REPORT NUMBER 2157 February 2005

Class II Permissive Change to EMC Technology Test Report Number 00914.1

RADIO PERFORMANCE MEASUREMENTS

On the T881-35-0200 Base Station Transmitter

FCC ID: CASTEL0045

SN: 13113462

In accordance with

FCC 47 CFR Parts 90.353

PREPARED BY: Garry Pringle _____
Test Technician

CHECKED & APPROVED BY: Hamish Newton _____
Senior Technician

577
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REPORT ON :

Type Approval Testing of the T881-35-0200 (Serial No 13113462)
in accordance with:

FCC CFR 47 Parts 90.353

FCC ID: CASTEL0045

PREPARED FOR :

Tait Electronics Ltd
PO Box 1645
558 Wairakei Rd
Christchurch
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Tait Electronics Ltd	Mr. Anura Gamalath	Copy No 3

APPROVED :

Hamish Newton

Senior Technician

Date :

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

Copy No:

TABLE OF CONTENTS

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:	T881-35-0200
Serial Numbers:	13113462
Quantity:	1

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

FCC CFR 47 Parts 90.353

Signature:_____

S. A. Crompton
Compliance Laboratory Manager.

Date:_____

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 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 = 3kHz
D = 2.5kHz

Bn = 6 + 5 x 1
=11kHz

Emission Designator

11K0F3E

F3E represents a FM voice transmission

2. Fast Frequency Shift Keying (FFSK) 12.5kHz Bandwidth

Necessary bandwidth

M = 1.8 kHz
D = 1.5kHz (60% of peak deviation)

Bn = 3.6 + 3 x 1
= 6.6 kHz

Emission Designator

6K60F2D

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

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: 5 W and 1 W

904.1 MHz	5 W nominal	1 W nominal
POWER (W)	5.1	1.1
Variation from Nominal (%)	+2.0	+10.0
Measurement Uncertainty (dB)	+0.63 -0.68	

LIMIT CLAUSE: FCC 47 CFR 90.205 (r)

Radio Type: Mobile Transceiver
Frequency Band: 902 MHz ~ 928 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-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:
Refer measurement plot below.
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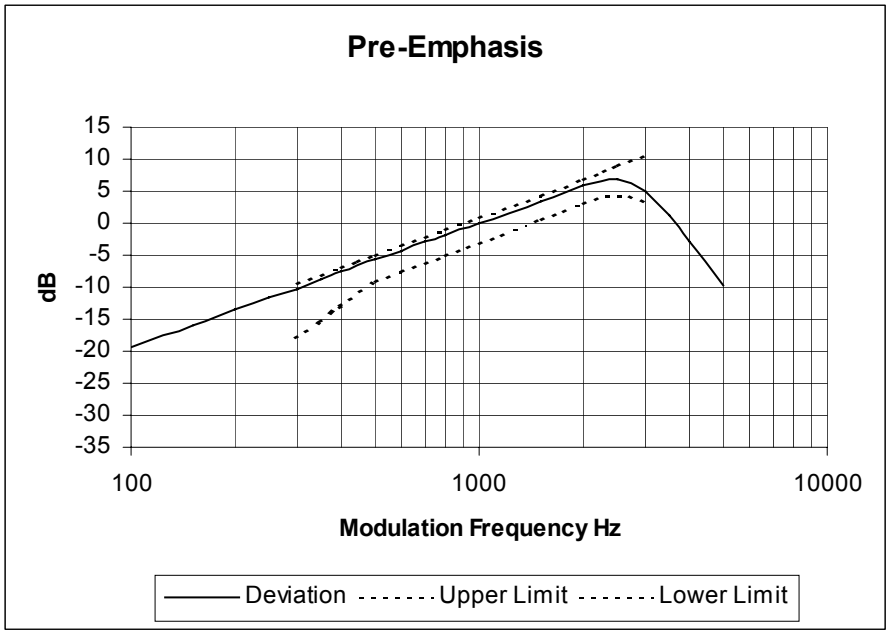
LIMIT CLAUSE: TIA/EIA-603B 3.2.6

Tx FREQUENCY: 904.1 MHz 12.5 kHz Channel Spacing



TRANSMITTER MODULATION LIMITING

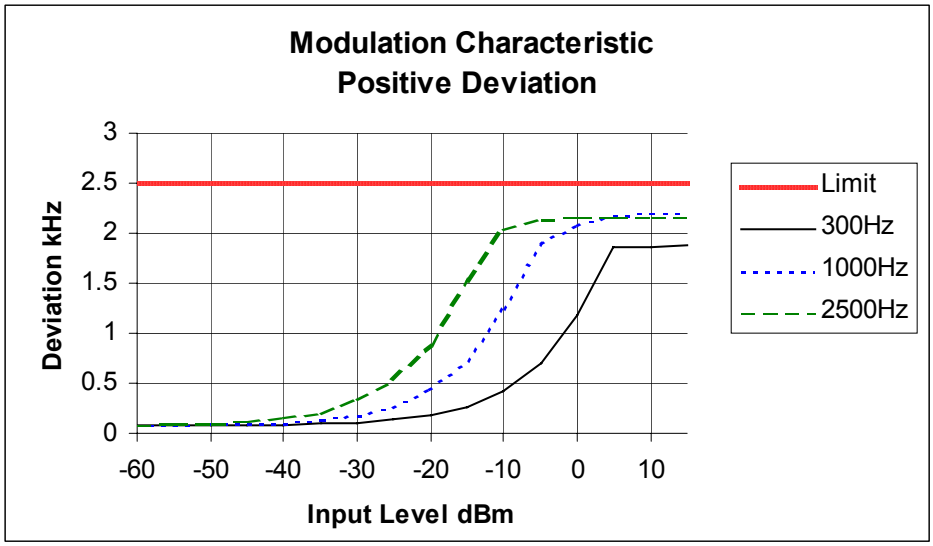
SPECIFICATION: FCC 47 CFR 2.1047 (b)

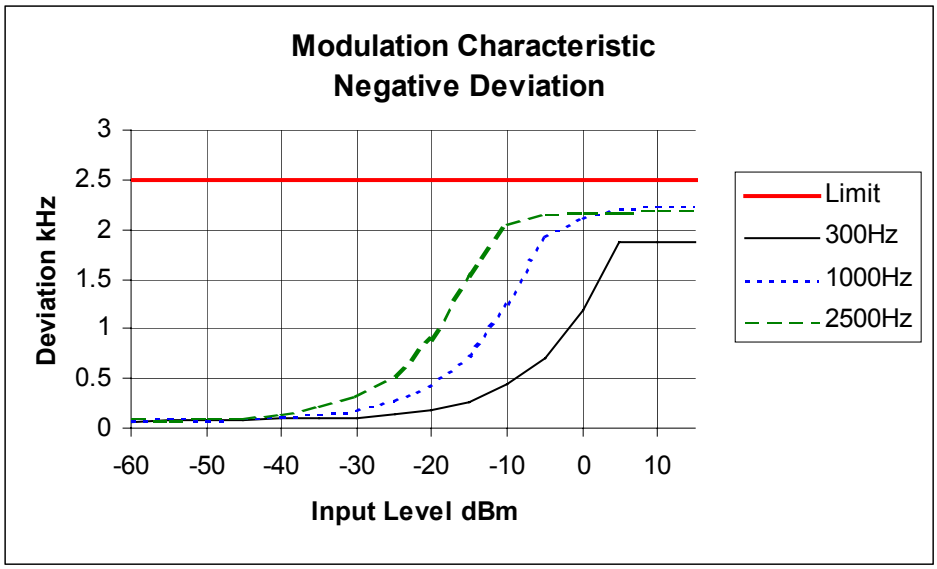
MEASUREMENT PROCEDURE:
1. Refer Appendix A for Equipment set up.
2. The modulation response was measured at three audio frequencies while varying the input level.
3. Measurements were made for both Positive and Negative Deviation.

MEASUREMENT RESULTS:
Refer measurement plots below.

LIMIT CLAUSE: TIA/EIA-603B 1.3.4.4

Tx FREQUENCY: 904.1 MHz 12.5 kHz Channel Spacing





OCCUPIED BANDWIDTH

SPECIFICATION: FCC 47 CFR 2.1049 (c)

GUIDE: TIA/EIA-603B 2.2.11

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, and C – Resolution bandwidth = 300Hz, Video Bandwidth = 3 kHz

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

LIMIT CLAUSE: FCC 47 CFR 90.210

EMISSION MASKS

Emission Mask D	12.5 kHz Channel Spacing	Analogue; FFSK

DATA SPEED:

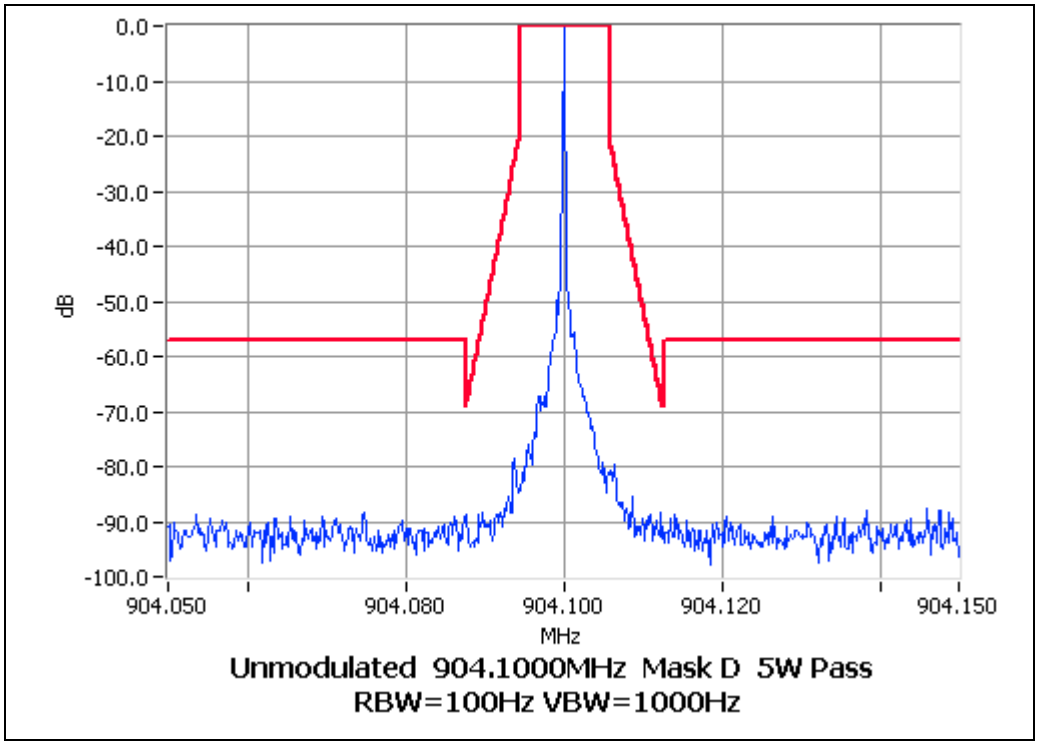
FFSK	1200 bps	12.5 kHz Channel Spacing

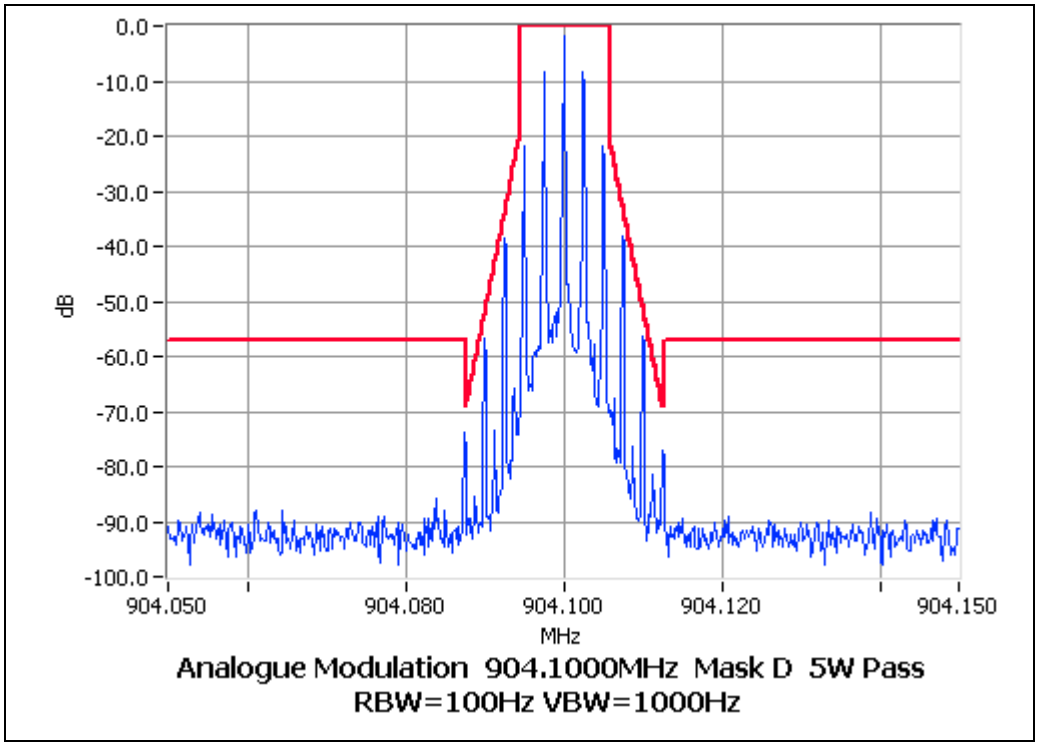
OCCUPIED BANDWIDTH

ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 904.1 MHz 5 W 12.5 kHz Channel Spacing



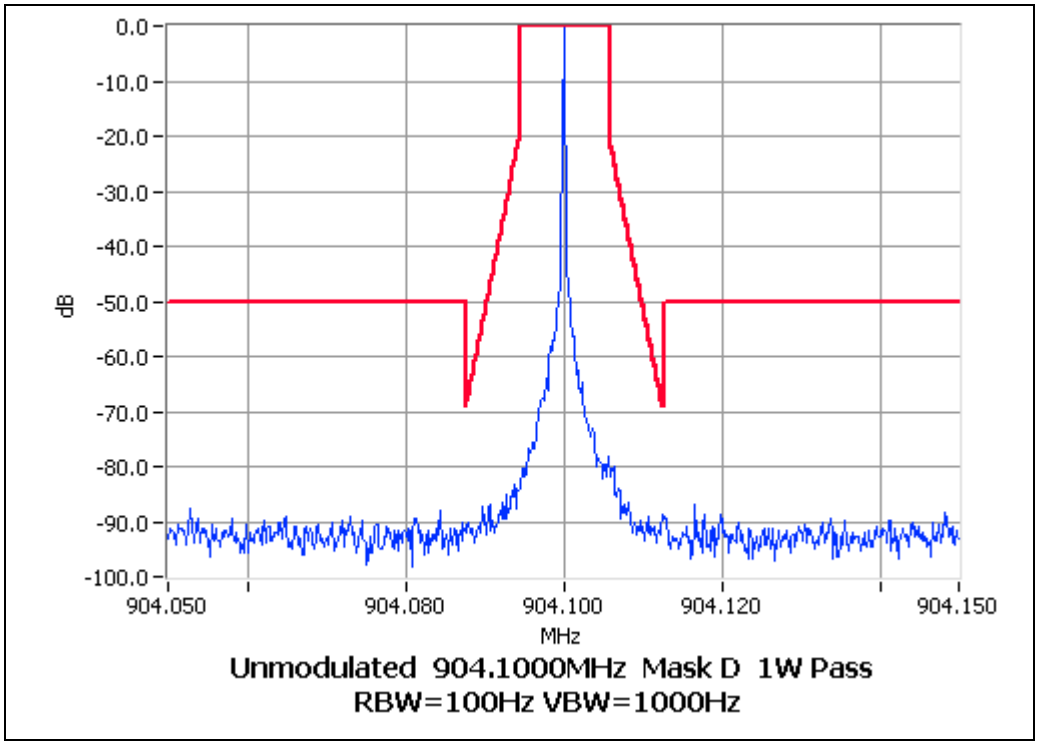


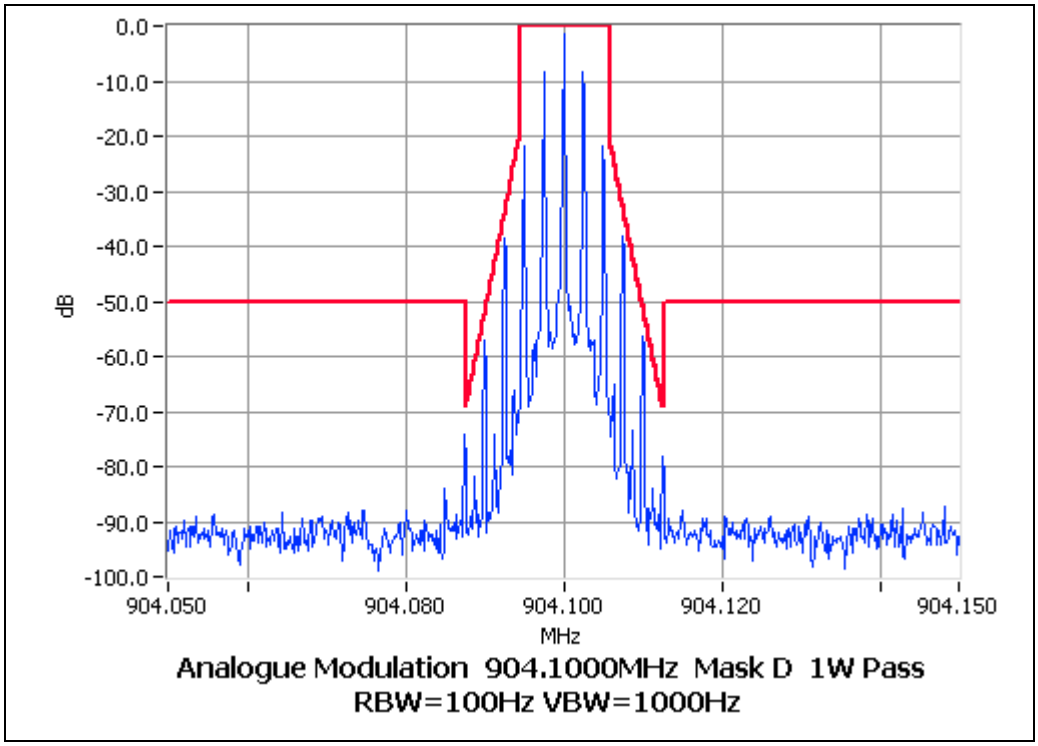
OCCUPIED BANDWIDTH

ANALOGUE VOICE

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 904.1 MHz 1 W 12.5 kHz Channel Spacing



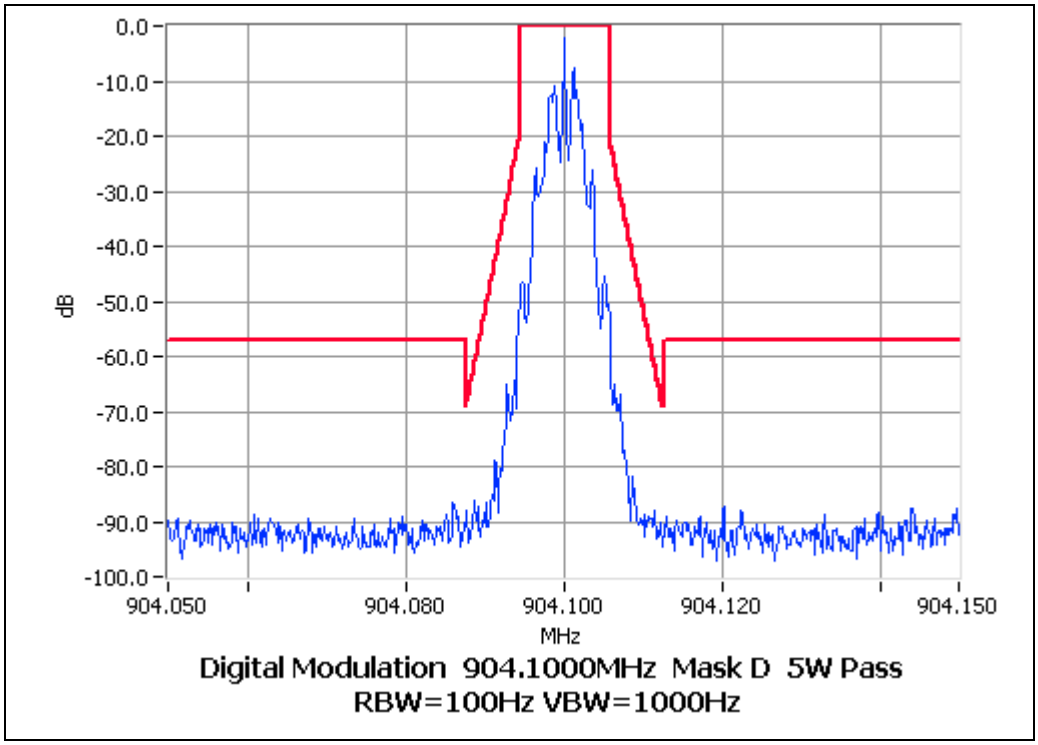


OCCUPIED BANDWIDTH

FFSK

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 904.1 MHz 5 W 12.5 kHz Channel Spacing

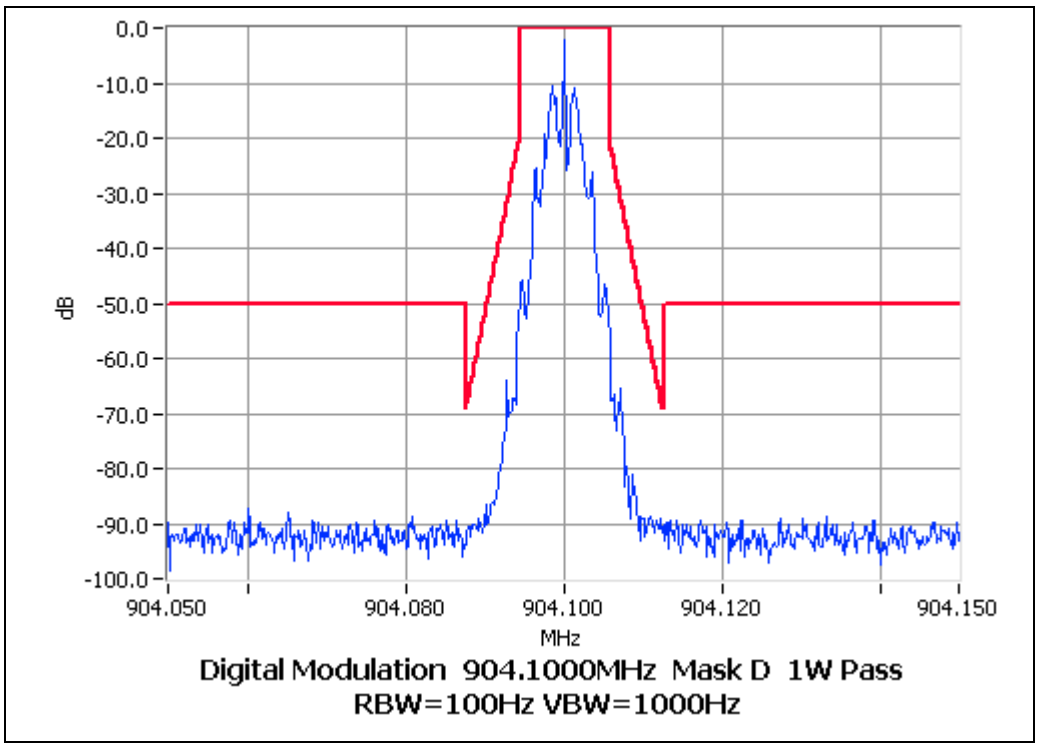


OCCUPIED BANDWIDTH

FFSK

SPECIFICATION: FCC CFR 2.1049 (c)

Tx FREQUENCY: 904.1 MHz 1 W 12.5 kHz Channel Spacing



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 °C to +50°C in 10 °C increments
3. The frequency error was recorded in parts per million (ppm).

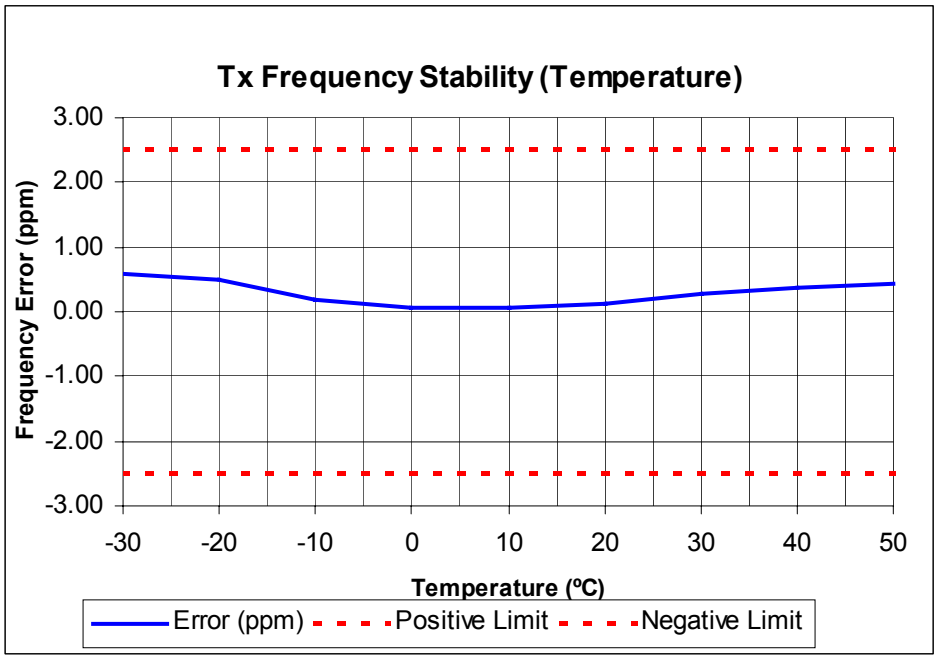
MEASUREMENT RESULTS:
Refer measurement plots below.

LIMIT CLAUSE: FCC 47 CFR 90.213

Frequency Range: 902 MHz ~ 928 MHz

Channel Spacing (kHz)	Frequency Error (ppm)
12.5	2.5

Tx FREQUENCY: 904.1 MHz 5 W 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 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: 902 MHz ~ 928 MHz

Channel Spacing (kHz)	FREQUENCY ERROR (ppm) @ 904.1 MHz		
	11.7 V DC	13.8 V DC	15.9 V DC
12.5	0.09	0.08	0.09

LIMIT CLAUSE: FCC 47 CFR 90.213

Channel Spacing (kHz)	Frequency Error (ppm)
12.5	2.5

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
15	Power Meter	Rohde & Schwarz	NRVS 1020.1809.02	841954/005	E3555	11-Mar-05
16	Power Sensor	Rohde & Schwarz	URV5- Z4 395.1619. 55	841.498/003	E3557	11-Mar-05
21	Power Supply	Rohde & Schwarz	NGS M32/10 192.0810.31	Fnr 434	E3556	14-Jun-05
82	3m Coax Cable BLUE)	Suhner	Sucoflex 104A	25033/4A	E3694	19-Nov-05
83	1m Coax Cable (BLUE)	Suhner	Sucoflex 104A	25006/4A	E3693	19-Nov-05
87	Audio Analyser	Hewlett Packard	HP8903B	2818A04275	E3710	12-Nov-05
99	BER Meter	Datatool	5000	9405003	-	
111	Modulation Analyser	Hewlett Packard	HP8901B (Opt 002)	3704A05837	E3786	06-Nov-05
117	RF Attenuator	Weinschel	Model 1	BL9950	E4080	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	E4280	13-Aug-05

APPENDIX A

TEST SETUP DETAILS

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.