Report on the FCC and IC Testing of the Sepura plc Radio Handset, Model: SC2128 Re-chargeable Li-Polymer Battery, Model: 300-01852 and Model: 300-01853 In accordance with FCC 47 CFR Part 15B, Industry Canada RSS-GEN and ICES-003

Product Service

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Prepared for: Sepura plc
9000 Cambridge Research Park, Beach Drive,
Waterbeach, Cambridge, CB25 9TL,
United Kingdom

FCC ID: XX6SC2128 IC: 8739A-SC2128

COMMERCIAL-IN-CONFIDENCE

Document Number: 75941492-01 | Issue: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Natalie Bennett	26 April 2018	
Authorised Signatory	Matthew Russell	26 April 2018	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

ENGINEERING STATEMENT
The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15B, Industry Canada RSS-GEN and ICES-003. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Graeme Lawler	26 April 2018	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC2932B-1 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15B :2017, Industry Canada RSS-GEN: Issue 04 (2014) and ICES-003: Issue 06 (2016).

TÜV SÜD Product Service
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Product Service

Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	26 April 2018

Table 1

1.2 Introduction

Applicant	Sepura plc
Manufacturer	Sepura plc
Model Number(s)	Handset: SC2128 Standard Capacity Battery: 300-01852 High Capacity Battery: 300-01853 Charger: 300-01930 Power Supply: ABSP024100240-1
Serial Number(s)	Handset: Not Serialised (75941492-TSR0002) Standard Capacity Battery: 30000000A997F63D and 5E000000A9E8E73D High Capacity Battery: 38000000A984183D, 76000000A99C723D, AC000000A97E403D and BE000000A9C92A3D Charger: 7PP001742B90M6Q Power Supply: N/A
Hardware Version(s)	Production
Software Version(s)	SC 1.5
Number of Samples Tested	1 handset with 2 types of battery
Test Specification/Issue/Date	FCC 47 CFR Part 15B: 2017 Industry Canada RSS-GEN: Issue 04 (2014) ICES-003: Issue 06 (2016)
Order Number Date	PO 008940 24-January-2018
Date of Receipt of EUT	05-March-2018
Start of Test	10-April-2018
Finish of Test	11-April-2018
Name of Engineer(s)	Graeme Lawler
Related Document(s)	ANSI C63.4: 2014

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15B, Industry Canada RSS-GEN and ICES-003 is shown below.

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15B	RSS-GEN	ICES-003			
Configuration and Mode: Standard Capacity Battery - Idle						
2.1	15.107	8.8	6.1	Conducted Disturbance at Mains Terminals	Pass	ANSI C63.4: 2014
2.2	15.109	7.1	6.2	Radiated Disturbance	Pass	ANSI C63.4: 2014
Configuration and Mode: High Capacity Battery - Idle						
2.1	15.107	8.8	6.1	Conducted Disturbance at Mains Terminals	Pass	ANSI C63.4: 2014
2.2	15.109	7.1	6.2	Radiated Disturbance	Pass	ANSI C63.4: 2014

Table 2

1.4 Application Form

EQUIPMENT DESCRIPTION	
Model Name/Number	SC2128
Part Number	N/A
Hardware Version	Production
Software Version	SC 1.5
FCC ID (if applicable)	XX6SC2128
Industry Canada ID (if applicable)	8739A-SC2128
Technical Description (Please provide a brief description of the intended use of the equipment)	Portable TETRA Radio for use by the emergency services etc.

INTENTIONAL RADIATORS									
Technology	Frequency Band (MHz)	Conducted Declared Output Power (dBm)	Antenna Gain (dBi)	Supported Bandwidth (s) (MHz)	Modulation Scheme(s)	ITU Emission Designator	Test Channels (MHz)		
							Bottom	Middle	Top
TETRA	806-824	34	>0	25kHz	Pi/4DQPSK	22K0DXW	806	815	824
TETRA	851-869	34	>0	25kHz	Pi/4DQPSK	22K0DXW	851	860	869
Bluetooth	2402-2480	7.382	2.5	1.0	8PSK, DQPSK, GFSK	1M00F1D	2402	2441	2480
WLAN	2412-2462	17.3	2.5	16.5 22 16.5	802.11g, 802.11b 802.11n.20	16M5D1D 22M0G1D 16M5D1D	2412	2437	2482

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	19.2 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	
Class A Digital Device (Use in commercial, industrial or business environment) ☒ Class B Digital Device (Use in residential environment only) ☐	

Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
External DC	Nominal Voltage	Maximum Current	
	7.4vdc	2A	
Battery	Nominal Voltage	Battery Operating End Point Voltage	
	7.4vdc	6.2vdc	
Can EUT transmit whilst being charged?		Yes ☒ No ☐	

EXTREME CONDITIONS					
Maximum temperature	+65	°C	Minimum temperature	-30	°C

Ancillaries
Please list all ancillaries which will be used with the device.
Remote speaker mic, leather cases, pocket clips, earpieces

ANTENNA CHARACTERISTICS					
☐	Antenna connector		State impedance		Ohm
☒	Temporary antenna connector		State impedance	50	Ohm
☐	Integral antenna	Type			
☐	External antenna	Type			

I hereby declare that the information supplied is correct and complete.

Name: Steve Wood

Position held: Product Conformance manager Date: 23/03/18

1.5 Product Information

1.5.1 Technical Description

Portable TETRA Radio for use by the emergency services etc.

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Handset: Serial Number: Not Serialised (75941492-TSR0002)			
0	As supplied by the customer	Not Applicable	Not Applicable
Standard Capacity Battery: Serial Number: 30000000A997F63D			
0	As supplied by the customer	Not Applicable	Not Applicable
Standard Capacity Battery: Serial Number: 5E000000A9E8E73D			
0	As supplied by the customer	Not Applicable	Not Applicable
High Capacity Battery: Serial Number: 38000000A984183D			
0	As supplied by the customer	Not Applicable	Not Applicable
High Capacity Battery: Serial Number: 76000000A99C723D			
0	As supplied by the customer	Not Applicable	Not Applicable
High Capacity Battery: Serial Number: AC000000A97E403D			
0	As supplied by the customer	Not Applicable	Not Applicable
High Capacity Battery: Serial Number: BE000000A9C92A3D			
0	As supplied by the customer	Not Applicable	Not Applicable
Charger: Serial Number: 7PP001742B90M6Q			
0	As supplied by the customer	Not Applicable	Not Applicable
Power Supply: Serial Number: N/A			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.8 Test Location

TÜV SÜD Product Service conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: Standard Capacity Battery - Idle		
Conducted Disturbance at Mains Terminals	Graeme Lawler	UKAS
Radiated Disturbance	Graeme Lawler	UKAS
Configuration and Mode: High Capacity Battery - Idle		
Conducted Disturbance at Mains Terminals	Graeme Lawler	UKAS
Radiated Disturbance	Graeme Lawler	UKAS

Table 4

Office Address:

Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 Conducted Disturbance at Mains Terminals

2.1.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.107
Industry Canada RSS-GEN, Clause 8.8
ICES-003, Clause 6.1

2.1.2 Equipment Under Test and Modification State

Handset: SC2128, S/N: Not Serialised (75941492-TSR0002) - Modification State 0
Standard Capacity Battery: 300-01852, S/N: 30000000A997F63D - Modification State 0
Standard Capacity Battery: 300-01852, S/N: 5E000000A9E8E73D - Modification State 0
High Capacity Battery: 300-01853, S/N: 76000000A99C723D - Modification State 0
High Capacity Battery: 300-01853, S/N: AC000000A97E403D - Modification State 0
Charger: 300-01930, S/N: 7PP001742B90M6Q - Modification State 0
Power Supply: ABSP024100240-1, S/N: N/A - Modification State 0

2.1.3 Date of Test

11-April-2018

2.1.4 Test Method

The EUT was placed on a non-conductive table 0.8m above a reference ground plane and 0.4m away from a vertical coupling plane.

All power was connected to the EUT through an Artificial Mains Network (AMN). Conducted disturbance voltage measurements on mains lines were made at the output of the AMN. The AMN was placed 0.8m from the boundary of the EUT and bonded to the reference ground plane.

The EUT was assessed against the class B limits specified in FCC 47 CFR Part 15.107 and Industry Canada ICES-003, clause 6.1 as this represents the most stringent limits.

2.1.5 Environmental Conditions

Ambient Temperature	21.6 °C
Relative Humidity	41.0 %

2.1.6 Test Results

Results for Configuration and Mode: Standard Capacity Battery - Idle

Performance assessment of the EUT made during this test: Pass.

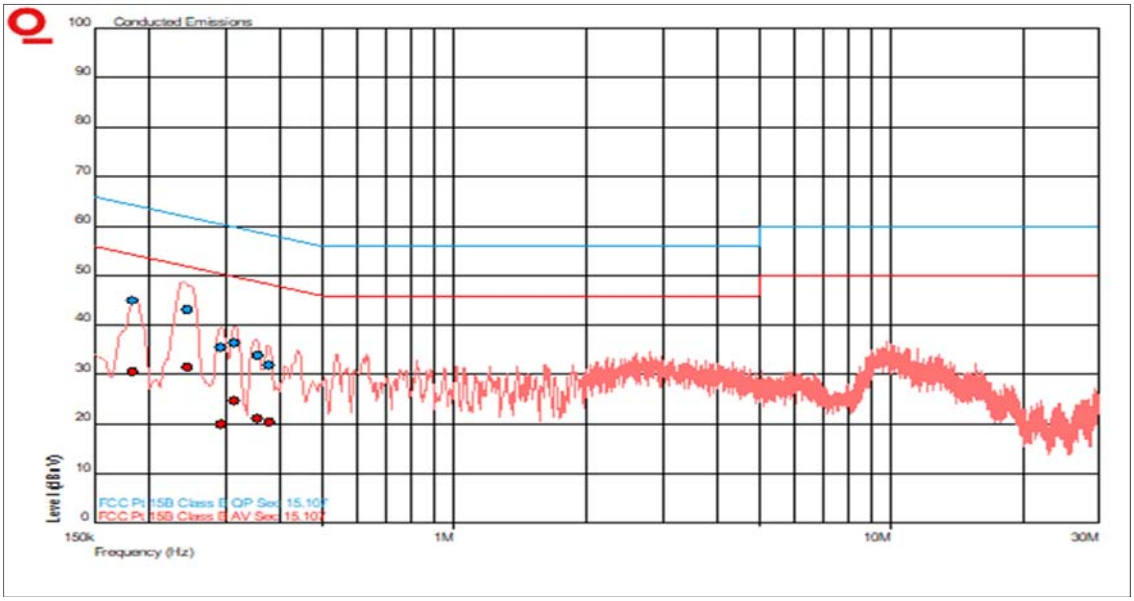

Figure 1 - Graphical Results - AC Mains Neutral

Frequency (MHz)	QP Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.184	44.9	64.3	-19.4	30.5	54.3	-23.8
0.245	43.1	61.9	-18.8	31.5	51.9	-20.5
0.293	35.5	60.4	-25.0	19.9	50.4	-30.6
0.313	36.4	59.9	-23.5	24.7	49.9	-25.2
0.355	33.8	58.8	-25.0	21.2	48.8	-27.7
0.376	31.9	58.4	-26.5	20.3	48.4	-28.0

Table 5

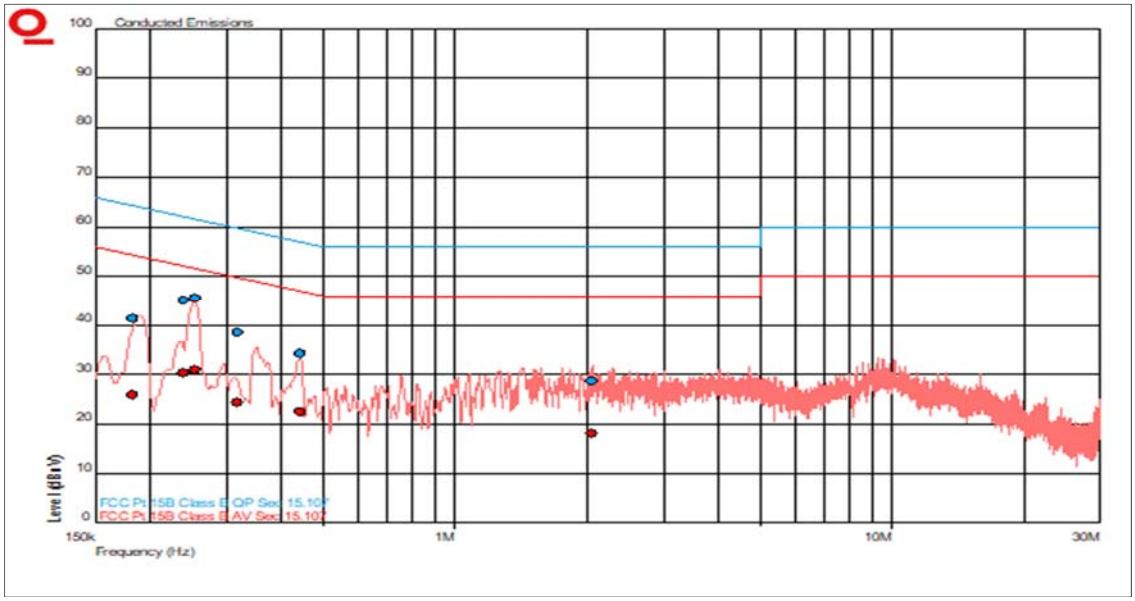

Figure 2 - Graphical Results - AC Mains Live

Frequency (MHz)	QP Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.183	41.5	64.4	-22.9	25.9	54.4	-28.5
0.238	45.2	62.2	-17.0	30.3	52.2	-21.8
0.253	45.6	61.7	-16.0	31.0	51.7	-20.7
0.316	38.5	59.8	-21.3	24.4	49.8	-25.4
0.441	34.3	57.1	-22.8	22.5	47.1	-24.5
2.051	28.7	56.0	-27.3	18.2	46.0	-27.8

Table 6

Results for Configuration and Mode : High Capacity Battery - Idle.

Performance assessment of the EUT made during this test: Pass.

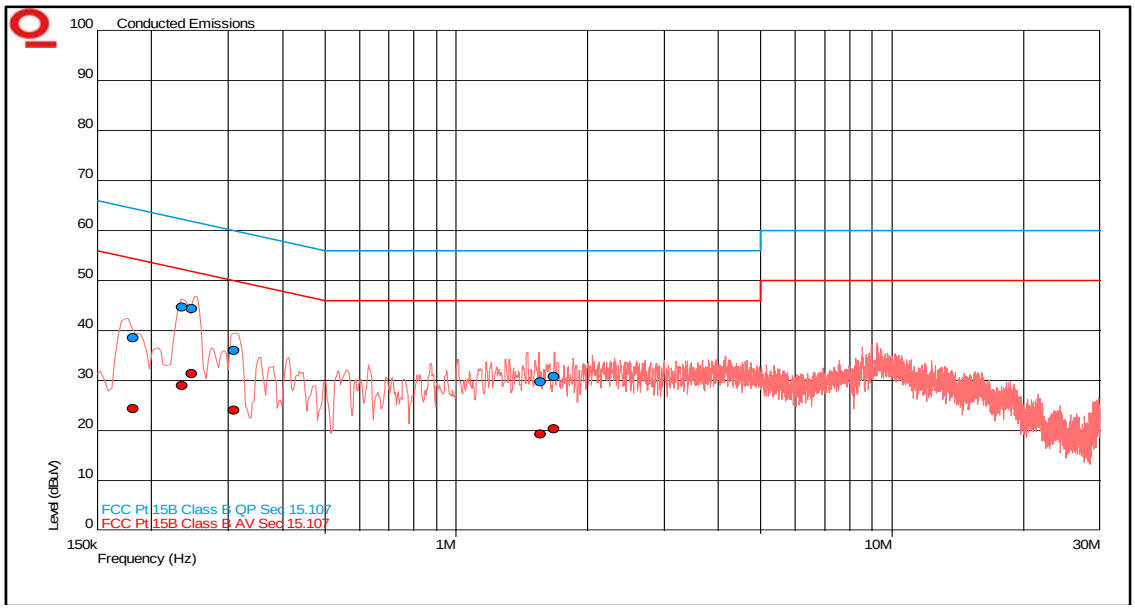

Figure 3 - Graphical Results - AC Mains Neutral

Frequency (MHz)	QP Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.181	38.6	64.4	-25.8	24.4	54.4	0.181
0.235	44.7	62.3	-17.6	29.0	52.3	0.235
0.247	44.3	61.9	-17.5	31.4	51.9	0.247
0.309	36.1	60.0	-23.9	24.1	50.0	0.309
1.562	29.8	56.0	-26.2	19.4	46.0	1.562
1.676	30.8	56.0	-25.2	20.3	46.0	1.676

Table 7

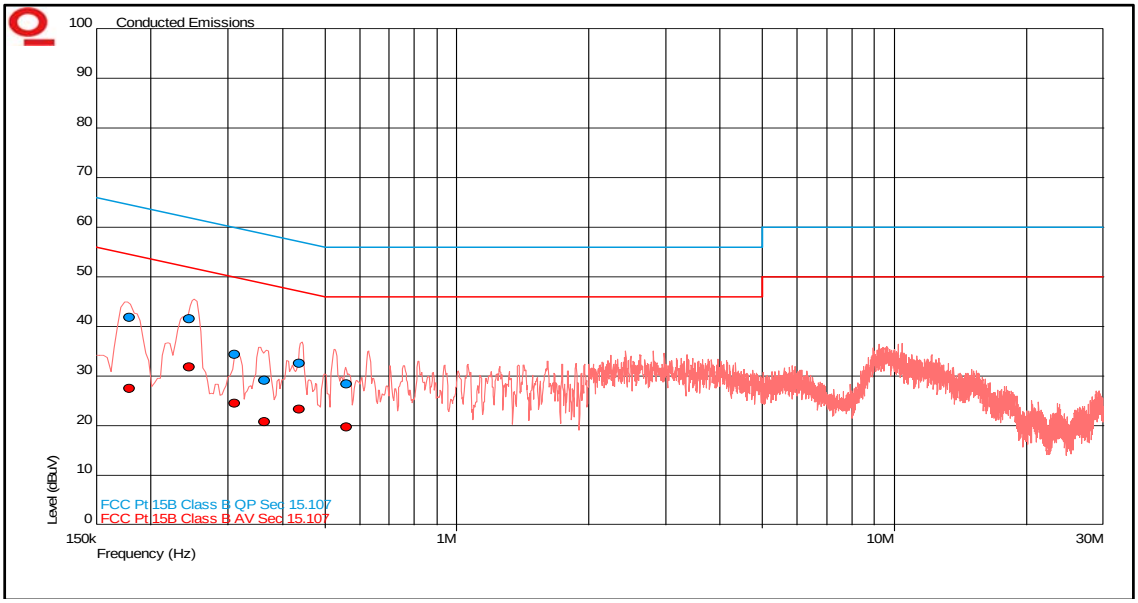

Figure 4 - Graphical Results - AC Mains Live

Frequency (MHz)	QP Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.179	41.8	64.5	-22.7	27.5	54.5	-27.0
0.244	41.6	61.9	-20.3	31.9	51.9	-20.0
0.310	34.4	60.0	-25.6	24.5	50.0	-25.5
0.364	29.2	58.6	-29.5	20.8	48.6	-27.8
0.436	32.6	57.1	-24.5	23.3	47.1	-23.8
0.559	28.4	56.0	-27.6	19.7	46.0	-26.3

Table 8

2.1.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Transient Limiter	Hewlett Packard	11947A	15	12	30-May-2018
Screened Room (5)	Rainford	Rainford	1545	36	9-Jun-2018
Single Phase LISN	Rohde & Schwarz	ESH3-Z5	1674	12	4-Apr-2019
Hygromer	Rotronic	A1	2138	12	21-Feb-2019
Multimeter	Iso-tech	IDM101	2417	12	2-Oct-2018
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Nov-2018
N to N cable, 4m	Rhophase	2303-002-TUVS	4849	12	18-Dec-2018
N to N cable, 4m	Rhophase	2303-002-TUVS	4850	12	18-Dec-2018

Table 9

2.2 Radiated Disturbance

2.2.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.109
Industry Canada RSS GEN, Clause 7.1
ICES-003, Clause 6.2

2.2.2 Equipment Under Test and Modification State

Handset: SC2128, S/N: Not Serialised (75941492-TSR0002) - Modification State 0
Standard Capacity Battery: 300-01852, S/N: 30000000A997F63D - Modification State 0
Standard Capacity Battery: 300-01852, S/N: 5E000000A9E8E73D - Modification State 0
High Capacity Battery: 300-01853, S/N: 38000000A984183D - Modification State 0
High Capacity Battery: 300-01853, S/N: BE000000A9C92A3D - Modification State 0
Charger: 300-01930, S/N: 7PP001742B90M6Q - Modification State 0
Power Supply: ABSP024100240-1, S/N: N/A - Modification State 0

2.2.3 Date of Test

10-April-2018

2.2.4 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive table 0.8m above a reference ground plane.

A pre-scan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarisation using a peak detector; measurements were taken at a 3m distance. Using the pre-scan list of the highest emissions detected, their bearing and associated antenna polarisation, the EUT was then formally measured using a Quasi-Peak, Peak, Average detector as appropriate. The readings were maximised by adjusting the antenna height, polarisation and turntable azimuth, in accordance with the specification.

The EUT was assessed against the class B limits specified in FCC 47 CFR Part 15.109 and Industry Canada ICES-003, clause 7.1 as this represents the most stringent limits.

2.2.5 Environmental Conditions

Ambient Temperature	21.0 °C
Relative Humidity	42.0 %

2.2.6 Test Results

Results for Configuration and Mode: Standard Capacity Battery - Idle

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Highest frequency generated or used within the EUT: 19.2 MHz
Which necessitates an upper frequency test limit of: 13 GHz

Frequency Range of Test: 30 MHz to 1 GHz

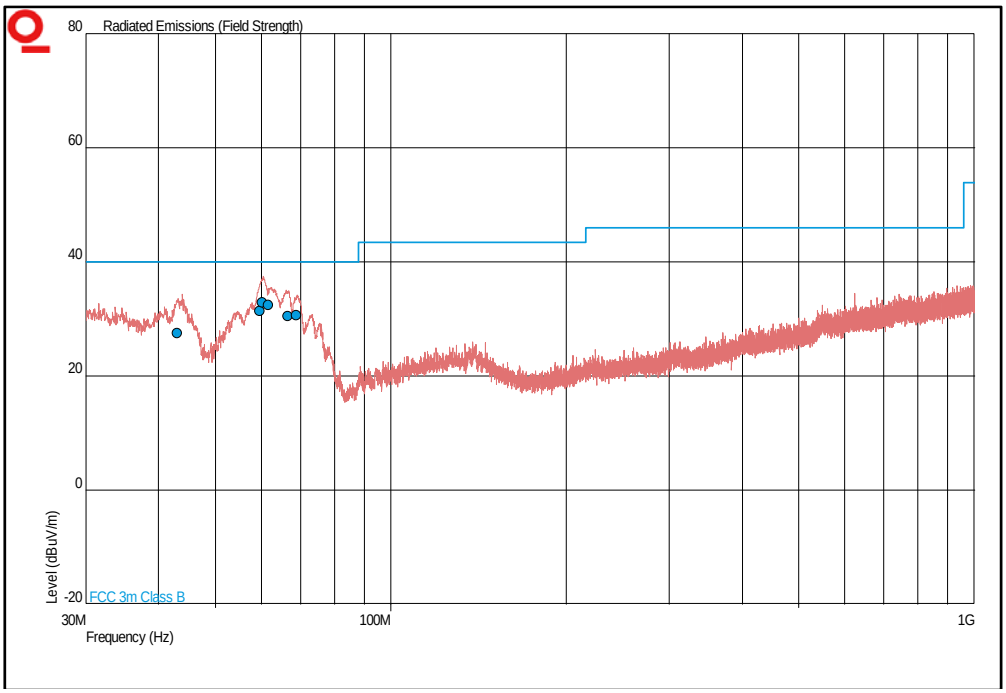

Figure 5 - Graphical Results 30 MHz to 1 GHz - Horizontal and Vertical Polarity

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
41.074	27.9	40.0	-12.1	317	1.48	Vertical
58.478	29.3	40.0	-10.7	24	1.00	Vertical
60.832	33.8	40.0	-6.2	31	1.00	Vertical
61.122	33.3	40.0	-6.7	38	1.00	Vertical
63.768	30.8	40.0	-9.2	346	1.00	Vertical
67.378	29.5	40.0	-10.5	0	1.00	Vertical

Table 10

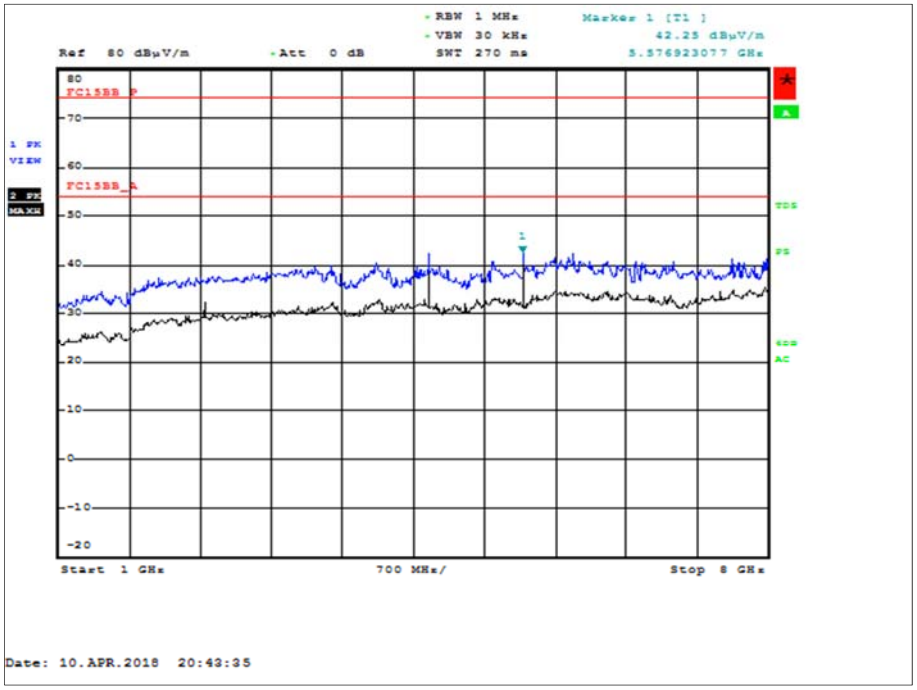

Figure 6 - Graphical Results - 1 GHz to 8 GHz
Combined Polarity

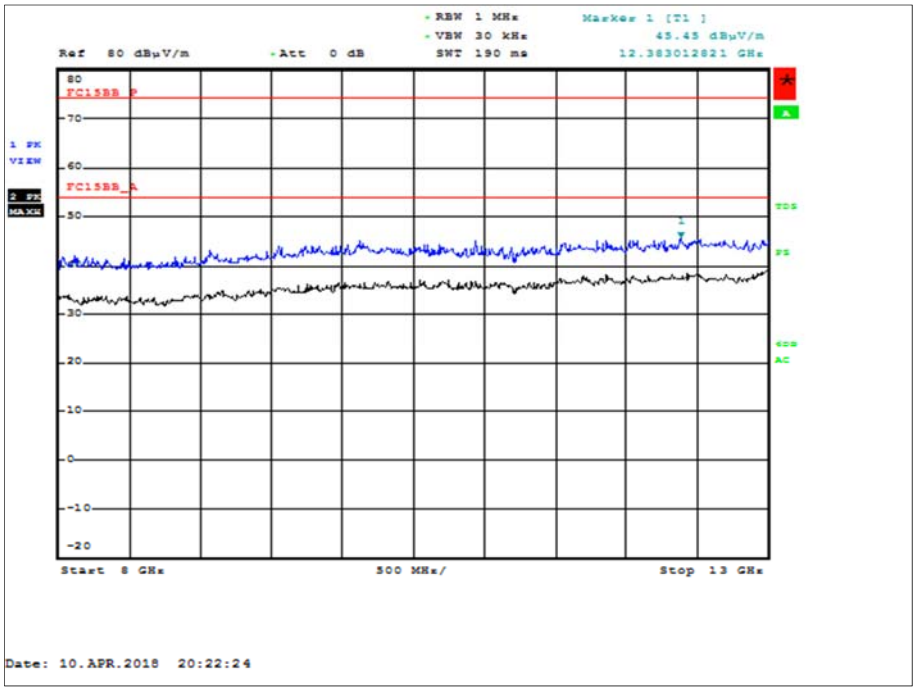

Figure 7 - Graphical Results - 8 GHz to 13 GHz
Combined Polarity

Frequency (GHz)	Result (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)		Angle (°)	Height (m)	Polarisation	EUT Orientation
	Peak	Average	Peak	Average	Peak	Average				
*										

Table 11

*No emissions were detected within 10 dB of the limit.

Results for Configuration and Mode : High Capacity Battery - Idle.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Highest frequency generated or used within the EUT: 19.2 MHz
Which necessitates an upper frequency test limit of: 13 GHz

Frequency Range of Test: 30 MHz to 1 GHz

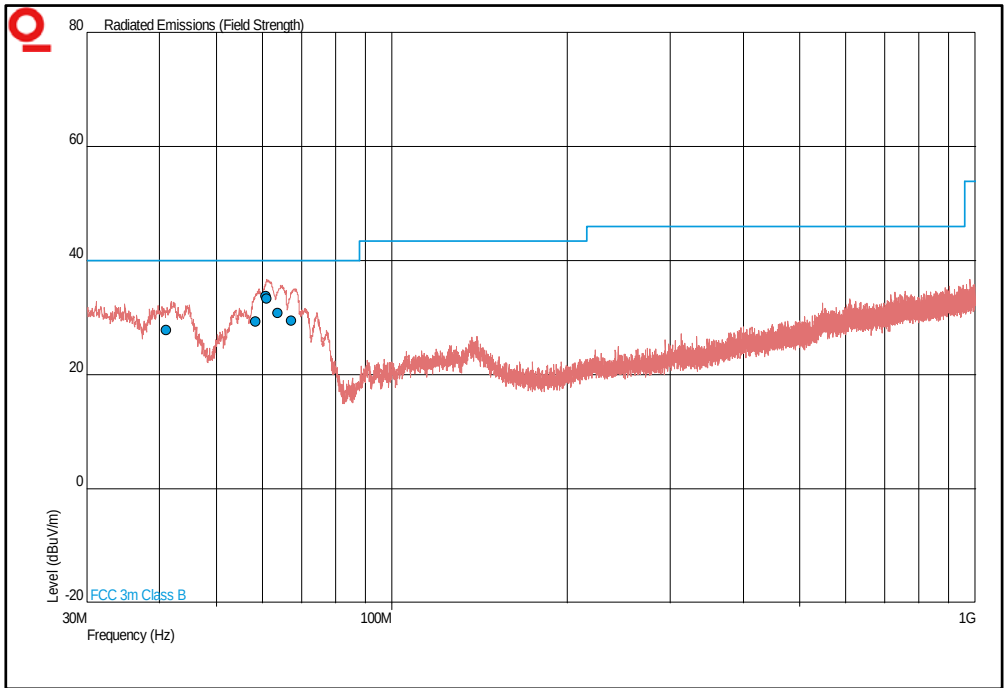

Figure 8 - Graphical Results 30 MHz to 1 GHz - Horizontal and Vertical Polarity

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
43.074	27.6	40.0	-12.4	286	1.00	Vertical
59.552	31.4	40.0	-8.6	0	1.00	Vertical
60.307	32.9	40.0	-7.1	38	1.00	Vertical
61.588	32.4	40.0	-7.6	26	1.00	Vertical
66.586	30.6	40.0	-9.4	360	1.00	Vertical
68.994	30.6	40.0	-9.4	314	1.00	Vertical

Table 12

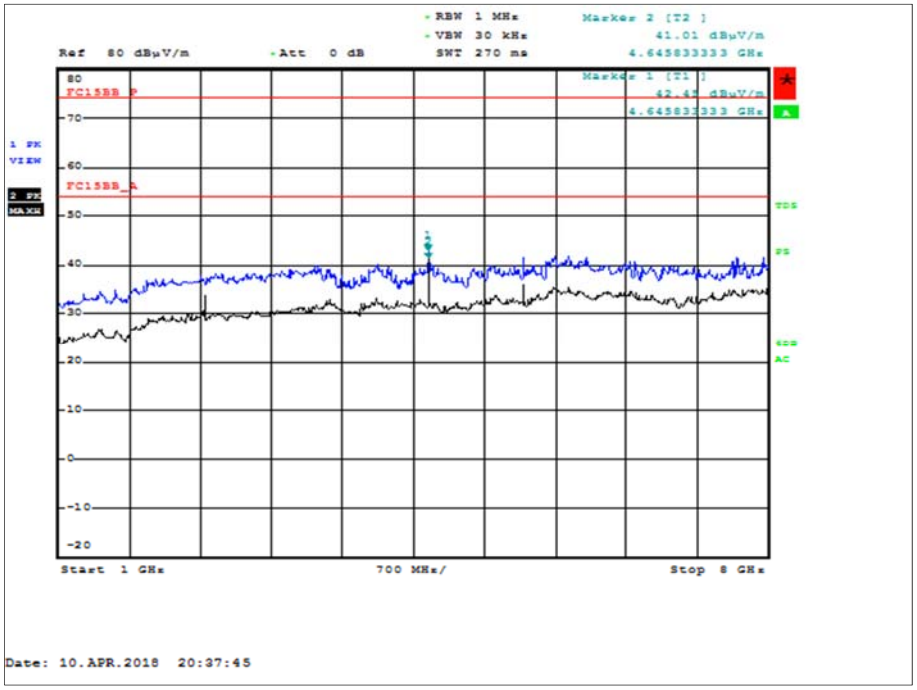

Figure 9 - Graphical Results - 1 GHz to 8 GHz
Combined Polarity

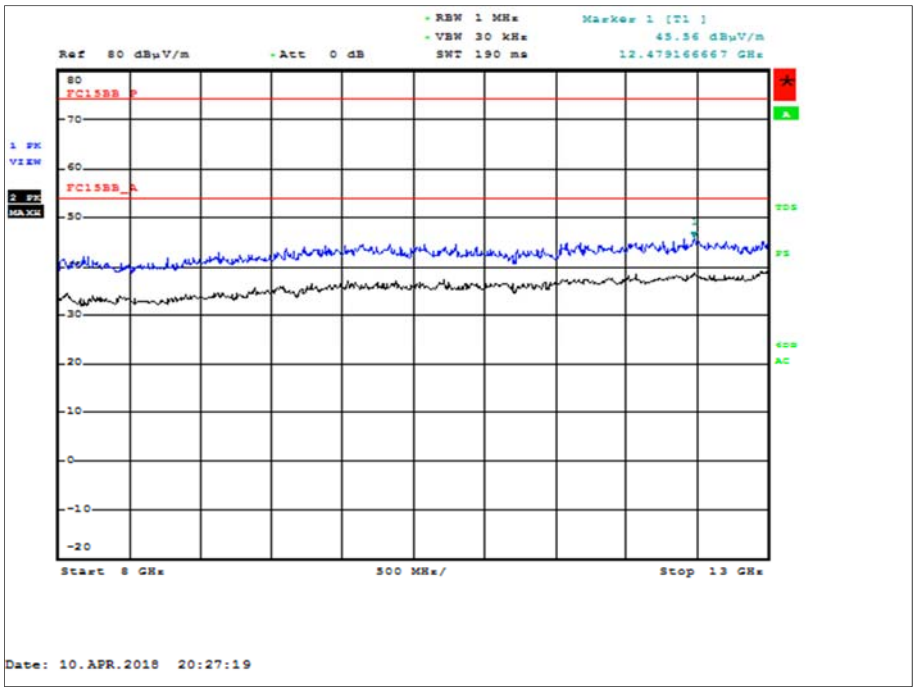

Figure 10 - Graphical Results - 8 GHz to 13 GHz
Combined Polarity

Frequency (GHz)	Result (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)		Angle (°)	Height (m)	Polarisation	EUT Orientation
	Peak	Average	Peak	Average	Peak	Average				
*										

Table 13

*No emissions were detected within 10 dB of the limit.

2.2.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Antenna 18-40GHz (Double Ridge Guide)	Q-Par Angus Ltd	QSH 180K	1511	24	7-Dec-2018
18GHz - 40GHz Pre-Amplifier	Phase One	PSO4-0087	1534	12	2-Feb-2019
Screened Room (5)	Rainford	Rainford	1545	36	9-Jun-2018
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygromer	Rotronic	A1	2138	12	21-Feb-2019
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Nov-2018
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	22-May-2018
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	6	15-Aug-2018

Table 14

TU – Traceability Unscheduled

3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Conducted Disturbance at Mains Terminals	150 kHz to 30 MHz, LISN, ±3.7 dB
Radiated Disturbance	30 MHz to 1 GHz, Bilog Antenna, ±5.2 dB 1 GHz to 40 GHz, Horn Antenna, ±6.3 dB

Table 15