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Report On

FCC and Industry Canada Testing of the
ACR Electronics, Inc. RLB-41

In accordance with FCC 47 CFR Part 80, FCC 47 CFR Part 2,
Industry Canada RSS-287 and Industry Canada RSS-GEN

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Document 75927040 Report 06 Issue 3

February 2016



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TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North, Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuv-sud.co.uk

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PREPARED FOR

ACR Electronics, Inc.
5757 Ravenswood Road
Fort Lauderdale
Florida
33312-6645
USA

PREPARED BY



Natalie Bennett
Senior Administrator, Project Support

APPROVED BY



Mark Jenkins
Authorised Signatory

DATED

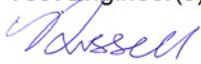
05 February 2016

This report has been revised to Issue 3 to correct the FCC clause references.

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 80, FCC 47 CFR Part 2, Industry Canada RSS-287 and Industry Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);



M Russell





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SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
ACR Electronics, Inc. RLB-41
In accordance with FCC 47 CFR Part 80, FCC 47 CFR Part 2,
Industry Canada RSS-287 and Industry Canada RSS-GEN



Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC and Industry Canada Testing of the ACR Electronics, Inc. RLB-41 to the requirements of FCC 47 CFR Part 80, FCC 47 CFR Part 2, Industry Canada RSS-287 and Industry Canada RSS-GEN.

Objective	To perform FCC and Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	ACR Electronics, Inc.
Model Number(s)	RLB-41
Serial Number(s)	#36 #06
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 80 (2014) FCC 47 CFR Part 2 (2014) Industry Canada RSS-287 Issue 2 (2014) Industry Canada RSS-GEN Issue 4 (2014)
Disposal	Held Pending Disposal
Reference Number	Not Applicable
Date	Not Applicable
Order Number	28890-00
Date	04 June 2014
Start of Test	17 November 2015
Finish of Test	20 November 2015
Name of Engineer(s)	M Russell A Guy



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR Part 80, FCC 47 CFR Part 2, Industry Canada RSS-287 and Industry Canada RSS-GEN is shown below.

Section	Specification Clause				Test Description	Result	Comments/Base Standard
	Part 80	Part 2	RSS-287	RSS-GEN			
Transmit							
2.1	80.209	2.1055	7.4.2	6.11	Transmitter Frequency Stability	Pass	
2.2	80.215 (e)(6)	2.1046	7.4.3	6.12	Transmitter Output Powers	Pass	
2.3	80.205	2.1049	-	6.6	Occupied Bandwidth	Pass	
2.4	80.211	2.1051	7.4.4	6.13	Transmitter Conducted Unwanted Emissions	Pass	
2.5	80.211	2.1053	7.4.4	6.13	Transmitter Radiated Unwanted Emissions	Pass	
2.6	80.213 (k)	2.1047	7.4.1	-	Modulation Requirements	N/A	Please refer to Document 75927040 Report 04 (IEC 61097-2 test report for compliance)



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1.3 APPLICATION FORM

Beacon Manufacturer and Beacon Model

Beacon Manufacturer	ACR Electronics, Inc.
Beacon Model Name	RLB-41
Additional Beacon Model Names	GlobalFix™ V4

Beacon Type and Operational Configurations

Beacon Type	Beacon used while:	Tick where appropriate
EPIRB Float Free	Floating in water or on deck or in a safety raft	X
EPIRB Non-Float Free (automatic and manual activation)	Floating in water or on deck or in a safety raft	
EPIRB Non-Float Free (manual activation only)	Floating in water or on deck or in a safety raft	
EPIRB Float Free with VDR	Floating in water or on deck or in a safety raft	
PLB	On ground and above ground	
	On ground and above ground and floating in water	
ELT Survival	On ground and above ground	
	On ground and above ground and floating in water	
ELT Auto Fixed	Fixed ELT with aircraft external antenna	
ELT Auto Portable	In aircraft with an external antenna	
	On ground, above ground, or in a safety raft with an integrated antenna	
ELT Auto Deployable	Deployable ELT with attached antenna	
Other (specify)		

**Beacon Characteristics**

Characteristic	Specification
Operating frequency	406.040 MHz 121.5 MHz
Operating temperature range	T _{min} = -20 °C T _{max} = 55°C
Temperature, at which minimum duration of continuous operation is expected	-20 °C
Operating lifetime	48 hours for 121.5 MHz and 406 MHz
Beacon power supply type (internal non-rechargeable, internal re-chargeable, external, combined, other)	Internal
External power supply parameters (AC/DC and nominal voltage)	N/A
Is external power supply needed to energise the beacon or its ancillary devices in any of operational modes (N/A or Yes or No)	No
Battery cell chemistry	LiMnO ₂
Battery cell model name, cell size, number of cells in a battery pack, and details of the battery pack electrical configuration	CR-123A, 2/3A size, 3 battery packs, 3 cells each
Battery cell manufacturer	Panasonic
Battery pack manufacturer and part number	ACR pack P/N: A3-06-2865 ACR cell P/N: A1-13-0118 Panasonic cell P/N: CR-123A
Beacon manufacturers declared maximum allowed cell shelf-life (from date of cell manufacture to date of battery pack installation in the beacon)	0.25 years
Declared beacon battery replacement period (from date of installation in the beacon to expiry date marked on the beacon)	10 years
Oscillator type (e.g. OCXO, MCXO, TCXO)	TCXO
Oscillator manufacturer	RAKON Ltd, (Made in New Zealand)
Oscillator model name/ part number	RAKON P/N 5344LF, ACR P/N A1-11-0940
Oscillator satisfies long-term frequency stability requirements (Yes or No)	Yes
Antenna type: Integral or Other (e.g. External, Detachable – specify type)	Integral
Antenna manufacturer	ACR Electronics, Inc.
Antenna part name and part number	Antenna Assy RLB's, P/N A3-06-2554
Antenna cable assembly min/max RF- losses at 406 MHz, if applicable	N/A
Navigation device type (Internal, External or None)	Internal
Features in beacon that prevent degradation to 406 MHz signal or beacon lifetime	Yes



Product Service

Characteristic	Specification
resulting from a failure of navigation device or failure to acquire position data (Yes, No, or N/A)	Yes
Features in beacon that ensure erroneous position data is not encoded into the beacon message (Yes, No or N/A)	Yes
Navigation device capable of supporting global coverage (Yes, No or N/A)	Yes
Encoded position update capability (Yes, No, N/A) and	Yes
Encoded position update interval value (range)	20 min to 4 hours
For Internal Navigation Devices	
- Geodetic reference system (WGS 84 or GTRF)	WGS 84
- GNSS receiver cold start forced at every beacon activation (Yes or No)	Yes
- Navigation device manufacturer	GlobalTop Tech Inc.
- Navigation device model name and part Number	ACR P/N: A1-11-0877-1 GlobalTop P/N: gms-hpr
- Internal navigation device antenna type(integrated, internal, external, passive/active) , manufacturer and model	Integrated in A1-11-0877-1
- GNSS system supported (e.g. GPS, GLONASS, Galileo)	GPS
For External Navigation Devices	
- Data protocol for GNSS receiver to beacon interface	N/A
- Physical interface for beacon to navigation device	N/A
- Electrical interface for beacon to navigation device	N/A
- Part number of the external navigation interface device (if applicable)	N/A
- Navigation device model and manufacturer (if beacon designed to use specific devices)	N/A



Self-Test Mode Characteristics:	Self-Test Mode	Optional GNSS Self-test Mode
- Activated by a separate switch/ separate switch position (Yes or No)	Yes	Yes
- Self-test/GNSS self-test mode switch automatically returns to normal position when released (Yes or No)	Yes	Yes
- Self-test/ GNSS self-test activation can cause an operational mode transmission (Yes or No)	No	No
- Results in transmission of a single self-test burst only, regardless of how long the self-test activation mechanism is applied (Yes or No)	Yes	Yes
- Results of self-test/ GNSS self-test are indicated by (provide details, e.g. Pass / Fail indicator light, strobe light, etc.)	Refer to Operating Manual	Refer to Operating Manual
- The content of the encoded position data fields of the self-test message has default values	Yes	Yes if NO GNSS found. No if GNSS found
<input type="checkbox"/> Performs an internal check and indicates that RF-power is being emitted at 406 MHz and 121.5 MHz, if beacon includes a 121.5 Hz homer (Yes or No)	Yes	No
<input type="checkbox"/> Self-test results in transmission of a signal other than at 406 MHz (Yes & details or No)	Yes 121.5 MHz	No
- Self-test can be activated directly at beacon (Yes or No)	Yes	Yes
- List of Items checked by self-test	See Note 1	See Note 1
- Self-test/ GNSS self-test 406 MHz burst duration (440 or 520 ms)	440 ms	520 ms
- Self-test message length format flag in bit 25, ("0" or "1")	1	1
- Maximum duration of a self-test mode, sec	11 Seconds	132 Seconds
- Maximum recommended number of self-tests during battery pack replacement period	120	84
- Distinct indication of self-test start (Yes or No)	Yes	Yes
- Indication of self-test results(Yes or No)	Yes	Yes
- Distinct indication of insufficient battery capacity (Yes or No)	Yes	No
- Automatic termination of self-test mode immediately after completion of the self-test cycle (Yes or No)	Yes	Yes
- Maximum number of GNSS Self Tests (beacons with internal navigation devices only)	N/A	84



Product Service

Self-Test Mode Characteristics:	Self-Test Mode	Optional GNSS Self-test Mode
- GNSS Self-test results in transmission of a single burst, irrespectively of the test result (Yes or No)	N/A	Yes
- Maximum number of self-tests during battery pack replacement period	120	84
- Self-test/ GNSS self-test can be activated from beacon remote activation points (Yes & details or No)	N/A	N/A
- List all methods of Self-test mode and GNSS Self-test modes activation. Provide details on a separate sheet to describe	Switch at EPIRB Activated less than 2 s	Switch at EPIRB Activated more than 5 s

NOTE 1:

First pass/fail indication:

- o Beacon will check Battery Capacity monitor.
- o Beacon will check for previous emergency activations.

Second pass/fail indication:

- o Beacon will test that the PLL locks.
- o Beacon will test that 406 MHz RF power is present during a 406 MHz transmission.
- o Beacon will test battery voltage during a 406 MHz transmission.
- o Beacon will test that 121.5 MHz RF power is present during a 121.5 MHz transmission.

Third pass/fail indication:

- o Beacon will check the code checksum.
- o Beacon will check the serialization of the current (ACR or POS) 406 message checksum.
- o Beacon will check for GPS module communication.



Product Service

Message Coding Protocols:	(x) Tick the boxes below against the intended protocol options
User Protocol (tick where appropriate)	Maritime with MMSI
	Maritime with Radio Call Sign
	EPIRB Float Free with Serial Number
	EPIRB Non Float Free with Serial Number
	Radio Call Sign
	Aviation
	ELT with Serial Number
	ELT with Aircraft Operator and Serial Number
	ELT with Aircraft 24-bit Address
	PLB with Serial Number
	National (Short Message Format)
	National (Long Message Format)
Standard Location Protocol (tick where appropriate)	X EPIRB with MMSI
	X EPIRB with Serial Number
	ELT with 24-bit Address
	ELT with Aircraft Operator Designator
	ELT with Serial Number
National Location Protocol (tick where appropriate)	X National Location: EPIRB
	National Location: ELT
	National Location: PLB



RLS Location Protocol (tick where appropriate) ¹	EPIRB
	ELT
	PLB
User Location Protocol (tick where appropriate)	<input checked="" type="checkbox"/> Maritime with MMSI
	<input checked="" type="checkbox"/> Maritime with Radio Call Sign
	<input checked="" type="checkbox"/> EPIRB Float Free with Serial Number
	<input checked="" type="checkbox"/> EPIRB Non Float Free with Serial Number
	<input checked="" type="checkbox"/> Radio Call Sign
	<input type="checkbox"/> Aviation
	<input type="checkbox"/> ELT with Serial Number
	<input type="checkbox"/> ELT with Aircraft Operator and Serial Number
	<input type="checkbox"/> ELT with Aircraft 24-bit Address
	<input type="checkbox"/> PLB with Serial Number
Beacon includes a homer transmitter(s) (Yes or No)	Yes
- homer transmitter(s) frequency	121.5 MHz
- homer transmitter(s) power	17 - 22 dBm EIRP
<input type="checkbox"/> homer transmitter(s) duty cycle	96 %
<input type="checkbox"/> duty cycle of homer swept tone	33 %
Beacon includes a high intensity flashing light (e.g. Strobe)	Yes
- light intensity	>0.75 cd
- flash rate	20 flashes per minute
Beacon transmission repetition period satisfies C/S T.001 requirement that two beacon's repetition periods are not synchronised closer than a few seconds over 5 minute period, and the time intervals between transmissions are randomly distributed on the interval 47.5 to 52.5 seconds (Yes or No)	Yes
Other ancillary devices (e.g. voice transceiver, remote control, external audio and light indicators, external activation device). List details on a separate sheet if insufficient space to describe.	N/A
Beacon includes automatic activation mechanism (Yes or No). Specify type of automatic beacon activation mechanism	Yes. Automatic activation occurs when water makes contact across water sensors when not in bracket
Beacon includes features and functions not listed above, related or non-related to 406 MHz (Yes or No)	No
List features and use a separate sheet if insufficient space	

¹ RLS protocols will be effective as of 1 November 2015. The use of RLS-enabled beacons will be regulated by national administrations.



Product Service

Beacon model hardware part number (P/N) and version	A3-06-2862, Rev B
Beacon model software/firmware P/N, version, date of issue/releases	K3-01-0122, Version B, Release 10/15/2014
Beacon model printed circuit board P/N and version	A3-07-0413 Rev G
Known non-compliances with C/S T,001 requirements:(Yes or No) If Yes, provide details (or use a separate sheet if insufficient space)	No
Beacon Manufacturer Point of Contact (POC) for this Type Approval application:	Name and Job Title: Mr. Dan Stankovic, Director of Certification and Test. Phone: 954-981-3333 X 2175 E-mail: dan.stankovic@acrartex.com

Dated: 07/10/2015..... Signed: Dan Stankovic, Director of Certification and Test



Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was an ACR Electronics, Inc. RLB-41. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 9 V DC supply using an internal battery unless otherwise stated in the relevant result section.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

Industry Canada Company Address Code
IC2932B-1 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

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

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.



Product Service

SECTION 2

TEST DETAILS

Industry Canada Testing of the
ACR Electronics, Inc. RLB-41
In accordance with FCC 47 CFR Part 80, FCC 47 CFR Part 2,
Industry Canada RSS-287 and Industry Canada RSS-GEN



Product Service

2.1 TRANSMITTER FREQUENCY STABILITY

2.1.1 Specification Reference

FCC 47 CFR Part 80, Clause 80.209
FCC 47 CFR Part 2, Clause 2.1055
Industry Canada RSS-287, Clause 7.4.2
Industry Canada RSS-GEN, Clause 6.11

2.1.2 Equipment Under Test and Modification State

RLB-41 S/N: #36 - Modification State 0

2.1.3 Date of Test

19 November 2015 and 20 November 2015

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

The test was performed in accordance with Industry Canada RSS-287, Clause 6.1 and Industry Canada RSS-GEN, Clause 6.11.

Remarks

The EUT was powered using an external power supply connected to the battery input terminals of the EUT to accommodate for varying the voltage.

2.1.6 Environmental Conditions

Ambient Temperature	24.1°C
Relative Humidity	42.8%



Product Service

2.1.7 Test Results

Transmit, 121.5 MHz, Frequency Stability Under Temperature Variation Results

Temperature	Voltage	Carrier Frequency Deviation (ppm)
-20°C	9 V DC	-0.658
	5.8 V DC (Battery End Point)	-0.741
-10°C	9 V DC	1.646
	5.8 V DC (Battery End Point)	1.646
0°C	9 V DC	2.551
	5.8 V DC (Battery End Point)	2.551
+10°C	9 V DC	1.646
	5.8 V DC (Battery End Point)	1.646
+20°C	9 V DC	-
	5.8 V DC (Battery End Point)	-0.165
+30°C	9 V DC	-2.387
	5.8 V DC (Battery End Point)	-2.387
+40°C	9 V DC	-4.527
	5.8 V DC (Battery End Point)	-4.527
+50°C	9 V DC	-5.844
	5.8 V DC (Battery End Point)	-5.844
+55°C	9 V DC	-5.926
	5.8 V DC (Battery End Point)	-5.926

Transmit, 121.5 MHz, Frequency Stability Under Voltage Variataion Results

Temperature	Voltage	Frequency Error (ppm)
+20°C	10.35 V DC	-0.247
	7.65 V DC	-0.165

Industry Canada RSS-287, Limit Clause 7.4.2

The carrier frequency shall not depart by more than 0.005 % (\pm 50 ppm) from that measured at 20°C and the rated supply voltage.

FCC 47 CFR Part 80, Limit Clause 80.209

The carrier frequency shall not depart by more than 0.005 % (\pm 50 ppm) from that measured at 20°C and the rated supply voltage.



Product Service

2.2 TRANSMITTER OUTPUT POWERS

2.2.1 Specification Reference

FCC 47 CFR Part 80, Clause 80.215 (e)(6)
FCC 47 CFR Part 2, Clause 2.1046
Industry Canada RSS-287 Clause 7.4.3
Industry Canada RSS-GEN, Clause 6.12

2.2.2 Equipment Under Test and Modification State

RLB-41 S/N: #36 - Modification State 0

2.2.3 Date of Test

19 November 2015 and 20 November 2015

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

The test was performed in accordance with Industry Canada RSS-287, Clause 6.1, 6.2 and Industry Canada RSS-GEN, Clause 6.12.

Remarks

A 100 kHz resolution bandwidth was used for this measurement to ensure all significant modulation products were captured.

The EUT was provided with a temporary antenna port for testing purposes therefore a conducted method was chosen for testing as per Industry Canada RSS-GEN, Clause 6.12.

2.2.6 Environmental Conditions

Ambient Temperature	24.1°C
Relative Humidity	42.8%



2.2.7 Test Results

Transmit , 121.5 MHz, Transmitter Output Power Under Temperature Variation Results

Temperature	Voltage	Transmitter Output Power (mW)
-20°C	9 V DC	144.41
	5.8 V DC (Battery End Point)	143.55
-10°C	9 V DC	149.62
	5.8 V DC (Battery End Point)	145.51
0°C	9 V DC	153.14
	5.8 V DC (Battery End Point)	151.01
+10°C	9 V DC	154.77
	5.8 V DC (Battery End Point)	151.32
+20°C	9 V DC	147.60
	5.8 V DC (Battery End Point)	142.92
+30°C	9 V DC	154.03
	5.8 V DC (Battery End Point)	151.57
+40°C	9 V DC	153.32
	5.8 V DC (Battery End Point)	148.80
+50°C	9 V DC	152.55
	5.8 V DC (Battery End Point)	147.84
+55°C	9 V DC	151.77
	5.8 V DC (Battery End Point)	148.35

Transmit , 121.5 MHz, Transmitter Output Power Under Voltage Variation Results

Temperature	Voltage	Transmitter Output Power (mW)
20°C	10.35 V DC	146.45
	7.65 V DC	146.18

Industry Canada RSS-287, Limit Clause 7.4.3

The average output power of EPIRBs and PLBs shall not be less than 50 mW when the transmitter is used as a primary beacon and not less than 25 mW when used as a homing transmitter. The output power of MSLDs shall be less than 25 mW.

FCC 47 CFR Part 80, Limit Clause 80.215(e)(6)

Refer to RTCM 11000.2 test report



Product Service

2.3 OCCUPIED BANDWIDTH

2.3.1 Specification Reference

FCC 47 CFR Part 80, Clause 80.205
FCC 47 CFR Part 2, Clause 2.1049
Industry Canada RSS-GEN, Clause 6.6

2.3.2 Equipment Under Test and Modification State

RLB-41 S/N: #36 - Modification State 0

2.3.3 Date of Test

19 November 2015

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

The test was performed in accordance with RSS-GEN Clause 6.6 using the 99% occupied bandwidth function of the spectrum analyser.

2.3.6 Environmental Conditions

Ambient Temperature	24.1°C
Relative Humidity	42.8%



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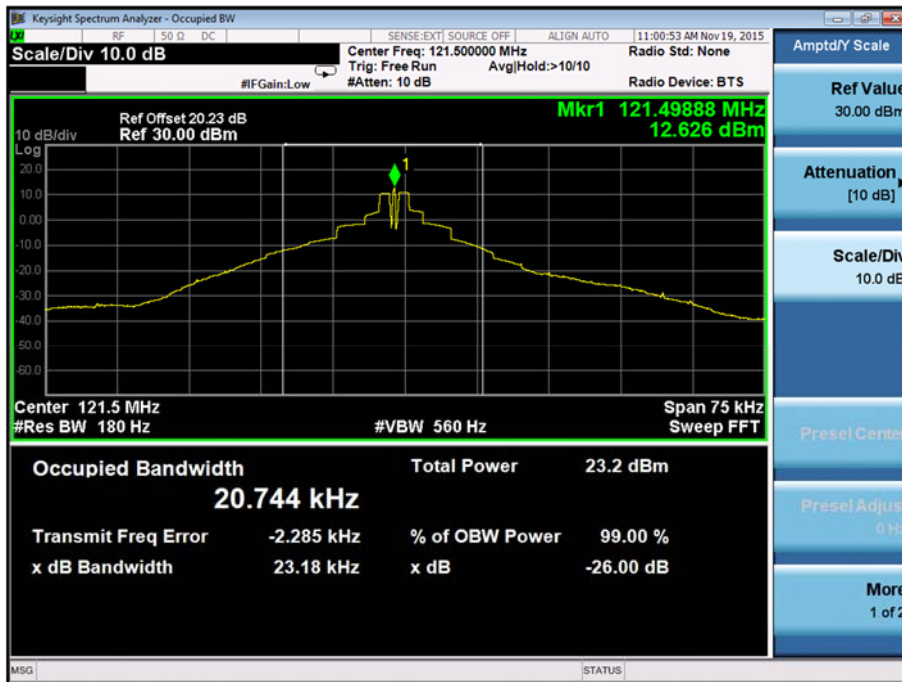
2.3.7 Test Results

9 V DC Supply – Integral Battery

Transmit, 121.5 MHz, Occupied Bandwidth Result

20.744 kHz

Transmit, 121.5 MHz, Occupied Bandwidth Plot



Industry Canada RSS-GEN, Limit Clause 6.6

None Specified.

FCC 47 CFR Part 80, Limit Clause 80.205

A3X : Authorised Bandwidth: ≤25 kHz



Product Service

2.4 TRANSMITTER CONDUCTED UNWANTED EMISSIONS

2.4.1 Specification Reference

FCC 47 CFR Part 80, Clause 80.211(d)
FCC 47 CFR Part 2, Clause 2.1051
Industry Canada RSS-287, Clause 7.4.4
Industry Canada RSS-GEN, Clause 6.13

2.4.2 Equipment Under Test and Modification State

RLB-41 S/N: #36 - Modification State 0
RLB-41 S/N: #06 - Modification State 0

2.4.3 Date of Test

17 November 2015

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Procedure

The test was performed in accordance with Industry Canada RSS-287, Clause 6.3 and Industry Canada RSS-GEN, Clause 6.13.

Remarks

The resolution bandwidth settings chosen at frequencies removed more than 100% of the authorised bandwidth are greater than 300 Hz to improve the sweep time of the spectrum analyser. This is considered worst case and therefore the EUT is deemed compliant using the larger resolution bandwidth values chosen. For measurements that exceed the limit in a 100 kHz bandwidth the measurement was repeated using a narrower span and 300 Hz resolution bandwidth.

2.4.6 Environmental Conditions

Ambient Temperature	21.9 - 23.3°C
Relative Humidity	39.0 - 43.2%

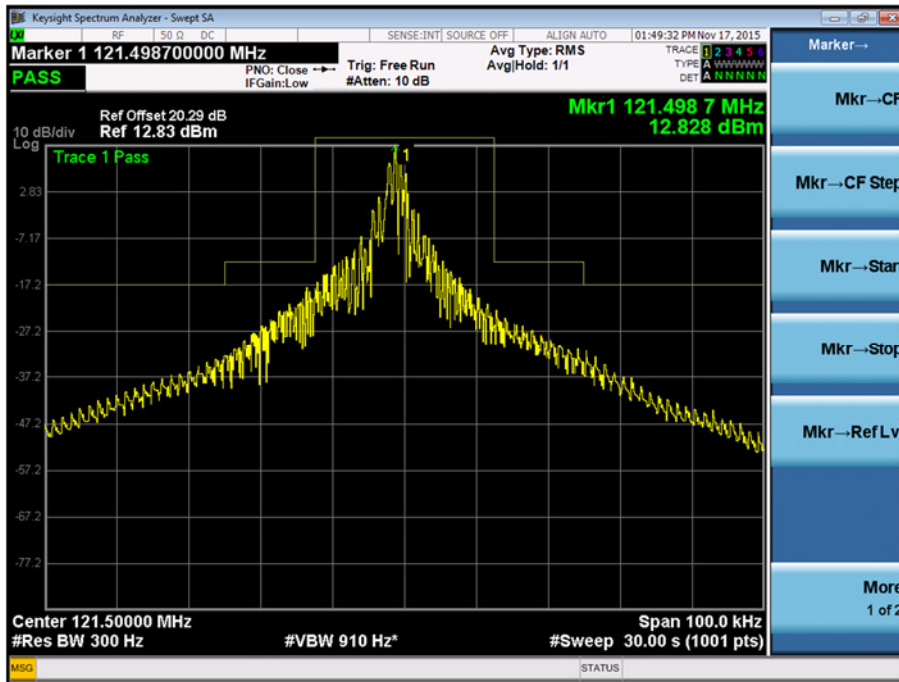


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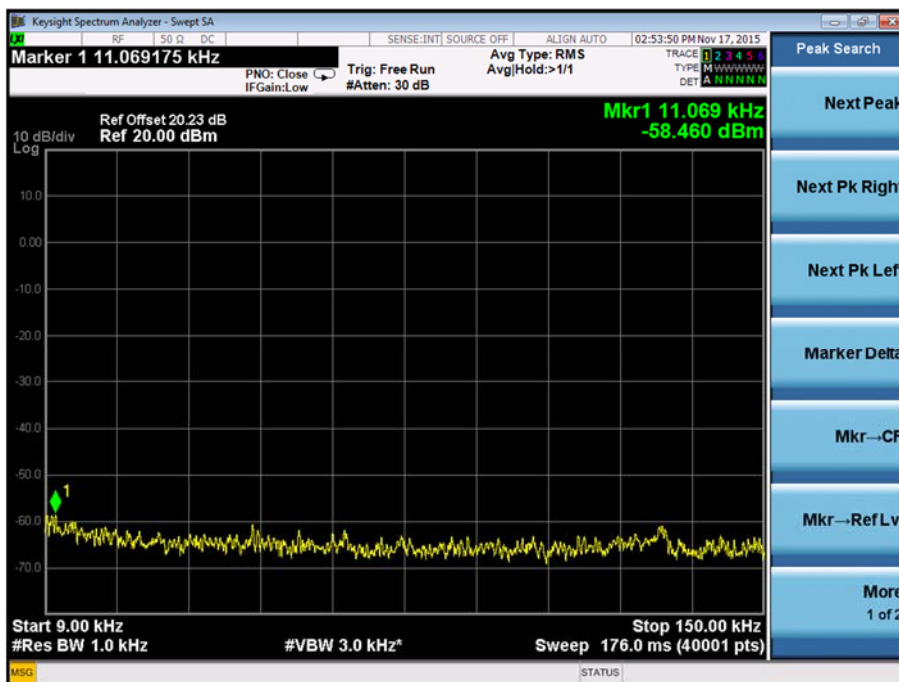
2.4.7 Test Results

9 V DC Supply

Transmit, 121.5 MHz, Emission Mask, Transmitter Conducted Unwanted Emissions Plot



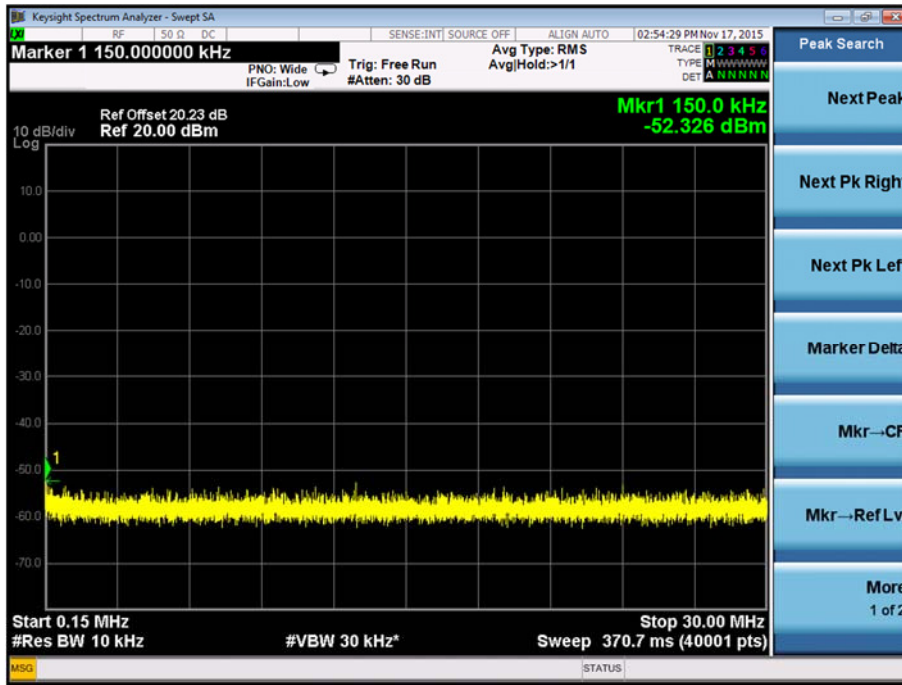
Transmit, 121.5 MHz, 9 kHz to 150 kHz, Transmitter Conducted Unwanted Emissions Plot



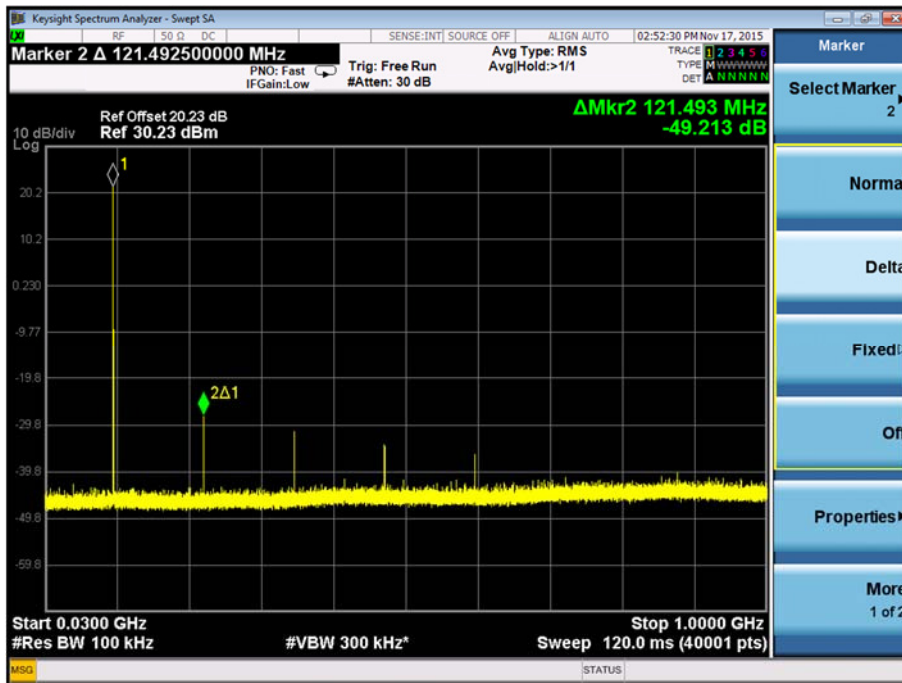


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Transmit, 121.5 MHz, 150 kHz to 30 MHz, Transmitter Conducted Unwanted Emissions Plot

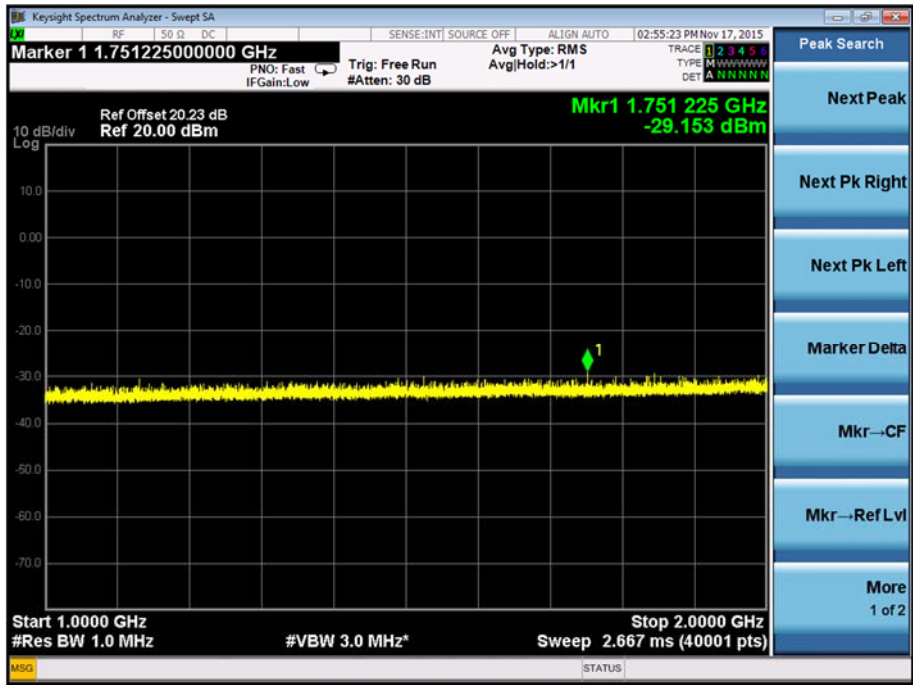


Transmit, 121.5 MHz, 30 MHz to 1 GHz, Transmitter Conducted Unwanted Emissions Plot





Transmit, 121.5 MHz, 1 GHz to 2 GHz, Transmitter Conducted Unwanted Emissions Plot



Industry Canada RSS-287, Limit Clause 7.4.4

The average power of unwanted emissions in a 300 Hz resolution bandwidth shall be attenuated below the level of the average transmitter power P (dBW) by:

- (a) at least 25 dB on any frequency removed from the centre of the authorized bandwidth by more than 50%, up to and including 100% of the authorized bandwidth; and
- (b) at least 30 dB on any frequency removed from the centre of the authorized bandwidth by more than 100%

where the authorized bandwidth is set at 25 kHz with the transmit frequency at the centre of the bandwidth.

FCC 47 CFR Part 80, Limit Clause 80.211(d)

The average power of unwanted emissions in a 300 Hz resolution bandwidth shall be attenuated below the level of the average transmitter power P (dBW) by:

- (a) at least 25 dB on any frequency removed from the centre of the authorized bandwidth by more than 50%, up to and including 100% of the authorized bandwidth; and
- (b) at least 30 dB on any frequency removed from the centre of the authorized bandwidth by more than 100%

where the authorized bandwidth is set at 25 kHz with the transmit frequency at the centre of the bandwidth.



Product Service

2.5 TRANSMITTER RADIATED UNWANTED EMISSIONS

2.5.1 Specification Reference

FCC 47 CFR Part 80, Clause 80.211(d)
FCC 47 CFR Part 2, Clause 2.1051
Industry Canada RSS-287, Clause 7.4.4
Industry Canada RSS-GEN, Clause 6.13

2.5.2 Equipment Under Test and Modification State

RLB-41 S/N: #06 - Modification State 0

2.5.3 Date of Test

19 November 2015

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Procedure

The test was performed in accordance with Industry Canada RSS-287, Clause 6.3, Industry Canada RSS-GEN, Clause 6.13 and ANSI C63.4 clause 8.

Remarks

The resolution bandwidth settings chosen at frequencies removed more than 100% of the authorised bandwidth are greater than 300 Hz to improve the sweep time of the spectrum analyser. This is considered worst case and therefore the EUT is deemed compliant using the larger resolution bandwidth values chosen. For measurements that exceed the limit in a 100 kHz bandwidth the measurement was repeated using a narrower span and 300 Hz resolution bandwidth.

2.5.6 Environmental Conditions

Ambient Temperature	21.9 - 23.3°C
Relative Humidity	39.0 - 43.2%

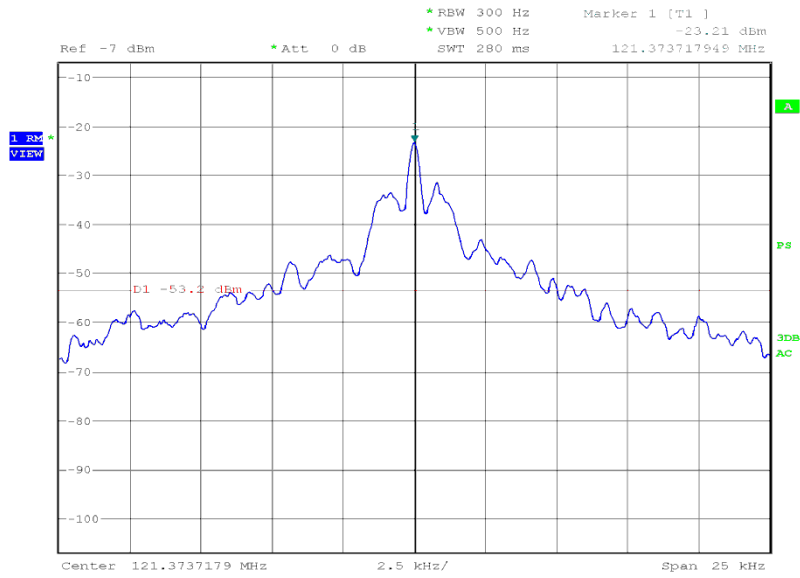


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2.5.7 Test Results

9 V DC Supply

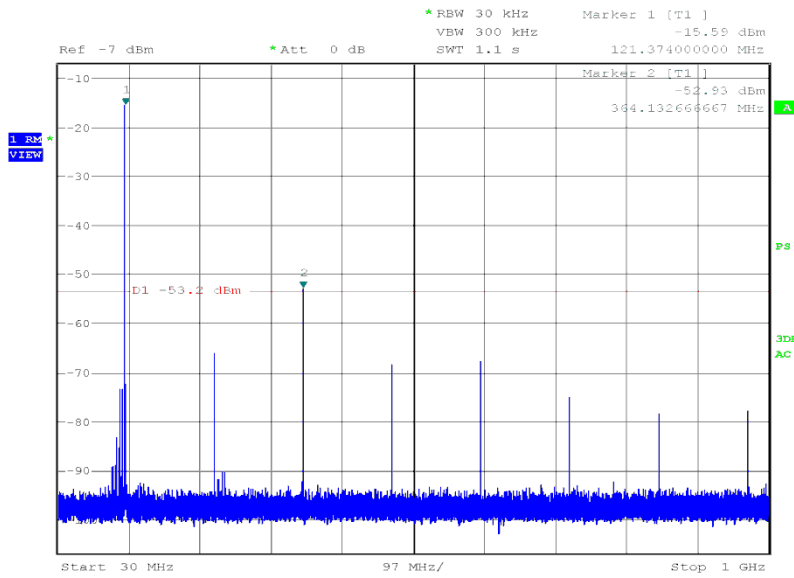
Transmit, 121.5 MHz, Fundamental Transmitter Radiated Unwanted Emissions Plot



Date: 19.NOV.2015 11:54:57

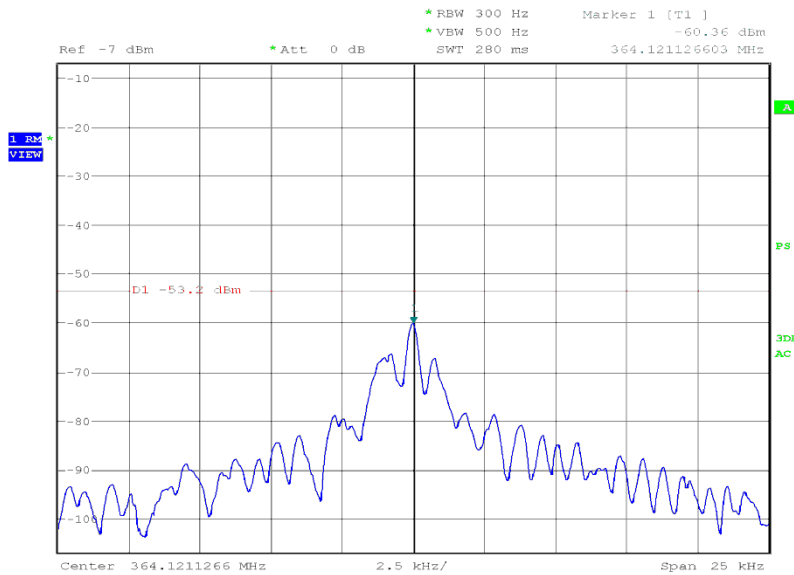


Transmit , 121.5 MHz, 30 MHz to 1 GHz, Transmitter Radiated Unwanted Emissions Plot



Date: 19.NOV.2015 12:14:42

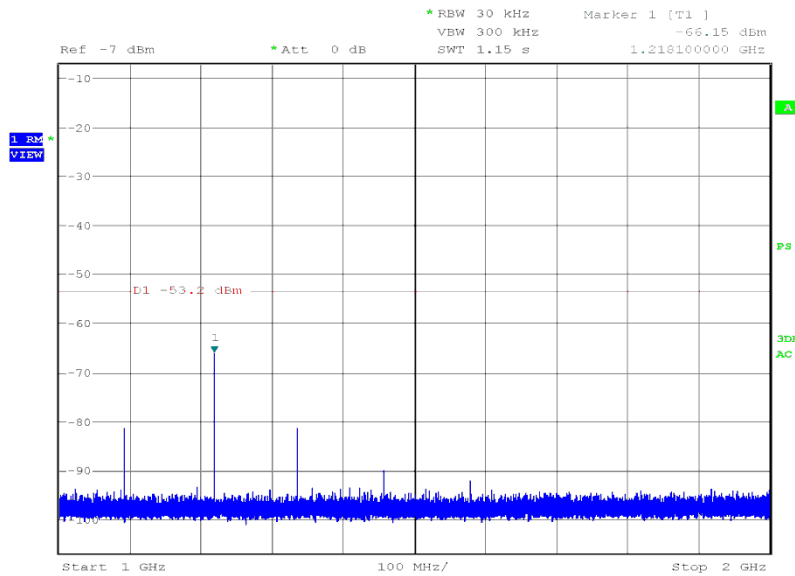
Transmit , 121.5 MHz, 30 MHz to 1 GHz Final Result 300 Hz RBW, Transmitter Radiated Unwanted Emissions Plot



Date: 19.NOV.2015 12:30:41



Transmit, 121.5 MHz, 1 GHz to 2 GHz, Transmitter Radiated Unwanted Emissions Plot



Date: 19.NOV.2015 12:40:35

Remarks

Radiated emission plot amplitudes are relative, i.e. neither transducer or offset has been shown on the plots.

Industry Canada RSS-287, Limit Clause 7.4.4

The average power of unwanted emissions in a 300 Hz resolution bandwidth shall be attenuated below the level of the average transmitter power P (dBW) by:

(a) at least 25 dB on any frequency removed from the centre of the authorized bandwidth by more than 50%, up to and including 100% of the authorized bandwidth; and

(b) at least 30 dB on any frequency removed from the centre of the authorized bandwidth by more than 100%

where the authorized bandwidth is set at 25 kHz with the transmit frequency at the centre of the bandwidth.



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FCC 47 CFR Part 80, Limit Clause 80.211(d)

The average power of unwanted emissions in a 300 Hz resolution bandwidth shall be attenuated below the level of the average transmitter power P (dBW) by:

- (a) at least 25 dB on any frequency removed from the centre of the authorized bandwidth by more than 50%, up to and including 100% of the authorized bandwidth; and
- (b) at least 30 dB on any frequency removed from the centre of the authorized bandwidth by more than 100%

where the authorized bandwidth is set at 25 kHz with the transmit frequency at the centre of the bandwidth.



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2.6 MODULATION CHARACTERISTICS

2.6.1 Specification Reference

FCC 47 CFR Part 80, Clause 80.213 (k)
FCC 47 CFR Part 2, Clause 2.1047
Industry Canada RSS-287, Clause 7.4.1

2.6.2 Equipment Under Test

RLB-41

2.6.3 Test Results

An analysis of the requirements and measurement procedures in Industry Canada RSS-287 were compared to those specified in IEC 61097-2 and were confirmed as equivalent therefore testing has not been repeated.

Please refer to Document 75927040 Report 04 (IEC 61097-2 test report for compliance)



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SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1- Transmitter Frequency Stability					
Multimeter	Fluke	75 Mk3	455	12	10-Sep-2016
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	13-Feb-2016
Digital Temperature Indicator	Fluke	51	1385	12	23-Sep-2016
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Attenuator (20dB, 150W)	Narda	769-20	3367	12	29-May-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	13-Feb-2016
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	8-Oct-2016
Section 2.2 – Transmitter Output Powers					
Multimeter	Fluke	75 Mk3	455	12	10-Sep-2016
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Digital Temperature Indicator	Fluke	51	1385	12	23-Sep-2016
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Attenuator (20dB, 150W)	Narda	769-20	3367	12	29-May-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	8-Oct-2016
Section 2.3 – Occupied Bandwidth					
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	13-Feb-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Attenuator (20dB, 150W)	Narda	769-20	3367	12	29-May-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	13-Feb-2016
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	8-Oct-2016



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Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.4 – Transmitter Conducted Unwanted Emissions					
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	13-Feb-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Attenuator (20dB, 150W)	Narda	769-20	3367	12	29-May-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	13-Feb-2016
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	8-Oct-2016
Section 2.5 – Transmitter Radiated Unwanted Emissions					
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
Tilt Antenna Mast	maturo GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	maturo GmbH	NCD	3917	-	TU

TU – Traceability Unscheduled

O/P MON – Output Monitored with Calibrated Equipment



3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	MU
Transmitter Frequency Stability	± 2.717 Hz
Transmitter Output Powers	± 3.21 dB
Occupied Bandwidth	± 671.92 Hz
Transmitter Conducted Unwanted Emissions	± 3.454 dB
Transmitter Radiated Unwanted Emissions	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
Modulation Characteristics	-



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SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

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