TELTEST Laboratories
Tait International Ltd
Report Number 4270

LABORATORY TEST REPORT

RADIO PERFORMANCE MEASUREMENTS

for the

TPHN0A HAND PORTABLE Transceiver

Tested in accordance with:

FCC 47 CFR Part 80

Report Revision:	1
Issue Date:	17 February 2023
PREPARED BY:	I. D. Russell Test Technician
CHECKED & APPROVED BY:	M. C. James Laboratory Technical Manager

FCC REGISTRATION: 838288

TELTEST Laboratories (A Division of Tait International Ltd)
PO Box 1645, 558 Wairakei Road, Christchurch, New Zealand.
Telephone: 64 3 358 3399
FAX: 64 3 359 4632

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REVISION

Date	Revision	Comments
17 February 2023	1	Initial test report

INTRODUCTION

Type approval testing of the TPHN0A, HAND PORTABLE transceiver to demonstrate compliance with FCC 47 CFR Part 80 in the VHF range, using analogue modulation with 25kHz channel spacing. Compliance with 47 CFR Part 90 for other frequencies and modulations is demonstrated in Teltest report 4239

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

DESCRIPTION OF SAMPLE

Manufacturer	Tait International Limited
Equipment:	HAND PORTABLE Transceiver
Type:	TPHN0A
Product Code:	T03-00071-NBAC
Serial Number(s):	26637740

Transmit Frequency range (MHz)	136 → 174	378 → 520	757 → 870	896 → 941
Rated Transmit Power (Watts)	6	5	3	3

HARDWARE & SOFTWARE
Quantity: 1

Type	Code & Version
Hardware ID	TPGB11-N000_0003
Firmware Package	QIDMR_TRM45093.0074

TEST CONDITIONS
All testing was performed between 15 → 17 February 2023, and under the following conditions:
Ambient temperature: 15°C → 30°C
Relative Humidity: 20% → 75%
Standard Test Voltage 7.5 VDC

TEST REQUIREMENTS AND RESULT SUMMARY

FCC Specification	Test Name	Test Methods	Result
FCC 47 CFR 2.1046	Transmitter Output Power (Conducted)	ANSI C63.26 5.2.4.2	P
FCC 47 CFR 2.1047 (a)	Transmitter Audio Frequency Response – Pre-emphasis	ANSI C63.26 5.3.3.2	P
FCC 47 CFR 2.1047 (b)	Transmitter Modulation Limiting	ANSI C63.26 5.3.2	P
FCC 47 CFR 2.1049 (c	Transmitter Spectrum Masks	TIA-603-E 2.2.11	P
FCC 47 CFR 2.1051	Transmitter Spurious Emissions (Conducted)	ANSI C63.26 5.7	P
FCC 47 CFR 2.1053	Transmitter Spurious Emissions (Radiated)	ANSI C63.26 5.5	P
FCC 47 CFR 2.1055 (d) (1)	Transmitter Frequency Stability - Temperature	ANSI C63.26 5.6.4	P
FCC 47 CFR 2.1055 (d) (1)	Transmitter Frequency Stability - Voltage	ANSI C63.26 5.6.5	P

Test Case Result Definitions	
No test Performed	N
Test does not apply to the test object	N/A
Test object meets requirements	P (Pass)
Test object does not meet requirements	F (Fail)
Test object is not conclusive	I (Inconclusive)

Comments:

STATEMENT OF COMPLIANCE

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

Equipment:	HAND PORTABLE Transceiver
Type:	TPHN0A
Product Code:	T03-00071-NBAC
Serial Number(s):	26637740
Quantity:	1

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

FCC 47 CFR Part 80

Signature: 

M. C. James
Laboratory Technical Manager

Date: 3 March 2023

The results obtained in this test report pertain only to the item(s) tested. Teltest does not make any claims of compliance for samples or variants that were not tested.

LIST OF ANTENNAE INTENDED FOR USE WITH THE DEVICE

Model	Part Number	Antenna Type	Antenna Frequency	Antenna Peak Gain (dBi)
TPA-AN-001 (needs to be cut to have several ranges)	007-00022-02	Whip	135-225MHz	1
TPA-AN-034	007-00047-01	Helical	136-174MHz	-2
TPA-AN-002	007-00033-01	Whip (Same as TPA-AN-001 cut)	136-151MHz	1
TPA-AN-003	007-00034-01	Whip (Same as TPA-AN-001 cut)	150-162MHz	1
TPA-AN-032	007-00045-01	Helical	155-176MHz	1
TPA-AN-004	007-00035-01	Whip (Same as TPA-AN-001 cut)	162-174MHz	1
TPA-AN-037	007-00077-01	¼ Wave Whip	378-470MHz	1
TPA-AN-038	007-00079-01	Helical	378-470MHz	-1
TPA-AN-039	007-00039-00	¼ Wave Whip	380-420MHz	2
TPA-AN-027	007-00038-00	Helical	380-420MHz	1
TPA-AN-011	007-00023-02	Whip	400-470MHz	2
TPA-AN-013	007-00040-01	Helical	400-470MHz	1
TPA-AN-012	007-00041-01	Whip	450-520MHz	2
TPA-AN-015	007-00024-02	Helical	450-520MHz	1
TPA-AN-022	007-00025-10	½ Wave Whip	762-870MHz	1
TPA-AN-023	007-00030-01	Helical	762-870MHz	2
TPA-AN-028	007-00042-01	Helical	762-870MHz	1
TPA-AN-024	007-00028-01	¼ Wave Whip	896-941MHz	2
TPA-AN-051	007-00098-00	Multiband	136-174 & 378-520 & 757-870MHz	2.5
TPA-AN-050	007-00097-00	Multiband	136-174 & 378-520	2

The equipment tested has a 50 Ω coaxial antenna connection. No antenna was fitted to the EUT during testing the parameters in this report, except GNSS Radiated Emissions.

The EUT was connected as shown in Annex A, using a customer supplied test box to provide access to the analogue and digital interfaces. A “dummy” battery with connections for external DC supply was used to power the equipment.

MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS

MODULATION TYPES:
G3E Analogue Phase Modulation (PM)

CHANNEL SPACINGS: 25.0 kHz

EMISSION DESIGNATORS:

	25.0 kHz
Analogue FM	16K0G3E

CALCULATIONS
Equation: Bn = 2M + 2Dk
(M is highest modulating frequency; D is peak allowable deviation; k is a constant of 1 for FM)

Analogue Voice 25.0 kHz Bandwidth
Necessary bandwidth
M = 3.0 kHz

D = 5.0 kHz
Bn = (2x3.0) + (2x5.0) x 1
= 16.0 kHz

Emission Designator
16K0G3E
G3E represents a PM voice transmission

TEST RESULTS

TRANSMITTER OUTPUT POWER (CONDUCTED)

SPECIFICATION: FCC 47 CFR 2.1046

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: 6 W and 1 W

Nominal 6 W	156.050 MHz	161.975 MHz
Measured	6.2	5.8
Variation (%)	3.0	-3.4
Nominal 1 W	156.050 MHz	161.975 MHz
Measured	1.0	1.0
Variation (%)	2.3	4.0
Measurement Uncertainty		± 0.6 dB

Example calculation

Power in dBm =	Measured power (dBm) + attenuator and cable loss (dB)
Chan 1 power (dBm) =	7.89 dBm +30.02 dB
=	37.91dBm
Power in Watts =	(10^(37.91dBm)/10)/1000
=	6.2W

LIMIT CLAUSE:

FCC 47 CFR 80.215
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.

TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS

SPECIFICATION: FCC 47 CFR 2.1047 (a)

GUIDE: TIA/EIA-603D 2.2.6

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

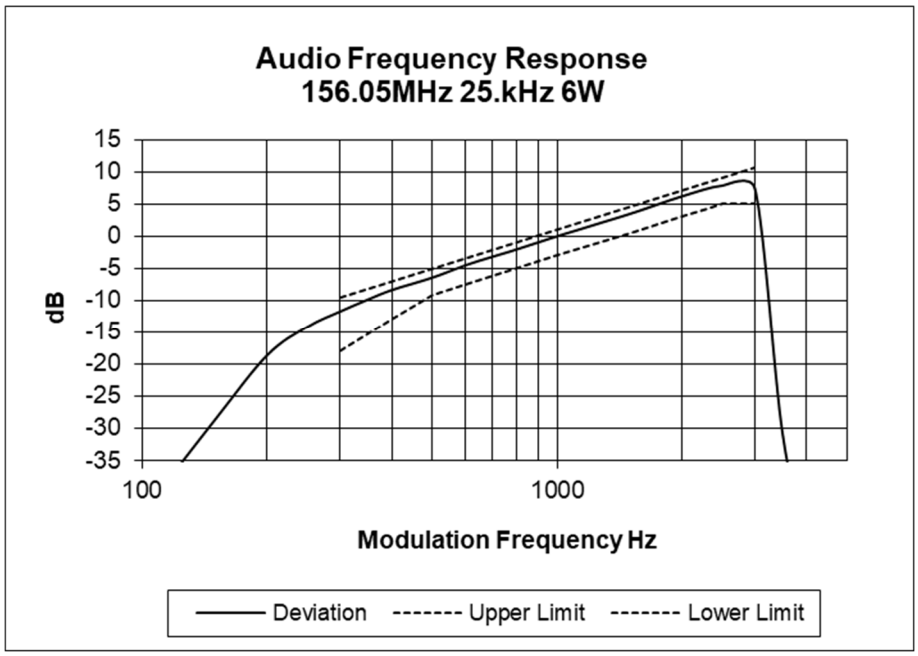
MEASUREMENT RESULTS:
See the plots on the following pages for 25.0 kHz channel spacing tested at 6 W transmit power.

LIMIT CLAUSE: TIA/EIA-603D 3.2.6

MEASUREMENT UNCERTAINTY: ± 1.5 %

SPECIFICATION: FCC 47 CFR 2.1047 (a)

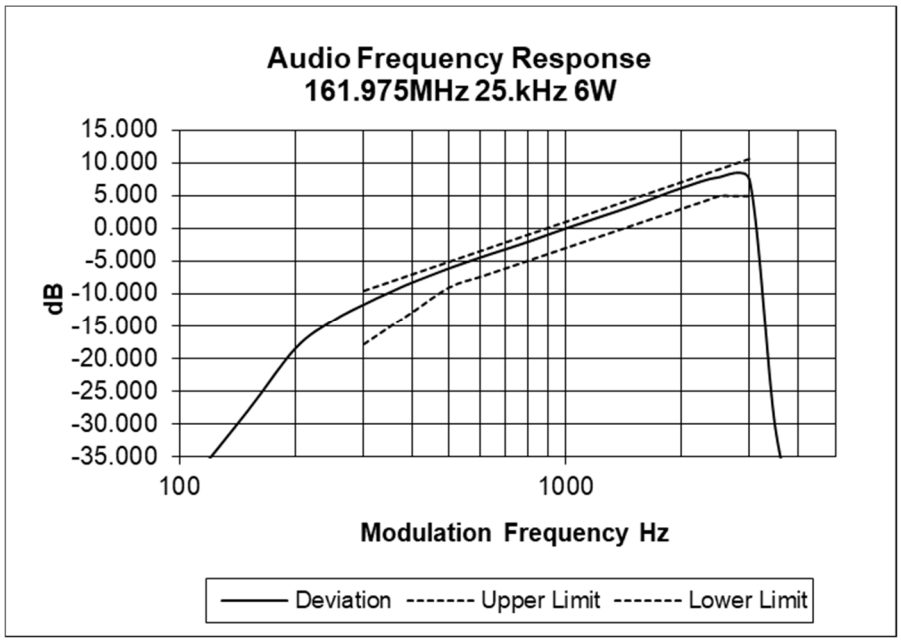
Tx FREQUENCY: 156.050 MHz 25 kHz Channel Spacing



Transmitter Audio Frequency Response – Pre-emphasis

SPECIFICATION: FCC 47 CFR 2.1047 (a)

Tx FREQUENCY: 161.975 MHz 25 kHz Channel Spacing



TRANSMITTER MODULATION LIMITING

SPECIFICATION: FCC 47 CFR 2.1047 (b)

GUIDE: TIA/EIA-603D 2.2.3

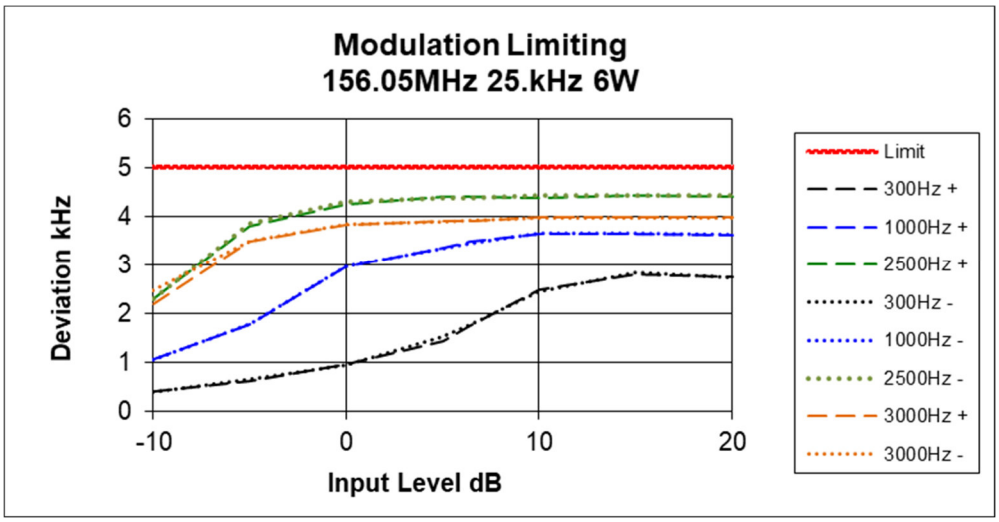
MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment set up.
2. The modulation response was measured at three audio frequencies while varying the input level.
3. Measurements were made for both Positive and Negative Deviation.

MEASUREMENT RESULTS:
See the plots below for 25.0 kHz channel spacing.

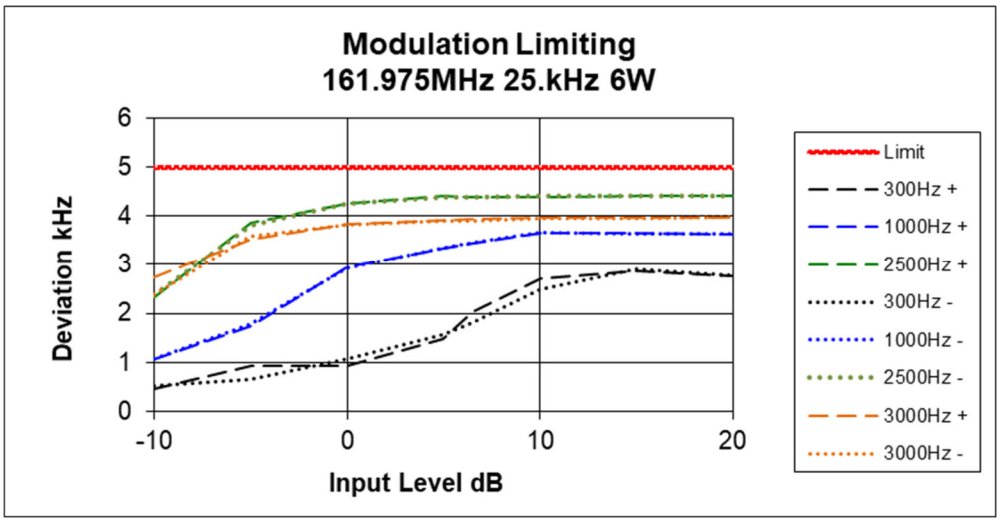
LIMIT CLAUSE: TIA/EIA-603D 1.3.4.4

MEASUREMENT UNCERTAINTY: ± 1.5 %

Tx FREQUENCY: 156.050 MHz 25 kHz Channel Spacing



Tx FREQUENCY: 161.975 MHz 25 kHz Channel Spacing



TRANSMITTER OCCUPIED BANDWIDTH AND SPECTRUM MASKS

SPECIFICATION: FCC 47 CFR 2.1049 (c)

GUIDE: TIA/EIA-603D 2.2.11 (Analogue)

MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment Set up.
2. For analogue measurements: The EUT was modulated by a 2500 Hz tone at an input level 16 dB above a level that produced 50% deviation. The input level was established at the frequency of maximum response of the audio modulating circuit.
3. The Occupied Bandwidth was measured on the Spectrum Analyser, with bandwidth settings as follows.

   Resolution bandwidth = 300 Hz, Video Bandwidth = 3 kHz

MEASUREMENT RESULTS:
See the plots on the following pages for 25.0 kHz channel spacing.

MEASUREMENT UNCERTAINTY 95% ±0.65dB

LIMIT CLAUSE: FCC 47 CFR 80.211 (f)

f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section:

(1) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 dB;

(2) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB; and

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus $10\log_{10}$ (mean power in watts) dB.

Authorized bandwidth for G3E emissions is 20kHz (80.205)

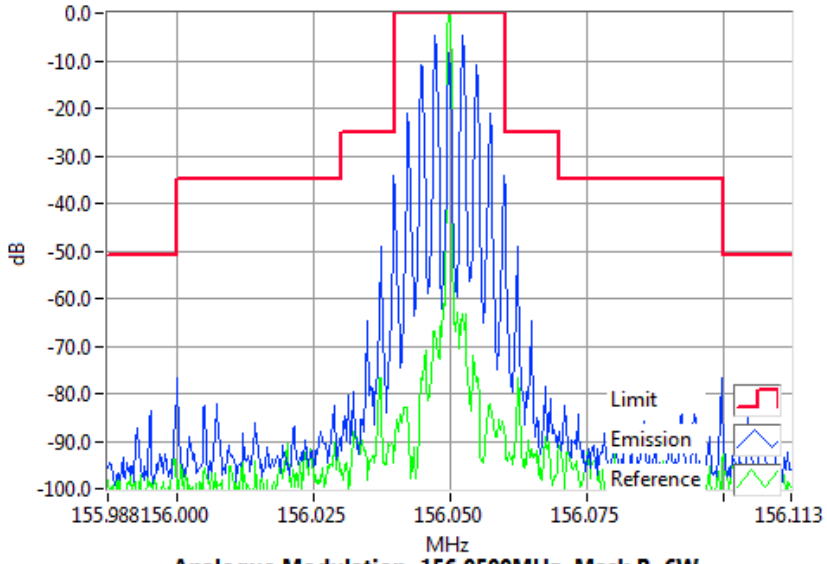
NB The captions of the plots on the following pages include “Mask B”. This refers to “Emission Mask B” defined in 47 CFR 90.210 (b) which is identical to emission mask required by 80.211(f).

Occupied Bandwidth and Spectrum Masks

ANALOGUE VOICE

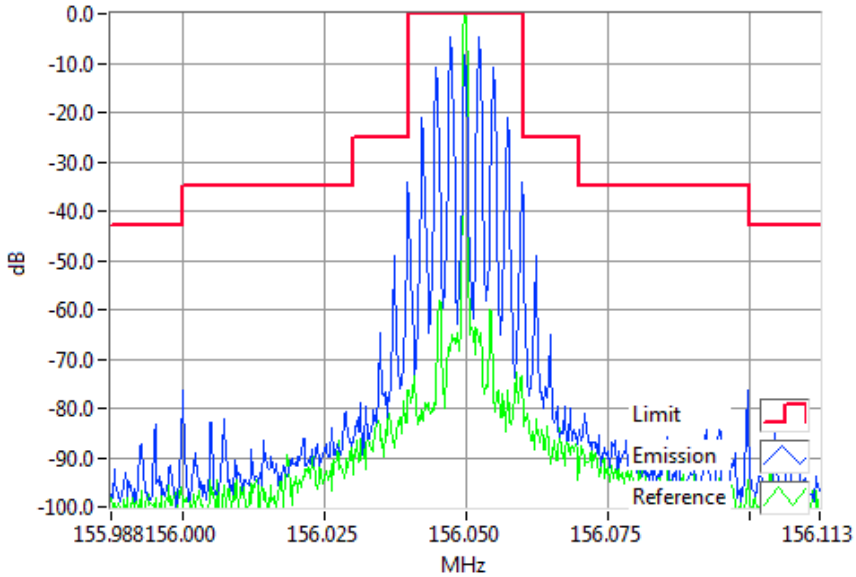
SPECIFICATION: FCC 47 CFR 2.1049 (c)

Tx FREQUENCY: 156.050 MHz 6 W 25 kHz Channel Spacing



Analogue Modulation 156.0500MHz Mask B 6W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 156.050 MHz 1 W 25 kHz Channel Spacing



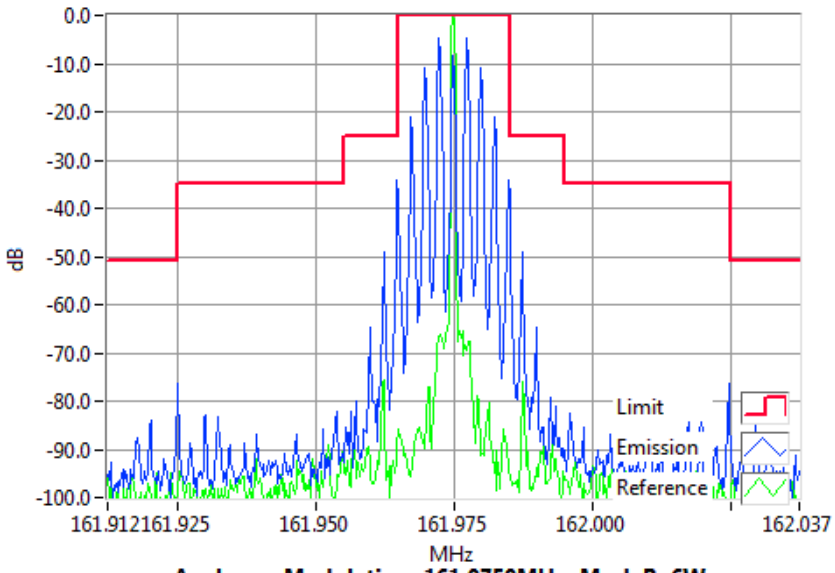
Analogue Modulation 156.0500MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOGUE VOICE

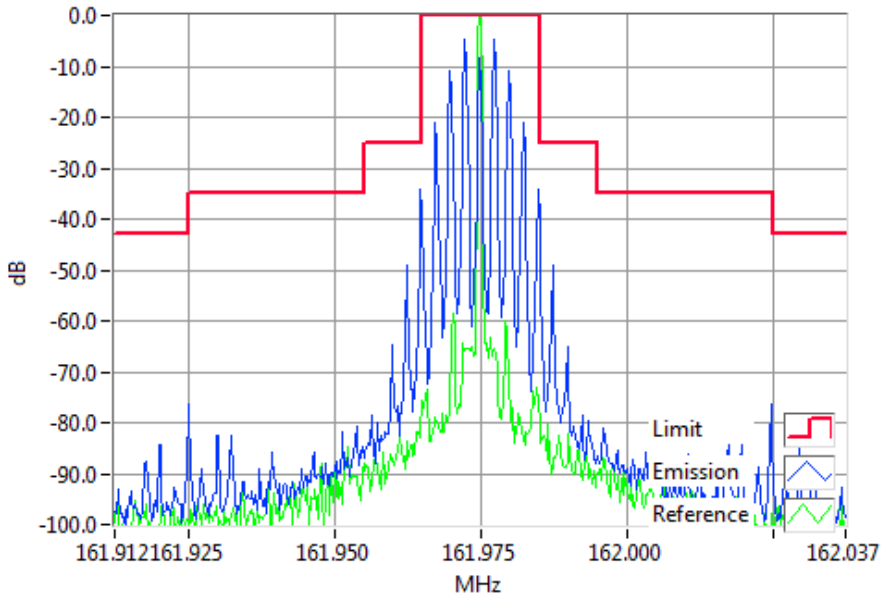
SPECIFICATION: FCC 47 CFR 2.1049 (c)

Tx FREQUENCY: 161.975 MHz 6 W 25 kHz Channel Spacing



Analogue Modulation 161.9750MHz Mask B 6W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 161.975 MHz 1 W 25 kHz Channel Spacing



Analogue Modulation 161.9750MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

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.
2. The frequency range examined was from the lowest frequency generated within the EUT, to a frequency higher than the 10th Harmonic: 9 kHz to 10Fc (1.7 GHz)
3. The EUT was set to transmit high or low power. A scan is performed with a resolution bandwidth of 100 kHz and a video bandwidth of 300 kHz for frequencies up to 1 GHz, and a resolution bandwidth of 1 MHz and a video bandwidth of 3 MHz for frequencies above 1 GHz.
4. For frequencies close to the carrier the spectrum was measured using a resolution bandwidth of 1kHz, the results were then integrated to give measurements for 100kHz bandwidth.
5. For each frequency range the spectrum analyser was loaded with the appropriate calibration figures to compensate for the cables, attenuator, and filter losses, allowing the emission levels to be read directly with no further calculation.
6. The results of the various sweeps were combined programmatically to give charts for frequencies near the carrier, up to 1GHz and above 1GHz.

   The calibrations are loaded as an overall reference level offset plus a set of correction factors for the required frequency band.

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

Example of attenuation correction: (dB)

E5023 30dB 350W CK9178	31.89	
E5015 3m Blue 503429	0.36	
E5028 1m5 Blue 501868	0.16	
Total Attenuation @ 156.05 MHz	32.4	Sum of component attenuation (a)
Amplitude offset	34.44	(b)
Correction @ 156.05 MHz	-2.03	(a-b)

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

LIMIT CLAUSE: FCC 47 CFR 80.211
Photo: Conducted Emissions Test Setup

Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC 47 CFR 2.1051

25 kHz Channel Spacing 156.050 MHz @ 6 W Emission Mask B

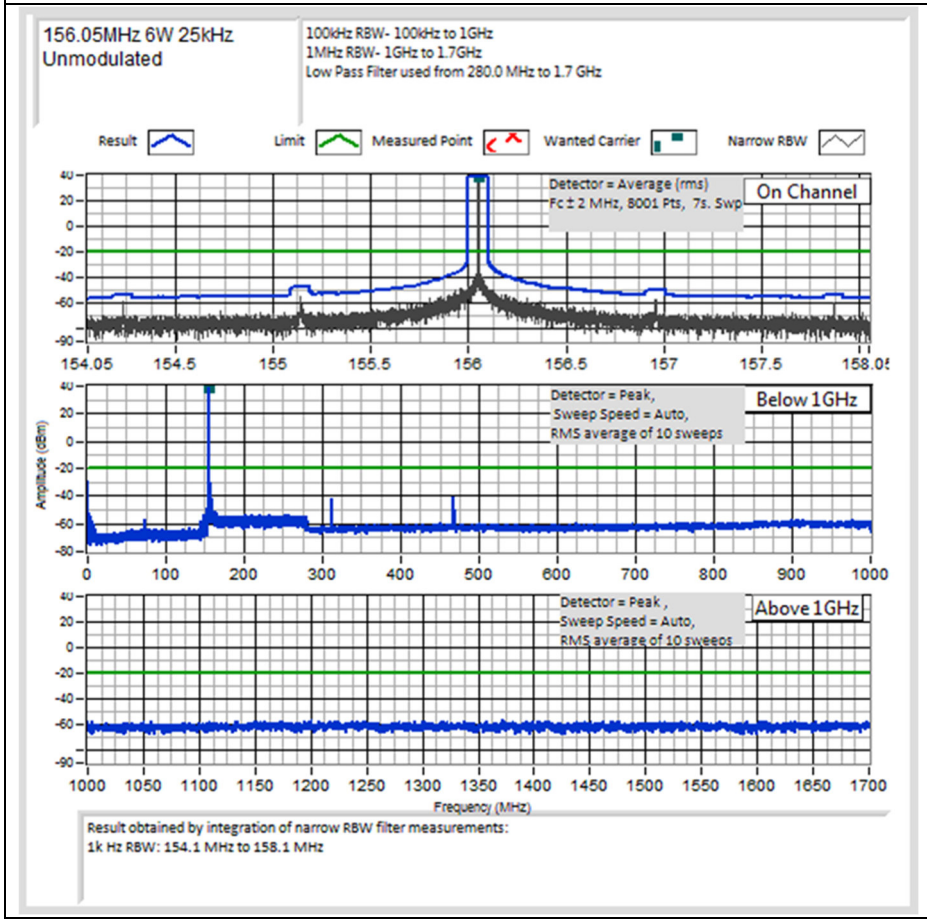
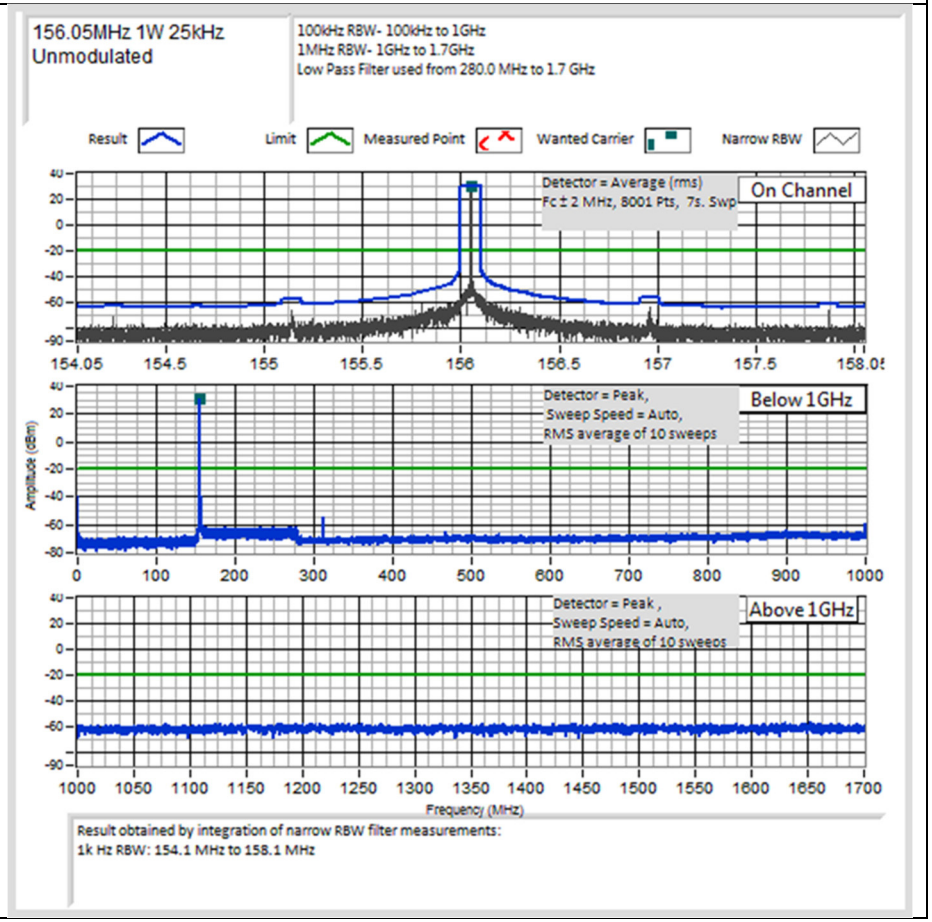
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~

25 kHz Channel Spacing 156.050 MHz @ 1 W Emission Mask B

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty:	≤12.75 GHz ± 3.0 dB	
No emissions were detected at a level greater than 20 dB below the limit.		

Spurious Emissions (Tx Conducted)

156.050 MHz, 100 kHz to 1.7 GHz scan

6 W	1 W
	

Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC 47 CFR 2.1051

25 kHz Channel Spacing 161.975 MHz @ 6 W Emission Mask B

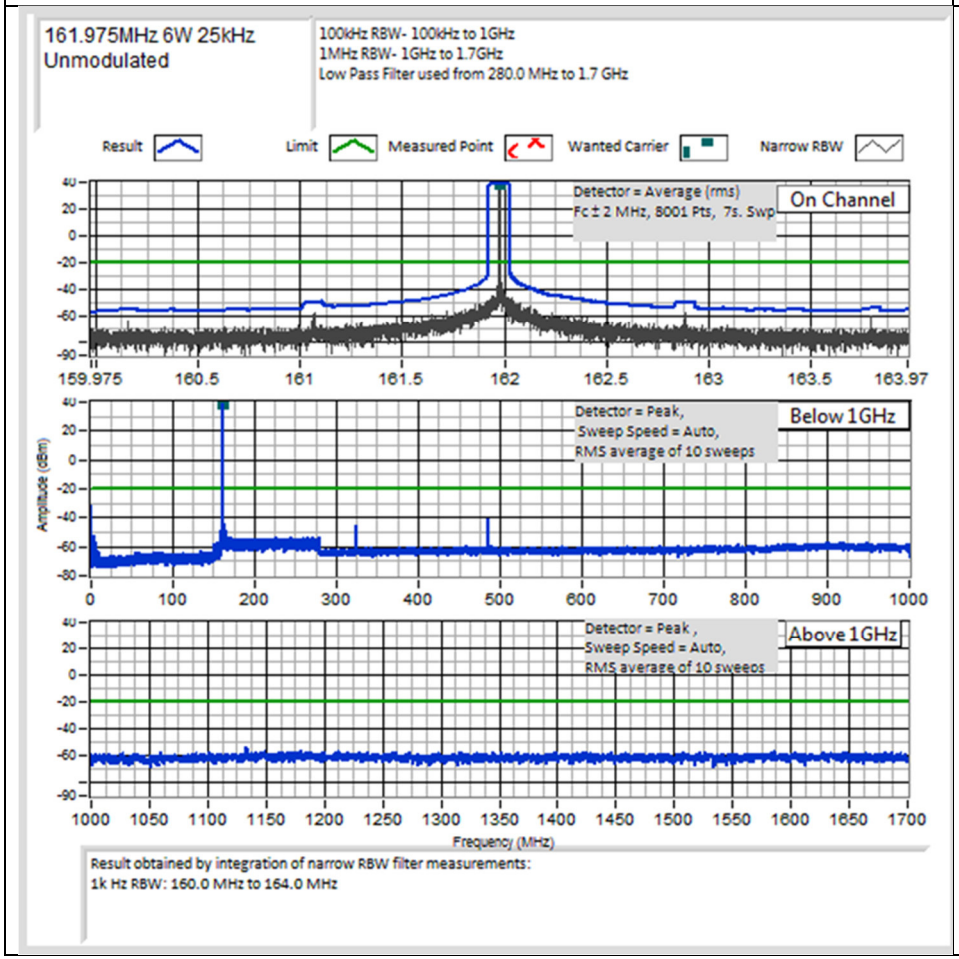
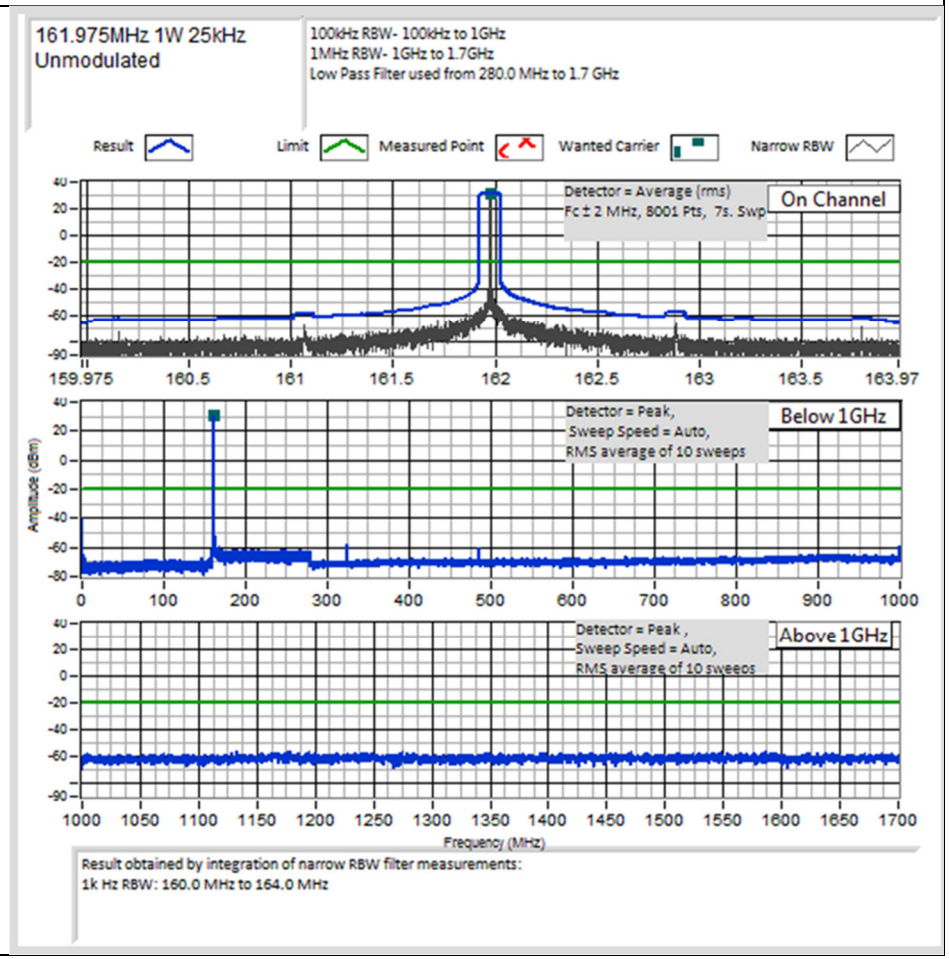
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~

25 kHz Channel Spacing 161.975 MHz @ 1 W Emission Mask B

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty:	≤12.75 GHz ± 3.0 dB	
No emissions were detected at a level greater than 20 dB below the limit.		

Spurious Emissions (Tx Conducted)

161.975 MHz, 100 kHz to 1.7 GHz scan

6 W	1 W
	

TRANSMITTER SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC 47 CFR 2.1053

GUIDE: TIA/EIA-603D 2.2.12

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

OATS Measurement:
1. The EUT is placed on a wooden turntable at a distance of three metres from the test antenna. The output terminal is connected to an RF dummy load.
2. The test antenna is raised from 1 m to 4 m to obtain a maximum reading; the turntable is then rotated through 360^{o} 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 80.211

Spurious Emissions (Tx Radiated)

SPECIFICATION: FCC 47 CFR 2.1053

25 kHz Channel Spacing 156.050 MHz @ 6 W Emission Mask B

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~

25 kHz Channel Spacing 156.050 MHz @ 1 W Emission Mask B

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty	± 4.6 dB	
No emissions were detected at a level greater than 20 dB below the limit.		

25 kHz Channel Spacing 161.975 MHz @ 6 W Emission Mask B

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~

25 kHz Channel Spacing 161.975 MHz @ 1 W Emission Mask B

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty	± 4.6 dB	
No emissions were detected at a level greater than 20 dB below the limit.		

LIMIT CLAUSE: FCC 47 CFR 2.1053

Carrier Output Power	Emission Mask B 25 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{Watts})$	
6 W	-20 dBm	- 58 dBc
1 W	-20 dBm	- 50 dBc

Spurious Emissions (Tx Radiated)

Open Area Test Site Results:

25 kHz Channel Spacing | 161.975 MHz @ 6 W | Emission Mask B

Harmonics Emission Frequency (MHz)	Level (dBm)	Level (dBc)
323.950000	-44.00	-82.00
485.925000	-54.98	-92.98
647.900000	-66.95	-104.95
809.875000	-65.06	-103.06
971.850000	-71.09	-109.09
1133.825000	-63.80	-101.80
Measurement Uncertainty	± 4.6 dB	

Sample Calculation	Measurement					Result	
	Reference	Substitution					
Emission Frequency (MHz)	Reference Level (dBm)	Sig-gen Level	Cable and Attenuator Gain	Antenna Gain (dBd)	Path and Boresight corrections	dBm	nW
323.950000	-67.82	-31.01	-13.36	-0.49	0.86	-44.00	39.85
		A	B	C	D	E	

Result (E) = A+B+C+D

Photo: OATS Setup

TRANSMITTER FREQUENCY STABILITY - TEMPERATURE

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

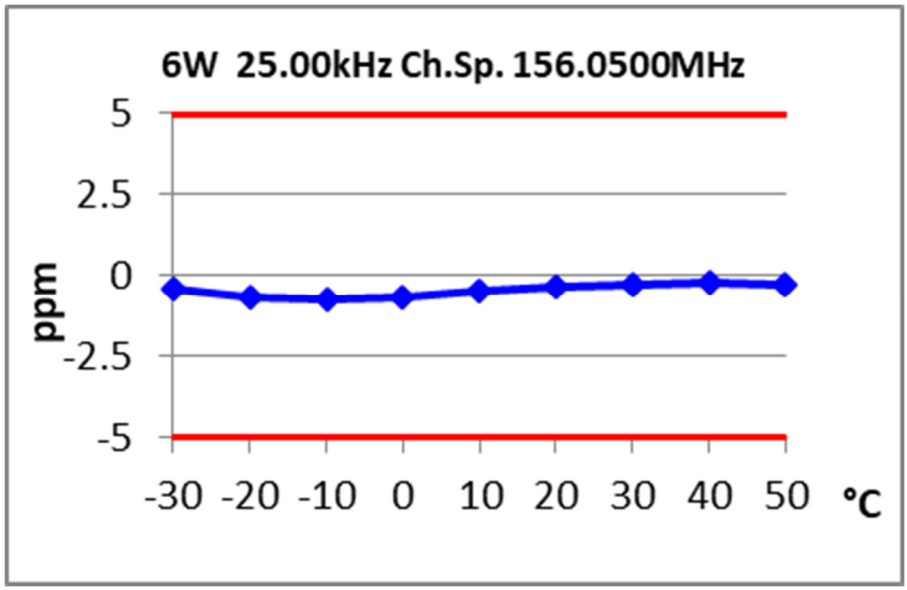
GUIDE: TIA/EIA-603D 2.2.2

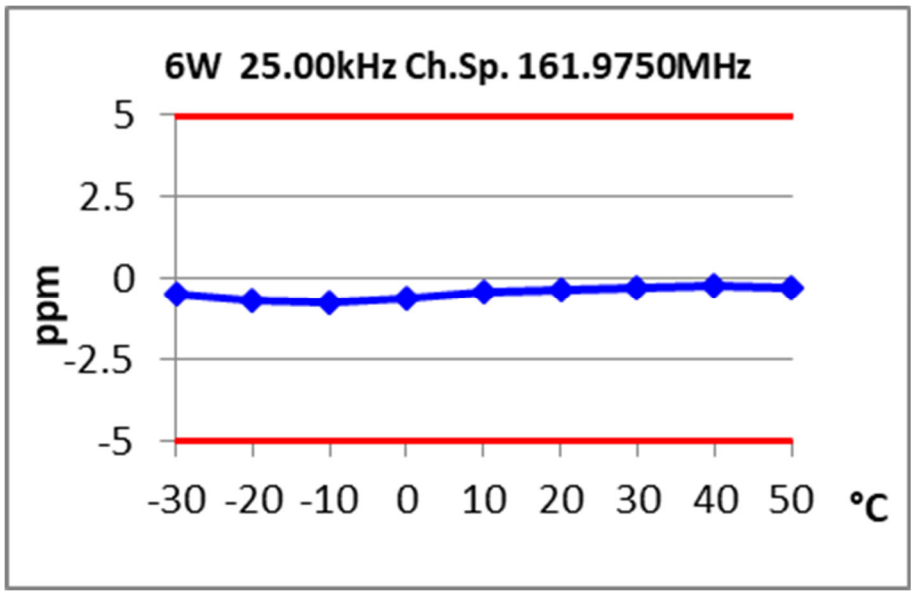
MEASUREMENT PROCEDURE:
1. Refer Annex A for equipment set up.
2. The EUT was tested for frequency error from –30° C to +50° C in 10° C increments
3. The frequency error was recorded in parts per million (ppm).

MEASUREMENT RESULTS:
See the plots below for 25 kHz channel spacing.

	Error (ppm)	
Temperature (ºC)	156.050 MHz	161.975 MHz
-30	-0.4	-0.48
-20	-0.67	-0.7
-10	-0.75	-0.73
0	-0.69	-0.62
10	-0.45	-0.4
20	-0.35	-0.33
30	-0.31	-0.29
40	-0.25	-0.22
50	-0.28	-0.3
Measurement Uncertainty	$\pm 5 \times 10^{-8}$	

TRANSMITTER FREQUENCY STABILITY - TEMPERATURE -continued





LIMIT CLAUSE: FCC 47 CFR 80.209

Frequency range	Frequency Error (ppm)
136-174	5

TRANSMITTER FREQUENCY STABILITY - VOLTAGE

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

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 at an input voltage to the radio of 85% and battery end voltage (100%).
3. The frequency error was recorded in parts per million (ppm).

MEASUREMENT RESULTS:

	FREQUENCY ERROR (ppm) for 25 kHz Channel Spacing	
	6.375 V_{DC}	7.50 V_{DC}
156.050 MHz	-0.31	-0.28
161.975 MHz	-0.32	-0.30
Measurement Uncertainty		± 5 x 10^{-8}

LIMIT CLAUSE: FCC 47 CFR 80.209

Frequency range	Frequency Error (ppm)
136-174	5

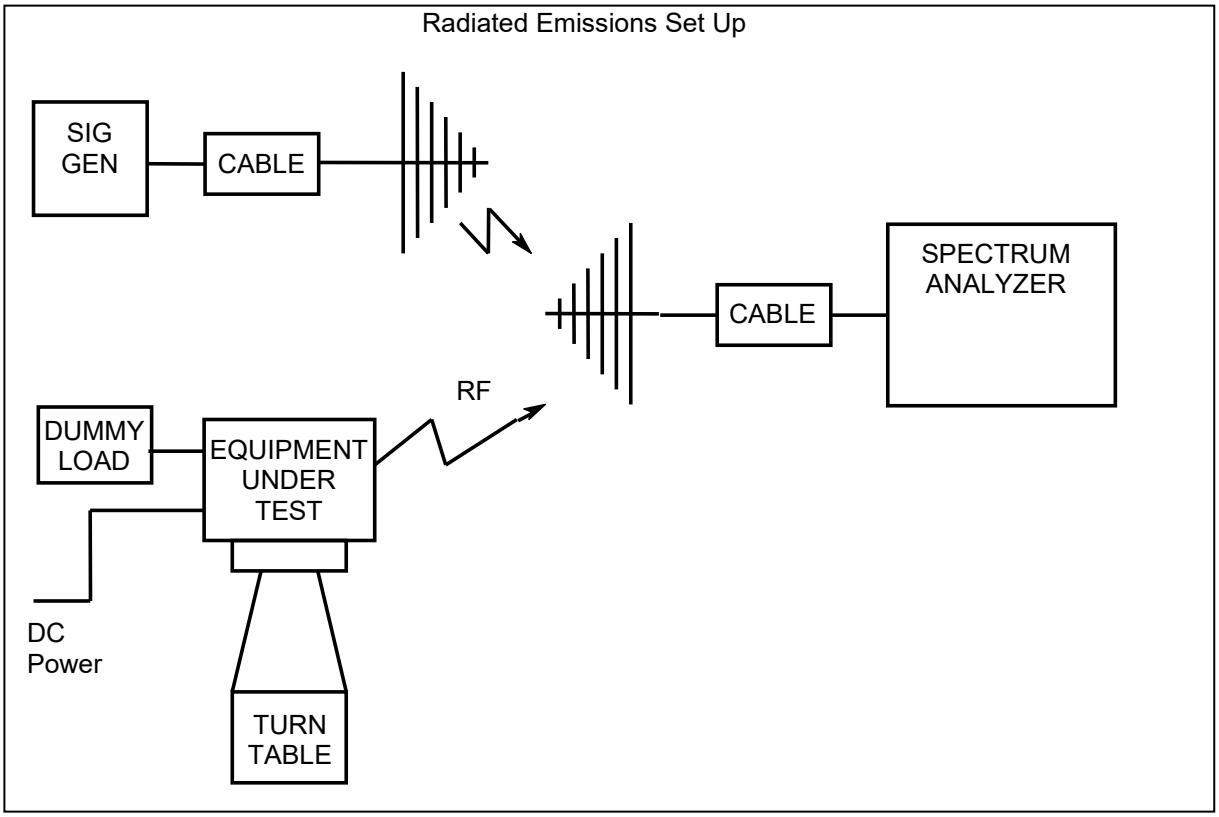
TEST EQUIPMENT LIST

Equipment Type	Information	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
Antenna	Reference Dipoles	Emco	3121C DB1	9510-1164	E3559	15-Jun-23
Antenna	Reverb - 1-18GHz DRG	Schwarzbeck	BBHA 9120 D	9120D-885	E4857	
Antenna	Reverb - 1-18GHz DRG	Schwarzbeck	BBHA 9120 D	9120D-884	E4858	
Audio Analyser	TREVA1	Hewlett Packard	HP8903A	2437A04625	E4986	13-Oct-23
Coax Cable	OATS Turntable Cable 1	Intelcom	RG214	OATS1	E4621	27-Oct-23
Coax Cable	OATS Tower Cable	Intelcom	RG214	OATS2	E4622	27-Oct-23
Coax Cable	Reverb - 4.5m Multiflex 141	TeltestBlue6	MF 141	TeltestBlue6	E4843	26-Oct-23
Coax Cable	Reverb - 2m Multiflex 141	TeltestBlue5	MF 141	TeltestBlue5	E4844	26-Oct-23
Coax Cable	Reverb - 2m Multiflex 141	TeltestBlue4	MF 141	TeltestBlue4	E4845	26-Oct-23
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue3	MF 141	TeltestBlue3	E4846	26-Oct-23
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue2	MF 141	TeltestBlue2	E4847	26-Oct-23
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue1	MF 141	TeltestBlue1	E4848	26-Oct-23
Coax Cable	OATS Turntable Cable 2	Intelcom	RG215	OATS3	E4995	27-Oct-23
Coax Cable	3m Blue	Suhner	Sucoflex 126EA	503429/126EA	E5015	25-Oct-23
Coax Cable	1.5m Blue	Suhner	Sucoflex 126EA	502868/126EA	E5028	25-Oct-23
Environ. Chamber	Upright	Contherm	5400 RHSLT.M	1416	E4051	28-Nov-24
Environ. Chamber	Upright	Contherm	5400 RHSLT.M	1416	E4051	30-Aug-23
Filter High Pass/ Notch	135 to 175MHz	Tait		N/A	E3382	27-Jun-23
Modulation Analyser	TREVA1	Hewlett Packard	HP8901B (Opt 002)	3704A05837	E3786	17-Oct-23
OATS	Controller	Electrometrics	EM-4700	119	E4445	
OATS	Turntable	Electrometrics	EM-4704A	105	E4446	
OATS	Antenna Tower	Electrometrics	EM-4720-2	112	E4447	
Power Meter	Reverb - USB interface for NRT Z44	Rohde & Schwarz	NRT Z5	100586	E4852	
Power Meter	Reverb - 0.2 - 4GHz directional power meter	Rohde & Schwarz	NRT Z44	105151	E4853	11-Oct-24
Power Meter	TREVA1 Power Head for HP8901	Hewlett Packard	HP11722A	3111A05573	E7054	13-Oct-23
Power Supply		Rohde & Schwarz	NGS M32/10 192.0810.31	Fnr 434	E3556	6-May-23
RF Amplifier	+21.7 dB 1GHz	Tait	ZFL-1000LN	E3660	E3360	5-Aug-23
RF Attenuator	30+3dB 350W	Weinschel	67-30-33 & BW-N3W5+	CK9178	E5023	25-Oct-23
RF Attenuator	TREVA1 3dB	Weinschel	Model 1	BL9958	E4081	26-Oct-23
RF Attenuator	TREVA1 20dB 150W	Weinschel	40-20-23	MF817	E4082	26-Oct-23
RF Attenuator	3dB 0.5W	Weinschel	Model 1	CH6843	E5011	26-Oct-23
RF Chamber	S-LINE TEM CELL	Rohde & Schwarz	1089.9296.02	338232/003	E3636	28-Mar-23
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	

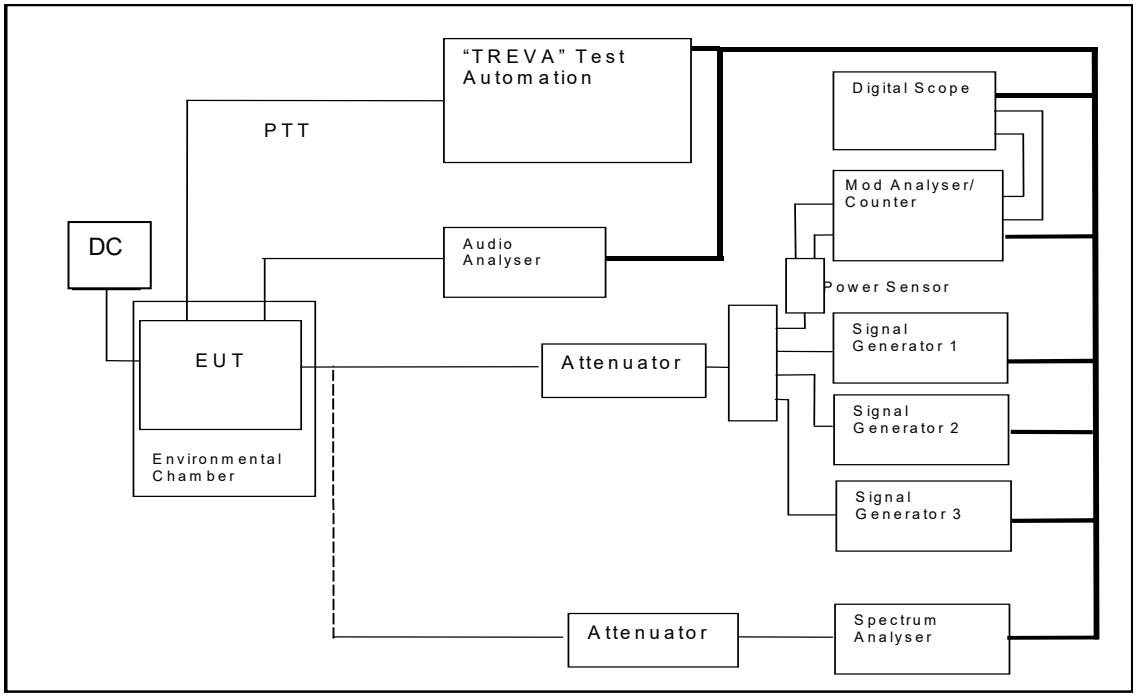
Equipment Type	Information	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
RF Load	50W	Weinschel	F1426	BF0487	E3675	26-Oct-23
Signal Generator	Analog 3.2GHz	Hewlett Packard	HP8648C	3443U00543	E3558	8-Oct-23
Signal Generator	Analog 12.75GHz	Rohde & Schwarz	SMB100A	183236	E11369	24-Oct-23
Spectrum Analyser	13.2GHz	Agilent	PSA E4445A	MY42510072	E4139	18-Oct-24
Spectrum Analyser	26.5GHz	Agilent	PXA N9030A	MY49432161	E4907	18-Feb-23
Temp & Humidity datalogger		Hobo	U21-011	10134276	E4981	26-Jul-23
TREVA 1		Teltest	-	1	-	1-Aug-23
Testware	Conducted Emissions		March 2018	-	-	
Testware	Frequency Vs Temperature		April 2018	-	-	
Testware	Reverb Emissions		TTEL_REVEMIS 2.00.03	-	-	
Testware	Sideband Spectrum		February 2017	-	-	
Testware	S-Line Radiated Emissions		TTEL_SLINERADEM 2.00.01	-	-	
Testware	TREVA		TTEL_TREVA 2.00.00	-	-	

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

ANNEX A – TEST SETUP DETAILS



All other testing is performed using the **T**eltest **R**adio **EVA**luation system (TREVA), which is configured as shown below. The Spectrum Analyser is connected to the EUT via the attenuator network for Conducted Emissions testing, and Occupied Bandwidth.



END OF REPORT