Dynon Radios, LLC

ADDENDUM TEST REPORT TO 93344-8

Aviation VHF COM Transceiver, SV-COM-425

Tested To The Following Standards:

FCC Part 87

Report No.: 93344-8A

Date of issue: August 13, 2012

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

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 EMC 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.

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Dynon Radios, LLC
19825 141st PI NE
Woodinville, WA 98072

Representative: Warren Snyder

REPORT PREPARED BY:

Joyce Walker
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 93344

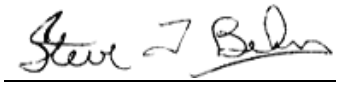
DATE OF EQUIPMENT RECEIPT: July 2, 2012
DATE(S) OF TESTING: July 2-6, 2012

Revision History

Original: Testing of the Aviation VHF COM Transceiver, SV-COM-425 to FCC Part 87.
Addendum A: Added peripheral devices to the Equipment Under Test sections, added necessary bandwidth calculations to section 87.135 and added cutoff frequency clarification under the plots in section 2.1047(a)(b).

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment 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., Suite A
Bothell, WA 98021-4413

Site Registration & Accreditation Information

Location	CB #	Taiwan	Canada	FCC	Japan
Bothell	US0081	SL2-IN-E-1145R	3082C-1	318736	R-2296 C-2506 T-1489 G-284

SUMMARY OF RESULTS

Standard / Specification: FCC Part 87

Description	Test Procedure/Method	Results
Frequency Stability	FCC 87.113 / TIA / EIA 603-C	Pass
RF Power Output	FCC 87.131 / TIA / EIA 603-C	Pass
Occupied Bandwidth	FCC 87.135 / TIA / EIA 603-C	Pass
Field Strength of Spurious Radiation	FCC 87.139 / TIA / EIA 603-C	Pass
Audio Frequency Response	FCC 2.1047 (a)(b) / TIA / EIA 603-C	Pass

Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Aviation VHF COM Transceiver
Manuf: Dynon Radios LLC
Model: SV-COM-425
Serial: F1-3

PERIPHERAL DEVICES

The EUT was tested with the following peripheral devices:

Remote Control Unit
Manuf: Dynon Radios LLC
Model: SV-COM-450
Serial: 1

DC Power Supply
Manuf: AMREL
Model: PPS 18-4D
Serial: 999838

Arbitrary Waveform Generator
Manuf: HP
Model: 33120A
Serial: US36037737

FCC PART 87

87.113 Frequency Stability

Test Conditions / Setup

Spectrum analyzer is connected to the EUT's RF Port through 30dB of external attenuation. EUT is located inside the temperature chamber. Temperature will vary from -30°C to +50°C in 10°C steps. Measurements will be taken after the EUT temp has stabilized.
Testing is being performed per TIA / EIA 603-C.
Temp: 21°C
Humidity: 34%
Pressure: 101.2kPa
Frequency Range: 118-136.975MHz

Engineer Name: Armando Del Angel

Test Equipment

Asset/Serial #	Description	Model	Manufacturer	Cal Date	Cal Due
02757	Temperature Chamber	F100/350-8	Bemco	1/30/2011	1/30/2013
02871	Spectrum Analyzer	E4440A	Agilent	4/22/2011	4/22/2013
02817	Arbitrary Waveform Generator	33120A	HP	8/18/2010	8/18/2012
06130	Attenuator	18N20W-10	Inmet	8/18/2011	8/18/2013
06131	Attenuator	18N20W-20	Inmet	8/18/2011	8/18/2013

Test Data

	LOW	MID	HIGH	LOW	MID	HIGH	Limit
Temp °C	Freq	Freq	Freq	PPM	PPM	PPM	PPM
-30	118.000580MHz	127.500575MHz	136.975490MHz	4.915	4.509	3.577	20
-20	118.000385MHz	127.500390MHz	136.975275MHz	3.262	3.058	2.007	20
-10	118.000055MHz	127.499990MHz	136.974965MHz	0.466	0.078	0.255	20
0	117.999770MHz	127.499685MHz	136.974715MHz	1.949	2.470	2.080	20
10	117.999655MHz	127.499555MHz	136.974535MHz	2.923	3.490	3.394	20
20	117.999570MHz	127.499580MHz	136.974530MHz	3.644	3.294	3.431	20
30	117.999550MHz	127.499590MHz	136.974510MHz	3.813	3.215	3.577	20
40	117.999535MHz	127.499585MHz	136.974645MHz	3.940	3.254	2.591	20
50	117.999785MHz	127.499720MHz	136.974735MHz	1.822	2.196	1.934	20

Test Setup Photos

87.131 RF Power Output

Test Conditions / Setup

Spectrum analyzer is connected to the EUT's RF port through 30dB of attenuation.
Testing is being performed per TIA / EIA 603-C.
Temp: 21°C
Humidity: 34%
Pressure: 101.2kPa
Frequency Range: 118 -136.975MHz

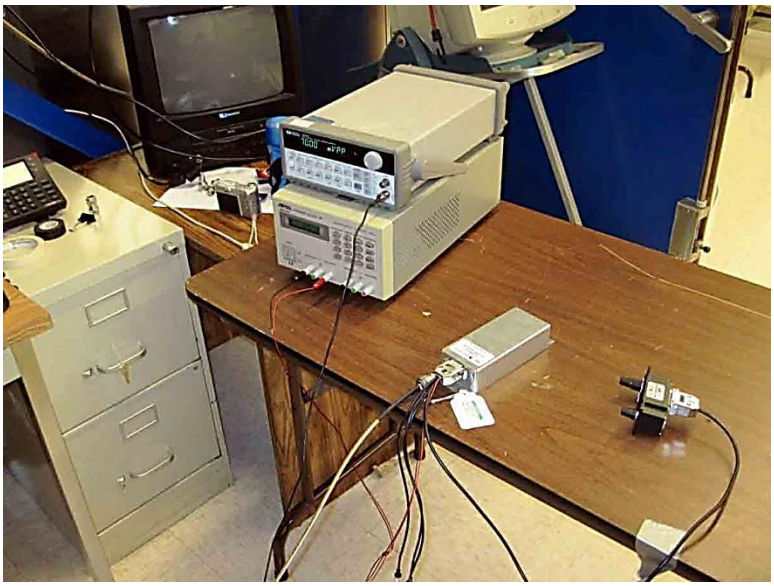
Engineer Name: Armando Del Angel

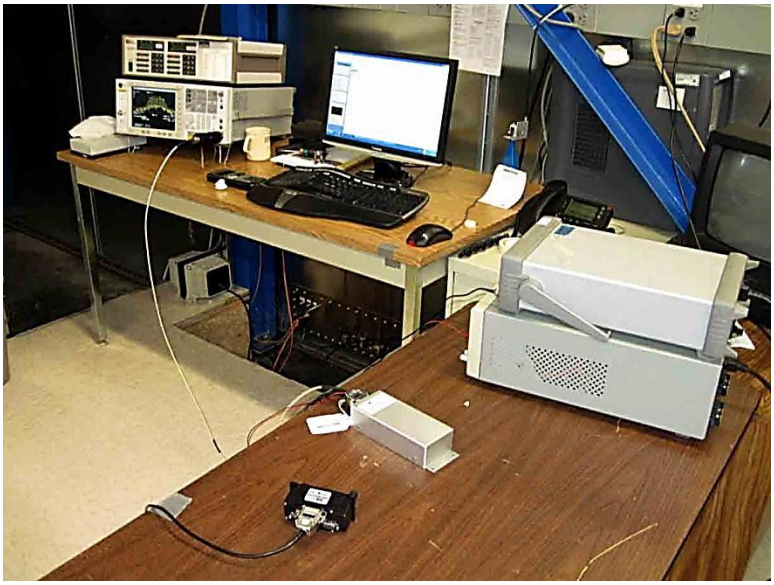
Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
02871	Spectrum Analyzer	E4440A	Agilent	4/22/2011	4/22/2013
06130	Attenuator	18N20W-10	Inmet	8/18/2011	8/18/2013
06131	Attenuator	18N20W-20	Inmet	8/18/2011	8/18/2013
03227	Cable	32026-29080-29080-84	Astrolab	5/2/2011	5/2/2013

Test Data

	Input Voltage	**Mean Power**	**Limit**
LOW 118.000MHz	**85%**	38.5dBm	40.0dBm
	100%	38.5dBm	40.0dBm
	115%	38.5dBm	40.0dBm
MID 127.500MHz	**85%**	36.7dBm	40.0dBm
	100%	36.5dBm	40.0dBm
	115%	36.3dBm	40.0dBm
HIGH 136.975MHz	**85%**	36.6dBm	40.0dBm
	100%	36.8dBm	40.0dBm
	115%	36.7dBm	40.0dBm

Test Setup Photos





87.135 Occupied Bandwidth

Test Conditions / Setup

Spectrum analyzer is connected to the EUT's antenna through 30dB of attenuation.
Testing is being performed per TIA / EIA 603-C.
Temp: 21°C
Humidity: 34%
Pressure: 101.2kPa
Frequency Range: 118-136.975MHz

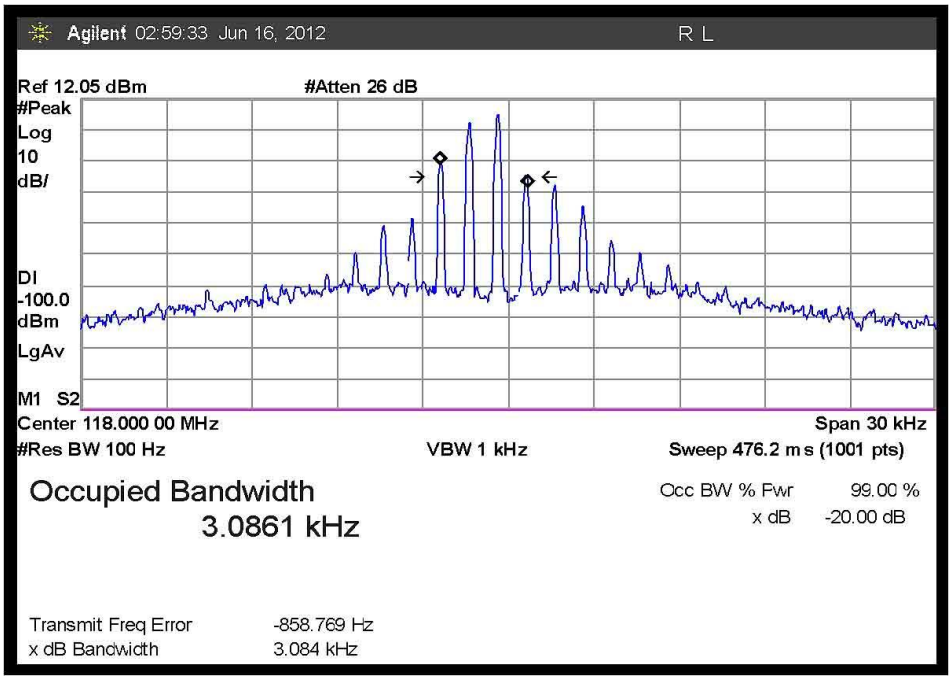
Engineer Name: Armando Del Angel

Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
02871	Spectrum Analyzer	E4440A	Agilent	4/22/2011	4/22/2013
06130	Attenuator	18N20W-10	Inmet	8/18/2011	8/18/2013
06131	Attenuator	18N20W-20	Inmet	8/18/2011	8/18/2013
03227	Cable	32026-29080-29080-84	Astrolab	5/2/2011	5/2/2013

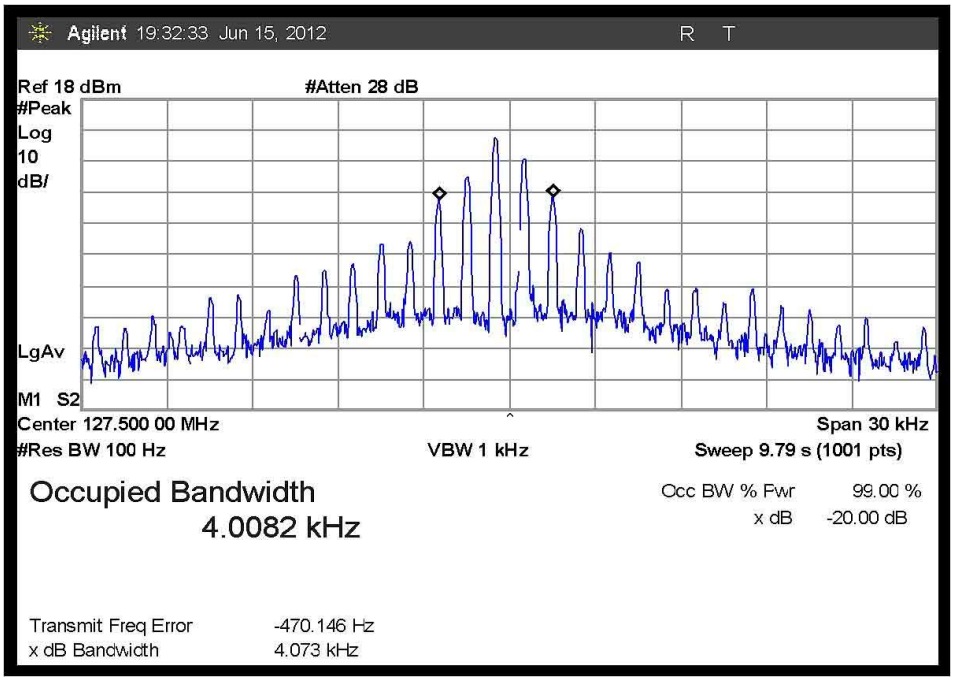
Test Data

Necessary Bandwidth = 2 * Cutoff Frequency = 2 * 3kHz = *6kHz*

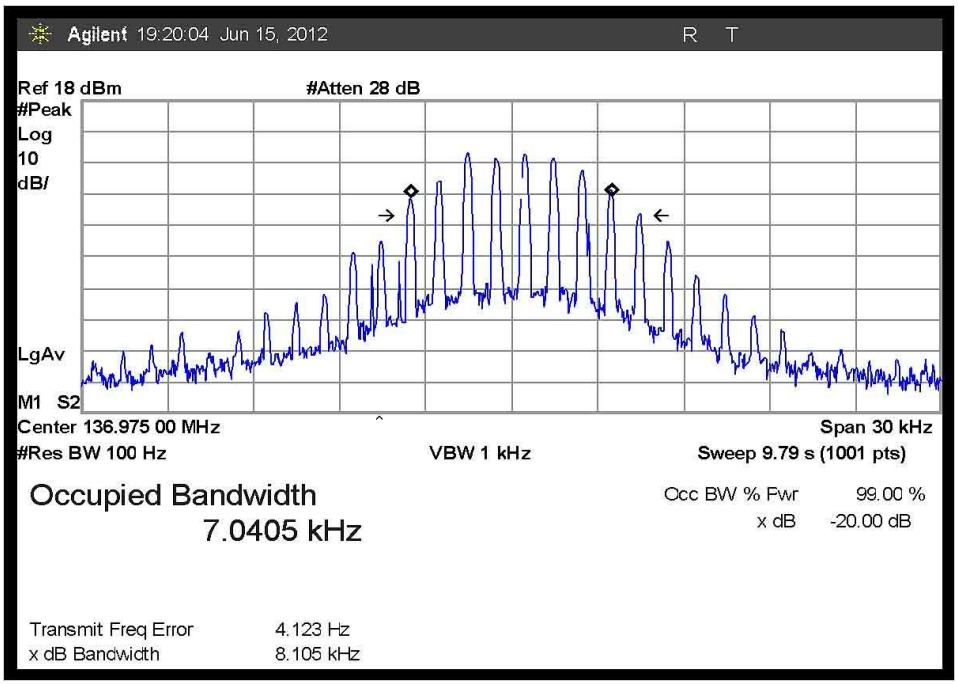
Frequency	Bandwidth	Bandwidth Limit
Low	3.084kHz	25kHz
Mid	4.073kHz	25kHz
High	8.105kHz	25kHz


Agilent 02:59:33 Jun 16, 2012
R L
Ref 12.05 dBm
#Atten 26 dB
#Peak
Log
10
dB/
DI
-100.0
dBm
LgAv
M1 S2
Center 118.000 00 MHz
Span 30 kHz
#Res BW 100 Hz
VBW 1 kHz
Sweep 476.2 ms (1001 pts)
Occupied Bandwidth
3.0861 kHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -858.769 Hz
x dB Bandwidth 3.084 kHz

LOW

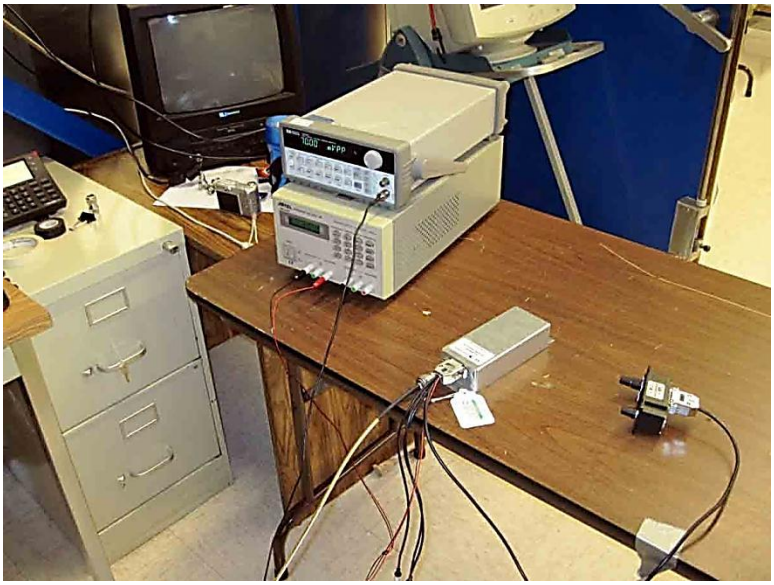

Agilent 19:32:33 Jun 15, 2012
R T
Ref 18 dBm
#Atten 28 dB
#Peak
Log
10
dB/
LgAv
M1 S2
Center 127.500 00 MHz
Span 30 kHz
#Res BW 100 Hz
VBW 1 kHz
Sweep 9.79 s (1001 pts)
Occupied Bandwidth
4.0082 kHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -470.146 Hz
x dB Bandwidth 4.073 kHz

MID


Agilent 19:20:04 Jun 15, 2012
R T
Ref 18 dBm
#Atten 28 dB
#Peak
Log
10
dB/
LgAv
M1 S2
Center 136.975 00 MHz
Span 30 kHz
#Res BW 100 Hz
VBW 1 kHz
Sweep 9.79 s (1001 pts)
Occupied Bandwidth
7.0405 kHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error 4.123 Hz
x dB Bandwidth 8.105 kHz

HIGH

Test Setup Photos



87.139 Spurious Emissions

Test Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer:	**Dynon Radios, LLC**		
Specification:	**47 CFR §87.139(a) Spurious Emissions**		
Work Order #:	**93344**	Date:	7/3/2012
Test Type:	**Conducted Emissions**	Time:	10:39:36
Equipment:	**Aviation VHF COM transceiver**	Sequence#:	1
Manufacturer:	Dynon Radios, LLC	Tested By:	Armando Del Angel
Model:	SV-COM-425		14.5Vdc
S/N:	F1-3		

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06130	Attenuator	18N20W-10	8/18/2011	8/18/2013
T2	ANP06131	Attenuator	18N20W-20	8/18/2011	8/18/2013
T3	AN03227	Cable	32026-29080-29080-84	5/2/2011	5/2/2013
	AN02871	Spectrum Analyzer	E4440A	4/22/2011	4/22/2013

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Aviation VHF COM transceiver*	Dynon Avionics	SV-COM-425	F1-3

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Temp: 24°C
Humidity: 39%
Pressure: 101.9kPa
Frequency: 9kHz - 1.37GHz

EUT's antenna port is connected to the spectrum analyzer's input through a cable and 30dB of external attenuation. Testing is being performed the TIA-603-C.

Operating Frequency:	118MHz - 137MHz			
Channels:	Low, Mid and High			
Highest Measured Output Power:	38.50	(dBm)=	7.08	(Watts)
Distance:	Conducted	meters		
Limit:	43+10Log(P)=	51.50	dBc	

Freq. (MHz)	Reference Level (dBm)	Port	dBc
236.00	-18.20033258	RF Port	56.70
590.00	-22.80033258	RF Port	61.30
943.99	-26.10033258	RF Port	64.60
273.95	-27.10033258	RF Port	65.60
547.89	-29.60033258	RF Port	68.10
255.00	-30.00033258	RF Port	68.50
472.00	-30.20033258	RF Port	68.70
510.00	-30.40033258	RF Port	68.90
637.50	-32.40033258	RF Port	70.90
707.99	-32.70033258	RF Port	71.20
825.99	-32.90033258	RF Port	71.40
958.81	-34.30033258	RF Port	72.80
892.49	-34.90033258	RF Port	73.40
410.92	-37.30033258	RF Port	75.80
382.50	-37.70033258	RF Port	76.20
1,061.98	-38.00033258	RF Port	76.50
354.00	-38.80033258	RF Port	77.30
1,020.06	-39.10033258	RF Port	77.60
765.00	-39.10033258	RF Port	77.60
821.84	-39.30033258	RF Port	77.80
126.07	-43.50033258	RF Port	82.00
106.08	-43.80033258	RF Port	82.30
1,180.08	-45.00033258	RF Port	83.50
30.88	-46.00033258	RF Port	84.50
1,147.57	-46.30033258	RF Port	84.80
684.88	-46.70033258	RF Port	85.20
1,095.65	-48.30033258	RF Port	86.80
1,232.78	-48.90033258	RF Port	87.40
1,369.45	-49.00033258	RF Port	87.50
1,275.09	-49.20033258	RF Port	87.70
124.97	-50.20033258	RF Port	88.70
113.97	-51.80033258	RF Port	90.30
27.82	-54.10033258	RF Port	92.60
27.84	-55.00033258	RF Port	93.50
99.70	-55.40033258	RF Port	93.90
44.97	-58.30033258	RF Port	96.80
103.96	-59.20033258	RF Port	97.70
90.16	-59.20033258	RF Port	97.70
73.03	-59.60033258	RF Port	98.10

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: Dynon Radios LLC
Specification: **87.139 Radiated Spurious Emissions Mask A**
Work Order #: **93344** Date: 7/6/2012
Test Type: **Maximized Emissions** Time: 13:16:37
Equipment: **Aviation VHF COM transceiver** Sequence#: 3
Manufacturer: Dynon Radios LLC Tested By: Armando del Angel
Model: SV-COM-425
S/N: F1-3

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN01316	Preamp	8447D	4/3/2012	4/3/2014
	AN01993	Biconilog Antenna	CBL6111C	3/2/2012	3/2/2014
	AN03227	Cable	32026-29080-29080-84	5/2/2011	5/2/2013
	ANP05360	Cable	RG214	11/8/2010	11/8/2012
	ANP05366	Cable	RG-214	10/14/2011	10/14/2013
	AN02871	Spectrum Analyzer	E4440A	4/22/2011	4/22/2013
	AN01271	Preamp	83017A	8/18/2011	8/18/2013
	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	10/19/2011	10/19/2013
	ANP05542	Cable	Heliax	9/27/2011	9/27/2013
	AN03123	Cable	32026-2-29801-12	10/14/2011	10/14/2013
	AN00052	Loop Antenna	6502	5/16/2012	5/16/2014

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Aviation VHF COM transceiver*	Dynon Radios LLC	SV-COM-425	F1-3

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Temp: 21°C
Humidity: 34%
Pressure: 101.2kPa
Frequency Range: 9kHz -1.36975GHz

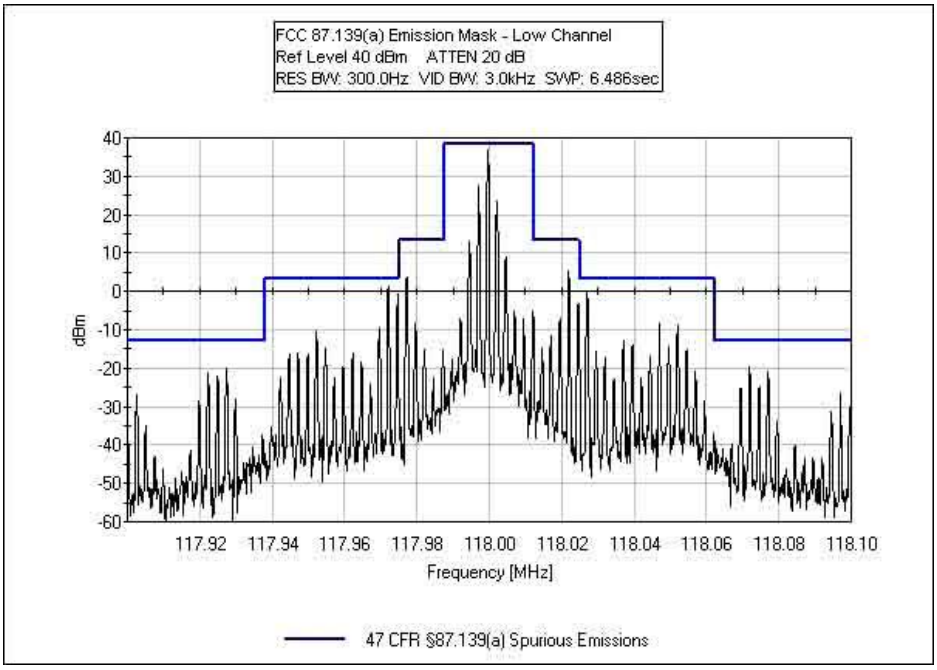
EUT is located on the test table 80cm above the ground plane.
EUT's antenna port is terminated on a 50ohm load.
All measurements are maximized.

Testing is being performed per TIA / EIA 603-C.

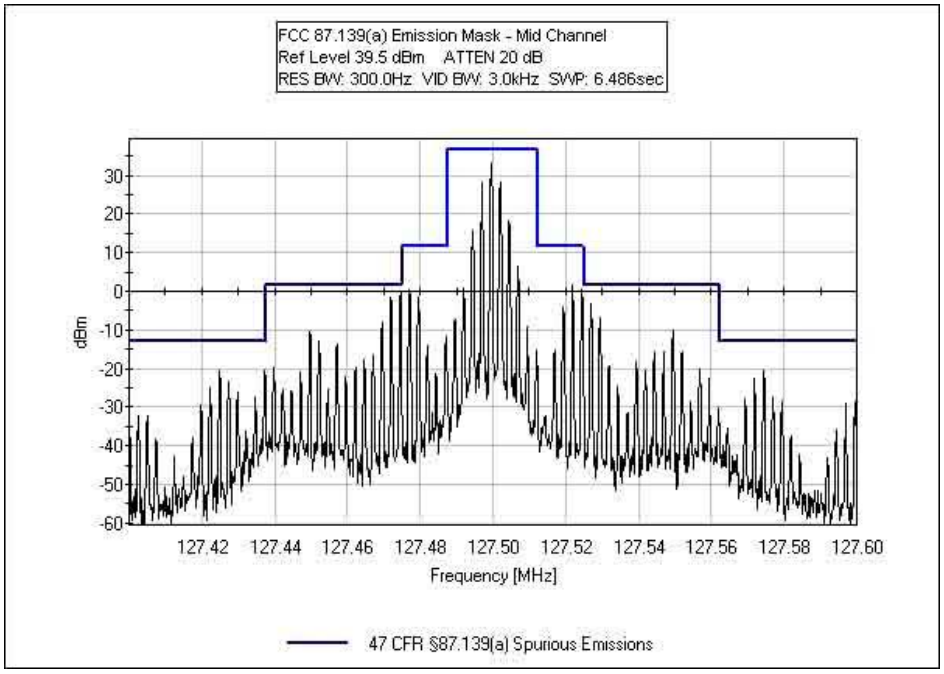
Operating Frequency:	118-136.975MHz			
Channels:	Low, Mid and High			
Highest Measured Output Power:	38.50	(dBm)=	7.079	(Watts)
Distance:	3	meters		
Limit:	43+10Log(P)=	51.50	dBc	

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
590.00	-14	Horiz	52.50
590.00	-15.9	Vert	54.40
637.50	-18.5	Vert	57.00
472.00	-19.1	Vert	57.60
273.95	-19.4	Horiz	57.90
236.00	-19.8	Vert	58.30
472.00	-21.5	Horiz	60.00
708.00	-22	Horiz	60.50
236.00	-23.5	Horiz	62.00
944.00	-24.4	Horiz	62.90
410.93	-26.7	Vert	65.20
382.50	-26.7	Horiz	65.20
273.95	-27	Vert	65.50
510.00	-28	Vert	66.50
510.00	-28	Horiz	66.50
255.00	-28	Horiz	66.50
708.00	-28	Vert	66.50
943.99	-28.1	Vert	66.60
547.90	-28.6	Vert	67.10
684.88	-29.4	Horiz	67.90
255.00	-29.4	Vert	67.90
547.90	-29.9	Horiz	68.40
410.93	-30.1	Horiz	68.60
637.50	-32.1	Horiz	70.60
354.00	-32.1	Horiz	70.60
958.83	-33.9	Horiz	72.40
958.83	-34.3	Vert	72.80
382.50	-34.6	Vert	73.10
765.00	-34.9	Horiz	73.40
892.50	-35	Horiz	73.50
1,062.01	-35.2	Horiz	73.70
826.00	-35.7	Vert	74.20
892.50	-36.6	Vert	75.10
1,019.98	-38.8	Horiz	77.30
765.00	-39.1	Vert	77.60
1,062.03	-40.2	Vert	78.70
1,020.04	-42	Vert	80.50
354.00	-42.1	Vert	80.60

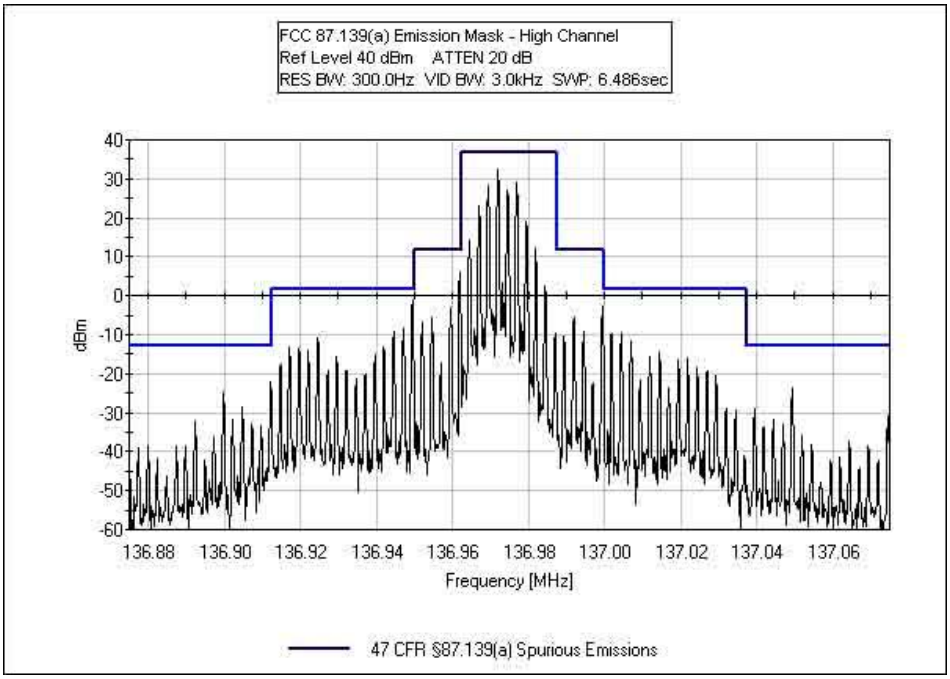
821.85	-42.9	Vert	81.40
1,095.80	-46	Vert	84.50
1,179.94	-46.7	Vert	85.20
1,147.51	-48.1	Vert	86.60
1,147.48	-49.4	Horiz	87.90
1,095.75	-51.1	Horiz	89.60
1,179.94	-51.3	Horiz	89.80
1,275.02	-52.9	Horiz	91.40
1,274.98	-53.9	Vert	92.40
1,232.78	-54.2	Vert	92.70
1,232.73	-54.3	Horiz	92.80
1,369.75	-60	Horiz	98.50
1,369.75	-60.5	Vert	99.00



LOW

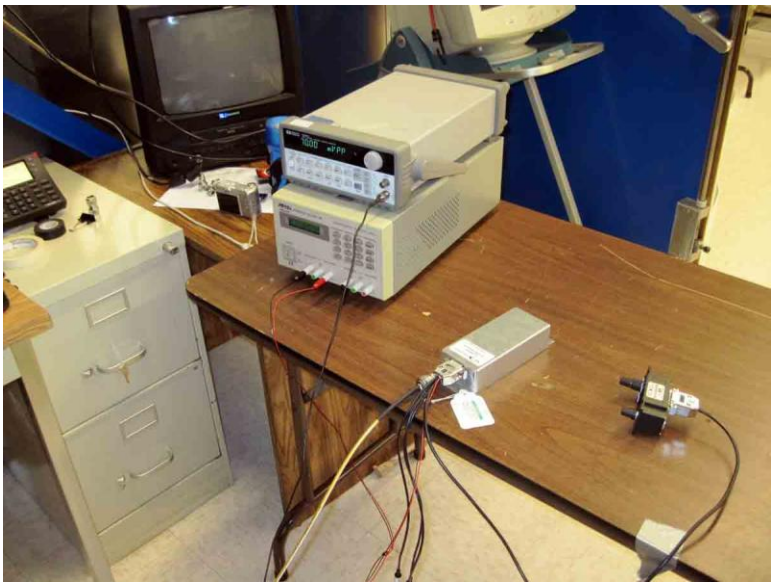

FCC 87.139(a) Emission Mask - Mid Channel
Ref Level 39.5 dBm ATTEN 20 dB
RES BW: 300.0Hz VID BW: 3.0kHz SWP: 6.486sec
dBm
30
20
10
0
-10
-20
-30
-40
-50
-60
127.42 127.44 127.46 127.48 127.50 127.52 127.54 127.56 127.58 127.60
Frequency [MHz]
47 CFR §87.139(a) Spurious Emissions

MID


FCC 87.139(a) Emission Mask - High Channel
Ref Level 40 dBm ATTEN 20 dB
RES BW: 300.0Hz VID BW: 3.0kHz SWP: 6.486sec
dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
136.88 136.90 136.92 136.94 136.96 136.98 137.00 137.02 137.04 137.06
Frequency [MHz]
47 CFR §87.139(a) Spurious Emissions

HIGH

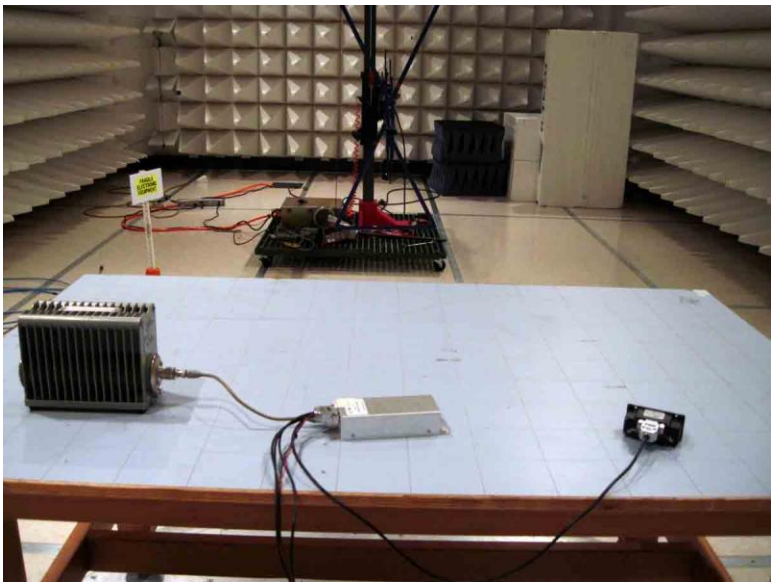
Test Setup Photos



CONDUCTED

CONDUCTED

RADIATED



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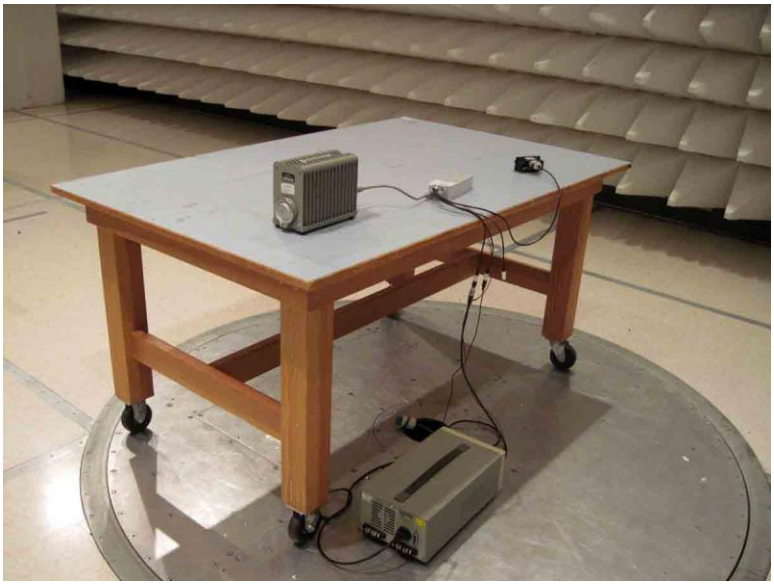


RADIATED

2.1047(a)(b) Audio Frequency Response

Test Conditions / Setup

2.1047(a) Audio Frequency Response Setup, Low, Mid and High Channels
The test setup is in accordance with TIA/EIA 603 2.2.6.2.2 Constant Input Method. EUT is powered by an external 14VDC power source. The EUT is functioning normally on the indicated frequency. Modulation Input voltage is held at 10mVPP (20% AM modulation). . The measured deviation is in % AM modulation.

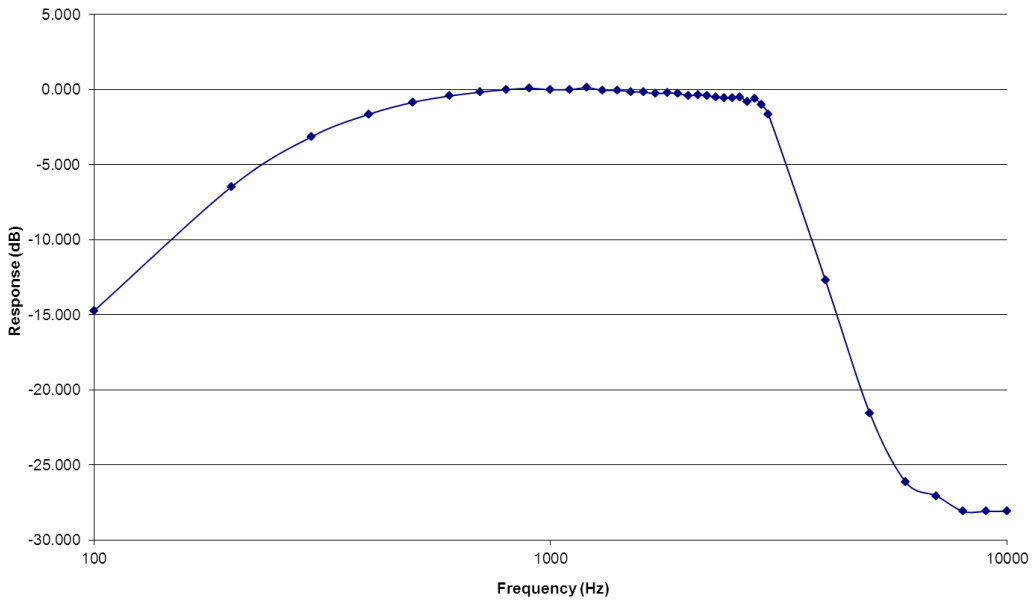
2.1047(b) Modulation Limiting Setup, Low, Mid and High Channels
The test setup is in accordance with TIA/EIA 603. The EUT is functioning normally on the indicated frequency. EUT is powered by an external 14VDC power source. A family of curves is plotted as a function of input modulation voltage relative to the 60% of the manufacturer's declared system deviation voltage of 70mVPP; the measured deviation is in % AM modulation.

Engineer Name: Armando Del Angel

Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
02817	Arbitrary Waveform Generator	33120A	HP	8/18/2010	8/18/2012
02072	RF Characteristics Analyzer	8901A	HP	4/14/2011	4/14/2013
03227	Cable	32026-29080-29080-84	Astrolab	5/2/2011	5/2/2013
06130	Attenuator	18N20W-10	Inmet	8/18/2011	8/18/2013
06131	Attenuator	18N20W-20	Inmet	8/18/2011	8/18/2013

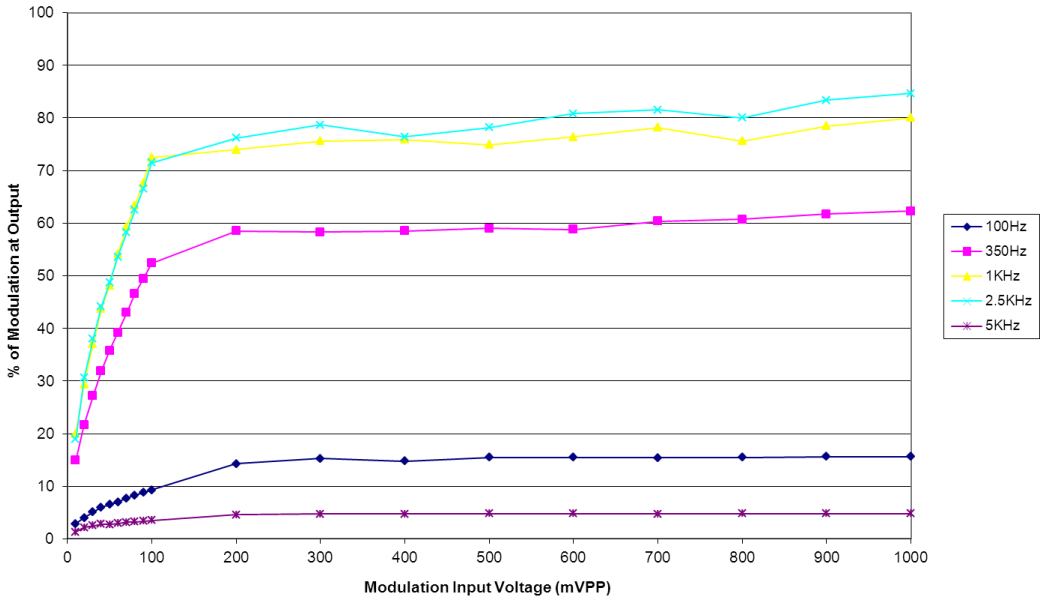
Test Data

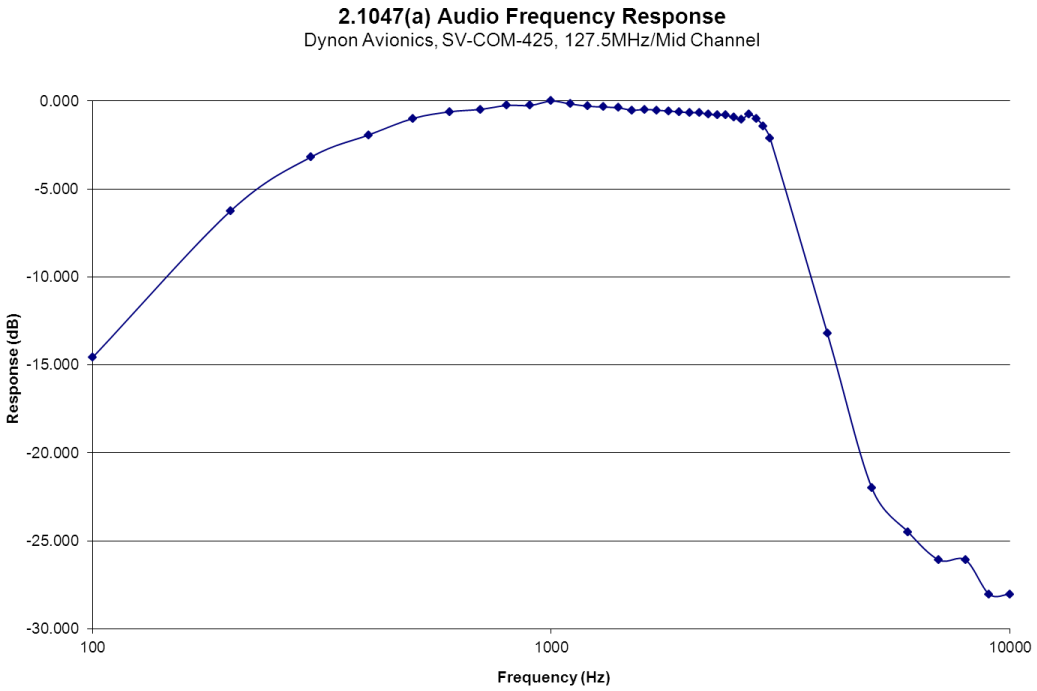
2.1047(a) Audio Frequency Response
Dynon Avionics, SV-COM-425, 118MHz/Low Channel



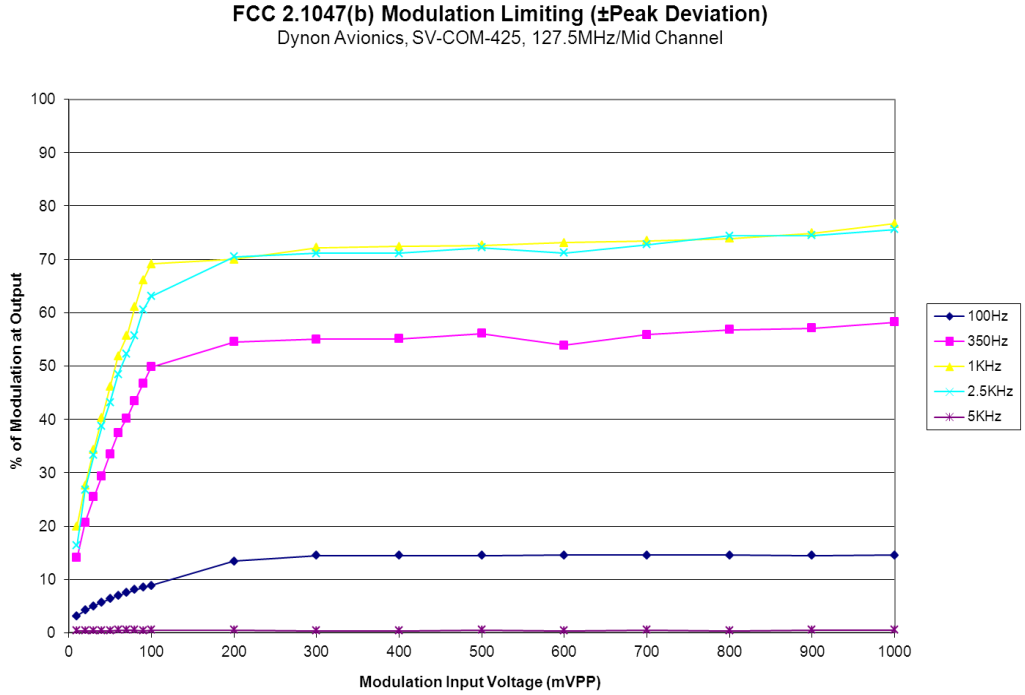
Cutoff Frequency is 3kHz

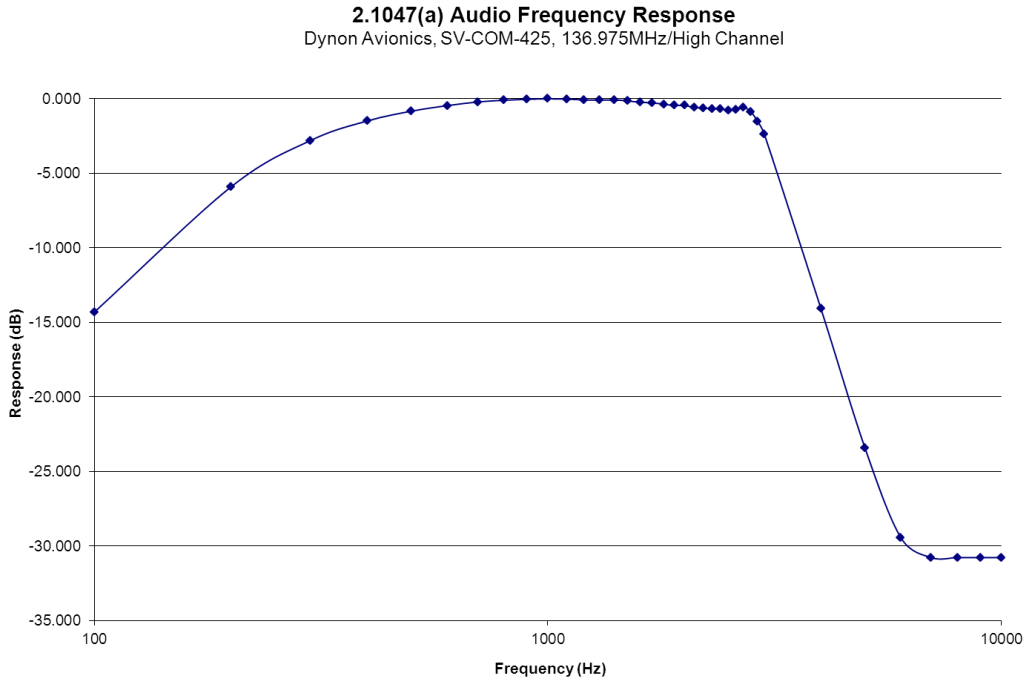
FCC 2.1047(b) Modulation Limiting (±Peak Deviation)
Dynon Avionics, SV-COM-425, 118MHz/Low Channel



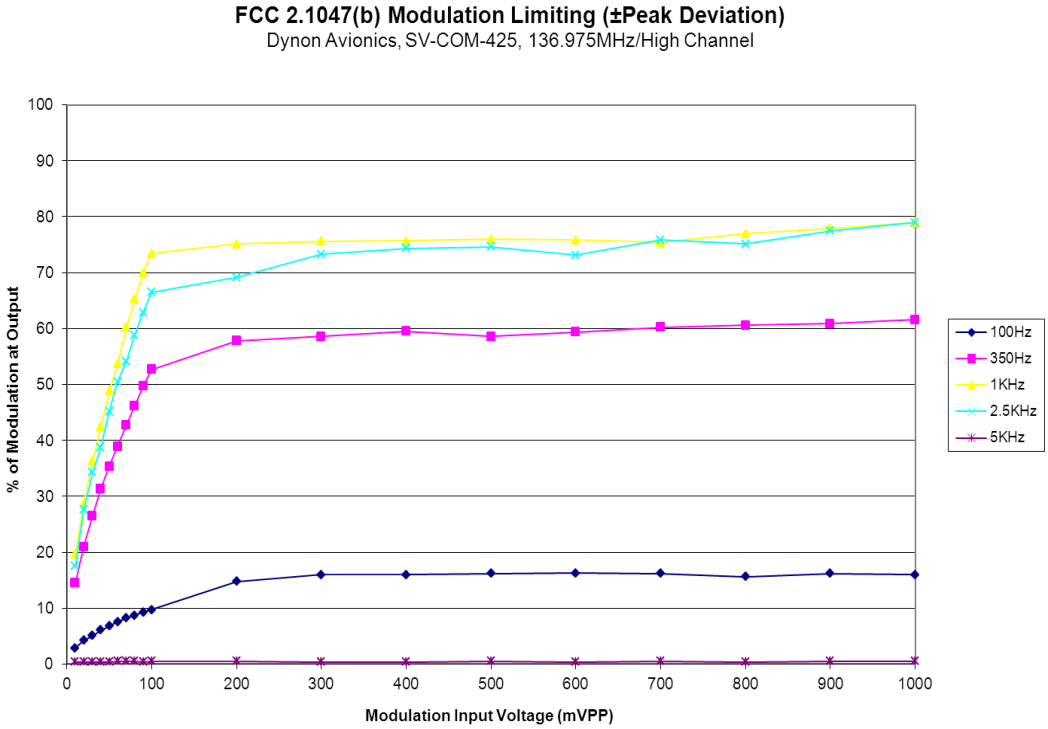


Cutoff Frequency is 3kHz





Cutoff Frequency is 3kHz



Test Setup Photos