Report on the EMC Testing of the

Orolia Limited
Z423 FastFind 220 Personal Locating Beacon

In accordance with ETSI EN 301 843-1, IEC 60945 ETSI EN 301 489-1, ETSI EN 301 489-19.

Prepared for: Orolia Limited
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Product Service

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Authorised Signatory	Andy Lawson	25 September 2018	

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

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with ETSI EN 301 843-1: V2.2.1 (2017-11), IEC 60945: 2002 C1:2008, ETSI EN 301 489-1: Draft V2.2.0 (2017-03), ETSI EN 301 489-19: Draft V2.1.0 (2017-03).

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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	25 September 2018

Table 1

1.2 Introduction

Applicant	Orolia Limited
Manufacturer	Orolia Limited
Model Number(s)	Z423 FastFind 220
Manufacturer Declared Variant*	Z424 FastFind Ranger and Safelink Solo Personal Locating Beacon
Serial Number(s)	#08
Hardware Version(s)	DOB
Software Version(s)	DOB
Number of Samples Tested	1
Test Specification/Issue/Date	ETSI EN 301 843-1: V2.2.1 (2017-11) IEC 60945: 2002 C1: 2008 ETSI EN 301-489-1 V2.1.1 (2017-02) ETSI EN 301-489-19 V1.2.1 (2002-11)
Test Plan/Issue/Date	Not Applicable
Order Number Date	20805 20-March-2018
Date of Receipt of EUT	19 June 2018
Start of Test	19-June-2018
Finish of Test	22-June-2018
Name of Engineer(s)	Colin McKean
Related Document(s)	IEC 61000-4-2: 2001 IEC 61000-4-3: 2006 CISPR 16-1-4: 2007 EN 55032: 2015

*See Annex A for Manufacturer document detailing the declared variant(s).

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with ETSI EN 301 843-1: V1.3.1 and IEC 60945 is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: PLB standalone – Transmitting (GPS signal present, 121 active, 406 active)				
2.2	9.3	Immunity to Electrostatic Discharge	Pass	IEC 61000-4-2: 2001
2.3	9.2	Immunity to Radiated Radio Frequencies	Pass	IEC 61000-4-3: 2006
Configuration and Mode: PLB standalone - Non- Transmitting				
2.1	8.2	Radiated Emissions	Pass	EN 61000-4-16: 2016, CISPR 16-1-4:2007
2.2	9.3	Immunity to Electrostatic Discharge	Pass	IEC 61000-4-2: 2001
2.3	9.2	Immunity to Radiated Radio Frequencies	Pass	IEC 61000-4-3: 2006

Table 2

A brief summary of the tests carried out in accordance with ESTI EN 301 489-1 and ESTI EN 301 489-19 is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: PLB standalone – Transmitting (GPS signal present, 121 active, 406 active)				
2.2	9.3	Immunity to Electrostatic Discharge	Pass	IEC 61000-4-2: 2001
2.3	9.2	Immunity to Radiated Radio Frequencies	Pass	IEC 61000-4-3: 2006
Configuration and Mode: PLB standalone - Non- Transmitting				
2.1	8.2	Radiated Emissions	Pass	EN 61000-4-16: 2016, CISPR 16-1-4:2007
2.2	9.3	Immunity to Electrostatic Discharge	Pass	IEC 61000-4-2: 2001
2.3	9.2	Immunity to Radiated Radio Frequencies	Pass	IEC 61000-4-3: 2006

Table 3

Product Service

1.4 Declaration of Build Status

MAIN EUT			
MANUFACTURING DESCRIPTION	FastFind 220 PLB		
MANUFACTURER	OROLIA LTD		
MODEL NAME/NUMBER	Z423		
PART NUMBER	Z423		
SERIAL NUMBER			
HARDWARE VERSION	1001488 Issue A		
SOFTWARE VERSION	1001767 Issue A		
PSU VOLTAGE/FREQUENCY/CURRENT	Lithium 12 Volts nominal (2 Battery pack in series)		
HIGHEST INTERNALLY GENERATED / USED FREQUENCY	GEN : 406.031 Mhz / USED :1575.42 MHz (GNSS)		
FCC ID (if applicable)	KLS		
INDUSTRY CANADA ID (if applicable)	6319A		
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Personal Locator Beacon (PLB) device with buikt-in 406 Mhz Cospas-Sarsat transmitter and 121.5MHz Homer. It is used to assist in the locating and recovery of people that are in imminent danger.		
COUNTRY OF ORIGIN	N/A		
RF CHARACTERISTICS (if applicable)			
TRANSMITTER FREQUENCY OPERATING RANGE (MHz)	406.031 MHz / 121.5 MHz		
RECEIVER FREQUENCY OPERATING RANGE (MHz)	1575.42 MHz (GNSS)		
INTERMEDIATE FREQUENCIES	N/A		
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)	16K0G1D (406.031 MHz) / 3K20A3X (121.5MHz)		
MODULATION TYPES: (i.e. GMSK, QPSK)	Phase Mod (406.031 MHz) / Swept tone AM (121.5MHz)		
OUTPUT POWER (W or dBm)	37dBm (406.031 MHz) / 19dBm (121.5MHz)		
SEPARATE BATTERY/POWER SUPPLY (if applicable)			
MANUFACTURING DESCRIPTION	Lithium battery Pack		
MANUFACTURER	OROLIA LTD (Made with CR123 GP cells)		
TYPE	Lithium Manganese Dioxide		
PART NUMBER	1001802		
PSU VOLTAGE/FREQUENCY/CURRENT	6V		
COUNTRY OF ORIGIN	N/A		
MODULES (if applicable)			
MANUFACTURING DESCRIPTION			
MANUFACTURER			
TYPE			
POWER			
FCC ID			
INDUSTRY CANADA ID			
EMISSION DESIGNATOR			
DHSS/FHSS/COMBINED OR OTHER			
COUNTRY OF ORIGIN			
ANCILLARIES (if applicable)			
MANUFACTURING DESCRIPTION			
MANUFACTURER			
TYPE			
PART NUMBER			
SERIAL NUMBER			
COUNTRY OF ORIGIN			

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

Name: Erwan THOMAS Position held: Hardware and Certification engineer

Date: 14/08/2018

1.5 Product Information

1.5.1 Technical Description

The Equipment Under Test (EUT) was a Orolia SAS, Personal Locator Beacon, Model: FastFind 220.

The primary function of the EUT is an Emergency Personal Locator Beacon (PLB) for search and rescue. The PLB transmits a 406 MHz signal to alert rescue services. The PLB includes a 121.5 MHz homing transmitter and incorporates a GPS module.

A full description and detailed product specification details are available from the manufacturer.

Figure 1 - General View

Figure 2 - Rear View

Figure 3 – Sample Ref

1.5.2 Test Configuration

Configuration	Description
PLB standalone	The EUT was powered from its own internal battery.

Table 4

1.5.3 Modes of Operation

Mode	Description
Transmitting (GPS signal present, 121 active, 406 active)	The EUT started to transmit when switched on. A GPS simulator was used to transmit a Global Position Signal to the EUT. The EUT transmits the GPS signal approximately every 50s. A 121.5MHz radio transmit signal was present during a non-transmission state.
Non- Transmitting	The EUT was not turned on.

Table 5

1.5.4 Monitoring of Performance

Transmitting - A beacon tester was used to monitor the intentional transmission of the EUT An antenna was placed inside the chamber connected to a Spectrum analyser via an RF cable. The spectrum analyser was monitoring the 121MHz signal during the non-transmitting state.

Non-Transmitting - An antenna was placed inside the chamber connected to a Spectrum analyser via an RF cable. The spectrum analyser was used to monitor for any unintentional transmission from the EUT.

1.5.5 Performance Criteria

Performance Criteria A

The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance Criteria C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

The manufacturers specified performance level is detailed as:

The EUT must continue to transmit approximately every 50s+/-2seconds. The shall be no unintentional transmission during the non-transmit state of operation.

Performance Criteria for ETSI EN 301 489-1 Clause 6.1 Continuous Phenomena (CP)

During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases, this permissible performance level may be replaced by a permissible loss of performance.

During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data.
If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance Criteria for ETSI EN 301 489-1 Clause 6.2 - Transient Phenomena (TP)

After the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the apparatus is used as intended.
In some cases, this permissible performance level may be replaced by a permissible loss of performance.

During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

1.6 Deviations from the Standard

Section 2.1 – Radiated Emissions

ETSI EN 301 843-1 states that “The EUT shall be placed on a non-conductive support with a height of 1.5m”

EN 60945 and ETSI EN 301 489-1 both recommend placing the EUT on a non-conductive support with a height of 0.8m.

Radiated emissions were measured with the EUT at a height of 1.5m.

No other 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
Serial Number: #08			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 6

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: PLB standalone - Transmitting (GPS signal present, 121 active, 406 active)		
Immunity to Electrostatic Discharge	Colin McKean	UKAS
Immunity to Radiated Radio Frequencies	Colin McKean	UKAS
Configuration and Mode: PLB standalone - Non- Transmitting		
Radiated Emissions	Colin McKean	UKAS
Immunity to Electrostatic Discharge	Colin McKean	UKAS
Immunity to Radiated Radio Frequencies	Colin McKean	UKAS

Table 7

Office Address:

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

2 Test Details

2.1 Radiated Emissions

2.1.1 Specification Reference

EN 301 843-1: V1.3.1, Clause 8.2
EN 301 489-1: Clause 8.2
IEC 60945, Clause 9.3

2.1.2 Equipment Under Test and Modification State

FastFind 220, S/N: #08 - Modification State 0

2.1.3 Date of Test

19-June-2018

2.1.4 Test Method

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

A pre-scan of the EUT emissions profile was made while varying the antennae-to-EUT azimuth and antennae-to-EUT polarization 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 Quasi-Peak and Average detectors, as appropriate. The readings were maximised by adjusting the antenna height, polarisation and turntable azimuth, in accordance with the specification.

2.1.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	51.0 %

2.1.6 Specification Limits

150 kHz to 30 MHz

Required Specification Limits (@ 3m)	
Frequency Range (MHz)	Quasi-peak (dBµV/m)
0.15 to 0.3	80 - 52*
0.3 to 30	52 - 34*
Supplementary Information: The measured test results shall be compared with the corresponding acceptable performance limits, and the EUT shall pass the test only if the measured performance margin is favourable and greater than the test measurement uncertainty. *As detailed in specification clause 5.3 Test results, the EUT shall pass the test only if the measured performance margin is favourable and greater than the test measurement uncertainty.	

Table 8 - EN 301 843-1 and IEC 60945

30 MHz to 2 GHz

Required Specification Limits (@ 3m)		
Frequency Range (MHz)	Quasi-peak (dBµV/m)	Peak (dBµV/m)
30 to 2000(1)	54*	N/A
156 to 165(2)	24*	30*

Supplementary Information:
*As detailed in specification clause 5.3 Test results, the EUT shall pass the test only if the measured performance margin is favourable and greater than the test measurement uncertainty.
(1) In addition, for the frequency band 156 MHz to 165 MHz, the measurement shall be repeated with a receiver bandwidth of 9 kHz, all other conditions hereinbefore remaining unchanged.
(2) Alternatively, for the frequency band 156 MHz to165 MHz, a peak receiver or a frequency analyser may be used, in accordance with the agreement between the manufacturer and the test house.

Table 9 - EN 301 843-1 and IEC 60945

30 MHz to 1 GHz

Required Specification Limits (@ 3m)		
Frequency Range (MHz)	Quasi-peak (dBµV/m)	Peak (dBµV/m)
30 to 230	50	N/A
230 to 1000	57	N/A

Table 10 - EN 301 489-1

2.1.7 Test Results

Results for Configuration and Mode: PLB standalone - Non-Transmitting.

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

Detailed results are shown below.

Frequency Range of Test: 150 kHz to 30 MHz

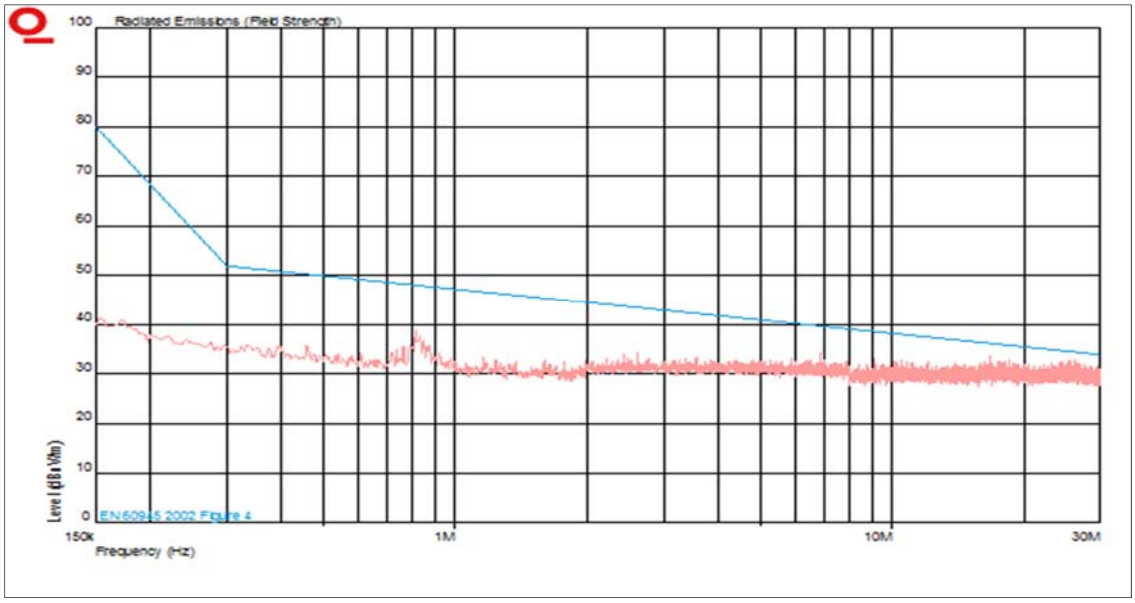

Figure 4 - Graphical Results - Horizontal and Vertical Polarity

No formal measurements were taken as all peak emissions seen were greater than 6dB below the test limit.

Frequency Range of Test: 30 MHz to 2 GHz

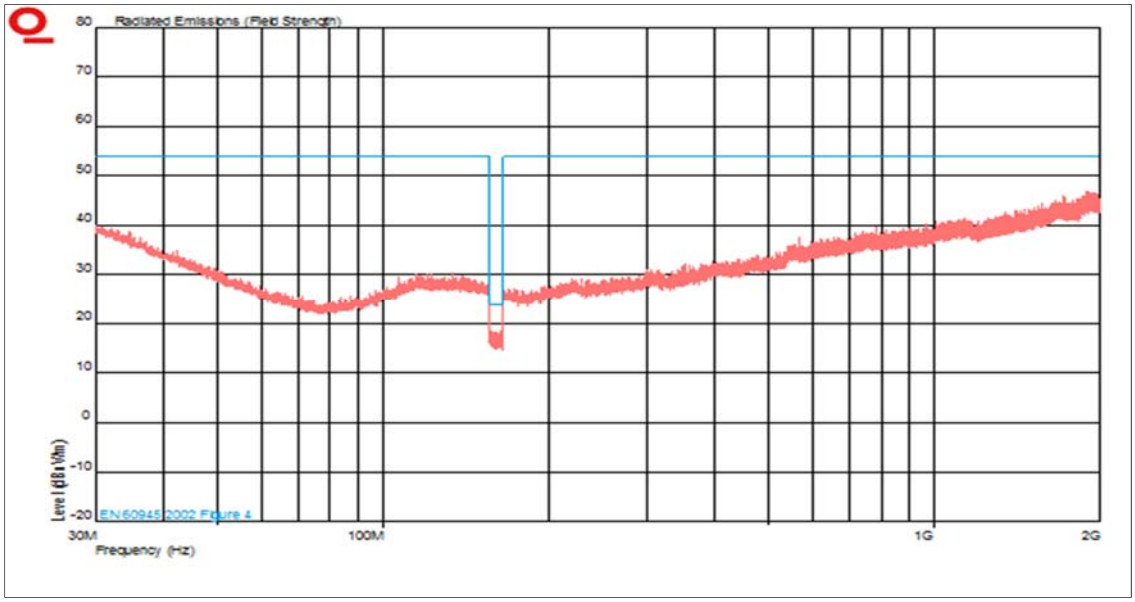

Figure 5 - Graphical Results - Horizontal and Vertical Polarity

No formal measurements were taken as all peak emissions seen were greater than 6dB below the test limit.

This emission profile also meets the requirements of ETSI EN 301 489-1 Class A across the frequency range 30MHz to 1GHz.

Frequency Range of Test: 156 MHz to 165 MHz

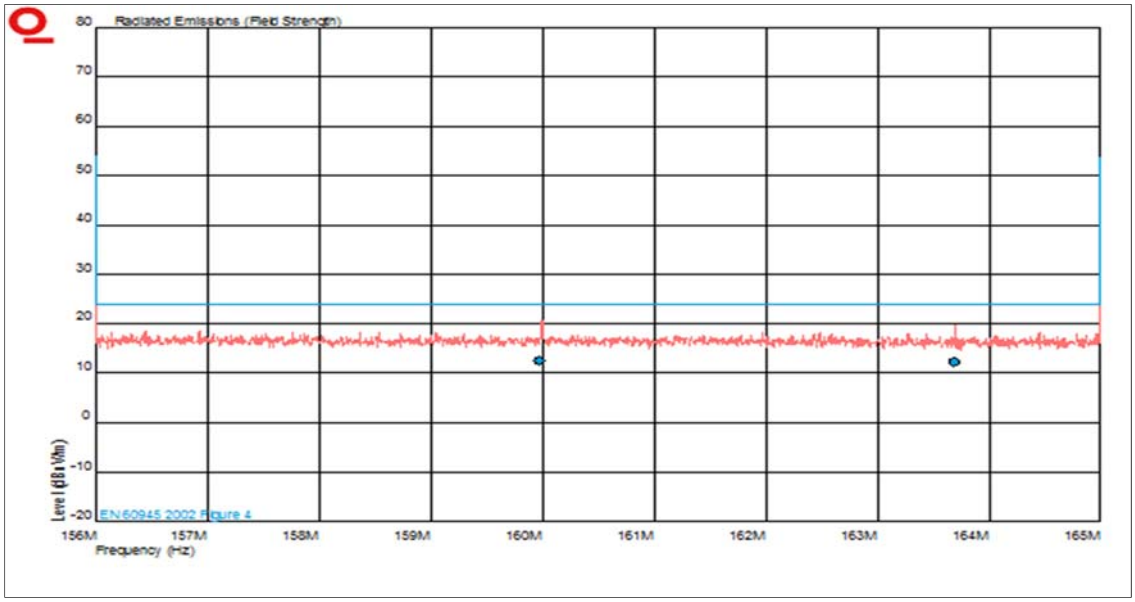

Figure 6 - Graphical Results - Horizontal and Vertical Polarity

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
159.979	12.5	24.0	-11.5	8	1.00	Vertical
163.698	12.1	24.0	-11.9	186	1.00	Horizontal

Table 11

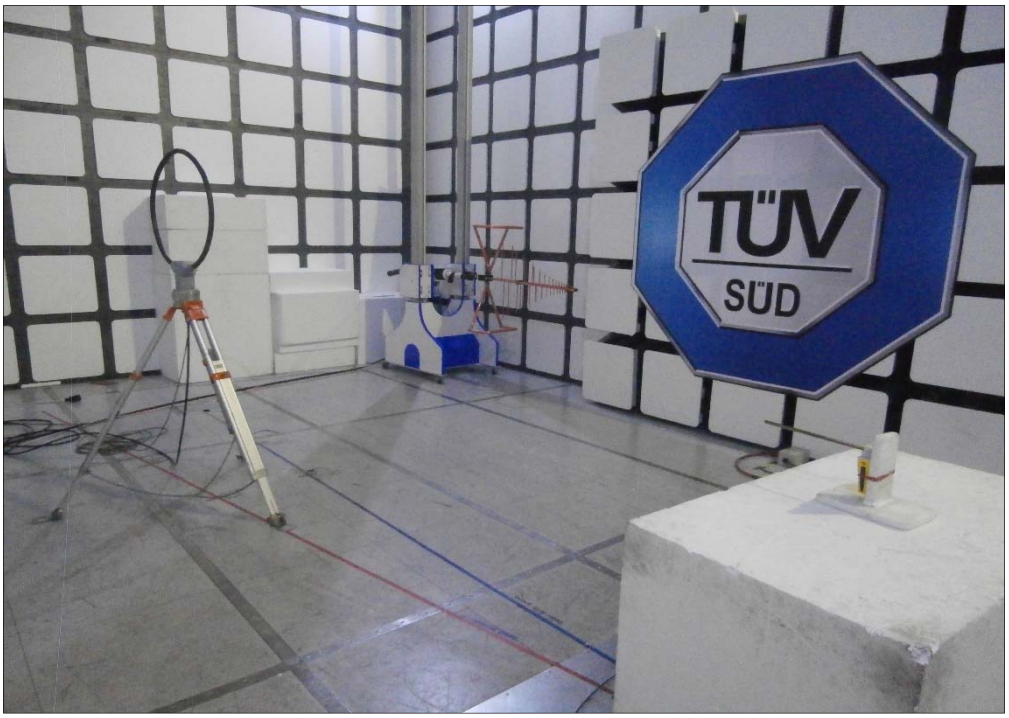

Figure 7 - Test Setup - 150 kHz to 30MHz

Figure 8 - Test Setup - 30MHz to 2GHz

2.1.8 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 (Active Loop, 9kHz-30MHz)	Rohde & Schwarz	HFH2-Z2	333	24	09-Dec-2018
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	08-Aug-2019
Compliance 5 Emissions	Schaffner	C5e Software	3274	-	Software
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Nov-2018
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	18-Oct-2018
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	01-Mar-2019
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU

Table 12

TU - Traceability Unscheduled

2.2 Immunity to Electrostatic Discharge

2.2.1 Specification Reference

EN 301 843-1: V1.3.1, Clause 9.3
IEC 60945, Clause 10.9
ETSI EN 301 489-1, Clause 9.3
ETSI EN 301 489-19

2.2.2 Equipment Under Test and Modification State

FastFind 220, S/N: #08 - Modification State 0

2.2.3 Date of Test

22-June-2018

2.2.4 Test Method

The equipment under test including associated cabling was configured on but insulted from, using a 0.5mm isolator, a horizontal coupling plane fitted to the top of a 0.8m non-conductive table for table-top equipment; and on a 0.1m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

Using the air discharge method for non-metallic parts, contact discharge method for metallic parts with both vertical and horizontal couple plane discharge methods for the sides of the equipment under test, the required electrostatic discharge voltage levels in both voltage polarities were applied at the detailed pulse repartition rate.

During this testing any anomalies in the equipment under tests performance was recorded.

2.2.5 Environmental Conditions

Ambient Temperature	23.0 °C
Relative Humidity	35.0 - 46.0 %

2.2.6 Specification Limits

Required Test Levels				Performance Criteria
Discharge type	Discharge Level (kV)		Number of discharges per location (each polarity)	
	Positive	Negative		
Air – Direct	2, 4 and 8	2, 4 and 8	10	B
Contact – Direct	2, 4 and 6	2, 4 and 6	10	B
Contact – Indirect	2, 4 and 6	2, 4 and 6	10	B
Supplementary information: None				

Table 13

2.2.7 Test Results

Results for Configuration and Mode: PLB standalone – Transmitting (GPS signal present, 121 active and 406 active).

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

Detailed results are shown below.

◯ Contact ☐ Air

Test Point	Discharge	Results									
		2kV		4kV		6kV		8kV		15kV	
		+	-	+	-	+	-	+	-	+	-
Horizontal Coupling Plane	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Vertical Coupling Plane	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Contact Discharge Points	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Air Discharge Points	Air	✓*	✓*	✓*	✓*	N/A	N/A	✓*	✓*	N/A	N/A

Table 14

Results for Configuration and Mode: PLB standalone - Non-Transmitting.

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

Detailed results are shown below.

◯ Contact ☐ Air

Test Point	Discharge	Results									
		2kV		4kV		6kV		8kV		15kV	
		+	-	+	-	+	-	+	-	+	-
Horizontal Coupling Plane	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Vertical Coupling Plane	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Contact Discharge Points	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Air Discharge Points	Air	✓*	✓*	✓*	✓*	N/A	N/A	✓*	✓*	N/A	N/A

Table 15

Key to Results	
✓	The EUT's performance was not impaired at this test point when the ESD pulse was applied.
✓*	No discharge occurred at this point when the ESD pulse was applied.
N/A	Not Applicable.

Table 16

Figure 9 - Test Positions

Figure 10 - Test Positions

2.2.8 Test Location and Test Equipment Used

This test was carried out in EMC Laboratory 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Digital Multimeter	Iso-tech	IDM-101	2895	12	20-Jul-2018
ESD Generator	Schloder	SESD 30000	4724	12	14-May-2019

Table 17

2.3 Immunity to Radiated Radio Frequencies

2.3.1 Specification Reference

EN 301 843-1: V1.3.1, Clause 9.2
IEC 60945, Clause 10.4
ETSI EN 301 489-1, Clause 9.2
ETSI EN 301 489-19

2.3.2 Equipment Under Test and Modification State

FastFind 220, S/N: #08 - Modification State 0

2.3.3 Date of Test

20-June-2018 to 21-June-2018

2.3.4 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment; with a pre-calibrated semi anechoic chamber.

All four sides of the equipment under test were subjected to the required RF field strength, modulated as described, swept over the frequency range of test with the antenna positioned in both horizontal and vertical polarizations.

During testing any anomalies in the equipment under tests performance was recorded.

2.3.5 Environmental Conditions

Ambient Temperature	23.0 °C
Relative Humidity	45.0 - 46.0 %

2.3.6 Specification Limits

EN 60945

Required Test Levels					Performance Criteria
Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
80 to 1000	10*	AM (80 %,400 Hz, sine wave)	1	3[1]	A
1000 to 2000	10*	AM (80 %,400 Hz, sine wave)	1	9[1]	A

Supplementary information:

Note 1. dwell times <1GHz can be reduced to 2 s and >1GHz to 6 s for samples with fast cycle times.

Note 2. EUT powered at one of the Nominal input voltages and frequencies

*As detailed in specification clause 5.3 Test results, the EUT shall pass the test only if the measured performance margin is favourable and greater than the test measurement uncertainty.

Table 18

ESTI 301-489-1

Required Test Levels					Performance Criteria
Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
80 to 6000	3	AM (80 %,400 Hz, sine wave)	1	>1	A
80,104,136,165,200, 260,330,430,560,715 and 920MHz at 200Hz Pulse	Front, Right, Left, Rear, Top and Base	Horizontal and Vertical	10 V/m	Pass	A
Supplementary information: Note 1. EUT powered at one of the Nominal input voltages and frequencies Note 2. if the wanted signal is modulated at 1 000 Hz, then an audio signal of 400 Hz shall be used Special conditions ESTI 301-489-19, 7.2.2 A spot frequency test shall be performed at: 80,104,136,165,200,260,330,430,560,715 and 920MHz at 200Hz pulse equal mark space ratio.					

Table 19

2.3.7 Test Results

Results for Configuration and Mode: PLB standalone – Transmitting (GPS signal present, 121 active and 406 active).

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

Detailed results are shown below.

Tabulated Results for RF Electromagnetic Field				
Step Size	1%			
Dwell Time < 1GHz Dwell Time > 1GHz	3 s 5 s			
Modulation	400Hz Sine 80% AM			
Frequency Range (MHz)	Test Face	Antenna Polarisation	Test Level (V/m)	Result
80 MHz to 2 GHz	Front, Right and Underside	Horizontal and Vertical	12.6 V/m (10 + MU)	Pass
2 GHz to 6 GHz	Front, Right and Underside	Horizontal and Vertical	3 V/m	Pass
80,104,136,165,200,260,330,430,560,715 and 920MHz at 200Hz Pulse	Front, Right and Underside	Horizontal and Vertical	10 V/m	Pass

Table 20

Results for Configuration and Mode: PLB standalone - Non-Transmitting.

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

Detailed results are shown below.

Tabulated Results for RF Electromagnetic Field				
Step Size	1%			
Dwell Time < 1GHz Dwell Time > 1GHz	3 s 3 s			
Modulation	400Hz Sine 80% AM			
Frequency Range (MHz)	Test Face	Antenna Polarisation	Test Level (V/m)	Result
80 MHz to 2 GHz	Front, Right and Underside	Horizontal and Vertical	12.6 V/m (10 + MU)	Pass
2 GHz to 6 GHz	Front, Right and Underside	Horizontal and Vertical	3 V/m	Pass
80,104,136,165,200,260,330,430,560,715 and 920MHz at 200Hz Pulse	Front, Right and Underside	Horizontal and Vertical	10 V/m	Pass

Table 21

Figure 11 - Test Setup

2.3.8 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	-	TU
Directional Coupler	Amp Research	DC6180	283	-	TU
Antenna	Schaffner	CBL6143	322	12	TU
50ohm Load (50W)	Weinschel	M1426	361	12	13-Sep-2018
Power Meter	Rohde & Schwarz	NRVD	748	-	TU
Screened Room (1)	Rainford	Rainford	1541	-	TU
Power Sensor (10MHz to 18GHz)	Rohde & Schwarz	NRV-Z1	2899	-	TU
Amplifier (250W, 80MHz - 1GHz)	Amp Research	250W1000A	3029	24	TU
Signal Generator, 9kHz to 6GHz	Rohde & Schwarz	SMB 100A	3500	12	16-Apr-2019

Table 22

TU - Traceability Unscheduled

3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Antenna	EMCO	3115	794	12	8-Dec-2018
Spectrum Analyser	Hewlett Packard	8562A	2044	12	11-Apr-2019
GPS/SBAS Simulator	Spirent	STR4500	3056	0	9-Oct-2018
Beacon Tester	WS Technologies	BT100S	3263	-	TU

Table 23

TU - Traceability Unscheduled

4 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Radiated Emissions	30 MHz to 1 GHz, Bilog Antenna, ±5.2 dB 1 GHz to 40 GHz, Horn Antenna, ±6.3 dB
Immunity to Electrostatic Discharge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2
Immunity to Radiated Radio Frequencies	10 MHz to 6 GHz Test Amplitude ±2.0 dB

Table 24

Worst case error for both Time and Frequency measurement 12 parts in 106.
*In accordance with CISPR 16-4
†In accordance with UKAS Lab 34

Annex A – Manufacturer Supplied Information

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Z423 / Z424 variants description statement

OROLIA develops and sells Personal Locator Beacon (PLB) that uses the dedicated 406MHz frequency to transmit a unique ID and precise GNSS location to the global network of search and rescue satellites. It also integrates a 121.5MHz homing transmission to help local rescue researches.

These PLBs are named FastFind and Safelink. The Fastfind and Safelink PLB has 3 existing variants, where electronics is the same and some minor mechanical parts differs:

- Fastfind 220
- Fastfind Ranger
- Safelink SOLO

The table below summarizes the differences between variants. It can be highlighted that, between variants:

- Firmware is the same.
- Electronics and battery pack are the same.
- Point of attachment of the antenna is the same so the 406MHz, 121.5Mhz performances are equivalent on all the products types.
- The internal volume of the mechanical shapes is the same so thermal aspects are equivalent on all the products types.
- Materials are the same.

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VARIANTS ELECTRICAL AND MECHANICAL PARTS

Z423 (FF220) 91-100-xxxB	Z424 (SOLO – RANGER) 91-103-xxxB
PCB and components	Identical
Battery	Identical
Programming software	Identical
Beacon firmware	Identical
Antenna	Identical
Antenna connection to PCB	Identical
Plastic material - Cycoloy	Identical
Weight = 150g	Weight = 165g
Dimensions LxWxD in mm = 107x48x34	Dimensions LxWxD in mm = 112x50x36
cover moulding	Minor change to external shape, dimensions see figure 1 below
Silicon keypad	Minor change to external shape see figure 1 above
Base plastic moulding	Minor change to external shape, dimensions see figure 1 above
Silicon side grips	None on FF220 see figure 1 below
Lever moulding	identical
Top moulding	identical
Sealing gasket	identical
Dome switch assembly	identical

VARIANTS MATERIALS

⇨ **Mechanical parts material**

The materials used on the different variants is listed below.

Part	Material	Comment
Base plastic moulding	Cycoloy 1200	Identical on all beacon variants
Cover moulding	Cycoloy 1200	Identical on all beacon variants
Top moulding	Polycarbonate – calibre 303-15	Identical on all beacon variants
Lever moulding	Polypropylene PPH9081	Identical on all beacon variants
Sealing gasket	White silicone sponge	Identical on all beacon variants
Silicon keypad	Silicon rubber 55 shore	Identical on all beacon variants
Silicon side grips	Silicon rubber 55 shore	Identical on all beacon variants
Antenna	SUS-301 S/S	Identical on all beacon variants
Antenna Bolt	Stainless steel SUS-316	Identical on all beacon variants
Antenna o-ring	BS005 N70 Silicon o-ring	Identical on all beacon variants
Label set	Clear polypropylene	Identical on all beacon variants
M2.5 Nyloc nut	Stainless steel	Identical on all beacon variants
M3x12mm pan head pozi stainless steel screw	Stainless steel	Identical on all beacon variants
M2.5x5mm screw	Stainless steel	Identical on all beacon variants

ISO 9001 EN 9100 BUREAU VERITAS Certification

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All variants use the same materials.

⇨ **Label parts material**

The materials used on the different variants is listed below.

Part	Material	Comment
Label set	Clear polypropylene	Identical on all beacon variants
Labels	MADICO 03-770	Identical on all beacon variants
Adhesive	P110 Acrylic	Identical on all beacon variants
Liner	LR09 90 gsm white polycoated glissine	Identical on all beacon variants

All variants use the same labels materials, only few rear text statements differs.

With this statement, it can be concluded that performance results on Z424 SOLO and RANGER beacons regarding ETSI EN 302 152 and ETSI EN 303 413 will be covered by the Z423 FASTFIND 220 beacon test results.

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