LABORATORY TEST REPORT

RADIO PERFORMANCE MEASUREMENTS

for the

TDAH5A Data Terminal Transceiver

Tested in accordance with:

FCC 47 CFR Parts 22, 74 and 90

RSS-119 Issue 11 RSS-Gen Issue 4

Report Revision:

1

Issue Date:

12-May-2015

PREPARED BY:

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Test Technician

CHECKED & APPROVED BY: M. C. James

Laboratory Technical Manager



OATS FCC LISTING REGISTRATION: 837095 OATS IC LISTING REGISTRATION: SITE# 737A-1

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

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REVISION

| Date | Revision | Comments | | | | |
|-------------|----------|---------------------|--|--|--|--|
| 12-May-2015 | 1 | Initial test report | | | | |
| | | | | | | |

INTRODUCTION

Type approval testing of the TDAH5A, 25 Watt, data terminal transceiver in order to demonstrate compliance with FCC 47 Parts 22, 74 & 90, and RSS-119 Issue 11 & RSS-Gen Issue 4. This radio supports Digital Mobile Radio modulation (DMR).

| Modulation | | Channel Spacing | Speech Channels | Symbol Rate (symbols/sec) | Data Rate (bps) |
|-------------------------------|--|--------------------|--------------------|---------------------------|--------------------|
| Digital Mobile Radio (DMR) | 4 Level FSK 2 slot TDMA (ETSI TS102 361-1) | 12.5 kHz | 2 | 4800 | 9600 |

REPORT PREPARED FOR Tait Communications PO Box 1645 558 Wairakei Road Christchurch New Zealand

DESCRIPTION OF SAMPLEManufacturerTait LimitedEquipment:Data Terminal TransceiverType:TDAH5AProduct Code:T04-00002-JAAASerial Number(s):29000076Frequency Range:400 to 470 MHzQuantity:1

HARDWARE & SOFTWARE

| Hardware ID | TMBB12-H500_0006 |
|-------------------------|------------------------|
| Boot Code | QMB1B_S00_3.01.03.0001 |
| DSP | QMB1A_E00_2.01.00.0018 |
| Radio Application | QMB1F_E00_2.01.00.0018 |
| FPGA Image | QMB1G_S00_1.07.00.0002 |
| Linux Software Platform | 1.00.10 |

TEST CONDITIONSAll testing was performed between 29 April \rightarrow 06 May 2015, and under the following conditions:Ambient temperature: $15^{\circ}C \rightarrow 30^{\circ}C$ Relative Humidity: $20\% \rightarrow 75\%$ Standard Test Voltage $24 V_{DC}$

STATEMENT OF COMPLIANCE

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

| Equipment: | Data Terminal Transceiver |
|-------------------|---------------------------|
| Type: | TDAH5A |
| Product Code: | T04-00002-JAAA |
| Serial Number(s): | 29000076 |
| Quantity: | 1 |

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

FCC 47 CFR Parts 22, 74 and 90

RSS-119 Issue 11 & RSS-Gen Issue 4

Signature: _____

M. C. James Laboratory Technical Manager

Date: _____

MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS

MODULATION TYPES:

| FXW | DMR Digital Voice | 9600 bps |
|-----|-------------------|----------|
| FXD | DMR Digital Data | 9600 bps |

CHANNEL SPACING: 12.5 kHz

EMISSION DESIGNATORS:

| Digital Voice DMR | 7K60FXW |
|-------------------|---------|
| Digital Data DMR | 7K60FXD |

CALCULATIONS

Digital Voice 12.5 kHz Bandwidth DMR 99% bandwidth = 7.6 kHz

Emission Designator **7K60FXW** FXW represents a FM Time Division Multiple Access (TDMA) combination of data and telephony

Digital Data 12.5 kHz Bandwidth DMR 99% bandwidth = 7.6 kHz

Emission Designator **7K60FXD** FXD represents FM Time Division Multiple Access (TDMA) data only

TEST RESULTS

TRANSMITTER OUTPUT POWER (CONDUCTED)

SPECIFICATION:

FCC 47 CFR 2.1046 RSS-119 5.4

GUIDE: TIA/EIA-603D 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: 25 W and 1 W

| Nominal 25 W | 406.2 MHz | 418.1 MHz | 429.9 MHz | 450.1 MHz | 459.9 MHz | 469.9 MHz |
|-------------------|-------------------------|-----------|-----------|-----------|-----------|-----------|
| Measured | 26.4 | 25.5 | 24.9 | 25.8 | 24.9 | 25.3 |
| Variation (%) | 5.6 | 2.0 | -0.4 | 3.0 | -0.3 | 1.0 |
| Variation (dB) | 0.2 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 |
| | | | | | | |
| Nominal 1 W | 406.2 MHz | 418.1 MHz | 429.9 MHz | 450.1 MHz | 459.9 MHz | 469.9 MHz |
| Measured | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Variation (%) | 0.3 | 1.1 | -0.8 | -2.6 | -4.6 | -3.5 |
| Variation (dB) | 0.0 | 0.0 | 0.0 | -0.1 | -0.2 | -0.2 |
| Measuremen | Measurement Uncertainty | | | ± 0.6 dB | | |

LIMIT CLAUSES:

FCC 47 CFR 90.205 (s)

The output power shall not exceed by more than 20%... the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

RSS-119 5.4

The output power shall be within ±1.0 dB of the manufacturer's rated power.

TRANSMITTER OCCUPIED BANDWIDTH AND SPECTRUM MASKS

SPECIFICATION: FCC 47 CFR 2.1049 (c)

RSS-119 5.5

TIA/EIA-603D 2.2.11

MEASUREMENT PROCEDURE:

GUIDE:

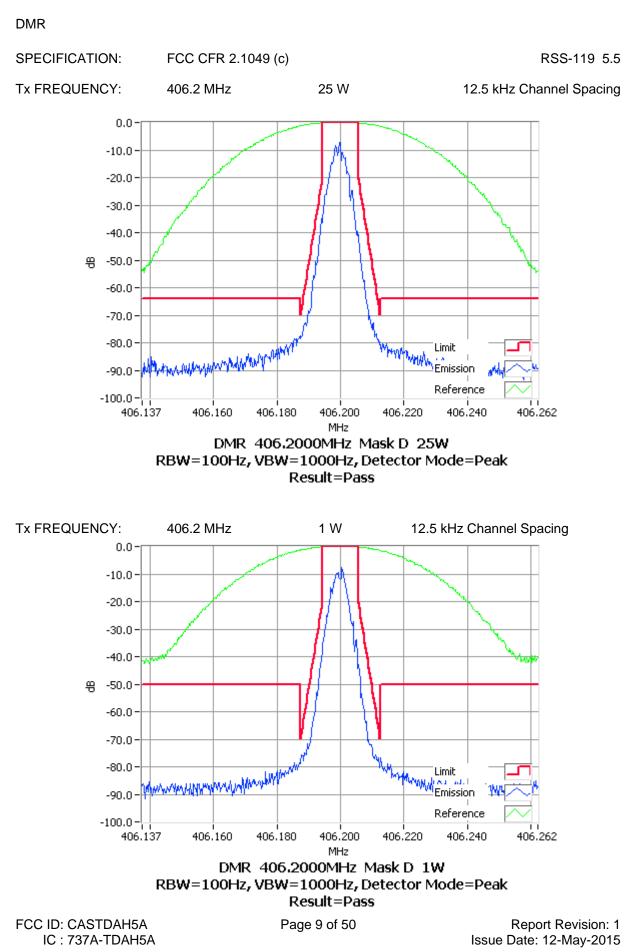
- 1. Refer Annex A for Equipment Set up.
- 2. For Data measurements: The EUT was modulated with an internally generated pseudo random bit sequence at the appropriate Baud rates.
- 3. The Occupied Bandwidth was measured on the Spectrum Analyser, with bandwidth settings as follows.

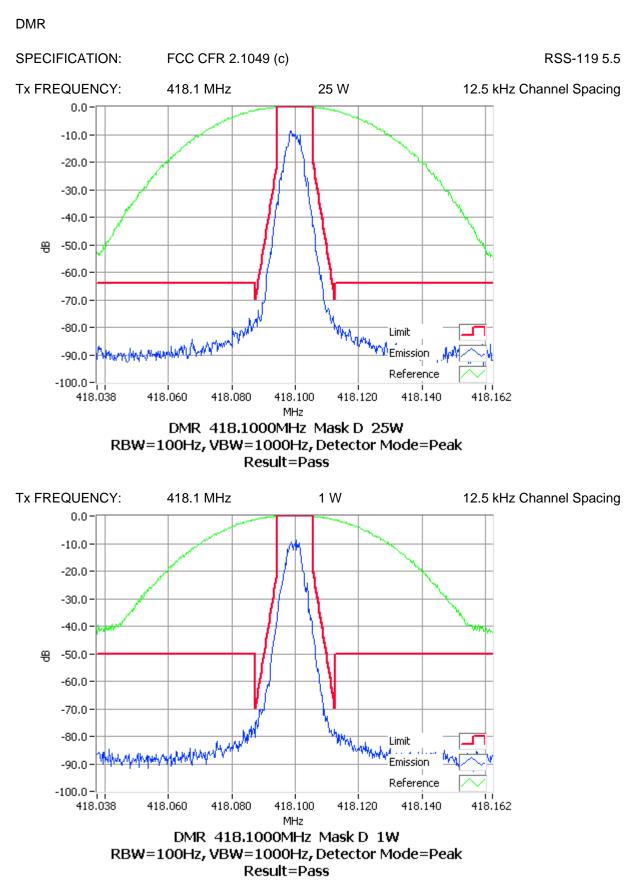
Emission Mask D – Resolution Bandwidth = 100 Hz, Video Bandwidth = 1 kHz

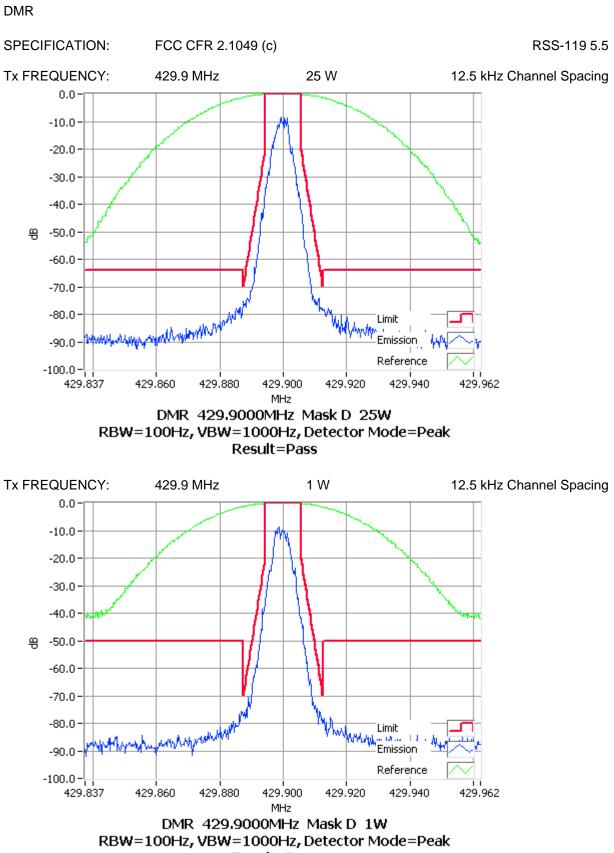
MEASUREMENT RESULTS:

See the plots on the following pages for 12.5 kHz & 25.0 kHz channel spacings.

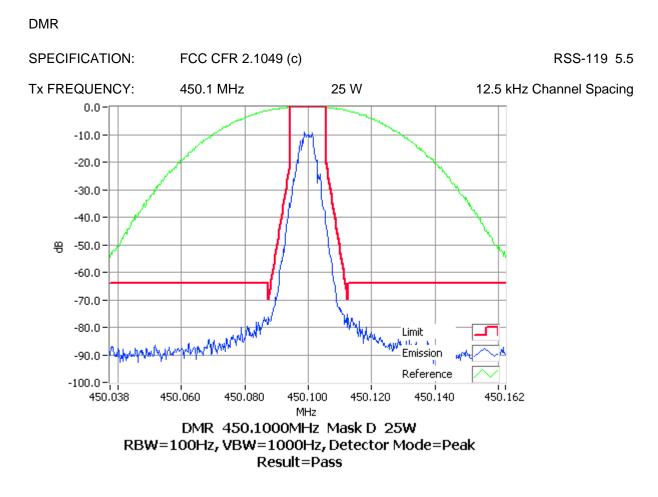
| LIMIT CLAUSE: | FCC 47 CFR 90.210 | RSS-119 5.5 |
|-----------------------------------|--------------------------|--------------------|
| EMISSION MASKS Emission Mask D | 12.5 kHz Channel Spacing | Digital Voice/Data |
| DATA SPEED Digital Voice/Data | 12.5 kHz Channel Spacing | 9600 bps |

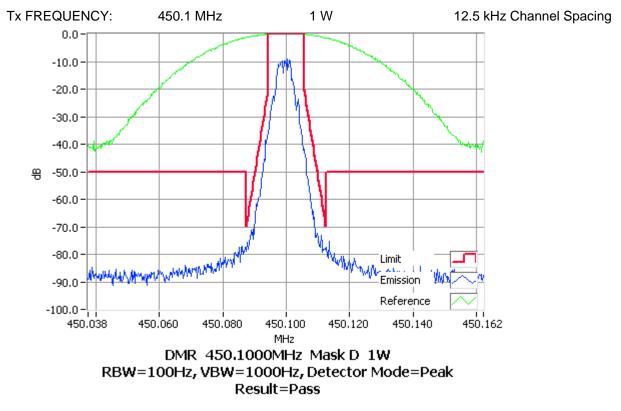






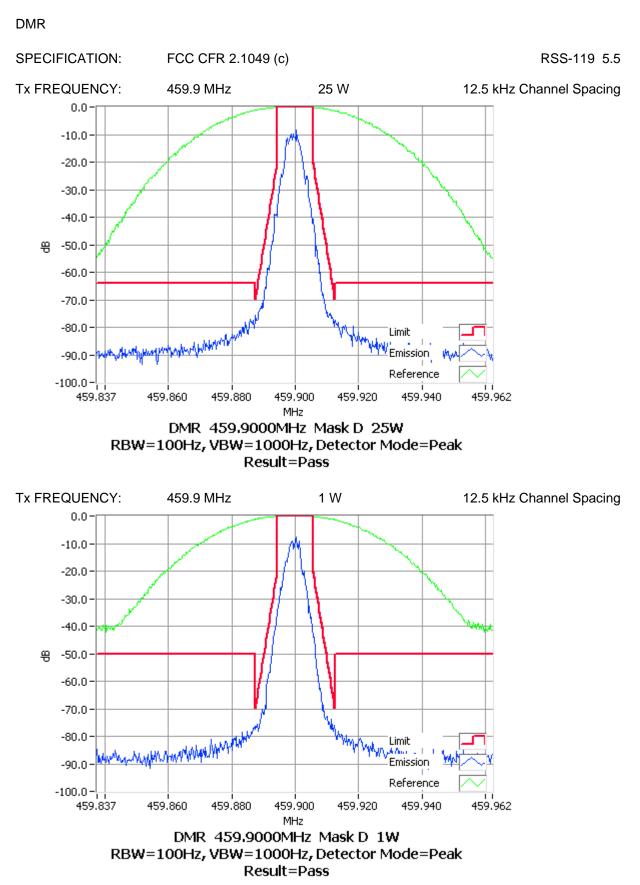
Occupied Bandwidth and Spectrum Masks

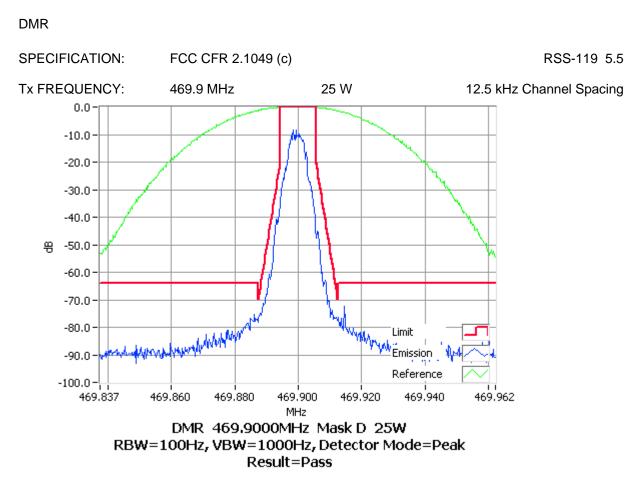


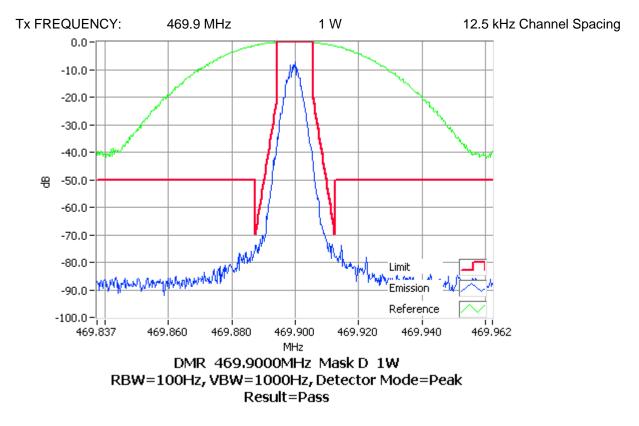


FCC ID: CASTDAH5A IC : 737A-TDAH5A Page 12 of 50

Report Revision: 1 Issue Date: 12-May-2015







TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED) SPECIFICATIONS: FCC 47 CFR 2.1051

GUIDE: TIA/EIA-603D 2.2.13

MEASUREMENT PROCEDURE:

- 1. Refer Annex A for equipment set up.
- 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 and plots on the following pages for 12.5 kHz & 25.0 kHz channel spacings.

LIMIT CLAUSES: FCC 47 CFR 90.210

RSS-119 5.8

Photo: Conducted Emissions Test Setup



RSS-119 5.8

Spurious Emissions (Tx Conducted)

| SPECIFICATION: FCC CF | RSS-119 5.8 | |
|--------------------------|-------------------------------------|-----------------------|
| 12.5 kHz Channel Spacing | 406.2 MHz @ 25 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |
| 12.5 kHz Channel Spacing | 406.2 MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |
| No emissions were | detected at a level greater than 20 |) dB below the limit. |

| Trace/Det | E123456 | 0β:46:36 p.m TRACI | | Avg Type | ISE:NT | 1 | z | | 6.00594 | |
|--|-------------------|-----------------------|-------------|-------------------|-------------------|--------------------------|------------------------|-----------|----------------------------|-----------------------|
| Select Trace 1 | 5.0 MHz 66 dBm | kr1 406 | | Avg Hold: | | Trig: Free #Atten: 32 | NC: Fast 😱 Gain:Low | IFO | ef Offset 29 ef 50.00 c | |
| Clear Writ | | | | | | 1 | | | | |
| Trace Averag | | | | | | | | | | |
| Max Hol | | | | | | | | | | |
| Min Ho | -20.00 (Bri | | | | | | | | | |
| View/Blank Trace On | [| | | | | | | | | |
| | | | uninger and | yoinshipploonally | phillinghtte | hengreijkennin ~ | (finderstration) | distant | 2 - 1989 (188) | huhanadah t 10 kHz |
| View/Blank Trace On More 1 of 3 | | Stop 1.0 | | wichylowan | polist langua kan | nungagiliansia 30 kHz | 1000 | salaashaa | -d | »մեսիկաներով kHz |

| 8F 50 Ω AC | | SENSE:NT | ALIGNAJTO | 04:25:47 p.m. May 04, 2015 | Peak Search |
|----------------------------------|------------------------------------|--------------------------------|---------------------------------------|---|-------------------|
| Ref Offset 29.94 dB |) GHz PNC: Fast 🖵 IFGain:Low | Trig: Free Run #Atten: 6 dB | Avg Type: Log-Pwr Avg Hold>100/100 | TRACE 123456 TYPE A WWWW Det S NNNVN Akr1 3.624 GHz -54.777 dBm | NextPea |
| a 94 Ref 19.94 dBm | | | | -54.777 dBm | Next Pk Rig |
| 0.1 | | | | | Next Pk Le |
| 0.1 | | | | -20.00 (Bm | Marker De |
| 0.1 | | | 1 | | Mkr→C |
|).1 | and and an intervention | Anarta marte alertore | www. www. www. | - | Mkr→RefL |
| tart 1.000 GHz Res BW 1.0 MHz | #VBW | 3.0 MHz | Sweep | Stop 5.000 GHz 12.1 ms (1001 pts) | M o 1 o |

Spurious Emissions (Tx Conducted)

| SPECIFICATION: FCC CFF | R 2.1051 | RSS-119 5.8 | | |
|--------------------------|-------------------------------------|---------------------|--|--|
| 12.5 kHz Channel Spacing | 418.1 MHz @ 25 W | Emission Mask D | | |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | | |
| ~ | ~ | ~ | | |
| 12.5 kHz Channel Spacing | 418.1 MHz @ 1 W | Emission Mask D | | |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | | |
| ~ | ~ | ~ | | |
| No emissions were | detected at a level greater than 20 | dB below the limit. | | |

| Peak Search | E 1 2 3 4 5 6 | TRAC | | Avg Type | VSE:NT | 1 | z | | 50 g 4 8.005820 | |
|-------------|-----------------------|----------|-------------|------------------|------------|--------------------------|-----------------------|--------------------|----------------------------|-----------|
| NextPea | B.0 MHz 17 dBm | kr1 418 | | Avg Hold: | | Trig: Free #Atten: 32 | I0: Fast 😱 ain:Low | PN IFG 94 dB | f Offset 29. ef 50.00 d | R |
| Next Pk Rig | | | | | | ♦ ¹ | | | | |
| Next Pk Le | | | | | | | | | | |
| Marker Del | | | | | | | | | | |
| Mkr→C | -20.00 @m | | | | | | | | | |
| Mkr→RefL | | | | | | | | | | |
| Mor | | | apricina An | angly sim become | wileyeride | haute | e-trachelisquee | hastoforget | bfyrfliffigra | ւե 10 kHz |
| 1 of | 0000 GHz 1001 pts) | 9.56 s (| | | | 30 kHz | #VBW | | kHz | |
| | pled | LDC Cou | STATUS | | | | | | | |

| arker 1 3.60000000000 | 0 CHz | SENSE:NT | Aug Type: Lo | | 50 p.m. May 04, 2015 TRACE 1 2 3 4 5 6 | Peak Search |
|---|---------------------------|--------------------------------|----------------|-------------------|---|--------------|
| Ref Offset 29.94 dB dB/div Ref 19.94 dBm | PN0: Fast 😱 IFGain:Low | Trig: Free Run #Atten: 6 dB | Avg Hold>10 | ۵٬۱۰۰ Mkr1 | 3.600 GHz 5.352 dBm | NextPea |
| 34 | | | | | | Next Pk Righ |
| .1 | | | | | | Next Pk Le |
| .1 | | | | | -20.00 (Bin | Marker Del |
| .1 | | | 1 | | | Mkr→C |
| 1 | 6 | - | an marking the | The second second | | Mkr→RefL |
| art 1.000 GHz es BW 1.0 MHz | #VBW | 3.0 MHz | Sv | St veep 12.1 | op 5.000 GHz ms (1001 pts) | Mor 1 of |

Spurious Emissions (Tx Conducted)

| SPECIFICATION: FCC CFF | R 2.1051 | RSS-119 5.8 |
|--------------------------|------------------|-----------------|
| 12.5 kHz Channel Spacing | 429.9 MHz @ 25 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |
| 12.5 kHz Channel Spacing | 429.9 MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |

No emissions were detected at a level greater than 20 dB below the limit.

| Peak Search | n. May 04, 2015 DE 1 2 3 4 5 6 | | LIGNAUTO | Aug Tup | VSE:NT | SE | _ | | 50 g 30.00570 | where d |
|-------------------|------------------------------------|----------|----------|-----------------|----------|--------------------------|-----------------------|--------------------|--|-----------|
| NextPea | 0.0 MHz 44 dBm | kr1 430 | 2/100 | Avg Hold | | Trig: Free #Atten: 33 | l(: Fast 😱 ain:Low | PN IFG 94 dB | 30.00570 Ref Offset 29 Ref 50.00 c | dB/div |
| Next Pk Rig | | | | | | ↑ ¹ | | | | |
| Next Pk Le | | | | | | | | | | .0 |
| Marker De | | | | | | | | | | .0 |
| Mkr→C | -20.00 @m | | | | | | | | | .0 |
| Mkr→RefL | | | | | | | | | | .0 |
| Mo 1 of | нининини 0000 GHz (1001 pts) | Stop 1.0 | | ne diperte anot | hallowho | 200700 | what where the | utoposer-u- | | art 10 kH |
| | | 9.30 S (| | | | O KHZ | #VDVV | | | CS DVV |

| | SENSE:NT | Aug Tur | ALIGN AUTO | 04:28:18 p.m. | May 04, 2015 | Trace/Det |
|--------------------------------|--------------------------------|--|---|---|---|---|
| PNC: Fast 😱 IFGain:Low | Trig: Free Run #Atten: 6 dB | | d:>100/100 | Det Mkr1 3.60 | O GHz | Select Trace 1 |
| | | | | | | Clear Writ |
| | | | | | | Trace Averag |
| | | | | | -20.00 (Bin | Max Ho |
| | | 1- | | | | Min Ho |
| to a contraction of the second | | | a segure | have a secondar | heldenselayina | View/Blank Trace On |
| #VBW | 3.0 MHz | | Sweep | | | Moi 1 of |
| | | 0 GHz PNC: Fast Trig: Free Run IFGain:Low #Atten: 6 dB | O GHz FNC: Fast Trig: Free Run #Atten: 6 dB Avg]Heir | O GHz PNC: Fast C Trig: Free Run #Atten: 6 dB Avg]Hold>100/110 #Atten: 6 dB | O GHZ PRC: Fast Trig: Free Run #Atten: 6 dB Mkr1 3.60 -55,63 Mkr1 3.60 -55,63 Stop 5.0 | 0 GHZ PNC: Fast PNC: Fast |

Spurious Emissions (Tx Conducted)

| SPECIFICATION: FCC CFF | R 2.1051 | RSS-119 5.8 |
|--------------------------|------------------|-----------------|
| 12.5 kHz Channel Spacing | 450.1 MHz @ 25 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |
| 12.5 kHz Channel Spacing | 450.1 MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |

No emissions were detected at a level greater than 20 dB below the limit.

| 123456 | TRACE | : Log-Pwr | | | 1 | Hz | | | larker 1 |
|------------|------------------|--|--|--|---|--|---|--|---|
| O MHz | ∞ kr1 450 | | Avg Hold: | | | | 9.94 dB | | 0 dB/div |
| | | | | | •1 ⁻ | | | | 40.0 |
| | | | | | | | | _ | 20.0 |
| | | | | | | | | | 0.00 |
| -20.00 (Bm | | | | | | | | | 0.0 |
| | | | | | | | | | 0.0 |
| 000 GHz | Stop 1.0 | ulianuunuu Sweep | ajyadi.isyadi.is | who period and a | | , | ranger | | tart 10 k |
| | .0 MHz 26 dBm | тиче (12 3 45 4 тиче (12 3 45 4 ост (Р ИЛИЧИ) kr1 450.0 MHz 43.626 dBm | Log-hwr Tree (1 2 3 4 5 6 Tree (1 2 3 4 5 6 Tre | Avg Type: Log-bvr Avg Hold: 3/100 TRACE [1 2 3 4 5 6 Type [www.www. cerl P NINUN Mkr1 450.0 MHz 43.626 dBm | Avg Type: Log-fwr That: [1 2 3 4 5 6 2 dB Mkr1 450.0 MHz Mkr1 450.0 MHz 43.626 dBm 43.626 dBm | Arg Type: Log-Nur Avg[Hold: 3/100 TRACE [1:2:3:45 ArgHold: 3/100 Tref MargHold: 3/100 Mkr1 450.0 MHz 43.626 dBm 1 | Hz Avg Type: Log-Avr AvgHold: 3100 The Clip and the | 00000 MHz PHC: FaatTrig: Free Run IFGaint.ow IFGAINT.ow | 450.005500000 MHz PRC Faat Trig: Free Run IFGant.ow Trig: Free Run Matten: 32 dB Mkr1 450.0 MHz 43.626 dBm 1 1 1 1 1 1 1 1 1 1 1 1 1 |

| Peak Search | :29:10 p.m. May 04, 2015 | ALIGNAUTO | | SENSE:NT | | 50 Q AC | | |
|--------------|---|-----------|--------------------|--|-----------------------|------------|-------------------------|----------|
| NextPea | 123456 TYPE A WWWWW CET S NNNYN 13.684 GHz -55.103 dBm | | Avg Typ Avg Hol | :Free Run en:6 dB | NC: East | t 29.94 dB | Ref Offset Ref 19.94 | 0 dB/div |
| Next Pk Rigi | | | | | | | | 9.94 |
| Next Pk Le | | | | | | | | 10.1 |
| Marker Del | -20.00 dBm | | | | | | | 10.1 |
| Mkr→C | | | | | | | | 10.1 |
| Mkr→RefL | - with the second se | **~ | - second water | and the second | earranticetty and the | | ****** | |
| Moi 1 of | Stop 5.000 GHz 1 ms (1001 pts) | Sweep | | MHz | #VBW 3.0 | | 00 GHz V 1.0 MHz | |

Spurious Emissions (Tx Conducted)

| SPECIFICATION: FCC CFF | R 2.1051 | RSS-119 5.8 |
|--------------------------|------------------|-----------------|
| 12.5 kHz Channel Spacing | 459.9 MHz @ 25 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |
| 12.5 kHz Channel Spacing | 459.9 MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |

No emissions were detected at a level greater than 20 dB below the limit.

| 3F 50 Q DC | | SE | NSE:NT | Avg Type | ALIGNAUTO | | E 1 2 3 4 5 6 | Peak Search |
|---|---------------------------|--------------------------|--------|--------------|-----------|----------|---|-------------|
| Narker 1 460.005400000 Ref Offset 29.94 dB 0 dB/div Ref 50.00 dBm | PNC: Fast 😱 IFGain:Low | Trig: Free #Atten: 32 | | Avg Hold: | 11/100 | kr1 460 | 0.0 MHz 25 dBm | NextPea |
| •0 •0 •0 •0 •0 •0 •0 •0 •0 •0 •0 •0 •0 • | | •1 | | | | | | Next Pk Rig |
| 20.0 | | | | | | | | Next Pk Le |
| 0.00 | | | | | | | | Marker Del |
| 20.0 | | | | | | | -20.00 (Bin | Mkr→C |
| 80.0 | | | | | | | | Mkr→RefL |
| 40.0 แหน่งหน่งหน่งหน่งหน่ง Start 10 kHz Res BW 10 kHz | า ^ม ุณเ | | | gansiustarne | | Stop 1.0 | ملادر بلایانیا 0000 GHz 1001 pts) | Mo 1 of |

| SENSE:NT | ALIGNAUTO 04:29:56 p.m. May 04, 201 Avg Type: Log-Pwr TRACE 1, 2, 3, 4, 5 | |
|---|--|--|
| PNC: Fast Trig: Free Run IFGain:Low #Atten: 6 dB | AvgiHoid>100/110 TVELA WWWW DETS NNNY Mkr1 3.644 GH | Z NextPea |
| | | Next Pk Rig |
| | | Next Pk Le |
| | -20.00 @ | Marker De |
| | | Mkr→C |
| anter des anter and | the space of the second se | a Mkr→RefL |
| #VBW 3.0 MHz | | |
| | D GHZ PNC: Fast Trig: Free Run #Atten: 6 dB | D GHZ PHC: Fbat IFG dinLow Trig: Free Run IFG dinLow Atten: 5 dB Avg Type: Log-Avr Avg Type: Log-Avr Avg Type: Log-Avr Triace [2 3 4.4 Mkr1 3.644 GH -55.349 dBn -55.349 dBn -000 et -000 et Stop 5.000 GH: |

Spurious Emissions (Tx Conducted)

| SPECIFICATION: FCC CFF | R 2.1051 | RSS-119 5.8 |
|--------------------------|------------------|-----------------|
| 12.5 kHz Channel Spacing | 469.9 MHz @ 25 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |
| 12.5 kHz Channel Spacing | 469.9 MHz @ 1 W | Emission Mask D |
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |

No emissions were detected at a level greater than 20 dB below the limit.

| Peak Search | E 1 2 3 4 5 6 | TRAC | LIGNAUTO | Avg Type Avg Hold | sense:nt | Tring | | | 85 50 g | arker 1 4 |
|-------------|---------------------------------------|----------|----------|----------------------|----------|--------|-------------------------|-----------------------------|------------------------------|------------|
| NextPea | 0.0 MHz 77 dBm | kr1 470 | | Avĝinoia. | | #Atten | PNC: Fast 😱 Gain:Low | .94 dB | ef Offset 29. lef 50.00 d | |
| Next Pk Rig | | | | | 1 | | | | | 0.0 |
| Next Pk Le | | | | | | | | | | 0.0 |
| Marker Del | | | | | | | | | | .00 |
| Mkr→C | -20.00 @in | | | | | | | | | 0.0 |
| Mkr→RefL | | | | | | | | | | 0.0 |
| Mor 1 of | կոհվուլյեստի 0000 GHz 1001 pts) | Stop 1.0 | | workilleterry | | | ndirtsiint+lei #VBW | anten ^{ar} kodulej | | tart 10 kH |
| | 1001 pts) | | | | | 30 kH | #VBW | | | |

| | | Avg Type | Log-Pwr | TRAC | E123456 | Peak Search |
|-----------------------------------|-----------------------|--|--|---|---|--|
| PNC: Fast Trig IFGain:Low #Att | | Avg Hold: | - 100/100 | 06 Wkr1 3.6 | 00 GHz | NextPea |
| | | | | | | Next Pk Rig |
| | | | | | | Next Pk Le |
| | | | | | -20.00 @m | Marker De |
| | | 1_ | | | | Mkr→C |
| e | and the second second | agend a mono | | eradional-pi-pi-pi-pi-pi-pi-pi-pi-pi-pi-pi-pi-pi- | | Mkr→RefL |
| #VBW 3.0 I | MHz | | Sweep | Stop 5. 12.1 ms (| .000 GHz 1001 pts) | Mo 1 of |
| | IFGuin:Low #Atto | PHC: Fast C Trig: Free Run IFGainLow #Atten: 6 dB | PNC: Fast Trig: Free Run Avg Hold: IFGan:Low #Atten: 6 dB | PNC: Fast Avg Hold>100/110 | PRC: Fast Trig: Free Run Avg Hold>100/100 Trig: Free Run IFGainLow #Atten: 6 dB Mkr1 3.6 -54.6 IFGainLow IFGainLow Image: August and | PNC: Fast Trig: Free Run IFG and tow IFG a |

Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC CFR 2.1051

RSS-119 5.8

LIMITS:

FCC 47 CFR 90.210

RSS-119 5.8

| Carrier Output Power | Emission Mask D 12.5 kHz Channel Spacing 50 + 10 Log ₁₀ (P _{Watts}) | | |
|----------------------|--|---------|--|
| 25 W | -20 dBm | -64 dBc | |
| 1 W | -20 dBm | -50 dBc | |

TRANSMITTER SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC 47 CFR 2.1053

GUIDE: TIA/EIA-603D 2.2.12

MEASUREMENT PROCEDURE:

Initial Scan:

- The EUT is placed in the S-Line TEM cell and emissions are measured from 30 MHz to 1000 MHz. Any emission within 20 dB of the limit is then re-tested on the OATS along with measurements from 1000 MHz to the 10th harmonic of the fundamental frequency.
- The EUT is placed in the reverberation chamber and emissions are measured from 1000 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.
- 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 90.210

Spurious Emissions (Tx Radiated)

SPECIFICATION: FCC CFR 2.1053

| 12.5 kHz Channel Spacing | 406.2 MHz @ 25 W | Emission Mask D |
|--------------------------|------------------|-----------------|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |
| | | |

| 12.5 kHz Channel Spacing | 406.2 MHz @ 1 W | Emission Mask D | | |
|---|-----------------|-----------------|--|--|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | | |
| ~ | ~ | ~ | | |
| | | | | |
| No emissions were detected at a level greater than 20 dB below the limit. | | | | |

12.5 kHz Channel Spacing 418.1 MHz @ 25 W Emission Mask D Emission Frequency (MHz) Level (dBm) Level (dBc) ~ ~ ~ Image: Comparison of the second secon

| 12.5 kHz Channel Spacing | 418.1 MHz @ 1 W | Emission Mask D | |
|---|-----------------|-----------------|--|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| No emissions were detected at a level greater than 20 dB below the limit. | | | |

Spurious Emissions (Tx Radiated)

SPECIFICATION: FCC CFR 2.1053

| 12.5 kHz Channel Spacing | 429.9 MHz @ 25 W | Emission Mask D |
|--------------------------|------------------|-----------------|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |
| | | |

| 12.5 kHz Channel Spacing | 429.9 MHz @ 1 W | Emission Mask D | |
|---|-----------------|-----------------|--|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| No emissions were detected at a level greater than 20 dB below the limit. | | | |

| 12.5 kHz Channel Spacing | 450.1 MHz @ 25 W | Emission Mask D |
|--------------------------|------------------|-----------------|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |
| | | |

| 12.5 kHz Channel Spacing | 450.1 MHz @ 1 W | Emission Mask D | |
|---|-----------------|-----------------|--|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| ~ | ~ | ~ | |
| | | | |
| No emissions were detected at a level greater than 20 dB below the limit. | | | |

Spurious Emissions (Tx Radiated)

SPECIFICATION: FCC CFR 2.1053

| 12.5 kHz Channel Spacing | 459.9 MHz @ 25 W | Emission Mask D |
|--------------------------|------------------|-----------------|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |
| | | |

| 12.5 kHz Channel Spacing | 459.9 MHz @ 1 W | Emission Mask D | | |
|---|-----------------|-----------------|--|--|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) | | |
| ~ | ~ | ~ | | |
| | | | | |
| No emissions were detected at a level greater than 20 dB below the limit. | | | | |

| 12.5 kHz Channel Spacing | 469.9 MHz @ 25 W | Emission Mask D |
|--------------------------|------------------|-----------------|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |
| | | |

| 12.5 kHz Channel Spacing | 469.9 MHz @ 1 W | Emission Mask D |
|--------------------------|-------------------------------------|----------------------|
| Emission Frequency (MHz) | Level (dBm) | Level (dBc) |
| ~ | ~ | ~ |
| No emissions were | detected at a level greater than 20 |) dB below the limit |

Spurious Emissions (Tx Radiated)

Open Area Test Site Results:

| 12.5 kHz Channel Spacing | 429.9 MHz @ 25 W | Emission Mask D | |
|---------------------------------------|------------------|-----------------|--|
| Harmonics Emission Frequency (MHz) | Level (dBm) | Level (dBc) | |
| 859.8 | -79.2 | -123.2 | |
| 1289.7 | -61.0 | -105.0 | |
| 1719.6 | -82.3 | -126.2 | |
| 2149.5 | -58.8 | -102.8 | |
| 2579.4 | -72.8 | -116.8 | |
| 3009.3 | -69.7 | -113.7 | |

Photo: OATS Setup



FCC ID: CASTDAH5A IC : 737A-TDAH5A Page 27 of 50

Report Revision: 1 Issue Date: 12-May-2015

Spurious Emissions (Tx Radiated)

SPECIFICATION: FCC CFR 2.1053

LIMITS: FCC CFR 2.1053

| Carrier Output Power | Emission Mask D 12.5 kHz Channel Spacing 50 + 10 Log ₁₀ (P _{Watts}) | | | |
|----------------------|--|--|--|--|
| 25 W | -20 dBm -64 dBc | | | |
| 1 W | -20 dBm -50 dBc | | | |

TRANSIENT FREQUENCY BEHAVIOR

SPECIFICATION: FCC 47 CFR 90.214

RSS-119 5.9

GUIDE: TIA/EIA-603D 2.2.19

MEASUREMENT PROCEDURE:

- 1. Refer Annex A for equipment set up.
- 2. Measurements and plots were made following the TIA/EIA procedure.

MEASUREMENT RESULTS: See the tables and plots on the following pages for 12.5 kHz & 25.0 kHz channel spacings.

LIMIT CLAUSES: FCC 47 CFR 90.214

RSS-119 5.9

Transient Frequency Behaviour

RSS-119 5.9

Tx FREQUENCY: 406.2 MHz

25 W

12.5 kHz Channel Spacing

| TRANSIENT RESPONSE | CARRIER PEAK VARIATION FROM NORMAL | | |
|--------------------|------------------------------------|---------------|--|
| PERIOD | Key ON (kHz) | Key OFF (kHz) | |
| t1 | 2.2 | N/A | |
| t2 | -0.6 | N/A | |
| t3 | N/A | 0.7 | |

| Confirm that during periods t1 and t3 the frequency difference | YES | NO |
|--|--------------|----|
| does not exceed the value of one channel separation. | \checkmark | |
| Confirm that during the period t2 the frequency difference does | YES | NO |
| not exceed half a channel separation. | 1 | |
| Confirm that during the period t2 to t3 the frequency difference | YES | NO |
| does not exceed the frequency error limit. | 1 | |

LIMIT:

FCC 47 CFR 90.214

| TRANSIENT PERIODS | FREQUENCY RANGE | | |
|-------------------|-------------------|-------------------|--|
| TRANSIENT PERIODS | 150 MHz – 174 MHz | 421 MHz – 512 MHz | |
| t1 (ms) | 5 ms | 10 ms | |
| t2 (ms) | 20 ms | 25 ms | |
| t3 (ms) | 5 ms | 10 ms | |

LIMIT: RSS-119 5.9

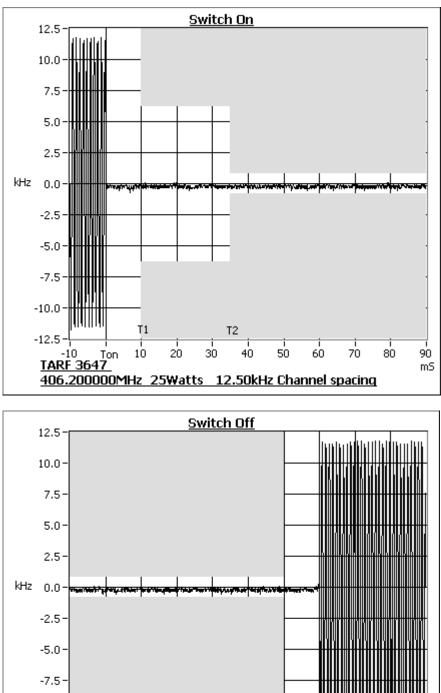
| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|-------------------|-----------------|-----------------|
| TRANSIENT PERIODS | Maximum Frequency | FREQUENCY RANGE | |
| | Difference | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods.

Transient Frequency Behaviour



RSS-119 5.9



-70

TARF 3647

-60

-50

-40

-30

406.200000MHz 25Watts 12.50kHz Channel spacing

-10.0-

-12.5

Toff

10

20

30

mS

з

-10

-20

Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 418.1 MHz

25 W

12.5 kHz Channel Spacing

| TRANSIENT RESPONSE | CARRIER PEAK VARIATION FROM NORMAL | | |
|--------------------|------------------------------------|---------------|--|
| PERIOD | Key ON (kHz) | Key OFF (kHz) | |
| t1 | -0.9 | N/A | |
| t2 | -0.4 | N/A | |
| t3 | N/A | 0.6 | |

| Confirm that during periods t1 and t3 the frequency difference | YES | NO |
|--|--------------|----|
| does not exceed the value of one channel separation. | \checkmark | |
| Confirm that during the period t2 the frequency difference does | YES | NO |
| not exceed half a channel separation. | 1 | |
| Confirm that during the period t2 to t3 the frequency difference | YES | NO |
| does not exceed the frequency error limit. | 1 | |

LIMIT:

FCC 47 CFR 90.214

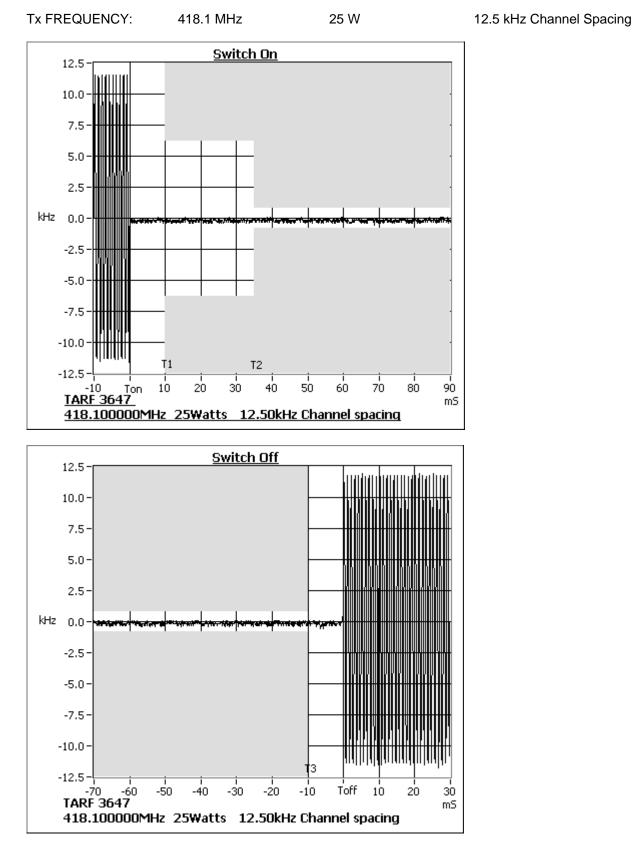
| | TRANSIENT PERIODS | FREQUENCY RANGE | | |
|--|-------------------|-------------------|-------------------|--|
| | | 150 MHz – 174 MHz | 421 MHz – 512 MHz | |
| | t1 (ms) | 5 ms | 10 ms | |
| | t2 (ms) | 20 ms | 25 ms | |
| | t3 (ms) | 5 ms | 10 ms | |

LIMIT: RSS-119 5.9

| Transient Frequency Be | Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|------------------------|--|-----------------|-----------------|--|
| TRANSIENT PERIODS | Maximum Frequency | FREQUENCY RANGE | | |
| HIANGIEITI I ERIODO | Difference | 138 – 174 MHz | 406.1 – 470 MHz | |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms | |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms | |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms | |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

Transient Frequency Behavior



FCC 47 CFR 90.214

FCC ID: CASTDAH5A IC : 737A-TDAH5A

SPECIFICATION:

Report Revision: 1 Issue Date: 12-May-2015

Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY:

429.9 MHz

25 W

12.5 kHz Channel Spacing

| TRANSIENT RESPONSE PERIOD | CARRIER PEAK VARIATION FROM NORMAL | | |
|------------------------------|------------------------------------|---------------|--|
| | Key ON (kHz) | Key OFF (kHz) | |
| t1 | -0.6 | N/A | |
| t2 | -1.6 | N/A | |
| t3 | N/A | -0.6 | |

| Confirm that during periods t1 and t3 the frequency difference | YES | NO |
|--|--------------|----|
| does not exceed the value of one channel separation. | \checkmark | |
| Confirm that during the period t2 the frequency difference does | YES | NO |
| ot exceed half a channel separation. | 1 | |
| Confirm that during the period t2 to t3 the frequency difference | YES | NO |
| es not exceed the frequency error limit. | 1 | |

LIMIT:

FCC 47 CFR 90.214

| TRANSIENT PERIODS | FREQUENCY RANGE | | |
|-------------------|-------------------|-------------------|--|
| | 150 MHz – 174 MHz | 421 MHz – 512 MHz | |
| t1 (ms) | 5 ms | 10 ms | |
| t2 (ms) | 20 ms | 25 ms | |
| t3 (ms) | 5 ms | 10 ms | |

LIMIT: RSS-119 5.9

| Transient Frequency Be | Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | |
|------------------------|--|-----------------|-----------------|
| TRANSIENT PERIODS | Maximum Frequency | FREQUENCY RANGE | |
| | Difference | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

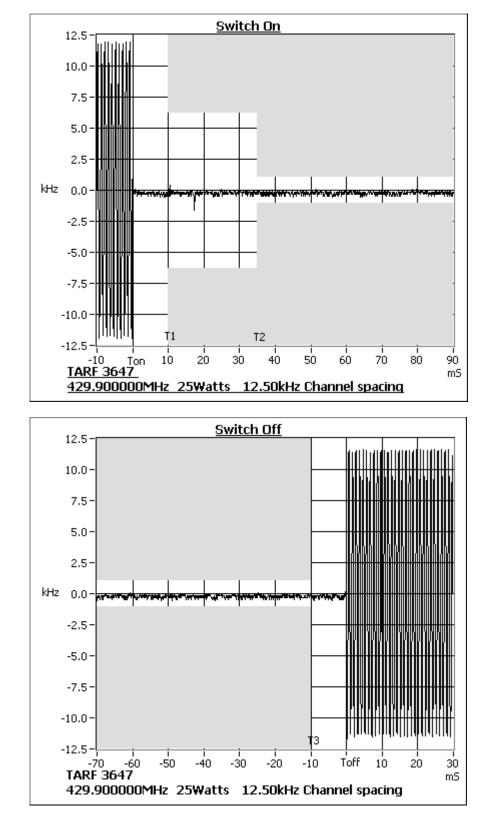
Transient Frequency Behavior



FCC 47 CFR 90.214

Tx FREQUENCY:

429.9 MHz 25 W 12.5 kHz Channel Spacing



Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 450.1 MHz

25 W

12.5 kHz Channel Spacing

| TRANSIENT RESPONSE PERIOD | CARRIER PEAK VARIATION FROM NORMAL | | |
|------------------------------|------------------------------------|---------------|--|
| | Key ON (kHz) | Key OFF (kHz) | |
| t1 | -0.8 | N/A | |
| t2 | -0.7 | N/A | |
| t3 | N/A | -0.6 | |

| Confirm that during periods t1 and t3 the frequency difference | YES | NO |
|--|-----|----|
| does not exceed the value of one channel separation. | 1 | |
| Confirm that during the period t2 the frequency difference does | YES | NO |
| not exceed half a channel separation. | 1 | |
| Confirm that during the period t2 to t3 the frequency difference | YES | NO |
| does not exceed the frequency error limit. | 1 | |

LIMIT:

FCC 47 CFR 90.214

| | TRANSIENT PERIODS | FREQUENCY RANGE | | |
|--|-------------------|-------------------|-------------------|--|
| | | 150 MHz – 174 MHz | 421 MHz – 512 MHz | |
| | t1 (ms) | 5 ms | 10 ms | |
| | t2 (ms) | 20 ms | 25 ms | |
| | t3 (ms) | 5 ms | 10 ms | |

LIMIT: RSS-119 5.9

| Transient Frequency Be | Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|------------------------|--|-----------------|-----------------|--|
| TRANSIENT PERIODS | Maximum Frequency | FREQUENCY RANGE | | |
| INANSIENTTERIODS | Difference | 138 – 174 MHz | 406.1 – 470 MHz | |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms | |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms | |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms | |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

Transient Frequency Behavior

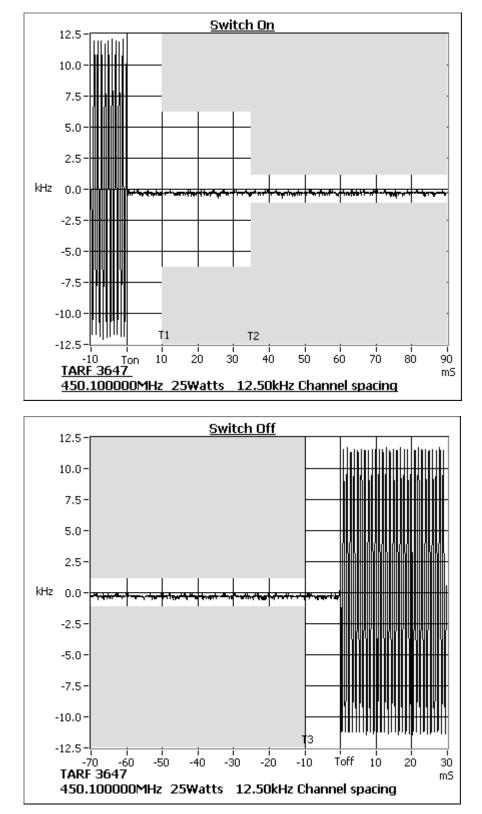


FCC 47 CFR 90.214

450.1 MHz

Tx FREQUENCY:

25 W 12.5 kHz Channel Spacing



FCC ID: CASTDAH5A IC : 737A-TDAH5A

Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 459.9 MHz

25 W

12.5 kHz Channel Spacing

| TRANSIENT RESPONSE | CARRIER PEAK VARIATION FROM NORMAL | | |
|--------------------|------------------------------------|---------------|--|
| PERIOD | Key ON (kHz) | Key OFF (kHz) | |
| t1 | -1.9 | N/A | |
| t2 | -0.5 | N/A | |
| t3 | N/A | -0.5 | |

| Confirm that during periods t1 and t3 the frequency difference | YES | NO |
|--|-----|----|
| does not exceed the value of one channel separation. | 1 | |
| Confirm that during the period t2 the frequency difference does | YES | NO |
| not exceed half a channel separation. | 1 | |
| Confirm that during the period t2 to t3 the frequency difference | YES | NO |
| does not exceed the frequency error limit. | 1 | |

LIMIT:

FCC 47 CFR 90.214

| | TRANSIENT PERIODS | FREQUENCY RANGE | | | |
|--|-------------------|-------------------|-------------------|--|--|
| | IRANSIENT PERIODS | 150 MHz – 174 MHz | 421 MHz – 512 MHz | | |
| | t1 (ms) | 5 ms | 10 ms | | |
| | t2 (ms) | 20 ms | 25 ms | | |
| | t3 (ms) | 5 ms | 10 ms | | |

LIMIT: RSS-119 5.9

| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|------------|---------------|-----------------|
| TRANSIENT PERIODS | | FREQUE | NCY RANGE |
| | Difference | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

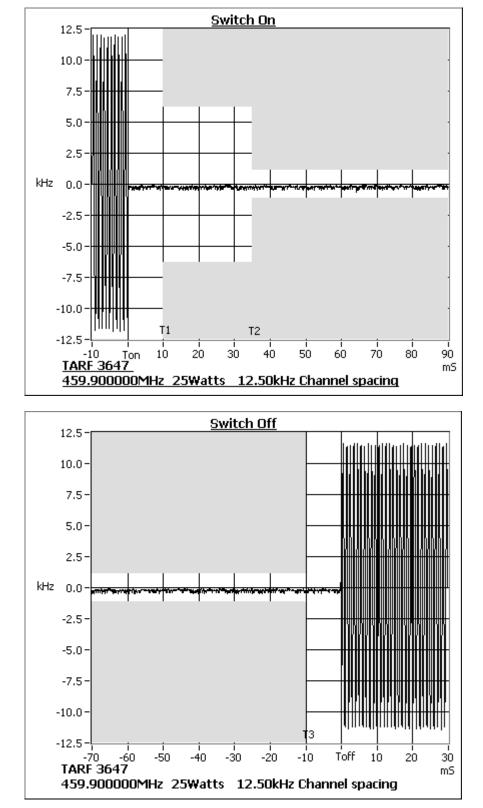
Transient Frequency Behavior



FCC 47 CFR 90.214

Tx FREQUENCY:

459.9 MHz 25 W 12.5 kHz Channel Spacing



FCC ID: CASTDAH5A IC: 737A-TDAH5A

Transient Frequency Behaviour

SPECIFICATION: FCC 47 CFR 90.214

Tx FREQUENCY: 469.9 MHz

25 W

12.5 kHz Channel Spacing

| TRANSIENT RESPONSE | CARRIER PEAK VARIATION FROM NORMAL | | |
|--------------------|------------------------------------|---------------|--|
| PERIOD | Key ON (kHz) | Key OFF (kHz) | |
| t1 | -0.8 | N/A | |
| t2 | -0.6 | N/A | |
| t3 | N/A | 0.7 | |

| Confirm that during periods t1 and t3 the frequency difference | YES | NO |
|--|-----|----|
| does not exceed the value of one channel separation. | 1 | |
| Confirm that during the period t2 the frequency difference does | YES | NO |
| not exceed half a channel separation. | 1 | |
| Confirm that during the period t2 to t3 the frequency difference | YES | NO |
| does not exceed the frequency error limit. | 1 | |

LIMIT:

FCC 47 CFR 90.214

| | TRANSIENT PERIODS | FREQUENCY RANGE | | | |
|--|-------------------|-------------------|-------------------|--|--|
| | IRANSIENT PERIODS | 150 MHz – 174 MHz | 421 MHz – 512 MHz | | |
| | t1 (ms) | 5 ms | 10 ms | | |
| | t2 (ms) | 20 ms | 25 ms | | |
| | t3 (ms) | 5 ms | 10 ms | | |

LIMIT: RSS-119 5.9

| Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|--|------------|---------------|-----------------|
| TRANSIENT PERIODS | | FREQUE | NCY RANGE |
| | Difference | 138 – 174 MHz | 406.1 – 470 MHz |
| t1 (ms) | ± 12.5 kHz | 5 ms | 10 ms |
| t2 (ms) | ± 6.25 kHz | 20 ms | 25 ms |
| t3 (ms) | ± 12.5 kHz | 5 ms | 10 ms |

Note: RSS-119 5.9 - If the transmitter carrier output power rating is 6 Watts or less, the frequency difference during the time periods t1 and t3 may exceed the maximum frequency difference for these time periods,

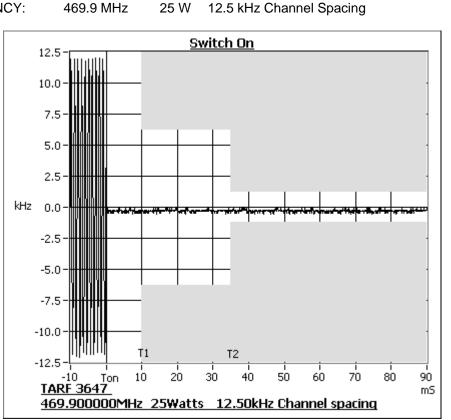
Transient Frequency Behavior

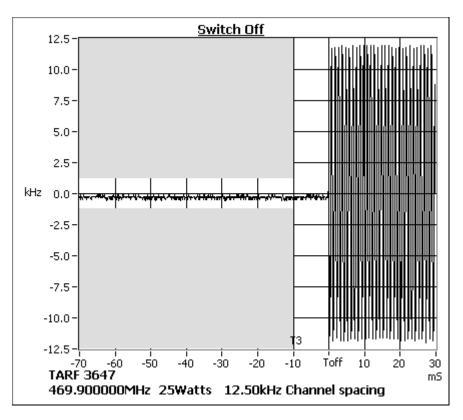
SPECIFICATION:

FCC 47 CFR 90.214

Tx FREQUENCY:

25 W 12.5 kHz Channel Spacing





FCC ID: CASTDAH5A IC: 737A-TDAH5A

TRANSMITTER FREQUENCY STABILITY - TEMPERATURE

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

RSS-119 5.3

GUIDE: TIA/EIA-603D 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).

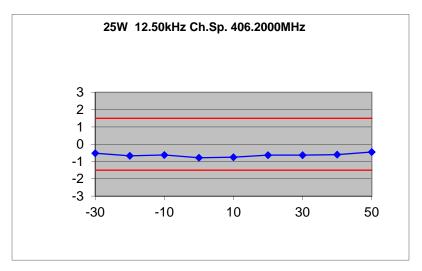
MEASUREMENT RESULTS:

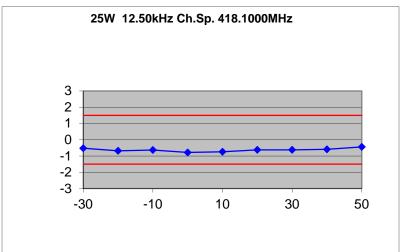
See the plots on the following pages for 12.5 kHz & 25.0 kHz channel spacings.

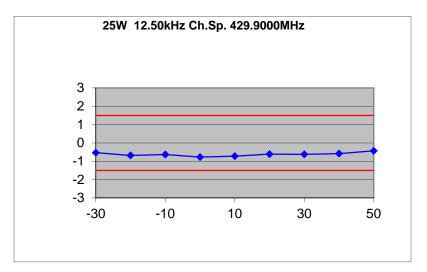
| | Error (ppm) | | | | | |
|---------------------|-------------|-----------|-----------|-----------|-----------|-----------|
| Temperature (ºC) | 406.2 MHz | 418.1 MHz | 429.9 MHz | 450.1 MHz | 459.9 MHz | 469.9 MHz |
| -30 | -0.52 | -0.52 | -0.53 | -0.53 | -0.55 | -0.58 |
| -20 | -0.67 | -0.68 | -0.68 | -0.68 | -0.67 | -0.66 |
| -10 | -0.62 | -0.63 | -0.63 | -0.66 | -0.67 | -0.7 |
| 0 | -0.78 | -0.78 | -0.77 | -0.76 | -0.75 | -0.74 |
| 10 | -0.75 | -0.74 | -0.72 | -0.71 | -0.69 | -0.68 |
| 20 | -0.63 | -0.62 | -0.61 | -0.61 | -0.6 | -0.6 |
| 30 | -0.63 | -0.62 | -0.62 | -0.62 | -0.62 | -0.61 |
| 40 | -0.6 | -0.59 | -0.58 | -0.57 | -0.56 | -0.54 |
| 50 | -0.45 | -0.44 | -0.43 | -0.42 | -0.4 | -0.38 |

| L | LIMIT CLAUSES: FCC 47 CFR 90.213 | RSS-119 5.3 |
|---|----------------------------------|-----------------------|
| | Channel Spacing (kHz) | Frequency Error (ppm) |
| | 12.5 | 1.5 |

Transmitter Frequency Stability - Temperature

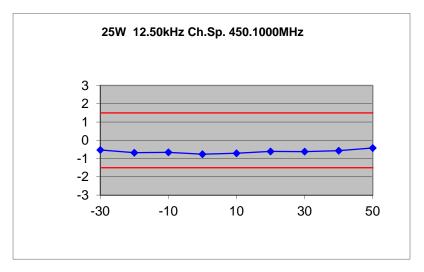


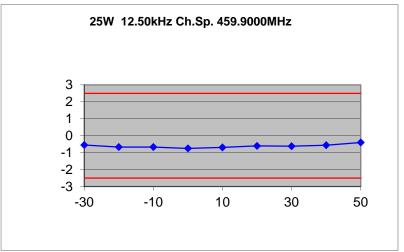


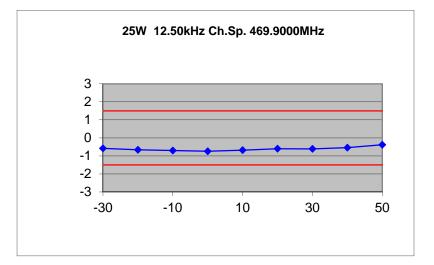


FCC ID: CASTDAH5A IC : 737A-TDAH5A

Transmitter Frequency Stability - Temperature







FCC ID: CASTDAH5A IC : 737A-TDAH5A

TRANSMITTER FREQUENCY STABILITY - VOLTAGE

SPECIFICATION: FCC 47 CFR 2.1055 (d) (1) RSS-119 5.3

GUIDE: TIA/EIA-603D 2.2.2

MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.

- The EUT was tested for frequency error at an input voltage to the radio of 85% to 115%.
 The frequency error was recorded in parts per million (ppm).

MEASUREMENT RESULTS:

| Voltage | FREQU | ENCY ERROR (ppm) for 1 | 12.5 kHz |
|--------------------|-----------|------------------------|-----------|
| | 406.2 MHz | 418.1 MHz | 429.9 MHz |
| 24 V _{DC} | -0.72 | -0.70 | -0.70 |
| 9 V _{DC} | -0.70 | -0.72 | -0.70 |
| 36 V _{DC} | -0.71 | -0.70 | -0.69 |

| Voltage | FREQUENCY ERROR (ppm) for 12.5 kHz | | |
|--------------------|------------------------------------|-----------|-----------|
| | 450.1 MHz | 459.9 MHz | 469.9 MHz |
| 24 V _{DC} | -0.73 | -0.70 | -0.69 |
| 9 V _{DC} | -0.72 | -0.70 | -0.69 |
| 36 V _{DC} | -0.72 | -0.70 | -0.69 |

| LIMIT CLAUSES: FCC 47 CFR 90.213 | RSS-119 5.3 |
|----------------------------------|-----------------------|
| Channel Spacing (kHz) | Frequency Error (ppm) |
| 12.5 | 1.5 |

RECEIVER SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: RSS-119 5.11

GUIDE: TIA/EIA-603D 2.1.2

MEASUREMENT PROCEDURE:

- Refer Annex A for Equipment set up diagram.
 The frequency range examined was from 30 MHz to 3 times highest tunable frequency.
- 3. Spurious emissions which were attenuated more than 20 dB below the limit were not recorded.

| 406.2 MHz Receive | | | | | | |
|---|---|--|--|--|--|--|
| Emission Frequency (MHz) Level (nW) Level (dBm) | | | | | | |
| ~ | ~ | | | | | |
| | | | | | | |
| | | | | | | |
| No emissions were detected within 20 dB of Limit. | | | | | | |

| 418.1 MHz Receive | | | | | | |
|---|---|---|--|--|--|--|
| Emission Frequency (MHz) Level (nW) Level (dBm) | | | | | | |
| ~ | ~ | ~ | | | | |
| | | | | | | |
| | | | | | | |
| No emissions were detected within 20 dB of Limit. | | | | | | |

| 429.9 MHz Receive | | | | | | |
|---|---|--|--|--|--|--|
| Emission Frequency (MHz) Level (nW) Level (dBm) | | | | | | |
| ~ | ~ | | | | | |
| | | | | | | |
| | | | | | | |
| No emissions were detected within 20 dB of Limit. | | | | | | |

RECEIVER SPURIOUS EMISSIONS (CONDUCTED)

| 450.1 MHz Receive | | | | | | |
|---|---|---|--|--|--|--|
| Emission Frequency (MHz) Level (nW) Level (dBm) | | | | | | |
| ~ | ~ | ~ | | | | |
| | | | | | | |
| | | | | | | |
| No emissions were detected within 20 dB of Limit. | | | | | | |

| 459.9 MHz Receive | | | | | | |
|---|--|--|--|--|--|--|
| Emission Frequency (MHz) Level (nW) Level (dBm) | | | | | | |
| ~ ~ ~ | | | | | | |
| | | | | | | |
| | | | | | | |
| No emissions were detected within 20 dB of Limit. | | | | | | |

| 469.9 MHz Receive | | | | | | | |
|---|---|---|--|--|--|--|--|
| Emission Frequency (MHz) Level (nW) Level (dBm) | | | | | | | |
| ~ | ~ | ~ | | | | | |
| | | | | | | | |
| | | | | | | | |
| No emissions were detected within 20 dB of Limit. | | | | | | | |

| LIMIT CLAUSE: | RSS-Gen 6(b) | | | |
|---------------|--------------|------|----------|--|
| 30 → 1000 MHz | | 2 nW | - 57 dBm | |
| | > 1000 MHz | 5 nW | - 53 dBm | |

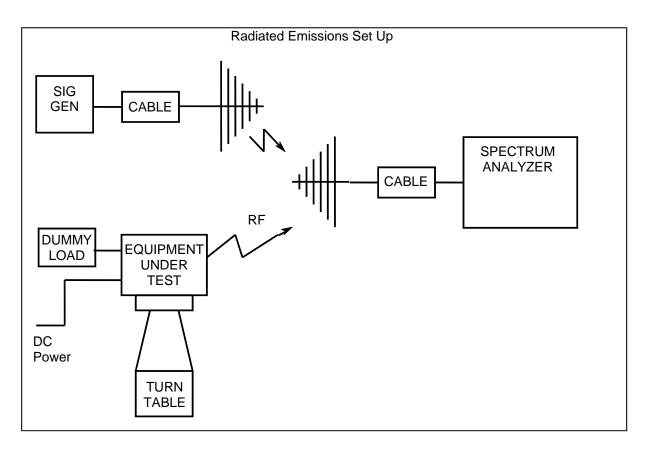
TEST EQUIPMENT LIST

| Oscilloscope | 100MHz Digital | Tektronics | TDS340 | B013611 | E3585 | 16-Oct-15 |
|------------------------|---------------------------------|--------------------|------------------------|---------------|-------|-----------|
| Environ. Chamber | Chest | Contherm | Chest | E3397 | E3397 | 2-Aug-15 |
| Environ. Chamber | Chest | Contherm | Chest | E3397 | E3397 | 1-Aug-15 |
| Power Supply | TREVA2 60V/25A | Agilent | N5767A | US09F4901H | E4656 | 16-Oct-15 |
| Antenna | Reference Dipoles | Emco | 3121C DB1 | 9510-1164 | E3559 | 30-Jan-16 |
| Antenna | 18GHz DRG | Emco | DRG3115 | 9512-4638 | E3560 | 6-Mar-16 |
| Antenna | 18GHz DRG | Emco | DRG3115 | 2084 | E3076 | 6-Mar-16 |
| Spectrum Analyser | 26.5GHz | Agilent | PXA N9030A | MY49432161 | E4907 | 6-Jul-16 |
| Transient Limiter | 9kHz to 200MHz | Agilent | 11947A | 3107A03657 | E4982 | 5-May-16 |
| RF Chamber | S-LINE TEM CELL | Rohde & Schwarz | 1089.9296.02 | 338232/003 | E3636 | 31-Aug-15 |
| RF Amplifier | +21.7 dB 1GHz | Tait | ZFL-1000LN | E3660 | E3360 | 19-Jan-16 |
| RF Attenuator | 20dB 25W | Weinschel | 33-20-33 | BD5871 | E3673 | 14-Oct-15 |
| RF Attenuator | TREVA2 20dB 150W | Weinschel | 40-20-33 | CJ405 | E3733 | 15-Oct-15 |
| Coax Cable | 2m Black | Suhner | RG214HF/Nm/Nm/2 000 | TeltestBlack3 | E4624 | 15-Oct-15 |
| Audio Analyser | TREVA2 | Hewlett Packard | HP8903B | 2818A04275 | E3710 | 16-Oct-15 |
| Power Supply | 60V/50A/1000W | Hewlett Packard | HP6012B | 2524A00616 | E3712 | 16-Oct-15 |
| Modulation Analyser | TREVA2 | Hewlett Packard | HP8901B (Opt 002) | 3704A05837 | E3786 | 18-Oct-15 |
| Signal Generator | Digital 4GHz | Agilent | E4433B | US38440446 | E4147 | 22-Oct-16 |
| Signal Generator | TREVA2 Analog 3.3GHz | Rohde & Schwarz | SML03 1090.3000.13 | 100597 | E4050 | 24-Oct-15 |
| RF Attenuator | TREVA2 3dB | Weinschel | Model 1 | BL9950 | E4080 | |
| RF Combiner | TREVA2 | Minicircuits | ZFSC-4-1 | - | E4084 | |
| Spectrum Analyser | 13.2GHz | Agilent | E4445A | MY42510072 | E4139 | 22-Oct-16 |
| Coax Cable | OATS Turntable Cable 1 | Intelcom | RG214 | OATS1 | E4621 | 23-Oct-15 |
| Coax Cable | OATS Tower Cable | Intelcom | RG214 | OATS2 | E4622 | 23-Oct-15 |
| OATS | Antenna Tower | Electrometrics | EM-4720-2 | 112 | E4447 | |
| OATS | Controller | Electrometrics | EM-4700 | 119 | E4445 | |
| OATS | Turntable | Electrometrics | EM-4704A | 105 | E4446 | |
| RF Attenuator | 30dB 350W | Weinschel | 67-30-33 | BR0531 | E4280 | 18-Oct-15 |
| Coax Cable | 2m Black | Suhner | RG214HF/Nm/Nm/2 000 | TeltestBlack5 | E4850 | 14-Oct-15 |
| Power Meter | TREVA2 Power Head for HP8901 | Hewlett Packard | HP11722A | 2716A02037 | 1575 | 18-Oct-15 |
| Antenna | Log Periodic | Schwarzbeck | VUSLP | 9111-219 | E4617 | |
| TREVA 2 | | Teltest | - | 2 | - | 4-May-15 |
| Coax Cable | Reverb - 4.5m Multiflex 141 | TeltestBlue6 | MF 141 | TeltestBlue6 | E4843 | 13-Oct-16 |
| Coax Cable | Reverb - 2m Multiflex 141 | TeltestBlue5 | MF 141 | TeltestBlue5 | E4844 | 14-Oct-15 |
| Coax Cable | Reverb - 2m Multiflex 141 | TeltestBlue4 | MF 141 | TeltestBlue4 | E4845 | 14-Oct-15 |
| Coax Cable | Reverb - 1m Multiflex 141 | TeltestBlue3 | MF 141 | TeltestBlue3 | E4846 | 14-Oct-15 |

| Coax Cable | Reverb - 1m Multiflex 141 | TeltestBlue2 | MF 141 | TeltestBlue2 | E4847 | 14-Oct-15 |
|-----------------|--|--------------|--------------------|--------------|-------|-----------|
| Coax Cable | Reverb - 1m Multiflex 141 | TeltestBlue1 | MF 141 | TeltestBlue1 | E4848 | 14-Oct-15 |
| 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 | 16-Oct-15 |
| OATS | FCC Listing Registration | | | 837095 | | 12-May-16 |
| Power Supply | 60V/25A | Agilent | N5767A | 3111A05573 | E4979 | 21-Oct-15 |
| LIŚN | 32A 50ohm//50µH | Cranage | VN3-635 | 3527 | E4996 | 9-Jan-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 EVAluation 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.

