Laboratory Test Report

For the

TMAB34-K500 Mobile Transceiver

Tested In accordance with

FCC 47 CFR Parts 22, 90S and 90R

Report Revision: 2
Issue Date: 01-May-2007
FCC ID: CASTMAK5F

PREPARED BY: Robin Kidson _____
Test Technician

CHECKED & APPROVED BY: Steve Crompton _____
Laboratory Manager

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

TABLE OF CONTENTS

REVISION HISTORY

Date	Revision	Comments
26-Mar-2007	1	Initial test report
01-May-2007	2	Updated GNSS radiated emissions tests

INTRODUCTION

Type Approval Testing of the TMAB34-K500 (Serial No 19226280)
in accordance with:

FCC CFR 47 Parts 22, 90S & 90R

REPORT PREPARED FOR

Tait Electronics Ltd
PO Box 1645
558 Wairakei Rd
Christchurch
New Zealand

DESCRIPTION OF SAMPLE

Equipment:	Mobile Transceiver	
Type:	TMAK5F	
Product code:	TMAB34-K500	
Serial Numbers:	19226280	
Quantity:	1	
Frequency range:	Transmit -	762 – 870 MHz
	Receive -	762 – 776 MHz
		850 – 870 MHz
Output Power:	Switchable between 2 and 35W	
Channel Spacings:	12.5 kHz, 20kHz, 25kHz	

STATEMENT OF COMPLIANCE

The TMAB34-K500 mobile transceiver as tested in this report was found to conform to the following standards:

FCC CFR 47 Parts 22, 90S and 90R

TEST CONDITIONS

All testing was performed at the following conditions.

Ambient Temperature	15°C → 30°C
Relative Humidity	20% → 75%
Standard Test Voltage	13.8 Vdc

NECESSARY BANDWIDTH AND EMISSION DESIGNATORS

SPECIFICATION: FCC 47 CFR 2.202

The Necessary Bandwidth is the minimum value of the occupied bandwidth sufficient to ensure the transmission of information at the rate and with the quality required for the system employed.
This is calculated using the following formulas:

FM Speech and FFSK – CFR 47 90.202 (g) III A 2

Bn = 2M + 2DK Where: Bn = Necessary Bandwidth
M = Maximum modulation frequency
For Data transmission
M = B/2
Where: B = Modulation rate in Baud
D = Peak deviation
K = Constant
For Analogue transmission this is 1
For Data transmission this is typically 1.2

Multilevel Frequency Shift Keying – CFR 47 90.202 (g) III A 6

$Bn = R/\log_2 S + 2Dk$ Where: Bn = Necessary Bandwidth
R = Signal Rate
S = Signal States
D = Peak deviation
k = Constant

1. Analogue Voice 12.5 kHz Channel Spacing

Necessary bandwidth
M = 3 kHz
D = 2.5 kHz
k = 1

Emission Designator
11K0F3E

F3E represents an analogue FM voice transmission

Bn = 6 + (5 x 1)
=11 kHz

2. Analogue Voice 25 kHz Channel Spacing

Necessary bandwidth
M = 3 kHz
D = 5 kHz
k = 1

Emission Designator
16K0F3E

F3E represents an analogue FM voice transmission

Bn = 6 + (10 x 1)
=16 kHz

3. Fast Frequency Shift Keying (FFSK) 12.5 kHz Channel Spacing

Necessary bandwidth
M = 1.8 kHz
D = 1.5 kHz (60% of peak deviation)
k = 1

Emission Designator
6K60F2D

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

Bn = (2 x 1.8) + (2 x 1.5 x 1)
= 6.6 kHz

4. Fast Frequency Shift Keying (FFSK) 25 kHz Channel Spacing

Necessary bandwidth	Emission Designator
M = 1.8 kHz D = 3 kHz (60% of peak deviation)	**9K60F2D**
	F2D represents a FM data transmission with the use of a modulating sub carrier
Bn = (2 x 1.8) + (2 x 3 x 1) = 9.6 kHz	

5. Digital Voice /Data (4 – Level FSK)

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

Digital Voice (Operating in a 12.5 kHz Bandwidth)

8.1 kHz	Emission Designator
R = 9600 bps S = 4 D = 2.827 kHz K = 0.5836	**8K10F1E** F1E represents a digital FM voice transmission
Bn = 4800 + 3300 = 8.1 kHz	**8K10F7E** F7E represents two or more channels containing quantized or digital voice information

Digital Data

8.1 kHz	Emission Designator
R = 9600 bps S = 4 D = 2.827 kHz K = 0.5836	**8K10F1D** F1D represents a digital FM data transmission
Bn = 4800 + 3300 = 8.1 kHz	**8K10F7D** F7D represents two or more channels containing quantized or digital information

TEST RESULTS

TRANSMITTER OUTPUT POWER (CONDUCTED)

SPECIFICATION: FCC 47 CFR 2.1046

GUIDE: TIA/EIA-603C 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:

Frequency Range: 806 – 824 MHz Limit Clause FCC 47 CFR 90.653

Frequency	Nominal Power (W)	Measured Power (W)	Variation from Nominal (%)
807.5500 MHz	35.0	37.6	7.4
807.5500 MHz	2.0	2.1	5.0
816.5125 MHz	35.0	35.1	2.9
816.5125 MHz	2.0	2.1	5.0
Measurement Uncertainty (dB)	± 0.6dB		

Frequency Range: 794 – 806 MHz Limit Clause FCC 47 CFR 90.541 (c), (d)

Frequency	Nominal Power (W)	Measured Power (W)	Variation from Nominal (%)
795.9875 MHz	30.0	31.4	10.3
795.9875 MHz	2.0	2.1	5.0
794.0000 MHz	2.0	2.0	0.0
Measurement Uncertainty (dB)	± 0.6dB		

LIMIT CLAUSE: FCC 47 CFR 90S.205 (r)

Radio Type: Mobile Transceiver
Frequency Band: 762 MHz ~ 869 MHz

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

TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS

SPECIFICATION: FCC 47 CFR 2.1047 (a)

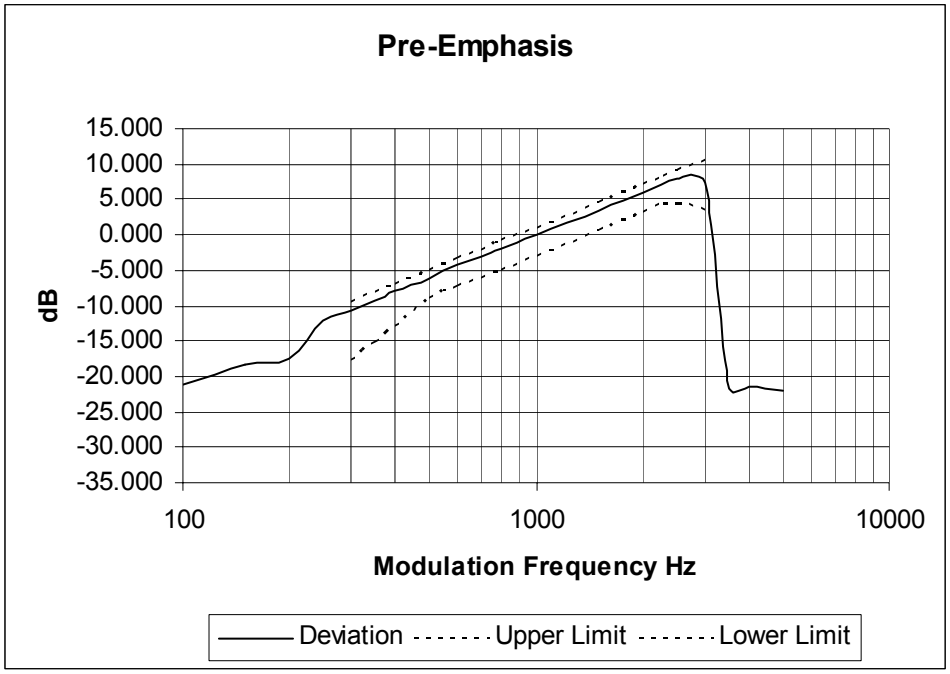
GUIDE: TIA/EIA-603C 2.2.6

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

LIMIT CLAUSE: TIA/EIA-603C 3.2.6

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

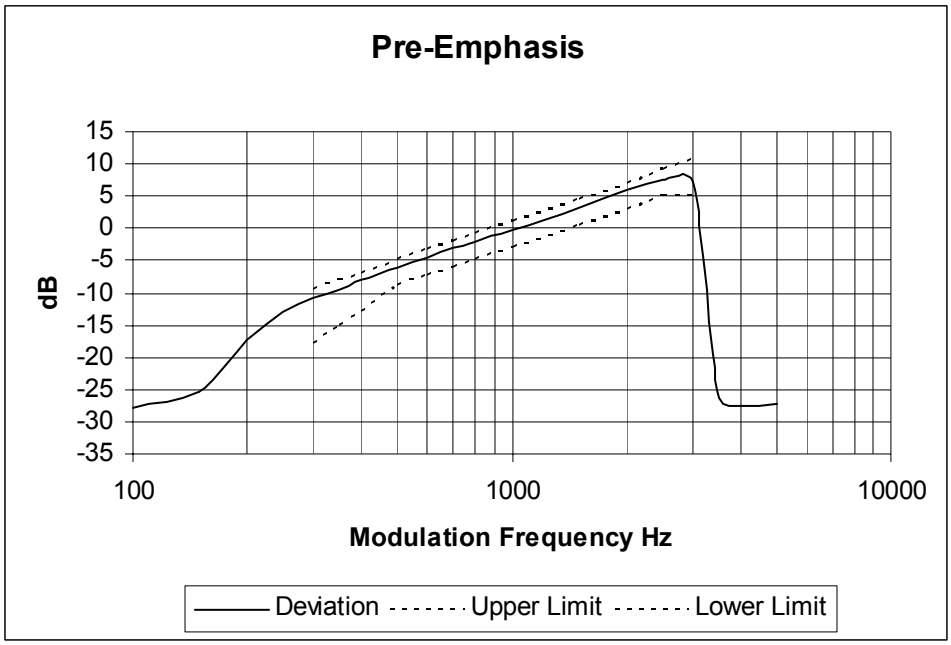
Tx FREQUENCY: 807.55MHz 12.5 kHz Channel Spacing



TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 816.5125 MHz 25 kHz Channel Spacing



TRANSMITTER MODULATION LIMITING

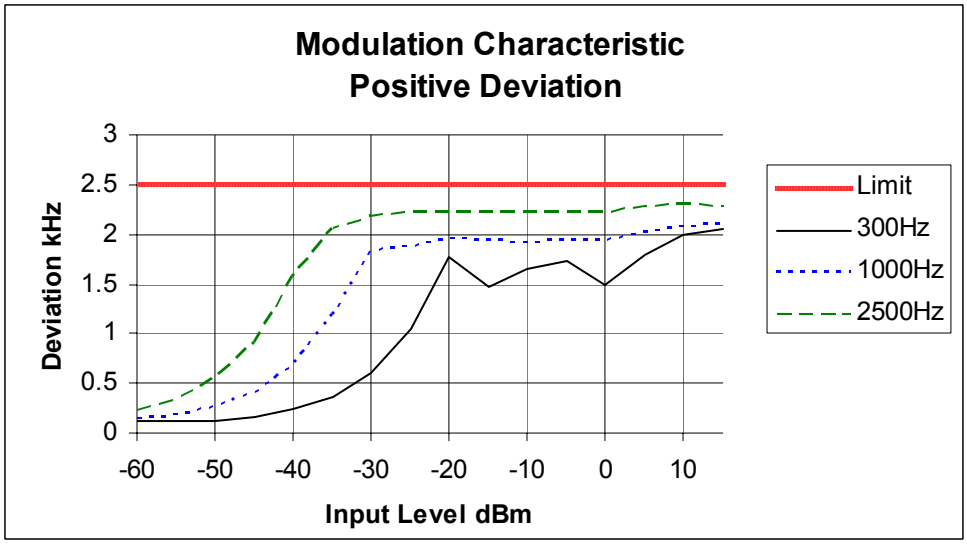
SPECIFICATION: FCC 47 CFR 2.1047 (b)

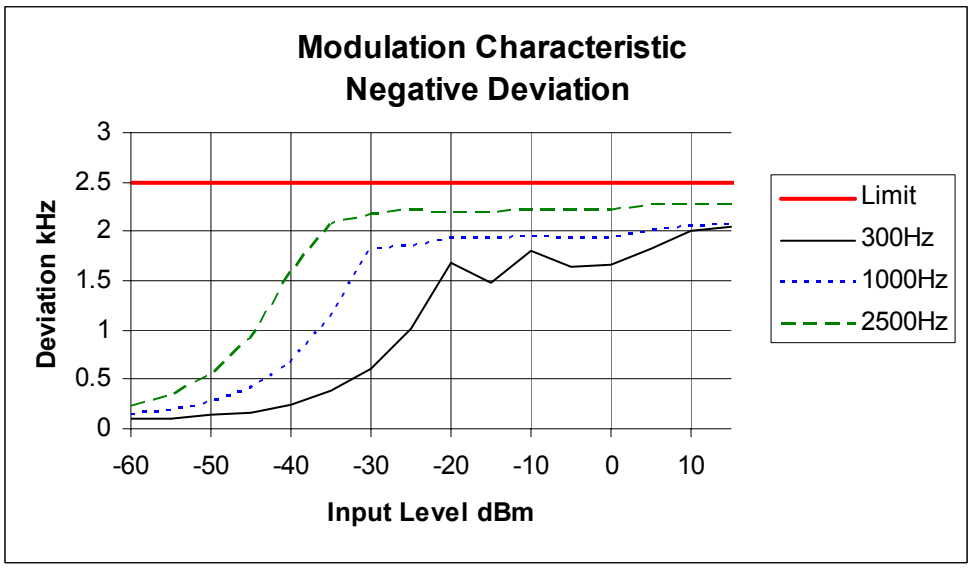
MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment set up.
2. The modulation response was measured at three audio frequencies while varying the input level.
3. Measurements were made for both Positive and Negative Deviation.

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

LIMIT CLAUSE: TIA/EIA-603C 1.3.4.4

Tx FREQUENCY: 807.55MHz 12.5 kHz Channel Spacing

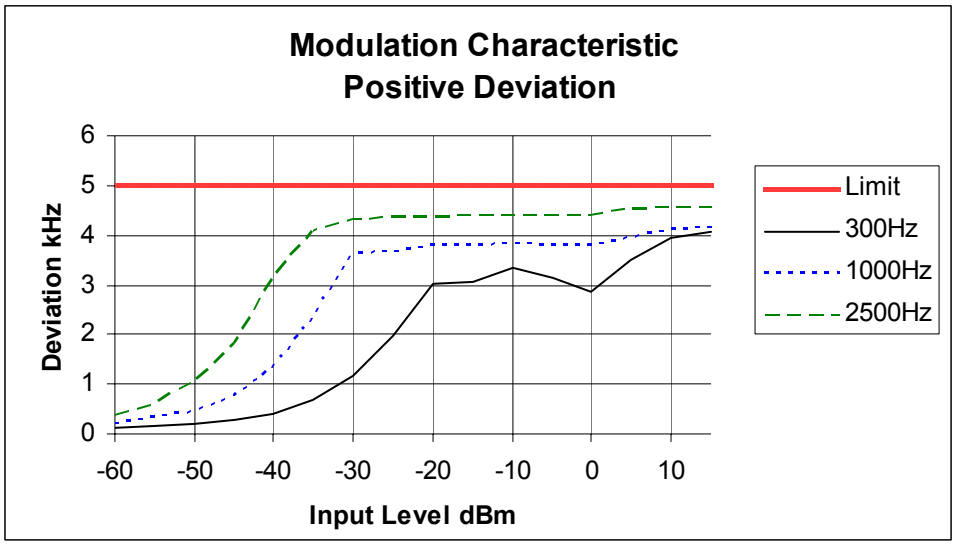


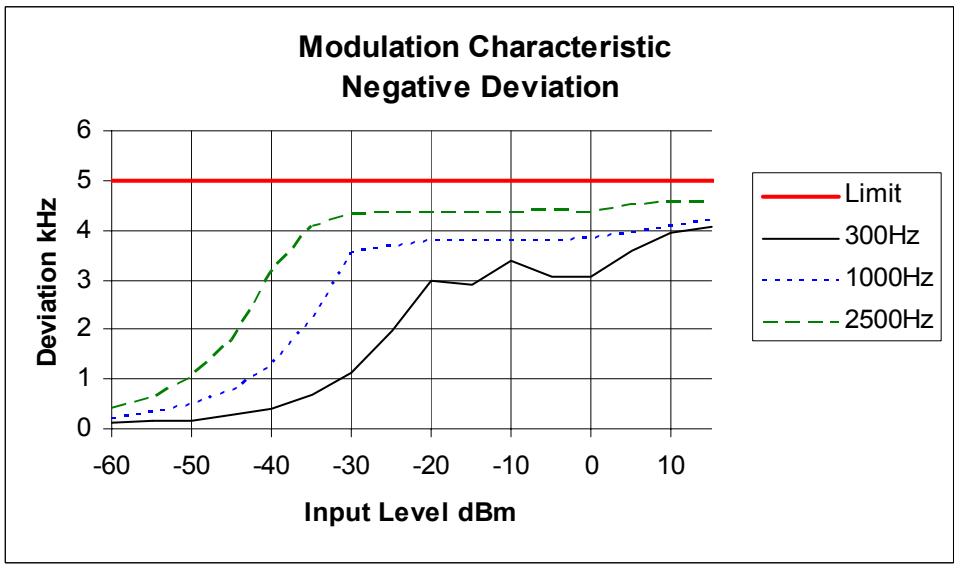


TRANSMITTER MODULATION LIMITING

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 816.5125 MHz 25.0 kHz Channel Spacing





OCCUPIED BANDWIDTH

SPECIFICATION: FCC 47 CFR 2.1049 (c)

GUIDE: TIA/EIA-603C 2.2.11

MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment Set up.
2. For analogue measurements: The EUT was modulated by a 2500Hz tone at an input level 16dB 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 = 100Hz, Video Bandwidth = 1 kHz
   Emission Mask B, and C – Resolution bandwidth = 300Hz, 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

EMISSION MASKS:

Emission Mask B	12.5 kHz Channel Spacing	Analogue;
Emission Mask H	12.5 kHz Channel Spacing	FFSK, Digital Voice/Data;
Emission Mask B	25.0 kHz Channel Spacing	Analogue;
Emission Mask G	25.0 kHz Channel Spacing	FFSK.

DATA SPEED:

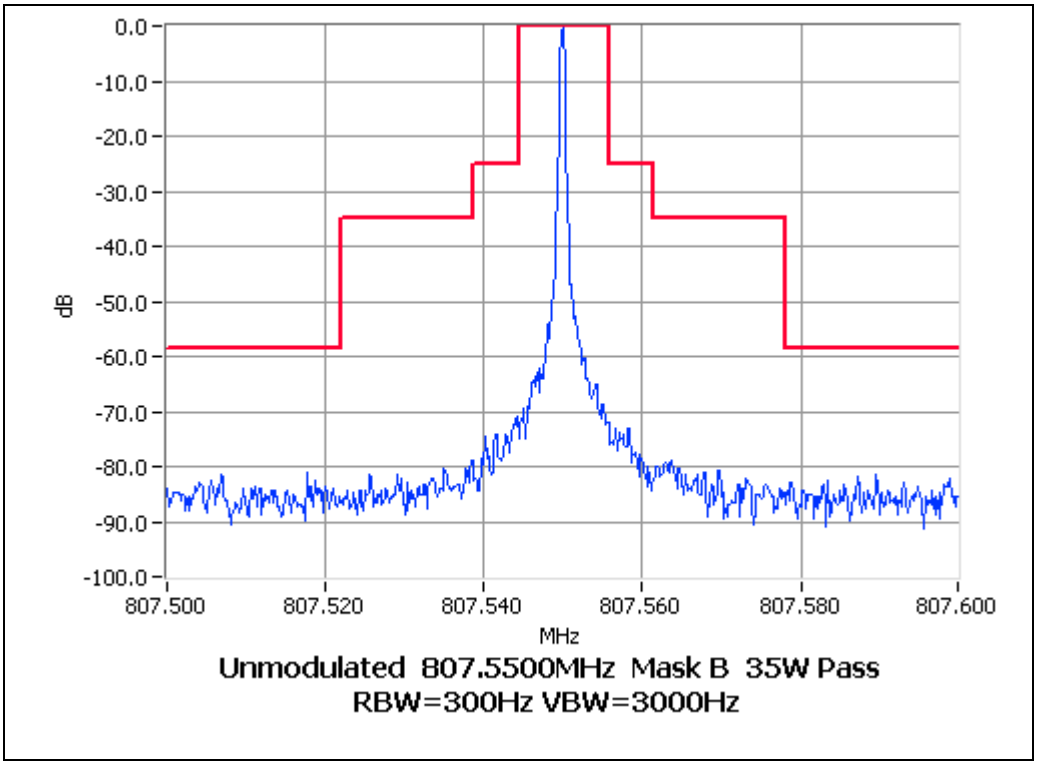
FFSK	1200 bps	12.5 kHz Channel Spacing
FFSK	1200 bps	25.0 kHz Channel Spacing
Digital Voice/Data	9600 bps	12.5 kHz Channel Spacing

OCCUPIED BANDWIDTH

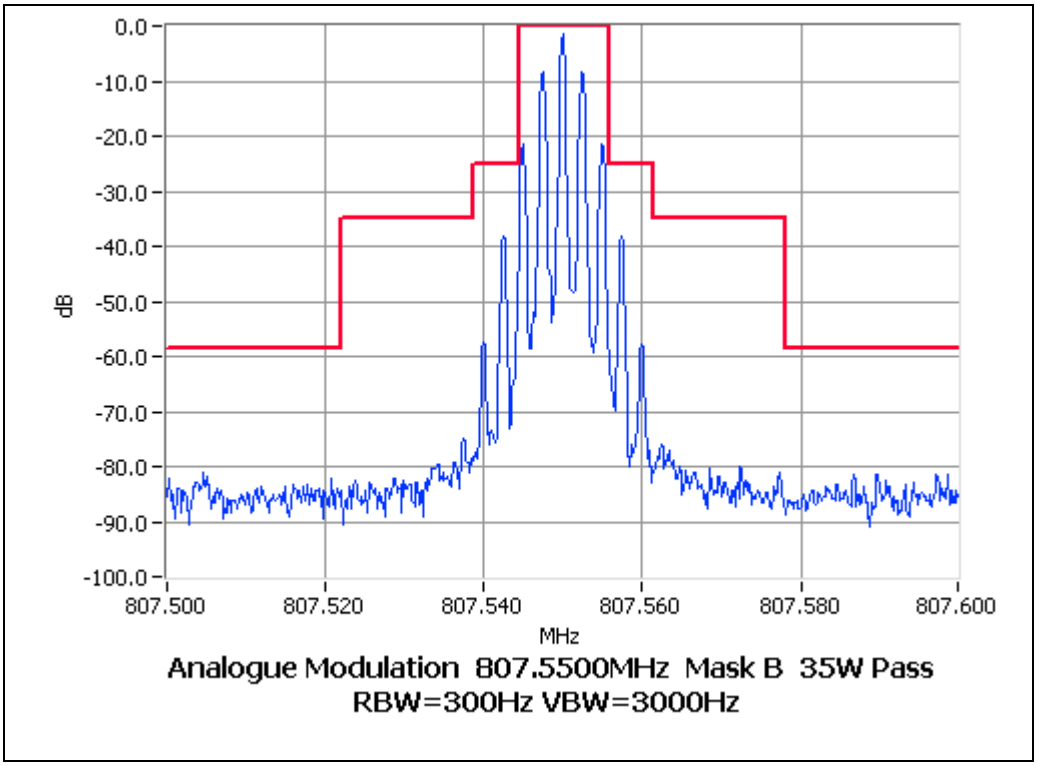
ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 807.55MHz 35 W 12.5 kHz Channel Spacing



Unmodulated 807.5500MHz Mask B 35W Pass
RBW=300Hz VBW=3000Hz



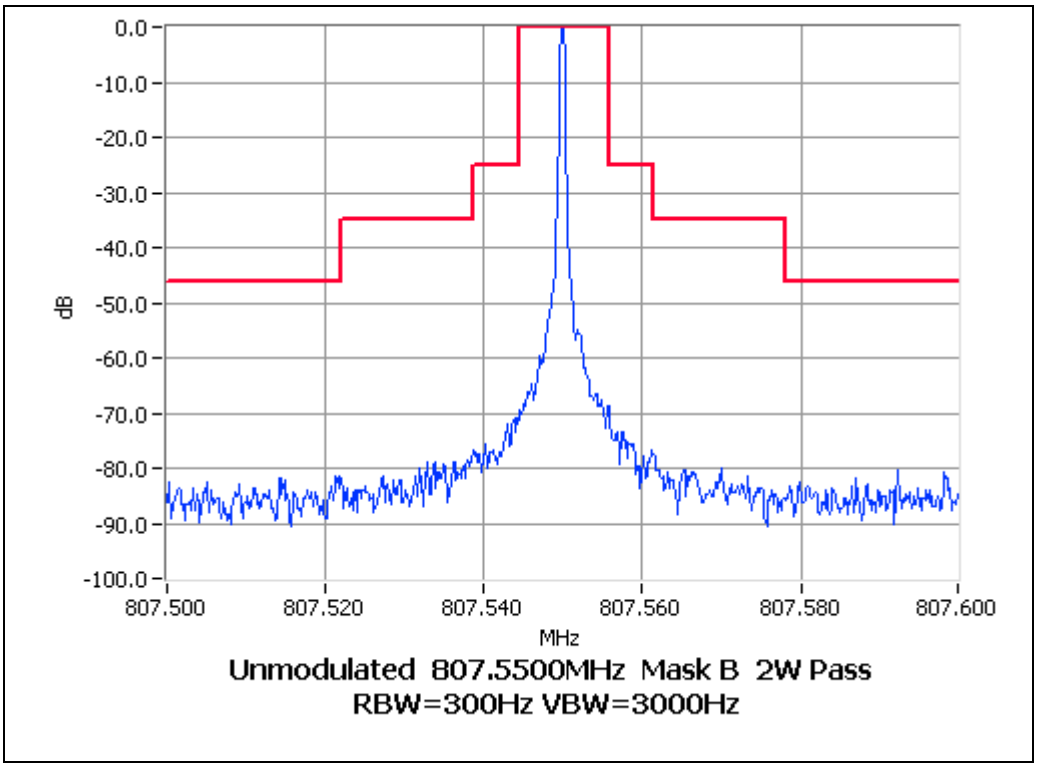
Analogue Modulation 807.5500MHz Mask B 35W Pass
RBW=300Hz VBW=3000Hz

OCCUPIED BANDWIDTH

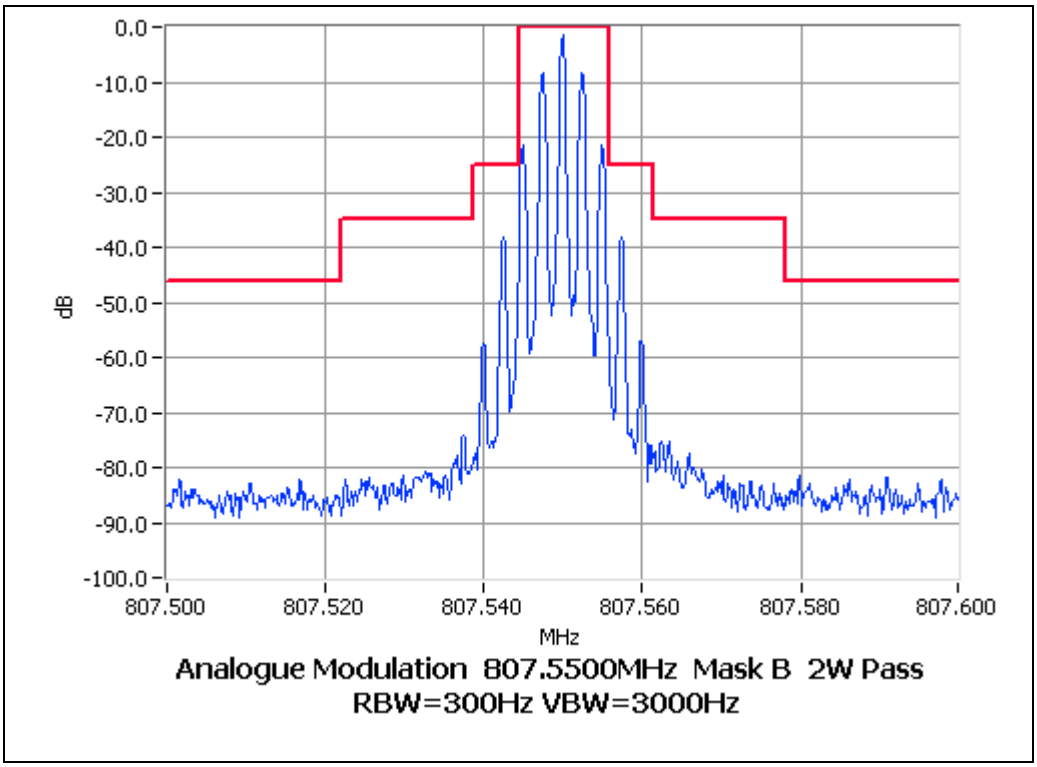
ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 807.55MHz 2 W 12.5 kHz Channel Spacing



Unmodulated 807.5500MHz Mask B 2W Pass
RBW=300Hz VBW=3000Hz



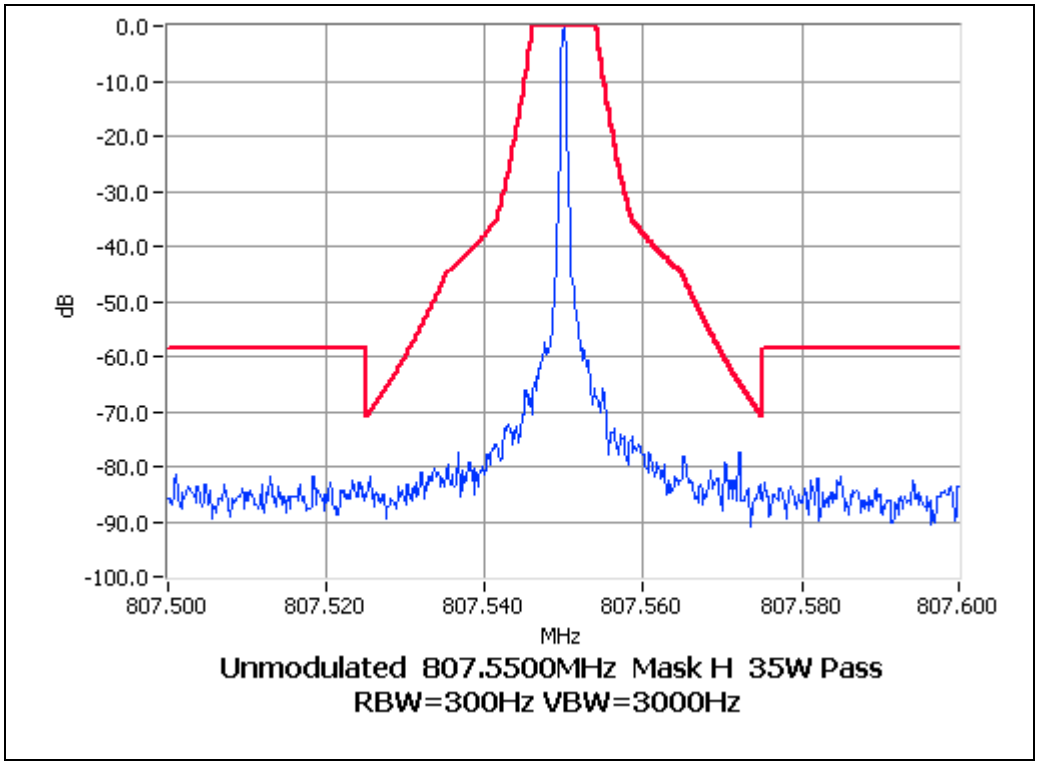
Analogue Modulation 807.5500MHz Mask B 2W Pass
RBW=300Hz VBW=3000Hz

OCCUPIED BANDWIDTH

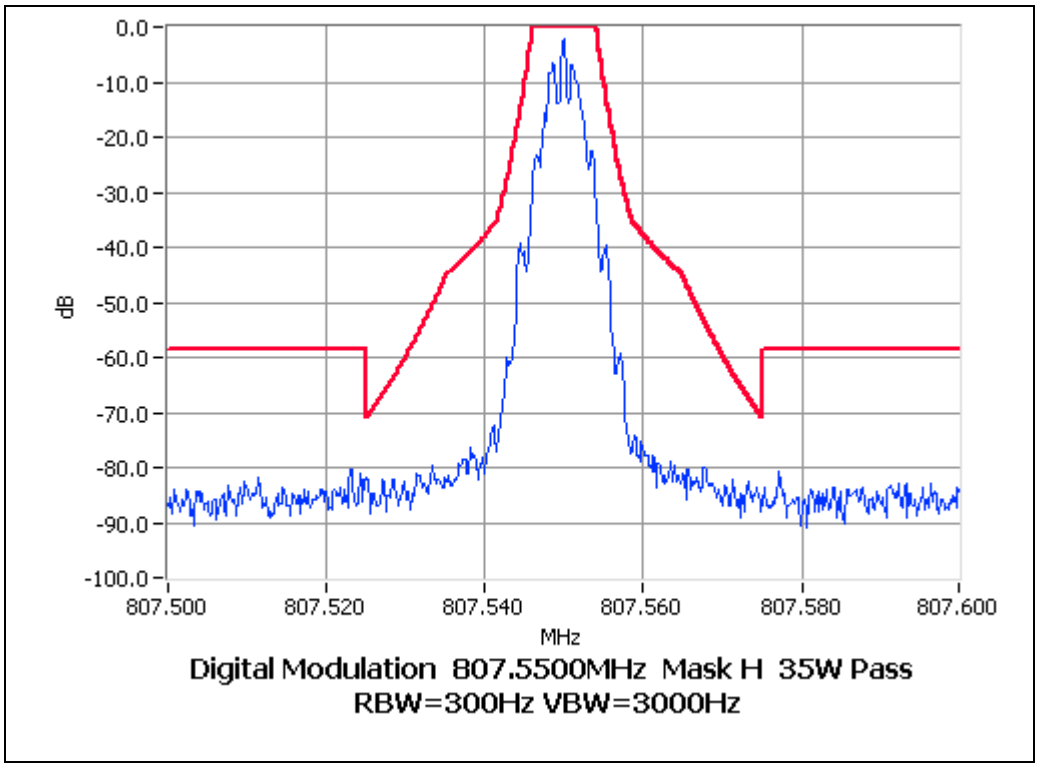
FFSK

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 807.55MHz 35 W 12.5 kHz Channel Spacing



Unmodulated 807.5500MHz Mask H 35W Pass
RBW=300Hz VBW=3000Hz



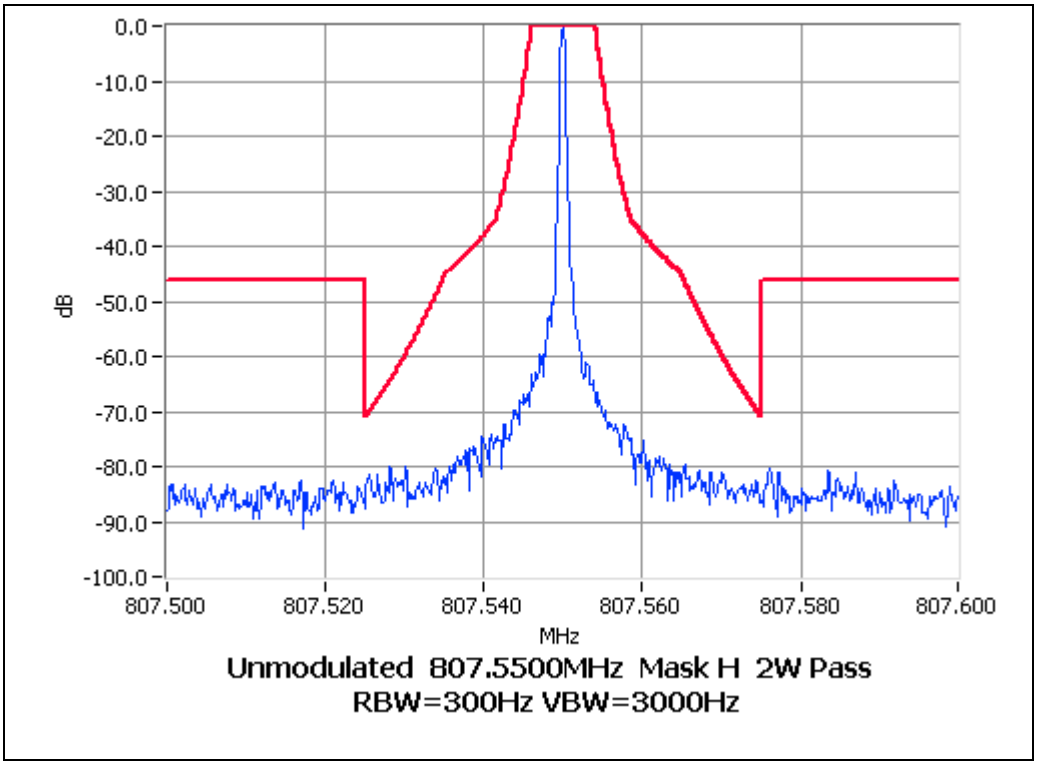
Digital Modulation 807.5500MHz Mask H 35W Pass
RBW=300Hz VBW=3000Hz

OCCUPIED BANDWIDTH

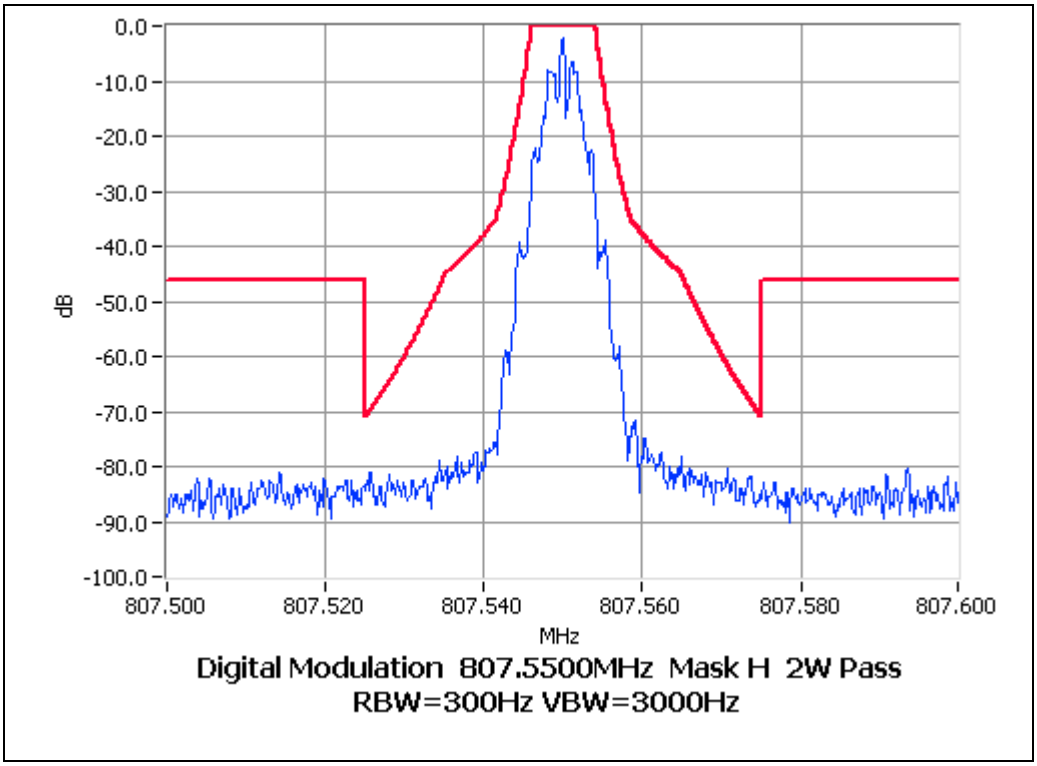
FFSK

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 807.55MHz 2 W 12.5 kHz Channel Spacing



Unmodulated 807.5500MHz Mask H 2W Pass
RBW=300Hz VBW=3000Hz



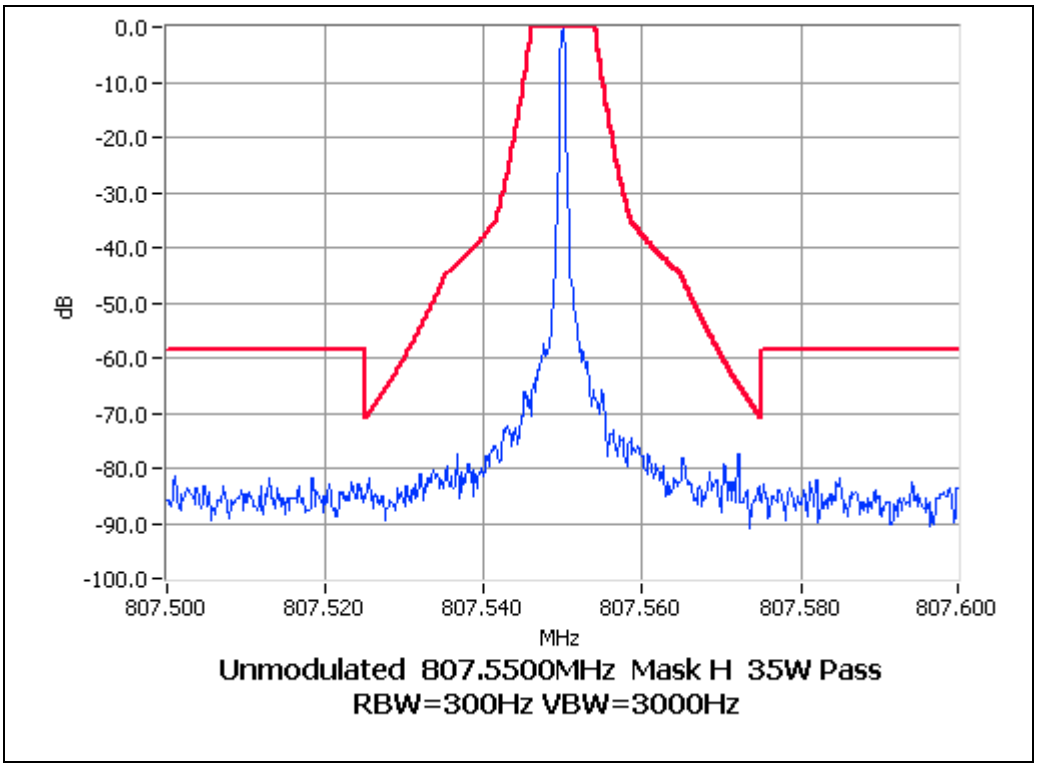
Digital Modulation 807.5500MHz Mask H 2W Pass
RBW=300Hz VBW=3000Hz

OCCUPIED BANDWIDTH

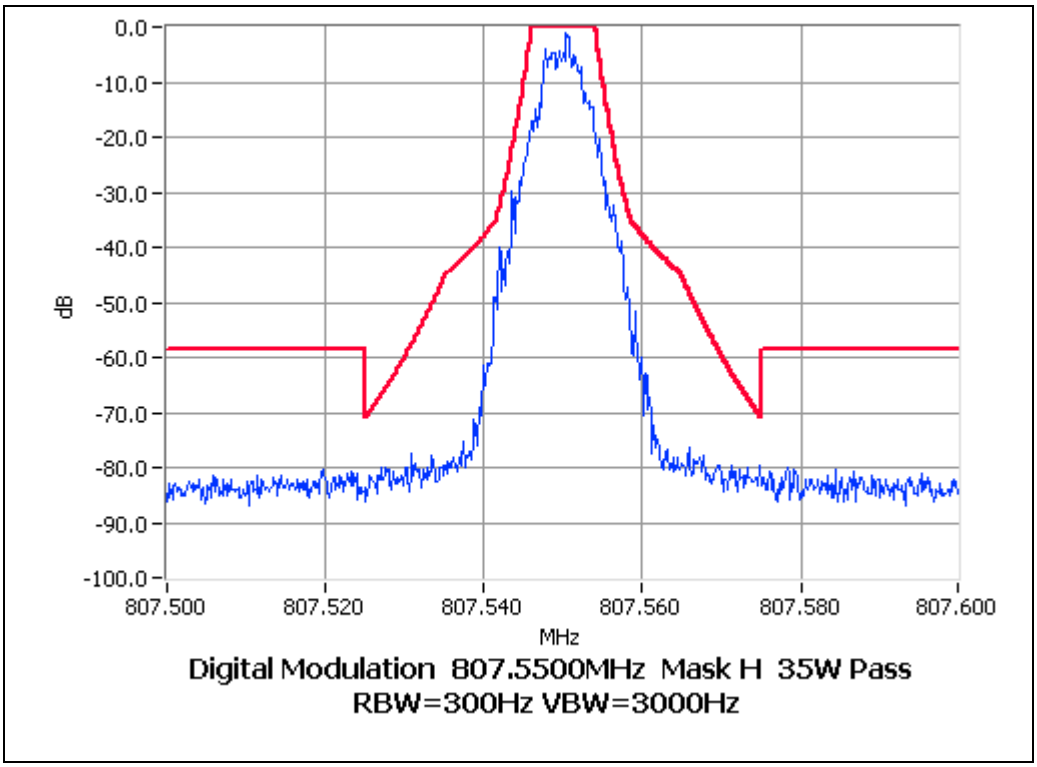
Digital – (4 Level FSK)

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 807.55MHz 35 W 12.5 kHz Channel Spacing



Unmodulated 807.5500MHz Mask H 35W Pass
RBW=300Hz VBW=3000Hz



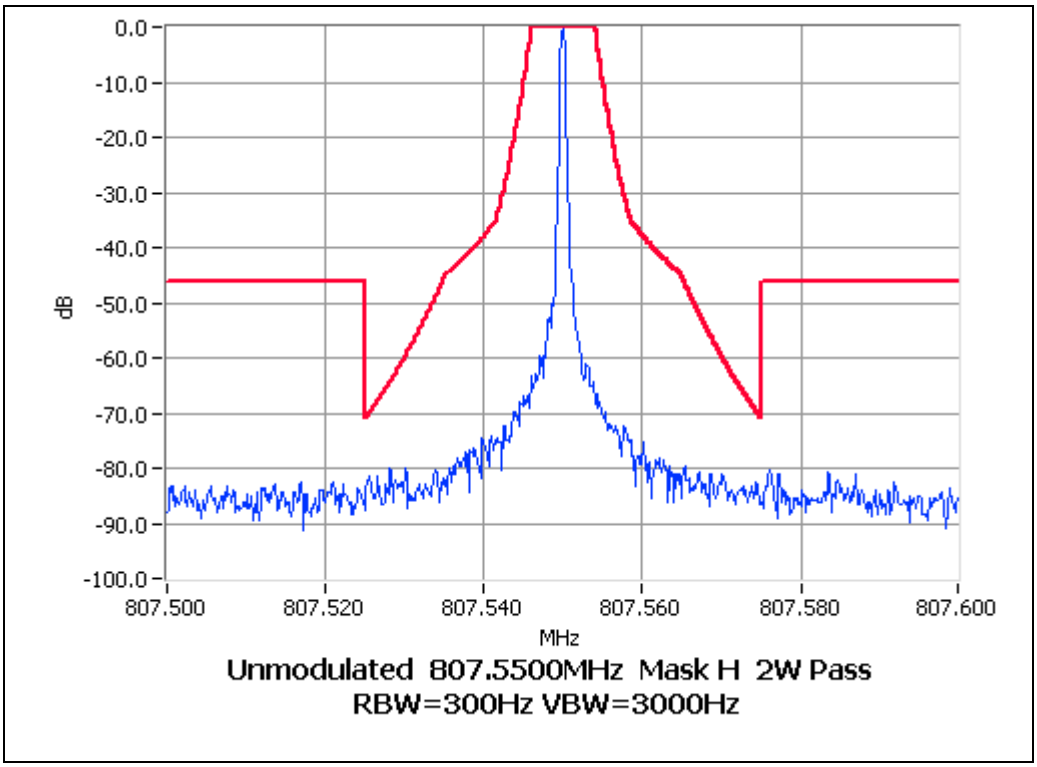
Digital Modulation 807.5500MHz Mask H 35W Pass
RBW=300Hz VBW=3000Hz

OCCUPIED BANDWIDTH

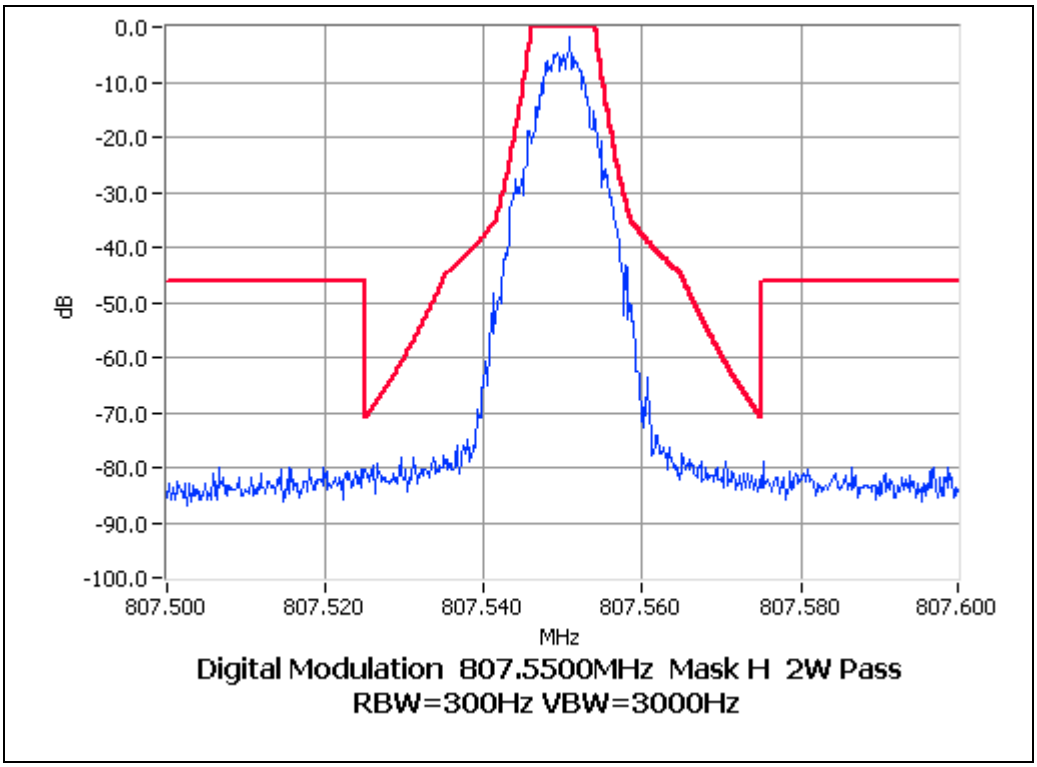
Digital – (4 Level FSK)

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 807.55MHz 2 W 12.5 kHz Channel Spacing



Unmodulated 807.5500MHz Mask H 2W Pass
RBW=300Hz VBW=3000Hz



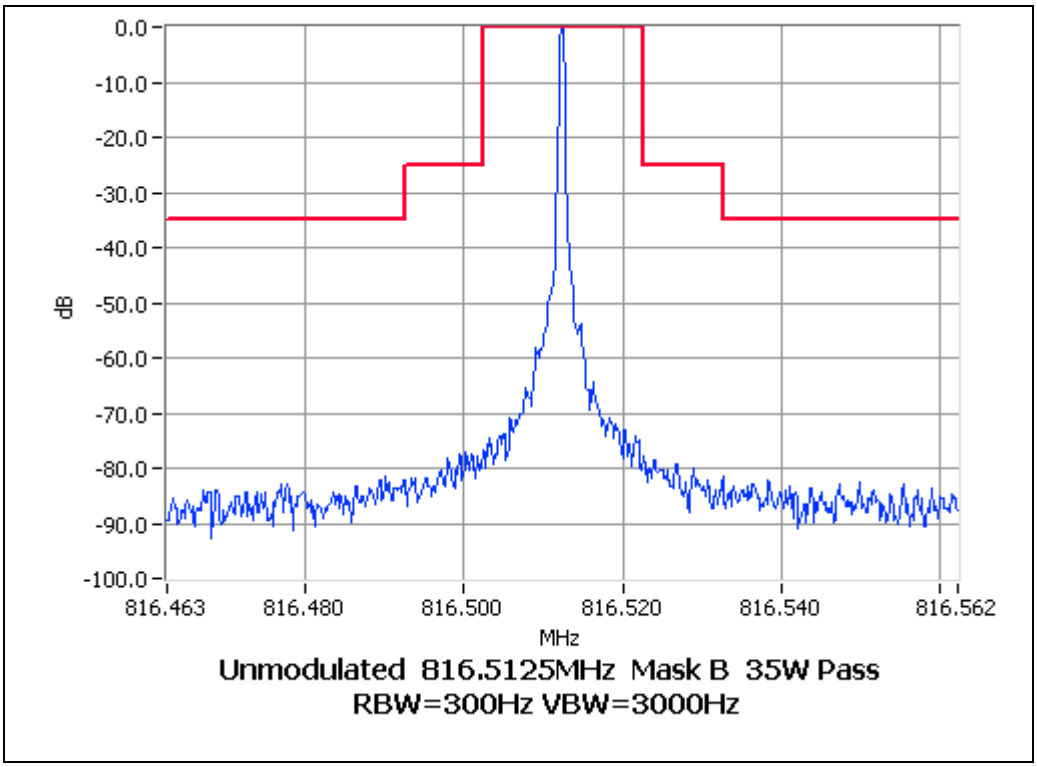
Digital Modulation 807.5500MHz Mask H 2W Pass
RBW=300Hz VBW=3000Hz

OCCUPIED BANDWIDTH

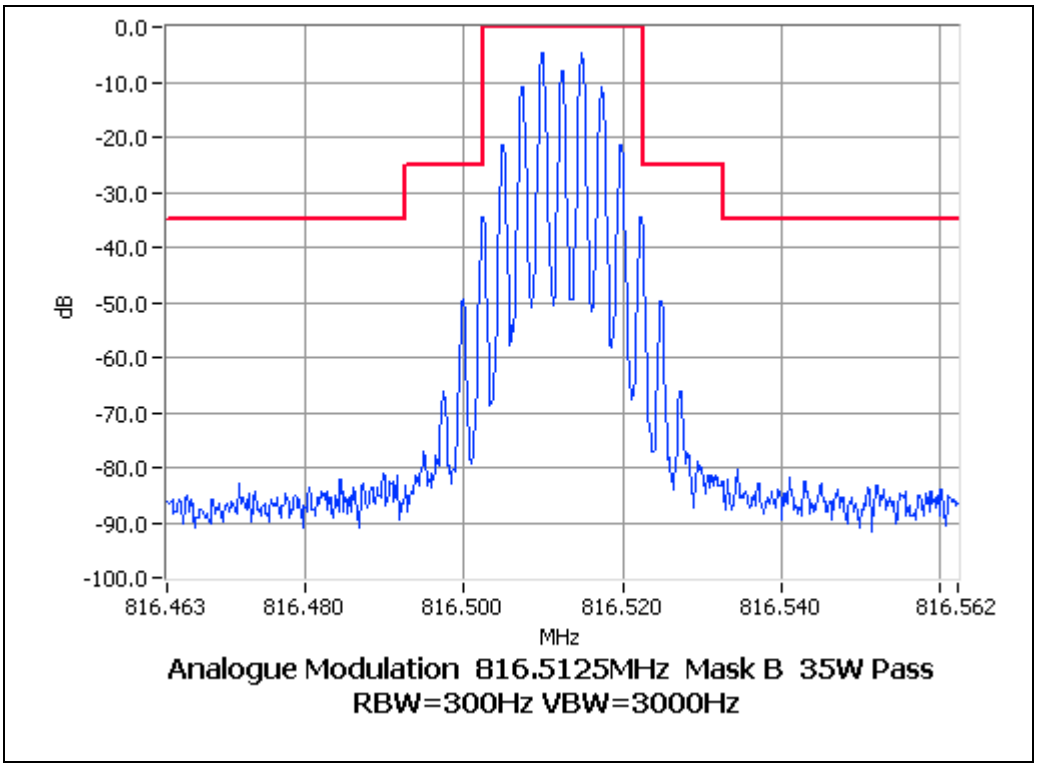
ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 816.5125 MHz 35 W 25 kHz Channel Spacing



Unmodulated 816.5125MHz Mask B 35W Pass
RBW=300Hz VBW=3000Hz



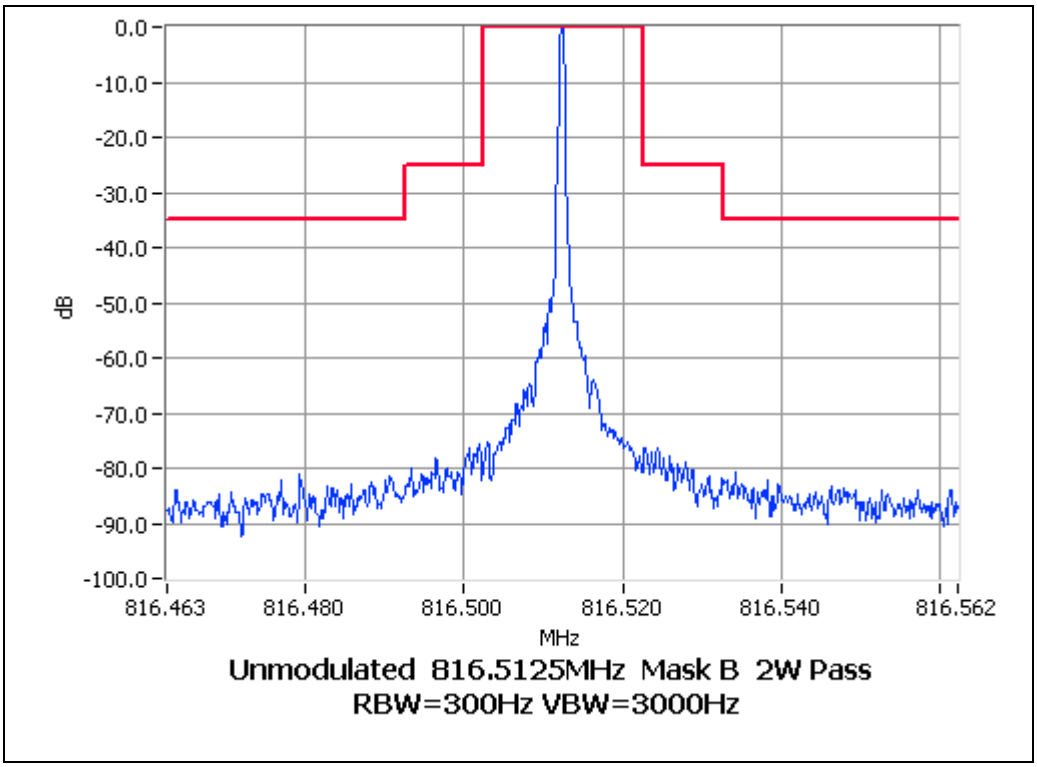
Analogue Modulation 816.5125MHz Mask B 35W Pass
RBW=300Hz VBW=3000Hz

OCCUPIED BANDWIDTH

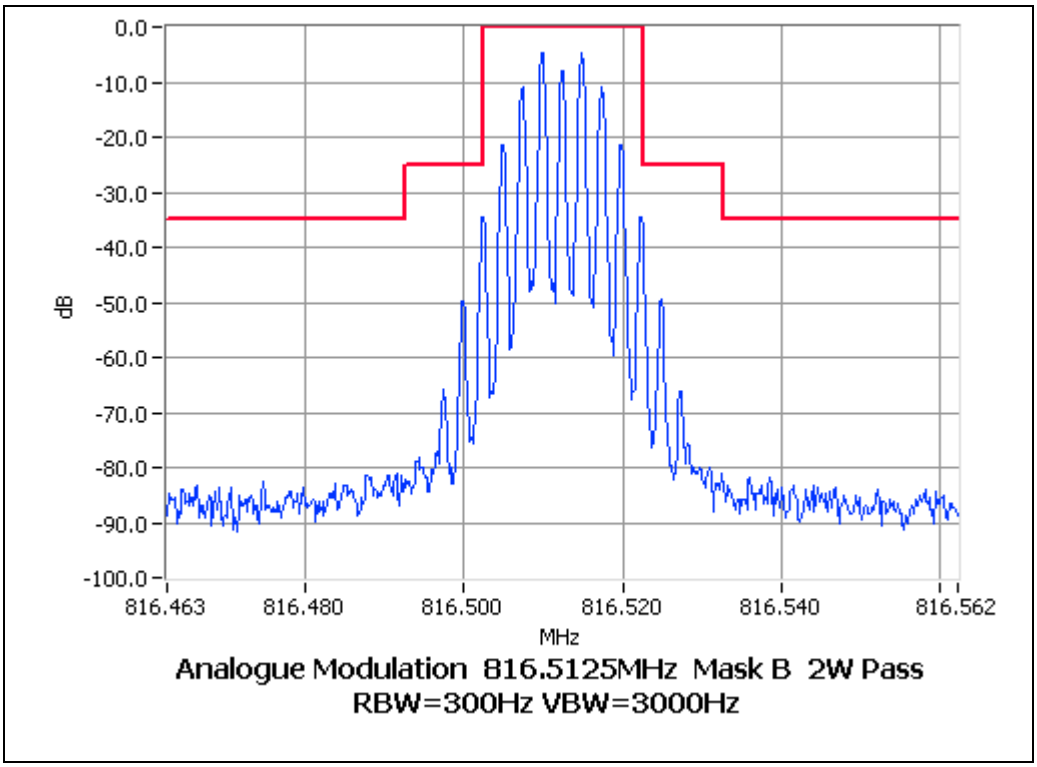
ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 816.5125 MHz 2 W 25 kHz Channel Spacing



Unmodulated 816.5125MHz Mask B 2W Pass
RBW=300Hz VBW=3000Hz



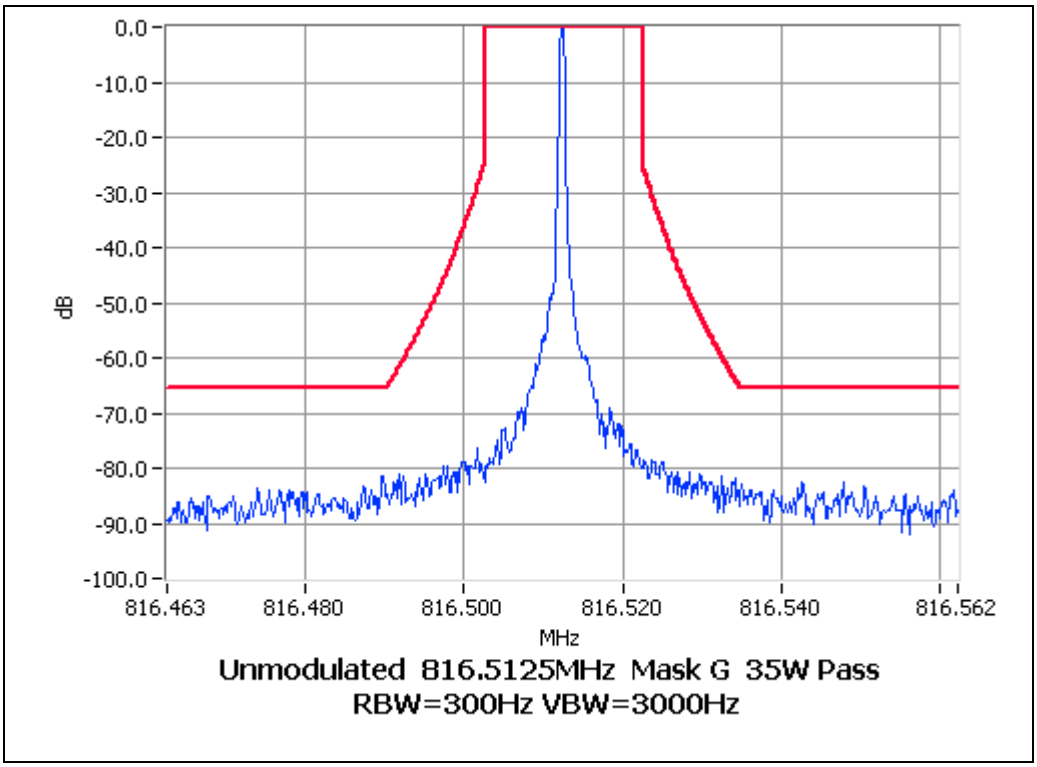
Analogue Modulation 816.5125MHz Mask B 2W Pass
RBW=300Hz VBW=3000Hz

OCCUPIED BANDWIDTH

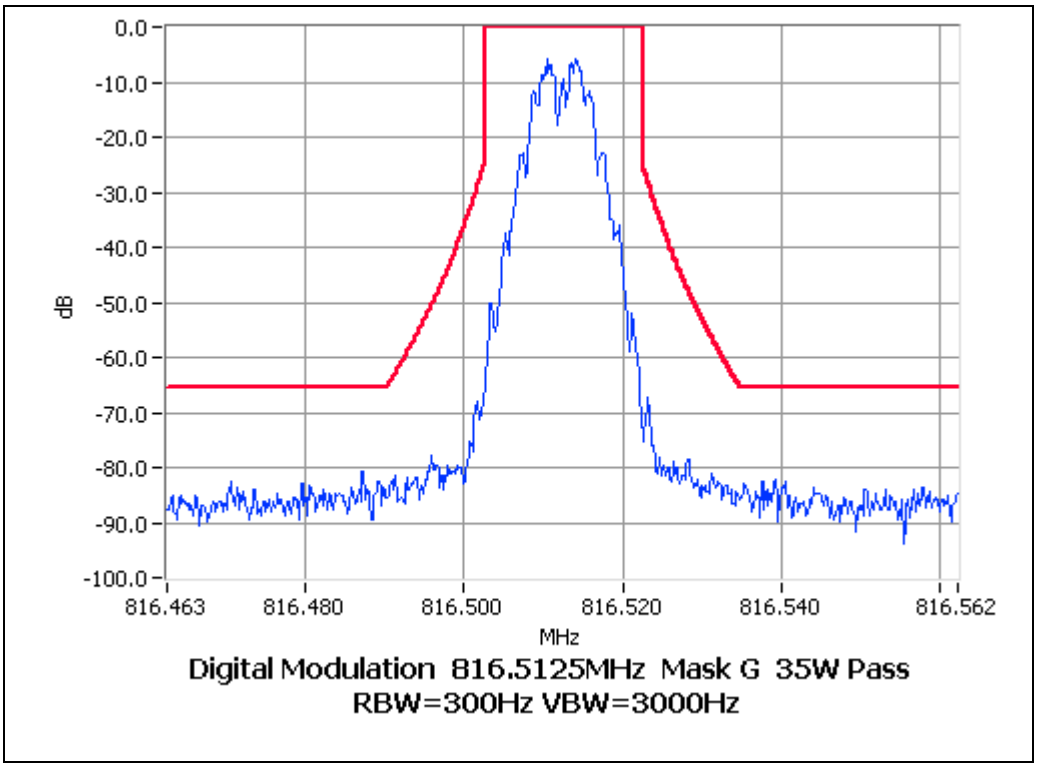
FFSK

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 816.5125 MHz 35 W 25 kHz Channel Spacing



Unmodulated 816.5125MHz Mask G 35W Pass
RBW=300Hz VBW=3000Hz



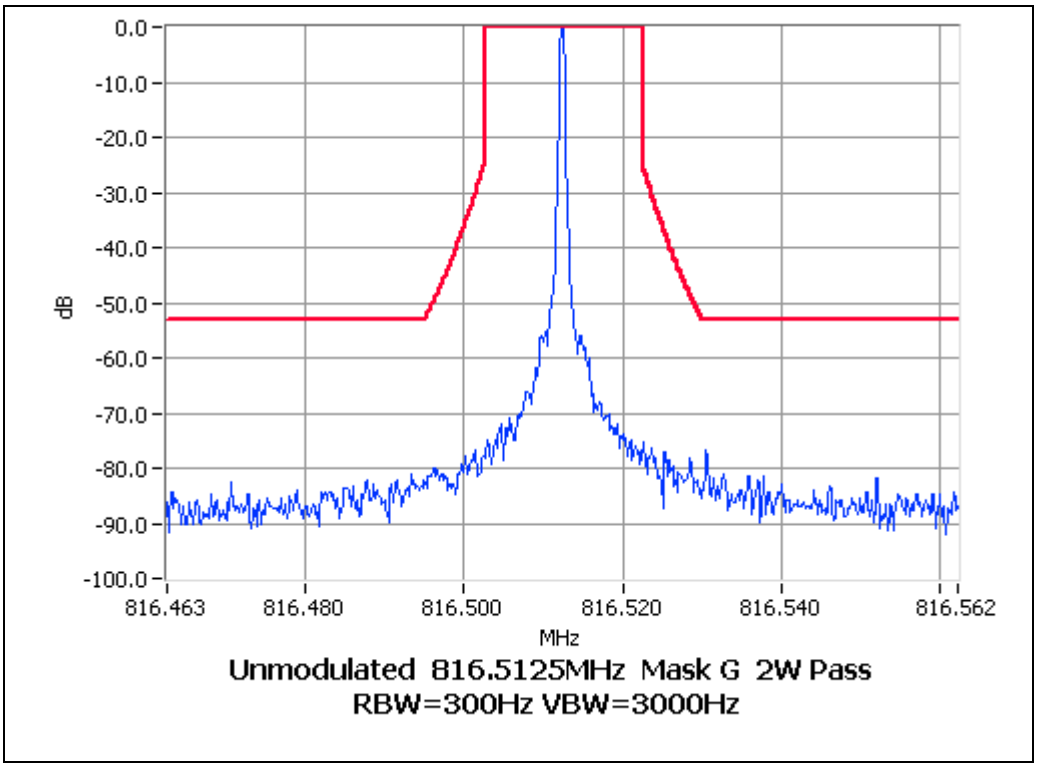
Digital Modulation 816.5125MHz Mask G 35W Pass
RBW=300Hz VBW=3000Hz

OCCUPIED BANDWIDTH

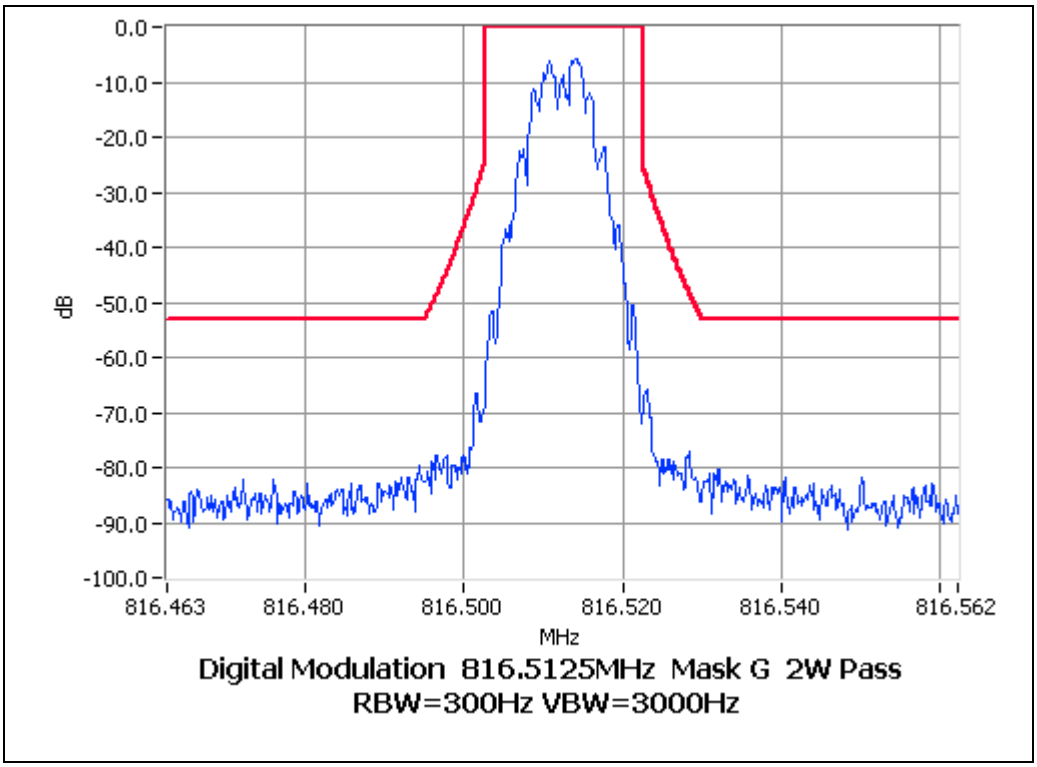
FFSK

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 816.5125 MHz 2 W 25 kHz Channel Spacing



Unmodulated 816.5125MHz Mask G 2W Pass
RBW=300Hz VBW=3000Hz



Digital Modulation 816.5125MHz Mask G 2W Pass
RBW=300Hz VBW=3000Hz

ADJACENT CHANNEL POWER

SPECIFICATION: FCC 47 CFR 90.543

MEASUREMENT PROCEDURE:
1. Refer Annex A for equipment set up.
2. The transmitter is modulated with the standard test pattern for FFSK, and digital modulation, and in accordance with TIA/EIA 603C 2.2.14 for analogue voice.
3. The test is performed in accordance with 47 CFR 90.543

LIMIT CLAUSE: FCC 47 CFR 90.543

MEASUREMENT RESULTS:

Digital – (4 Level FSK)

Tx FREQUENCY: 795.9875 MHz 30 W 12.5 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP (dBc)
9.375 kHz	6.25 kHz	-40.63	-43.05	-40
15.625 kHz	6.25 kHz	-71.67	-71.99	-60
21.875 kHz	6.25 kHz	-73.91	-74.13	-60
37.5 kHz	25 kHz	-70.24	-70.12	-60
62.5 kHz	25 kHz	-73.66	-73.74	-65
87.5 kHz	25 kHz	-77.08	-77.27	-65
150 kHz	100 kHz	-74.18	-74.12	-65
250 kHz	100 kHz	-80.44	-80.68	-65
350 kHz	100 kHz	-84.40	-84.64	-65
>400 kHz to 12 MHz	30 kHz (swept)	-82.08	-80.09	-75
12 MHz to paired receive band	30 kHz (swept)	-82.41		-75
In the paired receive band	30 kHz (swept)	-102.66		-100

SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: FCC 47 CFR 2.1051

GUIDE: TIA/EIA-603C 2.2.13

MEASUREMENT PROCEDURE:

4. Refer Annex A for equipment set up.
5. The frequency range examined was from the lowest frequency generated within the EUT, to a frequency higher than the 10th Harmonic: 100kHz to Fc-BW
   Fc+BW to 10Fc GHz
6. A Pre-scan is performed with a resolution bandwidth of 1 kHz, and a video bandwidth of 3 kHz. If any emissions are found to be within 20dB of the limit a second measurement is made with the carrier modulated, and a resolution bandwidth of 10 kHz, and a video bandwidth of 30kHz.
7. Spurious emissions, which were attenuated more than 20dB below the limit, were not recorded.

MEASUREMENT RESULTS:
See the tables on the following pages for 12.5 kHz & 25.0 kHz channel spacings.

LIMIT CLAUSE: FCC 47 CFR 90.210

SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: FCC CFR 2.1051

Tx FREQUENCY: 795.9875MHz

12.5 kHz Channel Spacing	795.9875MHz@ 30 W	
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	795.9875MHz@ 2 W	
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

LIMITS:

Carrier Output Power Watts	FCC 47 CFR 90.453 (c) 12.5 kHz Channel Spacing $43 + 10 \text{ Log}_{10} (P_{Watts})$	
2 W	-13 dBm	46 dBc
30 W	-13 dBm	58 dBc

SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: FCC CFR 2.1051

Tx FREQUENCY: 807.55MHz

12.5 kHz Channel Spacing	807.55MHz @ 35 W	Emission Mask B
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
8075.5002	-31.60	77.04
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing	807.55MHz @ 2 W	Emission Mask B
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

LIMITS:

Carrier Output Power Watts	Emission Mask B 12.5 kHz Channel Spacing $43 + 10 \text{ Log}_{10} (P_{Watts})$	
2 W	-13 dBm	46 dBc
35 W	-13 dBm	58 dBc

SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: FCC CFR 2.1051

Tx FREQUENCY: 816.5125 MHz

25 kHz Channel Spacing	816.5125 MHz @ 35 W	Emission Mask B
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
8165.1241	-32.70	78.14
No other emissions were detected at a level greater than 20 dB below the limit.		

25 kHz Channel Spacing	816.5125 MHz @ 2 W	Emission Mask B
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

LIMITS:

Carrier Output Power Watts	Emission Mask B 12.5 kHz Channel Spacing $43 + 10 \text{ Log}_{10} (P_{Watts})$	
2 W	-13 dBm	46 dBc
35 W	-13 dBm	58 dBc

SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC 47 CFR 2.1053

GUIDE: TIA/EIA-603C 2.2.12

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment set up.
2. Initial Scan
    a) The EUT is placed in S-Line TEM cell and emissions are measured from 30MHz to 1000MHz.
    Any emission within 10dB of the limit is them re-tested on the OATS along with measurements from 1000MHz to the 10^{th} harmonic of the fundamental frequency.
3. OATS Measurement
    a) The EUT was placed on a wooden turntable at a distance of three metres from the test antenna. The output terminal was connected to an RF dummy load.
    b) The test antenna was raised from 1m to 4m to obtain a maximum reading, the turntable was then rotated through 360^{o} to obtain the maximum response of each spurious emission. Valid emissions were determined by switching the EUT on and off.
    c) The EUT was 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

SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC CFR 2.1053

Tx FREQUENCY: 795.9875MHz

12.5 kHz Channel Spacing	795.9875MHz@ 30 W	
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	795.9875MHz@ 2 W	
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

LIMITS:

Carrier Output Power Watts	FCC 47 CFR 90.453 (c) 12.5 kHz Channel Spacing $43 + 10 \text{ Log}_{10} (P_{Watts})$	
2 W	-13 dBm	46 dBc
35 W	-13 dBm	58 dBc

SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC CFR 2.1051

Tx FREQUENCY: 807.55MHz

12.5 kHz Channel Spacing	807.55MHz @ 35 W	Emission Mask B
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
2422.65	-22.96	68.40
6460.40	-28.12	73.56
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing	807.55MHz @ 2 W	Emission Mask B
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
6460.40	-29.07	62.08
No other emissions were detected at a level greater than 20 dB below the limit.		

LIMITS:

Carrier Output Power Watts	Emission Mask B 12.5 kHz Channel Spacing $43 + 10 \text{ Log}_{10} (P_{Watts})$	
2 W	-13 dBm	46 dBc
35 W	-13 dBm	58 dBc

SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC CFR 2.1051

Tx FREQUENCY: 816.5125 MHz

25 kHz Channel Spacing	816.5125 MHz @ 35 W	Emission Mask B
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
2449.5375	-17.86	63.30
6532.10	-30.82	76.26
No other emissions were detected at a level greater than 20 dB below the limit.		

25 kHz Channel Spacing	816.5125 MHz @ 2 W	Emission Mask B
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

LIMITS:

Carrier Output Power Watts	Emission Mask B 12.5 kHz Channel Spacing $43 + 10 \text{ Log}_{10} (P_{Watts})$	
2 W	-13 dBm	46 dBc
35 W	-13 dBm	58 dBc

SPURIOUS EMISSIONS (EIRP in the GNSS Band)

SPECIFICATION: FCC CFR 90.543 (e)

GUIDE: TIA/EIA-102CAAA-A 2.2.6.3

MEASUREMENT PROCEDURE:
1. Refer Annex A for equipment set up.
2. Spurious emissions were measured in the GNSS band. (1559 – 1610 MHz)
3. The EUT was placed on a wooden turntable at a distance of three metres from the test antenna.
4. Transceiver was transmitting standard APCO digital modulation.
5. The test antenna was raised from 1m to 4m to obtain a maximum reading, the turntable was then rotated through 360^{o} to obtain the maximum response of each spurious emission.
6. Valid emissions were determined by switching the EUT on and off.
7. The EUT was replaced by a signal generator and substitution antenna to make measurements by the substitution method.
8. The test was performed with a representative antenna connected to the EUT

MEASUREMENT RESULTS:

Tx FREQUENCY: 795.9875 MHz

12.5 kHz Channel Spacing	795.9875 MHz @ 30 W	Antenna Type: Monopole Collinear	
Emission Frequency (MHz)	Polarisation	EIRP (dBm)	EIRP (dBW)
1591.9750	Horizontal	-53.95	-83.95
1591.9750	Vertical	-54.02	-84.02

12.5 kHz Channel Spacing	795.9875 MHz @ 2 W	Antenna Type: Monopole Collinear	
Emission Frequency (MHz)	Polarisation	EIRP (dBm)	EIRP (dBW)
1591.9750	Horizontal	-65.75	-95.75
1591.9750	Vertical	-54.93	-84.93

LIMIT CLAUSE FCC 47 CFR 90.543 (e)	-70 dBW (-40 dBm) EIRP

TRANSMITTER FREQUENCY STABILITY (TEMPERATURE)

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

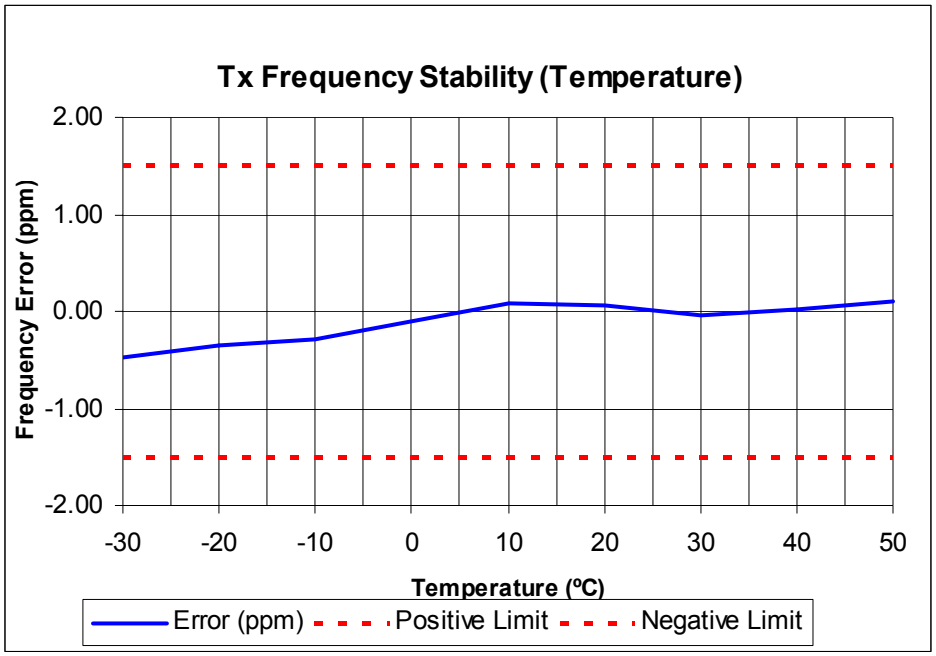
GUIDE: TIA/EIA-603C 2.2.2

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).

Limit Clause	Frequency range	Test Frequency (MHz)	Frequency Error (ppm)
47 CFR 90.539	794 – 806 MHz	795.9875	1.5
47 CFR 90.213	806 – 809 MHz 809 – 824 MHz	807.5500 816.5125	1.5 2.5

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

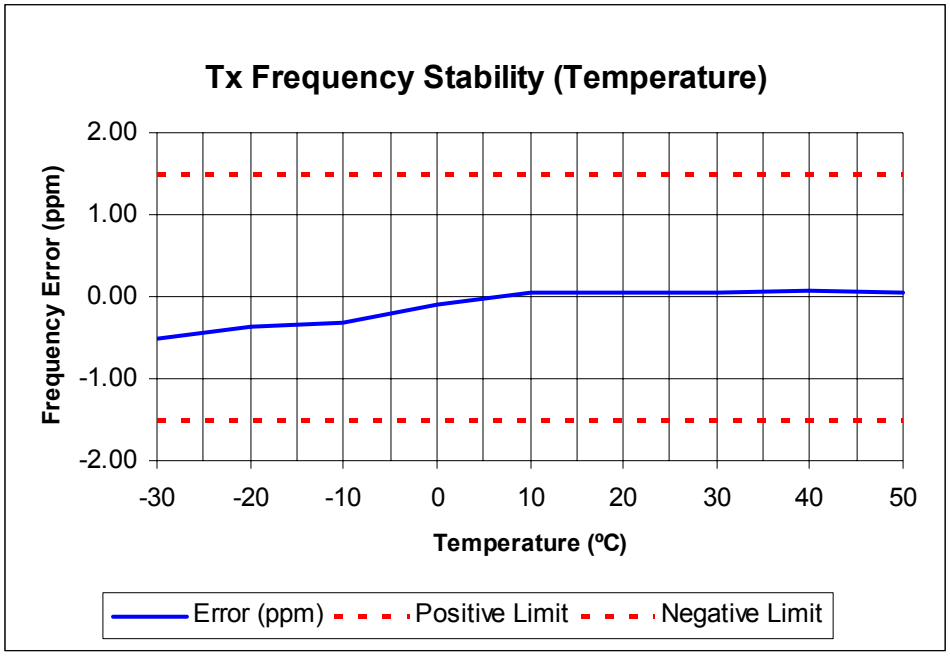
Tx FREQUENCY: 795.9875MHz 30 W 12.5 kHz channel Spacing



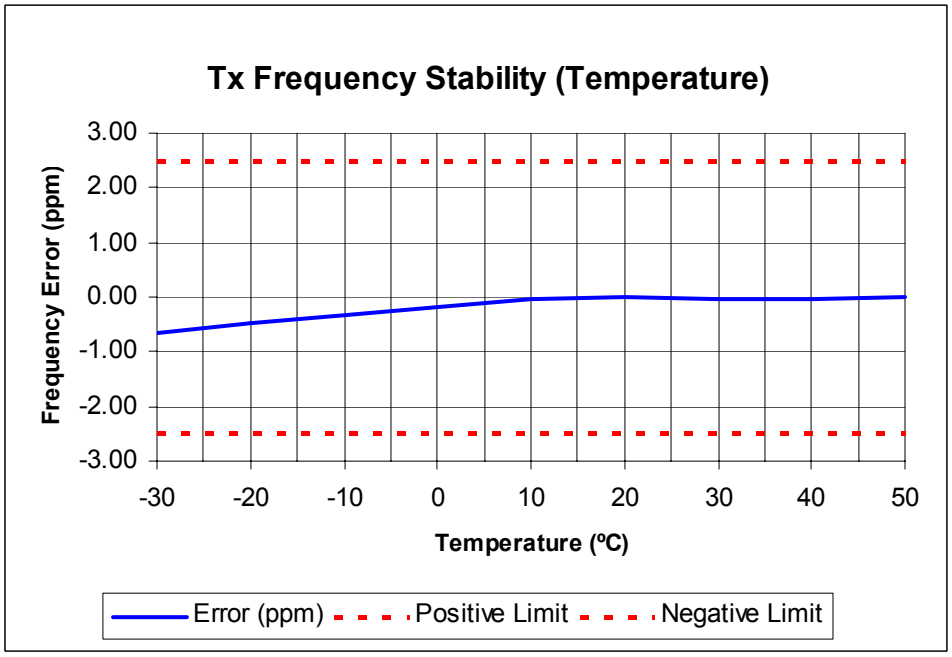
TRANSMITTER FREQUENCY STABILITY (TEMPERATURE)

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

Tx FREQUENCY: 807.5500 MHz 35W 12.5 kHz channel Spacing



Tx FREQUENCY: 816.5125 MHz 35W 25.0 kHz channel Spacing



TRANSMITTER FREQUENCY STABILITY (With AFC)

SPECIFICATION: FCC 47 CFR 90.539 (c)

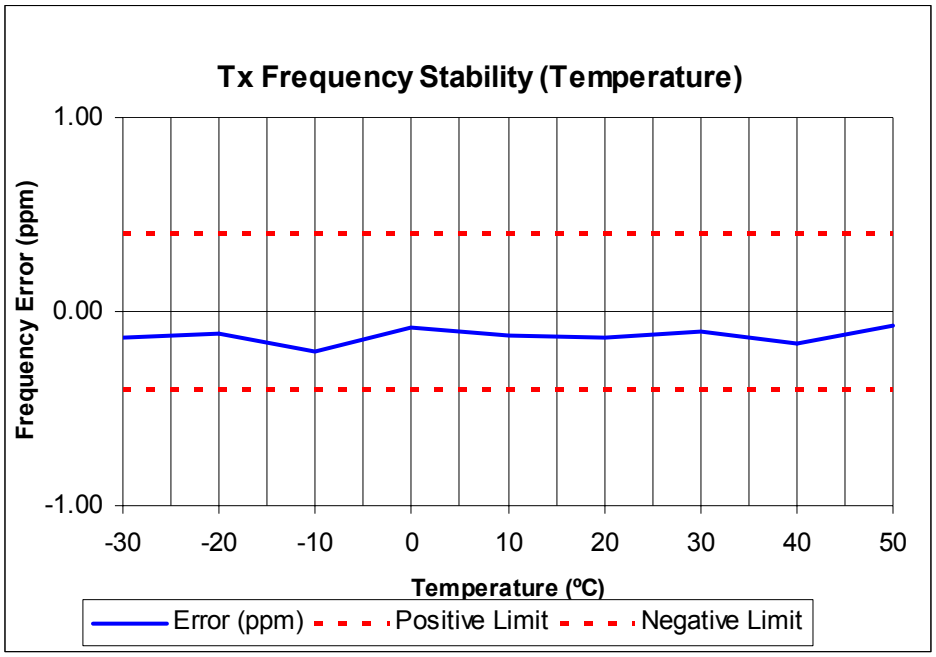
GUIDE: TIA/EIA-102.CAAA-A 2.2.2.3

MEASUREMENT PROCEDURE:
1. Refer Annex A for equipment set up.
2. The signal generator was modulated with the AFC test pattern.
3. For temperature stability the EUT was tested for frequency error from –30 °C to +50°C in 10 °C increments.
4. For the voltage stability the EUT was tested for frequency error at the nominal battery voltage, and at the end point voltage of the battery.
5. The frequency error was recorded in parts per million (ppm).

Limit Clause	Frequency range	Test Frequency (MHz)	Frequency Error (ppm)
47 CFR 90.539	794 → 806 MHz	795.9875	0.4

MEASUREMENT RESULTS: Temperature

Tx FREQUENCY: 795.9875MHz 30W 12.5 kHz channel Spacing



TRANSMITTER FREQUENCY STABILITY (VOLTAGE)

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

GUIDE: TIA/EIA-603C 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: Frequency Range: 794 MHz ~ 869 MHz

Frequency	Channel Spacing (kHz)	FREQUENCY ERROR (ppm)		
		11.7 V DC	13.8 V DC	15.9 V DC
795.9875	12.5	0.09	0.14	0.07
807.55	12.5	0.01	0.05	0.02
816.5125	25	0.02	0.01	0.09

Limit Clause	Frequency range	Test Frequency (MHz)	Frequency Error (ppm)
47 CFR 90.539	794 – 806 MHz	795.9875	1.5
47 CFR 90.213	806 – 809 MHz 809 – 824 MHz	807.5500 816.5125	1.5 2.5

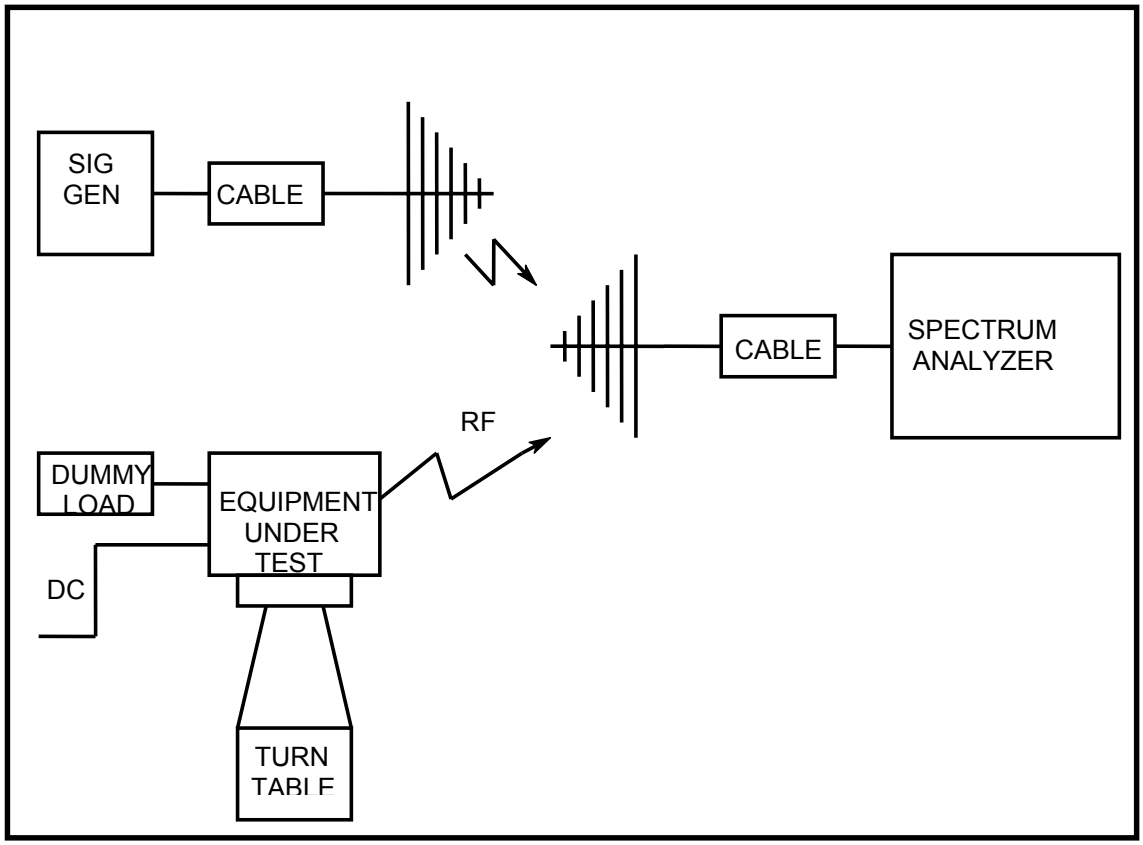
TEST EQUIPMENT USED

Equipment	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
Signal Generator	Hewlett Packard	HP8648C	3443U00543	E3558	1/11/2007
Power Supply	Rohde & Schwarz	NGS M32/10 192.0810.31	Fnr 434	E3556	16/10/2007
RF Attenuator 150W	Weinschel	40-06-34	KV457	E3561	1/11/2007
RF Termination 20W	Deltec		118.001	E3626	
Environ. Chamber	Contherm	Spatial Cal	E3397	E3397	21-Apr-07
Environ. Chamber	Contherm	Temp Control	E3397	E3397	21-Apr-07
Audio Analyser	Hewlett Packard	HP8903B	2818A04275	E3710	1/11/2007
S-LINE TEM CELL	Rohde & Schwarz	1089.9296.02	338232/003	E3636	20-Mar-09
Oscilloscope	Tektronics	TDS380	B017095	E3782	2/11/2007
Modulation Analyser	Hewlett Packard	HP8901B (Opt 002)	3704A05837	E3786	1/11/2007
Signal Generator	Agilent	E4433B	US38440446	E4147	10/08/2008
Signal Generator	Rohde & Schwarz	SML03 1090.3000.13	100597	E4050	1/11/2007
RF Attenuator	Weinschel	Model 1	BL9950	E4080	28/11/2007
RF Attenuator 150W Treva	Weinschel	40-20-23	MF817	E4082	30/10/2007
RF Splitter Combiner	Minicircuits	ZFSC-4-1	-	E4084	
Spectrum Analyser	Agilent	E4445A	MY42510072	E4139	4/07/2007
1m Multiflex Cable	Suhner	MF141	TT007	E4443	30/10/2007
1m Multiflex Cable	Suhner	MF141	TT086	E4444	30/10/2007
Reference Horn Antenna	Emco	DRG3115	9512-4638	E3560	16-Nov-09
Horn Antenna	Emco	DRG3115	2084	E3076	25-Nov-09
RF Attenuator 50W	Weinschel	24-10-34	AZ0401	E3388	31-Oct-07
20m Coax Cable	Intelcom	RG214/U-50	CBL03	E3659	31-Oct-07
Spectrum Analyser	Hewlett Packard	HP8562E	3821A00779	E3715	31-Oct-07
20m Coax Cable		RG214/U-50 (Ext Cal)	CBL01	E3404	31-Oct-07

ANNEX A

TEST SETUP DETAILS

Radiated Emissions Set up.



All other testing is performed using the **T**eltest **R**adio **EVA**luation 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.