



REPORT

For

Guard RFID Solutions Inc

#140 – 766 Cliveden Place
Delta, British Columbia
V3M 6C7, Canada

Date of Issue: 4 October 2022
Report No.: 20.01.21145 - 2_Rev0_GaurdRFID
Project No.: 21145
Equipment: WiFi Staff Tag
Model No.: ST-4

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ISO 17025 ACCREDITED

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ISO 17065 ACCREDITED

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TEST REPORT_ FCC Part 15C/ ISED RSS-247	
Intentional Radiator - WiFi 802.11b	
Report No.	20.01.21145-2_Rev0_GaurdRFID
Compiled by	Zara Vali <i>Zara Vali</i>
Approved by	David Johanson <i>[Signature]</i>
Date of issue	4 October 2022
Laboratory information:	
Testing Laboratory	LabTest Certification Inc.
Address	Richmond Lab: Unit 3128-20800 Westminster HWY, Richmond, B.C. V6V 2W3 Canada
FCC Site Registration No.:	CA5970
IC Site Registration No.:	5970A-2
Applicant's name	Guard RFID Solutions Inc
Address	#140 – 766 Cliveden Place Delta BC V3M 6C7 Canada
Manufacture's Name	Guard RFID Solutions Inc
Address	#140 – 766 Cliveden Place Delta BC V3M 6C7 Canada
Test item description :	
Trade Mark	
Equipment name:	WiFi Staff Tag
Model/Type reference	ST-4
Product Marketing name (PMN).....	ST-4- WiFi
Serial Number	08:ed:02:C5:02:30
FCC ID	VZKST4
IC ID	9937A-ST4
Possible test case verdicts:	
- test case does not apply to the test object	N/A

- test object does meet the requirement	P (Pass)
- test object does not meet the requirement	F (Fail)
Testing:	
Date of receipt of test item	8 July 2022
Date (s) of performance of tests.....	May – July 2022

Revision History

Revision	Date	Reason For Change	Author(s)
0		Initial Data	Zara Vali

Result Summary

The tests indicated in result summary were performed on the product constructed as described below. The test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test method, a list of the actual test equipment used, documentation photos, results, and raw data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

The compliance status is a judgment based on the direct measurements and calculated highest emissions to appropriate standard limits. Measurement uncertainty values, provided on calibration certificates, were not be used in the judgment of the final status of compliance.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. LabTest does not make any claims of compliance for samples or variants which were not tested.

FCC Part 15. 247 and RSS-247			
Test Type	Standard	Test Method	Result
6-dB Occupied Bandwidth	FCC Part 15.247 (a) (2) RSS-247 5.2 (a)	ANSI C63.10:2013, Clause 6	Pass
Power Spectral Density	FCC 15.247(e) RSS-247 5.2(b)	ANSI C63.4:2014 ANSI C63.10:2013, Clause 6	Pass
RF Conducted Peak Output Power	FCC 15.247 (b)(3) RSS-247 5.4 (d)	ANSI C63.10:2013, Clause 6	Pass
Conducted Spurious Emissions	FCC part 15.247(d), FCC part 15.205, FCC part 15.209(a), RSS-247 5.5	ANSI C63.10:2013, Clause 6	Pass
Frequency Stability (Temperature/Voltage Variation)	FCC Part 2.1055 (a) (1) & (b) FCC Part 2.1055 (d)(1) FCC Part 15.215(c)	ANSI C63.10:2013, Clause 6 RSS-Gen Issue 5 (6.11)	Pass
99% Occupied Bandwidth	RSS-Gen Issue 5, section 6.7	-	Pass
Out of Band Emissions (Band Edge)	FCC Part 15.247 (d)	RSS Gen Issue 5	Pass
Radiated Spurious Emissions- Transmit Mode	FCC Part 15.247 (d) FCC Part 15.209 FCC Part 15.205 RSS-Gen Issue 5	ANSI C63.4	Pass
Antenna Requirement	FCC Part 15.203	RSS-Gen Issue 5	Pass
Non-standard test method	NA		

Description of Equipment Under Test and Variant Models

Description:

The ST-4 – WIFI is a tag that is designed for locating and monitoring personnel. These tags can leverage existing wireless networks to work with GuardRFID® excitors and AllGuard® software to complete the real-time location system. It also has the wireless power receiver for battery charging (Qi charging). When blue and red buttons are pressed the tag will transmit the message indicating the button has been pressed. The message is the same as periodic message that tag sends, just have few data bits different.

- Top view

- Bottom View



Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

Radio Device Under Test Description

Application for	WiFi Staff Tag
Operating Transmit Frequency	2.4 GHz (802.11b compliant)
Operating Receive Frequency	2.4 GHz (802.11b compliant)
Number of Channels	11
Peak output power	7.102 dBm
Modulation Type	802.11b modulation (DSSS)
Data Rate	6 Mbps
Hop Timing	NA
Antenna Type/Gain	Model: Taiyo Yuden AH316M245001-T / Gain: 1.9 dBi,

Equipment mobility	Mobile
Operating condition	-20 to + 50 °C
Mass of equipment (g)	46
Dimension	80 mm x 53 mm x 12 mm
Supply Voltage:	_____ AC _____ Amps __4 V__ DC _____ Amps
If DC Power:	<input type="checkbox"/> Internal Power Supply <input type="checkbox"/> External Power Supply or AC/DC adapter <input checked="" type="checkbox"/> Battery: Rechargeable battery <input type="checkbox"/> Nickel Cadmium <input type="checkbox"/> Alkaline, 4 X AA <input type="checkbox"/> Nickel-Metal Hydride <input type="checkbox"/> Lithium-Ion <input checked="" type="checkbox"/> Other

EUT Internal Operating Frequencies

#	Frequency (MHz)	Description
1	2412- 2462 MHz	802.11b
2	125 KHz	Receiver for communication between ST-4 tag and Tag Exciter
3	136 KHz – 144 KHz	Receiver for wireless charging through WTC Charger
4	40 MHz	Crystal frequency
5	32 kHz	Crystal frequency

Client Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	WiFi Staff Tag	Guard RFID Solutions Inc	ST-4	-
Abbreviations: EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment, or SIM - Simulator (Not Subjected to Test)				

Software and Firmware

Use*	Description	Version
	Firmware	v1.4.0

Abbreviations:
EUT - Equipment Under Test,
AE - Auxiliary/Associated Equipment, or
SIM - Simulator (Not Subjected to Test)

Input/Output Ports

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
	NA	-	-	-	-

*Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

Power Interface

Mode #	Voltage (V)	Max Current (mA)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
1	4 Vdc	250	-	-	-	Rechargeable battery

EUT Operation Modes

Mode #	Description
1	ST-4- WiFi transmits periodic unassociated Wi-Fi packets for the purpose of locating the tag based on RSSI. Tag location is determined on server side based on signals received from multiple Wi-Fi Access Points. Tag configuration is also done on server side and communicated to the tag over Wi-Fi.

EUT Configuration Modes

Mode #	Description
1	Tag location is determined on server side based on signals received from multiple Wi-Fi Access Points. Tag configuration is also done on server side and communicated to the tag over Wi-Fi.

Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests:

Parameter	Uncertainty
Radio Frequency	± 1 ppm
Total RF Power: Conducted	± 1 dB
RF Power Density: Conducted	± 2.75 dB
Spurious Emissions: Conducted	± 3.0 dB
Temperature	± 1.0 °C
Humidity	± 5.0 %
DC and Low Frequency Voltages	± 3.0 %
Radiated Emission, 30 to 6,000MHz	± 4.93 dB
Conducted Measurements, 0.15 to 30MHz	± 3.52 dB

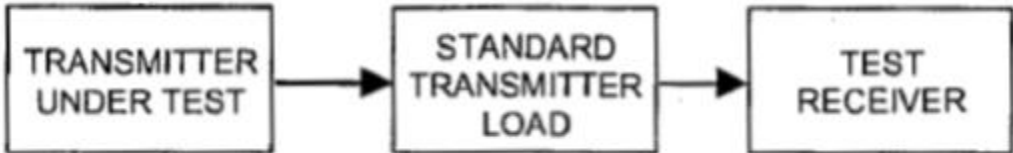
Uncertainty figures are valid to a confidence level of 95%.

1- 6-dB Occupied Bandwidth

Standard	FCC Part 15.247 (a) (2) RSS-247 5.2 (a)	Room Temperature (°C)	30.1		
Test Method	ANSI C63.10:2013, Clause 6	Relative Humidity (%)	58.1		
Test Location	Richmond lab	Barometric Pressure (KPa)	1012.8		
Test Engineer	Jack Qin	Date of Test	20 July 2022		
Test Equipment Used	Manufacturer	Model	Identifier	Calibration	Calibration due
Spectrum Analyzer	Agilent	E7405A	272	07 September, 2022	07 September, 2023
RF Cable	MRO	n/a	n/a	IHC ¹	IHC ¹
EMC Shielded Enclosure	USC	USC-26	374	IHC ²	IHC ²
<p>Note1) In House Calibration Ref. # 6 Note2) In House Calibration Ref. # 4</p>					
Frequency (MHz)	Bandwidth (KHz)	Limit KHz)	Comments		
2411.62	9050	500	Pass		
2436.85	8020	500	Pass		
2461.77	9500	500	Pass		
Limit: The minimum 6 dB bandwidth shall be at least 500 kHz.					
Compliant <input checked="" type="checkbox"/>		Non-Compliant <input type="checkbox"/>		Not Applicable <input type="checkbox"/>	

Test Setup

Description of test set-up:

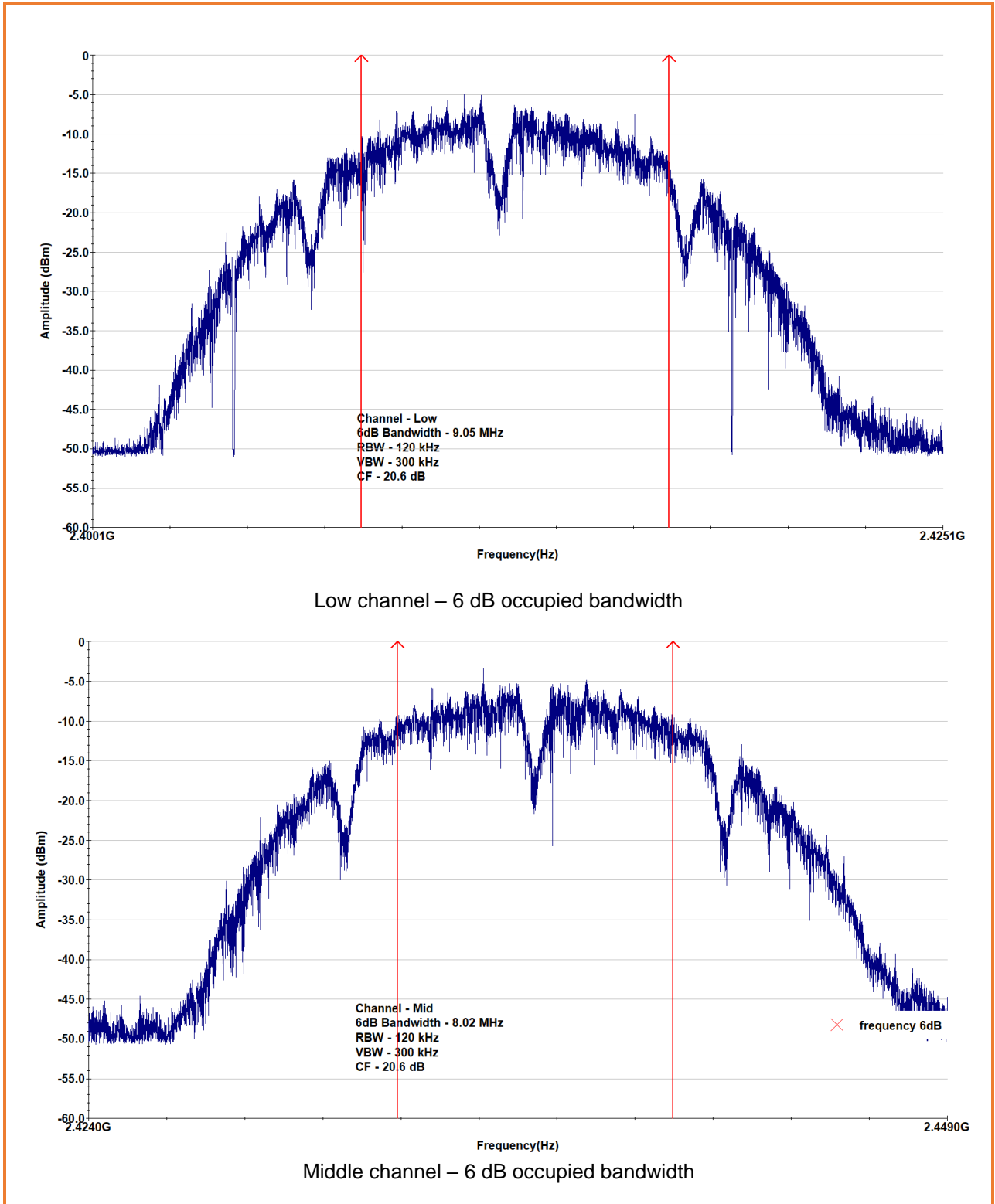


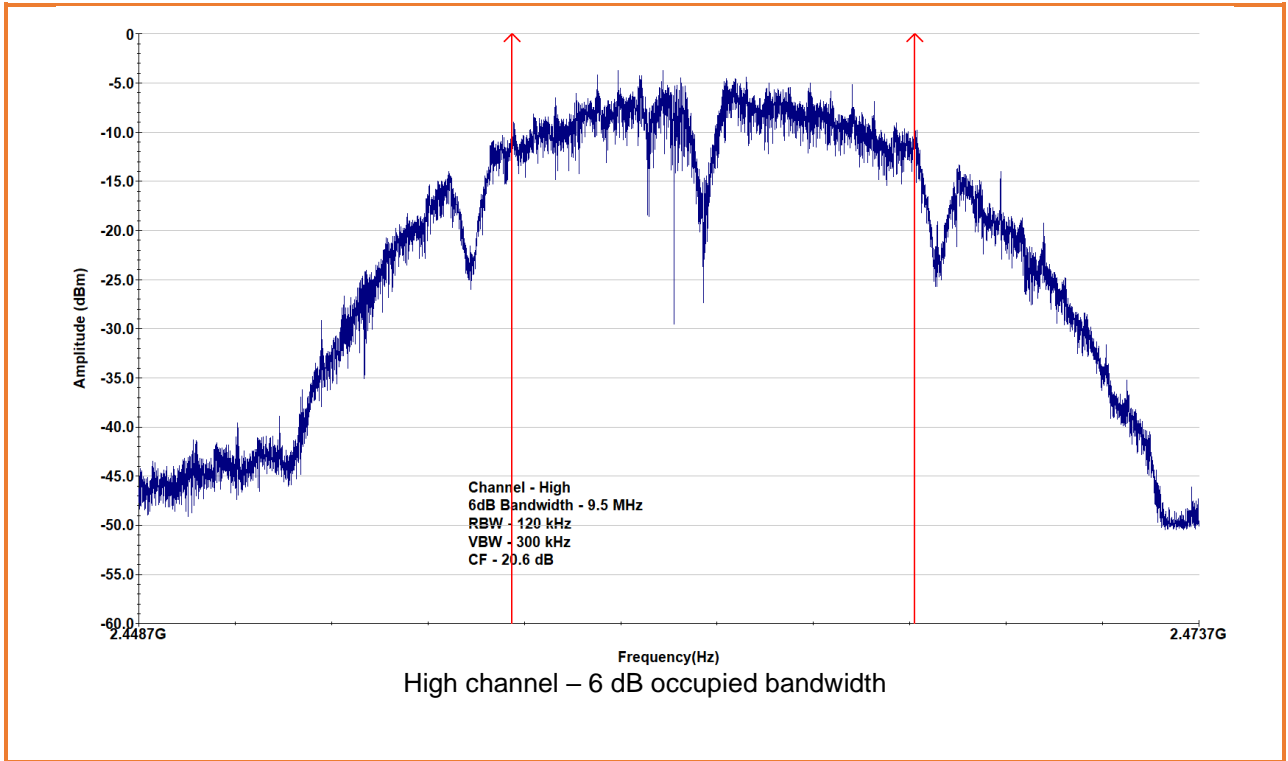
```

graph LR
    A[TRANSMITTER UNDER TEST] --> B[STANDARD TRANSMITTER LOAD]
    B --> C[TEST RECEIVER]
  
```

- The EUT was connected directly to the spectrum analyzer/receiver with appropriate attenuation to make sure no signal saturation.
- The EUT was set to **Operation Mode #1 with configuration Mode #1.**

Test Results





2- Power Spectral Density

Standard	FCC 15.247(e) RSS-247 5.2(b)	Room Temperature (°C)	30.1		
Test Method	ANSI C63.4:2014 ANSI C63.10:2013, Clause 6	Relative Humidity (%)	58.1		
Test Location	Richmond lab	Barometric Pressure	1012.8		
Test Engineer	Jack Qin	Date of Test	20 July 2022		
Test Equipment Used	Manufacturer	Model	Identifier	Calibration	Calibration due
Spectrum Analyzer	Agilent	E7405A	272	07 September, 2022	07 September, 2023
RF Cable	MRO	n/a	n/a	IHC ¹	IHC ¹
EMC Shielded Enclosure	USC	USC-26	374	IHC ²	IHC ²

Note1) In House Calibration Ref. # 6

Note2) In House Calibration Ref. # 4

Channel	Frequency (GHz)	Un-Corrected PSD (dBm)	System Loss (dB)	Corrected PSD (dBm)	Limit (dBm)	Results
Low	2.4105	-38.037	20.6	-17.437	8	Pass
Middle	2.4377	-36.186	20.6	-16.186	8	Pass
High	2.4614	-36.06	20.6	-15.46	8	Pass
Compliant <input checked="" type="checkbox"/>		Non-Compliant <input type="checkbox"/>		Not Applicable <input type="checkbox"/>		

Test Method

FCC Part 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.

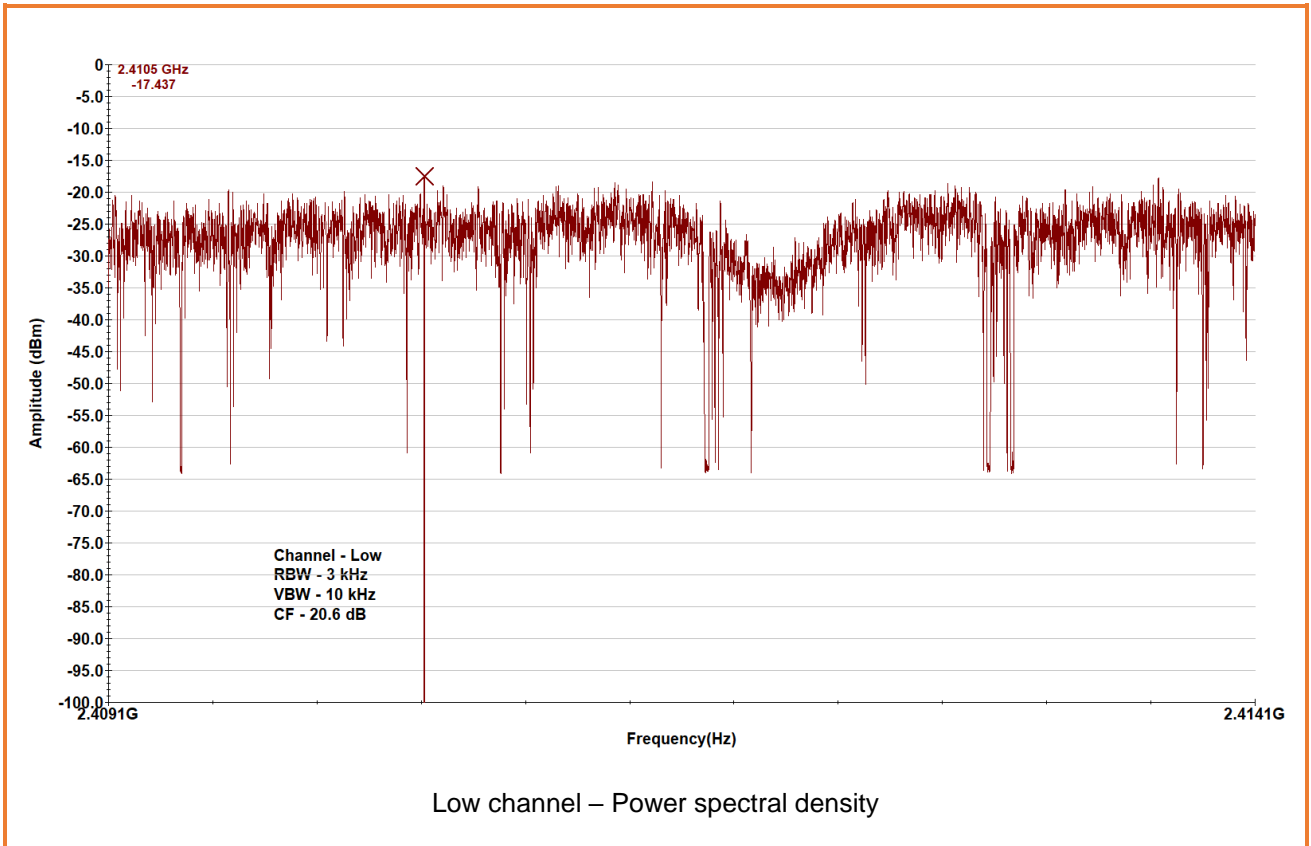
Test Setup

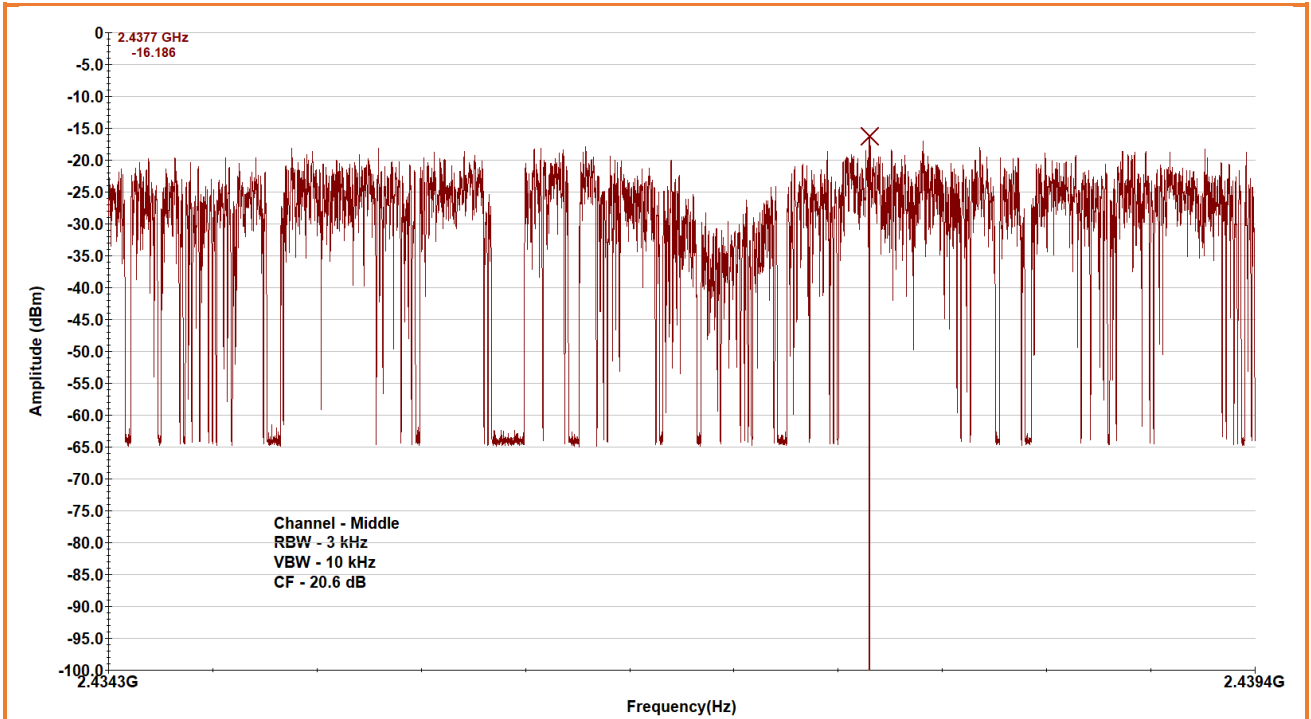
Description of test set-up:



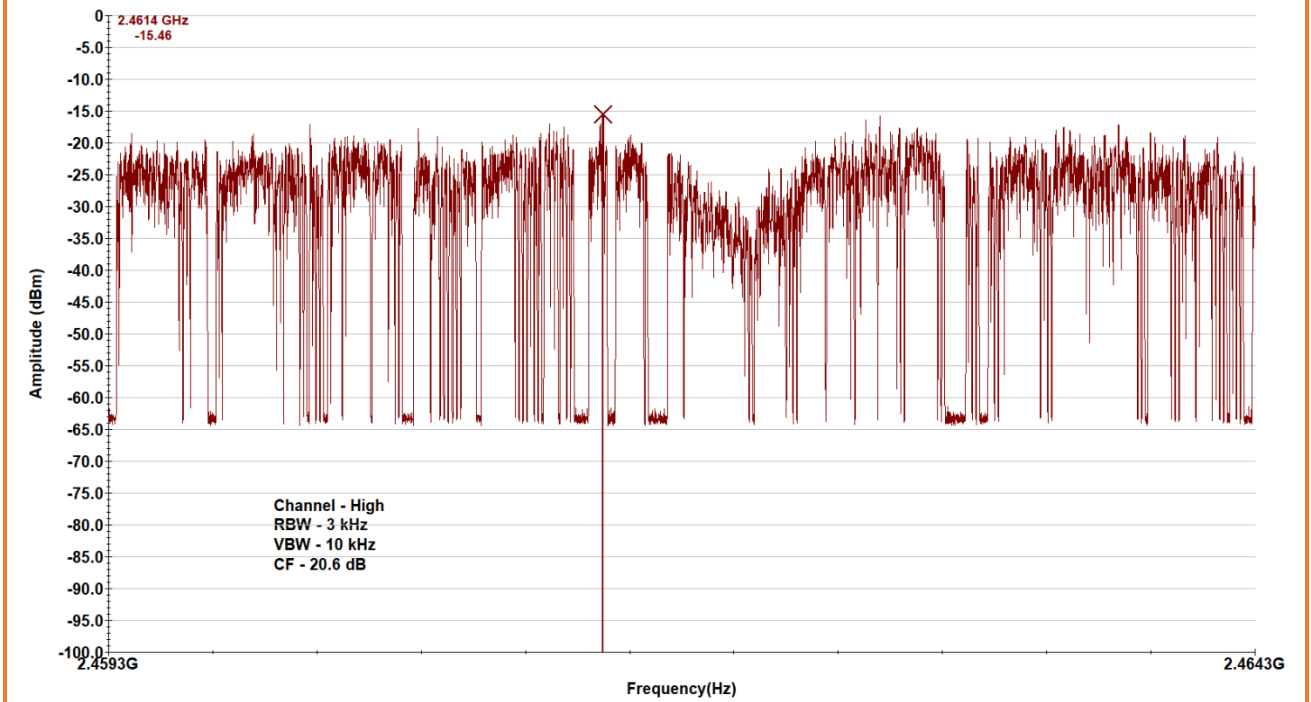
- The EUT was connected directly to the spectrum analyzer/receiver with appropriate attenuation to make sure no signal saturation.
- The EUT was set to **Operation Mode #1 with configuration Mode #1.**

Test Results





Middle channel – Power spectral density



High channel – Power spectral density

3- RF Conducted Peak Output Power

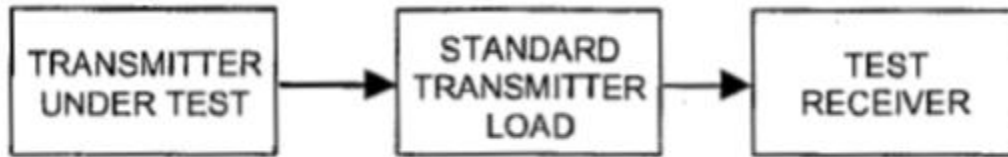
Standard	15.247 (b)(3) RSS-247 5.4 (d)	Room Temperature (°C)			30.1	
Test Method	ANSI C63.10:2013, Clause 6	Relative Humidity (%)			58.1	
Test Location	Richmond lab	Barometric Pressure (kPa)			1012.8	
Test Engineer	Jack Qin	Date of Test			20 July 2022	
Test Equipment Used	Manufacturer	Model	Identifier	Calibration	Calibration due	
Spectrum Analyzer	Agilent	E7405A	272	07 September, 2022	07 September, 2023	
Spectrum Analyzer	Keysight	N9038A	702	02 November, 2022	02 November, 2023	
RF Cable	MRO	n/a	n/a	IHC ¹	IHC ¹	
EMC Shielded Enclosure	USC	USC-26	374	IHC ²	IHC ²	
Note1) In House Calibration Ref. # 6 Note2) In House Calibration Ref. # 4						
Conducted Peak Output Power Measurements						
Channel	Frequency (GHz)	Un-Corrected output power (dBm)	System (dB)	Conducted power (dBm)	Limit (dBm)	Results
Low	2.4105	-16.722	20.6	3.878	30	Pass
Middle	2.4377	-15.396	20.6	5.204	30	Pass
High	2.4614	-14.631	20.6	5.969	30	Pass
Compliant <input checked="" type="checkbox"/>		Non-Compliant <input type="checkbox"/>		Not Applicable <input type="checkbox"/>		

Test Method

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. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e) of RSS-247.

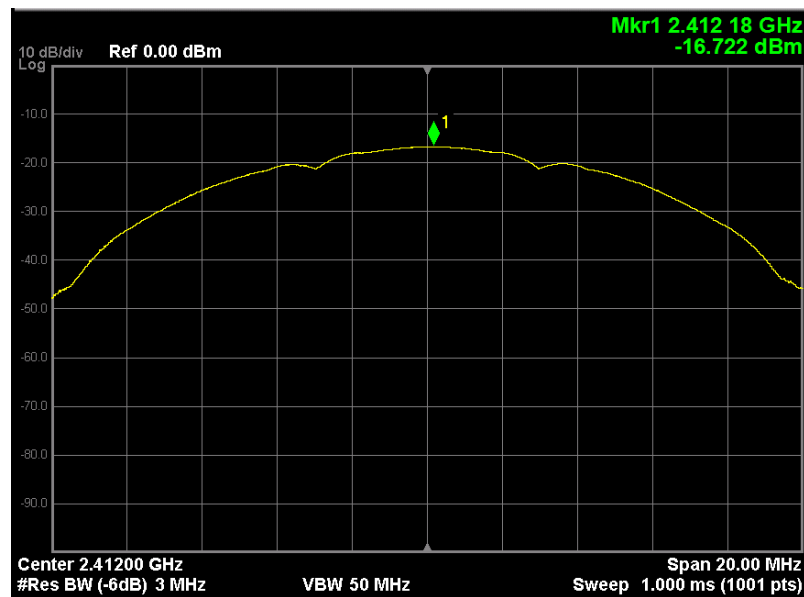
Test Setup

Description of test set-up:

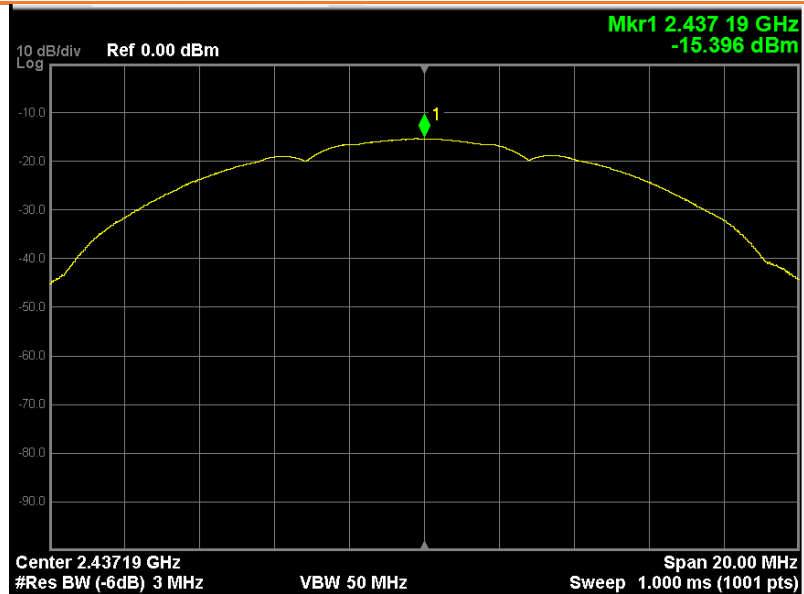


- The EUT was connected directly to the spectrum analyzer/receiver with appropriate attenuation to make sure no signal saturation.
- The EUT was set to **Operation Mode #1 with configuration Mode #1**.

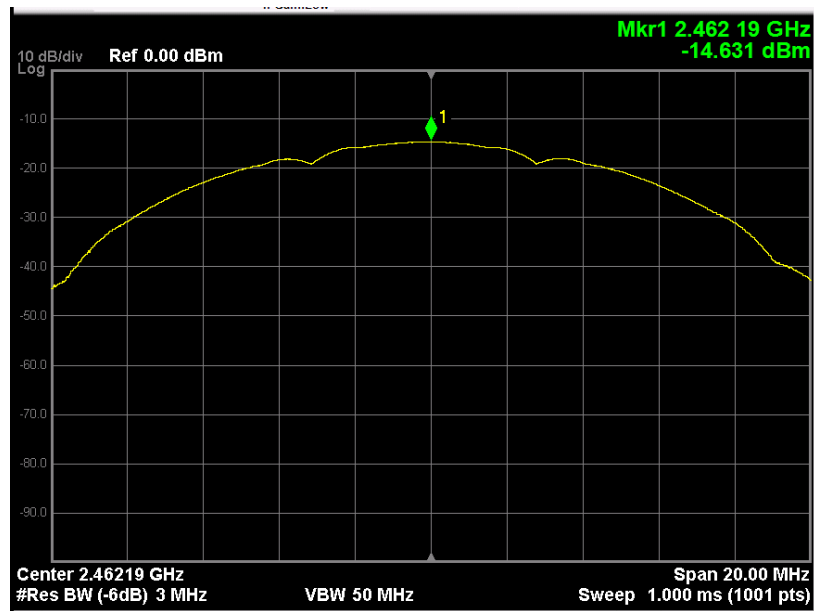
Test Results



Low channel – Conducted peak power



Middle channel – Conducted peak power



High channel – Conducted peak power

4- Conducted Spurious Emissions

Standard	FCC part 15.247(d), FCC part 15.205, FCC part 15.209(a), RSS-247 5.5	Room Temperature (°C)	30.1		
Test Method	ANSI C63.10:2013, Clause 6	Relative Humidity (%)	58.1		
Test Location	Richmond	Barometric Pressure (kPa)	1012.8		
Test Engineer	Jack Qin	Date of Test	July 15 2022		
Test Equipment Used	Manufacturer	Model	Identifier	Calibration	Calibration due
Spectrum Analyzer	Agilent	E7405A	272	07 September, 2022	07 September, 2023
RF Cable	MRO	n/a	n/a	IHC ¹	IHC ¹
Attenuator(s)	As needed	n/a	n/a	IHC ¹	IHC ¹
Note1) In House Calibration Ref. # 6 Note2) In House Calibration Ref. # 7					
Detector:	<input checked="" type="checkbox"/> Peak				
Distance:	<input checked="" type="checkbox"/> Direct				
Arrangement of EUT:	<input checked="" type="checkbox"/> Table-top only <input type="checkbox"/> Floor-standing only <input type="checkbox"/> Rack Mounted				
Compliant <input checked="" type="checkbox"/> Non-Compliant <input type="checkbox"/> Not Applicable <input type="checkbox"/>					

Test Method

This test ensures the RF peak power output of the EUT does not exceed the limits as specified in 15.247(d), 15.205, 15.209(a), and RSS-247 5.5 for systems employing, frequency hopping, digital modulation, and/or other modulation techniques operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.

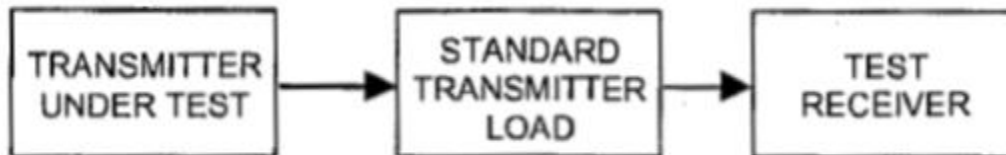
FCC part 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the 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)). MEASUREMENT METHOD: As called by the standards above. Conducted spurious emissions were measured up to 25GHz

Emissions emitted outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

Worse case data is shown.

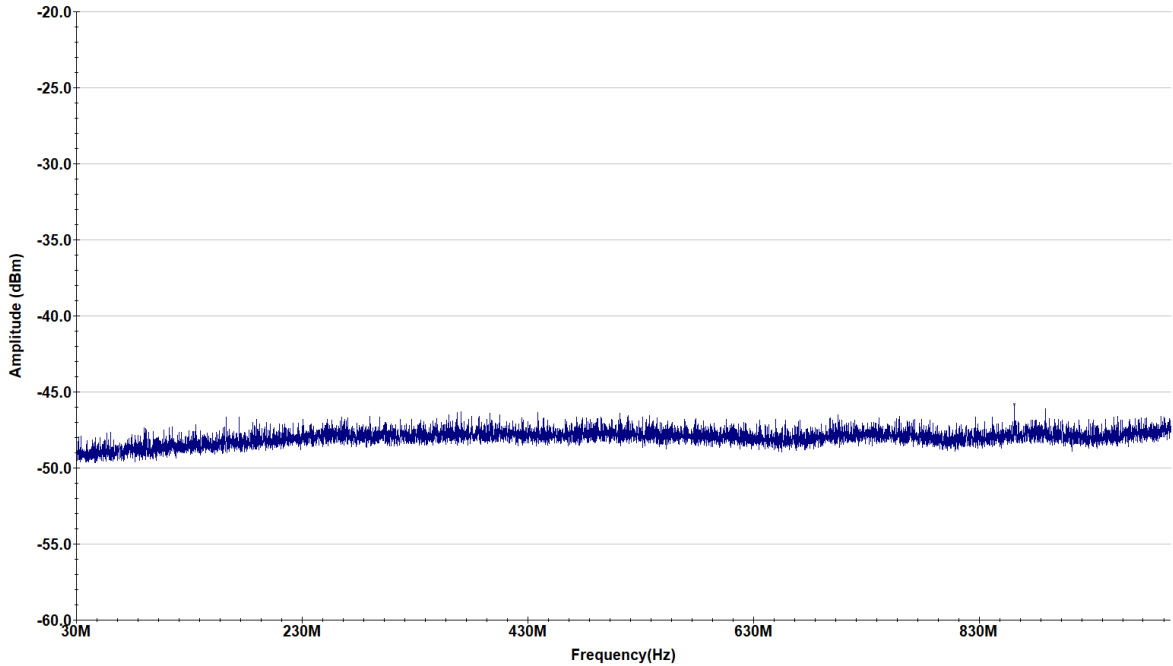
Test Setup

Description of test set-up:

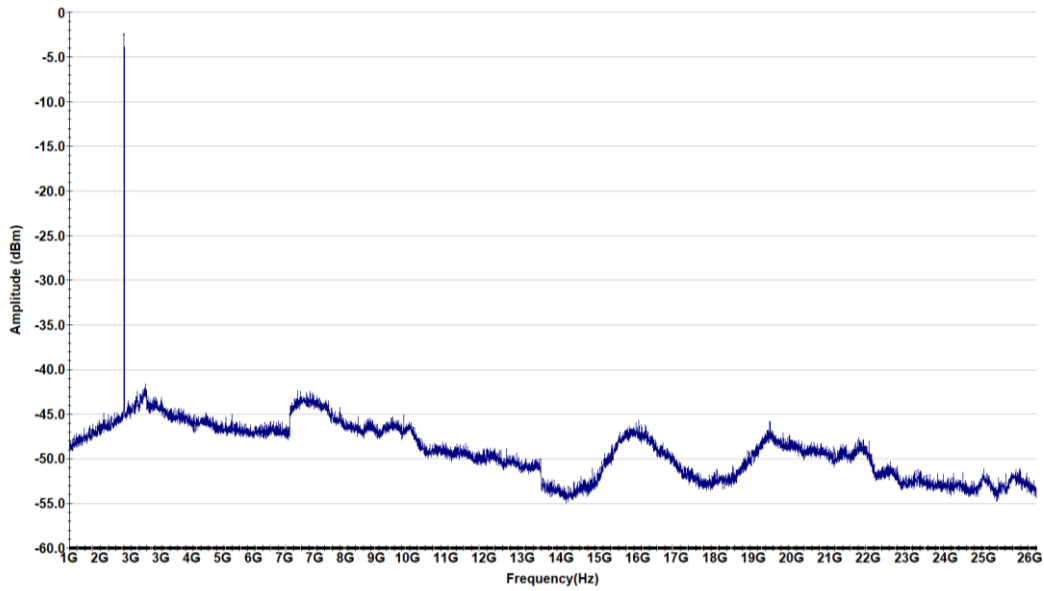


- The EUT was connected directly to the spectrum analyzer/receiver with appropriate attenuation to make sure no signal saturation.
- The EUT was set to **Operation Mode #1 with configuration Mode #1.**

Test Results



Conducted Spurious Emission 30 MHz – 1 GHz



Conducted Spurious Emission 1 GHz – 26 GHz

5- Frequency Stability (Temperature/Voltage Variation)

standard	FCC Part 2.1055 (a) (1) & (b) FCC Part 2.1055 (d)(1) FCC Part 15.215(c)	Room Temperature (°C)	30.1		
Test Method	RSS-Gen Issue 5 (6.11) ANSI C63.10:2013, Clause 6	Relative Humidity (%)	58.1		
Test Location	Richmond lab	Barometric Pressure (kPa)	1012.8		
Test Engineer	Zara Vali	Date of Test	July 16 2022		
Test Equipment Used	Manufacturer	Model	Identifier	Calibration	Calibration due
Spectrum Analyzer	Agilent	E7405A	272	07 September, 2022	07 September, 2023
Spectrum Analyzer	Keysight	N9038A	702	02 November, 2022	02 November, 2023
Temperature Chamber	Haida international equipment Co., LTD	HD-E702-100-7	1068	calibration not required	calibration not required
RF Cable	MRO	n/a	n/a	IHC ¹	IHC ¹
Note1) In House Calibration Ref. # 6 Note2) In House Calibration Ref. # 7					
Limit: ± 0.01% or 100 PPM at ~2.4 GHz = ~0.24 MHz					
Compliant <input checked="" type="checkbox"/> Non-Compliant <input type="checkbox"/> Not Applicable <input type="checkbox"/>					

Test Method

EUT with external SMA connector was setup inside the temperature chamber and test equipment configured to provide continuous measurement. The temperature was varied over the manufacturer's temperature range specified and continuous measurement of the transmitter frequency made.

The battery voltage was adjusted using a battery at full capacity and a depleted battery while the EUT frequency was monitored.

Test Setup



- The EUT was connected directly to the spectrum analyzer/receiver with appropriate attenuation to make sure no signal saturation.
- The EUT was set to Operation Mode #1 with configuration Mode #1.



Test Results

The manufacturer's declared temperature range is -20 to 50C.

Temperature (C)	Low channel		Middle channel		High Channel	
	Frequency (MHz)	Power (dBm)	Frequency (MHz)	Power (dBm)	Frequency (GHz)	Power (dBm)
50	2411.63	3.542	2436.81	4.653	2461.76	5.337
40	2411.62	3.641	2436.84	4.865	2461.75	5.541
30	2411.61	3.759	2436.86	5.003	2461.73	5.732
20	2411.62	3.878	2436.85	5.204	2461.77	5.969
10	2411.60	4.102	2436.81	5.412	2461.76	6.210
0	2411.63	4.351	2436.83	5.630	2461.72	6.431
-10	2411.64	4.570	2436.82	5.823	2461.75	6.599
-20	2411.62	4.699	2436.84	6.112	2461.71	6.814

Variance per channel is within the range of 0.04 – 0.06 MHz which is less than 0.24 MHz
The fundamental emission is within at least the central 80% of the permitted band.

The voltage supplied to the EUT was varied using a battery at full capacity and a 'used' battery at rated minimum voltage while continuously monitoring the frequency of the EUT. The maximum voltage dependent frequency variation of the EUT was within the central 80% of the permitted band.

6- 99% Occupied Bandwidth

Standard	RSS-Gen Issue 5, section 6.7	Room Temperature (°C)	30.1		
Test Method	-	Relative Humidity (%)	58.1		
Test Location	Richmond	Barometric Pressure (kPa)	1012.8		
Test Engineer	Jack Qin	Date of Test	July 10, 2022		
Test Equipment Used	Manufacturer	Model	Identifier	Calibration	Calibration due
Spectrum Analyzer	Agilent	E7405A	272	07 September, 2022	07 September, 2023
RF Cable	MRO	n/a	n/a	IHC ¹	IHC ¹
Note1) In House Calibration Ref. # 6 Note2) In House Calibration Ref. # 7					
Detector:	<input checked="" type="checkbox"/> Peak				
RBW/VBW:	<input checked="" type="checkbox"/> 120/300kHz				
Arrangement of EUT:	<input checked="" type="checkbox"/> Table-top only <input type="checkbox"/> Floor-standing only <input type="checkbox"/> Rack Mounted				
Compliant <input checked="" type="checkbox"/> Non-Compliant <input type="checkbox"/> Not Applicable <input type="checkbox"/>					

Test Method

Based on the RSS- Gen:

The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

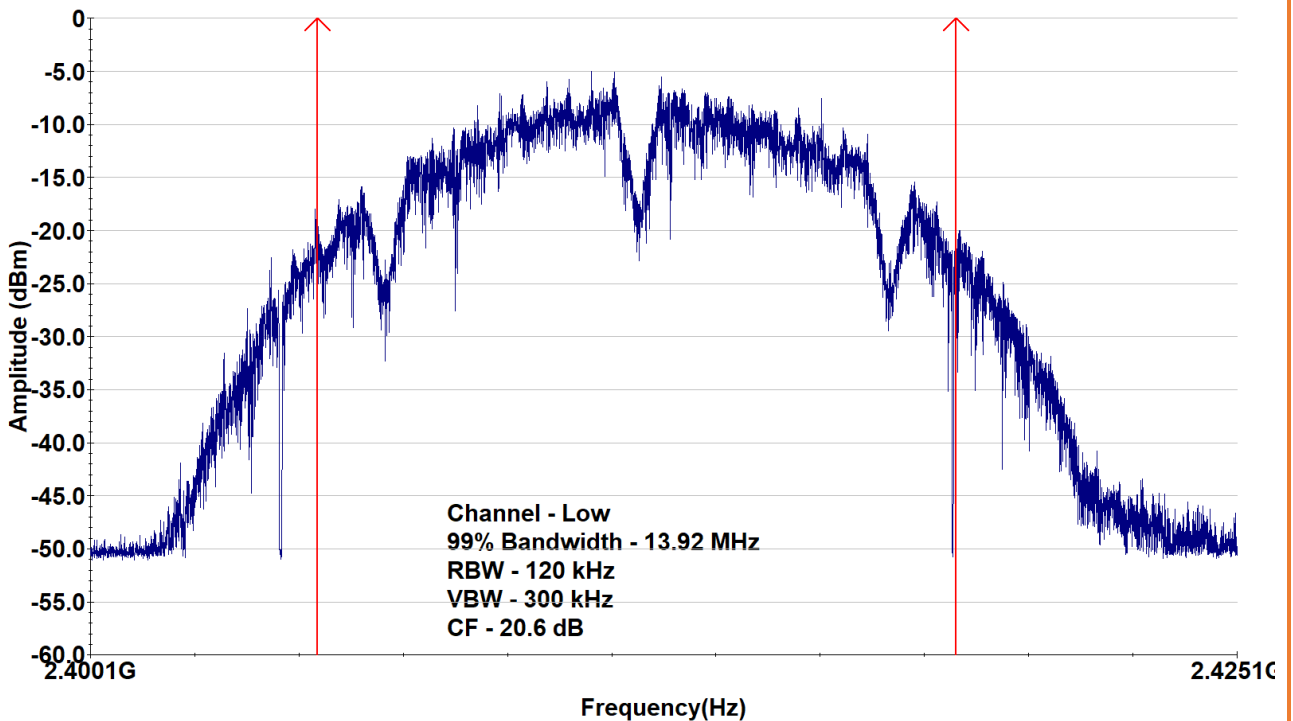
Test Setup



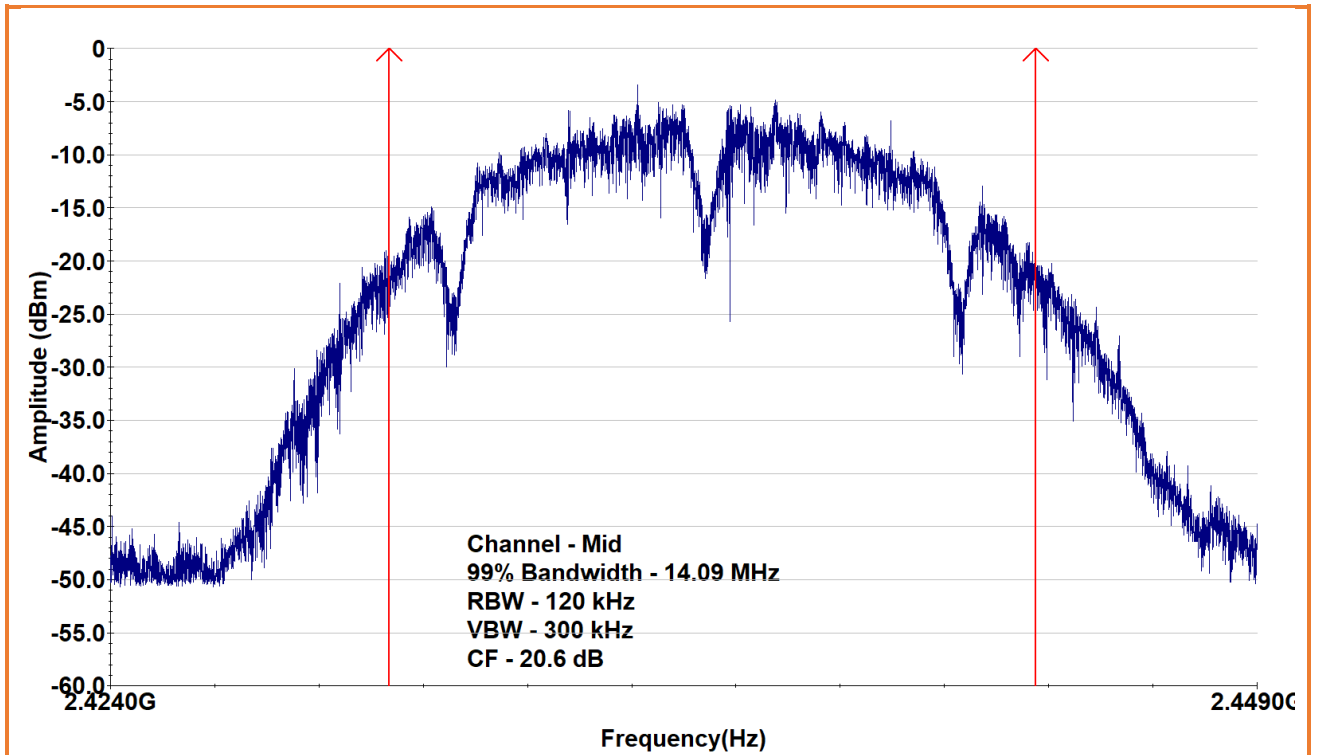
- The EUT was connected directly to the spectrum analyzer/receiver with appropriate attenuation to make sure no signal saturation.
- The EUT was set to Operation Mode #1 with configuration Mode #1.

Test Results

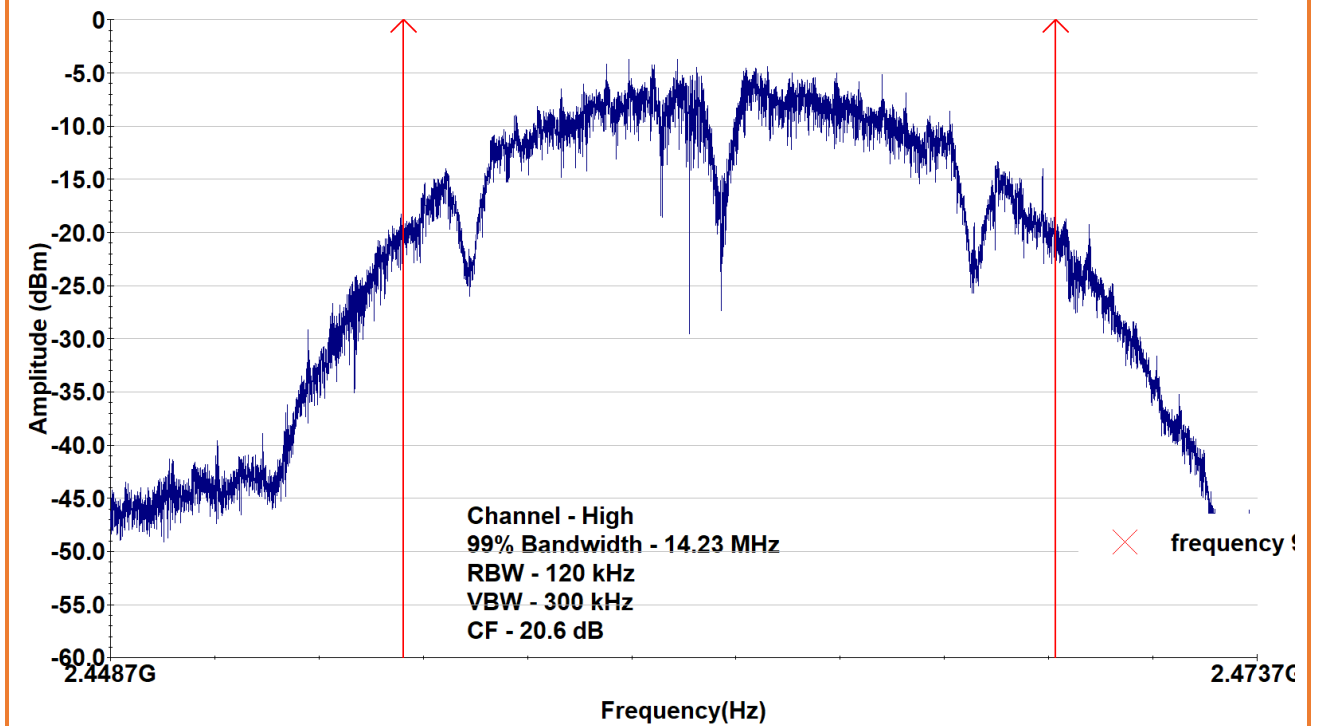
Channel	Frequency (MHz)	Bandwidth (MHz)	Result
Low	2412	13.92	Pass
Mid	2437	14.09	Pass
High	2462	14.23	Pass



Low Channel : 99% occupied bandwidth



Mid Channel : 99% occupied Bandwidth



High Channel : 99% occupied Bandwidth

7- Out of Band Emissions (Band Edge)

Standard	FCC Part 15.247 (d)	Room Temperature (°C)	30.1		
Test Method	RSS Gen Issue 5	Relative Humidity (%)	58.1		
Test Location	Richmond	Barometric Pressure (kPa)	1012.8		
Test Engineer	Jack Qin	Date of Test	July 10, 2022		
Test Equipment Used	Manufacturer	Model	Identifier	Calibration	Calibration due
Spectrum Analyzer	Agilent	E7405A	272	07 September, 2022	07 September, 2023
RF Cable	MRO	n/a	n/a	IHC ¹	IHC ¹
Note1) In House Calibration Ref. # 6 Note2) In House Calibration Ref. # 7					
Detector:	<input checked="" type="checkbox"/> Peak				
RBW/VBW:	<input checked="" type="checkbox"/> 120/300kHz				
Arrangement of EUT:	<input checked="" type="checkbox"/> Table-top only <input type="checkbox"/> Floor-standing only <input type="checkbox"/> Rack Mounted				
Compliant <input checked="" type="checkbox"/> Non-Compliant <input type="checkbox"/> Not Applicable <input type="checkbox"/>					

Test Method

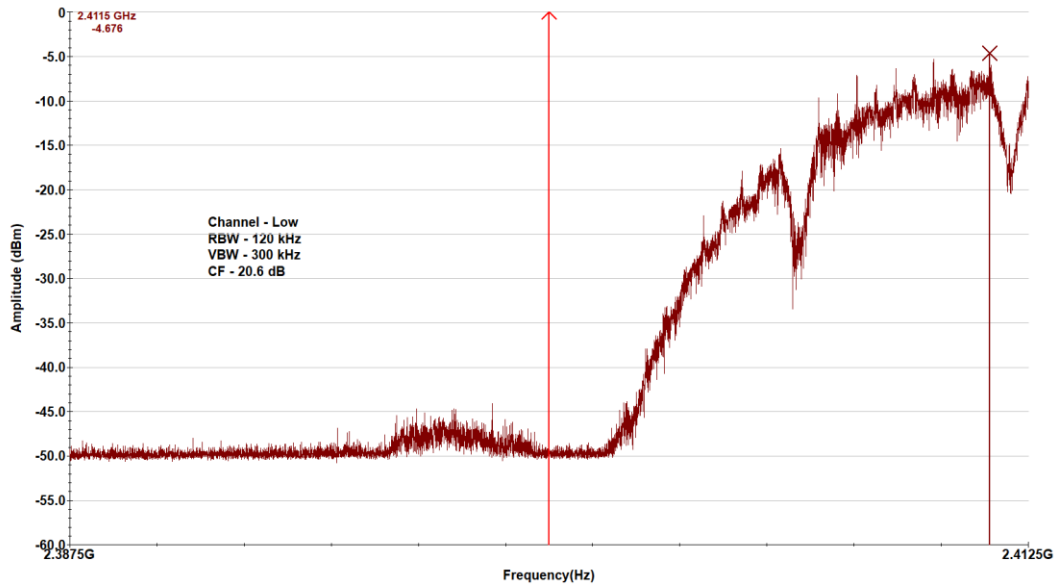
Based on the FCC part 15. 247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth 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)).

Test Setup

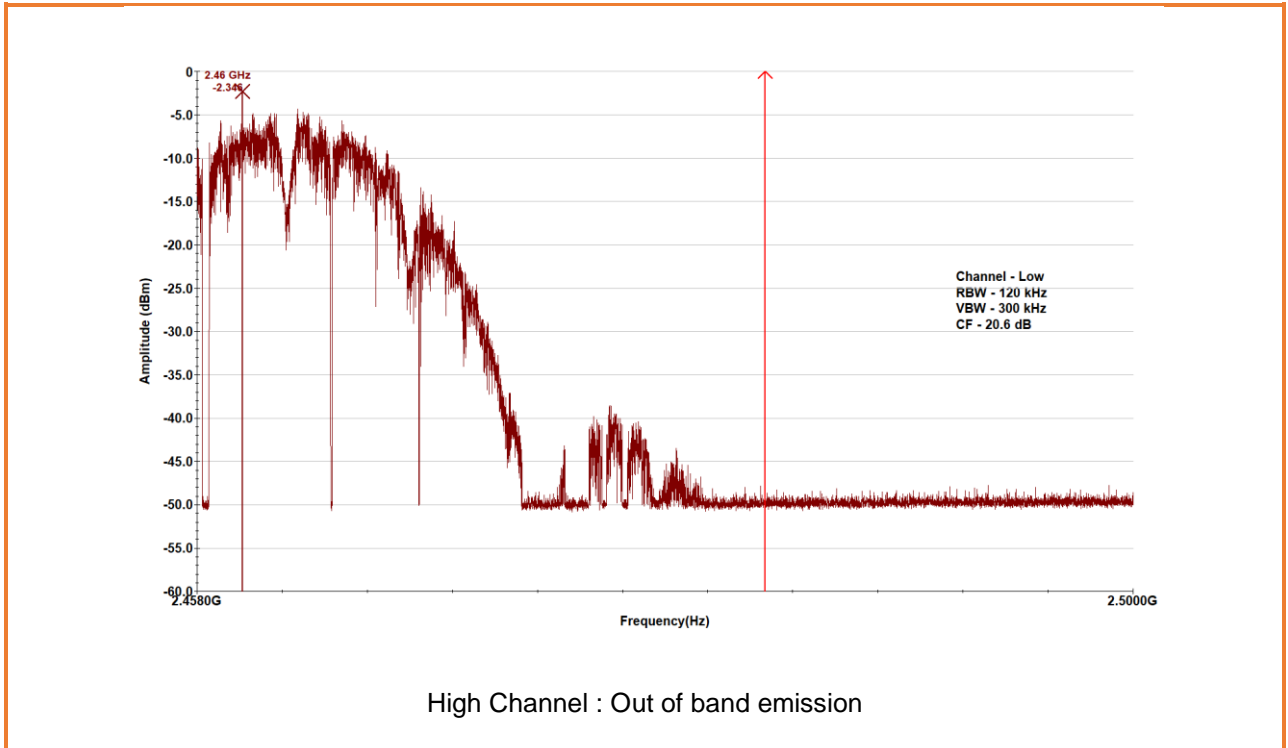


- The EUT was connected directly to the spectrum analyzer/receiver with appropriate attenuation to make sure no signal saturation.
- The EUT was set to Operation Mode #1 with configuration Mode #1.

Test Results



Low Channel : Out of band emission



8- Radiated Spurious Emissions – Transmit Mode

Standard	FCC Part 15.247 (d) FCC Part 15.209 FCC Part 15.205 RSS-Gen Issue 5	Room Temperature (°C)	30.1		
Test Method	ANSI C63.4	Relative Humidity (%)	58.1		
Test Location	Richmond	Barometric Pressure (kPa)	1012.8		
Test Engineer	Zara Vali	Date of Test	12 July 2022		
Test Equipment Used	Manufacturer	Model	Identifier	Calibration	Calibration due
Spectrum Analyzer	Agilent	E7405A	272	07 September, 2022	07 September, 2023
Double-ridged Guide Horn Antenna	A.H.Systems	SAS-571	227C	13 Sep 2022	13 Sep 2024
Broadband Antenna	Sunol	JB1	371	24 September, 2020	24 September, 2022
Loop Antenna	ComPower	AL-130	241	12 Jan 2022	12 Jan 2024
Horn Antenna	A.H.Systems	SAS-572	227D	NA	NA
RF Cable	MRO	n/a	n/a	IHC ¹	IHC ¹
EMC Shielded Enclosure	USC	USC-26	374	IHC ²	IHC ²
Used Template of Tile 7!					
Note1) In House Calibration Ref. # 6 Note2) In House Calibration Ref. # 4					
Frequency Range:	<input checked="" type="checkbox"/> 150kHz-30MHz		<input checked="" type="checkbox"/> 30-1000MHz		<input checked="" type="checkbox"/> 1- 18 GHz
	<input checked="" type="checkbox"/> 18-26.5GHz				
Detector:	<input checked="" type="checkbox"/> Peak		<input checked="" type="checkbox"/> Quasi-Peak/AVG		
RBW/VBW:	<input type="checkbox"/> 9/30kHz		<input checked="" type="checkbox"/> 120/300kHz		<input checked="" type="checkbox"/> 1/3MHz
Type of Facility:	<input checked="" type="checkbox"/> SAC		<input type="checkbox"/> FSOATS		<input type="checkbox"/> <i>in-situ</i>
Distance:	<input checked="" type="checkbox"/> 3meter		<input type="checkbox"/> 10meter		<input type="checkbox"/> 1meter
Arrangement of EUT:	<input checked="" type="checkbox"/> Table-top only		<input type="checkbox"/> Floor-standing only		<input type="checkbox"/> Rack Mounted
Classification:	<input checked="" type="checkbox"/> Class B		<input type="checkbox"/> Class A		
Compliant <input checked="" type="checkbox"/> Non-Compliant <input type="checkbox"/> Not Applicable <input type="checkbox"/>					

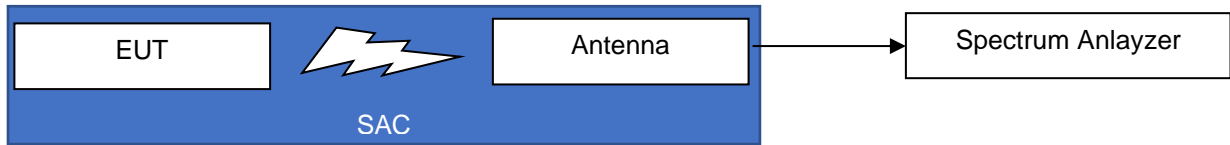
Test Setup

Description of test set-up:

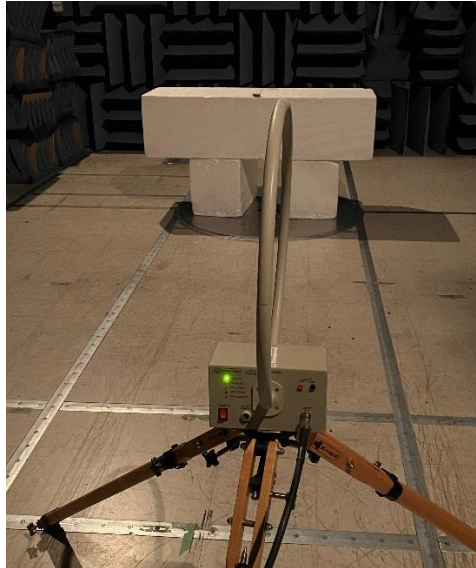
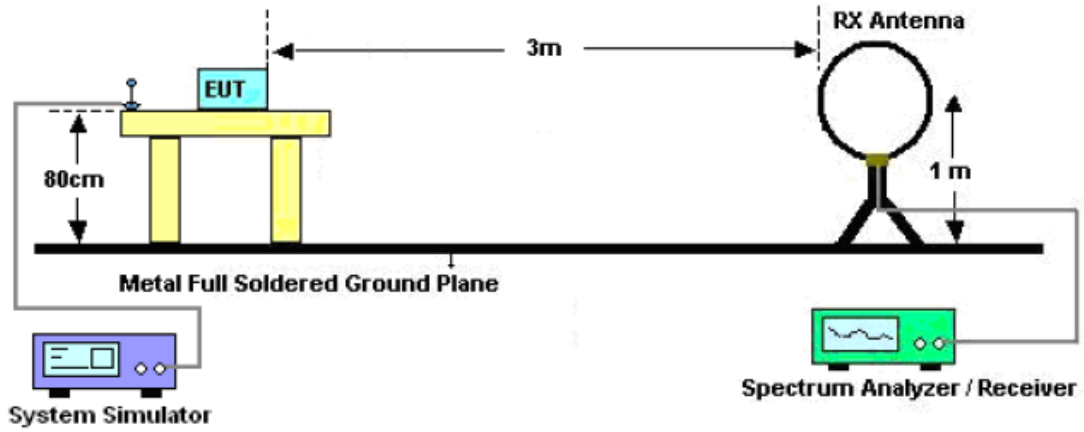
The EUT was placed on a 0.8 m non-conducting table above a Turn table in SAC (below 1 GHz).

The EUT was placed on a 1.5m non-conducting table above a ground reference plane (GRP)(above 1 GHz).

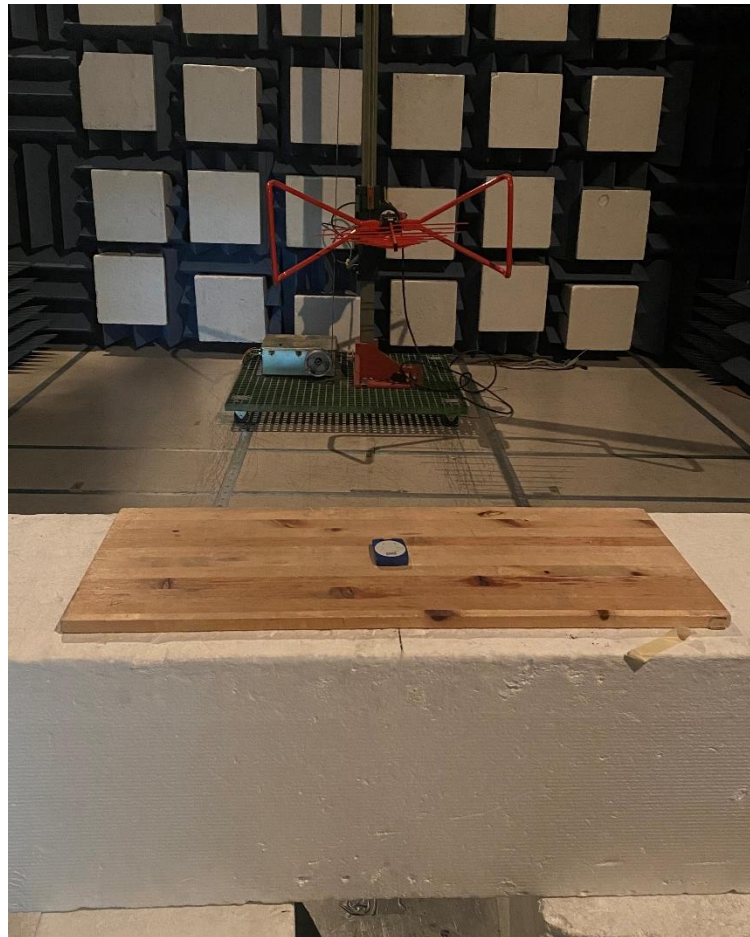
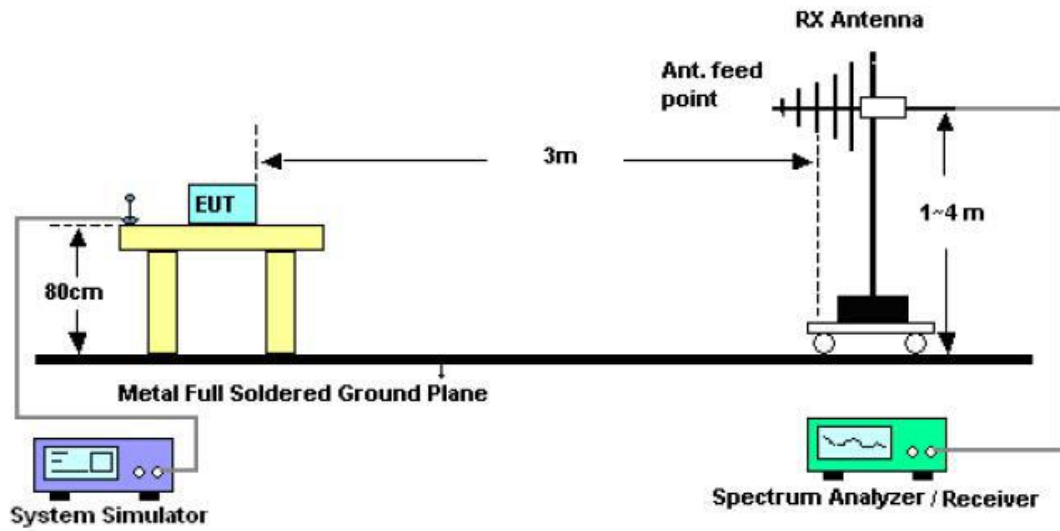
The EUT was set to **Operation Mode #1 with configuration Mode #1.**



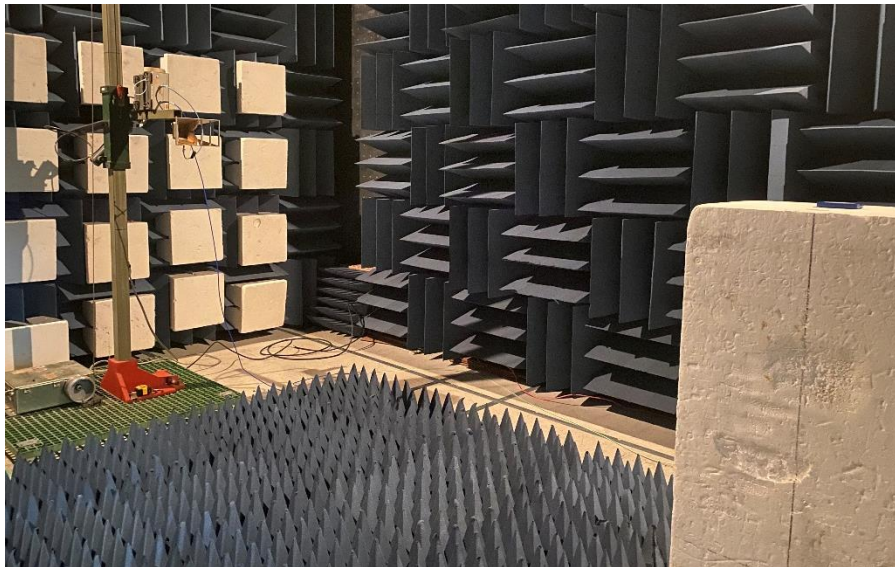
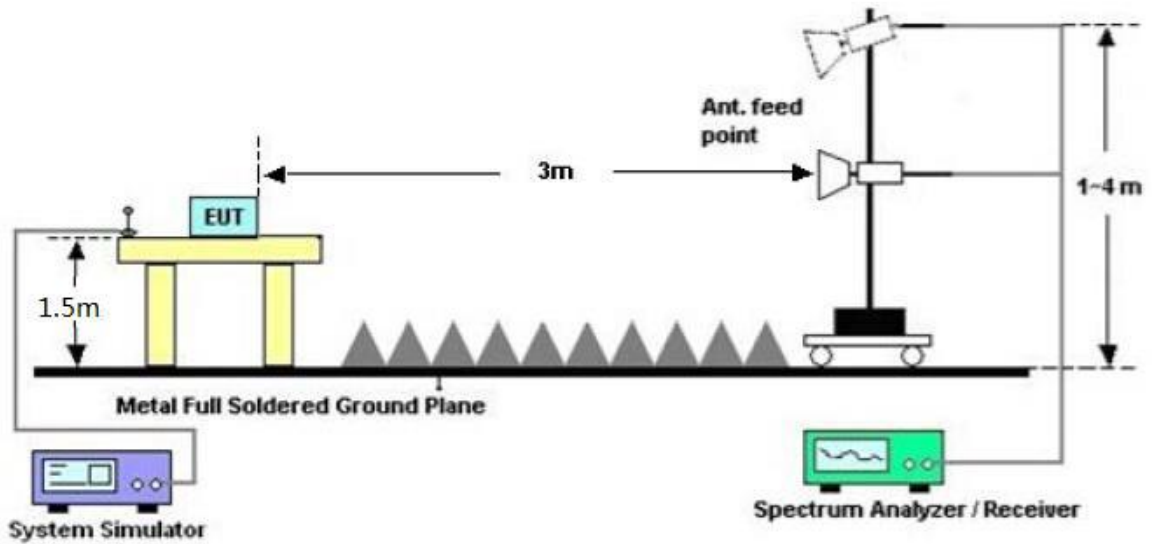
- Radiated Emission below 30MHz, with AL-130



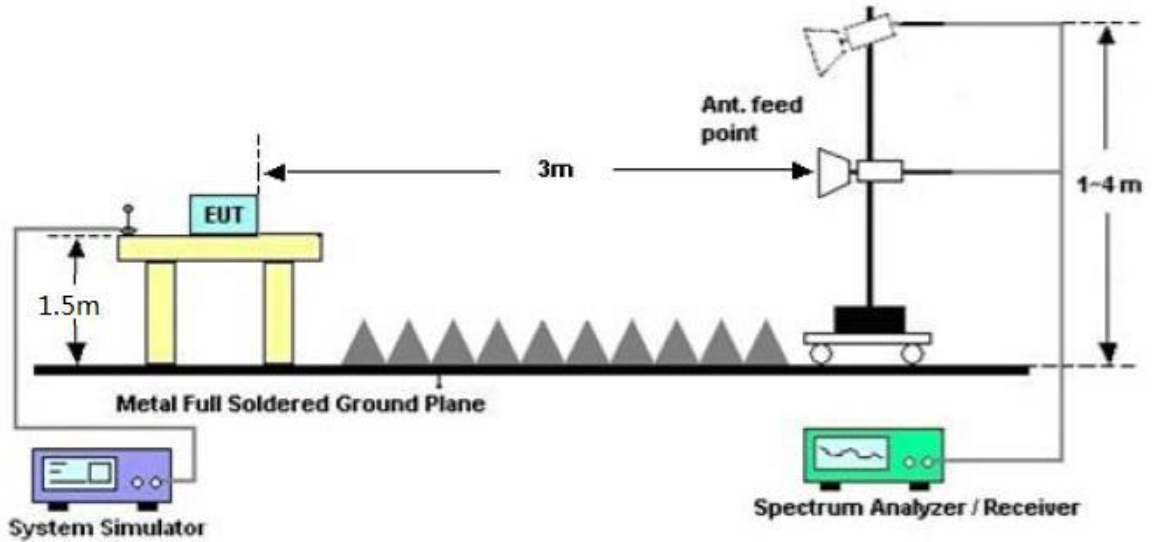
- Radiated Emission 30 to 1,000MHz, with JB-1



- Radiated Emission 1 to 18GHz, with SAS-571



- Radiated Emission 18 to 26 GHz, with SAS-572 Antenna



Test Method

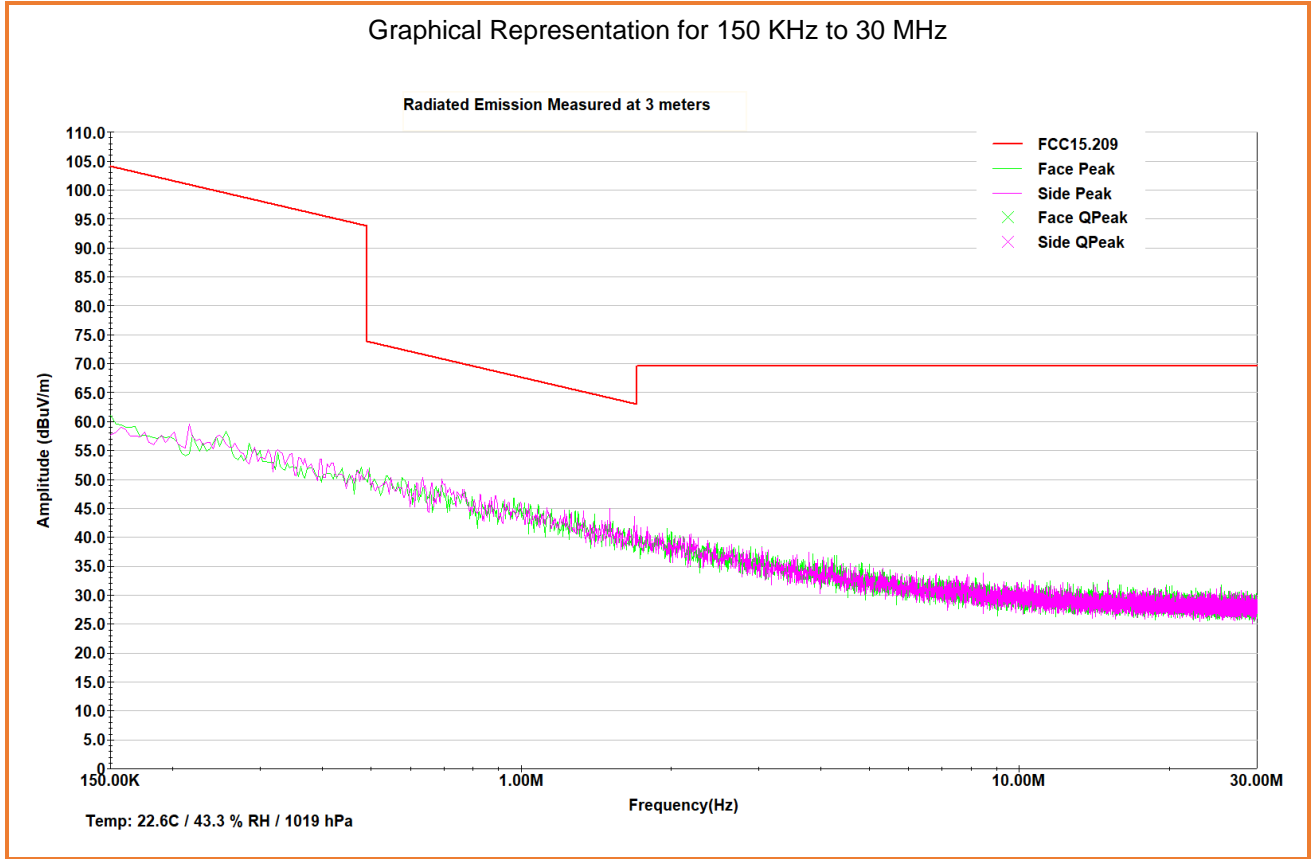
This test measures the radiating levels from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Testing was performed in accordance with the test standard(s) referenced in the test summary section of this report. The EUT was configured based upon the requirements of the applicable test standard. Initially, the primary emission frequencies are identified by positioning a broadband receive antenna three meter from the EUT.

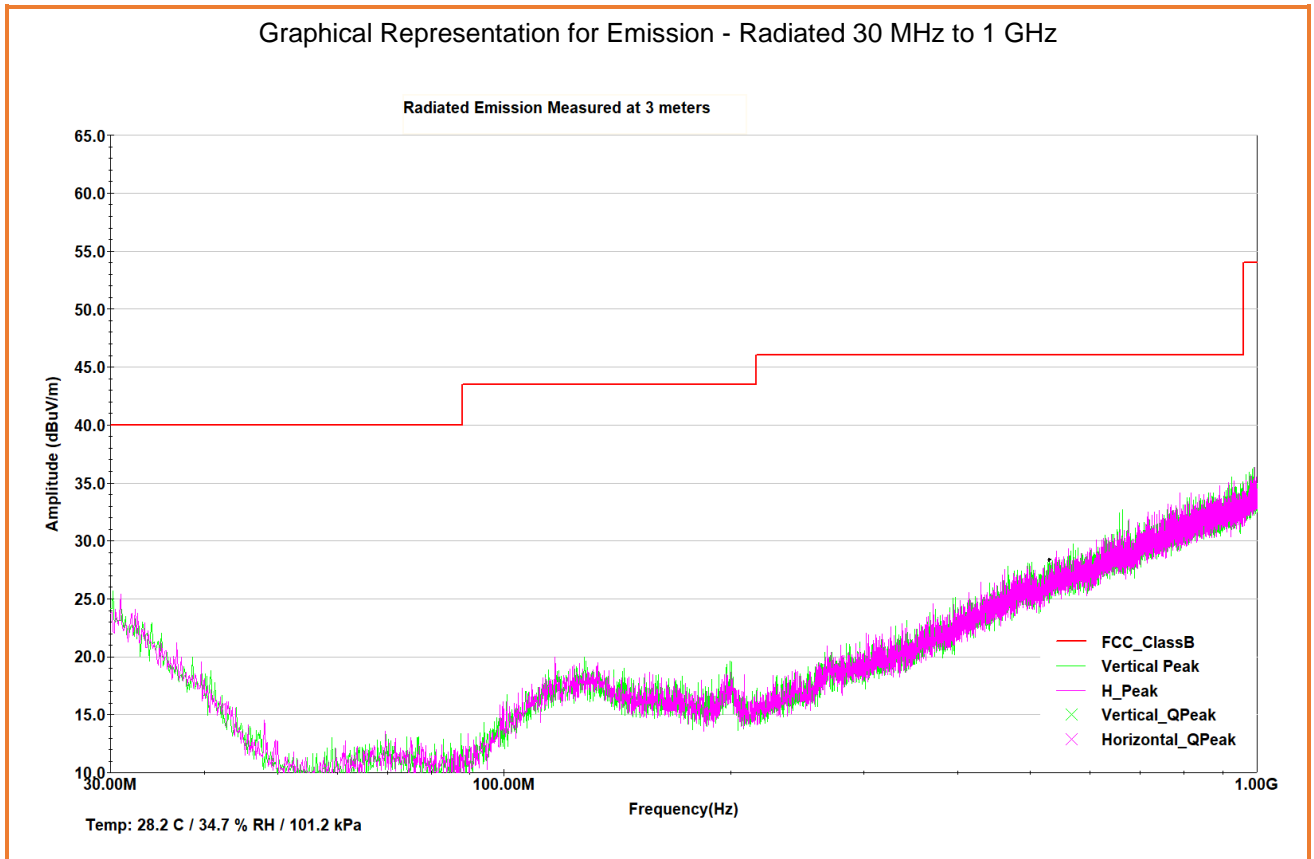
A scan was made with an EMC Analyzer, controlled by EMC Test Software, Tile7!, with the receiver in the peak mode. The IF bandwidth was 120 kHz (under 1GHz) and 1MHz(over 1GHz).To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters and rotated to produce horizontal and vertical polarities while the turntable is rotated to determine the worst emitting configuration.

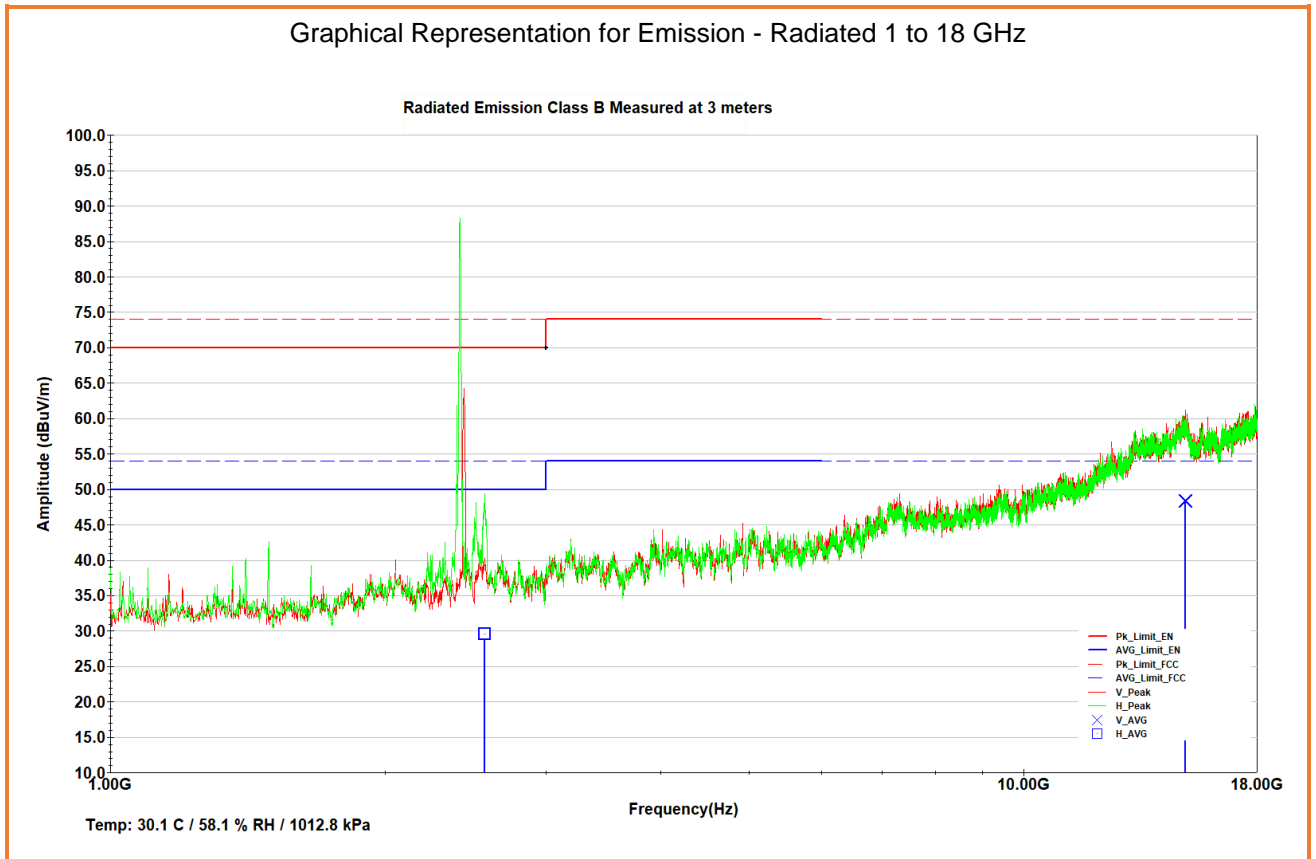
Measurements were then made using CISPR quasi peak (under 1 GHz) and Averaging (over 1GHz) when the peak readings were within 10dB of the limit line. The numerical results are included herein to demonstrate compliance. Worse case data is shown.

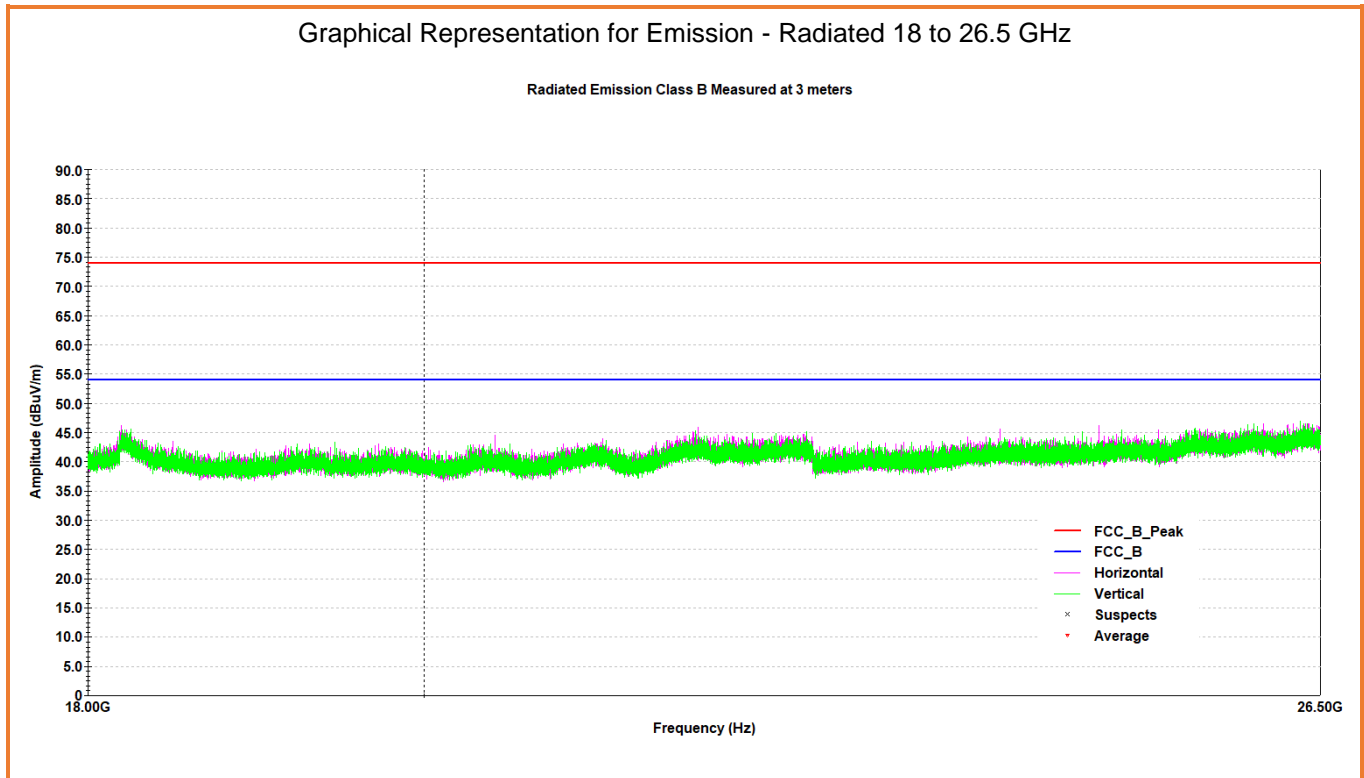
Emission level (dBuV/m) = Quasi-Peak detected level (dBuV) +Cable Loss (dB) + Antenna Factor (dB/m)

Test Result









9- Antenna Requirement

Standard	FCC Part 15.203 RSS-Gen Issue 5	Room Temperature (°C)	30.1
Test Method	Inspection	Relative Humidity (%)	58.1%
Test Location	Richmond lab	Barometric Pressure (kPa)	1012.8
Test Engineer	Jack Qin	Date of Test	May 18, 2022
Compliant <input checked="" type="checkbox"/> Non-Compliant <input type="checkbox"/> Not Applicable <input type="checkbox"/>			

Test Method

According to §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.

Test Results

The EUT has an internal antenna and is not accessible to the end user. Accordance to the above sections, it is considered sufficient to comply with the provisions of these section.

END OF REPORT