TELTEST Laboratories
Tait Ltd
Report Number 3838

LABORATORY TEST REPORT

RADIO PERFORMANCE MEASUREMENTS

for the

TMAB1B Mobile Transceiver

Tested in accordance with:

FCC 47 CFR Parts 22, 74 & 90

Report Revision: 1

Issue Date: 5 July 2017

PREPARED BY: M. C. James

Laboratory Technical Manager
Authorised IANZ Signatory

OATS FCC LISTING REGISTRATION: 837095

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

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REVISION

Date	Revision	Comments
5 July 2017	1	Initial test report

INTRODUCTION

Type approval testing of the TMAB1B, 50 Watt, Mobile Transceiver in order to demonstrate compliance with FCC 47 Parts 22, 74 & 90,
This Class-2 Permissive Change report adds 11000bps 4FSK to the list of modulations supported using an IQ2248I modem supplied by Radio Mobile INC.

The original test report is TARF 2074.

REPORT PREPARED FOR
Tait Ltd
245 Wooldridge Road
Harewood
Christchurch 8051
New Zealand

DESCRIPTION OF SAMPLE
Radio

Manufacturer	Tait Limited
Equipment:	Mobile Transceiver
Type:	TMAB1B
Frequency range	136 → 174 MHz
Transmit Power	50W

Modem

Manufacturer	Radio Mobile Inc.
Equipment:	Data modem
Type:	IQ2248 Modem

Modulation		Channel Spacing	Speech Channels	Symbol Rate (symbols/sec)	Data Rate (bps)
4FSK	Four Level Frequency Shift Keying	12.5 kHz	~	5500	11000

HARDWARE & SOFTWARE –

Radio

Description	Product Code	Serial Number	Firmware Version	Database Version	Hardware Version
TM8100 High Power	TMAB14-B100	20460632	02.19.00.03	0095, 0086	0202, band B1

Modem

Description	Product Code	Serial Number	Firmware Version	Hardware Version
Modem	IQ2248	-	11/04/14 17:46	-

TEST CONDITIONS
All testing was performed on 30 June 2017, and under the following conditions:
Ambient temperature: 15°C → 30°C
Relative Humidity: 20% → 75%
Standard Test Voltage 3.8 dc

TEST PATTERNS
4FSK tests were performed using a pseudo-random sequence.

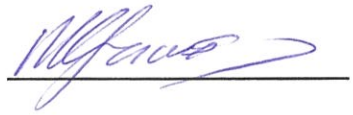
STATEMENT OF COMPLIANCE

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

Equipment:	Mobile Transceiver
Type:	TMAB1B
Serial Number:	20460632
With modem:	IQ2248
Quantity:	1 of each

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

FCC 47 CFR Parts 22, 74 & 90

Signature: 

M. C. James
Laboratory Technical Manager

Date: 5 July 2017

MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS

MODULATION TYPES:

F1D 4FSK 11000bps

EMISSION DESIGNATORS:

Channel Spacing 12.5 kHz	
4FSK digital data	6K50F1D

CALCULATIONS

99% bandwidth
= 6.5 kHz

Emission Designator
6K50F1D
F1D represents an digital FM data transmission

TEST RESULTS

TRANSMITTER OCCUPIED BANDWIDTH AND SPECTRUM MASKS

SPECIFICATION: FCC 47 CFR 2.1049 (c)

GUIDE: TIA/EIA-603E 2.2.11 (Analog)
TIA-102.CAAA-E 2.2.5 (Digital)

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment Set up.
   For Data measurements: The EUT was modulated with an internally generated pseudo random bit sequence at the appropriate Baud rates.
2. The Occupied Bandwidth was measured on the Spectrum Analyser, with bandwidth settings as follows.

   Emission Mask D – Resolution Bandwidth = 100 Hz, Video Bandwidth = 1 kHz

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

LIMIT CLAUSE: FCC 47 CFR 90.210

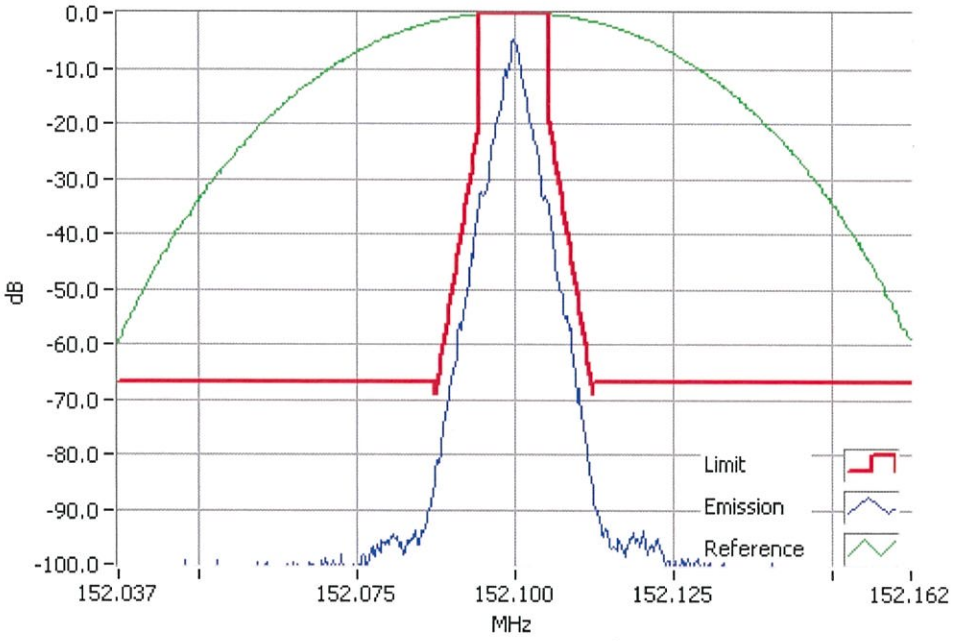
EMISSION MASKS

Emission Mask D	12.5 kHz Channel Spacing	4FSK 11000bps

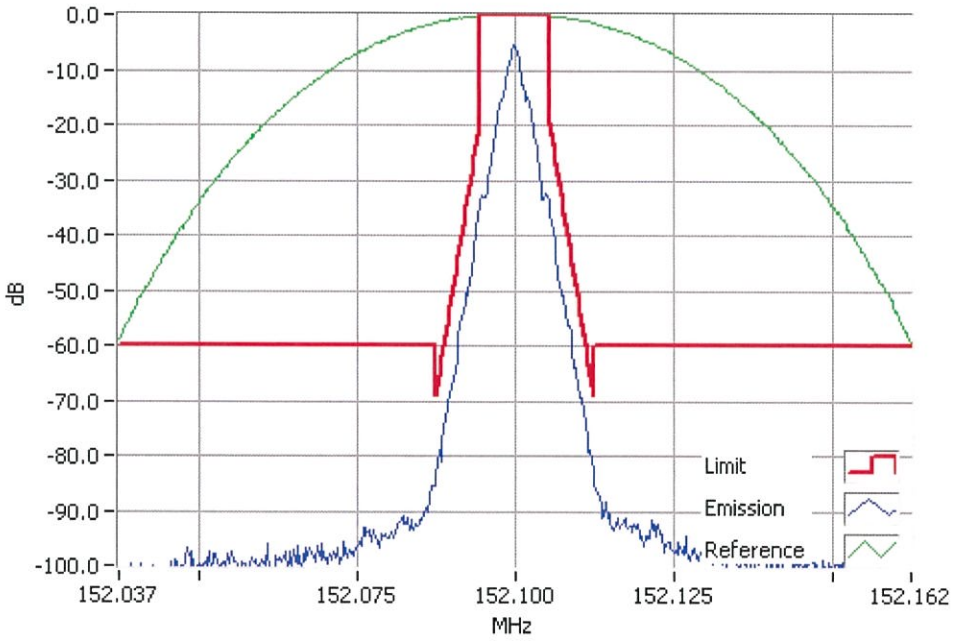
Occupied Bandwidth and Spectrum Masks

SPECIFICATION: FCC CFR 2.1049 (c) Mask- D

Tx FREQUENCY: 152.1 MHz 50W & 10W 12.5 kHz Channel Spacing



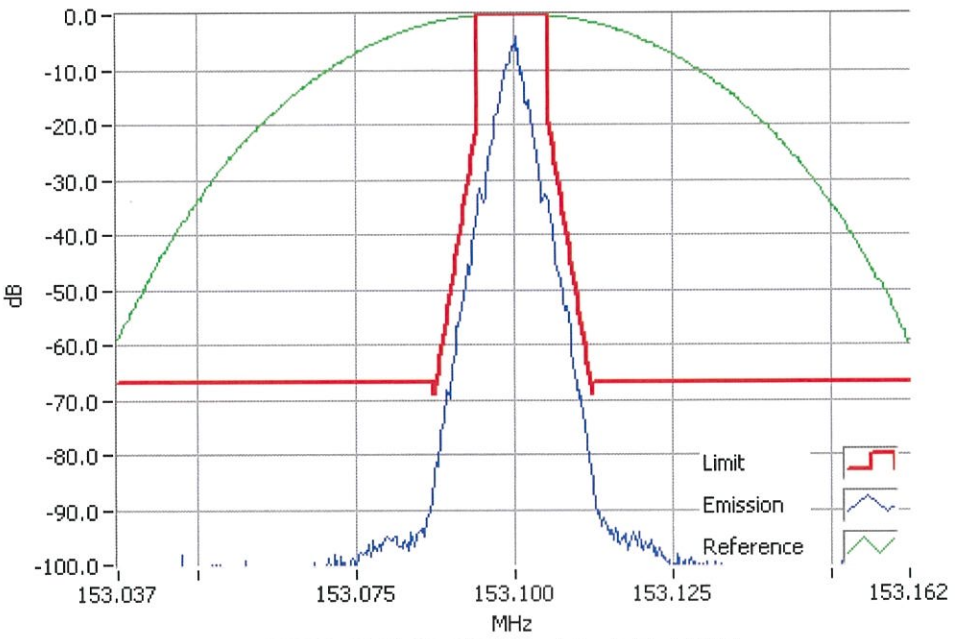
4FSK 152.1000MHz Mask D 50W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



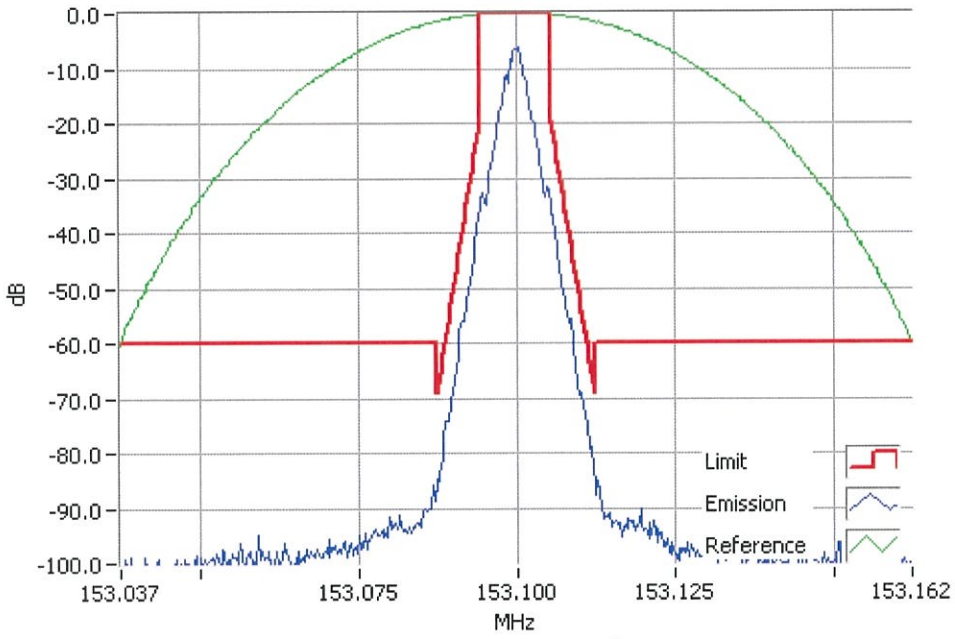
4FSK 152.1000MHz Mask D 10W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

Tx FREQUENCY: 153.1 MHz 50W & 10W 12.5 kHz Channel Spacing



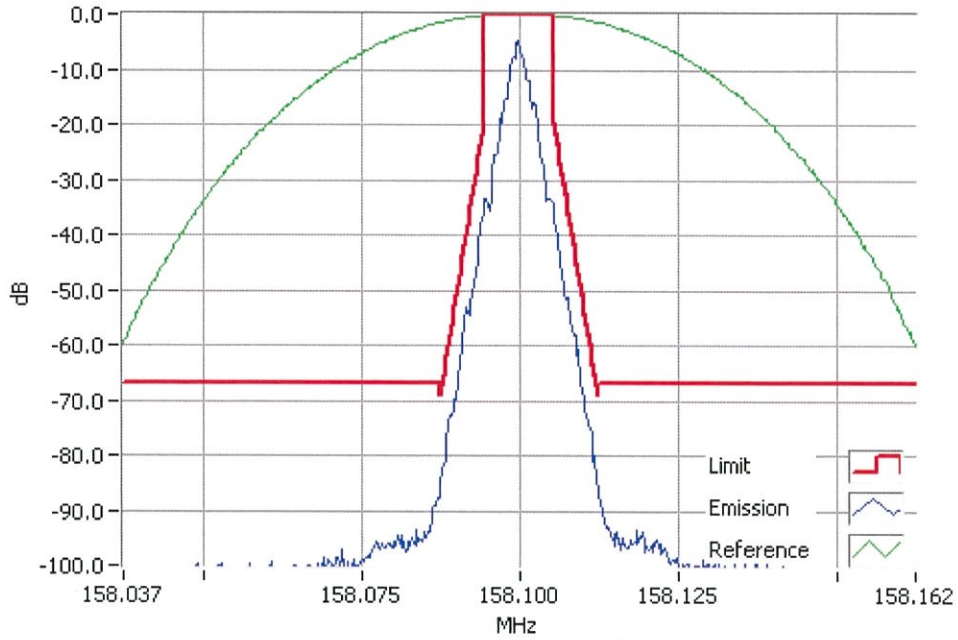
4FSK 153.1000MHz Mask D 50W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



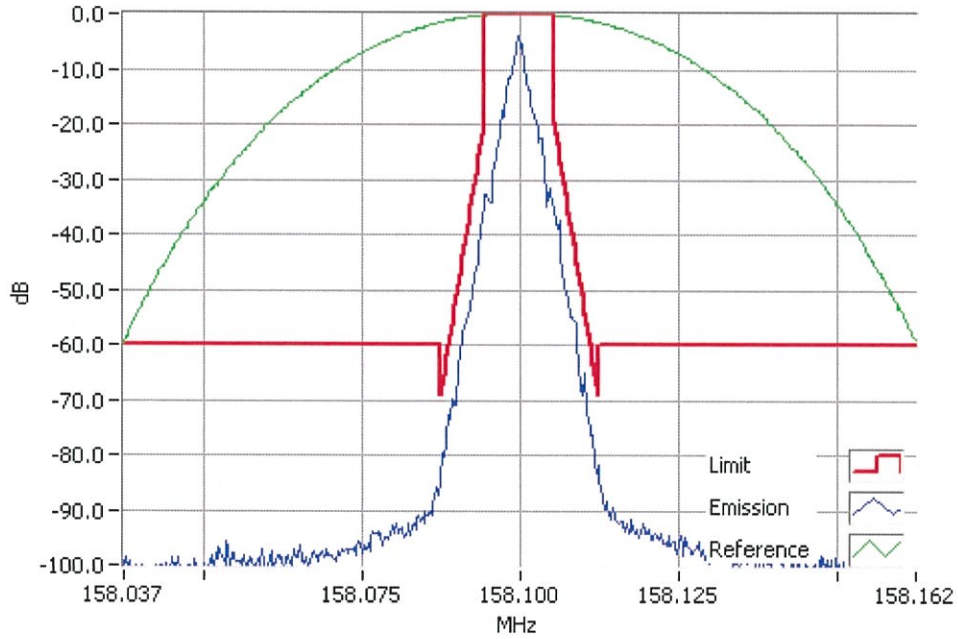
4FSK 153.1000MHz Mask D 10W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

Tx FREQUENCY: 158.1 MHz 50W & 10W 12.5 kHz Channel Spacing



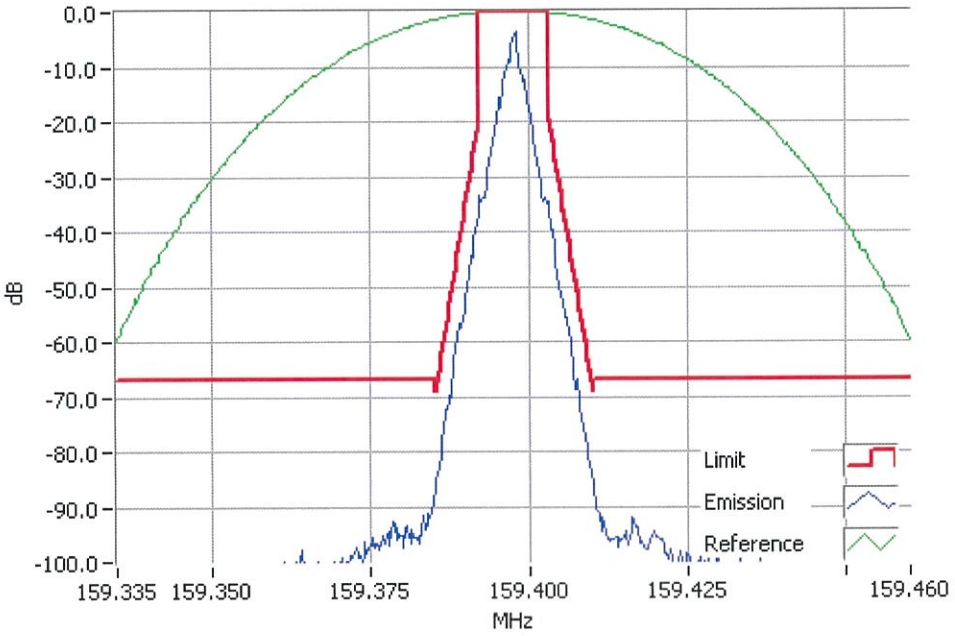
4FSK 158.1000MHz Mask D 50W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



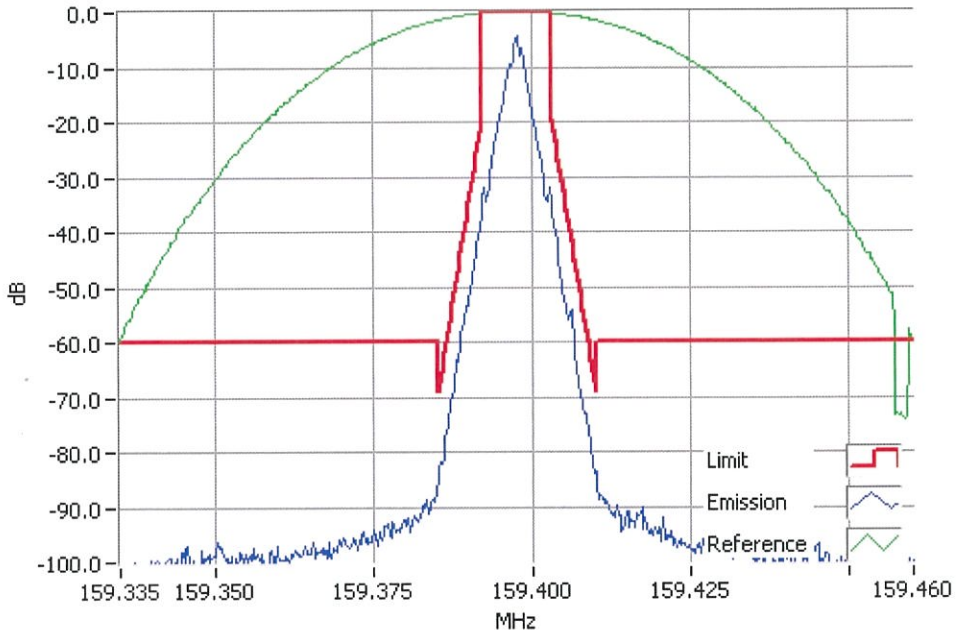
4FSK 158.1000MHz Mask D 10W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

SPECIFICATION: FCC CFR 2.1049 (c)
Tx FREQUENCY: 159.3975 MHz 50W & 10W 12.5 kHz Channel Spacing



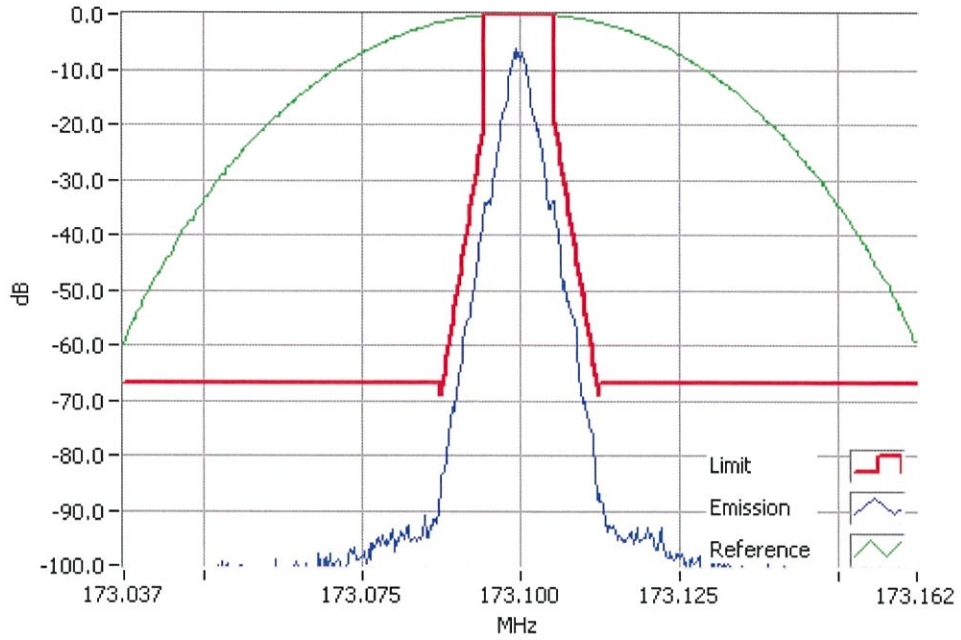
4FSK 159.3975MHz Mask D 50W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



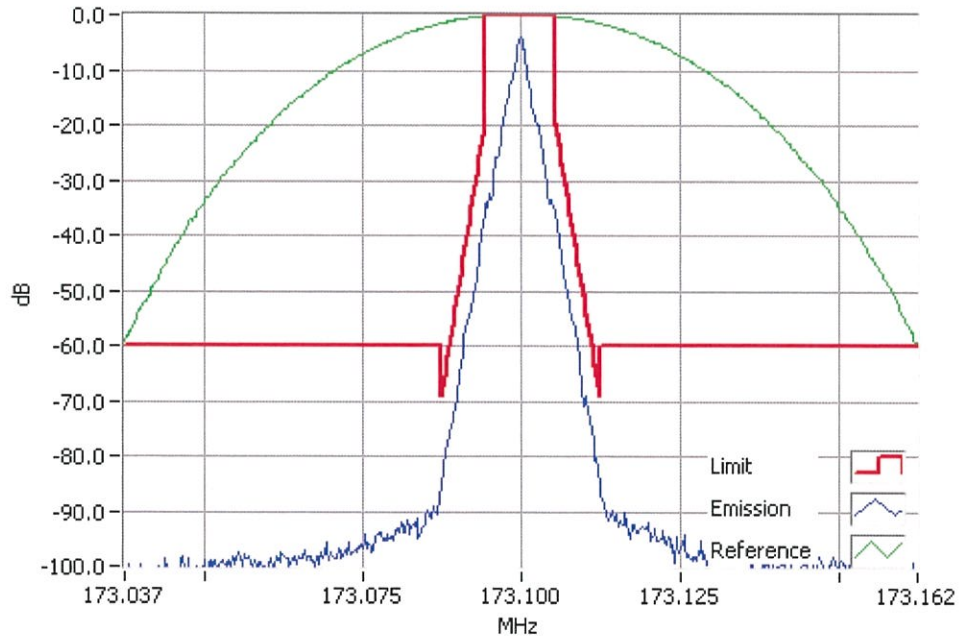
4FSK 159.3975MHz Mask D 10W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

Tx FREQUENCY: 173.1 MHz 50W & 10W 12.5 kHz Channel Spacing



4FSK 173.1000MHz Mask D 50W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



4FSK 173.1000MHz Mask D 10W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

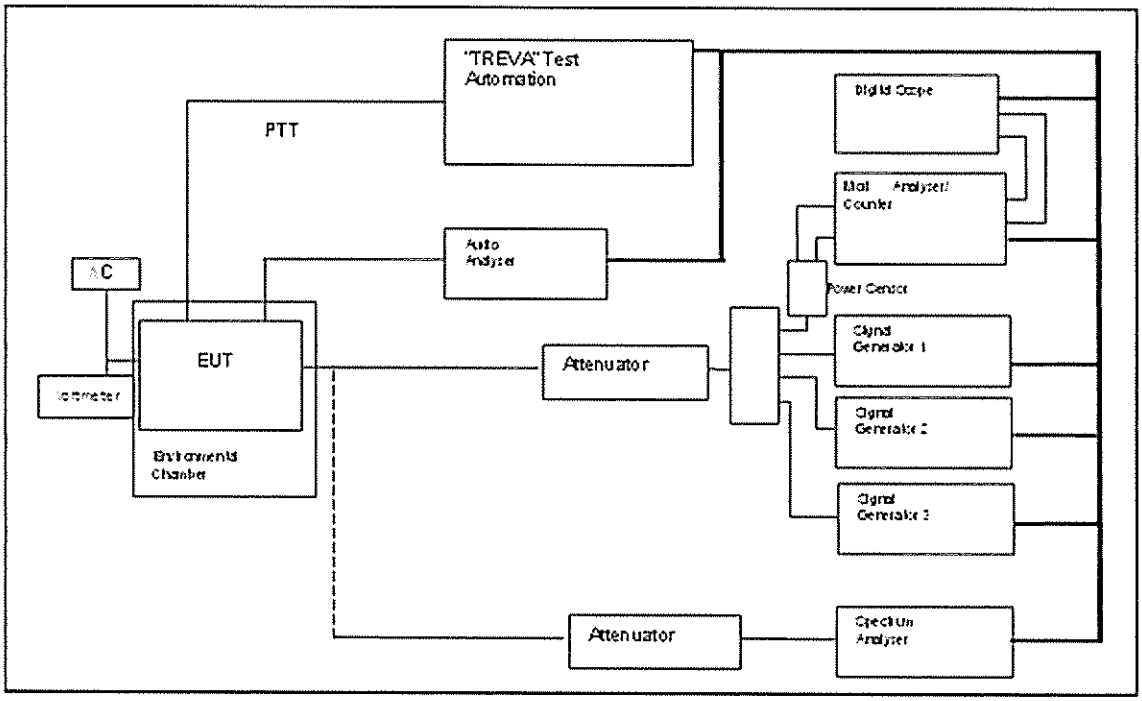
TEST EQUIPMENT LIST

Equipment Type	Information	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
AC Voltmeter		Tait		1		7-Mar-18
Audio Analyser	TREVA1	Hewlett Packard	HP8903A	2437A04625	E4986	13-Oct-17
Coax Cable	2m Black	Suhner	RG214HF/Nm/Nm/2000	TeltestBlack7	E5004	6-Dec-17
Modulation Analyser	TREVA1	Hewlett Packard	HP8901B (Opt 002)	2441A00393	E3073	14-Oct-17
Power Meter	TREVA1 Power Head for HP8901	Hewlett Packard	HP11722A	3111A05573	E7054	13-Oct-17
Power Supply	TREVA1	Hewlett Packard	HP6032A	2441A00412	E3075	13-Oct-17
RF Attenuator	TREVA1 3dB	Weinschel	Model 1	BL9958	E4081	30-Nov-17
RF Attenuator	TREVA 1 20dB 150W	Weinschel	40-20-23	MF817	E4082	28-Nov-17
RF Combiner	TREVA1	Minicircuits	ZFSC-4-1	-	E4083	
Signal Generator	TREVA1 Analog 3.2GHz	Agilent	E8663D	MY50420224	E4908	20-Oct-18
Spectrum Analyser	26.5GHz	Agilent	PXA N9030A	MY49432161	E4907	18-Oct-18
Testware	Sideband Spectrum		August 2015	-	-	

* NOTE: Items without calibration dates are calibrated immediately before use, or set using calibrated instruments.

ANNEX A – TEST SETUP DETAILS

All 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.



ANNEX B – MODEM INSTRUCTIONS

RadioMobile
Hardware – Software - Networking
8801 Kenamar Dr ■ San Diego CA 92126
Ph: 858 530 1060 ■ Fax: 858 530 1063
Web: www.radiomobile.com

Testing IQ MODEM with Tait Mobile (TM8100).

Connect devices as shown. Note Modem connects to mini match connector inside the TM8100.

1. Power up TM8100 mobile for test. Use program emailed for Mobile configuration.
2. Connect the DB9 to a PC's Com port and run Hyperterm. The Baud rate is 115Kb, no hardware control, 8bits, N parity
3. With TM8100 powered, modem should also power and a Green LED should blink.
4. ON the PC, press the "." (period) a list of options should appear on the screen. If not recheck all connections and Hyperterm setup. If a USB to Serial adapter is used in many cases it is the problem.
5. Select #2 option' Personality, Select #2 again, to change Modem type to Mobile and #1 for 11kb. Press "f" to Save configuration. PRESS ESC, the the "." To get back to Main screen.
6. Select #1 option. Then check Item 2 for 27 value this sets deviation drive., 27 for Mobile and Base.
7. Press #8 twice to switch audio type to random. That is the 22kb signal, with Random data.
8. Press #9 to cause the mobile to transmit this signal. It will last about 5 seconds, then release, press 9 again or press it several times to have it continue for 5 seconds times number of presses on the 9 key.

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