TEST REPORT

Test Report No. : UL-RPT-RP12761350-116B

Customer	:	Remote Diagnostic Technologies Ltd
Model No. / HVIN	:	00-1026-R
PMN	:	Tempus Pro
FCC ID	:	Contains FCC ID: NCMOMO6012 & PV7-WIBEAR11N-DF2
ISED Certification No.	:	Contains IC: 2734A-M06012 & 7738A-WB11NDF2
Technology	:	*Bluetooth* – Basic Rate & EDR
Test Standard(s)	:	FCC Parts 15.209(a) & 15.247 Innovation, Science and Economic Development Canada RSS-247 Section 5.5 & RSS-Gen Section 6.13

1. This test report shall not be reproduced except in full, without the written approval of UL VS 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. Version 1.0

Date of Issue: 02 May 2019

Checked by:

Ben Mercer
Senior Test Engineer, Radio Laboratory

Company Signatory:

Sarah Williams
Senior Test Engineer, Radio Laboratory
UL VS LTD

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This laboratory is accredited by UKAS. The tests reported herein have been performed in accordance with its' terms of accreditation.

UL VS LTD

Unit 1-3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, UK
Telephone: +44 (0)1256 312000
Facsimile: +44 (0)1256 312001

Customer Information

Company Name:	Remote Diagnostic Technology Ltd
Address:	Pavilion C2 Ashwood Park Ashwood way Basingstoke RG23 8BG United Kingdom

Report Revision History

Version Number	Issue Date	Revision Details	Revised By
1.0	02/05/2019	Initial Version	Ben Mercer

Table of Contents

1. Attestation of Test Results

1.1. Description of EUT

The equipment under test was a medical vital signs monitor that contains FCC / ISED Canada certified GSM/UMTS, *Bluetooth* and 2.4 GHz WLAN radio modules (FCC ID: NCMOMO6012 & PV7-WIBEAR11N-DF2, ISED Certification No. IC: 2734A-M06012 & 7738-WB11NDF2).

1.2. General Information

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.209
Specification Reference:	RSS-Gen Issue 5 April 2018
Specification Title:	General Requirements for Compliance of Radio Apparatus
Specification Reference:	RSS-247 Issue 2 February 2017
Specification Title:	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
FCC Test Firm Registration No.:	621311
ISED#:	20903
CAB Identifier:	UK0001
Test Dates:	10 February 2019 to 27 March 2019

1.3. Summary of Test Results

FCC Reference (47CFR)	ISED Canada Reference	Measurement	Result
15.247(d) & 15.209(a)	RSS-Gen 6.13 & RSS-247 5.5	Transmitter Radiated Emissions	✓

Key to Results

✓ = 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 Unit 3 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 2	
Site 17	X

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2.2. Methods and Procedures

Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

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

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 measured (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.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

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
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±4.65 dB
Radiated Spurious Emissions	1 GHz to 25 GHz	95%	±2.94 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 Radiated Emissions

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2003	Thermohygrometer	Testo	608-H1	45046641	06 Jan 2020	12
K0017	3m RSE Chamber	Rainford	N/A	N/A	16 Feb 2020	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	10 Aug 2019	12
A3167	Pre-Amplifier	Com-Power	PAM-103	18020010	11 Feb 2020	12
A2948	Pre-Amplifier	Com-Power	PAM-118A	551087	12 Feb 2020	12
A3142	Pre-Amplifier	Schwarzbeck	BBV 9718 B	00020	12 Feb 2020	12
A3161	Antenna	Teseq	CBL611D	50859	17 Dec 2019	12
A2889	Antenna	Schwarzbeck	BBHA 9120 B	BBHA 9120 B 653	12 Feb 2020	12
A2890	Antenna	Schwarzbeck	HWRD 750	014	12 Feb 2020	12
A3113	Attenuator	AtlanTecRF	AN18-06	219706#3	17 Dec 2019	12
A2916	Attenuator	AtlanTecRF	AN18W5-10	832827#1	20 Feb 2020	12
A2914	High Pass Filter	AtlanTecRF	AFH-03000	2155	20 Feb 2020	12
A2947	High Pass Filter	AtlanTecRF	AFH-07000	1601900001	20 Feb 2020	12
M2040	Thermohygrometer	Testo	608-H1	45124934	06 Jan 2020	12
K0001	5m RSE Chamber	Rainford	N/A	N/A	04 Oct 2019	12
M2044	Test Receiver	Rohde & Schwarz	ESU26	100122	17 Apr 2019	12
A3155	Pre-Amplifier	Com-Power	PAM-118A	18040037	14 Sep 2019	12
A2896	Pre-Amplifier	Schwarzbeck	BBV 9721	9721- 023	08 Feb 2020	12
A3139	Antenna	Schwarzbeck	HWRD750	00027	04 Oct 2019	12
A2895	Antenna	Schwarzbeck	BBHA 9170	9170-728	08 Feb 2020	12
A2924	Attenuator	AtlanTecRF	AN18W5-20	832828#7	04 Mar 2020	12
A3095	High Pass Filter	AtlanTecRF	AFH-07000	18051600012	29 Jun 2019	12

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Tempus Pro
Model No. / HVIN:	00-1026-R
PMN:	Tempus Pro
Test Sample Serial Number:	602429
Hardware Version:	Trizeps VII
Software Version:	V7.01
FCC ID:	Contains FCC ID: NCMOMO6012 & PV7-WIBEAR11N-DF2
ISED Canada Certification Number:	Contains IC: 2734A-M06012 & 7738A-WB11NDF2

3.2. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.3. Additional Information Related to Testing

Tested Technology:	*Bluetooth*		
Power Supply Requirement:	Nominal	12 VDC via 120 VAC 60 Hz	
Type of Unit:	Transceiver		
Channel Spacing:	1 MHz		
Mode:	Basic Rate		
Modulation:	GFSK		
Packet Type: (Maximum Payload)	DH5		
Data Rate (Mbit/s):	1		
Transmit Frequency Range:	2402 MHz to 2480 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	0	2402
	Middle	39	2441
	Top	78	2480

3.4. Description of Available Antennas

The radio utilises an integrated antenna with the following maximum gain:

Manufacturer	Model	Type	Frequency Range (MHz)	Antenna Gain (dBi)
Antenova	A10470-BLADE	Monopole	2400 to 2500	Not specified

3.5. Description of Test Setup

EUT Accessories

The following accessories were used to exercise the EUT during testing:

Description:	Power Supply
Brand Name:	ASTEC
Model Name or Number:	DPS53-M / RDT Tempus PSU 01-2049
Serial Number:	Not marked or stated

Description:	Earpiece. Quantity 1
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	Pulse Oximeter (Masimo rainbow finger sensor). Quantity 1
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	End Tidal C02 Monitor (plastic hose). Quantity 1
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	ECG (RDT 12-lead cable 01-2073). Quantity 1
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	Non-invasive blood pressure monitor (plastic hose). Quantity 1
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	Contact temperature thermocouple. Quantity 2
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

EUT Accessories (continued)

Description:	USB Cable (RDT data transfer cable 01-2243). Quantity 1
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	Invasive blood pressure; internal (RDT 2-channel cable 01-2108 & 01-2113 with transducers)
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Support Equipment

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

Description:	Laptop PC
Brand Name:	Lenovo
Model Name or Number:	L430
Serial Number:	R9-Z2L03 13/06

Description:	USB Cable. Length 2 metres. Quantity 1.
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	Ethernet Cable. Length 2 metres. Quantity 1.
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	USB Hub
Brand Name:	HAMA
Model Name or Number:	00078498
Serial Number:	Not marked or stated

Description:	Ethernet Hub
Brand Name:	Netgear
Model Name or Number:	DG834G
Serial Number:	1JX167B008C4A

Support Equipment (continued)

Description:	Wideband Radio Comms Tester
Brand Name:	Rohde & Schwarz
Model Name or Number:	CMW 500
Serial Number:	145923

Operating Modes

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

- Continuously transmitting at maximum power on bottom, middle and top channels in Basic Rate (DH5 packets) as required.

Configuration and Peripherals

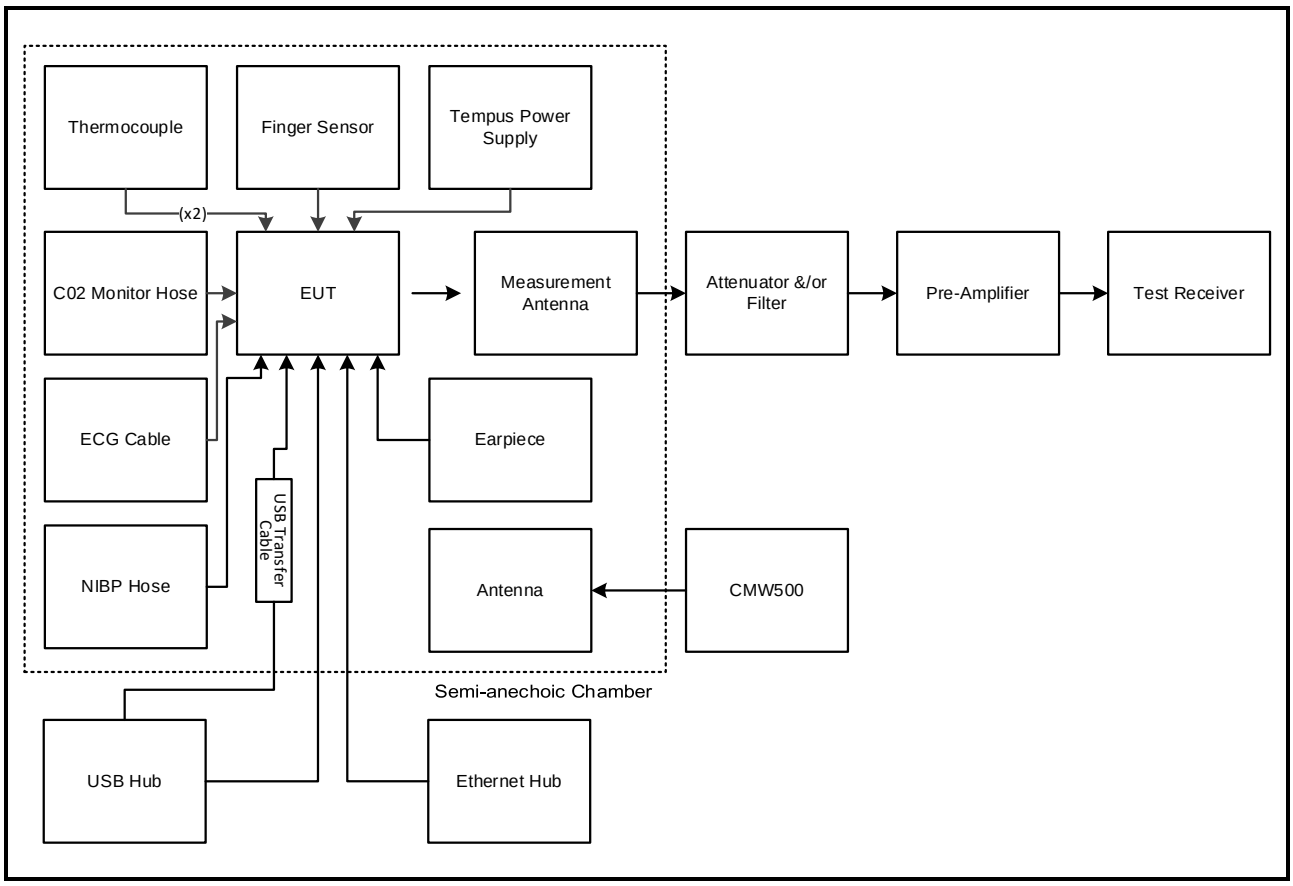
The EUT was tested in the following configuration(s):

- *Bluetooth* was configured using a command prompt application installed on the laptop PC supplied by the customer. The application was used to enable continuous transmission and to select the test channels as required.
- Transmitter radiated spurious emissions tests were performed with the EUT transmitting in DH5 mode as this was declared to be worst case by the client.
- The EUT was powered from a 120 VAC 60 Hz single phase supply via a 12V power adaptor.
- All ports were terminated with typical end-user hardware.

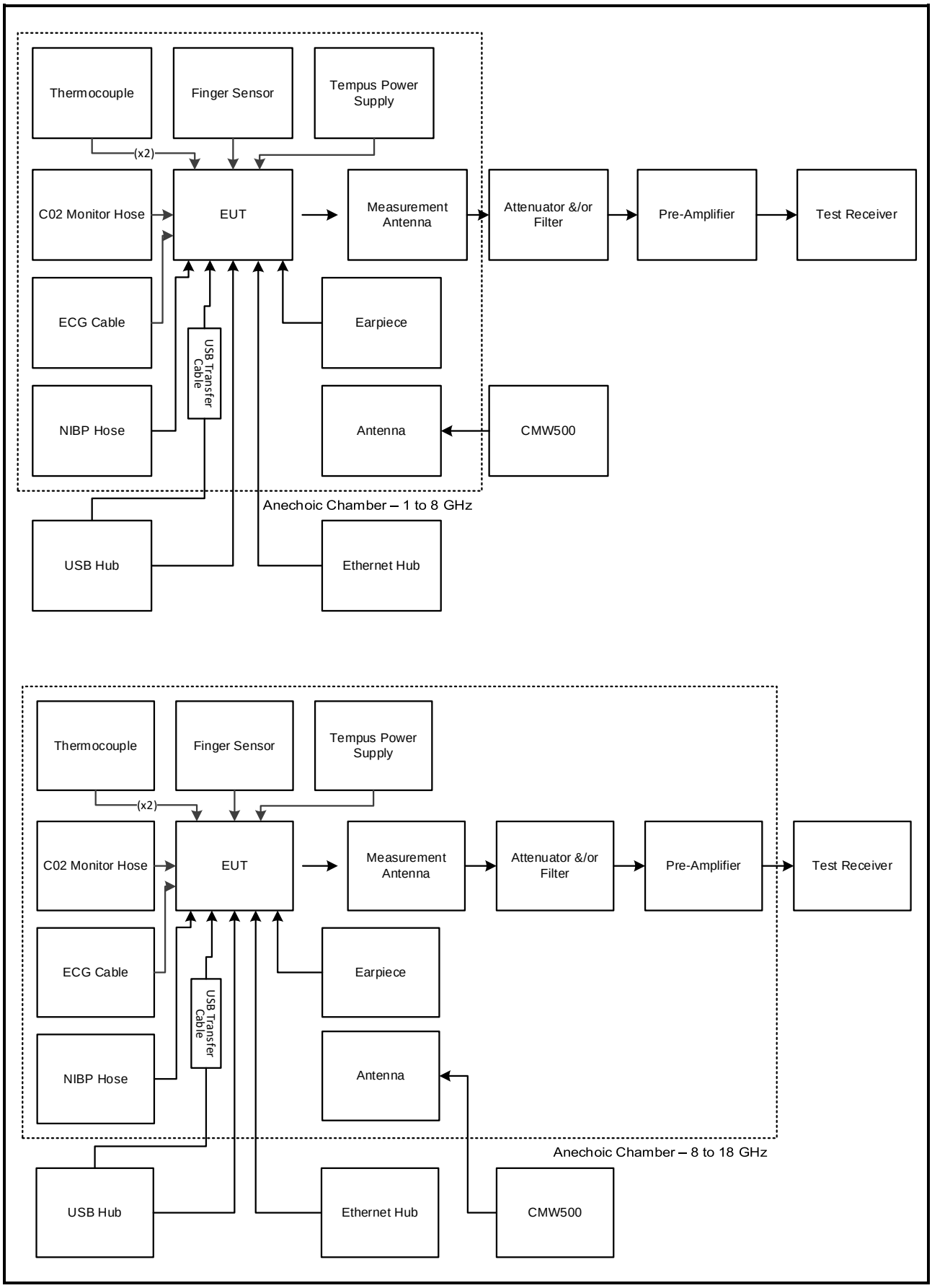
Test Setup Diagrams

Radiated Tests:

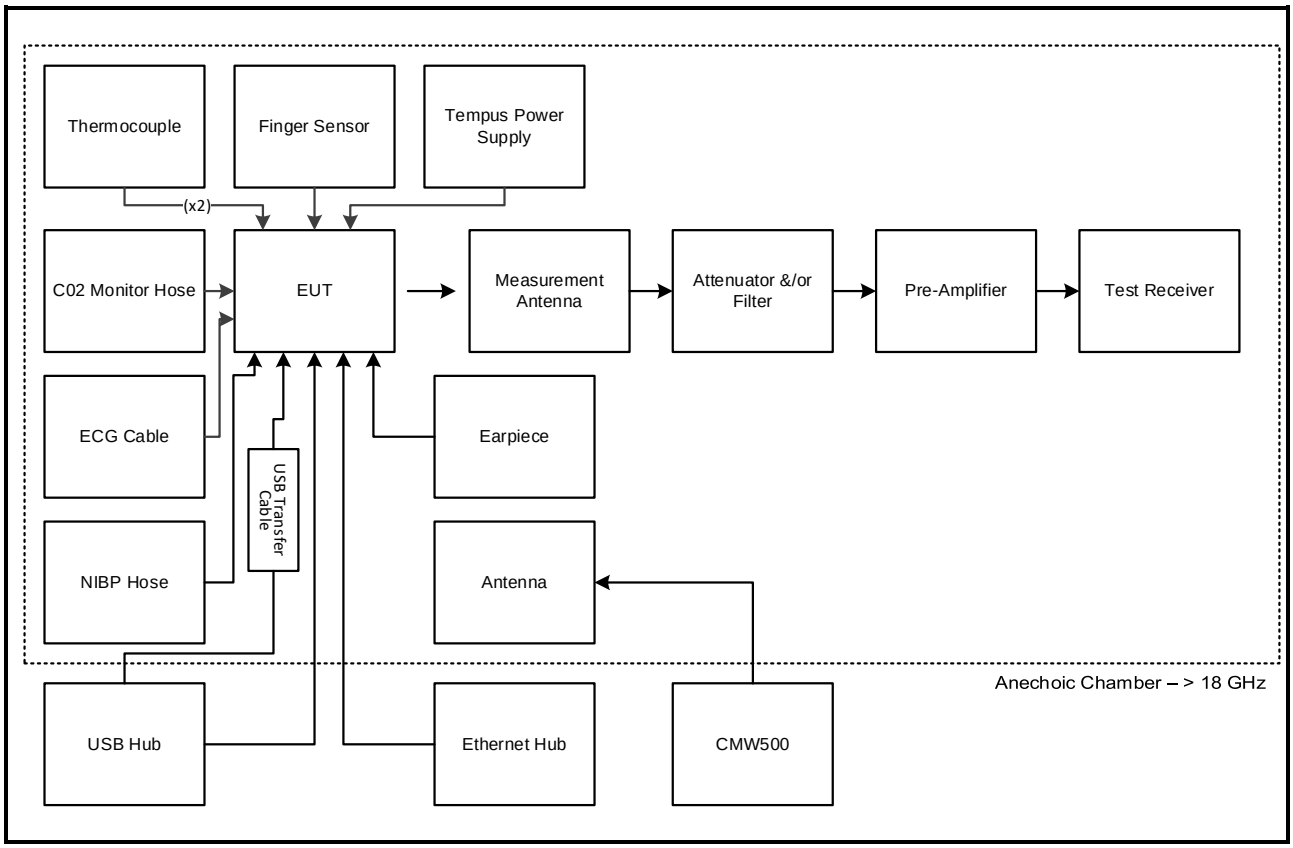
Test Setup for Transmitter Radiated Emissions



Test Setup for Transmitter Radiated Emission (continued)



Test Setup for Transmitter Radiated Emission (continued)



4. Radiated Test Results

4.1. Transmitter Radiated Emissions <1 GHz

Test Summary:

Test Engineers:	James O'Reilly & Mark Perry	**Test Date:**	22 March 2019
Test Sample Serial Number:	602429		

FCC Reference:	Parts 15.247(d) & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13 & RSS-247 5.5
Test Method Used:	ANSI C63.10 Sections 6.3 and 6.5
Frequency Range	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	21 to 24
Relative Humidity (%):	37 to 52

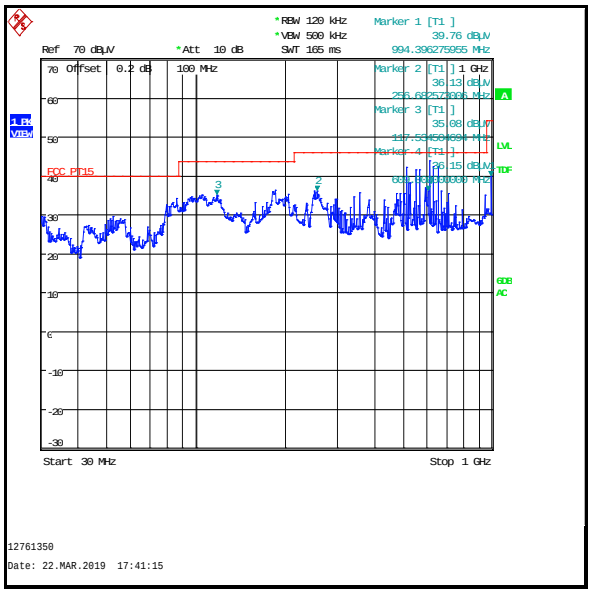
Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the middle channel only.
3. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0017) 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.
4. Pre-scans were performed with the EUT transmitting on middle channel with a data rate of DH5 and markers placed on the highest measured levels. The test receiver 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.
5. Final measurements were performed on the marker frequencies and the results entered into the table below. The test receiver resolution bandwidth was set to 120 kHz, using a CISPR quasi-peak detector and span wide enough to see the whole emission.

Transmitter Radiated Emissions (continued)

Results: Quasi-Peak

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
116.477	Vertical	31.3	43.5	12.2	Complied
257.613	Horizontal	29.9	46.0	16.1	Complied
331.782	Vertical	31.1	46.0	14.9	Complied
609.029	Horizontal	30.7	46.0	15.3	Complied
613.907	Horizontal	43.1	46.0	2.9	Complied
990.021	Vertical	37.5	54.0	16.5	Complied



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

4.2. Transmitter Radiated Emissions >1 GHz

Test Summary:

Test Engineers:	James O'Reilly, Mark Perry & Andrew Edwards	**Test Dates:**	09 March 2019 to 27 March 2019
Test Sample Serial Number:	602429		

FCC Reference:	Parts 15.247(d) & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13 / RSS-247 5.5
Test Method Used:	ANSI C63.10 Sections 6.3 and 6.6
Frequency Range	1 GHz to 25 GHz

Environmental Conditions:

Temperature (°C):	21 to 24
Relative Humidity (%):	37 to 43

Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. The emission shown on the 1 GHz to 3 GHz plot is the EUT fundamental.
3. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the appropriate limit or below the measurement system noise floor.
4. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0017) 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. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT.
5. Final measurements above 1 GHz were performed in a semi-anechoic chambers (Asset Numbers K0001 and K0017) at a distance of 3 metres. The EUT was placed at a height of 1.5 m 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.
6. Pre-scans were performed with the EUT transmitting on middle channel with a data rate of DH5 and a marker placed on the highest measured level of the appropriate plot. The test receiver resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. The sweep time was set to auto.
7. *In accordance with ANSI C63.10 Section 6.6.4.3 (Note 1), if the peak measured value complies with the average limit, it is not necessary to perform an average measurement.
8. Final measurements have only been performed on static channel as hopping mode is not required.

Transmitter Radiated Emissions (continued)

Results: Peak / Bottom Channel

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2326.366	Horizontal	52.8*	54.0	1.2	Complied

Results: Peak / Middle Channel

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2361.624	Horizontal	53.9*	54.0	0.1	Complied
7323.366	Vertical	56.3	74.0	17.7	Complied

Results: Average / Middle Channel

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
7323.430	Vertical	53.6	54.0	0.4	Complied

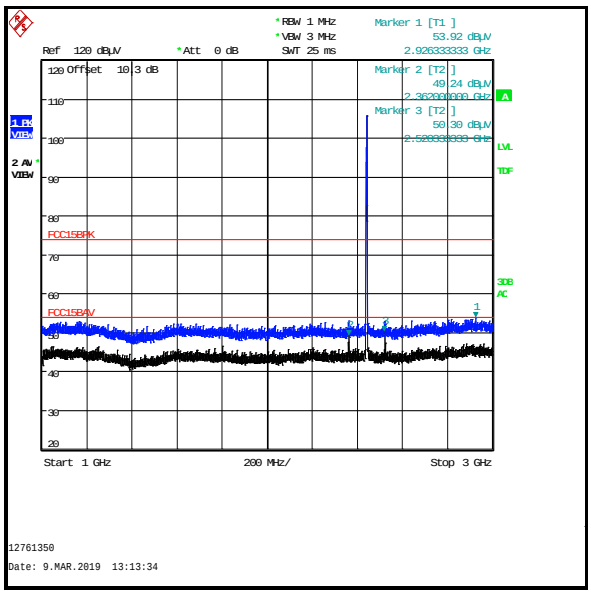
Results: Peak / Top Channel

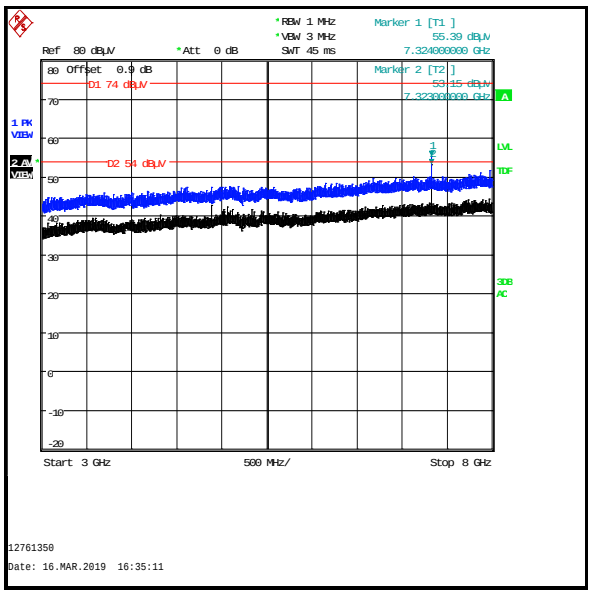
Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
7440.546	Vertical	54.3	74.0	19.7	Complied

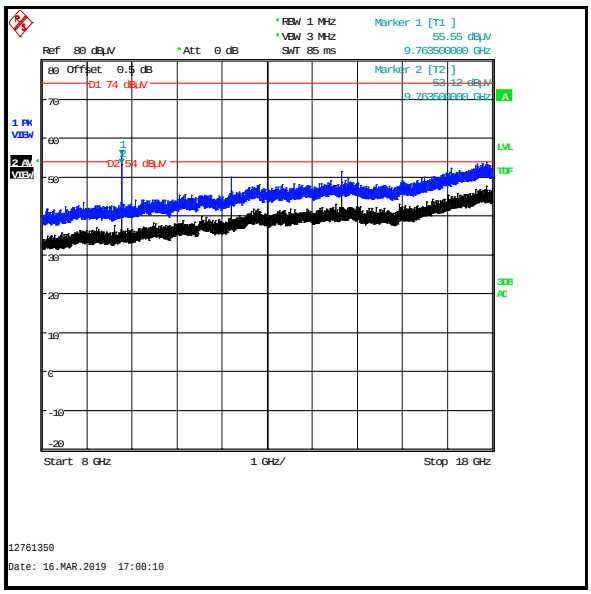
Results: Average / Top Channel

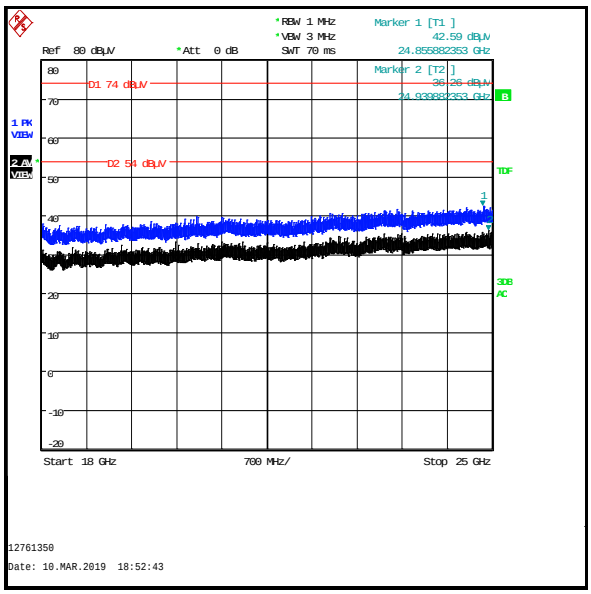
Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
7440.292	Vertical	50.5	54.0	3.5	Complied

Transmitter Radiated Emissions (continued)









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

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