Maiden Rock Communications

EMC TEST REPORT FOR

MRC565 Packet Data Radio
Model: MRC565-15

Tested to The Following Standards:

FCC Part 90 Subpart I

Report No.: 104972-4

Date of issue: November 30, 2021

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

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Maiden Rock Communications
586 Double Arrow Road
Seeley Lake, MT 59868

Representative: Peter Donich
Customer Reference Number: 20211025

REPORT PREPARED BY:

Lisa Bevington
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 104972

DATE OF EQUIPMENT RECEIPT: November 1, 2021
DATE(S) OF TESTING: November 1 & 3, 2021

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.
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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.
Canyon Park
22116 23rd Drive S.E., Suite A
Bothell, WA 98021

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.20
EMITest Immunity	5.03.10

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Canada	Japan
Canyon Park, Bothell, WA	US0103	US1024	3082C	A-0136
Brea, CA	US0103	US1024	3082D	A-0136
Fremont, CA	US0103	US1024	3082B	A-0136
Mariposa, CA	US0103	US1024	3082A	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 90 Subpart I

Test Procedure	Description	Modifications	Results
90.205	Power Output	NA	Pass
90.209	Occupied Bandwidth	NA	Pass
90.210	Emissions Mask	NA	Pass
90.213	Frequency Stability	NA	Pass
2.1047	Modulation Characteristics	NA	NA1

NA = Not applicable.

NA1 = The Manufacturer declares that the EUT does not employ analog modulation limiting or support voice capability.

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
No modifications were made during testing.

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 su pport compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Deice	Manufacturer	Model #	S/N
MRC565 Packet Data Radio	Maiden Rock Communications, LLC.	MRC565-15	565012003

Support Equipment:

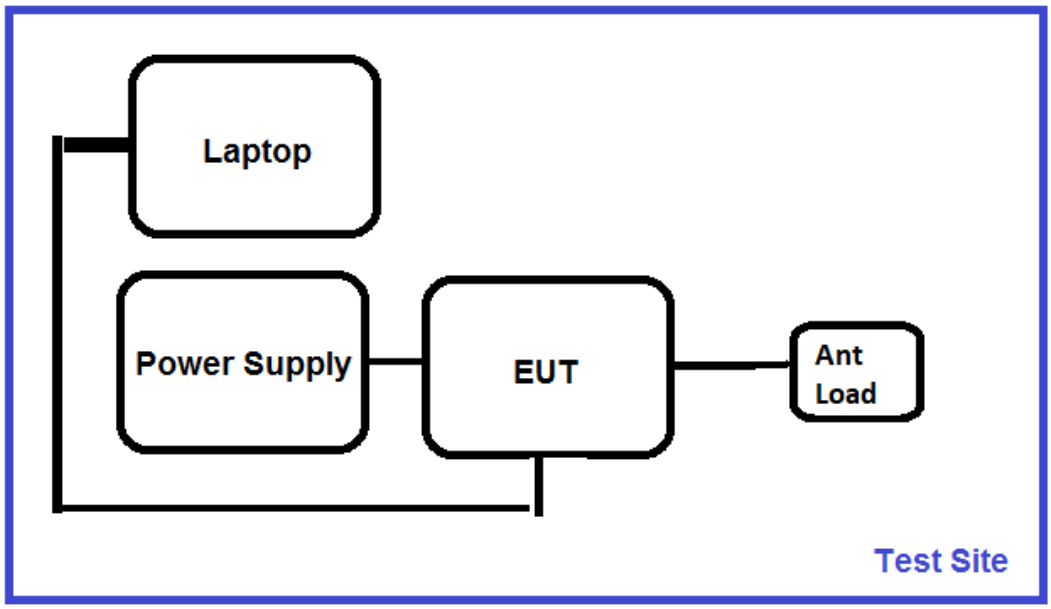
Device	Manufacturer	Model #	S/N
Laptop	Dell	Inspiron 7573	NA
DC Supply	Astron Corporation	VS-50M-AP	NA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	GMSK
Antenna Type(s) and Gain:	Isotropic / 0dBi or Dipole / 2.2dBi
Antenna Connection Type:	BNC
Nominal Input Voltage:	12VDC
Firmware / Software used for Test:	CMU Rev 1.01.0119
Temperature Range	-30°C to +60°C

Block Diagram of Test Setup

Test Setup Block Diagram



FCC PART 90 SUBPART I

90.205 RF Power Output

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.26	Test Date(s):	11/1 & 23/2021
Configuration:	1		
Test Setup:	Center frequency: Fundamental, 40-46MHz EUT is continuously transmitting in normal operation. It is directly connected through attenuators to a Signal Analyzer. Max power readings taken with Input Voltage set to 16VDC (Max), lower readings taken at nominal voltage of 13.8VDC.		

Environmental Conditions			
Temperature (ºC)	20-24	Relative Humidity (%):	25-45

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02673	Spectrum Analyzer	Agilent	E4446A	2/3/2021	2/3/2023
P01917	Attenuator	Bird	8327-300	8/16/2021	8/16/2023
P05503	Attenuator	Narda	766-10	6/8/2021	6/8/2023

Test Data Summary					
Frequency (MHz)	**Power Setting (W)**	**Conducted Output Power (dBm)**	**Conducted Power (W)**	**Limit Watts**	**Results**
40	10	41.6	14.5	300W	Pass
40	25	44.1	25.7		
40	50	47.1	51.3		
40	100	50	100.0		
46	10	40.8	12.0		
46	25	44.2	26.3		
46	50	47.0	50.1		
46	100	50.3	107.2		

Parameter Definitions

Parameter	Value
$V_{Nominal}$:	13.8VDC
$V_{Minimum}$:	11VDC
$V_{Maximum}$:	16VDC

Measurements performed at input voltage according to manufacturer specification.

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Maiden Rock Communications**		
Specification:	**47 CFR §90.210(c) Spurious Emissions**		
Work Order #:	**104972**	Date:	11/3/2021
Test Type:	**Conducted Emissions**	Time:	08:41:20
Tested By:	Matt Harrison	Sequence#:	7
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

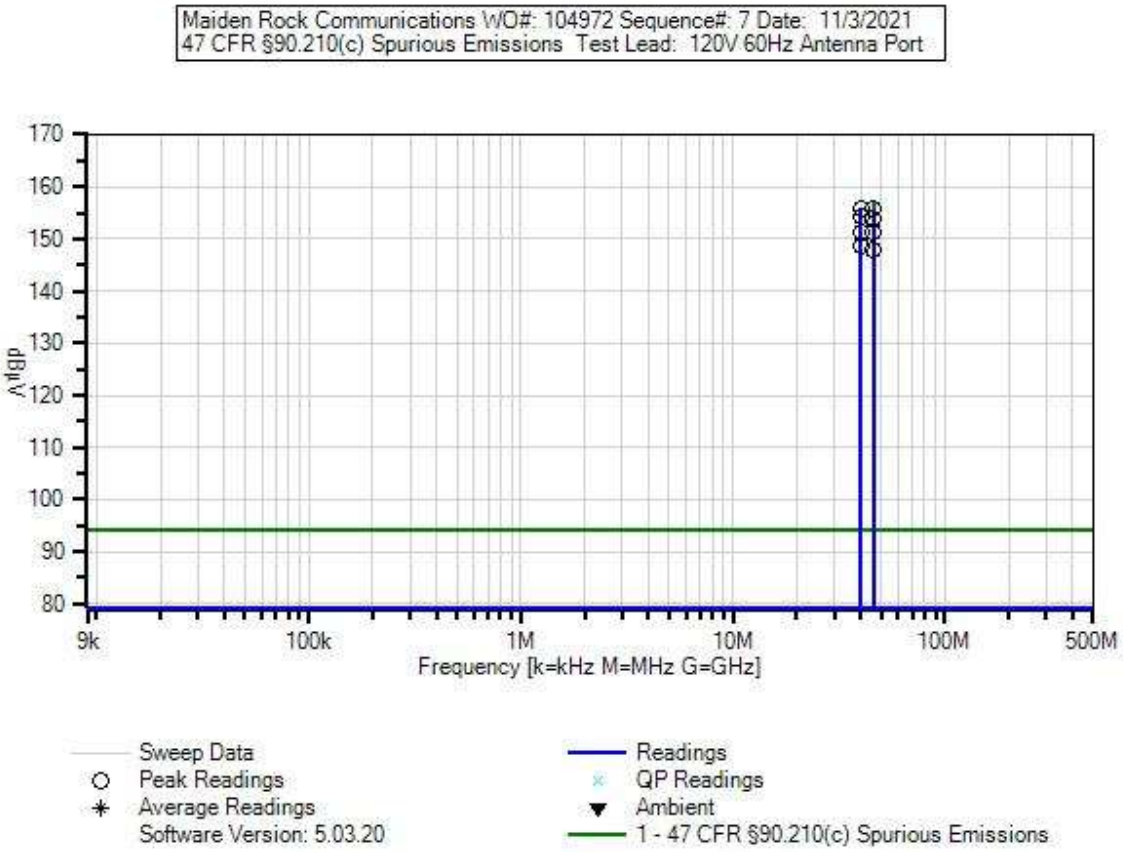
Environmental Conditions:
Temperature: 19°C
Humidity: 43%
Pressure: 100.9kPa

Method: ANSI C63.26

Frequency Range: 30-1000MHz

Setup:
EUT is setup in a direct connect configuration. It is connected to a DC source and laptop via Ethernet and USB. Antenna port is connected to Spectrum Analyzer with Attenuators.

Note: Operational Transmit Mode at 40 and 46MHz



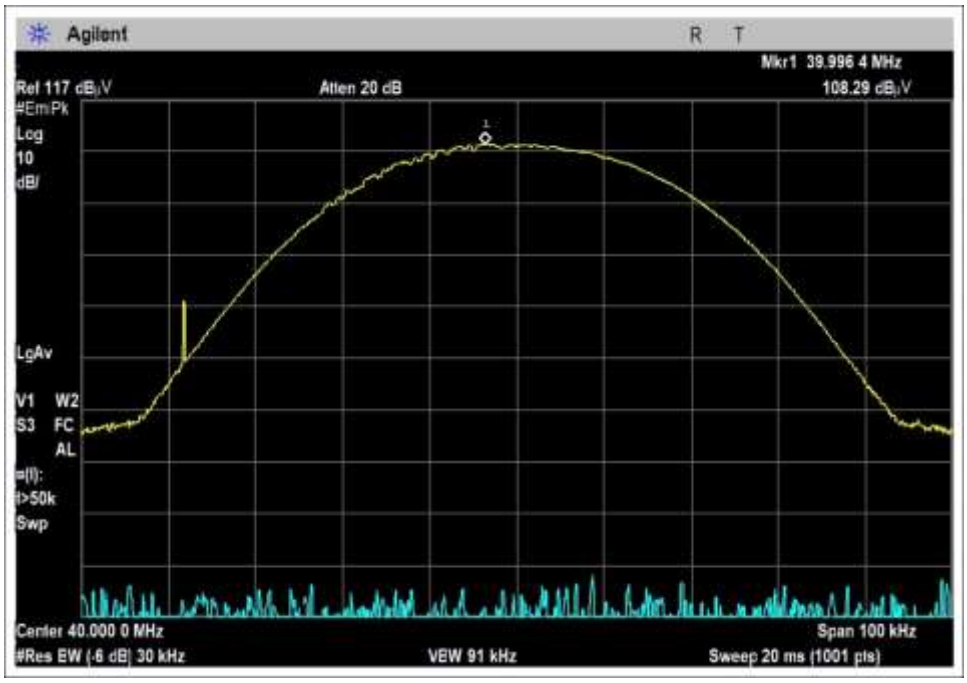
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01917	Attenuator	8327-300	8/16/2021	8/16/2023
T2	ANP05503	Attenuator	766-10	6/8/2021	6/8/2023
T3	ANP06452	Cable	Heliax	4/21/2021	4/21/2023
T4	ANP06454	Cable	Heliax	1/20/2020	1/20/2022
T5	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T6	ANP07229	Attenuator	PE7004-20	8/9/2021	8/9/2023
T7	ANP05373	Cable	RG-214	7/27/2021	7/27/2023
T8	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021

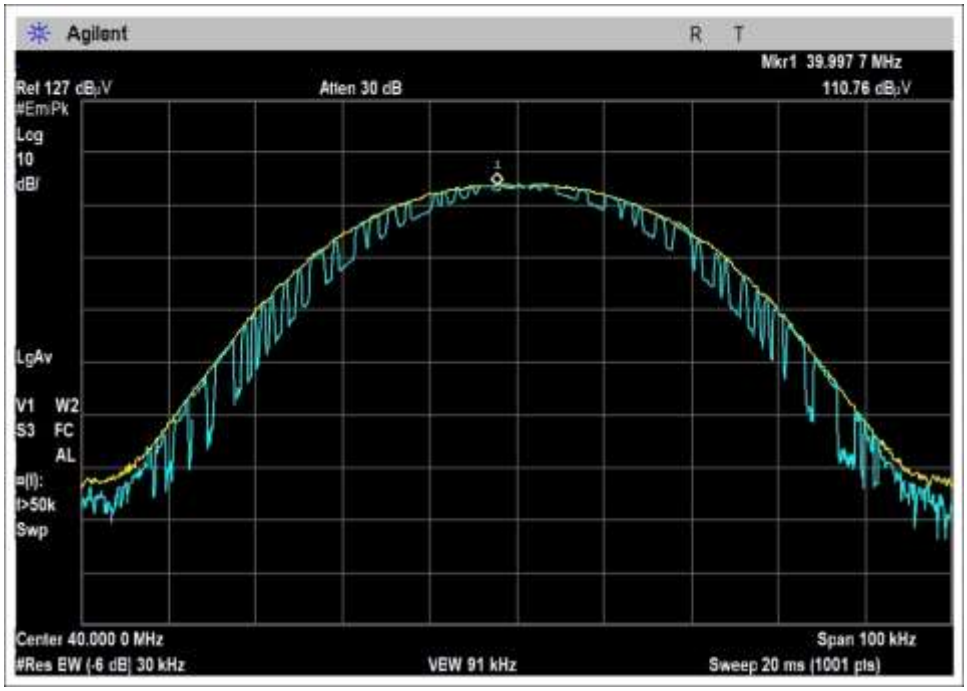
Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq	Rdng	T1 T5	T2 T6	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	39.998M	115.5	+30.0 +0.0	+10.1 +0.0	+0.1 +0.0	+0.1 +0.0	+0.0	155.7	157.0 40MHz, 100W Output	-1.3	Anten
2	45.997M	105.4	+30.0 +0.0	+0.0 +20.1	+0.2 +0.0	+0.0 +0.0	+0.0	155.7	157.0 46MHz, 100W Output	-1.3	Anten
3	39.996M	113.8	+30.0 +0.0	+10.1 +0.0	+0.1 +0.0	+0.1 +0.0	+0.0	154.1	157.0 40MHz, 50W Output	-2.9	Anten
4	45.998M	113.5	+30.0 +0.0	+10.1 +0.0	+0.2 +0.0	+0.2 +0.0	+0.0	154.0	157.0 46MHz, 50W Output	-3.0	Anten
5	45.998M	110.7	+30.0 +0.0	+10.1 +0.0	+0.2 +0.0	+0.2 +0.0	+0.0	151.2	157.0 46MHz, 25W Output	-5.8	Anten
6	39.998M	110.8	+30.0 +0.0	+10.1 +0.0	+0.1 +0.0	+0.1 +0.0	+0.0	151.1	157.0 40MHz, 25W Output	-5.9	Anten
7	39.996M	108.3	+30.0 +0.0	+10.1 +0.0	+0.1 +0.0	+0.1 +0.0	+0.0	148.6	157.0 40MHz, 10W Output	-8.4	Anten
8	45.998M	107.4	+30.0 +0.0	+10.1 +0.0	+0.2 +0.0	+0.2 +0.0	+0.0	147.9	157.0 46MHz, 10W Output	-9.1	Anten

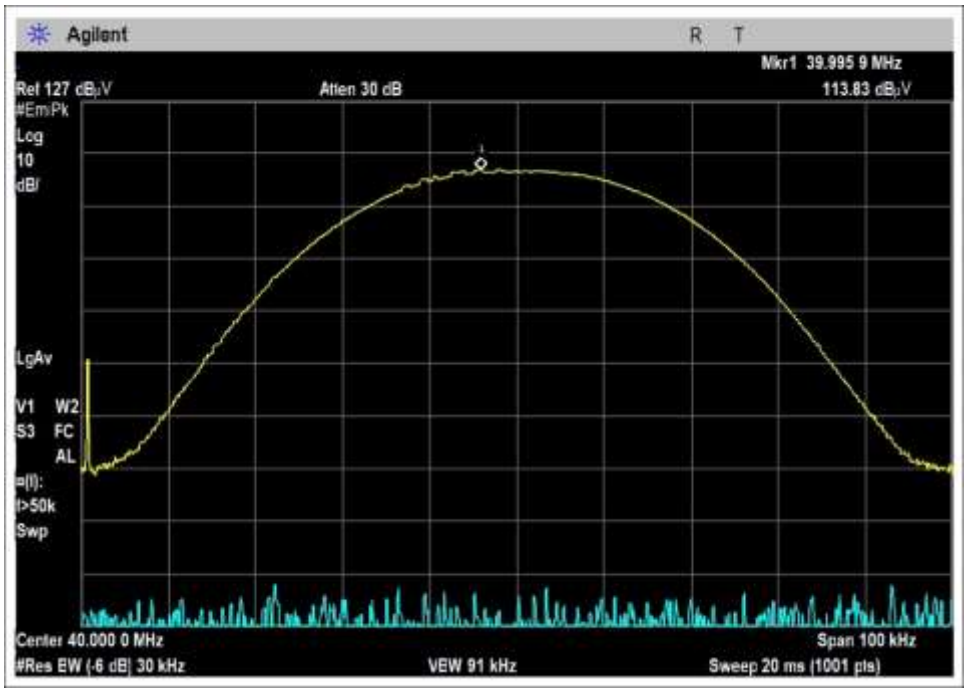
Test Plot



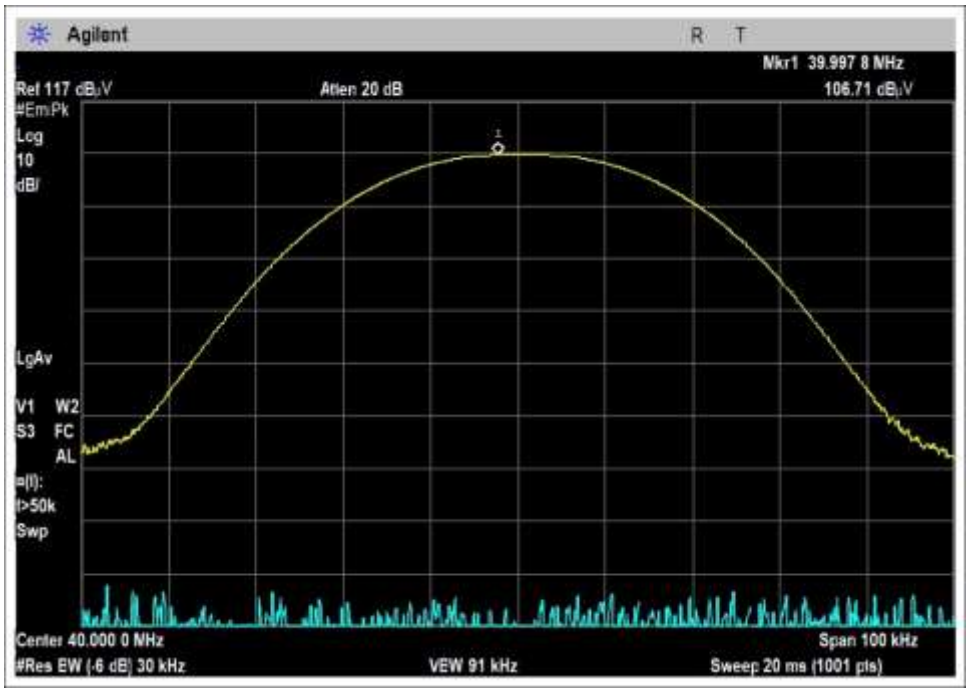
40MHz, 10W



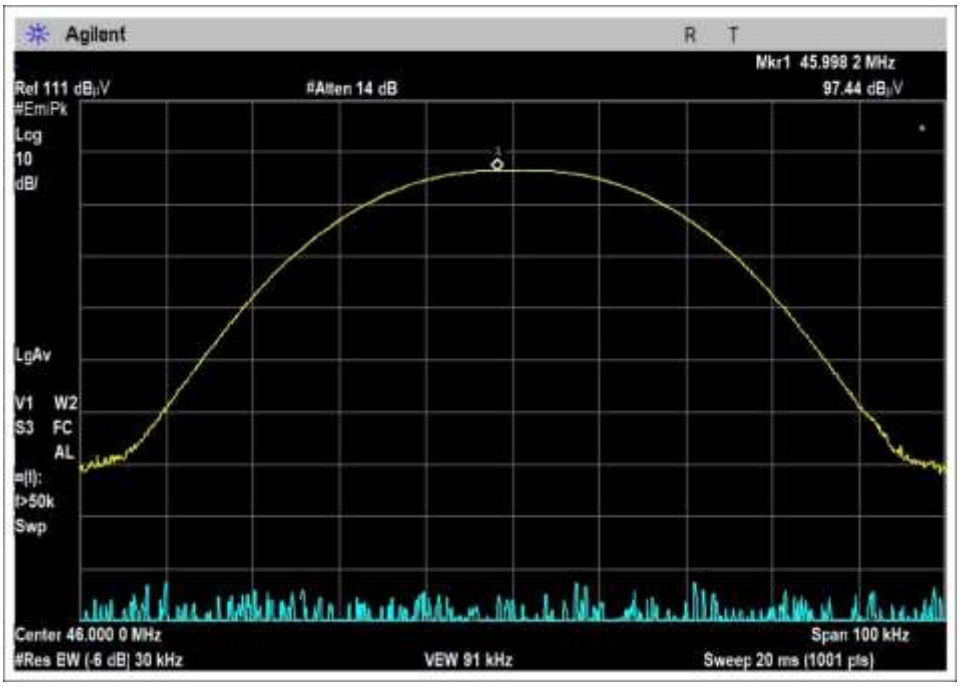
40MHz, 25W



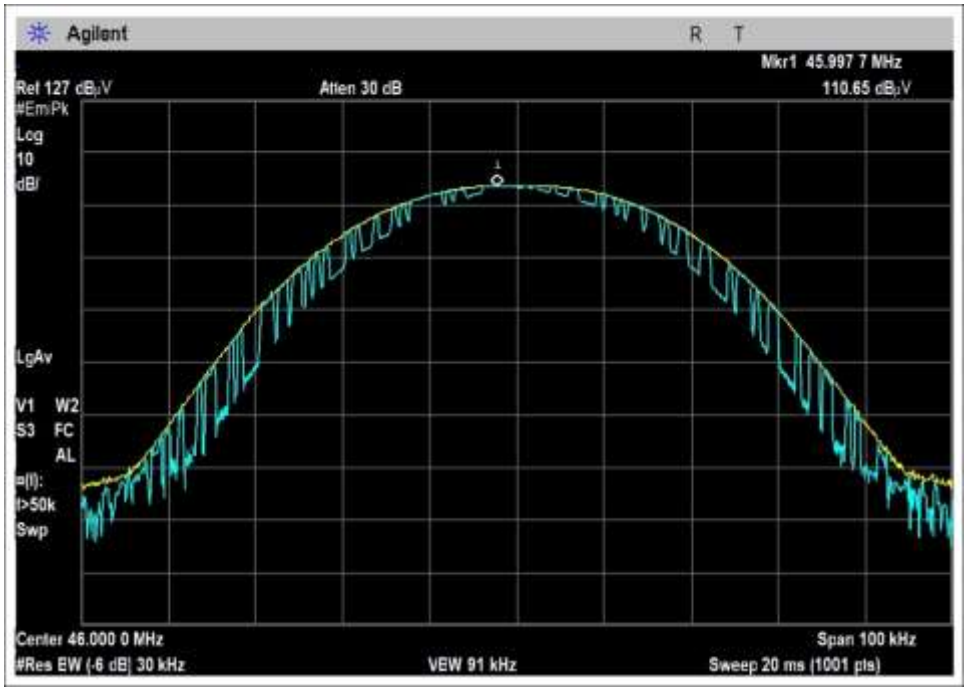
40MHz, 50W



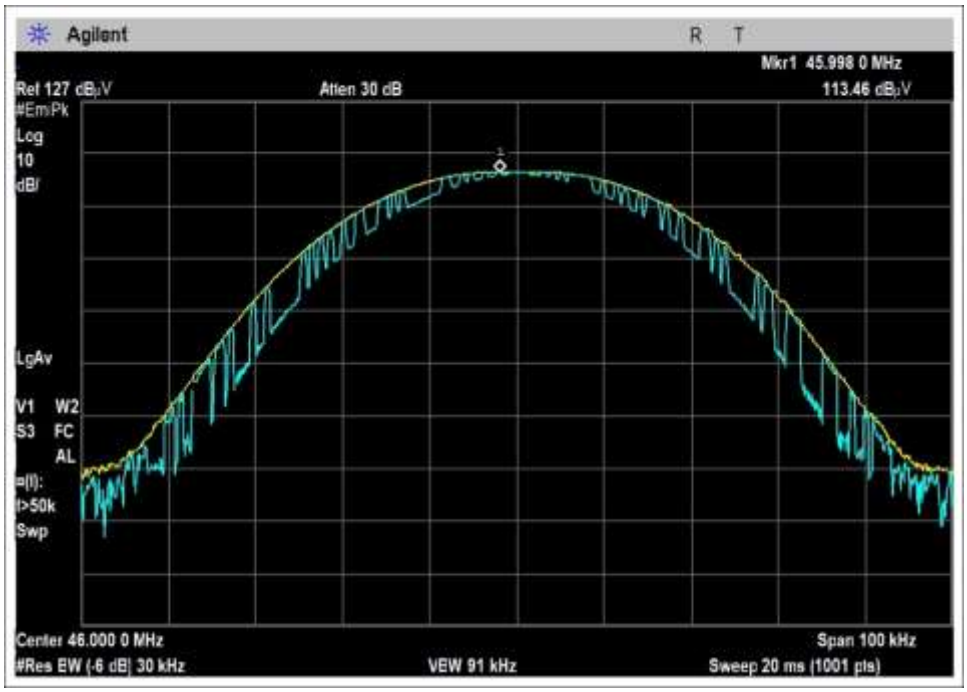
40MHz, 100W



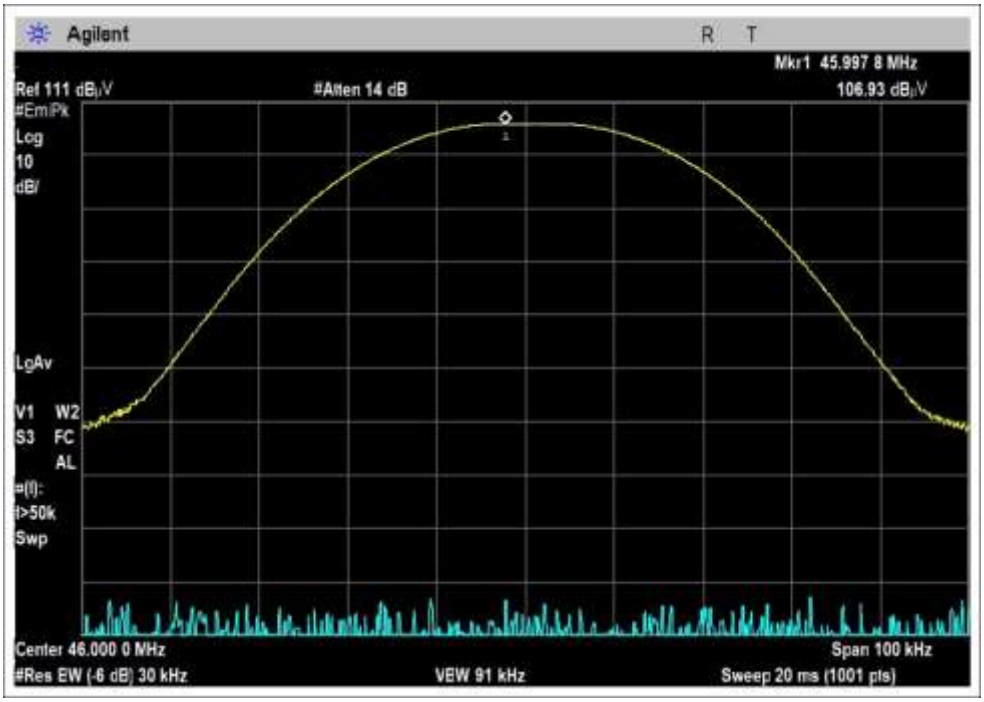
46MHz, 10W



46MHz, 25W



46MHz, 50W



46MHz, 100W

Test Setup Photo

90.209 Occupied Bandwidth

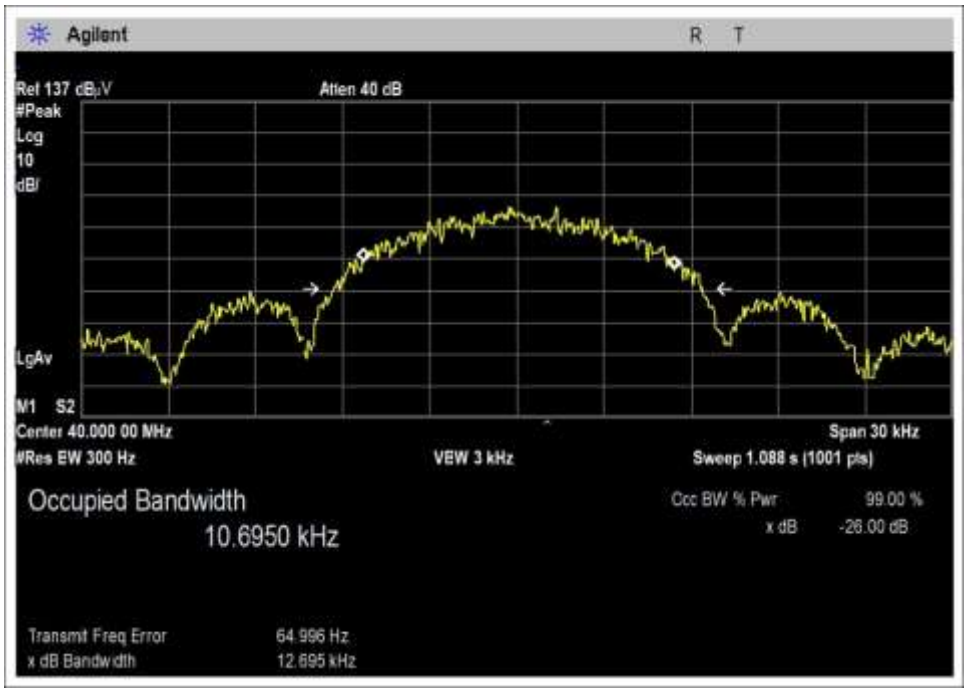
Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.26	Test Date(s):	11/1/2021
Configuration:	1		
Test Setup:	Center frequency: Fundamental, 40-46MHz EUT is continuously transmitting in normal operation. It is directly connected through attenuators to a Signal Analyzer. Occupied Bandwidth taken at nominal voltage of 13.8VDC at 100W setting and did not change with different voltage or power levels.		

Environmental Conditions			
Temperature (ºC)	21	Relative Humidity (%):	43

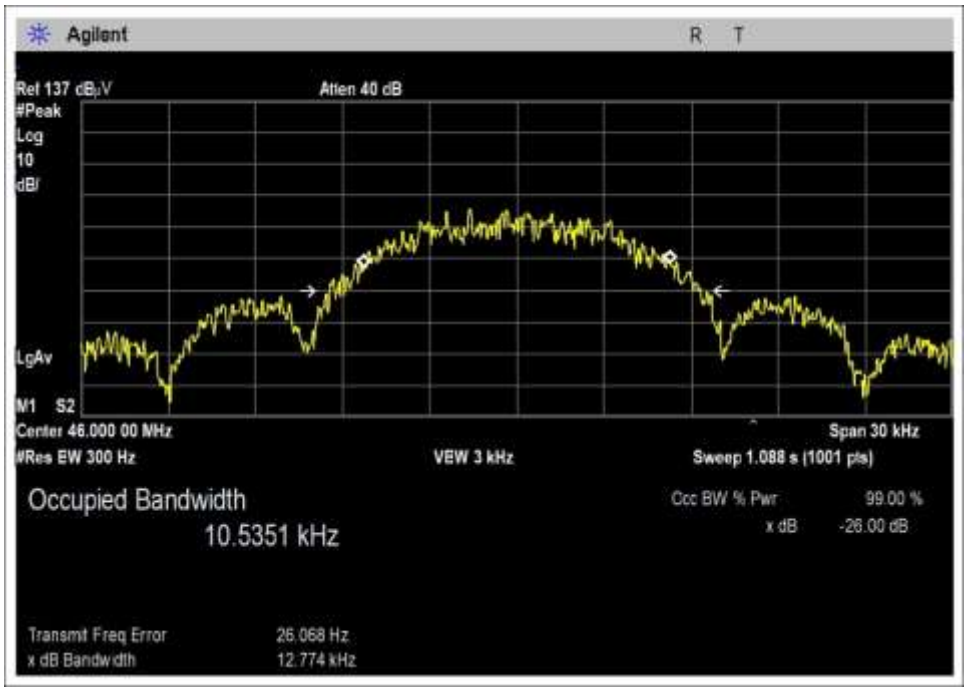
Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02673	Spectrum Analyzer	Agilent	E4446A	2/3/2021	2/3/2023
P01917	Attenuator	Bird	8327-300	8/16/2021	8/16/2023
P05503	Attenuator	Narda	766-10	6/8/2021	6/8/2023

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz) (99%)**	**Limit (kHz)**	**Results**
40	1	GMSK	10.7	20	Pass
46	1	GMSK	10.5	20	Pass

Test Plot



40MHz



46MHz

Test Setup Photo

90.210 Emissions Mask

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.26	Test Date(s):	11/23/2021
Configuration:	1		
Test Setup:	Frequency: 9kHz-500MHz EUT is continuously transmitting pulses signals in normal operation. The EUT is sitting on a foam table, transmitting with antenna connected to a load.		

Environmental Conditions			
Temperature (ºC)	20-24	Relative Humidity (%):	25-45

Test Equipment Radiated					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02307	Preamp	HP	8447D	1/10/2020	1/10/2022
02673	Spectrum Analyzer	Agilent	E4446A	2/3/2021	2/3/2023
00052	Loop Antenna	EMCO	6502	5/4/2020	5/4/2022
03628	Biconilog Antenna	ETS	3142E	6/3/2021	6/3/2023

Limit applied: 90.210 (C):

Emission Mask C. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5 kHz, but not more than 10 kHz: At least 83 log (fd/5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least 29 log (fd2/11) dB or 50 dB, whichever is the lesser attenuation;

(3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

(4) In the 1427-1432 MHz band, licensees are encouraged to take all reasonable steps to ensure that unwanted emissions power does not exceed the following levels in the 1400-1427 MHz band:

(i) For stations of point-to-point systems in the fixed service: −45 dBW/27 MHz.

(ii) For stations in the mobile service: −60 dBW/27 MHz.

Measured Conducted Power = 107.2 W

Authorized Bandwidth is set at 20kHz according to 47 CFR 90.209. ABW = 20kHz

Outside the emission mask, must be attenuated by at least 43 + 10 log (P) dB. 43+20.3 = 63.3dBm. Outside of the emission mask, using the following relation:

$P(dBm) - 20LOG(d) + G + 104.77 = E(dBuV/m)$

Where G = 0
D = 3m

$E(dBuV/m)$ = 82.2dBuV

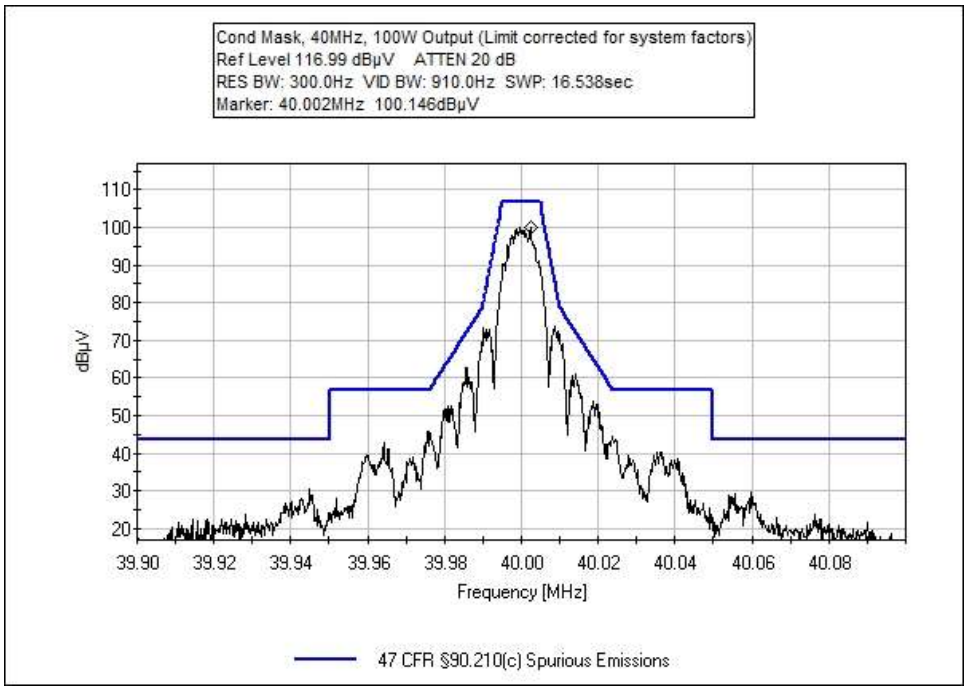
Note: The limit and measurements were recorded and corrected for dBµV/m at 3m using correction factors based on known measurement system losses.

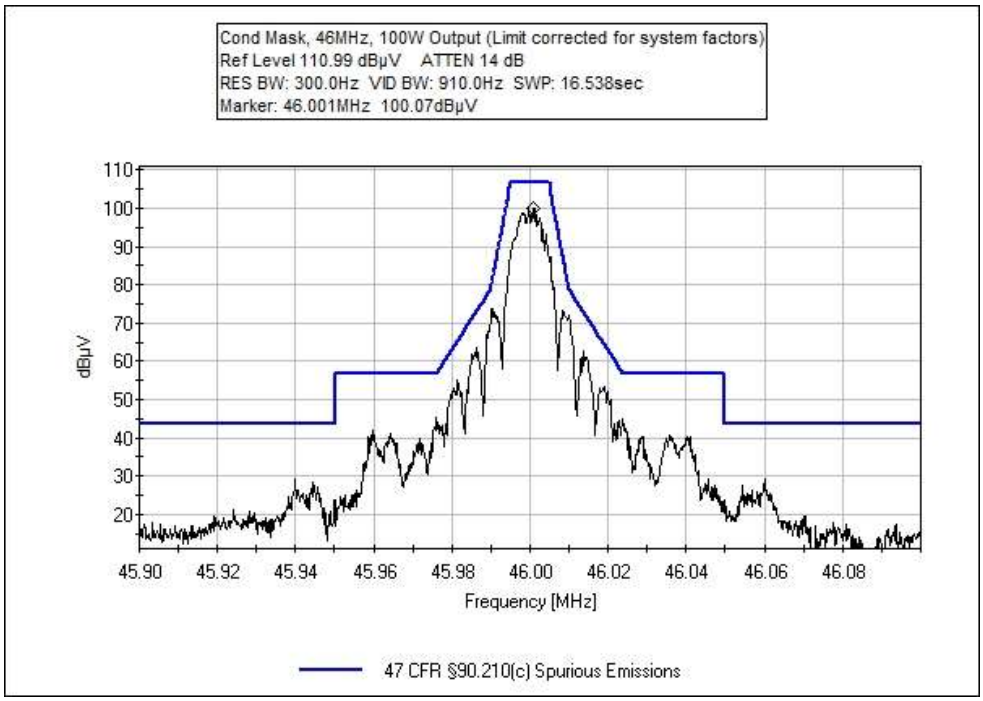
100W power output was worst-case for emissions masks.

Mode	Frequency (MHz)	Measured (dBµV/m at 3m)	Limit (dBµV/m at 3m)	Margin (dB)	Results
Radiated Emissions Outside of Mask					
Transmitting	39.9	73.1	82.20	-9.1	Pass
Transmitting	46.06	72.5	82.20	-9.7	
Transmitting	184	71.8	82.20	-10.4	
Transmitting	92.04	67.7	82.20	-14.5	
Transmitting	200.06	59.9	82.20	-22.3	
Transmitting	0.02	57.1	82.20	-25.1	
Transmitting	79.94	55.3	82.20	-26.9	
Transmitting	119.98	52.4	82.20	-29.8	
Transmitting	229.98	45.9	82.20	-36.3	
Transmitting	240.1	44.1	82.20	-38.1	
Transmitting	160.02	42.5	82.20	-39.7	
Transmitting	24.358	35.5	82.20	-46.7	
Transmitting	24.358	35.1	82.20	-47.1	
Transmitting	24.358	35.1	82.20	-47.1	
Transmitting	27.164	34.2	82.20	-48	
Transmitting	23.134	32.8	82.20	-49.4	

Mode	Frequency (MHz)	Measured (dBµV)	Limit (dBµV)	Margin (dB)	Results
Conducted Emissions Outside of Mask					
Transmitting	80.004	93.1	94	-0.9	Pass
Transmitting	120.004	82.9	94	-11.1	
Transmitting	20.79	86.9	94	-7.1	
Transmitting	19.19	85.5	94	-8.5	
Transmitting	23.99	84.9	94	-9.1	
Transmitting	22.39	80.3	94	-13.7	
Transmitting	16	80	94	-14	
Transmitting	17.59	77.5	94	-16.5	
Transmitting	38.42	88.5	94	-5.5	
Transmitting	26.8	89.5	94	-4.5	
Transmitting	19.21	86.7	94	-7.3	
Transmitting	44.55	86.2	94	-7.8	
Transmitting	47.5	85.6	94	-8.4	
Transmitting	42	83.4	94	-10.6	
Transmitting	23.2	81.5	94	-12.5	
Transmitting	91.995	91.2	94	-2.8	
Transmitting	137.993	78.3	94	-15.7	

Emission Mask Plot(s)





Test Setup Photo(s)

90.213 Frequency Stability

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.26	Test Date(s):	11/3/2021
Configuration:	1		
Test Setup:	Test Mode: UUT is continuously transmitting. Test Setup: The EUT is sitting inside the temperature chamber and attached to the spectrum analyzer for a relative measurement through attenuators. Voltage variations and temperature range performed to manufacturer specified extremes. The EUT is connected to the support equipment outside the chamber through the USB and Power.		

Environmental Conditions			
Temperature (ºC)	22-24°C	Relative Humidity (%):	25-45

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
2757	Temperature Chamber	Bemco	F100/350-8	12/16/2020	12/16/2022
2872	Spectrum Analyzer	Agilent	E4440A	11/18/2019	11/18/2021
3029	Thermometer, Digital Infrared	Fluke	566	3/11/2021	3/11/2023
P01917	Attenuator	Bird	8327-300	8/16/2021	8/16/2023
P07229	Attenuator	Pasternack	PE7004-20	8/9/2021	8/9/2023

Test Data Summary 40MHz Low Channel					
Temperature (ºC)	**Voltage**	**Frequency (MHz)**	**Deviation (PPM)**	**Limit (PPM)**	**Results**
-30	$V_{Nominal}$	40.000002	0.30	20	Pass
-20	$V_{Nominal}$	40.000008	0.45	20	
-10	$V_{Nominal}$	40.000002	0.30	20	
0	$V_{Nominal}$	39.999992	0.05	20	
10	$V_{Nominal}$	39.999986	0.10	20	
20	$V_{Minimum}$	39.999992	0.05	20	
20	$V_{Nominal}$	39.999990	0.00	20	
20	$V_{Maximum}$	39.999990	0.00	20	
30	$V_{Nominal}$	39.999984	0.15	20	
40	$V_{Nominal}$	39.999984	0.15	20	
50	$V_{Nominal}$	39.999984	0.15	20	
Nominal Frequency:		39.999992			

Test Data Summary 46MHz High Channel					
Temperature (ºC)	**Voltage**	**Frequency (MHz)**	**Deviation (PPM)**	**Limit (PPM)**	**Results**
-30	$V_{Nominal}$	46.000008	0.39	20	Pass
-20	$V_{Nominal}$	46.000010	0.43	20	
-10	$V_{Nominal}$	46.000018	0.61	20	
0	$V_{Nominal}$	45.999996	0.13	20	
10	$V_{Nominal}$	45.999986	0.09	20	
20	$V_{Minimum}$	45.999990	0.00	20	
20	$V_{Nominal}$	45.999994	0.00	20	
20	$V_{Maximum}$	45.999990	0.09	20	
30	$V_{Nominal}$	45.999982	0.17	20	
40	$V_{Nominal}$	45.999978	0.26	20	
50	$V_{Nominal}$	45.999980	0.22	20	
Nominal Frequency:		45.999990			

Parameter Definitions

Parameter	Value
$V_{Nominal}$:	13.8VDC
$V_{Minimum}$:	11.0VDC
$V_{Maximum}$:	16.0VDC

Measurements performed at input voltage according to manufacturer specification.

Test Setup Photo(s)

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. Compliance is deemed to occur provided measurements are below the specified limits.

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 dBµV/m, the spectrum analyzer reading in dBµV 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	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/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.