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FCC PART 90
&
IC RSS 119

TEST REPORT

APPLICANT	SPECTRA ENGINEERING PTY LTD
	731 MARSHALL RD MALAGA WESTERN AUSTRALIA 6090 AUSTRALIA
FCC ID	OKRMXDR7V
IC	5605A-MXDR7V
MODEL NUMBER	MXDR7V
PRODUCT DESCRIPTION	**ATLAS 4500 MULTIMODE STATION**
DATE SAMPLE RECEIVED	6/23/2016
DATE TESTED	7/19/2016
TESTED BY	Sid Sanders
APPROVED BY	Cory Leverett
TEST RESULTS	☒ PASS ☐ FAIL

Report Number	Version Number	Description	Issue Date
1198AUT16TestReport_	Rev2	Initial Issue	7/19/2016
	Rev2.5	Added reference to IC requirements on Summary Table, and updated FCC rule part	7/29/2016
	Rev3	Updated Product Description	8/25/2016

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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

Summary

The device under test does:

☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.

☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669

Tested by: _____
Name and Title: Project Manager/Testing Technician

Date: 7/19/2016

Reviewed and approved by: _____
Name and Title: Cory Leverett, Engineering Tech.

Date: 7/29/2016

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GENERAL INFORMATION

EUT Specification

EUT Description	ATLAS 4500 MULTIMODE STATION
FCC ID	OKRMXDR7V
IC	5605A-MXDR7V
Model Number	MXDR7V
Operating Frequency	763-775, and 851-869 MHz
Test Frequencies	764.500, 769.500, 851.500, 868.500 MHz
Type of Emission	8K10F1E, 8K10F1D, 8K10F7E,
Modulation	FM
EUT Power Source	☒ 110–120Vac/50– 60Hz
	☐ DC Power 12V
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☒ Fixed
	☐ Mobile
	☐ Portable
Test Conditions	The temperature was 24-26ºC with a relative humidity of 50 - 65%. Atmospheric Pressure 1014.9mb
Modification to the EUT	None
Test Exercise	The EUT was operated in a normal mode.
Applicable Standards	ANSI/TIA 603-D:2010, FCC CFR 47 Part 90, & IC RSS 119 i12 2015
Test Facility	**Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA.**

RF EXPOSURE INFORMATION: 47CFR 2.1093

The requirements for this equipment are covered in the included a RF Exposure exhibit.

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Test Results Summary

Test Description	FCC RULE PART NO.	IC RSS	RESULT
RF Power Output	2.1046(a), 90.541(a), 90.542(a)(1), 90.635(a)(b)	119§5.4	Pass
Occupied Bandwidth	2.1049(c)(h), 90.210(b)(g)(h), 90.691	119§5.5	Pass
Adjacent Channel Power	90.543(a)	119§5.8.9.1	Pass
Spurious Emissions at Antenna Terminal	2.1051(a), 90.210(b)(g)(h), 90.691, 90.543(c),	119§5.8.2	Pass
Field Strength of Spurious Radiation	2.1053, 90.210(b)(g)(h), 90.691, 90.543(c),	119§5.8.2	Pass
Frequency Stability	2.1055, 90.213, 90.539(c),	119§5.3	Pass

RF POWER OUTPUT

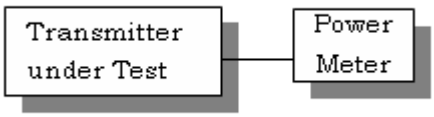
Rule Part No.: Part 2.1046(a), Part 90, RSS-119.

Requirements: For IC the power output must be within ±1.0dB of the manufacturer's rating.

Method of Measurement: RF power is measured by using a 50-ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage (if battery operated), or a properly adjusted power supply (if not battery operated), and the transmitter properly adjusted the RF output measures:

For the device with a fixed or integral antenna, the RF power is measured as ERP. The substitution method was used. The RF output measures:

Test Setup Diagram:



Test Data: Power Output Measurement Table

Tuned Freq. MHz	Power Output			
	High		Low	
	dBm	Watts	dBm	Watts
764.500	50.77	119.94	47.71	58.88
851.500	50.65	119.97	47.60	57.54
868.500	50.79	120.22	47.50	60.30

Part 2.1033 (C)(8) DC Input into the final amplifier

FOR LOW POWER SETTING INPUT POWER: (48V) (3.8A) = 182.49.75 Watts
FOR HIGH POWER SETTING INPUT POWER: (48V) (8.1A) = 388.8Watts

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MODULATION CHARACTERISTICS

Rule Part: Part 2.1033(c), Part 2.1033(c) (4), Part 90.209, Part 90.207

APCO 25 modulation phase 1 and phase 2 as defined in ANSI/ TIA-102.BABA.

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OCCUPIED BANDWIDTH

Part 2.1049(c) EMISSION BANDWIDTH:
Part 90.210(b) 25 kHz Channel Spacing

Data in the plots show that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35 dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least 43 + 10log (P) dB.

Part 90.210(c) 25 kHz Channel Spacing Not Equipped with a Low Pass Filter

For transmitters that are not equipped with an audio low pass filter pursuant to S90.211 (b), the power of any emission must be attenuated below the un-modulated carrier output power 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 than10 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% 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% of the authorized bandwidth: At least 43+10 log(Po)dB.

Part 90.210(d) Emission Mask D - 12.5 kHz channel BW equipment.
For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.
(2) On any frequency from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27 (fd - 2.88 kHz) dB.
(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10log (P) dB or 70 dB, whichever is the lesser attenuation.

Part 90.210(e) Emission Mask E – 6.25 kHz channel BW equipment.
For transmitters designed to operate with a 6.25 kHz bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f0 to 3.0 kHz removed from f0: Zero dB.
(2) On any frequency from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least 30 + 16.67(fd – 3.0 kHz) or 55 + 10 Log (P) or 65, whichever us the lesser attenuation.

(3) On any frequency removed from the center of the authorized bandwidth by more than 4.6 kHz: At least 55 + 10log (P) dB or 65 dB, whichever is the lesser attenuation.

Part 90.210(h) Emission Mask H) NPSPAC Mutual aid

Part 90.210(h) & 90.615 Emission Mask H) NPSPAC Mutual aid

FCC Rule 90.615 (a) explains what frequencies should be used to determine compliance with the NPSPAC, THIS IS ONLY REQUIRED IN the 806-824/851/869MHz band.

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

(1).On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of 4kHz or less: Zero dB.

(2).On any frequency removed from the center of the authorized bandwidth by a displacement frequency of (f_d in kHz) of more than 4kHz, but no more than 8.5kHz: At least 107 log (f_d/4) dB;

(3). On any frequency removed from the center of the authorized bandwidth by a displacement frequency of (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz; At least 40.5 log (f_d/1.16) dB.

(4).On any frequency removed from the center of the authorized bandwidth by a displacement frequency of (f_d in kHz) of more than 15 kHz, but no more than 25 kHz; At least 116 log (f_d/6.1) dB.

(5).On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least 43 +log (P) dB.

EA EMISSION MASK

Part 90.691: Emission mask requirements for EA-based systems

(Under the Policies Governing the Licensing and Use of EA-Based SMR Systems in the 809–824/854–869 MHz Band rule part)

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log_{10} (f/6.1) decibels or 50 + 10 Log_{10} (P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log_{10} (P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

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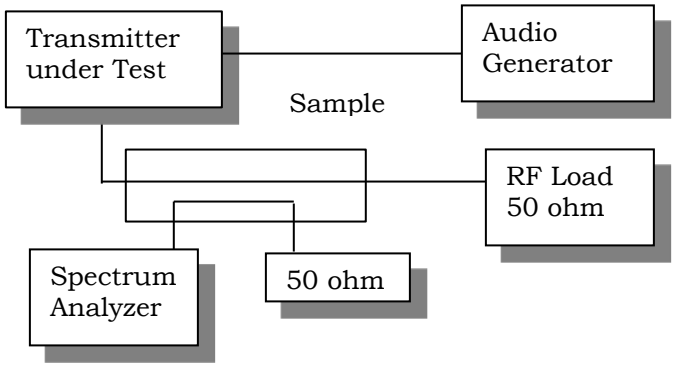
Method of Measurement: Was in accordance with test procedures detailed in the standard list above.

Test Setup Diagram:



Test Data: See the plots below

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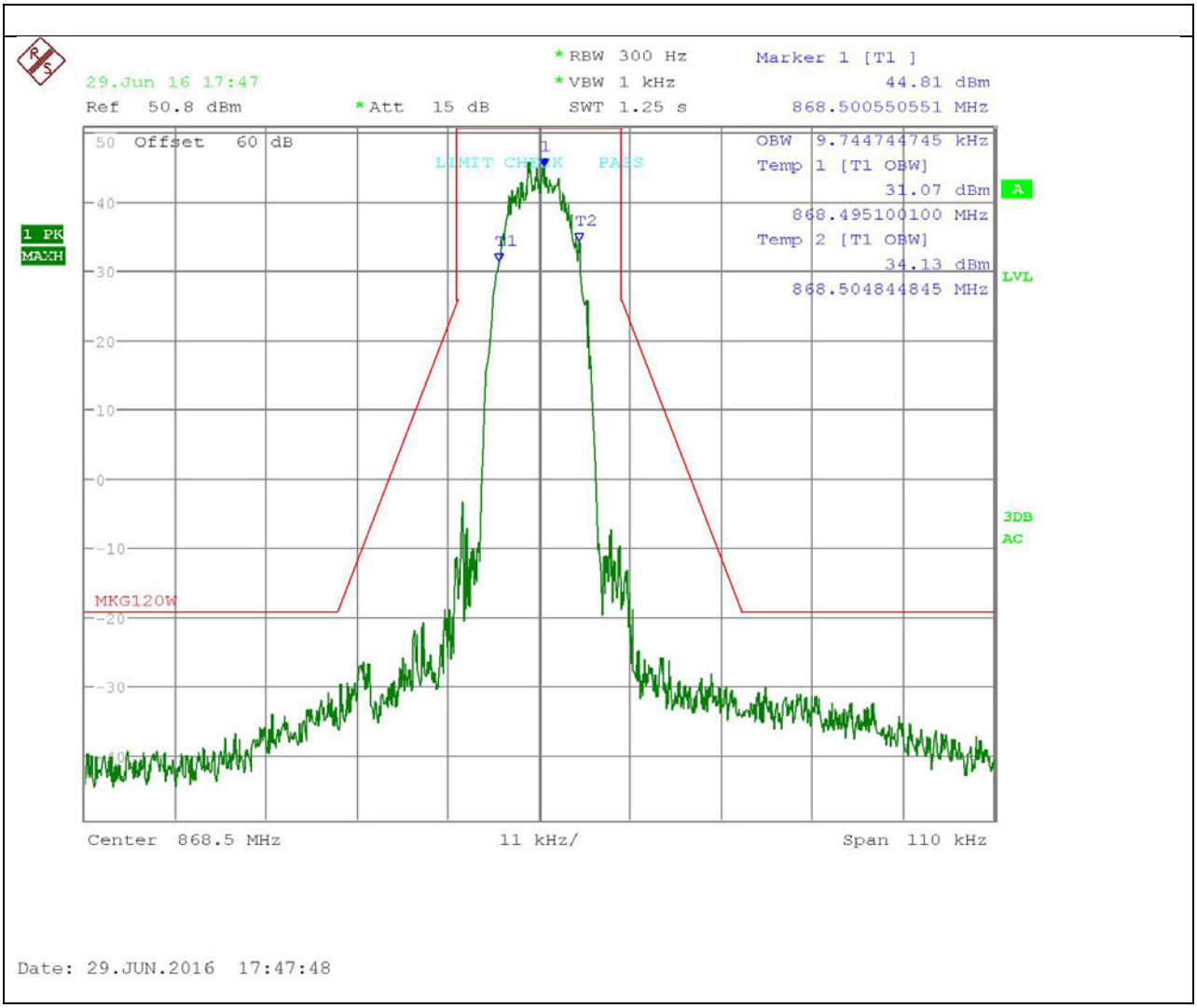
OCCUPIED BANDWIDTH 12.5 KHz Digital

Part 90.210(d) Emission Mask G - 12.5 kHz channel Digital

Test Data: 868.50 MHz Mask G 8k10F1E/ 8k10F1D



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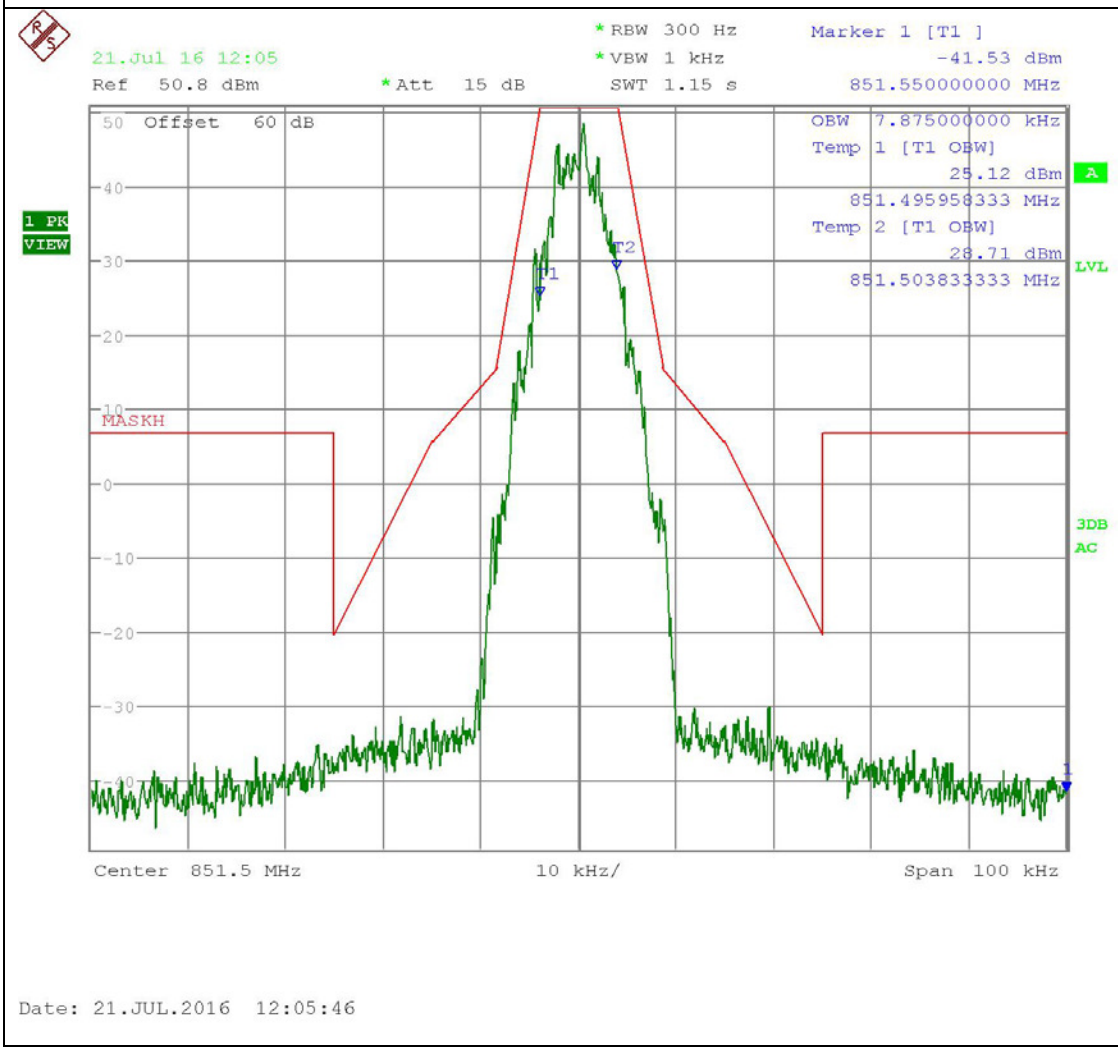
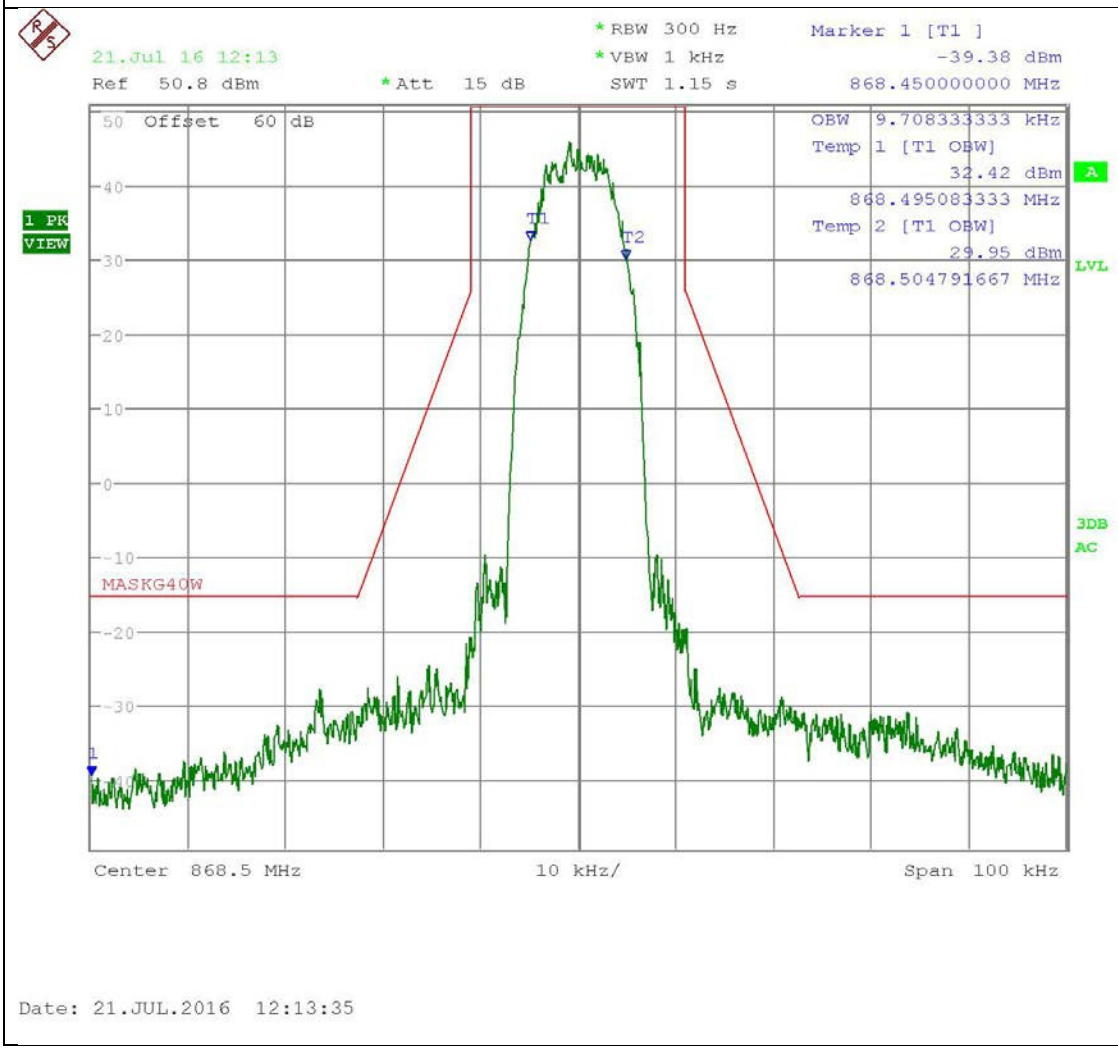
Part 90.210(d) Emission Mask H - 12.5 kHz channel Digital

8k10F1E/ 8k10F1D

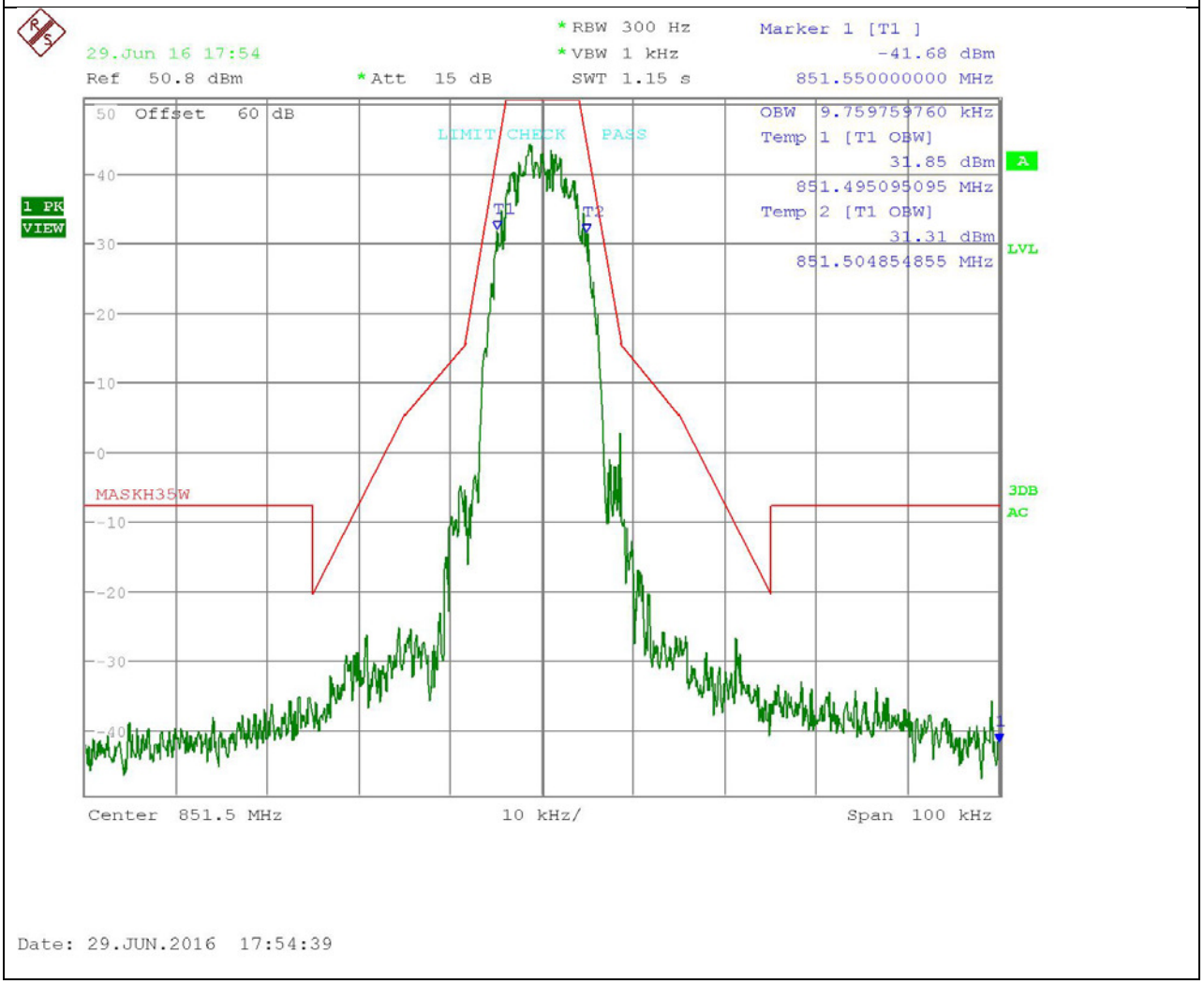


Part 90.210(d) Emission Mask G - 12.5 kHz channel Digital

8k10F7E

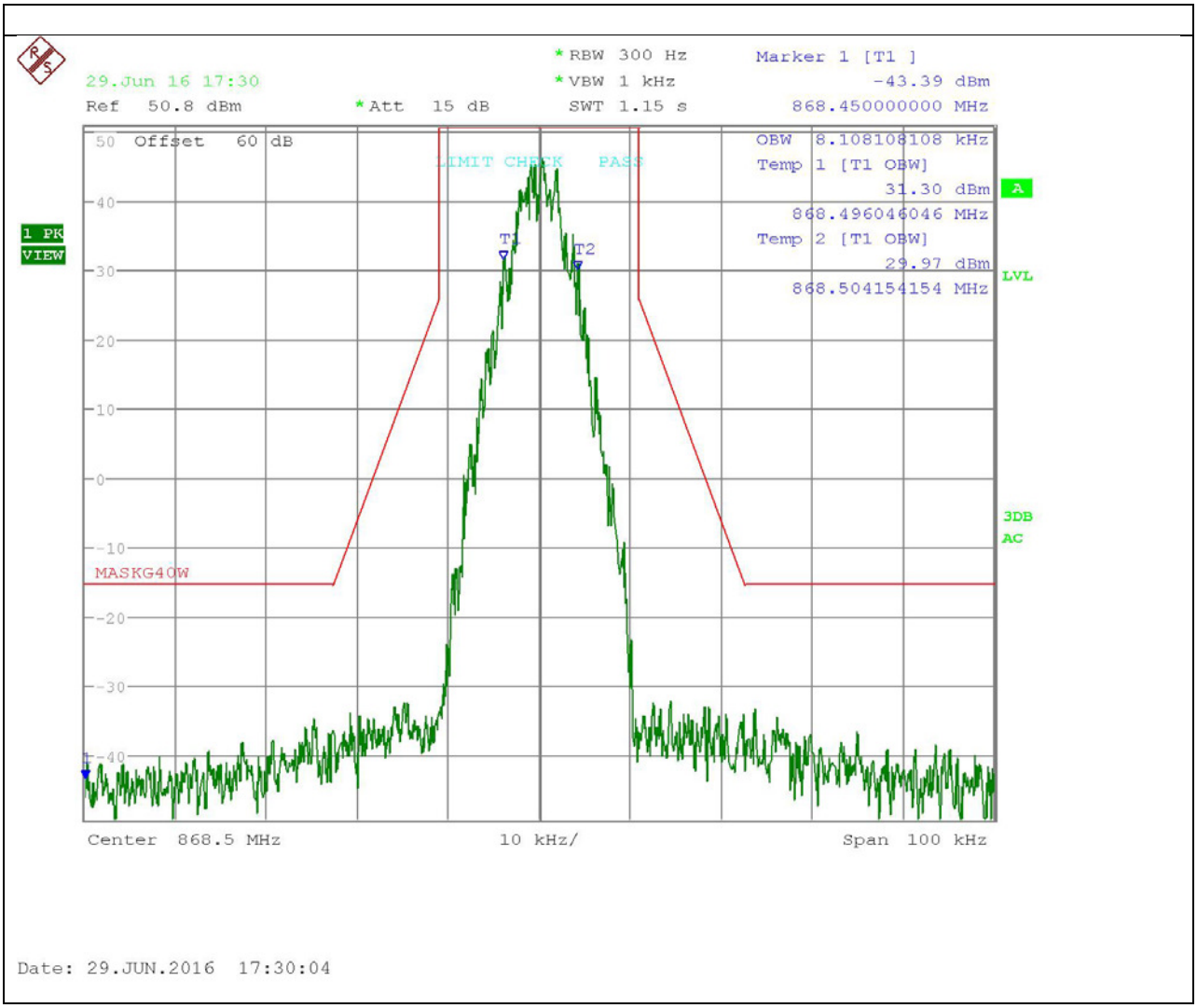


Part 90.210(h) Emission Mask H - 12.5 kHz channel Digital 8K10F7



Part 90.210(d) Emission Mask D - 12.5 kHz channel Digital

Test Data: 868.50 Mask G 8K10F7E



Note: Although the limit line says “MASK G 40Watts the reference was set to the 50.8dBm and complies with the requirement.

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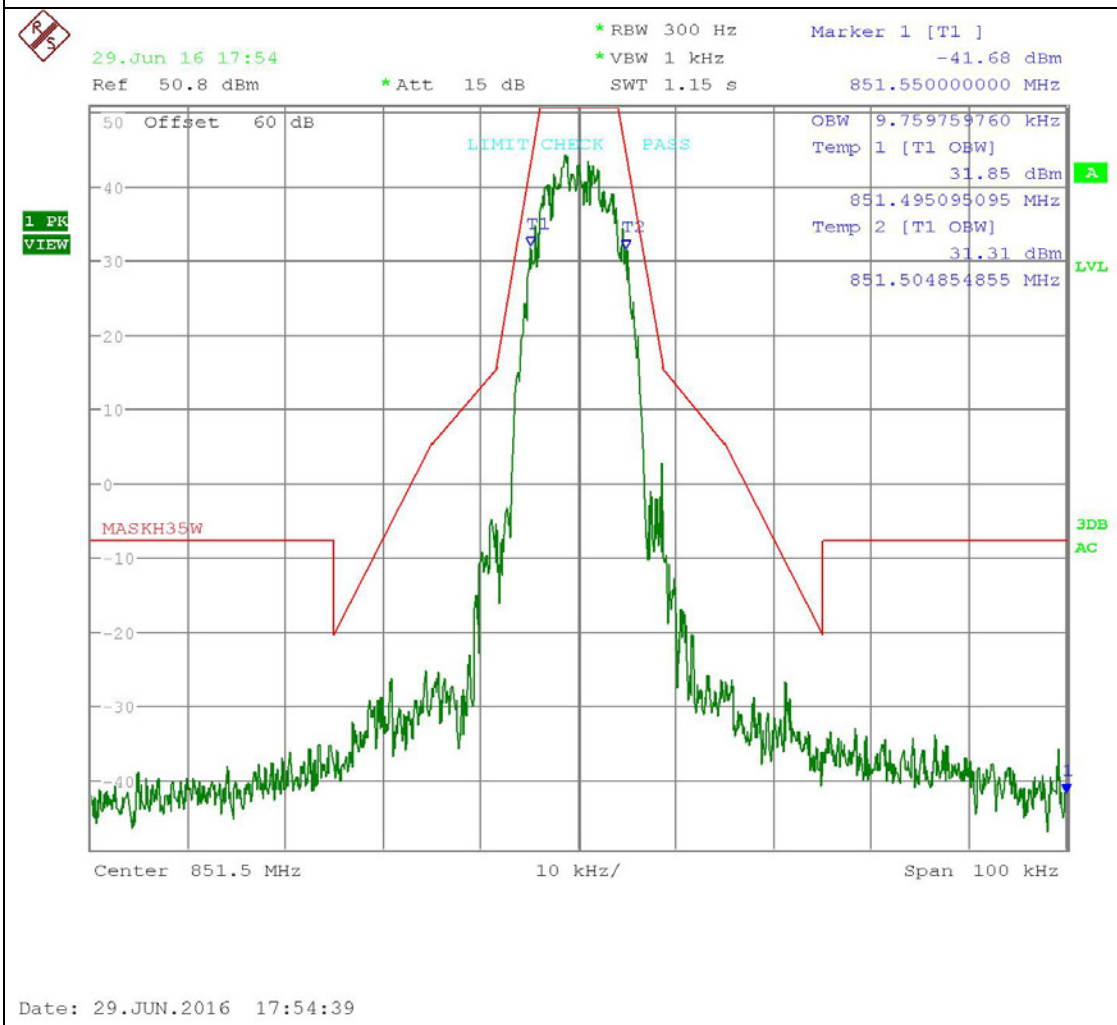
OCCUPIED BANDWIDTH PLOTS (NPSPAC mutual aid channels)

Part 90.210(h) Emission Mask H

Test Data: 851.50 Mask H 8k10F1E/8K10F1D



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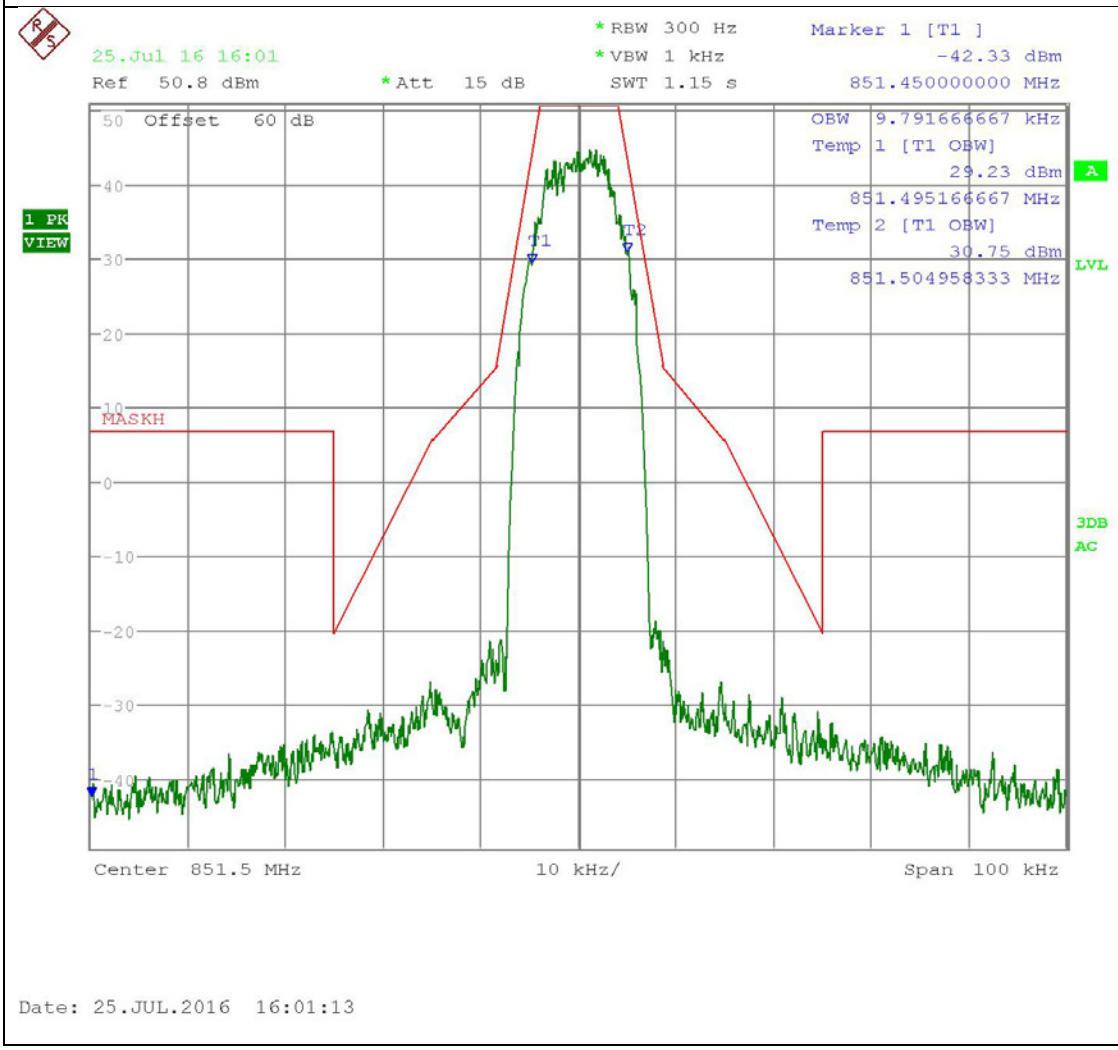
OCCUPIED BANDWIDTH PLOTS (NPSPAC mutual aid channels)

Part 90.210(h) Emission Mask H

Test Data: 851.50 Mask H 8k10F7E



OCCUPIED BANDWIDTH 806-824/ 854-869MHz EA Mask

ADJACENT CHANNEL POWER (ACP)

25 kHz Transmitter ACP: 16k0F3E

Requirements: 90.543 Emission limitations.

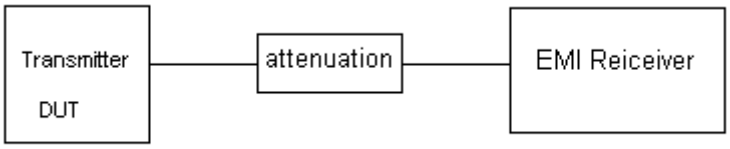
Offset from center frequency	Measurement bandwidth	Maximum ACP relative
(kHz)	(kHz)	(dBc)
15.625	6.25	−40
21.875	6.25	−60
37.5	25	−60
62.5	25	−65
87.5	25	−65
150	100	−65
250	100	−65
350	100	−65
> 400 kHz to 12 MHz	30 (s)	−75
12 MHz to paired receive band	30 (s)	−75
In the paired receive band	30 (s)	−100

Swept 30 KHz Bandwidth Measurement

Offset from center frequency	ACP Limit (dBc)
> 400 KHz to 12 MHz	-75
12 MHz to paired rx band	-75
In the paired rx band	-100

TEST PROCEDURE:

1. All the measurement are made at the transmitter's output port.
2. The ACP was made with the EMI receiver which has a direct ACP function.
3. Reference level was set at 34 dBm.



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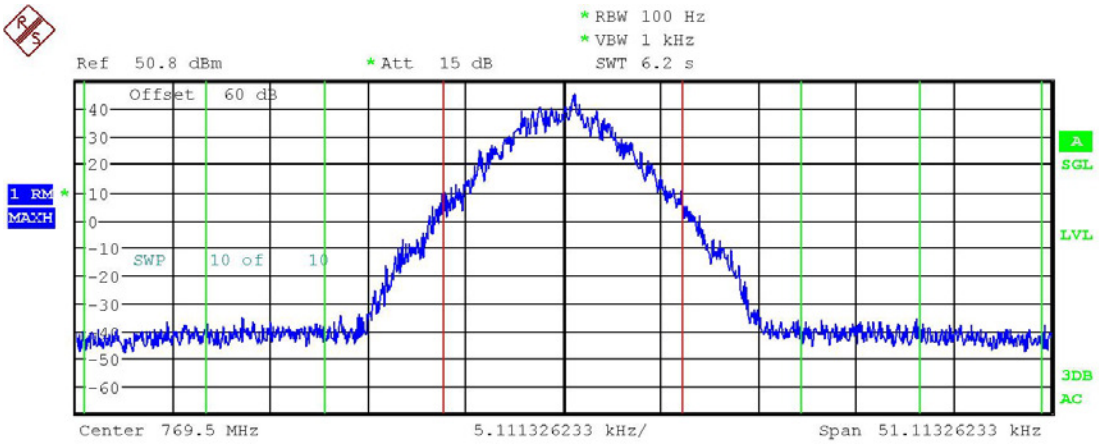
ADJACENT CHANNEL POWER (ACP)

12.5 kHz Transmitter ACP: 8k10F1E

Test Data: 12.5 KHz 8K10F1E/ 8K10F1D

8k10F1E

ACP1C4FM160718A



Tx Channel			
Bandwidth	12.5 kHz	Power	54.28 dBm
Adjacent Channel			
Bandwidth	6.25 kHz	Lower	-41.49 dB
Spacing	9.375 kHz	Upper	-42.88 dB
Alternate Channel			
Bandwidth	6.25 kHz	Lower	-77.18 dB
Spacing	15.625 kHz	Upper	-77.10 dB
2nd Alternate Channel			
Bandwidth	6.25 kHz	Lower	-78.82 dB
Spacing	21.875 kHz	Upper	-78.68 dB

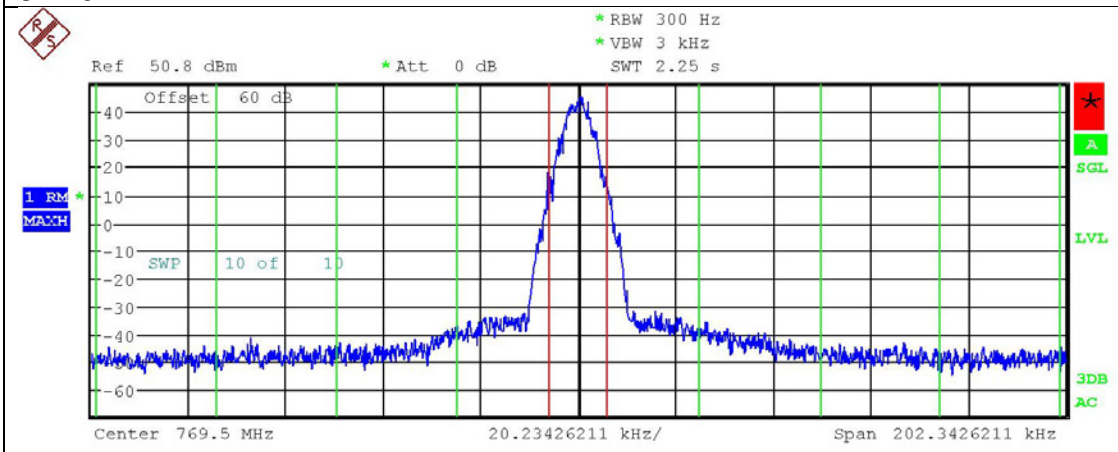
Date: 21.JUL.2016 12:35:14

ADJACENT CHANNEL POWER (ACP)

12.5 kHz Transmitter ACP: 8k10F1E

2

8k10F1E



Tx Channel
Bandwidth 12.5 kHz

Power 54.11 dBm

Adjacent Channel
Bandwidth 25 kHz
Spacing 37.5 kHz

Lower -79.66 dB
Upper -77.76 dB

Alternate Channel
Bandwidth 25 kHz
Spacing 62.5 kHz

Lower -82.65 dB
Upper -82.80 dB

2nd Alternate Channel
Bandwidth 25 kHz
Spacing 87.5 kHz

Lower -83.95 dB
Upper -83.77 dB

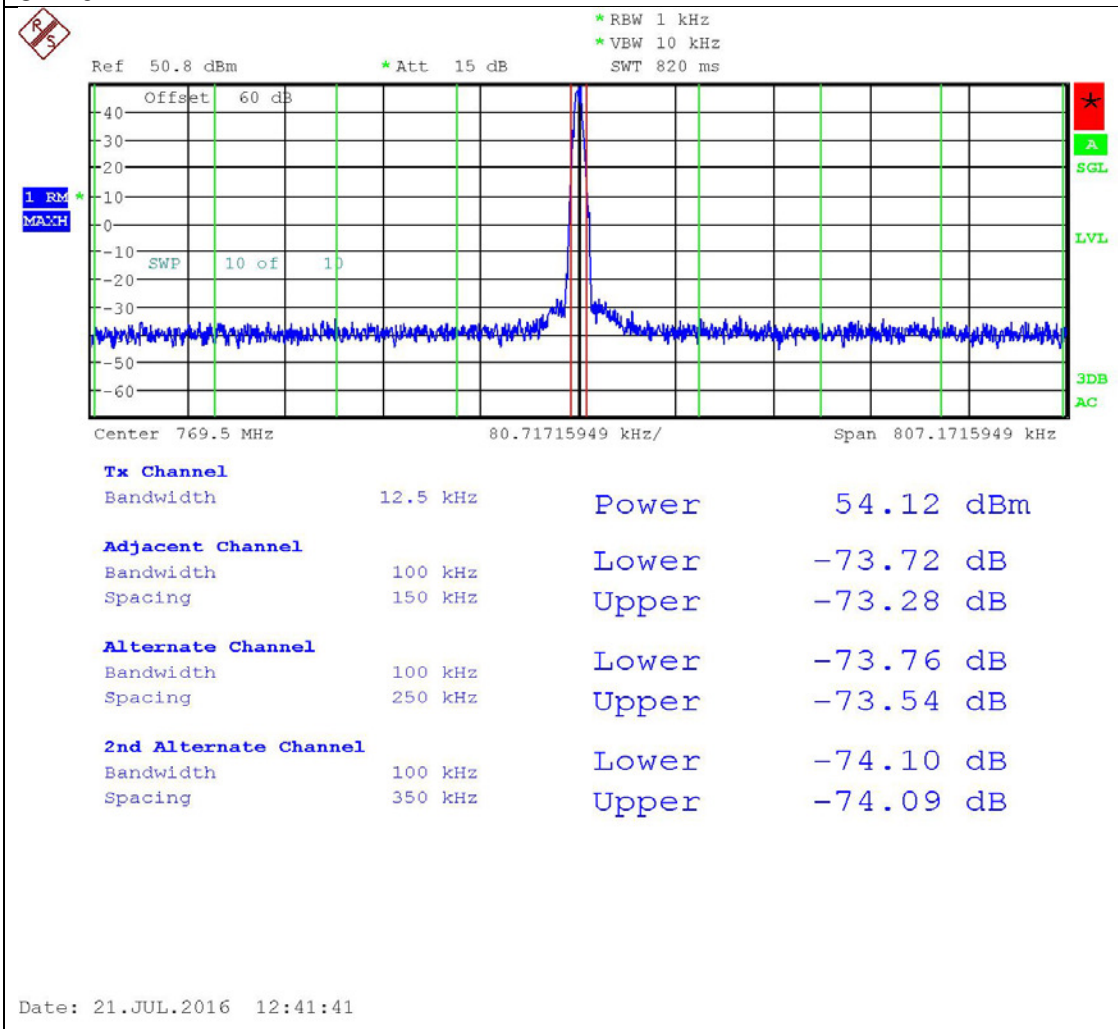
Date: 21.JUL.2016 12:39:20

ADJACENT CHANNEL POWER (ACP)

12.5 kHz Transmitter ACP: 8k10F1E

3

8k10F1E



Swept 30 KHz Bandwidth Measurement

Offset from center frequency	ACP Limit (dBc)	ACP Level (dBc)		Margin (dB)
> 400 KHz to 12 MHz	-75	Upper	-97.9	23.5
		Lower	-103	27.8
12 MHz to paired rx band	-75		-100.22	25.2
In the paired rx band	-100		-103.73	4.2

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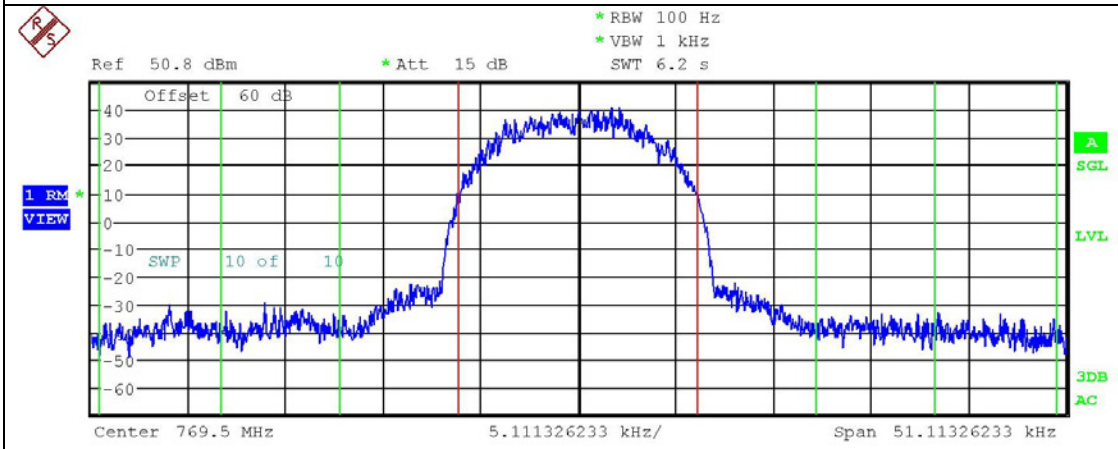
ADJACENT CHANNEL POWER (ACP)

12.5 kHz Transmitter ACP: 8k10F7E

Test Data: 12.KHz 8K10F7E

8K10F7E



Tx Channel			
Bandwidth	12.5 kHz	Power	54.02 dBm
Adjacent Channel			
Bandwidth	6.25 kHz	Lower	-42.05 dB
Spacing	9.375 kHz	Upper	-42.88 dB
Alternate Channel			
Bandwidth	6.25 kHz	Lower	-73.55 dB
Spacing	15.625 kHz	Upper	-74.54 dB
2nd Alternate Channel			
Bandwidth	6.25 kHz	Lower	-74.82 dB
Spacing	21.875 kHz	Upper	-76.20 dB

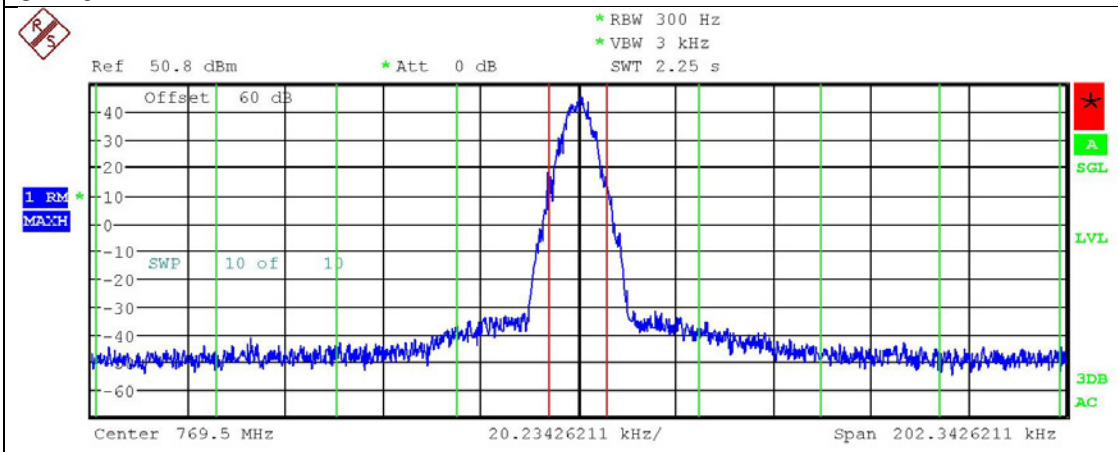
Date: 21.JUL.2016 12:27:33

ADJACENT CHANNEL POWER (ACP)

12.5 kHz Transmitter ACP: 8k10F7E

2

8k10F7E



Tx Channel
Bandwidth 12.5 kHz

Power 54.11 dBm

Adjacent Channel
Bandwidth 25 kHz
Spacing 37.5 kHz

Lower -79.66 dB
Upper -77.76 dB

Alternate Channel
Bandwidth 25 kHz
Spacing 62.5 kHz

Lower -82.65 dB
Upper -82.80 dB

2nd Alternate Channel
Bandwidth 25 kHz
Spacing 87.5 kHz

Lower -83.95 dB
Upper -83.77 dB

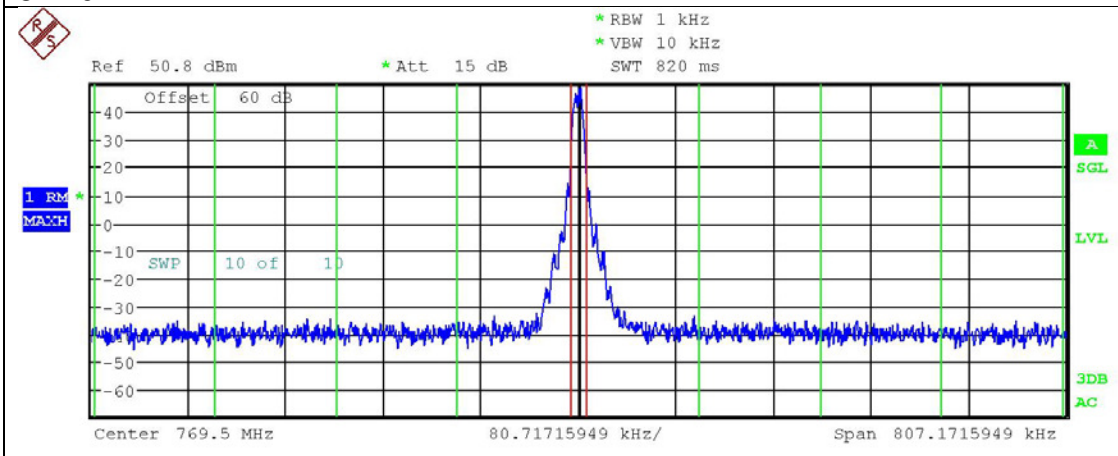
Date: 21.JUL.2016 12:39:20

ADJACENT CHANNEL POWER (ACP)

12.5 kHz Transmitter ACP: 8k10F7E

3

8k10F7E



Tx Channel			
Bandwidth	12.5 kHz	Power	54.04 dBm
Adjacent Channel			
Bandwidth	100 kHz	Lower	-73.63 dB
Spacing	150 kHz	Upper	-73.23 dB
Alternate Channel			
Bandwidth	100 kHz	Lower	-73.70 dB
Spacing	250 kHz	Upper	-73.78 dB
2nd Alternate Channel			
Bandwidth	100 kHz	Lower	-74.04 dB
Spacing	350 kHz	Upper	-74.14 dB

Date: 21.JUL.2016 12:44:15

25 kHz Transmitter ACP Swept 30 KHz Bandwidth Measurement

Offset from center frequency	ACP Limit (dBc)	ACP Level (dBc)		Margin (dB)
> 400 KHz to 12 MHz	-75	Upper	-97.9	23.5
		Lower	-103	27.8
12 MHz to paired rx band	-75	-100.22		25.2
In the paired rx band	-100	-103.73		4.2

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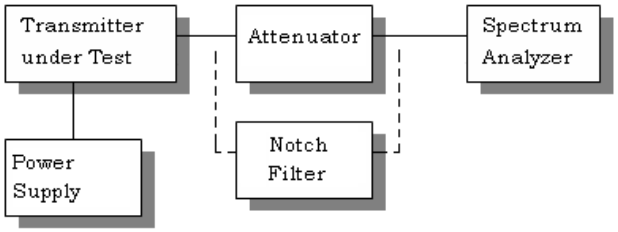
SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Rule Part No.: Part 2.1051(a)

Method of Measuring Conducted Spurious Emissions



Requirements:

12.5 kHz Channel Spacing = 50+10log (120.9) = 70.8dBc
12.5 kHz Channel Spacing = 50+10log (60.3) = 67.80dBc

Method of Measurement: The carrier was modulated 16 dB above the 50% modulation using a 2500 Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard test procedures detailed in the standard list above.

Test Data: 764.500MHz Low Power

	dBm	Watts	Limit	Notes
Power Output	47.8	60.3	67.8dBc	
			Margin	
	Frequency	dBc	dB	
	764.5	0		
	1529	84.2	16.4	*
	2293.5	85.5	17.7	*
	3058	84.98	17.18	
	3822.5	84.95	17.15	*
	4587	86.9	19.1	*
	5351.5	82.16	14.36	*
	6116	79.4	11.6	*
	6880.5	80.88	13.08	*
	7645	86.04	18.24	*

Note: "*" Indicates noise floor.

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Test Data: 764.500MHz High Power

High Power

	dBm	Watts	Limit	Notes
Power Output	50.79	25	dBc	
			70.82	
	Frequency	dBc		
	764.5	0		
	1529	88.29	17.47	*
	2293.5	88.73	17.91	
	3058	88.71	17.89	*
	3822.5	90.35	19.53	*
	4587	89.35	18.53	*
	5351.5	85.33	14.51	*
	6116	84.27	13.45	*
	6880.5	83.57	12.75	*
	7645	89.07	18.25	*

Note: "*" Indicates noise floor.

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Test Data: 851.500MHz Low Power

Low Power

	dBm	Watts	Limit	Notes
Power Output	47.7		67.88	
			Martgin	
	Frequency	dBc		
	851.5	0	0	
	1703	88.6	20.72	*
	2554.5	87.76	19.88	
	3406	90.17	22.29	*
	4257.5	90.57	22.69	*
	5109	85.81	17.93	*
	5960.5	83.84	15.96	*
	6812	82.95	15.07	*
	7663.5	87.67	19.79	*

Note: "*" Indicates noise floor.

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Test Data: 851.500MHz High Power

High Power

	dBm	Watts	Limit	Notes
Power Output	50.79	25	70.8dBc	
	Frequency	dBc	Margin	
	851.5	0		
	1703	97.5	26.7	*
	2554.5	95.16	24.36	
	3406	96.47	25.67	*
	4257.5	99.75	28.95	*
	5109	95.71	24.91	*
	5960.5	95.58	24.78	*
	6812	94.3	23.5	*
	7663.5	98.32	27.52	*
	8515	89.89	19.09	*

Note: "*" Indicates noise floor.

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Test Data: 868.500MHz Low Power

Low Power

	dBm	Watts	Limit	Notes
Power Output	47.7		67.88	
			Martgin	
	Frequency	dBc		
	868.5	0	0	
	1737	88.42	20.54	*
	2605.5	88.06	20.18	
	3474	89.34	21.46	*
	4342.5	89.39	21.51	*
	5211	85.01	17.13	*
	6079.5	83.37	15.49	*
	6948	80.26	12.38	*
	7816.5	88.16	20.28	*
	8685	87.6	19.72	*

Note: "*" Indicates noise floor.

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Test Data: 868.500MHz High Power

High Power

	dBm	Watts	Limit	Notes
Power Output	50.79		67.88	
			Martgin	
	Frequency	dBc		
	868.5	0	0	
	1737	91.06	23.18	*
	2605.5	93.49	25.61	*
	3474	93.29	25.41	*
	4342.5	94.05	26.17	*
	5211	90.57	22.69	*
	6079.5	85.12	17.24	*
	6948	86.18	18.3	*
	7816.5	87.46	19.58	*
	8685	88.54	20.66	*

Note: "*" Indicates noise floor.

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FIELD STRENGTH OF SPURIOUS RADIATION EMISSIONS

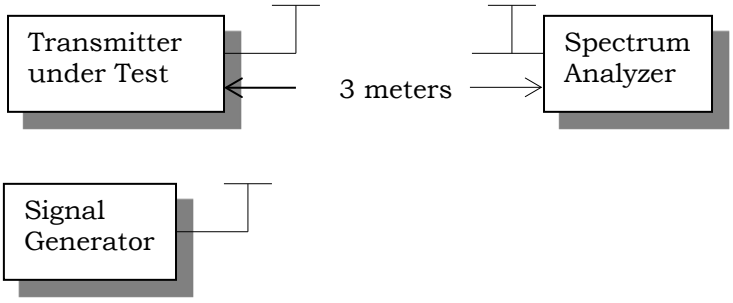
Rule Parts. No.: Part 2.1053

Requirements:

12.5 kHz Channel Spacing = 50+10log (P_o) 12.5 kHz Channel Spacing = 50+10log (60.3) =67.80dBc

METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted in accordance with test procedures detailed in the standard list above using the substitution method. Measurements were made at the test site of **TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.**

Test Setup Diagram:



TEST DATA: The test data shown below represents the worst case for all of the test frequencies.

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FIELD STRENGTH OF SPURIOUS RADIATION EMISSIONS

Rule Parts. No.: Part 2.1053

Test Data: 851.50 MHz 11K0F3E

This test data represents the worse case of emission of any of the test frequencies.

Emission Frequency (MHz)	Power Mode	Power Output (dBm)	Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
851.50	Hi	50.80	120.23	70.00	12.50

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
1,703.00	V	75.42	5.42
2,554.50	V	100.87	30.87
3,406.00	H	82.03	12.03
4,257.50	H	93.09	23.09
5,109.00	H	82.58	12.58
5,960.50	H	87.91	17.91
6,812.00	H	97.38	27.38
7,663.50	H	104.70	34.70
8,515.00	H	101.98	31.98

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FIELD STRENGTH OF SPURIOUS RADIATION EMISSIONS

Rule Parts. No.: Part 2.1053, 90.210, 90.543(c)(f)

REQUIREMENTS: Out of Band Emission Limits

Transmit Band (MHz)	Equipment Type	Rule Part	Requirement
769-775	All Equipment Types	90.543(c)	43 + 10log (P) dB Except for emissions in the band 1559-1610 MHz
		90.543(f)	−70 dBW/MHz EIRP for wideband signals, & −80 dBW/MHz EIRP for discrete emissions of less than 700 Hz bandwidth for all emissions in the band 1559-1610 MHz

METHOD OF MEASUREMENT: The following test methods were used

ANSI/TIA-603 § 2.2.12.2 Unwanted Emissions: Radiated Spurious
(Out of Band Emissions from 9 KHz – Tenth Harmonic of Fundamental)

ANSI/TIA-603 § 2.2.12.3 Unwanted Emissions: EIRP in GNSS Band: 1.559 to 1.1610 GHz
(EIRP of Emissions In the 1559 – 1610 MHz Band)

RULE PARTS. NO.: Part 2.1053, 90.210, 90.543(c)(f)

Test Data: Emissions in Band 1559 – 1610 MHz

Note: For the purpose of equipment authorization, during this test the transmitter was tested with an antenna that is representative of the type that will be used with the equipment in normal operation. All modes of modulation were tested; the following is the worst case results

Test Data: 769.5 MHz 8K10F1E/ 8K10F1D

Tuned Freq MHz	Emission Freq MHz	Meter Reading dBuV	Ant Polarity	Coax Loss dB	Filter Insertion Loss dB	Correction Factor dB/M	Field Strength dBu V/M	EIRP dBW/MHz	Margin dB
769.5	1598.1	18.76	H	3.14	1.30	28.67	51.87	-73.43	3.43
769.5	1598.1	17.76	V	3.14	1.30	28.67	50.87	-74.43	4.43
769.5	1604.1	19.83	H	3.13	1.30	28.71	52.97	-72.33	2.33
769.5	1604.1	18.22	V	3.13	1.30	28.71	51.36	-73.94	3.94
769.5	1609.9	17.03	H	3.12	1.30	28.75	50.20	-75.10	5.10
769.5	1609.9	15.59	V	3.12	1.30	28.75	48.76	-76.54	6.54

NOTE: The field strength measurement listed above represent the worse case for all emission designators.

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FREQUENCY STABILITY

Rule Parts. No.: Part 2.1055, Part 90.213

Requirements: Temperature range requirements: -30 to +50º C.
Voltage Variation +, -15%
±2.5 PPM

Method of Measurements: Was in accordance with test procedures detailed in the standard list above.

Test Data: 868.50 MHz

Temperature	Frequency MHz	Cycles	PPM
25°C (reference)	868.500000		
-30°C	868.499798	-202	-0.233
-20°C	868.499791	-209	-0.241
-10°C	868.499768	-232	-0.267
0°C	868.499778	-222	-0.256
10°C	868.499785	-215	-0.248
20°C	868.499786	-214	-0.246
30°C	868.499785	-215	-0.248
40°C	868.499782	-218	-0.251
50°C	868.499704	-296	-0.341
Input Voltage	Frequency	Cycles	PPM
-15%	868.499885	-115	-0.132
15%	868.499883	-117	-0.135

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EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/ Char Date	Due Date
Antenna: Biconical 1057	Eaton	94455-1	1057	11/18/15	11/18/17
CHAMBER	Panashield	3M	N/A	12/31/16	12/31/17
Antenna: Log-Periodic 1122	Electro-Metrics	LPA-25	1122	07/14/15	07/14/17
Temperature Chamber LARGE	Tenney Engineering	TTRC	11717-7	08/19/14	08/19/16
AC Voltmeter	HP	400FL	2213A14728	10/24/15	10/24/17
Digital Multimeter	Fluke	77	35053830	10/21/15	10/21/17
Frequency Counter Large Chamber	HP	5352B	2632A00165	07/01/15	07/01/17
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren Chamber	3117	00041534	02/25/15	02/25/17
Software: Field Strength Program	Timco	N/A	Version 4.0 NO	N/A	N/A
RF Power Meter	Boonton	4531	11793	04/08/16	04/08/18
Hygro-Thermometer	Extech	445703	0602	06/30/15	06/30/17
Type K J Thermometer	Martel	303	080504494	10/26/15	10/26/17
Modulation Analyzer	HP	8901A	3050A05856	04/16/15	04/16/17
Attenuator N 30dB 150W DC-6G	Narda	769-30	10267	06/26/15	06/26/17
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	04/01/16	04/01/18
Waverunner Digital Scope	LeCroy	LT364L	00543	10/23/15	10/23/17
Attenuator 6dB 50OHM DC-2G	Mini-Circuits	HAT-6+	#52 NO	06/25/15	06/25/17
Coaxial Cable - Chamber 3 cable set (Primary)	Micro-Coax	Chamber 3 cable set (Primary)	KMKM-0244-00; KMKM-0670-00; KFKF-0198-00	12/05/15	12/05/17

*** EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3

End of REPORT

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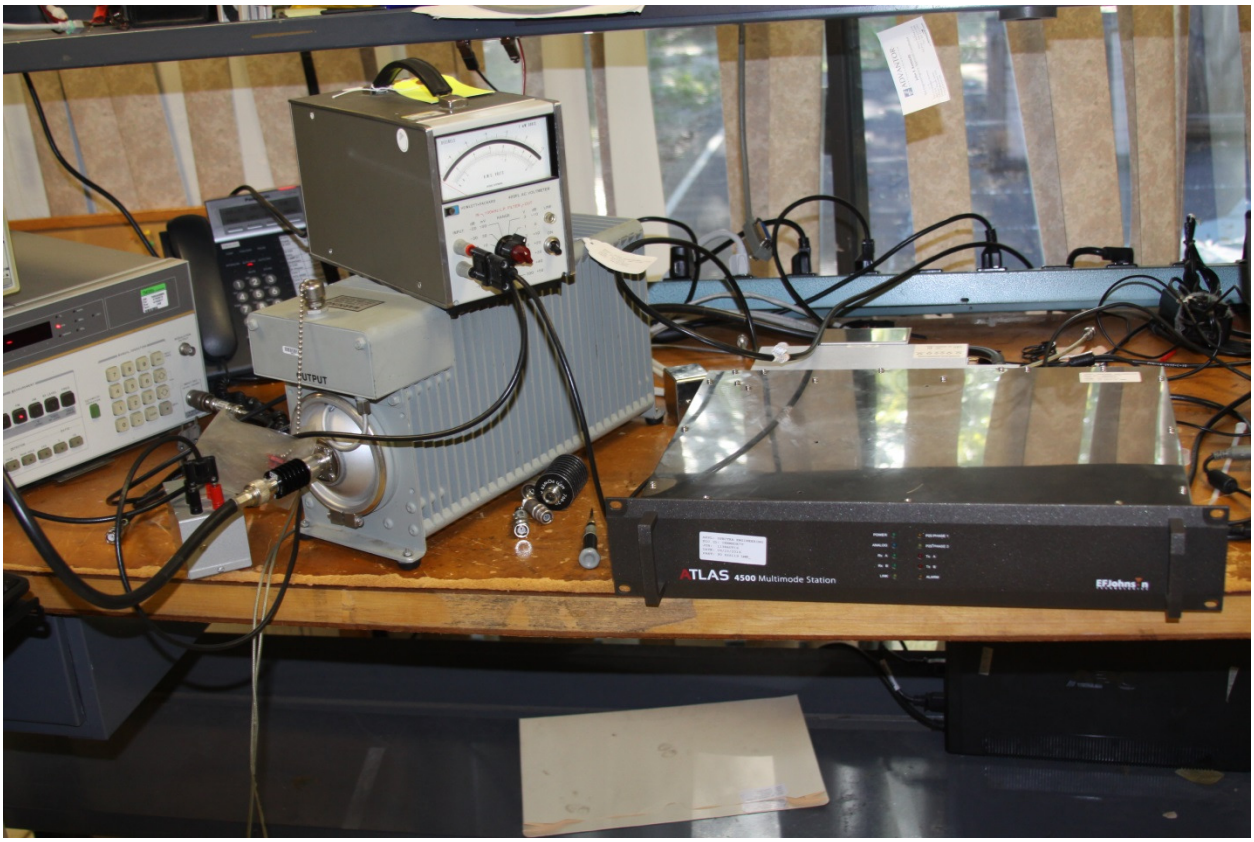
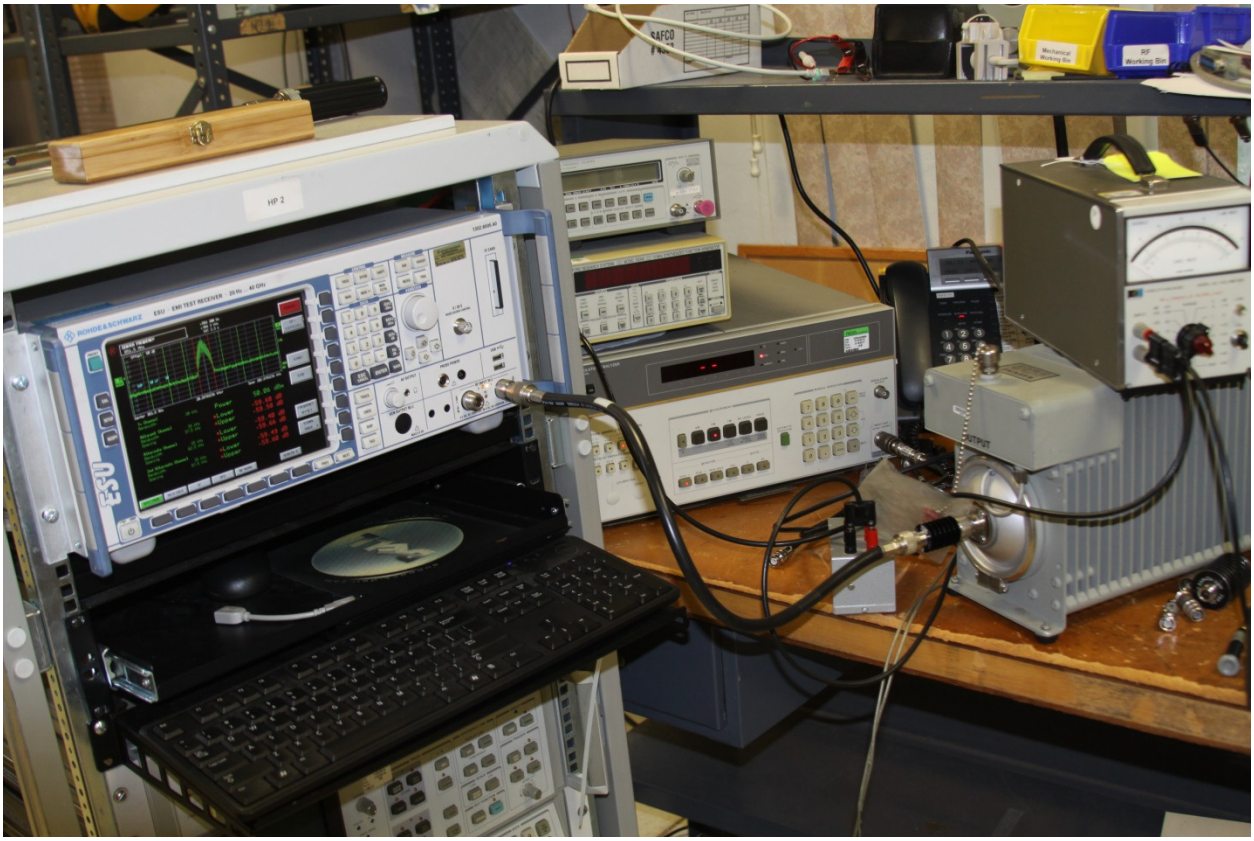
APPLICANT: SPECTRA ENGINEERING PTY LTD
FCC ID: OKRMXDR7V
IC: 5605A-MXDR7V
TEST SET UP PHOTOS

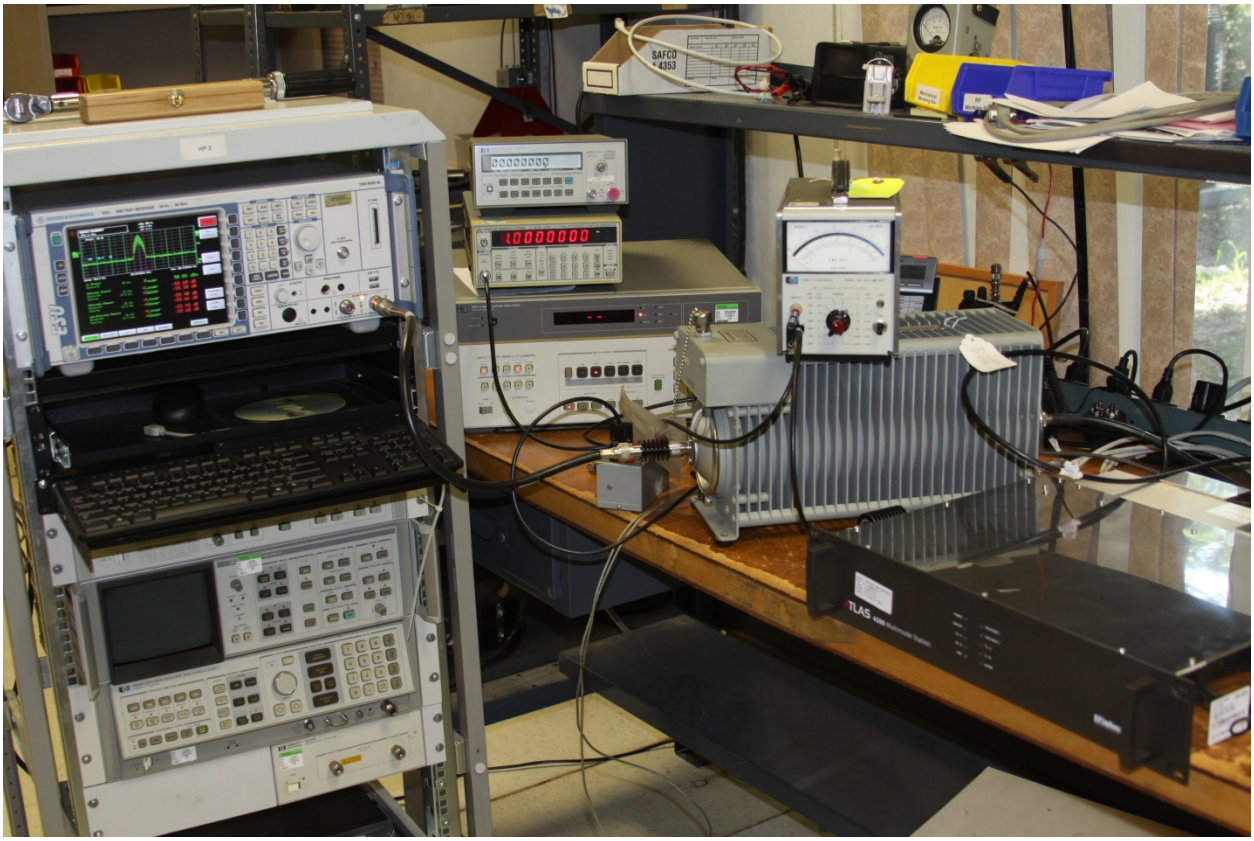
OUTPUT POWER


MODULATION CHARACTERSISTICS

OCCUPIED BANDWIDTH

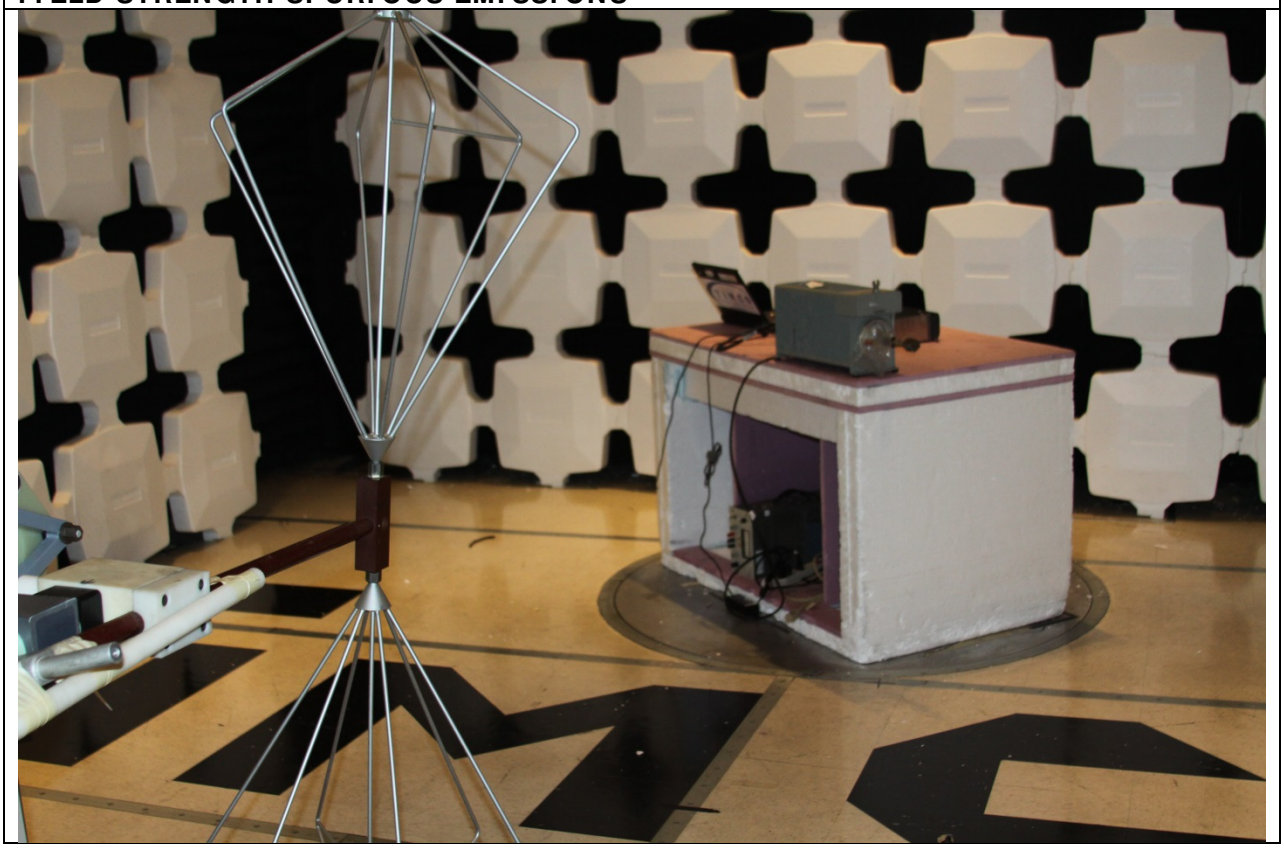


SPURIOUS EMMISIONS AT ANTENNA

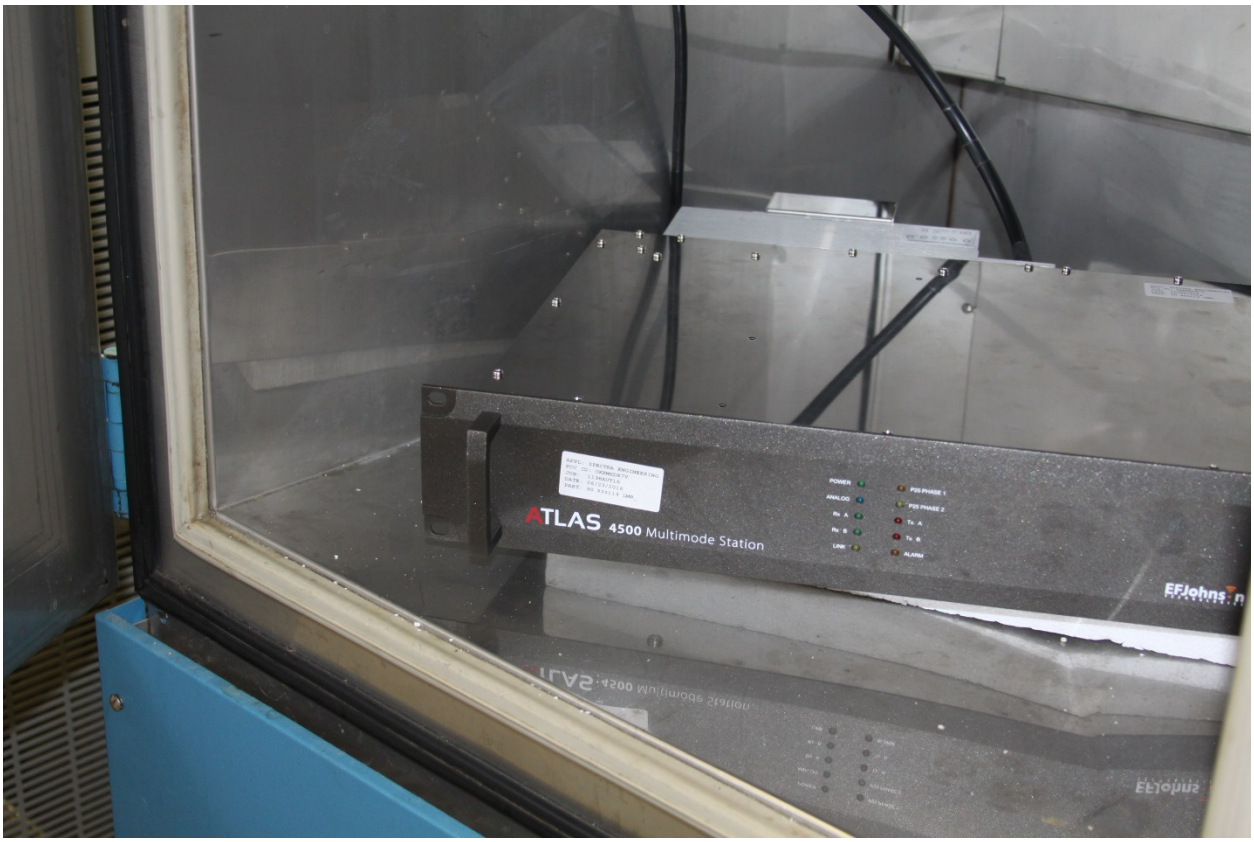


FIELD STRENGTH SPURIOUS EMISSIONS

FIELD STRENGTH SPURIOUS EMISSIONS



FREQUENCY STABILITY



TRANSIENT FREQUENCY BEHAVIOR