NORTHWEST EMC

Multi-Tech Systems

MTDOT in DTS mode

FCC 15.207:2016
FCC 15.247:2016

902 – 928 MHz Transceiver

Report # MLTI0051

NVLAP Lab Code: 200881-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: April 13, 2016
Multi-Tech Systems
Model: MTDOT in DTS mode

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2016	ANSI C63.10:2013
FCC 15.247:2016	

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	AC - Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
7.8.2	Carrier Frequency Separation	No	N/A	Not required for DTS devices
7.8.3	Number of Hopping Frequencies	No	N/A	Not required for DTS devices
7.8.4	Dwell Time	No	N/A	Not required for DTS devices
7.8.6	Band Edge Compliance - Hopping Mode	No	N/A	Not required for DTS devices
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Tim O'Shea, 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 2016.3.22

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

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 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.

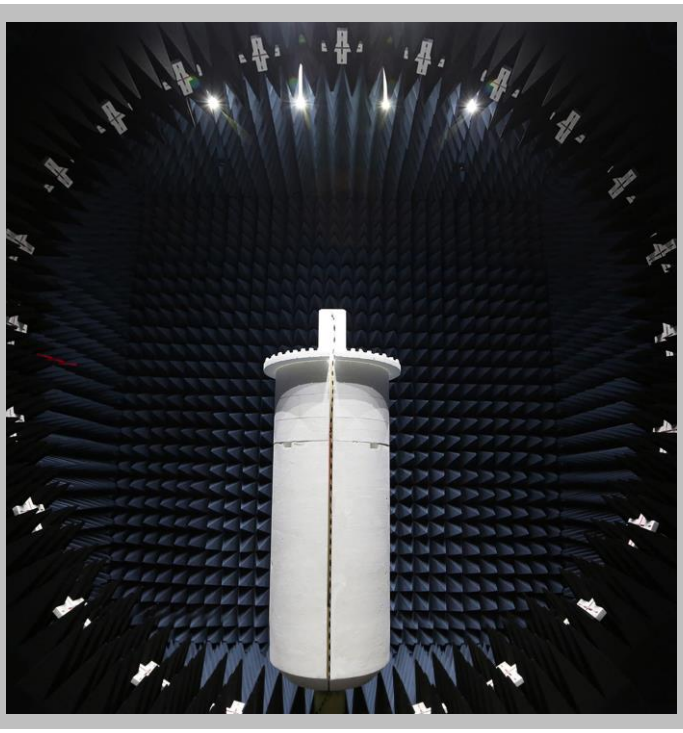
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

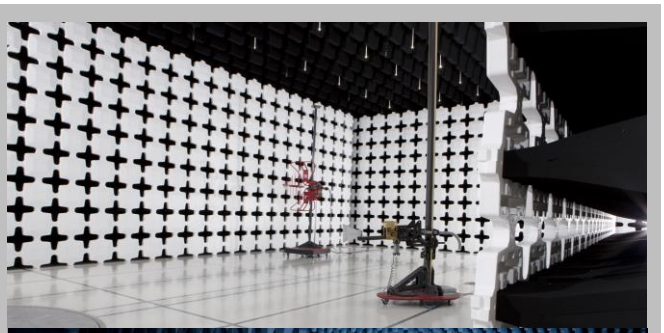
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

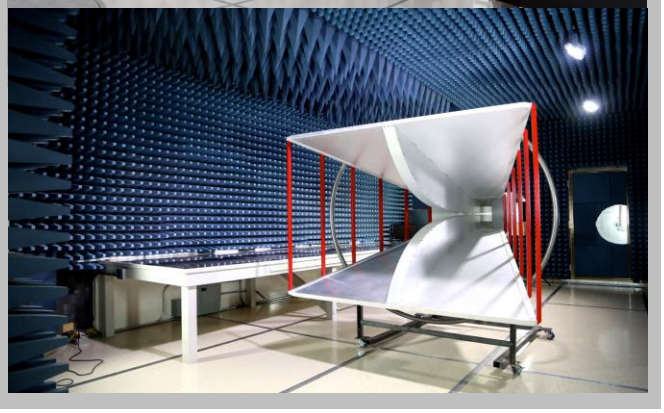
FACILITIES

REV 2015.2.19

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
Industry 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

NORTHWEST EMC 2014-12-10

Client and Equipment Under Test (EUT) Information

Company Name:	Multi-Tech Systems
Address:	2205 Woodale Drive
City, State, Zip:	Mounds View, MN, 55112
Test Requested By:	Mike Lynch
Model:	MTDOT in DTS mode
First Date of Test:	April 13, 2016
Last Date of Test:	April 13, 2016
Receipt Date of Samples:	April 11, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
The MultiConnect® mDotTM is a secure, CE/FCC certified, ARM® mbed® programmable, low-power RF module, that provides long-range, low bit rate M2M data connectivity to sensors, industrial equipment and remote appliances.

Testing Objective:
Seeking to demonstrate compliance of the DTS radio under FCC 15.247 for operation in the 902 - 928 MHz Band.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration MLTI0051- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wireless Module (EUT)	Multitech	MTDOT-915	18349449
Development Board (EUT)	Multitech	83150	0040

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Adapter	Enercell	Dual USB Port AC Adapter	None

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop (EUT)	Dell	Studio	Unknown

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB (EUT)	No	1m	No	Wireless Module (EUT)	AC/DC Adapter
Serial Cable	Yes	>3m	Yes	Development Board (EUT)	USB to Serial Adapter
USB to Serial Adapter	No	1.5m	Yes	Serial Cable	Laptop (EUT)

Configuration MLTI0051- 3

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wireless Module (EUT)	Multitech	MTDOT-915	18349449
Development Board (EUT)	Multitech	83150	0040

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Power Supply	EZ	GP-4303D	TQK

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop (EUT)	Dell	Studio	Unknown

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Serial Cable	Yes	>3m	Yes	Development Board (EUT)	USB to Serial Adapter
USB to Serial Adapter	No	1.5m	Yes	Serial Cable	Laptop (EUT)
USB Power Cable	Yes	0.5m	No	Development Board (EUT)	DC Leads
DC Leads	No	1.0m	No	USB Power Cable	Power Supply

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	4/13/2016	Duty Cycle	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	4/13/2016	Occupied Bandwidth	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	4/13/2016	Output Power	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	4/13/2016	Power Spectral Density	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	4/13/2016	Spurious Conducted 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	4/13/2016	Band Edge Compliance	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.
7	4/13/2016	Spurious Radiated 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.
8	4/13/2016	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.

DUTY CYCLE

NORTHWEST EMC

XMit 2015.01.14

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 (mo)
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	12

TEST DESCRIPTION

The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used.

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

If the transmit duty cycle < 98 percent, burst gating may have been used during some of the other tests in this report to only take the measurement during the burst duration.

DUTY CYCLE

NORTHWEST EMC

XMit 2015.01.14

EUT:	**MTDOT in DTS mode**			**Work Order:**	**MLTI0051**
Serial Number:	**18349449**			**Date:**	**04/13/16**
Customer:	**Multi-Tech Systems**			**Temperature:**	**22.7°C**
Attendees:	**Marcus Glass**			**Humidity:**	**21%**
Project:	**None**			**Barometric Pres.:**	**988.1 mbar**
Tested by:	**Jared Ison**	**Power:**	**110VAC/60Hz**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

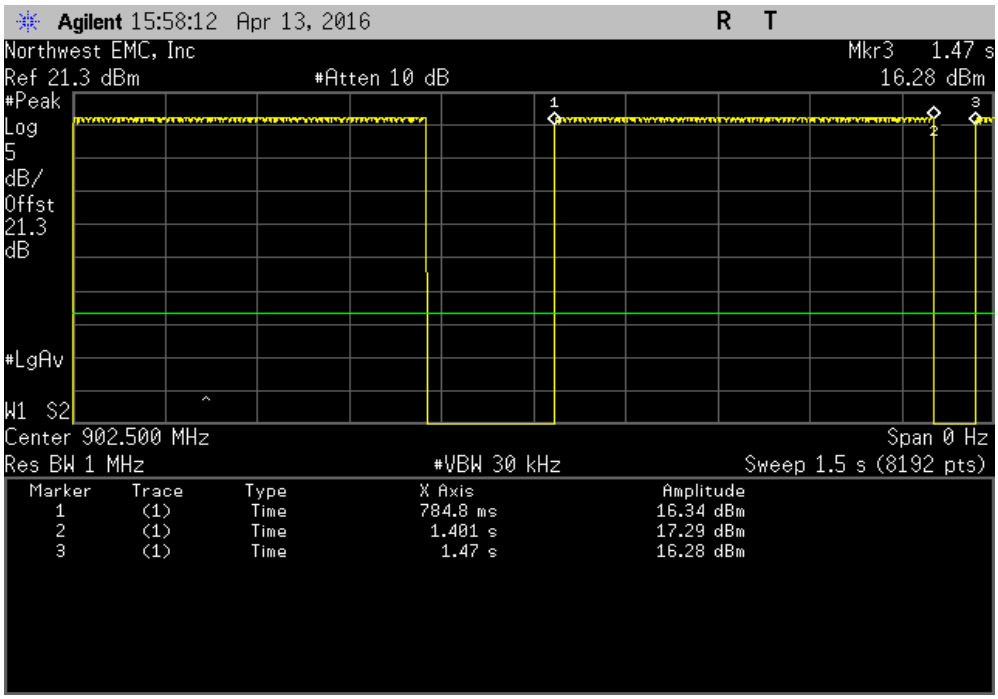
Configuration #	**2**	*Signature*

	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
Data Rate: BW 500 kHz						
Low Channel: 902.5 MHz	616.061 ms	685.01 ms	1	89.9	N/A	N/A
Low Channel: 902.5 MHz	N/A	N/A	6	N/A	N/A	N/A
Mid Channel: 915.1 MHz	575.551 ms	658.346 ms	1	87.4	N/A	N/A
Mid Channel: 915.1 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel: 927.5 MHz	575.185 ms	658.163 ms	1	87.4	N/A	N/A
High Channel: 927.5 MHz	N/A	N/A	5	N/A	N/A	N/A

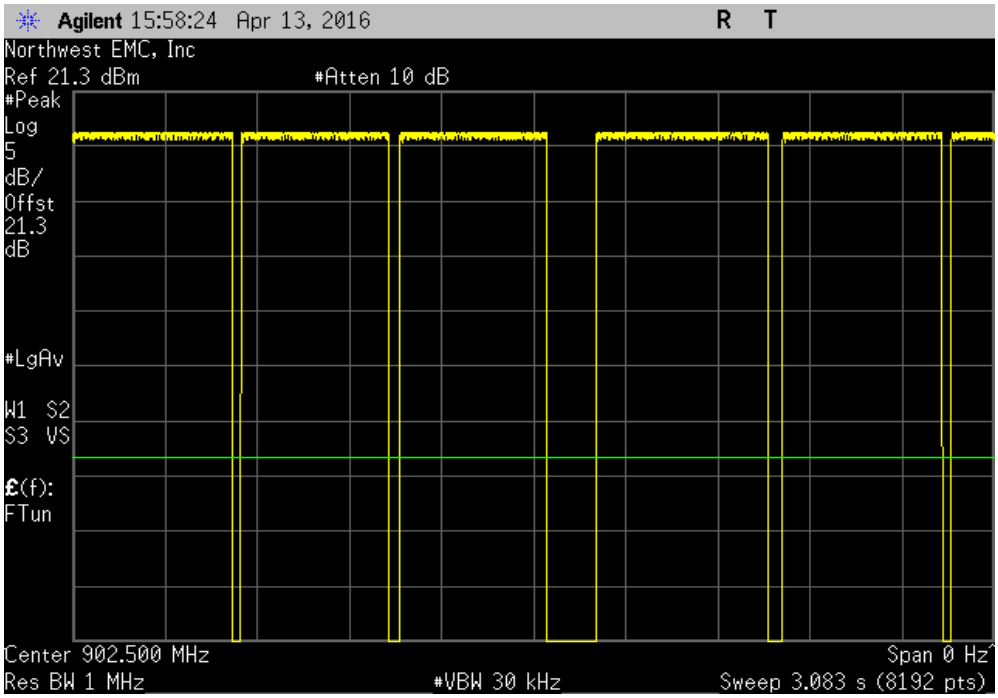
DUTY CYCLE

XMit 2015.01.14

Data Rate: BW 500 kHz, Low Channel: 902.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	616.061 ms	685.01 ms	1	89.9	N/A	N/A



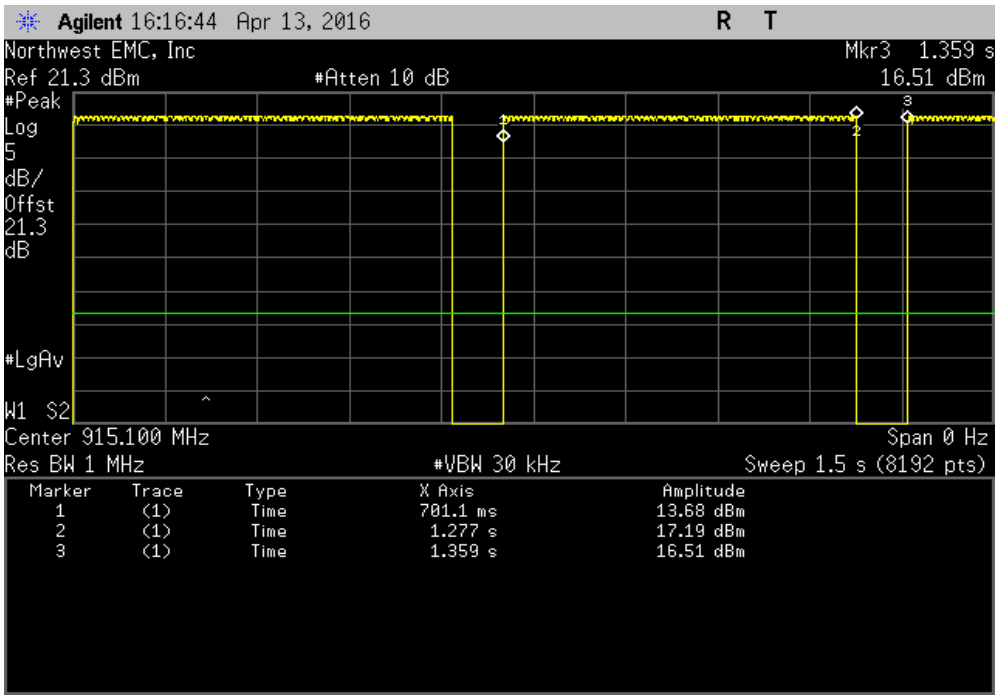
Data Rate: BW 500 kHz, Low Channel: 902.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A



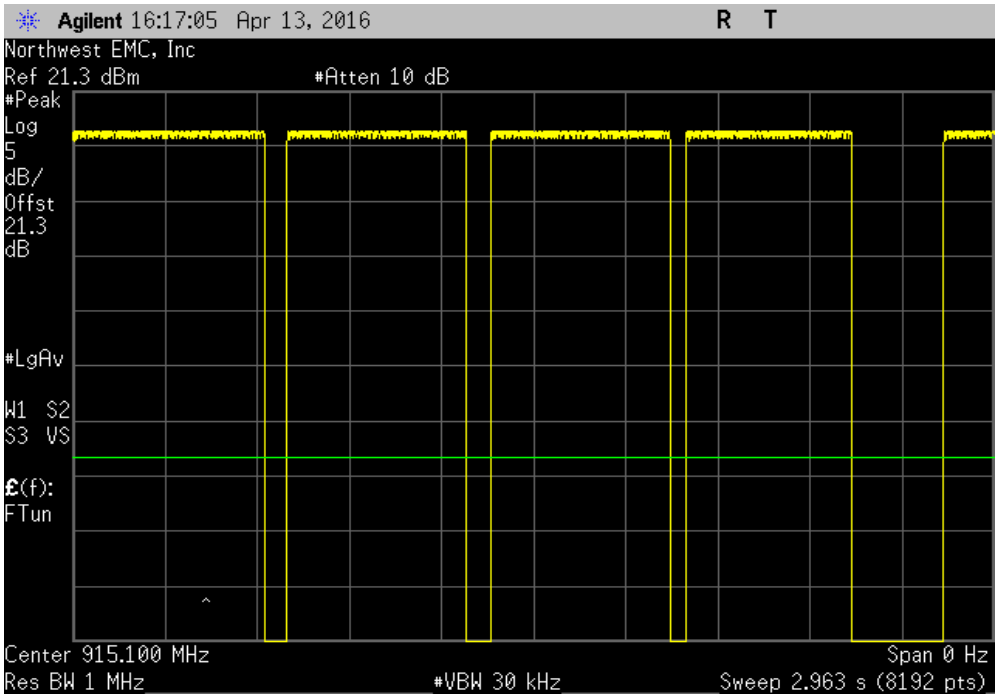
DUTY CYCLE

XMit 2015.01.14

Data Rate: BW 500 kHz, Mid Channel: 915.1 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	575.551 ms	658.346 ms	1	87.4	N/A	N/A



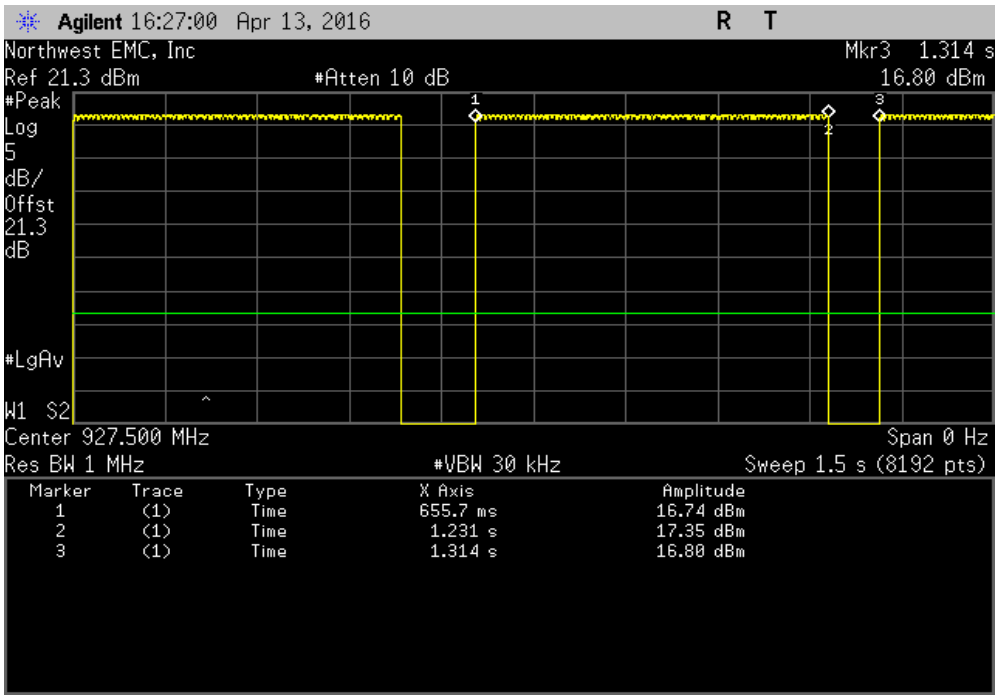
Data Rate: BW 500 kHz, Mid Channel: 915.1 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



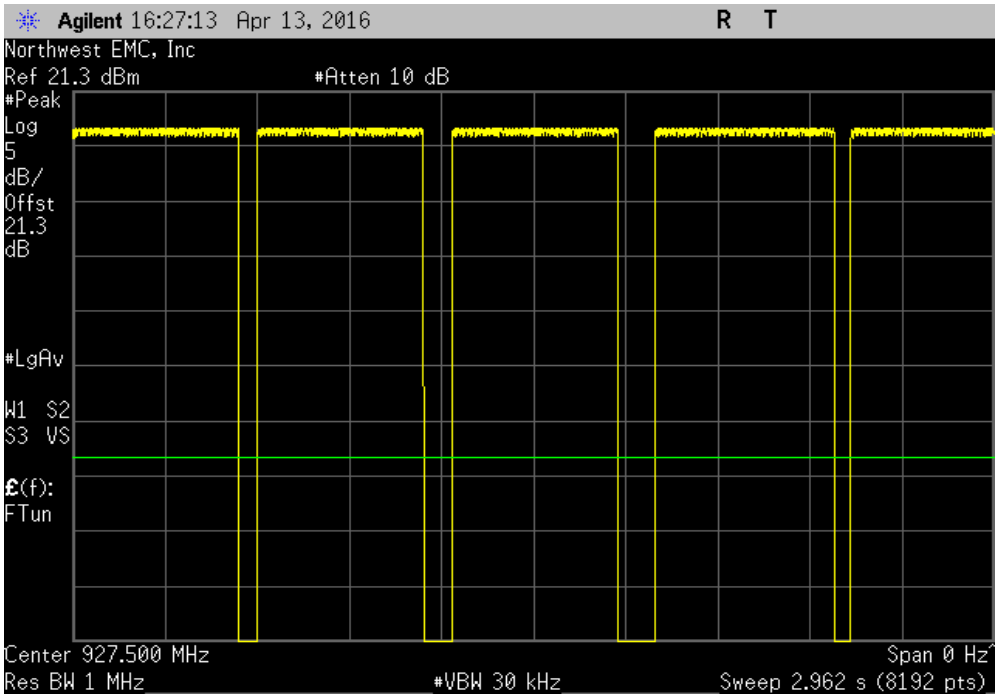
DUTY CYCLE

XMit 2015.01.14

Data Rate: BW 500 kHz, High Channel: 927.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	575.185 ms	658.163 ms	1	87.4	N/A	N/A



Data Rate: BW 500 kHz, High Channel: 927.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



OCCUPIED BANDWIDTH

XMit 2015.01.14

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 (mo)
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	12

TEST DESCRIPTION

The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.9% (approximate 26 dB) emission bandwidth (EBW) was also measured at the same time.

The EUT was set to the channels and modes listed in the datasheet. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer.

OCCUPIED BANDWIDTH

NORTHWEST EMC

XMit 2015.01.14

EUT:	**MTDOT in DTS mode**			**Work Order:**	**MLTI0051**
Serial Number:	**18349449**			**Date:**	**04/13/16**
Customer:	**Multi-Tech Systems**			**Temperature:**	**22.7°C**
Attendees:	**Marcus Glass**			**Humidity:**	**21%**
Project:	**None**			**Barometric Pres.:**	**988.1 mbar**
Tested by:	**Jared Ison**	**Power:**	**110VAC/60Hz**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

None

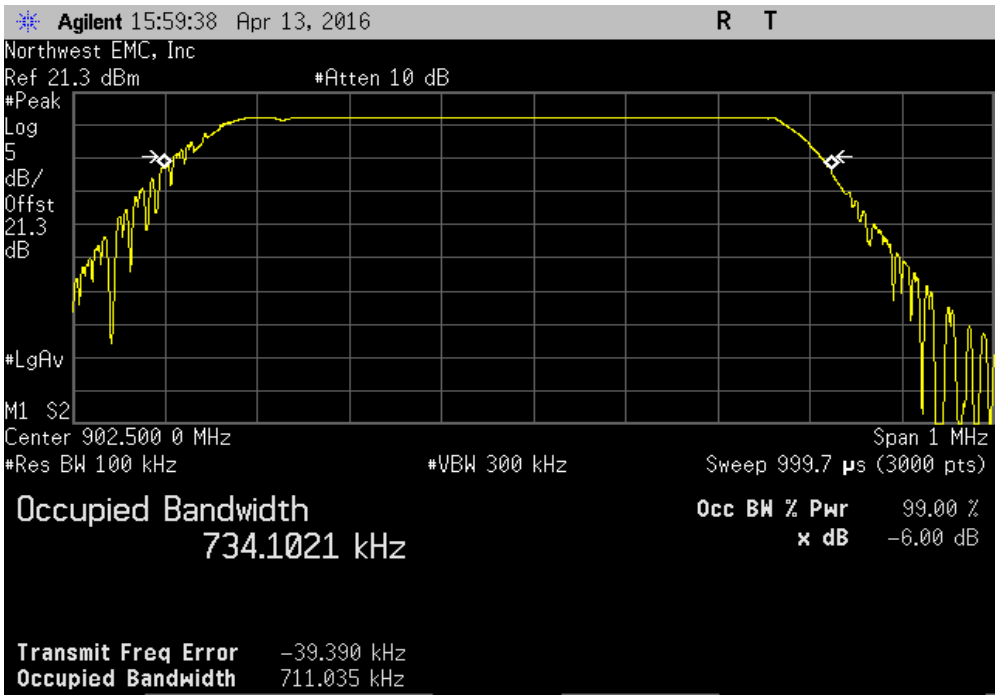
DEVIATIONS FROM TEST STANDARD

None

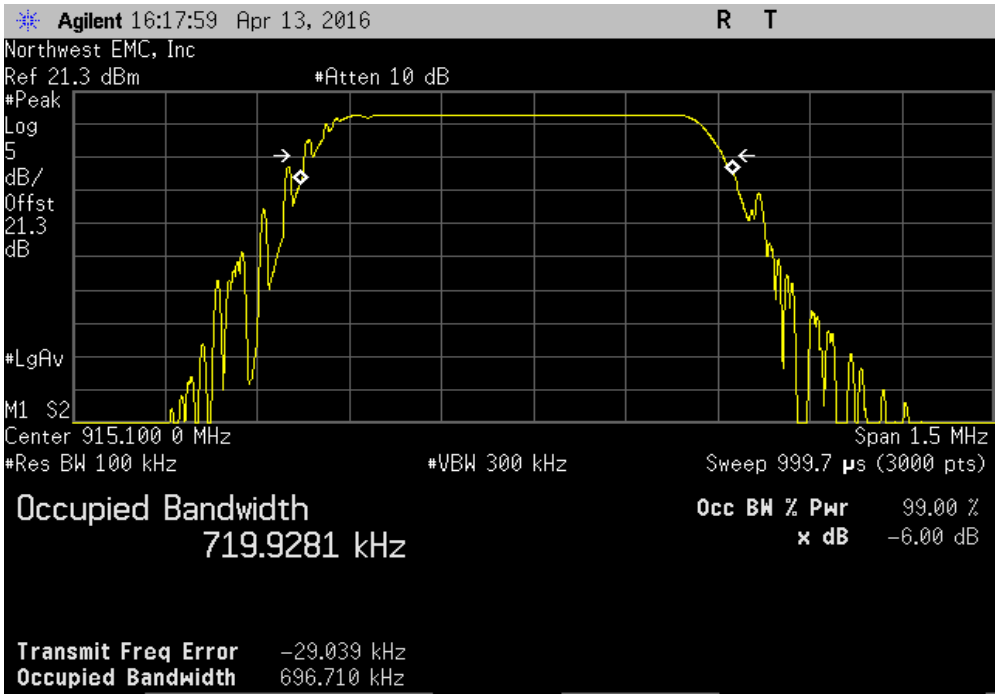
Configuration #	**2**	*Signature*

	Value	**Limit (>)**	**Result**
Data Rate: BW 500 kHz			
Low Channel: 902.5 MHz	711.035 kHz	500 kHz	Pass
Mid Channel: 915.1 MHz	696.71 kHz	500 kHz	Pass
High Channel: 927.5 MHz	682.865 kHz	500 kHz	Pass

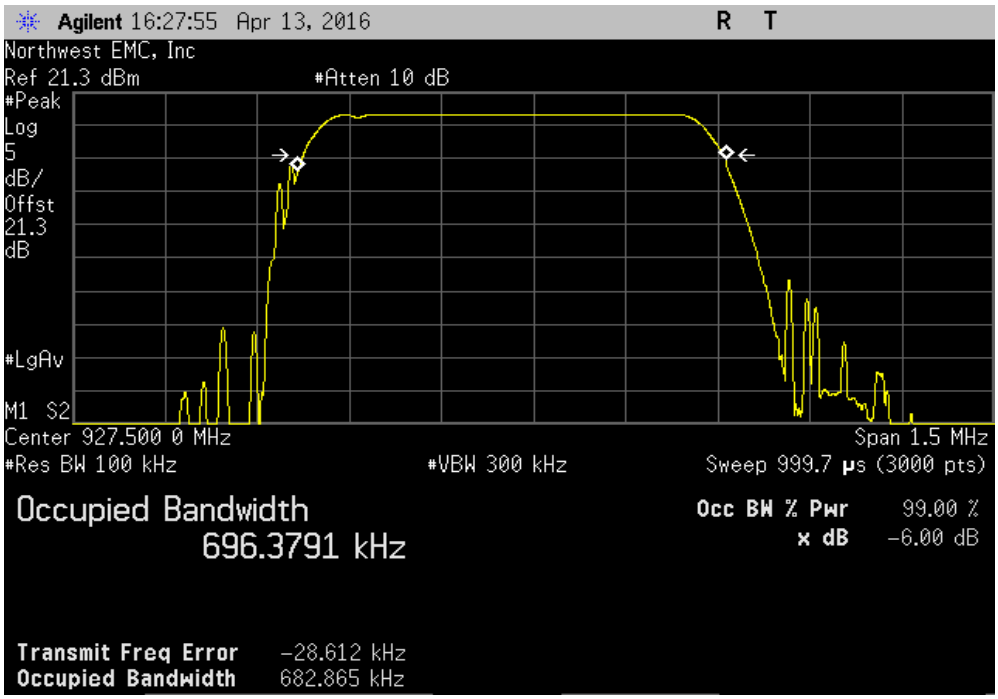
Data Rate: BW 500 kHz, Low Channel: 902.5 MHz						
				Value	Limit (>)	Result
				711.035 kHz	500 kHz	Pass



Data Rate: BW 500 kHz, Mid Channel: 915.1 MHz						
				Value	Limit (>)	Result
				696.71 kHz	500 kHz	Pass



Data Rate: BW 500 kHz, High Channel: 927.5 MHz						
				Value	Limit (>)	Result
				682.865 kHz	500 kHz	Pass



OUTPUT POWER

NORTHWEST EMC

XMit 2015.01.14

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 (mo)
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	12

TEST DESCRIPTION

The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. External attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

Prior to measuring output power; the emission bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.

The method AVGSA-2 in section 11.9.2.2.4 of ANSI C63.10:2013 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

De Facto EIRP Limit: Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36 dBm.

OUTPUT POWER

NORTHWEST EMC

XMit 2015.01.14

EUT:	**MTDOT in DTS mode**			**Work Order:**	**MLTI0051**
Serial Number:	**18349449**			**Date:**	**04/13/16**
Customer:	**Multi-Tech Systems**			**Temperature:**	**22.7°C**
Attendees:	**Marcus Glass**			**Humidity:**	**21%**
Project:	**None**			**Barometric Pres.:**	**988.1 mbar**
Tested by:	**Jared Ison**	**Power:**	**110VAC/60Hz**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

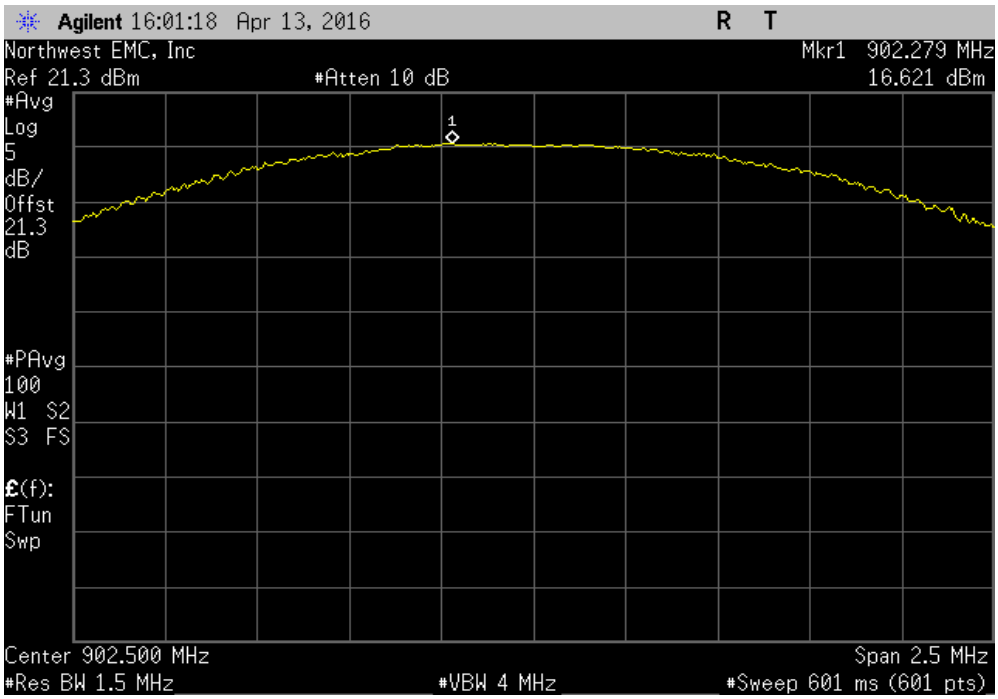
Configuration #	**2**	*Signature*

	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (dBm)	Results
Data Rate: BW 500 kHz					
Low Channel: 902.5 MHz	16.621	0.5	17.1	30	Pass
Mid Channel: 915.1 MHz	17.049	0.6	17.6	30	Pass
High Channel: 927.5 MHz	17.333	0.6	17.9	30	Pass

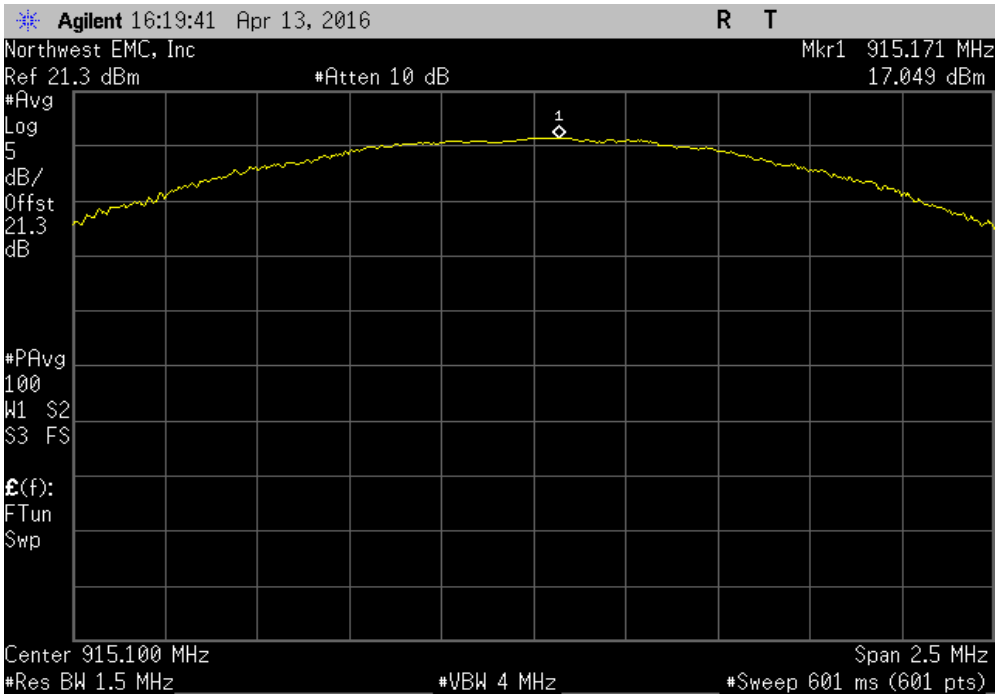
OUTPUT POWER

XMit 2015.01.14

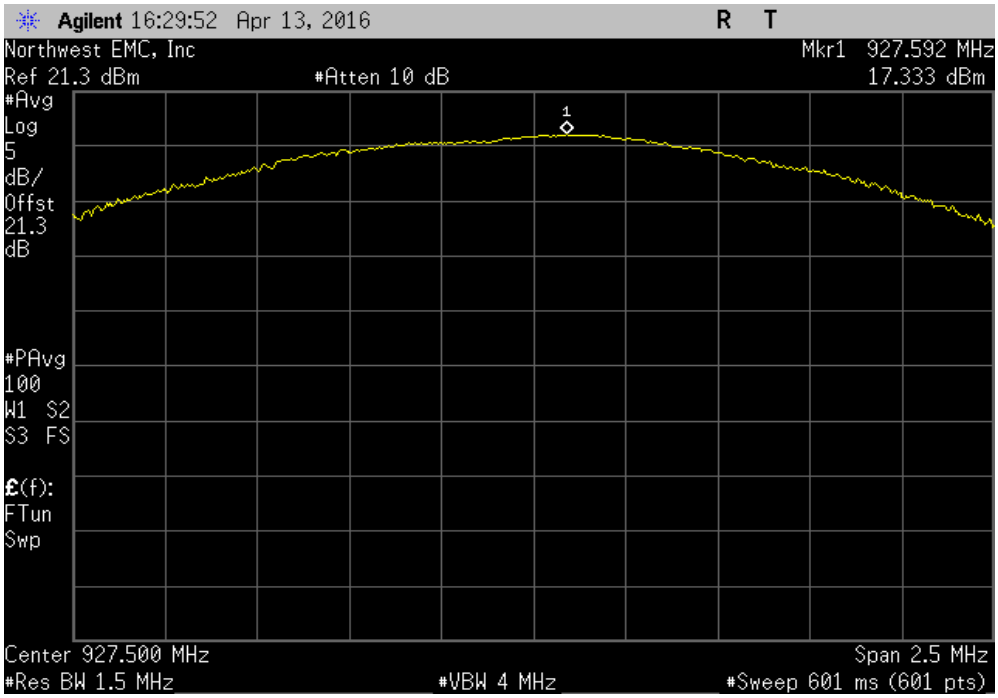
Data Rate: BW 500 kHz, Low Channel: 902.5 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)		Value (dBm)	Limit (dBm)	Results
	16.621	0.5		17.1	30	Pass



Data Rate: BW 500 kHz, Mid Channel: 915.1 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)		Value (dBm)	Limit (dBm)	Results
	17.049	0.6		17.6	30	Pass



Data Rate: BW 500 kHz, High Channel: 927.5 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)		Value (dBm)	Limit (dBm)	Results
	17.333	0.6		17.9	30	Pass



POWER SPECTRAL DENSITY

XMit 2015.01.14

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 (mo)
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	12

TEST DESCRIPTION

The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. External attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

Per the procedure outlined in ANSI C63.10 the AVGPSD-2 method for power spectral density was measured in a 3 kHz RBW.

POWER SPECTRAL DENSITY

NORTHWEST EMC

XMit 2015.01.14

EUT:	**MTDOT in DTS mode**			**Work Order:**	**MLTI0051**
Serial Number:	**18349449**			**Date:**	**04/13/16**
Customer:	**Multi-Tech Systems**			**Temperature:**	**22.7°C**
Attendees:	**Marcus Glass**			**Humidity:**	**21%**
Project:	**None**			**Barometric Pres.:**	**988.1 mbar**
Tested by:	**Jared Ison**	**Power:**	**110VAC/60Hz**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

None

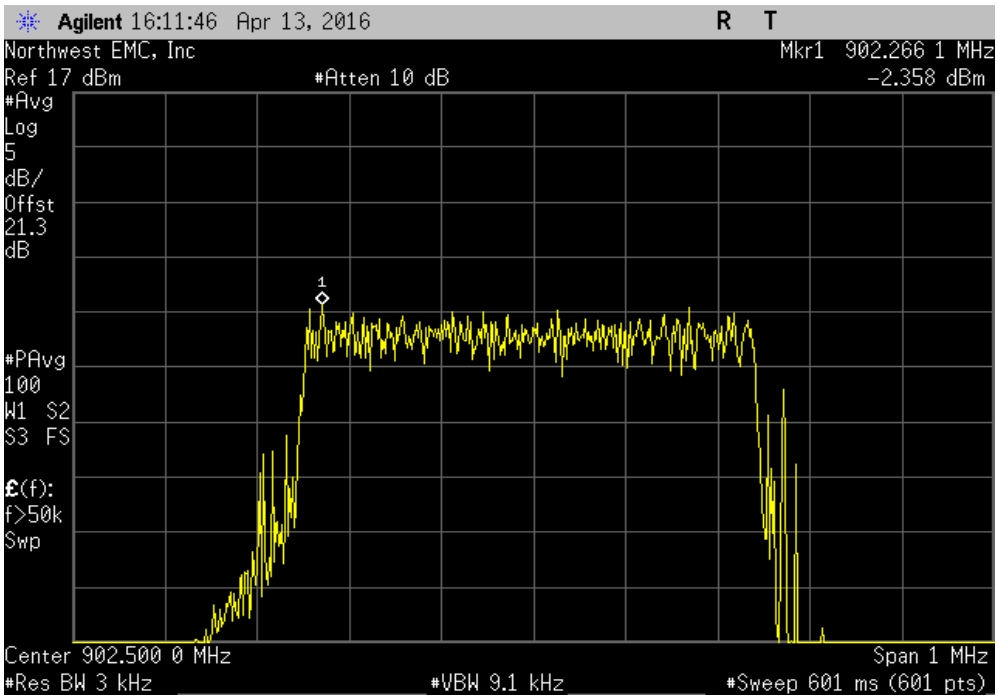
DEVIATIONS FROM TEST STANDARD

None

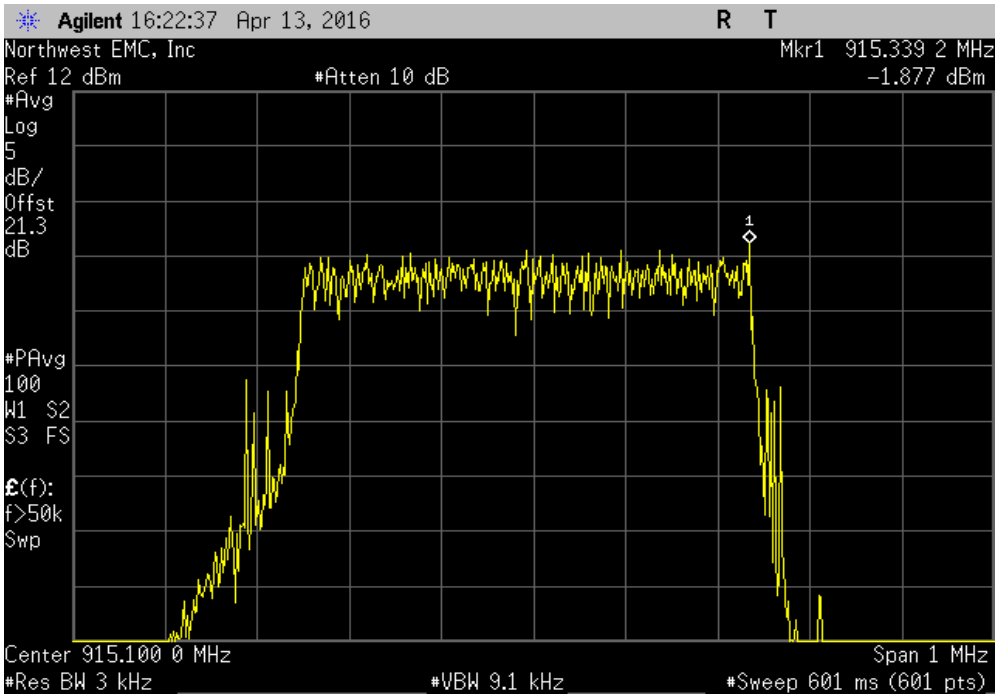
Configuration #	**2**	*Signature*

	Power (dBm/kHz)	Duty Cycle Factor (dB)	Density (dBm/kHz)	Limit ≤ (dBm / 3 kHz)	Results
Data Rate: BW 500 kHz					
Low Channel: 902.5 MHz	-2.358	0.5	-1.9	8	Pass
Mid Channel: 915.1 MHz	-1.877	0.6	-1.3	8	Pass
High Channel: 927.5 MHz	-1.848	0.6	-1.3	8	Pass

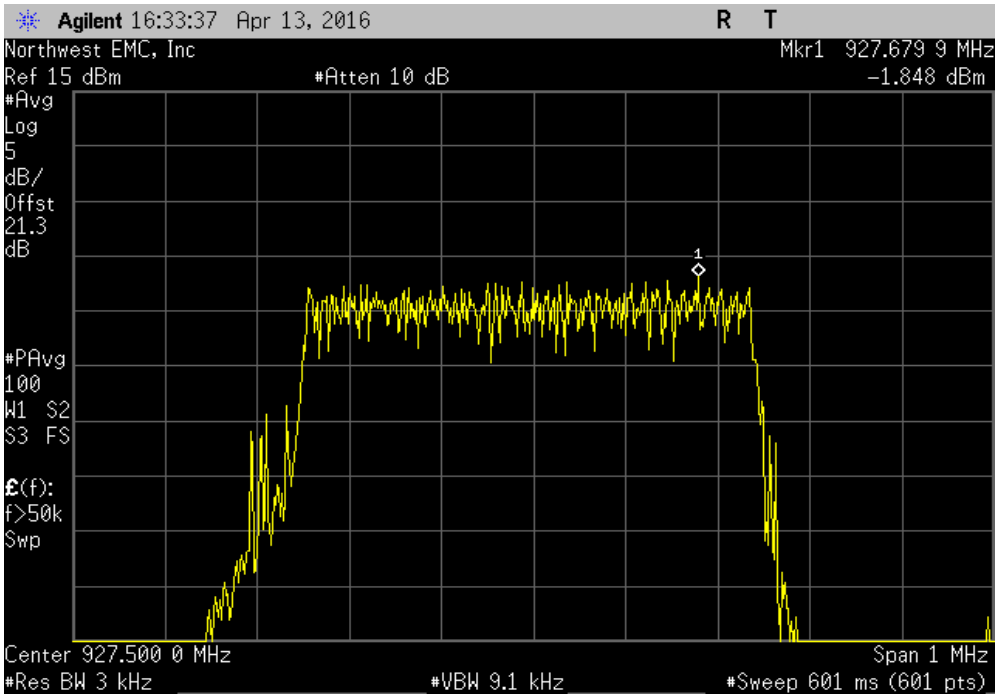
Data Rate: BW 500 kHz, Low Channel: 902.5 MHz						
	Power (dBm/kHz)	Duty Cycle Factor (dB)		Density (dBm/kHz)	Limit ≤ (dBm / 3 kHz)	Results
	-2.358	0.5		-1.9	8	Pass



Data Rate: BW 500 kHz, Mid Channel: 915.1 MHz						
	Power (dBm/kHz)	Duty Cycle Factor (dB)		Density (dBm/kHz)	Limit ≤ (dBm / 3 kHz)	Results
	-1.877	0.6		-1.3	8	Pass



Data Rate: BW 500 kHz, High Channel: 927.5 MHz						
	Power (dBm/kHz)	Duty Cycle Factor (dB)		Density (dBm/kHz)	Limit ≤ (dBm / 3 kHz)	Results
	-1.848	0.6		-1.3	8	Pass



SPURIOUS CONDUCTED EMISSIONS

XMit 2015.01.14

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 (mo)
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	12
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	12

TEST DESCRIPTION

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

SPURIOUS CONDUCTED EMISSIONS

NORTHWEST EMC

XMit 2015.01.14

EUT:	**MTDOT in DTS mode**			**Work Order:**	**MLTI0051**
Serial Number:	**18349449**			**Date:**	**04/13/16**
Customer:	**Multi-Tech Systems**			**Temperature:**	**22.7°C**
Attendees:	**Marcus Glass**			**Humidity:**	**21%**
Project:	**None**			**Barometric Pres.:**	**988.1 mbar**
Tested by:	**Jared Ison**	**Power:**	**110VAC/60Hz**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

None

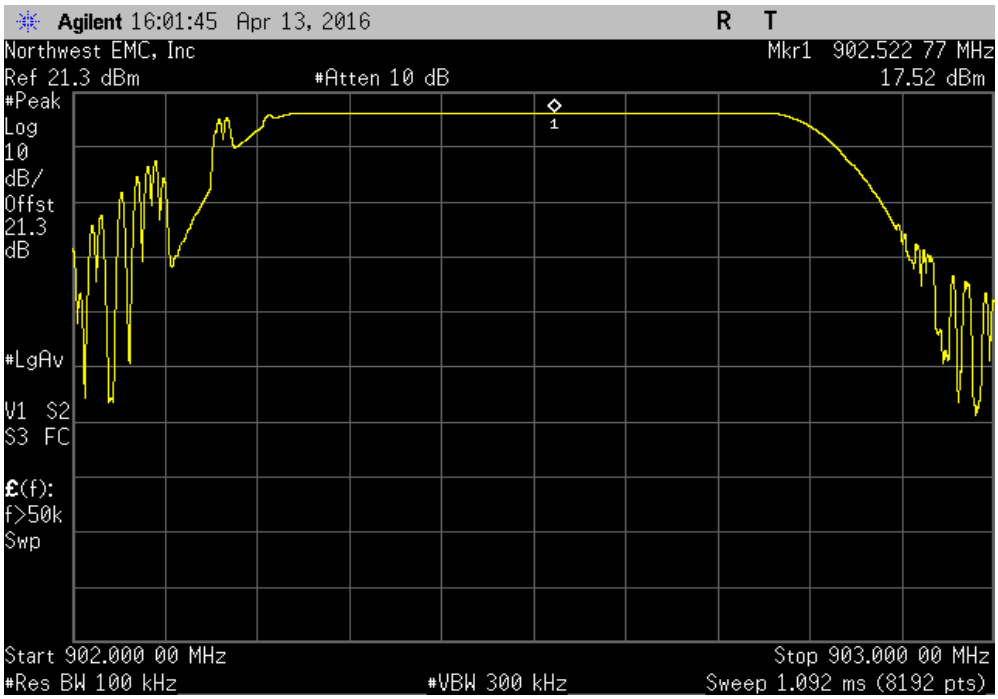
DEVIATIONS FROM TEST STANDARD

None

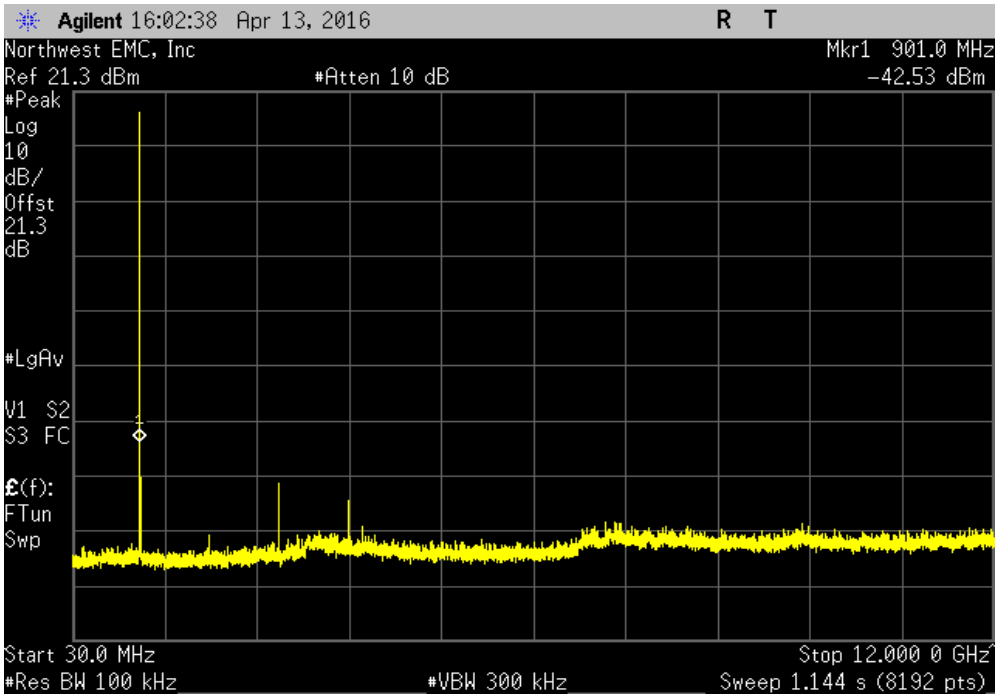
Configuration #	**2**	*Signature*

	Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
Data Rate: BW 500 kHz				
Low Channel: 902.5 MHz	Fundamental	N/A	N/A	N/A
Low Channel: 902.5 MHz	30 MHz - 12 GHz	-60.05	-20	Pass
Mid Channel: 915.1 MHz	Fundamental	N/A	N/A	N/A
Mid Channel: 915.1 MHz	30 MHz - 12 GHz	-67.32	-20	Pass
High Channel: 927.5 MHz	Fundamental	N/A	N/A	N/A
High Channel: 927.5 MHz	30 MHz - 12 GHz	-44.46	-20	Pass

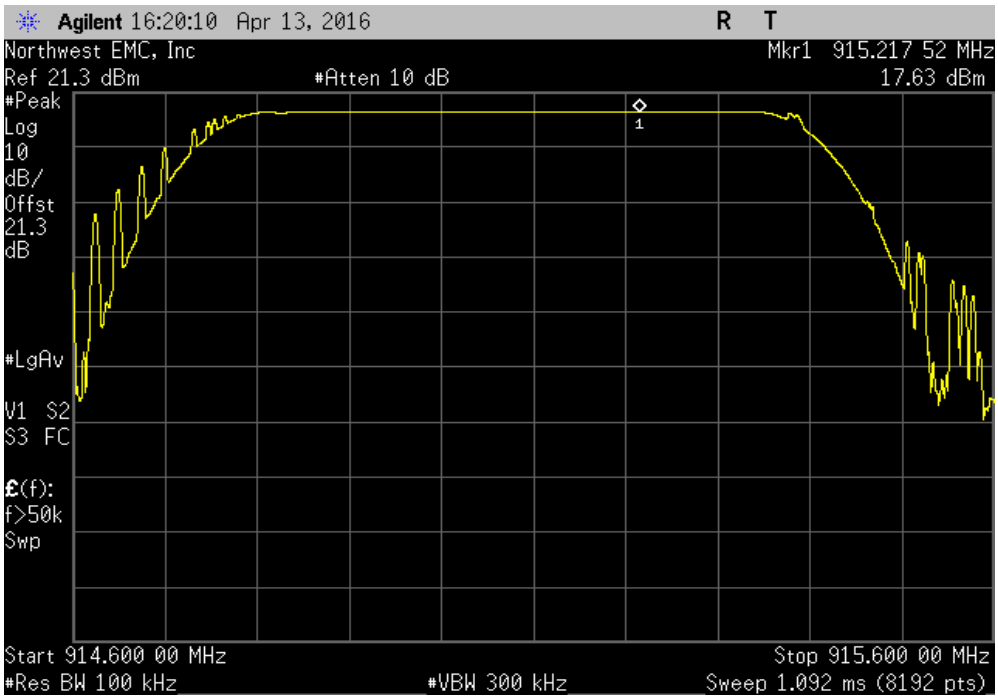
Data Rate: BW 500 kHz, Low Channel: 902.5 MHz						
	Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



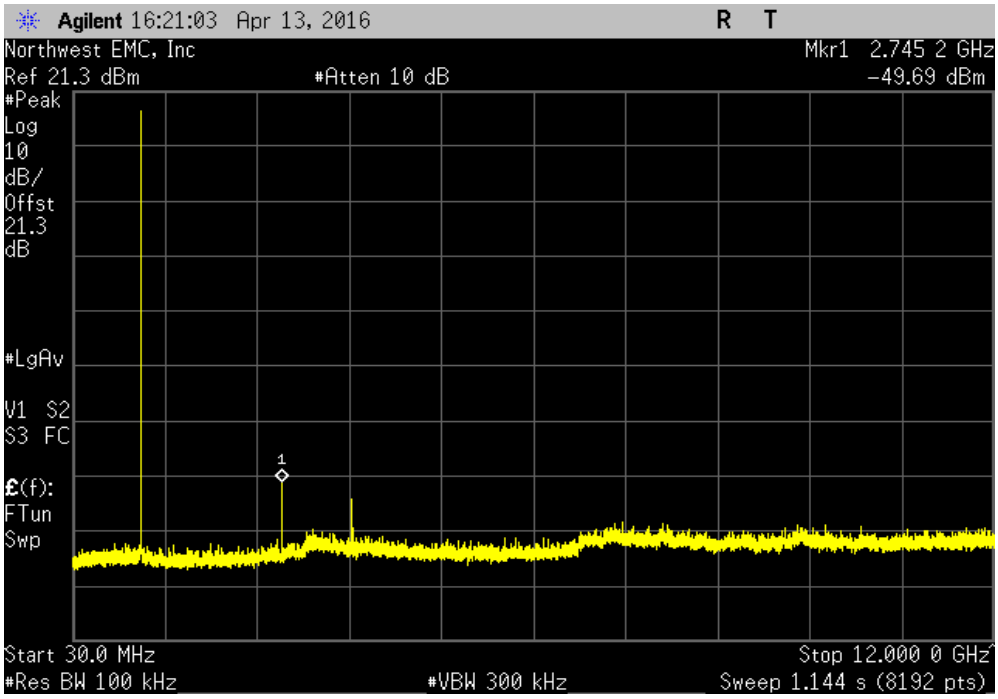
Data Rate: BW 500 kHz, Low Channel: 902.5 MHz					
Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12 GHz			-60.05	-20	Pass



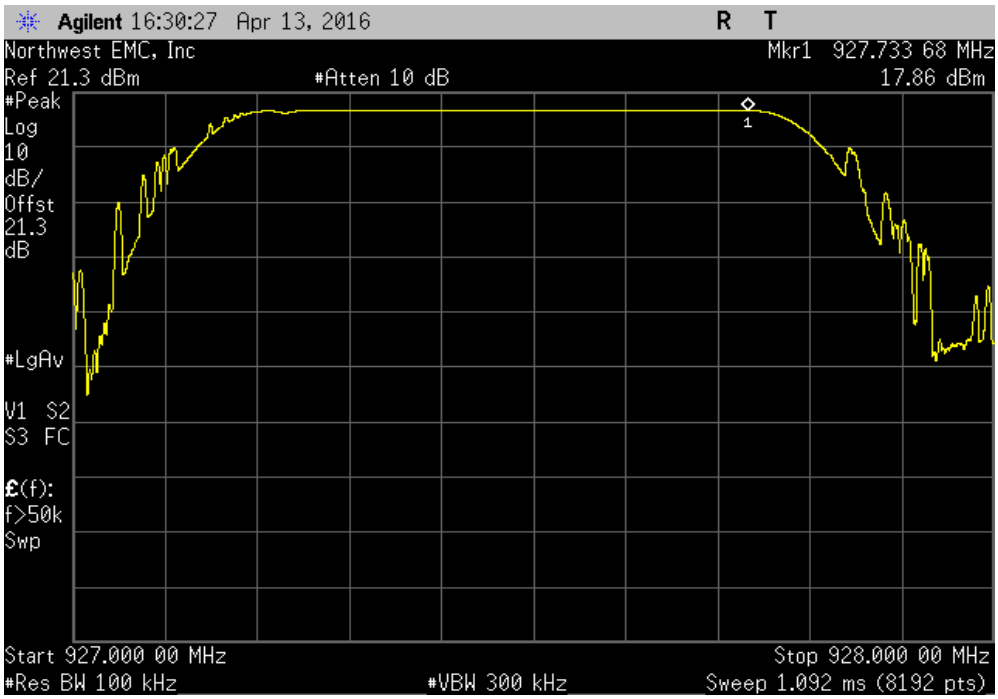
Data Rate: BW 500 kHz, Mid Channel: 915.1 MHz						
	Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



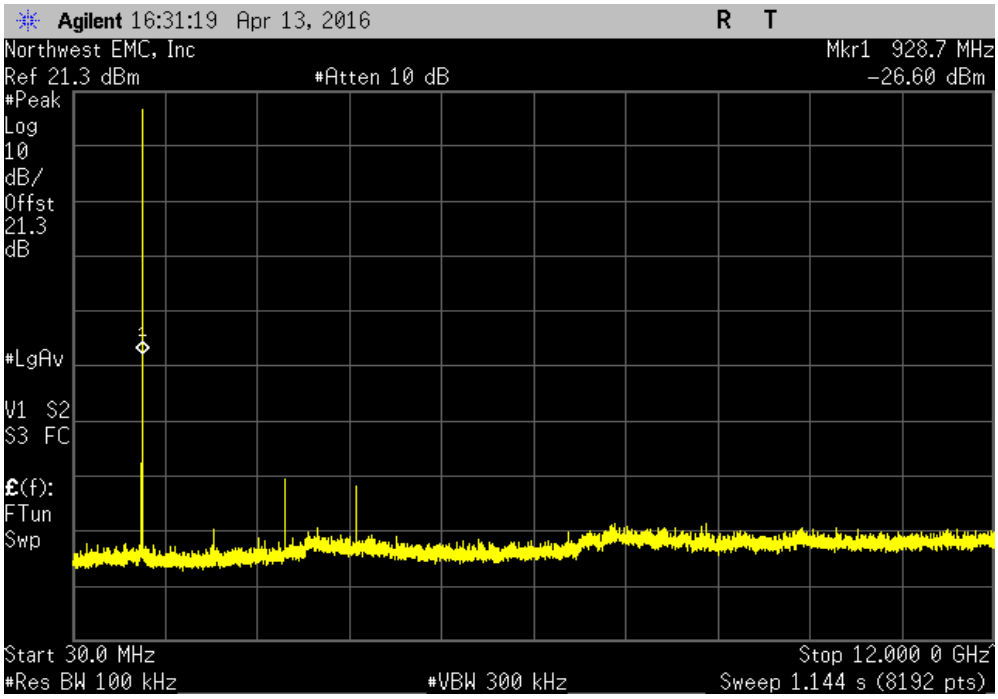
Data Rate: BW 500 kHz, Mid Channel: 915.1 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12 GHz		-67.32	-20	Pass	



Data Rate: BW 500 kHz, High Channel: 927.5 MHz						
	Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



Data Rate: BW 500 kHz, High Channel: 927.5 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12 GHz		-44.46	-20	Pass	



BAND EDGE COMPLIANCE

XMit 2015.01.14

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 (mo)
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Meter - Multimeter	Fluke	114	MMU	6/30/2014	36
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	12

TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

BAND EDGE COMPLIANCE

NORTHWEST EMC

XMit 2015.01.14

EUT:	**MTDOT in DTS mode**			**Work Order:**	**MLTI0051**
Serial Number:	**18349449**			**Date:**	**04/13/16**
Customer:	**Multi-Tech Systems**			**Temperature:**	**22.7°C**
Attendees:	**Marcus Glass**			**Humidity:**	**21%**
Project:	**None**			**Barometric Pres.:**	**988.1 mbar**
Tested by:	**Jared Ison**	**Power:**	**110VAC/60Hz**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

None

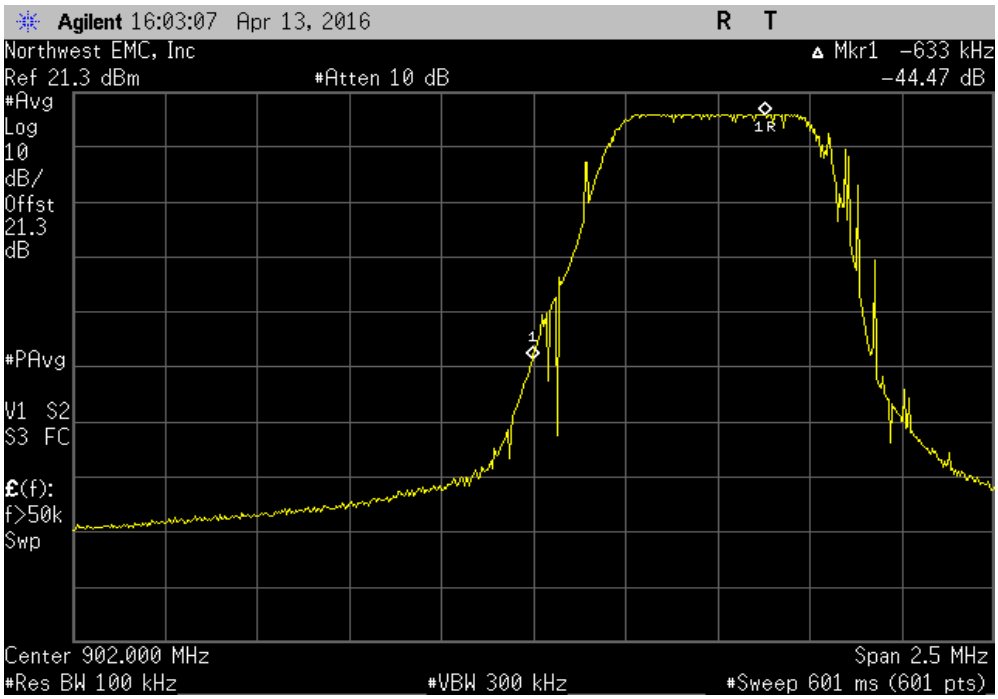
DEVIATIONS FROM TEST STANDARD

None

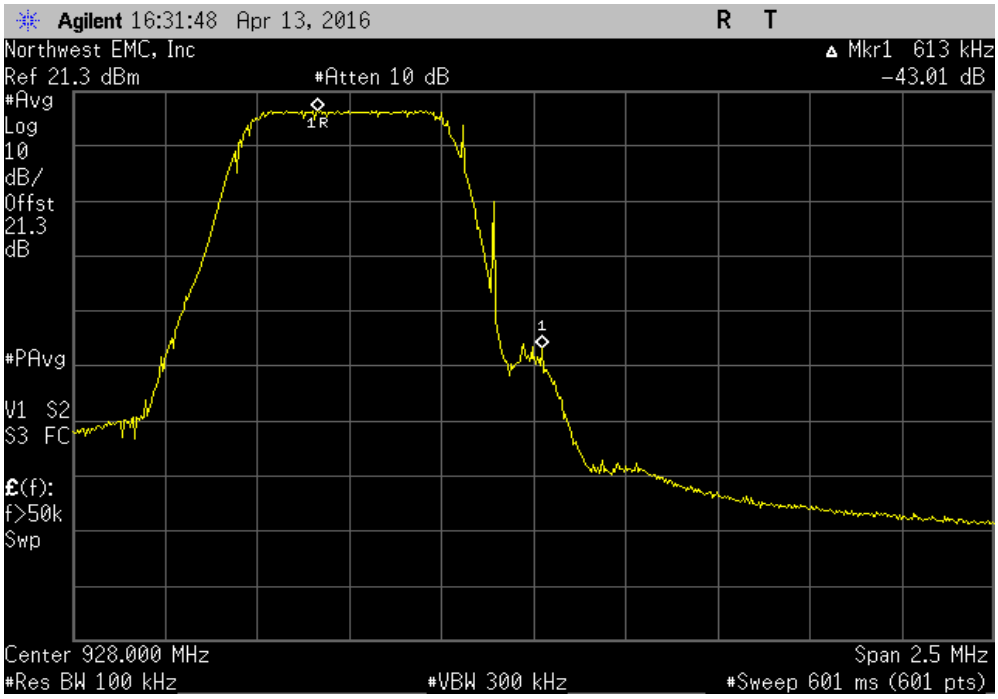
Configuration #	**2**	*Signature*

	Value (dBc)	**Limit ≤ (dBc)**	**Result**
Data Rate: BW 500 kHz			
Low Channel: 902.5 MHz	-44.47	-30	Pass
High Channel: 927.5 MHz	-43.01	-30	Pass

Data Rate: BW 500 kHz, Low Channel: 902.5 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-44.47	-30	Pass



Data Rate: BW 500 kHz, High Channel: 927.5 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-43.01	-30	Pass



SPURIOUS RADIATED 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

Transmit.

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

MLTI0051 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	12400 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 (mo)
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	3/1/2016	12
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	12/7/2015	12
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	3/1/2016	12
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	12/7/2015	12
Antenna - Double Ridge	ETS Lindgren	3115	AJA	6/3/2014	24
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	12/10/2015	12
Cable	ESM Cable Corp.	Bilog Cables	MNH	12/7/2015	12
Antenna - Biconilog	Teseq	CBL 6141B	AYD	1/6/2016	24
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2016	12

MEASUREMENT BANDWIDTHS

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

TEST DESCRIPTION

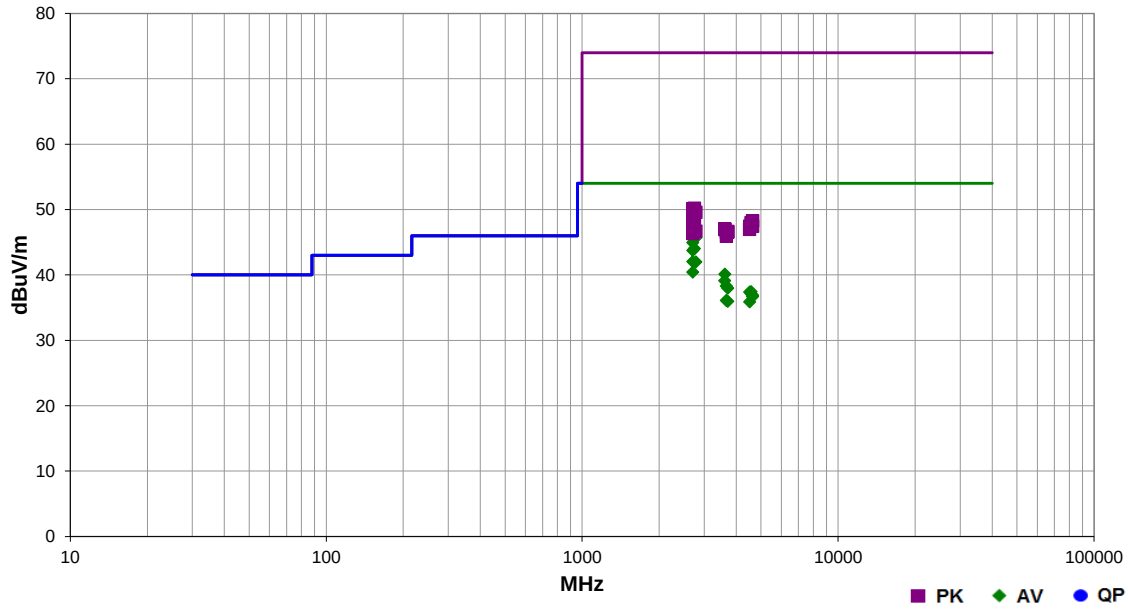
The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

SPURIOUS RADIATED EMISSIONS

Work Order:	MLTI0051	**Date:**	04/13/16		
Project:	None	**Temperature:**	22 °C		
Job Site:	MN05	**Humidity:**	24.4% RH		
Serial Number:	18349449	**Barometric Pres.:**	1021 mbar	**Tested by:**	Jared Ison
EUT:	MTDOT in DTS mode				
Configuration:	2				
Customer:	Multi-Tech Systems				
Attendees:	Marcus Glass				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmit.				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

Run #	24	**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
2706.875	49.8	-2.6	1.0	324.0	3.0	0.0	Horz	AV	0.0	47.2	54.0	-6.8	Low Ch. 902.5 MHz, EUT Horz
2744.717	49.4	-2.4	1.0	315.9	3.0	0.0	Horz	AV	0.0	47.0	54.0	-7.0	Mid Ch. 915.1 MHz, EUT Horz
2706.742	49.2	-2.6	1.0	69.1	3.0	0.0	Horz	AV	0.0	46.6	54.0	-7.4	Low Ch. 902.5 MHz, EUT On Side
2783.133	47.9	-2.2	1.0	315.0	3.0	0.0	Horz	AV	0.0	45.7	54.0	-8.3	High Ch. 927.5 MHz, EUT Horz
2707.550	47.5	-2.6	1.0	354.0	3.0	0.0	Vert	AV	0.0	44.9	54.0	-9.1	Low Ch. 902.5 MHz, EUT Vert
2744.542	46.4	-2.4	1.0	350.0	3.0	0.0	Vert	AV	0.0	44.0	54.0	-10.0	Mid Ch. 915.1 MHz, EUT Vert
2707.117	46.3	-2.6	1.0	311.0	3.0	0.0	Vert	AV	0.0	43.7	54.0	-10.3	Low Ch. 902.5 MHz, EUT Horz
2706.933	44.6	-2.6	1.0	224.1	3.0	0.0	Vert	AV	0.0	42.0	54.0	-12.0	Low Ch. 902.5 MHz, EUT On Side
2783.033	44.2	-2.2	1.0	128.0	3.0	0.0	Vert	AV	0.0	42.0	54.0	-12.0	High Ch. 927.5 MHz, EUT Vert
2707.725	43.0	-2.6	1.0	5.1	3.0	0.0	Horz	AV	0.0	40.4	54.0	-13.6	Low Ch. 902.5 MHz, EUT Vert
3609.367	39.2	0.9	1.0	159.1	3.0	0.0	Horz	AV	0.0	40.1	54.0	-13.9	Low Ch. 902.5 MHz, EUT Horz
3609.142	38.2	0.9	1.0	271.9	3.0	0.0	Vert	AV	0.0	39.1	54.0	-14.9	Low Ch. 902.5 MHz, EUT Vert
3659.892	37.0	1.3	1.0	239.9	3.0	0.0	Horz	AV	0.0	38.3	54.0	-15.7	Mid Ch. 915.1 MHz, EUT Horz
3710.750	36.3	1.7	1.0	238.0	3.0	0.0	Horz	AV	0.0	38.0	54.0	-16.0	High Ch. 927.5 MHz, EUT Horz
4576.483	32.9	4.5	1.0	143.0	3.0	0.0	Vert	AV	0.0	37.4	54.0	-16.6	Mid Ch. 915.1 MHz, EUT Vert
4513.183	33.0	4.4	1.0	111.0	3.0	0.0	Vert	AV	0.0	37.4	54.0	-16.6	Low Ch. 902.5 MHz, EUT Vert
4576.158	32.6	4.5	1.0	131.1	3.0	0.0	Horz	AV	0.0	37.1	54.0	-16.9	Mid Ch. 915.1 MHz, EUT Horz
4637.967	32.1	4.8	1.0	219.0	3.0	0.0	Vert	AV	0.0	36.9	54.0	-17.1	High Ch. 927.5 MHz, EUT Vert
4636.550	31.9	4.8	2.7	86.0	3.0	0.0	Horz	AV	0.0	36.7	54.0	-17.3	High Ch. 927.5 MHz, EUT Horz
3659.650	34.8	1.3	1.0	263.0	3.0	0.0	Vert	AV	0.0	36.1	54.0	-17.9	Mid Ch. 915.1 MHz, EUT Vert
3710.708	34.3	1.7	1.0	289.0	3.0	0.0	Vert	AV	0.0	36.0	54.0	-18.0	High Ch. 927.5 MHz, EUT Vert
4515.367	31.5	4.4	1.0	208.0	3.0	0.0	Horz	AV	0.0	35.9	54.0	-18.1	Low Ch. 902.5 MHz, EUT Horz
2744.983	52.6	-2.4	1.0	315.9	3.0	0.0	Horz	PK	0.0	50.2	74.0	-23.8	Mid Ch. 915.1 MHz, EUT Horz
2707.042	52.7	-2.6	1.0	324.0	3.0	0.0	Horz	PK	0.0	50.1	74.0	-23.9	Low Ch. 902.5 MHz, EUT Horz
2707.258	52.3	-2.6	1.0	69.1	3.0	0.0	Horz	PK	0.0	49.7	74.0	-24.3	Low Ch. 902.5 MHz, EUT On Side
2782.350	51.8	-2.2	1.0	315.0	3.0	0.0	Horz	PK	0.0	49.6	74.0	-24.4	High Ch. 927.5 MHz, EUT Horz
2707.292	51.2	-2.6	1.0	354.0	3.0	0.0	Vert	PK	0.0	48.6	74.0	-25.4	Low Ch. 902.5 MHz, EUT Vert

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
4639.200	43.5	4.8	2.7	86.0	3.0	0.0	Horz	PK	0.0	48.3	74.0	-25.7	High Ch. 927.5 MHz, EUT Horz
4575.300	43.5	4.5	1.0	131.1	3.0	0.0	Horz	PK	0.0	48.0	74.0	-26.0	Mid Ch. 915.1 MHz, EUT Horz
2744.767	50.4	-2.4	1.0	350.0	3.0	0.0	Vert	PK	0.0	48.0	74.0	-26.0	Mid Ch. 915.1 MHz, EUT Vert
4576.317	43.4	4.5	1.0	143.0	3.0	0.0	Vert	PK	0.0	47.9	74.0	-26.1	Mid Ch. 915.1 MHz, EUT Vert
2706.850	50.4	-2.6	1.0	311.0	3.0	0.0	Vert	PK	0.0	47.8	74.0	-26.2	Low Ch. 902.5 MHz, EUT Horz
4637.917	42.7	4.8	1.0	219.0	3.0	0.0	Vert	PK	0.0	47.5	74.0	-26.5	High Ch. 927.5 MHz, EUT Vert
4512.875	43.1	4.4	1.0	111.0	3.0	0.0	Vert	PK	0.0	47.5	74.0	-26.5	Low Ch. 902.5 MHz, EUT Vert
3610.575	46.1	0.9	1.0	159.1	3.0	0.0	Horz	PK	0.0	47.0	74.0	-27.0	Low Ch. 902.5 MHz, EUT Horz
4511.317	42.6	4.4	1.0	208.0	3.0	0.0	Horz	PK	0.0	47.0	74.0	-27.0	Low Ch. 902.5 MHz, EUT Horz
3610.283	46.0	0.9	1.0	271.9	3.0	0.0	Vert	PK	0.0	46.9	74.0	-27.1	Low Ch. 902.5 MHz, EUT Vert
2707.808	49.4	-2.6	1.0	224.1	3.0	0.0	Vert	PK	0.0	46.8	74.0	-27.2	Low Ch. 902.5 MHz, EUT On Side
2782.467	48.9	-2.2	1.0	128.0	3.0	0.0	Vert	PK	0.0	46.7	74.0	-27.3	High Ch. 927.5 MHz, EUT Vert
3710.258	45.0	1.7	1.0	289.0	3.0	0.0	Vert	PK	0.0	46.7	74.0	-27.3	High Ch. 927.5 MHz, EUT Vert
3709.367	44.9	1.7	1.0	238.0	3.0	0.0	Horz	PK	0.0	46.6	74.0	-27.4	High Ch. 927.5 MHz, EUT Horz
3660.575	45.2	1.3	1.0	239.9	3.0	0.0	Horz	PK	0.0	46.5	74.0	-27.5	Mid Ch. 915.1 MHz, EUT Horz
2706.992	48.9	-2.6	1.0	5.1	3.0	0.0	Horz	PK	0.0	46.3	74.0	-27.7	Low Ch. 902.5 MHz, EUT Vert
3660.617	44.6	1.3	1.0	263.0	3.0	0.0	Vert	PK	0.0	45.9	74.0	-28.1	Mid Ch. 915.1 MHz, EUT Vert

AC – POWERLINE CONDUCTED EMISSIONS

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	ESR7	ARI	5/21/2015	5/21/2016
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	1/29/2016	1/29/2017
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	3/21/2016	3/21/2017
Power Supply - DC	EZ Digital Co., Ltd.	GP-4030D	TQK	NCR	NCR

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

MLTI0051-3

MODES INVESTIGATED

Transmitting 915.1 MHz

AC – POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

EUT:	MTDOT in DTS mode	Work Order:	MLTI0051
Serial Number:	18349449	Date:	04/13/2016
Customer:	Multi-Tech Systems	Temperature:	21.9°C
Attendees:	Marcus Glass	Relative Humidity:	23.5%
Customer Project:	None	Bar. Pressure:	1021 mb
Tested By:	Dustin Sparks	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	MLTI0051-3

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	8	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

5VDC supplied by benchtop power supply

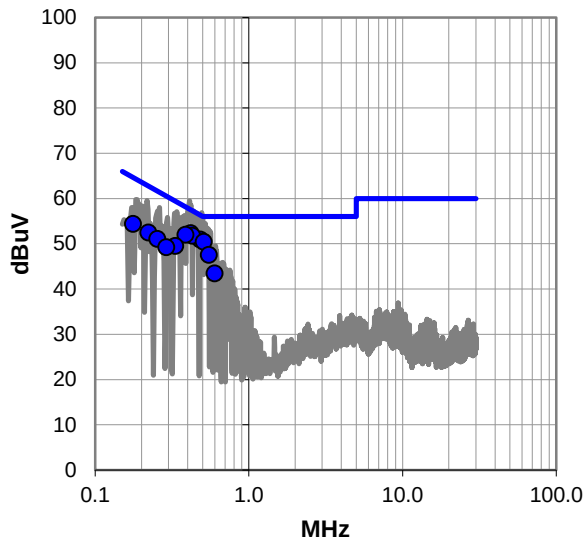
EUT OPERATING MODES

Transmitting 915.1 MHz

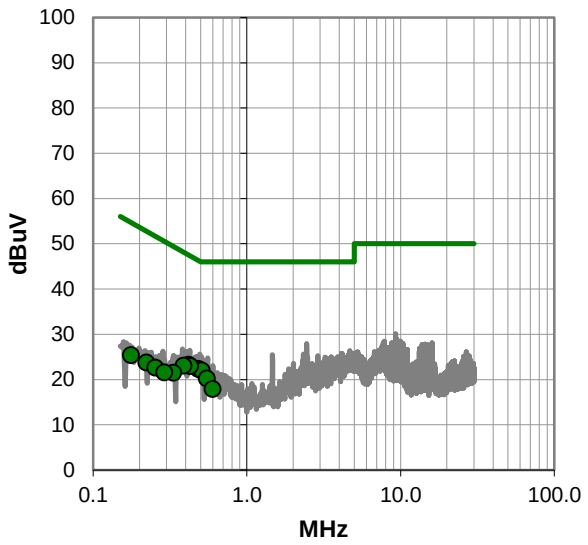
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC – POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

RESULTS - Run #8

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (()	Spec. Limit (()	Margin (dB)
0.418	32.2	20.1	52.3	57.5	-5.1
0.484	30.8	20.1	50.9	56.3	-5.4
0.429	31.6	20.1	51.7	57.3	-5.5
0.510	30.3	20.1	50.4	56.0	-5.6
0.388	31.8	20.2	52.0	58.1	-6.2
0.551	27.4	20.1	47.5	56.0	-8.5
0.332	29.3	20.2	49.5	59.4	-9.9
0.177	34.0	20.4	54.4	64.6	-10.3
0.222	32.2	20.3	52.5	62.7	-10.3
0.254	30.8	20.2	51.0	61.6	-10.6
0.290	29.0	20.2	49.2	60.5	-11.3
0.600	23.3	20.1	43.4	56.0	-12.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (()	Spec. Limit (()	Margin (dB)
0.484	2.2	20.1	22.3	46.3	-24.0
0.510	1.9	20.1	22.0	46.0	-24.0
0.418	3.1	20.1	23.2	47.5	-24.2
0.429	2.8	20.1	22.9	47.3	-24.3
0.388	2.9	20.2	23.1	48.1	-25.1
0.551	0.1	20.1	20.2	46.0	-25.8
0.332	1.3	20.2	21.5	49.4	-27.9
0.600	-2.2	20.1	17.9	46.0	-28.1
0.222	3.5	20.3	23.8	52.7	-29.0
0.254	2.4	20.2	22.6	51.6	-29.0
0.290	1.3	20.2	21.5	50.5	-29.0
0.177	5.0	20.4	25.4	54.6	-29.3

CONCLUSION

Pass

Tested By

AC – POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

EUT:	MTDOT in DTS mode	Work Order:	MLTI0051
Serial Number:	18349449	Date:	04/13/2016
Customer:	Multi-Tech Systems	Temperature:	21.9°C
Attendees:	Marcus Glass	Relative Humidity:	23.5%
Customer Project:	None	Bar. Pressure:	1021 mb
Tested By:	Dustin Sparks	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	MLTI0051-3

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	9	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

5VDC supplied by benchtop power supply

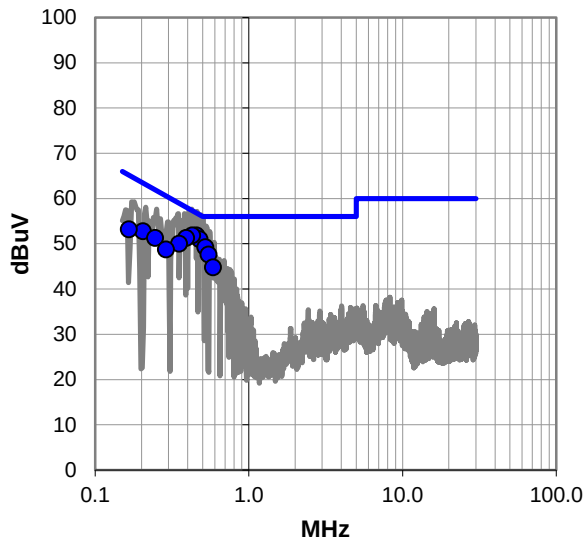
EUT OPERATING MODES

Transmitting 915.1 MHz

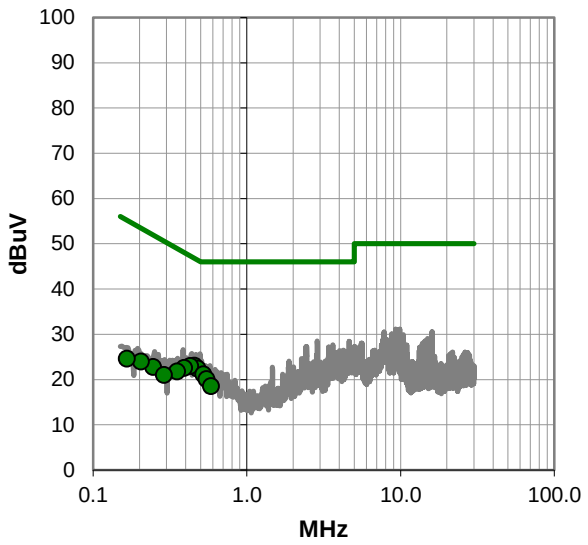
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC – POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

RESULTS - Run #9

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (()	Spec. Limit (()	Margin (dB)
0.456	31.7	20.1	51.8	56.8	-4.9
0.478	30.9	20.1	51.0	56.4	-5.4
0.428	31.7	20.1	51.8	57.3	-5.4
0.391	31.1	20.2	51.3	58.0	-6.8
0.521	29.1	20.1	49.2	56.0	-6.8
0.548	27.5	20.1	47.6	56.0	-8.4
0.353	29.8	20.2	50.0	58.9	-8.9
0.205	32.5	20.3	52.8	63.4	-10.6
0.246	31.0	20.2	51.2	61.9	-10.7
0.585	24.7	20.1	44.8	56.0	-11.2
0.289	28.5	20.2	48.7	60.5	-11.8
0.166	32.8	20.4	53.2	65.2	-12.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (()	Spec. Limit (()	Margin (dB)
0.456	2.9	20.1	23.0	46.8	-23.7
0.478	2.3	20.1	22.4	46.4	-24.0
0.428	2.8	20.1	22.9	47.3	-24.3
0.521	1.0	20.1	21.1	46.0	-24.9
0.391	2.4	20.2	22.6	48.0	-25.5
0.548	0.0	20.1	20.1	46.0	-25.9
0.353	1.6	20.2	21.8	48.9	-27.1
0.585	-1.6	20.1	18.5	46.0	-27.5
0.246	2.5	20.2	22.7	51.9	-29.2
0.205	3.7	20.3	24.0	53.4	-29.4
0.289	0.8	20.2	21.0	50.5	-29.5
0.166	4.2	20.4	24.6	55.2	-30.6

CONCLUSION

Pass

Tested By