



Compliance Testing, LLC

Previously Flom Test Lab

EMI, EMC, RF Testing Experts Since 1963

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Test Report

Prepared for: Life Sensing Instruments, Inc.

Model: K-1003

Description: Digital Bedside Wireless Interface

Serial Number: BWI007H613.00, BWI008H609.50

FCC ID: OF8-BWI

To

FCC Part 95
Subpart H

Date of Issue: October 12, 2017

On the behalf of the applicant:

Life Sensing Instruments, Inc.
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Tullahoma, TN 37388

Attention of:

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Project No: p1780013

Poona Saber
Project Test Engineer

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All results contained herein relate only to the sample tested.



Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	September 12, 2017	Poona Saber	Original Document
2.0	October 2, 2017	Poona Saber	Revised page 9 to reflect quasi peak measurement Revised test equipment table on page 16
3.0	October 10, 2017	Poona Saber	Revised the frequency stability page to reflect the tolerance in ppm Added the emissions Designator code to page 6 Revised the antenna gain on page 6



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ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to the joint ISO-ILAC-IAF Communiqué dated January 2009).

The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to <http://www.compliancetesting.com/labscope.html> for current scope of accreditation.

Testing Certificate Number: **2152.01**



FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A

The Applicant has been cautioned as to the following:

15.21: Information to the User

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a): Special Accessories

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Test and Measurement Data

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II, Part 2, Subpart J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, and the following individual Parts: FCC Part 95.

Standard Test Conditions and Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing.

In accordance with ANSI/TIA 603C, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specified testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Environmental Conditions		
Temp (°C)	Humidity (%)	Pressure (mbar)
24.2 – 25.6	41.4 – 45.6	967.5 – 968.2

Measurement results, unless otherwise noted, are worst-case measurements.

EUT Description

Model: K-1003

Description: Digital Bedside Wireless Interface

Firmware: N/A

Software: TCBWI_PIC32MXXproduction_201706300.hex

Serial Number: BWI007H613.00, BWI008H609.50

Additional Information:

Operating voltage of the device is 3 Vdc which was powered up with external power supply. The modulation is FSK with F1D emission code and in frequency Range of 609-614 MHz.

EUT Operation during Tests

Two units are provided set on transmit mode on low channel (609.5 MHz) and High channel (613 MHz) of the frequency range 608-614 MHz. It has a monopole antenna of 2.5 dBi gain attached externally to a SMA connector.



Accessories:

Qty	Description	Manufacturer	Model	S/N
1	External power supply	Kenwood	CTi0008	N/A

Cables: None

Modifications: None



Test Result Summary

Specification	Test Name	Pass, Fail, N/A	Comments
2.1046 95.1115 (a)	Carrier Output Power	Pass	
95.1115 (b) (2)	Occupied Bandwidth	Pass	
2.1053 95.1115 (b)	Field Strength of Spurious Radiation	Pass	
95.632	Frequency Stability (Temperature Variation)	Pass	
95.632	Frequency Stability (Voltage Variation)	Pass	
2.202	Necessary Bandwidth Calculation	Pass	



Carrier Output Power

Engineer: Poona Saber

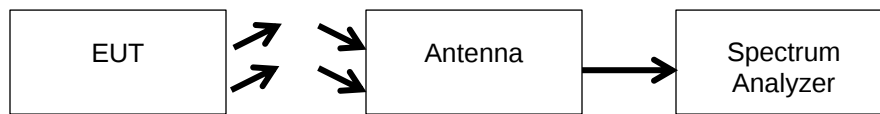
Test Date: 09/13/17

Measurement Procedure

The Equipment under Test (EUT) was located in anechoic chamber at 3 meters away from receive antenna and was rotated through 360 degrees and the receive antenna height was varied from 1m to 4m so that maximum radiated emission level was captured.

FCC limit for power is stated as a radiated field strength of 200 mV/m at 3 meters or 106 dBuV/m when measured with quasi peak detector ability of Spectrum Analyzer. Radiated Power measured on spectrum analyzer is corrected for pre-amp, cable and antenna factors.

Test Setup



Power Transmitter Output Power

Tuned Frequency (MHz)	Recorded Measurement (dBuV/m)	Limit (dBuV/m)	Result
609.5	93.42	106	Pass
613	94.2.6	106	Pass



Field Strength of Spurious Radiation

Engineer: Poona Saber

Test Date: 9/11/17

Test Procedure

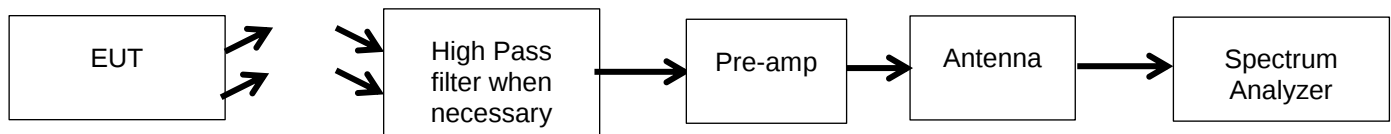
The Equipment under Test (EUT) was located in anechoic chamber at 3 meters away from receive antenna and was rotated through 360 degrees and the receive antenna height was varied from 1m to 4m so that maximum radiated emission level was captured.

FCC limit for undesired emissions at a distance of 3 meters below 960 MHz is 200 $\mu\text{V/m}$ or 46 dB $\mu\text{V/m}$ with quasi-peak detector on spectrum analyzer and for measurements above 960 MHz is 500 $\mu\text{V/m}$ or 54 dB $\mu\text{V/m}$ with average detector and 1 MHz measurement Bandwidth.

For Measurements above 960 MHz a High Pass filter was utilized to reduce the fundamental emission to not saturate the preamplifier and the device was tested up to 7 GHz to cover the 10th harmonic of the highest frequency generated in the device.

Cable, antenna and pre-amp factors were all included in spectrum analyzer correction setup and the reading represented the Electric field strength.

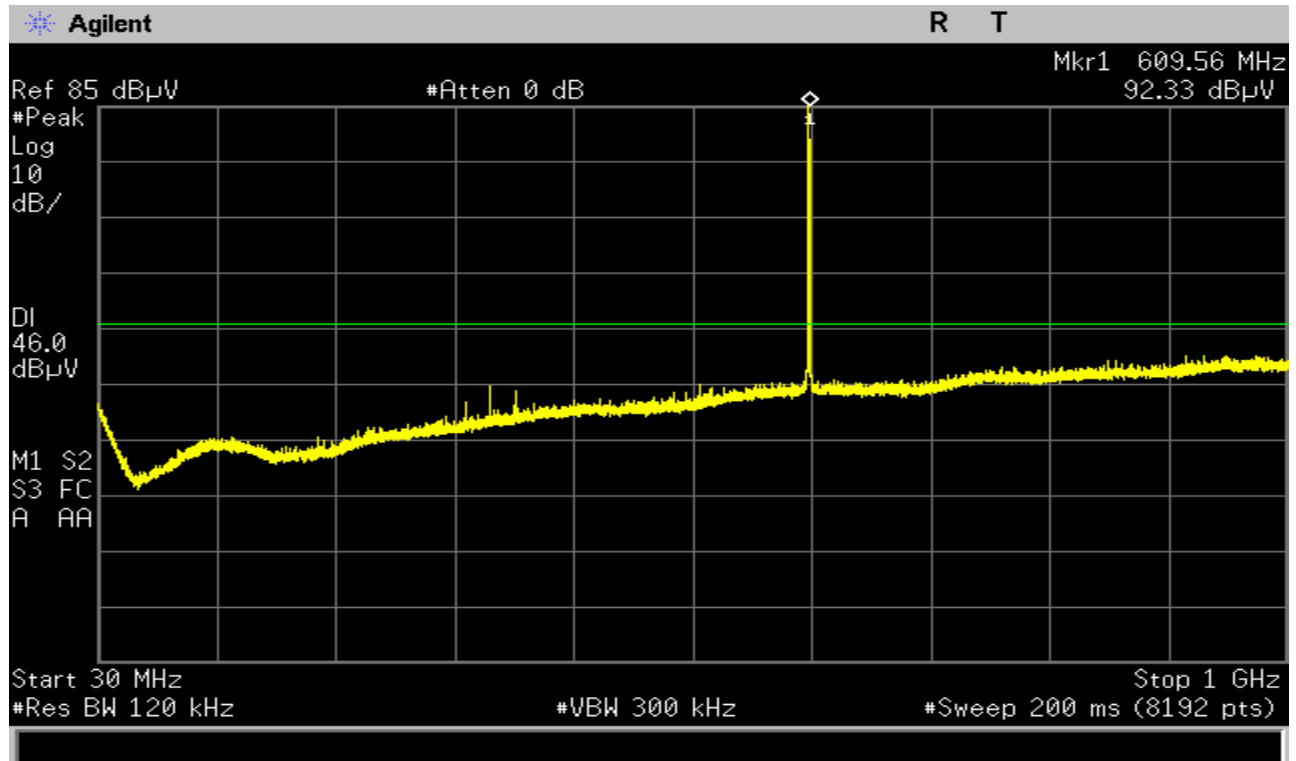
Test Setup



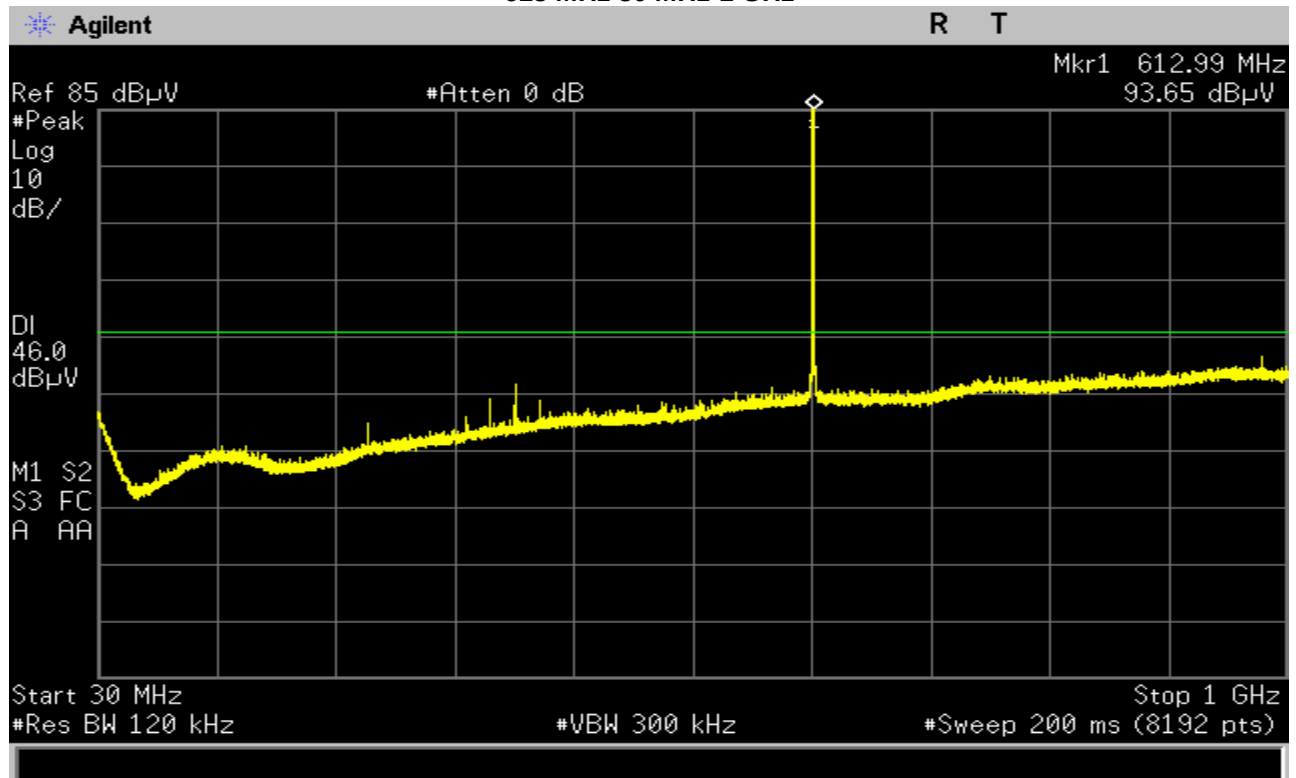


Test Results

609.5 MHz 30 MHz-1 GHz

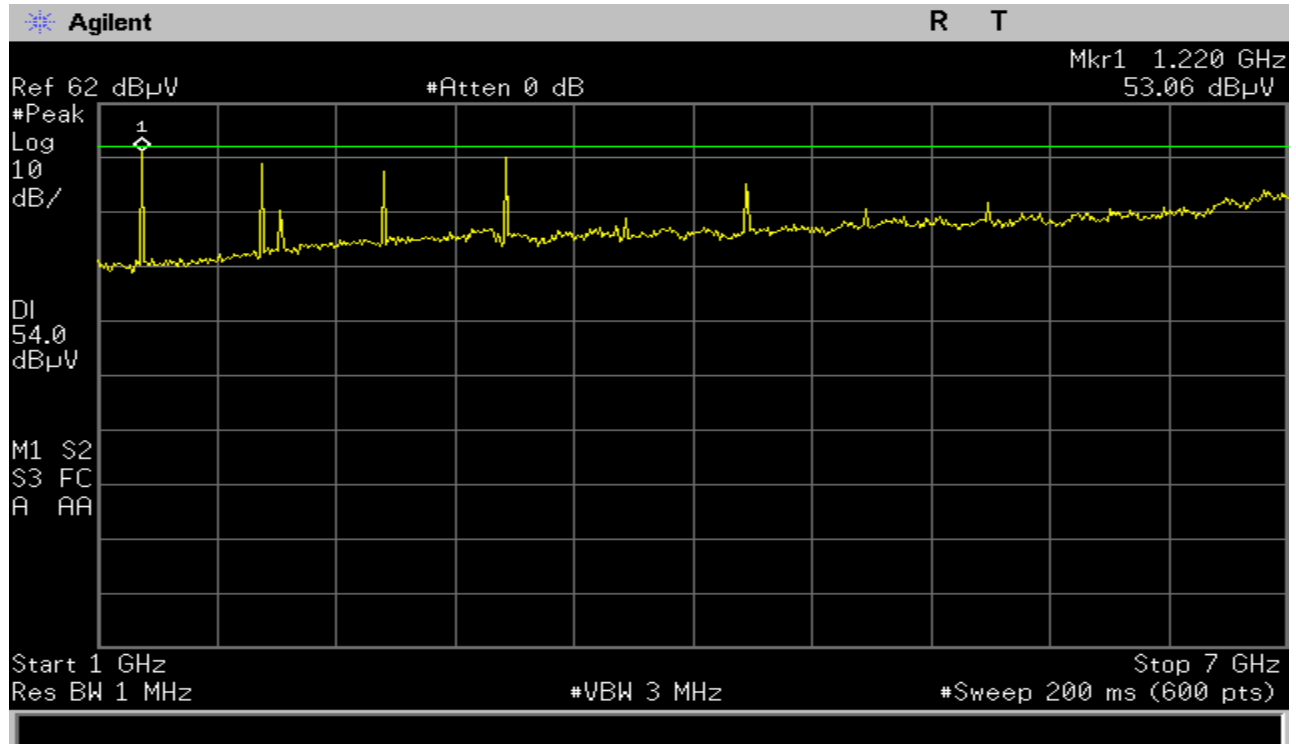


613 MHz 30 MHz-1 GHz

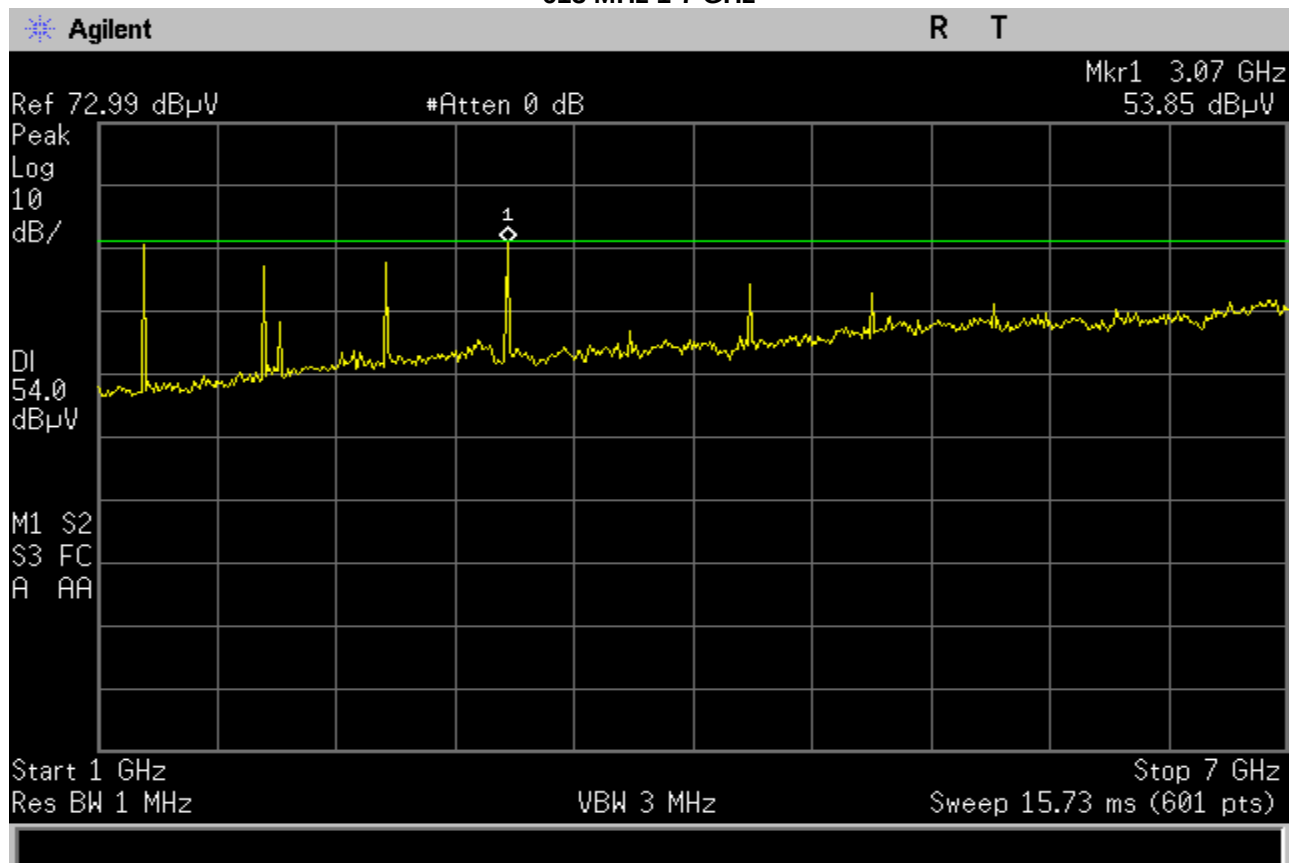




609.5 MHz 1-7 GHz



613 MHz 1-7 GHz



Occupied Bandwidth

Engineer: Poona Saber

Test Date: 9/11/17

The Equipment under Test (EUT) was located in anechoic chamber at 3 meters away from receive antenna and was rotated through 360 degrees and the receive antenna height was varied from 1m to 4m so that maximum radiated emission level was captured.

FCC calls out for wireless medical telemetry devices to operate within one or more of the following 1.5MHz up to 6MHz channels:

608.0-609.5 MHz

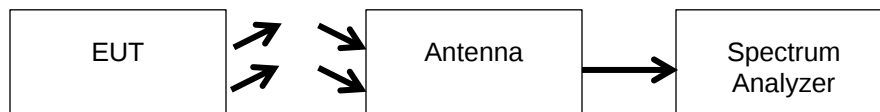
609.5-611.0 MHz

611.0-612.5 MHz

612.5-614.0 MHz

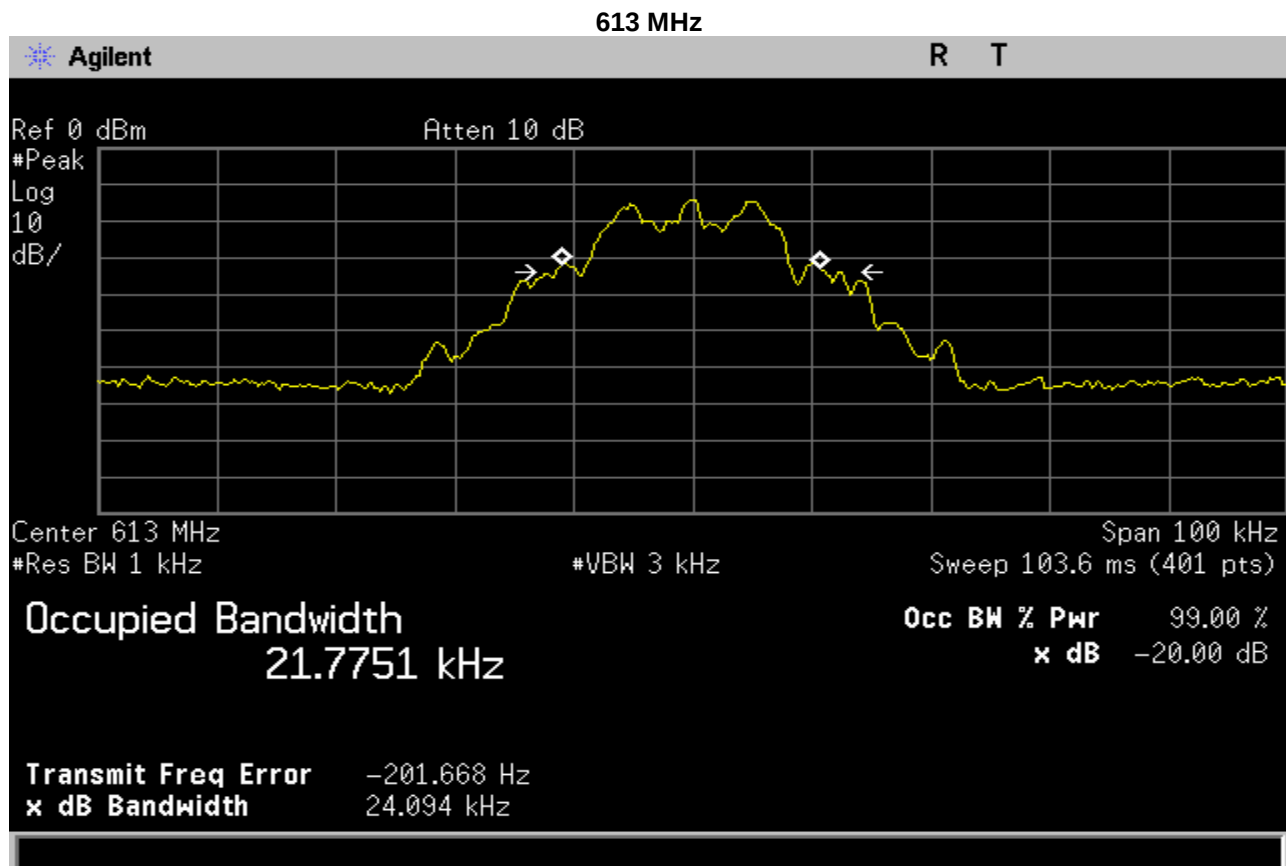
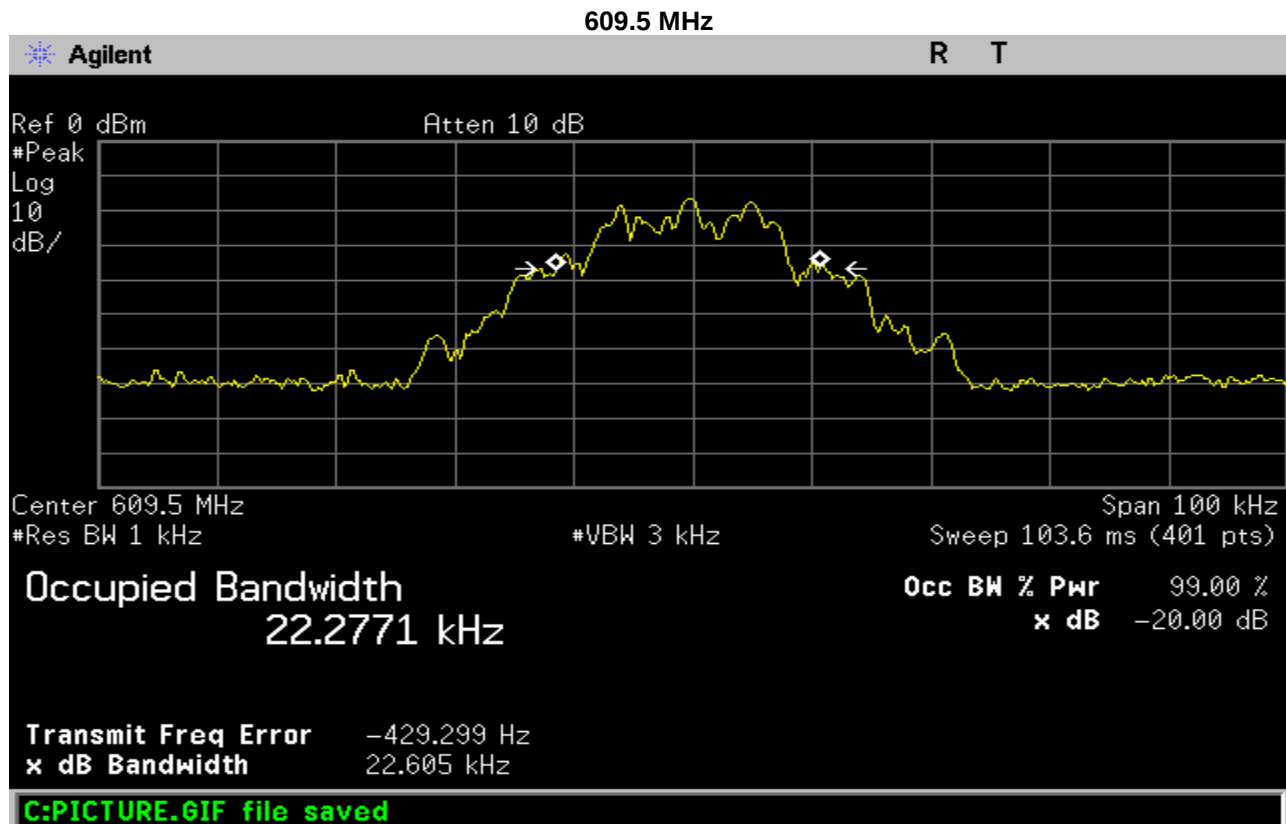
Procedures in KDB 971168 were followed to measure the occupied Bandwidth

Test Setup





Occupied Bandwidth Plots





Frequency Stability (Temperature and voltage Variation)

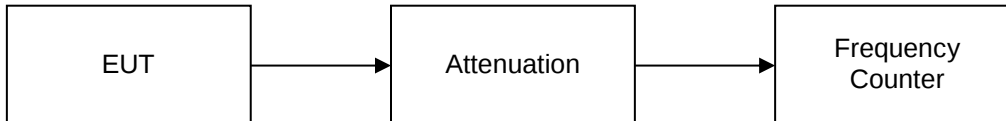
Engineer: Poona Saber

Test Date: 9/12/17

Measurement Procedure

The EUT was placed in an environmental test chamber and the RF output was connected directly to a frequency counter. The temperature was varied from -30°C to 50°C in 10°C increments. After a sufficient time for temperature stabilization the RF output frequency was measured. At 20°C the power supply voltage to the EUT was varied from 85% to 115% of the nominal value and the RF output was measured.

Measurement Setup



Measurement Results

Frequency Versus Temperature

Tuned Frequency (MHz)	Frequency Tolerance (ppm)	Upper Limit (MHz)	Lower Limit (MHz)		Temperature centigrade	Measured Frequency (MHz)	Upper Margin (MHz)	Lower Margin (MHz)
613.000	17.654159	614.000000	612.500000					
		614.000000	612.500000		-30	612.989223	-1.010777	0.489223
		614.000000	612.500000		-20	612.989543	-1.010457	0.489543
		614.000000	612.500000		-10	612.990000	-1.010000	0.490000
		614.000000	612.500000		0	612.999825	-1.000175	0.499825
		614.000000	612.500000		10	613.000000	-1.000000	0.500000
		614.000000	612.500000		20	613.000045	-0.999955	0.500045
		614.000000	612.500000		30	613.000175	-0.999825	0.500175
		614.000000	612.500000		40	613.000175	-0.999825	0.500175
		614.000000	612.500000		50	613.000182	-0.999818	0.500182
		614.000000	612.500000					
		614.000000	612.500000					

Frequency Versus voltage

Tuned Frequency (MHz)	Frequency Tolerance (ppm)	Upper Limit (MHz)	Lower Limit (MHz)	Nominal Voltage	Voltage	Measured Frequency (MHz)	Upper Margin (MHz)	Lower Margin (MHz)
613.000	0.219	614.000000	612.500000	5.00	4.25	613.000765	-0.999235	0.500765
		614.000000	612.500000		5.00	613.000820	-0.999180	0.500820
		614.000000	612.500000		5.75	613.000954	-0.999046	0.500954



Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna	ARA	DRG-118/A	i00271	6/16/16	6/16/18
Horn Antenna, Amplified	ARA	MWH-1826/B	i00273	4/22/15	4/22/18
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	6/9/17	6/9/18
Spectrum Analyzer	Agilent	E4407B	i00331	10/19/16	10/19/17
Bi-Log Antenna	Schaffner	CBL 6111D	i00349	8/3/16	8/3/18
EMI Analyzer	Agilent	E7405A	i00379	2/22/17	2/22/18
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	8/15/16	8/15/19
Temperature Chamber	Tenney	Tenney Jr	i00027	Verified on : 8/22/17	
Preamplifier	Miteq	AFS44 00101 400 23-10P-44	i00509	N/A	N/A

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT