Synapse Strategic Product Development LLC

xTPra/xTPrs

FCC 15.225:2012

Report #: SYNA0108

Report Prepared By Northwest EMC Inc.

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

California – Minnesota – Oregon – New York – Washington

CERTIFICATE OF TEST

WTD 12.5.23

Last Date of Test: December 5, 2012
Synapse Strategic Product Development LLC
Model: xTPra/xTPrs

Emissions

Test Description	Specification	Test Method	Pass/Fail
Frequency Stability	FCC 15.225:2012	ANSI C63.10:2009	Pass
Field Strength of Fundamental	FCC 15.225:2012	ANSI C63.10:2009	Pass
Field Strength of Spurious Emissions	FCC 15.225:2012	ANSI C63.10:2009	Pass
AC Powerline Conducted Emissions	FCC 15.207:2012	ANSI C63.10:2009	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-1).

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.

NORTHWEST EMC
REV 2012.08.02

REVISION HISTORY

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

NORTHWEST EMC

REV 2012.05.24

ACCREDITATIONS AND AUTHORIZATIONS

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 Guide 65 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

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and 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

KCC / 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.

Hong Kong

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

Vietnam

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

Russia

GOST – Accredited by Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC to perform EMC and Hygienic testing for Information Technology products to GOST standards.

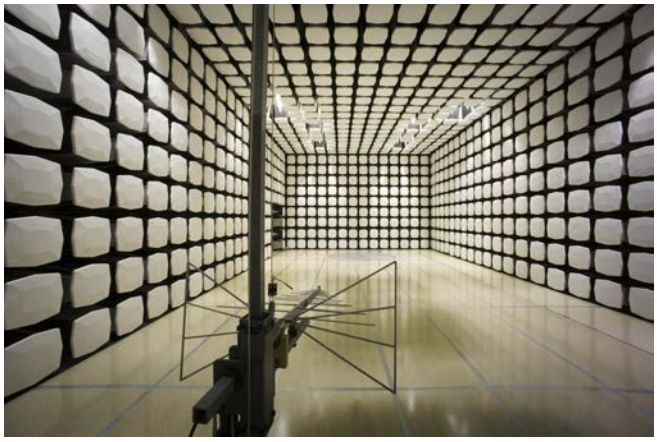
SCOPE

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

LOCATIONS

REV 2012.08.03

Oregon	California	New York	Minnesota	Washington
Labs EV01-EV12 22975 NW Evergreen Pkwy, #400 Hillsboro, OR 97124 (503) 844-4066	Labs OC01-OC13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs WA01-WA04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796	Labs MN01-MN08 9349 W Broadway Ave. Brooklyn Park, MN 55445 (763) 425-2281	Labs SU01-SU07 14128 339th Ave. SE Sultan, WA 98294 (360) 793-8675
VCCI				
A-0108	A-0029		A-0109	A-0110
Industry Canada				
2834D-1, 2834D-2	2834B-1, 2834B-2, 2834B-3		2834E-1	2834C-1



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Synapse Strategic Product Development LLC
Address:	1511 6th Ave. 4th Floor
City, State, Zip:	Seattle, WA 98101
Test Requested By:	Brian Piquette
Model:	xTPra/xTPrs
First Date of Test:	November 10, 2012
Last Date of Test:	December 5, 2012
Receipt Date of Samples:	November 10, 2012
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
xTPra: POE powered RFID tag reader, xTPrs: derivative model of the xTPra used for external sensor monitoring.

Testing Objective:
Seeking system approval under FCC 15.225

CONFIGURATIONS

Configuration SYNA0108- 1

Software/Firmware Running during test	
Description	**Version**
puTTY	Release 0.61

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
xTPra,xTPrs Case	Synapse Strategic Product Development LLC	xTPra,xTPrs	DVT-006

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
DC Power Supply	Mastech	HY3005C	HY3005C

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop Computer	Apple	MacBook Pro i7	C02GF3E3DV7M

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
CAT-6	No	6.0m	No	xTPra,xTPrs case	Laptop Computer
DC Power	No	4.7m	No	xTPra,xTPrs case	DC Power Supply
AC Power	No	2.0m	No	DC Power Supply	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATIONS

Configuration SYNA0108- 2

Software/Firmware Running during test	
Description	**Version**
puTTY	Release 0.61

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
xTPra,xTPrs Case	Synapse Strategic Product Development LLC	xTPra,xTPrs	DVT-006

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
DC Power Supply	Mastech	HY3005C	HY3005C

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop Computer	Apple	MacBook Pro i7	C02GF3E3DV7M

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	No	4.7m	No	xTPra,xTPrs case	DC Power Supply
AC Power	No	2.0m	No	DC Power Supply	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATIONS

Configuration SYNA0110- 1

Software/Firmware Running during test	
Description	**Version**
puTTY	Release 0.61

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Touch Point Remote	Synapse Strategic Product Development LLC	xTPra	xTPra-0095
Large Rectangular Antenna	Skye Tek	18362-900-00003	None

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
DC Power Supply	Mastech	HY3005C	HY3005C
Laptop Computer	Apple	MacBook Pro i7	C02GF3E3DV7M

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Ethernet	No	4.2m	No	xTPra	Laptop Computer
DC Power	No	3.2m	No	xTPra	DC Power Supply
AC Power	No	2.0m	No	DC Power Supply	AC Mains
Coaxial	Yes	1.0m	No	xTPra	Touch Point Remote Antenna
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATIONS

Configuration SYNA0110- 2

Software/Firmware Running during test	
Description	**Version**
puTTY	Release 0.61

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Touch Point Remote	Synapse Strategic Product Development LLC	xTPra	xTPra-0095
Octagonal Antenna	Walt Disney Imagineering	WMKPOTCND0004	None

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
DC Power Supply	Mastech	HY3005C	HY3005C
Laptop Computer	Apple	MacBook Pro i7	C02GF3E3DV7M

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Ethernet	No	4.2m	No	xTPra	Laptop Computer
DC Power	No	3.2m	No	xTPra	DC Power Supply
AC Power	No	2.0m	No	DC Power Supply	AC Mains
Coaxial	Yes	1.0m	No	xTPra	Touch Point Remote Antenna
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATIONS

Configuration SYNA0110- 3

Software/Firmware Running during test	
Description	**Version**
puTTY	Release 0.61

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Touch Point Remote	Synapse Strategic Product Development LLC	xTPra	xTPra-0095
Small Rectangular Antenna	Feig Electronics	1967.000.00	None

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
DC Power Supply	Mastech	HY3005C	HY3005C
Laptop Computer	Apple	MacBook Pro i7	C02GF3E3DV7M

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Ethernet	No	4.2m	No	xTPra	Laptop Computer
DC Power	No	3.2m	No	xTPra	DC Power Supply
AC Power	No	2.0m	No	DC Power Supply	AC Mains
Coaxial	Yes	1.0m	No	xTPra	Touch Point Remote Antenna
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

MODIFICATIONS

WTD 12.5.23

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	11/10/2012	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.
2	11/10/2012	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	11/10/2012	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.
4	11/10/2012	AC Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.
5	12/4/2012	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.
6	12/5/2012	Field Strength of Fundamental	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
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
Temp./Humidity Chamber	Cincinnati Sub Zero (CSZ)	ZH-32-2-2-H/AC	TBA	NCR	0
Humidity Temperature Meter	Omegaette	HH311	DTY	3/29/2011	24
Spectrum Analyzer	Agilent	E4440A	AFD	7/5/2012	12

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

Variation of Supply Voltage

The primary supply voltage was varied from 85 % to 115% of the nominal voltage

Variation of Ambient Temperature

Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range (-20 ° to +50° C) and at 10°C intervals.

A direct connect measurement was made between the EUT's antenna cable and a spectrum analyzer. The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT. Measurements were made at the mid channel of each band to determine frequency stability. If the frequency variation is less than 100 ppm, the EUT will meet the requirement of part 15.225, that the emissions are maintained within the band of operation.

Frequency Stability

EUT:	xTPra/xTPrs			**Work Order:**	SYNA0108
Serial Number:	A			**Date:**	11/10/12
Customer:	Synapse Strategic Product Development LLC			**Temperature:**	18.5°C
Attendees:	Bill Standing			**Humidity:**	38%
Project:	None			**Barometric Pres.:**	1016
Tested by:	Brandon Hobbs	**Power:**	24VDC	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.225:2012	ANSI C63.10:2009

COMMENTS

The EUT was transmitting at 100% duty cycle.

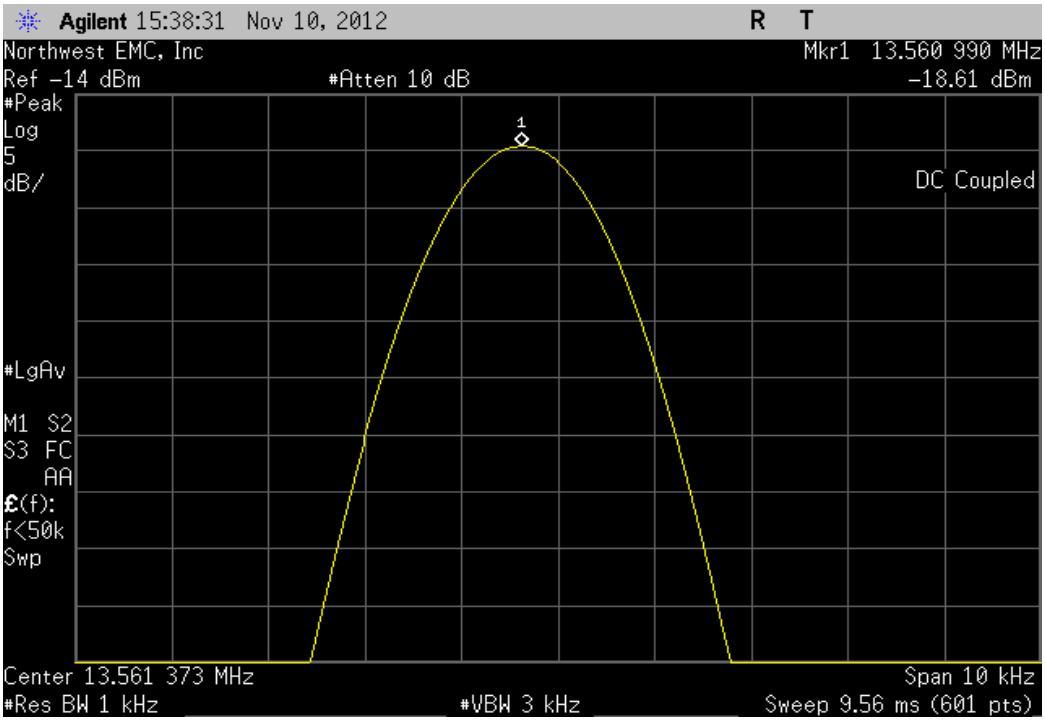
DEVIATIONS FROM TEST STANDARD

None

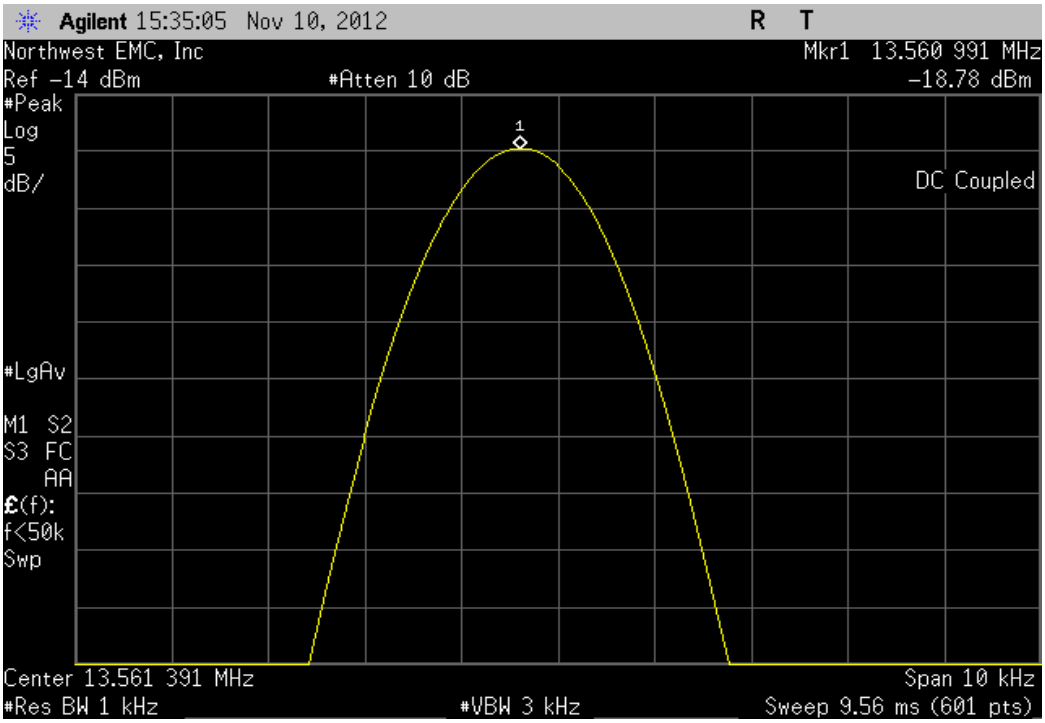
Configuration #	1	Signature

	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
13.567 MHz Single Channel					
Voltage: 115%	13.56099	13.56	73.01	100	Pass
Voltage: 100%	13.560991	13.56	73.08	100	Pass
Voltage: 85%	13.56099	13.56	73.01	100	Pass
Temperature: +50°	13.560991	13.56	73.08	100	Pass
Temperature: +40°	13.560991	13.56	73.08	100	Pass
Temperature: +30°	13.560973	13.56	71.76	100	Pass
Temperature: +20°	13.560973	13.56	71.76	100	Pass
Temperature: +10°	13.560973	13.56	71.76	100	Pass
Temperature: 0°	13.560974	13.56	71.83	100	Pass
Temperature: -10°	13.560991	13.56	73.08	100	Pass
Temperature: -20°	13.560973	13.56	71.76	100	Pass

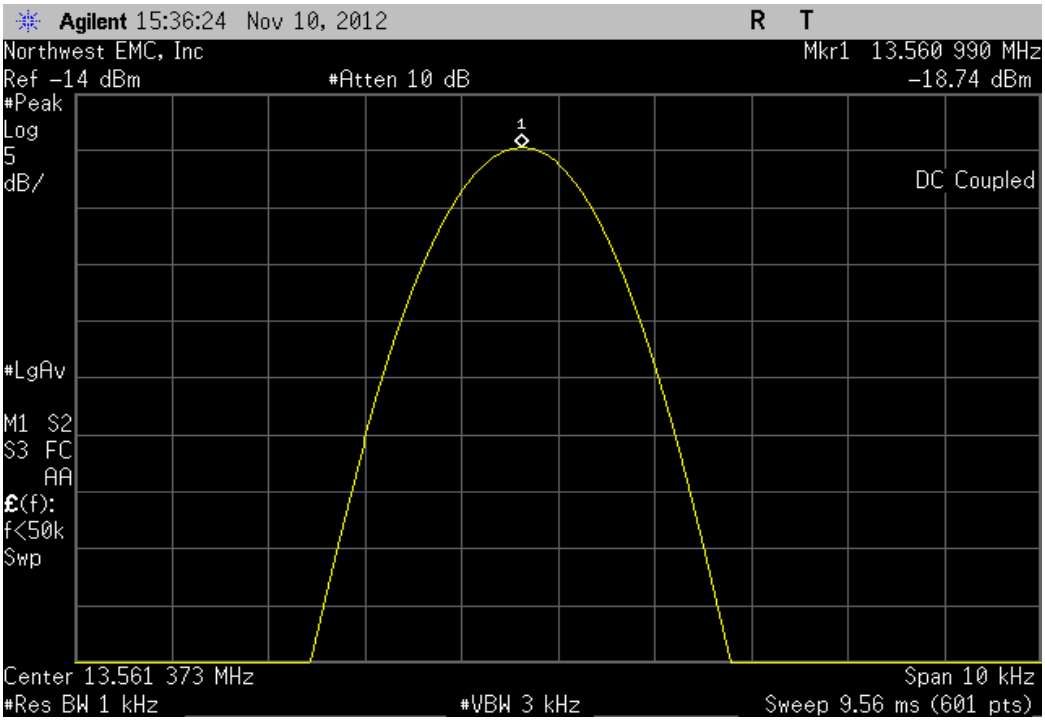
13.567 MHz Single Channel , Voltage: 115%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
		13.56099	13.56	73.01	100	Pass



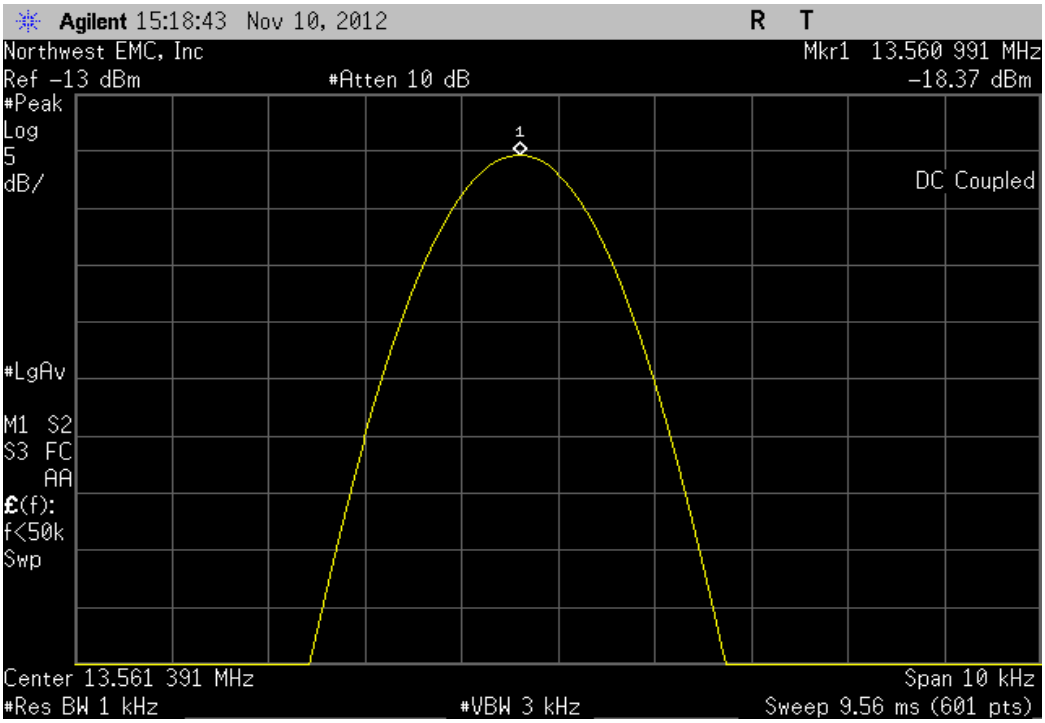
13.567 MHz Single Channel , Voltage: 100%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
		13.560991	13.56	73.08	100	Pass



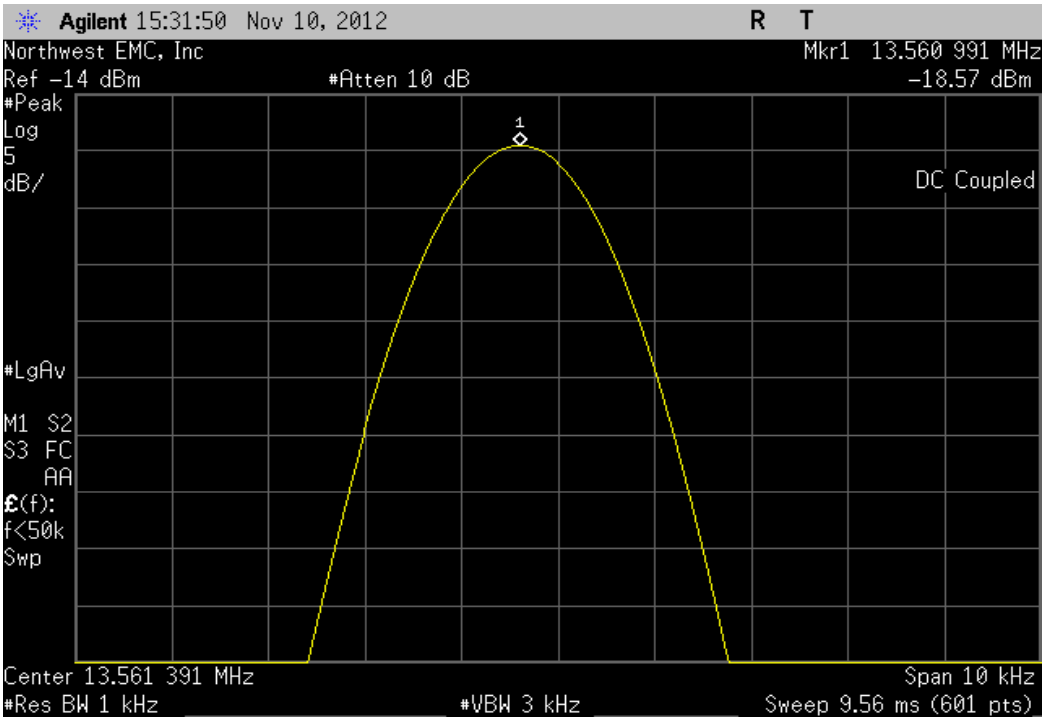
13.567 MHz Single Channel , Voltage: 85%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
		13.56099	13.56	73.01	100	Pass



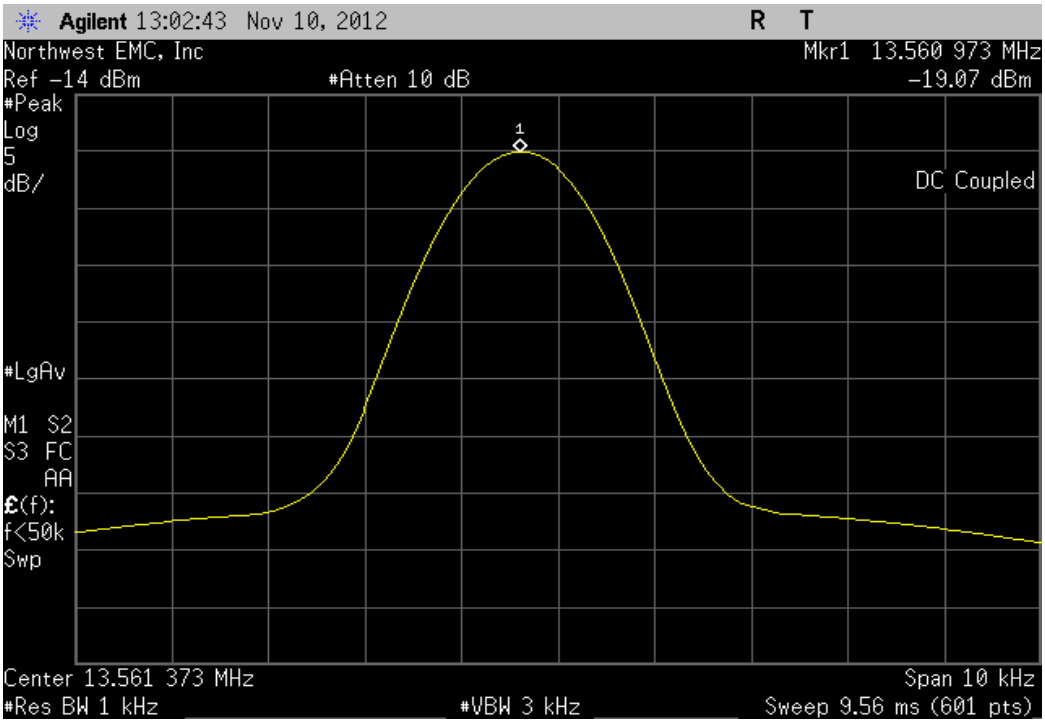
13.567 MHz Single Channel , Temperature: +50°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
		13.560991	13.56	73.08	100	Pass



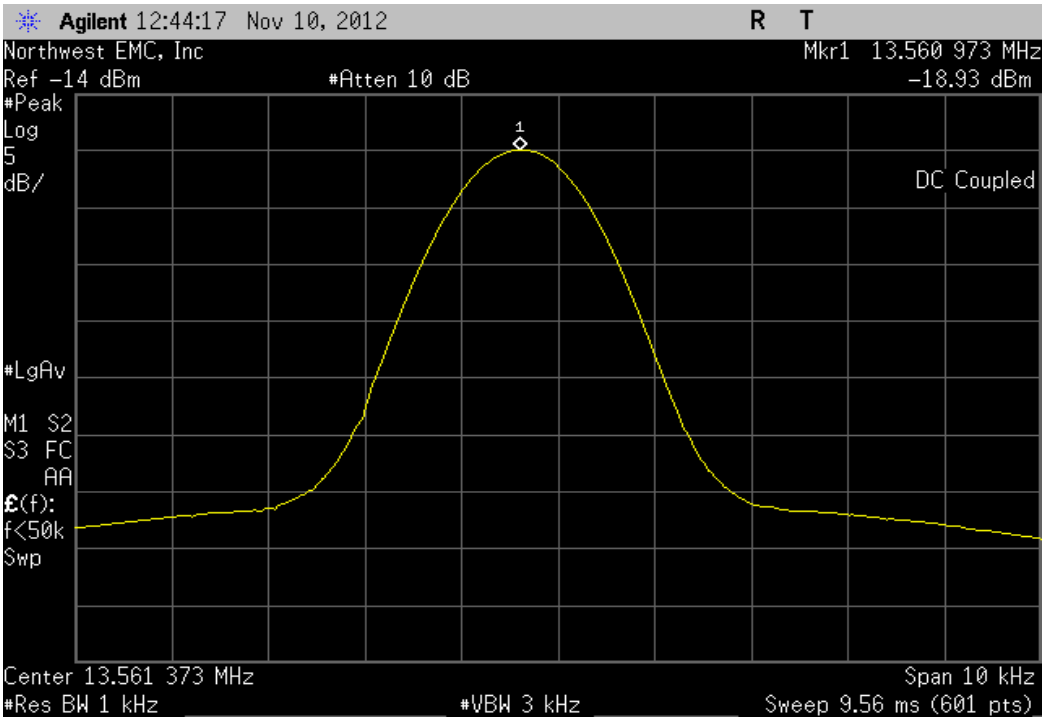
13.567 MHz Single Channel , Temperature: +40°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
		13.560991	13.56	73.08	100	Pass



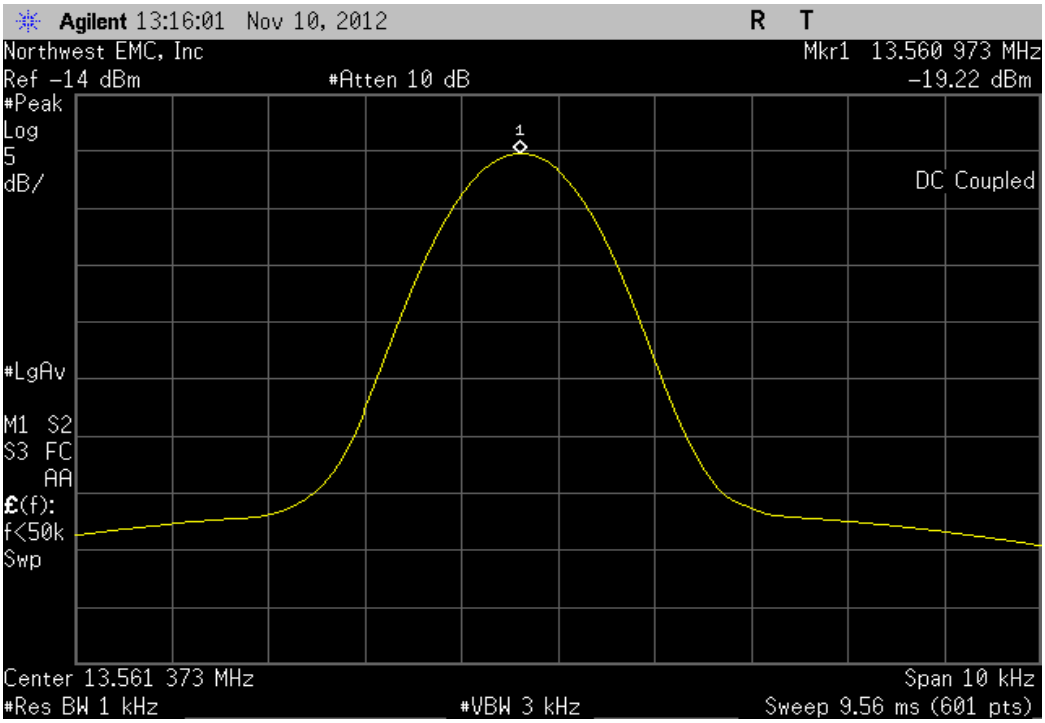
13.567 MHz Single Channel , Temperature: +30°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
		13.560973	13.56	71.76	100	Pass



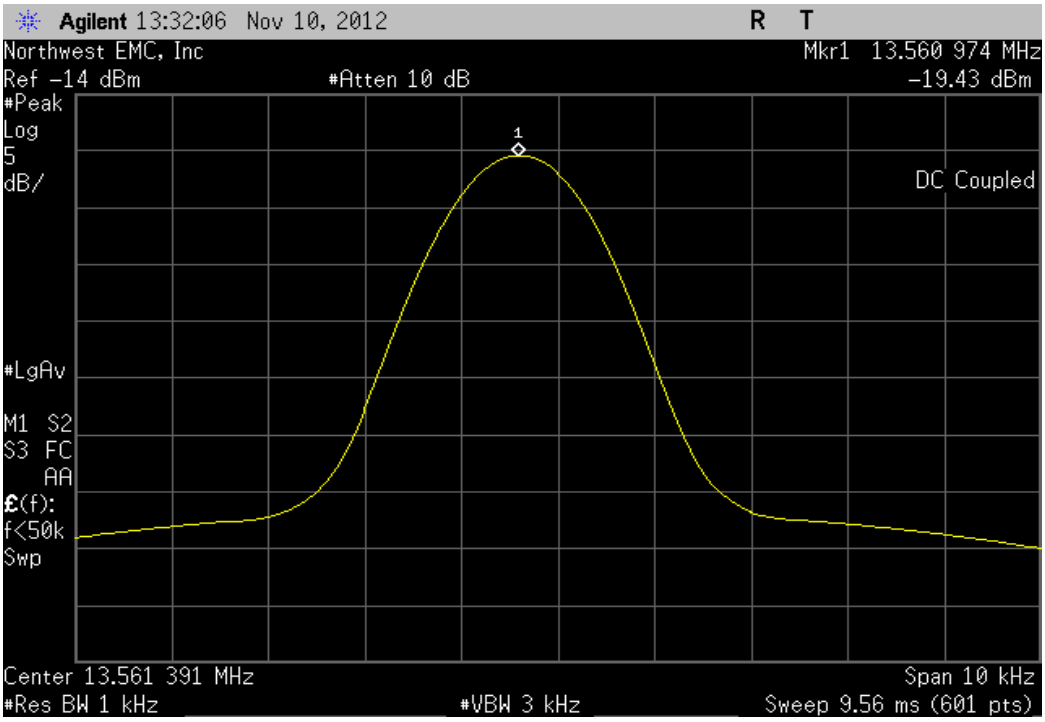
13.567 MHz Single Channel , Temperature: +20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
		13.560973	13.56	71.76	100	Pass



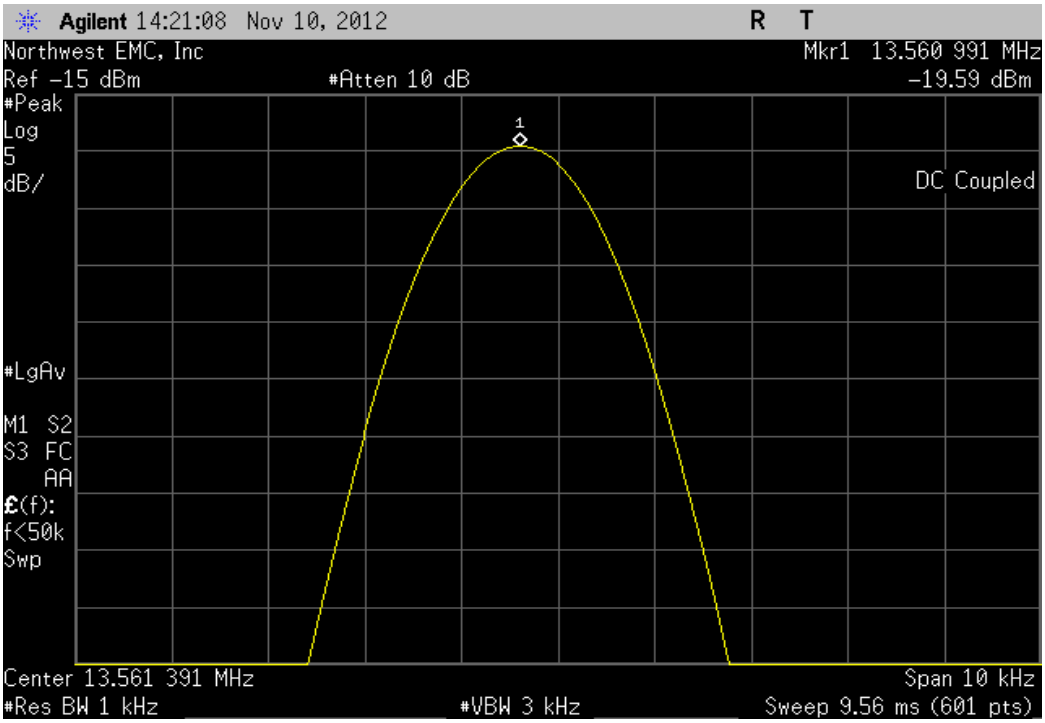
13.567 MHz Single Channel , Temperature: +10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
		13.560973	13.56	71.76	100	Pass



13.567 MHz Single Channel , Temperature: 0°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
		13.560974	13.56	71.83	100	Pass

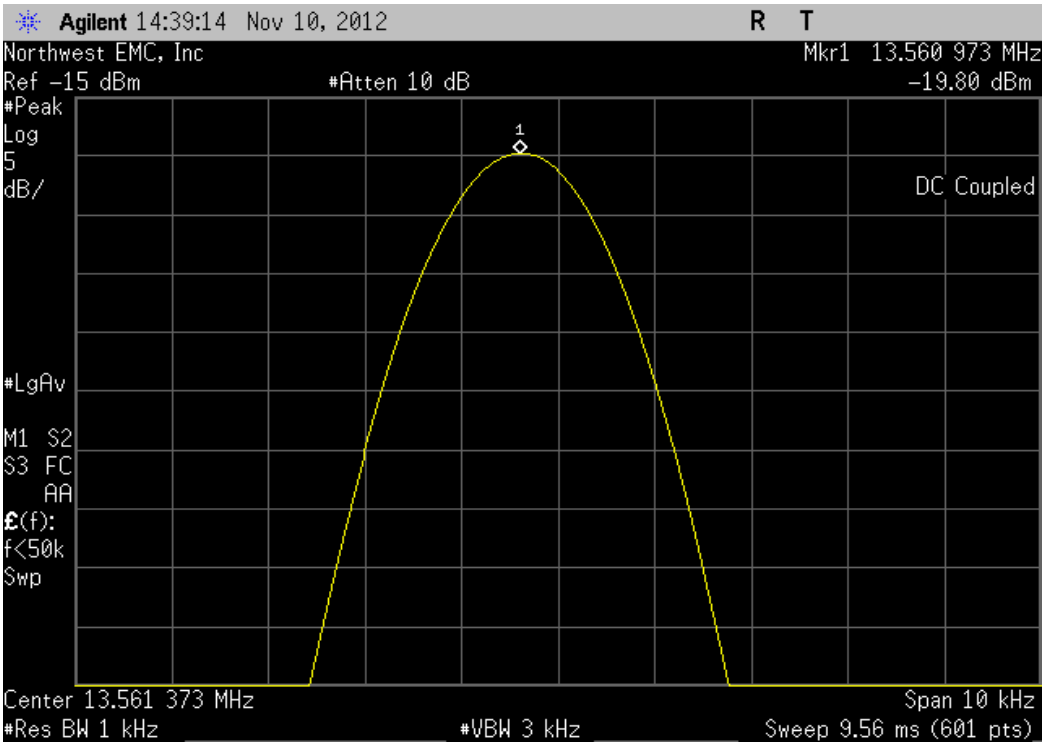


13.567 MHz Single Channel , Temperature: -10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
		13.560991	13.56	73.08	100	Pass



Frequency Stability

13.567 MHz Single Channel , Temperature: -20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
		13.560973	13.56	71.76	100	Pass



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 at 13.56MHz, 100% modulation, 99% duty cycle

POWER SETTINGS INVESTIGATED

24VDC

CONFIGURATIONS INVESTIGATED

SYNA0108 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	490 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
Spectrum Analyzer	Agilent	E4443A	AFB	1/31/2012	12 mo
EV11 Cables	N/A	3m Test Distance Cables	EVM	3/15/2012	12 mo
Antenna, Loop	EMCO	6502	AOA	6/28/2011	24 mo

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

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 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.

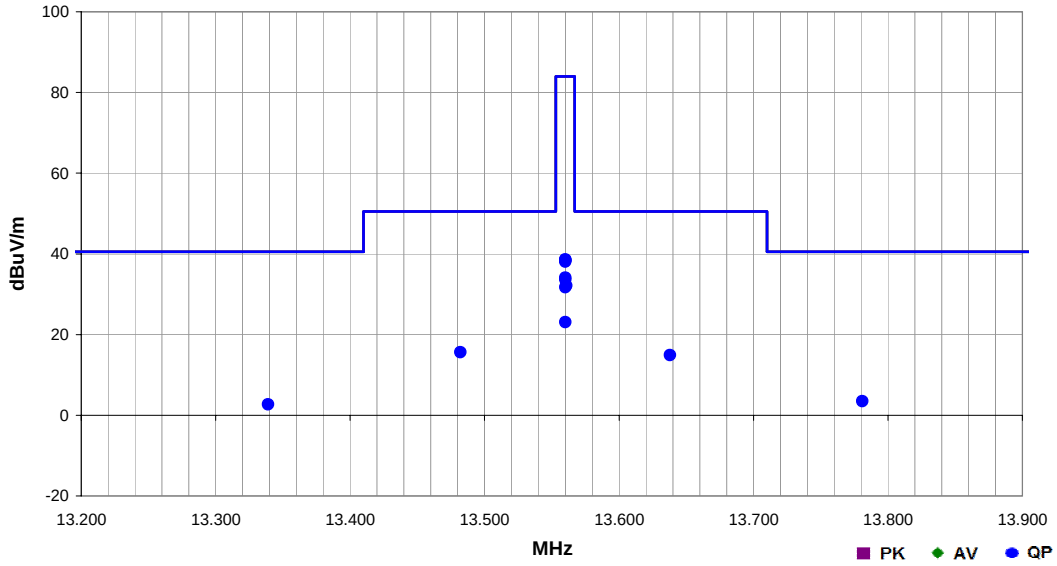
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of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

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	SYNA0108	**Date:**	11/10/12		
Project:	None	**Temperature:**	17.1 °C		
Job Site:	EV11	**Humidity:**	38% RH		
Serial Number:	A	**Barometric Pres.:**	1020 mbar	**Tested by:**	Carl Engholm. Rod Peloquir
EUT:	xTPra/xTPrs				
Configuration:	1				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	Internal shielded CAT5, no ferrite				

Test Specifications	**Test Method**
FCC 15.225:2012	ANSI C63.10:2009

Run #	1	**Test Distance (m)**	10	**Antenna Height(s)**	1-4m	**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
13.482	23.1	11.6	1.0	174.0	10.0	0.0	See Comments	QP	-19.1	15.6	50.5	-34.9	Antenna Perp to ground, Perp to horizontal EUT
13.638	22.4	11.6	1.0	174.0	10.0	0.0	See Comments	QP	-19.1	14.9	50.5	-35.6	Antenna Perp to ground, Perp to horizontal EUT
13.781	11.0	11.6	1.0	174.0	10.0	0.0	See Comments	QP	-19.1	3.5	40.5	-37.0	Antenna Perp to ground, Perp to horizontal EUT
13.339	10.2	11.6	1.0	174.0	10.0	0.0	See Comments	QP	-19.1	2.7	40.5	-37.8	Antenna Perp to ground, Perp to horizontal EUT
13.560	46.1	11.6	1.0	174.0	10.0	0.0	See Comments	QP	-19.1	38.6	84.0	-45.4	Antenna Perp to ground, Perp to horizontal EUT
13.560	45.9	11.6	1.0	163.0	10.0	0.0	See Comments	QP	-19.1	38.4	84.0	-45.6	Antenna Para to ground, Perp to horizontal EUT
13.560	45.9	11.6	1.0	182.0	10.0	0.0	See Comments	QP	-19.1	38.4	84.0	-45.6	Antenna Perp to ground, Perp to on-side EUT
13.560	45.6	11.6	1.0	177.0	10.0	0.0	See Comments	QP	-19.1	38.1	84.0	-45.9	Antenna Para to ground, Perp to on-side EUT
13.560	41.6	11.6	1.0	82.0	10.0	0.0	See Comments	QP	-19.1	34.1	84.0	-49.9	Antenna Para to ground, Perp to vertical EUT
13.560	41.1	11.6	1.0	65.0	10.0	0.0	See Comments	QP	-19.1	33.6	84.0	-50.4	Antenna Perp to ground, Perp to vertical EUT
13.561	39.6	11.6	1.0	91.0	10.0	0.0	See Comments	QP	-19.1	32.1	84.0	-51.9	Antenna Perp to ground, Para to horizontal EUT
13.560	39.2	11.6	1.0	100.0	10.0	0.0	See Comments	QP	-19.1	31.7	84.0	-52.3	Antenna Perp to ground, Para to on-side EUT
13.560	30.6	11.6	1.0	50.0	10.0	0.0	See Comments	QP	-19.1	23.1	84.0	-60.9	Antenna Perp to ground, Para to vertical EUT

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 at 13.56MHz, 100% modulation, 99% duty cycle

POWER SETTINGS INVESTIGATED

24VDC

CONFIGURATIONS INVESTIGATED

SYNA0108 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	490 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
Spectrum Analyzer	Agilent	E4443A	AFB	1/31/2012	12 mo
EV11 Cables	N/A	3m Test Distance Cables	EVM	3/15/2012	12 mo
Antenna, Loop	EMCO	6502	AOA	6/28/2011	24 mo

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

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 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.

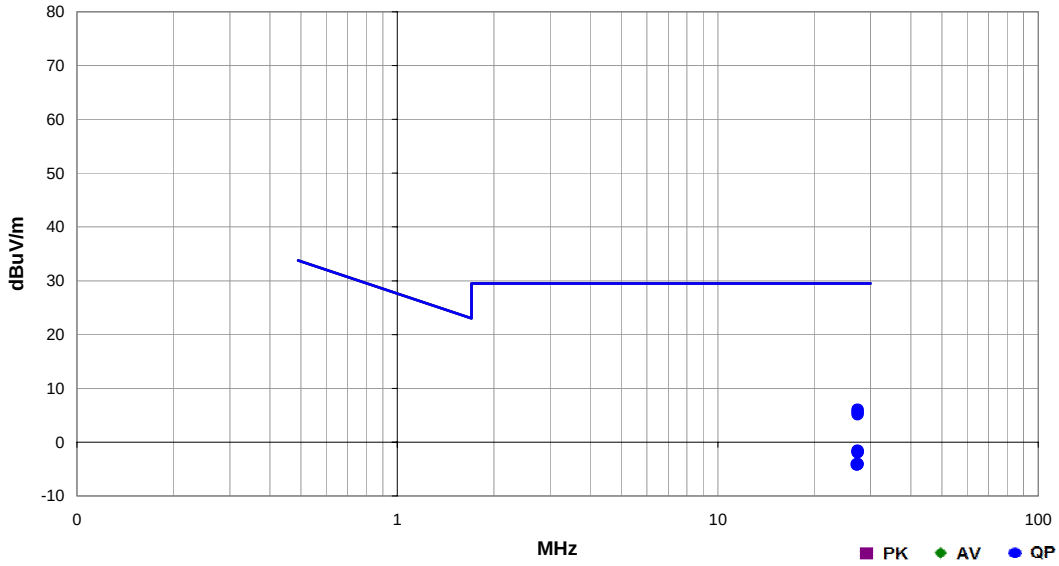
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of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

FIELD STRENGTH OF SPURIOUS EMISSIONS

Work Order:	SYNA0108	**Date:**	11/10/12		
Project:	None	**Temperature:**	17.1 °C		
Job Site:	EV11	**Humidity:**	38% RH		
Serial Number:	A	**Barometric Pres.:**	1020 mbar	**Tested by:**	Carl Engholm
EUT:	xTPra/xTPrs				
Configuration:	1				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	Internal shielded CAT5, no ferrite				

Test Specifications	**Test Method**
FCC 15.225:2012	ANSI C63.10:2009

Run #	2	**Test Distance (m)**	10	**Antenna Height(s)**	1-4m	**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
27.343	15.4	9.7	1.0	14.0	10.0	0.0	See Comments	QP	-19.1	6.0	29.5	-23.5	Antenna Perp to ground, Perp to on-side EUT
27.342	15.0	9.7	1.0	342.0	10.0	0.0	See Comments	QP	-19.1	5.6	29.5	-23.9	Antenna Perp to ground, Perp to horizontal EUT
27.338	14.6	9.7	1.0	325.0	10.0	0.0	See Comments	QP	-19.1	5.2	29.5	-24.3	Antenna Perp to ground, Perp to vertical EUT
27.342	7.8	9.7	1.0	97.0	10.0	0.0	See Comments	QP	-19.1	-1.6	29.5	-31.1	Antenna Para to ground, Perp to horizontal EUT
27.341	7.6	9.7	1.0	96.0	10.0	0.0	See Comments	QP	-19.1	-1.8	29.5	-31.3	Antenna Para to ground, Perp to on-side EUT
27.342	7.5	9.7	1.0	53.0	10.0	0.0	See Comments	QP	-19.1	-1.9	29.5	-31.4	Antenna Para to ground, Perp to vertical EUT
27.294	5.3	9.7	1.0	157.0	10.0	0.0	See Comments	QP	-19.1	-4.1	29.5	-33.6	Antenna Perp to ground, Para to on-side EUT
27.335	5.3	9.7	1.0	55.0	10.0	0.0	See Comments	QP	-19.1	-4.1	29.5	-33.6	Antenna Perp to ground, Para to horizontal EUT
27.148	5.2	9.7	1.0	295.0	10.0	0.0	See Comments	QP	-19.1	-4.1	29.5	-33.6	Antenna Perp to ground, Para to vertical EUT

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 at 13.56MHz, 100% modulation, 99% duty cycle

POWER SETTINGS INVESTIGATED

24VDC

CONFIGURATIONS INVESTIGATED

SYNA0108 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	1000 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
EV01 Cables	N/A	Bilog Cables	EVA	6/26/2012	12 mo
Pre-Amplifier	Miteq	AM-1616-1000	AOL	6/26/2012	12 mo
Antenna, Biconilog	EMCO	3141	AXG	4/10/2012	12 mo
Spectrum Analyzer	Agilent	E4446A	AAQ	2/7/2012	12 mo

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

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

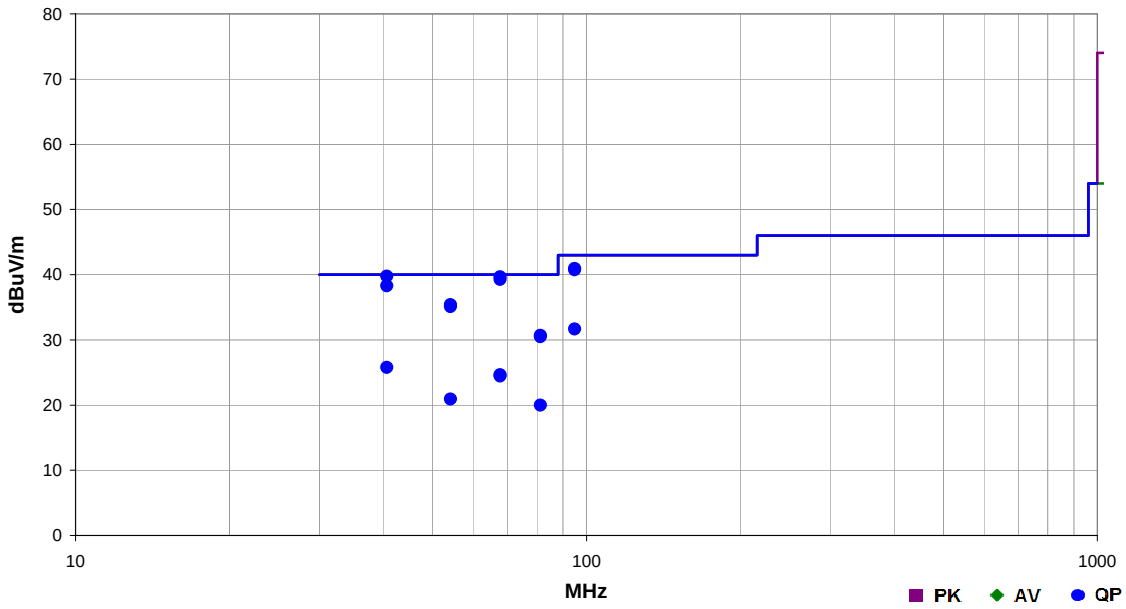
The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set at the operating channel. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009).

FIELD STRENGTH OF SPURIOUS EMISSIONS

Work Order:	SYNA0108	**Date:**	11/10/12		
Project:	None	**Temperature:**	17.1 °C		
Job Site:	EV01	**Humidity:**	38% RH		
Serial Number:	A	**Barometric Pres.:**	1020 mbar	**Tested by:**	Carl Engholm, Rod Peloquin
EUT:	xTPra/xTPrs				
Configuration:	1				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	Internal shielded CAT5, no ferrite				

Test Specifications	**Test Method**
FCC 15.225:2012	ANSI C63.10:2009

Run #	2	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**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
40.675	42.6	-2.8	1.0	86.0	3.0	0.0	Vert	QP	0.0	39.8	40.0	-0.2	EUT Antenna Vertical
67.806	47.7	-8.1	1.8	358.0	3.0	0.0	Vert	QP	0.0	39.6	40.0	-0.4	EUT Antenna Vertical
67.806	47.3	-8.1	1.8	358.0	3.0	0.0	Vert	QP	0.0	39.2	40.0	-0.8	EUT Antenna Horizontal
40.680	41.1	-2.8	1.0	226.0	3.0	0.0	Vert	QP	0.0	38.3	40.0	-1.7	EUT Antenna Horizontal
94.928	47.8	-6.8	1.2	134.0	3.0	0.0	Vert	QP	0.0	41.0	43.0	-2.0	EUT Antenna Vertical
94.926	47.6	-6.8	1.3	218.0	3.0	0.0	Vert	QP	0.0	40.8	43.0	-2.2	EUT Antenna Horizontal
54.192	42.6	-7.2	1.0	314.0	3.0	0.0	Vert	QP	0.0	35.4	40.0	-4.6	EUT Antenna Vertical
54.195	42.3	-7.2	1.0	263.0	3.0	0.0	Vert	QP	0.0	35.1	40.0	-4.9	EUT Antenna Horizontal
81.361	38.8	-8.1	1.0	163.0	3.0	0.0	Vert	QP	0.0	30.7	40.0	-9.3	EUT Antenna Horizontal
81.361	38.6	-8.1	1.0	170.0	3.0	0.0	Vert	QP	0.0	30.5	40.0	-9.5	EUT Antenna Vertical
94.932	38.5	-6.8	2.0	130.0	3.0	0.0	Horz	QP	0.0	31.7	43.0	-11.3	EUT Antenna Horizontal
40.675	28.6	-2.8	2.4	258.0	3.0	0.0	Horz	QP	0.0	25.8	40.0	-14.2	EUT Antenna Horizontal
67.806	32.7	-8.1	2.9	115.0	3.0	0.0	Horz	QP	0.0	24.6	40.0	-15.4	EUT Antenna Horizontal
67.806	32.5	-8.1	1.7	143.0	3.0	0.0	Horz	QP	0.0	24.4	40.0	-15.6	EUT Antenna Vertical
54.191	28.1	-7.2	2.7	271.0	3.0	0.0	Horz	QP	0.0	20.9	40.0	-19.1	EUT Antenna Horizontal
81.358	28.1	-8.1	4.0	142.0	3.0	0.0	Horz	QP	0.0	20.0	40.0	-20.0	EUT Antenna Horizontal

AC POWERLINE CONDUCTED 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.

MODES OF OPERATION

Transmitting at 13.56MHz, 100% modulation, 99% duty cycle

POWER SETTINGS INVESTIGATED

24VDC

CONFIGURATIONS INVESTIGATED

SYNA0108 - 1

SAMPLE CALCULATIONS

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
EV07 Cables	N/A	Conducted Cables	EVG	4/27/2012	12 mo
Attenuator	Coaxicom	66702 2910-20	RBR	8/7/2012	12 mo
High Pass Filter	TTE	H97-100K-50-720B	HHD	2/1/2012	24 mo
Receiver	Rohde & Schwarz	ESCI	ARH	3/29/2012	12 mo
LISN	Solar	9252-50-R-24-BNC	LIN	4/16/2012	12 mo

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 bandwidths and detectors specified. No video filter 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 EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT.

The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10-2009.

In the event that the operating frequency of 13.56 MHz is causing the product to fail the FCC 15.207 limits, the following guidance can be used:

Per the FCC Guidance, the FCC will accept measurements on a 13.56 MHz transmitter done with a dummy load under the following conditions. (1) First, perform the AC line conducted tests with the antenna attached to make sure the device complies with the 15.207 limits outside the transmitter's fundamental emission band, and then retest with a dummy load to make sure the device complies with the 15.207 limits inside the transmitter's fundamental emission band. (2) For the second portion of these tests, only the fundamental emission band of the transmitter needs to be retested.

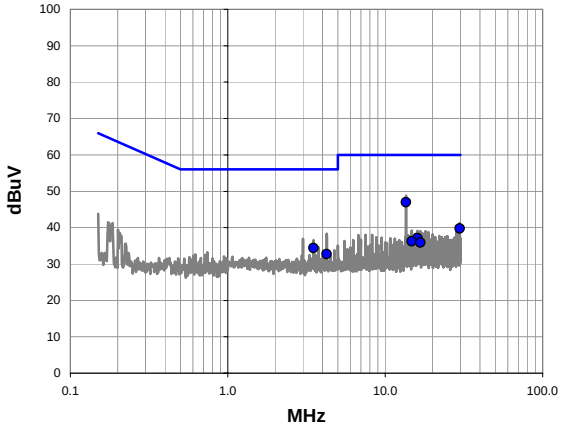
AC POWERLINE CONDUCTED EMISSIONS

Work Order:	SYNA0108	**Date:**	11/10/12		
Project:	None	**Temperature:**	18 °C		
Job Site:	EV07	**Humidity:**	40% RH		
Serial Number:	A	**Barometric Pres.:**	1016 mbar	**Tested by:**	Brandon Hobbs
EUT:	xTPra/xTPrs				
Configuration:	2				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	Antenna terminated with 50 ohm load on the antenna port, add (1) 1.1uf cap at cirular connector cable end internal ethernet connector shield attached to chassis removed balun short to chassis added the common mode power choke.				

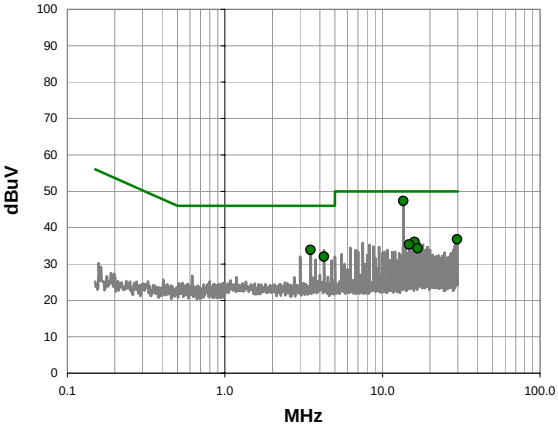
Test Specifications	**Test Method**
FCC 15.207:2012	ANSI C63.10:2009

Run #	27	**Line:**	High Line	**Ext. Attenuation:**	20	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.560	25.8	21.2	47.0	60.0	-13.0
29.776	17.5	22.3	39.8	60.0	-20.2
3.504	13.8	20.6	34.4	56.0	-21.6
16.014	15.7	21.4	37.1	60.0	-22.9
4.252	12.0	20.7	32.7	56.0	-23.3
14.762	14.9	21.3	36.2	60.0	-23.8
16.766	14.4	21.5	35.9	60.0	-24.1

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.560	26.1	21.2	47.3	50.0	-2.7
3.504	13.3	20.6	33.9	46.0	-12.1
29.776	14.5	22.3	36.8	50.0	-13.2
16.014	14.6	21.4	36.0	50.0	-14.0
4.252	11.3	20.7	32.0	46.0	-14.0
14.762	14.0	21.3	35.3	50.0	-14.7
16.766	12.8	21.5	34.3	50.0	-15.7

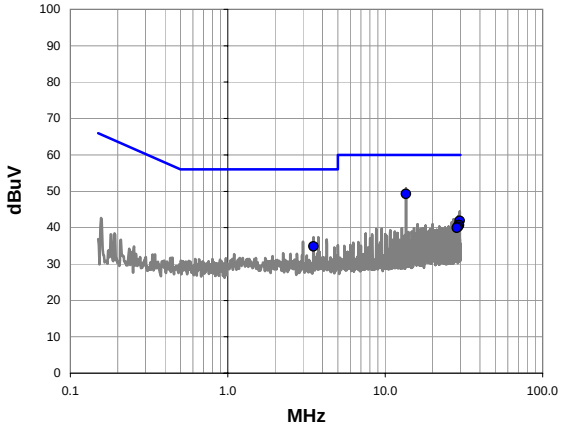
AC POWERLINE CONDUCTED EMISSIONS

Work Order:	SYNA0108	**Date:**	11/10/12		
Project:	None	**Temperature:**	18 °C		
Job Site:	EV07	**Humidity:**	40% RH		
Serial Number:	A	**Barometric Pres.:**	1016 mbar	**Tested by:**	Brandon Hobbs
EUT:	xTPra/xTPrs				
Configuration:	2				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	Antenna terminated with 50 ohm load on the antenna port, add (1) 1.1uf cap at cirular on cable ethernet disconnect from the bulk head internal connector shield attached to chassis removed balun short to chassis added the common mode power choke.				

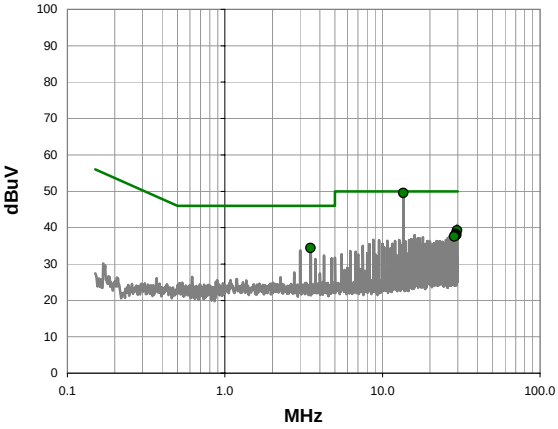
Test Specifications	**Test Method**
FCC 15.207:2012	ANSI C63.10:2009

Run #	28	**Line:**	Neutral	**Ext. Attenuation:**	20	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.560	28.0	21.2	49.2	60.0	-10.8
29.778	19.6	22.3	41.9	60.0	-18.1
29.280	18.5	22.2	40.7	60.0	-19.3
29.532	18.4	22.3	40.7	60.0	-19.3
29.026	18.0	22.2	40.2	60.0	-19.8
28.526	17.7	22.2	39.9	60.0	-20.1
3.504	14.3	20.6	34.9	56.0	-21.1

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.560	28.3	21.2	49.5	50.0	-0.5
29.778	16.9	22.3	39.2	50.0	-10.8
3.504	13.8	20.6	34.4	46.0	-11.6
29.280	16.0	22.2	38.2	50.0	-11.8
29.532	15.7	22.3	38.0	50.0	-12.0
29.026	15.5	22.2	37.7	50.0	-12.3
28.526	15.4	22.2	37.6	50.0	-12.4

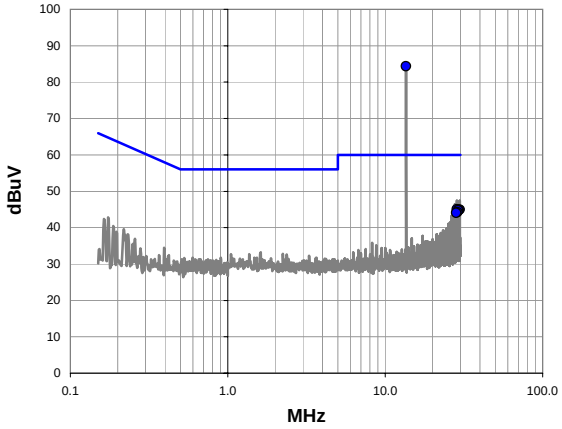
AC POWERLINE CONDUCTED EMISSIONS

Work Order:	SYNA0108	**Date:**	11/10/12		
Project:	None	**Temperature:**	18 °C		
Job Site:	EV07	**Humidity:**	40% RH		
Serial Number:	A	**Barometric Pres.:**	1016 mbar	**Tested by:**	Brandon Hobbs
EUT:	xTPra/xTPrs				
Configuration:	2				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	Antenna radiating add (1) 1.1uf cap at cirular on cable ethernet disconnect from the bulk head internal connector shield attached to chassis removed balun short to chassis added the common mode power choke.				

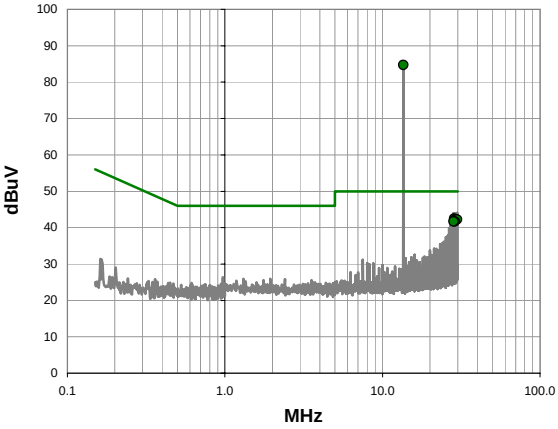
Test Specifications	**Test Method**
FCC 15.207:2012	ANSI C63.10:2009

Run #	29	**Line:**	High Line	**Ext. Attenuation:**	20	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.560	63.1	21.2	84.3	60.0	24.3
28.526	22.8	22.2	45.0	60.0	-15.0
29.778	22.7	22.3	45.0	60.0	-15.0
29.276	22.6	22.2	44.8	60.0	-15.2
29.026	22.5	22.2	44.7	60.0	-15.3
28.776	22.0	22.2	44.2	60.0	-15.8
28.272	21.9	22.2	44.1	60.0	-15.9

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.560	63.5	21.2	84.7	50.0	34.7
28.526	20.3	22.2	42.5	50.0	-7.5
29.276	20.0	22.2	42.2	50.0	-7.8
29.026	20.0	22.2	42.2	50.0	-7.8
29.778	19.9	22.3	42.2	50.0	-7.8
28.776	19.5	22.2	41.7	50.0	-8.3
28.272	19.5	22.2	41.7	50.0	-8.3

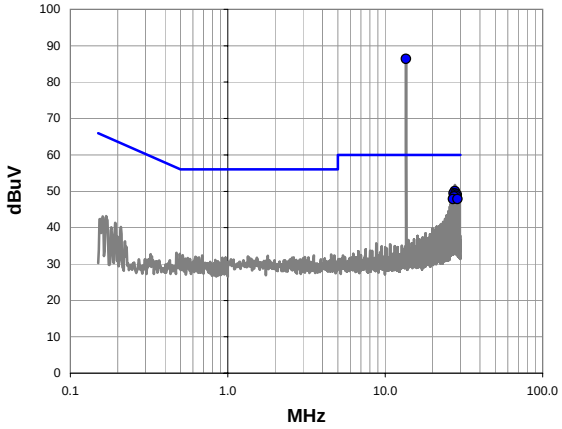
AC POWERLINE CONDUCTED EMISSIONS

Work Order:	SYNA0108	**Date:**	11/10/12		
Project:	None	**Temperature:**	18 °C		
Job Site:	EV07	**Humidity:**	40% RH		
Serial Number:	A	**Barometric Pres.:**	1016 mbar	**Tested by:**	Brandon Hobbs
EUT:	xTPra/xTPrs				
Configuration:	2				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	Antenna radiating add (1) 1.1uf cap at cirular on cable ethernet disconnect from the bulk head internal connector shield attached to chassis removed balun short to chassis added the common mode power choke.				

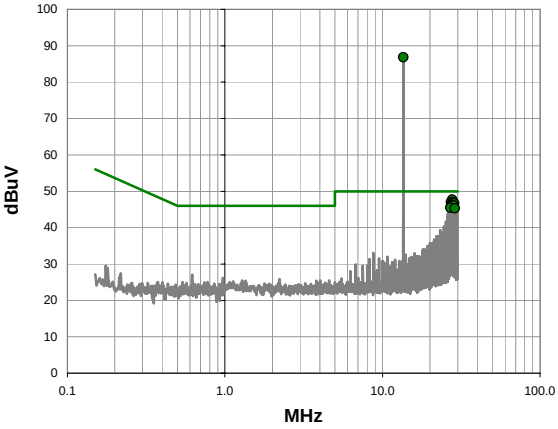
Test Specifications	**Test Method**
FCC 15.207:2012	ANSI C63.10:2009

Run #	30	**Line:**	Neutral	**Ext. Attenuation:**	20	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.560	65.2	21.2	86.4	60.0	26.4
27.776	27.9	22.1	50.0	60.0	-10.0
27.274	27.3	22.1	49.4	60.0	-10.6
28.032	27.2	22.1	49.3	60.0	-10.7
28.526	26.9	22.2	49.1	60.0	-10.9
28.272	26.6	22.2	48.8	60.0	-11.2
27.526	26.4	22.1	48.5	60.0	-11.5
27.024	25.8	22.1	47.9	60.0	-12.1
28.780	25.6	22.2	47.8	60.0	-12.2

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.560	65.6	21.2	86.8	50.0	36.8
27.776	25.5	22.1	47.6	50.0	-2.4
27.274	24.9	22.1	47.0	50.0	-3.0
28.032	24.8	22.1	46.9	50.0	-3.1
28.526	24.5	22.2	46.7	50.0	-3.3
27.526	24.1	22.1	46.2	50.0	-3.8
28.272	23.9	22.2	46.1	50.0	-3.9
27.024	23.4	22.1	45.5	50.0	-4.5
28.780	23.1	22.2	45.3	50.0	-4.7

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 at 13.56MHz, 100% modulation, 99% duty cycle

POWER SETTINGS INVESTIGATED

+24VDC

CONFIGURATIONS INVESTIGATED

SYNA0110 - 1
SYNA0110 - 2
SYNA0110 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	490 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
EV11 Cables	N/A	3m Test Distance Cables	EVM	3/15/2012	12 mo
Antenna, Loop	EMCO	6502	AOA	6/28/2011	24 mo
Spectrum Analyzer	Agilent	E4443A	AFB	1/31/2012	12 mo

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

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 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.

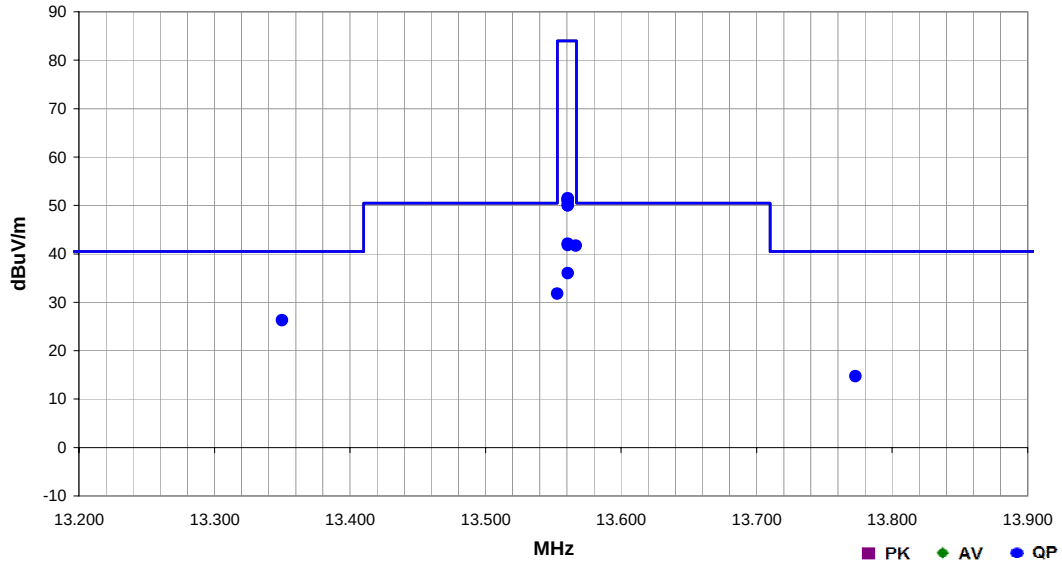
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	SYNA0110	**Date:**	12/04/12		
Project:	None	**Temperature:**	20.3 °C		
Job Site:	EV11	**Humidity:**	49% RH		
Serial Number:	xTPra-0095	**Barometric Pres.:**	1007 mbar	**Tested by:**	Carl Engholm, Rod Peloquin
EUT:	xTPra w/ large rectangular SkyeTek Antenna				
Configuration:	1				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	+24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.225:2012	ANSI C63.10:2009

Run #	1	**Test Distance (m)**	10	**Antenna Height(s)**	1-4m	**Results**	Pass



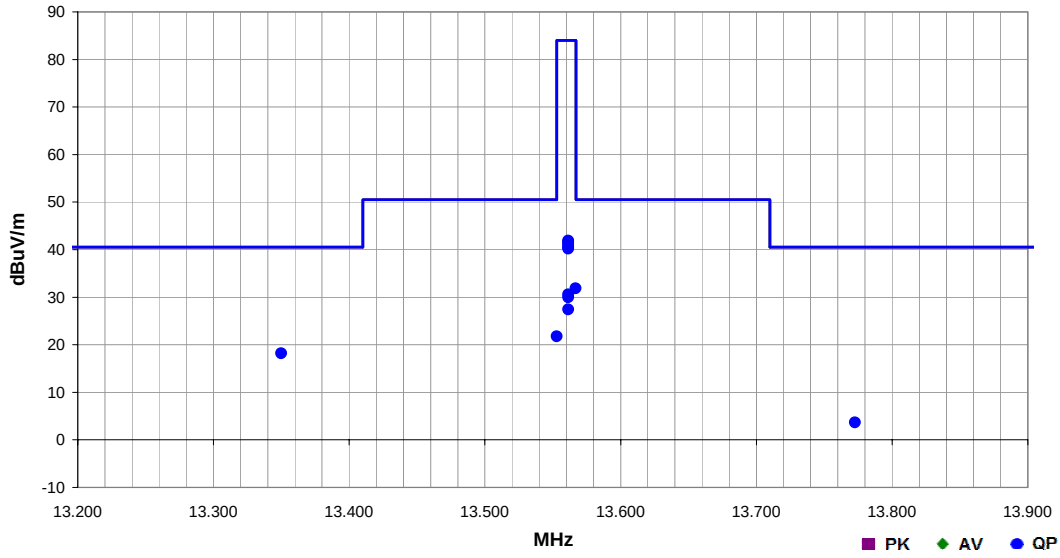
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
13.350	33.8	11.6	1.0	71.0	10.0	0.0	See Comments	QP	-19.1	26.3	40.5	-14.2	Antenna Para to ground, Perp to vertical EUT
13.553	39.3	11.6	1.0	83.0	10.0	0.0	See Comments	QP	-19.1	31.8	50.5	-18.7	Antenna Para to ground, Perp to vertical EUT
13.773	22.2	11.6	1.0	322.0	10.0	0.0	See Comments	QP	-19.1	14.7	40.5	-25.8	Antenna Para to ground, Perp to vertical EUT
13.561	59.0	11.6	1.0	149.0	10.0	0.0	See Comments	QP	-19.1	51.5	84.0	-32.5	Antenna Para to ground, Perp to vertical EUT
13.561	58.8	11.6	1.0	-4.0	10.0	0.0	See Comments	QP	-19.1	51.3	84.0	-32.7	Antenna Perp to ground, Perp to horizontal EUT
13.561	58.7	11.6	1.0	352.0	10.0	0.0	See Comments	QP	-19.1	51.2	84.0	-32.8	Antenna Para to ground, Perp to horizontal EUT
13.561	58.4	11.6	1.0	154.0	10.0	0.0	See Comments	QP	-19.1	50.9	84.0	-33.1	Antenna Perp to ground, Perp to vertical EUT
13.561	57.5	11.6	1.0	-4.0	10.0	0.0	See Comments	QP	-19.1	50.0	84.0	-34.0	Antenna Perp to ground, Perp to on-side EUT
13.561	57.5	11.6	1.0	4.0	10.0	0.0	See Comments	QP	-19.1	50.0	84.0	-34.0	Antenna Para to ground, Perp to on-side EUT
13.561	49.6	11.6	1.0	262.0	10.0	0.0	See Comments	QP	-19.1	42.1	84.0	-41.9	Antenna Perp to ground, Para to on-side EUT
13.561	49.3	11.6	1.0	273.0	10.0	0.0	See Comments	QP	-19.1	41.8	84.0	-42.2	Antenna Perp to ground, Para to horizontal EUT
13.567	49.2	11.6	1.0	143.0	10.0	0.0	See Comments	QP	-19.1	41.7	84.0	-42.3	Antenna Para to ground, Perp to vertical EUT
13.561	43.5	11.6	1.0	146.0	10.0	0.0	See Comments	QP	-19.1	36.0	84.0	-48.0	Antenna Perp to ground, Para to vertical EUT

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	SYNA0110	**Date:**	12/04/12		
Project:	None	**Temperature:**	20.3 °C		
Job Site:	EV11	**Humidity:**	49% RH		
Serial Number:	xTPra-0095	**Barometric Pres.:**	1007 mbar	**Tested by:**	Carl Engholm, Rod Peloquin
EUT:	xTPra w/Octagonal WDI Antenna				
Configuration:	2				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	+24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.225:2012	ANSI C63.10:2009

Run #	3	**Test Distance (m)**	10	**Antenna Height(s)**	1-4m	**Results**	Pass



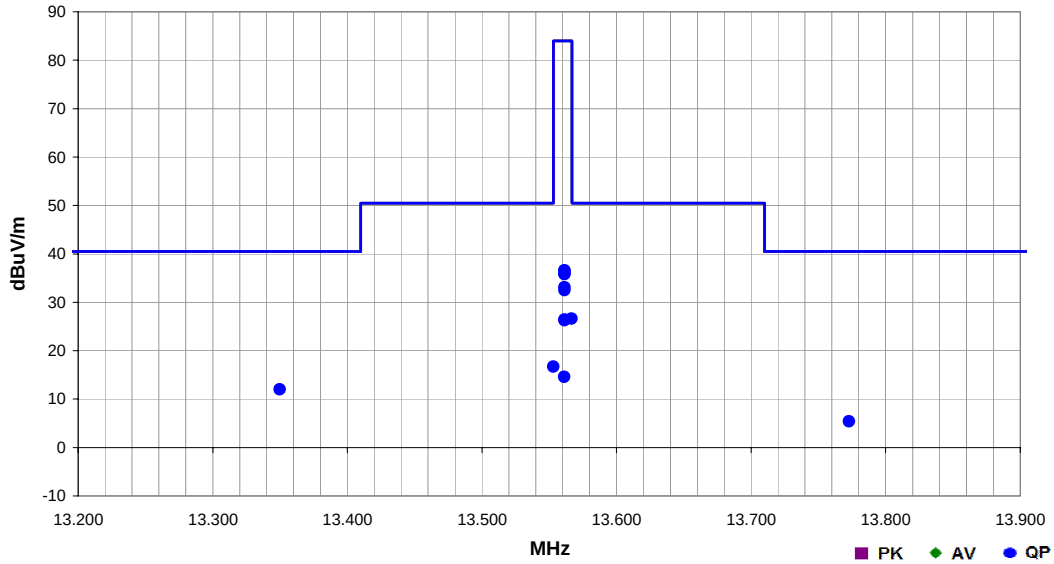
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
13.350	25.7	11.6	1.0	12.0	10.0	0.0	See Comments	QP	-19.1	18.2	40.5	-22.3	Antenna Para to ground, Perp to horizontal EUT
13.553	29.3	11.6	1.0	335.0	10.0	0.0	See Comments	QP	-19.1	21.8	50.5	-28.7	Antenna Para to ground, Perp to horizontal EUT
13.773	11.2	11.6	1.0	99.0	10.0	0.0	See Comments	QP	-19.1	3.7	40.5	-36.8	Antenna Para to ground, Perp to horizontal EUT
13.561	49.4	11.6	1.0	355.0	10.0	0.0	See Comments	QP	-19.1	41.9	84.0	-42.1	Antenna Para to ground, Perp to horizontal EUT
13.561	49.1	11.6	1.0	363.0	10.0	0.0	See Comments	QP	-19.1	41.6	84.0	-42.4	Antenna Perp to ground, Perp to horizontal EUT
13.561	48.8	11.6	1.0	104.0	10.0	0.0	See Comments	QP	-19.1	41.3	84.0	-42.7	Antenna Para to ground, Perp to vertical EUT
13.561	48.3	11.6	1.0	110.0	10.0	0.0	See Comments	QP	-19.1	40.8	84.0	-43.2	Antenna Perp to ground, Perp to vertical EUT
13.561	47.9	11.6	1.0	252.0	10.0	0.0	See Comments	QP	-19.1	40.4	84.0	-43.6	Antenna Para to ground, Perp to on-side EUT
13.561	47.7	11.6	1.0	272.0	10.0	0.0	See Comments	QP	-19.1	40.2	84.0	-43.8	Antenna Perp to ground, Perp to on-side EUT
13.567	39.4	11.6	1.0	343.0	10.0	0.0	See Comments	QP	-19.1	31.9	84.0	-52.1	Antenna Para to ground, Perp to horizontal EUT
13.561	38.1	11.6	1.0	275.0	10.0	0.0	See Comments	QP	-19.1	30.6	84.0	-53.4	Antenna Perp to ground, Para to horizontal EUT
13.561	37.5	11.6	1.0	260.0	10.0	0.0	See Comments	QP	-19.1	30.0	84.0	-54.0	Antenna Perp to ground, Para to on-side EUT
13.561	34.9	11.6	1.0	156.0	10.0	0.0	See Comments	QP	-19.1	27.4	84.0	-56.6	Antenna Perp to ground, Para to vertical EUT

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	SYNA0110	**Date:**	12/04/12		
Project:	None	**Temperature:**	20.3 °C		
Job Site:	EV11	**Humidity:**	49% RH		
Serial Number:	xTPra-0095	**Barometric Pres.:**	1007 mbar	**Tested by:**	Carl Engholm, Rod Peloquin
EUT:	xTPra w/ small rectangular Feig Antenna				
Configuration:	3				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	+24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.225:2012	ANSI C63.10:2009

Run #	5	**Test Distance (m)**	10	**Antenna Height(s)**	1-4m	**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
13.350	19.5	11.6	1.0	202.0	10.0	0.0	See Comments	QP	-19.1	12.0	40.5	-28.5	Antenna Para to ground, Perp to horizontal EUT
13.553	24.2	11.6	1.0	184.0	10.0	0.0	See Comments	QP	-19.1	16.7	50.5	-33.8	Antenna Para to ground, Perp to horizontal EUT
13.773	12.9	11.6	1.0	148.0	10.0	0.0	See Comments	QP	-19.1	5.4	40.5	-35.1	Antenna Para to ground, Perp to horizontal EUT
13.561	44.1	11.6	1.0	178.0	10.0	0.0	See Comments	QP	-19.1	36.6	84.0	-47.4	Antenna Para to ground, Perp to horizontal EUT
13.561	43.9	11.6	1.0	176.0	10.0	0.0	See Comments	QP	-19.1	36.4	84.0	-47.6	Antenna Para to ground, Perp to on-side EUT
13.561	43.4	11.6	1.0	166.0	10.0	0.0	See Comments	QP	-19.1	35.9	84.0	-48.1	Antenna Perp to ground, Perp to horizontal EUT
13.561	43.3	11.6	1.0	173.0	10.0	0.0	See Comments	QP	-19.1	35.8	84.0	-48.2	Antenna Perp to ground, Perp to on-side EUT
13.561	40.6	11.6	1.0	211.0	10.0	0.0	See Comments	QP	-19.1	33.1	84.0	-50.9	Antenna Para to ground, Perp to vertical EUT
13.561	40.0	11.6	1.0	243.0	10.0	0.0	See Comments	QP	-19.1	32.5	84.0	-51.5	Antenna Perp to ground, Perp to vertical EUT
13.567	34.1	11.6	1.0	177.0	10.0	0.0	See Comments	QP	-19.1	26.6	84.0	-57.4	Antenna Para to ground, Perp to horizontal EUT
13.561	33.9	11.6	1.0	96.0	10.0	0.0	See Comments	QP	-19.1	26.4	84.0	-57.6	Antenna Perp to ground, Para to on-side EUT
13.561	33.8	11.6	1.0	81.0	10.0	0.0	See Comments	QP	-19.1	26.3	84.0	-57.7	Antenna Perp to ground, Para to horizontal EUT
13.561	22.1	11.6	1.0	319.0	10.0	0.0	See Comments	QP	-19.1	14.6	84.0	-69.4	Antenna Perp to ground, Para to vertical EUT

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 at 13.56MHz, 100% modulation, 99% duty cycle

POWER SETTINGS INVESTIGATED

+24VDC

CONFIGURATIONS INVESTIGATED

SYNA0110 - 1
SYNA0110 - 2
SYNA0110 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	490 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
EV11 Cables	N/A	3m Test Distance Cables	EVM	3/15/2012	12 mo
Antenna, Loop	EMCO	6502	AOA	6/28/2011	24 mo
Spectrum Analyzer	Agilent	E4443A	AFB	1/31/2012	12 mo

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

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 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.

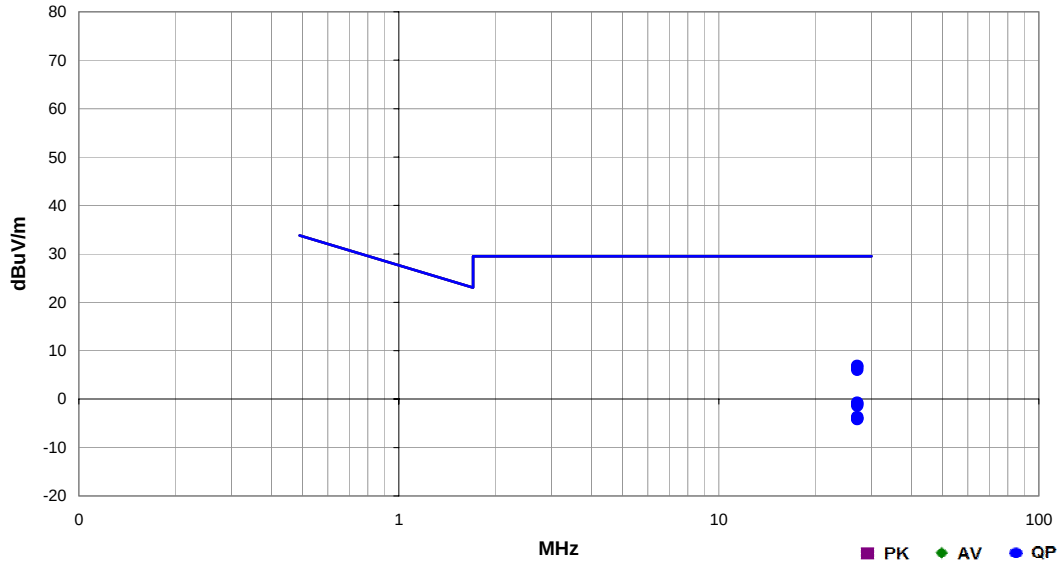
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of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

FIELD STRENGTH OF SPURIOUS EMISSIONS

Work Order:	SYNA0110	**Date:**	12/04/12		
Project:	None	**Temperature:**	20.3 °C		
Job Site:	EV11	**Humidity:**	49% RH		
Serial Number:	xTPra-0095	**Barometric Pres.:**	1007 mbar	**Tested by:**	Carl Engholm, Rod Peloquin
EUT:	xTPra w/ large rectangular SkyeTek Antenna				
Configuration:	1				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	+24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.225:2012	ANSI C63.10:2009

Run #	2	**Test Distance (m)**	10	**Antenna Height(s)**	1-4m	**Results**	Pass



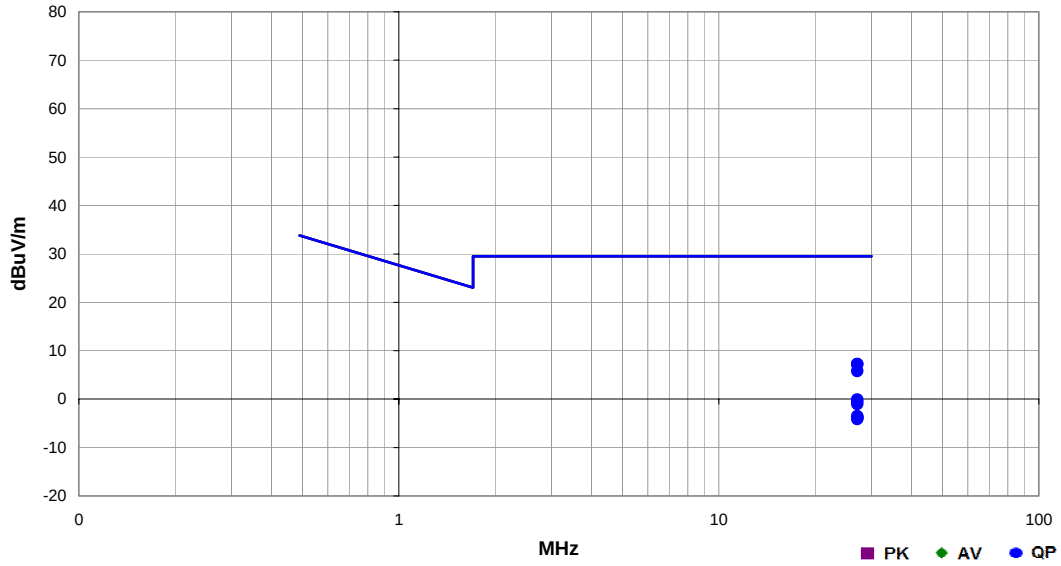
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
27.120	16.2	9.7	1.0	43.0	10.0	0.0	See Comments	QP	-19.1	6.9	29.5	-22.6	Antenna Perp to ground, Perp to on-side EUT
27.116	15.9	9.7	1.0	43.0	10.0	0.0	See Comments	QP	-19.1	6.6	29.5	-22.9	Antenna Perp to ground, Perp to vertical EUT
27.112	15.4	9.7	1.0	1.0	10.0	0.0	See Comments	QP	-19.1	6.1	29.5	-23.4	Antenna Perp to ground, Perp to horizontal EUT
27.116	8.6	9.7	1.0	38.0	10.0	0.0	See Comments	QP	-19.1	-0.7	29.5	-30.2	Antenna Para to ground, Perp to vertical EUT
27.111	8.3	9.7	1.0	121.0	10.0	0.0	See Comments	QP	-19.1	-1.0	29.5	-30.5	Antenna Para to ground, Perp to horizontal EUT
27.116	8.0	9.7	1.0	243.0	10.0	0.0	See Comments	QP	-19.1	-1.3	29.5	-30.8	Antenna Para to ground, Perp to on-side EUT
27.118	5.6	9.7	1.0	315.0	10.0	0.0	See Comments	QP	-19.1	-3.7	29.5	-33.2	Antenna Perp to ground, Para to horizontal EUT
27.133	5.3	9.7	1.0	332.0	10.0	0.0	See Comments	QP	-19.1	-4.0	29.5	-33.5	Antenna Perp to ground, Para to on-side EUT
27.086	5.2	9.8	1.0	229.0	10.0	0.0	See Comments	QP	-19.1	-4.1	29.5	-33.6	Antenna Perp to ground, Para to vertical EUT

FIELD STRENGTH OF SPURIOUS EMISSIONS

Work Order:	SYNA0110	**Date:**	12/04/12		
Project:	None	**Temperature:**	20.3 °C		
Job Site:	EV11	**Humidity:**	49% RH		
Serial Number:	xTPra-0095	**Barometric Pres.:**	1007 mbar	**Tested by:**	Carl Engholm, Rod Peloquin
EUT:	xTPra w/Octagonal WDI Antenna				
Configuration:	2				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	+24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.225:2012	ANSI C63.10:2009

Run #	4	**Test Distance (m)**	10	**Antenna Height(s)**	1-4m	**Results**	Pass



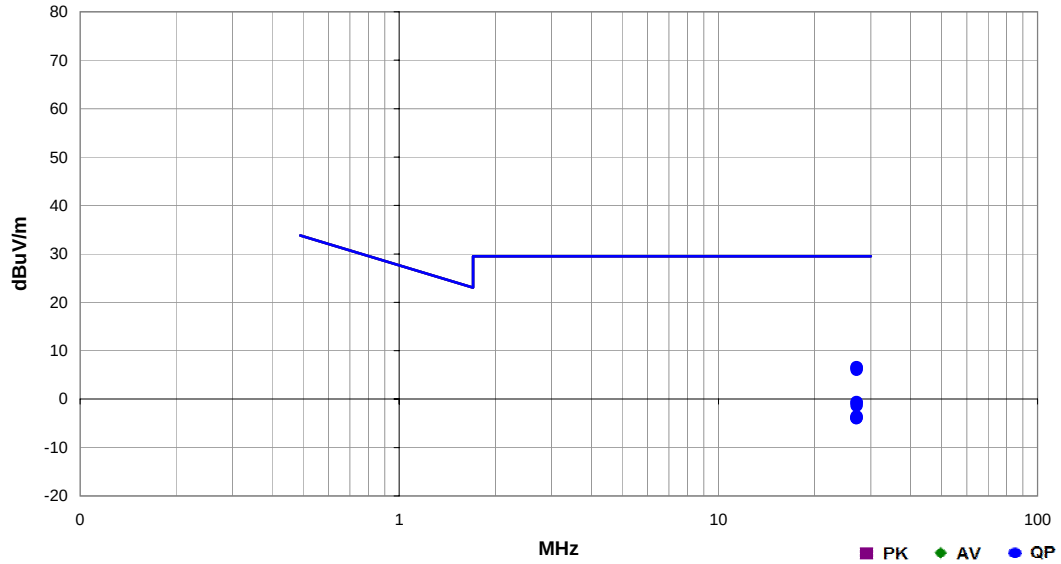
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
27.108	16.6	9.7	1.0	124.0	10.0	0.0	See Comments	QP	-19.1	7.3	29.5	-22.2	Antenna Perp to ground, Perp to vertical EUT
27.110	16.5	9.7	1.0	81.0	10.0	0.0	See Comments	QP	-19.1	7.2	29.5	-22.3	Antenna Perp to ground, Perp to on-side EUT
27.108	15.1	9.7	1.0	329.0	10.0	0.0	See Comments	QP	-19.1	5.8	29.5	-23.7	Antenna Perp to ground, Perp to horizontal EUT
27.109	9.2	9.7	1.0	35.0	10.0	0.0	See Comments	QP	-19.1	-0.1	29.5	-29.6	Antenna Para to ground, Perp to vertical EUT
27.105	8.8	9.7	1.0	182.0	10.0	0.0	See Comments	QP	-19.1	-0.5	29.5	-30.0	Antenna Para to ground, Perp to on-side EUT
27.106	8.3	9.7	1.0	133.0	10.0	0.0	See Comments	QP	-19.1	-1.0	29.5	-30.5	Antenna Para to ground, Perp to horizontal EUT
27.108	5.8	9.7	1.0	329.0	10.0	0.0	See Comments	QP	-19.1	-3.5	29.5	-33.0	Antenna Perp to ground, Para to vertical EUT
27.188	5.5	9.7	1.0	228.0	10.0	0.0	See Comments	QP	-19.1	-3.9	29.5	-33.4	Antenna Perp to ground, Para to horizontal EUT
27.073	5.2	9.8	1.0	29.0	10.0	0.0	See Comments	QP	-19.1	-4.1	29.5	-33.6	Antenna Perp to ground, Para to on-side EUT

FIELD STRENGTH OF SPURIOUS EMISSIONS

Work Order:	SYNA0110	**Date:**	12/04/12		
Project:	None	**Temperature:**	20.3 °C		
Job Site:	EV11	**Humidity:**	49% RH		
Serial Number:	xTPra-0095	**Barometric Pres.:**	1007 mbar	**Tested by:**	Carl Engholm, Rod Peloquin
EUT:	xTPra w/ small rectangular Feig Antenna				
Configuration:	3				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	+24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.225:2012	ANSI C63.10:2009

Run #	6	**Test Distance (m)**	10	**Antenna Height(s)**	1-4m	**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
27.106	15.9	9.7	1.0	90.0	10.0	0.0	See Comments	QP	-19.1	6.6	29.5	-22.9	Antenna Perp to ground, Perp to vertical EUT
27.105	15.7	9.7	1.0	68.0	10.0	0.0	See Comments	QP	-19.1	6.4	29.5	-23.1	Antenna Perp to ground, Perp to horizontal EUT
27.107	15.4	9.7	1.0	72.0	10.0	0.0	See Comments	QP	-19.1	6.1	29.5	-23.4	Antenna Perp to ground, Perp to on-side EUT
27.109	8.7	9.7	1.0	88.0	10.0	0.0	See Comments	QP	-19.1	-0.6	29.5	-30.1	Antenna Para to ground, Perp to on-side EUT
27.106	8.5	9.7	1.0	-4.0	10.0	0.0	See Comments	QP	-19.1	-0.8	29.5	-30.3	Antenna Para to ground, Perp to vertical EUT
27.106	8.0	9.7	1.0	310.0	10.0	0.0	See Comments	QP	-19.1	-1.3	29.5	-30.8	Antenna Para to ground, Perp to horizontal EUT
27.103	5.7	9.7	1.0	256.0	10.0	0.0	See Comments	QP	-19.1	-3.6	29.5	-33.1	Antenna Perp to ground, Para to horizontal EUT
27.067	5.4	9.8	1.0	248.0	10.0	0.0	See Comments	QP	-19.1	-3.9	29.5	-33.4	Antenna Perp to ground, Para to vertical EUT
27.106	5.4	9.7	1.0	203.0	10.0	0.0	See Comments	QP	-19.1	-3.9	29.5	-33.4	Antenna Perp to ground, Para to on-side EUT

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 at 13.56MHz, 100% modulation, 99% duty cycle

POWER SETTINGS INVESTIGATED

+24VDC

CONFIGURATIONS INVESTIGATED

SYNA0110 - 1
SYNA0110 - 2
SYNA0110 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	1000 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
Pre-Amplifier	Miteq	AM-1616-1000	AOL	6/26/2012	12 mo
Antenna, Biconilog	EMCO	3141	AXG	4/10/2012	12 mo
Spectrum Analyzer	Agilent	E4446A	AAQ	2/7/2012	12 mo

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

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

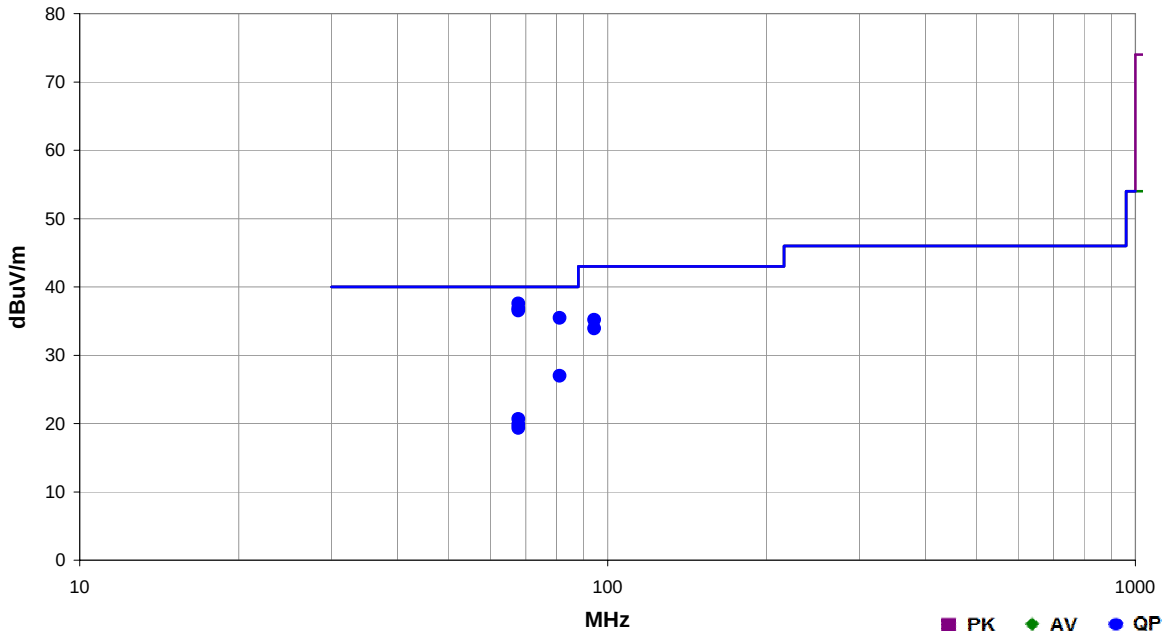
The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.
While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009).

FIELD STRENGTH OF SPURIOUS EMISSIONS

Work Order:	SYNA0110	**Date:**	12/05/12		
Project:	None	**Temperature:**	21.8 °C		
Job Site:	EV01	**Humidity:**	42% RH		
Serial Number:	xTPra-0095	**Barometric Pres.:**	1024 mbar	**Tested by:**	Carl Engholm, Rod Peloquin
EUT:	xTPra w/ small rectangular Feig Antenna				
Configuration:	3				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	+24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	L-8 & L-10 changed to 10nH				

Test Specifications	**Test Method**
FCC 15.225:2012	ANSI C63.10:2009

Run #	6	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**Results**	Pass



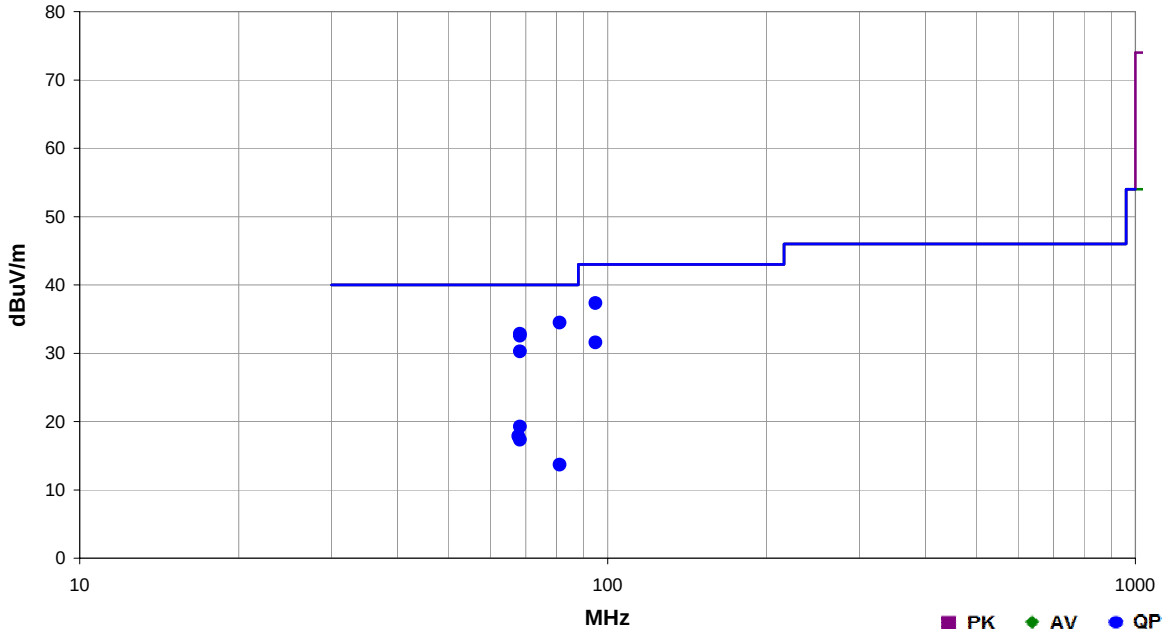
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
67.815	45.6	-8.1	1.0	294.0	3.0	0.0	Vert	QP	0.0	37.5	40.0	-2.5	EUT Horizontal
67.813	44.9	-8.1	1.0	212.0	3.0	0.0	Vert	QP	0.0	36.8	40.0	-3.2	EUT Vertical
67.815	44.6	-8.1	1.0	41.0	3.0	0.0	Vert	QP	0.0	36.5	40.0	-3.5	EUT On-Side
81.218	43.6	-8.1	1.0	271.0	3.0	0.0	Vert	QP	0.0	35.5	40.0	-4.5	EUT Horizontal
94.408	42.1	-6.9	1.0	273.0	3.0	0.0	Vert	QP	0.0	35.2	43.0	-7.8	EUT Horizontal
94.408	40.8	-6.9	3.0	223.0	3.0	0.0	Horz	QP	0.0	33.9	43.0	-9.1	EUT Horizontal
81.206	35.1	-8.1	2.1	8.0	3.0	0.0	Horz	QP	0.0	27.0	40.0	-13.0	EUT Horizontal
67.815	28.7	-8.1	2.4	136.0	3.0	0.0	Horz	QP	0.0	20.6	40.0	-19.4	EUT Horizontal
67.813	27.9	-8.1	2.7	117.0	3.0	0.0	Horz	QP	0.0	19.8	40.0	-20.2	EUT Vertical
67.812	27.4	-8.1	2.4	102.0	3.0	0.0	Horz	QP	0.0	19.3	40.0	-20.7	EUT On-Side

FIELD STRENGTH OF SPURIOUS EMISSIONS

Work Order:	SYNA0110	**Date:**	12/05/12		
Project:	None	**Temperature:**	21.8 °C		
Job Site:	EV01	**Humidity:**	42% RH		
Serial Number:	xTPra-0095	**Barometric Pres.:**	1024 mbar	**Tested by:**	Carl Engholm, Rod Peloquin
EUT:	xTPra w/Octagonal WDI Antenna				
Configuration:	2				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	+24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	L-8 & L-10 changed to 10nH				

Test Specifications	**Test Method**
FCC 15.225:2012	ANSI C63.10:2009

Run #	7	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**Results**	Pass



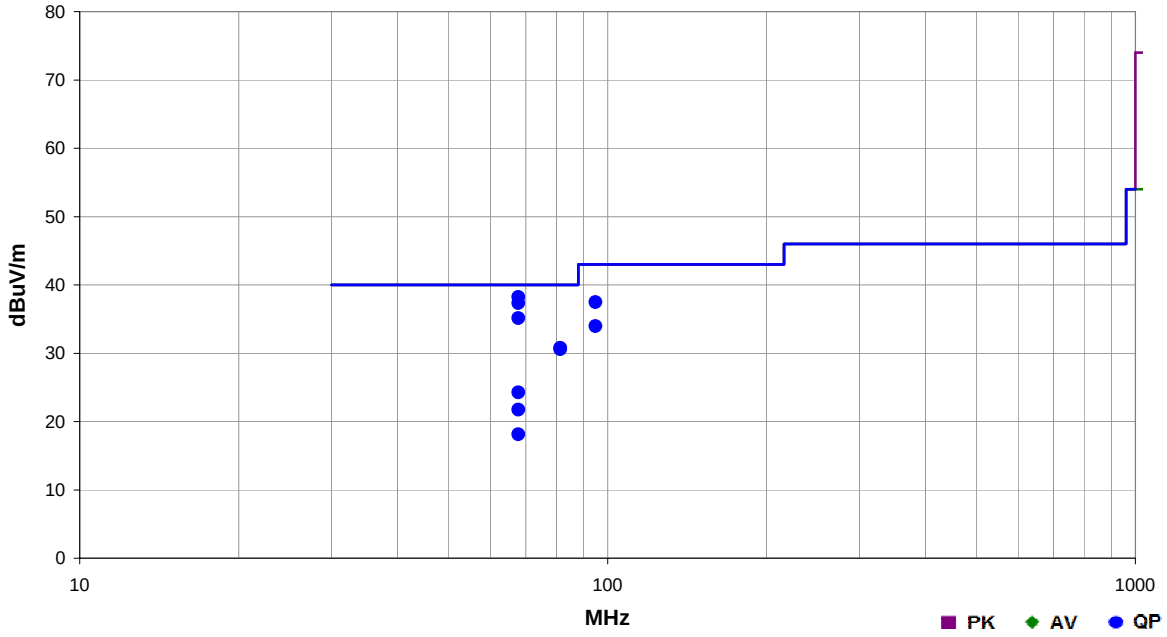
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
81.204	42.6	-8.1	1.0	156.0	3.0	0.0	Vert	QP	0.0	34.5	40.0	-5.5	EUT Horizontal
94.932	44.2	-6.8	1.0	112.0	3.0	0.0	Vert	QP	0.0	37.4	43.0	-5.6	EUT Horizontal
68.236	40.9	-8.1	1.4	9.0	3.0	0.0	Vert	QP	0.0	32.8	40.0	-7.2	EUT Horizontal
68.234	40.6	-8.1	1.0	299.0	3.0	0.0	Vert	QP	0.0	32.5	40.0	-7.5	EUT On-Side
68.232	38.3	-8.1	1.0	235.0	3.0	0.0	Vert	QP	0.0	30.2	40.0	-9.8	EUT Vertical
94.933	38.4	-6.8	2.7	247.0	3.0	0.0	Horz	QP	0.0	31.6	43.0	-11.4	EUT On-Side
68.239	27.3	-8.1	2.4	160.0	3.0	0.0	Horz	QP	0.0	19.2	40.0	-20.8	EUT Vertical
67.812	25.9	-8.1	2.8	1.0	3.0	0.0	Horz	QP	0.0	17.8	40.0	-22.2	EUT On-Side
68.239	25.4	-8.1	1.0	164.0	3.0	0.0	Horz	QP	0.0	17.3	40.0	-22.7	EUT Horizontal
81.214	21.8	-8.1	1.0	128.0	3.0	0.0	Horz	QP	0.0	13.7	40.0	-26.3	EUT On-Side

FIELD STRENGTH OF SPURIOUS EMISSIONS

Work Order:	SYNA0110	**Date:**	12/05/12		
Project:	None	**Temperature:**	21.8 °C		
Job Site:	EV01	**Humidity:**	42% RH		
Serial Number:	xTPra-0095	**Barometric Pres.:**	1024 mbar	**Tested by:**	Carl Engholm, Rod Peloquin
EUT:	xTPra w/ large rectangular SkyeTek Antenna				
Configuration:	1				
Customer:	Synapse Strategic Product Development LLC				
Attendees:	Bill Standing				
EUT Power:	+24VDC				
Operating Mode:	Transmitting at 13.56MHz, 100% modulation, 99% duty cycle				
Deviations:	None				
Comments:	L-8 & L-10 changed to 10nH				

Test Specifications	**Test Method**
FCC 15.225:2012	ANSI C63.10:2009

Run #	8	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**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
67.813	46.3	-8.1	1.2	155.0	3.0	0.0	Vert	QP	0.0	38.2	40.0	-1.8	EUT On-Side
67.813	45.4	-8.1	1.1	205.0	3.0	0.0	Vert	QP	0.0	37.3	40.0	-2.7	EUT Horizontal
67.812	43.2	-8.1	1.1	52.0	3.0	0.0	Vert	QP	0.0	35.1	40.0	-4.9	EUT Vertical
94.933	44.3	-6.8	1.2	59.0	3.0	0.0	Vert	QP	0.0	37.5	43.0	-5.5	EUT On-Side
94.933	40.8	-6.8	2.0	212.0	3.0	0.0	Horz	QP	0.0	34.0	43.0	-9.0	EUT On-Side
81.368	38.9	-8.1	2.4	192.0	3.0	0.0	Horz	QP	0.0	30.8	40.0	-9.2	EUT On-Side
81.368	38.7	-8.1	1.1	109.0	3.0	0.0	Vert	QP	0.0	30.6	40.0	-9.4	EUT On-Side
67.810	32.3	-8.1	2.5	11.0	3.0	0.0	Horz	QP	0.0	24.2	40.0	-15.8	EUT On-Side
67.810	29.8	-8.1	2.6	274.0	3.0	0.0	Horz	QP	0.0	21.7	40.0	-18.3	EUT Horizontal
67.813	26.2	-8.1	1.0	109.0	3.0	0.0	Horz	QP	0.0	18.1	40.0	-21.9	EUT Vertical