# 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

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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:

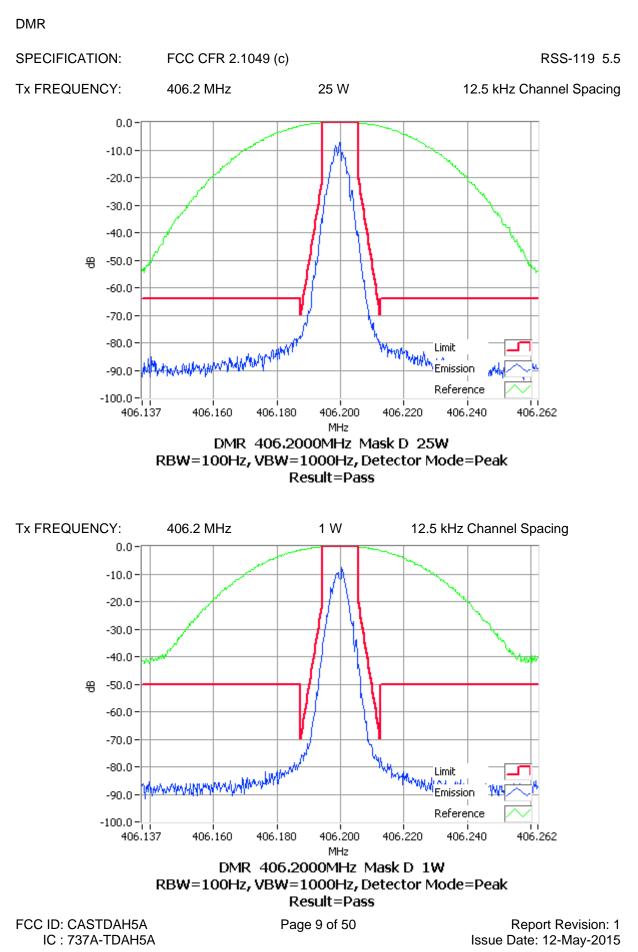
- 1. Refer Annex A for Equipment Set up.
- 2. For Data measurements: The EUT was modulated with an internally generated pseudo random bit sequence at the appropriate Baud rates.
- 3. The Occupied Bandwidth was measured on the Spectrum Analyser, with bandwidth settings as follows.

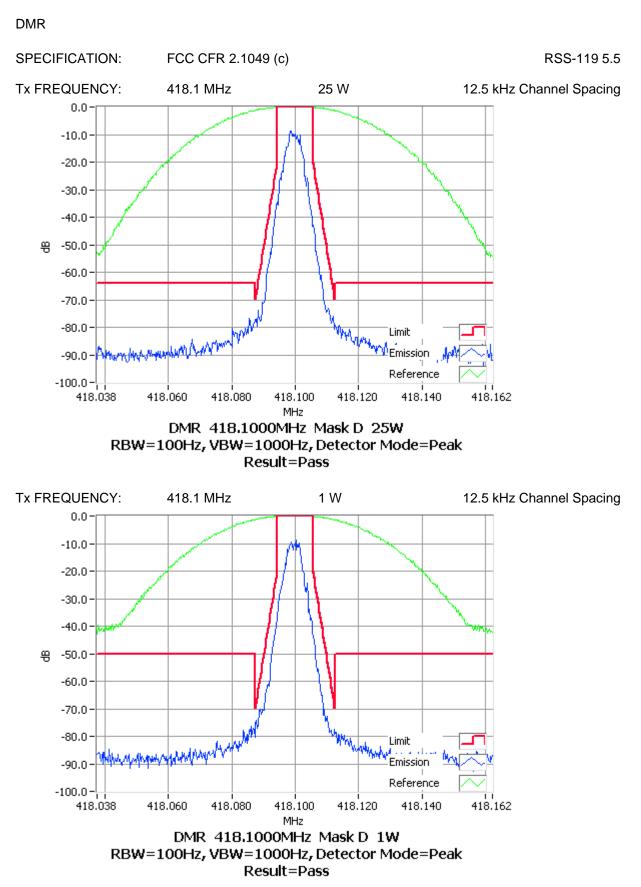
Emission Mask D – Resolution Bandwidth = 100 Hz, Video Bandwidth = 1 kHz

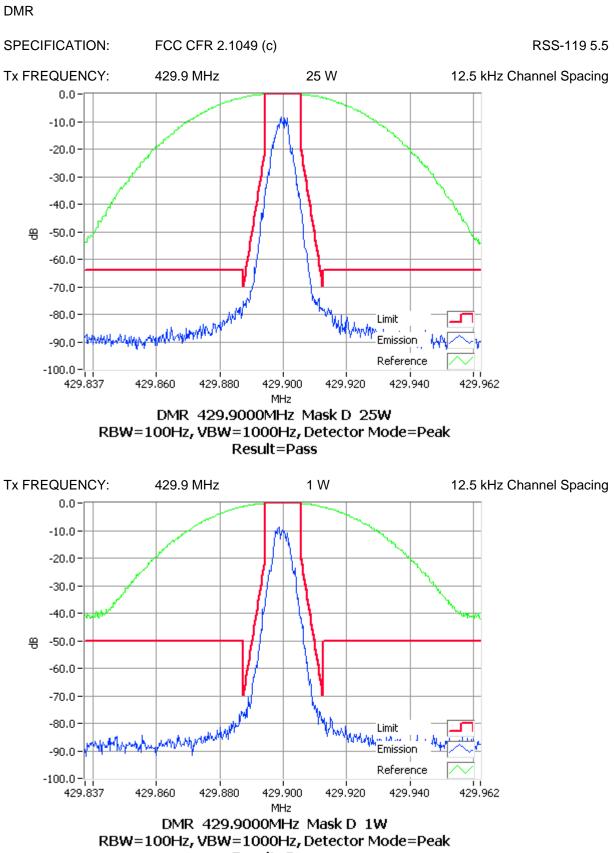
MEASUREMENT RESULTS:

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

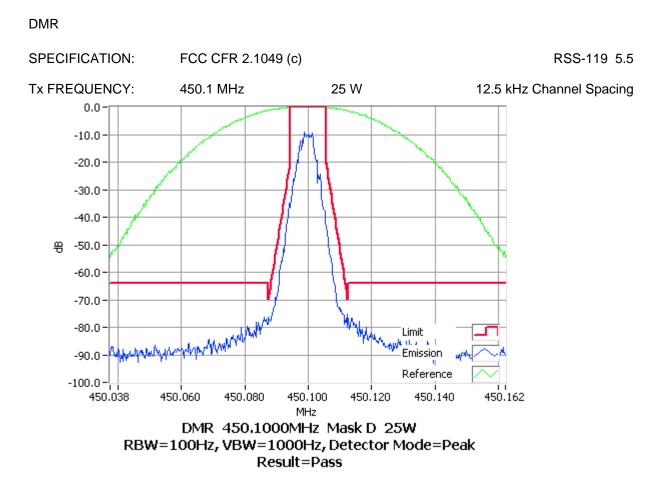
LIMIT CLAUSE:	FCC 47 CFR 90.210	RSS-119 5.5
EMISSION MASKS Emission Mask D	12.5 kHz Channel Spacing	Digital Voice/Data
DATA SPEED Digital Voice/Data	12.5 kHz Channel Spacing	9600 bps

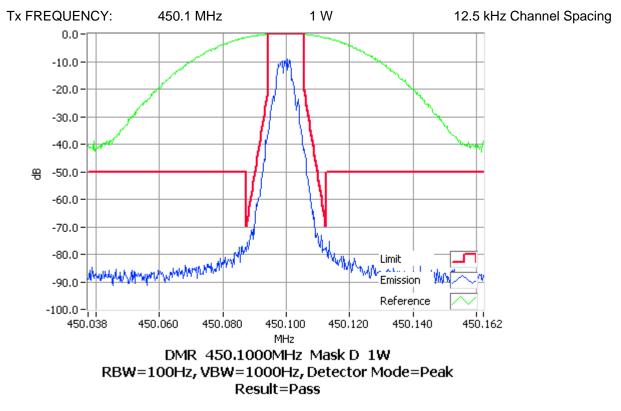






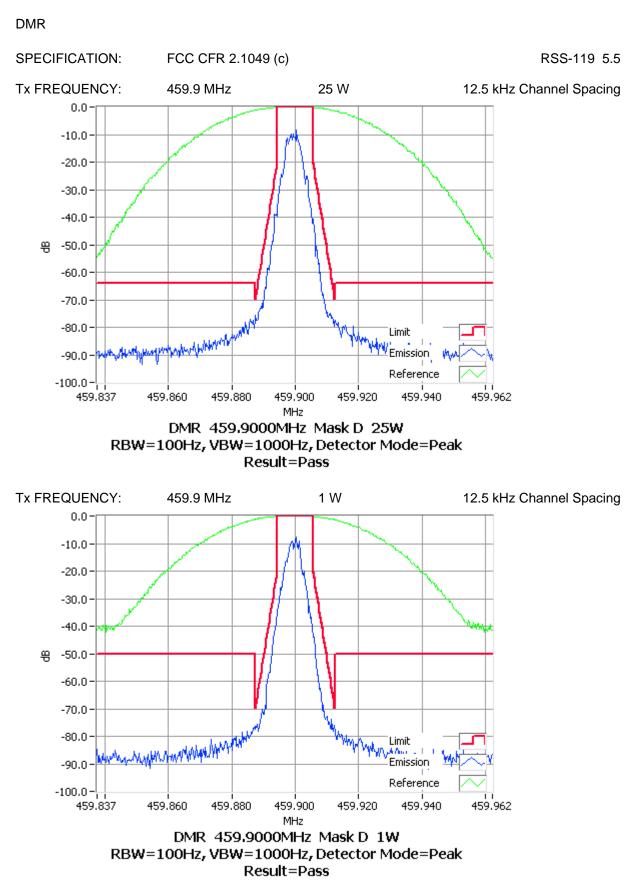
## Occupied Bandwidth and Spectrum Masks

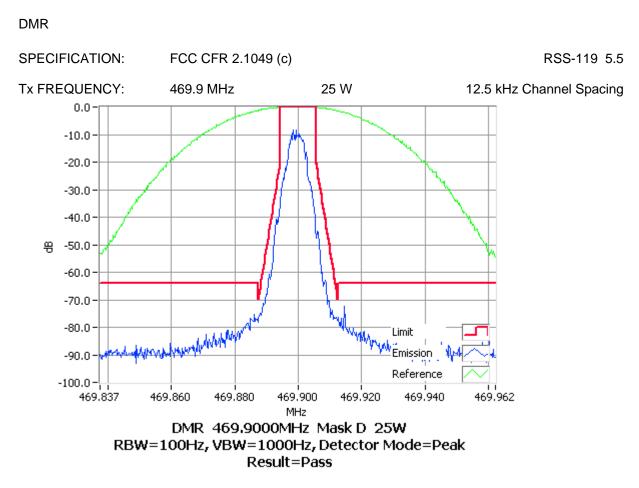


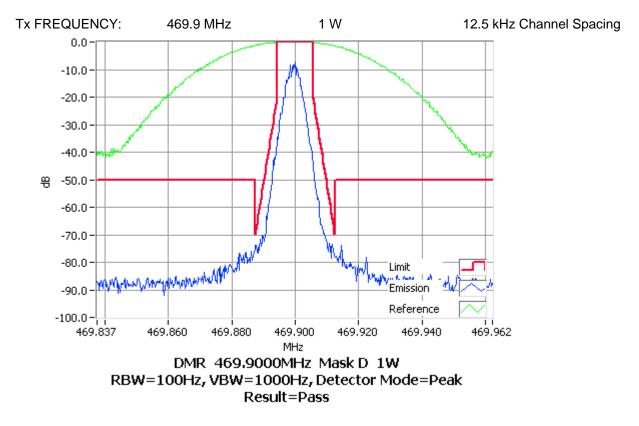


FCC ID: CASTDAH5A IC : 737A-TDAH5A Page 12 of 50

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 10<sup>th</sup> 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)	<b>M</b> 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						<b>♦</b> <sup>1</sup>				
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
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.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						↑ <sup>1</sup>				
Next Pk Le										.0
Marker De										.0
Mkr→C	-20.00 @m									.0
Mkr→RefL										.0
<b>Mo</b> 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 <sup>-</sup>				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 <sup>ม</sup> ุ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 <sup>ar</sup> 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)	<b>Mo</b> 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 <sub>10</sub> (P <sub>Watts</sub> )		
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 10<sup>th</sup> 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 6<sup>th</sup> 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 <sub>10</sub> (P <sub>Watts</sub> )			
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

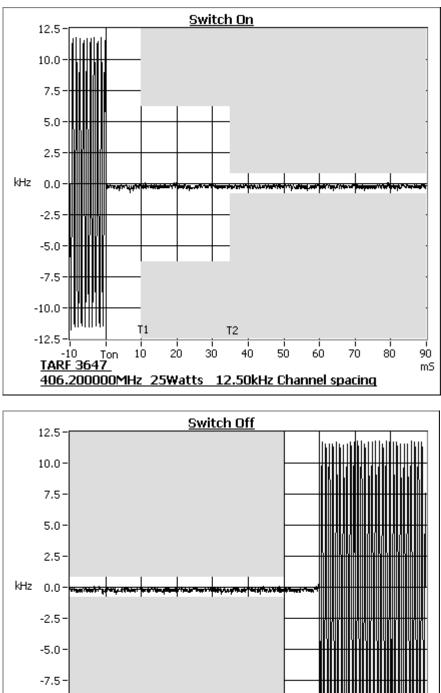
Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels			
TRANSIENT PERIODS	Maximum Frequency	FREQUENCY RANGE	
	Difference	138 – 174 MHz	406.1 – 470 MHz
t1 (ms)	± 12.5 kHz	5 ms	10 ms
t2 (ms)	± 6.25 kHz	20 ms	25 ms
t3 (ms)	± 12.5 kHz	5 ms	10 ms

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

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-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

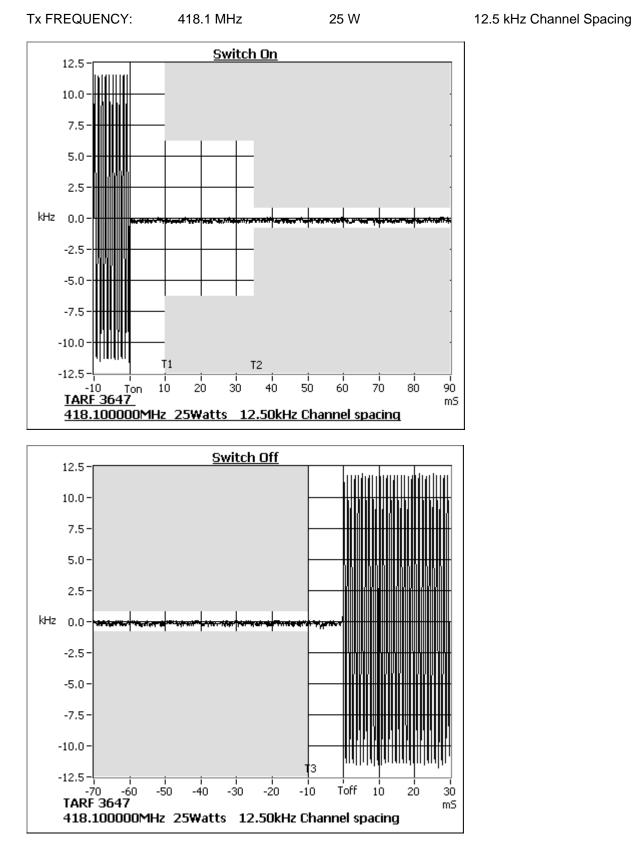
	TRANSIENT PERIODS	FREQUENCY RANGE		
		150 MHz – 174 MHz	421 MHz – 512 MHz	
	t1 (ms)	5 ms	10 ms	
	t2 (ms)	20 ms	25 ms	
	t3 (ms)	5 ms	10 ms	

#### 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,

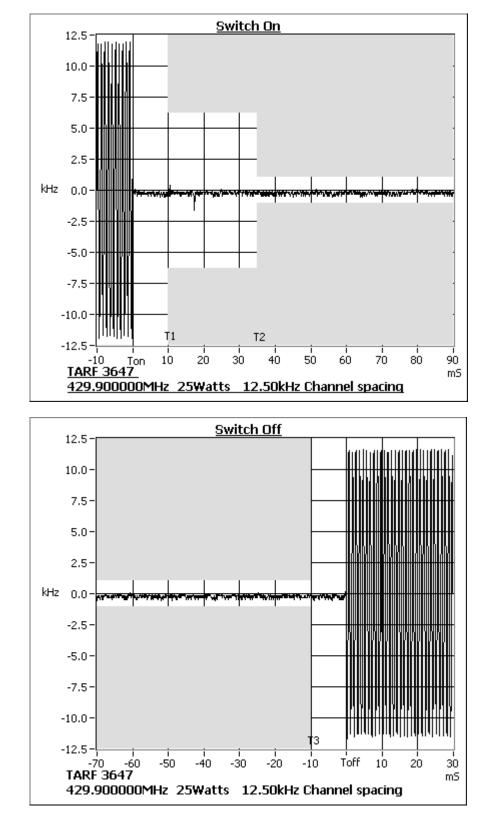
# Transient Frequency Behavior



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

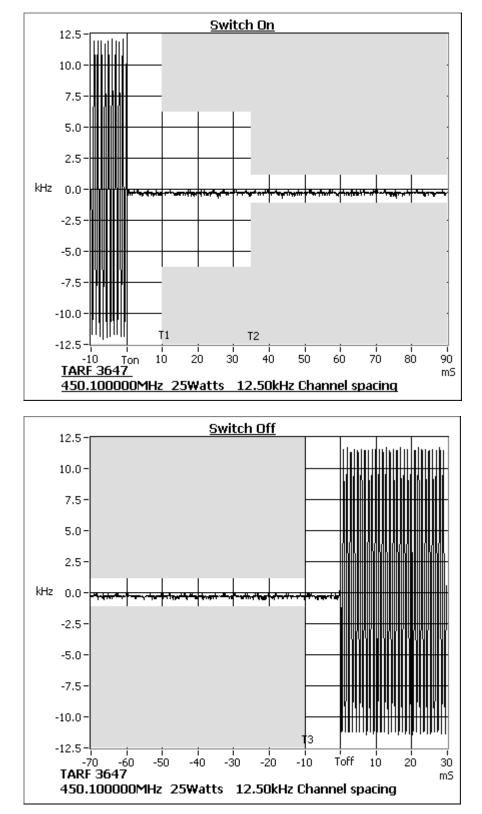


FCC 47 CFR 90.214

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,

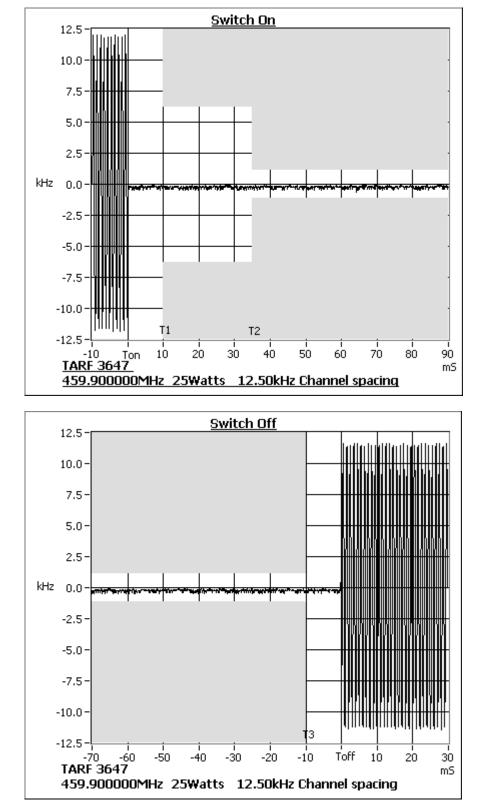
## Transient Frequency Behavior



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,

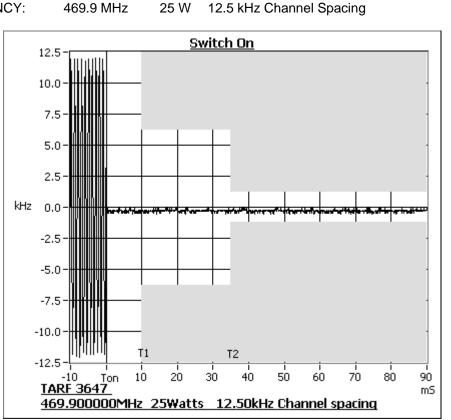
### **Transient Frequency Behavior**

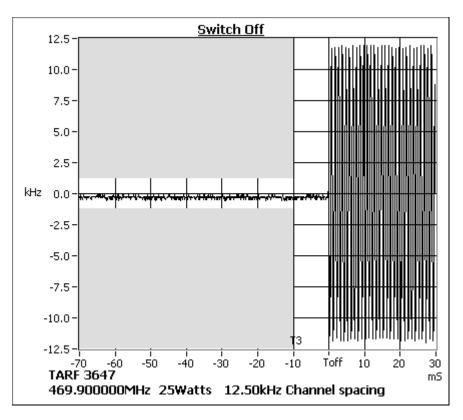
SPECIFICATION:

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).

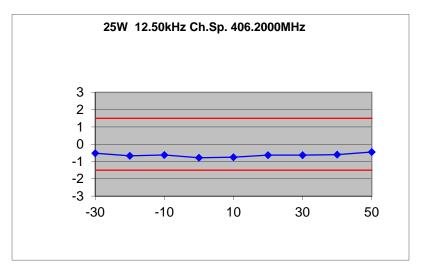
### MEASUREMENT RESULTS:

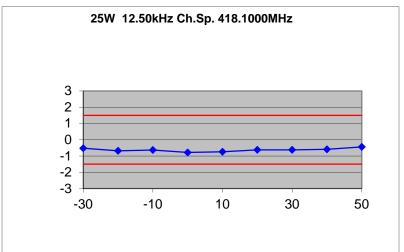
See the plots on the following pages for 12.5 kHz & 25.0 kHz channel spacings.

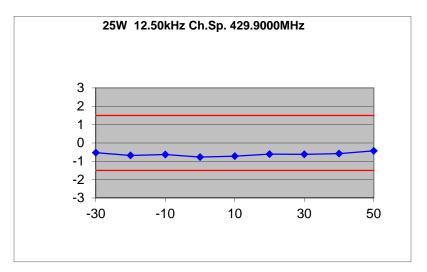
	Error (ppm)					
Temperature (ºC)	406.2 MHz	418.1 MHz	429.9 MHz	450.1 MHz	459.9 MHz	469.9 MHz
-30	-0.52	-0.52	-0.53	-0.53	-0.55	-0.58
-20	-0.67	-0.68	-0.68	-0.68	-0.67	-0.66
-10	-0.62	-0.63	-0.63	-0.66	-0.67	-0.7
0	-0.78	-0.78	-0.77	-0.76	-0.75	-0.74
10	-0.75	-0.74	-0.72	-0.71	-0.69	-0.68
20	-0.63	-0.62	-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

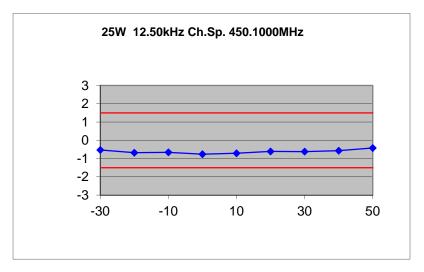


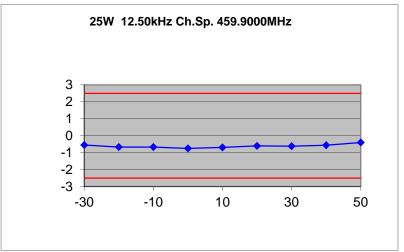


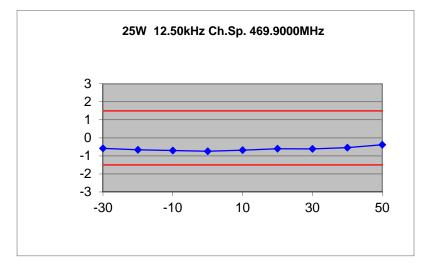


FCC ID: CASTDAH5A IC : 737A-TDAH5A

### 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 <sub>DC</sub>	-0.72	-0.70	-0.70
9 V <sub>DC</sub>	-0.70	-0.72	-0.70
36 V <sub>DC</sub>	-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 <sub>DC</sub>	-0.73	-0.70	-0.69
9 V <sub>DC</sub>	-0.72	-0.70	-0.69
36 V <sub>DC</sub>	-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	

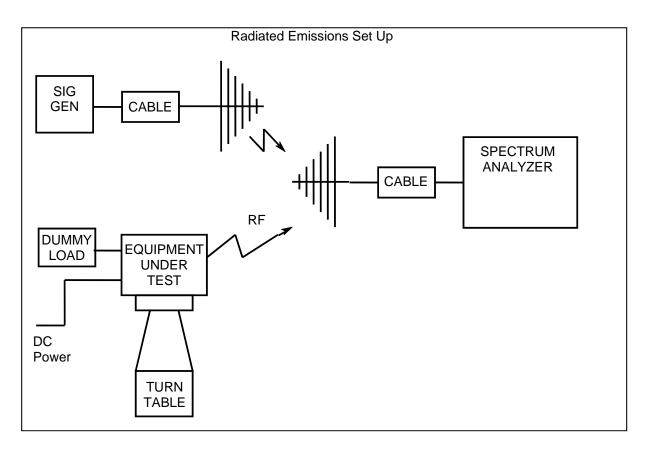
# TEST EQUIPMENT LIST

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.

