

LABORATORY TEST REPORT

RADIO PERFORMANCE MEASUREMENTS

for the

TMBK5B Mobile Transceiver

Tested in accordance with:

FCC 47 CFR Parts 2 & 27

Report Revision: 1

Issue Date: 21 September 2016

PREPARED BY: Aaron. Fan


Test Technician

CHECKED & APPROVED BY: M. C. James


Laboratory Technical Manager



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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TELTEST Laboratories (A Division of Tait Communications)
PO Box 1645, 558 Wairakei Road, Christchurch, New Zealand.

Tele50one: 64 3 358 3399
FAX: 64 3 359 4632

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REVISION

Date	Revision	Comments
21 September 2016	1	Initial test report

INTRODUCTION

Type approval testing of the Mobile, 30 Watt, TMBK5B transceiver. This report aims to demonstrate compliance in the 757-758MHz/787-788MHz band in accordance with:

FCC 47 CFR Part 2 & Part 27

This radio has previously been tested at other frequencies in Teltest report 3539.

REPORT PREPARED FOR

Tait Ltd
245 Wooldridge Road
Harewood
Christchurch 8051
New Zealand

DESCRIPTION OF SAMPLE

Manufacturer: Tait Limited
Equipment: Mobile Transceiver
Type: TMBK5B
Serial number: 20301709
Quantity: 1

HARDWARE & SOFTWARE Details:

Head

Type	Code and Version
Hardware ID	TMBC12-0100_0006
Boot Code	QCB1B_S00_3.01.03.0001
Radio Application	QCB1F_S00_1.01.06.0020
FPGA Image	QCB1G_S00_1.07.00.0002

Torso

Type	Code and Version
Hardware ID	TMBB14-K500_0006
Boot Code	QMB1B_S00_3.01.03.0001
DSP	QMB1A_E00_2.10.02.0067
Radio Application	QMB1F_E00_2.10.02.0067
FPGA Image	QMB1G_S00_1.09.00.0003

TEST CONDITIONS

All testing was performed between 14 → 20 September 2016, and under the following conditions:

Ambient temperature: 15°C → 30°C
Relative Humidity: 20% → 75%
Standard Test Voltage 13.8 V_{DC}

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: TMBK5B
Serial Number: 20301709
Quantity: 1

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

FCC 47 CFR Part 2 & Part 27

Signature: 

Mike James
Technical Manager

Date: 26 September 2016

MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS

MODULATION TYPES:

F3E	FM Analogue Voice	-	-
F2D	Fast Frequency Shift Keying	1200 symbols/sec	1200 bps
		2400 symbols/sec	2400 bps
FXW	Digital Voice / Data	4800 symbols/sec	9600 bps
FXD	Digital Data	4800 symbols/sec	9600 bps

EMISSION DESIGNATORS:

	12.5 kHz Channel Spacing	25.0 kHz Channel Spacing
Analogue Voice	11K0F3E	16K0F3E
FFSK 1200 baud	6K60F2D	9K60F2D
FFSK 2400 baud	7K80F2D	10K8F2D
DMR Digital Voice / Data	7K60FXW	-
DMR Digital Data	7K60FXD	-

Equation: $B_n = 2M + 2Dk$

(M is highest modulating frequency; D is peak allowable deviation; k is a constant of 1 for FM)

Analogue Voice 12.5 kHz Channel Spacing

Necessary bandwidth

M = 3.0 kHz

D = 2.5 kHz

$$B_n = (2 \times 3.0) + (2 \times 2.5) \times 1$$

$$= 11.0 \text{ kHz}$$

Emission Designator

11K0F3E

F3E represents an FM voice transmission

Analogue Voice 25.0 kHz Channel Spacing

Necessary bandwidth

M = 3.0 kHz

D = 5.0 kHz

$$B_n = (2 \times 3.0) + (2 \times 5.0) \times 1$$

$$= 16.0 \text{ kHz}$$

Emission Designator

16K0F3E

F3E represents an FM voice transmission

Fast Frequency Shift Keying (FFSK – 1200 bps) 12.5 kHz Channel Spacing

Necessary bandwidth

M = 1.8 kHz

D = 1.5 kHz

$$B_n = (2 \times 1.8) + (2 \times 1.5) \times 1$$

$$= 6.6 \text{ kHz}$$

Emission Designator

6K60F2D

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

Fast Frequency Shift Keying (FFSK – 1200 bps) 25.0 kHz Channel Spacing

Necessary bandwidth

M = 1.8 kHz

D = 3.0 kHz

$$B_n = (2 \times 1.8) + (2 \times 3.0) \times 1$$

$$= 9.6 \text{ kHz}$$

Emission Designator

9K60F2D

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

Fast Frequency Shift Keying (FFSK – 2400 bps) 12.5 kHz Channel Spacing

Necessary bandwidth

M = 2.4 kHz

D = 1.5 kHz

$$B_n = (2 \times 2.4) + (2 \times 1.5) \times 1 \\ = 7.8 \text{ kHz}$$

Emission Designator

7K80F2D

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

Fast Frequency Shift Keying (FFSK – 2400 bps) 25.0 kHz Channel Spacing

Necessary bandwidth

M = 2.4 kHz

D = 3.0 kHz

$$B_n = (2 \times 2.4) + (2 \times 3.0) \times 1 \\ = 10.8 \text{ kHz}$$

Emission Designator

10K8F2D

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

Digital Mobile Radio (DMR)

4 level FSK (as per ETSI TS 102 361-1)
4800 symbols/sec 9600 bps

Digital Data 12.5 kHz Channel Spacing

99% bandwidth = 7.6 kHz

Emission Designator

7K60FXW

FXW represents FM combination of data & telephony.

Digital Data 12.5 kHz Channel Spacing

99% bandwidth = 7.6 kHz

Emission Designator

7K60FXD

FXD represents FM of data only transmission.

TEST RESULTS

TRANSMITTER OUTPUT POWER (CONDUCTED)

SPECIFICATION: FCC 47 CFR 2.1046
FCC 47 CFR 27.50

GUIDE: TIA-102.CAAA-C 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:

Manufacturer's Rated Output Power:

Switchable: 30 W and 2 W

Tx 787.5 MHz	Nominal 30 W	Nominal 2 W
Measured	32.3	2.5
Variation (%)	7.8	22.8
Variation (dB)	0.3	0.9
Measurement Uncertainty: ± 0.6 dB		

LIMIT CLAUSES:

Subpart C Section 27.50 (b) (9): Control stations and mobile stations transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands and fixed stations transmitting in the 787-788MHz and 805-806MHz bands are limited to 30 watts ERP.

For use in this band the radio will need to be used in conjunction with an antenna system with a gain of less than $0.3\text{dB}_{\text{dipole}}$ or used at a lower power setting.

TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS

SPECIFICATION: FCC 47 CFR 2.1047 (a)

GUIDE: TIA/EIA-603E 2.2.6

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment set up.
2. An audio input tone of 1000 Hz was applied with the level set to obtain 20% of maximum deviation. This was used as the 0 dB reference point.
3. The AF was varied while the audio level was held constant.
4. The response in dB relative to 1000 Hz was measured.

MEASUREMENT RESULTS:

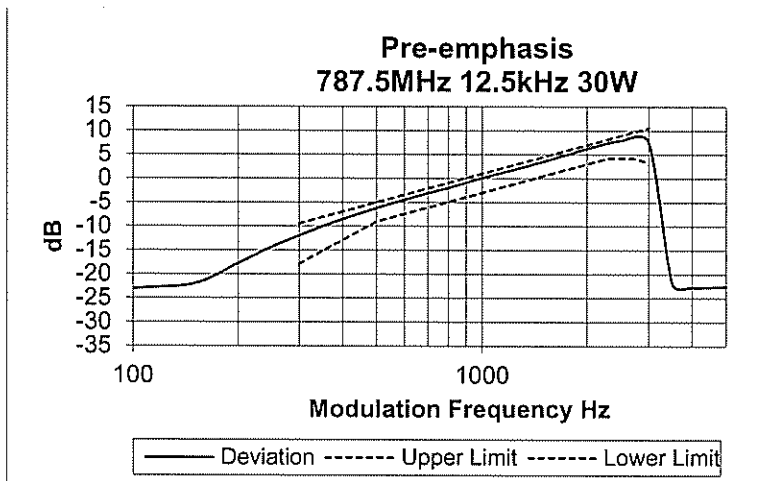
See the plots below for 12.5 kHz & 25.0 kHz channel spacings tested at 3 W transmit power.

LIMIT CLAUSE: TIA/EIA-603E 3.2.6

SPECIFICATION: FCC CFR 2.1047 (a)

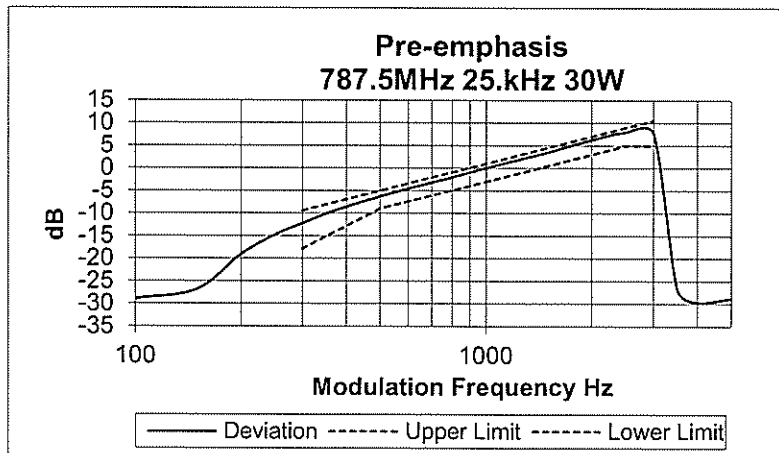
Tx FREQUENCY: 787.5 MHz

12.5 kHz Channel Spacing



Tx FREQUENCY: 787.5 MHz

25.0 kHz Channel Spacing



TRANSMITTER MODULATION LIMITING

SPECIFICATION: FCC 47 CFR 2.1047 (b)

GUIDE: TIA/EIA-603E 2.2.3

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:

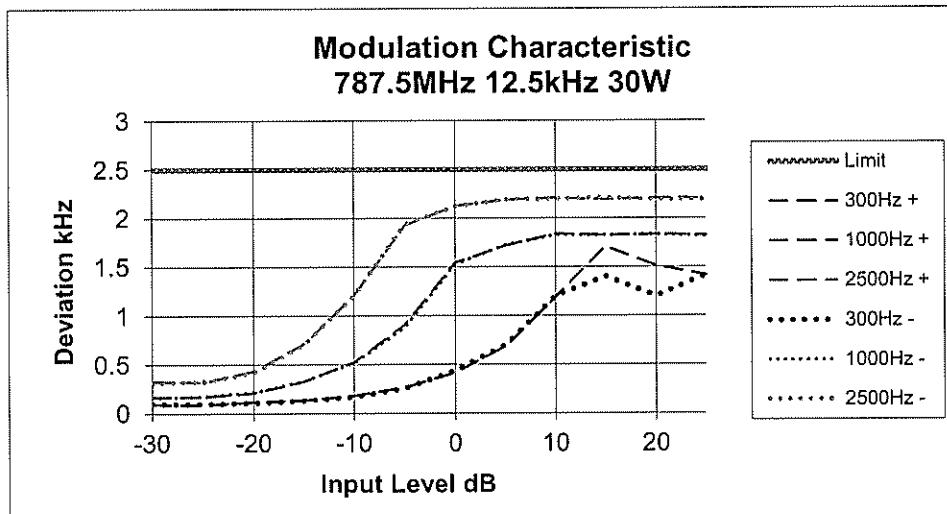
See the plots below for 12.5 kHz & 25.0 kHz channel spacings tested at 3 W transmit power.

LIMIT CLAUSE: TIA/EIA-603E 1.3.4.4

SPECIFICATION: FCC CFR 2.1047 (b)

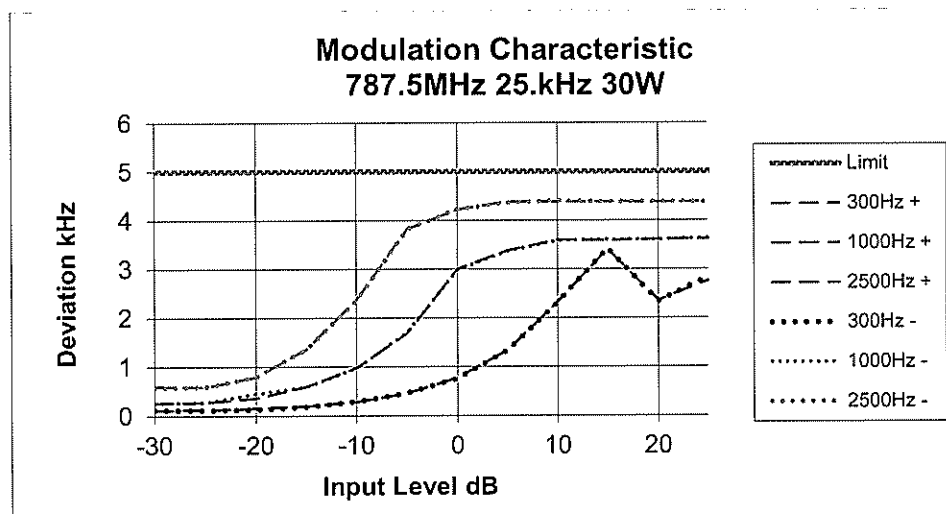
Tx FREQUENCY: 787.5 MHz

12.5 kHz Channel Spacing



Tx FREQUENCY: 787.5 MHz

25.0 kHz Channel Spacing



TRANSMITTER OCCUPIED BANDWIDTH

SPECIFICATION: FCC 47 CFR 2.1049 (c)

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

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment Set up.
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 Analyzer, with bandwidth settings as follows.
Resolution Bandwidth = 200 Hz, Video Bandwidth = 2KHz

MEASUREMENT RESULTS:

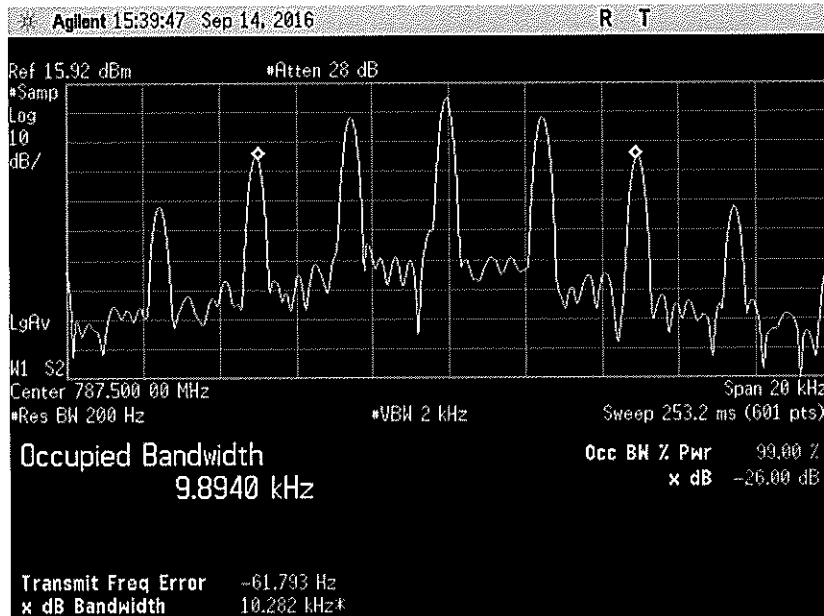
See the plots on the following pages

Tx FREQUENCY: 787.5 MHz

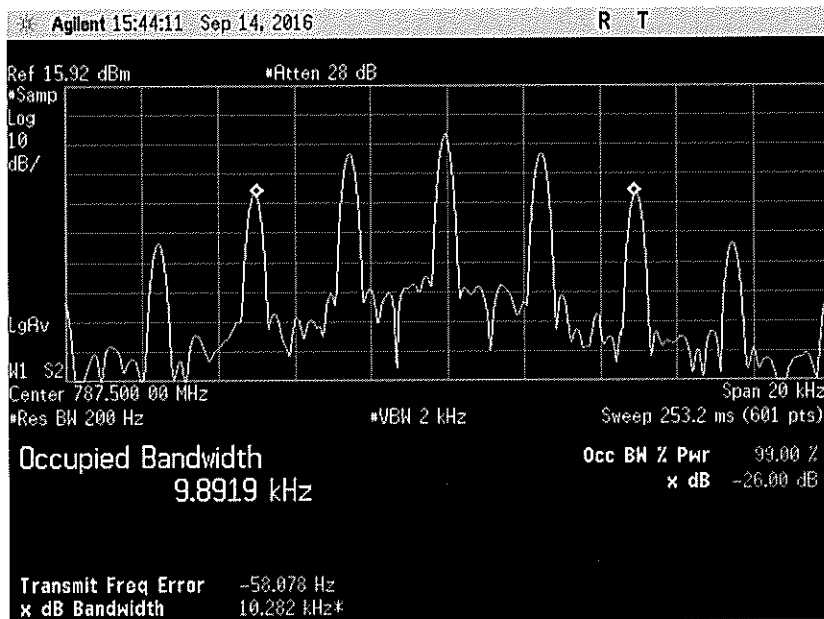
Modulation	Channel Spacing (kHz)	Power (W)	Occupied Bandwidth (kHz)
Analogue FM	12.5	30	9.89
	12.5	2	9.89
	25.0	30	14.88
	25.0	2	14.88
FFSK 1200 baud	12.5	30	5.76
	12.5	2	5.61
	25.0	30	9.20
	25.0	2	9.01
FFSK 2400 baud	12.5	30	5.19
	12.5	2	5.18
	25.0	30	9.57
	25.0	2	9.51
DMR	12.5	30	7.57
	12.5	2	7.43

Occupied Bandwidth

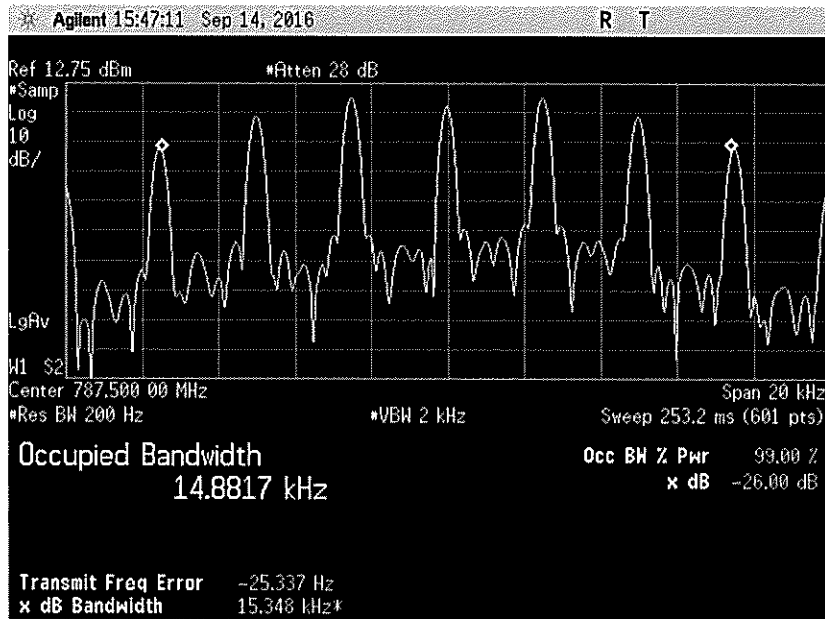
Tx 787.5 MHz 30 Watts 12.5 kHz channel spacing, Analogue FM



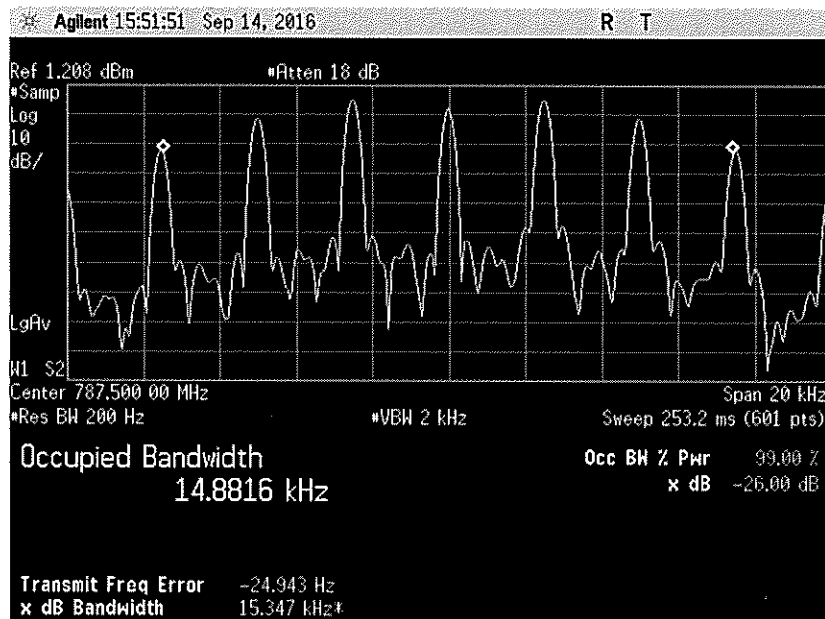
Tx 787.5 MHz 2 Watt 12.5 kHz channel spacing, Analogue FM



Tx 787.5 MHz 30 Watts 25 kHz channel spacing, Analogue FM



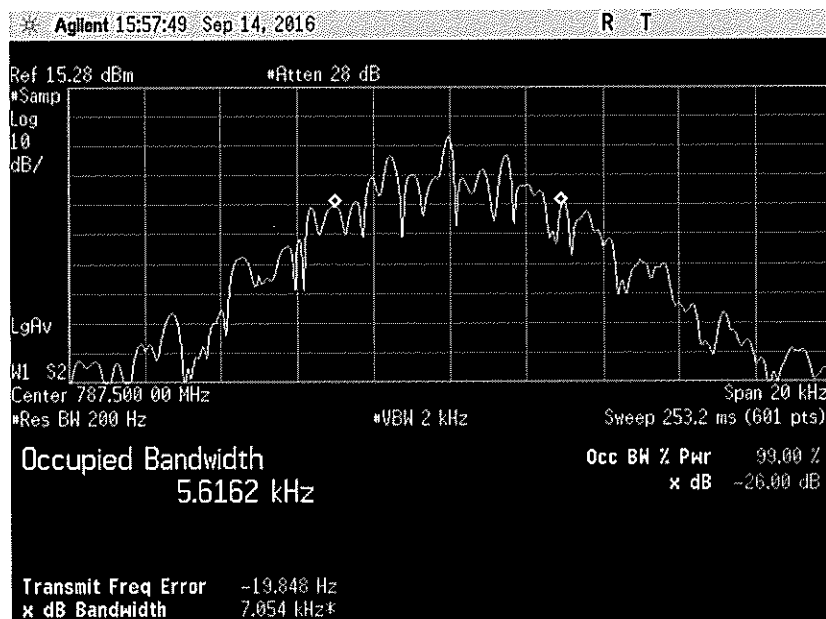
Tx 787.5 MHz 2 Watts 25 kHz channel spacing, Analogue FM



Tx 787.5 MHz 30 Watts 12.5 kHz channel spacing, FFSK 1200



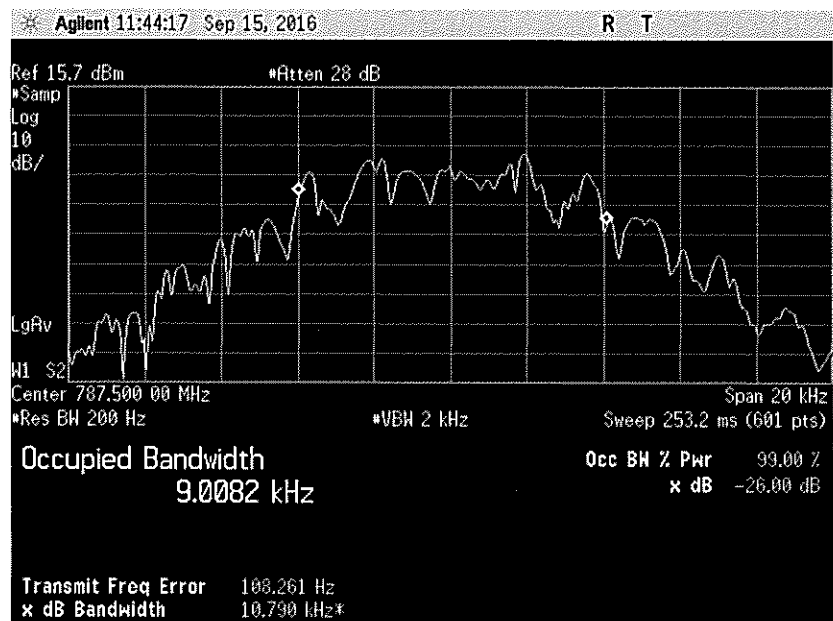
Tx 787.5 MHz 2 Watts 12.5 kHz channel spacing, FFSK 1200



Tx 787.5 MHz 30 Watts 25 kHz channel spacing, FFSK 1200



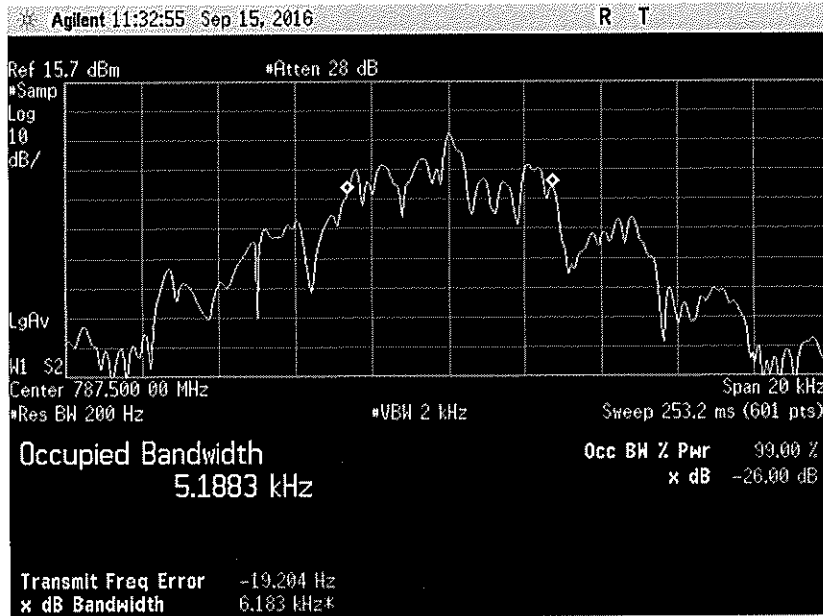
Tx 787.5 MHz 2 Watts 25 kHz channel spacing, FFSK 1200



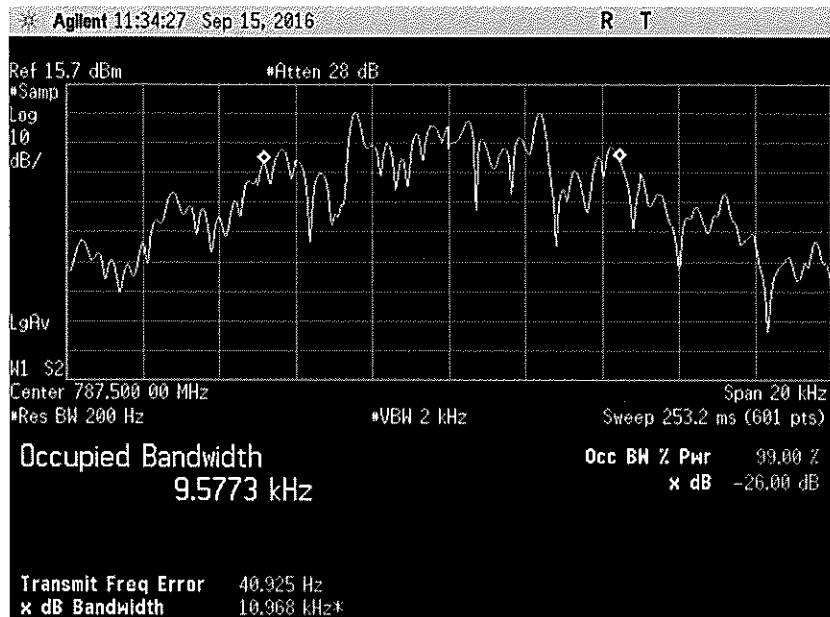
Tx 787.5 MHz 30 Watts 12.5 kHz channel spacing, FFSK 2400



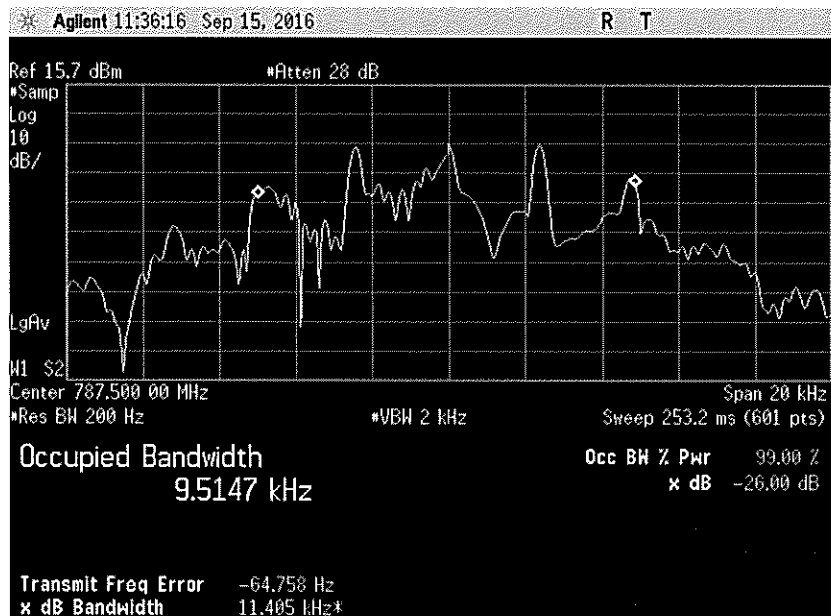
Tx 787.5 MHz 2 Watts 12.5 kHz channel spacing, FFSK 2400



Tx 787.5 MHz 30 Watts 25 kHz channel spacing, FFSK 2400



Tx 787.5 MHz 2 Watts 25 kHz channel spacing, FFSK 2400



Tx 787.5 MHz 30 Watts 12.5 kHz channel spacing, DMR



Tx 787.5 MHz 2 Watts 12.5 kHz channel spacing, DMR



TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED) Part 1

SPECIFICATIONS: FCC 47 CFR 2.1051
GUIDE: TIA-102.CAAA-C 2.2.7

MEASUREMENT PROCEDURE:

1. Refer Annex 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 10th Harmonic: 100 kHz to Fc-BW
Fc+ BW to 10Fc 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 20 dB of the limit a second measurement is made with the carrier modulated, and a resolution bandwidth of 10 kHz, and a video bandwidth of 30 kHz.

Spurious emissions which were attenuated by more than 20 dB below the limit were not recorded.

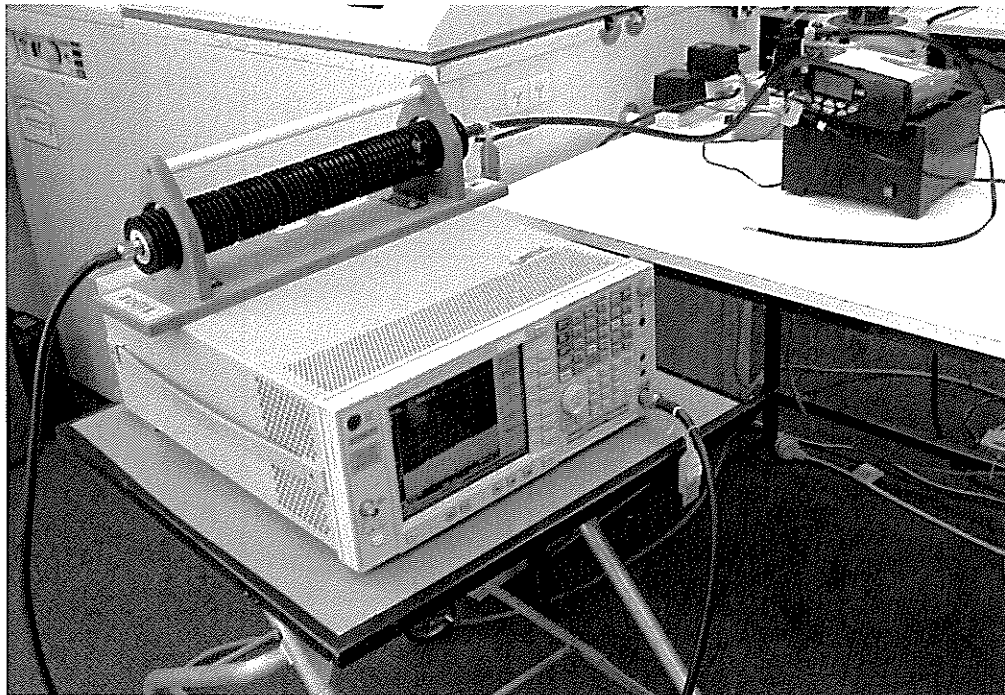
A photograph of the test set-up is included below.

MEASUREMENT RESULTS:

See the tables on the following pages.

LIMIT CLAUSES: FCC 47 CFR 27.53 c (1)

Photo: Conducted Emissions Test Setup



Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC 47 CFR 27.53 c(1)

Tx FREQUENCY: 787.5 MHz

12.5 kHz Channel Spacing 787.5 MHz @ 30 W

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than -40 dBm.		

12.5 kHz Channel Spacing 787.5 MHz @ 2 W

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than -40 dBm.		

LIMITS: FCC 47 CFR 27.53 c (1)

Carrier Output Power	$43 + 10 \log_{10} (P_{\text{Watts}})$	
30 W	-13 dBm	-58 dBc
2 W	-13 dBm	-46 dBc

TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED) Part 2

SPECIFICATIONS: FCC 47 CFR 27.53 c (3) & (6)
GUIDE: TIA-102.CAAA-C 2.2.7

MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. The frequency range examined was from 763-775MHz and 793-805MHz.
3. A Scan is performed with a resolution bandwidth of 6.25 kHz, and a video bandwidth of 6.25 kHz.

MEASUREMENT RESULTS:

See the tables and plots on the following pages.

LIMIT CLAUSES: FCC 47 CFR 27.53 c (3) & (6)

Tx FREQUENCY: 787.5 MHz

12.5 kHz Channel Spacing 787.5 MHz @ 30 W

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected exceeding the limit.		

12.5 kHz Channel Spacing 787.5 MHz @ 2 W

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected exceeding the limit.		

25.0 kHz Channel Spacing 787.5 MHz @ 30 W

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected exceeding the limit.		

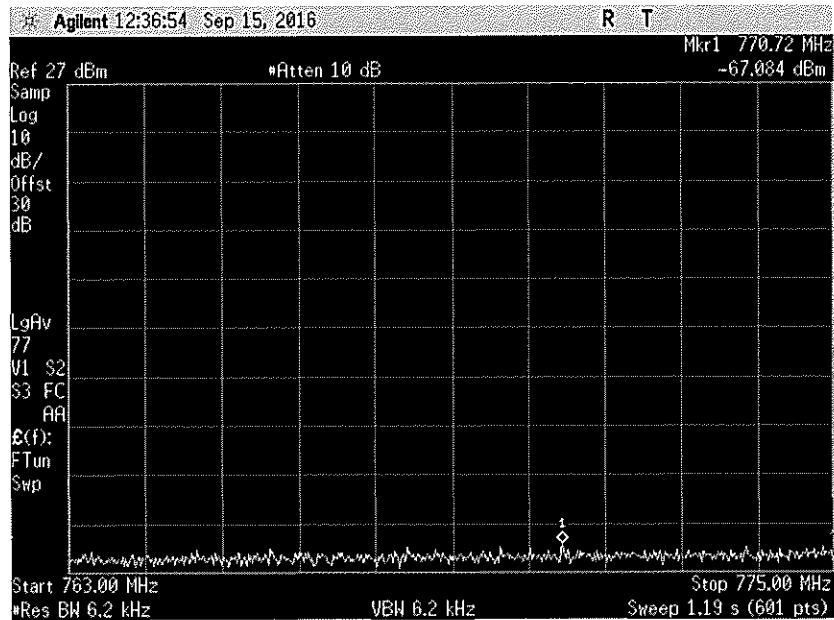
25.0 kHz Channel Spacing 787.5 MHz @ 2 W

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected exceeding the limit.		

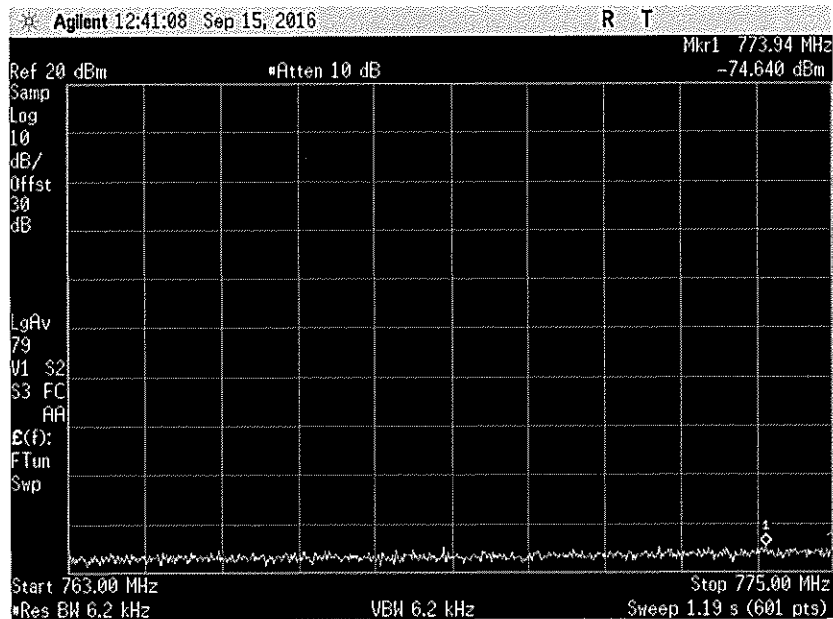
LIMITS: FCC 47 CFR 27.53 c (3) & (6)

Carrier Output Power	$76 + 10 \log_{10} (P_{\text{Watts}})$	
30 W	-46 dBm	-91 dBc
2 W	-46 dBm	-79 dBc

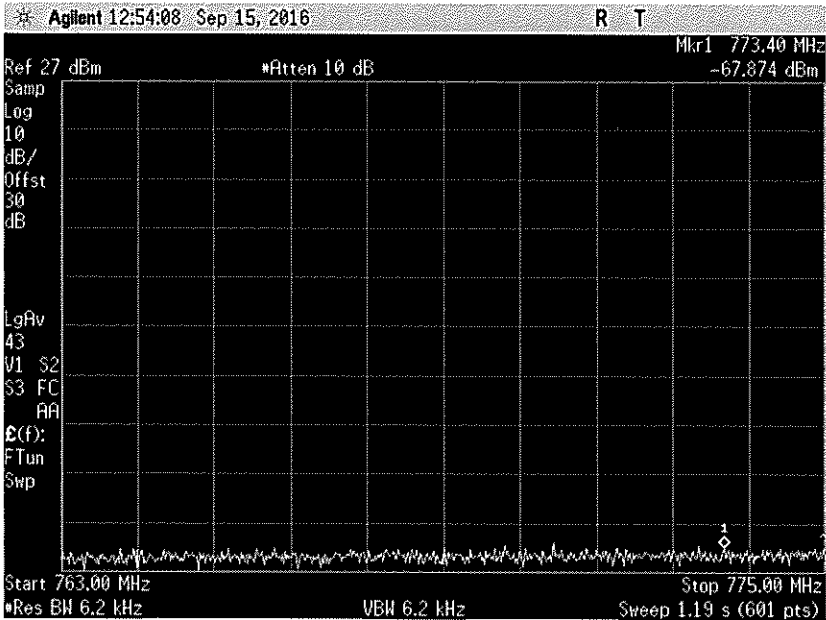
30 Watts 763-775 MHz Scan 12.5kHz channel spacing



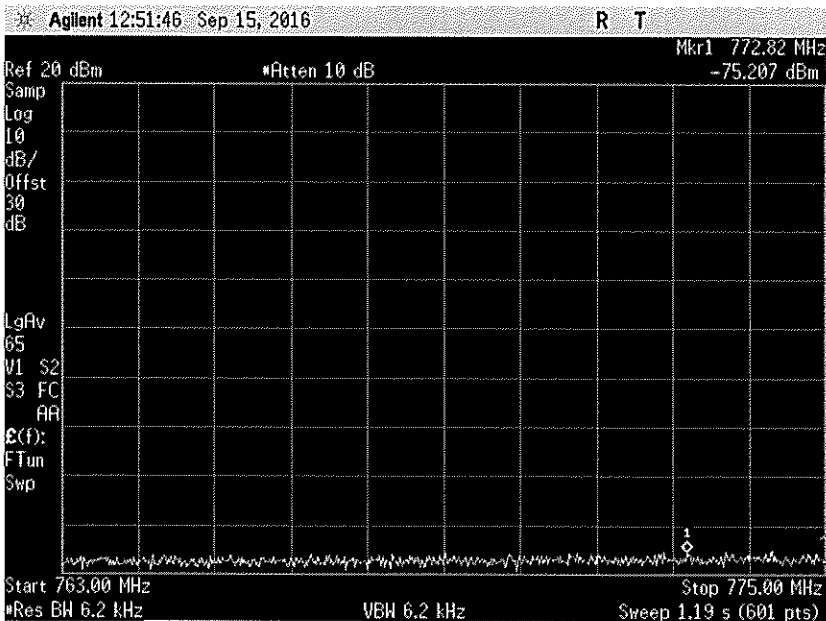
2 Watts 763-775 MHz Scan 12.5kHz channel spacing



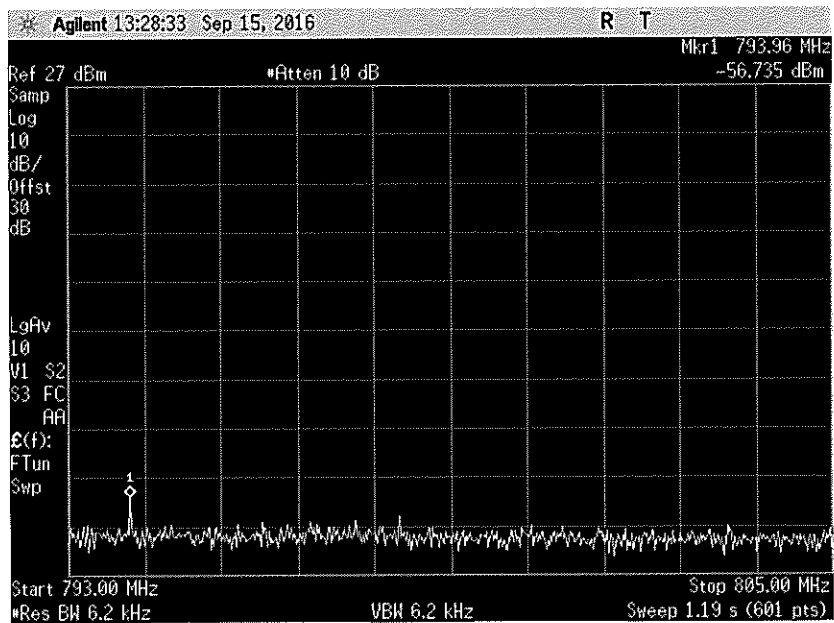
30 Watts 763-775 MHz Scan 25kHz channel spacing



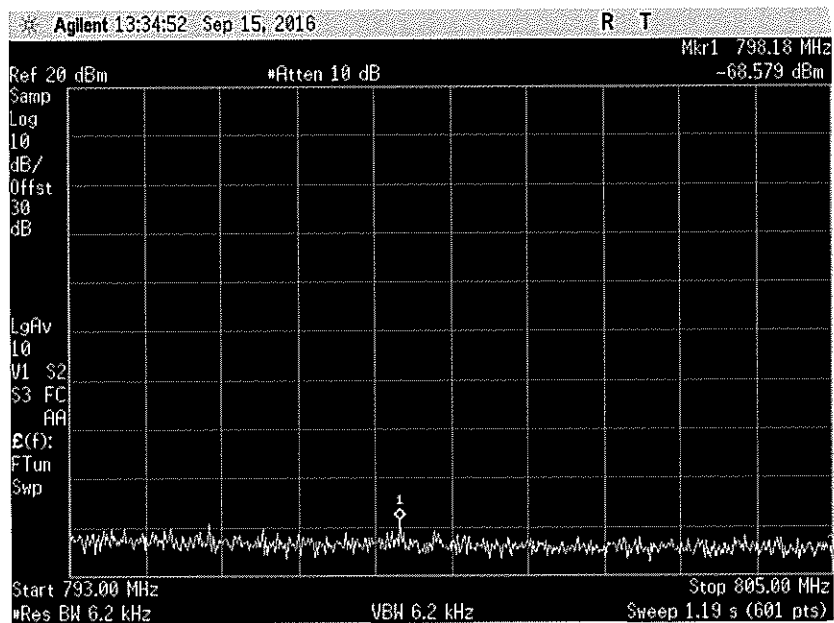
2 Watts 763-775 MHz Scan 25kHz channel spacing



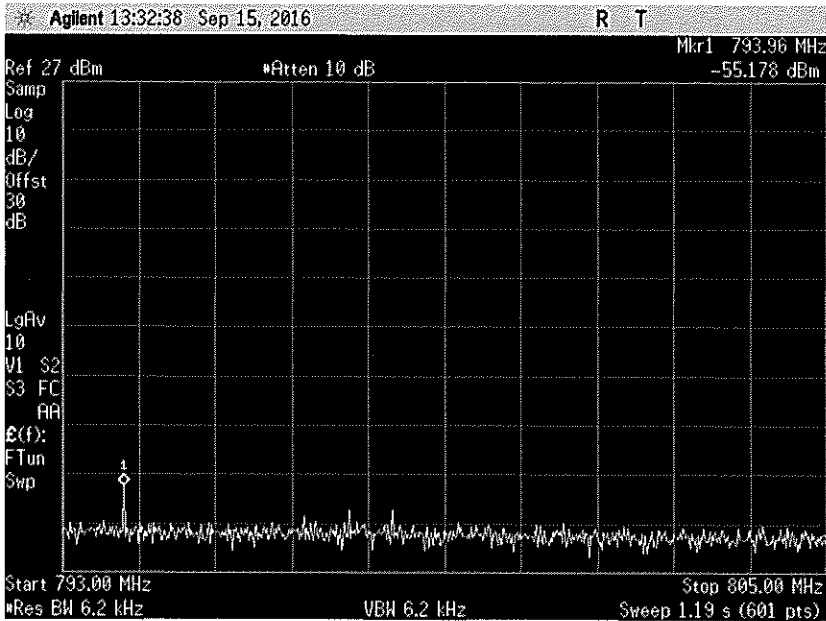
30 Watts 793-805 MHz Scan 12.5kHz channel spacing



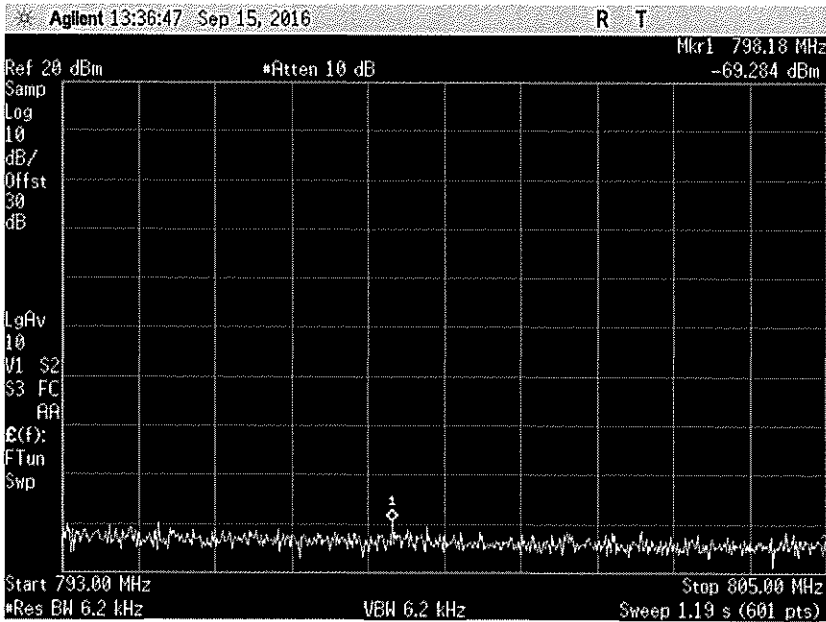
2 Watts 793-805 MHz Scan 12.5kHz channel spacing



30 Watts 793-805 MHz Scan 25kHz channel spacing



2 Watts 793-805 MHz Scan 25kHz channel spacing



TRANSMITTER SPURIOUS EMISSIONS (RADIATED) Part 1

SPECIFICATION: FCC 47 CFR 2.1053

GUIDE: TIA-102.CAAA-C 2.2.6

MEASUREMENT PROCEDURE:

Initial Scan:

1. The EUT is placed in the S-Line TEM cell and emissions are measured from 30 MHz to 800 MHz. Any emission within 20 dB of the limit is then re-tested on the OATS.
2. The EUT is placed in the reverberation chamber and emissions are measured from 800 MHz to the upper frequency required. Any emission within 20 dB of the limit is then re-tested on the OATS.
3. The harmonics emissions up to the 6th harmonic of the fundamental frequency are measured on the OATS

OATS Measurement:

1. The EUT is placed on a wooden turntable at a distance of three metres from the test antenna. The output terminal is connected to an RF dummy load.
2. The test antenna is raised from 1 m to 4 m to obtain a maximum reading; the turntable is then rotated through 360° to obtain the maximum response of each spurious emission. Valid emissions are determined by switching the EUT on and off.
3. The EUT is then 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 27.53 c (1)

Spurious Emissions (Tx Radiated)

SPECIFICATION: FCC CFR 2.1053

12.5 kHz Channel Spacing

787.5 MHz @ 30 W

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than -40dBm		

12.5 kHz Channel Spacing

787.5 MHz @ 2 W

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than -40dBm		

LIMITS: FCC 47 CFR 27.53 c (1)

Carrier Output Power	$43 + 10 \log_{10} (P_{\text{Watts}})$	
30 W	-13 dBm	-58 dBc
2 W	-13 dBm	-46 dBc

Tx Radiated Emissions - Continued

Open Area Test Site Results for first six harmonics:

12.5 kHz Channel Spacing

787.5 MHz @ 30 W

Harmonics Emission Frequency (MHz)	Level (dBm)	Level (dBc)
1575.0	-43.40	-88.20
2362.5	-51.44	-96.24
3150.0	-61.36	-106.16
3937.5	-54.80	-99.60
4725.0	-61.65	-106.45
5512.5	-53.03	-97.83

Photo: OATS Setup



TRANSMITTER SPURIOUS EMISSIONS (RADIATED) Part 2

SPECIFICATIONS: FCC 47 CFR 27.53 c (3) & (6)
GUIDE: TIA-102.CAAA-C 2.2.7

MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. The frequency range examined was from 763-775MHz and 793-805MHz.
3. A Scan is performed with a resolution bandwidth of 6.25 kHz, and a video bandwidth of 6.25kHz.

MEASUREMENT RESULTS:

See the tables below.

LIMIT CLAUSES: FCC 47 CFR 27.53 c (3) & (6)

Tx FREQUENCY: 787.5 MHz

12.5 kHz Channel Spacing 787.5 MHz @ 30 W

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected exceeding the limit.		

LIMITS: FCC 47 CFR 27.53 c (3) & (6)

Carrier Output Power	12.5 kHz Channel Spacing $76 + 10 \log_{10} (P_{\text{Watts}})$	
30 W	-46 dBm	-91 dBc
2 W	-46 dBm	-79 dBc

TRANSMITTER SPURIOUS EMISSIONS (RADIATED) Part 3

SPECIFICATIONS: FCC 47 CFR 27.53 (f)
GUIDE: TIA-102.CAAA-C 2.2.7

MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. The frequency range examined was from 1559-1610 MHz.
3. A Scan is performed with a resolution bandwidth of 1MHz and 1kHz respectively.

MEASUREMENT RESULTS:

787.5 MHz 30 W 12.5 kHz Channel Spacing

Sweep Band (MHz)	Maximum Observed Level (dBuV/m)	Limit (dBuV/m)	Polarity	RBW
1559 – 1610	39.14	55.2	Horizontal	1 MHz
1559 – 1610	40.70	55.2	Vertical	1 MHz
1559 – 1610	29.09	45.2	Horizontal	1 kHz
1559 – 1610	35.70	45.2	Vertical	1 kHz

LIMIT CLAUSES: FCC 47 CFR 27.53 (f)

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Measurements were attempted at a distance of 3 metres which gave the following limits using the formula:

Field strength (V/m) = (square root (30 * power (watts))) / distance (metres)

This gave limits of 55.2 dBuV/m for wideband emissions and 45.2 dBuV/m for discrete emissions.

TRANSMITTER FREQUENCY STABILITY - TEMPERATURE

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

GUIDE: TIA-102.CAAA-C 2.2.2

MEASUREMENT PROCEDURE:

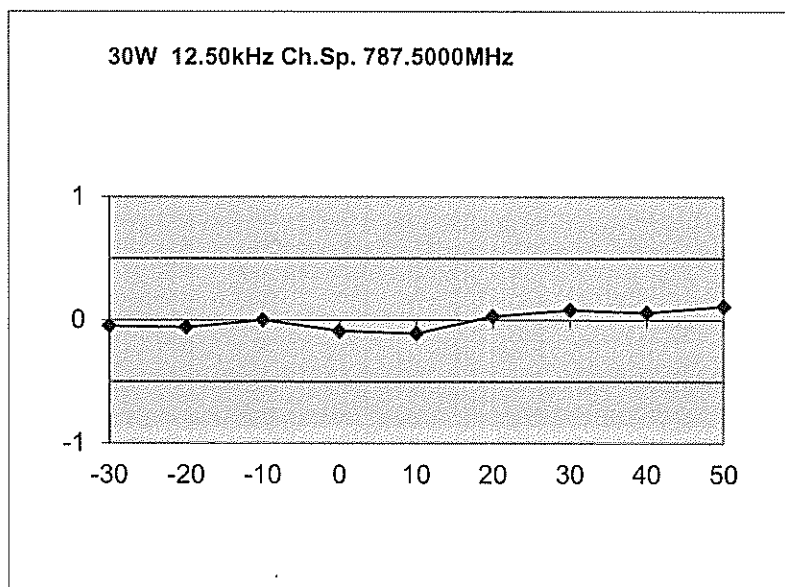
1. Refer Annex A for equipment set up.
2. The EUT was tested for frequency error from -30°C to $+50^{\circ}\text{C}$ in 10°C increments
3. The frequency error was recorded in parts per million (ppm).

MEASUREMENT RESULTS:

See the plots below.

Tx Frequency: 787.5 MHz 30 W

Temperature ($^{\circ}\text{C}$)	Frequency (Hz)	Error (ppm)
-30	-36	-0.05
-20	-50	-0.06
-10	-2	0
0	-71	-0.09
10	-83	-0.11
20	22	0.03
30	62	0.08
40	51	0.06
50	84	0.11



LIMIT: FCC 47 CFR 27.54

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TRANSMITTER FREQUENCY STABILITY - VOLTAGE

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

GUIDE: TIA-102.CAAA-C 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 100%.
3. The frequency error was recorded in parts per million (ppm).

MEASUREMENT RESULTS:

Tx Frequency: 787.5 MHz

Voltage	FREQUENCY ERROR (ppm)	FREQUENCY ERROR (ppm)
	30 W	2 W
11.7 V _{DC}	0.16	0.16
15.9 V _{DC}	0.16	0.15

LIMIT: FCC 47 CFR 27.54

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST EQUIPMENT LIST

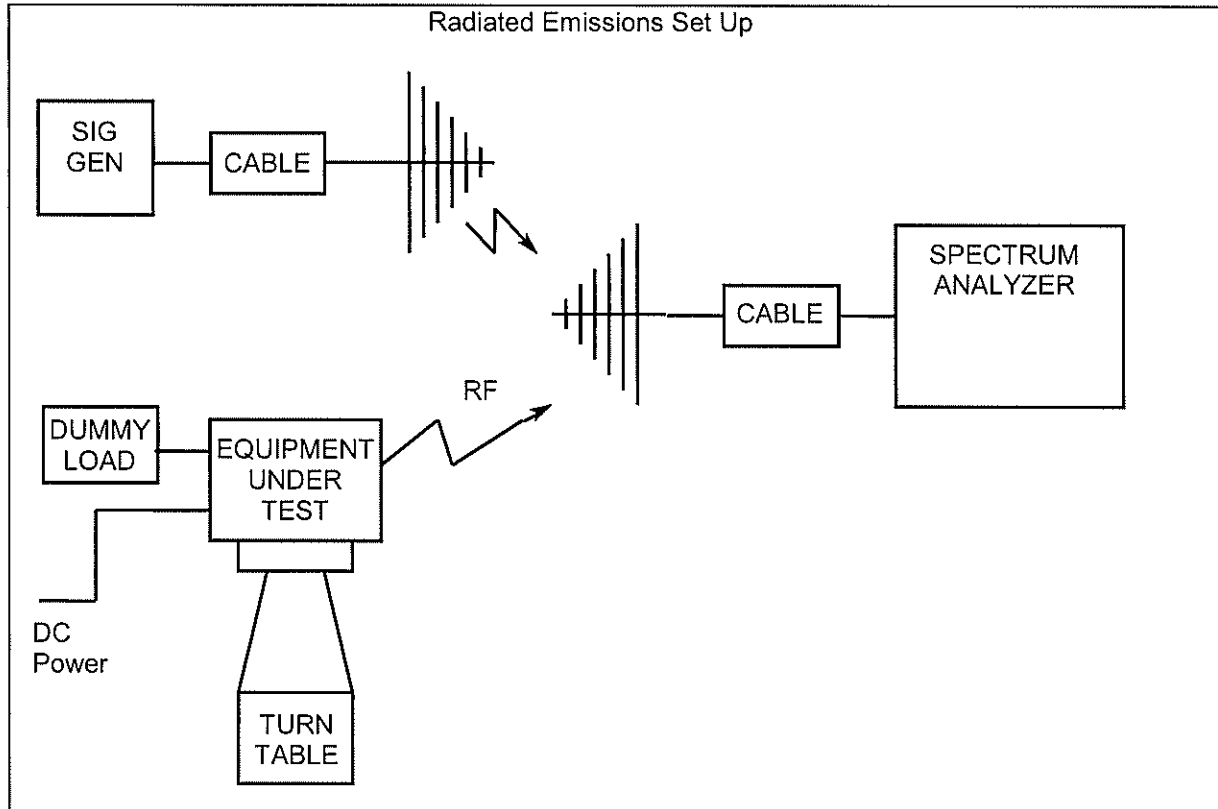
Equipment Type	Information	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
Antenna	18GHz DRG	Emco	DRG3115	9512-4638	E3560	29-Apr-19
Antenna	18GHz DRG	Emco	DRG3115	2084	E3076	29-Apr-19
Antenna	Reverb - 1-18GHz DRG	Schwarzbeck	BBHA 9120 D	9120D-885	E4857	
Antenna	Reverb - 1-18GHz DRG	Schwarzbeck	BBHA 9120 D	9120D-884	E4858	
Audio Analyser	TREVA2	Hewlett Packard	HP8903B	2818A04275	E3710	20-Oct-16
Coax Cable	2m Black	Suhner	RG214HF/Nm/Nm/2000	TeltestBlack2	E4623	18-Oct-16
Coax Cable	2m Black	Suhner	RG214HF/Nm/Nm/2000	TeltestBlack3	E4624	18-Oct-16
Coax Cable	3m Blue	Suhner	Sucoflex 104A	44611/4A	E4620	18-Oct-16
Coax Cable	OATS Turntable Cable 1	Intelcom	RG214	OATS1	E4621	20-Oct-16
Coax Cable	OATS Tower Cable	Intelcom	RG214	OATS2	E4622	20-Oct-16
Coax Cable	Reverb - 4.5m Multiflex 141	TeltestBlue6	MF 141	TeltestBlue6	E4843	20-Oct-16
Coax Cable	Reverb - 2m Multiflex 141	TeltestBlue5	MF 141	TeltestBlue5	E4844	20-Oct-16
Coax Cable	Reverb - 2m Multiflex 141	TeltestBlue4	MF 141	TeltestBlue4	E4845	20-Oct-16
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue3	MF 141	TeltestBlue3	E4846	20-Oct-16
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue2	MF 141	TeltestBlue2	E4847	20-Oct-16
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue1	MF 141	TeltestBlue1	E4848	20-Oct-16
Coax Cable	2.5m Blue	Suhner	Sucoflex 104A	33449/4PEA	E4997	18-Oct-16
Coax Cable	OATS Turntable Cable 2	Intelcom	RG215	OATS3	E4995	20-Oct-16
Environ. Chamber	Chest	Contherm	Chest	E3397	E3397	1-Aug-17
Filter High Pass		Tait	4 MHz	N/A	-	
Filter Notch Modulation Analyser		Tait		N/A	-	
	TREVA2	Hewlett Packard	HP8901B (Opt 002)	3704A05837	E3786	20-Oct-16
OATS	NSA	Tait				20-Apr-17
OATS	Antenna Tower	Electrometrics	EM-4720-2	112	E4447	
OATS	Controller	Electrometrics	EM-4700	119	E4445	
OATS	Turntable	Electrometrics	EM-4704A	105	E4446	
OATS	FCC Listing Registration TREVA2 Power Head for HP8901			837095		8-May-19
Power Meter		Hewlett Packard	HP11722A	2716A02037	1575	20-Oct-16
Power Supply	TREVA2 60V/25A	Agilent	N5767A	US09F4901H	E4656	18-Oct-17
RF Amplifier	+21.7 dB 1GHz	Tait	ZFL-1000LN	E3660	E3360	17-Jan-17
RF Amplifier	Pre-amplifier	Agilent	87405C	MY47010688	E4941	20-Oct-16
RF Attenuator	30dB 350W	Weinschel	67-30-33	BR0531	E4280	18-Oct-16
RF Attenuator	TREVA2 3dB	Weinschel	Model 1	BL9950	E4080	
RF Chamber	S-LINE TEM CELL	Rohde & Schwarz	1089.9296.02	338232/003	E3636	29-Sep-16
RF Chamber	Reverb - Stirrer controller for reverb chamber	Teseq	Stirrer Controller	29765.1	E4854	
RF Chamber	Reverb - 0.5 - 18GHz Reverberation Chamber	Teseq	RVC XS	29765	E4855	
RF Combiner	TREVA2	Minicircuits	ZFSC-4-1	-	E4084	
RF Load	150W	Bird	8166	524	E3625	
Signal Generator	Analog 4GHz	Agilent	E44228	GB40050320	E3788	18-Oct-16
Signal Generator	TREVA2 Analog 3.3GHz	Rohde & Schwarz	SML03 1090.3000.13	100597	E4050	18-Oct-16
Signal Generator	Digital 4GHz	Agilent	E4437B	US39260389	E4764	19-Aug-17

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Spectrum Analyser	26.5GHz	Agilent	PXA N9030A	MY49432161	E4907	29-Oct-16
Spectrum Analyser	13.2GHz	Agilent	E4445A	MY42510072	E4139	22-Oct-16
Transient Limiter	9kHz to 200MHz	Agilent	11947A	3107A03657	E4982	11-May-17
TREVA 2		Teltest	-	2	-	14-Nov-16

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

ANNEX A – TEST SETUP DETAILS



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.

