

# TEST REPORT

**Test Report No. :** UL-RPT-RP15713167-316A

**Customer\*** : Sportable Technologies Ltd

**Model No.\*** : KRLM0000

**FCC ID\*** : 2A929-662607

**Technology** : Wideband

**Test Standard(s)** : FCC Parts 15.207,15.209(a) & 15.250

**Test Laboratory** : UL International (UK) Ltd, Basingstoke, Hampshire, RG24 8AH,  
United Kingdom

1. This test report shall not be reproduced except in full, without the written approval of UL International (UK) Ltd.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. All information marked with (\*) was provided by the Customer, Applicant or Authorised representative
6. Version 2.0 supersedes all previous versions.

**Date of Issue:** 11 July 2025

**Checked by:**



Sarah Williams  
Staff Engineer, Radio Laboratory

**Company Signatory:**



Ben Mercer  
Lead Test Engineer, Radio Laboratory



5772

**Customer Information**

<b>Company Name*:</b>	Sportable Technologies Ltd
<b>Address*:</b>	Unit C, The Cube Building, 17-21 Wenlock Road, London N1 7GT United Kingdom

**Report Revision History**

Version Number	Issue Date	Revision Details	Revised By
1.0	24/04/2025	Initial Version	Sarah Williams
2.0	11/07/2025	Implemented TCB Feedback	Ben Mercer

## **Table of Contents**

<b>Customer Information.....</b>	<b>2</b>
<b>Report Revision History .....</b>	<b>2</b>
<b>Table of Contents.....</b>	<b>3</b>
<b>1 Attestation of Test Results.....</b>	<b>4</b>
1.1 Description of EUT	4
1.2 General Information	4
1.3 Summary of Test Results	4
1.4 Deviations from the Test Specification	4
<b>2 Summary of Testing.....</b>	<b>5</b>
2.1 Facilities and Accreditation	5
2.2 Methods and Procedures	5
2.3 Calibration and Uncertainty	6
2.4 Test and Measurement Equipment	7
<b>3 Equipment Under Test (EUT) .....</b>	<b>9</b>
3.1 Identification of Equipment Under Test (EUT)	9
3.2 Modifications Incorporated in the EUT	9
3.3 Additional Information Related to Testing	10
3.4 Description of Available Antennas	10
3.5 Description of Test Setup	10
<b>4 Antenna Port Test Results .....</b>	<b>15</b>
4.1 Transmitter -10 dB Bandwidth	15
4.2 Transmitter Frequency Stability (Temperature Variation)	17
4.3 Transmitter Frequency Stability (Voltage Variation)	18
<b>5 Radiated Test Results.....</b>	<b>19</b>
5.1 Transmitter Emission Average Level	19
5.2 Transmitter Emission Peak Level	20
5.3 Transmitter Radiated Emissions Below 960 MHz	21
5.4 Transmitter Radiated Emissions Above 960 MHz	23
<b>6 AC Power Line Conducted Emissions Test Results.....</b>	<b>28</b>
6.1 Transmitter AC Conducted Spurious Emissions	28
<b>Appendix 1 .....</b>	<b>33</b>

## **1 Attestation of Test Results**










### **1.1 Description of EUT**

The equipment under test (EUT) was a standalone, battery-powered UWB radio tracker designed for real-time player monitoring in professional sports.\*

### **1.2 General Information**

<b>Specification Reference:</b>	47CFR15.250
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunication): Part 15 Subpart C (Intentional Radiators) – Section 15.250
<b>Specification Reference:</b>	47CFR15.207 and 47CFR15.209
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunication): Part 15 Subpart C (Intentional Radiators) – Sections 15.207 and 15.209
<b>Site Registration:</b>	685609
<b>FCC Lab. Designation No.:</b>	UK2011
<b>Location of Testing:</b>	Units 3 & 4 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
<b>Test Dates:</b>	11 March 2025 to 20 March 2025

### **1.3 Summary of Test Results**

<b>FCC Reference (47CFR)</b>	<b>Measurement</b>	<b>Result</b>
Part 15.250(a) & (b)	Transmitter -10 dB Bandwidth	
Part 15.250(a)	Transmitter Frequency Stability	
Part 15.250(d)(1)	Transmitter Emission Average Level	
Part 15.250(d)(3)	Transmitter Emission Peak Level	
Parts 15.250(d)(4) & 15.209(a)	Transmitter Radiated Emissions Below 960 MHz	
Part 15.250(d)(1) & (2)	Transmitter Radiated Emissions Above 960 MHz	
Part 15.207	Transmitter AC Conducted Emissions	
<b>Key to Results</b>  = Complied  = Did not comply		

### **1.4 Deviations from the Test Specification**

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

## **2 Summary of Testing**

### **2.1 Facilities and Accreditation**

The test site and measurement facilities used to collect data are located at Units 3 & 4 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom. The following table identifies which facilities were utilised for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

Site 1	X
Site 17	-
Site 32	-
Site 33	-

UL International (UK) Ltd is accredited by the United Kingdom Accreditation Service (UKAS). UKAS is one of the signatories to the International Laboratory Accreditation Co-operation (ILAC) Arrangement for the mutual recognition of test reports. The tests reported herein have been performed in accordance with its terms of accreditation.

### **2.2 Methods and Procedures**

<b>Reference:</b>	ANSI C63.10-2013
<b>Title:</b>	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
<b>Reference:</b>	KDB 174176 D01 Line Conducted FAQ v01r01 June 3, 2015
<b>Title:</b>	AC Power-Line Conducted Emissions Frequently Asked Questions

## **2.3 Calibration and Uncertainty**

### **Measuring Instrument Calibration**

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

### **Measurement Uncertainty & Decision Rule**

#### **Overview**

No measurement or test can ever be perfect, and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

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

#### **Decision Rule**

Measurement system instrumentation shall be used with an accuracy specification meeting the accuracy specification limits according to IEC/IECEE OD-5014.

As applicable, unless specified otherwise in this quotation, the compliance "Decision Rule" is based on Simple Acceptance. If the measured value is on the limit, the result is defined as a pass. In this case the risk of a false positive is 50%. For further information regarding risk assessment refer to ILAC G8:09/2019.

#### **Measurement Uncertainty**

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

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Transmitter -10 dB Bandwidth	5.925 GHz to 7.250 GHz	95%	±3.27 %
Frequency Stability	5.925 GHz to 7.250 GHz	95%	±3.27 %
Transmitter Emissions Average/Peak Level	5.925 GHz to 7.250 GHz	95%	±3.64 dB
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	±5.44 dB
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±2.98 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	±3.64 dB
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±1.88 dB

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

## 2.4 Test and Measurement Equipment

### Test Equipment Used for Transmitter -10 dB Bandwidth and Transmitter Frequency Stability Tests

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2037	Thermohygrometer	Testo	608-H1	45124925	23 Dec 2025	12
M1883	Signal Analyser	Rohde & Schwarz	FSV30	103084	09 Aug 2025	12
C215337	Coaxial Cable	Huber+Suhner	SF126EA/11 SMA/11SMA/2000	515836/126EA	Calibrated before use	-
M226933	Thermometer	Fluke Corporation	51 Series	53101351WS	07 Jan 2026	12
M226937	Multimeter	Fluke Corporation	175	58890171	23 Oct 2025	12
E138277	Environmental Chamber	Espec	SH-642	93009444	Calibrated before use	-
S0580	DC Power Supply	TTI	EX1810R	444111	Calibrated before use	-

### Test Equipment Used for Transmitter Emission Average & Peak Level Tests

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2040	Thermohygrometer	Testo	608-H1	45124934	23 Dec 2025	12
K0001	3m RSE Chamber	MVG Industries UK	N/A	N/A	11 Sep 2025	12
M236226	Test Receiver	Rohde & Schwarz	ESW26	103134	06 May 2025	12
A222867	Pre-Amplifier	Atlantic Microwave	A-LNAKX-380116-S5S5	220705002	24 Feb 2026	12
A3138	Antenna	Schwarzbeck	BBHA 9120 B	00702	06 Sep 2025	12

### Test Equipment Used for Transmitter AC Conducted Spurious Emissions Tests

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2073	Thermohygrometer	Testo	608-H1	45124925	23 Dec 2025	12
M1124	Test Receiver	Rohde & Schwarz	ESIB26	100046	15 Oct 2025	12
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	07 Aug 2025	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	15 Jul 2025	12

### Test Measurement Software/Firmware Used:

Name	Version	Release Date
Rohde & Schwarz EMC32	6.30.0	2018

**Test and Measurement Equipment (continued)****Test Equipment Used for Transmitter Radiated Emissions Tests**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2040	Thermohygrometer	Testo	608-H1	45124934	23 Dec 2025	12
K0001	3m RSE Chamber	MVG Industries UK	N/A	N/A	11 Sep 2025	12
M236226	Test Receiver	Rohde & Schwarz	ESW26	103134	06 May 2025	12
M227313	Signal Analyser	Rohde & Schwarz	FSW43	102471	20 Sep 2025	12
A3154	Pre-Amplifier	Com-Power	PAM-103	18020012	28 Aug 2025	12
A231566	Pre-Amplifier	RF Bay Inc	LNA-1070	1	25 Mar 2025	12
A222867	Pre-Amplifier	Atlantic Microwave	A-LNAKX-380116-S5S5	220705002	24 Feb 2026	12
A230567	Pre-Amplifier	Atlantic Microwave	A-HPAKX-380143-K5K5	VJ3601001	04 Apr 2025	12
A3198	Antenna	ETS-Lindgren	6502	00221887	05 Nov 2025	12
A553	Antenna	Chase	CBL6111A	1593	27 Aug 2025	12
A3138	Antenna	Schwarzbeck	BBHA 9120 B	00702	06 Sep 2025	12
A3139	Antenna	Schwarzbeck	HWRD 750	00027	06 Sep 2025	12
A231050	Antenna	Schwarzbeck	BBHA 9170	01280	05 Apr 2025	12
A3112	Attenuator	AtlanTecRF	AN18-06	219706#2	27 Aug 2025	12
A212031	Low Pass Filter	Micro-Tronics	LPS20721	002	16 Sep 2025	12
A227131	High Pass Filter	Micro-Tronics	HPS20722	005	16 Sep 2025	12



### **3 Equipment Under Test (EUT)**

#### **3.1 Identification of Equipment Under Test (EUT)**

<b>Brand Name*:</b>	Sportable
<b>Model Number*:</b>	KRLM0000
<b>Test Sample Serial Number*:</b>	MA015R ( <i>Radiated sample #1</i> )
<b>Hardware Version*:</b>	02.00
<b>Software Version*:</b>	N/A
<b>Firmware Version*:</b>	Zephyr 36a05b5
<b>FCC ID*:</b>	2A929-662607
<b>Date of Receipt:</b>	11 March 2025

<b>Brand Name*:</b>	Sportable
<b>Model Number*:</b>	KRLM0000
<b>Test Sample Serial Number*:</b>	MA015M ( <i>Radiated sample #2</i> )
<b>Hardware Version*:</b>	02.00
<b>Firmware Version*:</b>	Zephyr 36a05b5
<b>FCC ID*:</b>	2A929-662607
<b>Date of Receipt:</b>	11 March 2025

<b>Brand Name*:</b>	Sportable
<b>Model Name or Number*:</b>	KRLM0000
<b>Test Sample Serial Number*:</b>	MA001D ( <i>Conducted sample</i> )
<b>Hardware Version*:</b>	01.02
<b>Firmware Version*:</b>	Zephyr 36a05b5
<b>FCC ID*:</b>	2A929-662607
<b>Date of Receipt:</b>	19 March 2025

#### **3.2 Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

### **3.3 Additional Information Related to Testing**

<b>Technology Tested:</b>	Wideband	
<b>Type of Unit:</b>	Transceiver	
<b>Modulation*:</b>	Burst Position Modulation (BPM) - Binary Phase shift keying (BPSK)	
<b>Duty Cycle*:</b>	15%	
<b>Power Supply Requirement(s)*:</b>	3.8 VDC	
<b>Transmit Frequency Range*:</b>	6250 MHz to 6750 MHz	
<b>Transmit Channel Tested:</b>	<b>Channel ID</b>	<b>Channel Frequency (MHz)</b>
	Single	6500

### **3.4 Description of Available Antennas**

The radio utilizes an integrated antenna, with the following maximum gain:

<b>Frequency Range (MHz)</b>	<b>Antenna Gain (dBi)*</b>
6250 - 6750	6.5

### **3.5 Description of Test Setup**

#### **Support Equipment**

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

#### **Customer Supplied\*:**

<b>Description</b>	<b>Brand Name</b>	<b>Model Name or Number</b>	<b>Serial Number</b>
Test Laptop	Dell	Latitude 3510	F41PX93
USB-A to Pogo Diagnostic Cable	Not marked or stated	Not marked or stated	Not marked or stated
Swift Key Switch and Cable	Not marked or stated	Not marked or stated	Not marked or stated
AC USB Power Adapter	Apple	A1357	NSW24363

#### **Laboratory Supplied\*:**

<b>Description</b>	<b>Brand Name</b>	<b>Model Name or Number</b>	<b>Serial Number</b>
Test Laptop	Lenovo	L480	PF1EHZQQ

## **Operating Modes**

The EUT was tested in the following operating mode(s):

- Constantly transmitting at maximum power with a wideband modulated signal with the longest supported burst length.

## **Configuration and Peripherals**

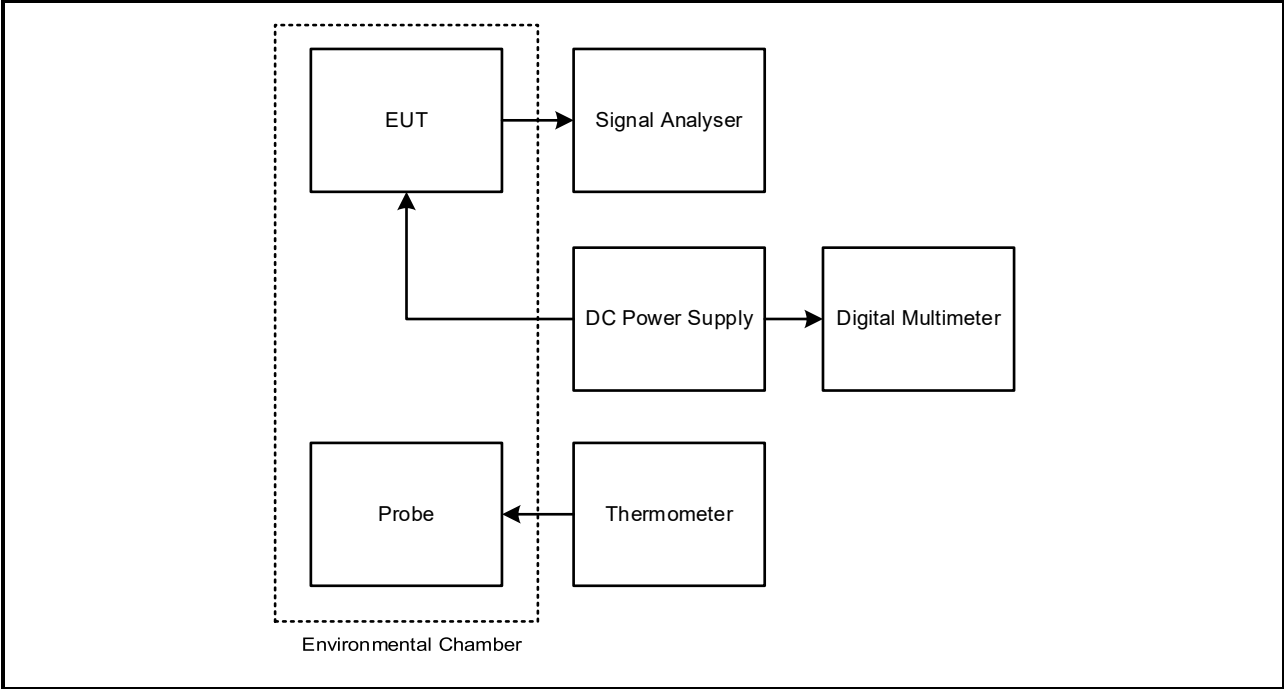
The EUT was tested in the following configuration(s):

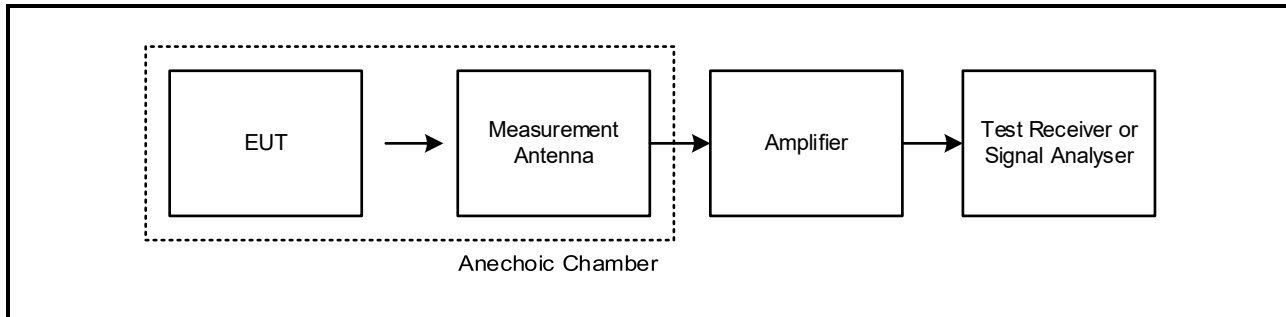
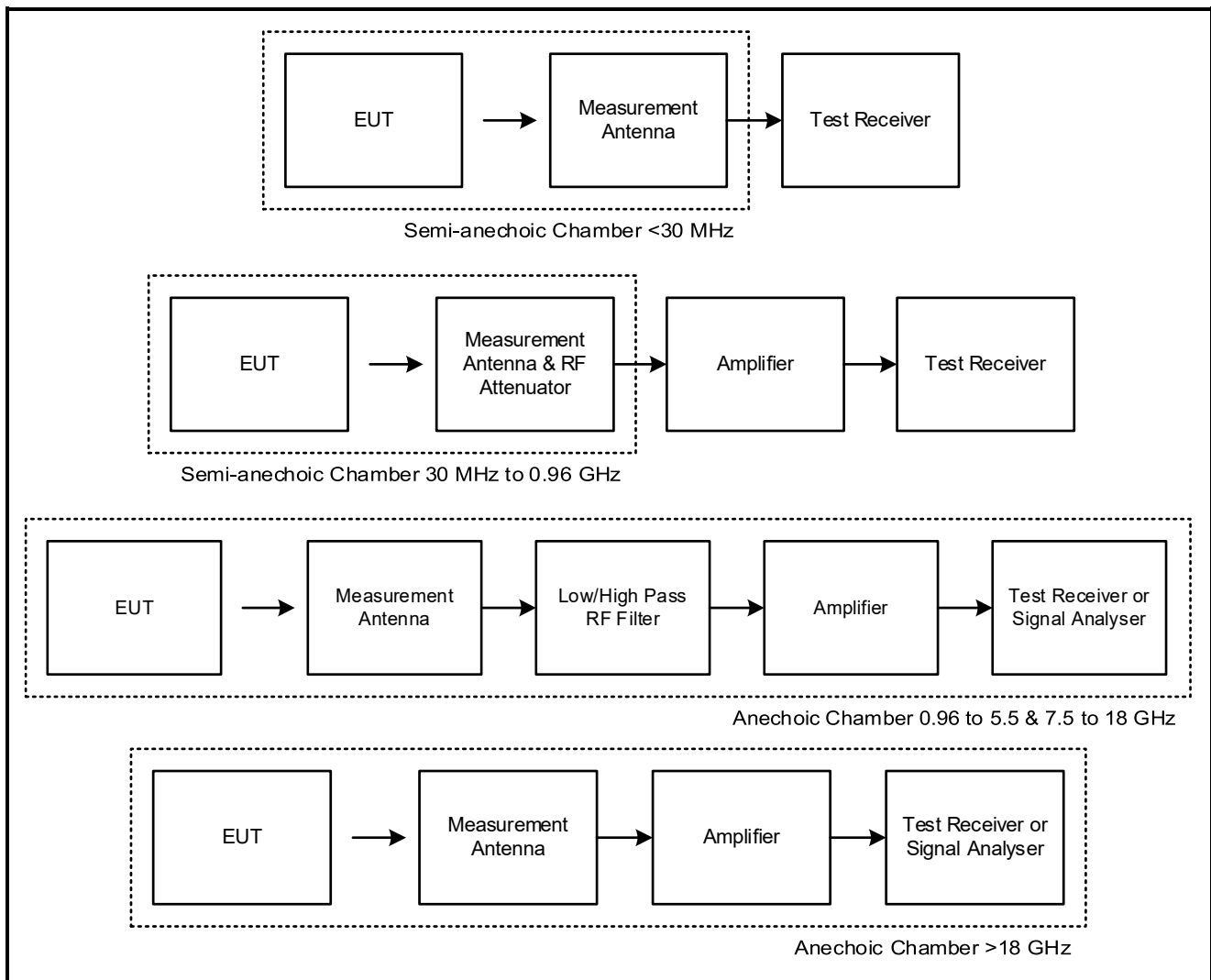
- Controlled in test mode using a terminal application on the clients test laptop. The laptop was connected to the EUT via a diagnostic cable. The terminal commands were used to enable a continuous transmission from the EUT.
- Frequency stability measurements were performed using sample with serial number MA001D. This sample had a retrofitted connector which allowed the EUT to be powered directly from a DC power supply. This DC power supply was monitored throughout the test using a calibrated digital voltmeter. All other measurements were performed using samples with serial numbers MA015M and MA015R.
- Radiated measurements were performed with the EUT in the worst-case orientation with respect to emissions whilst powered by its internal battery.

**Test Setup Diagrams**

**Antenna Port Test:**

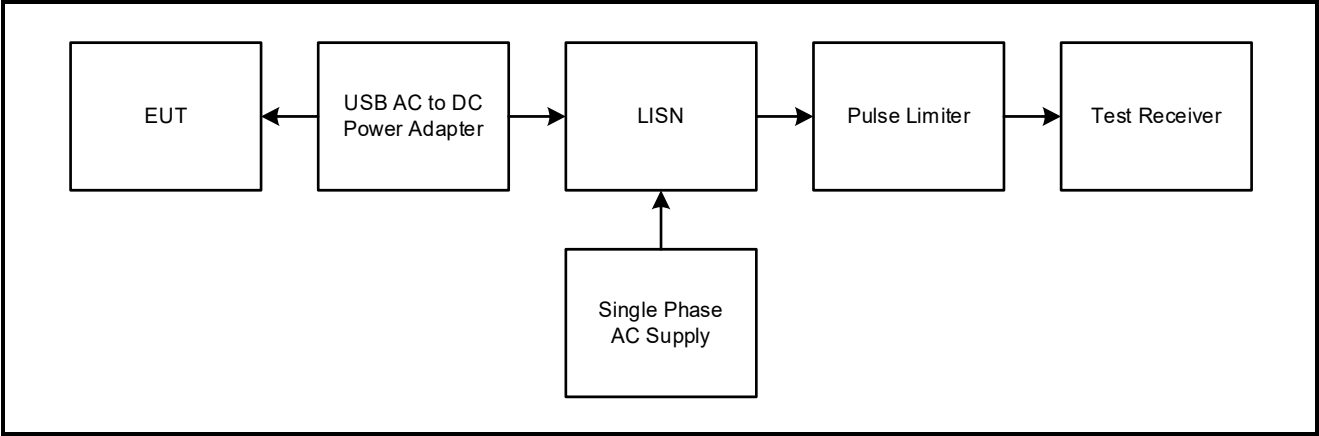
**Test Setup for Transmitter -10 dB Bandwidth and Frequency Stability Tests**



**Test Setup Diagrams (continued)****Radiated Tests:****Test Setup for Transmitter Emission Average & Peak Level Tests****Test Setup for Transmitter Radiated Emissions**

**Test Setup Diagrams (continued)**

**Test Setup for Transmitter AC Conducted Spurious Emissions**



## **4 Antenna Port Test Results**

### **4.1 Transmitter -10 dB Bandwidth**

#### **Test Summary:**

<b>Test Engineers:</b>	Lenny Hantz & Andrew Edwards	<b>Test Date:</b>	19 March 2025
<b>Test Sample Serial Number:</b>	MA001D		

<b>FCC Reference:</b>	Part 15.250(a) & (b)
<b>Test Method Used:</b>	Part 15.250(e)(4) & ANSI C63.10 Section 10.1

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	27
<b>Relative Humidity (%):</b>	26

#### **Note(s):**

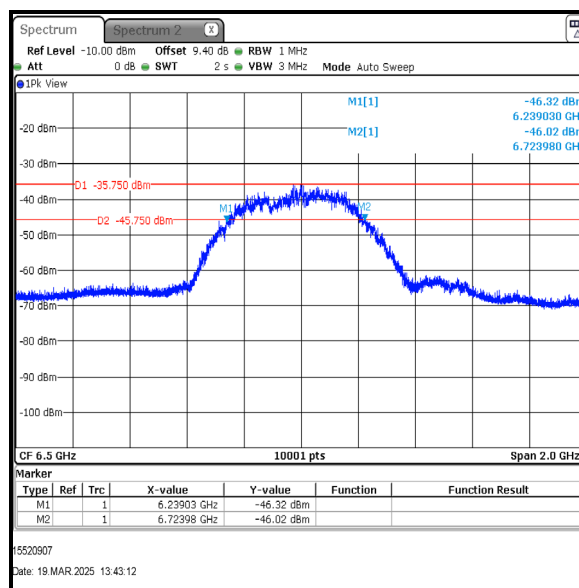
1. The -10 dB bandwidth was measured using a peak detector in a 1 MHz resolution bandwidth and a video bandwidth greater than or equal to the resolution bandwidth. Markers were placed on the lower and upper -10 dB points and the frequencies recorded.
2. The -10 dB Bandwidth was calculated in accordance with ANSI C63.10 section 10.1.

**Transmitter -10 dB Bandwidth (continued)****Results: 15.250(a)**

Lower -10 dB Frequency (MHz)	Upper -10 dB Frequency (MHz)	Lower Limit (MHz)	Upper Limit (MHz)	Result
6239.030	6723.980	5925	7250	Complied

**Results: 15.250(b)**

-10 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
484.950	>50.0	434.950	Complied





## **4.2 Transmitter Frequency Stability (Temperature Variation)**

### **Test Summary:**

<b>Test Engineers:</b>	Lenny Hantz & Andrew Edwards	<b>Test Date:</b>	19 March 2025
<b>Test Sample Serial Number:</b>	MA001D		

<b>FCC Reference:</b>	Part 15.250(a)
<b>Test Method Used:</b>	Part 15.250(e)(4) & ANSI C63.10 Section 6.8 and Notes below

### **Environmental Conditions:**

<b>Temperature (°C):</b>	27
<b>Relative Humidity (%):</b>	26

### **Note(s):**

1. The -10 dB bandwidth was measured using a peak detector in a 1 MHz resolution bandwidth and a video bandwidth greater than or equal to the resolution bandwidth. -10 dB points were measured at the customer's stated minimum and maximum temperatures of -10°C and +50°C. Markers were placed on the lower and upper -10 dB points and the results recorded in the table below.
2. A sufficient stabilisation period was allowed at each temperature level in accordance with ANSI C63.10 Section 6.8.1(f). Result plots are archived on the company IT server and available for inspection if required. The worst case values are recorded in the table below.
3. Temperature was monitored throughout the test with a calibrated digital thermometer.

### **Results:**

<b>Temperature (°C)</b>	<b>Lower -10 dB Frequency (MHz)</b>	<b>Upper -10 dB Frequency (MHz)</b>	<b>Lower Limit (MHz)</b>	<b>Upper Limit (MHz)</b>	<b>Result</b>
-10	6210.630	6739.780	5925	7250	Complied
0	6210.630	6739.980	5925	7250	Complied
10	6211.030	6739.780	5925	7250	Complied
20	6237.230	6726.380	5925	7250	Complied
30	6239.230	6726.380	5925	7250	Complied
40	6245.430	6724.180	5925	7250	Complied
50	6249.230	6724.580	5925	7250	Complied

### **4.3 Transmitter Frequency Stability (Voltage Variation)**

#### **Test Summary:**

<b>Test Engineers:</b>	Lenny Hantz & Andrew Edwards	<b>Test Date:</b>	19 March 2025
<b>Test Sample Serial Number:</b>	MA001D		

<b>FCC Reference:</b>	Part 15.250(a)
<b>Test Method Used:</b>	Part 15.250(e)(4) & ANSI C63.10 Section 6.8 and Notes below

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	27
<b>Relative Humidity (%):</b>	26

#### **Note(s):**

1. The -10 dB bandwidth was measured using a peak detector in a 1 MHz resolution bandwidth and a video bandwidth greater than or equal to the resolution bandwidth. -10 dB points were measured at the customer's stated minimum, nominal and maximum voltages. Markers were placed on the lower and upper -10 dB points and the results recorded in the table below.
2. Voltage was monitored throughout the test with a calibrated digital voltmeter.
3. Result plots are archived on the company IT server and available for inspection if required.

#### **Results:**

<b>Voltage (DC)</b>	<b>Lower -10 dB Frequency (MHz)</b>	<b>Upper -10 dB Frequency (MHz)</b>	<b>Lower Limit (MHz)</b>	<b>Upper Limit (MHz)</b>	<b>Result</b>
3.5	6237.430	6724.780	5925	7250	Complied
3.8	6237.230	6726.380	5925	7250	Complied
4.2	6237.230	6729.580	5925	7250	Complied

## 5 Radiated Test Results

### 5.1 Transmitter Emission Average Level

#### Test Summary:

Test Engineers:	Lenny Hantz & Shamraiz Ashiq	Test Date:	11 March 2025
Test Sample Serial Number:	MA015M		

FCC Reference:	Part 15.250(d)(1)
Test Method Used:	Part 15.250(e)(1) & ANSI C63.10 Sections 10.3

#### Environmental Conditions:

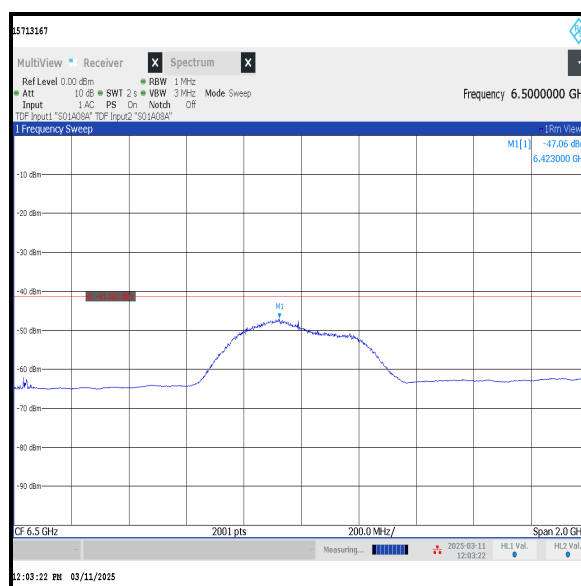
Temperature (°C):	21
Relative Humidity (%):	39

#### Note(s):

- Measurements were performed in a fully anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
- The test receiver was configured with a resolution bandwidth of 1 MHz and video bandwidth of 3 MHz. The measurement span was set to 2 GHz and a sweep time of 2 seconds with 2001 sweep points were used. The test receiver was set to the centre frequency of the peak signal. An RMS detector and max hold function were used.

#### Results:

Frequency (MHz)	Antenna Polarity	Level (dBm)	Limit (dBm)	Margin (dB)	Result
6423.000	Vertical	-47.1	-41.3	5.8	Complied



5.2 Transmitter Emission Peak Level

Test Summary:

Test Engineers:	Lenny Hantz & Shamraiz Ashiq	Test Date:	11 March 2025
Test Sample Serial Number:	MA015M		

FCC Reference:	Part 15.250(d)(3)
Test Method Used:	Part 15.250(e)(2) & ANSI C63.10 Section 10.3.6

Environmental Conditions:

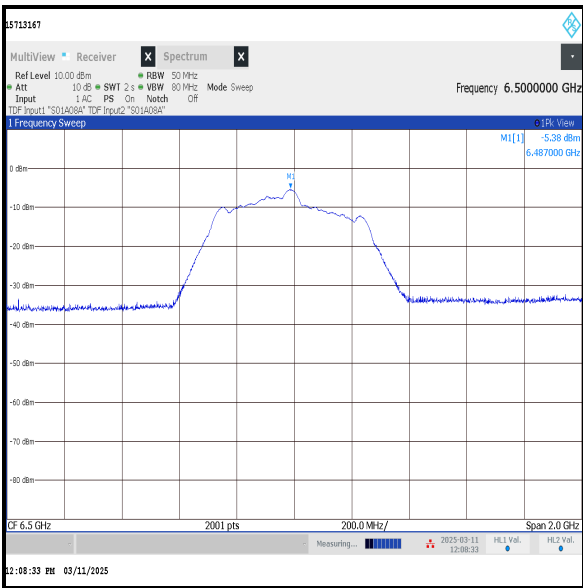
Temperature (°C):	21
Relative Humidity (%):	39

Note(s):

1. Measurements were performed in a fully anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
2. The test receiver was configured with a resolution bandwidth of 50 MHz and video bandwidth of 80 MHz. The measurement span was set to 2 GHz and a sweep time of 2 seconds with 2001 sweep points were used. The test receiver was set to the centre frequency of the peak signal. A peak detector and max hold function were used.

Results:

Frequency FM (MHz)	Antenna Polarity	Level (dBm/50 MHz)	Limit (dBm/50 MHz)	Margin (dB)	Result
6487.000	Vertical	-5.4	0.0	5.4	Complied



### **5.3 Transmitter Radiated Emissions Below 960 MHz**

#### **Test Summary:**

<b>Test Engineers:</b>	Lenny Hantz & Shamraiz Ashiq	<b>Test Dates:</b>	12 March 2025 & 13 March 2025
<b>Test Sample Serial Numbers:</b>	MA015R & MA015M		

<b>FCC Reference:</b>	Parts 15.250(d)(4) & 15.209(a)
<b>Test Method Used:</b>	ANSI C63.10 Sections 6.3, 6.4 and 6.5
<b>Frequency Range</b>	9 kHz to 960 MHz

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	20 & 21
<b>Relative Humidity (%):</b>	33 to 36

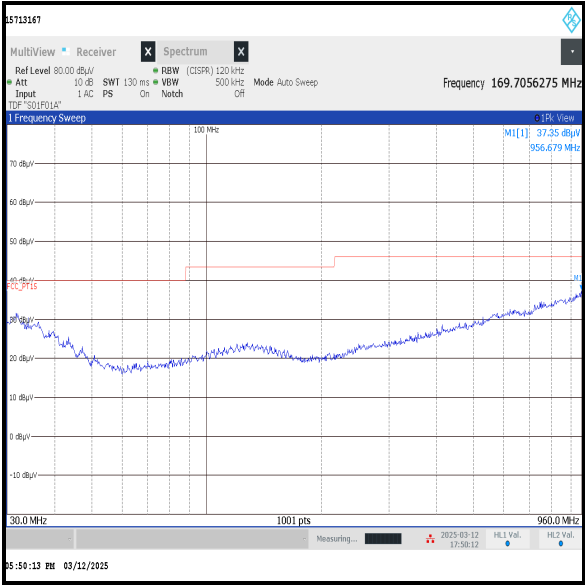
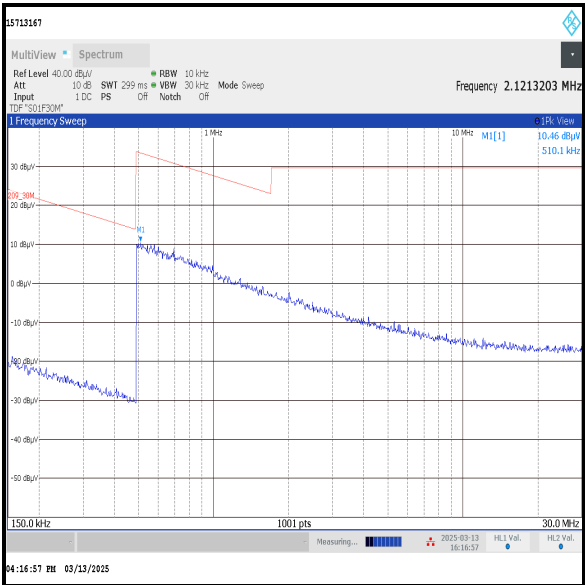
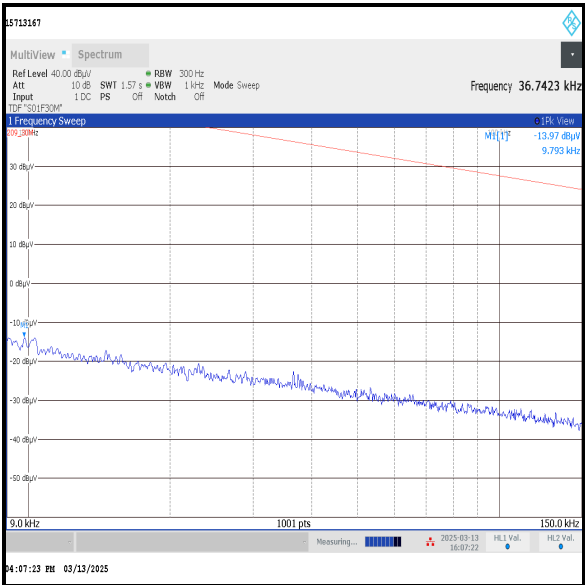
#### **Note(s):**

1. All emissions shown on the pre-scans were investigated and found to be ambient, or > 20 dB below the appropriate limit or below the noise floor of the measurement system. Therefore, the highest peak noise floor reading of the measuring receiver was recorded in the table below.
2. Measurements below 30 MHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. As allowed by ANSI C63.10 clause 5.2; an alternative test site that can demonstrate equivalence to an open area test site may be used for measurements below 30 MHz. Therefore, measurements were performed in a semi-anechoic chamber. The correlation data between semi-anechoic chamber and an open field test site is available upon request.
3. The measured values at 3 metres were extrapolated to the required measurement distances of 300 metres and 30 metres and compared to the specified limits at those distances:
  - 9 kHz to 490 kHz: measured value extrapolated from 3 metres to 300 metres by subtracting 80 dB at 40 dB / decade
  - 490 kHz to 30 MHz: measured value extrapolated from 3 metres to 30 metres by subtracting 40 dB at 40 dB / decade
4. Measurements from 30 MHz to 960 MHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
5. Pre-scans were performed and markers placed on the highest measured levels. The test receiver was configured as follows: For 9 kHz to 150 kHz, the resolution bandwidth was set to 300 Hz and video bandwidth 1 kHz. A peak detector was used, and trace mode was Max Hold. For 150 kHz to 30 MHz, the resolution bandwidth was set to 10 kHz and video bandwidth 30 kHz, trace mode was Max Hold. For 30 MHz to 960 MHz, the resolution bandwidth was set to 120 kHz and video bandwidth 500 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.

Transmitter Radiated Emissions (continued)

Results: Peak

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
956.679	Vertical	37.4	46.0	8.6	Complied



## 5.4 Transmitter Radiated Emissions Above 960 MHz

### Test Summary:

<b>Test Engineers:</b>	Lenny Hantz & Shamraiz Ashiq	<b>Test Dates:</b>	11 March 2025 to 17 March 2025
<b>Test Sample Serial Number:</b>	MA015R		

<b>FCC Reference:</b>	Part 15.250(d)(1)(2)
<b>Test Method Used:</b>	Part 15.250(e)(1) & ANSI C63.10 Sections 6.3, 6.6 & 10.3
<b>Frequency Range</b>	960 MHz to 40 GHz

### Environmental Conditions:

<b>Temperature (°C):</b>	20 to 21
<b>Relative Humidity (%):</b>	33 to 39

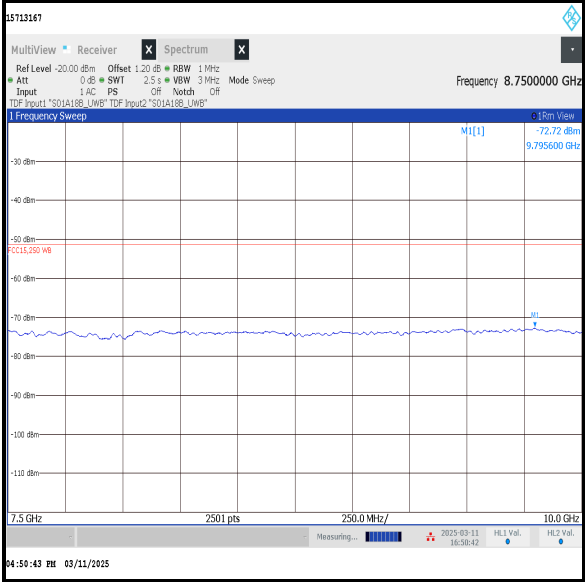
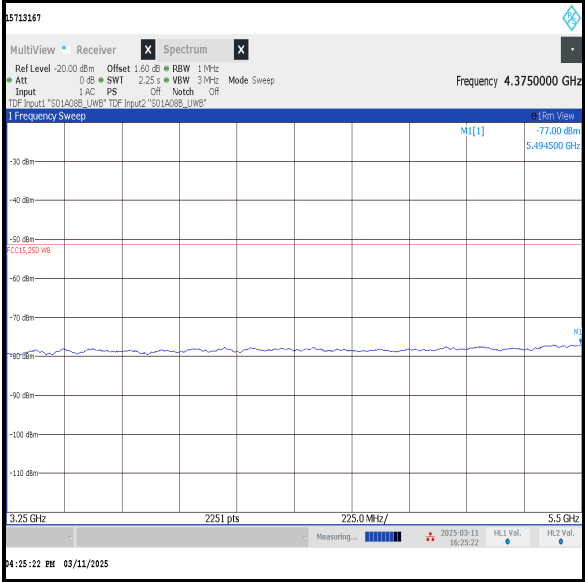
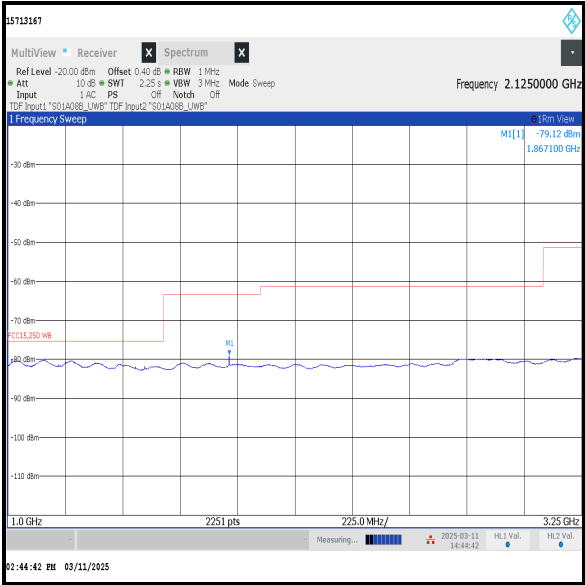
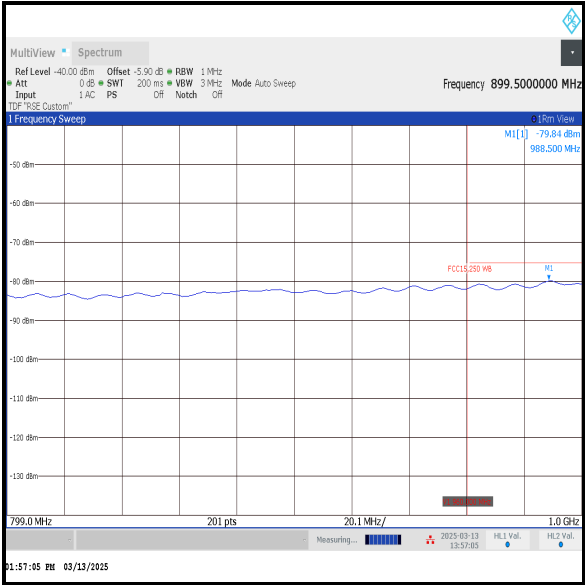
### Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. Part 15.250(d)(1): All other emissions shown on the pre-scans were investigated and found to be ambient, or > 20 dB below the appropriate limit or below the noise floor of the measurement system.
3. Part 15.250(d)(2): The emissions shown on the pre-scans at approximately 1200 MHz, 1600 MHz and 1867 MHz were investigated and found to be ambient. No other spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
4. Measurements between 5.5 GHz to 7.5 GHz showing the fundamental can be found in section 5.1
5. In certain frequency ranges it was not possible to perform the measurements at the required distance due to the level of the measurement system noise floor compared with the limit. Therefore, the test distance was reduced and a correction offset was applied to the measurements.
6. Pre-scans above 960 MHz were performed in a fully anechoic chamber (Asset Number K0001) at a distance of between 0.2 to 1 metre. The EUT was placed at a height of 1.5 metres above the reference ground plane in the centre of the chamber turntable. For emissions measured at <1 metre test distance, it was not possible to maximise the emission using height search, therefore in accordance with ANSI C63.10 section 6.6.5.4 the alternative method was used (elevating the EUT in 30° increments from 0° to 150°).
7. Pre-scans were performed and a marker placed on the highest measured level of the appropriate plot. Part 15.250(d)(1): The test receiver/signal analyser resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz the sweep time was set in accordance with FCC Part 15.250(e)(1). An RMS detector was used, and trace mode was Max Hold. Part 15.250(d)(2): The test receiver/signal analyser resolution bandwidth was set to 30 kHz and video bandwidth 1 MHz the sweep time was set in accordance with FCC Part 15.250(e)(2). An RMS detector was used, and trace mode was Max Hold.
8. Due to limitations of the test receiver/signal analyser, it was necessary to overlap the start and stop frequencies of pre-scan measurement ranges to satisfy the sweep point requirement in FCC Part 15.250(e)(1). Pre-scan measurements < 1 GHz were performed between 799 MHz to 1 GHz; A frequency line has been placed at 960 MHz to indicate the actual measurement start frequency. Appendix 1 of this report details the frequency range, sweep points and sweep time used.

Transmitter Radiated Emissions (continued)

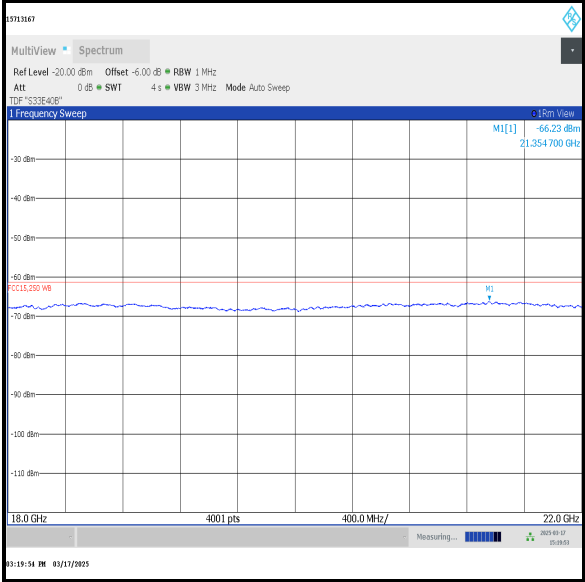
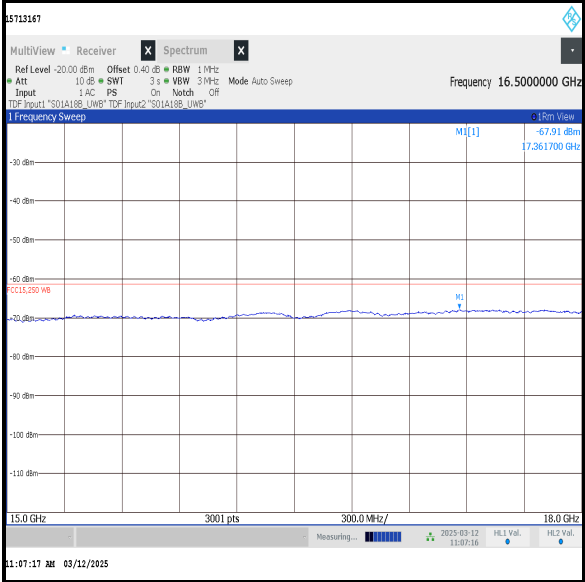
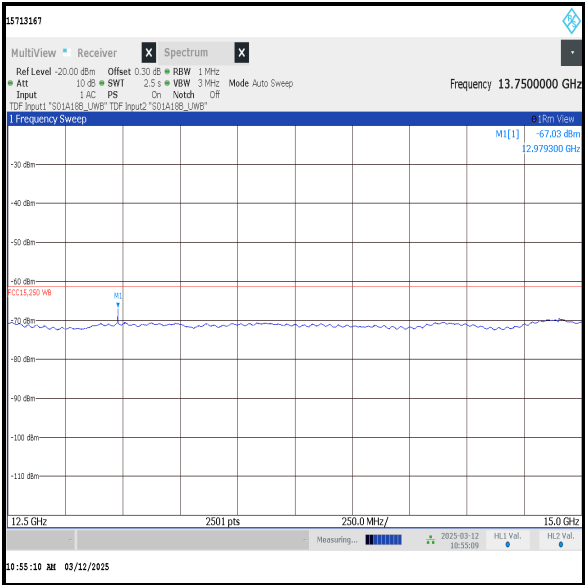
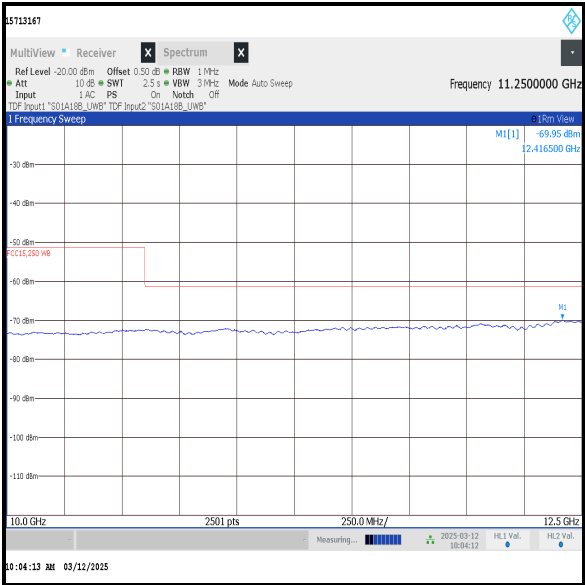
Results: Part 15.250(d)(1)

Frequency (MHz)	Antenna Polarity	RMS Level (dBm)	Limit (dBm)	Margin (dB)	Result
12979.274	Vertical	-65.5	-61.3	4.2	Complied

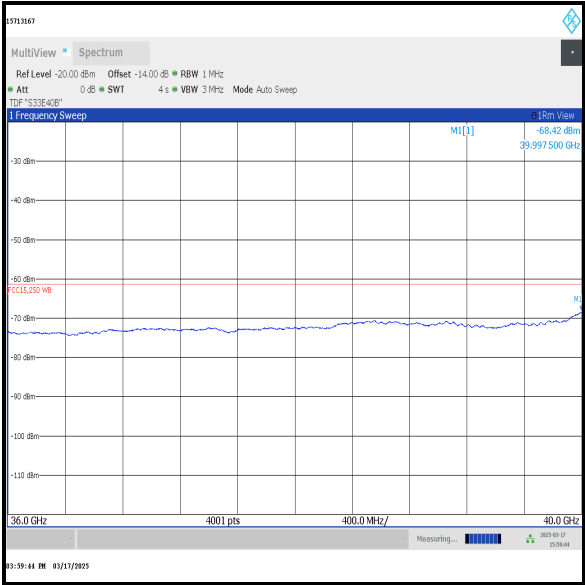
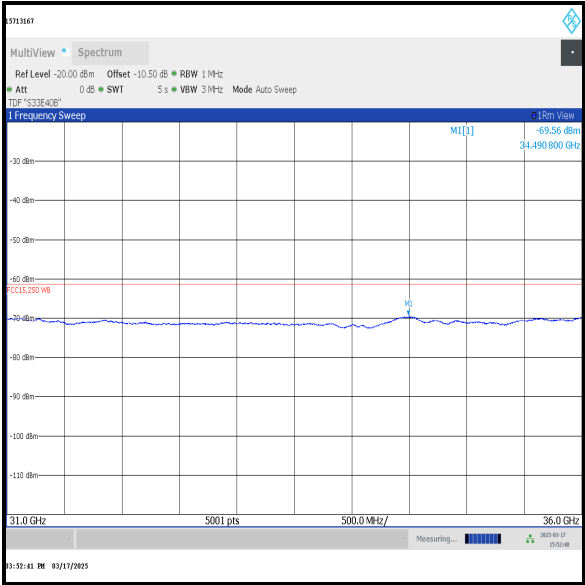
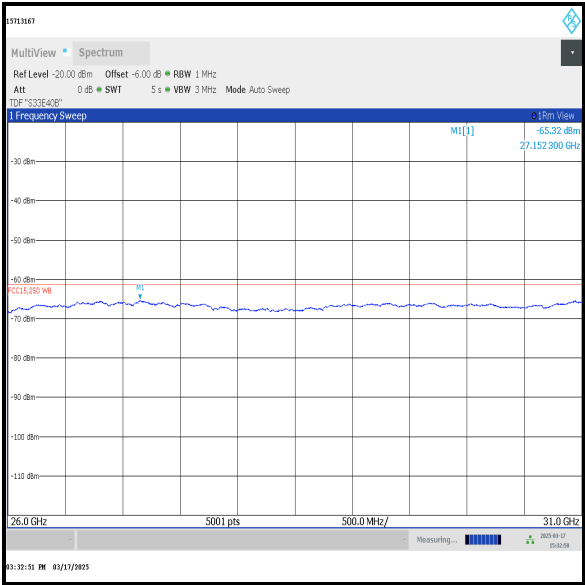
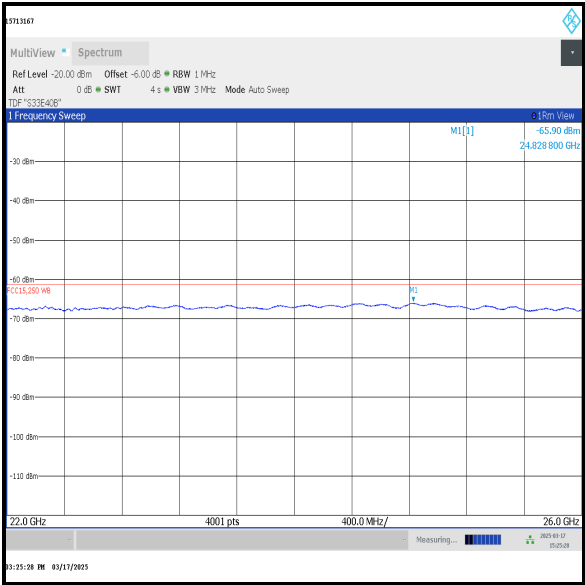




Transmitter Radiated Emissions (continued)



Transmitter Radiated Emissions (continued)

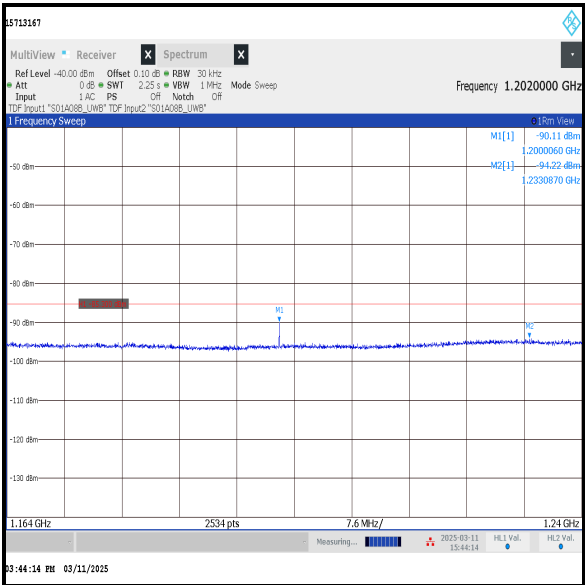


Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying table.

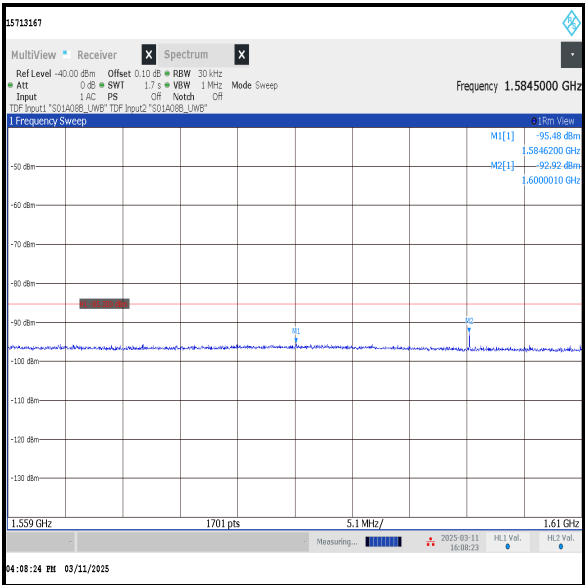
Transmitter Radiated Emissions (continued)

Results: Part 15.250(d)(2)

Frequency (MHz)	Antenna Polarity	RMS Level (dBm)	Limit (dBm)	Margin (dB)	Result
1233.087	Vertical	-94.2	-85.3	8.9	Complied



1164 to 1240 MHz  
-85.3 dBm limit / 30 kHz resolution bandwidth



1559 to 1610 MHz  
-85.3 dBm limit / 30 kHz resolution bandwidth

## **6 AC Power Line Conducted Emissions Test Results**

### **6.1 Transmitter AC Conducted Spurious Emissions**

#### **Test Summary:**

<b>Test Engineers:</b>	Shamraiz Ashiq & Andrew Edwards	<b>Test Dates:</b>	19 March 2025 & 20 March 2025
<b>Test Sample Serial Number:</b>	MA015M		

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

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	27 to 23
<b>Relative Humidity (%):</b>	26 to 32

#### **Note(s):**

1. The EUT was connected to an AC charger via a USB cable. The AC charger was connected to 120 VAC 60 Hz single phase supply via a LISN.
2. In accordance with FCC KDB 174176 Q4, tests were performed with a 240 VAC 60 Hz single phase supply as this was within the voltage range marked on the USB AC to DC power supply.
3. Preliminary measurements were performed at both 50 Hz and 60 Hz supply frequencies. There was no change to the observed emissions.
4. A pulse limiter was fitted between the LISN and the test receiver.
5. Pre-scans were performed and markers placed on the highest live and neutral measured levels. Final measurements were performed on the marker frequencies and the results entered into the tables below.

**Transmitter AC Conducted Spurious Emissions (continued)****Results: Live / Quasi Peak / 120 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Live	48.7	66.0	17.3	Complied
0.195	Live	45.7	63.8	18.1	Complied
0.276	Live	41.8	60.9	19.1	Complied
0.415	Live	37.0	57.5	20.5	Complied
0.582	Live	37.2	56.0	18.8	Complied
0.604	Live	36.0	56.0	20.0	Complied

**Results: Live / Average / 120 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Live	37.5	56.0	18.5	Complied
0.204	Live	36.8	53.4	16.6	Complied
0.253	Live	30.3	51.6	21.3	Complied
0.303	Live	27.6	50.2	22.6	Complied
0.352	Live	27.2	48.9	21.7	Complied
0.582	Live	30.3	46.0	15.7	Complied

**Results: Neutral / Quasi Peak / 120 VAC 60 Hz**

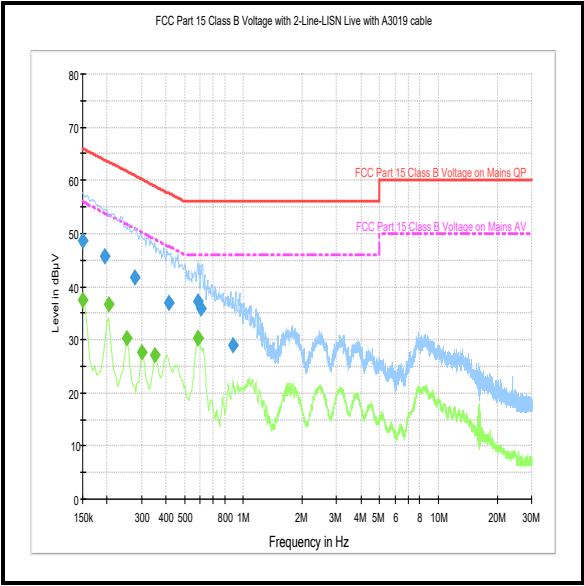
Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Neutral	49.9	66.0	16.1	Complied
0.195	Neutral	47.0	63.8	16.8	Complied
0.285	Neutral	42.8	60.7	17.9	Complied
0.388	Neutral	38.9	58.1	19.2	Complied
0.487	Neutral	36.3	56.2	19.9	Complied
0.586	Neutral	34.4	56.0	21.6	Complied

**Results: Neutral / Average / 120 VAC 60 Hz**

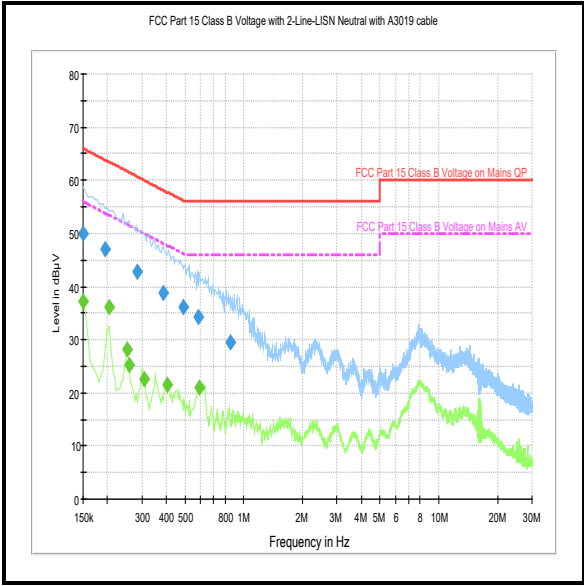
Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Neutral	37.1	56.0	18.9	Complied
0.204	Neutral	36.2	53.4	17.2	Complied
0.253	Neutral	28.1	51.6	23.5	Complied
0.258	Neutral	25.2	51.5	26.3	Complied
0.406	Neutral	21.6	47.7	26.1	Complied
0.591	Neutral	20.9	46.0	25.1	Complied

Transmitter AC Conducted Spurious Emissions (continued)

Results: 120 VAC 60 Hz



Live



Neutral

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

**Transmitter AC Conducted Spurious Emissions (continued)****Results: Live / Quasi Peak / 240 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.177	Live	41.8	64.6	22.8	Complied
0.271	Live	36.8	61.1	24.3	Complied
0.330	Live	35.3	59.5	24.2	Complied
0.541	Live	33.8	56.0	22.2	Complied
0.649	Live	37.1	56.0	18.9	Complied
1.684	Live	30.8	56.0	25.2	Complied

**Results: Live / Average / 240 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.182	Live	33.6	54.4	20.8	Complied
0.303	Live	29.6	50.2	20.6	Complied
0.334	Live	29.6	49.3	19.7	Complied
0.564	Live	27.9	46.0	18.1	Complied
0.654	Live	31.3	46.0	14.7	Complied
1.684	Live	30.2	46.0	15.8	Complied

**Results: Neutral / Quasi Peak / 240 VAC 60 Hz**

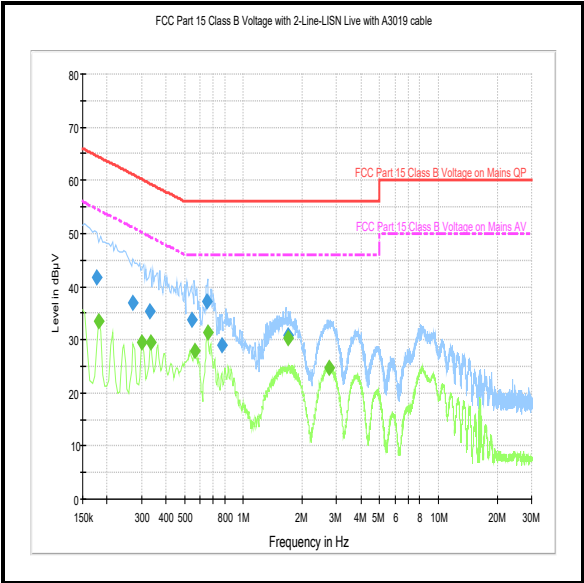
Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.177	Neutral	42.5	64.6	22.1	Complied
0.330	Neutral	36.6	59.5	22.9	Complied
0.460	Neutral	31.4	56.7	25.3	Complied
0.546	Neutral	31.7	56.0	24.3	Complied
0.573	Neutral	32.6	56.0	23.4	Complied
8.070	Neutral	31.5	60.0	28.5	Complied

**Results: Neutral / Average / 240 VAC 60 Hz**

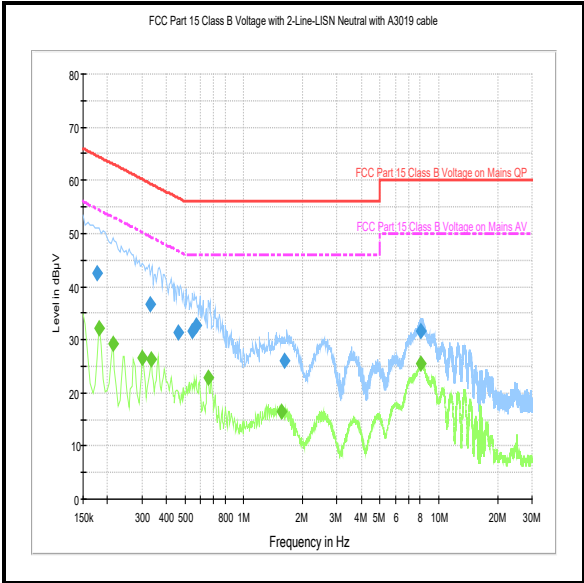
Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.182	Neutral	32.1	54.4	22.3	Complied
0.213	Neutral	29.2	53.1	23.9	Complied
0.303	Neutral	26.5	50.2	23.7	Complied
0.334	Neutral	26.3	49.3	23.0	Complied
0.654	Neutral	22.9	46.0	23.1	Complied
8.092	Neutral	25.6	50.0	24.4	Complied

**Transmitter AC Conducted Spurious Emissions (continued)**

**Results: 240 VAC 60 Hz**



**Live**



**Neutral**

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



## **Appendix 1**

In accordance with FCC 15.250(e)(1), the test receiver span, sweep time and sweep points must be set to achieve a 1 ms dwell time over each 1 MHz segment. The test receiver settings used during testing are detailed in the table below.

### **Using a 1 MHz Bandwidth**

<b>Frequency Range (GHz)</b>	<b>Span (MHz)</b>	<b>Sweep Points</b>	<b>Sweep Time (s)</b>	<b>Test Distance (m)</b>
0.799 to 1	201	201	0.2	1.5
1 to 3.25	2250	2251	2.25	1.0
3.25 to 5.5	2250	2251	2.25	1.0
7.5 to 10	2500	2501	2.5	1.0
10 to 12.5	2500	2501	2.5	1.0
12.5 to 15	2500	2501	2.5	1.0
15 to 18	3000	3001	3.0	1.0
18 to 22	4000	4001	4.0	0.5
22 to 26	4000	4001	4.0	0.5
26 to 31	5000	5001	5.0	0.5
31 to 36	5000	5001	5.0	0.3
36 to 40	4000	4001	4.0	0.2

### **Using a 30 kHz Bandwidth**

<b>Frequency Range (GHz)</b>	<b>Span (MHz)</b>	<b>Sweep Points</b>	<b>Sweep Time (s)</b>	<b>Test Distance (m)</b>
1.164 to 1.24	76	2534	2.53	1.0
1.559 to 1.61	51	1701	1.7	1.0

**--- END OF REPORT ---**