Spacelabs

Telemetry Transmitter 96281-C05W

Report #: SPAC0479

Report Prepared By Northwest EMC Inc.

NORTHWEST EMC – (888) 364-2378 – www.nwemc.com

California – Minnesota – Oregon – New York – Washington

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Last Date of Test: January 25, 2012
Spacelabs
Model: Telemetry Transmitter 96281-C05W

Emissions

Test Description	Specification	Test Method	Pass/Fail
Frequency Stability	FCC 95H:2012	ANSI/TIA/EIA-603-C-2004	**Pass**
Occupied Bandwidth	FCC 95H:2012	ANSI/TIA/EIA-603-C-2004	**Pass**
Field Strength of Spurious Emissions	FCC 95H:2012	ANSI/TIA/EIA-603-C-2004	**Pass**
Field Strength of Fundamental	FCC 95H:2012	ANSI/TIA/EIA-603-C-2004	**Pass**

Deviations From Test Standards

None

Approved By:

Tim O'Shea, Operations Manager

NVLAP Lab Code: 200630-0

Test Facility

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
22975 NW Evergreen Parkway, Suite 400
Hillsboro, OR 97124

Phone: (503) 844-4066 Fax: 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834D-2).

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

Revision History

Revision Number	Description	Date	Page Number
00	None		

Accreditations and Authorizations

FCC

Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.

NVLAP

Northwest EMC, Inc. is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. NVLAP is administered by the National Institute of Standards and Technology (NIST), an agency of the U.S. Commerce Department. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 2004/108/EC, and ANSI C63.4. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada.

Industry Canada

Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS-Gen, Issue 2 and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements. (*Site Filing Numbers - Hillsboro: 2834D-1, 2834D-2, Sultan: 2834C-1, Irvine: 2834B-1, 2834B-2, Brooklyn Park: 2834E-1)*

CAB

Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement.

Australia/New Zealand

The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body (NVLAP).

Accreditations and Authorizations

VCCI

Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Numbers. - Hillsboro: C-1071, R-1025, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-3265, and T-1511, Brooklyn Park: R-3125, G-86, G-141, C-3464, and T-1634).*

BSMI

Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement (US0017).

GOST

Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification

KCC

Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. (*Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157, Brooklyn Park: US0175)*

VIETNAM

Vietnam MIC has approved Northwest EMC as an accredited test lab. Per Decision No. 194/QD-QLCL (dated December 15, 2009), Northwest EMC test reports can be used for Vietnam approval submissions.

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/

Locations

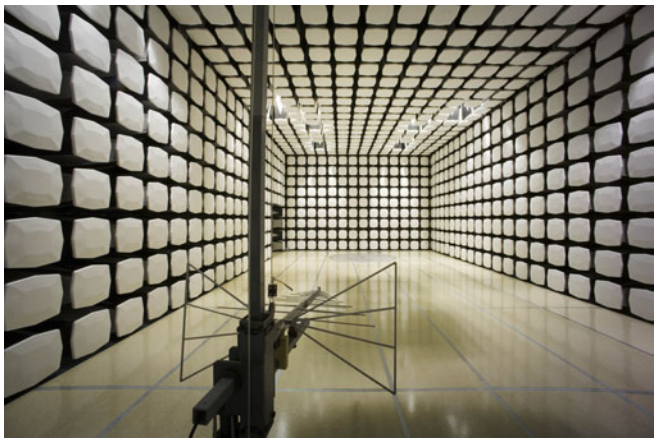
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

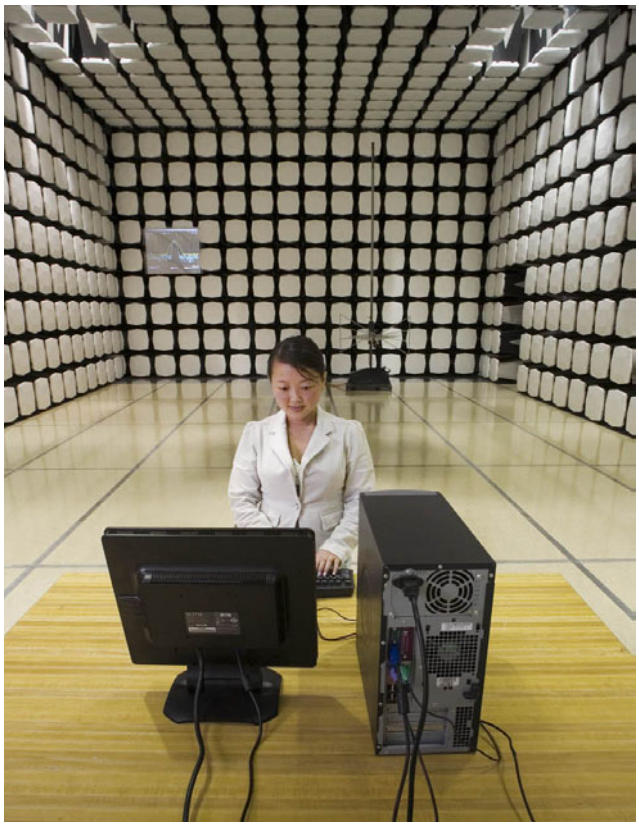
California
Labs OC01-OC13
41 Tesla
Irvine, CA 92618
(949) 861-8918

Minnesota
Labs MN01-MN08
9349 W Broadway Ave.
Brooklyn Park,
MN 55445
(763) 425-2281

Washington
Labs SU01-SU07
14128 339th Ave. SE
Sultan, WA 98294
(360) 793-8675

New York
Labs WA01-WA04
4939 Jordan Rd.
Elbridge, NY 13060
(315) 685-0796





Product Description

Client and Equipment Under Test (EUT) Information

Company Name:	Spacelabs Medical Inc.
Address:	5150 220th Ave SE
City, State, Zip:	Issaquah, WA 98027-7018
Test Requested By:	Steve Cantwell
Model:	Telemetry Transmitter 96281-C05W
First Date of Test:	January 19, 2012
Last Date of Test:	January 25, 2012
Receipt Date of Samples:	January 19, 2012
Equipment Design Stage:	Preproduction
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
The 96281-C05W is a body-worn telemetry transmitter operating at 600 MHz and also contains a Bluetooth radio.

Testing Objective:
To demonstrate compliance with FCC 95H requirements for a medical telemetry device operating in the 600 MHz band.

Configurations

Configuration 1 SPAC0479

Software/Firmware Running during test	
Description	**Version**
STT Driver Interface	1.1.4392.26483

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Telemetry Transmitter (with SpO2)	Spacelabs	96281-C05W	6008

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
ECG lead wires shorting bars	Spacelabs	None	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
ECG lead wires	No	0.6m	No	Telemetry Transmitter	Shorting bar
SPO2 extender 070-0014-00	Yes	0.6m	No	Telemetry transmitter	SPO2 probe
SPO2 Probe	Yes	1.0m*	No	SPO2 Extender	Probe (none)

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

* SPO2 extender and probe are bundled to 1.0 m overall length.

Modifications

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	1/19/2012	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	1/20/2012	Field Strength of Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	1/25/2012	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	1/25/2012	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

Frequency Stability

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	7/5/2011	12
Near Field Probe	EMCO	7405	IPD	NCR	0
Multimeter	Tektronix	DMM912	MMH	1/28/2011	24
DC Power Supply	Topward	TPS-2000	TPD	NCR	0
Chamber Temp. & Humidity Controller	ESZ / Eurotherm	Dimension II	TBC	NCR	0
Chamber, Temp./Humidity Chamber	Cincinnati Sub Zero (CSZ)	ZH-32-2-2-H/AC	TBA	8/20/2010	24

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

Per FCC 95.1115(e) *Frequency stability. "*Manufacturers of wireless medical telemetry devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all of the manufacturer's specified conditions."

Variation of Supply Voltage

The primary supply voltage was varied from 85% to 115% of the nominal voltage. A DC lab supply was used to vary the supply voltage.

Variation of Ambient Temperature

Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range (-30° to +50° C) and at 10°C intervals.

The measurement was made with a near field probe located between the EUT and the test equipment. The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Frequency Stability

EUT:	Telemetry Transmitter 96281-C05W			**Work Order:**	SPAC0479
Serial Number:	6004			**Date:**	01/25/12
Customer:	Spacelabs			**Temperature:**	23°C
Attendees:	None			**Humidity:**	36%
Project:	None			**Barometric Pres.:**	102.71 kPa
Tested by:	Rod Peloquin	**Power:**	Battery	**Job Site:**	EV09

TEST SPECIFICATIONS	**Test Method**
FCC 95H:2012	ANSI/TIA/EIA-603-C-2004

COMMENTS

With ECG lead wires, ECD shorting bar, SpO2 cable and sensor

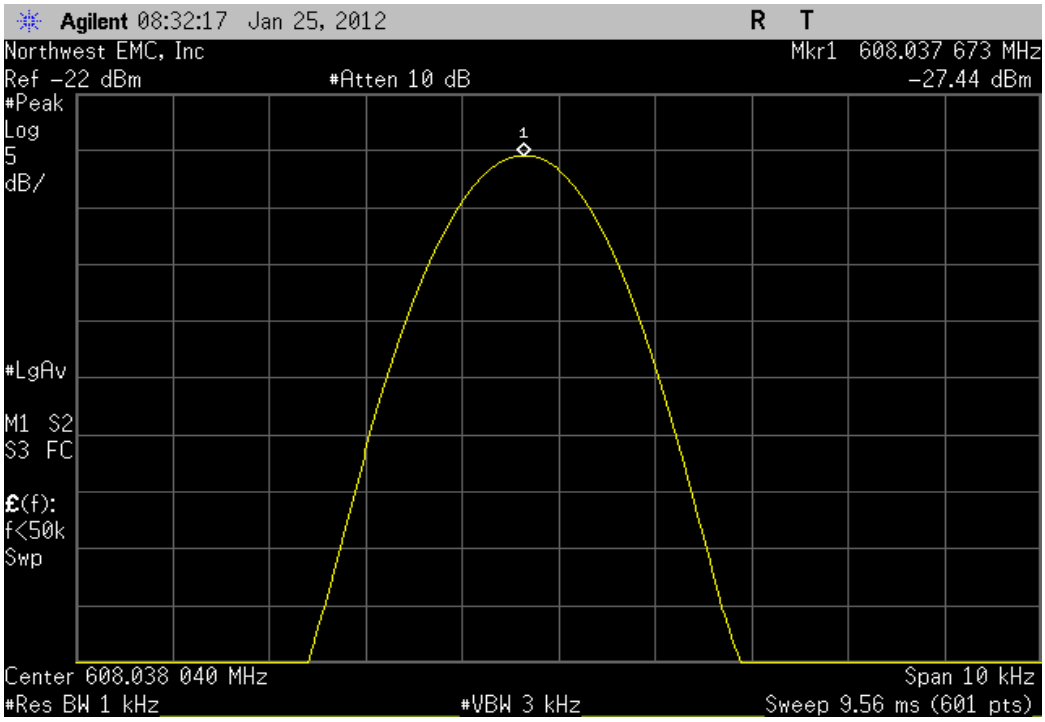
DEVIATIONS FROM TEST STANDARD

Configuration #	1	*Signature*

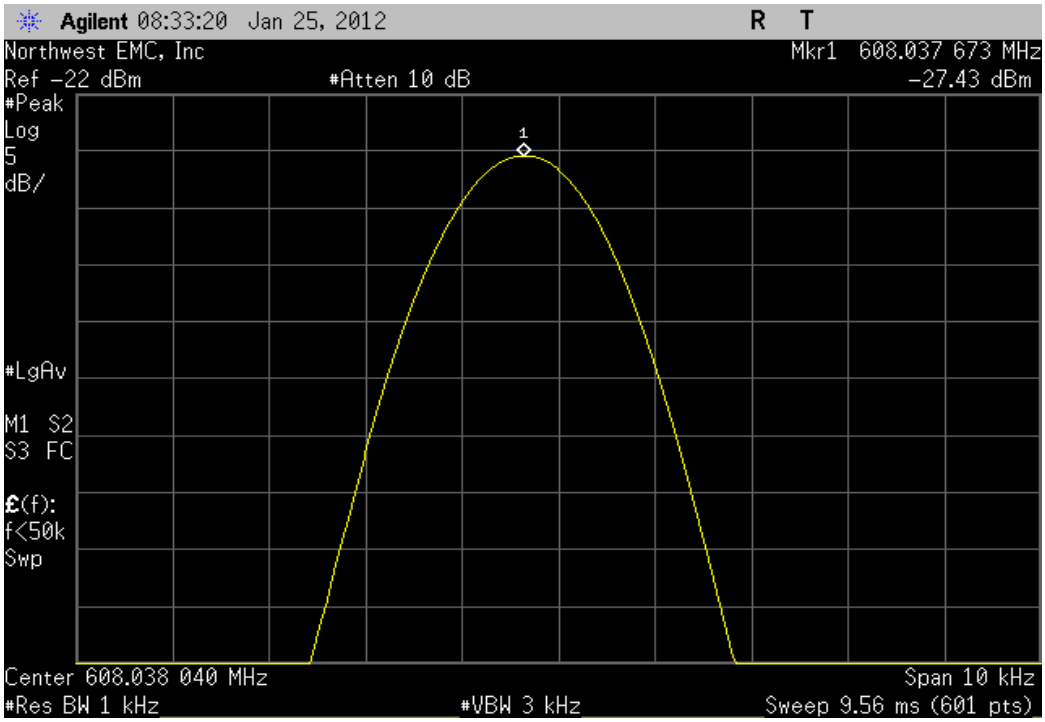
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Result
Low Channel, 608.0375 MHz				
Voltage: 3.45 VDC, 115%	608.037673	608.0375	0.28	Pass
Voltage: 3.0 VDC, 100%	608.037673	608.0375	0.28	Pass
Voltage: 2.55 VDC 85%	608.037673	608.0375	0.28	Pass
Temperature: +50°	608.037506	608.0375	0.01	Pass
Temperature: +40°	608.037506	608.0375	0.01	Pass
Temperature: +30°	608.037473	608.0375	0.04	Pass
Temperature: +20°	608.037473	608.0375	0.04	Pass
Temperature: +10°	608.037607	608.0375	0.18	Pass
Temperature: 0°	608.037557	608.0375	0.09	Pass
Temperature: -10°	608.03744	608.0375	0.1	Pass
Temperature: -20°	608.037657	608.0375	0.26	Pass
Temperature: -30°	608.03744	608.0375	0.1	Pass
High Channel, 613.9375 MHz				
Voltage: 3.45 VDC, 115%	613.9376	613.9375	0.16	Pass
Voltage: 3.0 VDC, 100%	613.937587	613.9375	0.14	Pass
Voltage: 2.55 VDC 85%	613.937604	613.9375	0.17	Pass
Temperature: +50°	613.937487	613.9375	0.02	Pass
Temperature: +40°	613.937503	613.9375	0	Pass
Temperature: +30°	613.93747	613.9375	0.05	Pass
Temperature: +20°	613.937503	613.9375	0	Pass
Temperature: +10°	613.93762	613.9375	0.2	Pass
Temperature: 0°	613.937587	613.9375	0.14	Pass
Temperature: -10°	613.937437	613.9375	0.1	Pass
Temperature: -20°	613.937687	613.9375	0.3	Pass
Temperature: -30°	613.93742	613.9375	0.13	Pass

Frequency Stability

Low Channel, 608.0375 MHz, Voltage: 3.45 VDC, 115%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		608.037673	608.0375	0.28	N/A	N/A

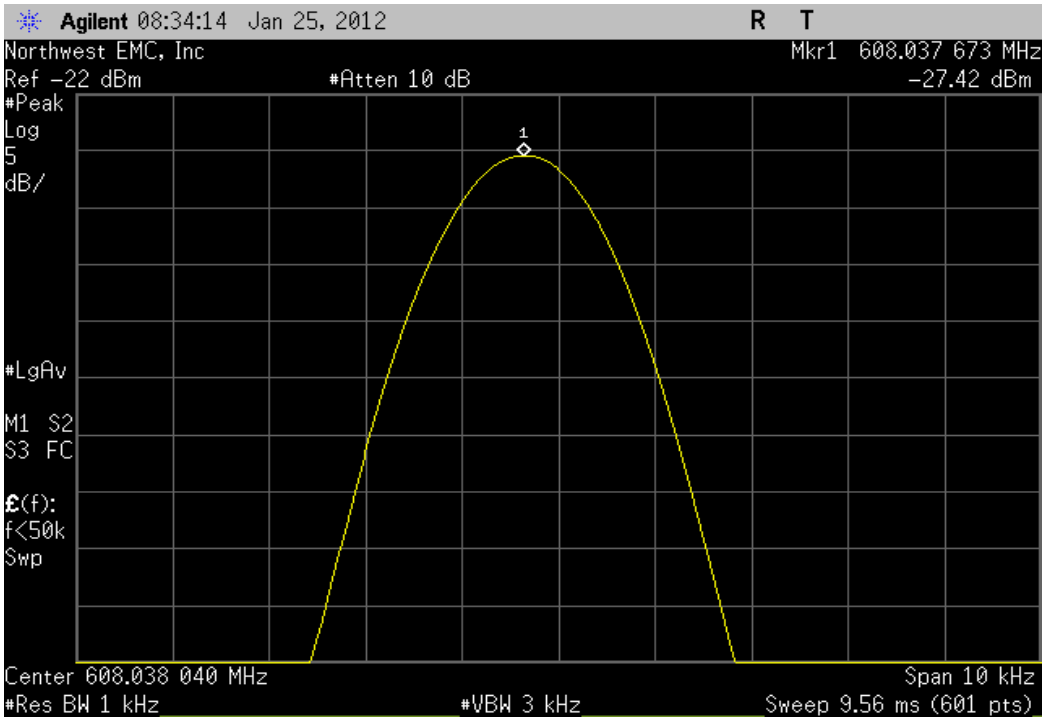


Low Channel, 608.0375 MHz, Voltage: 3.0 VDC, 100%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		608.037673	608.0375	0.28	100	Pass

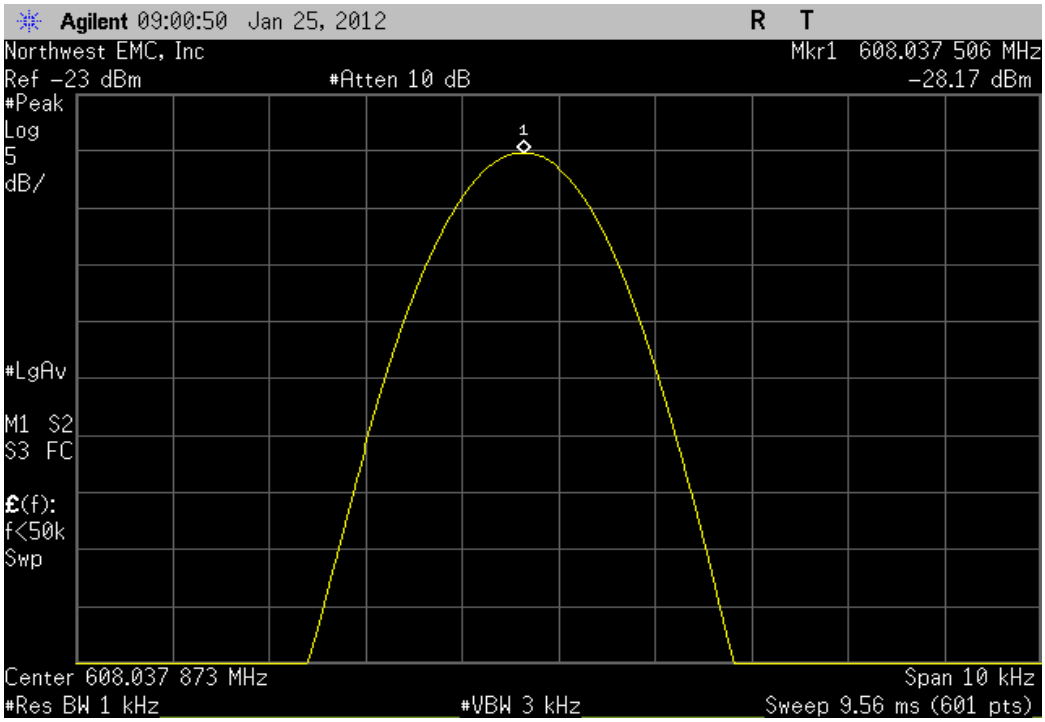


Frequency Stability

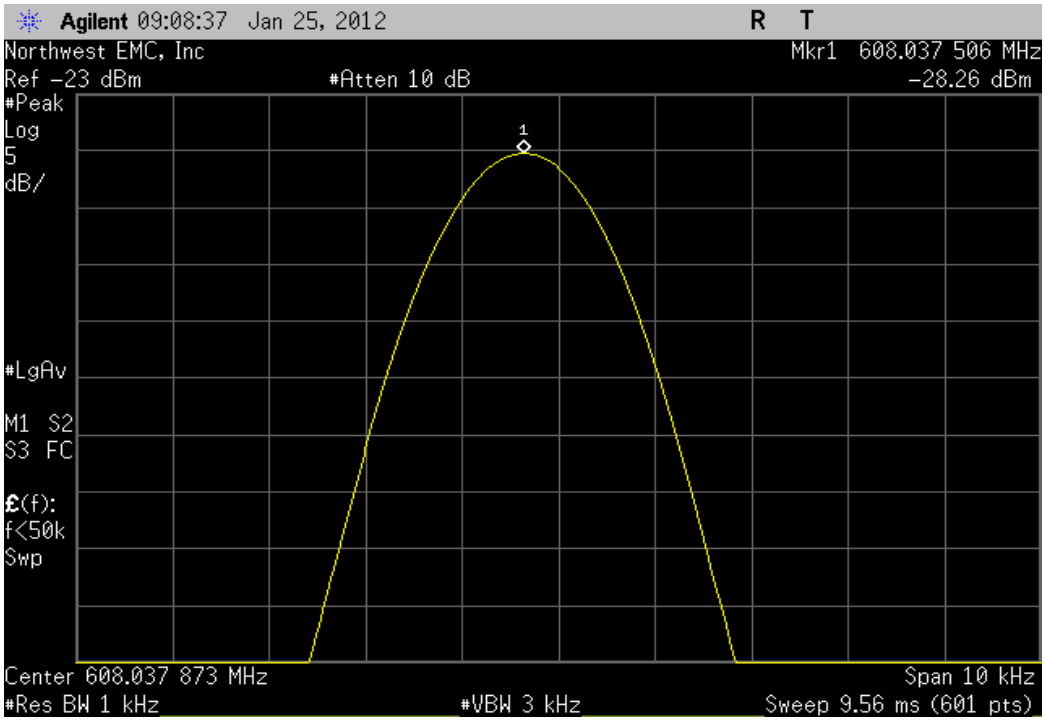
Low Channel, 608.0375 MHz, Voltage: 2.55 VDC 85%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		608.037673	608.0375	0.28	N/A	N/A



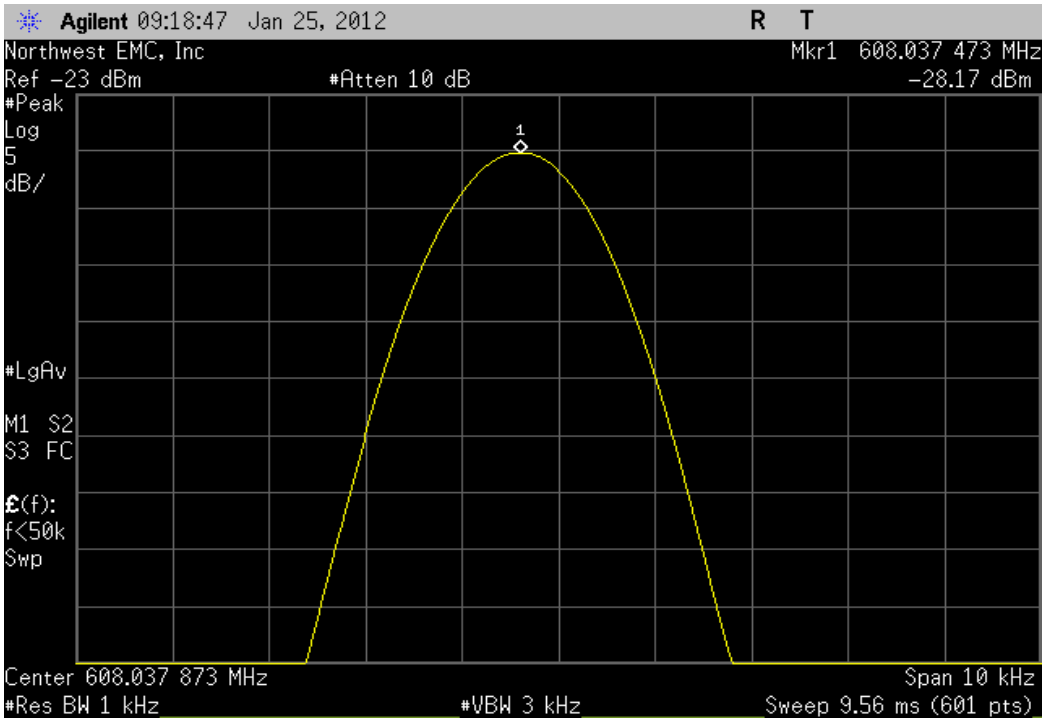
Low Channel, 608.0375 MHz, Temperature: +50°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		608.037506	608.0375	0.01	100	Pass



Low Channel, 608.0375 MHz, Temperature: +40°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		608.037506	608.0375	0.01	N/A	N/A

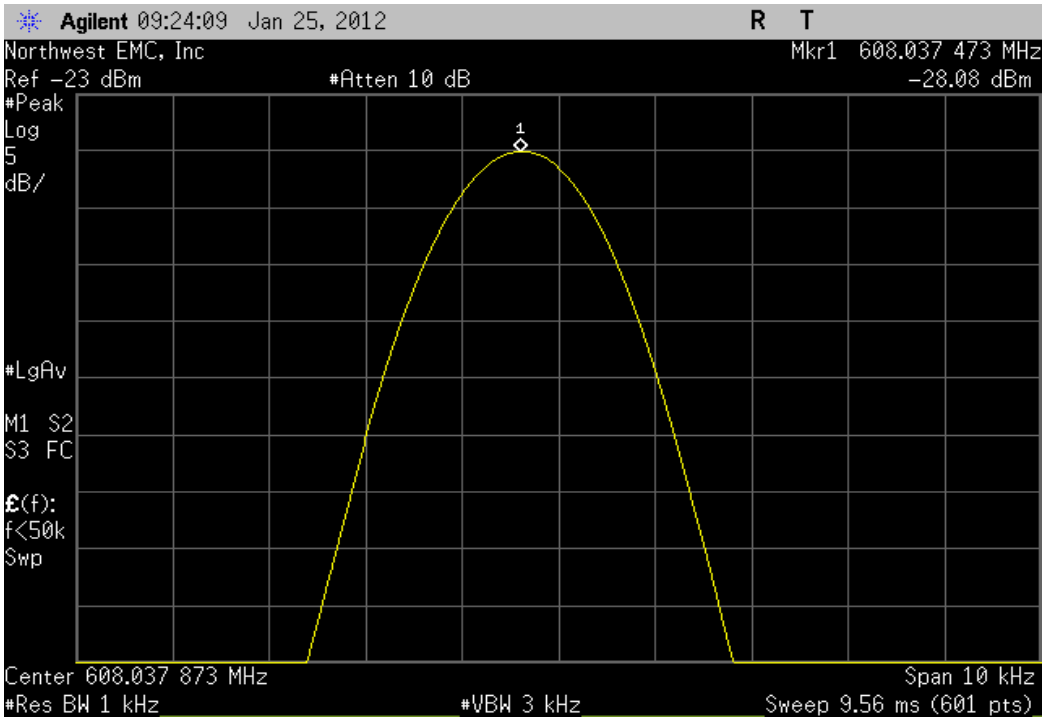


Low Channel, 608.0375 MHz, Temperature: +30°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		608.037473	608.0375	0.04	100	Pass

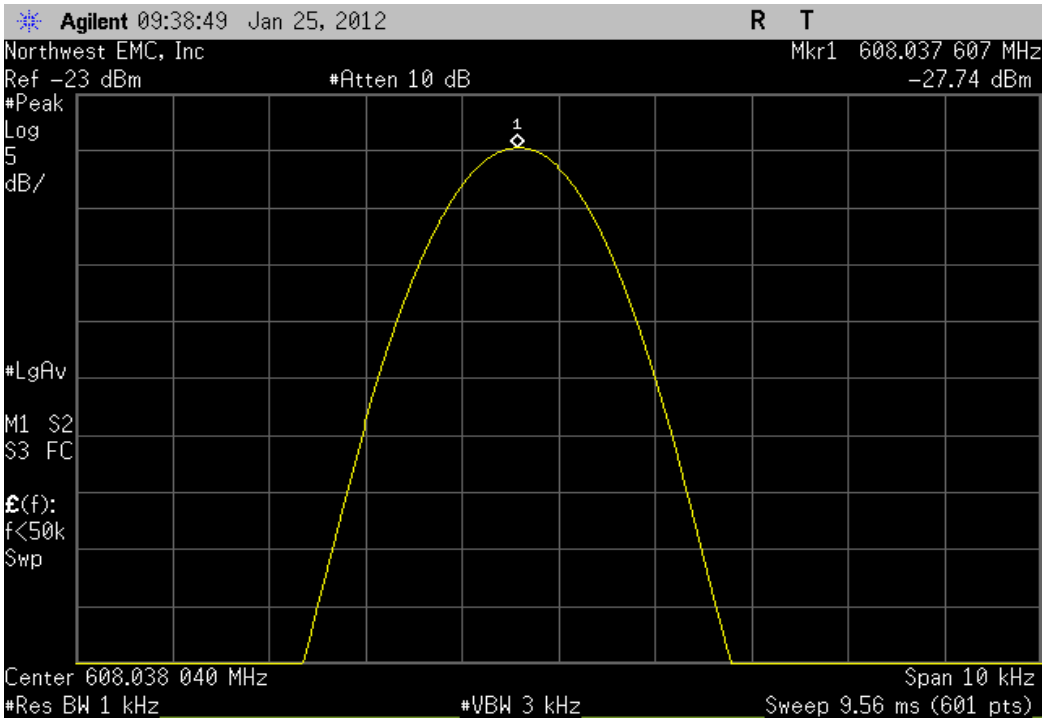


Frequency Stability

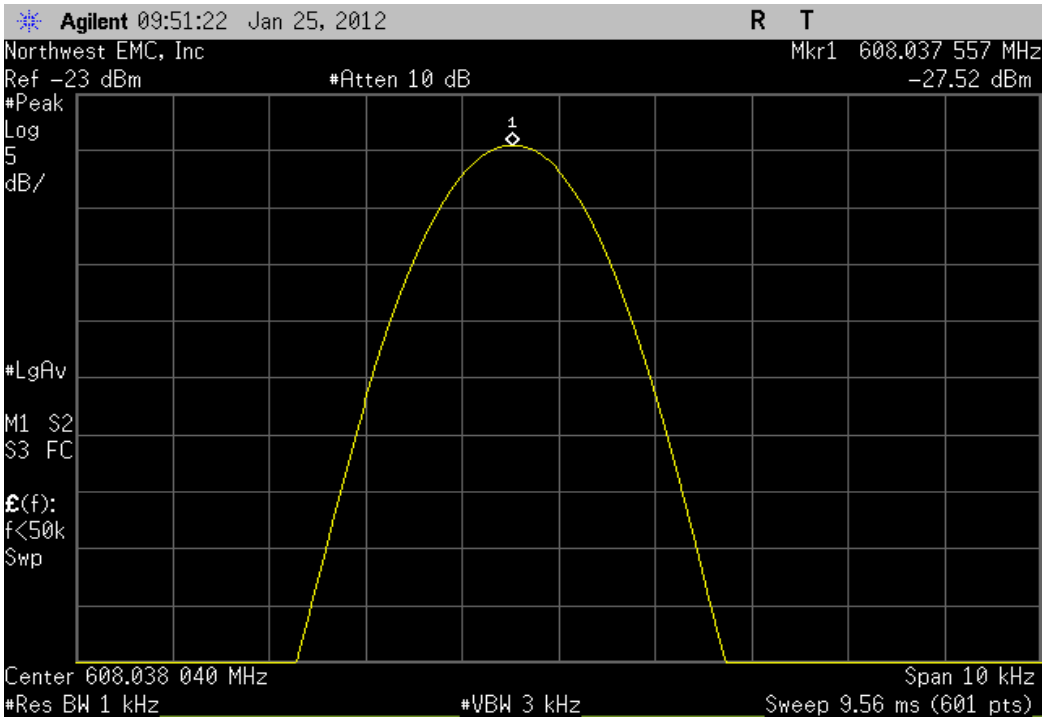
Low Channel, 608.0375 MHz, Temperature: +20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		608.037473	608.0375	0.04	N/A	N/A



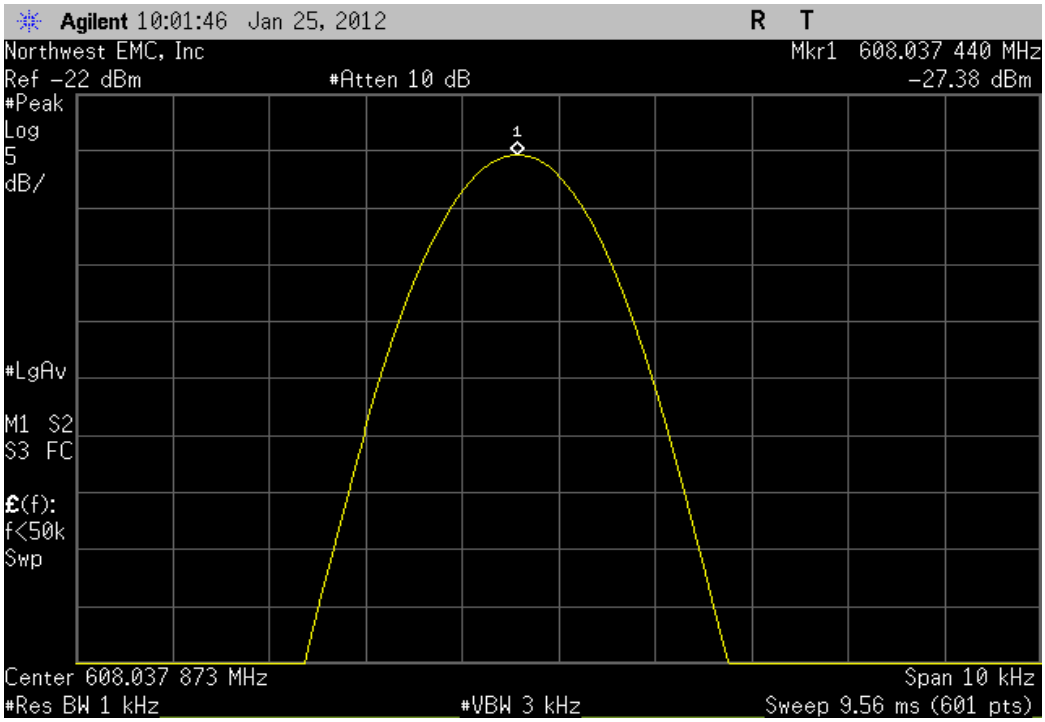
Low Channel, 608.0375 MHz, Temperature: +10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		608.037607	608.0375	0.18	100	Pass



Low Channel, 608.0375 MHz, Temperature: 0°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		608.037557	608.0375	0.09	N/A	N/A

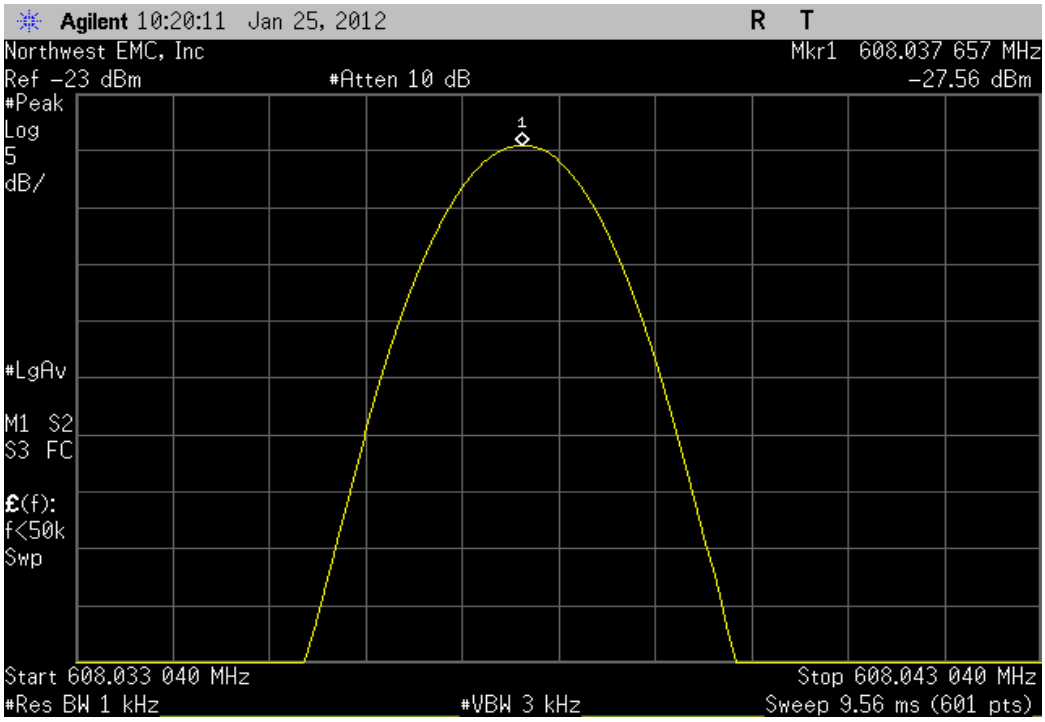


Low Channel, 608.0375 MHz, Temperature: -10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		608.03744	608.0375	0.1	100	Pass

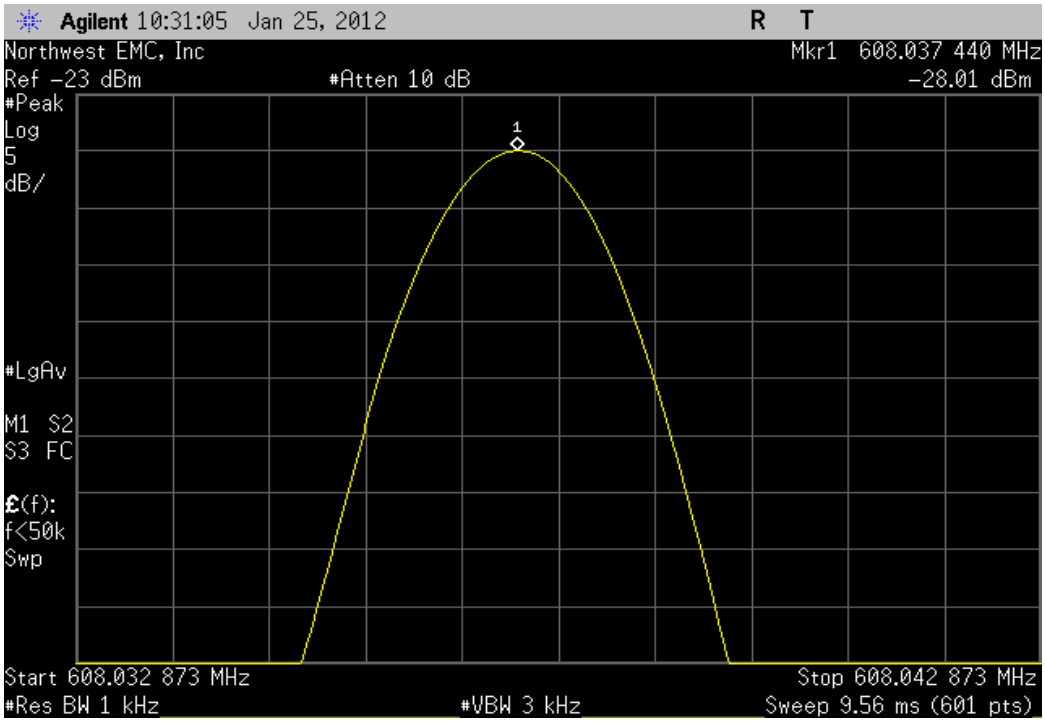


Frequency Stability

Low Channel, 608.0375 MHz, Temperature: -20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		608.037657	608.0375	0.26	N/A	N/A

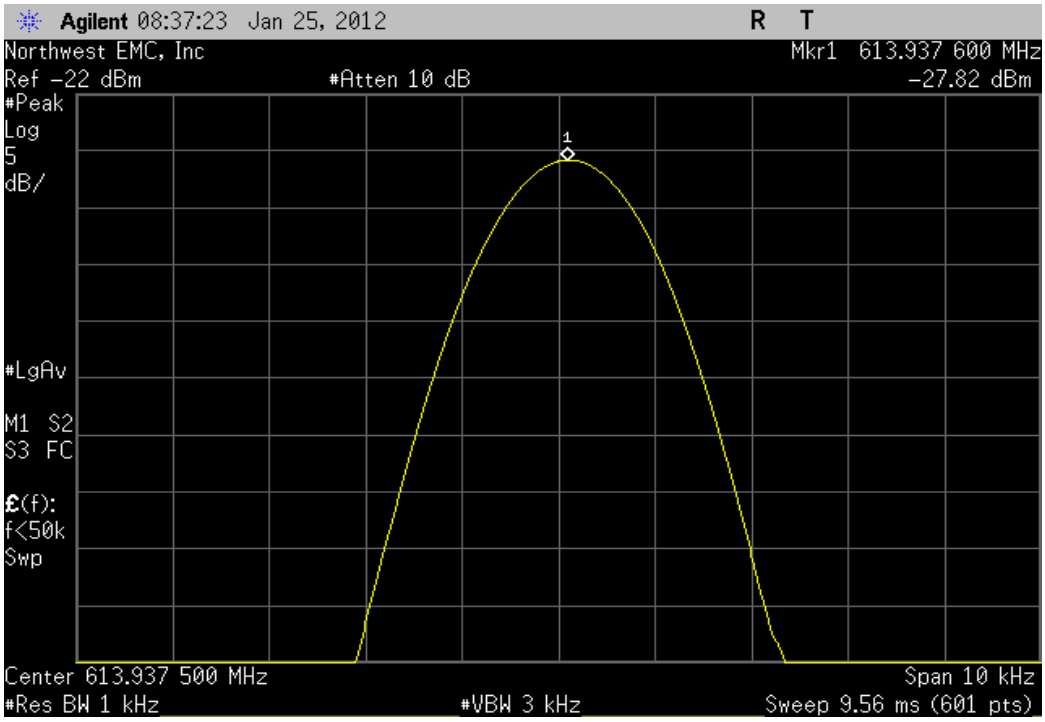


Low Channel, 608.0375 MHz, Temperature: -30°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		608.03744	608.0375	0.1	100	Pass

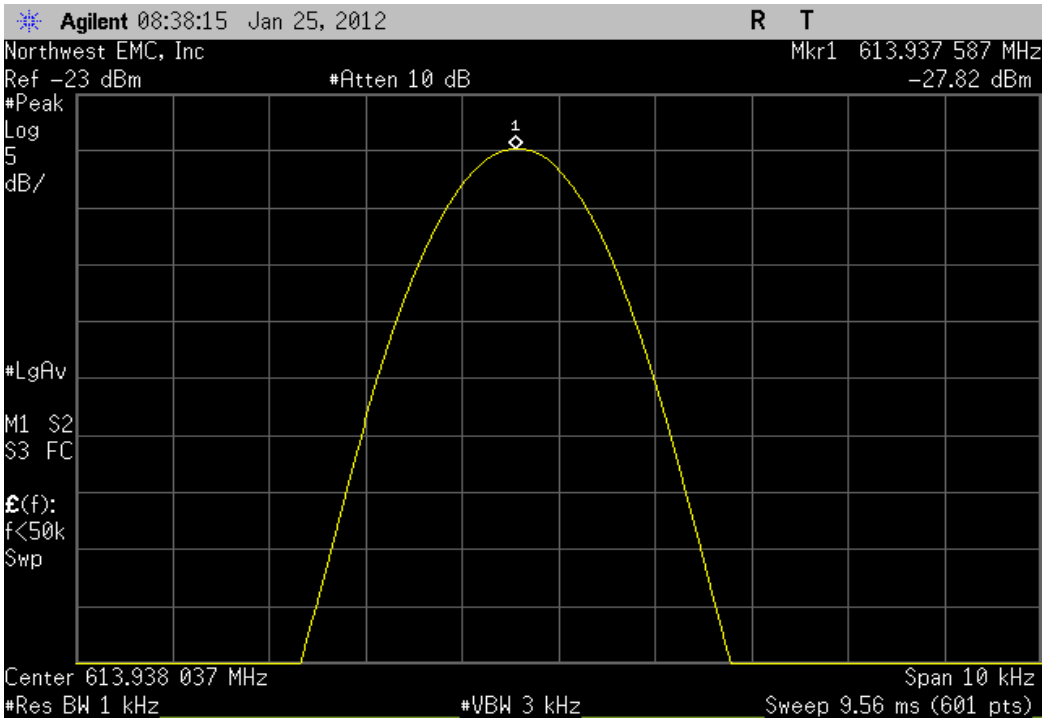


Frequency Stability

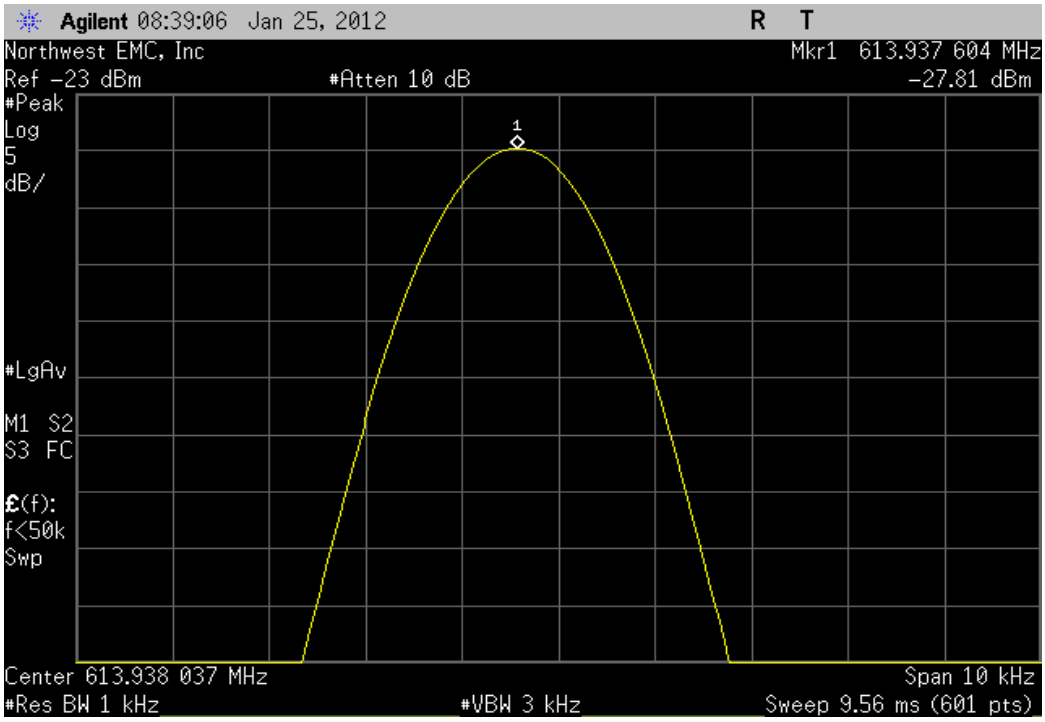
High Channel, 613.9375 MHz, Voltage: 3.45 VDC, 115%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		613.9376	613.9375	0.16	N/A	N/A



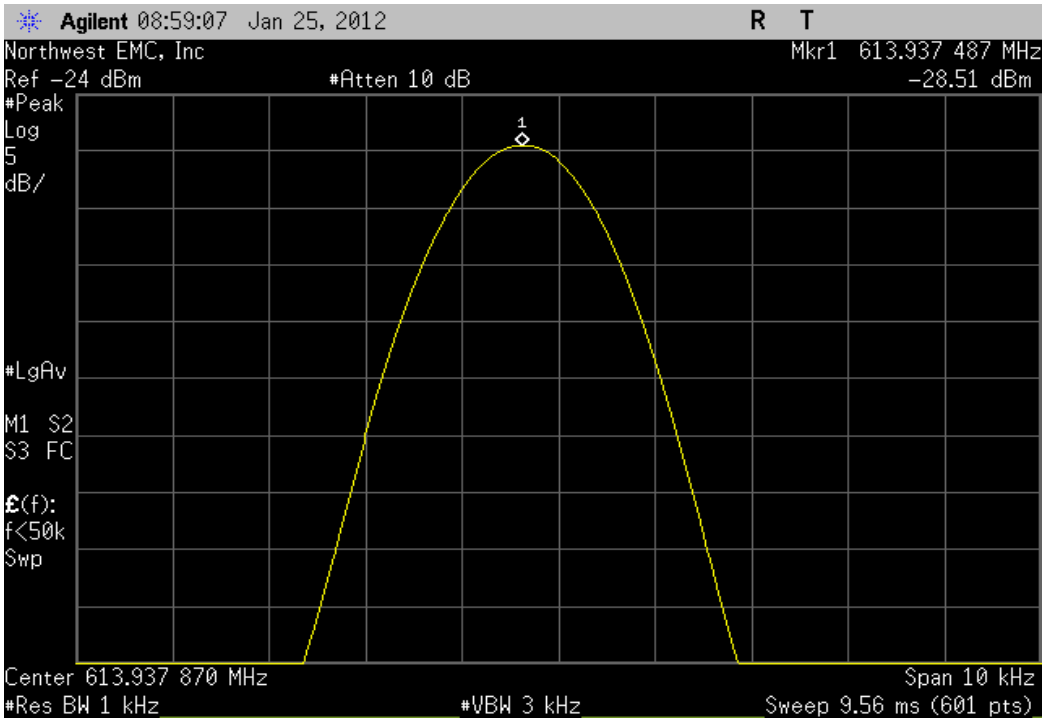
High Channel, 613.9375 MHz, Voltage: 3.0 VDC, 100%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		613.937587	613.9375	0.14	100	Pass



High Channel, 613.9375 MHz, Voltage: 2.55 VDC 85%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		613.937604	613.9375	0.17	N/A	N/A

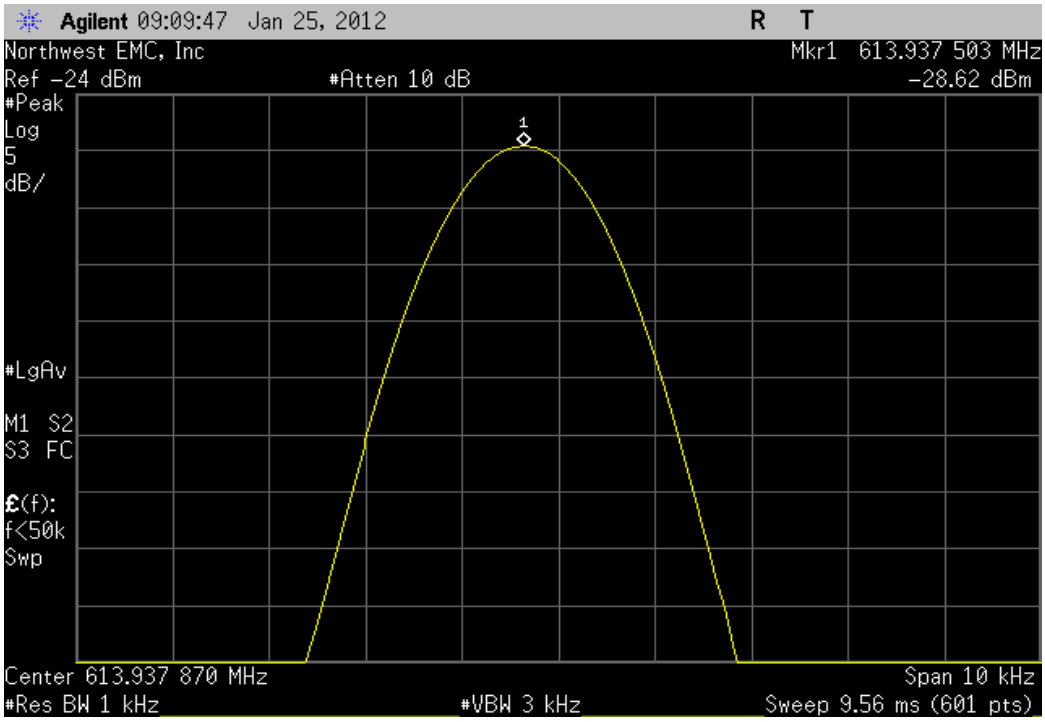


High Channel, 613.9375 MHz, Temperature: +50°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		613.937487	613.9375	0.02	100	Pass

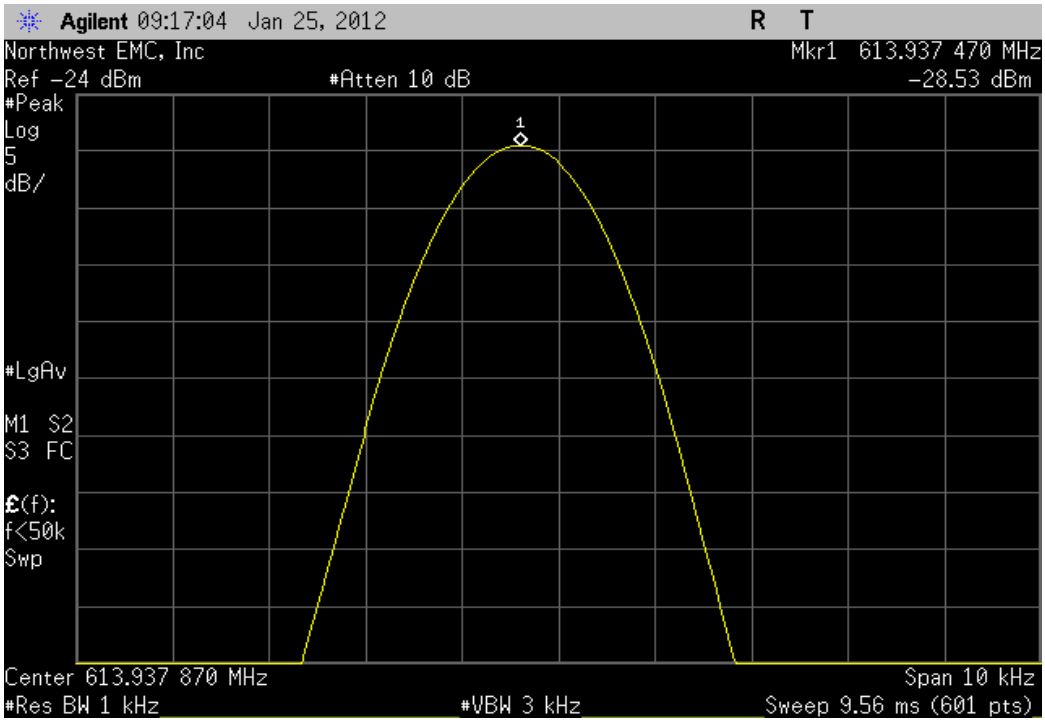


Frequency Stability

High Channel, 613.9375 MHz, Temperature: +40°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		613.937503	613.9375	0	N/A	N/A

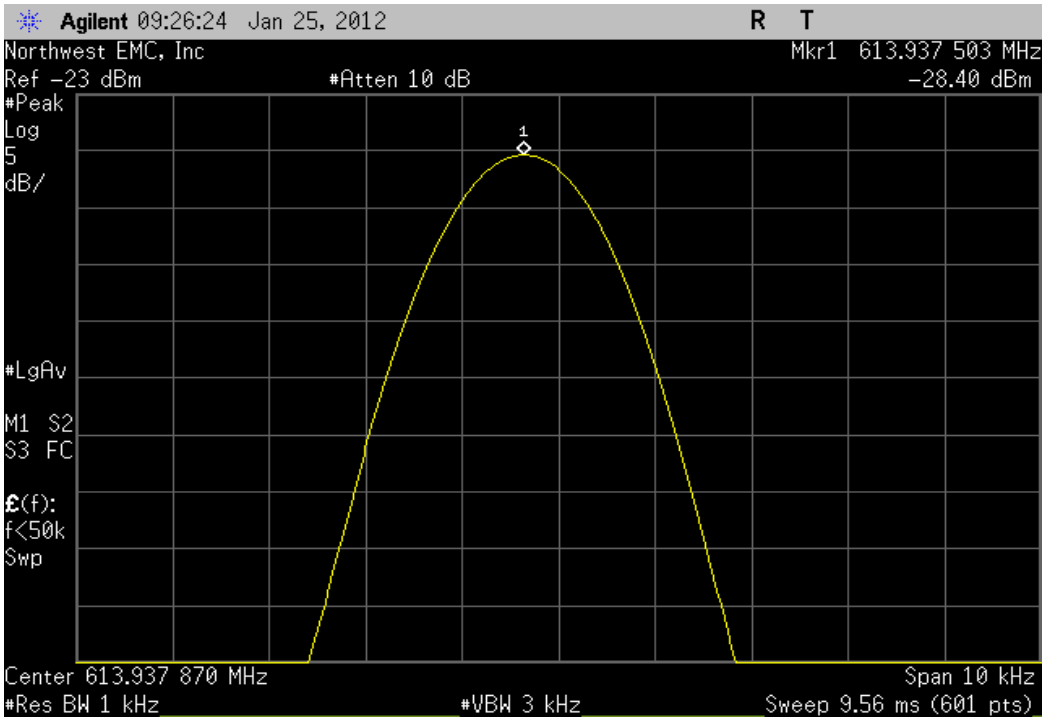


High Channel, 613.9375 MHz, Temperature: +30°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		613.93747	613.9375	0.05	100	Pass

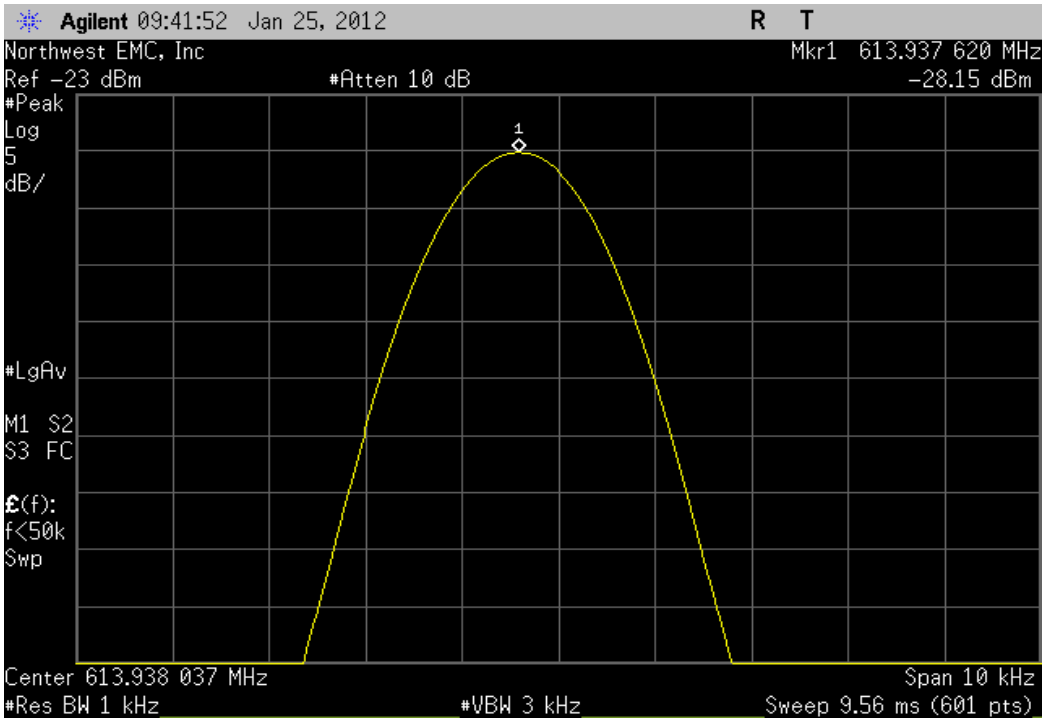


Frequency Stability

High Channel, 613.9375 MHz, Temperature: +20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		613.937503	613.9375	0	N/A	N/A

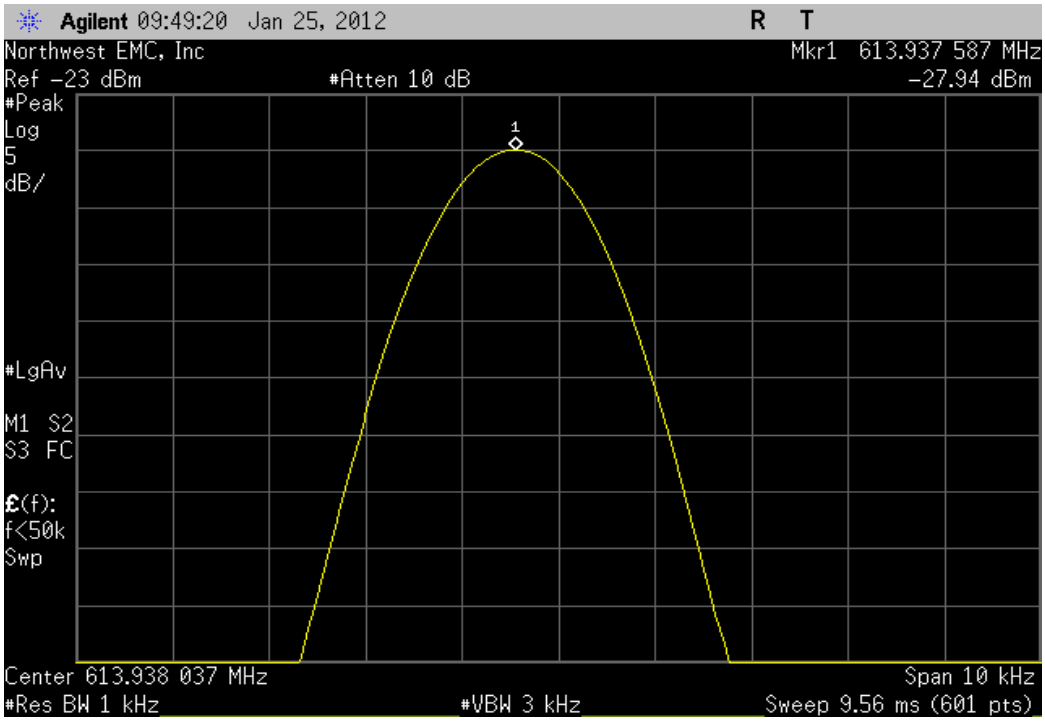


High Channel, 613.9375 MHz, Temperature: +10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		613.93762	613.9375	0.2	100	Pass

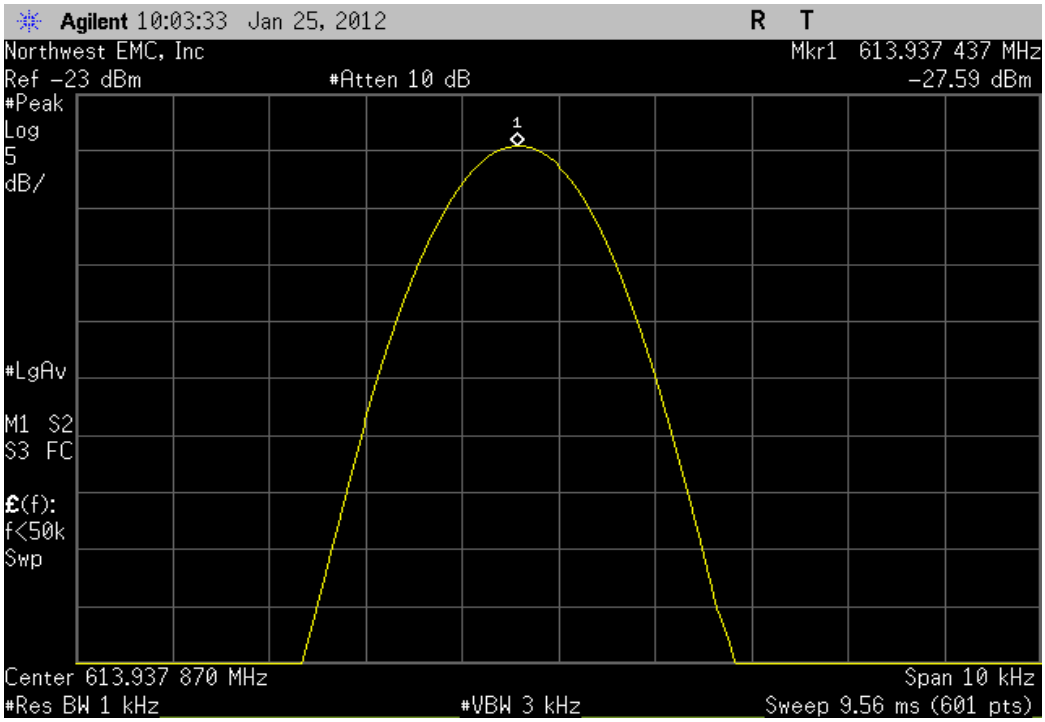


Frequency Stability

High Channel, 613.9375 MHz, Temperature: 0°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		613.937587	613.9375	0.14	N/A	N/A

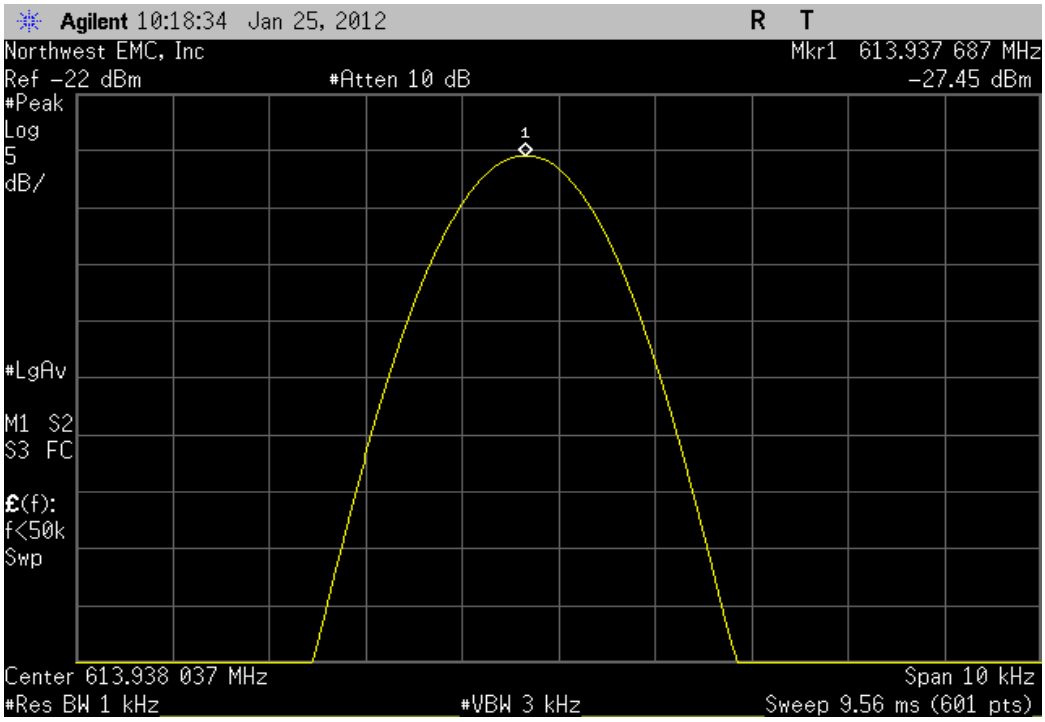


High Channel, 613.9375 MHz, Temperature: -10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		613.937437	613.9375	0.1	100	Pass

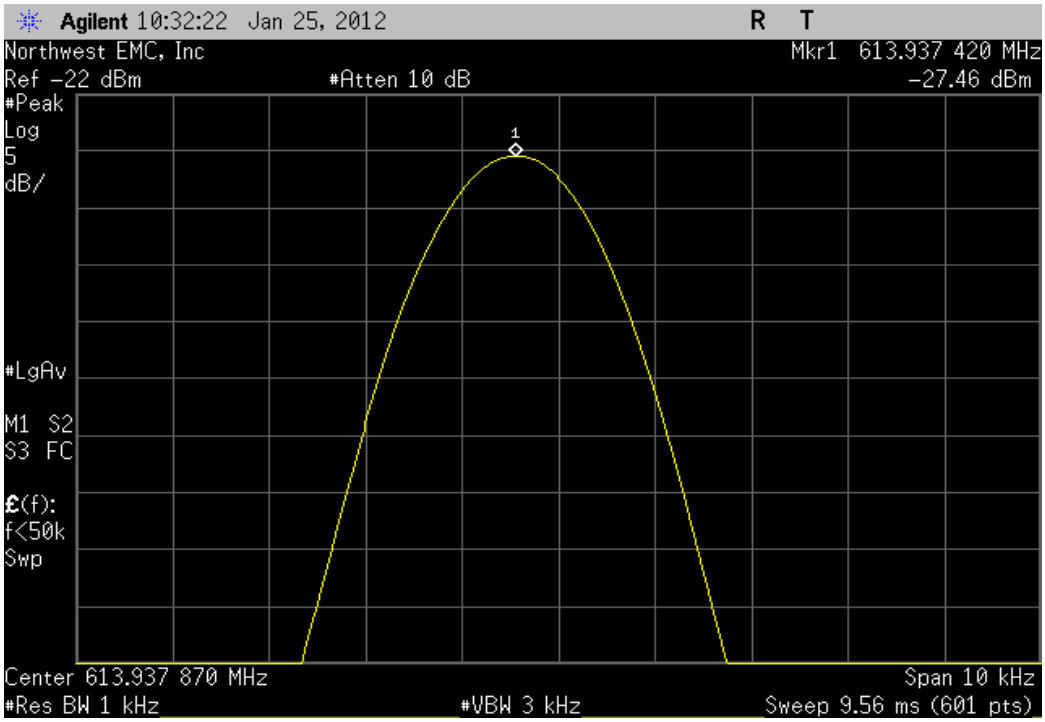


Frequency Stability

High Channel, 613.9375 MHz, Temperature: -20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		613.937687	613.9375	0.3	N/A	N/A



High Channel, 613.9375 MHz, Temperature: -30°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)		Result
		613.93742	613.9375	0.13	100	Pass



Occupied Bandwidth

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	7/5/2011	12
Near Field Probe	EMCO	7405	IPD	NCR	0

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

Per 47 CFR 2.1049, the 99% bandwidth was measured utilizing the analyzer's Occupied BW measurement function. The antenna is integral to the EUT, so a radiated measurement was made using a spectrum analyzer and a near field probe. The analyzer's resolution bandwidth was sufficiently narrow to plot the actual bandwidth of the signal and not the filter response curve of the spectrum analyzer. The resolution bandwidth was >1% of the 99% bandwidth and the video bandwidth was greater than or equal to the resolution bandwidth.

The occupied bandwidth was measured with the EUT configured for continuous modulated operation at the low, mid, and high channel of the operational band.

Occupied Bandwidth

EUT:	Telemetry Transmitter 96281-C05W			**Work Order:**	SPAC0479
Serial Number:	6004			**Date:**	01/25/12
Customer:	Spacelabs			**Temperature:**	23°C
Attendees:	None			**Humidity:**	38%
Project:	None			**Barometric Pres.:**	101.76 kPa
Tested by:	Rod Peloquin	**Power:**	Battery	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 95H:2012	ANSI/TIA/EIA-603-C-2004

COMMENTS

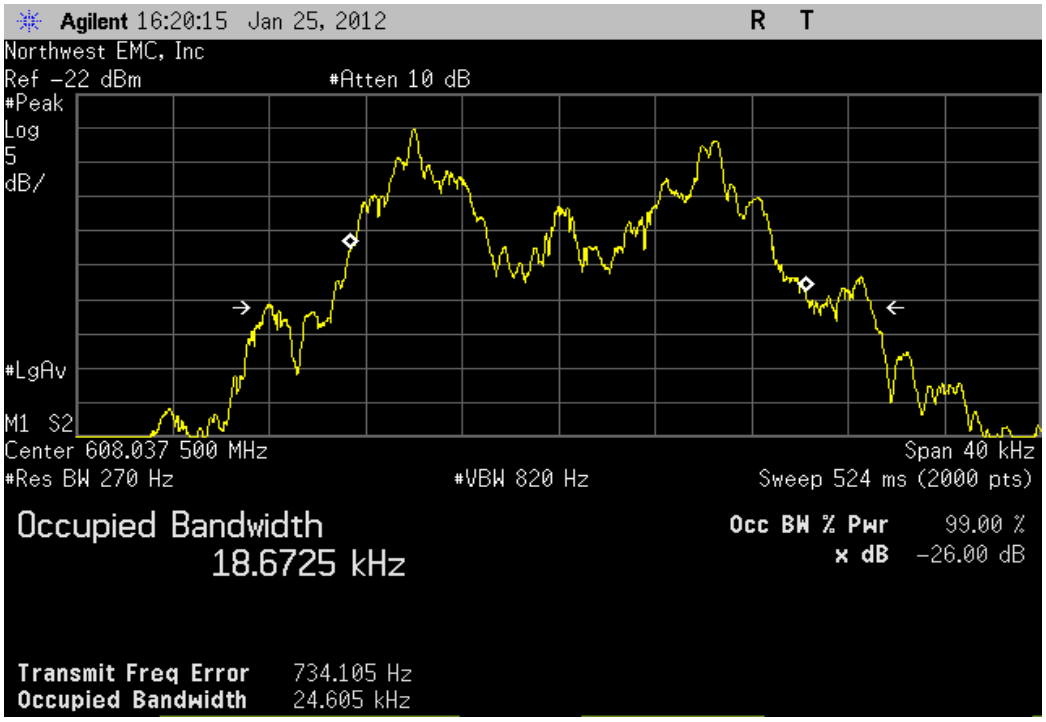
With ECG lead wires, ECD shorting bar, SpO2 cable and sensor

DEVIATIONS FROM TEST STANDARD

Configuration #	1	Signature

	Value	Limit	Result
Wide Band			
Low, 2242, 608.375	18.672 kHz	N/A	N/A
Mid, 2360, 610.9875	19.343 kHz	N/A	N/A
High, 2478, 613.9375	19.51 kHz	N/A	N/A

Wide Band, Low, 2242, 608.375							
					Value	Limit	Result
					18.672 kHz	N/A	N/A



Wide Band, Mid, 2360, 610.9875							
					Value	Limit	Result
					19.343 kHz	N/A	N/A

Occupied Bandwidth

Wide Band, High, 2478, 613.9375						
				Value	Limit	Result
				19.51 kHz	N/A	N/A

FIELD STRENGTH OF SPURIOUS EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting MPT (Wideband), Low = Ch.2242, 608.0375 MHz
Transmitting MPT (Wideband), Mid = Ch. 2360, 610.9875 MHz
Transmitting MPT (Wideband), High = Ch. 2478, 613.9375 MHz

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

SPAC0479 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	7 GHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	7/5/2011	12
Pre-Amplifier	Miteq	AM-1616-1000	AVM	6/20/2011	12
Antenna, Biconilog	EMCO	3141	AXG	3/15/2010	24
EV12 Cables	N/A	Bilog Cables	EVS	6/20/2011	12
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	6/20/2011	12
Antenna, Horn	ETS	3115	AIB	9/8/2010	24
EV12 Cables	N/A	Double Ridge Horn Cables	EVT	10/6/2011	12
High Pass Filter	Micro-Tronics	50108	HGF	1/9/2012	24
Attenuator	Pasternack	PE7005-20	AUN	7/5/2011	12
Attenuator	INMET	64671 6A-10dB	AUI	10/6/2011	12
.5-1 GHz Notch Filter	K&L Microwave	3TNF-500/1000-N/N	HFT	1/11/2011	24

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

Measurements were made using the IF bandwidths and detectors specified. No video filter was used, except in the case of the FCC Average Measurements above 1GHz. In that case, a peak detector with a 10Hz video bandwidth was used.

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes.

FIELD STRENGTH OF SPURIOUS EMISSIONS

EUT:	Telemetry Transmitter 96281-C05W			**Work Order:**	SPAC0479
Serial Number:	6008			**Date:**	01/20/12
Customer:	Spacelabs			**Temperature:**	23
Attendees:	Hugh Carter			**Humidity:**	38%
Project:	None			**Barometric Pres.:**	101.76 kPa
Tested by:	Rod Peloquin	**Power:**	Battery	**Job Site:**	EV12

TEST SPECIFICATIONS

FCC 95H:2012	

Test Method

ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS

Antenna Height(s) (m)	1 - 4	**Test Distance (m)**	3

COMMENTS

With ECG lead wires, ECD shorting bar, SpO2 leads

EUT OPERATING MODES

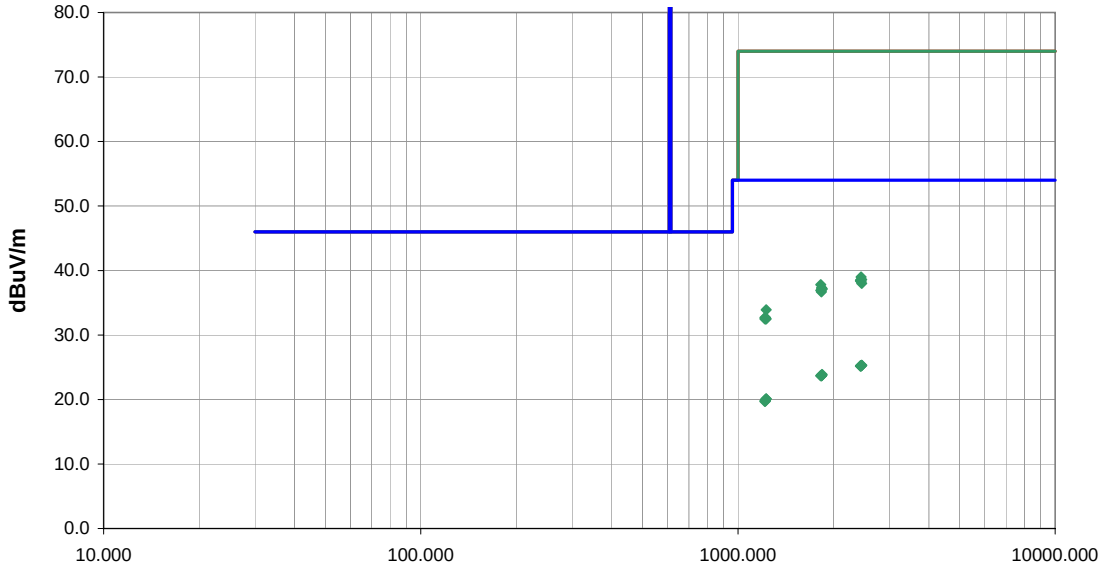
Transmitting MPT, high channel

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	**2**
Configuration #	**1**
Results	**Pass**

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2454.267	26.5	-1.2	321.0	1.0	0.0	0.0	H-Horn	AV	0.0	25.3	54.0	-28.7	High Channel
2454.753	26.5	-1.2	167.0	1.8	0.0	0.0	V-Horn	AV	0.0	25.3	54.0	-28.7	High Channel
2433.037	26.5	-1.3	156.0	1.3	0.0	0.0	H-Horn	AV	0.0	25.2	54.0	-28.8	Low Channel
2433.070	26.5	-1.3	7.0	3.3	0.0	0.0	V-Horn	AV	0.0	25.2	54.0	-28.8	Low Channel
2442.147	26.5	-1.3	53.0	1.0	0.0	0.0	H-Horn	AV	0.0	25.2	54.0	-28.8	Mid Channel
2443.580	26.5	-1.3	295.0	1.0	0.0	0.0	V-Horn	AV	0.0	25.2	54.0	-28.8	Mid Channel
1840.963	27.6	-3.7	86.0	1.0	0.0	0.0	V-Horn	AV	0.0	23.9	54.0	-30.1	High Channel
1841.843	27.5	-3.7	45.0	1.0	0.0	0.0	H-Horn	AV	0.0	23.8	54.0	-30.2	High Channel
1824.800	27.6	-3.9	61.0	1.0	0.0	0.0	V-Horn	AV	0.0	23.7	54.0	-30.3	Low Channel
1825.647	27.6	-3.9	33.0	2.7	0.0	0.0	H-Horn	AV	0.0	23.7	54.0	-30.3	Low Channel
1833.727	27.5	-3.8	343.0	1.0	0.0	0.0	V-Horn	AV	0.0	23.7	54.0	-30.3	Mid Channel
1833.787	27.5	-3.8	210.0	1.0	0.0	0.0	H-Horn	AV	0.0	23.7	54.0	-30.3	Mid Channel
1227.777	28.6	-8.5	4.0	1.0	0.0	0.0	V-Horn	AV	0.0	20.1	54.0	-33.9	High Channel
1227.800	28.6	-8.5	233.0	1.0	0.0	0.0	H-Horn	AV	0.0	20.1	54.0	-33.9	High Channel
1221.920	28.7	-8.7	273.0	1.0	0.0	0.0	H-Horn	AV	0.0	20.0	54.0	-34.0	Mid Channel
1216.050	28.5	-8.7	37.0	1.0	0.0	0.0	V-Horn	AV	0.0	19.8	54.0	-34.2	Low Channel
1222.047	28.5	-8.7	271.0	1.0	0.0	0.0	V-Horn	AV	0.0	19.8	54.0	-34.2	Mid Channel
1215.950	28.4	-8.7	0.0	1.5	0.0	0.0	H-Horn	AV	0.0	19.7	54.0	-34.3	Low Channel
2444.190	40.3	-1.3	295.0	1.0	0.0	0.0	V-Horn	PK	0.0	39.0	74.0	-35.0	Mid Channel

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2455.350	39.8	-1.2	321.0	1.0	0.0	0.0	H-Horn	PK	0.0	38.6	74.0	-35.4	High Channel
2432.887	39.8	-1.3	7.0	3.3	0.0	0.0	V-Horn	PK	0.0	38.5	74.0	-35.5	Low Channel
2432.870	39.7	-1.3	156.0	1.3	0.0	0.0	H-Horn	PK	0.0	38.4	74.0	-35.6	Low Channel
2444.510	39.6	-1.3	53.0	1.0	0.0	0.0	H-Horn	PK	0.0	38.3	74.0	-35.7	Mid Channel
2455.837	39.2	-1.2	167.0	1.8	0.0	0.0	V-Horn	PK	0.0	38.0	74.0	-36.0	High Channel
1823.390	41.7	-3.9	33.0	2.7	0.0	0.0	H-Horn	PK	0.0	37.8	74.0	-36.2	Low Channel
1833.823	41.1	-3.8	343.0	1.0	0.0	0.0	V-Horn	PK	0.0	37.3	74.0	-36.7	Mid Channel
1841.773	40.9	-3.7	45.0	1.0	0.0	0.0	H-Horn	PK	0.0	37.2	74.0	-36.8	High Channel
1842.340	40.8	-3.7	86.0	1.0	0.0	0.0	V-Horn	PK	0.0	37.1	74.0	-36.9	High Channel
1823.550	40.8	-3.9	61.0	1.0	0.0	0.0	V-Horn	PK	0.0	36.9	74.0	-37.1	Low Channel
1832.937	40.5	-3.8	210.0	1.0	0.0	0.0	H-Horn	PK	0.0	36.7	74.0	-37.3	Mid Channel
1226.897	42.4	-8.5	4.0	1.0	0.0	0.0	V-Horn	PK	0.0	33.9	74.0	-40.1	High Channel
1216.143	41.4	-8.7	37.0	1.0	0.0	0.0	V-Horn	PK	0.0	32.7	74.0	-41.3	Low Channel
1222.193	41.4	-8.7	271.0	1.0	0.0	0.0	V-Horn	PK	0.0	32.7	74.0	-41.3	Mid Channel
1215.917	41.2	-8.7	0.0	1.5	0.0	0.0	H-Horn	PK	0.0	32.5	74.0	-41.5	Low Channel
1221.620	41.2	-8.7	273.0	1.0	0.0	0.0	H-Horn	PK	0.0	32.5	74.0	-41.5	Mid Channel
1227.910	41.0	-8.5	233.0	1.0	0.0	0.0	H-Horn	PK	0.0	32.5	74.0	-41.5	High Channel

FIELD STRENGTH OF FUNDAMENTAL

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting MPT (Wideband), Low = Ch.2242, 608.0375 MHz
Transmitting MPT (Wideband), Mid = Ch. 2360, 610.9875 MHz
Transmitting MPT (Wideband), High = Ch. 2478, 613.9375 MHz

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

SPAC0479-1

FREQUENCY RANGE INVESTIGATED

Start Frequency	608 MHz	Stop Frequency	614 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	7/5/2011	12
Antenna, Biconilog	EMCO	3141	AXG	3/15/2010	24
EV12 Cables	N/A	Bilog Cables	EVS	6/1/5403	12

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

Measurements were made using the IF bandwidths and detectors specified. No video filter was used, except in the case of the FCC Average Measurements above 1GHz. In that case, a peak detector with a 10Hz video bandwidth was used.

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes

FIELD STRENGTH OF FUNDAMENTAL

PSA 2011.11.16
EMI 2009.8.29

EUT:	Telemetry Transmitter 96281-C05W			Work Order:	SPAC0479
Serial Number:	6008			Date:	01/19/12
Customer:	Spacelabs			Temperature:	23
Attendees:	Hugh Carter			Humidity:	38%
Project:	None			Barometric Pres.:	101.76 kPa
Tested by:	Rod Peloquin	Power:	Battery	Job Site:	EV12

TEST SPECIFICATIONS

FCC 95H:2012	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS

Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

With ECG lead wires, ECD shorting bar, and SpO2 cable

EUT OPERATING MODES

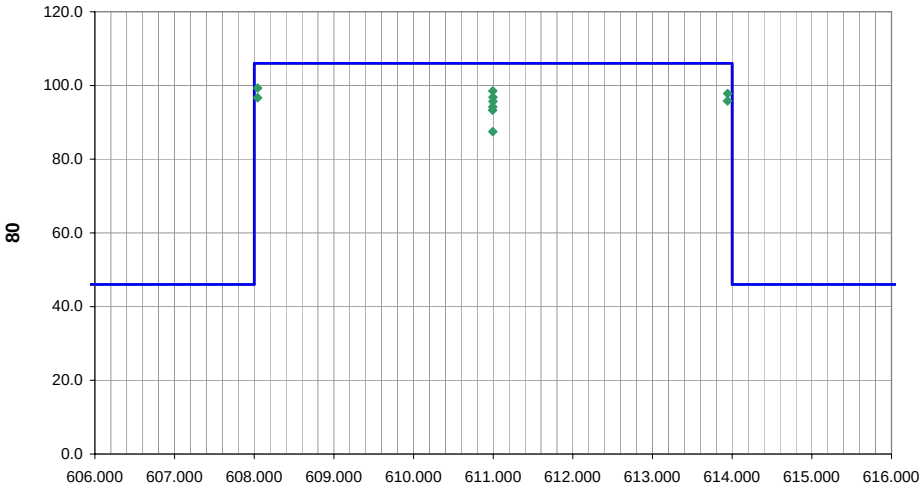
Transmitting MPT

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	1
Configuration #	1
Results	Pass

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted 80.00	Spec. Limit 80.00	Compared to Spec. (dB)	Comments
608.043	69.5	29.8	105.0	1.2	3.0	0.0	H-Bilog	QP	0.0	99.3	106.0	-6.7	Low Channel, Wideband, EUT horizontal
610.995	68.7	29.8	108.0	1.2	3.0	0.0	H-Bilog	QP	0.0	98.5	106.0	-7.5	Mid Channel, Wideband, EUT horizontal
613.943	67.9	29.9	108.0	1.2	3.0	0.0	H-Bilog	QP	0.0	97.8	106.0	-8.2	High Channel, Wideband, EUT horizontal
610.996	67.0	29.8	102.0	1.2	3.0	0.0	H-Bilog	QP	0.0	96.8	106.0	-9.2	Mid Channel, Wideband, EUT on side
608.043	66.9	29.8	85.0	1.4	3.0	0.0	V-Bilog	QP	0.0	96.7	106.0	-9.3	Low Channel, Wideband, EUT horizontal
613.942	65.9	29.9	85.0	1.4	3.0	0.0	V-Bilog	QP	0.0	95.8	106.0	-10.2	High Channel, Wideband, EUT horizontal
610.996	65.9	29.8	83.0	1.4	3.0	0.0	V-Bilog	QP	0.0	95.7	106.0	-10.3	Mid Channel, Wideband, EUT horizontal
610.994	64.4	29.8	81.0	1.5	3.0	0.0	V-Bilog	QP	0.0	94.2	106.0	-11.8	Mid Channel, Wideband, EUT on side
610.993	63.5	29.8	272.0	1.7	3.0	0.0	V-Bilog	QP	0.0	93.3	106.0	-12.7	Mid Channel, Wideband, EUT vertical
610.994	57.7	29.8	0.0	3.0	3.0	0.0	H-Bilog	QP	0.0	87.5	106.0	-18.5	Mid Channel, Wideband, EUT vertical