

HEADQUARTERS: 914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313

3/31/2025

Mazetch Industries 1641 Reynolds Dr. Irvine, CA 92614

Dear Craig Cronin,

Enclosed is the EMC Wireless test report for compliance testing of the Maztech Industries X4-FCS as tested to the requirements of FCC Part 15 - F (Ultra-Wideband Operation) for Intentional Radiators. This test report pertains specifically to the Ultra-Wideband radio onboard.

Thank you for using the services of Eurofins MET Labs. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours, EUROFINS MET LABS

I Jancy Labucque

Nancy LaBrecque Documentation Department

Reference: WIRA122491_UWB – Rev 2

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The Nation's First Licensed Nationally Recognized Testing Laboratory





Maztech Industries X4-FCS

Ultra-Wideband Test Report

for the

Maztech Industries X4-FCS

Tested under FCC Part 15 – F (Ultra-Wideband Operation) For Intentional Radiators

Bryan Taylor, Wireless Team Lead Electromagnetic Compatibility Lab

y Jancy Lab

Nancy LaBrecque Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules Part 15.519 under normal use and maintenance.

Matthew Hinojosa EMC Manager, Austin Electromagnetic Compatibility Lab



Maztech Industries X4-FCS

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	1/30/2025	Initial Issue.
1	3/19/2025	Customer Requested Changes.
2	3/31/2025	Customer Requested Changes.



Maztech Industries X4-FCS

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
d	Measurement Distance
dB	Decibels
dBμA	Decibels above one microamp
dBμV	Decibels above one microvolt
dBµA/m	Decibels above one microamp per meter
dBμV/m	Decibels above one microvolt per meter
DC	Direct Current
Е	Electric Field
DSL	Digital Subscriber Line
ESD	Electrostatic Discharge
EUT	Equipment Under Test
f	Frequency
FCC	Federal Communications Commission
GRP	Ground Reference Plane
Н	Magnetic Field
НСР	Horizontal Coupling Plane
Hz	Hertz
IEC	International Electrotechnical Commission
kHz	kilohertz
kPa	kilopascal
kV	kilovolt
LISN	Line Impedance Stabilization Network
MHz	Megahertz
μΗ	microhenry
μ	microfarad
μs	microseconds
NEBS	Network Equipment-Building System
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
TWT	Traveling Wave Tube
V/m	Volts per meter
VCP	Vertical Coupling Plane

List of Terms and Abbreviations



Maztech Industries X4-FCS

I. Executive Summary



A. Purpose of Test

An EMC evaluation was performed to determine compliance of the X4-FCS, with the requirements of FCC Part 15 - F (Ultra-Wideband Operation). Maztech Industries should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the X4-FCS, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15 - F (Ultra-Wideband Operation), in accordance with Maztech Industries purchase order number IRV12896. All tests were conducted using measurement procedures ANSI C63.4-2014 and ANSI C63.10-2013.

FCC Reference 47 CFR Part 15 Subpart F for Ultra-Wideband Operation	Description	Compliance
Title 47 of the CFR, Part 15 §15.203, 15.519(a)(2)	Antenna Requirements	Compliant
Title 47 of the CFR, Part 15 §15.519(a)(1)	Transmission Cutoff Timing	Compliant
Title 47 of the CFR, Part 15 §15.519(b)	UWB Bandwidth for Hand-Held Device	Compliant
Title 47 of the CFR, Part 15 §15.519(c)	Radiated Emissions	Compliant
Title 47 of the CFR, Part 15 §15.519(d)	Radiated Emissions in1164-1240MHz and 1559-1610 Bands	Compliant
Title 47 of the CFR, Part 15 §15.519(e)	Radiated Emissions (Peak Level) Centered on the Frequency With Highest Emissions	Compliant
Title 47 of the CFR, Part 15 §15.521(a)	UWB cannot be used for toy operation or onboard aircraft, ships, or satellites	Compliant
Title 47 of the CFR, Part 15 §15.521(b)	The antenna requirements from part 15.203 and 15.204 apply	Compliant
Title 47 of the CFR, Part 15 §15.521(c)	Emissions from digital circuitry are subject to part 15B compliance	Compliant
Title 47 of the CFR, Part 15 §15.521(d)	The limits and criteria from part 15.519 apply since this is a hand-held UWB device	Compliant
Title 47 of the CFR, Part 15 §15.521(e)	The frequency at which the highest radiated emission occurs, f_M , must be contained within the UWB bandwidth	Compliant
Title 47 of the CFR, Part 15 §15.521(f)	Imaging systems may be employed only for the type of information exchange described in their specific definitions contained in part 15.503	Compliant
Title 47 of the CFR, Part 15 §15.521(g)	Peak EIRP measurements may use a resolution bandwidth other than 50MHz provided that the limit is adjusted to 20 log (RBW/50)	Compliant
Title 47 of the CFR, Part 15 §15.521(h)	The highest frequency employed in part 15.33 to determine the scan range for radiated measurements shall be the center frequency, f_c	Compliant
Title 47 of the CFR, Part 15 §15.521(i)	The prohibition against Class B (damped wave) emissions does not apply to UWB devices operating under this part	Noted
Title 47 of the CFR, Part 15 §15.521(j)	Responsible parties are reminded that standards cross referenced under part 15.505 may be applicable.	Noted

 Table 1. Executive Summary



Maztech Industries X4-FCS

II. Equipment Configuration



A. Overview

Eurofins MET Labs was contracted by Maztech Industries to perform testing on the X4-FCS, under Maztech Industries' purchase order number IRV12896.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the X4-FCS.

Product Name:	X4 Fire Control System				
Model(s) Tested:	X4-FCS				
	Primary Power:	4-18VDC			
	Transmitters Onboard:	Ultra-Wideband			
Equipment	Equipment Code:	UWB			
Specifications:	Peak RF Output Power (EIRP):	-14.99dBm			
	EUT Frequency Ranges:	UWB: 3113.96MHz – 5775.36MHz			
	Antenna Gain ¹ :	4.16dBi			
Analysis:	The results obtained relate only to the item(s) tested.				
	Temperature: 15-35° C				
Environmental Test Conditions:	Relative Humidity: 30-60%				
	Barometric Pressure: 860-1060 mbar				
Evaluated by:	Bryan Taylor and Veer Patel				
Report Date(s):	3/31/2025				

The results obtained relate only to the item(s) tested.

 Table 2. EUT Summary Table

¹ The antenna gain information was provided by Maztech Industries at the time of testing.



Maztech Industries X4-FCS

B. References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
ANSI C63.4:2014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Table 3. References



Maztech Industries X4-FCS

C. Test Site

All testing was performed at Eurofins MET Labs, 13501 McCallen Pass, Austin, TX 78753. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 10 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

ISED Lab Info:

CAB Identifier: US0004 Company Number: 2043D

FCC Lab Info:

Designation Number: US1127

D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
Occupied Bandwidth Measurements	±4.52 Hz	2	95%
Conducted Power Measurements	±2.74 dB	2	95%
Power Spectral Density Measurements	±2.74 dB	2	95%
Conducted Spurious Emissions	±2.80 dB	2	95%
Conducted Emissions (Mains)	±2.97 dB	2	95%
Radiated Spurious Emissions (9kHz – 1GHz)	±2.95 dB	2	95%
Radiated Spurious Emissions (1GHz - 40GHz)	±3.54 dB	2	95%

Table 4. Uncertainty Calculations Summary

E. Description of Test Sample

The X4 Fire Control System is a Ballistic mount heads-up display for sportsmen target shooters. It has wireless interfaces to communicate with accessories: UWB (3.1 GHz-5.8 GHz), NFC (13.56 MHz) and to communicate with smartphone for a command/control app: NFC (13.56 MHz), BLE 5.0 (2.4 GHz).





Maztech Industries X4-FCS



Figure 1. Block Diagram of Test Configuration

F. Equipment Configuration

The X4 Fire Control System was set up as outlined in Figure 1 above. It was tested in a stand-alone configuration with special test code loaded onto the device to allow for transmission on low, mid, and high channels.

G. Support Equipment

The X4 Fire Control System was tested in a stand-alone configuration. No support equipment was used during the evaluation.

H. Ports and Cabling Information

The X4 Fire Control System was tested in a stand-alone configuration. No cables were connected during the evaluation.

I. Mode of Operation

The X4 Fire Control System was tested in a stand-alone configuration with special test code loaded onto the device to allow for transmission on low, mid, and high channels.

Transmit Band	Modulation	Channel Frequencies Tested	Test Tool Power Setting
3.1GHz – 5.8GHz	UWB	3113.96MHz / 4423.68MHz /	9
5.1GH2 - 5.8GH2		5775.36MHz	

Table 5. Test Channels Utilized



J. Method of Monitoring EUT Operation

A spectrum analyzer was used to confirm proper transmitter operation.

K. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

L. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Maztech Industries upon completion of testing.



Industries

Maztech Industries X4-FCS

III. Electromagnetic Compatibility Criteria for Intentional Radiators



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

Test Requirement:	§ 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.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

- a.) Antenna must be permanently attached to the unit.
- b.) Antenna must use a unique type of connector to attach to the EUT.
- b.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

§ 15.519(a)(2): The use of antennas mounted on outdoor structures, e.g., antennas mounted on the outside of a building or on a telephone pole, or any fixed outdoors infrastructure is prohibited. Antennas may be mounted only on the hand held UWB device.

Results: The EUT as tested is compliant with the criteria of §15.203 and 15.519(a)(2). The TX antenna is permanently attached to the unit and is not accessible by the end user. Additionally, the antenna used on this device is only attached to this device and not to any outdoor structures such as building or telephone poles.

Test Engineer(s): Bryan Taylor

Test Date(s): 12/19/2024



Maztech Industries X4-FCS

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.519(a)(1)	Transmission Cutoff Timing
Test Requirements:	§ 15.519(a)(1): A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting
Test Procedure:	The test sample was configured to communicate via normal UWB signal to an associated UWB receiver. The receiver was shut off and the transmitted signal was observed on a spectrum analyzer. Markers were placed on the captured plots indicating when the receiver was turned off and when the transmission was observed to stop. This transmission cutoff time was recorded and compared to the 10 second limit. This measurement was performed with the receiver terminating the communication link as well as with the test sample terminating the communication link.
Test Results	The EUT was compliant with § $15.519(a)(1)$. The transmission cutoff timing was less than 10 seconds.
Test Engineer(s):	Bryan Taylor
Test Date(s):	12/18/2024



Maztech Industries X4-FCS

Spectr	um											
	vel	-37.70 dE			3 👄 RBW 1 N							
Att SGL PA		U	dB 👄 SWT	20 9	5 👄 VBW 3 M	/IHZ						
o 1Pk Clr	w											
						_	D:	[1]				-24.73 dB
			Comm Lin	k Termina	ted							566.7 ms
-50 dBm-						_	M	1[1]				-62.52 dBm
												4.0667 s
1-5014BM	hill	Mangung										
	II .	00.00 U U V										
-70 dBm-												
00 40			Tr	ansmitter	Shutoff							
-80 dBm-			D1									
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-90 ubiii												
-100 dBn	n											
-110 dBn	n-					_						
-120 dBn	n+-					_						
-130 dBn	n 					-						
CF 4.42	368	GHz			60	1 pts						2.0 s/
Marker							_		1			
	Ref	Trc	X-value	D667 s	<u>Y-value</u> -62,52 -	10 m	Func	tion		Fun	ction Resu	it i
M1 D1	M1	1		0667 S 6.7 ms	-62.52							
	TIN T		50	0.7 113	27.75)				
		Л]			- 4	XA

Date: 18.DEC.2024 13:06:27

Transmission Cutoff Time = 566.7mS

Figure 2. UWB Communication Terminated by Test Sample



Maztech Industries X4-FCS

Spectr	um											
Ref Le	vel	-37.70 dBr	n Offset	2.30 dB	RBW	1 MHz						
👄 Att		0 d	B 👄 SWT	20 s	VBW	3 MHz						
SGL PA												
⊖1Pk Clr	w											,
			Comm Lin	k Terminat	ed			.[1]				-17.11 dB 600.0 ms
-50 dBm·		M	1				M	L[1]	1		-	61.10 dBm 4.0667 s
	Mp	Luthan Att	ίν ^ι μ _{Tr}	ansmitter S	Shutoff							
-70 dBm-												
-80 dBm-			4 the allow	fulployuda	wyther w	ⁿ rhallyan	all Mar	adimican	∿u<mark>b</mark>hrµ Ω	in start	freggelige for the second s	thusser the southers
-90 dBm·												
-100 dBn	n											
-110 dBn	n											
-120 dBn	n											
-130 dBn	n											
CF 4.42	368	GHz			· ·	601 pts			·			2.0 s/
Marker												
	Ref	Trc	X-value		Y-val		Funct	ion		Func	tion Result	
M1		1		0667 s		10 dBm						
D1	M1	1	60	0.0 ms	-17	7.11 dB						
[R	e a d y	011		1

Date: 18.DEC.2024 13:03:59

Transmission Cutoff Time = 600mS

Figure 3. UWB Communication Terminated by Receiver



Maztech Industries X4-FCS

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.519(b)	UWB Bandwidth
Test Requirements:	§ 15.519(b): The UWB bandwidth of a device operating under the provisions of this section must be contained between 3100 MHz and 10,600 MHz
Test Procedure:	The UWB signal was maximized by rotating the device on a turntable and raising / lowering an antenna and adjusting the antennas polarity for maximum received signal. A marker was placed at the peak of the UWB signal. Markers were then placed at the lower edge and upper edge of the UWB signal 10dB lower than the peak marker (searching from the outside of the signal toward the center of the signal). The delta between these markers at the 10dB down points was recorded as the UWB Bandwidth. Delta markers were used on the plots so that the UWB Bandwidth could be read directly.
Test Results	The EUT was compliant with § 15.519(b). The UWB bandwidth was entirely within the range of 3100 MHz and 10,600 MHz for low, mid, and high channels. Additionally, the UWB Bandwidth for each measured channel was greater than 500MHz.
Test Engineer(s):	Bryan Taylor
Test Date(s):	12/19/2024



Maztech Industries X4-FCS

UWB Bandwidth Test Results

MultiView	Receiver	× Spe	ctrum	×					•
Ref Level 102.0 Att Input TDF Input1 "Radita"	OdB 5 1 AC F	SWT2ms = VBV PS On Not		le Auto Sweep			Fre	equency 3.11	139600 GHz
1 Frequency Swe	еер								●1Pk View
100 dBµV/m								M3[1]	51.04 dBµ∀/m
									3.69736 GHz
90 dBµV/m								M1[1]	49.69 dBµV/m
									2.87016 GHz
00.d0uV/m									2.07010 012
80 dBµV/m									
70 dBµV/m									
				M2					
60 dBµV/m				analia.	1	1 1 1 1			
			541	WWW Y	NM AM	hy the My algorithe a	k.a. №3		
50 dBµV/m				4WWWW	Www.Marro	1 **	have the		
	A A				4.1		Markey Mark	WWW AND IN THE REAL PROPERTY OF	
	11 A A A	1 11	$M^{\prime\prime}$. W WWW. WWW	hangle my horas
40 dBUV/m	www. they way	from mathematica	And Martin Contraction						
30 dBµV/m									
20 dBµV/m									
10 dBµV/m									
то аврууш									
CF 3.11396 GHz			1001 pts	5	20	0.0 MHz/			Span 2.0 GHz
2 Marker Table									
Type Ref	Trc	X-Value		Y-Value		Function		Function Re	esult
M1	1	2.87016 GH		.69 dBµV/m					
D1 M1	1	827.2 MH		1.35 dB					
M2 M3		3.07396 GH 3.69736 GH		.65 dBµV/m .04 dBµV/m					
L 1MI3	1	3.89730 GR	2 31.	.o4 uoµv/m	_				
~	Last self alignment older than 30 days. 👻 👻				 Measuring 	▼ Measuring ▲ 2024-12-19 Ref Level RBW 17:06:29 ●			

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UWB Bandwidth = 827.2MHz

Figure 4. UWB Bandwidth (Low Channel)



Maztech Industries X4-FCS

									I
MultiView	Receiver	× Spec	trum	×					-
Ref Level 102.00 Att Input TDF Input1 "Raditate	OdB SWT 1 AC PS	2 ms ● VBW On Noto		le Auto Sweep			Fre	equency 4.42	36800 GHz
1 Frequency Swee		100							●1Pk View
100 dBµV/m-	-							D1[1]	0.13 dB
									826.10 MHz
90 dBµV/m								M1[1]	59.08 dBµV/m
									4.17198 GHz
80 dBµV/m									117150 012
70 dBµV/m				M2					
			M1 .	Withown		work to a	Ma		
60 dBµV/m			, d JWW	W	www.www.www		MUMMAN	. uk	
F0_dBull/m			Marin				1 · · · · · · · · · · · · · · · · · · ·	www.	
70 авµv/m 60 авµv/m 50 авµv/m Фрадвуч«(голжулчата)	autor	manhand	with					· www.	Mr
ARIGEPHUR AND	wyshipper and								. WWMWWWW
30 dBµV/m									
20 dBµV/m									
20 000000									
10 dBµV/m									
CF 4.42368 GHz			1001 pts	5	20	0.0 MHz/			Span 2.0 GHz
2 Marker Table									
Type Ref	Trc	X-Value		Y-Value		Function		Function Re	sult
M1		7198 GHz		.08 dBµV/m					
D1 M1		826.1 MHz 27578 GHz		0.13 dB 13 dBuV/m					
M2 M3		9808 GHZ		.13 dBµV/m .21 dBµV/m					
~	Las	st self alignmen	it older than 30 d	lays.	 Measuring 		2024-12	-19 Ref Level	RBW

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UWB Bandwidth = 826.1MHz

Figure 5. UWB Bandwidth (Mid Channel)



Maztech Industries X4-FCS

MultiView	Receiver	× Spe	ctrum	×					•
Ref Level 102 Att Input TDF Input1 "Radit	0 dB 5 1 AC 1	SWT2ms = VBV PS On Not		de Auto Sweep			Fre	equency 6.01	.53600 GHz
1 Frequency Sv		0.00.100						●1Pk Vie	w •6AP View
100 dBµV/m								D1[1]	1.81 dB
									775.20 MHz
90 dBµV/m								M1[1]	53.11 dBµV/m
									5.55686 GHz
80 dBµV/m									
70 dBµV/m									
					M2				
60 dBµV/m			0	1 - Broken	Munham	M3			
		M1 V	MAN MARMAN	MANY WAND		Mary Mary Mary			
50 dBµV/m		- www.m	With It's too			4NVM4	William A.		
	.a.	and Mary					The summer	a dana sana s	. march and
60 dBµV/m	wax with when we							Contraction of the Contraction o	Nor way was a case
30 dBµV/m									
20 dBµV/m									
10 dBµV/m									
CF 6.01536 GH			1001 pt	s	20	0.0 MHz/			Span 2.0 GHz
2 Marker Table									
Type Ref M1		X-Value 5.55686 GH	7 53	Y-Value .11 dBµV/m		Function		Function Re	sult
D1 M1	1	775.2 MH		1.81 dB					
M2		6.12726 GH	z 62	.72 dBµV/m	, I				
M3	1	6.33206 GH:	z 54	.93 dBµV∕m	1				
	~	Last self alignme	nt older than 30 (days.	 Measuring 		2024-12	2-19 Ref Level	RBW

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UWB Bandwidth = 775.2MHz

Figure 6. UWB Bandwidth (High Channel)





Maztech Industries X4-FCS

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.519(c) Radiated Emissions

Test Requirements:\$15.519(c): radiated emissions at or below 960 MHz from a device operating under the
provisions of this section shall not exceed the emission levels in \$15.209. The radiated
emissions above 960 MHz from a device operating under the provisions of this section
shall not exceed the following average limits when measured using a resolution
bandwidth of 1 MHz:

Frequency	§ 15.209(a),Radiated Emission Limits
(MHz)	(dBµV) @ 3m
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0

Figure 7. Radiated Field Strength Emissions Limits from FCC Part 15.209 (a)

Frequency (MHz)	§ 15.519(c),Radiated Emission Limits (dBm)	§ 15.519(c),Radiated Emission Limits (dBuV/m @ 3m)	§ 15.519(c),Radiated Emission Limits (dBuV/m @ 1m)		
960 - 1610	-75.3	20.0	29.54		
1610 – 1990	-63.3	32.0	41.54		
1990 - 3100	-61.3	34.0	43.54		
3100 - 10,600	-41.3	54.0	63.54		
Above 10,600	-61.3	34.0	43.54		

Figure 8. Radiated Field Strength Emissions Limits from FCC Part 15.519 (c)



Maztech Industries X4-FCS	FCC Part 15 – F (Ultra-Wideband Operation)
Test Procedures:	The radiated emission methodology referenced in ANSI C63.10: 2013 was utilized in order to assess the unwanted emissions. The test sample was placed on an 80cm high table (for emission below 1GHz) and on a 150cm high table (for emissions above 1GHz). The test sample was rotated 360 degrees and examined in three orthogonal axis during the test.
	For measurements below 30MHz a magnetic field loop was utilized at a distance of 3m away The magnetic loop remained fixed at 1m height and the test was performed with the loop positioned in a co-axial (0 degrees) and co-planar (90 degrees) position. Radiated measurement below 30MHz were performed in a semi-anechoic chamber that has been correlated to an open area site. Emissions were compared to the limits from 15.209.
	Measurements from 30MHz – 960MHz were performed with a Hybrid BiLog type antenna positioned 10m from the test sample. This antenna was moved from 1 to 4m in height and in vertical and horizontal polarities. Emissions were compared to the limits from 15.209.
	Measurements from 960MHz – 18GHz were performed with a horn antenna positioned 1m away from the test sample. This antenna was moved from 1 to 4m in height and in vertical and horizontal polarities. Emissions were measured in terms of field strength (dBuV/m) and ther extrapolated to a distance of 3m using an inverse distance correction factor of 20 dB / decade. I was then converted to power terms (in dBm) for comparison to the limits in part 15.519(c). The formula from ANSI C63.10 Section 10.3.9 (formula 34) was used to convert from field strength to power terms:
	$EIRP(dBm) = E(dB\mu V/m) - 95.3$
	Measurements from 18GHz to 40GHz were performed with a horn antenna positioned 0.5m from the test sample as well as via a prescan using conducted methods with the test sample connected directly to a spectrum analyzer. Any emissions detected from the test sample above the measurement noise floor were then measured at 1m distance using the same methodology as was used from 960MHz – 18GHz. Where no actual emissions were detected a plot of the measurement noise floor is submitted in the results.
Test Software:	TILE Version 7.4.2.5 (Manufactured by ETS Lindgren) and ELEKTRA Version 4.61 (Manufactured by Rohde&Schwarz) was utilized to perform these measurements.
Test Results:	The EUT was compliant with the radiated emission limits from rule part 15.209 (below 960MHz) and 15.519(c) (above 960MHz).
Test Engineer(s):	Bryan Taylor and Veer Patel
Test Date(s):	12/19/2024 - 1/27/2025



Maztech Industries X4-FCS

Radiated Emissions Test Results

Frequency [MHz]	Peak Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]	Result
0.018	63.46	122.73	59.26	15.31	V	14.7	1	0.200	Pass
0.028	50.92	118.77	67.85	13.98	Н	99	1	0.200	Pass
1.685	30.53	63.07	32.53	11.69	Н	201.9	1	9.000	Pass
10.149	26.99	69.50	42.51	10.82	V	190.7	1	9.000	Pass

Figure 9. Worst Case Field Strength Below 30MHz (Valid for low, mid, and high channels)

Frequency [MHz]	QPK Level [dBµV/m]	QPK Limit [dBµV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]	Result
32.340	11.15	29.55	18.40	-1.87	Н	212.7	2.32	120.000	Pass
47.160	1.47	29.55	28.08	-12.12	V	148.4	3.92	120.000	Pass
138.150	5.76	33.07	27.31	-7.10	Н	173.2	3.17	120.000	Pass
159.990	6.96	33.07	26.11	-7.67	V	9	1.11	120.000	Pass
443.070	11.34	35.57	24.23	-1.63	Н	137.1	3.41	120.000	Pass
933.240	19.31	35.57	16.26	7.27	V	302	2.3	120.000	Pass

Figure 10. Worst Case Field Strength 30MHz – 960MHz (Low channel)

Frequency [MHz]	QPK Level [dBµV/m]	QPK Limit [dBµV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]	Result
32.130	11.24	29.55	18.31	-1.75	Н	295.2	3.92	120.000	Pass
62.220	0.43	29.55	29.12	-13.16	V	270	2.82	120.000	Pass
103.470	10.81	33.07	22.26	-9.69	V	133.5	1.23	120.000	Pass
121.440	6.77	33.07	26.30	-6.27	Н	225.4	1.5	120.000	Pass
569.820	13.86	35.57	21.71	1.16	V	226.5	3.99	120.000	Pass
715.140	15.83	35.57	19.74	3.22	Н	250.6	3.41	120.000	Pass

Figure 11. Worst Case Field Strength 30MHz – 960MHz (Mid channel)

Frequency [MHz]	QPK Level [dBµV/m]	QPK Limit [dBμV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]	Result
33.990	10.34	29.55	19.21	-2.96	Н	116.8	2.01	120.000	Pass
43.740	8.74	29.55	20.81	-10.68	V	16.7	2.26	120.000	Pass
103.470	10.29	33.07	22.78	-9.69	V	32.7	2.4	120.000	Pass
276.360	14.36	35.57	21.21	-5.91	Н	21.7	3.5	120.000	Pass
515.730	15.71	35.57	19.86	-0.44	V	291	1.2	120.000	Pass
723.900	15.78	35.57	19.79	3.25	Н	320.7	2.74	120.000	Pass



Frequency (GHz)	Polarity (V/H)	Amplitude (dBm)	Limit (dBm)	Margin (dB)	RBW	Result
2.414	V	-71.13	-61.3	9.83	1MHz	Pass
3.071	V	-65.61	-61.3	4.31	1MHz	Pass
1.349	V	-80.64	-75.3	5.34	1MHz	Pass
16.778	V	-65.51	-61.3	4.21	1MHz	Pass
17.297	V	-66.33	-61.3	5.03	1MHz	Pass
9.966	V	-72.45	-41.3	31.15	1MHz	Pass
1.882	Н	-67.12	-63.3	3.82	1MHz	Pass
3.071	Н	-64.57	-61.3	3.27	1MHz	Pass
1.441	Н	-80.57	-75.3	5.27	1MHz	Pass
16.780	Н	-65.34	-61.3	4.04	1MHz	Pass
17.856	Н	-68.25	-61.3	6.95	1MHz	Pass
8.140	Н	-73.80	-41.3	32.50	1MHz	Pass

Figure 13. Worst Case Spurious Emissions 960MHz - 40GHz (Low Channel)

Frequency (GHz)	Polarity (V/H)	Amplitude (dBm)	Limit (dBm)	Margin (dB)	RBW	Result
1.438	V	-80.53	-75.3	5.23	1MHz	Pass
1.853	V	-79.18	-63.3	15.88	1MHz	Pass
2.577	V	-77.29	-61.3	15.99	1MHz	Pass
4.271	V	-63.16	-41.3	21.86	1MHz	Pass
12.440	V	-69.62	-61.3	8.32	1MHz	Pass
16.779	V	-65.37	-61.3	4.07	1MHz	Pass
1.333	Н	-80.86	-75.3	5.56	1MHz	Pass
1.855	Н	-79.13	-63.3	15.83	1MHz	Pass
2.461	Н	-73.35	-61.3	12.05	1MHz	Pass
4.729	Н	-65.88	-41.3	24.58	1MHz	Pass
12.420	Н	-68.84	-61.3	7.54	1MHz	Pass
16.794	Н	-67.40	-61.3	6.10	1MHz	Pass

Figure 14. Worst Case Spurious Emissions 960MHz – 40GHz (Mid Channel)



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Frequency (GHz)	Polarity (V/H)	Amplitude (dBm)	Limit (dBm)	Margin (dB)	RBW	Result
1.438	V	-80.51	-75.3	5.21	1MHz	Pass
1.932	V	-77.97	-63.3	14.67	1MHz	Pass
2.440	V	-75.57	-61.3	14.27	1MHz	Pass
6.091	V	-63.22	-41.3	21.92	1MHz	Pass
14.360	V	-68.98	-61.3	7.68	1MHz	Pass
16.778	V	-65.38	-61.3	4.08	1MHz	Pass
1.347	Н	-80.54	-75.3	5.24	1MHz	Pass
1.951	Н	-75.96	-63.3	12.66	1MHz	Pass
2.760	Н	-78.00	-61.3	16.70	1MHz	Pass
6.187	Н	-64.51	-41.3	23.21	1MHz	Pass
14.360	Н	-68.83	-61.3	7.53	1MHz	Pass
16.779	Н	-65.46	-61.3	4.16	1MHz	Pass

Figure 15. Worst Case Spurious Emissions 960MHz – 40GHz (High Channel)



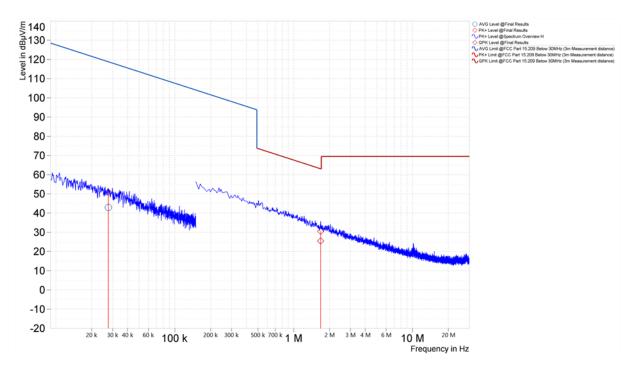


Figure 16. Radiated Emissions 9kHz – 30MHz (Coplanar Loop)

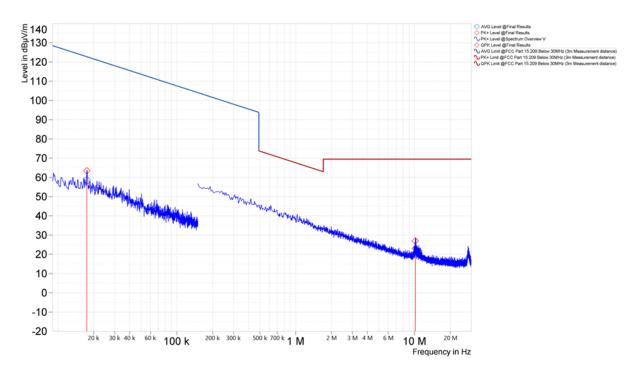


Figure 17. Radiated Emissions 9kHz – 30MHz (Coaxial Loop)



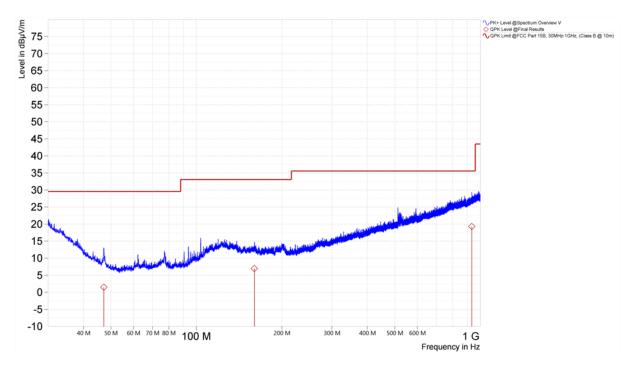


Figure 18. Radiated Emissions 30MHz-1GHz (Vertical, Low Channel)

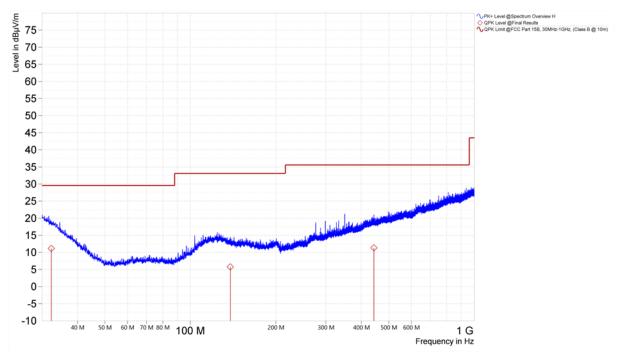


Figure 19. Radiated Emissions 30MHz-1GHz (Horizontal, Low Channel)



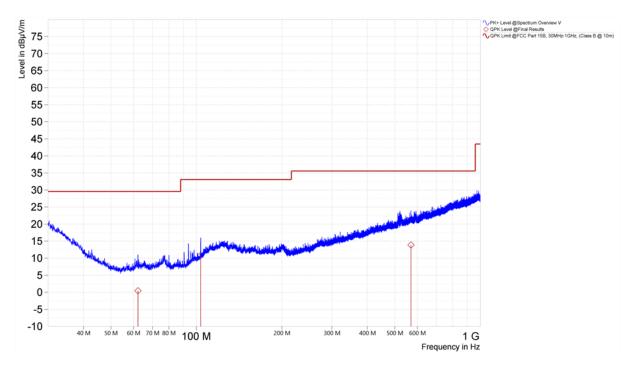


Figure 20. Radiated Emissions 30MHz-1GHz (Vertical, Mid Channel)

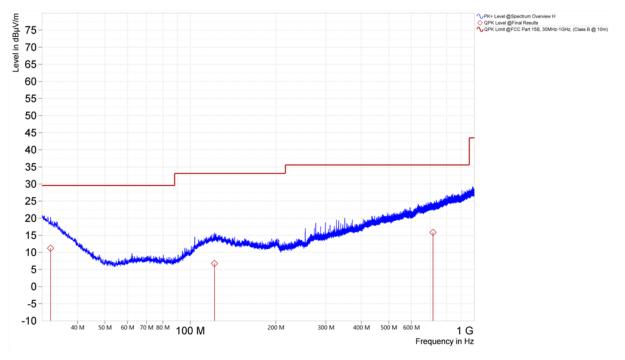


Figure 21. Radiated Emissions 30MHz-1GHz (Horizontal, Mid Channel)



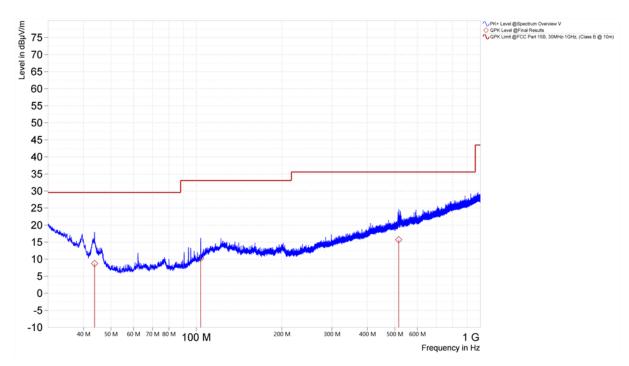


Figure 22. Radiated Emissions 30MHz-1GHz (Vertical, High Channel)

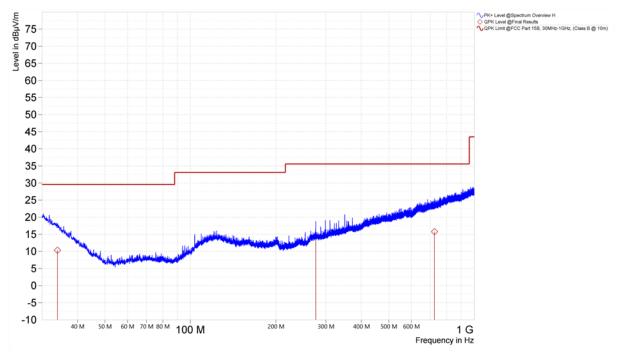


Figure 23. Radiated Emissions 30MHz-1GHz (Horizontal, High Channel)



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Scan	M4		1		16.7785 0			39.33 dB	
Scan Scan	M5 M6		1		9.966 0			38.51 dBp 32.39 dBp	V/m
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Scan	M5 M5		1		17.8565 0	GHZ		36.59 dB 31.04 dB	uV/m
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Scan	M4		i		4.271 0	SHZ		41.68 d	IBµV/m	
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Scan	M4		1		4.7295 0			38.96 (	BµV/m	
Scan	M5 M6		1		12.42 C 16.7945 C			37.44	IBµV/m IBµV/m	
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Scan	MB		i		2.44 0	SHz		29.27 dBj	V/m
Scan	M4 M5		1		14.36 0	SHz		41.62 dBp 35.86 dBp	V/m
Scan	M6		1		16.7785 0			39.46 dBj	
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3 Marker Table									
Wnd	Type	Ref	Trc		X-value			Y-valu	
Scan	M1		1		1.347 0			24.3 dBp	V/m
Scan	M2 M3		1		1.951 0			28.88 dBi 26.84 dBi	V/m
Scan	M3		1		6.187 0			40.33 dB	
Scan	MS		ĩ		14.36 0	GHZ		36.01 dBj	iV/m
Scan	M6		1		16.7795 0	SHZ		39.38 dB	/W/m
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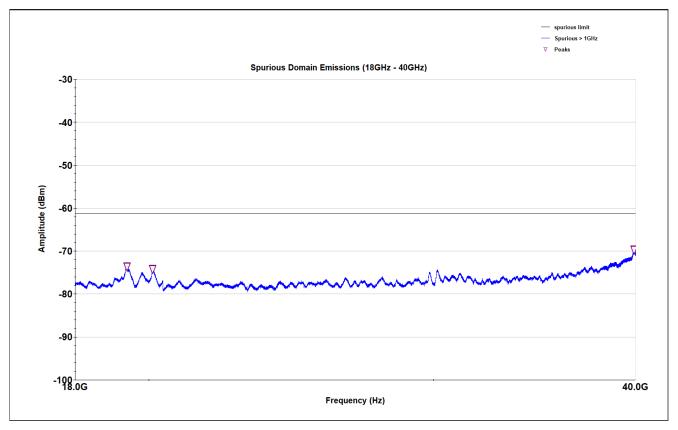


Figure 30. Radiated Emissions 18GHz – 40GHz (Low Channel)



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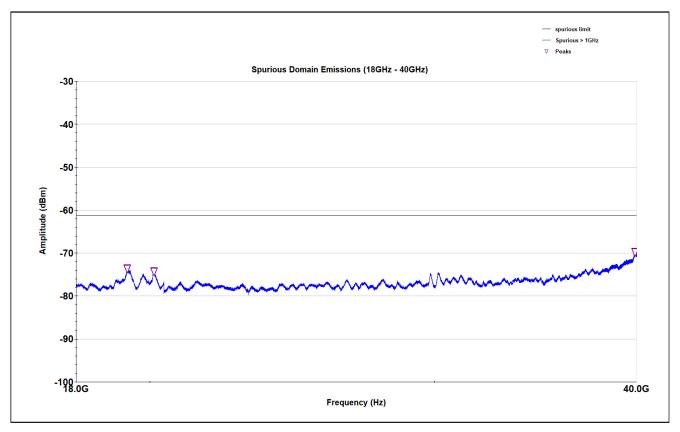


Figure 31. Radiated Emissions 18GHz – 40GHz (Mid Channel)



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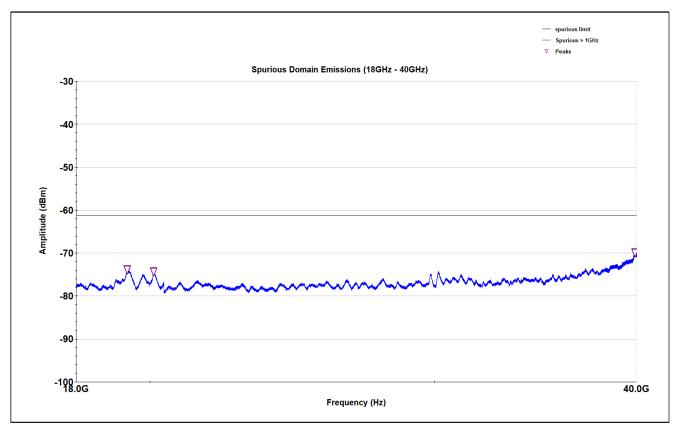


Figure 32. Radiated Emissions 18GHz – 40GHz (High Channel)





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## **Electromagnetic Compatibility Criteria for Intentional Radiators**

## § 15.519(d) Emissions in the 1164-1240MHz and 1559-1610MHz Bands

Test Requirements:\$15.519(d): In addition to the radiated emission limits specified in the table in paragraph<br/>(c) of this section, UWB transmitters operating under the provisions of this section shall not<br/>exceed the following average limits when measured using a resolution bandwidth of no less<br/>than 1 kHz

Frequency (MHz)	EIRP in dBm
1160 - 1240	-85.3
1559 - 1610	-85.3

**Test Procedure:** Measurements in the 1164-1240MHz and 1559-1610MHz bands were performed using the same methodology as was used for the 15.519(c) spurious emission measurements. Per ANSI C63.10 section 10.3.10 a resolution bandwidth of 30kHz was used on the measurement instrument with RMS detection.

The analyzer settings are shown in the following table:

RBW:	30kHz	Detector:	RMS	Reference Level:	-50dBm
VBW:	100kHz	Sweep Time:	Auto	Internal Attenuation:	0dB

### Figure 34. Analyzer Settings During Measurement

Test Software:	TILE Version 7.4.2.5 (Manufactured by ETS Lindgren) was utilized to perform these measurements.
Test Results:	The EUT was compliant with the peak power spectral density limits of § 15.519 (d).
Test Engineer:	Bryan Taylor and Veer Patel
Test Date:	12/19/2024 - 1/27/2025



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#### FCC Part 15 - F (Ultra-Wideband Operation)

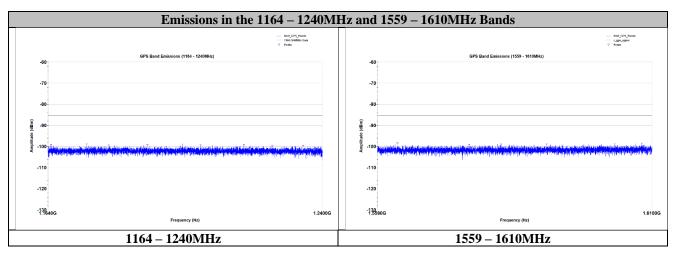


Figure 35. Emissions in the 1164 – 1240MHz and 1559 – 1610MHz Bands (Low Channel)

Tested Band	Frequency (MHz)	Amplitude (dBm)	Limit (dBm)	Margin (dB)	RBW	Result
	1164.03	-100.635	-85.3	15.335	30kHz	Pass
	1164.874	-99.2	-85.3	13.9	30kHz	Pass
	1174.465	-98.75	-85.3	13.45	30kHz	Pass
	1180.416	-99.51	-85.3	14.21	30kHz	Pass
1164MHz – 1240MHz	1191.01	-99.215	-85.3	13.915	30kHz	Pass
	1200.609	-98.919	-85.3	13.619	30kHz	Pass
	1205.64	-99.445	-85.3	14.145	30kHz	Pass
	1217.778	-99.219	-85.3	13.919	30kHz	Pass
	1225.788	-99.65	-85.3	14.35	30kHz	Pass
	1234.49	-99.65	-85.3	14.35	30kHz	Pass
	1562.667	-98.431	-85.3	13.131	30kHz	Pass
	1575.866	-99.218	-85.3	13.918	30kHz	Pass
1559MHz – 1610MHz	1581.812	-98.741	-85.3	13.441	30kHz	Pass
T223IAIUS – T0T0IAIUS	1590.227	-98.731	-85.3	13.431	30kHz	Pass
	1602.957	-98.701	-85.3	13.401	30kHz	Pass
	1608.042	-98.518	-85.3	13.218	30kHz	Pass

Figure 36. Emissions in the 1164 – 1240MHz and 1559 – 1610MHz Bands (Low Channel)



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### FCC Part 15 - F (Ultra-Wideband Operation)

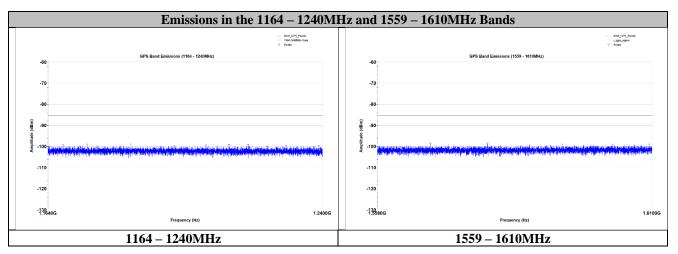


Figure 37. Emissions in the 1164 – 1240MHz and 1559 – 1610MHz Bands (Mid Channel)

Tested Band	Frequency (MHz)	Amplitude (dBm)	Limit (dBm)	Margin (dB)	RBW	Result
	1164.342	-100.095	-85.3	14.795	30kHz	Pass
	1168.112	-99.446	-85.3	14.146	30kHz	Pass
	1174.632	-98.927	-85.3	13.627	30kHz	Pass
	1186.481	-98.973	-85.3	13.673	30kHz	Pass
	1198.436	-99.8	-85.3	14.5	30kHz	Pass
1164MHz – 1240MHz	1207.191	-99.463	-85.3	14.163	30kHz	Pass
	1213.582	-99.271	-85.3	13.971	30kHz	Pass
	1218.956	-99.252	-85.3	13.952	30kHz	Pass
	1224.412	-100.115	-85.3	14.815	30kHz	Pass
	1229.641	-99.618	-85.3	14.318	30kHz	Pass
	1238.944	-99.582	-85.3	14.282	30kHz	Pass
	1568.731	-98.645	-85.3	13.345	30kHz	Pass
1559MHz – 1610MHz	1579.262	-98.637	-85.3	13.337	30kHz	Pass
1223MIUS – 1010MIUS	1593.134	-98.922	-85.3	13.622	30kHz	Pass
	1602.574	-98.905	-85.3	13.605	30kHz	Pass

Figure 38. Emissions in the 1164 – 1240MHz and 1559 – 1610MHz Bands (Mid Channel)



Maztech Industries X4-FCS

### FCC Part 15 - F (Ultra-Wideband Operation)

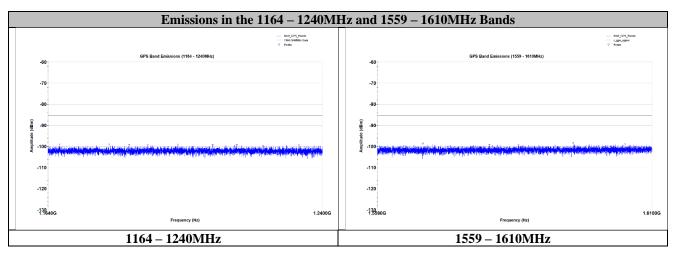


Figure 39. Emissions in the 1164 – 1240MHz and 1559 – 1610MHz Bands (High Channel)

Tested Band	Frequency (MHz)	Amplitude (dBm)	Limit (dBm)	Margin (dB)	RBW	Result
	1164.205	-100.539	-85.3	15.239	30kHz	Pass
	1167.124	-98.924	-85.3	13.624	30kHz	Pass
	1180.515	-98.887	-85.3	13.587	7 <u>30kHz</u> 30kHz	Pass
	1186.017	-99.22	-85.3	13.92		Pass
1164MHz – 1240MHz	1191.041	-99.428	-85.3	14.128	30kHz	Pass
	1199.408	-99.152	-85.3	13.852	2 30kHz	Pass
	1209.053	-99.254	-85.3	13.954		Pass
	1215.786	-99.266	-85.3	13.966	30kHz	Pass
	1223.158	-99.699	-85.3	14.399	30kHz	Pass
	1233.342	-99.336	-85.3	14.036	30kHz 30kHz	Pass
	1567.339	-98.651	-85.3	13.351	30kHz	Pass
	1579.604	-99.256	-85.3	13.956	30kHz	Pass
1559MHz – 1610MHz	1585.005	-99.38	-85.3	14.08	30kHz	Pass
	1595.21	-98.434	-85.3	13.134	30kHz	Pass
	1604.951	-98.721	-85.3	13.421	30kHz	Pass

Figure 40. Emissions in the 1164 – 1240MHz and 1559 – 1610MHz Bands (Low Channel)



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## **Electromagnetic Compatibility Criteria for Intentional Radiators**

### § 15.519(e) Peak EIRP Within a 50MHz

- **Test Requirement: 15.519(e)** There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, fM. That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in § 15.521.
- **Test Procedure:** The radiated emission methodology referenced in ANSI C63.10: 2013 was utilized in order to assess peak EIRP of the UWB device. The test sample was placed on an 150cm high table and was rotated 360 degrees and examined in three orthogonal axis during the test. A horn antenna was positioned 3m away and was scanned from 1-4 meters in height in vertical and horizontal polarities. The measurement instrument used was configured for peak detection using a 50MHz resolution bandwidth. The worst case field strength contained within a 50MHz bandwidth centered on the frequency at which the highest emission occurred was recorded (in dBuV/m). The field strength measurement was then converted to power terms (in dBm) for comparison to the 0dBm limit in part 15.519(e). The formula from ANSI C63.10 Section 10.3.9 (formula 34) was used to convert from field strength to power terms:

$$\mathrm{EIRP}(\mathrm{dBm}) = E(\mathrm{dB}\mu\mathrm{V/m}) - 95.3$$

- **Test Results:** The EUT was compliant with the peak EIRP limit from **§15.519(e)**.
- **Test Engineer:** Bryan Taylor and Veer Patel

**Test Date:** 12/19/2024 – 1/27/2025

Transmit Channel	Frequency (GHz)	Polarity (V/H)	Amplitude (dBuV/m)	Amplitude (dBm)	RBW Used	Limit (dBm)	Margin (dB)	Result
Low	3.1139	V	70.26	-25.04	30MHz	-4.43	20.61	Pass
Low	3.1139	Н	73.43	-21.87	30MHz	-4.43	17.44	Pass
Mid	4.4230	V	80.31	-14.99	50MHz	0	14.99	Pass
Mid	4.4230	Н	77.63	-17.67	50MHz	0	17.67	Pass
High	5.7753	V	76.53	-18.77	30MHz	-4.43	14.34	Pass
High	5.7753	Н	77.46	-17.84	30MHz	-4.43	13.41	Pass

Note: The low and high channels were measured using a RBW lower than 50MHz. Per 15.521 this is allowed as long as the limit is adjusted to  $20\log(RBW/50)$ . For that reason the limit for the low and the high channels has been adjusted to  $20\log(30/50) = -4.43$ dBm

#### Figure 41. Peak EIRP Measurements



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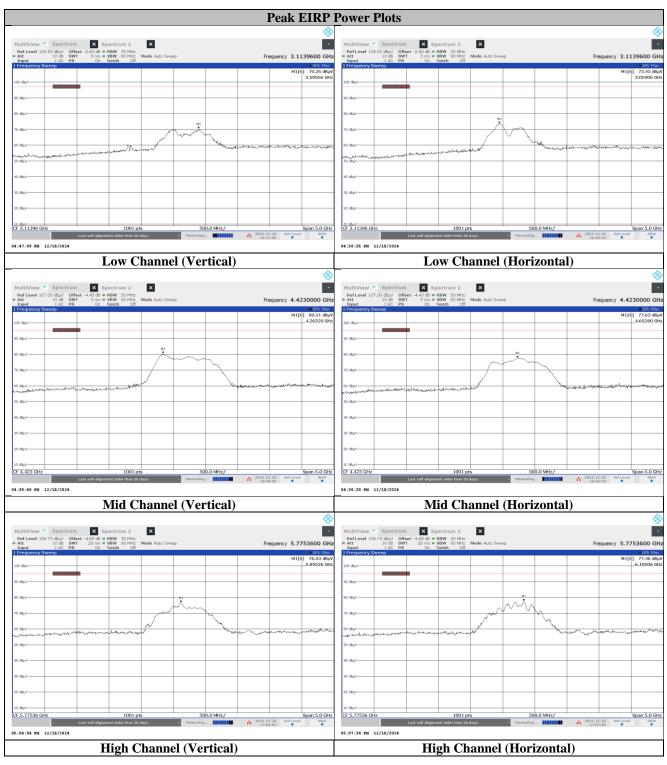


Figure 42. Peak EIRP Power Plots



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# **IV. Test Equipment**



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#### FCC Part 15 - F (Ultra-Wideband Operation)

# **Test Equipment**

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Asset #	Description	Manufacturer	Model	Last Cal Date	Cal Due Date
1A1250	Receiver	Rohde & Schwarz	ESW44	04/08/2024	04/08/2025
1A1234	FSV Signal Analyzer	Rohde & Schwarz	FSV 40	1/23/2023	01/23/2025 ²
1A1176	Active Loop Antenna (9KHz-30MHz)	ETS-Lindgren	6502	8/22/2024	8/22/2026
1A1147	Bi-Log Antenna	Suno Sciences Corp	JB3	04/06/2023	04/06/2025
1A1047	Horn Antenna (1GHz – 18GHz)	ETS - Lindgren	3117	06/26/2024	06/26/2025
1A1161	Horn Antenna (18GHz – 40GHz)	ETS Lindgren	3116C	08/01/2024	08/01/2026
1A1088	Preamplifier	Rohde & Schwarz	TS-PR1	See	Note
1A1044	Generator	Com-Power	CG-520	See	Note
1A1073	Multi Device Controller	ETS	2090	See	Note
1A1074	System Controller	Panasonic	WV-CU101	See	Note
1A1080	Multi-Device	ETS	2090	See	Note
1A1180	Preamplifier	Miteq	AMF-7D- 01001800-22- 10P	See	Note

## Table 6. Test Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

² The calibration on this item expired after 1/23/2025. It was not used for any measurements after that date.



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# **End of Report**