

LABORATORY TEST REPORT

RADIO PERFORMANCE MEASUREMENTS

for the

TMBH5A Mobile Transceiver

Tested in accordance with:

FCC 47 CFR Parts 22, 74 and 90

RSS-119 Issue 11
RSS-Gen Issue 3

Report Revision:

1

Issue Date:

17-August-2013

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Laboratory Technical Manager



OATS FCC LISTING REGISTRATION: 837095
OATS IC LISTING REGISTRATION: SITE# 737A-1

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

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FCC ID: CASTMBH5A
IC : 737A-TMBH5A

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Report Revision: 1
Issue Date: 17-August-2013

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REVISION

| Date | Revision | Comments |
|----------------|----------|---------------------|
| 17-August-2013 | 1 | Initial test report |
| | | |

INTRODUCTION

| REASON FOR REPORT | | | | | |
|---|--|----------------------|-----------------|---------------------------|-----------------|
| This report demonstrates that the TMBH5A mobile transceiver complies with FCC 47 Parts 22, 74 & 90, and RSS-119 Issue 11 & RSS-Gen Issue 3. This radio supports analog, digital FFSK, P25 phase-1, P25 phase-2, and Digital Mobile Radio modulations: | | | | | |
| Modulation | | Channel Spacing | Speech Channels | Symbol Rate (symbols/sec) | Data Rate (bps) |
| Analogue FM | | 12.5 kHz 25.0 kHz | 1 | - | - |
| FFSK | Fast Frequency Shift Keying | 12.5 kHz 25.0 kHz | - | 1200 | 1200 |
| | | 12.5 kHz 25.0 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 |

Type Approval Testing of the
Serial number
Frequency range

T02-00012-JBAA
20099483
400 → 470 MHz

in accordance with:
FCC 47 CFR Parts 22, 74 and 90
RSS-119 Issue 11 & RSS-Gen Issue 3

REPORT PREPARED FOR
Tait Communications
PO Box 1645
558 Wairakei Road
Christchurch
New Zealand

DESCRIPTION OF SAMPLE
Manufacturer: Tait Limited
Equipment: Mobile Transceiver
Type: TMBH5A
Product Code: T02-00012-JBAA
Serial Number(s): 20099483
Quantity: 1

HARDWARE & SOFTWARE

Analog & DMR

| <i>Type</i> | <i>Code and Version</i> |
|-------------------|-------------------------|
| Hardware ID | TMBB12-H500_0006 |
| Boot Code | QMB1B_S00_3.00.03.0001 |
| DSP | QMB1A_E00_1.01.00.0024 |
| Radio Application | QMB1F_E00_1.01.00.0024 |
| FPGA Image | QMB1G_D08_1.02.00.0010 |

P25 Phase I

| <i>Type</i> | <i>Code and Version</i> |
|-------------------|-------------------------|
| Hardware ID | TMBB12-H500_0006 |
| Boot Code | QMB1B_S00_3.00.03.0001 |
| DSP | QMB1A_A00_1.01.01.0017 |
| Radio Application | QMB1F_A00_1.01.01.0017 |
| FPGA Image | QMB1G_D08_1.02.00.0010 |

P25 Phase II

| <i>Type</i> | <i>Code and Version</i> |
|-------------------|-----------------------------|
| Hardware ID | TMBB12-H500_0006 |
| Boot Code | QMB1B_S00_3.00.03.0001 |
| DSP | QMB1A_A00_1.03.01.0029 |
| Radio Application | QMB1F_A00_1.03.01.0029 |
| FPGA Image | QMB1G_S00_1.00.02.0001_P2.a |

TEST CONDITIONS

All testing was performed between 26 July → 17 August 2013, and under the following conditions:

Ambient temperature: 15°C → 30°C
Relative Humidity: 20% → 75%
Standard Test Voltage 13.8 V_{DC}

STATEMENT OF COMPLIANCE

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

Equipment: Mobile Transceiver
Type: TMBH5A
Product Code: T02-00012-JBAA
Serial Number(s): 20099483
Quantity: 1

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

FCC 47 CFR Parts 22, 74 and 90

RSS-119 Issue 11 & RSS-Gen Issue 3

Signature: _____

M.C. James
Laboratory Technical Manager

Date: _____

MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS

MODULATION TYPES:

| | | | |
|-----|------------------------------------|-----------|----------|
| F3E | Analogue Frequency Modulation (FM) | | |
| F2D | FFSK | 1200 bps | 2400 bps |
| FXD | Digital | 9600 bps | |
| FXW | Digital Voice / Data | 9600 bps | |
| F1W | Digital Voice / Data | 12000 bps | |

CHANNEL SPACINGS: 12.5 kHz 25.0 kHz

EMISSION DESIGNATORS:

| | | | |
|--------------------|---------|---------|---------|
| Analog FM | 11K0F3E | 16K0F3E | |
| FFSK Data 1200 bps | 6K60F2D | 9K60F2D | |
| FFSK Data 2400 bps | 7K80F2D | 10K8F2D | |
| Digital Voice/Data | 8K10F1E | 8K10F7E | 8K10F7D |
| | 8K10F1D | 8K10F1W | |
| Digital Voice/Data | 7K60FXW | 7K60FXD | |

CALCULATIONS

Equation: $B_n = 2M + 2Dk$

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

Analog 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 / Data C4FM 4800 bps

Digital Voice/data transmissions use a 4 level frequency shift keying modulation scheme.

The necessary bandwidth has been measured using the 99% energy rule, and in accordance with TIA/EIA 102 CAAB 2.2.5.2

Digital Voice 12.5 kHz Bandwidth P25 phase 1

99% bandwidth

= 8.1 kHz

Emission Designator

8K10F1E

F1E represents a digital FM voice transmission

8K10F7E

F7E represents two or more channels containing quantized or digital voice information

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 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 P25 phase 1

99% bandwidth

= 8.1 kHz

Emission Designator

8K10F1D

F1D represents an digital FM data transmission

8K10F7D

F7D represents two or more channels containing quantized or digital information

Digital Data 12.5 kHz Bandwidth P25 phase 2

99% bandwidth

= 8.1 kHz

Emission Designator

8K10F1W

F1W represents digital FM data transmission

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

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: 25 W and 1 W

| | | | | | |
|-------------------------|-----------|-----------|-----------|-----------|-----------|
| Nominal 25 W | 406.2 MHz | 429.9 MHz | 450.1 MHz | 459.9 MHz | 469.9 MHz |
| Measured | 24.7 | 22.9 | 23.3 | 22.2 | 21.2 |
| Variation (%) | -1.0 | -8.3 | -6.7 | -11.3 | -15.3 |
| Variation (dB) | 0.0 | -0.4 | -0.3 | -0.5 | -0.7 |
| | | | | | |
| Nominal 1 W | 406.2 MHz | 429.9 MHz | 450.1 MHz | 459.9 MHz | 469.9 MHz |
| Measured | 1.1 | 1.0 | 0.9 | 0.9 | 0.9 |
| Variation (%) | 7.0 | -4.8 | -10.8 | -10.9 | -7.8 |
| Variation (dB) | 0.3 | -0.2 | -0.5 | -0.5 | -0.4 |
| 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:

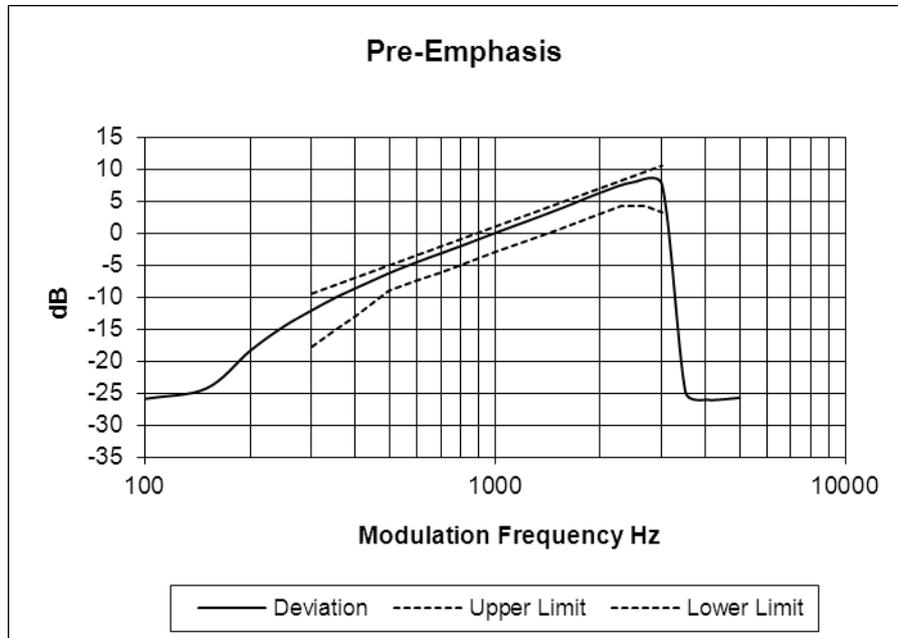
See the plots on the following pages for 12.5 kHz & 25.0 kHz channel spacings, tested at 25 W transmit power.

LIMIT CLAUSE: TIA/EIA-603D 3.2.6

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 406.2 MHz

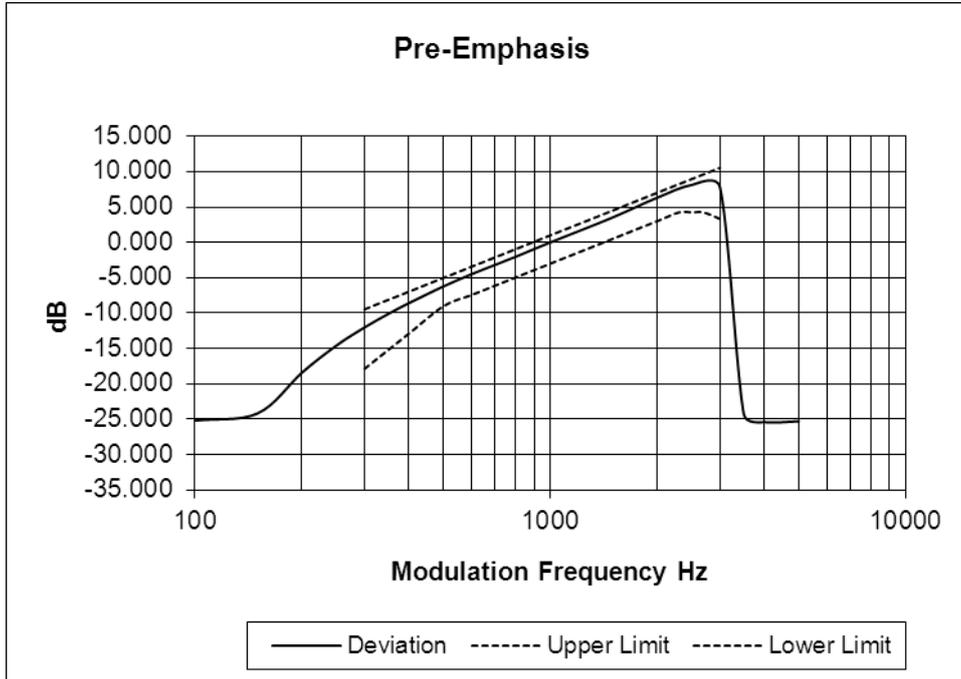
12.5 kHz Channel Spacing



Transmitter Audio Frequency Response – Pre-emphasis

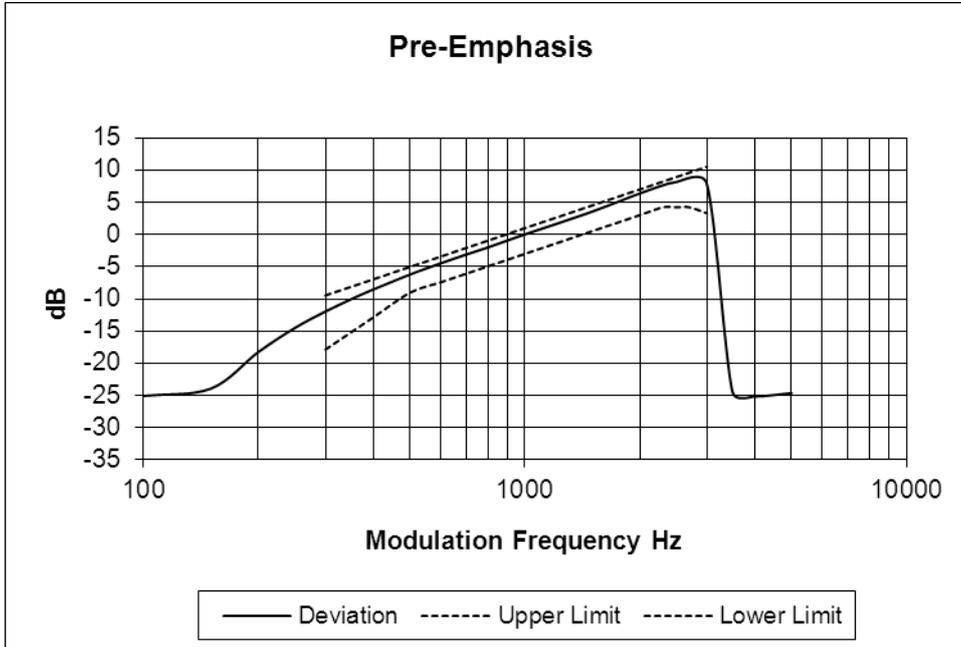
Tx FREQUENCY: 429.9 MHz

12.5 kHz Channel Spacing



Tx FREQUENCY: 450.1 MHz

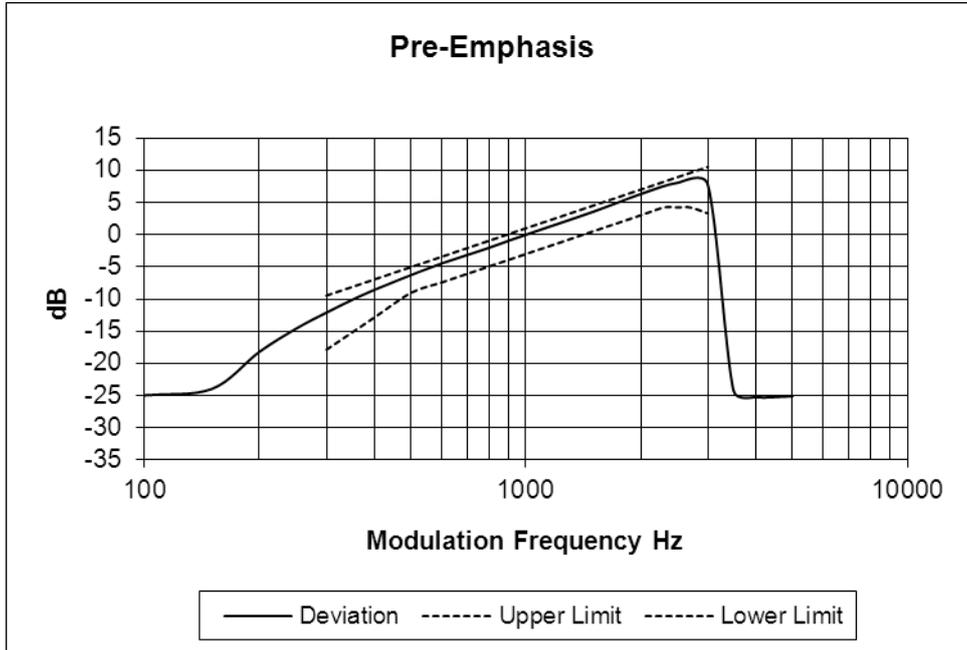
12.5 kHz Channel Spacing



Transmitter Audio Frequency Response – Pre-emphasis

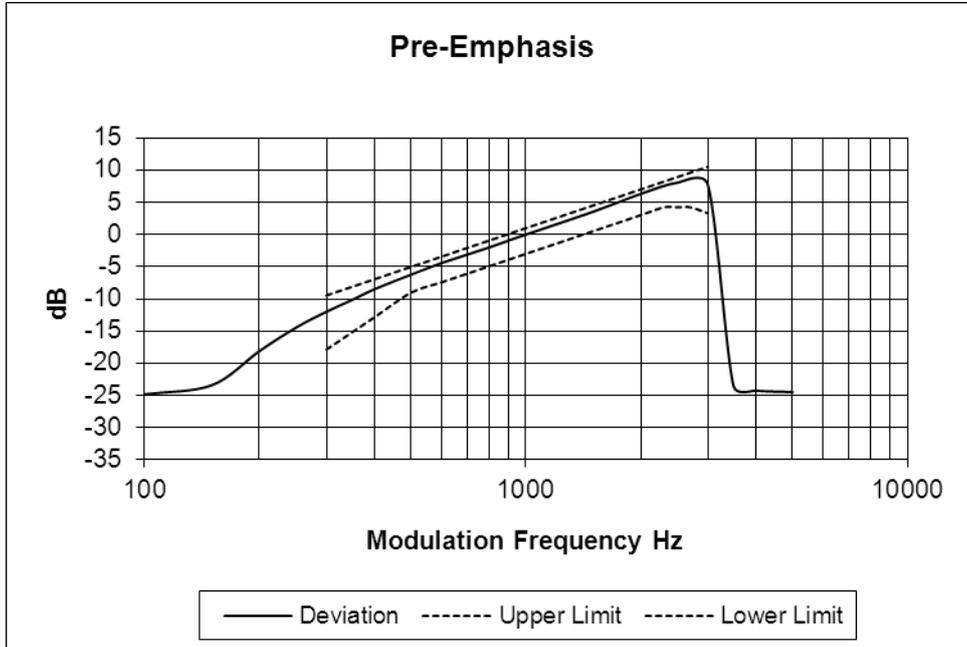
Tx FREQUENCY: 459.9 MHz

12.5 kHz Channel Spacing



Tx FREQUENCY: 469.9 MHz

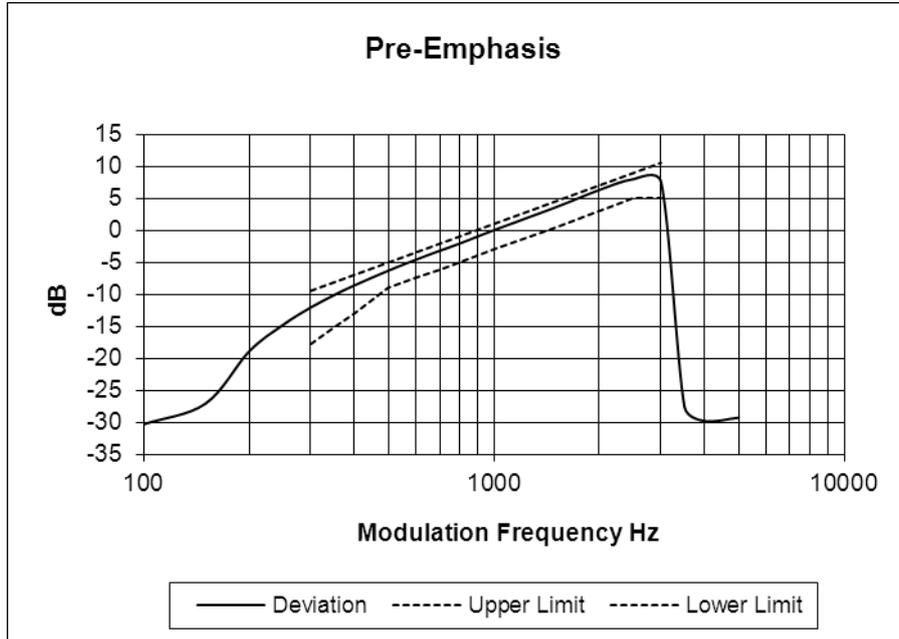
12.5 kHz Channel Spacing



Transmitter Audio Frequency Response – Pre-emphasis

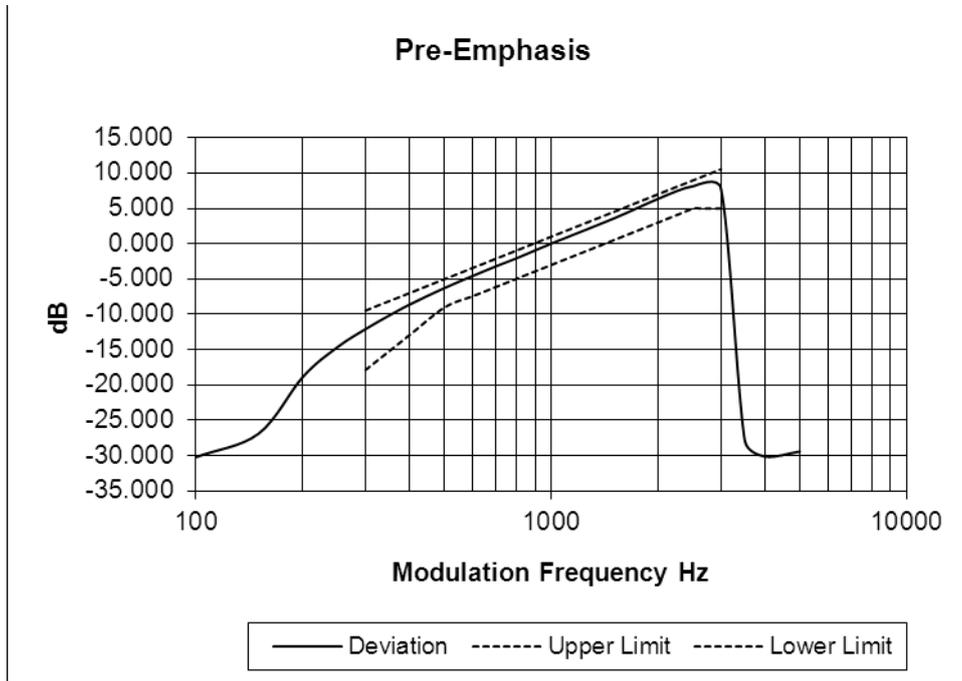
Tx FREQUENCY: 406.2 MHz

25.0 kHz Channel Spacing



Tx FREQUENCY: 429.9 MHz

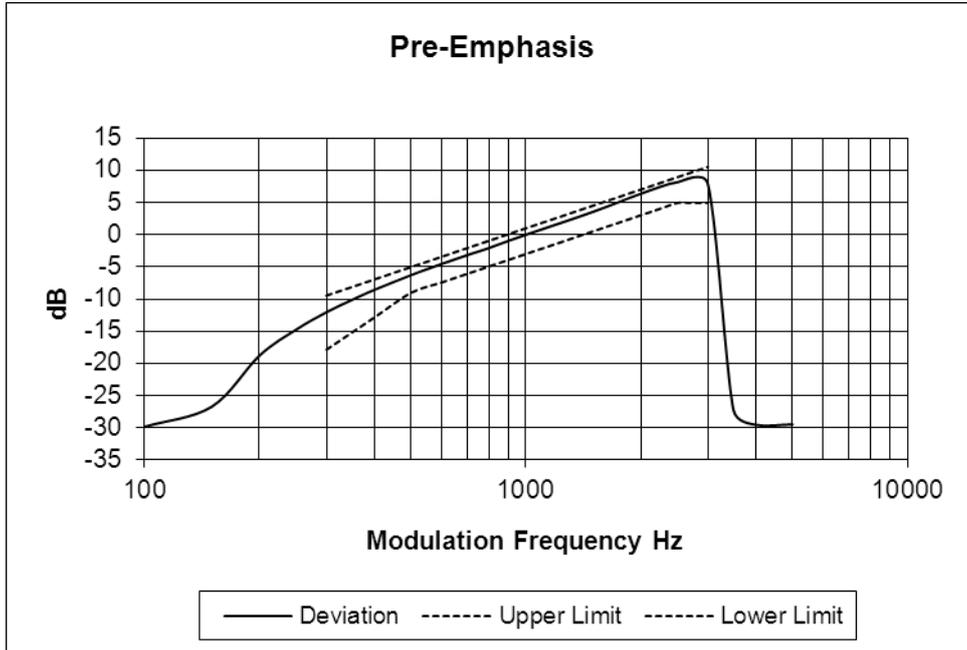
25.0 kHz Channel Spacing



Transmitter Audio Frequency Response – Pre-emphasis

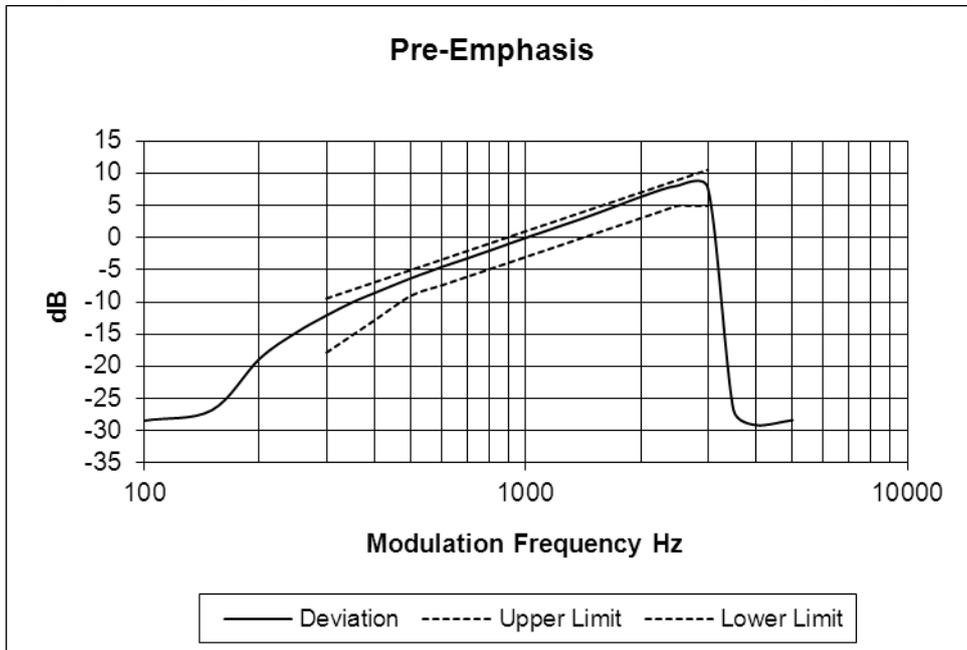
Tx FREQUENCY: 450.1 MHz

25.0 kHz Channel Spacing



Tx FREQUENCY: 459.9 MHz

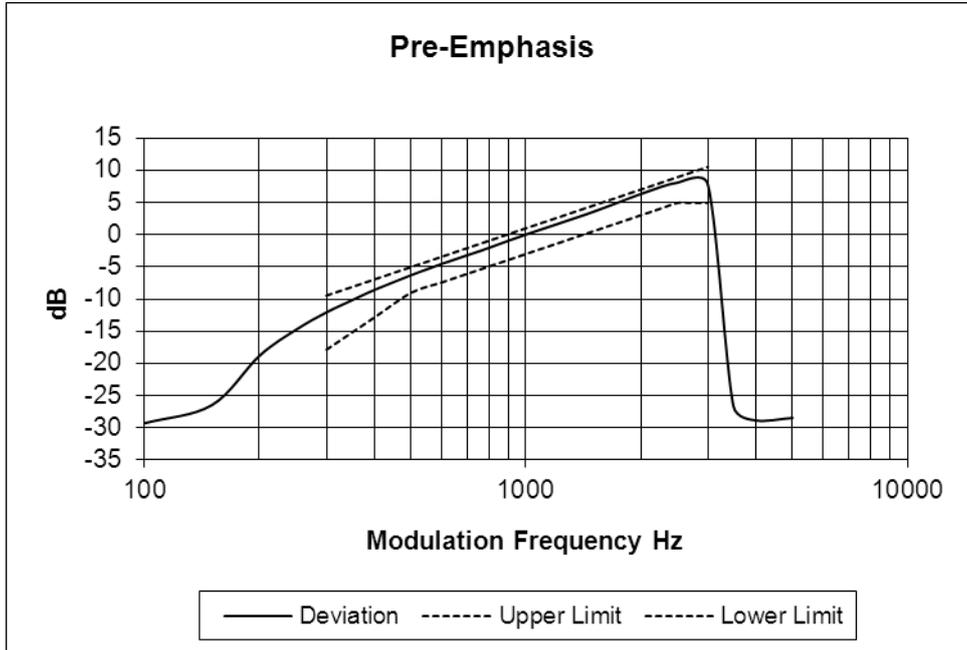
25.0 kHz Channel Spacing



Transmitter Audio Frequency Response – Pre-emphasis

Tx FREQUENCY: 469.9 MHz

25.0 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 & 25.0 kHz channel spacings.

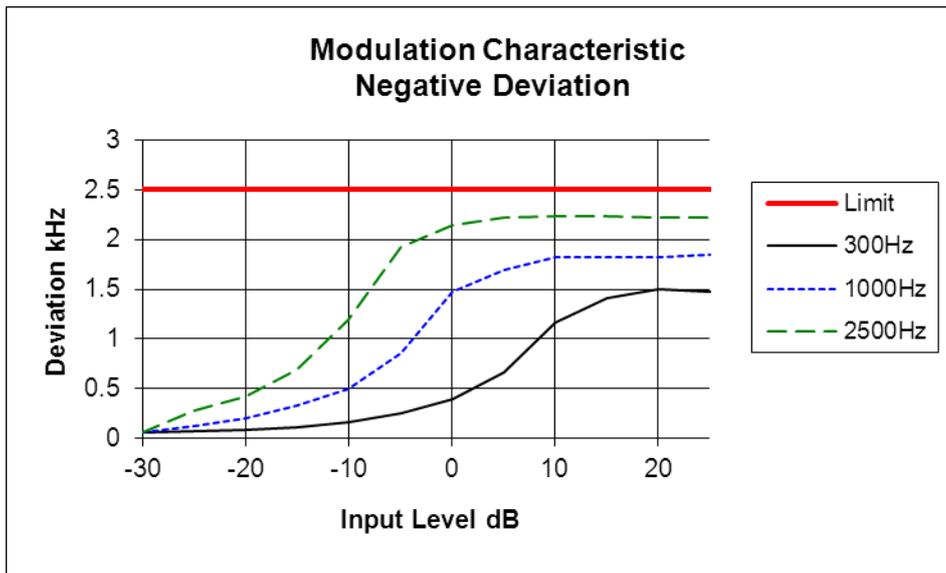
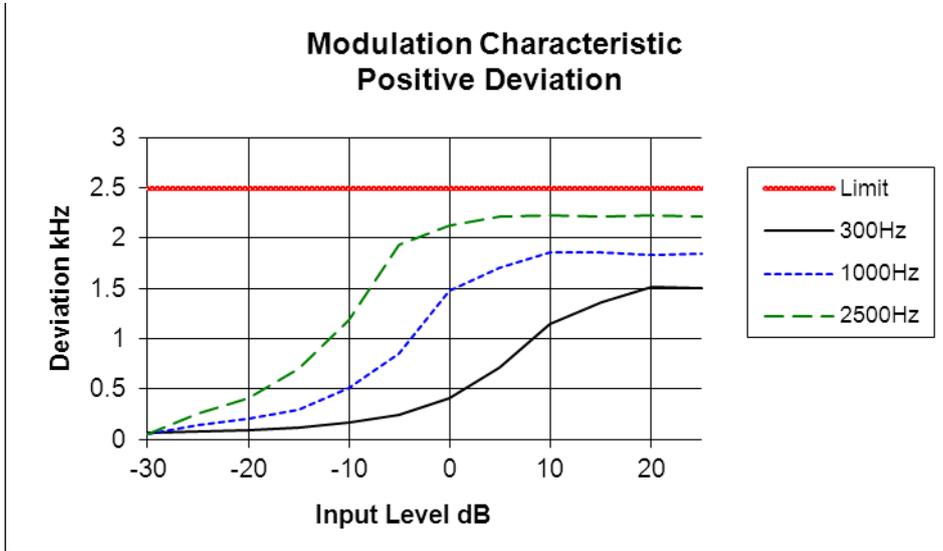
LIMIT CLAUSE: TIA/EIA-603D 1.3.4.4

Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 406.2 MHz

12.5 kHz Channel Spacing

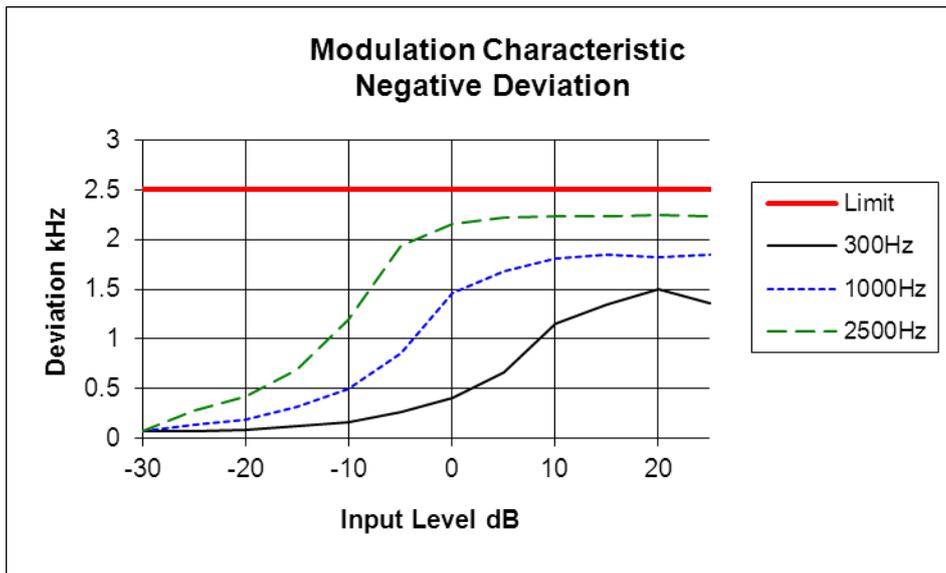
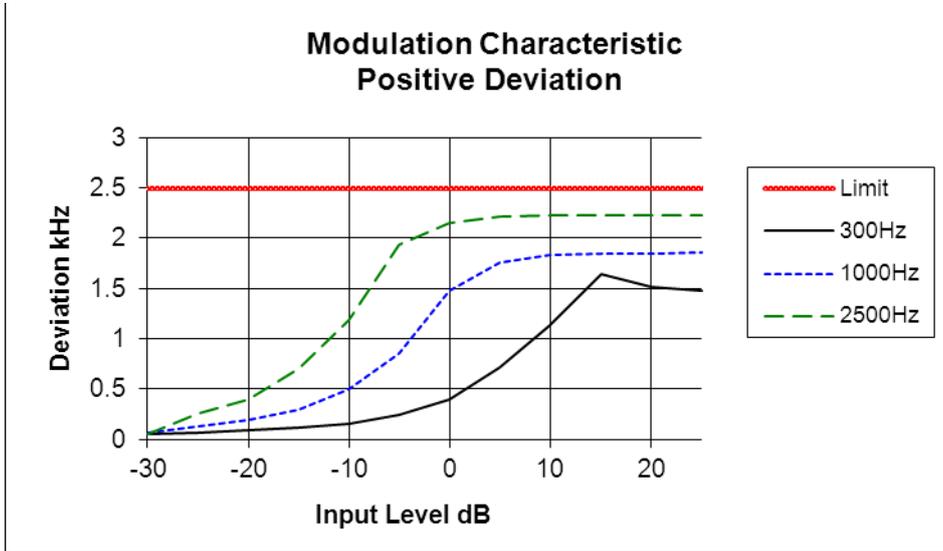


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 429.9 MHz

12.5 kHz Channel Spacing

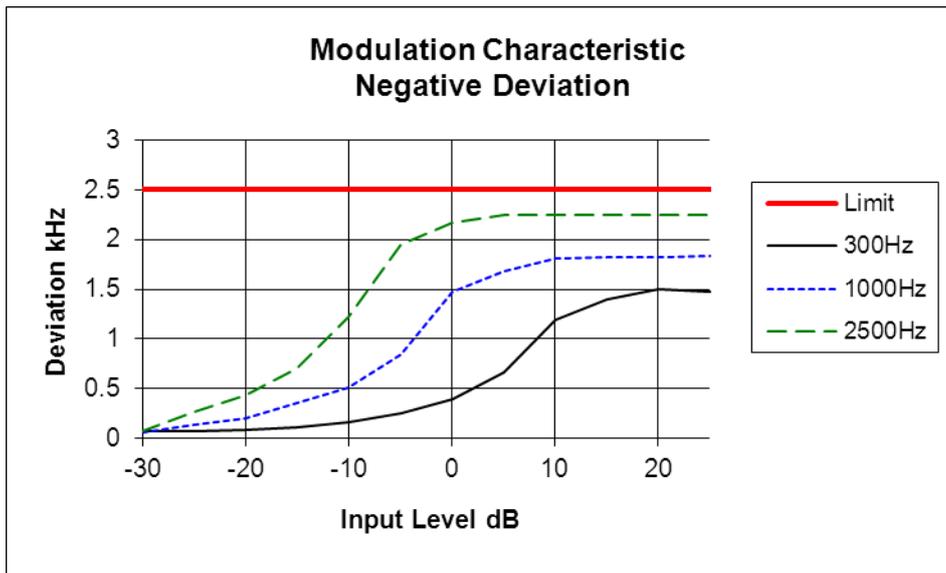
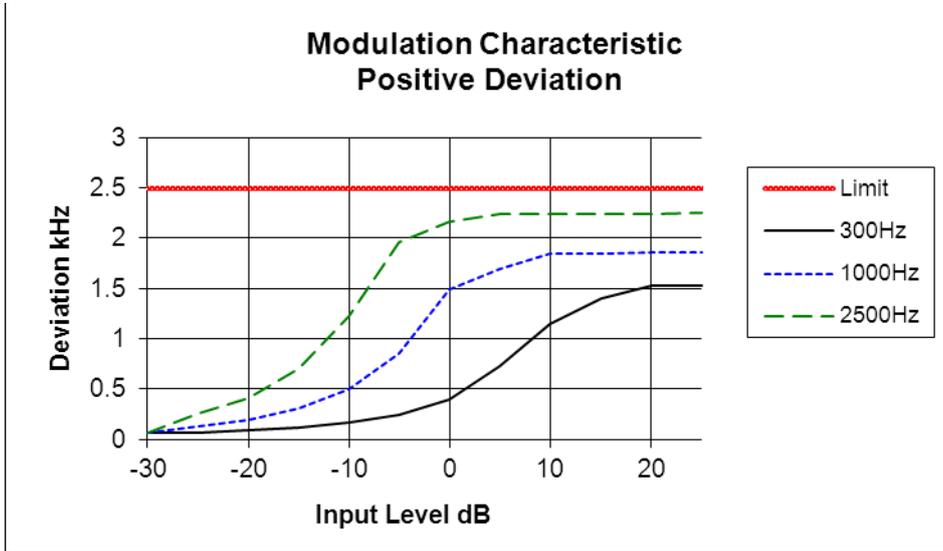


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 450.1 MHz

12.5 kHz Channel Spacing

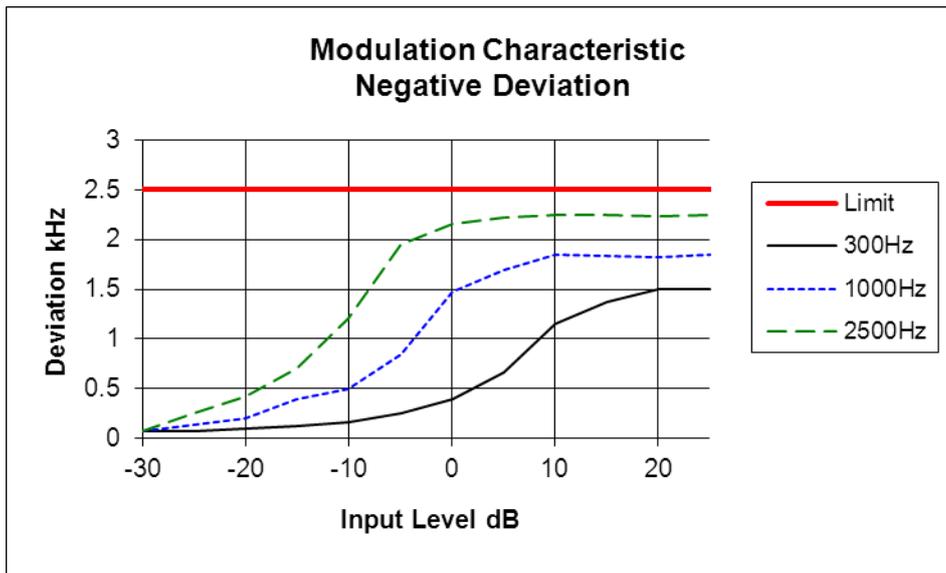
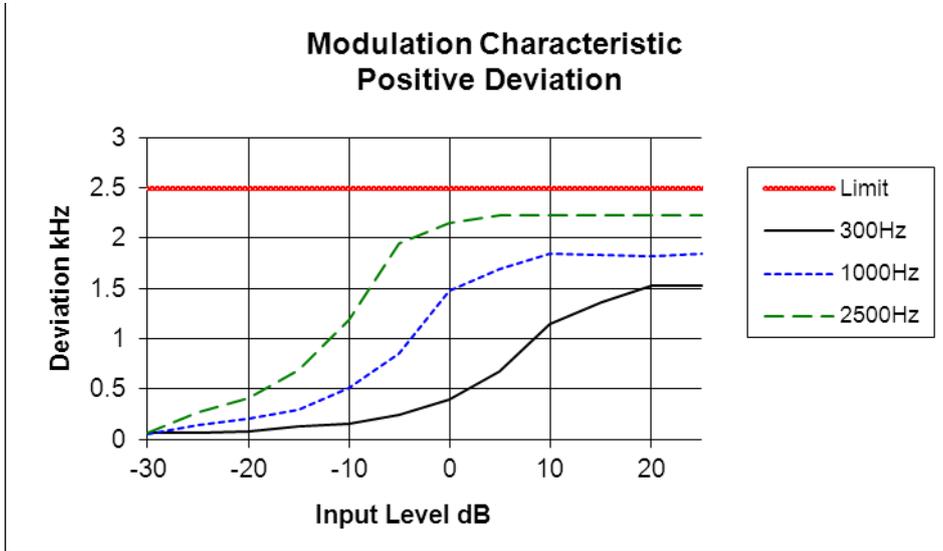


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 459.9 MHz

12.5 kHz Channel Spacing

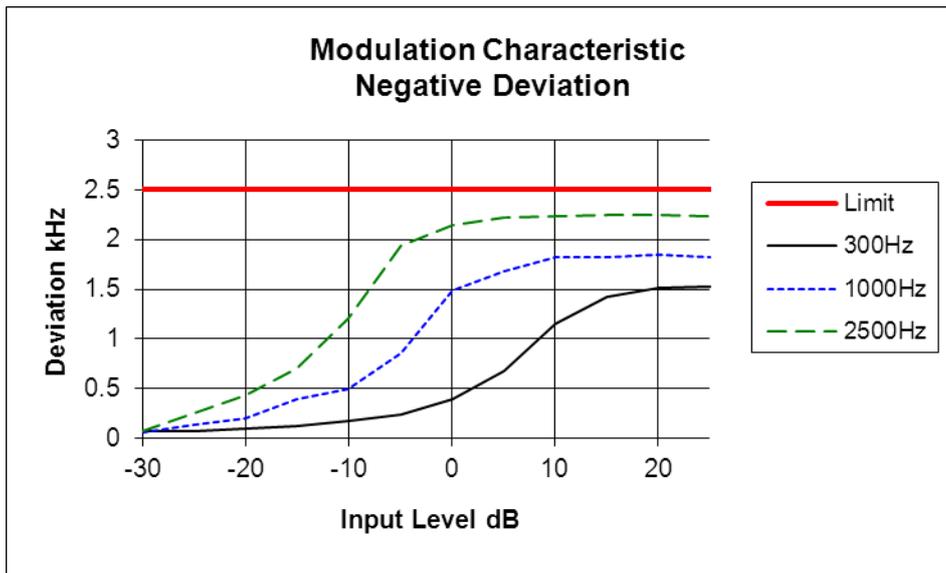
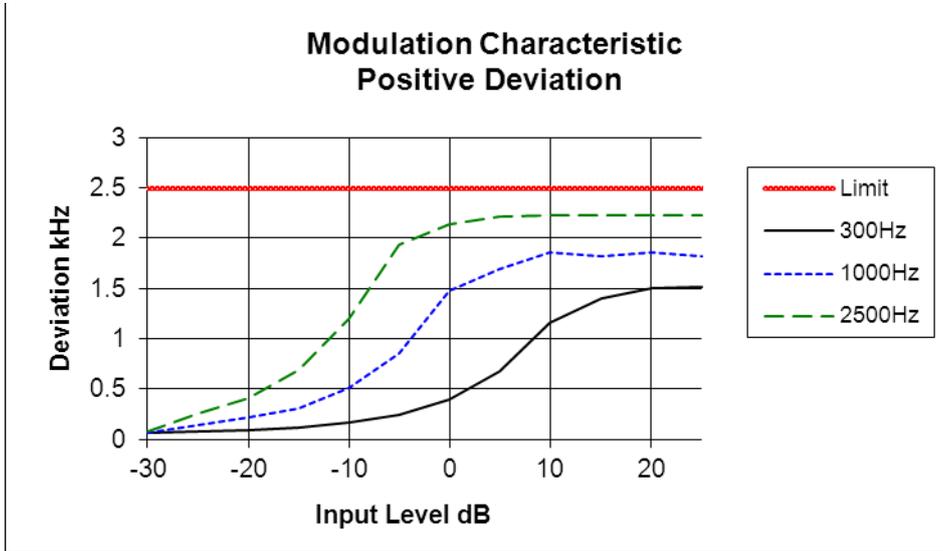


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 469.9 MHz

12.5 kHz Channel Spacing

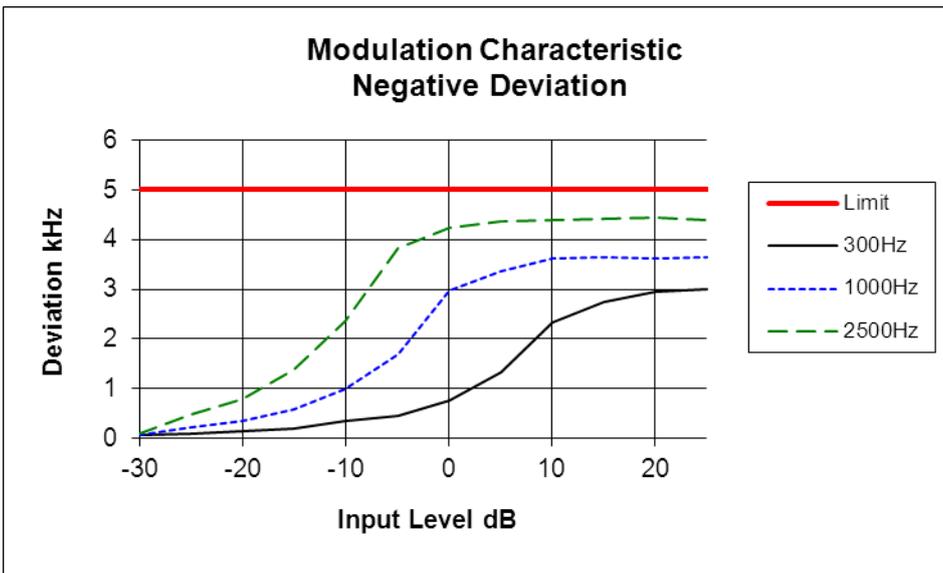
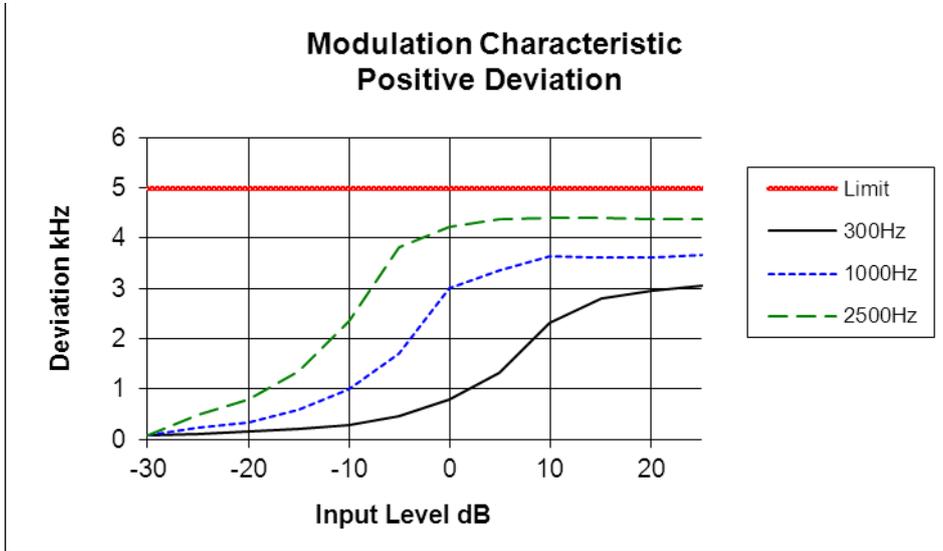


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 406.2 MHz

25.0 kHz Channel Spacing

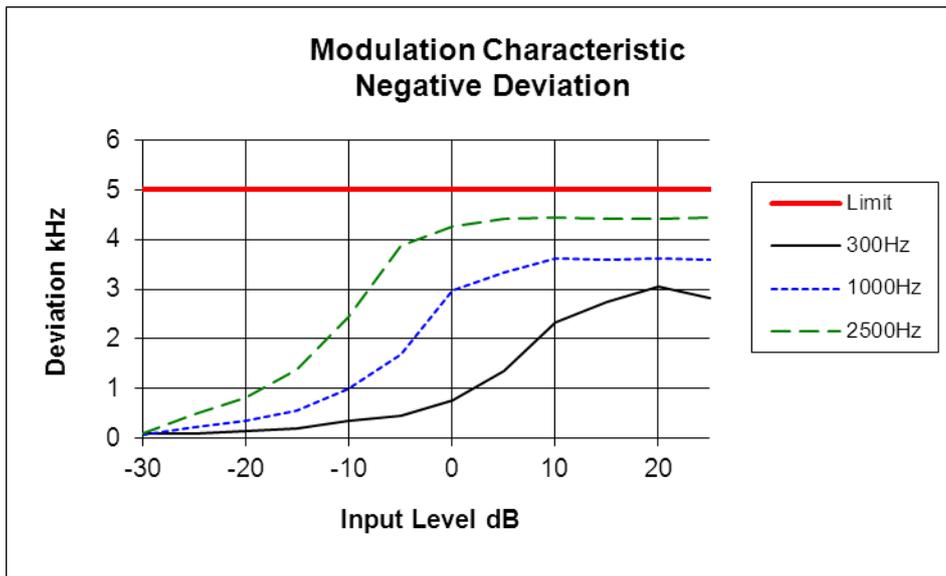
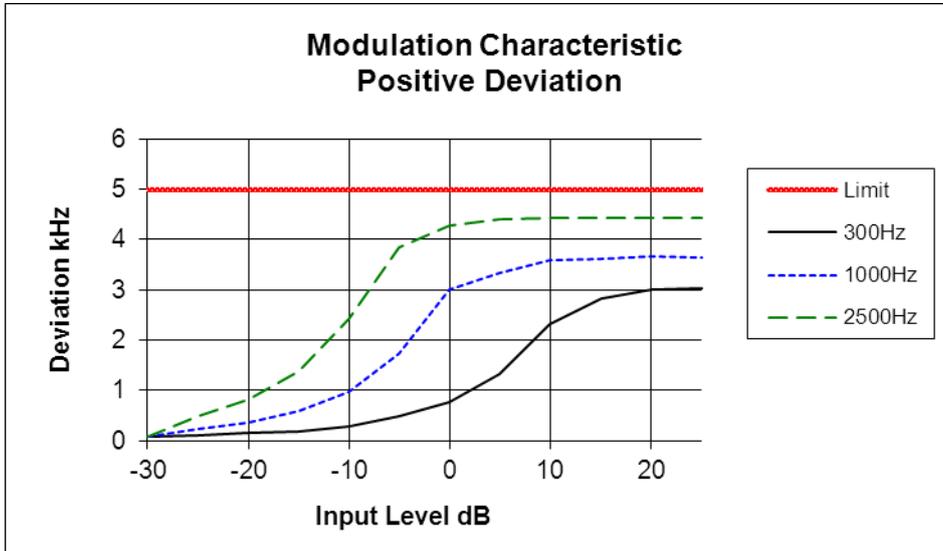


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 429.9 MHz

25.0 kHz Channel Spacing

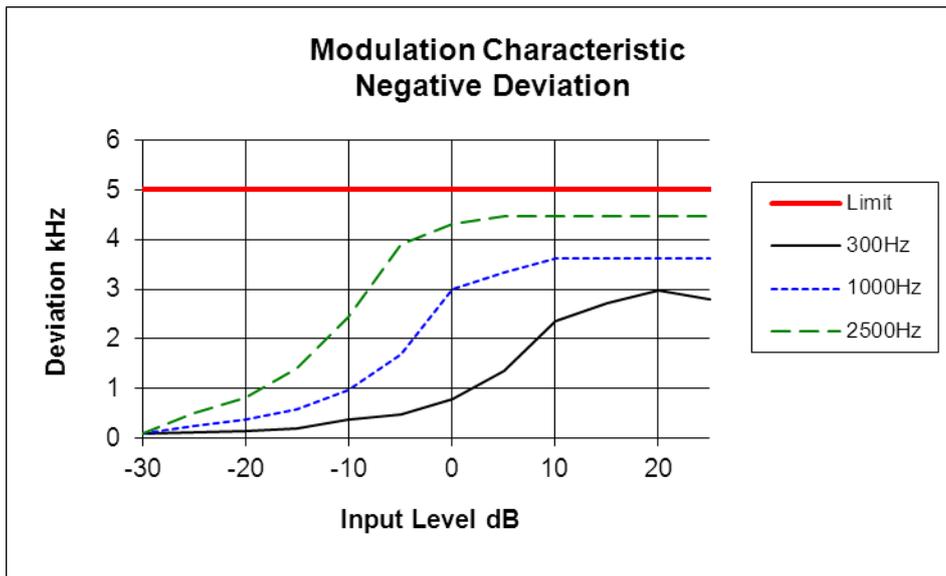
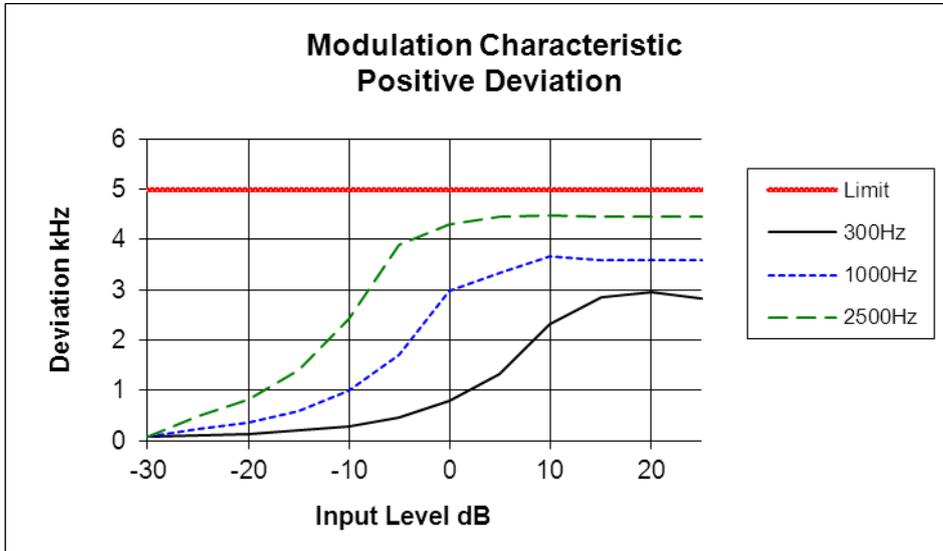


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 450.1 MHz

25.0 kHz Channel Spacing

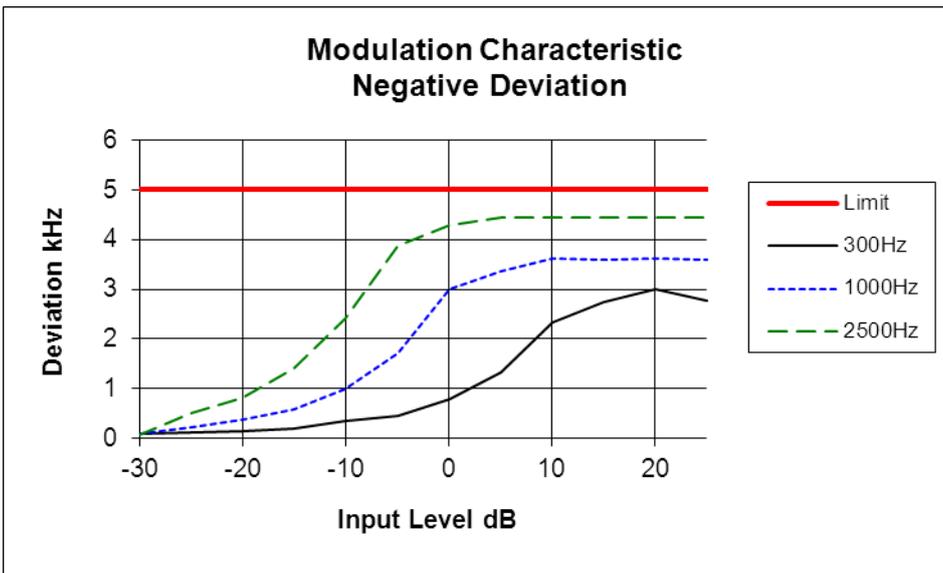
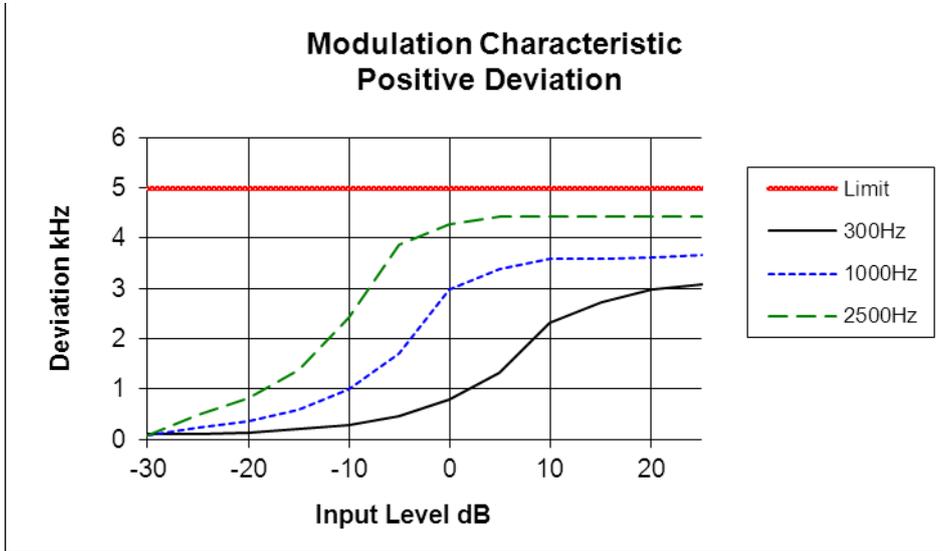


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 459.9 MHz

25.0 kHz Channel Spacing

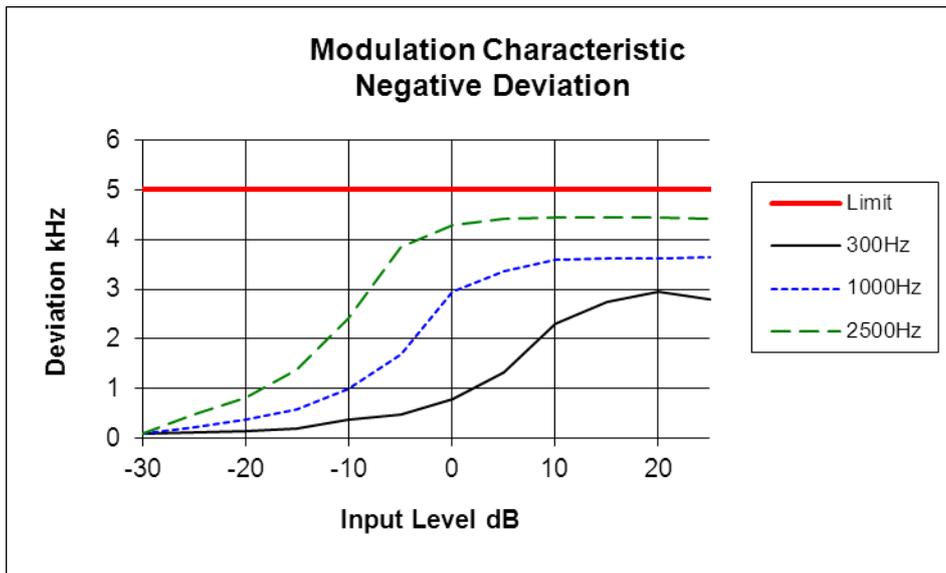
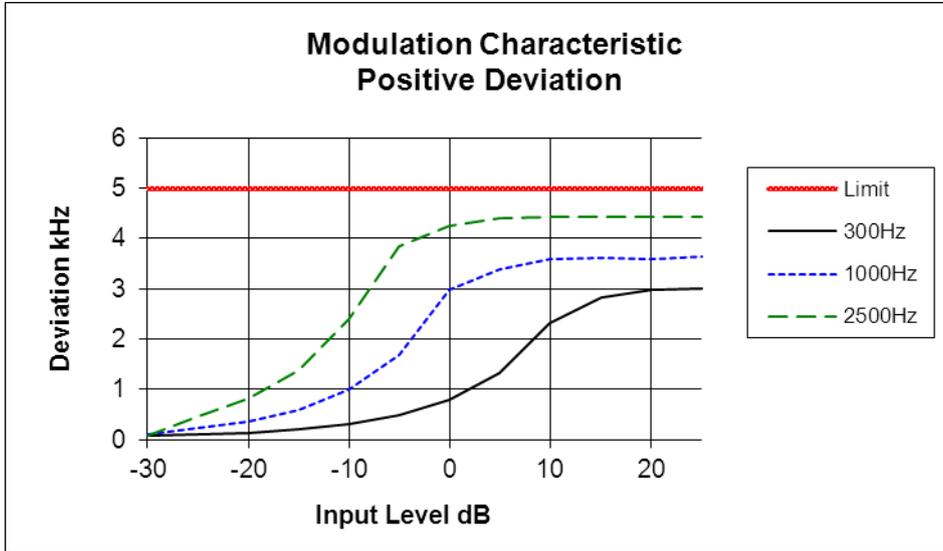


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 469.9 MHz

25.0 kHz Channel Spacing



OCCUPIED BANDWIDTH AND SPECTRUM MASKS

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

GUIDE: TIA/EIA-603D 2.2.11

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 – Resolution bandwidth = 300 Hz, Video Bandwidth = 3 kHz

MEASUREMENT RESULTS:

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

LIMIT CLAUSE: FCC 47 CFR 90.210 RSS-119 5.5

EMISSION MASKS

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

DATA SPEED

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

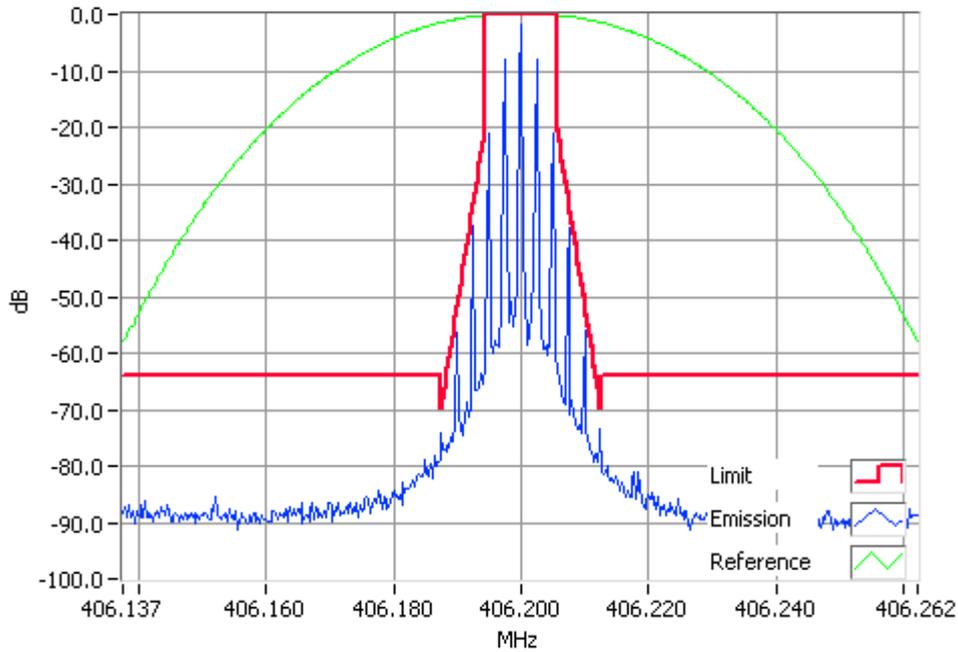
Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

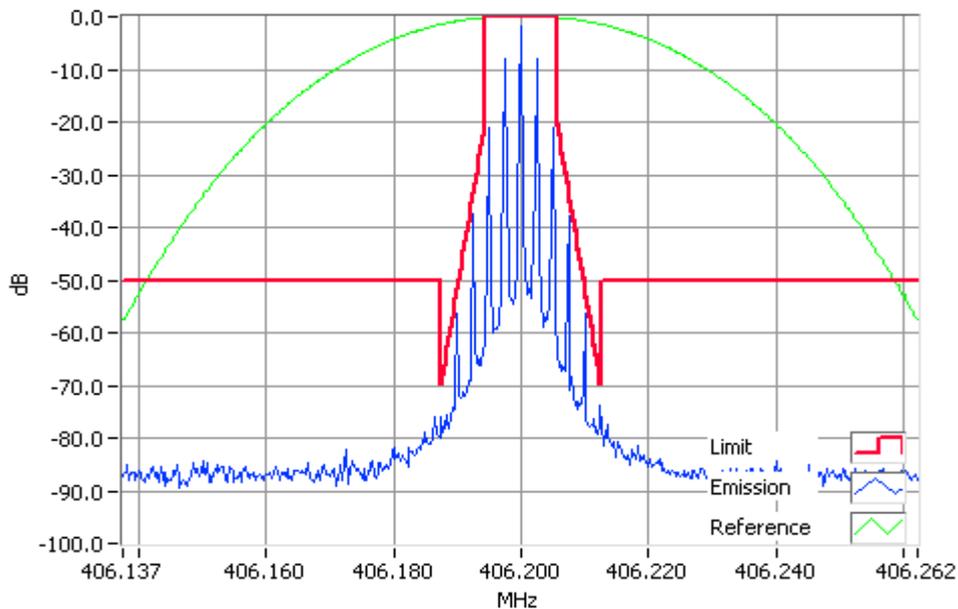
RSS-119 5.5

Tx FREQUENCY: 406.2 MHz 25 W 12.5 kHz Channel Spacing



Analogue Modulation 406.2000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 406.2 MHz 1 W 12.5 kHz Channel Spacing



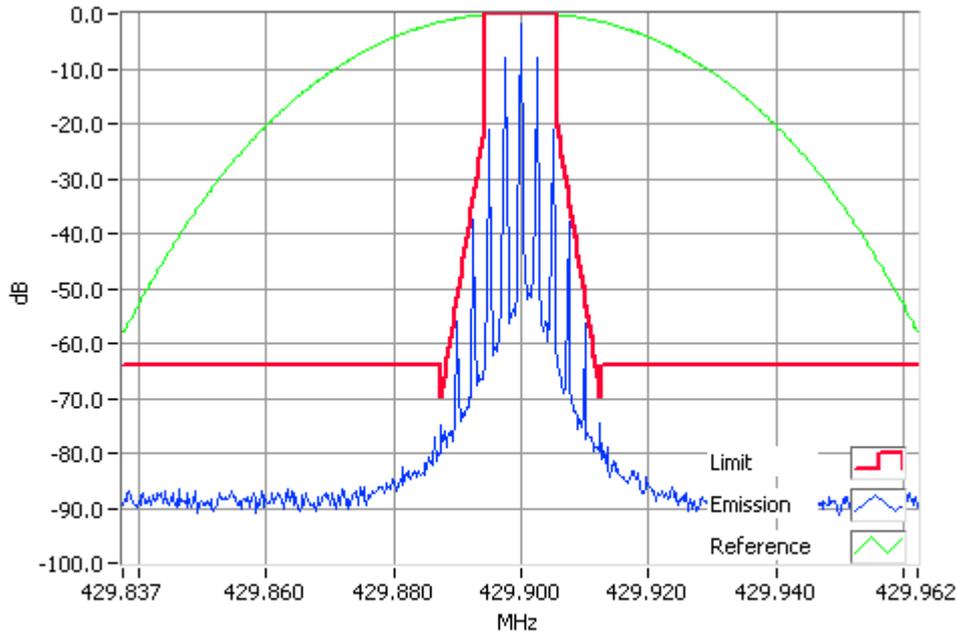
Analogue Modulation 406.2000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

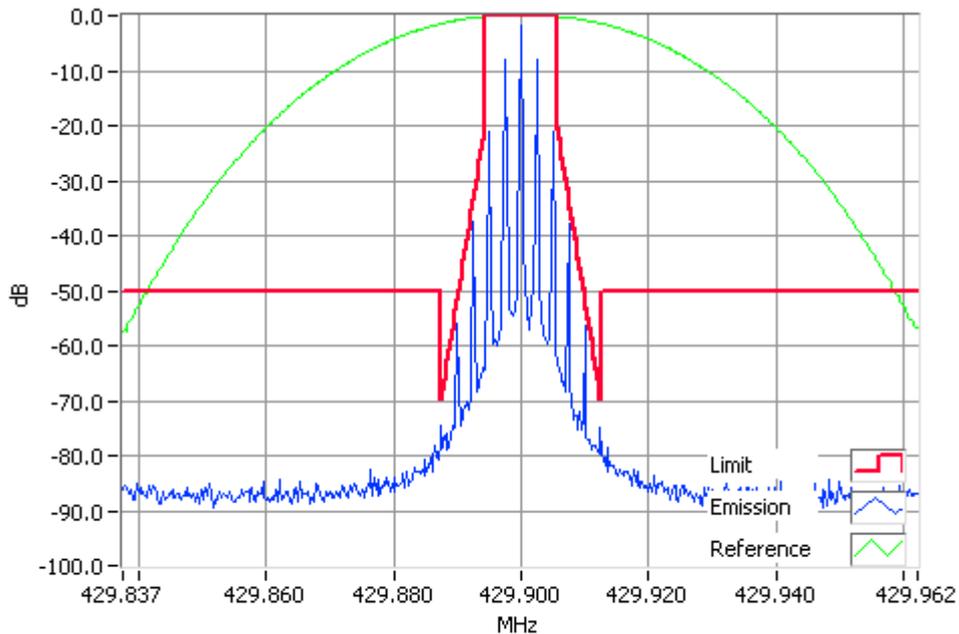
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 429.9 MHz 25 W 12.5 kHz Channel Spacing



Analogue Modulation 429.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 429.9 MHz 1 W 12.5 kHz Channel Spacing



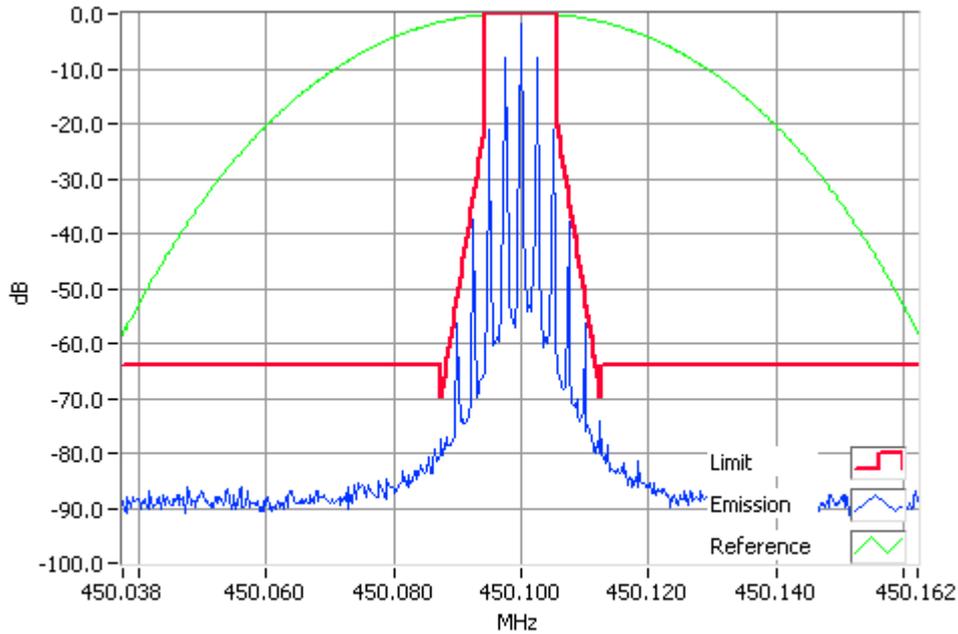
Analogue Modulation 429.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

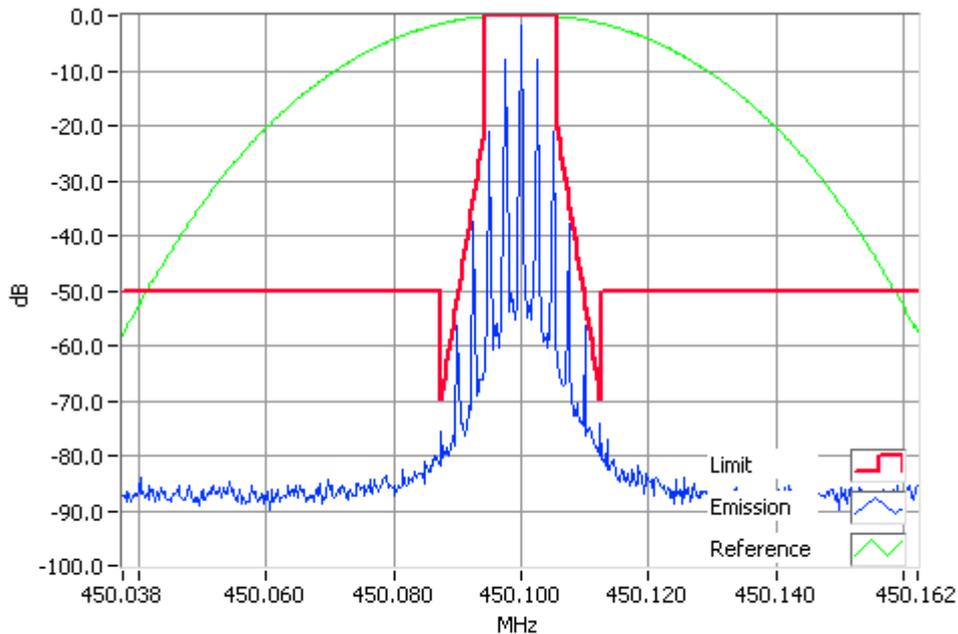
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 450.1 MHz 25 W 12.5 kHz Channel Spacing



Analogue Modulation 450.1000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 450.1 MHz 1 W 12.5 kHz Channel Spacing



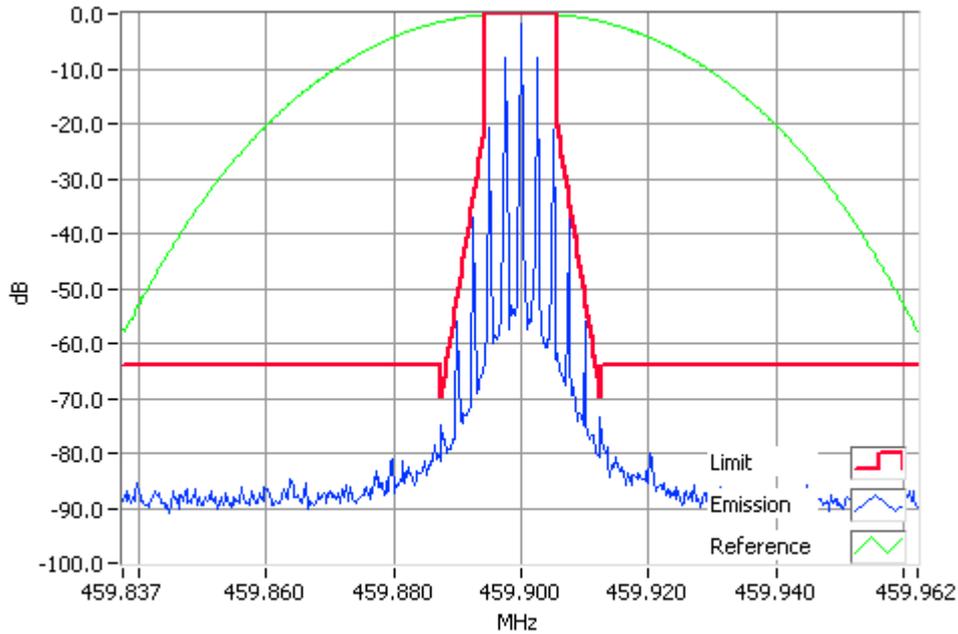
Analogue Modulation 450.1000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

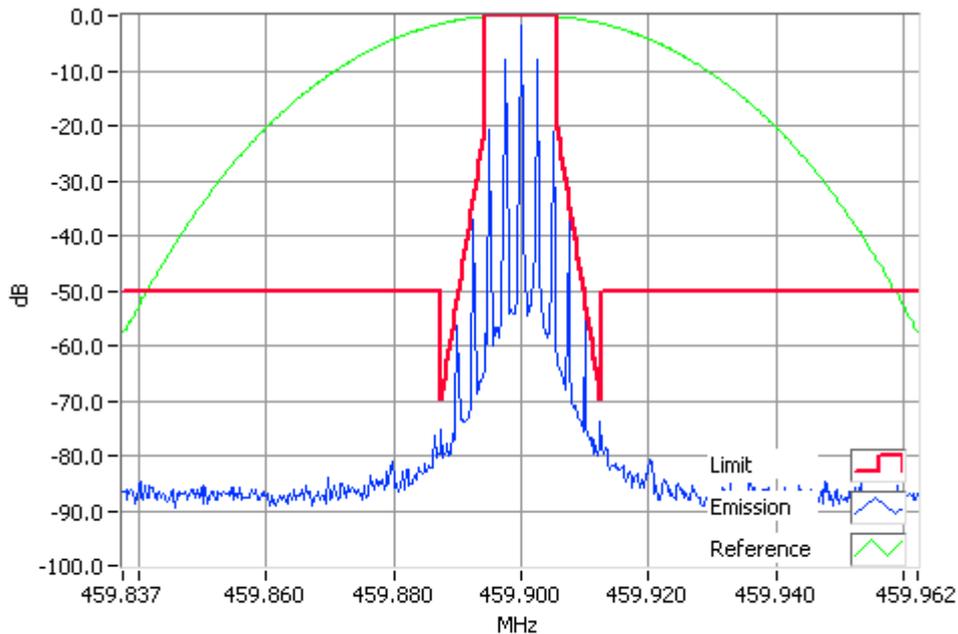
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 459.9 MHz 25 W 12.5 kHz Channel Spacing



Analogue Modulation 459.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 459.9 MHz 1 W 12.5 kHz Channel Spacing



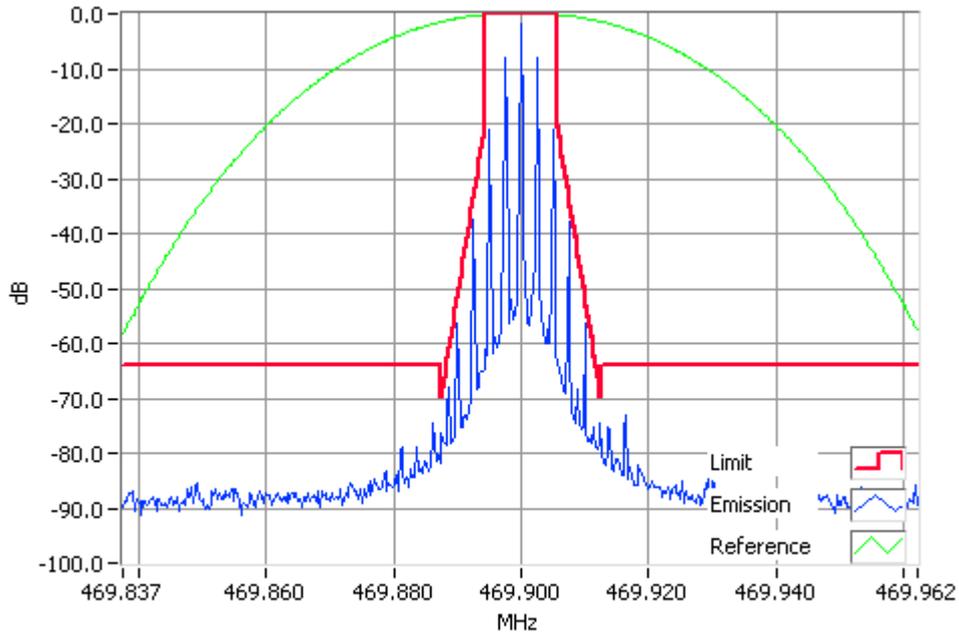
Analogue Modulation 459.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

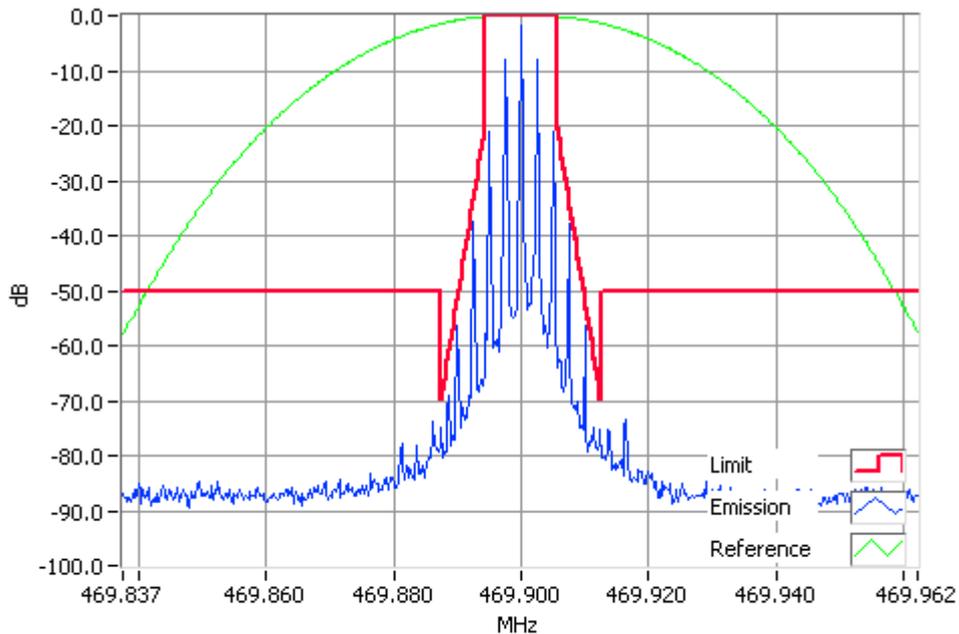
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 469.9 MHz 25 W 12.5 kHz Channel Spacing



Analogue Modulation 469.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 469.9 MHz 1 W 12.5 kHz Channel Spacing



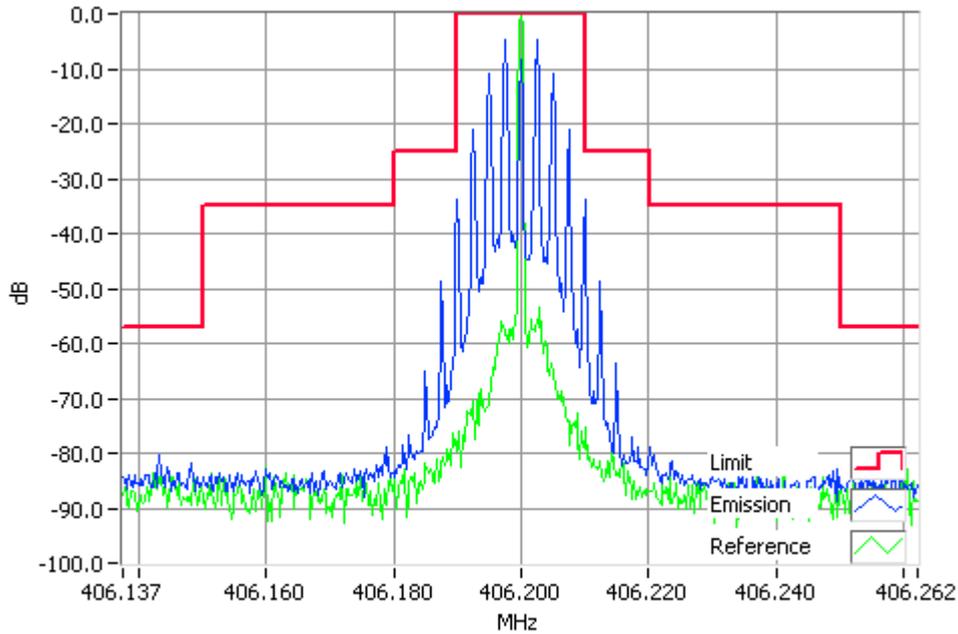
Analogue Modulation 469.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

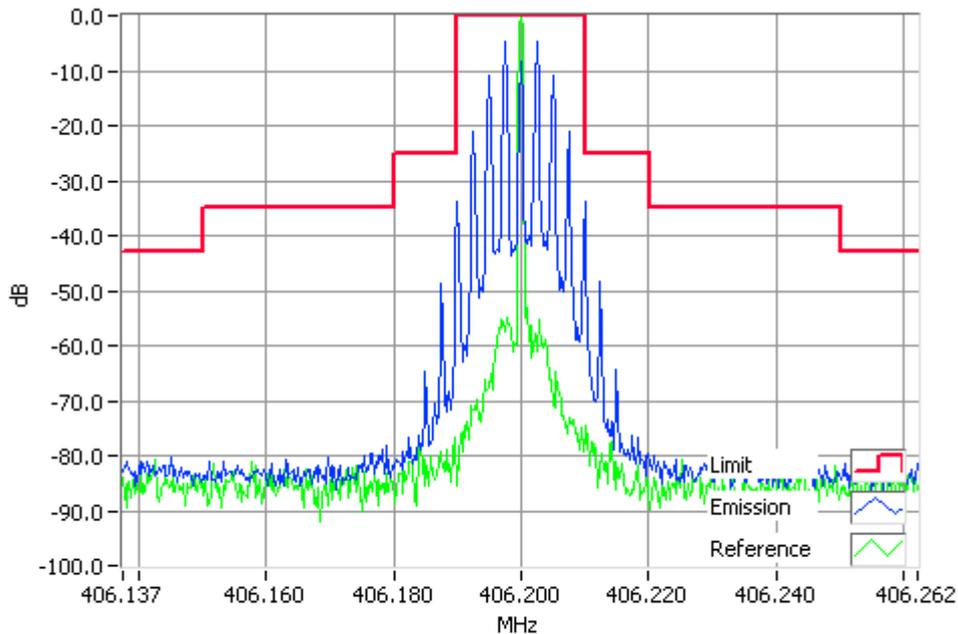
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 406.2 MHz 25 W 25.0 kHz Channel Spacing



Analogue Modulation 406.2000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 406.2 MHz 1 W 25.0 kHz Channel Spacing



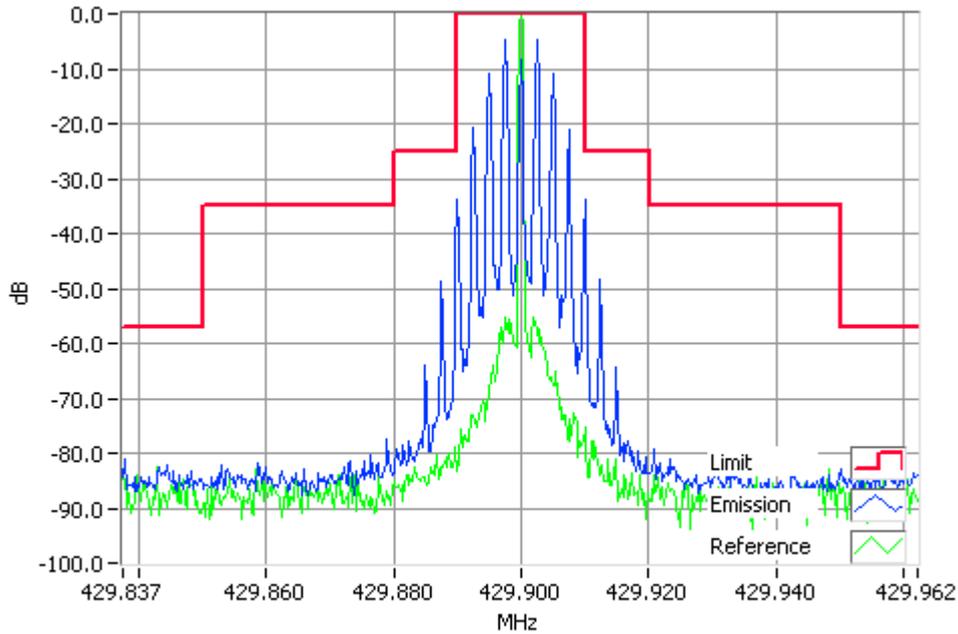
Analogue Modulation 406.2000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

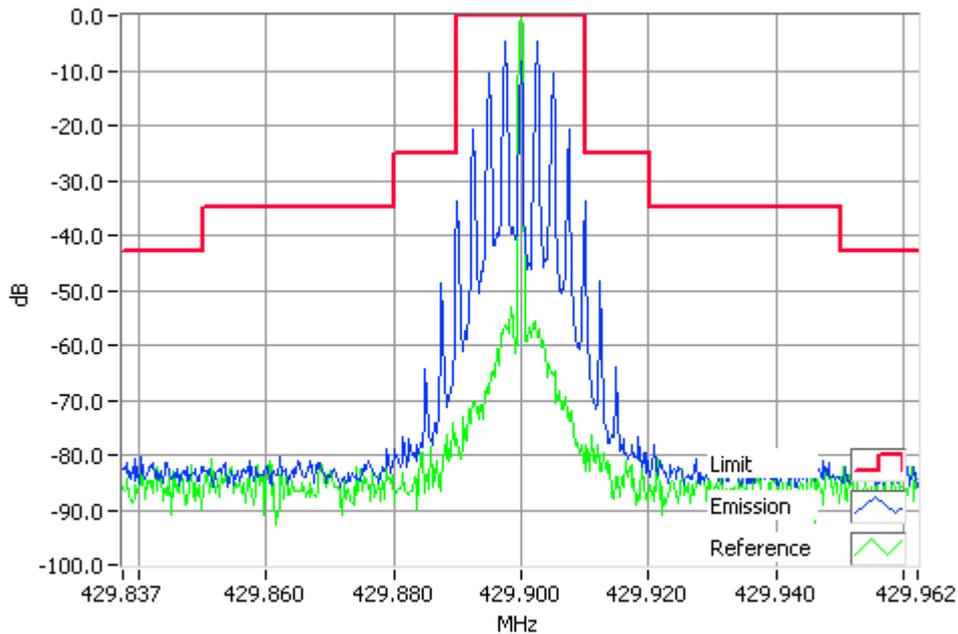
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 429.9 MHz 25 W 25.0 kHz Channel Spacing



Analogue Modulation 429.9000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 429.9 MHz 1 W 25.0 kHz Channel Spacing



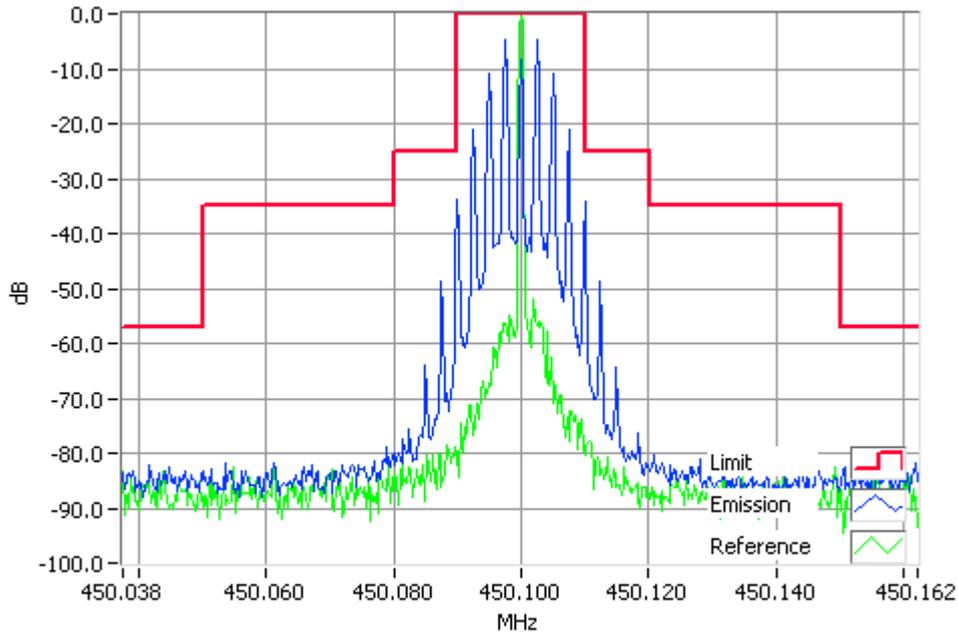
Analogue Modulation 429.9000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

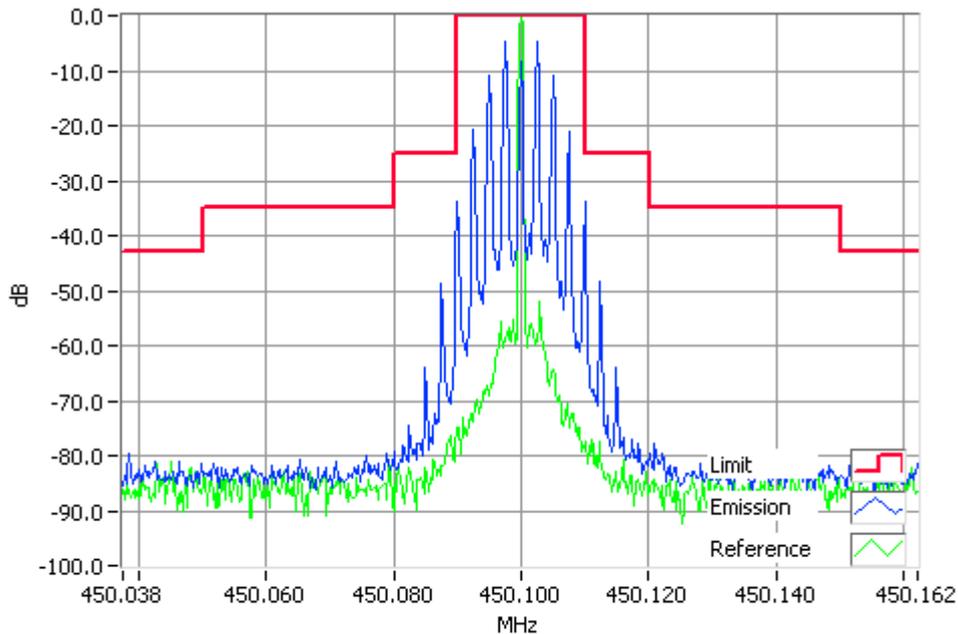
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 450.1 MHz 25 W 25.0 kHz Channel Spacing



Analogue Modulation 450.1000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 450.1 MHz 1 W 25.0 kHz Channel Spacing



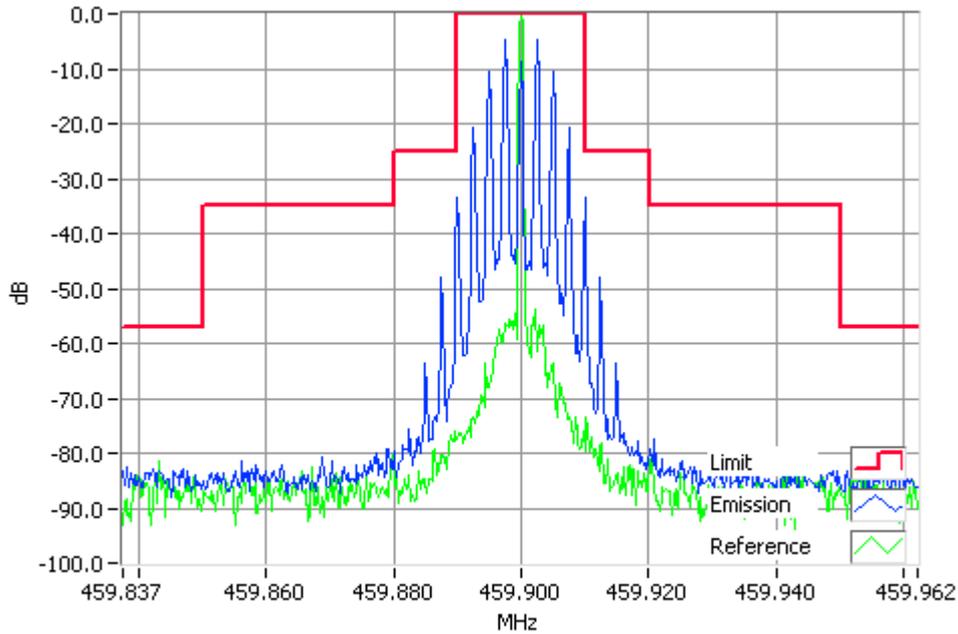
Analogue Modulation 450.1000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

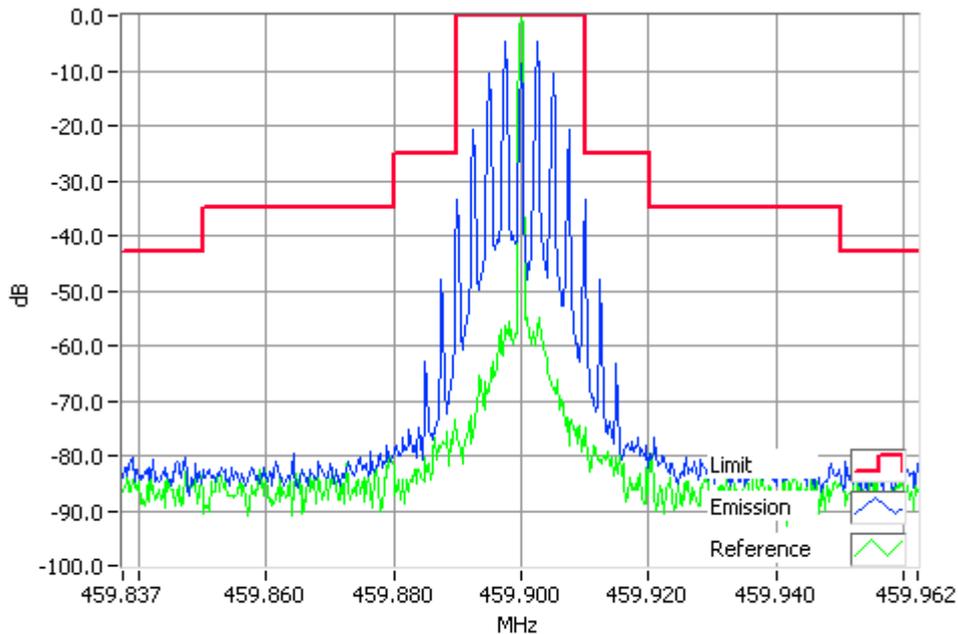
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 459.9 MHz 25 W 25.0 kHz Channel Spacing



Analogue Modulation 459.9000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 459.9 MHz 1 W 25.0 kHz Channel Spacing



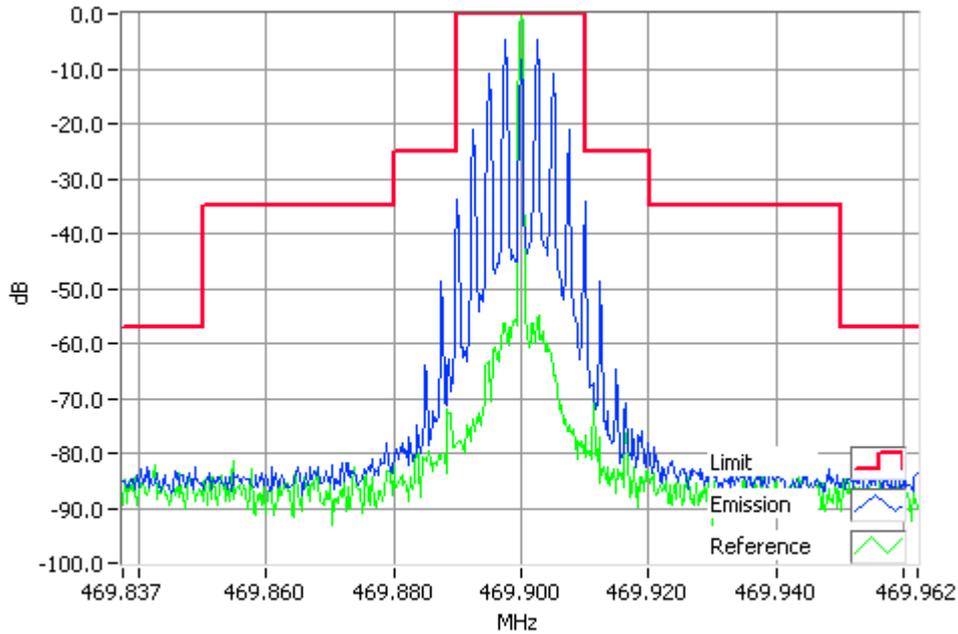
Analogue Modulation 459.9000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

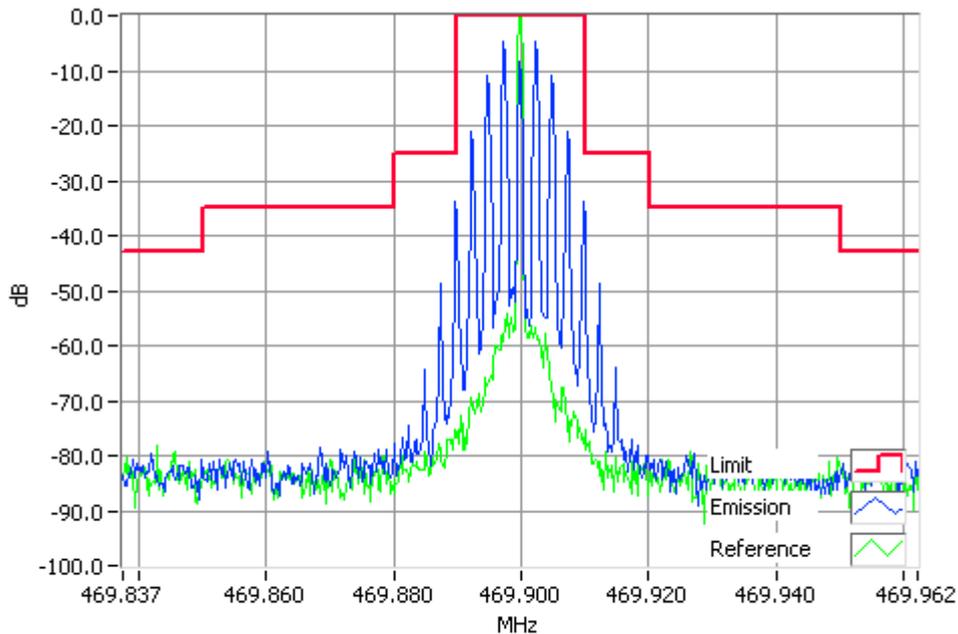
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 469.9 MHz 25 W 25.0 kHz Channel Spacing



Analogue Modulation 469.9000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 469.9 MHz 1 W 25.0 kHz Channel Spacing



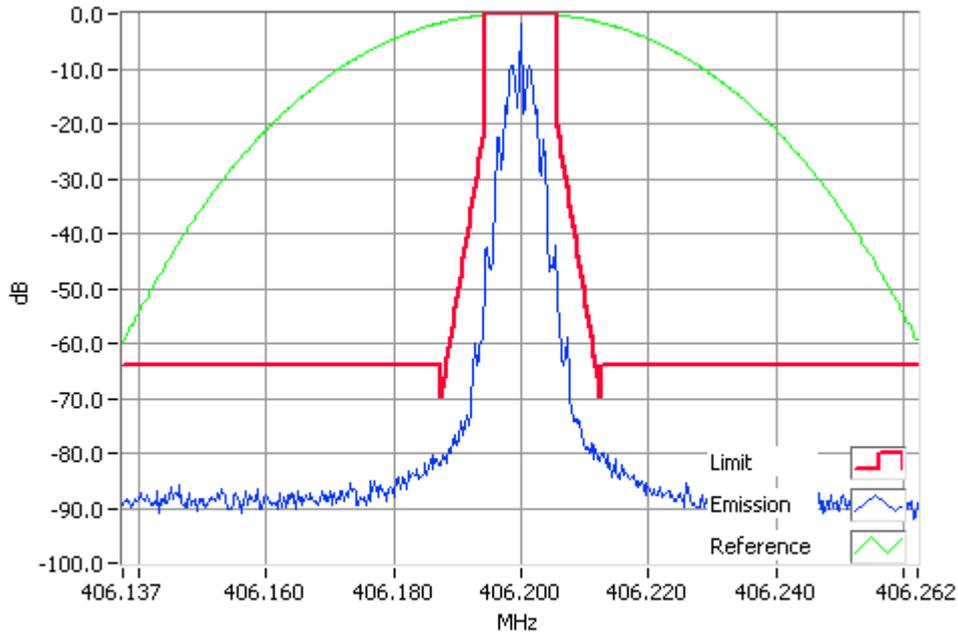
Analogue Modulation 469.9000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 1200 bps

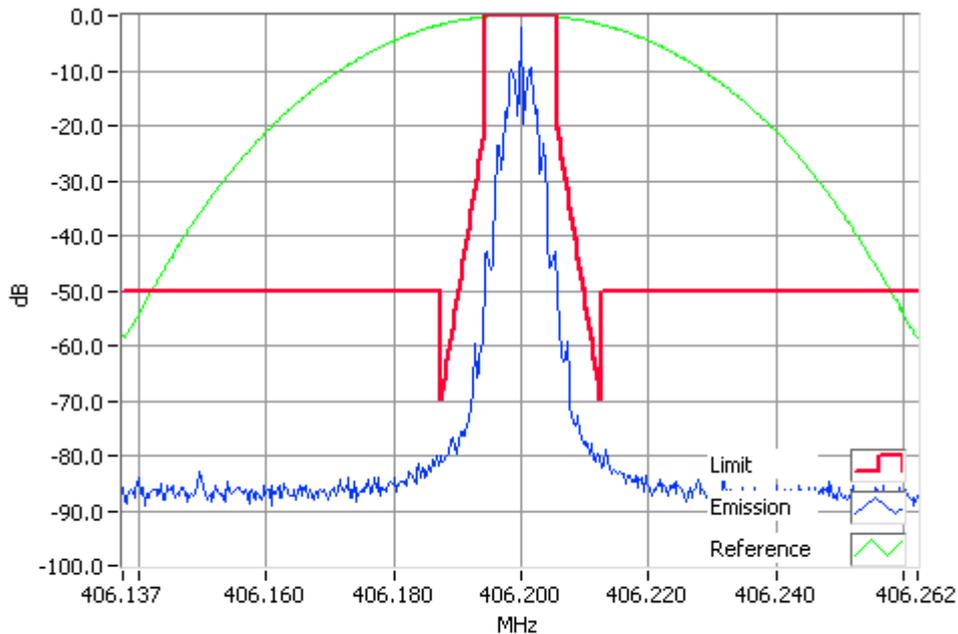
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 406.2 MHz 25 W 12.5 kHz Channel Spacing



FFSK 1200 406.2000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 406.2 MHz 1 W 12.5 kHz Channel Spacing



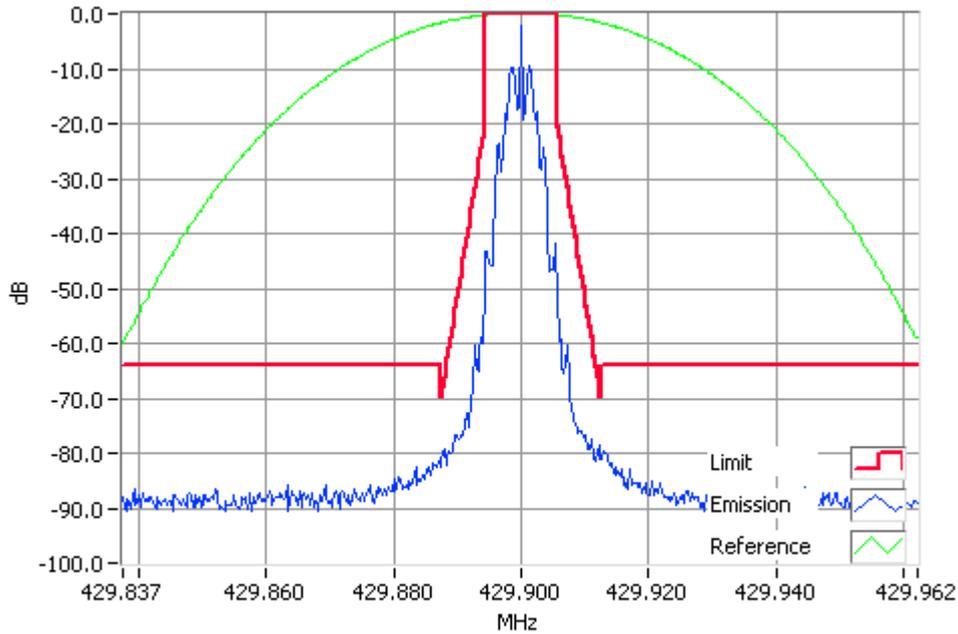
FFSK 1200 406.2000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 1200 bps

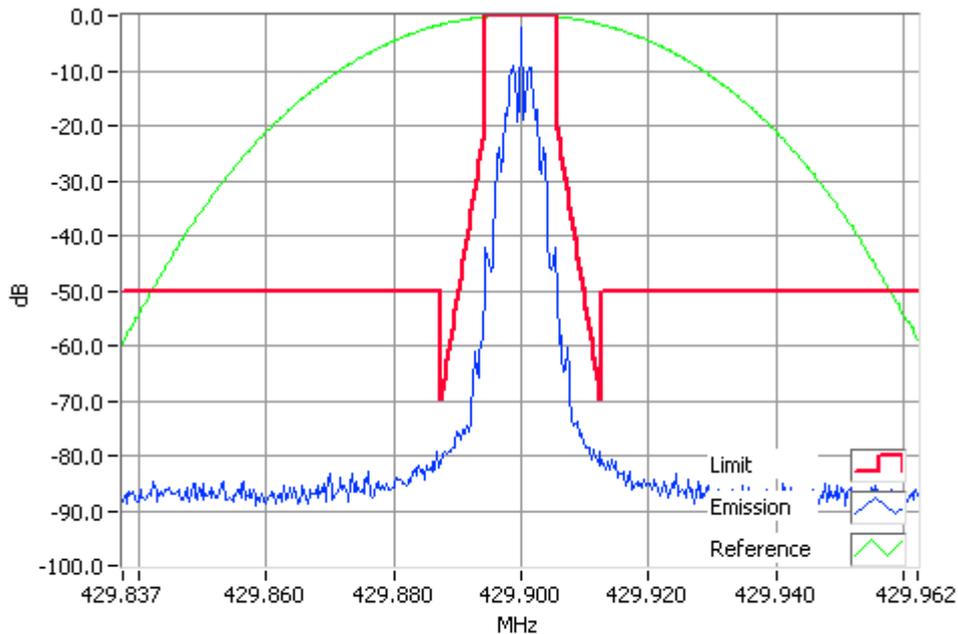
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 429.9 MHz 25 W 12.5 kHz Channel Spacing



FFSK 1200 429.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 429.9 MHz 1 W 12.5 kHz Channel Spacing



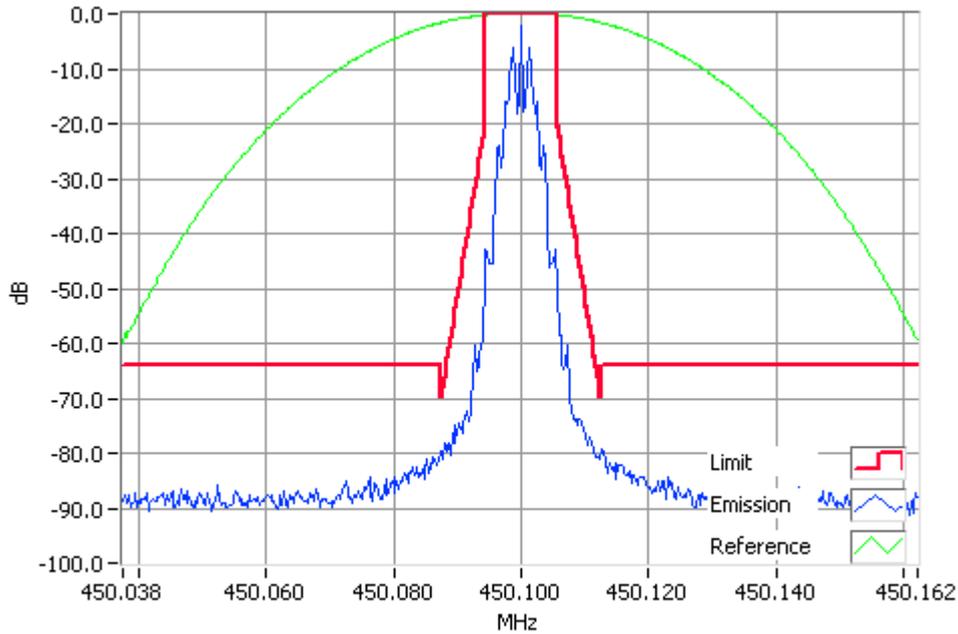
FFSK 1200 429.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 1200 bps

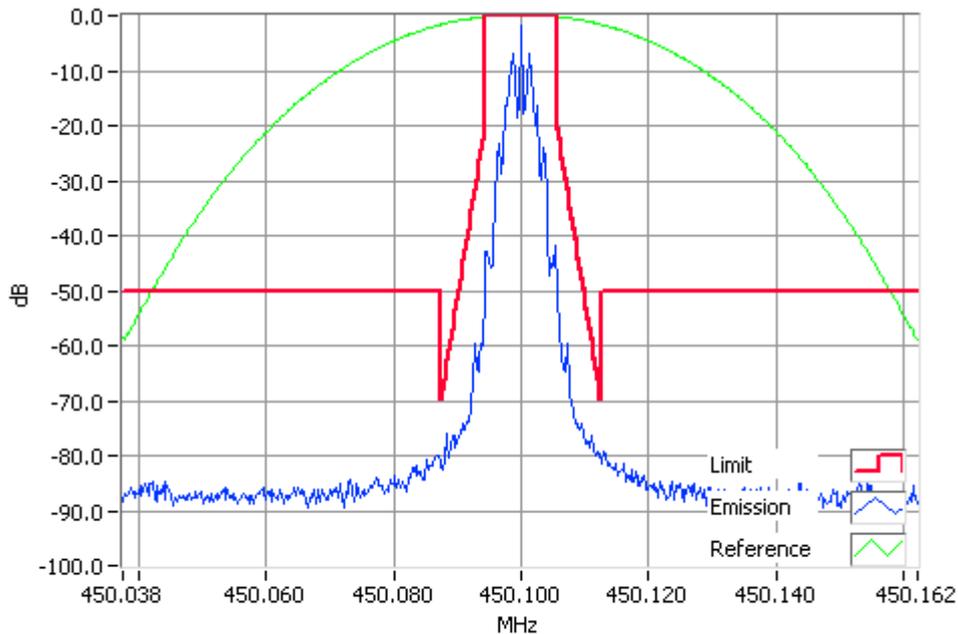
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 450.1 MHz 25 W 12.5 kHz Channel Spacing



FFSK 1200 450.1000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 450.1 MHz 1 W 12.5 kHz Channel Spacing



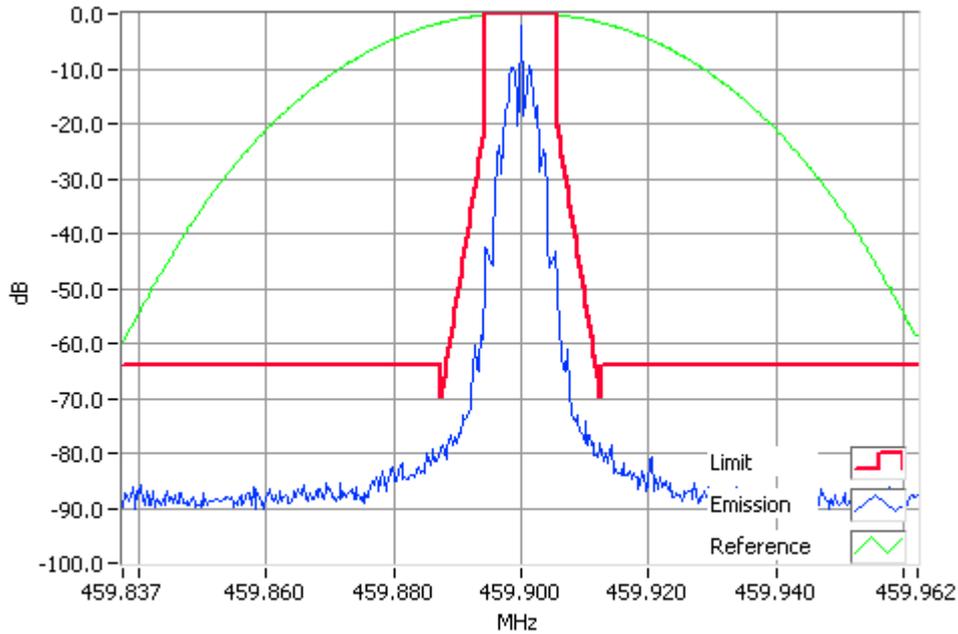
FFSK 1200 450.1000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 1200 bps

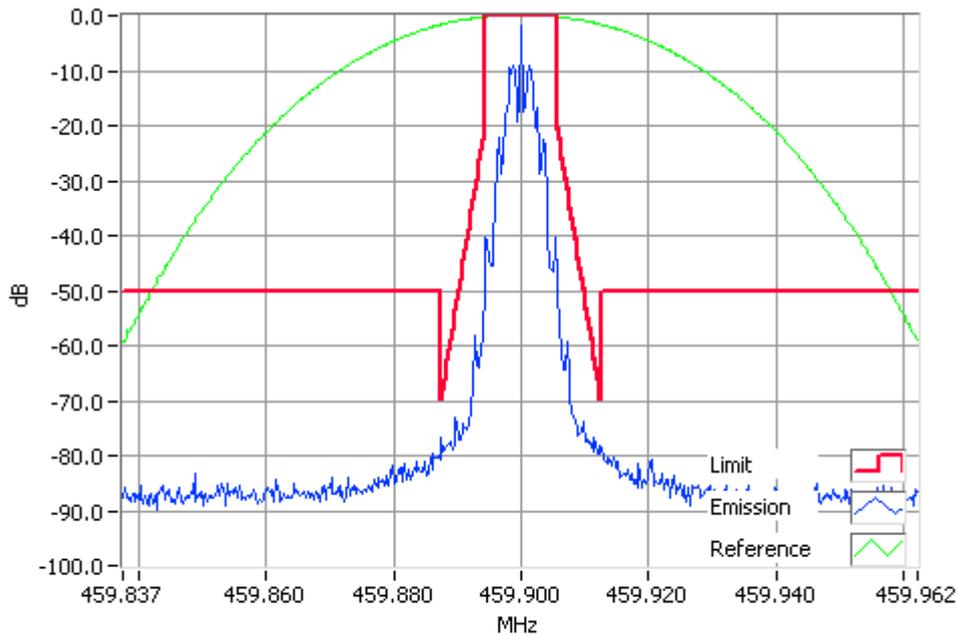
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 459.9 MHz 25 W 12.5 kHz Channel Spacing



FFSK 1200 459.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 459.9 MHz 1 W 12.5 kHz Channel Spacing



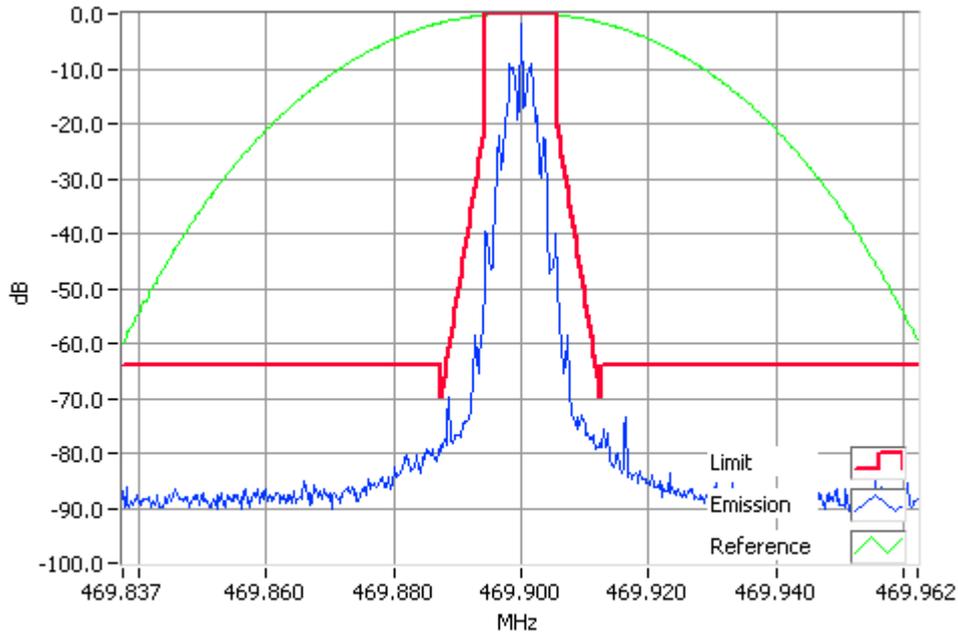
FFSK 1200 459.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 1200 bps

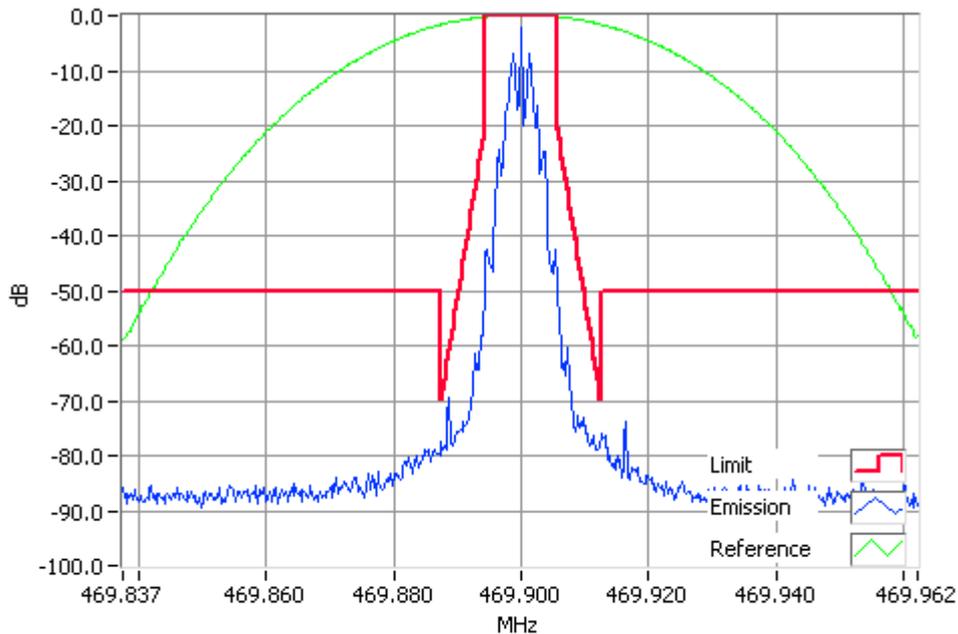
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 469.9 MHz 25 W 12.5 kHz Channel Spacing



FFSK 1200 469.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 469.9 MHz 1 W 12.5 kHz Channel Spacing



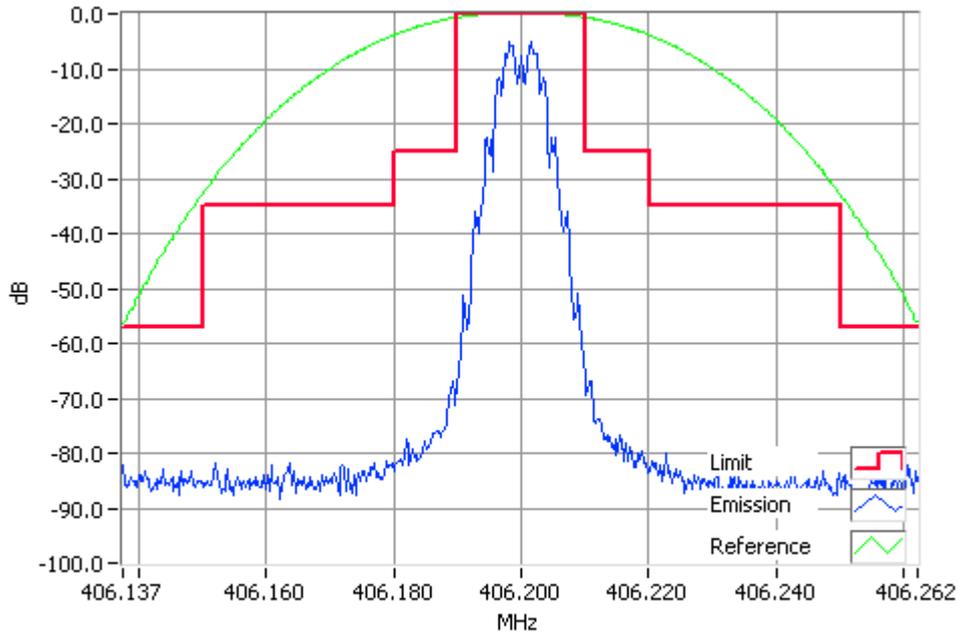
FFSK 1200 469.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 1200 bps

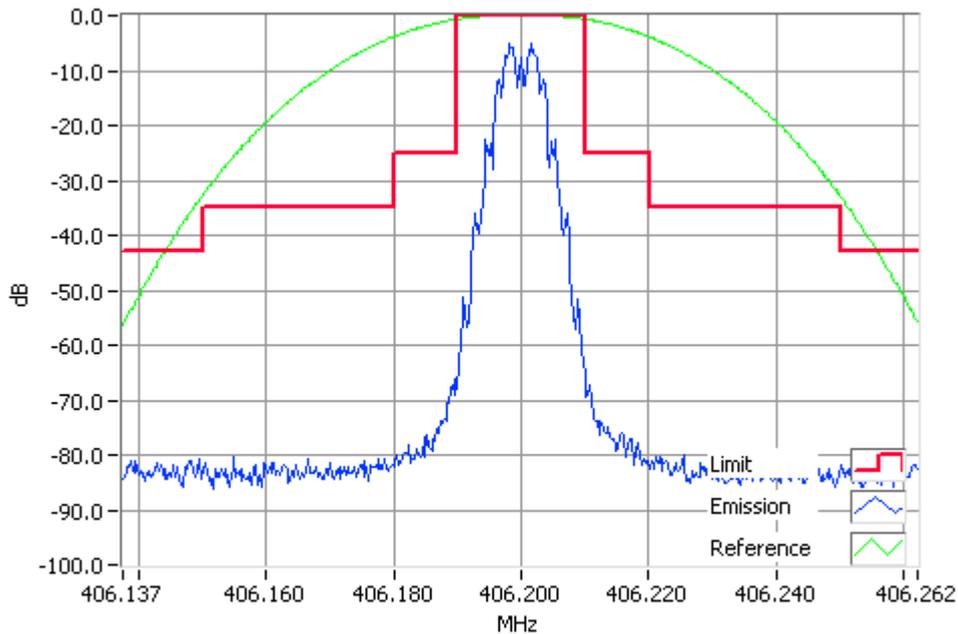
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 406.2 MHz 25 W 25.0 kHz Channel Spacing



FFSK 1200 406.2000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 406.2 MHz 1 W 25.0 kHz Channel Spacing



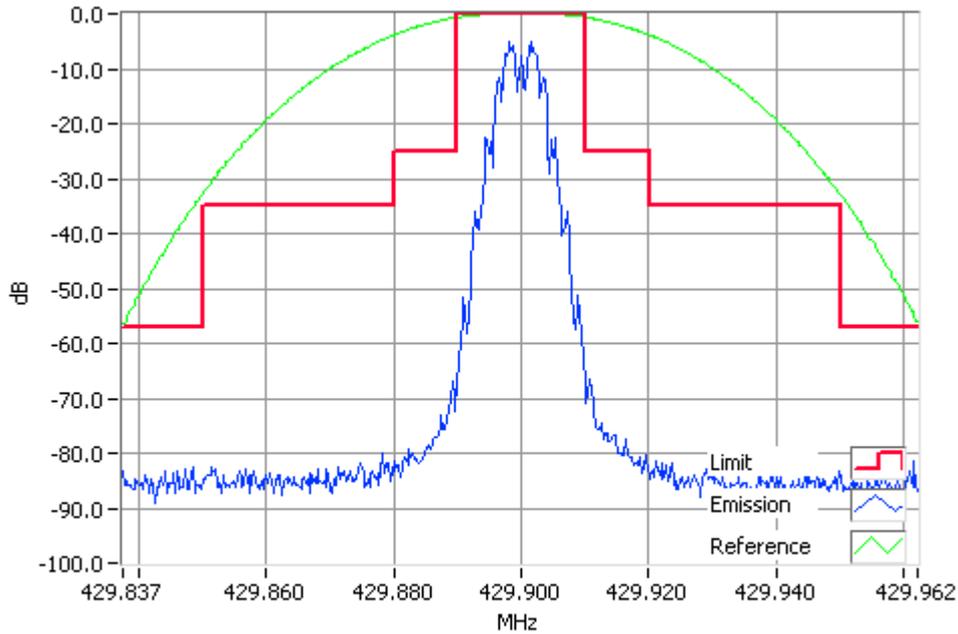
FFSK 1200 406.2000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 1200 bps

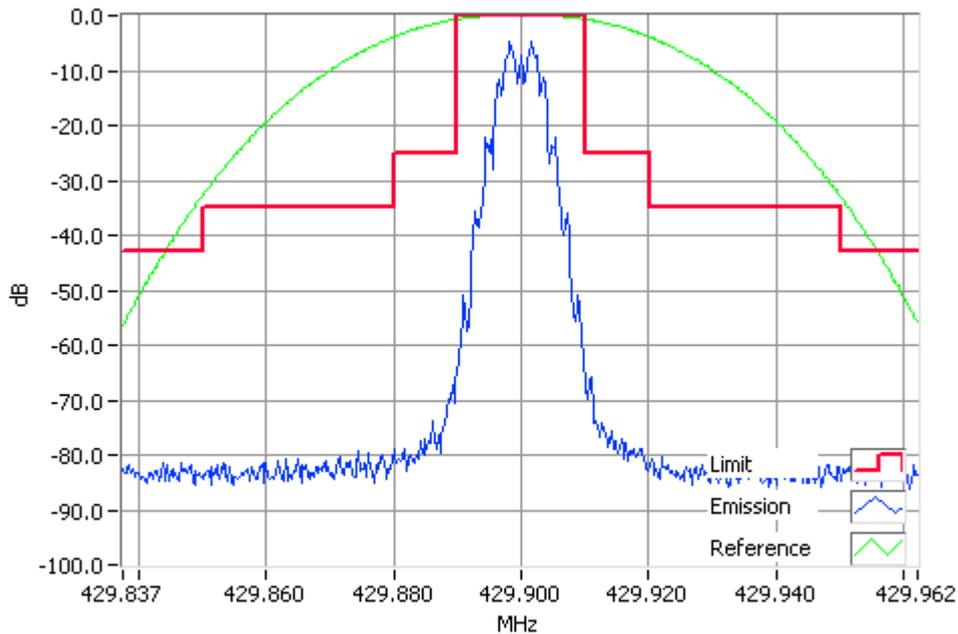
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 429.9 MHz 25 W 25.0 kHz Channel Spacing



FFSK 1200 429.9000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 429.9 MHz 1 W 25.0 kHz Channel Spacing



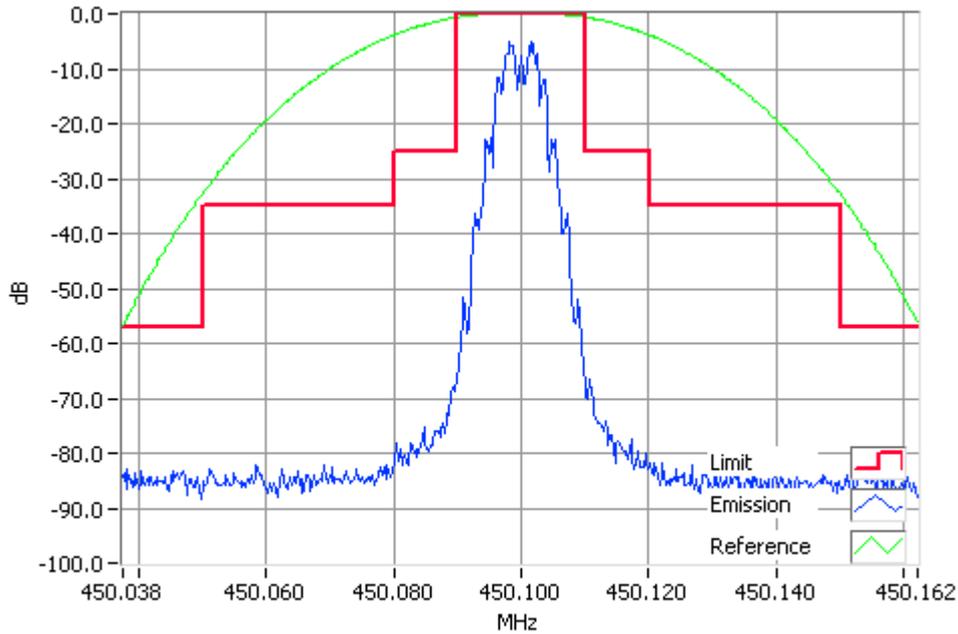
FFSK 1200 429.9000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 1200 bps

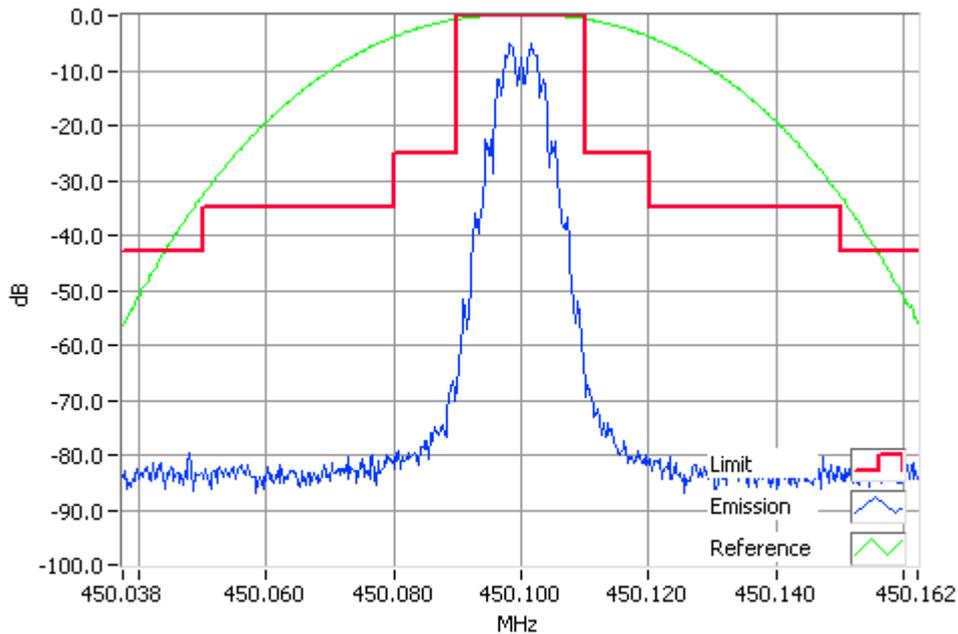
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 450.1 MHz 25 W 25.0 kHz Channel Spacing



FFSK 1200 450.1000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 450.1 MHz 1 W 25.0 kHz Channel Spacing



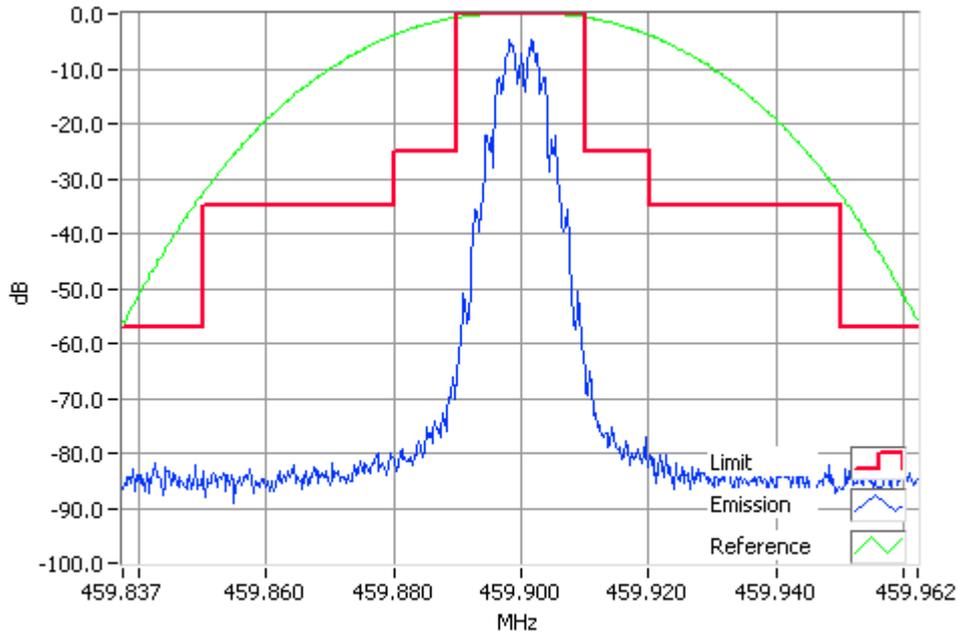
FFSK 1200 450.1000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 1200 bps

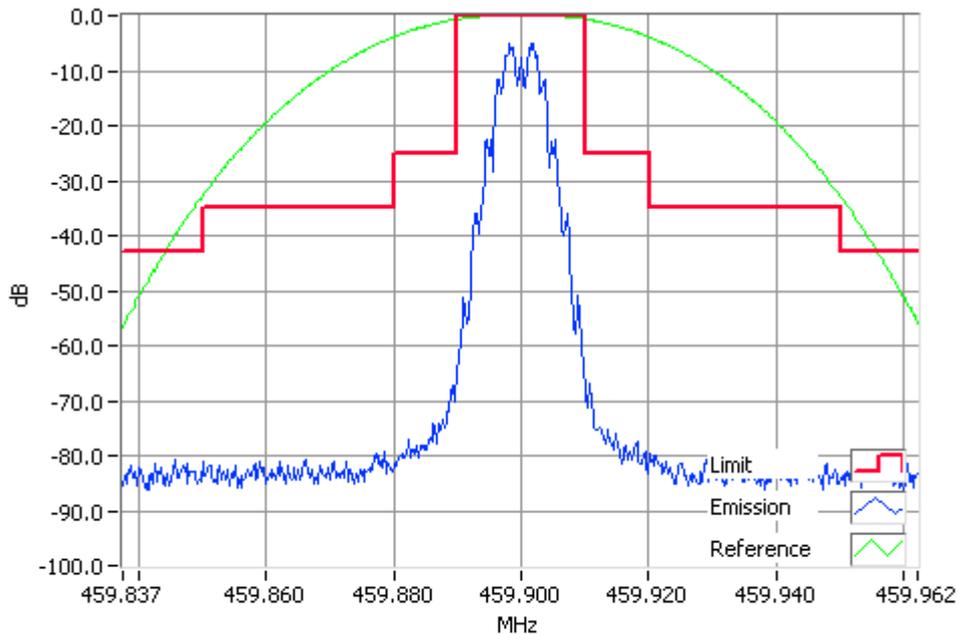
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 459.9 MHz 25 W 25.0 kHz Channel Spacing



FFSK 1200 459.9000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 459.9 MHz 1 W 25.0 kHz Channel Spacing



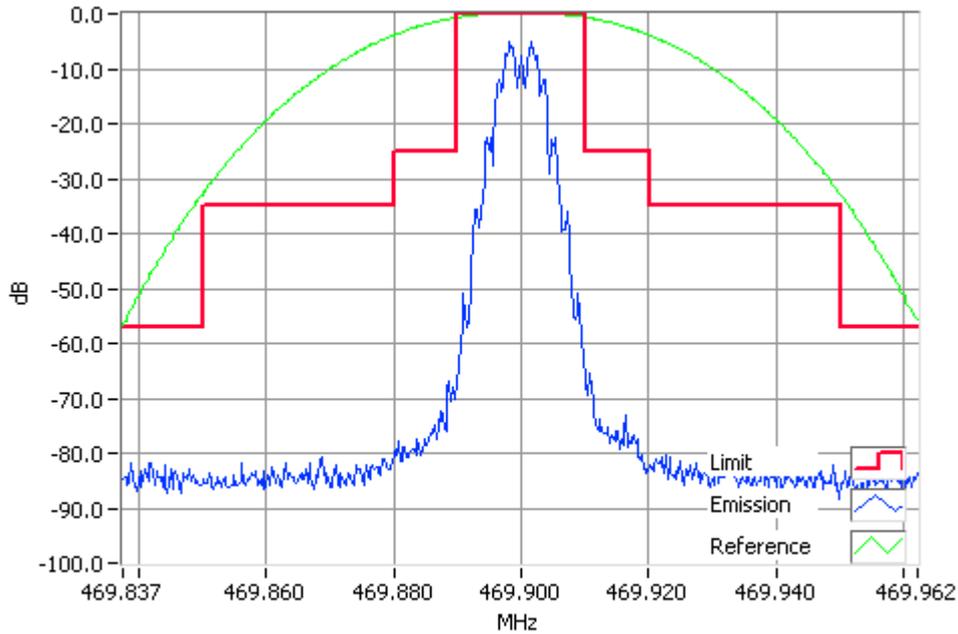
FFSK 1200 459.9000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 1200 bps

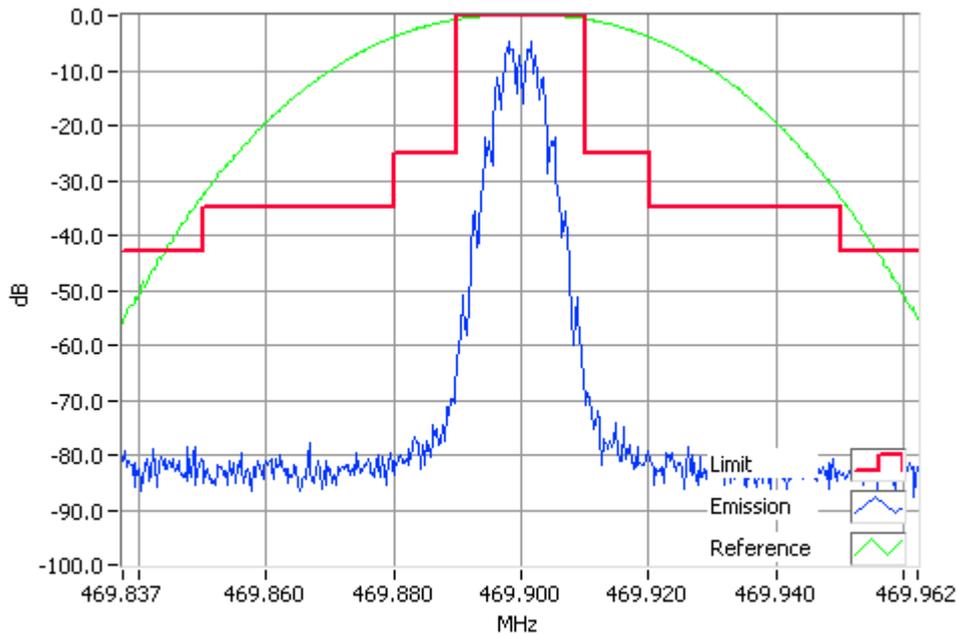
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 469.9 MHz 25 W 25.0 kHz Channel Spacing



FFSK 1200 469.9000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 469.9 MHz 1 W 25.0 kHz Channel Spacing



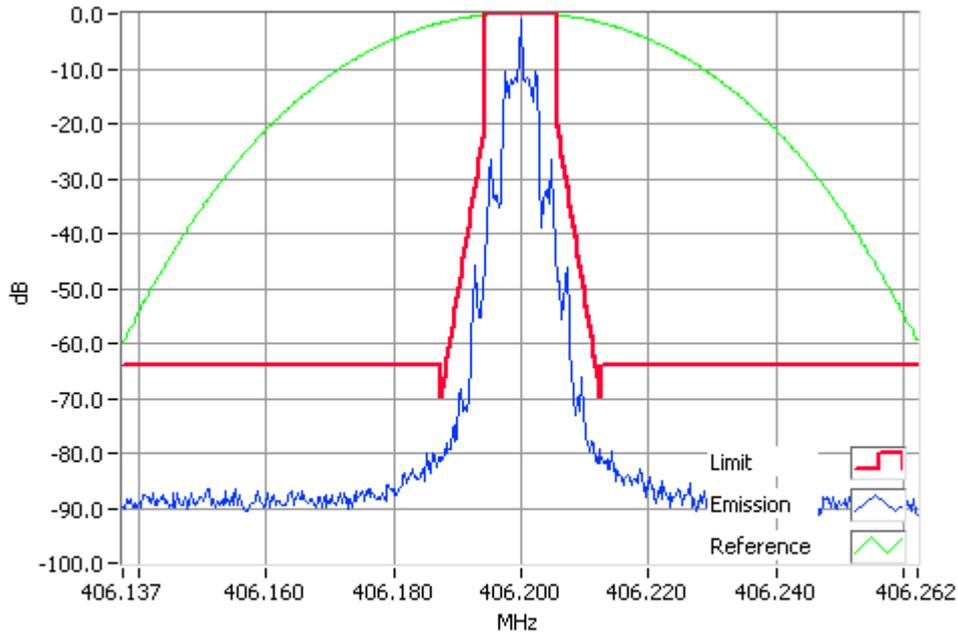
FFSK 469.9000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 2400 bps

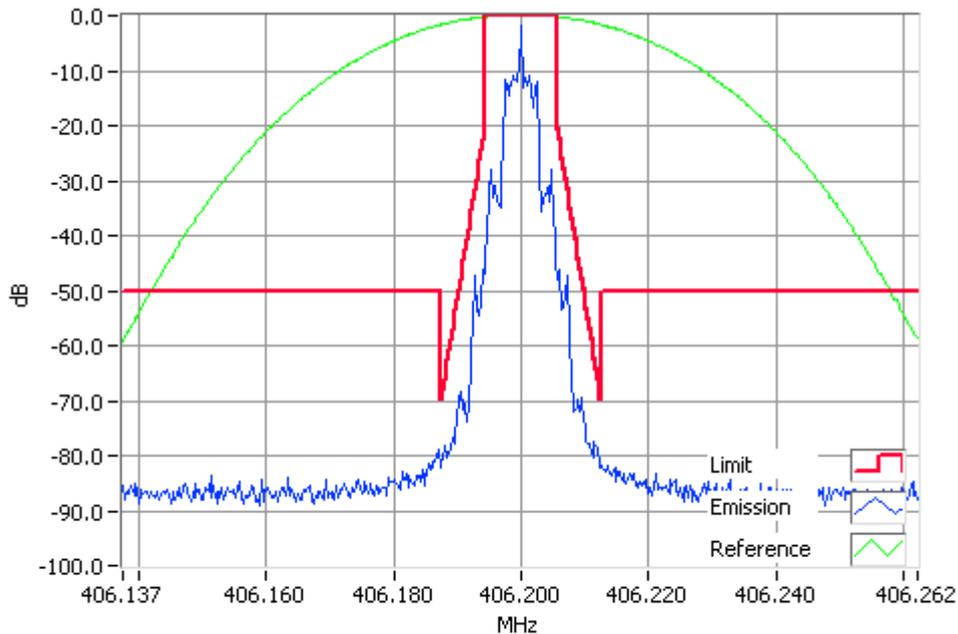
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 406.2 MHz 25 W 12.5 kHz Channel Spacing



FFSK 2400 406.2000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 406.2 MHz 1 W 12.5 kHz Channel Spacing



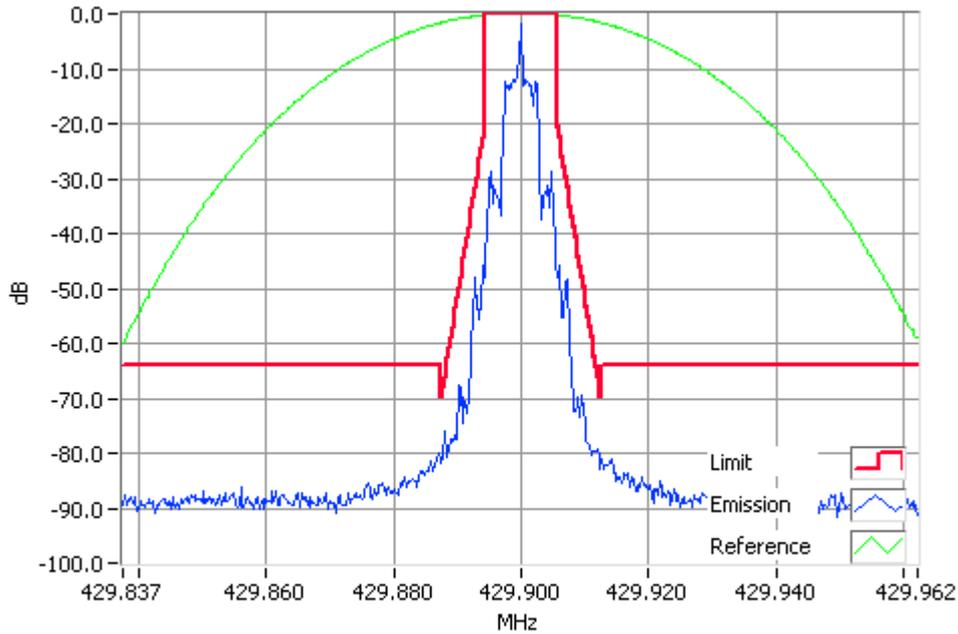
FFSK 2400 406.2000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 2400 bps

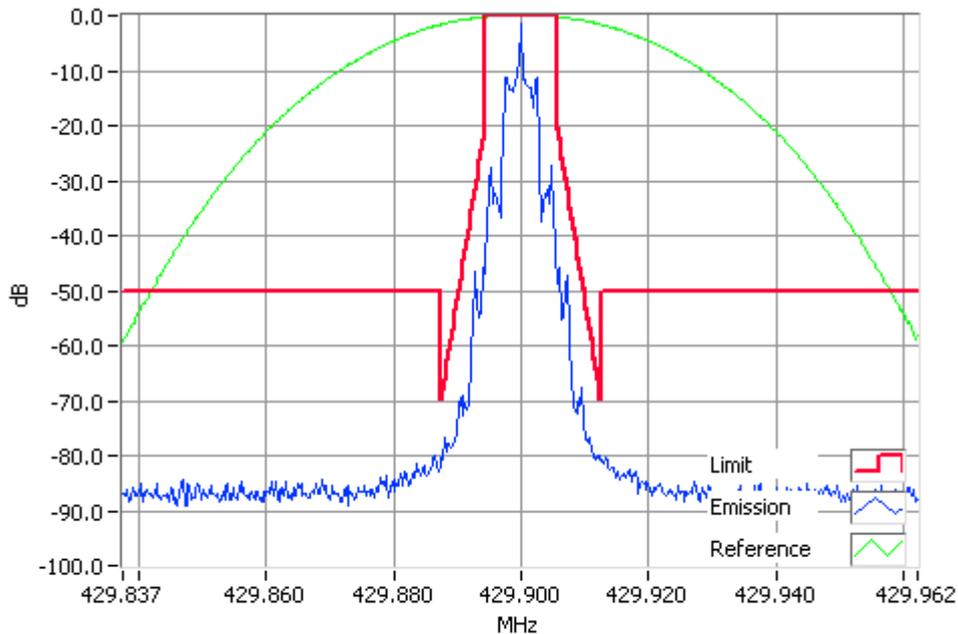
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 429.9 MHz 25 W 12.5 kHz Channel Spacing



FFSK 2400 429.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 429.9 MHz 1 W 12.5 kHz Channel Spacing



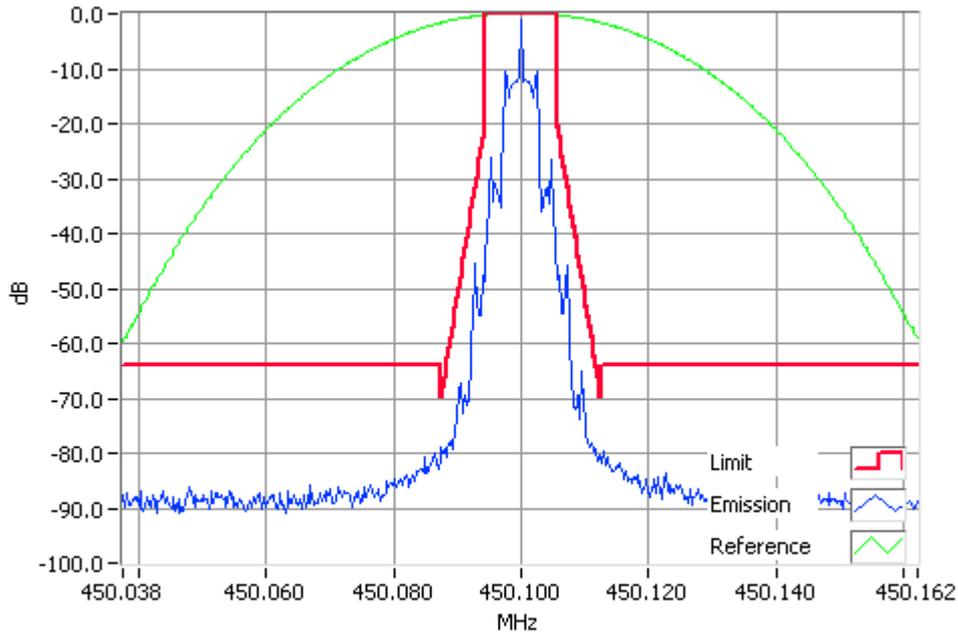
FFSK 2400 429.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 2400 bps

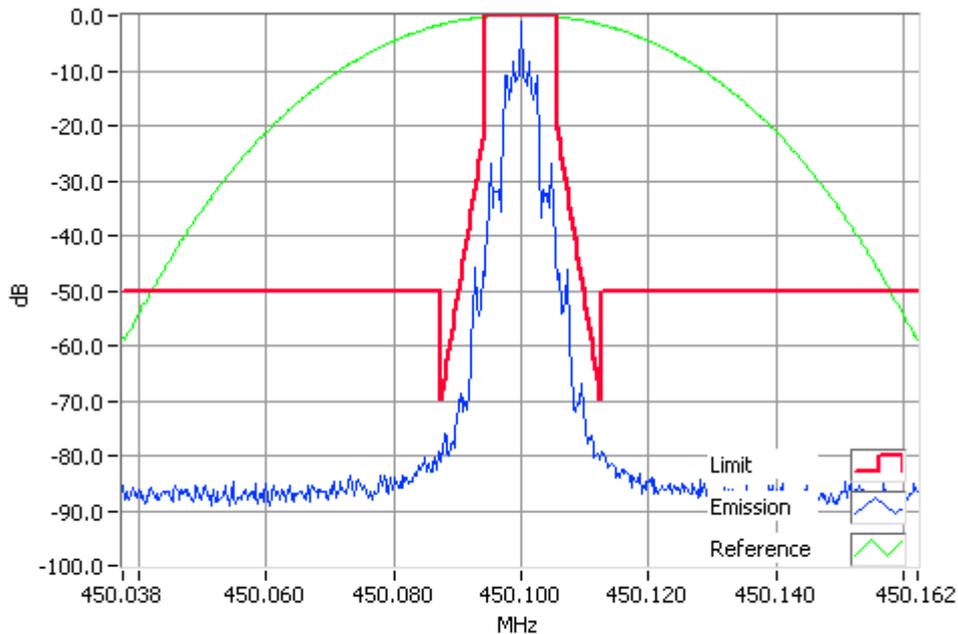
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 450.1 MHz 25 W 12.5 kHz Channel Spacing



FFSK 2400 450.1000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 450.1 MHz 1 W 12.5 kHz Channel Spacing



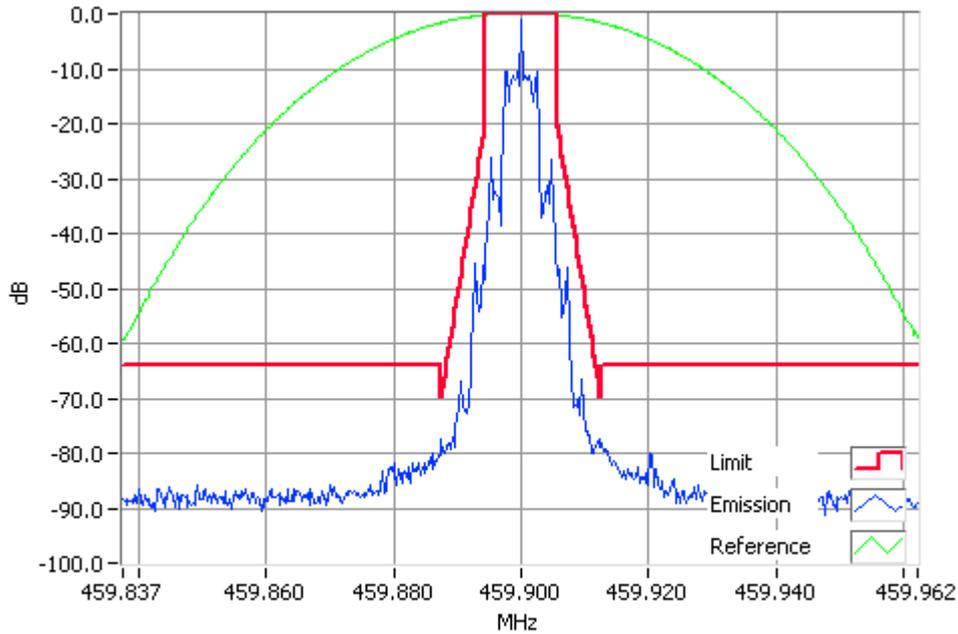
FFSK 2400 450.1000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 2400 bps

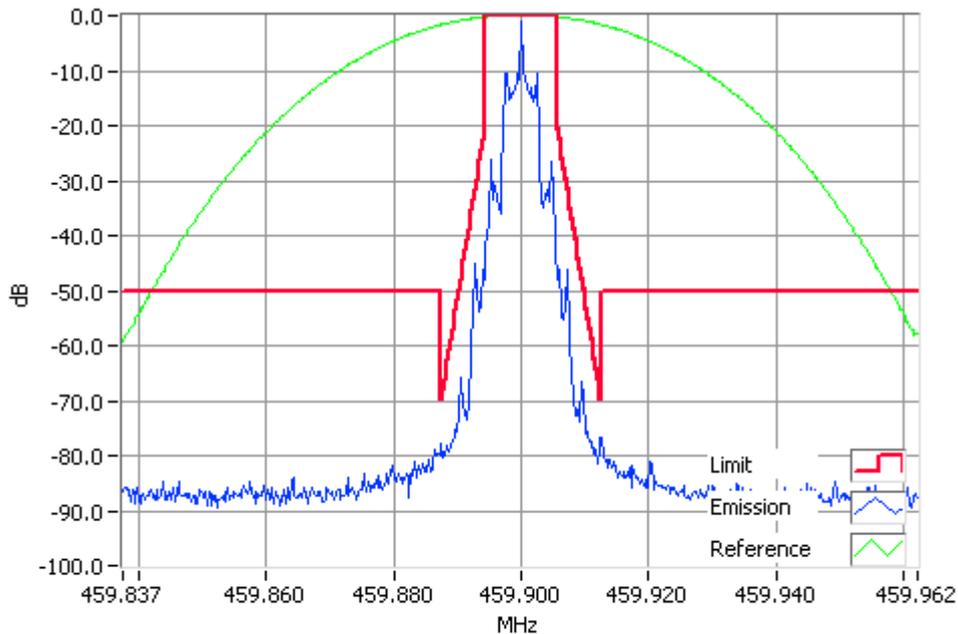
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 459.9 MHz 25 W 12.5 kHz Channel Spacing



FFSK 2400 459.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 459.9 MHz 1 W 12.5 kHz Channel Spacing



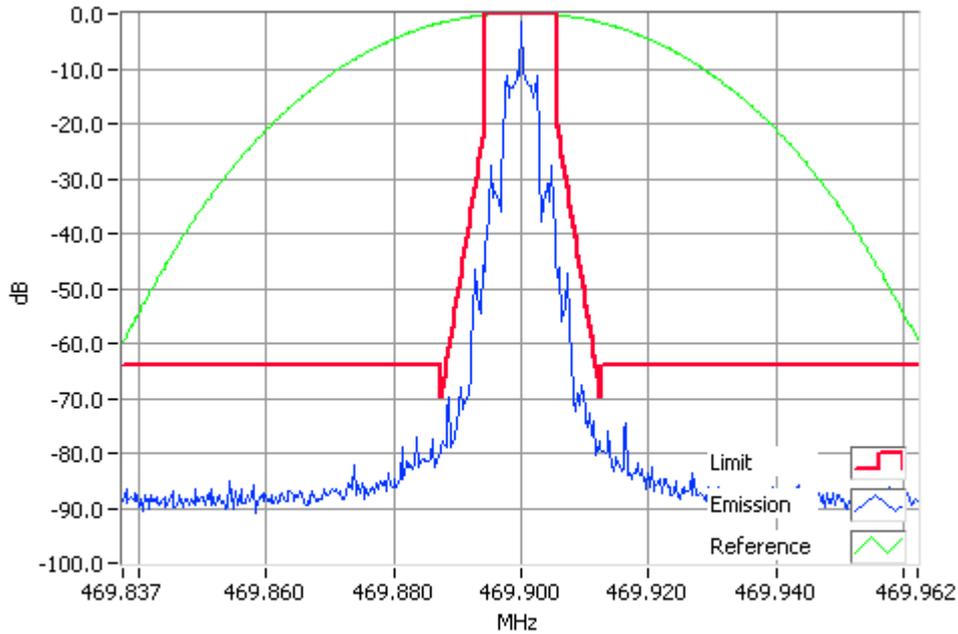
FFSK 2400 459.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 2400 bps

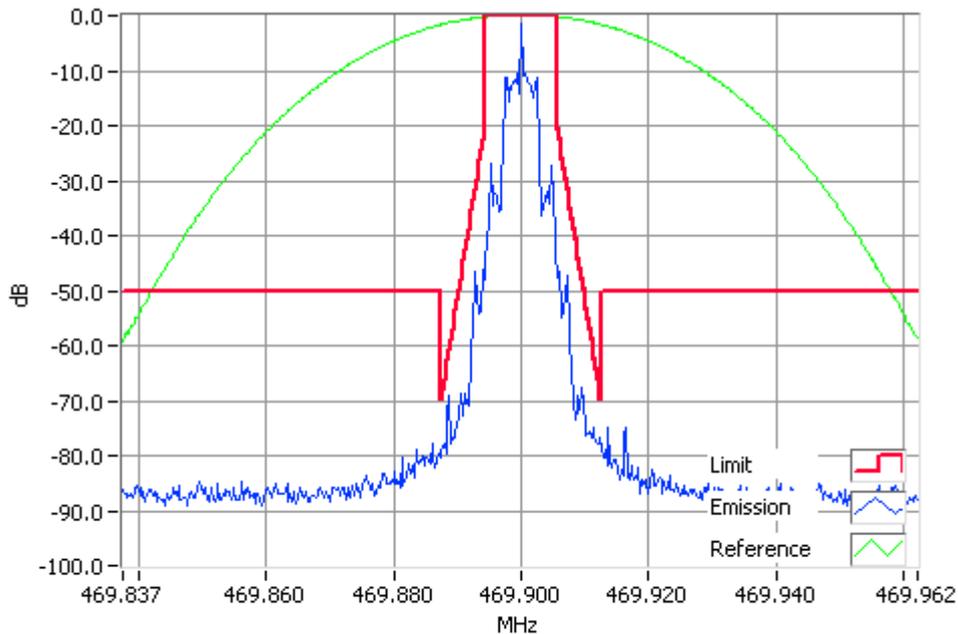
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 469.9 MHz 25 W 12.5 kHz Channel Spacing



FFSK 2400 469.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 469.9 MHz 1 W 12.5 kHz Channel Spacing



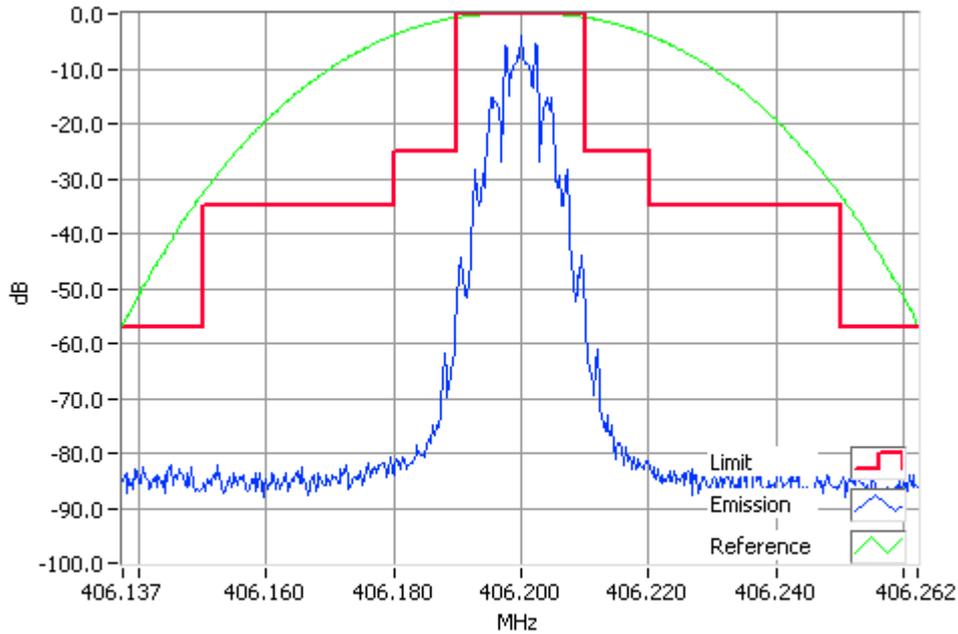
FFSK 2400 469.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 2400 bps

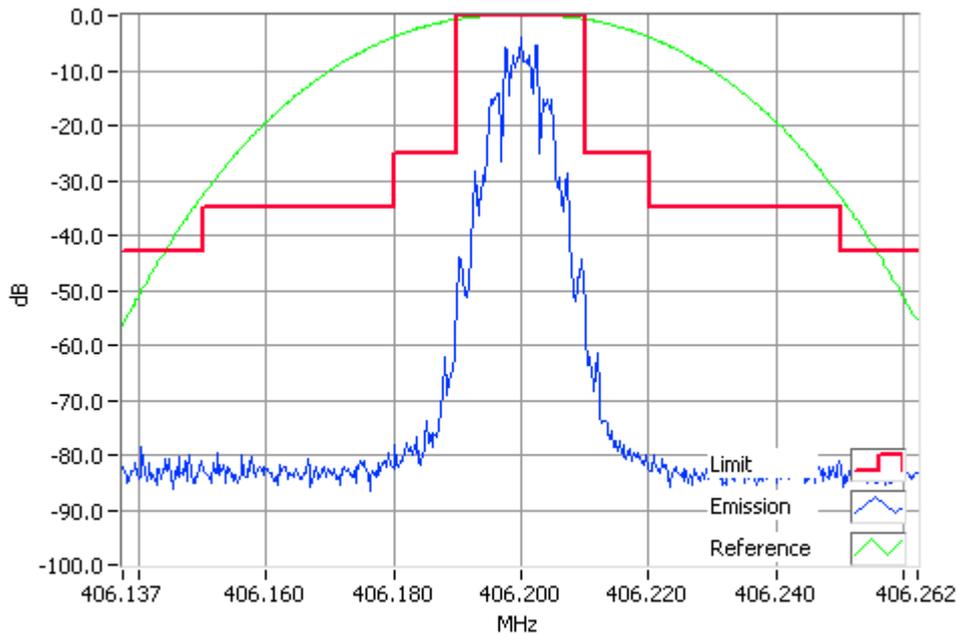
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 406.2 MHz 25 W 25.0 kHz Channel Spacing



FFSK 2400 406.2000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 406.2 MHz 1 W 25.0 kHz Channel Spacing



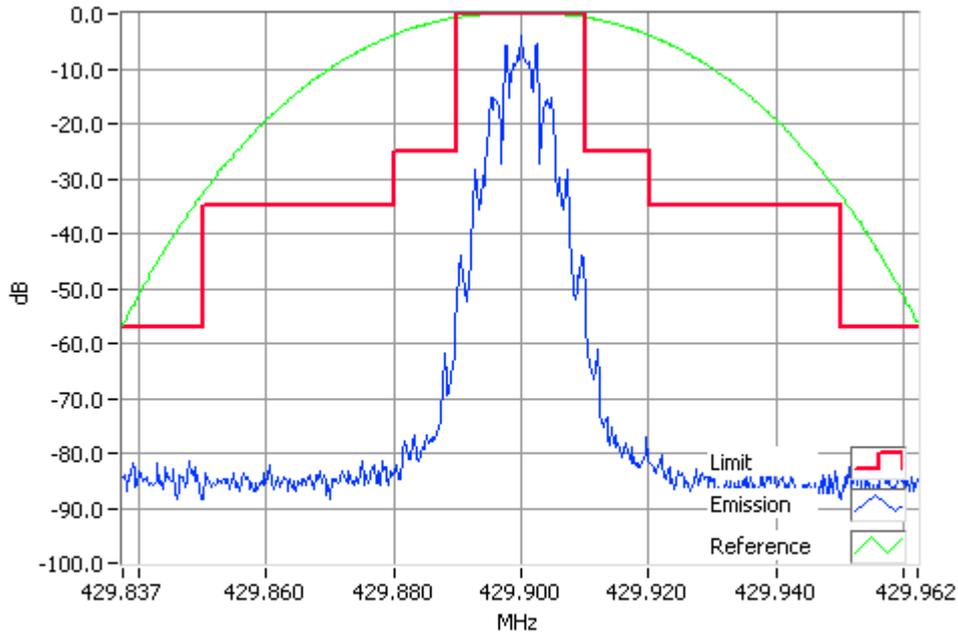
FFSK 2400 406.2000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 2400 bps

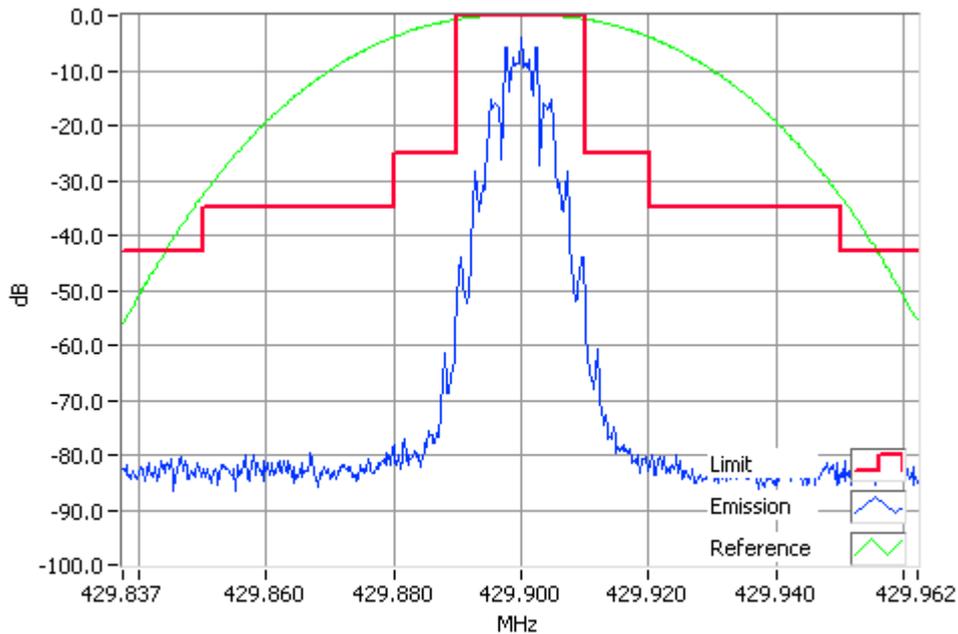
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 429.9 MHz 25 W 25.0 kHz Channel Spacing



FFSK 2400 429.9000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 429.9 MHz 1 W 25.0 kHz Channel Spacing



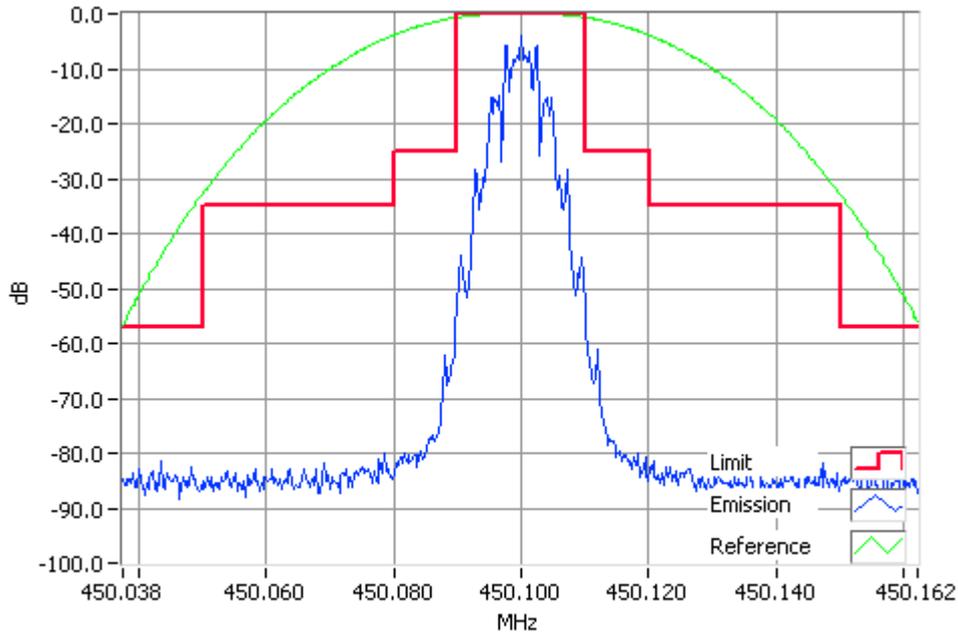
FFSK 2400 429.9000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 2400 bps

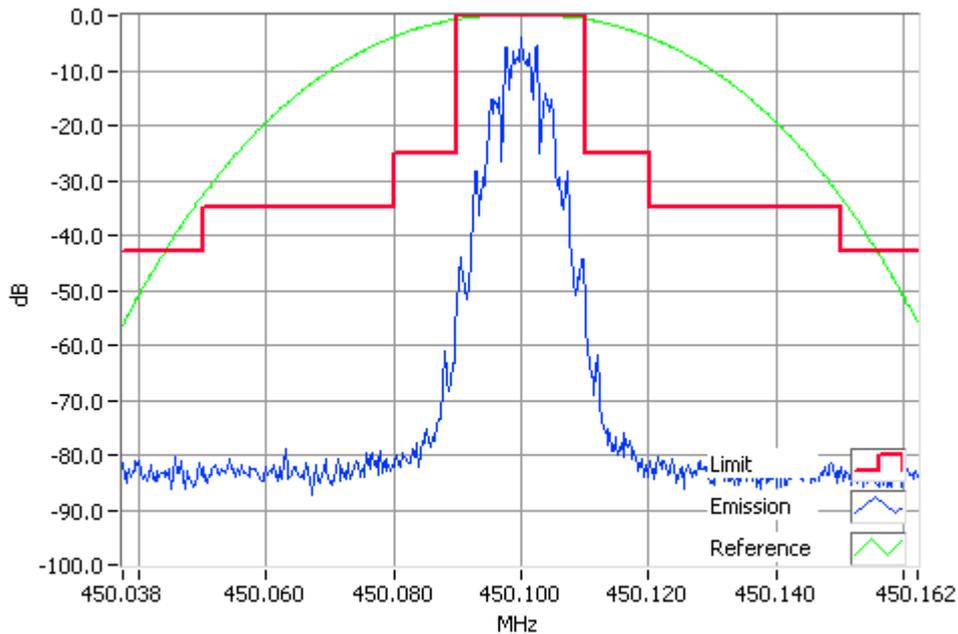
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 450.1 MHz 25 W 25.0 kHz Channel Spacing



FFSK 2400 450.1000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 450.1 MHz 1 W 25.0 kHz Channel Spacing



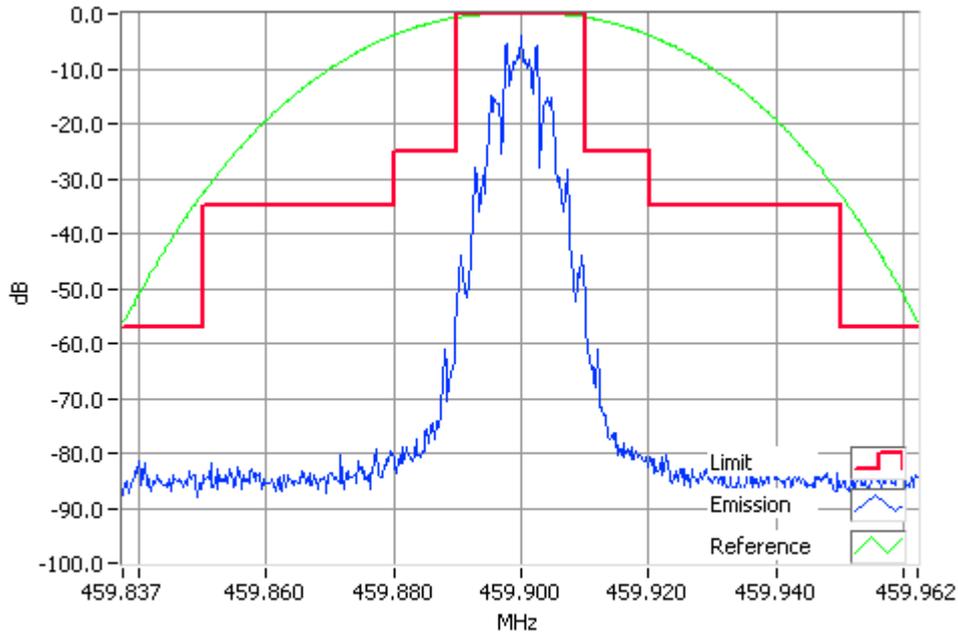
FFSK 2400 450.1000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 2400 bps

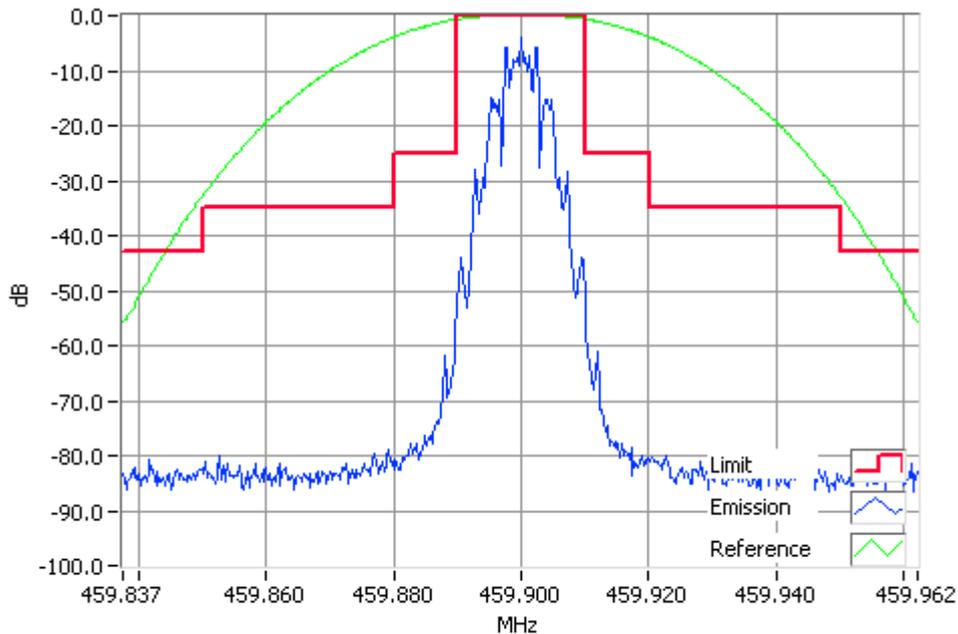
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 459.9 MHz 25 W 25.0 kHz Channel Spacing



FFSK 2400 459.9000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 459.9 MHz 1 W 25.0 kHz Channel Spacing



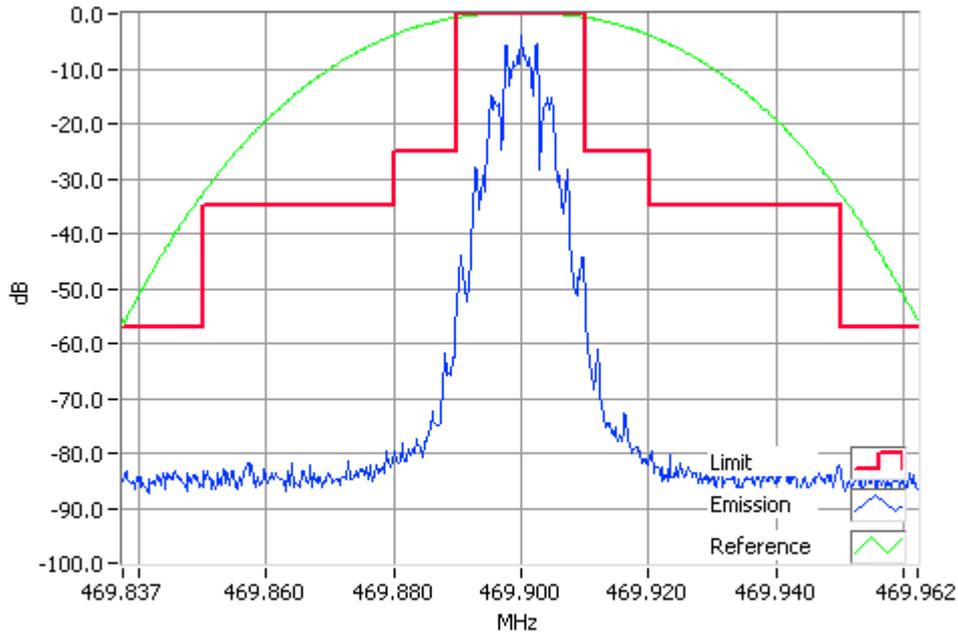
FFSK 2400 459.9000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK – 2400 bps

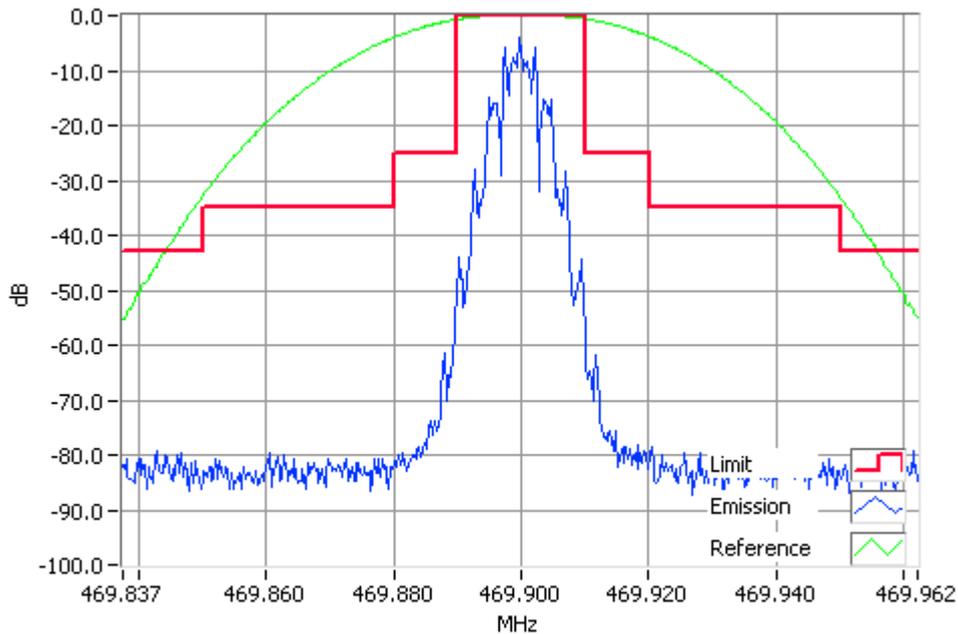
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 469.9 MHz 25 W 25.0 kHz Channel Spacing



FFSK 2400 469.9000MHz Mask B 25W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 469.9 MHz 1 W 25.0 kHz Channel Spacing



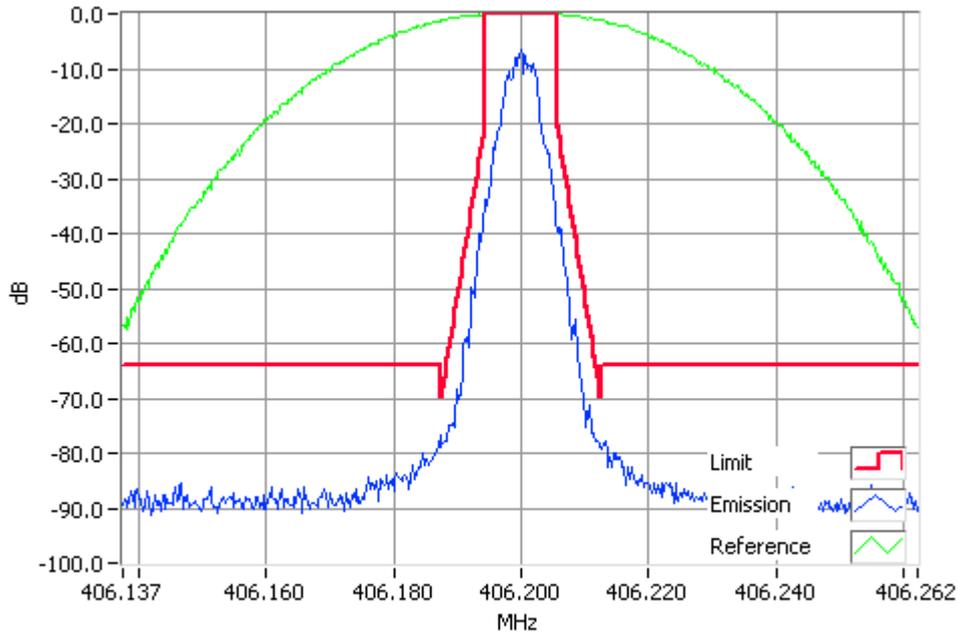
FFSK 469.9000MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

DMR

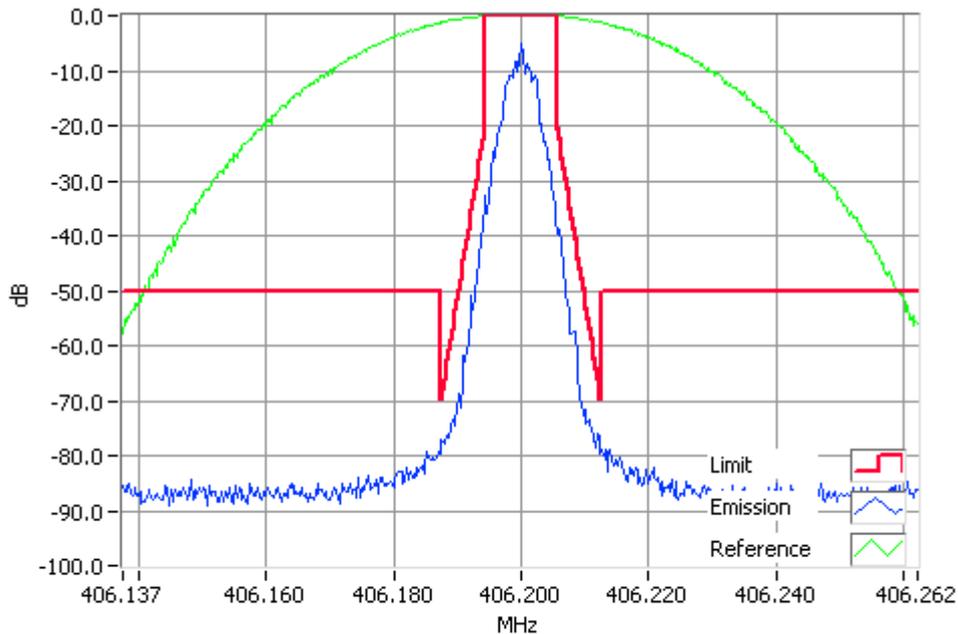
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 406.2 MHz 25 W 12.5 kHz Channel Spacing



DMR 406.2000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 406.2 MHz 1 W 12.5 kHz Channel Spacing



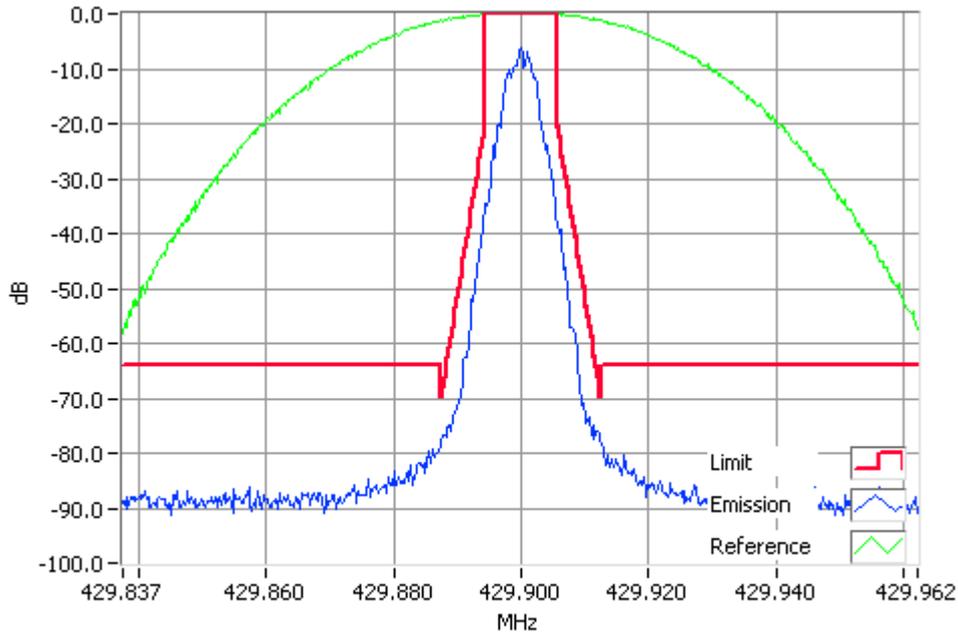
DMR 406.2000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

DMR

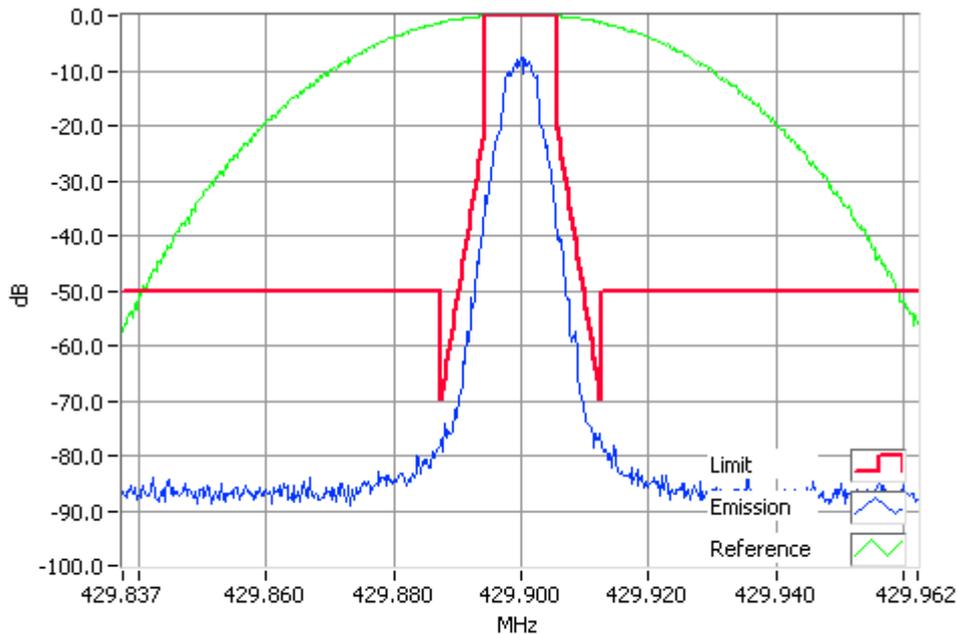
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 429.9 MHz 25 W 12.5 kHz Channel Spacing



DMR 429.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 429.9 MHz 1 W 12.5 kHz Channel Spacing



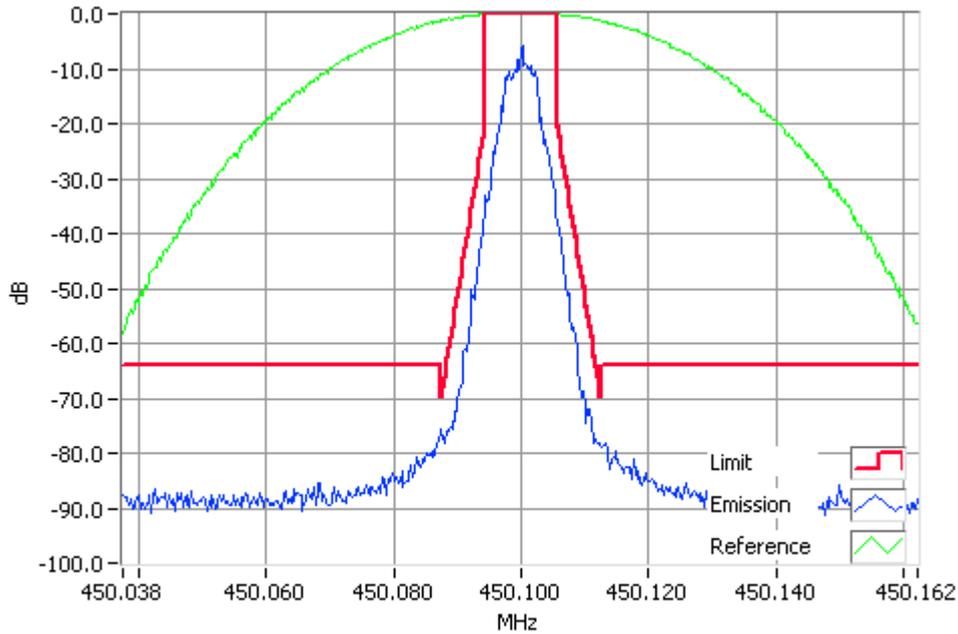
DMR 429.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

DMR

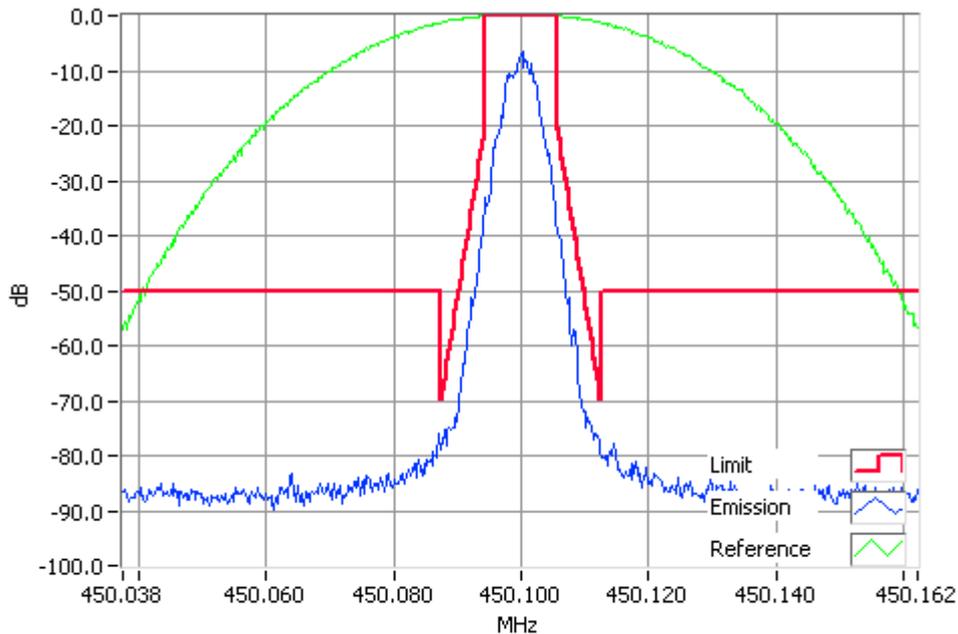
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 450.1 MHz 25 W 12.5 kHz Channel Spacing



DMR 450.1000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 450.1 MHz 1 W 12.5 kHz Channel Spacing



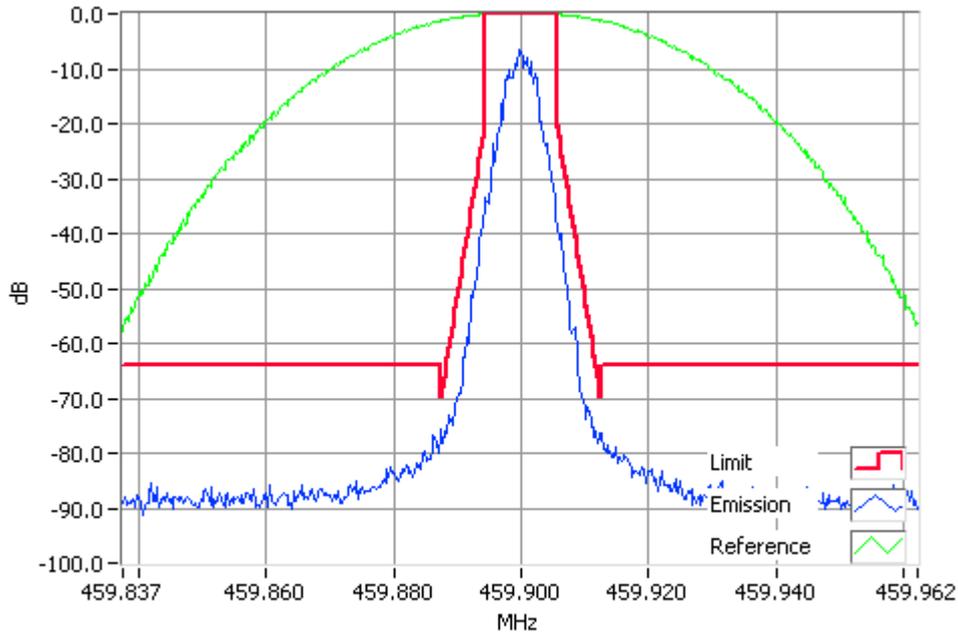
DMR 450.1000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

DMR

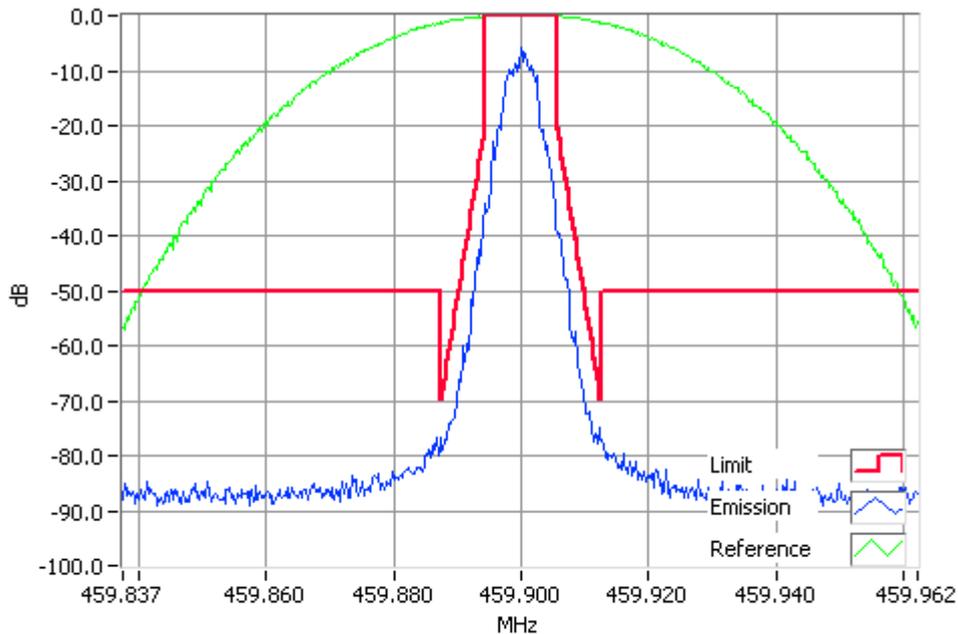
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 459.9 MHz 25 W 12.5 kHz Channel Spacing



DMR 459.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 459.9 MHz 1 W 12.5 kHz Channel Spacing



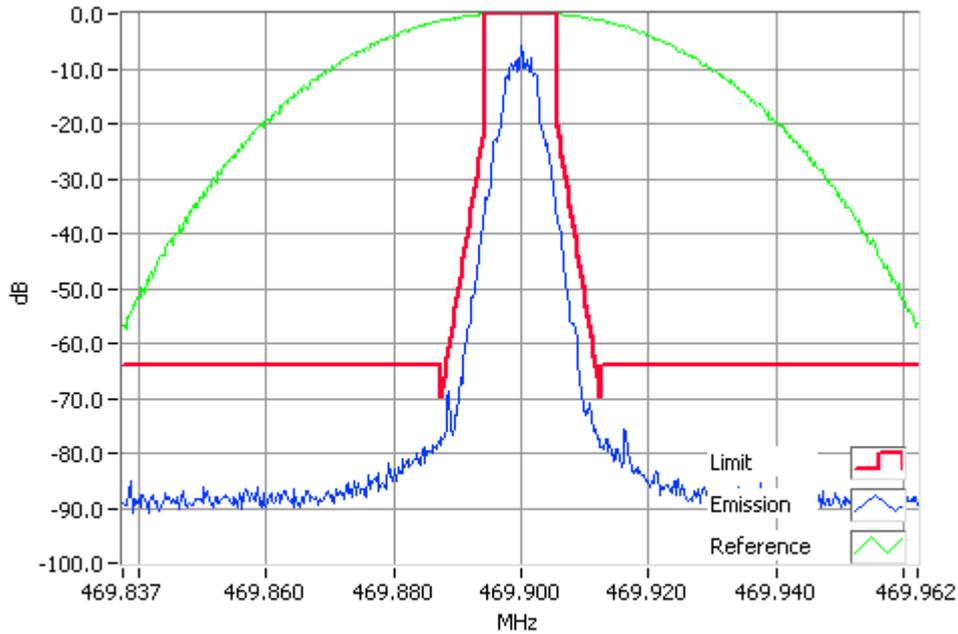
DMR 459.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

DMR

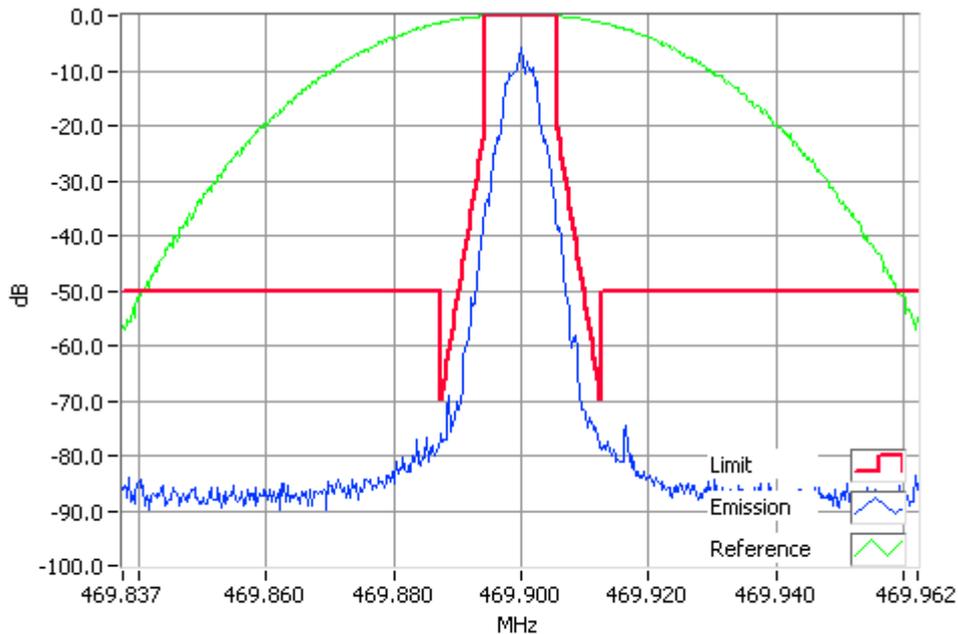
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 469.9 MHz 25W 12.5 kHz Channel Spacing



DMR 469.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 469.9 MHz 1 W 12.5 kHz Channel Spacing



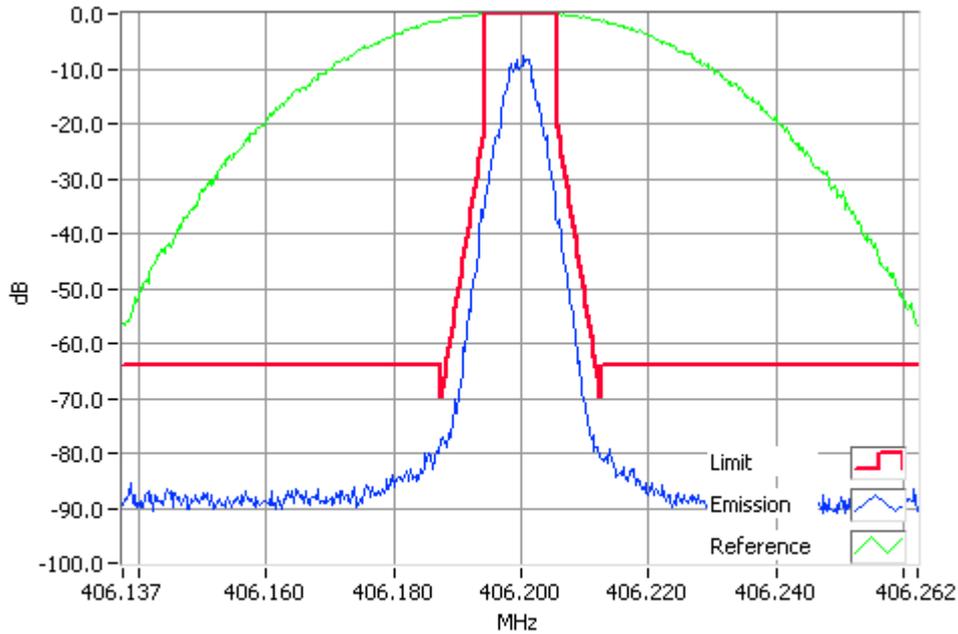
DMR 469.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase-1

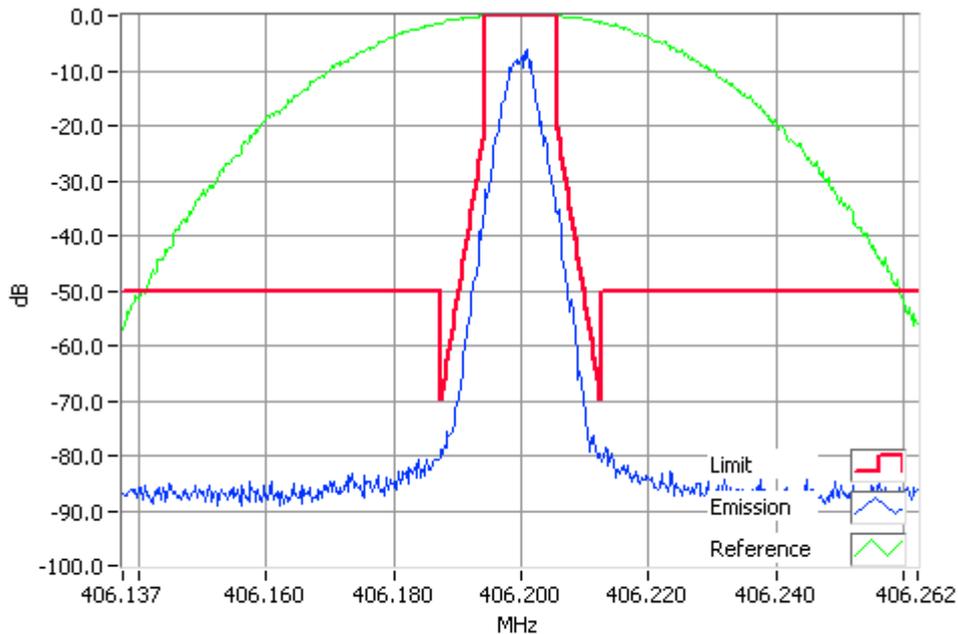
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 406.2 MHz 25 W 12.5 kHz Channel Spacing



P25I 406.2000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 406.2 MHz 1 W 12.5 kHz Channel Spacing



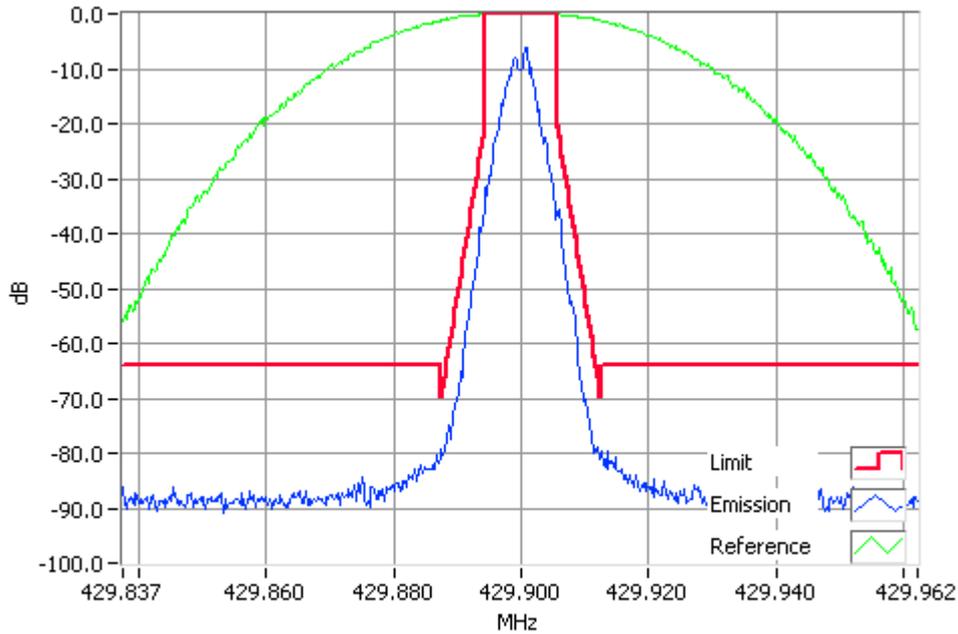
P25I 406.2000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase-1

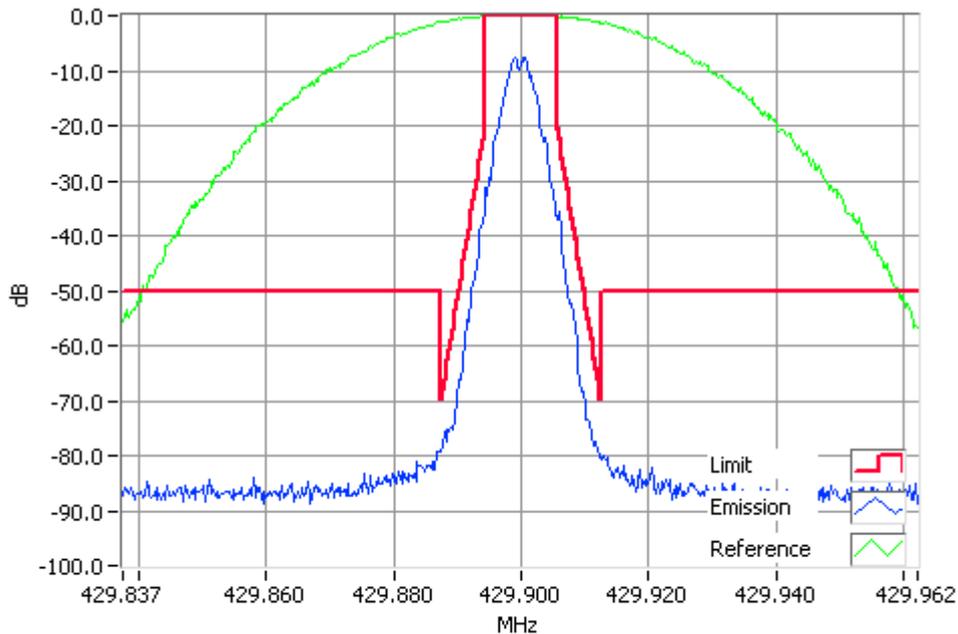
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 429.9 MHz 25 W 12.5 kHz Channel Spacing



P25I 429.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 429.9 MHz 1 W 12.5 kHz Channel Spacing



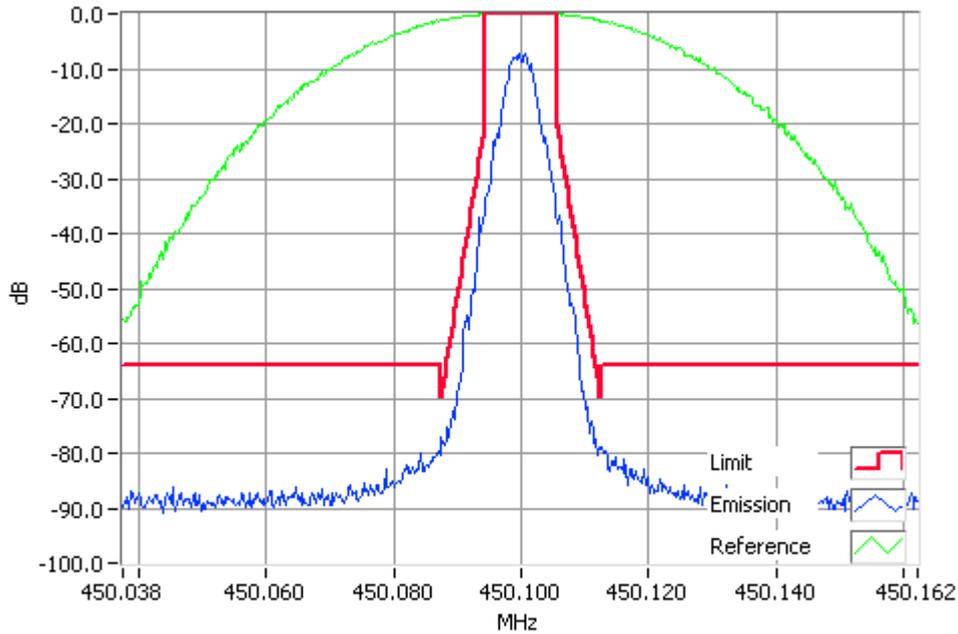
P25I 429.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase-1

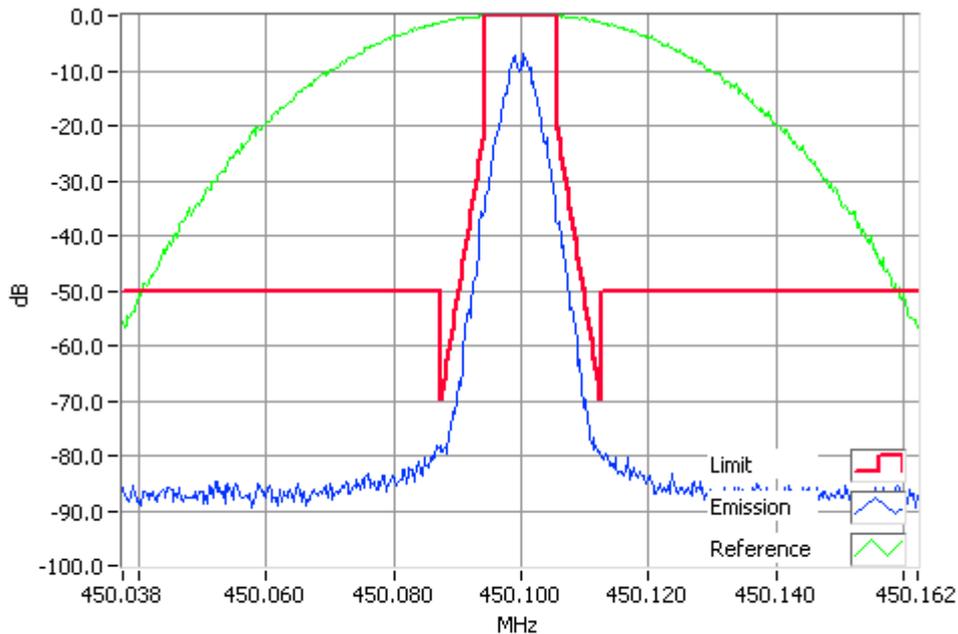
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 450.1 MHz 25 W 12.5 kHz Channel Spacing



P25I 450.1000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 450.1 MHz 1 W 12.5 kHz Channel Spacing



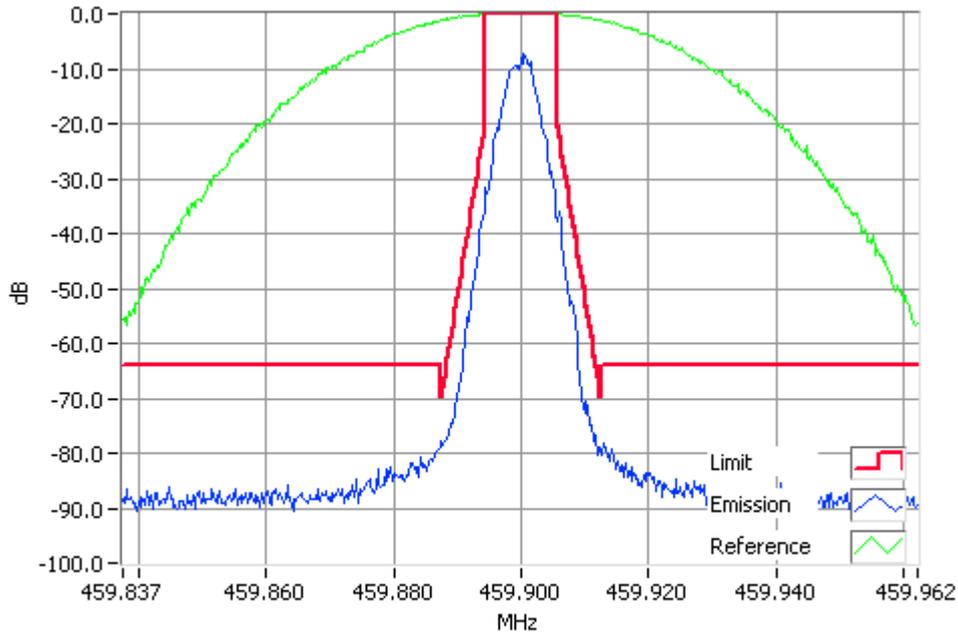
P25I 450.1000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase-1

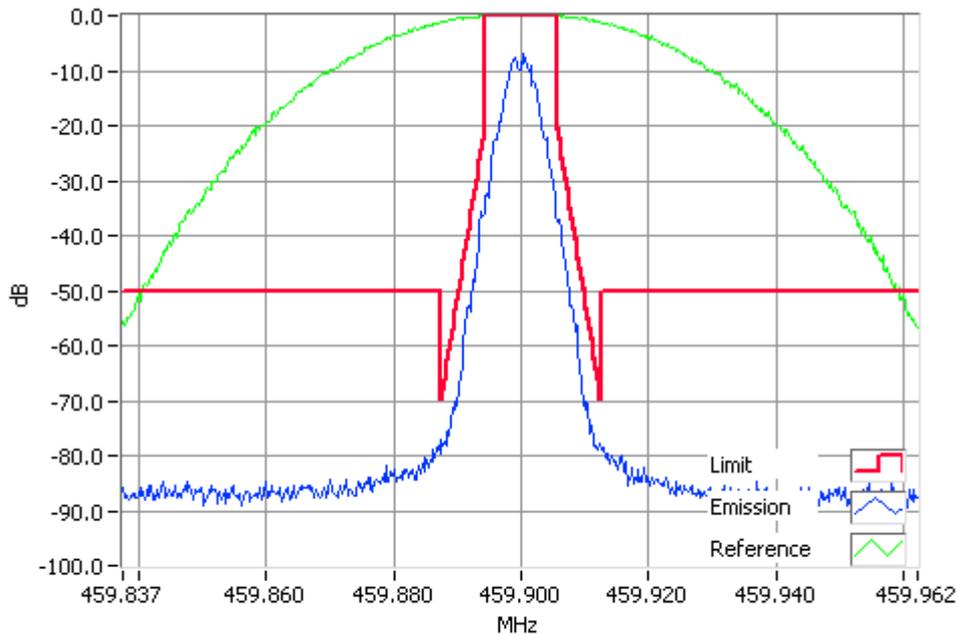
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 459.9 MHz 25 W 12.5 kHz Channel Spacing



P25I 459.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 459.9 MHz 1 W 12.5 kHz Channel Spacing



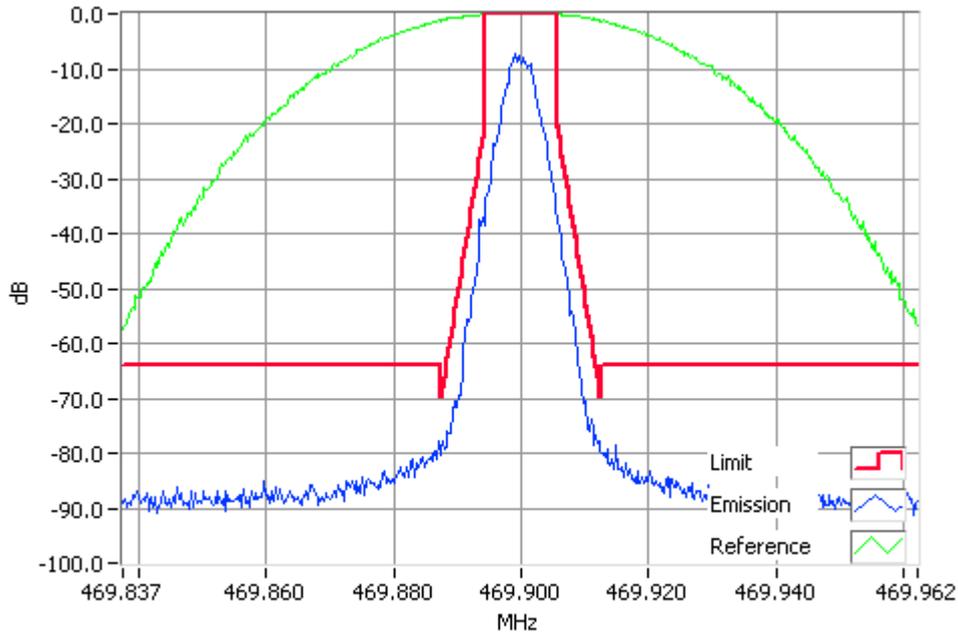
P25I 459.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase-1

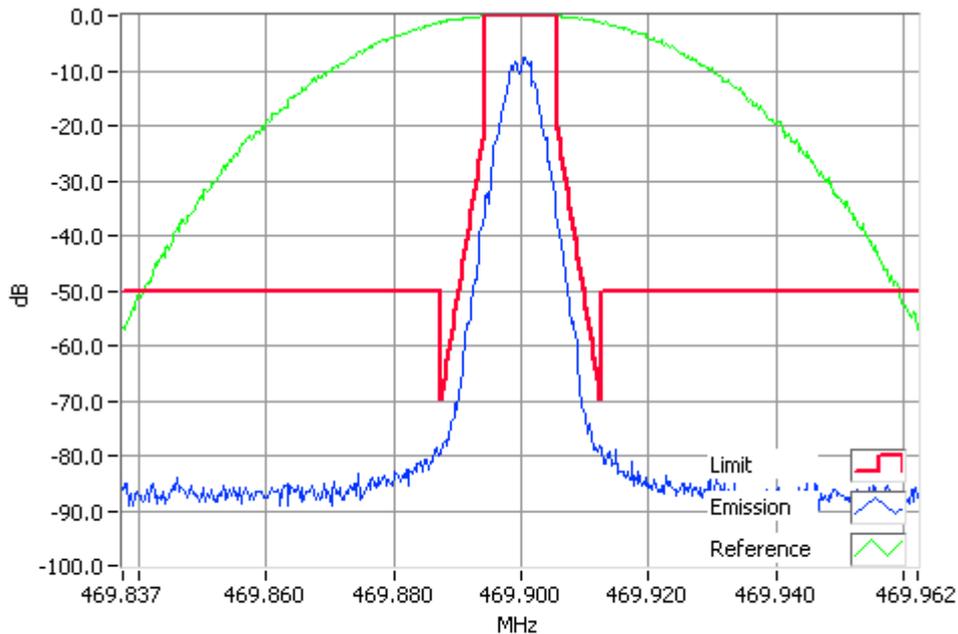
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 469.9 MHz 25 W 12.5 kHz Channel Spacing



P25I 469.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 469.9 MHz 1 W 12.5 kHz Channel Spacing



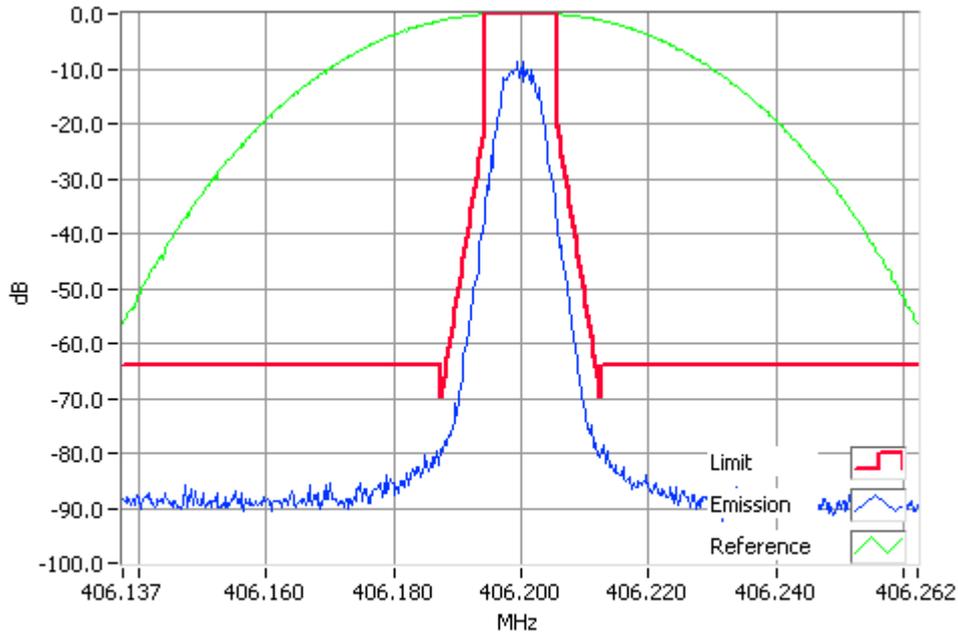
P25I 469.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase-2

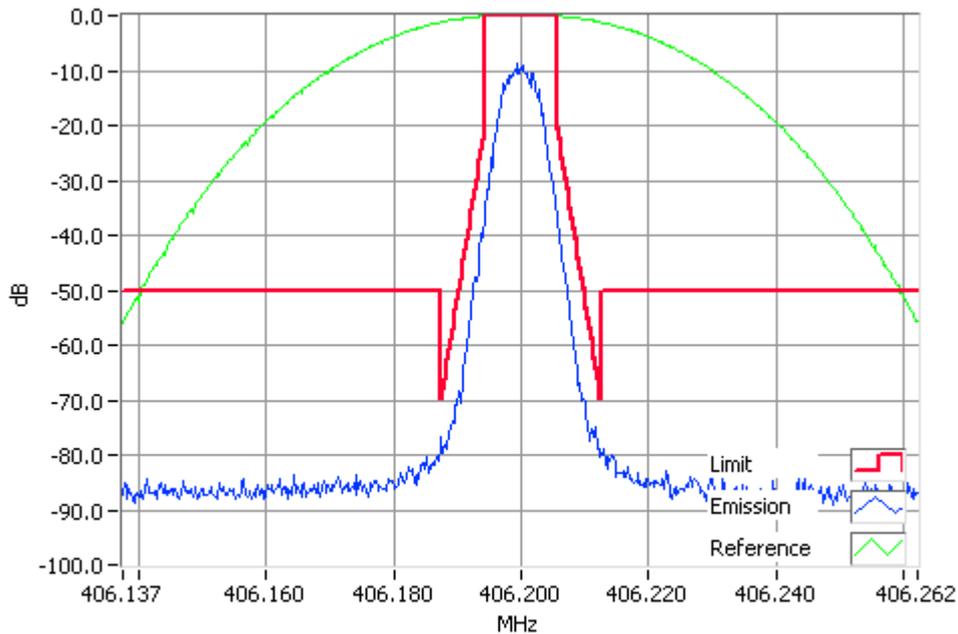
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 406.2 MHz 25 W 12.5 kHz Channel Spacing



P25II 406.2000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 406.2 MHz 1 W 12.5 kHz Channel Spacing



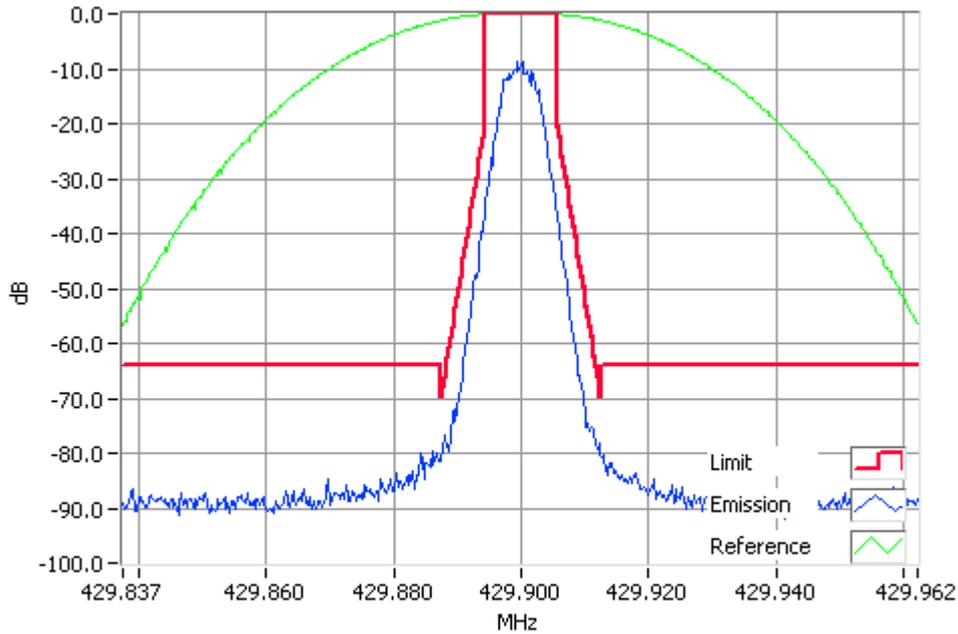
P25II 406.2000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase-2

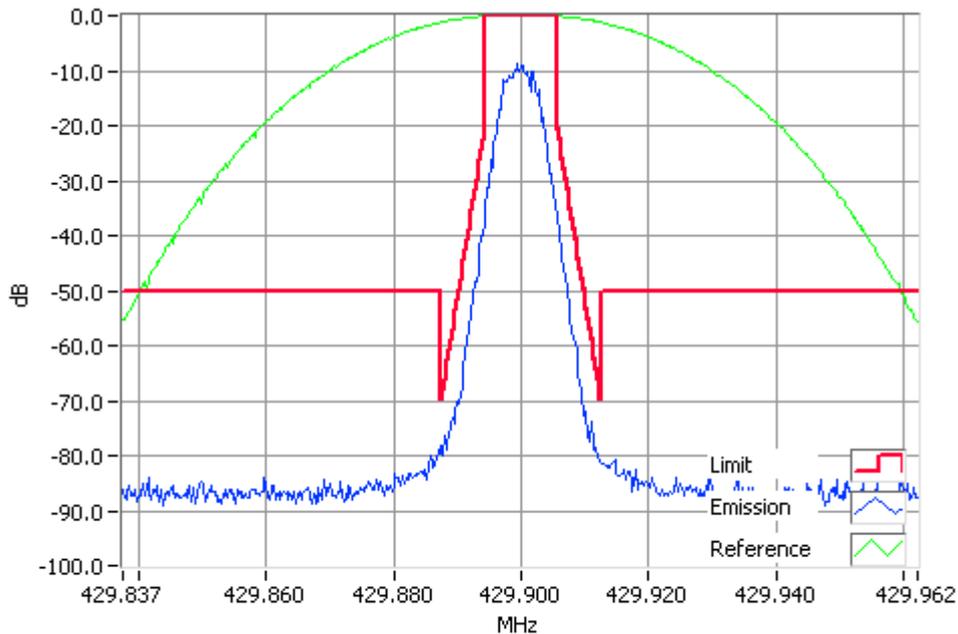
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 429.9 MHz 25 W 12.5 kHz Channel Spacing



P25II 429.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 429.9 MHz 1 W 12.5 kHz Channel Spacing



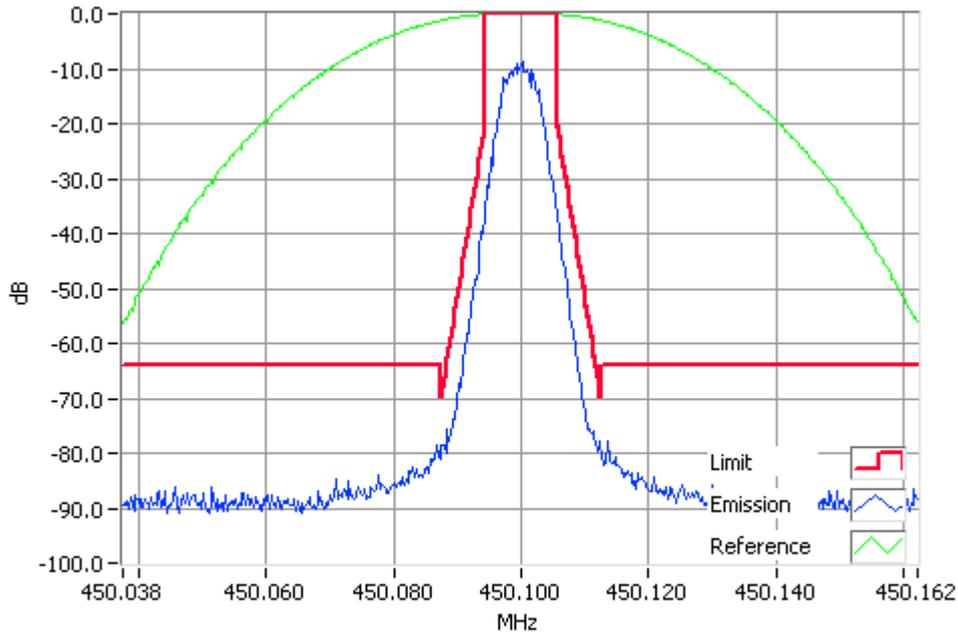
P25II 429.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase-2

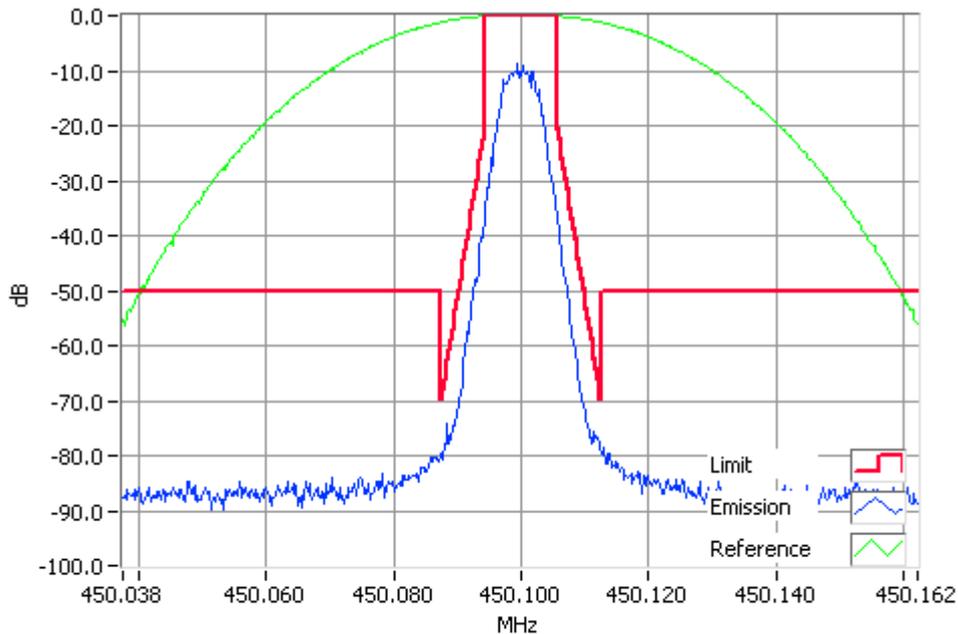
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 450.1 MHz 25 W 12.5 kHz Channel Spacing



P25II 450.1000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 450.1 MHz 1 W 12.5 kHz Channel Spacing



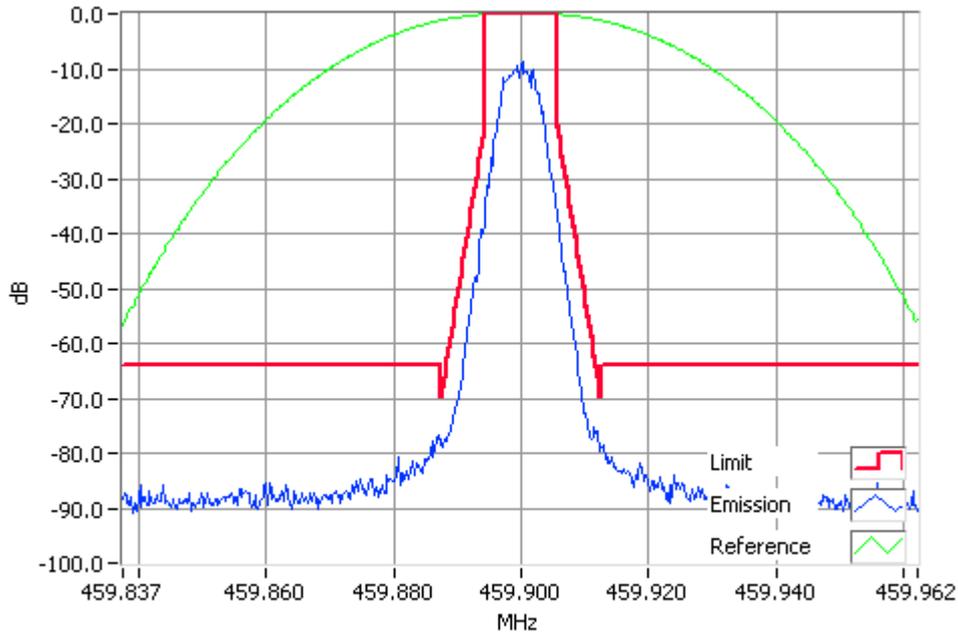
P25II 450.1000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase-2

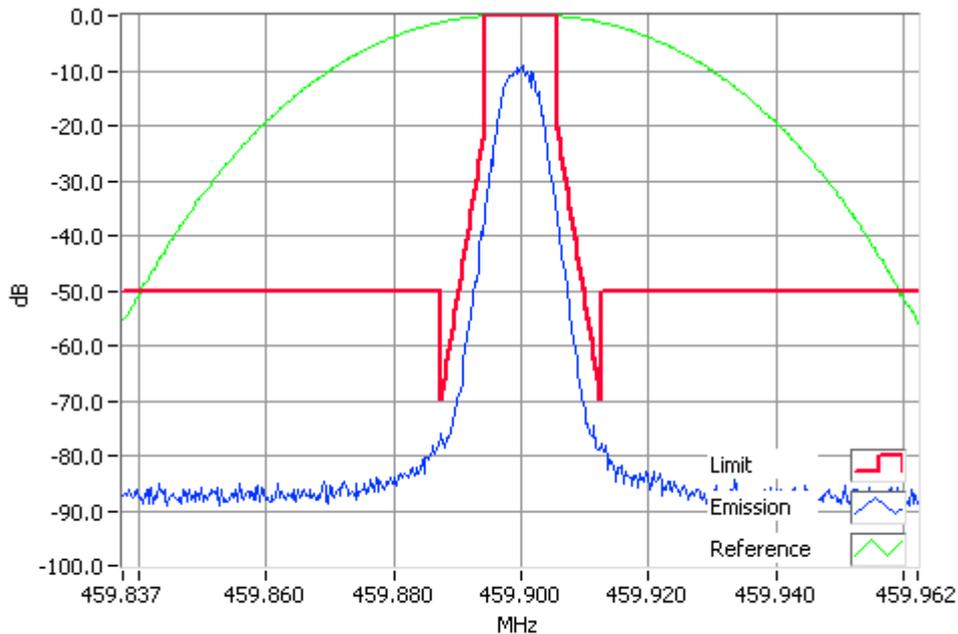
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 459.9 MHz 25 W 12.5 kHz Channel Spacing



P25II 459.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 459.9 MHz 1 W 12.5 kHz Channel Spacing



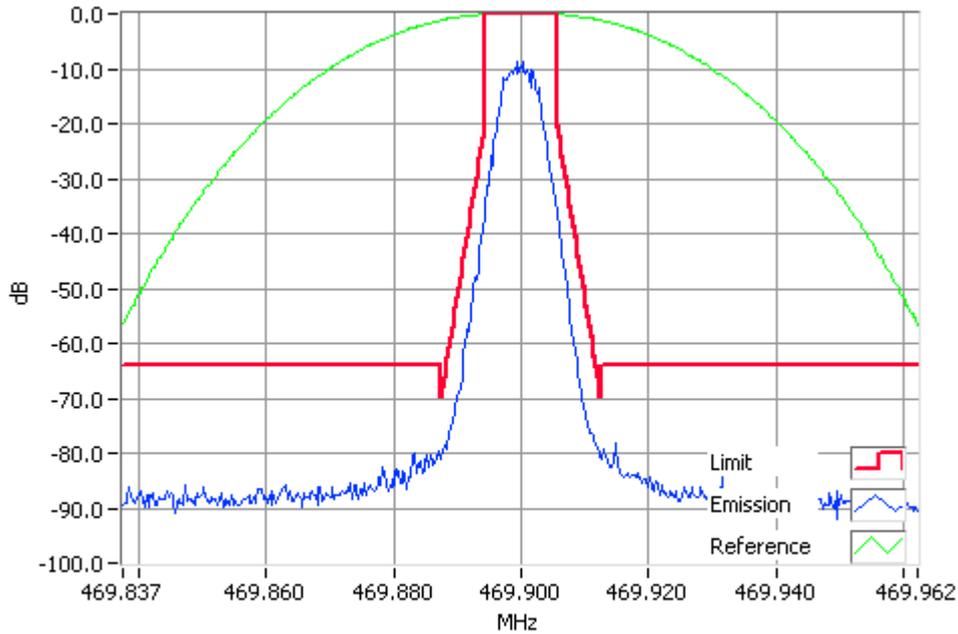
P25II 459.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase-2

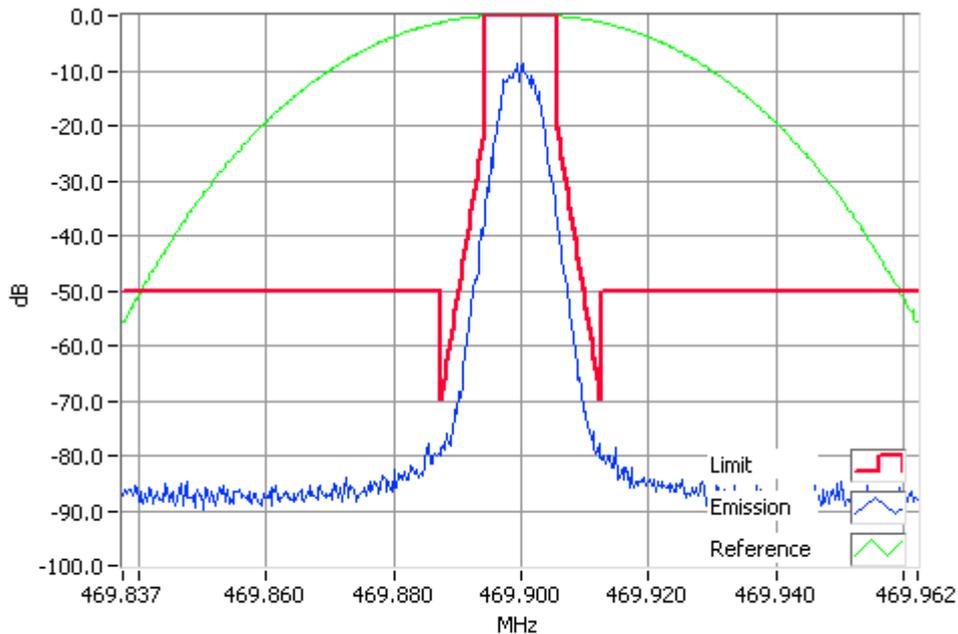
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 469.9 MHz 25 W 12.5 kHz Channel Spacing



P25II 469.9000MHz Mask D 25W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 469.9 MHz 1 W 12.5 kHz Channel Spacing



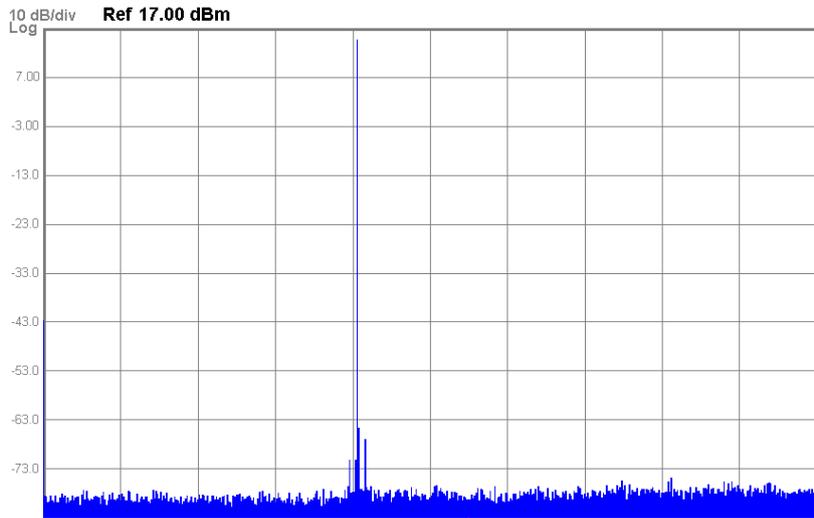
P25II 469.9000MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Spurious Emissions (Tx Conducted)

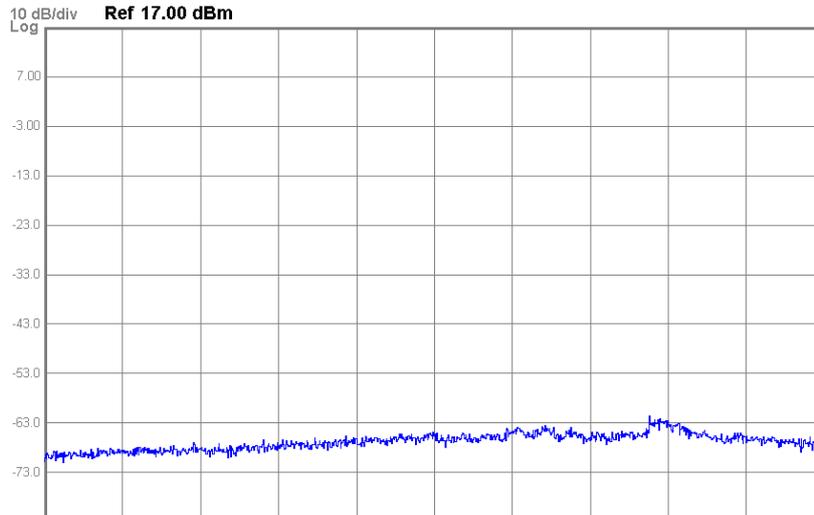
SPECIFICATION: FCC CFR 2.1051 RSS-119 5.8

| | | | |
|---|-------------|-----------------|-----------------|
| 12.5 kHz Channel Spacing | | 406.2MHz @ 25 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | | Level (dBc) |
| 416.8791 | -38.3 | | -83.3 |
| 12.5 kHz Channel Spacing | | 406.2MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | | Level (dBc) |
| ~ | ~ | | ~ |
| No other emissions were detected at a level greater than 20 dB below the limit. | | | |

406.2MHz @ 25 W



Start 10 kHz #Res BW 10 kHz #VBW 30 kHz Stop 1.0000 GHz Sweep 9.56 s (1001 pts)

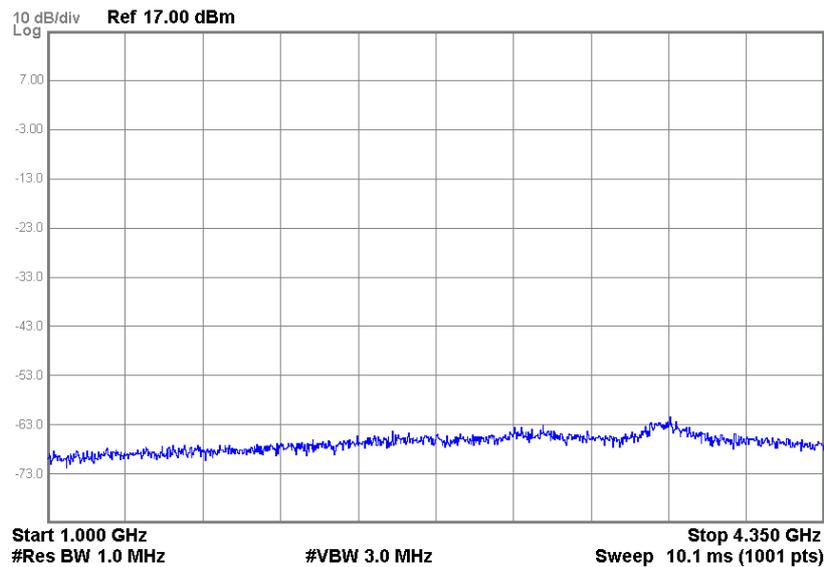
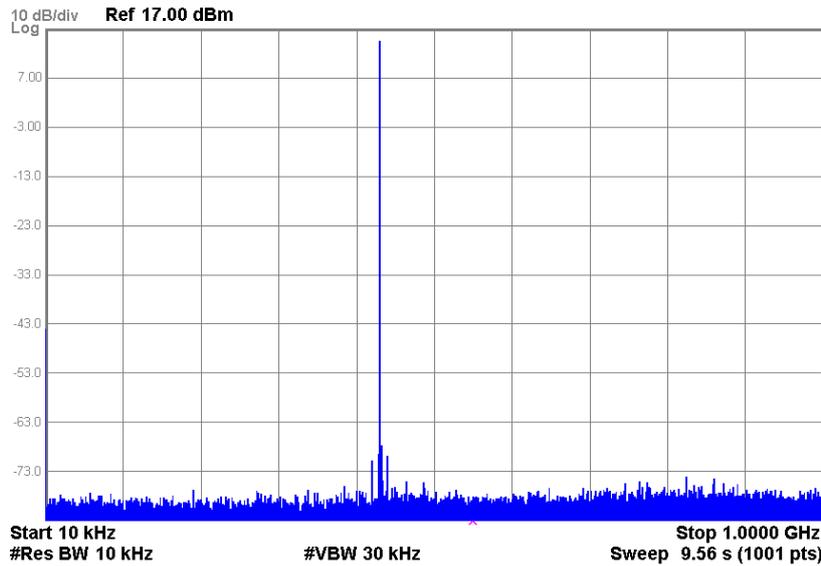


Start 1.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 4.350 GHz Sweep 10.1 ms (1001 pts)

Spurious Emissions (Tx Conducted) - Continued

| | | | |
|---|-------------|------------------|-----------------|
| 12.5 kHz Channel Spacing | | 429.9 MHz @ 25 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | | Level (dBc) |
| ~ | ~ | | ~ |
| 12.5 kHz Channel Spacing | | 429.9 MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | | Level (dBc) |
| ~ | ~ | | ~ |
| No emissions were detected at a level greater than 20 dB below the limit. | | | |

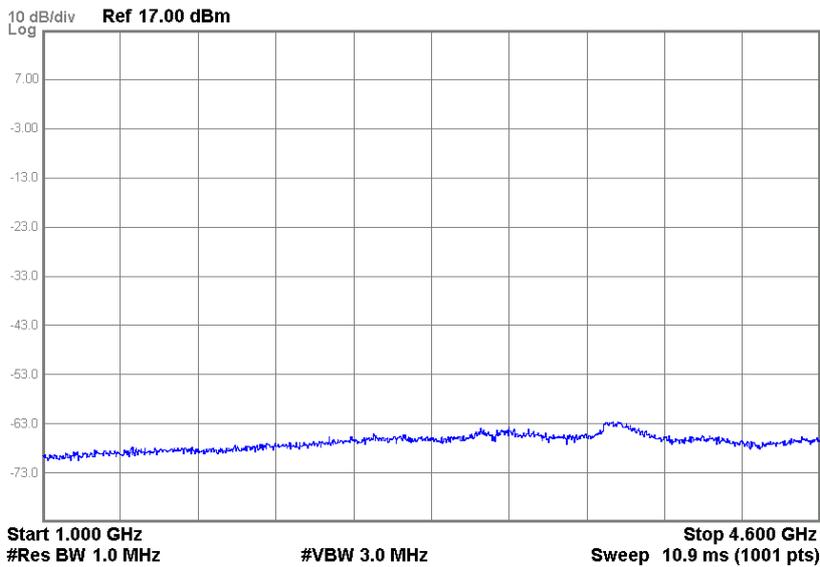
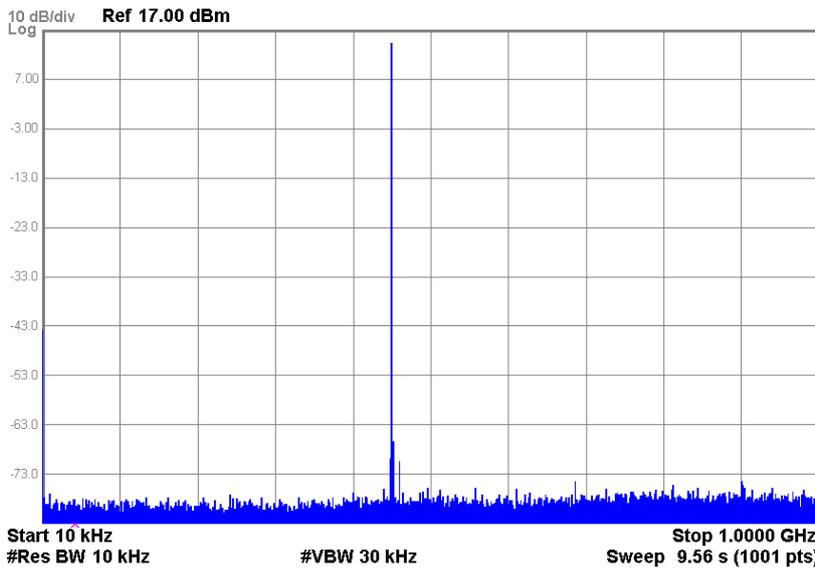
429.9 MHz @ 25 W



Spurious Emissions (Tx Conducted) - Continued

| | | | |
|---|-------------|-----------------|-----------------|
| 12.5 kHz Channel Spacing | | 450.1MHz @ 25 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | | Level (dBc) |
| ~ | ~ | | ~ |
| 12.5 kHz Channel Spacing | | 450.1MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | | Level (dBc) |
| ~ | ~ | | ~ |
| No emissions were detected at a level greater than 20 dB below the limit. | | | |

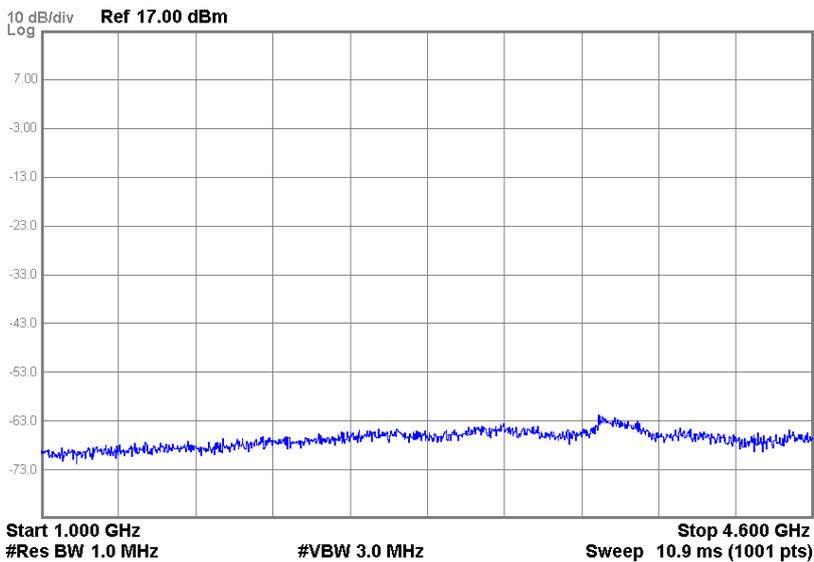
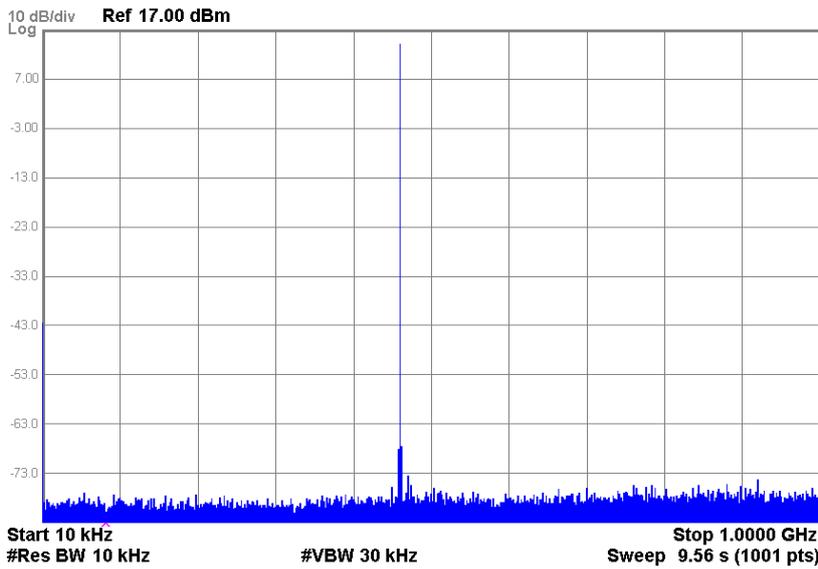
450.1MHz @ 25 W



Spurious Emissions (Tx Conducted) - Continued

| | | | |
|---|-------------|-----------------|-----------------|
| 12.5 kHz Channel Spacing | | 459.9MHz @ 25 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | | Level (dBc) |
| ~ | ~ | | ~ |
| 12.5 kHz Channel Spacing | | 459.9MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | | Level (dBc) |
| ~ | ~ | | ~ |
| No emissions were detected at a level greater than 20 dB below the limit. | | | |

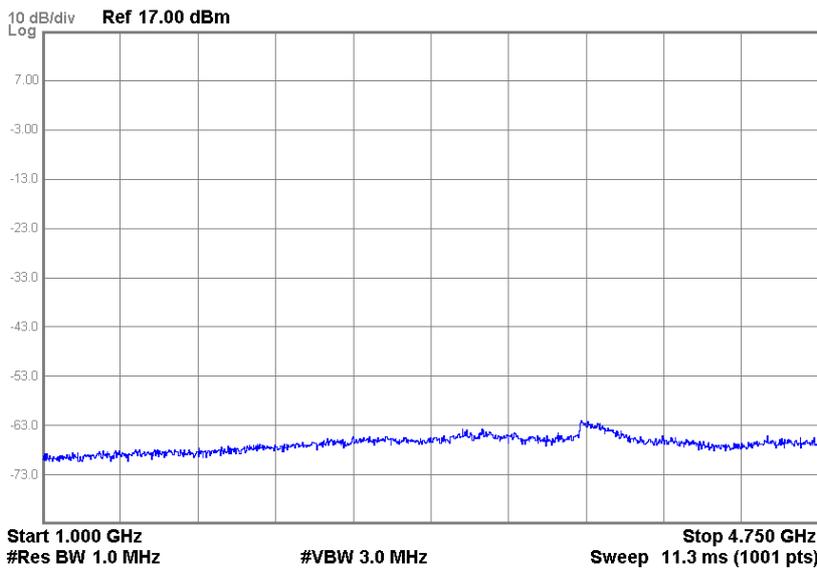
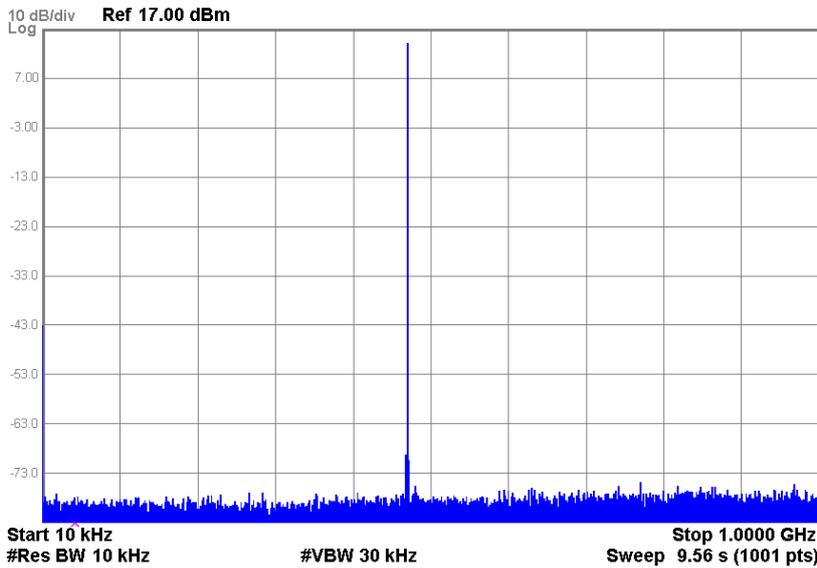
459.9MHz @ 25 W



Spurious Emissions (Tx Conducted) - Continued

| | | | |
|---|-------------|-----------------|-----------------|
| 12.5 kHz Channel Spacing | | 469.9MHz @ 25 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | | Level (dBc) |
| ~ | ~ | | ~ |
| 12.5 kHz Channel Spacing | | 469.9MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | | Level (dBc) |
| ~ | ~ | | ~ |
| No emissions were detected at a level greater than 20 dB below the limit. | | | |

469.9MHz @ 25 W



Spurious Emissions (Tx Conducted) - Continued

SPECIFICATION: FCC CFR 2.1051 RSS-119 5.8
LIMITS: FCC 47 CFR 90.210 RSS-119 5.8

| Carrier Output Power | Emission Mask D 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{\text{Watts}})$ | |
|----------------------|--|---------|
| | 25 W | -20 dBm |
| 1 W | -20 dBm | -50 dBc |

SPURIOUS EMISSIONS (Tx RADIATED)

SPECIFICATION: FCC 47 CFR 2.1053

GUIDE: TIA/EIA-603D 2.2.12

MEASUREMENT PROCEDURE:

Initial Scan:

1. The EUT is placed in the S-Line TEM cell and emissions are measured from 30 MHz to 1000 MHz. Any emission within 20 dB of the limit is then re-tested on the OATS along with measurements from 1000 MHz to the 10th harmonic of the fundamental frequency.
2. The EUT is placed in the reverberation chamber and emissions are measured from 1000 MHz to the upper frequency required. Any emission within 20 dB of the limit is then re-tested on the OATS.
3. The harmonic emissions up to the 6th harmonic of the fundamental frequency are measured on the OATS

OATS Measurement:

1. The EUT is placed on a wooden turntable at a distance of three metres from the test antenna. The output terminal is connected to an RF dummy load.
2. The test antenna is raised from 1 m to 4 m to obtain a maximum reading; the turntable is then rotated through 360° to obtain the maximum response of each spurious emission. Valid emissions are determined by switching the EUT on and off.
3. The EUT is then replaced by a signal generator and substitution antenna to make measurements by the substitution method.

MEASUREMENT RESULTS:

See the tables on the following pages

LIMIT CLAUSE: FCC 47 CFR 90.210

Tx Radiated Emissions - Continued

| 12.5 kHz Channel Spacing | | 406.2MHz @ 25 W | Emission Mask D |
|---|-------------|-----------------|-----------------|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| 12.5 kHz Channel Spacing | | 406.2MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| No emissions were detected at a level greater than 20 dB below the limit. | | | |

| 12.5 kHz Channel Spacing | | 429.9 MHz @ 25 W | Emission Mask D |
|---|-------------|------------------|-----------------|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| 12.5 kHz Channel Spacing | | 429.9 MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| No emissions were detected at a level greater than 20 dB below the limit. | | | |

| 12.5 kHz Channel Spacing | | 450.1MHz @ 25 W | Emission Mask D |
|---|-------------|-----------------|-----------------|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| 12.5 kHz Channel Spacing | | 450.1MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| No emissions were detected at a level greater than 20 dB below the limit. | | | |

Tx Radiated Emissions - Continued

| 12.5 kHz Channel Spacing | | 459.9MHz @ 25 W | Emission Mask D |
|---|-------------|-----------------|-----------------|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| 12.5 kHz Channel Spacing | | 459.9MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| No emissions were detected at a level greater than 20 dB below the limit. | | | |

| 12.5 kHz Channel Spacing | | 469.9MHz @ 25 W | Emission Mask D |
|---|-------------|-----------------|-----------------|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| 12.5 kHz Channel Spacing | | 469.9MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| No emissions were detected at a level greater than 20 dB below the limit. | | | |

LIMITS: FCC CFR 2.1053

| Carrier Output Power | Emission Mask D 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{\text{Watts}})$ | |
|----------------------|--|---------|
| | 25 W | -20 dBm |
| 1 W | -20 dBm | -50 dBc |

Tx Radiated Emissions - Continued

Open Area Test Site Results:

12.5 kHz Channel Spacing

459.9 MHz @ 25 W

Emission Mask D

| Harmonics Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
|---------------------------------------|-------------|-------------|
| 919.8 | -55.50 | -99.50 |
| 1379.7 | -57.47 | -101.47 |
| 1839.6 | -68.66 | -112.66 |
| 2299.5 | -63.15 | -107.15 |
| 2759.4 | -60.61 | -104.61 |
| 3219.3 | -53.87 | -97.87 |

OATS Testing was performed at 12°C at 48% relative humidity.

Photo: OATS Setup



TRANSIENT FREQUENCY BEHAVIOR

SPECIFICATION: FCC 47 CFR 90.214 RSS-119 5.9

GUIDE: TIA/EIA-603D 2.2.19

MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. Measurements and plots were made following the TIA/EIA procedure.

MEASUREMENT RESULTS:

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

LIMIT CLAUSES: FCC 47 CFR 90.214 RSS-119 5.9

Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 406.2 MHz 25 W 12.5 kHz Channel Spacing

| TRANSIENT RESPONSE PERIOD | CARRIER PEAK VARIATION FROM NORMAL | |
|---------------------------|------------------------------------|---------------|
| | Key ON (kHz) | Key OFF (kHz) |
| t1 | -1.7 | N/A |
| t2 | -0.5 | N/A |
| t3 | N/A | 0.7 |
| t2 → t3 ppm | -1.9 | |
| ERROR LIMIT (t2 → t3) ppm | 2.5 | |

| | | |
|---|-----|----|
| Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 the frequency difference does not exceed half a channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit. | YES | NO |
| | Y | |

LIMIT: FCC 47 CFR 90.214

| TRANSIENT PERIODS | FREQUENCY RANGE | |
|-------------------|-------------------|-------------------|
| | 150 MHz – 174 MHz | 421 MHz – 512 MHz |
| t1 (ms) | 5 ms | 10 ms |
| t2 (ms) | 20 ms | 25 ms |
| t3 (ms) | 5 ms | 10 ms |

LIMIT: RSS-119 5.9

| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|------------------------------|-----------------|-----------------|
| TRANSIENT PERIODS | Maximum Frequency Difference | FREQUENCY RANGE | |
| | | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods.

Transient Frequency Behaviour

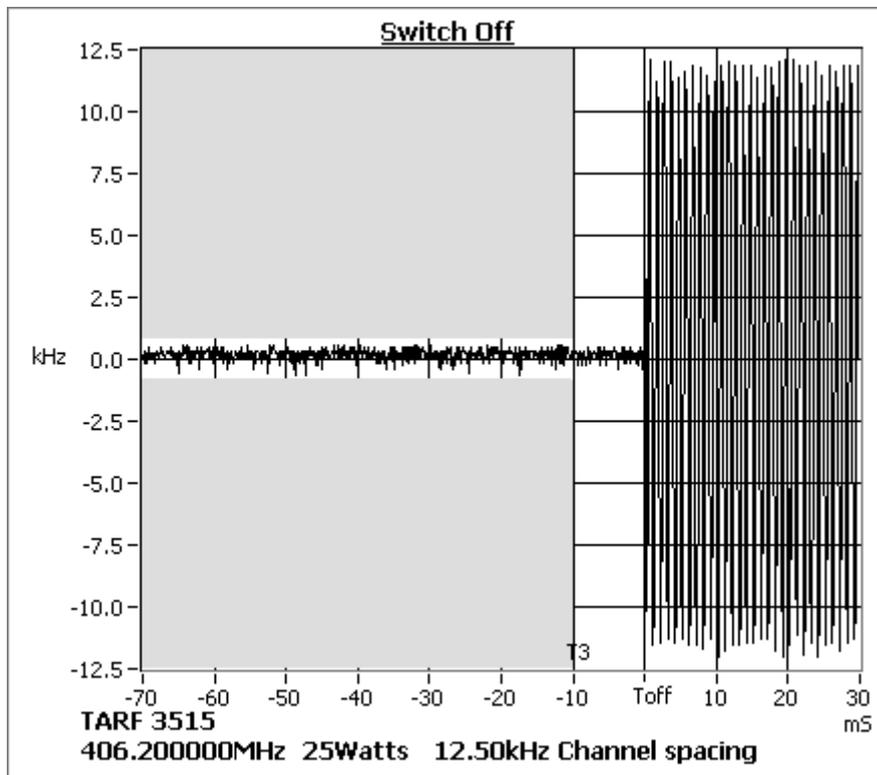
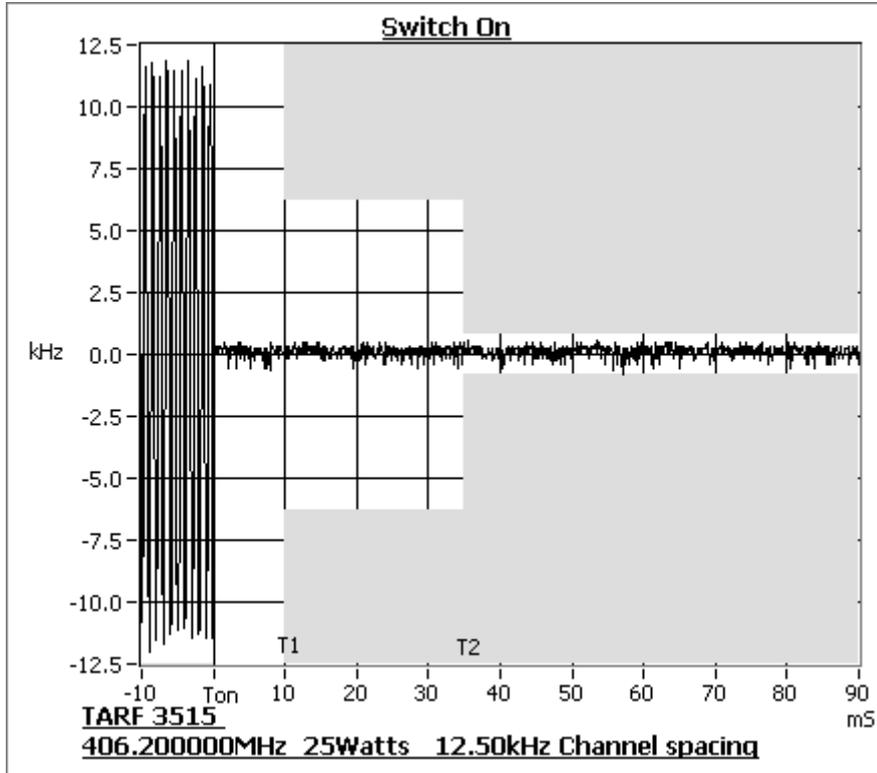
SPECIFICATION: FCC 47 CFR 90.214

RSS-119 5.9

Tx FREQUENCY: 406.2 MHz

25 W

12.5 kHz Channel Spacing



Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 429.9 MHz 25 W 12.5 kHz Channel Spacing

| TRANSIENT RESPONSE PERIOD | CARRIER PEAK VARIATION FROM NORMAL | |
|---------------------------|------------------------------------|---------------|
| | Key ON (kHz) | Key OFF (kHz) |
| t1 | 1.0 | N/A |
| t2 | 0.6 | N/A |
| t3 | N/A | 1.0 |
| t2 → t3 ppm | -1.8 | |
| ERROR LIMIT t2 → t3 (ppm) | 2.5 | |

| | | |
|---|-----|----|
| Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 the frequency difference does not exceed half a channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit. | YES | NO |
| | Y | |

LIMIT: FCC 47 CFR 90.214

| TRANSIENT PERIODS | FREQUENCY RANGE | |
|-------------------|-------------------|-------------------|
| | 150 MHz – 174 MHz | 421 MHz – 512 MHz |
| t1 (ms) | 5 ms | 10 ms |
| t2 (ms) | 20 ms | 25 ms |
| t3 (ms) | 5 ms | 10 ms |

LIMIT: RSS-119 5.9

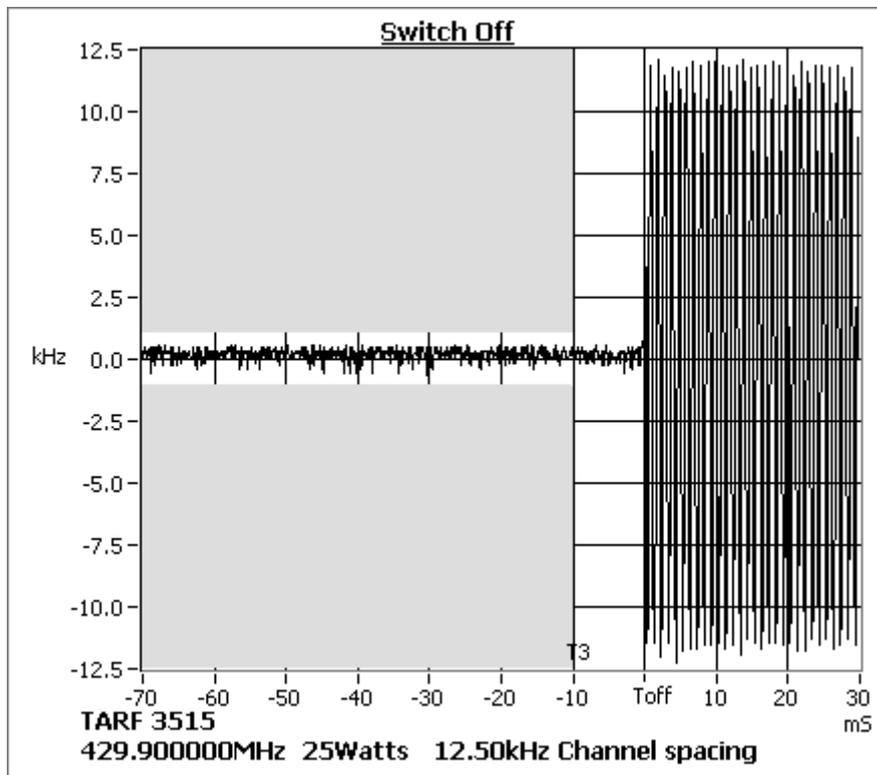
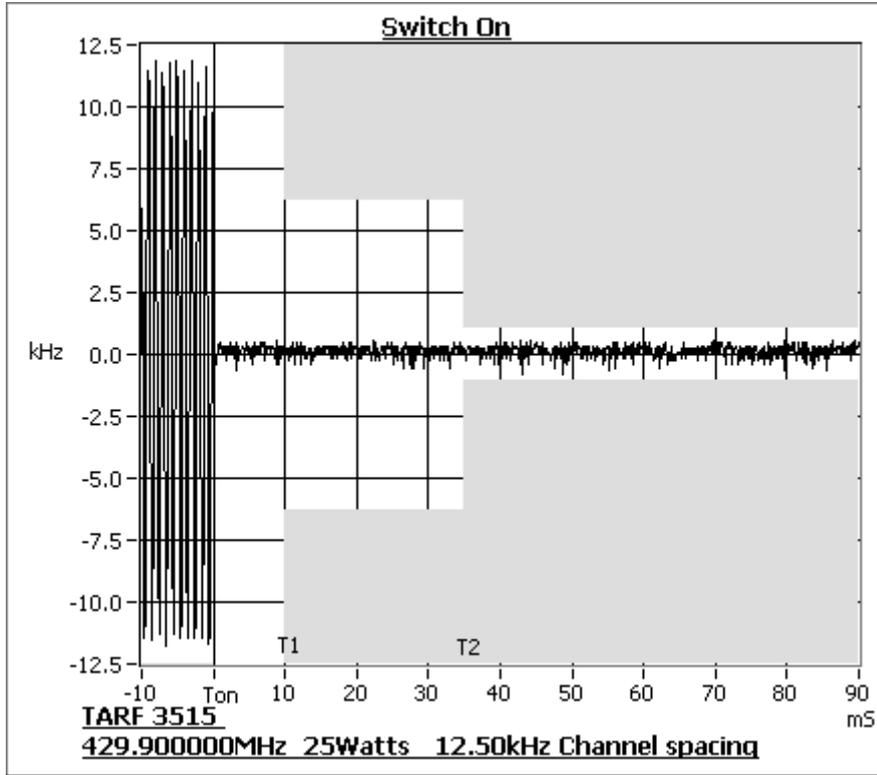
| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|------------------------------|-----------------|-----------------|
| TRANSIENT PERIODS | Maximum Frequency Difference | FREQUENCY RANGE | |
| | | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

Transient Frequency Behavior

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 429.9 MHz 25 W 12.5 kHz Channel Spacing



Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 450.1 MHz 25 W 12.5 kHz Channel Spacing

| TRANSIENT RESPONSE PERIOD | CARRIER PEAK VARIATION FROM NORMAL | |
|---------------------------|------------------------------------|---------------|
| | Key ON (kHz) | Key OFF (kHz) |
| t1 | -0.7 | N/A |
| t2 | -0.6 | N/A |
| t3 | N/A | -0.6 |
| t2 → t3 ppm | -1.5 | |
| ERROR LIMIT t2 → t3 (ppm) | 2.5 | |

| | | |
|---|-----|----|
| Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 the frequency difference does not exceed half a channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit. | YES | NO |
| | Y | |

LIMIT: FCC 47 CFR 90.214

| TRANSIENT PERIODS | FREQUENCY RANGE | |
|-------------------|-------------------|-------------------|
| | 150 MHz – 174 MHz | 421 MHz – 512 MHz |
| t1 (ms) | 5 ms | 10 ms |
| t2 (ms) | 20 ms | 25 ms |
| t3 (ms) | 5 ms | 10 ms |

LIMIT: RSS-119 5.9

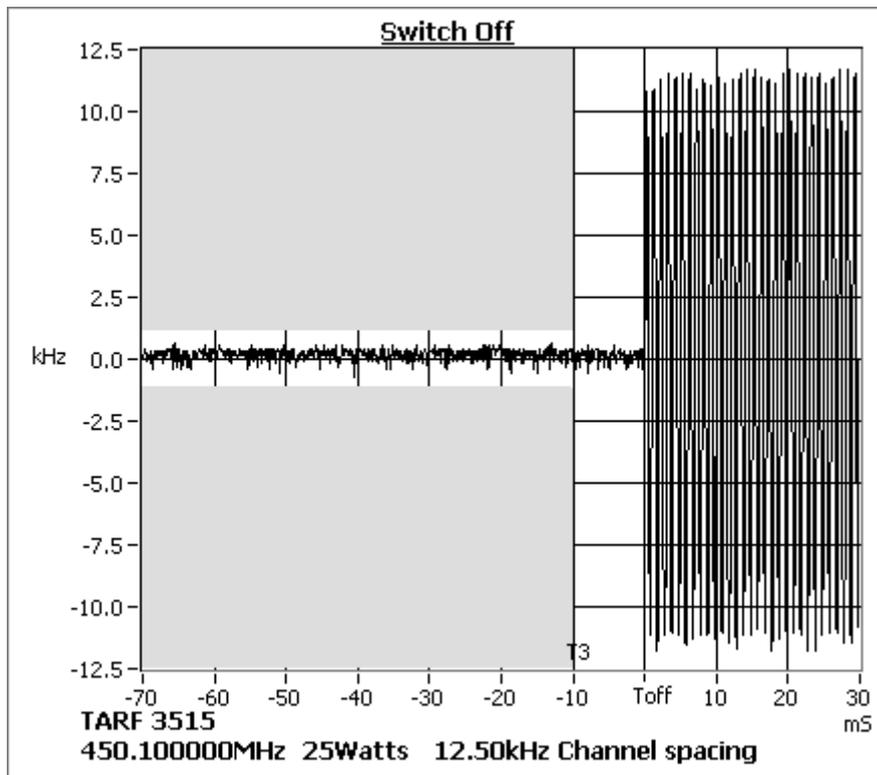
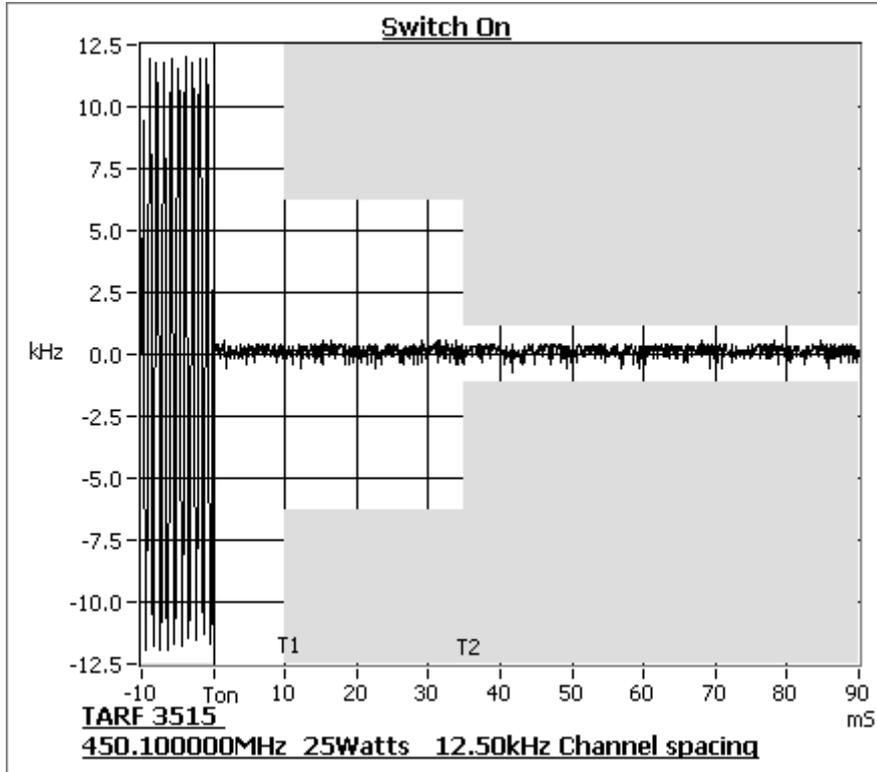
| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|------------------------------|-----------------|-----------------|
| TRANSIENT PERIODS | Maximum Frequency Difference | FREQUENCY RANGE | |
| | | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

Transient Frequency Behavior

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 450.1 MHz 25 W 12.5 kHz Channel Spacing



Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 459.9 MHz 25 W 12.5 kHz Channel Spacing

| TRANSIENT RESPONSE PERIOD | CARRIER PEAK VARIATION FROM NORMAL | |
|---------------------------|------------------------------------|---------------|
| | Key ON (kHz) | Key OFF (kHz) |
| t1 | -0.7 | N/A |
| t2 | -0.6 | N/A |
| t3 | N/A | -0.7 |
| t2 → t3 ppm | -1.5 | |
| ERROR LIMIT t2 → t3 (ppm) | 2.5 | |

| | | |
|---|-----|----|
| Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 the frequency difference does not exceed half a channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit. | YES | NO |
| | Y | |

LIMIT: FCC 47 CFR 90.214

| TRANSIENT PERIODS | FREQUENCY RANGE | |
|-------------------|-------------------|-------------------|
| | 150 MHz – 174 MHz | 421 MHz – 512 MHz |
| t1 (ms) | 5 ms | 10 ms |
| t2 (ms) | 20 ms | 25 ms |
| t3 (ms) | 5 ms | 10 ms |

LIMIT: RSS-119 5.9

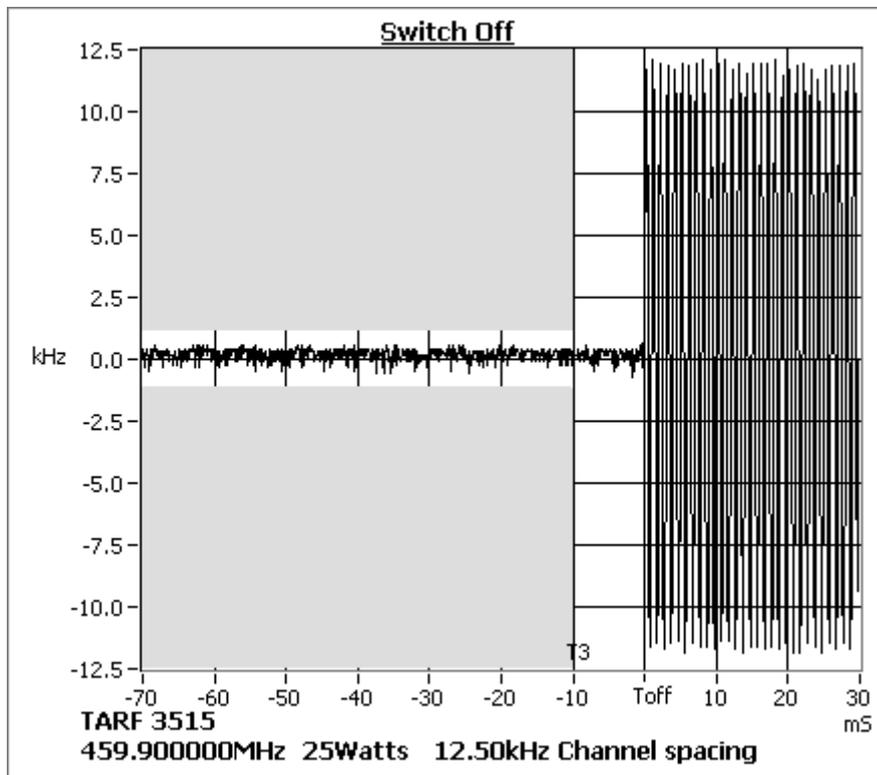
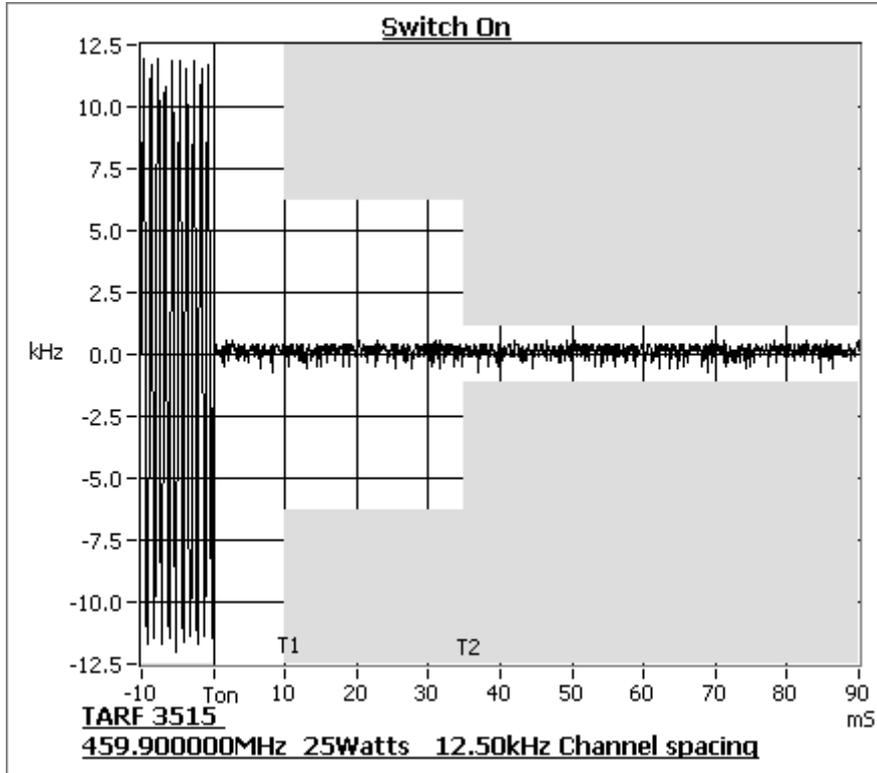
| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|------------------------------|-----------------|-----------------|
| TRANSIENT PERIODS | Maximum Frequency Difference | FREQUENCY RANGE | |
| | | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

Transient Frequency Behavior

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 459.9 MHz 25 W 12.5 kHz Channel Spacing



Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 469.9 MHz 25 W 12.5 kHz Channel Spacing

| TRANSIENT RESPONSE PERIOD | CARRIER PEAK VARIATION FROM NORMAL | |
|---------------------------|------------------------------------|---------------|
| | Key ON (kHz) | Key OFF (kHz) |
| t1 | -0.6 | N/A |
| t2 | -0.7 | N/A |
| t3 | N/A | -0.8 |
| t2 → t3 ppm | -1.4 | |
| ERROR LIMIT t2 → t3 (ppm) | 2.5 | |

| | | |
|---|-----|----|
| Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 the frequency difference does not exceed half a channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit. | YES | NO |
| | Y | |

LIMIT: FCC 47 CFR 90.214

| TRANSIENT PERIODS | FREQUENCY RANGE | |
|-------------------|-------------------|-------------------|
| | 150 MHz – 174 MHz | 421 MHz – 512 MHz |
| t1 (ms) | 5 ms | 10 ms |
| t2 (ms) | 20 ms | 25 ms |
| t3 (ms) | 5 ms | 10 ms |

LIMIT: RSS-119 5.9

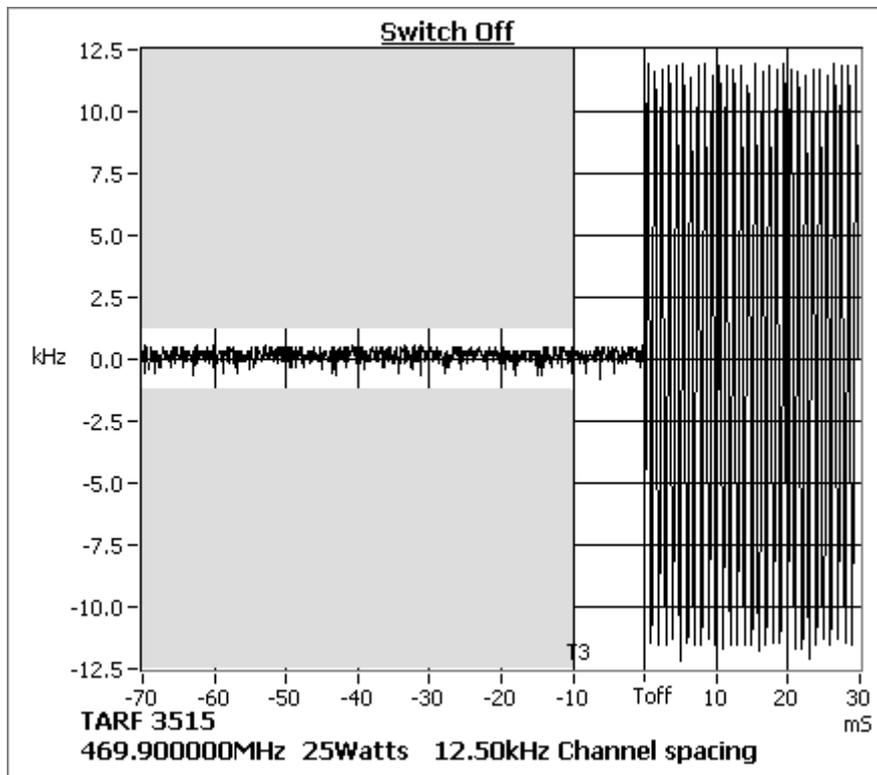
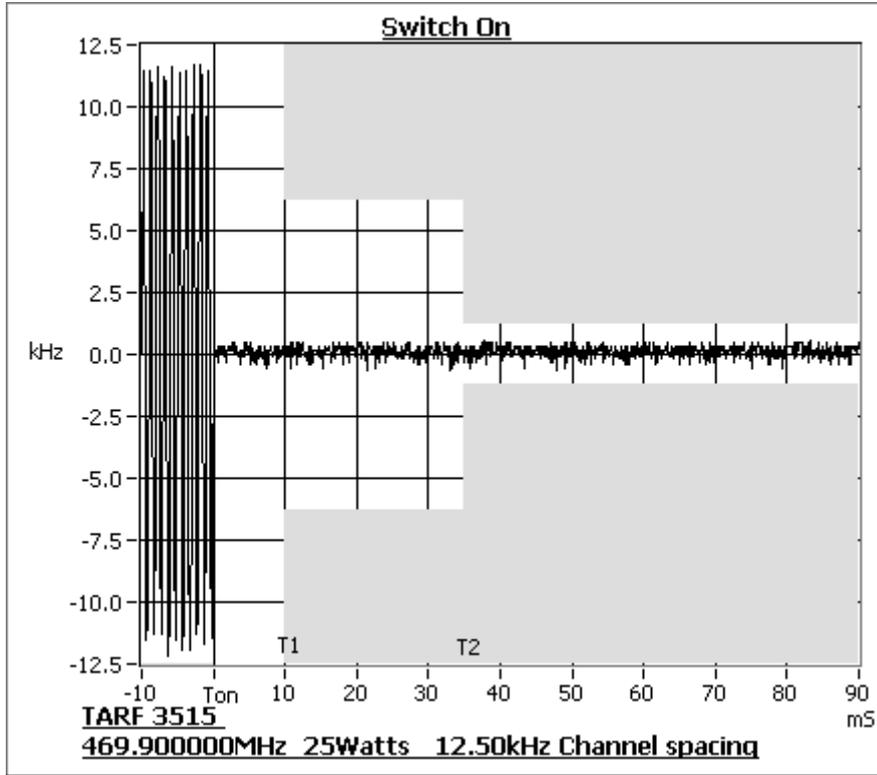
| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|------------------------------|-----------------|-----------------|
| TRANSIENT PERIODS | Maximum Frequency Difference | FREQUENCY RANGE | |
| | | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

Transient Frequency Behavior

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 469.9 MHz 25 W 12.5 kHz Channel Spacing



Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

RSS-119 5.9

Tx FREQUENCY: 406.2 MHz 25 W 25.0 kHz Channel Spacing

| TRANSIENT RESPONSE PERIOD | CARRIER PEAK VARIATION FROM NORMAL | |
|---------------------------|------------------------------------|---------------|
| | Key ON (kHz) | Key OFF (kHz) |
| t1 | -0.8 | N/A |
| t2 | -0.8 | N/A |
| t3 | N/A | 0.9 |
| t2 → t3 ppm | -2.6 | |
| ERROR LIMIT (t2 → t3) ppm | 5.0 | |

| | | |
|---|-----|----|
| Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 the frequency difference does not exceed half a channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit. | YES | NO |
| | Y | |

LIMIT: FCC 47 CFR 90.214

| TRANSIENT PERIODS | FREQUENCY RANGE | |
|-------------------|-------------------|-------------------|
| | 150 MHz – 174 MHz | 421 MHz – 512 MHz |
| t1 (ms) | 5 ms | 10 ms |
| t2 (ms) | 20 ms | 25 ms |
| t3 (ms) | 5 ms | 10 ms |

LIMIT: RSS-119 5.9

| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|------------------------------|-----------------|-----------------|
| TRANSIENT PERIODS | Maximum Frequency Difference | FREQUENCY RANGE | |
| | | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods.

Transient Frequency Behaviour

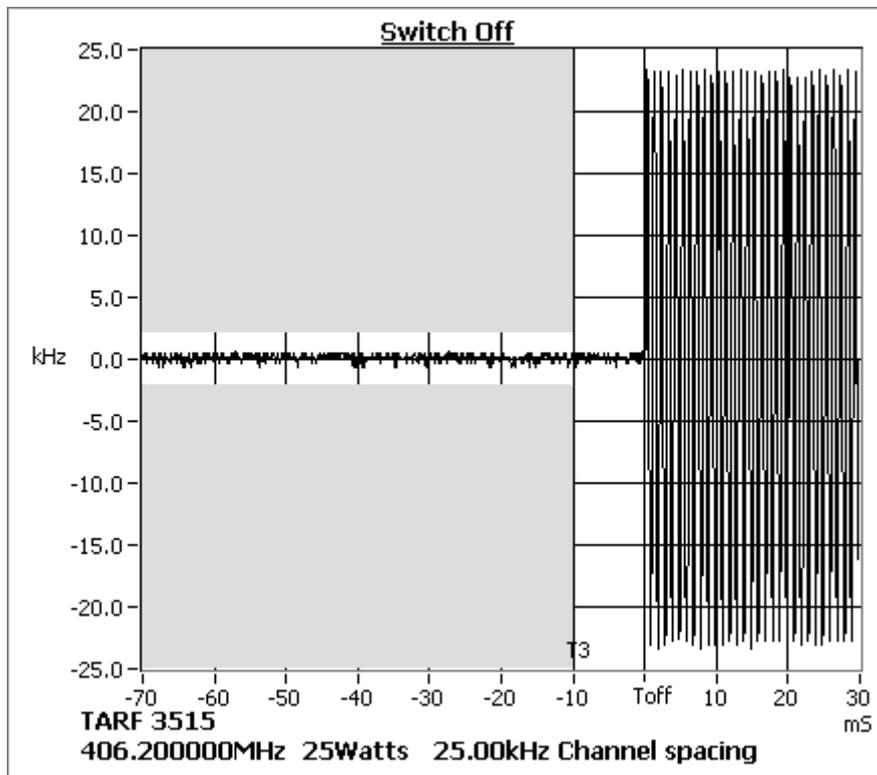
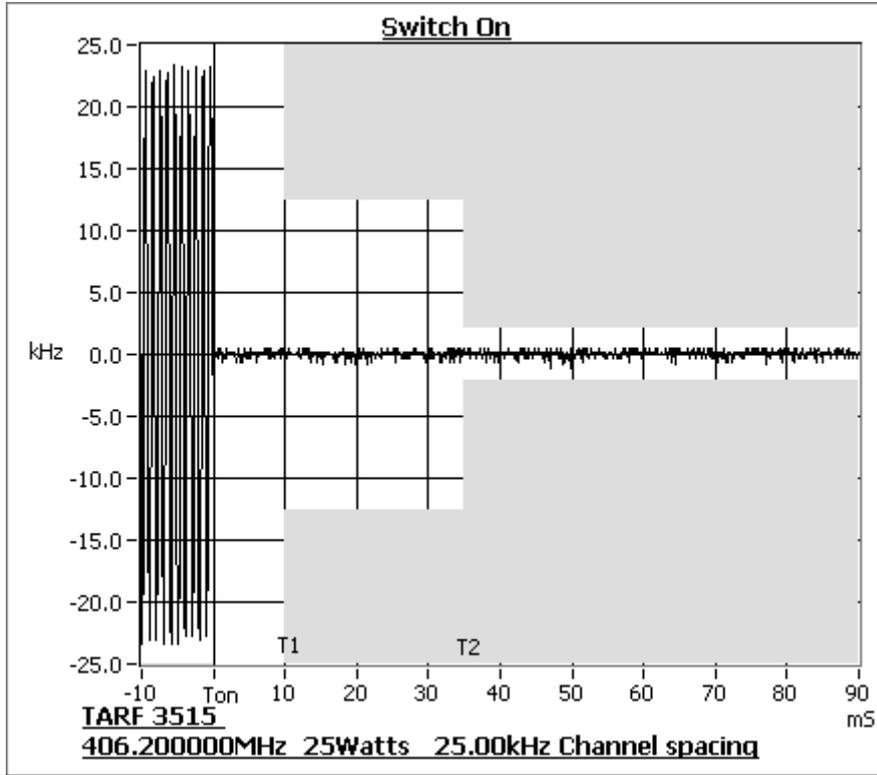
SPECIFICATION: FCC 47 CFR 90.214

RSS-119 5.9

Tx FREQUENCY: 406.2 MHz

25 W

25.0 kHz Channel Spacing



Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 429.9 MHz 25 W 25.0 kHz Channel Spacing

| TRANSIENT RESPONSE PERIOD | CARRIER PEAK VARIATION FROM NORMAL | |
|---------------------------|------------------------------------|---------------|
| | Key ON (kHz) | Key OFF (kHz) |
| t1 | -1.3 | N/A |
| t2 | -0.8 | N/A |
| t3 | N/A | 0.7 |
| t2 → t3 ppm | -2.3 | |
| ERROR LIMIT t2 → t3 (ppm) | 5.0 | |

| | | |
|---|-----|----|
| Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 the frequency difference does not exceed half a channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit. | YES | NO |
| | Y | |

LIMIT: FCC 47 CFR 90.214

| TRANSIENT PERIODS | FREQUENCY RANGE | |
|-------------------|-------------------|-------------------|
| | 150 MHz – 174 MHz | 421 MHz – 512 MHz |
| t1 (ms) | 5 ms | 10 ms |
| t2 (ms) | 20 ms | 25 ms |
| t3 (ms) | 5 ms | 10 ms |

LIMIT: RSS-119 5.9

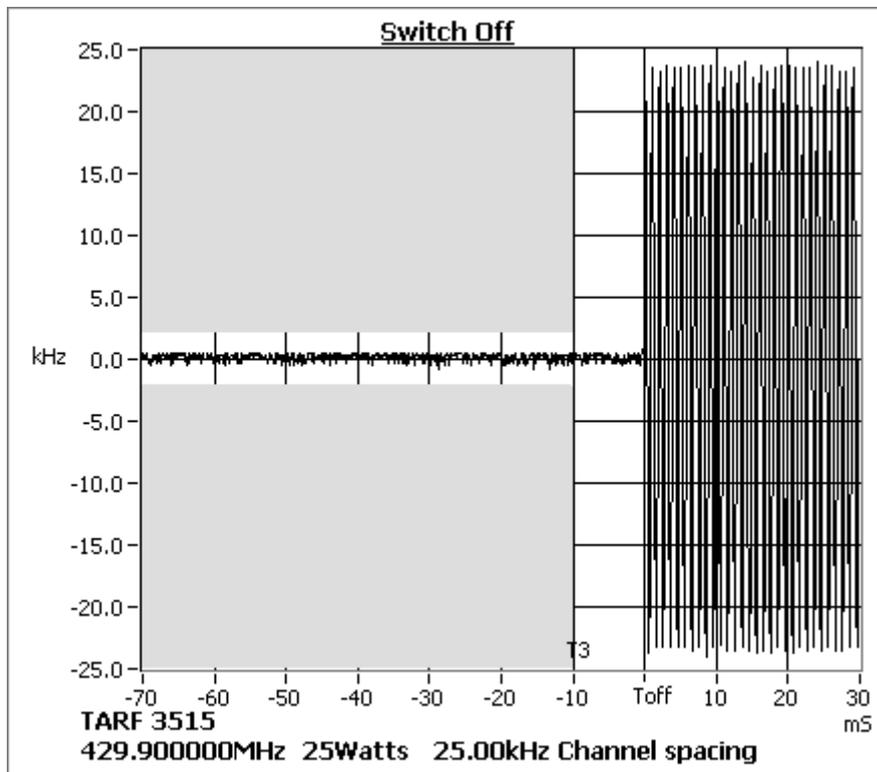
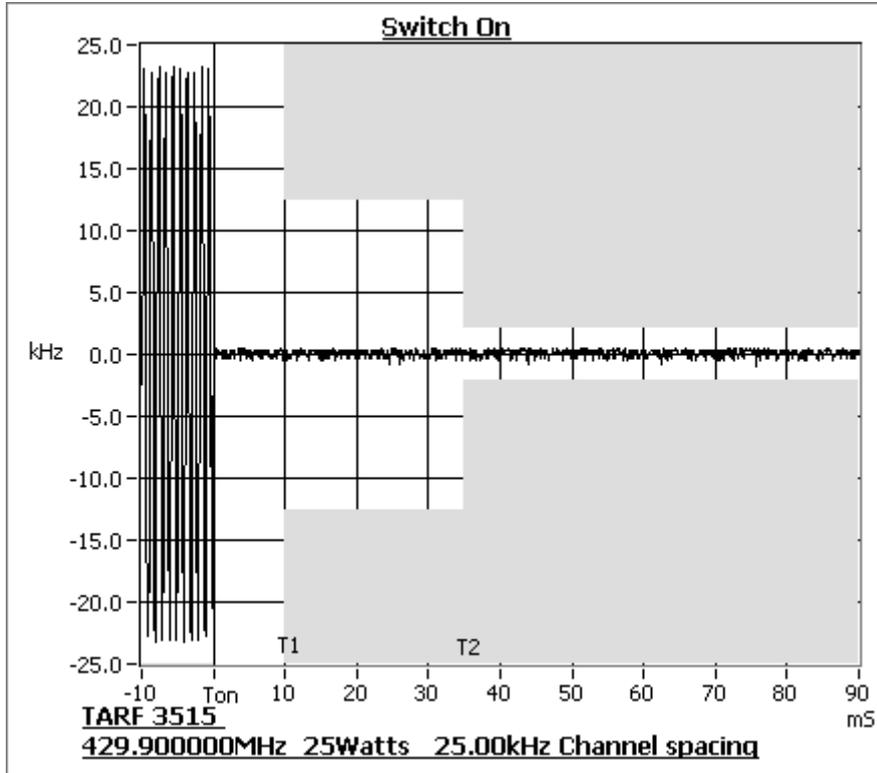
| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|------------------------------|-----------------|-----------------|
| TRANSIENT PERIODS | Maximum Frequency Difference | FREQUENCY RANGE | |
| | | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

Transient Frequency Behavior

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 429.9 MHz 25 W 25.0 kHz Channel Spacing



Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 450.1 MHz 25 W 25.0 kHz Channel Spacing

| TRANSIENT RESPONSE PERIOD | CARRIER PEAK VARIATION FROM NORMAL | |
|---------------------------|------------------------------------|---------------|
| | Key ON (kHz) | Key OFF (kHz) |
| t1 | -4.3 | N/A |
| t2 | -0.8 | N/A |
| t3 | N/A | 0.7 |
| t2 → t3 ppm | -2.9 | |
| ERROR LIMIT t2 → t3 (ppm) | 5.0 | |

| | | |
|---|-----|----|
| Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 the frequency difference does not exceed half a channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit. | YES | NO |
| | Y | |

LIMIT: FCC 47 CFR 90.214

| TRANSIENT PERIODS | FREQUENCY RANGE | |
|-------------------|-------------------|-------------------|
| | 150 MHz – 174 MHz | 421 MHz – 512 MHz |
| t1 (ms) | 5 ms | 10 ms |
| t2 (ms) | 20 ms | 25 ms |
| t3 (ms) | 5 ms | 10 ms |

LIMIT: RSS-119 5.9

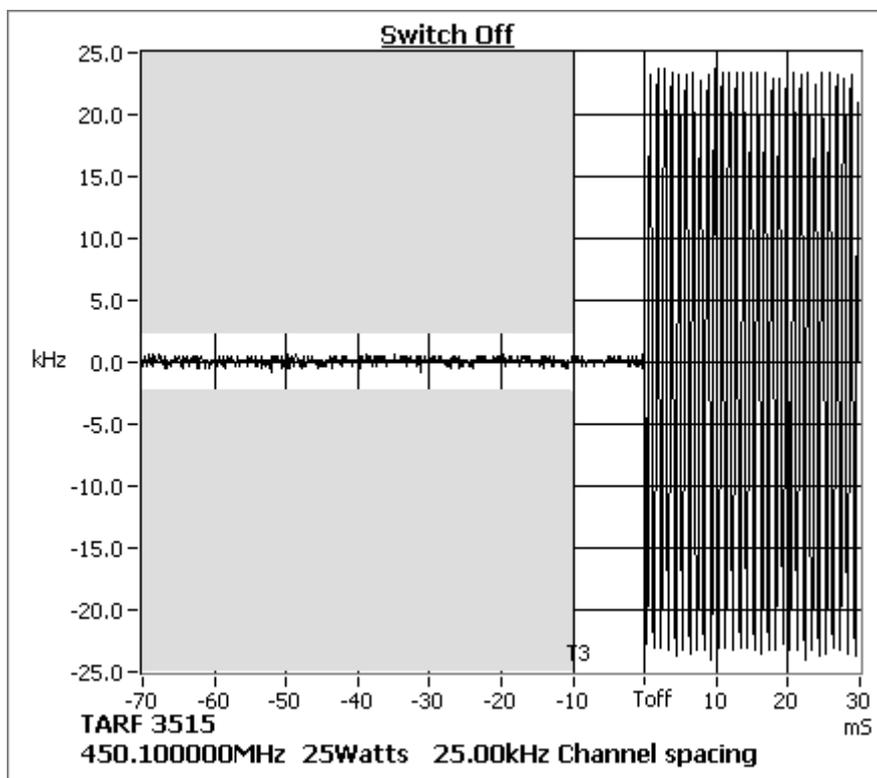
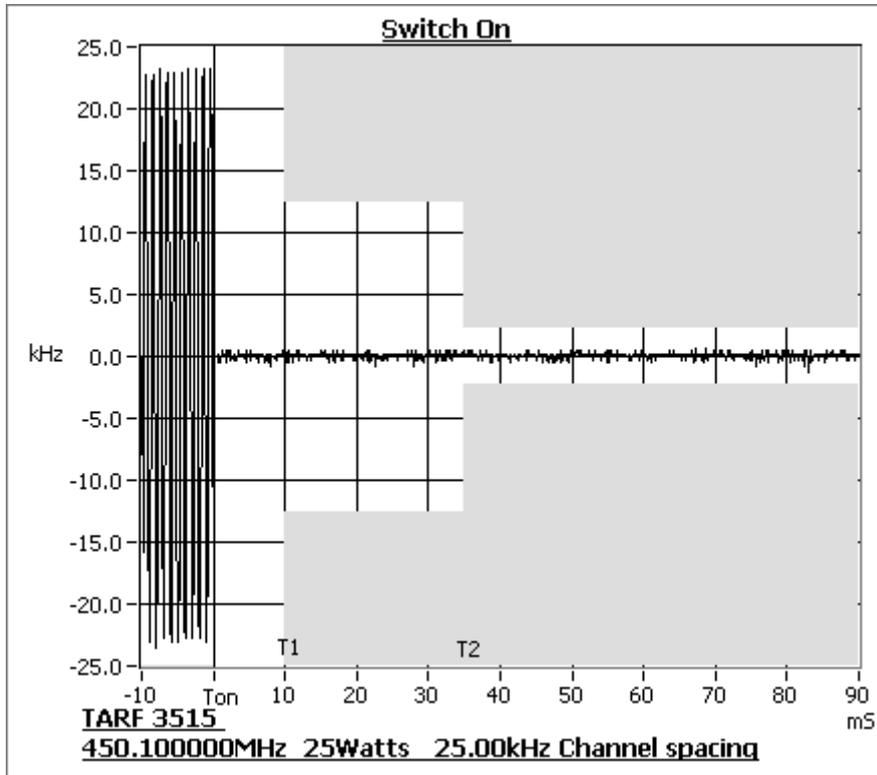
| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|------------------------------|-----------------|-----------------|
| TRANSIENT PERIODS | Maximum Frequency Difference | FREQUENCY RANGE | |
| | | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

Transient Frequency Behavior

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 450.1 MHz 25 W 25.0 kHz Channel Spacing



Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 459.9 MHz 25 W 25.0 kHz Channel Spacing

| TRANSIENT RESPONSE PERIOD | CARRIER PEAK VARIATION FROM NORMAL | |
|---------------------------|------------------------------------|---------------|
| | Key ON (kHz) | Key OFF (kHz) |
| t1 | -1.0 | N/A |
| t2 | -0.7 | N/A |
| t3 | N/A | -0.7 |
| t2 → t3 ppm | -1.6 | |
| ERROR LIMIT t2 → t3 (ppm) | 5.0 | |

| | | |
|---|-----|----|
| Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 the frequency difference does not exceed half a channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit. | YES | NO |
| | Y | |

LIMIT: FCC 47 CFR 90.214

| TRANSIENT PERIODS | FREQUENCY RANGE | |
|-------------------|-------------------|-------------------|
| | 150 MHz – 174 MHz | 421 MHz – 512 MHz |
| t1 (ms) | 5 ms | 10 ms |
| t2 (ms) | 20 ms | 25 ms |
| t3 (ms) | 5 ms | 10 ms |

LIMIT: RSS-119 5.9

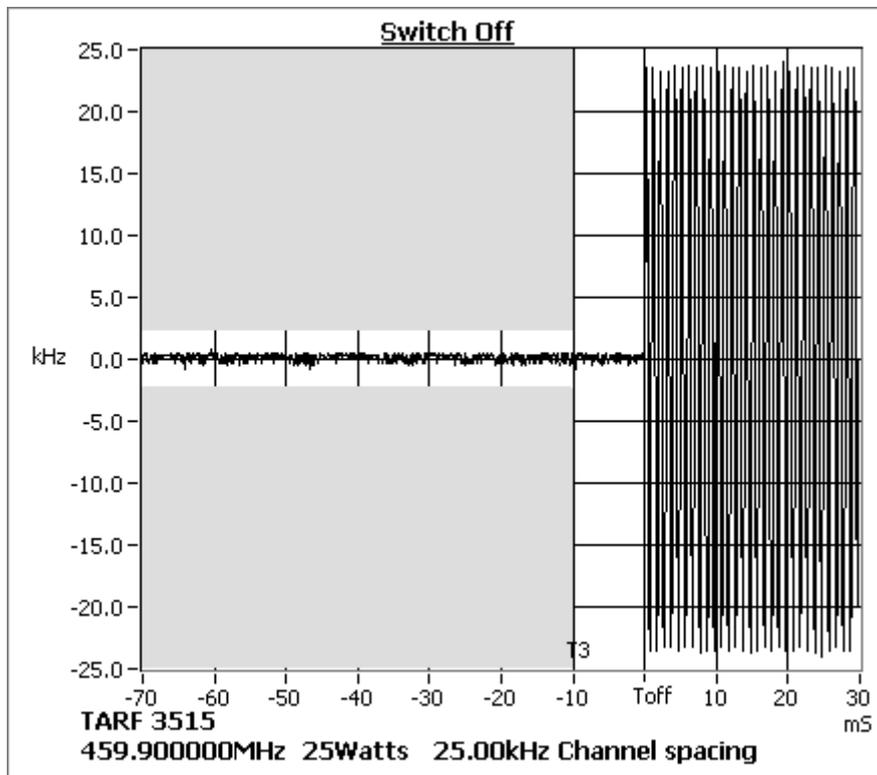
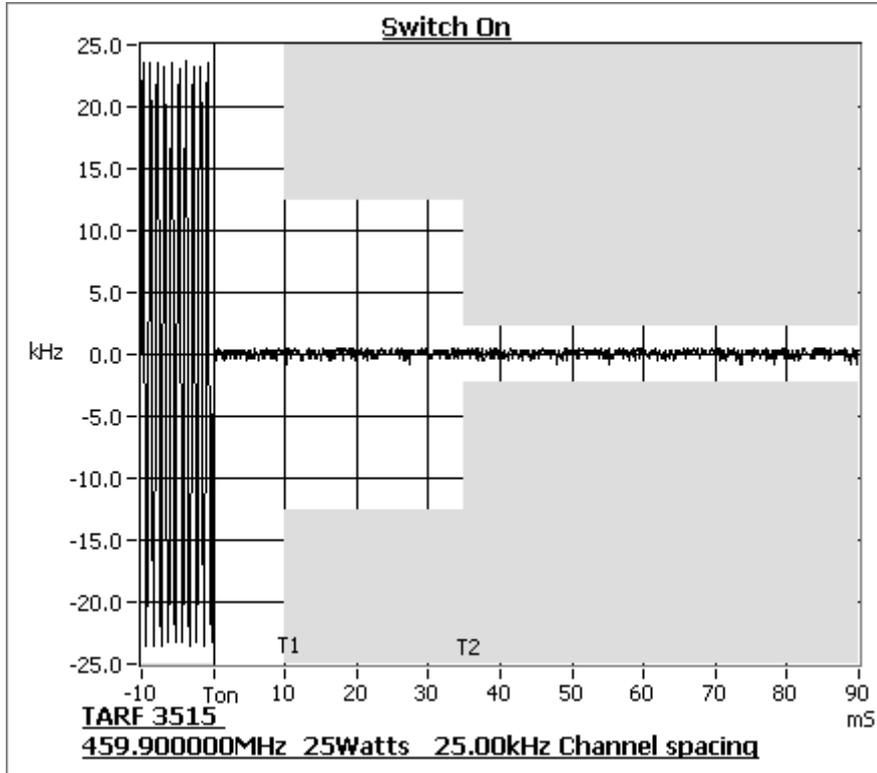
| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|------------------------------|-----------------|-----------------|
| TRANSIENT PERIODS | Maximum Frequency Difference | FREQUENCY RANGE | |
| | | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

Transient Frequency Behavior

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 459.9 MHz 25 W 25.0 kHz Channel Spacing



Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 469.9 MHz 25 W 25.0 kHz Channel Spacing

| TRANSIENT RESPONSE PERIOD | CARRIER PEAK VARIATION FROM NORMAL | |
|---------------------------|------------------------------------|---------------|
| | Key ON (kHz) | Key OFF (kHz) |
| t1 | 1.2 | N/A |
| t2 | -0.8 | N/A |
| t3 | N/A | -0.6 |
| t2 → t3 ppm | 2.5 | |
| ERROR LIMIT t2 → t3 (ppm) | 5.0 | |

| | | |
|---|-----|----|
| Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 the frequency difference does not exceed half a channel separation. | YES | NO |
| | Y | |
| Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit. | YES | NO |
| | Y | |

LIMIT: FCC 47 CFR 90.214

| TRANSIENT PERIODS | FREQUENCY RANGE | |
|-------------------|-------------------|-------------------|
| | 150 MHz – 174 MHz | 421 MHz – 512 MHz |
| t1 (ms) | 5 ms | 10 ms |
| t2 (ms) | 20 ms | 25 ms |
| t3 (ms) | 5 ms | 10 ms |

LIMIT: RSS-119 5.9

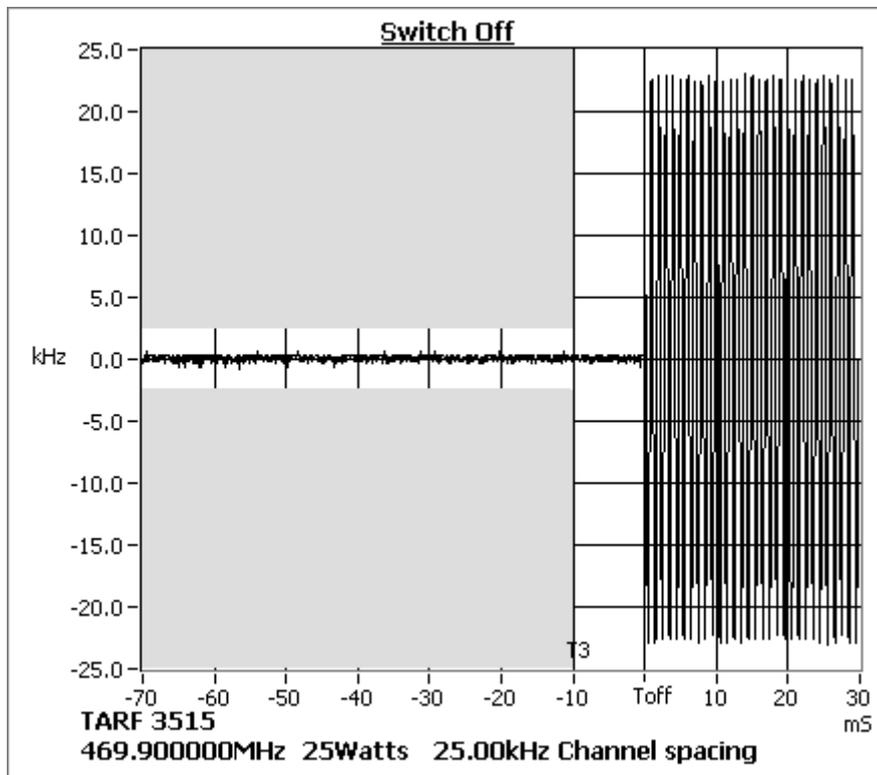
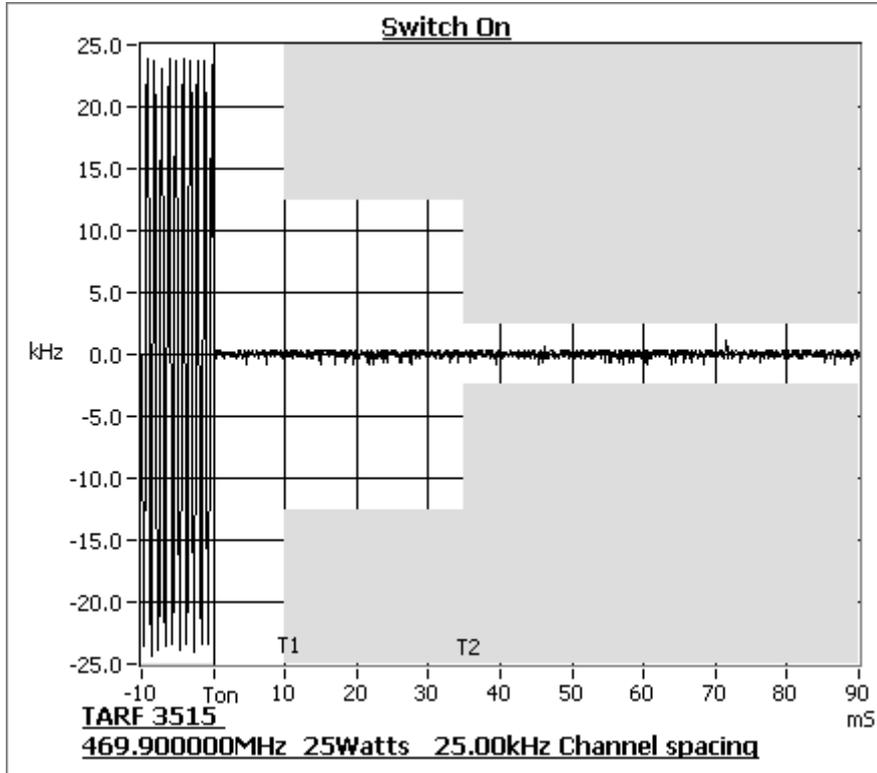
| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|------------------------------|-----------------|-----------------|
| TRANSIENT PERIODS | Maximum Frequency Difference | FREQUENCY RANGE | |
| | | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

Transient Frequency Behavior

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 469.9 MHz 25 W 25.0 kHz Channel Spacing



TRANSMITTER FREQUENCY STABILITY - TEMPERATURE

SPECIFICATION: FCC 47 CFR 2.1055 (a) (1)

RSS-119 5.3

GUIDE: TIA/EIA-603D 2.2.2

MEASUREMENT PROCEDURE:

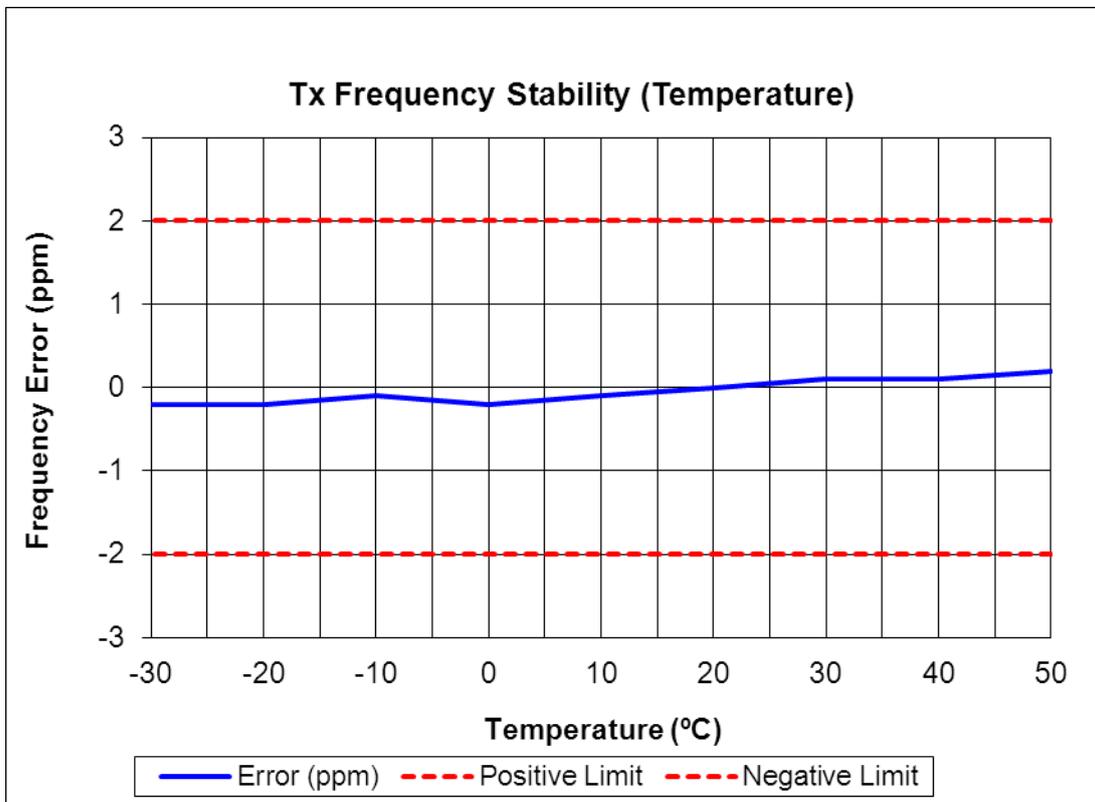
1. Refer Annex A for equipment set up.
2. The EUT was tested for frequency error from -30°C to +50°C in 10°C increments
3. The frequency error was recorded in parts per million (ppm).

MEASUREMENT RESULTS:

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

406.2 MHz

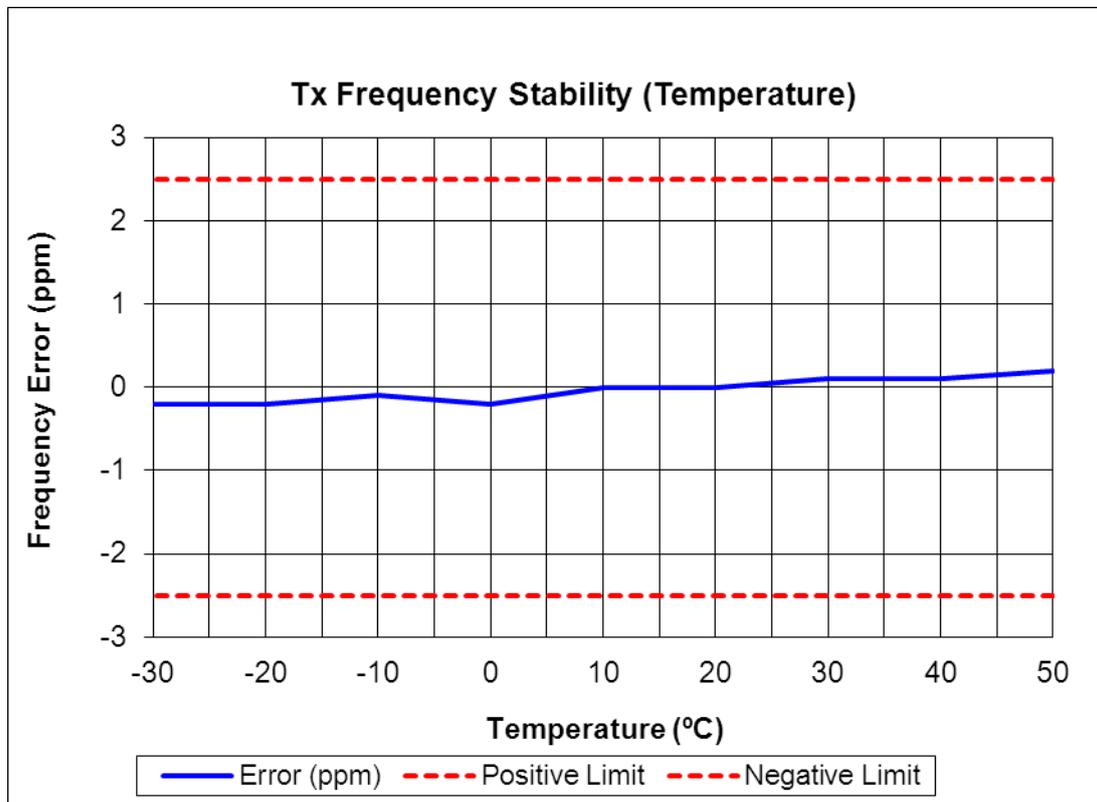
| Temperature (°C) | Frequency (MHz) | Error (ppm) |
|------------------|-----------------|-------------|
| 50 | 406.200078 | 0.2 |
| 40 | 406.200039 | 0.1 |
| 30 | 406.200033 | 0.1 |
| 20 | 406.199981 | 0.0 |
| 10 | 406.199942 | -0.1 |
| 0 | 406.199930 | -0.2 |
| -10 | 406.199951 | -0.1 |
| -20 | 406.199916 | -0.2 |
| -30 | 406.199916 | -0.2 |



Transmitter Frequency Stability - Temperature

429.9 MHz

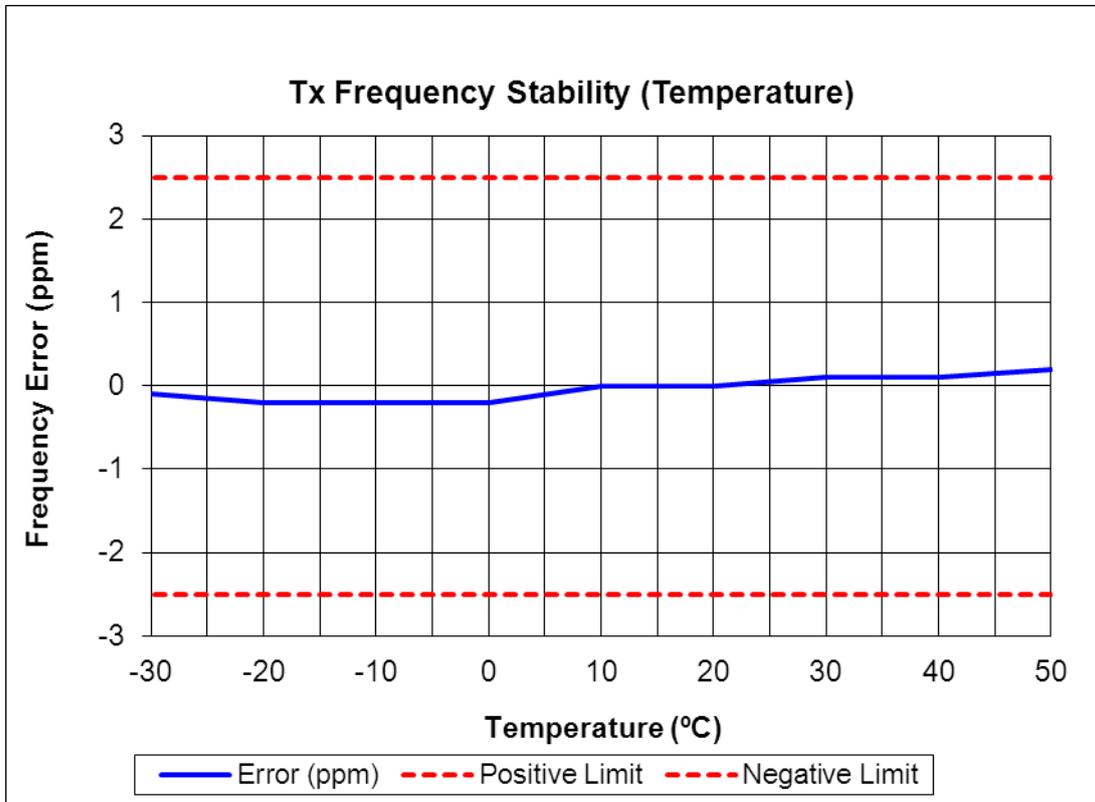
| Temperature (°C) | Frequency (MHz) | Error (ppm) |
|------------------|-----------------|-------------|
| 50 | 429.900088 | 0.2 |
| 40 | 429.900051 | 0.1 |
| 30 | 429.900039 | 0.1 |
| 20 | 429.899996 | 0.0 |
| 10 | 429.899994 | 0.0 |
| 0 | 429.899933 | -0.2 |
| -10 | 429.899949 | -0.1 |
| -20 | 429.899910 | -0.2 |
| -30 | 429.899934 | -0.2 |



Transmitter Frequency Stability - Temperature

450.1 MHz

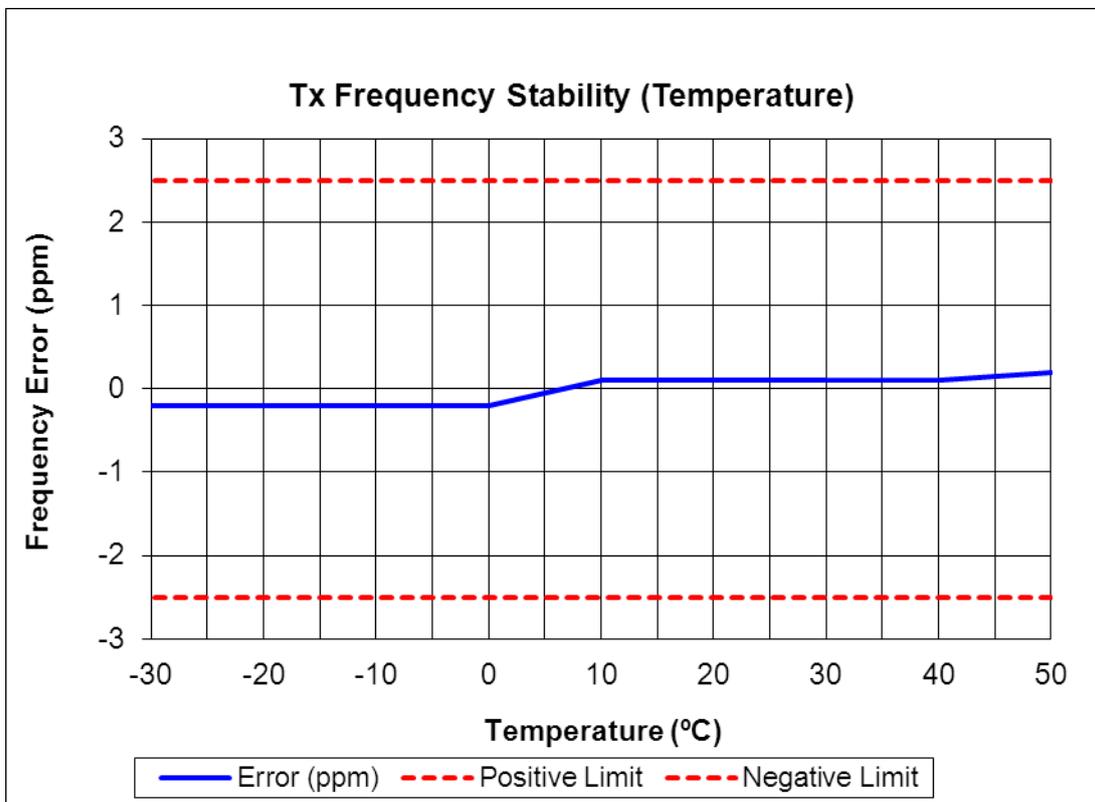
| Temperature (°C) | Frequency (MHz) | Error (ppm) |
|------------------|-----------------|-------------|
| 50 | 450.100102 | 0.2 |
| 40 | 450.100056 | 0.1 |
| 30 | 450.100045 | 0.1 |
| 20 | 450.100012 | 0.0 |
| 10 | 450.100006 | 0.0 |
| 0 | 450.099921 | -0.2 |
| -10 | 450.099929 | -0.2 |
| -20 | 450.099904 | -0.2 |
| -30 | 450.099940 | -0.1 |



Transmitter Frequency Stability - Temperature

459.9 MHz

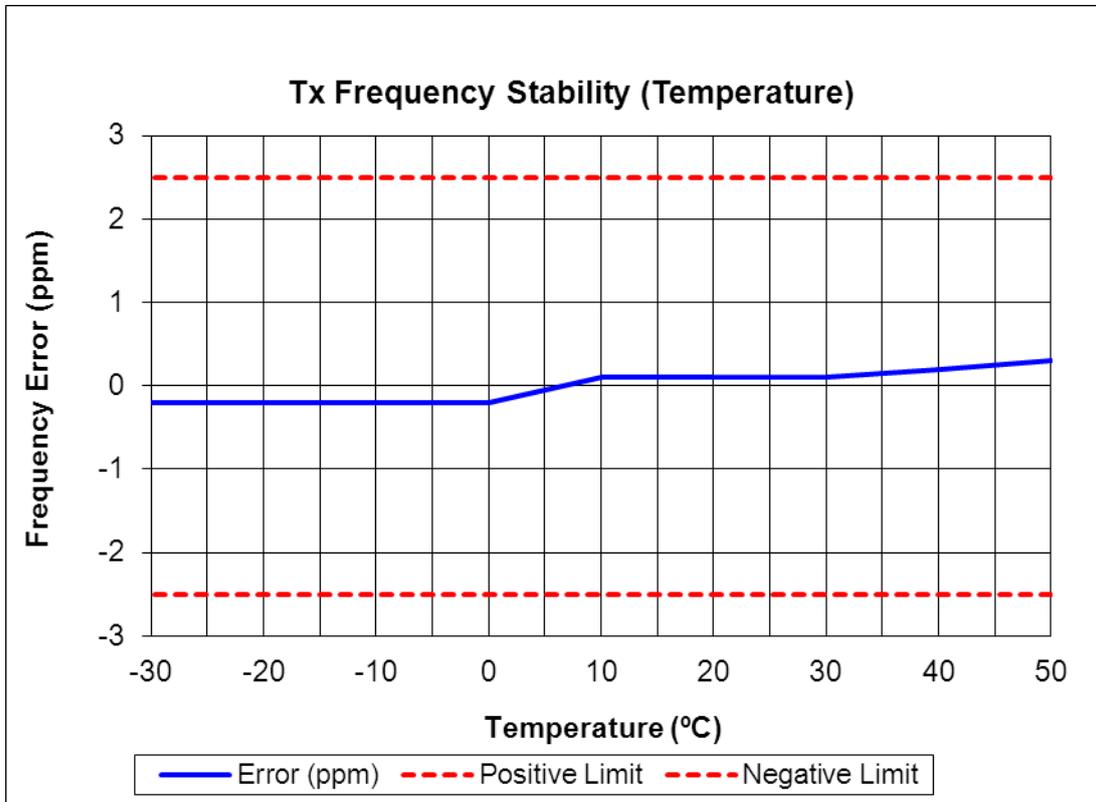
| Temperature (°C) | Frequency (MHz) | Error (ppm) |
|------------------|-----------------|-------------|
| 50 | 459.900114 | 0.2 |
| 40 | 459.900067 | 0.1 |
| 30 | 459.900049 | 0.1 |
| 20 | 459.900040 | 0.1 |
| 10 | 459.900033 | 0.1 |
| 0 | 459.899925 | -0.2 |
| -10 | 459.899928 | -0.2 |
| -20 | 459.899910 | -0.2 |
| -30 | 459.899931 | -0.2 |



Transmitter Frequency Stability - Temperature

469.9 MHz

| Temperature (°C) | Frequency (MHz) | Error (ppm) |
|------------------|-----------------|-------------|
| 50 | 469.900128 | 0.3 |
| 40 | 469.900085 | 0.2 |
| 30 | 469.900059 | 0.1 |
| 20 | 469.900049 | 0.1 |
| 10 | 469.900042 | 0.1 |
| 0 | 469.899922 | -0.2 |
| -10 | 469.899922 | -0.2 |
| -20 | 469.899911 | -0.2 |
| -30 | 469.899909 | -0.2 |



LIMIT: FCC 47 CFR 90.213

RSS-119

5.3

| Channel Spacing (kHz) | Frequency Error (ppm) | | | | |
|-----------------------|-----------------------|-----------|-----------|-----------|-----------|
| | 406.2 MHz | 429.9 MHz | 450.1 MHz | 459.9 MHz | 469.9 MHz |
| 12.5 | 2.0 | 2.5 | 2.5 | 2.5 | 2.5 |

TRANSMITTER FREQUENCY STABILITY - VOLTAGE

SPECIFICATION: FCC 47 CFR 2.1055 (d) (1) RSS-119 5.3

GUIDE: TIA/EIA-603D 2.2.2

MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. The EUT was tested for frequency error at an input voltage to the radio of 85% to 115%.
3. The frequency error was recorded in parts per million (ppm).

MEASUREMENT RESULTS:

| Voltage | FREQUENCY ERROR (ppm) for 12.5 kHz | | | | |
|----------------------|------------------------------------|-----------|-----------|-----------|-----------|
| | 406.2 MHz | 429.9 MHz | 450.1 MHz | 459.9 MHz | 469.9 MHz |
| 13.8 V _{DC} | -0.06 | 0.00 | 0.02 | 0.03 | 0.04 |
| 11.7 V _{DC} | -0.04 | 0.01 | 0.03 | 0.03 | 0.03 |
| 15.9 V _{DC} | -0.02 | 0.01 | 0.02 | 0.03 | 0.04 |

LIMIT CLAUSES: FCC 47 CFR 90.213 RSS-119 5.3

| Channel Spacing (kHz) | Frequency Error (ppm) | | | | |
|-----------------------|-----------------------|-----------|-----------|-----------|-----------|
| | 406.2 MHz | 429.9 MHz | 450.1 MHz | 459.9 MHz | 469.9 MHz |
| 12.5 | 2.0 | 2.5 | 2.5 | 2.5 | 2.5 |

SPURIOUS EMISSIONS – Rx CONDUCTED

SPECIFICATION: RSS-119 5.11

GUIDE: TIA/EIA-603D 2.1.2

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment set up diagram.
2. The frequency range examined was from 30 MHz to 3 times highest tunable frequency.
3. Spurious emissions which were attenuated more than 20 dB below the limit were not recorded.

| 406.2MHz Receive | | |
|---|------------|-------------|
| Emission Frequency (MHz) | Level (nW) | Level (dBm) |
| ~ | ~ | ~ |
| 429.9 MHz Receive | | |
| Emission Frequency (MHz) | Level (nW) | Level (dBm) |
| ~ | ~ | ~ |
| 450.1MHz Receive | | |
| Emission Frequency (MHz) | Level (nW) | Level (dBm) |
| ~ | ~ | ~ |
| 459.9MHz Receive | | |
| Emission Frequency (MHz) | Level (nW) | Level (dBm) |
| ~ | ~ | ~ |
| 469.9MHz Receive | | |
| Emission Frequency (MHz) | Level (nW) | Level (dBm) |
| ~ | ~ | ~ |
| No emissions were detected within 20 dB of Limit. | | |

LIMIT CLAUSE: RSS-Gen 6(b)

| LIMIT | 30 → 1000 MHz | 2 nW | - 57 dBm |
|-------|---------------|------------|----------|
| | | > 1000 MHz | 5 nW |

TEST EQUIPMENT LIST

| Equipment Type | Information | Manufacturer | Model No | Serial No# | Tait ID | Cal Due |
|---------------------|------------------------------|-----------------|--------------------|---------------|---------|-----------|
| Signal Generator | Analog 4GHz | Agilent | E4422B | GB40050320 | E3788 | 8-May-14 |
| Modulation Analyser | Includes Audio Analyser | Rohde & Schwarz | FMA0852.8500.52 | 842541/001 | E3554 | 14-Dec-14 |
| Oscilloscope | 100MHz Digital | Tektronics | TDS340 | B013611 | E3585 | 10-Oct-13 |
| Environ. Chamber | Chest | Contherm | Chest | E3397 | E3397 | 2-Aug-15 |
| Power Supply | TREVA2 60V/25A | Agilent | N5767A | US09F4901H | E4656 | 8-Oct-13 |
| Antenna | Reference Dipoles | Emco | 3121C DB1 | 9510-1164 | E3559 | 30-Jan-16 |
| Antenna | 18GHz DRG | Emco | DRG3115 | 9512-4638 | E3560 | 6-Mar-16 |
| Antenna | 18GHz DRG | Emco | DRG3115 | 2084 | E3076 | 6-Mar-16 |
| Spectrum Analyser | 26.5GHz | Agilent | PXA N9030A | MY49432161 | E4907 | 30-Mar-14 |
| Transient Limiter | 9kHz to 200MHz | Agilent | 11947A | 3107A03657 | E4982 | 18-Apr-14 |
| RF Chamber | S-LINE TEM CELL | Rohde & Schwarz | 1089.9296.02 | 338232/003 | E3636 | 31-Aug-15 |
| RF Amplifier | +21.7 dB 1GHz | Tait | ZFL-1000LN | E3660 | E3360 | 18-Dec-13 |
| RF Attenuator | 30dB 250W | Weinschel | 45-30-34 | JW663 | E3386 | 13-Oct-13 |
| RF Attenuator | TREVA2 20dB 150W | Weinschel | 40-20-33 | CJ405 | E3733 | 12-Oct-13 |
| RF Load | 50W | Weinschel | F1426 | BF0487 | E3675 | 13-Oct-13 |
| Coax Cable | 1m Blue | Suhner | Sucoflex 104A | 44610/4A | E4619 | 12-Oct-13 |
| Coax Cable | 3m Blue | Suhner | Sucoflex 104A | 44611/4A | E4620 | 13-Oct-13 |
| Coax Cable | 2m Black | Suhner | RG214HF/Nm/Nm/2000 | TeltestBlack4 | E4653 | 13-Oct-13 |
| Audio Analyser | TREVA2 | Hewlett Packard | HP8903B | 2818A04275 | E3710 | 12-Oct-13 |
| LISN | | Emco | 3825/2 | 9204-1961 | E3040 | 17-Oct-13 |
| Modulation Analyser | TREVA2 | Hewlett Packard | HP8901B (Opt 002) | 3704A05837 | E3786 | 12-Oct-13 |
| Signal Generator | TREVA2 Analog 3.3GHz | Rohde & Schwarz | SML03 1090.3000.13 | 100597 | E4050 | 17-Oct-13 |
| RF Attenuator | TREVA2 3dB | Weinschel | Model 1 | BL9950 | E4080 | * |
| RF Combiner | TREVA2 | Minicircuits | ZFSC-4-1 | - | E4084 | * |
| Spectrum Analyser | 13.2GHz | Agilent | E4445A | MY42510072 | E4139 | 21-Nov-14 |
| OATS | NSA | Tait | | | | 31-Aug-13 |
| Coax Cable | OATS Tower Cable | Intelcom | RG214 | OATS1 | E4621 | 15-Oct-13 |
| Coax Cable | OATS Turntable Cable | Intelcom | RG215 | OATS2 | E4622 | 15-Oct-13 |
| OATS | Antenna Tower | Electrometrics | EM-4720-2 | 112 | E4447 | * |
| OATS | Controller | Electrometrics | EM-4700 | 119 | E4445 | * |
| OATS | Turntable | Electrometrics | EM-4704A | 105 | E4446 | * |
| RF Load | 2W | MCL | NTRM-50 | 01 | | 18-Dec-13 |
| RF Attenuator | 30dB 350W | Weinschel | 67-30-33 | BR0531 | E4280 | 13-Oct-13 |
| Multimeter | | Fluke | 77 | 35069359 | E3237 | 9-Oct-13 |
| Coax Cable | 2m Black | Suhner | RG214HF/Nm/Nm/2000 | TeltestBlack5 | E4850 | 13-Oct-13 |
| Power Meter | TREVA2 Power Head for HP8901 | Hewlett Packard | HP11722A | 2716A02037 | 1575 | 15-Oct-13 |
| TREVA 2 | | Teltest | - | 2 | - | 24-Sep-13 |
| Coax Cable | Reverb - 2m Multiflex 141 | TeltestBlue5 | MF 141 | TeltestBlue5 | E4844 | 13-Oct-13 |
| Coax Cable | Reverb - 1m Multiflex 141 | TeltestBlue3 | MF 141 | TeltestBlue3 | E4846 | 13-Oct-13 |
| Coax Cable | Reverb - 1m Multiflex 141 | TeltestBlue2 | MF 141 | TeltestBlue2 | E4847 | 13-Oct-13 |

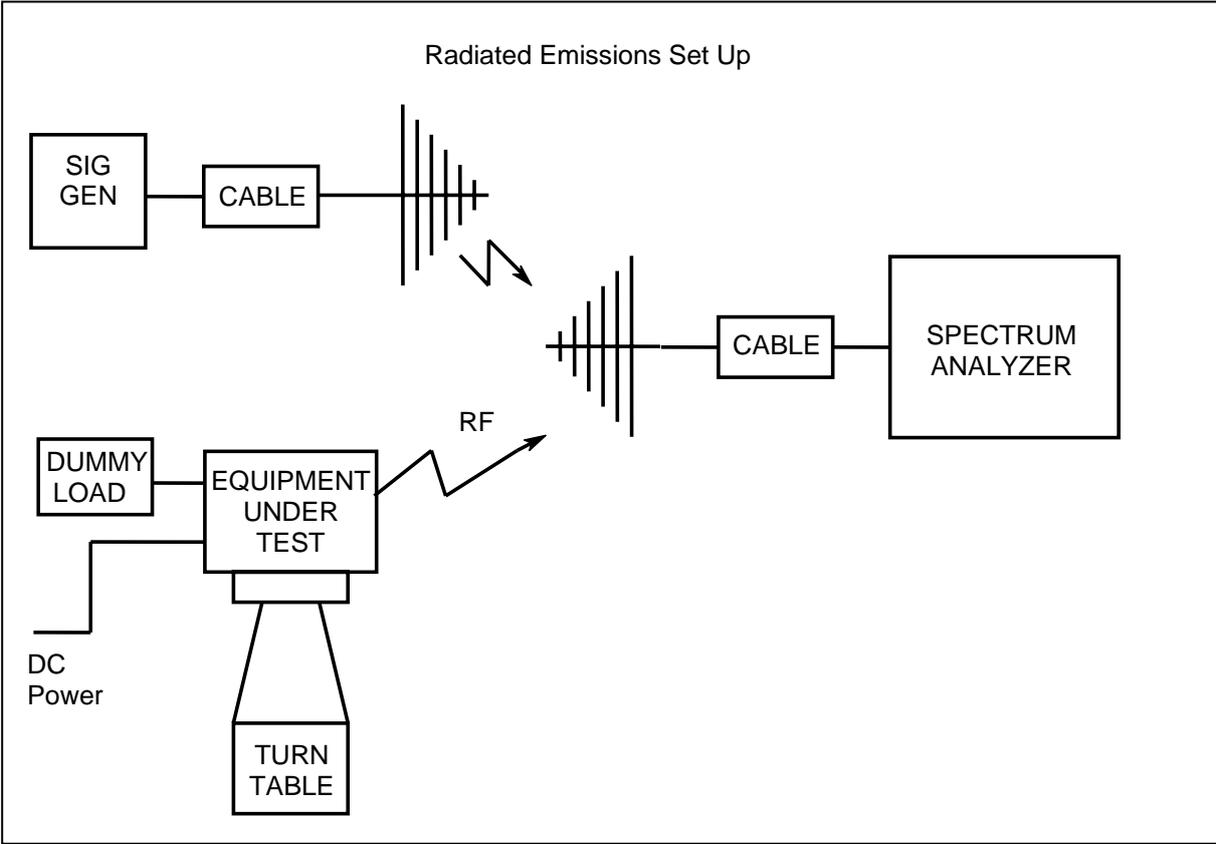
TELTEST Laboratories
Tait Ltd
Report Number 3515

| Equipment Type | Information | Manufacturer | Model No | Serial No# | Tait ID | Cal Due |
|----------------------------|--|--------------|--------------------|------------|---------|-----------|
| RF Chamber | Reverb - Stirrer controller for reverb chamber | Teseq | Stirrer Controller | 29765.1 | E4854 | * |
| RF Chamber | Reverb - 0.5 - 18GHz Reverberation Chamber | Teseq | RVC XS | 29765 | E4855 | * |
| Antenna | Reverb - 1-18GHz DRG | Schwarzbeck | BBHA 9120 D | 9120D-885 | E4857 | * |
| Antenna | Reverb - 1-18GHz DRG | Schwarzbeck | BBHA 9120 D | 9120D-884 | E4858 | * |
| RF Amplifier | Pre-amplifier | Agilent | 87405C | MY47010688 | E4941 | 16-Oct-15 |
| Temp & Humidity datalogger | | Hobo | U21-011 | 10134275 | E4980 | 8-Apr-14 |
| OATS | FCC Listing Registration | | | 837095 | | 12-May-16 |

* Note:

Items E4080 3 dB attenuator and E4084 RF Combiner are part of TREVA 2 Calibration
 Items E4447 OATS Antenna Tower, E4445 OATS Controller, E4446 OATS Turntable, and
 Items E4854 Reverb Stirrer, E4855 Reverb Chamber, E4857 DRG Antenna and E4858 DRG Antenna
 are calibrated prior to use.

ANNEX A – TEST SETUP DETAILS



All other testing is performed using the Teltest Radio **EVAL**uation system (TREVA), which is configured as shown below. The Spectrum Analyser is connected to the EUT via the attenuator network for Conducted Emissions testing, and Occupied Bandwidth.

