

LABORATORY TEST REPORT

RADIO PERFORMANCE MEASUREMENTS

for the

TBCK4B 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: 26 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: CASTBCK4B
IC : 737A-TBCK4B

Page 1 of 87

Report Revision: 1
Issue Date: 26 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

Date	Revision	Comments
26 November 2020	1	Initial test report

INTRODUCTION

Type approval testing of the TBCK4B, 100 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 3311, 3351 and 3661 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: TBCK4B
Frequency range: 762 → 870 MHz
Transmit Power: 100 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-NAZY	18166290	dmr-3.10.00.0006 & p25-3.10.0006	2
Power Amplifier	T01-01121-NBAA	18162712	1.12.00.0001	0.06
Front Panel	T01-01110-AAAA	18184264	1.10.01.0001	0.04
Power management unit	TBA30A0-0100	18160560	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 19 → 24 November 2020, and under the following conditions:

Ambient temperature: 15°C → 30°C
Relative Humidity: 20% → 75%
Standard Test Voltage: 120 V_{AC}

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: TBCK4B

Module	Product Code	Serial Number	Firmware Version	Hardware Version
Reciter	T01-01103-NAZY	18166290	dmr-3.10.00.0006 & p25-3.10.0006	2
Power Amplifier	T01-01121-NBAA	18162712	1.12.00.0001	0.06
Front Panel	T01-01110-AAAA	18184264	1.10.01.0001	0.04
Power management unit	TBA30A0-0100	18160560	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:

1 - December 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 Ω 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)
dB Spectra	DS7D03F36U-D or N	746-806MHz	3 (5.1)
dB Spectra	DS7D06F36U-D or N	746-806MHz	6 (8.1)
dB Spectra	DS7D09F36U-D or N	746-806MHz	8 (10.1)
dB Spectra	DS7D10F36U-D or N	746-806MHz	10 (12.1)
dB Spectra	DS7A06F36U-D or N	746-869MHz	6 (8.1)
dB Spectra	DS7A08F36U-D or N	746-869MHz	8 (10.1)
dB Spectra	DS7A06F36D-D or N	746-869MHz	2 x 6 (8.1)
dB Spectra	DS7C09F36U-D or N	746-869MHz	9 (11.1)
dB Spectra	DS7C10F36U-D or N	746-869MHz	10 (12.1)
dB Spectra	DS7B12F36U-D or N	764-806MHz	12 (14.1)
dB Spectra	DS7E12F36U-D or N	794-824MHz	12 (14.1)
dB Spectra	DS8A03F36U-D or N	806-869MHz	3 (5.1)
dB Spectra	DS8A06F36U-D or N	806-869MHz	6 (8.1)
dB Spectra	DS8A09F36U-D or N	806-869MHz	9 (11.1)
dB Spectra	DS8A10F36U-D or N	806-869MHz	10 (12.1)
dB Spectra	DS8A12F36U-D or N	806-869MHz	12 (14.1)
dB Spectra	DS8A06F36D-D or N	806-869MHz	2 x 6 (8.1)
dB Spectra	DS8A09F36D-D or N	806-869MHz	2 x 9 (11.1)
dB Spectra	DS8A03F36T-D or N	806-869MHz	3 x 3 (5.1)
dB Spectra	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	100 Watts	12.5 kHz
2	762.1 MHz	794.1 MHz	10 Watts	12.5 kHz
3	768.5 MHz	794.1 MHz	100 Watts	12.5 kHz
4	768.5 MHz	794.1 MHz	10 Watts	12.5 kHz
5	774.9 MHz	806.0 MHz	100 Watts	12.5 kHz
6	774.9 MHz	806.0 MHz	10 Watts	12.5 kHz
7	850.5 MHz	806.0 MHz	100 Watts	12.5 kHz
8	850.5 MHz	806.0 MHz	10 Watts	12.5 kHz
9	851.1 MHz	806.0 MHz	100 Watts	12.5 kHz
10	851.1 MHz	806.0 MHz	10 Watts	12.5 kHz
11	853.9 MHz	823.9 MHz	100 Watts	12.5 kHz
12	853.9 MHz	823.9 MHz	10 Watts	12.5 kHz
13	854.1 MHz	823.9 MHz	100 Watts	12.5 kHz
14	854.1 MHz	823.9 MHz	10 Watts	12.5 kHz
15	862.1 MHz	823.9 MHz	100 Watts	12.5 kHz
16	862.1 MHz	823.9 MHz	10 Watts	12.5 kHz
17	868.9 MHz	823.9 MHz	100 Watts	12.5 kHz
18	868.9 MHz	823.9 MHz	10 Watts	12.5 kHz
19	762.1 MHz	794.1 MHz	100 Watts	25.0 kHz
20	762.1 MHz	794.1 MHz	10 Watts	25.0 kHz
21	768.5 MHz	794.1 MHz	100 Watts	25.0 kHz
22	768.5 MHz	794.1 MHz	10 Watts	25.0 kHz
23	774.9 MHz	806.0 MHz	100 Watts	25.0 kHz
24	774.9 MHz	806.0 MHz	10 Watts	25.0 kHz
25	850.5 MHz	806.0 MHz	100 Watts	25.0 kHz
26	850.5 MHz	806.0 MHz	10 Watts	25.0 kHz
27	851.1 MHz	806.0 MHz	100 Watts	25.0 kHz
28	851.1 MHz	806.0 MHz	10 Watts	25.0 kHz
29	853.9 MHz	823.9 MHz	100 Watts	25.0 kHz
30	853.9 MHz	823.9 MHz	10 Watts	25.0 kHz
31	854.1 MHz	823.9 MHz	100 Watts	25.0 kHz
32	854.1 MHz	823.9 MHz	10 Watts	25.0 kHz
33	862.1 MHz	823.9 MHz	100 Watts	25.0 kHz
34	862.1 MHz	823.9 MHz	10 Watts	25.0 kHz
35	868.9 MHz	823.9 MHz	100 Watts	25.0 kHz
36	868.9 MHz	823.9 MHz	10 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	11K0F3E	16K0F3E
FFSK	7K60F2D	-
DMR Digital Voice / Data	8K00FXW	-
DMR Digital Data	8K00FXD	-

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
M = 3.0 kHz
D = 2.5 kHz
 $B_n = (2 \times 3.0) + (2 \times 2.5) \times 1$
= 11.0 kHz

Emission Designator
11K0F3E
F3E represents an FM voice transmission

Analogue Voice 25.0 kHz Channel Spacing

Necessary bandwidth
M = 3.0 kHz
D = 5.0 kHz
 $B_n = (2 \times 3.0) + (2 \times 5.0) \times 1$
= 16.0 kHz

Emission Designator
16K0F3E
F3E represents an FM voice transmission

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

Necessary bandwidth
M = 1.8 kHz
D = 2.0 kHz
 $B_n = (2 \times 1.8) + (2 \times 2.0) \times 1$
= 7.6 kHz

Emission Designator
7K60F2D
F2D represents a FM data transmission with the use of a modulating sub carrier

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
= 8.0 kHz

Emission Designator
8K00FXW
FXW represents FM combination of data and telephony.

Digital Data 12.5 kHz Channel Spacing – 7K60FXD

99% bandwidth
= 8.0 kHz

Emission Designator
8K00FXD
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:

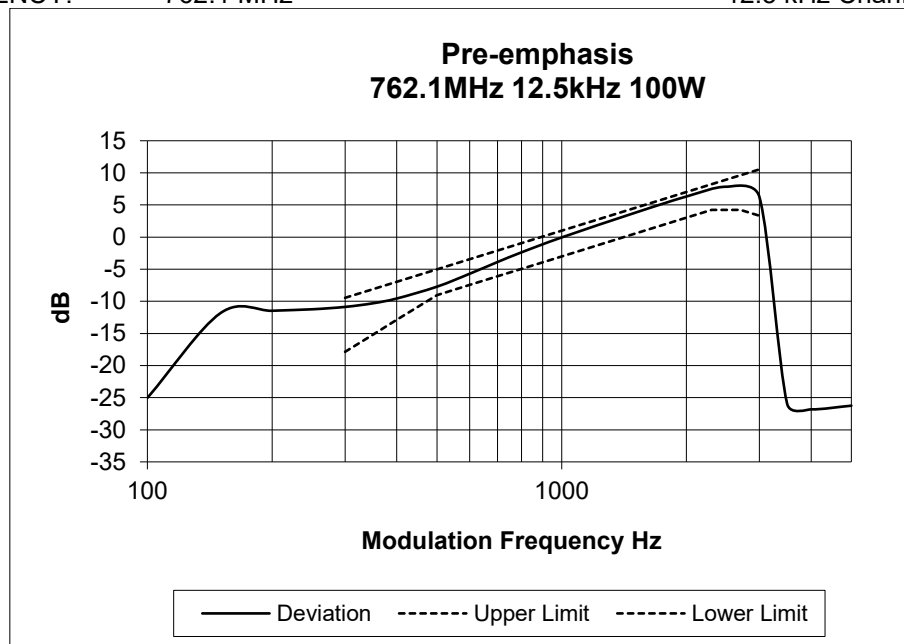
See the plots on the following pages for 12.5 kHz and 25.0 kHz channel spacings tested at 100 W transmit power.

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

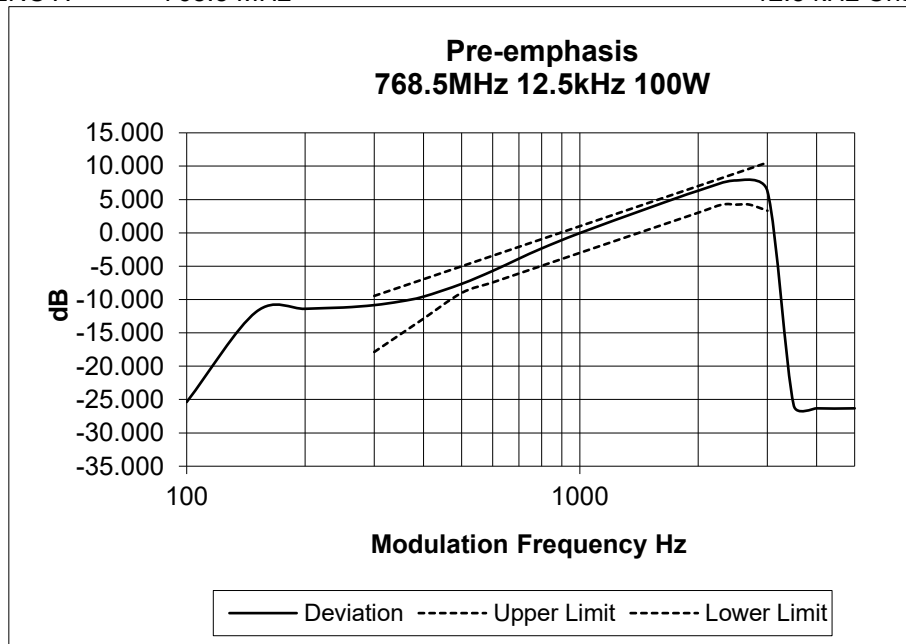


Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 768.5 MHz

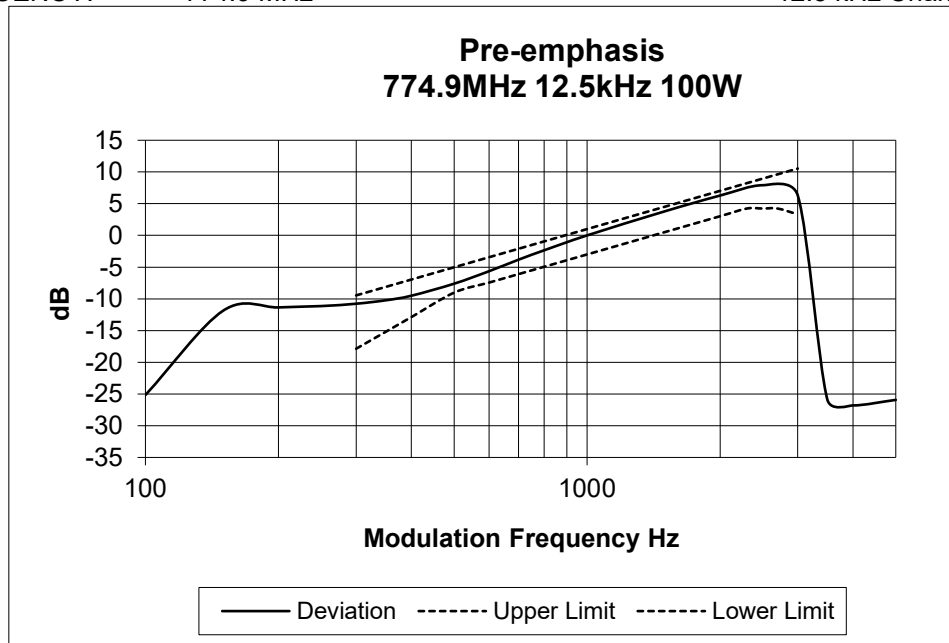
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 774.9 MHz

12.5 kHz Channel Spacing

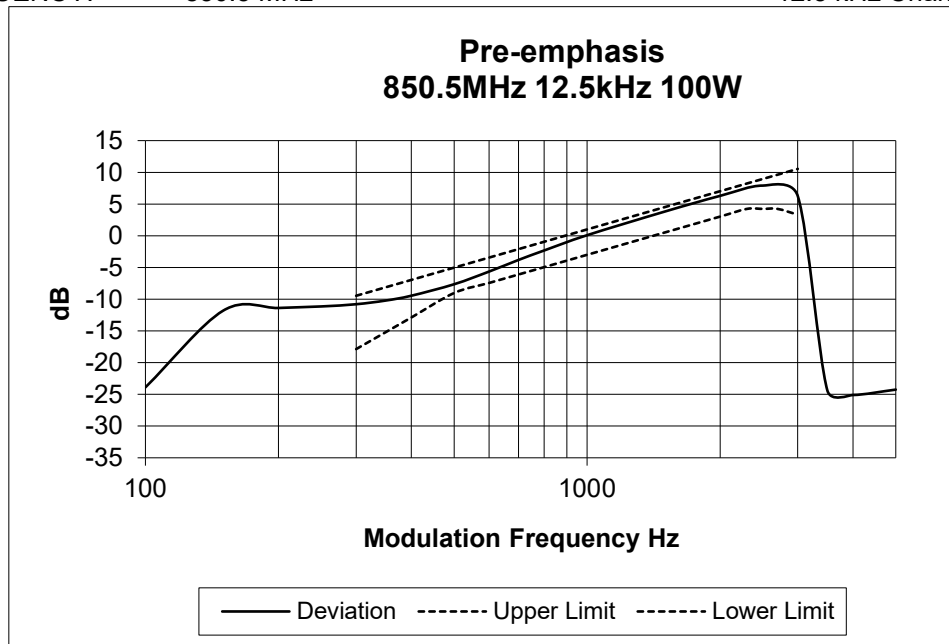


Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 850.5 MHz

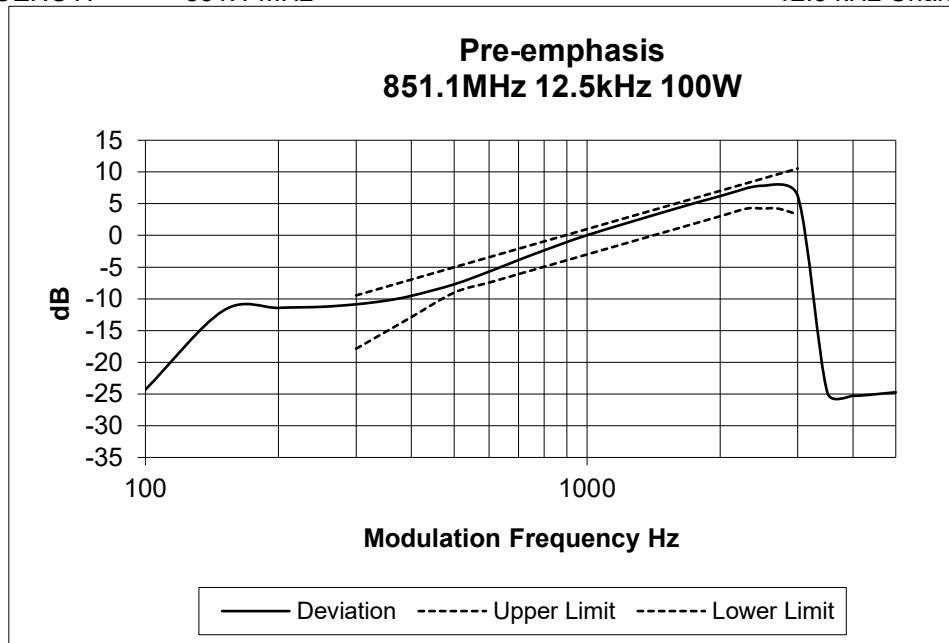
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 851.1 MHz

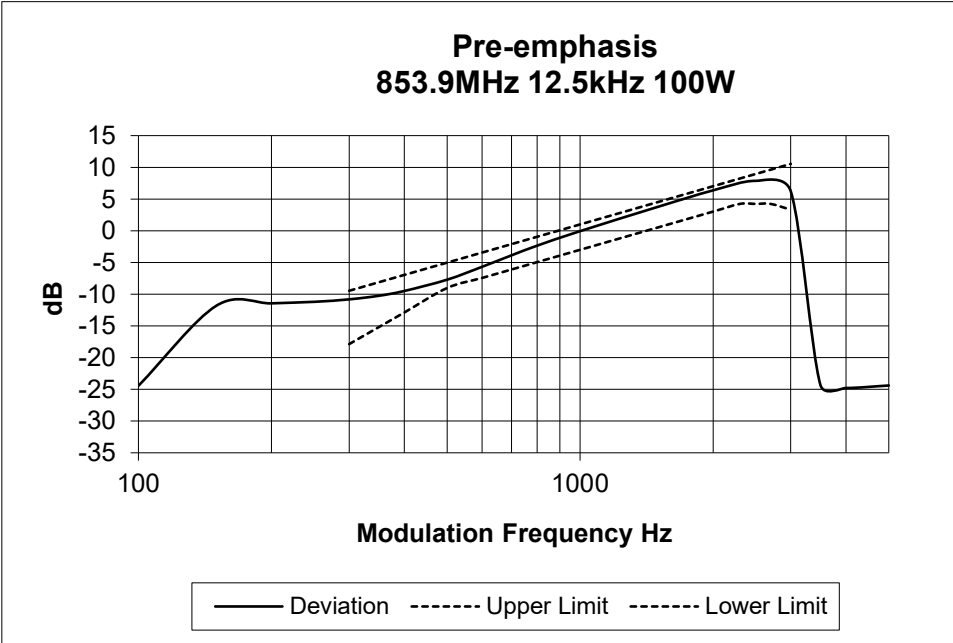
12.5 kHz Channel Spacing



Transmitter Audio Frequency Response – Pre-emphasis

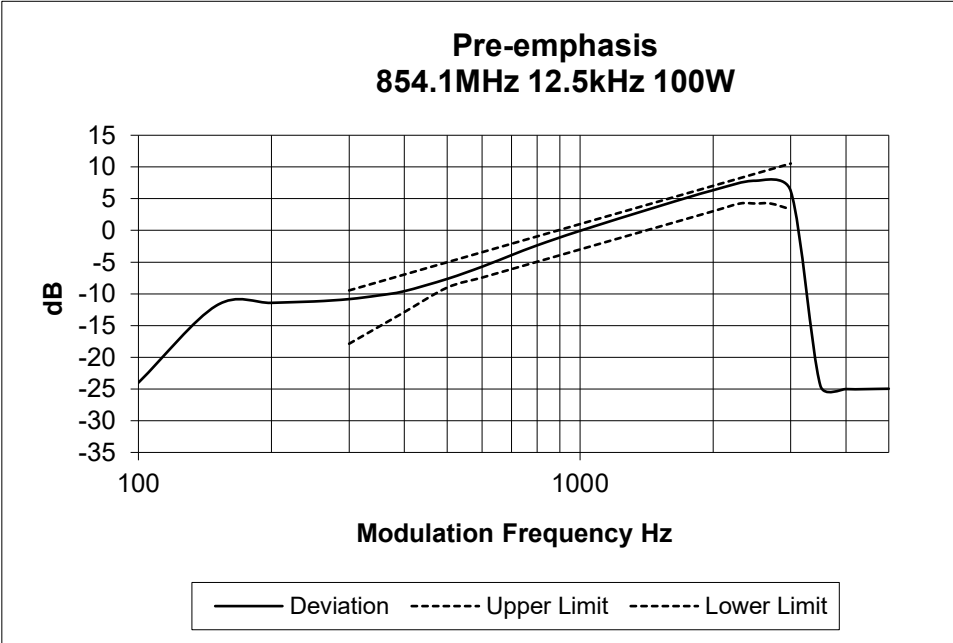
SPECIFICATION: FCC CFR 2.1047 (a)

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

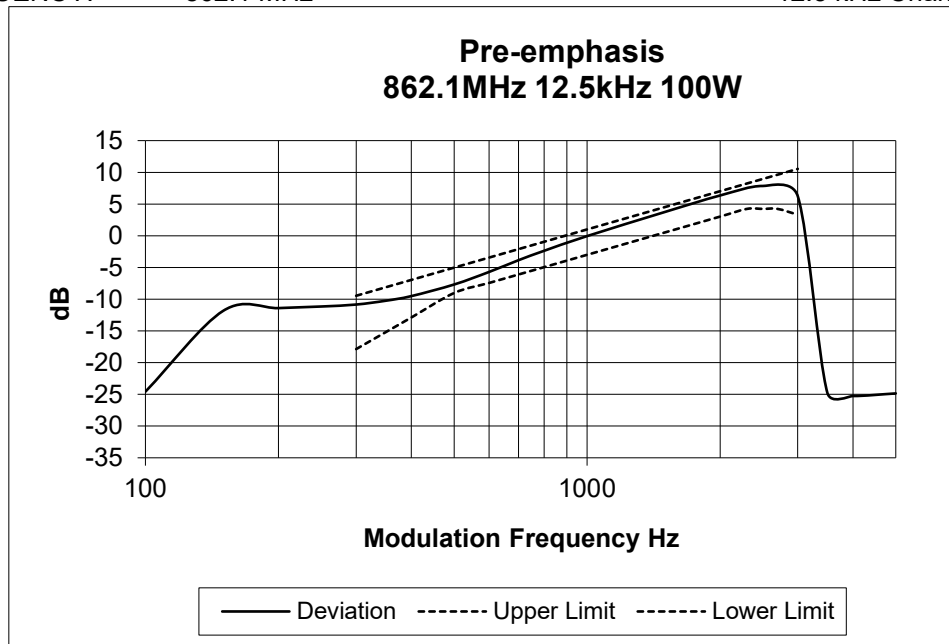


Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 862.1 MHz

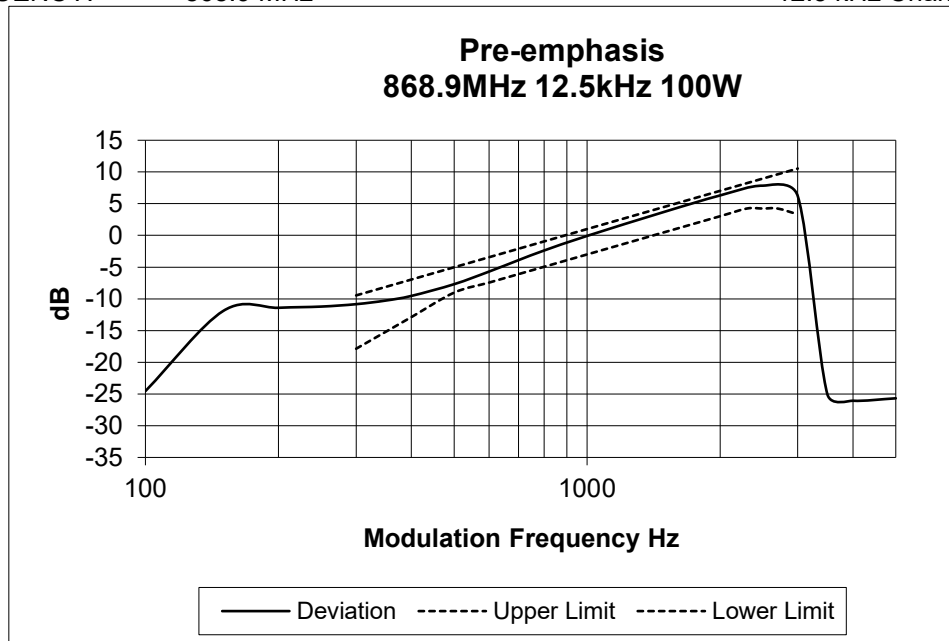
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 868.9 MHz

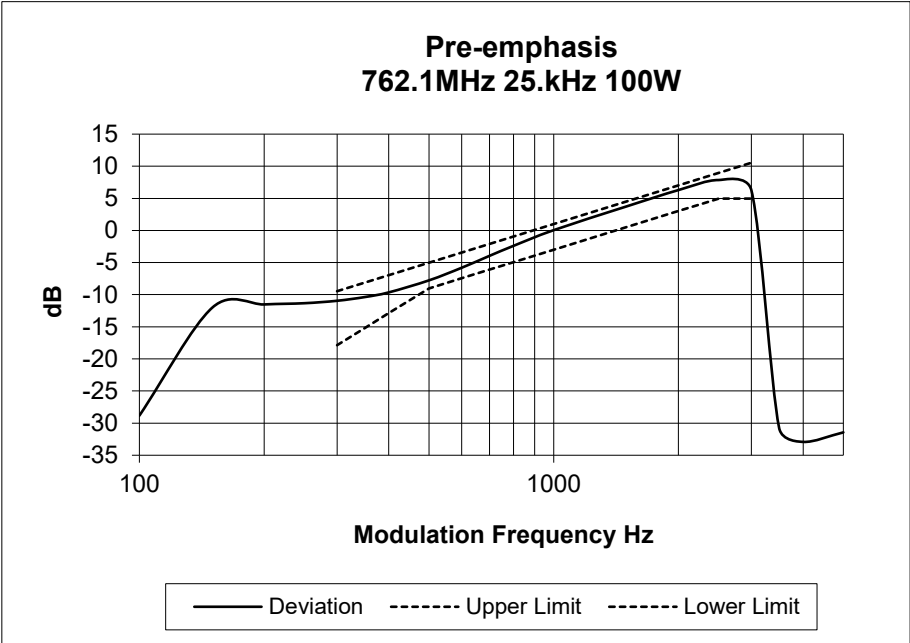
12.5 kHz Channel Spacing



Transmitter Audio Frequency Response – Pre-emphasis

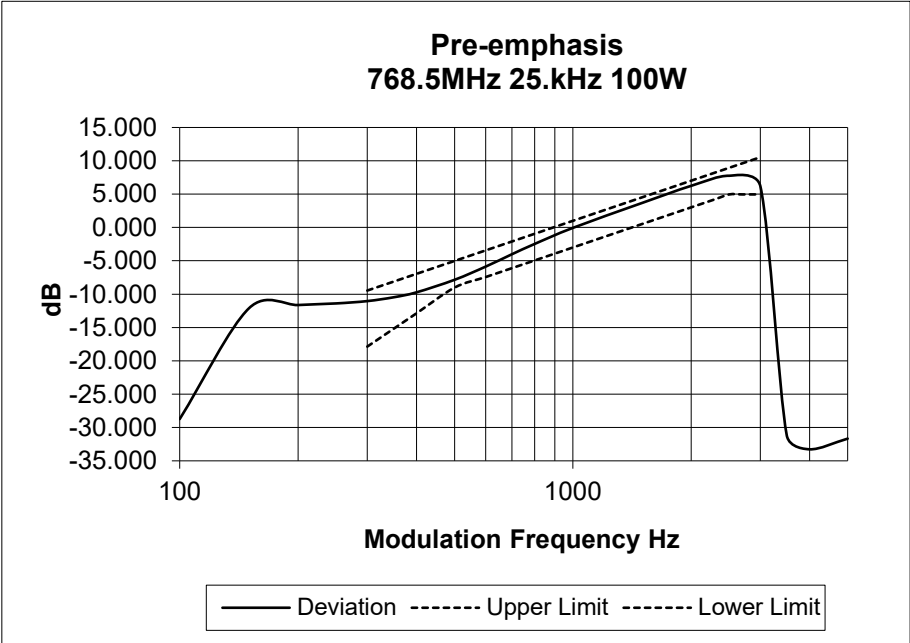
SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 762.1 MHz 25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

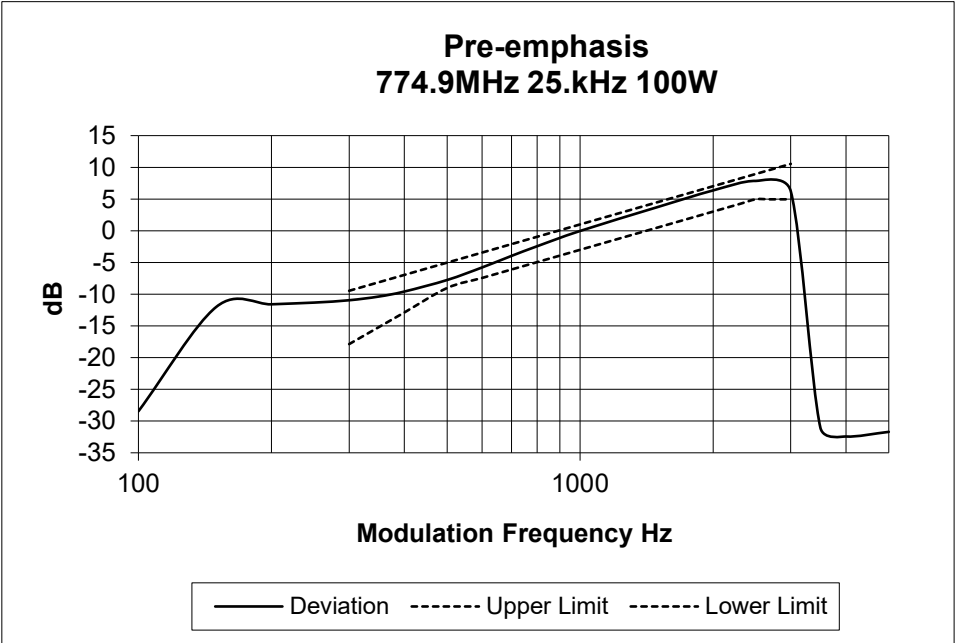
Tx FREQUENCY: 768.5 MHz 25.0 kHz Channel Spacing



Transmitter Audio Frequency Response – Pre-emphasis

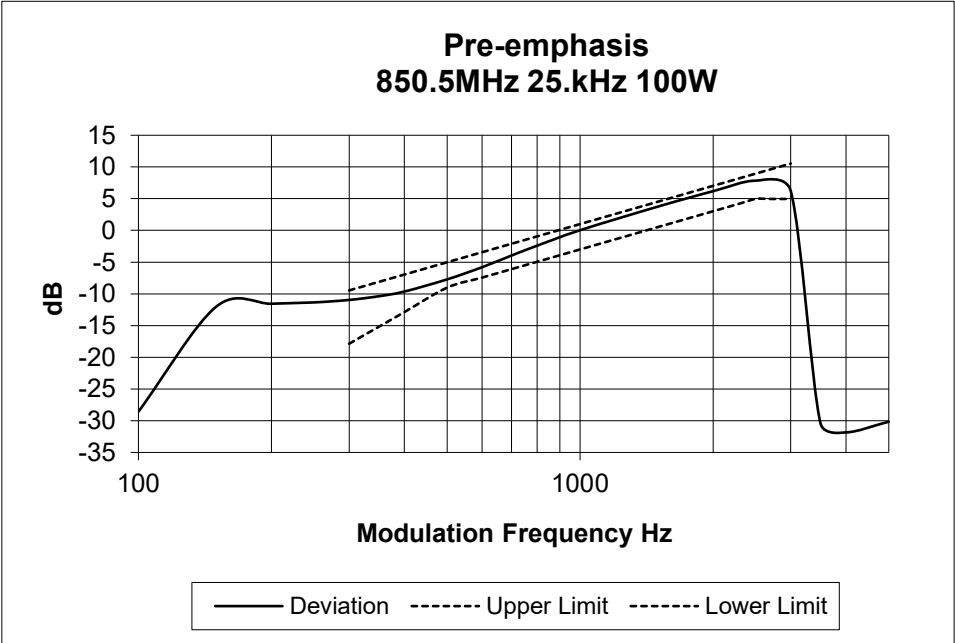
SPECIFICATION: FCC CFR 2.1047 (a)

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

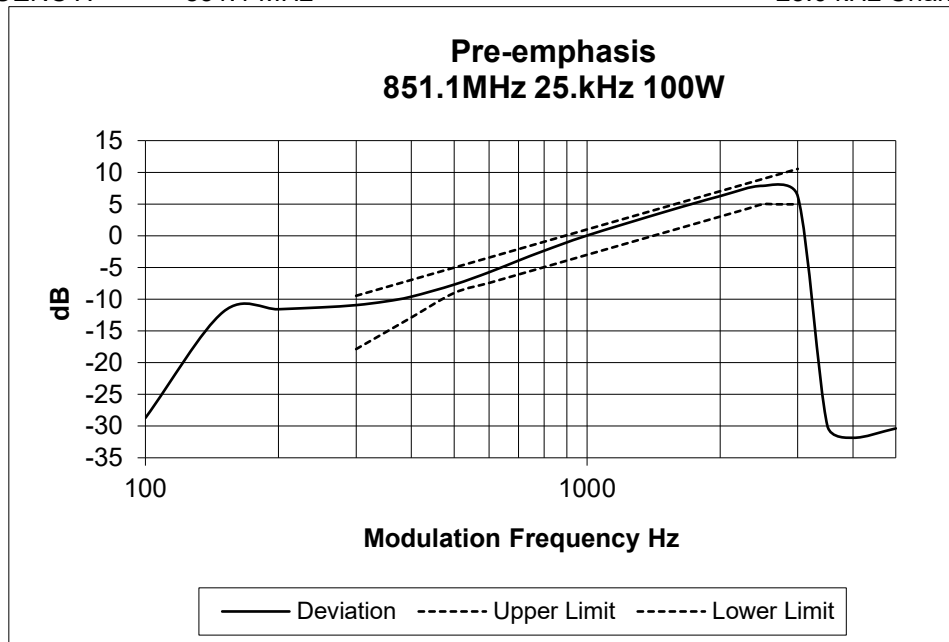


Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 851.1 MHz

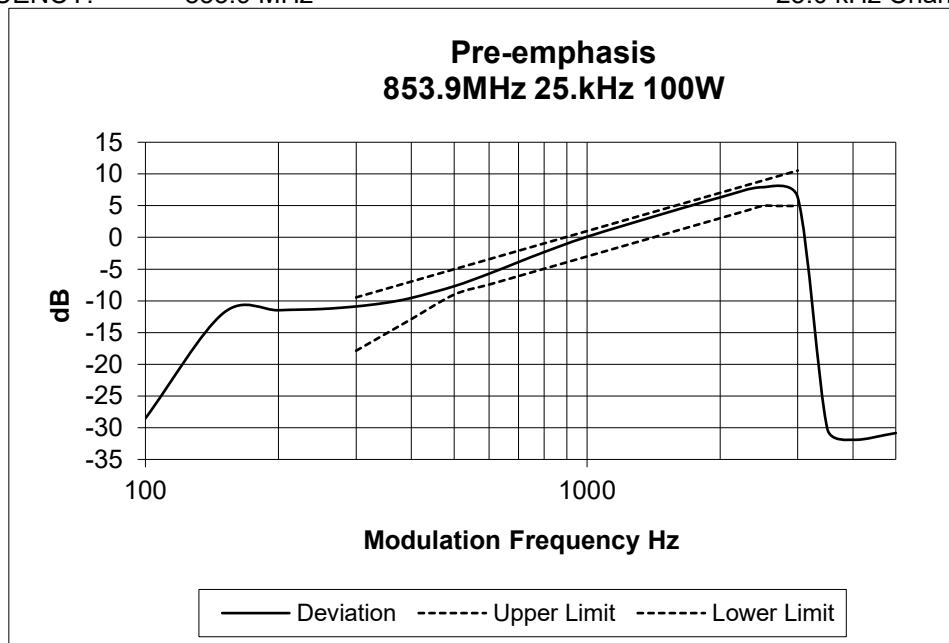
25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 853.9 MHz

25.0 kHz Channel Spacing

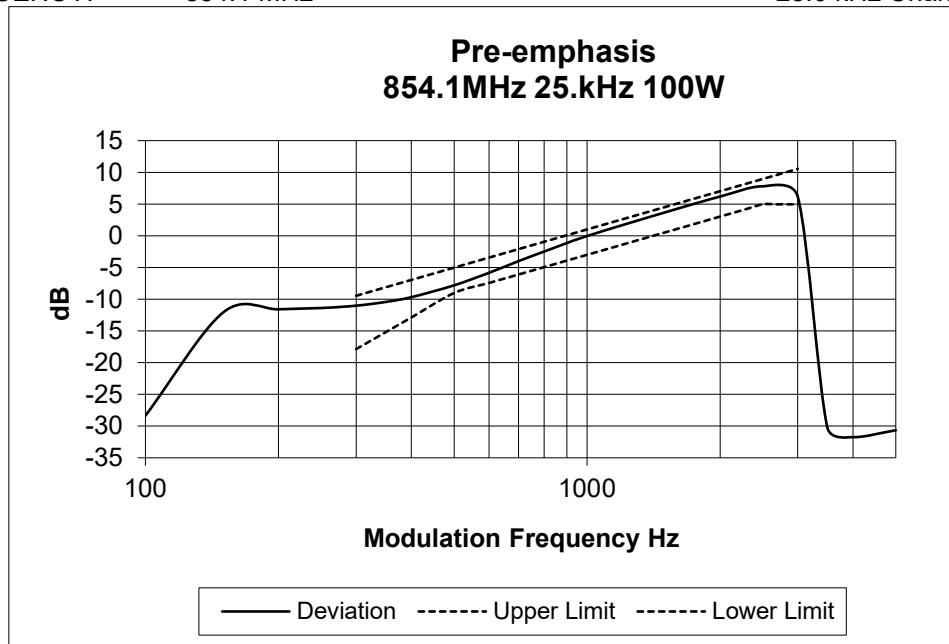


Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 854.1 MHz

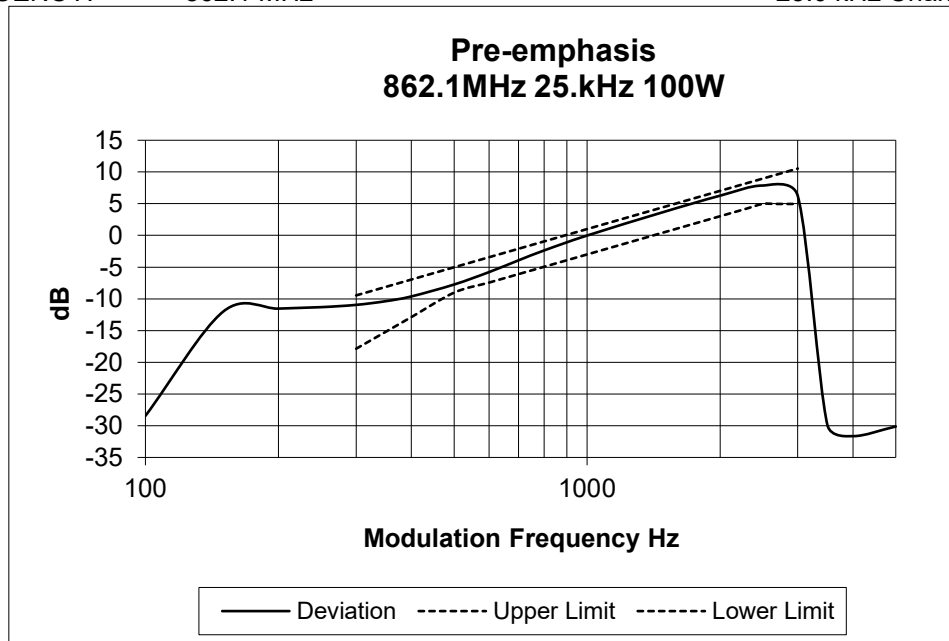
25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 862.1 MHz

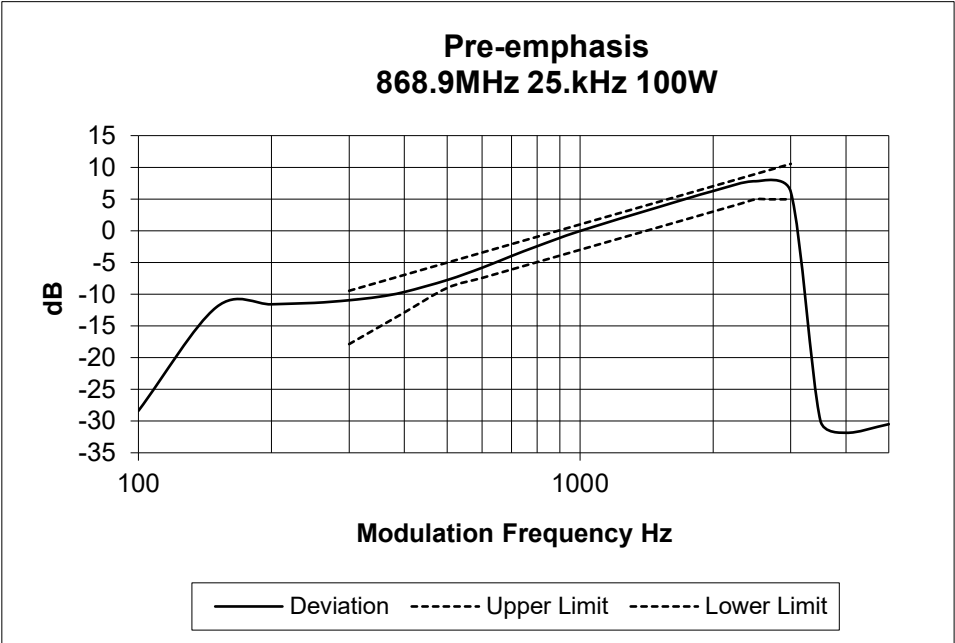
25.0 kHz Channel Spacing



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.

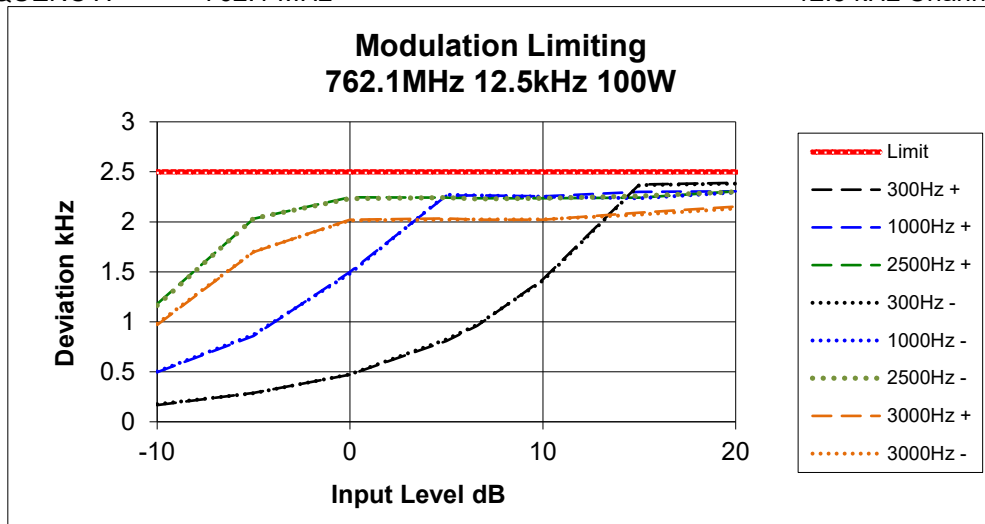
LIMIT CLAUSE: TIA/EIA-603E 1.3.4.4

MEASUREMENT UNCERTAINTY: $\pm 1.5 \%$

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 762.1 MHz

12.5 kHz Channel Spacing

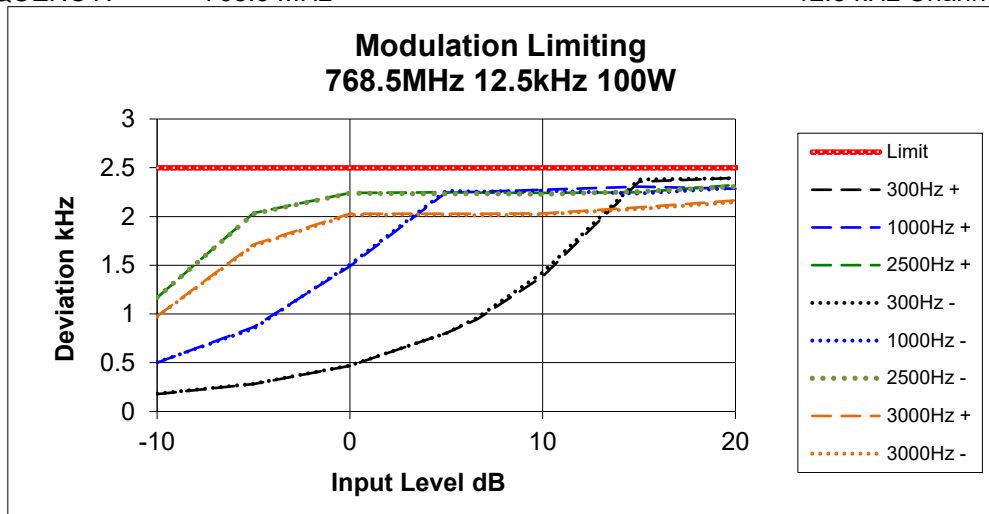


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 768.5 MHz

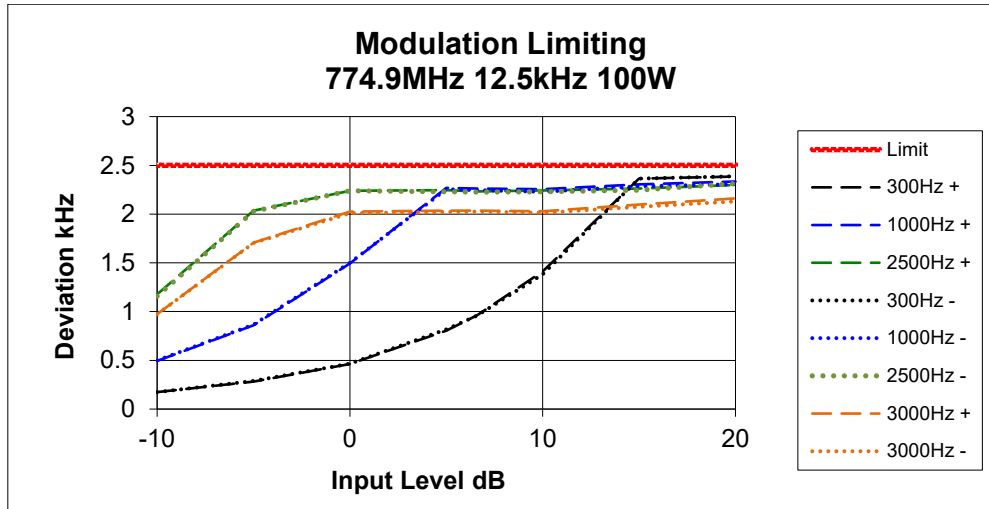
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 774.9 MHz

12.5 kHz Channel Spacing

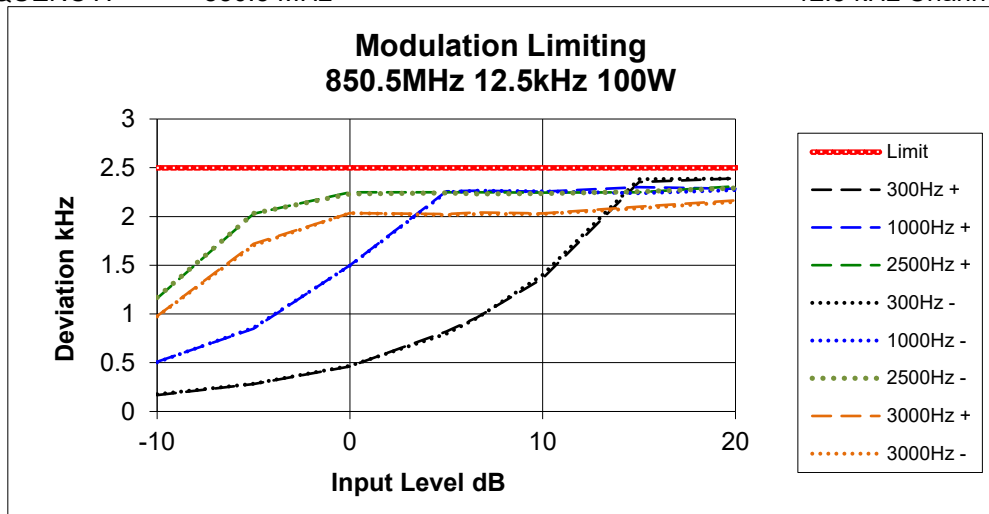


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 850.5 MHz

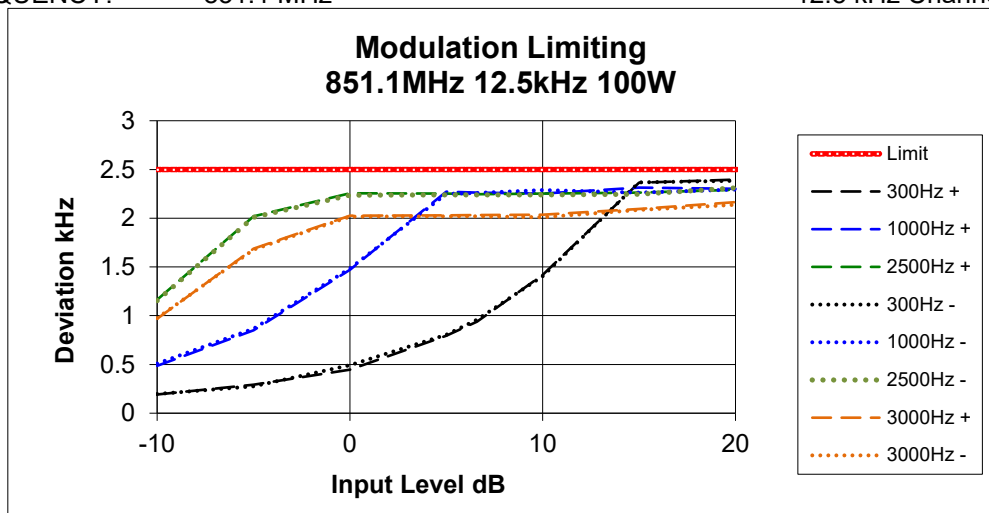
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 851.1 MHz

12.5 kHz Channel Spacing

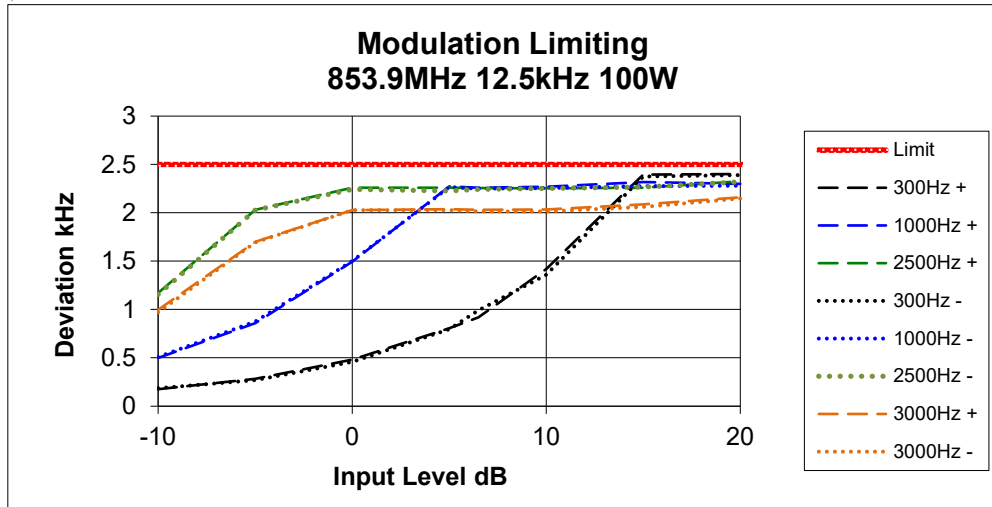


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 853.9 MHz

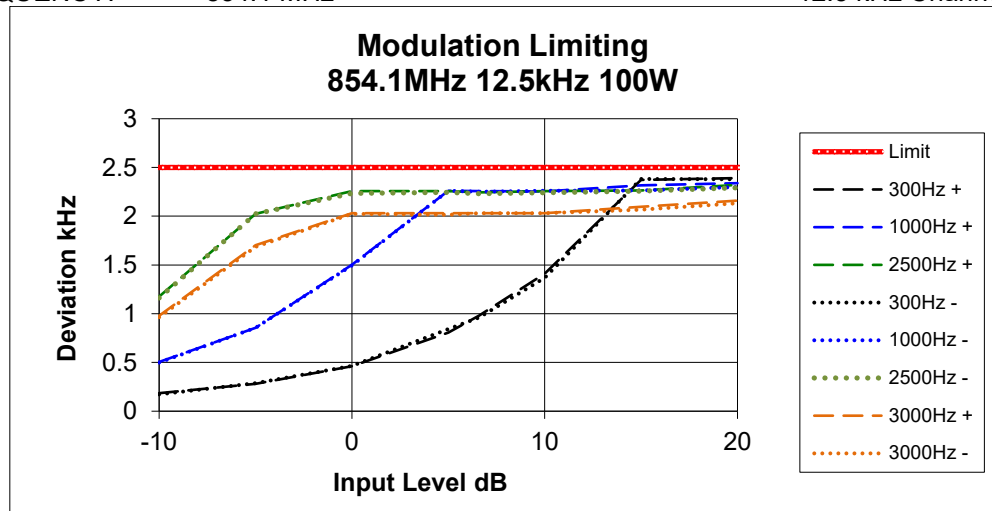
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 854.1 MHz

12.5 kHz Channel Spacing

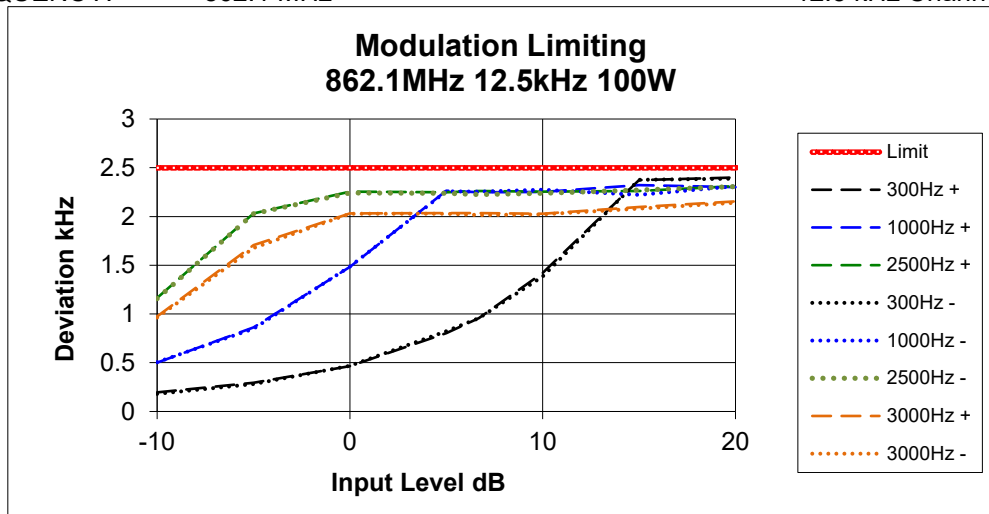


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 862.1 MHz

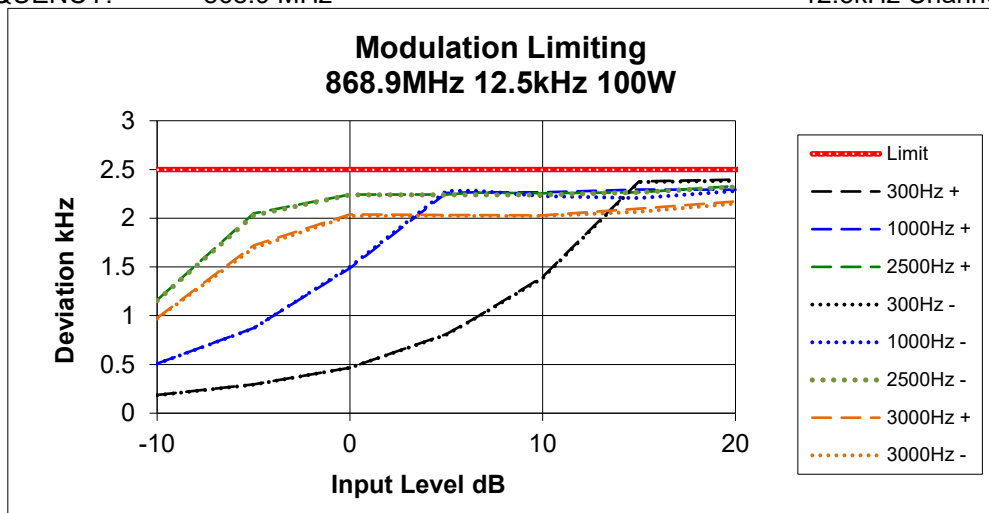
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 868.9 MHz

12.5kHz Channel Spacing

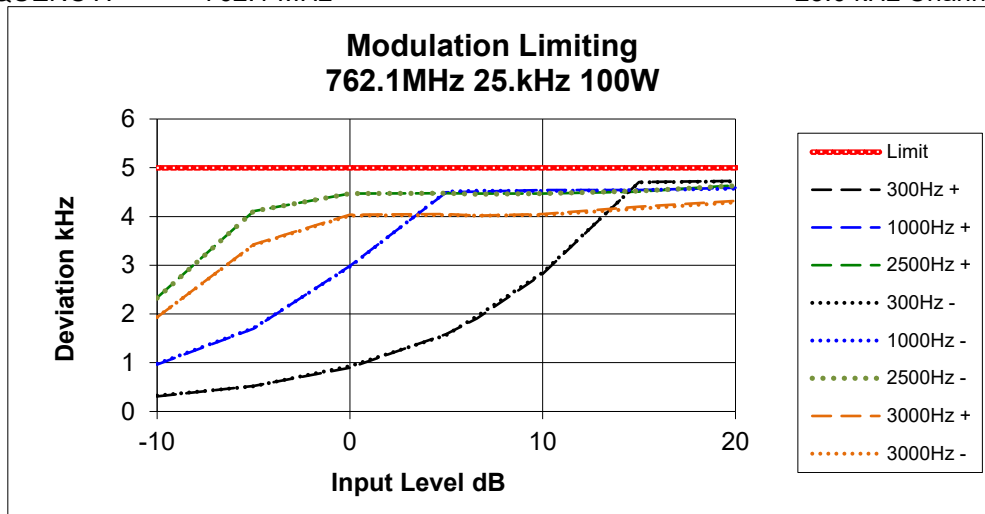


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 762.1 MHz

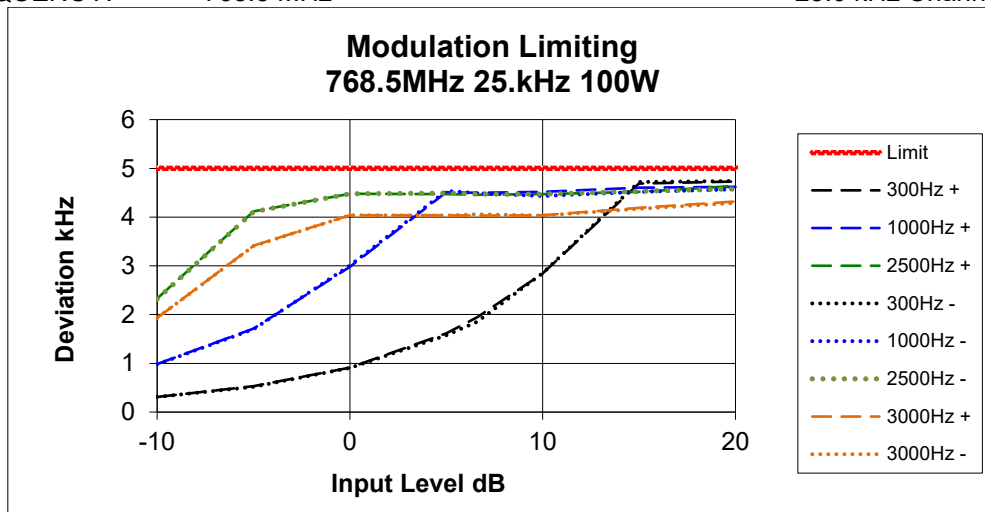
25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 768.5 MHz

25.0 kHz Channel Spacing

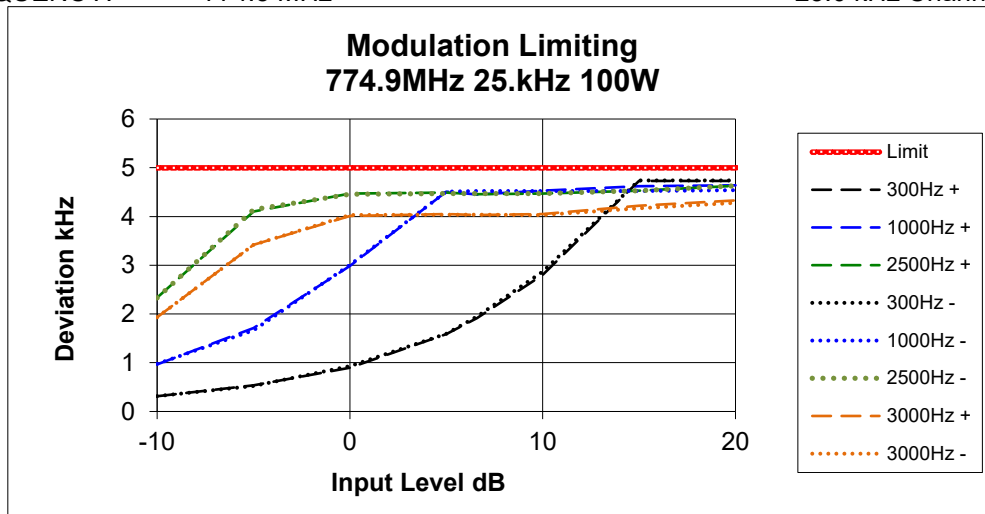


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 774.5 MHz

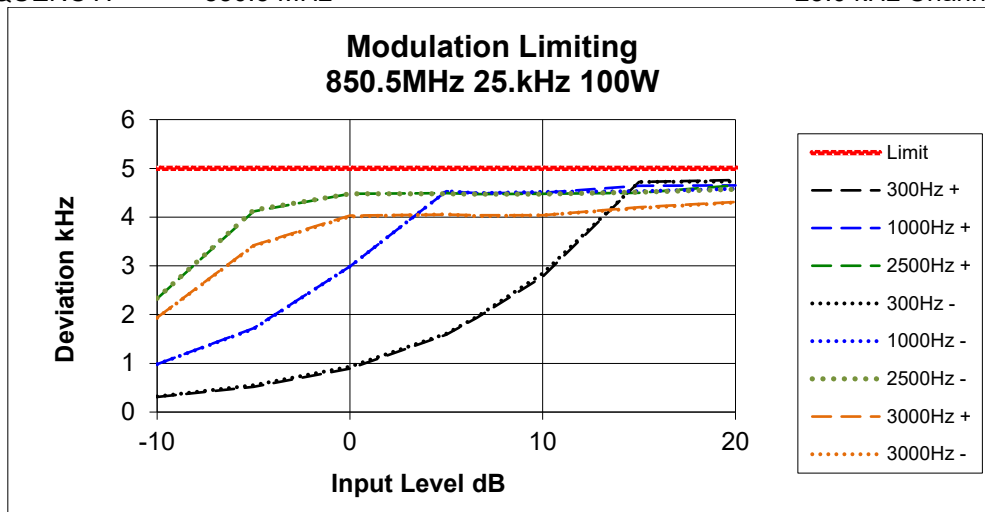
25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 850.5 MHz

25.0 kHz Channel Spacing

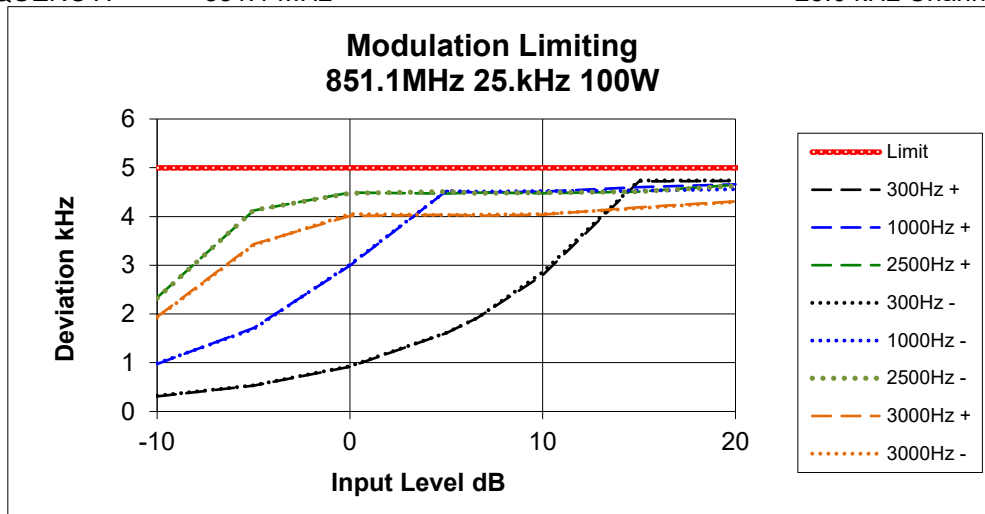


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 851.1 MHz

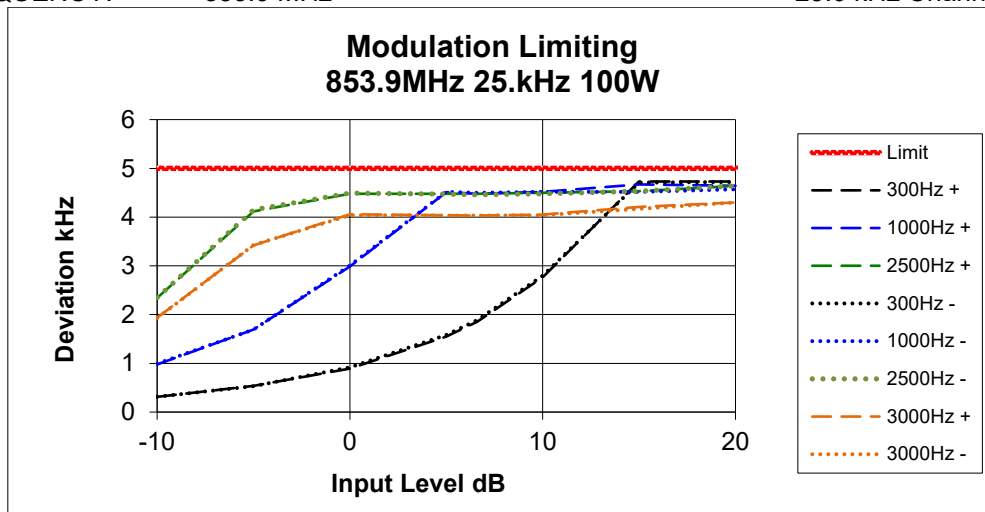
25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 853.9 MHz

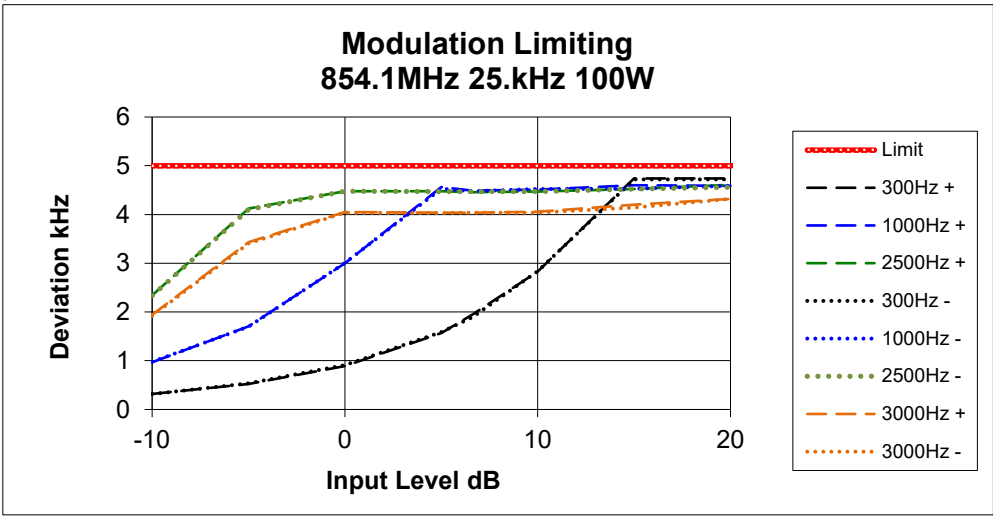
25.0 kHz Channel Spacing



Transmitter Modulation Limiting

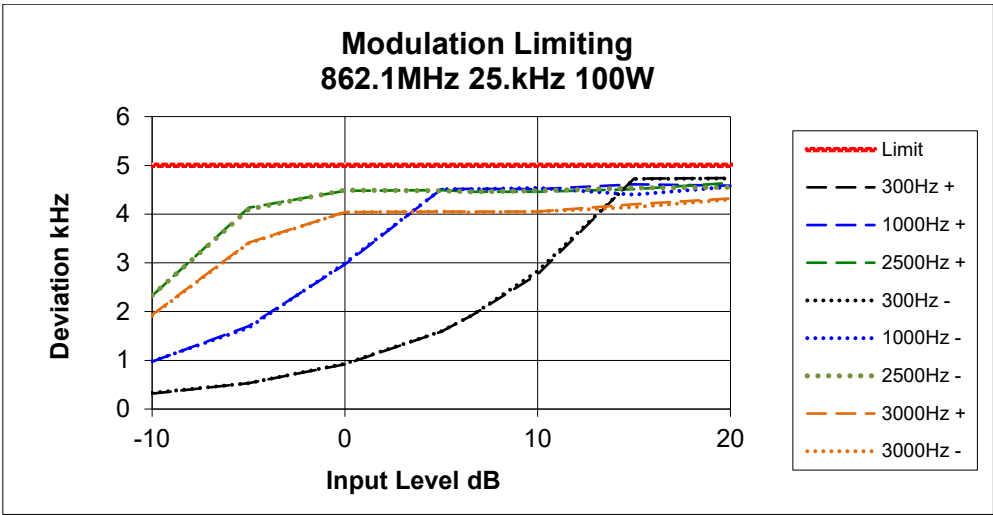
SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 854.1 MHz 25.0 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

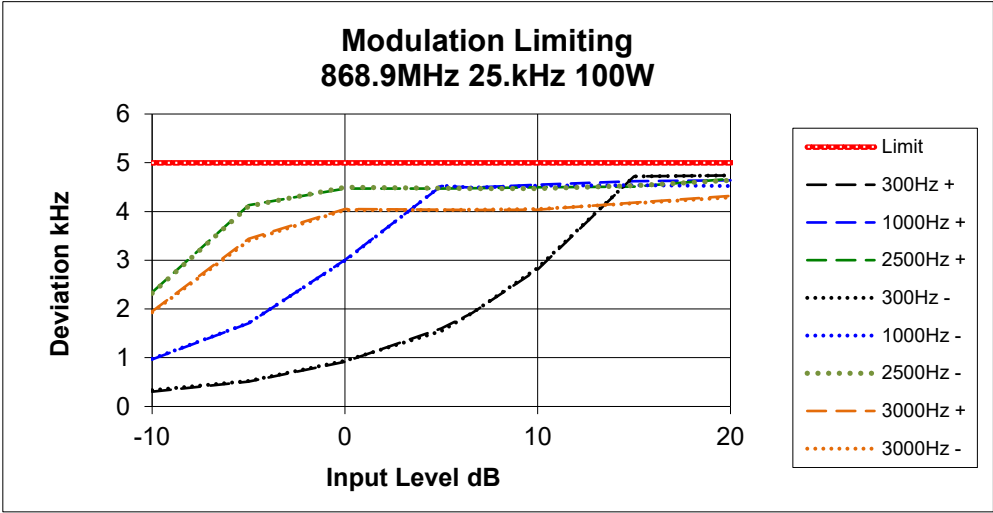
Tx FREQUENCY: 862.1 MHz 25.0 kHz Channel Spacing



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:

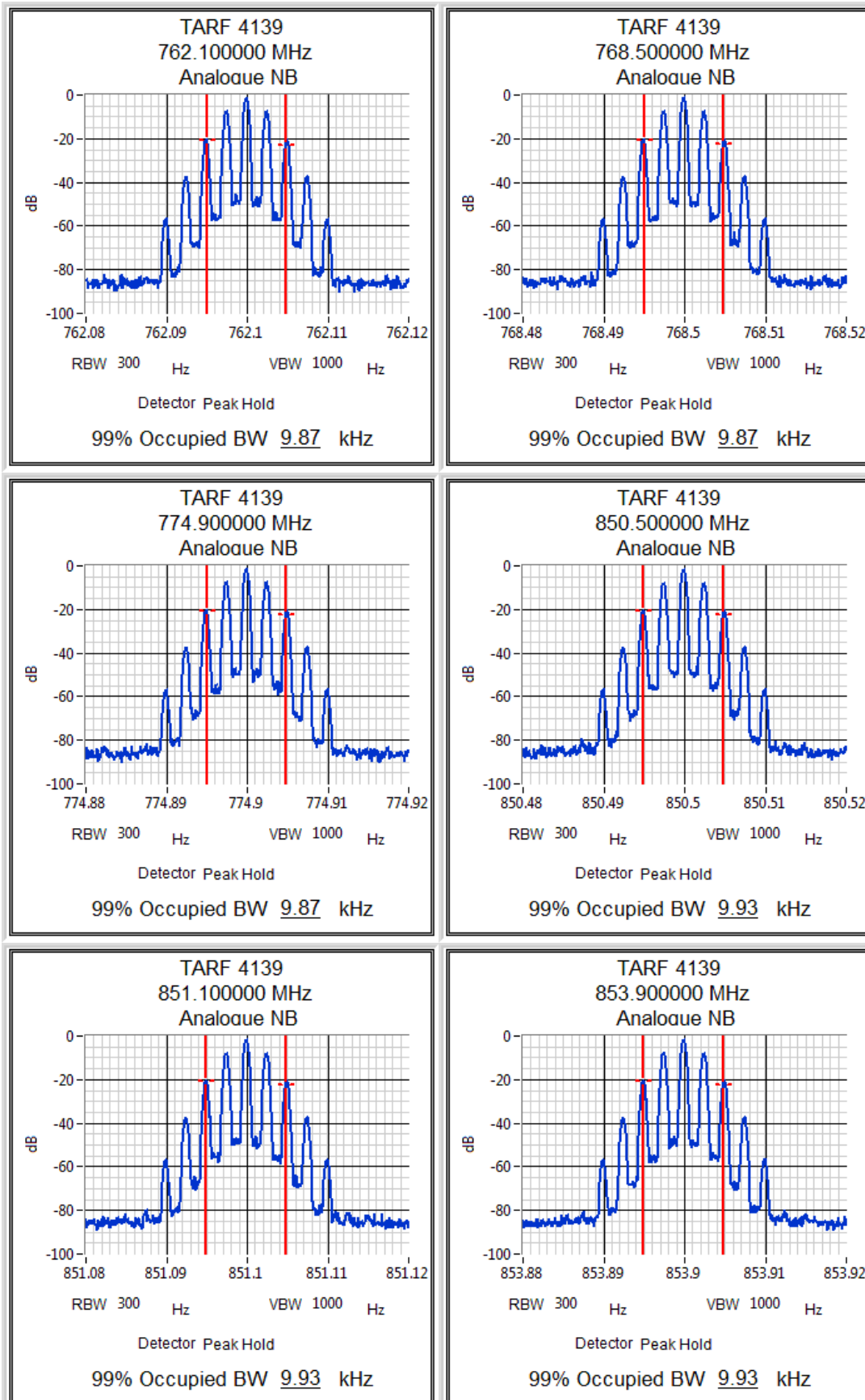
1. Refer Annex A for Equipment Set up.
2. For analogue measurements: The EUT was modulated by a 2500 Hz tone at an input level 16 dB above a level that produced 50% deviation. The input level was established at the frequency of maximum response of the audio modulating circuit.
For Data measurements: 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	9.87	-	7.00	7.80
768.5 MHz	12.5	9.87	-	6.93	7.87
774.9 MHz	12.5	9.87	-	6.93	7.80
850.5 MHz	12.5	9.93	-	7.00	7.80
851.1 MHz	12.5	9.93	-	6.93	7.73
853.9 MHz	12.5	9.93	-	6.87	7.80
854.1 MHz	12.5	9.93	-	6.93	7.80
862.1 MHz	12.5	9.93	-	6.93	7.73
868.9 MHz	12.5	9.93	-	6.93	7.73
762.1 MHz	25.0	-	14.9	-	-
768.5 MHz	25.0	-	14.9	-	-
774.9 MHz	25.0	-	14.9	-	-
850.5 MHz	25.0	-	14.9	-	-
851.1 MHz	25.0	-	15.0	-	-
853.9 MHz	25.0	-	14.9	-	-
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

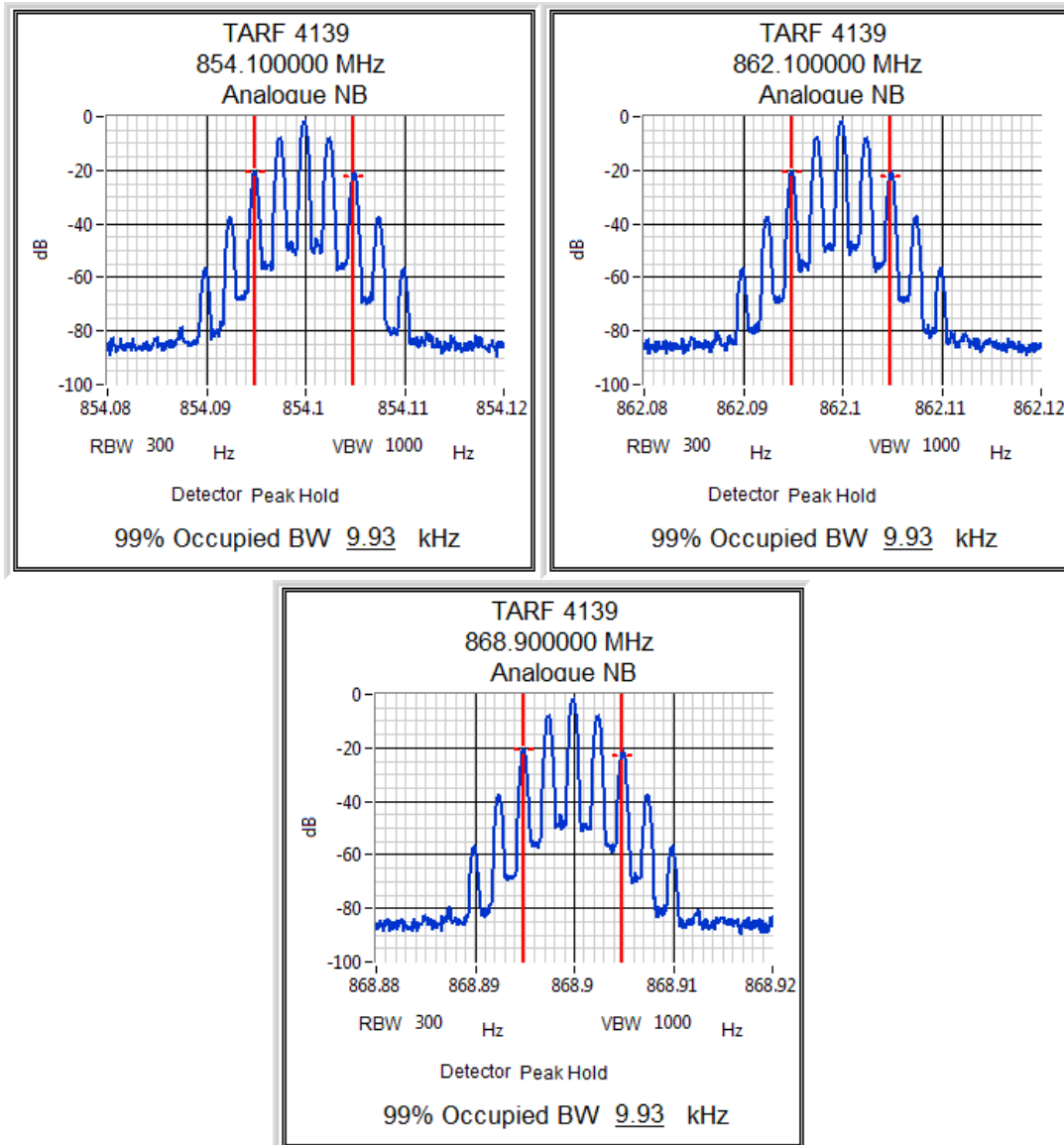
Transmitter Occupied (99%) Bandwidth

Channel 1-6 100 watts 12.5 kHz ch spacing Analogue Modulation



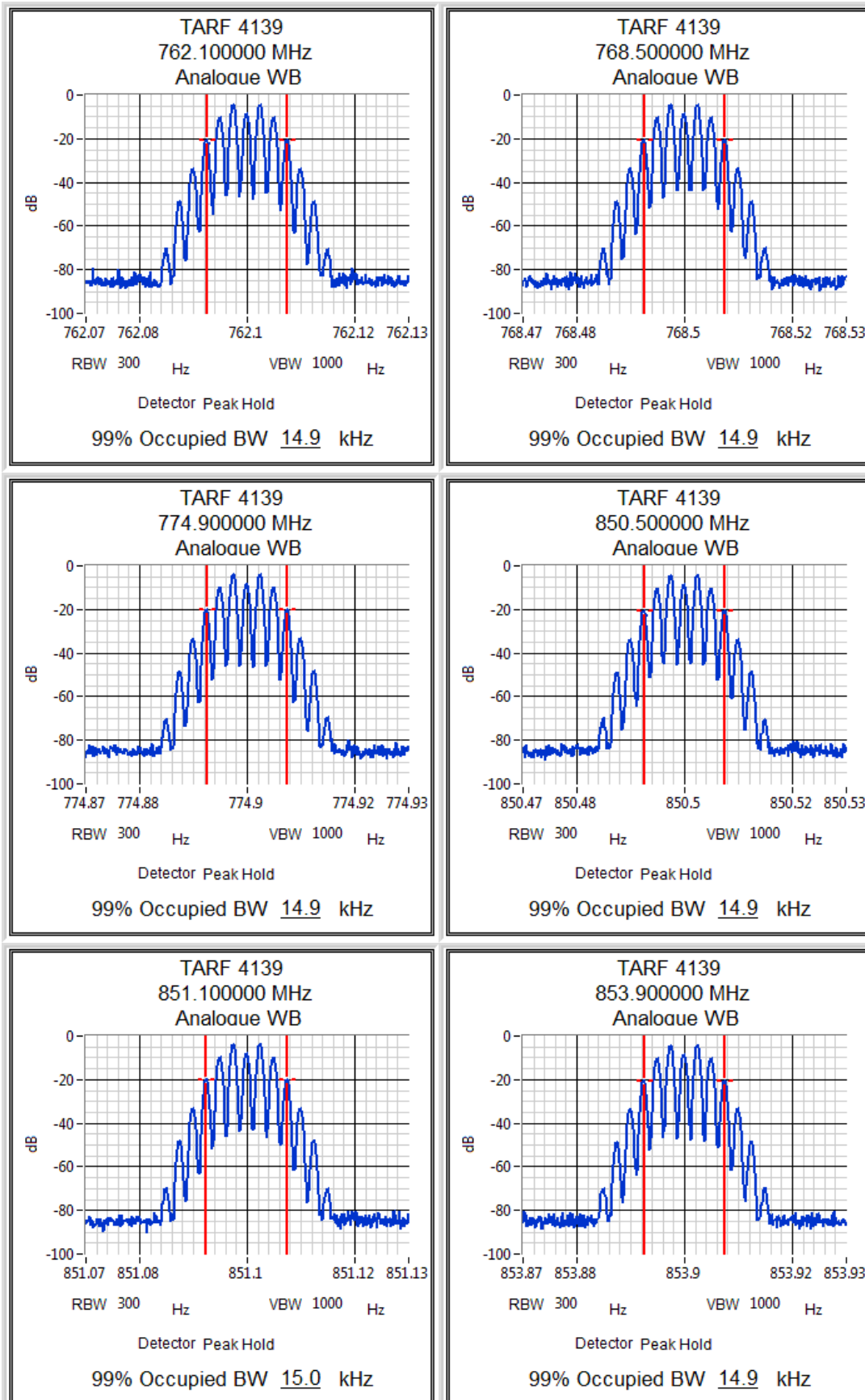
Transmitter Occupied (99%) Bandwidth

Channel 7-9 100 watts 12.5 kHz ch spacing Analogue Modulation



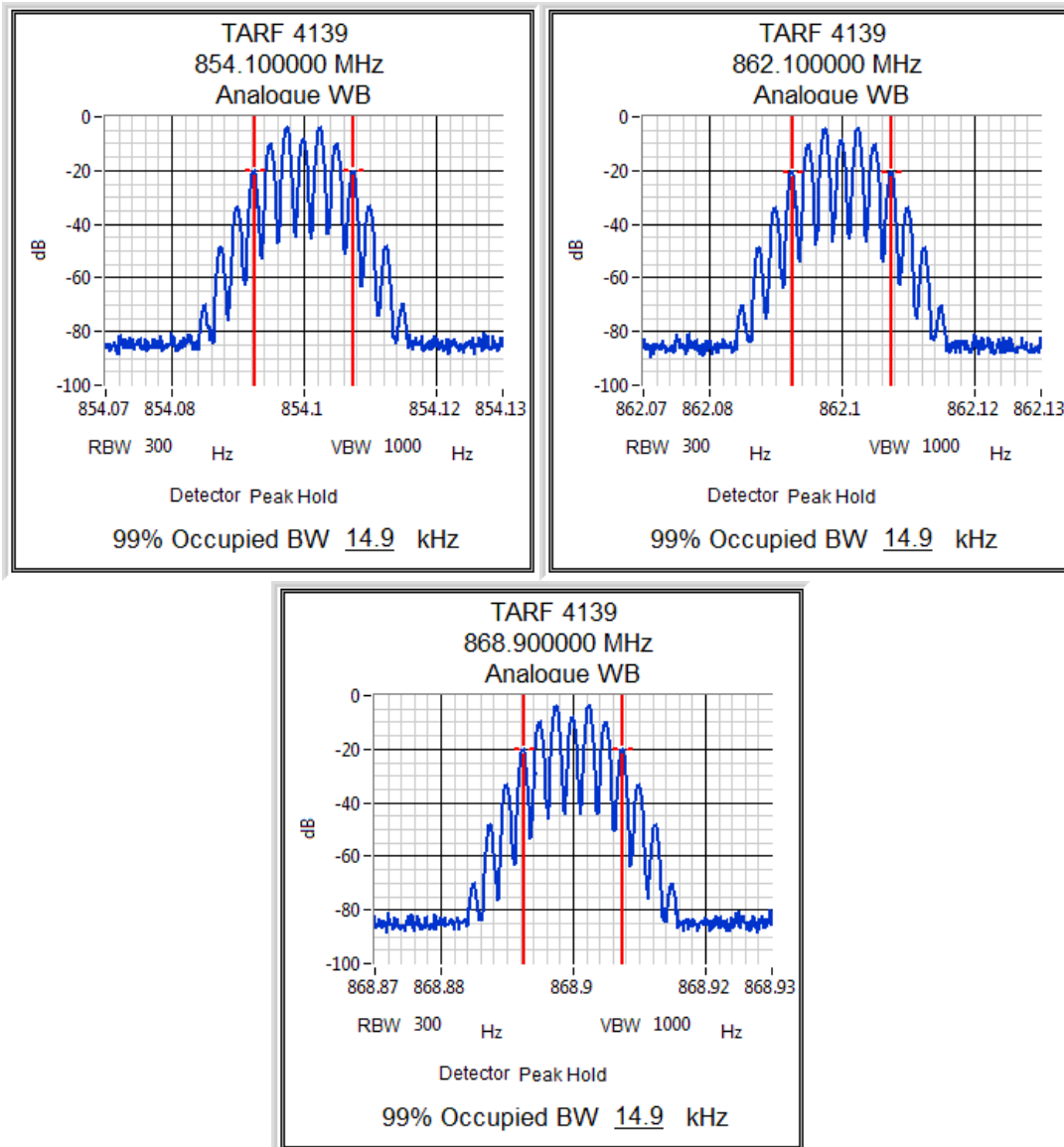
Transmitter Occupied (99%) Bandwidth

Channel 1-6 100 watts 25.0 kHz ch spacing Analogue Modulation



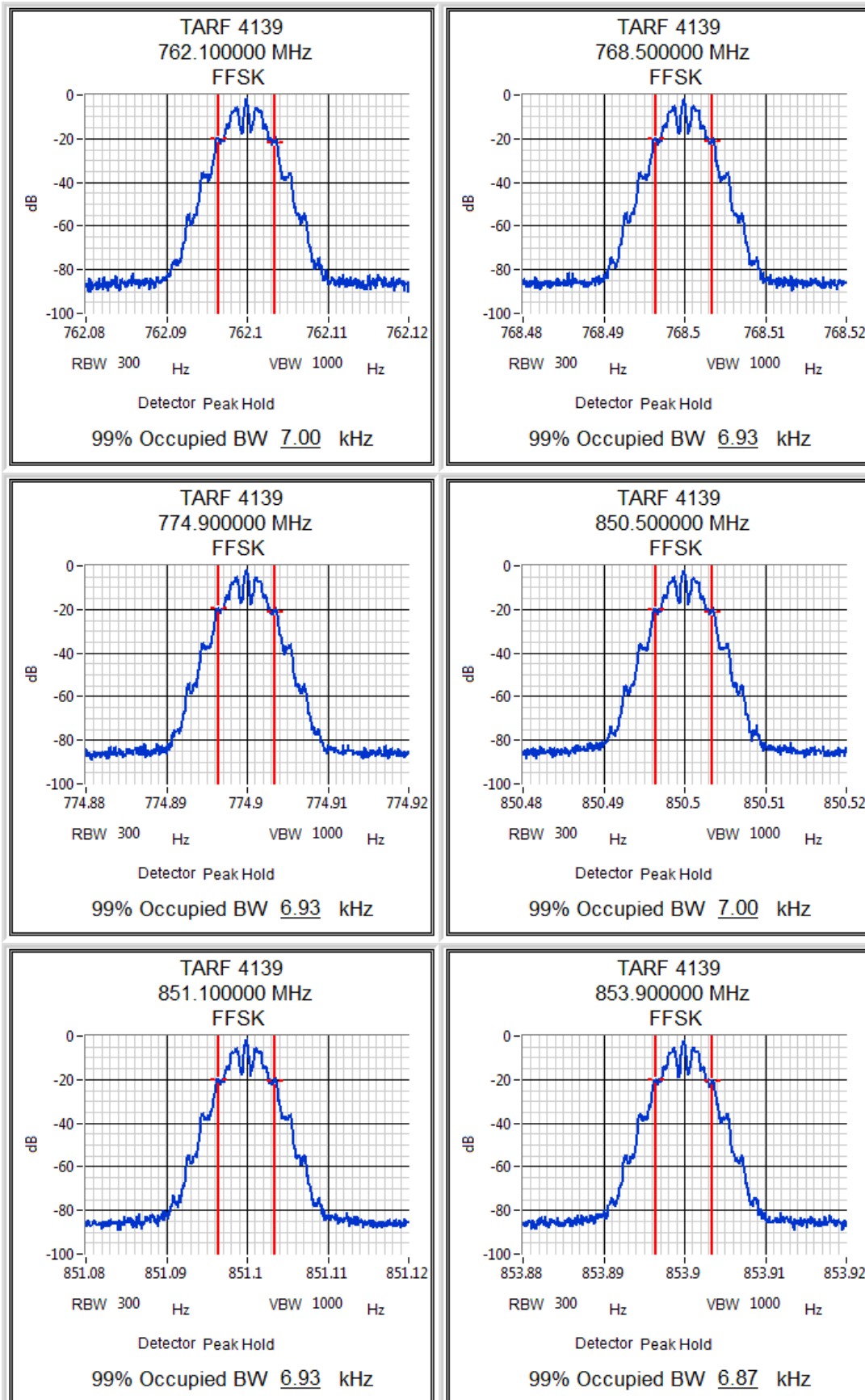
Transmitter Occupied (99%) Bandwidth

Channel 7-9 100 watts 25.0 kHz ch spacing Analogue Modulation



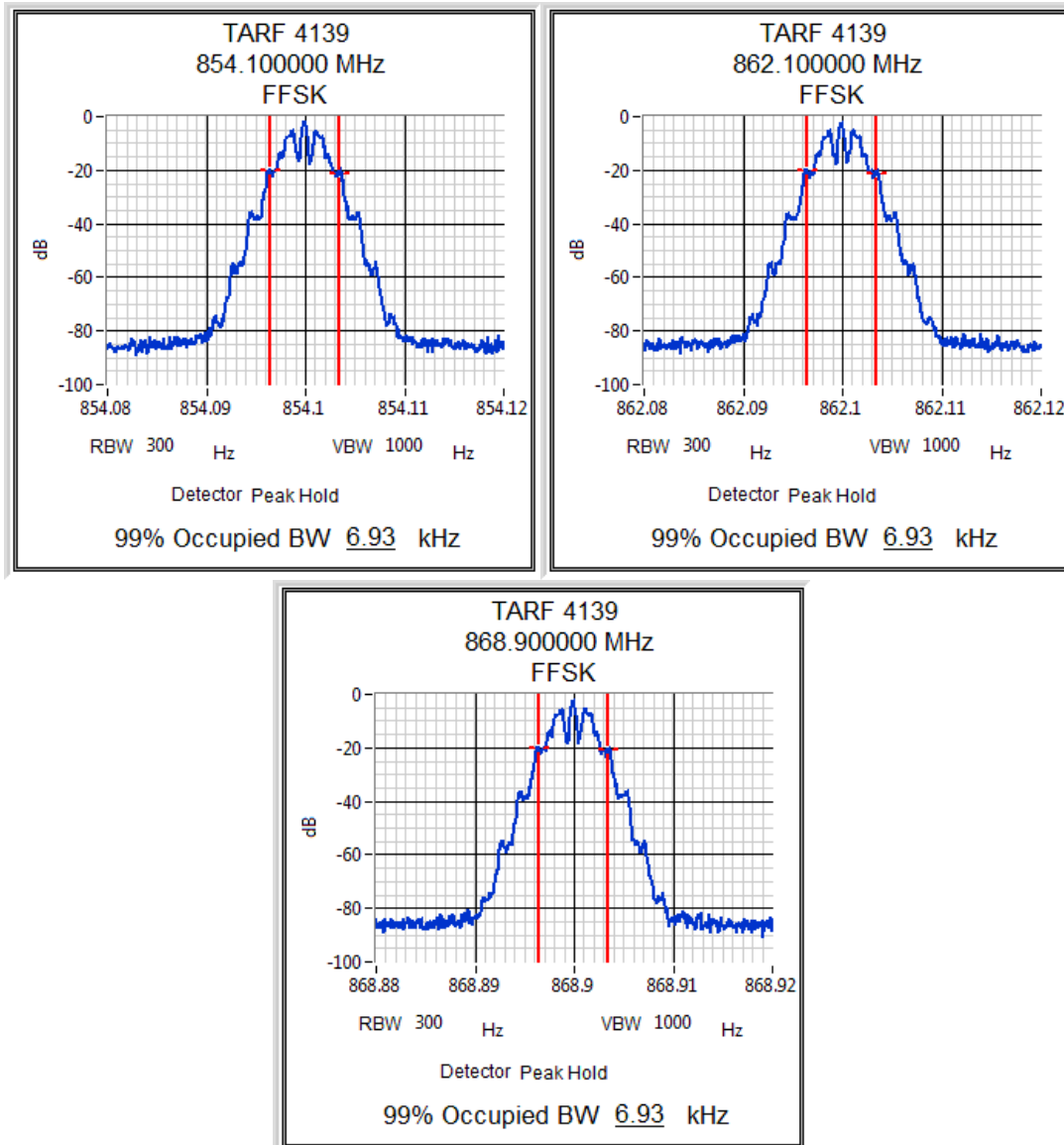
Transmitter Occupied (99%) Bandwidth

Channel 1-6 100 watts 12.5 kHz ch spacing FFSK Modulation



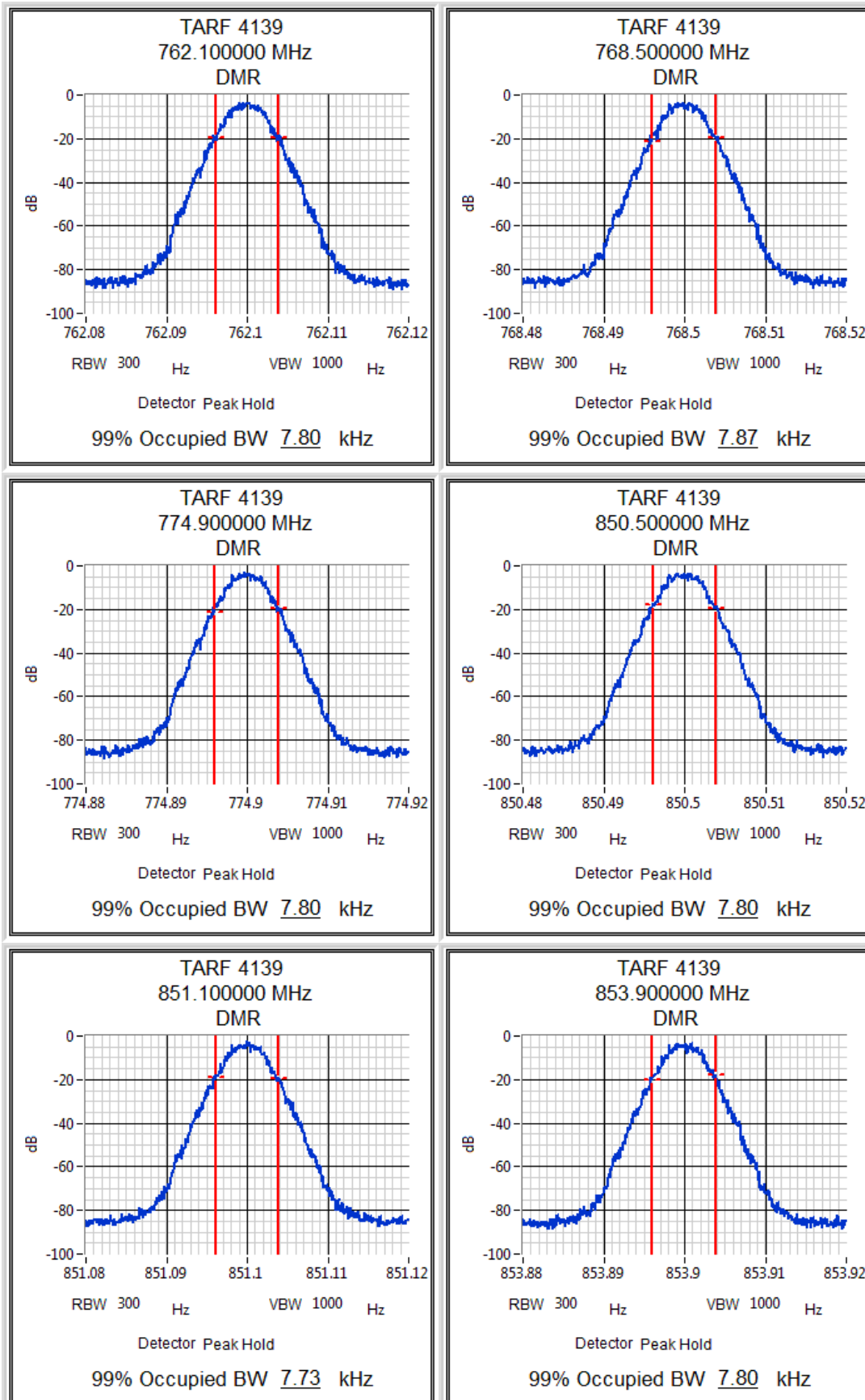
Transmitter Occupied (99%) Bandwidth

Channel 7-9 100 watts 12.5 kHz ch spacing FFSK Modulation



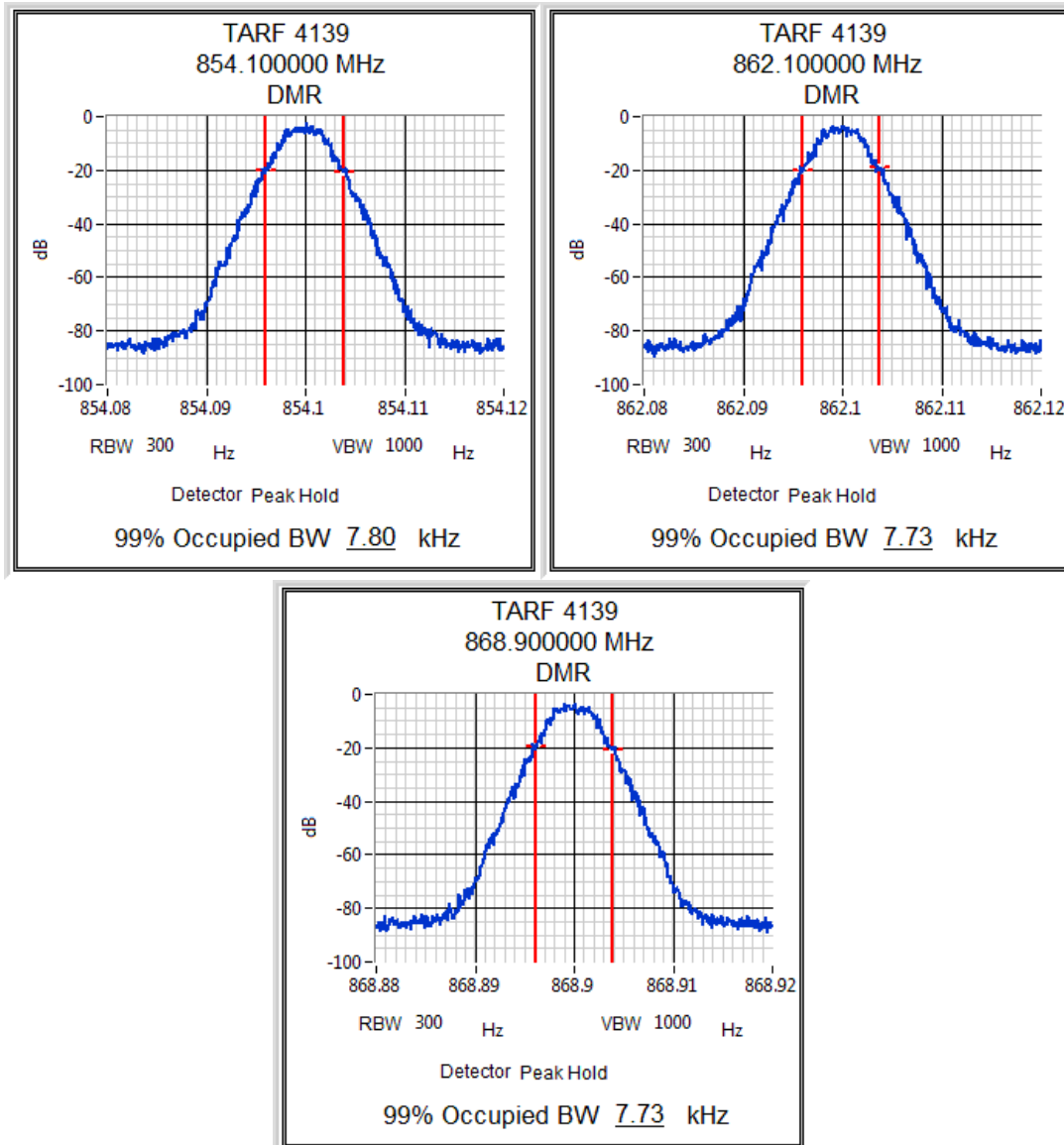
Transmitter Occupied (99%) Bandwidth

Channel 1-6 100 watts 12.5 kHz ch spacing DMR Modulation



Transmitter Occupied (99%) Bandwidth

Channel 7-9 100 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% $\pm 0.65\text{dB}$

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)

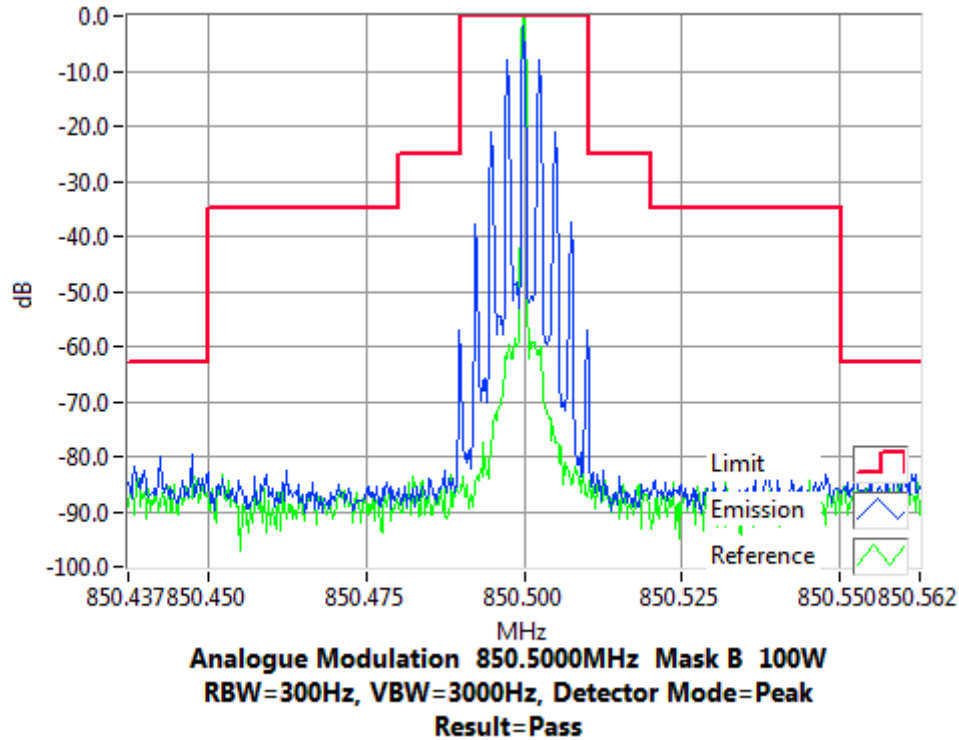
Transmitter Spectrum Masks

ANALOGUE VOICE

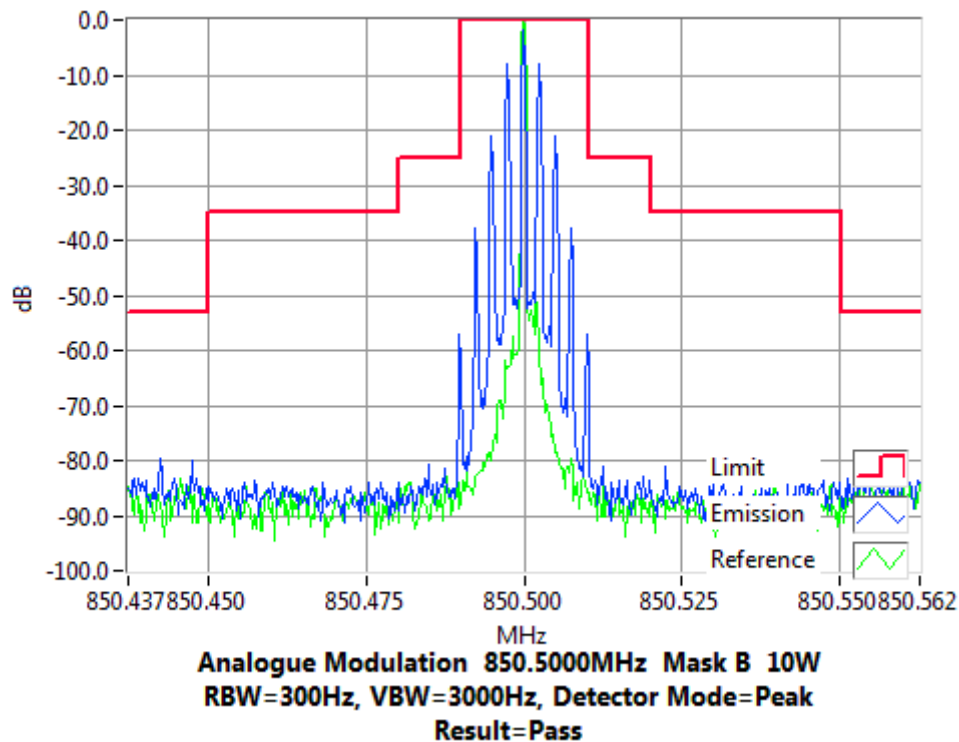
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 850.5 MHz 10 W 12.5 kHz Channel Spacing



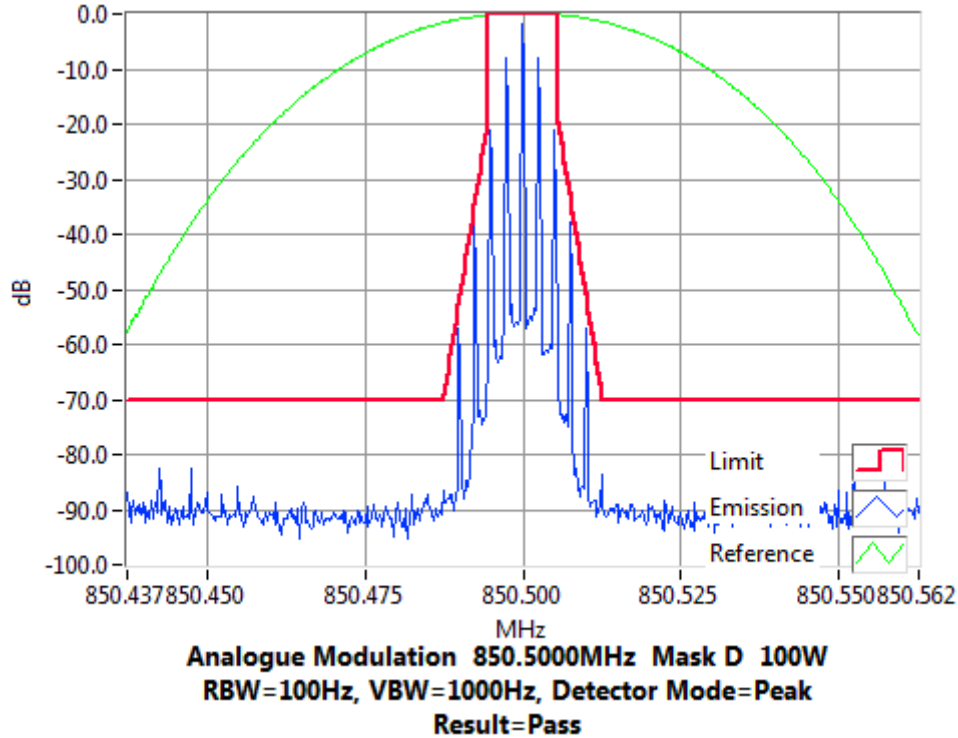
Transmitter Spectrum Masks

ANALOGUE VOICE

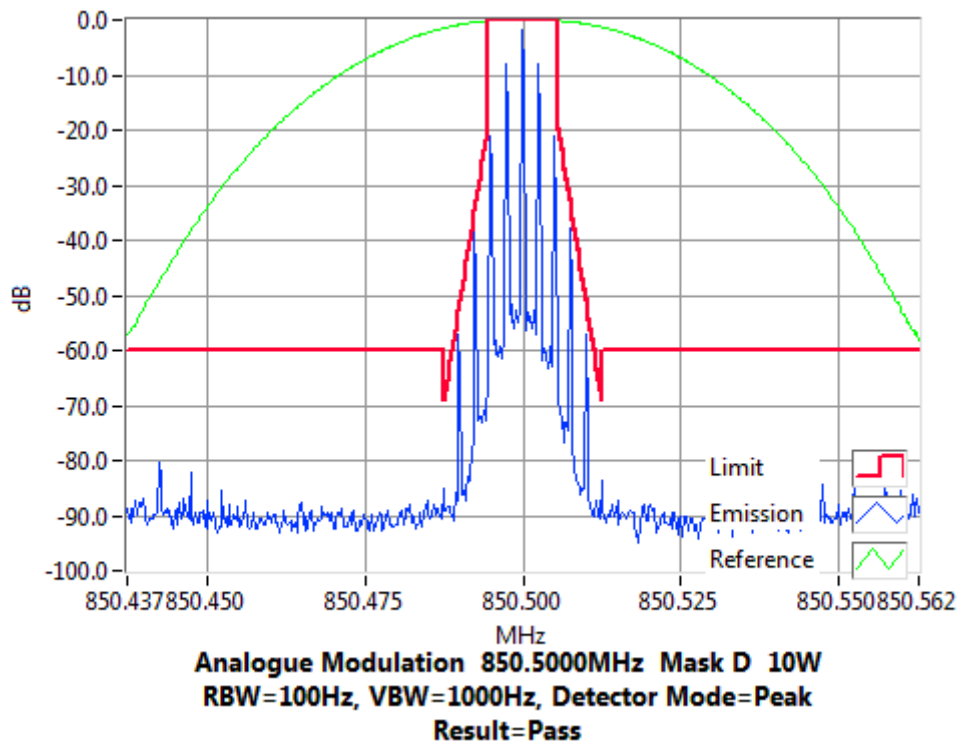
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 850.5 MHz 10 W 12.5 kHz Channel Spacing



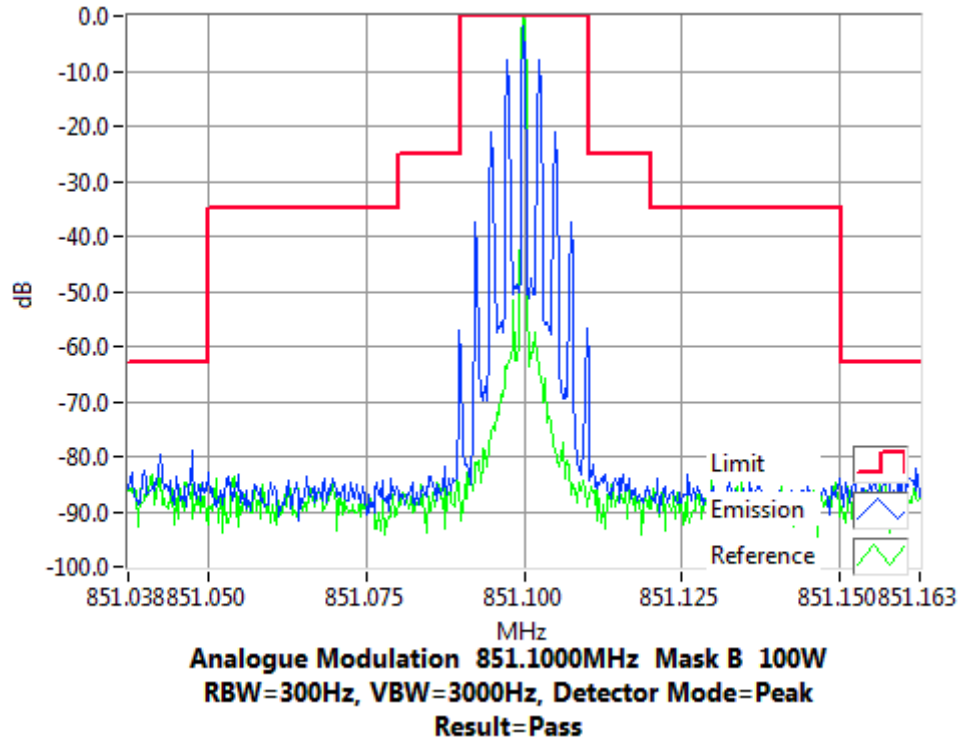
Transmitter Spectrum Masks

ANALOGUE VOICE

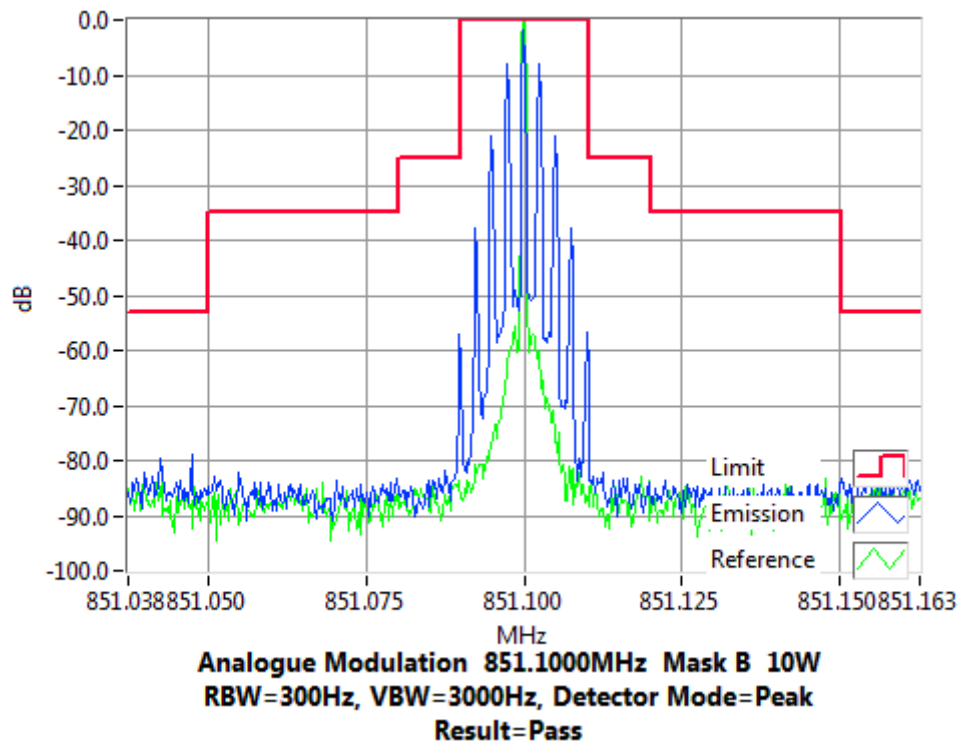
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 851.1 MHz 10 W 12.5 kHz Channel Spacing



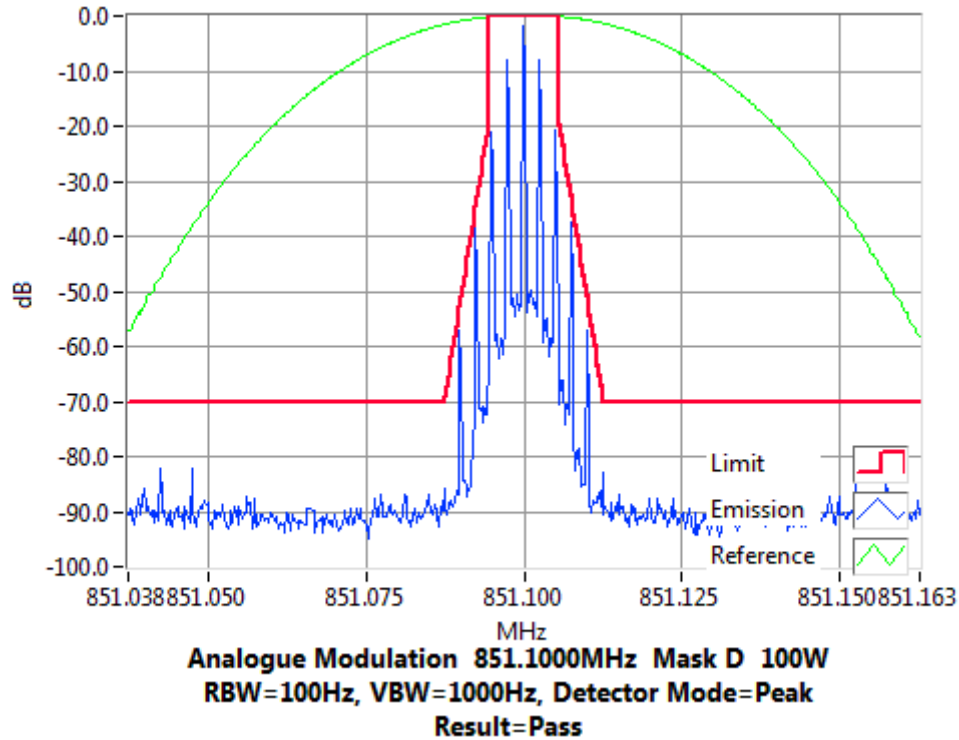
Transmitter Spectrum Masks

ANALOGUE VOICE

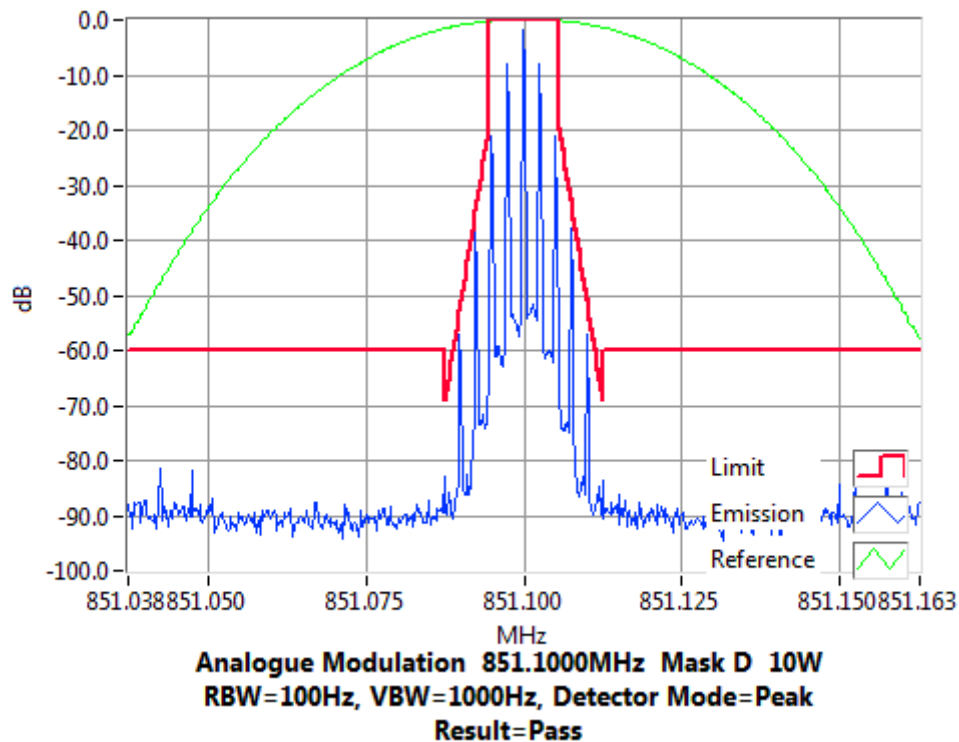
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 851.1 MHz 10 W 12.5 kHz Channel Spacing



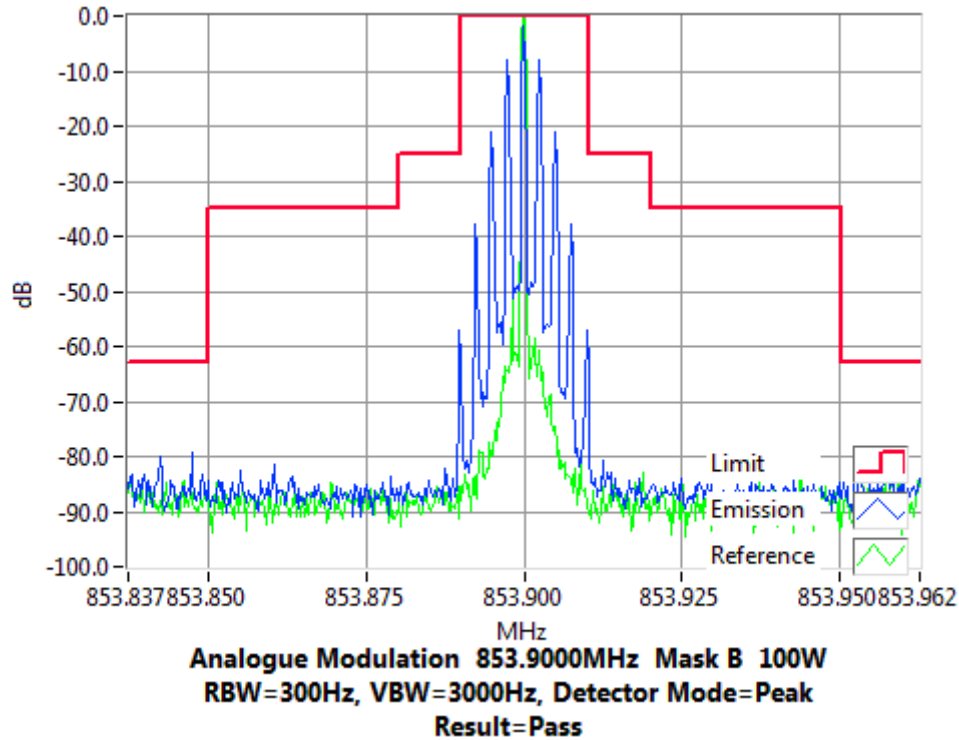
Transmitter Spectrum Masks

ANALOGUE VOICE

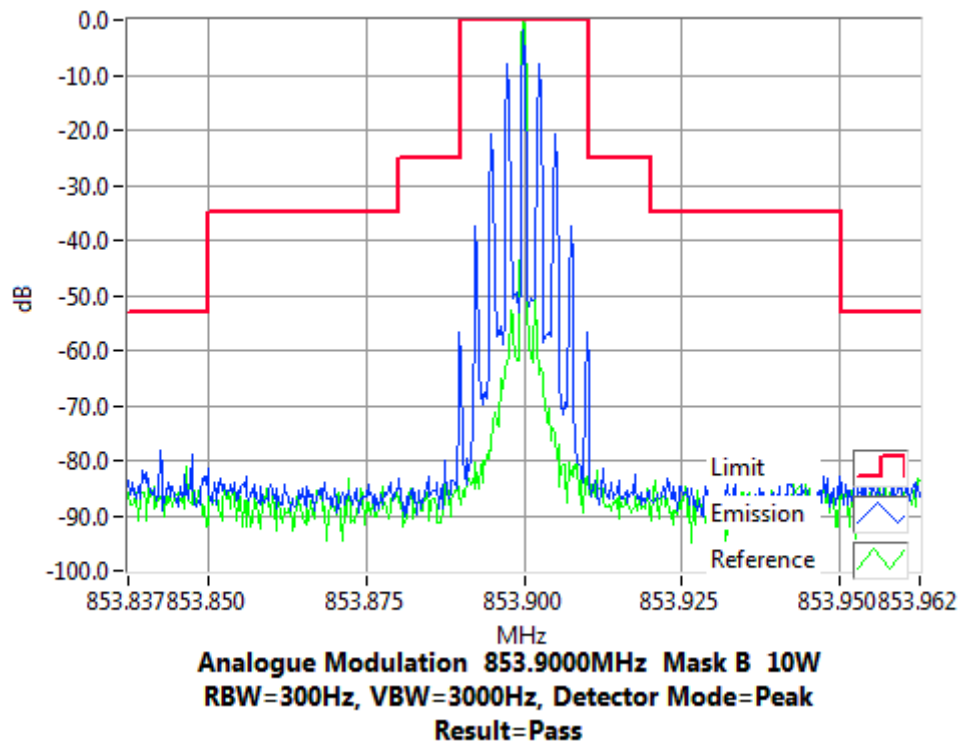
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 853.9 MHz 10 W 12.5 kHz Channel Spacing



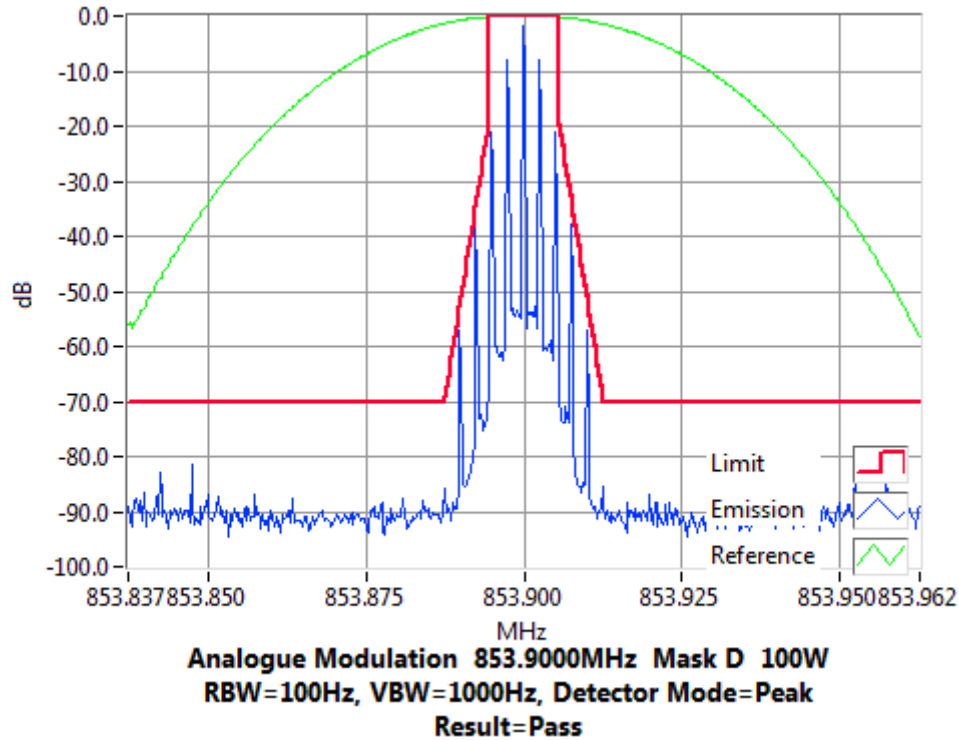
Transmitter Spectrum Masks

ANALOGUE VOICE

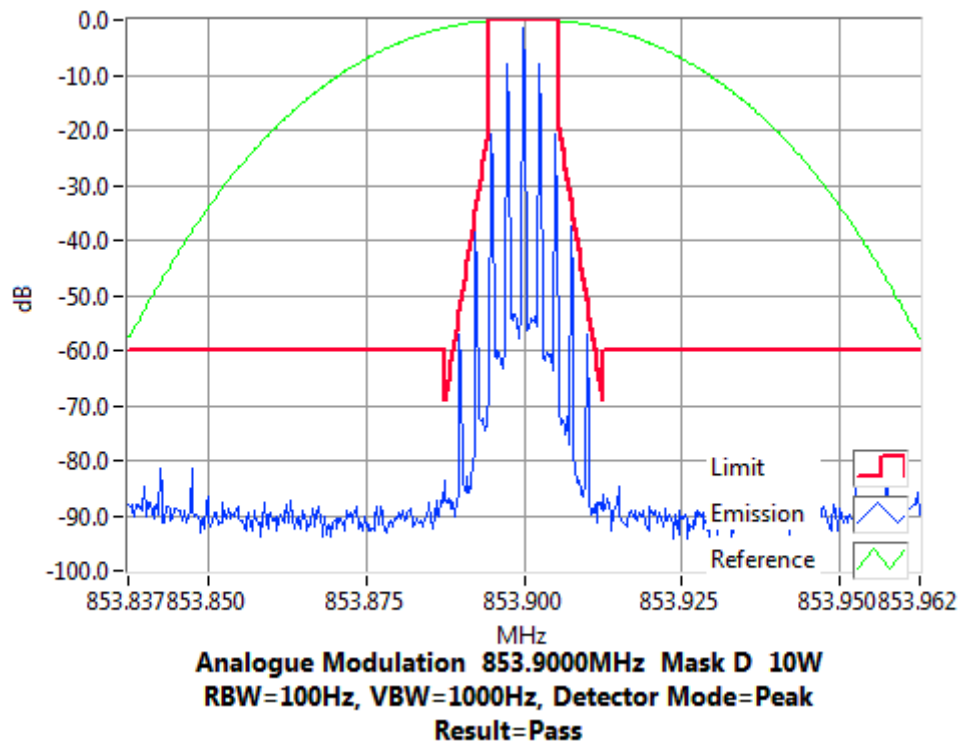
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 853.9 MHz 10 W 12.5 kHz Channel Spacing



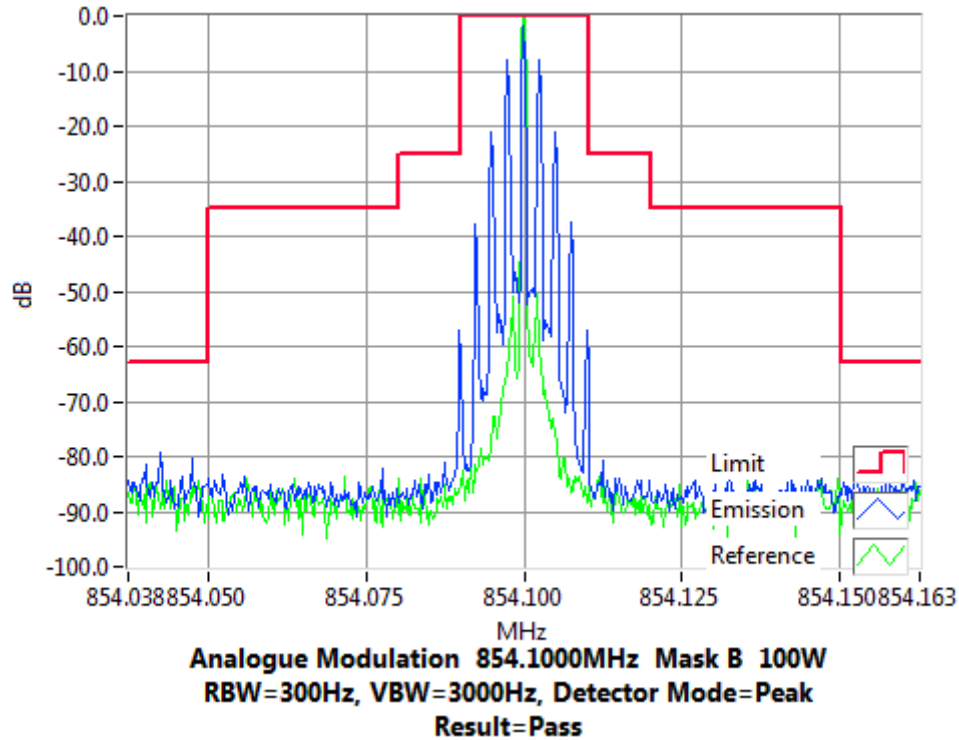
Transmitter Spectrum Masks

ANALOGUE VOICE

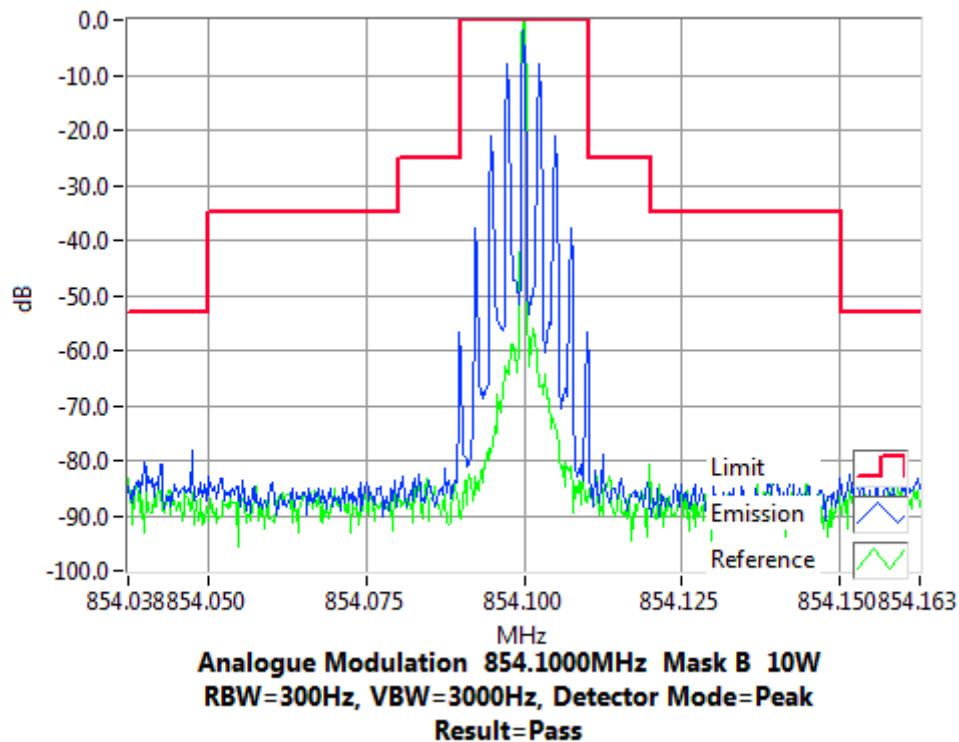
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 854.1 MHz 10 W 12.5 kHz Channel Spacing



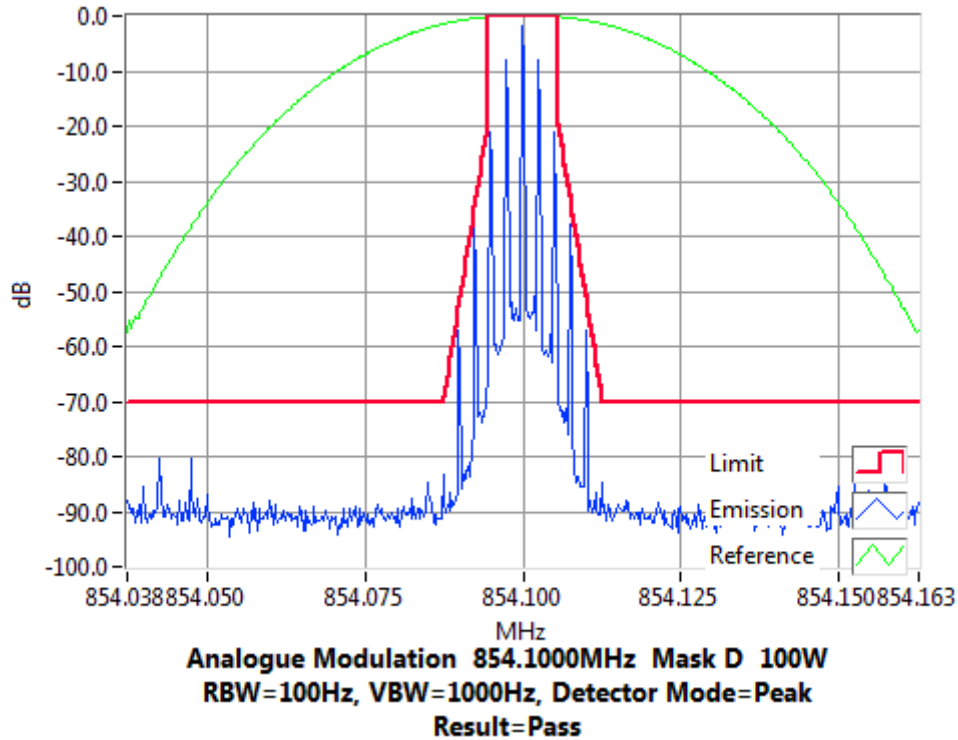
Transmitter Spectrum Masks

ANALOGUE VOICE

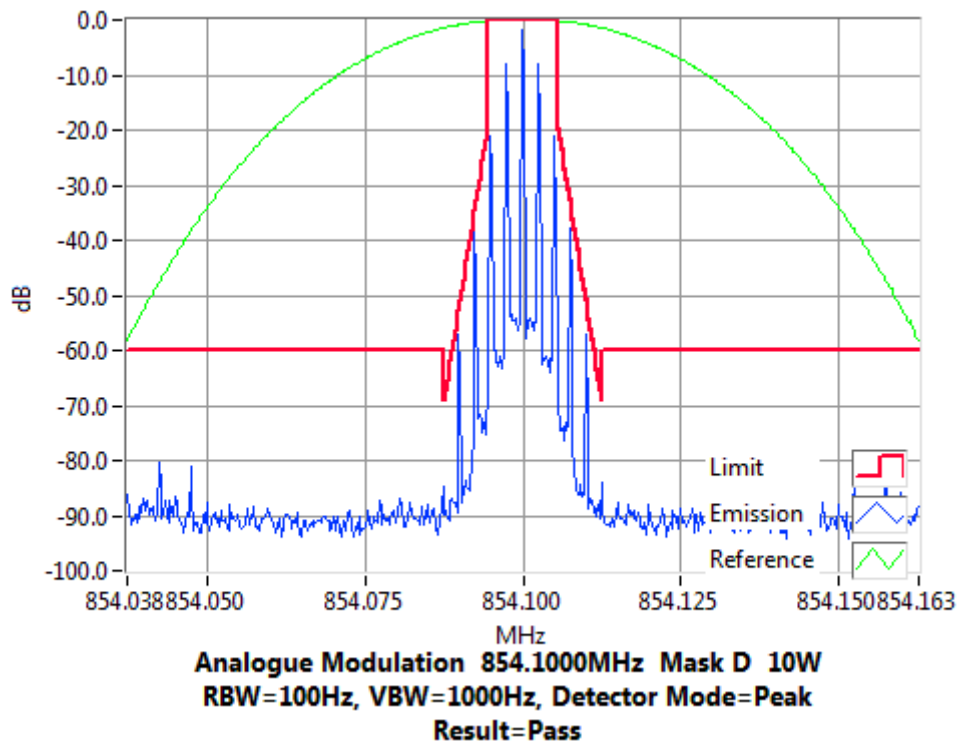
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 854.1 MHz 10 W 12.5 kHz Channel Spacing



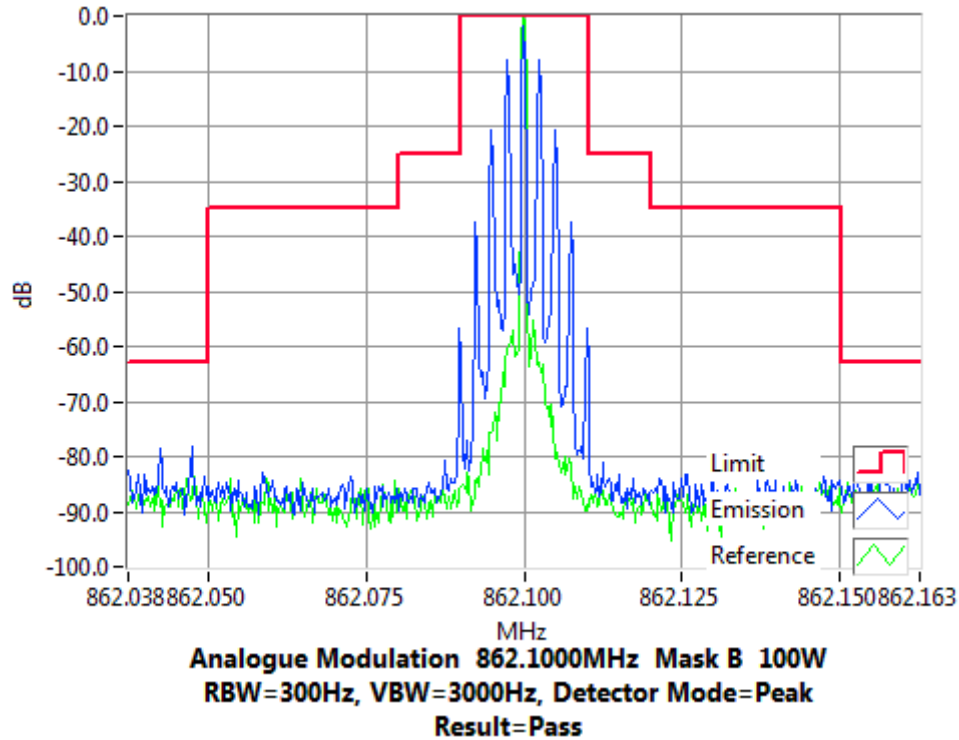
Transmitter Spectrum Masks

ANALOGUE VOICE

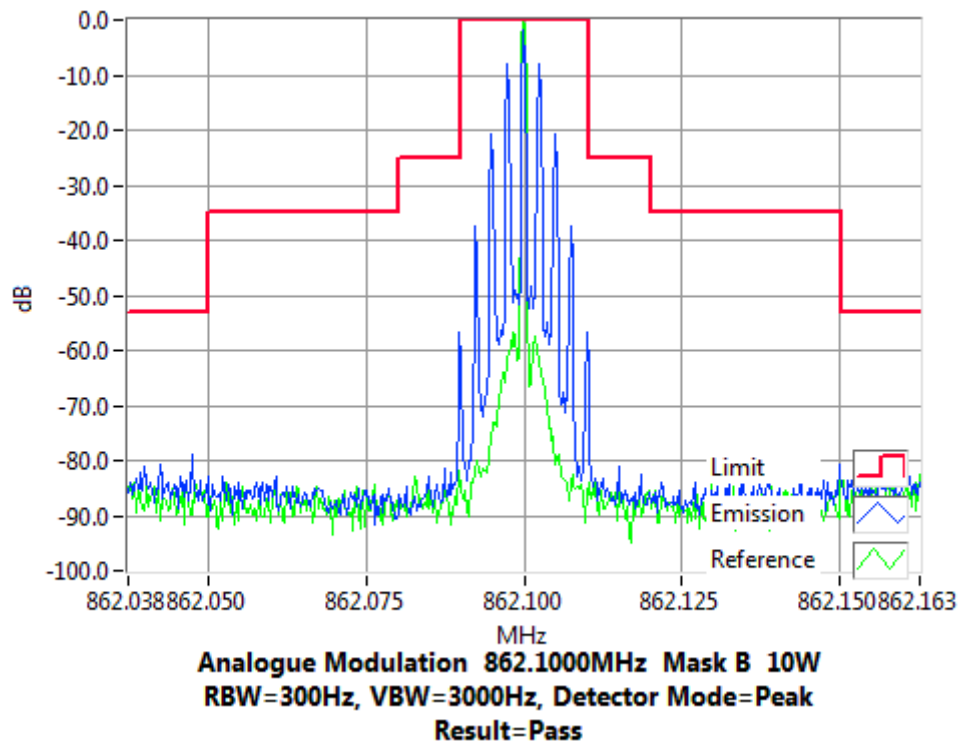
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 862.1 MHz 10 W 12.5 kHz Channel Spacing



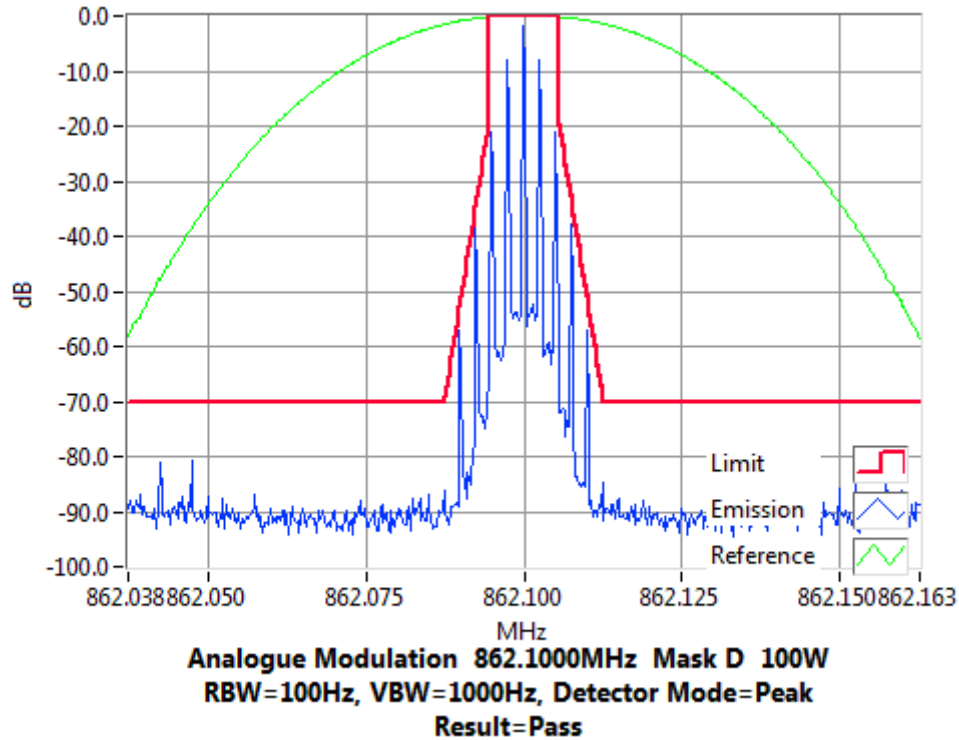
Transmitter Spectrum Masks

ANALOGUE VOICE

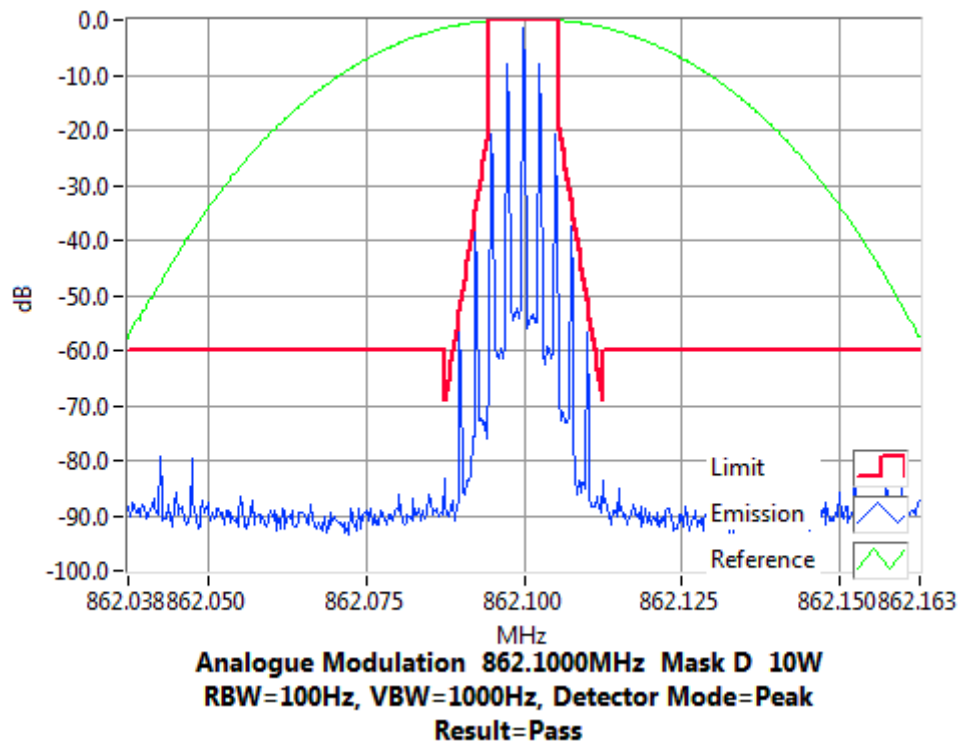
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 862.1 MHz 10 W 12.5 kHz Channel Spacing



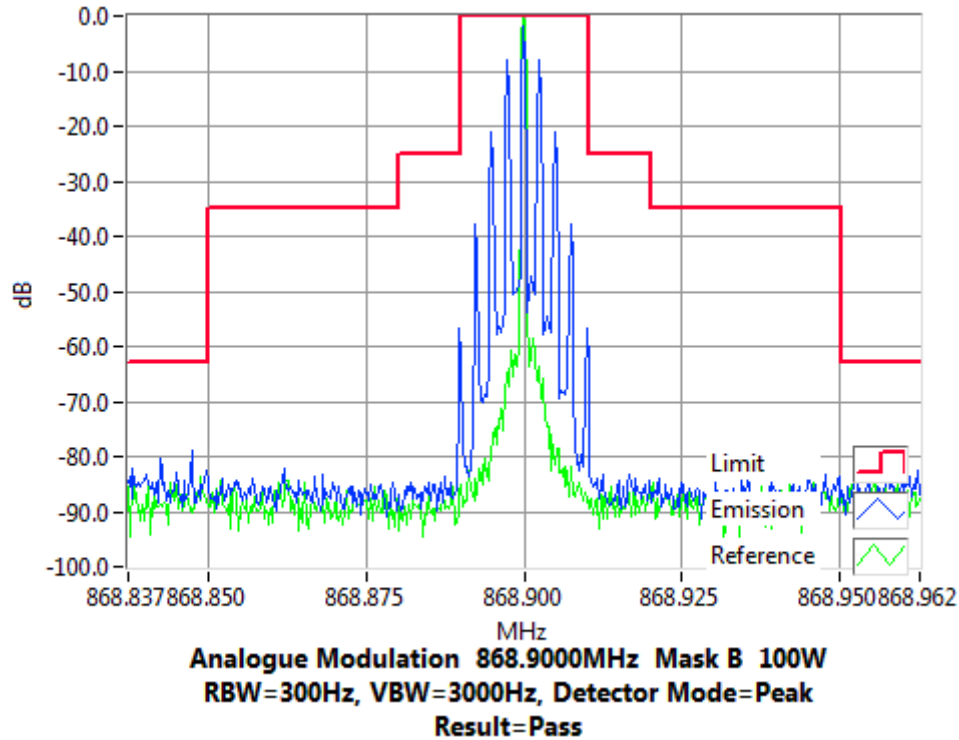
Transmitter Spectrum Masks

ANALOGUE VOICE

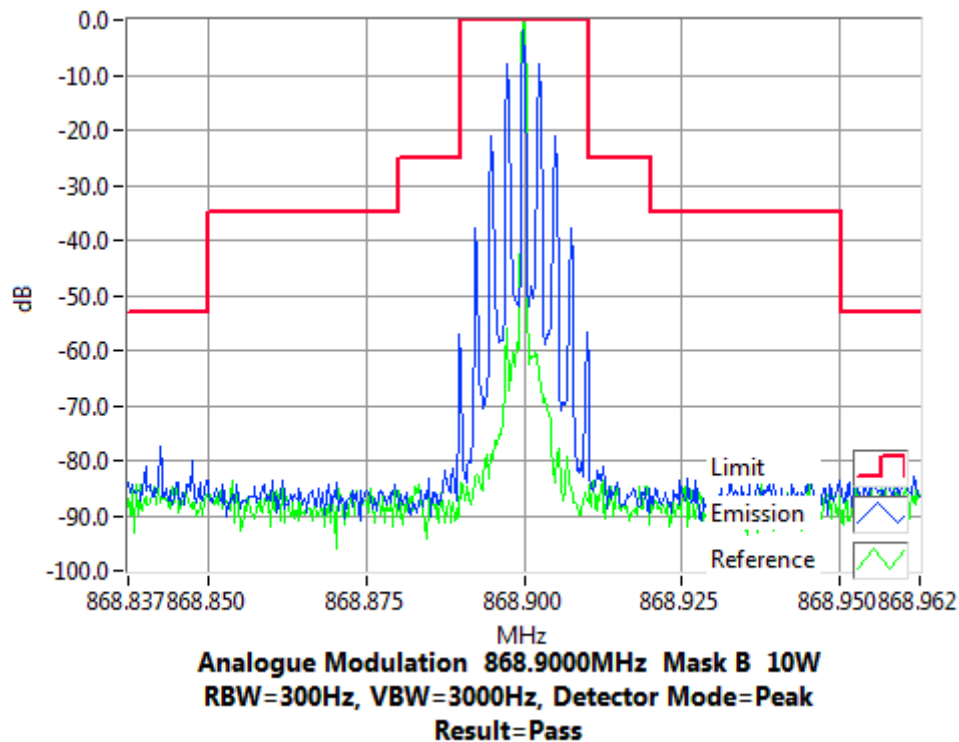
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 868.9 MHz 10 W 12.5 kHz Channel Spacing



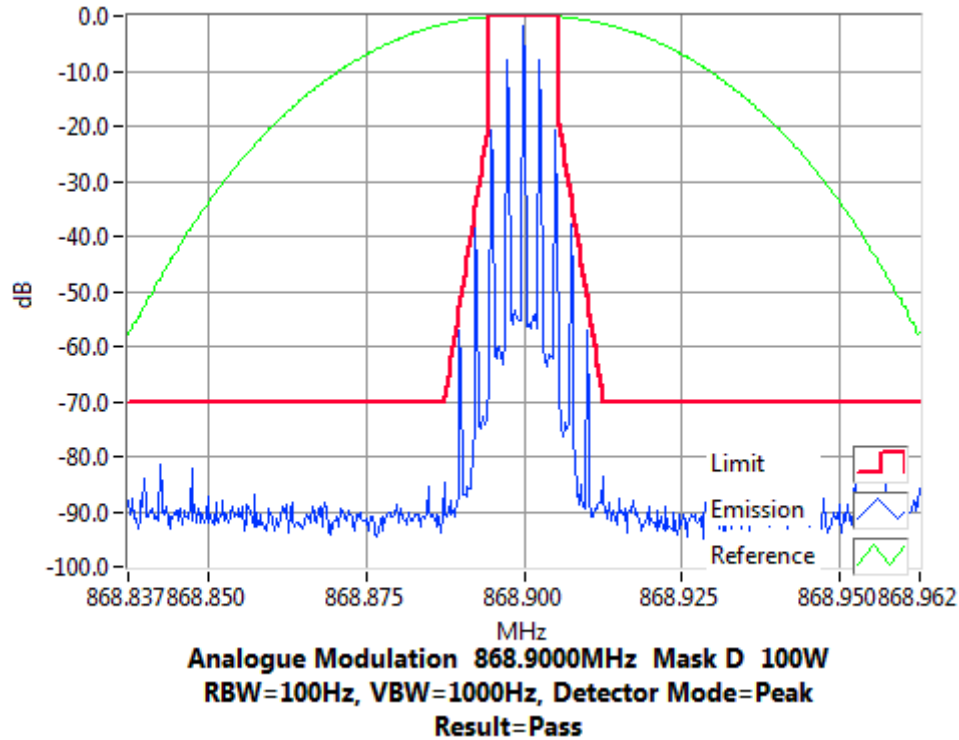
Transmitter Spectrum Masks

ANALOGUE VOICE

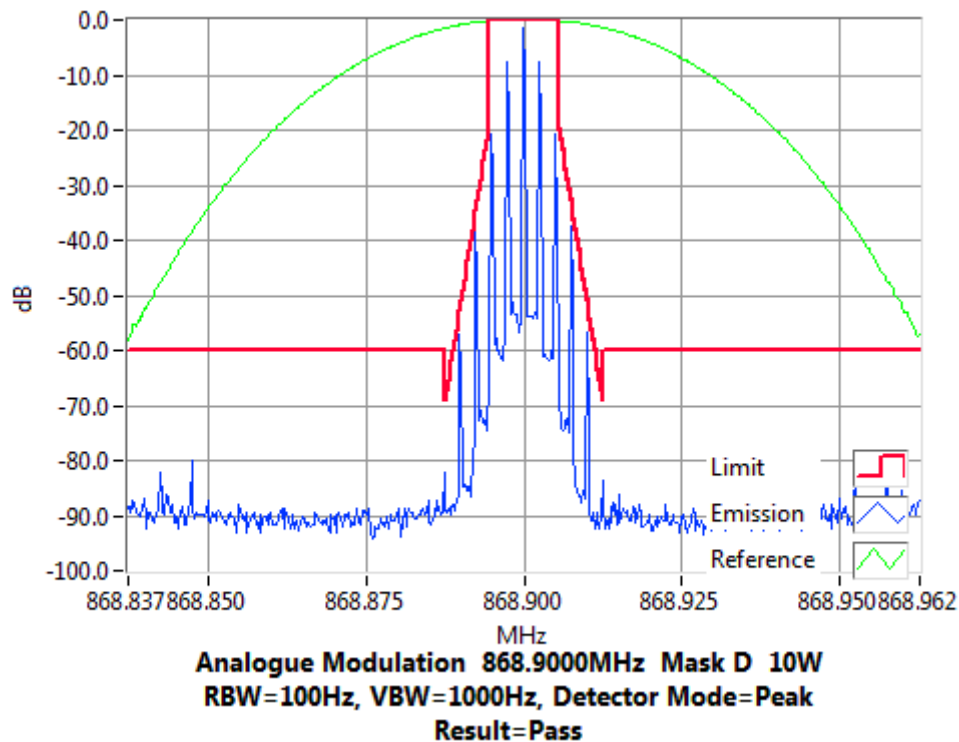
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 868.9 MHz 10 W 12.5 kHz Channel Spacing



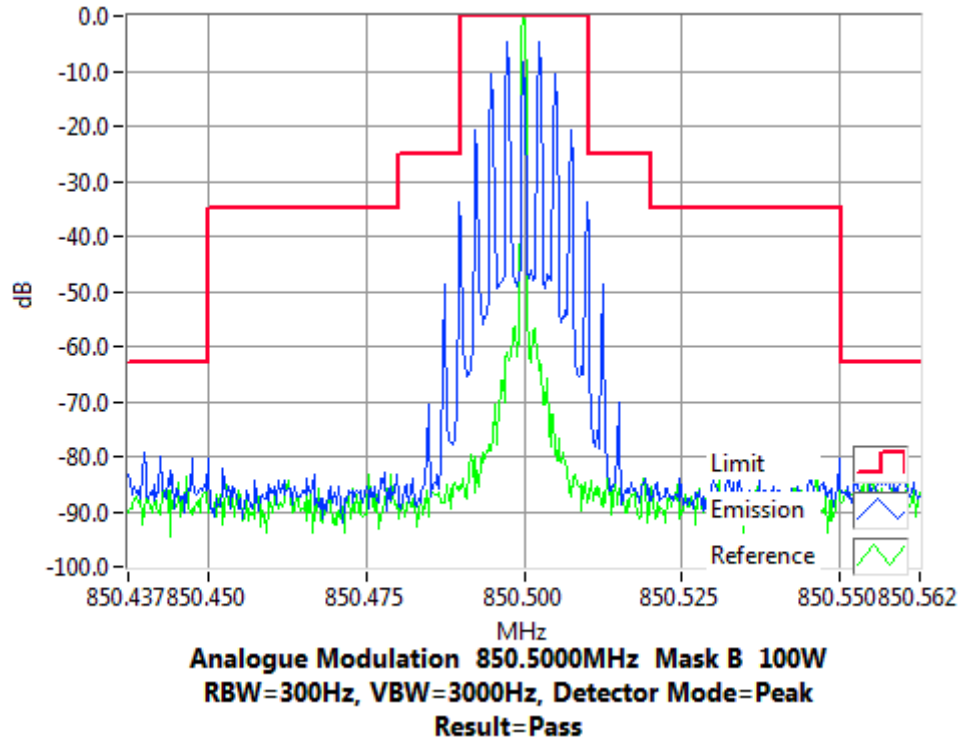
Transmitter Spectrum Masks

ANALOGUE VOICE

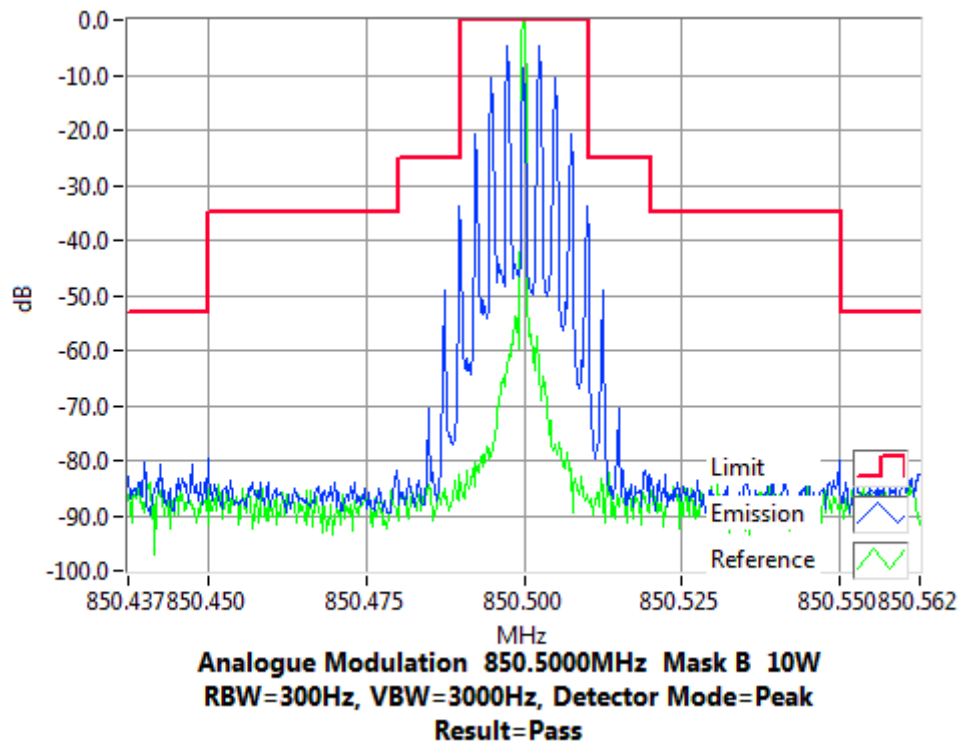
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 100 W 25 kHz Channel Spacing



Tx FREQUENCY: 850.5 MHz 10 W 25 kHz Channel Spacing



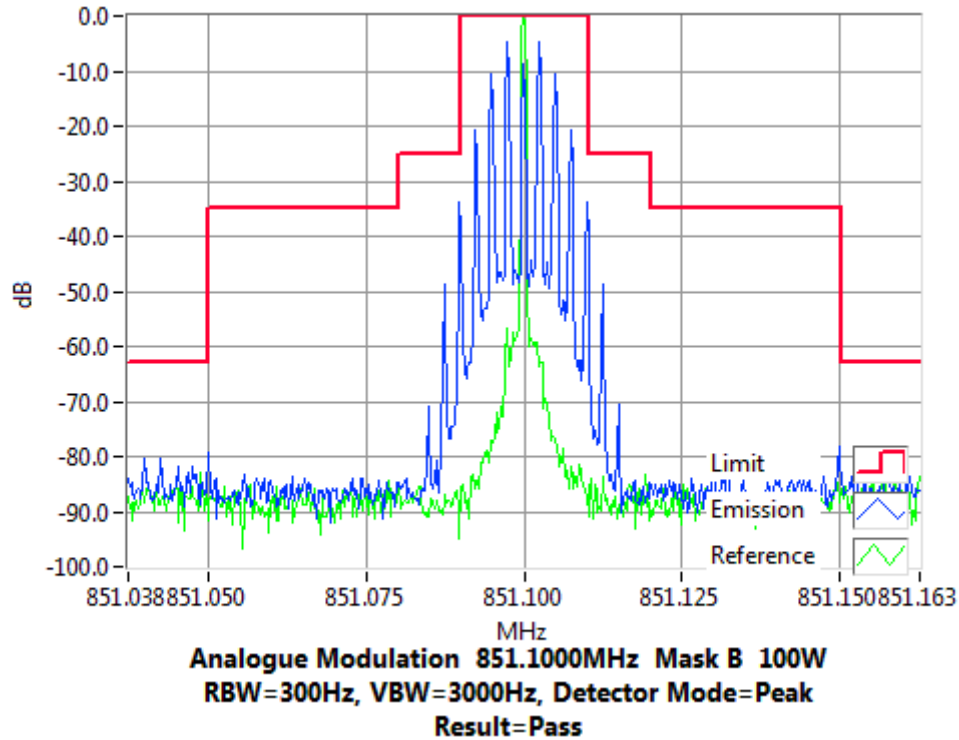
Transmitter Spectrum Masks

ANALOGUE VOICE

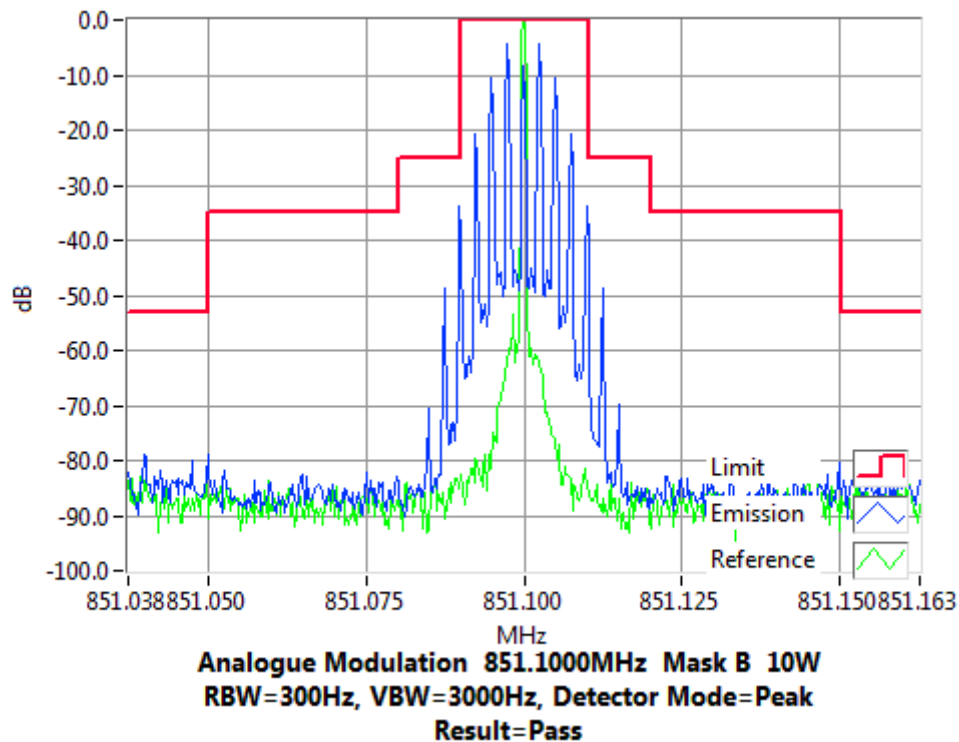
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 100 W 25 kHz Channel Spacing



Tx FREQUENCY: 851.1 MHz 10 W 25 kHz Channel Spacing



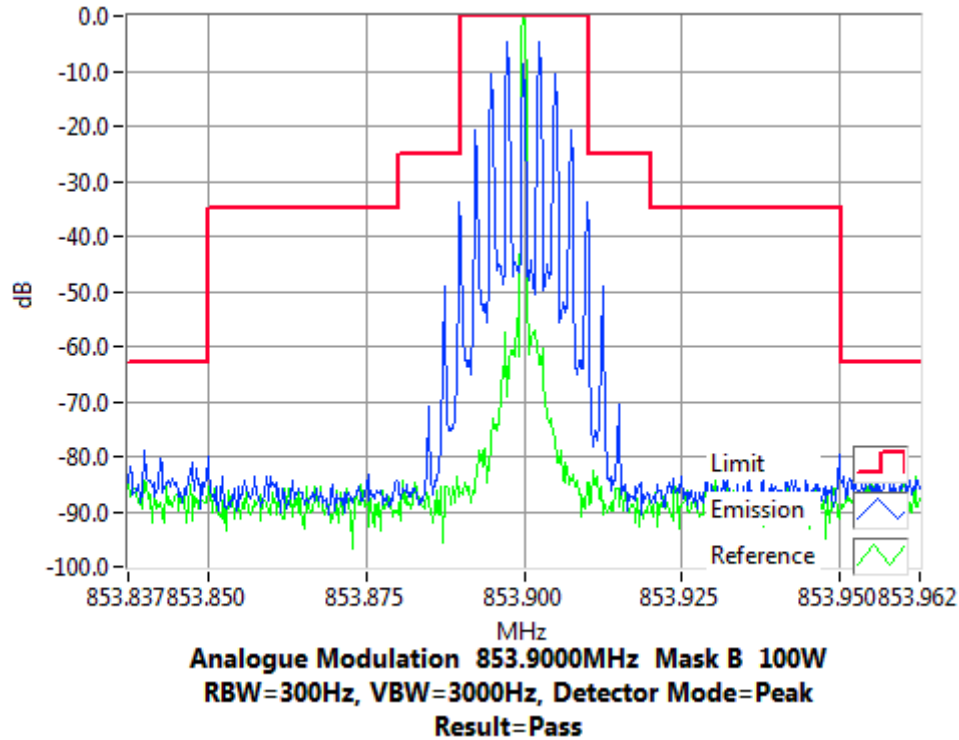
Transmitter Spectrum Masks

ANALOGUE VOICE

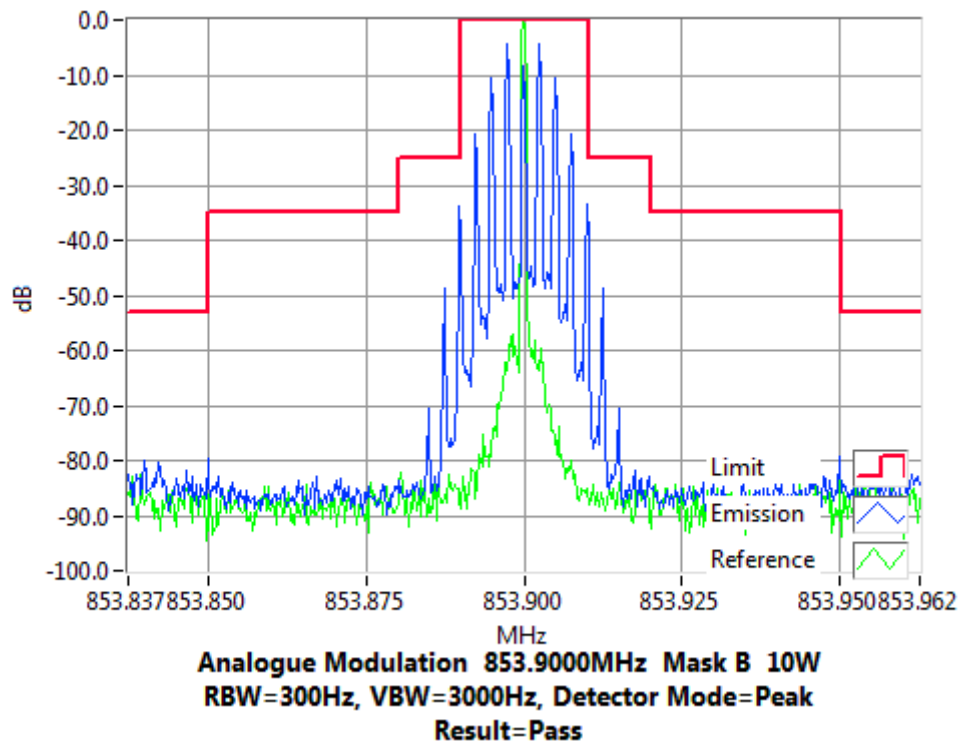
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 100 W 25 kHz Channel Spacing



Tx FREQUENCY: 853.9 MHz 10 W 25 kHz Channel Spacing



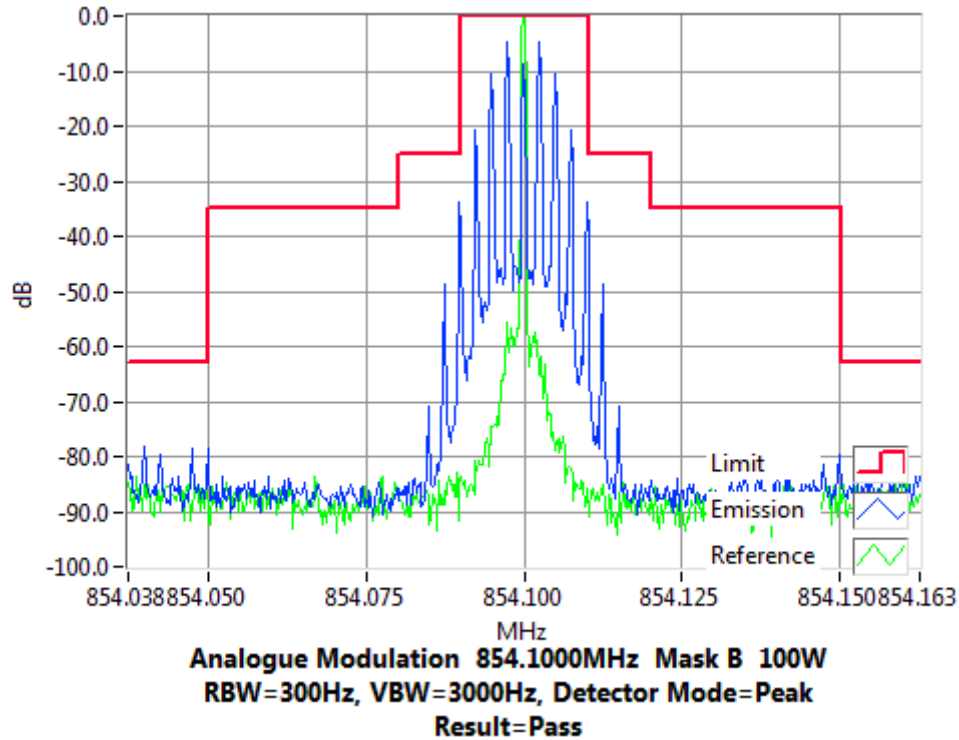
Transmitter Spectrum Masks

ANALOGUE VOICE

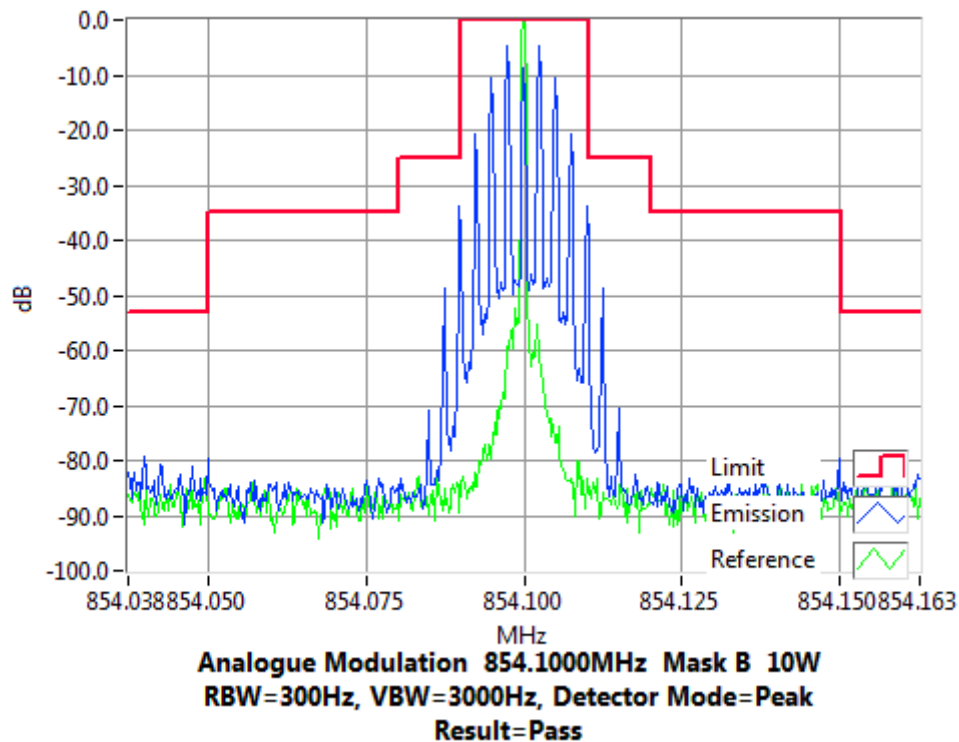
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 100 W 25 kHz Channel Spacing



Tx FREQUENCY: 854.1 MHz 10 W 25 kHz Channel Spacing



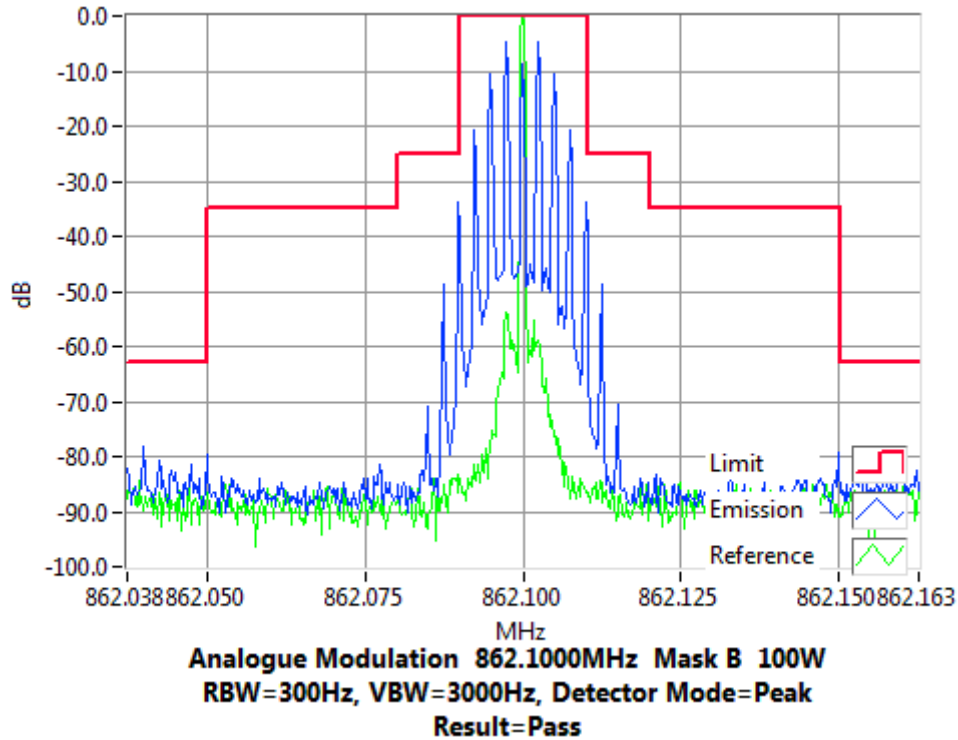
Transmitter Spectrum Masks

ANALOGUE VOICE

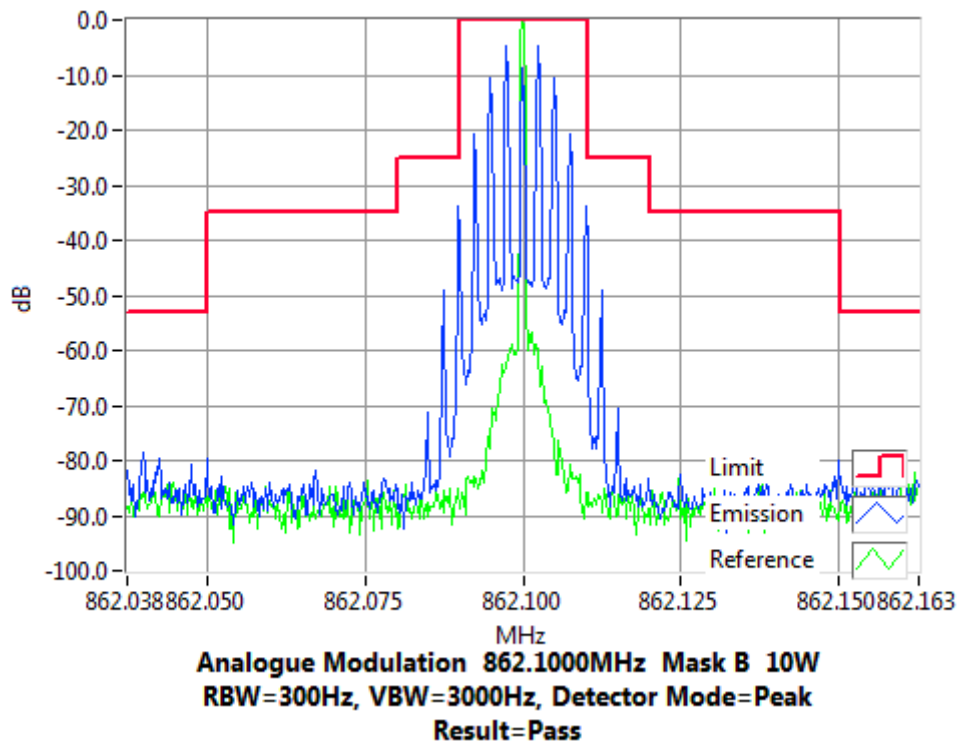
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 100 W 25 kHz Channel Spacing



Tx FREQUENCY: 862.1 MHz 10 W 25 kHz Channel Spacing



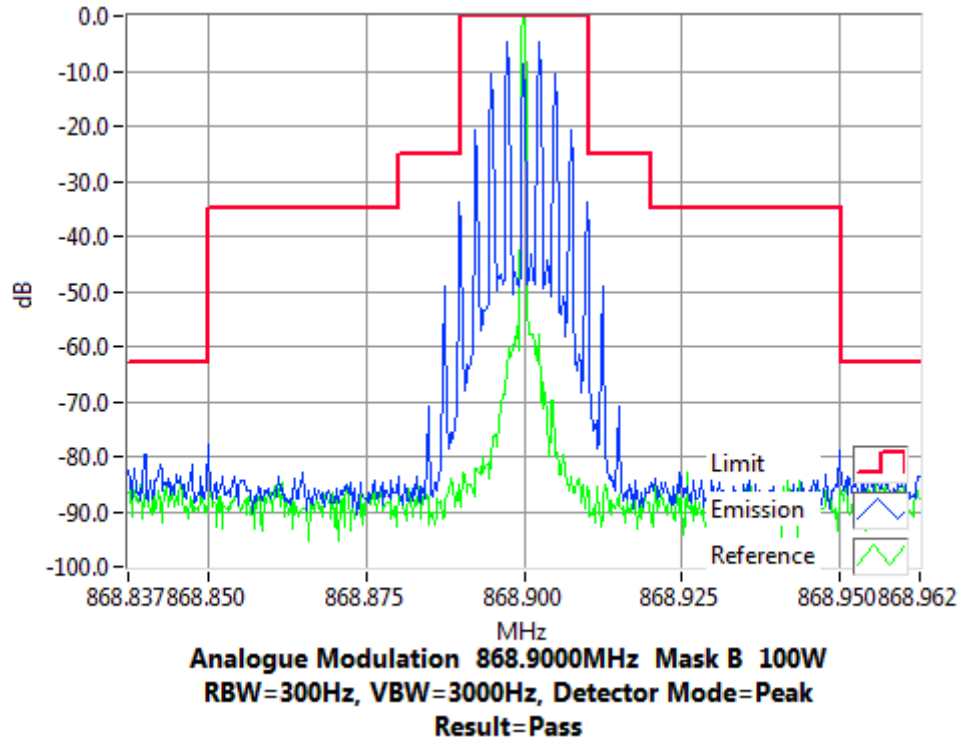
Transmitter Spectrum Masks

ANALOGUE VOICE

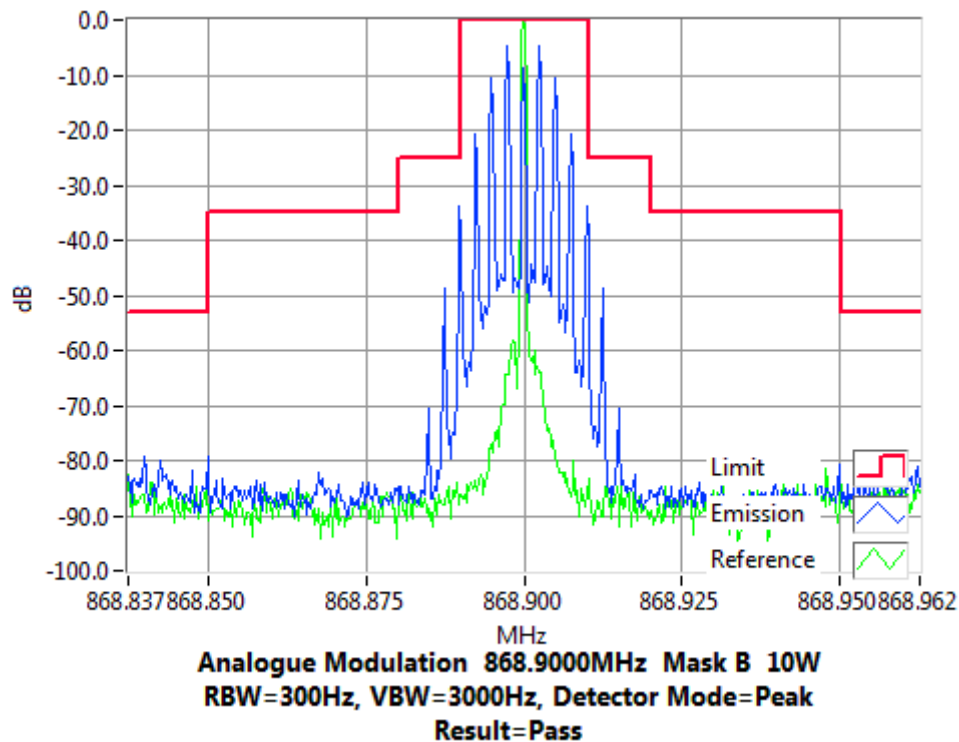
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 100 W 25 kHz Channel Spacing



Tx FREQUENCY: 868.9 MHz 10 W 25 kHz Channel Spacing



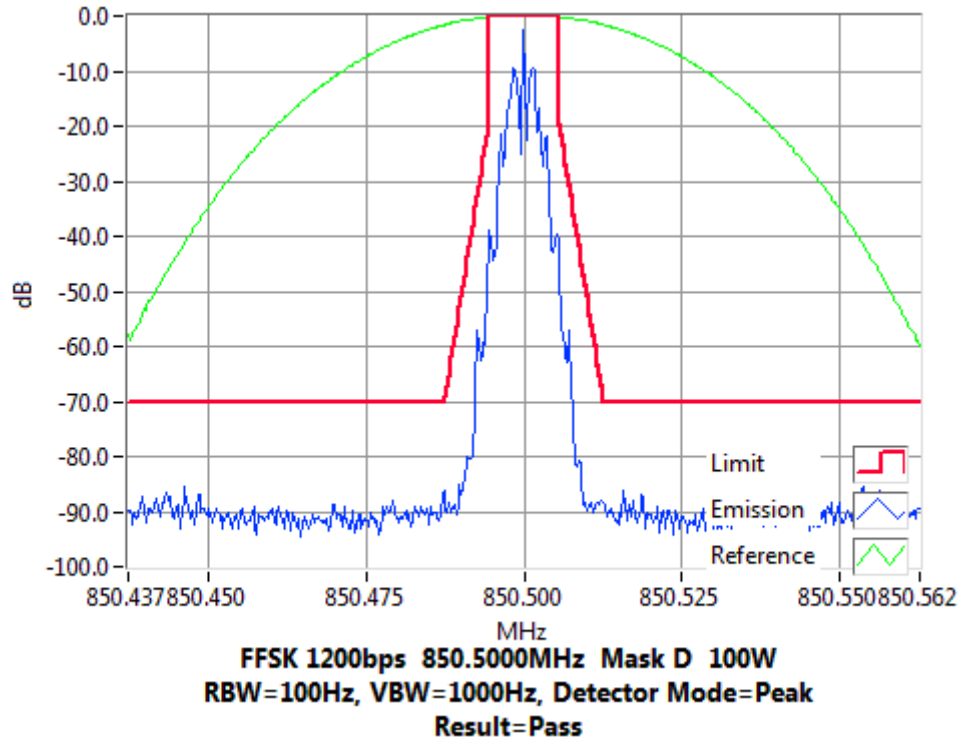
Transmitter Spectrum Masks

FSK, 1200 bps

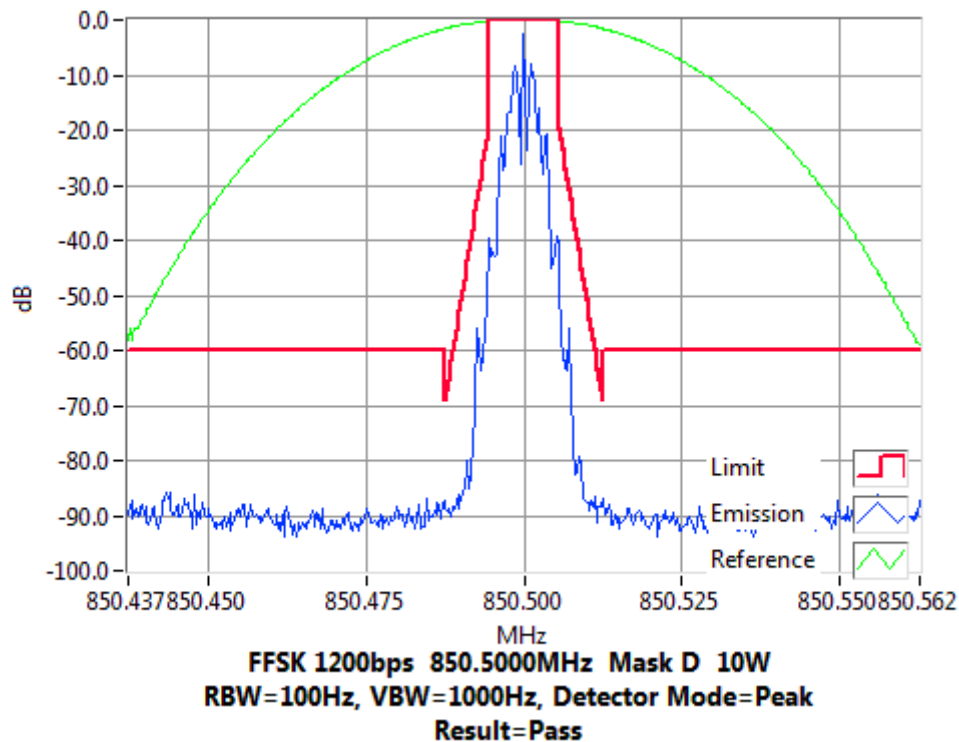
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 850.5 MHz 10 W 12.5 kHz Channel Spacing



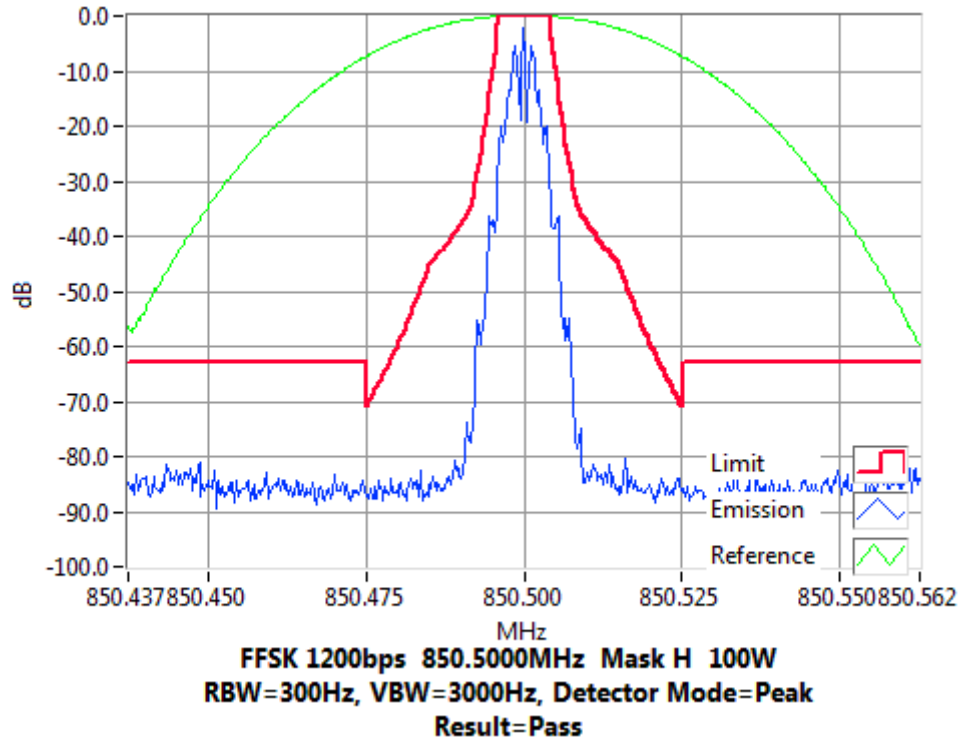
Transmitter Spectrum Masks

FFSK, 1200 bps

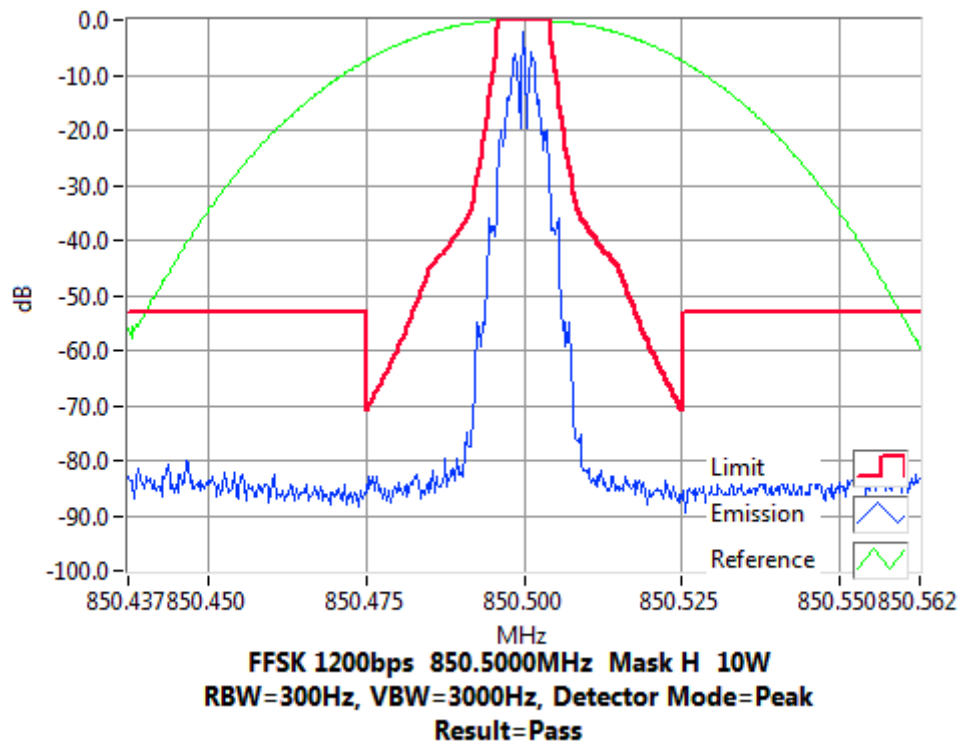
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 850.5 MHz 10 W 12.5 kHz Channel Spacing



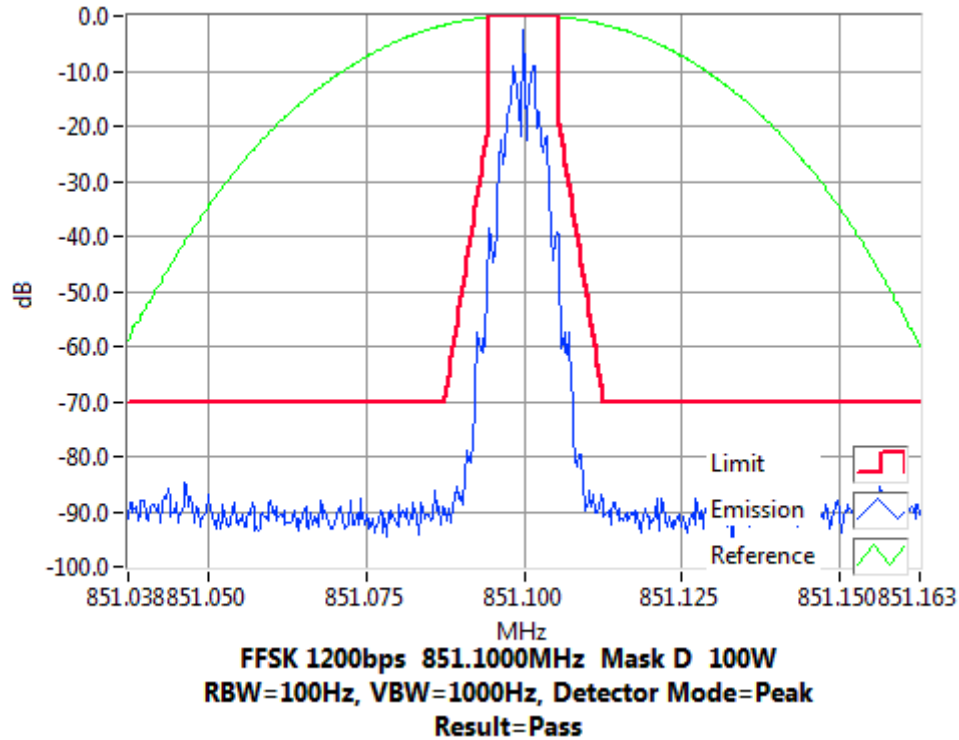
Transmitter Spectrum Masks

FSK, 1200 bps

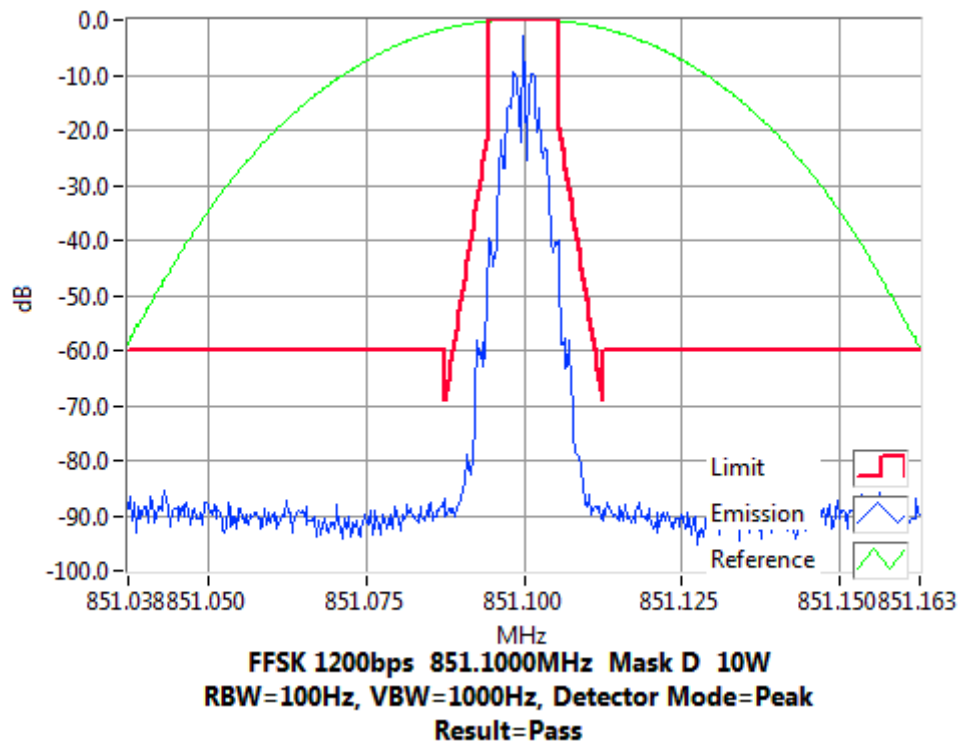
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 851.1 MHz 10 W 12.5 kHz Channel Spacing



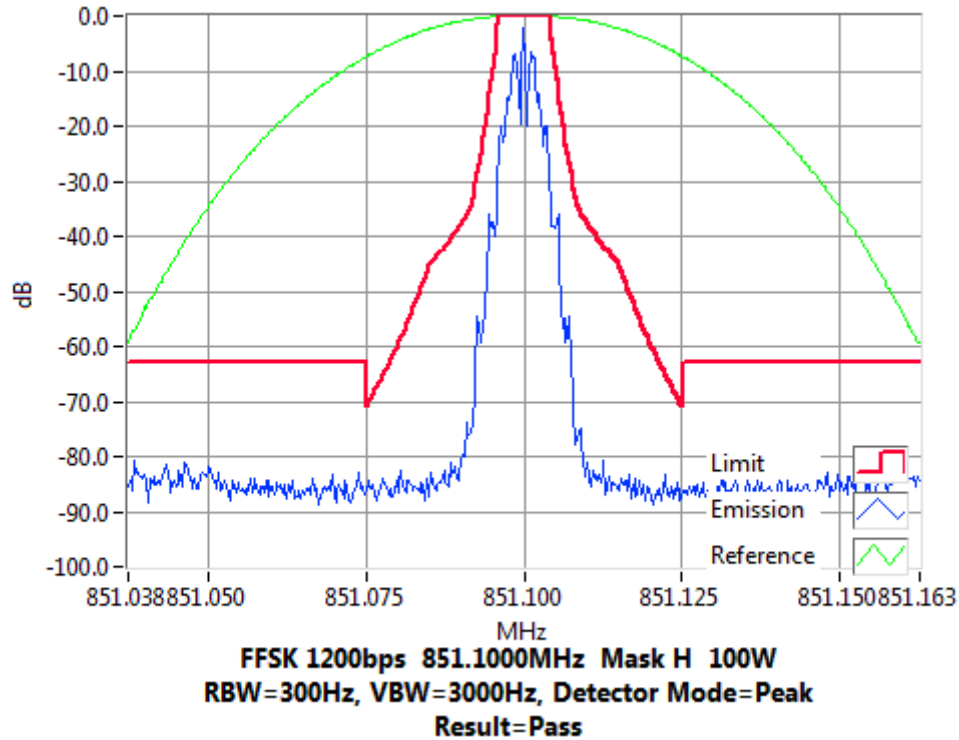
Transmitter Spectrum Masks

FSK, 1200 bps

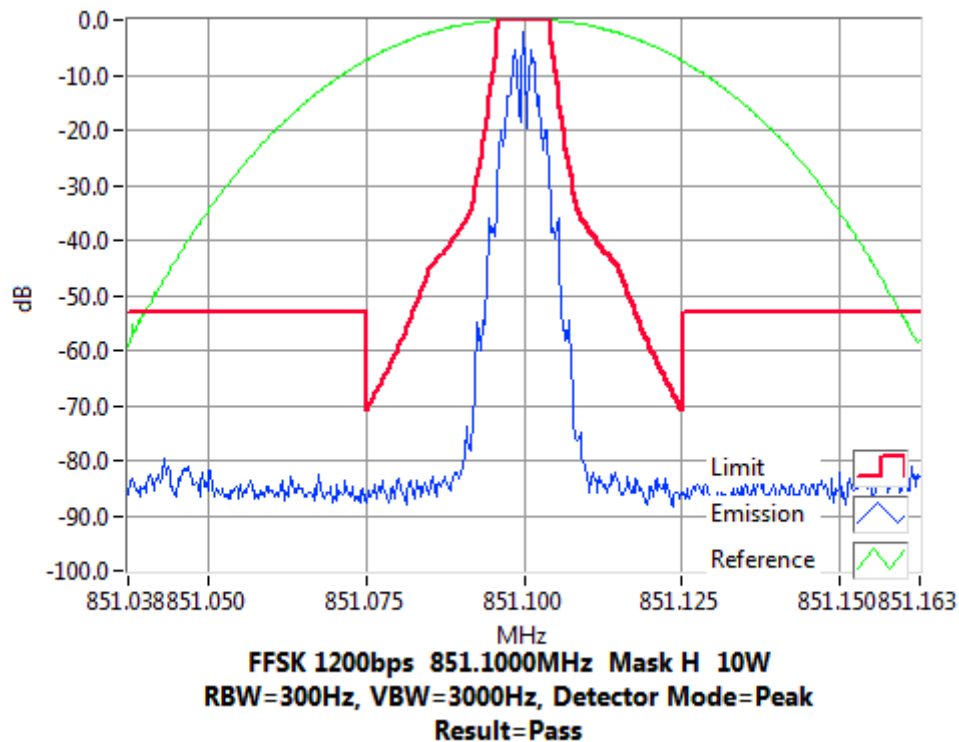
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 851.1 MHz 10 W 12.5 kHz Channel Spacing



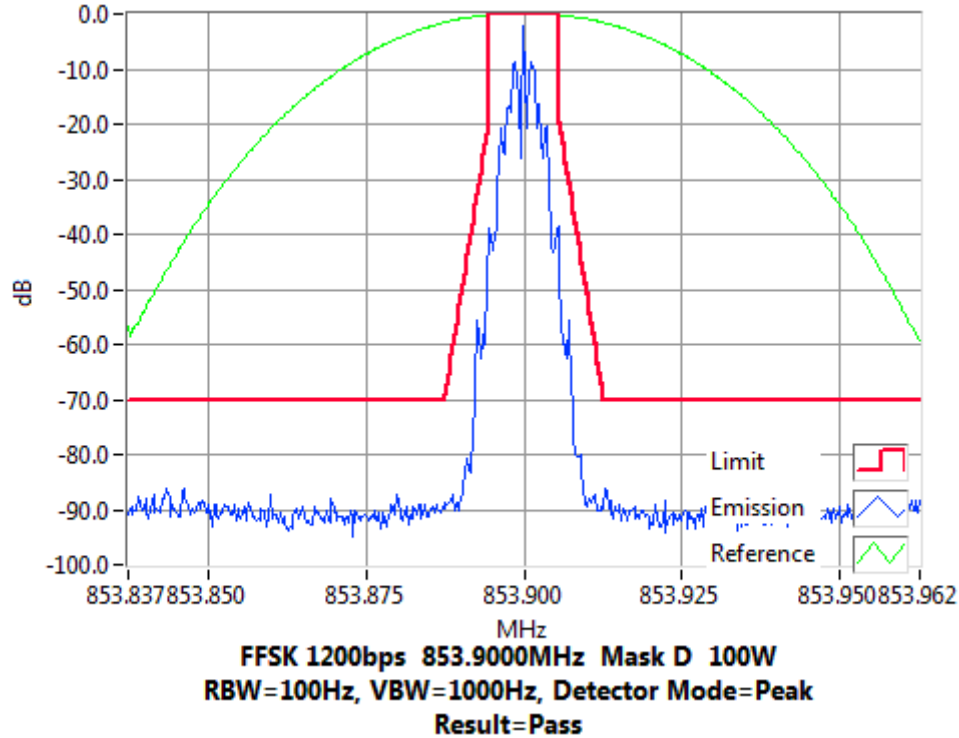
Transmitter Spectrum Masks

FSK, 1200 bps

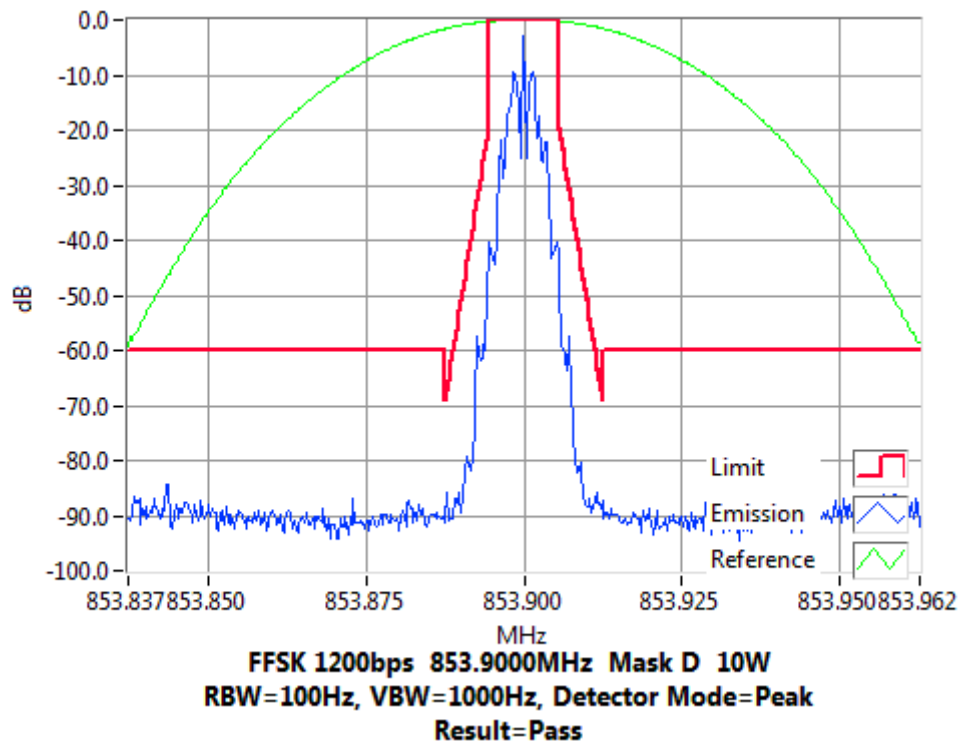
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 853.9 MHz 10 W 12.5 kHz Channel Spacing



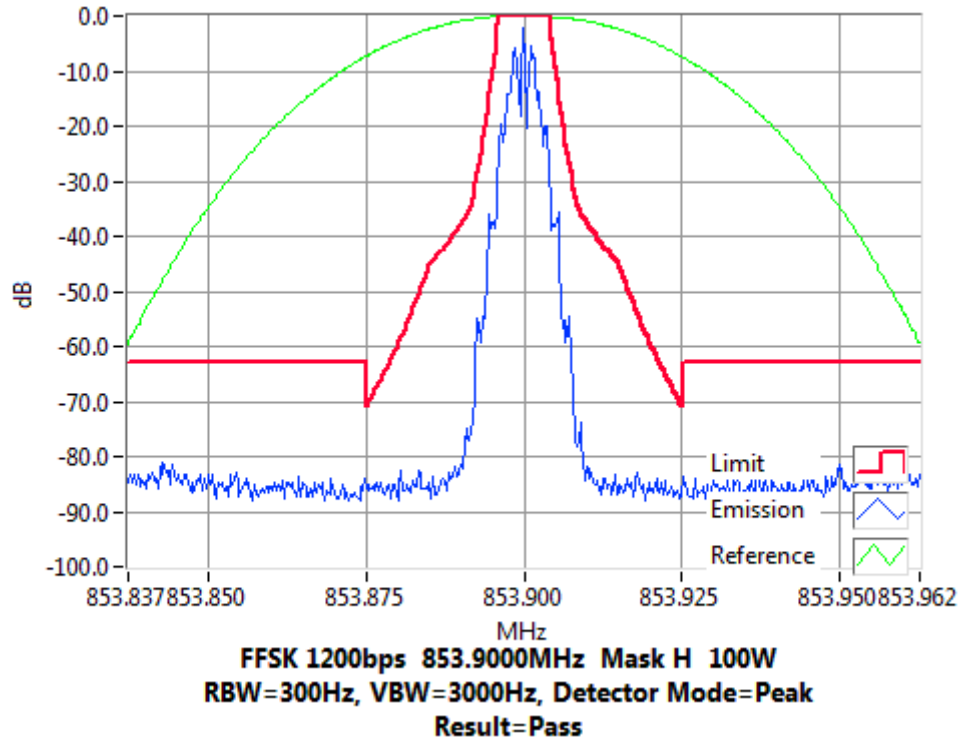
Transmitter Spectrum Masks

FSK, 1200 bps

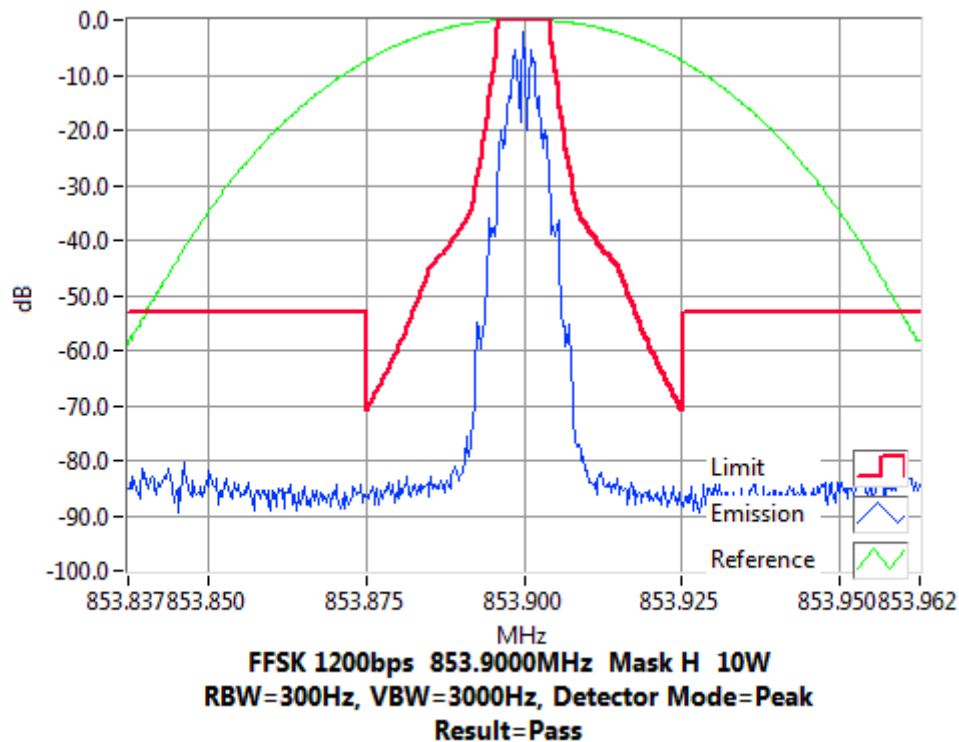
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 853.9 MHz 10 W 12.5 kHz Channel Spacing



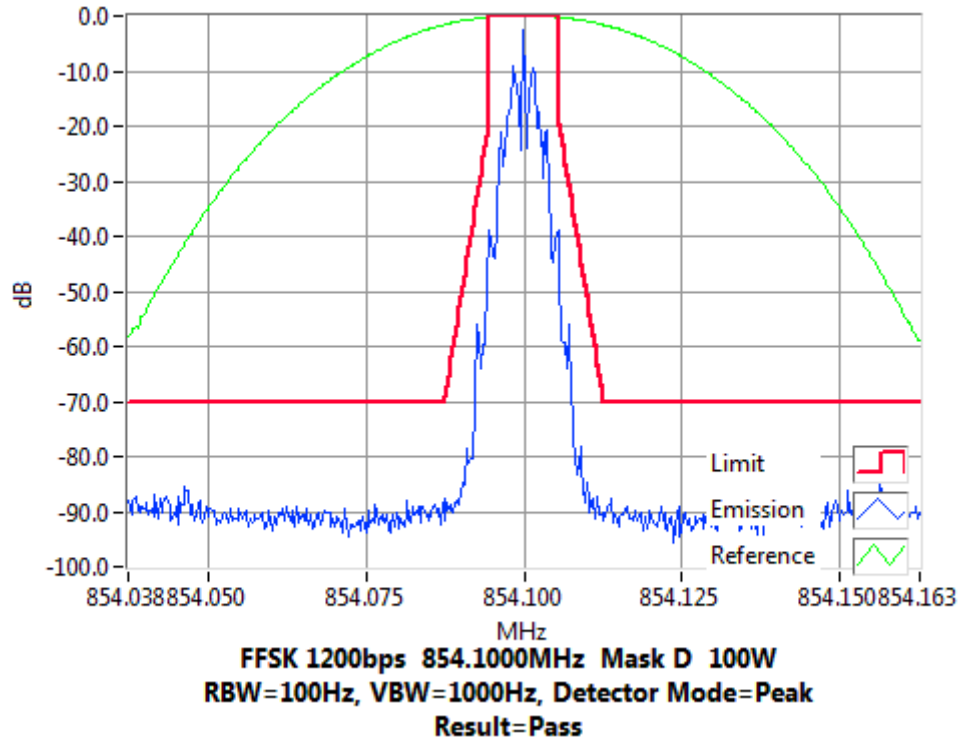
Transmitter Spectrum Masks

FSK, 1200 bps

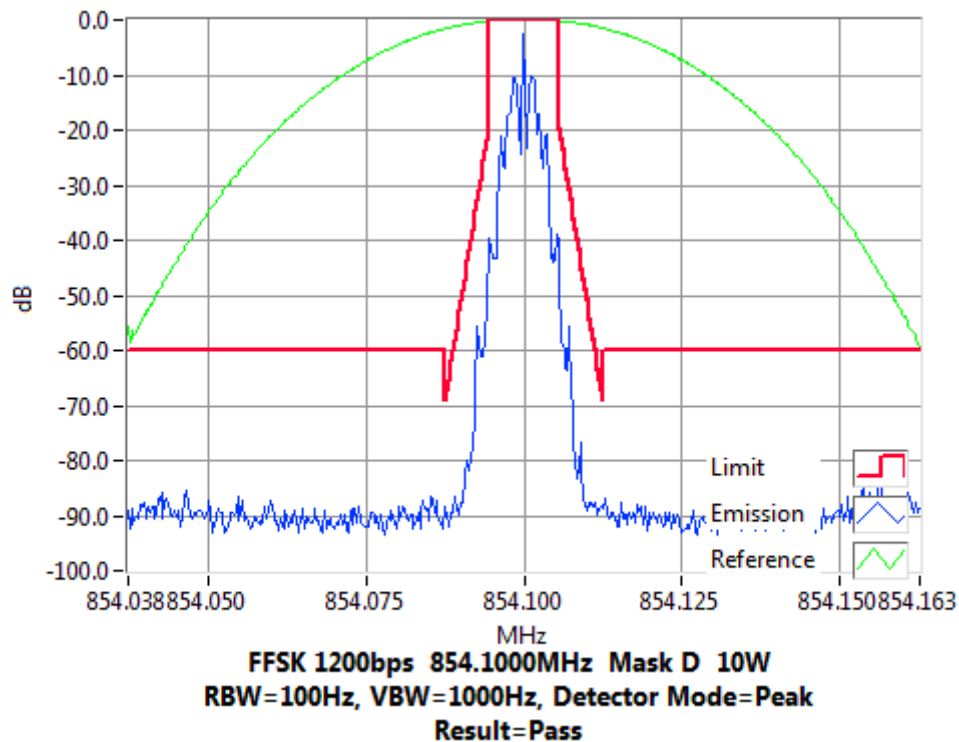
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 854.1 MHz 10 W 12.5 kHz Channel Spacing



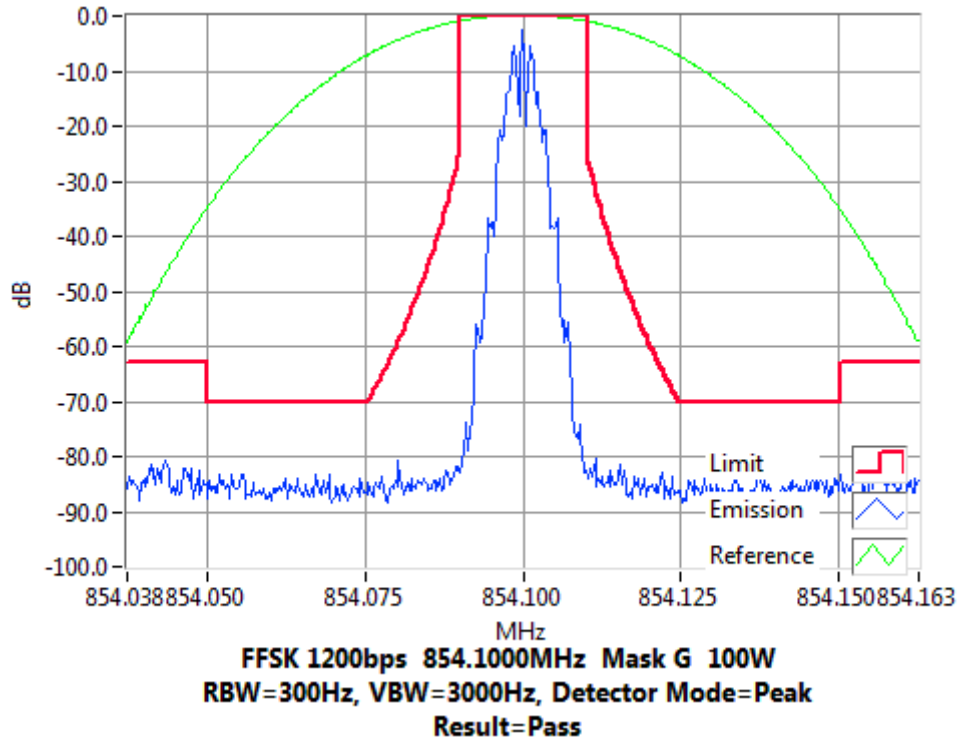
Transmitter Spectrum Masks

FSK, 1200 bps

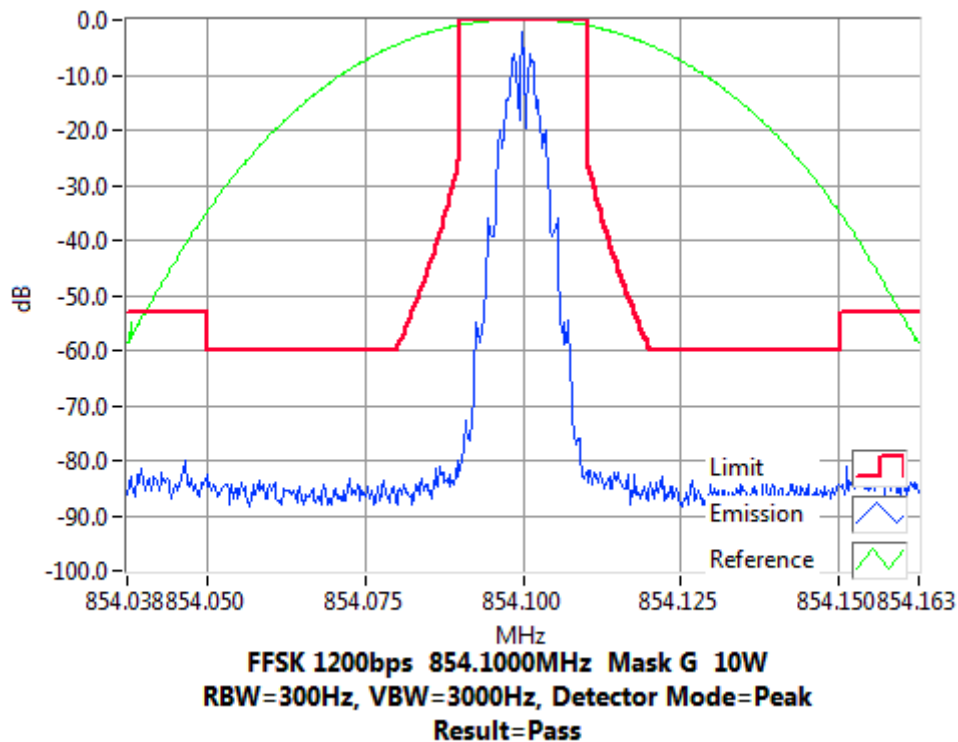
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 854.1 MHz 10 W 12.5 kHz Channel Spacing



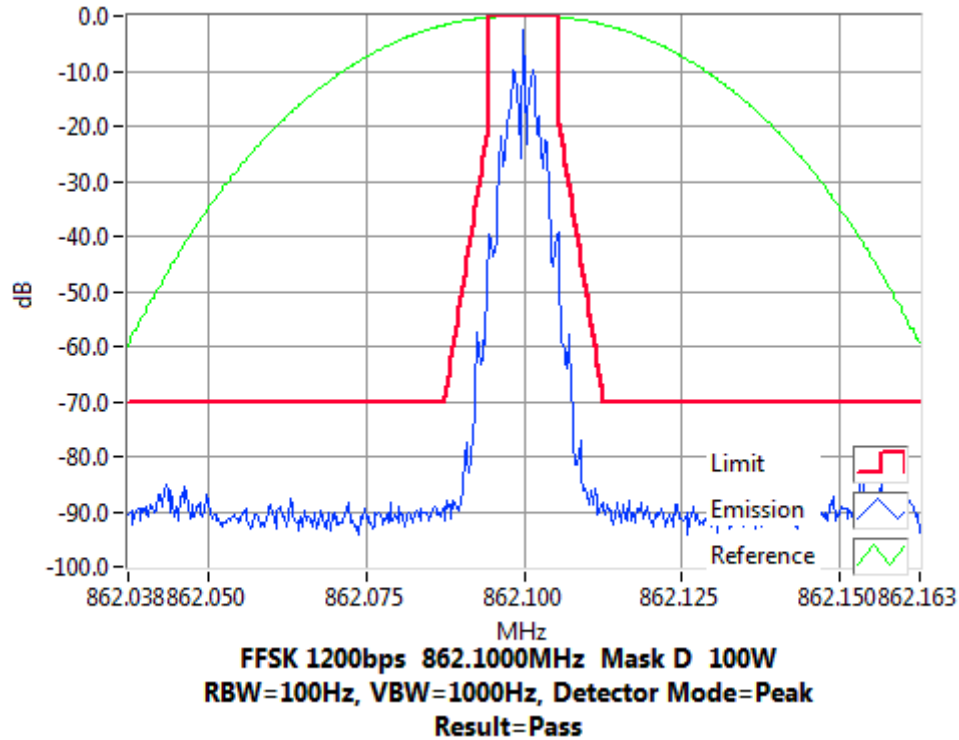
Transmitter Spectrum Masks

FSK, 1200 bps

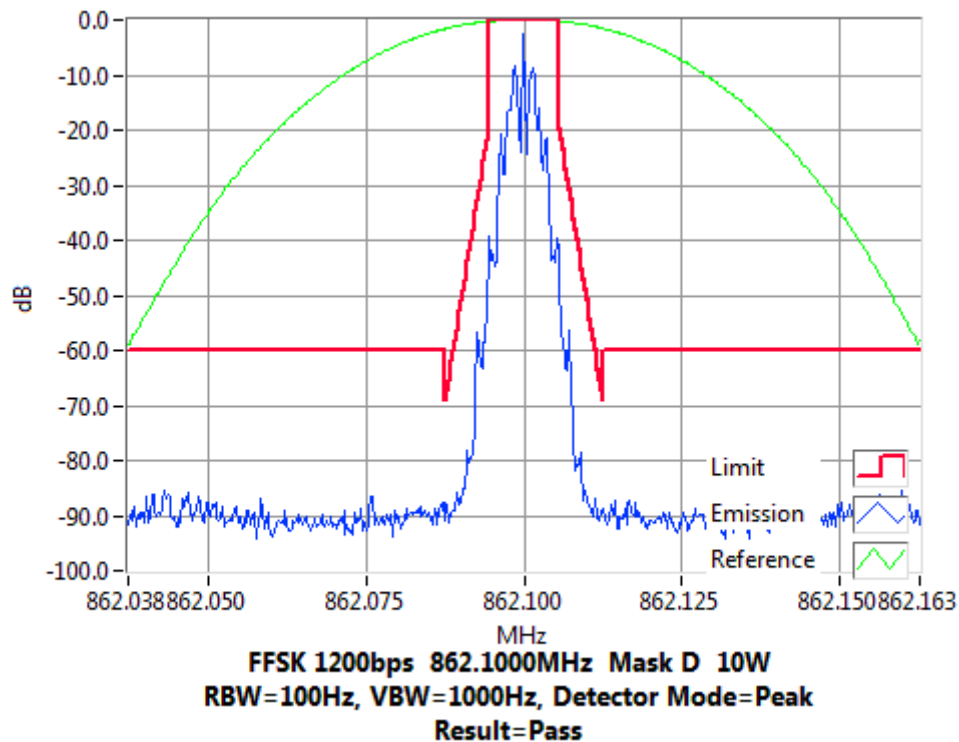
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 862.1 MHz 10 W 12.5 kHz Channel Spacing



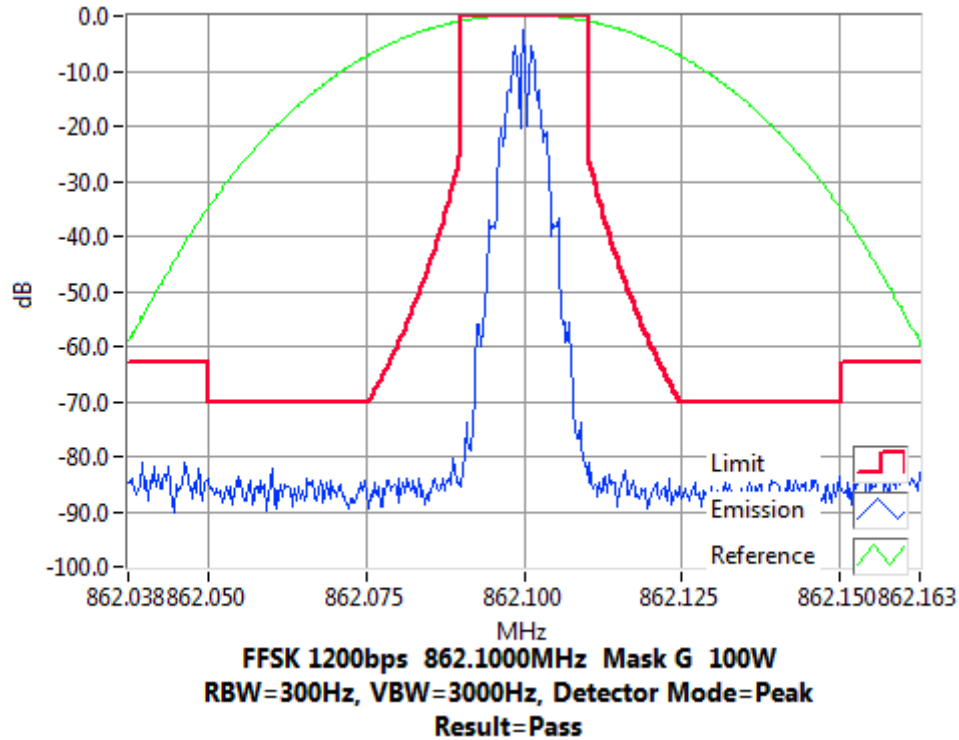
Transmitter Spectrum Masks

FSK, 1200 bps

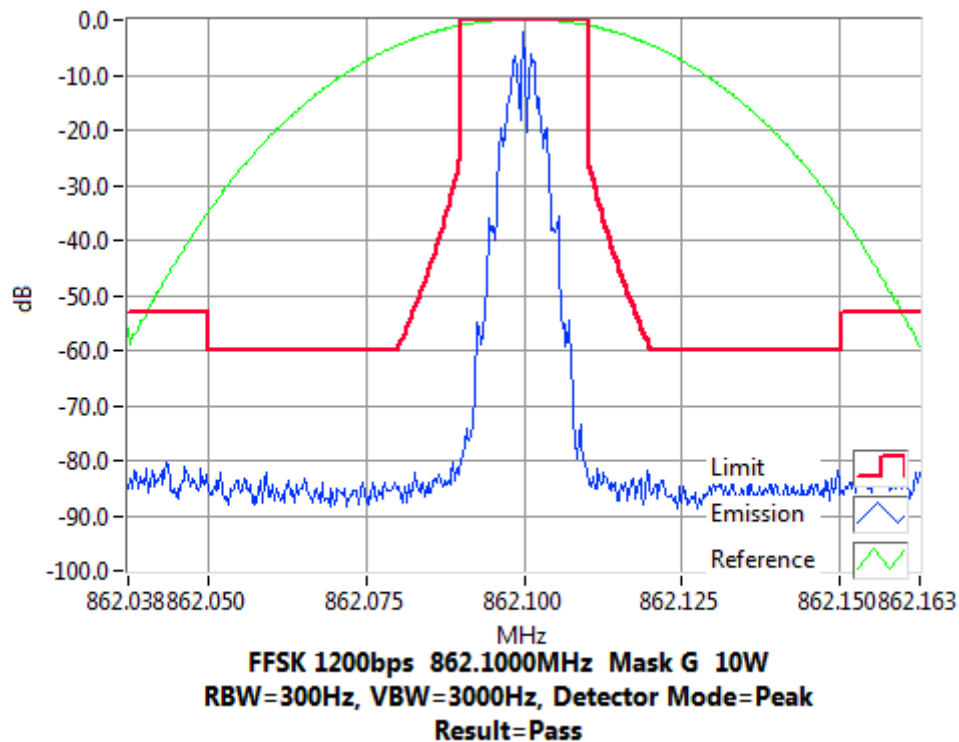
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 862.1 MHz 10 W 12.5 kHz Channel Spacing



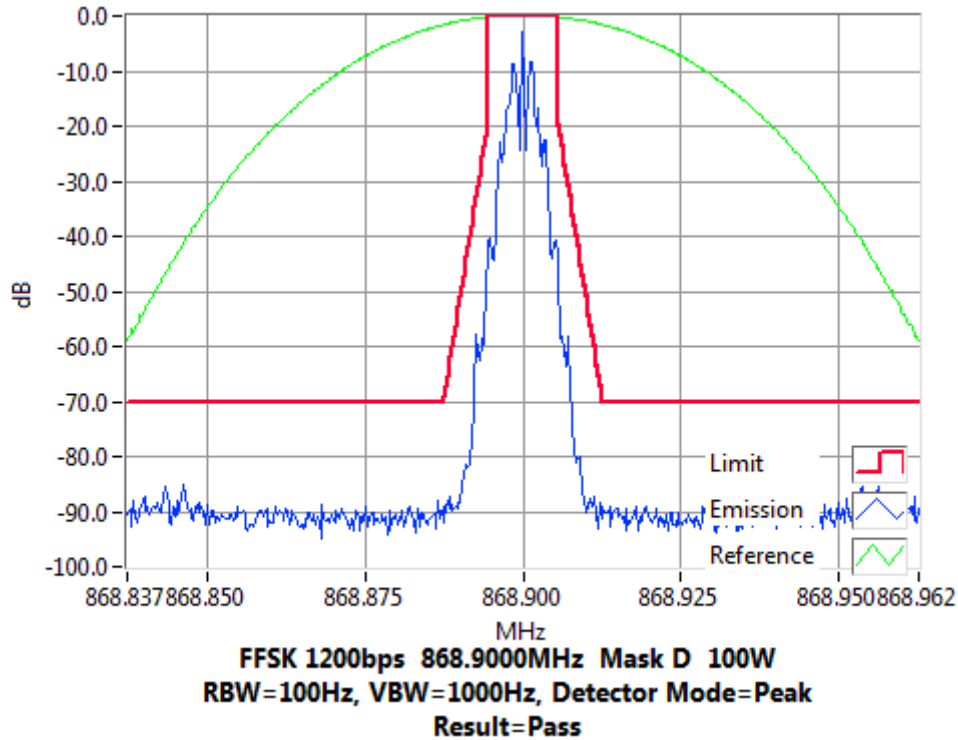
Transmitter Spectrum Masks

FSK, 1200 bps

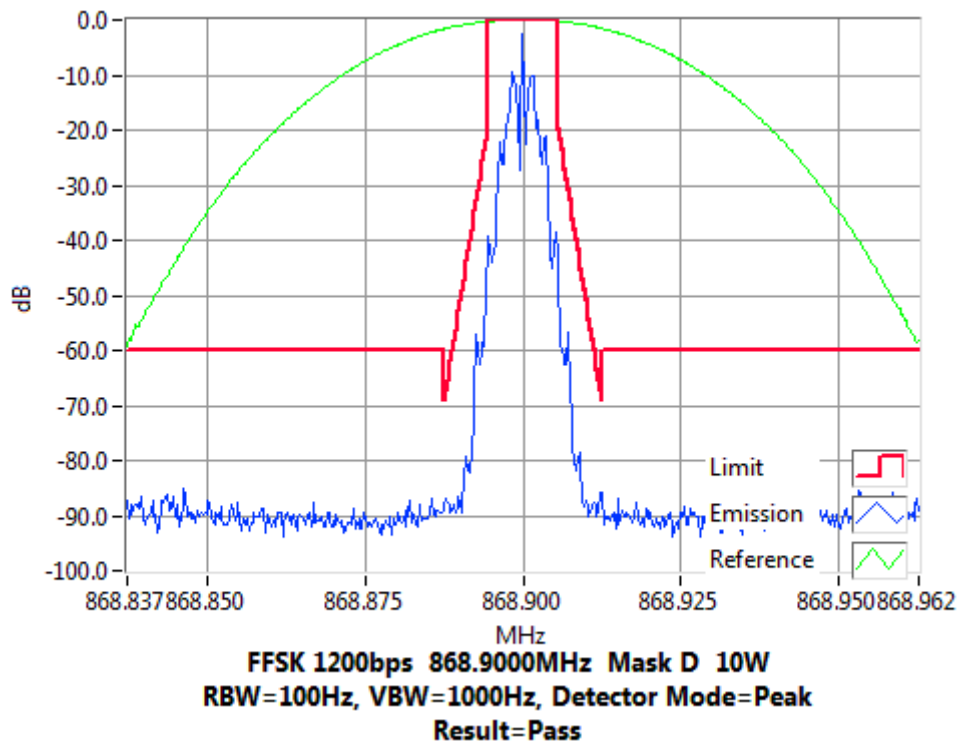
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 868.9 MHz 10 W 12.5 kHz Channel Spacing



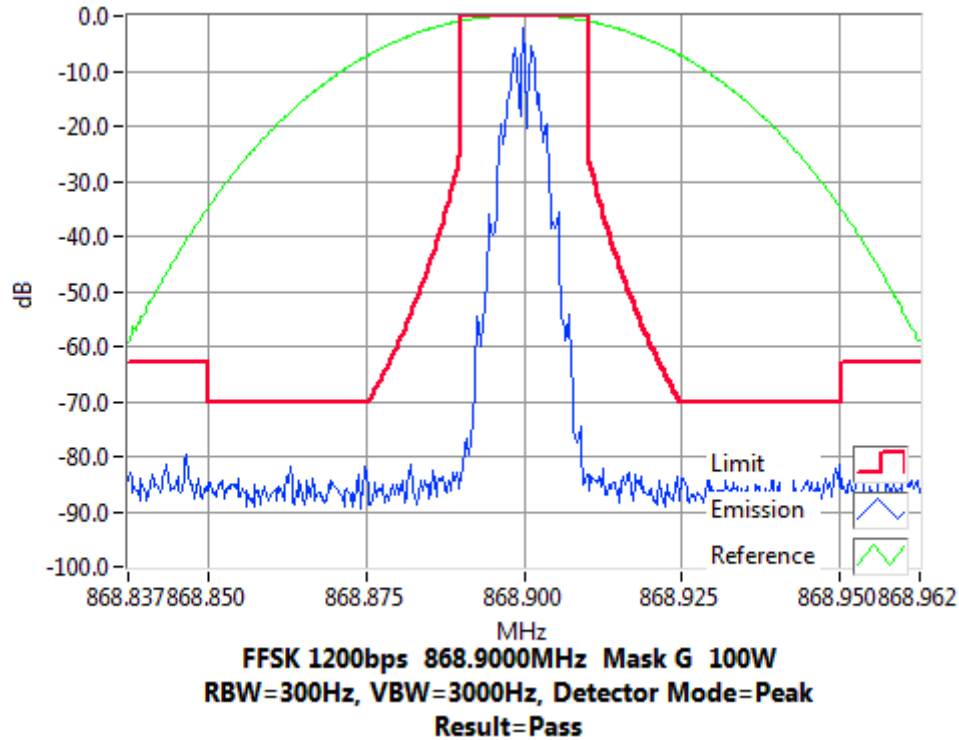
Transmitter Spectrum Masks

FSK, 1200 bps

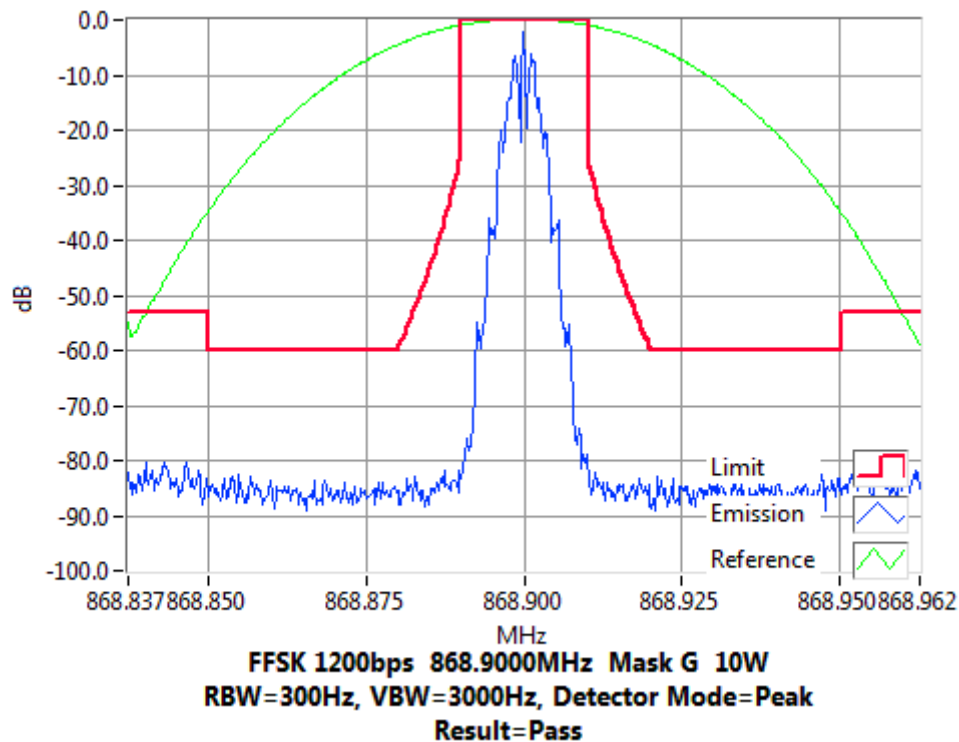
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 868.9 MHz 10 W 12.5 kHz Channel Spacing



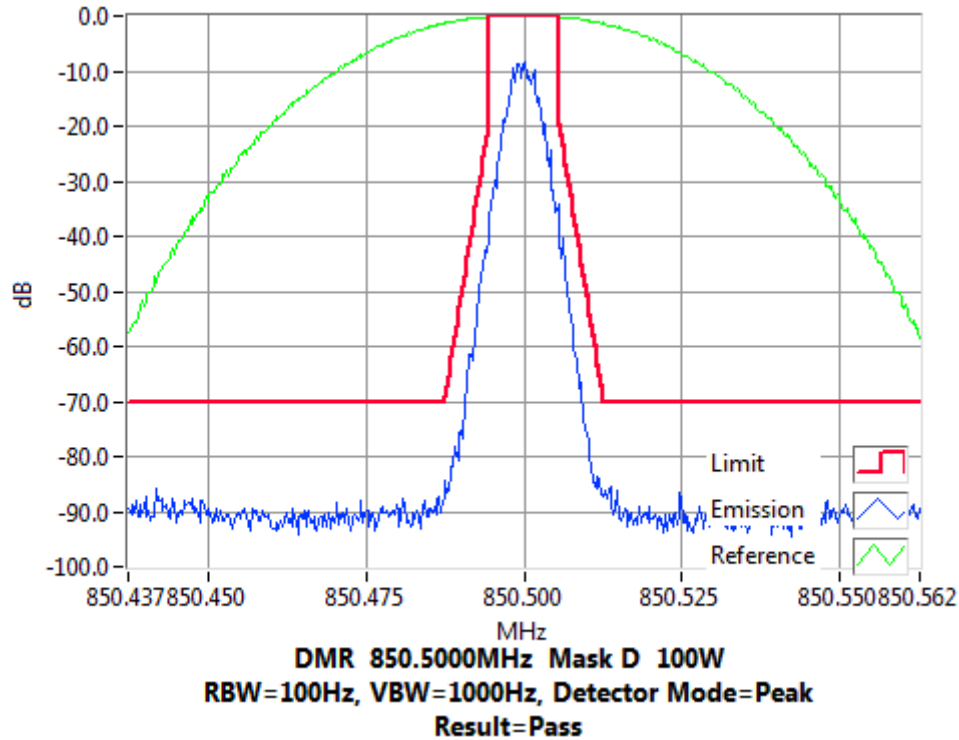
Transmitter Spectrum Masks

DMR

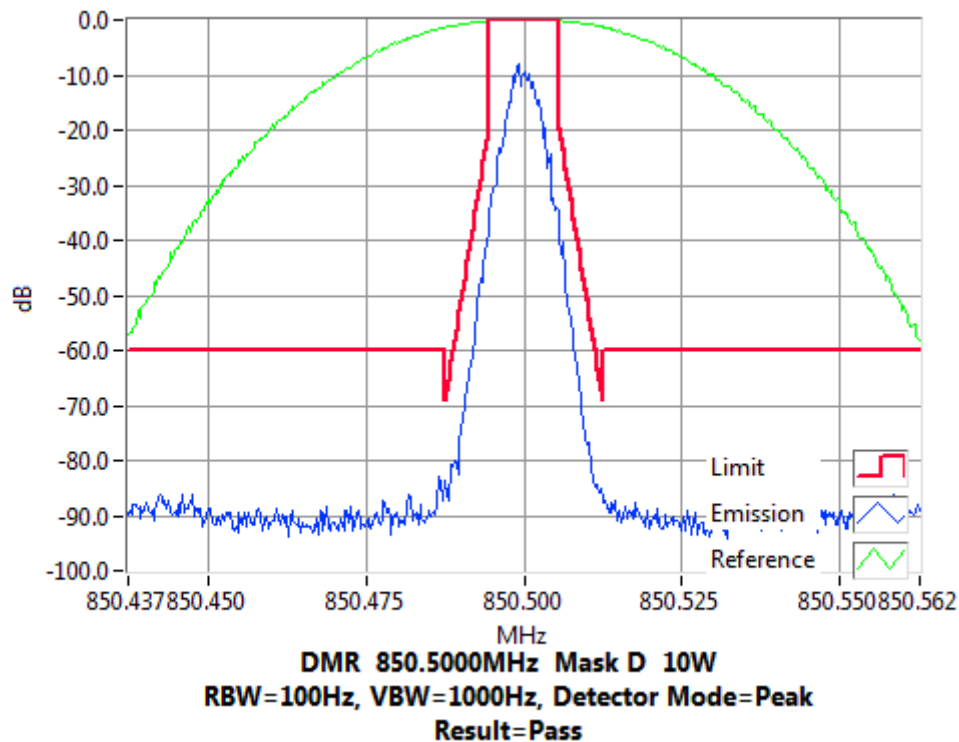
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 850.5 MHz 10 W 12.5 kHz Channel Spacing



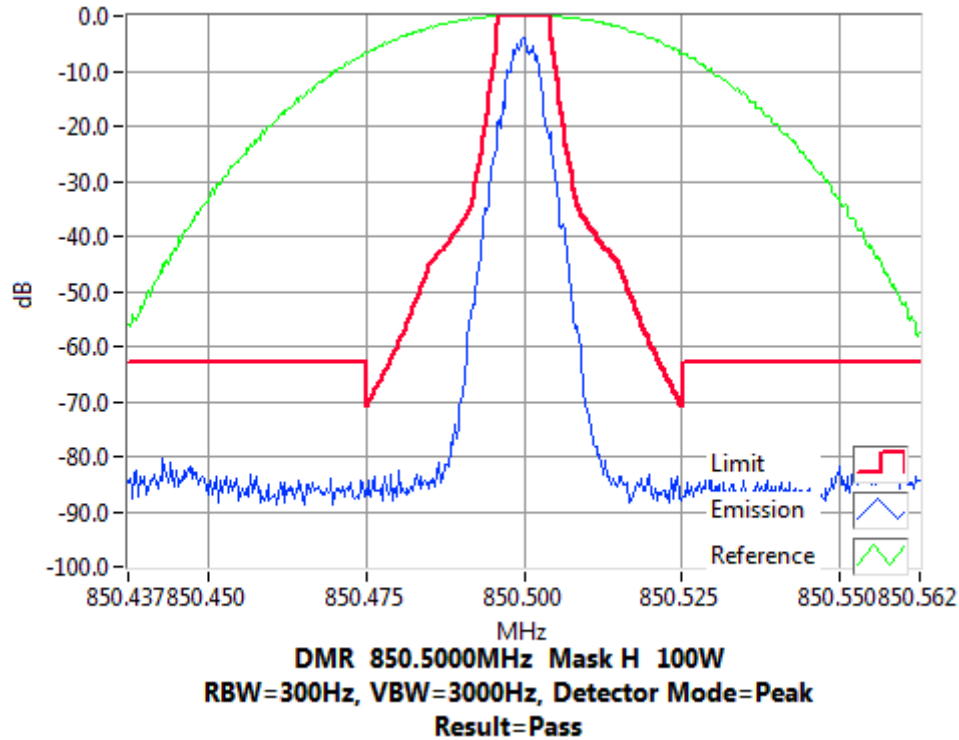
Transmitter Spectrum Masks

DMR

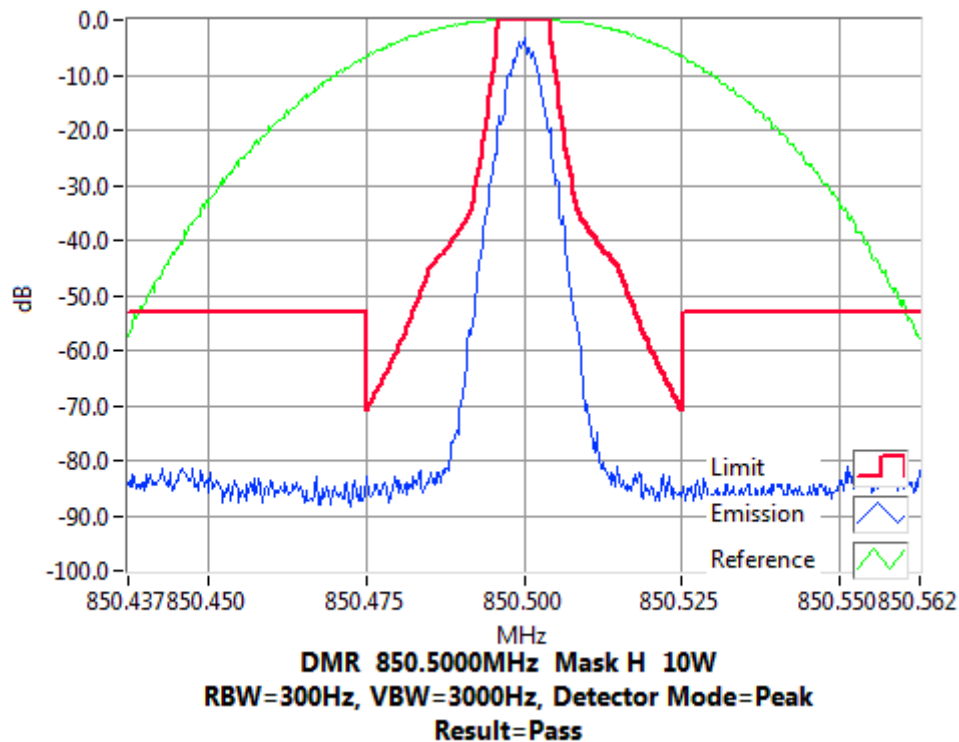
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 850.5 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 850.5 MHz 10 W 12.5 kHz Channel Spacing



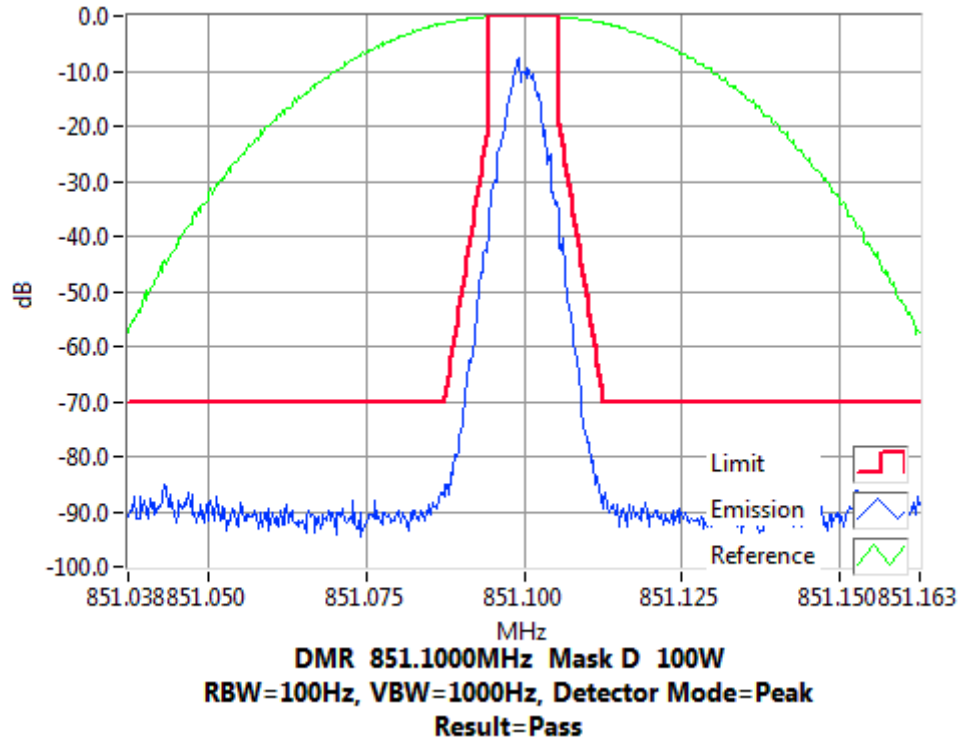
Transmitter Spectrum Masks

DMR

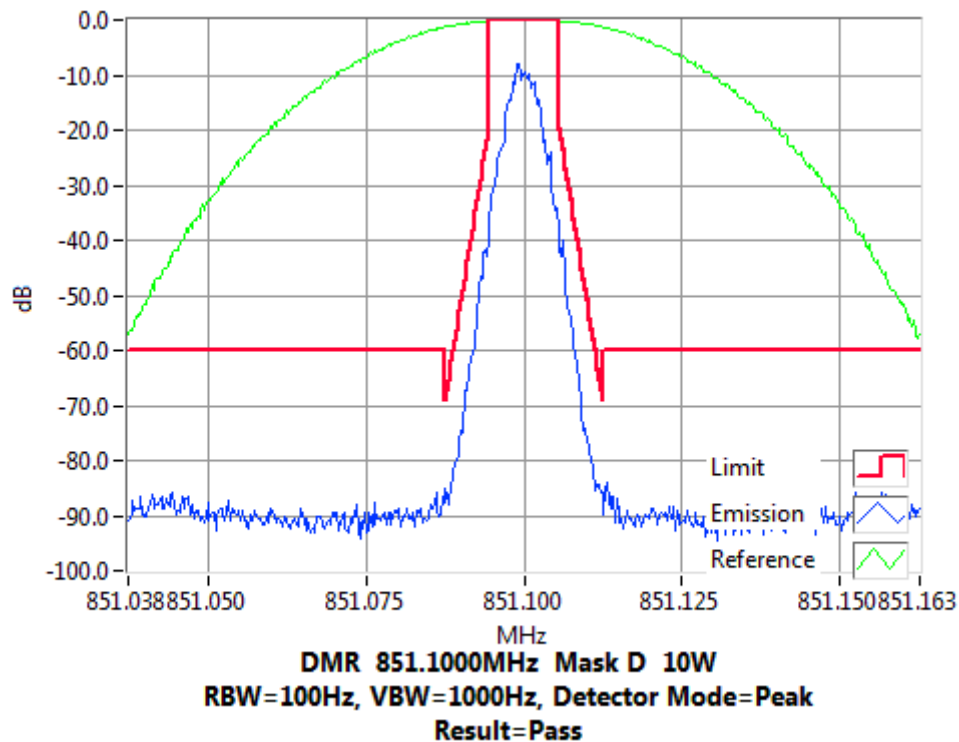
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 851.1 MHz 10 W 12.5 kHz Channel Spacing



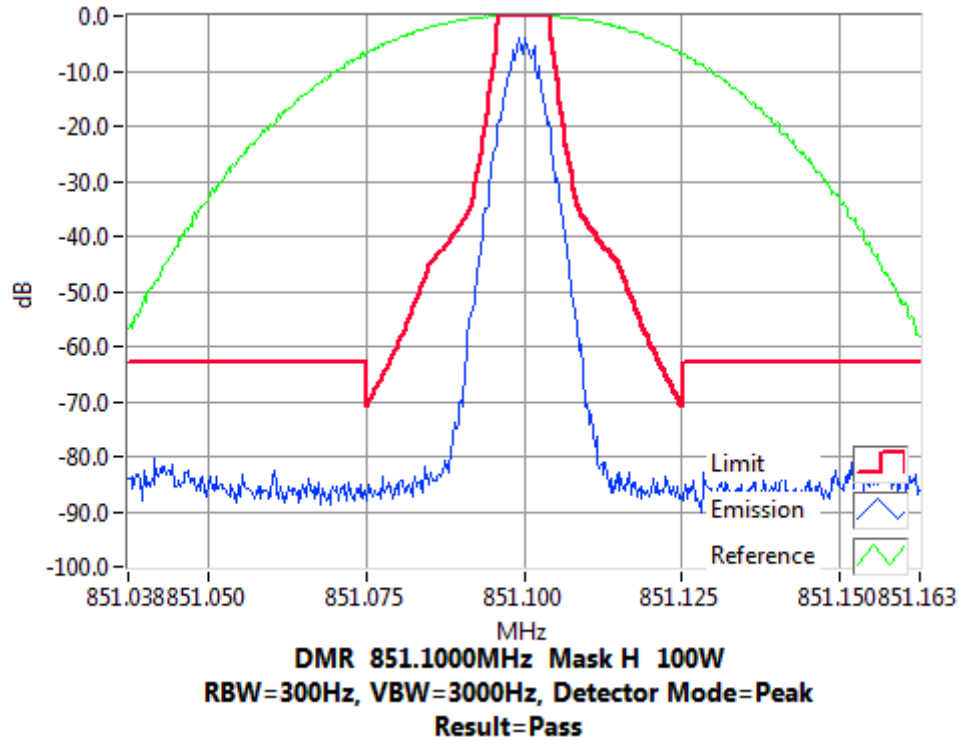
Transmitter Spectrum Masks

DMR

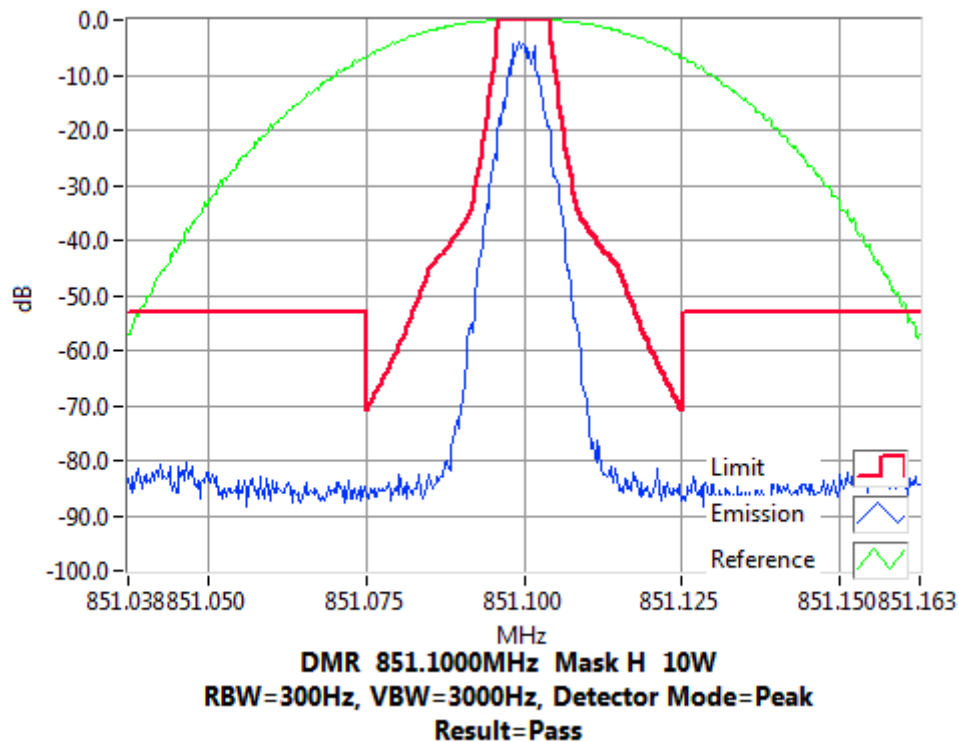
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 851.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 851.1 MHz 10 W 12.5 kHz Channel Spacing



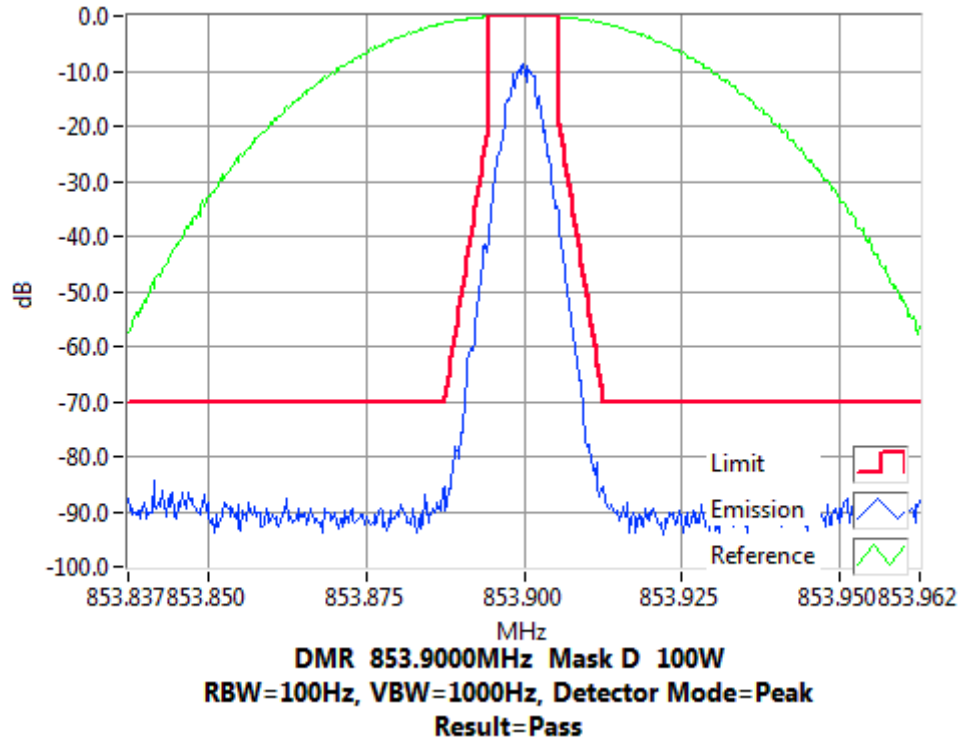
Transmitter Spectrum Masks

DMR

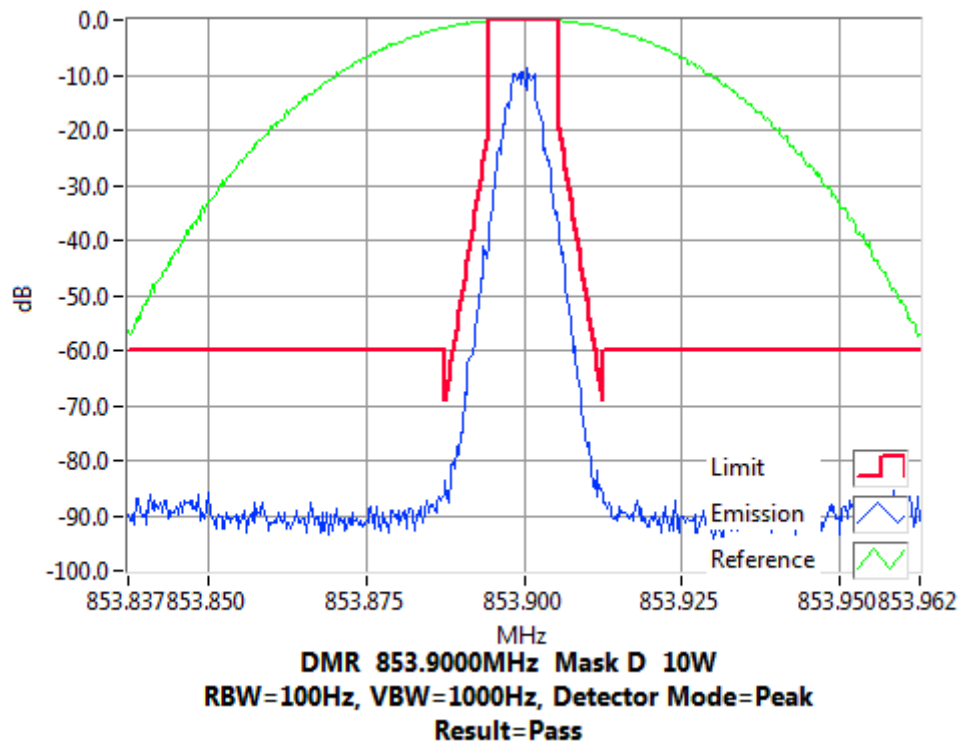
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 853.9 MHz 10 W 12.5 kHz Channel Spacing



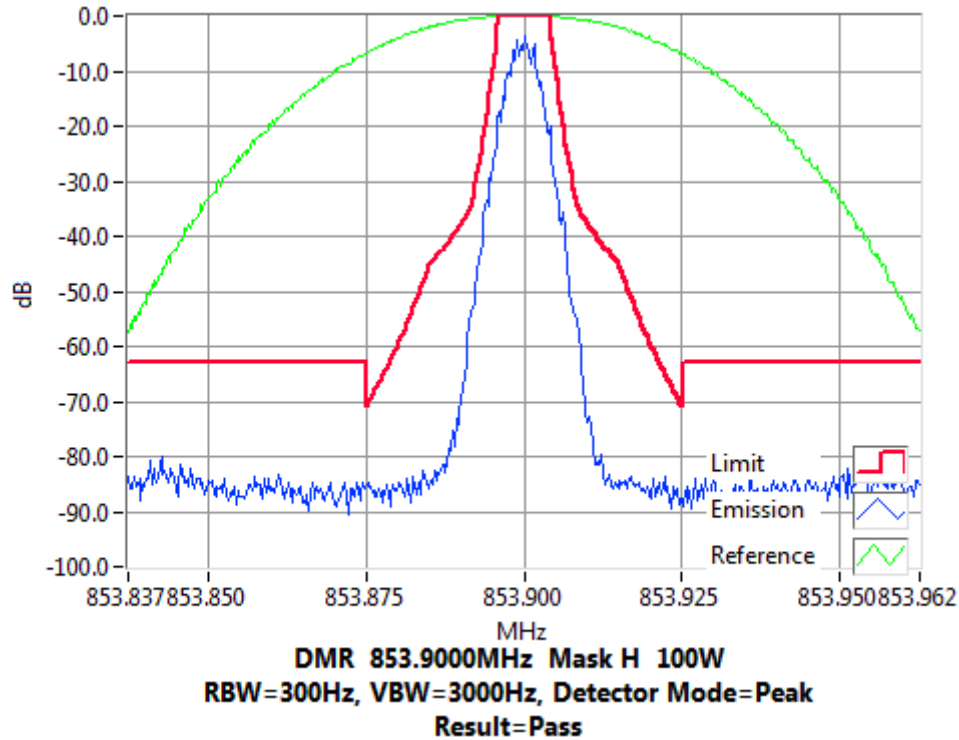
Transmitter Spectrum Masks

DMR

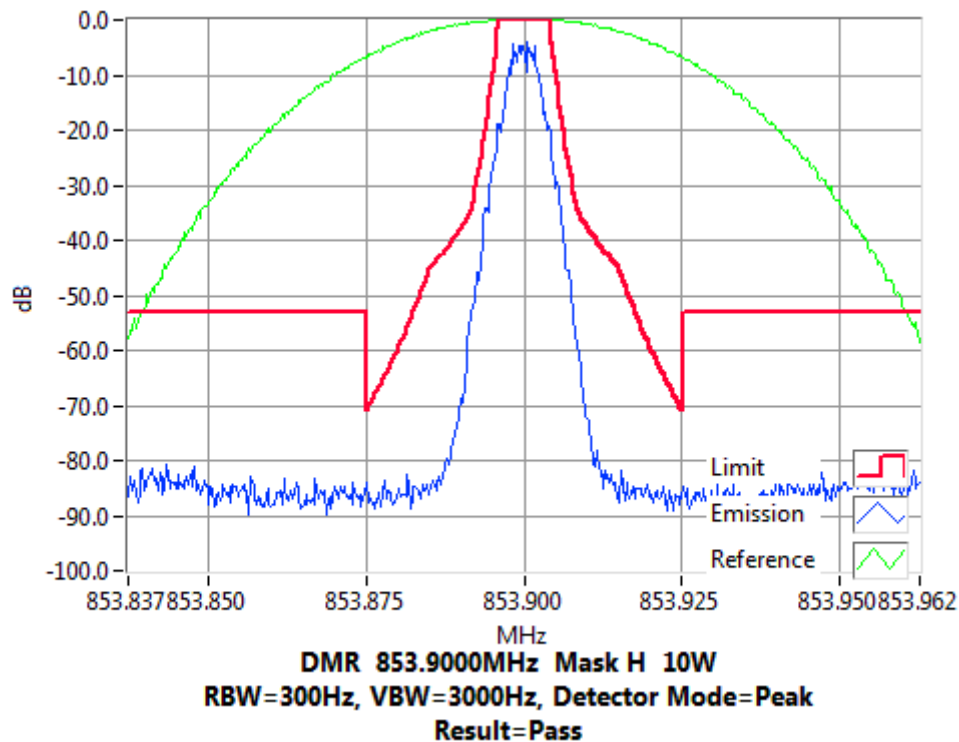
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 853.9 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 853.9 MHz 10 W 12.5 kHz Channel Spacing



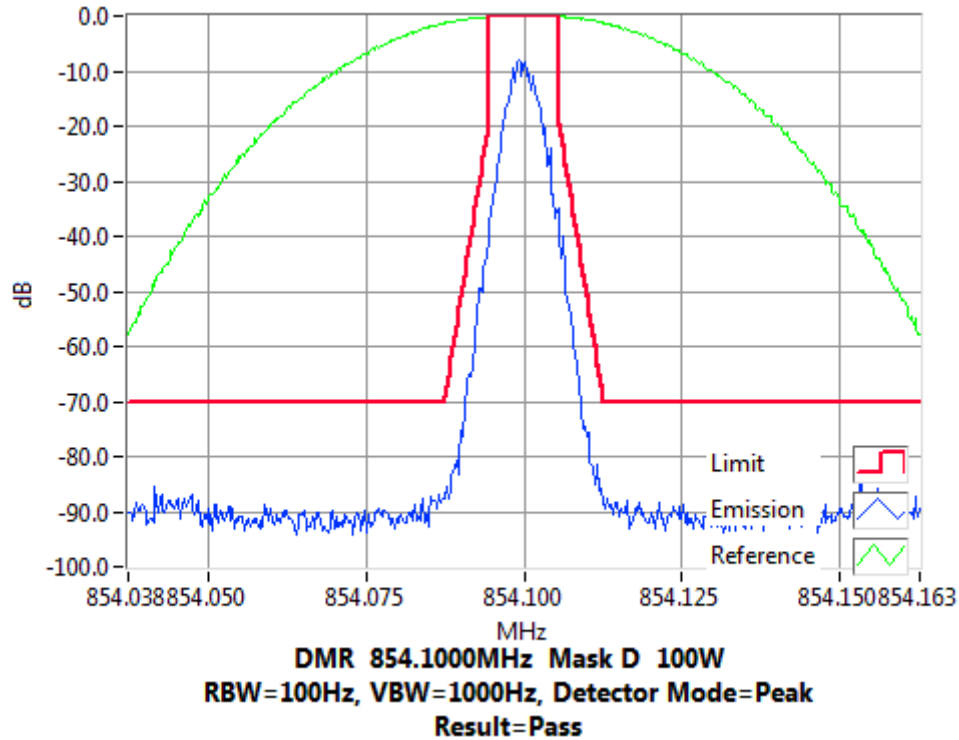
Transmitter Spectrum Masks

DMR

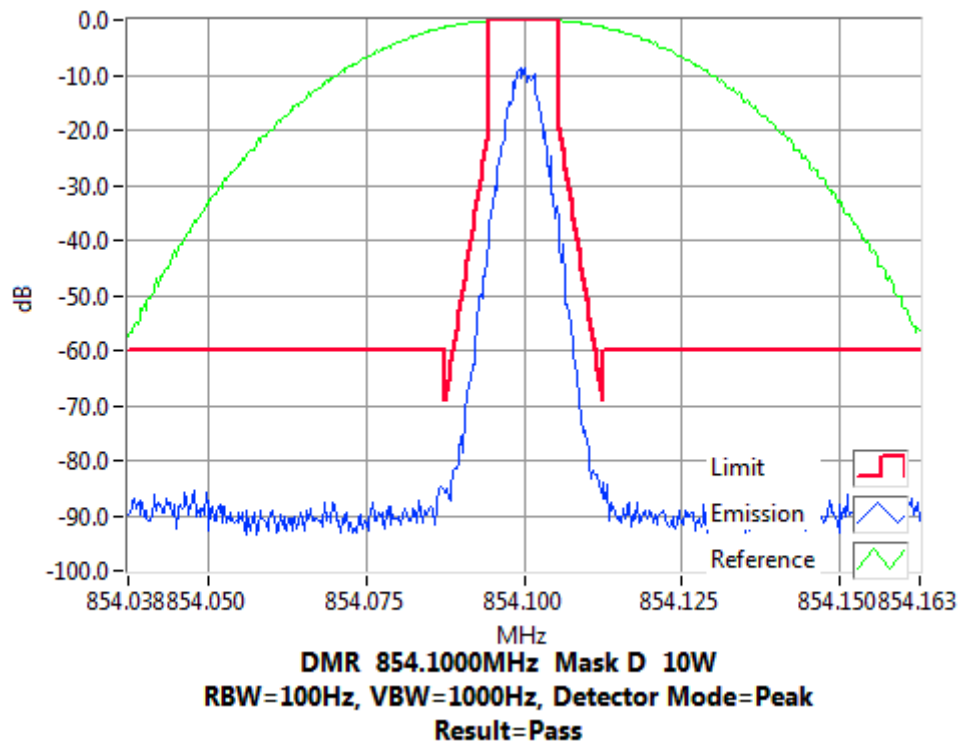
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 854.1 MHz 10 W 12.5 kHz Channel Spacing



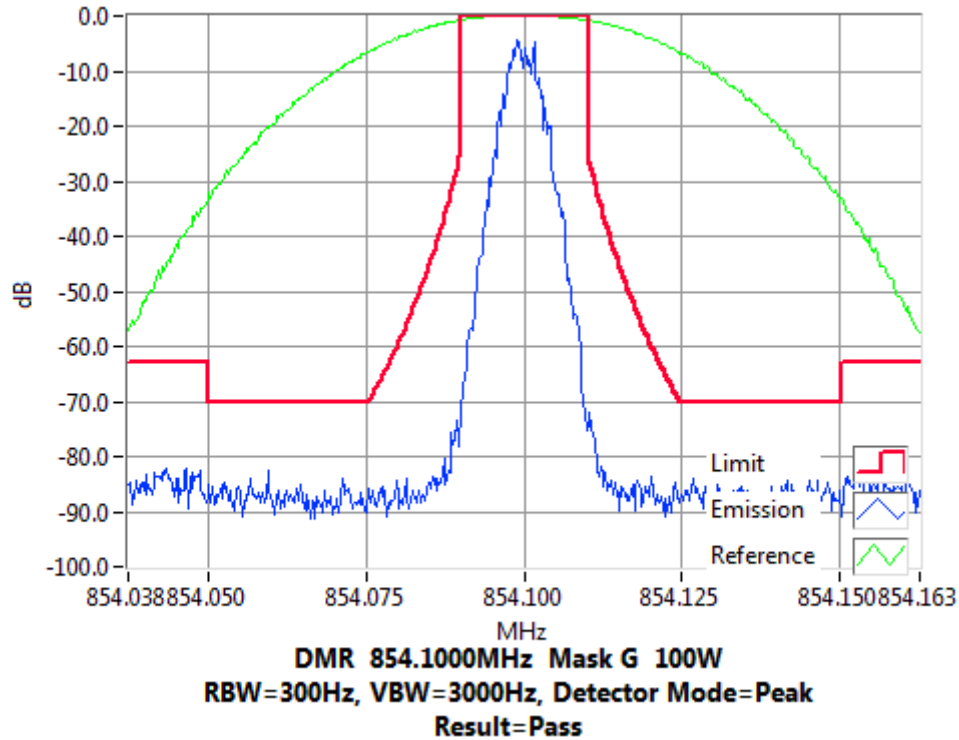
Transmitter Spectrum Masks

DMR

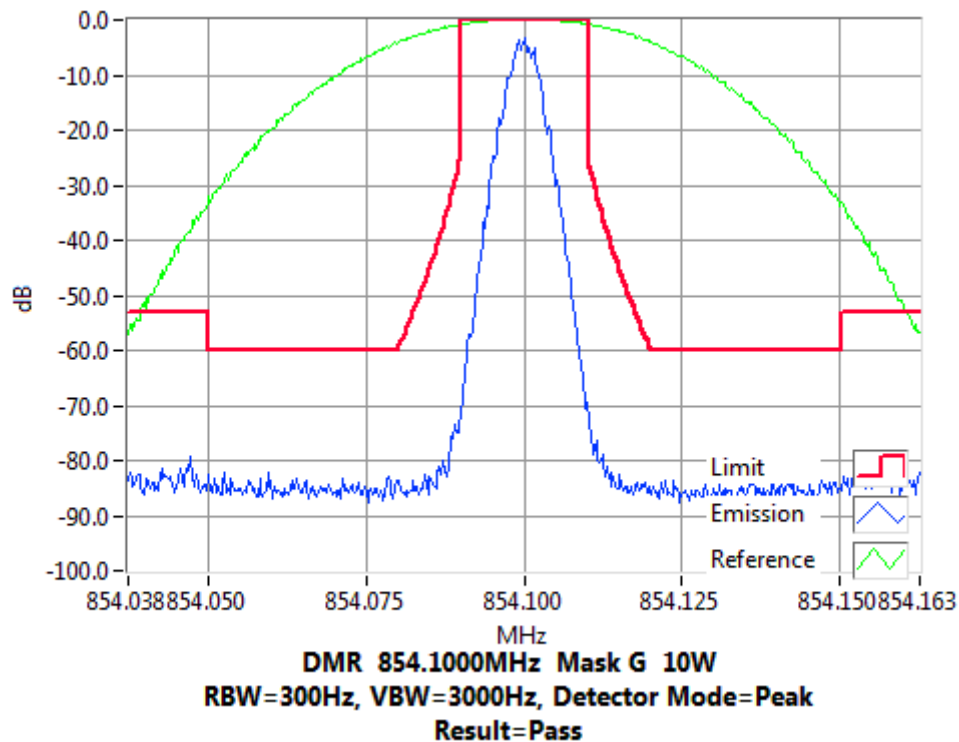
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 854.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 854.1 MHz 10 W 12.5 kHz Channel Spacing



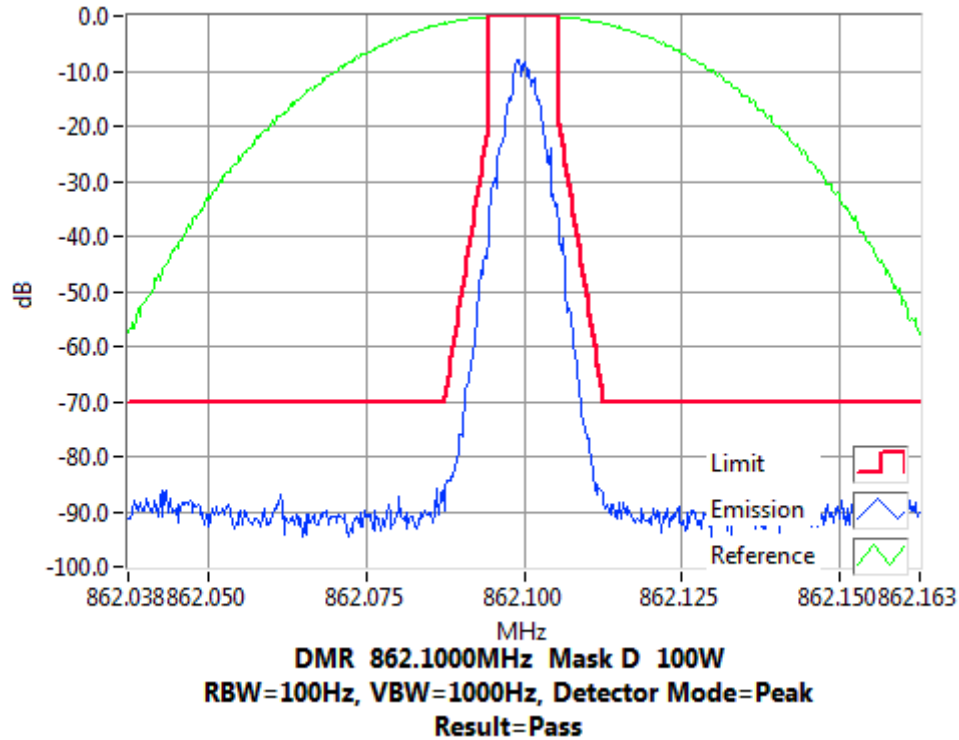
Transmitter Spectrum Masks

DMR

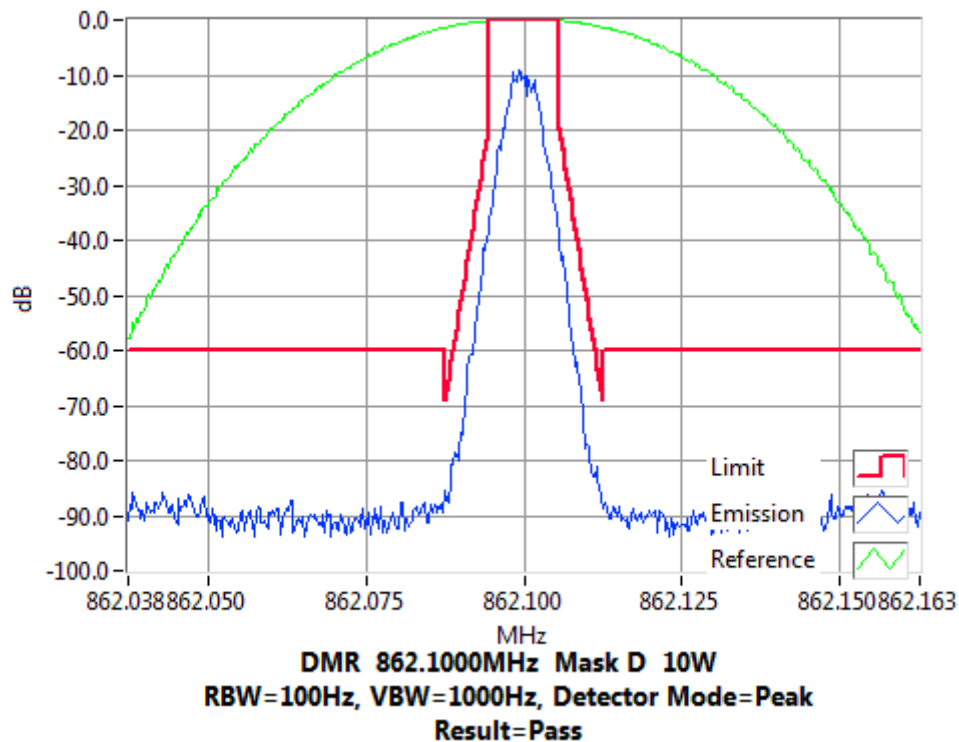
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 862.1 MHz 10 W 12.5 kHz Channel Spacing



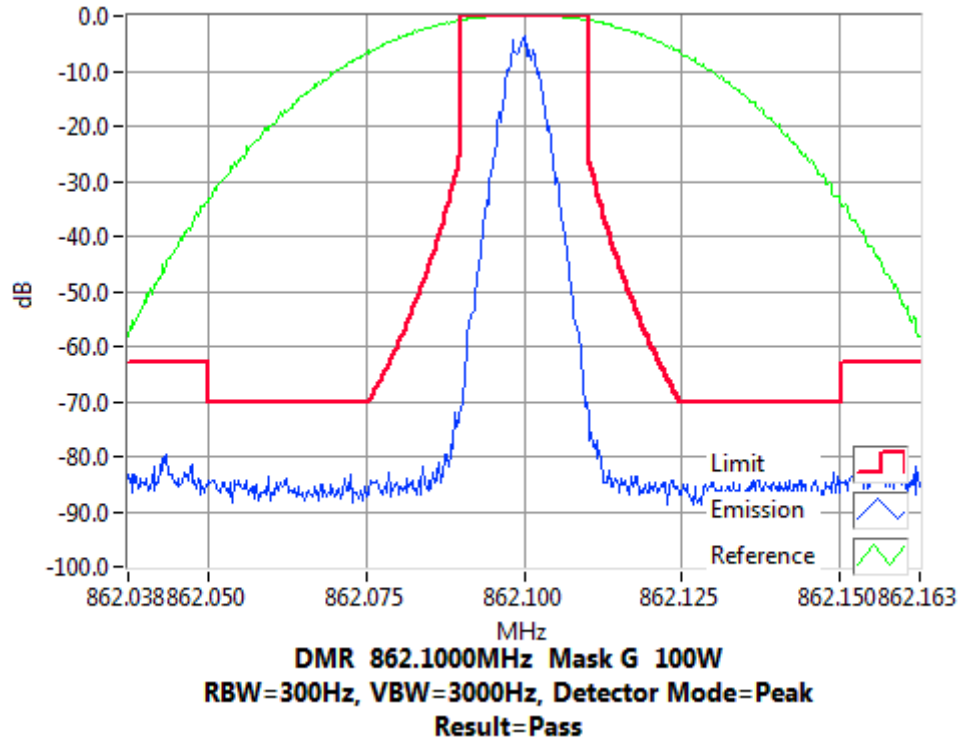
Transmitter Spectrum Masks

DMR

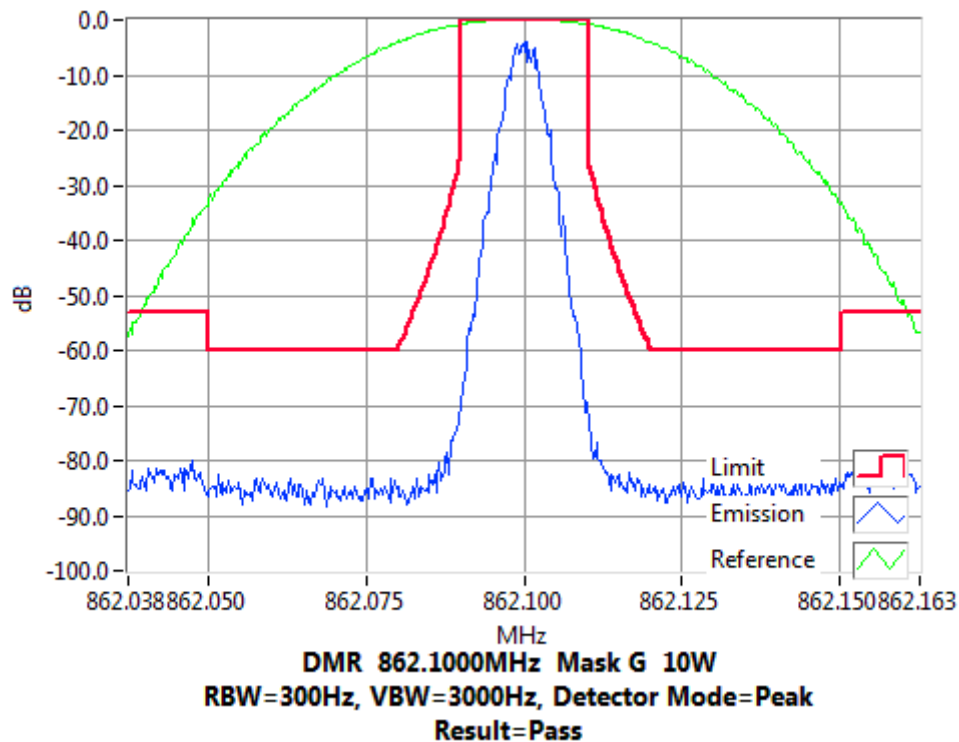
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 862.1 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 862.1 MHz 10 W 12.5 kHz Channel Spacing



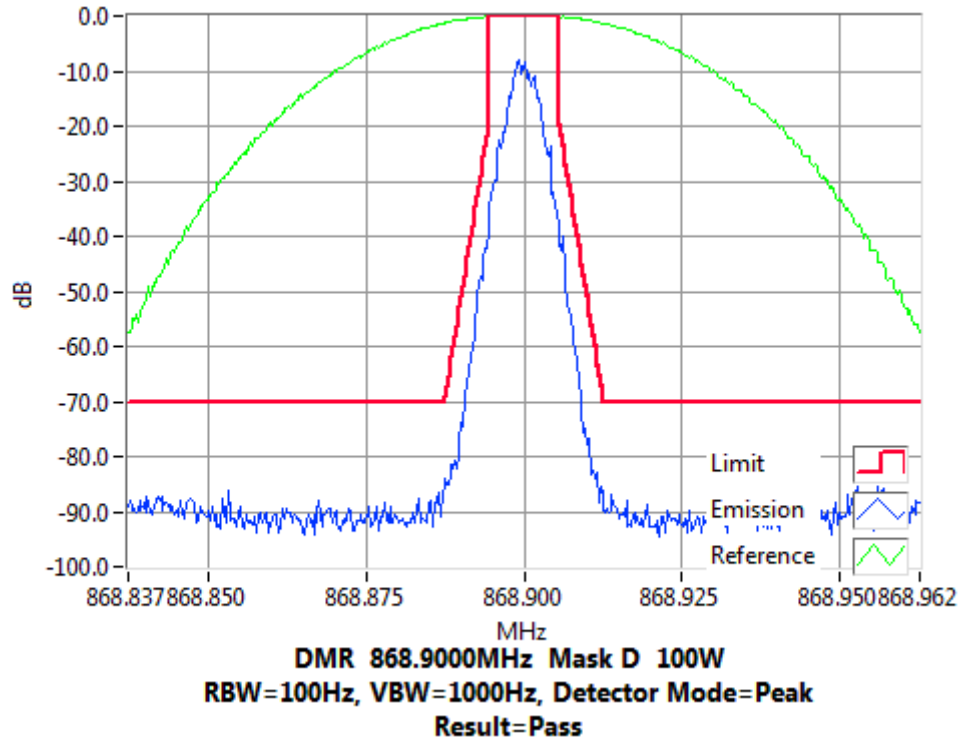
Transmitter Spectrum Masks

DMR

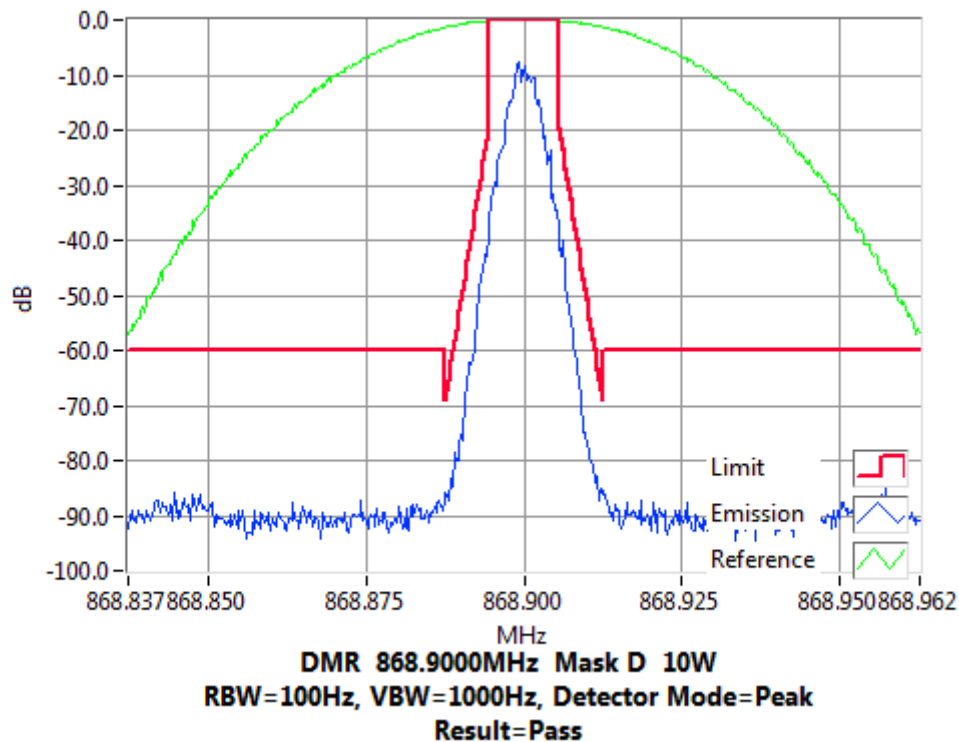
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 868.9 MHz 10 W 12.5 kHz Channel Spacing



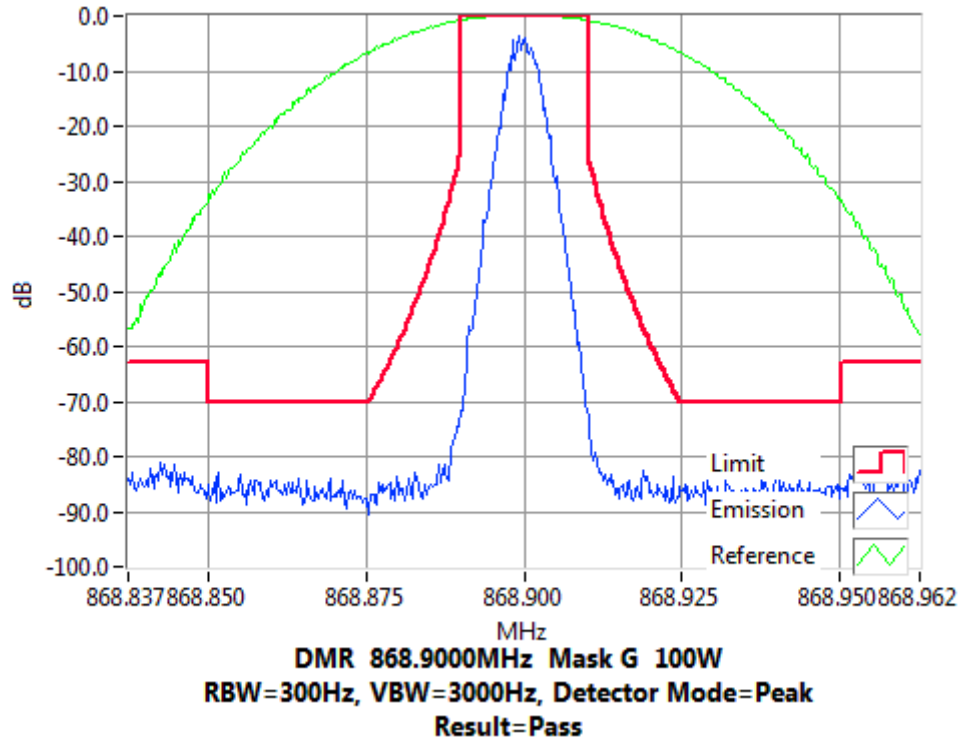
Transmitter Spectrum Masks

DMR

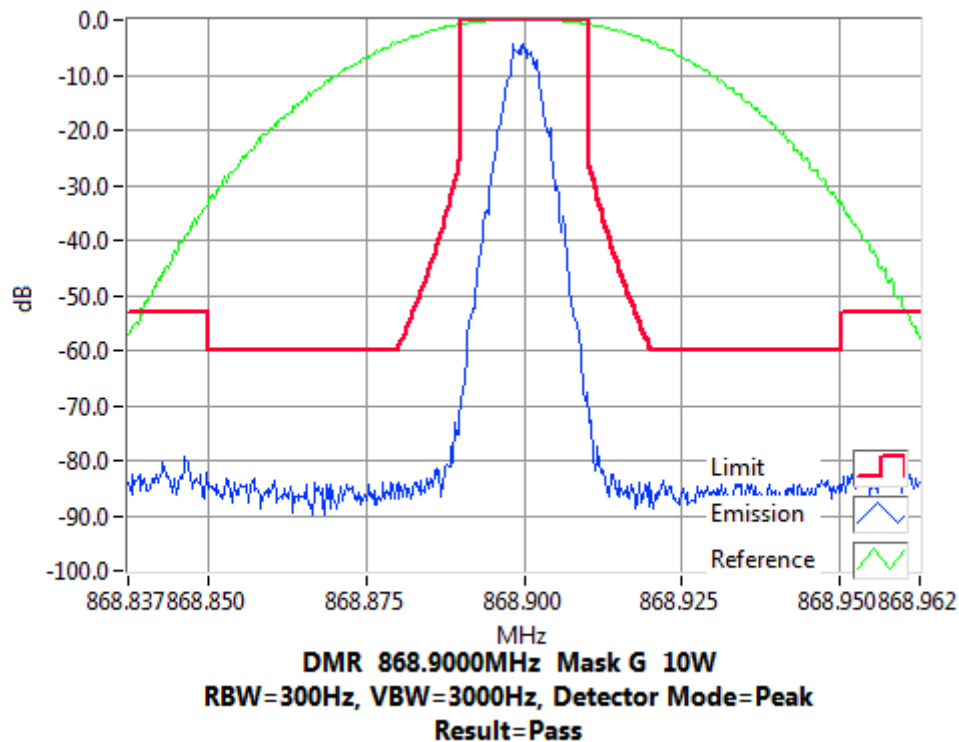
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

Tx FREQUENCY: 868.9 MHz 100 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 868.9 MHz 10 W 12.5 kHz Channel Spacing



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: ≤ 12.75 GHz ± 3.0 dB

MEASUREMENT RESULTS:

Analogue

Tx FREQUENCY: 769.1 MHz 100 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	-48.51	-46.38	-40
15.625 kHz	6.25 kHz	-74.71	-74.79	-60
21.875 kHz	6.25 kHz	-75.75	-75.76	-60
37.5 kHz	25 kHz	-71.19	-71.04	-60
62.5 kHz	25 kHz	-74.1	-73.96	-65
87.5 kHz	25 kHz	-77.56	-77.22	-65
150 kHz	100 kHz	-75	-74.7	-65
250 kHz	100 kHz	-79.95	-79.69	-65
350 kHz	100 kHz	-84.25	-83.81	-65
>400 kHz to 12 MHz	30 kHz (swept)	-88.5		-80
12 MHz to paired receive band	30 kHz (swept)	-106.6		-80
In the paired receive band	30 kHz (swept)	-109.2		-85

Analogue

Tx FREQUENCY: 774.9 MHz 100 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	-48.43	-46.8	-40
15.625 kHz	6.25 kHz	-74.78	-74.5	-60
21.875 kHz	6.25 kHz	-75.49	-75.82	-60
37.5 kHz	25 kHz	-71.21	-71.12	-60
62.5 kHz	25 kHz	-73.79	-73.91	-65
87.5 kHz	25 kHz	-77.32	-77.37	-65
150 kHz	100 kHz	-75	-74.83	-65
250 kHz	100 kHz	-80.13	-79.76	-65
350 kHz	100 kHz	-84	-84.1	-65
>400 kHz to 12 MHz	30 kHz (swept)	-89.2		-80
12 MHz to paired receive band	30 kHz (swept)	-107.6		-80
In the paired receive band	30 kHz (swept)	-109.1		-85

Adjacent Channel Power Ratio

Analogue

Tx FREQUENCY: 769.1 MHz 100 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	-59.36	-57.37	-40
21.875 kHz	6.25 kHz	-75.74	-76.05	-60
37.5 kHz	25 kHz	-76.89	-77.03	-60
62.5 kHz	25 kHz	-73.35	-73.35	-65
87.5 kHz	25 kHz	-77.24	-77.4	-65
150 kHz	100 kHz	-73.81	-73.66	-65
250 kHz	100 kHz	-79.28	-79.11	-65
350 kHz	100 kHz	-83.46	-83.21	-65
>400 kHz to 12 MHz	30 kHz (swept)	-88.8		-80
12 MHz to paired receive band	30 kHz (swept)	-106.2		-80
In the paired receive band	30 kHz (swept)	-107.7		-85

Analogue

Tx FREQUENCY: 774.9 MHz 100 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	-58.87	-58.93	-40
21.875 kHz	6.25 kHz	-75.53	-75.24	-60
37.5 kHz	25 kHz	-77.26	-77.16	-60
62.5 kHz	25 kHz	-73.21	-73.35	-65
87.5 kHz	25 kHz	-77.25	-77.21	-65
150 kHz	100 kHz	-74.89	-74.31	-65
250 kHz	100 kHz	-80.1	-79.95	-65
350 kHz	100 kHz	-84.04	-84.16	-65
>400 kHz to 12 MHz	30 kHz (swept)	-88.6		-80
12 MHz to paired receive band	30 kHz (swept)	-106.1		-80
In the paired receive band	30 kHz (swept)	-107.8		-85

Adjacent Channel Power Ratio

FFSK, 1200 bps

Tx FREQUENCY: 769.1 MHz 100 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	-55.69	-56.26	-40
15.625 kHz	6.25 kHz	-74.48	-74.8	-60
21.875 kHz	6.25 kHz	-75.64	-75.26	-60
37.5 kHz	25 kHz	-71.11	-71.35	-60
62.5 kHz	25 kHz	-73.97	-73.94	-65
87.5 kHz	25 kHz	-77.52	-77.25	-65
150 kHz	100 kHz	-75.2	-74.98	-65
250 kHz	100 kHz	-80.08	-79.66	-65
350 kHz	100 kHz	-83.85	-83.79	-65
>400 kHz to 12 MHz	30 kHz (swept)	-88.7		-80
12 MHz to paired receive band	30 kHz (swept)	-106.6		-80
In the paired receive band	30 kHz (swept)	-107.2		-85

FFSK, 1200 bps

Tx FREQUENCY: 774.9 MHz 100 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	-55.5	-56.49	-40
15.625 kHz	6.25 kHz	-74.63	-74.44	-60
21.875 kHz	6.25 kHz	-75.61	-75.09	-60
37.5 kHz	25 kHz	-71.13	-71.32	-60
62.5 kHz	25 kHz	-74.24	-74.23	-65
87.5 kHz	25 kHz	-77.51	-77.46	-65
150 kHz	100 kHz	-75.39	-74.96	-65
250 kHz	100 kHz	-80.23	-79.78	-65
350 kHz	100 kHz	-83.99	-84.14	-65
>400 kHz to 12 MHz	30 kHz (swept)	-89.3		-80
12 MHz to paired receive band	30 kHz (swept)	-107.5		-80
In the paired receive band	30 kHz (swept)	-106.5		-85

Adjacent Channel Power Ratio

DMR

Tx FREQUENCY: 769.1 MHz 100 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	-43.35	-44.44	-40
15.625 kHz	6.25 kHz	-74.42	-74.44	-60
21.875 kHz	6.25 kHz	-75.38	-75.65	-60
37.5 kHz	25 kHz	-71.23	-71.35	-60
62.5 kHz	25 kHz	-73.79	-73.8	-65
87.5 kHz	25 kHz	-77.57	-77.68	-65
150 kHz	100 kHz	-74.94	-74.62	-65
250 kHz	100 kHz	-79.71	-79.49	-65
350 kHz	100 kHz	-83.45	-83.27	-65
>400 kHz to 12 MHz	30 kHz (swept)	-88.3		-80
12 MHz to paired receive band	30 kHz (swept)	-106.7		-80
In the paired receive band	30 kHz (swept)	-107.1		-85

DMR

Tx FREQUENCY: 774.9 MHz 100 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	-43.32	-46.14	-40
15.625 kHz	6.25 kHz	-74.33	-74.24	-60
21.875 kHz	6.25 kHz	-75.58	-76	-60
37.5 kHz	25 kHz	-71.12	-71.26	-60
62.5 kHz	25 kHz	-73.51	-73.82	-65
87.5 kHz	25 kHz	-77.44	-77.39	-65
150 kHz	100 kHz	-75.24	-74.85	-65
250 kHz	100 kHz	-80.18	-79.8	-65
350 kHz	100 kHz	-84.2	-84.09	-65
>400 kHz to 12 MHz	30 kHz (swept)	-88.7		-80
12 MHz to paired receive band	30 kHz (swept)	-106.8		-80
In the paired receive band	30 kHz (swept)	-107.2		-85

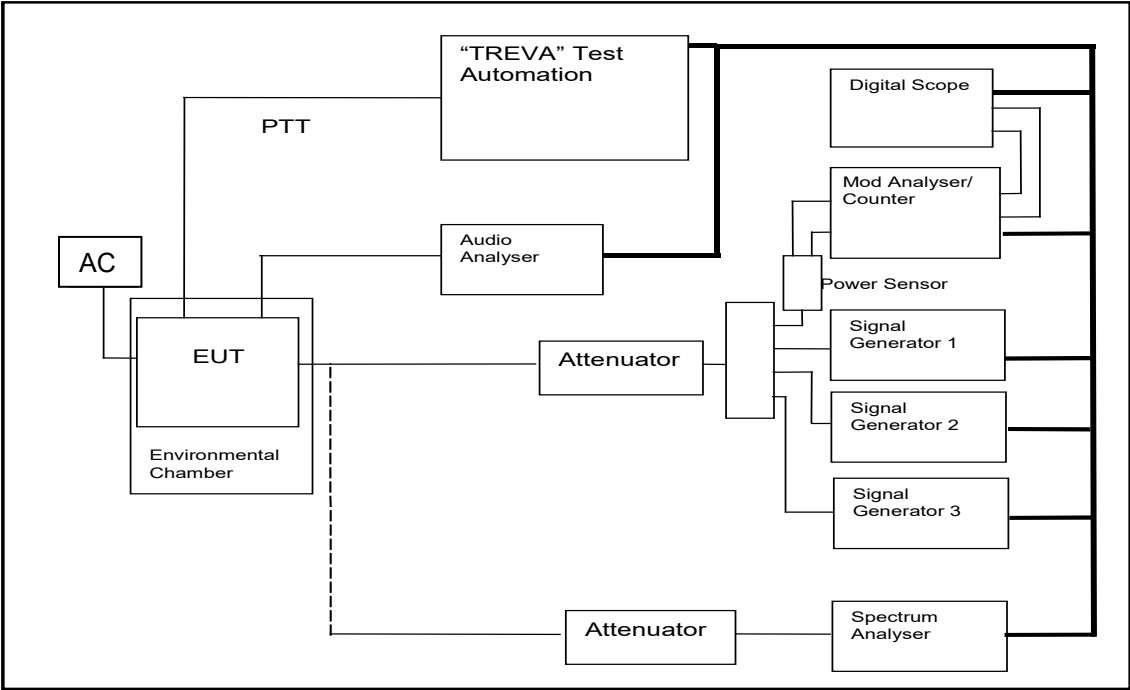
TEST EQUIPMENT LIST

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 **R**adio **E**VAuation 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