Dynon Avionics, Inc.

REVISED EMC TEST REPORT TO 105517-8A

SkyView VHF COM Radio
Model: SV-COM-760

Tested to The Following Standards:

FCC Part 2 / 87 Subpart D

Report No.: 105517-8B

Date of issue: August 24, 2022

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:

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Woodinville WA 98072

Representative: David DeLong

REPORT PREPARED BY:

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CKC Laboratories, Inc.
5046 Sierra Pines Drive
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Project Number: 105517

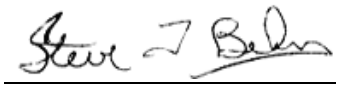
DATE OF EQUIPMENT RECEIPT: June 4, 2021
DATE(S) OF TESTING: June 4 -9, 2021

Revision History

Original: Testing of the SkyView VHF COM Radio, Model: SV-COM-760 to FCC Part 2 /87 Subpart D.
Revision A: Updating the AFR plots to be more concisely portray the measured results.
Revision B: Updated the Summary of Results Table with correct description of section 2.1051 / 87.139. Added additional Test Setup information and updated Antenna information to section 2.1051 / 87.139. Added additional Test Setup information to section 2.1053 / 87.139.

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

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.19
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(s) 2 / 87 Subpart D

Test Procedure	Description	Modifications	Results
2.1046 / 87.131	RF Power Output	NA	Pass
2.1047 / 87.141	Modulation Characteristics 2.1047(a) Audio Frequency Response 2.1047(b) Modulation Limiting	NA	Pass
2.1049 / 87.135	Occupied Bandwidth	NA	Pass
2.1051 / 87.139	Spurious Emissions at Antenna Terminals	NA	Pass
2.1053 / 87.139	Field Strength of Spurious Radiation	NA	Pass
2.1055 / 87.133	Frequency Stability	NA	Pass

NA = Not Applicable

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

Configuration 1

Device	Manufacturer	Model #	S/N
SkyView VHF COM Radio	Dynon Avionics, Inc.	SV-COM-760	6-2

Support Equipment:

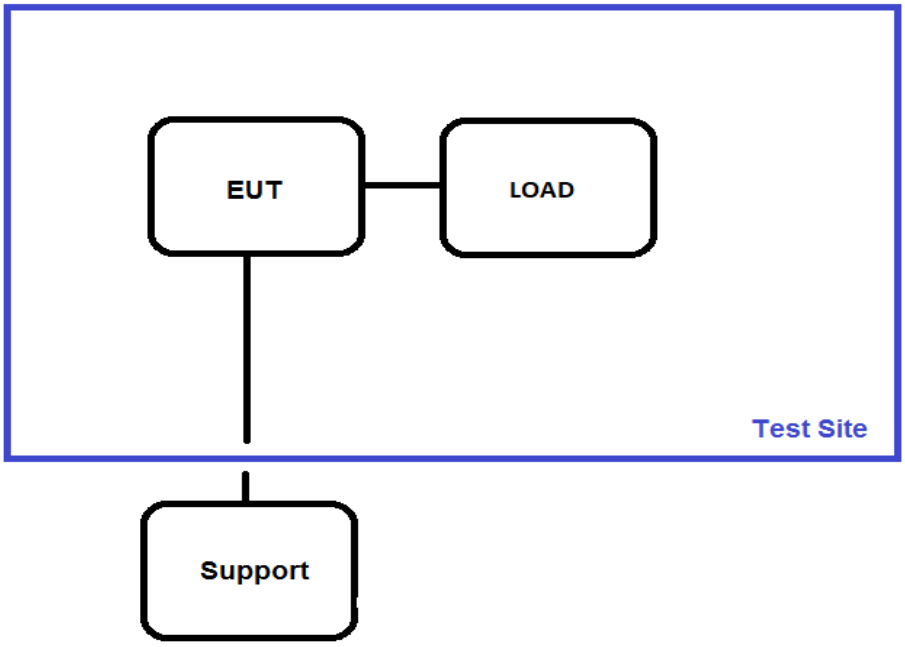
Device	Manufacturer	Model #	S/N
Power Supply	Lambda	GEN 125-80	08L2772B
Arbitrary Waveform Generator	Agilent	33120A	MY40000909

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Transmission System:	Narrowband (Audio)
Operating Frequency Range(s):	118-136.975 MHz
Modulation Type(s):	AM – 6K00A3E
Maximum Duty Cycle:	100% Tested
Number of TX Chains:	1
Antenna Type(s) and Gain:	Quarter-Wave Vertical / 2dBi
Beamforming Type:	NA
Antenna Connection Type:	External Connector
Nominal Input Voltage:	14VDC
Firmware / Software used for Test:	Alpha 1.02

Block Diagram(s) of Test Setup

Test Setup Block Diagram



FCC PART(S) 2 / 87

2.1046 / 87.131 RF Power Output

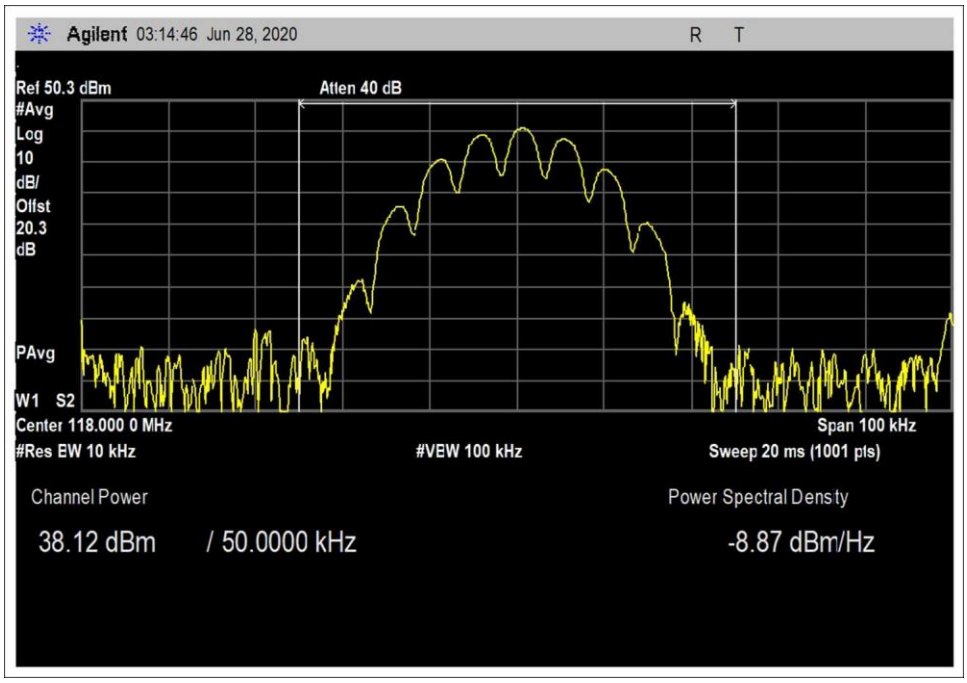
Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.26 (2015)	Test Date(s):	6/4/2021
Configuration:	1		
Test Setup:	Spectrum analyzer is connected to the EUT's antenna port through 20dB of attenuation.		

Environmental Conditions			
Temperature (ºC)	25	Relative Humidity (%):	42

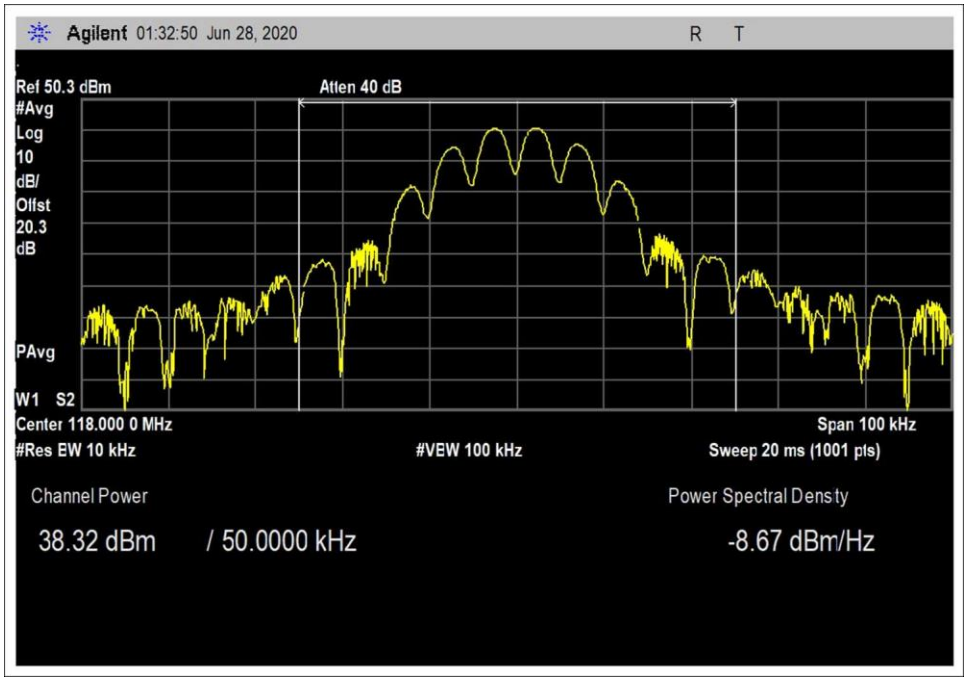
Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02871	Spectrum Analyzer	Agilent	E4440A	3/12/2020	3/12/2022
P07638	Attenuator	API Weinschel	47-20-34	6/19/2020	6/19/2022
D06122	Power Supply	Lambda	GEN 125-80	1/18/2021	1/18/2023

Test Data Summary - RF Conducted Measurement			
Frequency	**Input Voltage**	**Mean Power (dBm)**	**Limit (dBm)**
LOW 118 MHz	85%	38.12	47.4
	100%	38.32	47.4
	115%	38.43	47.4
MID 127 MHz	85%	38.01	47.4
	100%	38.58	47.4
	115%	38.51	47.4
HIGH 136.975 MHz	85%	37.04	47.4
	100%	37.36	47.4
	115%	37.39	47.4

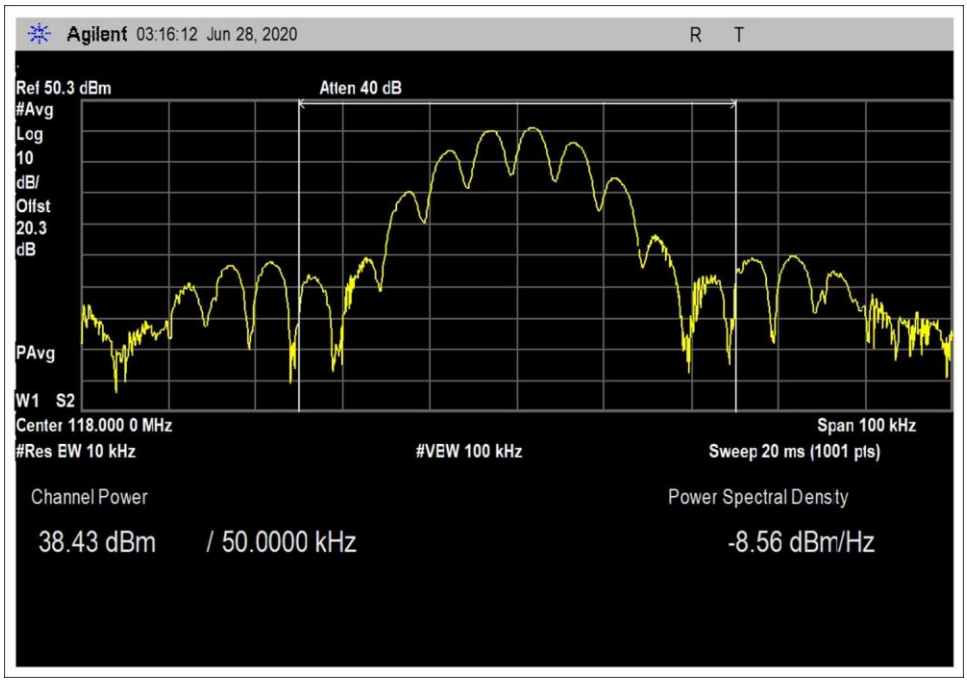
Plot(s)



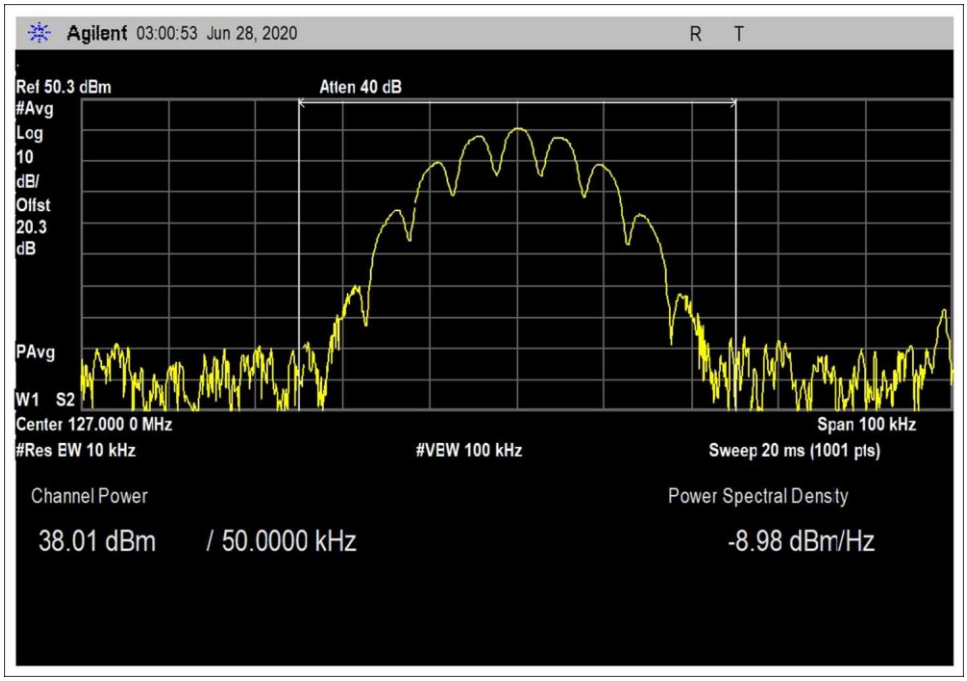
Low Channel, Vlow



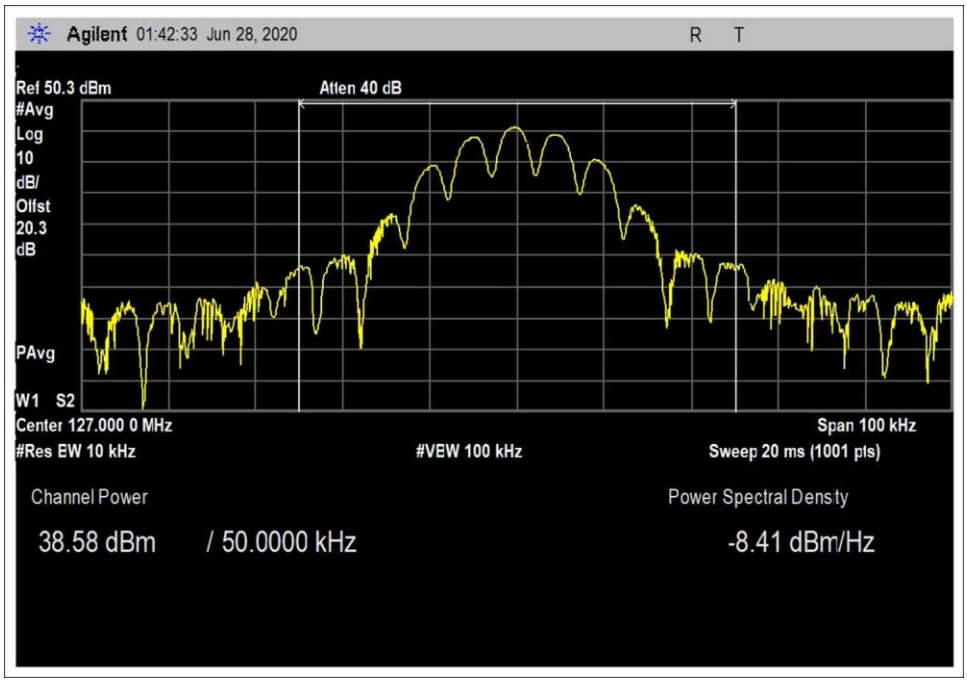
Low Channel, Vnom



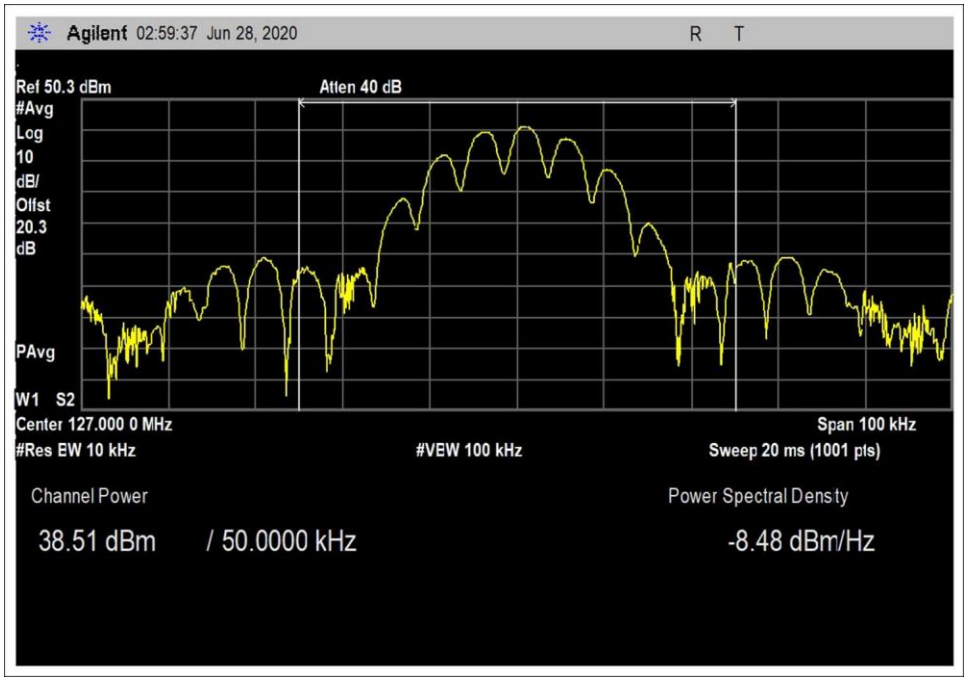
Low Channel, Vhigh



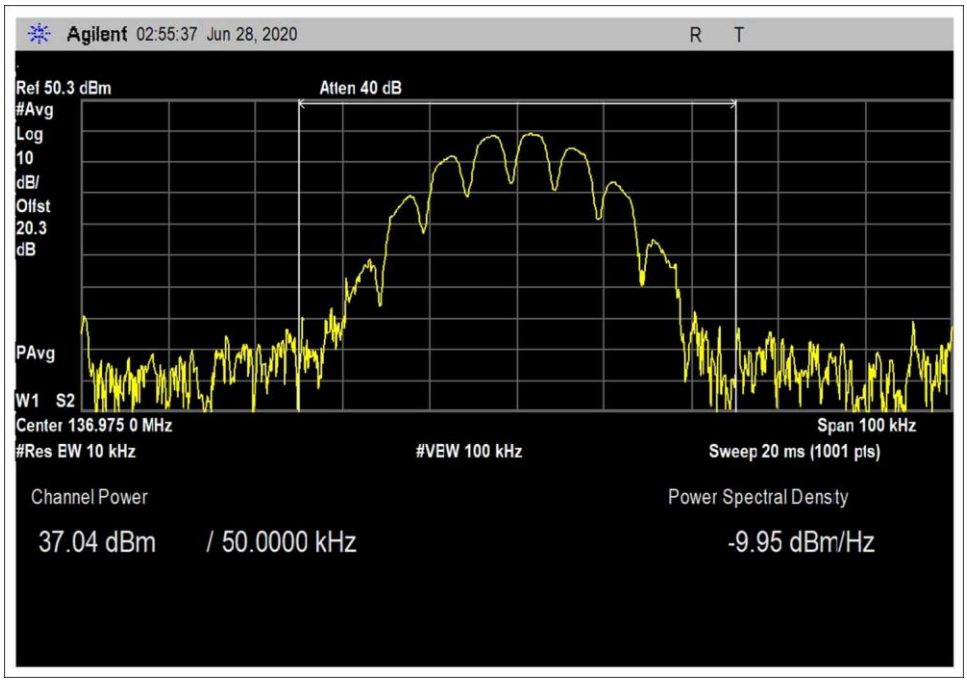
Middle Channel, Vlow



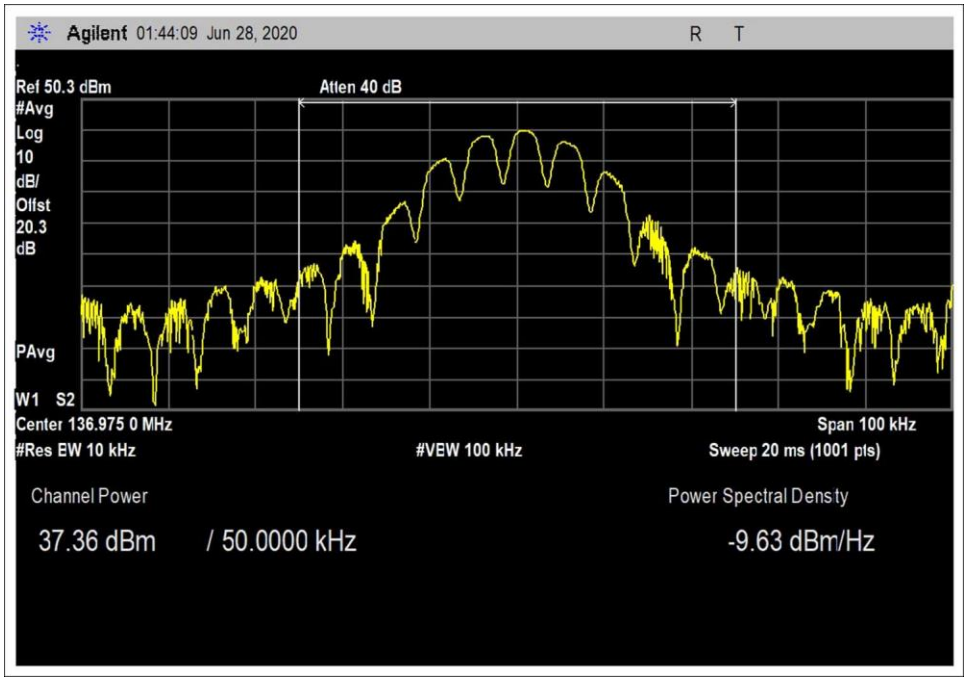
Middle Channel, Vnom



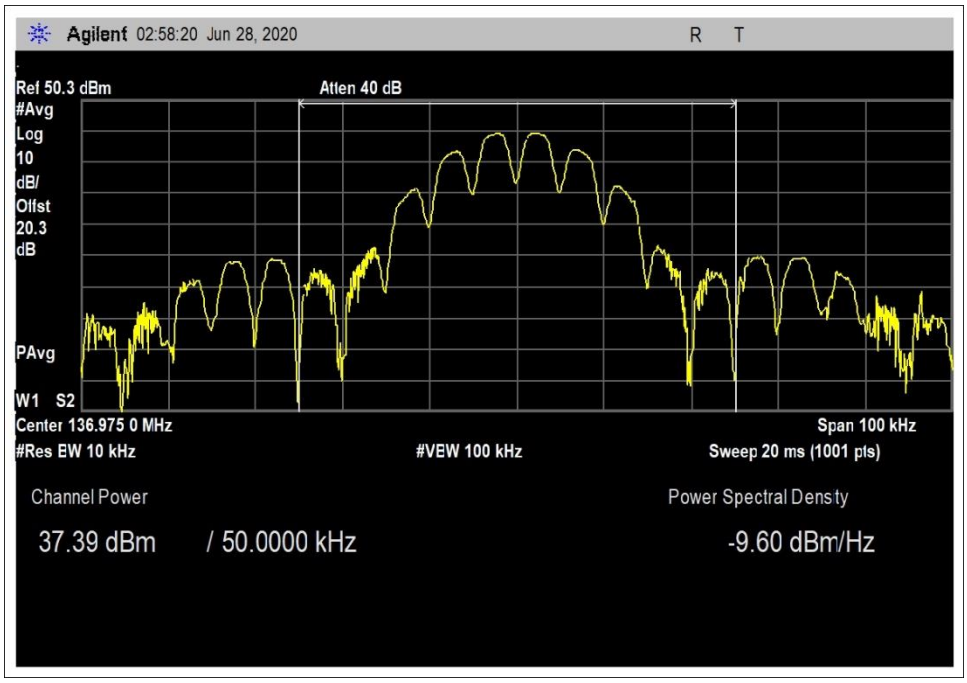
Middle Channel, Vhigh



High Channel, Vlow

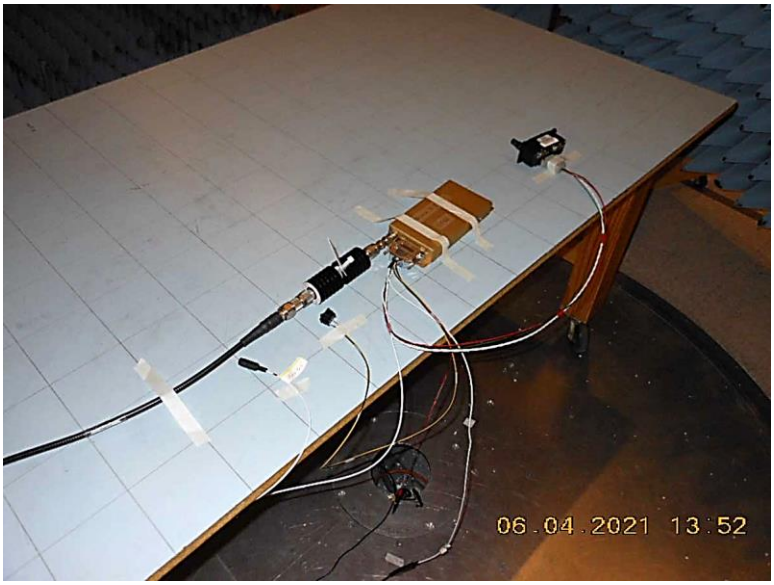


High Channel, Vnom



High Channel, Vhigh

Test Setup Photo(s)



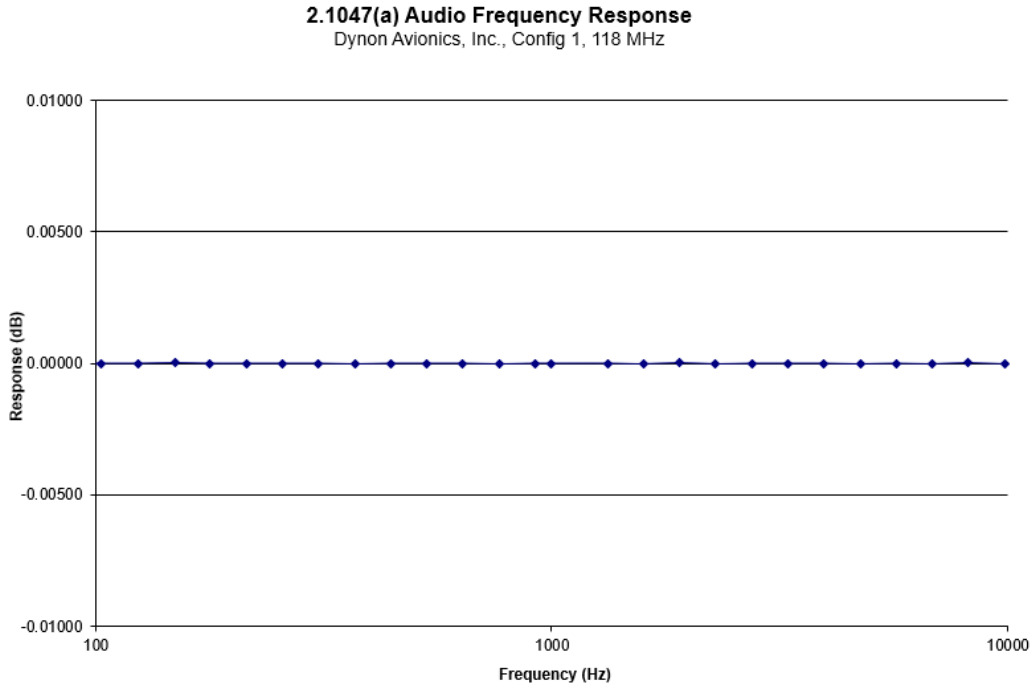
2.1047 Modulation Characteristics
2.1047(a) Audio Frequency Response
2.1047(b) Modulation Limiting

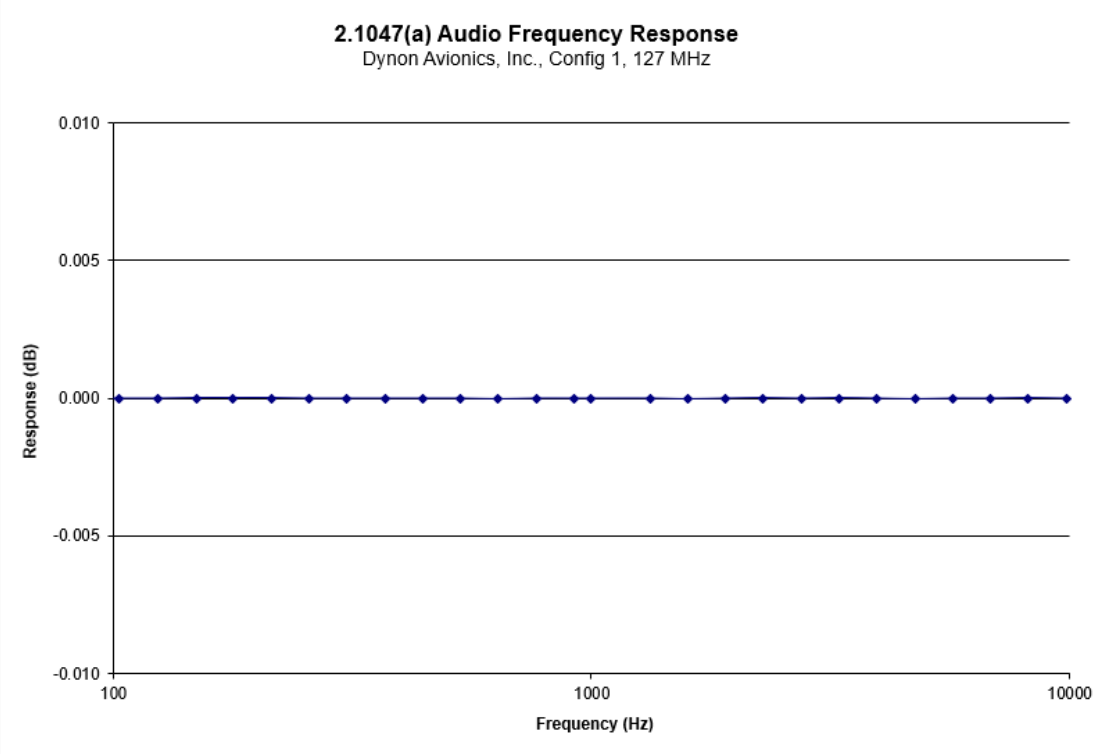
Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.26 (2015)	Test Date(s):	6/9/2021
Configuration:	1		
Test Setup:	Modulation analyzer is connected to the EUT's antenna port through 20dB of attenuation.		
Notes:	133MHz was used as high channel due to instrument limitation.		

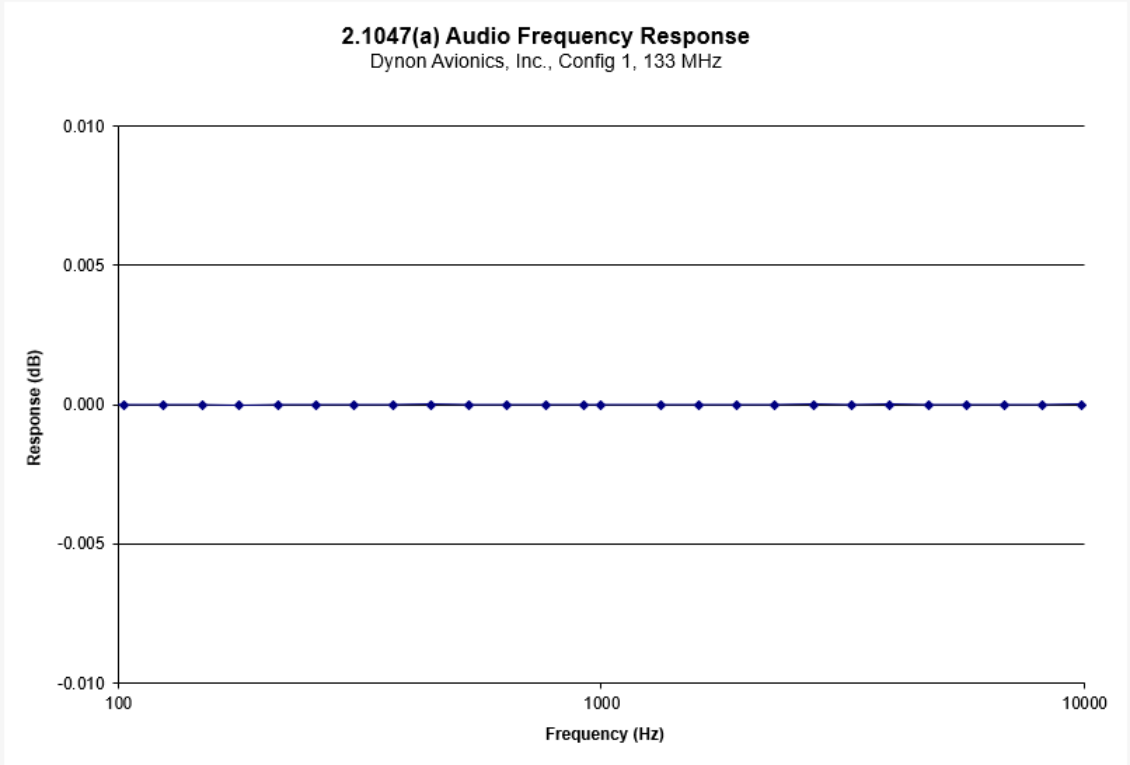
Environmental Conditions			
Temperature (ºC)	25	Relative Humidity (%):	36

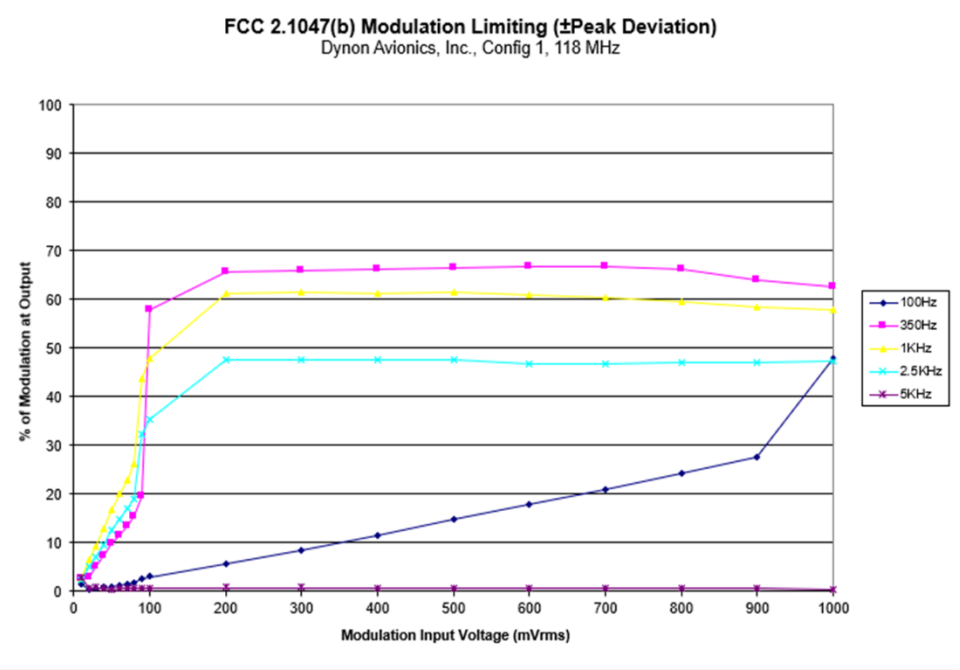
Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02072	RF Characteristics Analyzer	HP	8901A	2/12/2020	2/12/2022
03670	Oscilloscope	Tektronix	TDS3052	5/17/2021	5/17/2023
P07749	Arbitrary Waveform Generator	Agilent	33120A	3/1/2021	3/1/2023

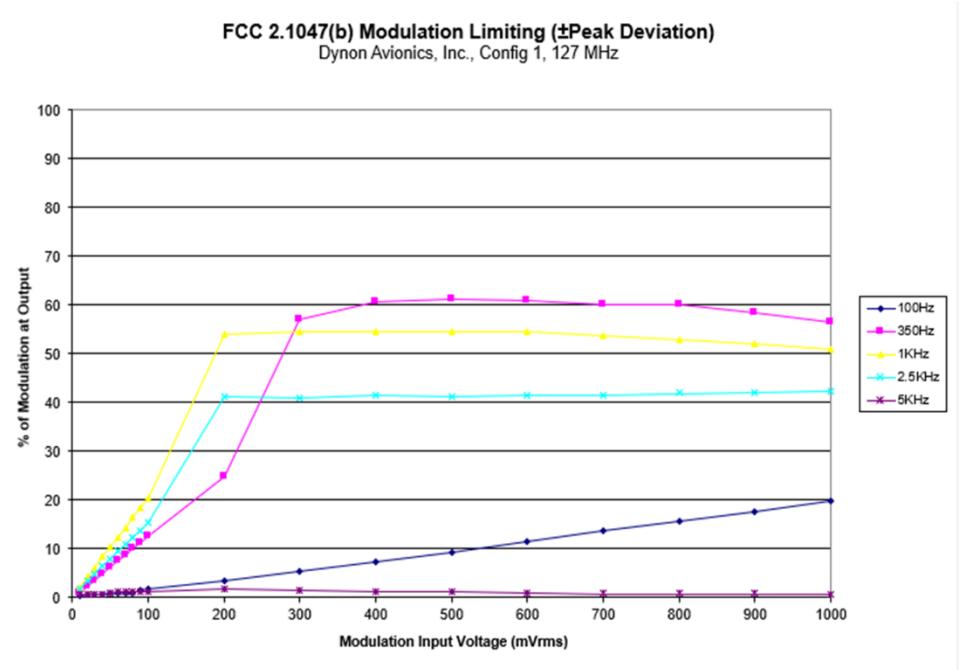
Plot(s)

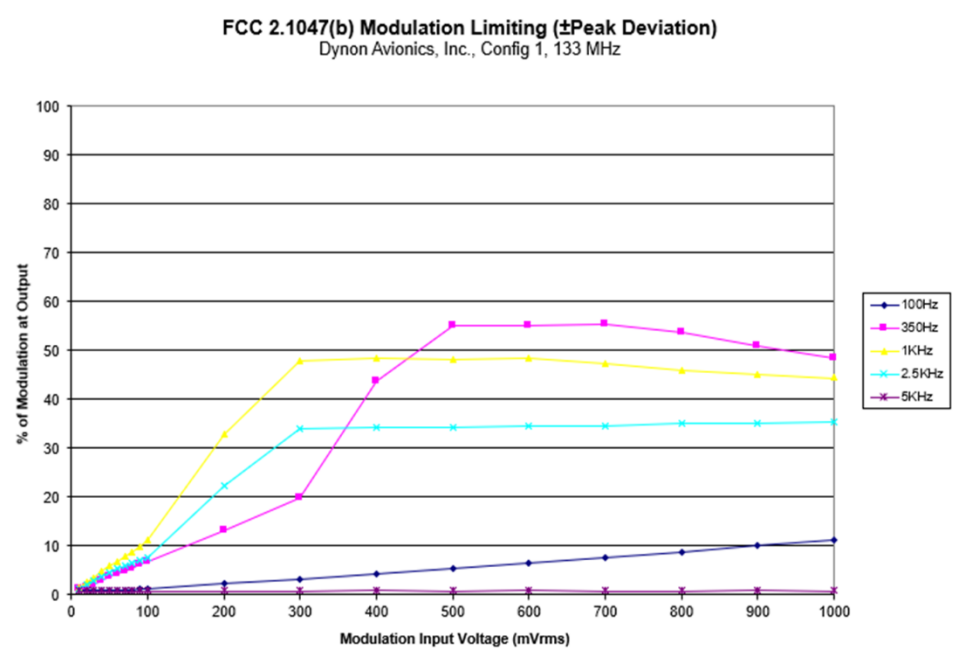



2.1047(a) Audio Frequency Response
Dynon Avionics, Inc., Config 1, 127 MHz
0.010
0.005
0.000
-0.005
-0.010
Response (dB)
100
1000
10000
Frequency (Hz)


2.1047(a) Audio Frequency Response
Dynon Avionics, Inc., Config 1, 133 MHz
0.010
0.005
0.000
-0.005
-0.010
Response (dB)
100
1000
10000
Frequency (Hz)


FCC 2.1047(b) Modulation Limiting (±Peak Deviation)
Dynon Avionics, Inc., Config 1, 118 MHz
% of Modulation at Output
Modulation Input Voltage (mVrms)
100Hz
350Hz
1KHz
2.5KHz
5KHz


FCC 2.1047(b) Modulation Limiting (±Peak Deviation)
Dynon Avionics, Inc., Config 1, 127 MHz
% of Modulation at Output
Modulation Input Voltage (mVrms)
100Hz
350Hz
1KHz
2.5KHz
5KHz



Test Setup Photo(s)

2.1049 / 87.135 Occupied Bandwidth

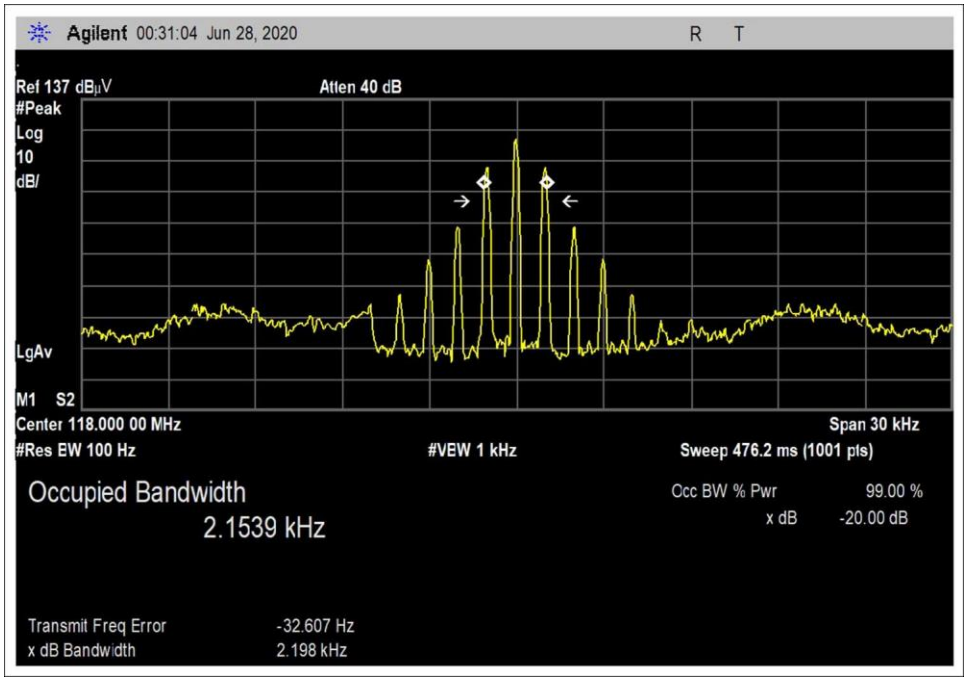
Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.26 (2015)	Test Date(s):	6/4/2021
Configuration:	1		
Test Setup:	Spectrum analyzer is connected to the EUT's antenna port through 20dB of attenuation.		
Declaration:	The necessary bandwidth is calculated as Bn = 2* Fc. The manufacturer declares the cuttoff frequency to be 3kHz, therefore the necessary bandwidth is 6kHz.		

Environmental Conditions			
Temperature (ºC)	25	Relative Humidity (%):	42

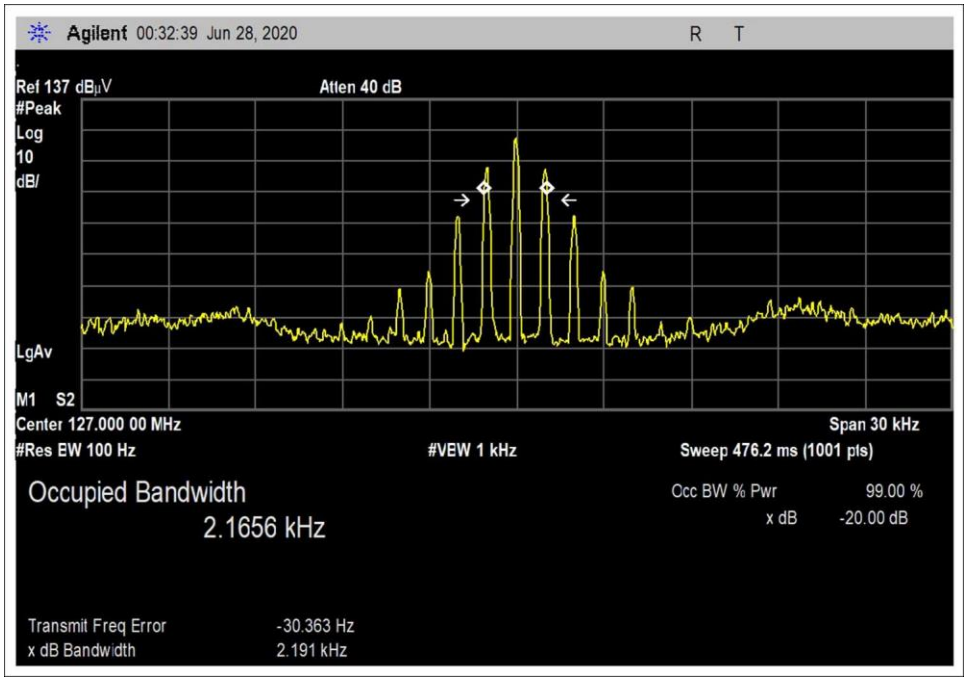
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02871	Spectrum Analyzer	Agilent	E4440A	3/12/2020	3/12/2022
P07638	Attenuator	API Weinschel	47-20-34	6/19/2020	6/19/2022

Frequency (MHz)	Bandwidth (kHz)	Bandwidth Limit (kHz)
118	2.16	25
127	2.15	25
136.975	3.93	25

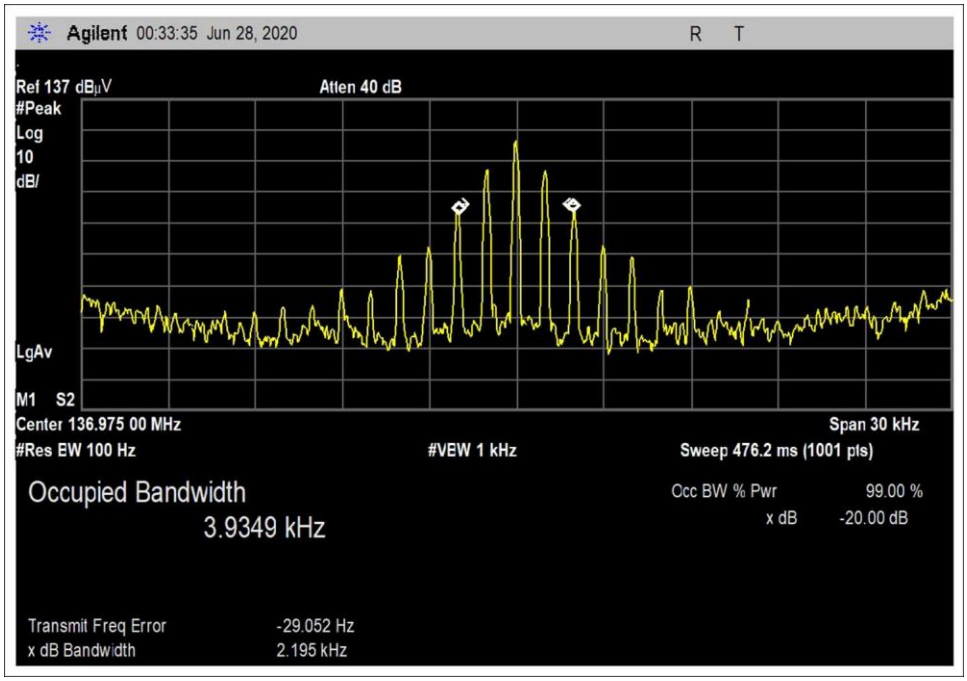
Plot(s)



Low Channel

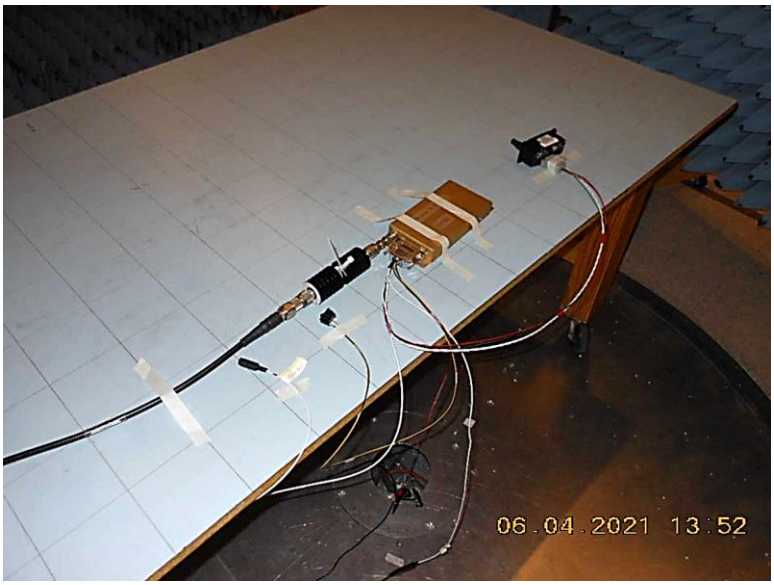


Middle Channel



High Channel

Test Setup Photo



2.1051 / 87.139 Spurious Emissions at Antenna Terminals.

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.26 (2015)	Test Date(s):	6/8/2021
Configuration:	1		
Test Setup:	Spectrum analyzer is connected to the EUT's antenna port through 20dB of attenuation. Frequency range investigated: 9kHz – 12GHz		

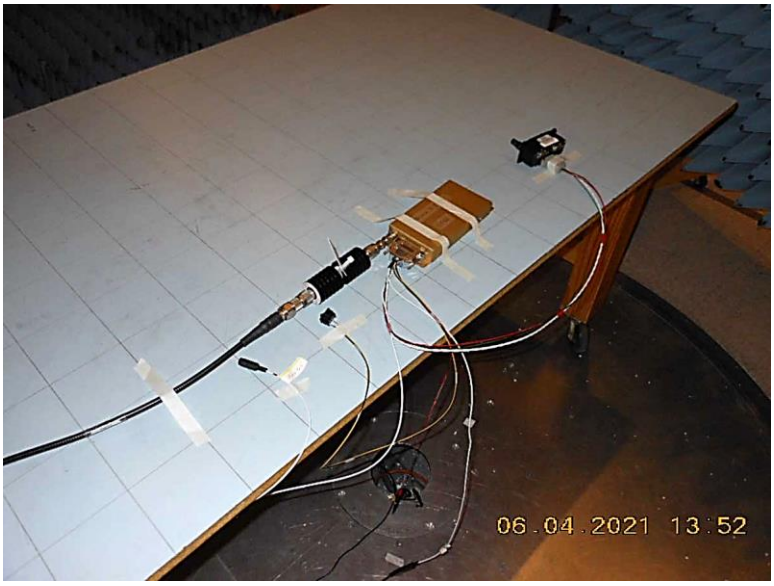
Environmental Conditions			
Temperature (ºC)	23	Relative Humidity (%):	40

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02872	Spectrum Analyzer	Agilent	E4440A	11/18/2019	11/18/2021
P07638	Attenuator	API Weinschel	47-20-34	6/19/2020	6/19/2022

Operating Frequency:118-136.975MHz			
Channels: Low, Mid and High			
Highest Measured Output Power:		dBm: 38.58	Watts: 7.21
Limit: 40 dBc			
Frequency (MHz)	**Reference Level (dBm)**	**Antenna Port**	**dBc**
112.4	-11.42	1	50
102.8	-16.42	1	55
24.572	-17.02	1	55.6
235.6	-20.32	1	58.9
235.6	-20.32	1	58.9
34.8	-21.92	1	60.5
273.5	-25.62	1	64.2
254.1	-25.82	1	64.4
20.493	-26.12	1	64.7
28.65	-28.22	1	66.8

No EUT Emissions detected within 20dB of the limit above 1.4GHz.

Test Setup Photo(s)



2.1053 / 87.139 Field Strength of Spurious Radiation

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.26 (2015)	Test Date(s):	6/7/2021
Configuration:	1		
Test Setup:	EUT is located on the test table 80cm above the ground plane for below 1GHz and 150cm for above 1GHz. EUT's antenna port is terminated on a 50ohm load. Frequency range investigated: 9kHz – 12GHz All measurements are maximized.		

Environmental Conditions			
Temperature (ºC)	22	Relative Humidity (%):	45

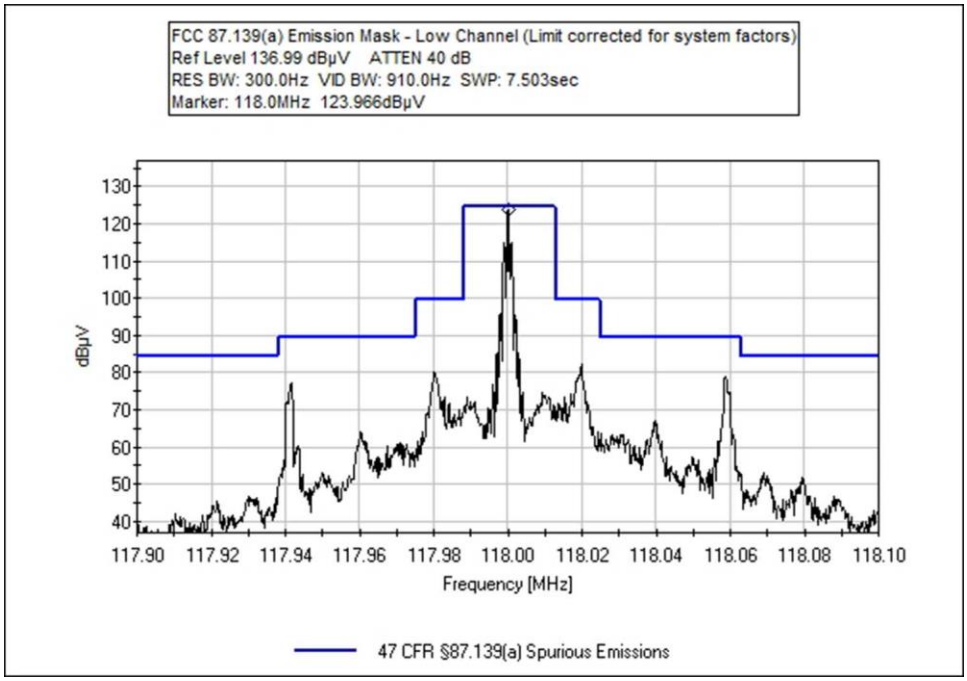
Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
00052	Loop Antenna	EMCO	6502	5/4/2020	5/4/2022
03540	Preamp	HP	83017A	5/14/2021	5/14/2023
01995	Biconilog Antenna	Chase	CBL6111C	4/14/2020	4/14/2022
01467	Horn Antenna	EMCO	3115	7/5/2019	7/5/2021
02307	Preamp	HP	8447D	1/10/2020	1/10/2022
02871	Spectrum Analyzer	Agilent	E4440A	3/12/2020	3/12/2022
P05275	Attenuator	Weinschel	1W	3/26/2020	3/26/2022

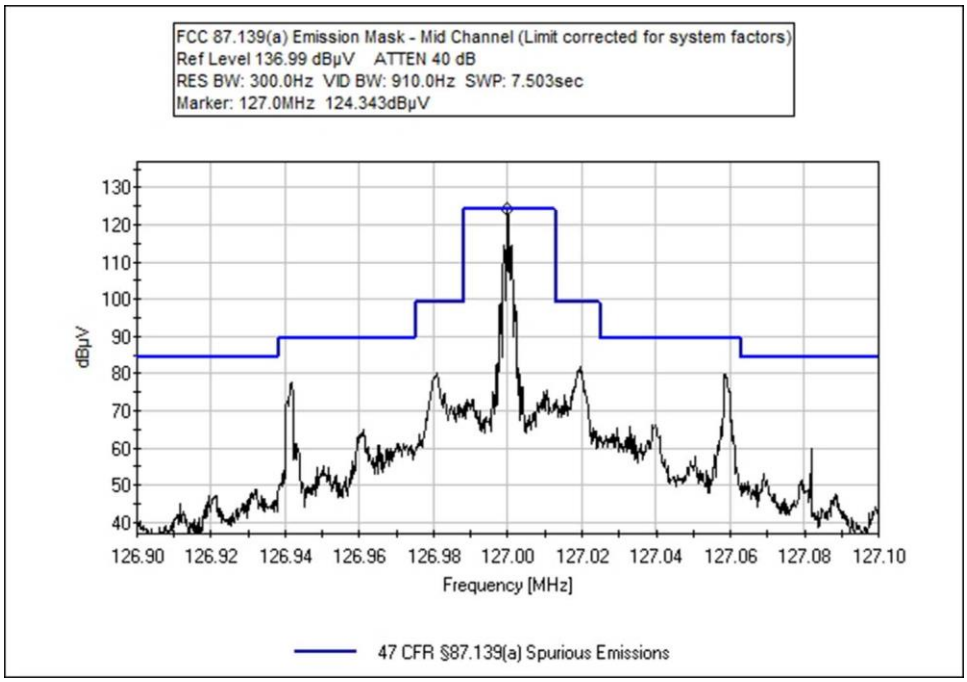
Operating Frequency: 118-136.975MHz		
Channels: Low, Mid and High		
Highest Measured Output Power:	dBm: 38.58	Watts: 7.21
Distance: 3 meters		
Limit: 40 dBc		

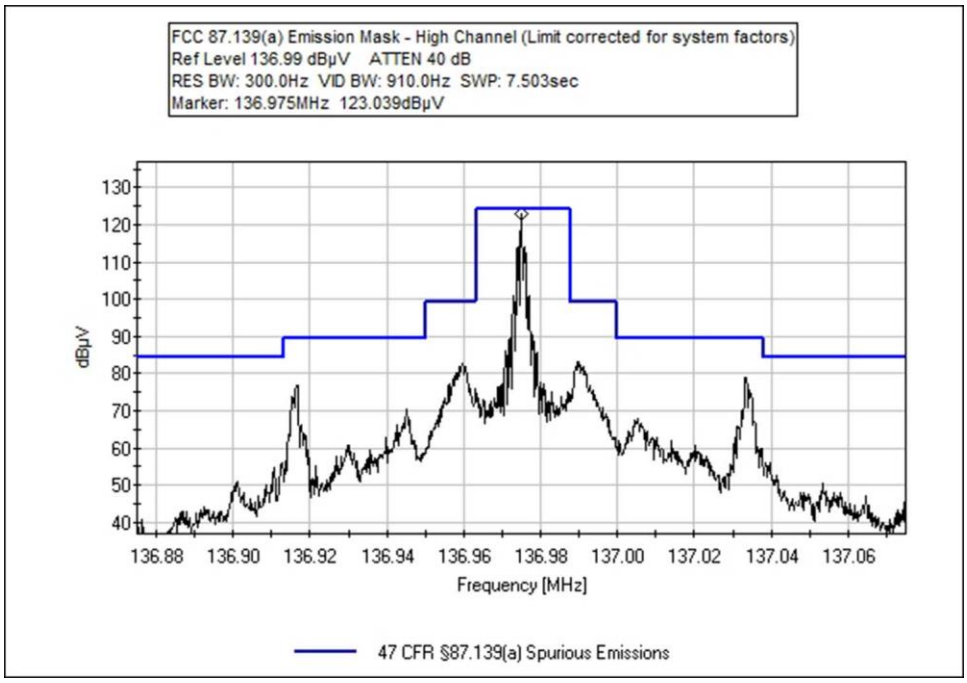
Frequency (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
826.004	-6.72	Vert/Horz	45.3
821.5	-9.82	Vert/Horz	48.4
634.999	-11.32	Vert/Horz	49.9
708.001	-13.72	Vert/Horz	52.3
0.02	-15.52	Perp/Para	54.1
589.995	-16.22	Vert/Horz	54.8
761.987	-16.32	Vert/Horz	54.9
943.997	-17.02	Vert/Horz	55.6
684.87	-17.82	Vert/Horz	56.4
507.999	-18.52	Vert/Horz	57.1
959.3	-18.92	Vert/Horz	57.5
889.4	-19.22	Vert/Horz	57.8
235.999	-19.32	Vert/Horz	57.9
1062.002	-19.62	Vert/Horz	58.2
548	-19.62	Vert/Horz	58.2
273.948	-21.02	Vert/Horz	59.6
0.01	-22.32	Perp/Para	60.9
472.013	-22.42	Vert/Horz	61
254.005	-22.92	Vert/Horz	61.5
1095.824	-23.42	Vert/Horz	62
1016	-23.52	Vert/Horz	62.1
1179.999	-25.92	Vert/Horz	64.5
380.996	-26.02	Vert/Horz	64.6
1142.8	-27.32	Vert/Horz	65.9
411.2	-29.12	Vert/Horz	67.7
0.04	-31.22	Perp/Para	69.8
1369.792	-32.92	Vert/Horz	71.5
1396.946	-34.92	Vert/Horz	73.5
354	-38.62	Vert/Horz	77.2
0.06	-40.72	Perp/Para	79.3
1232.774	-40.82	Vert/Horz	79.4
1298.074	-41.52	Vert/Horz	80.1
1270	-42.52	Vert/Horz	81.1
28.06	-59.42	Perp/Para	98
27.403	-59.92	Perp/Para	98.5
29.313	-61.32	Perp/Para	99.9

No EUT Emissions detected within 20dB of the limit above 1.4GHz.

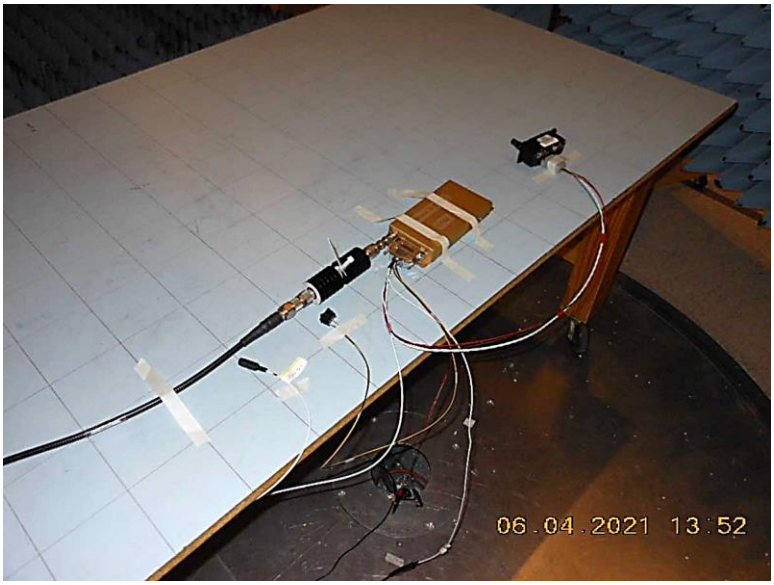
Plot(s)


FCC 87.139(a) Emission Mask - Low Channel (Limit corrected for system factors)
Ref Level 136.99 dBµV ATTEN 40 dB
RES BW: 300.0Hz VID BW: 910.0Hz SWP: 7.503sec
Marker: 118.0MHz 123.966dBµV
dBµV
130
120
110
100
90
80
70
60
50
40
117.90 117.92 117.94 117.96 117.98 118.00 118.02 118.04 118.06 118.08 118.10
Frequency [MHz]
47 CFR §87.139(a) Spurious Emissions


FCC 87.139(a) Emission Mask - Mid Channel (Limit corrected for system factors)
Ref Level 136.99 dBµV ATTEN 40 dB
RES BW: 300.0Hz VID BW: 910.0Hz SWP: 7.503sec
Marker: 127.0MHz 124.343dBµV
dBµV
130
120
110
100
90
80
70
60
50
40
126.90 126.92 126.94 126.96 126.98 127.00 127.02 127.04 127.06 127.08 127.10
Frequency [MHz]
47 CFR §87.139(a) Spurious Emissions



Test Setup Photo(s)



2.1055 / 87.133 Frequency Stability

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.26 (2015)	Test Date(s):	6/8/2021
Configuration:	1		
Test Setup:	Spectrum analyzer is connected to the EUT's antenna port through 20dB of attenuation.		

Environmental Conditions			
Temperature (ºC)	23	Relative Humidity (%):	40

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02872	Spectrum Analyzer	Agilent	E4440A	11/18/2019	11/18/2021
P07638	Attenuator	API Weinschel	47-20-34	6/19/2020	6/19/2022
D06122	Power Supply	Lambda	GEN 125-80	1/18/2021	1/18/2023
03029	Thermometer, Digital Infrared	Fluke	566	3/11/2021	3/11/2023

Test Data Summary

Declared Temperature Range: -30 to +60 ºC
Manufacturer declares the equipment does not utilize heater type crystal oscillators.

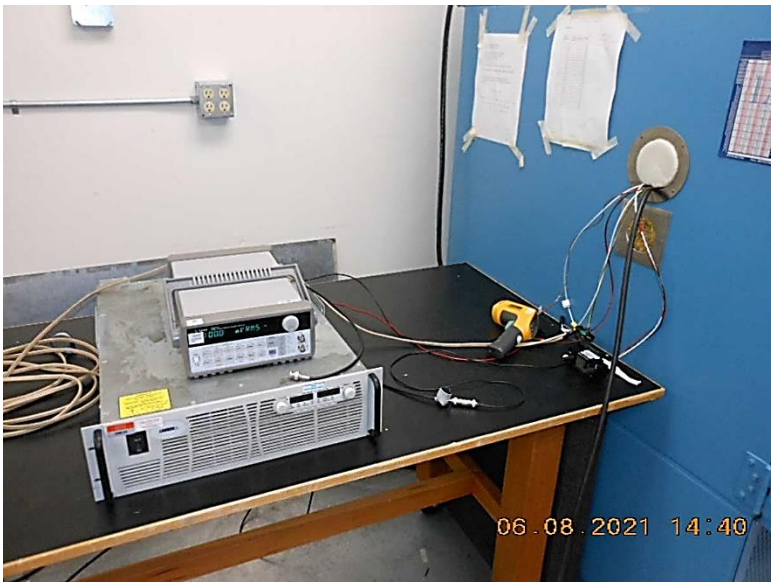
Temp (ºC)	Voltage ($V_{nominal}$ except as noted)	Low Channel Deviation (%/PPM)	Mid Channel Deviation (%/PPM)	High Channel Deviation (%/PPM)	Results
-30		0.297	0.323	0.256	Pass
-20		0.093	0.134	0.073	
-10		0.017	0.063	0.015	
0		-0.042	-0.063	-0.066	
10		-0.093	-0.039	-0.051	
20	$V_{Minimum}$	-0.0169	0.00	-0.0146	
20		0	0	0	
20	$V_{Maximum}$	-0.0085	0.0394	-0.0146	
30		-0.034	0	-0.037	
40		0.042	0.031	0	
50		0.068	0.102	0.058	
60		-0.127	-0.110	-0.153	
Maximum Deviation		0.297	0.323	0.256	

Parameter Definitions:

Measurements performed at input voltage according to manufacturer specification.

Parameter	Value
$V_{Nominal}$:	14 VDC
$V_{Minimum}$:	11.9 VDC
$V_{Maximum}$:	16.1 VDC

Test Setup Photo(s)



Test Setup

Chamber Test Setup