Radio Test Report

Flashnet SA

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

47 CFR Part 24 E Effective Date 1st October 2024
PCB: PCS Licensed Transmitter
Test Date: 13th March 2025 to 21st March 2025
Report Number: 03-14953-2-25 Issue 02
Supersedes Report Number: 03-14953-2-25 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:

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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).

Arnolds Court, A[kiwa] Essex, CM13 1UT

Certificate of Test 14953-2

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 24 E. 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
Full measurement results are detailed in Report Number:	03-14953-2-25 Issue 02
Proposed FCC ID:	2A7FA-NEMATNB1M1G
Test Standards:	47 CFR Part 24 E 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, Band edge compliance, 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

Graham Blake
Digitally signed by: Graham Blake
DN: CN = Graham Blake email = graham.blake@kiwa.com C = GB OU = Kiwa Electrical Compliance
Date: 2025.06.10 16:32:26 Z

Approved By:
Radio Manager

Digitally signed by: Daniel Sims
DN: CN = Daniel Sims email = Daniel.Sims@kiwa.com C = GB O = Kiwa Electrical Compliance - Brentwood
Date: 2025.06.10 16:31:46 Z

Customer Representative:

ilac-MRA UKAS TESTING 2360

1 Contents

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-P0C.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	FCC|PCB: PCS Licensed Transmitter

2.3 Functional description

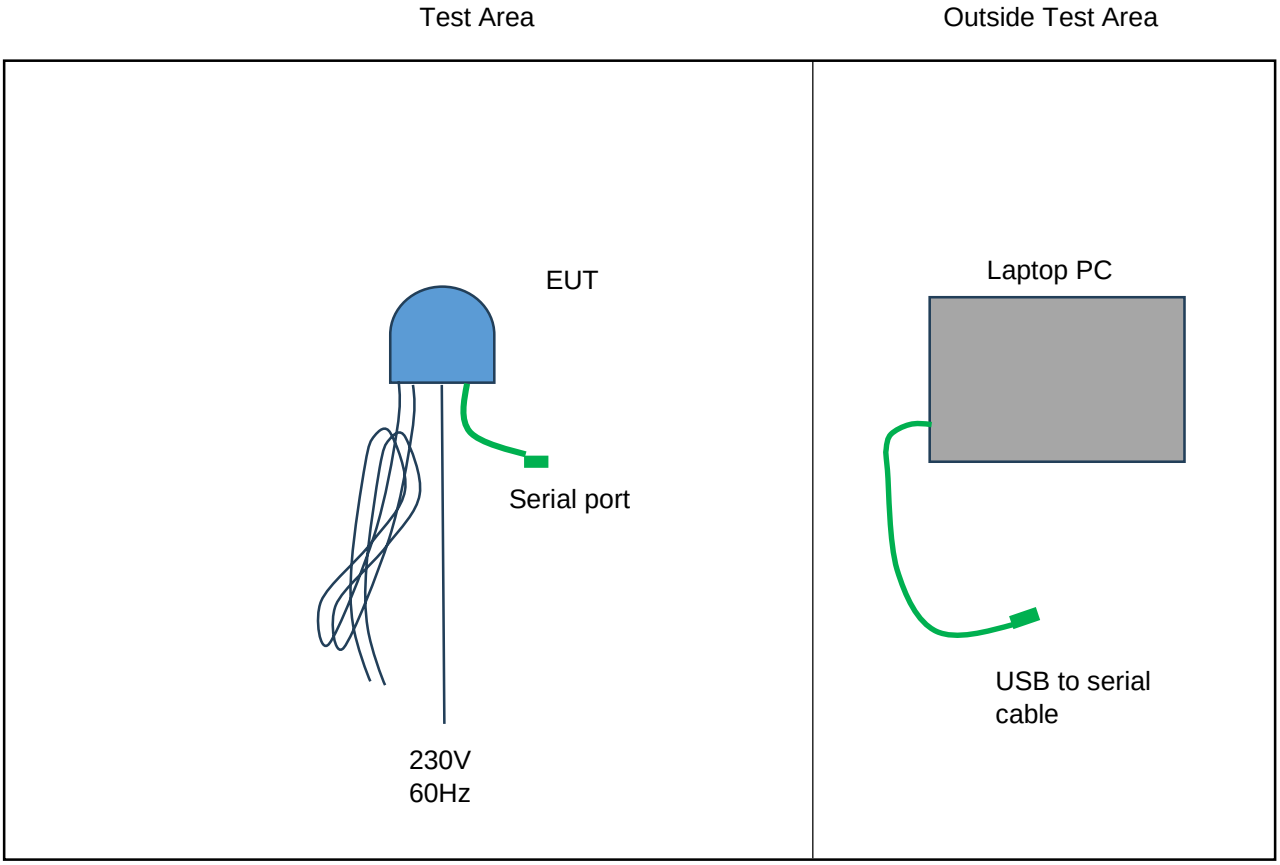
The product is connected to the public mains supply via an ANSI C136.41 compliant socket and its outputs are connected directly to the driver of the luminaire. It communicates wirelessly with the central management software, using an embedded LTE CatM1 and NB2 modem. The purpose of the controller is 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 1850.7 MHz, 1.4 MHz channel bandwidth. Band 25, QPSK modulation.	Yes
TX Mid	Transmitting continuously at 1882.5 MHz, 1.4 MHz channel bandwidth. Band 25, QPSK modulation.	Yes
TX High	Transmitting continuously at 1914.3 MHz, 1.4 MHz channel bandwidth. Band 25, QPSK modulation.	Yes

Note: This test report pertains to Band 25 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 units 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 (1850.7 MHz) = level 21dBm
Mid Channel (1882.5 MHz) only = level 21dBm
High Channel (1914.3 MHz) only = level 21dBm

Following the manufacturer’s 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 26047 0”	(Sets Low channel, 26365 for Mid 26683 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 24 E 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
Transmitter Tests		
1. RF Power Output (EIRP)	47 CFR PART 24E 24.232, 47 CFR Part 2J 2.1046	PASSED
2. Peak to Average power ratio	47 CFR PART 24E 24.232, 47 CFR Part 2J 2.1046	PASSED
3. Occupied bandwidth	47 CFR Part 2J 2.1049, ANSI C63.26 5.4	NOT TESTED[1]
4. Frequency stability	47 CFR PART 24E 24.235, 47 CFR Part 2J 2.1055	NOT TESTED[1]
5. Spurious emissions at antenna terminals	47 CFR Part 24E 24.238, 47 CFR Part 2J 2.1051	NOT APPLICABLE[2]
6. Band edge compliance	47 CFR PART 24E 24.238(a), 47 CFR Part 2J 2.1051	NOT TESTED[1]
7. Field strength of spurious emissions	47 CFR PART 24E 24.238(a), 47 CFR Part 2J 2.1053	PASSED[3]
8. Modulation characteristics	47 CFR Part 2J 2.1047	NOT TESTED[1]

[1] Not tested at request of applicant
[2] The EUT has an integral antenna and field strength emissions were performed with the antenna in place.
[3] Spectrum investigated up to a frequency of 19.5GHz based on 10 times the highest channel/ signal generated in equipment of 1915 MHz.

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 24E	2024	Part 24 Subpart E - Broadband PCS
4.1.2	47 CFR Part 2J	2023	Part 2 – Frequency Allocations and radio treaty matters; General rules and regulations
4.1.3	KDB 971168 D01 v03	2017	Federal Communications Commission Office of Engineering and Technology Laboratory Division; Measurement Guidance for Certification of Licensed Digital Transmitters
4.1.4	ANSI C63.26	2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

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 RF Power Output (EIRP)

5.1.1 Test methods

Test Requirements:	47 CFR PART 24E 24.232 [Reference 4.1.1 of this report], 47 CFR Part 2J 2.1046 [Reference 4.1.2 of this report]
Test Method:	ANSI C63.26 5.2 [Reference 4.1.4 of this report]
Limits:	47 CFR PART 24E 24.232(c) [Reference 4.1.1 of this report]

5.1.2 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.

5.1.3 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.

5.1.4 Test equipment

E410, E534, E624, E640

See Section 8 for more details

5.1.5 Test results

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

Band	1850-1915 MHz
Power Level	Maximum
Channel Spacing	1.4 MHz
Mod Scheme	QPSK
Low channel	1850.7 MHz
Mid channel	1882.5 MHz
High channel	1914.3 MHz

Test conditions	Carrier Power (dBm) Low channel	Carrier Power (dBm) Mid channel	Carrier Power (dBm) High channel
Measured power at onboard RF port	18.16	18.27	18.43
Manufacturers declared Antenna gain (dBi)	4.15	4.15	4.15
Maximum TX Power EIRP (dBm)	22.31	22.42	22.58

Analyser plots may be found in section 6.

LIMITS:
Part 24.232(c):
Mobile and portable stations are limited to 2 watts EIRP (33 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:
<± 1.0 dB

5.2 Peak to Average power ratio

5.2.1 Test methods

Test Requirements:	47 CFR PART 24E 24.232(d) [Reference 4.1.1 of this report], 47 CFR Part 2J 2.1046 [Reference 4.1.2 of this report]
Test Method:	ANSI C63.26 5.2 [Reference 4.1.4 of this report]
Limits:	47 CFR PART 24E 24.232(d) [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 directly to the internal RF port. The EUT was operated in TX Low, TX Mid and TX High modes for this test.

5.2.3 Test procedure

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

5.2.4 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	1850-1915 MHz
Power Level	Maximum
Channel Spacing	1.4 MHz
Mod Scheme	QPSK
Low channel	1850.7 MHz
Mid channel	1882.5 MHz
High channel	1914.3 MHz

	Low channel	Mid channel	High channel
Peak to Average power ratio (dB)	4.97	5.03	5.06
Plot	14953-2 1850.7	14953-2 1882.5	14953-2 1914.3

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

LIMITS:
Part 24.232(d):
The peak-to-average ratio (PAR) of the transmission may not exceed 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

5.3 Occupied bandwidth

NOT TESTED: Not tested at request of applicant

5.4 Frequency stability

NOT TESTED: Not tested at request of applicant

5.5 Spurious emissions at antenna terminals

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

5.6 Band edge compliance

NOT TESTED: Not tested at request of applicant

5.7 Field strength of spurious emissions

5.7.1 Test methods

Test Requirements:	47 CFR PART 24E 24.238 [Reference 4.1.1 of this report], 47 CFR Part 2J 2.1053 [Reference 4.1.2 of this report]
Test Method:	ANSI C63.26 5.5 [Reference 4.1.4 of this report]
Limits:	47 CFR PART 24E 24.238 [Reference 4.1.1 of this report]

5.7.2 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.

5.7.3 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 – 20GHz.
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.

5.7.4 Test equipment

CAL07, E005, E007-2, E136, E268, E420, E429, E433, E624, E743, LPE364, TMS78, TMS79, TMS812, TMS82

See Section 8 for more details

5.7.5 Test results

Temperature of test environment	15°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Setup Table

Band	1850-1915 MHz
Power Level	Maximum
Channel Spacing	1.4 MHz
Mod Scheme	QPSK
Low channel	1850.7 MHz
Mid channel	1882.5 MHz
High channel	1914.5 MHz

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

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

LIMITS:
Part 24.238, -13 dBm

These results show that the EUT has PASSED this test.

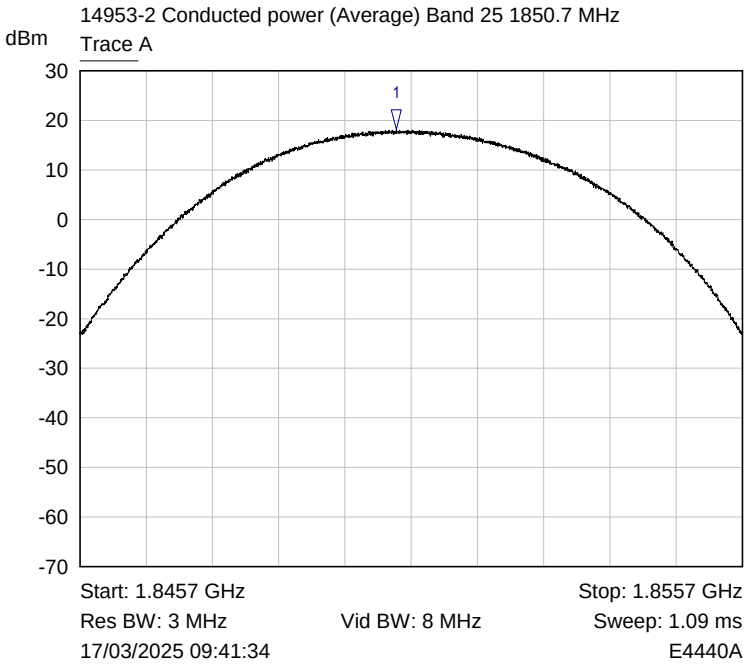
The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows: ± 3.9 dB (UR09A)

5.8 Modulation characteristics

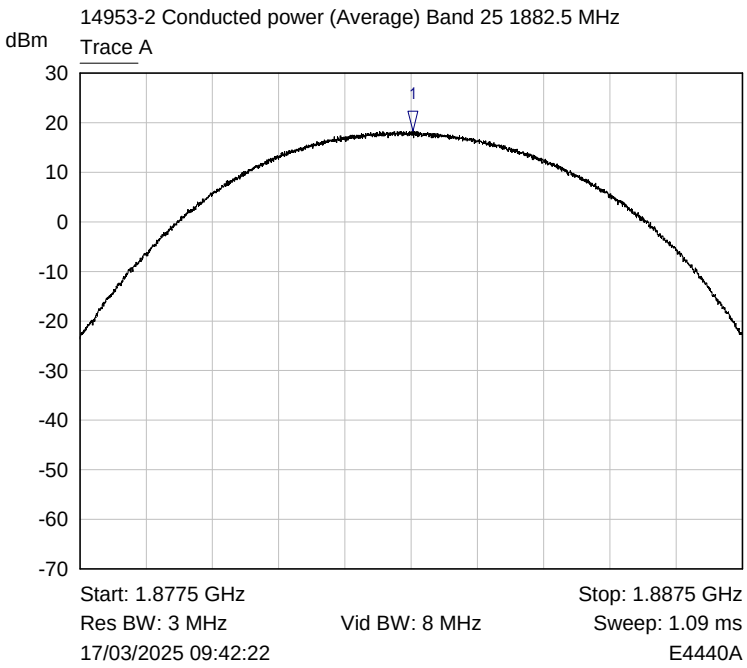
NOT TESTED: Not tested at request of applicant

6 Plots/Graphical results

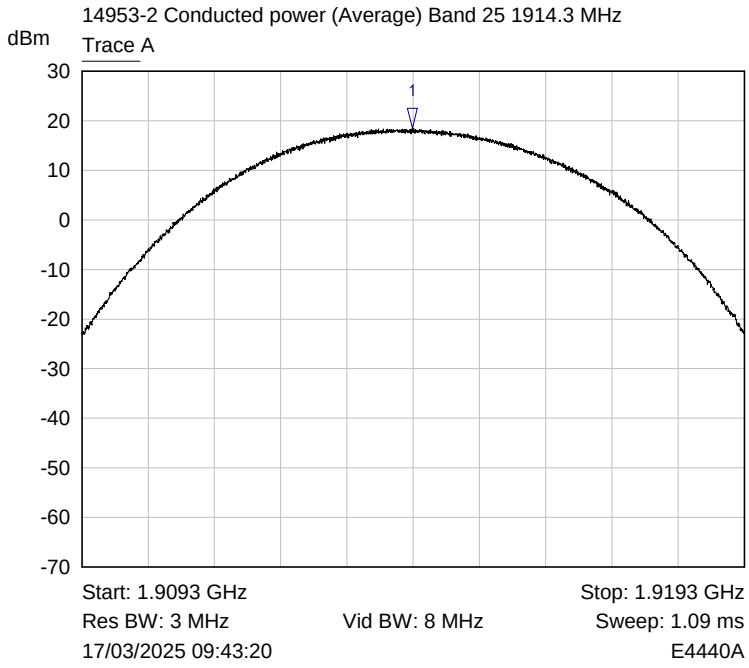
6.1 RF Power Output (EIRP)



Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	1.8505 GHz	18.16 dBm	



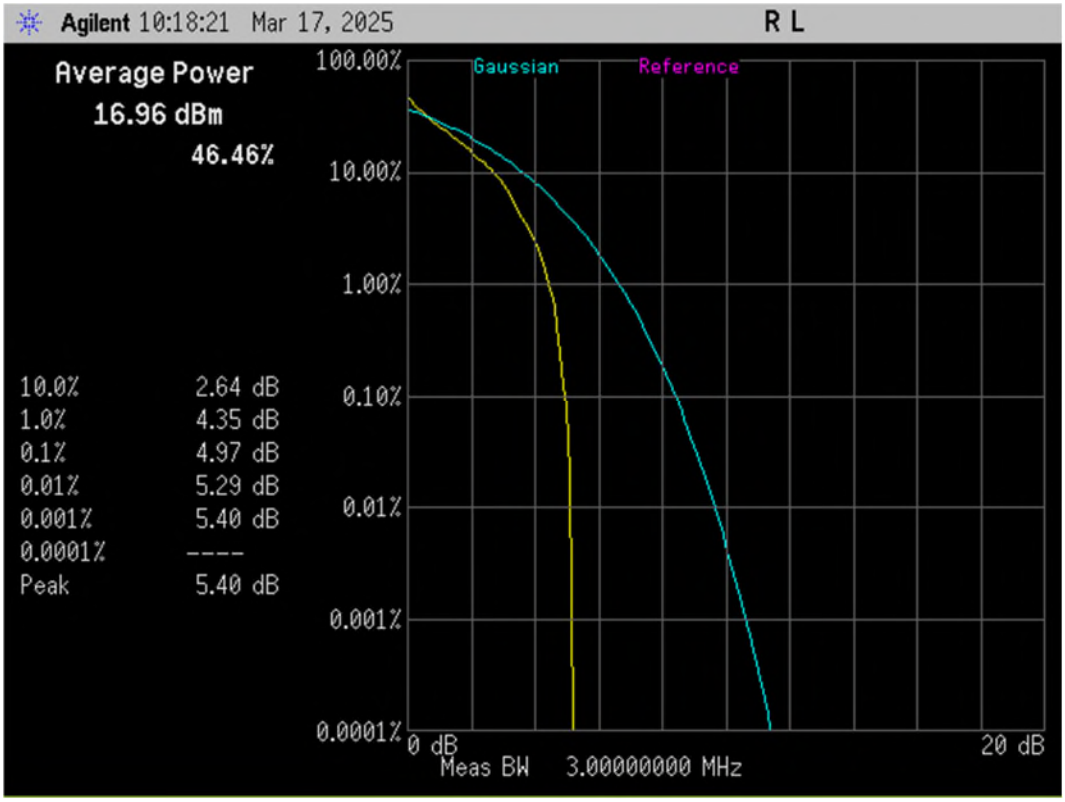
Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	1.8825 GHz	18.27 dBm	



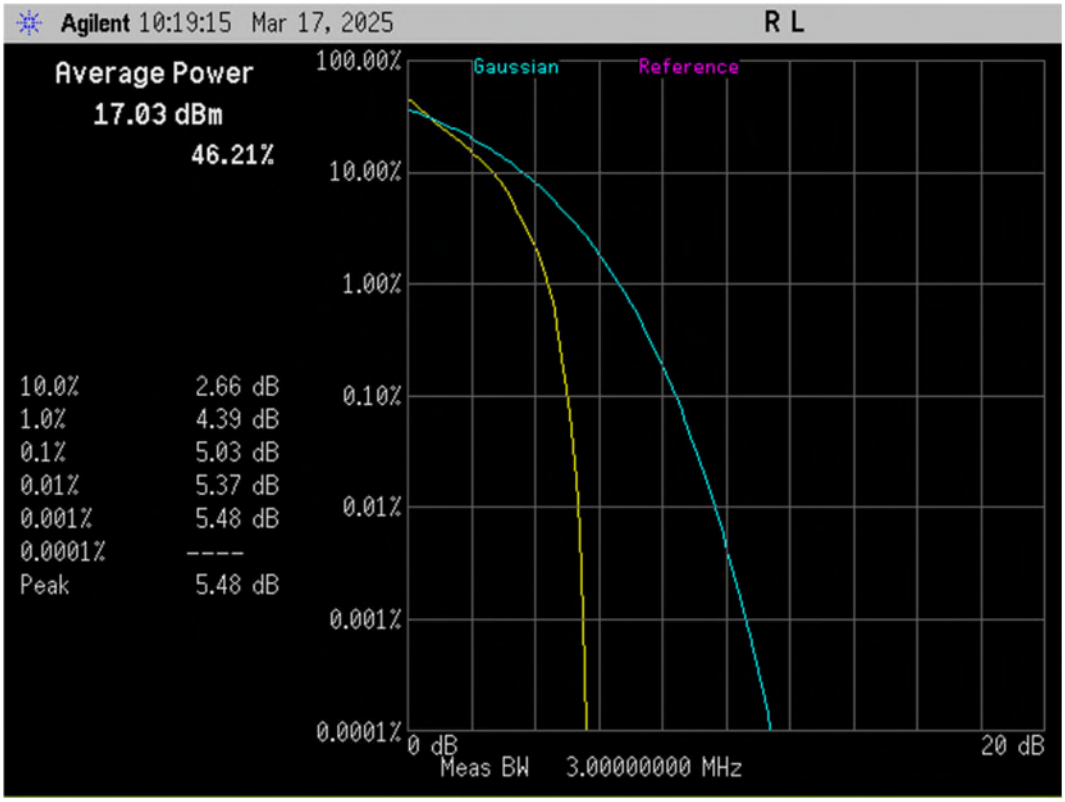
Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	1.9143 GHz	18.43 dBm	

6.2 Peak to Average power ratio

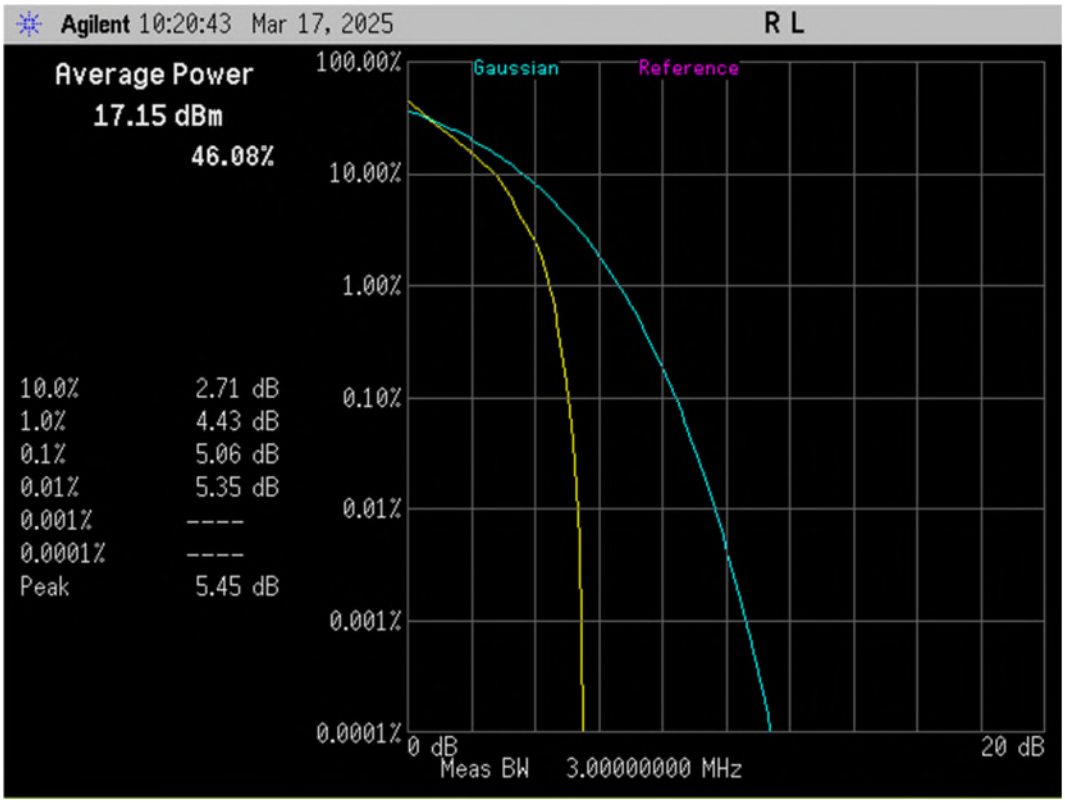
RF Parameters: Band 1850-1915 MHz, Power Maximum, Channel Spacing 1.4 MHz, Modulation QPSK



RF Parameters: Band 1850-1915 MHz, Power Maximum, Channel Spacing 1.4 MHz, Modulation QPSK



RF Parameters: Band 1850-1915 MHz, Power Maximum, Channel Spacing 1.4 MHz, Modulation QPSK


Agilent 10:20:43 Mar 17, 2025
R L
Average Power
17.15 dBm
46.08%
10.0% 2.71 dB
1.0% 4.43 dB
0.1% 5.06 dB
0.01% 5.35 dB
0.001% ----
0.0001% ----
Peak 5.45 dB
100.00%
10.00%
1.00%
0.10%
0.01%
0.001%
0.0001%
Gaussian
Reference
0 dB
20 dB
Meas BW 3.00000000 MHz

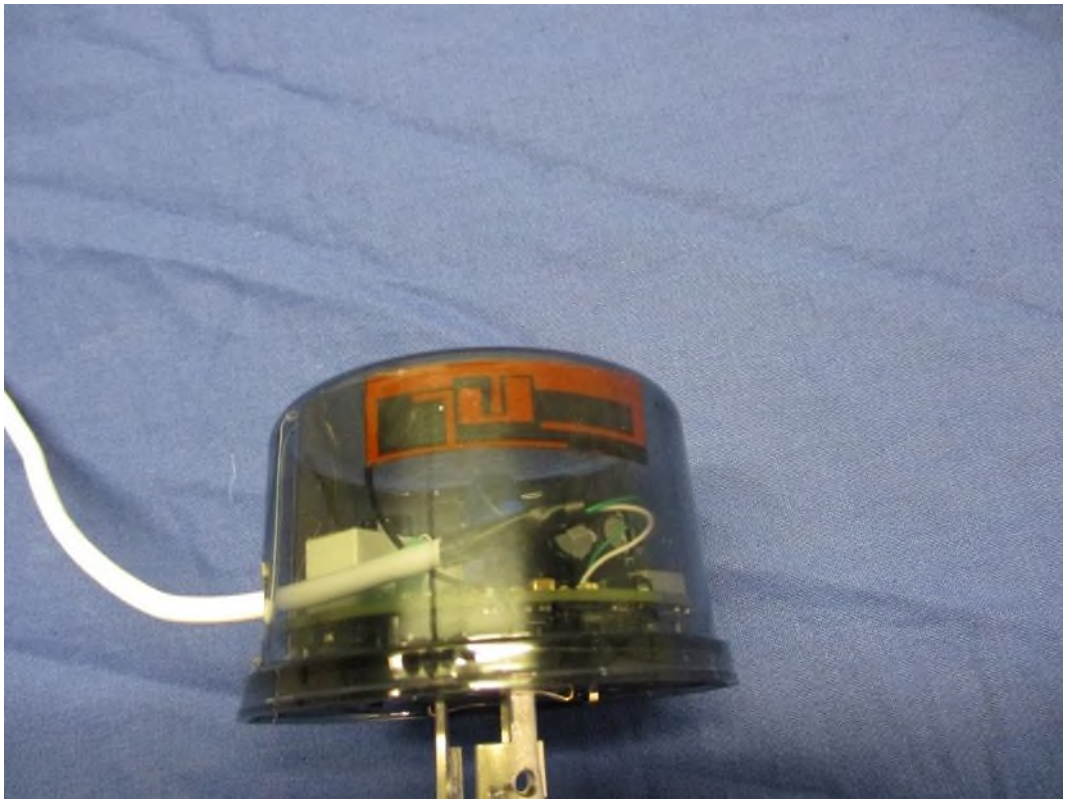
Plot

7 Photographs

7.1 EUT Front View

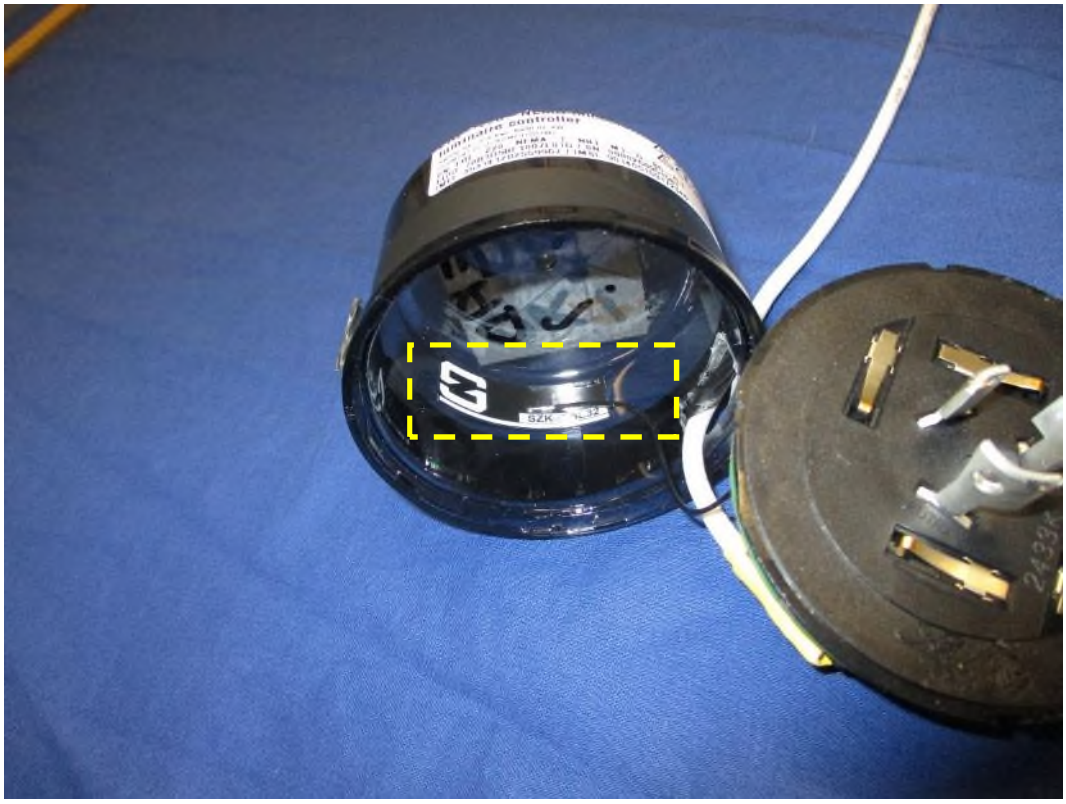
7.2 EUT Reverse Angle

7.3 EUT Left side View

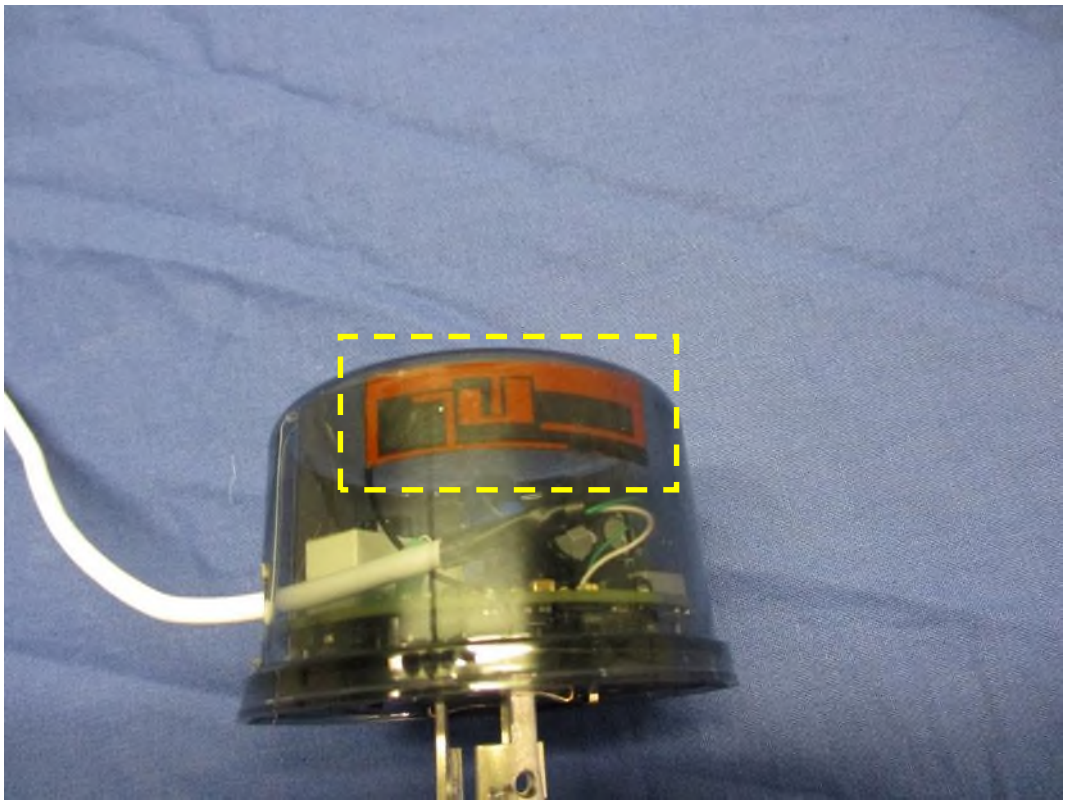


7.4 EUT Right side View

7.5 EUT Antenna



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

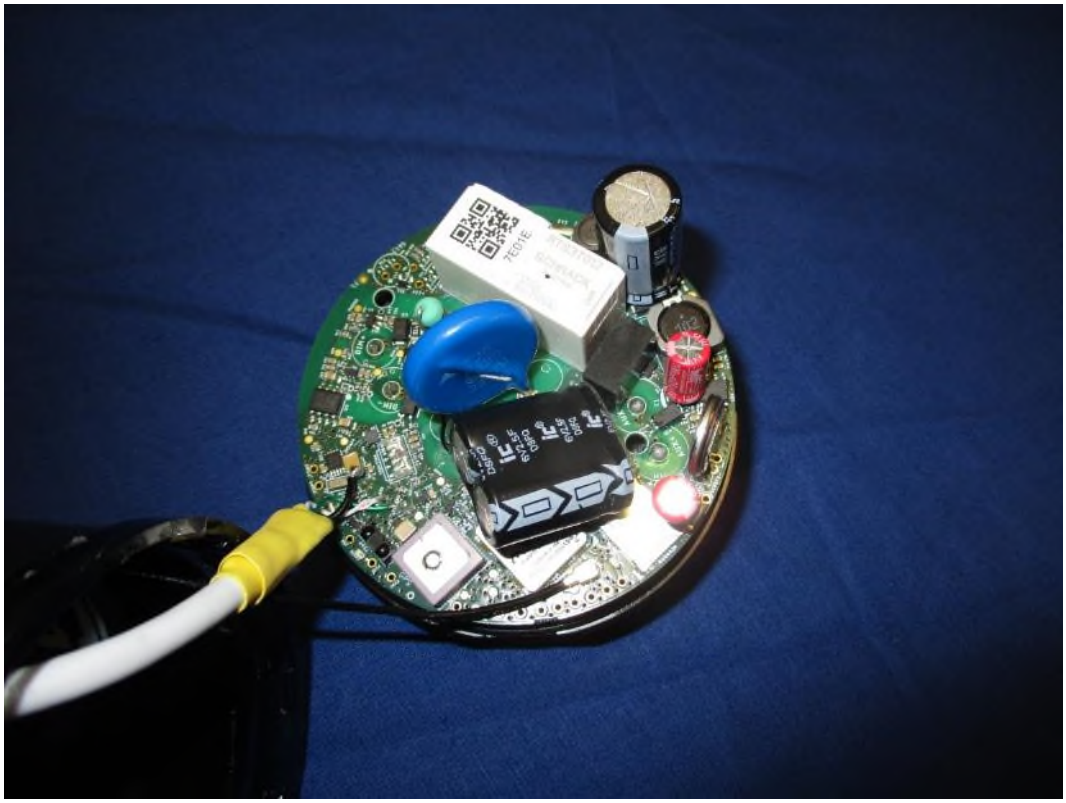


Photograph shows the EUTs internal flexible antenna mounted to the plastic enclosure (highlighted)

7.6 EUT Display & Controls

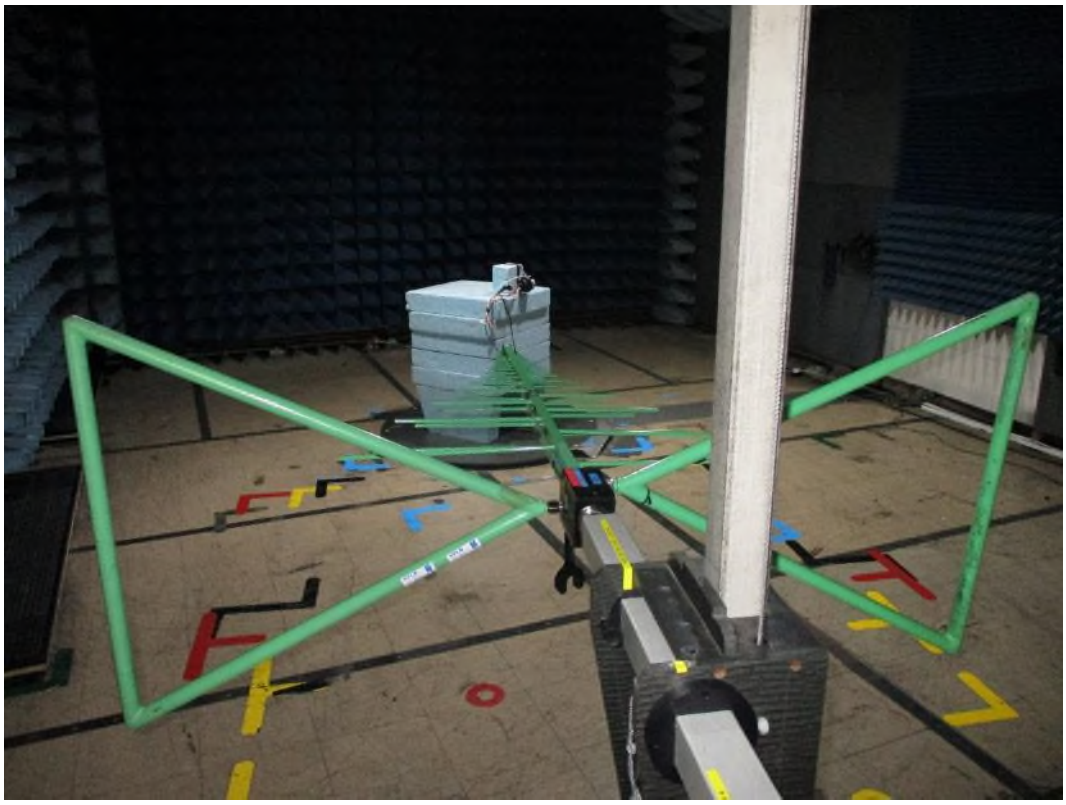
The EUT has no display or controls

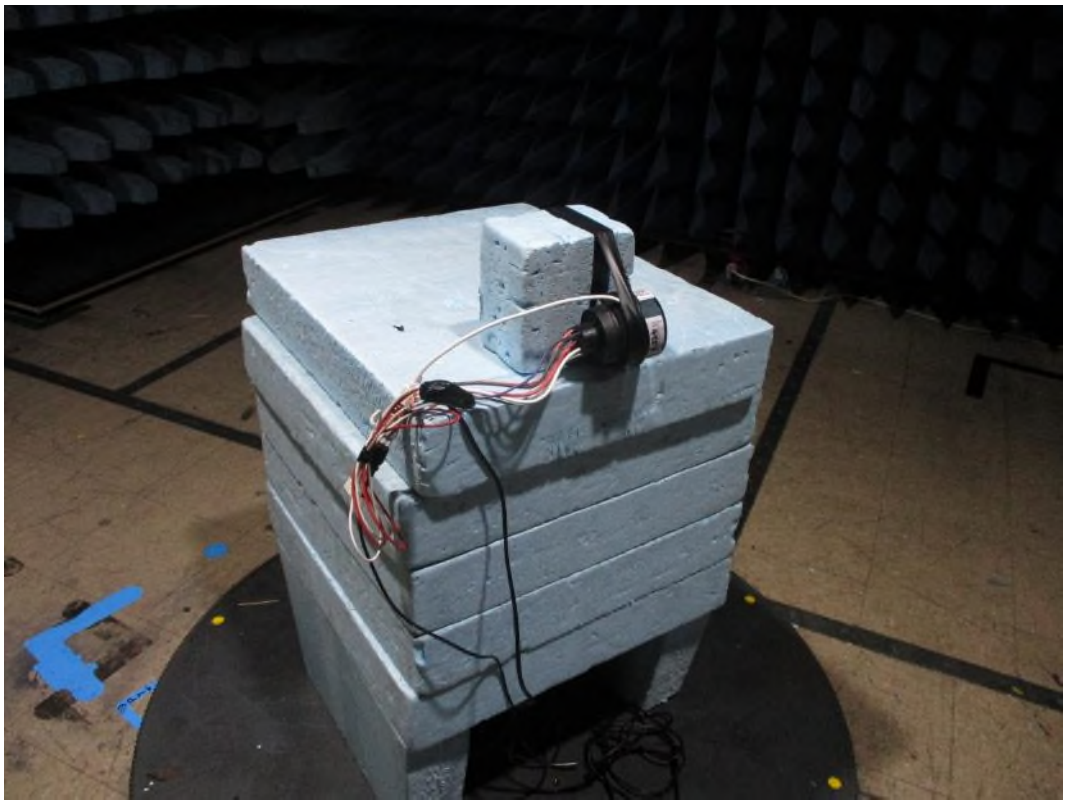
7.7 EUT Internal photos



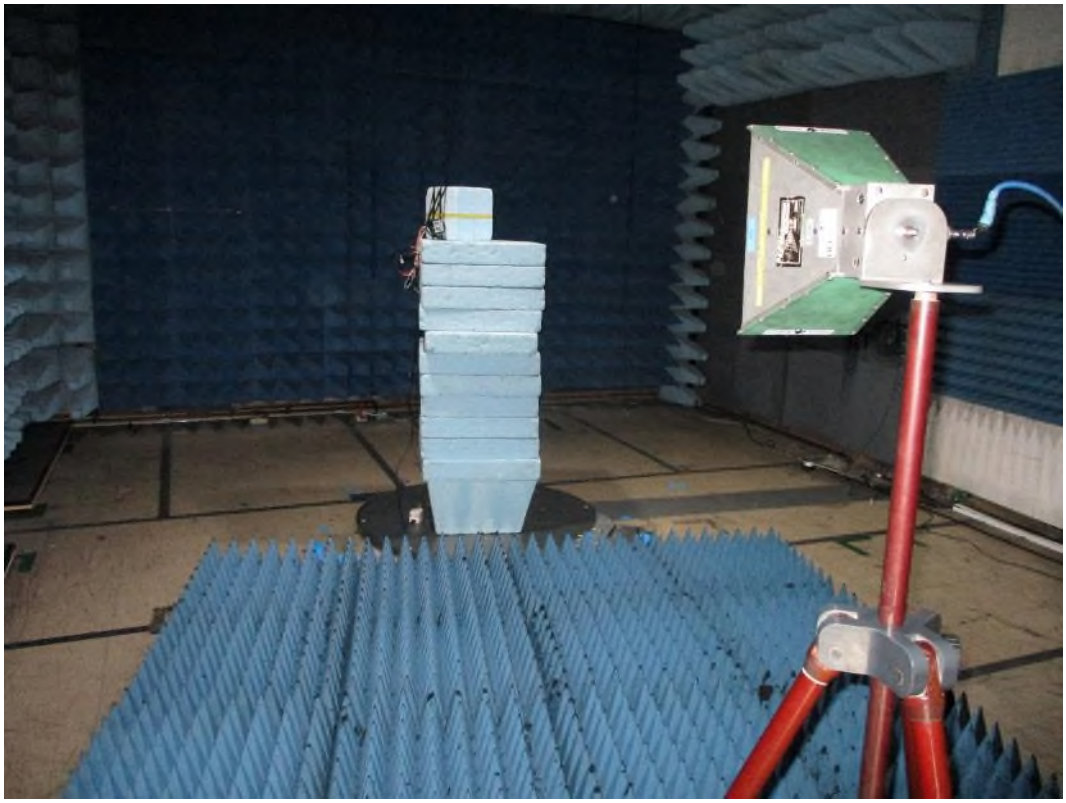
7.8 EUT ID Label

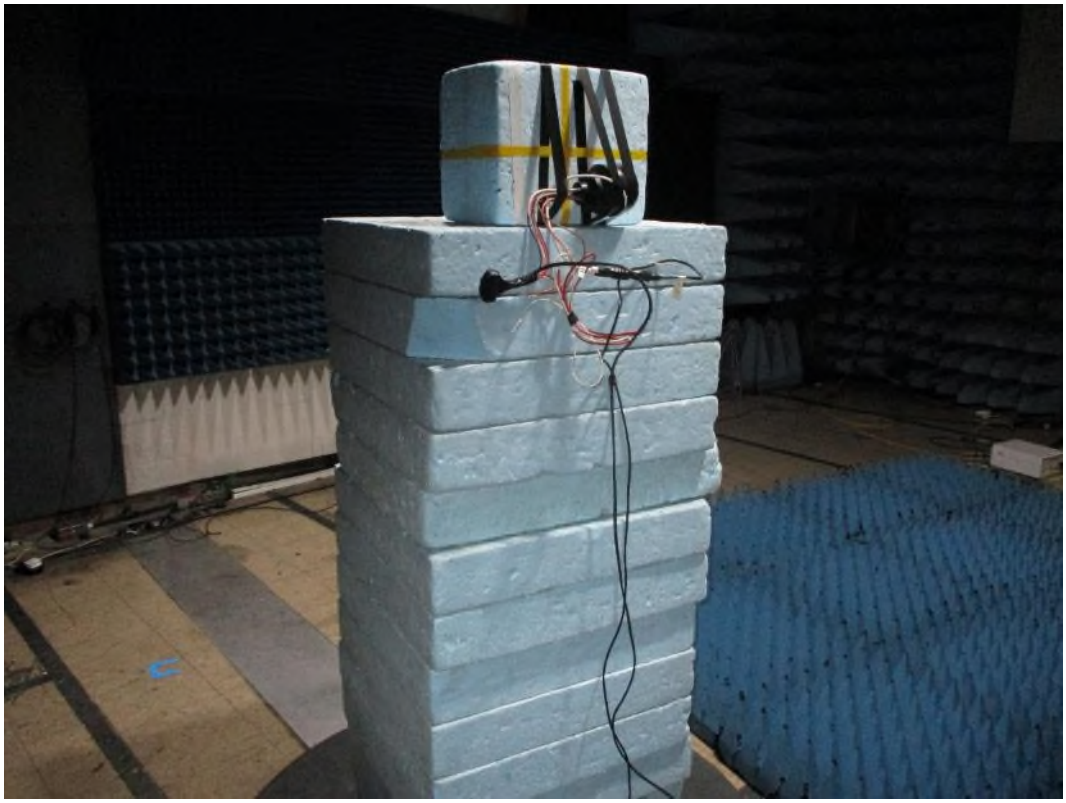
7.9 30-1000MHz Spurious emissions test set-up

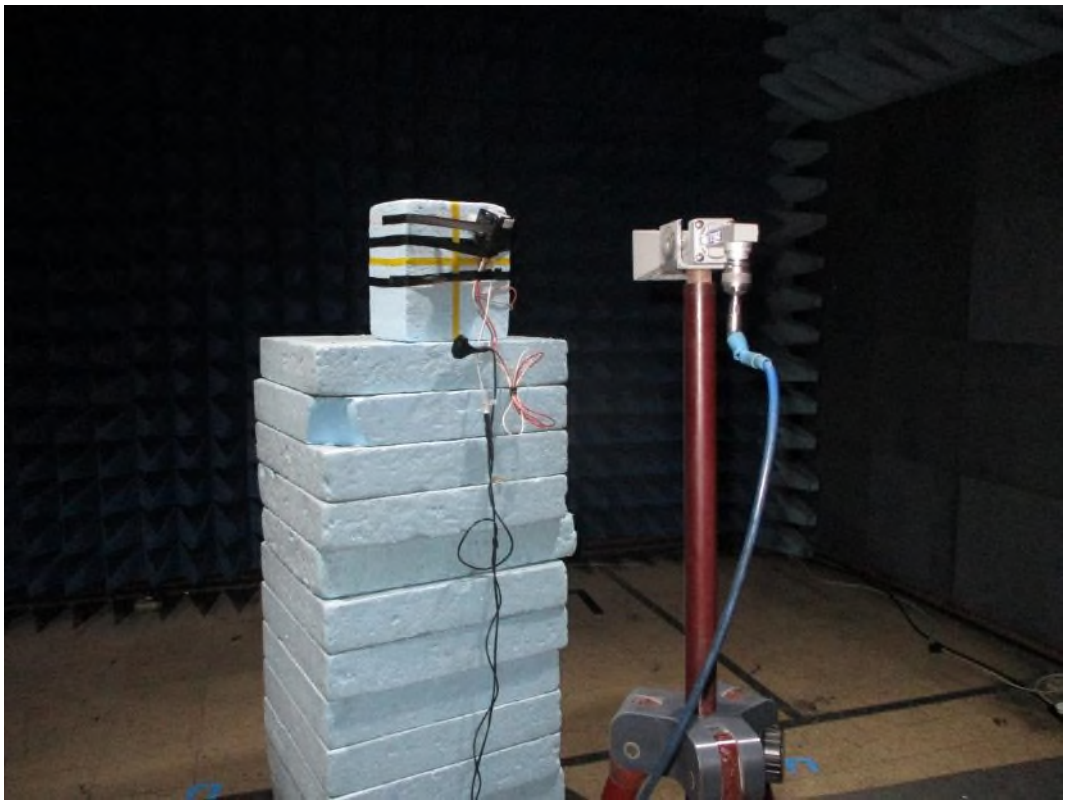


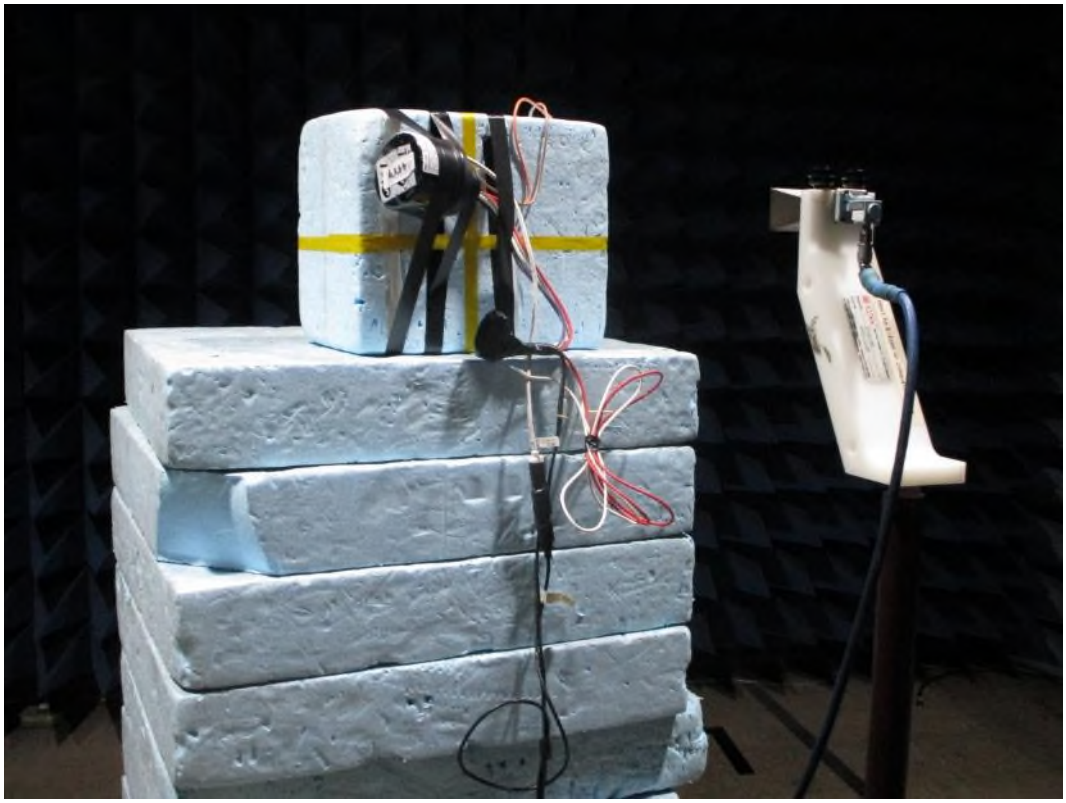


7.10 Above 1GHz Spurious emissions test set-up









7.12 Radiated emission diagrams

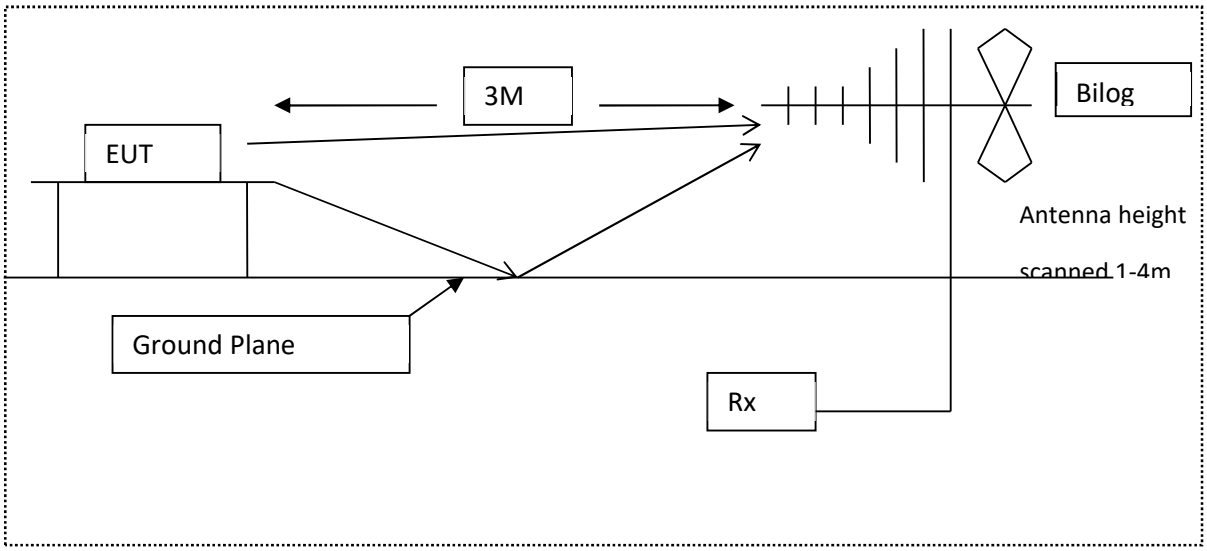


Diagram of the radiated emissions test setup 30 - 1000 MHz

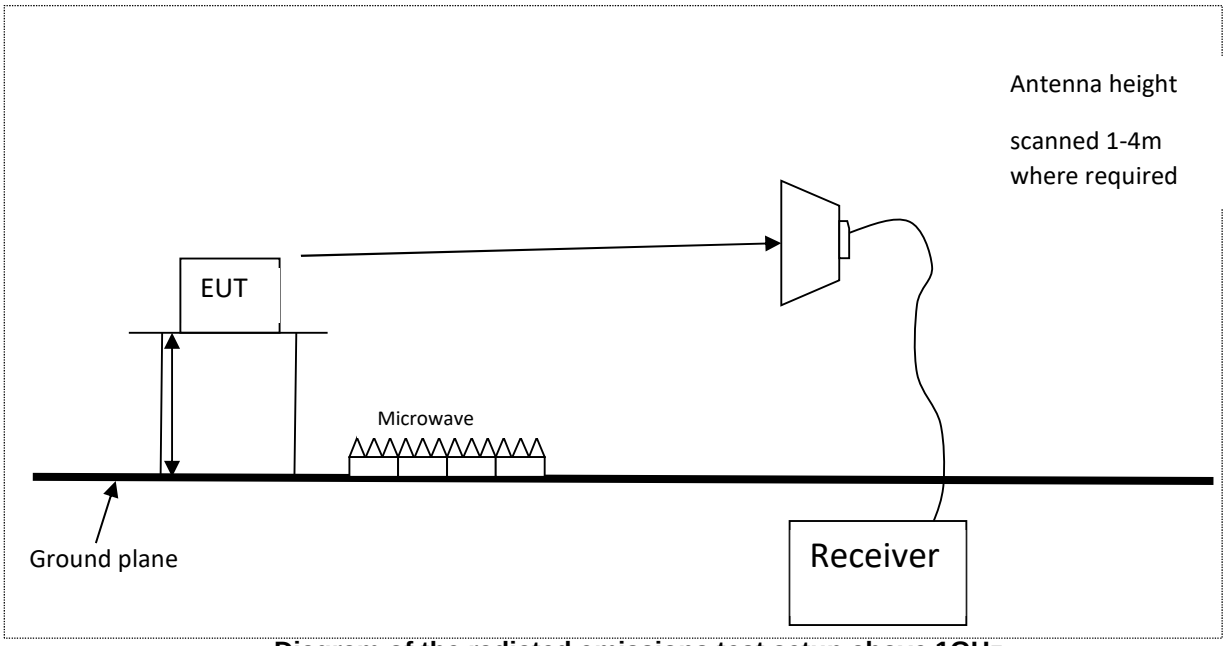


Diagram of the radiated emissions test setup above 1GHz

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
TMS79	3160-09	Horn Std Gain 18 - 26.5 GHz	ETS Systems	11/07/2024	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 OATS 3m 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
λ	Wavelength
µA/m	microAmps per metre
µV	microVolts
µW	microWatts
AC	Alternating Current
ACK	ACKnowledgement
ACP	Adjacent Channel Power
AFA	Adaptive Frequency Agility
ALSE	Absorber Lined Screened Enclosure
AM	Amplitude Modulation
Amb	Ambient
ANSI	American National Standards Institute
ATPC	Automatic Transmit Power Control
AVG	Average
AWGN	Additive White Gaussian Noise
BER	Bit Error Rate
BPSK	Binary Phase Shift Keying
BT	BlueTooth
BLE	BlueTooth Low Energy
BW	Bandwidth
ºC	Degrees Celsius
C/I	Carrier / Interferer
CAC	Channel Availability Check
CCA	Clear Channel Assessment
CEPT	European Conference of Postal and Telecommunications Administrations
CFR	Code of Federal Regulations
CISPR	Comité International Spécial des Perturbations Radioélectriques
cm	centimetre
COFDM	Coherent OFDM
COT	Channel Occupancy Time
CS	Channel Spacing
CW	Continuous Wave
DAA	Detect And Avoid
dB	deciBels
dBµA/m	deciBels relative to 1µA/m
dBµV	deciBels relative to 1µV
dBµV/m	deciBels relative to 1µV/m
dBc	deciBels relative to Carrier
dBd	deciBels relative to dipole gain
dBi	deciBels relative to isotropic gain
dBm	deciBels relative to 1mW
dBr	deciBels relative to a maximum value
dBW	deciBels relative to 1W
DC	Direct Current
DFS	Dynamic Frequency Selection
DMO	Dynamic Modulation Order
DSSS	Direct Sequence Spread Spectrum
DTA	Digital Transmission Analyser
EIRP	Equivalent Isotropic Radiated Power
emf	electromotive force
ERC	European Radiocommunications Committee
ERP	Effective Radiated Power
ETSI	European Telecommunications Standards Institute
EU	European Union
EUT	Equipment Under Test
FCC	Federal Communications Commission
FER	Frame Error Rate
FHSS	Frequency Hopping Spread Spectrum
FM	Frequency Modulation
FSK	Frequency Shift Keying
FSS	Fixed Satellite Service
g	Grams
GHz	GigaHertz
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
Hz	Hertz
IEEE	Institute of Electrical and Electronics Engineers
IF	Intermediate Frequency
ISED	Innovation Science and Economic Development
ITU	International Telecommunications Union
KDB	Knowledge DataBase

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

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. Test procedure expanded to clarify that height scanning was performed to determine that worst-case emissions were measured during test.	7 14

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