FCC and ISED Test Report

Park Air Systems Ltd
VHF Amplifier, Model: T6-AV100

In accordance with FCC 47 CFR Part 87, FCC 47 CFR Part 2, Industry Canada RSS-141 and ISED RSS-GEN

Add value.
Inspire trust.

Prepared for: Park Air Systems Ltd
Northfields
Market Deeping
Peterborough
PE6 8UE
United Kingdom

FCC ID: C8LT6-AV100 IC: 2137A-T6AV100

COMMERCIAL-IN-CONFIDENCE

Document 75949179-02 Issue 02

SIGNATURE			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Simon Bennett	Innovations Manager	Authorised Signatory	11 March 2021

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 87, FCC 47 CFR Part 2, Industry Canada RSS-141 and ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Neil Rousell	11 March 2021	
Testing	Graeme Lawler	11 March 2021	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

ISED Accreditation
12669A Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 87: 2019, FCC 47 CFR Part 2: 2019, Industry Canada RSS-141: Issue 2 (06-2010) and ISED RSS-GEN: Issue 5 (04-2018) + A1 (03-2019) for the tests detailed in section 1.3.

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Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	29-July-2020
2	Modify the FCC ID	11 March 2021

Table 1

1.2 Introduction

Applicant	Park Air Systems Ltd
Manufacturer	Park Air Systems Ltd
Model Number(s)	T6-AV100
Serial Number(s)	292446
Hardware Version(s)	1
Software Version(s)	Not Applicable
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 87: 2019 FCC 47 CFR Part 2: 2019 Industry Canada RSS-141: Issue 2 (06-2010) ISED RSS-GEN: Issue 5 (04-2018) + A1 (03-2019)
Order Number Date	70770 01-June-2020
Date of Receipt of EUT	01-July-2020
Start of Test	02-July-2020
Finish of Test	15-July-2020
Name of Engineer(s)	Neil Rousell and Graeme Lawler
Related Document(s)	ANSI C63.26 (2015)

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 87, FCC 47 CFR Part 2, Industry Canada RSS-141 and ISED RSS-GEN is shown below.

Section	Specification Clause				Test Description	Result	Comments/Base Standard
	Part 87	Part 2	RSS-141	RSS-GEN			
Configuration and Mode: AC Powered - Transmit							
2.1	87.131	2.1046	5.1	6.12	Power and Emissions	Pass	ANSI C63.26 (2015)
2.2	87.133	2.1055	5.1	6.11	Frequency Stability	Pass	ANSI C63.26 (2015)
2.3	87.135	2.1049	5.1	6.7	Bandwidth of Emission	Pass	ANSI C63.26 (2015)
2.4	87.139	2.1051	5.2	6.13	Spurious Emissions at Antenna Terminals	Pass	ANSI C63.26 (2015)
2.5	87.139	2.1053	5.2	6.13	Radiated Spurious Emissions	Pass	ANSI C63.26 (2015)
2.6	87.141	2.1047	5.1	-	Modulation Characteristics	Pass	ANSI C63.26 (2015)
Configuration and Mode: DC Powered - Transmit							
2.2	87.133	2.1055	5.1	6.11	Frequency Stability	Pass	ANSI C63.26 (2015)

Table 2

1.4 Customer Supplied Form

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment including the technologies the product supports)*	100 W carrier Amplifier for use with a ground to air T6 transmitter or transceiver in the VHF aeronautical band
Manufacturer:	Park Air Systems Ltd
Model:	T6-AV100
Part Number:	24-31631041/1
Hardware Version:	1
Software Version:	Not Applicable
FCC ID of the product under test – see guidance here	C8LT6-AV100
IC ID of the product under test – see guidance here	2137A-T6AV100

Intentional Radiators

Technology	Ground to Air Aeronautical Transmitter
Frequency Range (MHz to MHz)	118.000 to 136.975
Conducted Declared Output Power (dBm)	50
Antenna Gain (dBi)	2.15
Supported Bandwidth(s) (MHz) (e.g 1 MHz, 20 MHz, 40 MHz)	25 kHz
Modulation Scheme(s) (e.g GFSK, QPSK etc)	AM
ITU Emission Designator (see guidance here)	6K80A3EJN 5K00A3EJN
Bottom Frequency (MHz)	118.000
Middle Frequency (MHz)	127.500
Top Frequency (MHz)	136.975

Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	136.975 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	20 MHz (ref freq)
Class A Digital Device (Use in commercial, industrial or business environment) ☒ Class B Digital Device (Use in residential environment only) ☐	

AC Power Source

AC supply frequency:	50	Hz
Voltage	110 - 240	V
Max current:	5.5 x 2	A
Single Phase ☒ Three Phase ☐		

DC Power Source

Nominal voltage:	24.0	V
Extreme upper voltage:	32.0	V
Extreme lower voltage:	21.0	V
Max current:	25.0 x 2	A

Battery Power Source

Voltage:		V
End-point voltage:		V *(Point at which the battery will terminate)*
Alkaline ☐ Leclanche ☐ Lithium ☐ Nickel Cadmium ☐ Lead Acid* ☐ **(Vehicle regulated)*		
Other ☐ Please detail:		

Charging

Can the EUT transmit whilst being charged	Yes ☐ No ☐

Temperature

Minimum temperature:	-20.0	°C
Maximum temperature:	+55.0 (50 % duty cycle) +45.0 (100 % duty cycle)	°C

Antenna Characteristics

Antenna connector ☒			State impedance	50	Ohm
Temporary antenna connector ☐			State impedance		Ohm
Integral antenna ☐	Type:		Gain		dBi
External antenna ☐	Type:		Gain		dBi
For external antenna only: Standard Antenna Jack ☐ If yes, describe how user is prohibited from changing antenna (if not professional installed): Equipment is only ever professionally installed ☐ Non-standard Antenna Jack ☐					

Ancillaries (if applicable)

Manufacturer:	Park Air Systems	Part Number:	24-05655031/1
Model:	T6-TRV	Country of Origin:	UK

I hereby declare that the information supplied is correct and complete.

Name: Phil Ackerman
Position held: Principal Test and Acceptance Engineer
Date: 30 June 2020

1.5 Product Information

1.5.1 Technical Description

The T6-AV100 is a 100 W carrier amplifier for use with a ground to air T6 transmitter or transceiver in the VHF aeronautical band.

1.5.2 Test set-up

Conducted tests were setup in accordance with the diagram below unless otherwise specified.

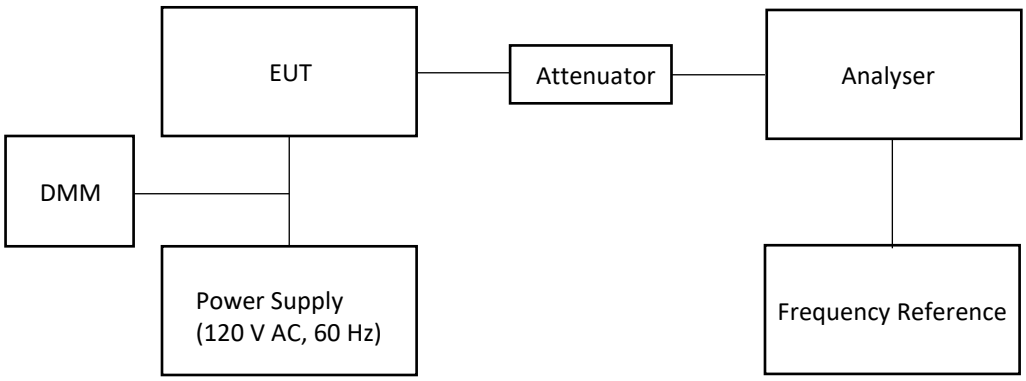

Figure 1 – Conducted Test Setup Diagram

The EUT was placed on the non-conducting platform in a manner typical of a normal installation. Ports on the EUT were terminated with loads as described in ANSI C63.4 clause 6.2.4. For multiple connectors of the same type, additional interconnecting cables were connected and pre-scans performed to determine whether the level of the emissions were increased by >2 dB. The EUT was powered via a 120 V AC, 60 Hz source.

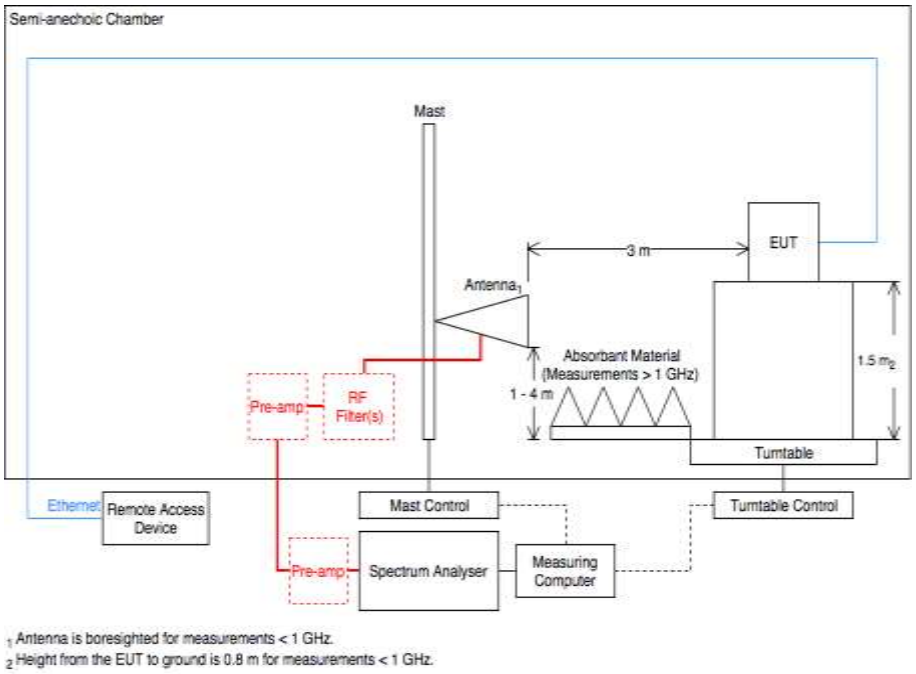

Figure 2 – Radiated Testing Setup Diagram

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.

The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Model: T6-AV100, Serial Number: 292446			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.8 Test Location

TÜV SÜD conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: AC Powered - Transmit		
Power and Emissions	Neil Rousell	UKAS
Frequency Stability	Neil Rousell	UKAS
Bandwidth of Emission	Neil Rousell	UKAS
Spurious Emissions at Antenna Terminals	Neil Rousell	UKAS
Radiated Spurious Emissions	Graeme Lawler	UKAS
Modulation Characteristics	Neil Rousell	UKAS
Configuration and Mode: DC Powered - Transmit		
Frequency Stability	Neil Rousell	UKAS

Table 4

Office Address:

Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 Power and Emissions

2.1.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.131
FCC 47 CFR Part 2, Clause 2.1046
Industry Canada RSS-141, Clause 5.1
ISED RSS-GEN, Clause 6.12

2.1.2 Equipment Under Test and Modification State

T6-AV100, S/N: 292446 - Modification State 0

2.1.3 Date of Test

02-July-2020

2.1.4 Test Method

This test was performed in accordance with ANSI C63.26, clause 5.2.4.3 and Industry Canada RSS-141, clause 4.1.

2.1.5 Environmental Conditions

Ambient Temperature	23.7 °C
Relative Humidity	55.2 %

2.1.6 Test Results

AC Powered - Transmit

118.000 MHz		127.500 MHz		136.975 MHz	
Maximum Power (dBm)	Maximum Power (W)	Maximum Power (dBm)	Maximum Power (W)	Maximum Power (dBm)	Maximum Power (W)
49.469	88.5	49.399	87.1	49.287	84.9

Table 5 - Transmitter Output Power

FCC 47 CFR Part 87, Limit Clause 87.131

<200 W

Industry Canada RSS-141, Limit Clause 5.1

Ground Equipment:

50 W for fixed equipment with A9W, G1D or G7D emissions
300 W for fixed equipment with A3E emissions
20 W for mobile, portable and transportable equipment with A3E emissions

Airborne Equipment:

55 W

2.1.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	08-Nov-2020
Attenuator (10dB, 150W)	Narda	769-10	3368	12	17-Jul-2020
Attenuator (30dB, 150W)	Narda	769-30	3369	12	17-Jul-2020
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	11-Dec-2020
Multimeter	Fluke	177	3813	12	09-Oct-2020
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	28-Nov-2020
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	08-Nov-2020
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	21-Oct-2020
AC Programmable Power Supply	iTech	IT7324	5226	-	O/P Mon
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5480	12	18-Mar-2021

Table 6

O/P Mon – Output Monitored using calibrated equipment

2.2 Frequency Stability

2.2.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.133
FCC 47 CFR Part 2, Clause 2.1055
Industry Canada RSS-141, Clause 5.1
ISED RSS-GEN, Clause 6.11

2.2.2 Equipment Under Test and Modification State

T6-AV100, S/N: 292446 - Modification State 0

2.2.3 Date of Test

06-July-2020 to 07-July-2020

2.2.4 Test Method

This test was performed in accordance with ANSI C63.26, clause 5.6 and ISED RSS-GEN 6.11.

2.2.5 Environmental Conditions

Ambient Temperature	23.1 - 23.7 °C
Relative Humidity	38.1 - 49.4 %

2.2.6 Test Results

AC Powered - Transmit

Voltage	Frequency Error (ppm)		
	118.000 MHz	127.500 MHz	136.975 MHz
102 V AC, 60 Hz	-0.51	-0.52	-0.52
138 V AC, 60 Hz	-0.50	-0.52	-0.52

Table 7 - Frequency Stability Under Voltage Variations

Temperature	Frequency Error (ppm)		
	118.000 MHz	127.500 MHz	136.975 MHz
+50.0 °C	-0.45	-0.48	-0.51
+40.0 °C	-0.50	-0.49	-0.47
+30.0 °C	-0.46	-0.49	-0.52
+20.0 °C	-0.50	-0.50	-0.47
+10.0 °C	-0.45	-0.49	-0.52
0 °C	-0.50	-0.49	-0.47
-10.0 °C	-0.47	-0.49	-0.52
-20.0 °C	-0.50	-0.49	-0.48
-30.0 °C	-0.45	-0.50	-0.53

Table 8 - Frequency Stability Under Temperature Variations

24 VDC Powered - Transmit

Voltage	Frequency Error (ppm)		
	118.000 MHz	127.500 MHz	136.975 MHz
20.4 VDC	-0.46	-0.46	-0.47
27.6 VDC	-0.51	-0.52	-0.52

Table 9 - Frequency Stability Under Voltage Variations

Temperature	Frequency Error (ppm)		
	118.000 MHz	127.500 MHz	136.975 MHz
50 °C	-0.46	-0.49	-0.52
40 °C	-0.47	-0.47	-0.47
30 °C	-0.46	-0.49	-0.52
20 °C	-0.46	-0.49	-0.52
10 °C	-0.49	-0.48	-0.48
0 °C	-0.46	-0.49	-0.53
-10 °C	-0.48	-0.48	-0.47
-20 °C	-0.47	-0.49	-0.50
-30 °C	-0.51	-0.52	-0.53

Table 10 - Frequency Stability Under Temperature Variations

FCC 47 CFR Part 87, Limit Clause 87.133

<20 ppm

Industry Canada RSS-141, Limit Clause 5.1

Ground Equipment:

<20 ppm for A3E and A9W emissions
<2 ppm for G1D and G7D emissions

Airborne Equipment:

30 ppm for A3E and A9W emissions
5 ppm for G1D and G7D emissions

2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Counter	Hewlett Packard	53181A	159	12	30-Jul-2020
Power Supply	Hewlett Packard	6269B	733	-	TU
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	08-Nov-2020
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
Attenuator (10dB, 150W)	Narda	769-10	3368	12	17-Jul-2020
Attenuator (30dB, 150W)	Narda	769-30	3369	12	17-Jul-2020
Multimeter	Fluke	177	3813	12	09-Oct-2020
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	08-Nov-2020
Climatic Chamber	Aralab	FitoTerm 300E45	4823	12	19-Mar-2021
Quad Power Supply	Rohde & Schwarz	HMP4040	4954	-	O/P Mon
AC Programmable Power Supply	iTech	IT7324	5225	-	O/P Mon

Table 11

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment

2.3 Bandwidth of Emission

2.3.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.135
FCC 47 CFR Part 2, Clause 2.1049
Industry Canada RSS-141, Clause 5.1
ISED RSS-GEN, Clause 6.7

2.3.2 Equipment Under Test and Modification State

T6-AV100, S/N: 292446 - Modification State 0

2.3.3 Date of Test

02-July-2020

2.3.4 Test Method

This test was performed in accordance with ANSI C63.26, clause 5.4.4 and 2.1049(c)(1).

2.3.5 Environmental Conditions

Ambient Temperature	23.7 °C
Relative Humidity	55.2 %

2.3.6 Test Results

AC Powered - Transmit

99% Occupied Bandwidth (kHz)		
118.000 MHz	127.500 MHz	136.975 MHz
5.279	5.282	5.282

Table 12 - Occupied Bandwidth Results

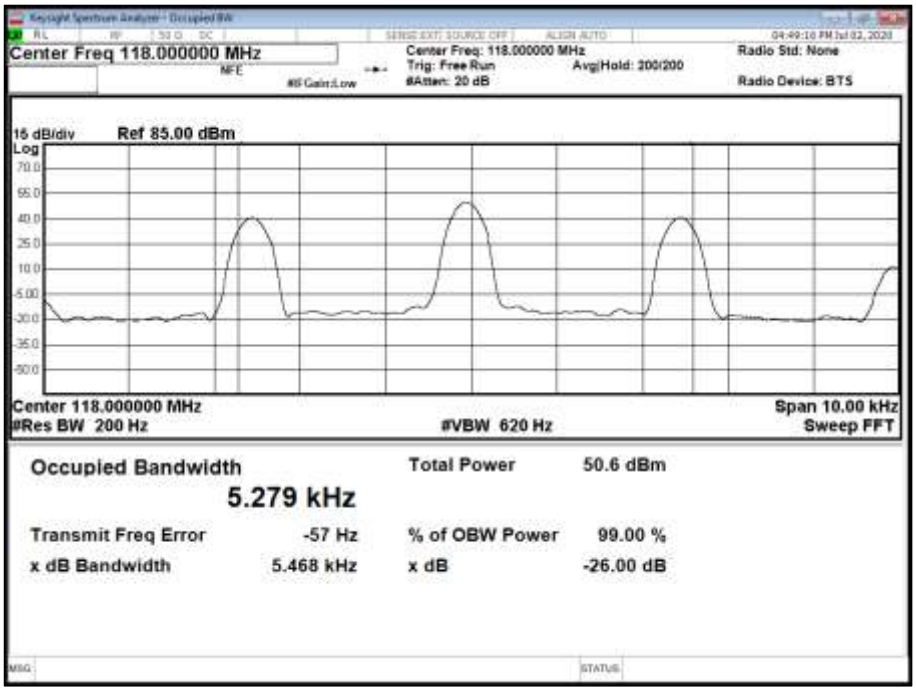

Figure 3 - Occupied Bandwidth - 118.000 MHz

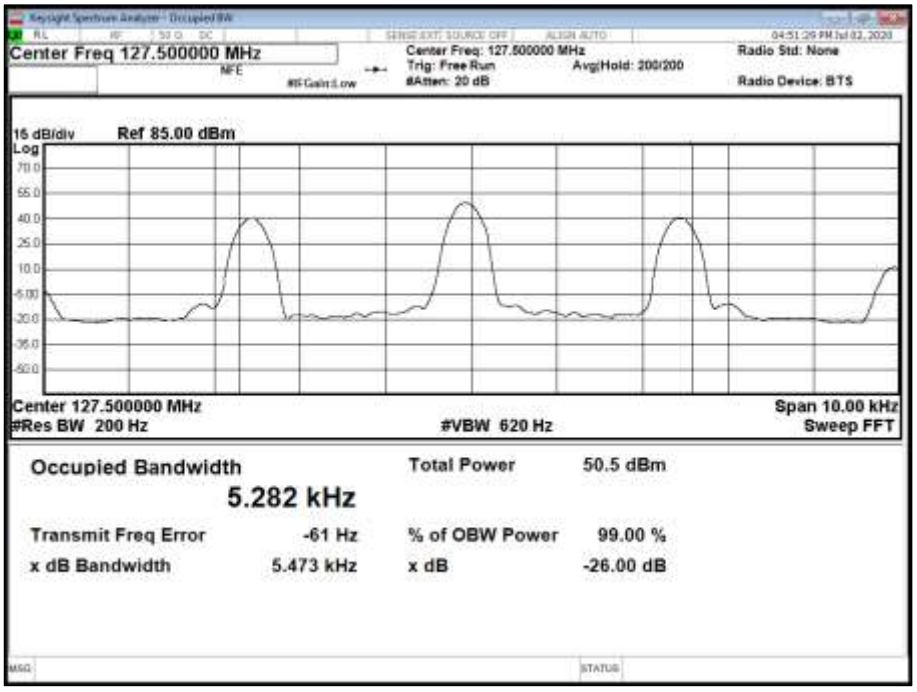

Figure 4 - Occupied Bandwidth - 127.500 MHz

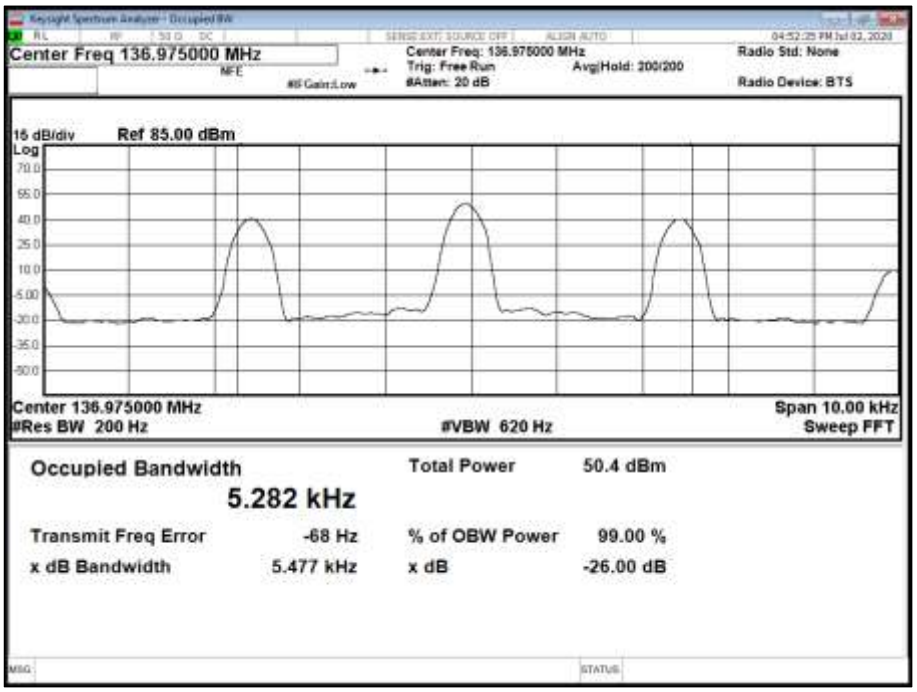

Figure 5 - Occupied Bandwidth - 136.975 MHz

FCC 47 CFR Part 87, Limit Clause 87.135(a) and 87.137(a)

The authorized bandwidth is the maximum occupied bandwidth authrorized to be used by a station.

The authorized bandwidth declared by the manufacturer is: < 25 kHz

Industry Canada RSS-141, Limit Clause 5.1

Channel Bandwidth:

25 kHz

Necessary Bandwidth

6 kHz for A3E emissions
13 kHz for A9W emissions
14 kHz for G1D and G7D emissions

2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Modulation Analyser	Hewlett Packard	8901B	45	12	03-Oct-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	08-Nov-2020
Audio Analyser	Hewlett Packard	8903B	2212	12	01-Nov-2020
Attenuator (10dB, 150W)	Narda	769-10	3368	12	17-Jul-2020
Attenuator (30dB, 150W)	Narda	769-30	3369	12	17-Jul-2020
Multimeter	Fluke	177	3813	12	09-Oct-2020
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	08-Nov-2020
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	21-Oct-2020
AC Programmable Power Supply	iTech	IT7324	5226	-	O/P Mon
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5480	12	18-Mar-2021

Table 13

O/P Mon – Output Monitored using calibrated equipment

2.4 Spurious Emissions at Antenna Terminals

2.4.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.139
FCC 47 CFR Part 2, Clause 2.1051
Industry Canada RSS-141, Clause 5.2
ISED RSS-GEN, Clause 6.13

2.4.2 Equipment Under Test and Modification State

T6-AV100, S/N: 292446 - Modification State 0

2.4.3 Date of Test

03-July-2020

2.4.4 Test Method

This test was performed in accordance with ANSI C63.26, clause 5.7 and Industry Canada RSS141, clause 4.2.

2.4.5 Environmental Conditions

Ambient Temperature	22.4 °C
Relative Humidity	54.0 %

2.4.6 Test Results

AC Powered - Transmit

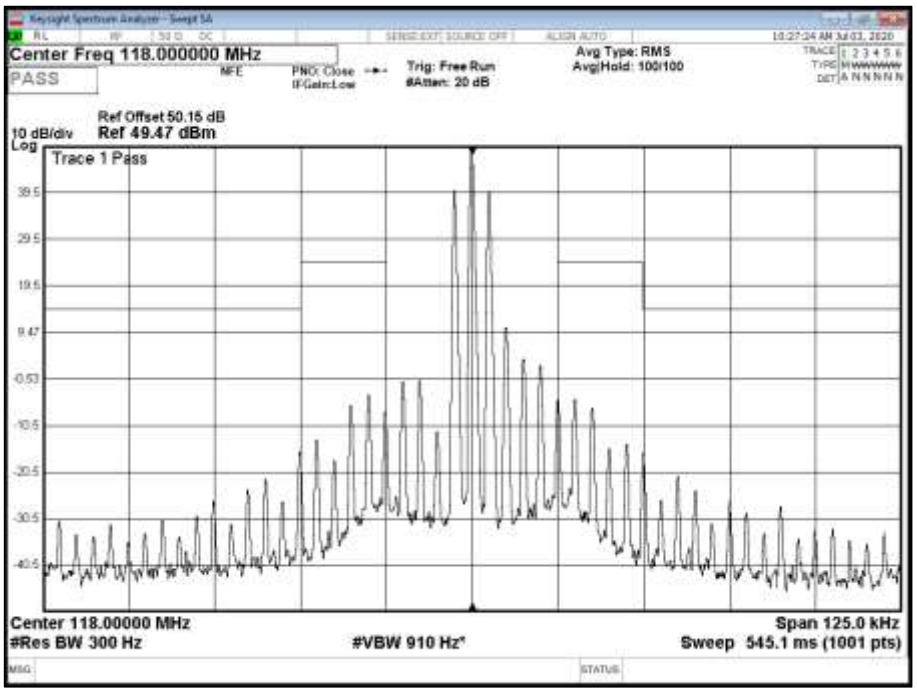

Figure 6 - 118.000 MHz - Transmitter Spectrum Mask

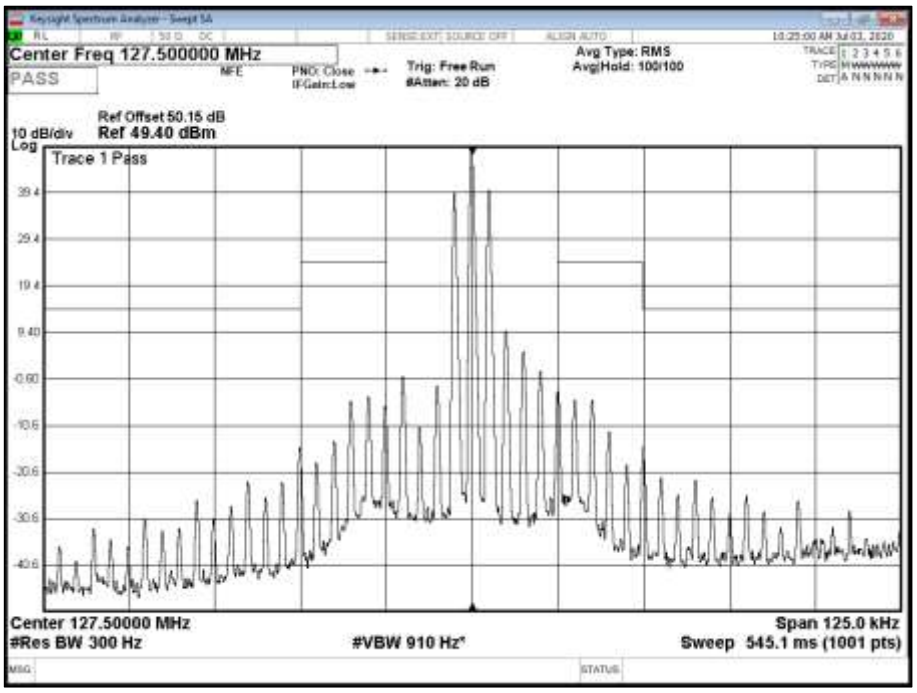

Figure 7 - 127.500 MHz - Transmitter Spectrum Mask

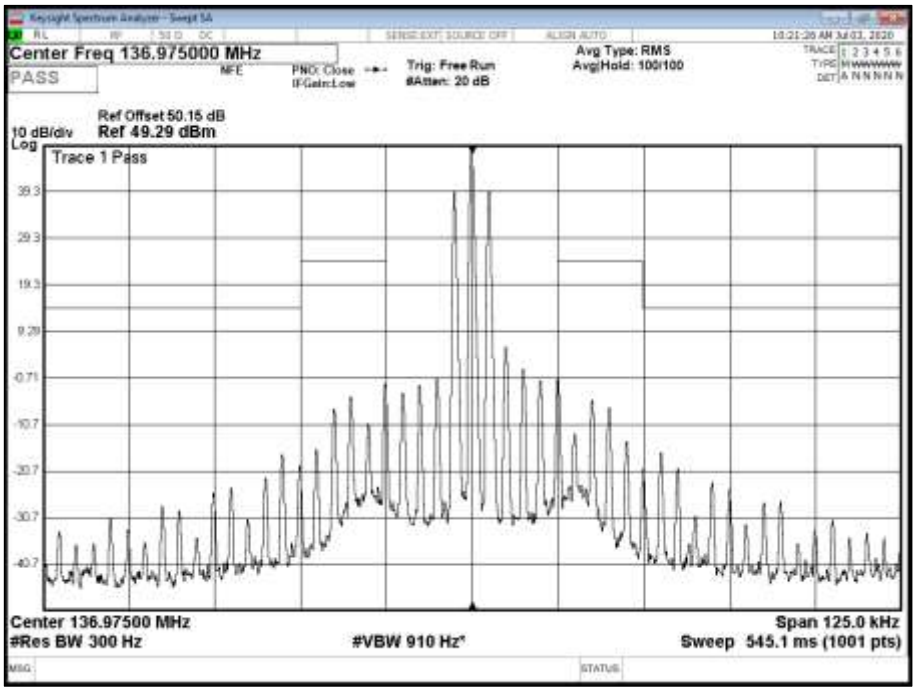

Figure 8 - 136.975 MHz - Transmitter Spectrum Mask

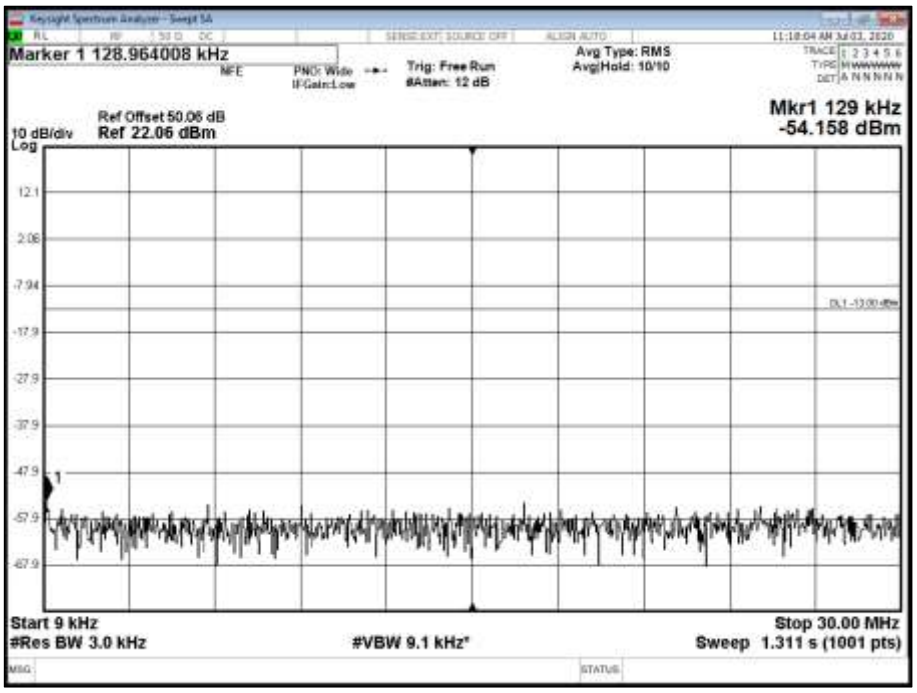

Figure 9 - 118.000 MHz - 9 kHz to 30 MHz

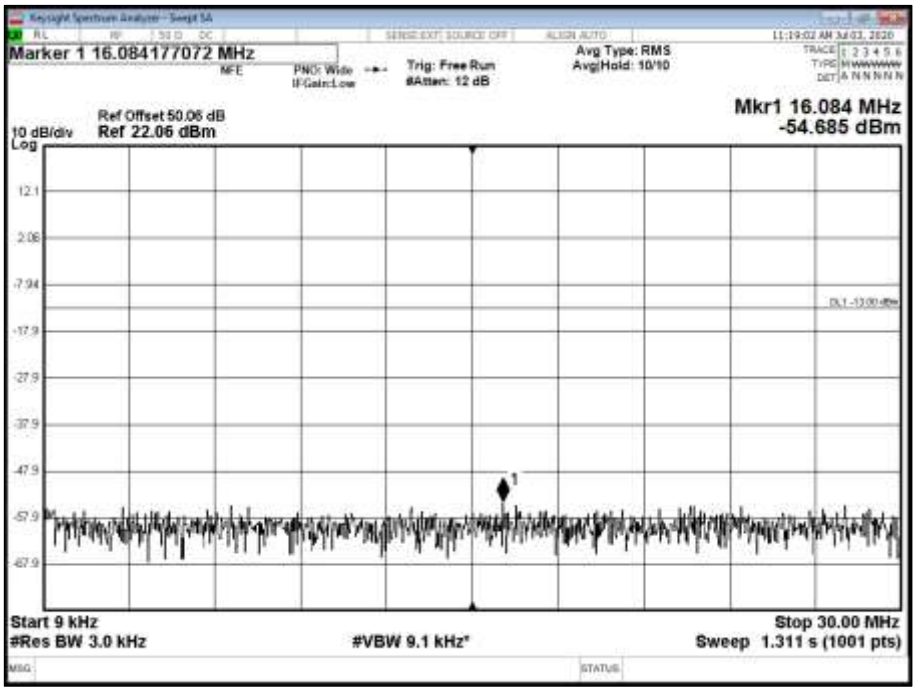

Figure 10 - 127.500 MHz - 9 kHz to 30 MHz

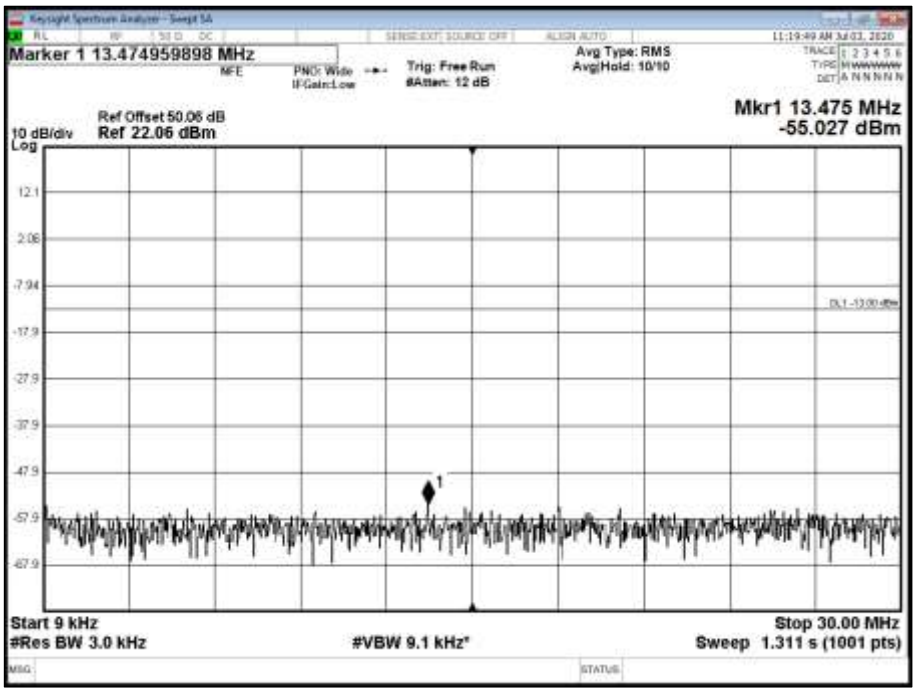

Figure 11 - 136.975 MHz - 9 kHz to 30 MHz

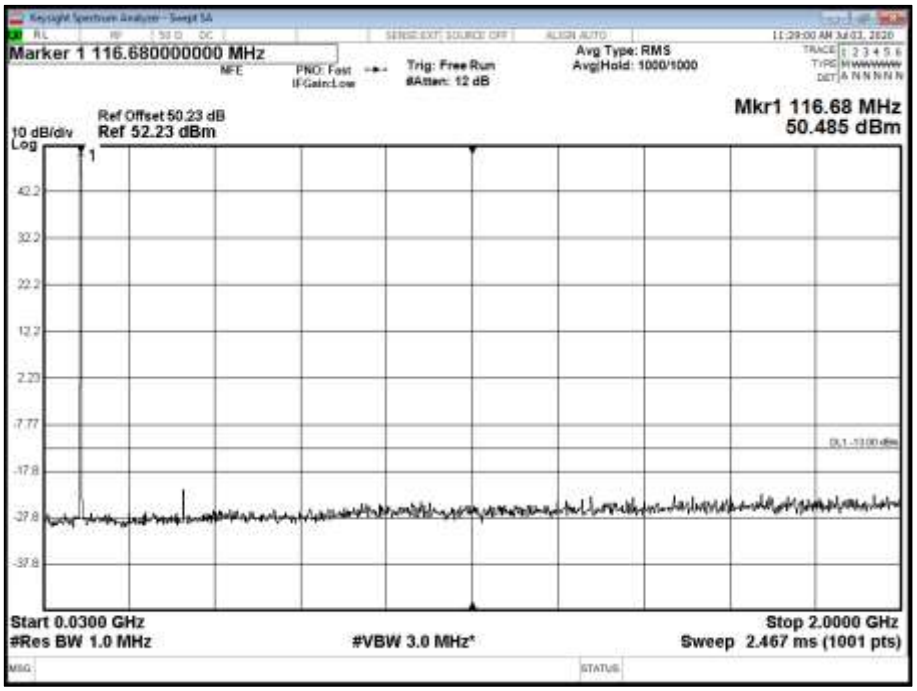

Figure 12 - 118.000 MHz - 30 MHz to 2 GHz

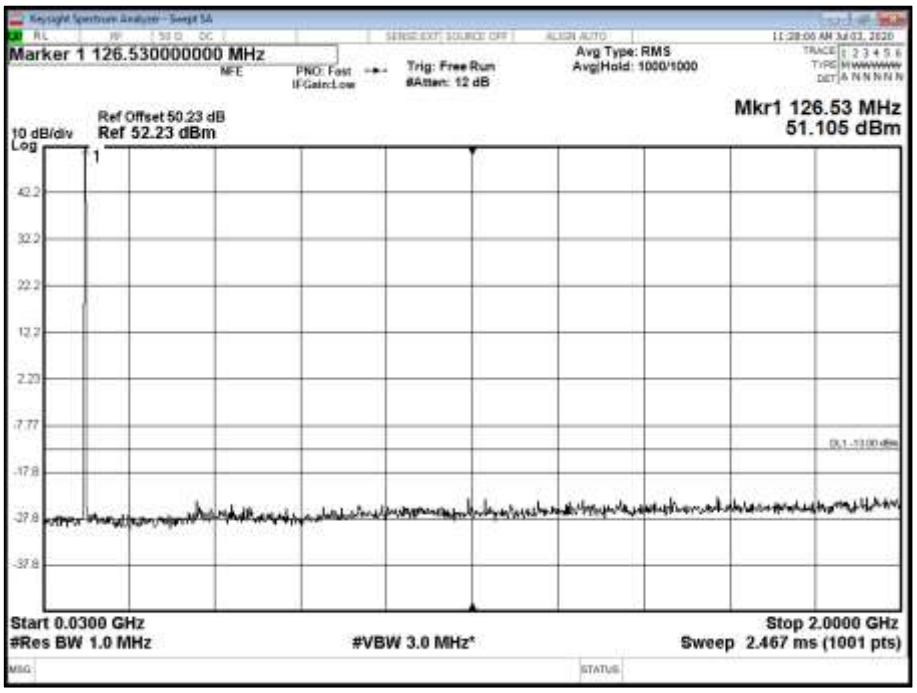

Figure 13 - 127.500 MHz - 30 MHz to 2 GHz

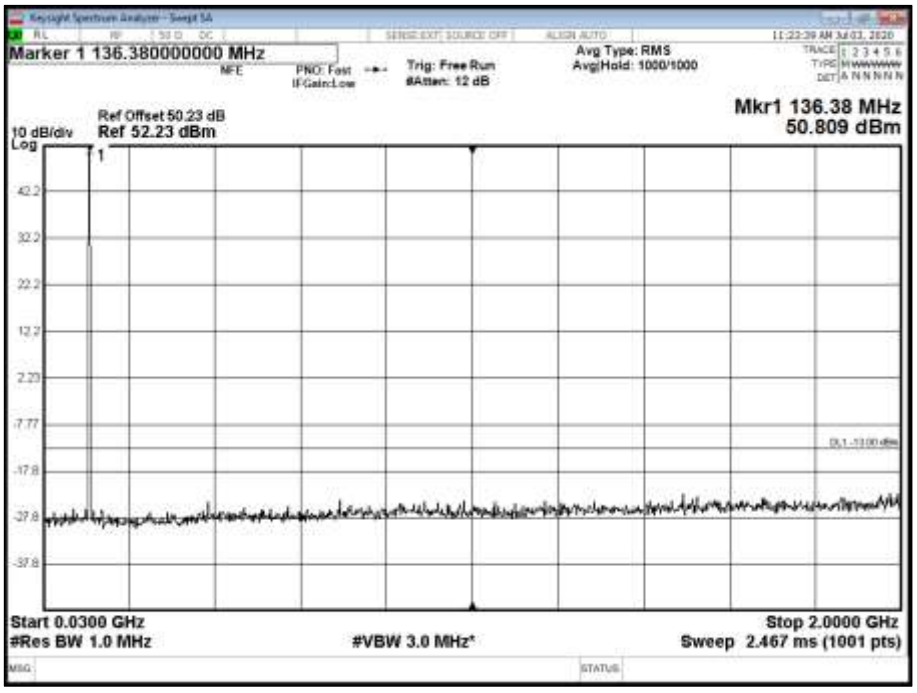

Figure 14 - 136.975 MHz - 30 MHz to 2 GHz

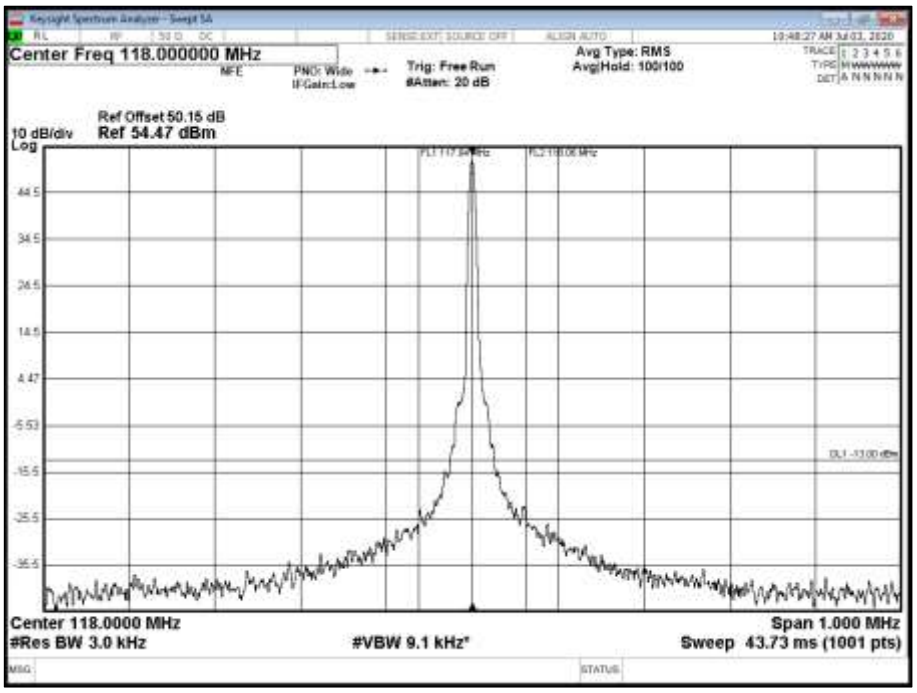

Figure 15 - 118.000 MHz - Mask >250 %

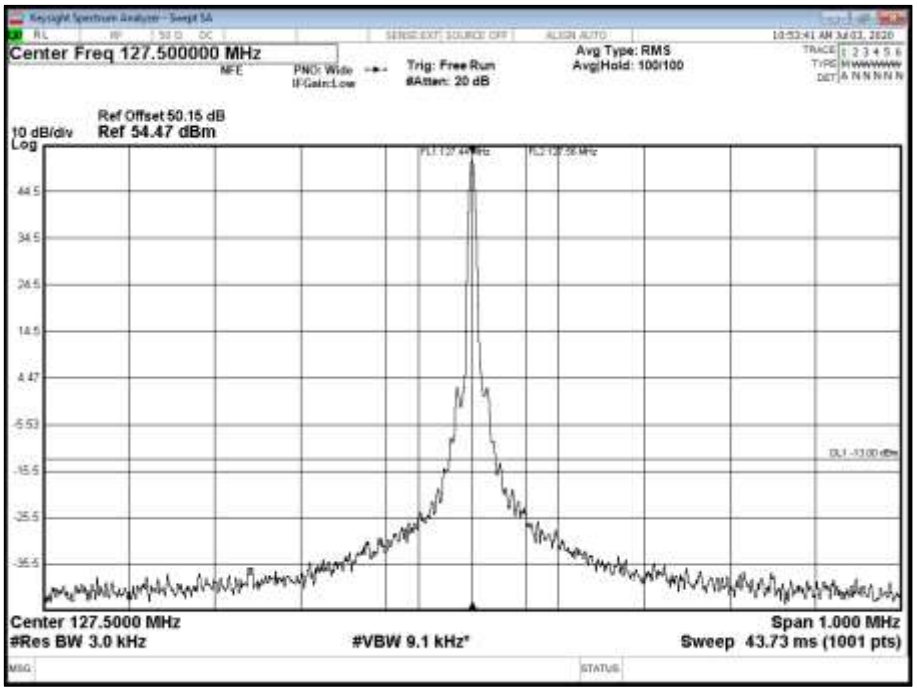

Figure 16 - 127.500 MHz - Mask >250 %

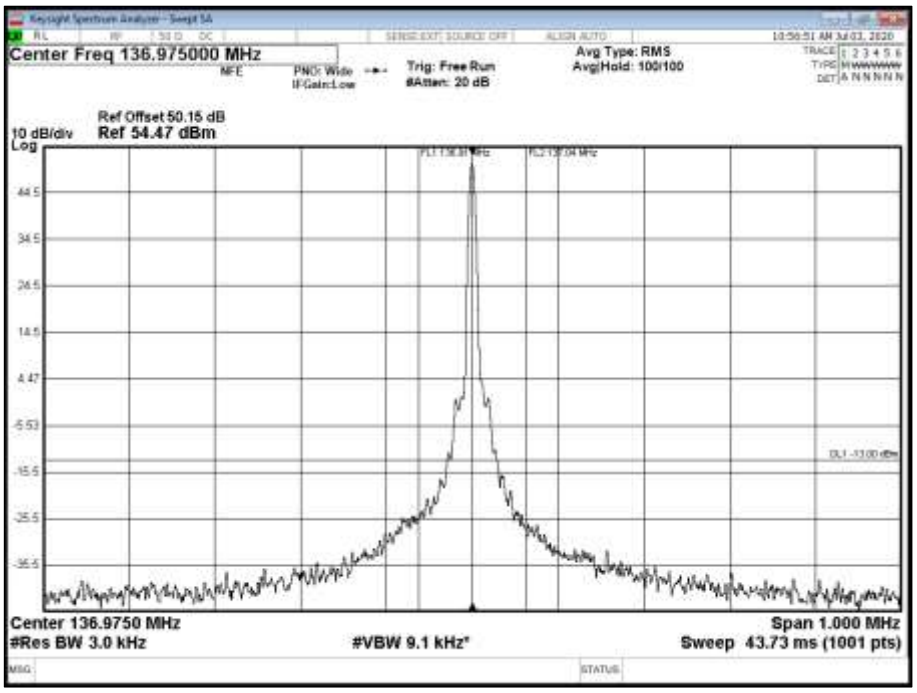

Figure 17 - 136.975 MHz - Mask >250 %

FCC 47 CFR Part 87, Limit Clause 87.139 (a)

Except for ELTs and when using single sideband (R3E, H3E, J3E), or frequency modulation (F9) or digital modulation (F9Y) for telemetry or telecommand in the 1435-1525 MHz, 2345-2395 MHz, or 5091–5150 MHz band or digital modulation (G7D) for differential GPS, the mean power of any emissions must be attenuated below the mean power of the transmitter (pY) as follows:

(1) When the frequency is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth the attenuation must be at least 25 dB;

(2) When the frequency is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth the attenuation must be at least 35 dB.

(3) When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth the attenuation for aircraft station transmitters must be at least 40 dB; and the attenuation for aeronautical station transmitters must be at least 43 + 10 log10 pY dB.

Industry Canada RSS-141, Limit Clause 5.2

Transmitters with G1D or G7D emissions shall comply with the following:

(a) the amount of transmitted peak power when measured over either of the first-adjacent 25 kHz channels shall not exceed 2 dBm;
(b) the amount of transmitted peak power when measured across either of the second-adjacent 25 kHz channels shall not exceed -28 dBm;
(c) the amount of transmitted peak power when measured across either of the third-adjacent 25 kHz channels shall not exceed -33 dBm; and
(d) the amount of transmitted peak power measured across either of the fourth-adjacent 25 kHz channels shall not exceed -38 dBm; and from thereon the amount of power measured in any other adjacent channel shall monotonically decrease at a rate of at least 5 dB/octave, to a maximum value of -53 dBm.

For transmitters with A3E or A9W emissions, the mean power of any emissions shall be attenuated below the mean power of the transmitter, P as follows:

(a) When the frequency is removed from the equipment's channel centre frequency by more than 50% up to and including 100% of the channel bandwidth, the attenuation shall be at least 25 dB, measured with a bandwidth of 300 Hz;
(b) When the frequency is removed from the equipment's channel centre frequency by more than 100% up to and including 250% of the channel bandwidth, the attenuation shall be at least 35 dB, measured with a bandwidth of 300 Hz;
(c) When the frequency is removed from the equipment's channel centre frequency by more than 250% of the channel bandwidth, the attenuation for on-board aircraft transmitters shall be at least 40 dB; and the attenuation for ground transmitters shall be at least 43 + 10 log10 P (in watts) dB, measured with a bandwidth of 3 kHz.

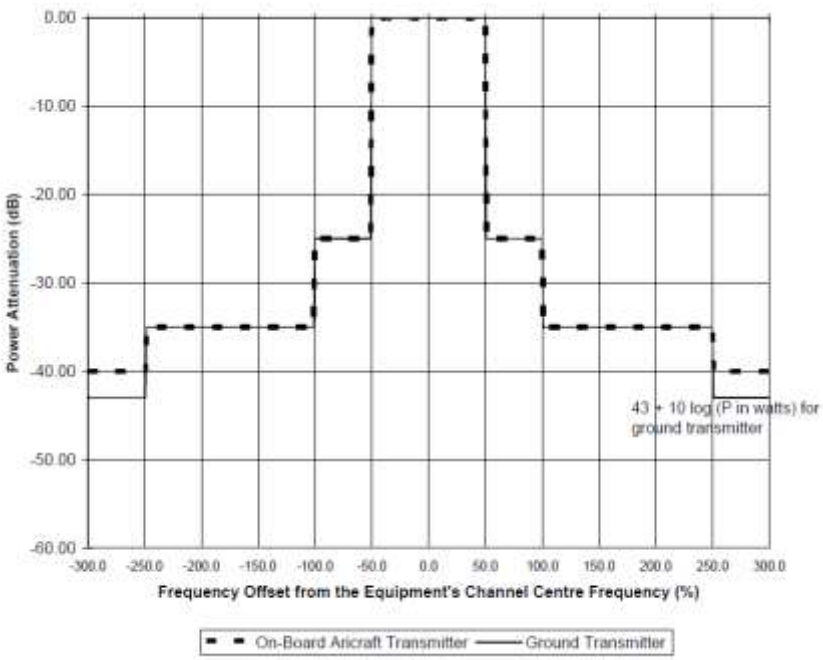

Figure 18 - Unwanted Emission Mask for Transmitters with A3E and A9W Emissions

2.4.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Modulation Analyser	Hewlett Packard	8901B	45	12	03-Oct-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	08-Nov-2020
Audio Analyser	Hewlett Packard	8903B	2212	12	01-Nov-2020
Attenuator (10dB, 150W)	Narda	769-10	3368	12	17-Jul-2020
Attenuator (30dB, 150W)	Narda	769-30	3369	12	17-Jul-2020
Multimeter	Fluke	177	3813	12	09-Oct-2020
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	08-Nov-2020
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	21-Oct-2020
AC Programmable Power Supply	iTech	IT7324	5226	-	O/P Mon
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5480	12	18-Mar-2021

Table 14

O/P Mon – Output Monitored using calibrated equipment

2.5 Radiated Spurious Emissions

2.5.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.139
FCC 47 CFR Part 2, Clause 2.1053
Industry Canada RSS-141, Clause 5.2
ISED RSS-GEN, Clause 6.13

2.5.2 Equipment Under Test and Modification State

T6-AV100, S/N: 292446 - Modification State 0

2.5.3 Date of Test

15-July-2020

2.5.4 Test Method

A preliminary profile of the Spurious Radiated Emissions was obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

This test was performed in accordance with ANSI C63.26, clause 5.5 and Industry Canada RSS141, clause 4.2.

Prescans and final measurements were performed using the direct field strength method.
The Regulatory limit of -13dBm has been converted to a field strength limit in accordance with ANSI C63.26 clause 5.2.7 equation c)

This is the limit line shown on the plots.

Example calculation
E (dBuV/m) = EIRP (dBm) - 20log(d) + 104.8 where (d) is the measurement distance.
E (dBuV/m) = -13 - 20log(3) + 104.8
E (dBuV/m) = 82.26

Tested using the customer supplied kit: T6-TRV, S/N: 247598

2.5.5 Environmental Conditions

Ambient Temperature	23.5 °C
Relative Humidity	51.3 %

2.5.6 Test Results

AC Powered - Transmit

Frequency (MHz)	Level (dBm)
*	

Table 15 - 118.000 MHz - Emissions Results

*No emissions were detected within 10 dB of the limit.

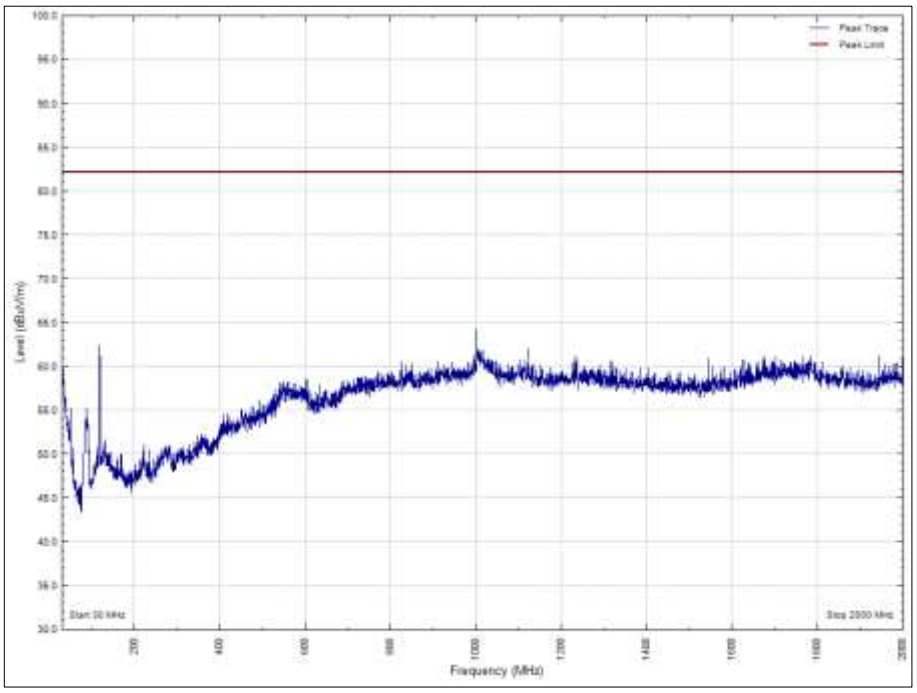

Figure 19 - 118.000 MHz - 30 MHz to 2 GHz - Vertical

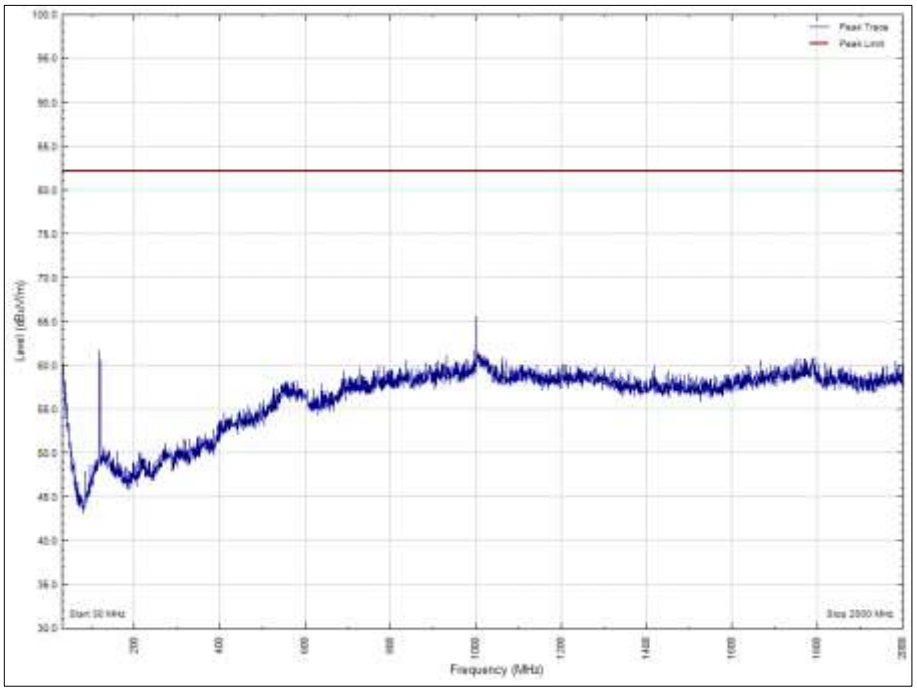

Figure 20 - 118.000 MHz - 30 MHz to 2 GHz - Horizontal

Frequency (MHz)	Level (dBm)
*	

Table 16 - 127.500 MHz - Emissions Results

*No emissions were detected within 10 dB of the limit.

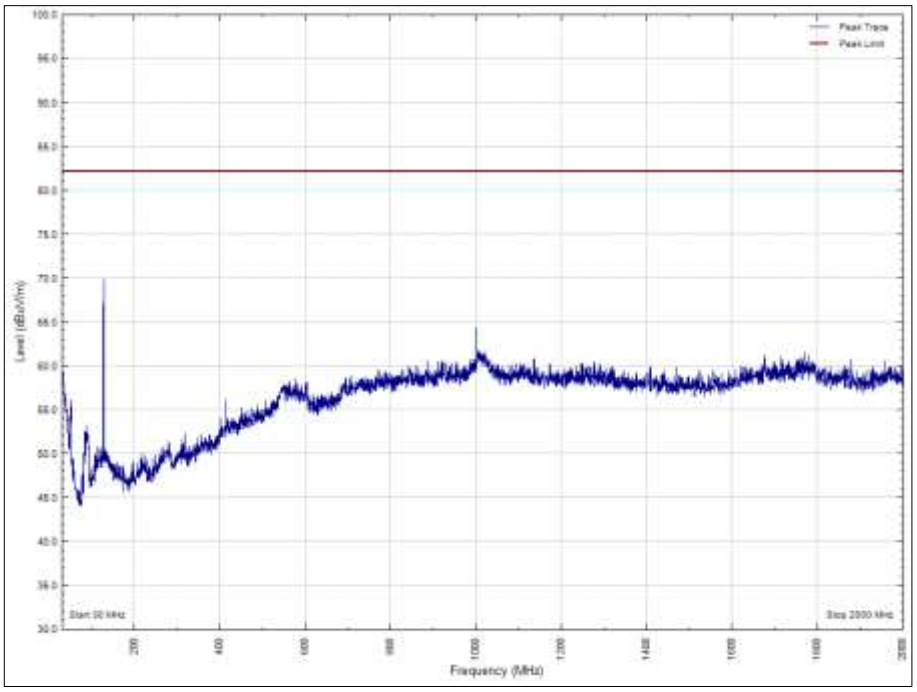

Figure 21 - 127.500 MHz - 30 MHz to 2 GHz - Vertical

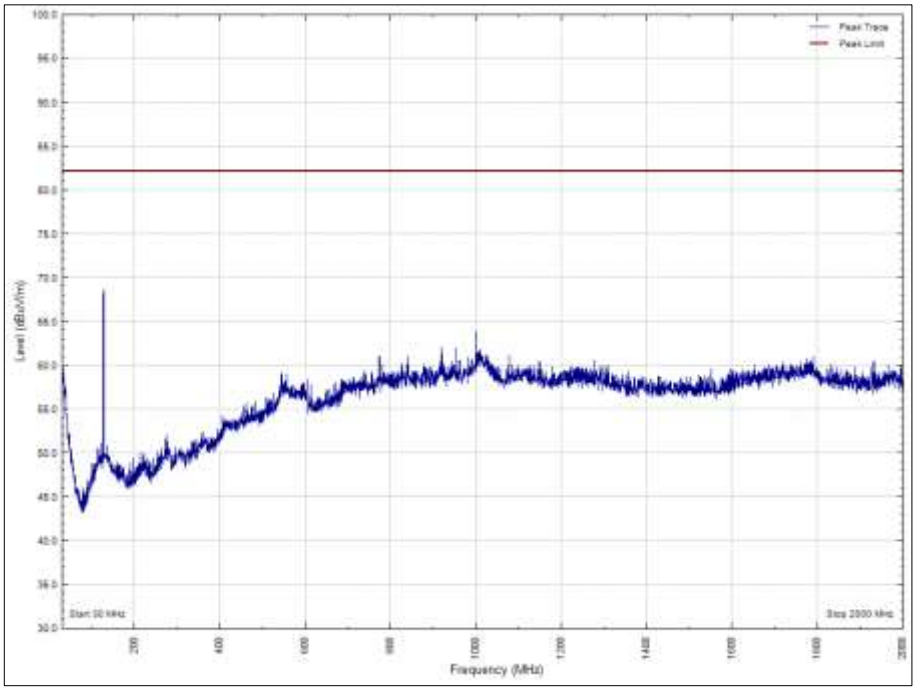

Figure 22 - 127.500 MHz - 30 MHz to 2 GHz - Horizontal

Frequency (MHz)	Level (dBm)
*	

Table 17 – 136.975 MHz - Emissions Results

*No emissions were detected within 10 dB of the limit.

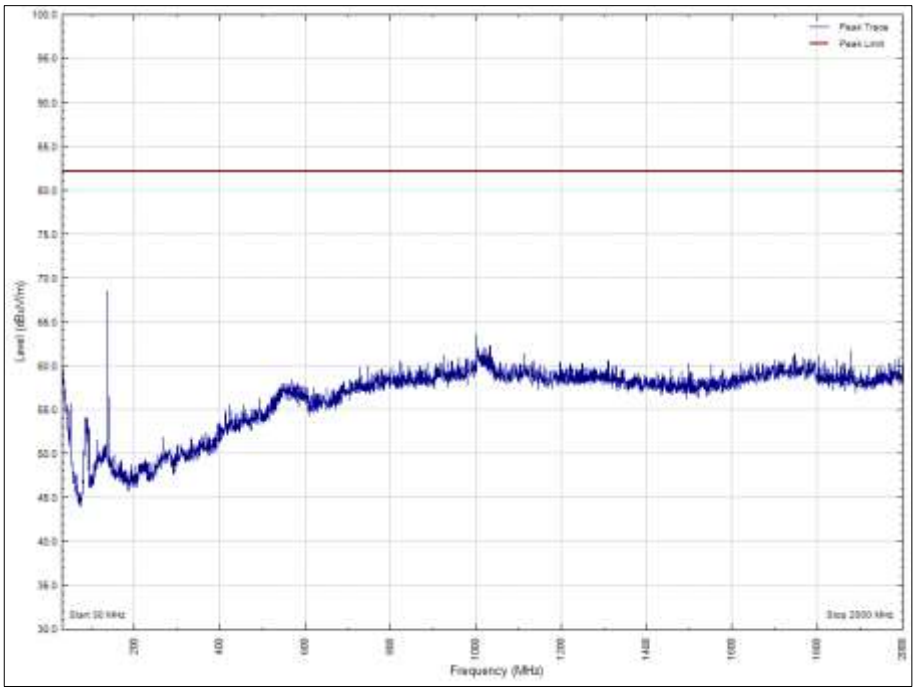

Figure 23 - 136.975 MHz - 30 MHz to 2 GHz - Vertical

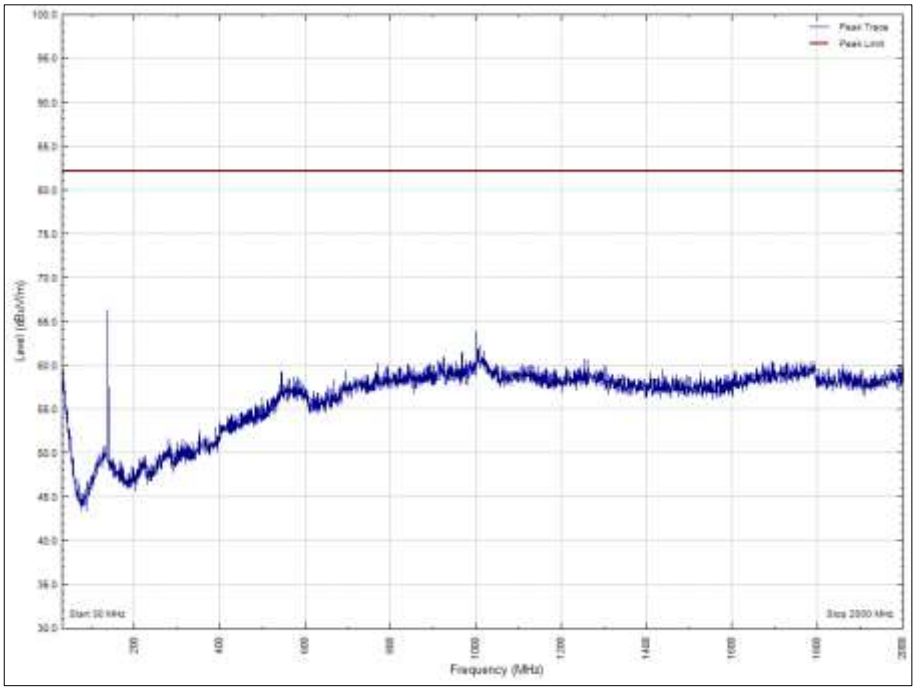

Figure 24 - 136.975 MHz - 30 MHz to 2 GHz - Horizontal

FCC 47 CFR Part 87, Limit Clause 87.139 (a)

Except for ELTs and when using single sideband (R3E, H3E, J3E), or frequency modulation (F9) or digital modulation (F9Y) for telemetry or telecommand in the 1435-1525 MHz, 2345-2395 MHz, or 5091–5150 MHz band or digital modulation (G7D) for differential GPS, the mean power of any emissions must be attenuated below the mean power of the transmitter (pY) as follows:

(1) When the frequency is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth the attenuation must be at least 25 dB;

(2) When the frequency is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth the attenuation must be at least 35 dB.

(3) When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth the attenuation for aircraft station transmitters must be at least 40 dB; and the attenuation for aeronautical station transmitters must be at least 43 + 10 log10 pY dB.

Industry Canada RSS-141, Limit Clause 5.2

Transmitters with G1D or G7D emissions shall comply with the following:

(a) the amount of transmitted peak power when measured over either of the first-adjacent 25 kHz channels shall not exceed 2 dBm;
(b) the amount of transmitted peak power when measured across either of the second-adjacent 25 kHz channels shall not exceed -28 dBm;
(c) the amount of transmitted peak power when measured across either of the third-adjacent 25 kHz channels shall not exceed -33 dBm; and
(d) the amount of transmitted peak power measured across either of the fourth-adjacent 25 kHz channels shall not exceed -38 dBm; and from thereon the amount of power measured in any other adjacent channel shall monotonically decrease at a rate of at least 5 dB/octave, to a maximum value of -53 dBm.

For transmitters with A3E or A9W emissions, the mean power of any emissions shall be attenuated below the mean power of the transmitter, P as follows:

(a) When the frequency is removed from the equipment’s channel centre frequency by more than 50% up to and including 100% of the channel bandwidth, the attenuation shall be at least 25 dB, measured with a bandwidth of 300 Hz;
(b) When the frequency is removed from the equipment’s channel centre frequency by more than 100% up to and including 250% of the channel bandwidth, the attenuation shall be at least 35 dB, measured with a bandwidth of 300 Hz;
(c) When the frequency is removed from the equipment’s channel centre frequency by more than 250% of the channel bandwidth, the attenuation for on-board aircraft transmitters shall be at least 40 dB; and the attenuation for ground transmitters shall be at least 43 + 10 log10 P (in watts) dB, measured with a bandwidth of 3 kHz.

2.5.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Modulation Analyser	Hewlett Packard	8901B	45	12	03-Oct-2020
Load (50ohm, 30W)	Weinschel	50T-054	350	12	25-Jun-2021
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Multimeter	Iso-tech	IDM 101	2118	12	07-Feb-2021
Antenna with permanent attenuator (Bilog)	Chase	CBL6143	2904	24	30-Sep-2021
Comb Generator	Schaffner	RSG1000	3034	-	TU
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	10-Mar-2021
Attenuator (20dB, 100W)	Weinschel	48-20-43	4870	12	18-Jul-2020
4dB Attenuator	Pasternack	PE7047-4	4935	24	30-Sep-2021
Thermo-Hygro-Barometer	PCE Instruments	OCE-THB-40	5470	12	16-Mar-2021
2m SMA Cable	Junkosha	MWX221-02000AMSAMS/A	5517	12	01-Apr-2021
8m N-Type Cable	Junkosha	MWX221-08000NMSNMS/B	5520	12	24-Mar-2021
EMI Test Receiver	Rohde & Schwarz	ESW44	5527	12	06-Feb-2021

Table 18

TU - Traceability Unscheduled

2.6 Modulation Characteristics

2.6.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.141
FCC 47 CFR Part 2, Clause 2.1047
Industry Canada RSS-141, Clause 5.1

2.6.2 Equipment Under Test and Modification State

T6-AV100, S/N: 292446 - Modification State 0

2.6.3 Date of Test

06-July-2020

2.6.4 Test Method

The test was performed in accordance with ANSI C63.26, clause 5.3.

2.6.5 Environmental Conditions

Ambient Temperature	22.9 °C
Relative Humidity	49.8 %

2.6.6 Test Results

AC Powered - Transmit

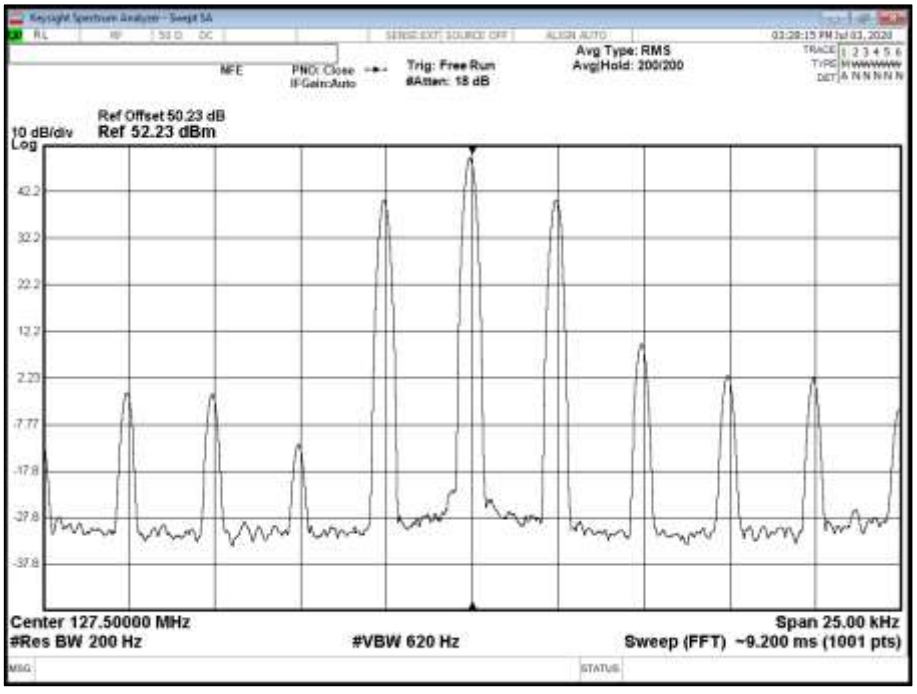

Figure 25 - Plot of the Modulation of the Transmission

The following description was supplied by the manufacturer:

ITU Emission Designator: 6K80A3EJN and 5K00A3EJN.

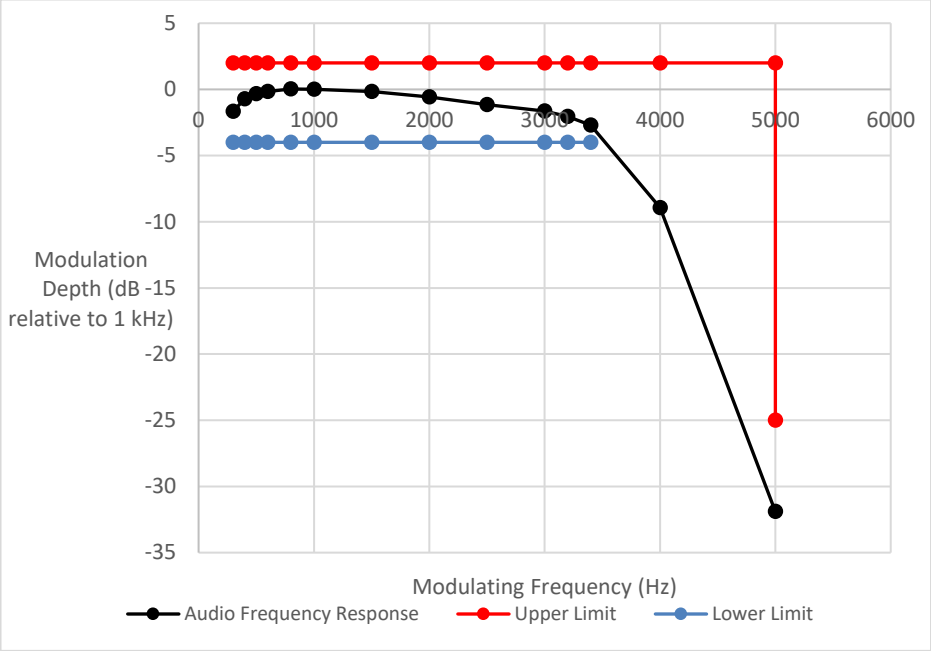

Figure 26 - Modulation Requirement - Frequency Response

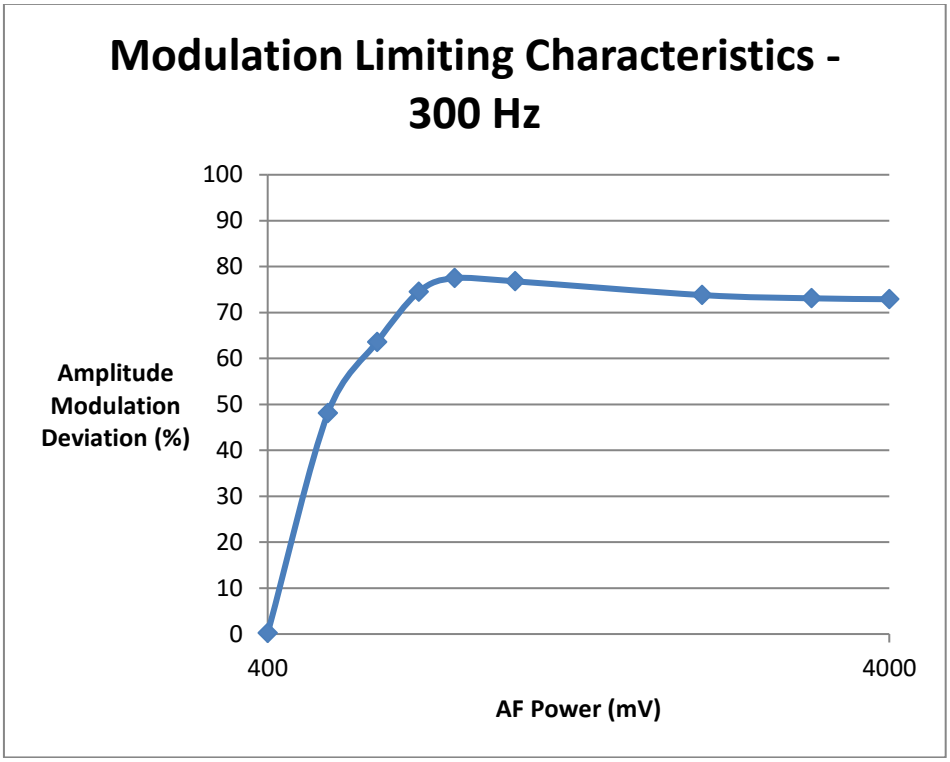

Figure 27 - Modulation Limiting Capability - 300 Hz AF

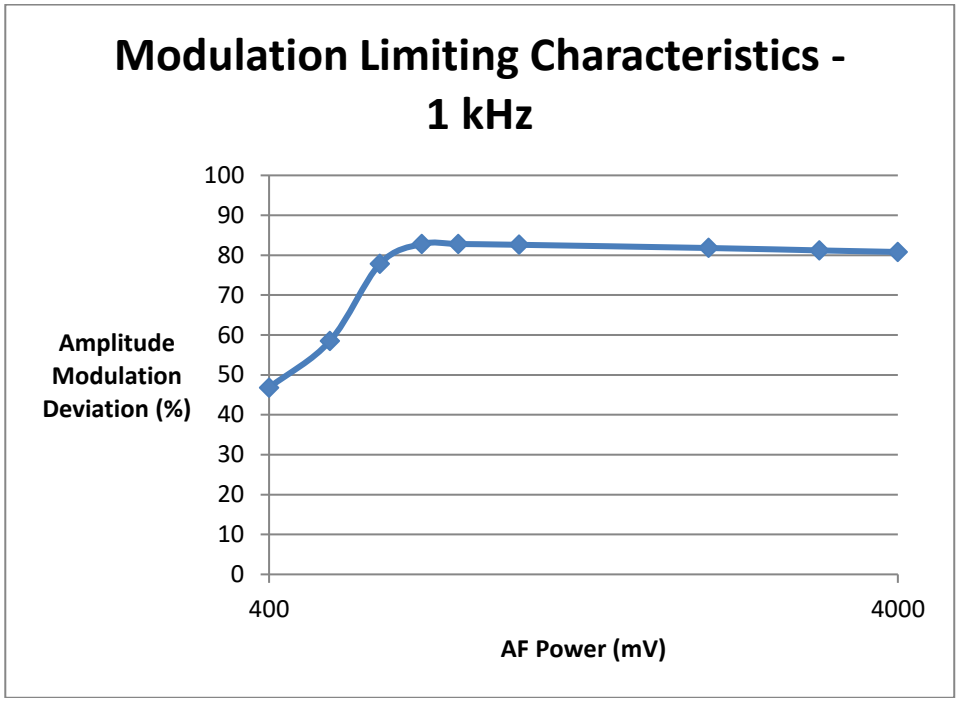

Figure 28 - Modulation Limiting Capability - 1 kHz AF

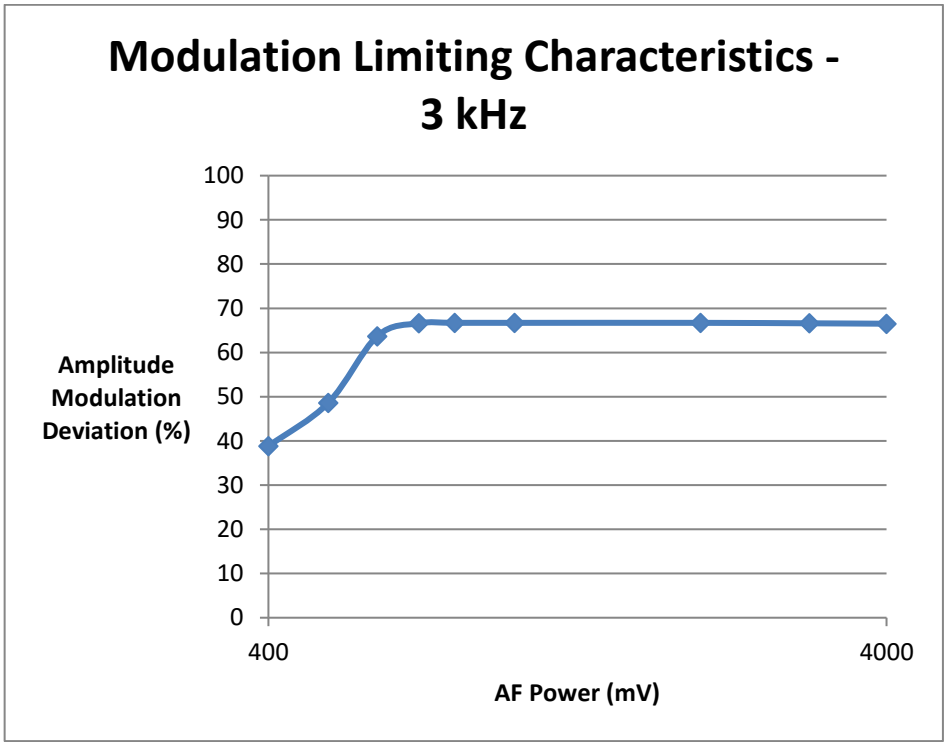

Figure 29 - Modulation Limiting Capability - 3 kHz AF

FCC 47 CFR Part 87, Limit Clause 87.141(a)

When A3E emission is used, the modulation percentage must not exceed 100 percent. This requirement does not apply to emergency locator transmitters or survival craft transmitters.

Industry Canada RSS-141, Limit Clause 5.1

Shall not exceed 100 %

2.6.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Modulation Analyser	Hewlett Packard	8901B	45	12	03-Oct-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	08-Nov-2020
Audio Analyser	Hewlett Packard	8903B	2212	12	01-Nov-2020
Attenuator (10dB, 150W)	Narda	769-10	3368	12	17-Jul-2020
Attenuator (30dB, 150W)	Narda	769-30	3369	12	17-Jul-2020
Multimeter	Fluke	177	3813	12	09-Oct-2020
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	08-Nov-2020
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	21-Oct-2020
AC Programmable Power Supply	iTech	IT7324	5226	-	O/P Mon
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5480	12	18-Mar-2021

Table 19

O/P Mon – Output Monitored using calibrated equipment

3 Photographs

3.1 Test Setup Photographs

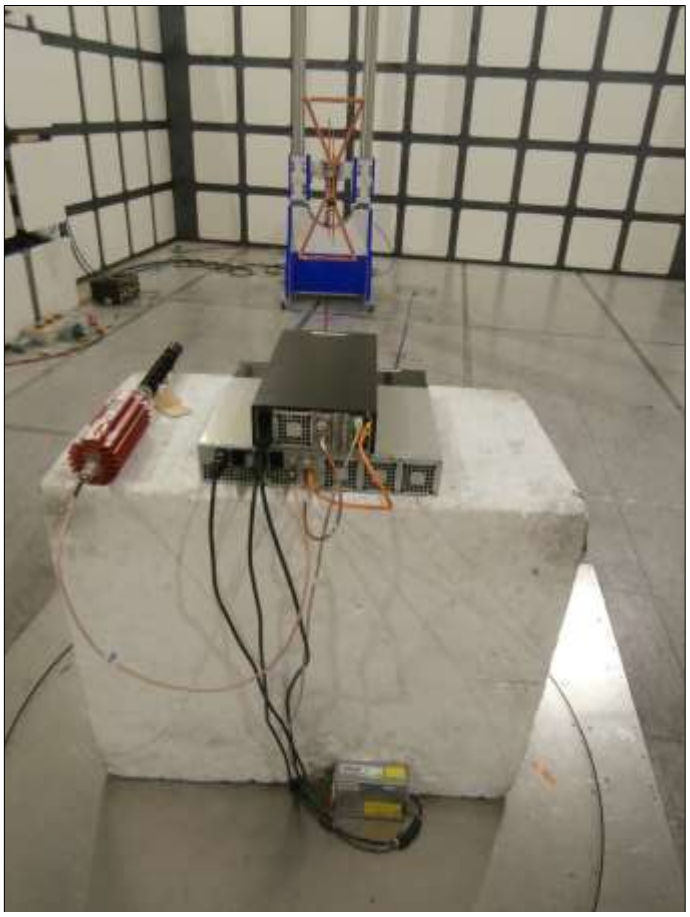

Figure 30 - Test Setup - 30 MHz to 1 GHz

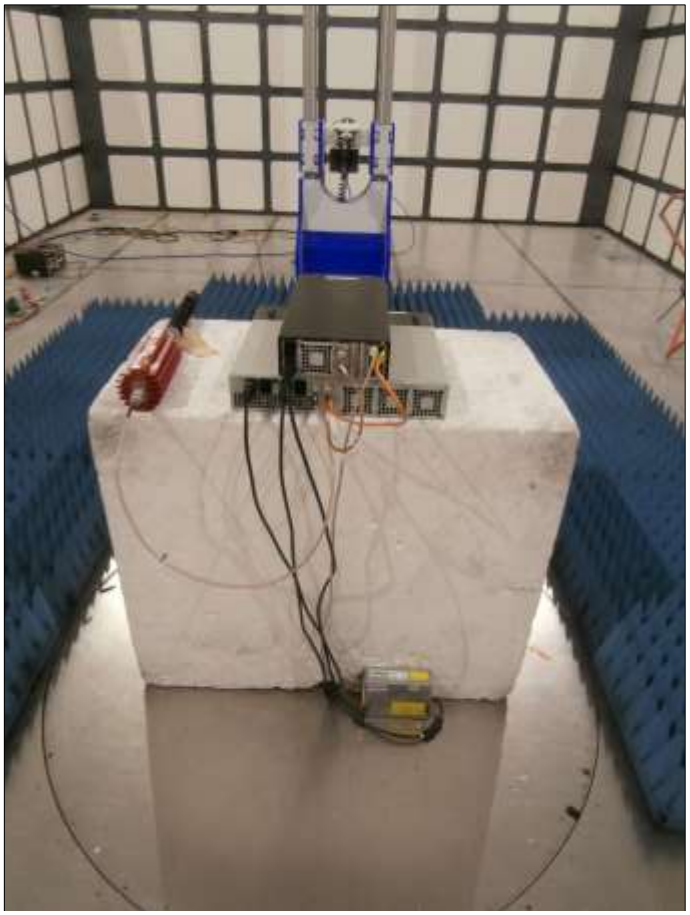

Figure 31 - Test Setup - 1 GHz to 2 GHz

4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Modulation Characteristics	-
Radiated Spurious Emissions	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 18 GHz: ± 6.3 dB
Spurious Emissions at Antenna Terminals	± 3.45 dB
Bandwidth of Emission	± 118.08 Hz
Frequency Stability	± 8.03 Hz
Power and Emissions	± 3.2 dB

Table 20

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.