TEST REPORT

Test Report No.: UL-RPT-RP-14296454-1216-FCC

Applicant	:	AS America, Inc. d/b/a LIXIL Americas
Model No.	:	NextGen IR faucet
FCC ID	:	2ACNC-7XXBX05-002
Technology	:	Bluetooth – Low Energy
Test Standard(s)	:	FCC Parts 15.207, 15.209(a) & 15.247
		For details of applied tests refer to test result summary

1. This test report shall not be reproduced in full or partial, without the written approval of UL International Germany GmbH.
2. The results in this report apply only to the sample tested.
3. The test results in this report are traceable to the national or international standards.
4. **Test Report Version 1.2 supersede Version 1.1 with immediate effect**
   Test Report No. UL-RPT-RP-14296454-1216-FCC Version 1.2, Issue Date 24 OCTOBER 2022 replaces
   Test Report No. UL-RPT-RP-14296454-1216-FCC Version 1.1, Issue Date 04 OCTOBER 2022, which is no longer valid.
5. Result of the tested sample: **PASS**

Prepared by: Muhammad Faiq Khan
Title: Project Engineer
Date: 24 October 2022

Approved by: Rachid, Acharkaoui
Title: Operations Manager
Date: 24 October 2022

DAkkS Deutsche Akkreditierungsstelle D-PL-19381-02-00

This laboratory is accredited by DAkkS.
The tests reported herein have been performed in accordance with its' terms of accreditation.

UL INTERNATIONAL GERMANY GMBH
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STU.CTECHLab@ul.com

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1. Customer Information

1.1. Applicant Information

Company Name:	AS America, Inc. d/b/a LIXIL Americas
Company Address:	30 Knightsbridge Road Piscataway, NJ 08854, USA
Company Phone No.:	+ 1 855-815-0004
Contact Person:	Mr. Mark Malatesta
Contact E-Mail Address:	malatestam@americanstandard.com
Contact Phone No.:	+1 762-369-4061

1.2. Manufacturer Information

Company Name:	AS America, Inc. d/b/a LIXIL Americas
Company Address:	30 Knightsbridge Road Piscataway, NJ 08854, USA
Company Phone No.:	+ 1 855-815-0004
Contact Person:	Mr. Stanimir Soynov
Contact E-Mail Address:	stanimir.stoynov@lixil.com
Contact Phone No.:	+1 908 227 8873

2. Summary of Testing

2.1. General Information

Applied FCC Rule Part(s)

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.207 and 47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209

Location

Location of Testing:	UL International Germany GmbH Hedelfinger Strasse. 61, 70327 Stuttgart, GERMANY
Registration Number:	399704

Date Information

Order Date:	20 April 2022
EUT Arrived:	11 July 2022
Test Dates:	22 July 2022 to 22 September 2022
EUT Returned:	-/-

2.2. Summary of Test Results

DIGITAL TRANSMISSION SYSTEMS (DTS): 2400-2483.5 MHz					
FCC Part 15 Clause	Compliance Test Description	Test Result			
		C	N.C.	N.P.	N.A.
15.207	Transmitter AC Power Line Conducted Emissions	☒	☐	☐	☐
15.35(c)	Transmitter Duty Cycle (1)	☒	☐	☐	☐
15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	☒	☐	☐	☐
15.247(b)(3)	Transmitter Maximum Peak Output Power	☒	☐	☐	☐
15.247(e)	Transmitter Power Spectral Density (2)	☐	☐	☒	☐
15.247(d) & 15.209(a)	Transmitter Conducted Emissions (3)	☐	☐	☒	☐
15.247(d) & 15.209(a)	Transmitter Radiated Emissions	☒	☐	☐	☐
15.247(d) & 15.209(a)	Transmitter Band Edge Radiated Emissions	☒	☐	☐	☐
C: COMPLIED | N.C.: NOT COMPLIED | N.P.: NOT PERFORMED | N.A.: NOT APPLICABLE					

Note(s):

1. The measurement was performed to assist in the calculation of the average measurements.
2. In accordance with ANSI C63.10-2013 Section 11.10.1, PSD is not required if the maximum conducted output power is less than the PSD limit of 8 dBm / 3 kHz. The PSD level is therefore deemed to be equal to the measured total output power.
3. The Spurious emission measurements were performed Radiated and therefore conducted emissions were not required.

2.3. Methods and Procedures

Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Reference:	FCC KDB 558074 D01 DTS Meas Guidance v05r02 April 2, 2019
Title:	Guidance for compliance measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 of the FCC rules
Reference:	FCC KDB 174176 D01 Line Conducted FAQ v01r01 June 3, 2015
Title:	AC Power-Line Conducted Emissions Frequently Asked Questions

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	American Standard
Model Name or Number:	NextGen IR faucet
Test Sample Serial Number:	775B605.002 (Radiated Test Sample)
Hardware Version Number:	7B05002
Firmware Version Number:	N/A
FCC ID:	2ACNC-7XXBX05-002

Brand Name:	American Standard
Model Name or Number:	NextGen IR faucet
Test Sample Serial Number:	775B605.002 (Conducted Test Sample with U.FL connector)
Hardware Version Number:	N/A
Firmware Version Number:	N/A
FCC ID:	2ACNC-7XXBX05-002

3.2. Description of EUT

The equipment under test was an IoT sensor for Faucet with Model name: NextGen IR faucet, supporting Bluetooth Low Energy operations in 2400-2483.5 MHz ISM band.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Technology Tested:	Bluetooth – Low Energy		
FCC Equipment Classification:	Digital Transmission System (DTS)		
Type of Unit:	Transceiver		
Operating Frequency Range:	2402 MHz to 2480 MHz		
Channel Spacing:	2 MHz		
Tested Data Rate(s) & Modulation(s):	125 kbps	GFSK (Coded)	
	500 kbps	GFSK (Coded)	
	1 Mbps	GFSK (Uncoded)	
	2 Mbps	GFSK (Uncoded)	
Maximum Conducted Output Power:	0.28 dBm		
Tested Antenna(s):	Stitched Antenna		
Declared Antenna Gain:	2 dBi		
Antenna Type:	2.4 GHz FlexPIFA Antenna		
Antenna Details:	Part Nr. 001-0014 Rev 5		
Transmit Channels Tested:	**Channel ID**	**RF Channel**	**Frequency(MHz)**
	Bottom	37	2402
	Middle	17	2440
	Top	39	2480
Power Supply Requirement(s):	110-240V AC , 50-60 Hz via an AC/DC Adaptor		
Highest internally generated clock and/ or oscillator frequency:	8 MHz		

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

A. Support Equipment (In-house)

Item	Description	Brand Name	Model Name or Number	Serial Number
1	Laptop PC with Test Software nRF Connect v3.7.1	HP	HP Probook 650 G1	5CG614419V

B. Support Equipment (Manufacturer supplied)

Item	Description	Brand Name	Model Name or Number	Serial Number
1	AC Adaptor with Backup battery and Failover Lixil	CELEC	PRO2756	Not stated
2	Wooden cabinet with Faucet and Leak detectors to simulate the typical use of the device	CELEC	-/-	-/-
3	U.FL to SMA (Female) RF Cable Length: 10 cm | Attenuation :0.5 dB@2.4 GHz	-/-	-/-	-/-

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):
☒ BT-LE Test Mode: Continuously transmitting modulated carrier with combination of • Data Rate: 125 kbps / 500 kbps / 1 Mbps / 2 Mbps • Packet Type: PRBS9 • Power Settings: 0 dBm • Channel: Bottom / Middle / Top

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- The applicant or manufacturer supplied test setup instructions “IRFPS_UL_radio_setup_instructions’’ issued on 14.06.2022 was used to configure the EUT.

EUT Power Supply:

- The EUT was powered with 120 V AC via an AC/DC Adaptor.

Test Mode Activation:

- The EUT can be connected with the Test laptop via USB cable supplied by the customer. The cables were only used to set the EUT in respective modes and were removed during the measurements.
- The test modes were activated using the test software / Radio Tool “nRF Connect v3.7.1”. This test software / Radio Tool was installed on the customer test laptop to enable continuous transmission and to select the required power levels and the test channels.

AC Conducted Emissions Measurements:

- The EUT radiated sample with Stitched antenna was used for AC conducted emissions measurement.
- For AC conducted line emissions measurement the EUT was powered with an AC/DC Adaptor. The measurements were carried out with 120 VAC / 60 Hz & 240 VAC / 60 Hz.
- The Toyo EMI Software EP5/CE Ver 4.0.1. was used for these measurements.

Conducted Measurements:

- All conducted measurements were carried out by using the EUT RF sample with U.FL connector and U.FL to SMA (Female) RF Cable supplied by the customer. The SMA RF cable’s attenuation (maximum 0.5 dB@2.4GHz) was added to as a reference level offset to each of the conducted plots.

Radiated Measurements:

- The EUT radiated sample with Stitched antenna was used for radiated measurements.
- The measurements were performed with the EUT in standing position as declared by the customer since it is the default position. Therefore, this report includes relevant test results
- For the Radiated measurements under 1 GHz, the EUT was mounted on a wooden cabinet. The cabinet was used to represent the EUT as it would be mounted in end application.
- For the measurements above 1 GHz, the EUT was taken out of this wooden housing cabinet so as to ensure that the EUT is not being covered from any side by the cabinet, during the measurements.
- Radiated measurements below 30 MHz were performed with the EUT positioned on the turn table and rotating 360 degrees while the loop antenna height was set at 100 cm.
- Radiated measurements above 30 MHz were performed with the EUT positioned on the turn table and rotating 360° while the antenna height varies from 1 to 4 m over the measurement frequency range.
- R&S® EMC32 V11.30.00 Software was used for the Radiated spurious emission measurements.

Duty Cycle Correction Details:

- As the EUT continuous transmission of the EUT ($D \geq 98\%$) cannot be achieved and EUT was transmitting continuously with different duty cycle w.r.t different data rates (duty cycle variations are less than ±2%). Therefore, Duty Cycle Correction Factors were added to all average measurements according to the below table, to compute the corrected average values of the emissions that would have been measured had the test been performed at 100% Duty Cycle.

Data rate	Duty cycle	Correction factor
	(%)	(dB)
125 kbps	97.18	0.12
500 kbps	91.32	0.4
1 Mbps	84.97	0.7
2 Mbps	57.34	2.41

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 6 *Measurement Uncertainty* for details.

In accordance with DAkkS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter AC Conducted Spurious Emissions

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	04 August 2022
Test Sample Serial Number:	775B605.002 (Radiated Test Sample)		
Test Site Identification	SR 7/8		

FCC Reference:	Part 15.207
Test Method Used:	ANSI C63.10 Section 6.2 / FCC KDB 174176 and notes below

Environmental Conditions:

Temperature (°C):	23.4
Relative Humidity (%):	41.8

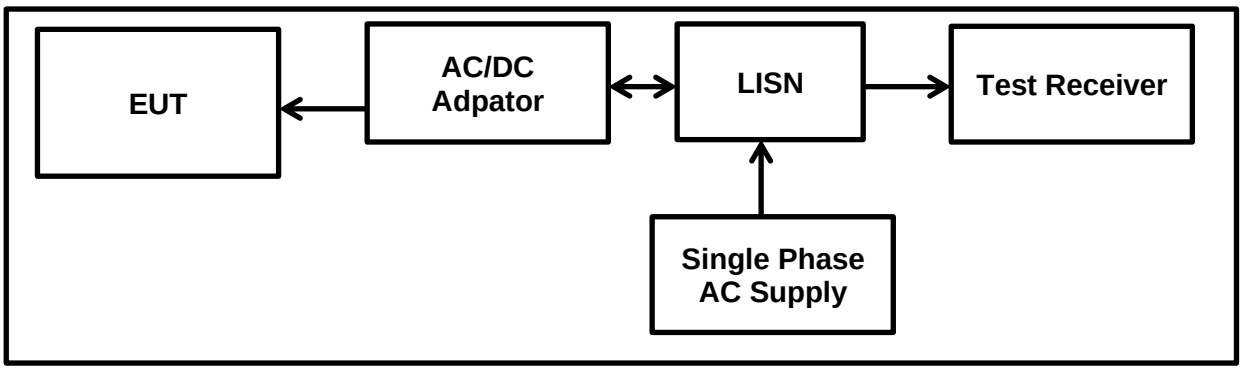
Settings of the Instrument

Detector	Quasi Peak/ Average Peak

Note(s):

1. In accordance with FCC KDB 174176 Q4, tests were also performed with a 240 VAC 60 Hz single phase supply as this was within the voltage range marked on the 100-240 VAC~50/60 Hz power supply.
2. The EUT was powered with the AC/DC Adpator. This Adaptor in turn was powered either with 120 VAC / 60 Hz and 240 VAC / 60 Hz.
3. The EUT was configured with the following modes:
   - BT-LE | 500 kbps | PRBS9 | PWR 0 dBm | Mid Channel | Stitched Antenna
4. Pre-scans were performed, and markers placed on the highest live and neutral measured levels. Final measurements were performed on the marker frequencies and the results entered into the tables below.
5. The final measured value, for the given emission, in the table below incorporates the cable loss.
6. All other emissions shown on the pre-scan plot were investigated. Only the highest 6 emissions have been reported in the tables below in accordance with ANSI C63.10 section 6.2.5.
7. Measurements were performed in shielded room (SR7/ 8 Asset Number 1603671). The EUT was placed at a height of 80 cm above the reference ground plane and in a distance of 40 cm from the vertical ground plane at the edge of the table.
8. Measurement software used: Toyo EMI Software; CE measurement software EP5/CE Ver 4.0.1.

Test Setup:



Transmitter AC Conducted Spurious Emissions (continued)

Results: BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Mid Channel / Stitched Antenna

Results: Live / Quasi Peak / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.433070	Live	20.90	57.20	36.30	Complied
6.139280	Live	12.00	60.00	48.00	Complied
11.504010	Live	11.30	60.00	48.70	Complied

Results: Live / Average / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.433070	Live	10.60	47.20	36.60	Complied
6.139280	Live	7.40	50.00	42.60	Complied
11.504010	Live	6.70	50.00	43.30	Complied

Results: Neutral / Quasi Peak / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.238680	Neutral	18.30	62.10	43.80	Complied
0.765730	Neutral	10.20	56.00	45.80	Complied
3.907810	Neutral	9.90	56.00	46.10	Complied

Results: Neutral / Average / 120 VAC 60 Hz

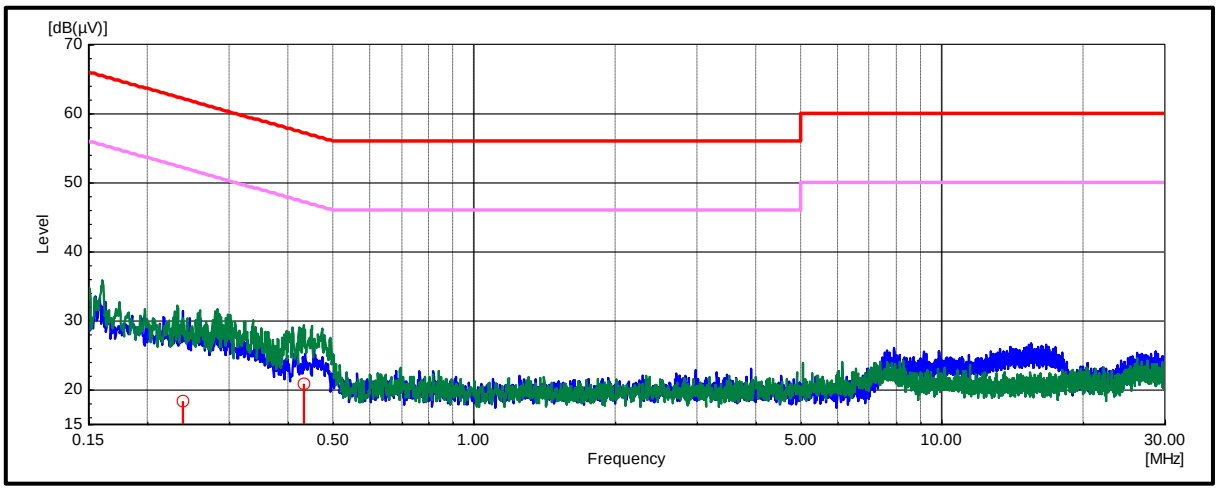
Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.238680	Neutral	12.10	52.10	40.00	Complied
0.765730	Neutral	5.00	46.00	41.00	Complied
3.907810	Neutral	5.90	46.00	40.10	Complied

Result: Pass

Transmitter AC Conducted Spurious Emissions (continued)

Results: BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Mid Channel / Stitched Antenna

Plot: Live and Neutral Line / 120 VAC 60 Hz



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter AC Conducted Spurious Emissions (continued)

Results: BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Mid Channel / Stitched Antenna

Results: Live / Quasi Peak / 240 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.415030	Live	19.60	57.50	37.90	Complied
2.108220	Live	9.30	56.00	46.70	Complied
7.471940	Live	18.10	60.00	41.90	Complied

Results: Live / Average / 240 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.415030	Live	8.20	47.50	39.30	Complied
2.108220	Live	4.20	46.00	41.80	Complied
7.471940	Live	9.00	50.00	41.00	Complied

Results: Neutral / Quasi Peak / 240 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.227150	Neutral	18.30	62.60	44.30	Complied
2.937880	Neutral	9.90	56.00	46.10	Complied
10.980960	Neutral	20.00	60.00	40.00	Complied

Results: Neutral / Average / 240 VAC 60 Hz

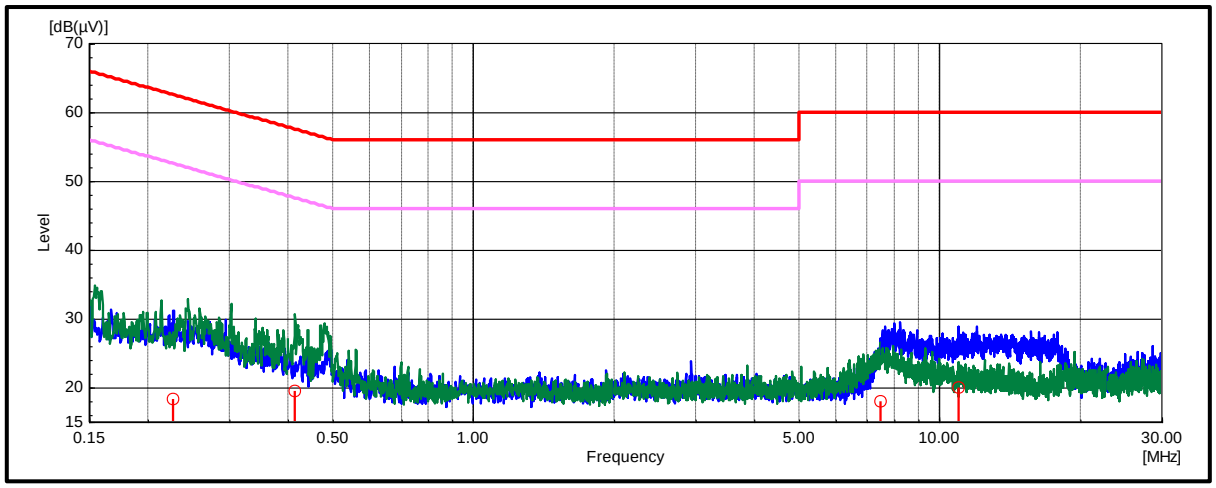
Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.227150	Neutral	12.10	52.60	40.50	Complied
2.937880	Neutral	5.20	46.00	40.80	Complied
10.980960	Neutral	9.50	50.00	40.50	Complied

Result: Pass

Transmitter AC Conducted Spurious Emissions (continued)

Results: BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Mid Channel / Stitched Antenna

Plot: Live and Neutral Line / 240 VAC 60 Hz



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

5.2.2. Transmitter Duty Cycle

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	22 July 2022
Test Sample Serial Number:	775B605.002 (Conducted Test Sample with U.FL connector)		
Test Site Identification	SR 9		

FCC Reference:	Part 15.35(c)
Test Method Used:	FCC KDB 558074 Section 6.0 referencing ANSI C63.10 Section 11.6

Environmental Conditions:

Temperature (°C):	22.9
Relative Humidity (%):	46.3

Note:

1. The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by using the following calculation:

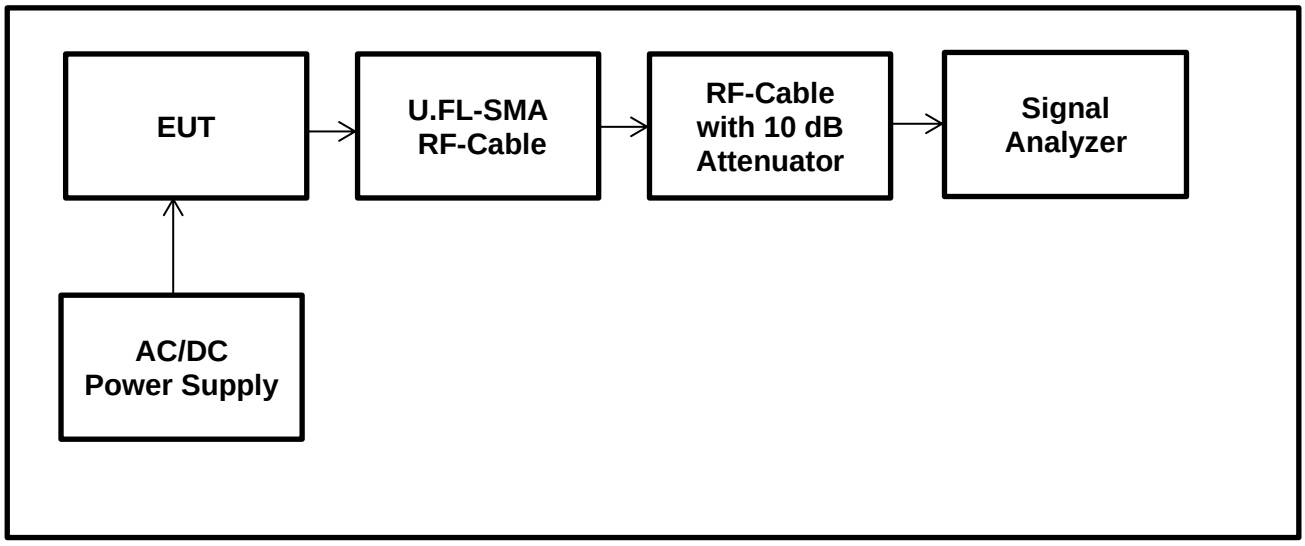
   Duty Cycle (%) = 100 X [On Time (T_{ON})] / [Period(T_{ON}+ T_{OFF}) or 100ms whichever is the lesser]

   Duty Cycle Correction Factor= 10 log 1 / [On Time (T_{ON})] / [Period(T_{ON}+ T_{OFF}) or 100ms whichever is the lesser]

2. The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values take into consideration the external attenuation correction factors.
   - The U.FL to SMA RF Cable connected on the PCB with maximum attenuation of 0.5 dB at the tested frequencies.
   - The SMA RF cable from the EUT to Analyzer with maximum attenuation of 0.5 dB at the tested frequencies including the 10 dB attenuator at the input of Spectrum Analyzer

Therefore, total a reference level offset 11.0 dB was added to each of the at the tested frequencies conducted plots.

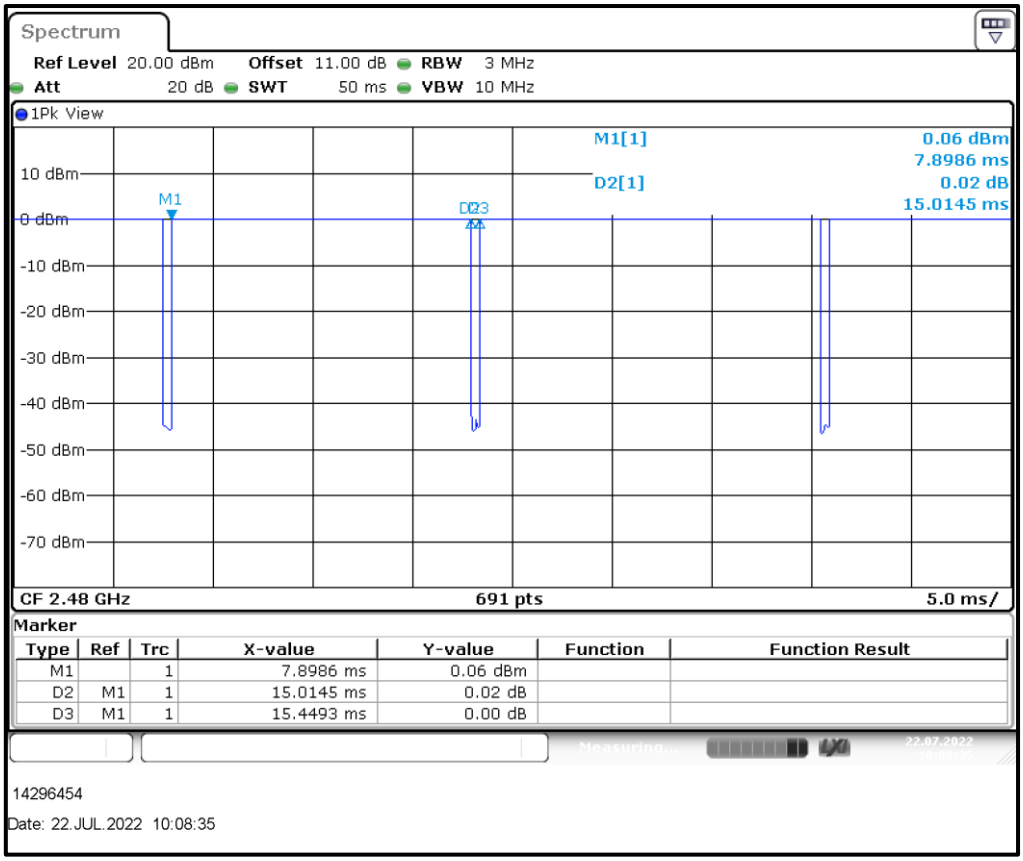
Test Setup:



Transmitter Duty Cycle (continued)

Results : BT-LE Mode / 125 kbps / PRBS9 / PWR 0 dBm / Top Channel

Pulse On Time (T_{ON}) (ms)	Pulse Period (T_{ON} +T_{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
15.0145	15.4493	97.18	0.12

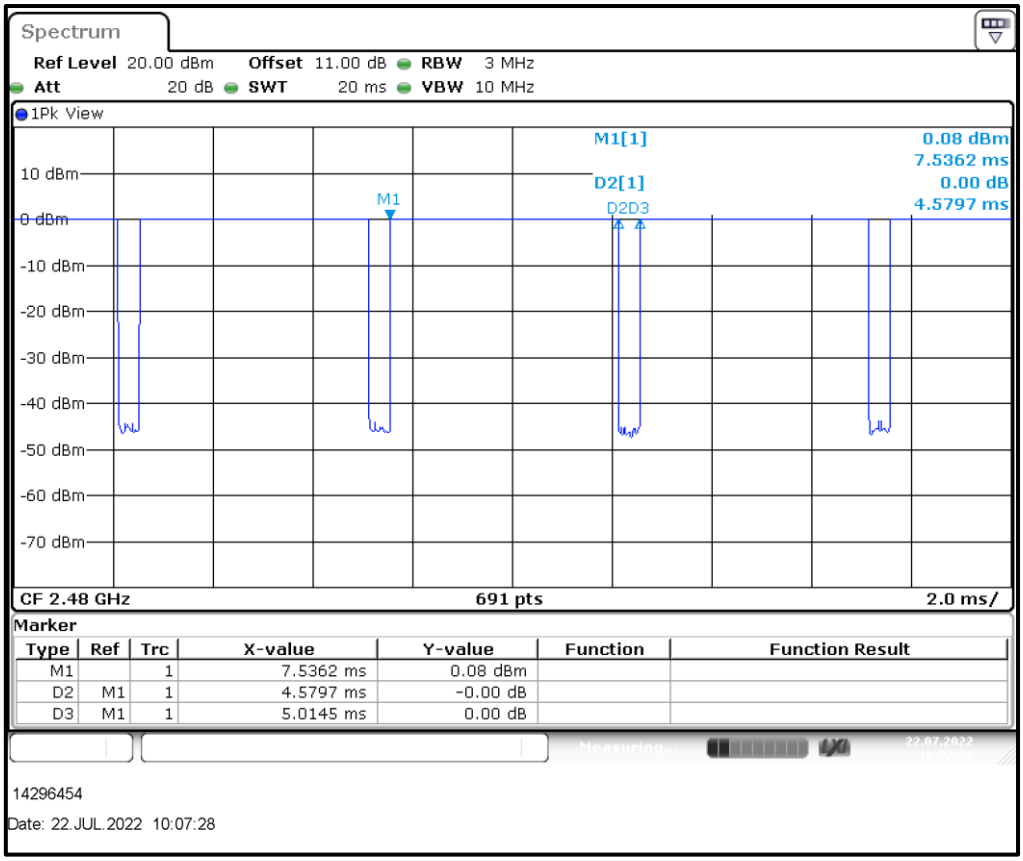


Result: Pass

Transmitter Duty Cycle (continued)

Results : BT-LE Mode / 500 kbps / PRBS9 / PWR 0 dBm / Top Channel

Pulse On Time (T_{ON}) (ms)	Pulse Period (T_{ON} +T_{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
4.5797	5.0145	91.32	0.4

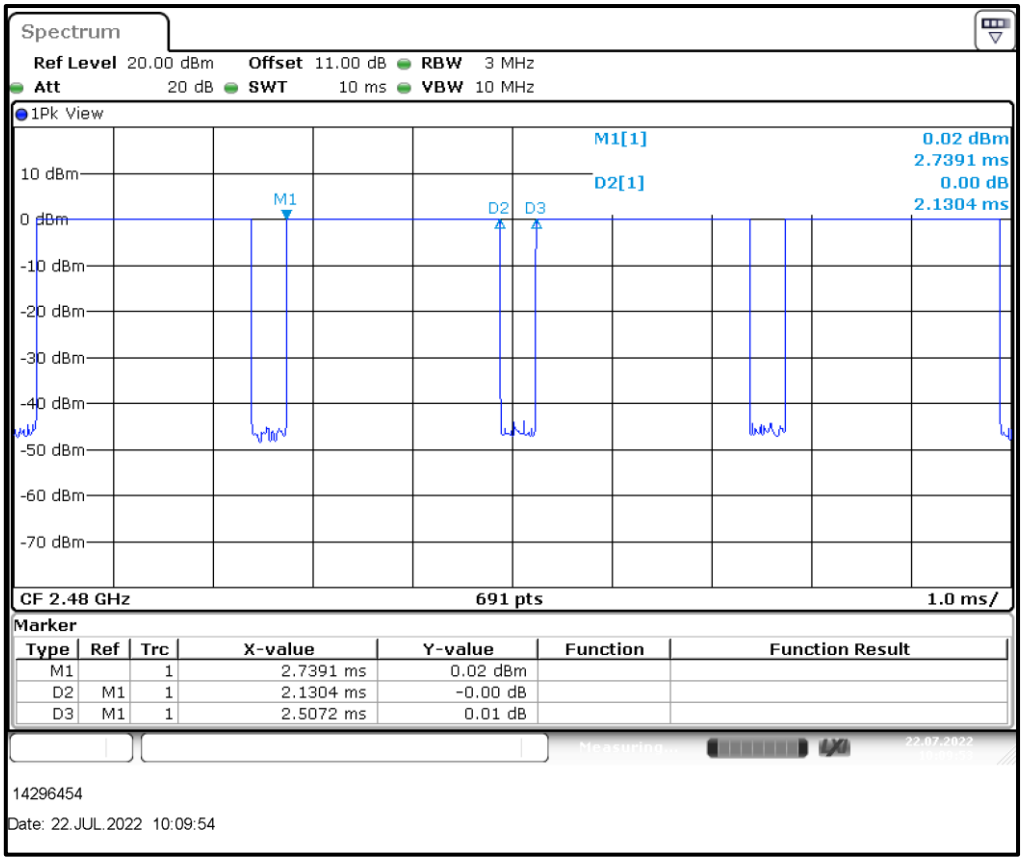


Result: Pass

Transmitter Duty Cycle (continued)

Results : BT-LE Mode / 1 Mbps / PRBS9 / PWR 0 dBm / Top Channel

Pulse On Time (T_{ON}) (ms)	Pulse Period (T_{ON} +T_{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
2.1304	2.5072	84.97	0.7

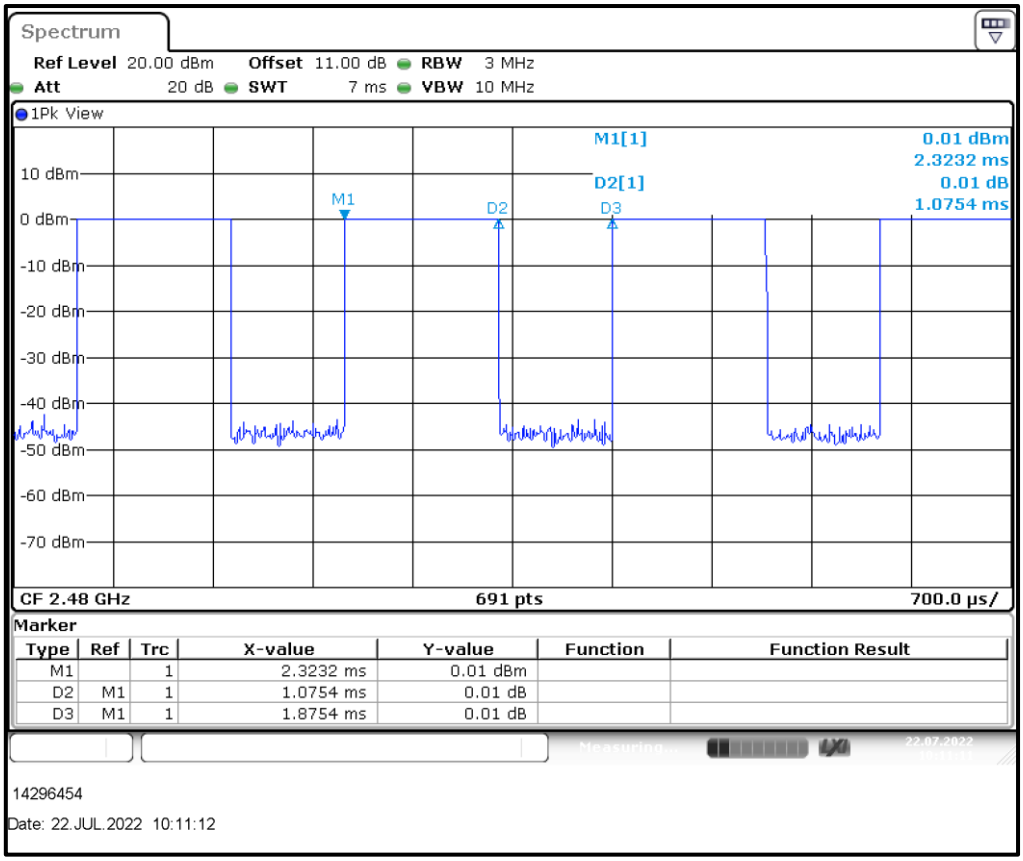


Result: Pass

Transmitter Duty Cycle (continued)

Results : BT-LE Mode / 2 Mbps / PRBS9 / PWR 0 dBm / Top Channel

Pulse On Time (T_{ON}) (ms)	Pulse Period (T_{ON} +T_{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
1.0754	1.8754	57.34%	2.41



Result: Pass

5.2.3. Transmitter 6 dB Bandwidth

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	21 & 22 July 2022
Test Sample Serial Number:	775B605.002 (Conducted Test Sample with U.FL connector)		
Test Site Identification	SR 9		

FCC Reference:	Part 15.247(a)(2)
Test Method Used:	FCC KDB 558074 Section 8.2 referencing ANSI C63.10:2013 Section 11.8.1 Option 1

Environmental Conditions:

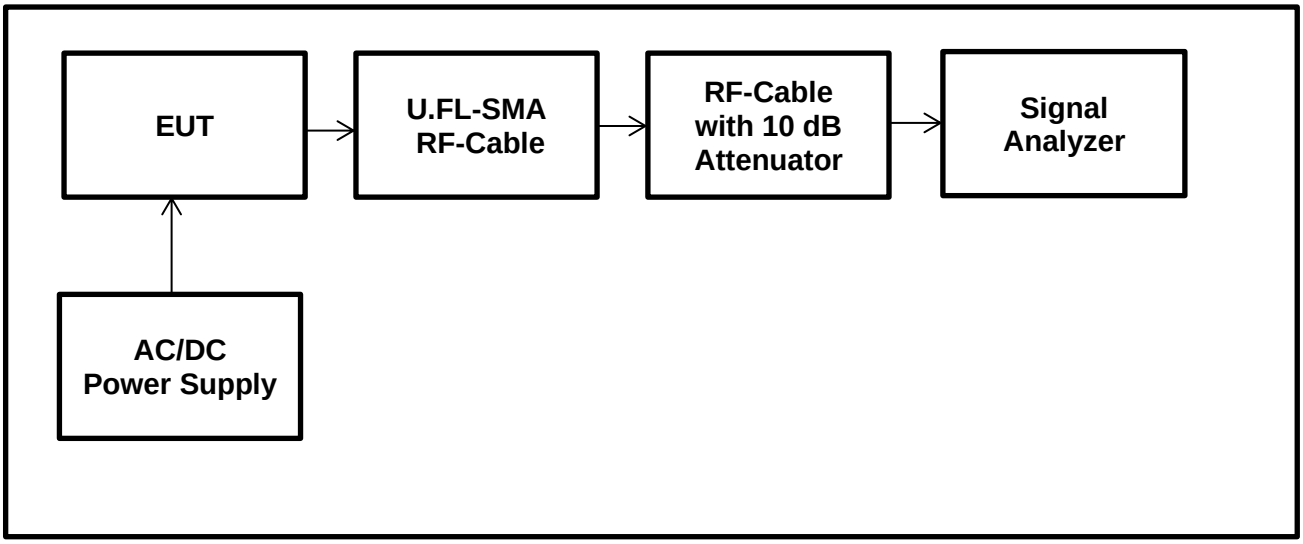
Temperature (°C):	21.4 & 22.9
Relative Humidity (%):	45.7 & 46.3

Notes:

1. The measurements were performed using the above configurations on the bottom, middle and top channels in accordance FCC KDB 558074 Section 8.2 referencing ANSI C63.10 Section 11.8 (11.8.1 Option 1 measurement procedure).
2. The spectrum analyser resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The DTS bandwidth was measured at 6 dB down from the peak of the signal.
3. The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values take into consideration the external attenuation correction factors.
    - The U.FL to SMA RF Cable connected on the PCB with maximum attenuation of 0.5 dB at the tested frequencies.
    - The SMA RF cable from the EUT to Analyzer with maximum attenuation of 0.5 dB at the tested frequencies including the 10 dB attenuator at the input of Spectrum Analyzer

Therefore, total a reference level offset 11.0 dB was added to each of the at the tested frequencies conducted plots.

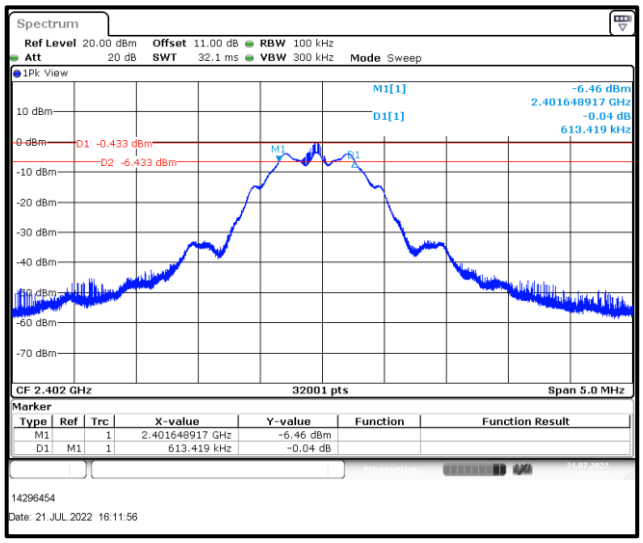
Test Setup:



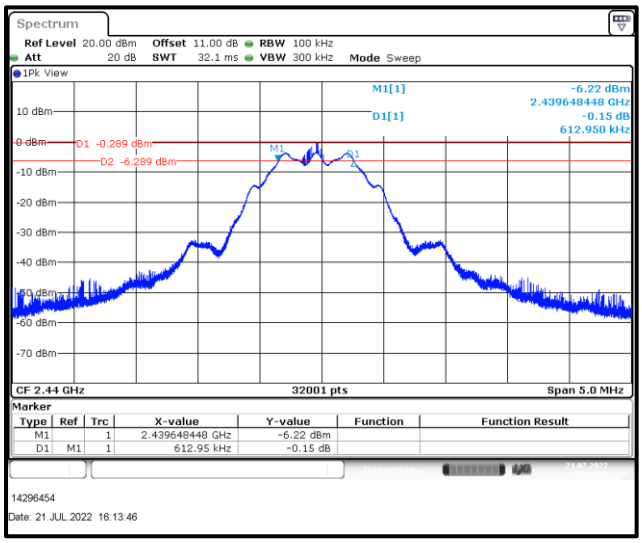
Transmitter Minimum 6 dB Bandwidth (continued)

Results: BT-LE Mode / 125 kbps / PRBS9 / PWR 0 dBm

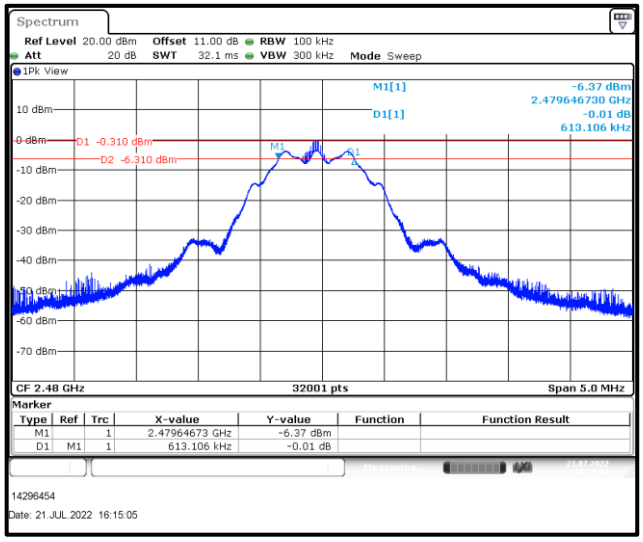
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	613.419	≥ 500	113.419	Complied
Middle	612.950	≥ 500	112.950	Complied
Top	613.106	≥ 500	113.106	Complied



Bottom Channel



Middle Channel



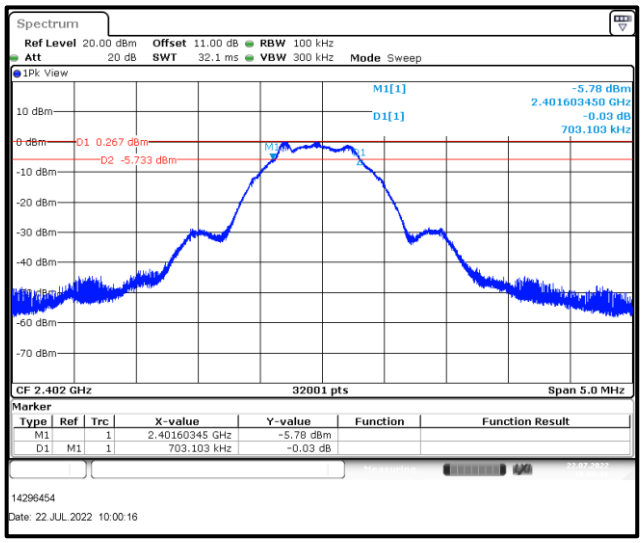
Top Channel

Result: Pass

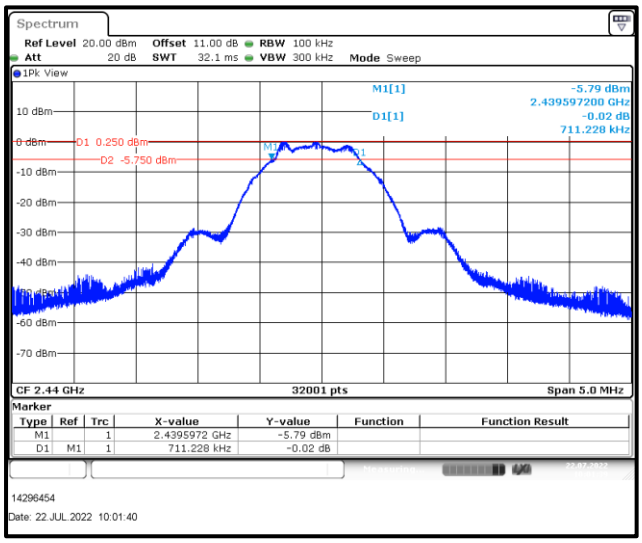
Transmitter Minimum 6 dB Bandwidth (continued)

Results: BT-LE Mode / 500 kbps / PRBS9 / PWR 0 dBm

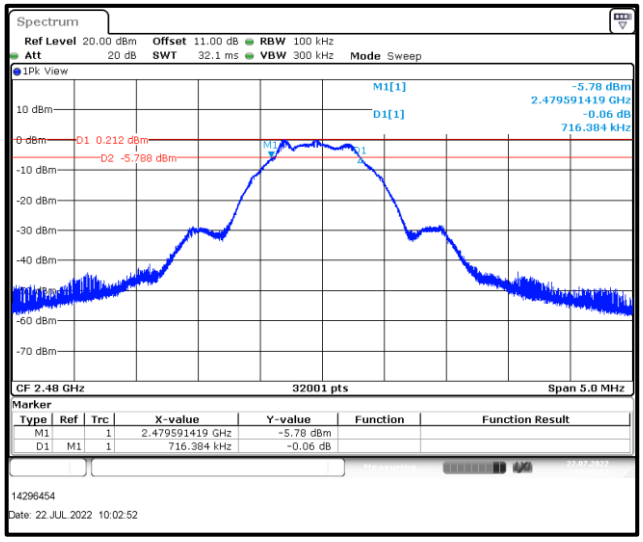
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	703.103	≥ 500	203.103	Complied
Middle	711.228	≥ 500	211.228	Complied
Top	716.384	≥ 500	216.384	Complied



Bottom Channel



Middle Channel



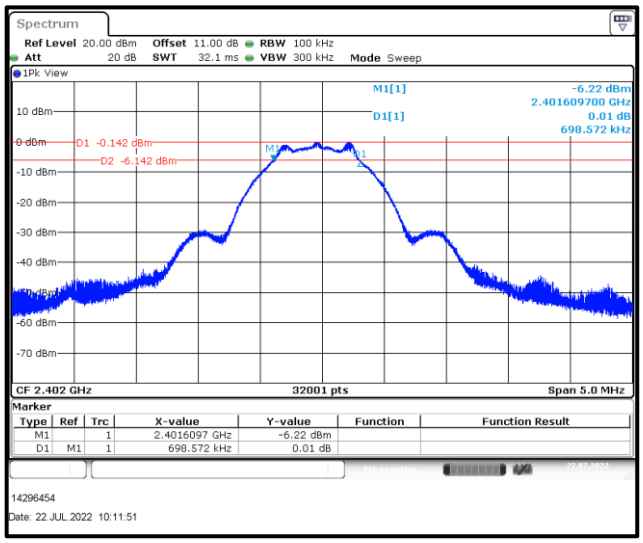
Top Channel

Result: Pass

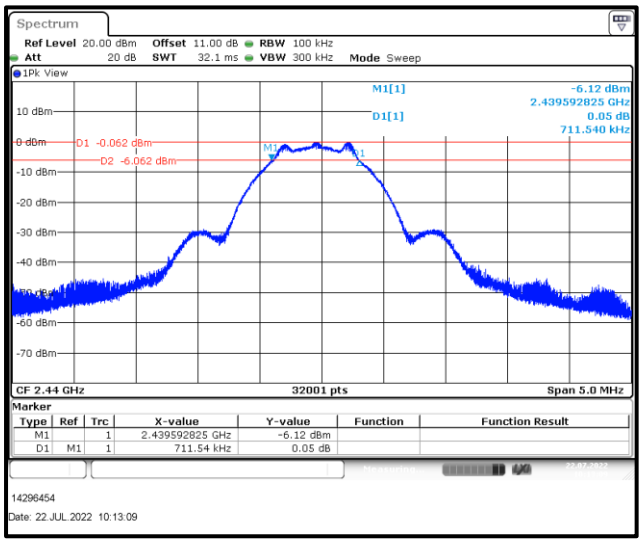
Transmitter Minimum 6 dB Bandwidth (continued)

Results: BT-LE Mode / 1 Mbps / PRBS9 / PWR 0 dBm

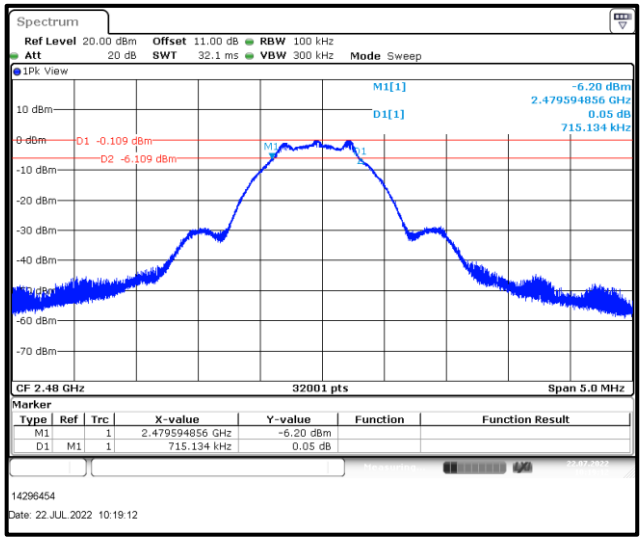
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	698.572	≥ 500	198.572	Complied
Middle	711.540	≥ 500	211.540	Complied
Top	715.134	≥ 500	215.134	Complied



Bottom Channel



Middle Channel



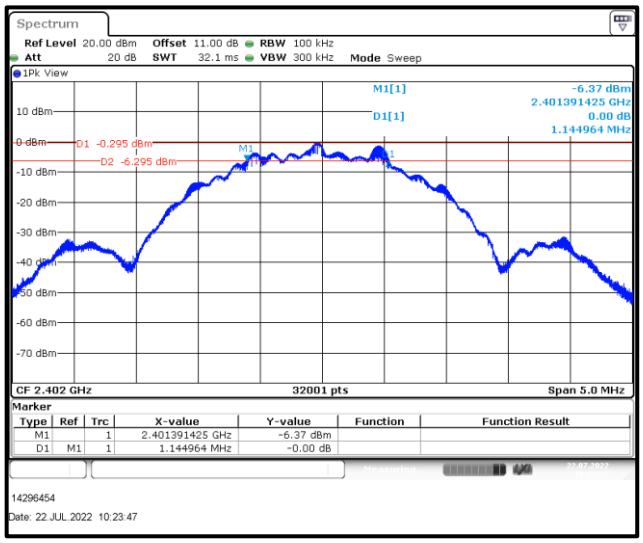
Top Channel

Result: Pass

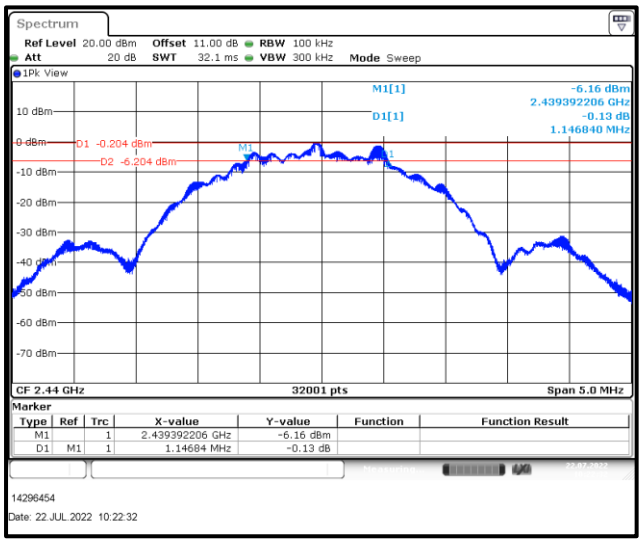
Transmitter Minimum 6 dB Bandwidth (continued)

Results: BT-LE Mode / 2 Mbps / PRBS9 / PWR 0 dBm

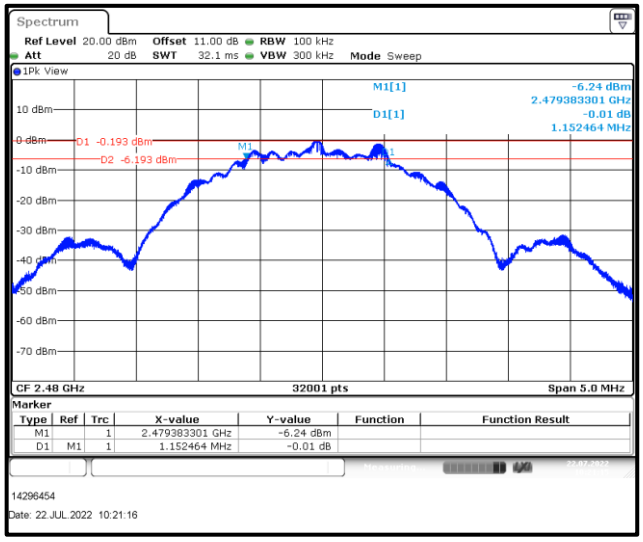
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	1144.964	≥ 500	644.964	Complied
Middle	1146.840	≥ 500	646.840	Complied
Top	1152.464	≥ 500	652.464	Complied



Bottom Channel



Middle Channel



Top Channel

Result: Pass

5.2.4. Transmitter Maximum Peak Output Power

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	22 July 2022
Test Sample Serial Number:	775B605.002 (Conducted Test Sample with U.FL connector)		
Test Site Identification	SR 9		

FCC Reference:	Part 15.247(b)(3)
Test Method Used:	FCC KDB 558074 Section 8.3.1.1 referencing ANSI C63.10 Section 11.9.1.1

Environmental Conditions:

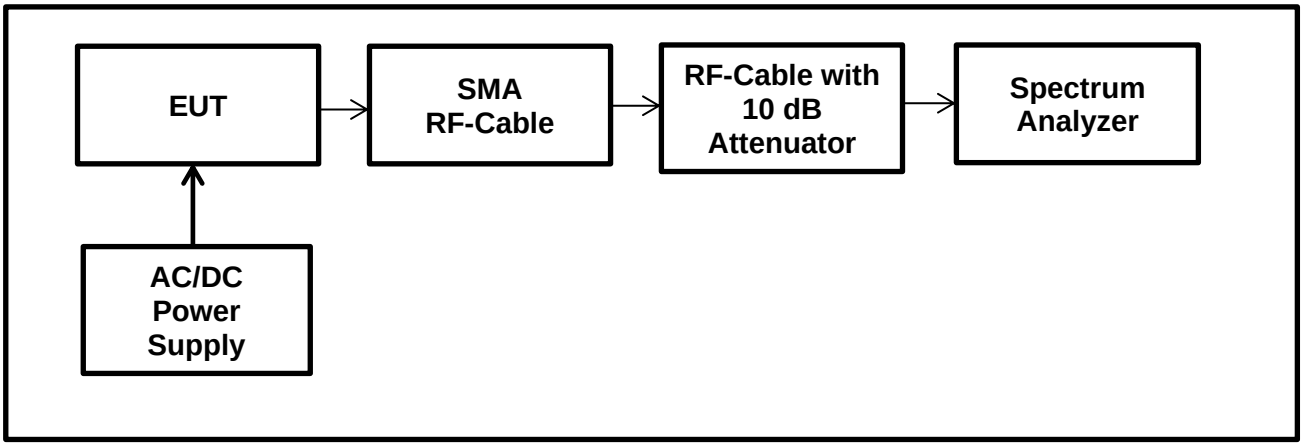
Temperature (°C):	22.9
Relative Humidity (%):	46.3

Notes:

1. Conducted power tests were performed using a spectrum analyser in accordance with FCC KDB 558074 Section 8.3.1.1 with the RBW ≥ DTS bandwidth referencing ANSI C63.10 Section 11.9.1.1.
2. The signal analyser resolution bandwidth was set to 3 MHz and video bandwidth of 10 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The span was set to 10 MHz. A marker was placed at the peak of the signal and the results recorded in the table below.
3. The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values take into consideration the external attenuation correction factors.
   - The U.FL to SMA RF Cable connected on the PCB with maximum attenuation of 0.5 dB at the tested frequencies.
   - The SMA RF cable from the EUT to Analyzer with maximum attenuation of 0.5 dB at the tested frequencies including the 10 dB attenuator at the input of Spectrum Analyzer

   Therefore, total a reference level offset 11.0 dB was added to each of the at the tested frequencies conducted plots.
4. The declared antenna gain was added to conducted power to obtain the relevant EIRP values.

Test Setup:



Transmitter Maximum Peak Output Power (continued)
Results: BT-LE Mode / 125 kbps / PRBS9 / PWR 0 dBm

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-0.21	30.00	-30.21	Complied
Middle	-0.13	30.00	-30.13	Complied
Top	-0.10	30.00	-30.1	Complied

Results: BT-LE Mode / 125 kbps / PRBS9 / PWR 0 dBm / Stitched Antenna

Channel	Conducted Peak Power (dBm)	Declared Stitched Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-0.21	2.0	1.79	36.00	34.21	Complied
Middle	-0.13	2.0	1.87	36.00	34.13	Complied
Top	-0.10	2.0	1.9	36.00	34.1	Complied

Result: Pass

Transmitter Maximum Peak Output Power (continued)
Results: BT-LE Mode / 500 kbps / PRBS9 / PWR 0 dBm

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	0.26	30.00	-29.74	Complied
Middle	0.28	30.00	-29.72	Complied
Top	0.24	30.00	-29.76	Complied

Results: BT-LE Mode / 500 kbps / PRBS9 / PWR 0 dBm / Stitched Antenna

Channel	Conducted Peak Power (dBm)	Declared Stitched Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	0.26	2.0	2.26	36.00	33.74	Complied
Middle	0.28	2.0	2.28	36.00	33.72	Complied
Top	0.24	2.0	2.24	36.00	33.76	Complied

Result: Pass

Transmitter Maximum Peak Output Power (continued)
Results: BT-LE Mode / 1 Mbps / PRBS9 / PWR 0 dBm

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-0.08	30.00	-30.08	Complied
Middle	0.01	30.00	-29.99	Complied
Top	-0.03	30.00	-30.03	Complied

Results: BT-LE Mode / 1 Mbps / PRBS9 / PWR 0 dBm / Stitched Antenna

Channel	Conducted Peak Power (dBm)	Declared Stitched Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-0.08	2.0	1.92	36.00	34.08	Complied
Middle	0.01	2.0	2.01	36.00	33.99	Complied
Top	-0.03	2.0	1.97	36.00	34.03	Complied

Result: Pass

Transmitter Maximum Peak Output Power (continued)
Results: BT-LE Mode / 2 Mbps / PRBS9 / PWR 0 dBm

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-0.16	30.00	-30.16	Complied
Middle	-0.05	30.00	-30.05	Complied
Top	-0.05	30.00	-30.05	Complied

Results: BT-LE Mode / 2 Mbps / PRBS9 / PWR 0 dBm / Stitched Antenna

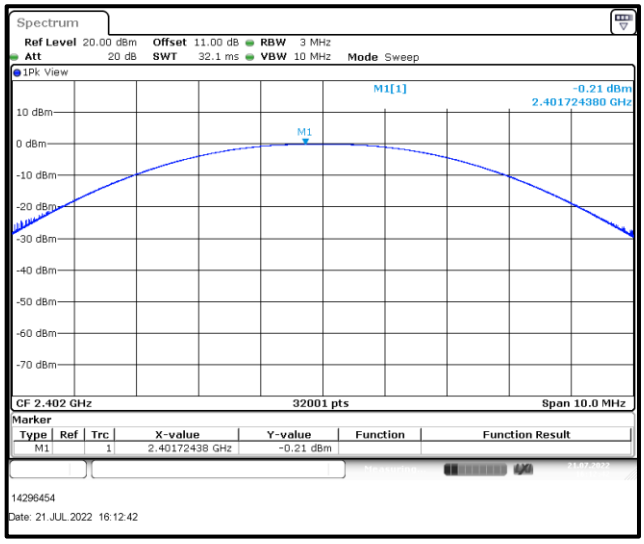
Channel	Conducted Peak Power (dBm)	Declared Stitched Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-0.16	2.0	1.84	36.00	34.16	Complied
Middle	-0.05	2.0	1.95	36.00	34.05	Complied
Top	-0.05	2.0	1.95	36.00	34.05	Complied

Result: Pass

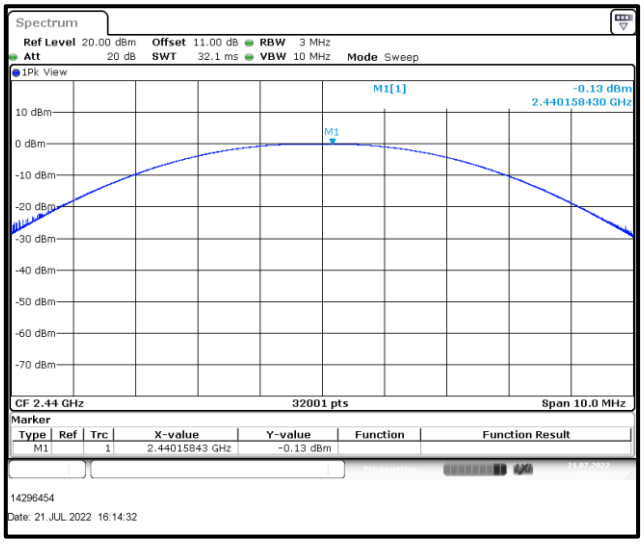
Transmitter Maximum Peak Output Power (continued)

Results: BT-LE Mode / 125 kbps / PRBS9 / PWR 0 dBm

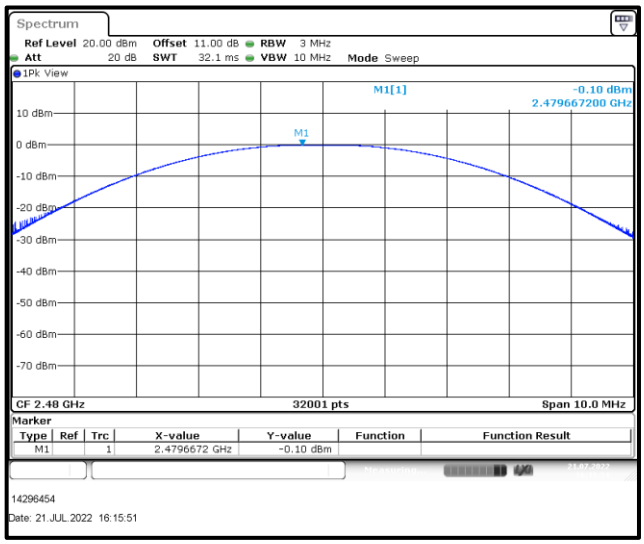
Representative Example Plots



Bottom Channel



Middle Channel



Top Channel

5.2.5. Transmitter Radiated Emissions

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	26 July 2022
Test Sample Serial Number:	775B605.002 (Radiated Test Sample)		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 8.5 & 8.6 referencing ANSI C63.10 Sections 11.11 and 11.12 ANSI C63.10:2013 Sections 6.3 and 6.4
Frequency Range	9 kHz to 30 MHz

Environmental Conditions:

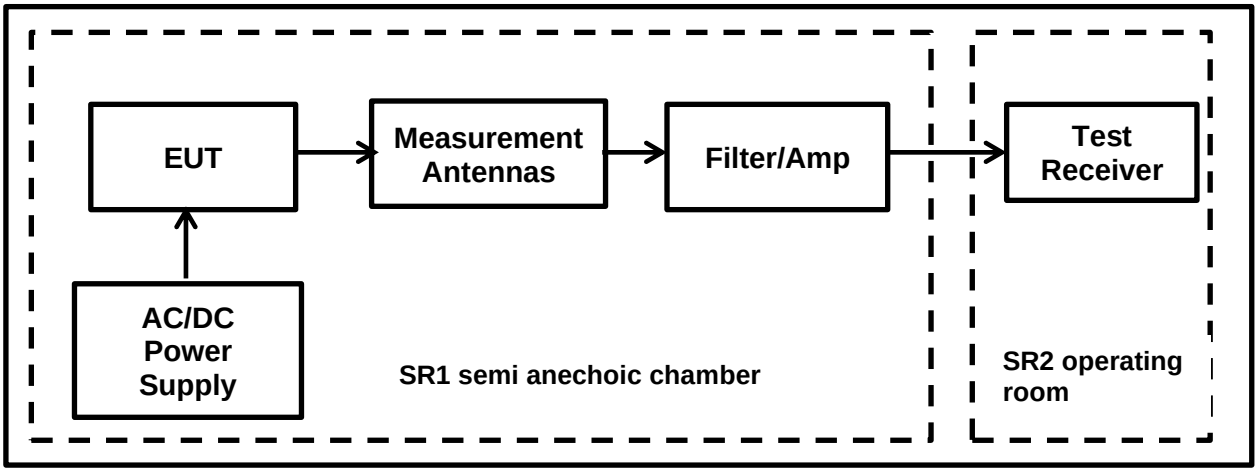
Temperature (°C):	21.8
Relative Humidity (%):	60.0

Notes:

1. In accordance with FCC KDB 414788 D01 Radiated Test Site & ANSI C63.10 clause 5.2 an alternative test site that can demonstrate equivalence to an open area test site may be used. Therefore, the measurement was performed in a Semi Anechoic Chamber. (The OATS / SAC comparison data is available upon request).
2. The limits are specified at a test distances of 30 and 300 metres. However, as specified in FCC Section 15.31 (f)(2) & ANSI C63.10 clause 6.4.3, measurements may be performed at a closer distance and the measured level extrapolated to the specified measurement distance using the method described in clauses 6.4.4, specifically sub-clause 6.4.4.1 which specifies that the measured level shall be extrapolated to the specified distance by conservatively presuming that the field strength decays at 40 dB/decade. Therefore, measurements were performed at measurement distance of 3m.
3. Therefore, the limit values are extrapolated to a measurement distance of 3 m.
   - 9 kHz- 490 kHz: limits extrapolated from 300 m to 3 m by adding 80 dB at 40 dB /decade.
   - 490 kHz-1705 kHz: limits extrapolated from 30 m to 3 m by adding 40 dB at 40 dB /decade.
4. Measurements below 30 MHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) at a distance of 3 m. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. The measurement loop antenna height was 100 cm.
5. The measurements were performed only with 500 kbps data rate on Mid channel since it was found out to be the worst-case w.r.t. maximum conducted output power.
6. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
7. All other emissions shown on the pre-scan plots were investigated and found to be below system noise floor.
8. Pre-scans were performed, and markers placed on the highest measured levels. The test receiver was set to:
   - Frequency range: 9 kHz-150 kHz: RBW: 1 kHz /VBW: 3 kHz
   - Frequency range: 150 kHz – 30 MHz: RBW: 10 kHz /VBW: 30 kHz
   - Detector: Max-Peak detector
   - Trace Mode: Max Hold

Transmitter Radiated Emissions (continued)

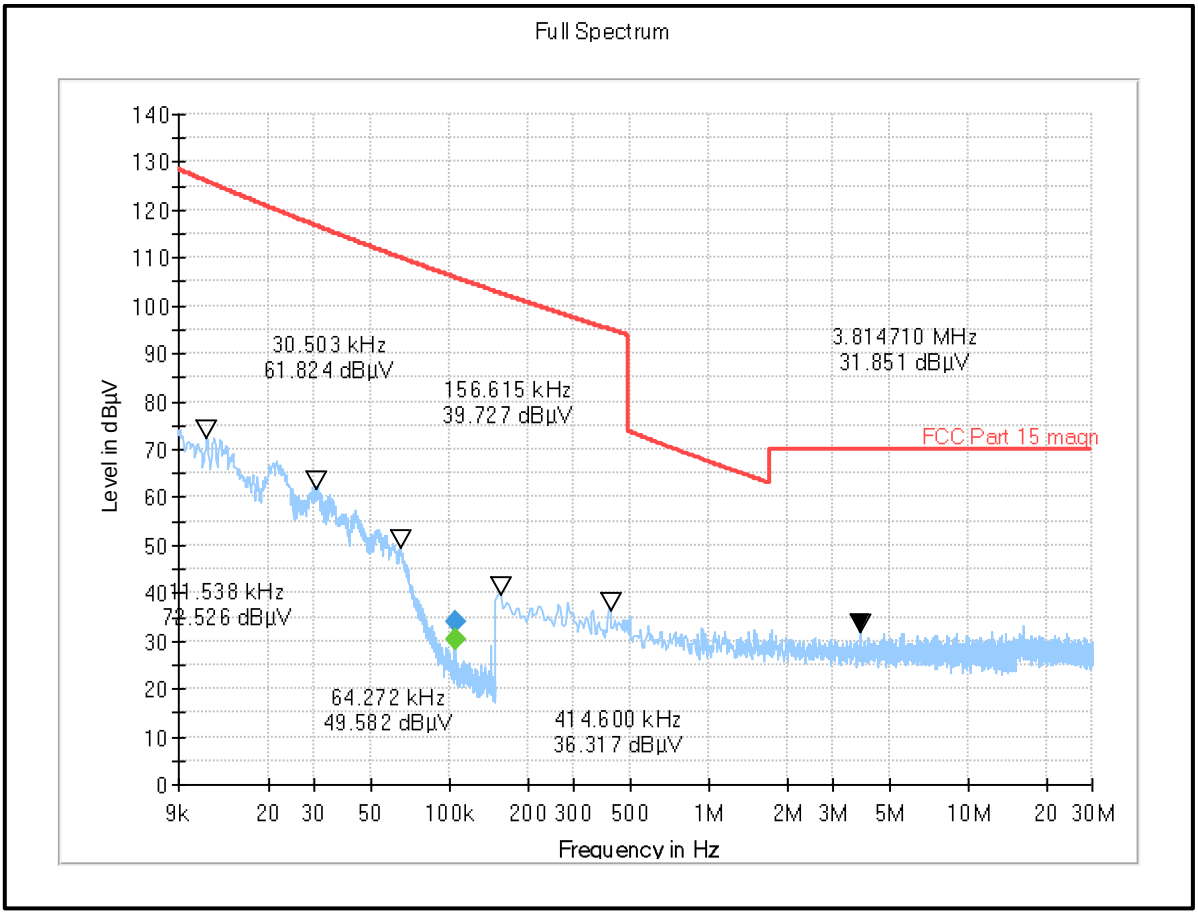
Test Setup:



Transmitter Radiated Emissions (continued)
Results : BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Mid Channel / Stitched Antenna

Frequency (MHz)	Loop Antenna Orientation	MaxPeak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
0.104457	0° to EUT	33.93	105.94	72.01	Complied

Plot: 9 kHz – 30 MHz: BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Mid Channel / Stitched Antenna



Result: Pass

Transmitter Radiated Emissions (continued)

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	26 July 2022
Test Sample Serial Number:	775B605.002 (Radiated Test Sample)		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 8.5 & 8.6 referencing ANSI C63.10 Sections 11.11 and 11.12 ANSI C63.10:2013 Sections 6.3 and 6.5
Frequency Range	30 MHz to 1000 MHz

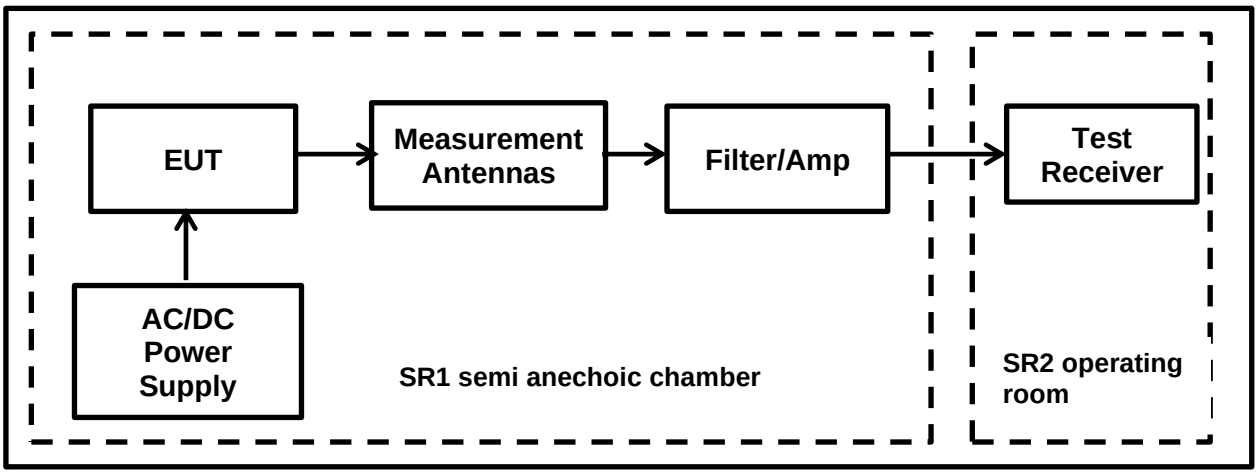
Environmental Conditions:

Temperature (°C):	22.0
Relative Humidity (%):	61.0

Note(s):

1. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
2. Pre-scans were performed, and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.
3. The measurements were performed only with 500 kbps data rate on Mid channel since it was found out to be the worst-case w.r.t. maximum conducted output power.
4. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
5. All other emissions shown on the pre-scan plots were investigated and found to be below system noise floor.

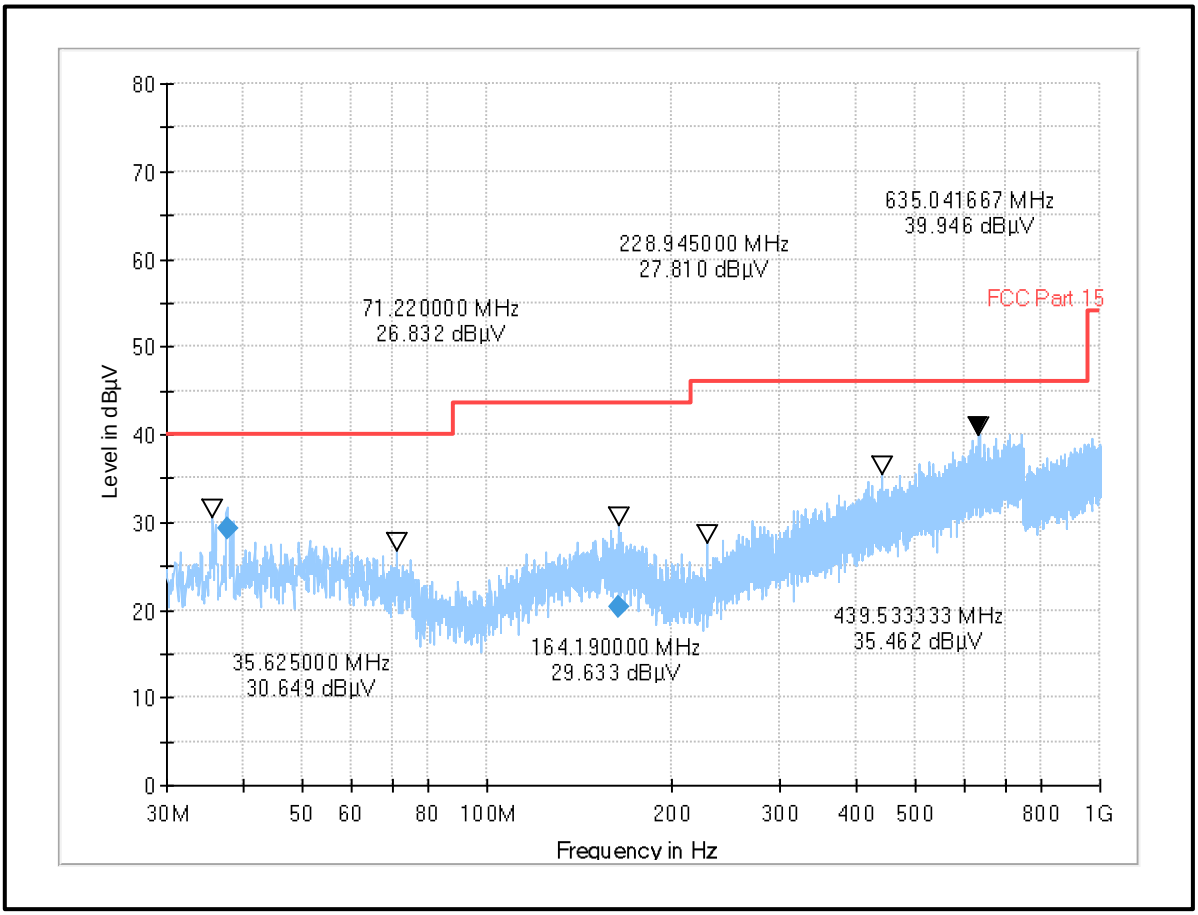
Test Setup:



Transmitter Radiated Emissions (continued)
Results : BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Mid Channel / Stitched Antenna

Frequency (MHz)	Antenna Polarization	MaxPeak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
37.605000	Vertical	29.26	40.00	10.74	Complied
164.190000	Horizontal	20.29	43.50	23.21	Complied

Plot: 30 MHz – 1 GHz: BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Mid Channel / Stitched Antenna



Result: Pass

Transmitter Radiated Emissions (continued)

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	22 September 2022
Test Sample Serial Number:	775B605.002 (Radiated Test Sample)		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d), 15.209(a) & 15.205(a)
Test Method Used:	FCC KDB 558074 Sections 8.5 & 8.6 referencing ANSI C63.10 Sections 11.11 and 11.12 ANSI C63.10:2013 Sections 6.3 and 6
Frequency Range	1 GHz to 26.5 GHz

Environmental Conditions:

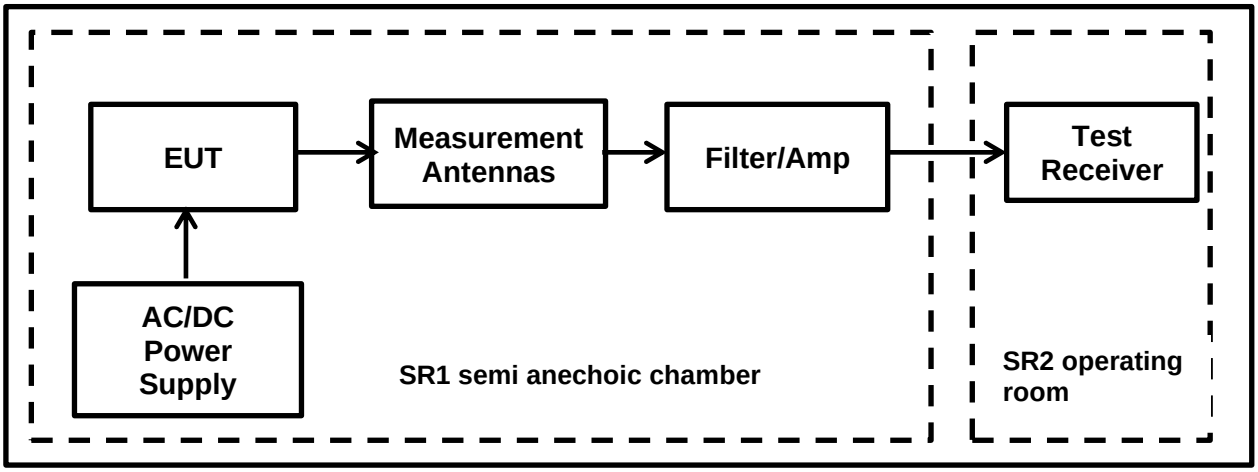
Temperature (°C):	22.1
Relative Humidity (%):	38.7

Note(s):

1. Pre-scans above 1 GHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) with RF absorbers on the floor at a distance of 3 m. The EUT was placed at a height of 1.5 m above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 m above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) with absorber on the floor at a distance of 3 m. The EUT was placed at a height of 1.5 m above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 m to 4 m.
2. The emissions shown at frequencies approximately 2.4 GHz to 2.4835 GHz on the 1 GHz to 18 GHz plots are the EUT fundamental for the tested channel.
3. The measurements were performed only with 500 kbps data rate on Mid channel since it was found out to be the worst-case w.r.t. maximum conducted output power.
4. Pre-scans were performed, and marker placed on the highest measured level of the plot. The test receiver RBW was set to 1 MHz and VBW 3 MHz. The sweep time was set to auto.
5. All other emissions shown on the pre-scan plots were investigated and found to be below system noise floor.
6. In accordance with ANSI C63.10-2013 Section 5.3.3 & 6.5.3 measurements above 18 GHz were performed at closer distance (1 m); because at specified measurement distance (3m) for compliance the instrumentation noise floor was typically close to the radiated emission limit.
7. For frequency range between 18 GHz and 26.5 GHz, on the pre-scan plots were investigated and found to be below system noise floor.

Transmitter Radiated Emissions (continued)

Test Setup:



Transmitter Radiated Emissions (continued)
Results : BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Mid Channel / Stitched Antenna

Frequency (MHz)	Antenna Orientation	MaxPeak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
7320.666667	Horizontal	50.04	54.00	3.96	Complied

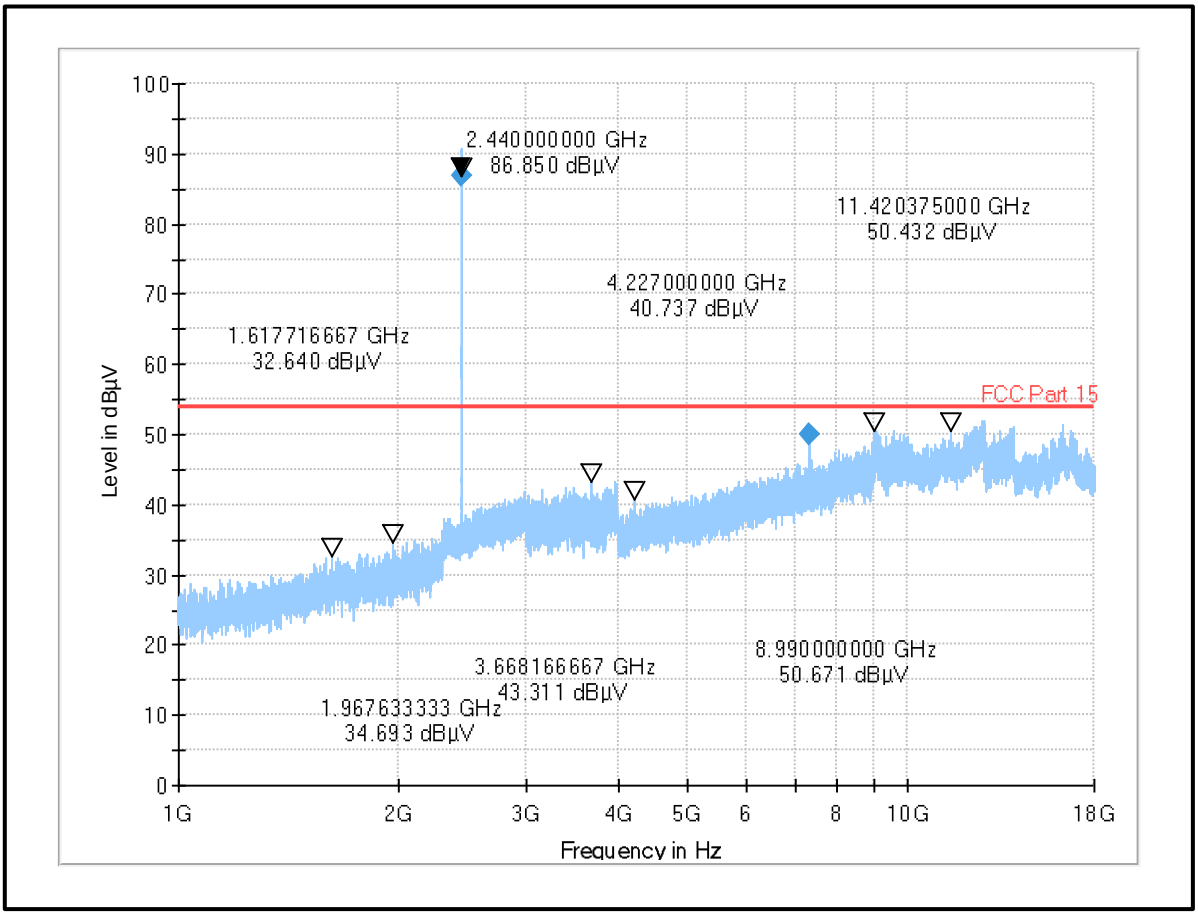
Note: The frequency is represented with the blue point in the plot below.

Restricted Band Emission:

Frequency (MHz)	Antenna Orientation	MaxPeak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
7319.04	Horizontal	55.17	74.00	18.83	Complied

Frequency (MHz)	Antenna Orientation	Average Level (dBµV/m)	Corrected Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
7319.24	Horizontal	47.12	47.52	54.00	6.48	Complied

Plot: 1 GHz – 18 GHz: BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Mid Channel / Stitched Antenna

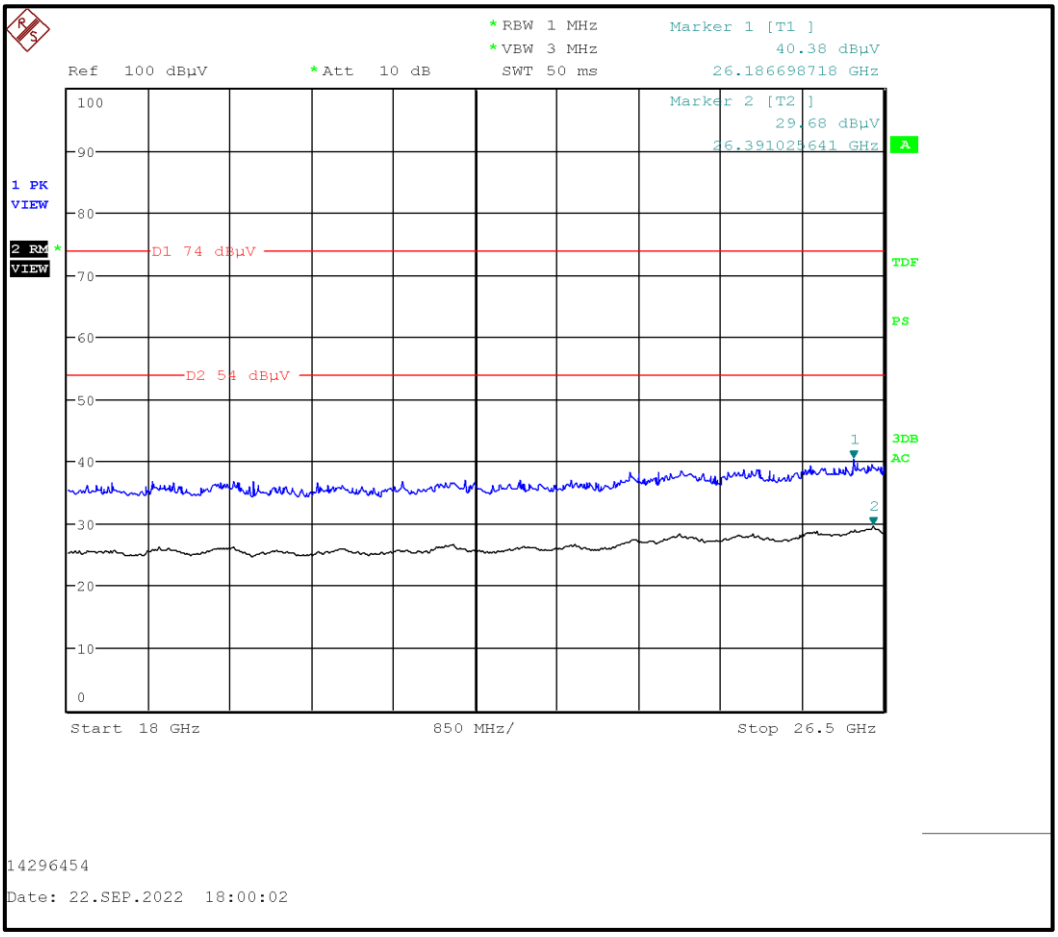


Result: Pass

Transmitter Radiated Emissions (continued)
Results : BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Mid Channel / Stithced Antenna

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
No critical spurious emissions were detected					

Plot: 18 GHz – 26 GHz: BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Mid Channel / Stitched Antenna



Result: Pass

5.2.6. Transmitter Band Edge Radiated Emissions

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	22 September 2022
Test Sample Serial Number:	775B605.002 (Radiated Test Sample)		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	DTS emissions in non-restricted frequency bands: FCC KDB 558074 Section 8.5 referencing ANSI C63.10:2013 Sections 11.11
	DTS emissions in restricted frequency bands: FCC KDB 558074 Section 8.6 referencing ANSI C63.10:2013 Sections 11.12
	ANSI C63.10:2013 Sections 6.10.4, 6.10.5, 11.13

Environmental Conditions:

Temperature (°C):	22.1
Relative Humidity (%):	38.7

Note(s):

1. The measurements were in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) with RF absorbers on the floor at a distance of 3 m. The EUT was placed at a height of 1.5 m above the test chamber floor in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 m to 4 m
2. As the lower band edge falls within a non-restricted band, measurements were performed in accordance with FCC KDB 558074 Section 8.5 referencing ANSI C63.10 Section 11.11. As the maximum peak conducted output power was previously measured, in accordance with ANSI C63.10 Section 11.11.1(a) lower band edge measurement was performed with a peak detector and the -20 dBc limit applied.
3. As the lower band edge falls within a non-restricted band, only peak measurements are required. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The test receiver was left to sweep for a sufficient length of time in order to maximise the carrier level and out-of-band emissions. A marker and corresponding reference level line were placed on the peak of the carrier. Marker frequencies and levels were recorded.
4. The restricted band peak measurements were performed in accordance with ANSI C63.10 Section 11.12.2.4.
5. As the upper band edge falls within a restricted band both peak and average measurements were recorded by placing a marker at the edge of the band. For peak measurements the test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz A peak detector was used, sweep time was set to auto and trace mode was Max Hold. For average measurements the test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz and RMS detector in linear power averaging mode was used. The test receiver was left to sweep for 300 sweeps in order to maximise the carrier level and out-of-band emissions. A marker was placed on the band edge spot frequencies and a second marker placed on the highest emission level in the adjacent restricted band of operation (where a higher-level emission was present). Marker frequencies and levels were recorded.
6. There is a restricted band 10 MHz below the lower band edge. The test receiver was set up as follows: the RBW set to 1 MHz, the VBW set to 3 MHz, with the sweep time set to auto couple. Peak and average measurements were performed with their respective detectors. Markers were placed on the highest point on each trace.

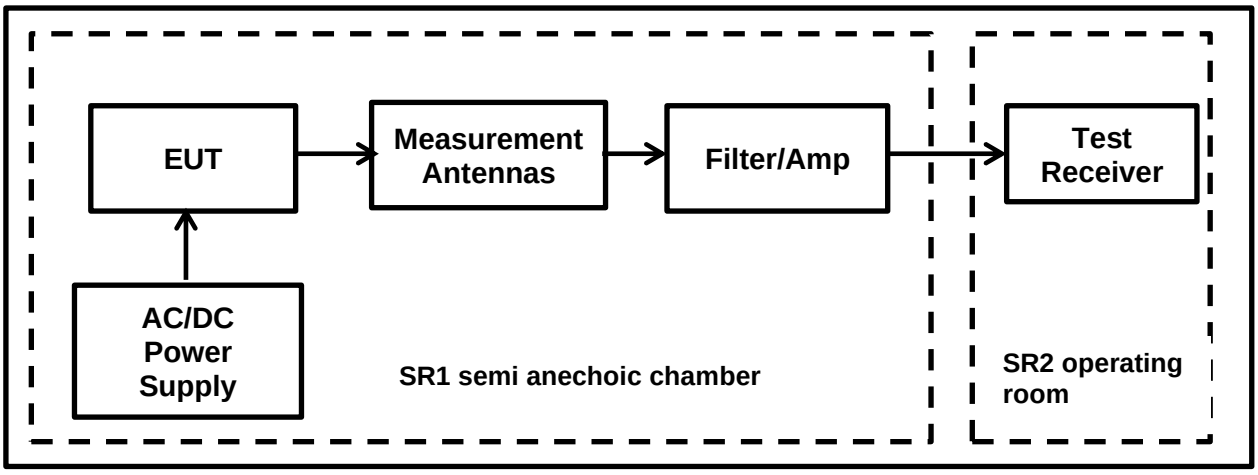
Transmitter Band Edge Radiated Emissions (continued)

Note(s):

7. The measurements were performed with 500 kbps since it was found out to be the worst-case w.r.t. maximum conducted output power and the has the widest bandwidth.
8. The measurements were also performed with 2 Mbps since it is the widest bandwidth
9. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
10. As the EUT continuous transmission of the EUT (D ≥ 98%) cannot be achieved and EUT was transmitting continuously with different duty cycle w.r.t different data rates (duty cycle variations are less than ±2%). Therefore, Duty Cycle Correction Factors were added to all average measurements according to the below table, to compute the corrected average values of the emissions that would have been measured had the test been performed at 100% Duty Cycle.

Data rate	Duty cycle	Correction factor
	(%)	(dB)
125 kbps	97.18	0.12
500 kbps	91.32	0.4
1 Mbps	84.97	0.7
2 Mbps	57.34	2.41

Test Setup:



Transmitter Band Edge Radiated Emissions (continued)

Results: BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Stitched Antenna

Results: Lower Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	-20 dBc Limit (dBµV/m)	Margin (dB)	Result
2399.99	44.06	75.01	30.95	Complied
2400.00	44.06	75.01	30.95	Complied

Results: 2310 to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2389.72	50.88	74.00	23.12	Complied

Results: 2310 to 2390 MHz Restricted Band / Average

Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2338.09	34.36	0.4	34.76	54.00	19.24	Complied

Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2483.50	59.66	74.00	14.34	Complied
2484.85	56.53	74.00	17.47	Complied

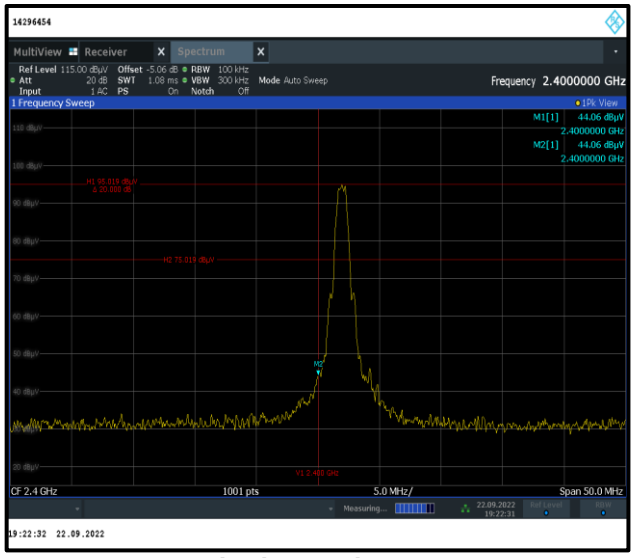
Results: Upper Band Edge / Average

Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2483.5	36.67	0.4	37.07	54.00	16.93	Complied
2483.58	37.32	0.4	37.72	54.00	16.28	Complied

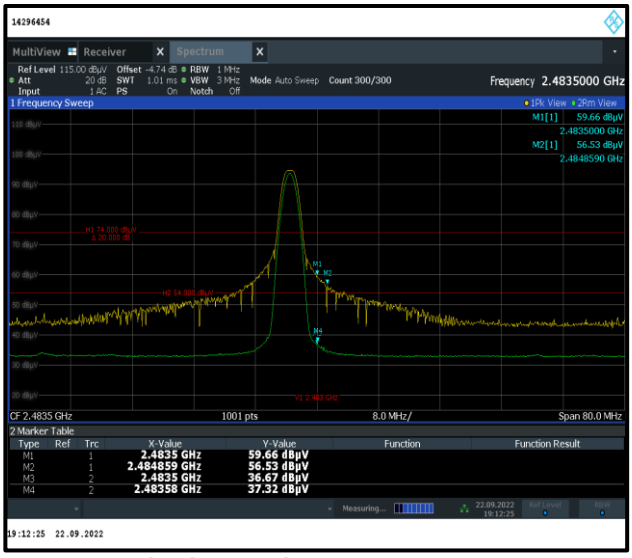
Result: Pass

Transmitter Band Edge Radiated Emissions (continued)

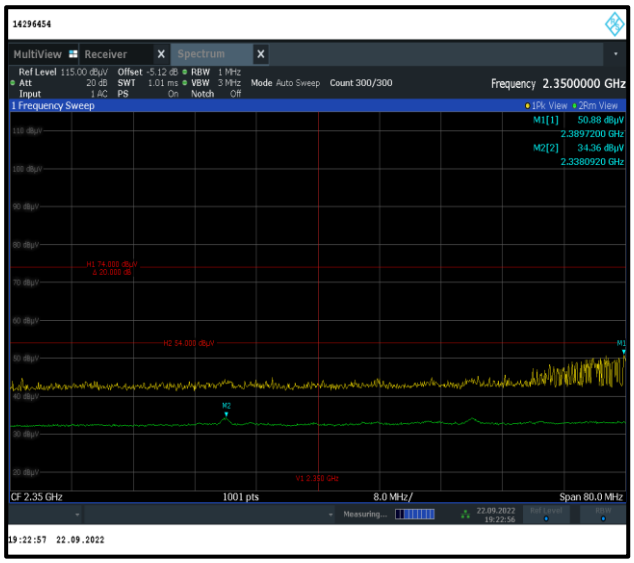
Results : BT-LE / 500 kbps / PRBS9 / PWR 0 dBm / Stitched Antenna



Lower Band Edge Peak Measurement



Upper Band Edge Peak & Average Measurement



2310 MHz to 2390 MHz Restricted Band

Result: Pass

Transmitter Band Edge Radiated Emissions (continued)

Results: BT-LE / 2 Mbps / PRBS9 / PWR 0 dBm / Stitched Antenna

Results: Lower Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	-20 dBc Limit (dBµV/m)	Margin (dB)	Result
2399.90	61.22	75.40	14.18	Complied
2400.00	60.51	75.40	14.89	Complied

Results: 2310 to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2388.68	51.88	74.00	22.12	Complied

Results: 2310 to 2390 MHz Restricted Band / Average

Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2370.06	34.16	2.41	36.57	54.00	17.43	Complied

Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2483.50	59.06	74.00	14.94	Complied
2488.13	52.84	74.00	21.16	Complied

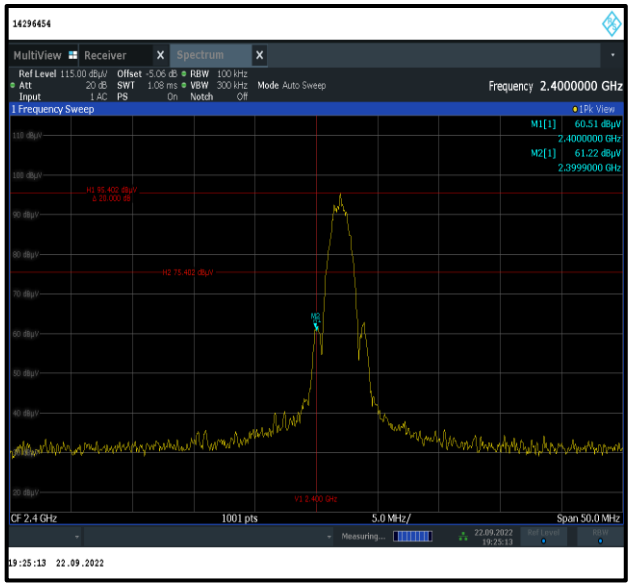
Results: Upper Band Edge / Average

Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2483.5	39.34	2.41	41.75	54.00	12.25	Complied
2483.58	38.41	2.41	40.82	54.00	13.18	Complied

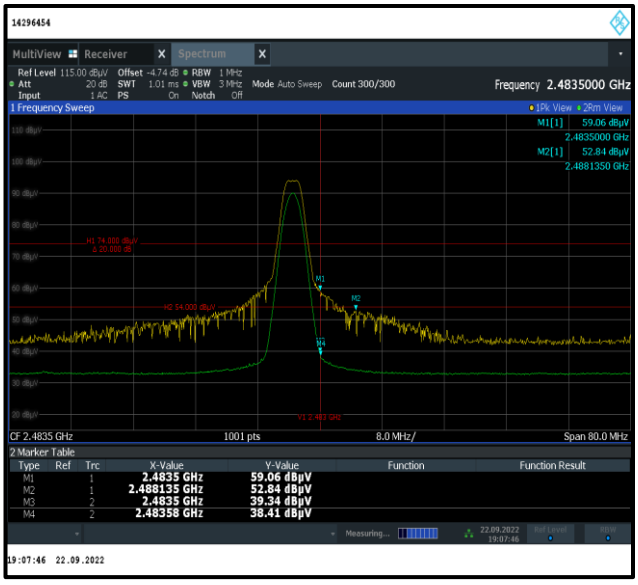
Result: Pass

Transmitter Band Edge Radiated Emissions (continued)

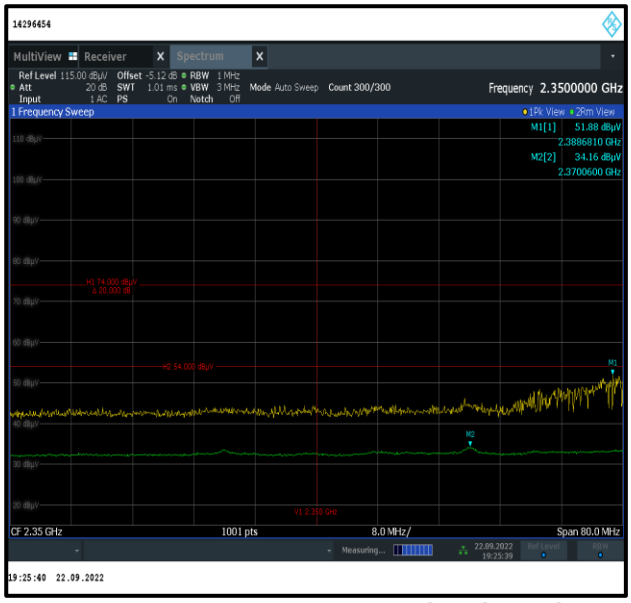
Results : BT-LE / 2 Mbps / PRBS9 / PWR 0 dBm / Stitched Antenna



Lower Band Edge Peak Measurement



Upper Band Edge Peak & Average Measurement



2310 MHz to 2390 MHz Restricted Band

Result: Pass

6. Measurement Uncertainty

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Confidence Level (%)	Calculated Uncertainty
AC conducted emission	95%	±2.49 dB
Transmitter Duty Cycle	95%	±3.4%
Minimum 6 dB Bandwidth	95%	±0.87 %
Conducted Maximum Peak Output Power	95%	±0.59 dB
Radiated Spurious Emissions	95%	±3.10 dB
Band Edge Radiated Emissions	95%	±3.10 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Used equipment

Test site: SR 1/2

ID	Manufacturer	Type	Model	Serial	Calibration Date	Cal. Cycle (months)
1	Rohde & Schwarz	Antenna, Loop	HFH2-Z2	831247/012	10/07/2020	36
377	BONN Elektronik	Amplifier, Low Noise Pre	BLMA 0118-1A	025294B	13/07/2022	12
460	Deisel	Turntable	DT 4250 S	n/a	n/a	n/a
452	Schwarzbeck	Antenna, Trilog Broadband	VULB 9168	9168-240	02/09/2020	24
496	Rohde & Schwarz	Antenna, log. - periodical	HL050	100297	05/08/2020	36
587	Maturo	antenna mast, tilting	TAM 4.0-E	011/7180311	n/a	n/a
588	Maturo	Controller	NCD	029/7180311	n/a	n/a
669	Rohde & Schwarz	EMI Test Receiver	ESW 44	103087	03/02/2022	12
608	Rohde & Schwarz	Switch Matrix	OSP 120	101227	lab verification	n/a
628	Maturo	Antenna mast	CAM 4.0-P	224/19590716	n/a	n/a
629	Maturo	Kippeinrichtung	KE 2.5-R-M	MAT002	n/a	n/a
-/-	Testo	Thermo-Hygrometer	608-H1	01	lab verification	n/a
1603665	Siemens Matsushita Components	semi-anechoic chamber SR1/ 2	-/-	B83117-A1421-T161	n/a	n/a

Test site: SR 9

ID	Manufacturer	Type	Model	Serial	Calibration Date	Cal. Cycle (months)
445	Huber & Suhner	RF Attenuator (10 dB)	6810.17.AC	--	lab verification	12
637	Rohde & Schwarz	Spectrum Analyzer	FSV40	101587	15/07/2022	12
-/-	Huber+Suhner	RF Cable -OSP120-DUT1	ST18/SMAm/SMAm/72	605505	lab verification	n/a
-/-	Testo	Thermo-Hygrometer	608-H1	07	lab verification	n/a
1603668	Siemens Matsushita Components	shielded room	--	B83117-B1422-T161	n/a	n/a

Test site: SR 7/8

ID	Manufacturer	Type	Model	Serial	Calibration Date	Cal. Cycle (months)
23	Rohde & Schwarz	Artificial Mains	ESH3-Z5	831767/013	11/07/2022	12
28	Rohde & Schwarz	Passive Probe	ESH2-Z3	none	12/07/2022	36
349	Rohde & Schwarz	Receiver, EMI Test	ESIB7	836697/009	12/07/2022	12
351	Rohde & Schwarz	network, Artificial Mains	ESH3-Z5	862770/018	11/07/2022	12
564	Teseq	Impedance stabilization network (ISN)	ISN T800	26076	12/07/2021	24
616	Rohde & Schwarz	ISN	ENY81-CA6	101656	07/07/2020	36
-/-	Testo	Thermo-Hygrometer	608-H1	08	lab verification	n/a
327	SPS	AC/DC power distribution system	PAS 5000	A2464 00/1 0200	lab verification	n/a

8. Report Revision History

Version Number	Revision Details		
	Page No(s)	**Clause**	**Details**
1.0	51	-	Initial Version
1.1	39 - 42	-	Radiated spurious emission measurements above 1 GHz repeated and updated after changing the test setup
	43 - 48	-	Radiated Band edge measurements repeated and updated after changing the test setup
Test Report Version 1.2 supersede Version 1.1 with immediate effect Test Report No. UL-RPT-RP-14296454-1216-FCC Version 1.2, Issue Date 24 OCTOBER 2022 replaces Test Report No. UL-RPT-RP-14296454-1216-FCC Version 1.1, Issue Date 04 OCTOBER 2022, which is no longer valid.			
1.2	as below	as below	Current Version
	1 & 7	-	Model name updated
	7	3.2	EUT description updated
	11	4.2	EUT configuration for Radiated measurements updated.

--- END OF REPORT ---