

# Test Report for the FCC and ISED Testing of an iTrack TPMS Sensor v5 to FCC Rule 47CFR 15.247 and ISED RSS-247 for Bridgestone Mining Solutions Technology Ltd

Report number: C15585TR2

Project number: C8609

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Issue	Description						Issue by	Date
2	Copy 1		Copy 2		PDF	√	JB	10 <sup>th</sup> July 2024

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Test Report Change History

Issue	Date	Modification Details
1	10 <sup>th</sup> July 2024	First Issue
2	10 <sup>th</sup> July 2024	FCC ID and ISED number added
3		
4		
5		
6		
7		
8		
9		
10		

## Section 1 Test Location

All testing was performed at;

<b>Eurofins E&amp;E UK</b>	Unit 5
	Speedwell Road
	Castleford
	WF10 5PY
<b>Tel:</b>	01977 731173
<b>Website</b>	<a href="http://www.yorkemc.co.uk">http://www.yorkemc.co.uk</a>
<b>UKAS Testing No.</b>	1574

### 1.1 UKAS Accreditation

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Eurofins E&E UK latest accreditation schedule can be found at:

[http://www.ukas.org/testing/lab\\_detail.asp?lab\\_id=989&location\\_id=&vMenuOption=3](http://www.ukas.org/testing/lab_detail.asp?lab_id=989&location_id=&vMenuOption=3)

Eurofins E&E UK Castleford Laboratory, is an Accredited facility recognised by the Federal Communications Commission (FCC) for certification testing. The appropriate FCC Designation Number is UK2013, dated 1<sup>st</sup> March 2021.

Eurofins E&E UK Castleford Laboratory is recognised by ISED for certification testing.

ISED Assigned Code: 22959

**Section 2 Customer Information**

<b>Company name</b>	Bridgestone Mining Solutions Technology Ltd
<b>Address</b>	2 Bakers Row
	London
	EC1R 3DB
	United Kingdom
<b>Contact</b>	Allister Thurman
<b>Email</b>	allister.thurman@bmst.bridgestone

## Section 3 Equipment Details

### 3.1 Equipment Under Test (EUT)

<b>Date received:</b>	14 <sup>th</sup> May 2024		
<b>EUT name:</b>	iTrack TPMS sensor v5		
<b>PMN:</b>	ITSEN005		
<b>HVIN:</b>	V5		
<b>FVIN:</b>	V1.0		
<b>FCC ID:</b>	2BGJDITSEN005		
<b>ISED number:</b>	32438-ITSEN005		
<b>EUT description:</b>	iTrack TPMS sensor is a tyre pressure and temperature monitoring sensor (TMPS) for mining equipment. The unit contains a short range radio device, operating on a single channel at 434.375 MHz.		
<b>Antenna</b>	Integral Antenna		
<b>Transmission</b>	Digital Transmission System (DTS)		
<b>Modulation schemes</b>	OOK		
<b>Operating frequency</b>	434.375MHz		
<b>No of units tested:</b>	Three		
<b>EUT power:</b>	3.6V lithium battery		
<b>Size of EUT (mm)</b>	Width: 45	Depth: 45 mm	Height: 40 mm
<b>Mode/s of operation:</b>	Continuous transmit of modulated data 434.375MHz On demand transmit of modulated data 434.375MHz		
<b>Test software:</b>	None		
<b>Modifications incorporated during testing:</b>	Initial spurious emission testing showed 2 <sup>nd</sup> & 3 <sup>rd</sup> harmonics of the fundamental emission to be above limits. The sensors were returned to the customer where they were analysed. The customer states that the sensors were shown to emit harmonics when they were in their unpotted state. Therefore, sensor samples were potted as they would be normally prior to sale and returned for re-testing.		

Ports and Cables	Cable Length	Screened/ unscreened	Connected to
-	-	-	-



### **3.2 EUT Photographs**

Photographs are supplied separately.

### **3.3 Configuration of EUT**

The apparatus was supplied in one single possible configuration.

### **3.4 EUT Monitoring/Auxiliary Equipment**

None.

### **3.5 Monitoring Software**

None.

**Section 4 Test Specifications****For USA:**

<b>Regulation / Test Standard</b>	<p>Title 47 of the Code of Federal Regulations (CFR) Part 15 (47CFR15)  Subpart C – Intentional Radiators  Section 15.231 Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.  Measurement standard:</p> <p>ANSI C63.10-2013  American National Standard of Procedures for Compliance Testing of  Unlicensed Wireless Devices</p>
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<b>Test</b>	<b>FCC Rule Part</b>	<b>Comments and deviations from the standard</b>	<b>Result</b>
Intentional emission, band occupancy, 20dB bandwidth	47 CFR 15.215(C)	Applies	Pass
Radiated spurious electric field emissions 30MHz to 6GHz	47CFR15.231(b) 47CFR15209	Applies Frequency range of measurement determined from 47CFR15.33(a)(1)	Pass
AC mains conducted emissions	47CFR15.207	Not applicable – battery powered	Not applicable
Transmission on time	47CFR15.231(a)	Applies	Pass
Intentional Emission Frequency	47CFR15.231(b)	Applies	Pass
Intentional emission field strength	47CFR15.231(b)	Applies	Pass
Intentional emission band occupancy	47CFR15.215	Applies	Pass
Restricted bands	15.205	Applies	Pass

**For Canada:**

<b>Regulation / Test Standard</b>	<p>RSS-210 — Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.</p> <p>Issue 10</p> <p>And,</p> <p>RSS-Gen — General Requirements for Compliance of Radio Apparatus</p> <p>Issue 5 April 2018</p> <p>+A1 March 2019</p> <p>+A2 February 2021</p>
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<b>Test</b>	<b>RSS-210 Clause references</b>	<b>RSS-Gen Clause reference</b>	<b>Result</b>
99% Occupied Bandwidth	-	6.7	Pass
Radiated spurious electric field emissions 30MHz to 6GHz	A1.2	8.9	Pass
AC mains conducted emissions	-	8.9	Not applicable – battery powered
Transmission on time	A1.1	-	Pass
Intentional Emission Frequency	A1.2	-	Pass
Intentional emission field strength	A1.2	-	Pass
Intentional emission band occupancy	A1.3	-	Pass
Restricted bands	7.2	8.10	Pass

#### 4.1 Knowledge Database References

The following KDBs were referenced during the testing.

The latest knowledge database references are available via the FCC KDB website at:

<https://apps.fcc.gov/kdb>

##### 4.1.1 Radiated Emissions (30MHz to 1000MHz)

Publication Number	Keyword	Publication Date
913591	Measurement of radiated emissions at the band-edge for a Part 15 RF Device	04/05/2017

##### 4.1.2 Radiated Emissions (1GHz to 40GHz)

Publication Number	Keyword	Publication Date
414788	Test Site Validation Requirements above 1 GHz.	07/12/2018
414788	Comparison Noise Emitter (CNE), reference noise source, .pdf	07/12/2018
913591	Measurement of radiated emissions at the band-edge for a Part 15 RF Device	04/05/2017
414788	Comparison Noise Emitters (CNE), test equipment, Broadband.pdf	07/12/2018

#### 4.2 Compliance Statement

The iTrack TPMS sensor v5, as tested, was shown to meet requirements of the standards listed in Section 4 of this report.

## Section 5 Spurious Emission Results – Radiated

### 5.1 Test Specification

FCC Rule Part	47CFR 15.247 (d)
RSS Rule Part	RSS-210 A1.2
Standard	ANSI C63.10:2013
Measurement Uncertainty Radiated tests	The reported uncertainty of measurement $y \pm U$ , where expended uncertainty $U$ is based on a standard uncertainty multiplied by a coverage factor of $k=2$ , providing a level of confidence of approximately 95% is  +/- 6.26dB for the frequency range 30MHz to 1GHz +/- 5.14dB for the frequency range from 1GHz to 6GHz
Measurement Uncertainty Conducted tests	$\pm 1.4$ dB

### 5.2 Procedure and Test Software Version

**Radiated tests:- 47CFR15.205 and 47CFR15.209**

Eurofins E&E UK test procedure (30MHz to 1GHz)	CEP23 Issue 10
Eurofins E&E UK test procedure (1GHz to 40GHz)	CEP64 Issue 11
Test software	RadiMation Version 2016.2.8

### Conducted Tests 47CFR 15.247(d)

ANSI C63.10-2013 Clause reference:	11.11.2 and 11.11.3
Test software	N/A

**5.3 Radiated Emissions (30MHz to 1GHz)**

Radiated electric field emission measurements are applied as defined in 47CFR15.205 and 47CFR15.209.

**5.3.1 Fundamental Limits at 3m**

The limits specified in Section 47CFR15.231(b)

<b>Fundamental frequency (MHz)</b>	<b>Field strength of fundamental (microvolts/meter) (average detector)</b>
40.66-40.70	2,250
70-130	1,250
130-174	1,250 to 3,750
174-260	3,750
260-470	3,750 to 12,500
Above 470	12,500

At 434.375MHz the limit was calculated as 11015.625 $\mu$ V/m using linear interpolation. This equates to 80.84dB $\mu$ V/m

**5.3.2 Spurious Emission Limits at 3m**

<b>Frequency (MHz)</b>	<b>Electric Field Strength Limit (dB<math>\mu</math>V/m) at 3m measurement distance</b>
	<b>Quasi Peak</b>
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
960- 1000	54.0

Note: FCC 47 CFR Part 15 Section 15.209 and 15.205 specifies test limits at 3m

**Receiver Settings**

<b>Receiver Parameters</b>	<b>Setting</b>
Detector Function	Quasi Peak
Start Frequency	30MHz
Stop Frequency	1000MHz
Resolution Bandwidth	120kHz
Video Bandwidth	Auto

**5.3.3 Emissions measurements**

**5.3.4 Date of Test**

3<sup>rd</sup> July 2024

**5.3.5 Test Area**

LAB 1 (SAC)

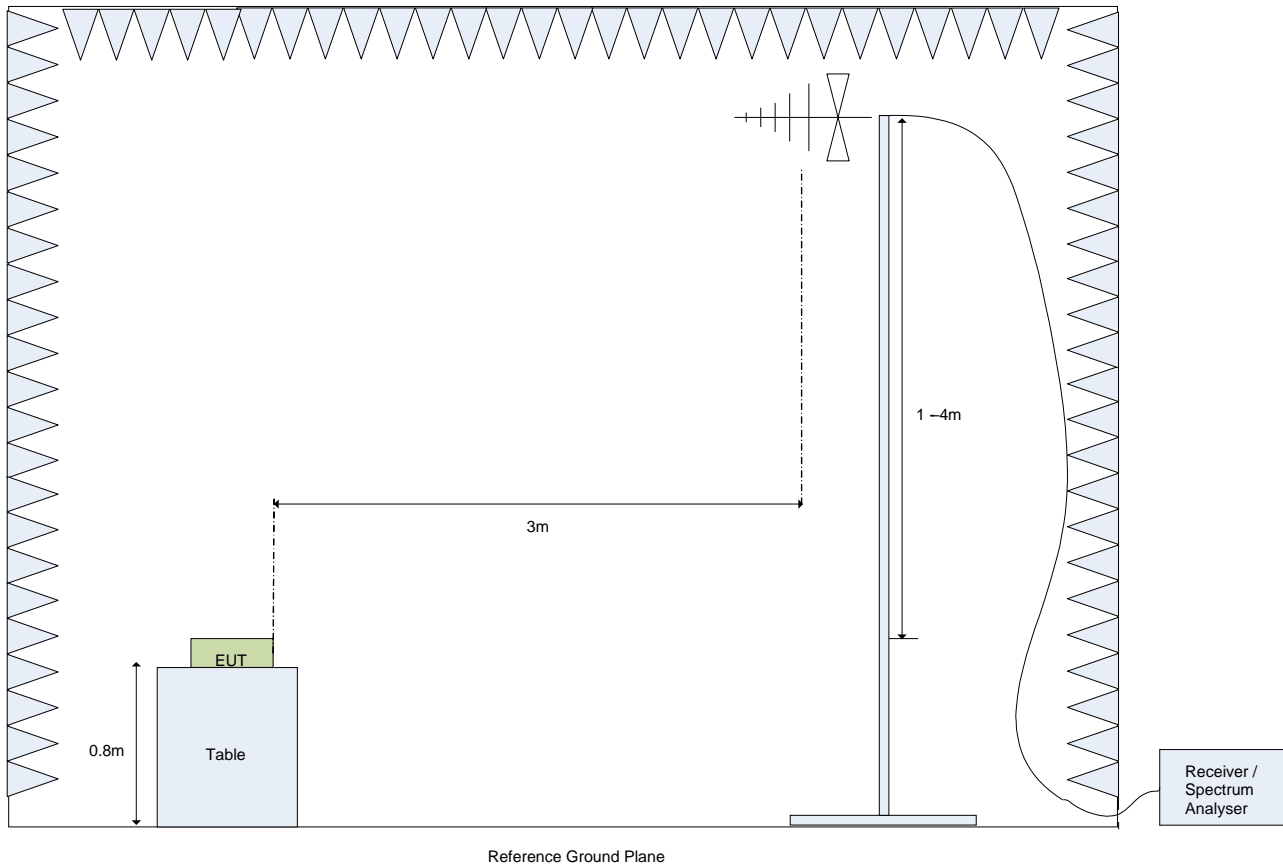
**5.3.6 Tested by**

L Trickett

### 5.3.7 Test Setup

The EUT was configured in the SAC on an 80cm high polystyrene table.

The measurement was performed with an antenna to EUT separation distance of 3m. The results were maximised in orientation 0-360 degrees and height 1-4m.



**Figure 1 Test Setup for E-Field Measurements from 30MHz to 1GHz**

Note 1 : With the EUT de-energized the ambient radio noise and signals met the 6dB peak detection requirement of ANSI C63.10-2013.

Note 2 : There were no significant environmental temperature changes during the test duration and hence it was not considered necessary to consider any variation in cable loss.

### Operating Mode During testing

During spurious emission testing the equipment under test was set to constantly transmit at the declared operating frequency of 434.375MHz.



### 5.3.8 Fundamental Emission

Rule part: 47CFR15.231(b).

Procedure: ANSIC63.10 Clause 6.5

The value of the fundamental emission was measured and recorded.

The turntable was rotated 360 degrees and the mast varied in height between 1 and 4m.

In addition, a pulse correction factor was measured and applied according to 47CFR15.35 and ANSIC63.10-2013.

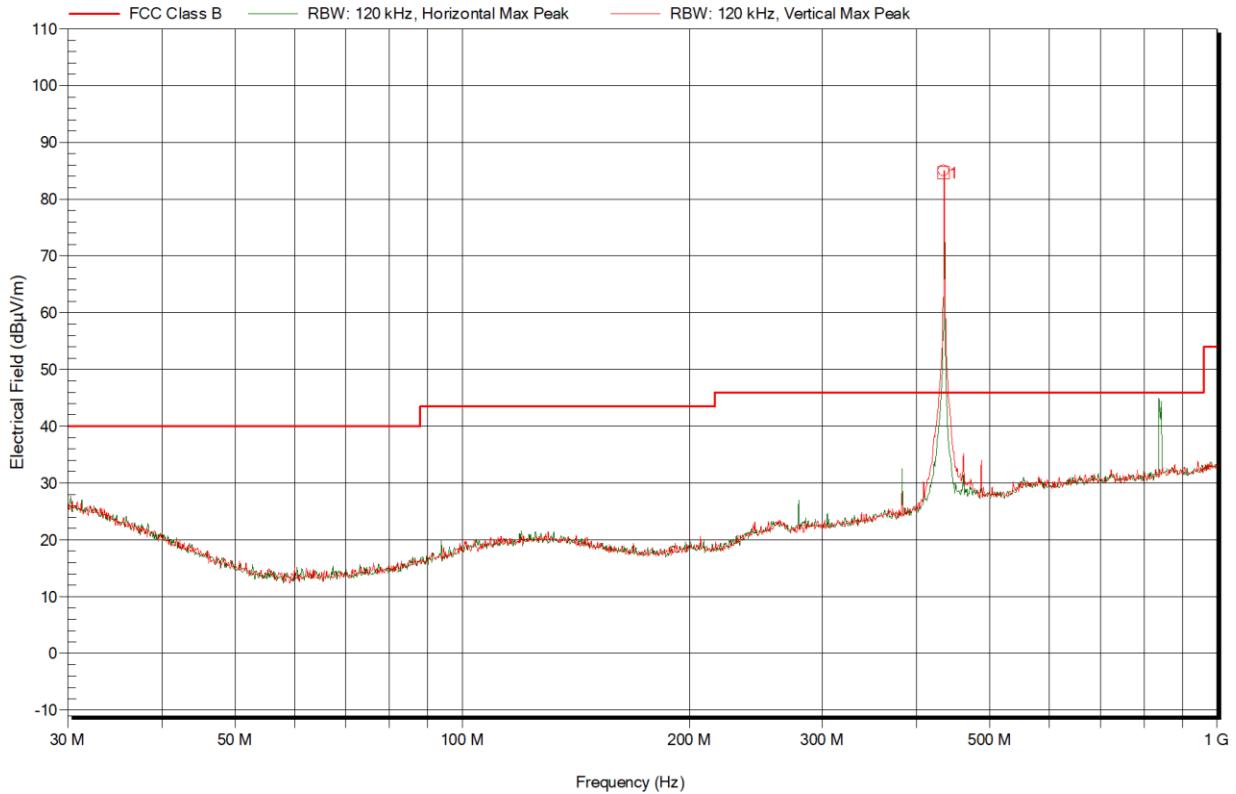


Figure 2 Fundamental Emissions Plot

Polarization	Frequency (MHz)	Amplitude (dBuV) (Peak detector)	Cable loss (dB)	AF (dB/m)	E (dBuV/m)	Pulse correction factor (dB) (Note 1)	Corrected E dBuV/m	Limit (dBuV/m)	Margin (dB)
Vertical	434.4	61.3	1.3	22.4	85.0	-26.0	59.0	80.84	21.84

Table 1 Electric Field Emissions Peaks, 30MHz to 1GHz

Note 1: The Pulse correction factor measurement and calculation are contained within Appendix B.

### 5.3.9 Electric field emissions, 30MHz to 1GHz

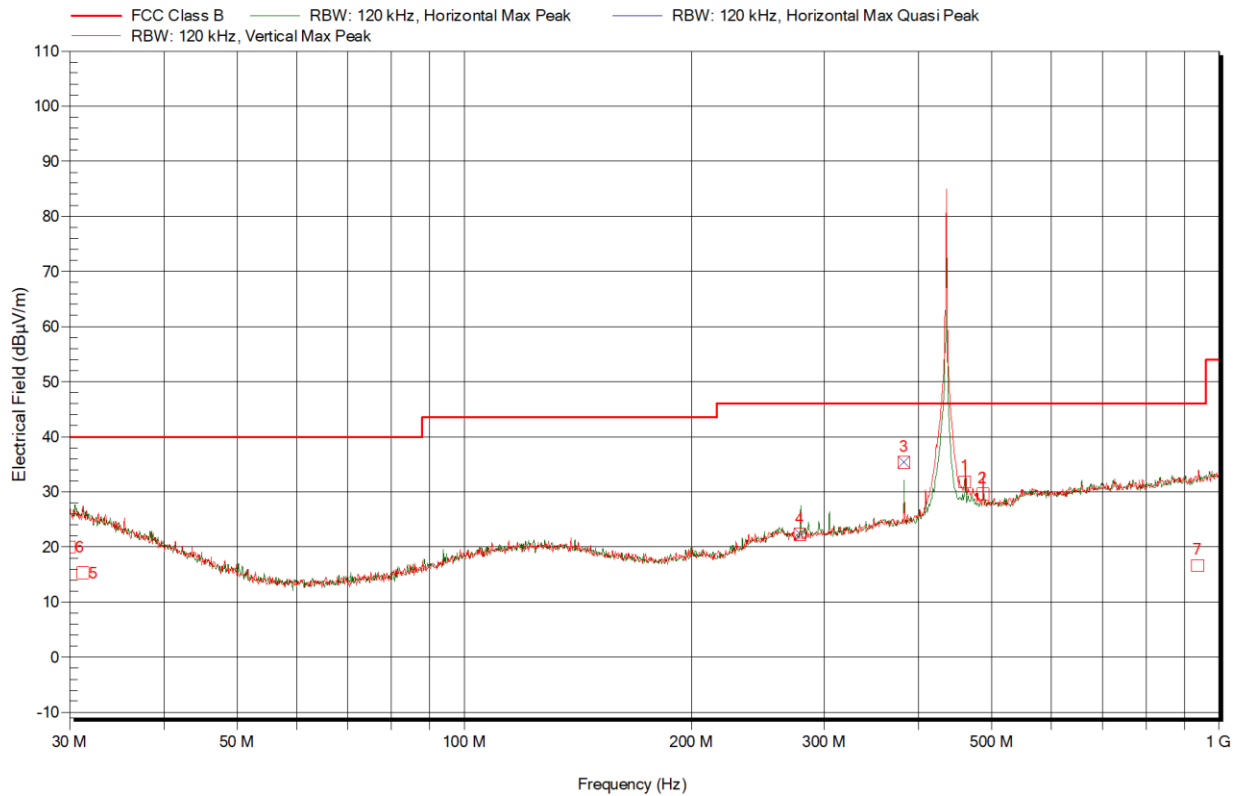


Figure 3 Electric field emissions Plot, 30MHz to 1GHz

Frequency MHz	Quasi- Peak dBμV/m	Quasi Peak Limit dBμV/m	Quasi- Peak Difference dB	Quasi- Peak Status	Angle Degrees	Height m	Polarization
936.5	16.6	46.0	-29.4	Pass	275	3.1	Vertical
30.0	19.9	40	-20.1	Pass	65	3.4	Vertical
31.3	15.4	40	-24.6	Pass	15	2.1	Vertical
278.4	22.3	46	-23.7	Pass	355	1.0	Horizontal
382.4	35.3	46	-10.7	Pass	5	1.0	Horizontal
486.4	29.6	46	-16.4	Pass	114	2.0	Vertical
460.4	31.8	46	-14.2	Pass	280	1.4	Vertical

Table 2 Electric Field Emissions Peaks, 30MHz to 1GHz

### 5.3.10 Example field strength calculation

The reported field strength consists of indicated received level, Preamplifier gain (PG), Antenna factor (AF); and Cable loss (CL).

Field strength (FS) is calculated as follows:

$$\text{FS (dB}\mu\text{V/m)} = \text{Indicated Signal Level (dB}\mu\text{V)} + \text{AF (dB/m)} + \text{CL (dB)}$$

Example:

At 460.4MHz

$$\text{FS (dB}\mu\text{V/m)} = 7.6 + 22.8 + 1.4\text{dB} = 31.8$$

5.4 Radiated Emissions (1GHz to 6GHz)

5.4.1 Limits

Frequency (GHz)	Limit (dBµV/m)	Limit (dBµV/m)
	Peak	Average
1-6	74.0	54.0

5.4.2 Receiver Settings

Receiver Parameters	Setting
Detector Function	Average and Peak
Start Frequency	1GHz
Stop Frequency	6GHz
Resolution Bandwidth	1MHz
Video Bandwidth	Auto

5.4.3 Emissions measurements

5.4.4 Date of Test

5<sup>th</sup> July 2024

5.4.5 Test Area

LAB 1 (SAC)

5.4.6 Tested by

L Trickett

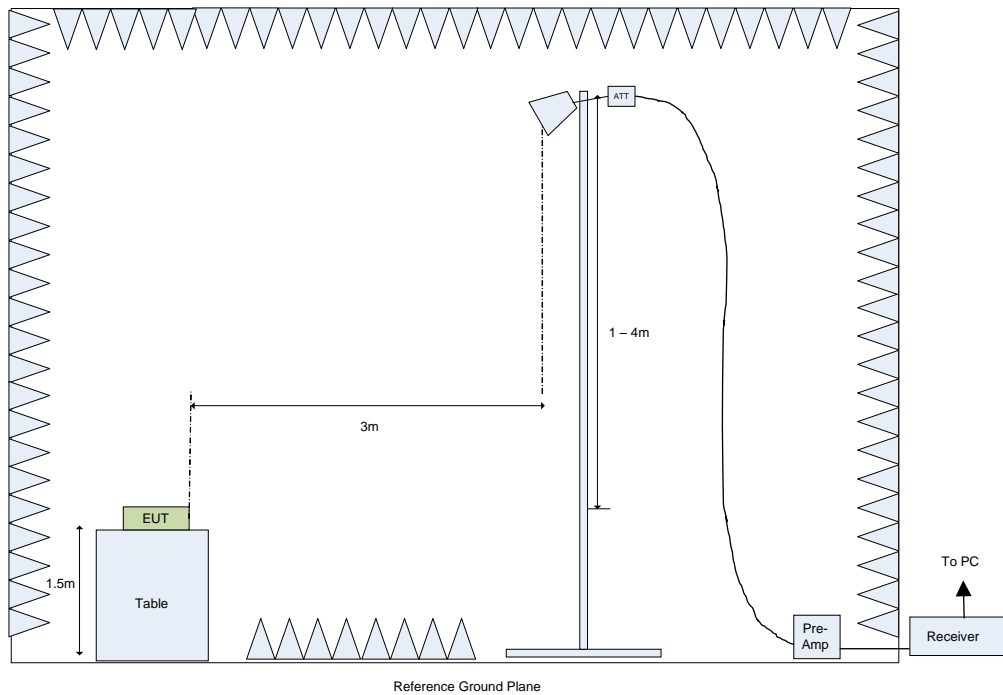
#### 5.4.7 Test Setup

The EUT was configured in the SAC on an 1.5m high table. Exploratory measurements on the EUT were carried out to identify suspect frequencies and worst case orientations, see Section 5.4.8.

The measurement was then performed with an antenna to EUT separation distance of 3m.

The antenna was kept in the “cone of radiation” from the EUT and pointed at the area both in azimuth and elevation using the tilt mechanism on the antenna mast.

The results were maximised in orientation 0-360 degrees and height 1-4m.



**Figure 4 Test Setup for Final E-Field Measurements from 1GHz to 18GHz**

Note 1 : With the EUT de-energized the ambient radio noise and signals met the 6dB peak detection requirement of ANSI C63.4-2010.

Note 2 : There were no significant environmental temperature changes during the test duration and hence it was not considered necessary to consider any variation in cable loss.

#### 5.4.8 Exploratory Radiated Emission Maximization

During exploratory testing, suspect emissions from the EUT were identified both in terms of the frequency and directionality. This was achieved by manually positioning the antenna close to the EUT and also by scanning it over all sides of the EUT whilst observing a spectral display. The typical distance between the surface of the EUT and the scanning antenna was circa 30cm.

Frequency (GHz)	Mode of operation	EUT face *	Emissions Angle (w.r.t. turntable)	Height	Polarization
1.255	Transmitting on 434.375MHz	front face	0	1.5	V
1.304	Transmitting on 434.375MHz	front face	0	1.5	V
1.738	Transmitting on 434.375MHz	front face	0	1.5	V
1.752	Transmitting on 434.375MHz	front face	0	1.5	V
1.759	Transmitting on 434.375MHz	front face	0	1.5	V
2.120	Transmitting on 434.375MHz	front face	0	1.5	V
2.172	Transmitting on 434.375MHz	front face	0	1.5	V
2.224	Transmitting on 434.375MHz	front face	0	1.5	V
2.606	Transmitting on 434.375MHz	front face	0	1.5	V
3.040	Transmitting on 434.375MHz	front face	0	1.5	V
3.440	Transmitting on 434.375MHz	front face	0	1.5	V
3.476	Transmitting on 434.375MHz	front face	0	1.5	V
3.910	Transmitting on 434.375MHz	front face	0	1.5	V
4.344	Transmitting on 434.375MHz	front face	0	1.5	V

**Table 3 Frequencies identified during Exploratory Radiated Emission maximization**

Note 1 : The front face of the EUT is deemed to be 0°, which is then turned in a clockwise direction through 360°.

### 5.4.9 Electric field emissions, 1GHz to 6GHz

During spurious emission testing the equipment under test was set to constantly transmit at the declared operating frequency of 434.375MHz.

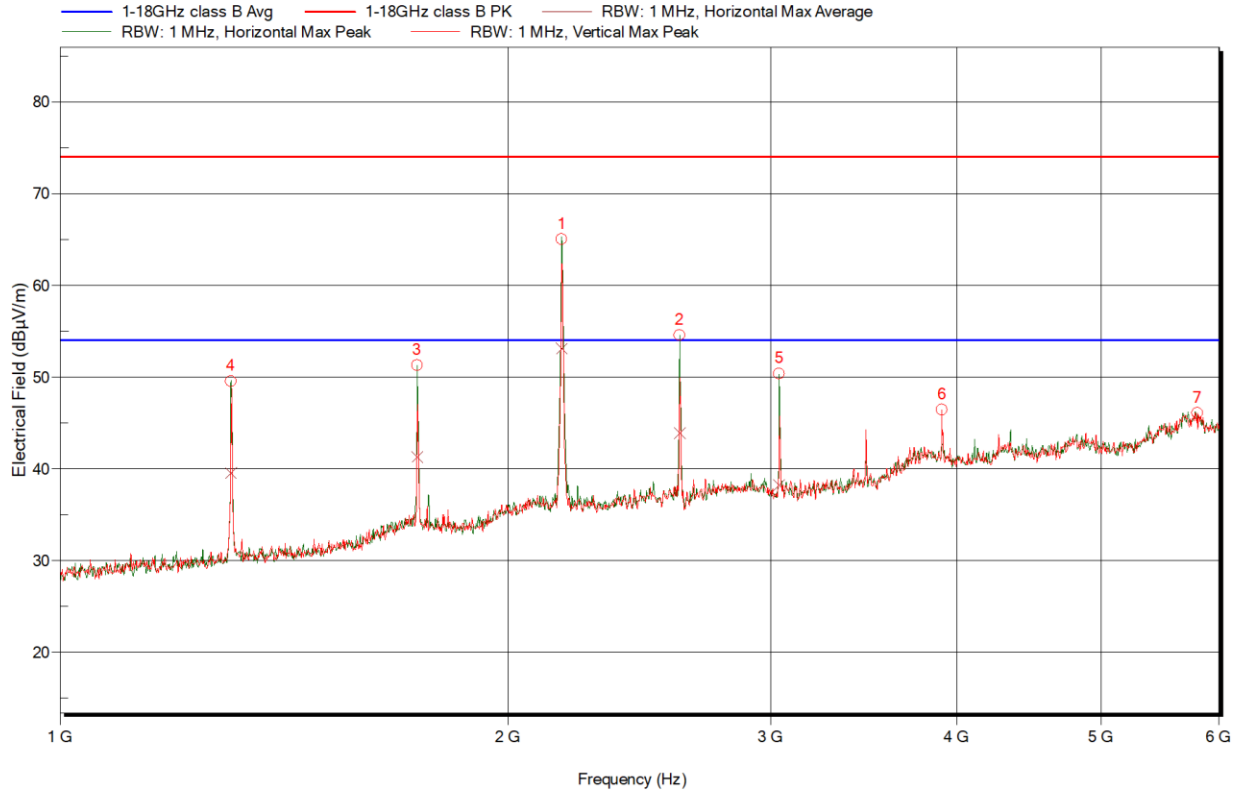


Figure 5 Electric field emissions Plot, 1GHz to 6GHz.

Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height	Polarization
GHz	dBμV/m	dBμV/m	dB		degrees	m	
5.804	32.9	54	-21.1	Pass	90	3.0	Vertical
3.910	32.0	54	-22.0	Pass	355	1.1	Vertical
3.041	38.2	54	-15.8	Pass	65	3.7	Horizontal
1.303	39.5	54	-14.5	Pass	80	1.6	Horizontal
1.738	41.3	54	-12.7	Pass	320	1.3	Horizontal
2.606	43.9	54	-10.1	Pass	190	1.7	Horizontal
2.172	53.1	54	-0.9	Pass	90	1.7	Horizontal

Table 4 Electric Field Emissions Peaks, 1GHz to 6GHz

#### 5.4.10 Example field strength calculation

The total average corrections are shown in the above table. This correction figure consists of Preamplifier gain (PG), Antenna factor (AF); and Cable loss (CL), and where necessary distance extrapolation factor (dB).

Field strength (FS) is calculated as follows:

$$\text{FS (dB}\mu\text{V/m)} = \text{Indicated Signal Level (dB}\mu\text{V)} - \text{PG (dB)} + \text{AF (dB)} + \text{CL (dB)}$$

#### 5.4.11 Sample Data

From Figure 5 and Table 4, The Average level at 2.172GHz is calculated as follows:

$$\text{FS (dB}\mu\text{V/m)} = 74.8(\text{dB}\mu\text{V}) - 54.1(\text{dB}) + 29.5(\text{dB/m}) + 2.9(\text{dB}) = 53.1\text{dB}\mu\text{V/m}$$



## Section 6 20dB Bandwidth and 99% Occupied Bandwidth

### 6.1 Test Specification

<b>FCC Rule Part</b>	47CFR15.231(c)
<b>RSS Rule Part</b>	RSS-210 A1.3
<b>Standard</b>	ANSI C63.10:2013
<b>Measurement Uncertainty</b>	The reported uncertainty of measurement $y \pm U$ , where expended uncertainty $U$ is based on a standard uncertainty multiplied by a coverage factor of $k=2$ , providing a level of confidence of approximately 95% is $\pm 1.4\text{dB}$

### 6.2 Procedure and Test Software Version

#### Conducted Tests

ANSi C63.10-2013 Clause reference:	11.9.1.1 (RBW>DTS bandwidth)
Test software	N/A

<b>Frequency (MHz)</b>	<b>Limit, 47CFR15.231(c) 20dB bandwidth</b>	<b>Limit, RSS Gen-6.7 99%dB bandwidth</b>
434.375	$\leq 0.25\%$ of the centre frequency	-

Spectrum analyser settings as specified by ANSI C63.10-2013 Clause 11.8.1

<b>Receiver Parameters</b>	<b>Setting 20dB bandwidth</b>	<b>Setting 99%dB bandwidth</b>
Detector Function	Peak	Peak
Span	500kHz	20MHz
Resolution Bandwidth	3kHz	100kHz
Video Bandwidth	10kHz	300kHz
Sweep rate	1.4ms	83.75 $\mu$ s
Trace mode	Max hold	Max hold

6.2.1 Emissions measurements

6.2.2 Date of Test

16<sup>th</sup> May 2024

6.2.3 Test Area

LAB 8

6.2.4 Tested by

L Trickett

6.2.5 Test Setup

The antenna port was connected directly to the signal analyser.



6.2.6 Test Results

The results of the 20dB & 99% bandwidth measurements are stated in the tables below and by the signal analyser images.

Centre frequency (MHz)	Measured 20dB bandwidth (kHz)	Limit (kHz)	Figure	Result
434.375	152.6	1086.0	6	Pass

Table 5 20dB Bandwidth Measurements

Centre frequency (MHz)	99% Occupied Bandwidth (MHz)	Minimum requirement (kHz)	Figure	Result
434.375	6.9	-	7	Pass

Table 6 99% Bandwidth Measurements

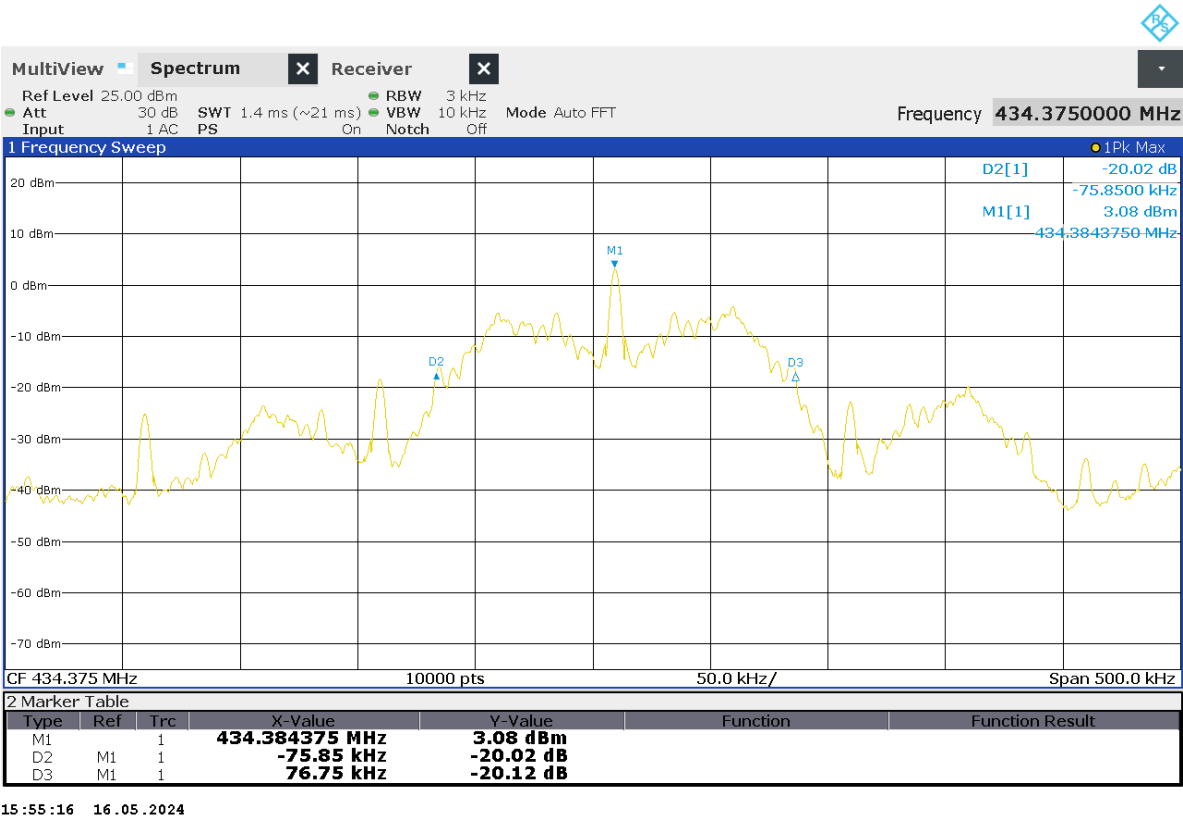


Figure 6 Bandwidth at 20dB point

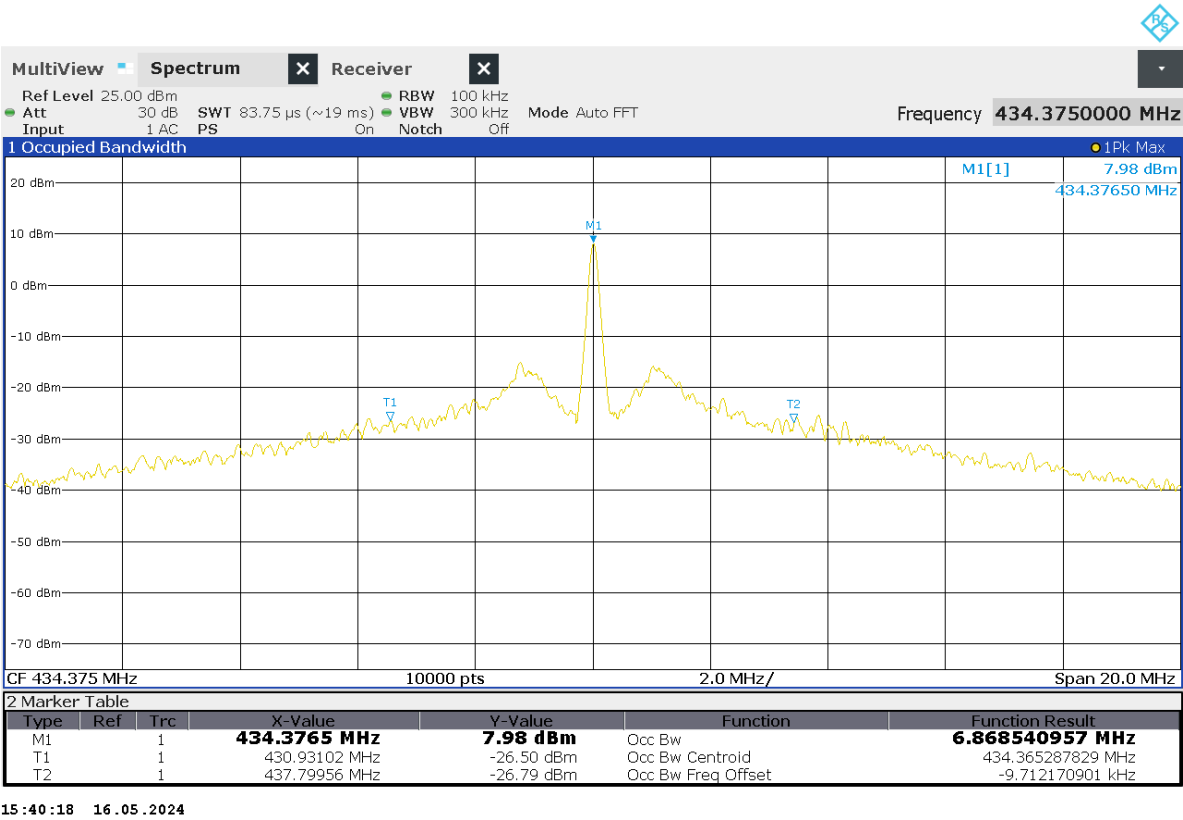


Figure 7 99% Occupied Bandwidth

## Section 7 Transmission On time

### 7.1 Test Specification

<b>FCC Rule Part</b>	47CFR14.231(a)(1)
<b>RSS Rule Part</b>	RSS-210 A1.1
<b>Standard</b>	ANSI C63.10:2013
<b>Measurement Uncertainty</b>	The reported uncertainty of measurement $y \pm U$ , where expended uncertainty $U$ is based on a standard uncertainty multiplied by a coverage factor of $k=2$ , providing a level of confidence of approximately 95% is $\pm 1.4\text{dB}$

### 7.2 Procedure and Test Software Version

#### Conducted Tests

ANSi C63.10-2013 Clause reference:	7.4
Test software	N/A

Frequency (MHz)	Limit, 47CFR14.231(a)(1)
434.375	A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Spectrum analyser settings as specified by ANSI C63.10-2013 7.4

Receiver Parameters	Setting
Detector Function	Peak
Span	Zero
Resolution Bandwidth	100kHz
Video Bandwidth	300kHz
Sweep rate	100ms
Trace mode	Max hold

7.2.1 Emissions measurements

7.2.2 Date of Test

16<sup>th</sup> May 2024

7.2.3 Test Area

LAB 8

7.2.4 Tested by

L Trickett

7.2.5 Test Setup

The antenna port was connected directly to the signal analyser.



### 7.2.6 Test Result

The results of the transmission on time measurements are stated in the table below and by the signal analyser images.

Centre frequency (MHz)	Measured length until automatic deactivation (Seconds)	Limit (Seconds)	Figure	Result
434.375	0.005	5	8	Pass

Table 7 Transmission On Time

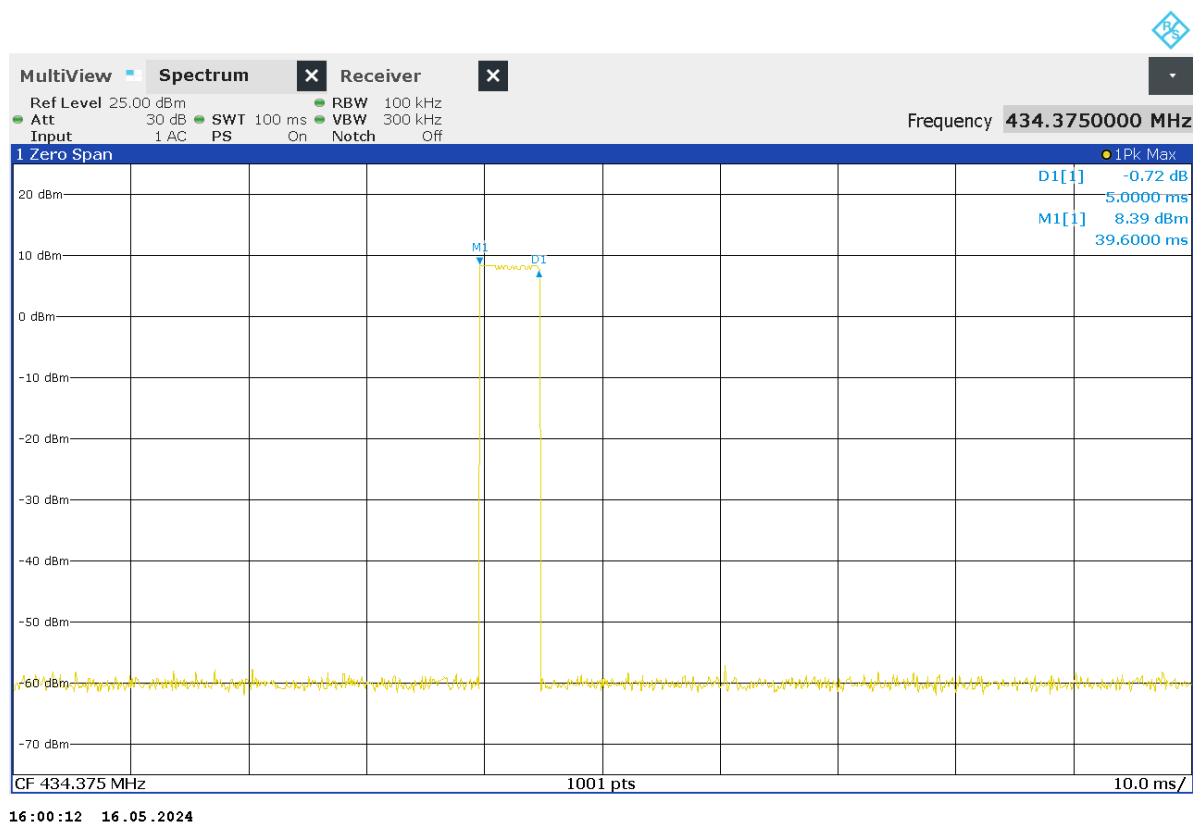


Figure 8 Transmission On time

## Section 8 Band Edge Compliance

### 8.1 Test Specification

<b>FCC Rule Part</b>	46CFR 15.205
<b>RSS Rule Part</b>	RSS-210 7.2
<b>Standard</b>	ANSI C63.10:2013
<b>Measurement Uncertainty</b>	The reported uncertainty of measurement $y \pm U$ , where expended uncertainty $U$ is based on a standard uncertainty multiplied by a coverage factor of $k=2$ , providing a level of confidence of approximately 95% is $\pm 1.4\text{dB}$

### 8.2 Procedure and Test Software Version

#### Conducted Tests

ANSi C63.10-2013 Clause reference:	Clause 6.10.5 Restricted band-edge measurements
Test software	N/A

For the operating frequency of 434.375MHz the closest restricted bands are:

399.9 – 410.0MHz & 608.0 – 614.0MHz

Within these bands only spurious emissions are permitted.

No restricted bands are adjacent to the 433MHz band.

## **Appendix A EUT Test Photos**

**Test set up photographs are supplied separately.**



## Appendix B Pulse correction factor

Since the apparatus employs pulsed operation, it is necessary to apply a correction factor.

FCC Rule Part: 47CFR15.35 (c)

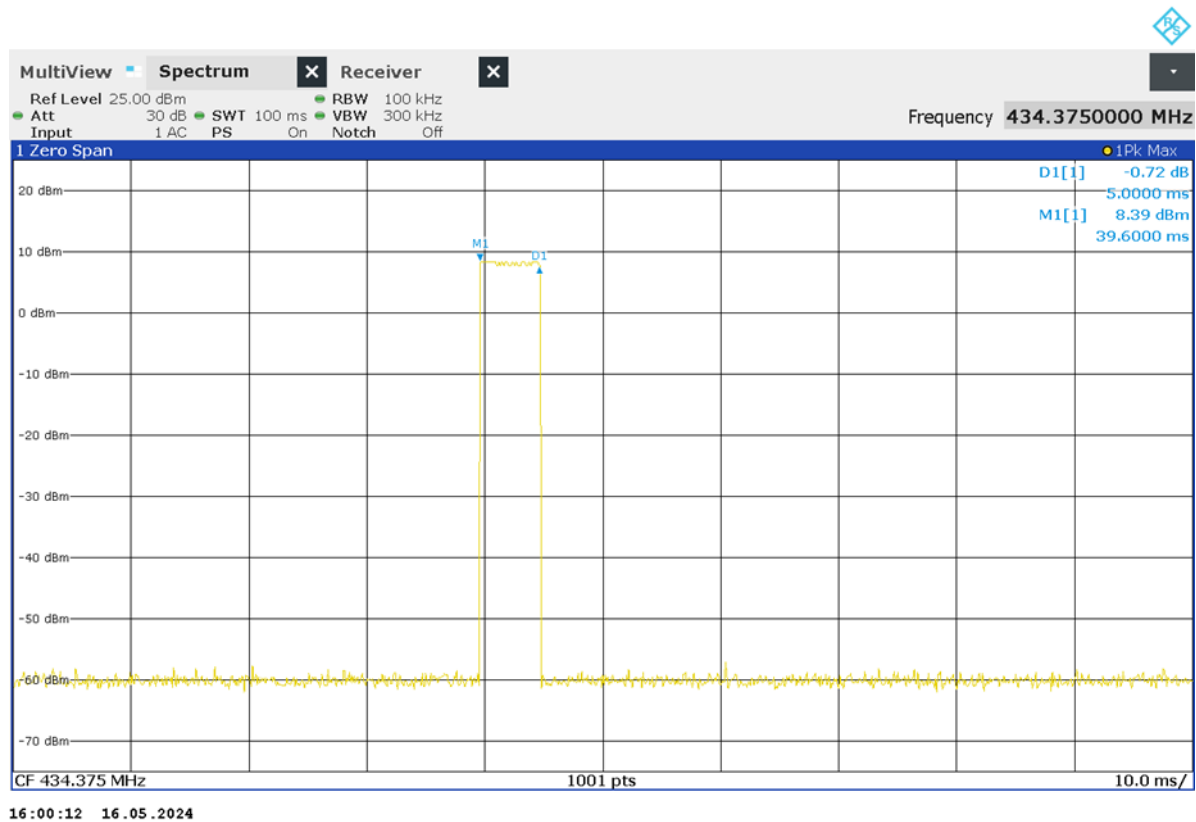
Procedure: ANSIC63.10-2013 Clause 7.5.

Refer to Figure 2 and table 1.

The centre frequency of the spectrum analyser was tuned to 434.375MHz and set to zero span mode. The sweep time was adjusted to capture the pulse.

Pulse	Duration (ms)	Total measurement time (ms)	Duty Cycle	Duty Cycle correction factor (dB)
1	5.0	100	0.05	-26.02

**Table 8 Pulse Correction Factor**



**Figure 9 Pulse correction measurement**

**Appendix C Test Equipment List**

**Conducted Emissions from Antenna Port**

Item	Serial No.	Last Calibration Date	Calibration Interval
R&S ESW44 EMI Receiver	C0658	30 <sup>th</sup> October 2023	12 Months

**Radiated Emissions Equipment**

Item	Serial No.	Last Calibration Date	Calibration Interval
Laboratory 1 Semi-Anechoic Chamber	C0471	6 <sup>th</sup> December 2022 (NSA) (Svswr)	36 Months
ETS Lindgren 2017B Mast (1 – 4m) with tilting mechanism	--	N/A	N/A
R & S ESR26	C0502	8 <sup>th</sup> August 2023	12 Months
Teseq CBL6112D Bilog Antenna	C0506	13 <sup>th</sup> January 2023	36 Months
HF 46 Cable	21068.01.14.001	7 <sup>th</sup> December 2023	12 Months
HF 27 Cable	19149.03.13.004	13 <sup>th</sup> December 2023	12 Months
HF 35 Cable	19149.02.13.003	13 <sup>th</sup> December 2023	12 Months
HF 29 Cable	20147.01.09.001	13 <sup>th</sup> December 2023	12 Months
HF 32 Cable	19149.01.09.003	13 <sup>th</sup> December 2023	12 Months
Micro-Tronics 1.0-18GHz Band Pass Filter	C0776	7 <sup>th</sup> February 2024	12 Months
Schwarzbeck STLP9148 Stacked log periodic Antenna	C0626	12 <sup>th</sup> April 2022	36 Months
BONN BLMA 0118-M Preamplifier	C0702	7 <sup>th</sup> July 2023	12 Months

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