



## REPORT ON :

Type Approval Testing of the TMAB34-H501 (Serial No 19018543)  
in accordance with:

FCC CFR 47 Parts 22 & 90

FCC ID: CASTMAH5F

## PREPARED FOR :

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

## DISTRIBUTION :

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## APPROVED :

Hamish Newton

Senior Technician

## Date :

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

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## DECLARATION OF CONFORMITY

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

Equipment: Mobile Transceiver

Type: TMAH5F

Product code: TMAB34-H501

Serial Numbers: 19018543

Quantity: 1

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

**FCC CFR 47 Parts 22 & 90**

**Signature:** \_\_\_\_\_

S. A. Crompton  
Compliance Laboratory Manager.

**Date:** \_\_\_\_\_

## Test Conditions

All testing was performed at the following conditions.

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

## 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 formula.

$B_n = 2M + 2DK$               Where:  $B_n$  = 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

### 1. Analogue Voice 12.5kHz Bandwidth

Necessary bandwidth

Emission Designator

$M = 3\text{kHz}$   
 $D = 2.5\text{kHz}$

**11K0F3E**

F3E represents an analogue FM voice transmission

$B_n = 6 + 5 \times 1$   
 $= 11\text{kHz}$

### 2. Analogue Voice 25kHz Bandwidth

Necessary bandwidth

Emission Designator

$M = 3\text{kHz}$   
 $D = 5\text{kHz}$

**16K0F3E**

F3E represents an analogue FM voice transmission

$B_n = 6 + 10 \times 1$   
 $= 16\text{kHz}$

### 3. Fast Frequency Shift Keying (FFSK) 12.5kHz Bandwidth

Necessary bandwidth

Emission Designator

$M = 0.6$  (Baud rate = 1200)  
 $D = 1.5\text{kHz}$  (60% of peak deviation)

**4K80F2D**

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

$B_n = 1.2 + 3 \times 1.2$   
 $= 4.8\text{kHz}$

#### 4. Fast Frequency Shift Keying (FFSK) 25kHz Bandwidth

Necessary bandwidth

Emission Designator

M = 0.6 (Baud rate = 1200)

**8K40F2D**

D = 3kHz (60% of peak deviation)

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

$B_n = 1.2 + 6 \times 1.2$   
=8.4kHz

#### 5. Tait High Speed Data (THSD)

THSD uses a 4 level gaussian frequency shift keying (CP-4GFSK) modulation scheme. It can be used when transferring data between two radios. Data is transmitted at a rate of 12000bps for narrow band channels, and 19200bps for wide-band channels.

Due to the difficulties in determining the value of k, the necessary bandwidth has been measured using the 99% energy rule.

12.5kHz Bandwidth

99% bandwidth

Emission Designator

7.8 kHz

**7K80F1D**

F1D represents a FM data transmission without the use of a modulating sub carrier

25kHz Bandwidth

99% bandwidth

Emission Designator

12.3 kHz

**12K3F1D**

F1D represents a FM data transmission without the use of a modulating sub carrier

#### 6. Digital Voice /Data (4 – Level FSK) – CFR 47 90.212 (b)

Digital Voice/data transmissions use a 4 level frequency shift keying modulation scheme. The necessary bandwidth as been measured using the 99% energy rule, and in accordance with TIA/EIA 102 CAAB 2.2.5.2

a) Operating in a 12.5 kHz Bandwidth

##### *Digital voice*

99% bandwidth

Emission Designator

8.1 kHz

**8K10F1E**

F1E represents a digital FM voice transmission

**8K10F7E**

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

*Digital Data*

99% bandwidth

Emission Designator

8.1 kHz

**8K10F1D**

F1D represents a digital FM data transmission

**8K10F7D**

F7D represents two or more channels containing quantized or digital information

b) Operating in a 25 kHz Bandwidth

*Digital voice*

99% bandwidth

Emission Designator

10.0 kHz

**10K0F1E**

F1E represents a digital FM voice transmission

**10K0F7E**

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

*Digital Data*

99% bandwidth

Emission Designator

10.0 kHz

**10K0F1D**

F1D represents a digital FM data transmission

**10K0F7D**

F7D represents two or more channels containing quantized or digital information

**7. Digital Voice Encryption (4 – Level FSK) – CFR 47 90.212 (b)**

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

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

b) Operating in a 12.5 kHz Bandwidth

Digital voice

99% bandwidth

Emission Designator

8.1 kHz

**8K10F1E**

F1E represents a digital FM voice transmission

c) Operating in a 25 kHz Bandwidth

Digital voice

99% bandwidth

Emission Designator

10.0 kHz

**10K0F1E**

F1E represents a digital FM voice transmission



## Test Results

### TRANSMITTER OUTPUT POWER (CONDUCTED)

SPECIFICATION: FCC 47 CFR 2.1046

GUIDE: TIA/EIA-603B 2.2.1

#### MEASUREMENT PROCEDURE:

1. Refer Appendix 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: 10 W and 40 W

| 425.1 MHz                    | 10 W nominal | 40 W nominal   |
|------------------------------|--------------|----------------|
| POWER (W)                    | 10.5         | 42.6           |
| Variation from Nominal (%)   | + 5.0        | + 6.5          |
| Measurement Uncertainty (dB) |              | +0.63<br>-0.68 |

LIMIT CLAUSE: FCC 47 CFR 90.205

Radio Type: Mobile Transceiver

Frequency Band: 421 MHz ~ 512 MHz

- (o) 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-603B 2.2.6

**MEASUREMENT PROCEDURE:**

1. Refer Appendix 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.

**MEASUREMENT RESULTS:**

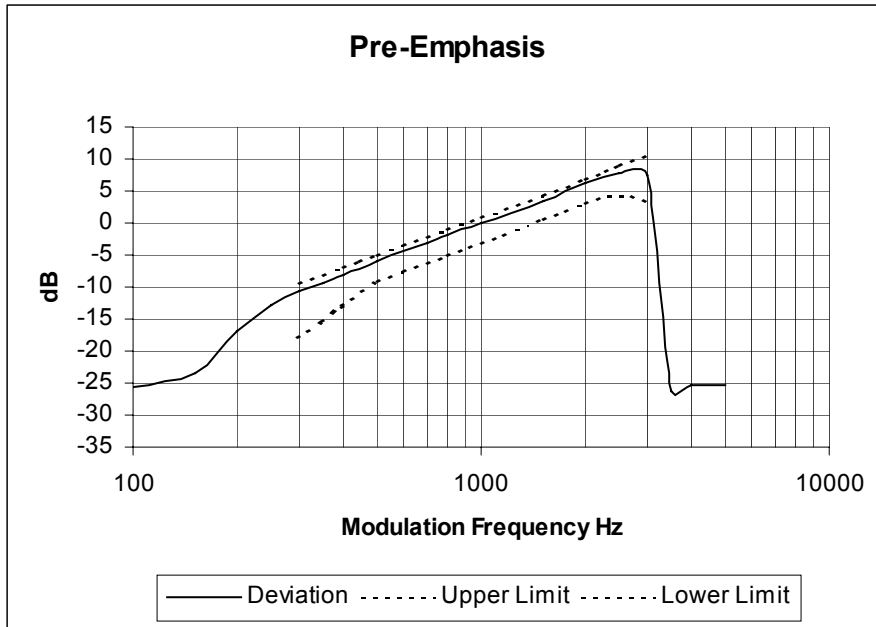
See the plots on the following pages for 12.5 kHz & 25.0 kHz channel spacings.

LIMIT CLAUSE: TIA/EIA-603B 3.2.6

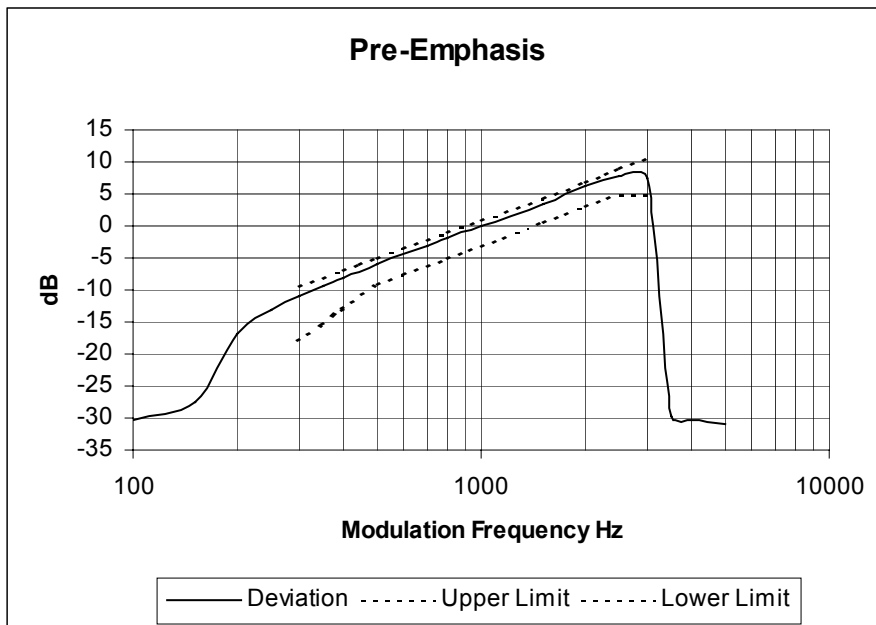
TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 425.1 MHz 12.5 kHz Channel Spacing



Tx FREQUENCY: 425.1 MHz 25.0 kHz Channel Spacing



TRANSMITTER MODULATION LIMITING

SPECIFICATION: FCC 47 CFR 2.1047 (b)

MEASUREMENT PROCEDURE:

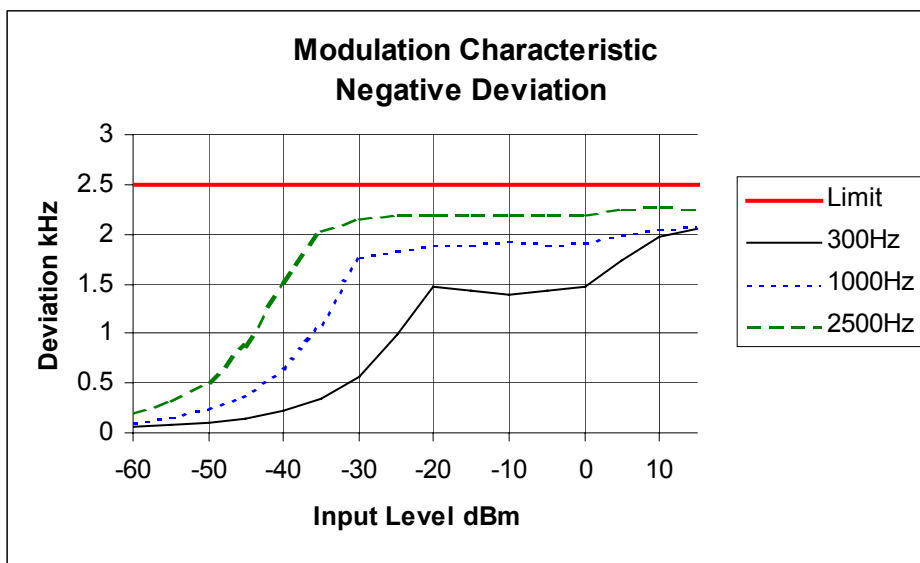
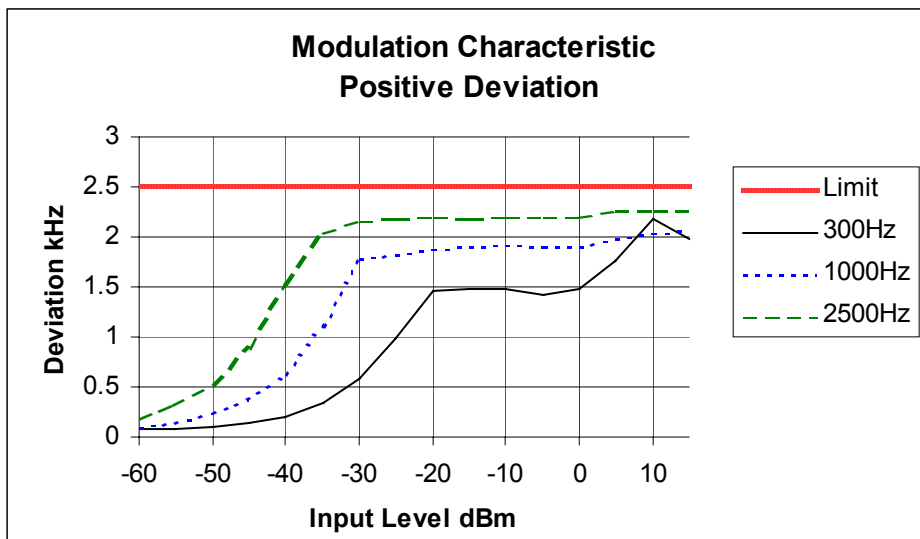
1. Refer Appendix A for Equipment set up.
2. The modulation response was measured at three audio frequencies while varying the input level.
3. Measurements were made for both Positive and Negative Deviation.

MEASUREMENT RESULTS:

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

LIMIT CLAUSE: TIA/EIA-603B 1.3.4.4

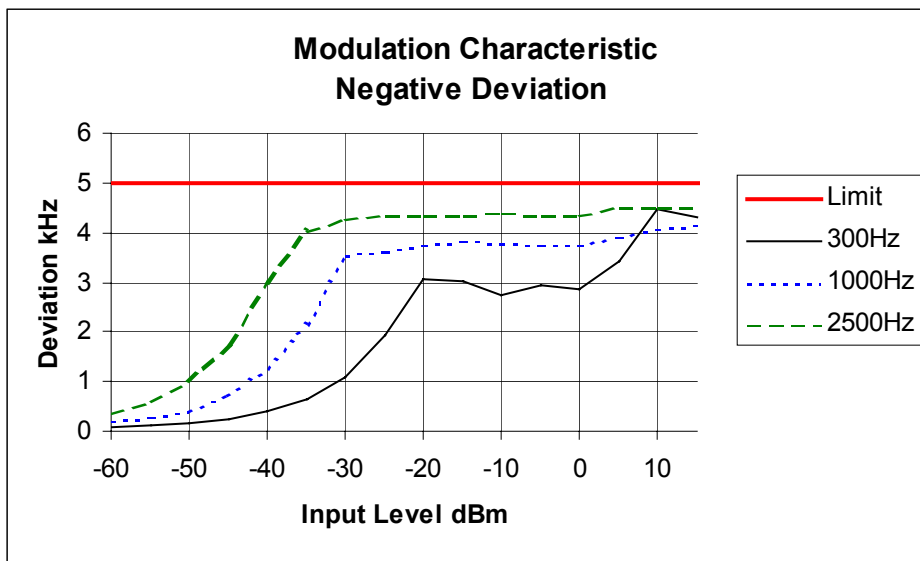
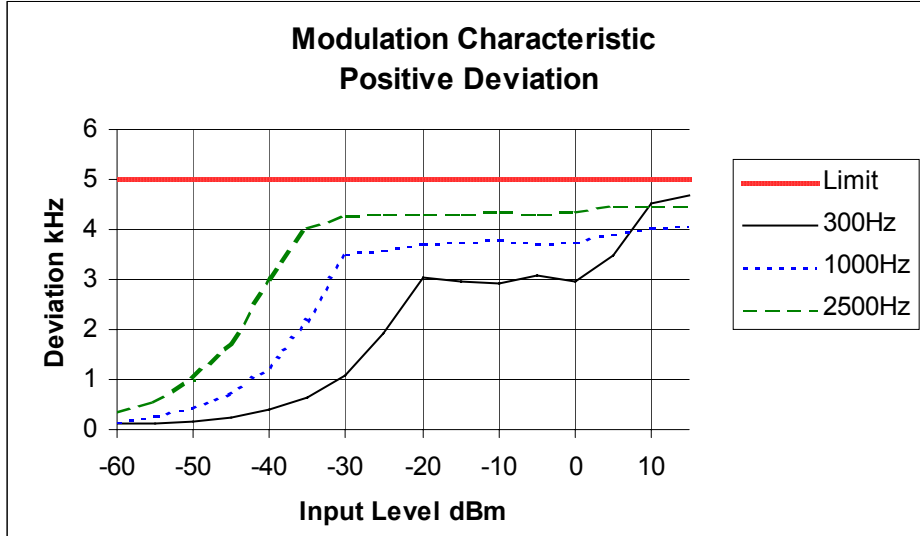
Tx FREQUENCY: 425.1 MHz 12.5 kHz Channel Spacing



TRANSMITTER MODULATION LIMITING

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 425.1 MHz 25.0 kHz Channel Spacing



## OCCUPIED BANDWIDTH

SPECIFICATION: FCC 47 CFR 2.1049 (c)

GUIDE: TIA/EIA-603B 2.2.11  
TIA/EIA-102CAAA-A 2.2.5

### MEASUREMENT PROCEDURE:

1. Refer Appendix 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 Digital 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

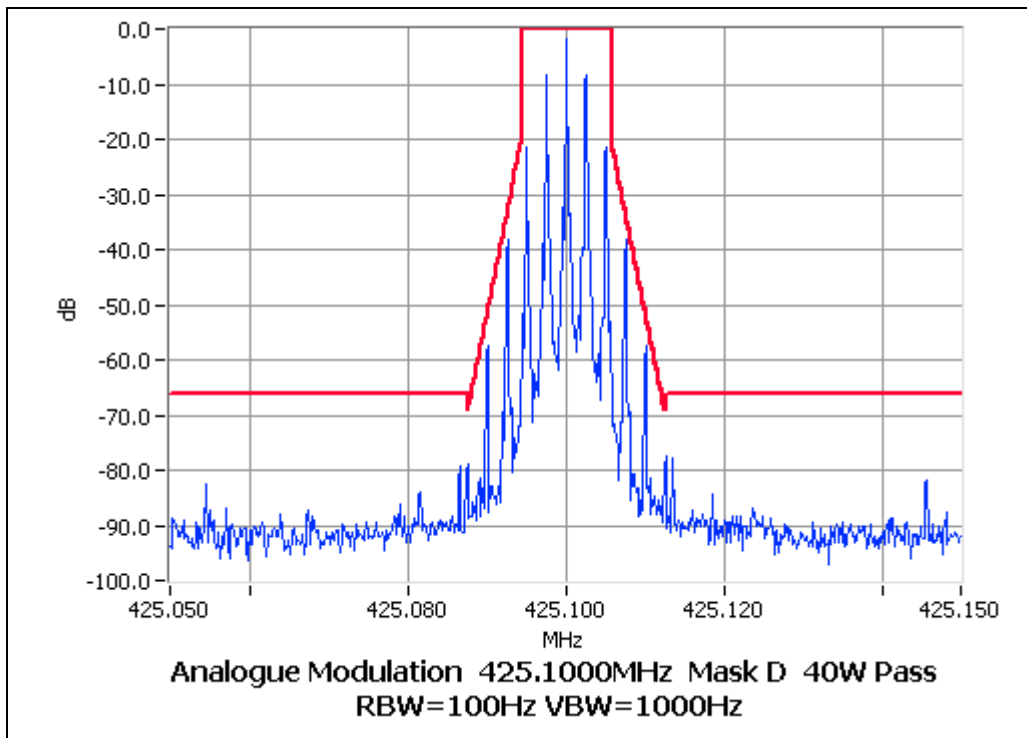
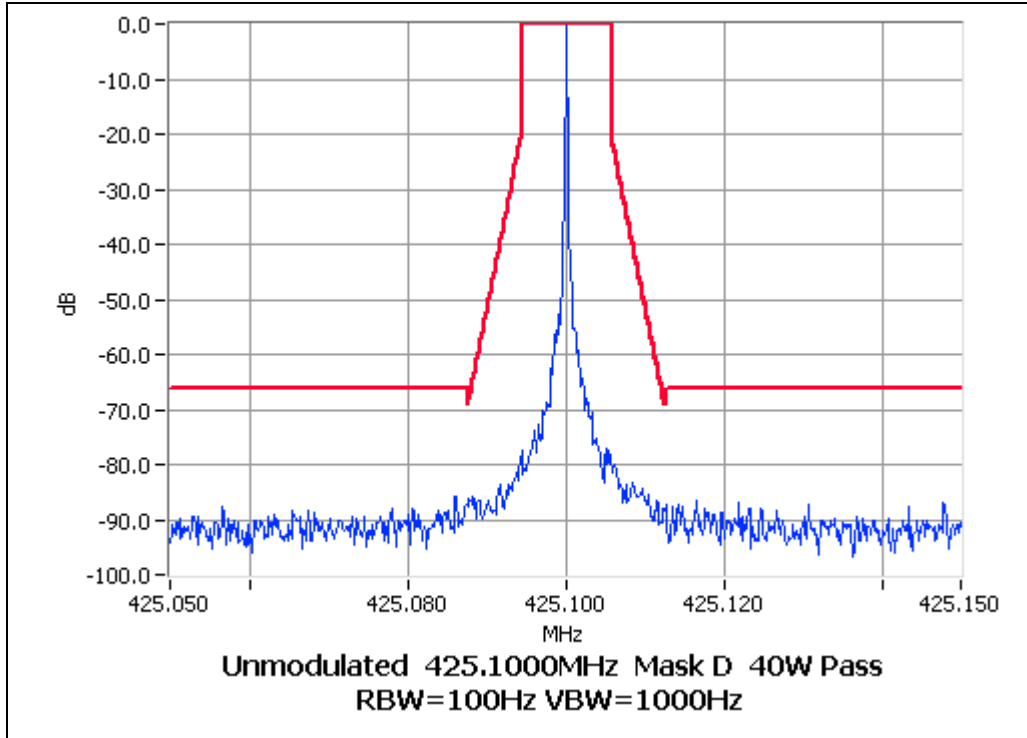
|                 |                          |                                |
|-----------------|--------------------------|--------------------------------|
| Emission Mask D | 12.5 kHz Channel Spacing | Analog; Digital; FFSK;<br>THSD |
| Emission Mask B | 25.0 kHz Channel Spacing | Analog;                        |
| Emission Mask C | 25.0 kHz Channel Spacing | Digital; FFSK; THSD            |

### DATA SPEED

|         |           |                          |
|---------|-----------|--------------------------|
| Digital | 9600 bps  | 12.5 kHz Channel Spacing |
| Digital | 9600 bps  | 25.0 kHz Channel Spacing |
| FFSK    | 1200 bps  | 12.5 kHz Channel Spacing |
| FFSK    | 1200 bps  | 25.0 kHz Channel Spacing |
| THSD    | 12000 bps | 12.5 kHz Channel Spacing |
| THSD    | 19200 bps | 25.0 kHz Channel Spacing |

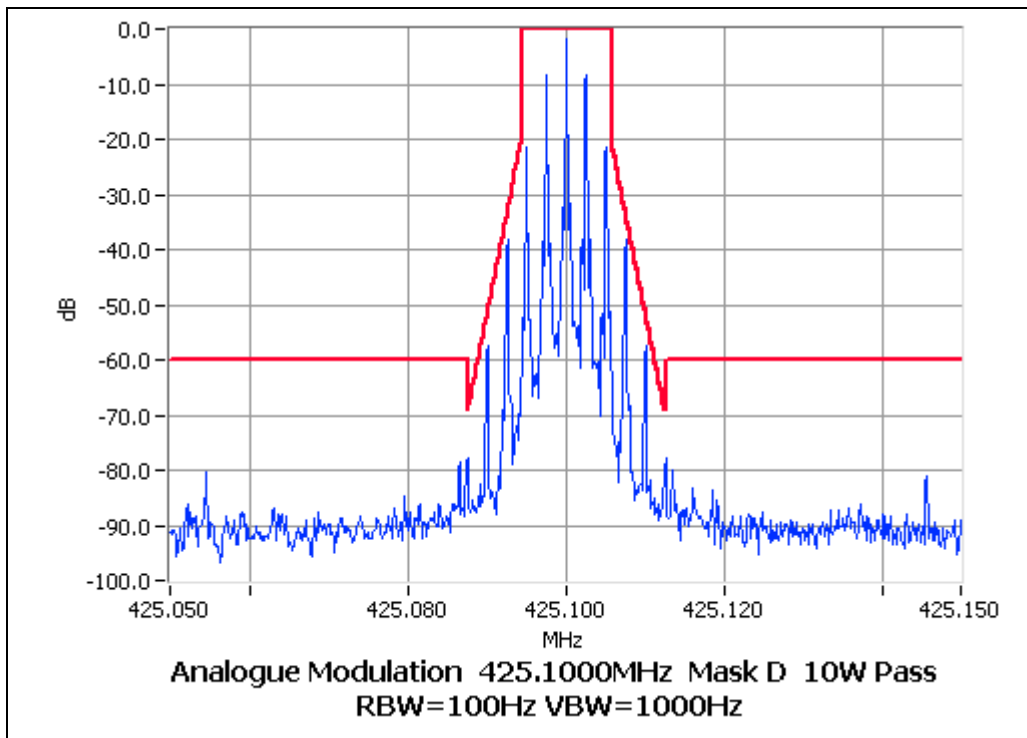
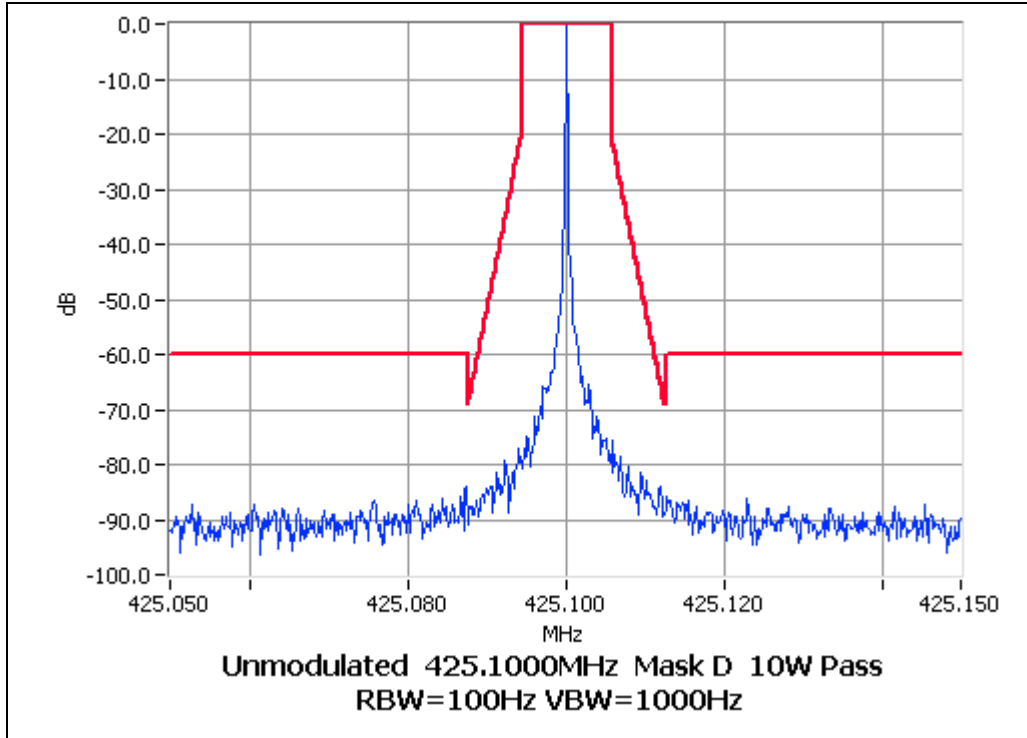
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Report Number 2092

NAME OF TEST: OCCUPIED BANDWIDTH ANALOGUE VOICE  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 40W 12.5 kHz Channel Spacing



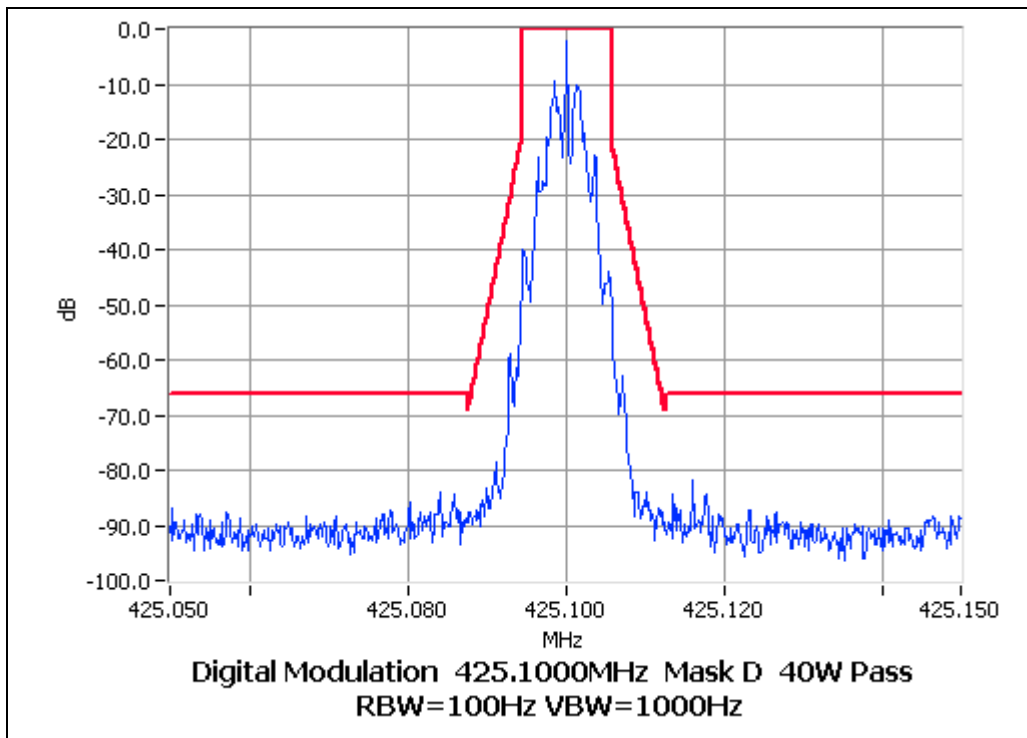
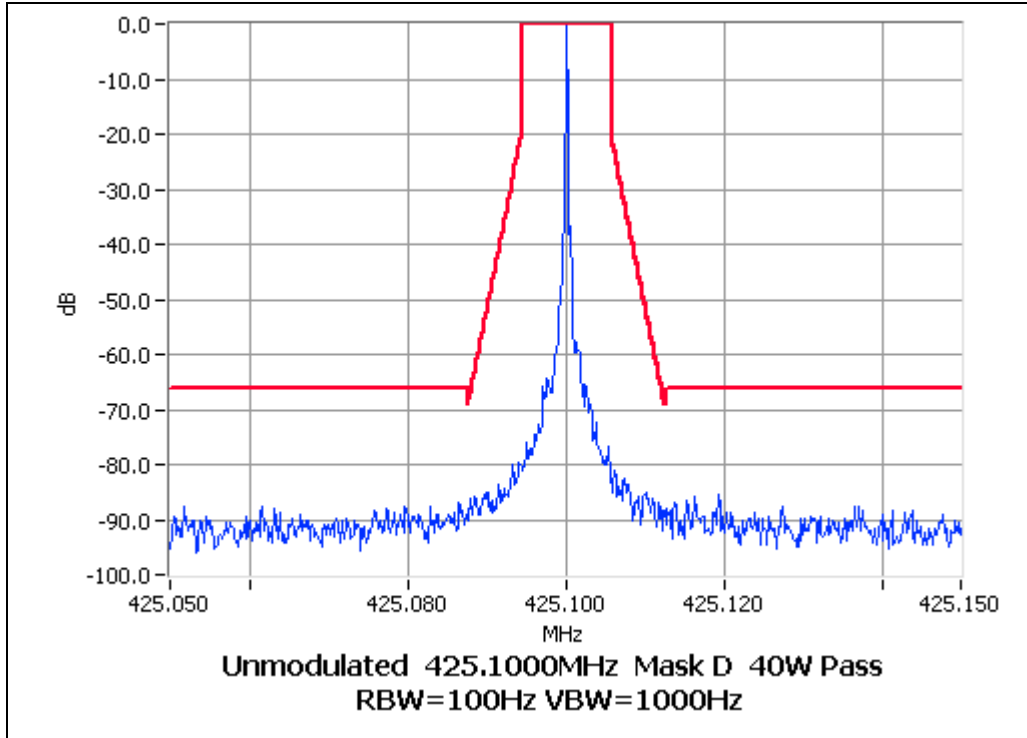
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Report Number 2092

NAME OF TEST: OCCUPIED BANDWIDTH ANALOGUE VOICE  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 10W 12.5 kHz Channel Spacing



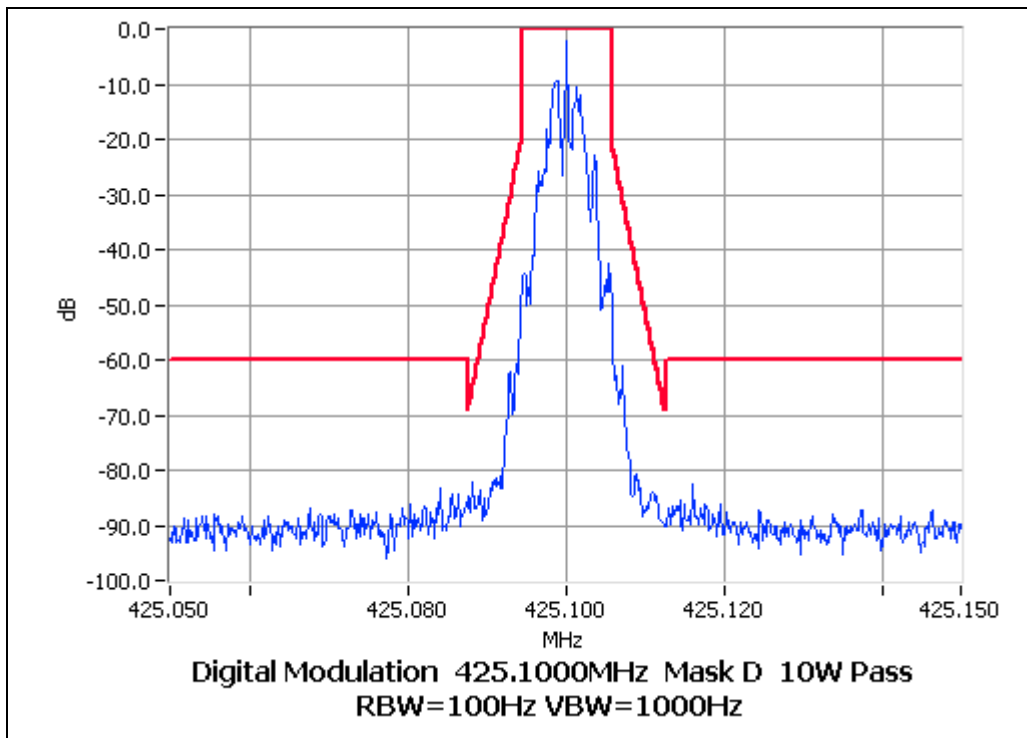
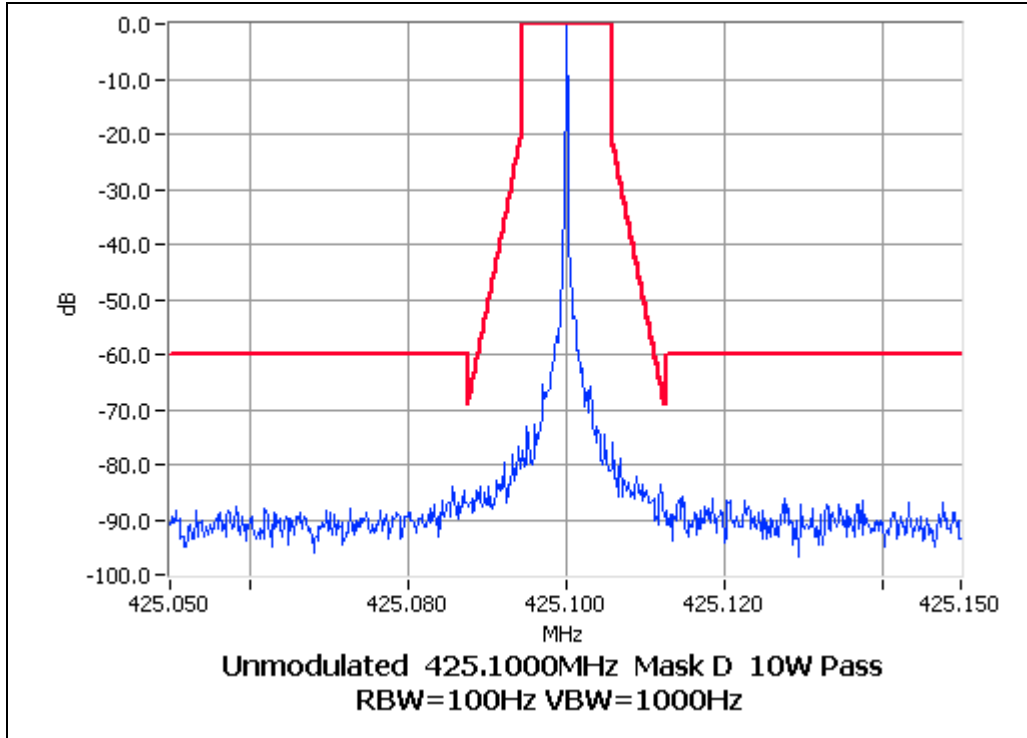


NAME OF TEST: OCCUPIED BANDWIDTH FFSK  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 40W 12.5 kHz Channel Spacing

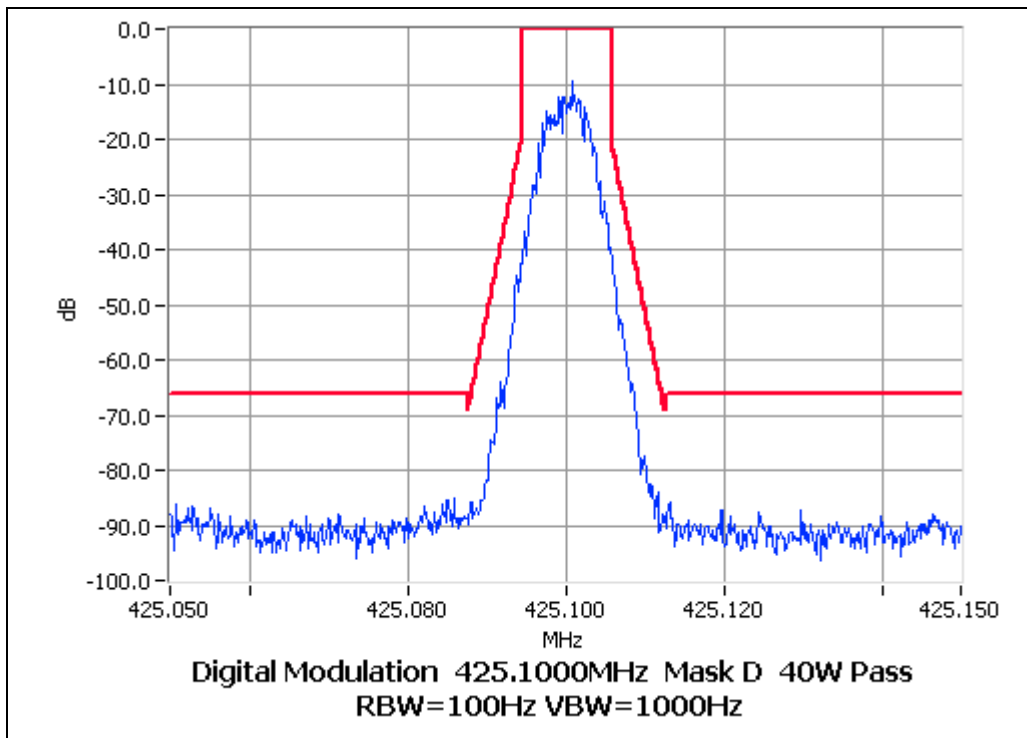
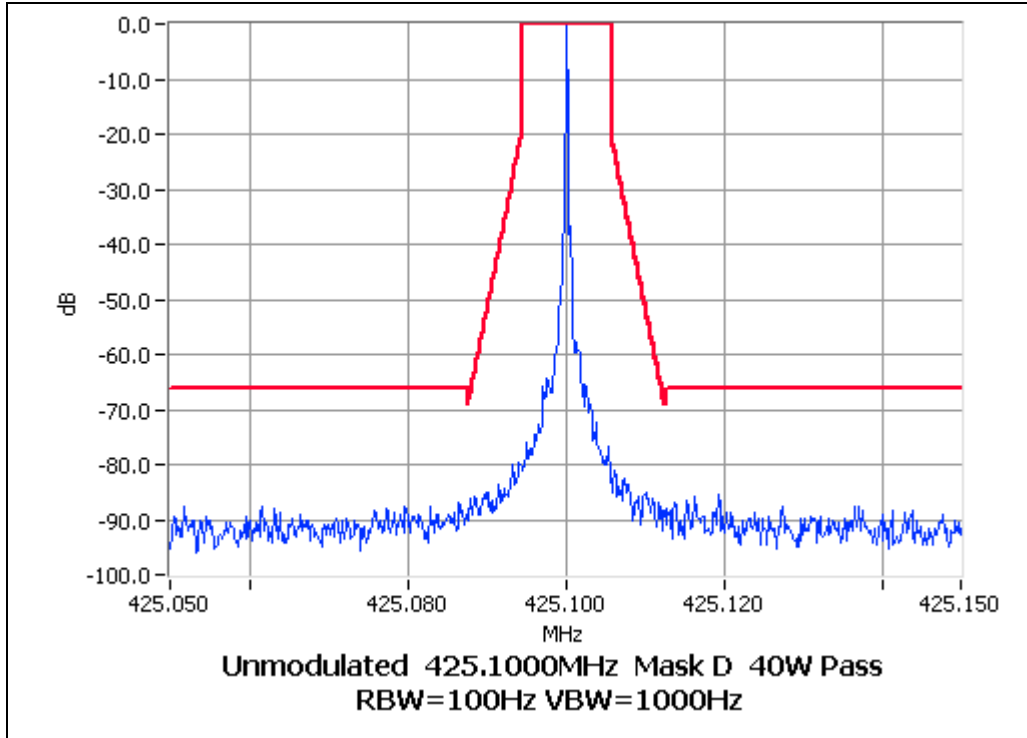


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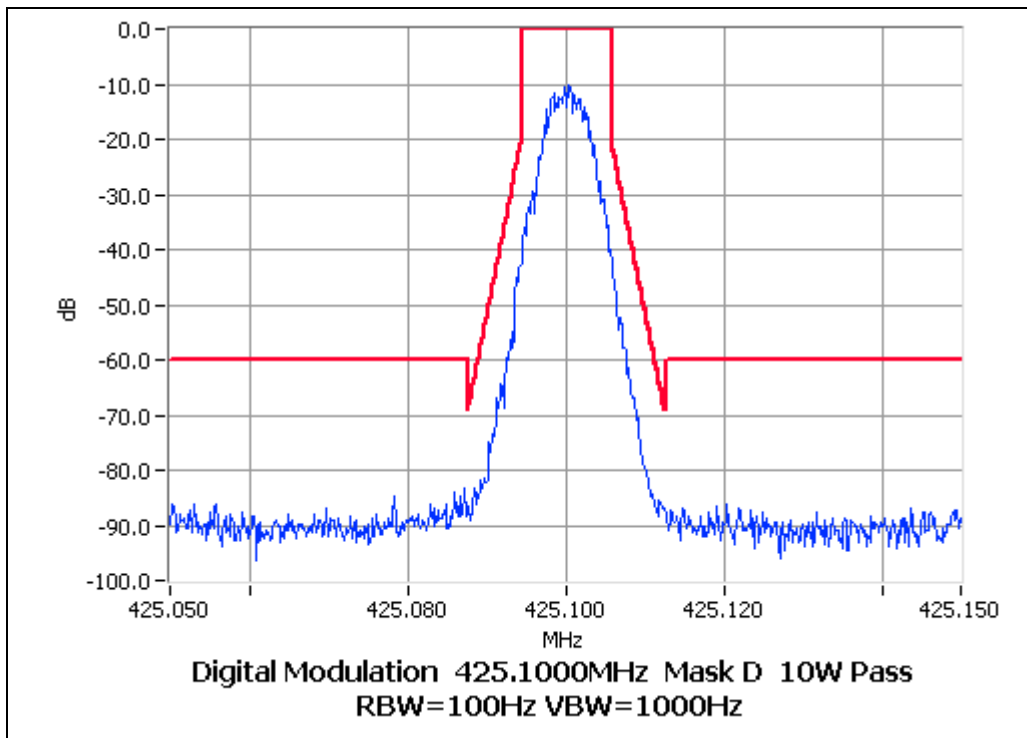
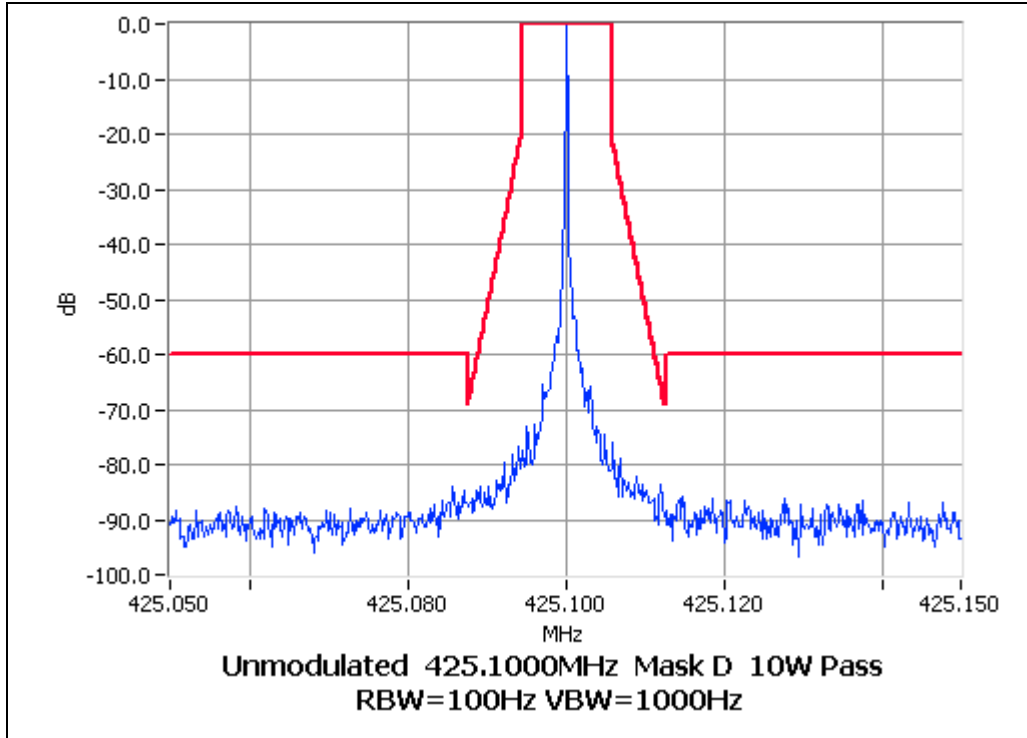
NAME OF TEST: OCCUPIED BANDWIDTH FFSK  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 10W 12.5 kHz Channel Spacing



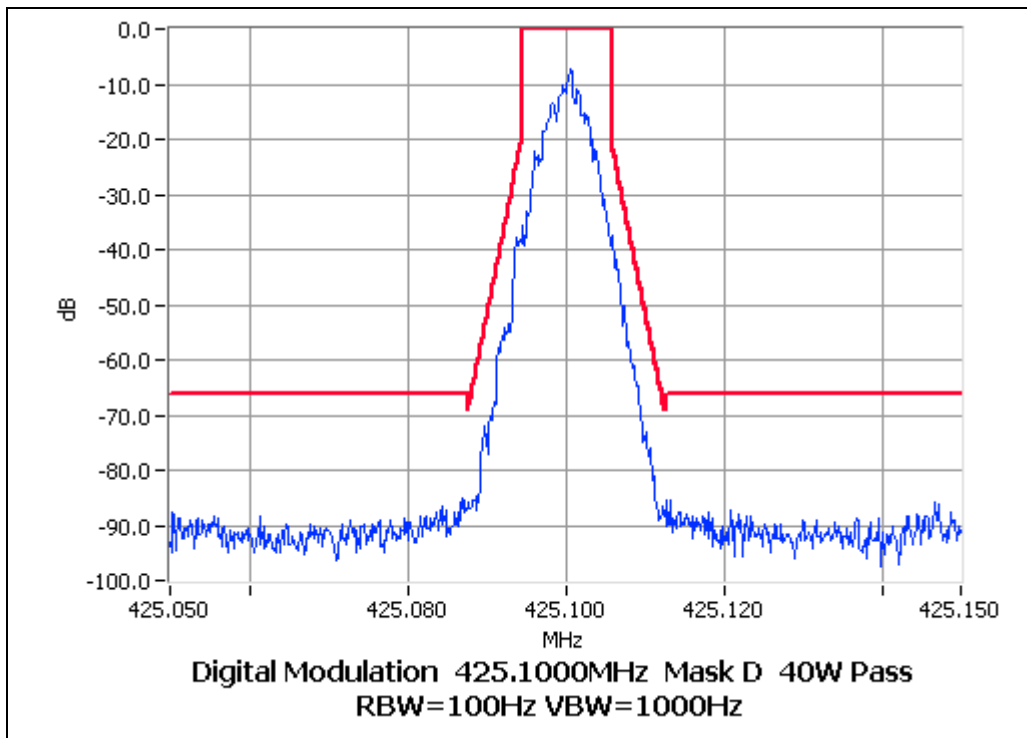
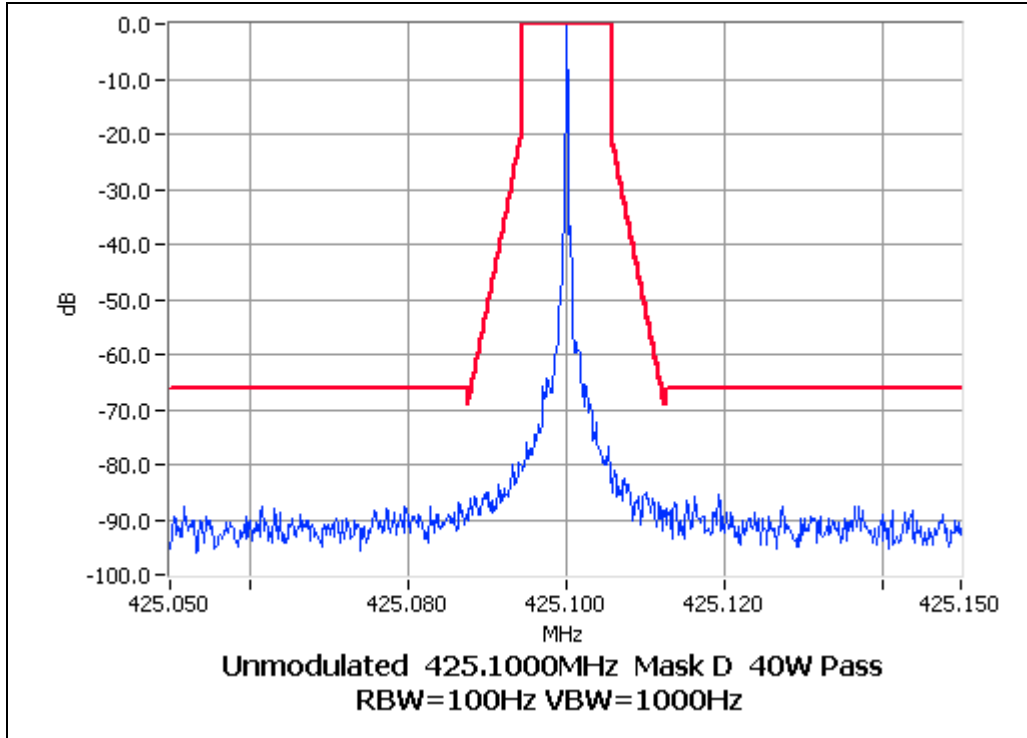
NAME OF TEST: OCCUPIED BANDWIDTH THSD  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 40W 12.5 kHz Channel Spacing



NAME OF TEST: OCCUPIED BANDWIDTH THSD  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 10W 12.5 kHz Channel Spacing

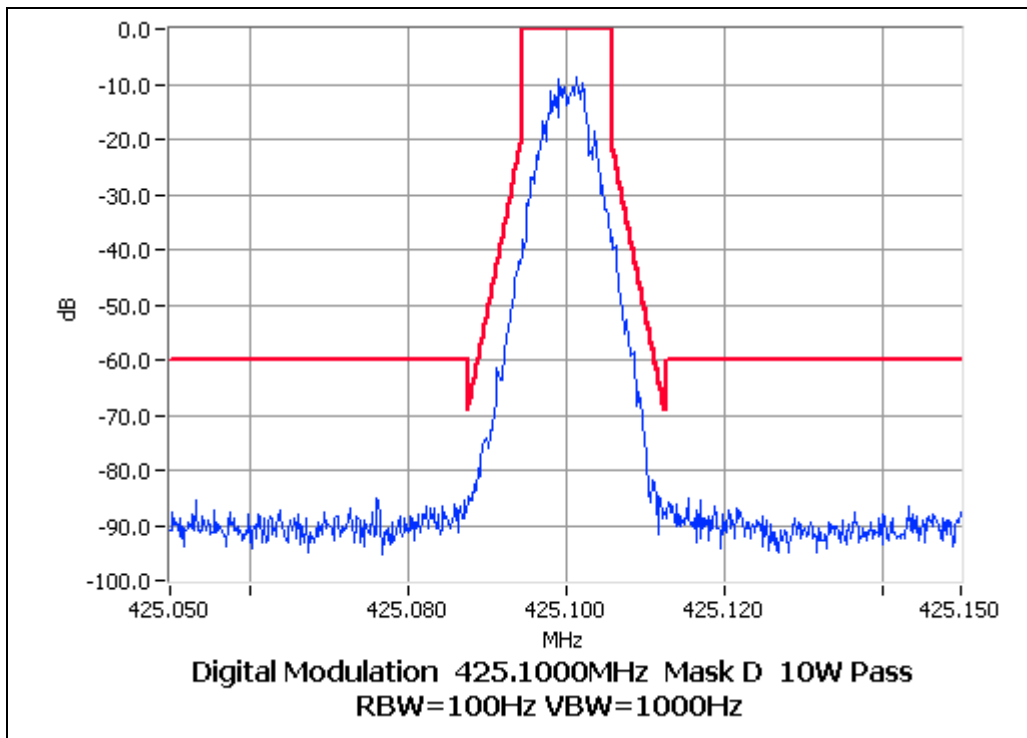
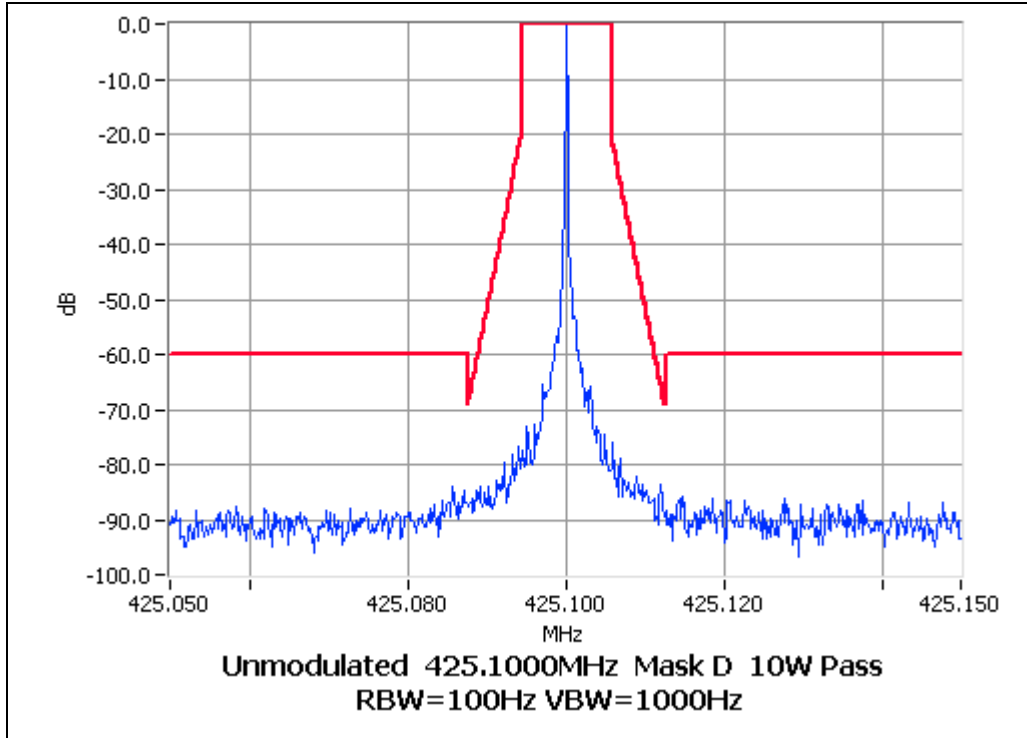


NAME OF TEST: OCCUPIED BANDWIDTH DIGITAL - 4 Level FSK  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 40W 12.5 kHz Channel Spacing



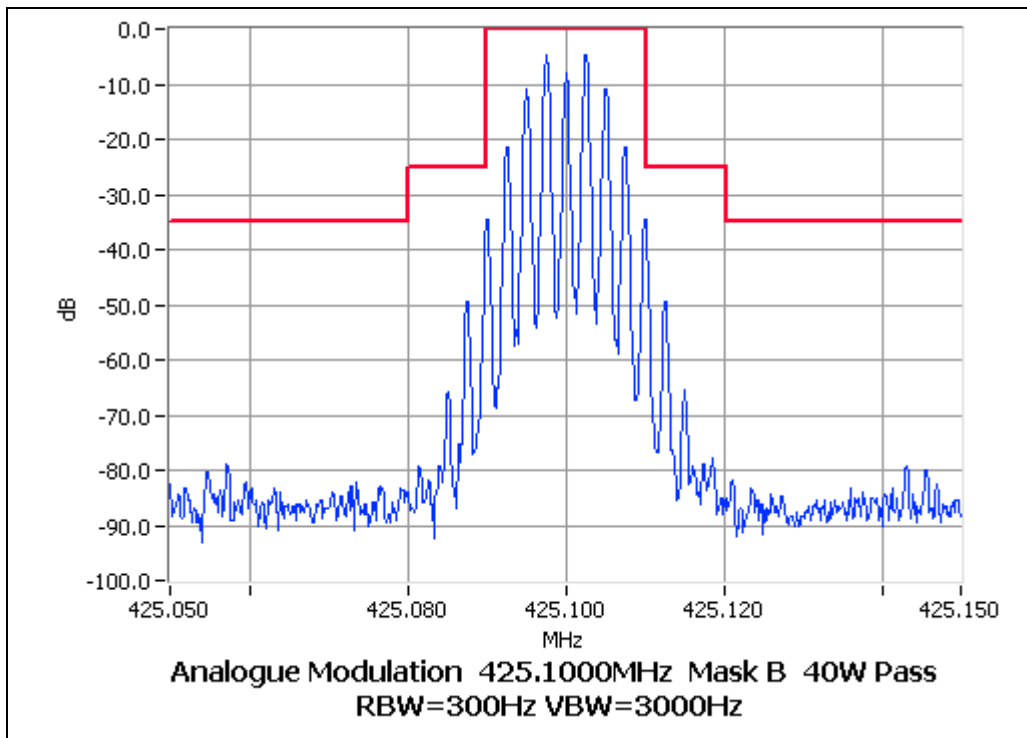
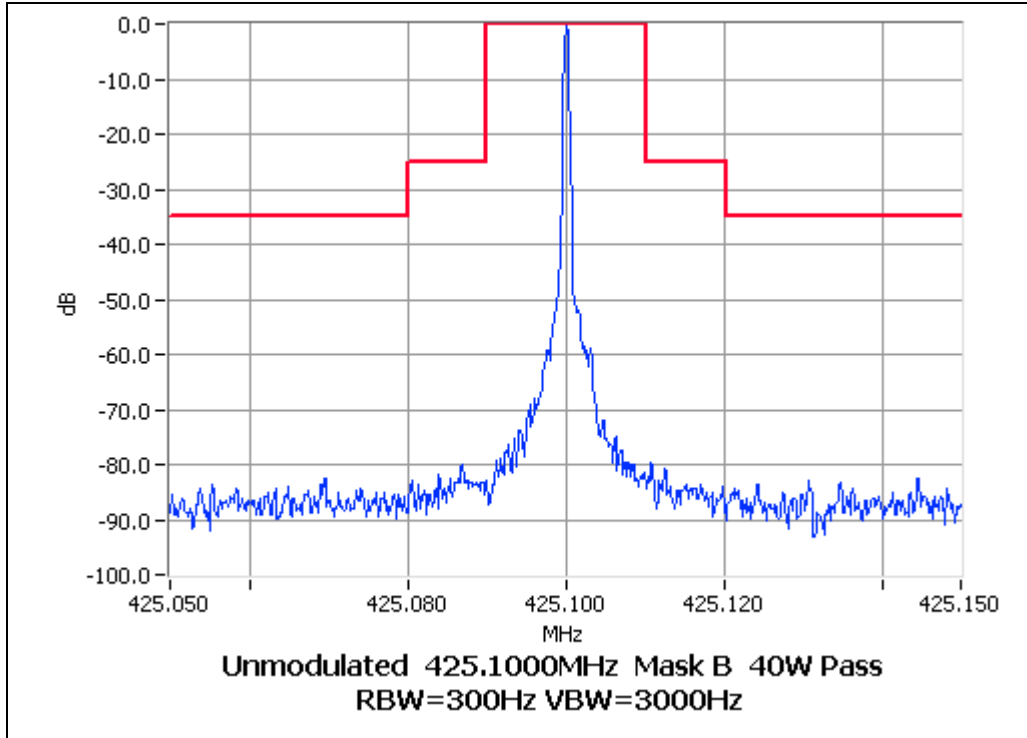
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NAME OF TEST: OCCUPIED BANDWIDTH DIGITAL - 4 Level FSK  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 10W 12.5 kHz Channel Spacing

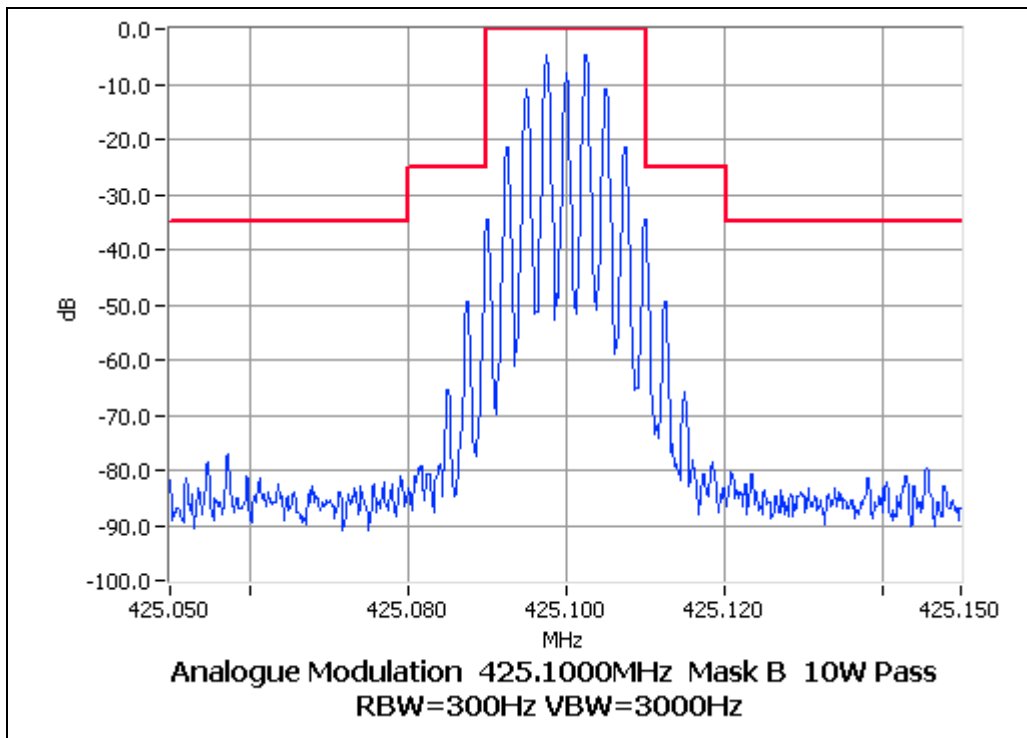
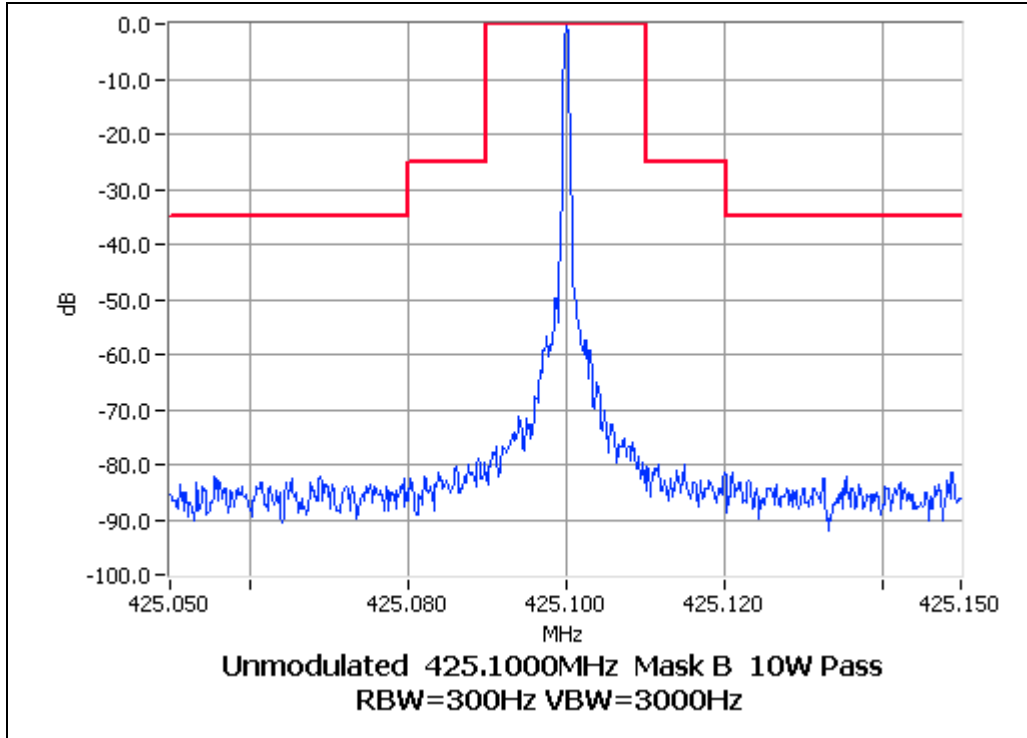


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NAME OF TEST: OCCUPIED BANDWIDTH ANALOGUE VOICE  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 40W 25.0 kHz Channel Spacing



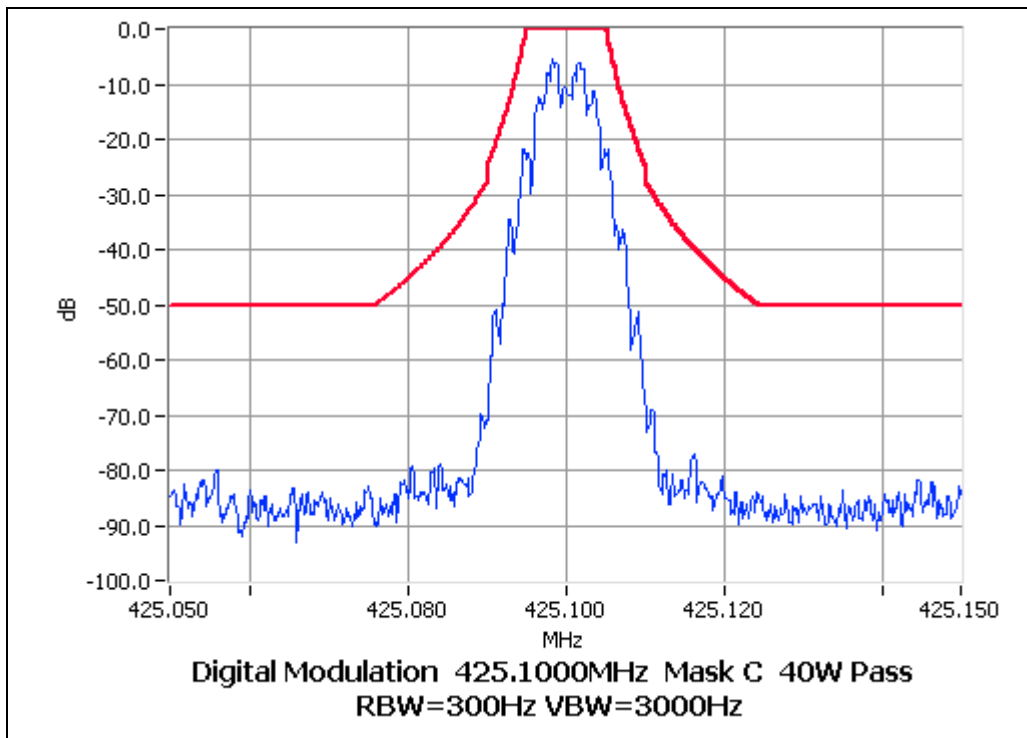
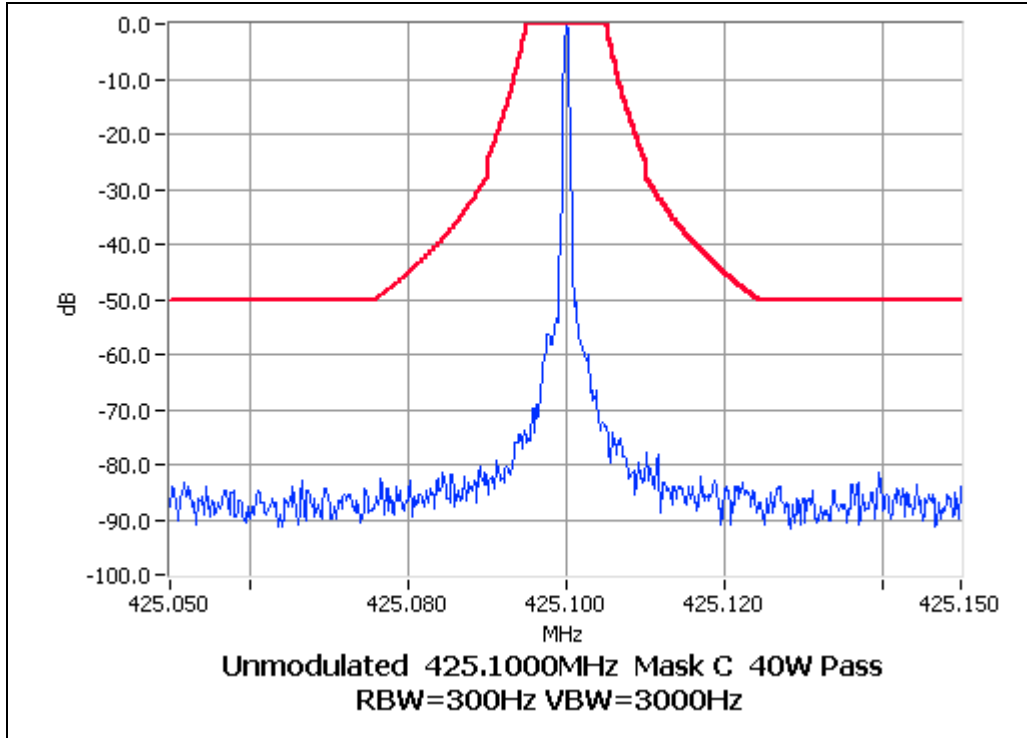
NAME OF TEST: OCCUPIED BANDWIDTH ANALOGUE VOICE  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 10W 25.0 kHz Channel Spacing





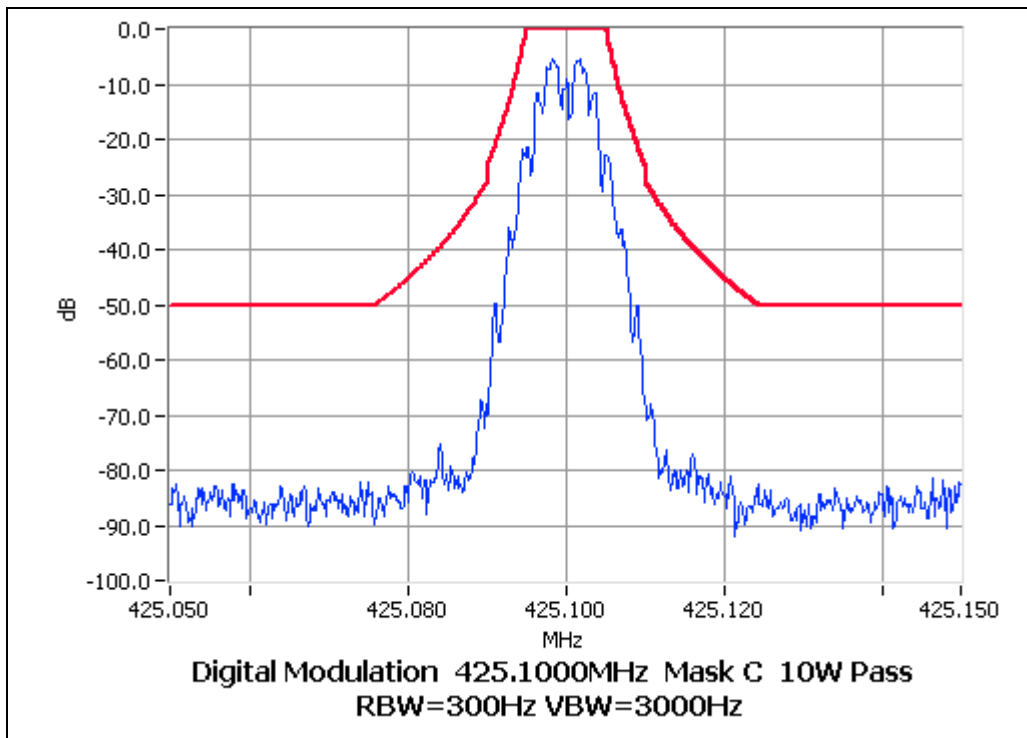
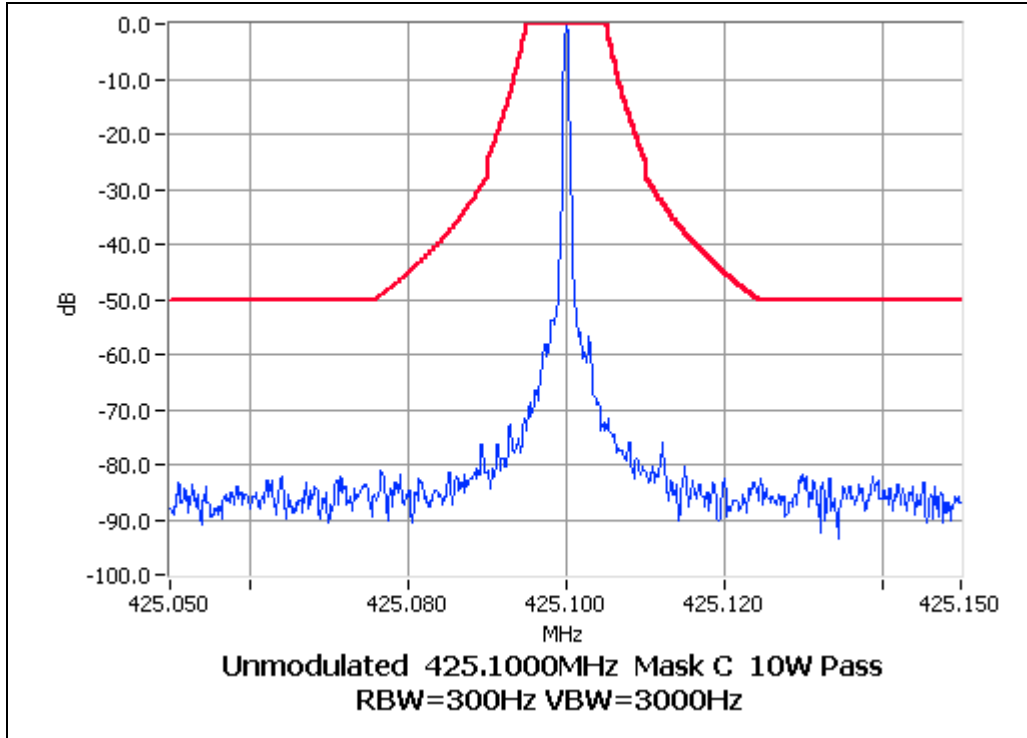
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NAME OF TEST: OCCUPIED BANDWIDTH FFSK  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 40W 25.0 kHz Channel Spacing



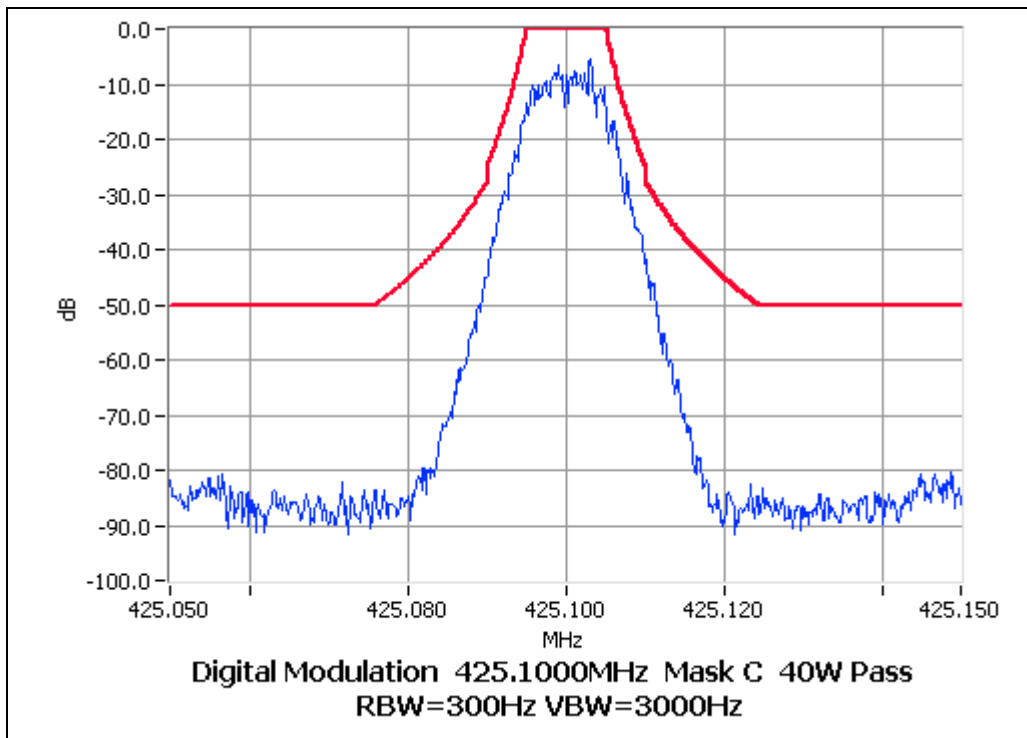
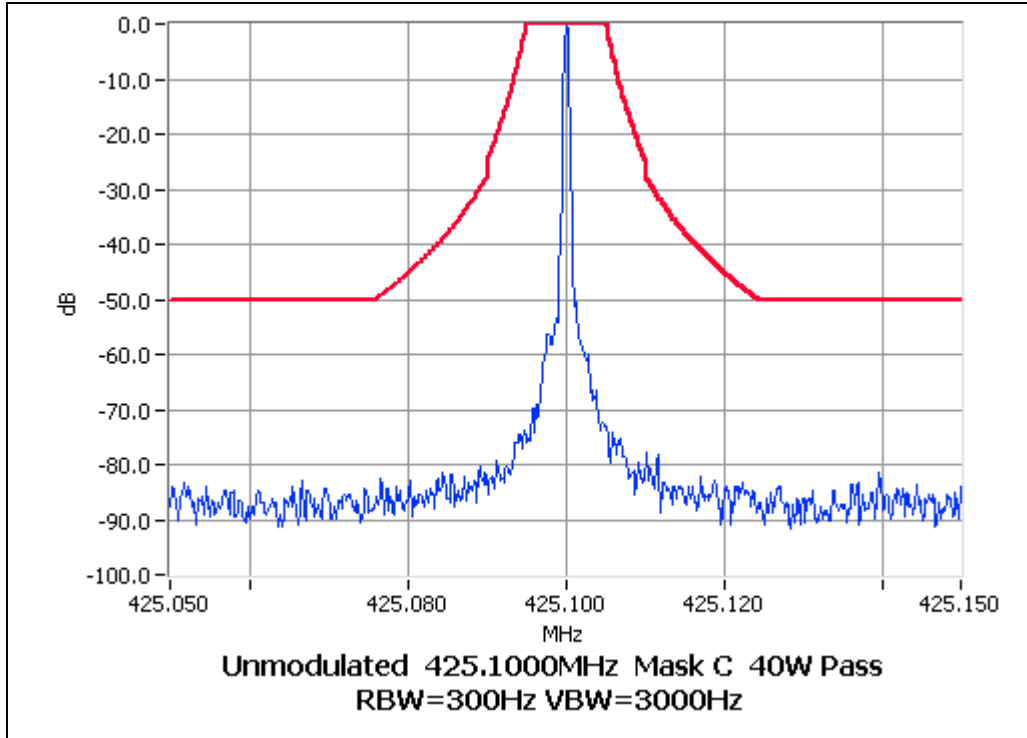
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NAME OF TEST: OCCUPIED BANDWIDTH FFSK  
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Tx FREQUENCY: 425.1 MHz 10W 25.0 kHz Channel Spacing

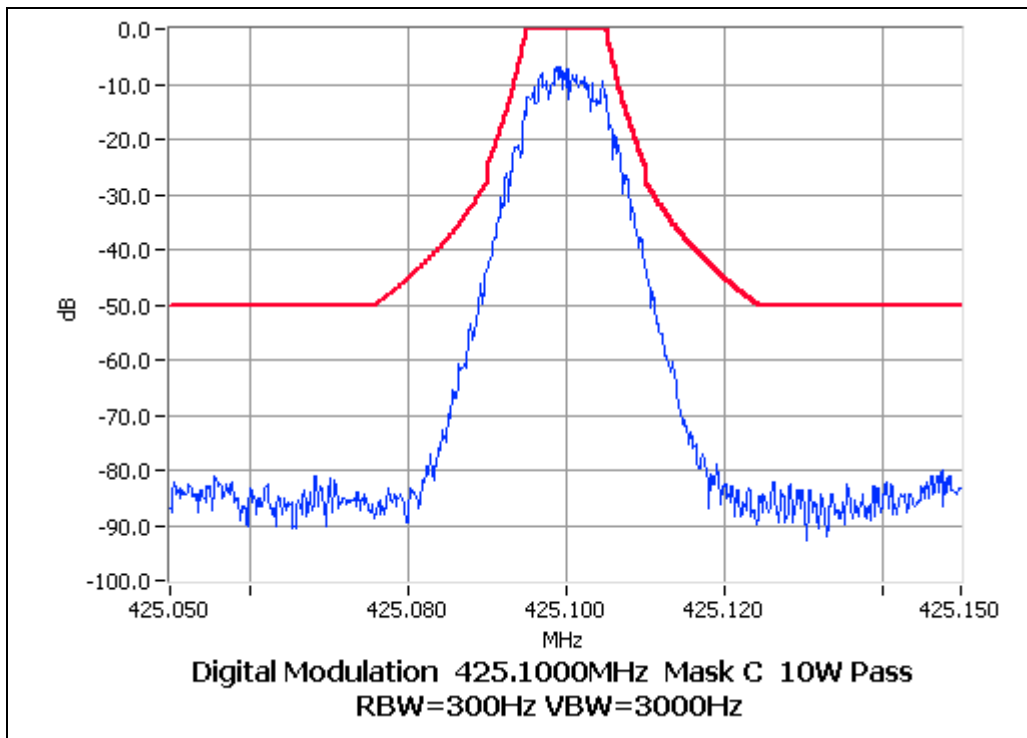
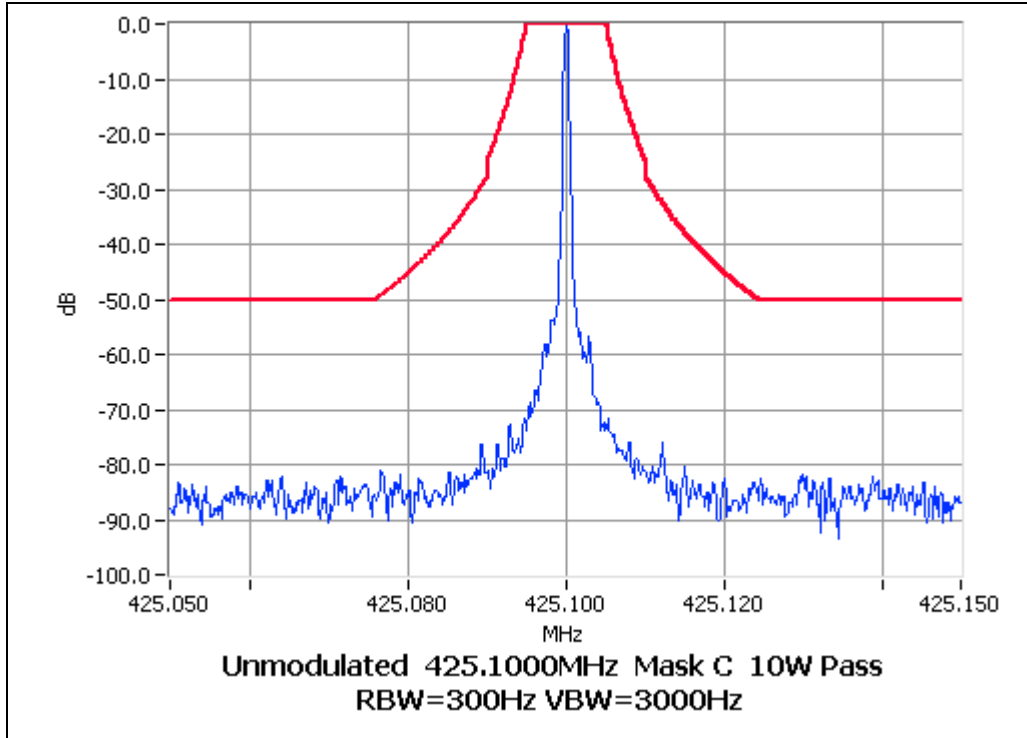


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Report Number 2092

NAME OF TEST: OCCUPIED BANDWIDTH THSD  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 40W 25.0 kHz Channel Spacing

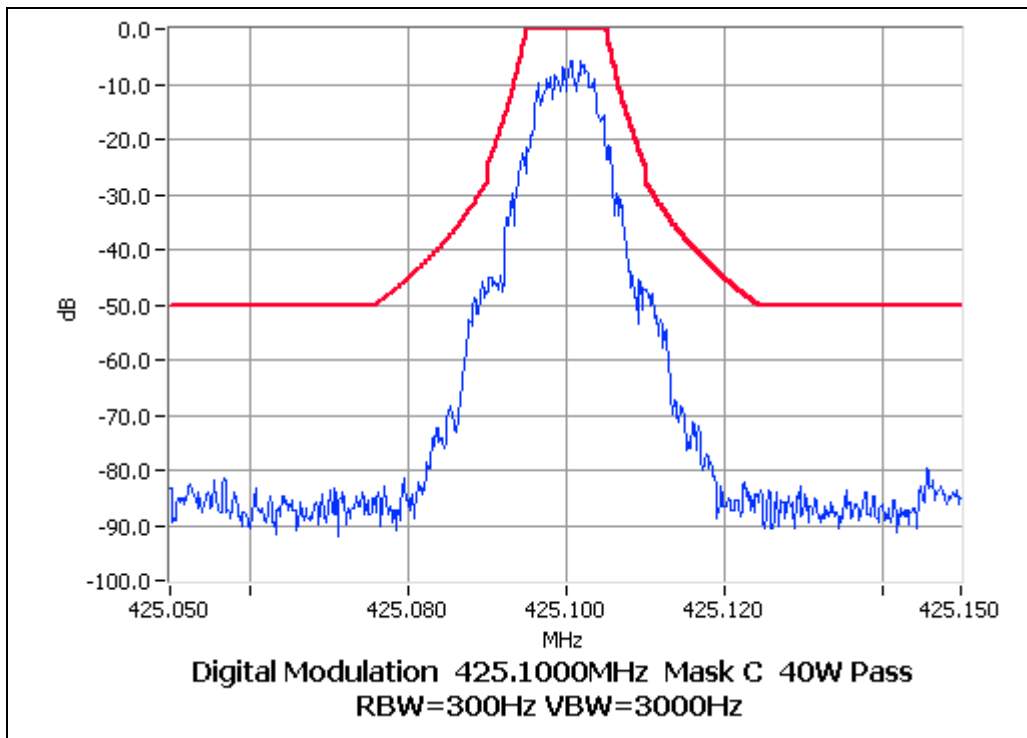
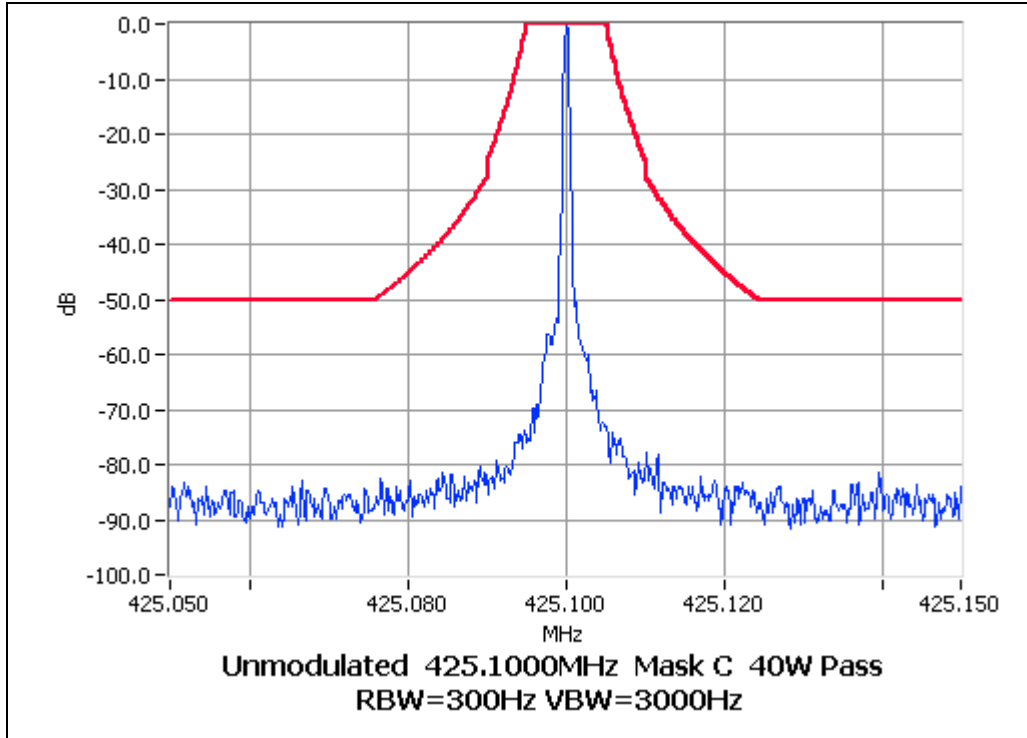


NAME OF TEST: OCCUPIED BANDWIDTH THSD  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 10W 25.0 kHz Channel Spacing



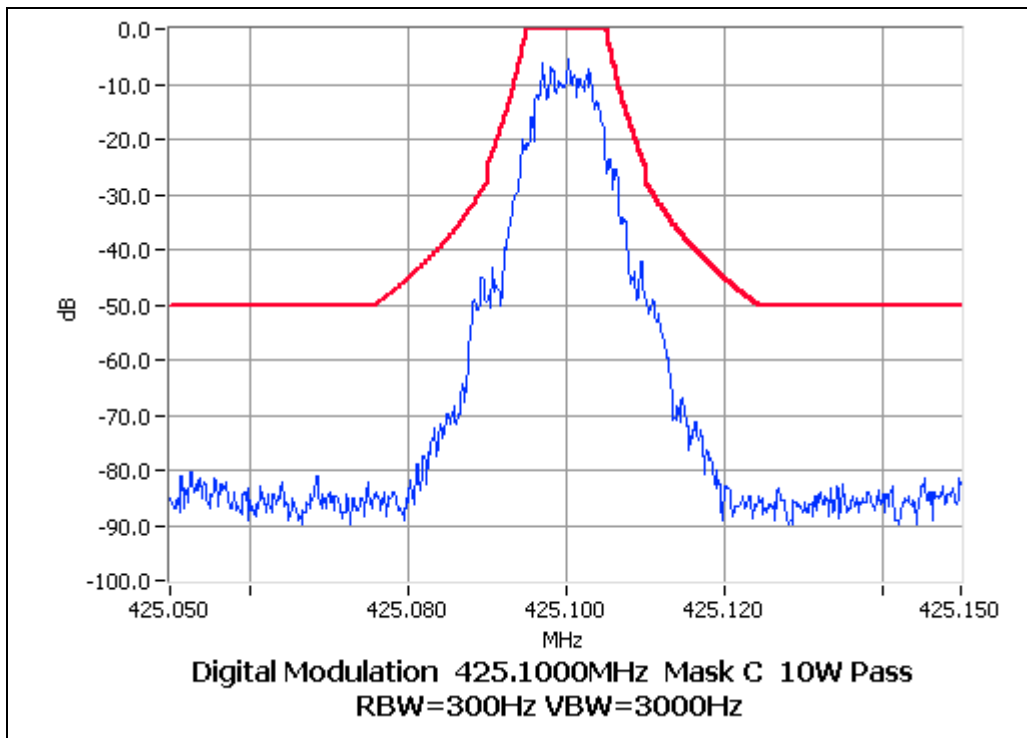
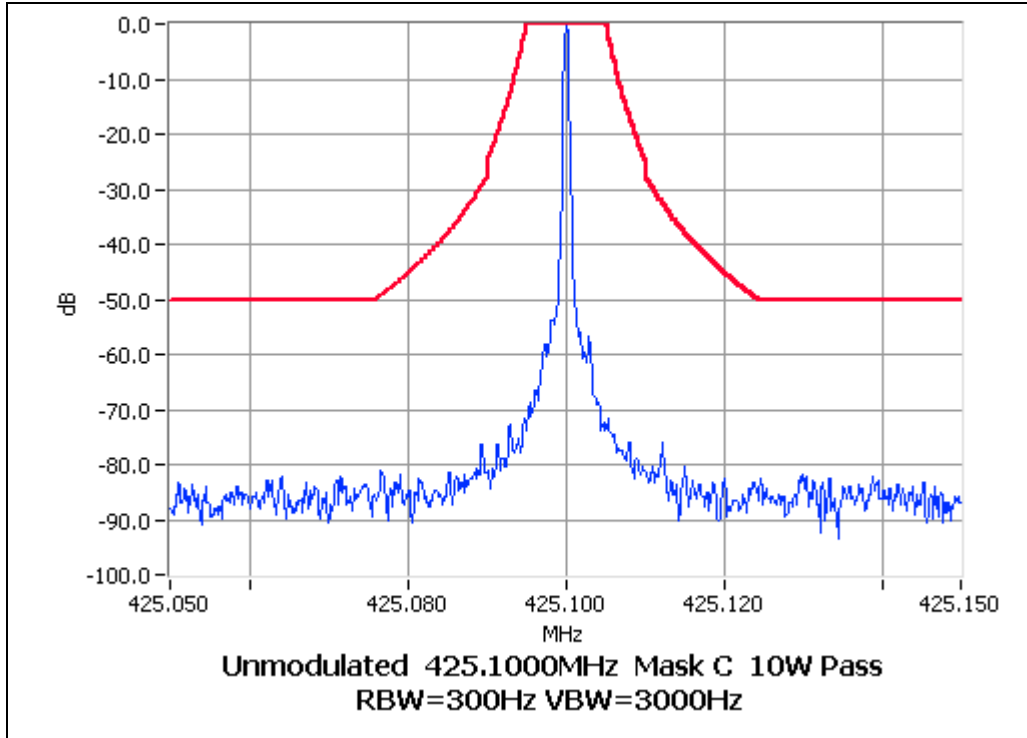
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NAME OF TEST: OCCUPIED BANDWIDTH DIGITAL - 4 Level FSK  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 40W 25.0 kHz Channel Spacing



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NAME OF TEST: OCCUPIED BANDWIDTH DIGITAL - 4 Level FSK  
SPECIFICATION: FCC CFR 2.1049 (c)  
Tx FREQUENCY: 425.1 MHz 10W 25.0 kHz Channel Spacing



**SPURIOUS EMISSIONS (CONDUCTED)**

SPECIFICATION: FCC 47 CFR 2.1051

GUIDE: TIA/EIA-603B 2.2.13

**MEASUREMENT PROCEDURE:**

1. Refer Appendix A for equipment set up.
2. The frequency range examined was from the lowest frequency generated within the EUT, to a frequency higher than the 10<sup>th</sup> Harmonic: 100kHz to Fc-BW  
Fc+BW to 4.5 GHz
3. 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.
4. Spurious emissions which were attenuated more than 20dB below the limit were not recorded.

**MEASUREMENT RESULTS:**

See the tables on the following pages.

LIMIT CLAUSE: FCC 47 CFR 90.210

SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: FCC CFR 2.1051

Tx FREQUENCY: 425.1 MHz

| 12.5 kHz Channel Spacing                                                  |             | 425.1 MHz @ 10 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:

| Carrier Output Power<br>Watts | Emission Mask D<br>12.5 kHz Channel Spacing<br>$50 + 10 \log_{10}(P_{\text{Watts}})$ |        |
|-------------------------------|--------------------------------------------------------------------------------------|--------|
| 10 W                          | -20 dBm                                                                              | 60 dBc |
| 40 W                          | -20 dBm                                                                              | 66 dBc |





SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC 47 CFR 2.1053

GUIDE: TIA/EIA-603B 2.2.12

MEASUREMENT PROCEDURE:

1. Refer Appendix A for equipment set up.
2. 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.
3. The turntable was rotated through 360° to obtain the maximum response of each spurious emission. Valid emissions were determined by switching the EUT on and off.
4. The EUT was 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





**TRANSMITTER FREQUENCY STABILITY (TEMPERATURE)**

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

GUIDE: TIA/EIA-603B 2.2.2

**MEASUREMENT PROCEDURE:**

1. Refer Appendix A for equipment set up.
2. The EUT was tested for frequency error from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  in  $10^{\circ}\text{C}$  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 & 25.0 kHz channel spacings.

LIMIT CLAUSE: FCC 47 CFR 90.213

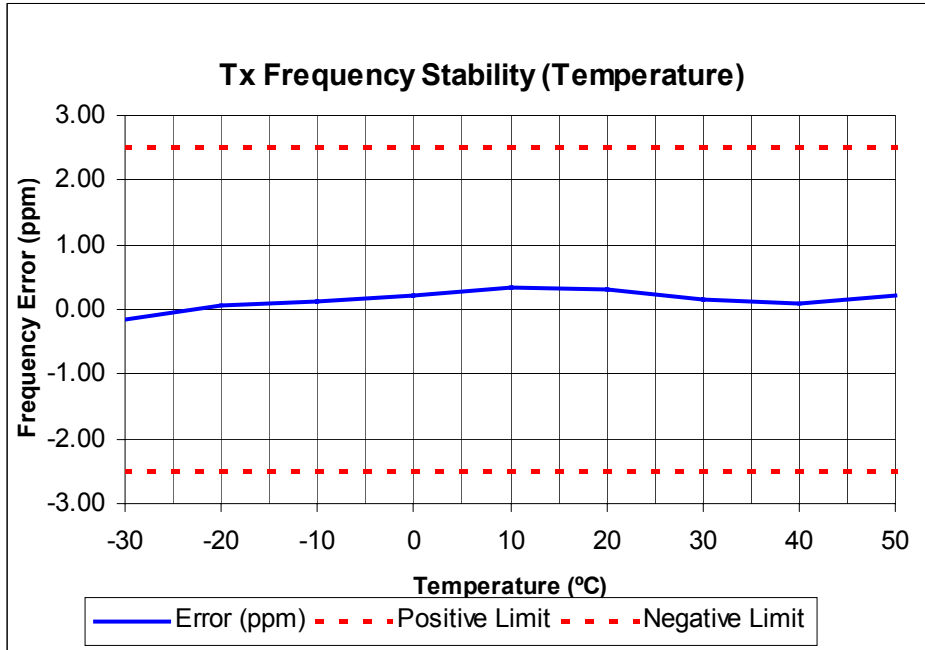
Frequency Range: 421 MHz to 512 MHz

| Channel Spacing (kHz) | Frequency Error (ppm) |
|-----------------------|-----------------------|
| 12.5                  | 2.5                   |
| 25.0                  | 5.0                   |

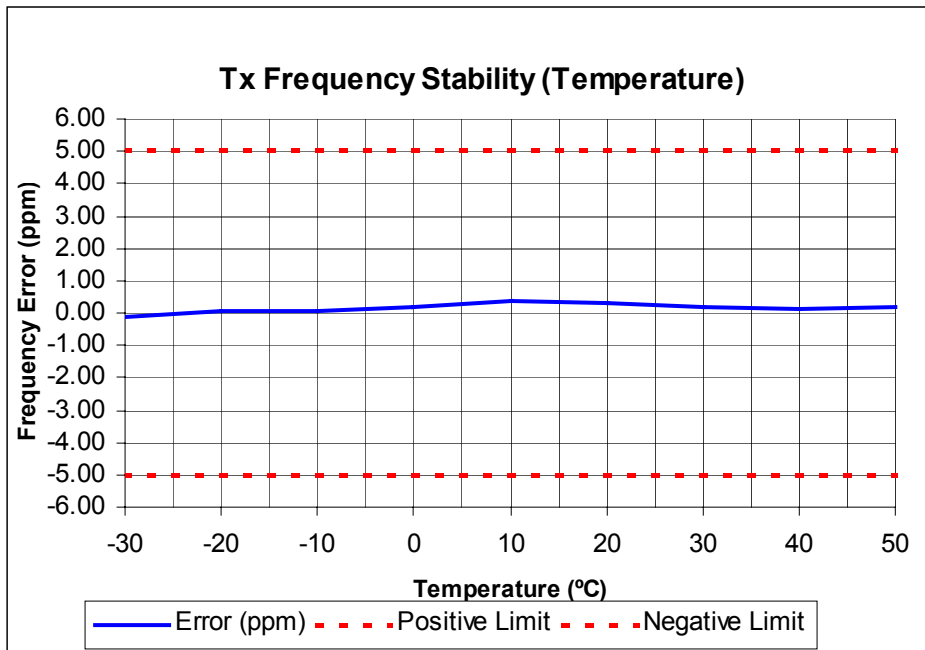
TRANSMITTER FREQUENCY STABILITY (TEMPERATURE)

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

Tx FREQUENCY: 425.1 MHz 40 W 12.5 kHz channel Spacing



Tx FREQUENCY: 425.1 MHz 40 W 25.0 kHz channel Spacing



**TRANSMITTER FREQUENCY STABILITY (VOLTAGE)**

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

GUIDE: TIA/EIA-603B 2.2.2

MEASUREMENT PROCEDURE:

1. Refer Appendix 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: 421 MHz to 512 MHz

| Channel Spacing (kHz) | FREQUENCY ERROR (ppm) @ 425.1 MHz |           |           |
|-----------------------|-----------------------------------|-----------|-----------|
|                       | 11.7 V DC                         | 13.8 V DC | 15.9 V DC |
| 12.5                  | 0.19                              | 0.19      | 0.18      |
| 25.0                  | 0.17                              | 0.14      | 0.18      |

LIMIT CLAUSE: FCC 47 CFR 90.213

| Channel Spacing (kHz) | Frequency Error (ppm) |
|-----------------------|-----------------------|
| 12.5                  | 2.5                   |
| 25.0                  | 5.0                   |

**TRANSIENT FREQUENCY BEHAVIOR**

SPECIFICATION: FCC 47 CFR 90.214

GUIDE: TIA/EIA-603B 2.2.19

**MEASUREMENT PROCEDURE:**

1. Refer Appendix 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 CLAUSE: FCC 47 CFR 90.214



TRANSIENT FREQUENCY BEHAVIOUR

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 425.1 MHz    40 W    12.5 kHz Channel Spacing

|                                           |                                    |               |
|-------------------------------------------|------------------------------------|---------------|
| FREQUENCY                                 | 425.1 MHz @ 40 W Tx                |               |
| TRANSIENT RESPONSE PERIOD                 | CARRIER PEAK VARIATION FROM NORMAL |               |
|                                           | Key ON (kHz)                       | Key OFF (kHz) |
| $t_1$                                     | 3.7                                | N/A           |
| $t_2$                                     | 0.6                                | N/A           |
| $t_3$                                     | N/A                                | 0.5           |
| $t_2 \rightarrow t_3$ ppm                 | 1.4                                |               |
| ERROR LIMIT ( $t_2 \rightarrow t_3$ ) ppm | 2.5                                |               |

|                                                                                                                           |     |    |
|---------------------------------------------------------------------------------------------------------------------------|-----|----|
| Confirm that during periods $t_1$ and $t_3$ the frequency difference does not exceed the value of one channel separation. | YES | NO |
|                                                                                                                           | Y   |    |
| Confirm that during the period $t_2$ the frequency difference does not exceed half a channel separation.                  | YES | NO |
|                                                                                                                           | Y   |    |
| Confirm that during the period $t_2$ to $t_3$ the frequency difference does not exceed the frequency error limit.         | YES | NO |
|                                                                                                                           | Y   |    |

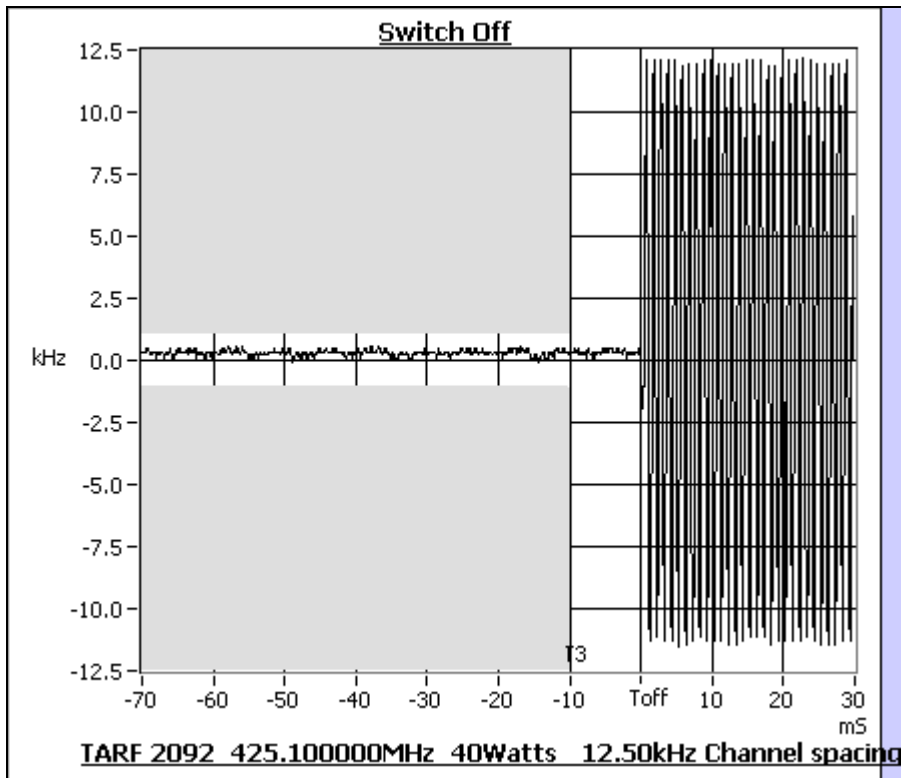
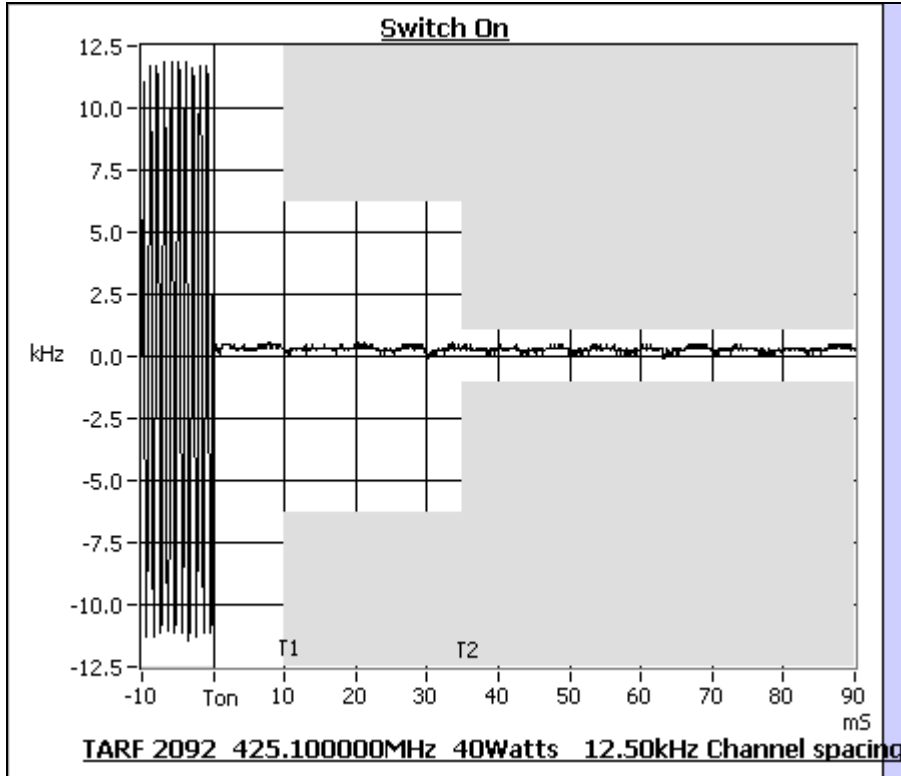
LIMIT:

| TRANSIENT PERIODS | FREQUENCY RANGE<br>150MHz – 174 MHz | FREQUENCY RANGE<br>421MHz – 512 MHz |
|-------------------|-------------------------------------|-------------------------------------|
| $t_1$ (ms)        | 5 ms                                | 10 ms                               |
| $t_2$ (ms)        | 20 ms                               | 25 ms                               |
| $t_3$ (ms)        | 5 ms                                | 10 ms                               |

TRANSIENT FREQUENCY BEHAVIOUR

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 425.1 MHz 40 W 12.5 kHz Channel Spacing



TRANSIENT FREQUENCY BEHAVIOUR

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 425.1 MHz    40 W    25.0 kHz Channel Spacing

|                                           |                                    |               |
|-------------------------------------------|------------------------------------|---------------|
| FREQUENCY                                 | 425.1 MHz @ 40 W Tx                |               |
| TRANSIENT RESPONSE PERIOD                 | CARRIER PEAK VARIATION FROM NORMAL |               |
|                                           | Key ON (kHz)                       | Key OFF (kHz) |
| $t_1$                                     | -1.0                               | N/A           |
| $t_2$                                     | 0.5                                | N/A           |
| $t_3$                                     | N/A                                | 0.5           |
| $t_2 \rightarrow t_3$ ppm                 | 1.1                                |               |
| ERROR LIMIT ( $t_2 \rightarrow t_3$ ) ppm | 5.0                                |               |

|                                                                                                                           |     |    |
|---------------------------------------------------------------------------------------------------------------------------|-----|----|
| Confirm that during periods $t_1$ and $t_3$ the frequency difference does not exceed the value of one channel separation. | YES | NO |
|                                                                                                                           | Y   |    |
| Confirm that during the period $t_2$ the frequency difference does not exceed half a channel separation.                  | YES | NO |
|                                                                                                                           | Y   |    |
| Confirm that during the period $t_2$ to $t_3$ the frequency difference does not exceed the frequency error limit.         | YES | NO |
|                                                                                                                           | Y   |    |

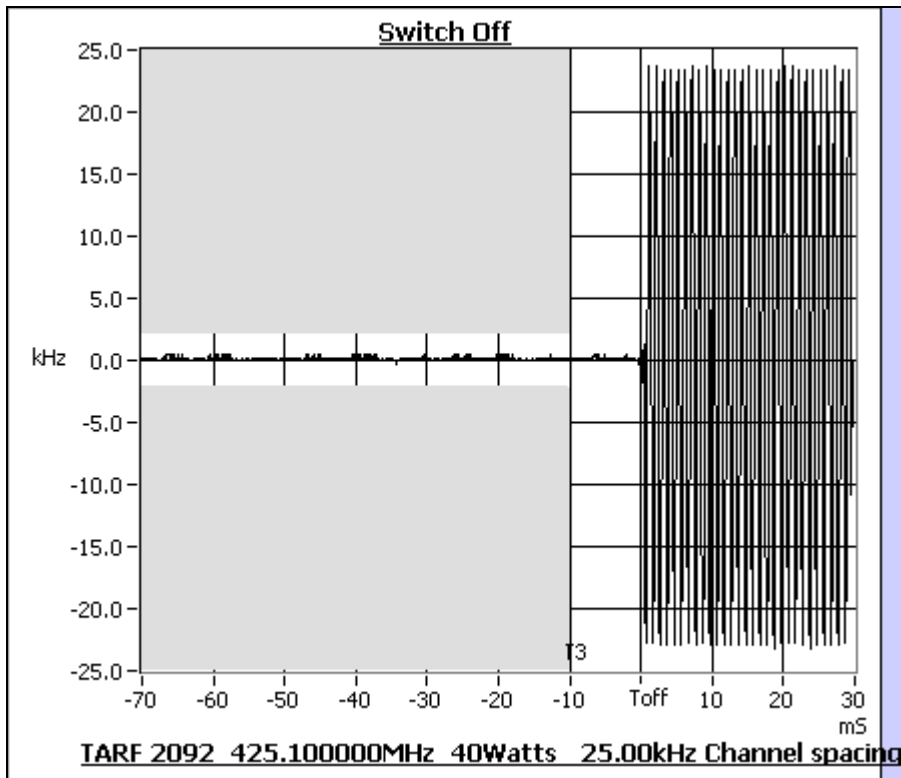
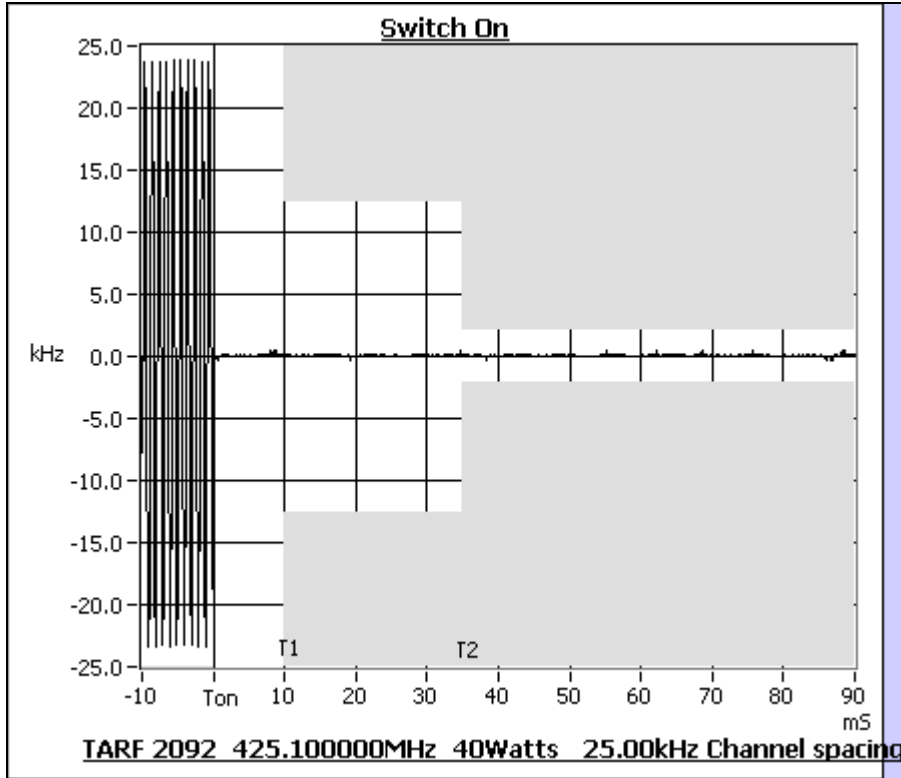
LIMIT:

| TRANSIENT PERIODS | FREQUENCY RANGE<br>150MHz – 174 MHz | FREQUENCY RANGE<br>421MHz – 512 MHz |
|-------------------|-------------------------------------|-------------------------------------|
| $t_1$ (ms)        | 5 ms                                | 10 ms                               |
| $t_2$ (ms)        | 20 ms                               | 25 ms                               |
| $t_3$ (ms)        | 5 ms                                | 10 ms                               |

TRANSIENT FREQUENCY BEHAVIOUR

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 425.1 MHz 40 W 25.0 kHz Channel Spacing



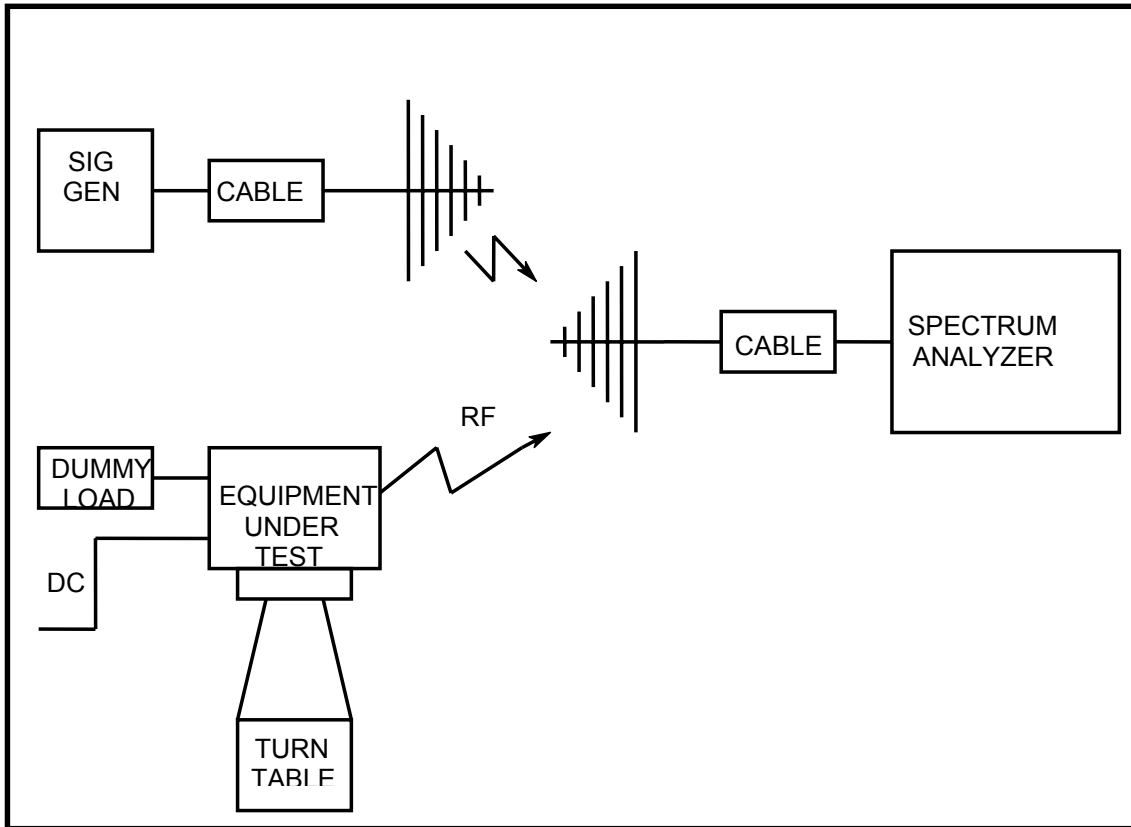
## TEST EQUIPMENT USED

| No# | Equipment                | Manufacturer    | Model No               | Serial No# | Tait ID | Cal Due   |
|-----|--------------------------|-----------------|------------------------|------------|---------|-----------|
| 2   | Signal Generator         | Hewlett Packard | HP8648A                | 3430U00344 | E3579   | 15-Oct-04 |
| 5   | Signal Generator         | Rohde & Schwarz | SMY01 1062.5502.11     | 841736/019 | E3553   | 29-Oct-04 |
| 14  | Power Head               | Hewlett Packard | HP11722A               | 2320A00688 | E3307   | 15-Oct-04 |
| 21  | Power Supply             | Rohde & Schwarz | NGS M32/10 192.0810.31 | Fnr 434    | E3556   | 14-Jun-05 |
| 22  | Oscilloscope             | Tektronics      | TDS340                 | B013611    | E3585   | 25-Nov-04 |
| 42  | Reference Horn Antenna   | Emco            | DRG3115                | 9512-4638  | E3560   | 27-Sep-06 |
| 43  | Horn Antenna             | Emco            | DRG3115                |            | E3076   | 27-Sep-06 |
| 60  | RF Attenuator 250W       | Weinschel       | 45-30-34               | JW663      | E3386   | 09-Aug-05 |
| 62  | RF Attenuator 150W       | Weinschel       | 57-10-34               | LB590      | E3674   | 20-Jul-05 |
| 65  | RF Attenuator 50W        | Weinschel       | 24-20-44               | AW1266     | E3562   | 28-Jun-05 |
| 82  | 3m Coax Cable (BLUE)     | Suhner          | Sucoflex 104A          | 25033/4A   | E3694   | 30-Oct-04 |
| 83  | 1m Coax Cable (BLUE)     | Suhner          | Sucoflex 104A          | 25006/4A   | E3693   | 30-Oct-04 |
| 84  | 1m Coax Cable (BLUE)     | Suhner          | Sucoflex 104A          | 25005/4A   | E3692   | 15-Jul-05 |
| 85  | 1m Coax Cable (BLUE)     | Suhner          | Sucoflex 104A          | 25004/4A   | E3691   | 15-Jul-05 |
| 86  | 1m Coax Cable (BLUE)     | Suhner          | Sucoflex 104A          | 25003/4A   | E3690   | 13-Aug-05 |
| 87  | Audio Analyser           | Hewlett Packard | HP8903B                | 2818A04275 | E3710   | 25-Nov-04 |
| 111 | Modulation Analyser      | Hewlett Packard | HP8901B (Opt 002)      | 3704A05837 | E3786   | 15-Oct-04 |
| 114 | Signal Generator         | Rohde & Schwarz | SML03 1090.3000.13     |            | E4050   | 28-Nov-04 |
| 117 | RF Attenuator            | Weinschel       | Model 1                | BL9950     | E4080   | 17-May-05 |
| 119 | RF Attenuator 150W Treva | Weinschel       | 40-20-23               | MF817      | E4082   | 17-May-05 |
| 121 | RF Splitter Combiner     | Minicircuits    | ZFSC-4-1               | -          | E4084   | 17-May-05 |
| 123 | Spectrum Analyser        | Agilent         | E4445A                 | MY42510072 | E4139   | 23-Apr-05 |
| 135 | Attenuator               | Weinschel       | 67-30-33               | BR0531     |         | 09-Aug-05 |

## APPENDIX A

### TEST SETUP DETAILS

Test set up for Spurious Emissions (Radiated)



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.

