



# H.B. Compliance Solutions

## Intentional Radiator Test Report

For the

**Kubota**

**ECU for Auto Steer Tractor**

Tested under

The FCC Rules contained in Title 47 of the CFR, Part 15.247 and ISSED RSS-247 Issue 3 Class II  
Permissive Change for

Digitally Transmitting Sequence

### **Prepared for:**

Kubota North America Corp.

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### **Prepared By:**

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### **Reviewed By:**

A handwritten signature in black ink, appearing to read 'Hoosamuddin Bandukwala'.

Hoosamuddin Bandukwala



Cert # ATL-0062-E

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedure 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 measurement made, the equipment tested is capable of operation in accordance with the requirements of Part 15 of the FCC Rules under normal use and maintenance. All results contained herein relate only to the sample tested.

## Report Status Sheet

Revision #	Report Date	Reason for Revision
Ø	March 07, 2025	Initial Issue

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## EXECUTIVE SUMMARY

### 1. Testing Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15.247. All tests were conducted using measurement procedure from ANSI C63.10-2013, RSS-GEN Issue 5, RSS-247, FCC Guidance document 558074 D01 v05r02 April 02, 2019 as appropriate.

Test Name	Test Method/Standard	ISED Standard	Result	Comments
Radiated Spurious Emissions & Restricted Band	15.247(d), 15.209(a), 15.205	RSS-247 (5.5) RSS-Gen (7.0)	Pass	

### **Class II Permissive Change:**

The device uses Variscite model VAR-SOM-MX93 system-on-module card. This contains Murata Type 2EL Part Number LBES5PL2EL module certified under Limited Modular approval. The host device is tested to confirm emissions are under the limits as per OEM instructions based on KDB 996369.

## EQUIPMENT CONFIGURATION

### 1. Overview

H.B Compliance Solutions was contracted by Kubota. to perform testing on the ECU for Auto Steer Tractor under the quotation number Q24121007.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Kubota, ECU for Auto Steer Tractor.

The tests were based on FCC Part 15 Rules. The tests described in this document were formal tests as described with the objective of the testing was to evaluate compliance of the Equipment Under Test (EUT) to the requirements of the aforementioned specifications. Kubota should retain a copy of this document and it should be kept on file for at least five years after the manufacturing of the EUT has been permanently discontinued. The results obtained relate only to the item(s) tested.

<b>Product Name:</b>	ECU for Auto Steer Tractor
<b>Model(s) Tested:</b>	KAE104
<b>FCC ID:</b>	2BOIZKAE104
<b>Supply Voltage Input:</b>	Primary Power: 12 VDC
<b>Frequency Range:</b>	2400-2483.5 MHz
<b>No. of Channels:</b>	WiFi 802.11/ Bluetooth (Classic)
<b>Necessary Bandwidth</b>	N/A
<b>Type(s) of Modulation:</b>	OQPSK
<b>Emission Designator:</b>	N/A
<b>Test Item:</b>	Pre-Production
<b>Type of Equipment:</b>	Mobile
<b>Antenna Requirement (§15.203):</b>	Type of Antenna: Trace Monopole Gain of Antenna: 3.6dBi
<b>Environmental Test Conditions:</b>	Temperature: 15-35°C Humidity: 30-60% Barometric Pressure: 860-1060 mbar
<b>Modification to the EUT:</b>	None
<b>Evaluated By:</b>	Staff at H.B. Compliance Solutions
<b>Test Date(s):</b>	March 03, 2025

## 2. Test Facility

All testing was performed at H.B. Compliance Solutions. This facility is located at 5005 S. Ash Avenue, Suite # A-10, Tempe AZ-85282. All equipment used in making physical determination is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a GTEM chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at H.B. Compliance Solutions.

Test facility H.B. Compliance Solutions is an ANAB accredited test site. The ANAB certificate number is L2458. The scope of accreditation can be found on ANAB website [www.anab.org](http://www.anab.org)

FCC Registered Number: 738876

ISED Test Site Registration number is 9481A



### 3. Description of Test Sample

#### ECU - KAE104 :

The WorkSmart Autosteer ECU, KAE104, is a simple, low-cost, auto-steering product for agricultural applications. With Bluetooth and Wi-Fi connectivity to the WorkSmart Autosteer App, it uses your own mobile device for a familiar user experience. It is compatible with the WorkSmart Autosteer Mechanical Drive Unit, KAMC06, and ISOBUS Steer Ready vehicles.

#### MDU - KAMC06:

The WorkSmart Autosteer Mechanical Drive Unit, KAMC06, is a simple, low-cost, auto-steering product for agricultural applications. It is compatible with the WorkSmart Autosteer ECU, KAE104, to add auto-steering capability to a wide range of vehicles.

Device contains FCC pre-certified Module FCC ID: VPYLBES5PL2EL

The Module is integrated consistent with the grant notes and manufacturer's integration guide.

### 4. Equipment Configuration

Ref. ID	Name / Description	Model Number	Serial Number
# 1	ECU for Auto Steer Tractor	KAE104	2598AZ9915

Table 1. Equipment Configuration

### 5. Support Equipment

All support equipment supplied is listed in the following Support Equipment List.

Ref ID	Name / Description	Manufacturer	Model #	Serial #
# 2	12V Battery	-	-	-
# 3	Laptop Computer	Dell	Latitude 5420	-

Table 2. Support Equipment

## 6. Ports and Cabling Information

Ref ID	Port name on the EUT	Cable Description	Qty.	Length (m)	Shielded? (Y/N)	Termination Box ID & Port ID
# 4	System Harness	Automotive Harness with multiple ports	1	6	N	# 2
# 5	# 4 Ethernet	Ethernet	1	2	N	# 3

Table 3. Ports and Cabling Information

## 7. Method of Monitoring EUT Operation

A test receiver will be used to monitor the data transmission from the EUT.

## 8. Mode of Operation

To Support FCC testing, a test firmware was provided to allow configuration of the carrier frequency, power level, and modulation type.

## 9. Modifications

### 9.1 Modifications to EUT

No modifications were made to the EUT

### 9.2 Modifications to Test Standard

No Modifications were made to the test standard.

## 10. Disposition of EUT

The test sample including all support equipment submitted to H.B Compliance Solutions for testing will be returned to Kubota at the completion of testing & certification.



## Criteria for Intentional Radiators

### 1. Radiated Spurious Emissions and Restricted Band

<b>Test Requirement(s):</b>	§15.247(d), 15.209(a), 15.205 and RSS-247 §5.5, RSS GEN §7.0	<b>Test Engineer(s):</b>	Sean E.
<b>Test Results:</b>	Pass	<b>Test Date(s):</b>	March 03, 2025

**Test Procedures:** As required by 47 CFR 15.247 and RSS-247 §5.5, Radiated spurious measurements were made in accordance with the procedures of the FCC Guidance Document 558074 D01 and ANSI C63.10.

The EUT was placed on a non-reflective table inside a 3-meter semi-anechoic room. The EUT was set on continuous transmit mode.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The frequency range up to the 10<sup>th</sup> harmonic was investigated included all the restricted band frequencies include 2483.5MHz. Measurement 10dB below the limits were not reported.

To get a maximum emission level from the EUT, the EUT was rotated throughout the X-axis, Y-axis and Z-axis. Worst case is X-axis

Detector Setting	Resolution Bandwidth	Video Bandwidth	Span
Peak	1MHz	3MHz	As necessary
Average	1MHz	10Hz	0 Hz

**Table 4. Analyzer Settings**

## Test Setup:

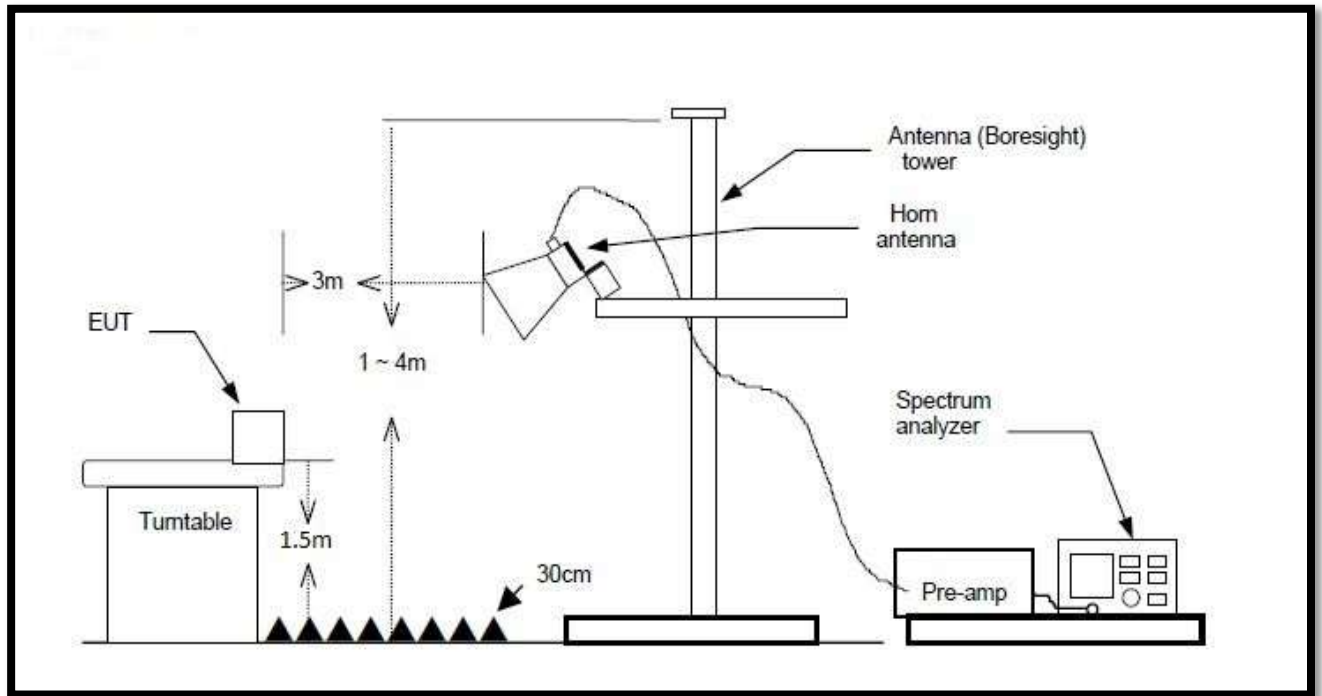


Figure 1. Radiated Emission Above 1GHz Test Setup

## Test Result:

Carrier Frequency (MHz)	Frequency (MHz)	Peak Amplitude (dbuV/m)	Peal Limit (dBuV/m)	Average Amplitude (dBuV/m))	Average Limit (dBuV/m)
2412	4824*	37.60	74.0	-	54.0
	7236*	35.27	74.0	-	54.0
2437	4874*	37.88	74.0	-	54.0
	7311*	35.17	74.0	-	54.0
2462	4924*	38.75	74.0	-	54.0
	7386*	34.76	74.0	-	54.0

Table 5 - Spurious Radiated Emission Data – Wi-Fi 802.11b 1Mbps

Carrier Frequency (MHz)	Frequency (MHz)	Peak Amplitude (dbuV/m)	Peal Limit (dBuV/m)	Average Amplitude (dBuV/m))	Average Limit (dBuV/m)
2402	4804*	36.57	74.0	-	54.0
	7206*	34.74	74.0	-	54.0
2442	4884*	37.68	74.0	-	54.0
	7326*	35.06	74.0	-	54.0
2480	4960*	38.62	74.0	-	54.0
	7440*	35.11	74.0	-	54.0

Table 6 – Spurious Radiated Emission Data – Bluetooth DH3 Modulation

NOTE 1: There were no detectable emissions above the 2nd harmonic.

NOTE 2: For Frequencies marked with “\*” – measurements were taken at the noise floor of the system due to no detectable spurious emissions.

## 6. Test Equipment

Equipment	Manufacturer	Model	Serial #	Last Cal Date	Cal Due Date
EMI Test Receiver	Rohde & Schwarz	ESMI26	840607/005	Jan-28-25	Jan-28-26
High Pass Filter	Mini-Circuits	VHF-3100+	1023	Verified	
High Pass Filter	Mini-Circuits	VHF-1320+	1034	Verified	
Attenuator 10dB	Huber+Suhner	6810.17.A	747300	Verified	
Horn Antenna	Com-Power	AHA-118	711150	Feb-13-25	Feb-13-28
Antenna	EMCO	GTEM 5417	1063	Verified	

Table 7 – Test Equipment List

**\*Statement of Traceability:** Test equipment is maintained and calibrated on a regular basis. All calibrations have been performed by a 17025 accredited test facility, traceable to National Institute of Standards and Technology (NIST)

## 7. Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. These measurements figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2. Instrumentation measurement uncertainty has **not** been taken into account to determine compliance.

The following measurement uncertainty values have been calculated as show in the table below:

Measured Parameter	Measurement Unit	Frequency Range	Expanded Uncertainty
Conducted Emissions (AC Power)	dBuV or dBuA	150kHz – 30MHz	± 4.3dB
Radiated Emission below 30MHz	dBuV/m	9kHz-30MHz	± 2.96dB
Radiated Emissions below 1GHz	dBuV/m	30 – 1000MHz	± 5.6dB
Radiated Emissions above 1GHz	dBuV/m	1 – 26.5GHz	± 4.1dB

The reported expanded uncertainty has been estimated at a 95% confidence level (k=2)

## **END OF TEST REPORT**