



## **Radio Test Report**

### **Flashnet SA**

### **FRE-220-NEMA-T-NB1-M1-G**

47 CFR Part 27 Effective Date 1st October 2024

PCB: PCS Licensed Transmitter

Test Date: 13th March 2025 to 21st March 2025

Report Number: 03-14953-3-25 Issue 02

Supersedes Report Number: 03-14953-3-25 Issue 01

The testing was carried out by Kiwa Ltd trading as Kiwa Electrical Compliance, an independent test house, at their test facility located at:

**Kiwa Ltd t/a Kiwa Electrical Compliance**

Arnolds Court  
Arnolds Farm Lane  
Mountnessing  
Essex  
CM13 1UT  
U.K.

[www.Kiwa.com](http://www.Kiwa.com)

Telephone: +44 (0) 1277  
352219

Email:  
[uk.enquiries@kiwa.com](mailto:uk.enquiries@kiwa.com)

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF communiqué dated April 2017).

This report is not to be reproduced by any means except in full and in any case not without the written approval of Kiwa Ltd t/a Kiwa Electrical Compliance.



Arnolds Court, Arnolds Farm Lane, Mountnessing, Brentwood Essex, CM13 1UT

## Certificate of Test 14953-3

The equipment noted below has been partially tested by Kiwa Ltd t/a Kiwa Electrical Compliance and, where appropriate, conforms to the relevant subpart of 47 CFR Part 27. This is a certificate of test only and should not be confused with an equipment authorisation. Other standards may also apply.

Equipment:	FRE-220-NEMA-T-NB1-M1-G
Model Number:	FRE-220-NEMA-T-NB1-M1-G
Unique Serial Number:	0000268951583
Applicant:	Flashnet SA Fundatura Harmanului Street No 4A, Brasov, Romania 500240
Proposed FCC ID:	2A7FA-NEMATNB1M1G
Full measurement results are detailed in Report Number:	03-14953-3-25 Issue 02
Test Standards:	47 CFR Part 27 Effective Date 1st October 2024 PCB: PCS Licensed Transmitter

### NOTE:

With reference to the Rule part detailed, not all tests within the Rule part have been applied at the request of the applicant. The following tests have not been performed at the applicant's request: Occupied bandwidth, Frequency stability, Spurious emissions at antenna terminals, Modulation characteristics. Certain tests were not performed based upon applicant's declarations. Certain other requirements are subject to applicant's declaration only and have not been tested/verified. For details refer to section 3 of this report. Contains FCC ID RI7ME310G1W1.

### DEVIATIONS:

Deviations have been applied, refer to section 4.2.

This certificate relates only to the unit tested as identified by a unique serial number and in the condition at the time it was tested. It does not relate to any other similar equipment and performance of the product before or after the test cannot be guaranteed. Whilst every effort is made to assure quality of testing, type tests are not exhaustive and although no non-conformances may be found, this doesn't exclude the possibility of unit not meeting the intentions of the standard or the requirements of the Federal Regulations, particularly under different conditions to those during testing. Any compliance statements are made reliant on (a) the application of the product and use of the assigned band being acceptable to the FCC and (b) the modes of operation as instructed to us by the Customer based on their specific knowledge of the application and functionality of the EUT. Statements of compliance, where measurements were made, do not include the measurement uncertainty. The measurement uncertainty, where stated, is the expanded uncertainty based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

Date of Test: 13th March 2025 to 21st March 2025

Test Engineer:  
Graham Blake

Approved By:  
Test Development Engineer

Customer Representative:



## 1 Contents

1	Contents.....	3
2	Equipment under test (EUT) .....	4
2.1	Equipment specification .....	4
2.2	Applicant declarations for testing .....	5
2.3	Functional description .....	5
2.4	Modes of operation.....	6
2.5	Emissions configuration .....	7
3	Summary of test results .....	8
4	Specifications .....	9
4.1	Relevant standards.....	9
4.2	Deviations.....	9
4.3	Test fixtures .....	9
5	Tests, methods and results.....	10
5.1	Spurious emissions at antenna terminals .....	10
5.2	RF Power Output.....	11
5.3	Peak to Average power ratio .....	13
5.4	Frequency stability.....	14
5.5	Occupied bandwidth.....	14
5.6	Field strength of spurious radiations .....	15
5.7	Band edge / spectrum mask additional emissions limitations .....	17
5.8	Modulation characteristics .....	17
6	Plots/Graphical results .....	18
6.1	RF Power Output (EIRP).....	18
6.2	Peak to Average power ratio .....	20
7	Photographs.....	22
7.1	EUT Front View .....	22
7.2	EUT Reverse Angle.....	24
7.3	EUT Left side View .....	24
7.4	EUT Right side View .....	25
7.5	EUT Antenna.....	26
7.6	EUT Display & Controls.....	27
7.7	EUT Internal photos .....	27
7.8	EUT ID Label.....	28
7.9	30-1000MHz Spurious emissions test set-up.....	29
7.10	Above 1GHz Spurious emissions test set-up.....	31
7.11	Radiated emission diagrams .....	33
8	Test equipment calibration list .....	34
9	Auxiliary and peripheral equipment.....	35
9.1	Customer supplied equipment.....	35
9.2	Kiwa Electrical Compliance supplied equipment.....	35
10	Condition of the equipment tested .....	36
10.1	Modifications before test .....	36
10.2	Modifications during test.....	36
11	Description of test sites .....	37
12	Abbreviations and units.....	38
13	Revision History .....	40

## 2 Equipment under test (EUT)

### 2.1 Equipment specification

Applicant	Flashnet SA Fundatura Harmanului Street, No 4A Brasov Romania 500240	
Manufacturer of EUT	Flashnet SA	
Full Name of EUT	FRE-220-NEMA-T-NB1-M1-G	
Model Number of EUT (HVIN)	FRE-220-NEMA-T-NB1-M1-G	
Serial Number of EUT	0000268951583	
Date Received	24th February 2025	
Date of Test:	13th March 2025 to 21st March 2025	
Date Report Issued	10th June 2025	
Main Function	The product is a street light management and control device that can remotely turn on/off and dim a luminaire, while measuring a wide range of electrical parameters and capable of sending alarms in case of fault detection.	
EUT Specification	Height	70 mm
	Width	80 mm
	Depth	80 mm
	Weight	0.11 kg
	Voltage	230 V AC 50 / 60 Hz
	Current	0.02 Amp

## 2.2 Applicant declarations for testing

General Parameters	
EUT Normal use position	Mounted in a luminaire
Choice of model(s) for type tests	Sample
Antenna details	Integral flexible antenna. SYNZEN SZK-C-3L32 Gain (from manufacturers data sheet): 698 – 960 MHz 2.9 dBi 1427 – 1660 MHz 3.8 dBi 1710 – 2200 MHz 4.15 dBi 2300 – 2400 MHz 3.45 dBi 2490 – 2690 MHz 2.6 dBi
Antenna port	Internal UFL connector
Baseband Data port (yes/no)?	No
Highest Signal generated in EUT	2200 MHz
Lowest Signal generated in EUT	32.768 kHz
Hardware Version (HVIN)	NEMA_ME310G1-W1_v2
Firmware Version (FVIN)	Microcontroller: FW version 4713 Telit radio module: FW version 37.00.116-POC.110000
Type of Equipment	Multi-radio
Technology Type	Cellular / GPS
Geo-location (yes/no)	Yes
TX Parameters	
Alignment range – transmitter	703 - 1980 MHz
EUT Declared Modulation Parameters	QPSK, BPSK and 16QAM
EUT Declared Power level	21 dBm
EUT Declared Signal Bandwidths	1.4, 3, 5, 10, 15 and 20 MHz
EUT Declared Channel Spacing's	3.75 / 15 MHz
EUT Declared Duty Cycle	Not declared
Unmodulated carrier available?	No
Declared frequency stability	Not declared
RX Parameters	
Alignment range – receiver	617 - 2200 MHz
EUT Declared RX Signal Bandwidth	1.4, 3, 5, 10, 15 and 20 MHz
FCC Parameters	
FCC Transmitter Class	PCB: PCS Licensed Transmitter

## 2.3 Functional description

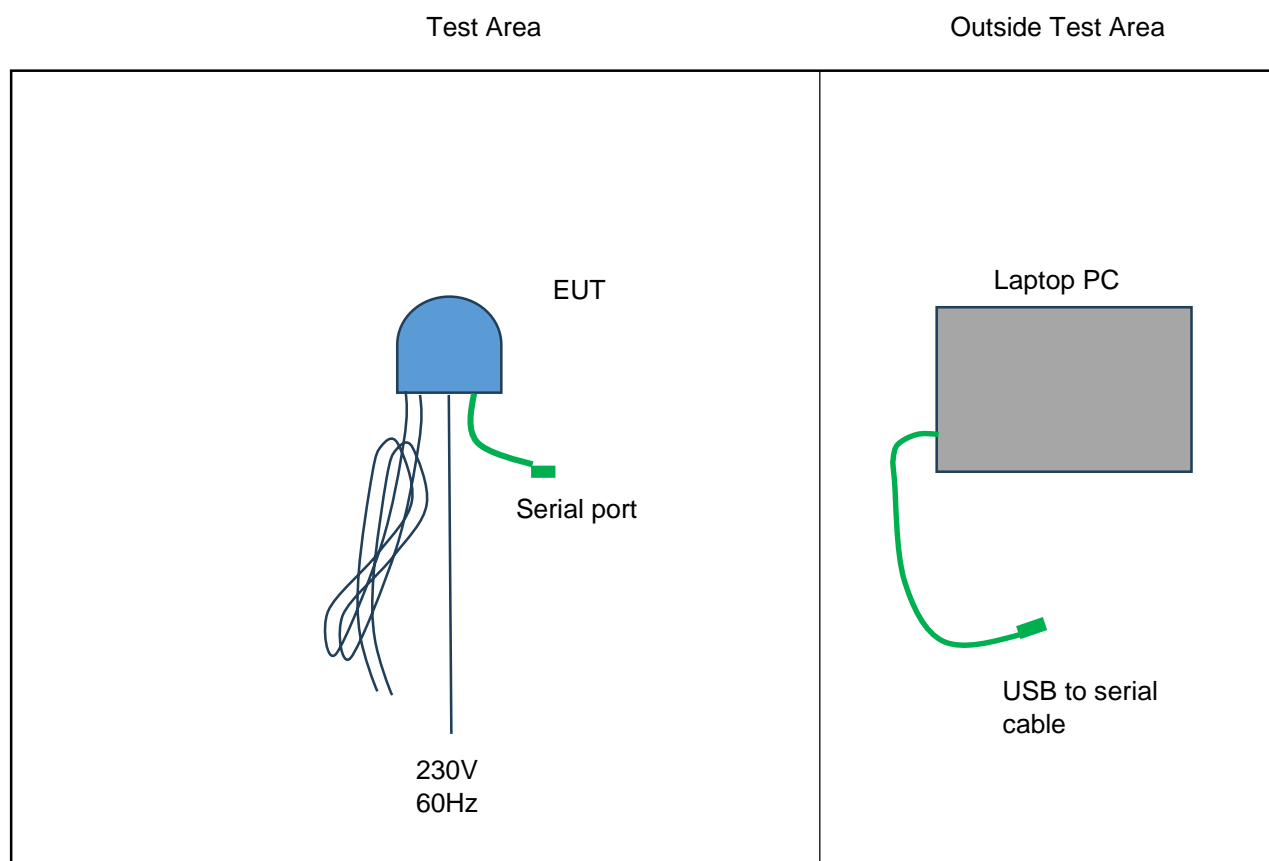
The product is connected to the public mains supply via an ANSI C136.41 compliant socket and its outputs are connected directly to the driver of the luminaire. It communicates wirelessly with the central management software, using an embedded LTE CatM1 and NB2 modem. The purpose of the controller is to turn the luminaire ON/OFF, as well as dim it to a preferred light level, either by direct commands from the user, by using the pre-loaded modifiable scheduler, or as a result of the integrated light sensor. Besides controlling the luminaire, the product measures a wide range of electrical parameters [ex. voltage, current, energies] and transmits them to the central management software and additionally is capable of sending alarms in case of various faults detected [ex. overcurrent, overvoltage, device fault].

## 2.4 Modes of operation

Mode Reference	Description	Used for testing
TX Low	Transmitting continuously at 1710.7 MHz, 1.4 MHz channel bandwidth. Band 66, QPSK modulation.	Yes
TX Mid	Transmitting continuously at 1745 MHz, 1.4 MHz channel bandwidth. Band 66, QPSK modulation.	Yes
TX High	Transmitting continuously at 1779.3 MHz, 1.4 MHz channel bandwidth. Band 66, QPSK modulation.	Yes

Note: This test report pertains to Band 66 mode of operation. At the request of the applicant only 1.4MHz channel bandwidth and QPSK modulation scheme has been assessed.

## 2.5 Emissions configuration



The unit was powered from a 230V 60Hz AC mains supply. The voltage used for test was declared by the applicant as that used by the device in operation. For conducted tests the internal antenna was disconnected and measurements were made directly at the EUTs onboard UFL connector. The unit was configured using a laptop PC running QCOM terminal software. To configure the EUT into the relevant test mode “AT” commands were sent to the EUT using a USB to serial cable. The unit was configured to transmit on the top, middle and bottom channels as stated within section 2.4 of this report. A single channel bandwidth of 1.4 MHz was assessed along with QPSK modulation. The transmit mode was 100% continuous with modulation and the power settings for each channel were as stated below:-

Low Channel (1710.7 MHz) = level 21dBm

Mid Channel (1745 MHz) only = level 21dBm

High Channel (1779.3 MHz) only = level 21dBm

Following the manufactures instructions the following commands were set:

AT#TESTMODE="TM"	(Sets the EUT into TEST MODE)
AT#TESTMODE="INIT4G"	(Initialises 4G cellular radio)
AT#TESTMODE="CH4G 131979 0"	(Sets Low channel, 132322 for Mid 132665 for high)
AT#TESTMODE="PL4G 200"	(Set the TX power level to 21dBm – Maximum)
AT#TESTMODE="TX4G"	(Starts transmission)

### 2.5.1 Signal leads

Port Name	Cable Type	Connected
Mains	2-core	Yes

### 3 Summary of test results

The FRE-220-NEMA-T-NB1-M1-G, was tested for compliance to the following standard(s):

47 CFR Part 27 Effective Date 1st October 2024  
PCB: PCS Licensed Transmitter

Any compliance statements are made reliant on (a) the application of the product and use of the assigned band being acceptable to the FCC and (b) the modes of operation as instructed to us by the Customer based on their specific knowledge of the application and functionality of the EUT. Whilst every effort is made to assure quality of testing, type tests are not exhaustive and although no non-conformances may be found, this doesn't exclude the possibility of equipment not meeting the intentions of the standard or the essential requirements of the directive, particularly under different conditions to those during testing. Statements of compliance, where measurements were made, do not include the measurement uncertainty. The measurement uncertainty, where stated, is the expanded uncertainty based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

Title	References	Results
<b>Transmitter Tests</b>		
1. Spurious emissions at antenna terminals	47 CFR Part 27 27.53 (a) 47 CFR Part 2J 2.1051	NOT APPLICABLE <sup>1</sup>
2. RF Power Output	47 CFR Part 27 27.50(d)(4) 47 CFR Part 2J 2.1046	PASSED
3. Peak to Average power ratio	47 CFR Part 27 Clause 27.50(d)(5) 47 CFR Part 2J Clause 2.1046	PASSED
4. Frequency stability	47 CFR Part 27 24.54, 47 CFR Part 2J 2.1055	NOT TESTED <sup>2</sup>
5. Occupied bandwidth	47 CFR Part 2J 2.1049	NOT TESTED <sup>2</sup>
6. Field strength of spurious radiations	47 CFR Part 27 53 47 CFR Part 2J 2.1053	PASSED <sup>4</sup>
7. Band edge / spectrum mask additional emissions limitations	47 CFR Part 27 27.53 47 CFR Part 2J 2.1053	NOT TESTED <sup>2</sup>
8. Modulation characteristics	FCC Part 27 Clause 2.1047	NOT TESTED <sup>3</sup>

<sup>1</sup> The EUT has an integral antenna and field strength emissions were performed with the antenna in place.

<sup>2</sup> Not tested at request of applicant

<sup>3</sup> Not applicable for EUTs using digital modulation

<sup>4</sup> Spectrum investigated up to a frequency of 18GHz based on 10 times the highest channel in equipment of 1779.3MHz.

Note: Tests performed using a single test mode only, as requested by the applicant.



## 4 Specifications

The tests were performed and operated in accordance with Kiwa Electrical Compliance procedures and the relevant standards listed below.

### 4.1 Relevant standards

Ref.	Standard Number	Version	Description
4.1.1	47 CFR Part 27	2024	Miscellaneous Wireless Communications Services
4.1.2	KDB 971168 D01 v03	2017	Federal Communications Commission Office of Engineering and Technology Laboratory Division; Measurement Guidance for Certification of Licensed Digital Transmitters
4.1.3	ANSI C63.26	2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
4.1.4	KDB 442401	2017	Radiated emissions measurements for licenced radio service equipment.
4.1.5	47 CFR Part 2J	2023	Part 2 – Frequency Allocations and radio treaty matters; General rules and regulations

### 4.2 Deviations

Deviation applied: Only a single test mode was used during testing as requested by the applicant.

### 4.3 Test fixtures

In order to measure Conducted Power an internal RF port was used for testing.

## 5 Tests, methods and results

### 5.1 Spurious emissions at antenna terminals

NOT APPLICABLE: The EUT has an integral antenna and field strength emissions were performed with the antenna in place.

## 5.2 RF Power Output

### 5.2.1 Test methods

Test Requirements:	47 CFR Part 27 27.50(d)(4) [Reference 4.1.1 of this report], 47 CFR Part 2J 2.1046 [Reference 4.1.5 of this report]
Test Method:	ANSI C63.26 5.2 [Reference 4.1.3 of this report]
Limits:	47 CFR Part 27 27.50(d)(4) [Reference 4.1.1 of this report]

### 5.2.2 Configuration of EUT

The EUT was measured on a bench using a spectrum analyser connected to the internal RF port. The EUT was set to each mode in turn (see section 2.4) and highest power levels recorded.

The EUT was operated in TX Low, TX Mid and TX High modes for this test.

### 5.2.3 Test procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment listed in the 'Test Equipment' Section. The spectrum analyser was tuned to the centre frequency of each channel and an RMS detector and trace averaging was used. Since measurements were made directly at the onboard connector the declared gain of the antenna used within the EUT was added to the final measurement.

Measurements were made in site M.

### 5.2.4 Test equipment

E410, E534, E624, E640

See Section 8 for more details

### 5.2.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Band	1710-1780 MHz
Power Level	Maximum
Channel Spacing	1.4 MHz
Mod Scheme	QPSK
Low channel	1710.7 MHz
Mid channel	1745.0 MHz
High channel	1779.3 MHz

Test conditions	Carrier Power (dBm)	Carrier Power (dBm)	Carrier Power (dBm)
	Low channel	Mid channel	High channel
Measured power at onboard RF port	18.47	18.41	18.44
Manufacturers declared Antenna gain (dBi)	4.15	4.15	4.15
Maximum TX Power EIRP (dBm)	22.62	22.56	22.59

Plots may be found in section 6.

**LIMITS:**

FCC Part 27.50(d)(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:  
<± 1 dB

## 5.3 Peak to Average power ratio

### 5.3.1 Test methods

Test Requirements:	47 CFR Part 27 Clause 27.50(d)(5) [Reference 4.1.1 of this report], 47 CFR Part 2J Clause 2.1046 [Reference 4.1.5 of this report]
Test Method:	ANSI C63.26 Clause 5.2 [Reference 4.1.3 of this report]
Limits:	47 CFR Part 27 Clause 27.50(d)(5) [Reference 4.1.1 of this report]

### 5.3.2 Configuration of EUT

The EUT was measured on a bench using a spectrum analyser connected directly to the internal RF port. The EUT was operated in TX Low, TX Mid and TX High modes for this test.

### 5.3.3 Test procedure

The CCDF function of the analyser was then used to determine Peak to Average Power Ratio. Tests were performed in site A.

### 5.3.4 Test equipment

E410, E534, E640

See Section 8 for more details

### 5.3.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Band	1710 – 1779.3 MHz
Power Level	Maximum
Channel Spacing	1.4 MHz
Mod Scheme	QPSK
Low channel	1710.7 MHz
Mid channel	1745.0 MHz
High channel	1779.3 MHz

	Low channel	Mid channel	High channel
Peak to Average power ratio (dB)	4.97	4.98	5.03
Plot ref	14953-3 1710.7	14953-3 1745.0	14953-3 1779.3

The plots referred to in the above table may be found in section 6.

#### LIMITS:

FCC Part 27.50(d)(5) Peak to Average power ratio shall be less than 13 dB

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:  
<±1 dB.

## 5.4 Frequency stability

NOT TESTED: Not tested at request of applicant

## 5.5 Occupied bandwidth

NOT TESTED: Not tested at request of applicant

## 5.6 Field strength of spurious radiations

### 5.6.1 Test methods

Test Requirements:	47 CFR Part 27 53(h)(1) [Reference 4.1.1 of this report], 47 CFR Part 2J 2.1053 [Reference 4.1.5 of this report]
Test Method:	ANSI C63.26 5.5 [Reference 4.1.3 of this report]
Limits:	47 CFR Part 27 27.53(h)(1) [Reference 4.1.1 of this report]

### 5.6.2 Configuration of EUT

The EUT was tested in an ALSE and ambient conditions were monitored. Three orthogonal planes were examined. The EUT was operated in TX Low, TX Mid and TX High modes for this test.

### 5.6.3 Test procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment listed in the 'Test Equipment' Section. Peak field strength from the EUT was maximised by rotating it 360 degrees. Appropriate band-pass filters were used to ensure the fundamental did not distort the results. An RMS detector was used for final measurements.

30MHz - 1GHz.

The measuring antenna was scanned 1 - 4m in both Horizontal and Vertical polarisations. Substitution method was performed using tuned dipoles / a calibrated bi-conical antenna.

1GHz – 18GHz.

Horn antennas were used at heights where the whole of the EUT was contained within the main beam in both horizontal and vertical polarisations. Emissions pre-scans were performed, including antenna height scanning (1-4m) to determine any worst-case maximised emissions for final test. Final tests were performed with the antenna in worst case position. The EUT was rotated in all three orthogonal planes. Substitution method was performed using standard gain horn antennas. Tests were performed in site M.

### 5.6.4 Test equipment

CAL07, E005, E007-2, E136, E268, E420, E429, E433, E624, E743, LPE364, TMS78, TMS812, TMS82

See Section 8 for more details

### 5.6.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Setup Table

Band	1710-1780 MHz
Power Level	Maximum
Channel Spacing	1.4 MHz
Mod Scheme	QPSK
Low channel	1710.7 MHz
Mid channel	1745.0 MHz
High channel	1779.3 MHz

Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Difference to Limit (dB)	Antenna Polarisation	EUT Polarisation
No emissions were found within 20 dB of the limits				

**LIMITS:**

FCC Part 27.53(h)(1) -13  
dBm

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:  
 $\pm 3.9$  dB (UR09A)



## 5.7 Band edge / spectrum mask additional emissions limitations

NOT TESTED: Not tested at request of applicant

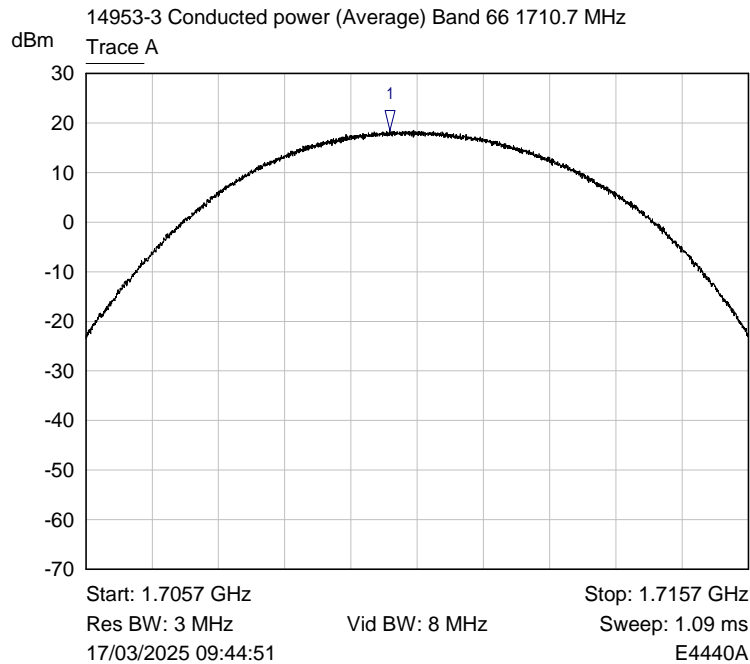
## 5.8 Modulation characteristics

NOT TESTED: Not applicable for EUTs using digital modulation

## 6 Plots/Graphical results

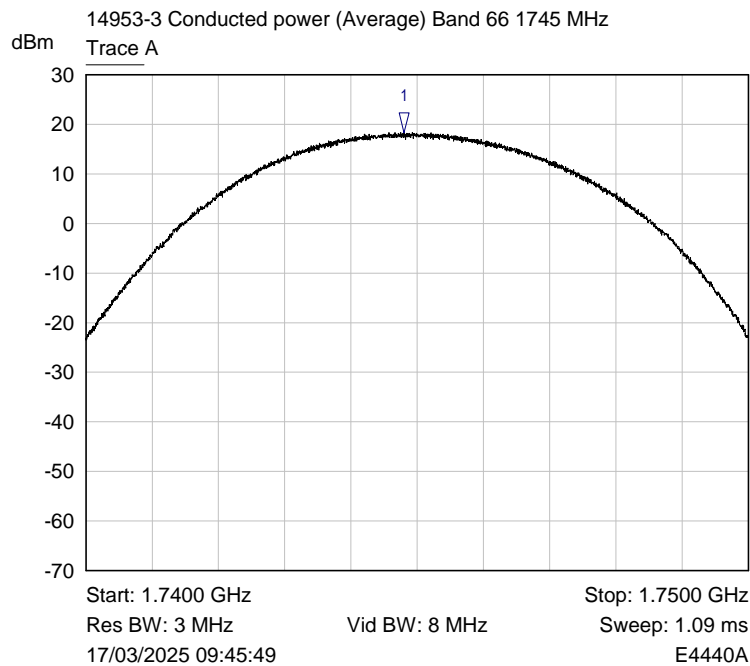
### 6.1 RF Power Output (EIRP)

RF Parameters: Band 1710.7 – 1779.3 MHz, Power Maximum, Channel Spacing 1.4 MHz, Modulation QPSK, Low channel.



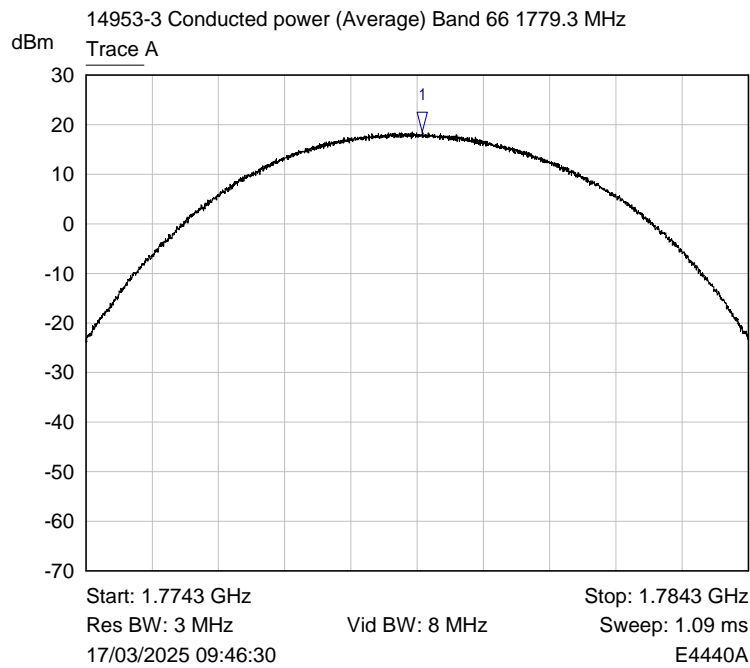
Mkr	Trace	X-Axis	Value	Notes
1 ▾	Trace A	1.7103 GHz	18.47 dBm	

RF Parameters: Band 1710.7 – 1779.3 MHz, Power Maximum, Channel Spacing 1.4 MHz, Modulation QPSK, Mid channel.



Mkr	Trace	X-Axis	Value	Notes
1 ▾	Trace A	1.7448 GHz	18.41 dBm	

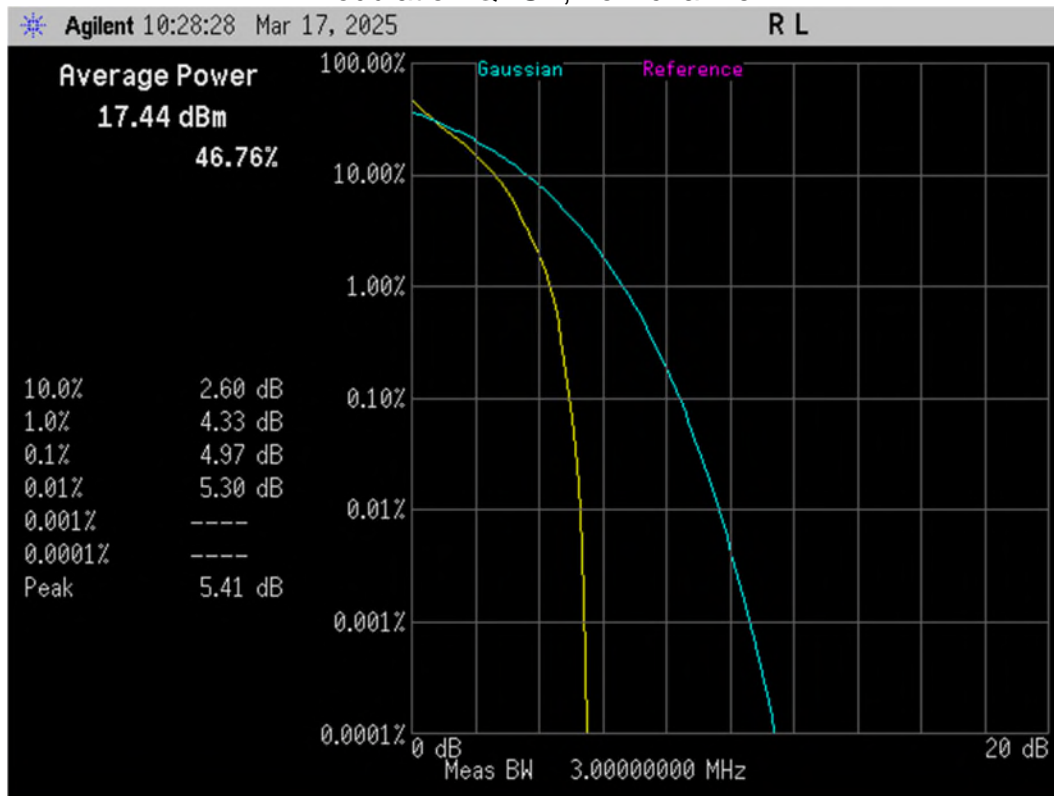
RF Parameters: Band 1710.7 – 1779.3 MHz, Power Maximum, Channel Spacing 1.4 MHz,  
Modulation QPSK, High channel.



Mkr	Trace	X-Axis	Value	Notes
1 ▾	Trace A	1.7794 GHz	18.44 dBm	

## 6.2 Peak to Average power ratio

RF Parameters: Band 1710.7 – 1779.3 MHz, Power Maximum, Channel Spacing 1.4 MHz,  
Modulation QPSK, Low channel.



RF Parameters: Band 1710.7 – 1779.3 MHz, Power Maximum, Channel Spacing 1.4 MHz,  
Modulation QPSK, Mid channel.



RF Parameters: Band 1710.7 – 1779.3 MHz, Power Maximum, Channel Spacing 1.4 MHz,  
Modulation QPSK, High channel.



## 7 Photographs

### 7.1 EUT Front View







## 7.2 EUT Reverse Angle



## 7.3 EUT Left side View

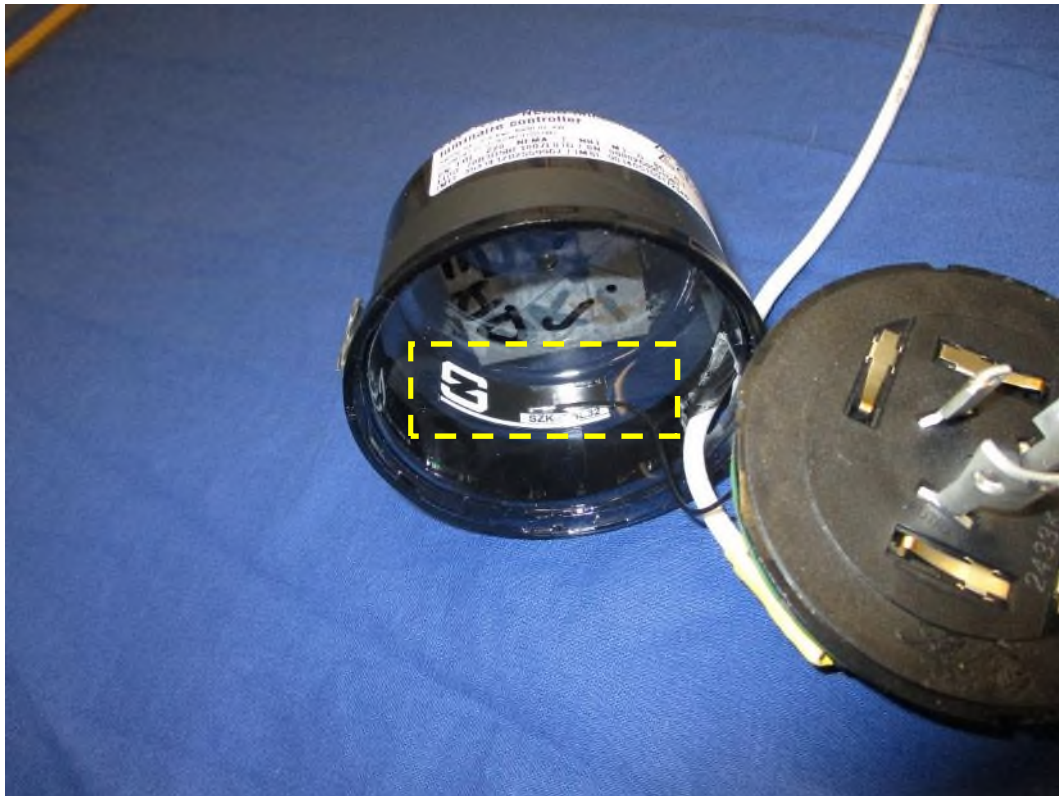




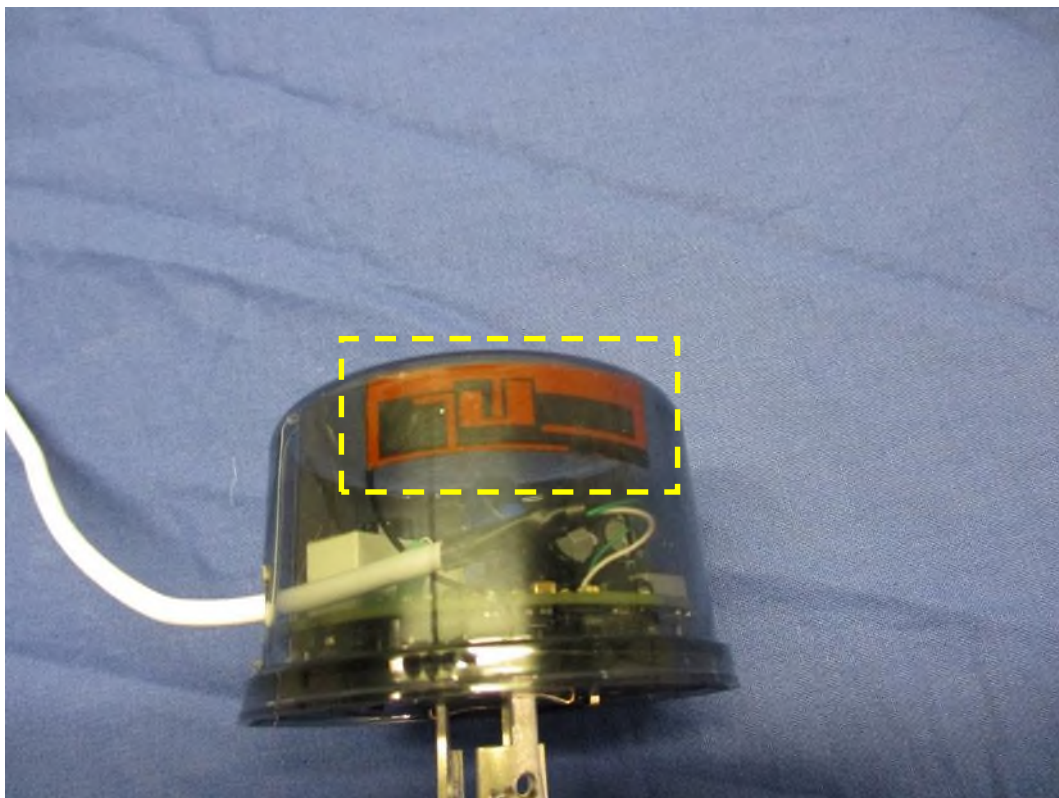
## 7.4 EUT Right side View



## 7.5 EUT Antenna



Photograph shows the EUTs internal flexible antenna mounted to the plastic enclosure (highlighted)



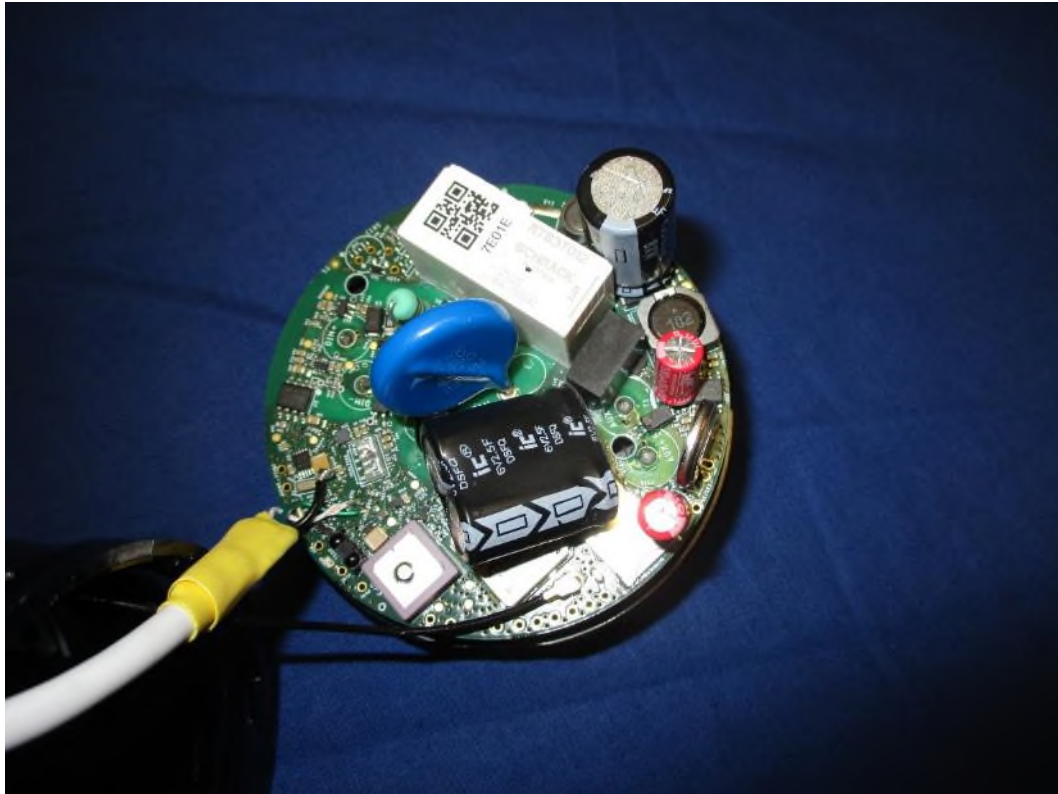
Photograph shows the EUTs internal flexible antenna mounted to the plastic enclosure (highlighted)



## 7.6 EUT Display & Controls

The EUT has no display or controls

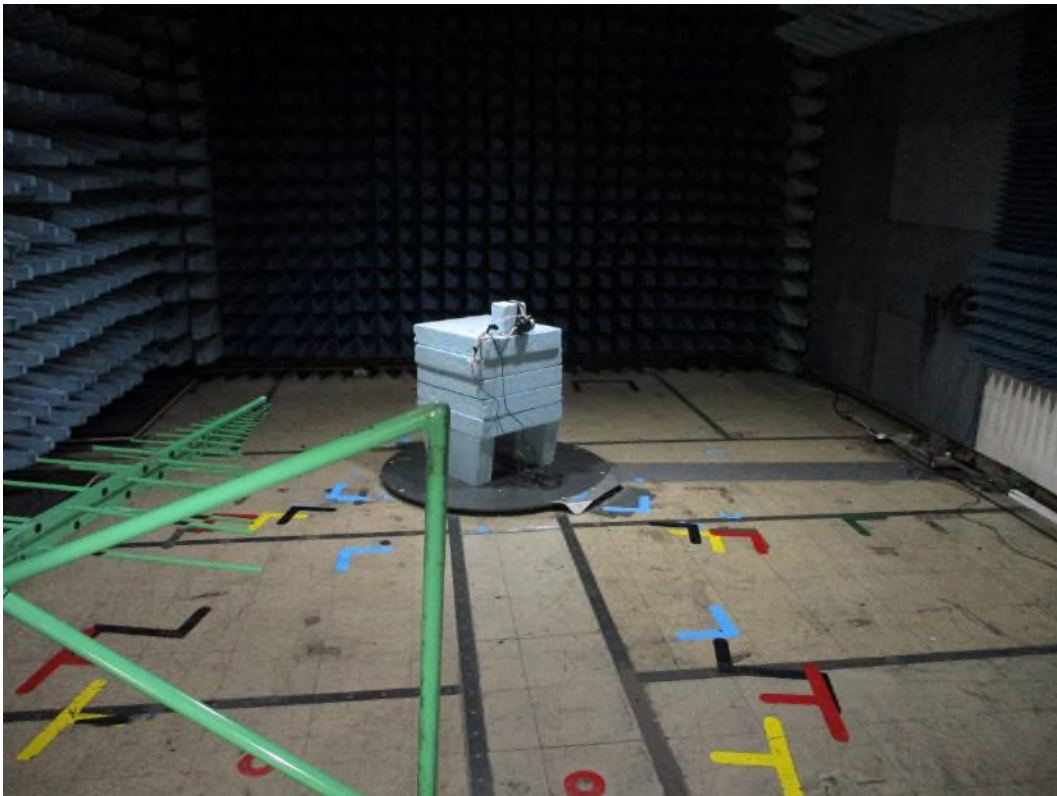
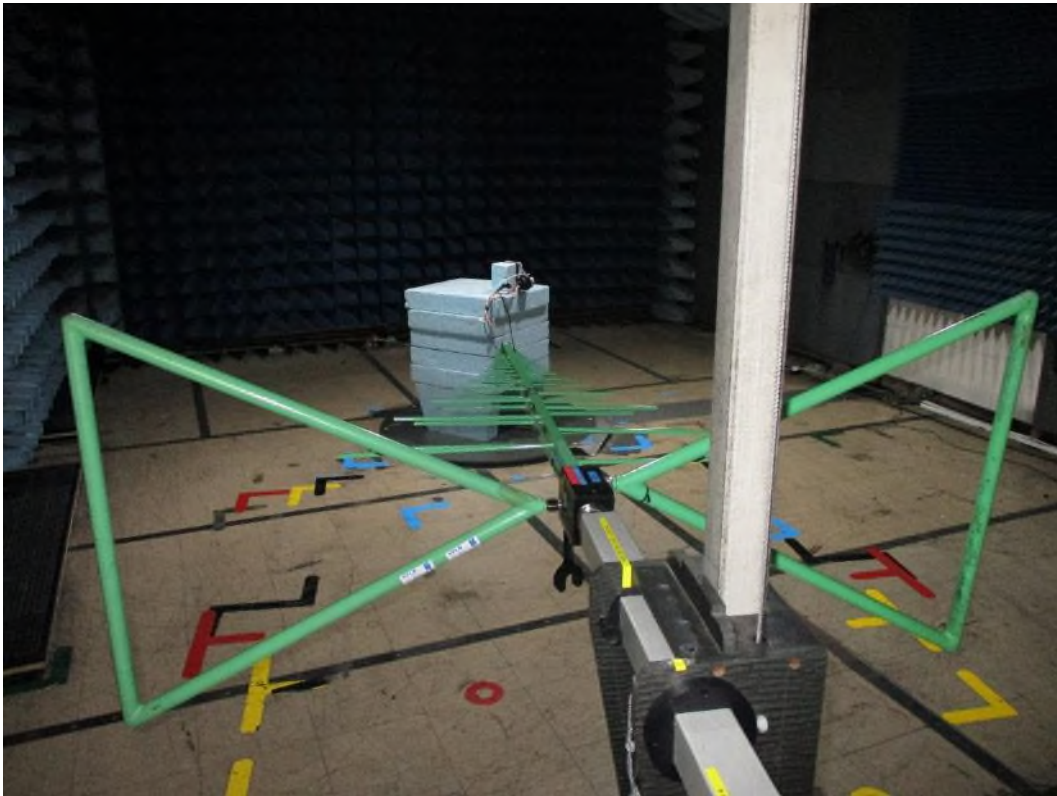
## 7.7 EUT Internal photos



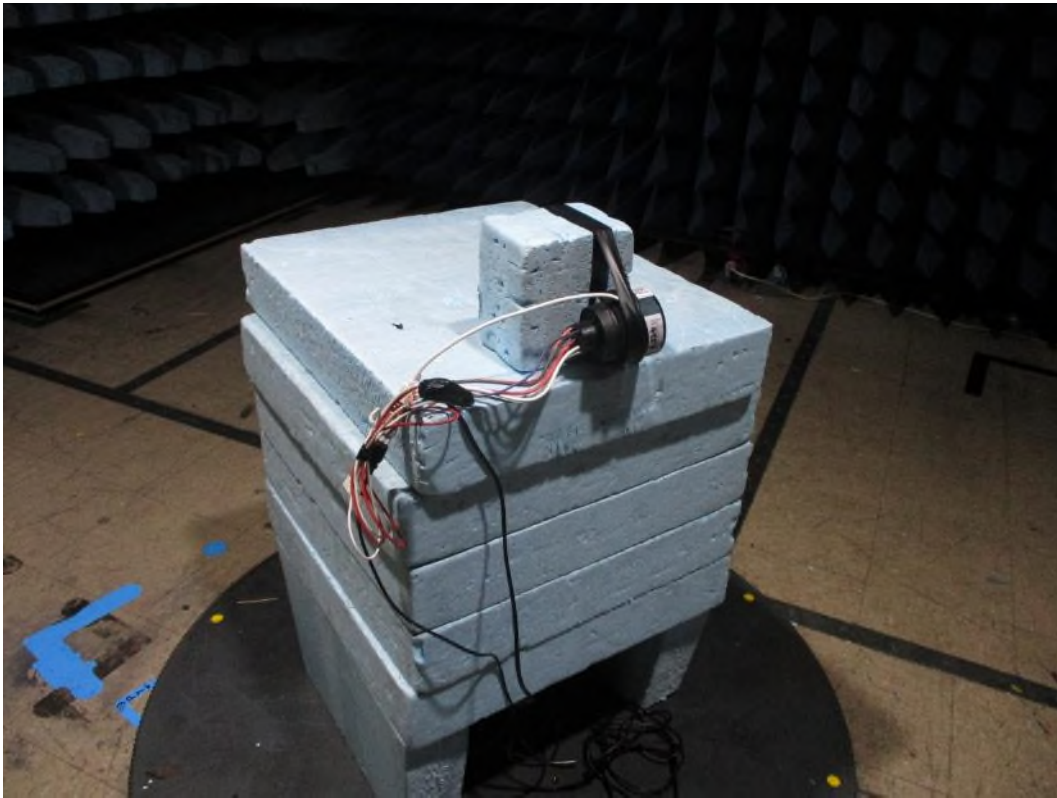
## 7.8 EUT ID Label



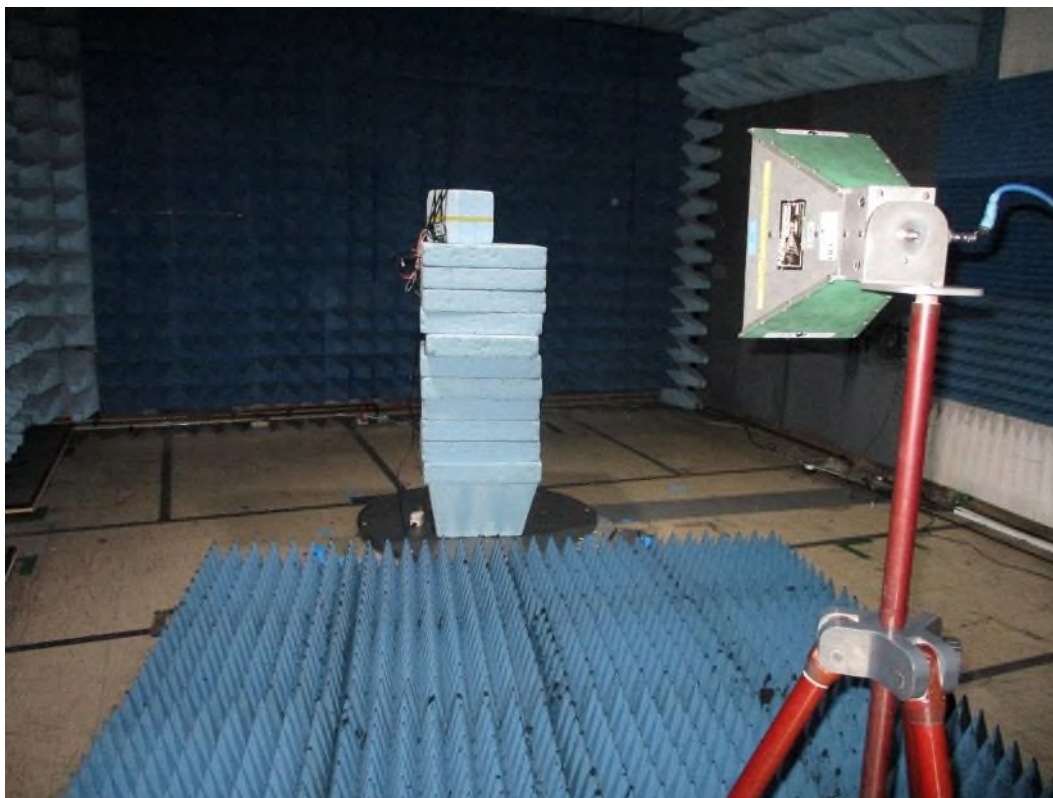
## 7.9 30-1000MHz Spurious emissions test set-up

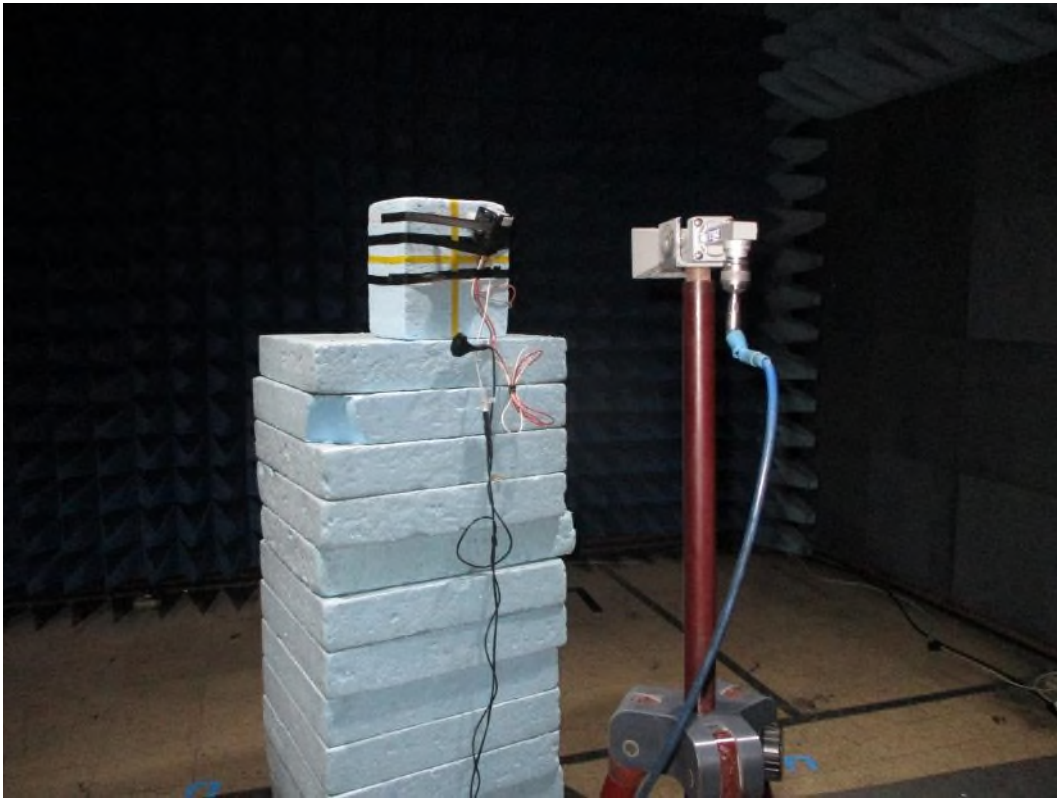






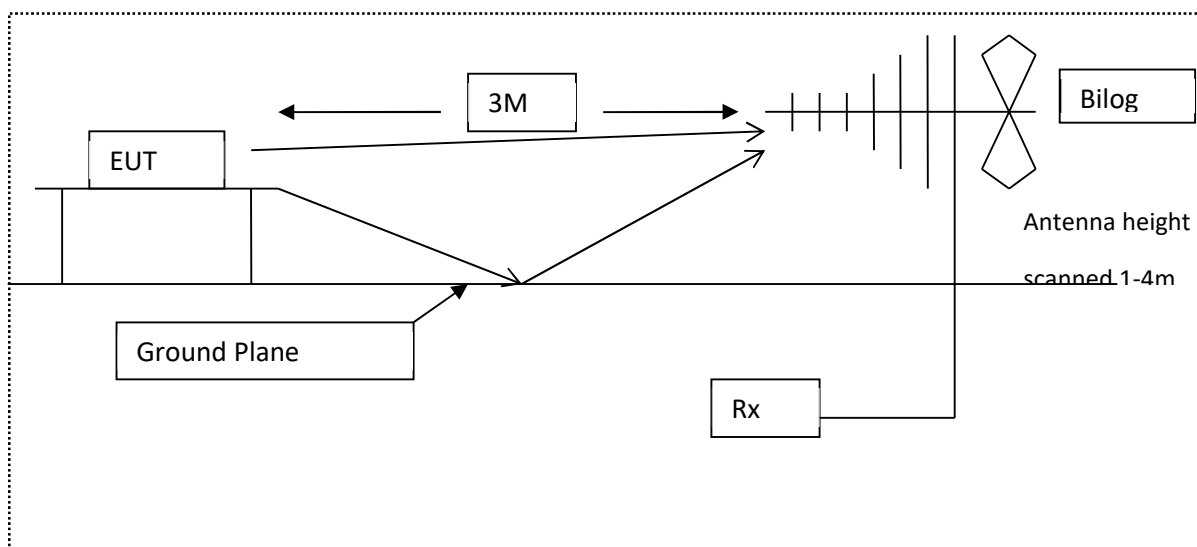
## 7.10 Above 1GHz Spurious emissions test set-up



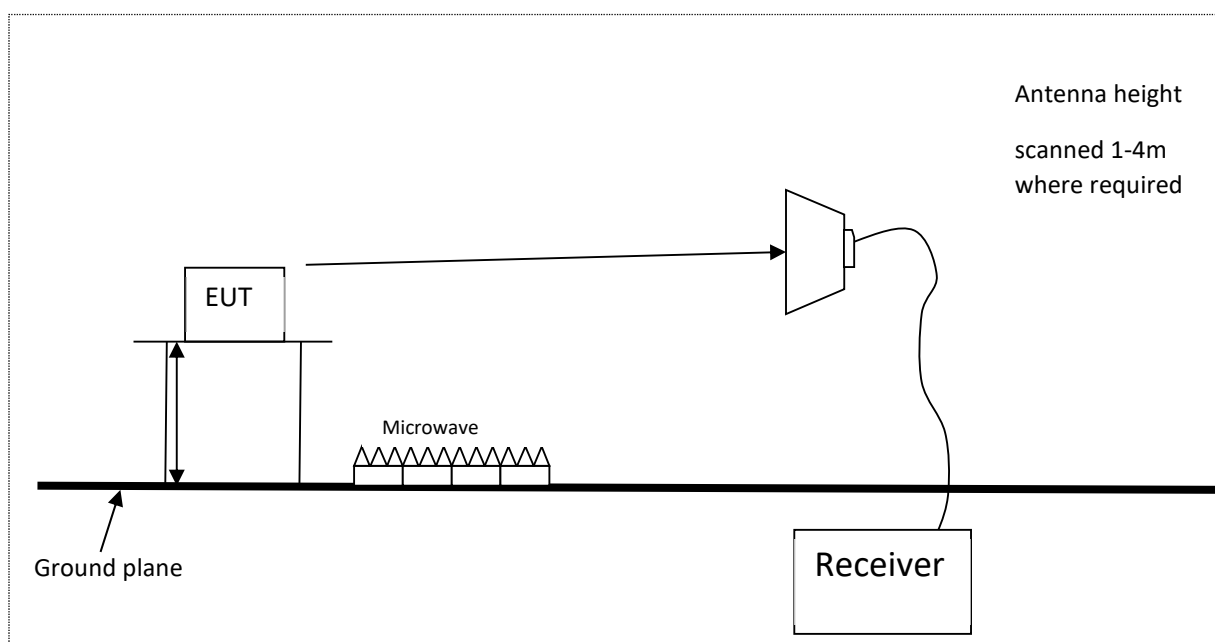




## 7.11 Radiated emission diagrams



**Diagram of the radiated emissions test setup 30 - 1000 MHz**



**Diagram of the radiated emissions test setup above 1GHz**

## 8 Test equipment calibration list

The following is a list of the test equipment used by Kiwa Electrical Compliance to test the unit detailed within this report. In line with our procedures, the equipment was within calibration for the period during which testing was carried out.

KEC No	Model	Description	Manufacturer	Calibrated Date	Period
CAL07	MWX221	Cable N Type to SMA Blue 2m (M)	Junflon	24/01/2025	6 months
E005	8447F	Pre-Amplifier 10MHz to 1000MHz	MCL Microwave+Mini-circuits	17/06/2024	12 months
E007-2	VHA9103	Antenna Bi-con	Schwarzbeck	15/05/2023	36 months
E136	3105	Horn Antenna 1 - 12.5 GHz	EMCO	15/05/2024	12 months
E268	BHA 9118	Horn Antenna 1 - 18 GHz	Schaffner	15/05/2024	12 months
E410	N5181A	Signal Generator 3 GHz MXG	Agilent Technologies	03/07/2024	36 months
E420	E4438C	Signal Generator 250 kHz - 3 GHz	Agilent Technologies	11/09/2024	12 months
E429	-	Filter Box 5 Switch Filters 0.91 GHz - 16.3 GHz	RN Electronics	14/08/2024	12 months
E433	MG3693A	Signal Generator 2 GHz - 30 GHz	Anritsu	16/12/2024	12 months
E534	E4440A	PSA 3 Hz - 3 GHz	Agilent Technologies	30/08/2023	24 months
E624	E4440A	PSA 3 Hz - 26.5 GHz	Agilent Technologies	06/07/2023	24 months
E640	6630.19.AA	Attenuator 30dB 18GHz	Suhner	08/04/2024	12 months
E743	2017 4/2dB	Attenuator 4/2dB 30-1000MHz	RN Electronics	17/02/2025	12 months
LPE364	CBL6112A	Antenna BiLog 30MHz - 2GHz	Chase Electronics Ltd	28/03/2022	36 months
TMS78	3160-08	Horn Std Gain 12.4 - 18 GHz	ETS Systems	26/09/2024	12 months
TMS812	MP534A MP651A	Dipole Set 200 - 1700 MHz	Anritsu	11/10/2024	12 months
TMS82	8449B	Pre-Amplifier 1GHz - 26.5GHz	Agilent Technologies	14/01/2025	12 months

## 9 Auxiliary and peripheral equipment

### 9.1 Customer supplied equipment

Item No.	Model No.	Description	Manufacturer	Serial No.
1	Not stated	USB to serial cable	Generic	Not stated

### 9.2 Kiwa Electrical Compliance supplied equipment

Item No	Model	Description	Manufacturer	Serial No
E465	PCR2000LA	AC Power Source 2kVA	Kikusui	HJ000995
I323	Vostro I5 3000	Laptop Computer	Dell	Not stated

## 10 Condition of the equipment tested

In order for the EUT to produce the results shown within this report the following modifications, if any, were implemented.

### 10.1 Modifications before test

No modifications were made before test by Kiwa Electrical Compliance.

### 10.2 Modifications during test

No modifications were made during test by Kiwa Electrical Compliance.

## 11 Description of test sites

Site A	Radio Laboratory and Anechoic Chamber
Site B	Semi-Anechoic Chamber and Control Room FCC Registration No. 654321, ISED Registration No. 5612A-4
Site C	Transient Laboratory
Site D	Screened Room (Conducted Immunity)
Site E	Screened Room (Control Room for Site D)
Site F	Screened Room (Conducted Emissions)
Site G	Screened Room (Control Room for Site H)
Site H	3m Semi-Anechoic Chamber (indoor OATS) FCC Registration No. 654321, ISED Registration No. 5612A-2, VCCI Registration No. 4065
Site J	Transient Laboratory
Site K	Screened Room (Control Room for Site M)
Site M	3m Semi-Anechoic Chamber (indoor OATS) FCC Registration No. 654321, ISED Registration No. 5612A-3
Site N	Radio Laboratory
Site Q	Fully-Anechoic Chamber
Site OATS3m and 10m Open Area Test Site	FCC Registration No. 654321, ISED Registration No. 5612A-1
Site R	Screened Room (Conducted Immunity)
Site S	Safety Laboratory
Site T	Transient Laboratory

CAB identifier as issued by Innovation, Science and Economic Development Canada is UK0002  
CAB identifier as issued by FCC is UK2015

## 12 Abbreviations and units

%	Percent	dBµV	decibels relative to 1µV
λ	Wavelength	dBµV/m	decibels relative to 1µV/m
µA/m	microAmps per metre	dBc	decibels relative to Carrier
µV	microVolts	dBd	decibels relative to dipole gain
µW	microWatts	dBi	decibels relative to isotropic gain
AC	Alternating Current	dBm	decibels relative to 1mW
ACK	ACKnowledgement	dB	decibels relative to a maximum value
ACP	Adjacent Channel Power	dBW	decibels relative to 1W
AFA	Adaptive Frequency Agility	DC	Direct Current
ALSE	Absorber Lined Screened Enclosure	DFS	Dynamic Frequency Selection
AM	Amplitude Modulation	DMO	Dynamic Modulation Order
Amb	Ambient	DSSS	Direct Sequence Spread Spectrum
ANSI	American National Standards Institute	DTA	Digital Transmission Analyser
ATPC	Automatic Transmit Power Control	EIRP	Equivalent Isotropic Radiated Power
AVG	Average	emf	electromotive force
AWGN	Additive White Gaussian Noise	ERC	European Radiocommunications Committee
BER	Bit Error Rate	ERP	Effective Radiated Power
BPSK	Binary Phase Shift Keying	ETSI	European Telecommunications Standards Institute
BT	Bluetooth	EU	European Union
BLE	Bluetooth Low Energy	EUT	Equipment Under Test
BW	Bandwidth	FCC	Federal Communications Commission
°C	Degrees Celsius	FER	Frame Error Rate
C/I	Carrier / Interferer	FHSS	Frequency Hopping Spread Spectrum
CAC	Channel Availability Check	FM	Frequency Modulation
CCA	Clear Channel Assessment	FSK	Frequency Shift Keying
CEPT	European Conference of Postal and Telecommunications Administrations	FSS	Fixed Satellite Service
CFR	Code of Federal Regulations	g	Grams
CISPR	Comité International Spécial des Perturbations Radioélectriques	GHz	GigaHertz
cm	centimetre	GNSS	Global Navigation Satellite System
COFDM	Coherent OFDM	GPS	Global Positioning System
COT	Channel Occupancy Time	Hz	Hertz
CS	Channel Spacing	IEEE	Institute of Electrical and Electronics Engineers
CW	Continuous Wave	IF	Intermediate Frequency
DAA	Detect And Avoid	ISED	Innovation Science and Economic Development
dB	decibels	ITU	International Telecommunications Union
dBµA/m	decibels relative to 1µA/m	KDB	Knowledge DataBase

kg	kilogram	pW	picoWatts
kHz	kiloHertz	QAM	Quadrature Amplitude Modulation
kPa	Kilopascal	QP	Quasi Peak
LBT	Listen Before Talk	QPSK	Quadrature Phase Shift Keying
LISN	Line Impedance Stabilisation Network	RBW	Resolution Band Width
LNA	Low Noise Amplifier	RED	Radio Equipment Directive
LNB	Low Noise Block	R&TTE	Radio and Telecommunication Terminal Equipment
LO	Local Oscillator	Ref	Reference
m	metre	RF	Radio Frequency
mA	milliAmps	RFC	Remote Frequency Control
max	maximum	RFID	Radio Frequency IDentification
Mbit/s	MegaBits per second	RLAN	Radio Local Area Network
MCS	Modulation and Coding Scheme	RMS	Root Mean Square
MHz	MegaHertz	RNSS	Radio Navigation Satellite Service
mic	Microphone	RSL	Received Signal Level
MIMO	Multiple Input, Multiple Output	RSSI	Received Signal Strength Indicator
min	minimum	RTP	Room Temperature and Pressure
mm	millimetres	RTPC	Remote Transmit Power Control
ms	milliseconds	Rx	Receiver
mW	milliWatts	s	Seconds
NA	Not Applicable	SINAD	Signal to Noise And Distortion
NFC	Near Field Communications	SRD	Short Range Device
nom	Nominal	Tx	Transmitter
nW	nanoWatt	UKAS	United Kingdom Accreditation Service
OATS	Open Area Test Site	UKCA	United Kingdom Conformity Assessed
OBW	Occupied Band Width	UKRER	United Kingdom Radio Equipment Regulations
OCW	Occupied Channel Width	UHF	Ultra High Frequency
OFDM	Orthogonal Frequency Division Multiplexing	U-NII	Unlicensed National Information Infrastructure
OOB	Out Of Band	USB	Universal Serial Bus
ppm	Parts per million	UWB	Ultra Wide Band
PER	Packet Error Rate	V	Volts
PK	Peak	V/m	Volts per metre
PMR	Private Mobile Radio	VBW	Video Band Width
PRBS	Pseudo Random Bit Sequence	VHF	Very High Frequency
PRF	Pulse Repetition Frequency	VSAT	Very Small Aperture Terminal
PSD	Power Spectral Density	W	Watts
PSU	Power Supply Unit		

## 13 Revision History

Issue Number	Revision History	Page Reference(s)
01	First Issue	-
02	Clarification that the voltage used for full-test was declared by the applicant and is that used by the device in service.	7
	Test procedure expanded to clarify that height scanning was performed to determine that worst-case emissions were measured during test.	15

===== END OF TEST REPORT =====