RF Exposure Criteria
Test Report

for the

Maztech Industries
X4-FCS

Tested under

FCC Part 2.1093

Report: WIRA122491_MPE_R2

3/6/2025

Bryan Taylor, Wireless Team Lead
Electromagnetic Compatibility 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 15.247 under normal use and maintenance.

Matthew Hinojosa
EMC Manager, Austin Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
0	2/3/2025	Initial Issue.
1	3/6/2025	Updated report to reflect a portable device and show SAR exemption for the BLE transmitter
2	3/19/2025	Reviewer comments

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List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**B**els
dBµA	**D**eci**B**els above one **micro**amp
dBµV	**D**eci**B**els above one **micro**volt
dBµA/m	**D**eci**B**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**B**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
CISPR	**C**omite **I**nternational **S**pecial des **P**erturbations **R**adioelectriques (International Special Committee on Radio Interference)
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ertz
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**H**ertz
kPa	**k**ilo**Pa**scal
kV	**k**ilovolt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**H**ertz
µ**H**	**micro**Henry
µ**F**	**micro**Farad
µ**s**	**micro**seconds
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

1.0 Requirements Summary

Page Number	Test Name	Result
12	FCC Part 2.1093 Limits (For General Public Exposure)	**Compliant**

Table 1. Summary of Test Results

2.0 Equipment Configuration

2.1 Overview

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

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

Product Name:	X4 Fire Control System	
Model Number:	X4-FCS	
FCCID:	2BKWD-FCS01	
EUT Specifications:	Primary Power: 4 – 18VDC	
	Antenna Gain[1]:	BLE: 1.0dBi UWB:4.16dBi RFID: N/A
	EUT Frequency Ranges:	BLE: 2402Hz – 2480MHz
		UWB: 3113.96MHz – 5775.36MHz
		RFID: 13.56MHz
	Maximum Conducted Output Power:	BLE: 0dBm (conducted power)
		UWB: -13.0dBm (EIRP)
		RFID: 40.12dBuV/m (measured at 3m), (-57.19dBm ERP)
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Type of Filing:	Original	
Evaluated by:	Bryan Taylor	
Report Date(s):	3/19/2025	

Table 2. EUT Summary Table

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

2.2 Test Site

All testing was performed at Eurofins E&E North America, Austin, TX. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

2.3 References

FCC Part 2.1093	Radiofrequency radiation exposure evaluation: portable devices.

Table 3. References

2.4 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).

2.5 Modifications

2.5.1 Modifications to EUT

No modifications were made to the EUT.

2.5.2 Modifications to Test Standard

No modifications were made to the test standard.

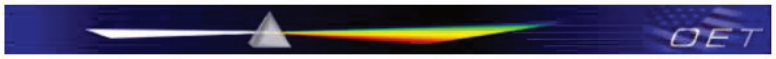
2.6 Disposition of EUT

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.

3.0 Exemption Threshold Limits

3.1 FCC SAR Exemption Thresholds

The FCC SAR exemption threshold limits from KDB447498D04 v01 are shown below.



11/29/2021

$$P_{th}\,(\text{mW}) = \begin{cases} ERP_{20\,\text{cm}}(d/20\,\text{cm})^{x} & d \le 20\,\text{cm} \\ ERP_{20\,\text{cm}} & 20\,\text{cm} < d \le 40\,\text{cm} \end{cases} \quad \text{(B.2)}$$

where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,\text{cm}}\sqrt{f}}\right)$$

and f is in GHz, d is the separation distance (cm), and ERP_{20cm} is per Formula (B.1).
The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)										
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

3.1 FCC Blanket 1mW Exemption Criteria

Per the FCCs KDB 447498D04 v01, transmitters that meet the 1mW blanket exemption power level are exempt from the RF exposure criteria.

B.1 General
This appendix provides the exemption criteria and summarizes relevant parameters and usage considerations based on descriptions in FCC 19-126.

B.2 Blanket 1 mW Blanket Exemption
The 1 mW Blanket Exemption of § 1.1307(b)(3)(i)(A) applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power of no more than 1 mW, regardless of separation distance.
The 1 mW blanket exemption applies at separation distances less than 0.5 cm, including where there is no separation. This exemption shall not be used in conjunction with other exemption criteria other than those for multiple RF sources in paragraph § 1.1307(b)(3)(ii)(A).
The 1 mW exemption is independent of service type and covers the full range of 100 kHz to 100 GHz, but it shall not be used in conjunction with other exemption criteria or in devices with higher-power transmitters operating in the same time-averaging period. Exposure from such higher-power transmitters would invalidate the underlying assumption that exposure from the lower-power transmitter is the only contributor to SAR in the relevant volume of tissue.

KDB 447498D01 Blanket Exemption for Transmitters Outputting Less than 1mW

Test Procedure:

For the RFID and Ultra-Wideband transmitters, the maximum radiated power was compared to the 1mW blanket exemption limit. For the BLE transmitter the maximum conducted power was added to the antenna gain and the resultant EIRP was compared to the SAR exemption limit at 2402MHz and a separation distance of 5mm.

Test Results:

The X4 Fire Control System was **compliant** with FCC Part 2.1093. The EIRP from the BLE transmitter was less than the power threshold limit for SAR based exemption with a separation distance of 5mm. Additionally, the RFID and Ultra-Wideband transmitters onboard met the 1mW blanket exemption criteria from KDB447498 D04.

Test Data:

Maximum Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Pth	Result
0	1	1.00	1.2589	3.0000	exempt

SAR Power Threshold Data for the BLE Transmitter at 2402MHz

Field Strength (dBuV/m)	Measurement Distance (m)	EIRP (dBm)	EIRP (mW)	ERP (dBm)	ERP (mW)
40.12	3	-55.04	0.0000031350	-57.19	0.0000019109

The field strength was measured at 3m with a sample operating at its maximum output. This field strength was converted to an EIRP using the formulas from ANSI C63.10 (9.5) and then further adjusted to ERP (by subtracting 2.15dB from the EIRP) since the RFID operates below 1GHz.

1mW Exemption for RFID Transmitter

EIRP (Including Tune-Up Tolerance) (dBm)	EIRP (mW)
-13	0.0501187234

The worst case output power including tune-up tolerance was converted to mW and compared to the 1mW Exemption Criteria.

1mW Exemption for the Ultra-Wideband Transmitter

Test Engineer(s): Bryan Taylor

Test Date(s): 1/27/2025

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
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 4. Test Equipment List

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