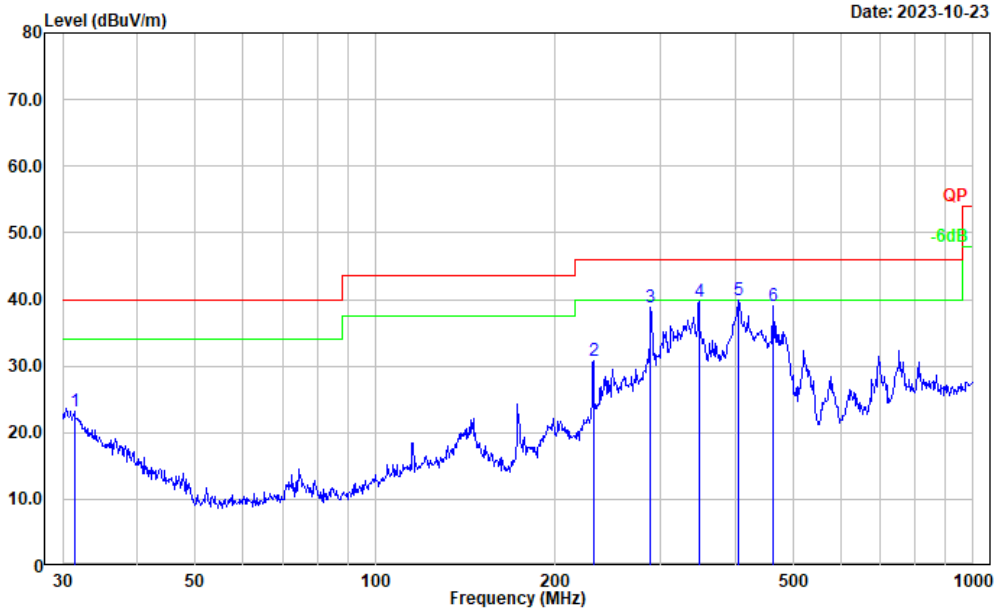
Project No.: CR231058894-RF
Tester: Jeff Luo
Polarization: vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	39.162	41.49	-10.75	30.74	40.00	9.26	Peak
2	43.659	41.40	-13.49	27.91	40.00	12.09	Peak
3	230.907	44.44	-13.07	31.37	46.00	14.63	Peak
4	346.809	44.16	-10.03	34.13	46.00	11.87	Peak
5	406.088	48.46	-8.58	39.88	46.00	6.12	Peak
6	462.346	43.61	-6.58	37.03	46.00	8.97	Peak

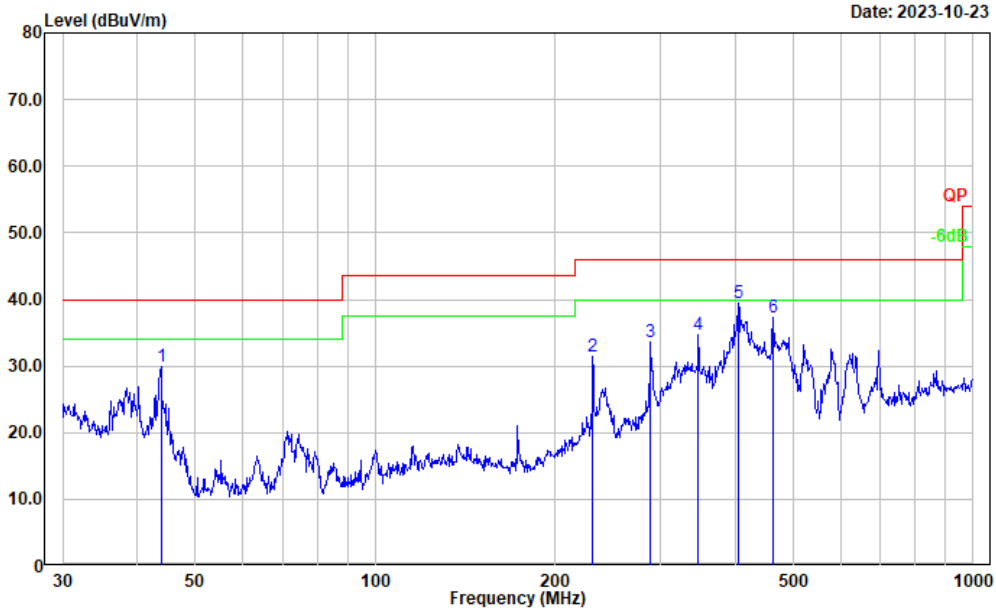
Middle Channel:

Project No.: CR231058894-RF
Tester: Jeff Luo
Polarization: horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	31.399	28.13	-4.86	23.27	40.00	16.73	Peak
2	231.718	43.80	-13.08	30.72	46.00	15.28	Peak
3	289.002	49.83	-11.12	38.71	46.00	7.29	Peak
4	348.027	49.75	-10.03	39.72	46.00	6.28	Peak
5	404.667	48.50	-8.64	39.86	46.00	6.14	Peak
6	463.970	45.48	-6.51	38.97	46.00	7.03	Peak

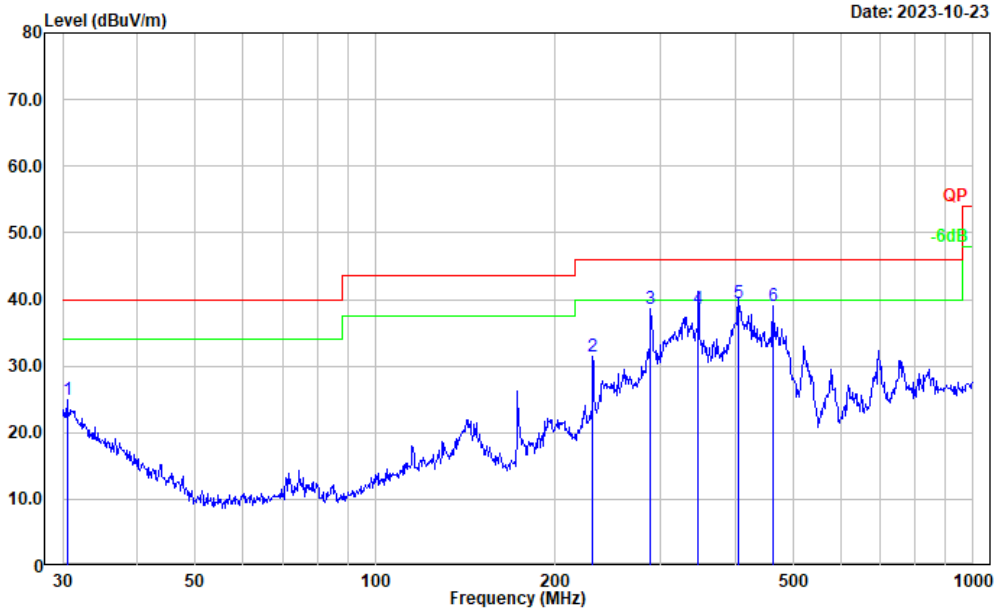
Project No.: CR231058894-RF
Tester: Jeff Luo
Polarization: vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	43.812	43.49	-13.58	29.91	40.00	10.09	Peak
2	230.907	44.42	-13.07	31.35	46.00	14.65	Peak
3	289.002	44.78	-11.12	33.66	46.00	12.34	Peak
4	346.809	44.78	-10.03	34.75	46.00	11.25	Peak
5	404.667	48.18	-8.64	39.54	46.00	6.46	Peak
6	462.346	43.89	-6.58	37.31	46.00	8.69	Peak

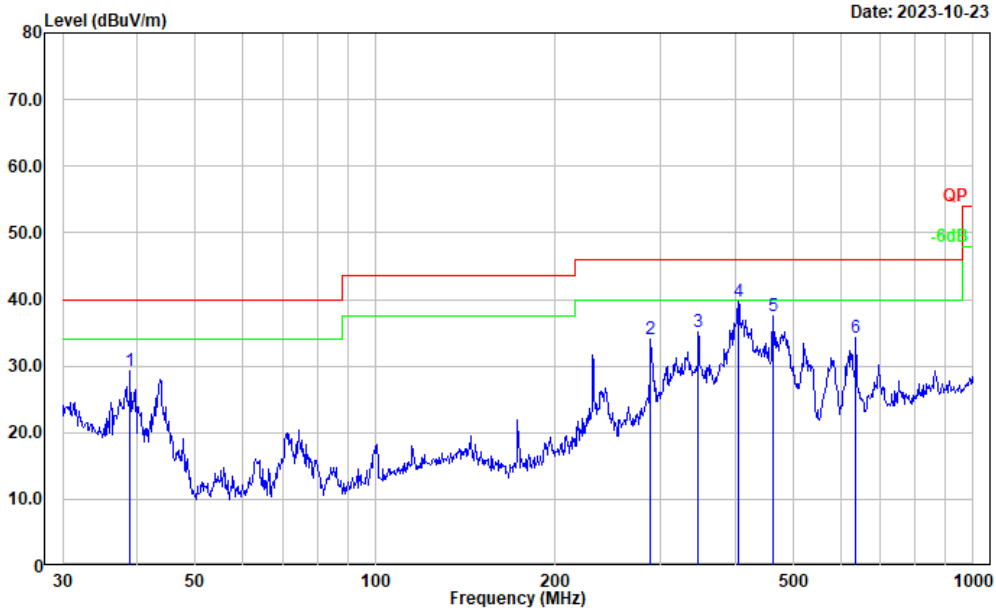
High Channel:

Project No.: CR231058894-RF
Tester: Jeff Luo
Polarization: horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	30.531	29.07	-4.20	24.87	40.00	15.13	Peak
2	230.907	44.60	-13.07	31.53	46.00	14.47	Peak
3	289.002	49.62	-11.12	38.50	46.00	7.50	Peak
4	346.712	48.58	-10.03	38.55	46.00	7.45	QP
5	404.667	48.19	-8.64	39.55	46.00	6.45	QP
6	462.346	45.64	-6.58	39.06	46.00	6.94	Peak

Project No.: CR231058894-RF
Tester: Jeff Luo
Polarization: vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	38.888	39.89	-10.54	29.35	40.00	10.65	Peak
2	289.002	45.14	-11.12	34.02	46.00	11.98	Peak
3	346.809	45.19	-10.03	35.16	46.00	10.84	Peak
4	404.667	48.37	-8.64	39.73	46.00	6.27	Peak
5	462.346	44.12	-6.58	37.54	46.00	8.46	Peak
6	636.134	38.91	-4.56	34.35	46.00	11.65	Peak

2) 1-25GHz:
BLE 1Mbps:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2402 MHz							
2390.000	26.47	PK	H	31.71	58.18	74.00	15.82
2390.000	13.38	AV	H	31.71	45.09	54.00	8.91
2390.000	26.62	PK	V	31.71	58.33	74.00	15.67
2390.000	13.55	AV	V	31.71	45.26	54.00	8.74
4804.000	34.25	PK	H	11.19	45.44	74.00	28.56
4804.000	21.56	AV	H	11.19	32.75	54.00	21.25
4804.000	34.39	PK	V	11.19	45.58	74.00	28.42
4804.000	21.62	AV	V	11.19	32.81	54.00	21.19
7206.000	42.68	PK	H	15.03	57.71	74.00	16.29
7206.000	33.15	AV	H	15.03	48.18	54.00	5.82
7206.000	42.79	PK	V	15.03	57.82	74.00	16.18
7206.000	33.27	AV	V	15.03	48.30	54.00	5.70
Middle Channel: 2440 MHz							
4880.000	34.26	PK	H	11.48	45.74	74.00	28.26
4880.000	21.73	AV	H	11.48	33.21	54.00	20.79
4880.000	34.56	PK	V	11.48	46.04	74.00	27.96
4880.000	21.83	AV	V	11.48	33.31	54.00	20.69
7320.000	42.53	PK	H	15.58	58.11	74.00	15.89
7320.000	32.69	AV	H	15.58	48.27	54.00	5.73
7320.000	43.88	PK	V	15.58	59.46	74.00	14.54
7320.000	33.98	AV	V	15.58	49.56	54.00	4.44
High Channel: 2480 MHz							
2483.500	26.92	PK	H	32.19	59.11	74.00	14.89
2483.500	13.85	AV	H	32.19	46.04	54.00	7.96
2483.500	26.84	PK	V	32.19	59.03	74.00	14.97
2483.500	13.91	AV	V	32.19	46.10	54.00	7.90
4960.000	35.00	PK	H	11.77	46.77	74.00	27.23
4960.000	21.96	AV	H	11.77	33.73	54.00	20.27
4960.000	34.58	PK	V	11.77	46.35	74.00	27.65
4960.000	21.63	AV	V	11.77	33.40	54.00	20.60
7440.000	43.58	PK	H	15.98	59.56	74.00	14.44
7440.000	33.91	AV	H	15.98	49.89	54.00	4.11
7440.000	44.41	PK	V	15.98	60.39	74.00	13.61
7440.000	34.89	AV	V	15.98	50.87	54.00	3.13

BLE 2Mbps:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2402 MHz							
2390.000	26.39	PK	H	31.71	58.10	74.00	15.90
2390.000	13.49	AV	H	31.71	45.20	54.00	8.80
2390.000	26.61	PK	V	31.71	58.32	74.00	15.68
2390.000	13.52	AV	V	31.71	45.23	54.00	8.77
4804.000	37.68	PK	H	11.19	48.87	74.00	25.13
4804.000	24.67	AV	H	11.19	35.86	54.00	18.14
4804.000	36.78	PK	V	11.19	47.97	74.00	26.03
4804.000	23.65	AV	V	11.19	34.84	54.00	19.16
7206.000	42.35	PK	H	15.03	57.38	74.00	16.62
7206.000	32.64	AV	H	15.03	47.67	54.00	6.33
7206.000	42.97	PK	V	15.03	58.00	74.00	16.00
7206.000	32.67	AV	V	15.03	47.70	54.00	6.30
Middle Channel: 2440 MHz							
4880.000	36.54	PK	H	11.48	48.02	74.00	25.98
4880.000	23.75	AV	H	11.48	35.23	54.00	18.77
4880.000	35.84	PK	V	11.48	47.32	74.00	26.68
4880.000	22.79	AV	V	11.48	34.27	54.00	19.73
7320.000	42.73	PK	H	15.58	58.31	74.00	15.69
7320.000	32.86	AV	H	15.58	48.44	54.00	5.56
7320.000	44.21	PK	V	15.58	59.79	74.00	14.21
7320.000	34.67	AV	V	15.58	50.25	54.00	3.75
High Channel: 2480 MHz							
2483.500	26.75	PK	H	32.19	58.94	74.00	15.06
2483.500	13.46	AV	H	32.19	45.65	54.00	8.35
2483.500	26.82	PK	V	32.19	59.01	74.00	14.99
2483.500	13.71	AV	V	32.19	45.90	54.00	8.10
4960.000	35.19	PK	H	11.77	46.96	74.00	27.04
4960.000	22.15	AV	H	11.77	33.92	54.00	20.08
4960.000	34.63	PK	V	11.77	46.40	74.00	27.60
4960.000	21.72	AV	V	11.77	33.49	54.00	20.51
7440.000	44.63	PK	H	15.98	60.61	74.00	13.39
7440.000	34.84	AV	H	15.98	50.82	54.00	3.18
7440.000	45.23	PK	V	15.98	61.21	74.00	12.79
7440.000	35.00	AV	V	15.98	50.98	54.00	3.02

BLE 125kbps:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2402 MHz							
2390.000	26.54	PK	H	31.71	58.25	74.00	15.75
2390.000	13.77	AV	H	31.71	45.48	54.00	8.52
2390.000	26.59	PK	V	31.71	58.30	74.00	15.70
2390.000	13.63	AV	V	31.71	45.34	54.00	8.66
4804.000	34.39	PK	H	11.19	45.58	74.00	28.42
4804.000	21.58	AV	H	11.19	32.77	54.00	21.23
4804.000	34.63	PK	V	11.19	45.82	74.00	28.18
4804.000	21.73	AV	V	11.19	32.92	54.00	21.08
7206.000	41.65	PK	H	15.03	56.68	74.00	17.32
7206.000	31.57	AV	H	15.03	46.60	54.00	7.40
7206.000	40.72	PK	V	15.03	55.75	74.00	18.25
7206.000	30.84	AV	V	15.03	45.87	54.00	8.13
Middle Channel: 2440 MHz							
4880.000	34.55	PK	H	11.48	46.03	74.00	27.97
4880.000	21.46	AV	H	11.48	32.94	54.00	21.06
4880.000	34.61	PK	V	11.48	46.09	74.00	27.91
4880.000	21.48	AV	V	11.48	32.96	54.00	21.04
7320.000	43.21	PK	H	15.58	58.79	74.00	15.21
7320.000	33.67	AV	H	15.58	49.25	54.00	4.75
7320.000	43.75	PK	V	15.58	59.33	74.00	14.67
7320.000	33.96	AV	V	15.58	49.54	54.00	4.46
High Channel: 2480 MHz							
2483.500	26.73	PK	H	32.19	58.92	74.00	15.08
2483.500	13.44	AV	H	32.19	45.63	54.00	8.37
2483.500	26.83	PK	V	32.19	59.02	74.00	14.98
2483.500	13.65	AV	V	32.19	45.84	54.00	8.16
4960.000	36.24	PK	H	11.77	48.01	74.00	25.99
4960.000	23.11	AV	H	11.77	34.88	54.00	19.12
4960.000	34.51	PK	V	11.77	46.28	74.00	27.72
4960.000	21.34	AV	V	11.77	33.11	54.00	20.89
7440.000	44.05	PK	H	15.98	60.03	74.00	13.97
7440.000	34.86	AV	H	15.98	50.84	54.00	3.16
7440.000	45.71	PK	V	15.98	61.69	74.00	12.31
7440.000	34.98	AV	V	15.98	50.96	54.00	3.04

BLE 500kbps:

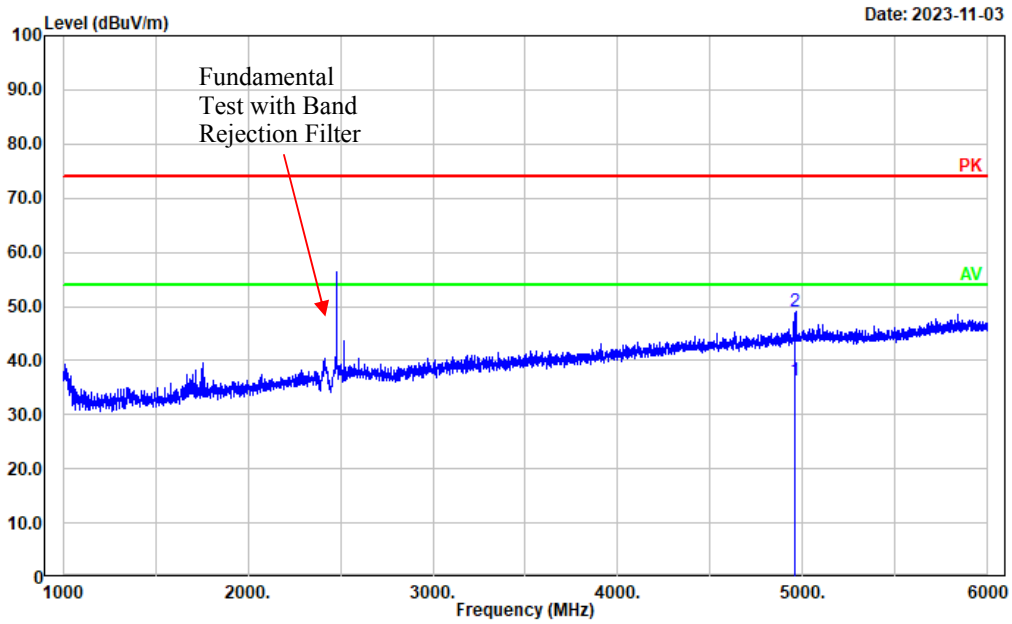
Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2402 MHz							
2390.000	26.43	PK	H	31.71	58.14	74.00	15.86
2390.000	13.73	AV	H	31.71	45.44	54.00	8.56
2390.000	26.62	PK	V	31.71	58.33	74.00	15.67
2390.000	13.82	AV	V	31.71	45.53	54.00	8.47
4804.000	34.73	PK	H	11.19	45.92	74.00	28.08
4804.000	21.50	AV	H	11.19	32.69	54.00	21.31
4804.000	35.12	PK	V	11.19	46.31	74.00	27.69
4804.000	22.34	AV	V	11.19	33.53	54.00	20.47
7206.000	42.44	PK	H	15.03	57.47	74.00	16.53
7206.000	33.76	AV	H	15.03	48.79	54.00	5.21
7206.000	43.62	PK	V	15.03	58.65	74.00	15.35
7206.000	34.75	AV	V	15.03	49.78	54.00	4.22
Middle Channel: 2440 MHz							
4880.000	35.23	PK	H	11.48	46.71	74.00	27.29
4880.000	22.27	AV	H	11.48	33.75	54.00	20.25
4880.000	34.77	PK	V	11.48	46.25	74.00	27.75
4880.000	22.02	AV	V	11.48	33.50	54.00	20.50
7320.000	42.29	PK	H	15.58	57.87	74.00	16.13
7320.000	33.64	AV	H	15.58	49.22	54.00	4.78
7320.000	43.05	PK	V	15.58	58.63	74.00	15.37
7320.000	34.46	AV	V	15.58	50.04	54.00	3.96
High Channel: 2480 MHz							
2483.500	27.11	PK	H	32.19	59.30	74.00	14.70
2483.500	14.09	AV	H	32.19	46.28	54.00	7.72
2483.500	26.79	PK	V	32.19	58.98	74.00	15.02
2483.500	13.99	AV	V	32.19	46.18	54.00	7.82
4960.000	37.37	PK	H	11.77	49.14	74.00	24.86
4960.000	24.53	AV	H	11.77	36.30	54.00	17.70
4960.000	34.49	PK	V	11.77	46.26	74.00	27.74
4960.000	21.67	AV	V	11.77	33.44	54.00	20.56
7440.000	44.87	PK	H	15.98	60.85	74.00	13.15
7440.000	35.02	AV	H	15.98	51.00	54.00	3.00
7440.000	44.77	PK	V	15.98	60.75	74.00	13.25
7440.000	34.99	AV	V	15.98	50.97	54.00	3.03

ZigBee:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2405 MHz							
2390.000	26.87	PK	H	31.71	58.58	74.00	15.42
2390.000	13.54	AV	H	31.71	45.25	54.00	8.75
2390.000	26.94	PK	V	31.71	58.65	74.00	15.35
2390.000	13.81	AV	V	31.71	45.52	54.00	8.48
4810.000	34.65	PK	H	11.21	45.86	74.00	28.14
4810.000	21.35	AV	H	11.21	32.56	54.00	21.44
4810.000	34.47	PK	V	11.21	45.68	74.00	28.32
4810.000	21.24	AV	V	11.21	32.45	54.00	21.55
7215.000	42.05	PK	H	15.10	57.15	74.00	16.85
7215.000	32.74	AV	H	15.10	47.84	54.00	6.16
7215.000	41.46	PK	V	15.10	56.56	74.00	17.44
7215.000	32.25	AV	V	15.10	47.35	54.00	6.65
Middle Channel: 2440 MHz							
4880.000	34.63	PK	H	11.48	46.11	74.00	27.89
4880.000	21.37	AV	H	11.48	32.85	54.00	21.15
4880.000	34.52	PK	V	11.48	46.00	74.00	28.00
4880.000	21.86	AV	V	11.48	33.34	54.00	20.66
7320.000	43.29	PK	H	15.58	58.87	74.00	15.13
7320.000	33.87	AV	H	15.58	49.45	54.00	4.55
7320.000	43.02	PK	V	15.58	58.60	74.00	15.40
7320.000	33.65	AV	V	15.58	49.23	54.00	4.77
High Channel: 2480 MHz							
2483.500	29.54	PK	H	32.19	61.73	74.00	12.27
2483.500	16.54	AV	H	32.19	48.73	54.00	5.27
2483.500	28.45	PK	V	32.19	60.64	74.00	13.36
2483.500	15.73	AV	V	32.19	47.92	54.00	6.08
4960.000	35.18	PK	H	11.77	46.95	74.00	27.05
4960.000	22.45	AV	H	11.77	34.22	54.00	19.78
4960.000	34.44	PK	V	11.77	46.21	74.00	27.79
4960.000	21.55	AV	V	11.77	33.32	54.00	20.68
7440.000	43.58	PK	H	15.98	59.56	74.00	14.44
7440.000	33.87	AV	H	15.98	49.85	54.00	4.15
7440.000	44.88	PK	V	15.98	60.86	74.00	13.14
7440.000	35.00	AV	V	15.98	50.98	54.00	3.02

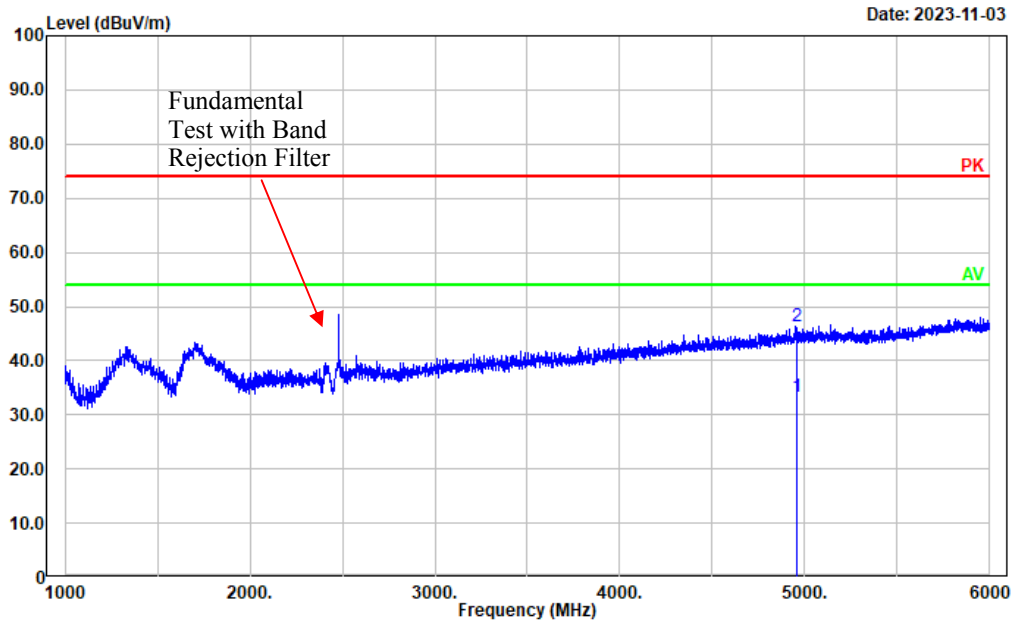
Listed with the worst radiation spurious emissions margin test plots (BLE 500kbps High Channel)

Project No.: CR231058894-RF
Tester: coco Tian
Polarization: horizontal
Note: BLE 500K



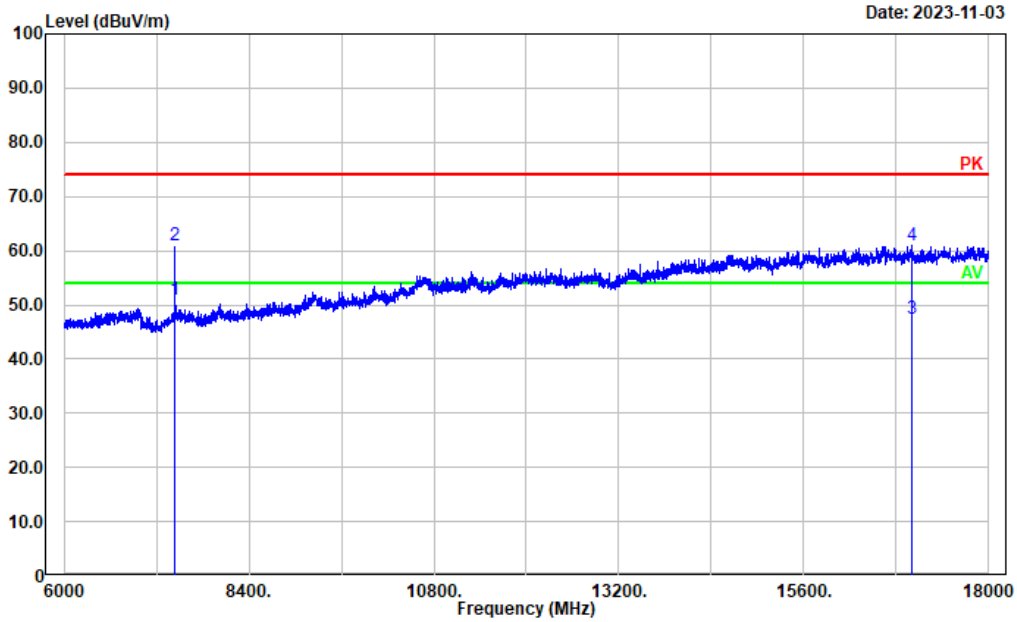
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	4960.000	24.53	11.77	36.30	54.00	17.70	Average
2	4960.000	37.37	11.77	49.14	74.00	24.86	Peak

Project No.: CR231058894-RF
Tester: coco Tian
Polarization: vertical
Note: BLE 500K



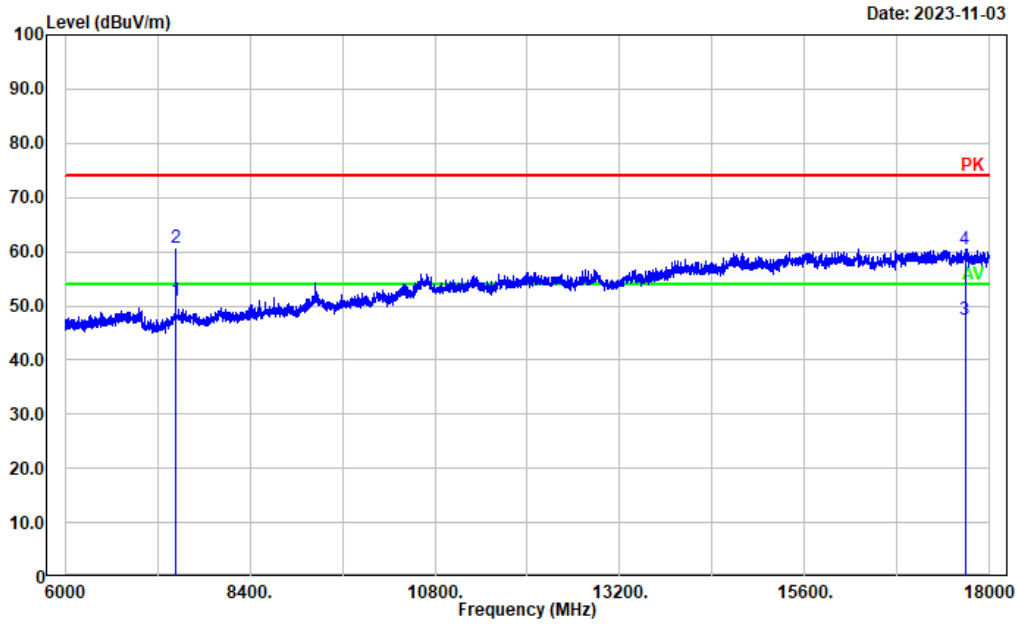
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	4960.000	21.67	11.77	33.44	54.00	20.56	Average
2	4960.000	34.49	11.77	46.26	74.00	27.74	Peak

Project No.: CR231058894-RF
Tester: coco Tian
Polarization: horizontal
Note: BLE 500K



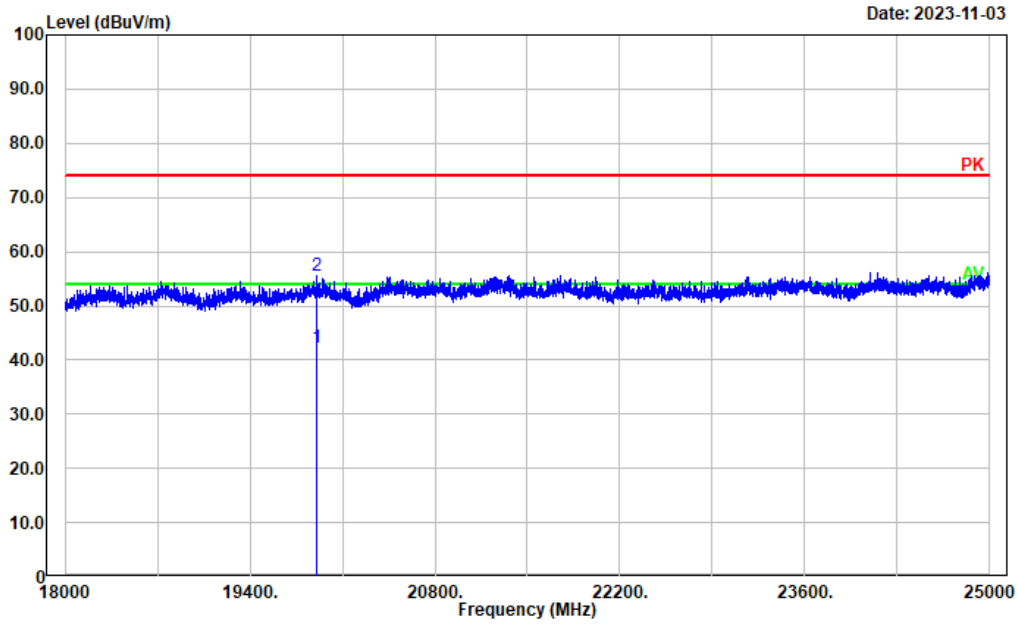
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	7440.000	35.02	15.98	51.00	54.00	3.00	Average
2	7440.000	44.87	15.98	60.85	74.00	13.15	Peak
3	17003.800	19.25	28.10	47.35	54.00	6.65	Average
4	17003.800	32.76	28.10	60.86	74.00	13.14	Peak

Project No.: CR231058894-RF
Tester: coco Tian
Polarization: vertical
Note: BLE 500K



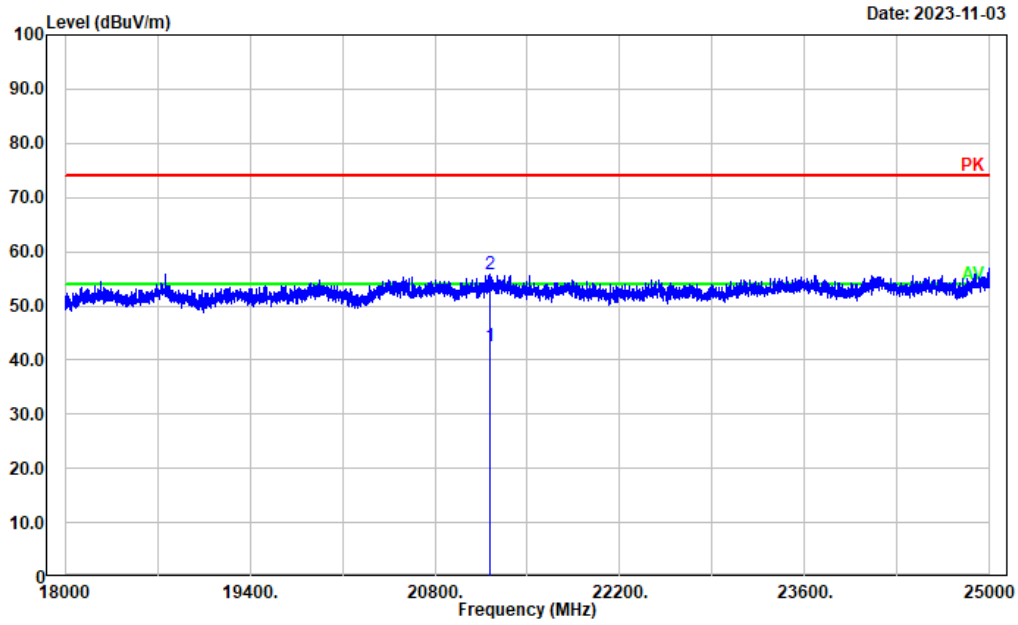
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	7440.000	34.99	15.98	50.97	54.00	3.03	Average
2	7440.000	44.77	15.98	60.75	74.00	13.25	Peak
3	17678.340	16.42	31.11	47.53	54.00	6.47	Average
4	17678.340	29.31	31.11	60.42	74.00	13.58	Peak

Project No.: CR231058894-RF
Tester: coco Tian
Polarization: Horizontal
Note: BLE 500K



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	19902.980	37.70	4.65	42.35	54.00	11.65	Average
2	19902.980	50.97	4.65	55.62	74.00	18.38	Peak

Project No.: CR231058894-RF
Tester: coco Tian
Polarization: vertical
Note: BLE 500K



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	21217.840	37.69	4.84	42.53	54.00	11.47	Average
2	21217.840	51.04	4.84	55.88	74.00	18.12	Peak

4.3 6 dB Emission Bandwidth

Serial Number:	2C3R-3	Test Date:	2023/11/6
Test Site:	RF	Test Mode:	Transmitting
Tester:	Arthur Su	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.3	Relative Humidity: (%)	59	ATM Pressure: (kPa)	101.1

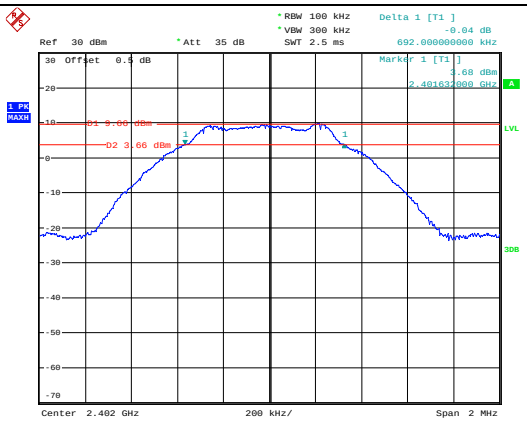
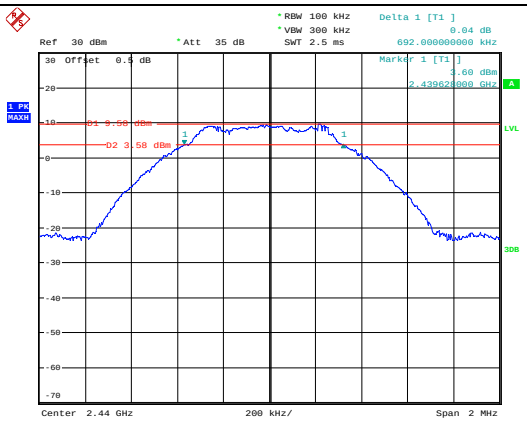
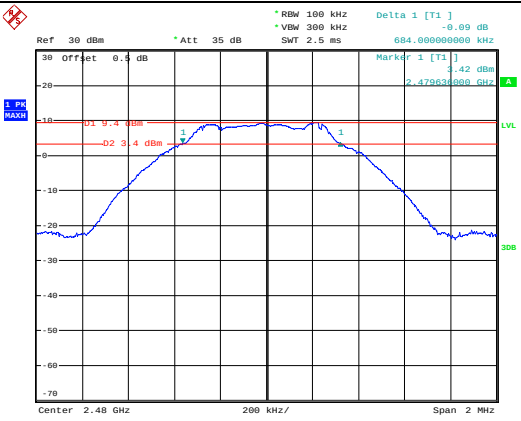
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU26	200256	2023/3/31	2024/3/30
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A

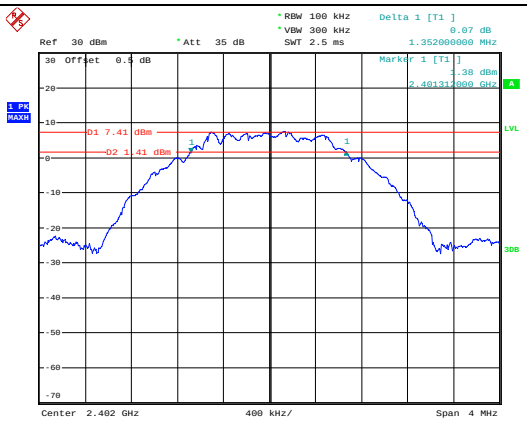
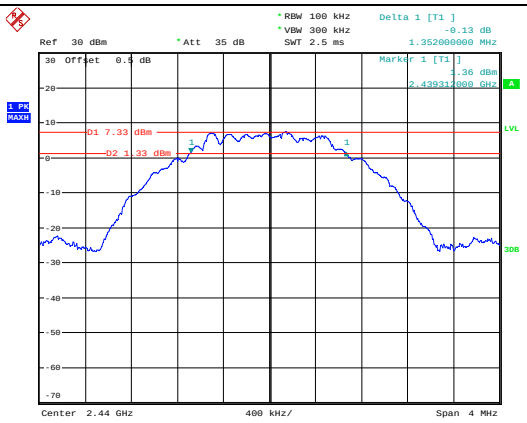
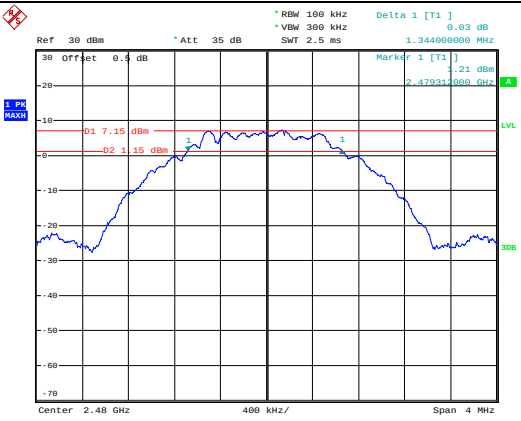
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

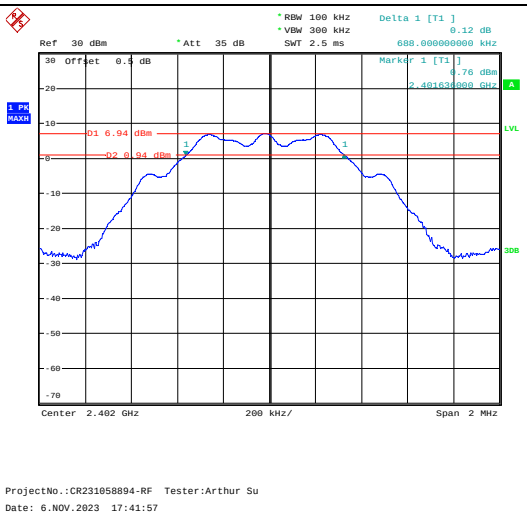
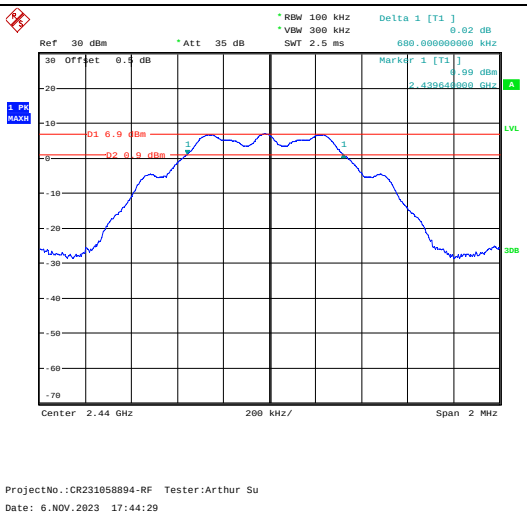
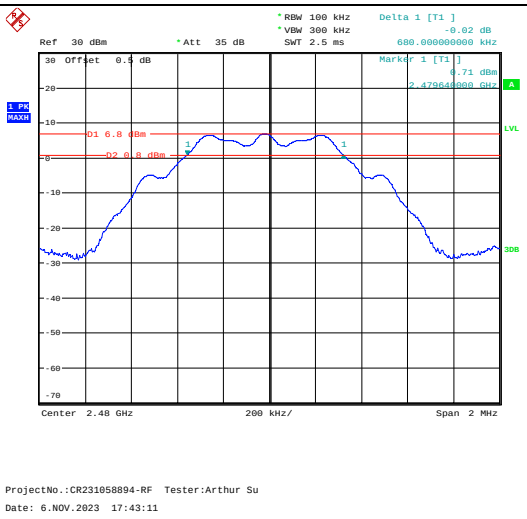
Test Data:

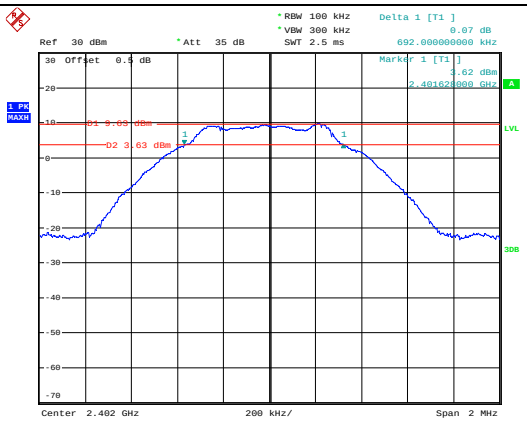
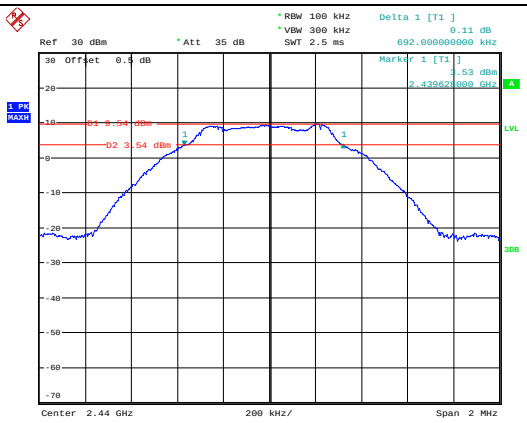
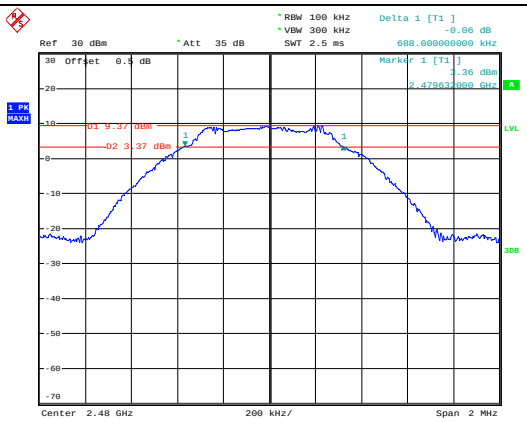
Test Modes	Test Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
BLE 125kbps	2402	0.688	≥0.5
	2440	0.680	≥0.5
	2480	0.680	≥0.5
BLE 500kbps	2402	0.692	≥0.5
	2440	0.692	≥0.5
	2480	0.688	≥0.5
BLE 1Mbps	2402	0.692	≥0.5
	2440	0.692	≥0.5
	2480	0.684	≥0.5
BLE 2Mbps	2402	1.352	≥0.5
	2440	1.352	≥0.5
	2480	1.344	≥0.5
ZigBee	2405	1.632	≥0.5
	2440	1.644	≥0.5
	2480	1.644	≥0.5

6dB Emission Bandwidth	
BLE 1Mbps Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:24:55
BLE 1Mbps Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:23:58
BLE 1Mbps Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:26:13

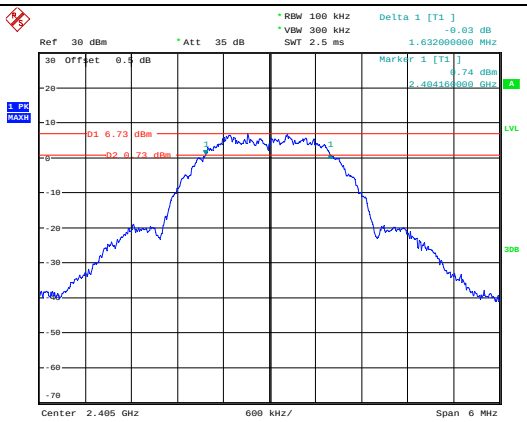
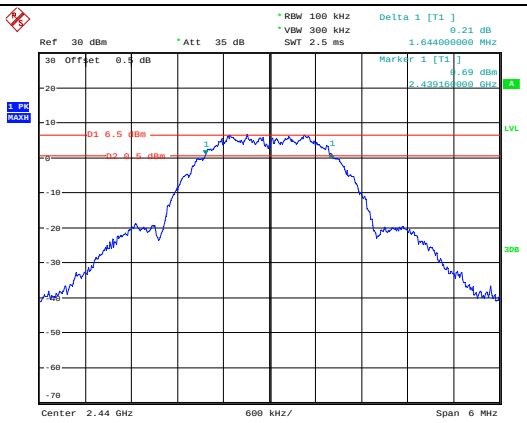
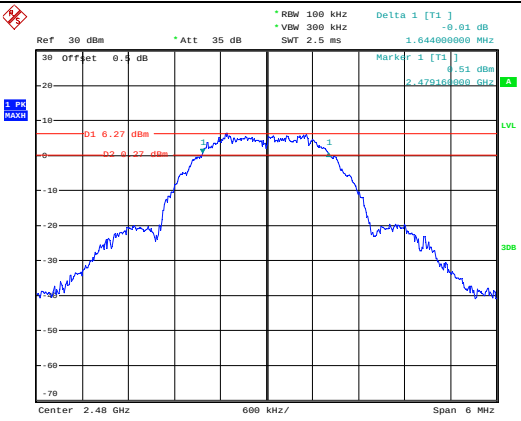
6dB Emission Bandwidth

BLE 2Mbps Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:27:54
BLE 2Mbps Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:30:14
BLE 2Mbps Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:29:07

6dB Emission Bandwidth	
BLE 125kbps Lowest Channel	
BLE 125kbps Middle Channel	
BLE 125kbps Highest Channel	

6dB Emission Bandwidth	
BLE 500kbps Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:35:46
BLE 500kbps Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:39:01
BLE 500kbps Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:36:57

6dB Emission Bandwidth

ZigBee Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:52:18
ZigBee Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 18:08:07
ZigBee Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 18:06:37

4.4 Maximum Conducted Output Power

Serial Number:	2C3R-3	Test Date:	2023/11/6
Test Site:	RF	Test Mode:	Transmitting
Tester:	Arthur Su	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.3	Relative Humidity: (%)	59	ATM Pressure: (kPa)	101.1

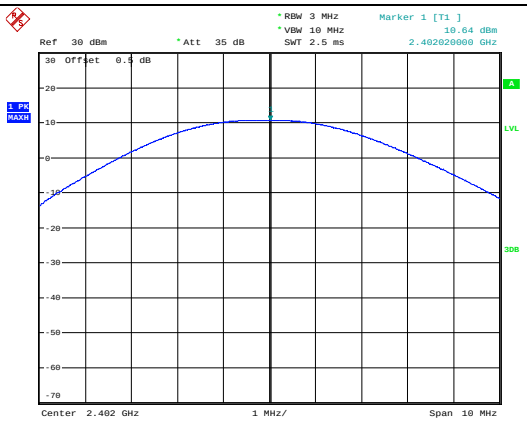
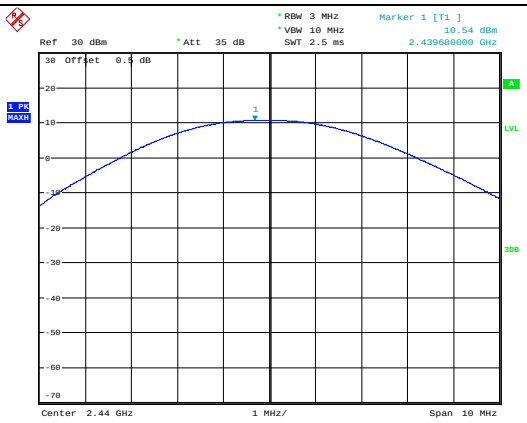
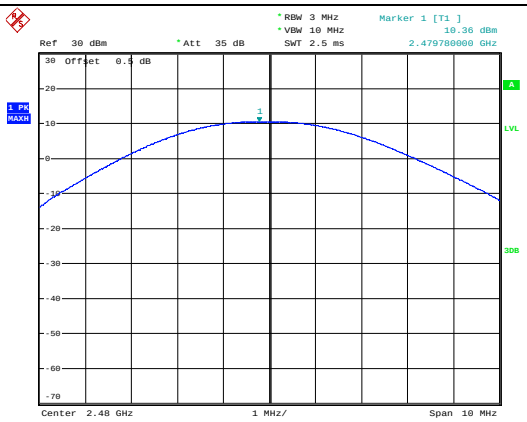
Test Equipment List and Details:

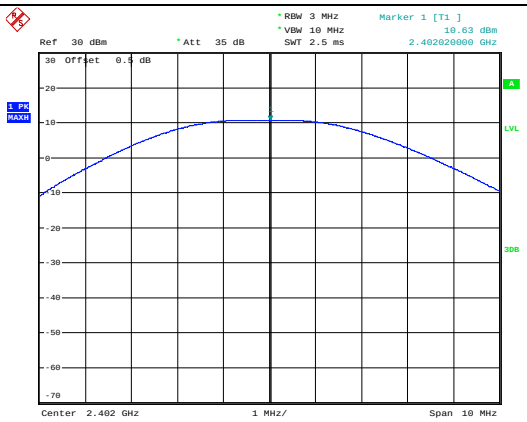
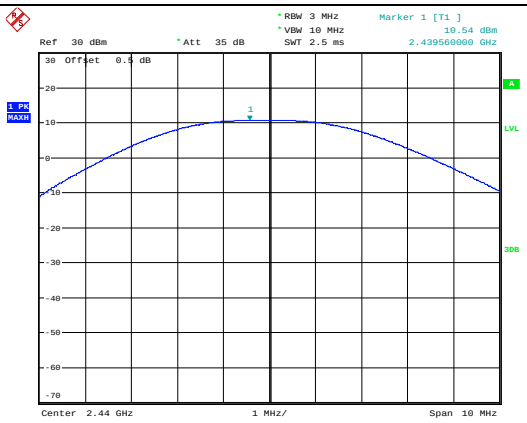
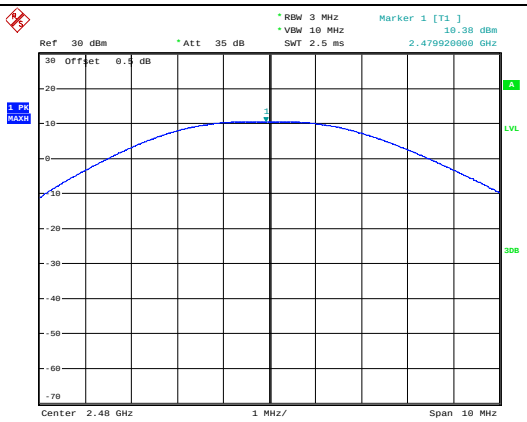
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU26	200256	2023/3/31	2024/3/30
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A

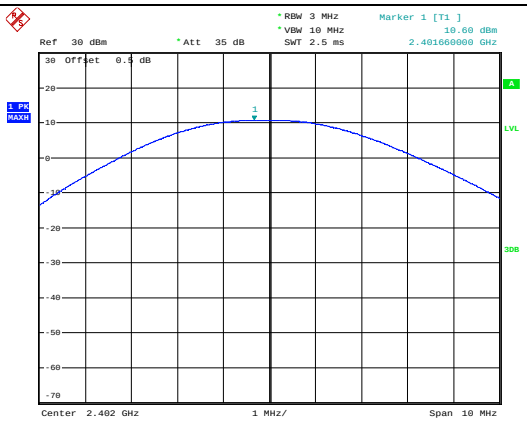
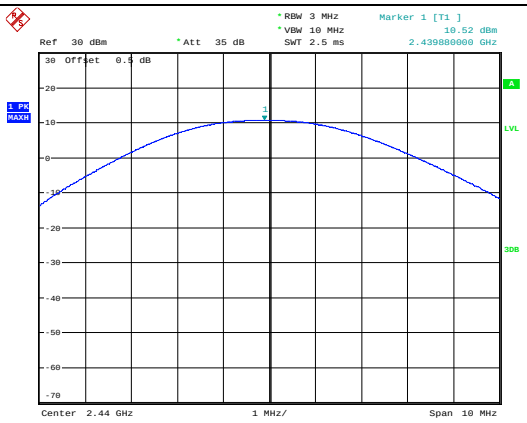
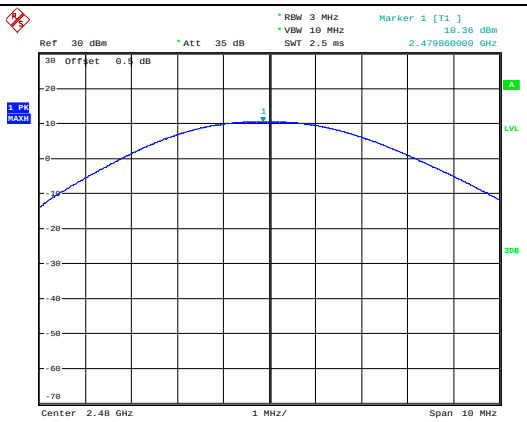
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

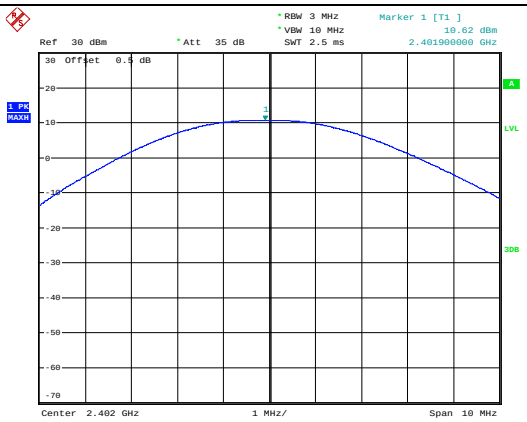
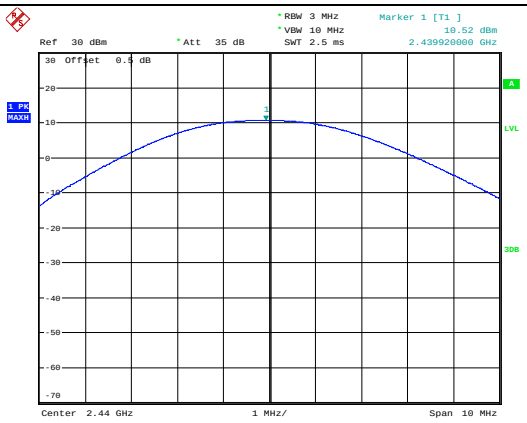
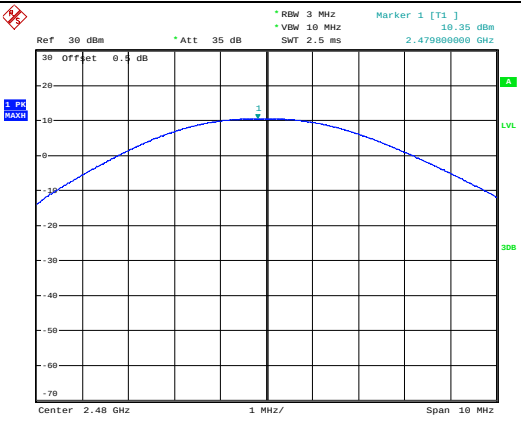
Test Data:

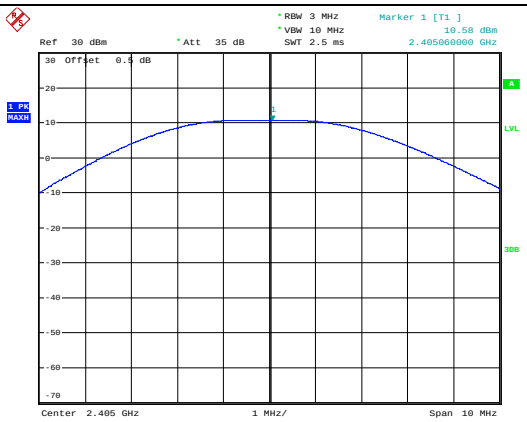
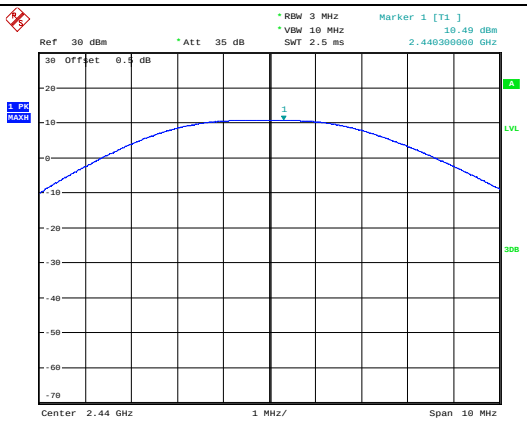
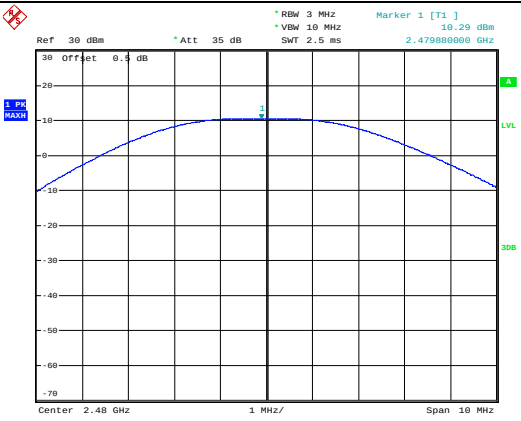
Test Modes	Test Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)	Limit (dBm)
BLE 125kbps	2402	10.60	≤30
	2440	10.52	≤30
	2480	10.36	≤30
BLE 500kbps	2402	10.62	≤30
	2440	10.52	≤30
	2480	10.35	≤30
BLE 1Mbps	2402	10.64	≤30
	2440	10.54	≤30
	2480	10.36	≤30
BLE 2Mbps	2402	10.63	≤30
	2440	10.54	≤30
	2480	10.38	≤30
ZigBee	2405	10.58	≤30
	2440	10.49	≤30
	2480	10.29	≤30

Maximum Conducted Peak Output Power	
BLE 1Mbps Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:25:20
BLE 1Mbps Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:24:23
BLE 1Mbps Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:26:38

Maximum Conducted Peak Output Power	
BLE 2Mbps Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:28:21
BLE 2Mbps Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:30:39
BLE 2Mbps Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:29:32

Maximum Conducted Peak Output Power	
BLE 125kbps Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:42:25
BLE 125kbps Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:44:56
BLE 125kbps Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:43:39

Maximum Conducted Peak Output Power	
BLE 500kbps Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:36:14
BLE 500kbps Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:39:29
BLE 500kbps Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:37:24

Maximum Conducted Peak Output Power	
ZigBee Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 18:05:43
ZigBee Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 18:05:20
ZigBee Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 18:06:10

4.5 Maximum Power Spectral Density

Serial Number:	2C3R-3	Test Date:	2023/11/6
Test Site:	RF	Test Mode:	Transmitting
Tester:	Arthur Su	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.3	Relative Humidity: (%)	59	ATM Pressure: (kPa)	101.1

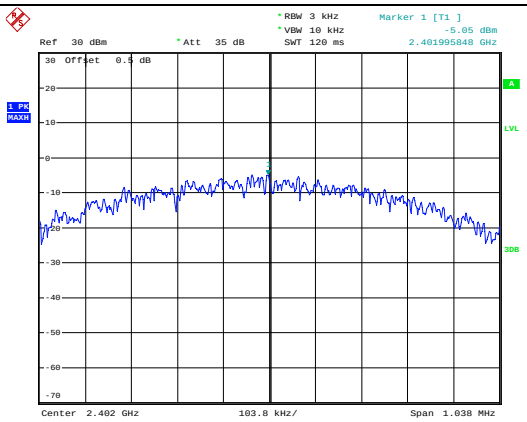
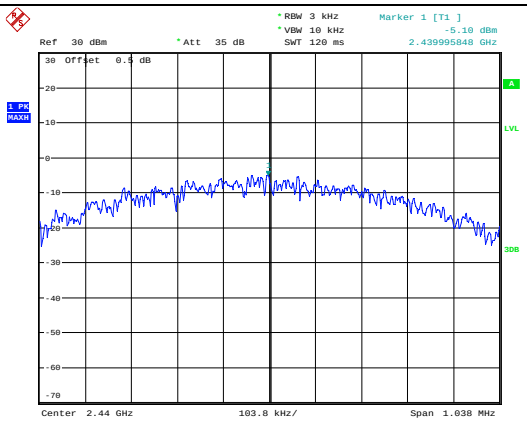
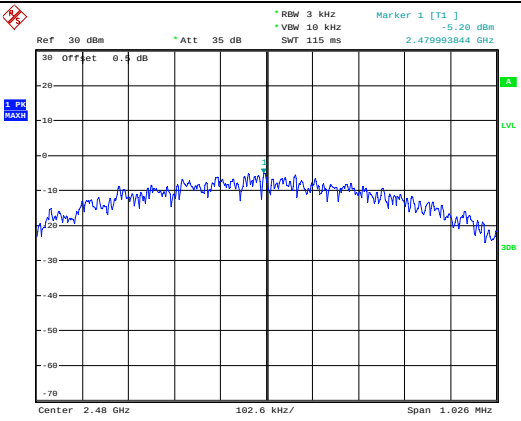
Test Equipment List and Details:

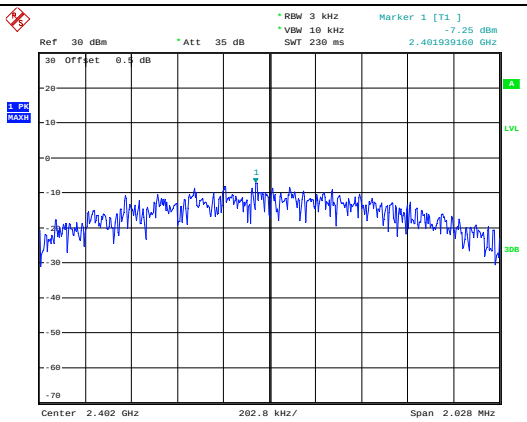
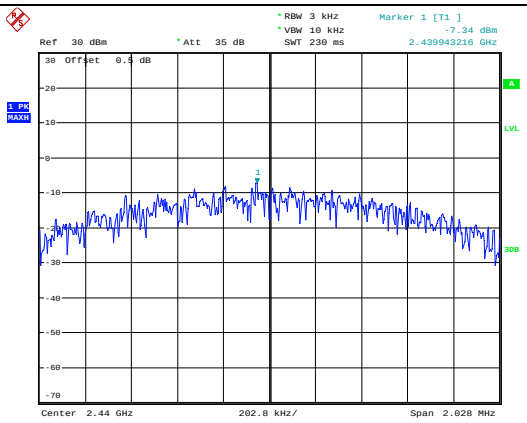
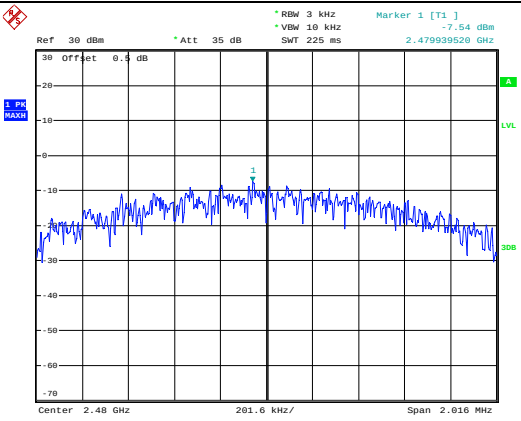
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU26	200256	2023/3/31	2024/3/30
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A

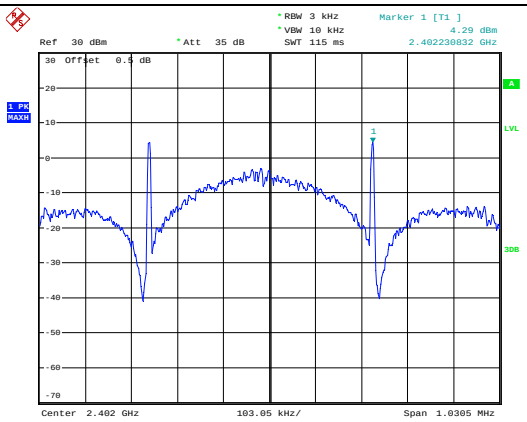
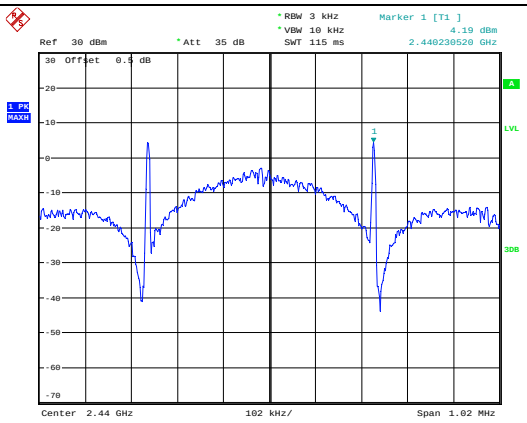
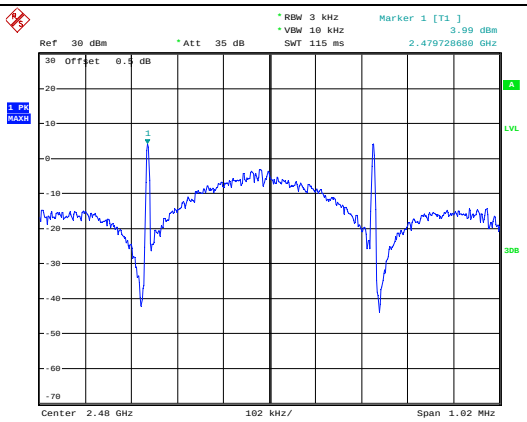
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

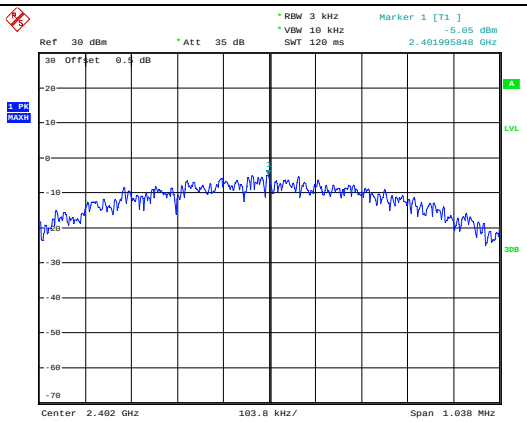
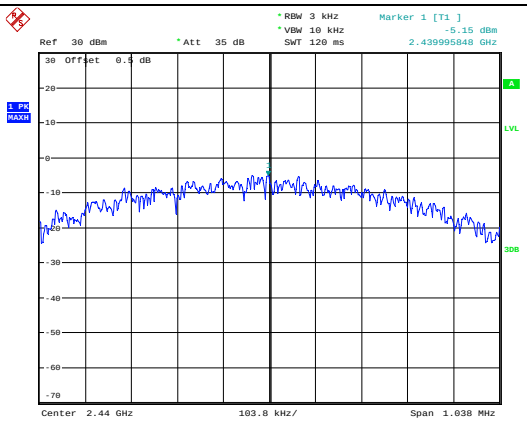
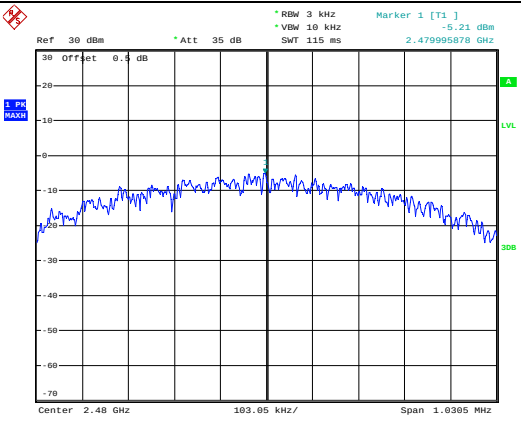
Test Data:

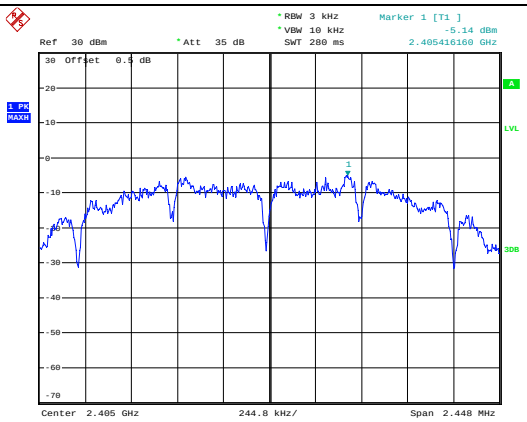
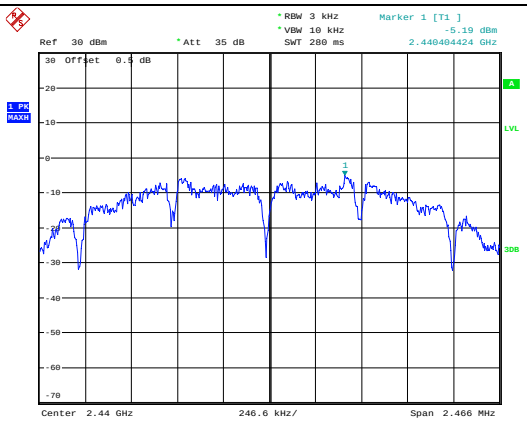
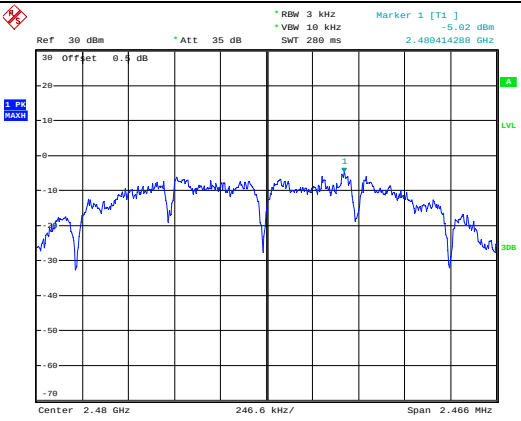
Test Modes	Test Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
BLE 125kbps	2402	4.29	≤8.00
	2440	4.19	≤8.00
	2480	3.99	≤8.00
BLE 500kbps	2402	-5.05	≤8.00
	2440	-5.15	≤8.00
	2480	-5.21	≤8.00
BLE 1Mbps	2402	-5.05	≤8.00
	2440	-5.10	≤8.00
	2480	-5.20	≤8.00
BLE 2Mbps	2402	-7.25	≤8.00
	2440	-7.34	≤8.00
	2480	-7.54	≤8.00
ZigBee	2405	-5.14	≤8.00
	2440	-5.19	≤8.00
	2480	-5.02	≤8.00

Maximum power spectral density	
BLE 1Mbps Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:25:29
BLE 1Mbps Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:24:32
BLE 1Mbps Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:26:47

Maximum power spectral density	
BLE 2Mbps Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:28:30
BLE 2Mbps Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:30:47
BLE 2Mbps Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:29:40

Maximum power spectral density	
BLE 125kbps Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:42:37
BLE 125kbps Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:45:08
BLE 125kbps Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:43:51

Maximum power spectral density	
BLE 500kbps Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:36:23
BLE 500kbps Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:39:38
BLE 500kbps Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:37:34

Maximum power spectral density	
ZigBee Lowest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:53:07
ZigBee Middle Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 18:08:53
ZigBee Highest Channel	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 18:07:25

4.6 100 kHz Bandwidth of Frequency Band Edge

Serial Number:	2C3R-3	Test Date:	2023/11/6
Test Site:	RF	Test Mode:	Transmitting
Tester:	Arthur Su	Test Result:	Pass

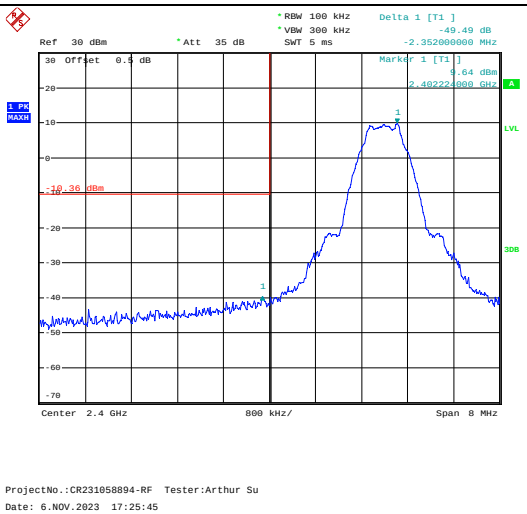
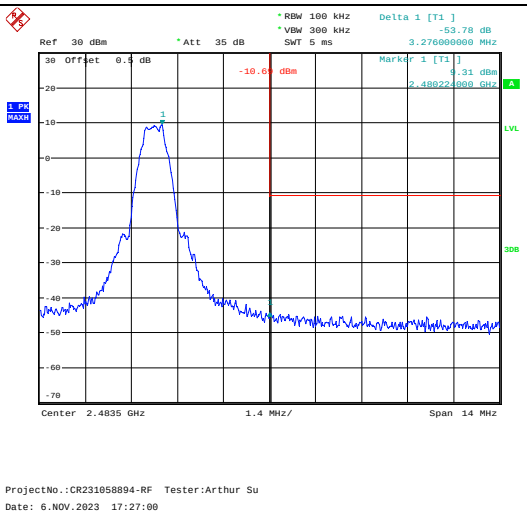
Environmental Conditions:					
Temperature: (℃)	25.3	Relative Humidity: (%)	59	ATM Pressure: (kPa)	101.1

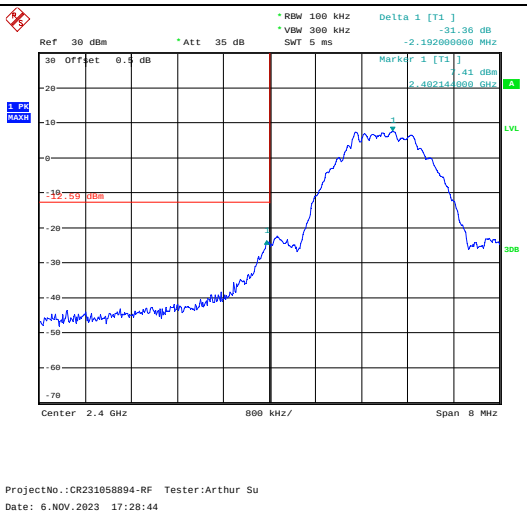
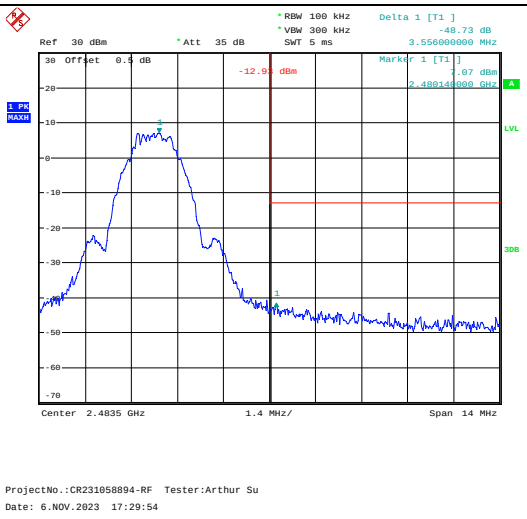
Test Equipment List and Details:

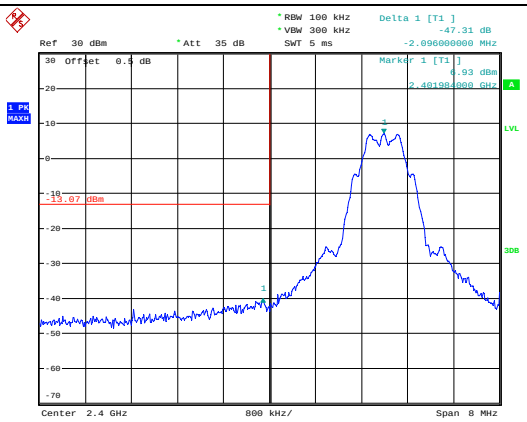
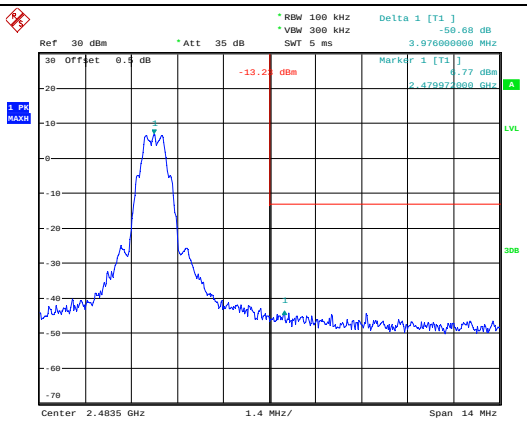
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU26	200256	2023/3/31	2024/3/30
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A

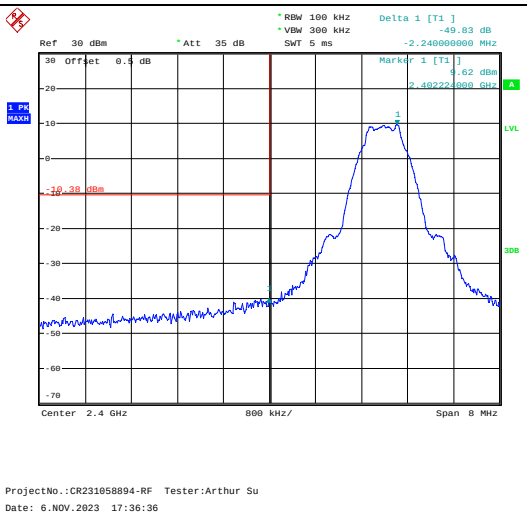
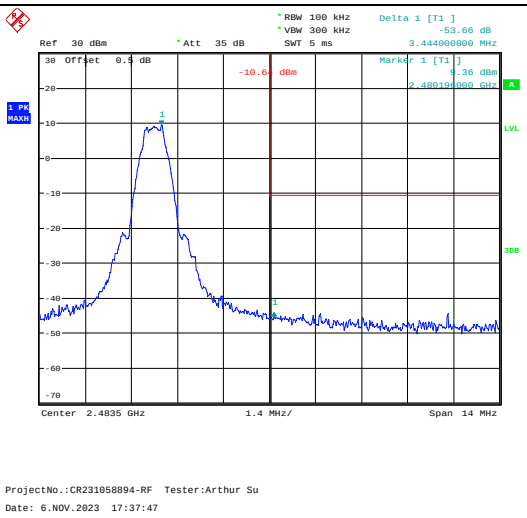
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

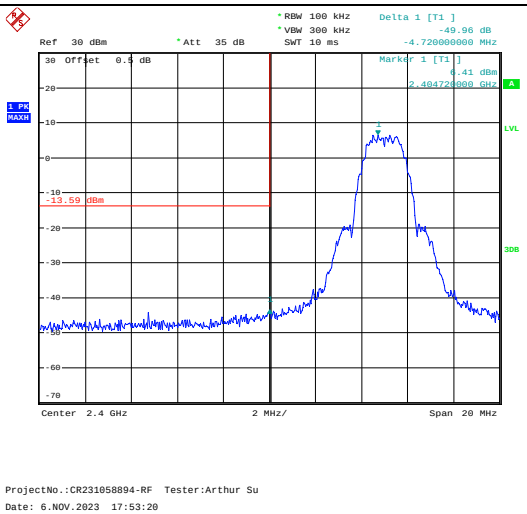
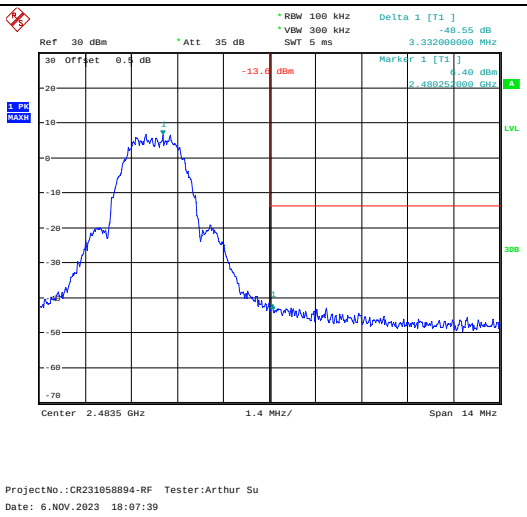
Test Data:

100 kHz Bandwidth of Frequency Band Edge	
BLE 1Mbps Lowest Band edge	
BLE 1Mbps Highest Band edge	

100 kHz Bandwidth of Frequency Band Edge	
BLE 2Mbps Lowest Band edge	
BLE 2Mbps Highest Band edge	

100 kHz Bandwidth of Frequency Band Edge	
BLE 125kbps Lowest Band edge	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:42:50
BLE 125kbps Highest Band edge	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:44:05

100 kHz Bandwidth of Frequency Band Edge	
BLE 500kbps Lowest Band edge	
BLE 500kbps Highest Band edge	

100 kHz Bandwidth of Frequency Band Edge	
ZigBee Lowest Band edge	
ZigBee Highest Band edge	

4.7 Duty Cycle

Serial Number:	2C3R-3	Test Date:	2023/11/6
Test Site:	RF	Test Mode:	Transmitting
Tester:	Arthur Su	Test Result:	pass

Environmental Conditions:					
Temperature: (℃)	25.3	Relative Humidity: (%)	59	ATM Pressure: (kPa)	101.1

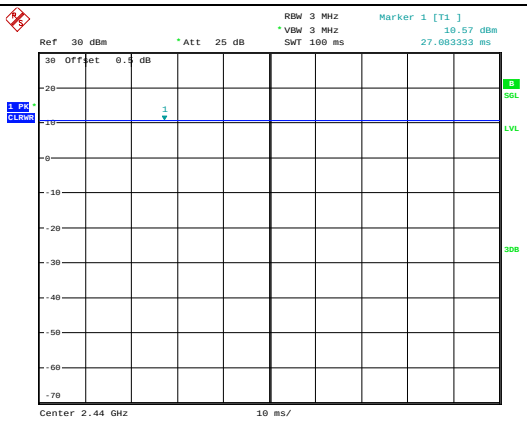
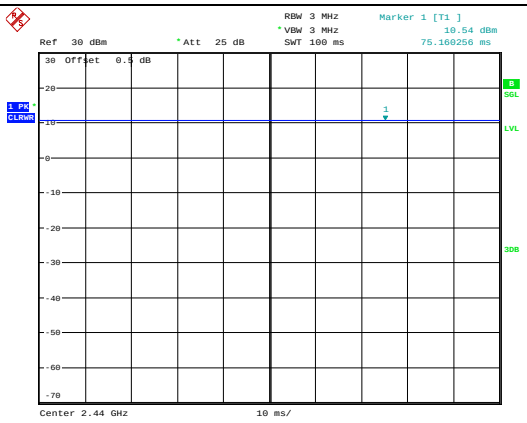
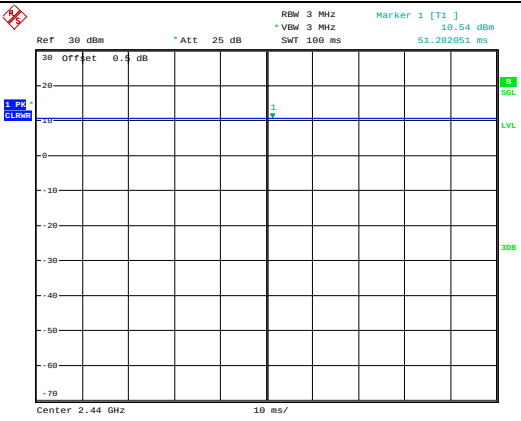
Test Equipment List and Details:

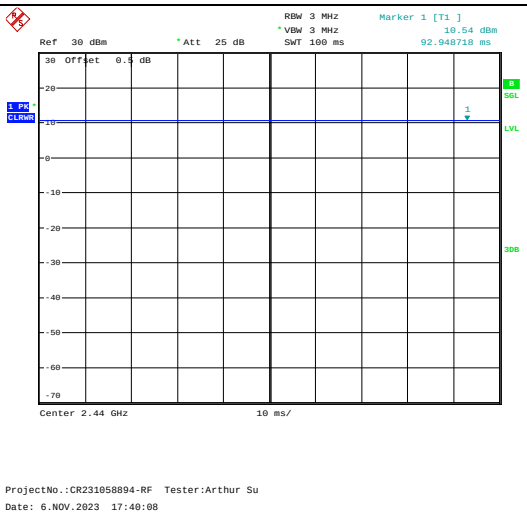
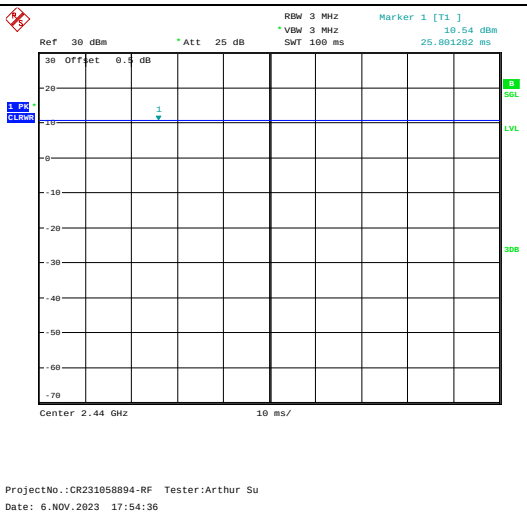
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU26	200256	2023/3/31	2024/3/30
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Test Modes	Ton (ms)	Ton+off (ms)	Duty cycle (%)	1/T (Hz)	VBW Setting (kHz)
BLE 125kbps	100	100	100.00	/	0.01
BLE 500kbps	100	100	100.00	/	0.01
BLE 1Mbps	100	100	100.00	/	0.01
BLE 2Mbps	100	100	100.00	/	0.01
ZigBee	100	100	100.00	/	0.01

Duty Cycle	
BLE 1Mbps	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:20:06
BLE 2Mbps	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:31:13
BLE 125kbps	 ProjectNo.:CR231058894-RF Tester:Arthur Su Date: 6.NOV.2023 17:46:00

Duty Cycle	
BLE 500kbps	
ZigBee	

5. RF EXPOSURE EVALUATION

5.1 Applicable Standard

FCC §15.247 (i) and subpart §1.1307

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

5.2 Procedure

According to §1.1307(b)(3)(i)

(C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.

5.3 Measurement Result

Radio	Frequency (MHz)	λ /2Π (mm)	Distance (mm)	Exemption ERP (mW)	Maximum Conducted Power including Tune-up Tolerance (dBm)	Antenna Gain (dBi)	ERP	
							dBm	mW
Zigbee	2405-2480	19.87	200	768	11	0.70	9.55	9.02
BLE	2402-2480	19.88	200	768	11	0.70	9.55	9.02

Note:
The Maximum Conducted Power including Tune-up Tolerance was declared by manufacturer.
The ZigBee and BLE can`t transmission simultaneously.

Result: The device compliant the MPE-Based Exemption at 20cm distances.

6. EUT PHOTOGRAPHS

Please refer to the attachment CR231058894-EXP EUT EXTERNAL PHOTOGRAPHS and CR231058894-INP EUT INTERNAL PHOTOGRAPHS

7. TEST SETUP PHOTOGRAPHS

Please refer to the attachment CR231058894-00-TSP TEST SETUP PHOTOGRAPHS.

===== END OF REPORT ====