

LABORATORY TEST REPORT

RADIO PERFORMANCE MEASUREMENTS

for the

TPDK5C Handportable Transceiver

Tested in accordance with:

FCC 47 CFR Parts 22 and 90

RSS-119 Issue 12

RSS-Gen Issue 5

Report Revision: 1

Issue Date: 4 March 2019

PREPARED BY: L. M. White


Test Technician

CHECKED & APPROVED BY: M. C. James


Laboratory Technical Manager



IANZ
ACCREDITED LABORATORY

FCC REGISTRATION: 838288
IC LISTING REGISTRATION: SITE# 737A-1

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

TABLE OF CONTENTS

REVISION	3
INTRODUCTION	4
STATEMENT OF COMPLIANCE	5
MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS	6
TEST RESULTS.....	8
TRANSMITTER OUTPUT POWER (CONDUCTED)	8
TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS.....	10
TRANSMITTER MODULATION LIMITING	19
TRANSMITTER OCCUPIED BANDWIDTH AND SPECTRUM MASKS	28
TRANSMITTER ADJACENT CHANNEL POWER RATIO	93
TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED).....	111
TRANSMITTER SPURIOUS EMISSIONS (RADIATED).....	129
TRANSMITTER RADIATED EMISSIONS IN THE GNSS BAND	134
TRANSMITTER CONDUCTED EMISSIONS IN THE GNSS BAND	136
TRANSMITTER FREQUENCY STABILITY - TEMPERATURE	138
TRANSMITTER FREQUENCY STABILITY - VOLTAGE	140
RECEIVER SPURIOUS EMISSIONS (CONDUCTED)	141
TEST EQUIPMENT LIST.....	143
ANNEX A – TEST SETUP DETAILS.....	145

REVISION

Date	Revision	Comments
4 March 2019	1	Initial test report

INTRODUCTION

Type approval testing of the TPDK5C, 3 Watt, Handportable transceiver in order to demonstrate compliance with FCC 47 Parts 22 & 90, and RSS-119 Issue 12 & RSS-Gen Issue 5. This radio supports analogue, digital FFSK, Digital Mobile Radio (DMR), APCO P25 phase-1 and APCO P25 phase-2 modulations.

REPORT PREPARED FOR

Tait International Ltd
245 Wooldridge Road
Harewood
Christchurch 8051
New Zealand

DESCRIPTION OF SAMPLE

Manufacturer: Tait International Limited
Equipment: Handportable Transceiver
Type: TPDK5C
Product Code: T03-00068-KCAZ
Serial Number(s): 26111472
Frequency range: 762 → 870 MHz
Transmit Power: 3 W

Modulation		Channel Spacing	Speech Channels	Symbol Rate (symbols/sec)	Data Rate (bps)
Analogue FM		12.5 kHz	1	-	-
FFSK	Fast Frequency Shift Keying	12.5 kHz	-	1200	1200
		12.5 kHz	-	2400	2400
Digital Mobile Radio (DMR)	4 Level FSK (2 slot TDMA) (ETSI TS102 361-1)	12.5 kHz	2	4800	9600
APCO P25 Phase 1	C4FM (TIA 102)	12.5 kHz	1	4800	9600
APCO P25 Phase 2	H-CPM (2 slot TDMA) (TIA 102)	12.5 kHz	2	6000	12000

HARDWARE & SOFTWARE

Quantity: 1

	Analogue, FFSK and DMR tests	P25 tests
Hardware ID	TPDB3X-K500_0001	TPDB3X-K500_0001
Boot Code	QPD3B_S00_3.05.07.0001	QPD3B_S00_3.05.07.0001
DSP	QPD3A_E00_2.19.05.0054	QPD3A_A02_2.13.03.0039
Radio Application	QPD3F_E00_2.19.05.0054	QPD3F_A00_2.13.03.0039
Firmware Package	QI93P_E00_2.19.05.0054	QI94P_A02_2.13.03.0039
FPGA Image	QPD3G_S00_1.12.14.0001	QPD3G_S00_1.12.14.0001

TEST CONDITIONS

All testing was performed between 14 February → 4 March 2019, and under the following conditions:

Ambient temperature: 15°C → 30°C
Relative Humidity: 20% → 75%
Standard Test Voltage: 7.5 V_{DC}

STATEMENT OF COMPLIANCE

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

Equipment: Handportable Transceiver
Type: TPDK5C
Product Code: T03-00068-KCAZ
Serial Number(s): 26111472
Quantity: 1

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

Signature:



M. C. James
Laboratory Technical Manager

Date:

8 March 2019

MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS

MODULATION TYPES:

F3E	Analogue Frequency Modulation (FM)	
F2D	FFSK	1200 bps and 2400 bps
FXW	DMR Digital Voice	9600 bps
FXD	DMR Digital Data	9600 bps
F1E, F7E	P25 phase 1 Digital Voice	9600 bps
F1D, F7D	P25 phase 1 Digital Data	9600 bps
F1W	P25 phase 2 Digital Voice / Data	12000 bps

CHANNEL SPACINGS: 12.5 kHz 25.0 kHz

EMISSION DESIGNATORS:

	12.5 kHz	25.0 kHz
Analog FM	11K0F3E	16K0F3E
FFSK Data 1200 bps	6K60F2D	9K60F2D
FFSK Data 2400 bps	7K80F2D	10K8F2D
Digital Voice DMR	7K60FXW	
Digital Data DMR	7K60FXD	
Digital Voice P25 phase 1	8K10F1E	
Digital Data P25 phase 1	8K10F1D	
Digital Voice P25 phase 2	8K10F1W	
Digital Data P25 phase 2	8K10F1W	

CALCULATIONS

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 Bandwidth

Necessary bandwidth

M = 3.0 kHz

D = 2.5 kHz

$$B_n = (2 \times 3.0) + (2 \times 2.5) \times 1$$

$$= 11.0 \text{ kHz}$$

Emission Designator

11K0F3E

F3E represents an FM voice transmission

Analog Voice 25.0 kHz Bandwidth

Necessary bandwidth

M = 3.0 kHz

D = 5.0 kHz

$$B_n = (2 \times 3.0) + (2 \times 5.0) \times 1$$

$$= 16.0 \text{ kHz}$$

Emission Designator

16K0F3E

F3E represents an FM voice transmission

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

Necessary bandwidth

M = 1.8 kHz

D = 1.5 kHz (60% of peak deviation)

$$B_n = (2 \times 1.8) + (2 \times 1.5) \times 1$$

$$= 6.6 \text{ kHz}$$

Emission Designator

6K60F2D

F2D represents a FM data transmission with the use of a modulating sub carrier

Fast Frequency Shift Keying (FFSK – 1200 bps) 25.0 kHz Bandwidth

Necessary bandwidth

M = 1.8 kHz

D = 3.0 kHz (60% of peak deviation)

$$B_n = (2 \times 1.8) + (2 \times 3.0) \times 1$$

$$= 9.6 \text{ kHz}$$

Emission Designator

9K60F2D

F2D represents a FM data transmission with the use of a modulating sub carrier

Emission Designators – Continued

Fast Frequency Shift Keying (FFSK – 2400 bps) 12.5 kHz Bandwidth

Necessary bandwidth

M = 2.4 kHz

D = 1.5 kHz (60% of peak deviation)

$$B_n = (2 \times 2.4) + (2 \times 1.5) \times 1 \\ = 7.8 \text{ kHz}$$

Emission Designator

7K80F2D

F2D represents a FM data transmission with the use of a modulating sub carrier

Fast Frequency Shift Keying (FFSK – 2400 bps) 25.0 kHz Bandwidth

Necessary bandwidth

M = 2.4 kHz

D = 3.0 kHz (60% of peak deviation)

$$B_n = (2 \times 2.4) + (2 \times 3.0) \times 1 \\ = 10.8 \text{ kHz}$$

Emission Designator

10K80F2D

F2D represents a FM data transmission with the use of a modulating sub carrier

Digital Voice 12.5 kHz Bandwidth DMR

99% bandwidth

= 7.6 kHz

Emission Designator

7K60FXW

FXW represents a FM Time Division Multiple Access (TDMA) combination of data and telephony

Digital Data 12.5 kHz Bandwidth DMR

99% bandwidth

= 7.6 kHz

Emission Designator

7K60FXD

FXD represents FM Time Division Multiple Access (TDMA) data only

Digital Voice 12.5 kHz Bandwidth P25 phase 1

99% bandwidth

= 8.1 kHz

Emission Designator

8K10F1E

F1E represents a digital FM voice transmission

Digital Data 12.5 kHz Bandwidth P25 phase 1

99% bandwidth

= 8.1 kHz

Emission Designator

8K10F1D

F1D represents an digital FM data transmission

Digital Voice 12.5 kHz Bandwidth P25 phase 2

99% bandwidth

= 8.1 kHz

Emission Designator

8K10F1W

F1W represents a single FM telephony channel

Digital Data 12.5 kHz Bandwidth P25 phase 2

99% bandwidth

= 8.1 kHz

Emission Designator

8K10F1W

F1W represents digital FM data transmission

TEST RESULTS

TRANSMITTER OUTPUT POWER (CONDUCTED)

SPECIFICATION: FCC 47 CFR 2.1046
RSS-119 5.4

GUIDE: TIA/EIA-603D 2.2.1

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment set up.
2. The coaxial attenuator has an impedance of 50 Ohms.
3. The unmodulated output power was measured with an RF Power meter.

MEASUREMENT RESULTS:

Manufacturer's Rated Output Power:

Switchable: 3 W and 1 W

Nominal 3 W	Measured	Variation (%)	Variation (dB)
762.1 MHz	2.9	-4.6	-0.2
774.9 MHz	3.0	-0.5	0.0
788.1 MHz	2.9	-2.1	-0.1
804.9 MHz	2.9	-3.0	-0.1
806.1 MHz	2.9	-3.2	-0.1
816.0 MHz	2.9	-2.2	-0.1
852.0 MHz	2.8	-6.5	-0.3
869.0 MHz	3.0	-1.0	0.0
Measurement Uncertainty		± 0.6 dB	

Transmitter Output Power (Conducted) - continued

Nominal 1 W	Measured	Variation (%)	Variation (dB)
762.1 MHz	1.0	-4.3	-0.2
774.9 MHz	1.0	2.7	0.1
788.1 MHz	1.0	3.3	0.1
804.9 MHz	0.9	-5.7	-0.3
806.1 MHz	0.9	-5.5	-0.2
816.0 MHz	1.0	-1.5	-0.1
852.0 MHz	0.9	-9.4	-0.4
869.0 MHz	1.0	-1.5	-0.1
Measurement Uncertainty		± 0.6 dB	

LIMIT CLAUSES:

FCC 47 CFR 90.205 (s)

The output power shall not exceed by more than 20%... the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

RSS-119 5.4

The output power shall be within ± 1.0 dB of the manufacturer's rated power.

TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS

SPECIFICATION: FCC 47 CFR 2.1047 (a)

GUIDE: TIA/EIA-603D 2.2.6

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 channel spacing tested at 3 W transmit power.

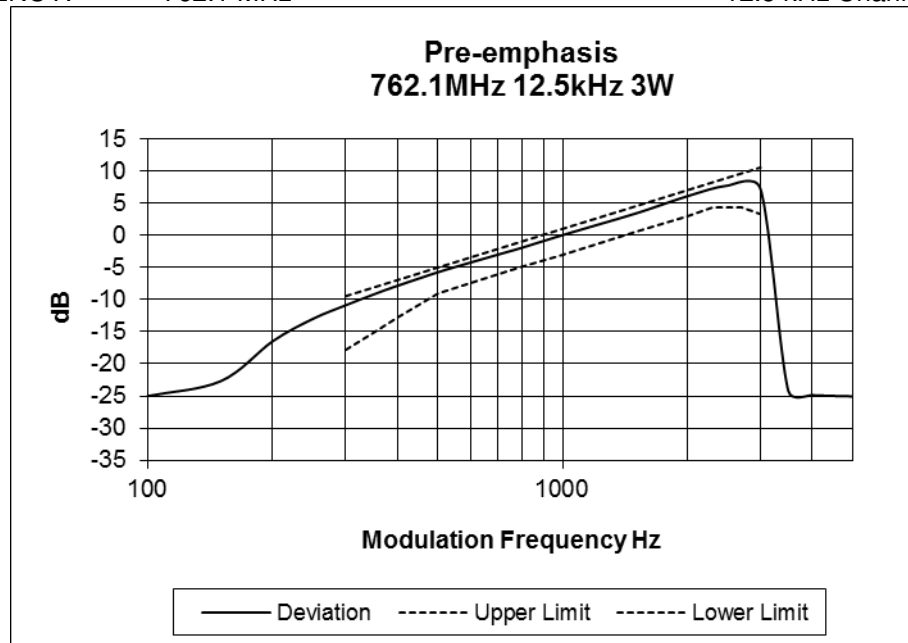
LIMIT CLAUSE: TIA/EIA-603D 3.2.6

MEASUREMENT UNCERTAINTY: $\pm 1.5\%$

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 762.1 MHz

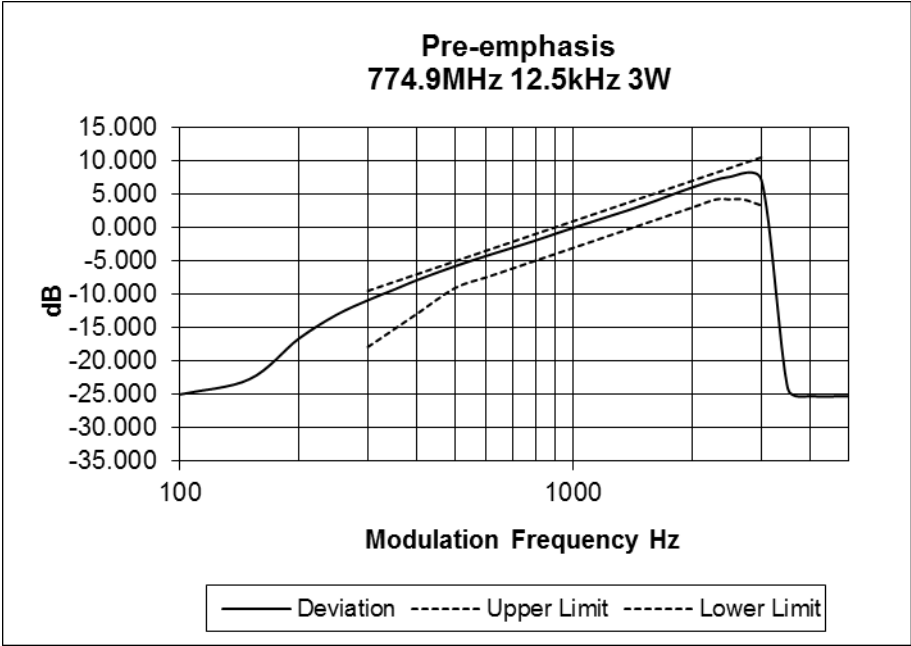
12.5 kHz Channel Spacing



Transmitter Audio Frequency Response – Pre-emphasis

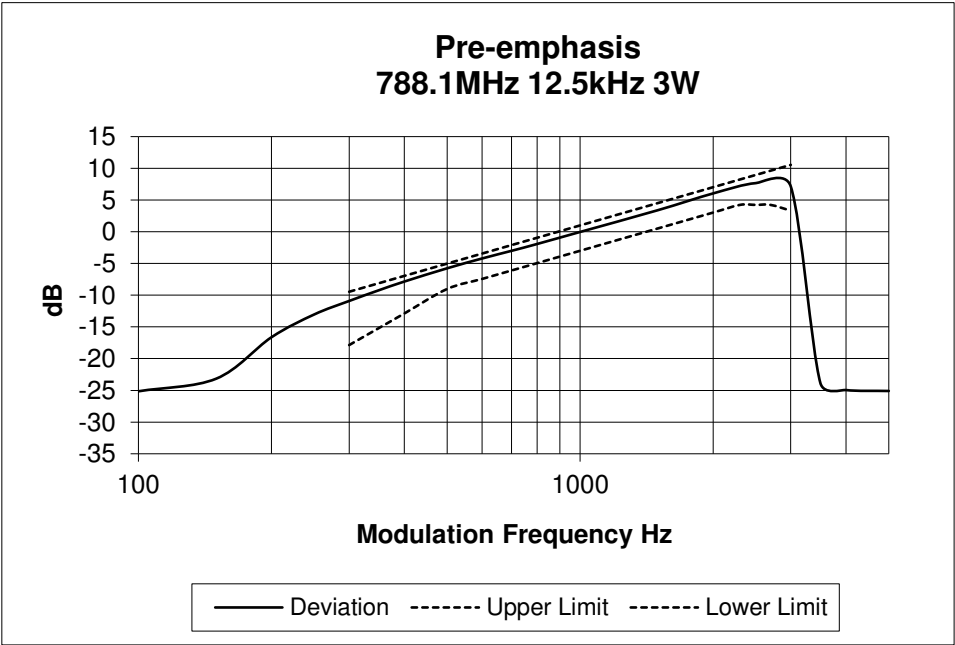
SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 774.9 MHz 12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 788.1 MHz 12.5 kHz Channel Spacing

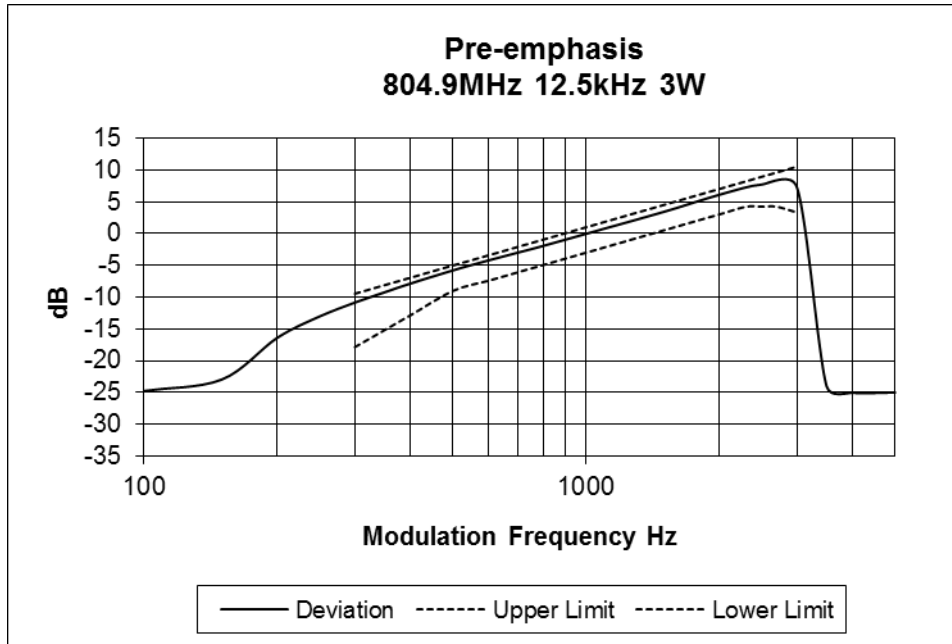


Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 804.9 MHz

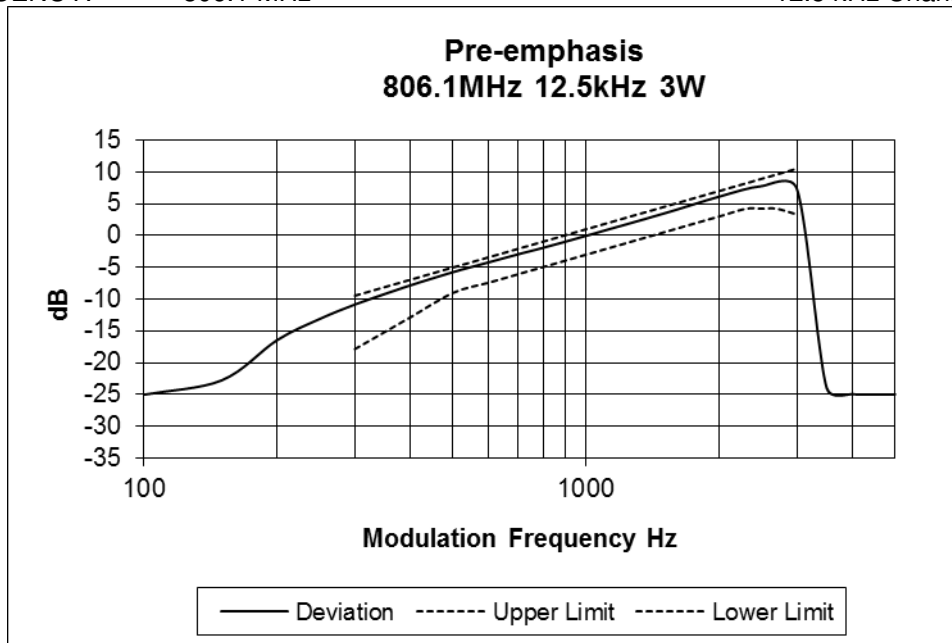
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 806.1 MHz

12.5 kHz Channel Spacing

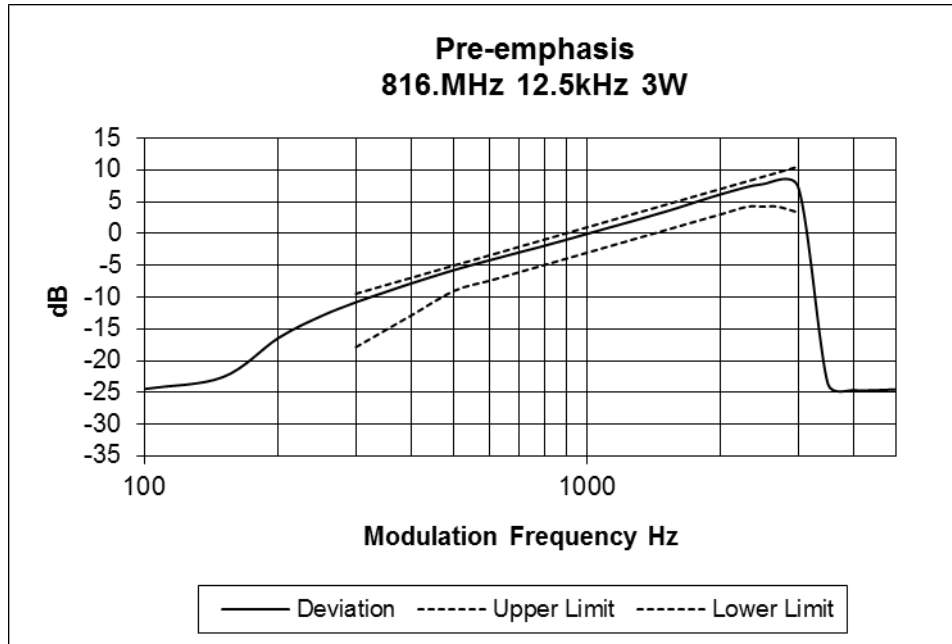


Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 816.0 MHz

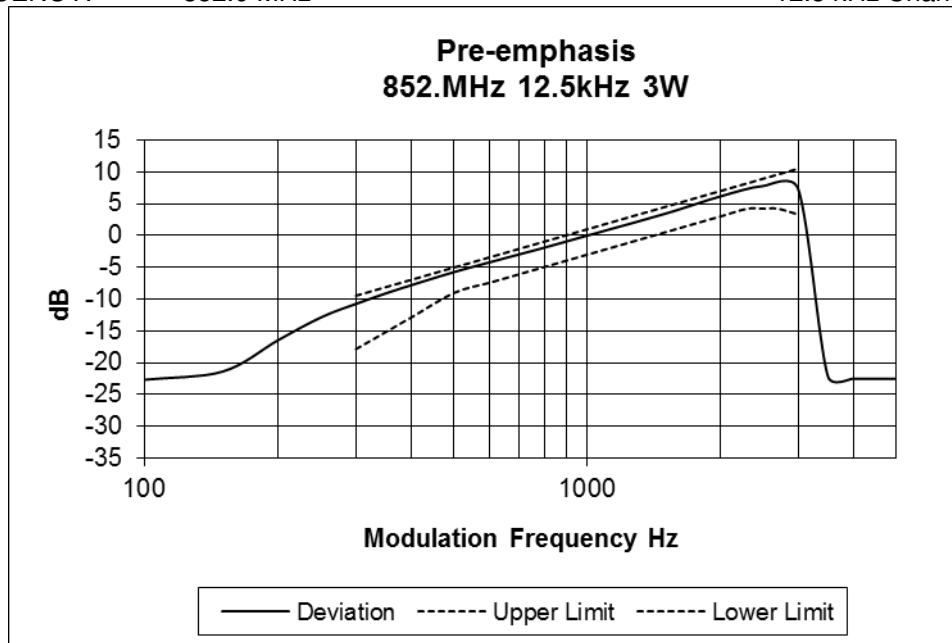
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 852.0 MHz

12.5 kHz Channel Spacing

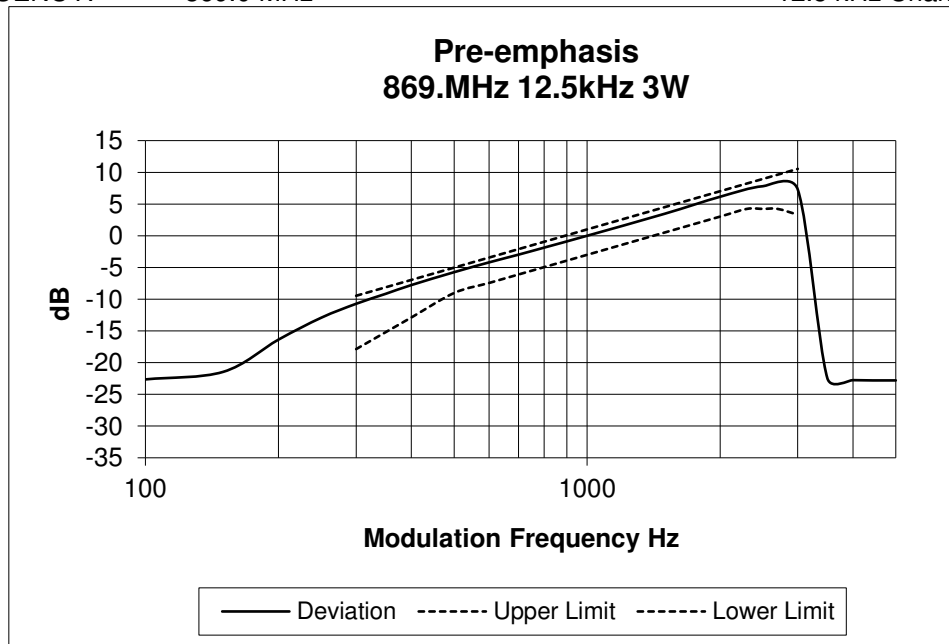


Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 869.0 MHz

12.5 kHz Channel Spacing

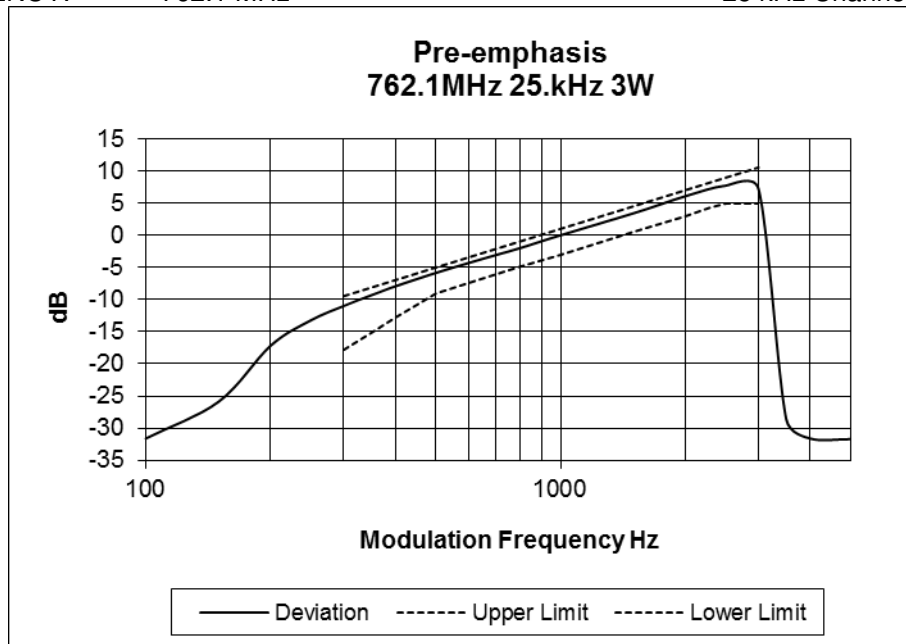


Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 762.1 MHz

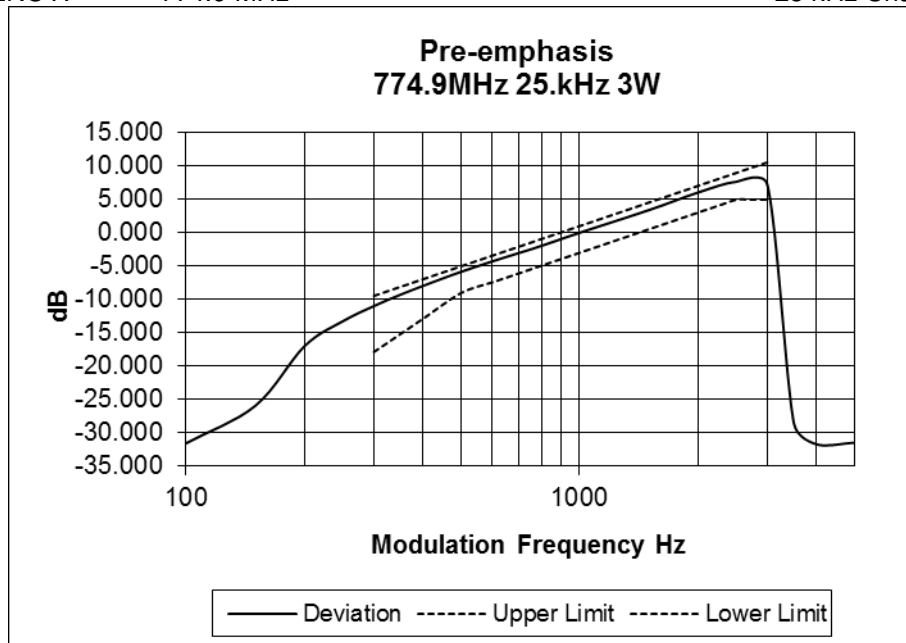
25 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 774.9 MHz

25 kHz Channel Spacing

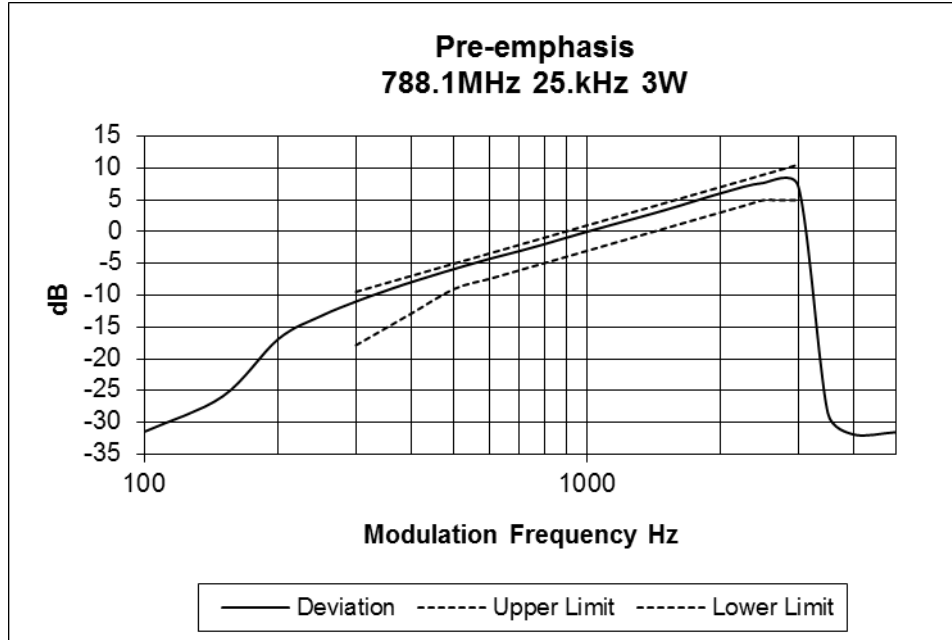


Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 788.1 MHz

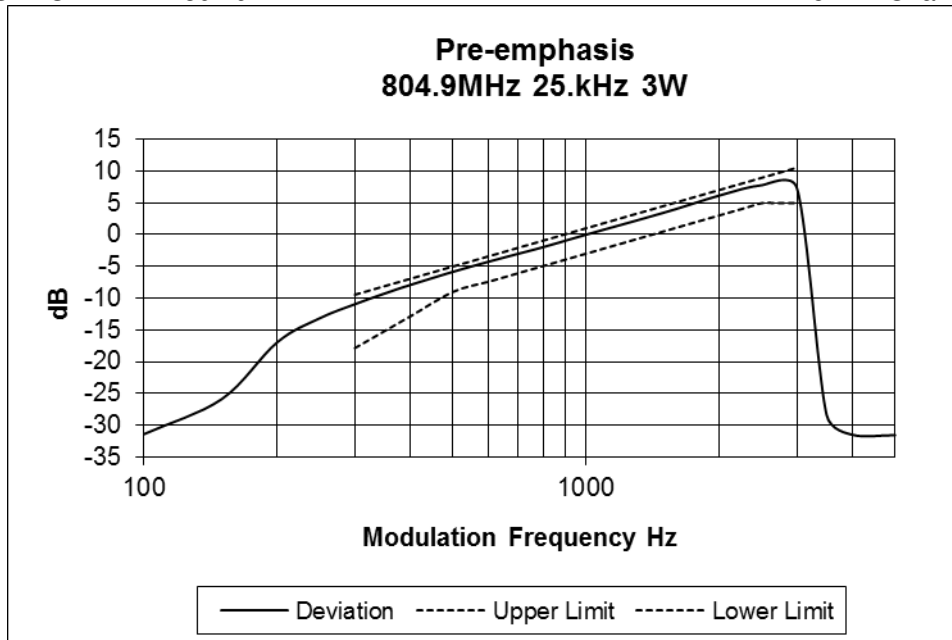
25 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 804.9 MHz

25 kHz Channel Spacing

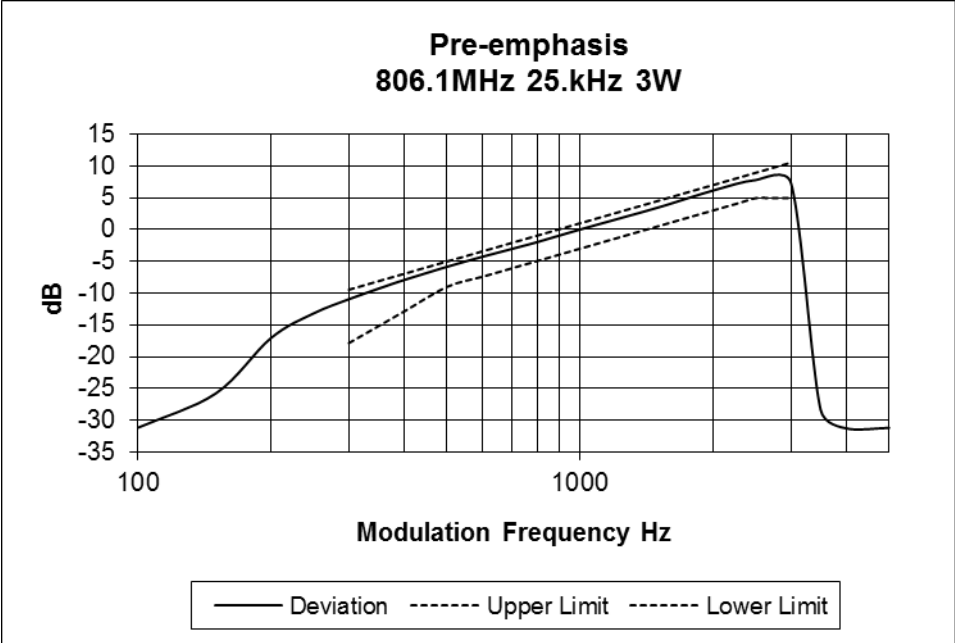


Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047

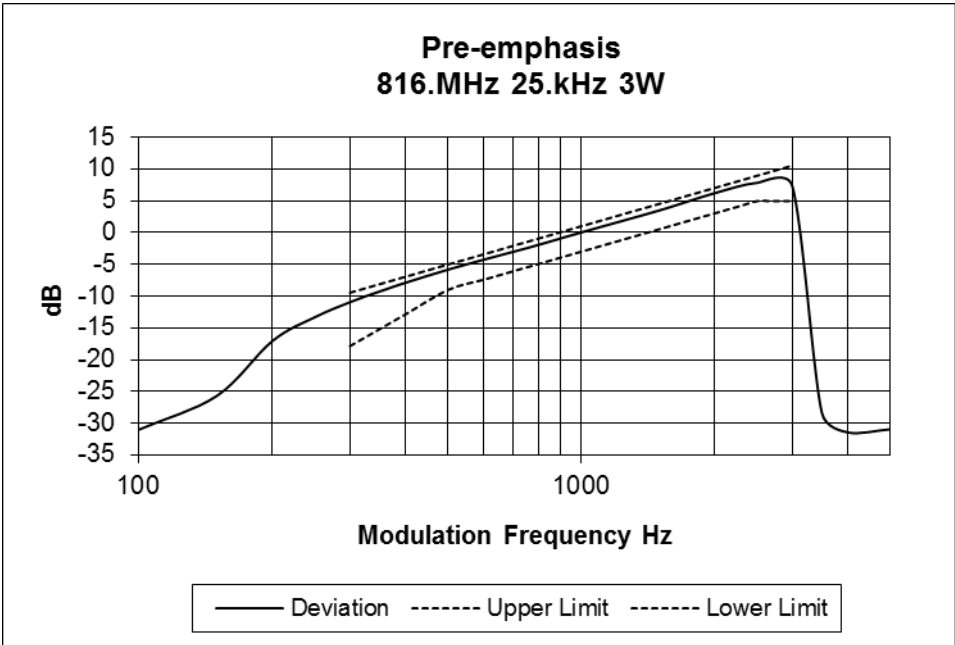
(a)

Tx FREQUENCY: 806.1 MHz 25 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 816.0 MHz 25 kHz Channel Spacing

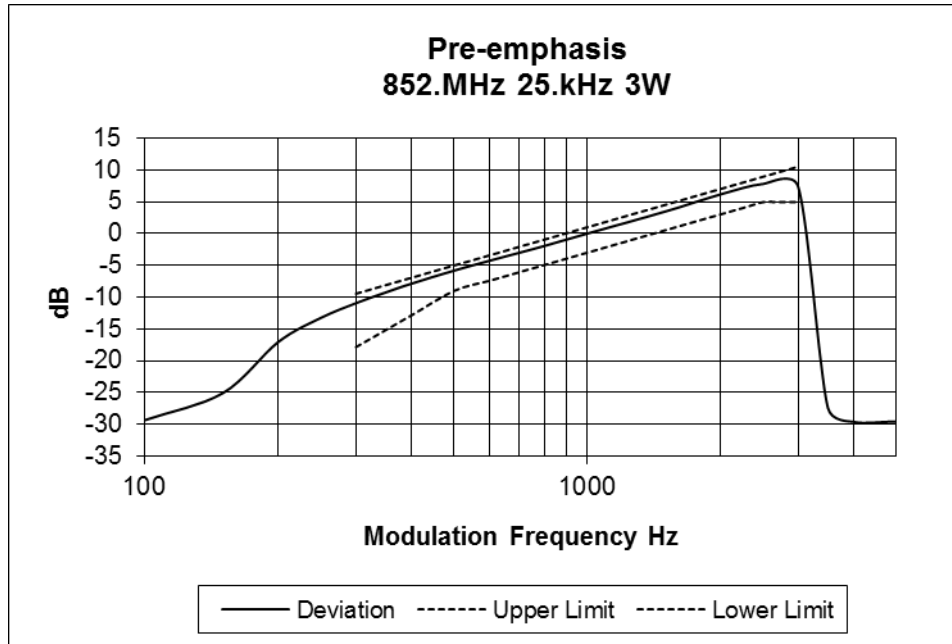


Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 852.0 MHz

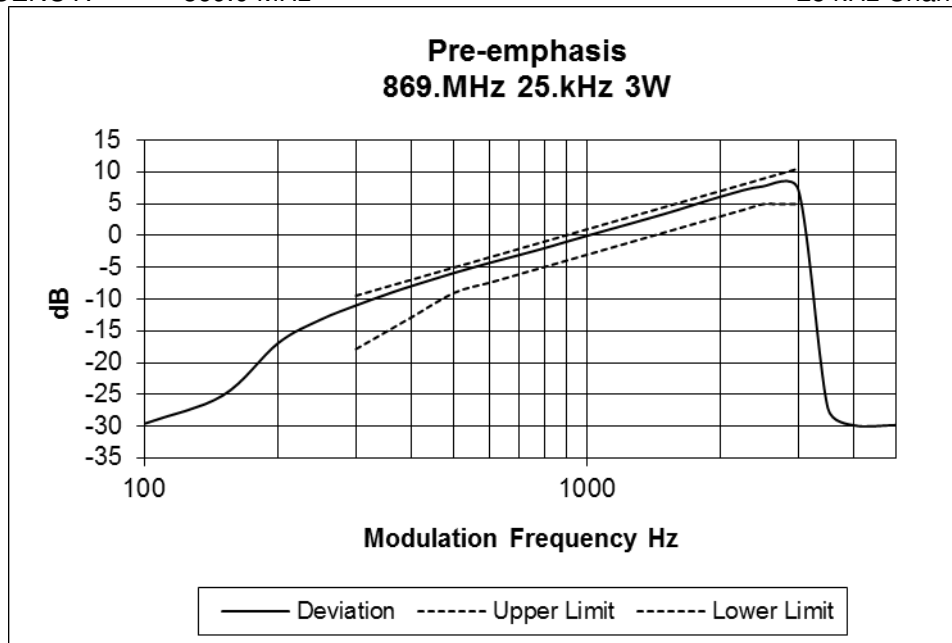
25 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 869.0 MHz

25 kHz Channel Spacing



TRANSMITTER MODULATION LIMITING

SPECIFICATION: FCC 47 CFR 2.1047 (b)

GUIDE: TIA/EIA-603D 2.2.3

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment set up.
2. The modulation response was measured at three audio frequencies while varying the input level.
3. Measurements were made for both Positive and Negative Deviation.

MEASUREMENT RESULTS:

See the plots on the following pages for 12.5 kHz channel spacing.

LIMIT CLAUSE: TIA/EIA-603D 1.3.4.4

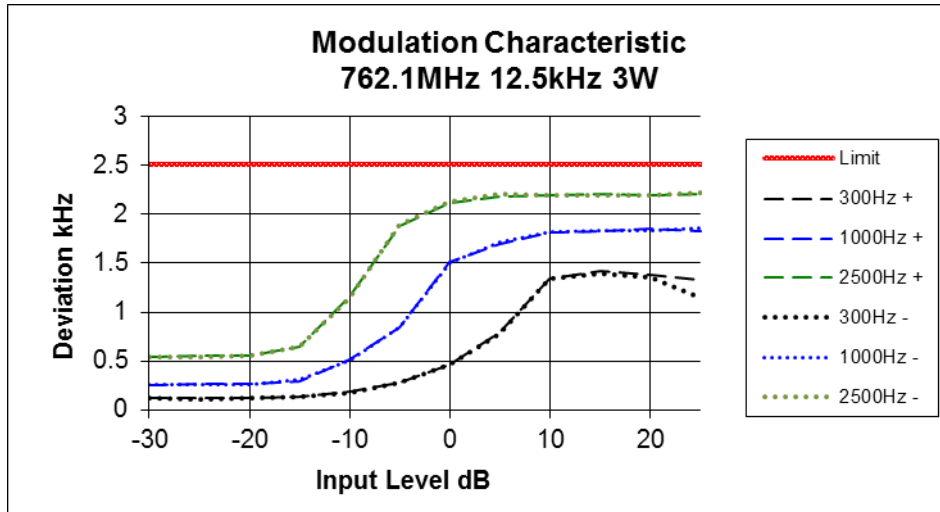
MEASUREMENT UNCERTAINTY: $\pm 1.5 \%$

Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 762.1 MHz

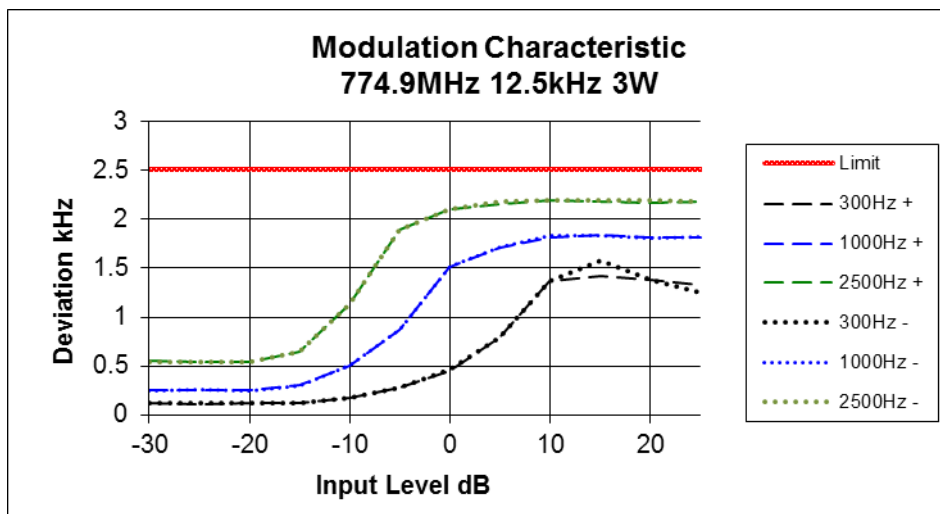
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 774.9 MHz

12.5 kHz Channel Spacing

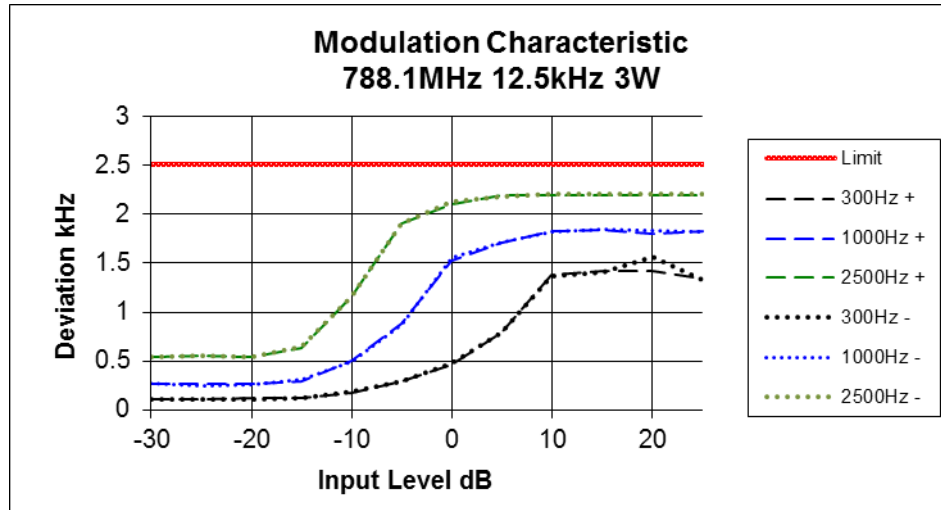


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 788.1 MHz

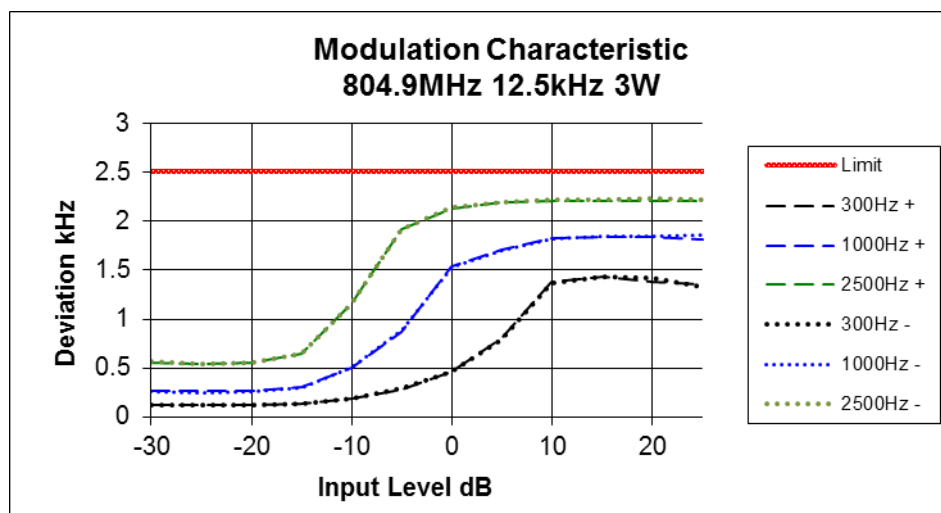
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 804.9 MHz

12.5 kHz Channel Spacing

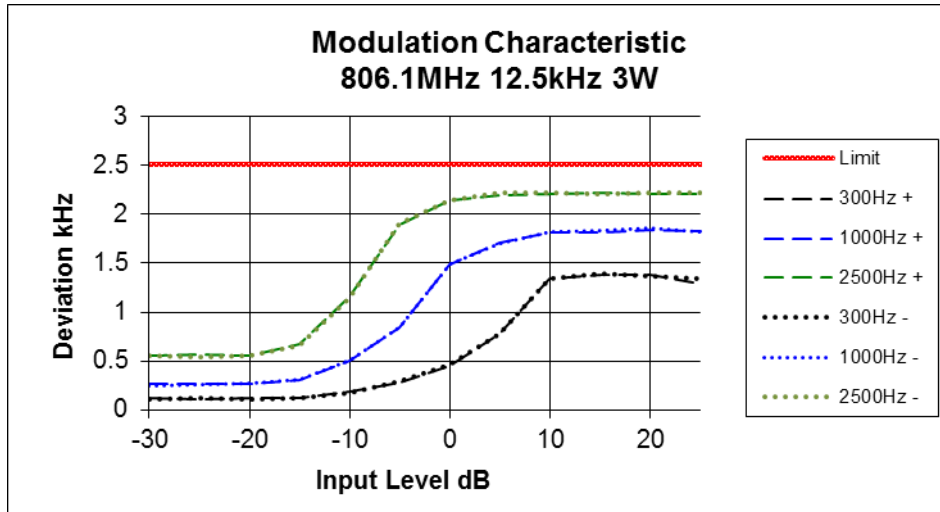


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 806.1 MHz

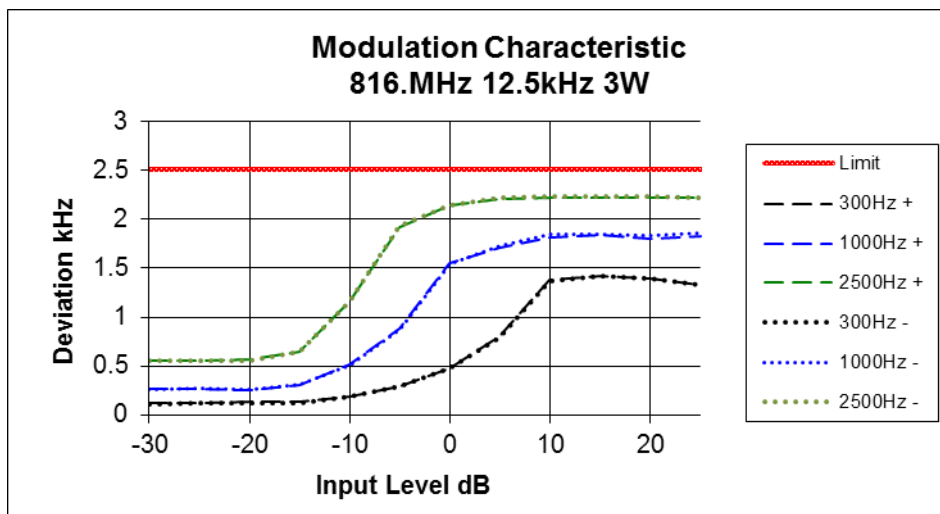
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 816.0 MHz

12.5 kHz Channel Spacing

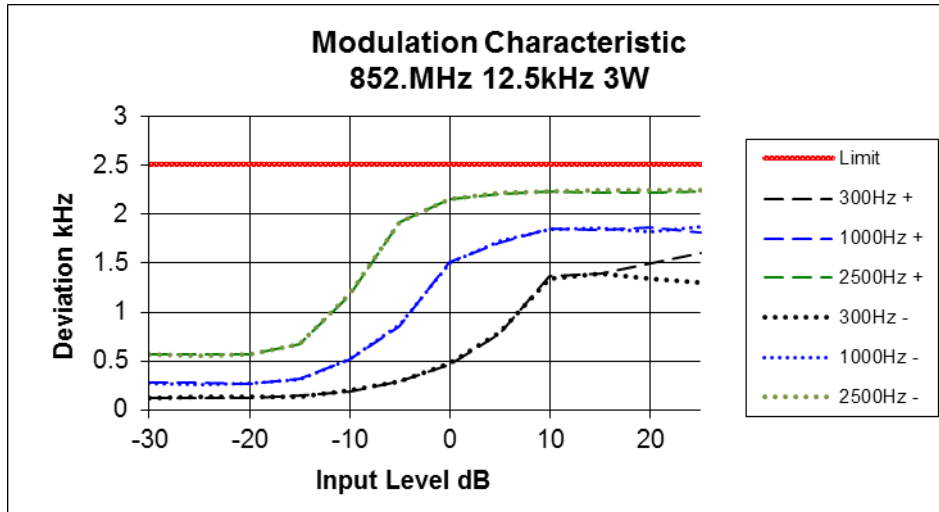


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 852.0 MHz

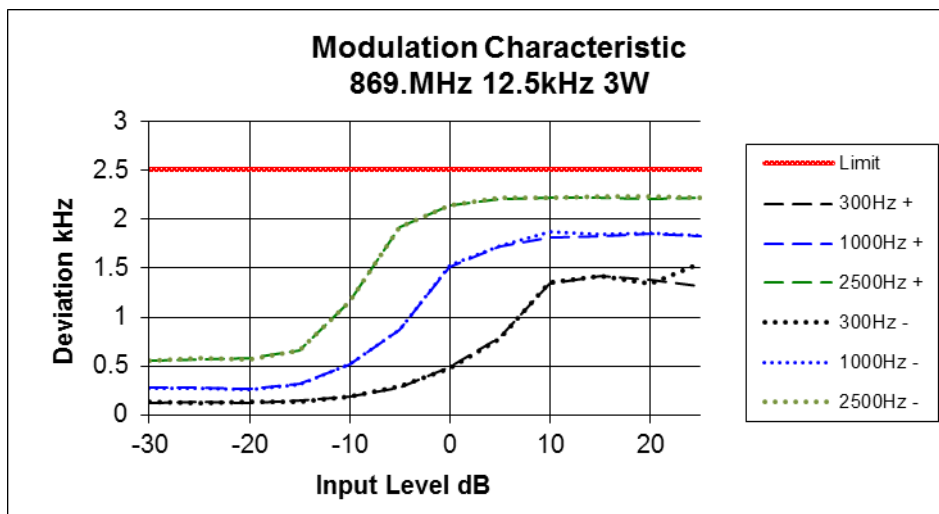
12.5 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 869.0 MHz

12.5 kHz Channel Spacing

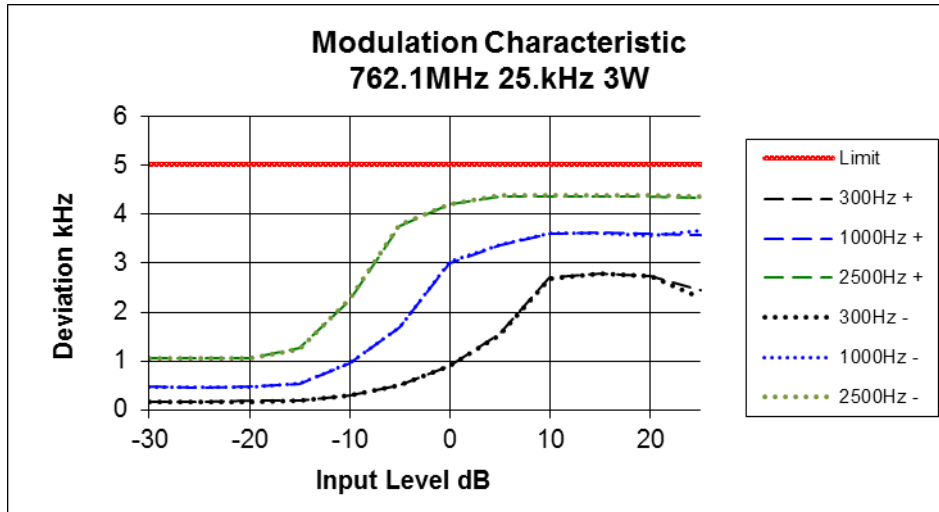


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 762.1 MHz

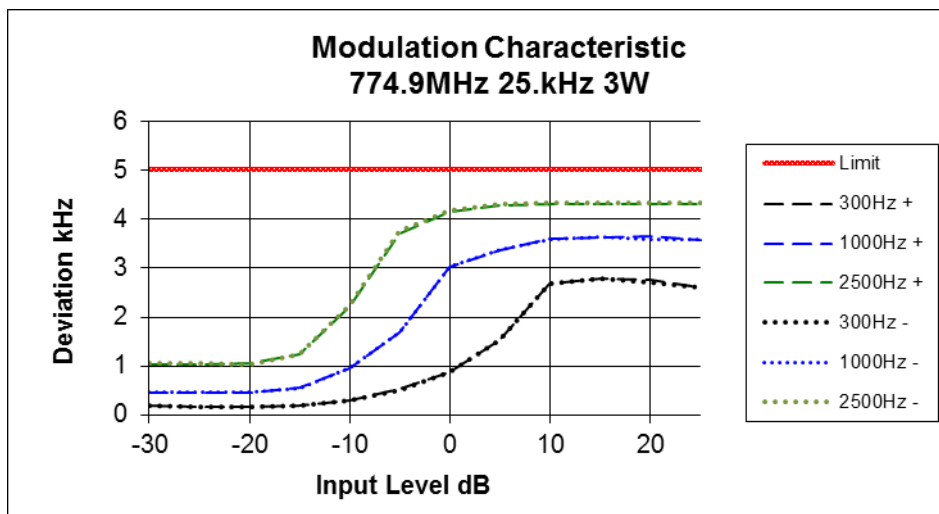
25 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 774.9 MHz

25 kHz Channel Spacing

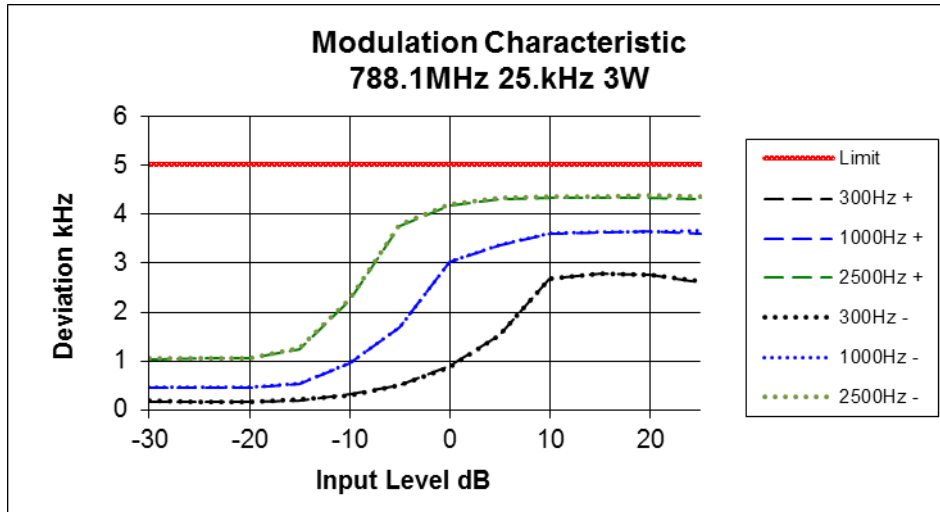


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 788.1 MHz

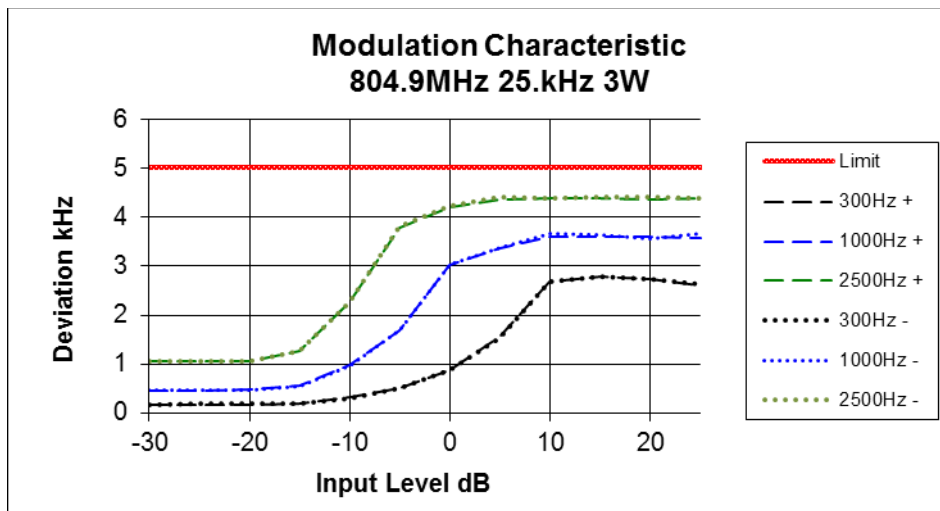
25 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 804.9 MHz

25 kHz Channel Spacing

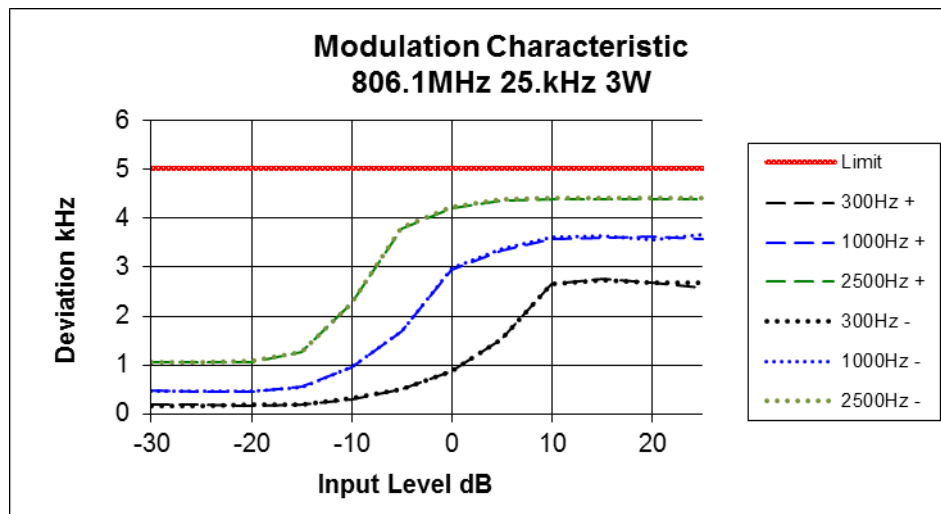


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 806.1 MHz

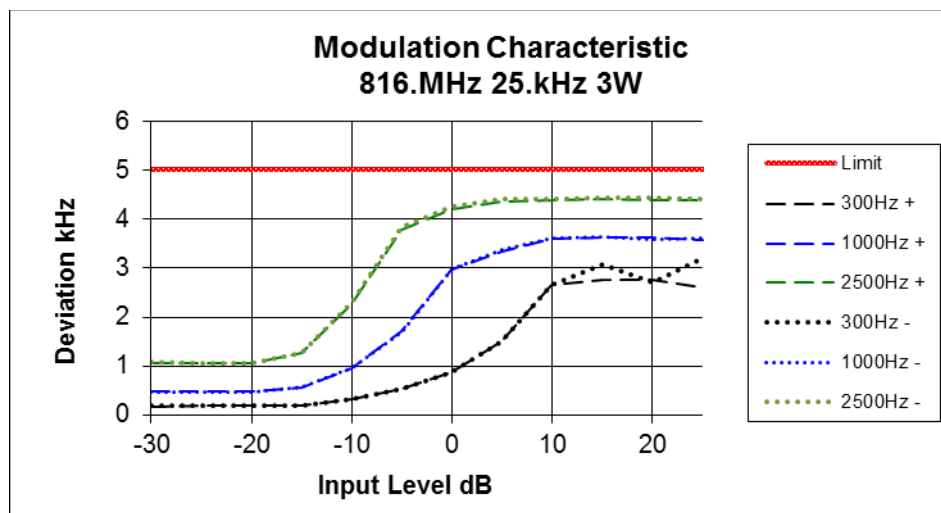
25 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 816.0 MHz

25 kHz Channel Spacing

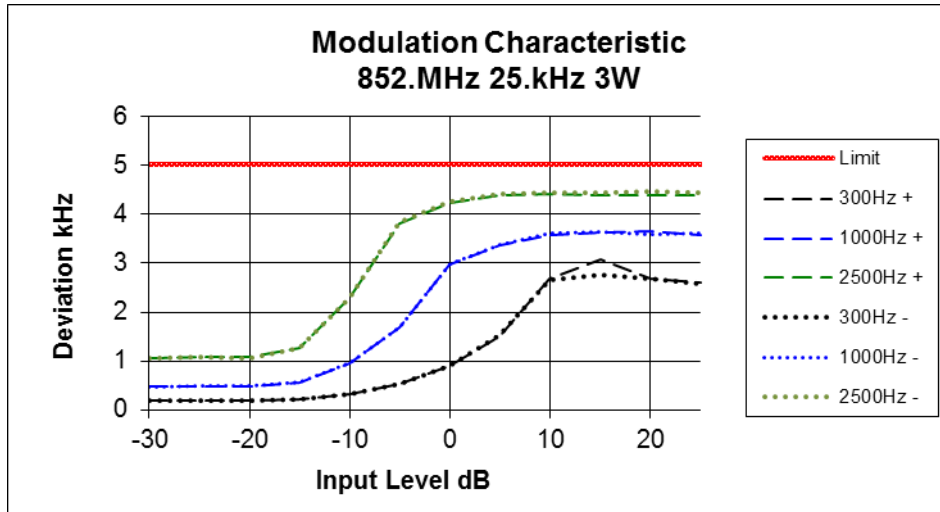


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 852.0 MHz

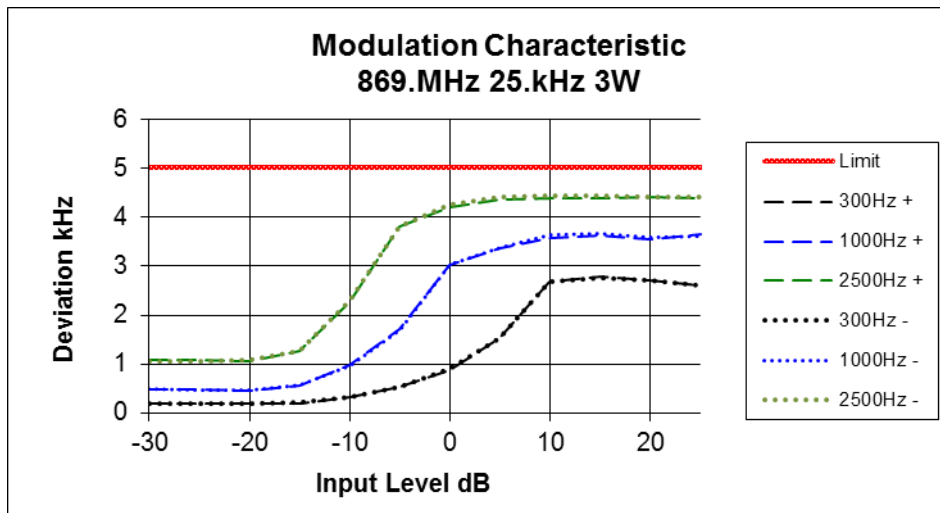
25 kHz Channel Spacing



SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 869.0 MHz

25 kHz Channel Spacing



TRANSMITTER OCCUPIED BANDWIDTH AND SPECTRUM MASKS

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

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

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment Set up.
2. For analog 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.

Emission Mask D – Resolution Bandwidth = 100 Hz, Video Bandwidth = 1 kHz

Emission Mask B, G and H – Resolution bandwidth = 300 Hz, Video Bandwidth = 3 kHz

MEASUREMENT RESULTS:

See the plots on the following pages for 12.5 kHz & 25 kHz channel spacings.

MEASUREMENT UNCERTAINTY 95% $\pm 0.65\text{dB}$

LIMIT CLAUSE: FCC 47 CFR 90.210 RSS-119 5.5

EMISSION MASKS for FCC

	Channel Spacing	
Emission Mask B	12.5 & 25.0 kHz	Analog
Emission Mask H	12.5 & 25.0 kHz	FFSK, Digital Voice/Data (806-809, 851-854 MHz)
Emission Mask G	12.5 & 25.0 kHz	FFSK, Digital Voice/Data (809-824/854-869 MHz)

EMISSION MASKS for ISSED (IC)

	Channel Spacing	
Emission Mask D	12.5 kHz	Analog, FFSK, Digital Voice/Data
Emission Mask B	25.0 kHz	Analog
Emission Mask G	25.0 kHz	FFSK

DATA SPEED

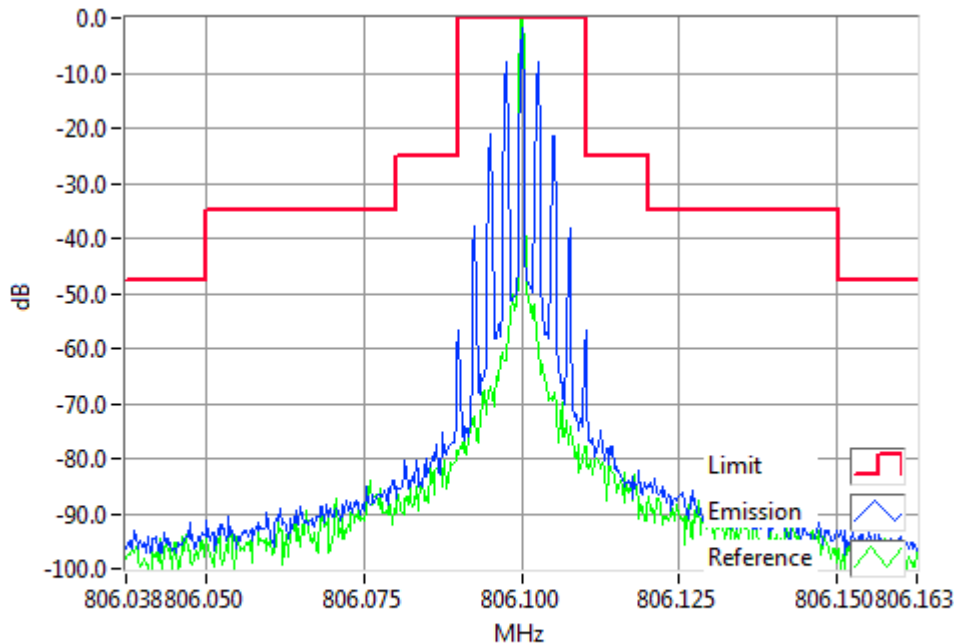
FFSK	12.5 kHz Channel Spacing	1200 bps & 2400 bps
FFSK	25.0 kHz Channel Spacing	1200 bps & 2400 bps
Digital Voice/Data	12.5 kHz Channel Spacing	9600 bps
Digital Voice/Data	12.5 kHz Channel Spacing	12000 bps

Occupied Bandwidth and Spectrum Masks

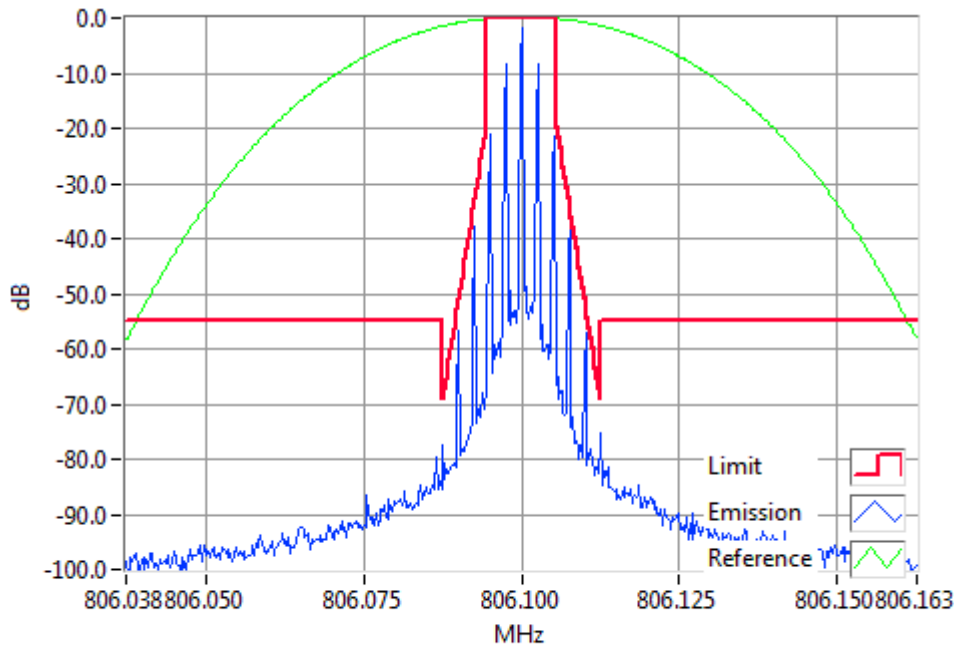
ANALOG VOICE

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

Tx FREQUENCY: 806.1 MHz 3 W 12.5 kHz Channel Spacing



Analogue Modulation 806.1000MHz Mask B 3W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

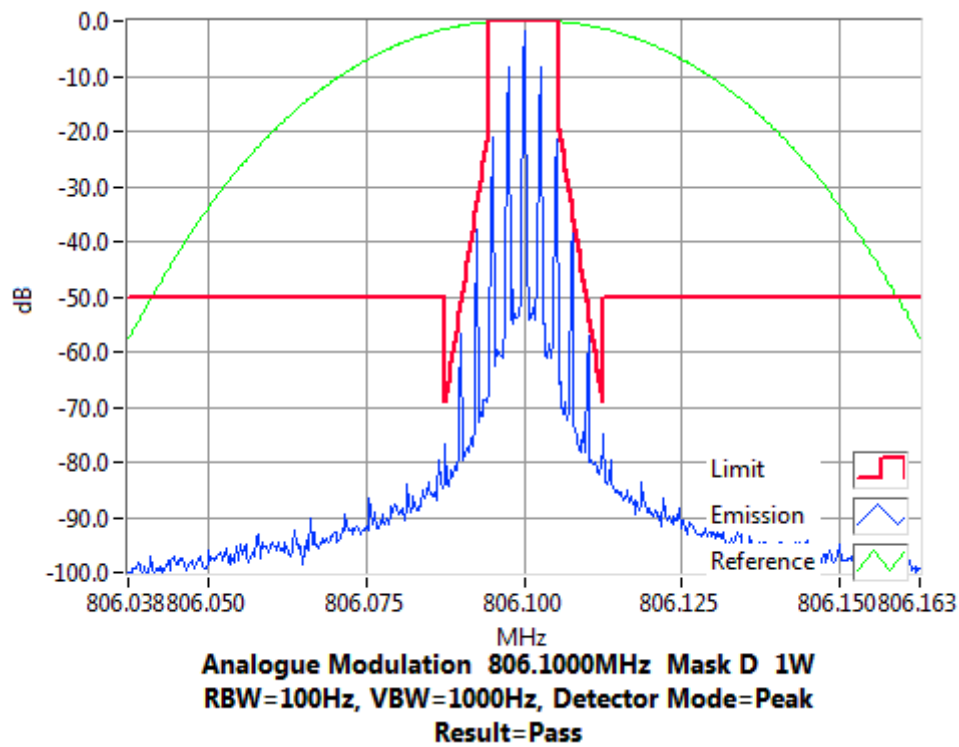
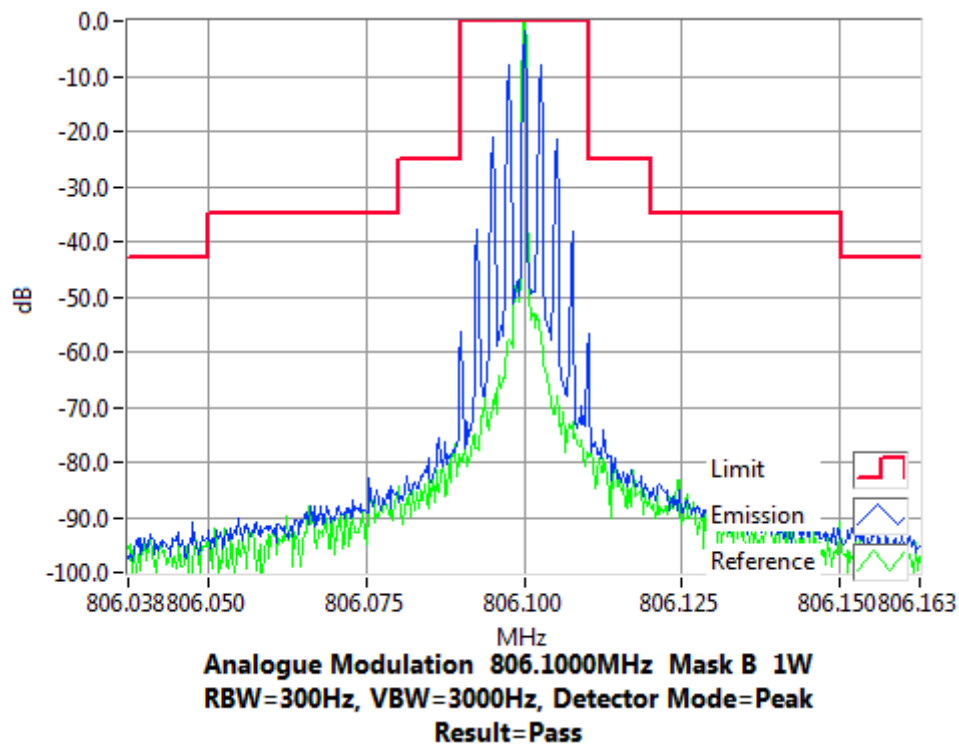


Analogue Modulation 806.1000MHz Mask D 3W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 806.1 MHz

1 W

12.5 kHz Channel Spacing

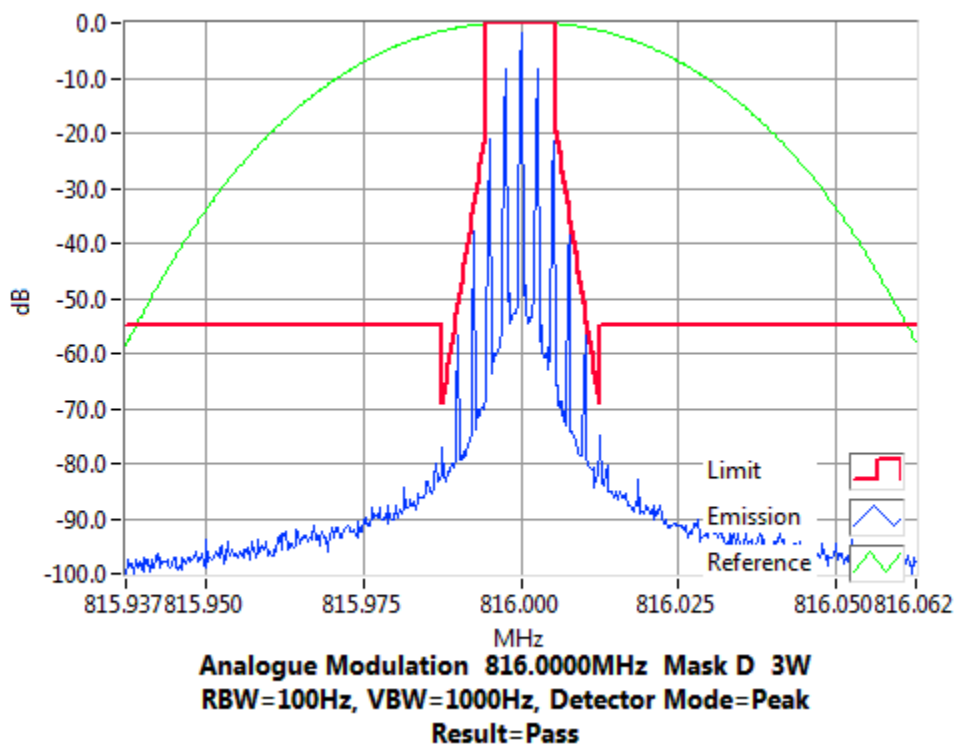
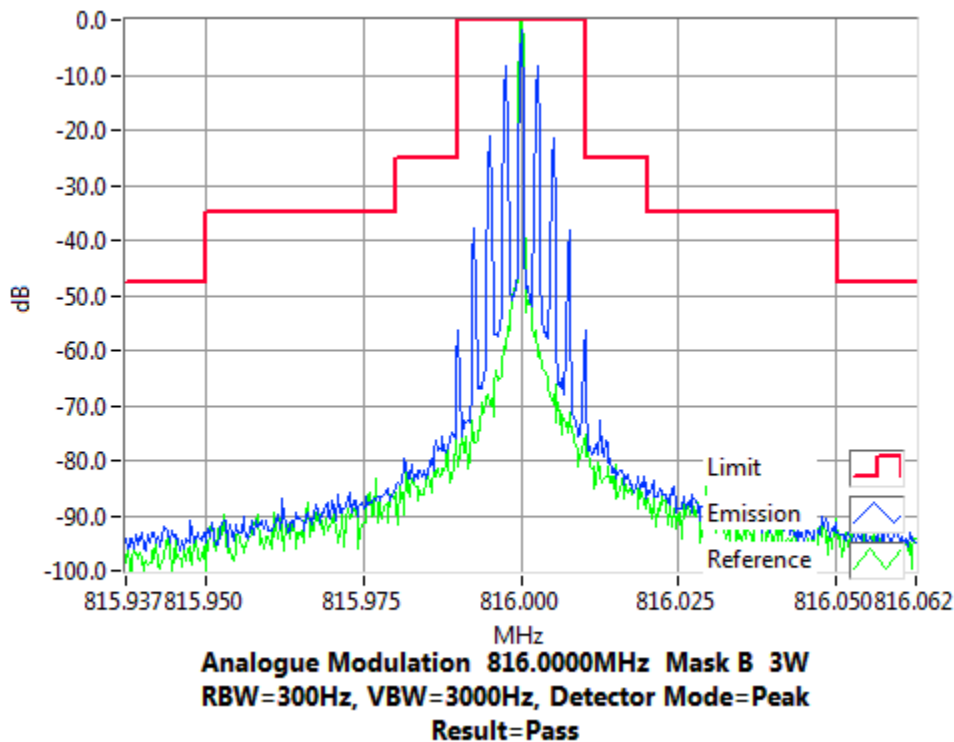


Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

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

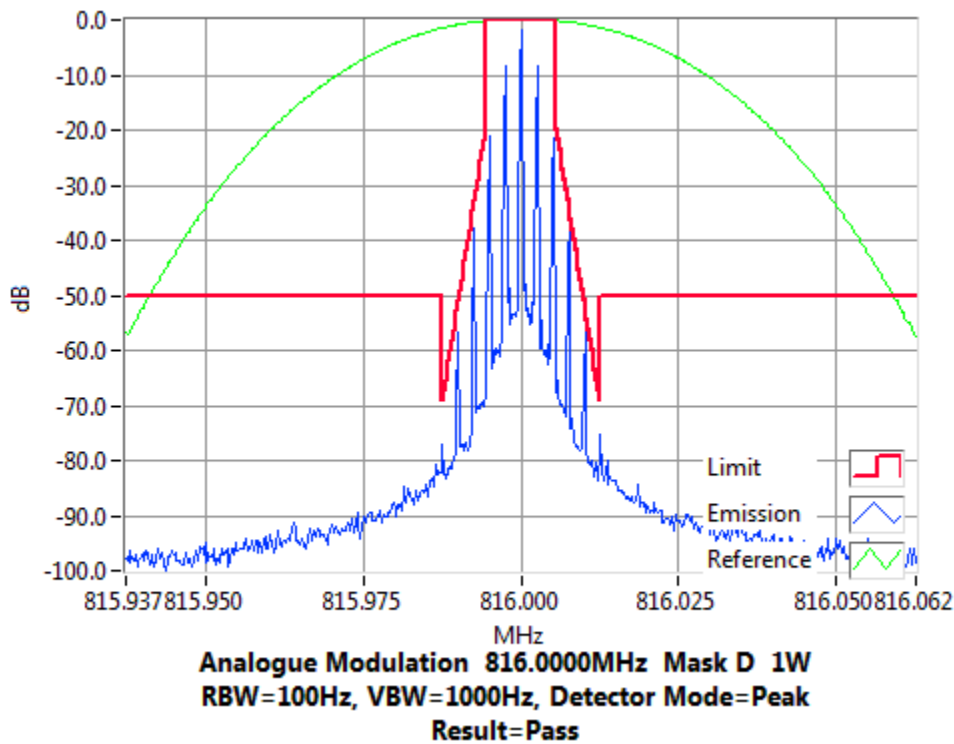
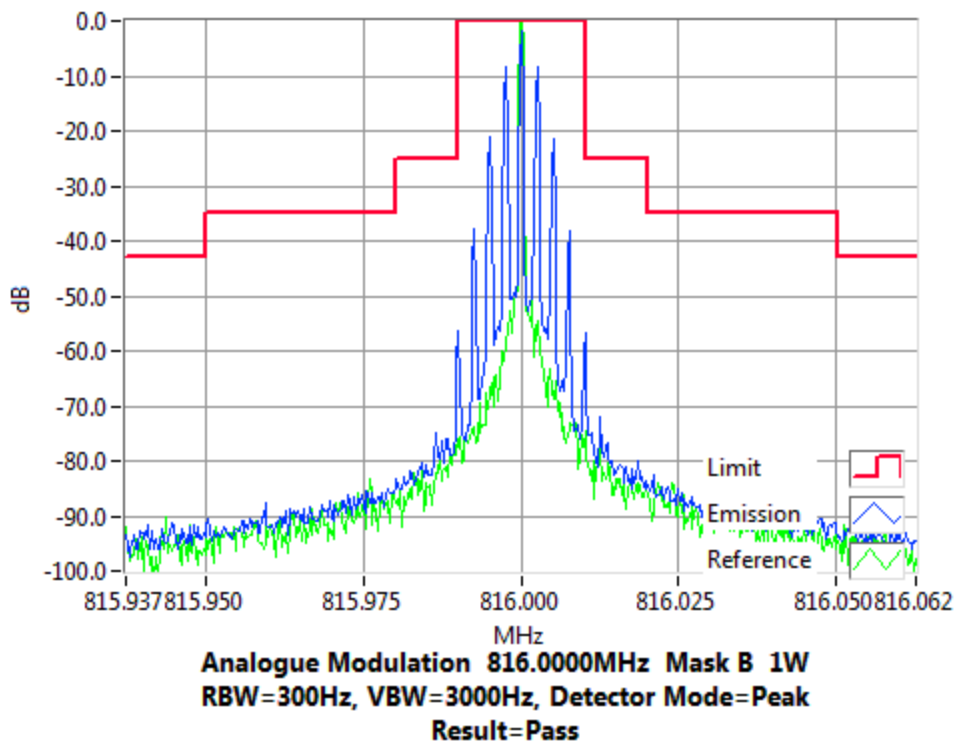
Tx FREQUENCY: 816.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 816.0 MHz

1 W

12.5 kHz Channel Spacing

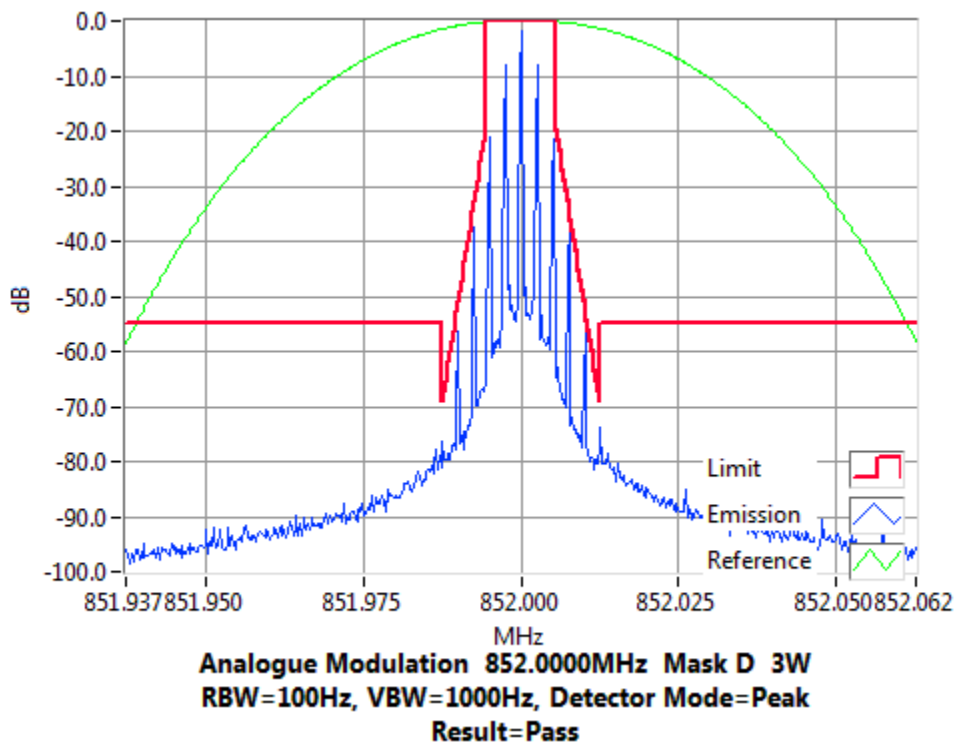
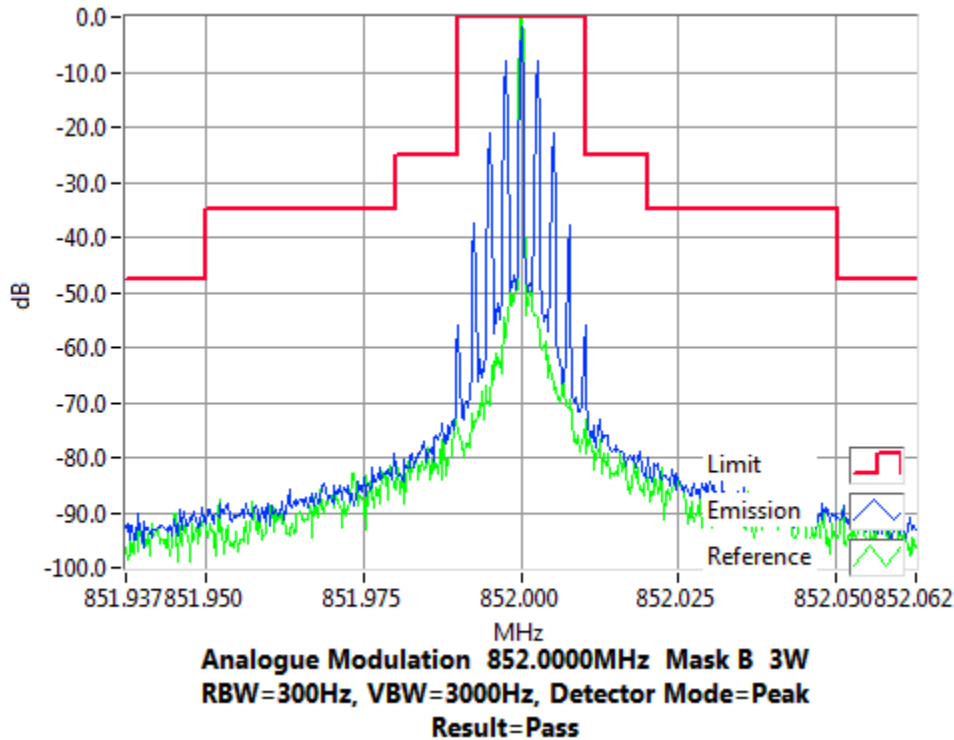


Occupied Bandwidth and Spectrum Masks

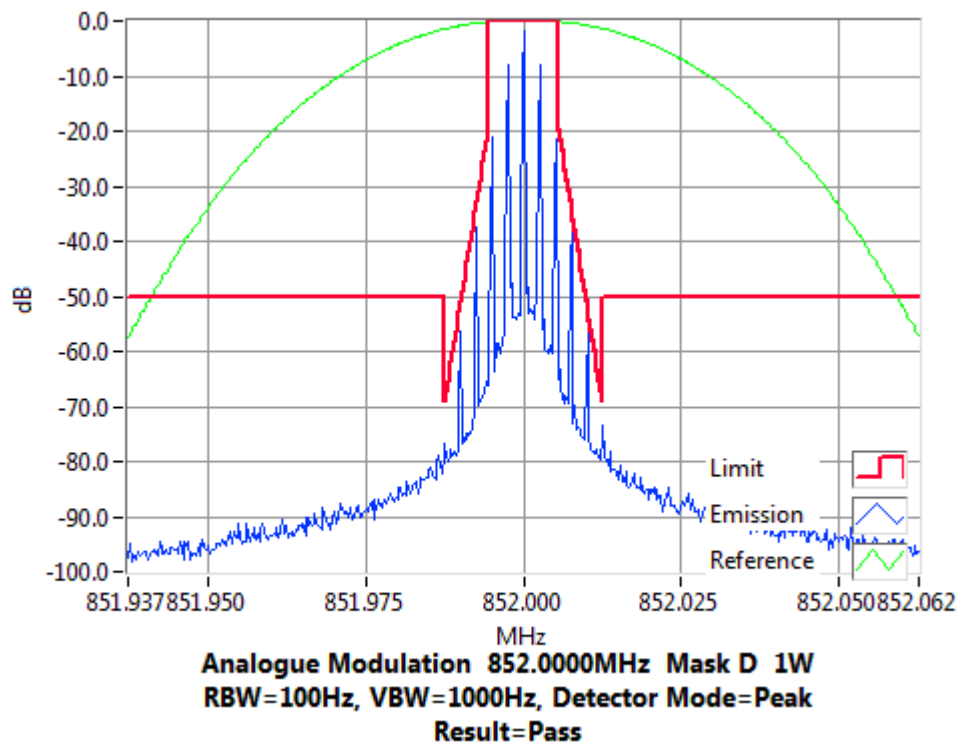
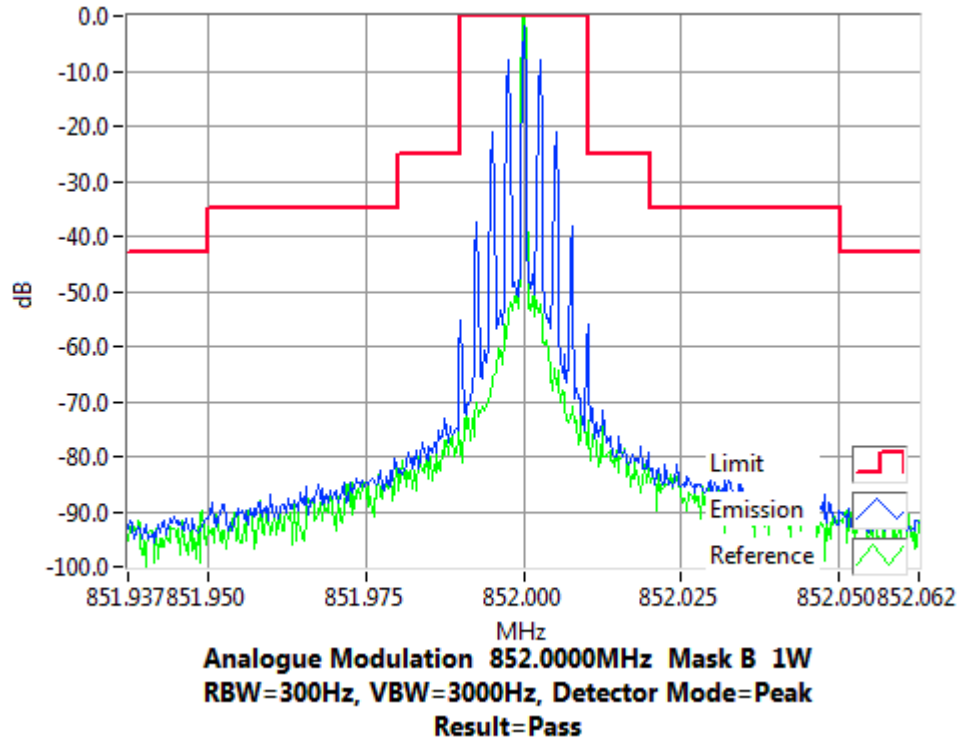
ANALOG VOICE

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

Tx FREQUENCY: 852.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 852.0 MHz 1 W 12.5 kHz Channel Spacing

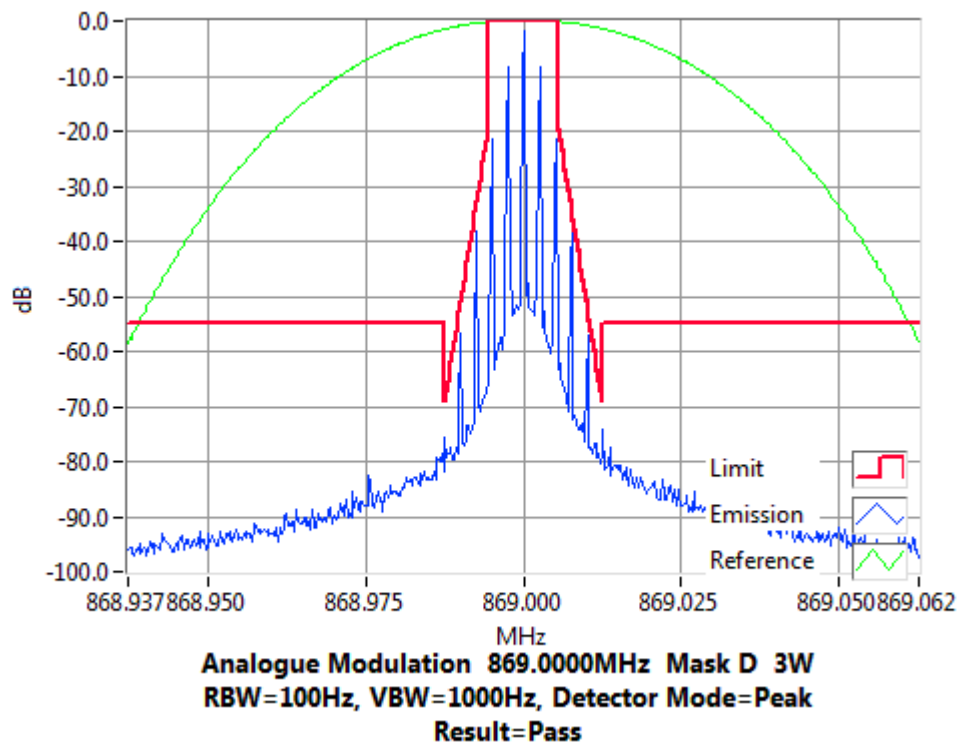
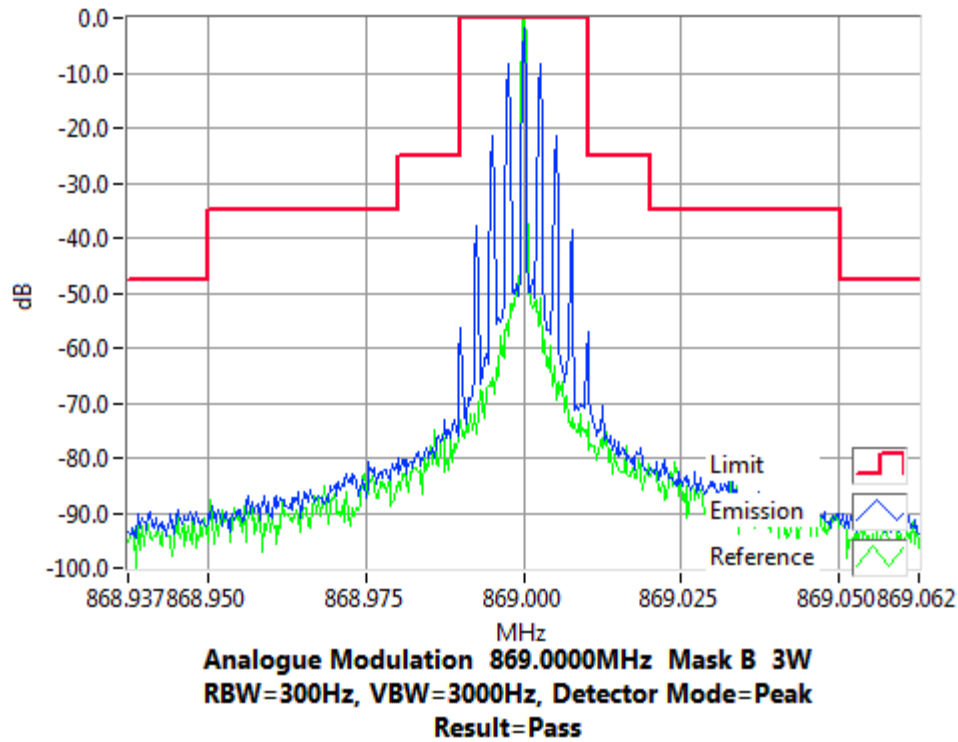


Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

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

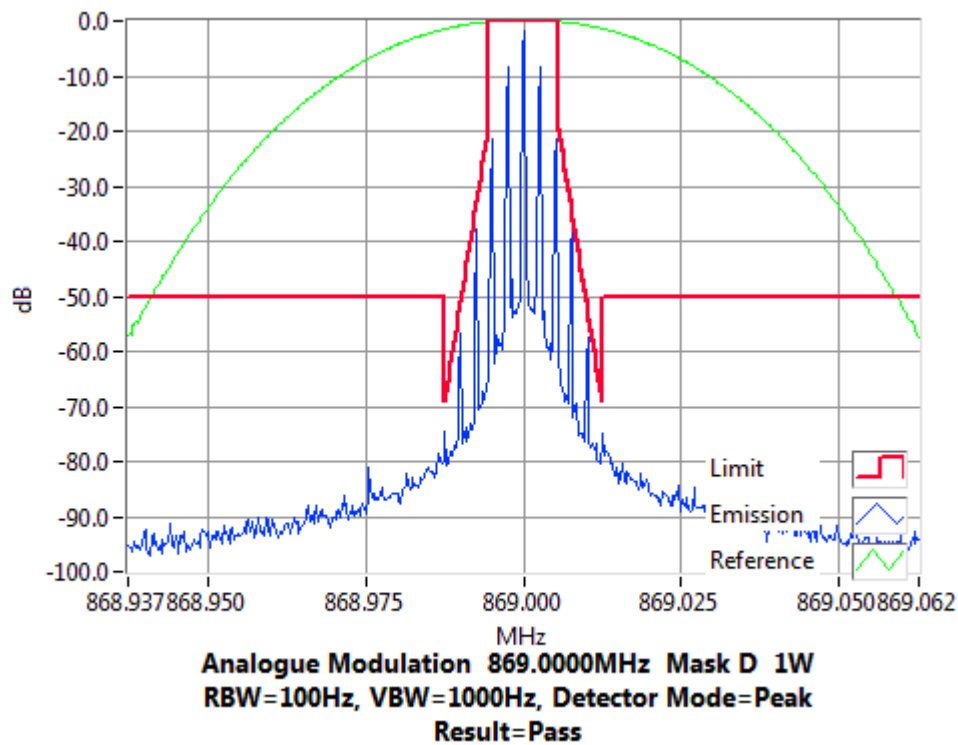
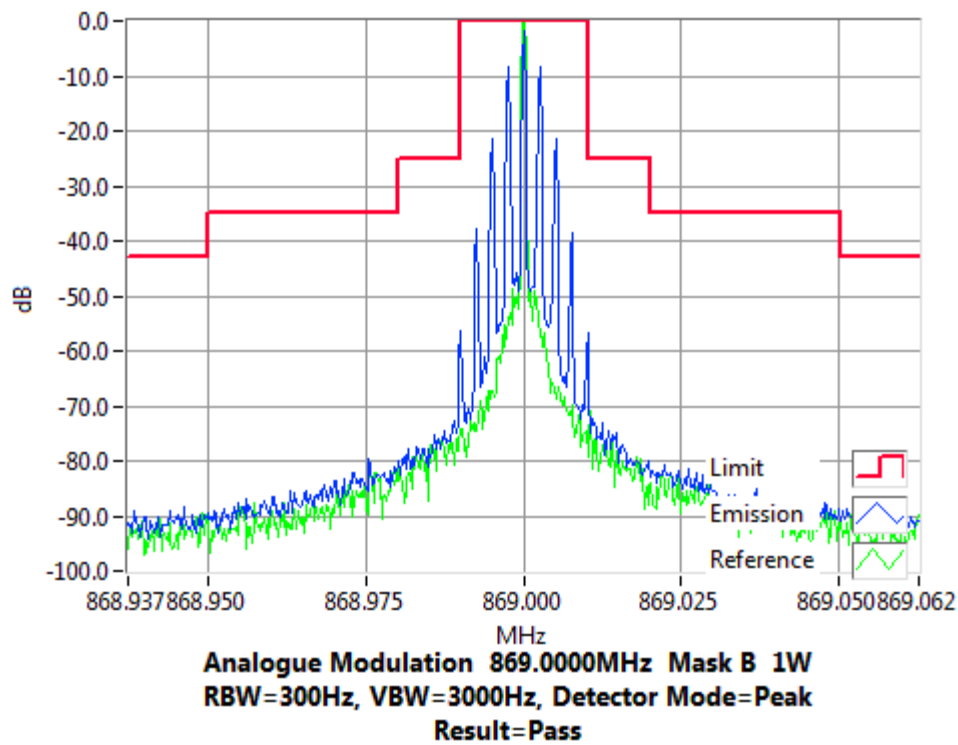
Tx FREQUENCY: 869.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 869.0 MHz

1 W

12.5 kHz Channel Spacing

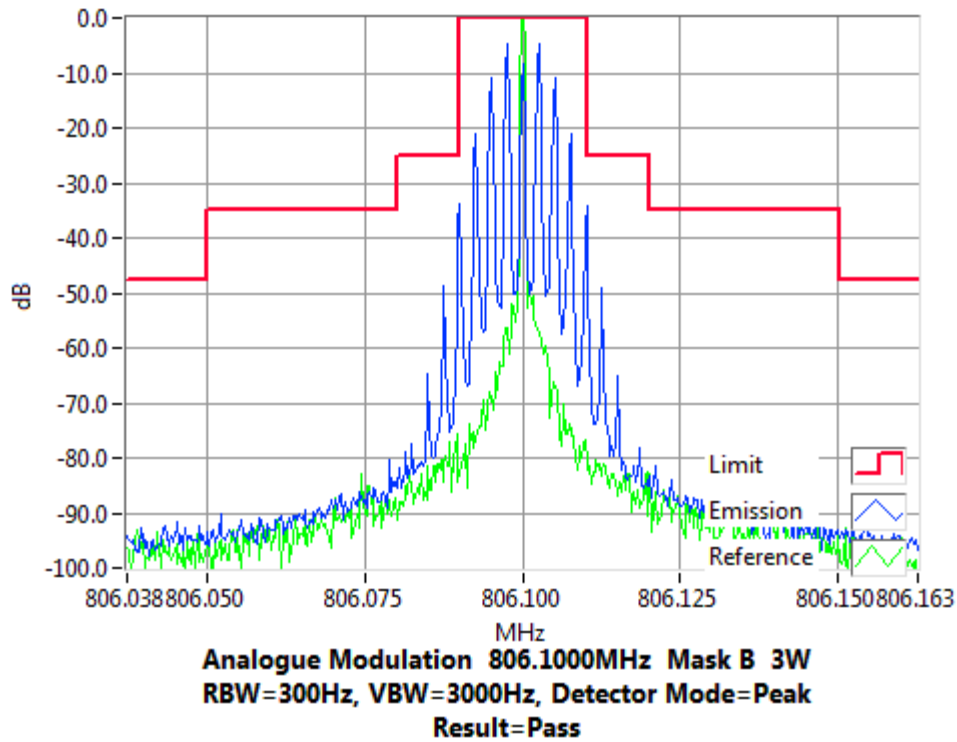


Occupied Bandwidth and Spectrum Masks

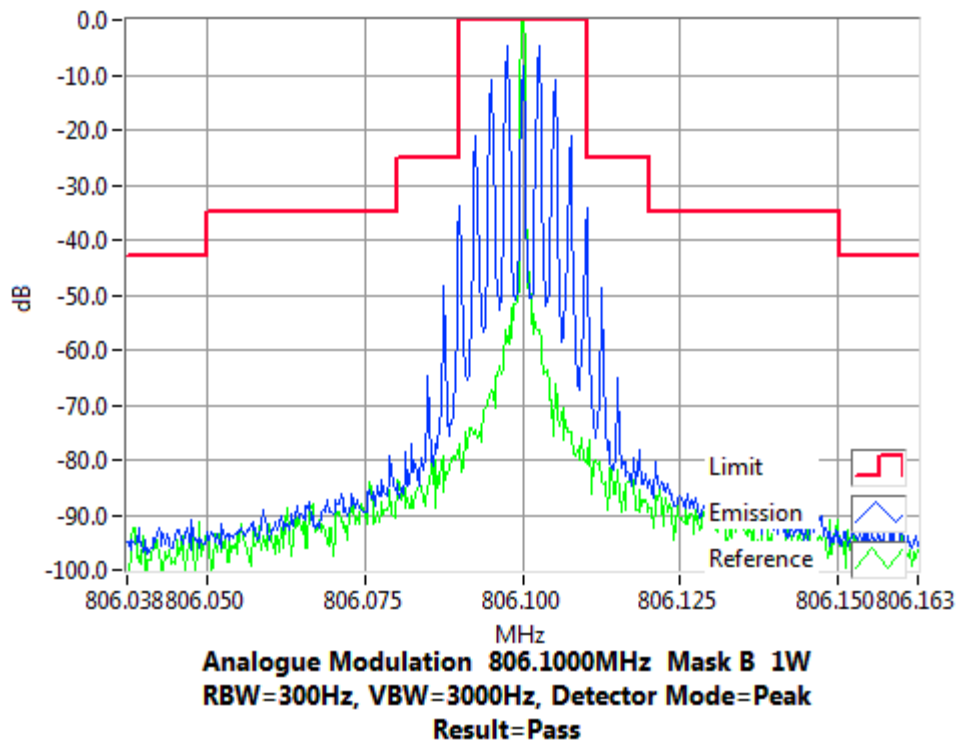
ANALOG VOICE

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

Tx FREQUENCY: 806.1 MHz 3 W 25 kHz Channel Spacing



Tx FREQUENCY: 806.1 MHz 1 W 25 kHz Channel Spacing

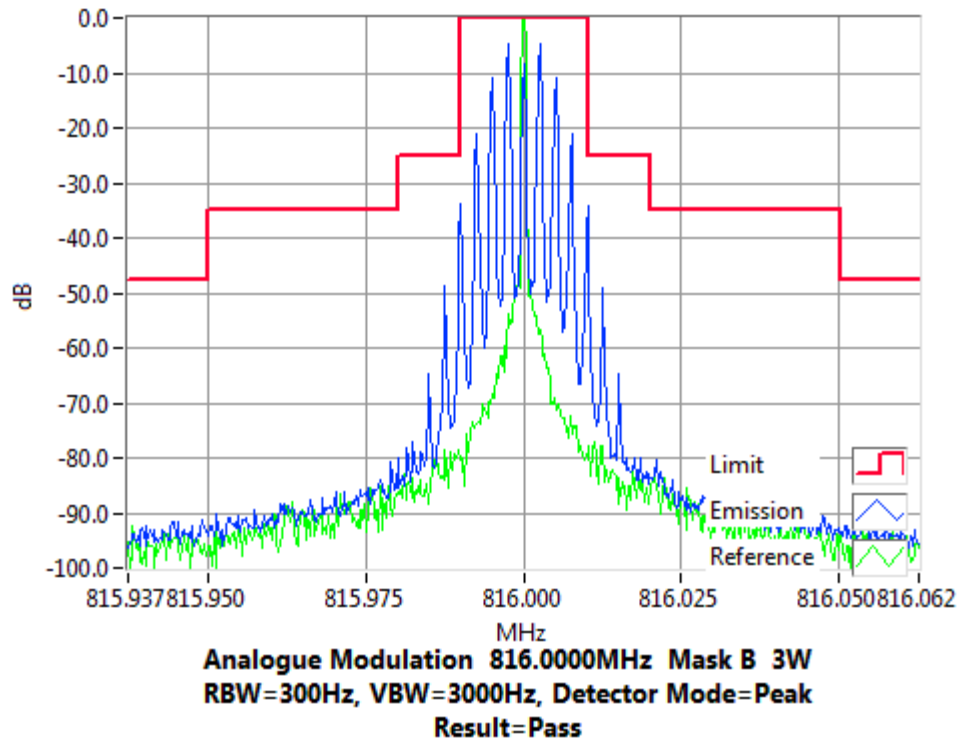


Occupied Bandwidth and Spectrum Masks

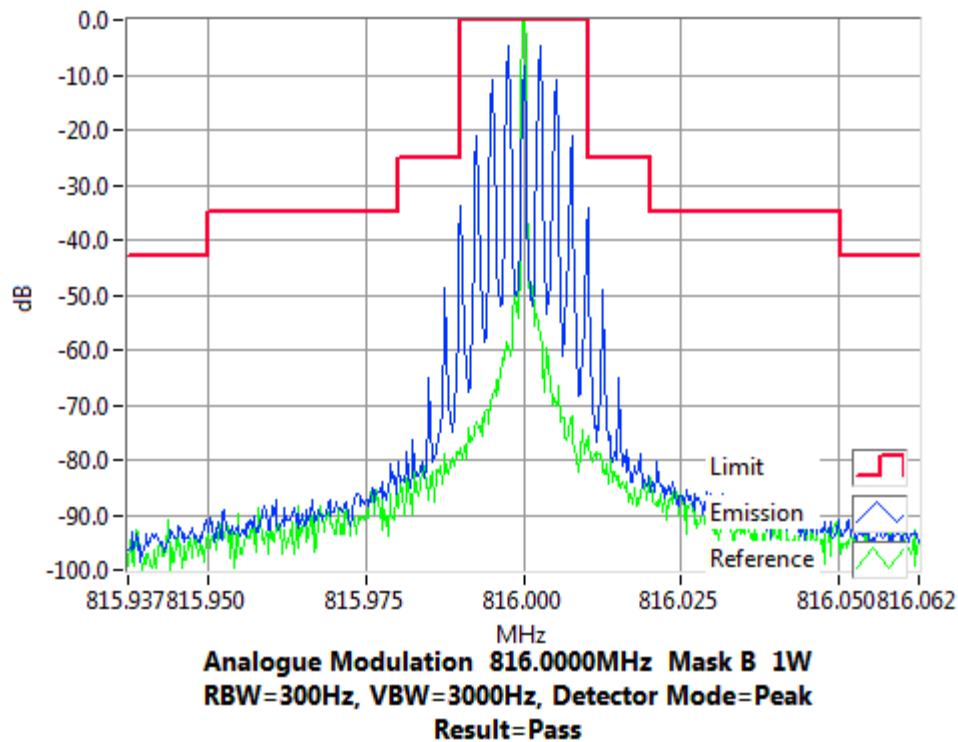
ANALOG VOICE

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

Tx FREQUENCY: 816.0 MHz 3 W 25 kHz Channel Spacing



Tx FREQUENCY: 816.0 MHz 1 W 25 kHz Channel Spacing

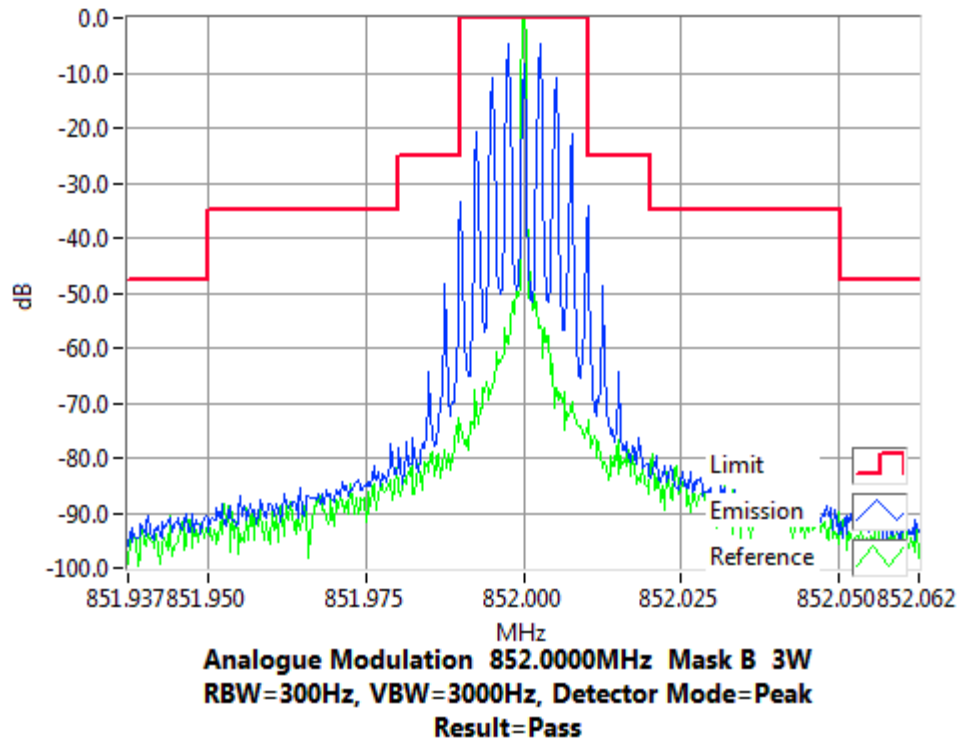


Occupied Bandwidth and Spectrum Masks

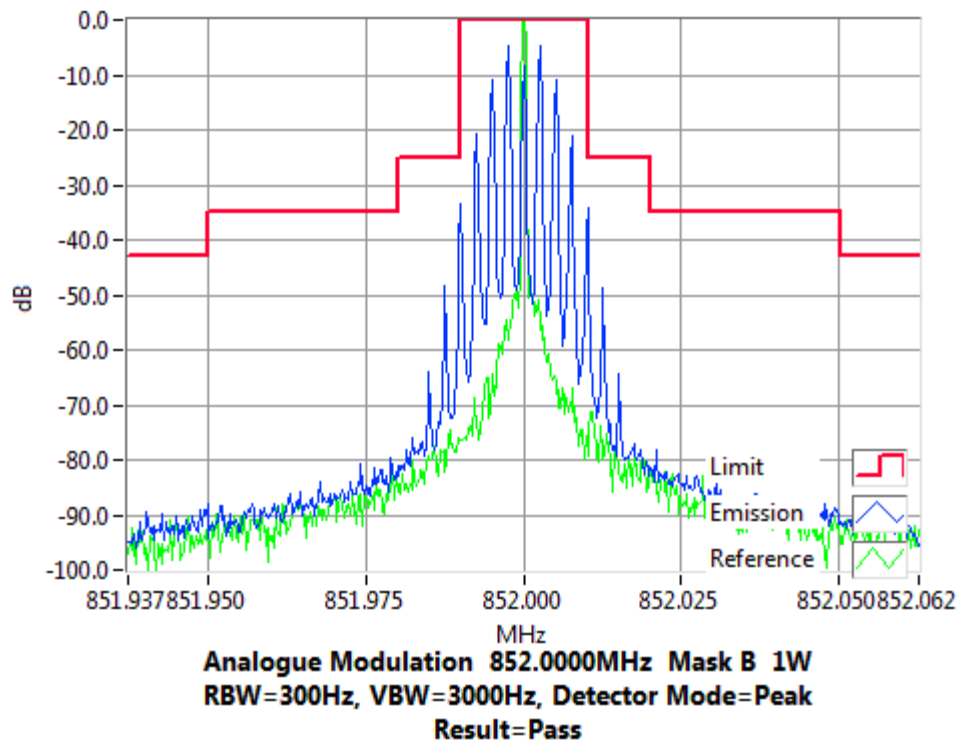
ANALOG VOICE

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

Tx FREQUENCY: 852.0 MHz 3 W 25 kHz Channel Spacing



Tx FREQUENCY: 852.0 MHz 1 W 25 kHz Channel Spacing

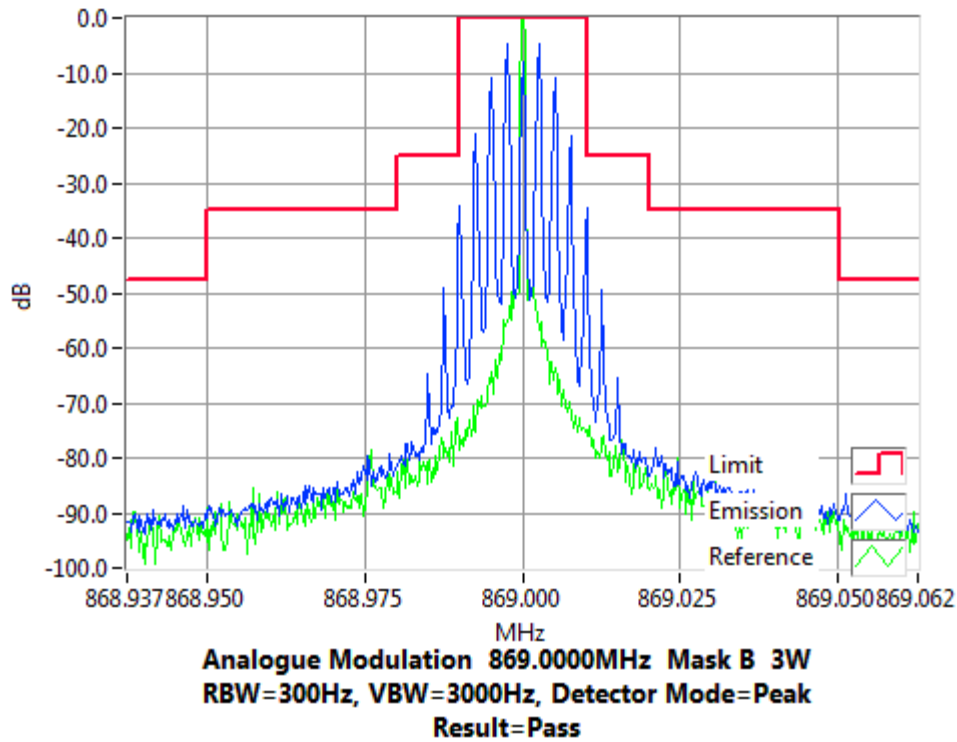


Occupied Bandwidth and Spectrum Masks

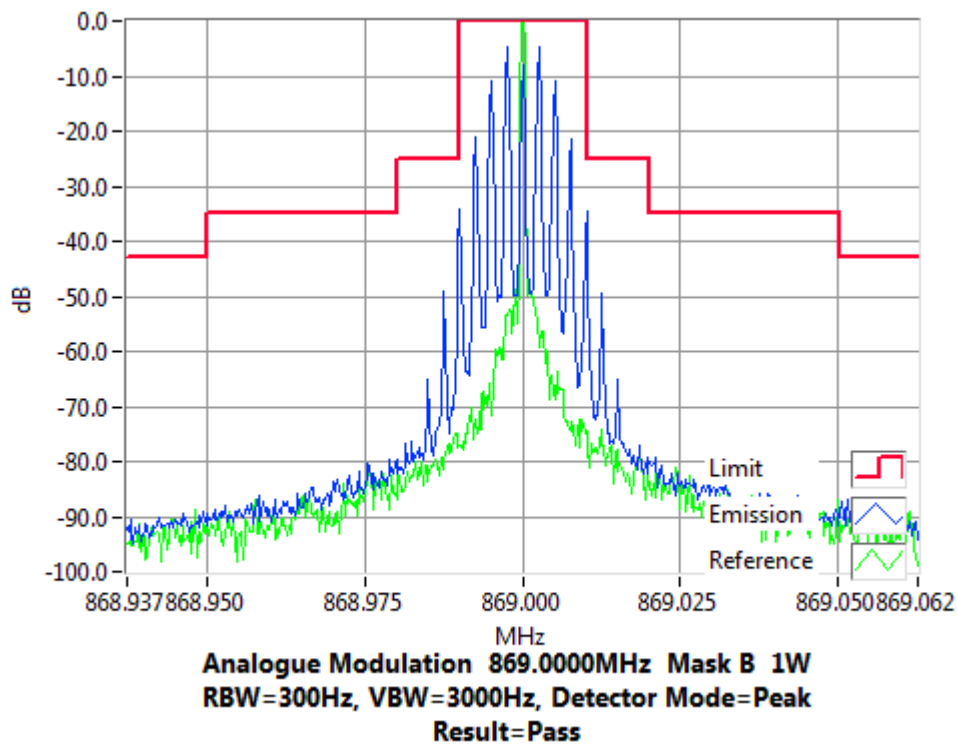
ANALOG VOICE

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

Tx FREQUENCY: 869.0 MHz 3 W 25 kHz Channel Spacing



Tx FREQUENCY: 869.0 MHz 1 W 25 kHz Channel Spacing

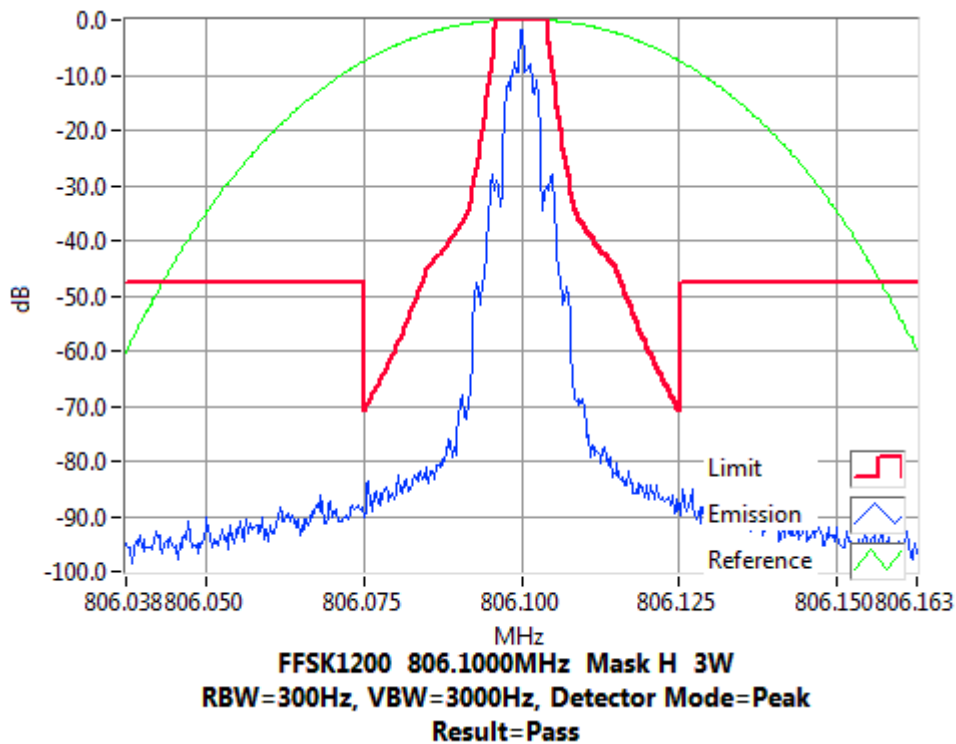
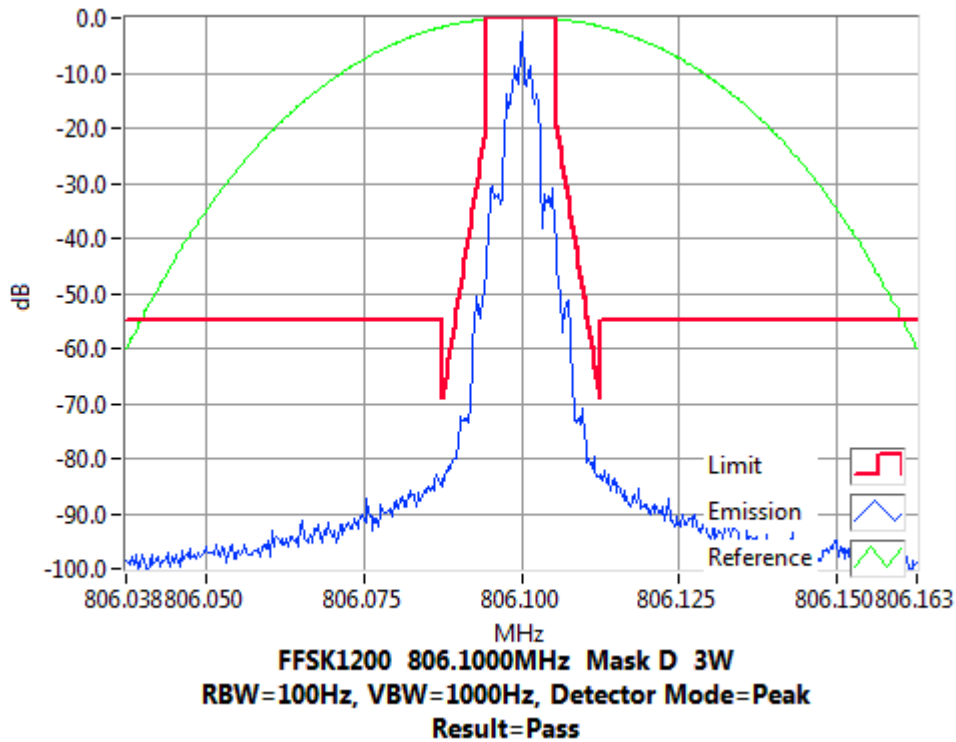


Occupied Bandwidth and Spectrum Masks

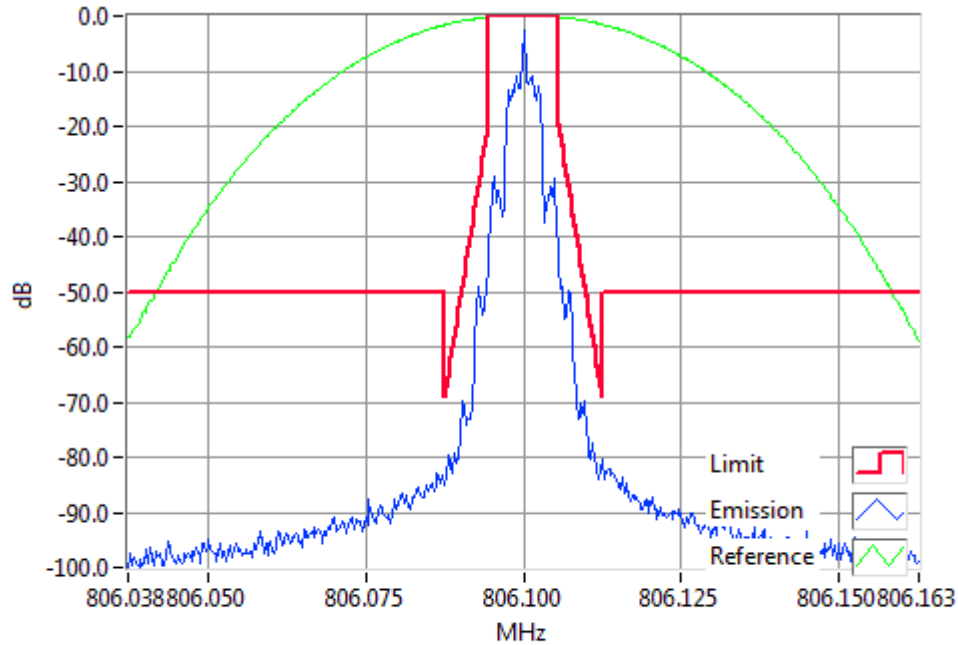
FFSK 1200 bps

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

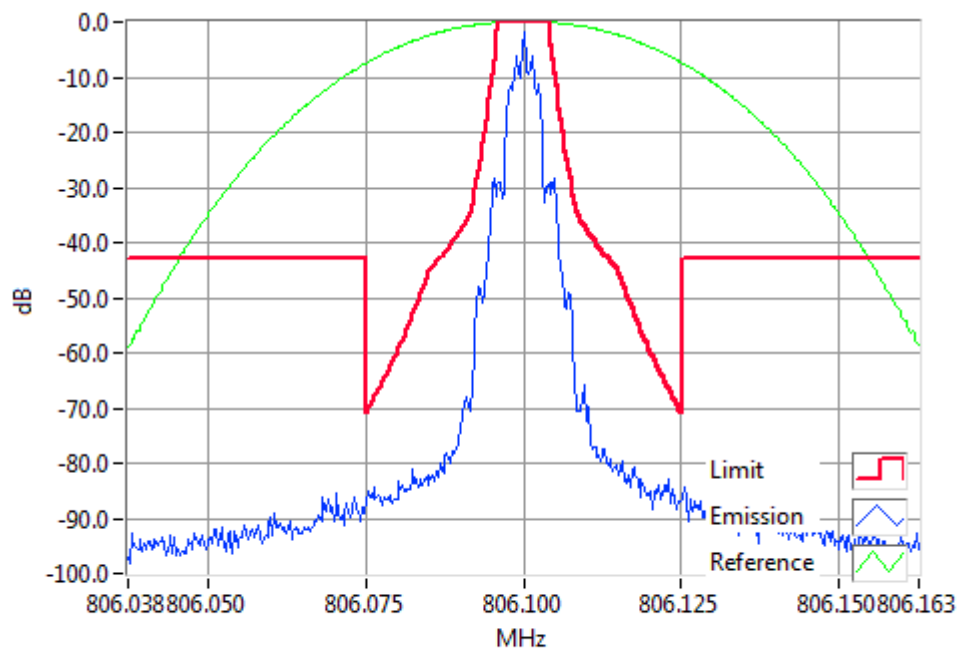
Tx FREQUENCY: 806.1 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 806.1 MHz 1 W 12.5 kHz Channel Spacing



FFSK1200 806.1000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



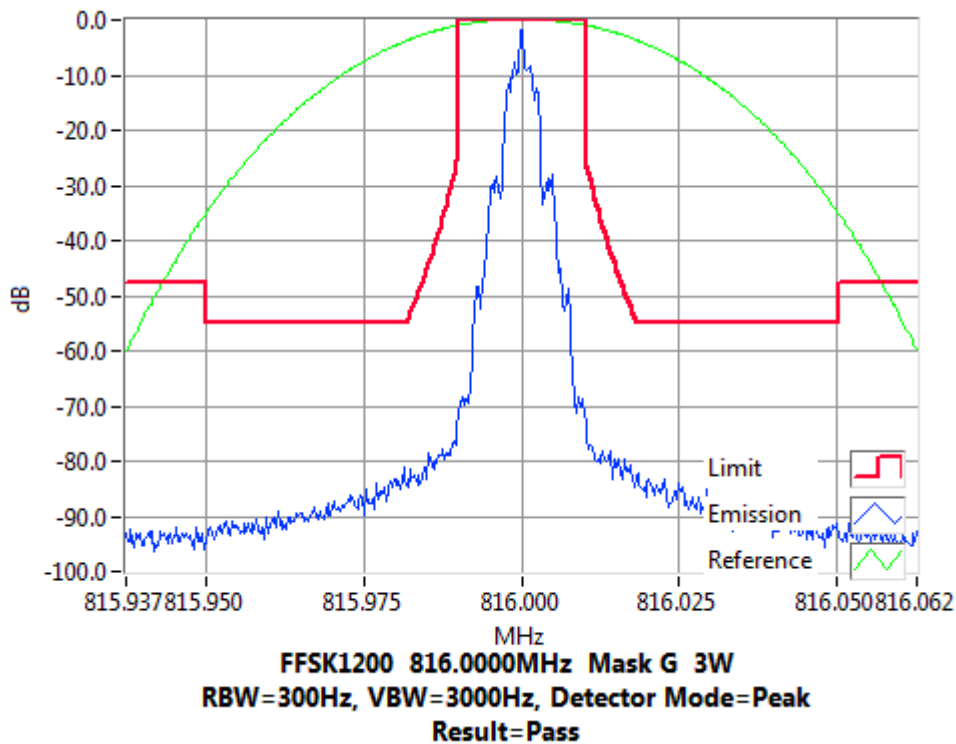
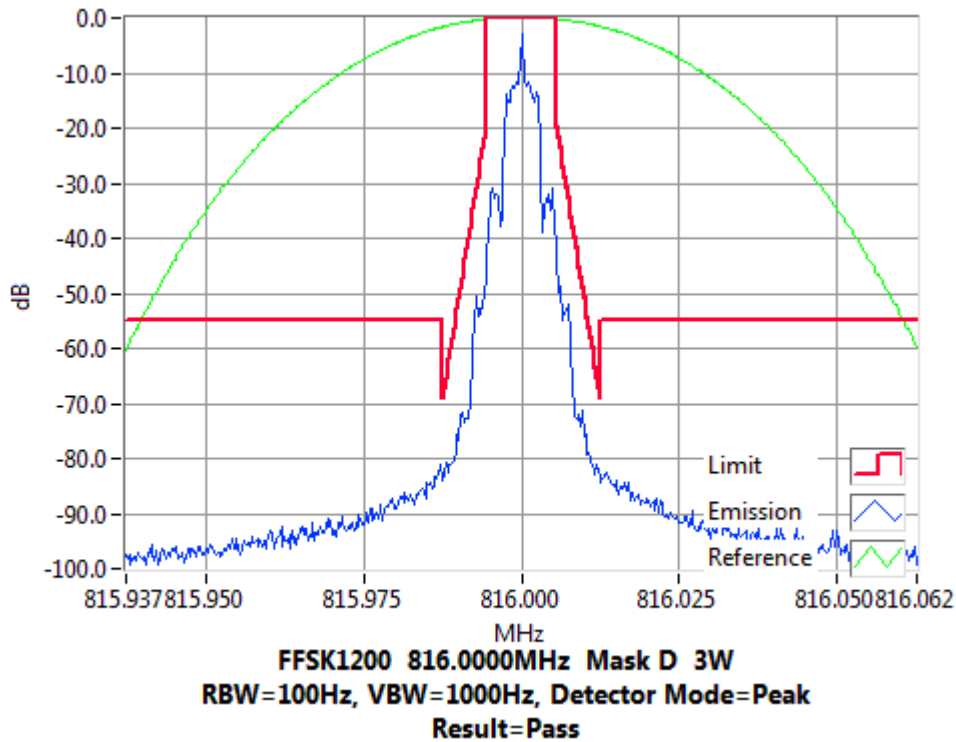
FFSK1200 806.1000MHz Mask H 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

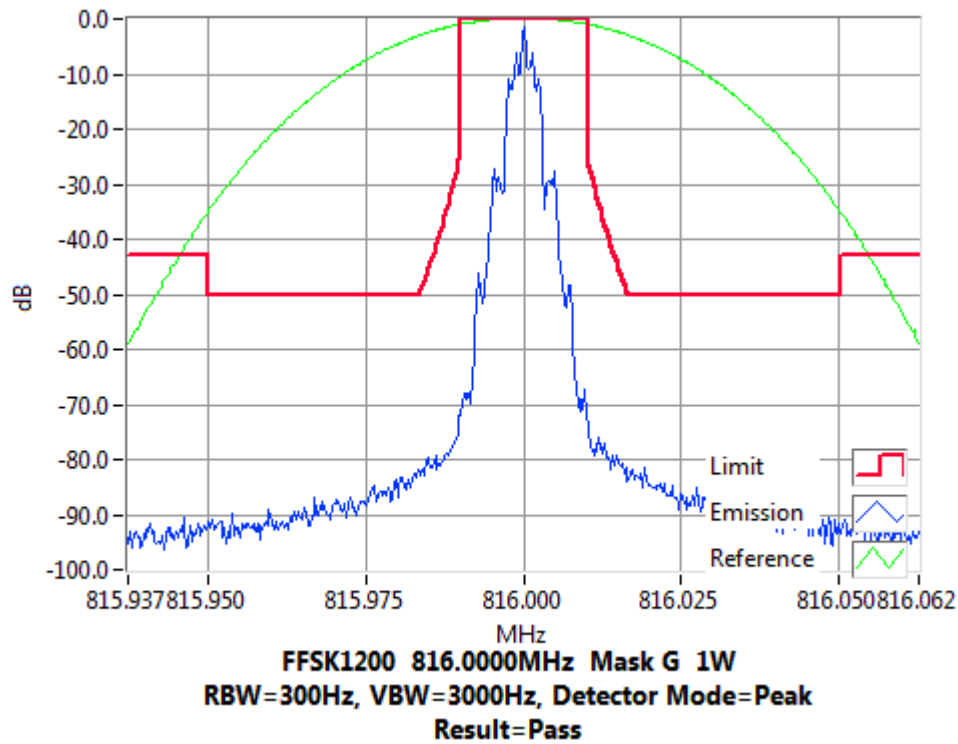
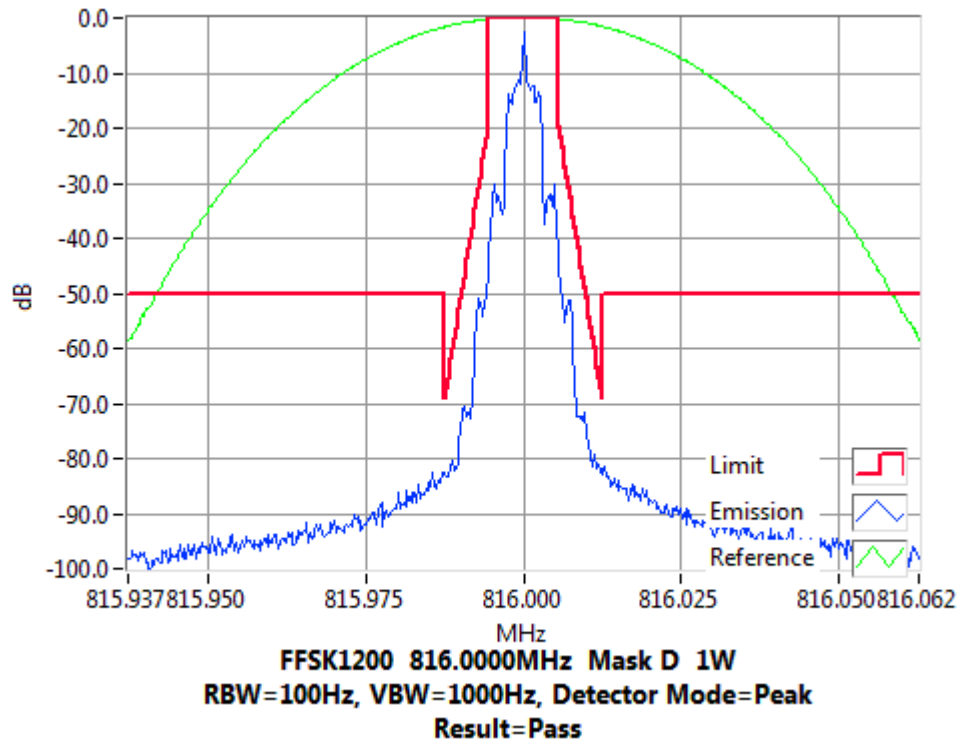
FSK 1200 bps

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

Tx FREQUENCY: 816.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 816.0 MHz 1 W 12.5 kHz Channel Spacing

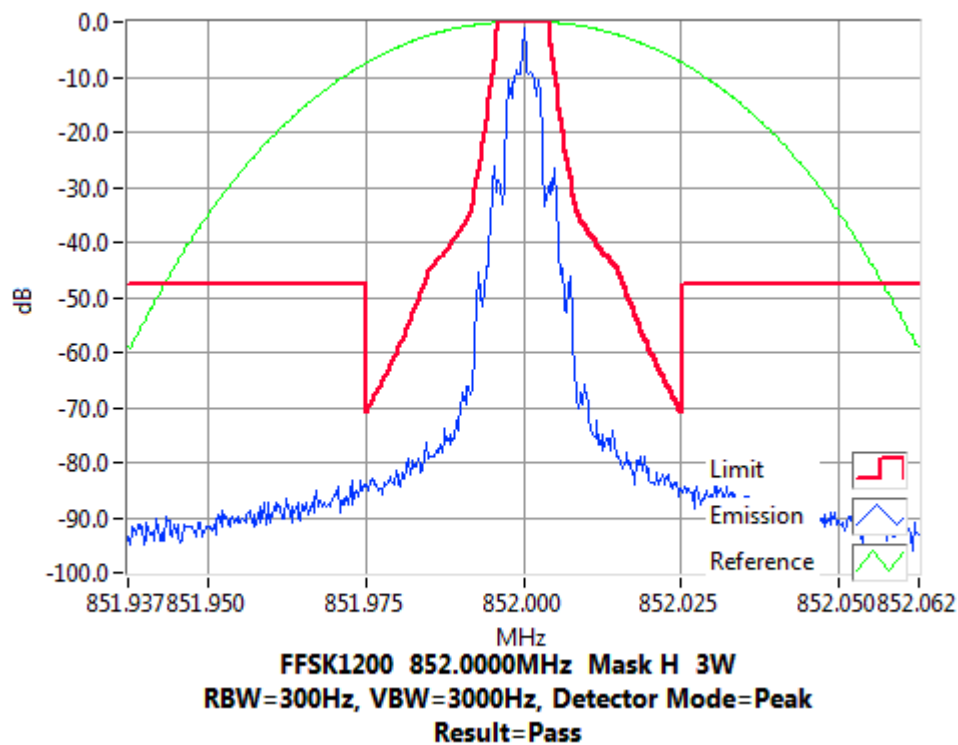
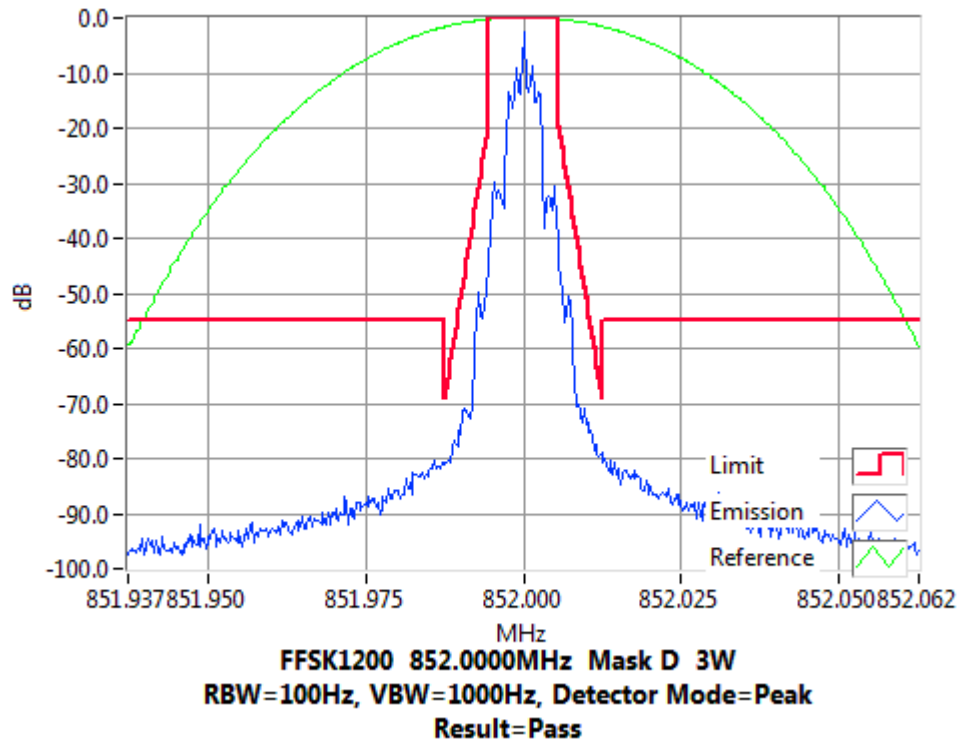


Occupied Bandwidth and Spectrum Masks

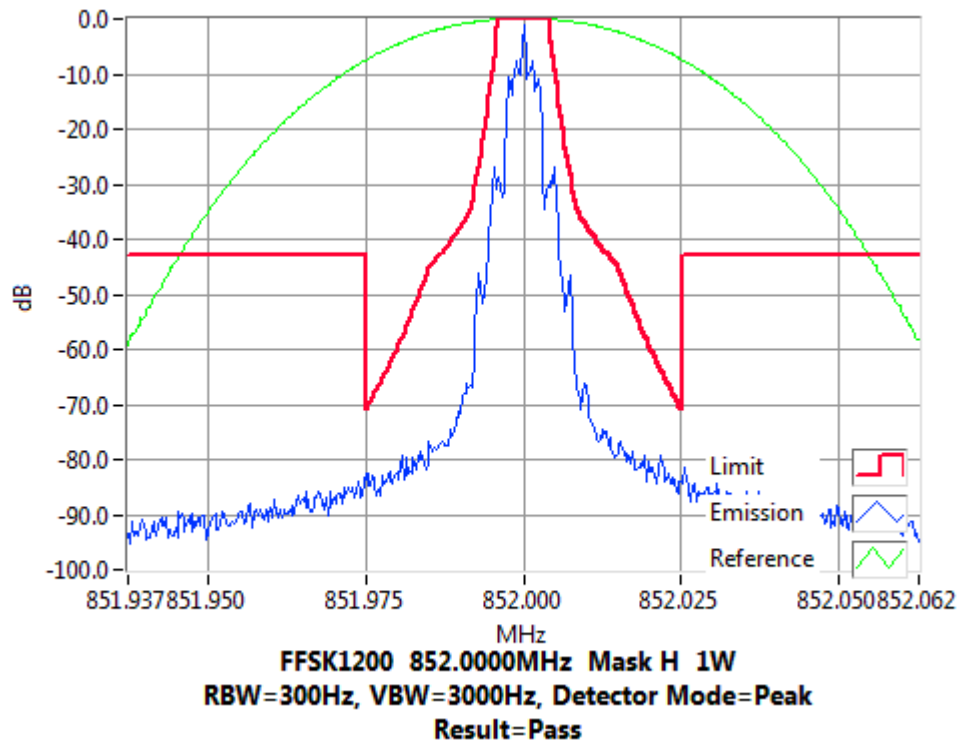
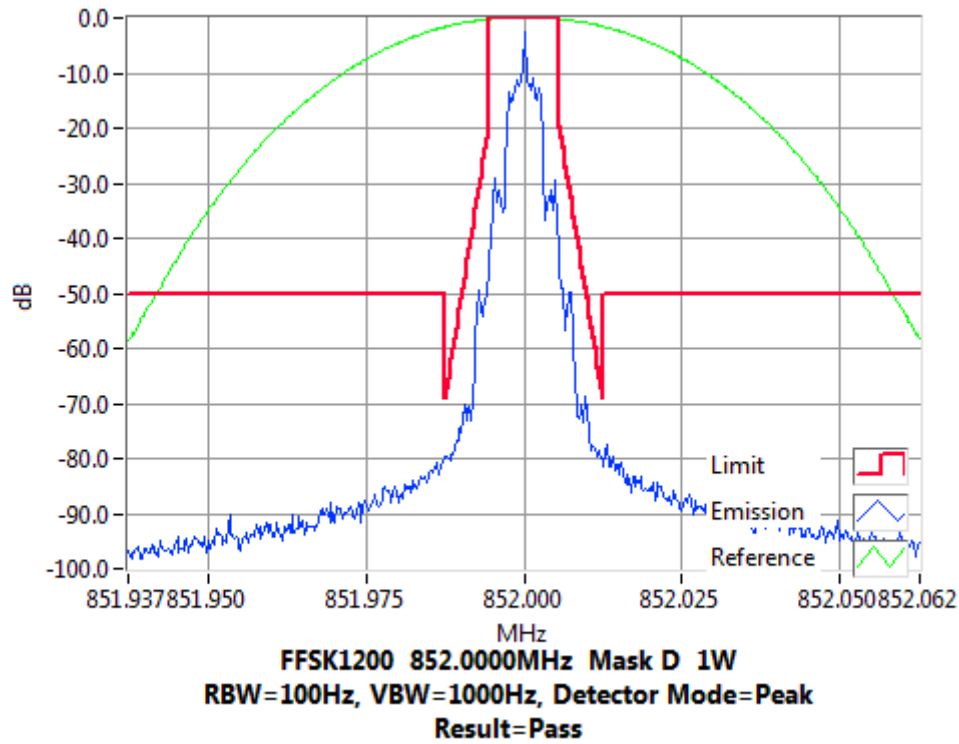
FFSK 1200 bps

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

Tx FREQUENCY: 852.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 852.0 MHz 1 W 12.5 kHz Channel Spacing

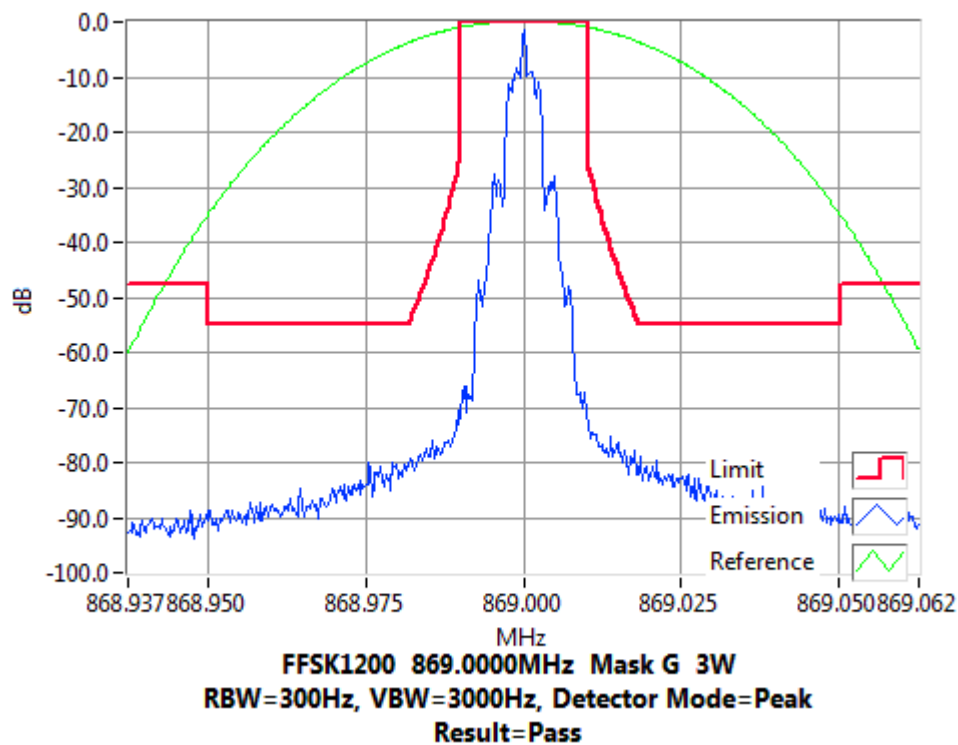
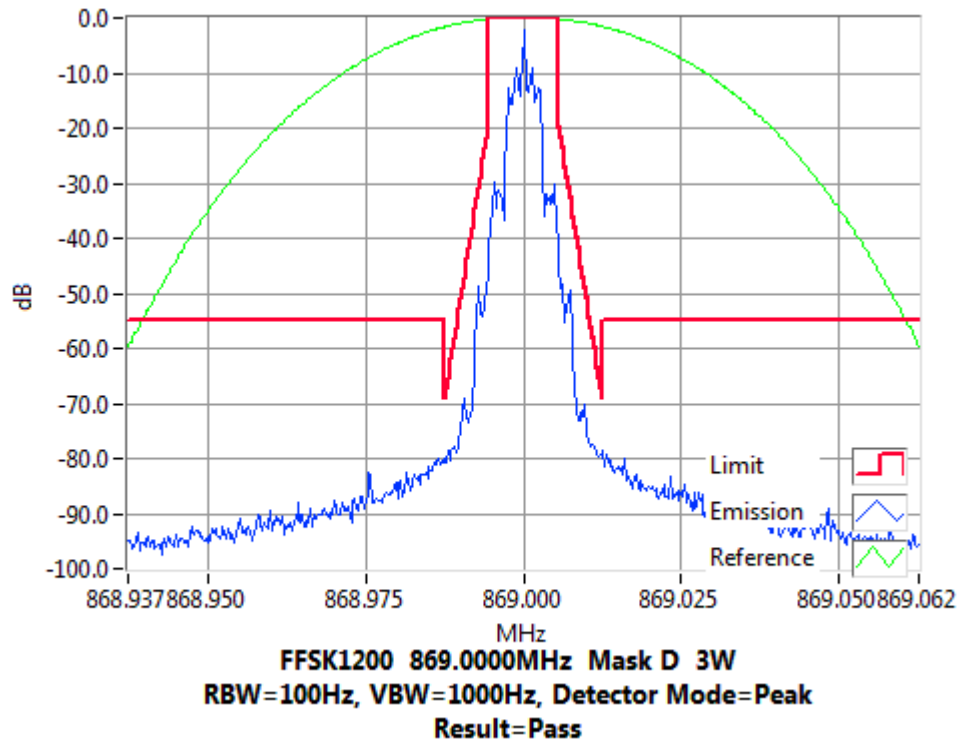


Occupied Bandwidth and Spectrum Masks

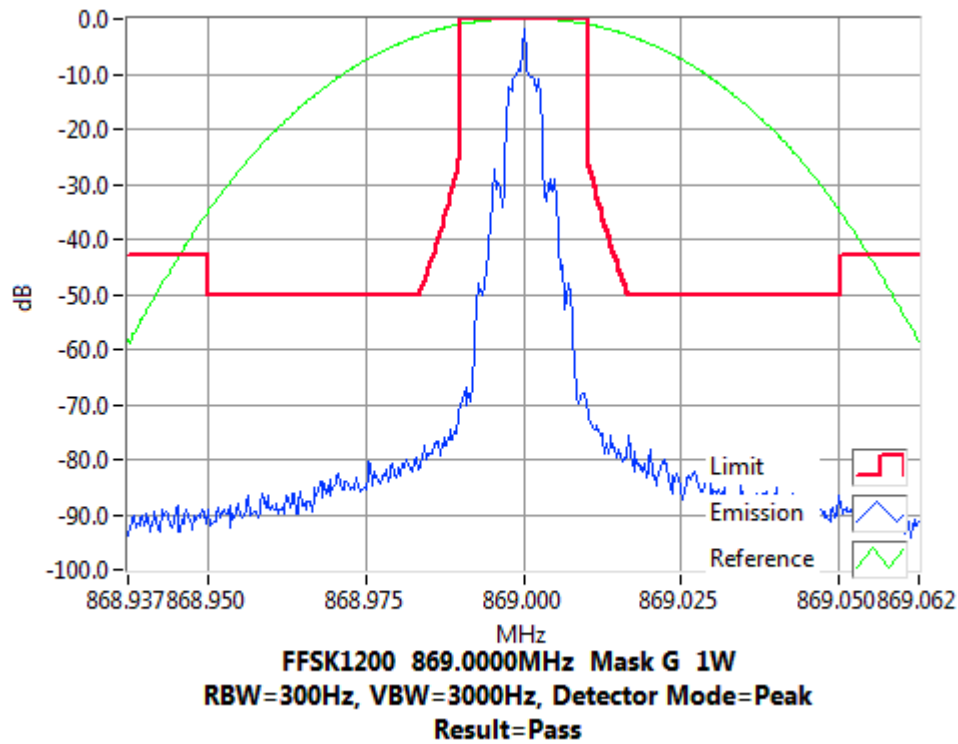
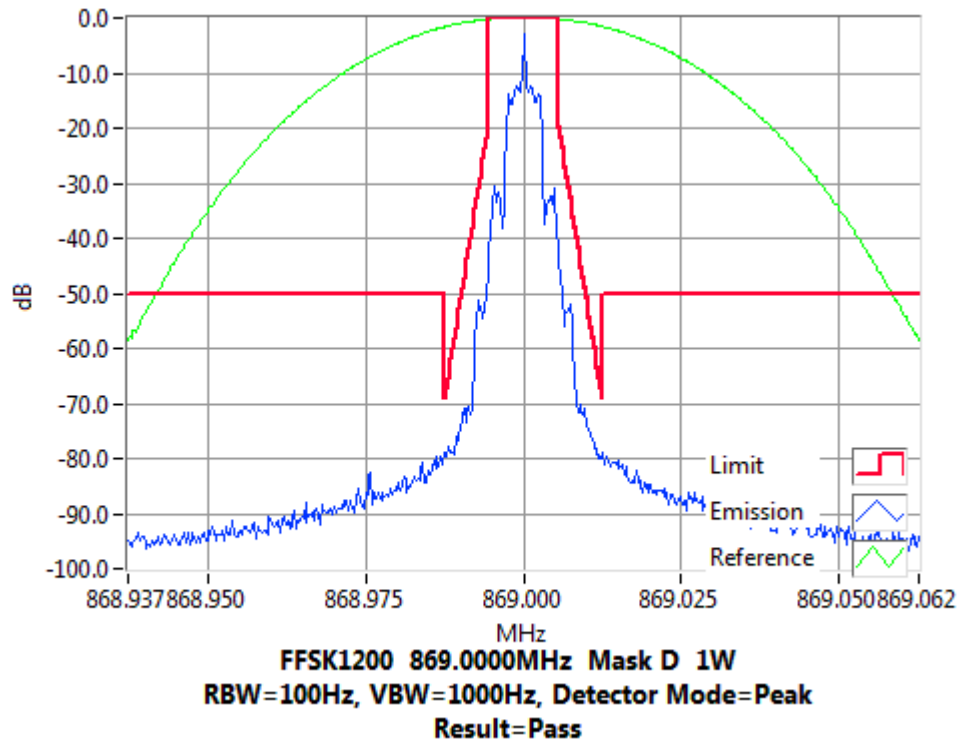
FFSK 1200 bps

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

Tx FREQUENCY: 869.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 869.0 MHz 1 W 12.5 kHz Channel Spacing

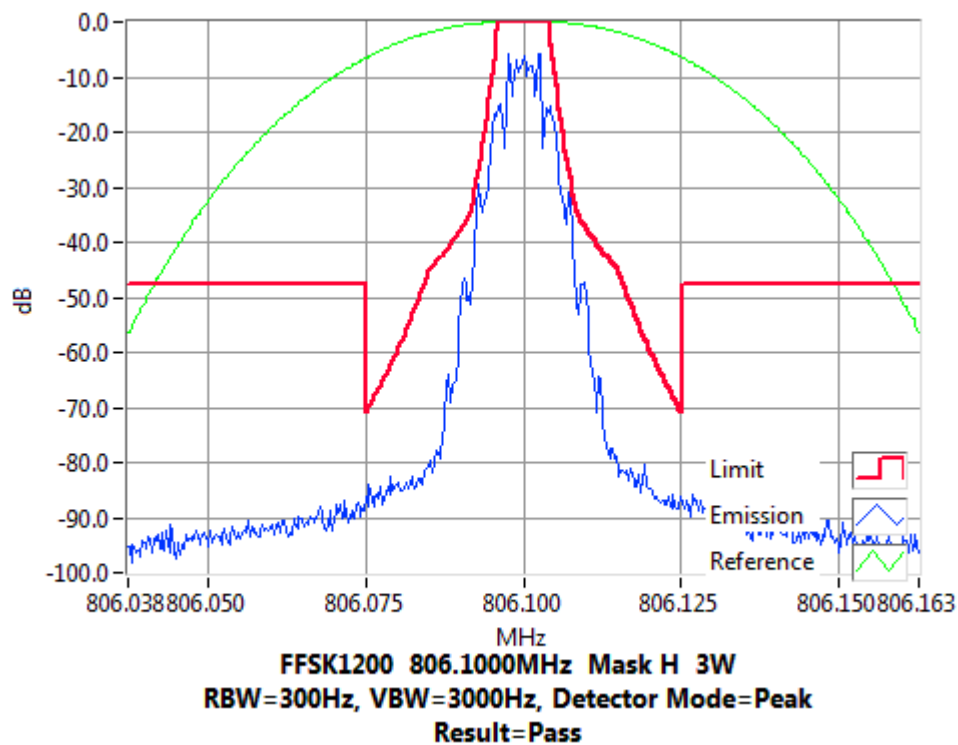
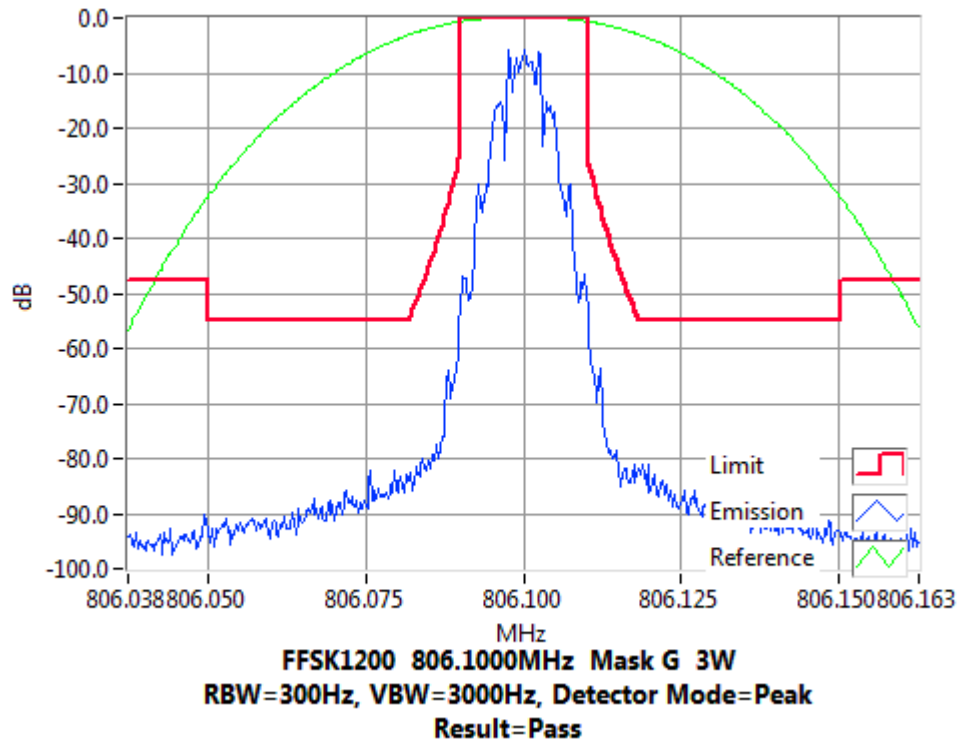


Occupied Bandwidth and Spectrum Masks

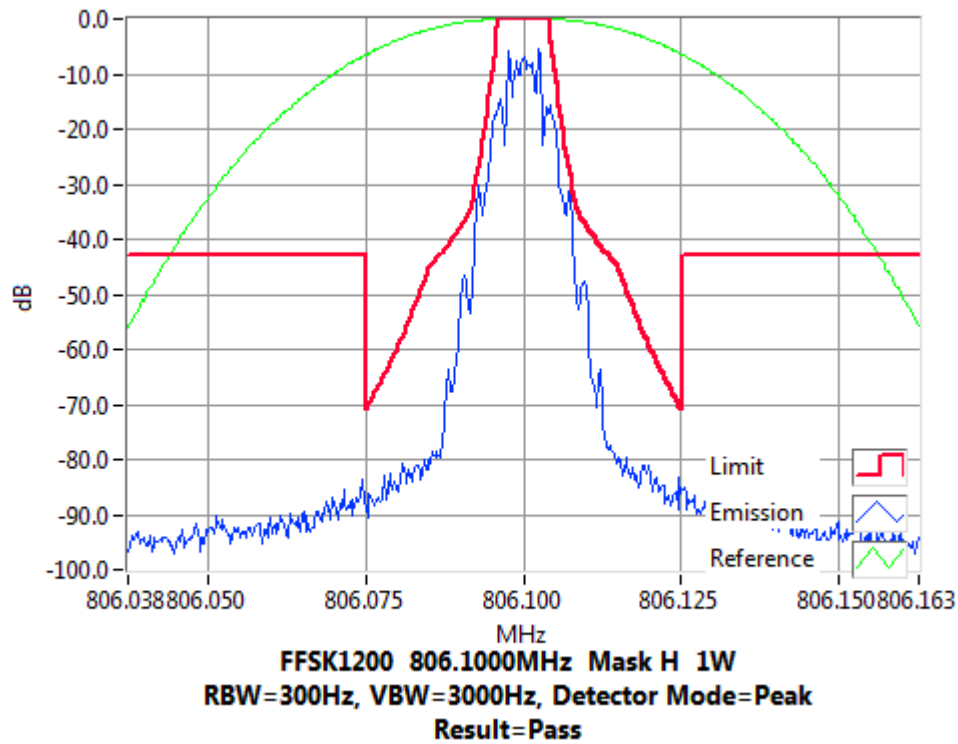
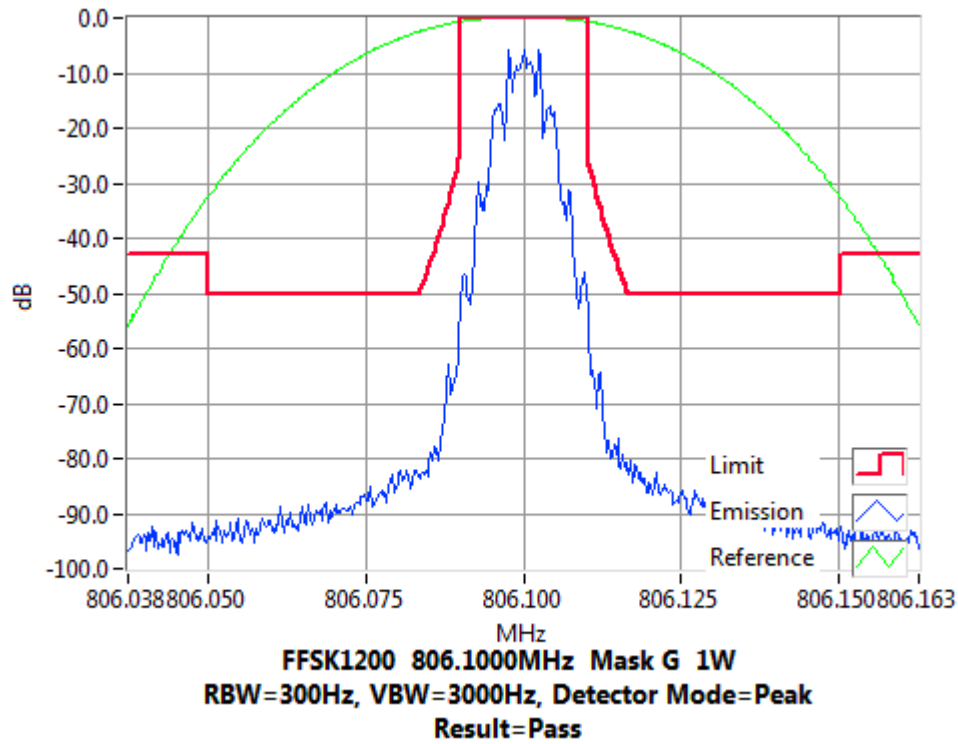
FFSK 1200 bps

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

Tx FREQUENCY: 806.1 MHz 3 W 25 kHz Channel Spacing



Tx FREQUENCY: 806.1 MHz 1 W 25 kHz Channel Spacing

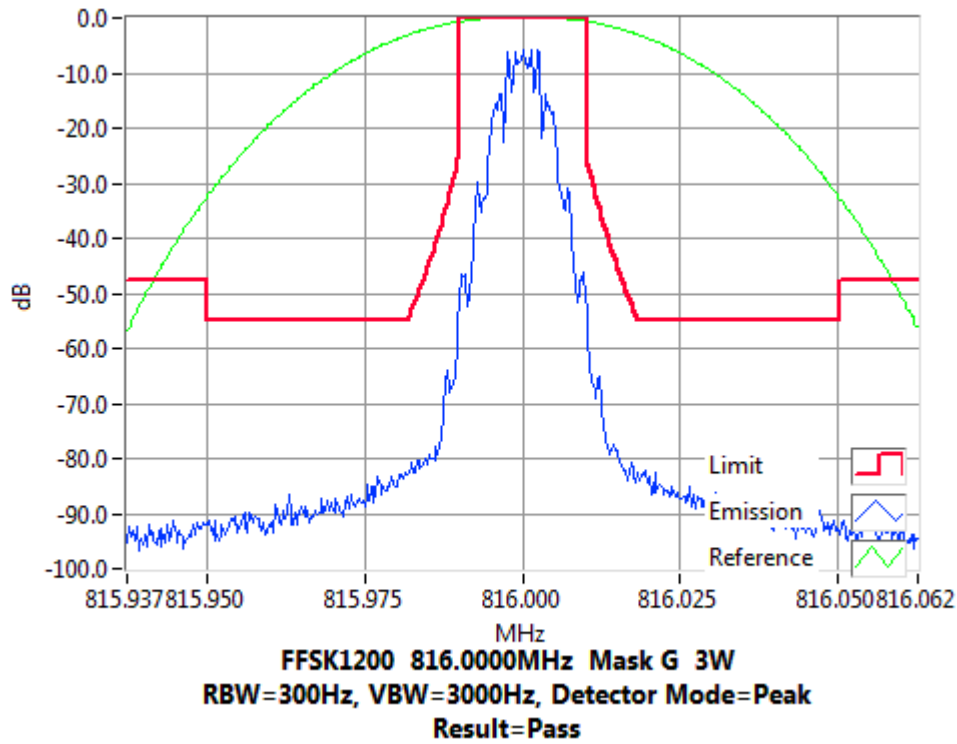


Occupied Bandwidth and Spectrum Masks

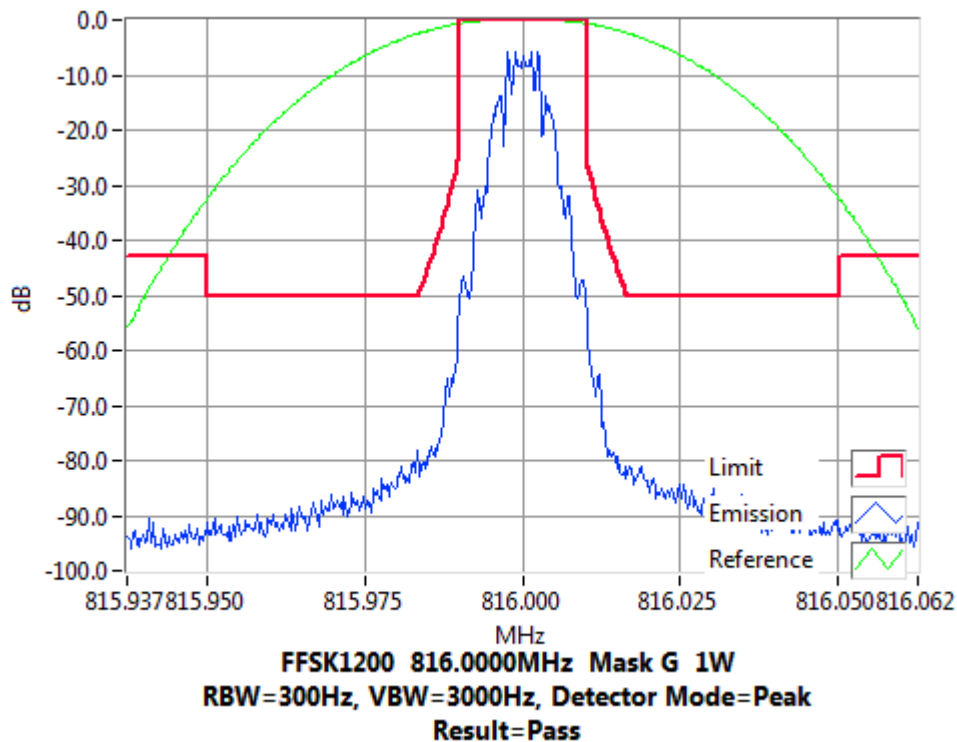
FFSK 1200 bps

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

Tx FREQUENCY: 816.0 MHz 3 W 25 kHz Channel Spacing



Tx FREQUENCY: 816.0 MHz 1 W 25 kHz Channel Spacing

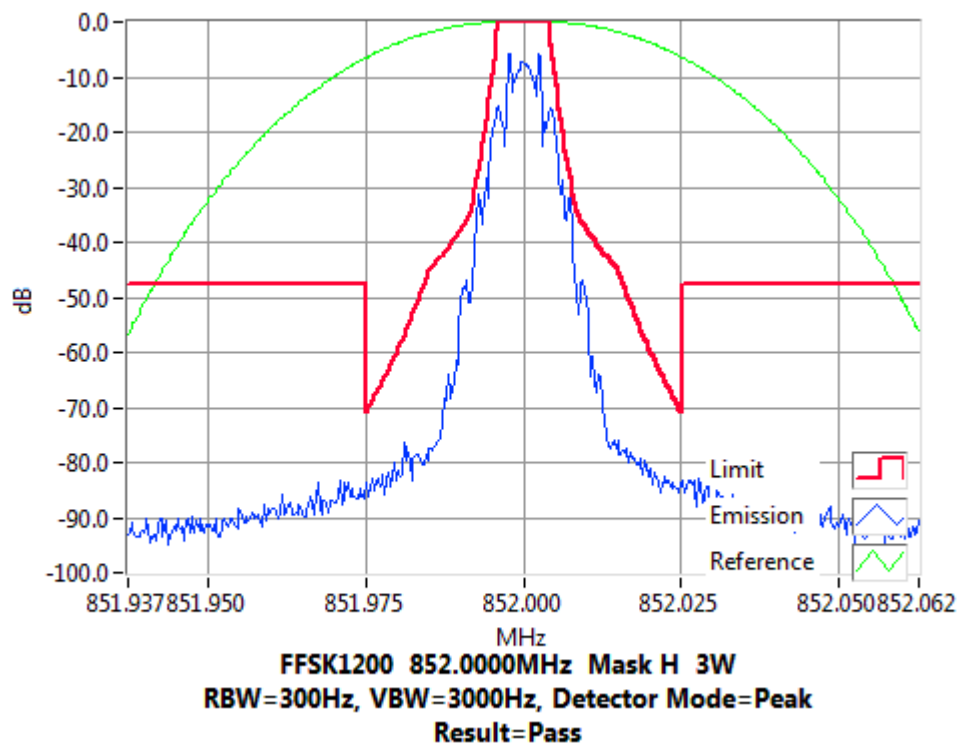
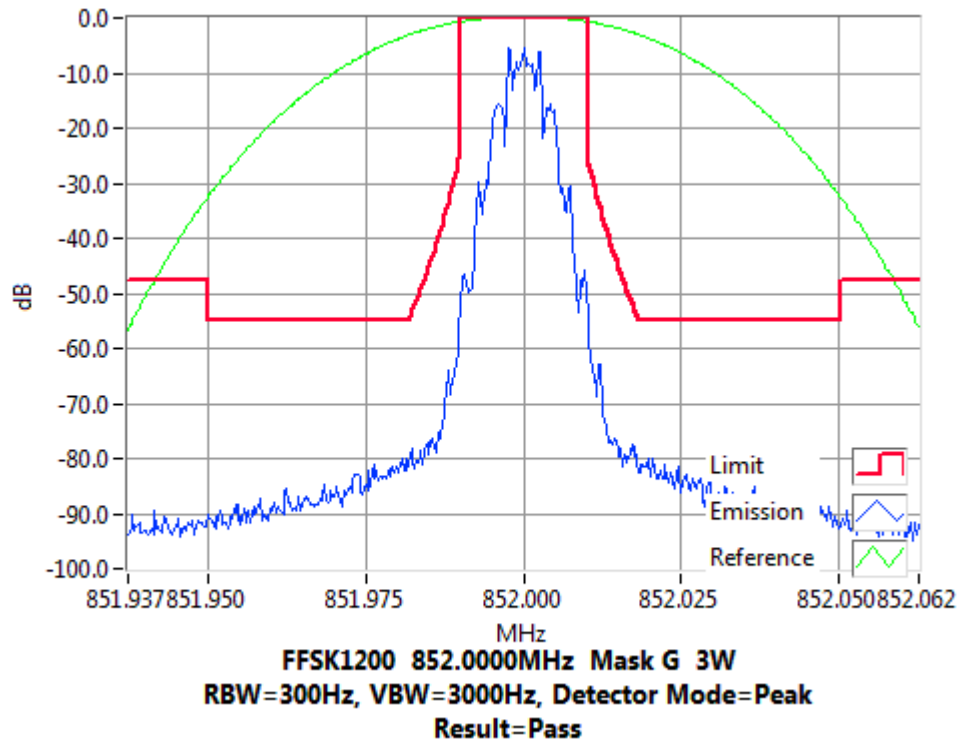


Occupied Bandwidth and Spectrum Masks

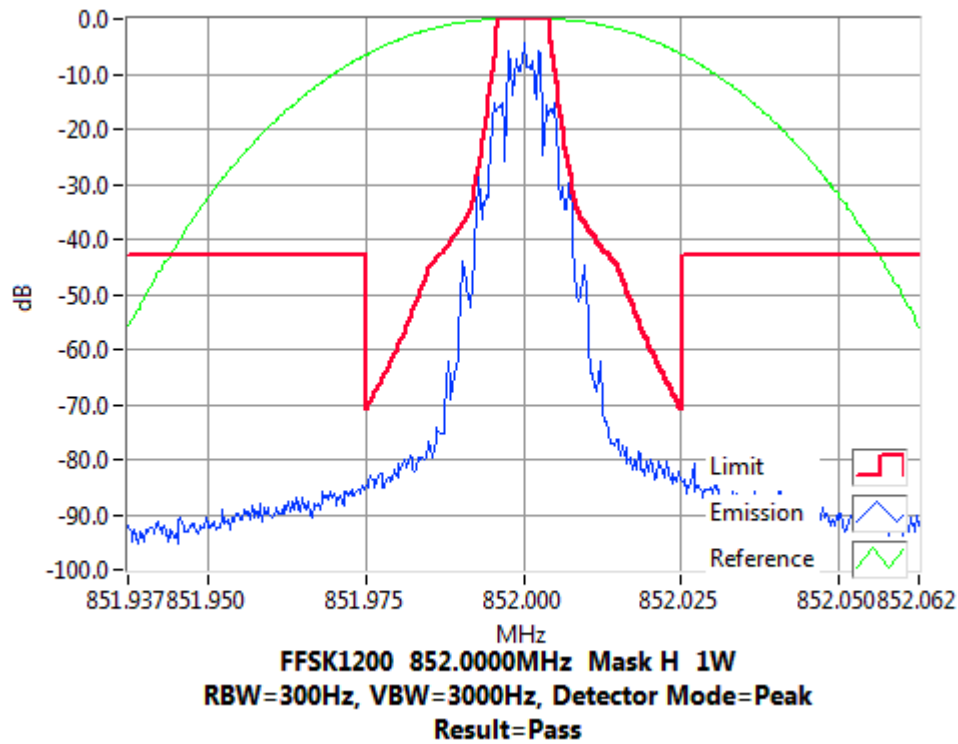
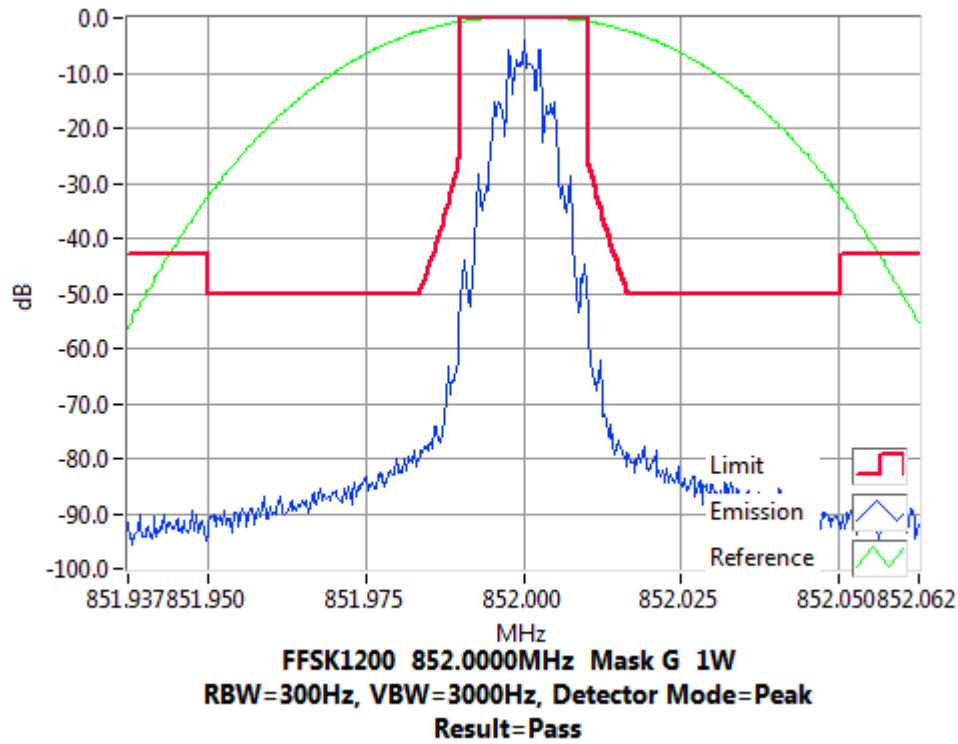
FFSK 1200 bps

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

Tx FREQUENCY: 852.0 MHz 3 W 25 kHz Channel Spacing



Tx FREQUENCY: 852.0 MHz 1 W 25 kHz Channel Spacing

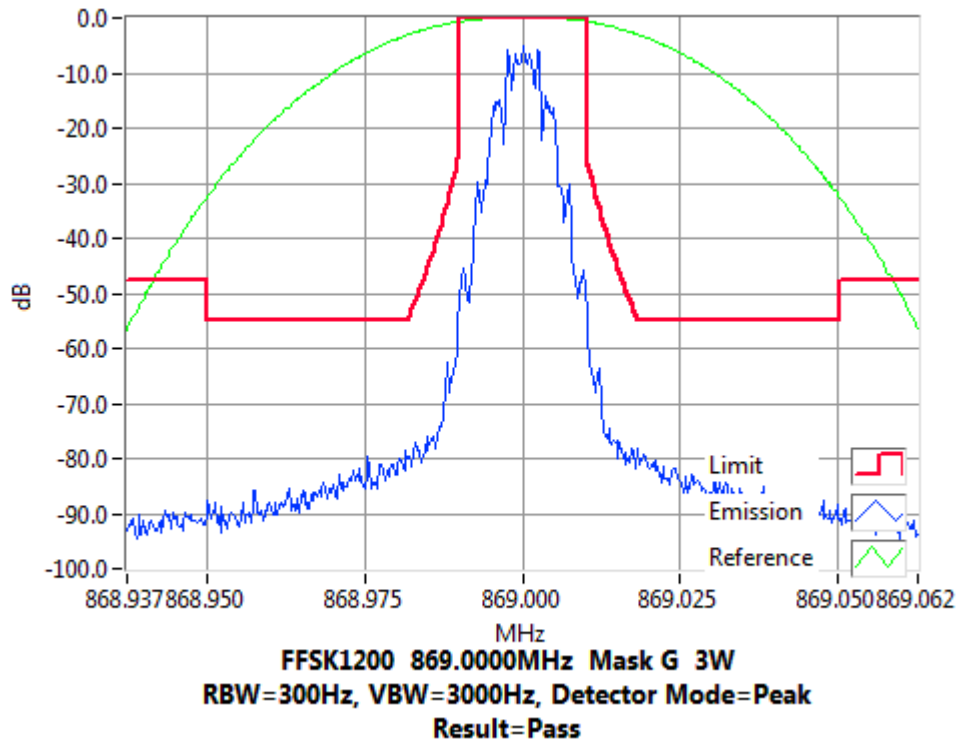


Occupied Bandwidth and Spectrum Masks

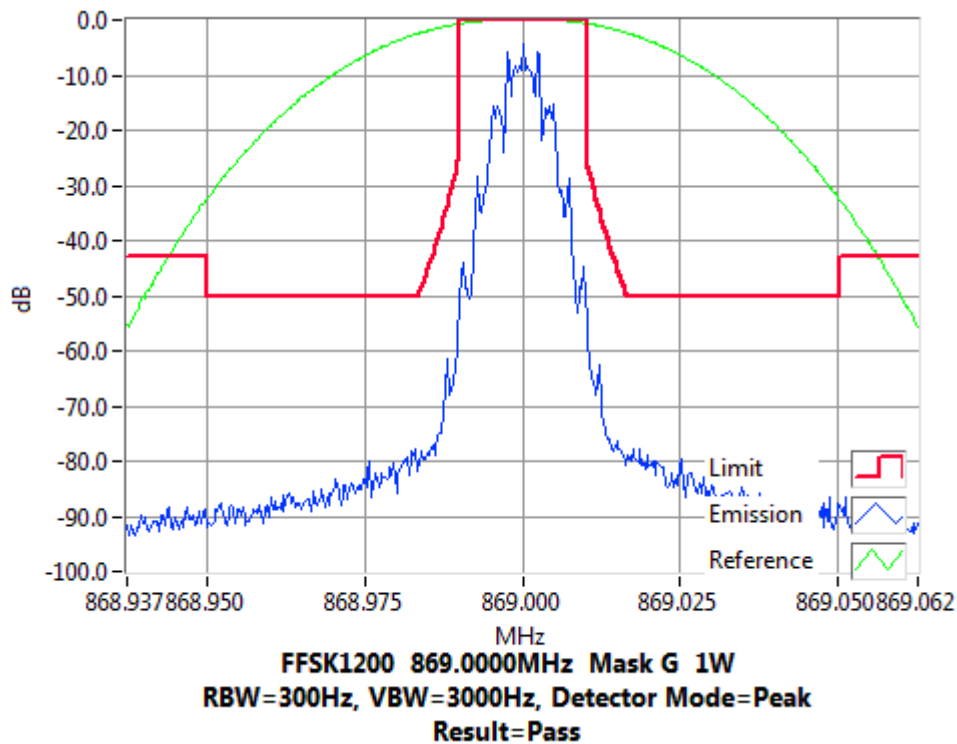
FFSK 1200 bps

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

Tx FREQUENCY: 869.0 MHz 3 W 25 kHz Channel Spacing



Tx FREQUENCY: 869.0 MHz 1 W 25 kHz Channel Spacing

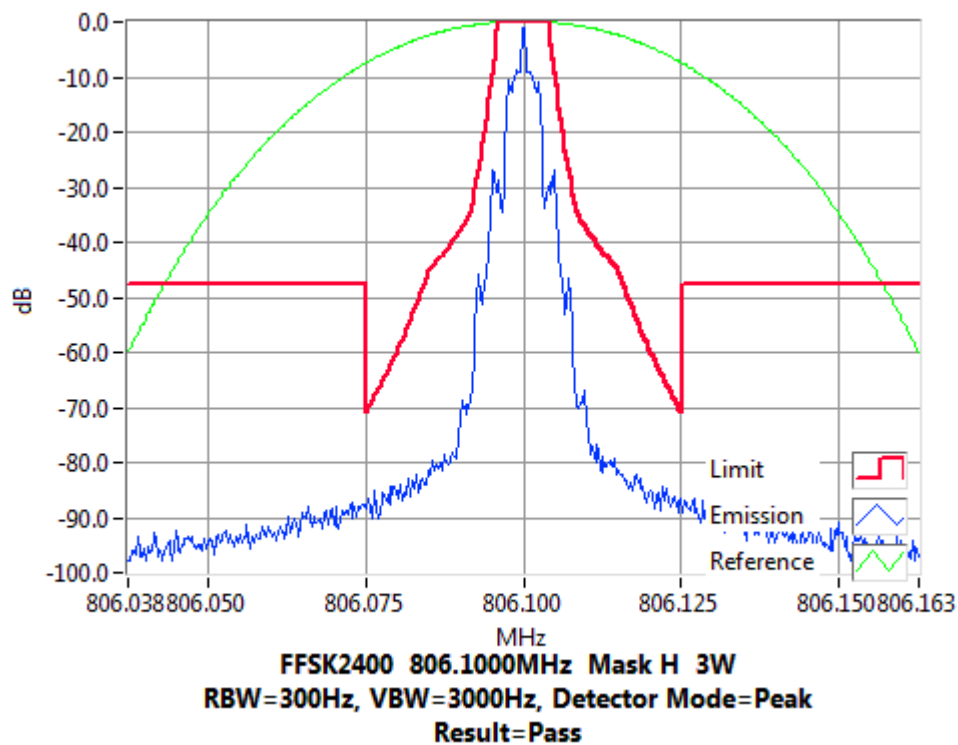
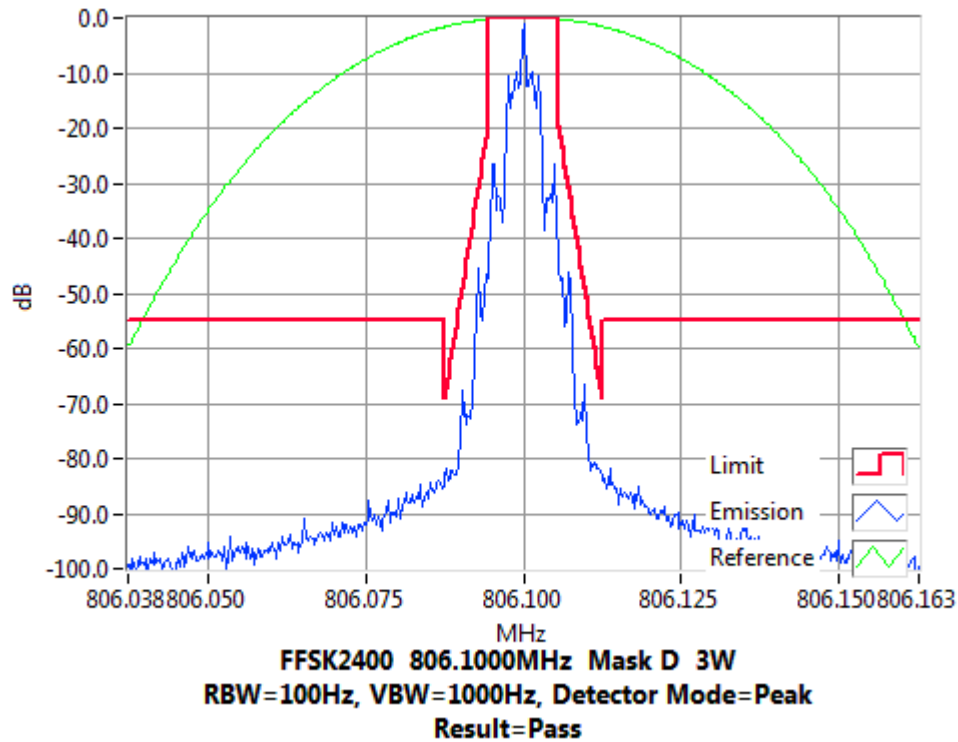


Occupied Bandwidth and Spectrum Masks

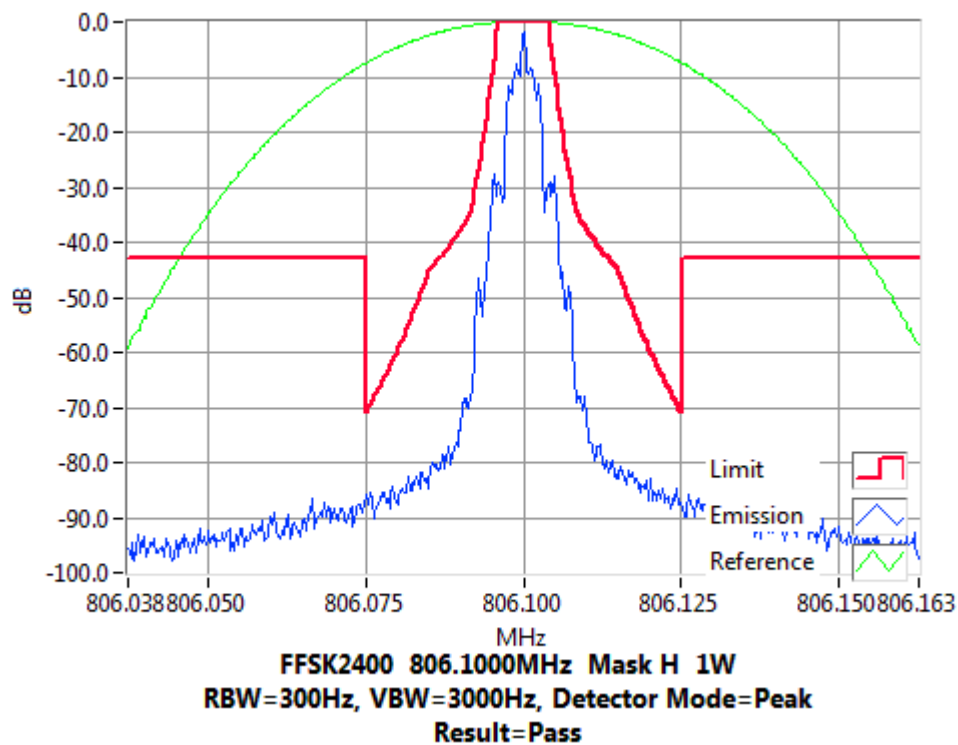
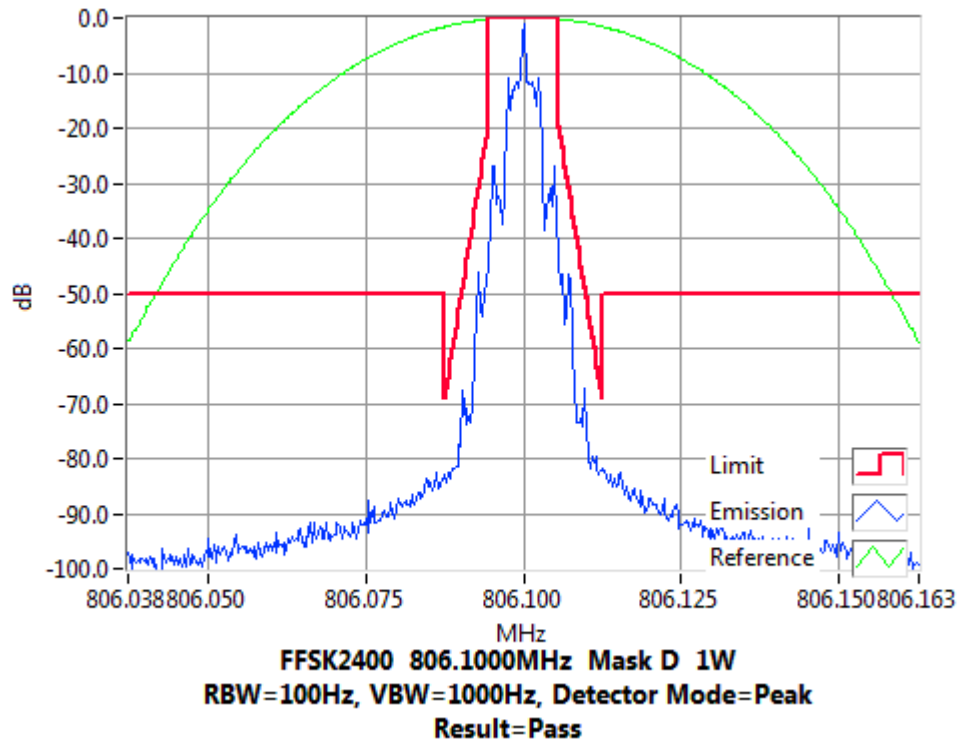
FFSK 2400 bps

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

Tx FREQUENCY: 806.1 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 806.1 MHz 1 W 12.5 kHz Channel Spacing

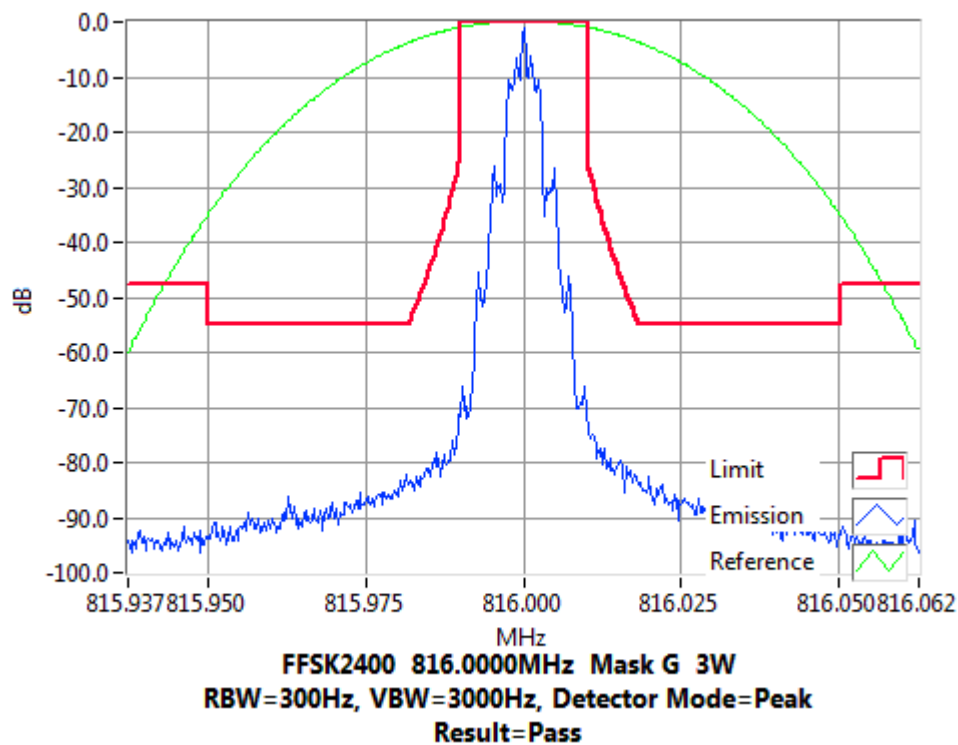
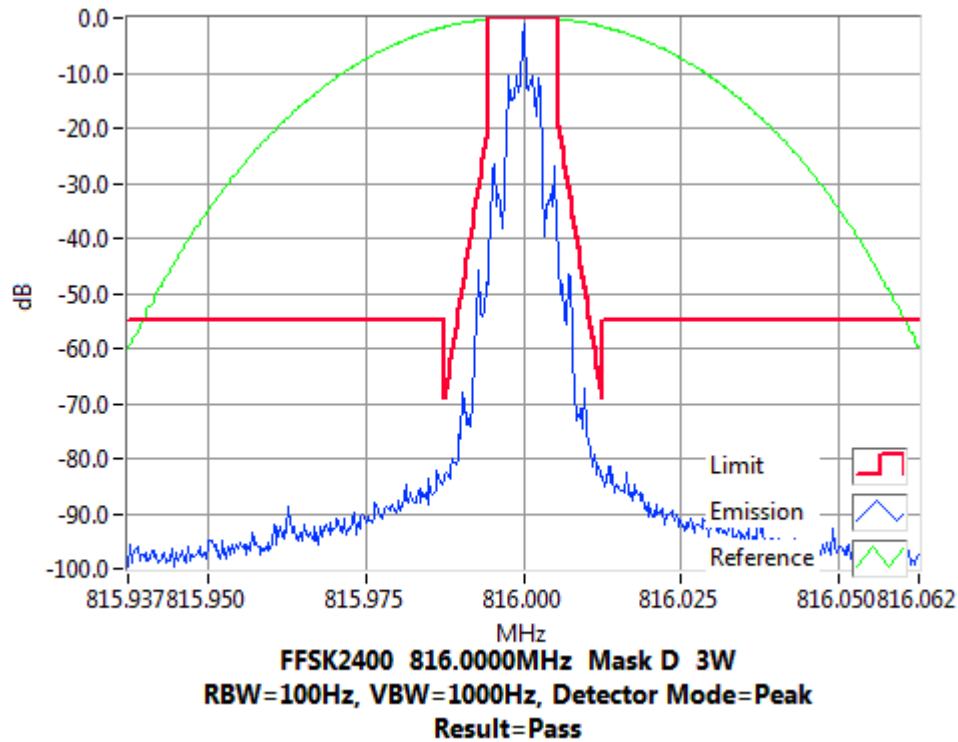


Occupied Bandwidth and Spectrum Masks

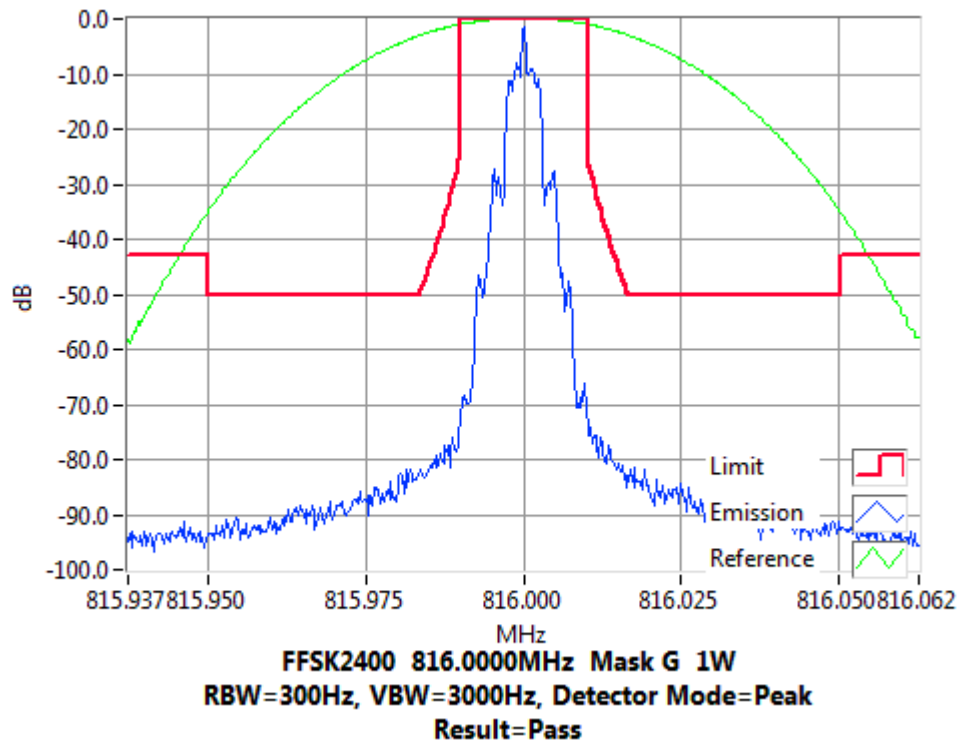
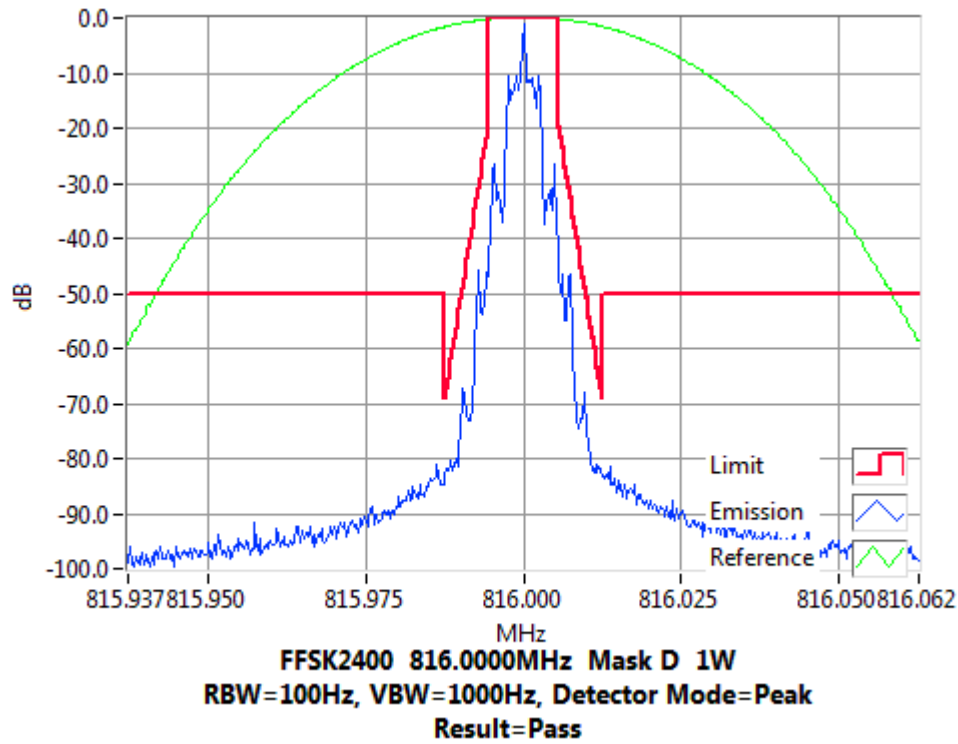
FFSK 2400 bps

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

Tx FREQUENCY: 816.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 816.0 MHz 1 W 12.5 kHz Channel Spacing

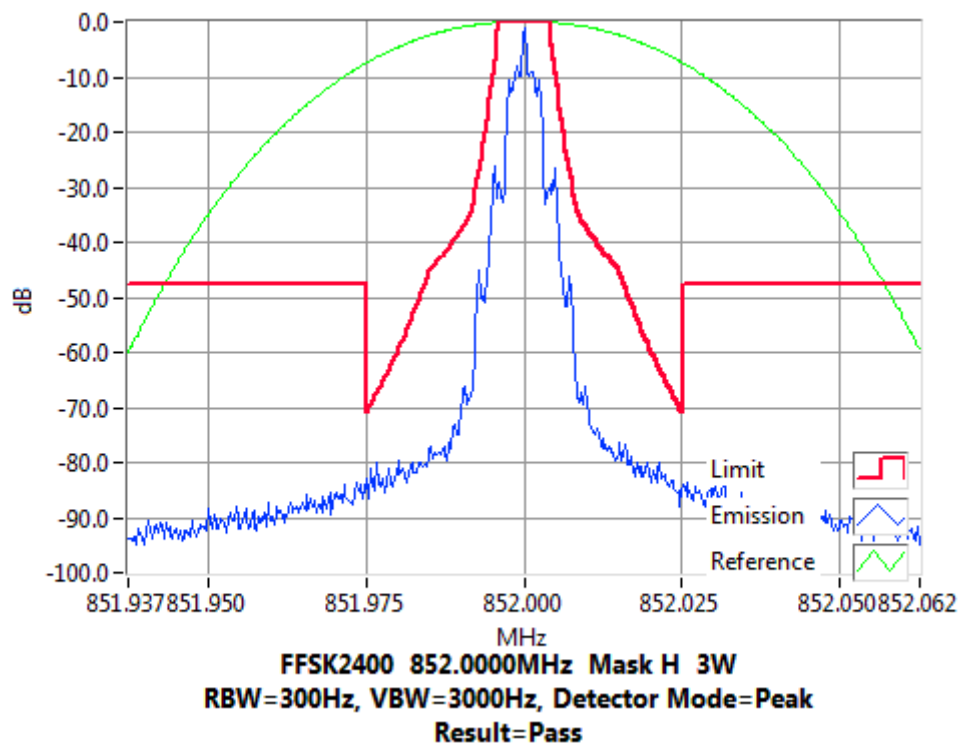
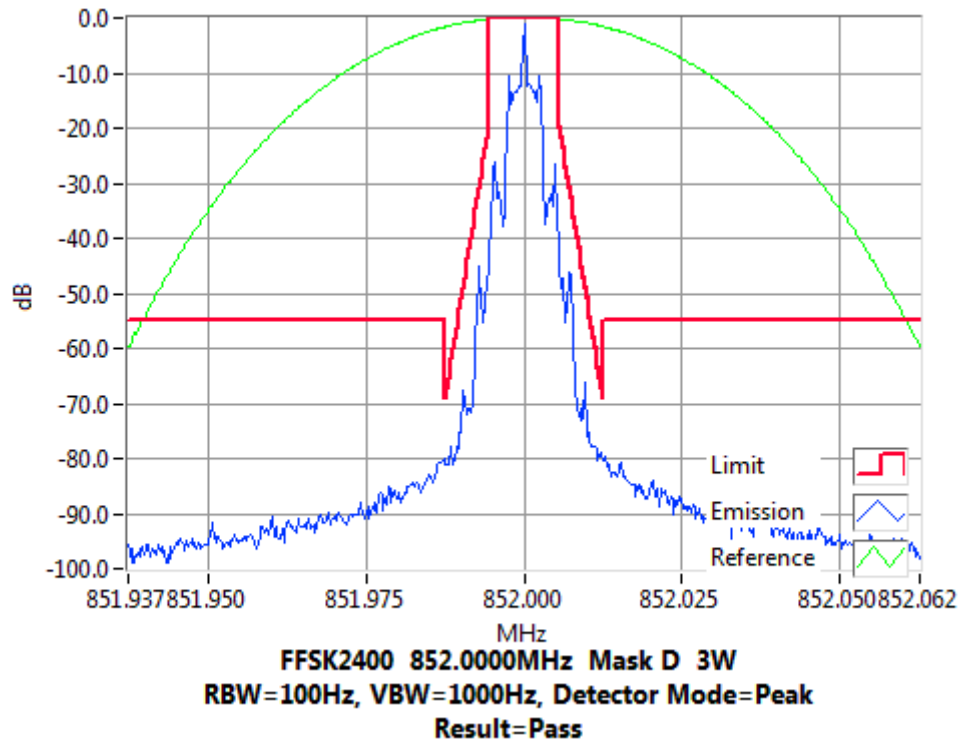


Occupied Bandwidth and Spectrum Masks

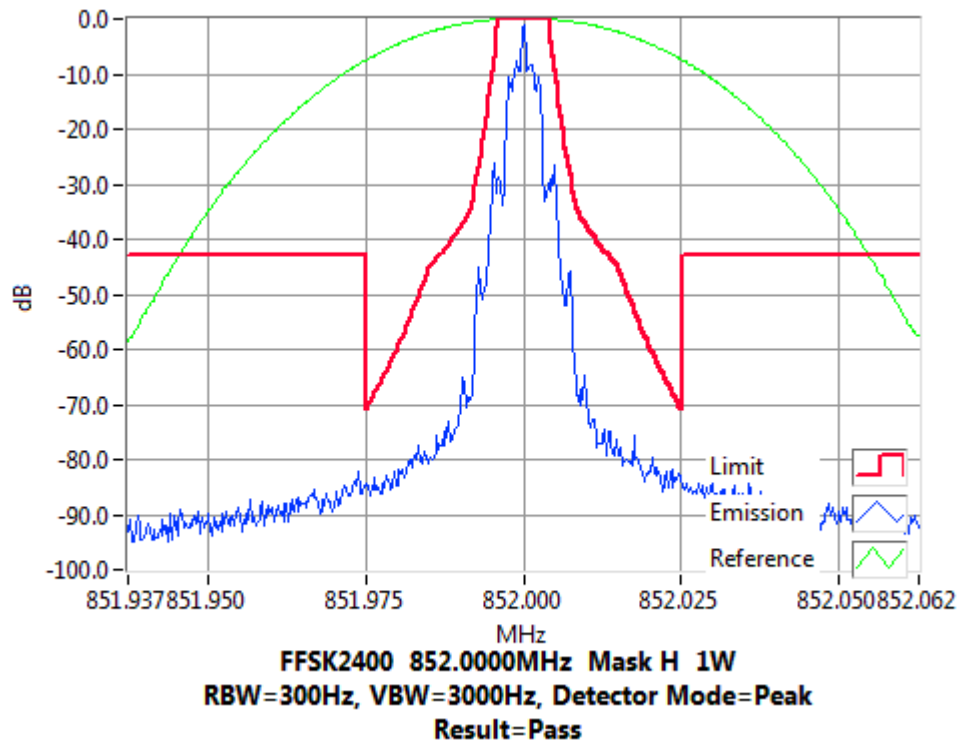
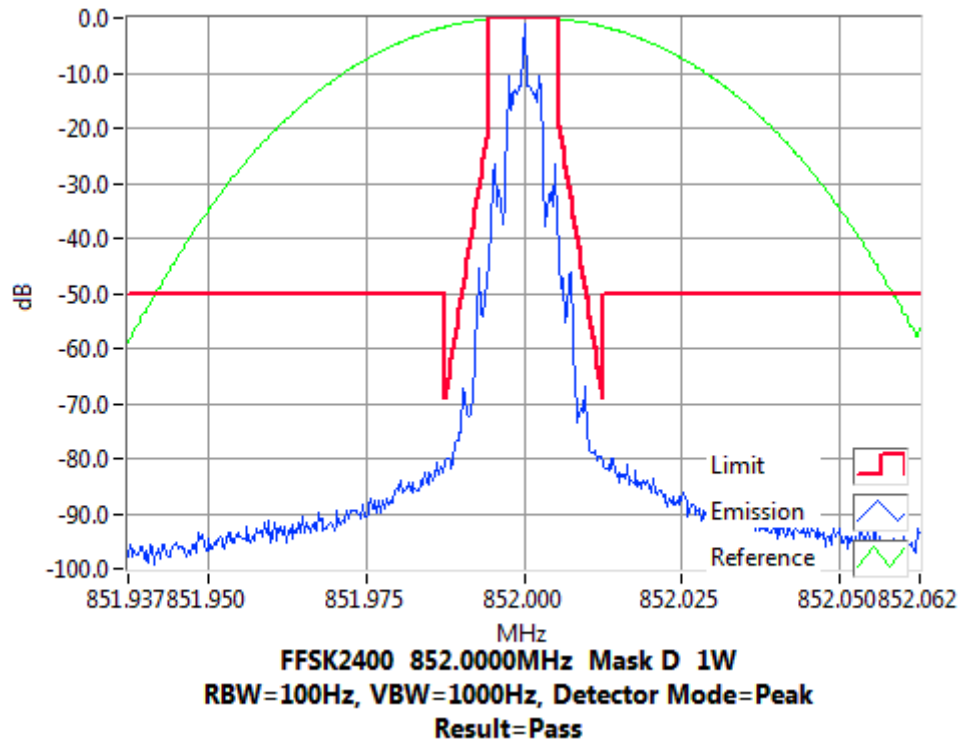
FFSK 2400 bps

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

Tx FREQUENCY: 852.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 852.0 MHz 1 W 12.5 kHz Channel Spacing

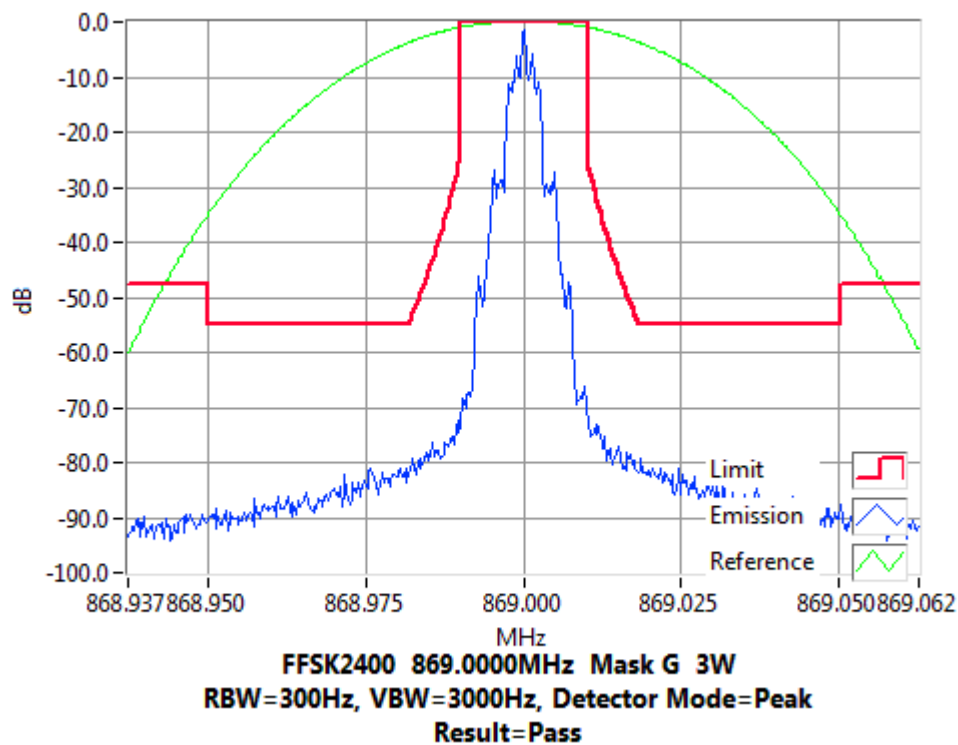
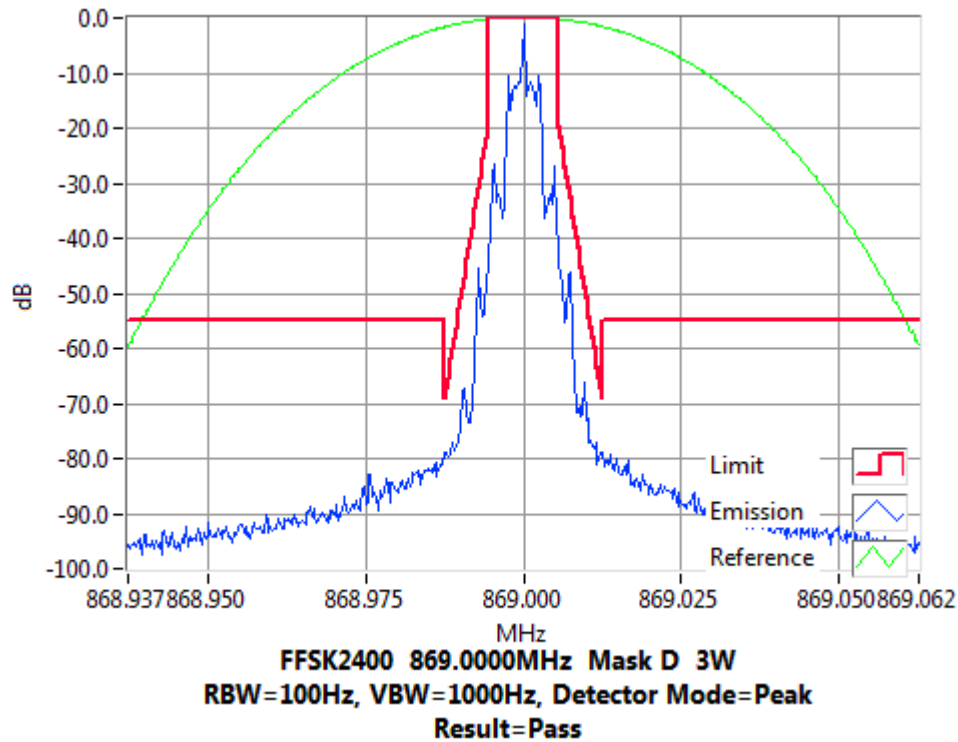


Occupied Bandwidth and Spectrum Masks

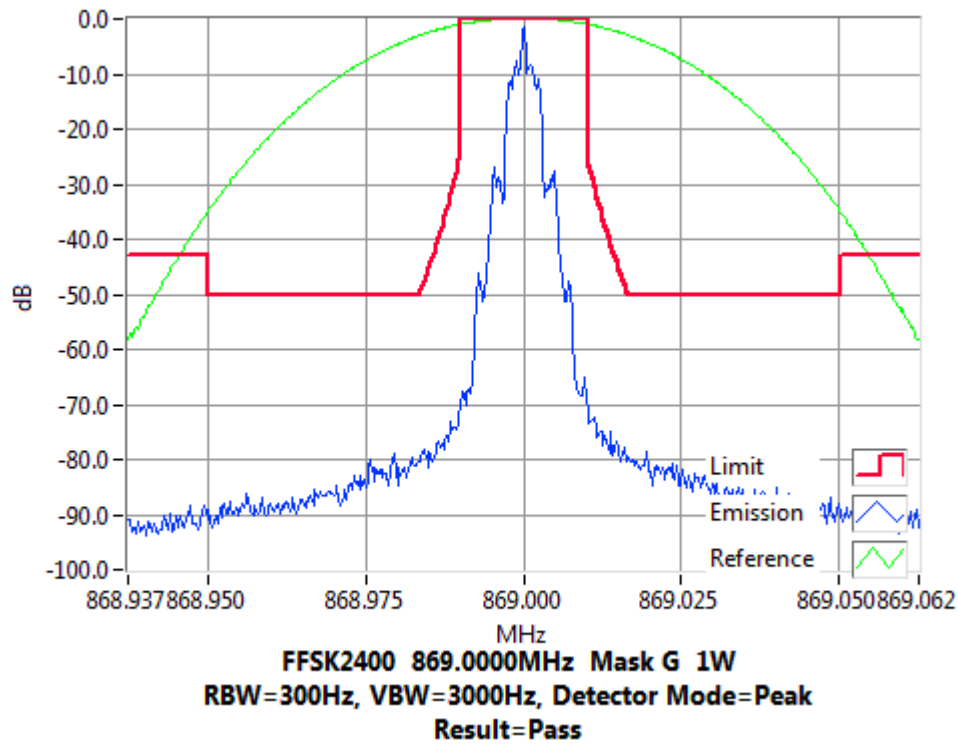
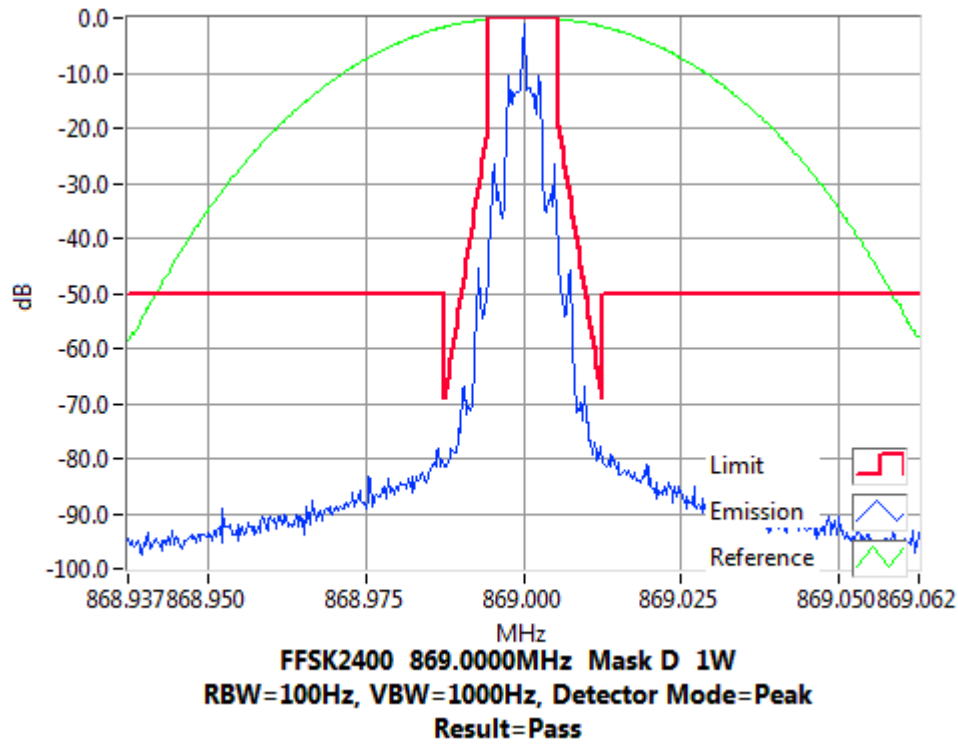
FFSK 2400 bps

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

Tx FREQUENCY: 869.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 869.0 MHz 1 W 12.5 kHz Channel Spacing

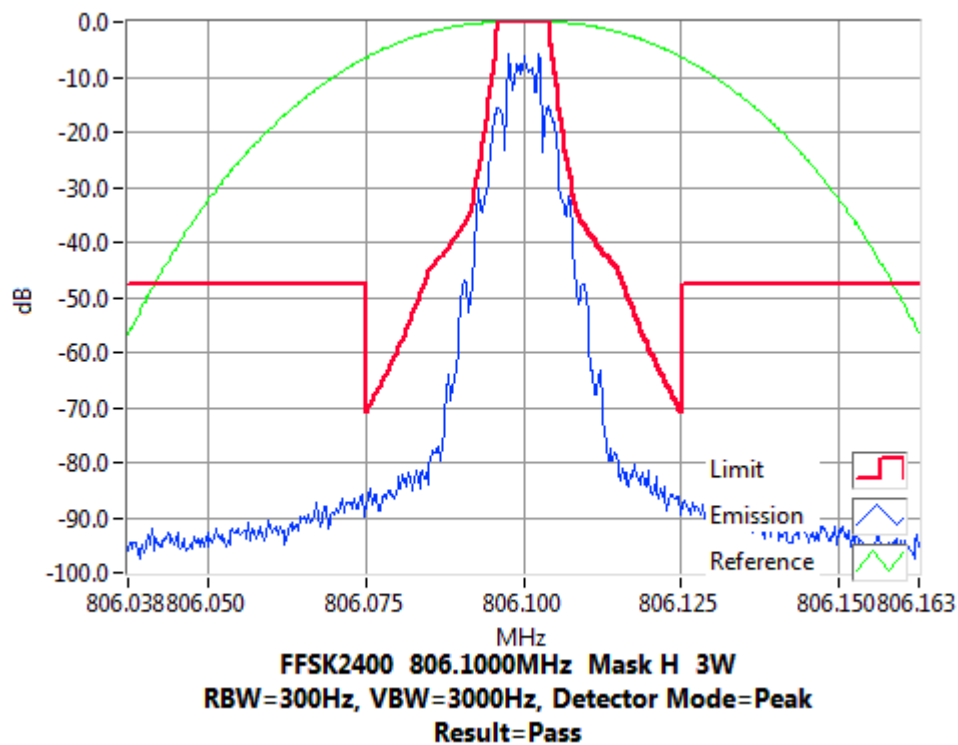
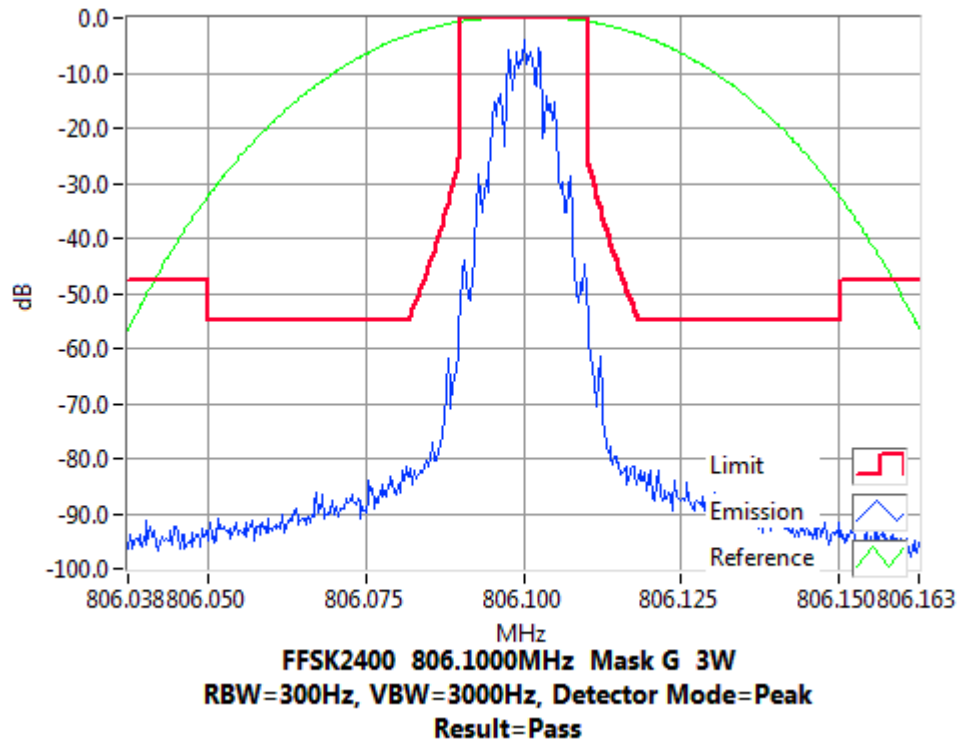


Occupied Bandwidth and Spectrum Masks

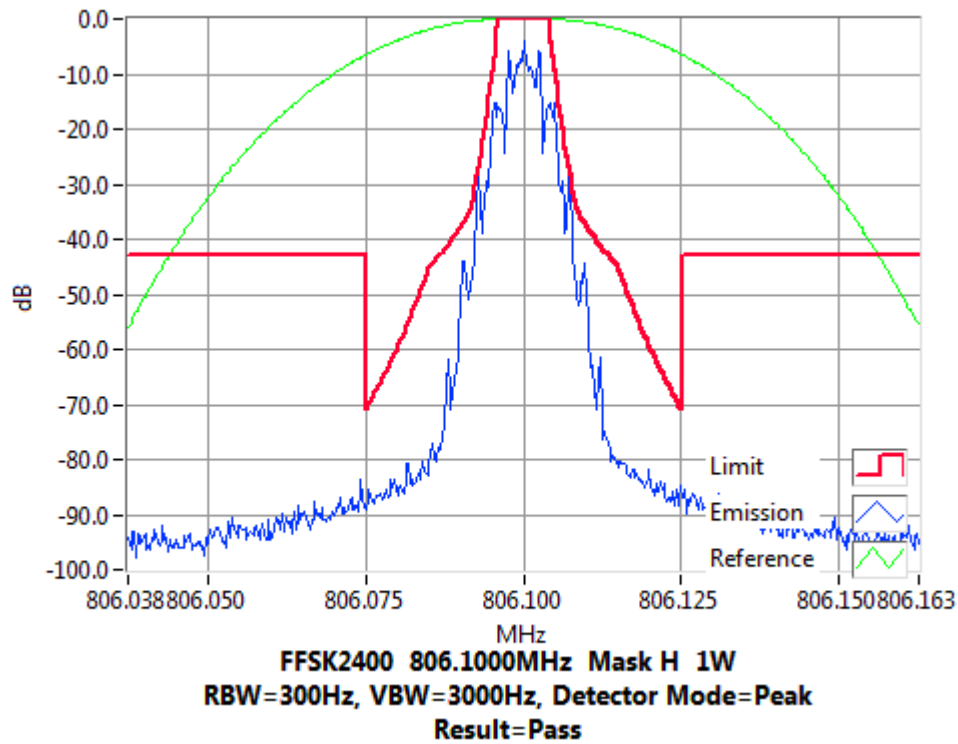
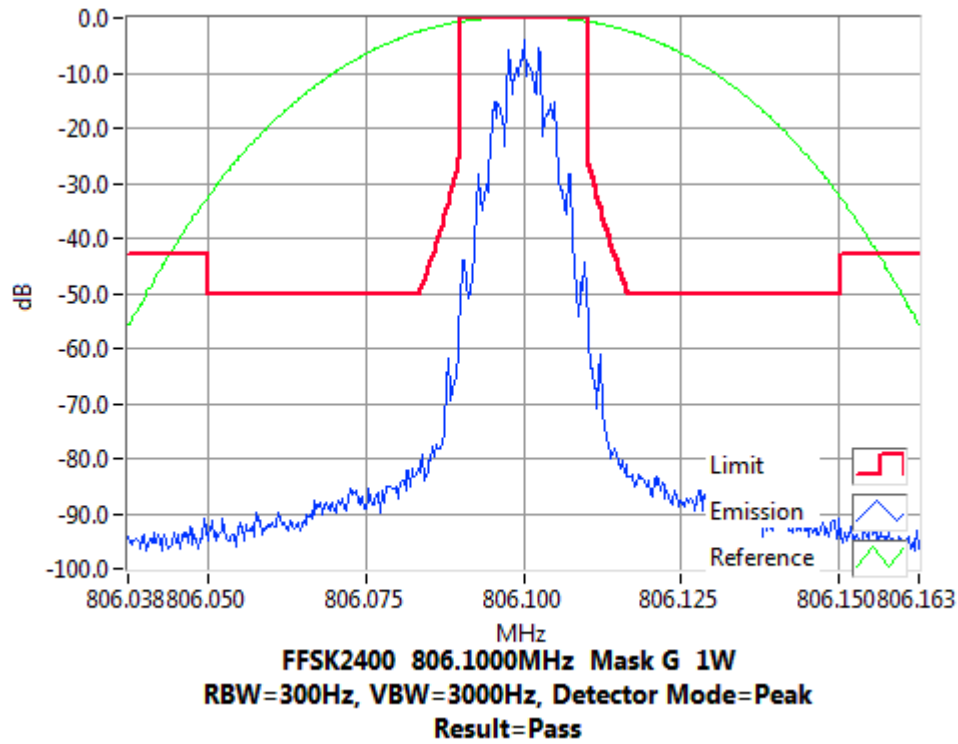
FFSK 2400 bps

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

Tx FREQUENCY: 806.1 MHz 3 W 25 kHz Channel Spacing



Tx FREQUENCY: 806.1 MHz 1 W 25 kHz Channel Spacing

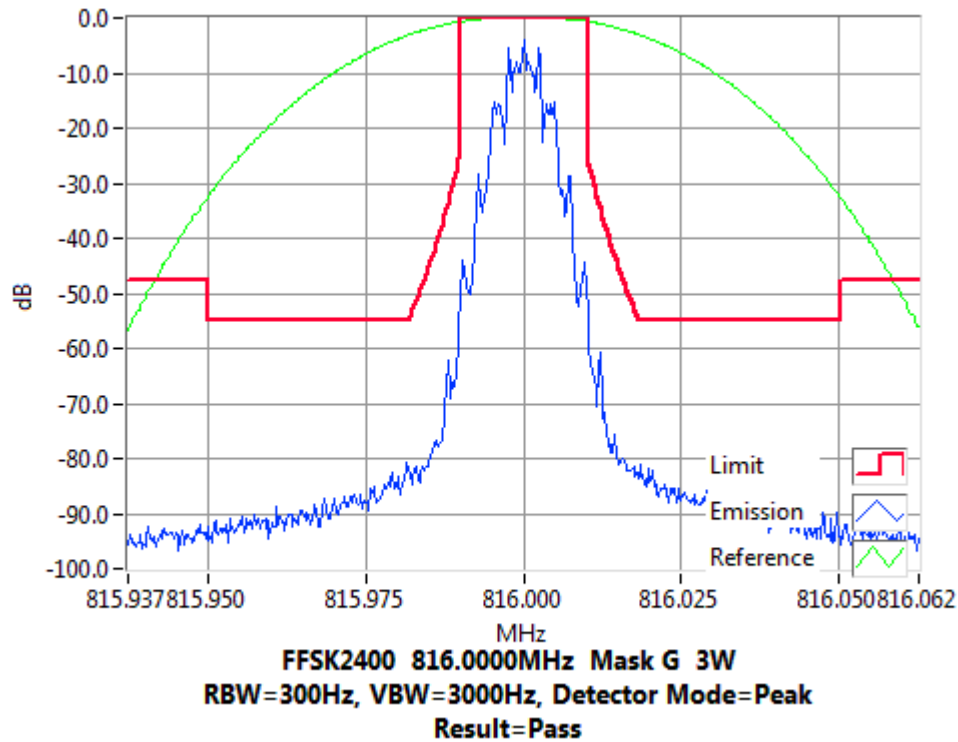


Occupied Bandwidth and Spectrum Masks

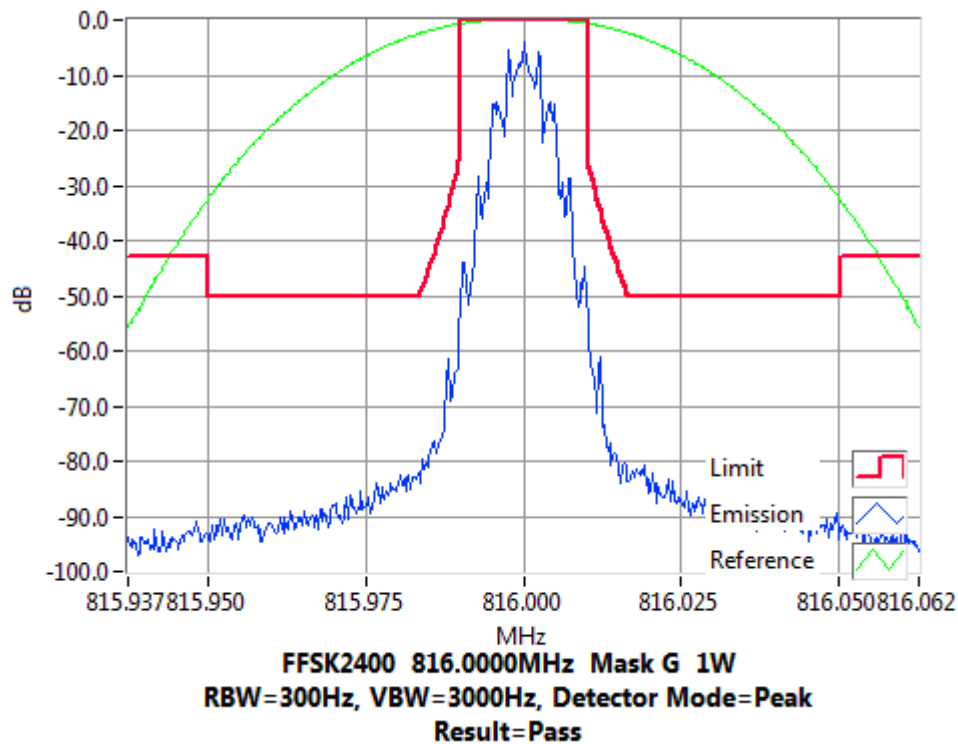
FFSK 2400 bps

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

Tx FREQUENCY: 816.0 MHz 3 W 25 kHz Channel Spacing



Tx FREQUENCY: 816.0 MHz 1 W 25 kHz Channel Spacing

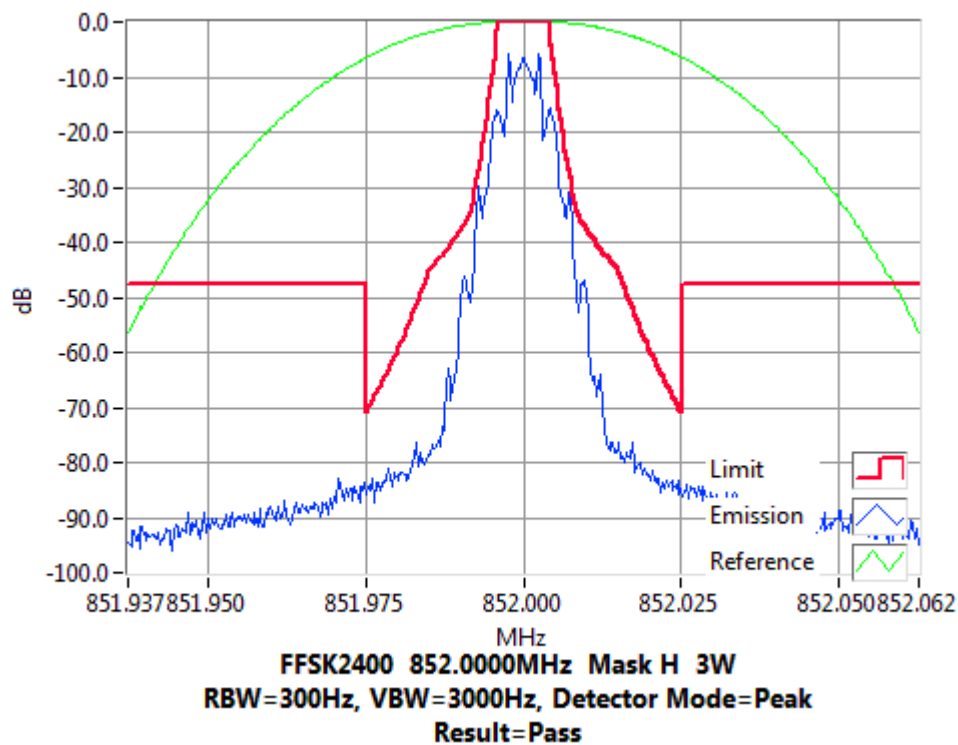
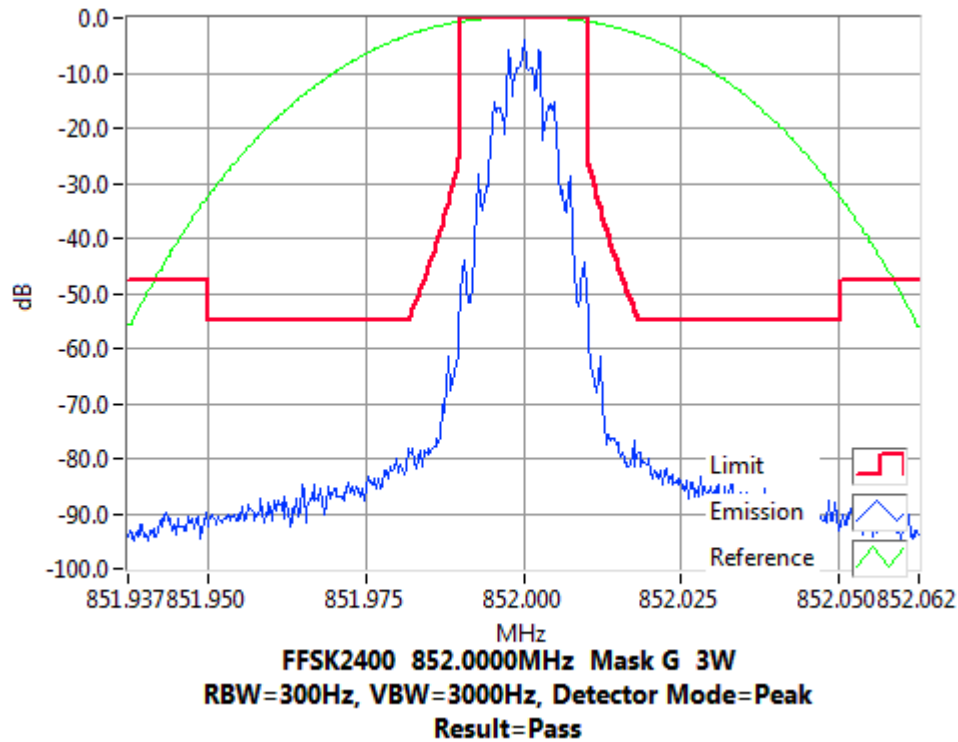


Occupied Bandwidth and Spectrum Masks

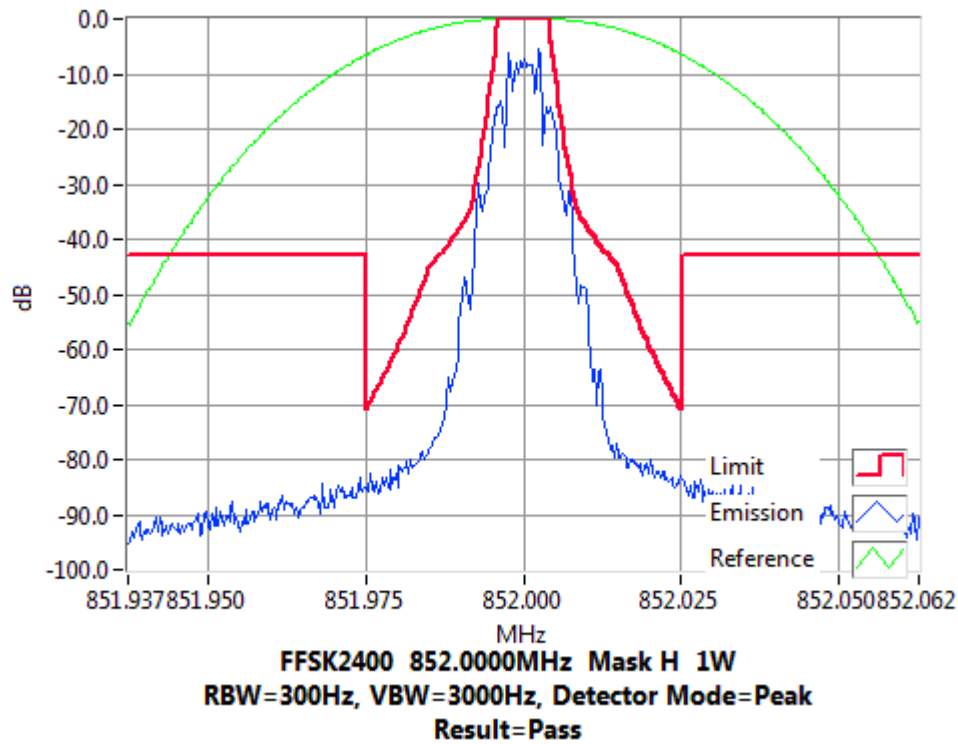
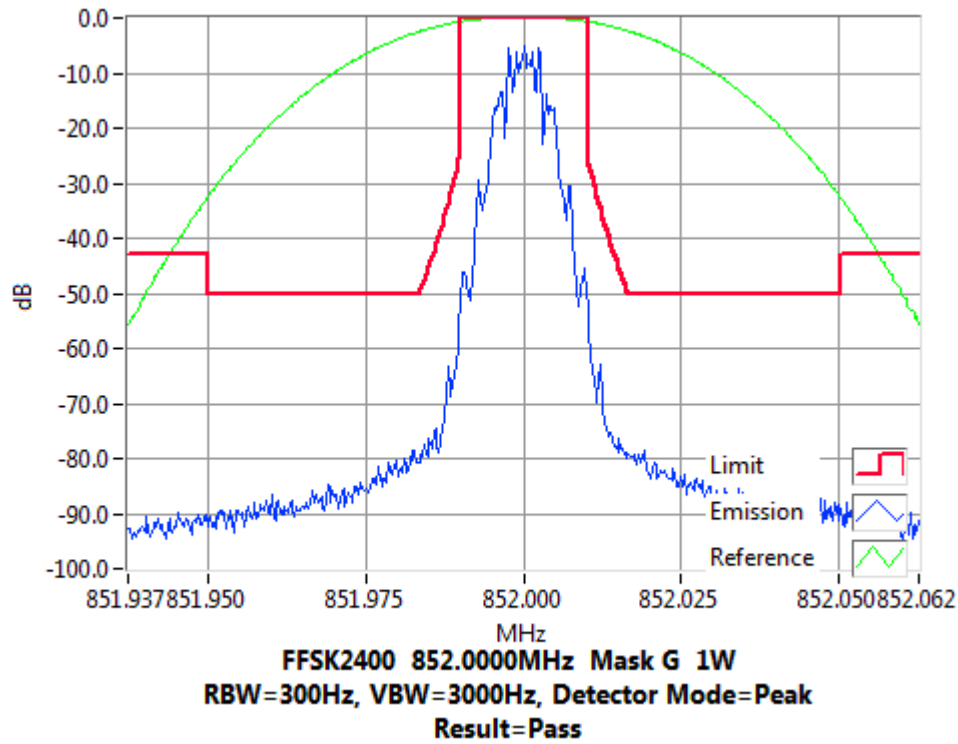
FFSK 2400 bps

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

Tx FREQUENCY: 852.0 MHz 3 W 25 kHz Channel Spacing



Tx FREQUENCY: 852.0 MHz 1 W 25 kHz Channel Spacing

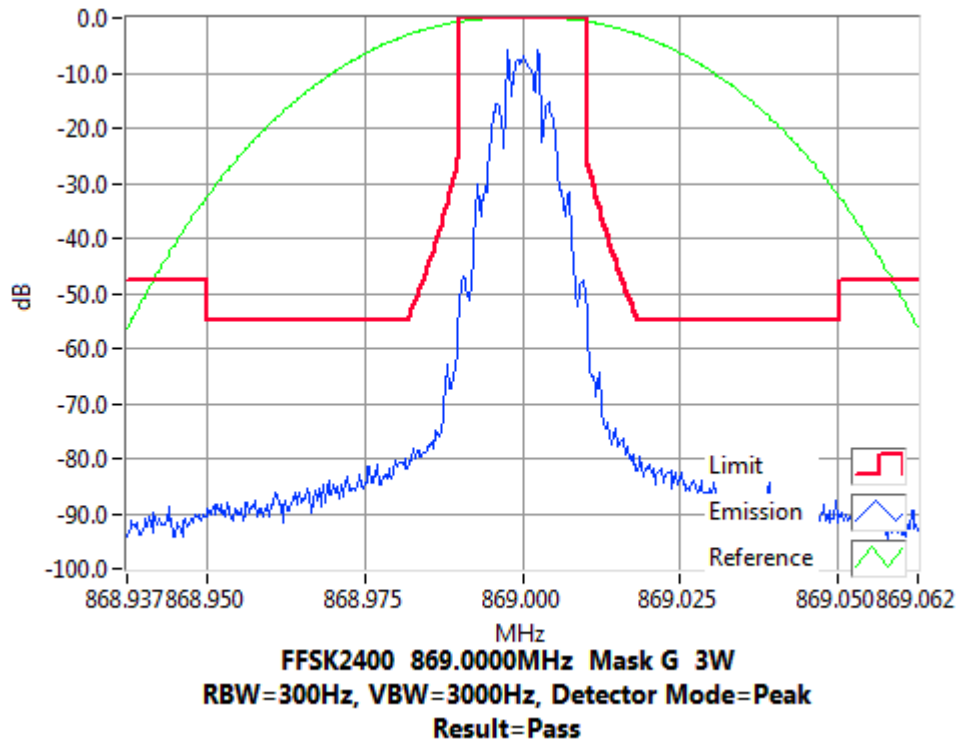


Occupied Bandwidth and Spectrum Masks

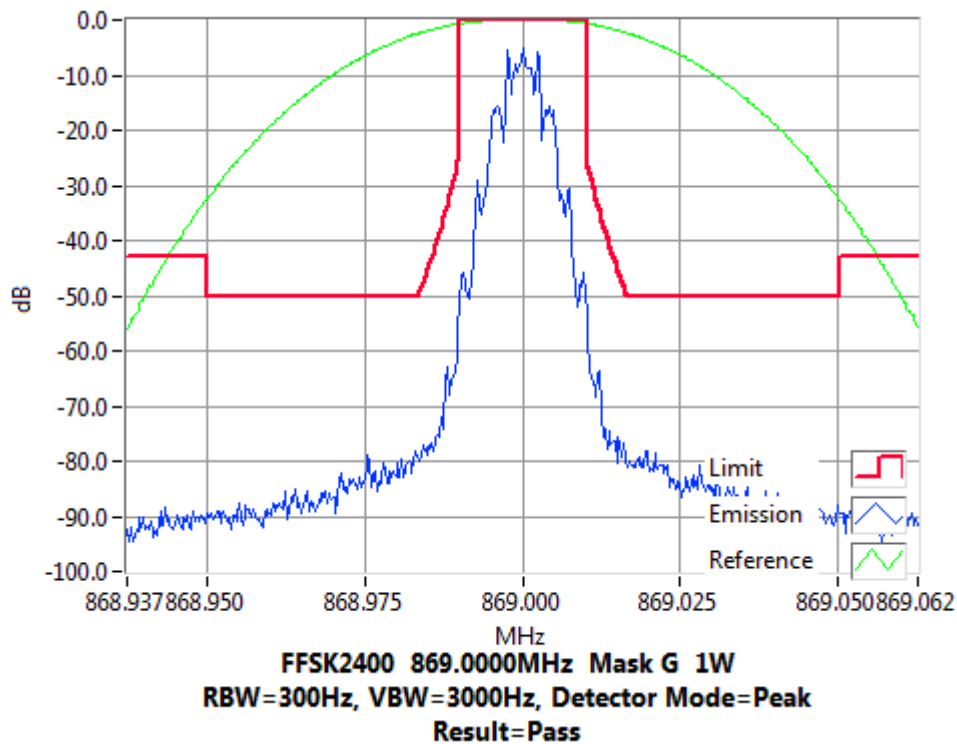
FFSK 2400 bps

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

Tx FREQUENCY: 869.0 MHz 3 W 25 kHz Channel Spacing



Tx FREQUENCY: 869.0 MHz 1 W 25 kHz Channel Spacing

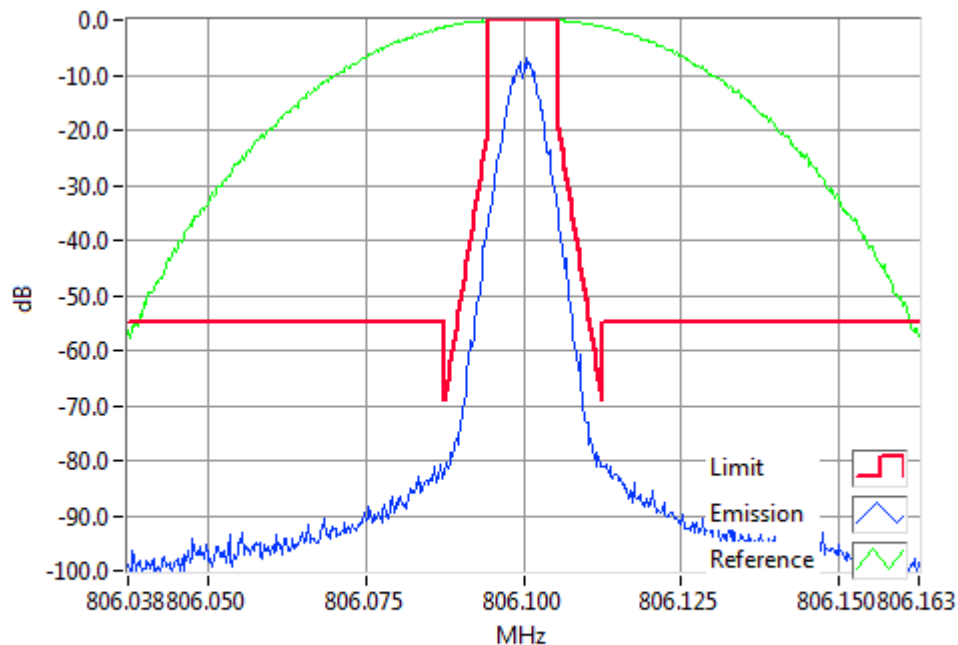


Occupied Bandwidth and Spectrum Masks

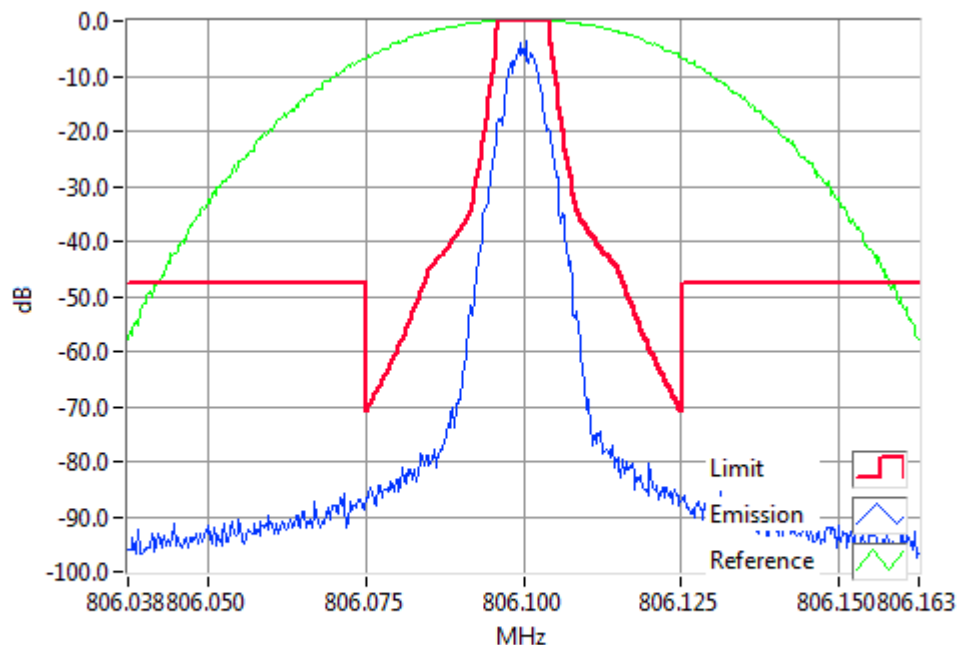
DMR

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

Tx FREQUENCY: 806.1 MHz 3 W 12.5 kHz Channel Spacing

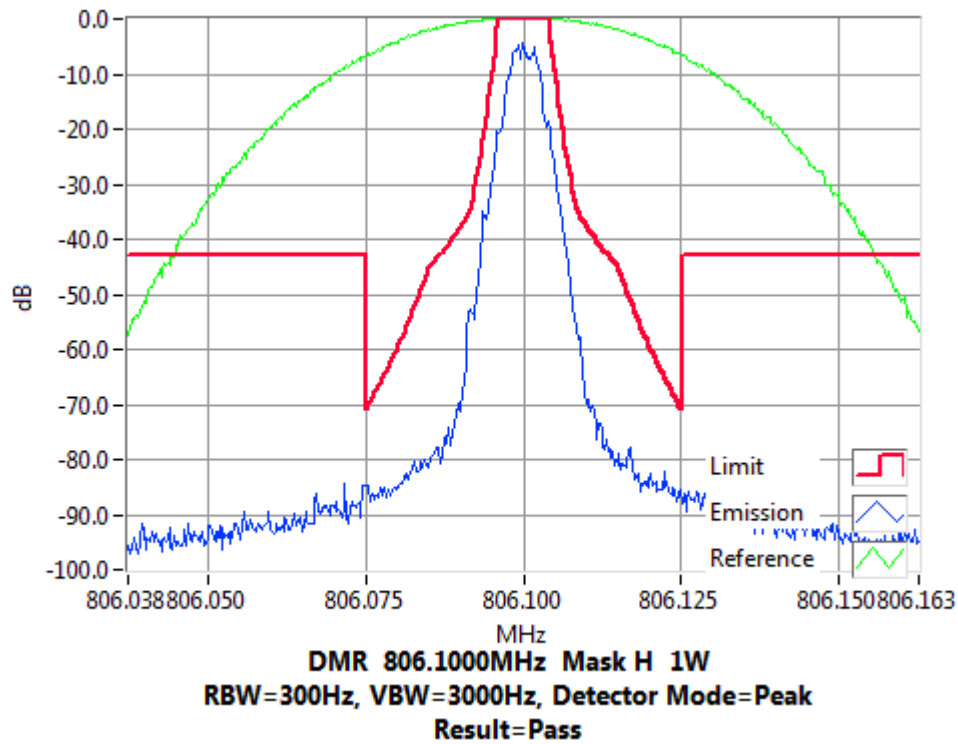
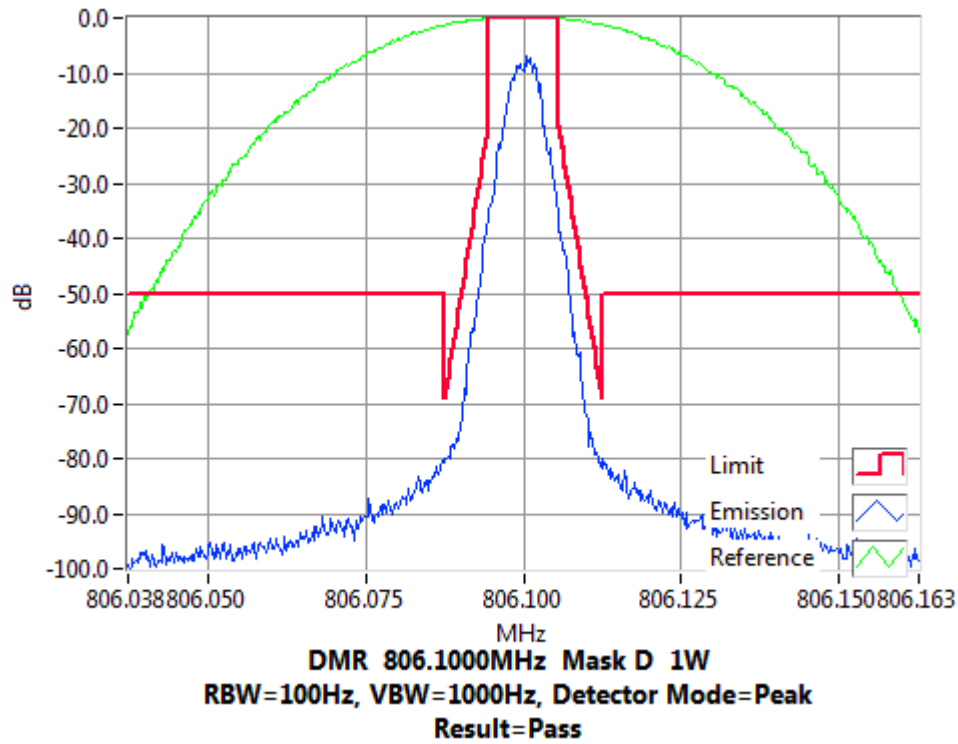


DMR 806.1000MHz Mask D 3W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



DMR 806.1000MHz Mask H 3W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 806.1 MHz 1 W 12.5 kHz Channel Spacing

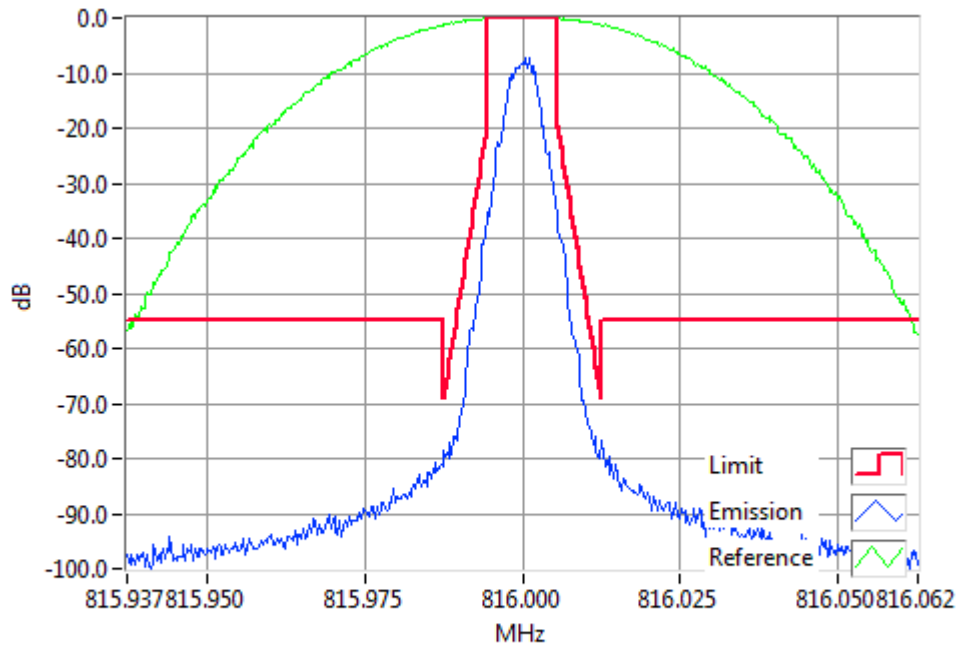


Occupied Bandwidth and Spectrum Masks

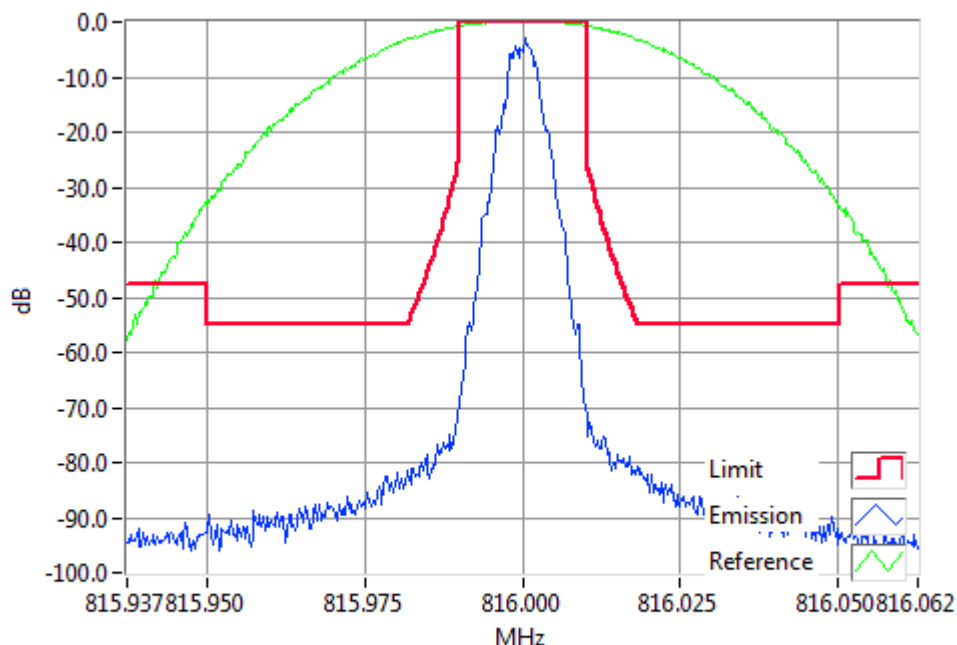
DMR

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

Tx FREQUENCY: 816.0 MHz 3 W 12.5 kHz Channel Spacing

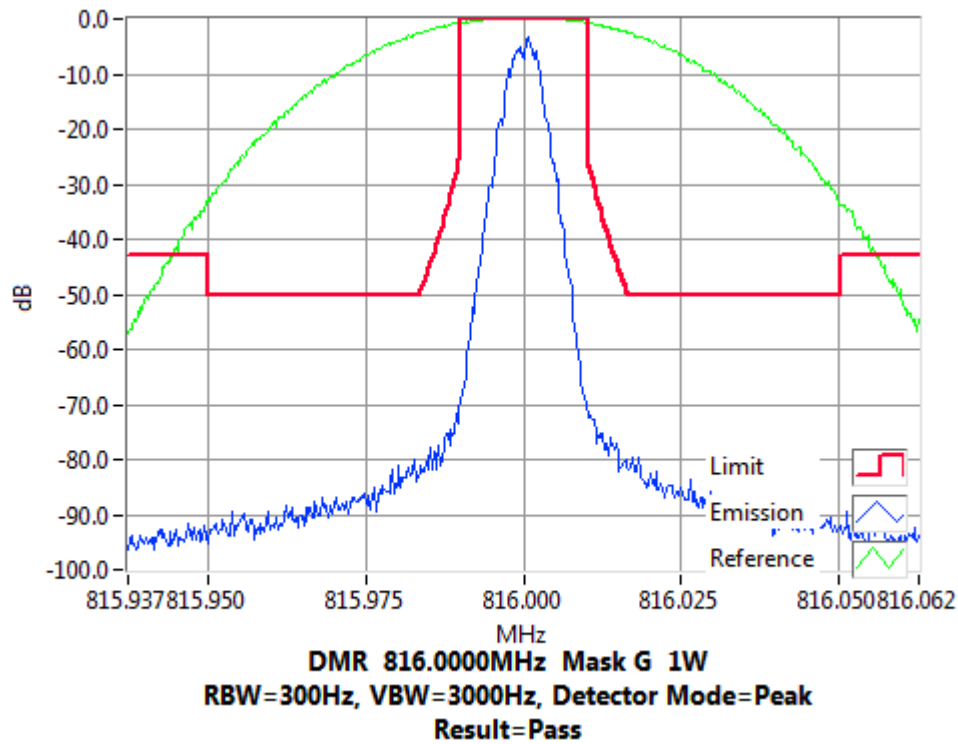
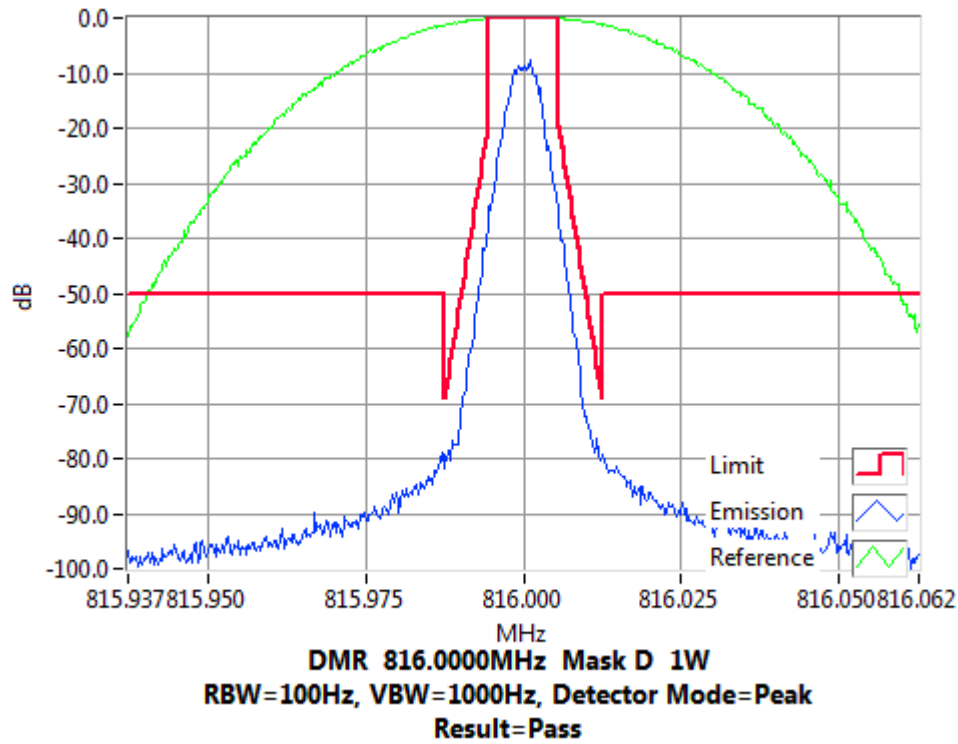


DMR 816.0000MHz Mask D 3W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



DMR 816.0000MHz Mask G 3W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 816.0 MHz 1 W 12.5 kHz Channel Spacing

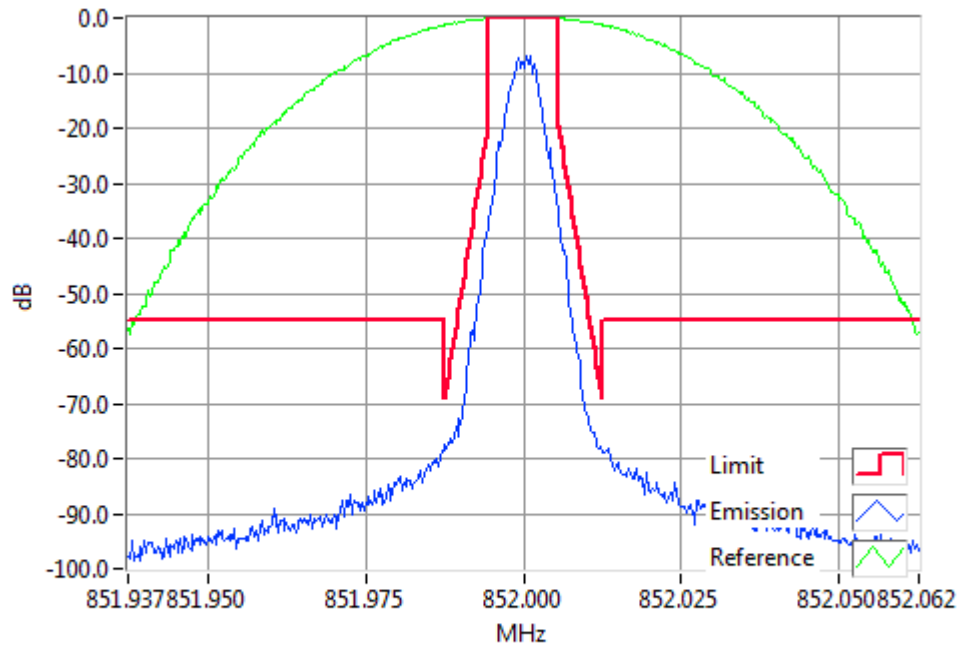


Occupied Bandwidth and Spectrum Masks

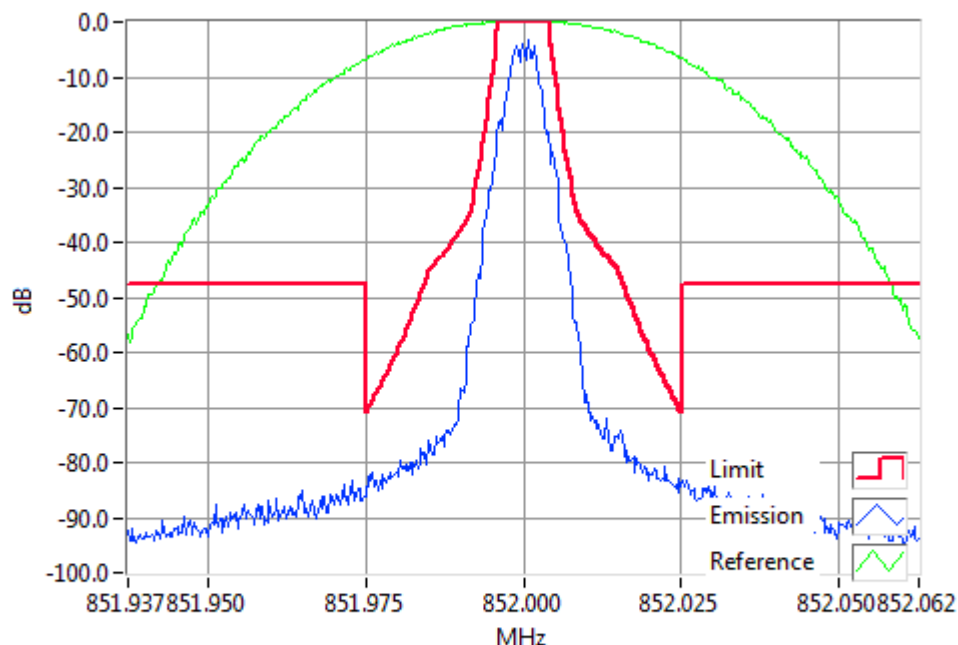
DMR

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

Tx FREQUENCY: 852.0 MHz 3 W 12.5 kHz Channel Spacing

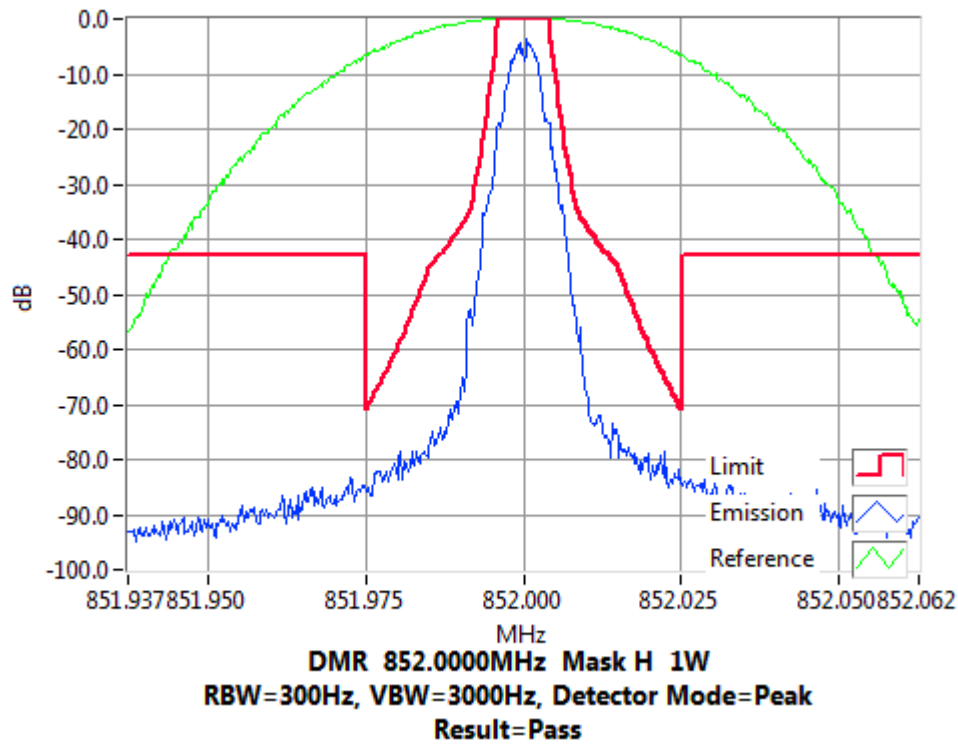
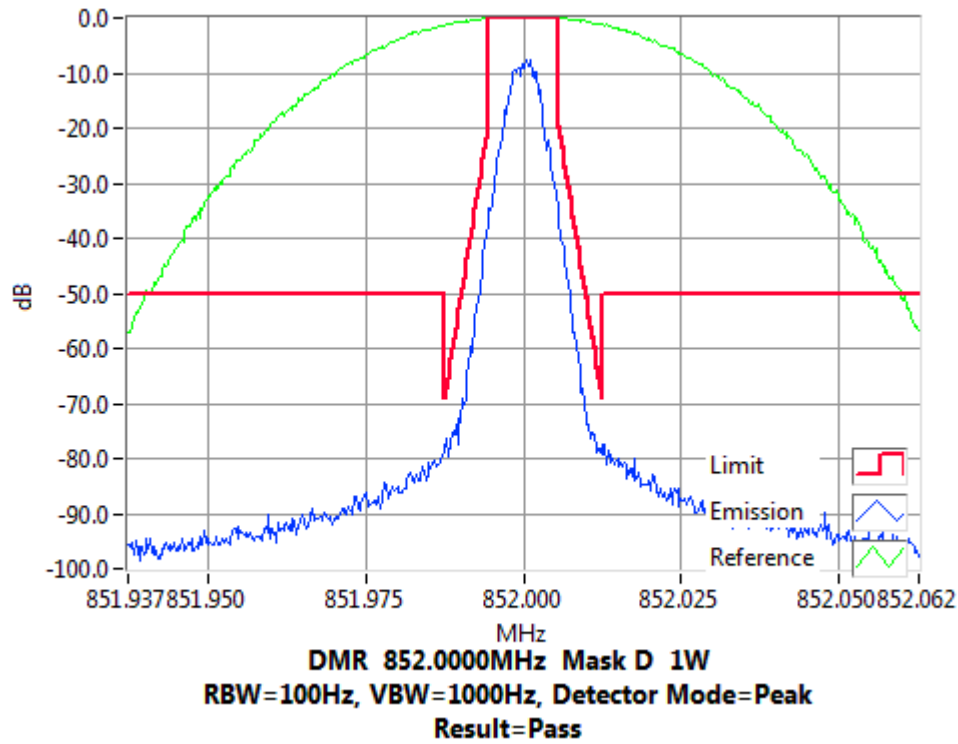


DMR 852.0000MHz Mask D 3W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



DMR 852.0000MHz Mask H 3W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 852.0 MHz 1 W 12.5 kHz Channel Spacing

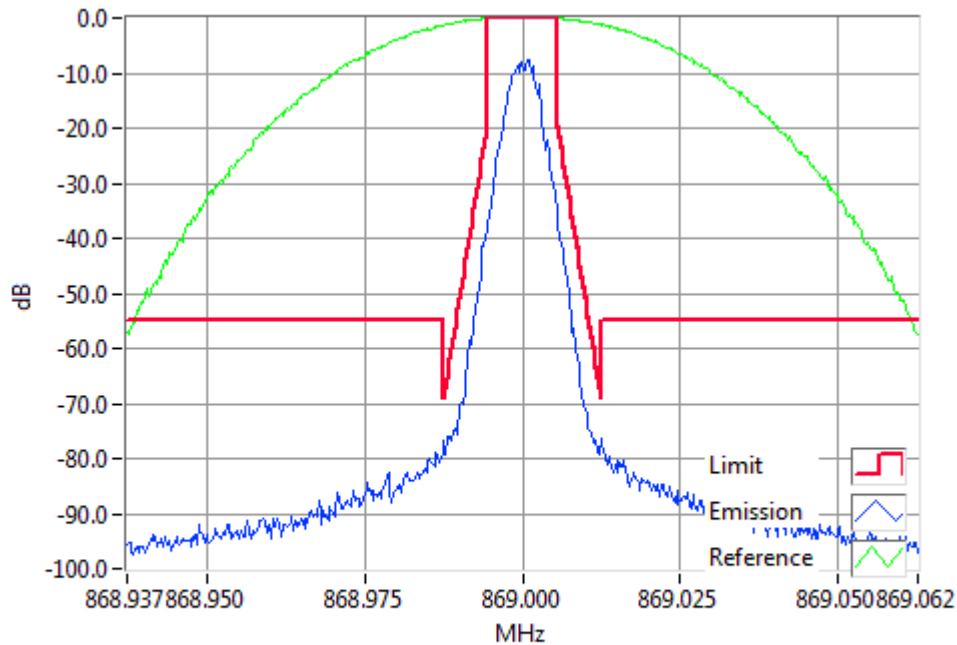


Occupied Bandwidth and Spectrum Masks

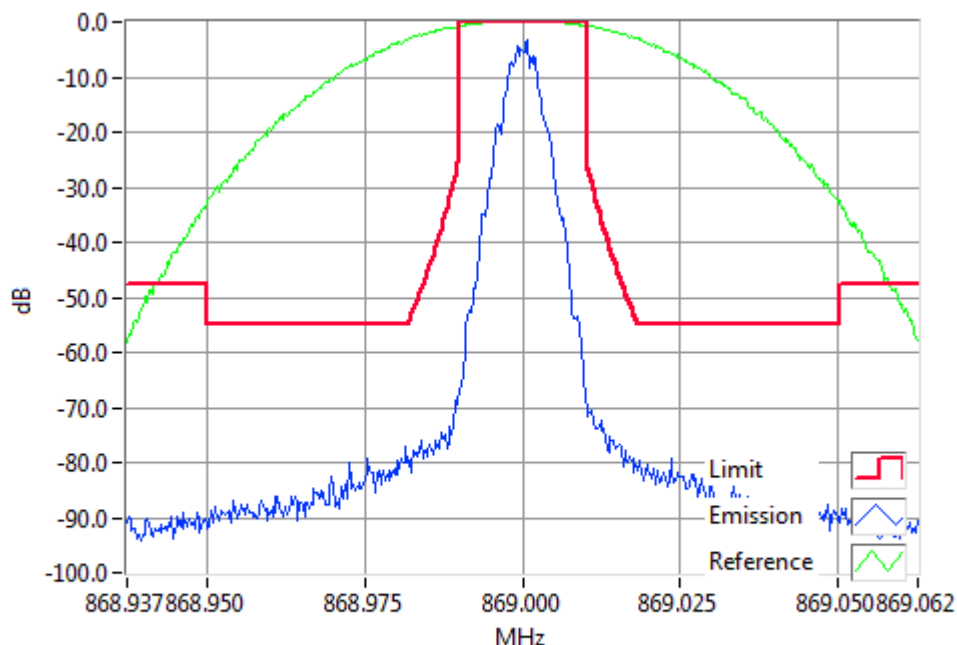
DMR

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

Tx FREQUENCY: 869.0 MHz 3 W 12.5 kHz Channel Spacing

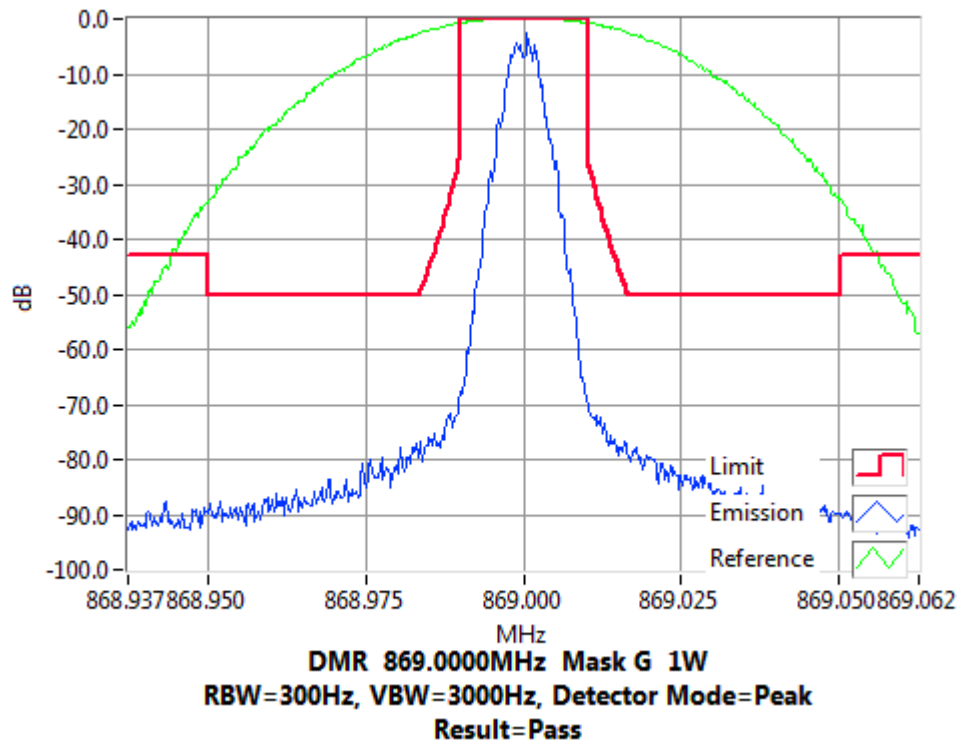
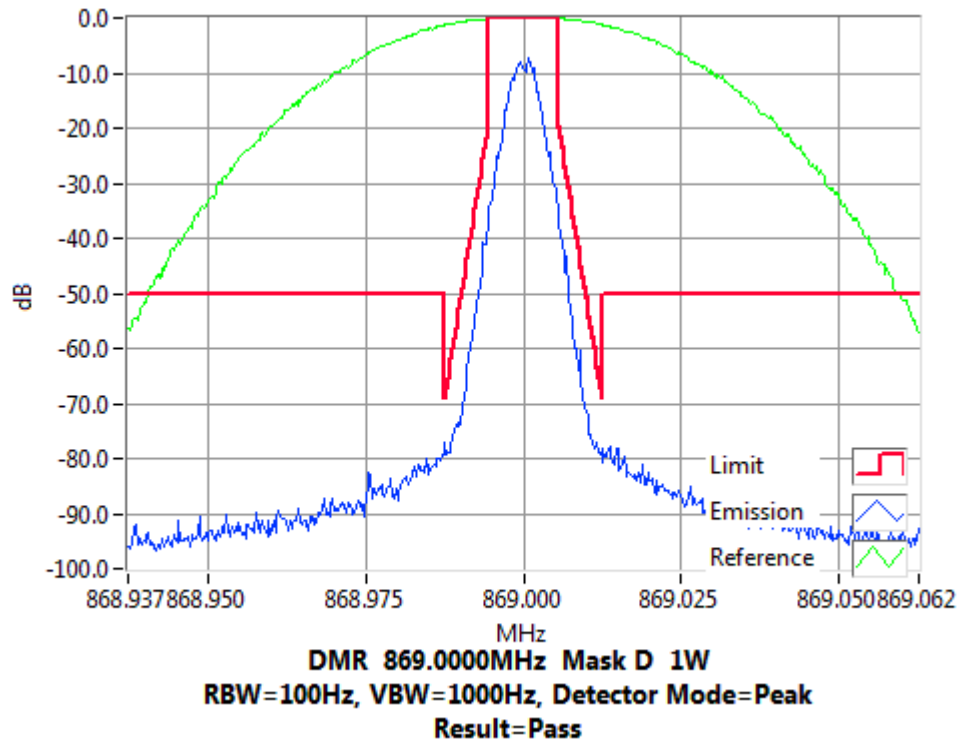


DMR 869.0000MHz Mask D 3W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



DMR 869.0000MHz Mask G 3W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 869.0 MHz 1 W 12.5 kHz Channel Spacing

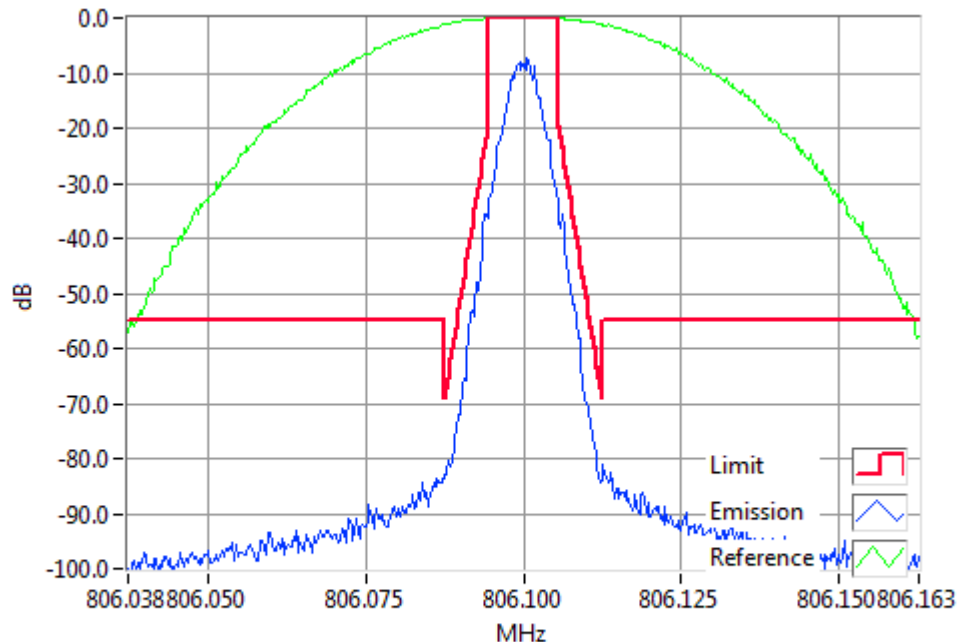


Occupied Bandwidth and Spectrum Masks

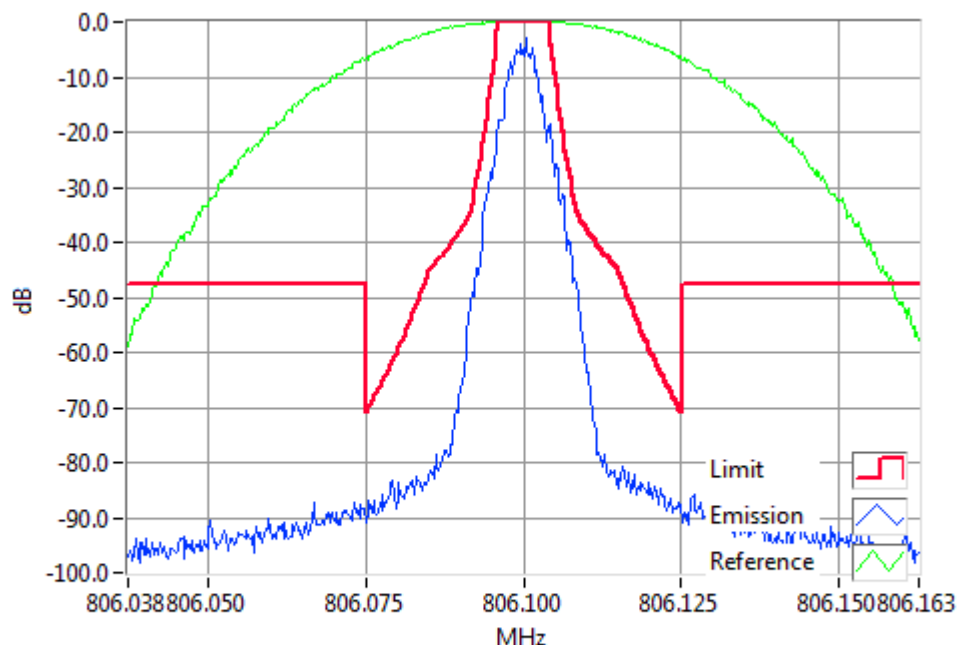
APCO P25 phase-1

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

Tx FREQUENCY: 806.1 MHz 3 W 12.5 kHz Channel Spacing

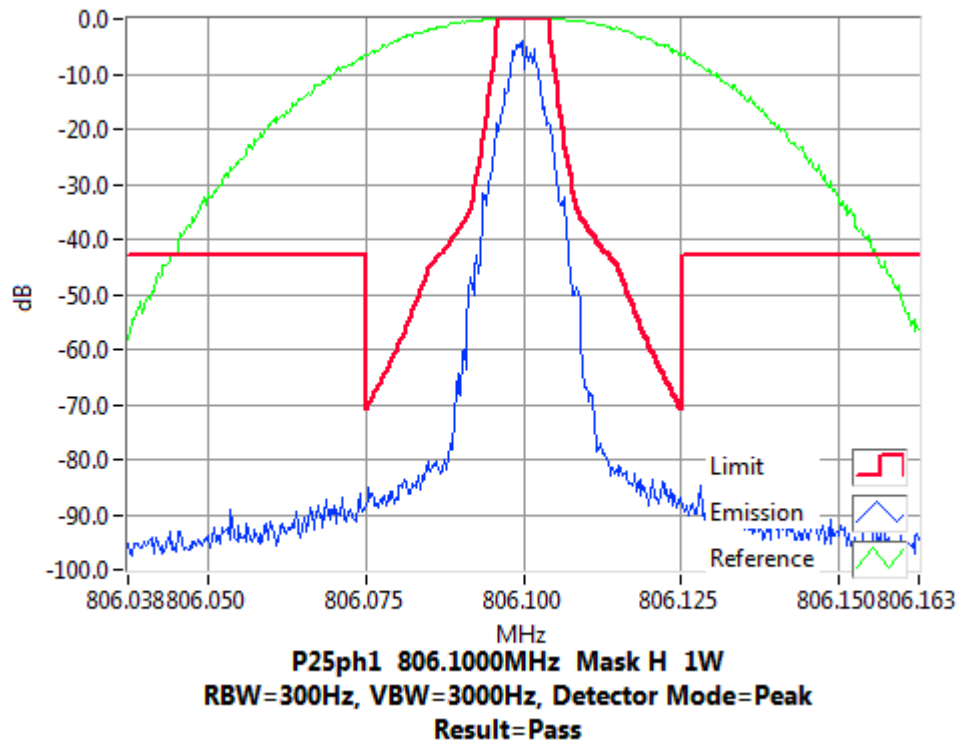
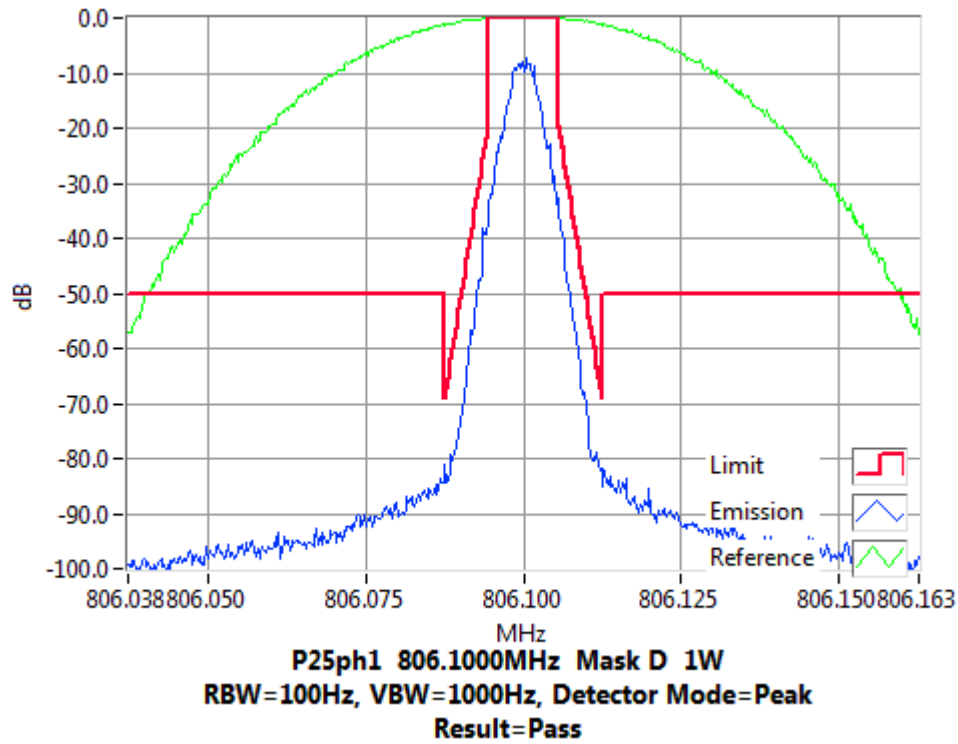


P25ph1 806.1000MHz Mask D 3W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



P25ph1 806.1000MHz Mask H 3W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 806.1 MHz 1 W 12.5 kHz Channel Spacing

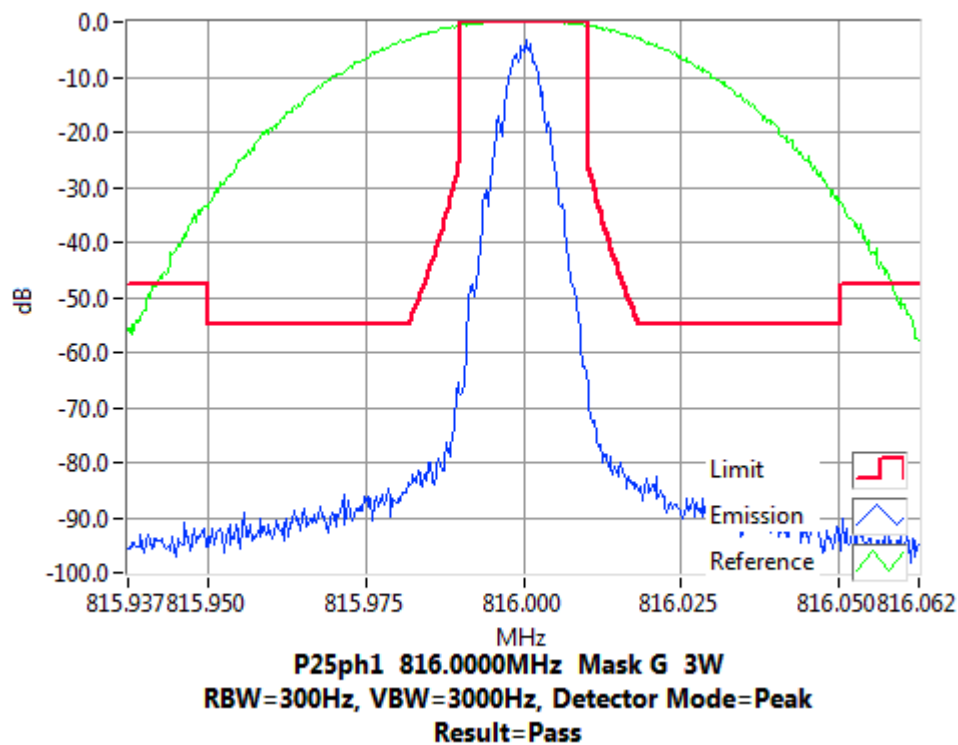
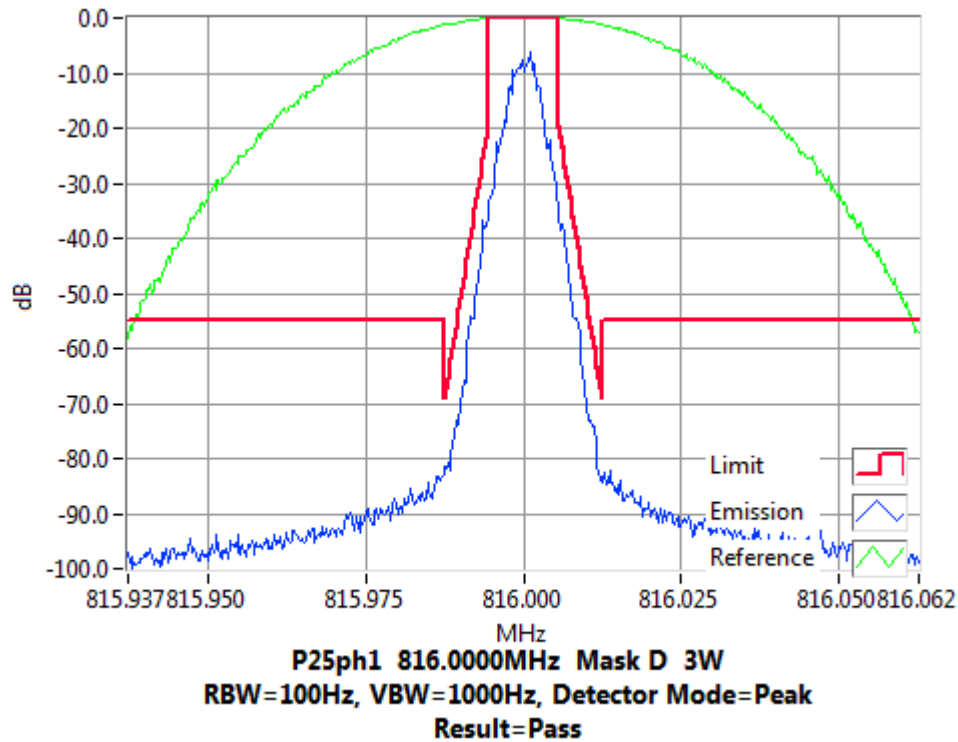


Occupied Bandwidth and Spectrum Masks

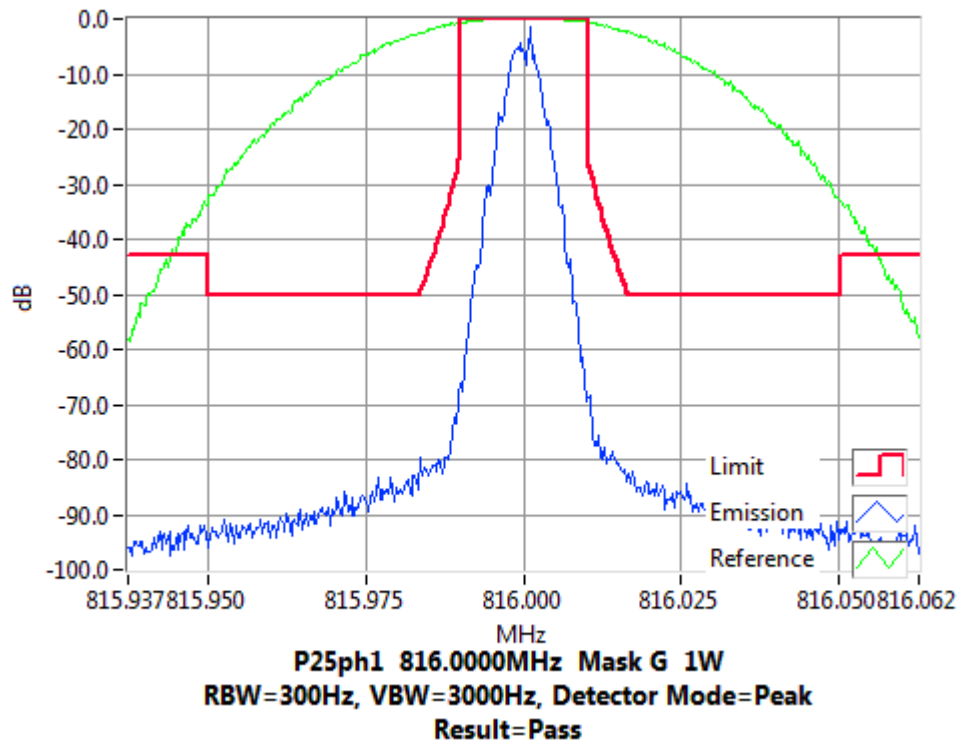
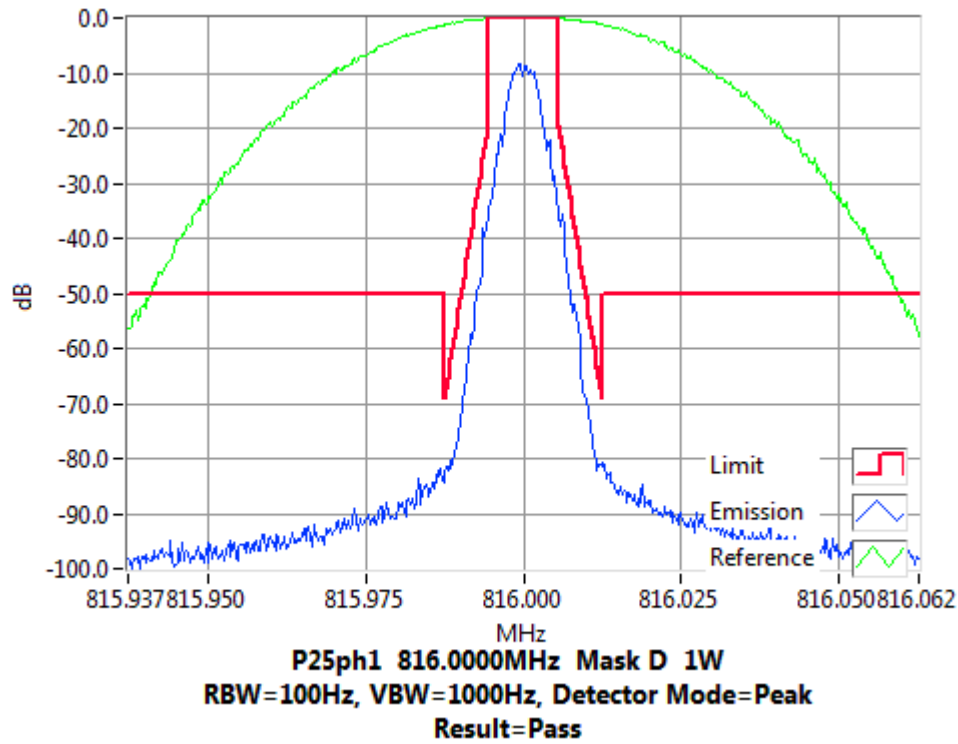
APCO P25 phase-1

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

Tx FREQUENCY: 816.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 816.0 MHz 1 W 12.5 kHz Channel Spacing

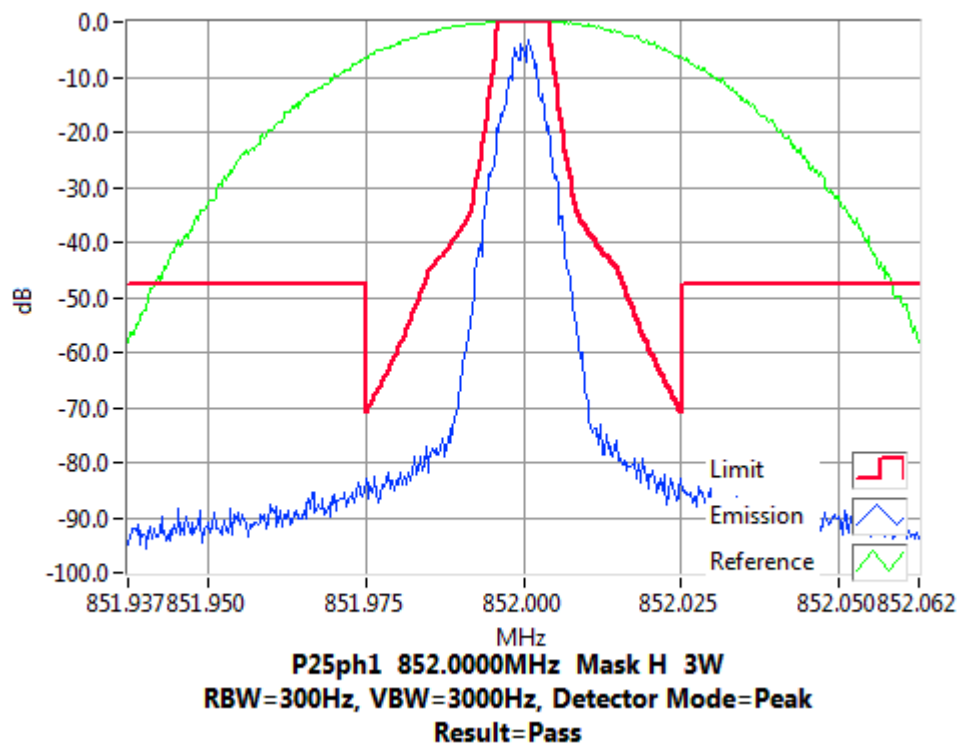
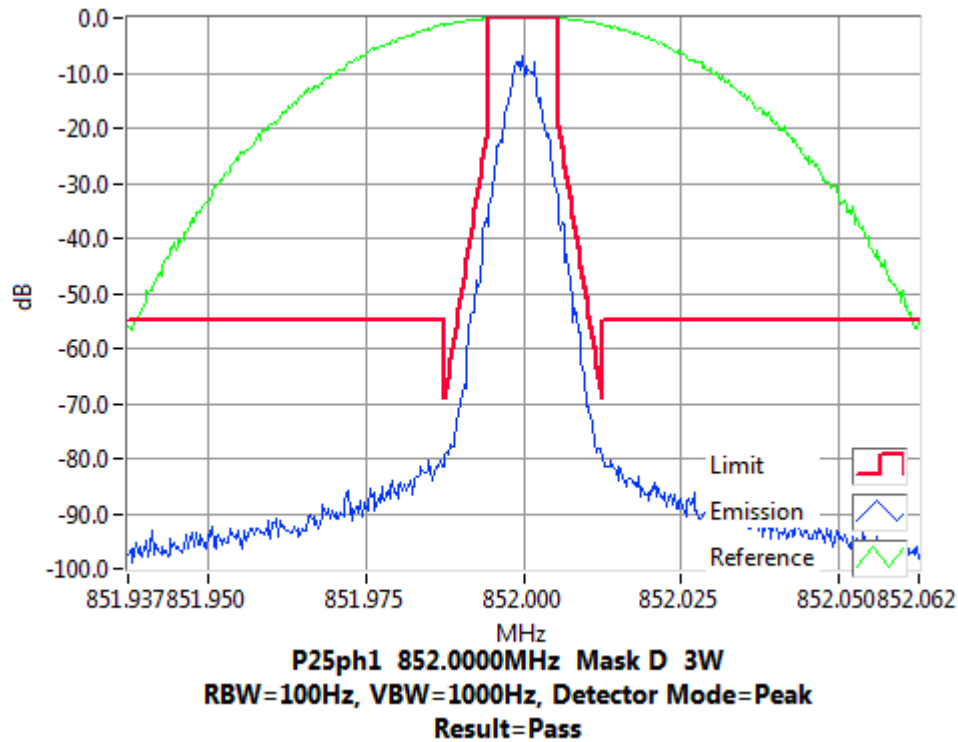


Occupied Bandwidth and Spectrum Masks

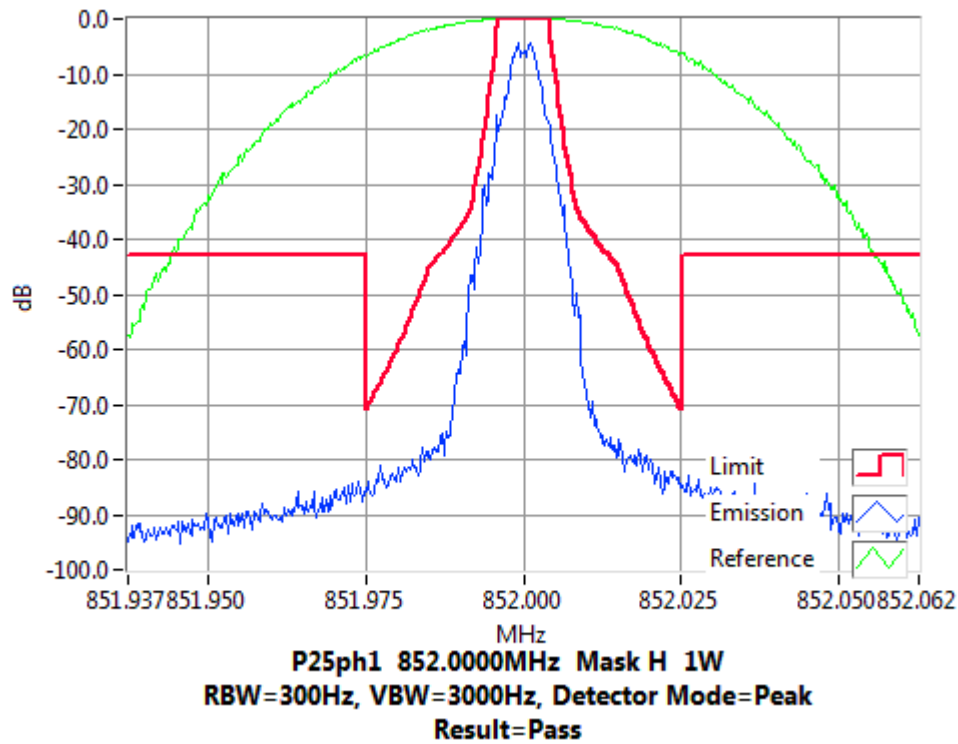
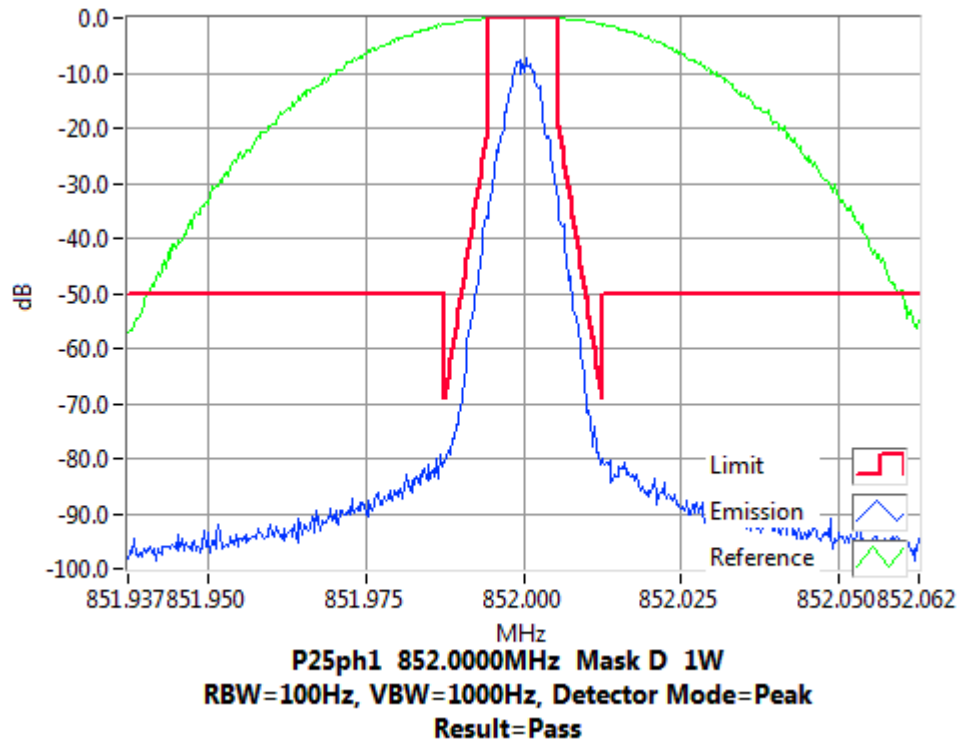
APCO P25 phase-1

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

Tx FREQUENCY: 852.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 852.0 MHz 1 W 12.5 kHz Channel Spacing

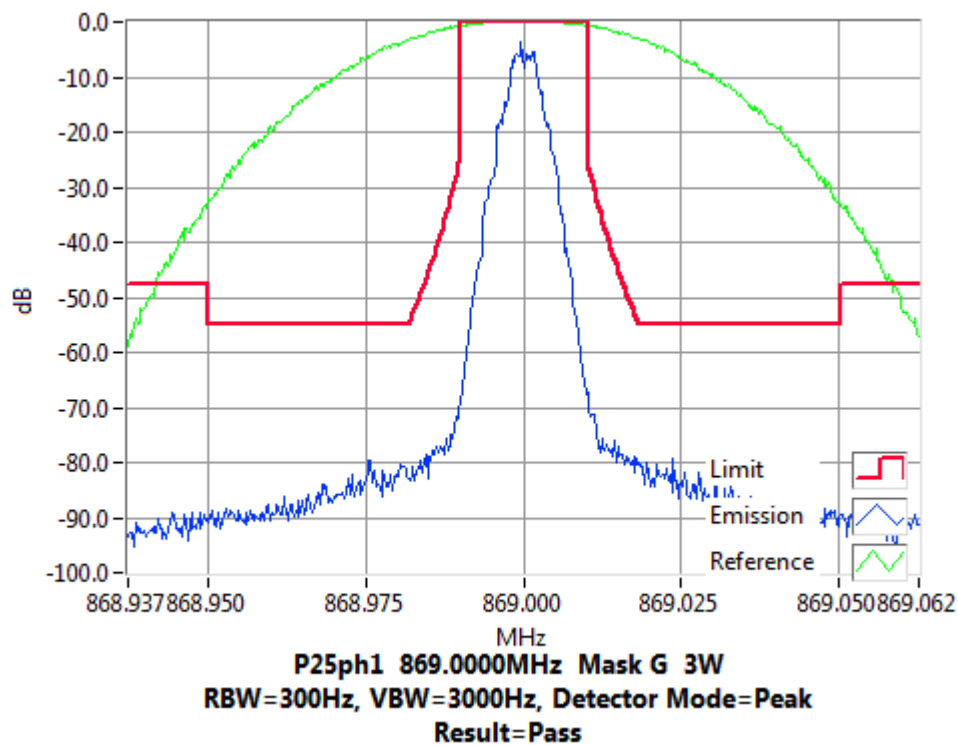
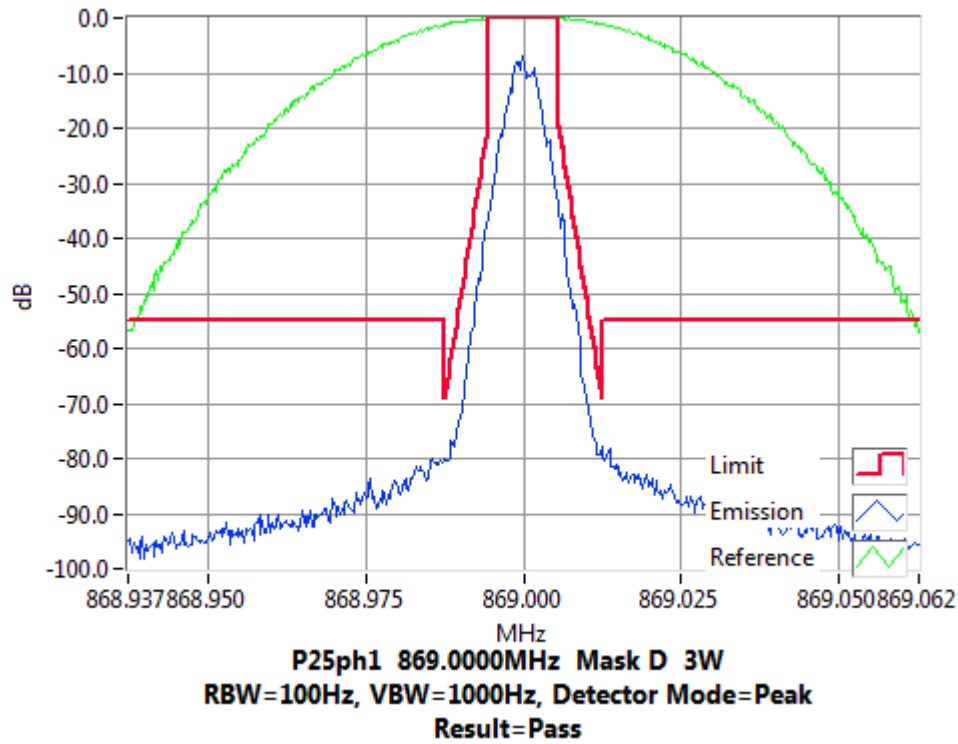


Occupied Bandwidth and Spectrum Masks

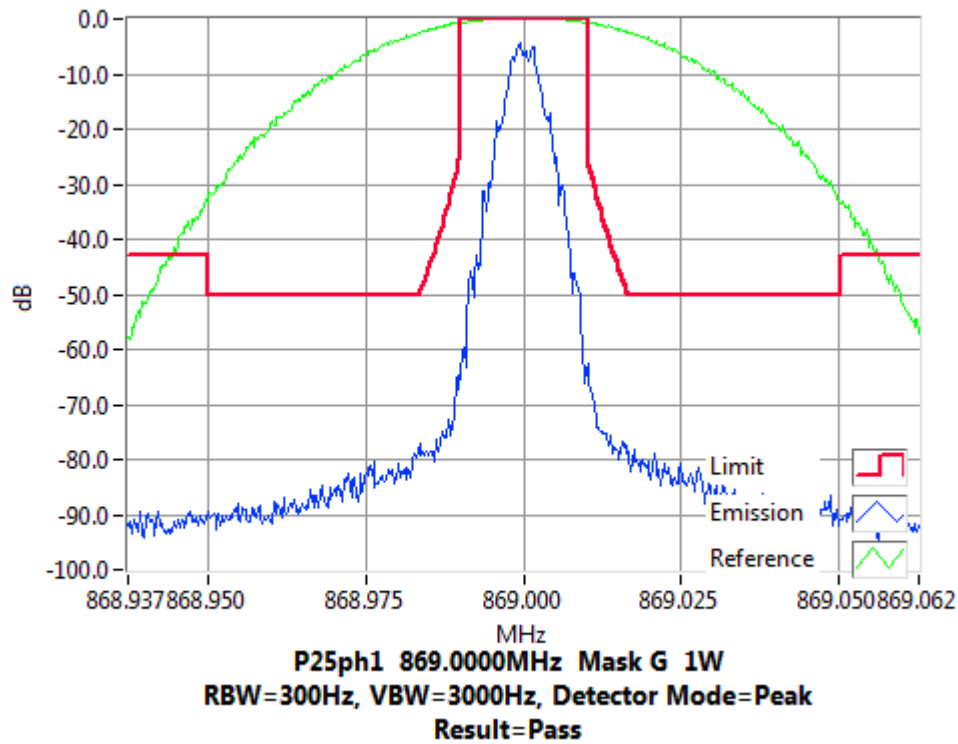
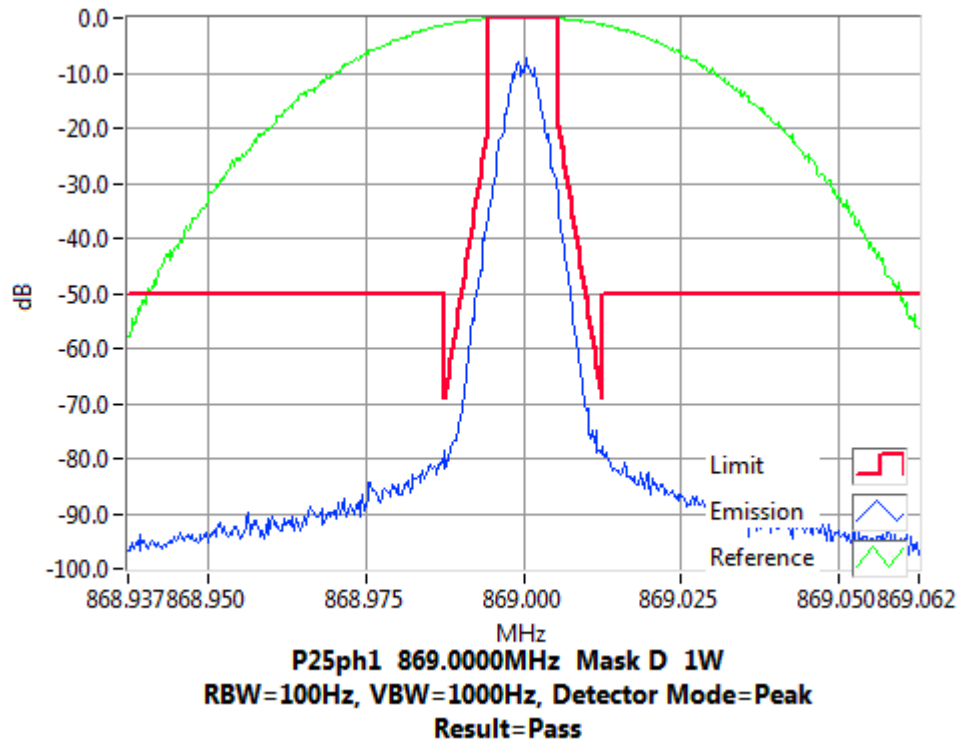
APCO P25 phase-1

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

Tx FREQUENCY: 869.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 869.0 MHz 1 W 12.5 kHz Channel Spacing

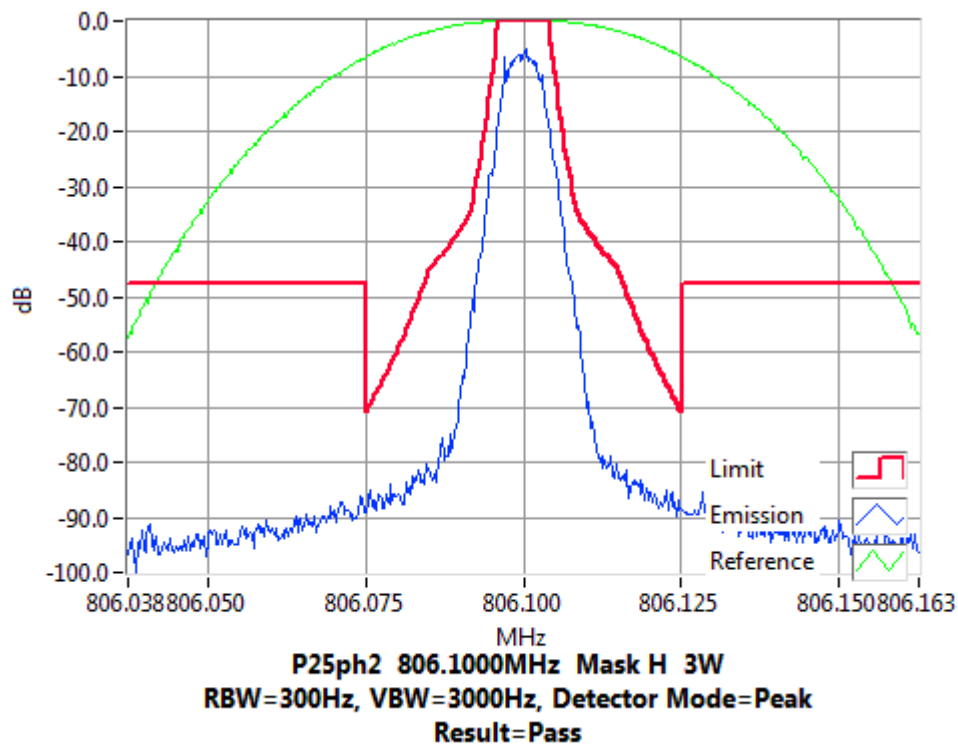
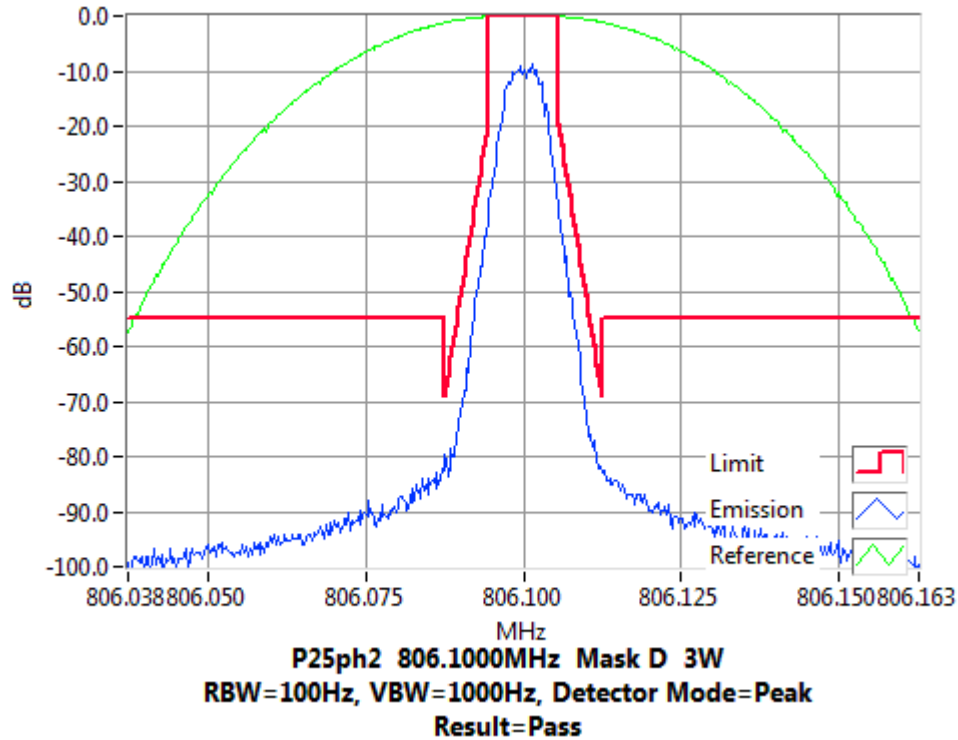


Occupied Bandwidth and Spectrum Masks

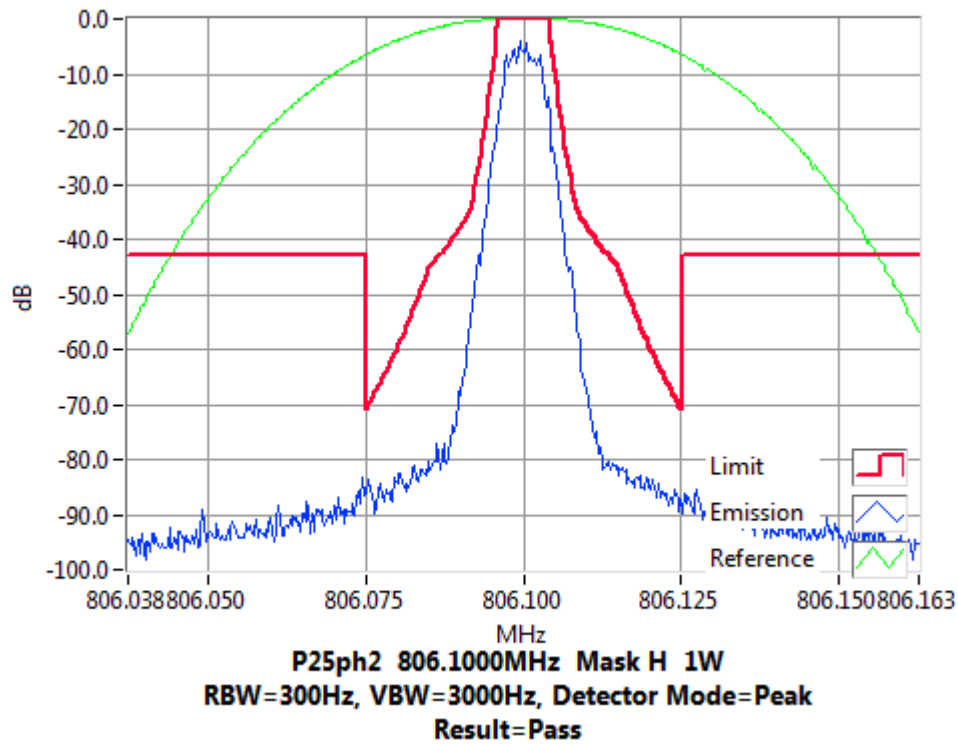
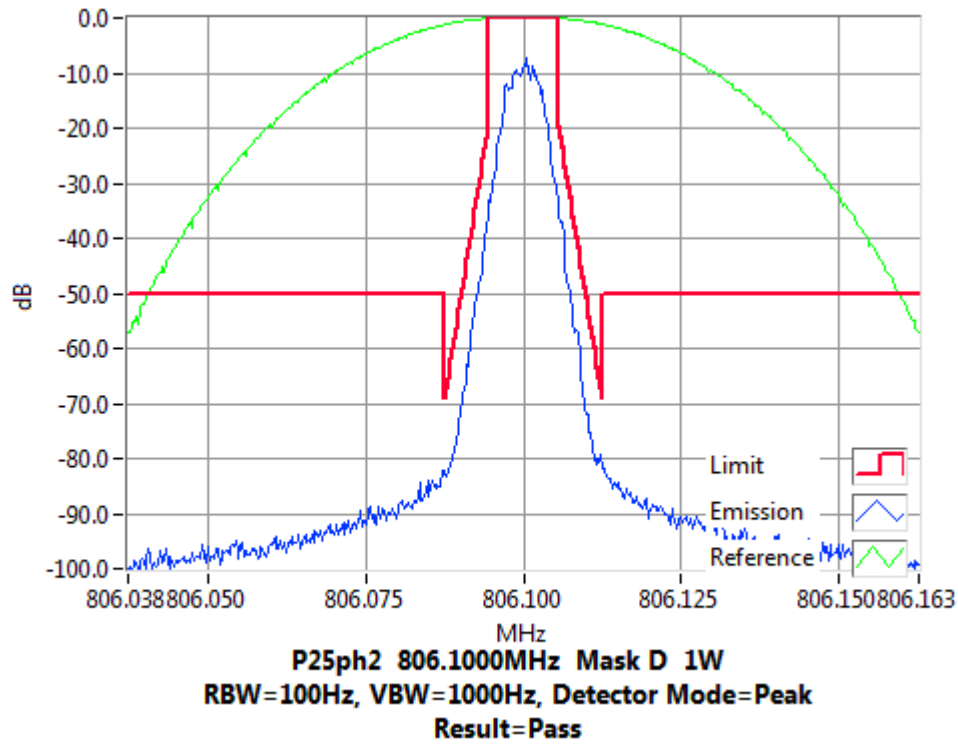
APCO P25 phase-2

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

Tx FREQUENCY: 806.1 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 806.1 MHz 1 W 12.5 kHz Channel Spacing

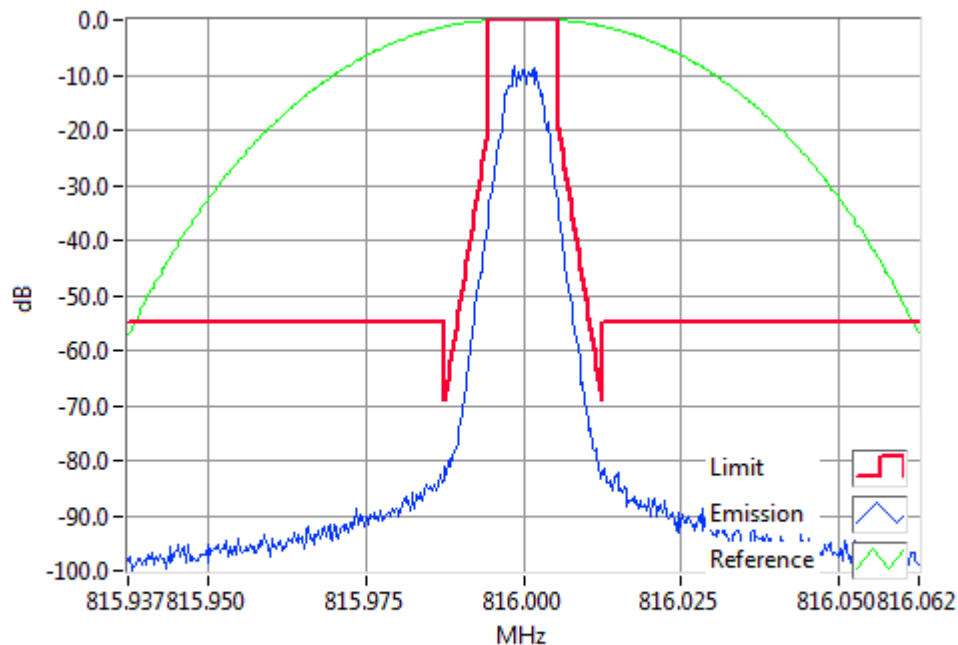


Occupied Bandwidth and Spectrum Masks

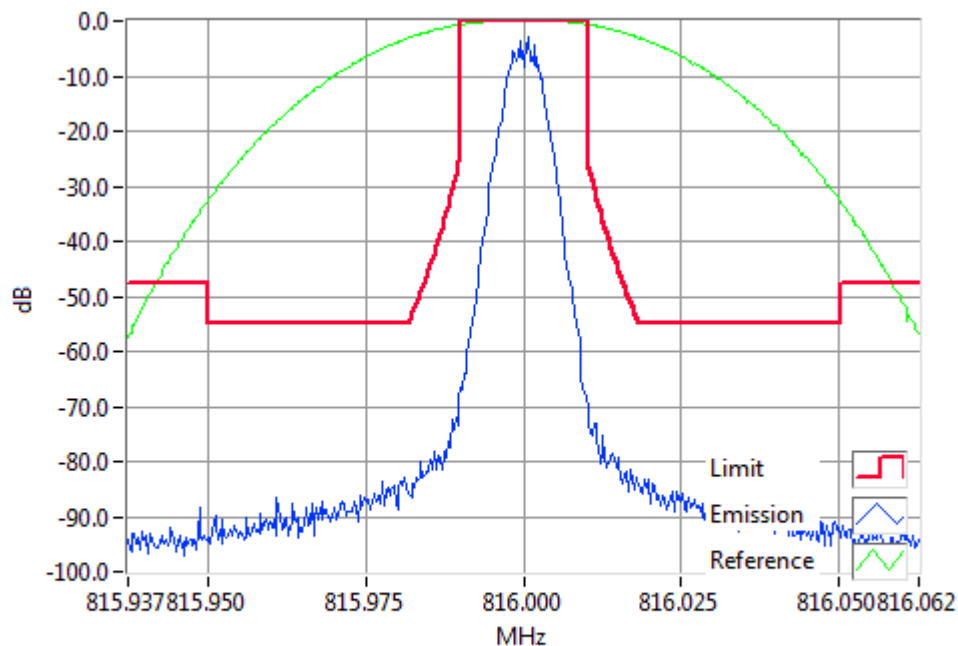
APCO P25 phase-2

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

Tx FREQUENCY: 816.0 MHz 3 W 12.5 kHz Channel Spacing

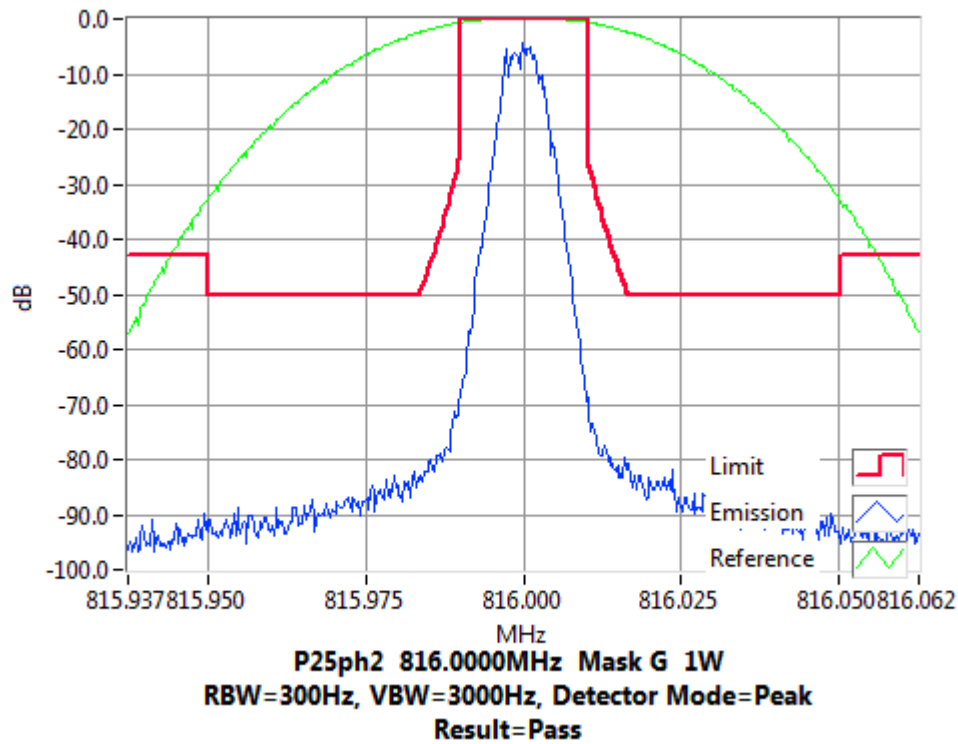
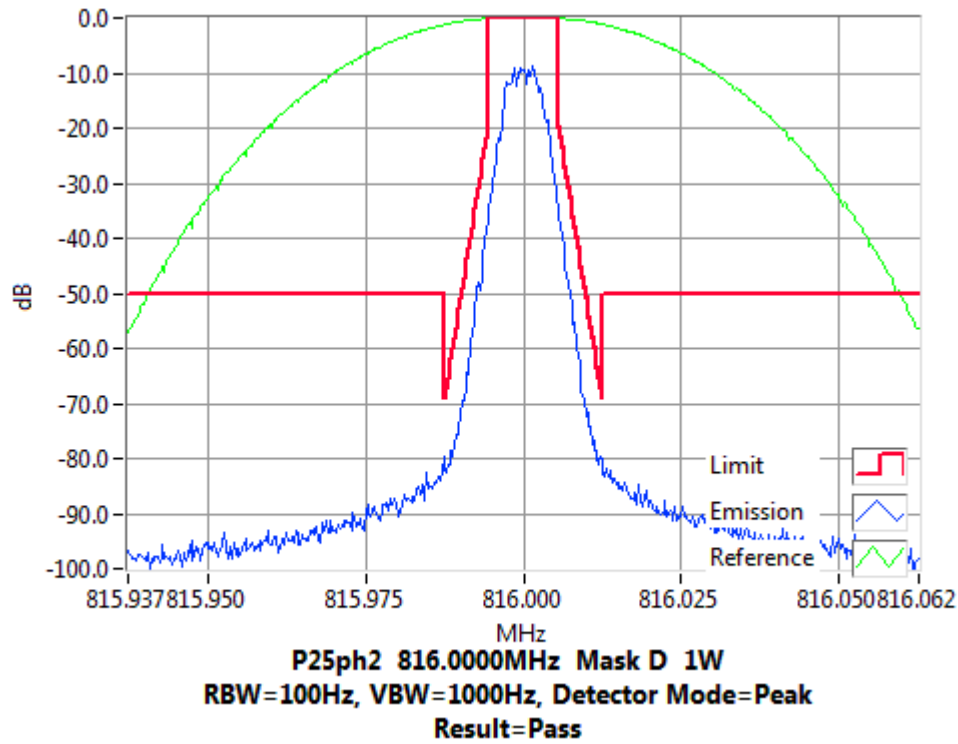


P25ph2 816.0000MHz Mask D 3W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



P25ph2 816.0000MHz Mask G 3W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 816.0 MHz 1 W 12.5 kHz Channel Spacing

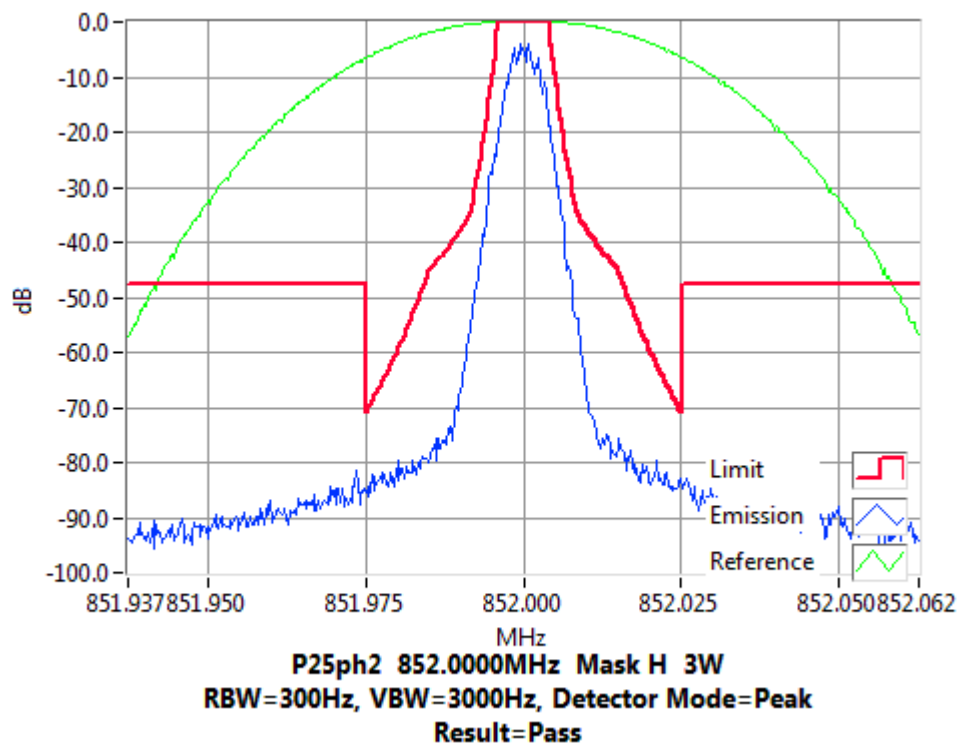
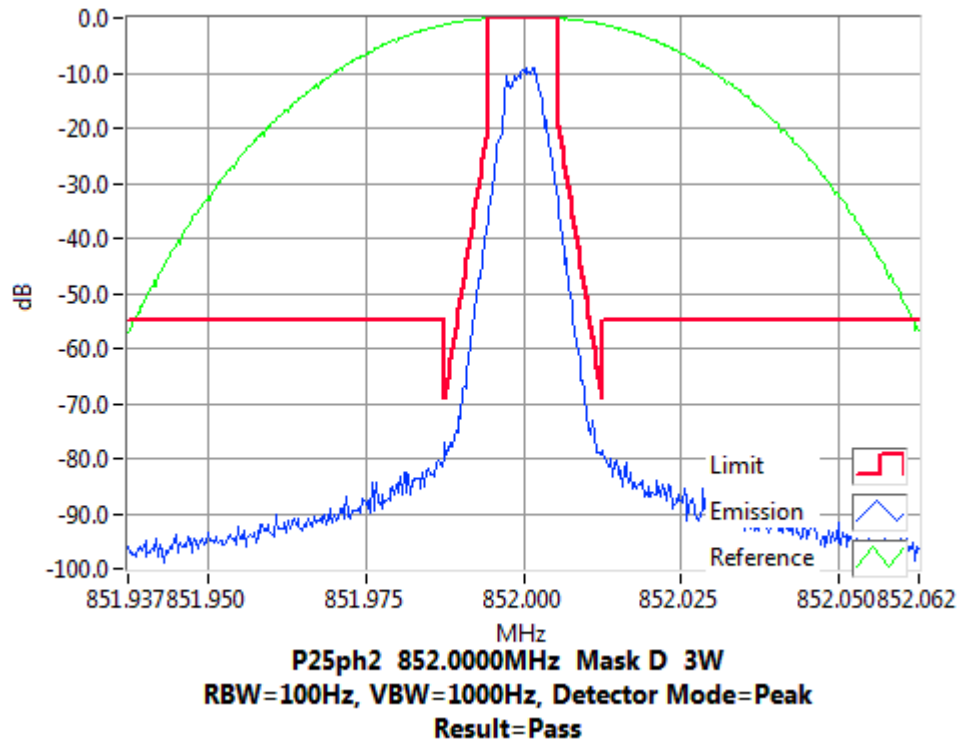


Occupied Bandwidth and Spectrum Masks

APCO P25 phase-2

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

Tx FREQUENCY: 852.0 MHz 3 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 852.0 MHz 1 W 12.5 kHz Channel Spacing

