TELTEST Laboratories
Tait International Ltd
Report Number 4308b

Laboratory Test Report

ELECTROMAGNETIC COMPATIBILITY

for the

TBDHHF Transportable Transceiver

Tested In accordance with

47CFR 15.107, 15.109, & 15.111

Report Revision:	1
Issue Date:	04 April 2024
FCC ID:	CASTBDHHF
IC:	737A-TBDHHF

PREPARED BY: J. J. Aro

Test Technician

CHECKED & APPROVED BY: M. C. James

Laboratory Technical Manager

ACCREDITED
TESTING LABORATORY
№ 9, 577

Tests indicated as not accredited are outside the laboratory's scope of accreditation.

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

Table of Contents

Revision History

Date	Revision	Comments
04 April 2024	1	Initial test report

Introduction

Type approval testing of the TBDHHF, 15W, Transportable transceiver in order to demonstrate compliance with 47CFR 15.107, 15.109 & 15.111.

Report Prepared For

Tait International Ltd
245 Wooldridge Road
Harewood
Christchurch 8051
New Zealand

Description of Sample

Manufacturer: Tait International Limited
Equipment: Transportable Transceiver
Type: TBDHHF
Product Code: TB7306-HHL0
Serial Number(s): 18411988
Quantity: 1

Hardware & Software

Module	Product Code	Serial Number	Firmware Version	Hardware Version
Reciter	T01-01403-JBAA	18412105	p25-3.55.00.0009	06.03
Power Amplifier	T01-01405-JCAA	18412352	NA	00.01

Test Requirements and Result Summary

FCC Specification	Test Items	Test Methods	Result
FCC 47 CFR 15.109	Receiver Spurious Emissions (Radiated)	ANSI C63.4 8.3 *	Pass
FCC 47 CFR 15.111	Receiver Spurious Emissions (Conducted)	TIA-603-E 2.1.2	Pass
FCC 47 CFR 15.107	Power Line Conducted Emissions	ANSI C63.4 7.3	Pass

*Not Accredited

Statement of Compliance

The TBDHHF Transportable transceiver as tested in this report was found to conform to the following standards:

47CFR 15.107, 15.109 & 15.111

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.

Test Conditions

Environmental Conditions
All testing was performed between 26 March → 04 April 2024, and under the following conditions:
Ambient Temperature: 15° C → 30° C
Relative Humidity: 20% → 75%
Standard Test Voltage: 13.80 V_{DC} (Radiated and Conducted Emissions)
120.0 V_{AC} (Power Line Conducted Emissions)

Channel Table

Label	Channel Number	Receive Frequency (MHz)	Transmit Frequency (MHz)	Amplifier Power (W)	Output Power (W)	Channel Spacing (kHz)
CH1 H	1	406.150	406.125	20	15	12.5
CH1 L	2	406.150	406.125	3	2	12.5
CH2 H	3	413.050	413.025	20	15	12.5
CH2 L	4	413.050	413.025	3	2	12.5
CH3 H	5	419.950	419.975	20	15	12.5
CH3 L	6	419.950	419.975	3	2	12.5
CH4 H	7	388.750	378.250	21	15	12.5
CH4 L	8	388.750	378.250	3	2	12.5

Note: To achieve the rated 15W transmission power at the output port, the internal power amplifier was adjusted to a higher power level, as indicated in the above table.

Measurement Frequency Range for Unintentional Radiators

The measured frequency range is determined in accordance with FCC 47CFR 15.33 (b) (1)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement (MHz)	Upper frequency selected for test
Below 1.705	30	☐
1.705 – 108	1000	☐
108 – 500	2000	☑
500 – 1000	5000	☐
Above 1000	5th Harmonic of highest frequency or 40 GHz, whichever is lower	☐ MHz

Test Results

RADIATED SPURIOUS EMISSIONS – Unintentional Radiator

Note: This test is not accredited

SPECIFICATION: FCC 47 CFR 15.109

GUIDE: ANSI C63.4 8.3

MEASUREMENT PROCEDURE: Direct Measurement

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 10 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 10 dB of the limit is then re-tested on the OATS.

OATS Measurement:

1. The EUT is placed on a wooden turntable at a distance of three metres from the test antenna. The output terminal is connected to an RF dummy load.

2. The test antenna is raised from 1 m to 4 m to obtain a maximum reading; the turntable is then rotated through 360° to obtain the maximum response of each spurious emission. Valid emissions are determined by switching the EUT on and off.

3. The maximum response of each spurious emission is recorded.

LIMIT CLAUSE: FCC 47CFR 15.109

EMISSION FREQUENCY (MHz)	µVolts / Metre @ 3 Metres
30 → 88	100
88 → 216	150
216 → 960	200
960 →	500

Measurement Uncertainty (dB)	<1GHz ±5.0 dB >1GHz ±5.5 dB

RADIATED SPURIOUS EMISSIONS – Unintentional Radiator

SPECIFICATION: FCC 47CFR 15.109

12.5 kHz Channel Spacing	406.150MHz Rx / 406.125MHz Tx Standby
Emission Frequency (MHz)	Level (µV/m)
~	~
No emissions were detected within 10 dB of Limit.	

12.5 kHz Channel Spacing	413.050MHz Rx / 413.025MHz Tx Standby
Emission Frequency (MHz)	Level (µV/m)
~	~
No emissions were detected within 10 dB of Limit.	

12.5 kHz Channel Spacing	419.950MHz Rx / 419.975MHz Tx Standby
Emission Frequency (MHz)	Level (µV/m)
~	~
No emissions were detected within 10 dB of Limit.	

12.5 kHz Channel Spacing	388.750MHz Rx / 378.250MHz Tx Standby
Emission Frequency (MHz)	Level (µV/m)
~	~
No emissions were detected within 10 dB of Limit.	

CONDUCTED SPURIOUS EMISSIONS - Receiver

SPECIFICATION: FCC 47CFR 15.111

GUIDE: TIA-603-E 2.1.2 (analogue)
TIA-102-CAAA-C 2.1.2 (digital)

MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment set up.
2. The measurement frequency range is from 30 MHz to the upper frequency limit as determined by FCC 47 CFR 15.33.
3. Spurious emissions which were attenuated more than 20 dB below the limit were not recorded.

LIMIT CLAUSE: FCC 47CFR 15.111

LIMIT	2 nW (-57 dBm)

Measurement Uncertainty	≤12.75 GHz ± 2.8 dB

MEASUREMENT RESULTS:

12.5 kHz Channel Spacing	406.150MHz Rx / 406.125MHz Tx Standby
Emission Frequency (MHz)	Level (nW)
~	~
No emissions were detected within 20 dB of Limit.	

12.5 kHz Channel Spacing	413.050MHz Rx / 413.025MHz Tx Standby
Emission Frequency (MHz)	Level (nW)
~	~
No emissions were detected within 20 dB of Limit.	

12.5 kHz Channel Spacing	419.950MHz Rx / 419.975MHz Tx Standby
Emission Frequency (MHz)	Level (nW)
~	~
No emissions were detected within 20 dB of Limit.	

12.5 kHz Channel Spacing	388.750MHz Rx / 378.250MHz Tx Standby
Emission Frequency (MHz)	Level (nW)
~	~
No emissions were detected within 20 dB of Limit.	

POWER LINE CONDUCTED EMISSIONS

SPECIFICATION: FCC 47CFR 15.107 Unintentional Radiator

MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment set up.
2. The frequency range examined was from 150 kHz to 30 MHz.
3. Emissions were measured using a 50Ω/50µH+5Ω line impedance stabilization network (LISN).

LIMIT CLAUSE: FCC 47CFR 15.107

LIMIT: CLASS A

Frequency Range MHz	Limits dBµV	
	Quasi-Peak	Average
0.15 → 0.5	79	66
> 0.5 → 30	73	60

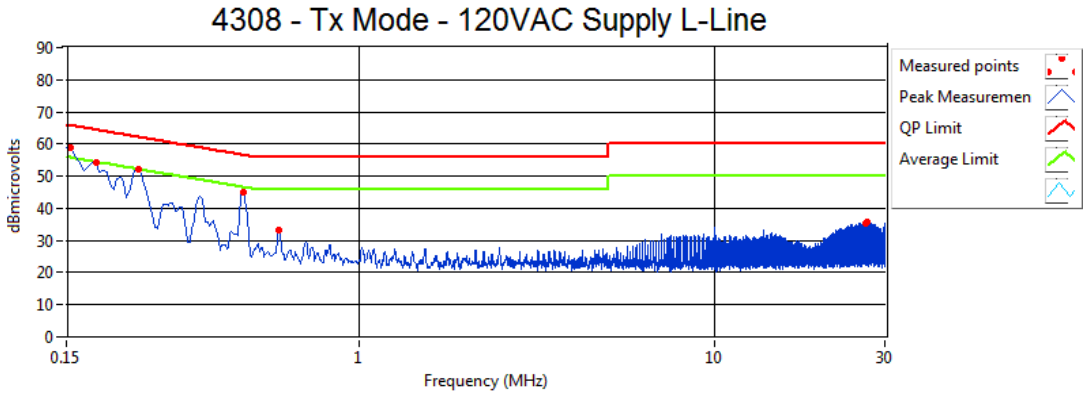
LIMIT: CLASS B

Frequency Range MHz	Limits dBµV	
	Quasi-Peak	Average
0.15 → 0.5	66 → 56 [1]	56 → 46 [1]
0.5 → 5.0	56	46
5.0 → 30	60	50
1. The limit decreases linearly with the logarithm of the frequency		

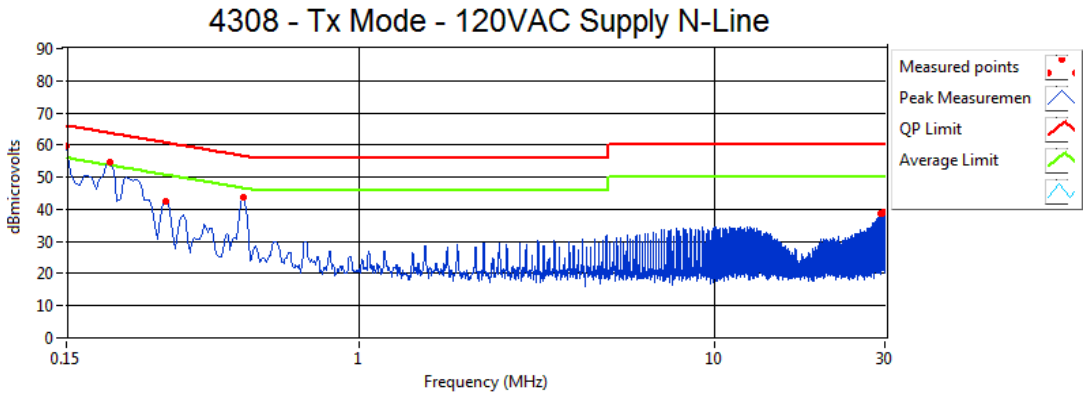
Measurement Uncertainty:

Measurement Uncertainty (dB)	with a 95% confidence interval is ± 3.5 dB

POWERLINE CONDUCTED EMISSIONS – 413.025 MHz, Tx 15W

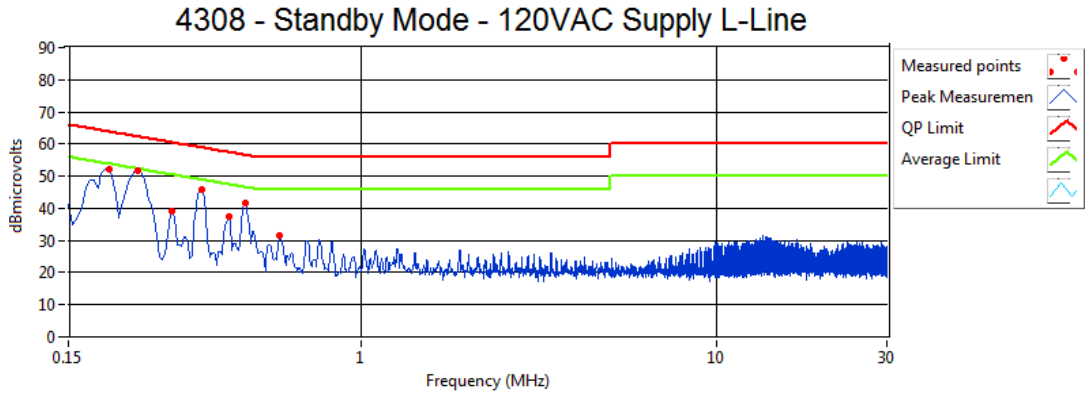


Frequency (MHz)	Peak Measurement (dBmicroVolt)	Average Measurement (dBmicroVolt)	Average Limit (dBmicroVolt)	Average Result	Quasi-Peak Measurement (dBmicroVolt)	Quasi-Peak Limit (dBmicroVolt)	Quasi-Peak Result
0.150	57.0	26.1	55.8	Pass	51.4	65.8	Pass
0.159	53.5	25.2	54.4	Pass	47.7	64.4	Pass
0.237	53.8	45.4	52.1	Pass	51.5	62.1	Pass
0.471	44.7	43.1	46.5	Pass	43.7	56.5	Pass
0.579	28.8	12.8	46.0	Pass	22.7	56.0	Pass
26.622	35.1	32.0	50.0	Pass	33.7	60.0	Pass
26.742	35.1	31.7	50.0	Pass	33.5	60.0	Pass
26.854	35.4	32.2	50.0	Pass	33.9	60.0	Pass

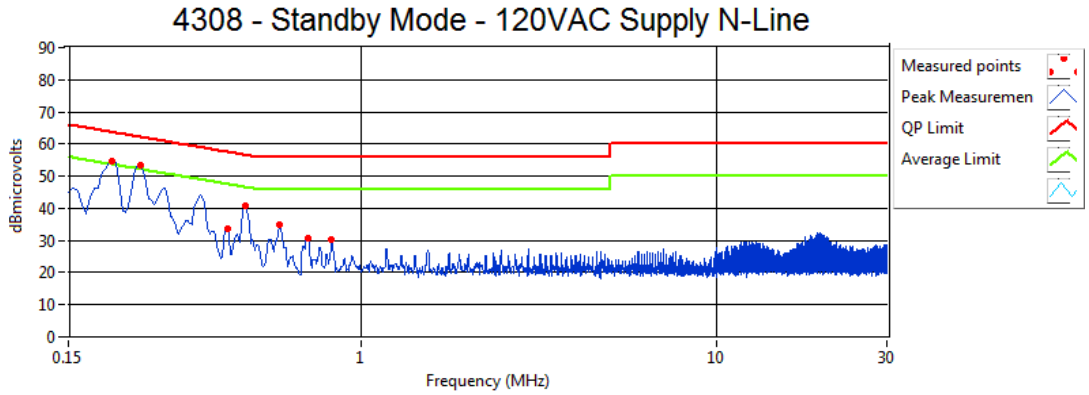


Frequency (MHz)	Peak Measurement (dBmicroVolt)	Average Measurement (dBmicroVolt)	Average Limit (dBmicroVolt)	Average Result	Quasi-Peak Measurement (dBmicroVolt)	Quasi-Peak Limit (dBmicroVolt)	Quasi-Peak Result
0.150	56.9	27.9	56.0	Pass	51.5	66.0	Pass
0.192	53.3	46.2	53.6	Pass	50.5	63.6	Pass
0.283	43.2	18.4	50.7	Pass	38.5	60.7	Pass
0.471	44.8	43.3	46.5	Pass	43.8	56.5	Pass
29.326	38.1	35.4	50.0	Pass	36.9	60.0	Pass
29.563	38.3	36.0	50.0	Pass	37.5	60.0	Pass
29.682	38.2	35.8	50.0	Pass	37.4	60.0	Pass

POWERLINE CONDUCTED EMISSIONS – 413.025 MHz, Tx Standby



Frequency (MHz)	Peak Measurement (dBmicroVolt)	Average Measurement (dBmicroVolt)	Average Limit (dBmicroVolt)	Average Result	Quasi-Peak Measurement (dBmicroVolt)	Quasi-Peak Limit (dBmicroVolt)	Quasi-Peak Result
0.191	52.5	42.4	53.8	Pass	50.5	63.8	Pass
0.236	54.5	46.8	52.3	Pass	53.5	62.3	Pass
0.278	44.8	14.7	50.4	Pass	39.3	60.4	Pass
0.354	46.4	41.0	48.8	Pass	45.3	58.8	Pass
0.415	36.1	11.1	47.4	Pass	30.0	57.4	Pass
0.471	42.1	39.6	46.5	Pass	41.1	56.5	Pass
0.588	35.1	25.2	46.0	Pass	29.8	56.0	Pass



Frequency (MHz)	Peak Measurement (dBmicroVolt)	Average Measurement (dBmicroVolt)	Average Limit (dBmicroVolt)	Average Result	Quasi-Peak Measurement (dBmicroVolt)	Quasi-Peak Limit (dBmicroVolt)	Quasi-Peak Result
0.190	53.7	43.3	53.6	Pass	51.4	63.6	Pass
0.236	54.0	45.8	52.1	Pass	52.0	62.1	Pass
0.431	33.4	10.4	47.5	Pass	26.2	57.5	Pass
0.471	41.9	39.5	46.5	Pass	40.6	56.5	Pass
0.589	35.7	26.3	46.0	Pass	33.5	56.0	Pass
0.709	31.9	25.4	46.0	Pass	29.6	56.0	Pass
0.825	31.1	24.5	46.0	Pass	28.1	56.0	Pass

TEST EQUIPMENT LIST

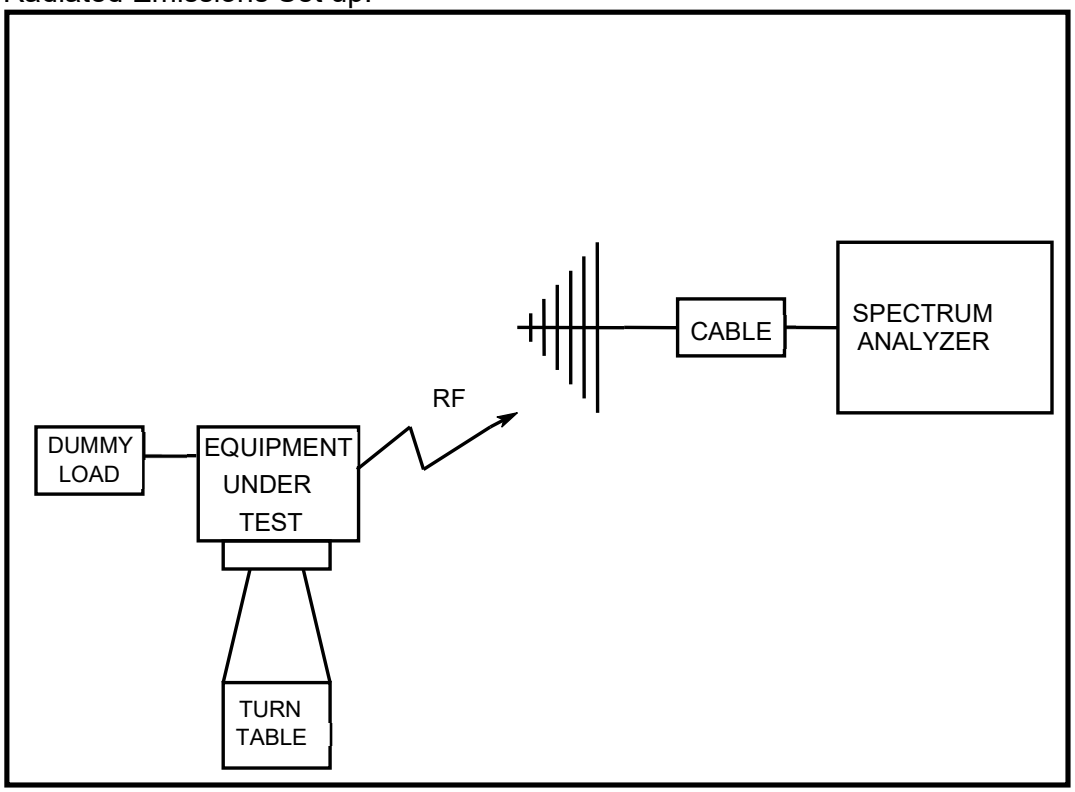
Equipment Type	Information	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
AC Voltmeter		Tait		2		02-May-24
Antenna	Reverb - 1-18GHz DRG	Schwarzbeck	BBHA 9120 D	9120D-885	E4857	
Antenna	Reverb - 1-18GHz DRG	Schwarzbeck	BBHA 9120 D	9120D-884	E4858	
Coax Cable	Reverb - 4.5m Multiflex 141	TeltestBlue6	MF 141	TeltestBlue6	E4843	08-Oct-24
Coax Cable	Reverb - 2m Multiflex 141	TeltestBlue5	MF 141	TeltestBlue5	E4844	08-Oct-24
Coax Cable	Reverb - 2m Multiflex 141	TeltestBlue4	MF 141	TeltestBlue4	E4845	08-Oct-24
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue3	MF 141	TeltestBlue3	E4846	08-Oct-24
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue2	MF 141	TeltestBlue2	E4847	08-Oct-24
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue1	MF 141	TeltestBlue1	E4848	08-Oct-24
Coax Cable	Conducted Disturbance Cable	Tait	RG223/U	EMC1	E5026	08-Oct-24
LISN	50Ω/50µH+5Ω	Schwarzbeck	NSLK 8117	7	E5016	06-Oct-24
Multimeter		Fluke	77	35069359	E3237	11-Oct-24
Power Supply	AC Variac	Yamabishi	S-260-5	TX-533	E1737	
Power Supply		Rohde & Schwarz	NGS M32/10 192.0810.31	Fnr 434	E3556	02-May-24
Power Supply	60V/50A/1000W	Hewlett Packard	HP6012B	2524A00616	E3712	05-Oct-25
Power Supply	40V/38A	Agilent	N5766A	US09E4663L	E4719	11-Oct-25
RF Amplifier	+21.7 dB 1GHz	Tait	ZFL-1000LN	E3660	E3360	15-Aug-24
RF Amplifier	Pre-amplifier	Agilent	87405C	MY47010688	E4941	16-Oct-24
RF Attenuator	30+3dB 350W	Weinschel	67-30-33 & BW-N3W5+	CK9178	E5023	08-Oct-24
RF Chamber	S-LINE TEM CELL	Rohde & Schwarz	1089.9296.02	338232/003	E3636	07-May-25
RF Chamber	Reverb - Stirrer controller for reverb chamber	Teseq	Stirrer Controller	29765.1	E4854	
RF Chamber	Reverb - 0.5 - 18GHz Reverberation Chamber	Teseq	RVC XS	29765	E4855	
RF Load	150W	Bird	8166	524	E3625	08-Oct-24
Signal Generator	Analog 3.2GHz	Hewlett Packard	HP8648C	3443U00543	E3558	08-Oct-24
Spectrum Analyser	13.2GHz	Agilent	PSA E4445A	MY42510072	E4139	18-Oct-24
Spectrum Analyser	26.5GHz	Agilent	PXA N9030A	MY49432161	E4907	02-Mar-25
Temp & Humidity datalogger		Hobo	U21-011	10134275	E4980	07-Aug-24
Transient Limiter	9kHz to 200MHz	Agilent	11947A	3107A03657	E4982	11-Oct-24
Testware	Conducted Disturbances		July 2019	-	-	
Testware	Conducted Emissions		March 2018	-	-	
Testware	Reverb Emissions		TTEL_REVEMIS 2.00.03	-	-	
Testware	S-Line Radiated Emissions		TTEL_SLINERADEM 2.00.01	-	-	

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

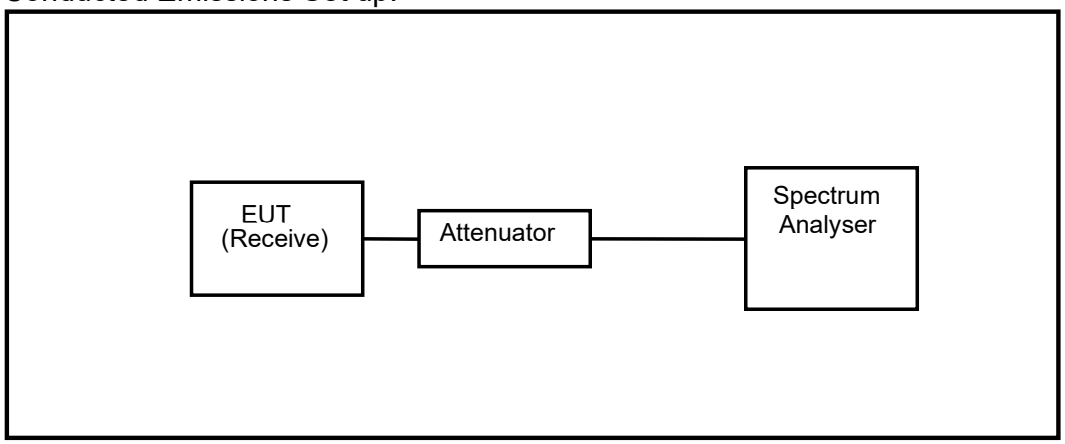
ANNEX A

TEST SETUP DETAILS

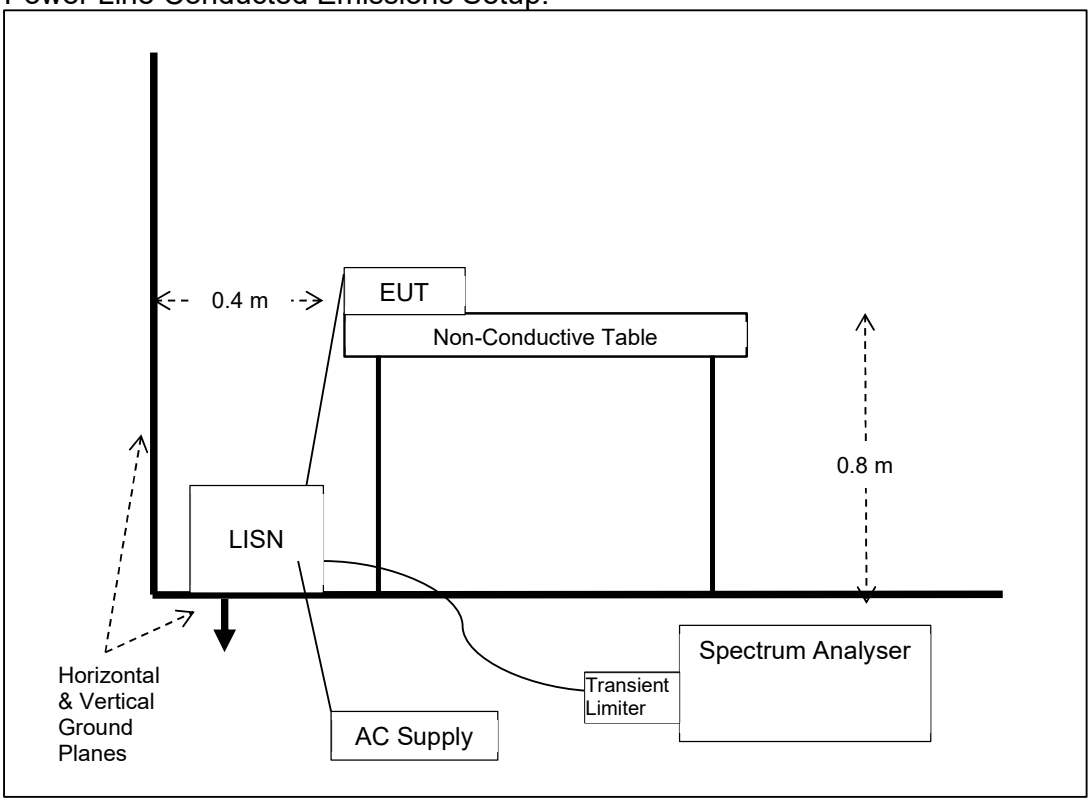
Radiated Emissions Set up.



Conducted Emissions Set up.



Power Line Conducted Emissions Setup.



END OF REPORT