TELTEST Laboratories
Tait Ltd
Report Number 3773B

# LABORATORY TEST REPORT

## RADIO PERFORMANCE MEASUREMENTS

for the

TBCK4E Base Station Transceiver

Tested in accordance with:

FCC 47 CFR Part 2, Part 27

| | |
|---|---|
| Report Revision: | 1 |
| Issue Date: | 23-August-2016 |
| PREPARED BY: | Aaron. Fan |
| CHECKED & APPROVED BY: | M. C. James |

Test Technician

Laboratory Technical Manager

ACCREDITED LABORATORY

OATS FCC LISTING REGISTRATION: 837095



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# REVISION

| Date | Revision | Comments |
|---|---|---|
| 23-August-2016 | 1 | Initial test report |
| | | |

# INTRODUCTION

Type approval testing of the BASE STATION, 100 Watt, TBCK4E transceiver. This is a class 2 permissive change to expand the radio's operation into the 757-758MHz/787-788MHz band in accordance with:

FCC 47 CFR Part 2, Part 27

The original test report for this product is TARF 3764

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

DESCRIPTION OF SAMPLE
Manufacturer Tait Limited
Equipment: BASE STATION Transceiver
Type: TBCK4E

TBCK4E Base Station Transceiver consisting of:

| FUNCTIONAL DESCRIPTION | PRODUCT DESIGNATION CODE | SERIAL NUMBER (S) |
|---|---|---|
| Reciter | T01-01105-TAAA | 18222413 |
| Power Amplifier | T01-01136-NBAA | 18241506 |
| Power Management Unit | TBA30A0-0100 | 18169039 |
| Front Panel | T01-01110-CCAA | 18169805 |

Quantity:1 of each

## HARDWARE & SOFTWARE Details:

| FUNCTIONAL DESCRIPTION | FIRMWARE VERSION | HARDWARE VERSION |
|---|---|---|
| Reciter | dmr-2.20.00.0002 | 1 |
| Power Amplifier | 314 | 1 |
| Power Management Unit | 316 | 0.03 |
| Front Panel | 1.08.00.0002 | 0.04 |

TEST CONDITIONS
All testing was performed between 04 August → 23 August-2016, and under the following conditions:
Ambient temperature: 15°C → 30°C
Relative Humidity: 20% → 75%
Standard Test Voltage 120 $V_{AC}$

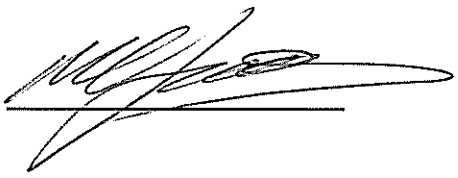
# STATEMENT OF COMPLIANCE

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

| | |
|---|---|
| Equipment: | BASE STATION Transceiver |
| Type: | TBCK4E |
| 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:** 31 August 2016

# MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS

## MODULATION TYPES:

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

## CHANNEL SPACINGS: 12.5 kHz

## EMISSION DESIGNATORS:

| | |
|---|---|
| Analogue Voice | 11k0F3E |
| FFSK | 7K60F2D |
| DMR Digital Voice / Data | 7K60FXW |
| DMR Digital Data | 7K60FXD |

Equation: Bn = 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
Bn = (2x3.0) + (2x2.5) x 1
= 11.0 kHz

Emission Designator
11K0F3E
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 = 2.0 kHz
Bn = (2 x 1.8) + (2 x 2.0) x 1
= 7.6 kHz

Emission Designator
7K60F2D
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 – 7K60FXW

99% bandwidth = 7.6 kHz

Emission Designator
7K60FXW
FXW represents FM combination of data and telephony.

Digital Data 12.5 kHz Channel Spacing – 7K60FXD

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: 100 W and 10 W

| Tx 757.5MHz | Nominal 100W | Nominal 10W |
|---|---|---|
| Measured | 91.7 | 9.0 |
| Variation (%) | -8.31 | -10.21 |
| Variation (dB) | -0.4 | -0.5 |
| Measurement Uncertainty: ± 0.6 dB | | |

LIMIT CLAUSES:

Subpart C Section27.50(b)(1): fixed and base station transmitters in the 757-758MHz band must not exceed 1000 watts ERP.

Therefore the gain of any antenna system attached to this transmitter shall not exceed 10dBd.

# TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS

SPECIFICATION: FCC 47 CFR 2.1047 (a)

GUIDE: TIA/EIA-603E 2.2.6

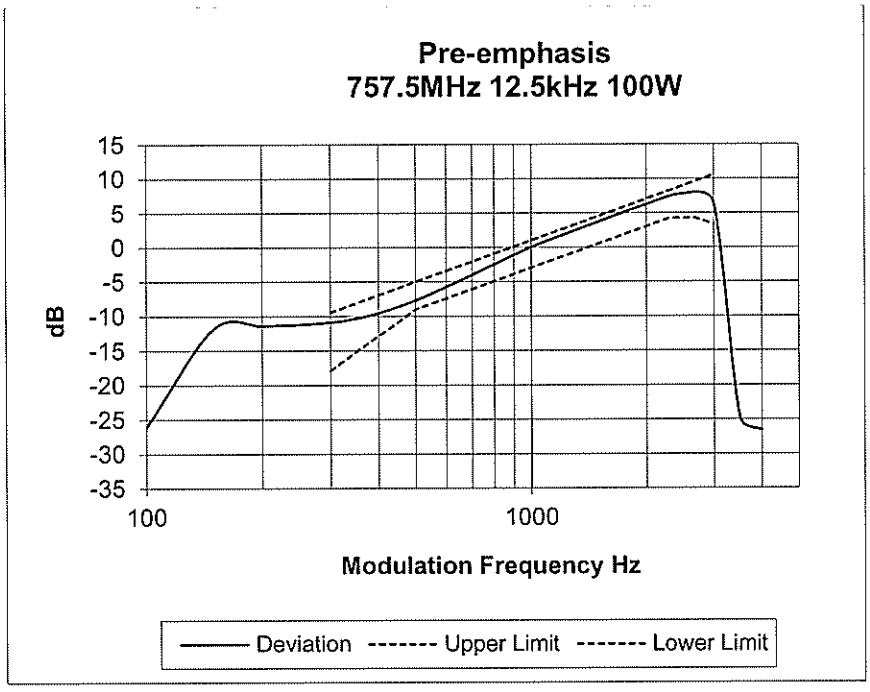
MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment set up.
2. An audio input tone of 1000 Hz was applied with the level set to obtain 20% of maximum deviation. This was used as the 0 dB reference point.
3. The AF was varied while the audio level was held constant.
4. The response in dB relative to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

MEASUREMENT RESULTS:
See the plots below for 12.5 kHz channel spacing tested at 100 W transmit power.

LIMIT CLAUSE: TIA/EIA-603E 3.2.6

SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 757.5 MHz 12.5 kHz Channel Spacing



# TRANSMITTER MODULATION LIMITING

SPECIFICATION: FCC 47 CFR 2.1047 (b)

GUIDE: TIA/EIA-603E 2.2.3

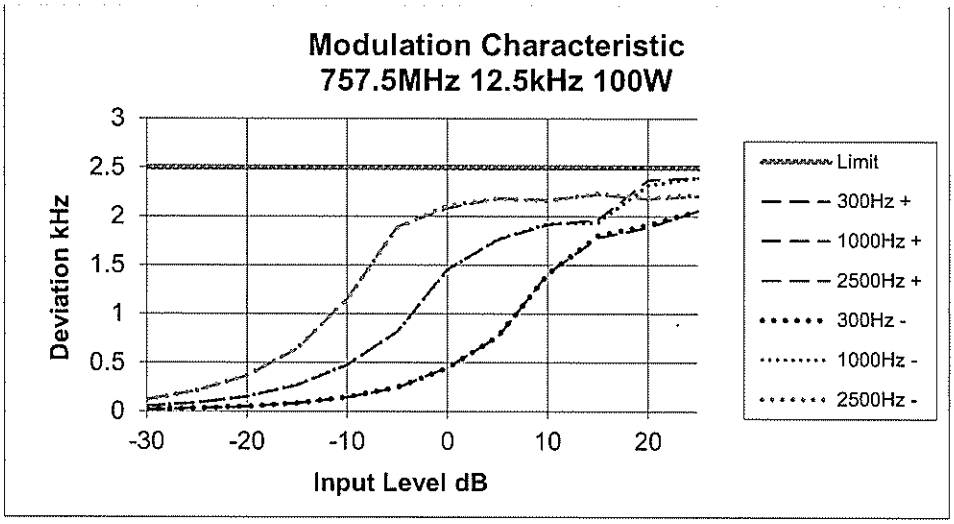
MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment set up.
2. The modulation response was measured at three audio frequencies while varying the input level.
3. Measurements were made for both Positive and Negative Deviation.

MEASUREMENT RESULTS:
See the plots below for 12.5 kHz channel spacing tested at 100 W transmit power.

LIMIT CLAUSE: TIA/EIA-603E 1.3.4.4

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 757.5 MHz 12.5 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 = 300 Hz, Video Bandwidth = 910 Hz

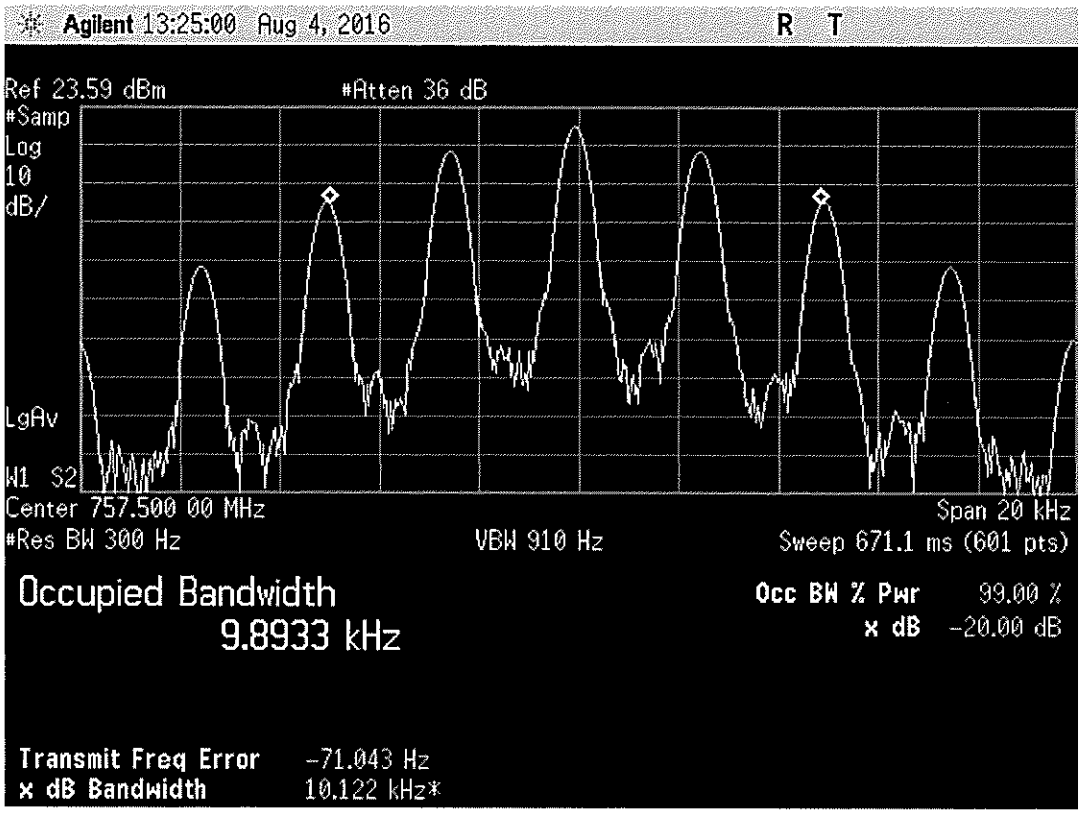
MEASUREMENT RESULTS:

See the plots on the following pages

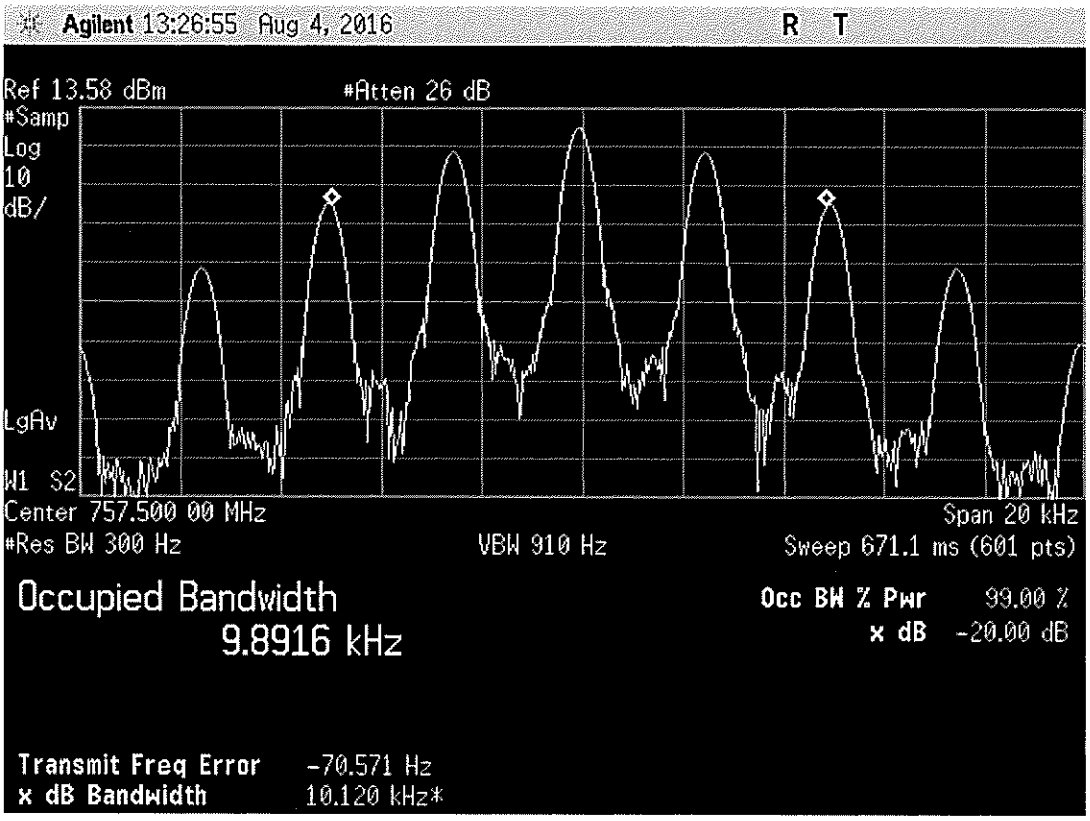
| Modulation | Power (W) | Occupied Bandwidth (KHz) |
|---|---|---|
| Analogue FM | 100 | 9.89 |
| | 10 | 9.89 |
| FFSK | 100 | 5.88 |
| | 10 | 5.89 |
| DMR | 100 | 7.57 |
| | 10 | 7.48 |

## Occupied Bandwidth

Tx FREQUENCY: 757.5 MHz 100 W Analogue FM



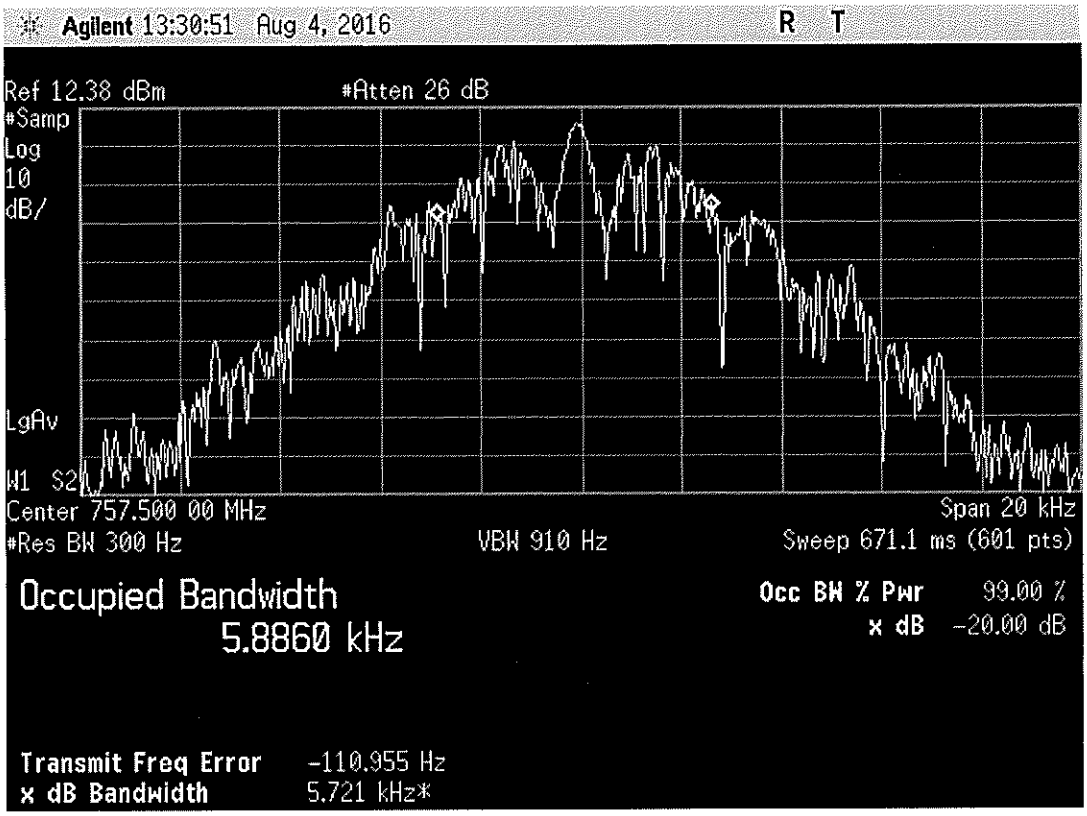

Tx FREQUENCY: 757.5 MHz 10 W Analogue FM



## Occupied Bandwidth

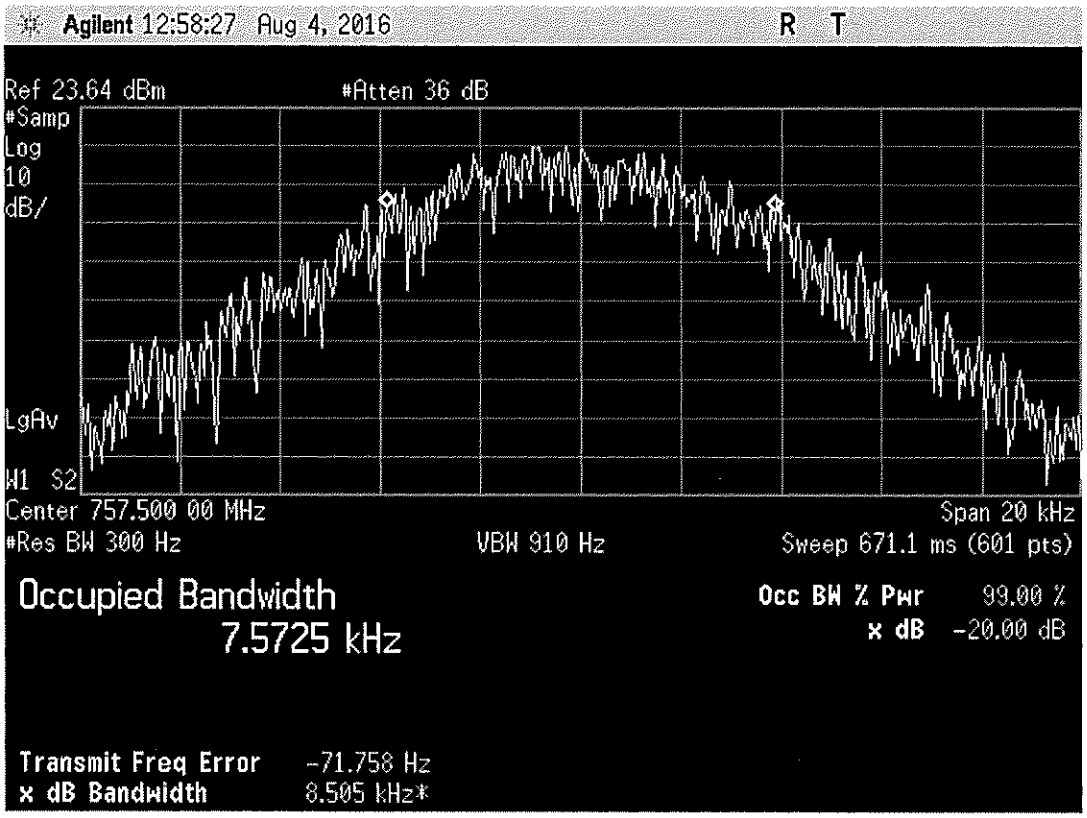
Tx FREQUENCY: 757.5 MHz 100 W FFSK


Tx FREQUENCY: 757.5 MHz 10 W FFSK

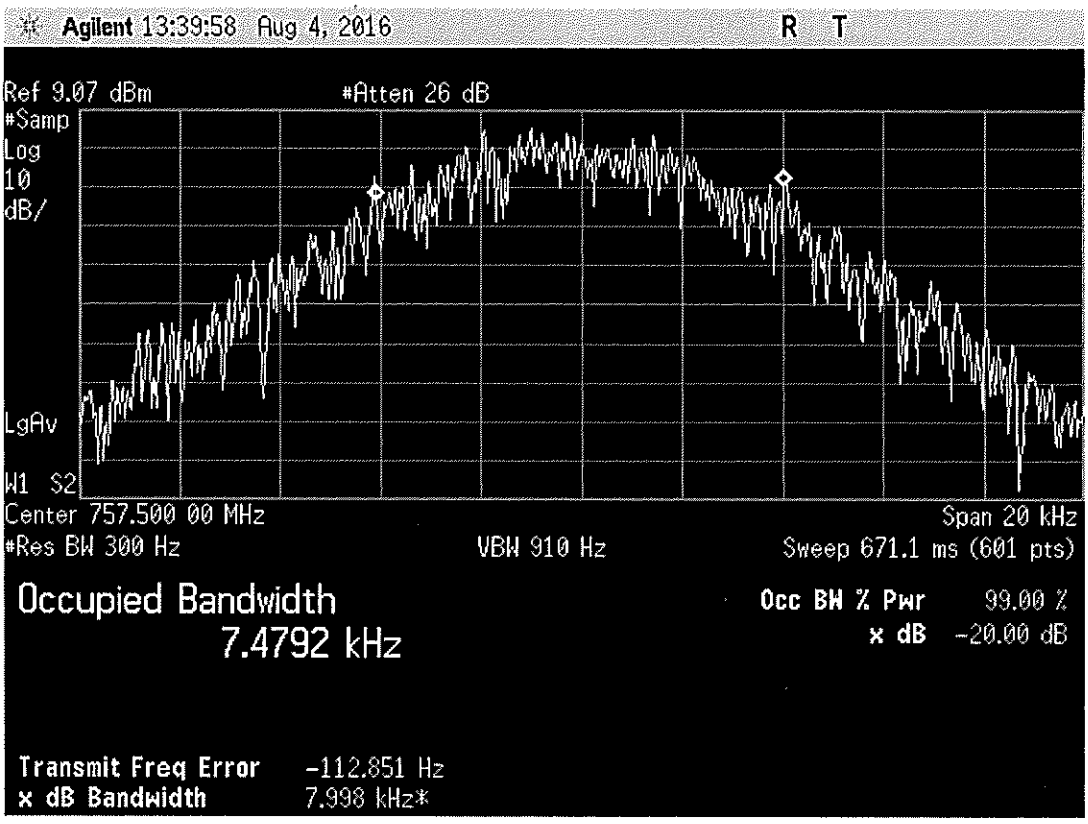


## Occupied Bandwidth

Tx FREQUENCY: 757.5 MHz 100 W DMR




Tx FREQUENCY: 757.5 MHz 10 W 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.

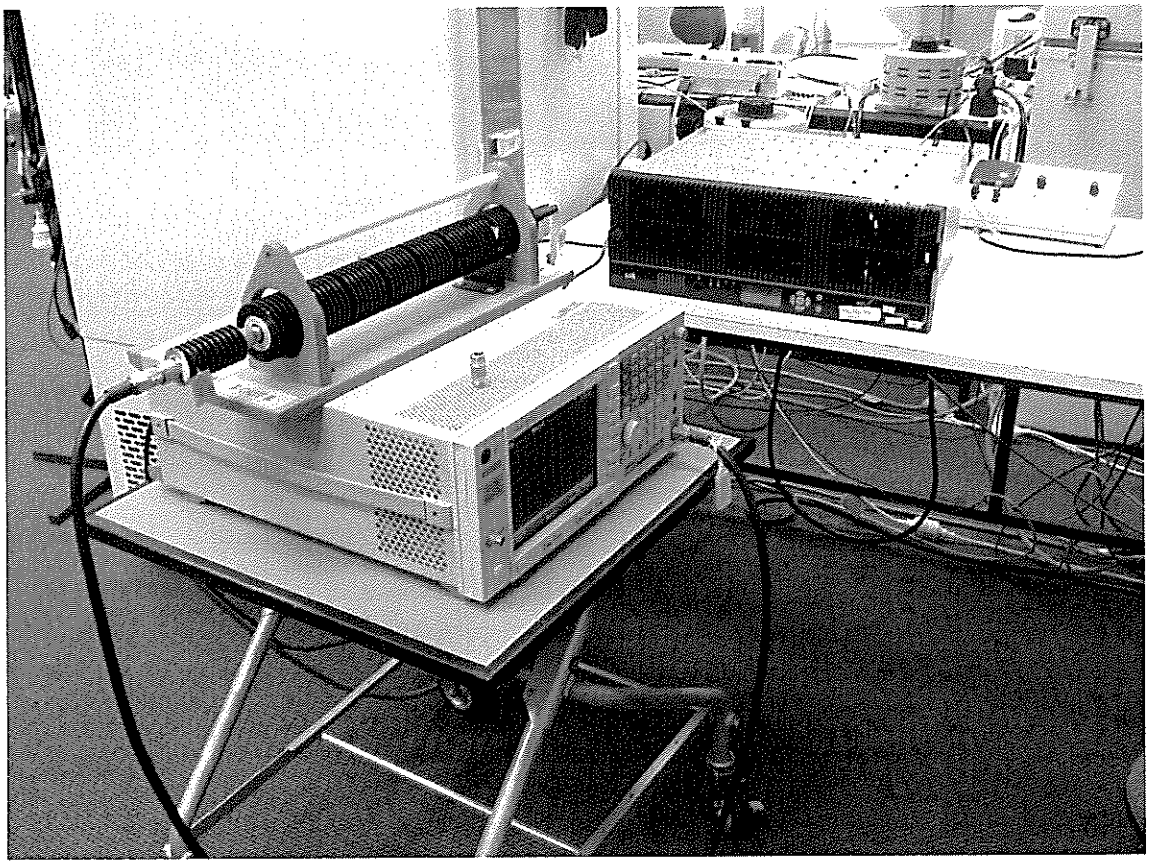
Spurious emissions which were attenuated by more than 20 dB below the limit were not recorded.

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: 757.5 MHz

12.5 kHz Channel Spacing 757.5 MHz @ 100 W

| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
|---|---|---|
| 1514.99 | -36.3 | -86.3 |
| No other emissions were detected at a level greater than -40 dBm. | | |

12.5 kHz Channel Spacing 757.5 MHz @ 10 W

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

LIMITS: FCC 47 CFR 27.53 c(1)

| Carrier Output Power | Emission Mask D<br>12.5 kHz Channel Spacing<br>$43 + 10 \text{Log}_{10} (P_{Watts})$ | |
|---|---|---|
| 100 W | -13 dBm | -70 dBc |
| 10 W | -13 dBm | -60 dBc |

# TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED) Part 2

SPECIFICATIONS: FCC 47 CFR 27.53(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 and plots on the following pages.

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

Tx FREQUENCY: 757.5 MHz

12.5 kHz Channel Spacing 757.5 MHz @ 100 W

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

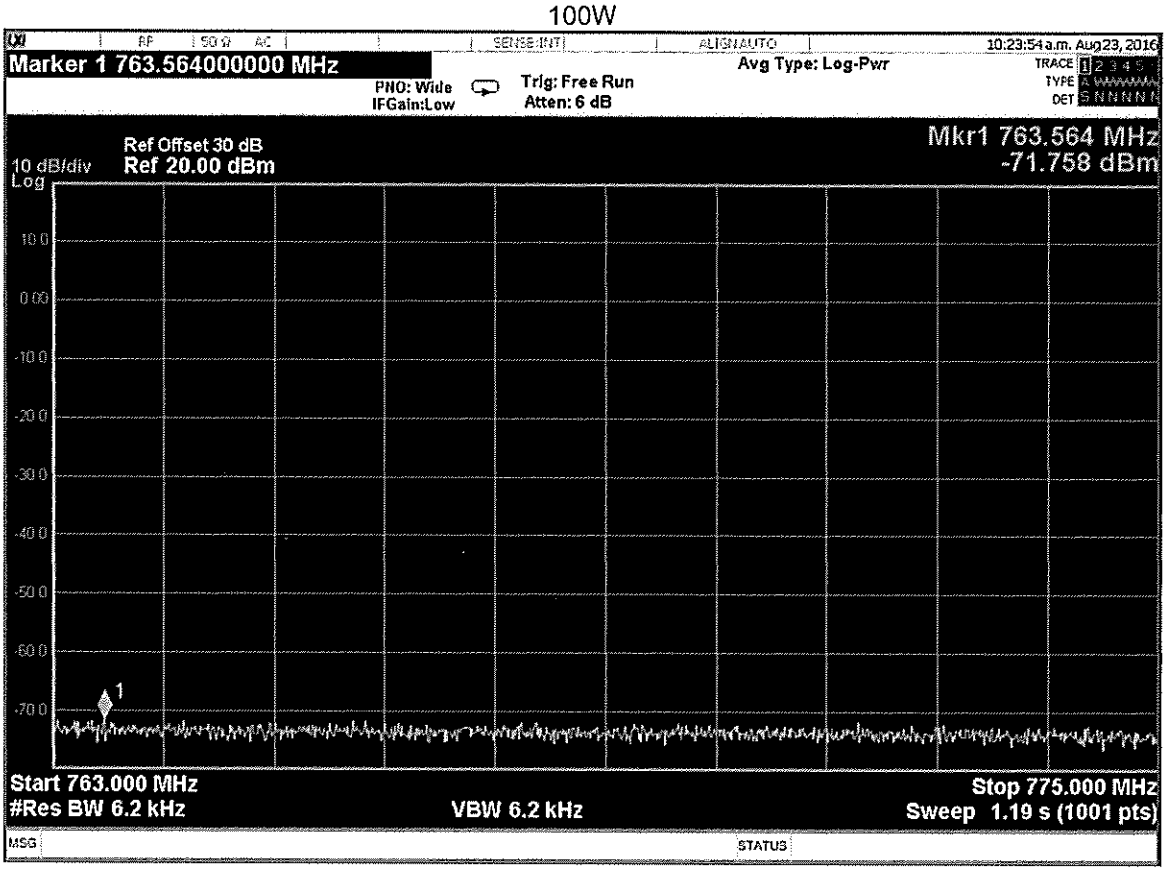
12.5 kHz Channel Spacing 757.5 MHz @ 10 W

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

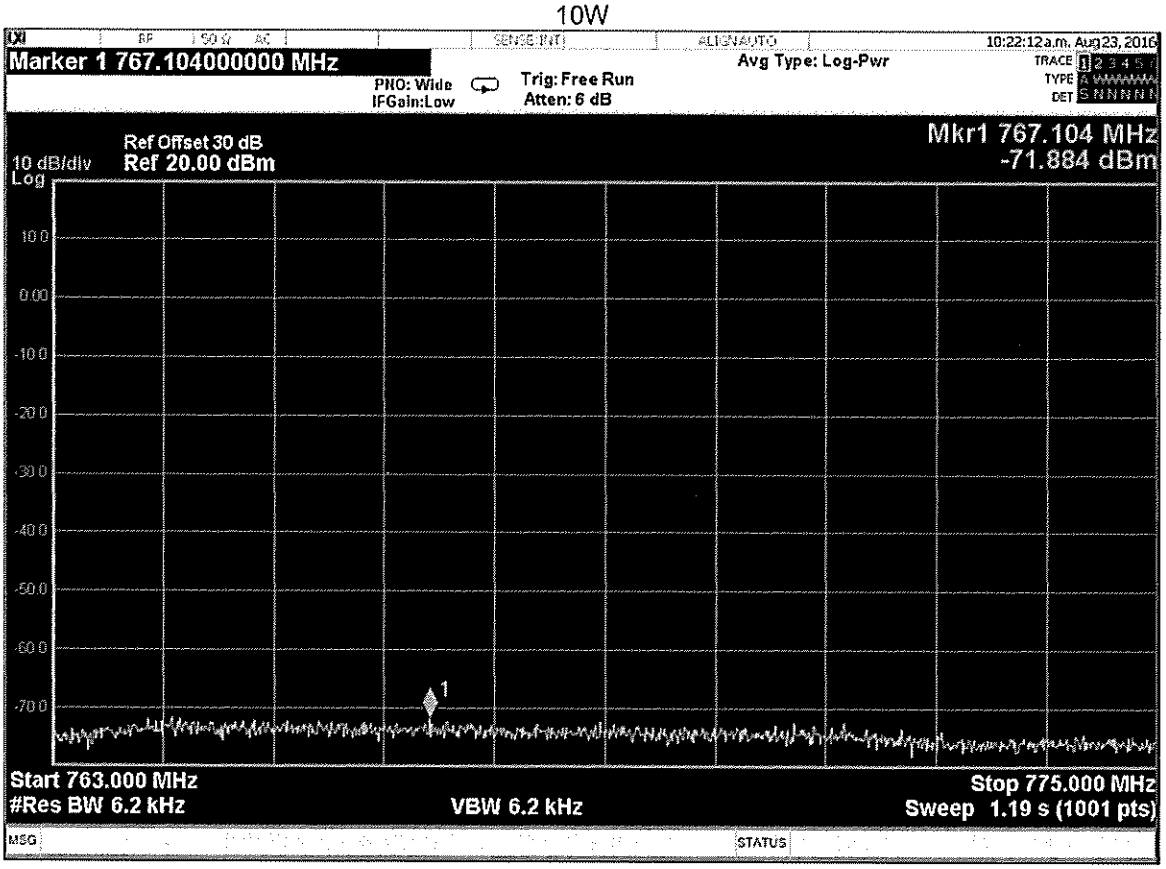
LIMITS: FCC 47 CFR 27.53(3)(6)

| Carrier Output Power | 12.5 kHz Channel Spacing<br>$76 + 10 \text{ Log}_{10} (P_{Watts})$ | |
|---|---|---|
| 100 W | -46 dBm | -96 dBc |
| 10 W | -46 dBm | -86 dBc |

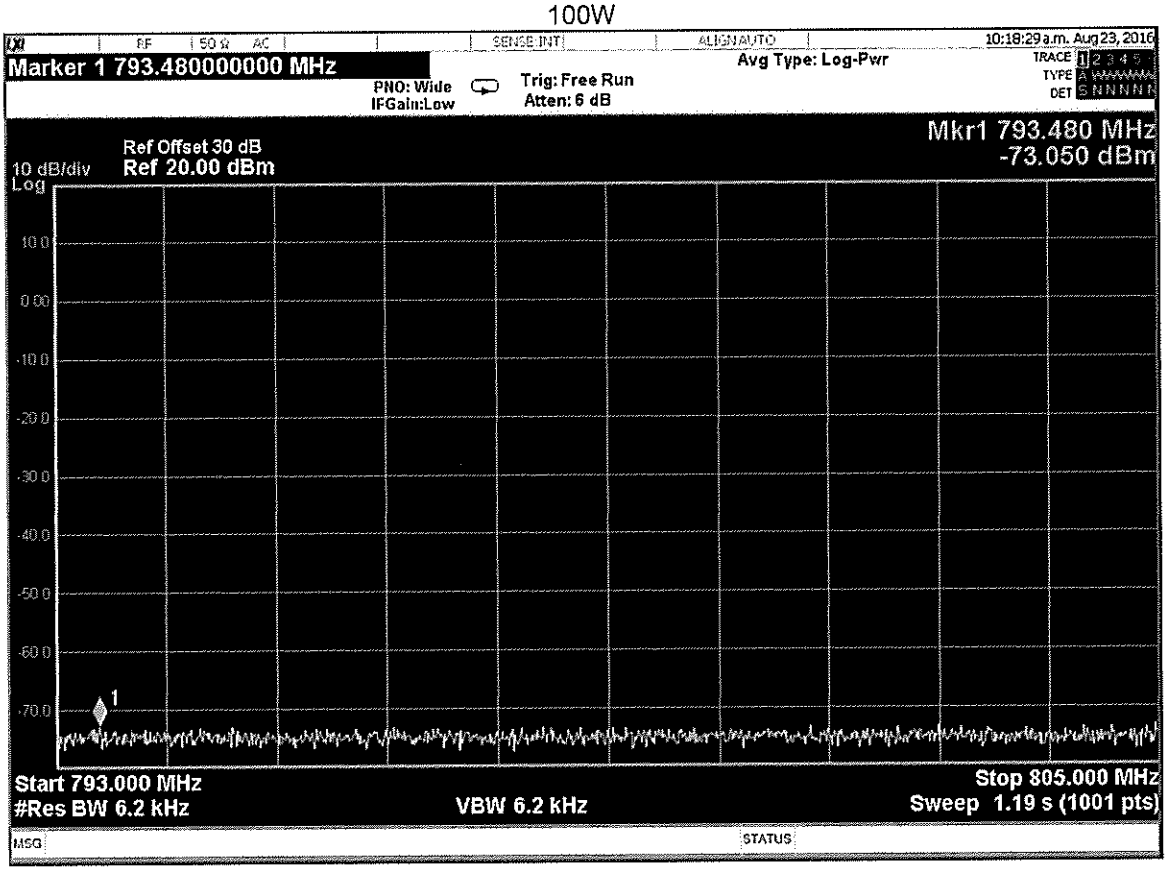
763-775MHz
100W



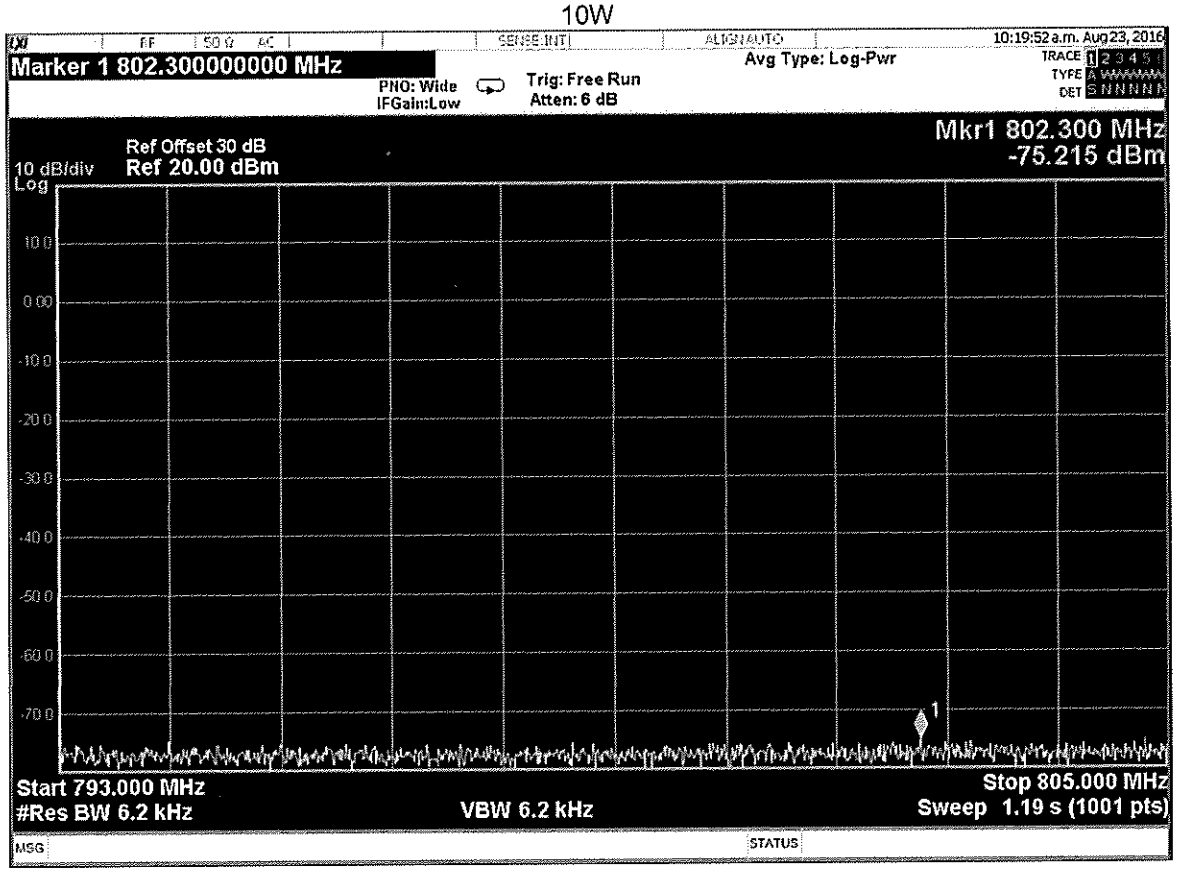

10W



793-805MHz
100W




793-805MHz
10W



# 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 $6^{th}$ 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 757.5 MHz @ 100 W

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

12.5 kHz Channel Spacing 757.5 MHz @ 10 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 | Emission Mask D<br>12.5 kHz Channel Spacing<br>$43 + 10 \log_{10} (P_{Watts})$ | |
|---|---|---|
| 100 W | -13 dBm | -70 dBc |
| 10 W | -13 dBm | -60 dBc |

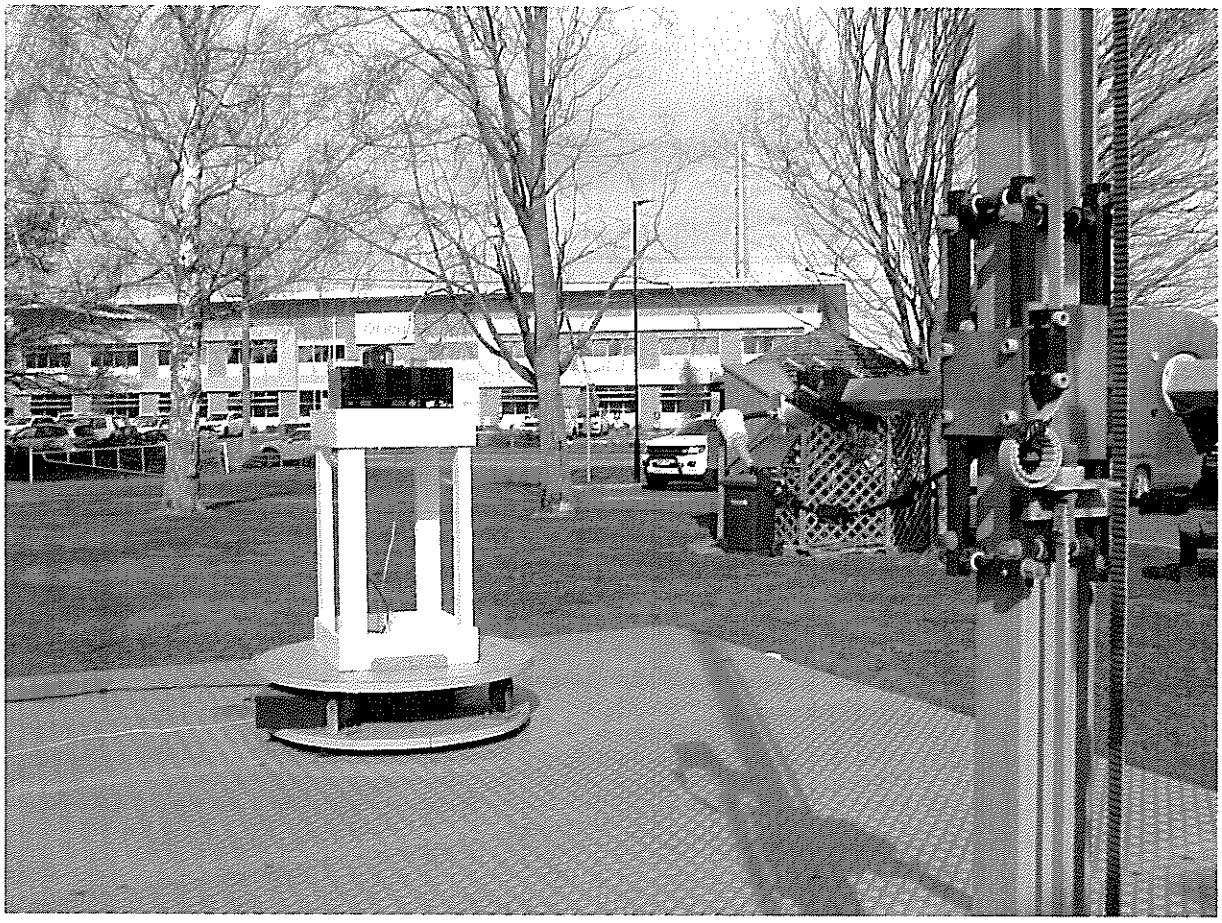
## Tx Radiated Emissions - Continued

Open Area Test Site Results for first six harmonics:

12.5 kHz Channel Spacing 757.5 MHz @ 100 W

| Harmonics Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
|---|---|---|
| 1515 | -61.60 | -111.60 |
| 2272.5 | -45.33 | -95.33 |
| 3030 | -47.45 | -97.45 |
| 3787.5 | -59.00 | -109.00 |
| 4545 | -45.75 | -95.75 |
| 5302.5 | -50.25 | -100.25 |

Photo: OATS Setup



# TRANSMITTER SPURIOUS EMISSIONS (RADIATED) Part 2

SPECIFICATIONS: FCC 47 CFR 27.53(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(3)(6)

Tx FREQUENCY: 757.5 MHz

12.5 kHz Channel Spacing 757.5 MHz @ 100 W

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

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

| Carrier Output Power | 12.5 kHz Channel Spacing<br>$76 + 10 \text{ Log}_{10} (P_{Watts})$ | |
|---|---|---|
| 100 W | -46 dBm | -96 dBc |
| 10 W | -46 dBm | -86 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:

| Sweep Band (MHz) | Maximum Observed Level (dBuV/m) | Limit (dBuV/m) | Polarity | RBW (Hz) |
|---|---|---|---|---|
| 1559.0-1610.0 | 45.8 | 55.2 | Horizontal | 1M |
| 1559.0-1610.0 | 45.9 | 55.2 | Vertical | 1M |
| | | | | |
| 1559.0-1610.0 | 17.9 | 45.2 | Horizontal | 1k |
| 1559.0-1610.0 | 17.9 | 45.2 | Vertical | 1k |

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)

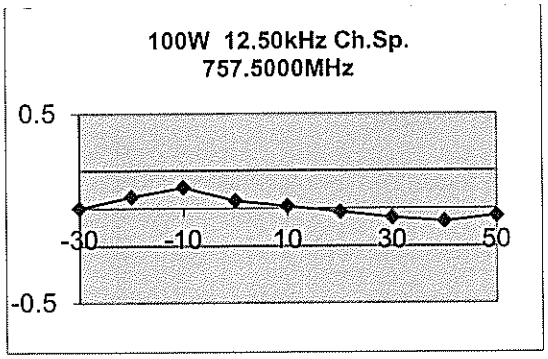
GUIDE: TIA-102.CAAA-C 2.2.2

MEASUREMENT PROCEDURE:
1. Refer Annex A for equipment set up.
2. The EUT was tested for frequency error from –30° C to +50° C in 10° C increments
3. The frequency error was recorded in parts per million (ppm).

MEASUREMENT RESULTS:
See the plots below.

Tx Frequency: 757.5 MHz

| Temperature (°C) | Frequency (Hz) | Error (ppm) |
|---|---|---|
| -30 | -3 | 0 |
| -20 | 49 | 0.06 |
| -10 | 81 | 0.11 |
| 0 | 31 | 0.04 |
| 10 | 6 | 0.01 |
| 20 | -12 | -0.02 |
| 30 | -37 | -0.05 |
| 40 | -50 | -0.07 |
| 50 | -33 | -0.04 |




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.

Taking the calculated necessary bandwidth to be the authorized bandwidth, and the measured 99% bandwidth to be the width of the fundamental emissions, the worst case scenario is for the DMR modulation where the authorized bandwidth = 7.6kHz, and the 99% bandwidth = 7.57kHz. This gives a frequency tolerance of ±150Hz or 0.2 ppm.

# 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 115%.
3. The frequency error was recorded in parts per million (ppm).

MEASUREMENT RESULTS:

Tx Frequency: 757.5 MHz

| Voltage | FREQUENCY ERROR (ppm) | FREQUENCY ERROR (ppm) |
|---|---|---|
| | 100W | 10W |
| 120 $V_{AC}$ | -0.02 | -0.07 |
| 102 $V_{AC}$ | -0.02 | -0.06 |
| 138 $V_{AC}$ | -0.02 | -0.06 |

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.

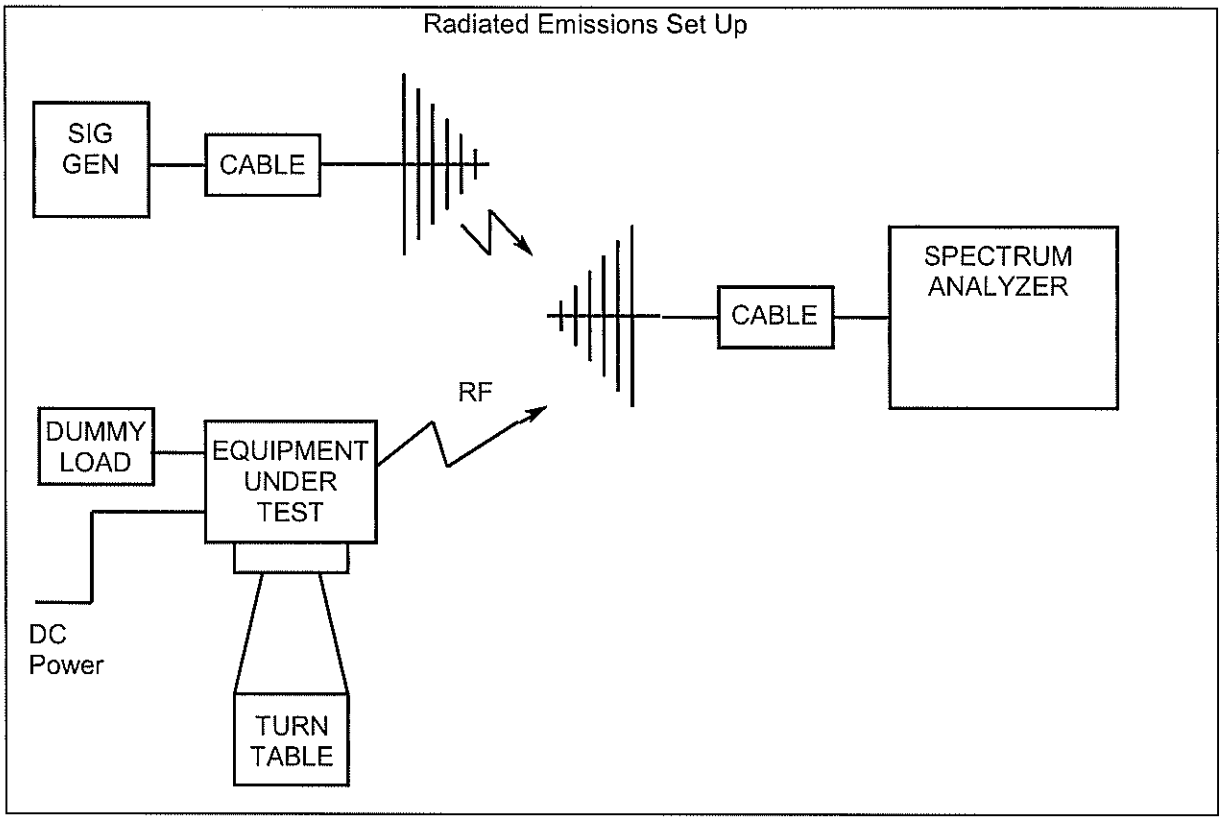
Taking the calculated necessary bandwidth to be the authorized bandwidth, and the measured 99% bandwidth to be the width of the fundamental emissions, the worst case scenario is for the DMR modulation where the authorized bandwidth = 7.6kHz, and the 99% bandwidth = 7.57kHz. This gives a frequency tolerance of ±150Hz or 0.2 ppm.

# TEST EQUIPMENT LIST

| Equipment Type | Information | Manufacturer | Model No | Serial No# | Tait ID | Cal Due |
|---|---|---|---|---|---|---|
| Modulation Analyser | TREVA1 | Hewlett Packard | HP8901B (Opt 002) | 2441A00393 | E3073 | 21-Oct-16 |
| Audio Analyser | TREVA1 | Hewlett Packard | HP8903A | 2437A04625 | E4986 | 21-Oct-16 |
| Power Supply | TREVA1 | Hewlett Packard | HP6032A | 2441A00412 | E3075 | 13-Oct-17 |
| Antenna | Biconical | Emco | 3110B | 9307-1680 | E3033 | |
| Antenna | 18GHz DRG | Emco | DRG3115 | 9512-4638 | E3560 | 29-Apr-19 |
| Antenna | 18GHz DRG | Emco | DRG3115 | 2084 | E3076 | 29-Apr-19 |
| RF Chamber | S-LINE TEM CELL | Rohde & Schwarz | 1089.9296.02 | 338232/003 | E3636 | 29-Sep-16 |
| RF Attenuator | 30dB 250W | Weinschel | 45-30-34 | JW663 | E3386 | 18-Oct-16 |
| RF Load | 150W | Bird | 8166 | 524 | E3625 | |
| 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 |
| Spectrum Analyser | 13.2GHz | Hewlett Packard | HP8562E | 3821A00779 | E3715 | 15-Oct-16 |
| Environ. Chamber | Upright | Contherm | 5400 RHSLT.M | 1416 | E4051 | 1-Aug-17 |
| RF Combiner | TREVA1 | Minicircuits | ZFSC-4-1 | - | E4083 | |
| Spectrum Analyser | 13.2GHz | Agilent | E4445A | MY42510072 | E4139 | 22-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 |
| OATS | Antenna Tower | Electrometrics | EM-4720-2 | 112 | E4447 | |
| OATS | Controller | Electrometrics | EM-4700 | 119 | E4445 | |
| OATS | Turntable | Electrometrics | EM-4704A | 105 | E4446 | |
| Antenna | Log Periodic | Schwarzbeck | VUSLP | 9111-219 | E4617 | |
| TREVA 1 | | Teltest | - | 1 | - | 14-Nov-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 |
| 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 | |
| Antenna | Reverb - 1-18GHz DRG | Schwarzbeck | BBHA 9120 D | 9120D-885 | E4857 | |
| Antenna | Reverb - 1-18GHz DRG | Schwarzbeck | BBHA 9120 D | 9120D-884 | E4858 | |
| RF Amplifier | Pre-amplifier | Agilent | 87405C | MY47010688 | E4941 | 20-Oct-16 |
| OATS | FCC Listing Registration | | | 837095 | | 8-May-19 |
| Coax Cable | OATS Turntable Cable 2 | Intelcom | RG215 | OATS3 | E4995 | 20-Oct-16 |
| Signal Generator | Digital 4GHz | Agilent | E4437B | US39260389 | E4764 | 19-Aug-17 |

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 **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.