Sulis Consultants
CE Marking and Product Approvals

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	1st 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 27th and 30th 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:

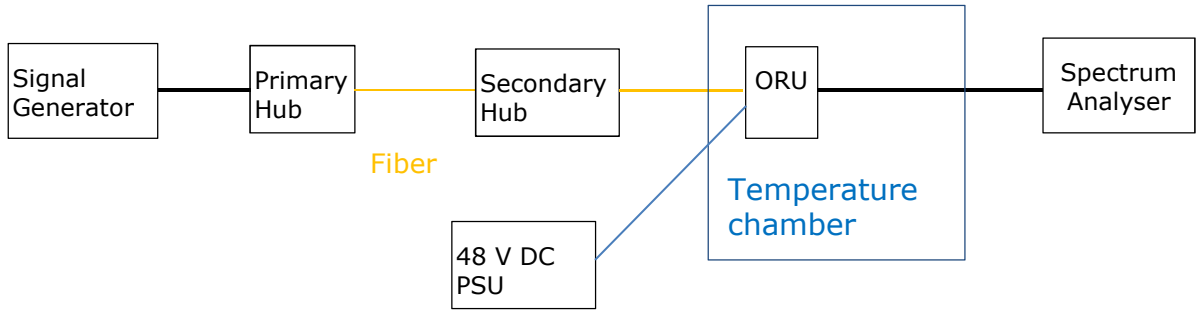

Figure 1: Test configuration

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
Zinwave UNIhub (Primary Hub)			
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
Zinwave UNIhub (Secondary Hub)			
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. ± 1Hz Accy. ± 1340Hz
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	± 0.05% + 10mV
Thermocouple	Pico Technology	TH-03	173	Cambridge RF Cert 20151128-01 Due 28 Nov 2016	± 0.3deg

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°C and +50°C in 10°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°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

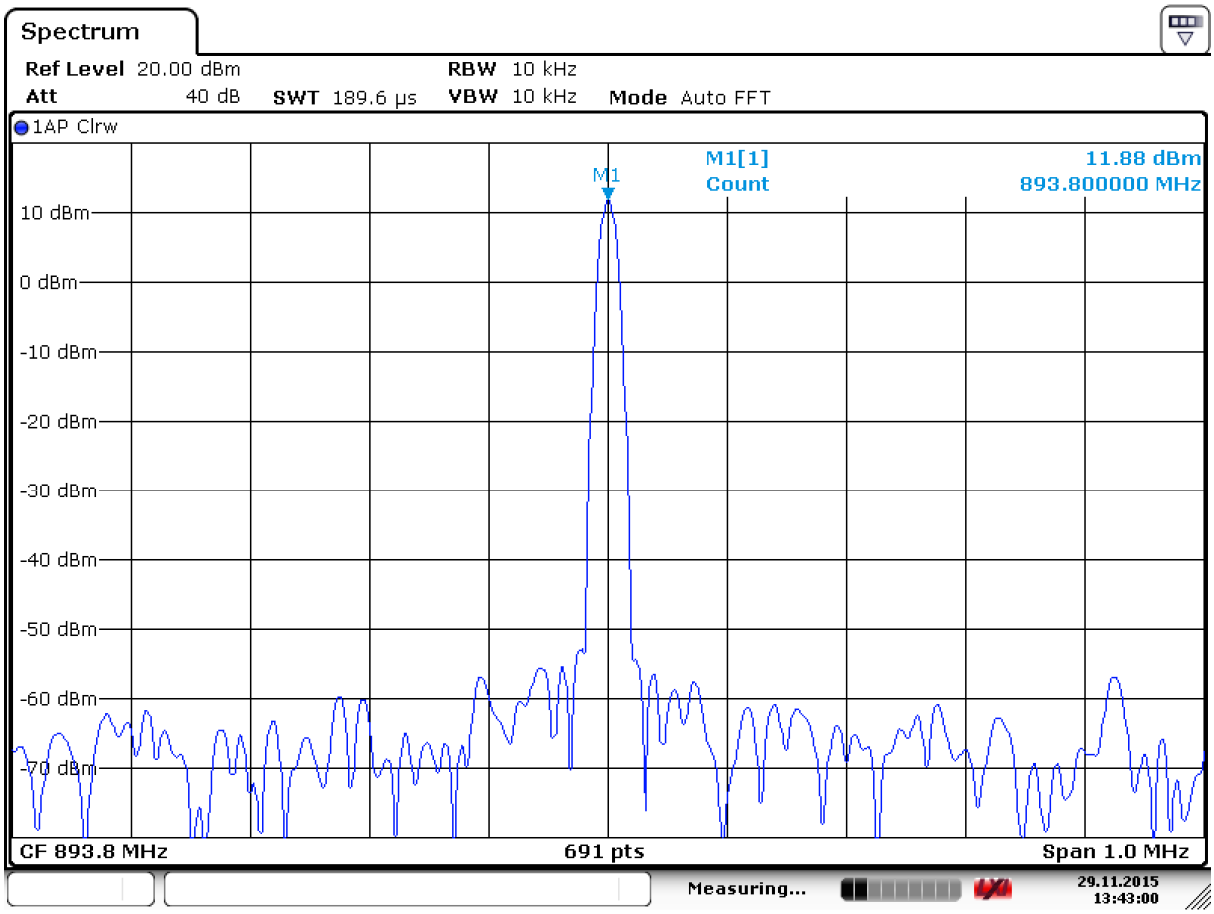

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Figure 2: Example measurement plot

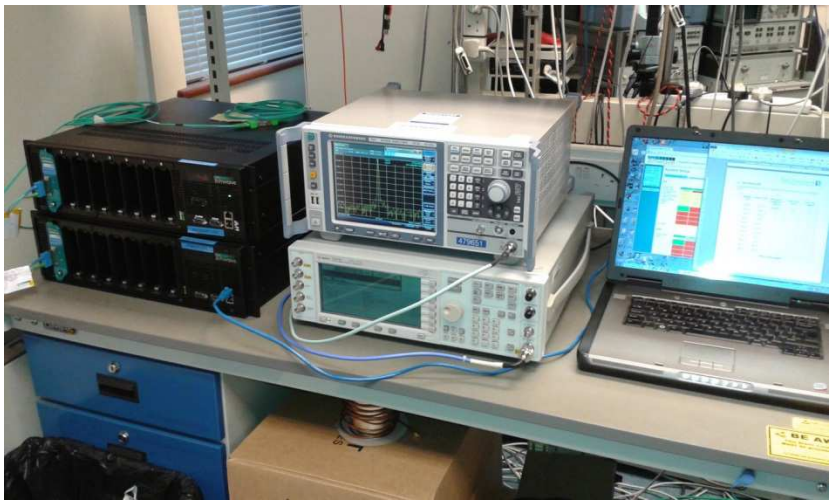

Figure 3: Equipment configuration