

# LABORATORY TEST REPORT

## RADIO PERFORMANCE MEASUREMENTS

for the

TBCK4A Base Station Transceiver  
Fitted with the TBCK4Z 762-870 MHz Reciter

Tested in accordance with:

FCC 47 CFR Parts 22 and 90

RSS-119 Issue 12  
RSS-Gen Issue 5

Report Revision: 1  
Issue Date: 19 November 2020

PREPARED BY: L. M. White

  
Test Technician

CHECKED & APPROVED BY: M. C. James

  
Laboratory Technical Manager



FCC Registration: 838288  
ISED Registration: 737A

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.

This document must not be reproduced except in full, without the written permission of the Compliance Laboratory Manager

TELTEST Laboratories (A Division of Tait International Ltd)  
PO Box 1645, 558 Wairakei Road, Christchurch, New Zealand.

Telephone: 64 3 358 3399  
FAX: 64 3 359 4632

FCC ID: CASTBCK4A  
IC : 737A-TBCK4A

Page 1 of 87

Report Revision: 1  
Issue Date: 19 November 2020

## TABLE OF CONTENTS

REVISION HISTORY .....	3
INTRODUCTION .....	4
TEST REQUIREMENTS AND RESULT SUMMARY .....	5
STATEMENT OF COMPLIANCE .....	6
LIST OF ANTENNA INTENDED FOR USE WITH THE DEVICE .....	7
CHANNEL TABLE .....	8
MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS	9
TEST RESULTS.....	10
TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS.....	10
TRANSMITTER MODULATION LIMITING .....	20
TRANSMITTER OCCUPIED (99%) BANDWIDTH .....	30
TRANSMITTER SPECTRUM MASKS.....	39
ADJACENT CHANNEL POWER RATIO.....	82
TEST EQUIPMENT LIST.....	86
ANNEX A – TEST SETUP DETAILS.....	87

## REVISION HISTORY

<b>Date</b>	<b>Revision</b>	<b>Comments</b>
19 November 2020	1	Initial test report

## INTRODUCTION

Type approval testing of the TBCK4A, 50 Watt, Base Station transceiver in order to demonstrate continued compliance with FCC 47 Parts 22 & 90, and RSS-119 Issue 12 & RSS-Gen Issue 5 after the addition of Analogue (narrow and wide band), Digital FFSK and Digital Mobile Radio (DMR) modulations. This radio also supports APCO P25 phase-1 and APCO P25 phase-2 modulations. See TELTEST report 3646 for these results.

### REPORT PREPARED FOR

Tait International Limited  
245 Wooldridge Road  
Harewood  
Christchurch 8051  
New Zealand

### DESCRIPTION OF SAMPLE

Manufacturer: Tait International Limited  
Equipment: Base Station Transceiver  
Type: TBCK4A  
Frequency range: 762 → 870 MHz  
Transmit Power: 50 Watts

Modulation		Channel Spacing	Speech Channels	Symbol Rate (symbols/sec)	Data Rate (bps)
Analogue FM		12.5 kHz	1	-	-
		25.0 kHz	1	-	-
FFSK	Fast Frequency Shift Keying	12.5 kHz	-	1200	1200
Digital Mobile Radio (DMR)	4 Level FSK (2 slot TDMA) (ETSI TS102 361-1)	12.5 kHz	2	4800	9600

### HARDWARE & SOFTWARE

Quantity: 1

Module	Product Code	Serial Number	Firmware Version	Hardware Version
Reciter	T01-01103-NAAA	18209183	dmr-3.10.00.0006 & p25-3.10.0006	2
Power Amplifier	T01-01121-NAAA	18209416	1.12.00.0001	0.06
Front Panel	T01-01110-AAAA	18158925	1.10.01.0001	0.04
Power management unit	TBA30A0-0100	18162690	3.16	0.03

p25-3.10.00.0006 firmware was used for Analogue wide band tests. All other tests were performed with dmr-3.10.00.0006 firmware.

### TEST CONDITIONS

All testing was performed between 10 → 12 November 2020, and under the following conditions:

Ambient temperature: 15°C → 30°C  
Relative Humidity: 20% → 75%  
Standard Test Voltage: 120 V<sub>AC</sub>

## TEST REQUIREMENTS AND RESULT SUMMARY

ISED Specification	FCC Specification	Test Name	Test Methods	Result
RSS-119 5.4	FCC 47 CFR 2.1046	Transmitter Output Power (Conducted)	RSS-Gen 6.12 ANSI C63.26 5.2.4.2	N1
No specification	FCC 47 CFR 2.1047 (a)	Transmitter Audio Frequency Response – Pre-emphasis	ANSI C63.26 5.3.3.2	P
No specification	FCC 47 CFR 2.1047 (b)	Transmitter Modulation Limiting	ANSI C63.26 5.3.2	P
RSS-119 5.5	FCC 47 CFR 2.1049 (c)	Transmitter Occupied (99%) Bandwidth	RSS-Gen 6.7 ANSI C63.26 5.4.4	P
RSS-119 5.5	FCC 47 CFR 90.210	Transmitter Spectrum Masks	RSS-119 4.2.2 TIA-603-E 2.2.11	P
RSS-119 5.8.9	FCC 47 CFR 90.543	Adjacent Channel Power Ratio	RSS-119 4.3 ANSI C63.26 6.5.2.4	P
RSS-119 5.8	FCC 47 CFR 2.1051	Transmitter Spurious Emissions (Conducted)	RSS-Gen 6.13 ANSI C63.26 5.7	N1
RSS-119 5.8	FCC 47 CFR 2.1053	Transmitter Spurious Emissions (Radiated)	RSS-Gen 6.13 ANSI C63.26 5.5	N1
No specification	FCC CFR 90.543	Transmitter Radiated Emissions in the GNSS Band	ANSI C63.26 6.5.2.7.3	N1
RSS-119 5.8.9.2 rad	No specification	Transmitter Conducted Emissions in the GNSS Band	RSS-119 5.8 ANSI C63.26 6.5.2.7.4	N1
RSS-119 5.9	FCC 47 CFR 90.214	Transient Frequency Behaviour	RSS-119 5.9 ANSI C63.26 6.5.2.2	N/A 1
RSS-119 5.3	FCC 47 CFR 90.214	Transmitter Frequency Stability - Temperature	RSS-Gen 6.11 ANSI C63.26 5.6.4	N1
RSS-119 5.3	FCC 47 CFR 2.1055 (d) (1)	Transmitter Frequency Stability - Voltage	RSS-Gen 6.11 ANSI C63.26 5.6.5	N1
RSS-Gen 7.4	FCC 47CFR 15.111	Receiver Spurious Emissions (Conducted)	RSS-Gen 7.4 TIA-603-E 2.1.2	N1

Test Case Result Definitions	
No test Performed	N
Test does not apply to the test object	N/A
Test object meets requirements	P (Pass)
Test object does not meet requirements	F (Fail)
Test object is not conclusive	I (Inconclusive)

**Comments:**

N/A 1: Only required where the EUT transmits in the 138-174 MHz or 406.1-512 MHz band  
N1: Not tested as this parameter is unlikely to be affected by the addition of modulation types

## STATEMENT OF COMPLIANCE

We, TELTEST LABORATORIES of 558 Wairakei Road, Christchurch, New Zealand, declare under our sole responsibility that the product:

Equipment: Base Station Transceiver  
Type: TBCK4A

Module	Product Code	Serial Number	Firmware Version	Hardware Version
Reciter	T01-01103-NAAA	18209183	dmr-3.10.00.0006 & p25-3.10.0006	2
Power Amplifier	T01-01121-NAAA	18209416	1.12.00.0001	0.06
Front Panel	T01-01110-AAAA	18158925	1.10.01.0001	0.04
Power management unit	TBA30A0-0100	18162690	3.16	0.03

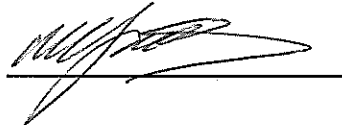
to which this declaration relates, is in conformity with the following standards:

FCC 47 CFR Parts 22 and 90

RSS-119 Issue 12 & RSS-Gen Issue 5

for the parameters tested in this report.

**Signature:**



Mike James  
Technical Manager

**Date:**

27 November 2020

The results obtained in this test report pertain only to the item(s) tested. TELTEST does not make any claims of compliance for samples or variants that were not tested.

## LIST OF ANTENNA INTENDED FOR USE WITH THE DEVICE

The equipment tested has a 50  $\Omega$  coaxial antenna connection. No antenna was fitted to the EUT during testing the parameters in this report.

Antennas and transmitter power settings are selected with regard to the overall loss of the antenna system, the desired coverage and the EIRP limit of the license.

The radio manufacturer (Tait) does not manufacture specific antennas for this equipment but suggests the following from other suppliers.

Manufacturer	Part Number	Tuning Bandwidth and / or Frequency Range - MHz	Gain - dBd (dBi)
RFI	COL81-806	746-806MHz	0 (2.1)
RFI	COL81-870	806-870MHz	0 (2.1)
RFI	COL84-806	746-806MHz	5 (7.1)
RFI	COL84-870	806-870MHz	5 (7.1)
RFI	COL85-806	746-806MHz	7 (9.1)
RFI	COL85-870	806-870MHz	7 (9.1)
RFI	COL811-806	746-806MHz	9 (11.1)
RFI	COL811-824	796-824MHz	9 (11.1)
RFI	COL811-870	806-870MHz	9 (11.1)
dBSpectra	DS7D03F36U-D or N	746-806MHz	3 (5.1)
dBSpectra	DS7D06F36U-D or N	746-806MHz	6 (8.1)
dBSpectra	DS7D09F36U-D or N	746-806MHz	8 (10.1)
dBSpectra	DS7D10F36U-D or N	746-806MHz	10 (12.1)
dBSpectra	DS7A06F36U-D or N	746-869MHz	6 (8.1)
dBSpectra	DS7A08F36U-D or N	746-869MHz	8 (10.1)
dBSpectra	DS7A06F36D-D or N	746-869MHz	2 x 6 (8.1)
dBSpectra	DS7C09F36U-D or N	746-869MHz	9 (11.1)
dBSpectra	DS7C10F36U-D or N	746-869MHz	10 (12.1)
dBSpectra	DS7B12F36U-D or N	764-806MHz	12 (14.1)
dBSpectra	DS7E12F36U-D or N	794-824MHz	12 (14.1)
dBSpectra	DS8A03F36U-D or N	806-869MHz	3 (5.1)
dBSpectra	DS8A06F36U-D or N	806-869MHz	6 (8.1)
dBSpectra	DS8A09F36U-D or N	806-869MHz	9 (11.1)
dBSpectra	DS8A10F36U-D or N	806-869MHz	10 (12.1)
dBSpectra	DS8A12F36U-D or N	806-869MHz	12 (14.1)
dBSpectra	DS8A06F36D-D or N	806-869MHz	2 x 6 (8.1)
dBSpectra	DS8A09F36D-D or N	806-869MHz	2 x 9 (11.1)
dBSpectra	DS8A03F36T-D or N	806-869MHz	3 x 3 (5.1)
dBSpectra	DS8A03F36T-D or N	806-869MHz	3 x 6 (8.1)

## CHANNEL TABLE

Channel Number	Transmit Frequency	Receive Frequency	Power	Bandwidth
1	762.1 MHz	794.1 MHz	50 Watts	12.5 kHz
2	762.1 MHz	794.1 MHz	5 Watts	12.5 kHz
3	768.5 MHz	794.1 MHz	50 Watts	12.5 kHz
4	768.5 MHz	794.1 MHz	5 Watts	12.5 kHz
5	774.9 MHz	806.0 MHz	50 Watts	12.5 kHz
6	774.9 MHz	806.0 MHz	5 Watts	12.5 kHz
7	850.5 MHz	806.0 MHz	50 Watts	12.5 kHz
8	850.5 MHz	806.0 MHz	5 Watts	12.5 kHz
9	851.1 MHz	806.0 MHz	50 Watts	12.5 kHz
10	851.1 MHz	806.0 MHz	5 Watts	12.5 kHz
11	853.9 MHz	823.9 MHz	50 Watts	12.5 kHz
12	853.9 MHz	823.9 MHz	5 Watts	12.5 kHz
13	854.1 MHz	823.9 MHz	50 Watts	12.5 kHz
14	854.1 MHz	823.9 MHz	5 Watts	12.5 kHz
15	862.1 MHz	823.9 MHz	50 Watts	12.5 kHz
16	862.1 MHz	823.9 MHz	5 Watts	12.5 kHz
17	868.9 MHz	823.9 MHz	50 Watts	12.5 kHz
18	868.9 MHz	823.9 MHz	5 Watts	12.5 kHz
19	762.1 MHz	794.1 MHz	50 Watts	25.0 kHz
20	762.1 MHz	794.1 MHz	5 Watts	25.0 kHz
21	768.5 MHz	794.1 MHz	50 Watts	25.0 kHz
22	768.5 MHz	794.1 MHz	5 Watts	25.0 kHz
23	774.9 MHz	806.0 MHz	50 Watts	25.0 kHz
24	774.9 MHz	806.0 MHz	5 Watts	25.0 kHz
25	850.5 MHz	806.0 MHz	50 Watts	25.0 kHz
26	850.5 MHz	806.0 MHz	5 Watts	25.0 kHz
27	851.1 MHz	806.0 MHz	50 Watts	25.0 kHz
28	851.1 MHz	806.0 MHz	5 Watts	25.0 kHz
29	853.9 MHz	823.9 MHz	50 Watts	25.0 kHz
30	853.9 MHz	823.9 MHz	5 Watts	25.0 kHz
31	854.1 MHz	823.9 MHz	50 Watts	25.0 kHz
32	854.1 MHz	823.9 MHz	5 Watts	25.0 kHz
33	862.1 MHz	823.9 MHz	50 Watts	25.0 kHz
34	862.1 MHz	823.9 MHz	5 Watts	25.0 kHz
35	868.9 MHz	823.9 MHz	50 Watts	25.0 kHz
36	868.9 MHz	823.9 MHz	5 Watts	25.0 kHz



## MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS

### MODULATION TYPES:

F3E	FM Analogue Voice	-	-
F2D	Fast Frequency Shift Keying	1200 symbols/sec	1200 bps
FXW	Digital Voice / Data	4800 symbols/sec	9600 bps
FXD	Digital Data	4800 symbols/sec	9600 bps

### EMISSION DESIGNATORS:

Channel Spacing	12.5 kHz	25.0 kHz
Analogue Voice	<b>11K0F3E</b>	<b>16K0F3E</b>
FFSK	<b>7K60F2D</b>	-
DMR Digital Voice / Data	<b>8K00FXW</b>	-
DMR Digital Data	<b>8K00FXD</b>	-

Equation:  $B_n = 2M + 2Dk$

(M is highest modulating frequency; D is peak allowable deviation; k is a constant of 1 for FM)

#### Analogue Voice 12.5 kHz Channel Spacing

Necessary bandwidth	Emission Designator
M = 3.0 kHz	<b>11K0F3E</b>
D = 2.5 kHz	F3E represents an FM voice transmission
$B_n = (2 \times 3.0) + (2 \times 2.5) \times 1$	
= 11.0 kHz	

#### Analogue Voice 25.0 kHz Channel Spacing

Necessary bandwidth	Emission Designator
M = 3.0 kHz	<b>16K0F3E</b>
D = 5.0 kHz	F3E represents an FM voice transmission
$B_n = (2 \times 3.0) + (2 \times 5.0) \times 1$	
= 16.0 kHz	

#### Fast Frequency Shift Keying (FFSK – 1200 bps) 12.5 kHz Channel Spacing

Necessary bandwidth	Emission Designator
M = 1.8 kHz	<b>7K60F2D</b>
D = 2.0 kHz	F2D represents a FM data transmission with the use of a modulating sub carrier
$B_n = (2 \times 1.8) + (2 \times 2.0) \times 1$	
= 7.6 kHz	

Digital Mobile Radio (DMR) 4 level FSK (as per ETSI TS 102 361-1)  
4800 symbols/sec 9600 bps

#### Digital Data 12.5 kHz Channel Spacing – 7K60FXW

99% bandwidth	Emission Designator
= 8.0 kHz	<b>8K00FXW</b>
FXW represents FM combination of data and telephony.	

#### Digital Data 12.5 kHz Channel Spacing – 7K60FXD

99% bandwidth	Emission Designator
= 8.0 kHz	<b>8K00FXD</b>
FXD represents FM data only	

## TEST RESULTS

### TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS

SPECIFICATION: FCC 47 CFR 2.1047 (a)

GUIDE: ANSI C63.26 5.3.3.2

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment set up.
2. An audio input tone of 1000 Hz was applied with the level set to obtain 20% of maximum deviation. This was used as the 0 dB reference point.
3. The AF was varied while the audio level was held constant.
4. The response in dB relative to 1000 Hz was measured.

MEASUREMENT RESULTS:

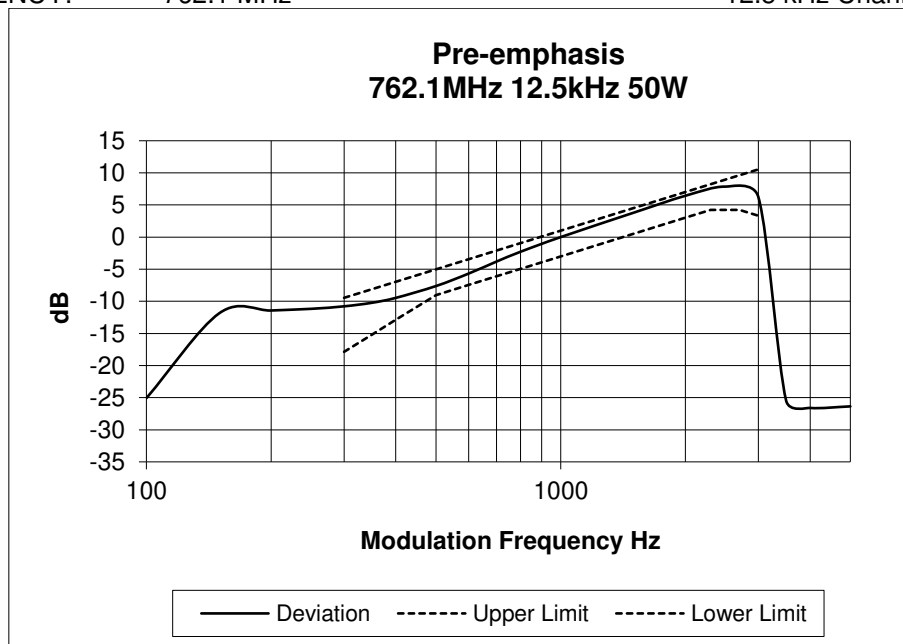
See the plots on the following pages for 12.5 kHz and 25.0 kHz channel spacings tested at 50 W transmit power.

LIMIT CLAUSE: TIA/EIA-603E 3.2.6

MEASUREMENT UNCERTAINTY:  $\pm 1.5\%$

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 762.1 MHz 12.5 kHz Channel Spacing

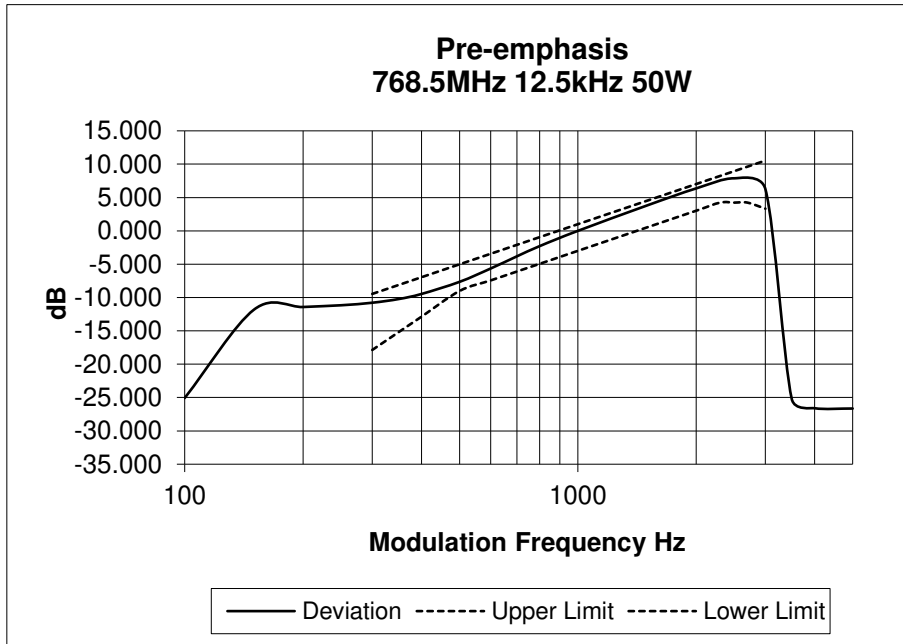


### Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 768.5 MHz

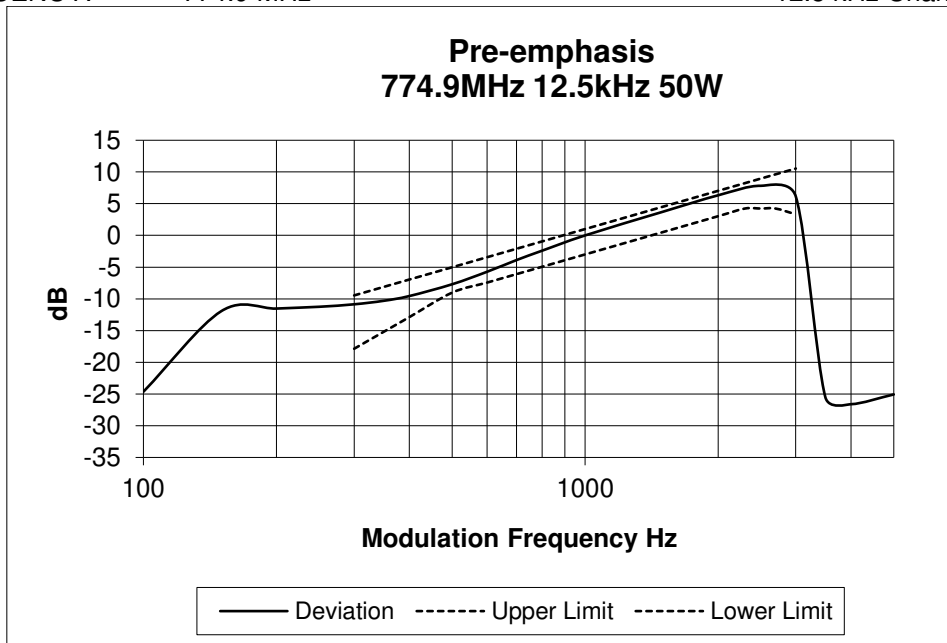
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 774.9 MHz

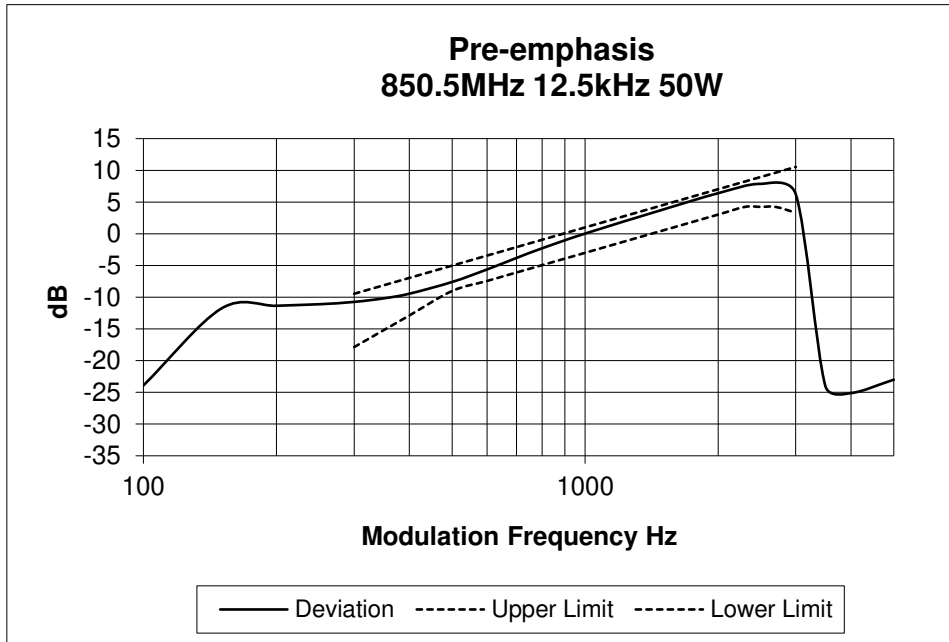
12.5 kHz Channel Spacing



### Transmitter Audio Frequency Response – Pre-emphasis

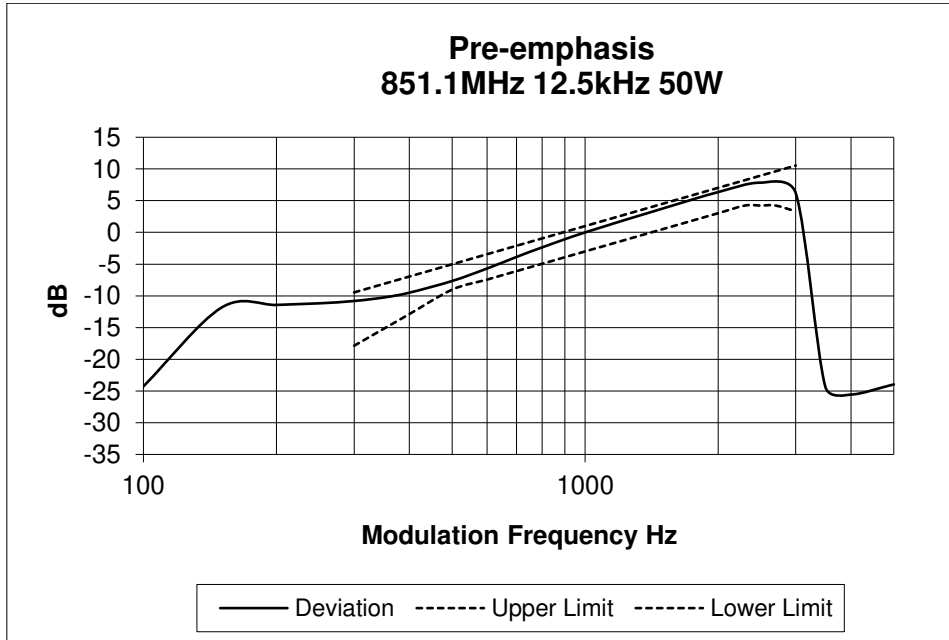
SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 850.5 MHz 12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

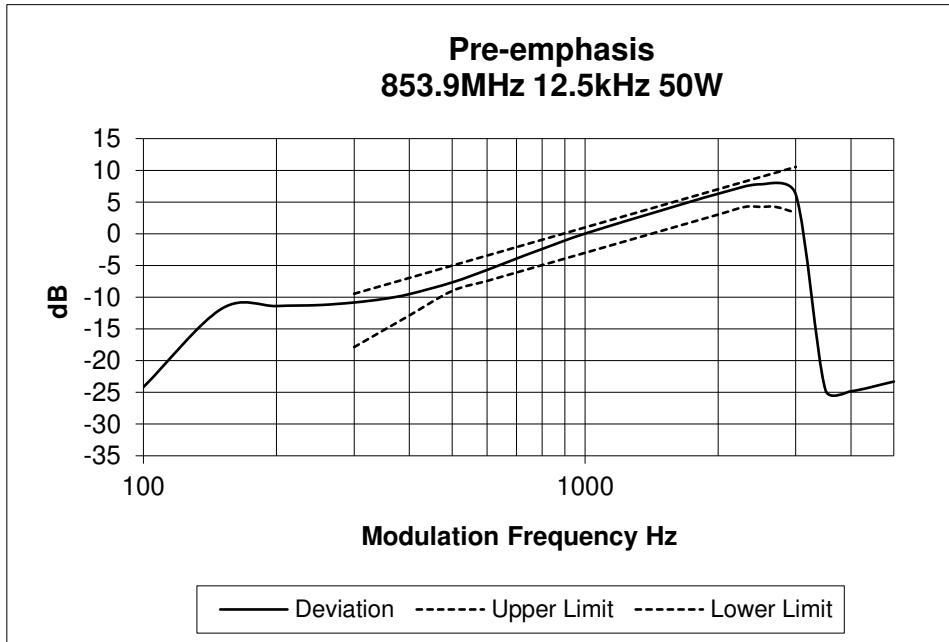
Tx FREQUENCY: 851.1 MHz 12.5 kHz Channel Spacing



### Transmitter Audio Frequency Response – Pre-emphasis

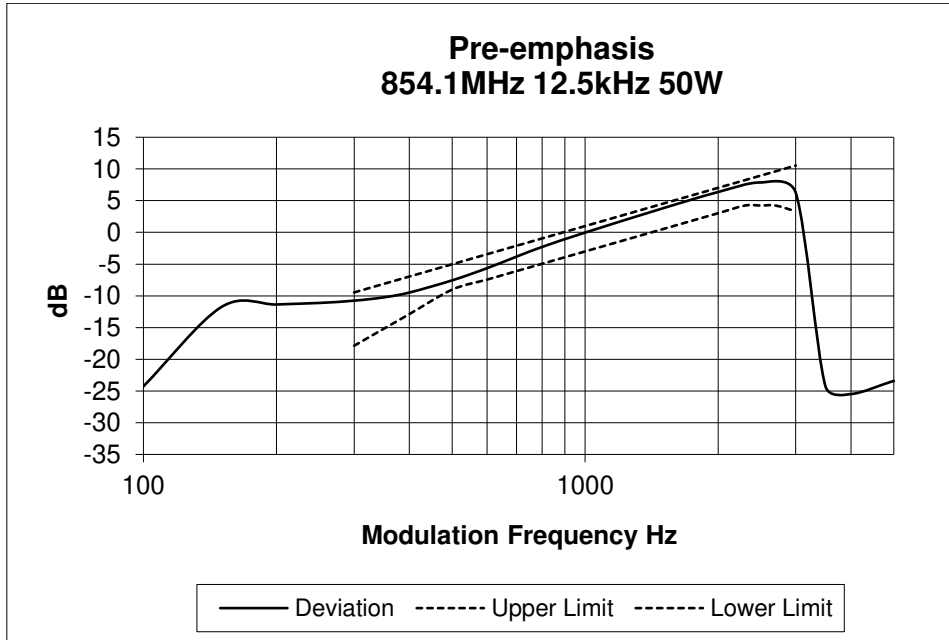
SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 853.9 MHz 12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

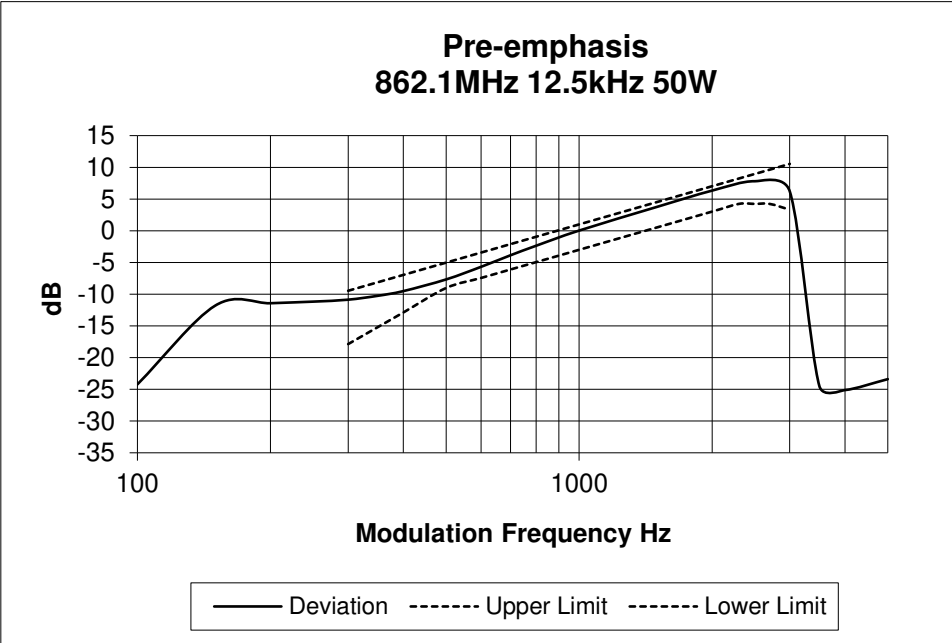
Tx FREQUENCY: 854.1 MHz 12.5 kHz Channel Spacing



Transmitter Audio Frequency Response – Pre-emphasis

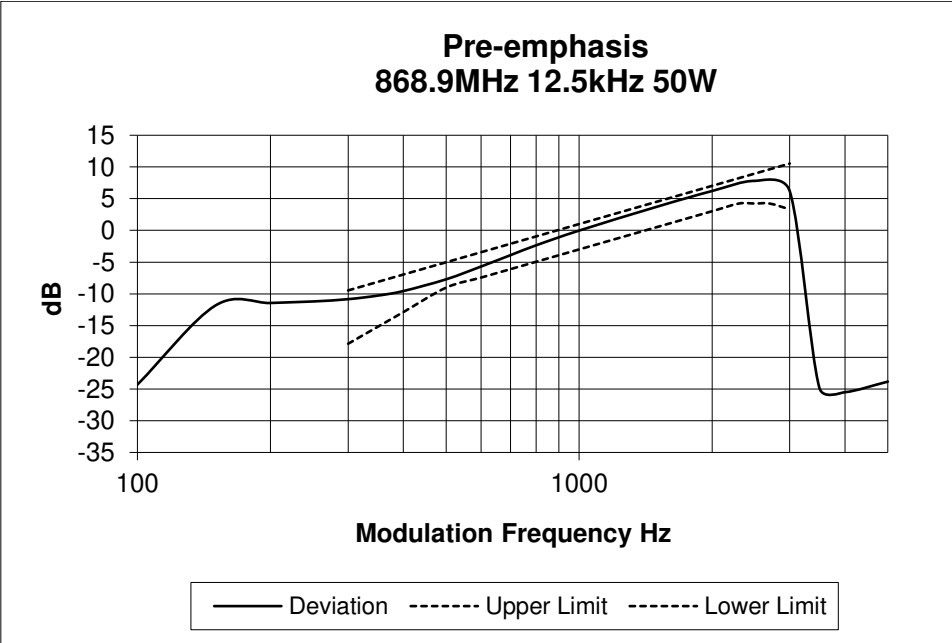
SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 862.1 MHz 12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 868.9 MHz 12.5 kHz Channel Spacing

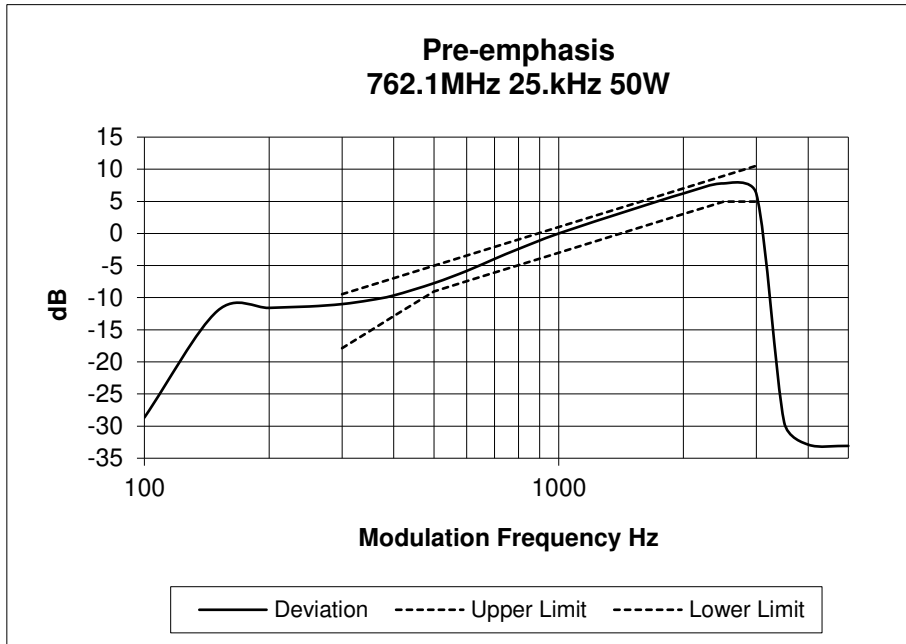


### Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 762.1 MHz

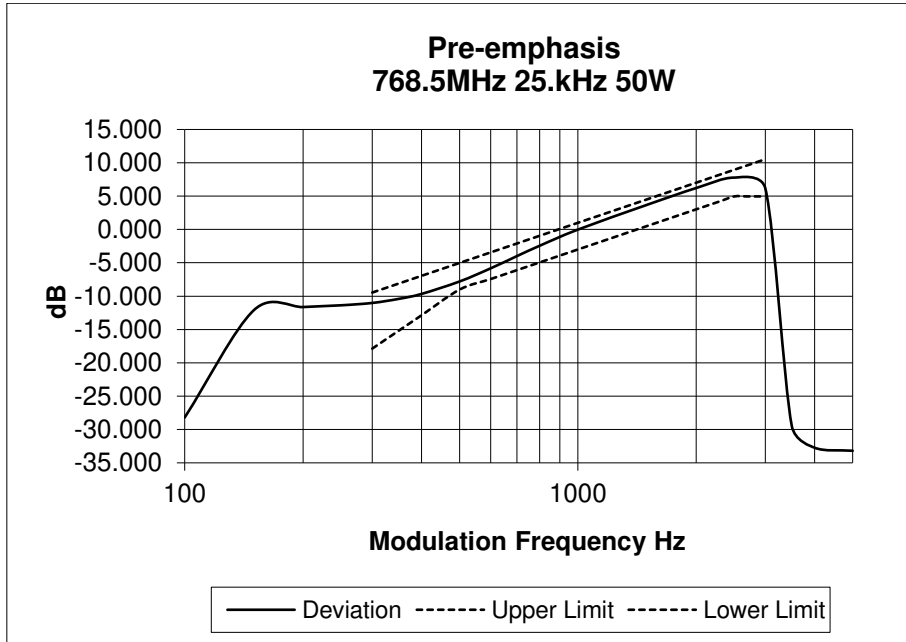
25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 768.5 MHz

25.0 kHz Channel Spacing

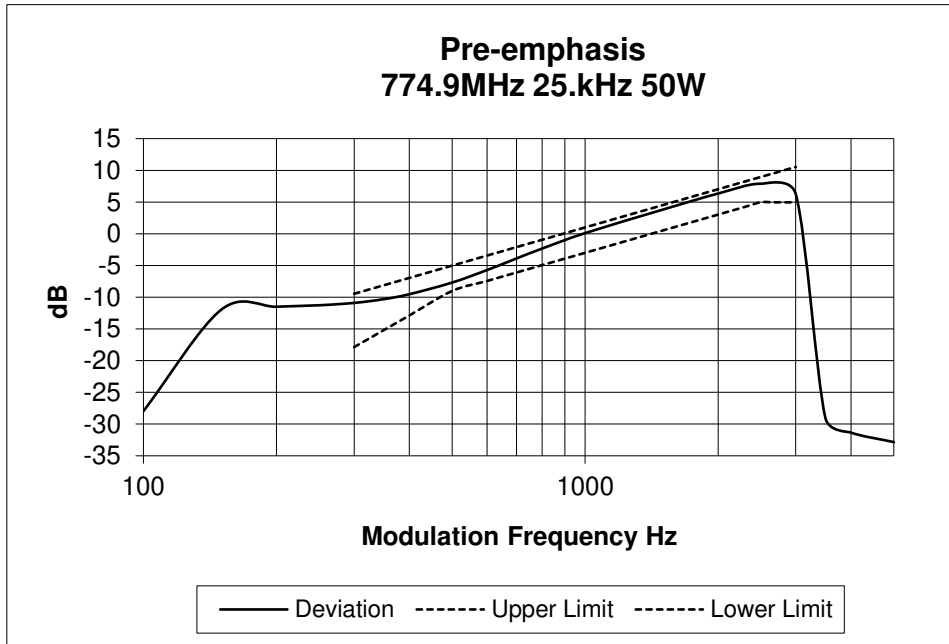


### Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 774.9 MHz

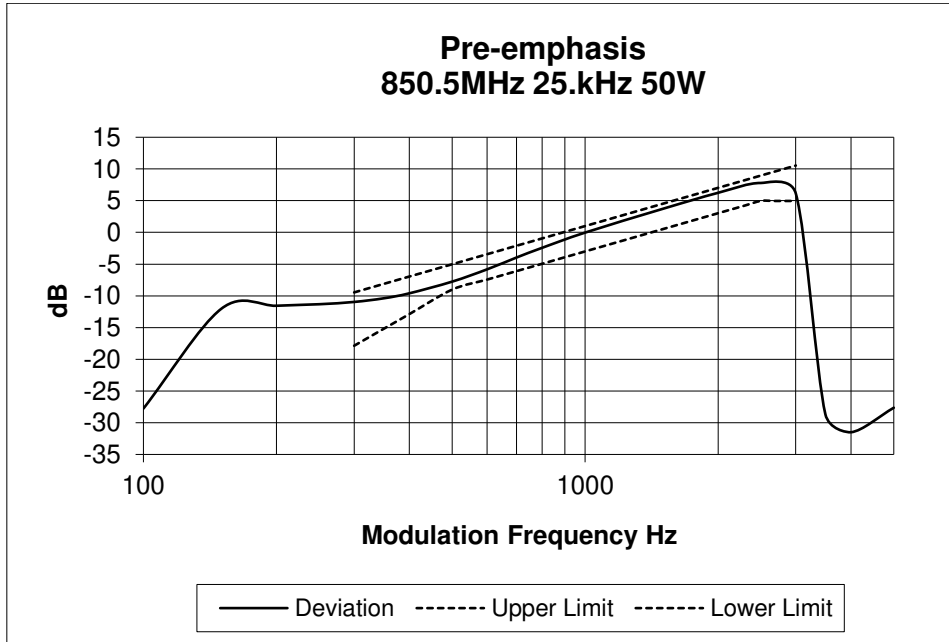
25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 850.5 MHz

25.0 kHz Channel Spacing



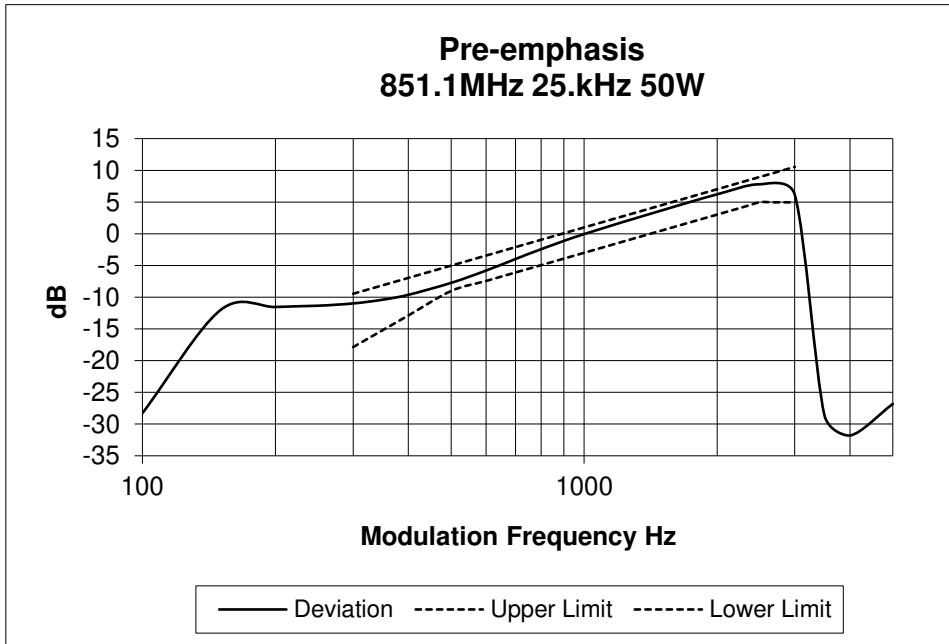


### Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 851.1 MHz

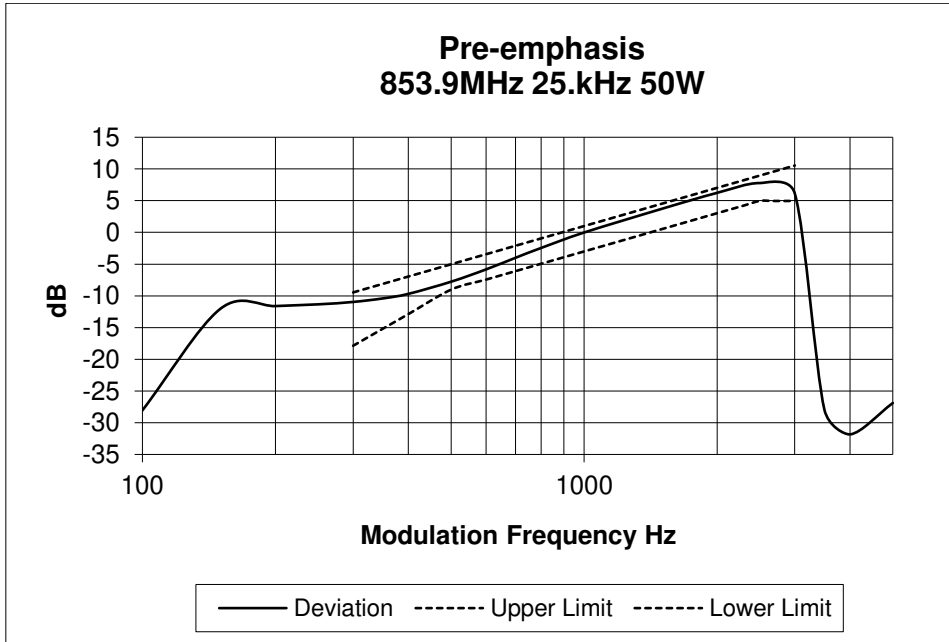
25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 853.9 MHz

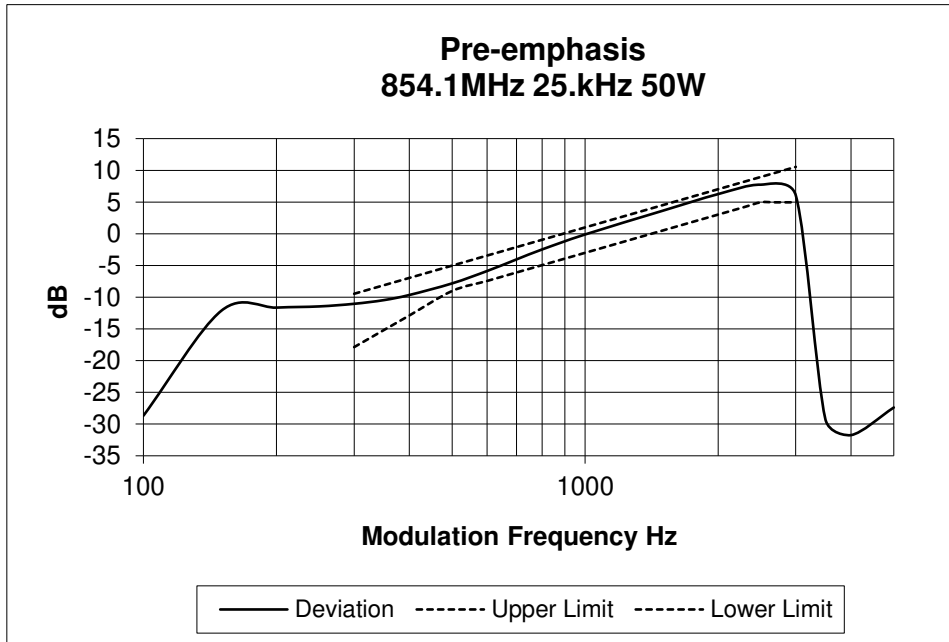
25.0 kHz Channel Spacing



### Transmitter Audio Frequency Response – Pre-emphasis

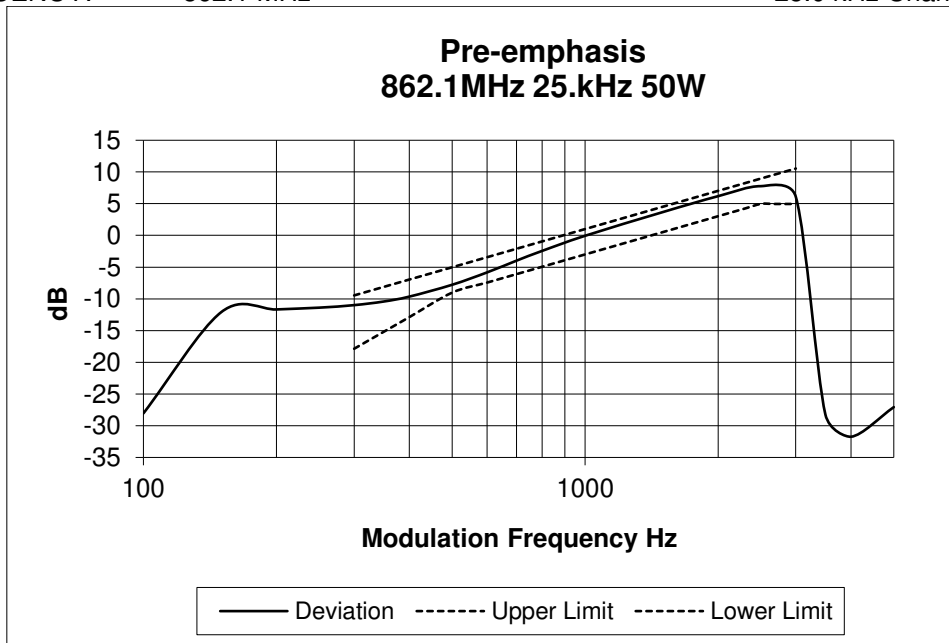
SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 854.1 MHz 25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 862.1 MHz 25.0 kHz Channel Spacing

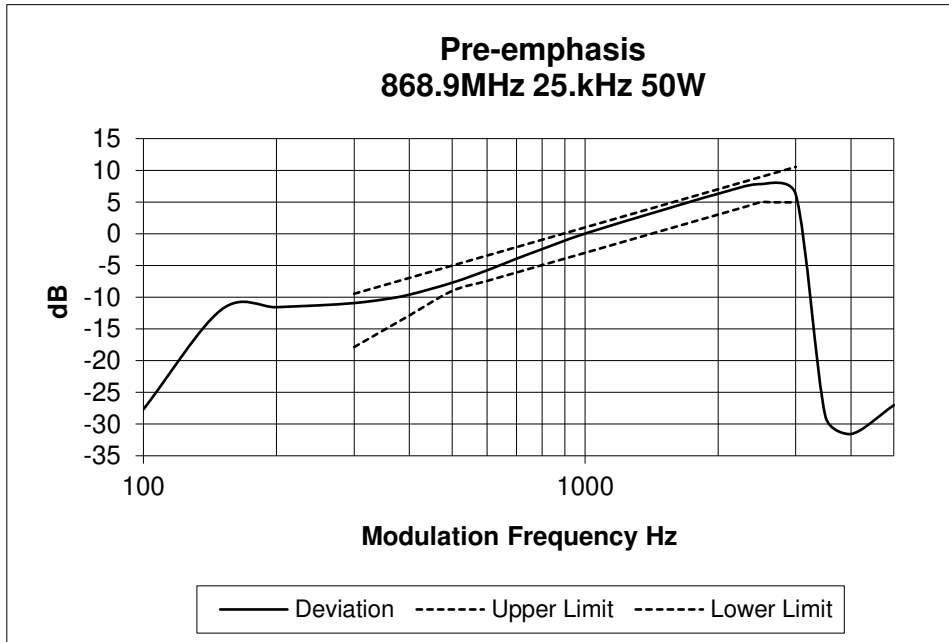


### Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 868.9 MHz

25.0 kHz Channel Spacing



## TRANSMITTER MODULATION LIMITING

SPECIFICATION: FCC 47 CFR 2.1047 (b)

GUIDE: ANSI C63.26 5.3.2

### MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment set up.
2. An audio input tone of 1000 Hz was applied with the level set to obtain 60% of maximum deviation. This was used as the 0 dB reference point.
3. The modulation response was measured at four audio frequencies while increasing the input level in 5dB steps.
4. Additionally the level used to measure sideband spectrum (occupied bandwidth) was included in the level sweep.
5. Measurements were made for both Positive and Negative Deviation.

### MEASUREMENT RESULTS:

See the plots on the following pages for 12.5 kHz and 25.0 kHz channel spacings.

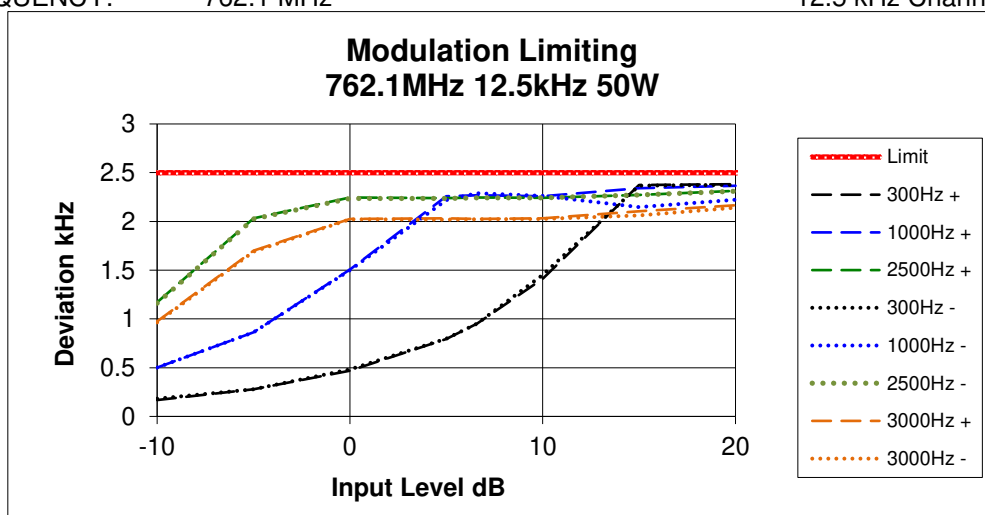
LIMIT CLAUSE: TIA/EIA-603E 1.3.4.4

MEASUREMENT UNCERTAINTY:  $\pm 1.5\%$

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 762.1 MHz

12.5 kHz Channel Spacing

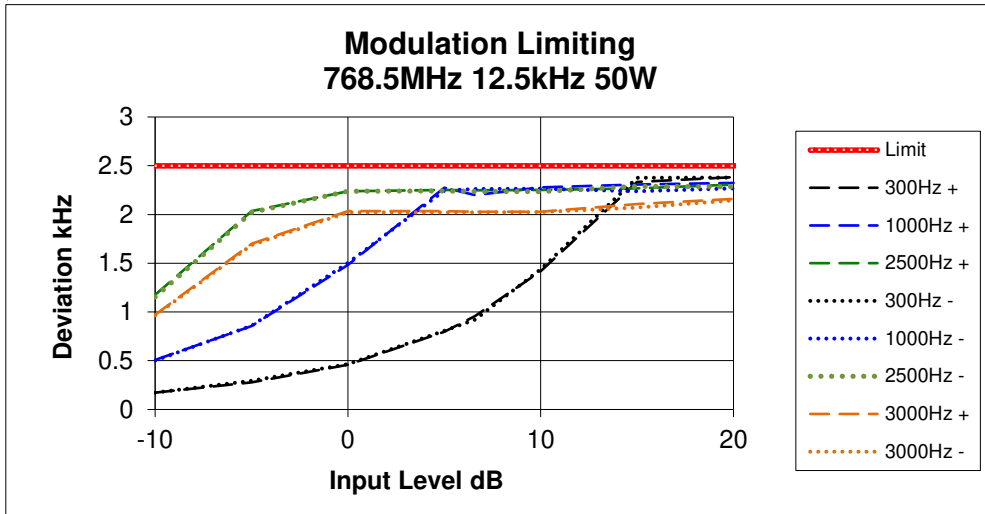


### Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 768.5 MHz

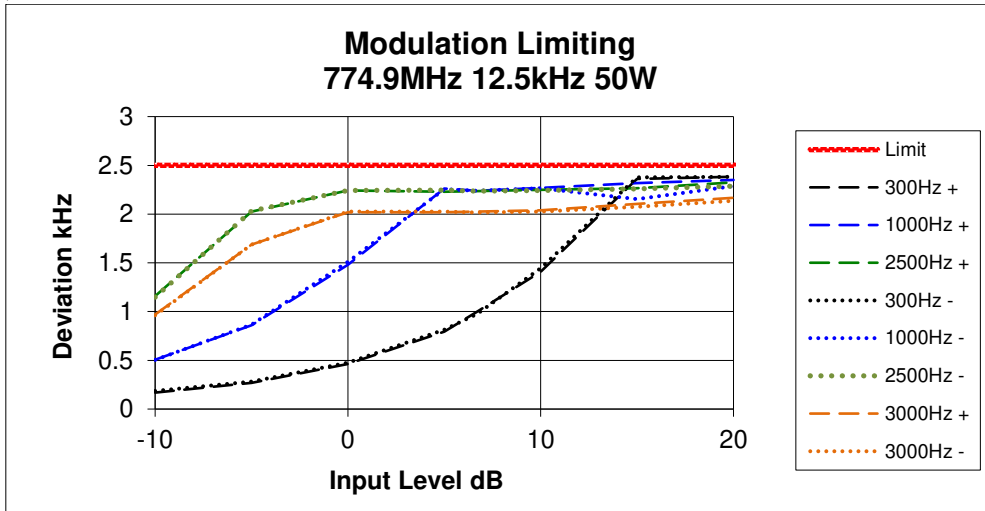
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 774.9 MHz

12.5 kHz Channel Spacing

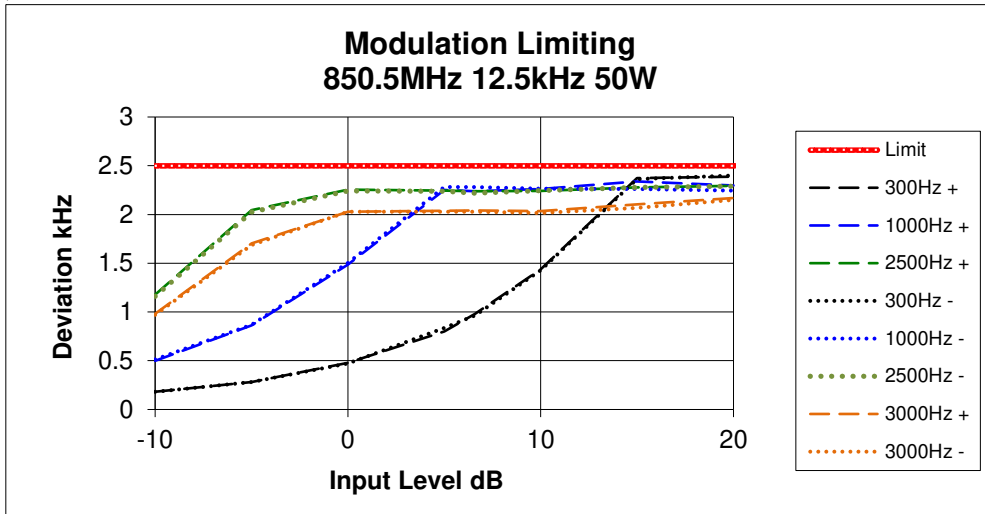


### Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 850.5 MHz

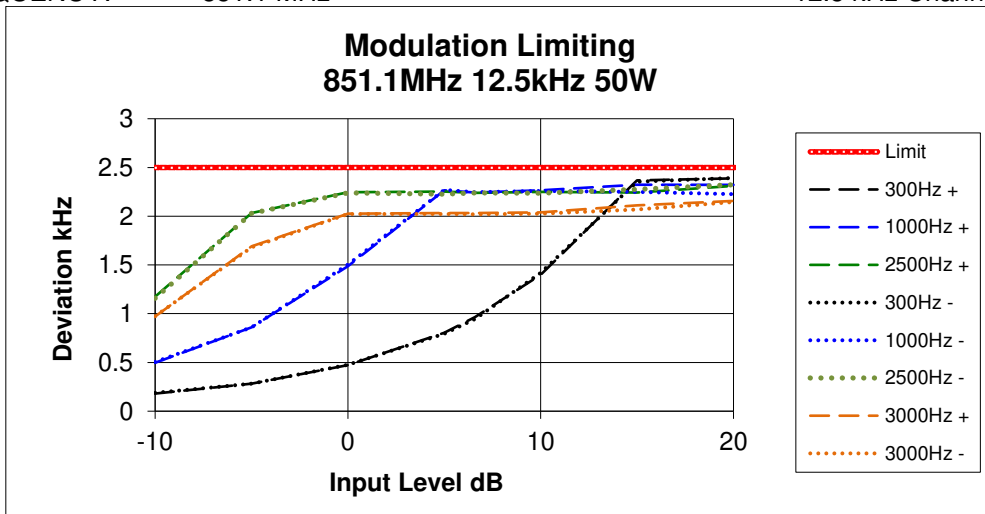
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 851.1 MHz

12.5 kHz Channel Spacing

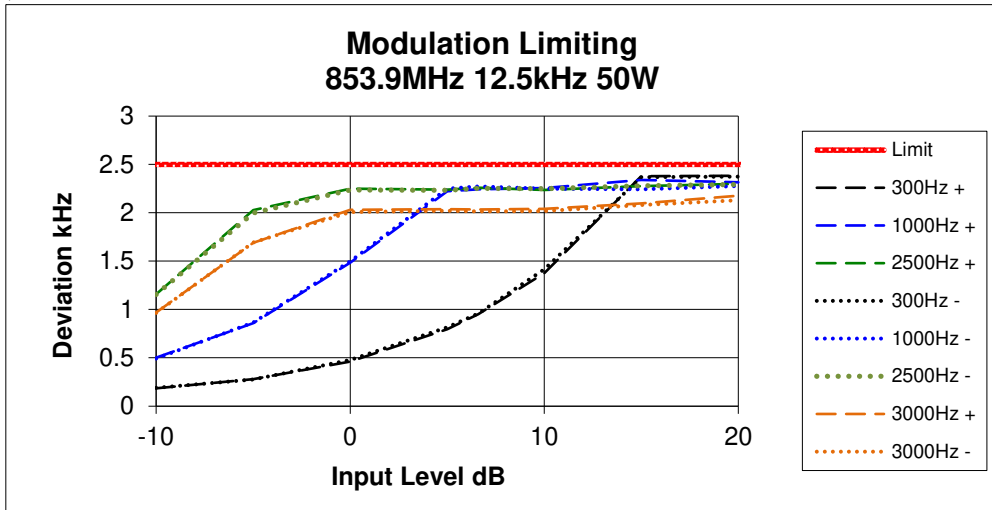


### Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 853.9 MHz

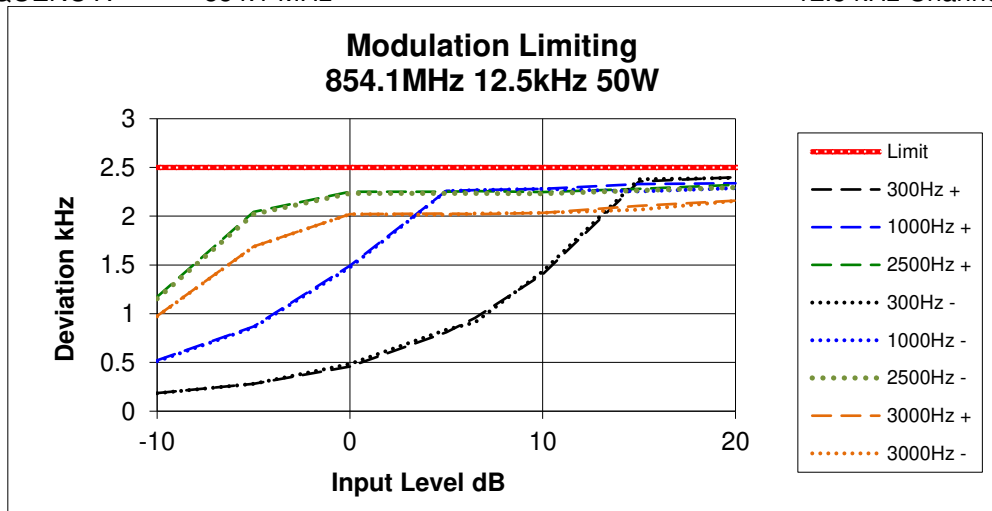
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 854.1 MHz

12.5 kHz Channel Spacing

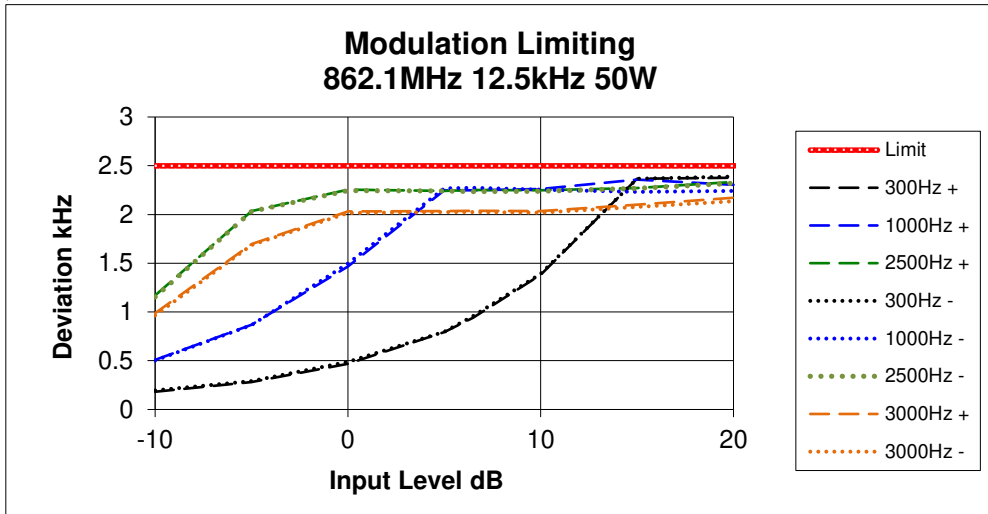


### Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 862.1 MHz

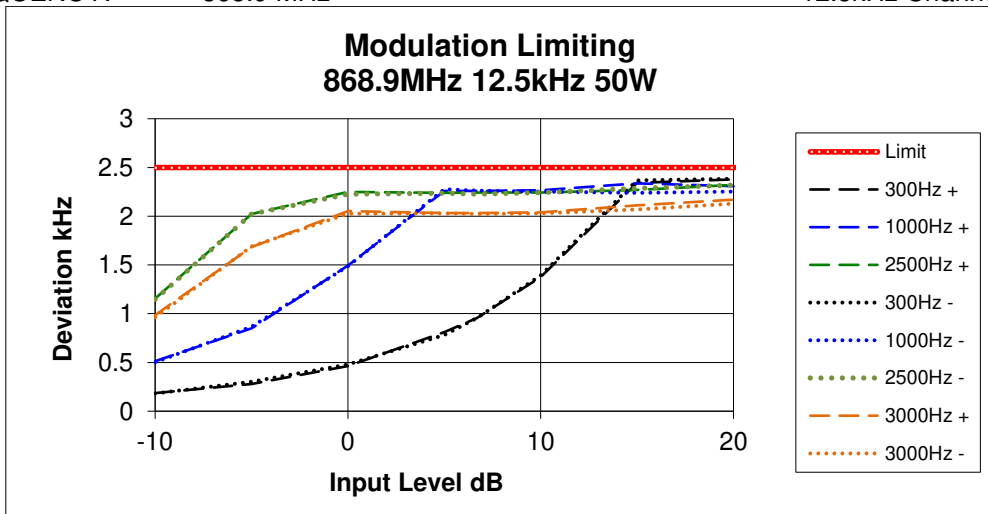
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 868.9 MHz

12.5kHz Channel Spacing



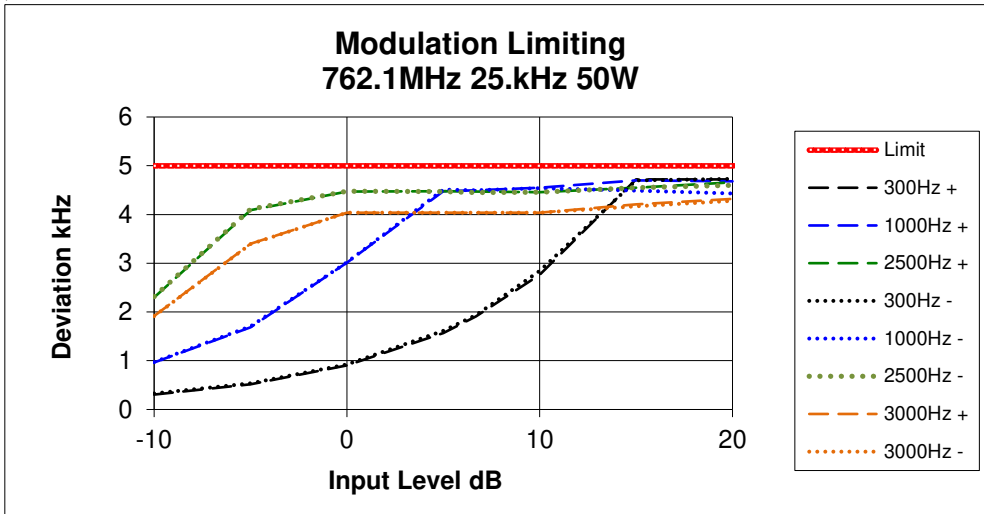


### Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 762.1 MHz

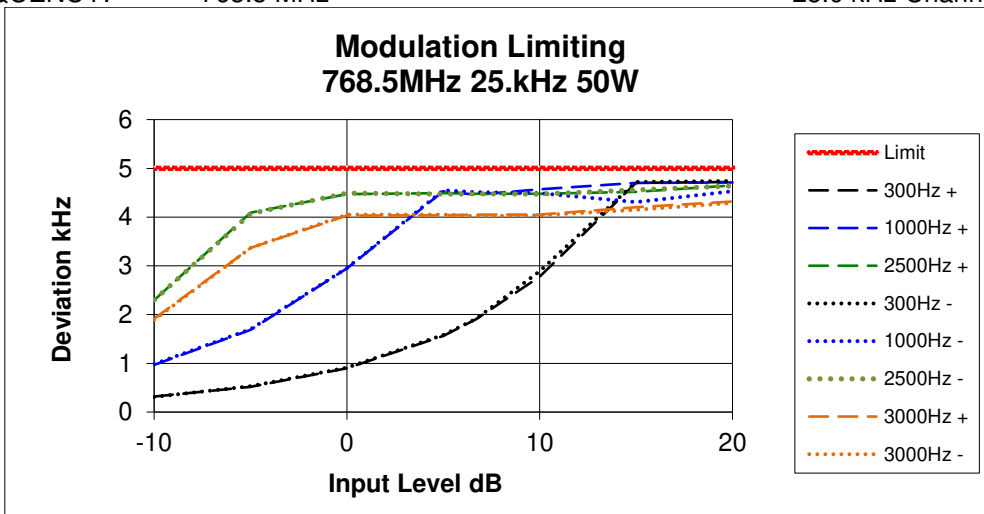
25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 768.5 MHz

25.0 kHz Channel Spacing

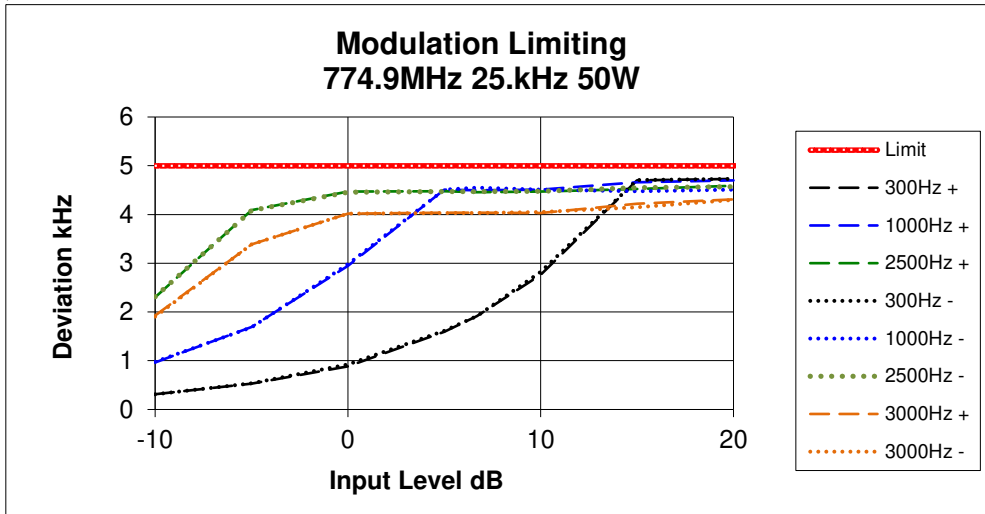


### Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 774.5 MHz

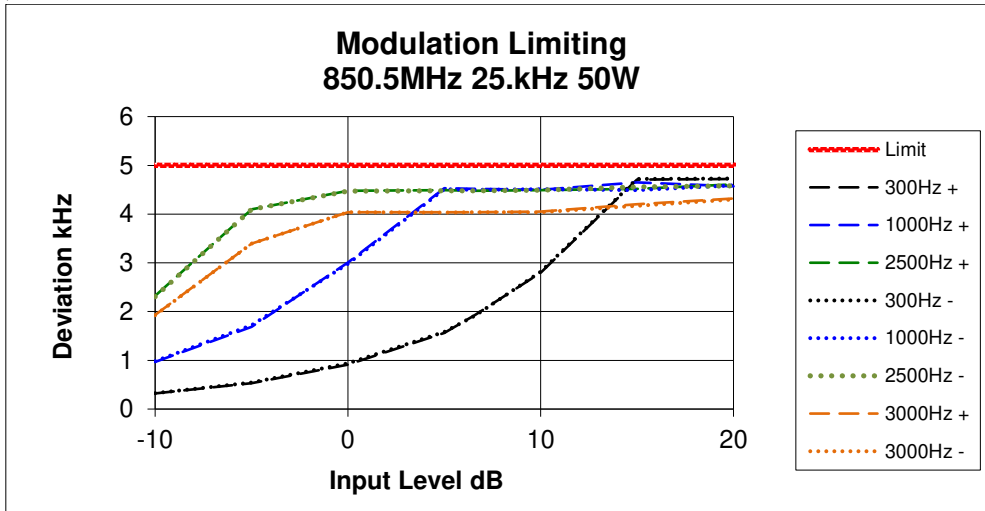
25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 850.5 MHz

25.0 kHz Channel Spacing

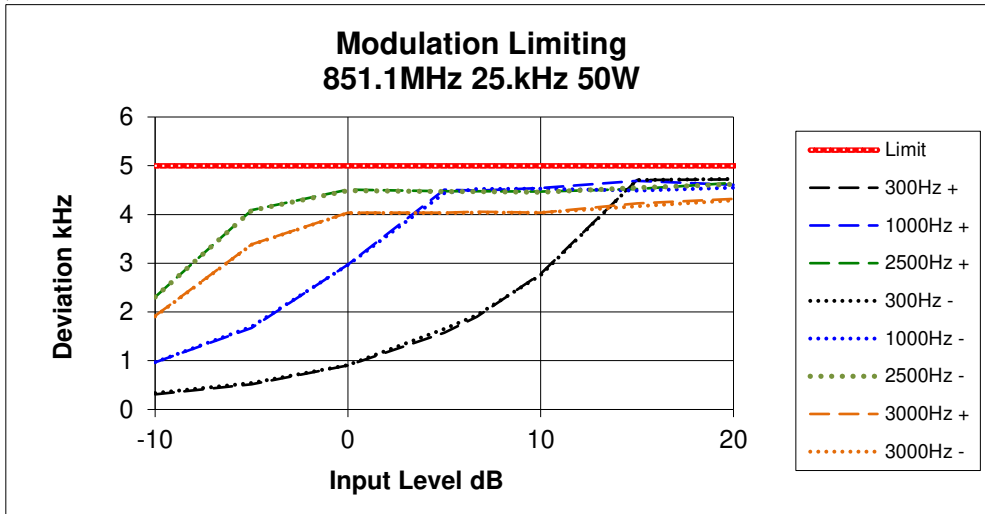


### Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 851.1 MHz

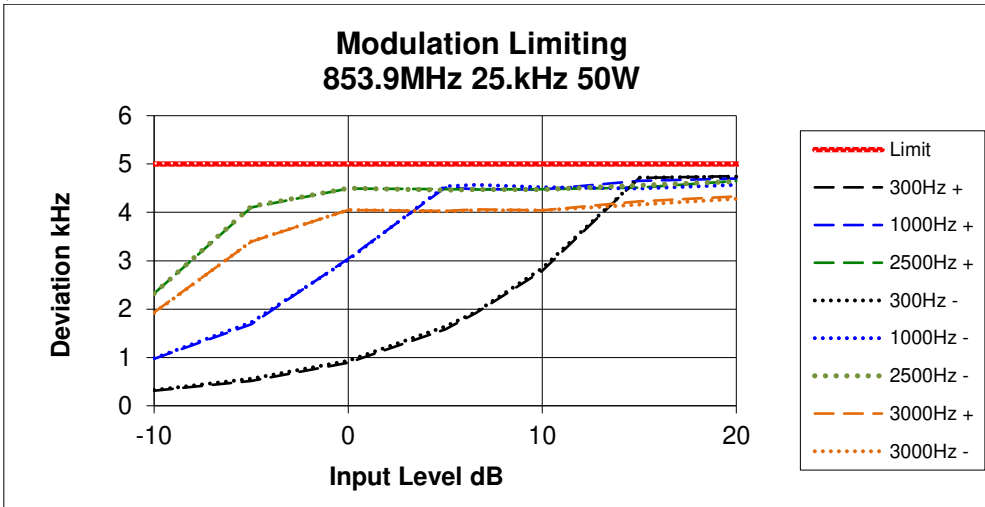
25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 853.9 MHz

25.0 kHz Channel Spacing

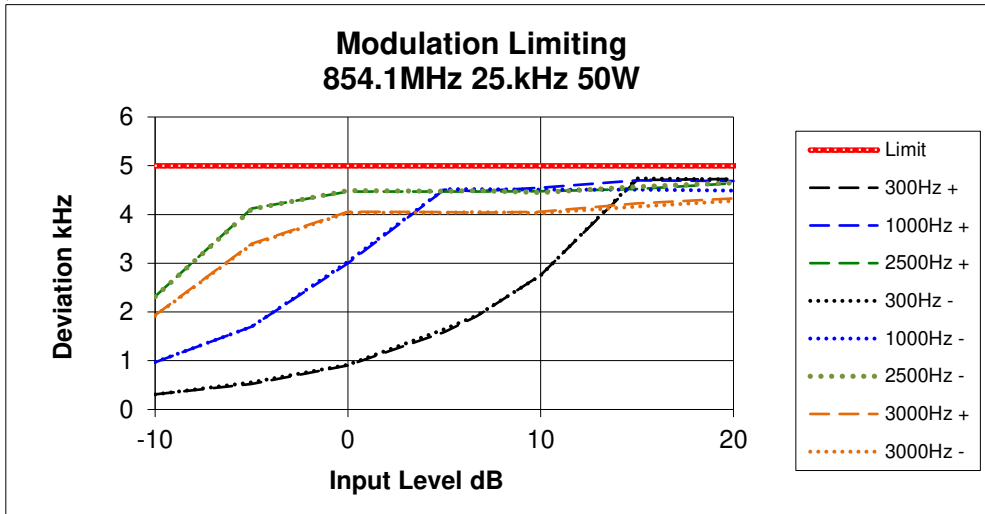


### Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 854.1 MHz

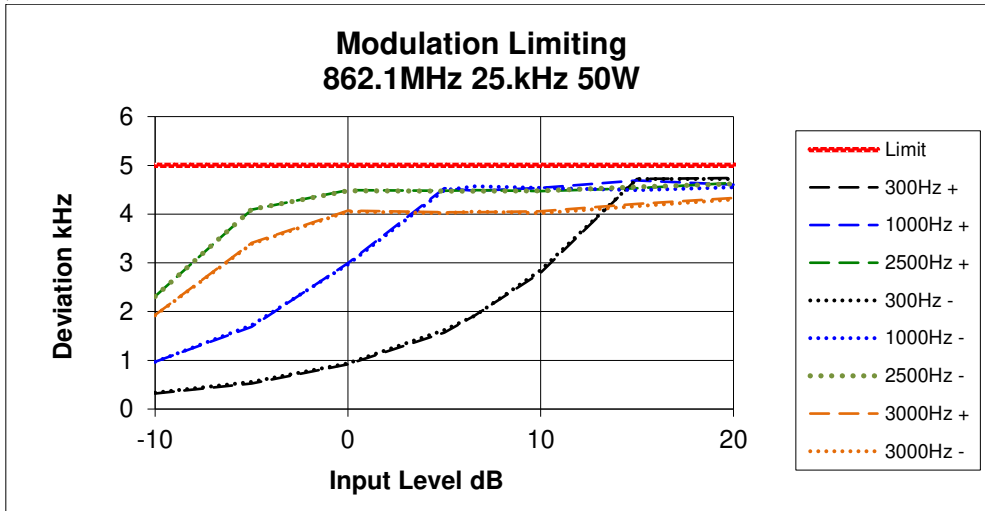
25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 862.1 MHz

25.0 kHz Channel Spacing

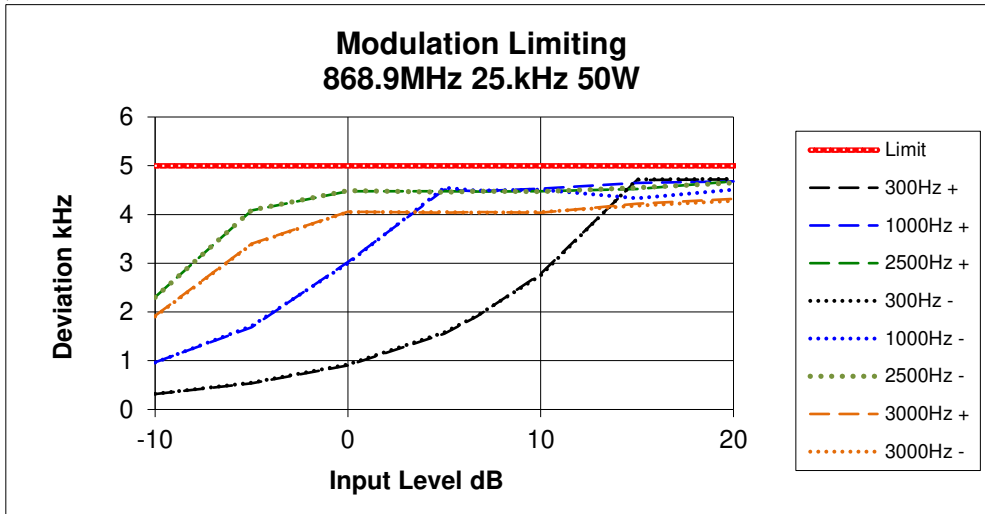


### Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 868.9 MHz

25.0 kHz Channel Spacing



## TRANSMITTER OCCUPIED (99%) BANDWIDTH

SPECIFICATION: RSS-119 5.5

GUIDE: RSS-Gen 6.7

### MEASUREMENT PROCEDURE:

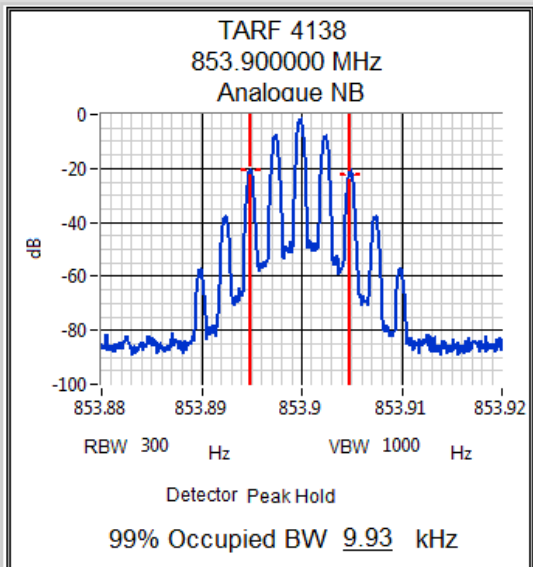
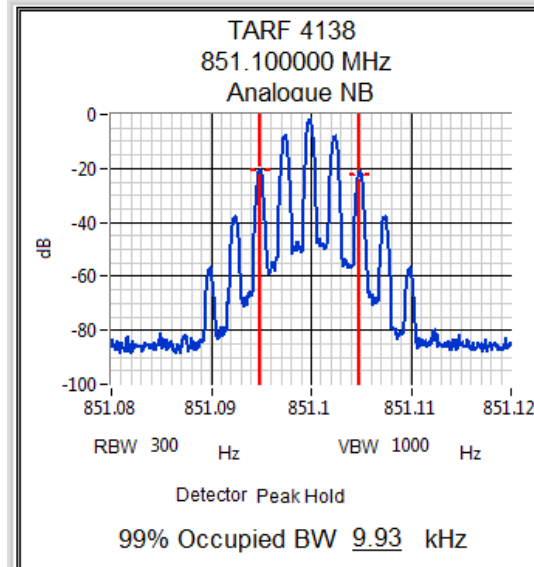
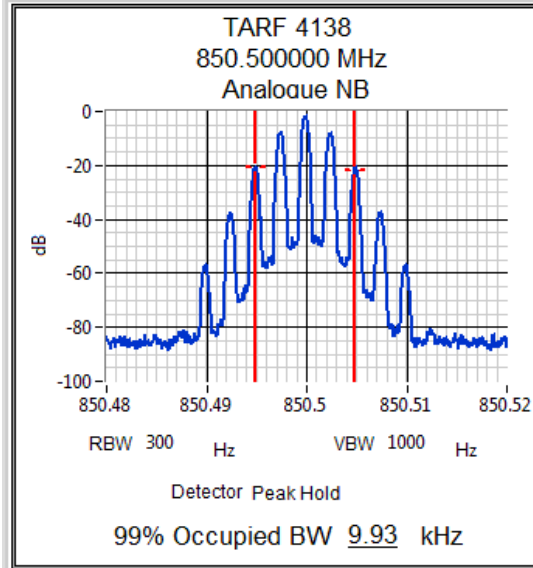
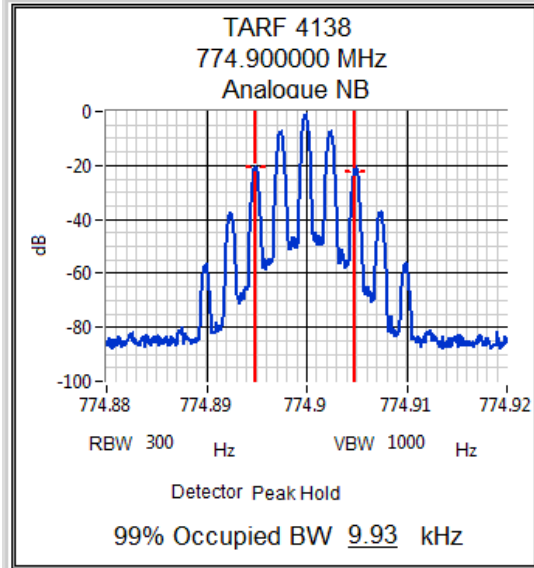
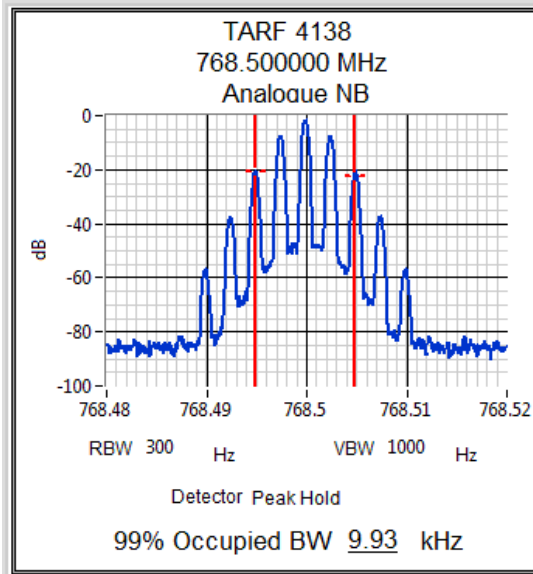
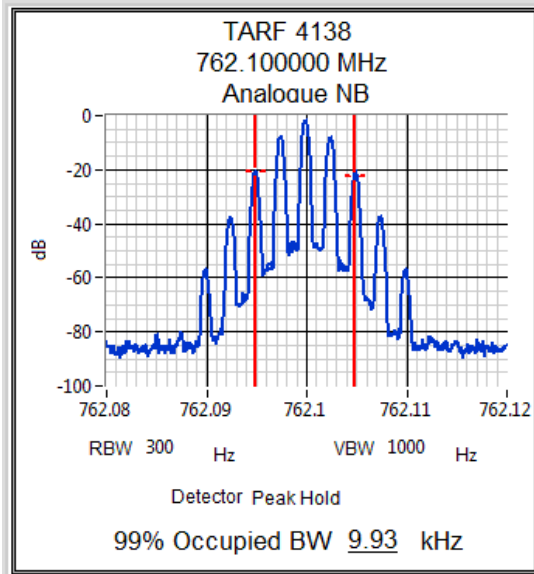
1. Refer Annex A for Equipment Set up.
2. For analogue measurements: The EUT was modulated by a 2500 Hz tone at an input level 16 dB above a level that produced 50% deviation. The input level was established at the frequency of maximum response of the audio modulating circuit.  
For Data measurements: The EUT was modulated with an internally generated pseudo random bit sequence at the appropriate Baud rates.
3. The Occupied Bandwidth was measured on the Spectrum Analyser, with bandwidth settings as follows.  
Resolution Bandwidth = 300 Hz, Video Bandwidth = 1000 Hz

### MEASUREMENT RESULTS:

Tx Frequency (MHz)	Channel Spacing (kHz)	Bandwidths (kHz)			
		Analogue Narrow Band	Analogue Wide Band	FFSK 1200 bps	DMR
762.1 MHz	12.5	9.93	-	6.93	7.80
768.5 MHz	12.5	9.93	-	7.00	7.73
774.9 MHz	12.5	9.93	-	7.00	7.93
850.5 MHz	12.5	9.93	-	7.00	7.87
851.1 MHz	12.5	9.93	-	7.00	7.80
853.9 MHz	12.5	9.93	-	6.93	7.73
854.1 MHz	12.5	9.93	-	7.00	7.80
862.1 MHz	12.5	9.93	-	7.00	7.87
868.9 MHz	12.5	9.93	-	7.00	7.87
762.1 MHz	25.0	-	14.9	-	-
768.5 MHz	25.0	-	15.0	-	-
774.9 MHz	25.0	-	14.9	-	-
850.5 MHz	25.0	-	15.0	-	-
851.1 MHz	25.0	-	15.0	-	-
853.9 MHz	25.0	-	15.0	-	-
854.1 MHz	25.0	-	14.9	-	-
862.1 MHz	25.0	-	14.9	-	-
868.9 MHz	25.0	-	14.9	-	-
<u>Limit</u> Authorized Bandwidth 47 CFR 90.209 RSS 119 5.5		11.25	20.0	11.25	11.25
Necessary BW used in emission designator		11.0	16.0	7.6	8.0
Result		Pass	Pass	Pass	Pass

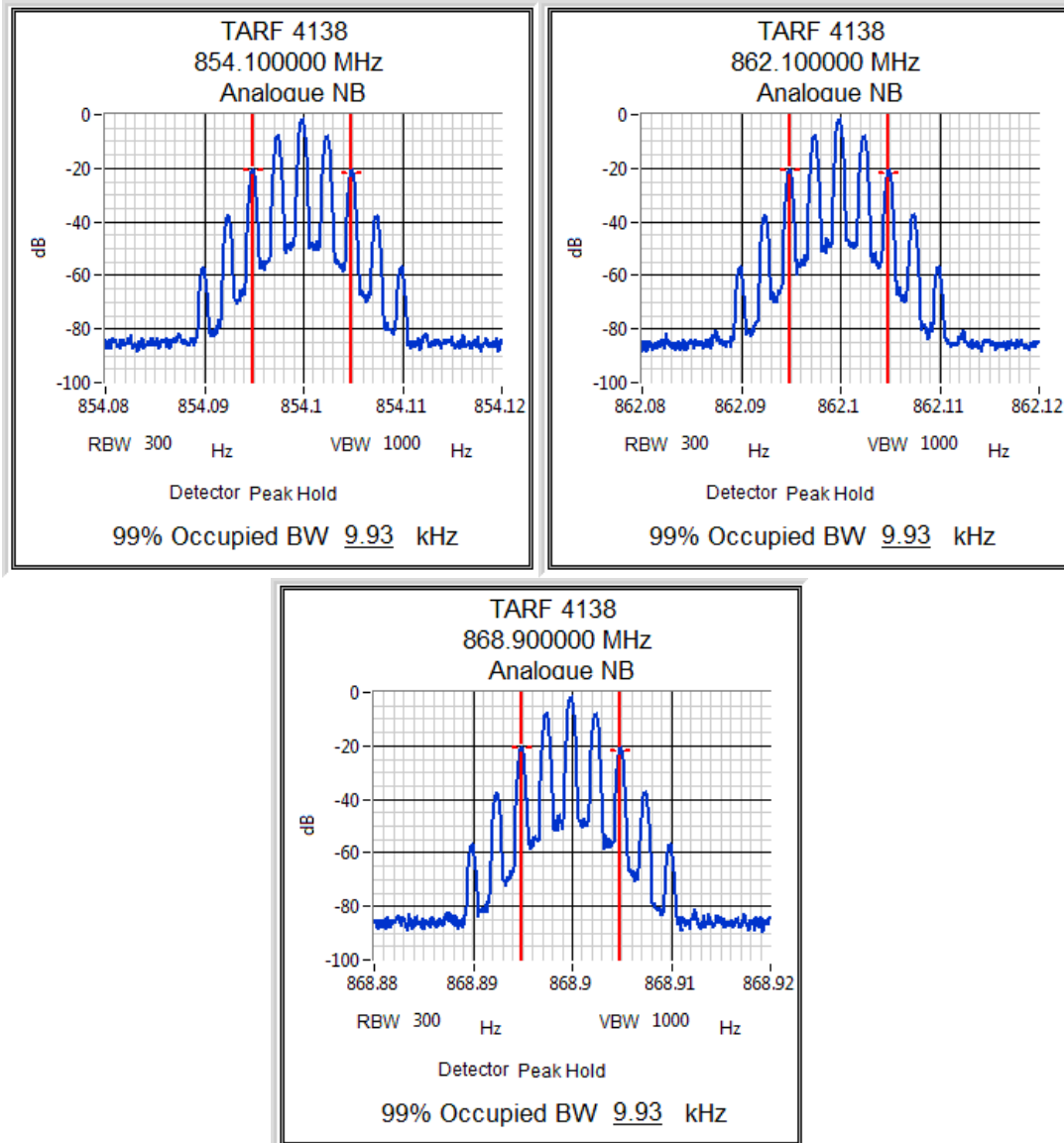
### Transmitter Occupied (99%) Bandwidth

Channel 1-6    50 watts    12.5 kHz ch spacing    Analogue Modulation



### Transmitter Occupied (99%) Bandwidth

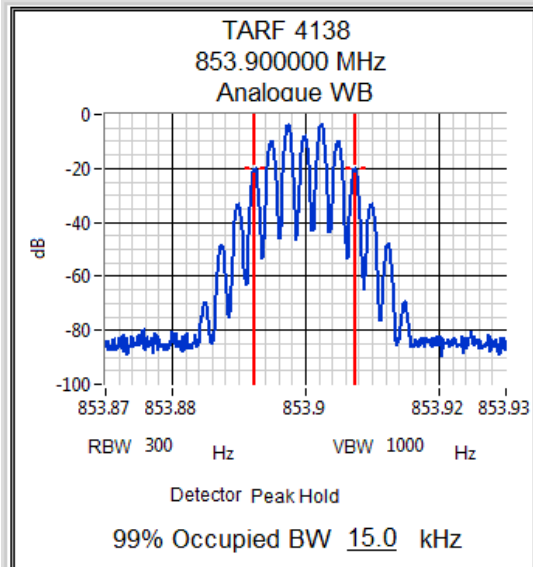
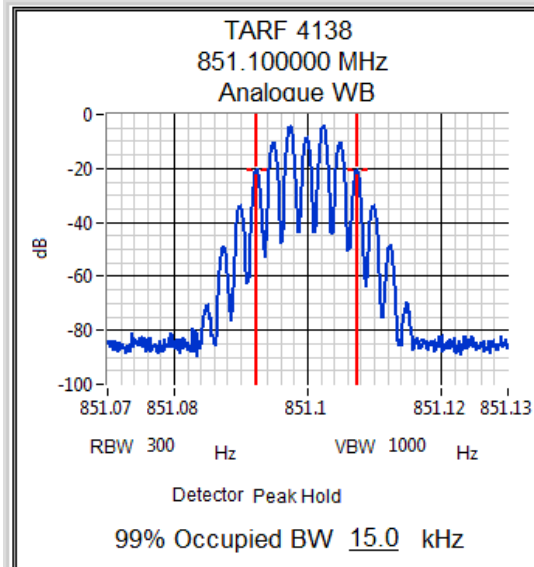
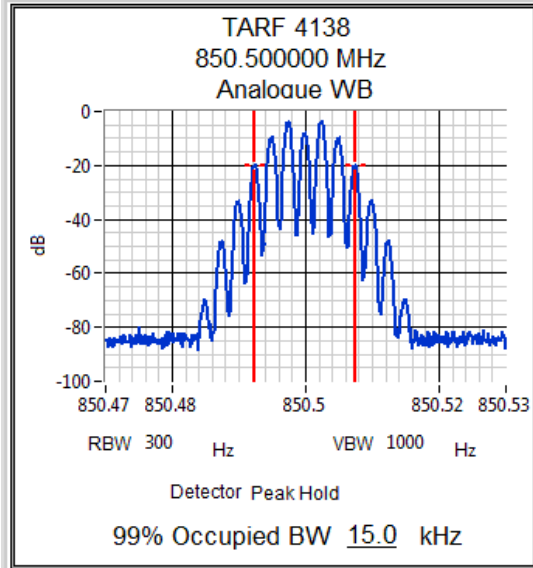
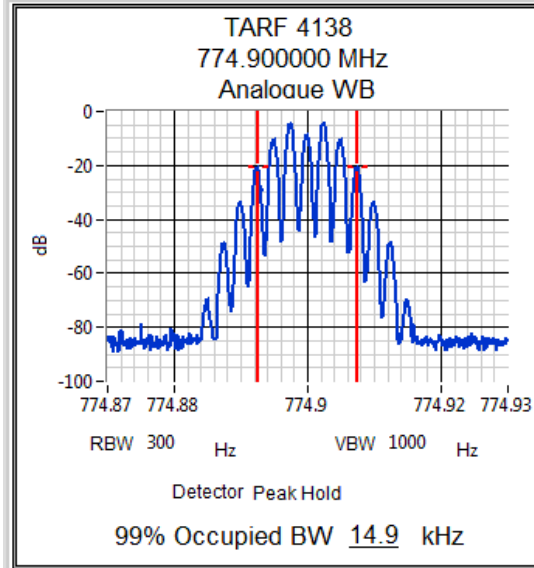
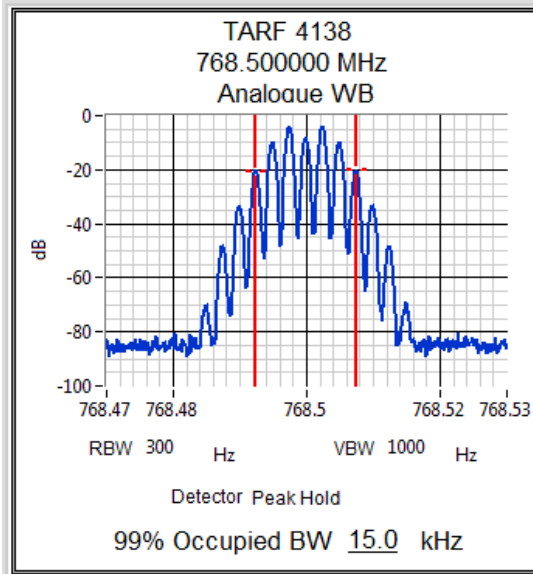
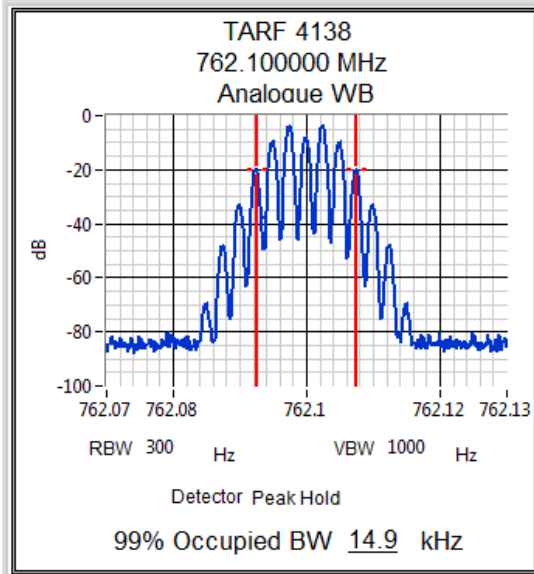
Channel 7-9    50 watts    12.5 kHz ch spacing    Analogue Modulation





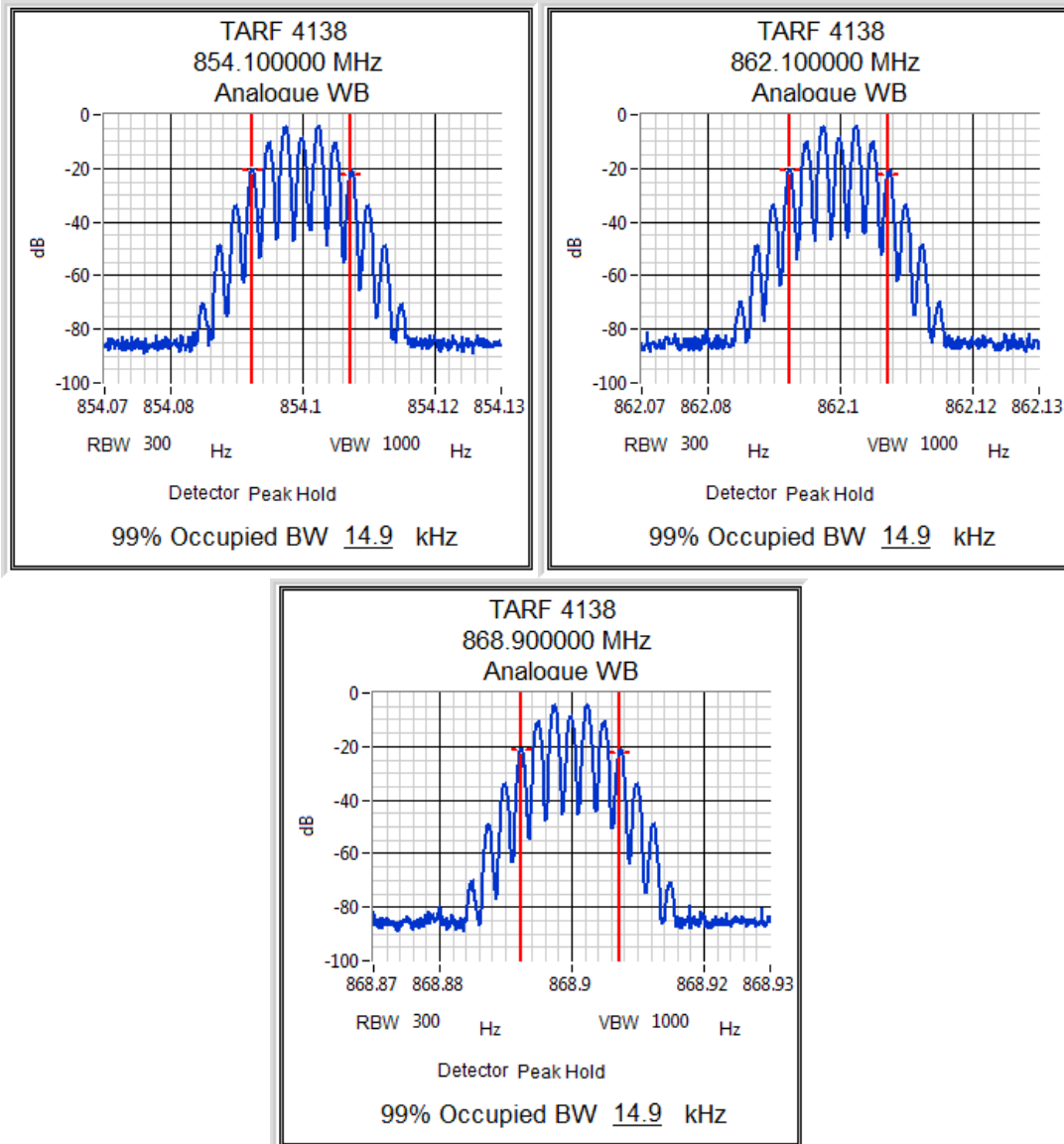
### Transmitter Occupied (99%) Bandwidth

Channel 1-6    50 watts    25.0 kHz ch spacing    Analogue Modulation



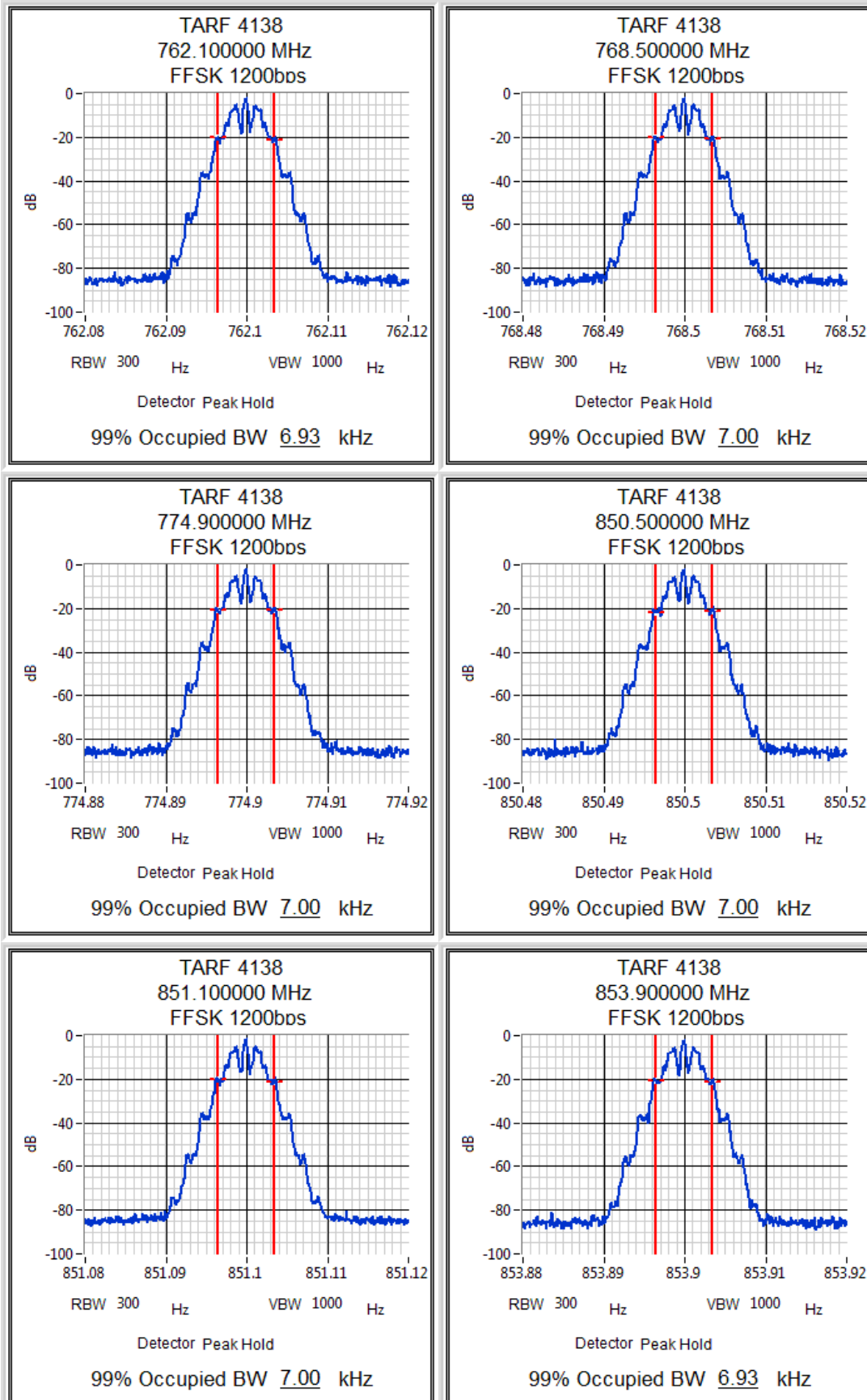
### Transmitter Occupied (99%) Bandwidth

Channel 7-9    50 watts    25.0 kHz ch spacing    Analogue Modulation



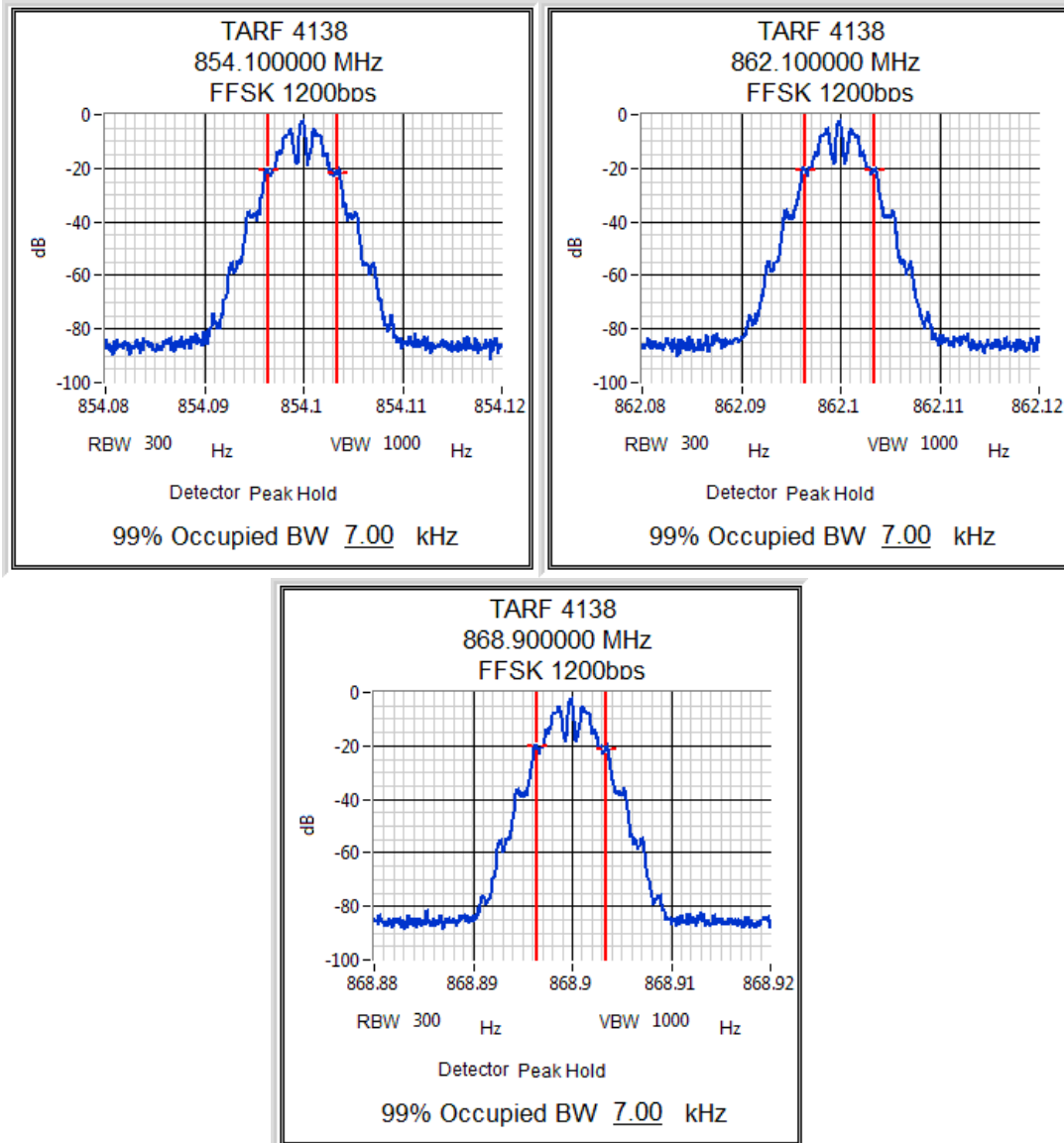
### Transmitter Occupied (99%) Bandwidth

Channel 1-6    50 watts    12.5 kHz ch spacing    FFSK Modulation



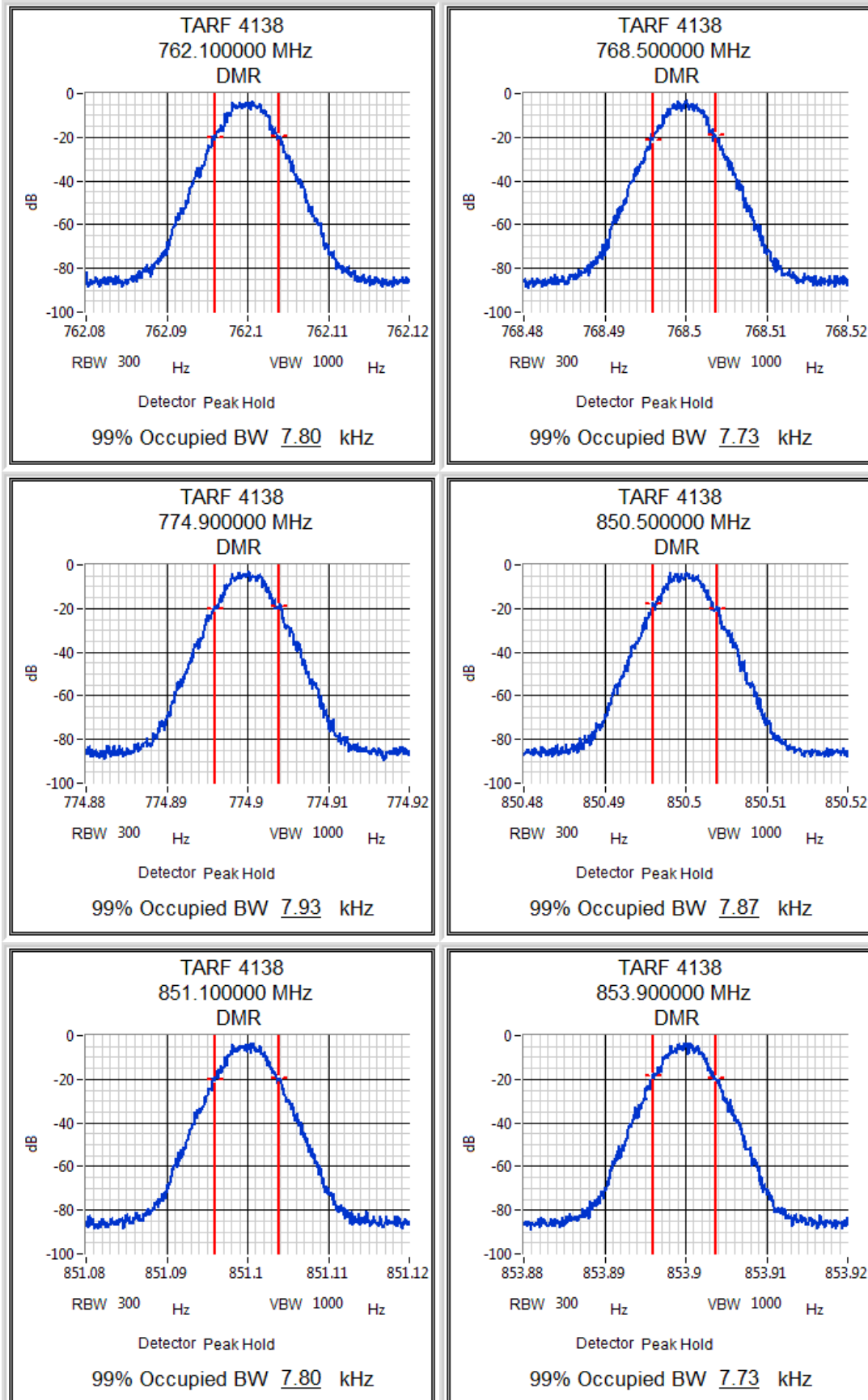
### Transmitter Occupied (99%) Bandwidth

Channel 7-9    50 watts    12.5 kHz ch spacing    FFSK Modulation



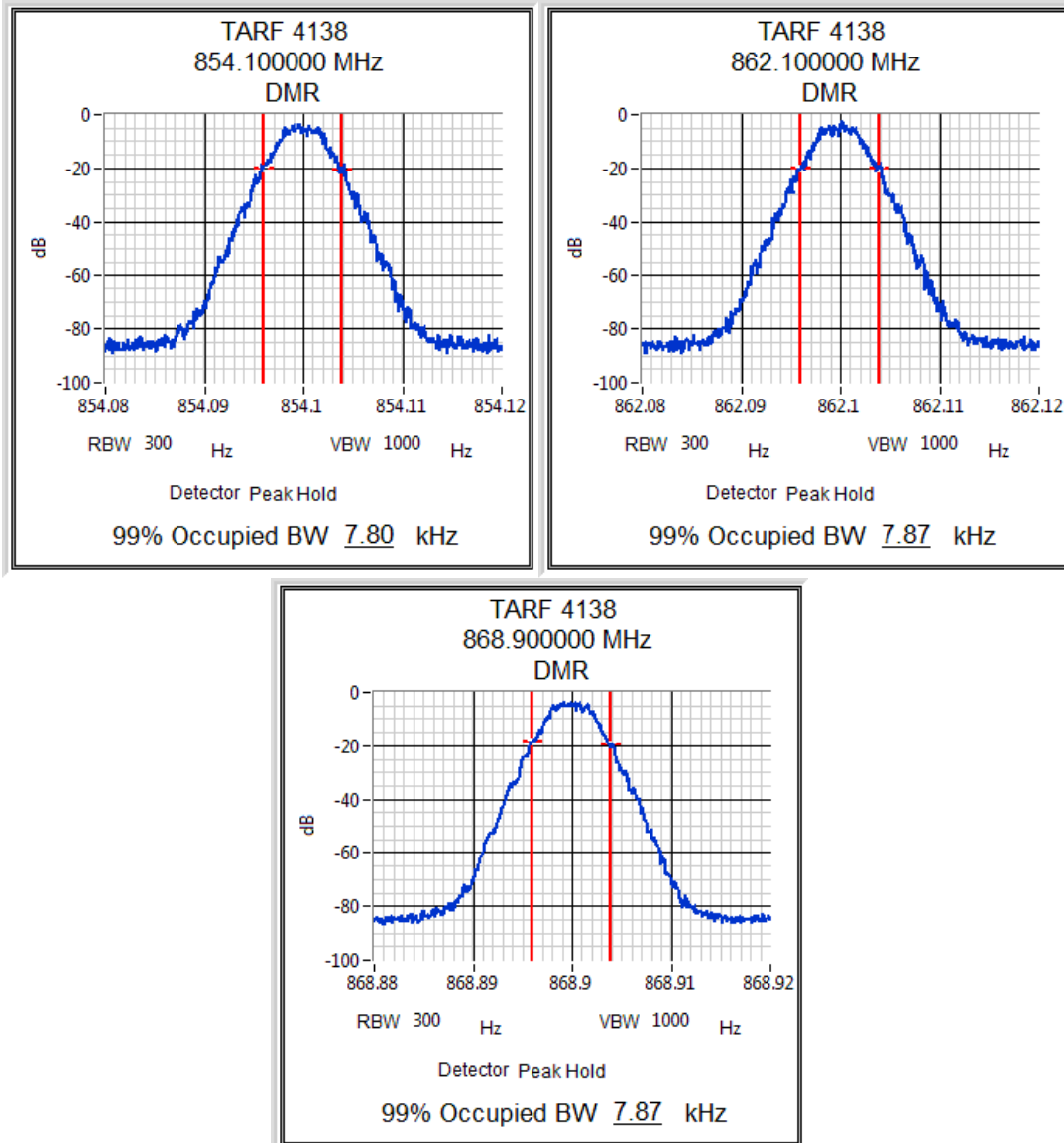
### Transmitter Occupied (99%) Bandwidth

Channel 1-6    50 watts    12.5 kHz ch spacing    DMR Modulation



### Transmitter Occupied (99%) Bandwidth

Channel 7-9    50 watts    12.5 kHz ch spacing    DMR Modulation



## TRANSMITTER SPECTRUM MASKS

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

GUIDE: TIA/EIA-603E 2.2.11 (Analogue)  
TIA-102.CAAA-C 2.2.5 (Digital)

### MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment Set up.
2. For Analogue measurements: The EUT was modulated by a 2500 Hz tone at an input level 16 dB above a level that produced 50% deviation. The input level was established at the frequency of maximum response of the audio modulating circuit.  
For Data measurements: The EUT was modulated with an internally generated pseudo random bit sequence at the appropriate Baud rates.
3. The Occupied Bandwidth was measured on the Spectrum Analyser, with bandwidth settings as noted on the recorded plots.

### MEASUREMENT RESULTS:

See the plots on the following pages for 12.5 kHz and 25.0 kHz channel spacings.

MEASUREMENT UNCERTAINTY 95%  $\pm 0.65$ dB

LIMIT CLAUSE: FCC 47 CFR 90.210 RSS-119 5.5

### EMISSION MASKS

Emission Mask B	12.5 & 25 kHz Channel Spacing	Analogue
Emission Mask D	12.5 kHz Channel Spacing	Analogue, FFSK, Digital Voice/Data
Emission Mask G	12.5 kHz Channel Spacing	FFSK, Digital Voice/Data
Emission Mask H	12.5 kHz Channel Spacing	FFSK, Digital Voice/Data

### DATA SPEED

FFSK	12.5 kHz Channel Spacing	1200 bps
Digital Voice/Data	12.5 kHz Channel Spacing	9600 bps (DMR)

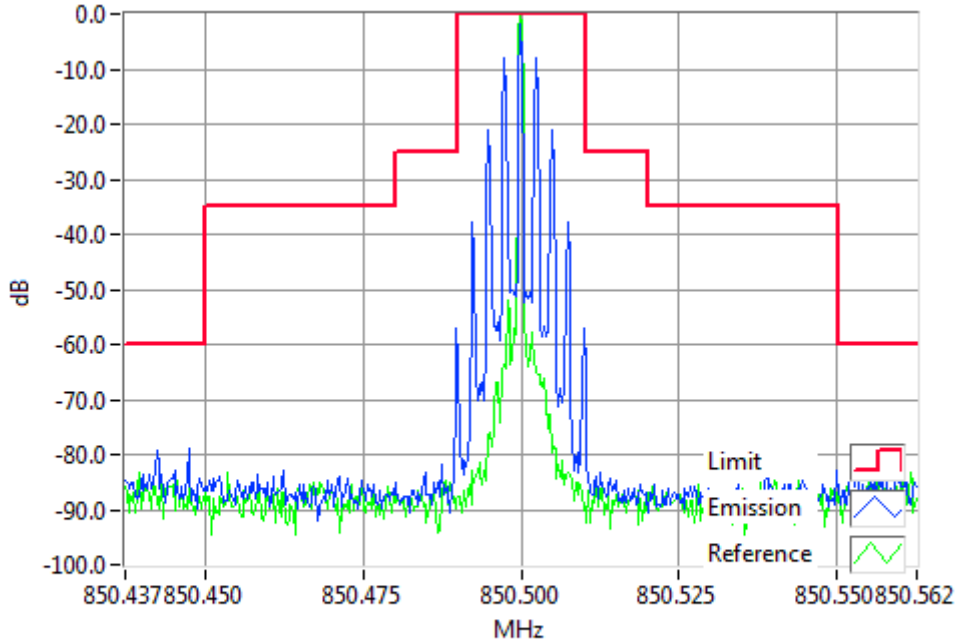
### Transmitter Spectrum Masks

ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

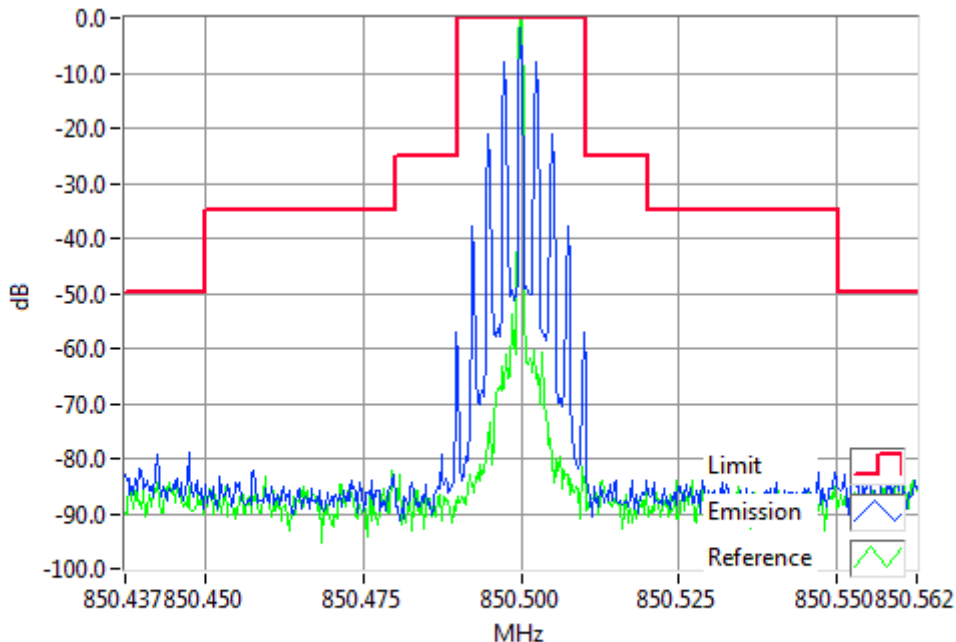
RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 50 W 12.5 kHz Channel Spacing



**Analogue Modulation 850.5000MHz Mask B 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 850.5 MHz 5 W 12.5 kHz Channel Spacing



**Analogue Modulation 850.5000MHz Mask B 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**



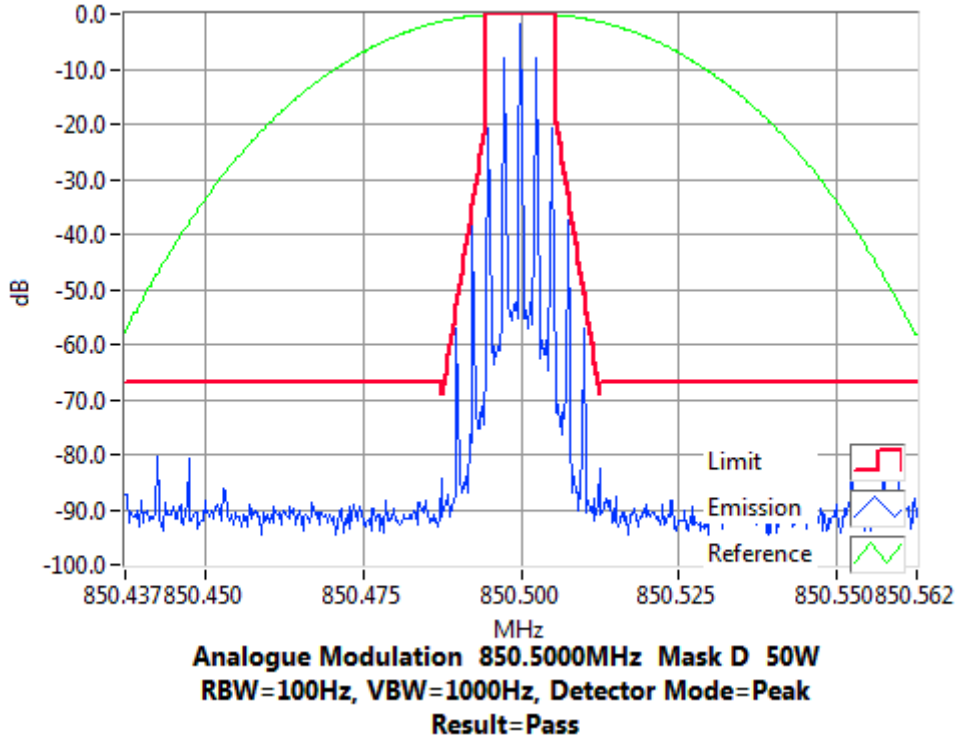
### Transmitter Spectrum Masks

ANALOGUE VOICE

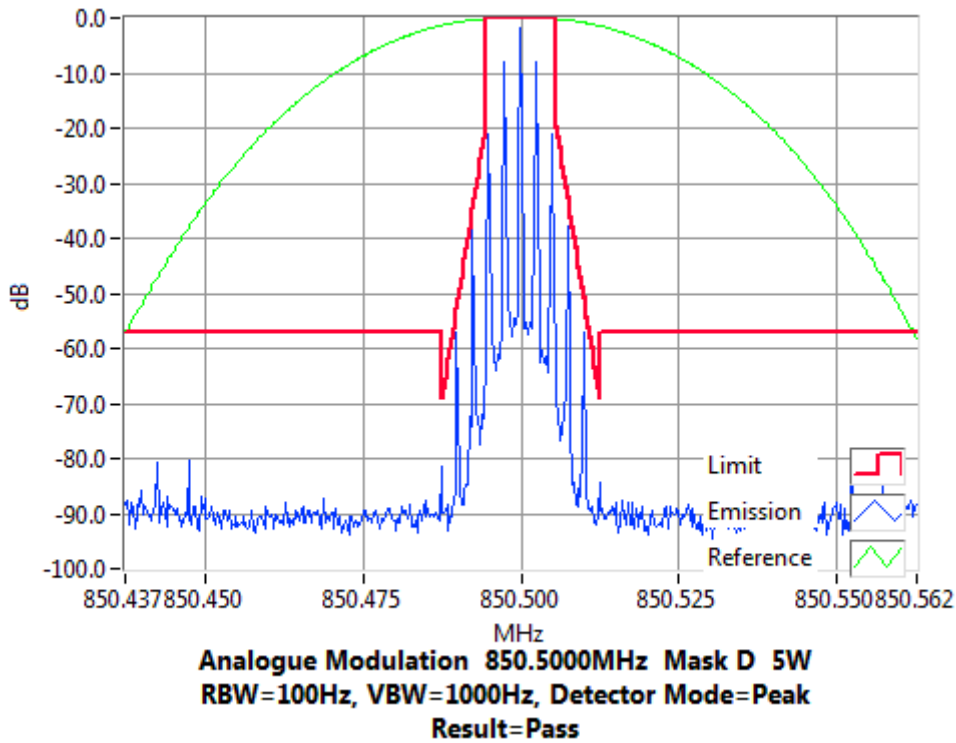
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 850.5 MHz 5 W 12.5 kHz Channel Spacing



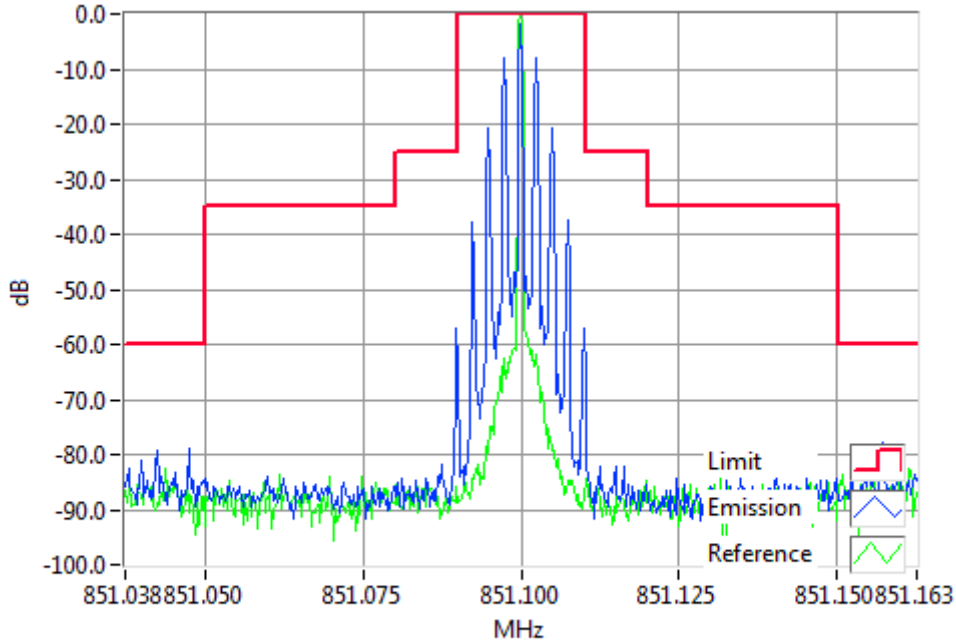
### Transmitter Spectrum Masks

ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

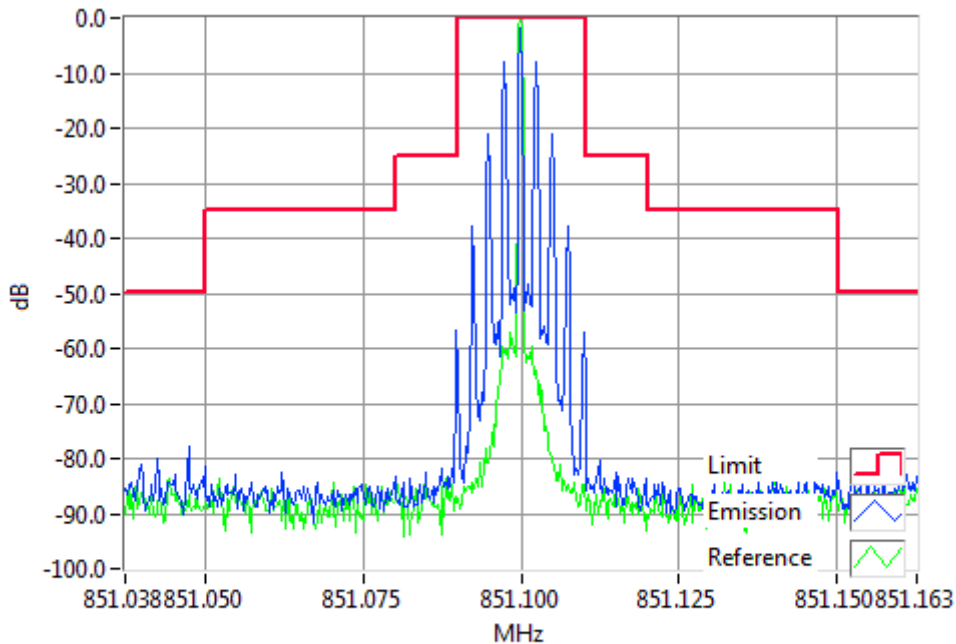
RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 50 W 12.5 kHz Channel Spacing



**Analogue Modulation 851.1000MHz Mask B 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 851.1 MHz 5 W 12.5 kHz Channel Spacing



**Analogue Modulation 851.1000MHz Mask B 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

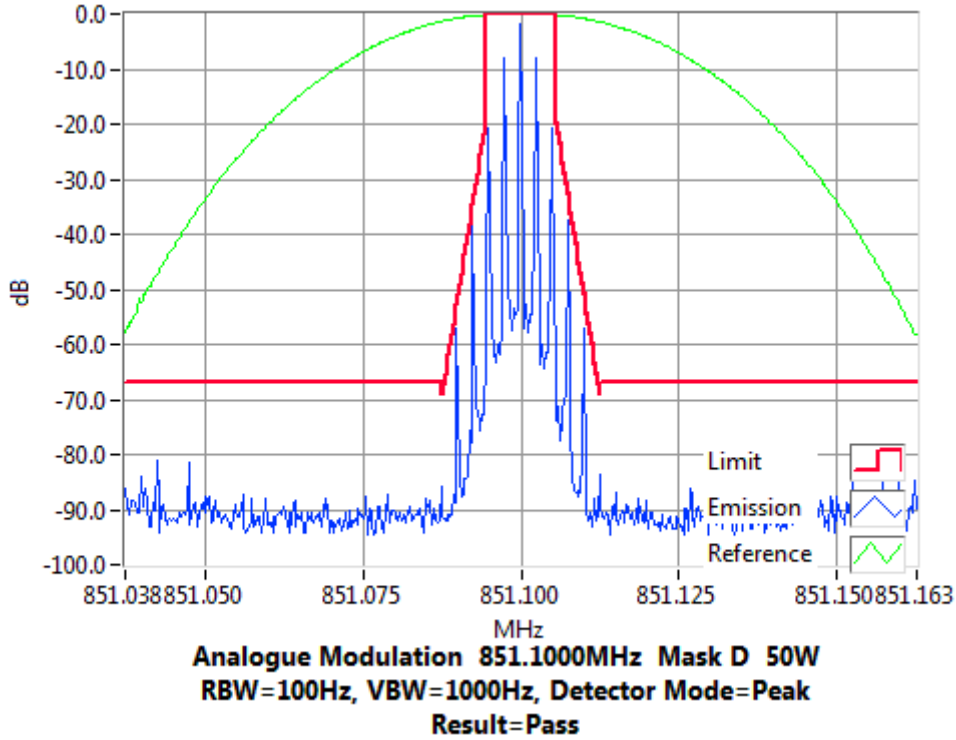
### Transmitter Spectrum Masks

ANALOGUE VOICE

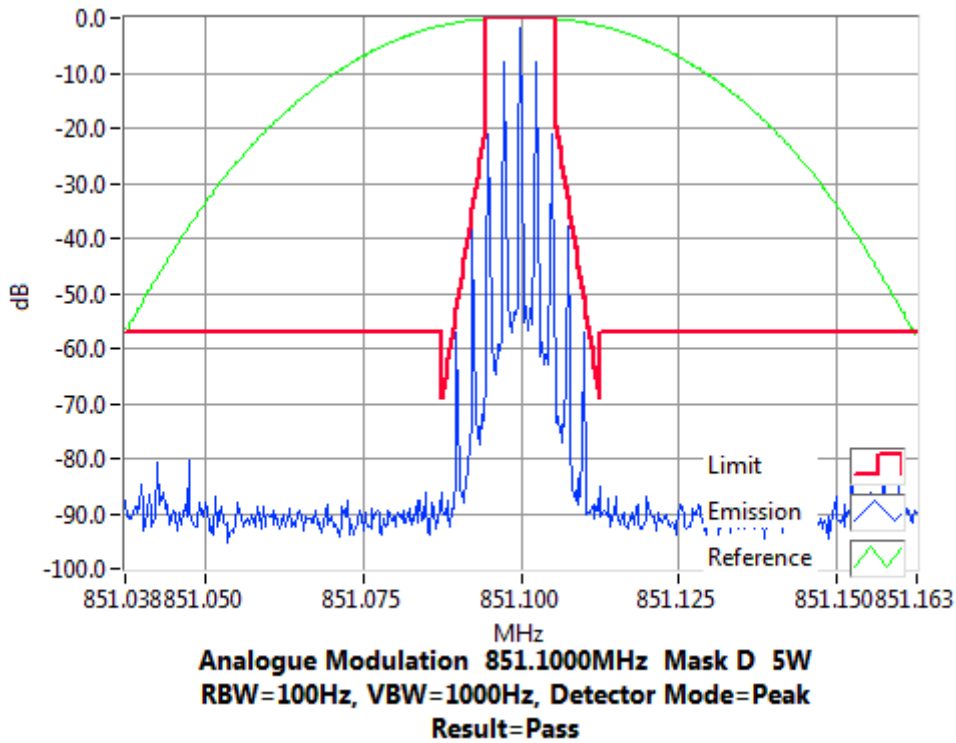
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 851.1 MHz 5 W 12.5 kHz Channel Spacing



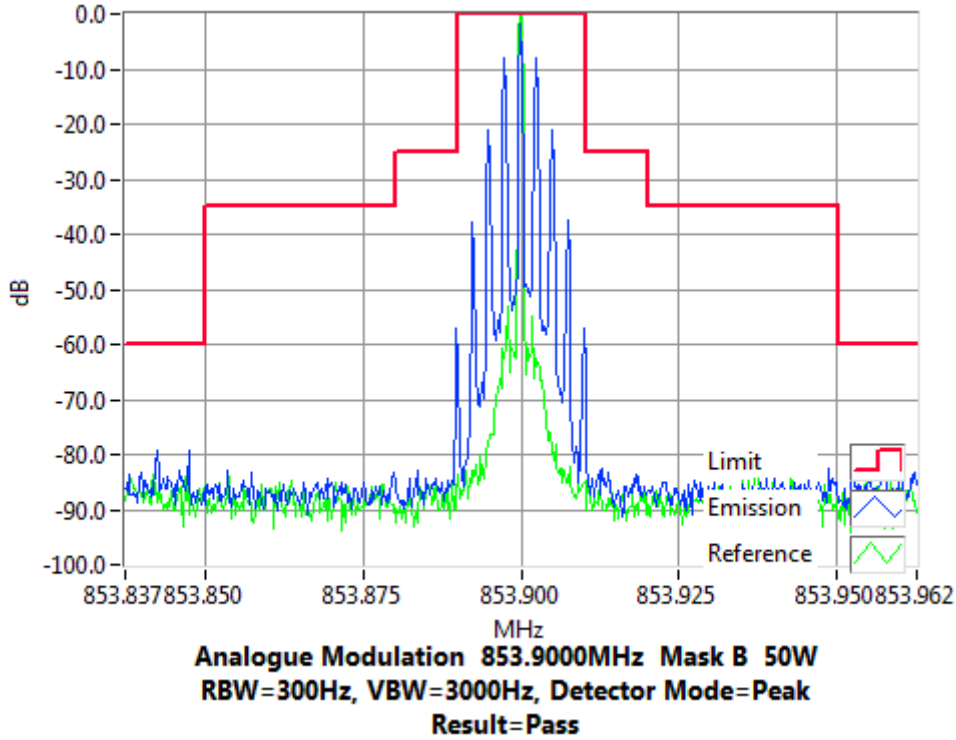
### Transmitter Spectrum Masks

ANALOGUE VOICE

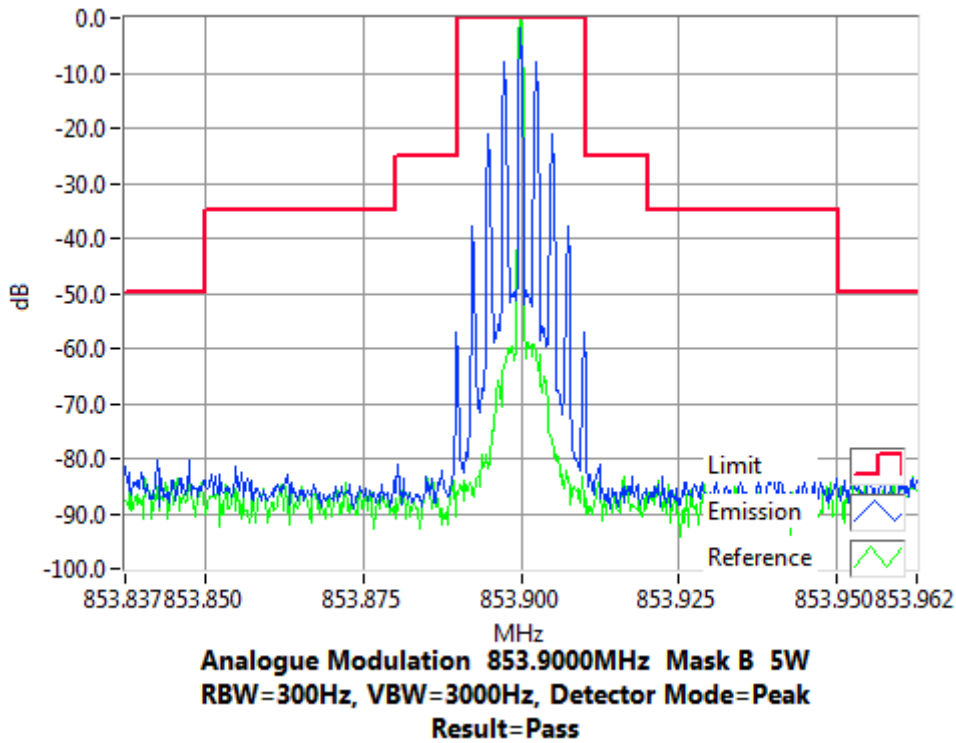
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 853.9 MHz 5 W 12.5 kHz Channel Spacing



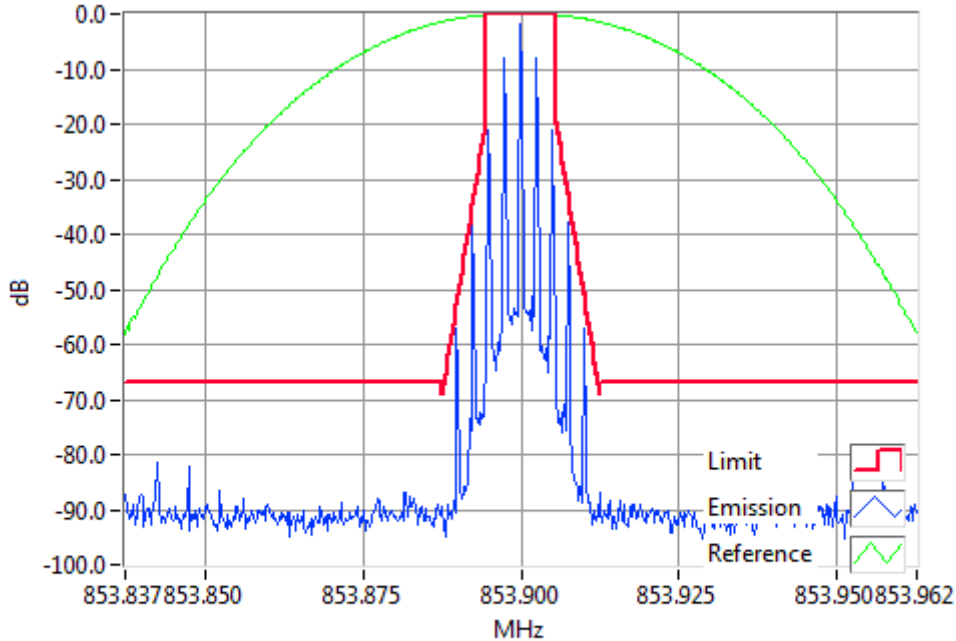
### Transmitter Spectrum Masks

ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

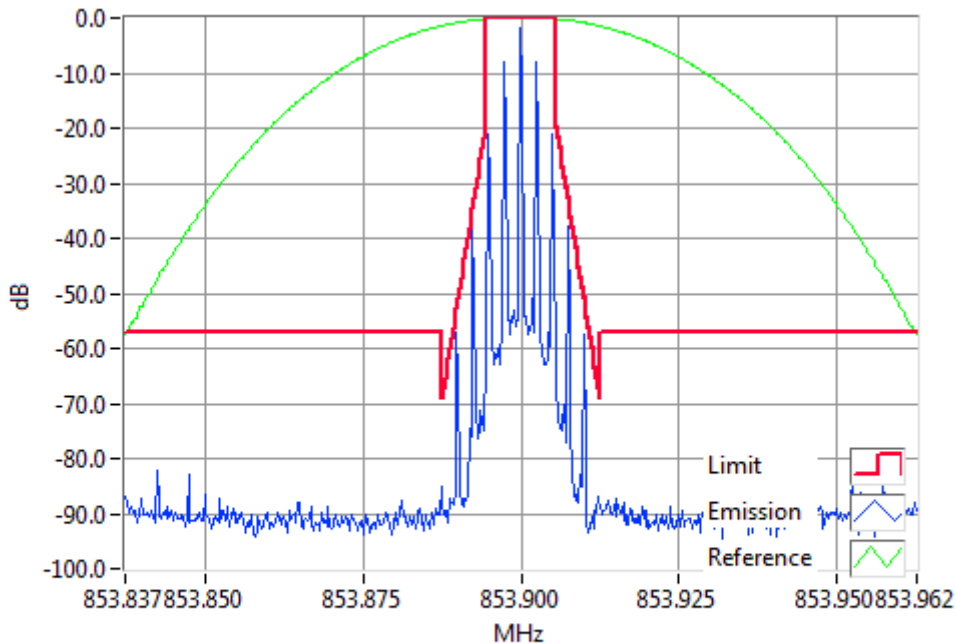
RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 50 W 12.5 kHz Channel Spacing



**Analogue Modulation 853.9000MHz Mask D 50W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 853.9 MHz 5 W 12.5 kHz Channel Spacing



**Analogue Modulation 853.9000MHz Mask D 5W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

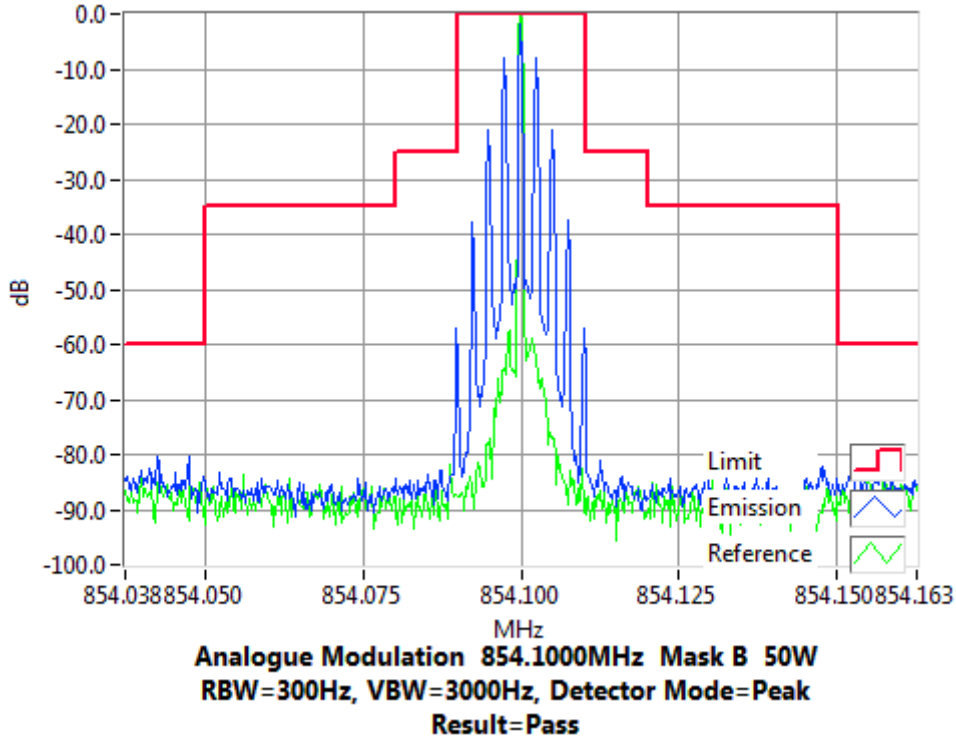
### Transmitter Spectrum Masks

ANALOGUE VOICE

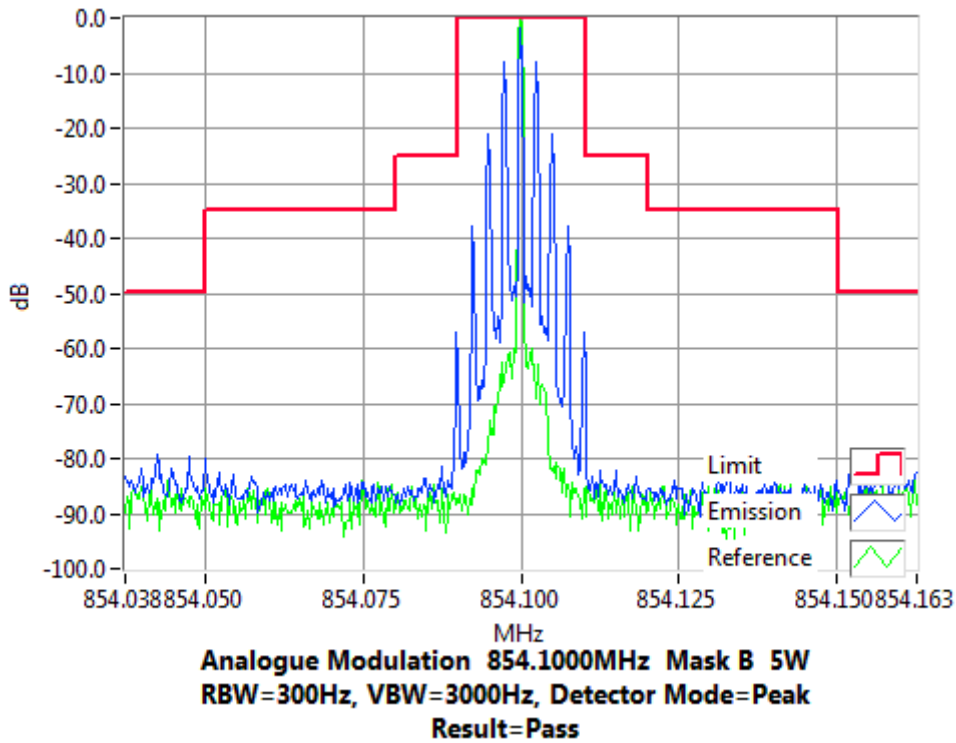
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 854.1 MHz 5 W 12.5 kHz Channel Spacing



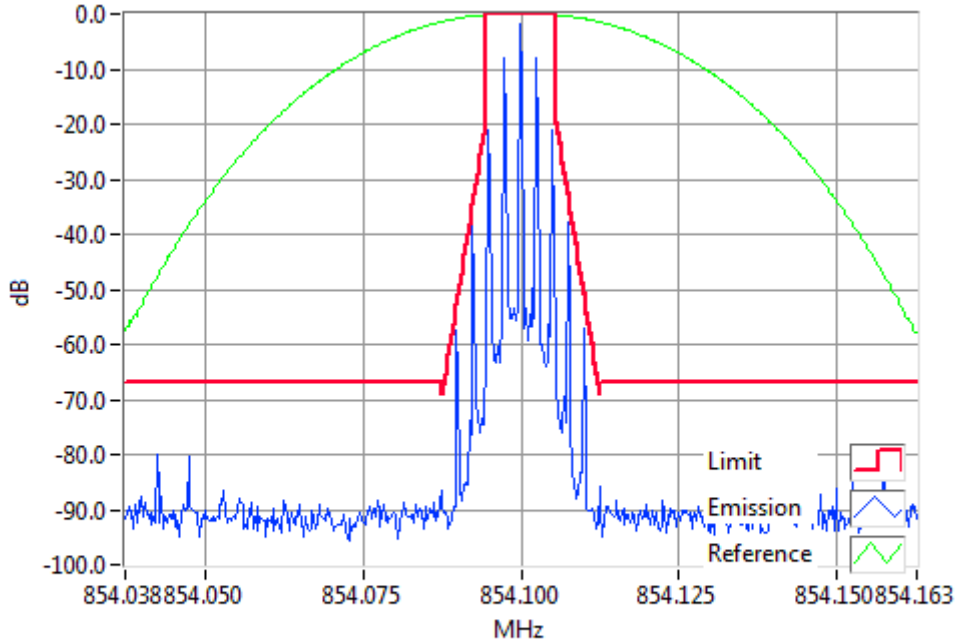
### Transmitter Spectrum Masks

ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

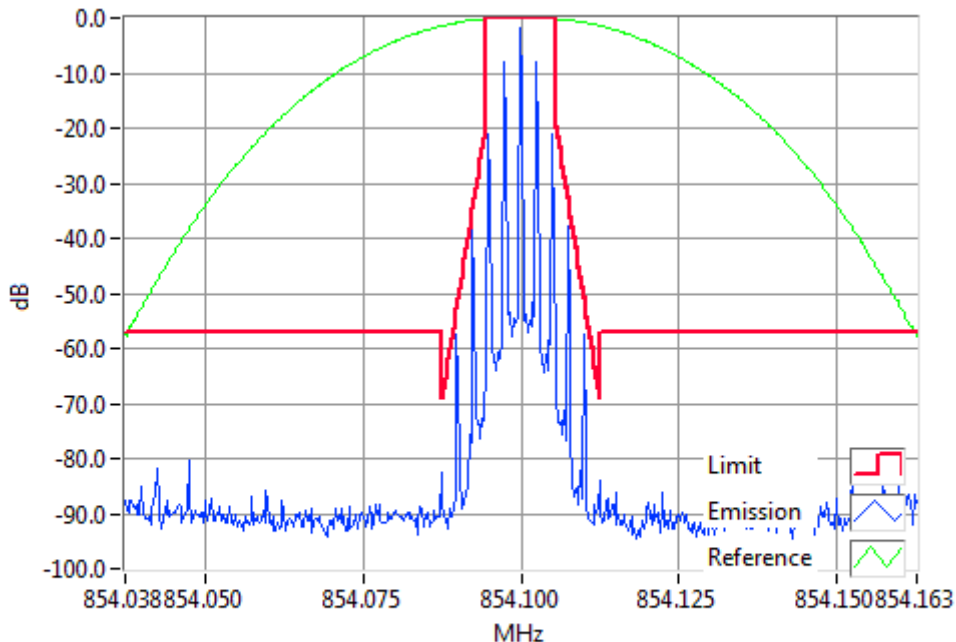
RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 50 W 12.5 kHz Channel Spacing



**Analogue Modulation 854.1000MHz Mask D 50W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 854.1 MHz 5 W 12.5 kHz Channel Spacing



**Analogue Modulation 854.1000MHz Mask D 5W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

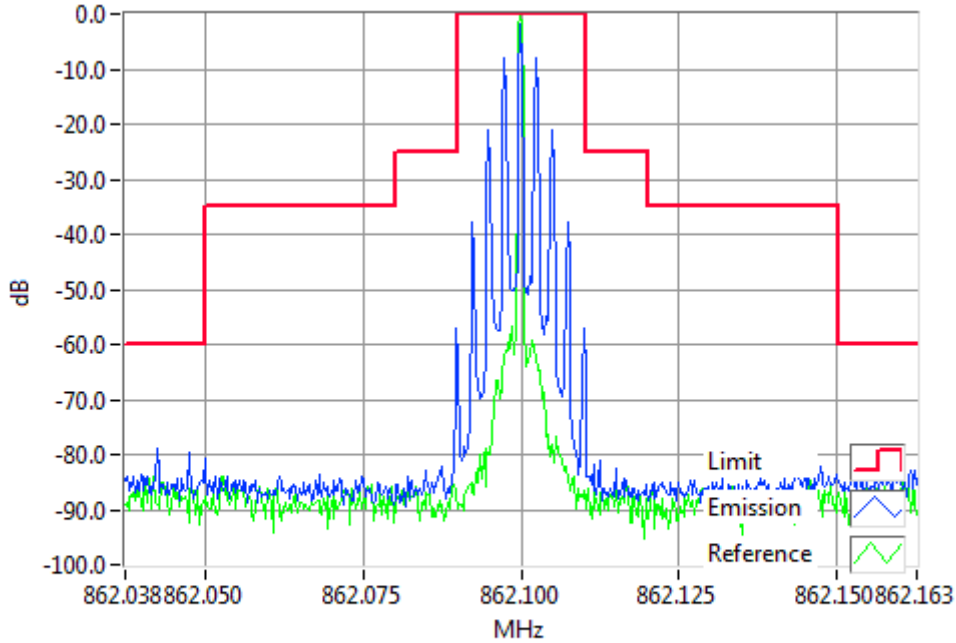
### Transmitter Spectrum Masks

ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

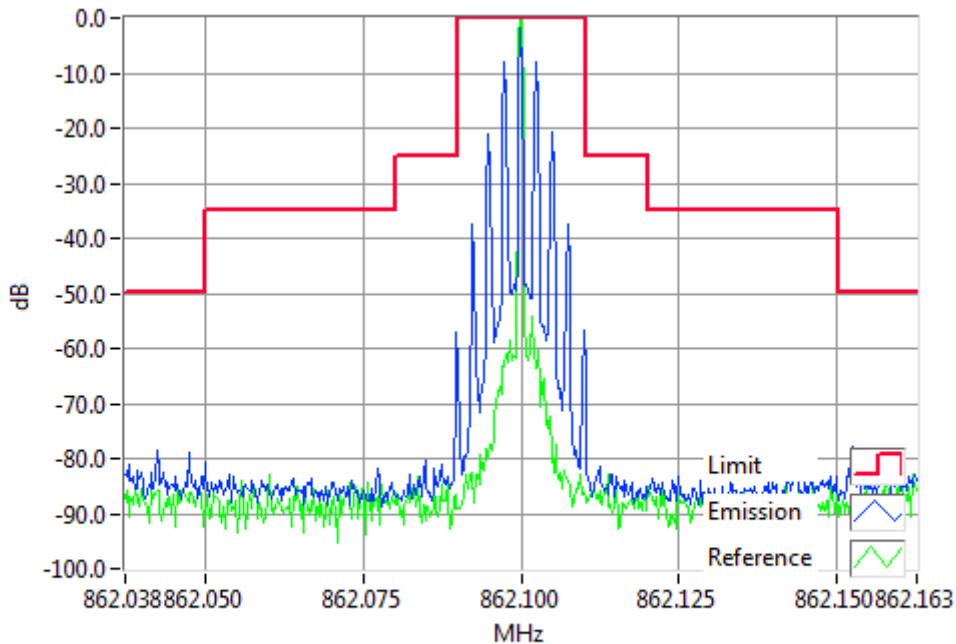
RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 50 W 12.5 kHz Channel Spacing



**Analogue Modulation 862.1000MHz Mask B 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 862.1 MHz 5 W 12.5 kHz Channel Spacing



**Analogue Modulation 862.1000MHz Mask B 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**



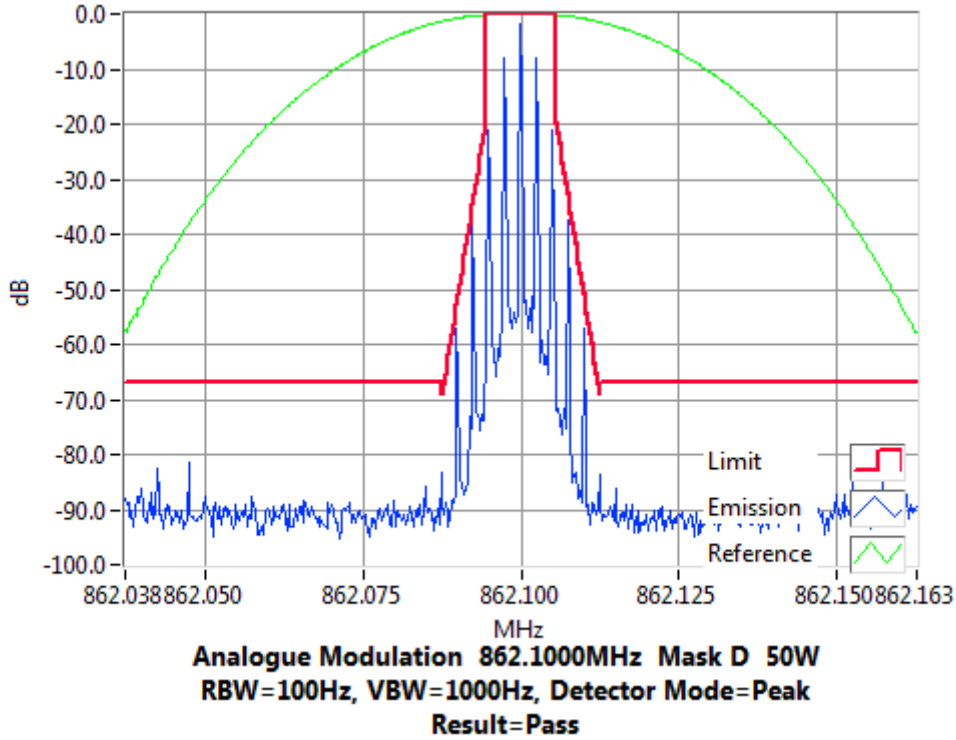
### Transmitter Spectrum Masks

ANALOGUE VOICE

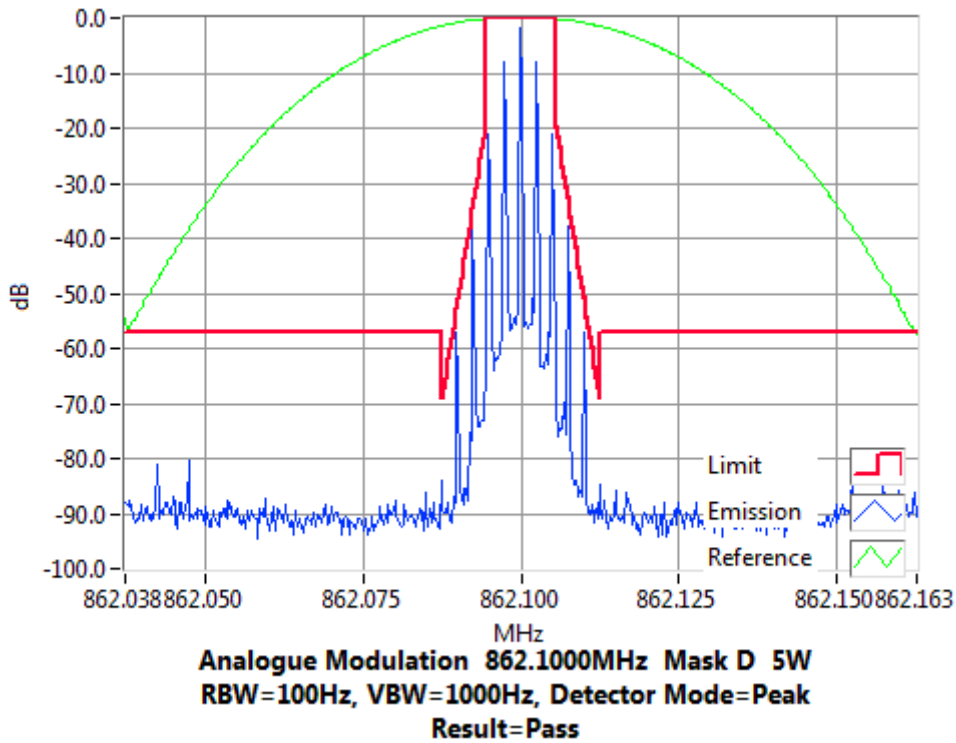
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 862.1 MHz 5 W 12.5 kHz Channel Spacing



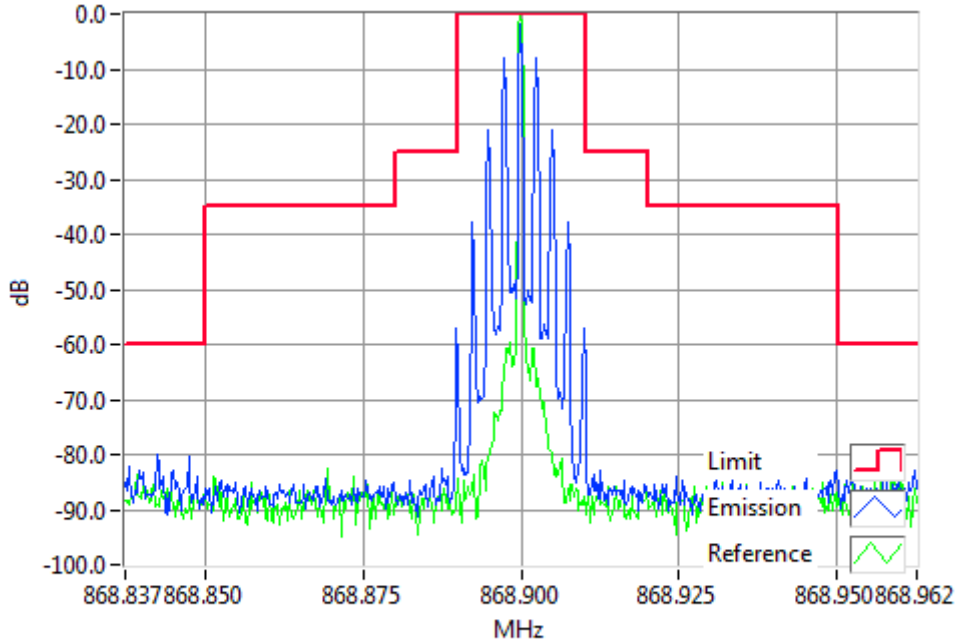
### Transmitter Spectrum Masks

ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

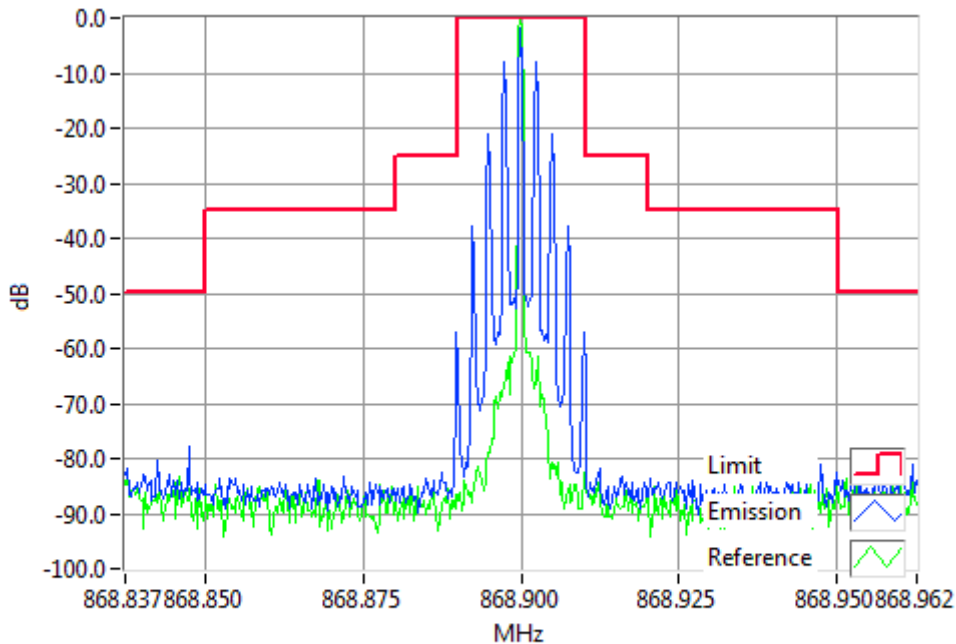
RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 50 W 12.5 kHz Channel Spacing



**Analogue Modulation 868.9000MHz Mask B 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 868.9 MHz 5 W 12.5 kHz Channel Spacing



**Analogue Modulation 868.9000MHz Mask B 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

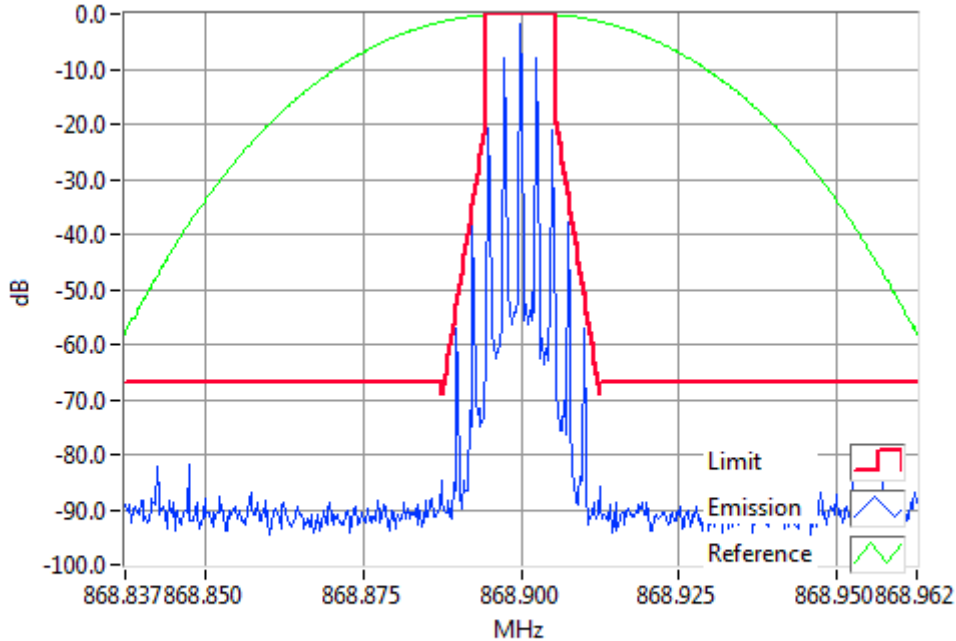
### Transmitter Spectrum Masks

ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

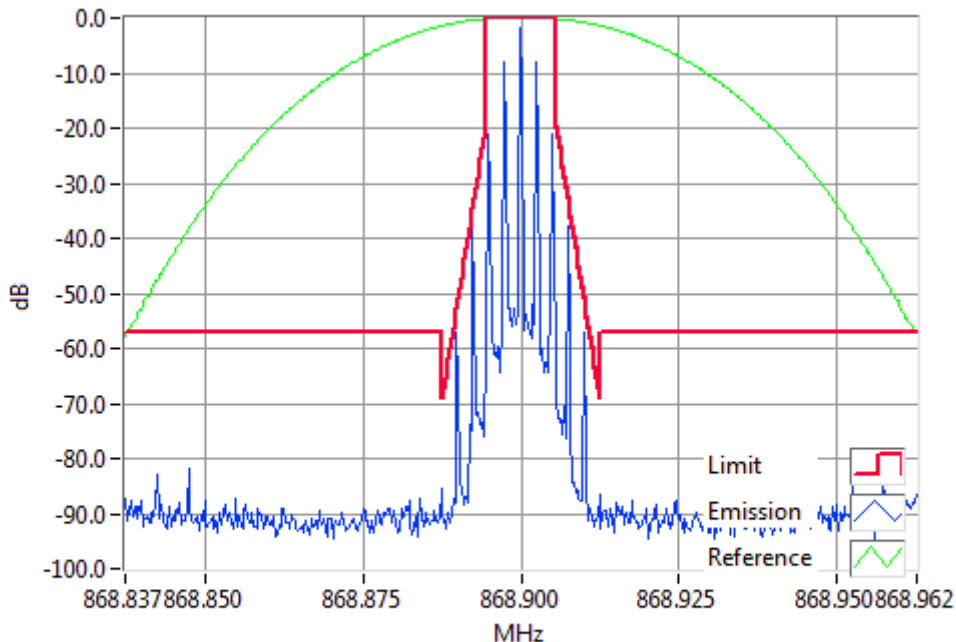
RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 50 W 12.5 kHz Channel Spacing



**Analogue Modulation 868.9000MHz Mask D 50W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 868.9 MHz 5 W 12.5 kHz Channel Spacing



**Analogue Modulation 868.9000MHz Mask D 5W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

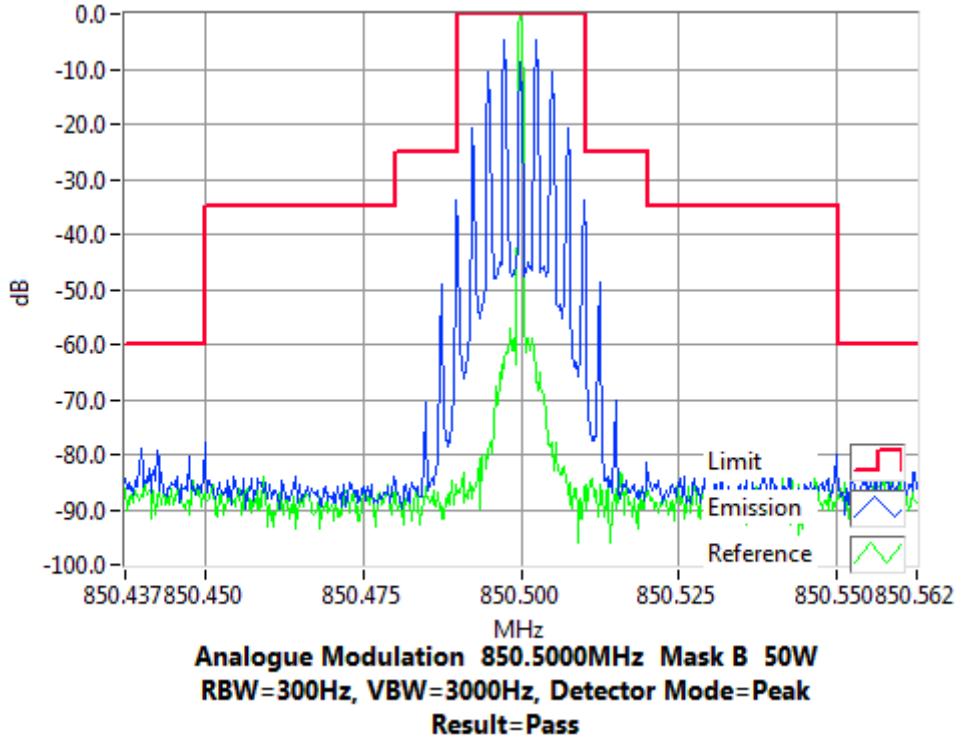
### Transmitter Spectrum Masks

ANALOGUE VOICE

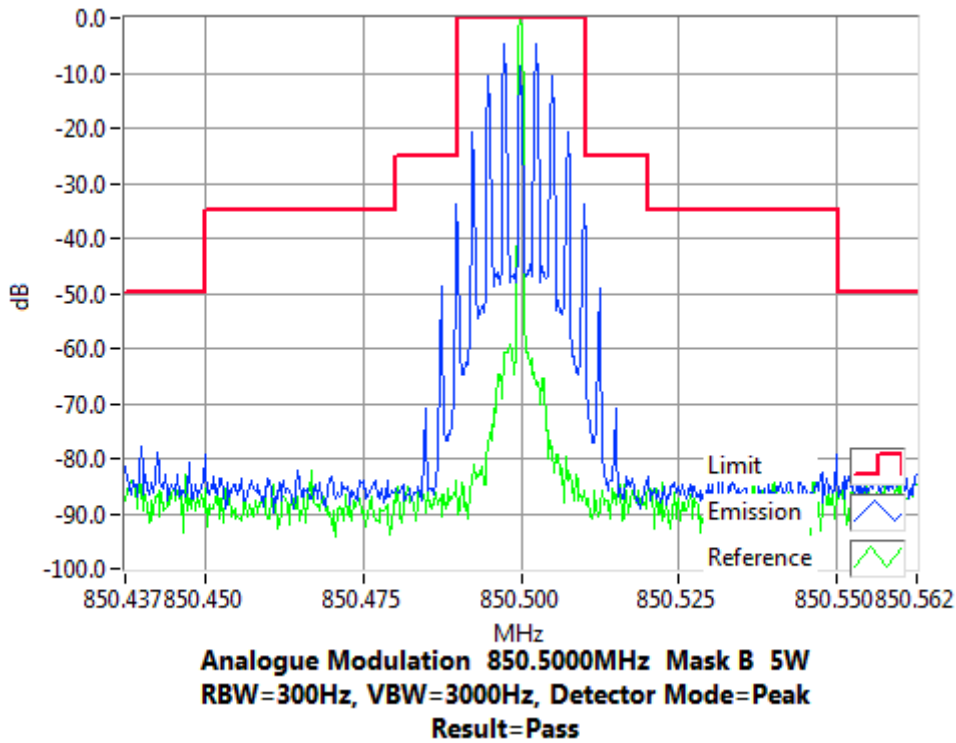
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 50 W 25 kHz Channel Spacing



Tx FREQUENCY: 850.5 MHz 5 W 25 kHz Channel Spacing



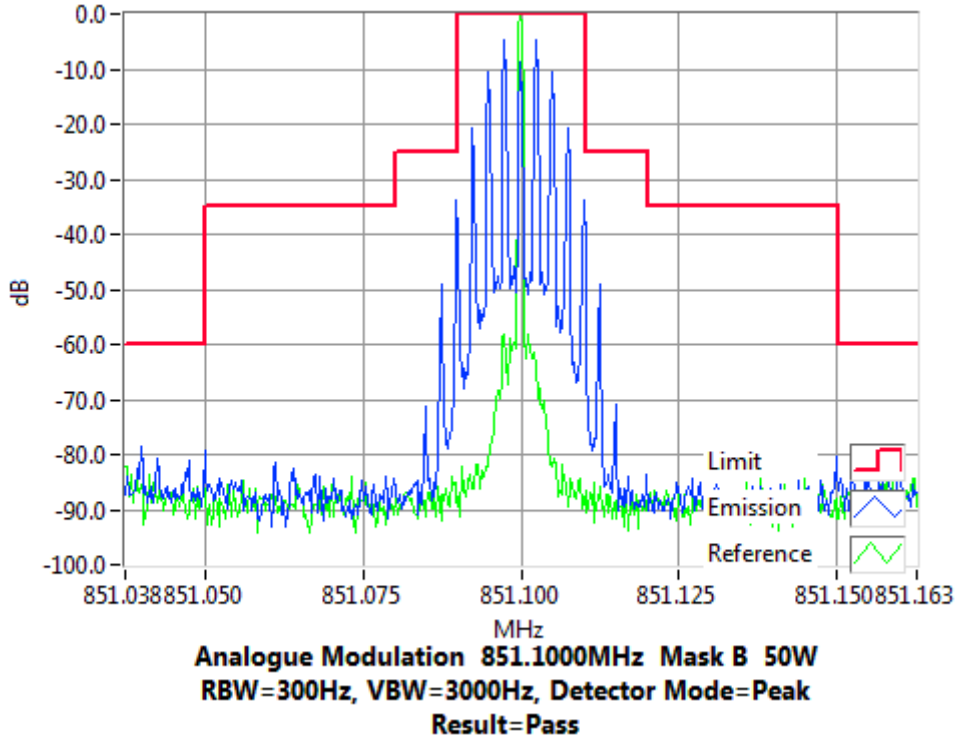
### Transmitter Spectrum Masks

ANALOGUE VOICE

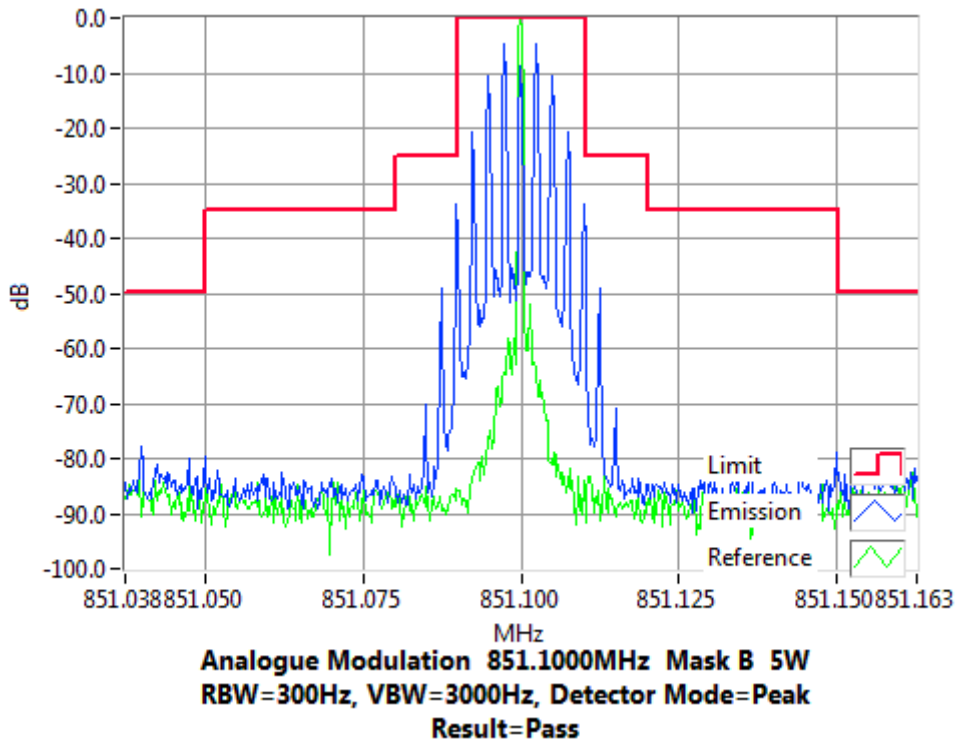
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 50 W 25 kHz Channel Spacing



Tx FREQUENCY: 851.1 MHz 5 W 25 kHz Channel Spacing



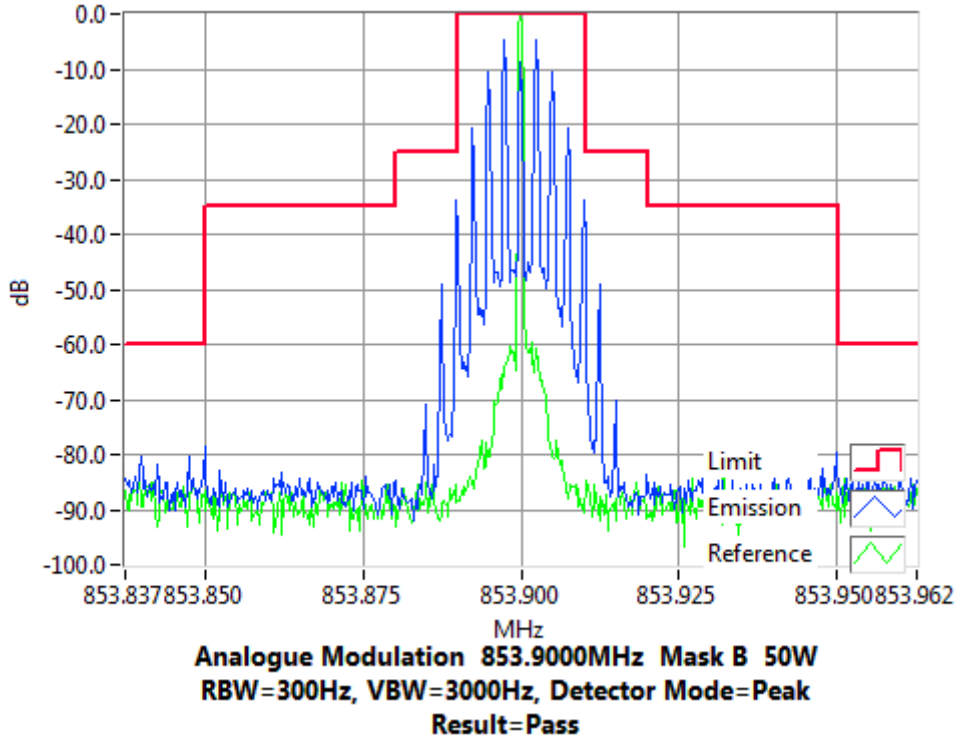
### Transmitter Spectrum Masks

ANALOGUE VOICE

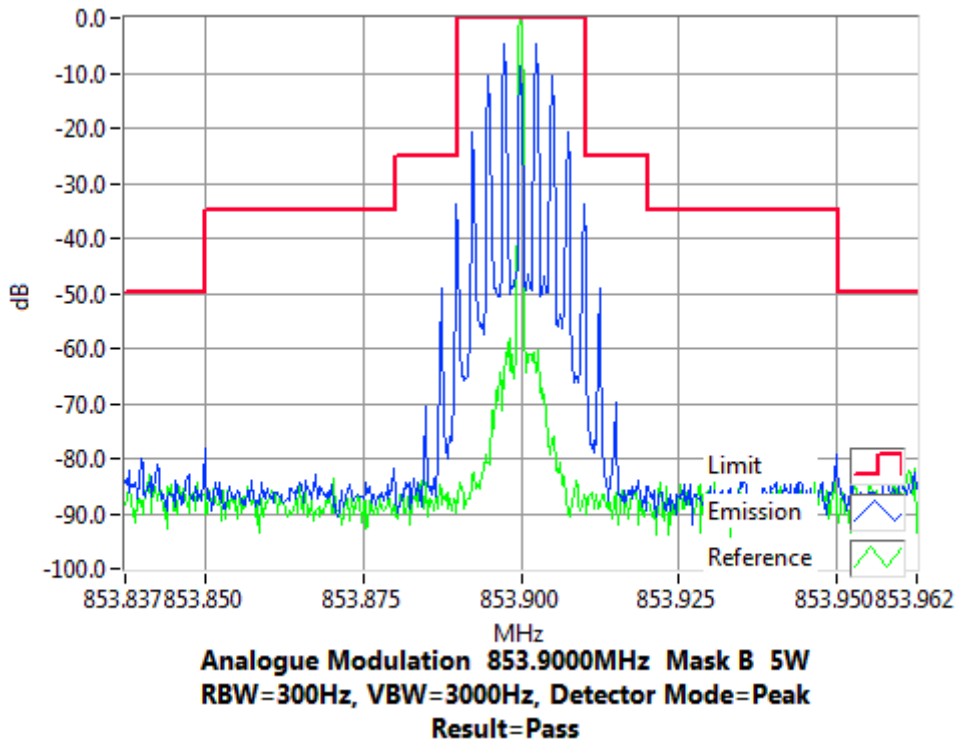
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 50 W 25 kHz Channel Spacing



Tx FREQUENCY: 853.9 MHz 5 W 25 kHz Channel Spacing



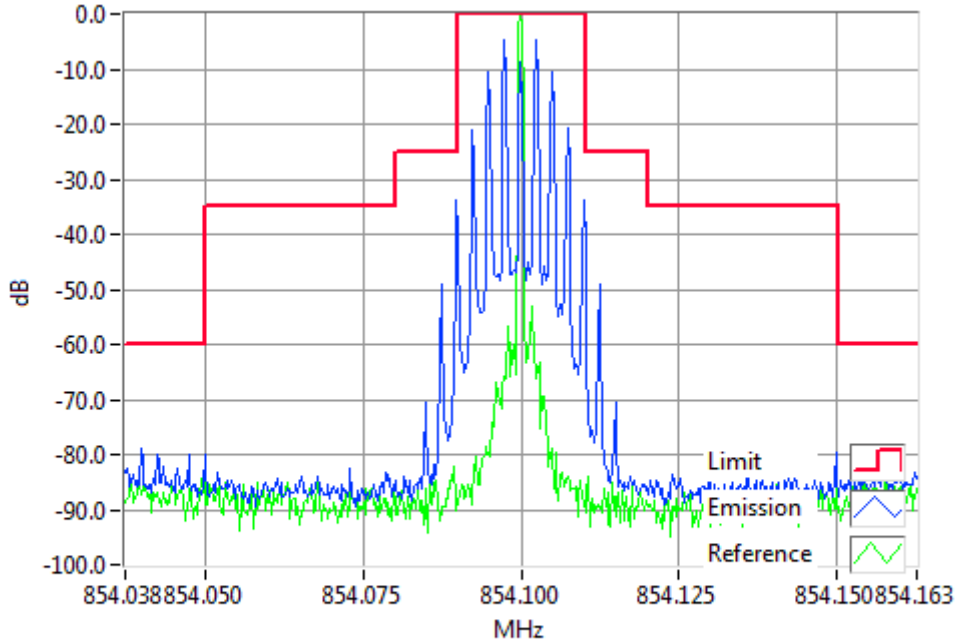
### Transmitter Spectrum Masks

ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

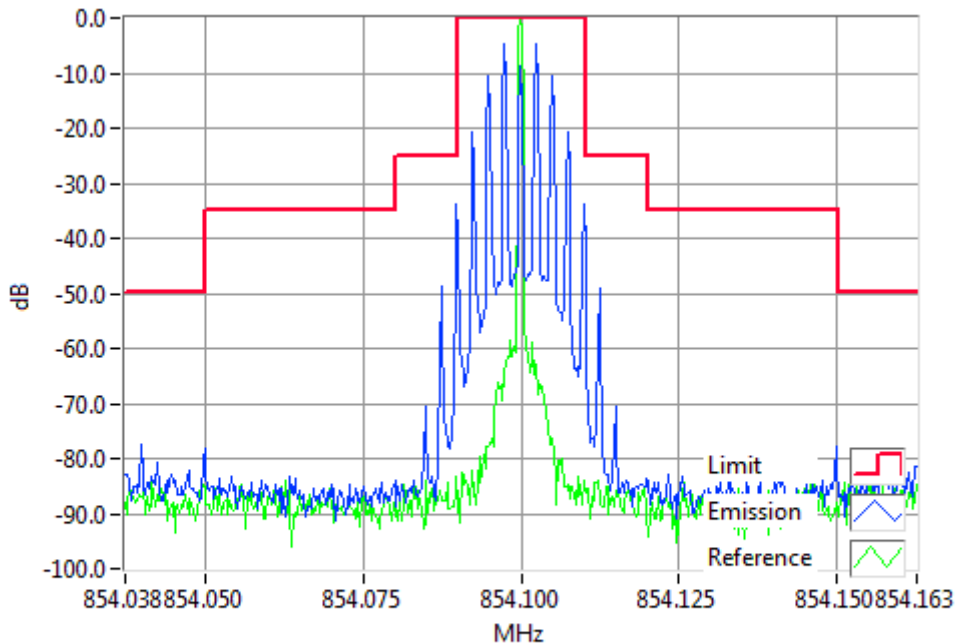
RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 50 W 25 kHz Channel Spacing



**Analogue Modulation 854.1000MHz Mask B 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 854.1 MHz 5 W 25 kHz Channel Spacing



**Analogue Modulation 854.1000MHz Mask B 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

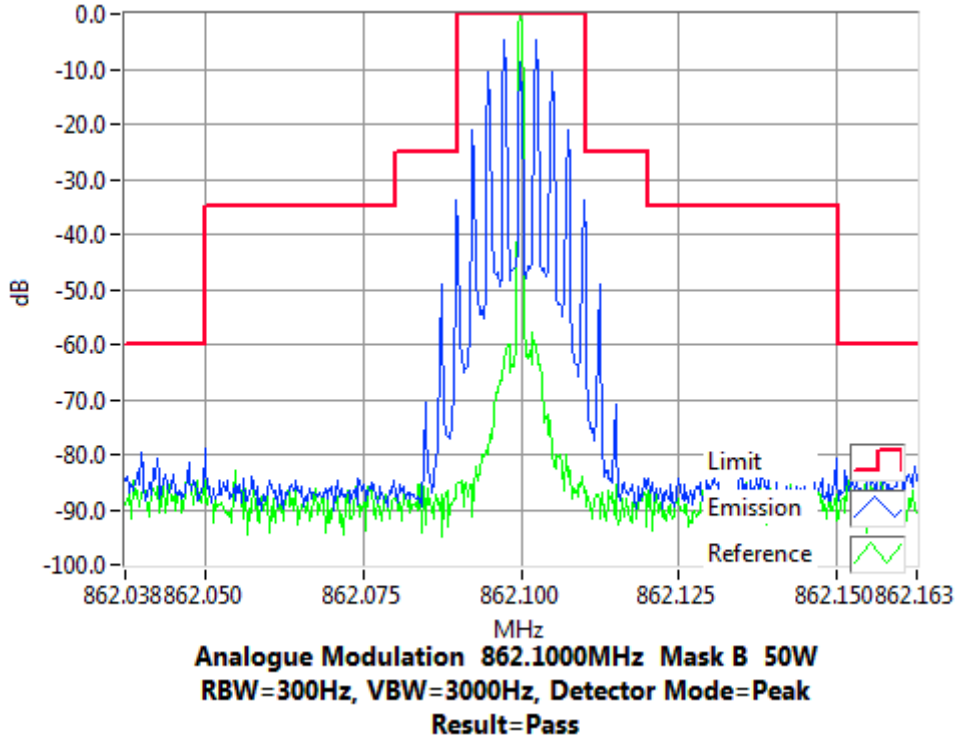
### Transmitter Spectrum Masks

ANALOGUE VOICE

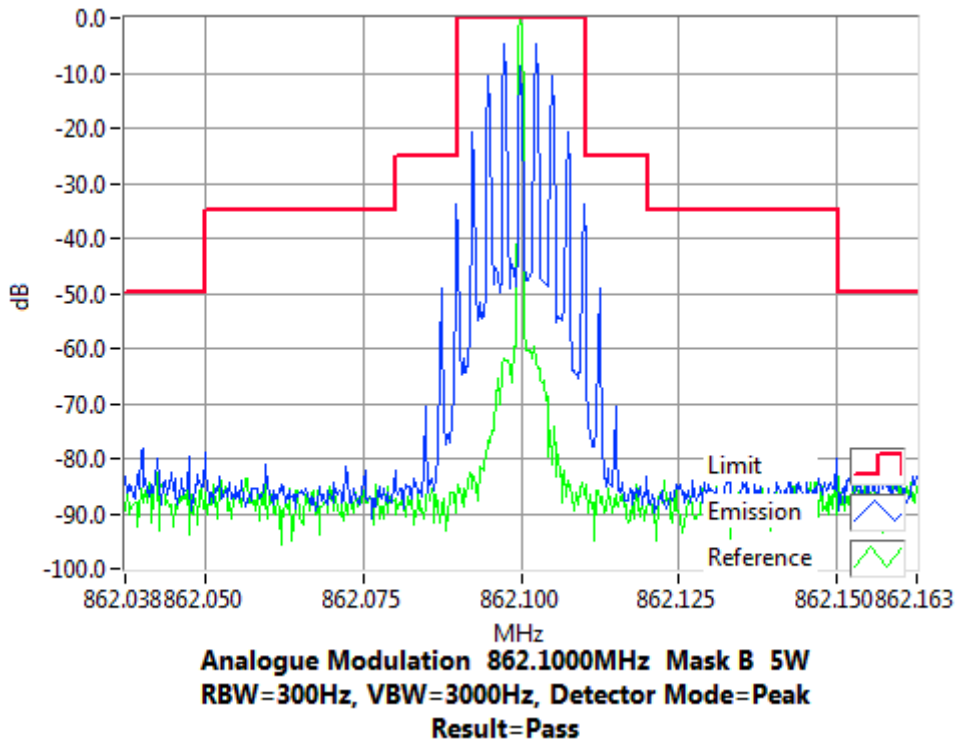
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 50 W 25 kHz Channel Spacing



Tx FREQUENCY: 862.1 MHz 5 W 25 kHz Channel Spacing





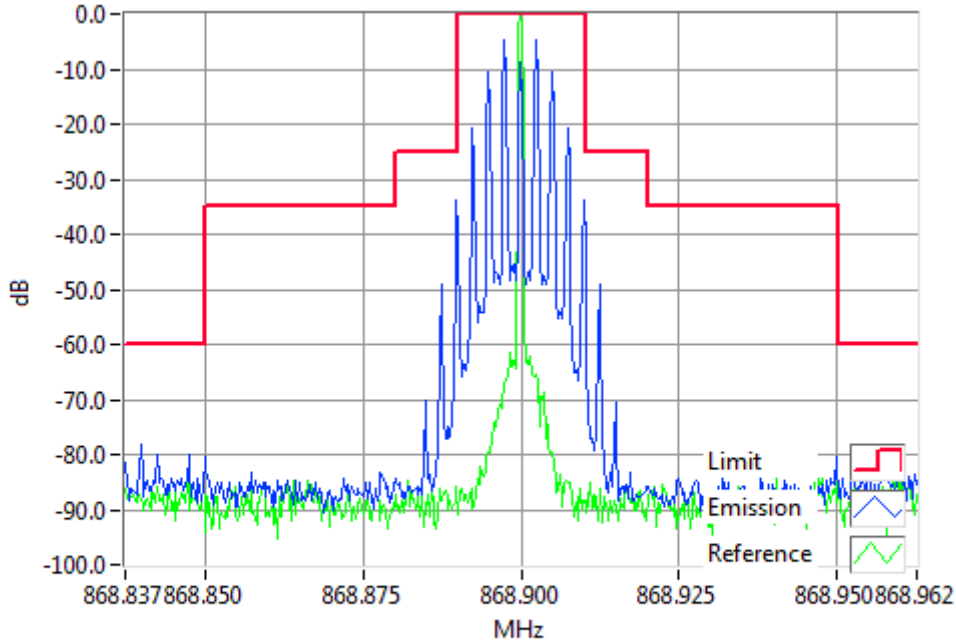
### Transmitter Spectrum Masks

ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

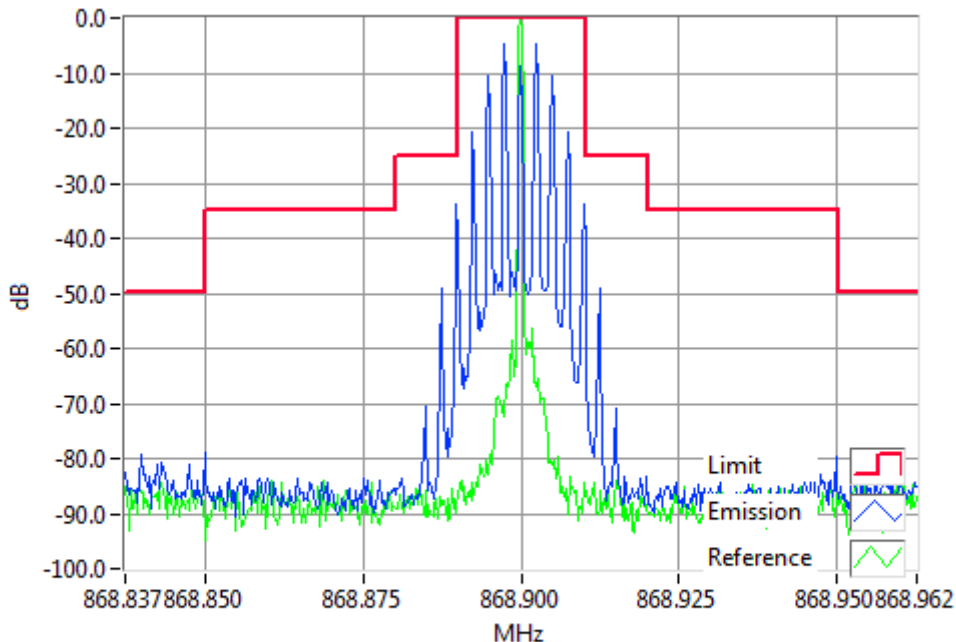
RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 50 W 25 kHz Channel Spacing



**Analogue Modulation 868.9000MHz Mask B 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 868.9 MHz 5 W 25 kHz Channel Spacing



**Analogue Modulation 868.9000MHz Mask B 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

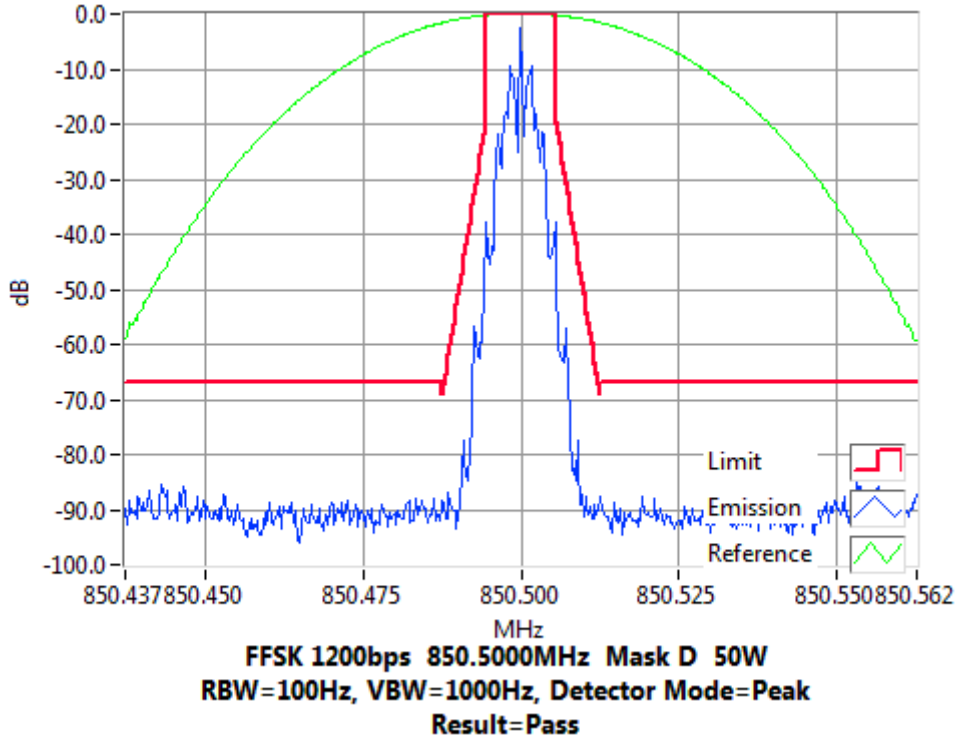
### Transmitter Spectrum Masks

FFSK, 1200 bps

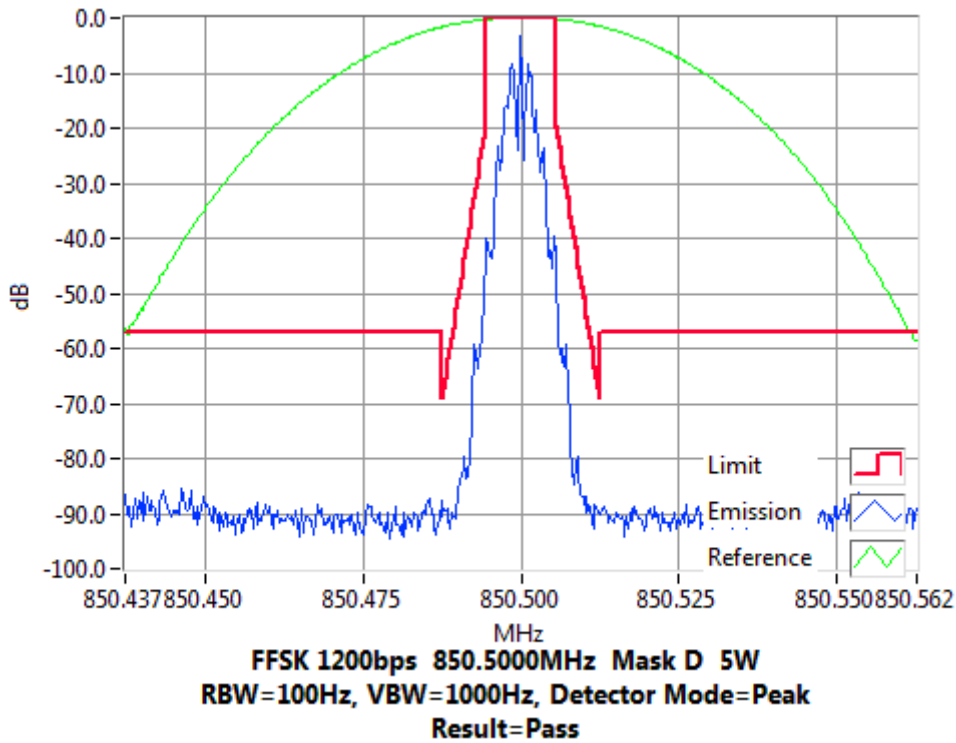
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 850.5 MHz 5 W 12.5 kHz Channel Spacing



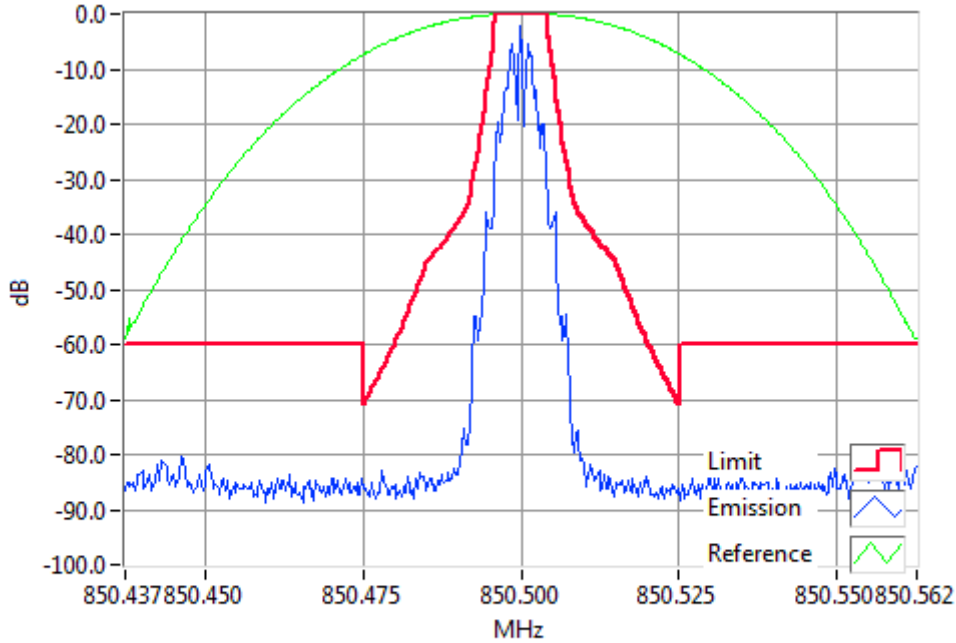
### Transmitter Spectrum Masks

FFSK, 1200 bps

SPECIFICATION: FCC CFR 2.1049 (c)

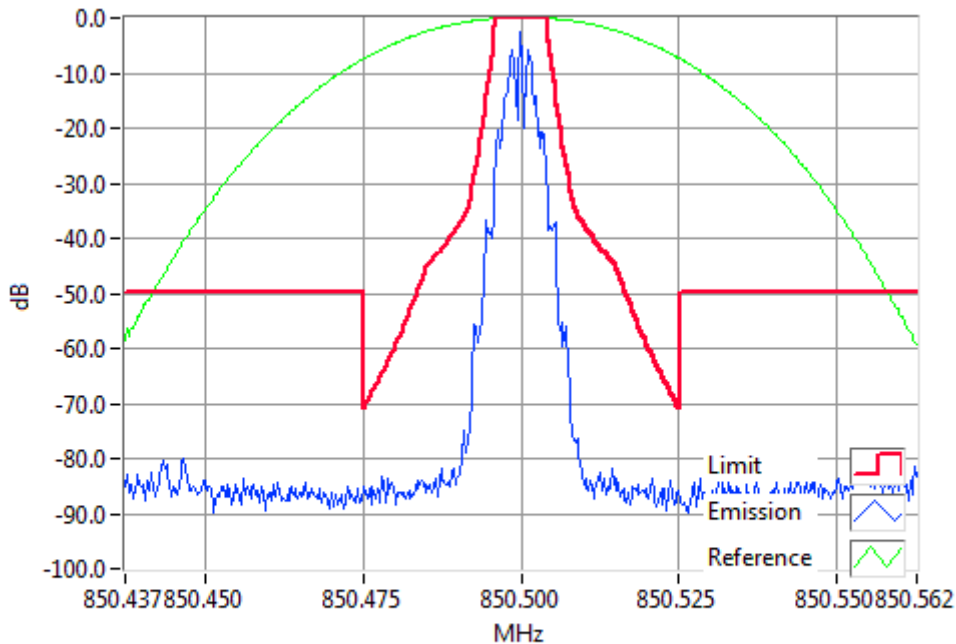
RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 50 W 12.5 kHz Channel Spacing



**FFSK 1200bps 850.5000MHz Mask H 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 850.5 MHz 5 W 12.5 kHz Channel Spacing



**FFSK 1200bps 850.5000MHz Mask H 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

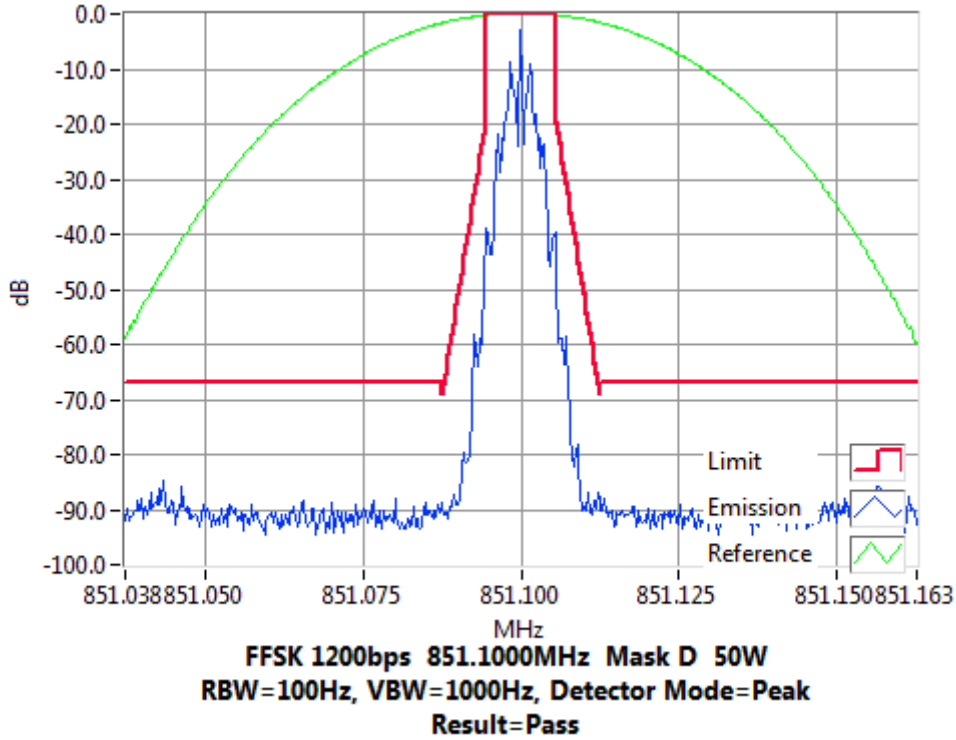
### Transmitter Spectrum Masks

FFSK, 1200 bps

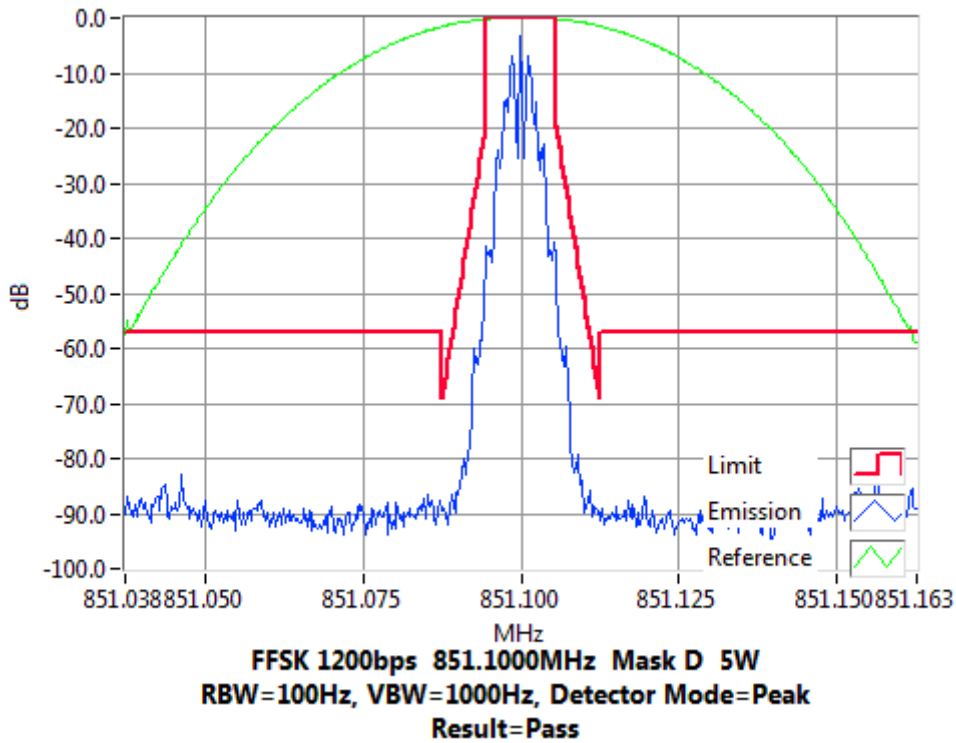
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 851.1 MHz 5 W 12.5 kHz Channel Spacing



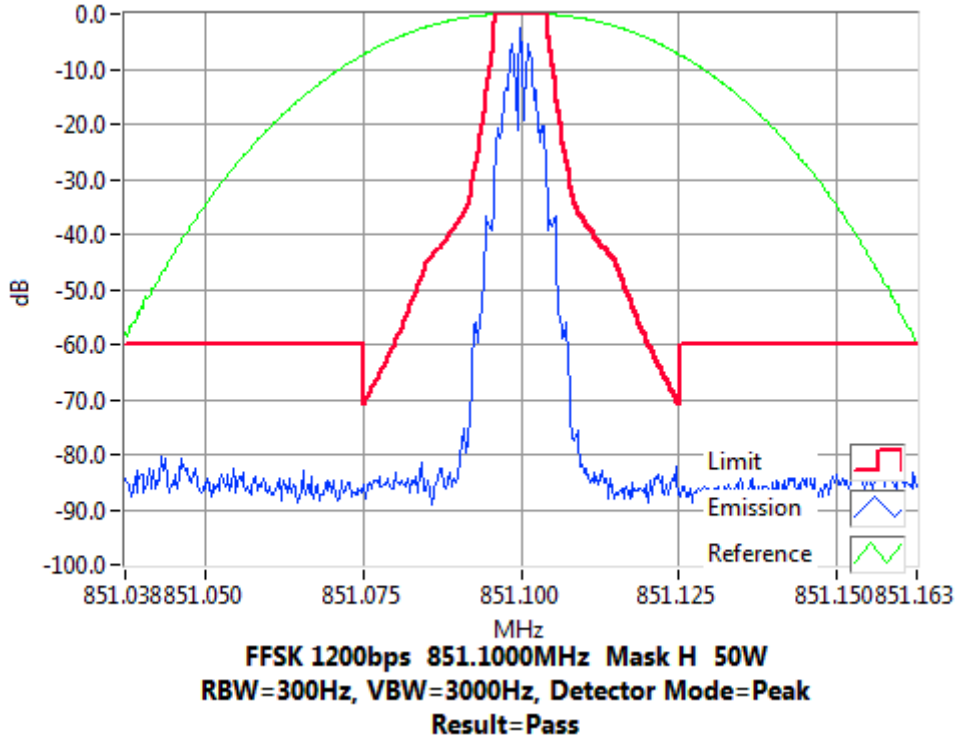
### Transmitter Spectrum Masks

FFSK, 1200 bps

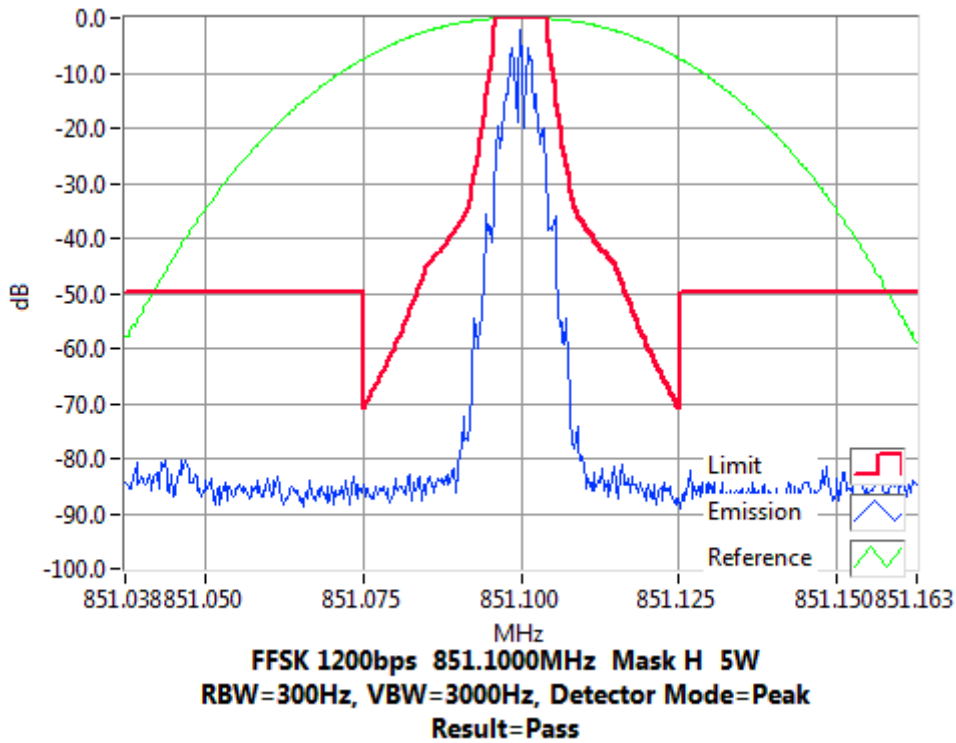
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 851.1 MHz 5 W 12.5 kHz Channel Spacing



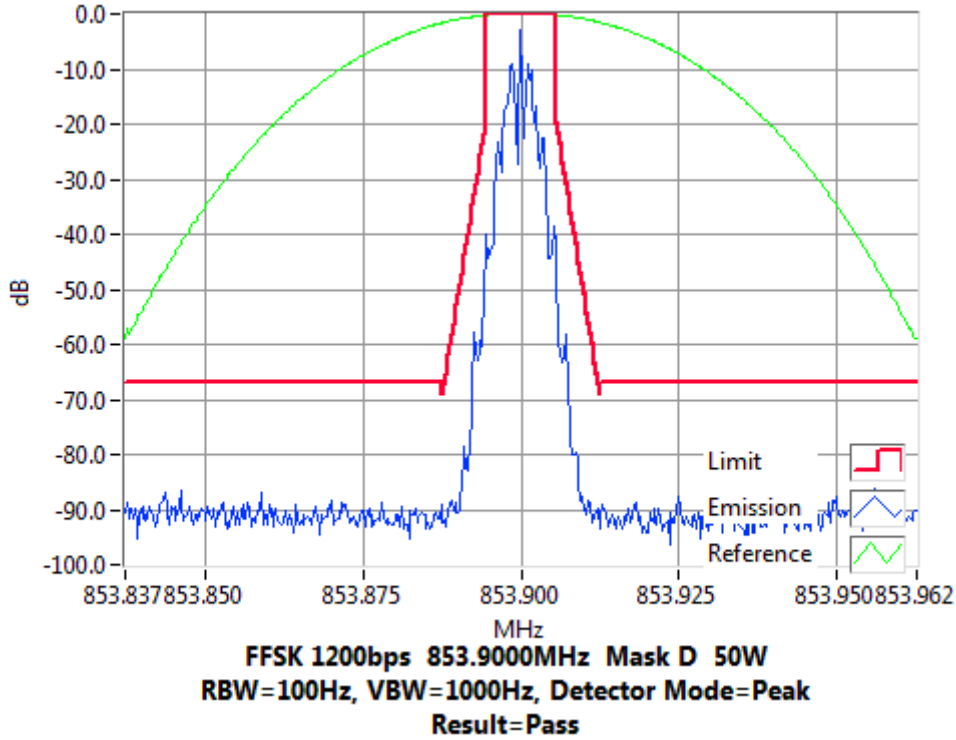
### Transmitter Spectrum Masks

FFSK, 1200 bps

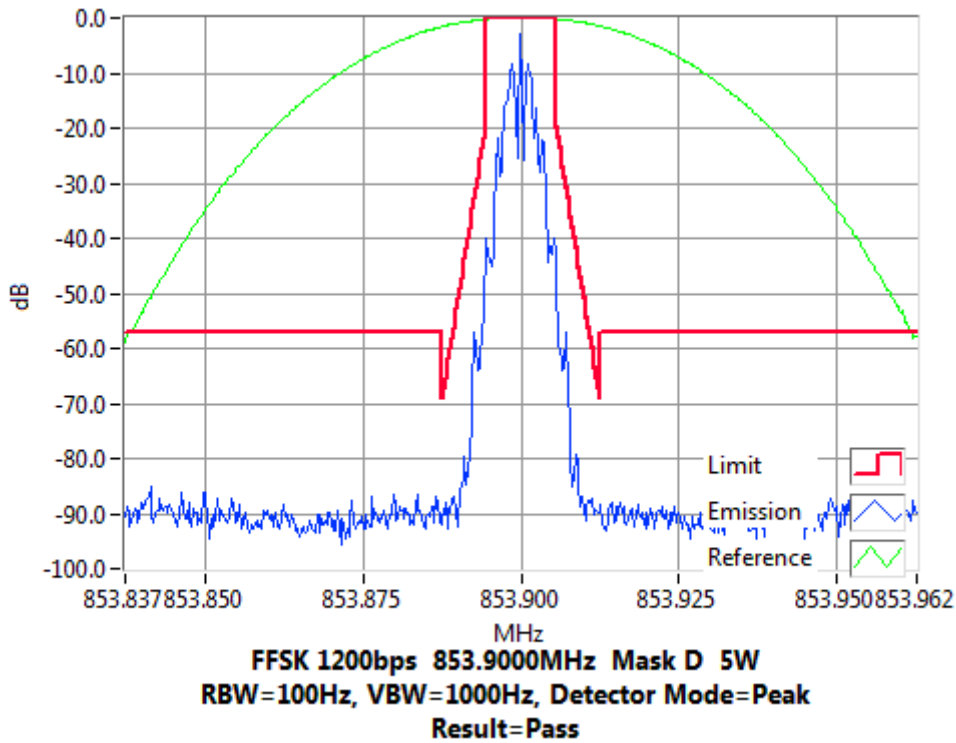
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 853.9 MHz 5 W 12.5 kHz Channel Spacing



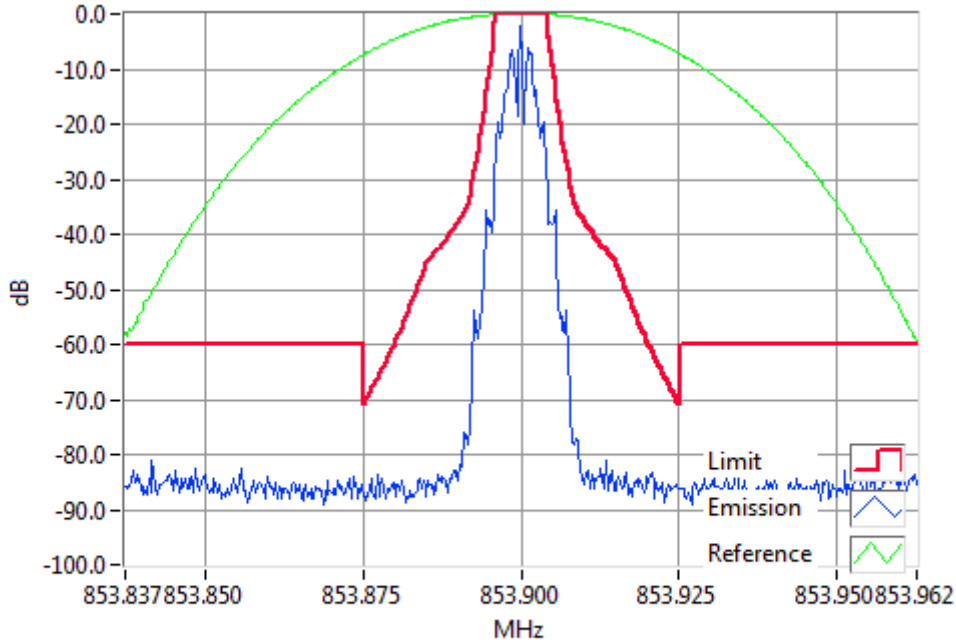
### Transmitter Spectrum Masks

FFSK, 1200 bps

SPECIFICATION: FCC CFR 2.1049 (c)

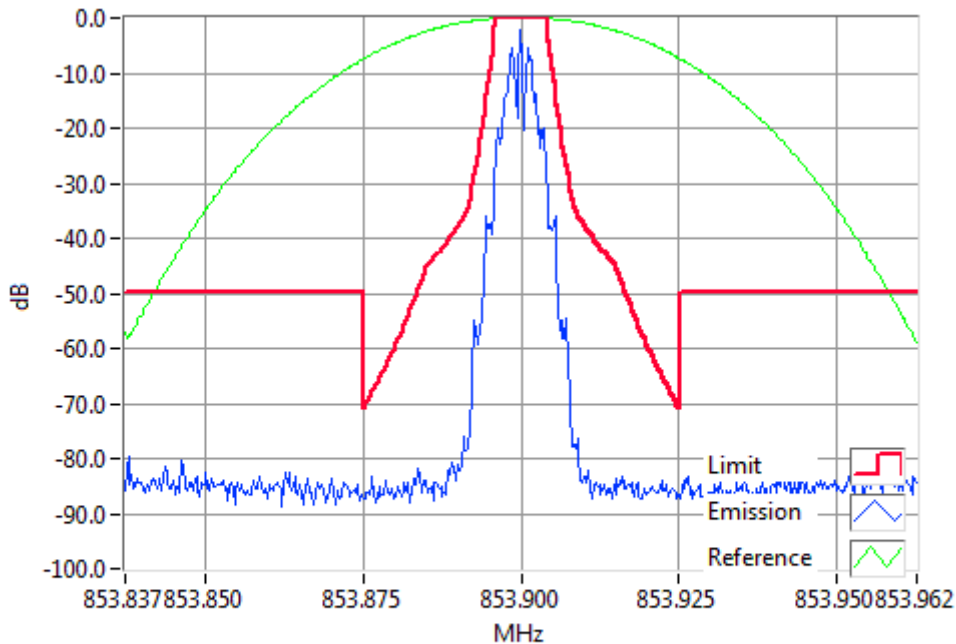
RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 50 W 12.5 kHz Channel Spacing



**FFSK 1200bps 853.9000MHz Mask H 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 853.9 MHz 5 W 12.5 kHz Channel Spacing



**FFSK 1200bps 853.9000MHz Mask H 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

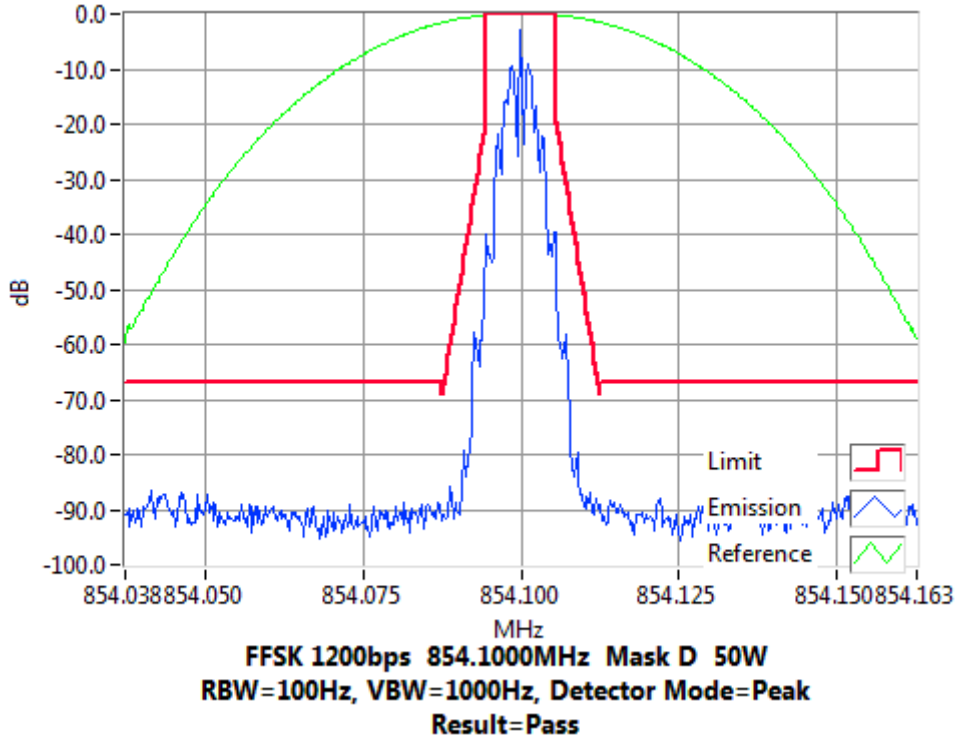
### Transmitter Spectrum Masks

FFSK, 1200 bps

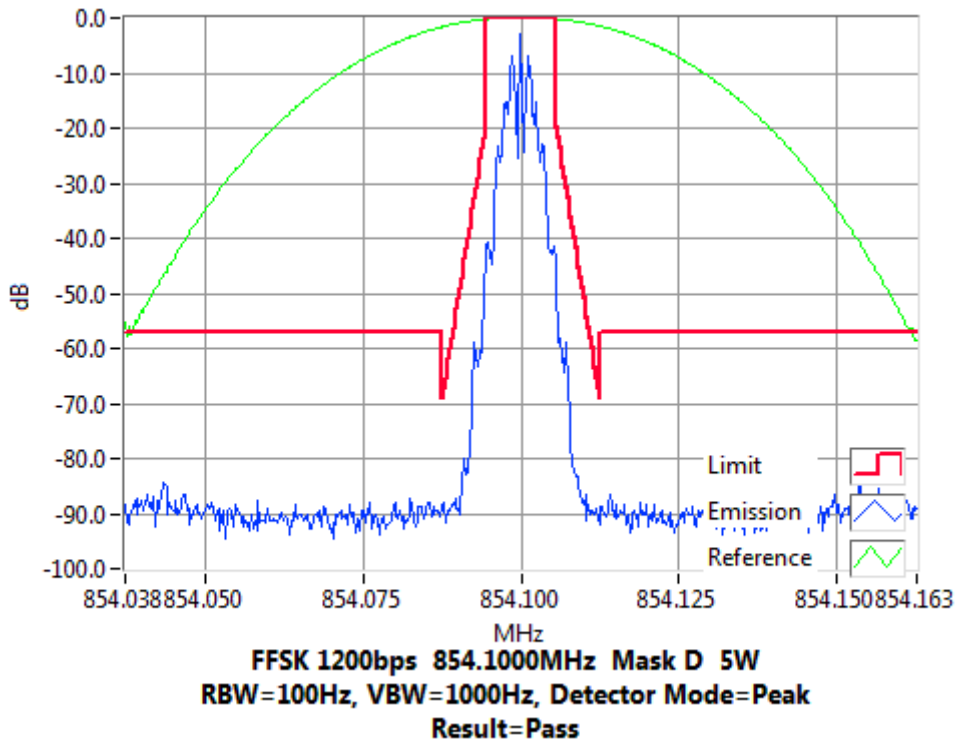
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 854.1 MHz 5 W 12.5 kHz Channel Spacing





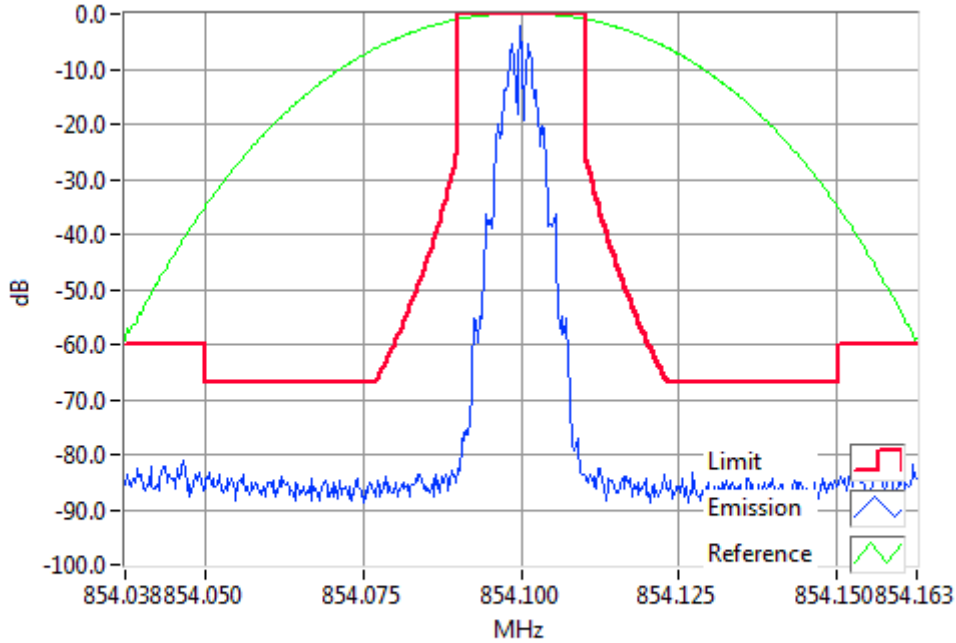
### Transmitter Spectrum Masks

FSK, 1200 bps

SPECIFICATION: FCC CFR 2.1049 (c)

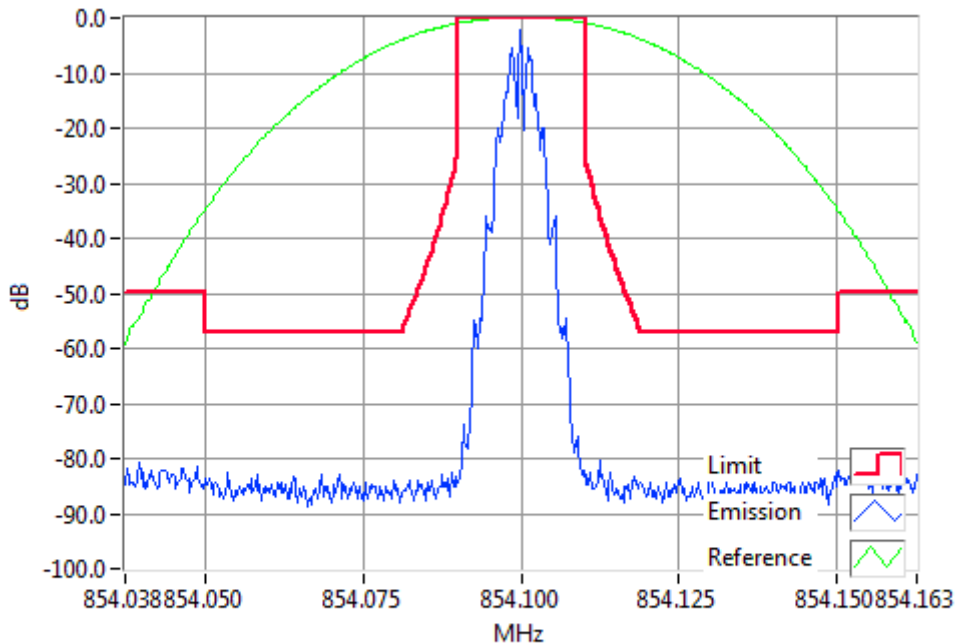
RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 50 W 12.5 kHz Channel Spacing



**FSK 1200bps 854.1000MHz Mask G 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 854.1 MHz 5 W 12.5 kHz Channel Spacing



**FSK 1200bps 854.1000MHz Mask G 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

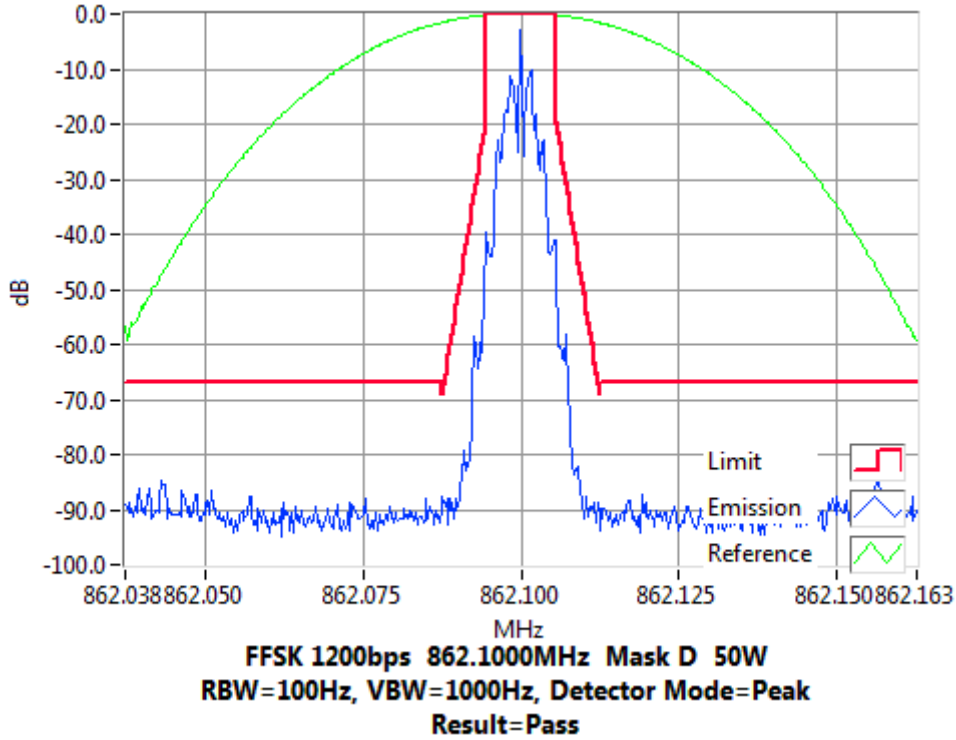
### Transmitter Spectrum Masks

FFSK, 1200 bps

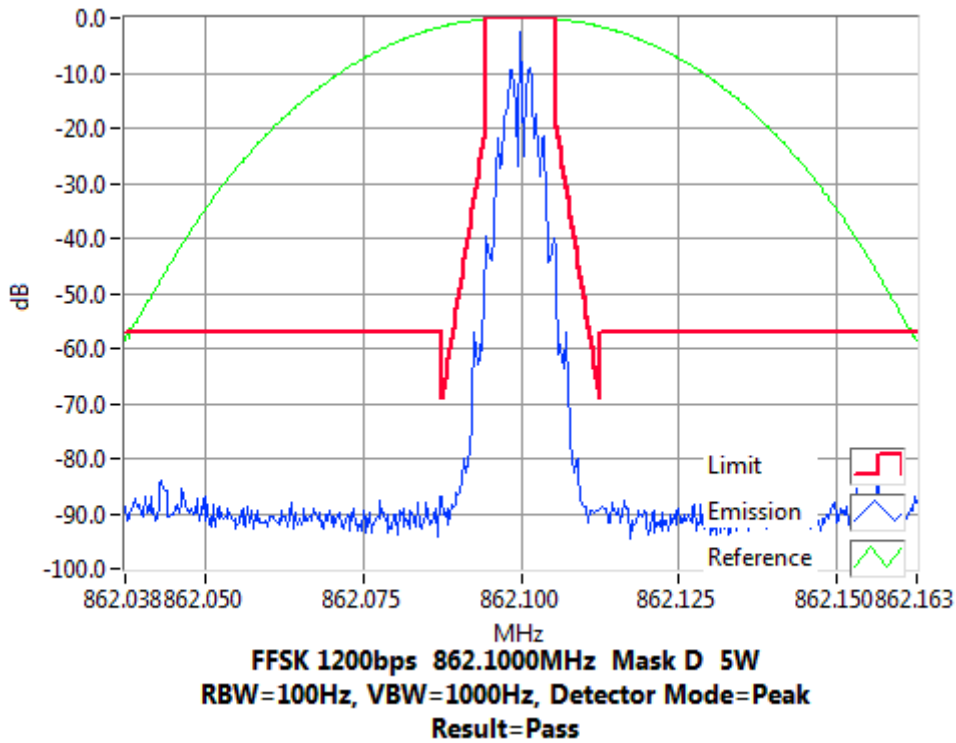
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 862.1 MHz 5 W 12.5 kHz Channel Spacing



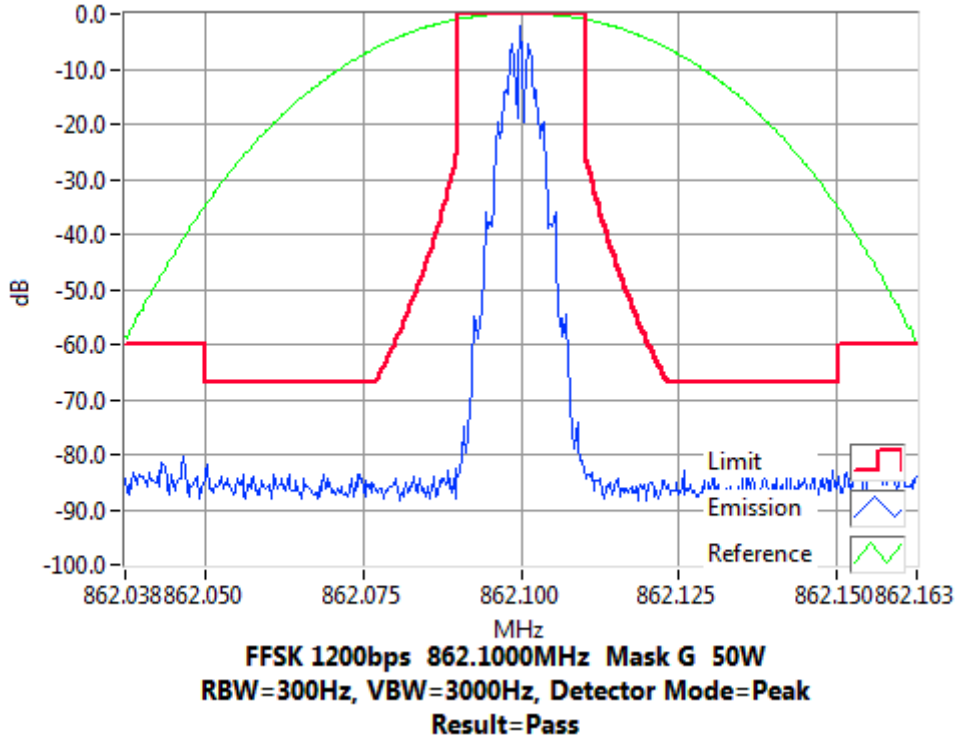
### Transmitter Spectrum Masks

FSK, 1200 bps

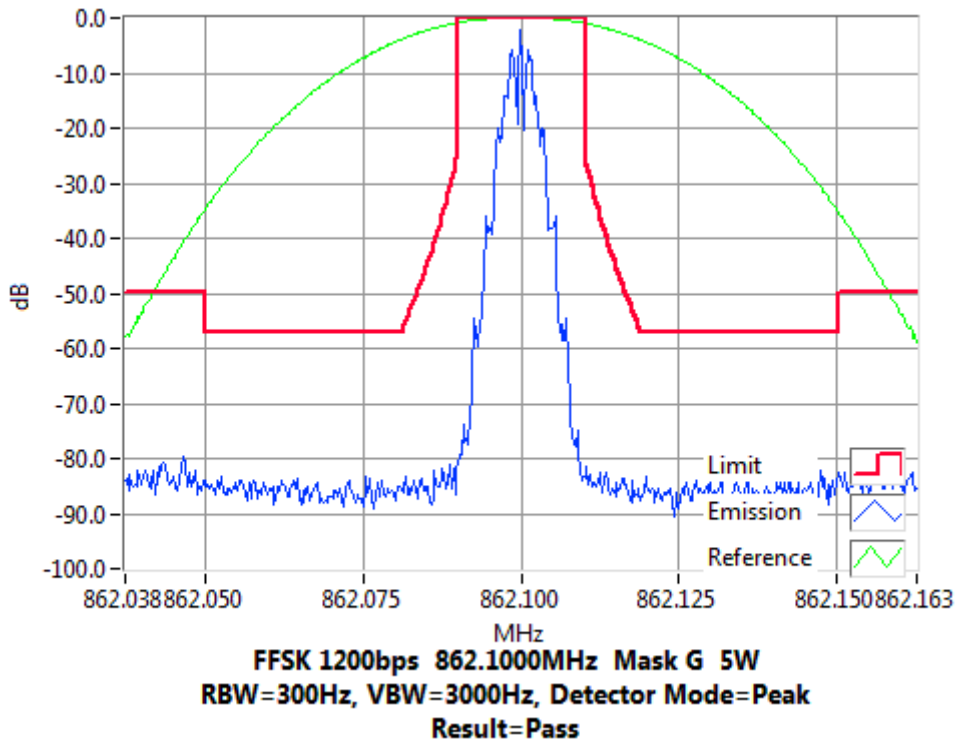
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 862.1 MHz 5 W 12.5 kHz Channel Spacing



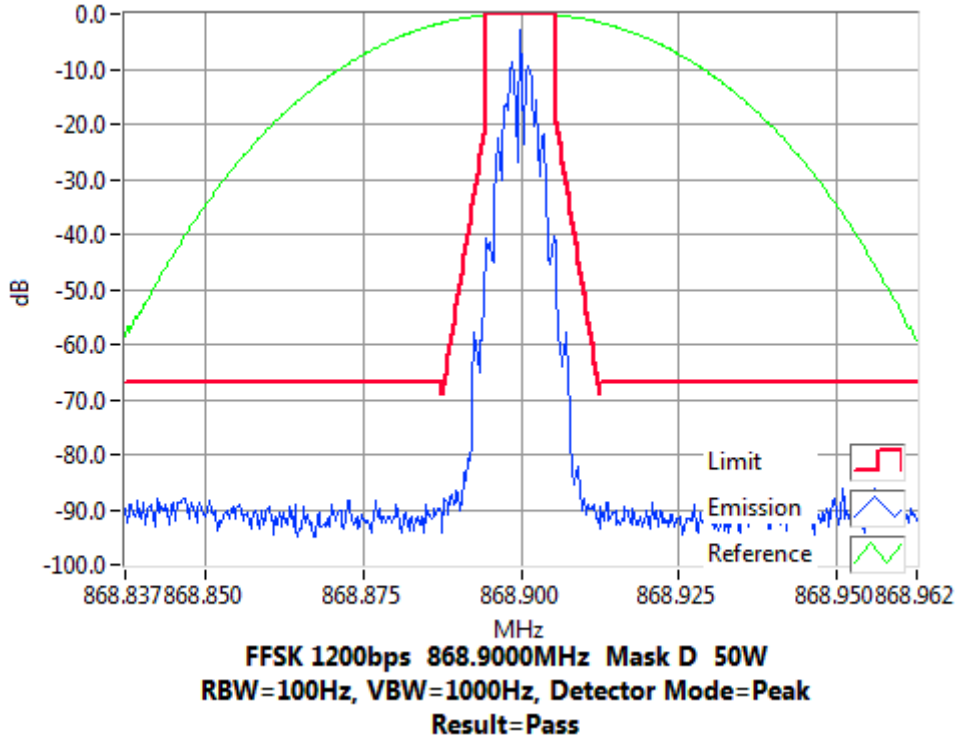
### Transmitter Spectrum Masks

FFSK, 1200 bps

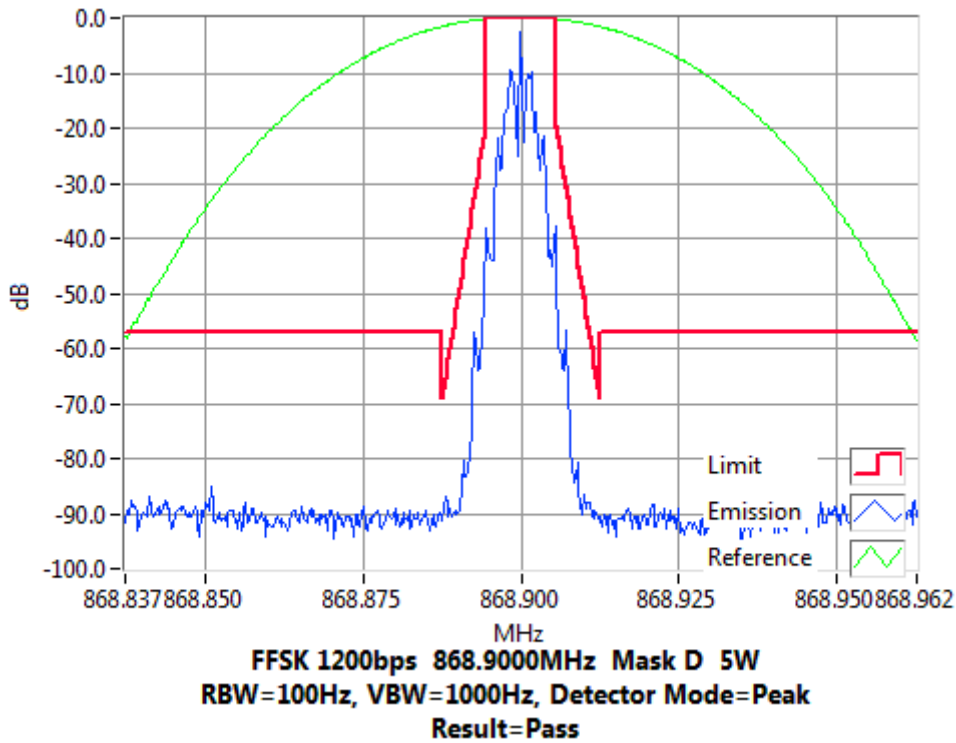
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 50 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 868.9 MHz 5 W 12.5 kHz Channel Spacing



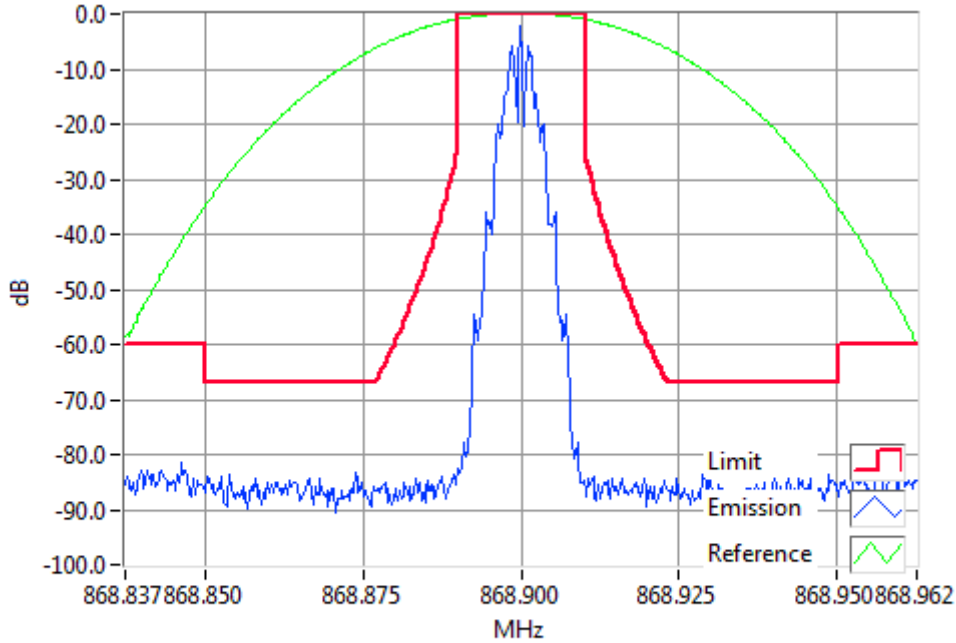
### Transmitter Spectrum Masks

FSK, 1200 bps

SPECIFICATION: FCC CFR 2.1049 (c)

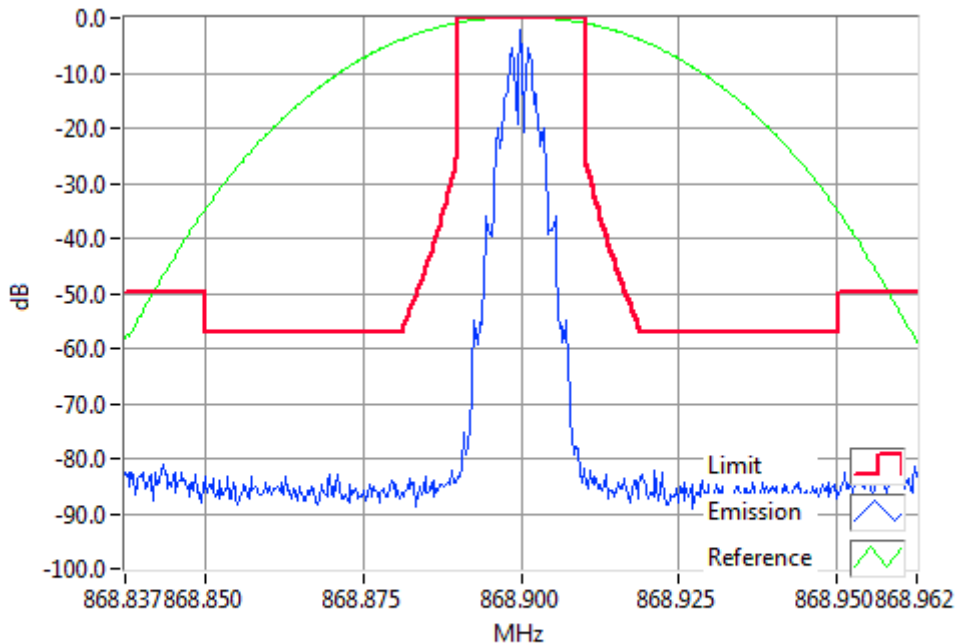
RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 50 W 12.5 kHz Channel Spacing



**FSK 1200bps 868.9000MHz Mask G 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 868.9 MHz 5 W 12.5 kHz Channel Spacing



**FSK 1200bps 868.9000MHz Mask G 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

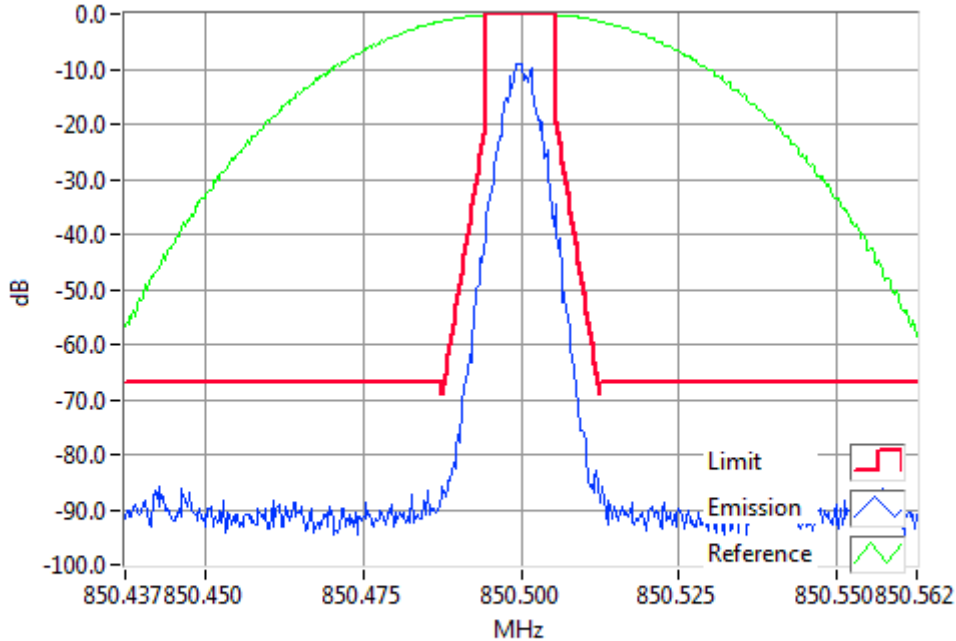
### Transmitter Spectrum Masks

DMR

SPECIFICATION: FCC CFR 2.1049 (c)

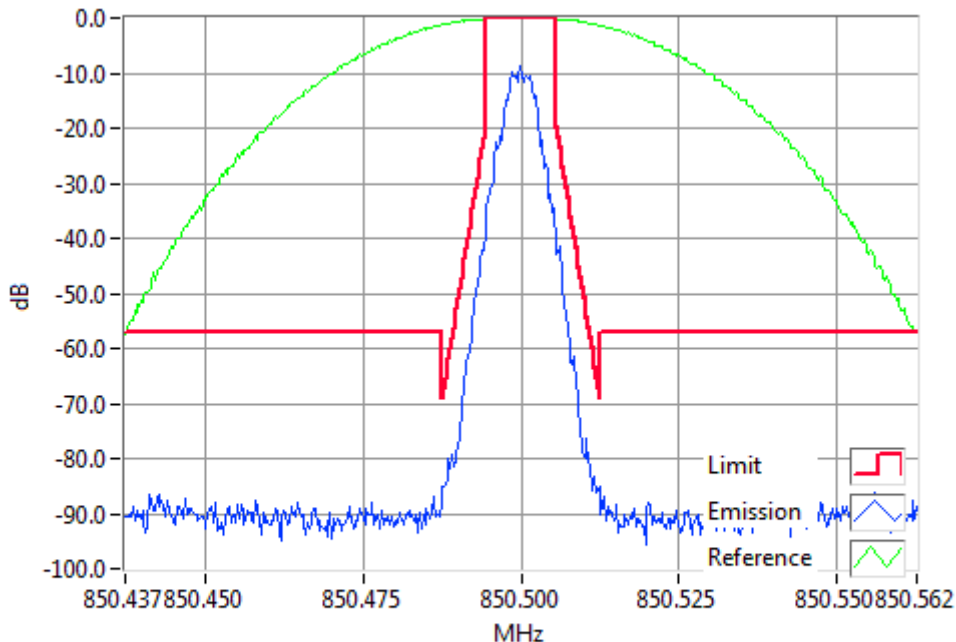
RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 50 W 12.5 kHz Channel Spacing



**DMR 850.5000MHz Mask D 50W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 850.5 MHz 5 W 12.5 kHz Channel Spacing



**DMR 850.5000MHz Mask D 5W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

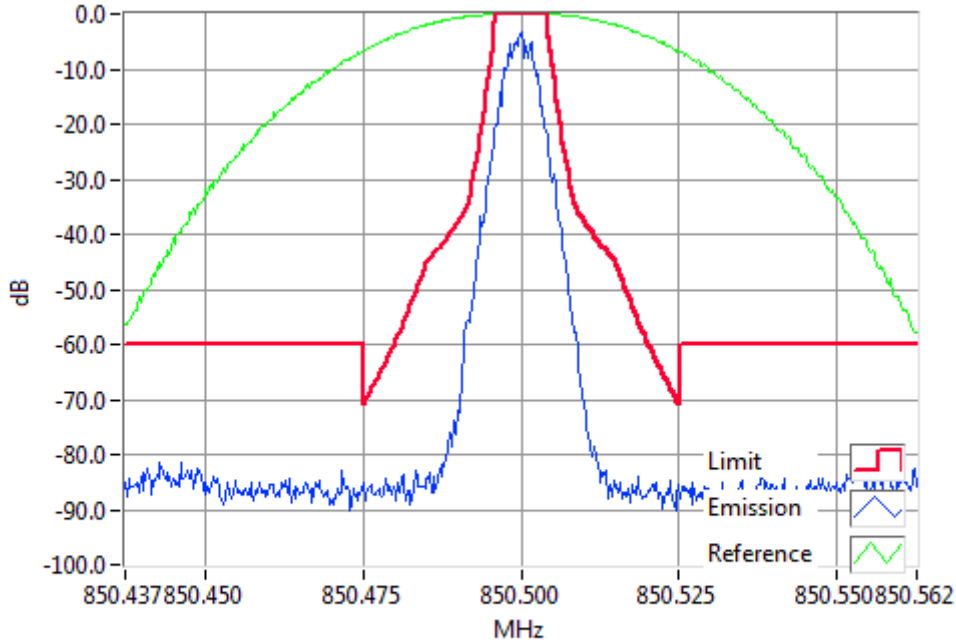
### Transmitter Spectrum Masks

DMR

SPECIFICATION: FCC CFR 2.1049 (c)

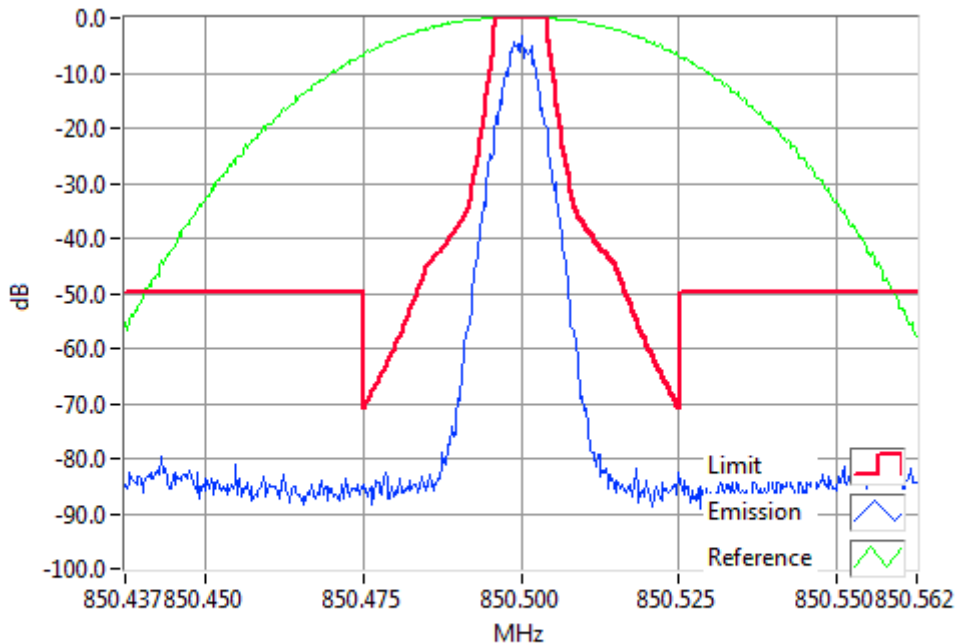
RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 50 W 12.5 kHz Channel Spacing



**DMR 850.5000MHz Mask H 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 850.5 MHz 5 W 12.5 kHz Channel Spacing



**DMR 850.5000MHz Mask H 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

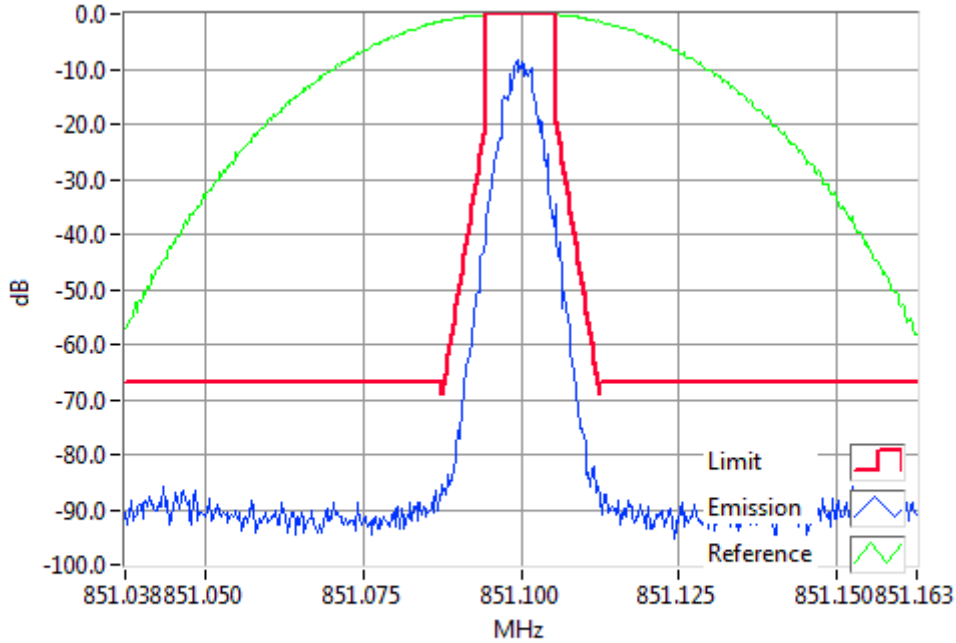
### Transmitter Spectrum Masks

DMR

SPECIFICATION: FCC CFR 2.1049 (c)

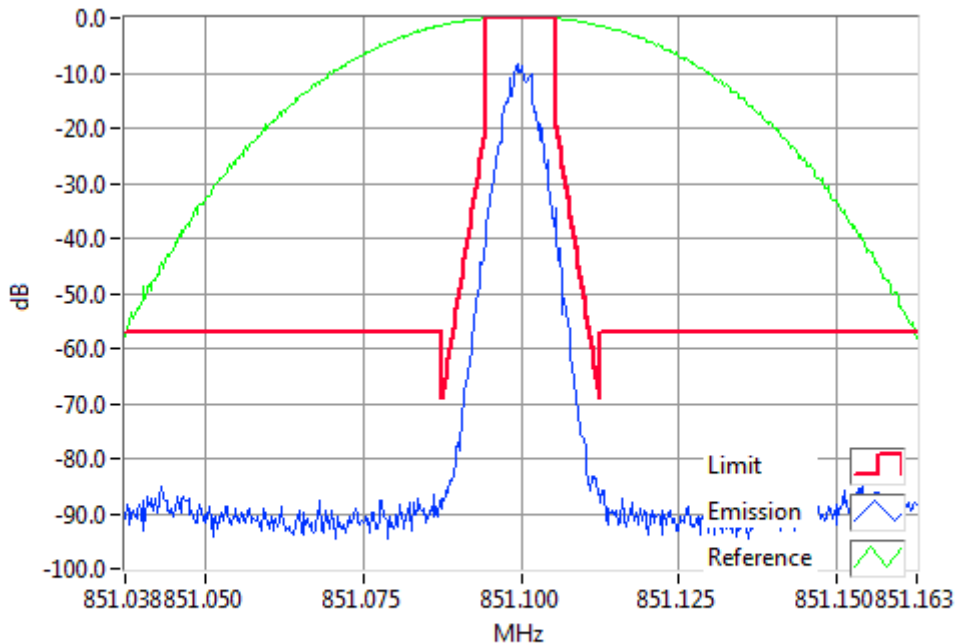
RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 50 W 12.5 kHz Channel Spacing



**DMR 851.1000MHz Mask D 50W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 851.1 MHz 5 W 12.5 kHz Channel Spacing



**DMR 851.1000MHz Mask D 5W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**



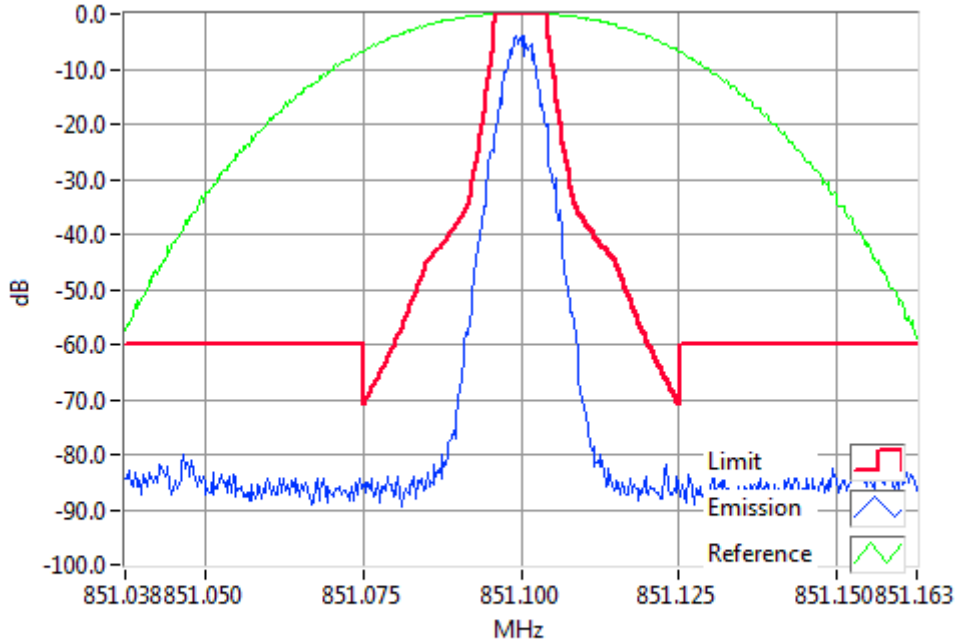
### Transmitter Spectrum Masks

DMR

SPECIFICATION: FCC CFR 2.1049 (c)

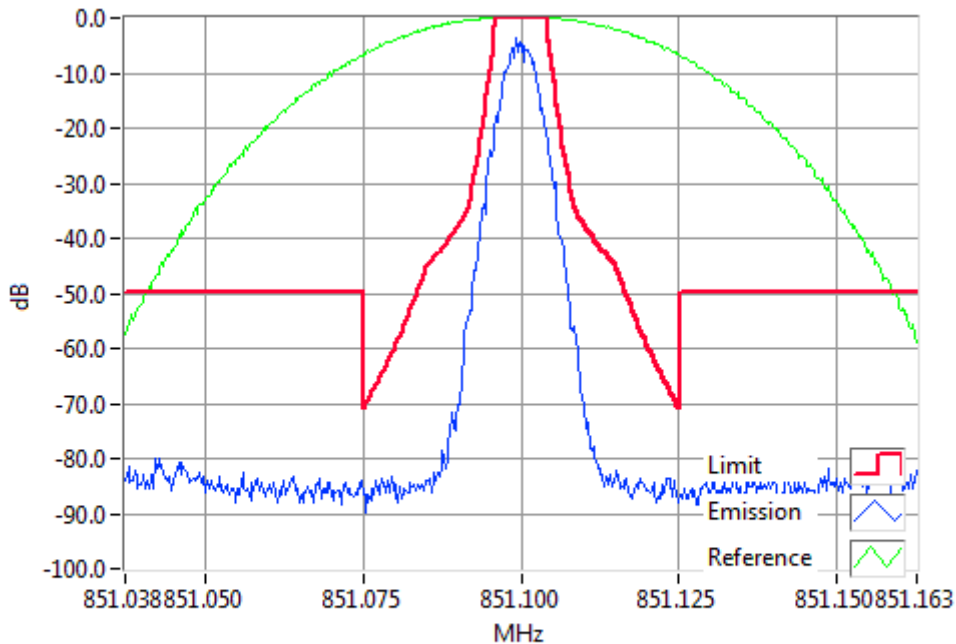
RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 50 W 12.5 kHz Channel Spacing



**DMR 851.1000MHz Mask H 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 851.1 MHz 5 W 12.5 kHz Channel Spacing



**DMR 851.1000MHz Mask H 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

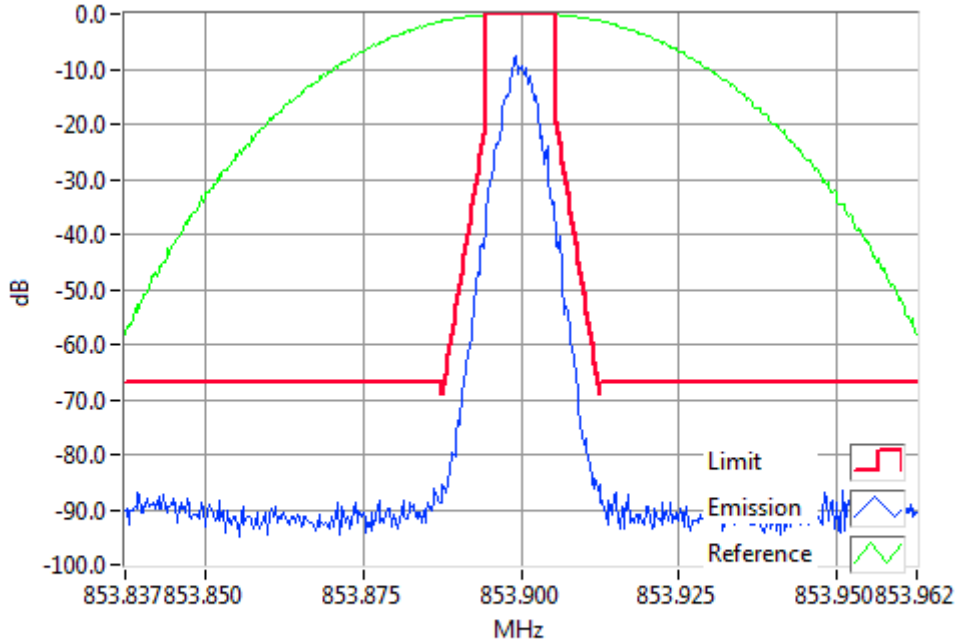
### Transmitter Spectrum Masks

DMR

SPECIFICATION: FCC CFR 2.1049 (c)

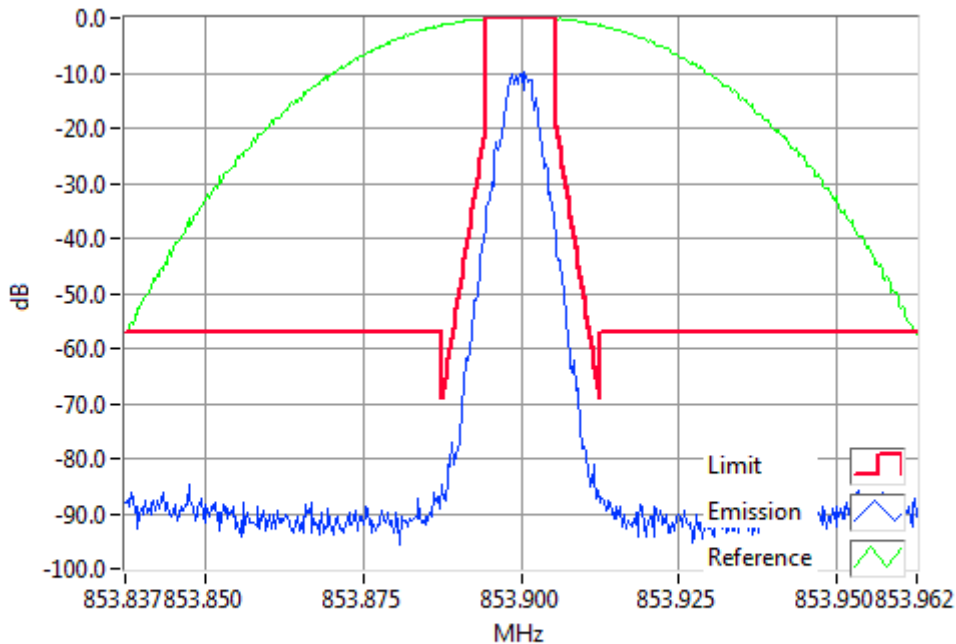
RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 50 W 12.5 kHz Channel Spacing



**DMR 853.9000MHz Mask D 50W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 853.9 MHz 5 W 12.5 kHz Channel Spacing



**DMR 853.9000MHz Mask D 5W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

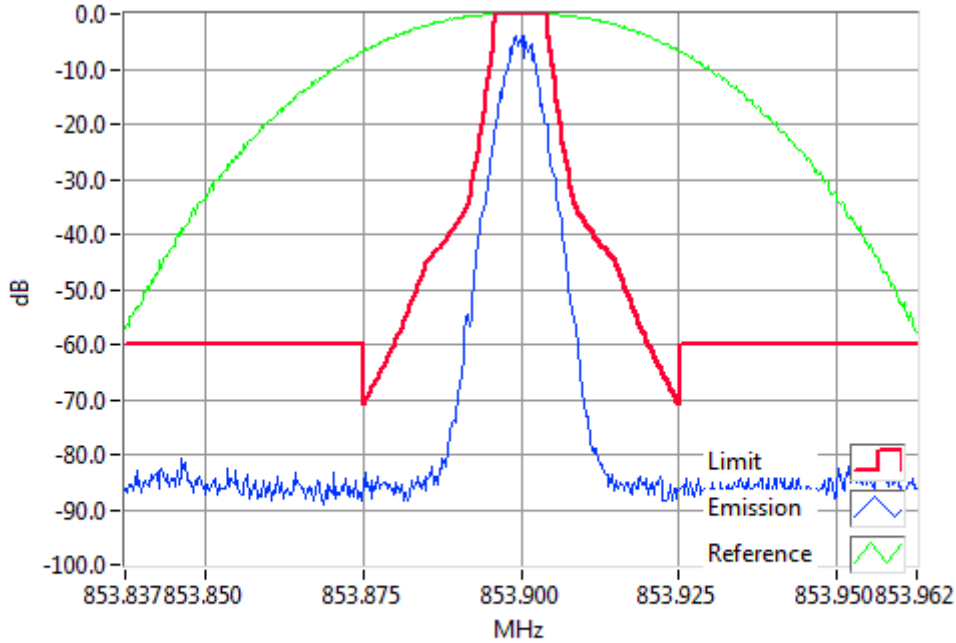
### Transmitter Spectrum Masks

DMR

SPECIFICATION: FCC CFR 2.1049 (c)

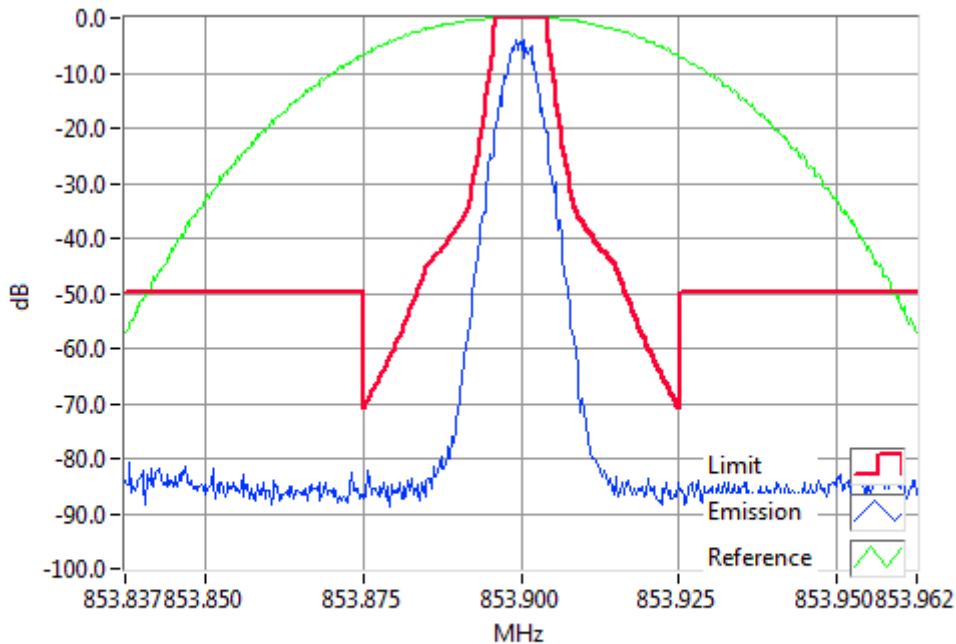
RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 50 W 12.5 kHz Channel Spacing



**DMR 853.9000MHz Mask H 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 853.9 MHz 5 W 12.5 kHz Channel Spacing



**DMR 853.9000MHz Mask H 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

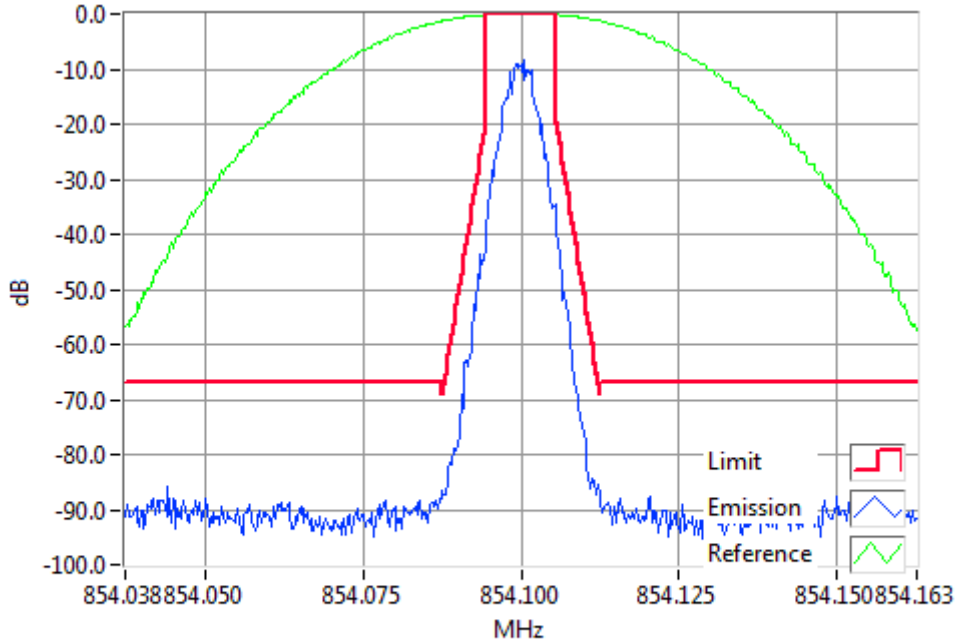
### Transmitter Spectrum Masks

DMR

SPECIFICATION: FCC CFR 2.1049 (c)

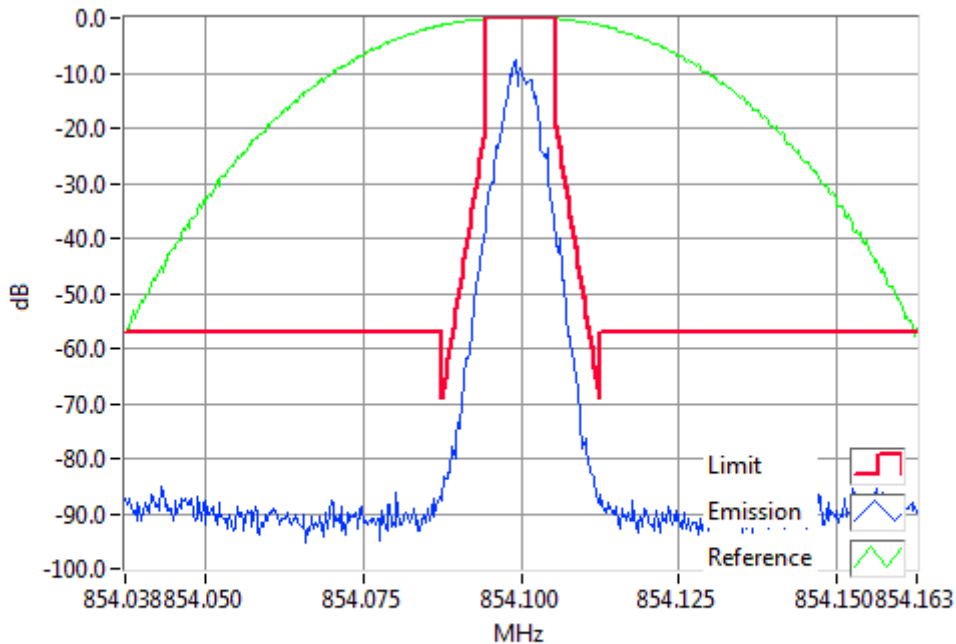
RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 50 W 12.5 kHz Channel Spacing



**DMR 854.1000MHz Mask D 50W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 854.1 MHz 5 W 12.5 kHz Channel Spacing



**DMR 854.1000MHz Mask D 5W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

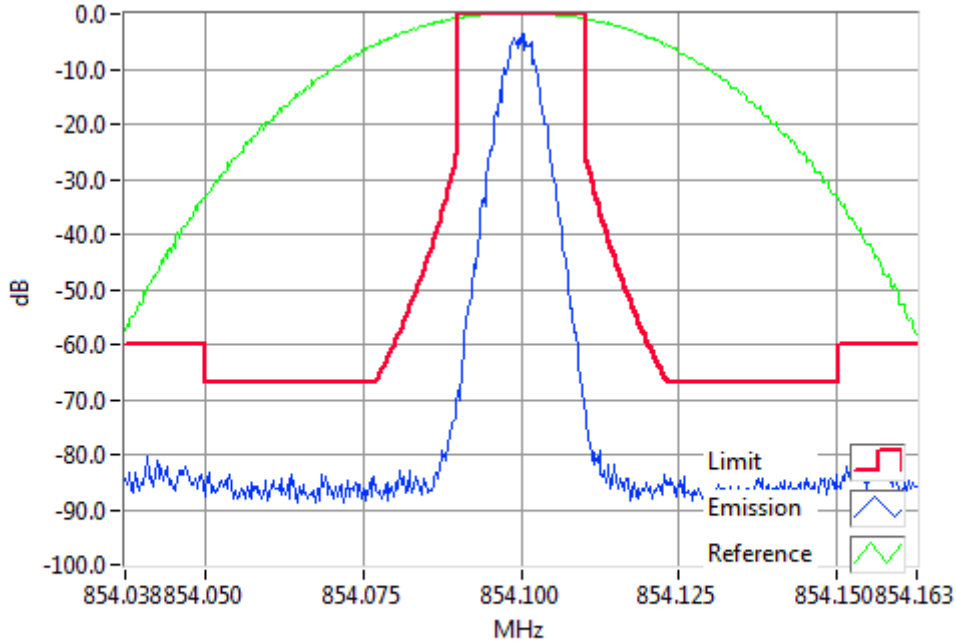
### Transmitter Spectrum Masks

DMR

SPECIFICATION: FCC CFR 2.1049 (c)

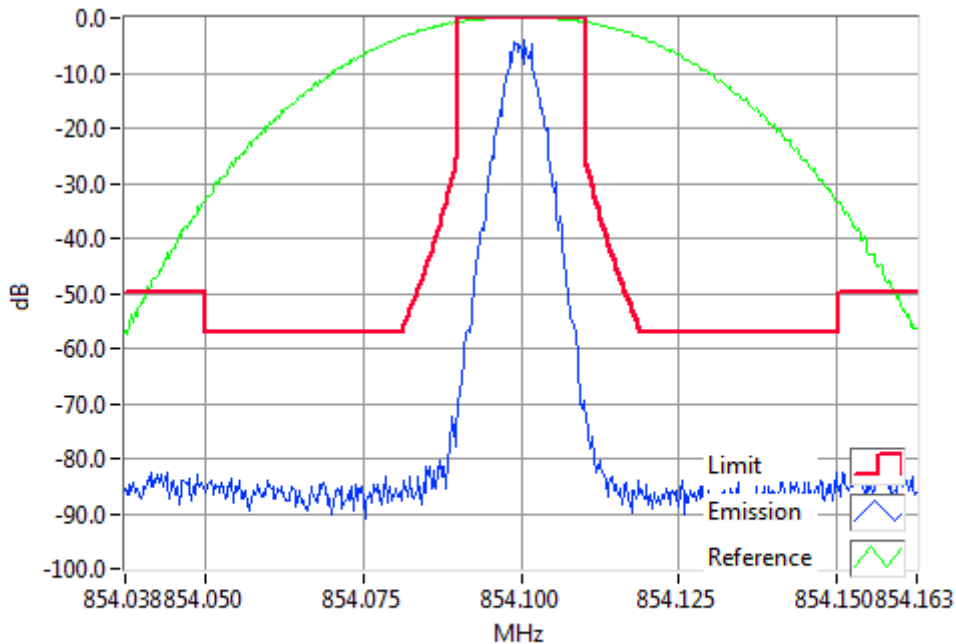
RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 50 W 12.5 kHz Channel Spacing



**DMR 854.1000MHz Mask G 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 854.1 MHz 5 W 12.5 kHz Channel Spacing



**DMR 854.1000MHz Mask G 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

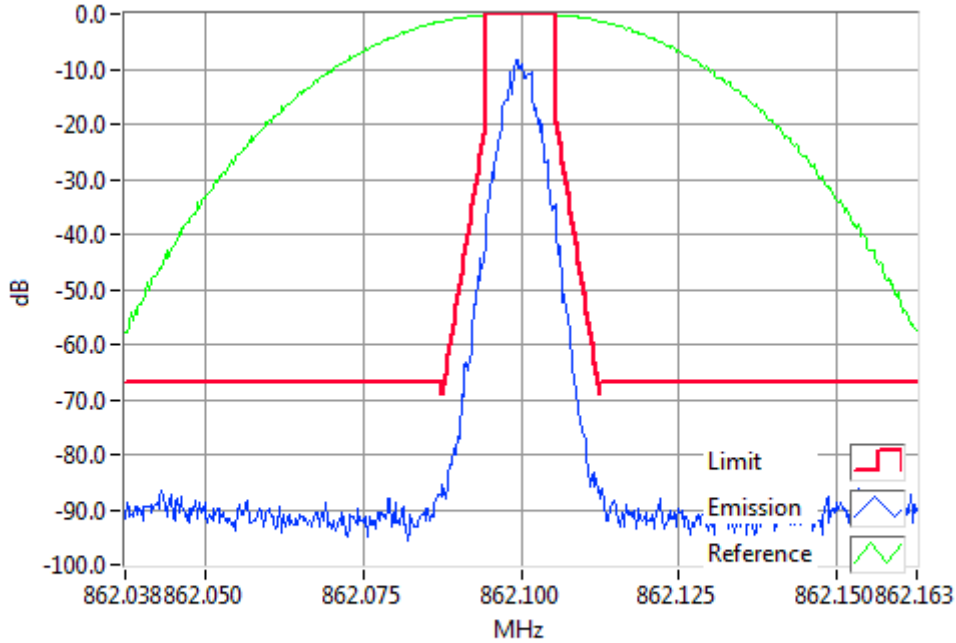
### Transmitter Spectrum Masks

DMR

SPECIFICATION: FCC CFR 2.1049 (c)

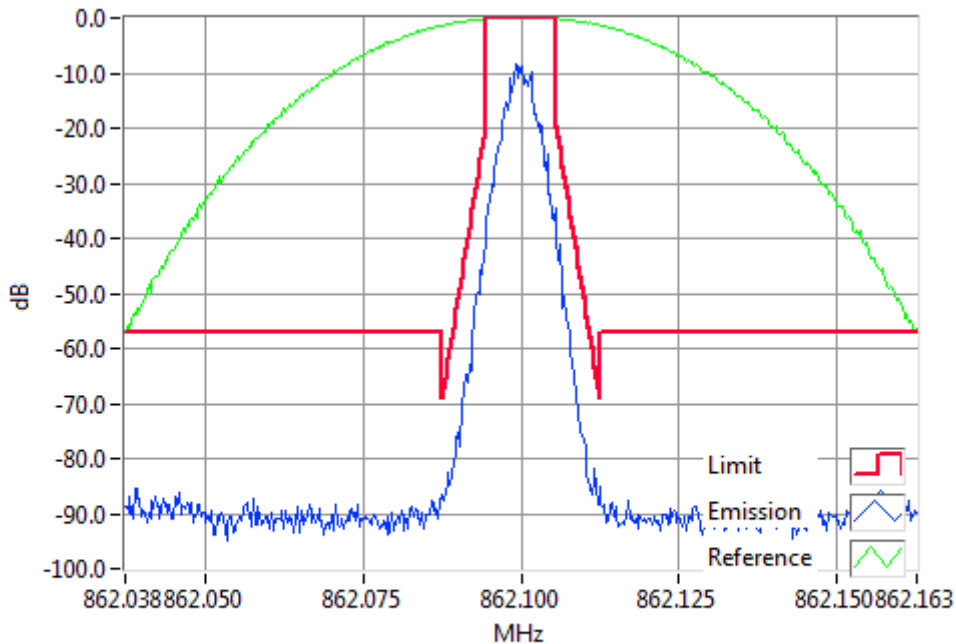
RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 50 W 12.5 kHz Channel Spacing



**DMR 862.1000MHz Mask D 50W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 862.1 MHz 5 W 12.5 kHz Channel Spacing



**DMR 862.1000MHz Mask D 5W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

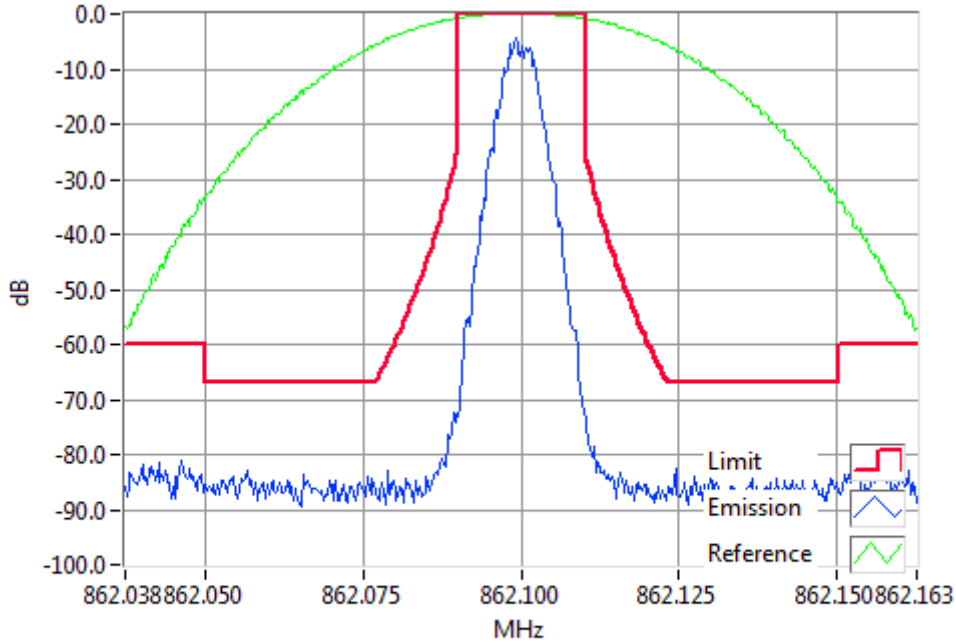
### Transmitter Spectrum Masks

DMR

SPECIFICATION: FCC CFR 2.1049 (c)

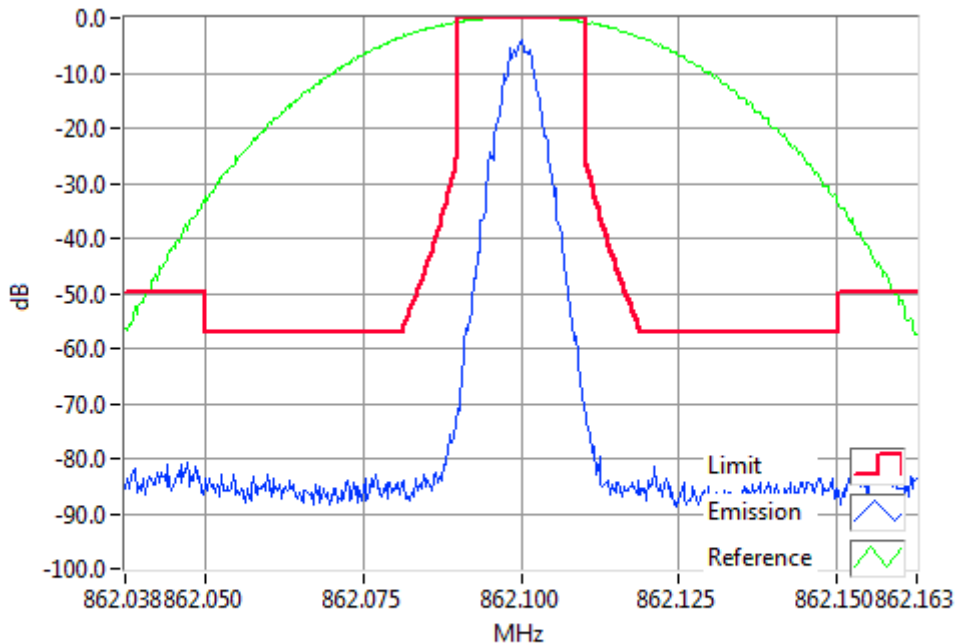
RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 50 W 12.5 kHz Channel Spacing



**DMR 862.1000MHz Mask G 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 862.1 MHz 5 W 12.5 kHz Channel Spacing



**DMR 862.1000MHz Mask G 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

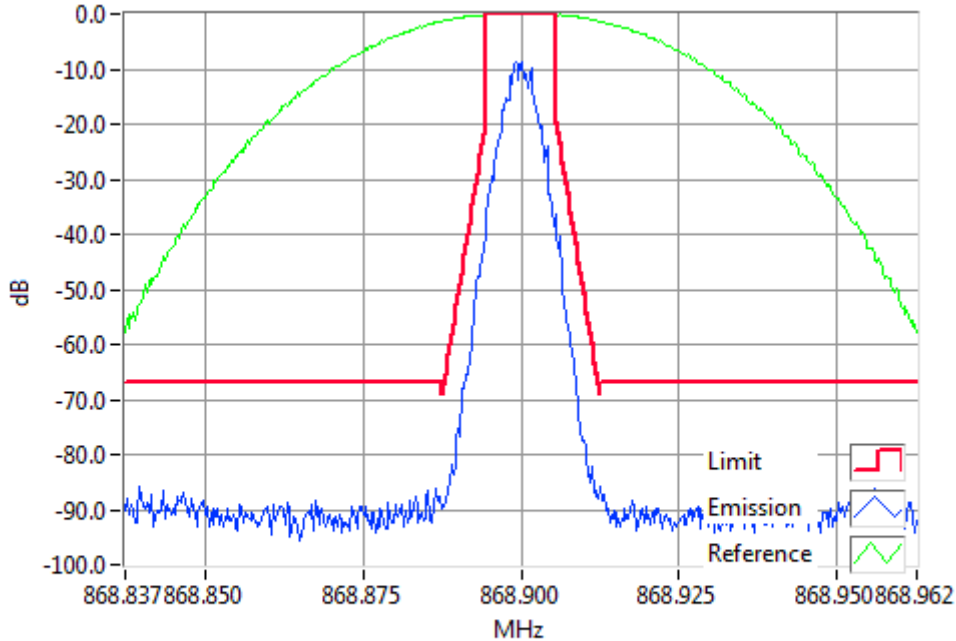
### Transmitter Spectrum Masks

DMR

SPECIFICATION: FCC CFR 2.1049 (c)

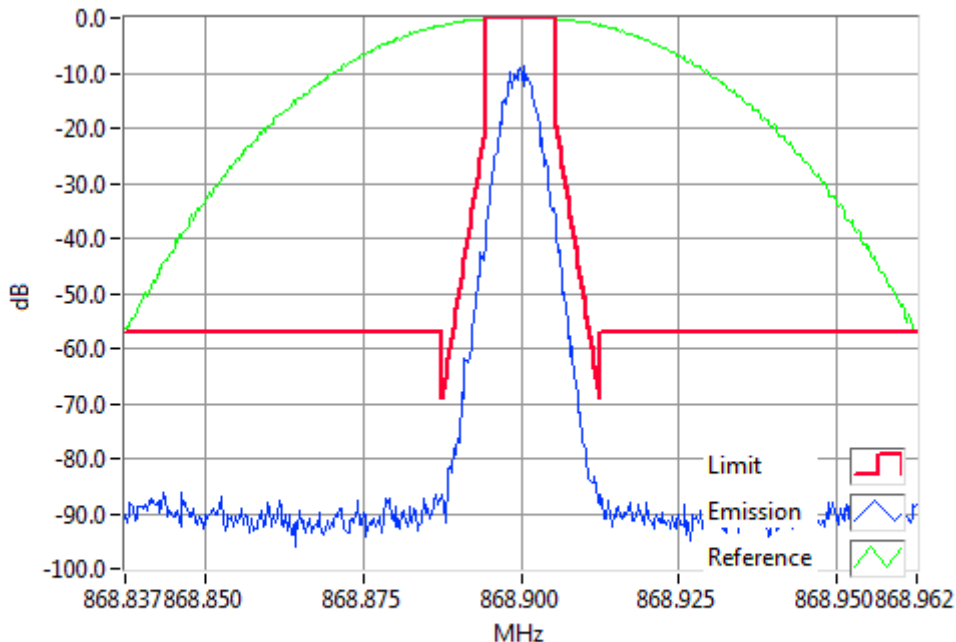
RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 50 W 12.5 kHz Channel Spacing



**DMR 868.9000MHz Mask D 50W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 868.9 MHz 5 W 12.5 kHz Channel Spacing



**DMR 868.9000MHz Mask D 5W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**



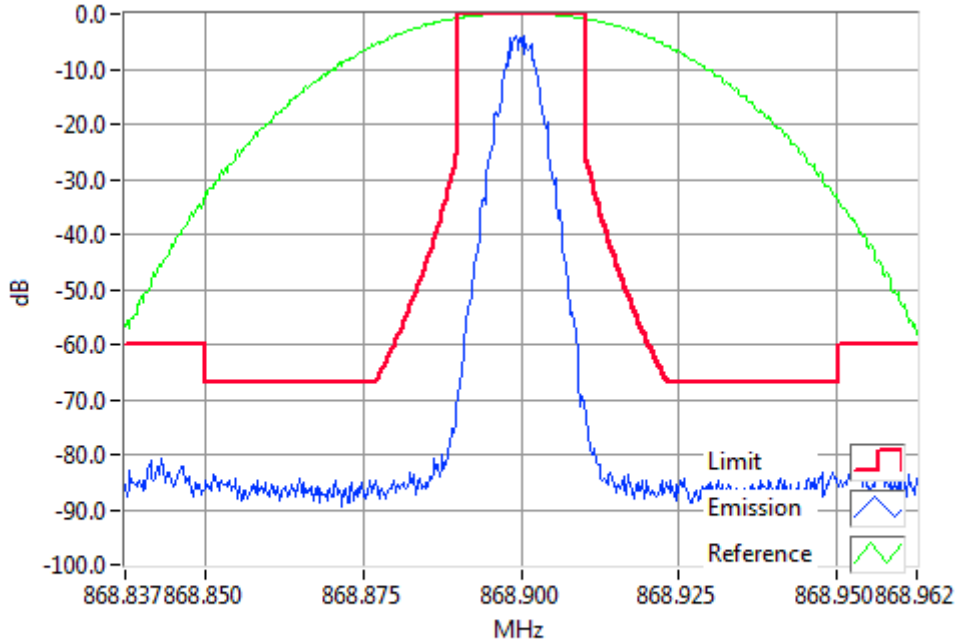
### Transmitter Spectrum Masks

DMR

SPECIFICATION: FCC CFR 2.1049 (c)

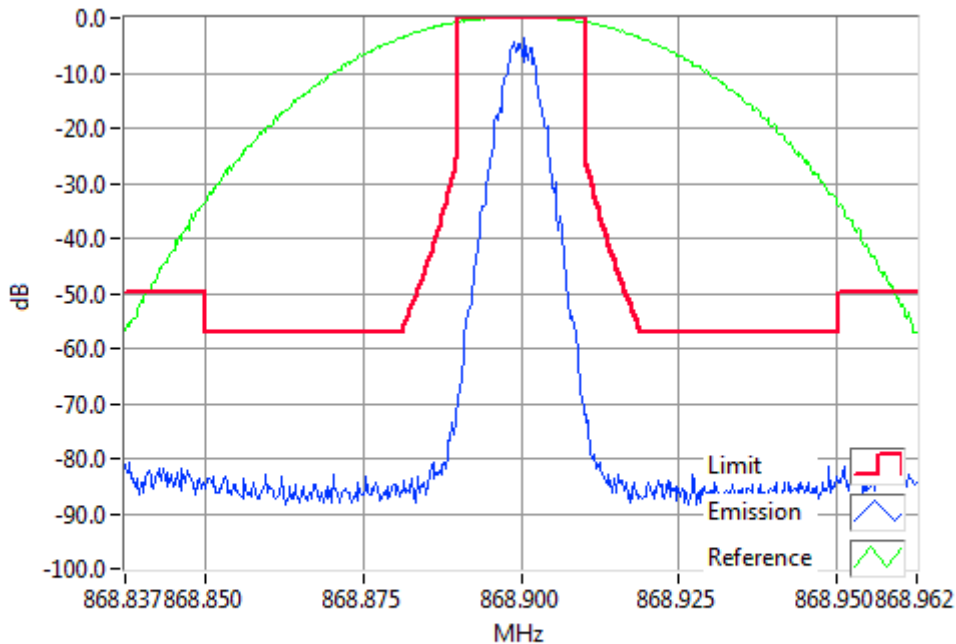
RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 50 W 12.5 kHz Channel Spacing



**DMR 868.9000MHz Mask G 50W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

Tx FREQUENCY: 868.9 MHz 5 W 12.5 kHz Channel Spacing



**DMR 868.9000MHz Mask G 5W**  
**RBW=300Hz, VBW=3000Hz, Detector Mode=Peak**  
**Result=Pass**

## ADJACENT CHANNEL POWER RATIO

SPECIFICATION: FCC 47 CFR 90.543

RSS-119 5.8.9

### MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. The transmitter is modulated with the standard test pattern for digital modulation.
3. The test is performed in accordance with 47 CFR 90.543

LIMIT CLAUSE: FCC 47 CFR 90.543

RSS-119 5.8.9

MEASUREMENT UNCERTAINTY:  $\leq 12.75$  GHz  $\pm 3.0$  dB

### MEASUREMENT RESULTS:

#### Analogue

Tx FREQUENCY: 769.1 MHz 50 W 12.5 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP (dBc)
9.375 kHz	6.25 kHz	-47.34	-46.44	-40
15.625 kHz	6.25 kHz	-74.56	-74.7	-60
21.875 kHz	6.25 kHz	-75.89	-75.72	-60
37.5 kHz	25 kHz	-71.16	-71.36	-60
62.5 kHz	25 kHz	-73.72	-73.69	-65
87.5 kHz	25 kHz	-77	-76.85	-65
150 kHz	100 kHz	-74.3	-74.42	-65
250 kHz	100 kHz	-80.26	-80.2	-65
350 kHz	100 kHz	-84.55	-84.68	-65
>400 kHz to 12 MHz	30 kHz (swept)	-88.89		-80
12 MHz to paired receive band	30 kHz (swept)	-110.88		-80
In the paired receive band	30 kHz (swept)	-111.62		-85

#### Analogue

Tx FREQUENCY: 774.9 MHz 50 W 12.5 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP (dBc)
9.375 kHz	6.25 kHz	-48.21	-46.44	-40
15.625 kHz	6.25 kHz	-74.73	-75.1	-60
21.875 kHz	6.25 kHz	-75.29	-75.53	-60
37.5 kHz	25 kHz	-71.29	-71.47	-60
62.5 kHz	25 kHz	-73.49	-73.68	-65
87.5 kHz	25 kHz	-77.09	-77.14	-65
150 kHz	100 kHz	-74.71	-74.46	-65
250 kHz	100 kHz	-80.34	-80.4	-65
350 kHz	100 kHz	-84.8	-84.84	-65
>400 kHz to 12 MHz	30 kHz (swept)	-89.47		-80
12 MHz to paired receive band	30 kHz (swept)	-111.7		-80
In the paired receive band	30 kHz (swept)	-111.42		-85

Adjacent Channel Power Ratio

Analogue

Tx FREQUENCY: 769.1 MHz 50 W 25.0 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP(dBc)
15.625 kHz	6.25 kHz	-60.88	-60.63	-40
21.875 kHz	6.25 kHz	-75.56	-75.72	-60
37.5 kHz	25 kHz	-77.09	-77.6	-60
62.5 kHz	25 kHz	-73.17	-73.31	-65
87.5 kHz	25 kHz	-77.07	-76.93	-65
150 kHz	100 kHz	-74.44	-74.02	-65
250 kHz	100 kHz	-80.39	-80.18	-65
350 kHz	100 kHz	-84.7	-84.43	-65
>400 kHz to 12 MHz	30 kHz (swept)	-88.7		-80
12 MHz to paired receive band	30 kHz (swept)	-110.5		-80
In the paired receive band	30 kHz (swept)	-111.98		-85

Analogue

Tx FREQUENCY: 774.9 MHz 50 W 25.0 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP (dBc)
15.625 kHz	6.25 kHz	-62.02	-60.26	-40
21.875 kHz	6.25 kHz	-75.65	-75.68	-60
37.5 kHz	25 kHz	-76.96	-77.23	-60
62.5 kHz	25 kHz	-73.3	-73.23	-65
87.5 kHz	25 kHz	-76.96	-76.97	-65
150 kHz	100 kHz	-74.47	-73.64	-65
250 kHz	100 kHz	-80.1	-79.95	-65
350 kHz	100 kHz	-84.57	-84.65	-65
>400 kHz to 12 MHz	30 kHz (swept)	-89.98		-80
12 MHz to paired receive band	30 kHz (swept)	-110.5		-80
In the paired receive band	30 kHz (swept)	-111.94		-85

### Adjacent Channel Power Ratio

FFSK, 1200 bps  
Tx FREQUENCY: 769.1 MHz 50 W 12.5 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP(dBc)
9.375 kHz	6.25 kHz	-55.44	-56.57	-40
15.625 kHz	6.25 kHz	-74.59	-74.54	-60
21.875 kHz	6.25 kHz	-75.68	-75.83	-60
37.5 kHz	25 kHz	-71.21	-71.3	-60
62.5 kHz	25 kHz	-73.75	-73.74	-65
87.5 kHz	25 kHz	-77.14	-77.16	-65
150 kHz	100 kHz	-74.65	-74.66	-65
250 kHz	100 kHz	-80.15	-80.11	-65
350 kHz	100 kHz	-84.54	-84.49	-65
>400 kHz to 12 MHz	30 kHz (swept)	-88.79		-80
12 MHz to paired receive band	30 kHz (swept)	-110.52		-80
In the paired receive band	30 kHz (swept)	-111.3		-85

FFSK, 1200 bps  
Tx FREQUENCY: 774.9 MHz 50 W 12.5 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP (dBc)
9.375 kHz	6.25 kHz	-55.61	-57.26	-40
15.625 kHz	6.25 kHz	-75.03	-74.84	-60
21.875 kHz	6.25 kHz	-75.53	-75.86	-60
37.5 kHz	25 kHz	-71.27	-71.02	-60
62.5 kHz	25 kHz	-73.79	-73.99	-65
87.5 kHz	25 kHz	-77.28	-77.16	-65
150 kHz	100 kHz	-74.53	-74.42	-65
250 kHz	100 kHz	-79.7	-80.15	-65
350 kHz	100 kHz	-84.34	-84.46	-65
>400 kHz to 12 MHz	30 kHz (swept)	-88.58		-80
12 MHz to paired receive band	30 kHz (swept)	-111.7		-80
In the paired receive band	30 kHz (swept)	-111.1		-85

### Adjacent Channel Power Ratio

DMR

Tx FREQUENCY: 769.1 MHz 50 W 12.5 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP(dBc)
9.375 kHz	6.25 kHz	-41.33	-44.52	-40
15.625 kHz	6.25 kHz	-74.19	-74.16	-60
21.875 kHz	6.25 kHz	-75.66	-75.37	-60
37.5 kHz	25 kHz	-71.08	-71.24	-60
62.5 kHz	25 kHz	-73.14	-73.38	-65
87.5 kHz	25 kHz	-76.96	-76.85	-65
150 kHz	100 kHz	-74.18	-73.93	-65
250 kHz	100 kHz	-79.8	-79.9	-65
350 kHz	100 kHz	-84.19	-84.51	-65
>400 kHz to 12 MHz	30 kHz (swept)	-89.24		-80
12 MHz to paired receive band	30 kHz (swept)	-111.02		-80
In the paired receive band	30 kHz (swept)	-111.47		-85

DMR

Tx FREQUENCY: 774.9 MHz 50 W 12.5 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP (dBc)
9.375 kHz	6.25 kHz	-42.75	-45.02	-40
15.625 kHz	6.25 kHz	-73.89	-74.13	-60
21.875 kHz	6.25 kHz	-75.42	-75.25	-60
37.5 kHz	25 kHz	-70.85	-71	-60
62.5 kHz	25 kHz	-73.06	-73.31	-65
87.5 kHz	25 kHz	-76.91	-76.77	-65
150 kHz	100 kHz	-74.1	-73.81	-65
250 kHz	100 kHz	-79.84	-79.91	-65
350 kHz	100 kHz	-84.24	-84.23	-65
>400 kHz to 12 MHz	30 kHz (swept)	-88.18		-80
12 MHz to paired receive band	30 kHz (swept)	-111.74		-80
In the paired receive band	30 kHz (swept)	-111.57		-85

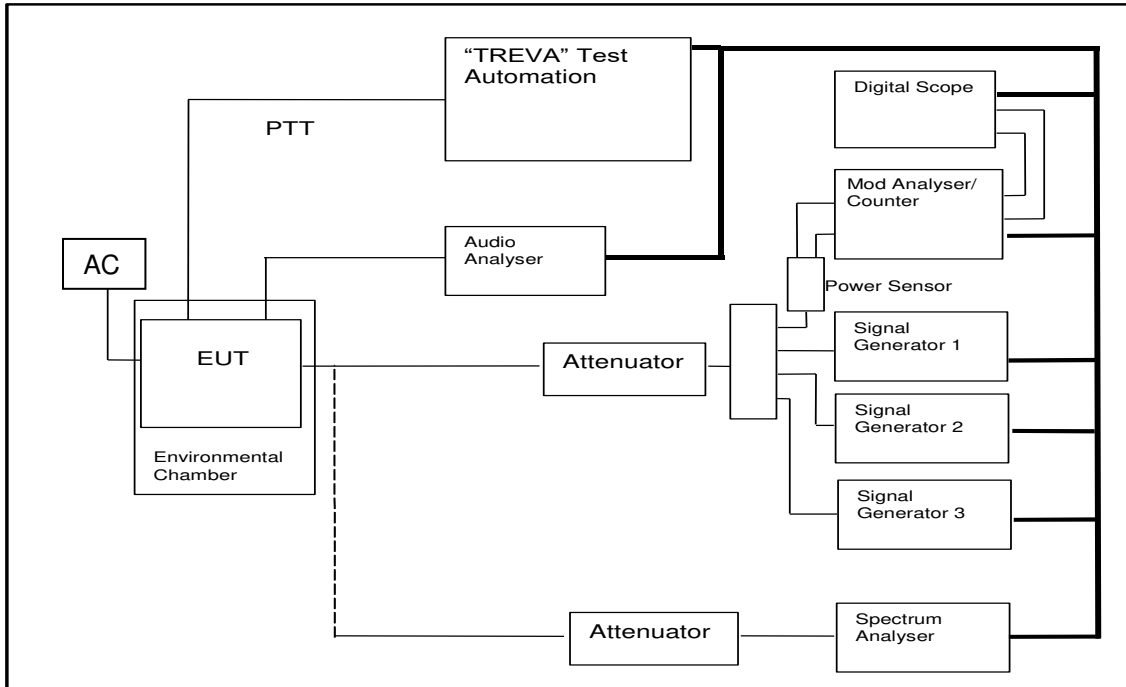
## TEST EQUIPMENT LIST

Equipment Type	Information	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
AC Voltmeter		Tait		1		21-May-21
Audio Analyser	TREVA1	Hewlett Packard	HP8903A	2437A04625	E4986	25-Sep-21
Coax Cable	2m Black	Suhner	RG214HF/Nm/ Nm/2000	TeltestBlack4	E4653	30-Oct-21
Coax Cable	2m Black	Suhner	RG214HF/Nm/ Nm/2000	TeltestBlack6	E4849	30-Oct-21
Coax Cable	2m Black	Suhner	RG214HF/Nm/ Nm/2000	TeltestBlack7	E5004	30-Oct-21
Modulation Analyser	TREVA1	Hewlett Packard	HP8901B (Opt 002)	2441A00393	E3073	28-Sep-21
Modulation Analyser	Includes Audio Analyser	Rohde & Schwarz	FMA0852.8500.52	842541/001	E3554	25-Mar-21
Power Meter	TREVA1 Power Head for HP8901	Hewlett Packard	HP11722A	3111A05573	E7054	28-Sep-21
Power Supply	AC Variac	Yamabishi	S-260-5	TX-533	E1737	
RF Attenuator	30+3dB 350W	Weinschel	67-30-33 & BW-N3W5+	CK9178	E5023	30-Oct-21
RF Attenuator	TREVA1 3dB	Weinschel	Model 1	BL9958	E4081	30-Oct-21
RF Attenuator	TREVA1 20dB 150W	Weinschel	40-20-23	MF817	E4082	30-Oct-21
RF Combiner	TREVA1	Minicircuits	ZFSC-4-1	-	E4083	
Signal Generator	TREVA1 Analog 3.2GHz	Agilent	E8663D	MY50420224	E4908	28-Sep-22
Spectrum Analyser	13.2GHz	Agilent	PSA E4445A	MY42510072	E4139	7-Oct-22
Temp & Humidity datalogger		Hobo	U21-011	10134276	E4981	7-Jul-21
TREVA 1		Teltest	-	1	-	2-Dec-20
Testware	Occupied Bandwidth		July 2019	-	-	
Testware	Sideband Spectrum		February 2017	-	-	
Testware	TREVA		29/01/2020	-	-	

NOTE: Items without calibration dates are calibrated immediately before use, or set using calibrated instruments.

## ANNEX A – TEST SETUP DETAILS

All testing is performed using the Teltest Radio **EVA**luation system (TREVA), which is configured as shown below. The Spectrum Analyser is connected to the EUT via the attenuator network for Occupied Bandwidth, Sideband Spectrum and Adjacent Channel Power Ratio testing.



END OF REPORT