NATIONAL CERTIFICATION LABORATORY
8370 Court Avenue, Suite B-1
Ellicott City MD 21043
(410) 461-5548

FCC REPORT OF CERTIFICATION

for

Filser Electronic GmbH
Gewerbestrasse 2
D-86875 Waal, Germany

FCC ID: OTKATR57COM

November 15, 1999

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EXHIBITS

1.0 Introduction

This report has been prepared on behalf of Filser Electronic GmbH to support the attached Application for Certification of an Aircraft Communications Transceiver, for use under FCC Part 87, in the Aviation Service. The Equipment Under Test was the Filser Electronic GmbH, ***ATR57COM Transceiver***.

Radio-Noise Emissions tests were performed according to Part 2, Subpart J and Part 87 Subpart D of the FCC Rules. The measuring equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

Testing was performed at National Certification Laboratory in Ellicott City, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch. FCC acceptance was granted on May 26, 1993.

1.1 Summary

The Filser Electronic GmbH, ***ATR57COM Transceiver*** complies with the technical standards for Aircraft Transmitters operating under FCC Rules Part 87.131-87.143, in the Aviation Service.

2.0 Description of Equipment Under Test (EUT)

The EUT Features:

118.0-137.0 MHz Operation

1.0 Watt Max RF Power Rating

Double Sideband AM Modulation

25.0 kHz Channel Spacing

50 Ohm RF Impedance

6 kHz Occupied Bandwidth

12 VDC Operation from Battery

90 Percent Max. Modulation

3.0 Test Program

Testing was performed on the EUT to demonstrate performance to the following FCC Rule Parts:

87.131 ---------- Power Rating

87.139 ---------- Harmonics & Spurious Levels

87.135 ---------- Frequency Segment/Channel Bandwidth

87.133 ---------- Frequency Stability

87.141 ---------- Modulation Characteristics

The following Section 4.0 of this report provides Testing Configurations and Data.

FCC Part 2.202/87.135 - Calculation of Necessary Bandwidth

Bn = 2M

Where: M= Max Modulation

Based on Designer's Specs.: M = 3.0 KHz

Therefore: Bn = 2 * 3.0 kHz = <u>6.0 KHz</u>

FCC Part 87.139 - Emission Limits

All spurious out-of-band emissions shall be attenuated by:

1) **25 dB on any frequency removed from center of carrier by more than 50 % up to 100 % of authorized bandwidth.**

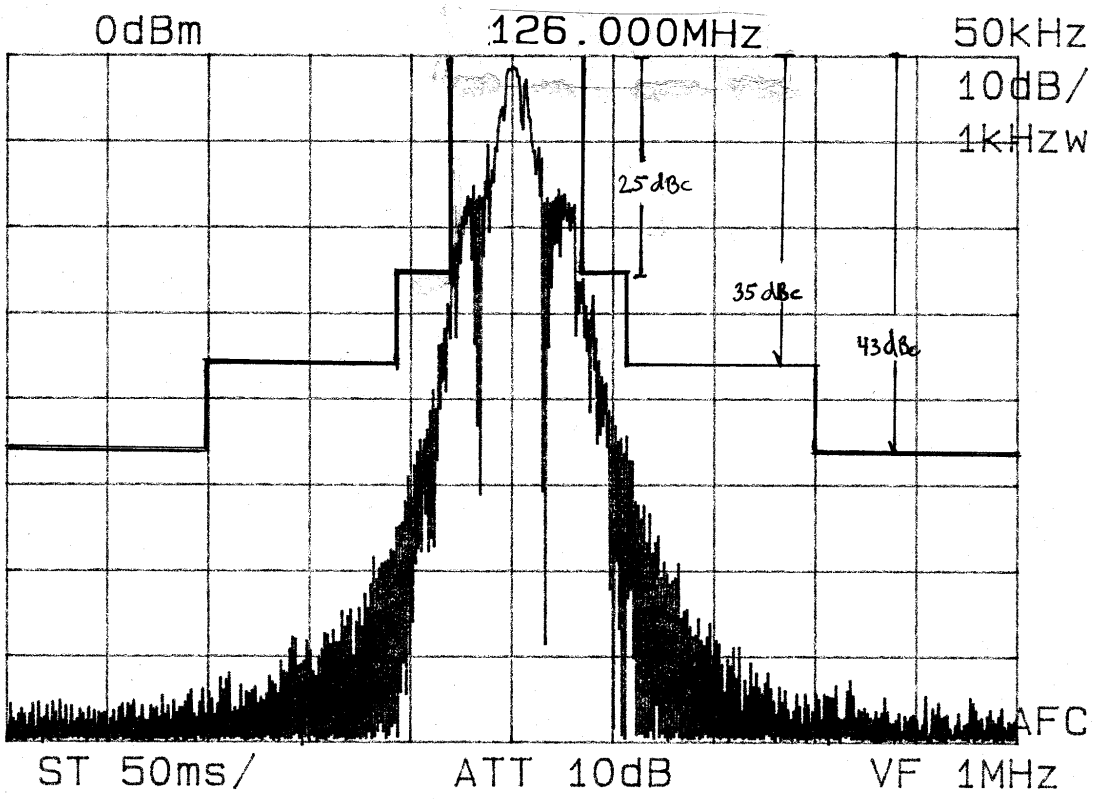
2) **35 dB on any frequency removed from center of carrier by more than 100 % up to 250 % of authorized bandwidth.**

3) **43 + 10*Log pY dB on any frequency removed from center of carrier by more than 250 % of authorized bandwidth.**

25 dB BANDWIDTH MEASUREMENT

MODULATION SIGNAL – 2.5 KHZ SINEWAVE @ 16 dB ABOVE 50 % MODULATION LEVEL

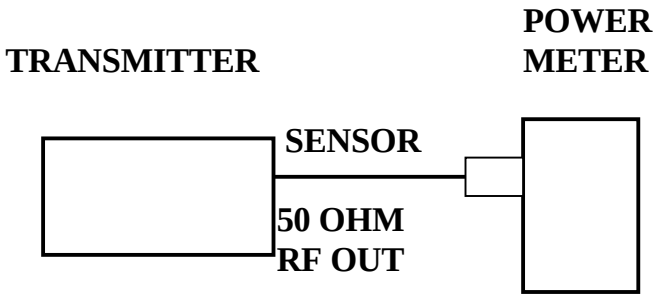
MODULATED **50 kHz SPAN** **1 kHz RES. BW**



NOTE: 30 dB EXT. ATTN.

FCC Part 87.131 - Power Output Rating

Test Configuration



RF Power Reading = 29.90 dBm @ 126.00 MHz

FCC Part 2.993/87.139 - RADIATED SPURIOUS EMISSIONS

RADIATED EMISSIONS MEASUREMENT

TEST CONFIGURATION

The transmitter under test is placed on a non-conductive turn-table which is 80 cm in height, and sitting on top of a 3-meter OATS ground plane. The 50 ohm RF output of the transmitter is terminated into a 50 ohm dummy load. A calibrated measuring antenna is placed 3 meters from the turn-table, also on the ground plane and attached to a 4-meter high mast to vary the height during measurements. The antenna output is connected to a spectrum analyzer. The EUT is turned on and set to transmit mode. RF emissions are measured while the EUT is transmitting and rotating in order to find the maximum field levels at each frequency. The measuring antenna is adjusted in height to maximize each emission.

PEAK CARRIER FIELD STRENGTH
CALCULATION FOR HALF-WAVE DIPOLE @ 3 METERS

$$FS\ (V/m) = \sqrt{\frac{(49.2 * 1.0\ WATT)}{3\ METERS}} = 2.3\ V/m\ @\ 3\ M$$

= 127 dBuV/m @ 3M

FCC PART 2.993/87.139 - RADIATED SPURIOUS EMISSIONS

Frequency of Carrier = 126.000 MHz
Limit = 43 + 10 (log 1.0 Watts) dB = 43.0 dBc

TEST RESULTS

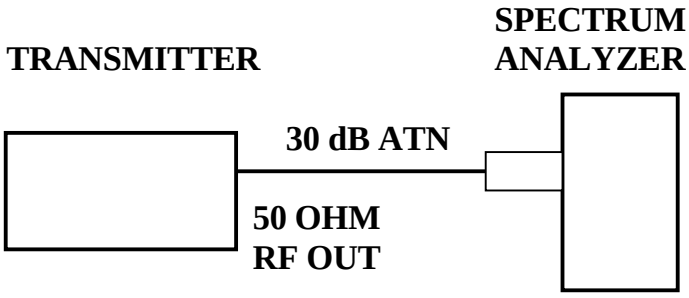
LIMIT: -43.0 dB FROM PEAK CARRIER

COMPONENT	FREQUENCY (MHZ)	RESULT(dB FROM PEAK)
HARMONIC	252.000	- 54
HARMONIC	378.000	- 59
HARMONIC	504.000	- 63
HARMONIC	630.000	- 68
HARMONIC	756.000	- 68
HARMONIC	882.000	- 71
HARMONIC	1008.00	- 75
HARMONIC	1134.00	- 77
HARMONIC	1260.00	- 77

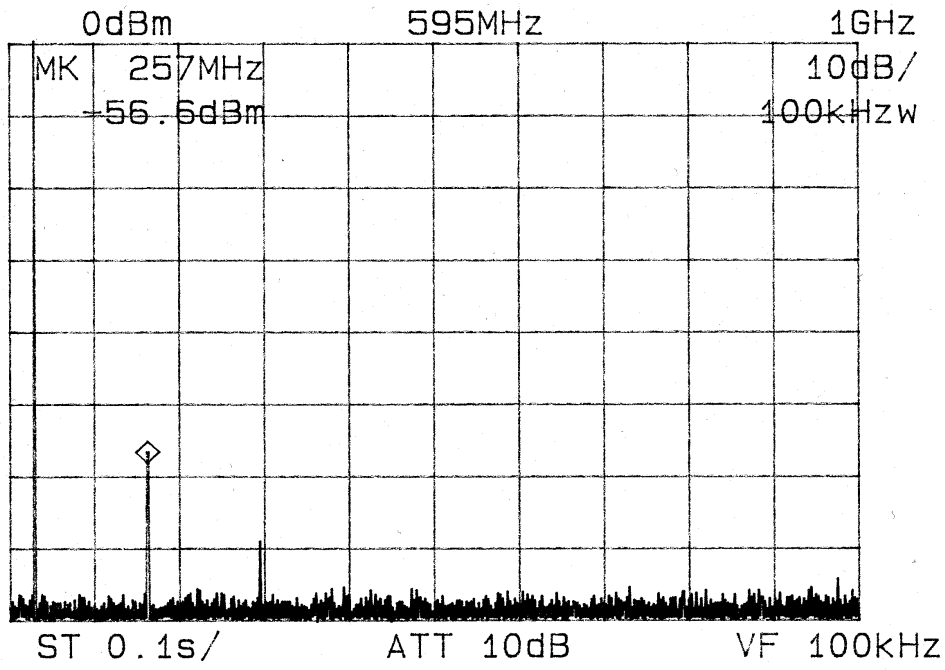
FCC Part 2.991/87.139 - CONDUCTED SPURIOUS EMISSIONS

CONDUCTED EMISSIONS MEASUREMENT

TEST CONFIGURATION



CONDUCTED OUTPUT – UNMODULATED CARRIER @ 126.00 MHZ



Fc 2Fc 3Fc 4Fc 5Fc 6Fc 7Fc 8Fc

NOTE: 30 dB EXT. ATTN. / 1 GHZ SPAN / 100 KHZ RBW

FCC PART 2.991/87.139 - CONDUCTED SPURIOUS EMISSIONS

Frequency of Carrier = 126.000 MHz
Limit = 43 + 10 (log 1.0 Watts) dB = 43.0 dBc

TEST RESULTS

LIMIT: -43.0 dB FROM PEAK CARRIER

COMPONENT	FREQUENCY (MHZ)	RESULT(dB FROM PEAK)
HARMONIC	252.000	- 57
HARMONIC	378.000	- 69
HARMONIC	504.000	- 76
HARMONIC	630.000	- 76
HARMONIC	756.000	- 77
HARMONIC	882.000	- 78
HARMONIC	1008.00	- 77
HARMONIC	1134.000	- 78
HARMONIC	1260.000	- 75

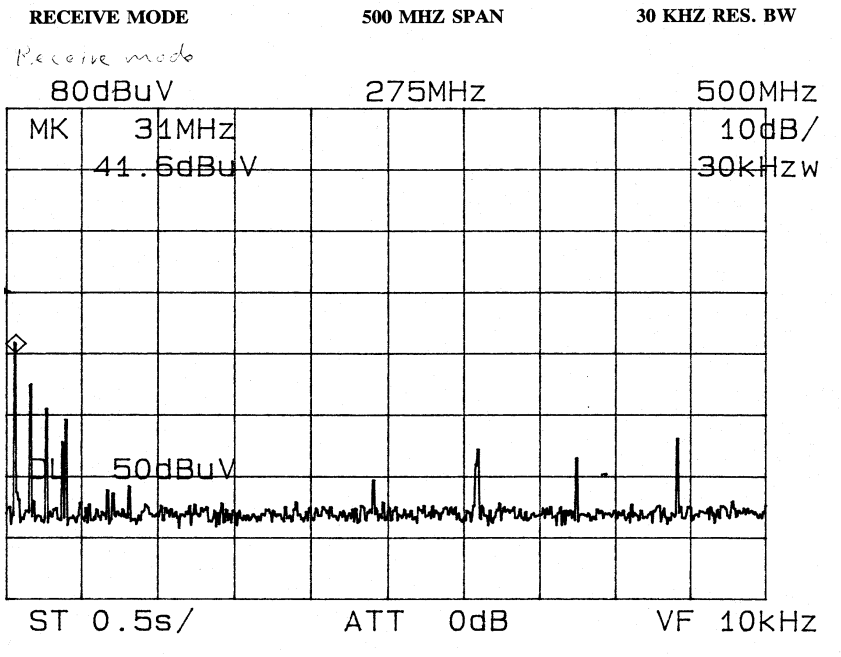
FCC PART 2.991 - CONDUCTED SPURIOUS EMISSIONS – RECEIVE MODE

Frequency of Tuning = 126.000 MHz
Limit = 50.0 dBuV

TEST RESULTS

COMPONENT	FREQUENCY (MHZ)	RESULT(dBuV)
IF HARMONIC	32.1000	41.6
IF HARMONIC	42.8000	35.3
IF HARMONIC	53.5000	31.2
IF HARMONIC	64.2000	29.2
IF HARMONIC	267.500	14.1
IF HARMONIC	331.700	24.4
IF HARMONIC	470.800	26.3

CONDUCTED OUTPUT - RECEIVE MODE

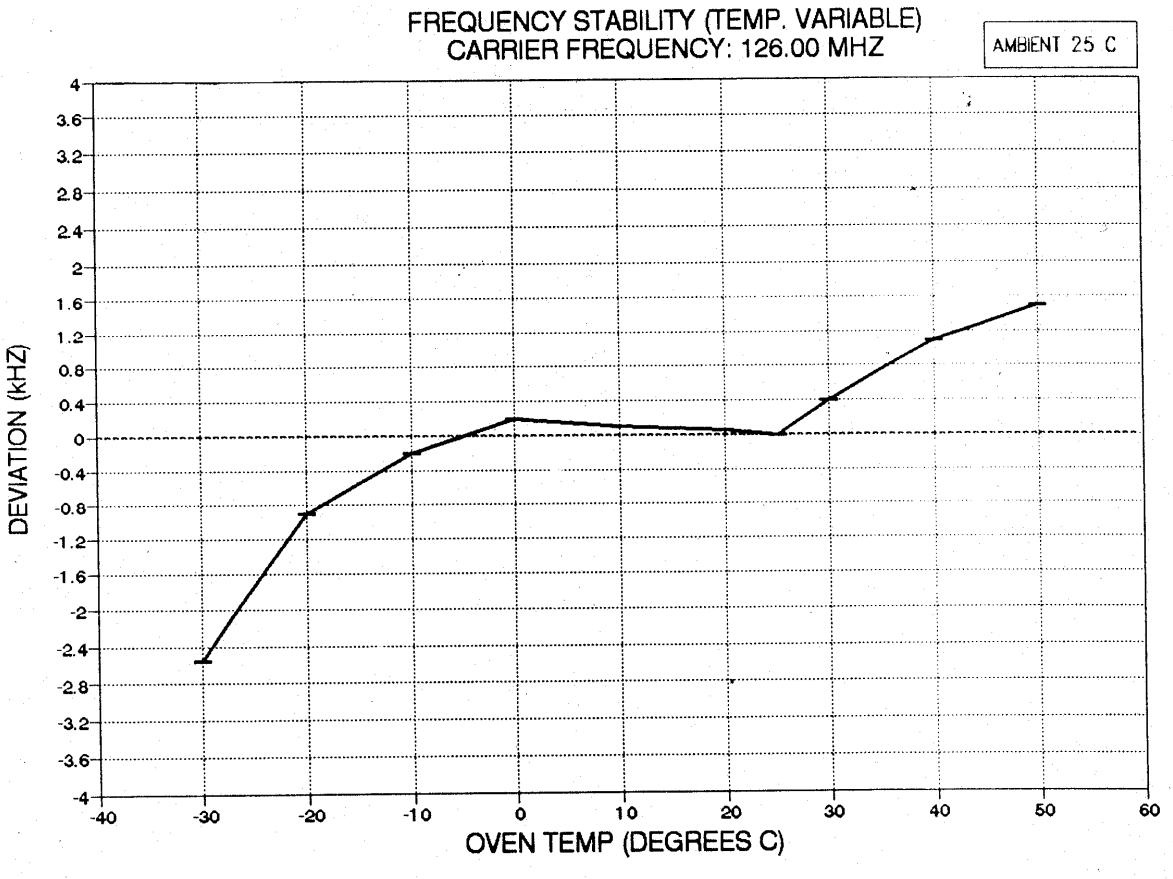


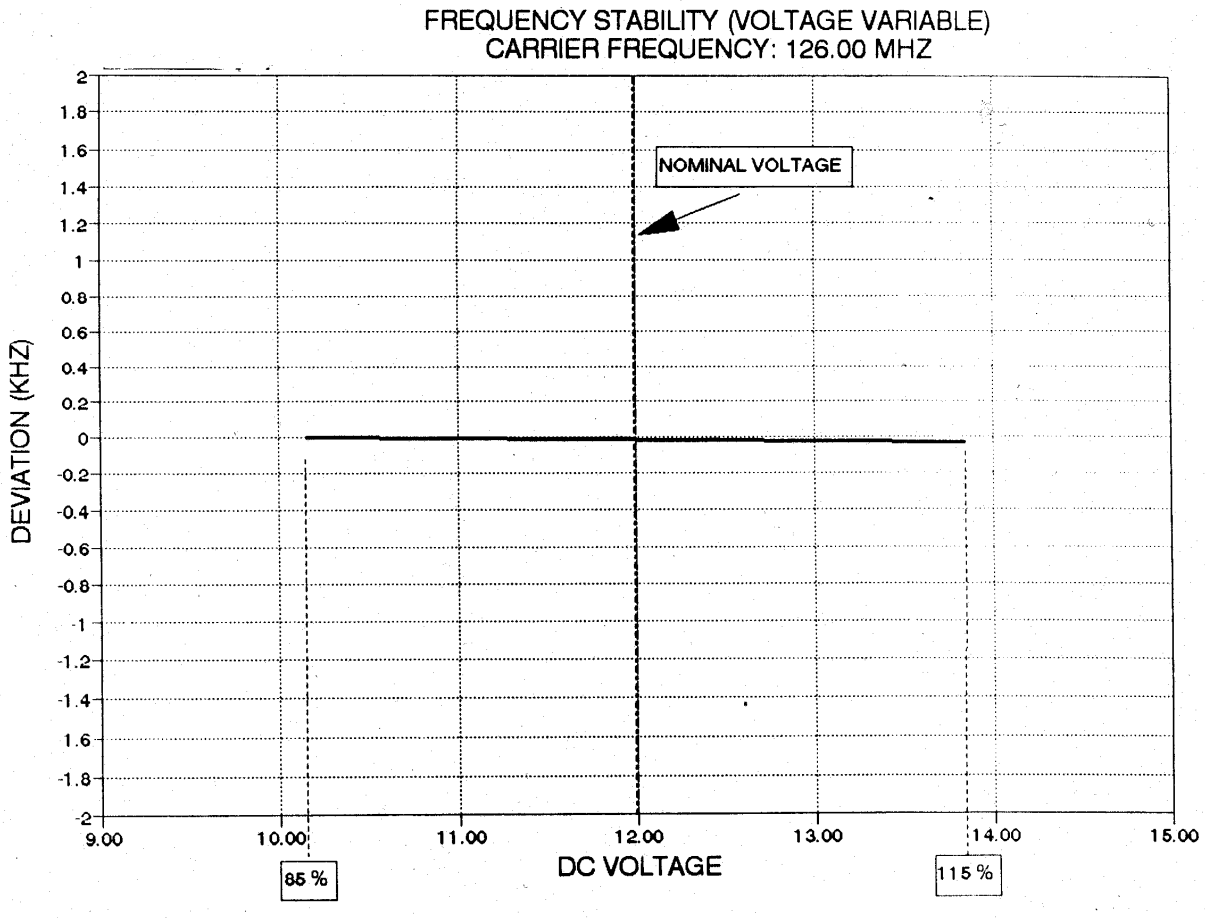
FCC PART 2.995/87.133 - FREQUENCY STABILITY

The following charts reveal the Frequency Tolerance of the transmitter carrier frequency as a function of Temperature and Supply Voltage. The charts confirm the rated tolerance of 30.0 ppm.

The transmitter was placed in the temperature chamber at 25 degrees C and allowed to stabilize for one hour. The transmitter was keyed on for one minute during which a frequency reading was taken. This was considered to be the reference frequnecy. The temp. was reduced to -30 degrees C and the transmitter allowed to stabilize for one hour. Frequency readings were taken and this procedure repeated in 10 degree increments up to 50 degrees C.

Frequency readings were also taken at + and - 15% of the supply voltage of 12.0 VDC.




FREQUENCY STABILITY (VOLTAGE VARIABLE)
CARRIER FREQUENCY: 126.00 MHZ
NOMINAL VOLTAGE
DEVIATION (KHZ)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
1.6
-1.8
-2
9.00
10.00
11.00
12.00
13.00
14.00
15.00
DC VOLTAGE
85 %
115 %

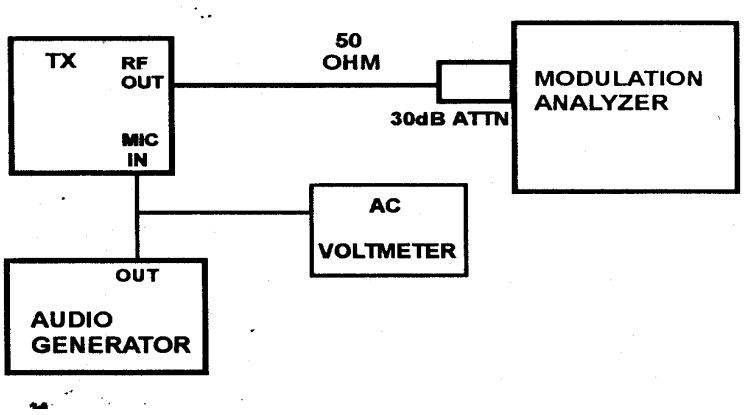
FCC Part 2.987(a)/(b)/87.141 - MODULATION CHARACTERISTICS

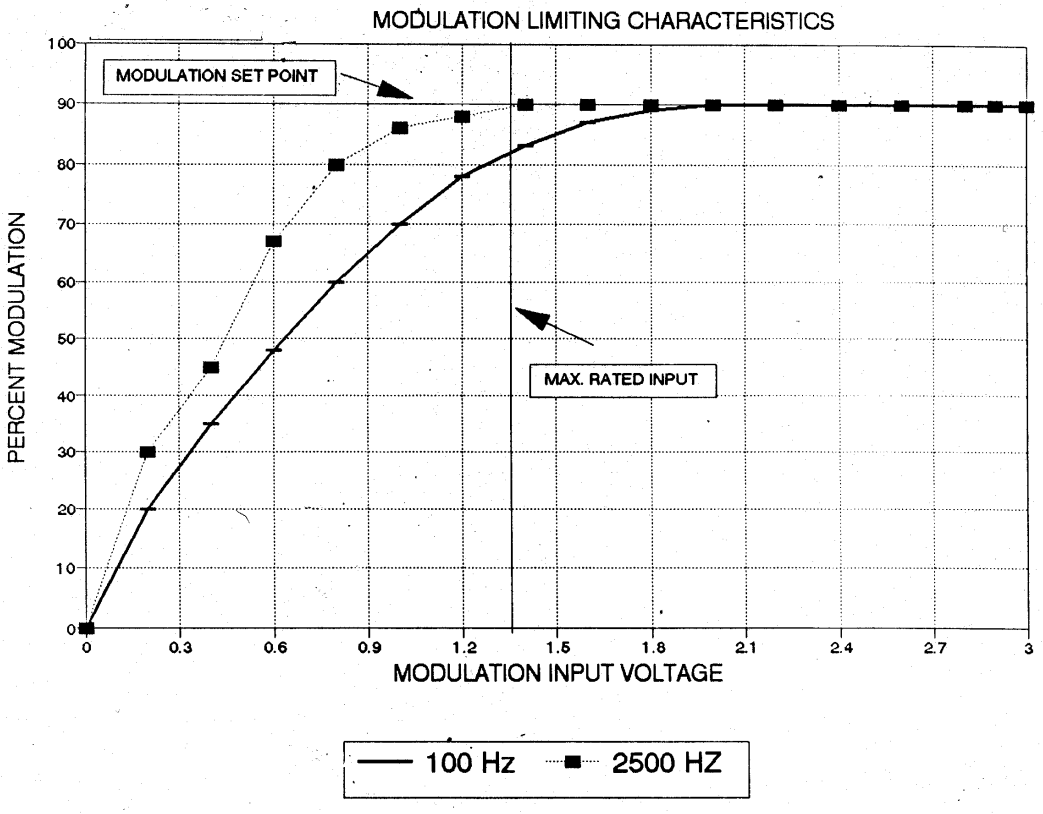
The following charts show the frequency response of the audio modulator and the modulation limiting curve.

The audio modulator frequency response data and curve were provided by the Applicant from an Australian Communications Authority test report # 98/021/N/I. Test equipment list is provided as well.

The modulation limiting curve was generated by National Certification Lab.

Test Configuration - Modulation Limiting





MODULATION FREQ. RESPONSE

MODULATION FREQUENCY (Hz)	MODULATION RESPONSE (dB)
300	-1.0
500	-0.8
1000	0
2000	+2.5
2800	-1.2 (≥ -6dB)
6000	-21.2
9000	-32.4 (≤ -30dB)
12000	-41.0
20000	-52.0

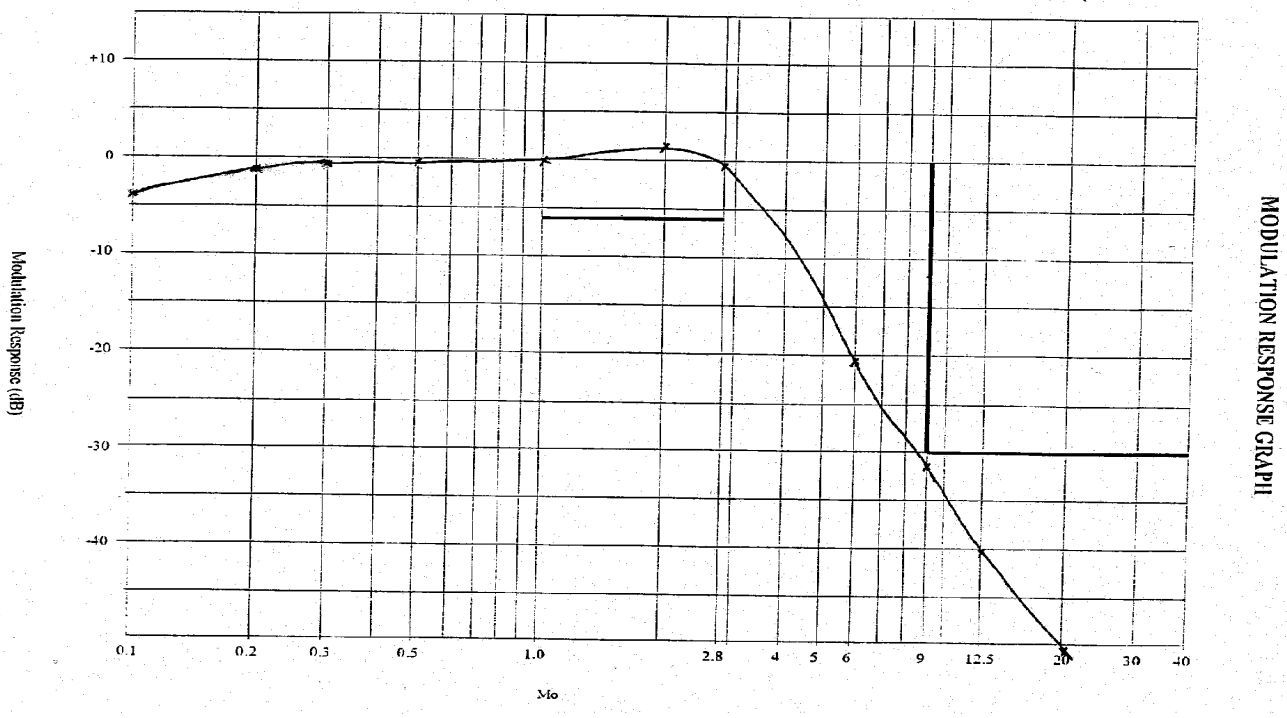
Noise floor = -55 dB

Specification limit: note modulation response limits on graph.

Uncertainty: ± 0.5 dB

Report No: 98/021/N/I

Initials: JK



(Australian Communications Authority)

STANDARD TEST EQUIPMENT DETAILS

Tests were carried out using the following equipment (tick as required)

EQUIPMENT	MODEL	ASSET/ SERIAL No	USED
Radio Communications Tester	R&S CMT	245653	✓
DC Power Supply	R&S NGPE	297695	✓
Switching Network	VSN02	VIC02	✓
Spectrum Analyser	HP70000	243098	✓
Distortion Analyser	HP334A	196602	✓
RF Power Meter	HP438A	500631	✓
Power Sensor c/w Attenuator	HP8482B	500697	✓
Multimeter Digital	HP34401A	500635	✓
Environment Chamber	Lindner & May	197056	✓
Oscilloscope	Tektronix TDS 220	B013619	
RF Signal Generator (2)	HP8642A	149172	✓
RF Signal Generator (3)	Marconi 2042	197055	✓
RF Signal Generator (4)	HP8640B	196703	
Attenuator Fixed 150W (3dB)	Weinschel 49-3-34	JX028	
Attenuator Fixed 150W (6dB)	Weinschel 49-6-33	KN973	
Attenuator Fixed 150W (10dB)	Weinschel 49-10-34	151060	
Attenuator Fixed 50W (20dB)	Narda 765-20	275300	
Attenuator Fixed 150W (40dB)	Weinschel 49-40-43	K8898	✓
Audio Output Power Meter	MU 964	245647	✓
Stepped Attenuator	HP 8494/8496B	149159 / 500633	
Dual Directional Coupler	HP778D	149208	

All equipments hold calibration to NATA requirements.

(National Certification Lab)

Table 1

Measurement Equipment Used

The following equipment is used to perform measurements:

EQUIPMENT	SERIAL NUMBER
EMCO Model 3115 Double Ridgeguide Horn Ant.	3807
EMCO Model 3110 Biconical Antenna	1619
EMCO Model 3146 Log Periodic Antenna	1222
HP 8482B Power Sensor	245-688PS
Advantest Model R4131D Spectrum Analyzer	54378A
HP 437B Power Meter	
HP 8498A 30dB Attenuator	924867
Thermotron S-16 Temperature Chamber	534-84
Decibel DB4303B 100 Watt/50 ohm RF Load	D34512-1