

# **Frequency Stability Measurements of Zinwave ORU**

FCC ID: UPO302-1107

IC: 6791A-3021107

**SC\_TR\_177\_A**

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## 1 Revision History

Revision	Originator	Date	Comment	Signature
A	C Blackham Director Sulis Consultants Ltd	07 Dec 2015	1 <sup>st</sup> release	

## 2 Associated Documents

- |     |                  |  |
|-----|------------------|--|
| [1] | 47CFR2           | Title 47 of FCC Rules Part 2   |
| [2] | ANSI / TIA-603-D | TIA Standard: Land Mobile FM or PM – Communications Equipment – Measurement and Performance Standards  |
| [3] | RSS 131          | Industry Canada Spectrum Management and Telecommunications Policy Radio Standards Specification Zone Enhancers for the Land Mobile Service, Issue 2, July 2003 |

## 3 Summary

### 3.1 Client and manufacturer

Zinwave Ltd  
 Harston Mill  
 Harston  
 Cambridge  
 CB22 7GG  
 UK

### 3.2 Test personnel and location

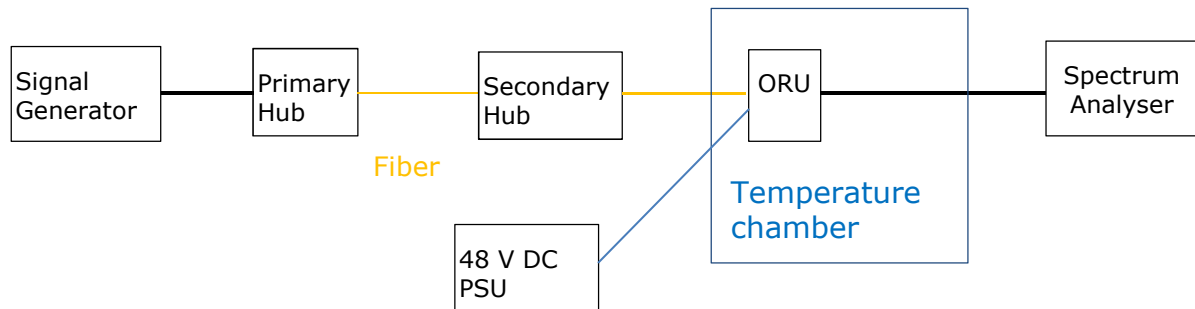
Testing was performed by Chris Potter of Zinwave Ltd and Charlie Blackham of Sulis Consultants Ltd between 27<sup>th</sup> and 30<sup>th</sup> November 2015 at Zinwave's offices in Harston.

### 3.3 Test sample

The results herein only refer to sample detailed in section 4

## 4 Test Configuration

Equipment was arranged as shown in figure 1:



**Figure 1: Test configuration**

### 4.1 Test sample and Operating mode

The equipment under test (EUT) was:

Manufacturer	Name	Model Number	Serial Number
Zinwave	ORU	302-1107	310400000022

**Table 1: Equipment under test**

Modifications during test: None

### 4.2 Support equipment

The following equipment shall be used, configured as shown in Figure 1:

Name	Part Number	Label	Serial Number
<b>Zinwave UNIhub (Primary Hub)</b>			
Chassis	302-1001	LWH_OCT2015_3/5	370300002487
RF Service module	302-1003	SM_OCT15_1/6	030370002050
Optical module	302-1002	OM_OCT15_1/6	050750002036
<b>Zinwave UNIhub (Secondary Hub)</b>			
Chassis	302-1001	LWH_OCT2015_1/5	370300002407
Input Optical module	302-1002	OM_OCT15_5/6	050750002039
Output Optical module	302-1002	OM_OCT15_3/6	050750002010

**Table 2: Support Equipment**

### 4.3 Test equipment

Item	Manufacturer	Model	Serial Number	Calibration cert no. and date	Measurement uncertainty
Spectrum Analyser	Rohde & Schwarz	FSV40	101374	R/0155727 Due 19 May 16	Resol. $\pm 1\text{Hz}$ Accy. $\pm 1340\text{Hz}$
Signal Generator	Agilent	E4433B	MY43350293	Verified as part of system test	Locked to Spectrum Analyzer
Temperature chamber	Climatic Systems Ltd	ET27LM	CS443	Verified as part of system test	n/a
Power Supply	Agilent	E3645A	MY55176641	1410534 Due 09 Sept 2016	$\pm 0.05\% + 10\text{mV}$
Thermocouple	Pico Technology	TH-03	173	Cambridge RF Cert 20151128-01 Due 28 Nov 2016	$\pm 0.3\text{deg}$

**Table 3: Test Equipment**

### 4.4 Measurement method

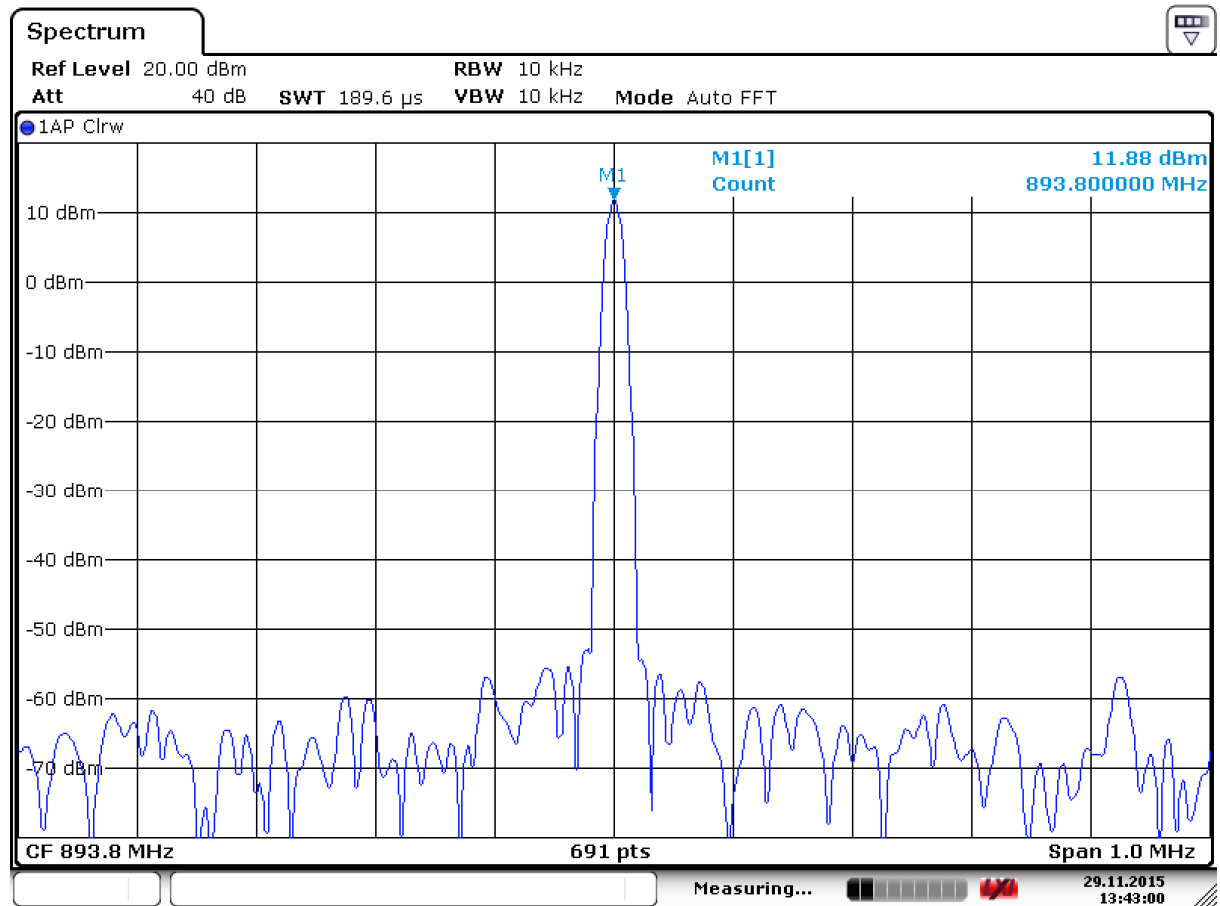
- The ORU was placed into the thermal chamber and connected to a DC supply, signal generator and signal analyser outside the chamber.
- 10 MHz Ref Clock output of signal analyser was connected to Ref Clock inputs of the Signal generators
- The signal generator was to transmit a CW signal at 893.8 MHz
- The output frequency from the ORU was measured on the signal analyser using a resolution bandwidth of 10 kHz.
- The Temperature of the chamber was varied between  $-30^{\circ}\text{C}$  and  $+50^{\circ}\text{C}$  in  $10^{\circ}\text{C}$  steps and the EUT temperature allowed to stabilise for one hour at each temperature.
- Measurements were recorded at all points
- Supply voltage was also varied when chamber was at  $20^{\circ}\text{C}$ .
- Frequency error was calculated and the results shown below in section 5.

## 5 Test Results

The measured frequency was compared to the transmitted frequency of 893800 kHz:

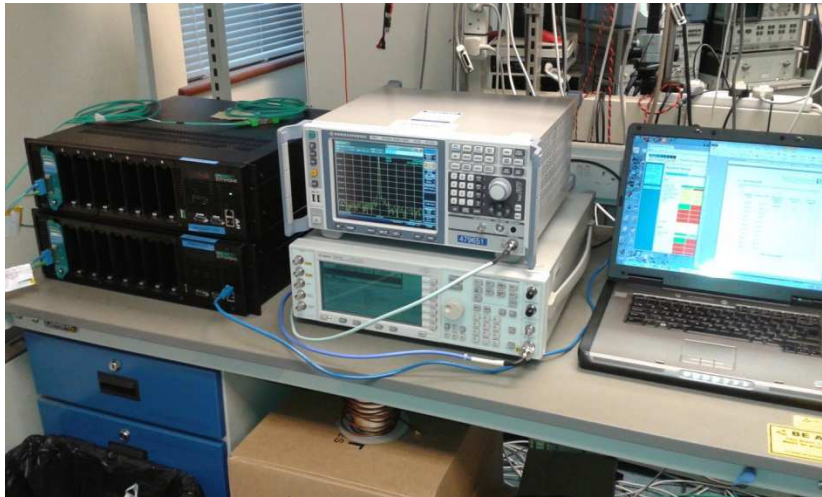
Voltage (V)	Temp (°C)	Measured Frequency (kHz)	Freq Error (Hz)	Freq Error (ppm)
48.0	-30.0	893800.000	0	0
48.0	-20.0	893800.000	0	0
48.0	-10.0	893800.000	0	0
48.0	0.0	893800.000	0	0
48.0	+10.0	893800.000	0	0
48.0	+20.0	893800.000	0	0
40.8	+20.0	893800.000	0	0
55.2	+20.0	893800.000	0	0
48.0	+30.0	893800.000	0	0
48.0	+40.0	893800.000	0	0
48.0	+50.0	893800.000	0	0

**Table 4: Test results**



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**Figure 2: Example measurement plot**



**Figure 3: Equipment configuration**