Laboratory Test Report

For the

TBAK2 Base Station Transceiver

Tested In accordance with

FCC 47 CFR Parts 22, 90S and 90R

Report Revision: 2
Issue Date: 10-Oct-2005
FCC ID: CASTBA9K2

PREPARED BY: Marcus Ludwig _____
Test Technician

CHECKED & APPROVED BY: Hamish Newton _____
Senior Technician

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

TABLE OF CONTENTS

REVISION HISTORY

Date	Revision	Comments
10-Oct-2005	1	Initial test report
13-Oct –2005	2	Removed encryption emissions designators, as the TBAK2 does not comply with FCC 47 CFR 90.553 (a).

INTRODUCTION

Type approval testing of the TBAK2 base station transceiver 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: Base Station Transceiver
Type: TBAK2

The TBAK2 is a modular base station transceiver consisting of:

Module	Product Designation Code	Serial Number	Description
Reciter	TBA40K4-PA00	18005777	Transmit 764 – 776 MHz 850 – 870 MHz Receive 794 – 824 MHz
Power Amplifier	TBA90K2-0000	18005342	10 – 100 Watts in 1 Watt steps
Power Management Unit	TBA30A4-4400	18005551	Input 88 – 264 Vac 45 – 65 Hz or 40 – 60 Vdc Output: 28 Vdc
User Interface	TBA2020	18005533	

STATEMENT OF COMPLIANCE

The TBAK2 Base Station transceiver as tested in this report was found to conform to the following standards:

FCC CFR 47 Parts 22, 90S & 90R

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	120 Vac

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.

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

1. Analogue Voice

12.5kHz Bandwidth

Necessary bandwidth
M = 3 Khz
D = 2.5 kHz
Bn = 6 + 5 x 1
= 11kHz

Emission Designator
11K0F3E
F3E represents a FM voice transmission

25kHz Bandwidth

Necessary bandwidth
M = 3 kHz
D = 5 kHz
Bn = 6 + 10 x 1
= 16 kHz

Emission Designator
16K0F3E
F3E represents a FM voice transmission

2. Digital Voice /Data (C4FM 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

12.5kHz Bandwidth	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 **8K10F1D** F1D represents a digital FM data transmission **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:

12.5 kHz Channel Spacing:
Manufacturer's Rated Output Power: Switchable: between 100 W and 10 W

Frequency	100 W nominal
766.9 MHz	99.0
Variation from Nominal (%)	-1.0
853.9 MHz	97.5
Variation from Nominal (%)	-2.5
Measurement Uncertainty (dB)	+0.63 -0.68

25 kHz Channel Spacing:
Manufacturer's Rated Output Power: Switchable: between 100 W and 10 W

Frequency	100 W nominal
853.9 MHz	97.7
Variation from Nominal (%)	-2.3
Measurement Uncertainty (dB)	+0.63 -0.68

LIMIT CLAUSE: FCC 47 CFR 90.541(c) 764 – 776 MHz
FCC 47 CFR 90.635 851 – 869 MHz

FCC 47 CFR 90.205 (r) 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.

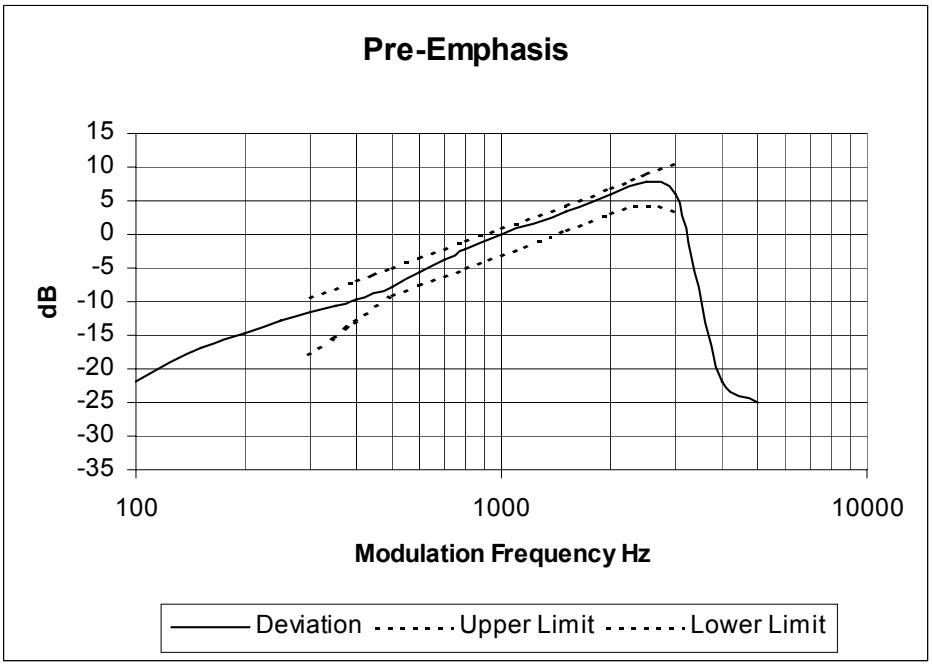
MEASUREMENT RESULTS:
See the plots on the following pages.
.

LIMIT CLAUSE: TIA/EIA-603C 3.2.6

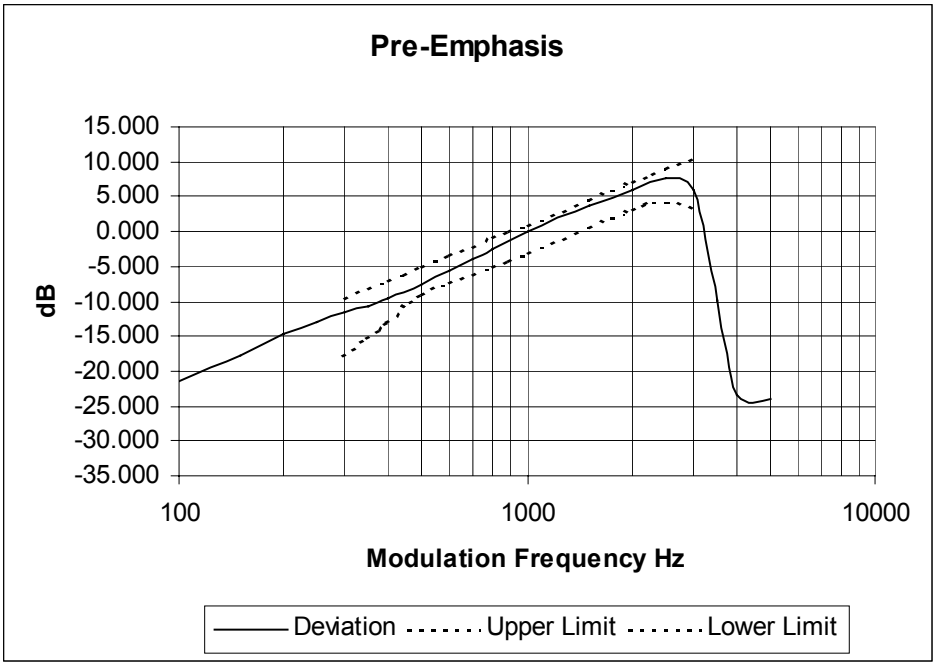
TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS

SPECIFICATION: FCC CFR 2.1047 (a)

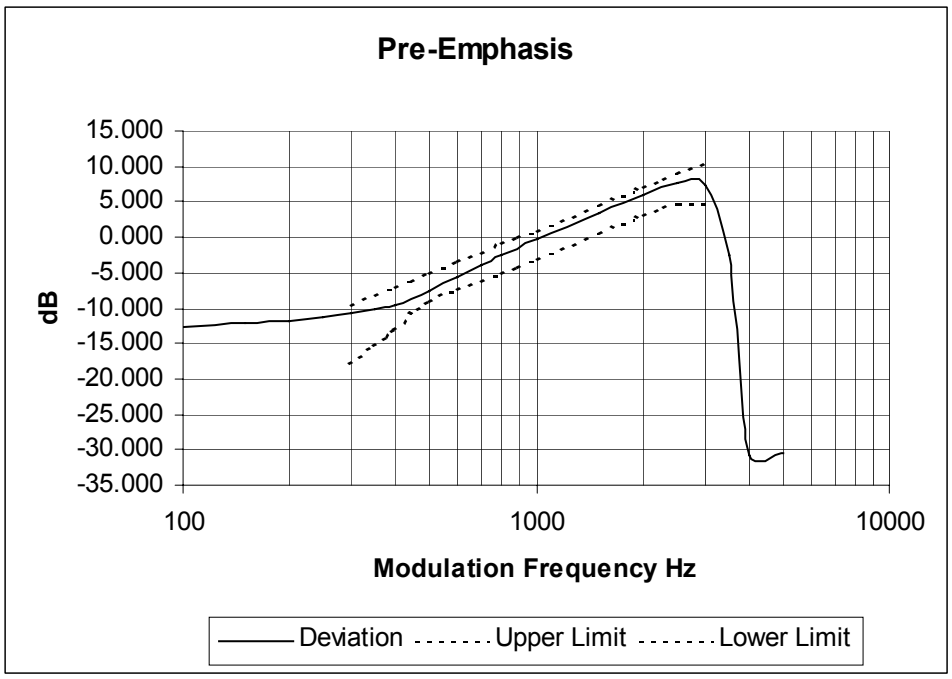
Tx FREQUENCY: 766.9 MHz 12.5 kHz Channel Spacing



Tx FREQUENCY: 853.9 MHz 12.5 kHz Channel Spacing



Tx FREQUENCY: 853.9 MHz 25 kHz Channel Spacing



TRANSMITTER MODULATION LIMITING

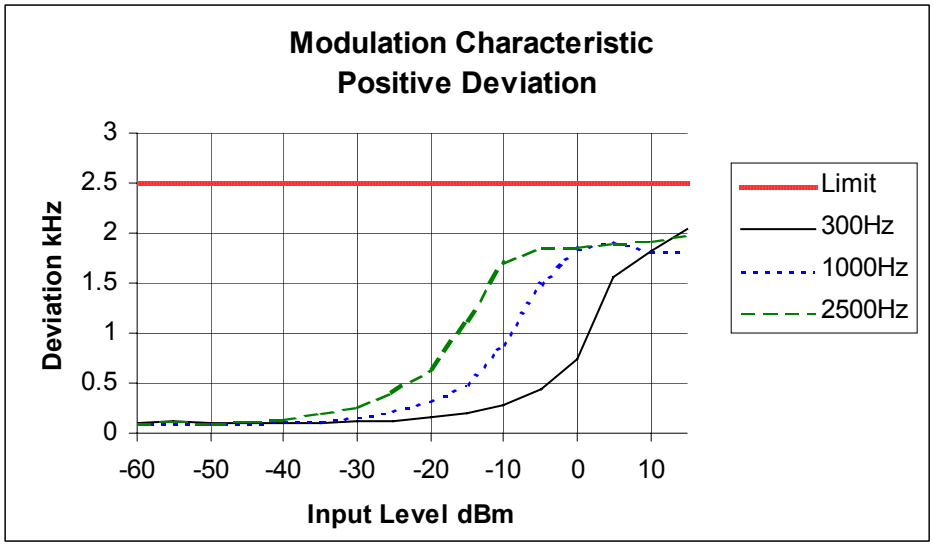
SPECIFICATION: FCC 47 CFR 2.1047 (b)

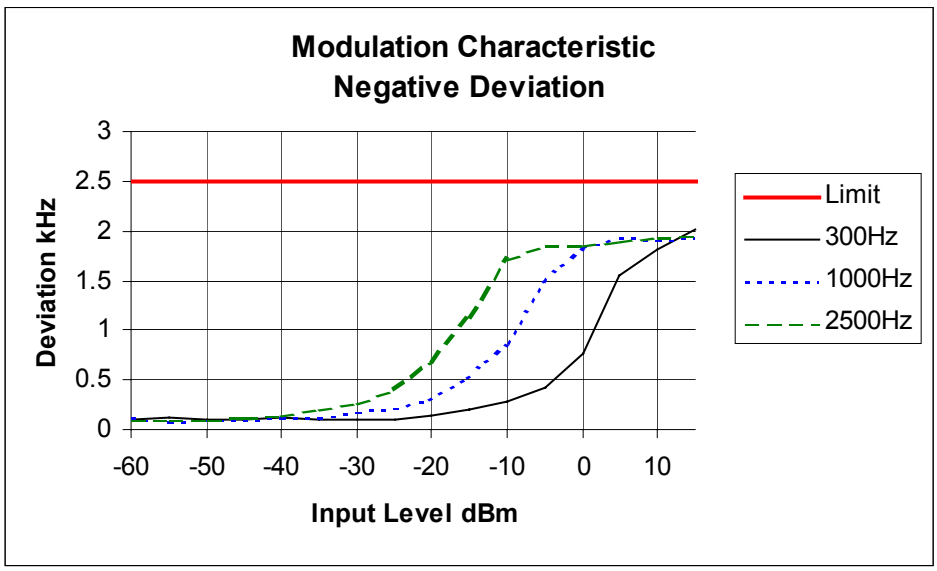
MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment set up.
2. The modulation response was measured at three audio frequencies while varying the input level.
3. Measurements were made for both Positive and Negative Deviation.

MEASUREMENT RESULTS:
See the plots on the following pages.

LIMIT CLAUSE: TIA/EIA-603C 1.3.4.4

Tx FREQUENCY: 766.9 MHz 12.5 kHz Channel Spacing

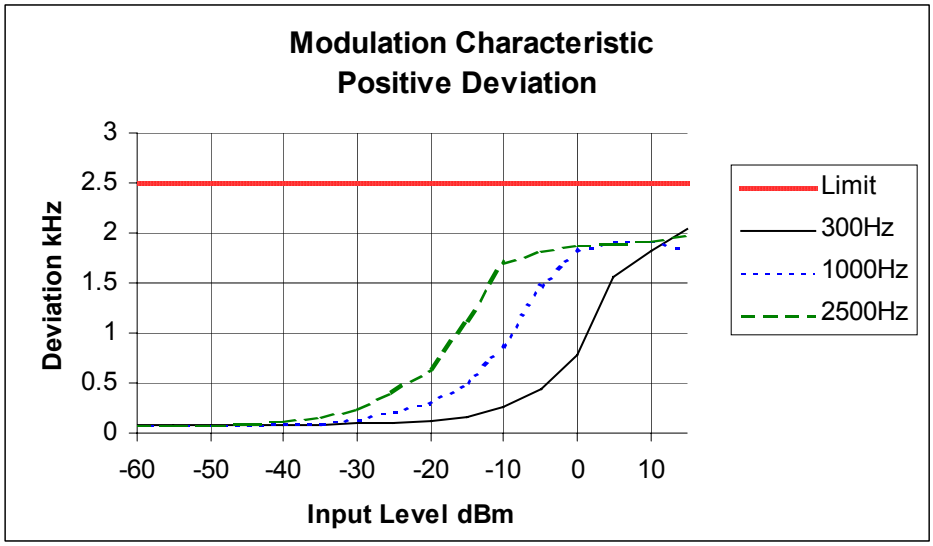


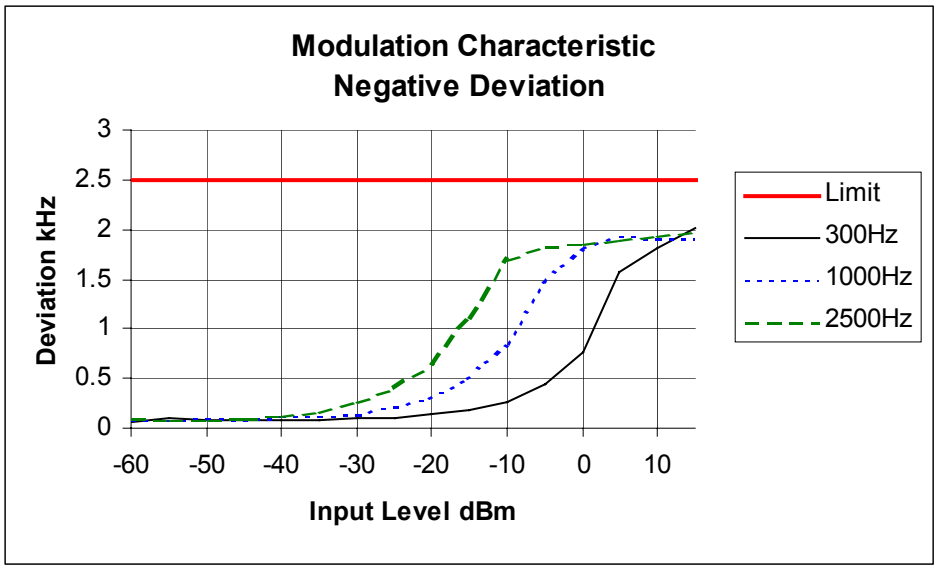


TRANSMITTER MODULATION LIMITING

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 853.9 MHz 12.5 kHz Channel Spacing

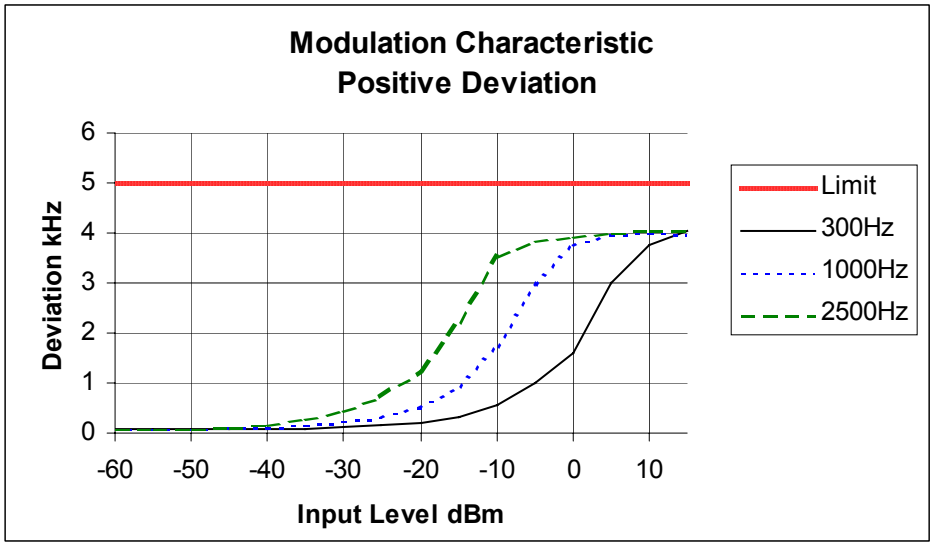


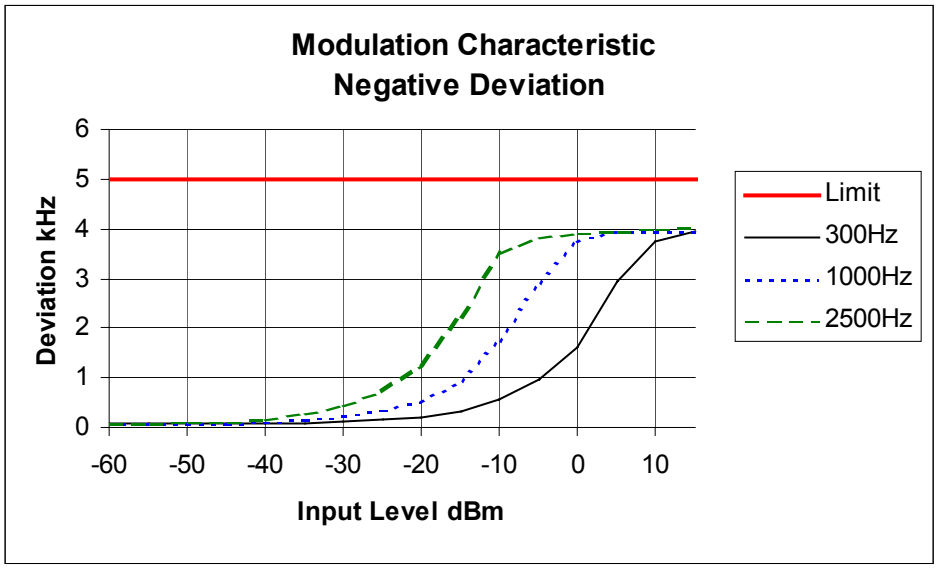


TRANSMITTER MODULATION LIMITING

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 853.9 MHz 25 kHz Channel Spacing





OCCUPIED BANDWIDTH

SPECIFICATION: FCC 47 CFR 2.1049 (c)

GUIDE: TIA/EIA-603C 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 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 – 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	Analogue; Digital Voice/Data
Emission Mask B	25.0 kHz Channel Spacing	Analogue

DATA SPEED

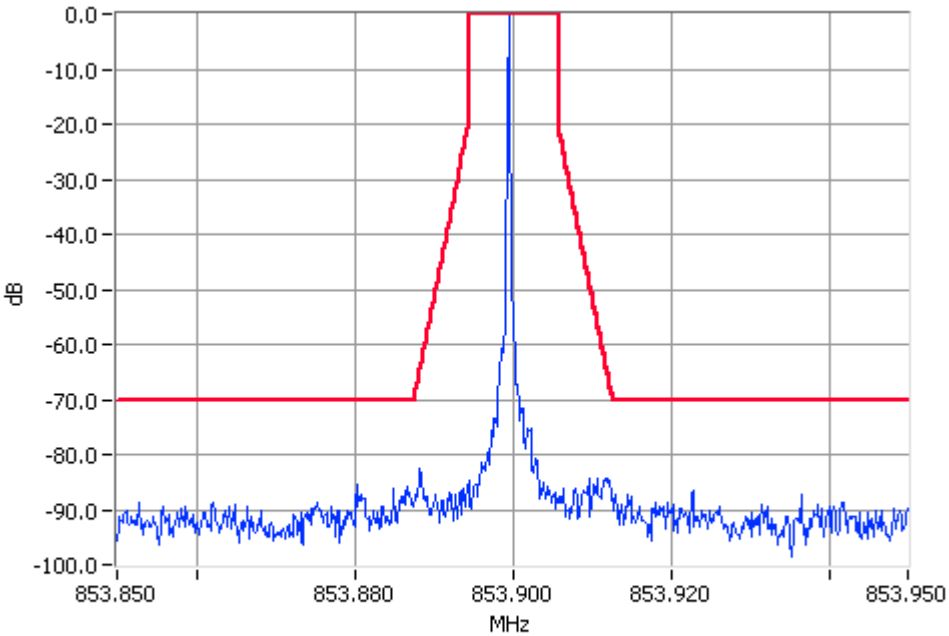
Digital Voice/Data	9600 bps	12.5 kHz Channel Spacing
Digital Voice/Data	9600 bps	25.0 kHz Channel Spacing

OCCUPIED BANDWIDTH

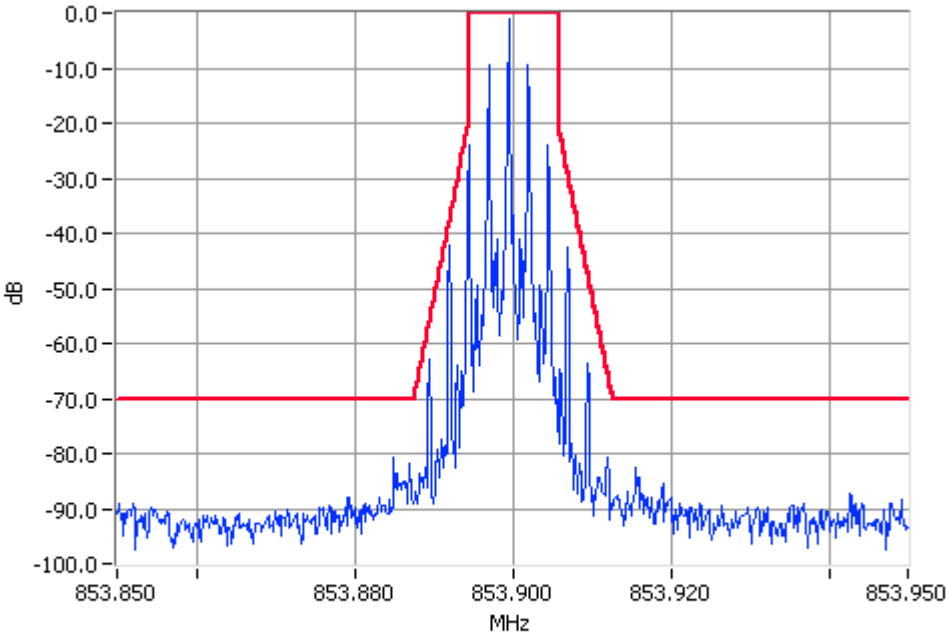
ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 853.9 MHz 100W 12.5 kHz Channel Spacing



Unmodulated 853.9000MHz Mask D 100W Pass
RBW=100Hz VBW=1000Hz



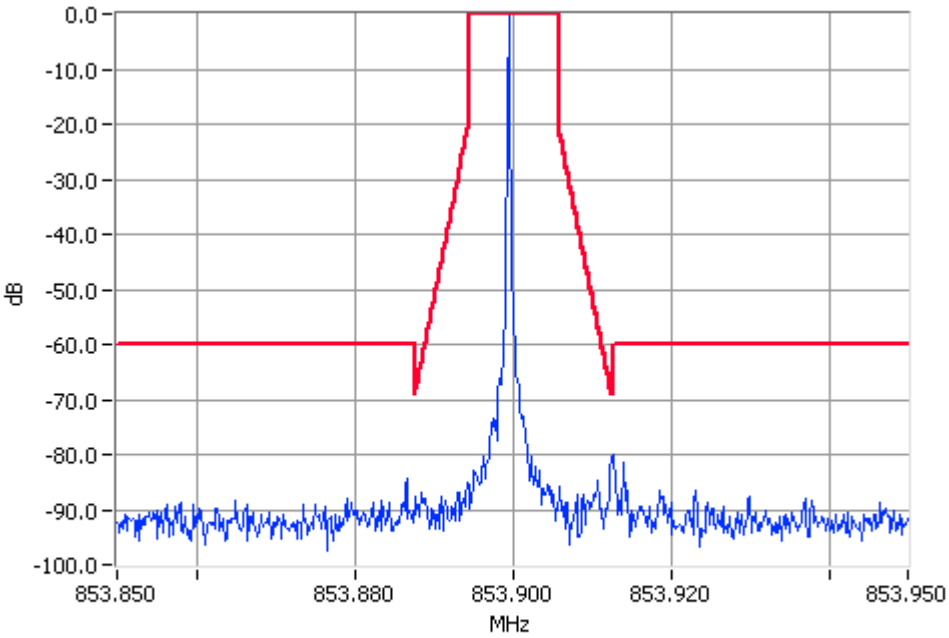
Analogue Modulation 853.9000MHz Mask D 100W Pass
RBW=100Hz VBW=1000Hz

OCCUPIED BANDWIDTH

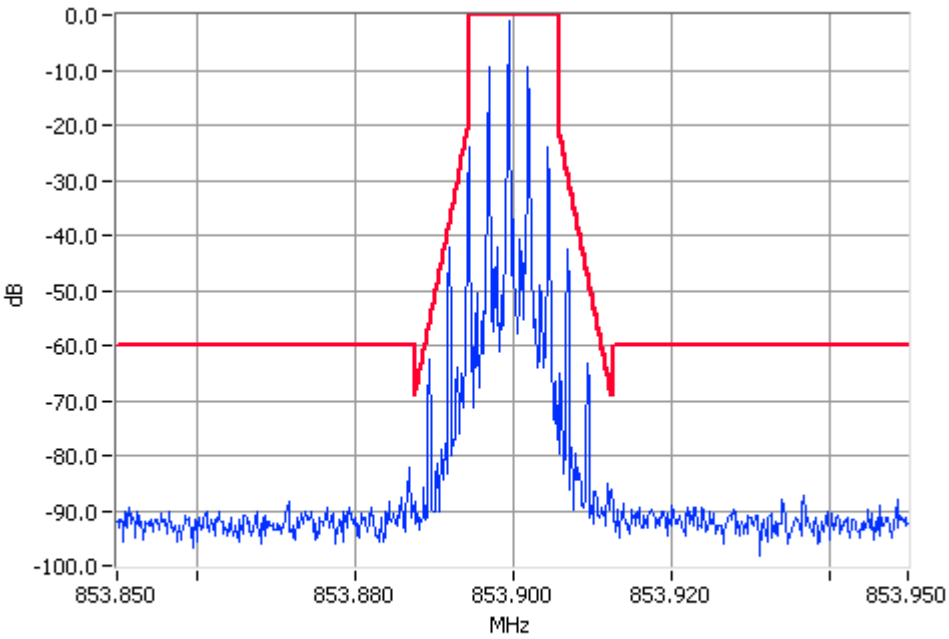
ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 853.9 MHz 10W 12.5 kHz Channel Spacing



Unmodulated 853.9000MHz Mask D 10W Pass
RBW=100Hz VBW=1000Hz



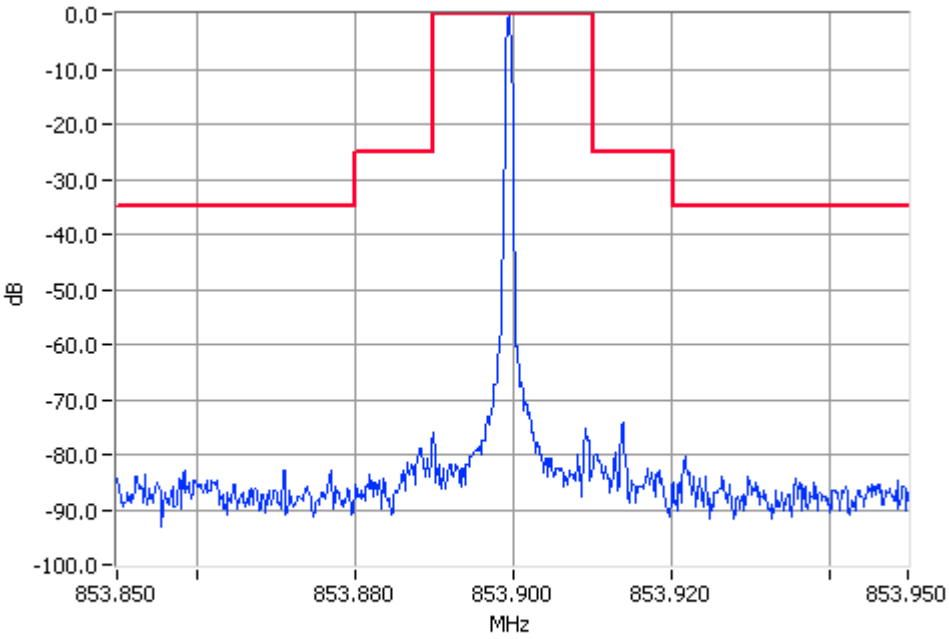
Analogue Modulation 853.9000MHz Mask D 10W Pass
RBW=100Hz VBW=1000Hz

OCCUPIED BANDWIDTH

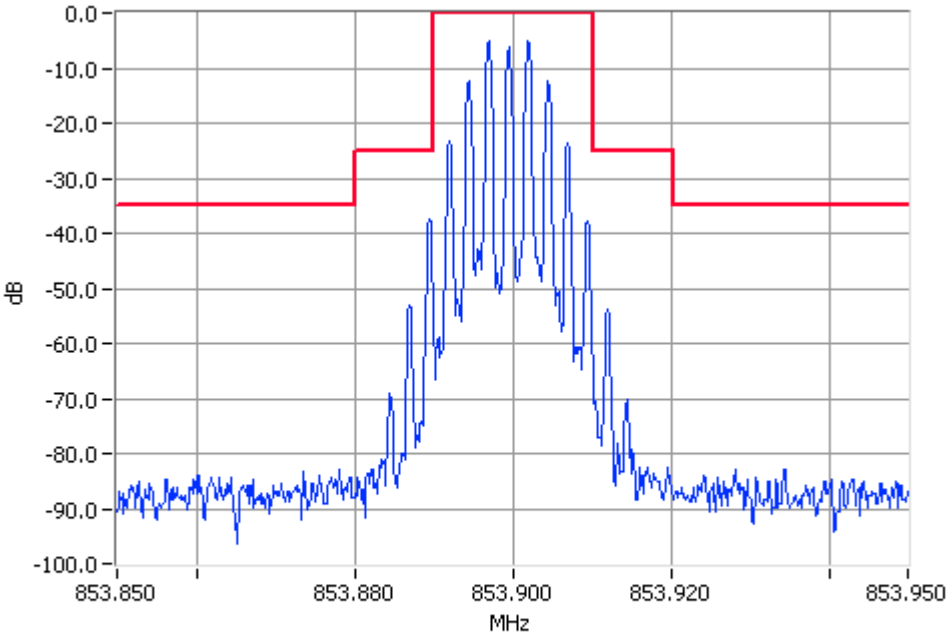
ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 853.9 MHz 100W 25 kHz Channel Spacing



Unmodulated 853.9000MHz Mask B 100W Pass
RBW=300Hz VBW=3000Hz



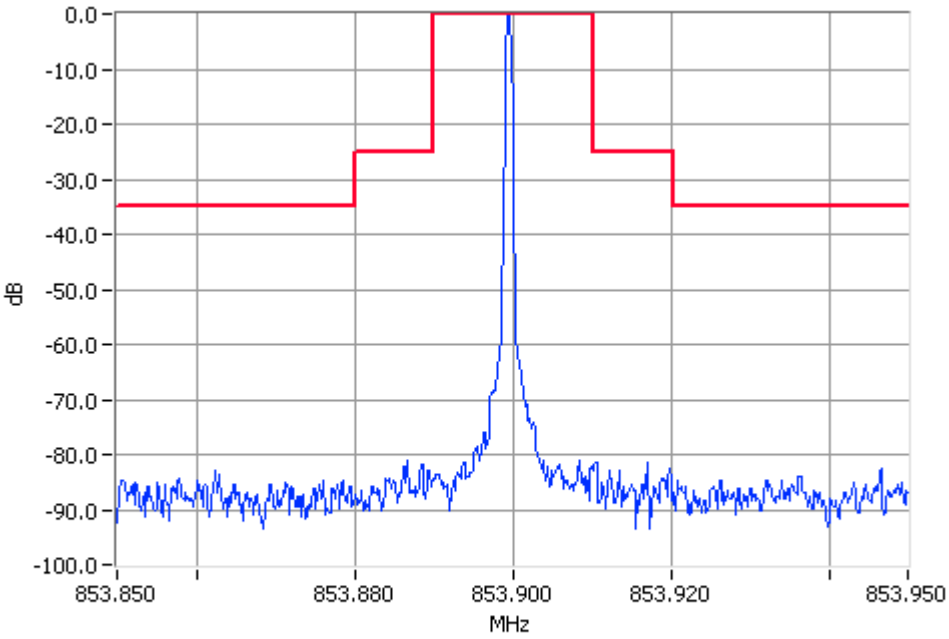
Analogue Modulation 853.9000MHz Mask B 100W Pass
RBW=300Hz VBW=3000Hz

OCCUPIED BANDWIDTH

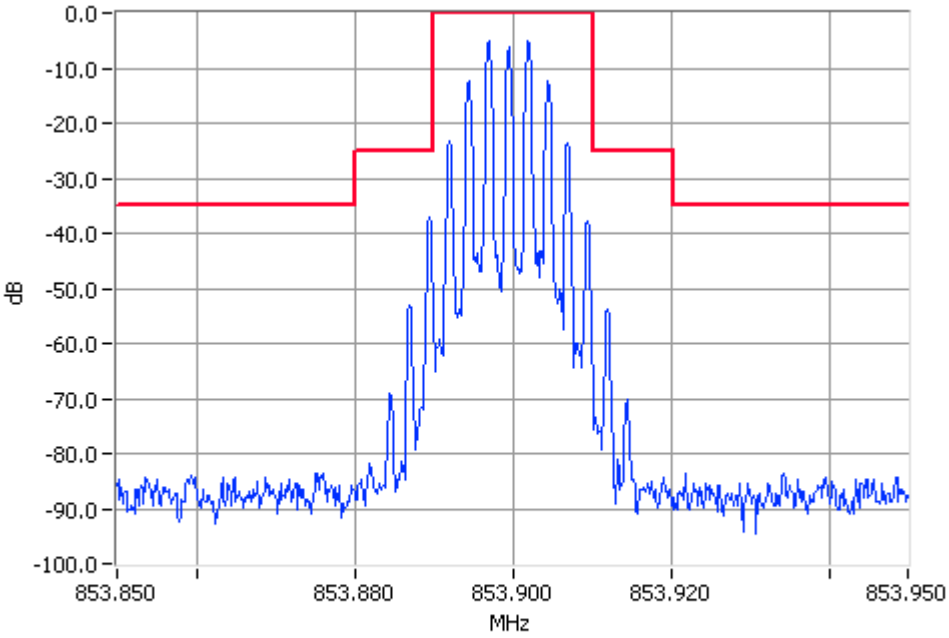
ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 853.9 MHz 10W 25 kHz Channel Spacing



Unmodulated 853.9000MHz Mask B 10W Pass
RBW=300Hz VBW=3000Hz



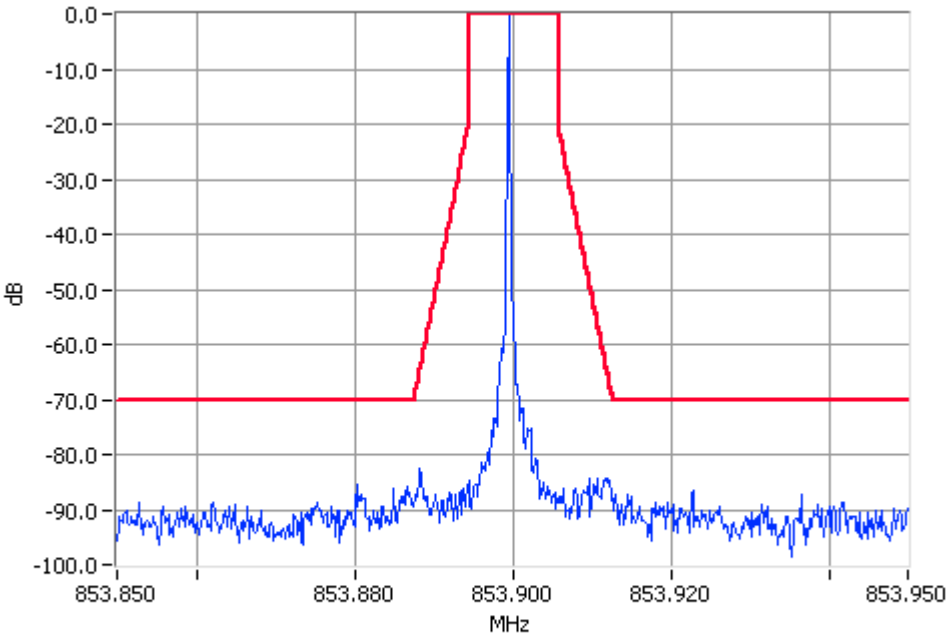
Analogue Modulation 853.9000MHz Mask B 10W Pass
RBW=300Hz VBW=3000Hz

OCCUPIED BANDWIDTH

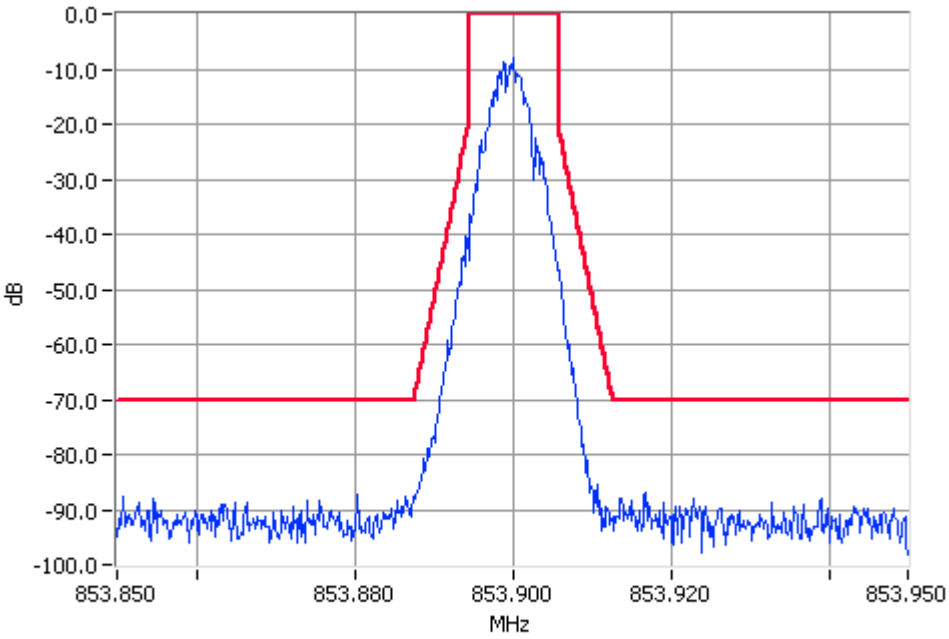
DIGITAL – (4 Level FSK)

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 853.9 MHz 100W 12.5 kHz Channel Spacing



Unmodulated 853.9000MHz Mask D 100W Pass
RBW=100Hz VBW=1000Hz



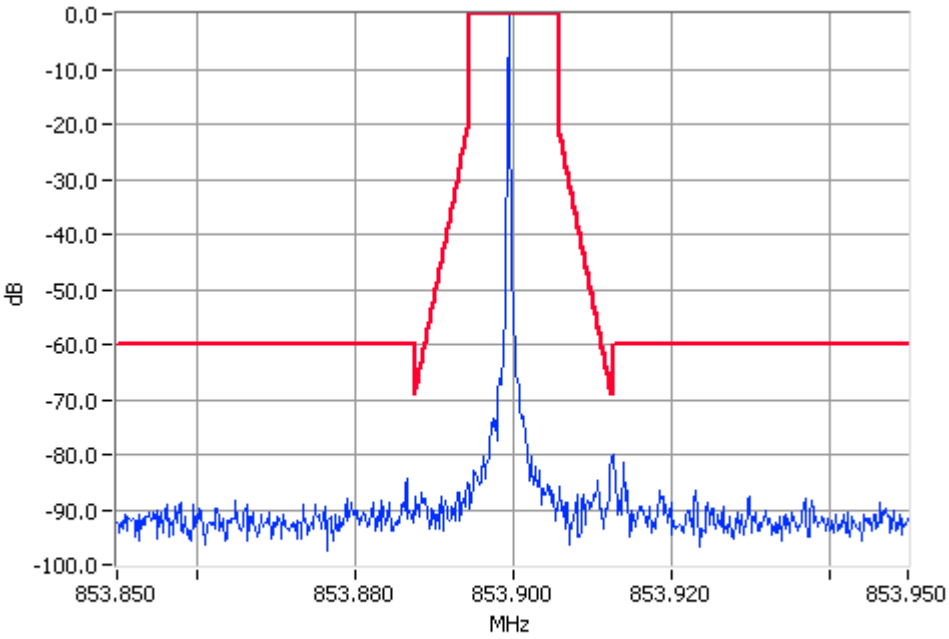
Digital Modulation 853.9000MHz Mask D 100W Pass
RBW=100Hz VBW=1000Hz

OCCUPIED BANDWIDTH

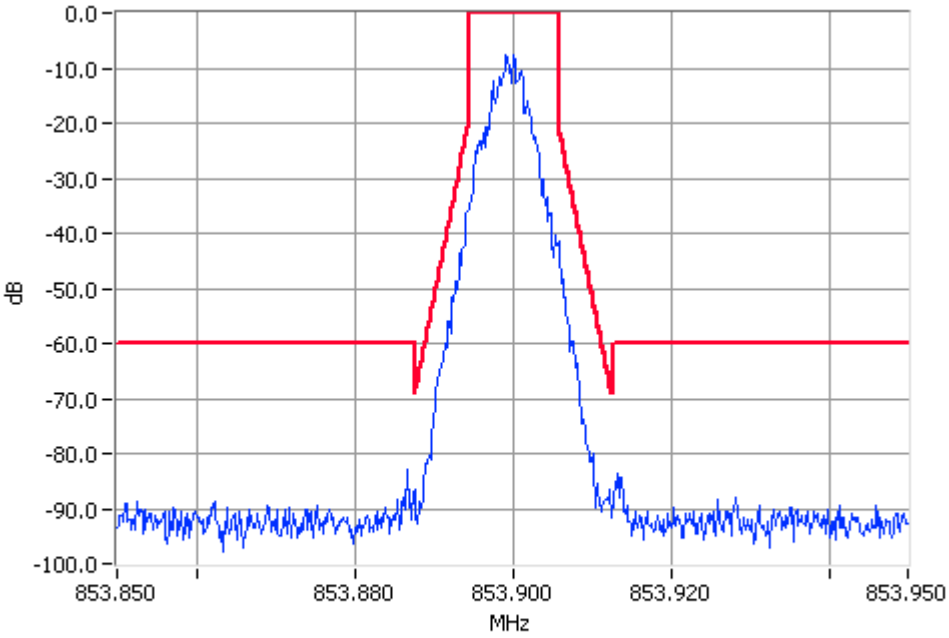
DIGITAL – (4 Level FSK)

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 853.9 MHz 10W 12.5 kHz Channel Spacing



Unmodulated 853.9000MHz Mask D 10W Pass
RBW=100Hz VBW=1000Hz



Digital Modulation 853.9000MHz Mask D 10W Pass
RBW=100Hz VBW=1000Hz

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 modulating signal.
3. The test is performed in accordance with 47 CFR 90.543

LIMIT CLAUSE: FCC 47 CFR 90.543

MEASUREMENT RESULTS:

ANALOGUE VOICE

Tx FREQUENCY: 766.9 MHz 100 W 12.5 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP (dBc)
9.375 kHz	6.25 kHz	-42.18	-42.74	-40
15.625 kHz	6.25 kHz	-74.12	-73.49	-60
21.875 kHz	6.25 kHz	75.68	-75.64	-60
37.5 kHz	25 kHz	-71.02	-71.14	-60
62.5 kHz	25 kHz	-74.39	-74.43	-65
87.5 kHz	25 kHz	-77.81	-77.81	-65
150 kHz	100 kHz	-76.60	-76.80	-65
250 kHz	100 kHz	-82.59	-82.62	-65
350 kHz	100 kHz	-86.01	-86.18	-65
>400 kHz to 12 MHz	30 kHz (swept)	< -80		-80
12 MHz to paired receive band	30 kHz (swept)	< -80		-80
In the paired receive band	30 kHz (swept)	< -100		-100

Tx FREQUENCY: 766.9 MHz 10 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	-42.21	-42.76	-40
15.625 kHz	6.25 kHz	-73.61	-74.13	-60
21.875 kHz	6.25 kHz	-75.62	-75.25	-60
37.5 kHz	25 kHz	-70.87	-71.05	-60
62.5 kHz	25 kHz	-74.46	-74.24	-65
87.5 kHz	25 kHz	-77.68	-77.97	-65
150 kHz	100 kHz	-76.34	-76.49	-65
250 kHz	100 kHz	-82.37	-82.19	-65
350 kHz	100 kHz	-85.90	-86.00	-65
>400 kHz to 12 MHz	30 kHz (swept)	< -80		-80
12 MHz to paired receive band	30 kHz (swept)	< -80		-80
In the paired receive band	30 kHz (swept)	< -100		-100

ADJACENT CHANNEL POWER

SPECIFICATION: FCC 47 CFR 90.543

ANALOGUE VOICE

Tx FREQUENCY: 766.9 MHz 100 W 25 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP (dBc)
15.625 kHz	6.25 kHz	-52.96	-69.45	-40
21.875 kHz	6.25 kHz	-75.77	-75.53	-60
37.5 kHz	25 kHz	-71.06	-71.47	-60
62.5 kHz	25 kHz	-74.13	-74.62	-65
87.5 kHz	25 kHz	-77.54	-77.86	-65
150 kHz	100 kHz	-76.49	-76.54	-65
250 kHz	100 kHz	-82.54	-82.63	-65
350 kHz	100 kHz	-86.34	-86.17	-65
>400 kHz to 12 MHz	30 kHz (swept)	< -80		-80
12 MHz to paired receive band	30 kHz (swept)	< -80		-80
In the paired receive band	30 kHz (swept)	< -100		-100

Tx FREQUENCY: 766.9 MHz 10 W 25 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP (dBc)
15.625 kHz	6.25 kHz	-52.94	-68.45	-40
21.875 kHz	6.25 kHz	-75.44	-75.19	-60
37.5 kHz	25 kHz	-70.76	-71.01	-60
62.5 kHz	25 kHz	-74.21	-74.34	-65
87.5 kHz	25 kHz	-77.80	-77.82	-65
150 kHz	100 kHz	-76.08	-76.30	-65
250 kHz	100 kHz	-81.67	-81.83	-65
350 kHz	100 kHz	-84.83	-84.87	-65
>400 kHz to 12 MHz	30 kHz (swept)	< -80		-80
12 MHz to paired receive band	30 kHz (swept)	< -80		-80
In the paired receive band	30 kHz (swept)	< -100		-100

ADJACENT CHANNEL POWER

SPECIFICATION: FCC 47 CFR 90.543

DIGITAL – (4 Level FSK)

Tx FREQUENCY: 766.9 MHz 100 W 12.5 kHz Channel Spacing

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP (dBc)
9.375 kHz	6.25 kHz	-40.73	-49.20	-40
15.625 kHz	6.25 kHz	-73.91	-73.54	-60
21.875 kHz	6.25 kHz	-75.31	-75.78	-60
37.5 kHz	25 kHz	-71.04	-71.21	-60
62.5 kHz	25 kHz	-74.43	-74.50	-65
87.5 kHz	25 kHz	-77.53	-77.91	-65
150 kHz	100 kHz	-76.54	-76.52	-65
250 kHz	100 kHz	-82.50	-82.59	-65
350 kHz	100 kHz	-86.05	-86.02	-65
>400 kHz to 12 MHz	30 kHz (swept)	< -80		-80
12 MHz to paired receive band	30 kHz (swept)	< -80		-80
In the paired receive band	30 kHz (swept)	< -100		-100

Tx FREQUENCY: 766.9 MHz 10 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	-40.49	-48.22	-40
15.625 kHz	6.25 kHz	-73.46	-74.27	-60
21.875 kHz	6.25 kHz	-75.23	-75.64	-60
37.5 kHz	25 kHz	-70.89	-71.05	-60
62.5 kHz	25 kHz	-74.20	-74.53	-65
87.5 kHz	25 kHz	-78.01	-78.02	-65
150 kHz	100 kHz	-76.32	-76.70	-65
250 kHz	100 kHz	-82.15	-82.11	-65
350 kHz	100 kHz	-85.63	-85.58	-65
>400 kHz to 12 MHz	30 kHz (swept)	< -80		-80
12 MHz to paired receive band	30 kHz (swept)	< -80		-80
In the paired receive band	30 kHz (swept)	< -100		-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 10^{th} Harmonic: 100kHz to Fc-BW
   Fc+BW to 10^{th} Harmonic
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
FCC 47 CFR 90.543 (c)

SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: FCC CFR 2.1051

Tx FREQUENCY: 766.9 MHz

12.5 kHz Channel Spacing	766.9 MHz @ 100 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 90.543 (c) 12.5 kHz Channel Spacing $43 + 10 \text{ Log}_{10} (P_{Watts})$	
100 W	-13 dBm	63 dBc
10 W	-13dBm	53 dBc

SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: FCC CFR 2.1051

Tx FREQUENCY: 766.9 MHz

12.5 kHz Channel Spacing	766.9 MHz @ 10 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 90.543 (c) 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{Watts})$	
100 W	-13 dBm	63 dBc
10 W	-13 dBm	53 dBc

SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: FCC CFR 2.1051

Tx FREQUENCY: 853.9 MHz

12.5 kHz Channel Spacing	853.9 MHz @ 100 W	Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
853.8621	-39.3	-89.3
853.9362	-38.6	-88.6
1707.7990	-39.9	-89.9
3415.5981	-32.8	-82.8
4269.4976	-33.7	-83.7
No other emissions were detected at a level greater than 20 dB below the limit.		

LIMITS:

Carrier Output Power Watts	Emission Mask D 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{Watts})$	
100 W	-20 dBm	70 dBc
10 W	-20 dBm	60 dBc

SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: FCC CFR 2.1051

Tx FREQUENCY: 853.9 MHz

12.5 kHz Channel Spacing	853.9 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 Watts	Emission Mask D 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{Watts})$	
100 W	-20 dBm	70 dBc
10 W	-20 dBm	60 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. 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^{o} 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
FCC 47 CFR 90.543 (c)

SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC CFR 2.1053

Tx FREQUENCY: 766.9 MHz

12.5 kHz Channel Spacing	766.9 MHz @ 100 W	
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3067.6	-30.94	-80.94
3834.5	-27.83	-77.83
No other emissions were detected at a level greater than 20 dB below the limit.		

LIMITS:

Carrier Output Power Watts	FCC 47 CFR 90.543 (c) 12.5 kHz Channel Spacing $43 + 10 \text{Log}_{10} (P_{Watts})$	
100 W	-13 dBm	63 dBc
10 W	-13 dBm	53 dBc

SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC CFR 2.1053

Tx FREQUENCY: 766.9 MHz

12.5 kHz Channel Spacing	766.9 MHz @ 10 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 90.543 (c) 12.5 kHz Channel Spacing $43 + 10 \text{Log}_{10} (P_{Watts})$	
100 W	-13 dBm	63 dBc
10 W	-13 dBm	53 dBc

SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC CFR 2.1053

Tx FREQUENCY: 853.9 MHz

12.5 kHz Channel Spacing	853.9 MHz @ 100 W	Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
1707.8	-33.81	-83.81
3415.6	-21.17	-71.17
4269.5	-24.95	-74.95
7685.1	-36.55	-86.55
No other emissions were detected at a level greater than 20 dB below the limit.		

LIMITS:

Carrier Output Power Watts	Emission Mask D 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{Watts})$	
100 W	-20 dBm	70 dBc
10 W	-20 dBm	60 dBc

SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC CFR 2.1053

Tx FREQUENCY: 853.9 MHz

12.5 kHz Channel Spacing	853.9 MHz @ 10 W	Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
1707.8	-38.49	-78.49
No emissions were detected at a level greater than 20 dB below the limit.		

LIMITS:

Carrier Output Power Watts	Emission Mask D 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{Watts})$	
100 W	-20 dBm	70 dBc
10 W	-20 dBm	60 dBc

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).
4. Where the Error limit is 0.1ppm a external reference oscillator has been used.

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

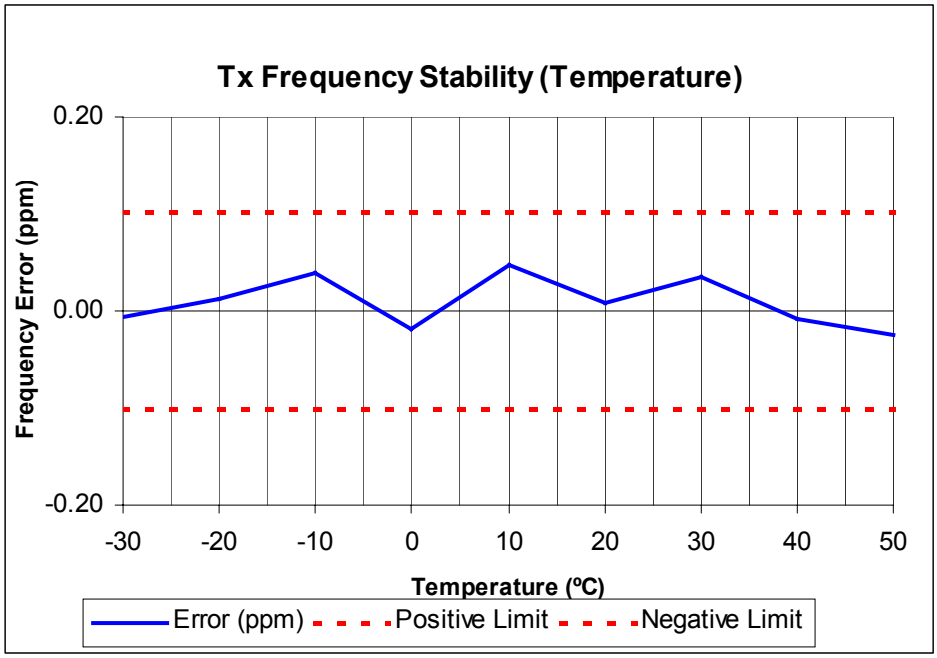
LIMIT

Limit Clause	Frequency range	Test Frequency (MHz)	Frequency Error (ppm)
47 CFR 90.539	764 – 776 MHz	766.9	0.1
47 CFR 90.213	851 – 854 MHz	853.9	1.0

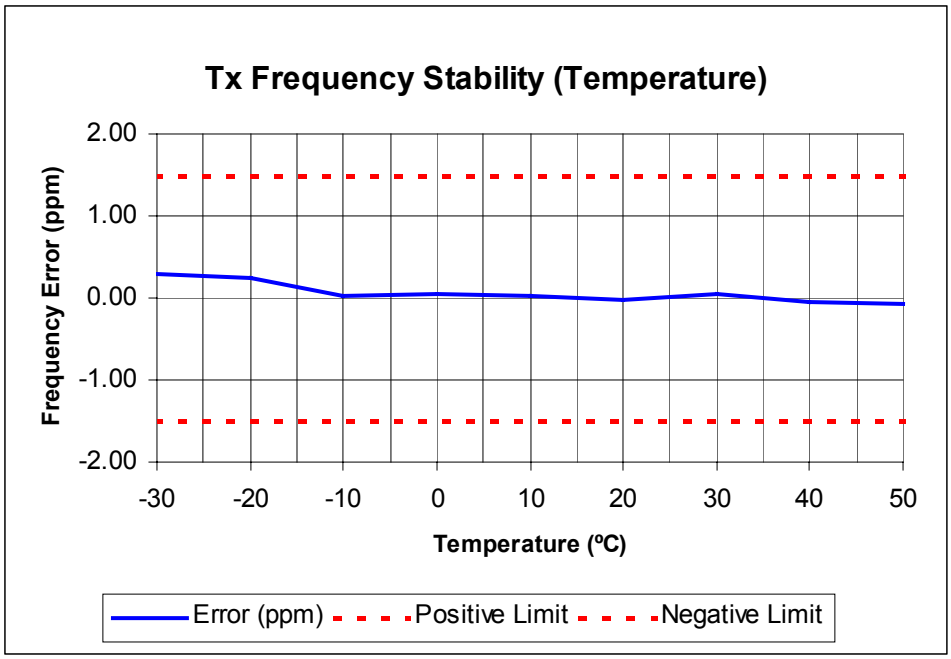
TRANSMITTER FREQUENCY STABILITY (TEMPERATURE)

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

Tx FREQUENCY: 766.9 MHz 100 W 12.5 kHz channel Spacing
(External 10 MHz Frequency Reference T801-20-000)



Tx FREQUENCY: 853.9 MHz 100W 12.5 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 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).
4. Where the error limit is 0.1ppm a external reference oscillator has been used.

MEASUREMENT RESULTS:
(External 10 MHz Frequency Reference T801-20-000)

Channel Spacing (kHz)	FREQUENCY ERROR (ppm) @ 766.9 MHz		
	102V ac	120 V ac	138 V ac
12.5	0.00	0.00	0.01

Channel Spacing (kHz)	FREQUENCY ERROR (ppm) @ 853.9 MHz		
	102V ac	120 V ac	138 V ac
12.5	-0.41	-0.42	-0.42

LIMIT

Limit Clause	Frequency range	Test Frequency (MHz)	Frequency Error (ppm)
47 CFR 90.539	764 – 776 MHz	766.9	0.1
47 CFR 90.213	851 – 854 MHz	853.9	1.0

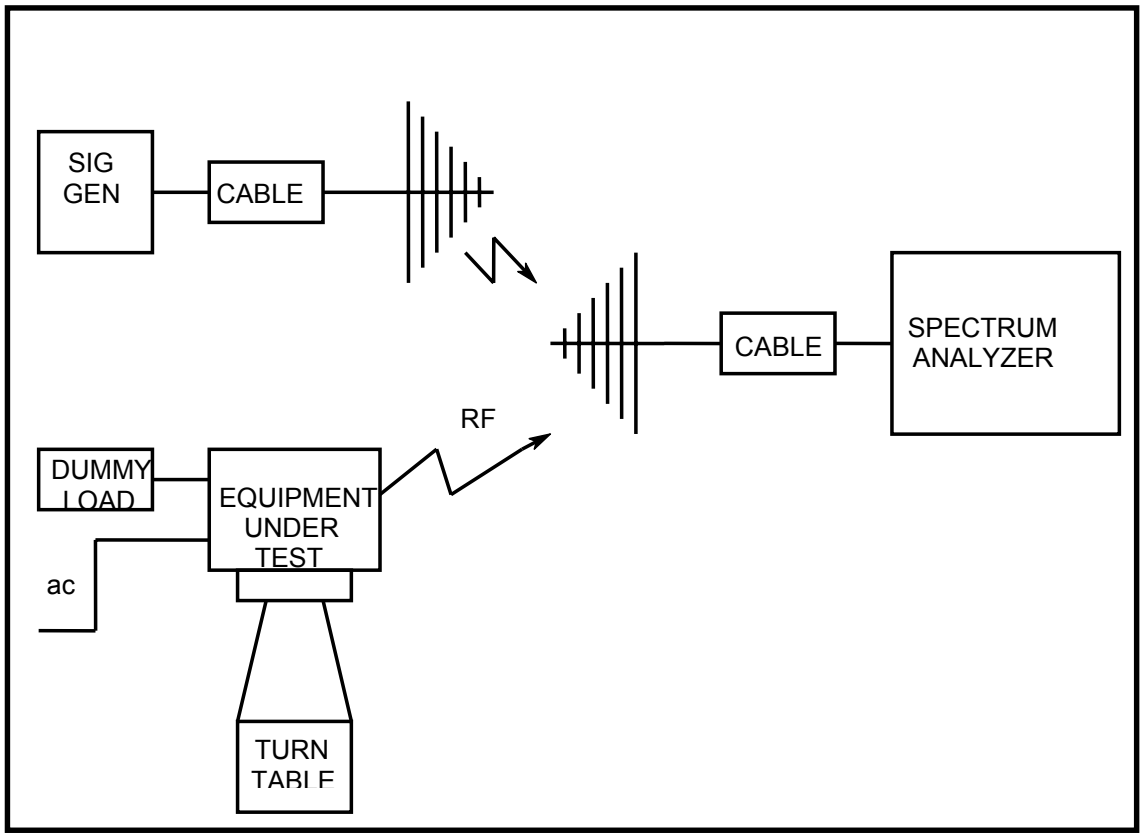
TEST EQUIPMENT USED

No #	Equipment	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
14	Power Head	Hewlett Packard	HP11722A	2320A00688	E3307	08-Nov-05
21	Power Supply	Rohde & Schwarz	NGS M32/10 192.0810.31	Fnr 434	E3556	26-Sep-06
42	Reference Horn Antenna	Emco	DRG3115	9512-4638	E3560	27-Sep-06
43	Horn Antenna	Emco	DRG3115	2084	E3076	27-Sep-06
46	S-LINE TEM CELL	Rohde & Schwarz	1089.9296.02	338232/003	E3636	
66	RF Attenuator 25W	Weinschel	33-20-33	BD5871	E3673	07-Nov-05
82	3m Coax Cable BLUE)	Suhner	Sucoflex 104A	25033/4A	E3694	19-Nov-05
87	Audio Analyser	Hewlett Packard	HP8903B	2818A04275	E3710	12-Nov-05
88	Spectrum Analyser	Hewlett Packard	HP8562E	3821A00779	E3715	14-Nov-05
111	Modulation Analyser	Hewlett Packard	HP8901B (Opt 002)	3704A05837	E3786	06-Nov-05
117	RF Attenuator	Weinschel	Model 1	BL9950	E4080	10-Nov-05
121	RF Splitter Combiner	Minicircuits	ZFSC-4-1	-	E4084	11-Oct-05
123	Spectrum Analyser	Agilent	E4445A	MY42510072	E4139	30-May-06
129	Antenna Tower	Electrometrics	EM-4720-2	112		
130	Controller	Electrometrics	EM-4700	119		
131	Turntable	Electrometrics	EM-4704A	105		
135	Attenuator	Weinschel	67-30-33	BR0531	E4280	13-Aug-05
136	Multimeter	Fluke	77	35069359	E3237	09-Nov-05
137	1m Multiflex Cable	Suhner	MF141	TT007		08-Aug-06
138	1m Multiflex Cable	Suhner	MF141	TT086		08-Aug-06

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, Occupied Bandwidth, and ACP measurements