NORTHWEST EMC

EA Technology Ltd

UltraTEV Plus2 (UTP2)

FCC 15.207:2016

FCC 15.225:2016

13.56 MHz Radio

Report # ELEM0010.1

NVLAP TESTING

NVLAP Lab Code: 201049-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: September 15, 2016
EA Technology Ltd
Model: UltraTEV Plus2 (UTP2)

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2016 FCC 15.225:2016	ANSI C63.10:2013

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.4	Field Strength of Fundamental	Yes	Pass	
6.4	Field Strength of Spurious Emissions Less Than 30 MHz	Yes	Pass	
6.5	Field Strength of Spurious Emissions Greater Than 30 MHz	Yes	Pass	
6.8	Frequency Stability	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Jeremiah Darden, Operations Manager

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. 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. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.

REVISION HISTORY

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

REV 2016.7.25

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

European Union

European Commission – Validated by the European Commission as a Notified Body under the R&TTE Directive.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIP / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/
http://gsi.nist.gov/global/docs/cabs/designations.html

MEASUREMENT UNCERTAINTY

TMU.2015.07.10

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

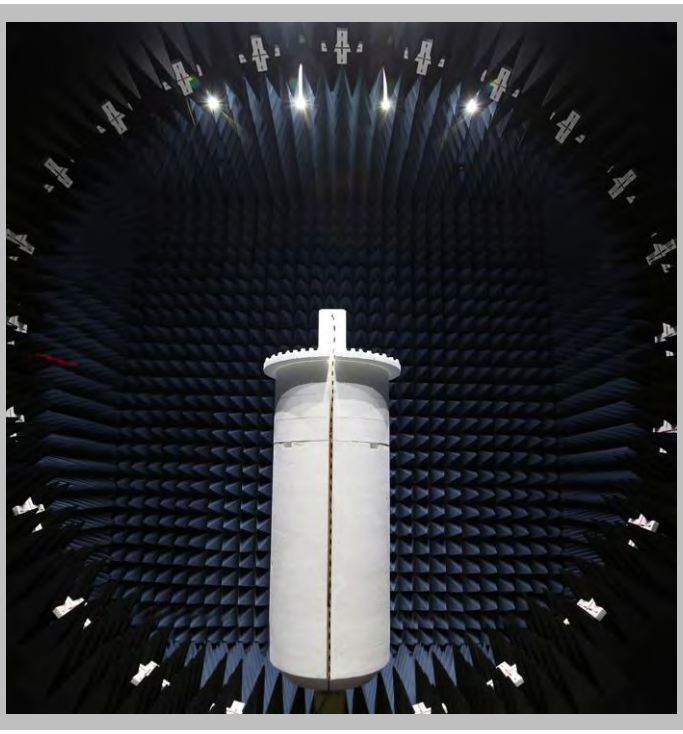
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

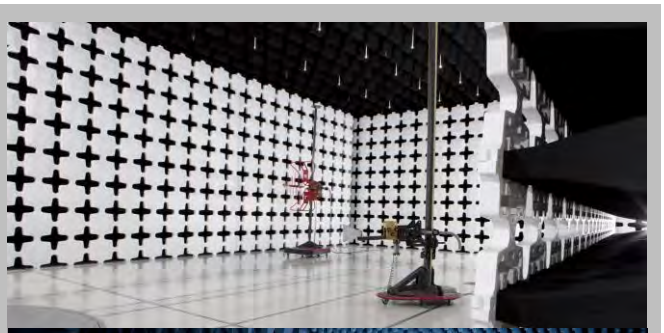
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	4.9 dB	-4.9 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

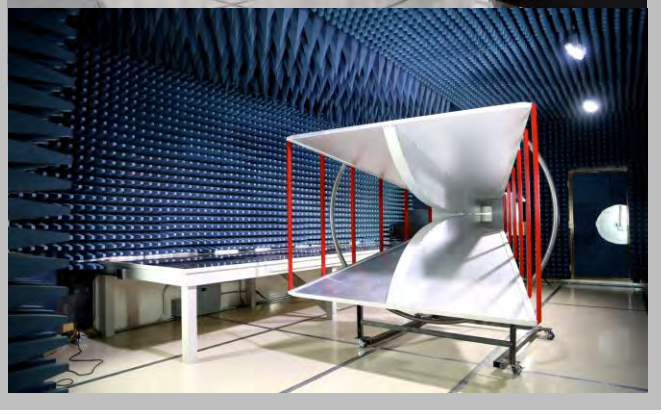
FACILITIES

NORTHWEST EMC
REV 2016.7.25

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157







PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	EA Technology Ltd
Address:	Capenhurst Technology Park, Capenhurst
City, State, Zip:	Chester CH1 6ES United Kingdom
Test Requested By:	Richard Squires-Thornton
Model:	UltraTEV Plus2 (UTP2)
First Date of Test:	September 8, 2016
Last Date of Test:	September 15, 2016
Receipt Date of Samples:	September 6, 2016
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
The UTP2 is a handheld instrument for detecting and measuring Partial Discharge (PD) in electrical assets, through measurement of Transient Earth Voltages, Ultrasonic emissions and Current pulses. The UTP2 is a handheld instrument and conveys the captured information to the user both visually via the colour LCD touch screen, and audibly via optional headphones connected via the headphone jack.

Testing Objective:
To demonstrate compliance to FCC Part 15.225 specifications.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration ELEM0010- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Handheld Partial Discharge Instrument	EA Technology	UltraTEV Plus2 (UTP2)	0148

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Adapter (Instrument)	Stontronics	DSA-10PFP-05	TRA-028382-95

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB to micro-USB	No	0.9m	Yes	Handheld Partial Discharge Instrument	AC/DC Adapter

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	9/8/2016	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	9/8/2016	Field Strength of Spurious Emissions less than 30 MHz	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	9/8/2016	Field Strength of Spurious Emissions greater than 30 MHz	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	9/9/2016	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.
5	9/15/2016	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.05.18

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESCI	ARF	6/22/2016	6/22/2017
Cable - Conducted Cable Assembly	Northwest EMC	TXA, HHZ, TQR	TXAA	5/17/2016	5/17/2017
LISN	Solar Electronics	9252-50-R-24-BNC	LJK	9/21/2016	9/21/2017

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

ELEM0010-2

MODES INVESTIGATED

Charging Mode

AC POWERLINE CONDUCTED EMISSIONS

EUT:	UltraTEV Plus2 (UTP2)	Work Order:	ELEM0010
Serial Number:	0148	Date:	09/23/2016
Customer:	EA Technology Ltd	Temperature:	23.6°C
Attendees:	None	Relative Humidity:	44.5%
Customer Project:	None	Bar. Pressure:	1016 mb
Tested By:	Jonathan Kiefer	Job Site:	TX01
Power:	110VAC/60Hz	Configuration:	ELEM0010-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	20	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

EUT transmitting at 13.56 MHz. Antenna connected.

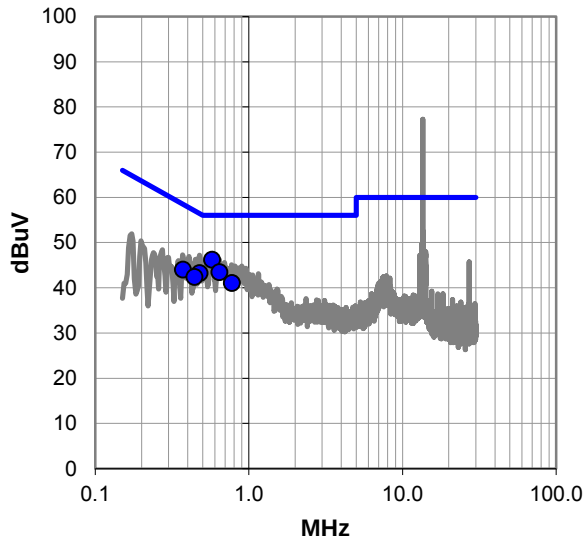
EUT OPERATING MODES

Charging Mode

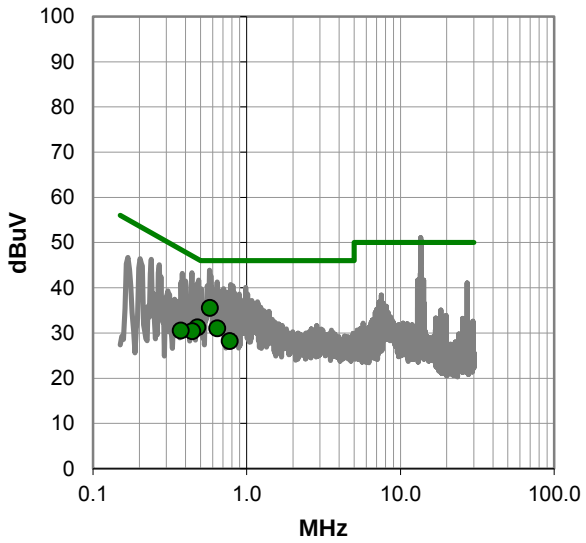
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.05.18

RESULTS - Run #20

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.578	26.3	19.9	46.2	56.0	-9.8
0.644	23.5	19.9	43.4	56.0	-12.6
0.478	23.4	19.8	43.2	56.4	-13.2
0.372	24.2	19.8	44.0	58.5	-14.5
0.442	22.6	19.8	42.4	57.0	-14.6
0.777	21.1	19.9	41.0	56.0	-15.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.578	15.6	19.9	35.5	46.0	-10.5
0.644	11.1	19.9	31.0	46.0	-15.0
0.478	11.4	19.8	31.2	46.4	-15.2
0.442	10.6	19.8	30.4	47.0	-16.6
0.777	8.3	19.9	28.2	46.0	-17.8
0.372	10.7	19.8	30.5	48.5	-18.0

CONCLUSION

Pass

Tested By

AC POWERLINE CONDUCTED EMISSIONS

EUT:	UltraTEV Plus2 (UTP2)	Work Order:	ELEM0010
Serial Number:	0148	Date:	09/23/2016
Customer:	EA Technology Ltd	Temperature:	23.6°C
Attendees:	None	Relative Humidity:	44.5%
Customer Project:	None	Bar. Pressure:	1016 mb
Tested By:	Jonathan Kiefer	Job Site:	TX01
Power:	110VAC/60Hz	Configuration:	ELEM0010-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	21	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

EUT transmitting at 13.56 MHz. Antenna connected.

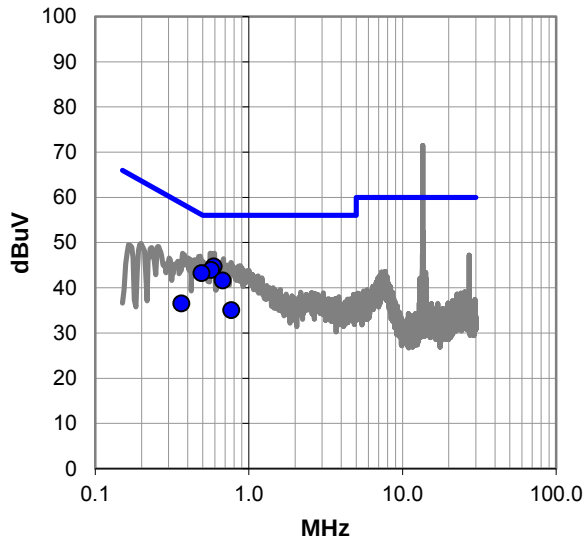
EUT OPERATING MODES

Charging Mode

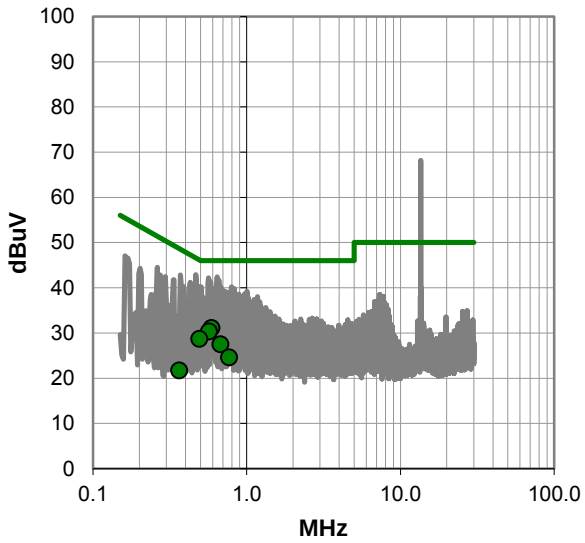
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.05.18

RESULTS - Run #21

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.589	24.8	19.9	44.7	56.0	-11.3
0.569	24.0	19.9	43.9	56.0	-12.1
0.492	23.4	19.8	43.2	56.1	-12.9
0.676	21.7	19.9	41.6	56.0	-14.4
0.768	15.1	19.9	35.0	56.0	-21.0
0.363	16.7	19.8	36.5	58.7	-22.2

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.589	11.2	19.9	31.1	46.0	-14.9
0.569	10.4	19.9	30.3	46.0	-15.7
0.492	8.9	19.8	28.7	46.1	-17.4
0.676	7.6	19.9	27.5	46.0	-18.5
0.768	4.7	19.9	24.6	46.0	-21.4
0.363	1.9	19.8	21.7	48.7	-27.0

CONCLUSION

Pass

Tested By

AC POWERLINE CONDUCTED EMISSIONS

EUT:	UltraTEV Plus2 (UTP2)	Work Order:	ELEM0010
Serial Number:	0148	Date:	09/23/2016
Customer:	EA Technology Ltd	Temperature:	23.6°C
Attendees:	None	Relative Humidity:	44.5%
Customer Project:	None	Bar. Pressure:	1016 mb
Tested By:	Jonathan Kiefer	Job Site:	TX01
Power:	110VAC/60Hz	Configuration:	ELEM0010-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	22	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

EUT transmitting at 13.56 MHz. Antenna disconnected.

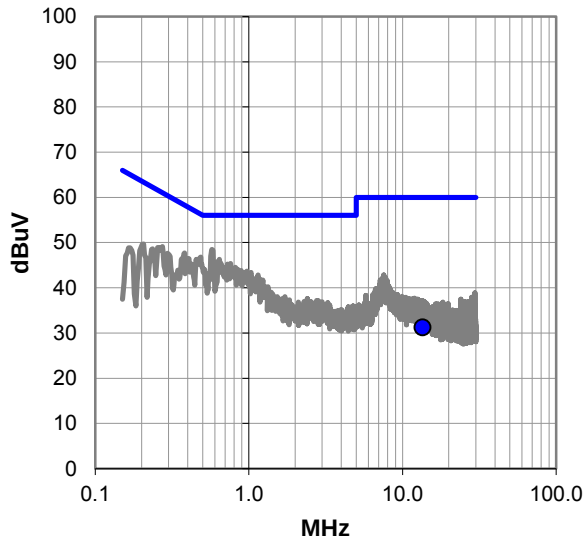
EUT OPERATING MODES

Charging Mode

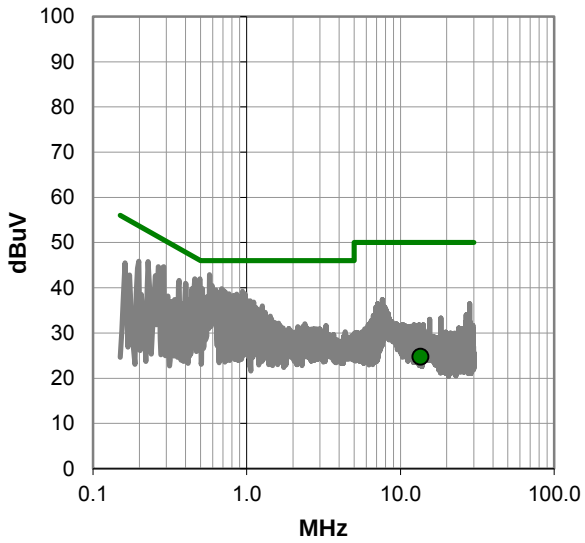
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.05.18

RESULTS - Run #22

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.553	11.0	20.2	31.2	60.0	-28.8

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.553	4.5	20.2	24.7	50.0	-25.3

CONCLUSION

Pass

Jonathan Kiefer

Tested By

AC POWERLINE CONDUCTED EMISSIONS

EUT:	UltraTEV Plus2 (UTP2)	Work Order:	ELEM0010
Serial Number:	0148	Date:	09/23/2016
Customer:	EA Technology Ltd	Temperature:	23.6°C
Attendees:	None	Relative Humidity:	44.5%
Customer Project:	None	Bar. Pressure:	1016 mb
Tested By:	Jonathan Kiefer	Job Site:	TX01
Power:	110VAC/60Hz	Configuration:	ELEM0010-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	23	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

EUT transmitting at 13.56 MHz. Antenna disconnected.

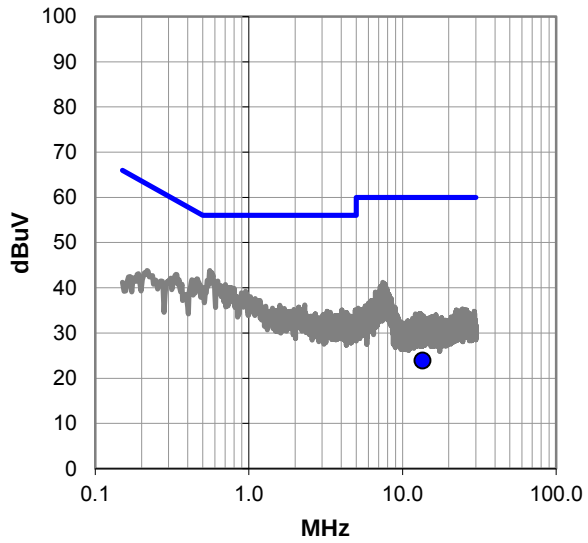
EUT OPERATING MODES

Charging Mode

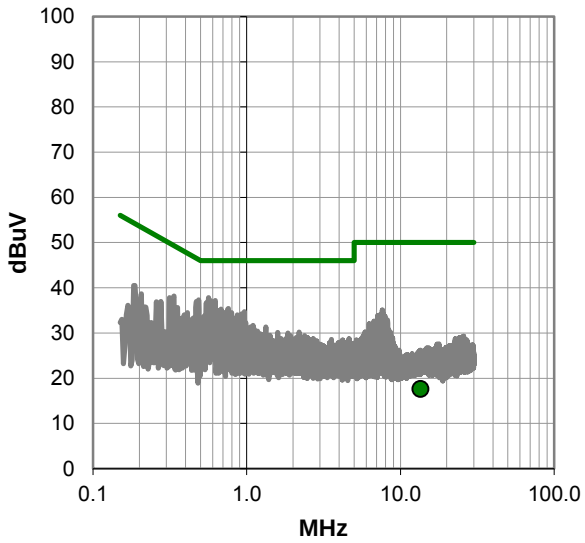
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.05.18

RESULTS - Run #23

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.552	3.7	20.2	23.9	60.0	-36.1

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.552	-2.6	20.2	17.6	50.0	-32.4

CONCLUSION

Pass

Jonathan Kiefer

Tested By

FIELD STRENGTH OF FUNDAMENTAL

PSA-ESCI 2016.07.22

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

NFC Charging Mode

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

ELEM0010 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	30 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
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	10/29/2015	12 mo
Antenna	ETS Lindgren	6502	AZM	6/24/2016	24 mo
Cable	Northwest EMC	RE 9kHz - 1GHz	TXB	5/31/2016	12 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

While scanning, fundamental carrier from the EUT was maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

FIELD STRENGTH OF FUNDAMENTAL

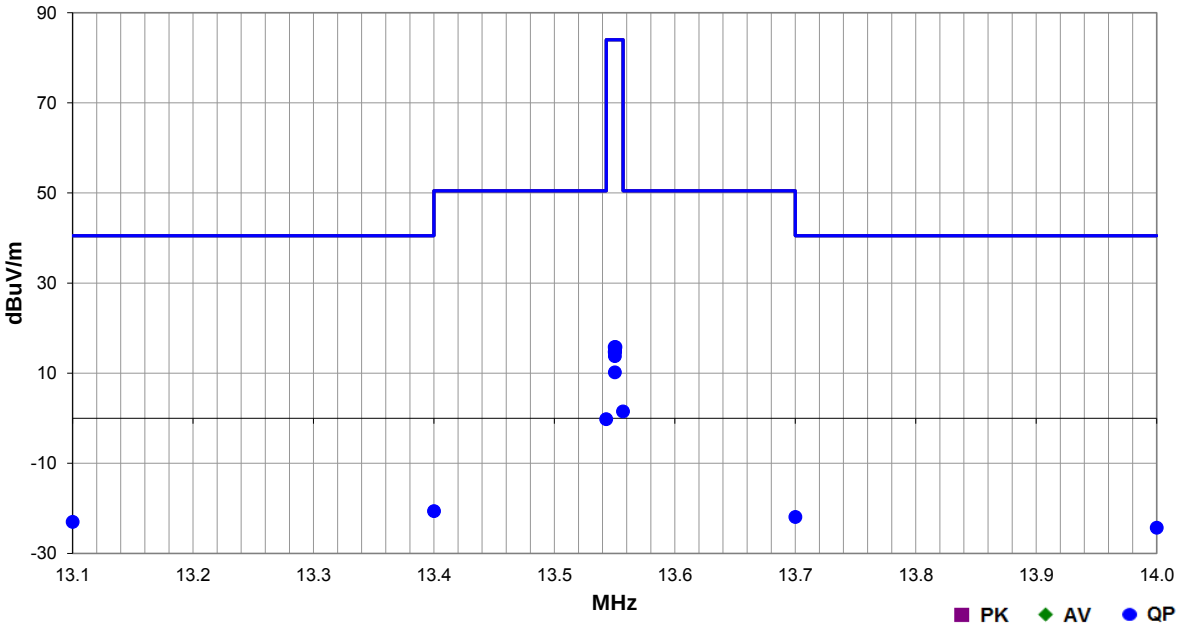
NORTHWEST EMC

PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0010	**Date:**	09/08/16	Jonathan Kiefer	
Project:	None	**Temperature:**	23.5 °C		
Job Site:	TX02	**Humidity:**	51% RH		
Serial Number:	0148	**Barometric Pres.:**	1019 mbar	**Tested by:**	Jonathan Kiefer
EUT:	UltraTEV Plus2 (UTP2)				
Configuration:	2				
Customer:	EA Technology Ltd				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	NFC Charging Mode				
Deviations:	None				
Comments:	QP data at 13.56MHz and band edges. 3m test distance. 40dB/decade adjustment factor.				

Test Specifications	**Test Method**
FCC 15.225:2016	ANSI C63.10:2013

Run #	26	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
13.567	31.3	10.2	1.0	159.0	3.0	0.0	Perp/GND, Para/EUT	QP	-40.0	1.5	50.5	-49.0	EUT On Side
13.553	29.6	10.2	1.0	156.0	3.0	0.0	Perp/GND, Para/EUT	QP	-40.0	-0.2	50.5	-50.7	EUT On Side
13.410	9.2	10.2	1.0	152.0	3.0	0.0	Perp/GND, Para/EUT	QP	-40.0	-20.6	40.5	-61.1	EUT On Side
13.710	7.9	10.2	1.0	153.9	3.0	0.0	Perp/GND, Para/EUT	QP	-40.0	-21.9	40.5	-62.4	EUT On Side
13.110	6.8	10.2	1.0	82.9	3.0	0.0	Perp/GND, Para/EUT	QP	-40.0	-23.0	40.5	-63.5	EUT On Side
14.010	5.6	10.1	1.0	27.0	3.0	0.0	Perp/GND, Para/EUT	QP	-40.0	-24.3	40.5	-64.8	EUT On Side
13.560	45.6	10.2	1.0	147.0	3.0	0.0	Perp/GND, Para/EUT	QP	-40.0	15.8	84.0	-68.2	EUT On Side
13.561	45.6	10.2	1.0	207.9	3.0	0.0	Perp/GND, Perp/EUT	QP	-40.0	15.8	84.0	-68.2	EUT On Side
13.560	45.3	10.2	1.0	7.0	3.0	0.0	Par/GND, Perp/EUT	QP	-40.0	15.5	84.0	-68.5	EUT On Side
13.560	45.1	10.2	1.0	196.9	3.0	0.0	Perp/GND, Perp/EUT	QP	-40.0	15.3	84.0	-68.7	EUT Horizontal

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHZ

PSA-ESCI 2016.07.22

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

NFC Charging Mode

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

ELEM0010 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	30 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
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	10/29/2015	12 mo
Cable	Northwest EMC	RE 9kHz - 1GHz	TXB	5/31/2016	12 mo
Antenna	ETS Lindgren	6502	AZM	6/24/2016	24 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHZ

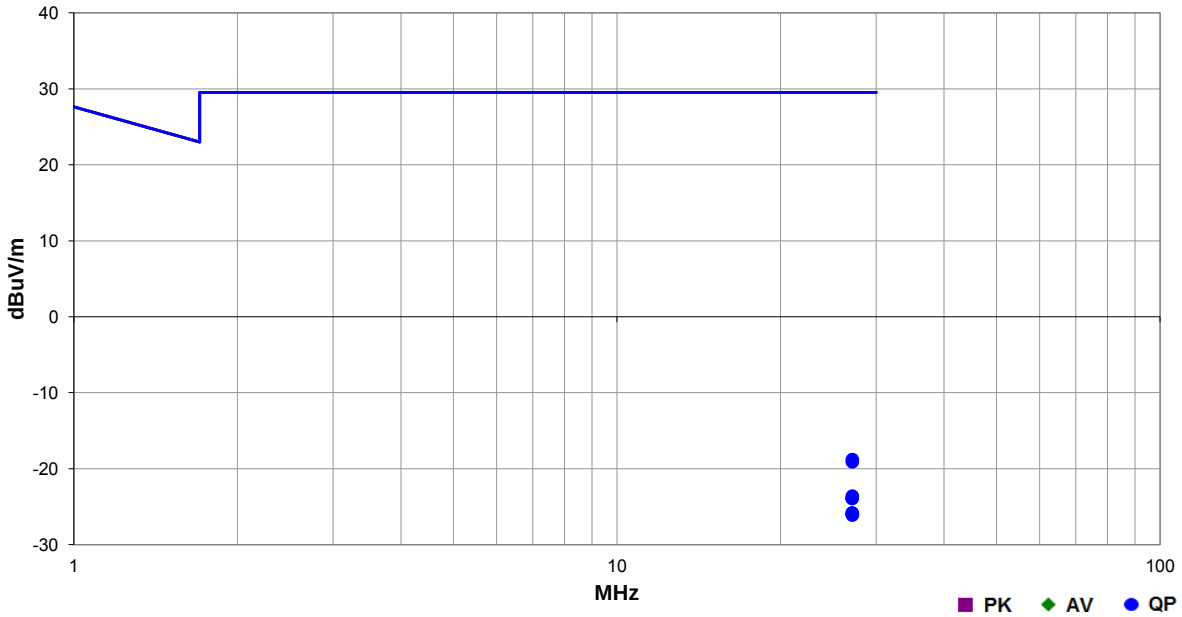
NORTHWEST EMC

PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0010	**Date:**	09/08/16		
Project:	None	**Temperature:**	23.5 °C		
Job Site:	TX02	**Humidity:**	51% RH		
Serial Number:	0148	**Barometric Pres.:**	1019 mbar	**Tested by:**	Jonathan Kiefer
EUT:	UltraTEV Plus2 (UTP2)				
Configuration:	2				
Customer:	EA Technology Ltd				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	NFC Charging Mode				
Deviations:	None				
Comments:	QP data for 2nd harmonic 27.12MHz. 3m test distance. 40dB/decade adjustment factor.				

Test Specifications	**Test Method**
FCC 15.225:2016	ANSI C63.10:2013

Run #	29	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
27.121	12.5	8.7	1.0	242.0	3.0	0.0	Para/GND, Perp/EUT	QP	-40.0	-18.8	29.5	-48.3	EUT Horizontal
27.120	12.2	8.7	1.0	255.0	3.0	0.0	Perp/GND, Para/EUT	QP	-40.0	-19.1	29.5	-48.6	EUT On Side
27.121	7.7	8.7	1.0	298.9	3.0	0.0	Perp/GND, Perp/EUT	QP	-40.0	-23.6	29.5	-53.1	EUT Horizontal
27.116	7.4	8.7	1.0	109.0	3.0	0.0	Perp/GND, Perp/EUT	QP	-40.0	-23.9	29.5	-53.4	EUT On Side
27.117	7.4	8.7	1.0	141.9	3.0	0.0	Perp/GND, Perp/EUT	QP	-40.0	-23.9	29.5	-53.4	EUT Vertical
27.115	5.5	8.7	1.0	237.9	3.0	0.0	Para/GND, Perp/EUT	QP	-40.0	-25.8	29.5	-55.3	EUT On Side
27.124	5.4	8.7	1.0	303.0	3.0	0.0	Para/GND, Perp/EUT	QP	-40.0	-25.9	29.5	-55.4	EUT Vertical
27.122	5.3	8.7	1.0	157.0	3.0	0.0	Perp/GND, Para/EUT	QP	-40.0	-26.0	29.5	-55.5	EUT Horizontal
27.119	5.2	8.7	1.0	32.0	3.0	0.0	Perp/GND, Para/EUT	QP	-40.0	-26.1	29.5	-55.6	EUT Vertical

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ

PSA-ESCI 2016.07.22

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

NFC Charging Mode

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

ELEM0010 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	140 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
Amplifier - Pre-Amplifier	Miteq	AM-1551	PAH	9/12/2016	12 mo
Cable	Northwest EMC	RE 9kHz - 1GHz	TXB	5/31/2016	12 mo
Antenna - Biconilog	ETS Lindgren	3143B	AYF	4/13/2016	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	10/29/2015	12 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

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 (per ANSI C63.10:2013).

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ

NORTHWEST EMC

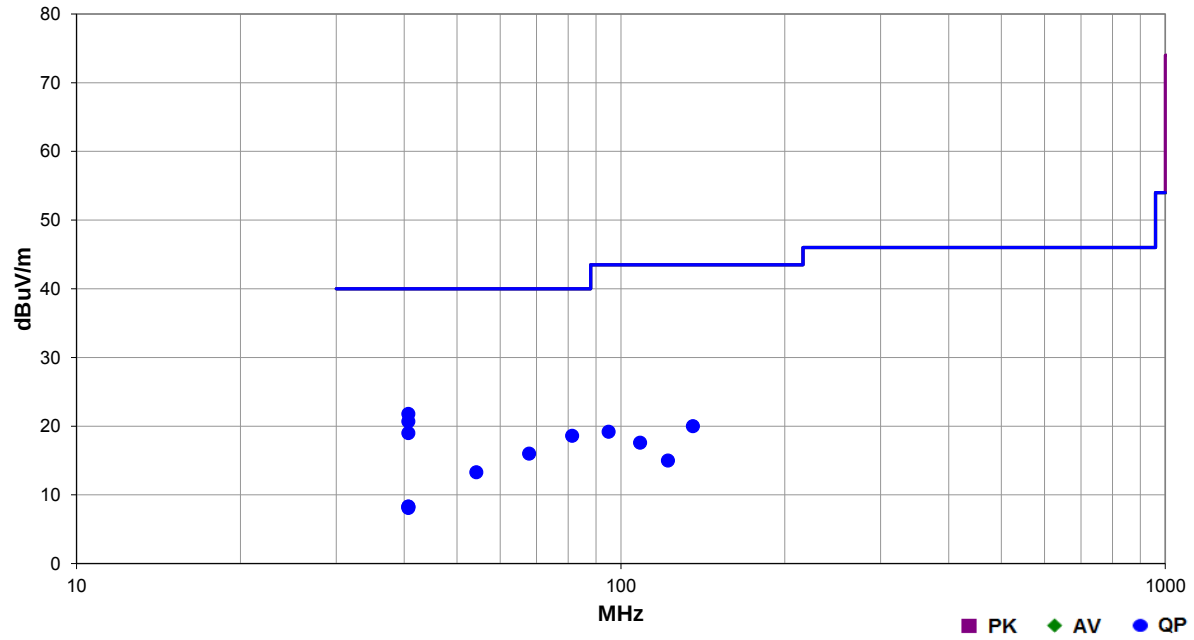
PSA-ESCI 2016.07.22

EmiR5 2016.07.22.1

Work Order:	ELEM0010	**Date:**	09/08/16		
Project:	None	**Temperature:**	23.4 °C		
Job Site:	TX02	**Humidity:**	51.4% RH		
Serial Number:	0148	**Barometric Pres.:**	1019 mbar	**Tested by:**	Jonathan Kiefer
EUT:	UltraTEV Plus2 (UTP2)				
Configuration:	2				
Customer:	EA Technology Ltd				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	NFC Charging Mode				
Deviations:	None				
Comments:	QP data for harmonics greater than 30 MHz. 13.56 MHz fundamental frequency.				

Test Specifications	**Test Method**
FCC 15.225:2016	ANSI C63.10:2013

Run #	25	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
40.678	51.2	-29.4	1.0	87.9	3.0	0.0	Vert	QP	0.0	21.8	40.0	-18.2	EUT Horizontal
40.678	50.1	-29.4	1.0	325.0	3.0	0.0	Vert	QP	0.0	20.7	40.0	-19.3	EUT On Side
40.684	48.4	-29.4	1.0	127.0	3.0	0.0	Vert	QP	0.0	19.0	40.0	-21.0	EUT Vertical
81.365	50.9	-32.3	1.0	27.9	3.0	0.0	Vert	QP	0.0	18.6	40.0	-21.4	EUT Horizontal
135.604	50.4	-30.4	1.0	55.0	3.0	0.0	Vert	QP	0.0	20.0	43.5	-23.5	EUT Horizontal
67.802	48.2	-32.2	1.0	224.0	3.0	0.0	Vert	QP	0.0	16.0	40.0	-24.0	EUT Horizontal
94.915	50.6	-31.4	1.0	28.9	3.0	0.0	Vert	QP	0.0	19.2	43.5	-24.3	EUT Horizontal
108.482	47.8	-30.2	1.0	106.9	3.0	0.0	Vert	QP	0.0	17.6	43.5	-25.9	EUT Horizontal
54.236	46.4	-33.1	1.0	111.0	3.0	0.0	Vert	QP	0.0	13.3	40.0	-26.7	EUT Horizontal
122.044	46.3	-31.3	1.0	138.0	3.0	0.0	Vert	QP	0.0	15.0	43.5	-28.5	EUT Horizontal
40.681	37.7	-29.4	3.3	342.0	3.0	0.0	Horz	QP	0.0	8.3	40.0	-31.7	EUT Horizontal
40.683	37.7	-29.4	3.7	255.0	3.0	0.0	Horz	QP	0.0	8.3	40.0	-31.7	EUT On Side
40.683	37.5	-29.4	2.9	296.0	3.0	0.0	Horz	QP	0.0	8.1	40.0	-31.9	EUT Vertical

FREQUENCY STABILITY

NORTHWEST EMC

XMit 2016.05.06

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.	Cal. Due
Transformer	Mastech	5KVA-110V/250V	XPU	NCR	NCR
Probe - Near Field Set	ETS Lindgren	7405	IPS	NCR	NCR
Thermometer	Omegaette	HH311	DTX	4/3/2015	4/3/2018
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-2-SCT/AC	TBH	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMM	2/25/2016	2/25/2017
Attenuator	Fairview Microwave	SA4018-20	TQY	2/25/2016	2/25/2017
Cable	Fairview Microwave	SCK0963-60	TXF	11/3/2015	11/3/2016
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	3/15/2016	3/15/2017
Meter - Multimeter	Fluke	77-IV	MLT	9/25/2014	9/25/2017

TEST DESCRIPTION

A near-field probe was placed near the transmitter. A low-loss coaxial cable was used to connect the near-field probe to the spectrum analyzer. The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Measurements were made on the single transmit frequency as called out on the data sheets. Testing was done while the EUT was continuously transmitting at an unmodulated carrier frequency.

The primary supply voltage was varied from 85 % to 115% of the nominal voltage while at ambient temperature. Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range of -20 ° to +50° C and at 10°C intervals.

The requirement of a frequency tolerance of ±0.01% is equivalent to 100 ppm
The formula to check for compliance is:

ppm = (Measured Frequency / Measured Nominal Frequency - 1) * 1,000,000

FREQUENCY STABILITY

NORTHWEST EMC

XMit 2016.05.06

EUT:	**UltraTEV Plus2 (UTP2)**			**Work Order:**	**ELEM0010**
Serial Number:	**0148**			**Date:**	**09/09/16**
Customer:	**EA Technology Ltd**			**Temperature:**	**23.5 °C**
Attendees:	**None**			**Humidity:**	**44.9% RH**
Project:	**None**			**Barometric Pres.:**	**1021 mbar**
Tested by:	**Jonathan Kiefer**	**Power:**	**110VAC/60Hz**	**Job Site:**	**TX09**

TEST SPECIFICATIONS	**Test Method**
FCC 15.225:2016	ANSI C63.10:2013

COMMENTS

None

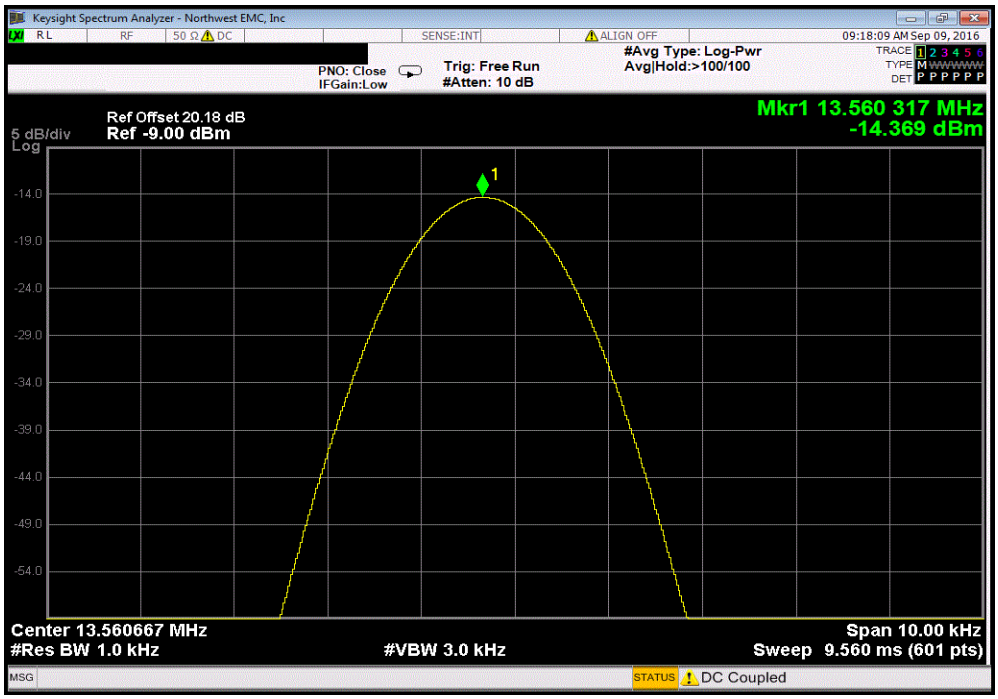
DEVIATIONS FROM TEST STANDARD

None

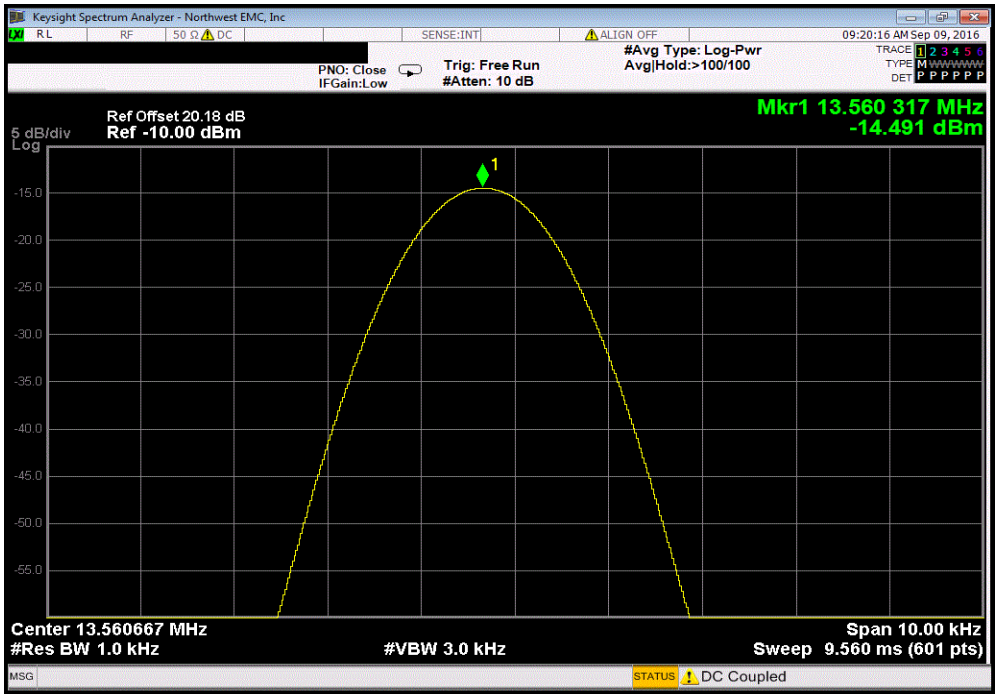
Configuration #	**2**	*Signature* Jonathan Kiefer

			Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
13.56 MHz							
	Temperature Variation						
		-20 °C (Low)					
		Start Up	13.560317	13.56	23.4	100	Pass
		After 2 Minutes	13.560317	13.56	23.4	100	Pass
		After 5 Minutes	13.560317	13.56	23.4	100	Pass
		After 10 Minutes	13.560317	13.56	23.4	100	Pass
		-10 °C					
		Start Up	13.560317	13.56	23.4	100	Pass
		After 2 Minutes	13.560317	13.56	23.4	100	Pass
		After 5 Minutes	13.560317	13.56	23.4	100	Pass
		After 10 Minutes	13.560317	13.56	23.4	100	Pass
		0 °C					
		Start Up	13.560317	13.56	23.4	100	Pass
		After 2 Minutes	13.560317	13.56	23.4	100	Pass
		After 5 Minutes	13.560317	13.56	23.4	100	Pass
		After 10 Minutes	13.560317	13.56	23.4	100	Pass
		10 °C					
		Start Up	13.56030033	13.56	22.2	100	Pass
		After 2 Minutes	13.560317	13.56	23.4	100	Pass
		After 5 Minutes	13.560317	13.56	23.4	100	Pass
		After 10 Minutes	13.56031633	13.56	23.3	100	Pass
		20 °C (Nominal)					
		Start Up	13.560267	13.56	19.7	100	Pass
		After 2 Minutes	13.56026667	13.56	19.7	100	Pass
		After 5 Minutes	13.560267	13.56	19.7	100	Pass
		After 10 Minutes	13.560267	13.56	19.7	100	Pass
		30 °C					
		Start Up	13.560267	13.56	19.7	100	Pass
		After 2 Minutes	13.560267	13.56	19.7	100	Pass
		After 5 Minutes	13.56025033	13.56	18.5	100	Pass
		After 10 Minutes	13.56025033	13.56	18.5	100	Pass
		40 °C					
		Start Up	13.560217	13.56	16	100	Pass
		After 2 Minutes	13.560217	13.56	16	100	Pass
		After 5 Minutes	13.560217	13.56	16	100	Pass
		After 10 Minutes	13.560217	13.56	16	100	Pass
		50 °C (High)					
		Start Up	13.560217	13.56	16	100	Pass
		After 2 Minutes	13.5602	13.56	14.8	100	Pass
		After 5 Minutes	13.56020033	13.56	14.8	100	Pass
		After 10 Minutes	13.5602	13.56	14.8	100	Pass
	Voltage Variation						
		Voltage: 115%					
		Start Up	13.56021667	13.56	16	100	Pass
		Voltage: 100%					
		Start Up	13.56020033	13.56	14.8	100	Pass
		Voltage: 85%					
		Start Up	13.560217	13.56	16	100	Pass

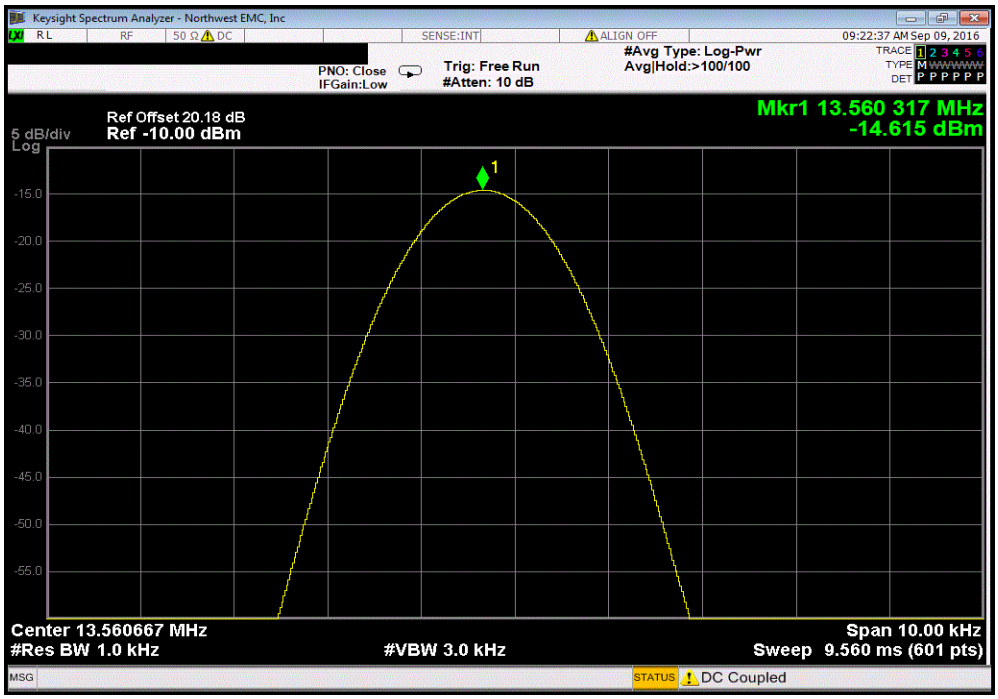
13.56 MHz, Temperature Variation, -20 °C (Low), Start Up						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



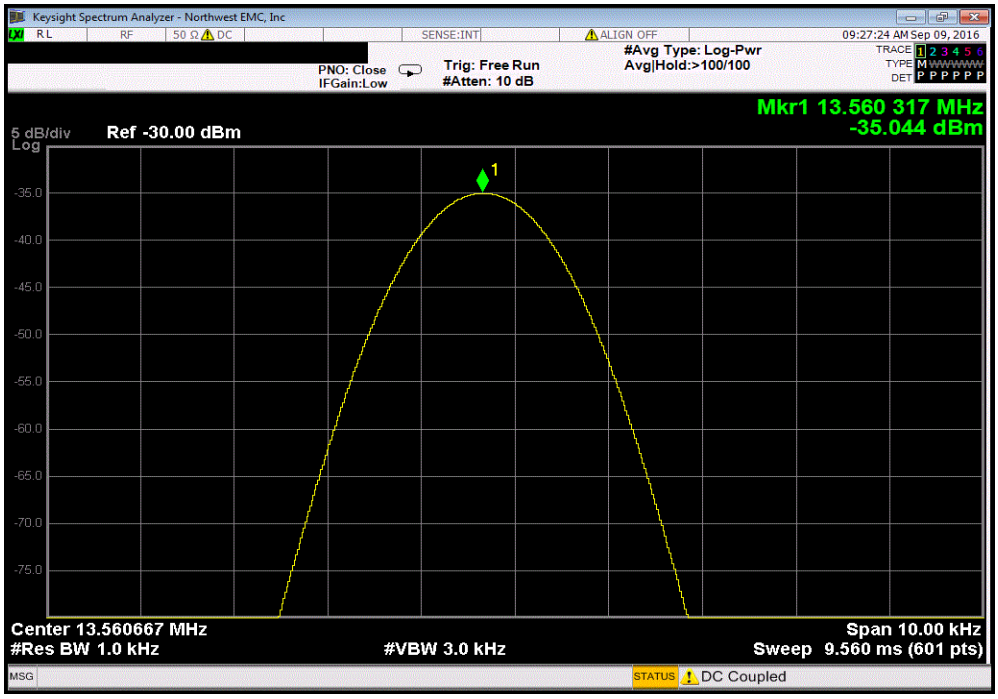
13.56 MHz, Temperature Variation, -20 °C (Low), After 2 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



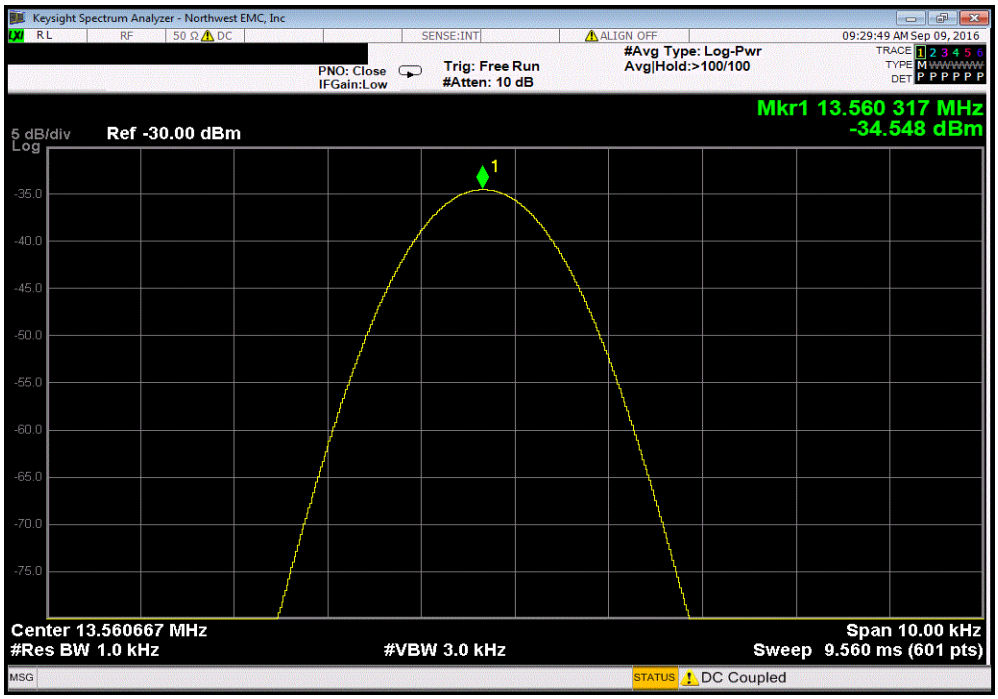
13.56 MHz, Temperature Variation, -20 °C (Low), After 5 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



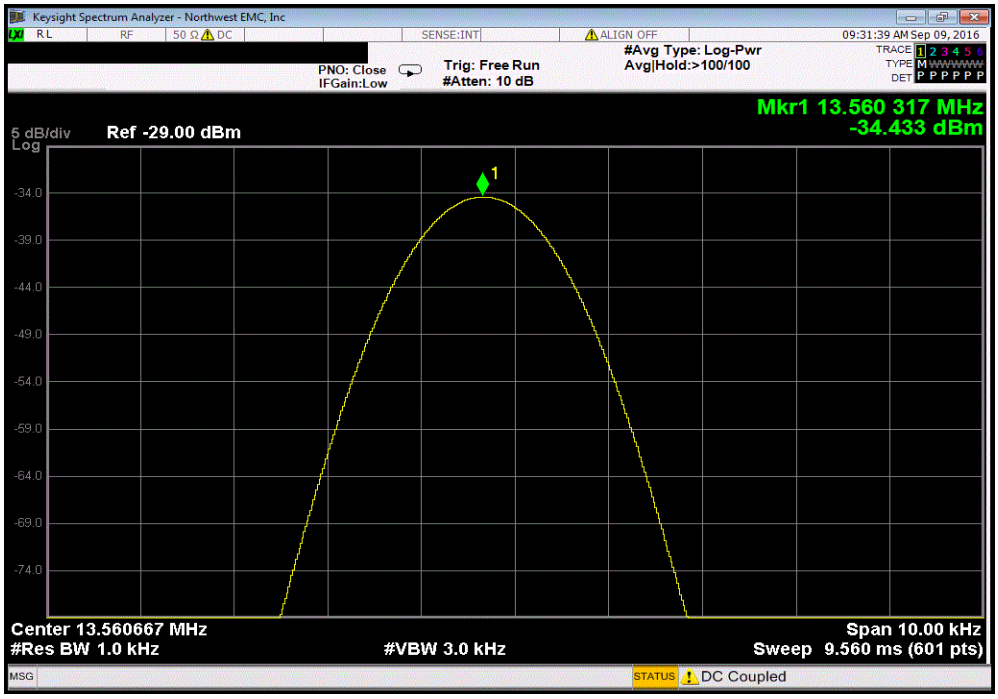
13.56 MHz, Temperature Variation, -20 °C (Low), After 10 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



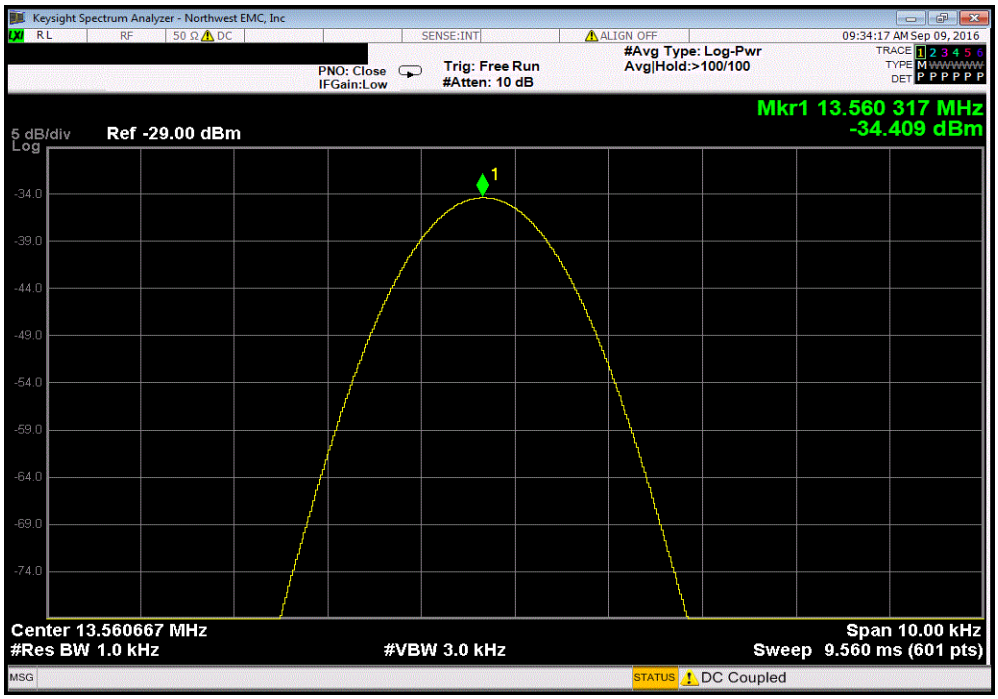
13.56 MHz, Temperature Variation, -10 °C , Start Up						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



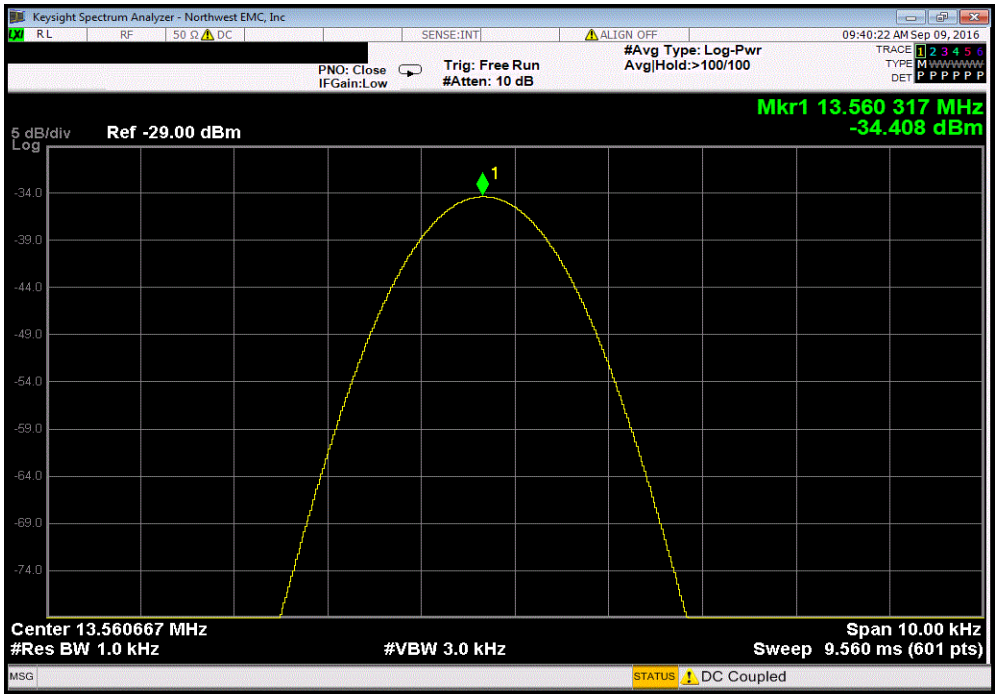
13.56 MHz, Temperature Variation, -10 °C , After 2 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



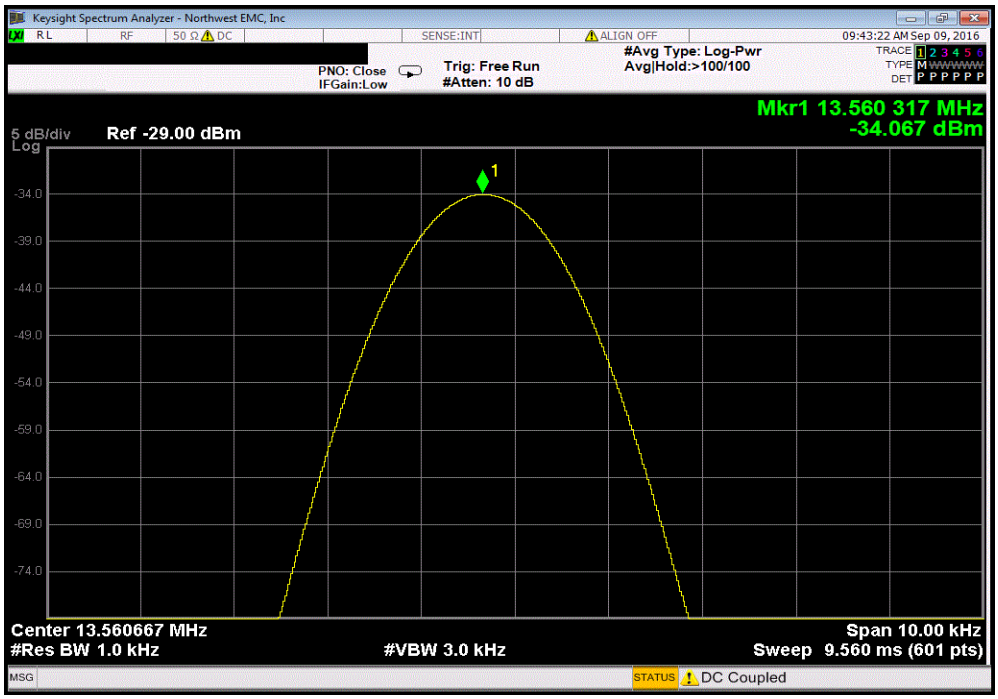
13.56 MHz, Temperature Variation, -10 °C , After 5 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



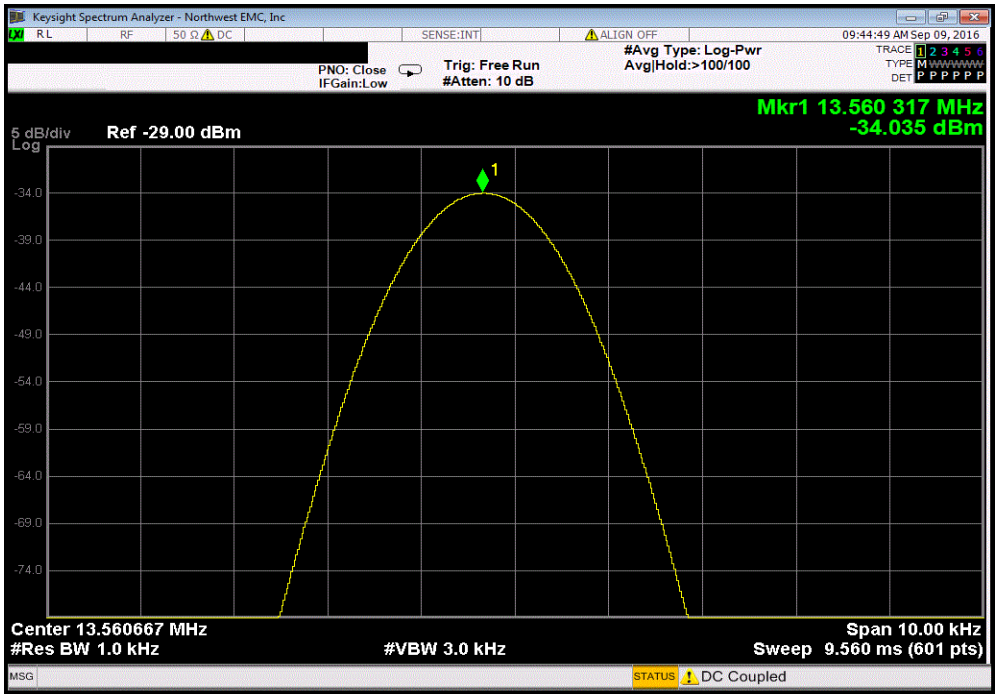
13.56 MHz, Temperature Variation, -10 °C , After 10 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



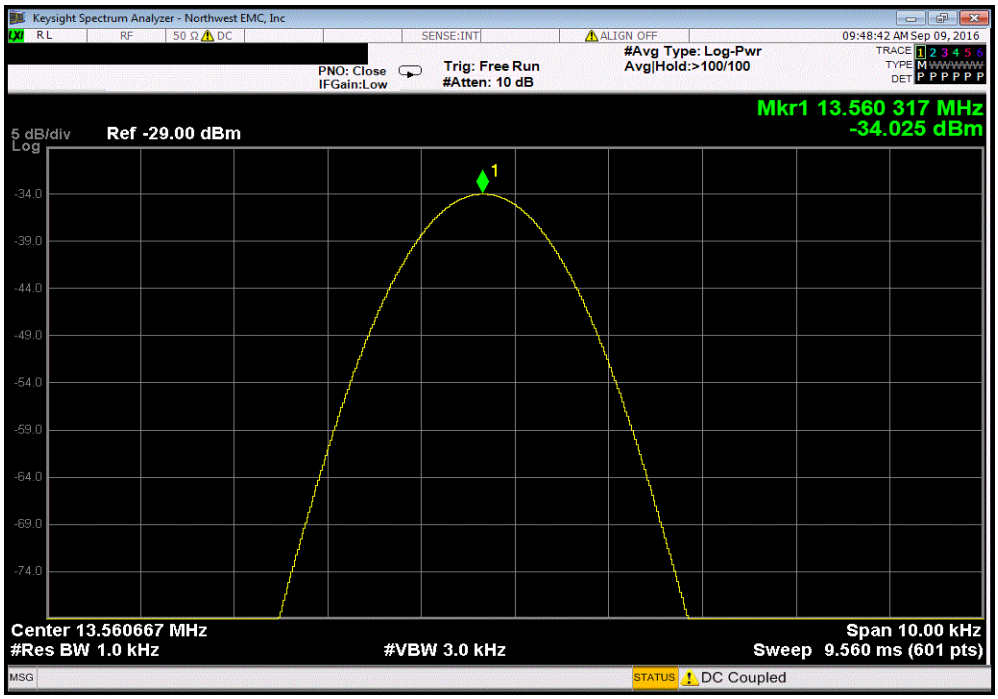
13.56 MHz, Temperature Variation, 0 °C , Start Up						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



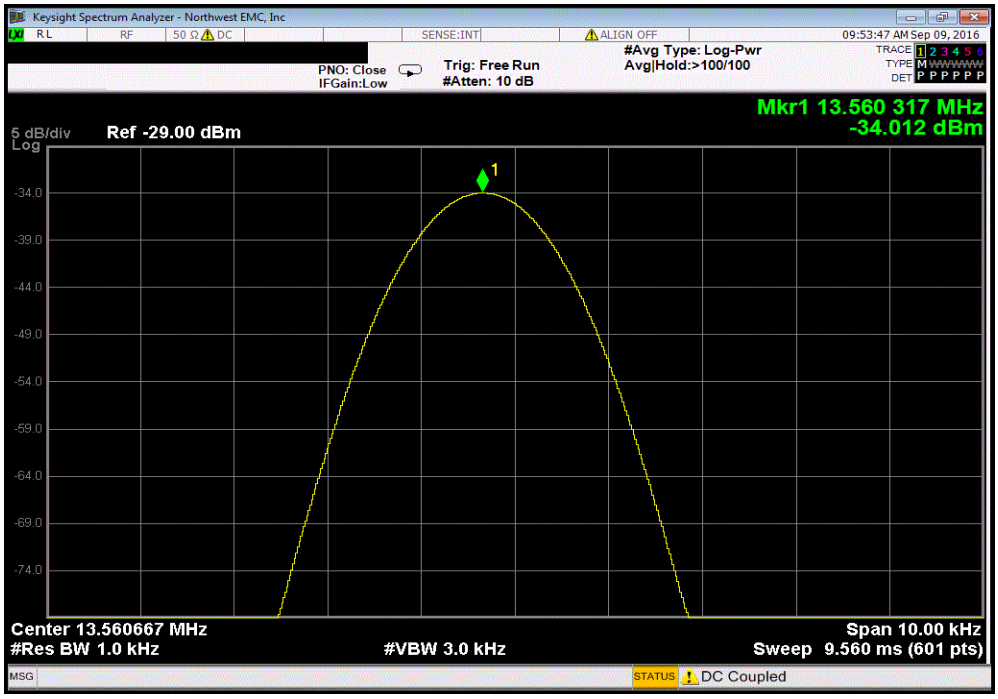
13.56 MHz, Temperature Variation, 0 °C , After 2 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



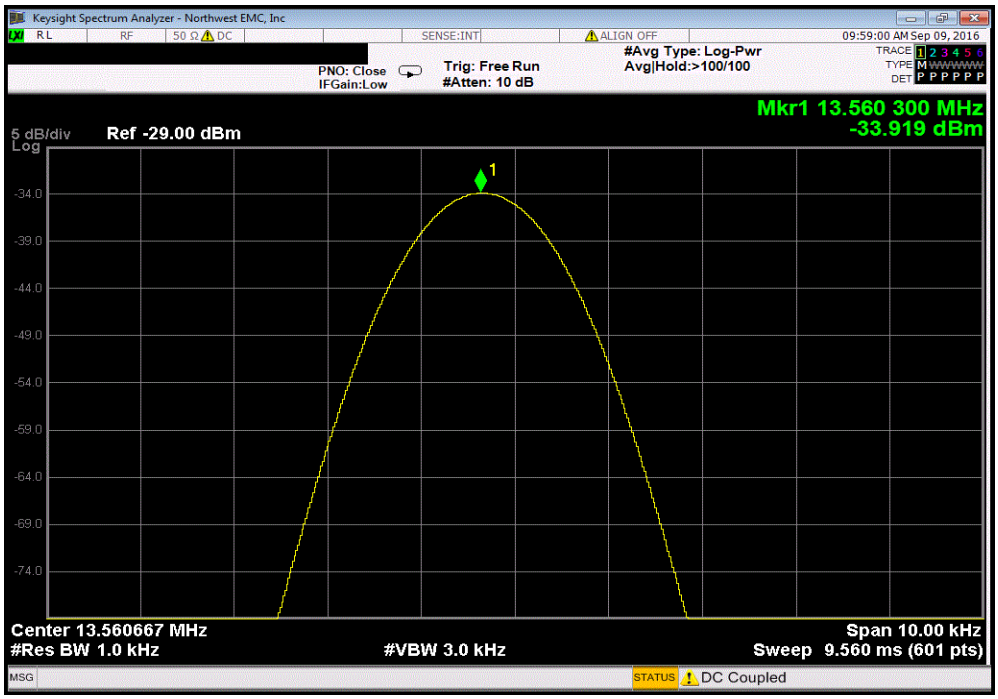
13.56 MHz, Temperature Variation, 0 °C , After 5 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



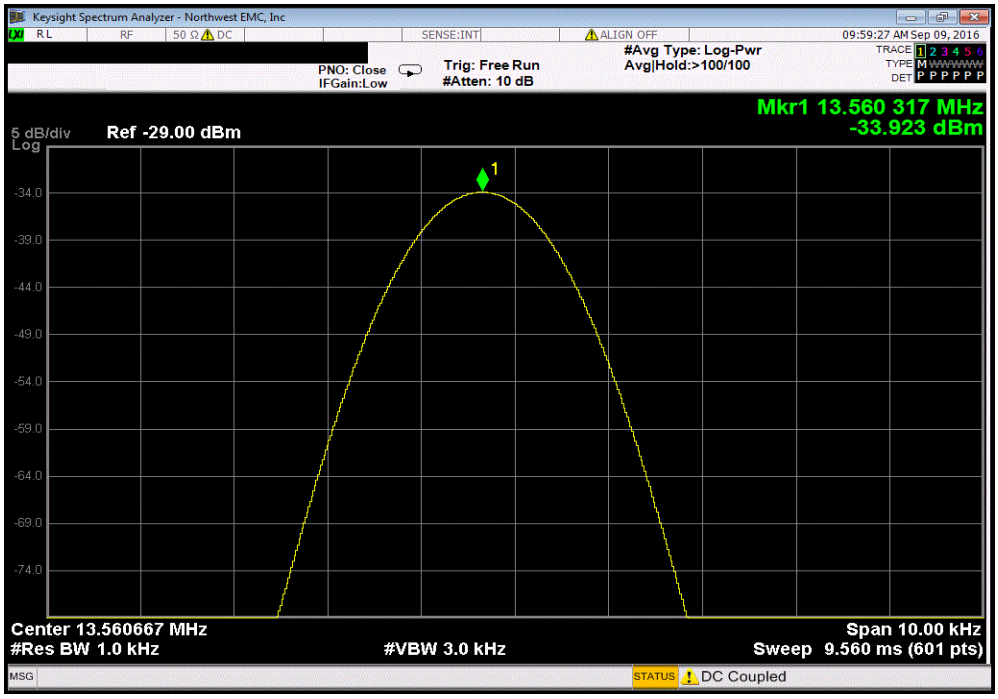
13.56 MHz, Temperature Variation, 0 °C , After 10 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



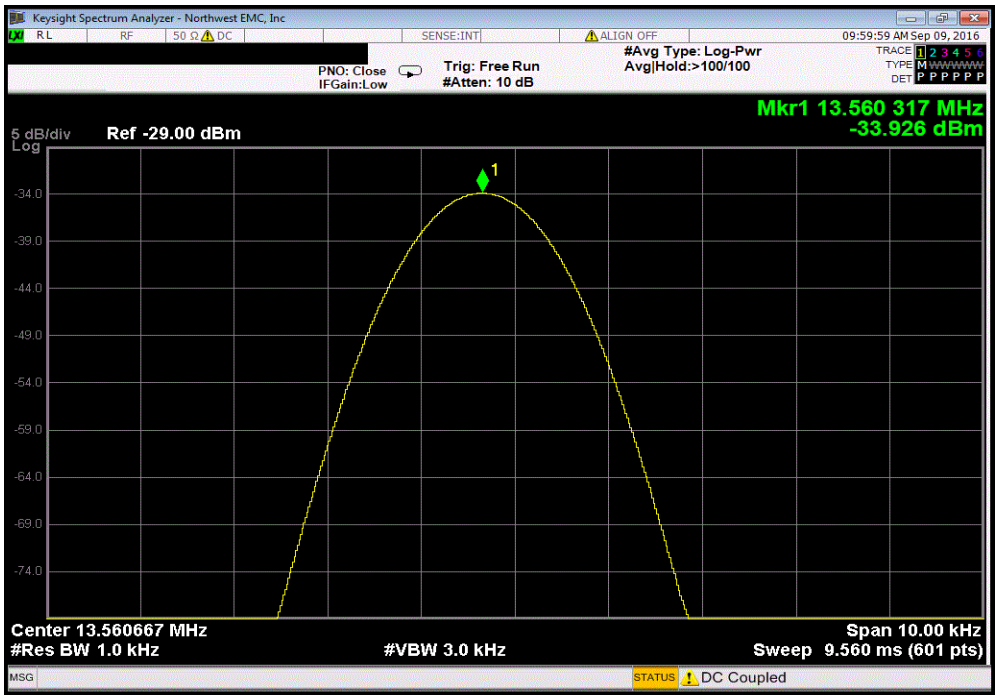
13.56 MHz, Temperature Variation, 10 °C , Start Up						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56030033	13.56	22.2	100	Pass



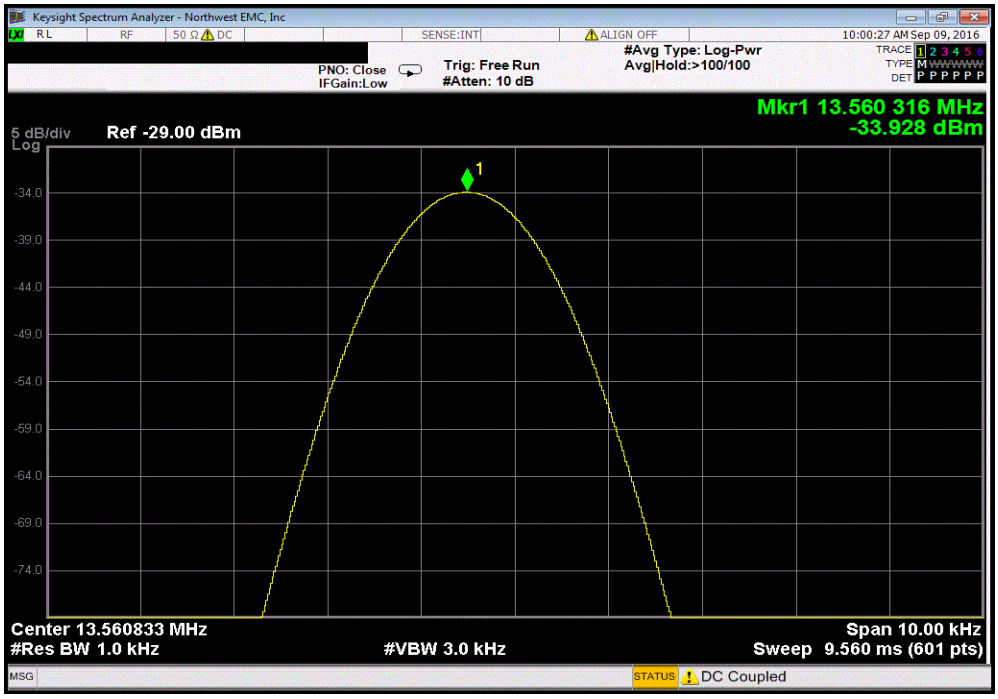
13.56 MHz, Temperature Variation, 10 °C , After 2 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



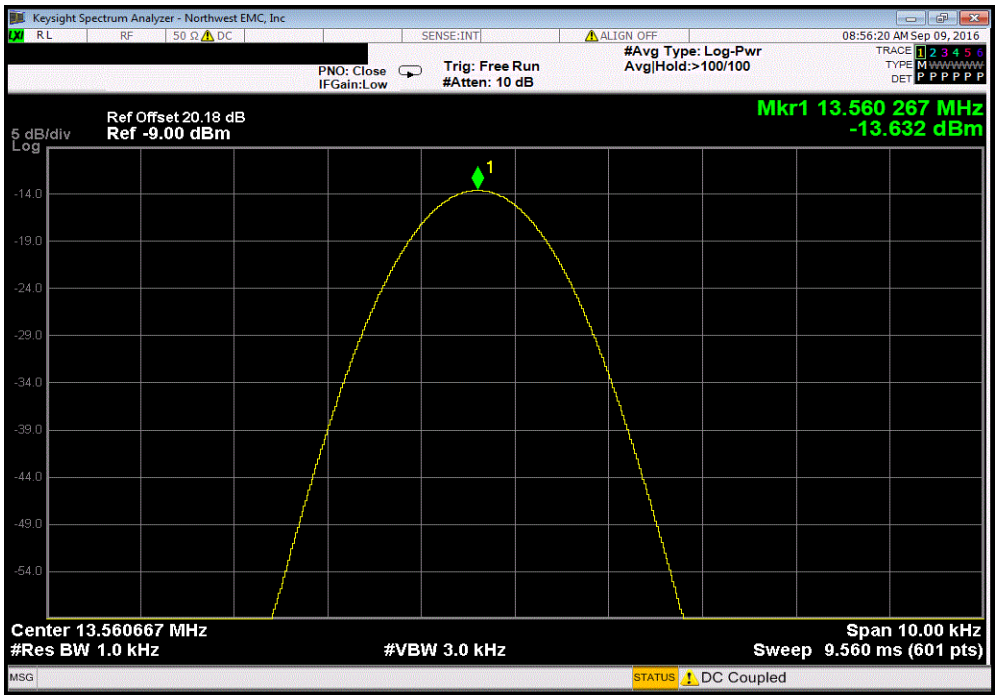
13.56 MHz, Temperature Variation, 10 °C , After 5 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560317	13.56	23.4	100	Pass



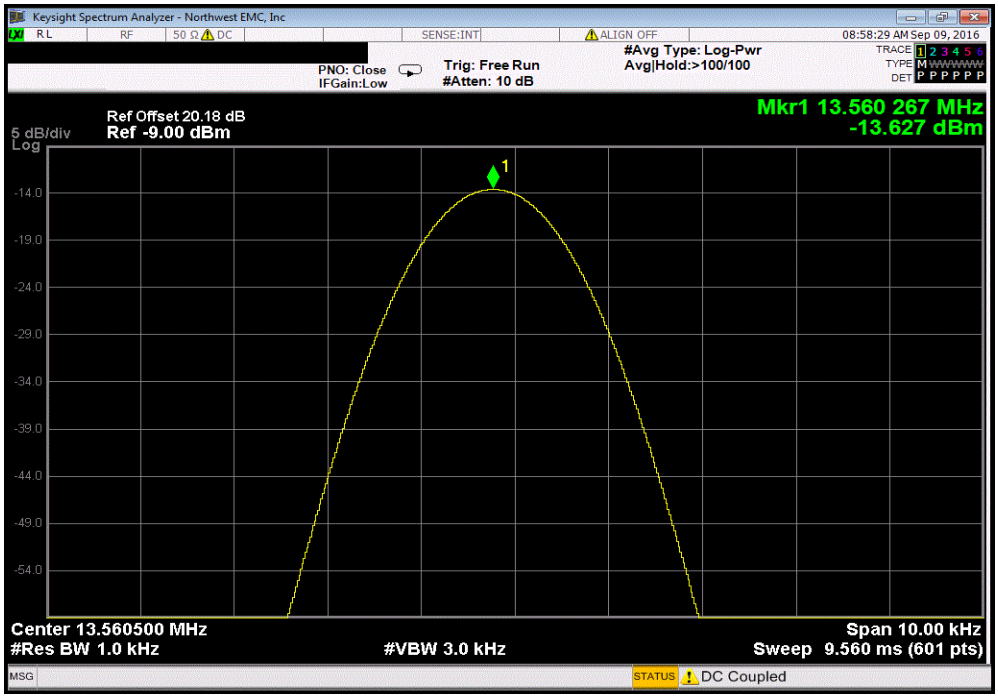
13.56 MHz, Temperature Variation, 10 °C , After 10 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56031633	13.56	23.3	100	Pass



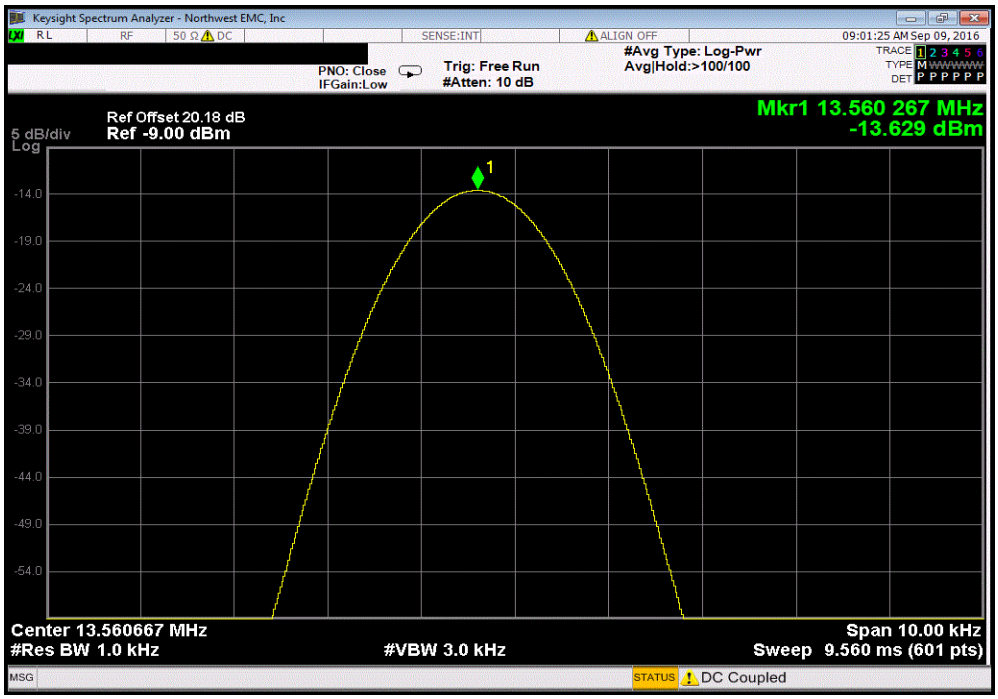
13.56 MHz, Temperature Variation, 20 °C (Nominal), Start Up						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560267	13.56	19.7	100	Pass



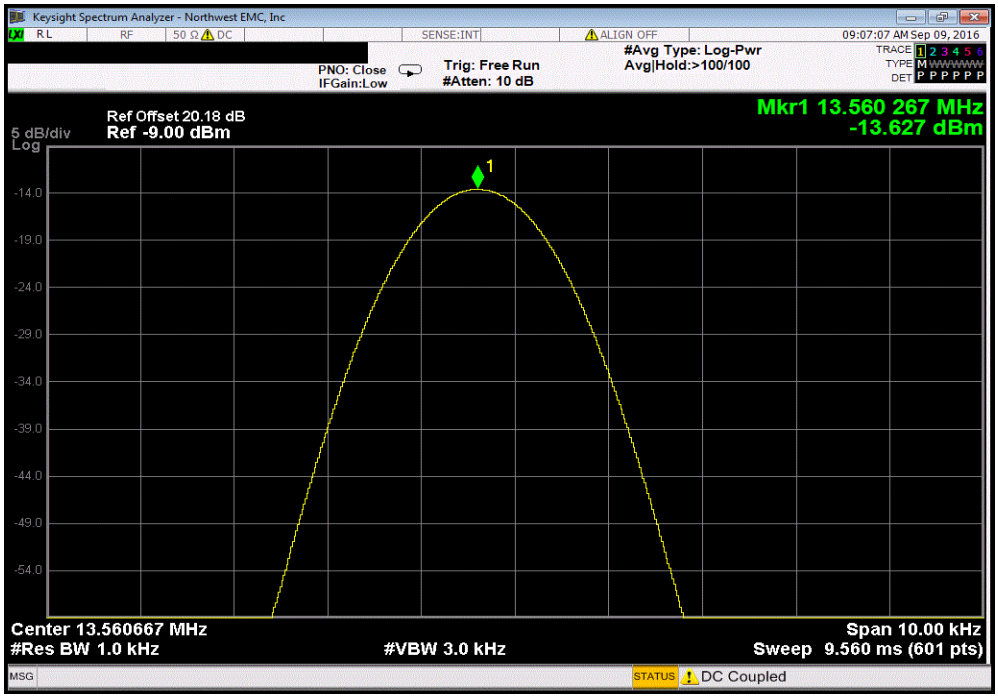
13.56 MHz, Temperature Variation, 20 °C (Nominal), After 2 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56026667	13.56	19.7	100	Pass



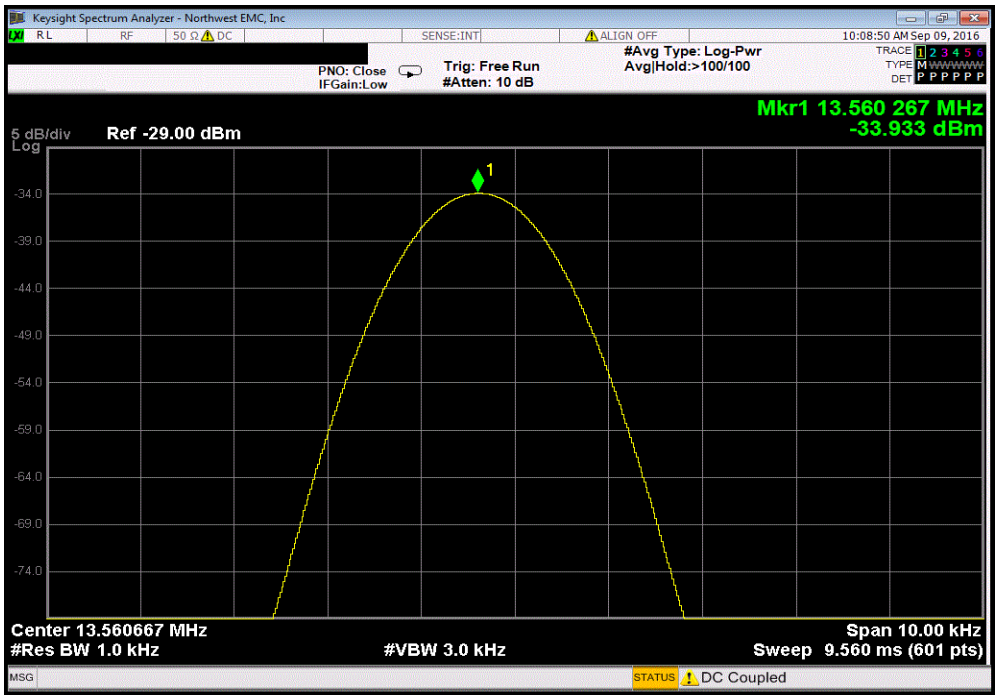
13.56 MHz, Temperature Variation, 20 °C (Nominal), After 5 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560267	13.56	19.7	100	Pass



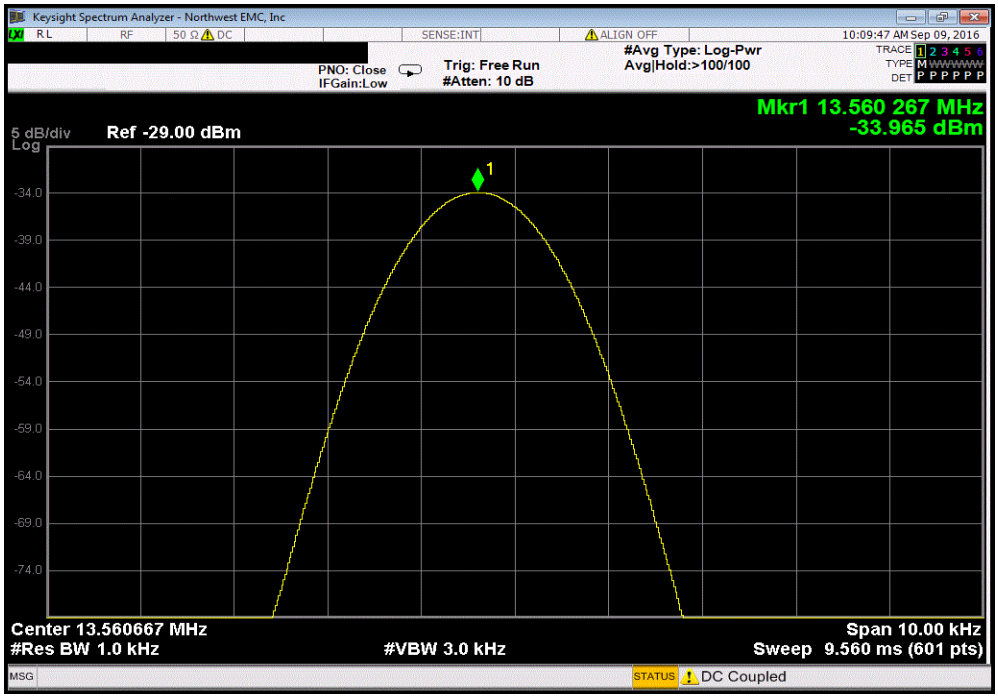
13.56 MHz, Temperature Variation, 20 °C (Nominal), After 10 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560267	13.56	19.7	100	Pass



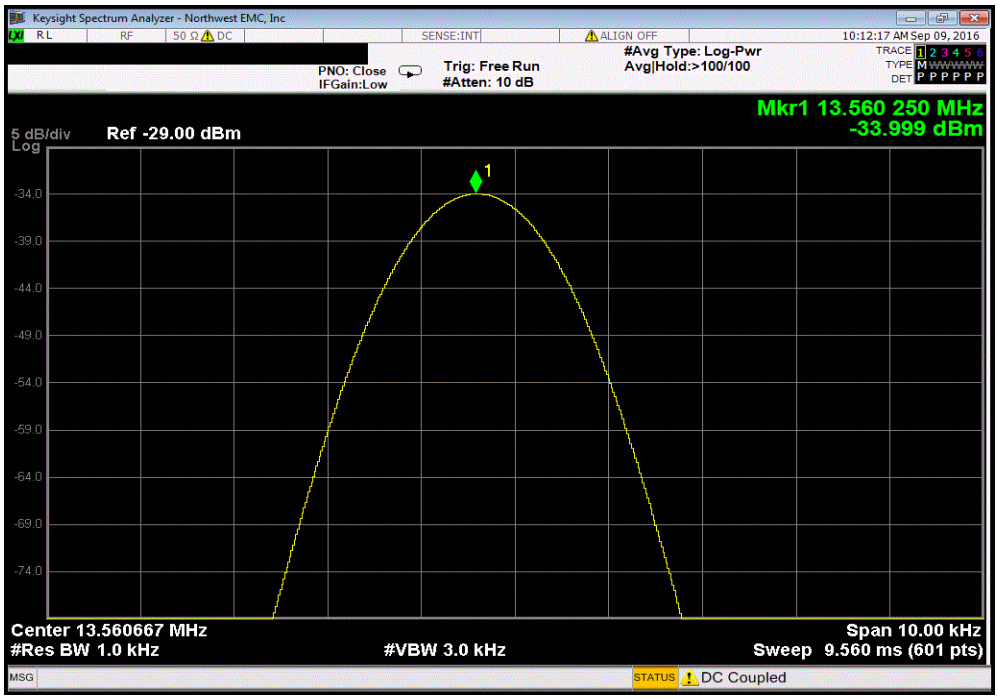
13.56 MHz, Temperature Variation, 30 °C, Start Up						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560267	13.56	19.7	100	Pass



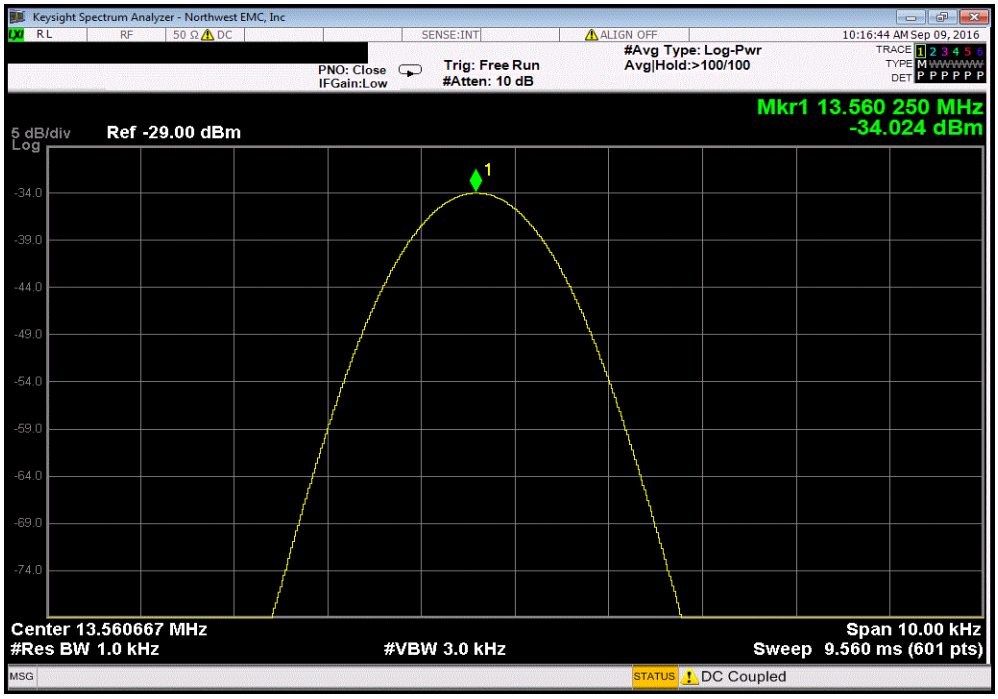
13.56 MHz, Temperature Variation, 30 °C, After 2 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560267	13.56	19.7	100	Pass



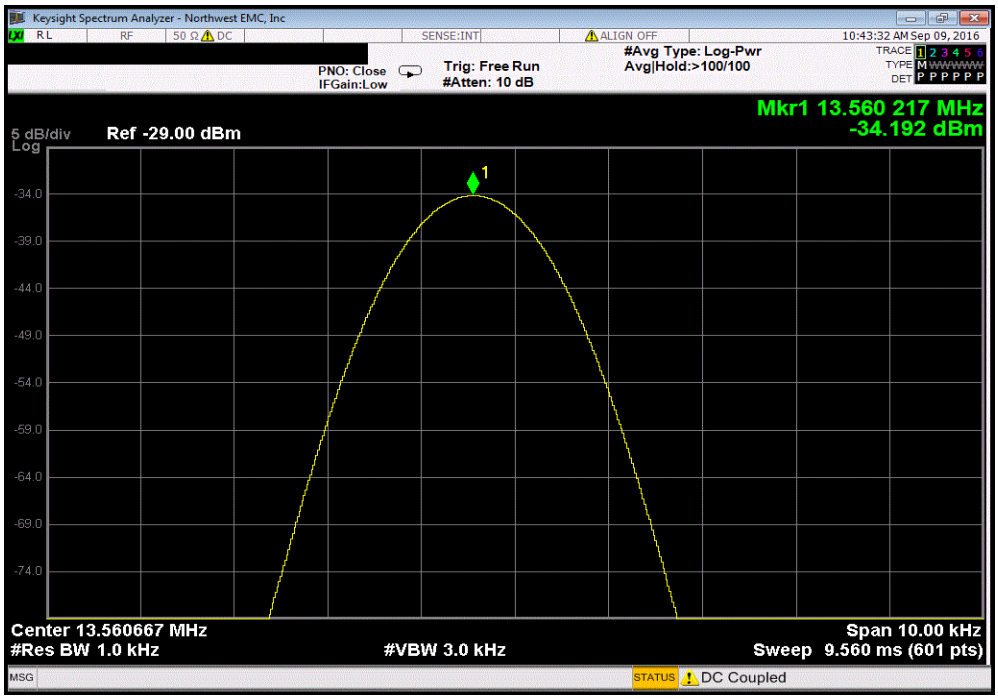
13.56 MHz, Temperature Variation, 30 °C, After 5 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56025033	13.56	18.5	100	Pass



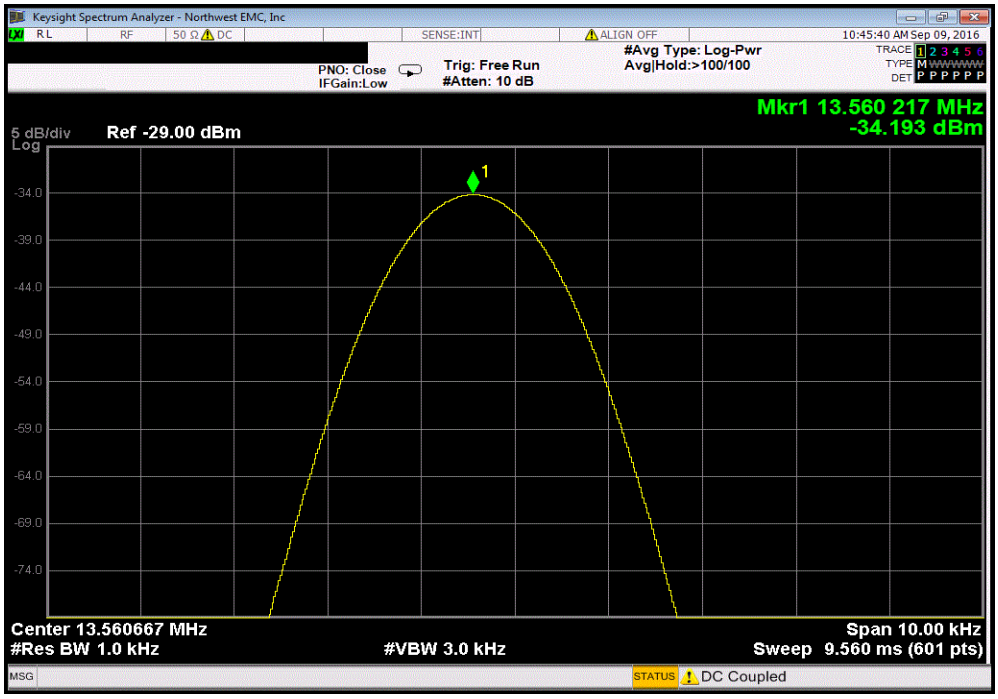
13.56 MHz, Temperature Variation, 30 °C, After 10 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56025033	13.56	18.5	100	Pass



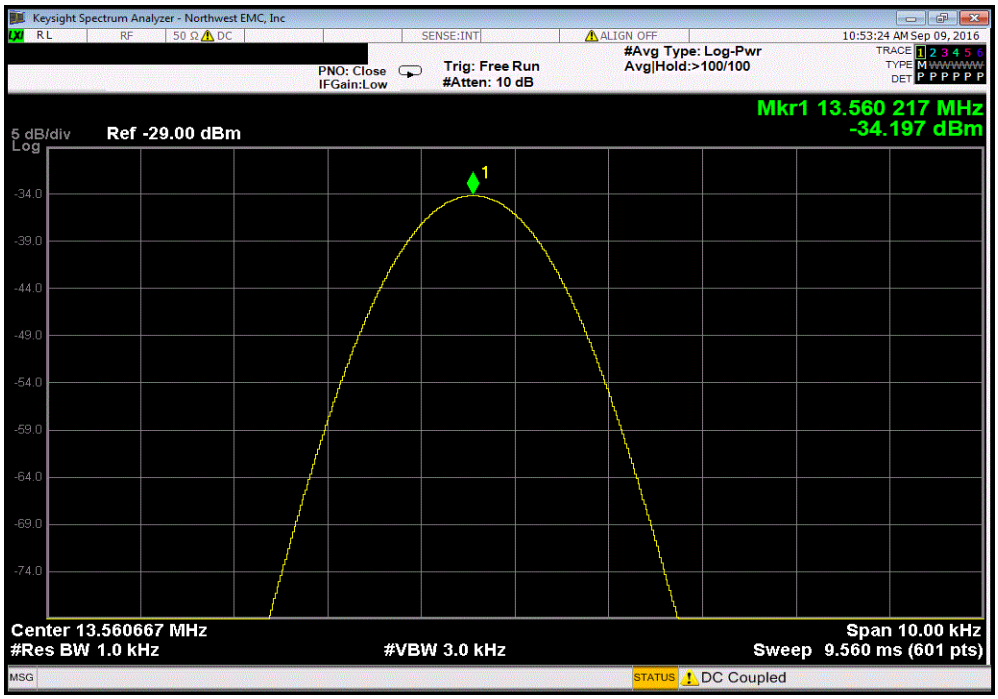
13.56 MHz, Temperature Variation, 40 °C, Start Up						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560217	13.56	16	100	Pass



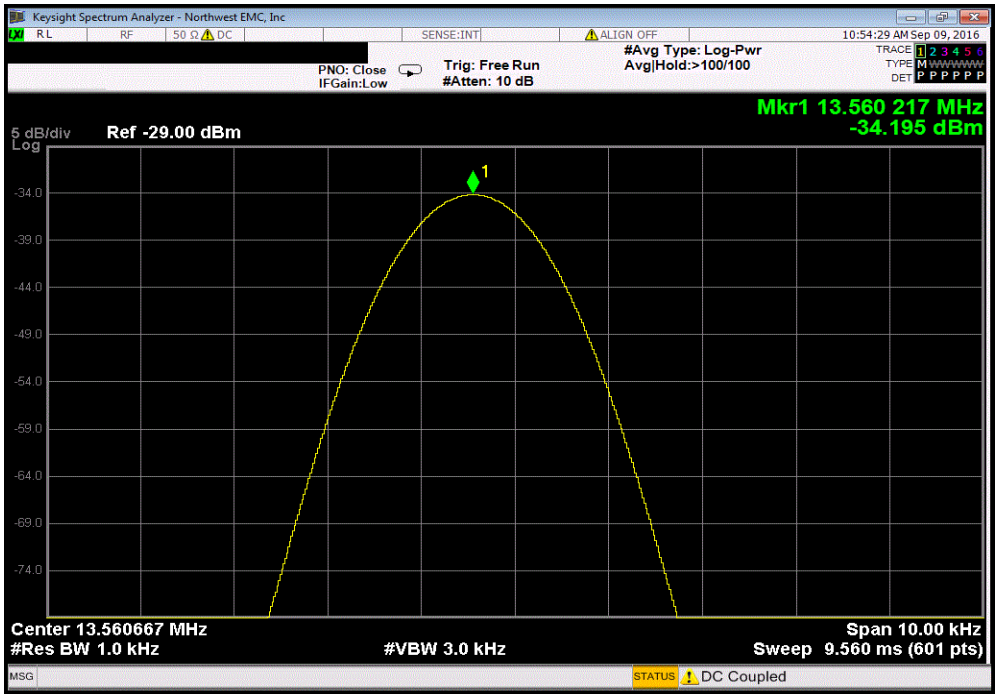
13.56 MHz, Temperature Variation, 40 °C, After 2 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560217	13.56	16	100	Pass



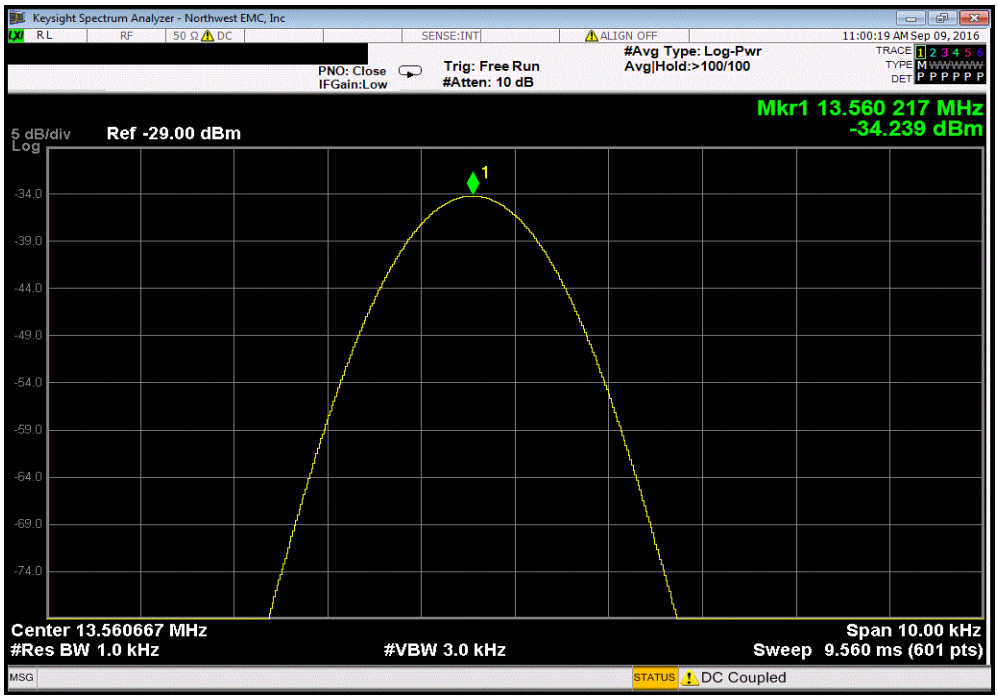
13.56 MHz, Temperature Variation, 40 °C, After 5 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560217	13.56	16	100	Pass



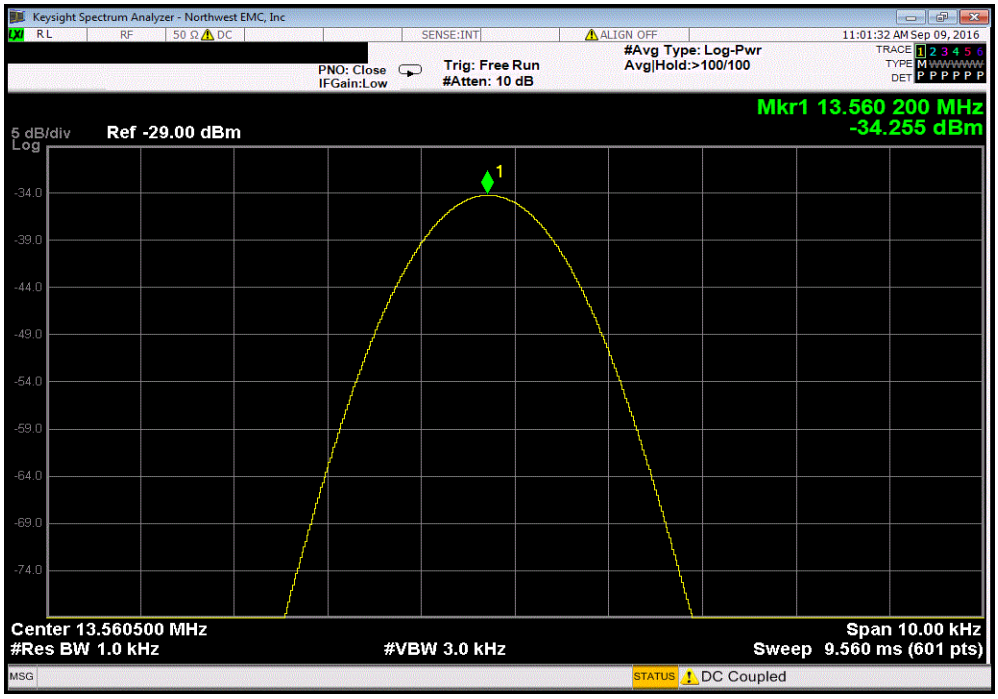
13.56 MHz, Temperature Variation, 40 °C, After 10 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560217	13.56	16	100	Pass



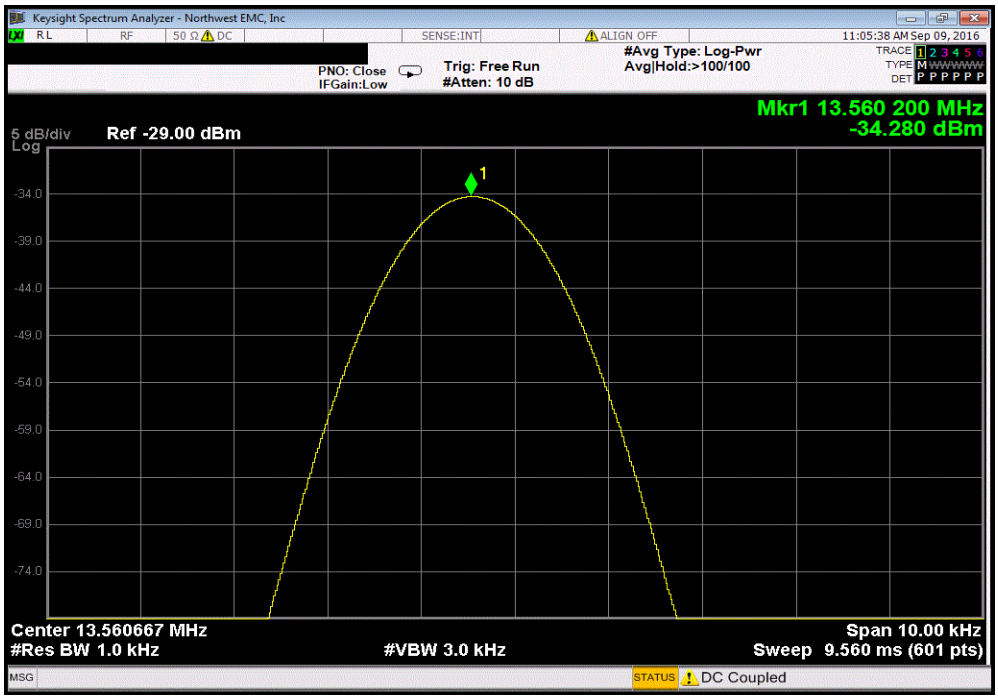
13.56 MHz, Temperature Variation, 50 °C (High), Start Up						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560217	13.56	16	100	Pass



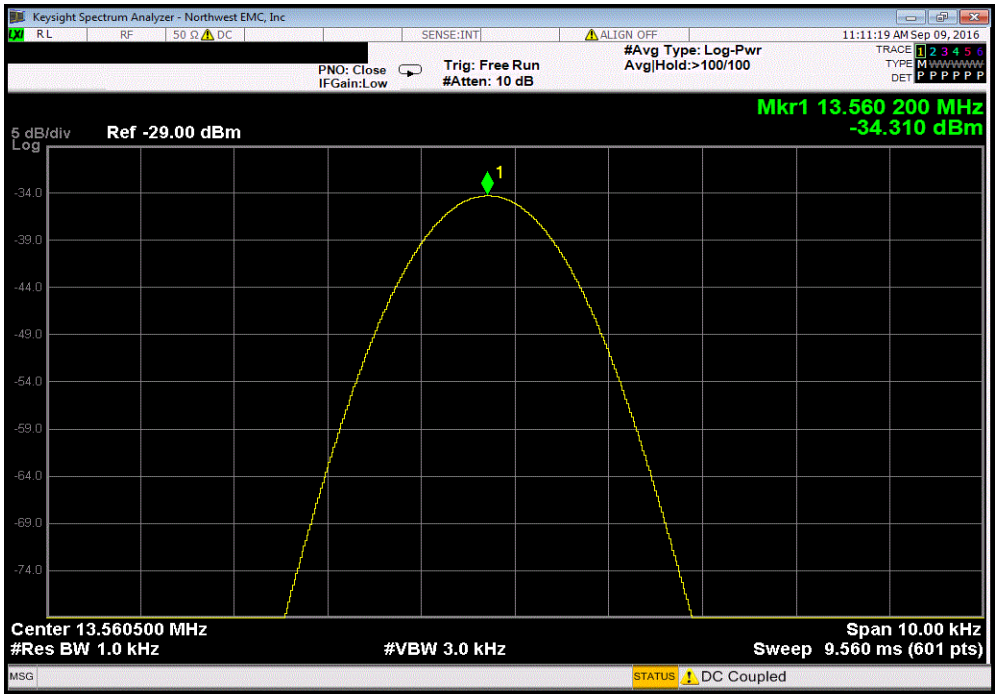
13.56 MHz, Temperature Variation, 50 °C (High), After 2 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.5602	13.56	14.8	100	Pass



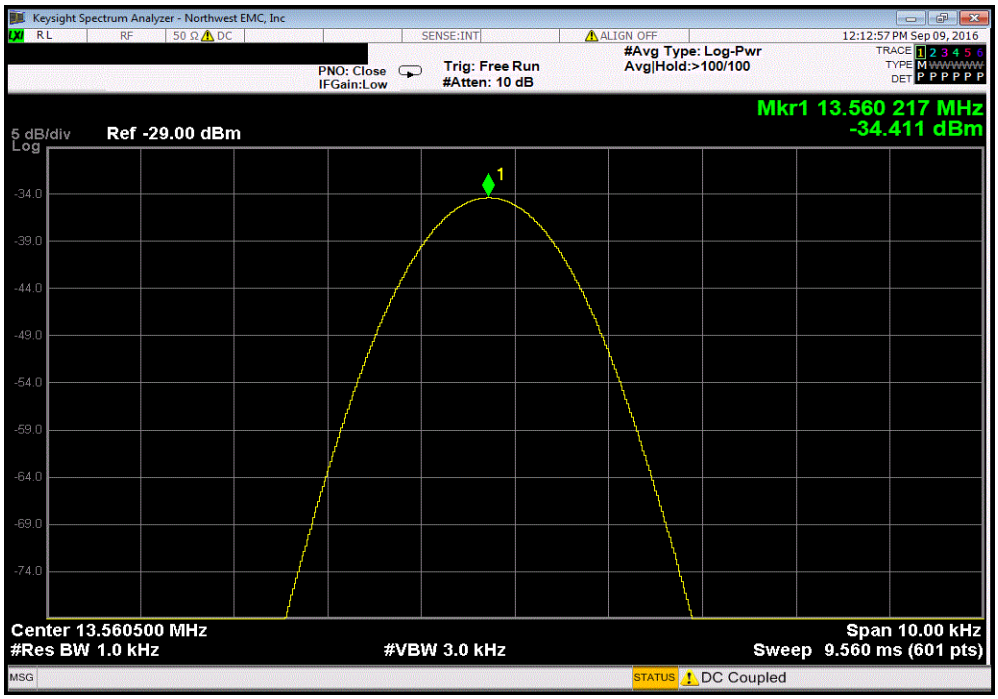
13.56 MHz, Temperature Variation, 50 °C (High), After 5 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56020033	13.56	14.8	100	Pass



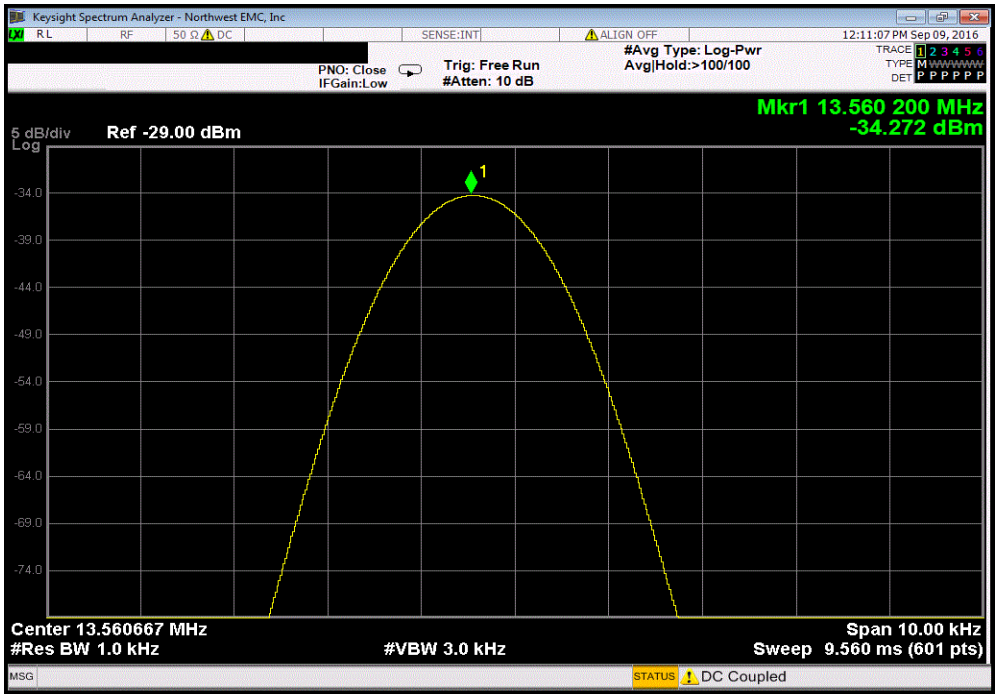
13.56 MHz, Temperature Variation, 50 °C (High), After 10 Minutes						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.5602	13.56	14.8	100	Pass



13.56 MHz, Voltage Variation, Voltage: 115%, Start Up						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56021667	13.56	16	100	Pass



13.56 MHz, Voltage Variation, Voltage: 100%, Start Up						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56020033	13.56	14.8	100	Pass



FREQUENCY STABILITY

XMit 2016.05.06

13.56 MHz, Voltage Variation, Voltage: 85%, Start Up						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560217	13.56	16	100	Pass