

Anywave Communication Technologies Inc.

EMC TEST REPORT FOR
600W V3 ATSC Transmitter System
Model: TRN-VIII-600-C
(See Equipment Under Test for details)

Tested to The Following Standards:

FCC Part 74 Subpart G

Report No.: 102510-12

Date of issue: June 18, 2019



This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.



We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

Test Certificate # 803.01

This report contains a total of 43 pages and may be reproduced in full only. Partial reproduction may only be done with the written consent of CKC Laboratories, Inc.

TABLE OF CONTENTS

Administrative Information	3
Test Report Information	3
Report Authorization	3
Test Facility Information	4
Software Versions	4
Site Registration & Accreditation Information	4
Summary of Results	5
Modifications During Testing	5
Conditions During Testing	5
Equipment Under Test	6
General Product Information	6
FCC Part 74 Subpart G	8
74.735(b)(1) Power Limitations	8
74.794(a)(2)(ii) Occupied Bandwidth / Stringent Mask	12
74.794(a)(2)(ii) Spurious Emissions at Antenna Terminal	16
15.249(a) Radiated Emissions	22
74.761(a)/74.761(b) Frequency Tolerance	38
Supplemental Information	42
Measurement Uncertainty	42
Emissions Test Details	42

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Anywave Communication Technologies Inc.
300 Knightsbridge Parkway, Suite 150
Lincolnshire IL, 60069

REPORT PREPARED BY:

Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Representative:

Erin Littell - F-Squared Labs
Ted Karam - Anywave Communication Technologies,
Inc.
Customer Reference Number: 4530

Project Number:

102510

DATE OF EQUIPMENT RECEIPT:

May 28, 2019

DATE(S) OF TESTING:

May 28-29, 2019

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
 CKC Laboratories, Inc.
 110 Olinda Place
 Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.12
EMITest Immunity	5.03.10

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Japan
Canyon Park, Bothell, WA	US0081	US1022	A-0136
Brea, CA	US0060	US1025	A-0136
Fremont, CA	US0082	US1023	A-0136
Mariposa, CA	US0103	US1024	A-0136

*CKC's list of NIST designated countries can be found at: <https://standards.gov/cabs/designations.html>

SUMMARY OF RESULTS

Standard / Specification: FCC Part(s) 2 /

Test Procedure	Description	Modifications*	Results
74.735(b)(1)	Power Limitations	NA	Pass
74.794(a)(2)(ii)	Occupied Bandwidth / Stringent Mask	NA	Pass
74.794(b)(1)	Radio Navigation Satellite Service Bands (GPS)	NA	NA1
74.794(a)(2)(ii)	Spurious Emissions at Antenna Terminal	NA	Pass
74.794(a)(2)(ii)	Field Strength of Spurious Radiation	Mod. #1	Pass
74.761(a)/74.761(b)	Frequency Tolerance – Voltage	NA	Pass
74.761(a)/74.761(b)	Frequency Tolerance –Temperature	NA	Pass

NA = Not Applicable

NA1 = Not applicable because the EUT does not operate on TV channels 22-24 (518-536 MHz), 32-36 (578-608 MHz), 38 (614-620 MHz), or 65-69 (776-806 MHz)

ISO/IEC 17025 Decision Rule

The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions

Modification #1: Grounded Ethernet connector shield on the PA and controller to chassis with copper tape.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions

None

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
5X+ Exciter	Anywave Communication Technologies, Inc	EXC-5X+c	1812144035667
700W 6-pole VHF Band III CH10(192-198MHz) BPF	Comtech	A-CL6X60B-A006	1917-203952
Controller Module	Anywave Communication Technologies, Inc	CTL-U-C	1903000010125519
600W VHF Band III PA - ATSC	Anywave Communication Technologies, Inc	AMP-4-VIII-M-C	1903070010182042

Support Equipment:

Device	Manufacturer	Model #	S/N
Router	Linksys	SE3005V2	13P20F1B812909

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	8VSB (ATSC)
Maximum Duty Cycle:	100%
Antenna Type(s) and Gain:	NA. Device is not sold with antenna.
Antenna Connection Type:	External Connector 7/16 DIN
Nominal Input Voltage:	Exciter and Controller, 120Vac 60Hz Power Amplifier, 240Vac 60Hz
Firmware / Software used for Test:	Controller code revision: MCU: V2.1-170217 Exciter code revisions: MCU: V5.2AW_190125, FPGA:V2.2A_I_161107

General Test Setup

Test Conditions / Notes
<p>The EUT is placed on the test bench. RF out of the exciter is connected to RF-In-A of the controller. Feed Back RF in A is connected to forward power of directional coupler before Band pass filter, Feed Back RF in B is connected to forward power of directional coupler After Band Pass filter.</p> <p>RF-Out-2 port of the controller is connected to the RF in port of the Amplifier.</p> <p>FWD-IN port of the controller is connected the Forward port of the directional coupler at the RF OUT of the Amplifier,</p> <p>REMOTE1 Port of the exciter is connected to ERS-485-A port of the controller. PRS-485-1 port of the controller is connected to the RS485 Port of the amplifier.</p> <p>All Ethernet ports are connected to a support network switch.</p> <p>All other IO ports are unpopulated and only used for troubleshooting.</p> <p>The Output of Band Pass Filter is terminated to the 50ohm load via two high power attenuators.</p> <p>Fundamental Frequency: 195MHz</p> <p>Output power: 600W</p>

FCC Part 74 Subpart G

74.735(b)(1) Power Limitations

Test Setup/Conditions

Test Location:	Brea Lab D	Test Engineer:	E. Wong
Test Method:	ANSI C63.26-2015 5.2.4.4	Test Date(s):	5/29/2019
Configuration:	1		

Environmental Conditions

Temperature (°C)	25	Relative Humidity (%):	47
------------------	----	------------------------	----

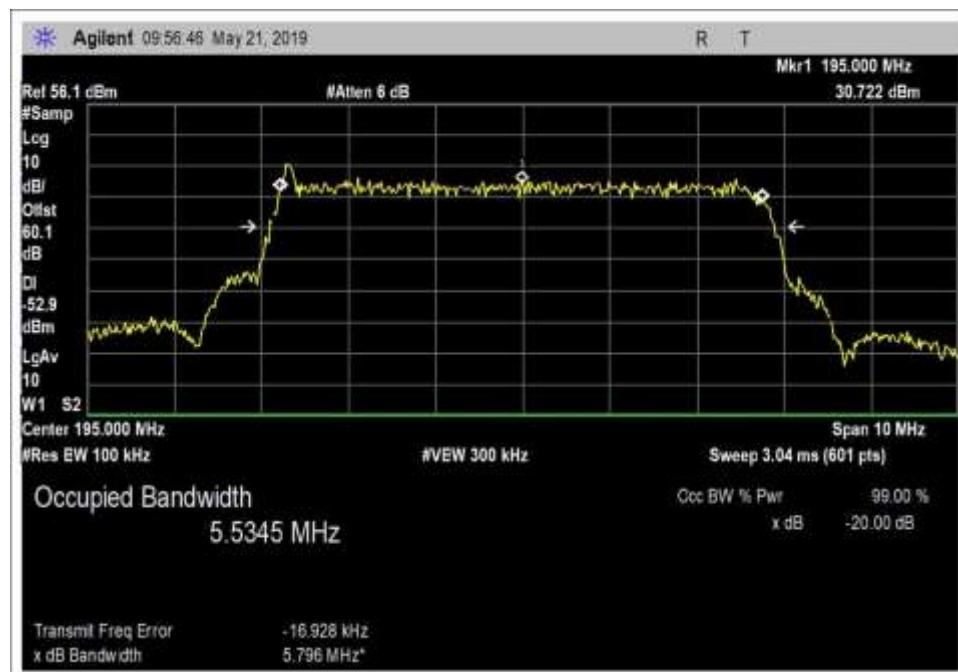
Test Equipment

Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/13/2019	3/13/2021
P07244	Cable	H&S	32022-29094K-29094K-24TC	7/5/2018	7/5/2020
03716	Attenuator	Weinschel	82-30-34	5/14/2019	5/14/2021
P01578	Attenuator	Bird	25-A-MFN-30	10/25/2017	10/25/2019

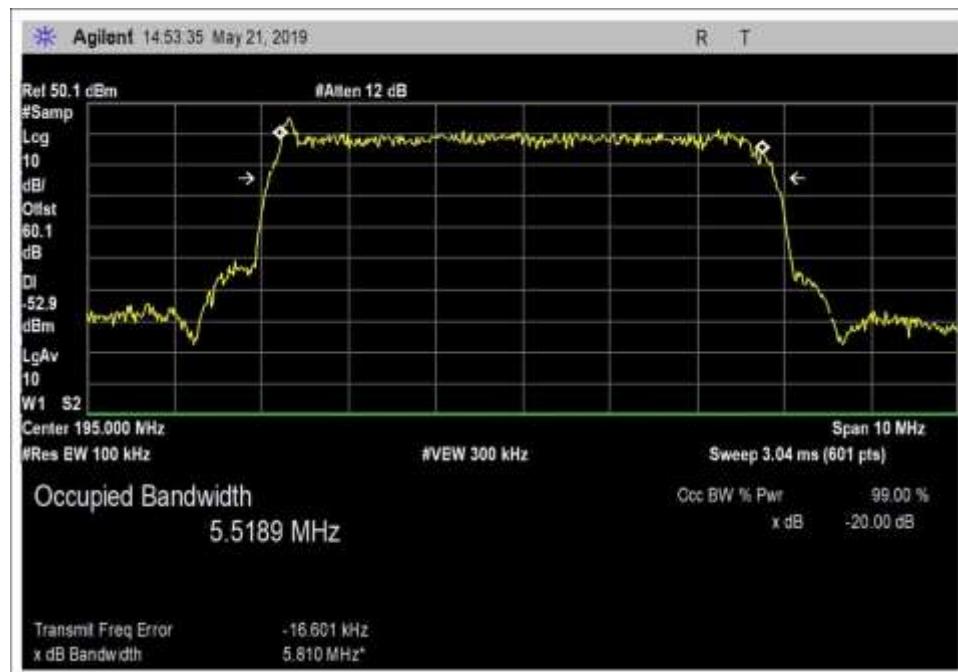
Test Data Summary

Frequency (MHz)	Modulation	Rated Power (dBm)	Measured (dBm)	Limit (dBm)	Results
195	8VSB	50.0	50.0	≤64.8	Pass
195	8VSB	58.45	57.76	≤64.8	Pass

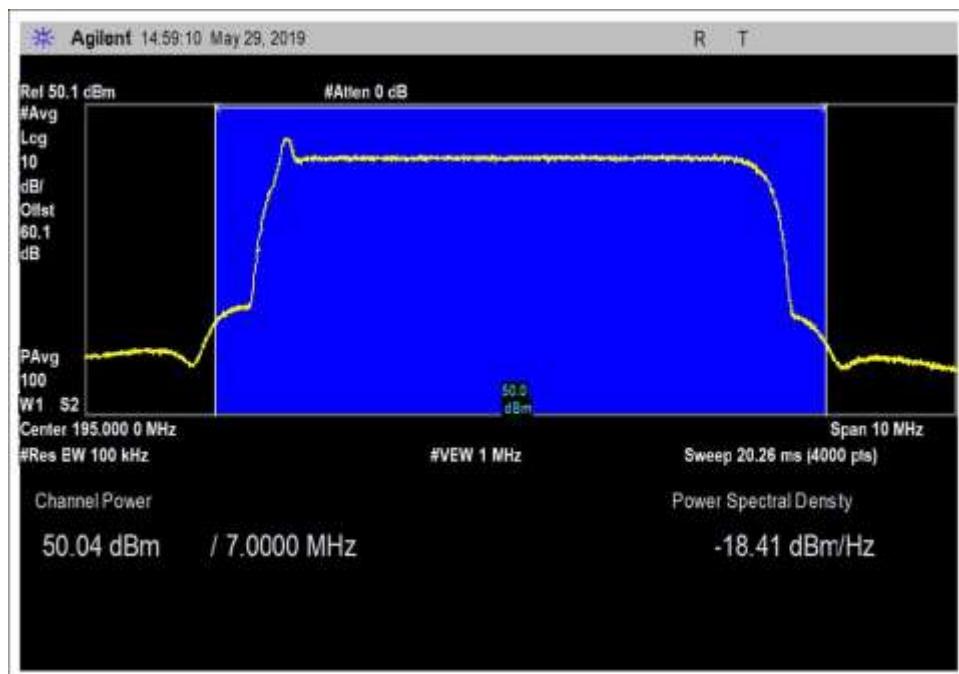
Plots



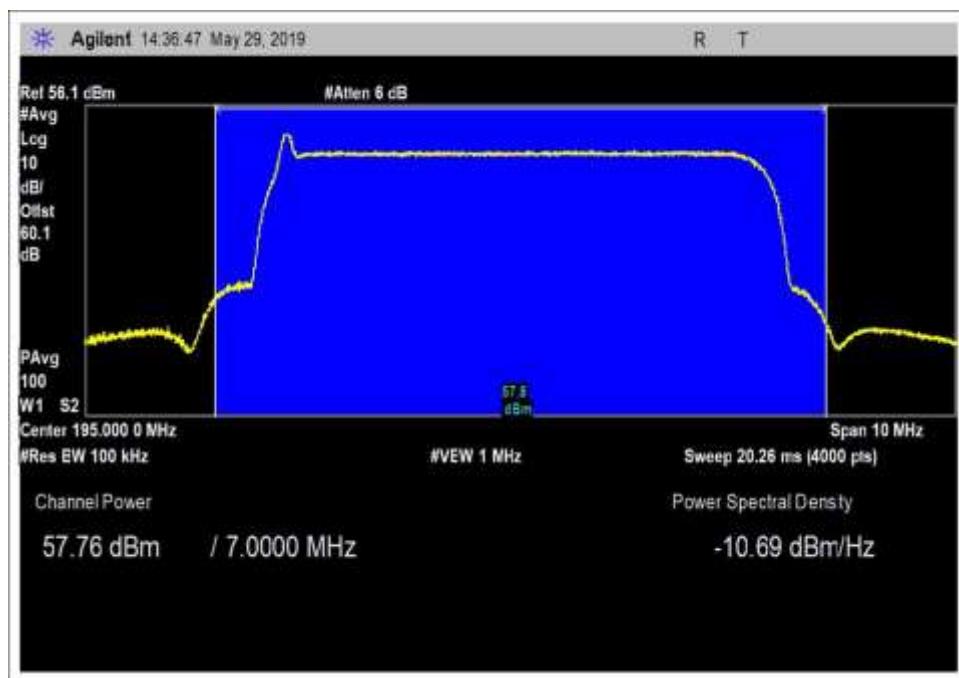
99% 100W



99% 600W



RF Power 100W



RF Power 600W 578dBm

Test Setup Photo(s)



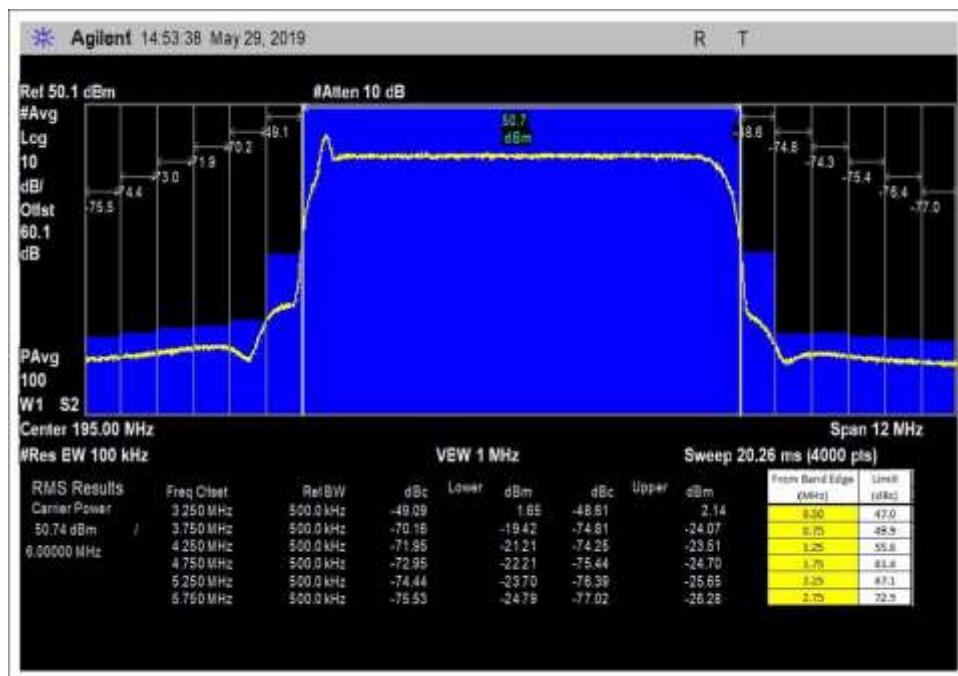
74.794(a)(2)(ii) Occupied Bandwidth / Stringent Mask

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	E. Wong
Test Method:	ANSI C63.26-2015 5.4.4 DA 05-1321-2005	Test Date(s):	5/29/2019
Configuration:	1		
Limit:	<p><i>(ii) Stringent mask. In the first 500 kHz from the channel edges, emissions must be attenuated no less than 47 dB. More than 3 MHz from the channel edges, emissions must be attenuated no less than 76 dB. At any frequency between 0.5 and 3 MHz from the channel edges, emissions must be attenuated no less than the value determined by the following formula:</i></p> $A(dB) = 47 + 11.5 (\Delta f - 0.5)$		

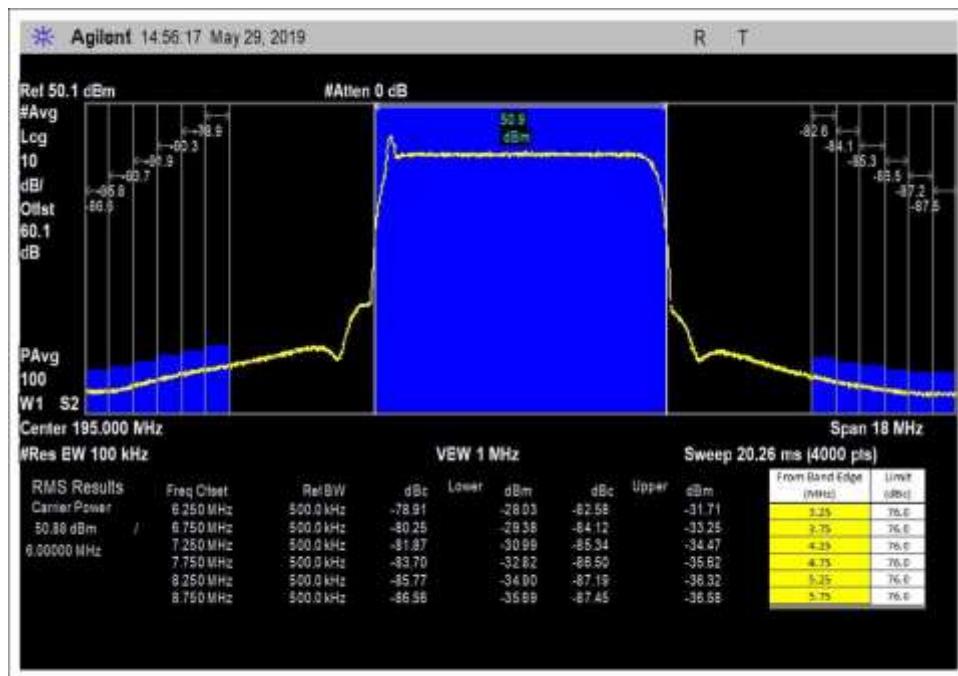
Environmental Conditions			
Temperature (°C)	25	Relative Humidity (%):	47

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/13/2019	3/13/2021
P07244	Cable	H&S	32022-29094K-29094K-24TC	7/5/2018	7/5/2020
03716	Attenuator	Weinschel	82-30-34	5/14/2019	5/14/2021
P01578	Attenuator	Bird	25-A-MFN-30	10/25/2017	10/25/2019

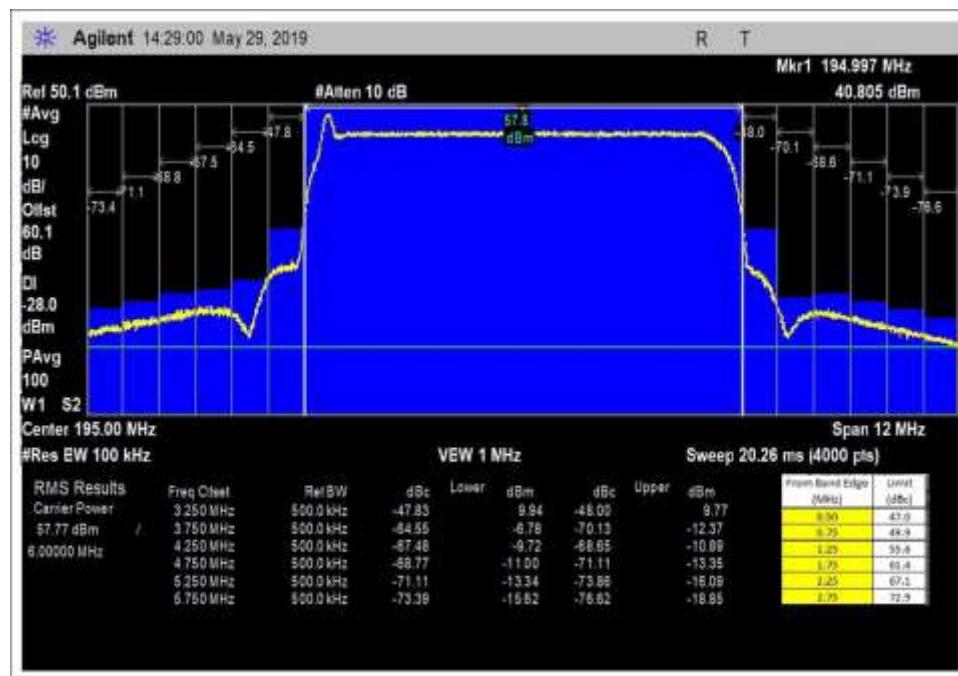
Emissions Mask



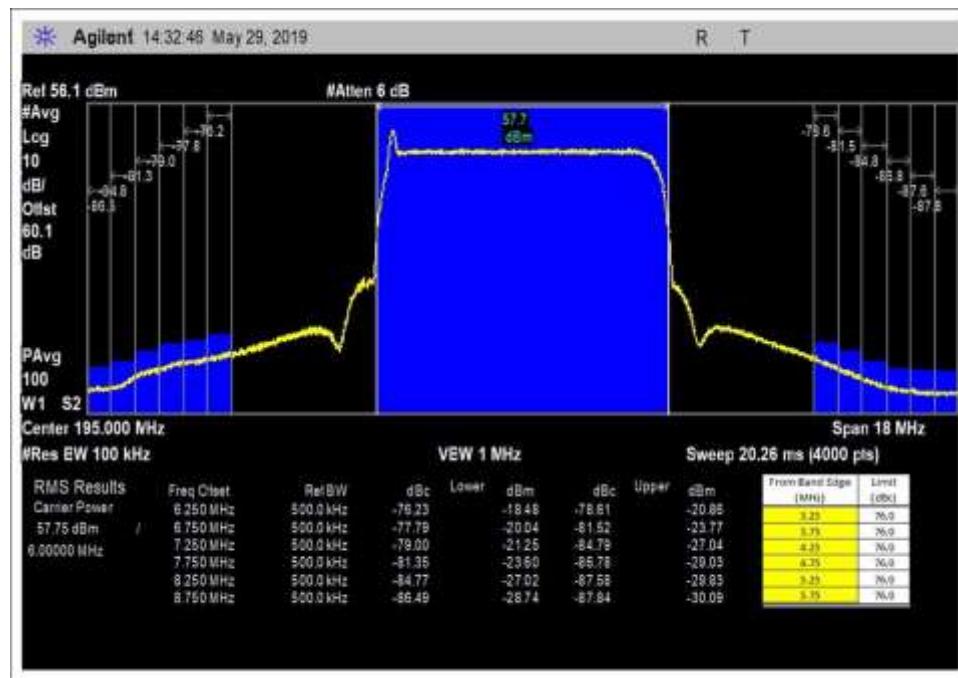
100W



100W



600W 578dBm



600W 578dBm

Test Setup Photo(s)



74.794(a)(2)(ii) Spurious Emissions at Antenna Terminal

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	E. Wong
Test Method:	ANSI C63.26-2015 5.7 DA 05-1321-2005	Test Date(s):	5/29/2019
Configuration:	1		
Limit Line Calculation:	<p>74.794(a)(2)(ii) Digital emissions. Stringent Mask. Stringent mask. Emissions more than 3 MHz from the channel edges, emissions must be attenuated no less than 76 dB.</p> <p>$\text{dBm} = 10 \log (P)$ where P is in mW $\text{dBuV} = \text{dBm} + 107$</p> <p>100 Watts = 50.0 dBm 600 Watts = 57.8 dBm</p> <p>100 Watts limit line = $50.0 - 76 = -26 \text{ dBm} = 81 \text{ dBuV}$ 600 Watts limit line = $57.8 - 76 = -18.2 \text{ dBm} = 88 \text{ dBuV}$</p>		

Environmental Conditions			
Temperature (°C)	25	Relative Humidity (%):	47

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/13/2019	3/13/2021
P07244	Cable	H&S	32022-29094K-29094K-24TC	7/5/2018	7/5/2020
03716	Attenuator	Weinschel	82-30-34	5/14/2019	5/14/2021
P01578	Attenuator	Bird	25-A-MFN-30	10/25/2017	10/25/2019
C00137	195MHz DC/Cable	Generic	NA	5/20/2019	5/20/2021
C00139	VHF B.III Bandpass Filter	COM-TECH	A-CL6X60B-A006	5/22/2019	5/22/2021

Test Data

Test Location: CKC Laboratories • 100 North Olinda Place • Brea CA 92823 • 714 993-6112
 Customer: **Anywave Communication Technologies, Inc.**
 Specification: **47 CFR §74.794(A)(2)(ii) Spurious Emissions**
 Work Order #: **102510** Date: 5/29/2019
 Test Type: **Conducted Emissions** Time: 16:14:59
 Tested By: E. Wong Sequence#: 1
 Software: EMITest 5.03.12 120/60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT is placed on the test bench. RF out of the exciter is connected to RF-In-A of the controller.

RF-Out-2 port of the controller is connected to the RF in port of the Amplifier.

FWD-IN port of the controller is connected the Forward port of the directional coupler at the RF OUT of the Amplifier,

REMOTE1 Port of the exciter is connected to RES-485-A port of the controller. PRD-485-1 port of the controller is connected to the RS485 Port of the amplifier.

RS45B of exciter, Lan port of Controller, LAN port of the Amplifier are connected to a Router.

The RF OUT of the amplifier is connected to the spectrum analyzer via two high power attenuators. (note the band pass filter is NOT installed for this measurement,)

Re-coded measurement is corrected with respect to attenuation of the Band Pass Filter as determined from separate insertion loss measurement.

Fundamental Frequency: 195MHz

Operations at 100W

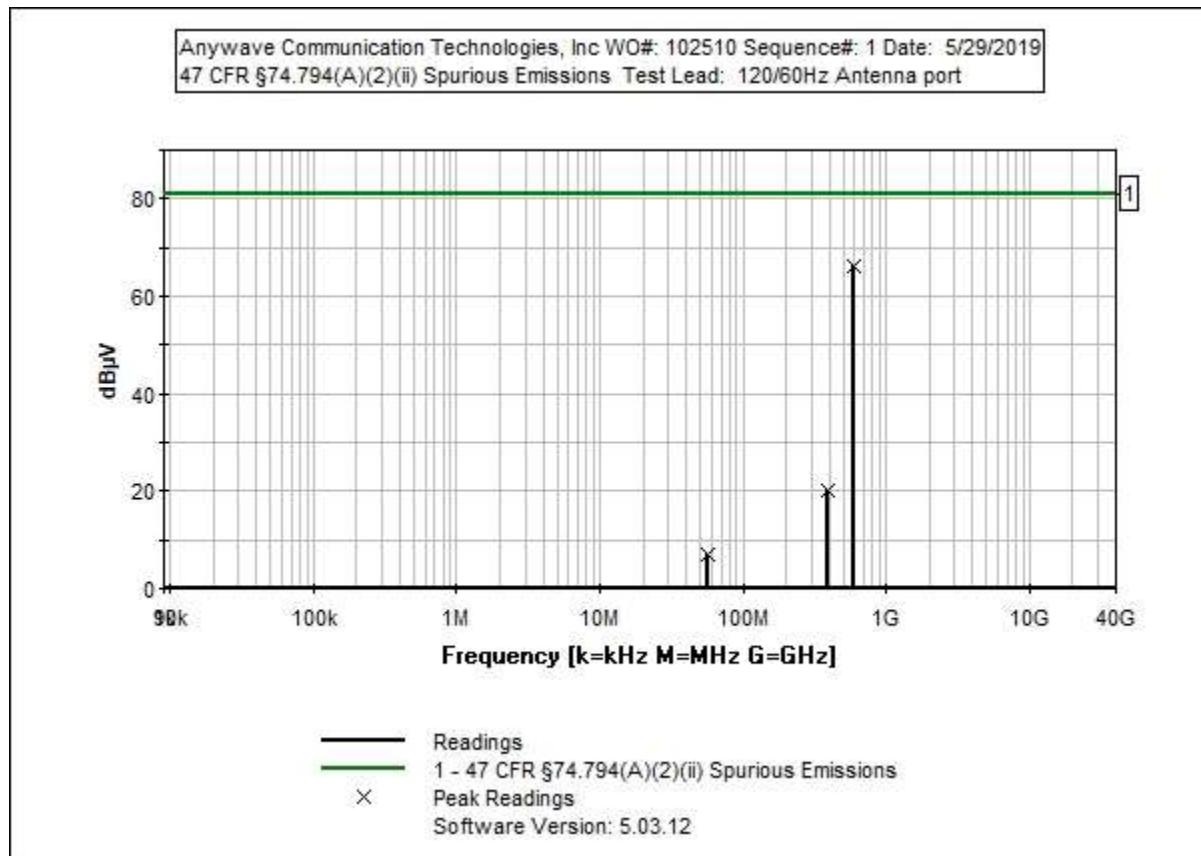
Frequency range of measurement = 9 kHz- 2 GHz.

RBW=510kHz, VBW=1MHz

Test environment conditions: 25.1°C, Relative Humidity: 47%, Pressure: 98.6kPa

Site A

ANSI C63.26-2015


Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	3/13/2019	3/13/2021
T2	ANP01578	Attenuator	25-A-MFN-30	10/25/2017	10/25/2019
T3	AN03716	Attenuator	82-30-34	5/14/2019	5/14/2021
T4	ANP07244	Cable	32022-29094K-29094K-24TC	7/5/2018	7/5/2020
T5	ANC00139	Band Pass Filter	25-A-MFN-30	5/22/2019	5/22/2021
T6	ANC00137	Cable	RG-142	5/20/2019	5/20/2021

Measurement Data: Reading listed by margin.

Test Lead: Antenna port

#	Freq MHz	Rdng dB _u V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB _u V	Spec dB _u V	Margin dB	Polar Ant
1	584.200M	30.5	+0.0	+30.2	+29.5	+0.2	+0.0	66.3	81.0	-14.7	Anten
			-24.3	+0.2							
2	389.600M	49.5	+0.0	+30.1	+29.7	+0.1	+0.0	20.0	81.0	-61.0	Anten
			-89.6	+0.2							
3	56.950M	36.2	+0.0	+30.1	+29.8	+0.0	+0.0	6.8	81.0	-74.2	Anten
			-89.4	+0.1							



Test Location: CKC Laboratories • 100 North Olinda Place • Brea CA 92823 • 714 993-6112
Customer: **Anywave Communication Technologies, Inc.**
Specification: **47 CFR §74.794(A)(2)(ii) Spurious Emissions**
Work Order #: **102510** Date: 5/29/2019
Test Type: **Conducted Emissions** Time: 16:25:56
Tested By: E. Wong Sequence#: 2
Software: EMITest 5.03.12 120/60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT is placed on the test bench. RF out of the exciter is connected to RF-In-A of the controller.

RF-Out-2 port of the controller is connected to the RF in port of the Amplifier.

FWD-IN port of the controller is connected the Forward port of the directional coupler at the RF OUT of the Amplifier,

REMOTE1 Port of the exciter is connected to RES-485-A port of the controller. PRD-485-1 port of the controller is connected to the RS485 Port of the amplifier.

RS45B of exciter, Lan port of Controller, LAN port of the Amplifier are connected to a Router.

The RF OUT of the amplifier is connected to the spectrum analyzer via two high power attenuators. (note the band pass filter is NOT installed for this measurement,)

Re-coded measurement is corrected with respect to attenuation of the Band Pass Filter as determined from separate insertion loss measurement.

Fundamental Frequency: 195MHz

Operations at 600W

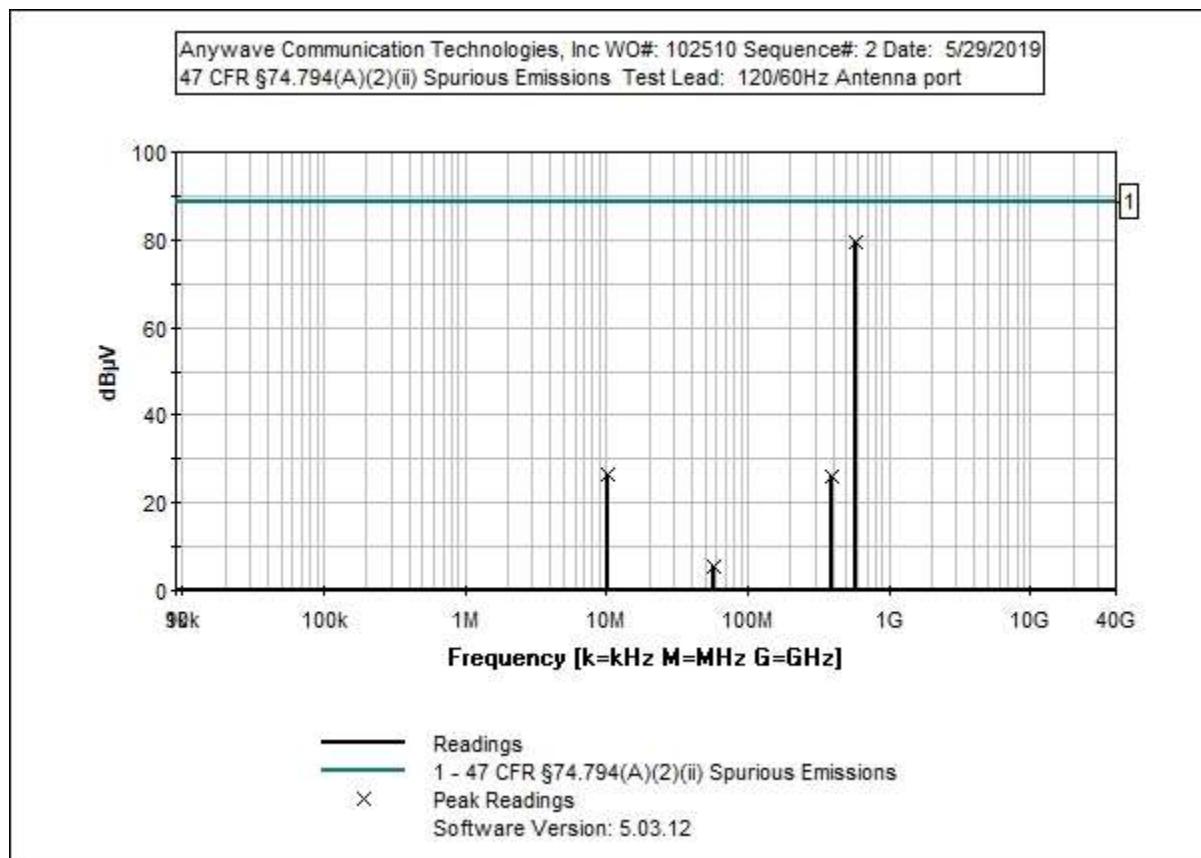
Frequency range of measurement = 9 kHz- 2 GHz.

RBW=510kHz, VBW=1MHz

Test environment conditions: 25.1°C, Relative Humidity: 47%, Pressure: 98.6kPa

Site A

ANSI C63.26-2015


Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02672	Spectrum Analyzer	E4446A	3/13/2019	3/13/2021
T1	ANP01578	Attenuator	25-A-MFN-30	10/25/2017	10/25/2019
T2	AN03716	Attenuator	82-30-34	5/14/2019	5/14/2021
T3	ANP07244	Cable	32022-29094K-29094K-24TC	7/5/2018	7/5/2020
T4	ANC00139	Band Pass Filter	25-A-MFN-30	5/22/2019	5/22/2021
T5	ANC00137	Cable	RG-142	5/20/2019	5/20/2021

Measurement Data: Reading listed by margin.

Test Lead: Antenna port

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB _u V	dB	dB	dB	dB	Table	dB _u V	dB _u V	dB	Ant
1	584.000M	44.2	+30.2	+29.5	+0.2	-24.7	+0.0	79.6	88.8	-9.2	Anten
			+0.2								
2	10.250M	53.1	+30.1	+29.8	+0.0	-86.5	+0.0	26.6	88.8	-62.2	Anten
			+0.1								
3	388.800M	57.1	+30.1	+29.7	+0.1	-91.2	+0.0	26.0	88.8	-62.8	Anten
			+0.2								
4	58.000M	36.5	+30.1	+29.8	+0.0	-90.8	+0.0	5.7	88.8	-83.1	Anten
			+0.1								

Test Setup Photo(s)



74.794(a)(2)(ii) Field Strength of Spurious Radiation

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	E. Wong
Test Method:	ANSI C63.26-2015 5.5 DA 05-1321-2005	Test Date(s):	5/28/2019
Configuration:	1		
Limit Line Calculation	<p>74.794(a)(2)(ii) Digital emissions. Stringent Mask. <i>Stringent mask.</i> Emissions more than 3 MHz from the channel edges, emissions must be attenuated no less than 76 dB.</p> <p>$dBm = 10 \log (P)$ where P is in mW $dBuV = dBm + 107$</p> <p>100 Watts = 50.0 dBm 600 Watts = 57.8 dBm</p> <p>100 Watts limit line = $50.0 - 76 = -26$ dBm = 81 dBuV 600 Watts limit line = $57.8 - 76 = -18.2$ dBm = 88 dBuV</p>		

Environmental Conditions			
Temperature (°C)	25	Relative Humidity (%):	47

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/13/2019	3/13/2021
00309	Preamp	HP	8447D	2/19/2018	2/19/2020
01995	Biconilog Antenna	Chase	CBL6111C	4/23/2018	4/23/2020
P05275	Attenuator	Weinschel	1W	4/5/2018	4/5/2020
P05050	Cable	Pasternack	RG223/U	12/24/2018	12/24/2020
P05198	Cable	Belden	8268	12/4/2018	12/4/2020
00314	Loop Antenna	EMCO	6502	5/13/2018	5/13/2020
00849	Horn Antenna	ETS	3115	3/14/2018	3/14/2020
P07244	Cable	H&S	32022-29094K-29094K-24TC	7/5/2018	7/5/2020
00786	Preamp	HP	83017A	5/12/2018	5/12/2020
P07139	Cable	Andrew	ANDL1-PNMNM-48	3/4/2019	3/4/2021

Test Data

Test Location: CKC Laboratories Inc. • 110 N Olinda Pl • Brea CA 92823 • 714 993-6112
 Customer: **Anywave Communication Technologies Inc.**
 Specification: **74.794(a)(2)(ii) Radiated Emissions**
 Work Order #: **102510** Date: 5/29/2019
 Test Type: **Maximized Emissions** Time: 09:41:49
 Tested By: Don Nguyen Sequence#: 13
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT is placed on the test bench. RF out of the exciter is connected to RF-In-A of the controller. Feed Back RF in A is connected to forward power of directional coupler before Band pass filter, Feed Back RF in B is connected to forward power of directional coupler After Band Pass filter.

RF-Out-2 port of the controller is connected to the RF in port of the Amplifier.

FWD-IN port of the controller is connected the Forward port of the directional coupler at the RF OUT of the Amplifier,

REMOTE1 Port of the exciter is connected to ERS-485-A port of the controller. PRS-485-1 port of the controller is connected to the RS485 Port of the amplifier.

All Ethernet ports are connected to a support network switch.

All other IO ports are unpopulated and only used for troubleshooting.

The Output of Band Pass Filter is terminated to the 50ohm load via two high power attenuators.

Fundamental Frequency: 195MHz

Output power: 100W,

Frequency range of measurement 9kHz -2000MHz

9 kHz -150 kHz;RBW=200 Hz,VBW=200 Hz;150 kHz-30 MHz;RBW=9 kHz,VBW=9 kHz;30 MHz-1000 MHz;RBW=120 kHz,VBW=120 kHz,1000 MHz-2000MHz;RBW=1 MHz,VBW=1 MHz.

Temperature: 22.1°C, Humidity: 43.0%

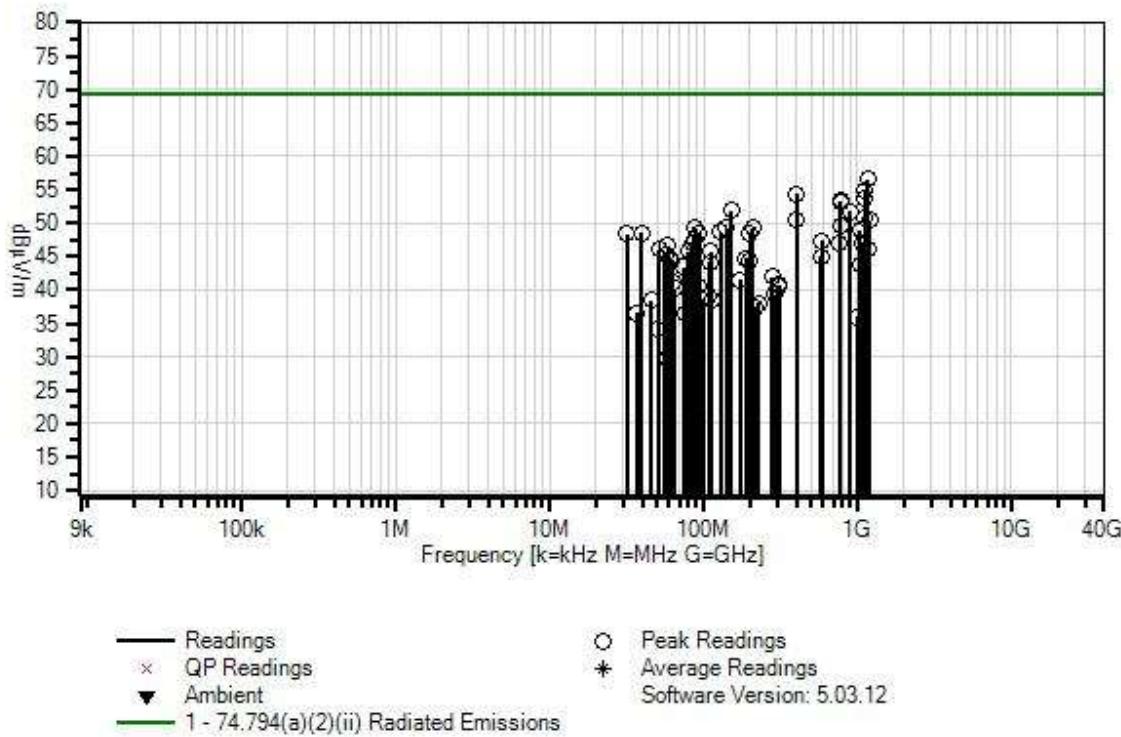
ANSI C63.26-2015

Site A

Modification #1 was in place during testing.

Note; bandwidth correction per 74.794 (a)(3) is applied to readings below 1GHz.

$10 \log (B\text{W}_{\text{alternate}}/500) = 10 \log (120/500) = 6.2\text{dB}$

Anywave Communication Technologies Inc. WO#: 102510 Sequence#: 13 Date: 5/29/2019
 74.794(a)(2)(ii) Radiated Emissions Test Distance: 3 Meters Horiz

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00314	Loop Antenna	6502	5/13/2018	5/13/2020
T1	AN00309	Preamp	8447D	2/19/2018	2/19/2020
T2	AN01995	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020
T3	ANP05275	Attenuator	1W	4/5/2018	4/5/2020
T4	ANP05050	Cable	RG223/U	12/24/2018	12/24/2020
T5	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/4/2018	12/4/2020
T6	AN74.794 (a)(3)	Test Data Adjustment		8/24/2018	8/24/2022
	AN02672	Spectrum Analyzer	E4446A	3/13/2019	3/13/2021
T7	AN00849	Horn Antenna	3115	3/14/2018	3/14/2020
T8	ANP07244	Cable	32022-29094K- 29094K-24TC	7/5/2018	7/5/2020
T9	AN00786	Preamp	83017A	5/12/2018	5/12/2020
T10	ANP07139	Cable	ANDL1- PNMNM-48	3/4/2019	3/4/2021

Measurement Data:			Reading listed by margin.				Test Distance: 3 Meters					
#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar	
			MHz	dB μ V	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	1168.000M	69.1	+0.0 +0.0 -40.3	+0.0 +0.0 +2.1	+0.0 +25.5 +0.2	+0.0	+0.0	56.6	69.2	-12.6	Vert	
2	1119.830M	67.8	+0.0 +0.0 -40.6	+0.0 +0.0 +2.0	+0.0 +25.4 +0.2	+0.0	+0.0	54.8	69.2	-14.4	Vert	
3	400.004M	50.1	-27.9 +3.7 +0.0	+15.9 +6.2 +0.0	+6.0 +0.0 +0.0	+0.3	+0.0	54.3	69.2	-14.9	Horiz	
4	1119.670M	66.6	+0.0 +0.0 -40.6	+0.0 +0.0 +2.0	+0.0 +25.4 +0.2	+0.0	+0.0	53.6	69.2	-15.6	Vert	
5	778.710M	40.9	-27.2 +5.4 +0.0	+21.6 +6.2 +0.0	+6.0 +0.0 +0.0	+0.4	+0.0	53.3	69.2	-15.9	Vert	
6	778.010M	40.7	-27.2 +5.4 +0.0	+21.6 +6.2 +0.0	+6.0 +0.0 +0.0	+0.4	+0.0	53.1	69.2	-16.1	Horiz	
7	151.040M	54.1	-28.0 +2.2 +0.0	+11.2 +6.2 +0.0	+6.0 +0.0 +0.0	+0.2	+0.0	51.9	69.2	-17.3	Vert	
8	151.110M	54.0	-28.0 +2.2 +0.0	+11.2 +6.2 +0.0	+6.0 +0.0 +0.0	+0.2	+0.0	51.8	69.2	-17.4	Horiz	
9	899.992M	37.6	-27.2 +5.9 +0.0	+22.8 +6.2 +0.0	+6.1 +0.0 +0.0	+0.4	+0.0	51.8	69.2	-17.4	Vert	
10	1120.000M	63.9	+0.0 +0.0 -40.6	+0.0 +0.0 +2.0	+0.0 +25.4 +0.2	+0.0	+0.0	50.9	69.2	-18.3	Horiz	
11	400.002M	46.3	-27.9 +3.7 +0.0	+15.9 +6.2 +0.0	+6.0 +0.0 +0.0	+0.3	+0.0	50.5	69.2	-18.7	Vert	
12	1200.500M	62.8	+0.0 +0.0 -40.2	+0.0 +0.0 +2.1	+0.0 +25.4 +0.2	+0.0	+0.0	50.3	69.2	-18.9	Horiz	
13	777.510M	37.3	-27.2 +5.4 +0.0	+21.6 +6.2 +0.0	+6.0 +0.0 +0.0	+0.4	+0.0	49.7	69.2	-19.5	Horiz	
14	208.860M	52.3	-28.0 +2.7 +0.0	+9.8 +6.2 +0.0	+6.0 +0.0 +0.0	+0.2	+0.0	49.2	69.2	-20.0	Horiz	
15	88.560M	54.7	-28.1 +1.7 +0.0	+8.6 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1	+0.0	49.2	69.2	-20.0	Vert	

16	140.110M	51.0	-28.0 +2.1 +0.0	+11.7 +6.2 +0.0	+6.0 +0.0 +0.0	+0.2 +0.0 +0.0	+0.0 +0.0 +0.0	49.2	69.2	-20.0	Horiz
17	1040.000M	63.2	+0.0 +0.0 -41.1	+0.0 +0.0 +1.9	+0.0 +24.8 +0.2	+0.0 +0.2 +0.0	+0.0 +0.0 +0.0	49.0	69.2	-20.2	Vert
18	128.790M	50.6	-28.0 +2.0 +0.0	+11.8 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	48.7	69.2	-20.5	Vert
19	39.710M	49.9	-28.1 +1.1 +0.0	+13.4 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	48.6	69.2	-20.6	Vert
20	199.610M	52.4	-28.0 +2.6 +0.0	+9.1 +6.2 +0.0	+6.0 +0.0 +0.0	+0.2 +0.0 +0.0	+0.0 +0.0 +0.0	48.5	69.2	-20.7	Horiz
21	94.260M	53.2	-28.1 +1.7 +0.0	+9.3 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	48.4	69.2	-20.8	Vert
22	31.710M	45.6	-28.1 +0.9 +0.0	+17.7 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	48.4	69.2	-20.8	Vert
23	87.060M	53.1	-28.1 +1.7 +0.0	+8.4 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	47.4	69.2	-21.8	Vert
24	583.990M	38.1	-27.6 +4.6 +0.0	+19.6 +6.2 +0.0	+6.0 +0.0 +0.0	+0.4 +0.0 +0.0	+0.0 +0.0 +0.0	47.3	69.2	-21.9	Vert
25	763.010M	34.7	-27.2 +5.4 +0.0	+21.4 +6.2 +0.0	+6.0 +0.0 +0.0	+0.5 +0.0 +0.0	+0.0 +0.0 +0.0	47.0	69.2	-22.2	Horiz
26	1080.000M	60.5	+0.0 +0.0 -40.8	+0.0 +0.0 +2.0	+0.0 +25.0 +0.2	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	46.9	69.2	-22.3	Horiz
27	84.760M	52.9	-28.1 +1.6 +0.0	+8.2 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	46.9	69.2	-22.3	Vert
28	58.673M	55.1	-28.1 +1.4 +0.0	+6.0 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	46.7	69.2	-22.5	Vert
29	1172.850M	58.6	+0.0 +0.0 -40.3	+0.0 +0.0 +2.1	+0.0 +25.5 +0.2	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	46.1	69.2	-23.1	Horiz
30	51.210M	52.7	-28.1 +1.2 +0.0	+8.0 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	46.1	69.2	-23.1	Vert
31	79.760M	52.1	-28.1 +1.6 +0.0	+7.8 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	45.7	69.2	-23.5	Vert
32	110.760M	48.6	-28.1 +1.9 +0.0	+11.0 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	45.7	69.2	-23.5	Vert

33	55.910M	53.1	-28.1 +1.3 +0.0	+6.7 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	45.3	69.2	-23.9	Vert
34	580.737M	35.8	-27.6 +4.6 +0.0	+19.6 +6.2 +0.0	+6.0 +0.0 +0.0	+0.4 +0.0 +0.0	+0.0 +0.0 +0.0	45.0	69.2	-24.2	Horiz
35	187.610M	48.8	-28.0 +2.5 +0.0	+9.1 +6.2 +0.0	+6.0 +0.0 +0.0	+0.2 +0.0 +0.0	+0.0 +0.0 +0.0	44.8	69.2	-24.4	Horiz
36	60.223M	53.2	-28.1 +1.4 +0.0	+5.7 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	44.5	69.2	-24.7	Vert
37	62.223M	53.0	-28.1 +1.4 +0.0	+5.8 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	44.4	69.2	-24.8	Vert
38	199.040M	48.2	-28.0 +2.6 +0.0	+9.1 +6.2 +0.0	+6.0 +0.0 +0.0	+0.2 +0.0 +0.0	+0.0 +0.0 +0.0	44.3	69.2	-24.9	Vert
39	109.560M	47.2	-28.1 +1.9 +0.0	+10.9 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	44.2	69.2	-25.0	Vert
40	1039.700M	57.9	+0.0 +0.0 -41.1	+0.0 +0.0 +1.9	+0.0 +24.8 +0.0	+0.0 +0.2 +0.0	+0.0 +0.0 +0.0	43.7	69.2	-25.5	Horiz
41	73.860M	50.9	-28.1 +1.5 +0.0	+6.8 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	43.4	69.2	-25.8	Vert
42	277.860M	41.3	-28.0 +3.1 +0.0	+13.1 +6.2 +0.0	+6.0 +0.0 +0.0	+0.3 +0.0 +0.0	+0.0 +0.0 +0.0	42.0	69.2	-27.2	Horiz
43	172.540M	45.0	-28.0 +2.4 +0.0	+9.7 +6.2 +0.0	+6.0 +0.0 +0.0	+0.2 +0.0 +0.0	+0.0 +0.0 +0.0	41.5	69.2	-27.7	Vert
44	63.323M	49.7	-28.1 +1.4 +0.0	+5.8 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	41.1	69.2	-28.1	Vert
45	307.540M	39.5	-28.0 +3.2 +0.0	+13.5 +6.2 +0.0	+6.0 +0.0 +0.0	+0.3 +0.0 +0.0	+0.0 +0.0 +0.0	40.7	69.2	-28.5	Vert
46	306.570M	39.3	-28.0 +3.2 +0.0	+13.5 +6.2 +0.0	+6.0 +0.0 +0.0	+0.3 +0.0 +0.0	+0.0 +0.0 +0.0	40.5	69.2	-28.7	Horiz
47	94.230M	45.2	-28.1 +1.7 +0.0	+9.3 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	40.4	69.2	-28.8	Horiz
48	64.823M	48.6	-28.1 +1.5 +0.0	+5.9 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	40.2	69.2	-29.0	Vert
49	287.040M	38.5	-28.0 +3.1 +0.0	+13.2 +6.2 +0.0	+6.0 +0.0 +0.0	+0.3 +0.0 +0.0	+0.0 +0.0 +0.0	39.3	69.2	-29.9	Vert

50	108.842M	42.2	-28.1 +1.8 +0.0	+10.8 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	39.0	69.2	-30.2	Horiz
51	113.130M	41.2	-28.0 +1.9 +0.0	+11.2 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	38.6	69.2	-30.6	Horiz
52	99.630M	42.3	-28.1 +1.8 +0.0	+10.1 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	38.4	69.2	-30.8	Horiz
53	45.592M	42.7	-28.1 +1.2 +0.0	+10.3 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	38.4	69.2	-30.8	Horiz
54	226.360M	39.7	-28.0 +2.8 +0.0	+11.2 +6.2 +0.0	+6.0 +0.0 +0.0	+0.2 +0.0 +0.0	+0.0 +0.0 +0.0	38.1	69.2	-31.1	Horiz
55	218.290M	39.8	-28.0 +2.7 +0.0	+10.6 +6.2 +0.0	+6.0 +0.0 +0.0	+0.2 +0.0 +0.0	+0.0 +0.0 +0.0	37.5	69.2	-31.7	Vert
56	36.860M	36.4	-28.1 +1.0 +0.0	+15.0 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	36.6	69.2	-32.6	Horiz
57	76.680M	43.3	-28.1 +1.6 +0.0	+7.3 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	36.4	69.2	-32.8	Horiz
58	1000.010M	50.4	+0.0 +0.0 -41.3	+0.0 +0.0 +1.9	+0.0 +0.0 +24.7	+0.0 +0.0 +0.2	+0.0 +0.0 +0.0	35.9	69.2	-33.3	Vert
59	85.980M	41.6	-28.1 +1.7 +0.0	+8.4 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	35.9	69.2	-33.3	Horiz
60	51.042M	40.9	-28.1 +1.2 +0.0	+8.0 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	34.3	69.2	-34.9	Horiz
61	58.792M	38.0	-28.1 +1.4 +0.0	+6.0 +6.2 +0.0	+6.0 +0.0 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	29.6	69.2	-39.6	Horiz



Test Location: CKC Laboratories Inc. • 110 N Olinda Pl • Brea CA 92823 • 714 993-6112
Customer: **Anywave Communication Technologies Inc.**
Specification: **74.794(a)(2)(ii) Radiated Emissions**
Work Order #: **102510** Date: 5/29/2019
Test Type: **Maximized Emissions** Time: 09:15:49
Tested By: E. Wong Sequence#: 13
Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT is placed on the test bench. RF out of the exciter is connected to RF-In-A of the controller. Feed Back RF in A is connected to forward power of directional coupler before Band pass filter, Feed Back RF in B is connected to forward power of directional coupler After Band Pass filter.
RF-Out-2 port of the controller is connected to the RF in port of the Amplifier.
FWD-IN port of the controller is connected the Forward port of the directional coupler at the RF OUT of the Amplifier,
REMOTE1 Port of the exciter is connected to ERS-485-A port of the controller. PRS-485-1 port of the controller is connected to the RS485 Port of the amplifier.
All Ethernet ports are connected to a support network switch.
All other IO ports are unpopulated and only used for troubleshooting.
The Output of Band Pass Filter is terminated to the 50ohm load via two high power attenuators.
Fundamental Frequency: 195MHz
Output power: 600W

Frequency range of measurement 9kHz -2000MHz

9 kHz -150 kHz;RBW=200 Hz,VBW=200 Hz;150 kHz-30 MHz;RBW=9 kHz,VBW=9 kHz;30 MHz-1000 MHz;RBW=120 kHz,VBW=120 kHz,1000 MHz-2000 MHz;RBW=1 MHz,VBW=1 MHz.

Temperature: 22.1°C, Humidity: 43.0%

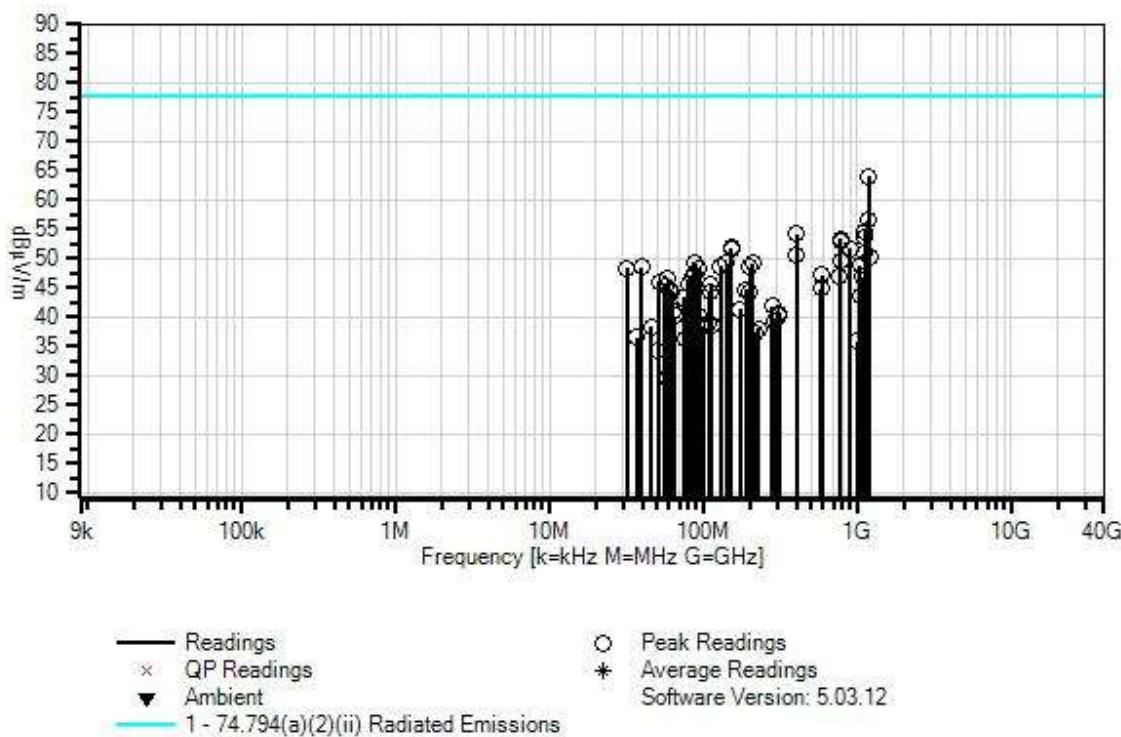
ANSI C63.26-2015

Site A

Modification #1 was in place during testing.

Note; bandwidth correction per 74.794 (a)(3) is applied to readings below 1GHz.
 $10 \log (B\text{W}_{\text{alternate}}/500) = 10 \log (120/500) = 6.2\text{dB}$

Anywave Communication Technologies Inc. WO#: 102510 Sequence#: 13 Date: 5/29/2019
74.794(a)(2)(ii) Radiated Emissions Test Distance: 3 Meters Horiz



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00314	Loop Antenna	6502	5/13/2018	5/13/2020
T1	AN00309	Preamp	8447D	2/19/2018	2/19/2020
T2	AN01995	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020
T3	AN74.794 (a)(3)	Test Data Adjustment		8/24/2018	8/24/2022
T4	ANP05275	Attenuator	1W	4/5/2018	4/5/2020
T5	ANP05050	Cable	RG223/U	12/24/2018	12/24/2020
T6	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/4/2018	12/4/2020
	AN02672	Spectrum Analyzer	E4446A	3/13/2019	3/13/2021
T7	AN00849	Horn Antenna	3115	3/14/2018	3/14/2020
T8	ANP07244	Cable	32022-29094K-29094K-24TC	7/5/2018	7/5/2020
T9	AN00786	Preamp	83017A	5/12/2018	5/12/2020
T10	ANP07139	Cable	ANDL1-PNMNM-48	3/4/2019	3/4/2021

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 +0.0 +0.0 -40.3	T4 +0.0 +0.0 +25.5 +0.2	Dist	Corr	Spec	Margin	Polar		
			MHz	dB μ V	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant		
1	1178.400M	76.5			+0.0	+0.0	+0.0	+0.0	64.0	77.7	-13.7	Horiz	
					+0.0	+0.0	+25.5	+0.2					
					-40.3	+2.1							
2	1168.000M	69.1			+0.0	+0.0	+0.0	+0.0	56.6	77.7	-21.1	Vert	
					+0.0	+0.0	+25.5	+0.2					
					-40.3	+2.1							
3	1119.830M	67.8			+0.0	+0.0	+0.0	+0.0	54.8	77.7	-22.9	Vert	
					+0.0	+0.0	+25.4	+0.2					
					-40.6	+2.0							
4	400.004M	50.1			-27.9	+15.9	+6.2	+6.0	+0.0	54.3	77.7	-23.4	Horiz
					+0.3	+3.7	+0.0	+0.0					
					+0.0	+0.0	+0.0	+0.0					
5	1119.670M	66.6			+0.0	+0.0	+0.0	+0.0	53.6	77.7	-24.1	Vert	
					+0.0	+0.0	+25.4	+0.2					
					-40.6	+2.0							
6	778.710M	40.9			-27.2	+21.6	+6.2	+6.0	+0.0	53.3	77.7	-24.4	Vert
					+0.4	+5.4	+0.0	+0.0					
					+0.0	+0.0	+0.0	+0.0					
7	778.010M	40.7			-27.2	+21.6	+6.2	+6.0	+0.0	53.1	77.7	-24.6	Horiz
					+0.4	+5.4	+0.0	+0.0					
					+0.0	+0.0	+0.0	+0.0					
8	151.040M	54.1			-28.0	+11.2	+6.2	+6.0	+0.0	51.9	77.7	-25.8	Vert
					+0.2	+2.2	+0.0	+0.0					
					+0.0	+0.0	+0.0	+0.0					

9	151.110M	54.0	-28.0 +0.2 +0.0	+11.2 +2.2 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 51.8 77.7	51.8 77.7 77.7	77.7 77.7 77.7	-25.9 -25.9 -25.9	Horiz Vert Horiz
10	899.992M	37.6	-27.2 +0.4 +0.0	+22.8 +5.9 +0.0	+6.2 +0.0 +0.0	+6.1 +0.0 +0.0	+0.0 51.8 77.7	51.8 77.7 77.7	77.7 77.7 77.7	-25.9 -25.9 -25.9	Vert
11	1120.000M	63.9	+0.0 +0.0 -40.6	+0.0 +0.0 +2.0	+0.0 +25.4 +0.0	+0.0 +0.2	+0.0 50.9 77.7	50.9 77.7 77.7	77.7 77.7 77.7	-26.8 -26.8 -26.8	Horiz
12	400.002M	46.3	-27.9 +0.3 +0.0	+15.9 +3.7 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 50.5 77.7	50.5 77.7 77.7	77.7 77.7 77.7	-27.2 -27.2 -27.2	Vert
13	1200.500M	62.8	+0.0 +0.0 -40.2	+0.0 +0.0 +2.1	+0.0 +25.4 +0.0	+0.0 +0.2	+0.0 50.3 77.7	50.3 77.7 77.7	77.7 77.7 77.7	-27.4 -27.4 -27.4	Horiz
14	777.510M	37.3	-27.2 +0.4 +0.0	+21.6 +5.4 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 49.7 77.7	49.7 77.7 77.7	77.7 77.7 77.7	-28.0 -28.0 -28.0	Horiz
15	208.860M	52.3	-28.0 +0.2 +0.0	+9.8 +2.7 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 49.2 77.7	49.2 77.7 77.7	77.7 77.7 77.7	-28.5 -28.5 -28.5	Horiz
16	88.560M	54.7	-28.1 +0.1 +0.0	+8.6 +1.7 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 49.2 77.7	49.2 77.7 77.7	77.7 77.7 77.7	-28.5 -28.5 -28.5	Vert
17	140.110M	51.0	-28.0 +0.2 +0.0	+11.7 +2.1 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 49.2 77.7	49.2 77.7 77.7	77.7 77.7 77.7	-28.5 -28.5 -28.5	Horiz
18	1040.000M	63.2	+0.0 +0.0 -41.1	+0.0 +0.0 +1.9	+0.0 +24.8 +0.0	+0.0 +0.2	+0.0 49.0 77.7	49.0 77.7 77.7	77.7 77.7 77.7	-28.7 -28.7 -28.7	Vert
19	128.790M	50.6	-28.0 +0.1 +0.0	+11.8 +2.0 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 48.7 77.7	48.7 77.7 77.7	77.7 77.7 77.7	-29.0 -29.0 -29.0	Vert
20	39.710M	49.9	-28.1 +0.1 +0.0	+13.4 +1.1 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 48.6 77.7	48.6 77.7 77.7	77.7 77.7 77.7	-29.1 -29.1 -29.1	Vert
21	199.610M	52.4	-28.0 +0.2 +0.0	+9.1 +2.6 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 48.5 77.7	48.5 77.7 77.7	77.7 77.7 77.7	-29.2 -29.2 -29.2	Horiz
22	94.260M	53.2	-28.1 +0.1 +0.0	+9.3 +1.7 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 48.4 77.7	48.4 77.7 77.7	77.7 77.7 77.7	-29.3 -29.3 -29.3	Vert
23	31.710M	45.6	-28.1 +0.1 +0.0	+17.7 +0.9 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 48.4 77.7	48.4 77.7 77.7	77.7 77.7 77.7	-29.3 -29.3 -29.3	Vert
24	87.060M	53.1	-28.1 +0.1 +0.0	+8.4 +1.7 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 47.4 77.7	47.4 77.7 77.7	77.7 77.7 77.7	-30.3 -30.3 -30.3	Vert
25	583.990M	38.1	-27.6 +0.4 +0.0	+19.6 +4.6 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 47.3 77.7	47.3 77.7 77.7	77.7 77.7 77.7	-30.4 -30.4 -30.4	Vert

26	763.010M	34.7	-27.2 +0.5 +0.0	+21.4 +5.4 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	47.0	77.7	-30.7	Horiz
27	1080.000M	60.5	+0.0 +0.0 -40.8	+0.0 +0.0 +2.0	+0.0 +25.0 +0.2	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	46.9	77.7	-30.8	Horiz
28	84.760M	52.9	-28.1 +0.1 +0.0	+8.2 +1.6 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	46.9	77.7	-30.8	Vert
29	58.673M	55.1	-28.1 +0.1 +0.0	+6.0 +1.4 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	46.7	77.7	-31.0	Vert
30	51.210M	52.7	-28.1 +0.1 +0.0	+8.0 +1.2 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	46.1	77.7	-31.6	Vert
31	79.760M	52.1	-28.1 +0.1 +0.0	+7.8 +1.6 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	45.7	77.7	-32.0	Vert
32	110.760M	48.6	-28.1 +0.1 +0.0	+11.0 +1.9 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	45.7	77.7	-32.0	Vert
33	55.910M	53.1	-28.1 +0.1 +0.0	+6.7 +1.3 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	45.3	77.7	-32.4	Vert
34	580.737M	35.8	-27.6 +0.4 +0.0	+19.6 +4.6 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	45.0	77.7	-32.7	Horiz
35	187.610M	48.8	-28.0 +0.2 +0.0	+9.1 +2.5 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	44.8	77.7	-32.9	Horiz
36	60.223M	53.2	-28.1 +0.1 +0.0	+5.7 +1.4 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	44.5	77.7	-33.2	Vert
37	62.223M	53.0	-28.1 +0.1 +0.0	+5.8 +1.4 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	44.4	77.7	-33.3	Vert
38	199.040M	48.2	-28.0 +0.2 +0.0	+9.1 +2.6 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	44.3	77.7	-33.4	Vert
39	109.560M	47.2	-28.1 +0.1 +0.0	+10.9 +1.9 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	44.2	77.7	-33.5	Vert
40	1039.700M	57.9	+0.0 +0.0 -41.1	+0.0 +0.0 +1.9	+0.0 +24.8 +0.2	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	43.7	77.7	-34.0	Horiz
41	73.860M	50.9	-28.1 +0.1 +0.0	+6.8 +1.5 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	43.4	77.7	-34.3	Vert
42	277.860M	41.3	-28.0 +0.3 +0.0	+13.1 +3.1 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	42.0	77.7	-35.7	Horiz

43	172.540M	45.0	-28.0 +0.2 +0.0	+9.7 +2.4 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	41.5	77.7	-36.2	Vert
44	63.323M	49.7	-28.1 +0.1 +0.0	+5.8 +1.4 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	41.1	77.7	-36.6	Vert
45	307.540M	39.5	-28.0 +0.3 +0.0	+13.5 +3.2 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	40.7	77.7	-37.0	Vert
46	306.570M	39.3	-28.0 +0.3 +0.0	+13.5 +3.2 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	40.5	77.7	-37.2	Horiz
47	94.230M	45.2	-28.1 +0.1 +0.0	+9.3 +1.7 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	40.4	77.7	-37.3	Horiz
48	64.823M	48.6	-28.1 +0.1 +0.0	+5.9 +1.5 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	40.2	77.7	-37.5	Vert
49	287.040M	38.5	-28.0 +0.3 +0.0	+13.2 +3.1 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	39.3	77.7	-38.4	Vert
50	108.842M	42.2	-28.1 +0.1 +0.0	+10.8 +1.8 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	39.0	77.7	-38.7	Horiz
51	113.130M	41.2	-28.0 +0.1 +0.0	+11.2 +1.9 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	38.6	77.7	-39.1	Horiz
52	99.630M	42.3	-28.1 +0.1 +0.0	+10.1 +1.8 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	38.4	77.7	-39.3	Horiz
53	45.592M	42.7	-28.1 +0.1 +0.0	+10.3 +1.2 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	38.4	77.7	-39.3	Horiz
54	226.360M	39.7	-28.0 +0.2 +0.0	+11.2 +2.8 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	38.1	77.7	-39.6	Horiz
55	218.290M	39.8	-28.0 +0.2 +0.0	+10.6 +2.7 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	37.5	77.7	-40.2	Vert
56	36.860M	36.4	-28.1 +0.1 +0.0	+15.0 +1.0 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	36.6	77.7	-41.1	Horiz
57	76.680M	43.3	-28.1 +0.1 +0.0	+7.3 +1.6 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	36.4	77.7	-41.3	Horiz
58	1000.010M	50.4	+0.0 +0.0 -41.3	+0.0 +0.0 +1.9	+0.0 +24.7 +0.2	+0.0 +0.2 +0.0	+0.0 +0.2 +0.0	35.9	77.7	-41.8	Vert
59	85.980M	41.6	-28.1 +0.1 +0.0	+8.4 +1.7 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 +0.0 +0.0	35.9	77.7	-41.8	Horiz

60	51.042M	40.9	-28.1 +0.1 +0.0	+8.0 +1.2 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0 29.6	34.3 77.7	77.7	-43.4 -48.1	Horiz
61	58.792M	38.0	-28.1 +0.1 +0.0	+6.0 +1.4 +0.0	+6.2 +0.0 +0.0	+6.0 +0.0 +0.0	+0.0	29.6 77.7	77.7	-43.4 -48.1	Horiz

Test Setup Photo(s)



Below 1GHz



Below 1GHz



Above 1GHz



Above 1GHz

74.761(a)/74.761(b) Frequency Tolerance

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	E. Wong
Test Method:	Part 74.761(a)/ Part 74.761(b) Part 2.1055	Test Date(s):	5/29/2019
Configuration:	1		
Limit:	<p>74.761 (a) The visual carrier shall be maintained to within 0.02 percent of the assigned visual carrier frequency for transmitters rated at not more than 100 watts peak visual power.</p> <p>74.761 (b) The visual carrier shall be maintained to within 0.002 percent of the assigned visual carrier frequency for transmitters rated at more than 100 watts peak visual power.</p>		

Environmental Conditions			
Temperature (°C)	25	Relative Humidity (%):	47

Test Equipment - Voltage					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/13/2019	3/13/2021
07164	Multimeter	Fluke	8845A/G	7/27/2017	7/27/2019
03640	AC Power Source	PPS	360-AMX	2/22/2019	2/22/2020
P07244	Cable	H&S	32022-29094K-29094K-24TC	7/5/2018	7/5/2020

Test Equipment - Temperature					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02869	Spectrum Analyzer	Agilent	E4440A	8/10/2018	8/10/2019
P05947*	Thermometer	Fluke	51	5/11/2018	5/11/2020
NA	Temperature chamber	Thermaltron	MK8	NA	NA
NA	Temperature chamber	Cincinnati Sub Zero	ZH-32-22-H/AC	NA	NA

*Note: Temperature measurement recorded with CKC property AN05947

Parameter Definitions:

Measurements performed at input voltage Vnominal \pm 15%.

Parameter	Value
V _{Nominal} :	120 VAC
V _{Minimum} :	102.00 VAC
V _{Maximum} :	138.00 VAC

Measurements performed according to manufacturer specification.

Parameter	Value
T _{Nominal} :	+20C
T _{Minimum} :	-10C
T _{Maximum} :	+50C

Test Data - Voltage and Temperature

Temperature Variations			
Channel Frequency*:	(MHz)		Dev (%)
	192.308656000		
Temp (C)	Voltage		
-10	120	192.308623000	0.00002
0	120	192.308673000	-0.00001
10	120	192.308673000	-0.00001
20	120	192.308656000	0.00000
30	120	192.308673000	-0.00001
40	120	192.308661000	0.00000
50	120	192.308661000	0.00000

* Frequency measurement taken at -6dB point of the pilot tone signal. Evaluation performed at the RF monitor port of the Exciter (signal source)

Voltage Variations (\pm 15%)			
Temp (C)	Voltage	Channel 1 (MHz)	Dev (%)
20	102.0	192.308656000	0.00000
20	120.0	192.308656000	0.00000
20	138.0	192.308656000	0.00000

Max Deviation (ppm)	+	0.00002
Max Deviation (ppm)	-	0.00001
PASS		

Test Setup Photo(s)



Test Setup



Temperature Chamber Test Setup



Temperature Chamber

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Uncertainties reported are worst case for all CKC Laboratories' sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS	
Meter reading	(dB μ V)
+ Antenna Factor	(dB/m)
+ Cable Loss	(dB)
- Distance Correction	(dB)
- Preamplifier Gain	(dB)
= Corrected Reading	(dB μ V/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point, the measuring device is set into the linear mode and the scan time is reduced.