

Laboratory Test Report

ELECTROMAGNETIC COMPATIBILITY

for the

TMBK5B MOBILE Transceiver

Tested In accordance with

47CFR 15.109 & 15.111

Report Revision: 1
Issue Date: 02 May 2022
FCC ID: CASTMBK5B

PREPARED BY: I. R. Russell


Test Technician

CHECKED & APPROVED BY: M. C. James


Laboratory Technical Manager



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

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

FCC ID: CASTMBK5B

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Revision History

Date	Revision	Comments
02 May 2022	1	Initial test report

TELTEST Laboratories

Tait International Ltd
Report Number 4242a

Introduction

Type approval testing of the TMBK5B, 30/35 Watt, MOBILE transceiver in order to demonstrate continued compliance with 47CFR 15.109 & 15.111, after a change in RF power amplifier design.

PCB IPN (old) 220-01815-09

PCB IPN (new) 220-01815-10

Report Prepared For

Tait International Ltd
245 Wooldridge Road
Harewood
Christchurch 8051
New Zealand

DESCRIPTION OF SAMPLE

Manufacturer Tait International Limited
Equipment: MOBILE Transceiver
Type: TMBK5B
Product Code: T02-00012-XFAA
Serial Number(s): 20917090
Frequency range 762 → 870 MHz
Transmit Power 30/35 W

HARDWARE & SOFTWARE

Quantity: 1

	Code and Version	Hardware
Hardware ID	TMBC52-0100_0008	Head
Boot Code	QCB5B_S00_3.05.12.0001	Head
Radio Application	QCB5F_S00_2.02.03.0009	Head
FPGA Image	QCB5G_S01_2.00.00.0001	Head
Hardware ID	TMBB24-K500_0002	Torso
Boot Code	QMB2B_S01_4.00.00.0001	Torso
DSP	QMB2A_E00_2.28.17.0139	Torso
Radio Application	QMB2F_E00_2.28.17.0139	Torso
FPGA Image	QMB2G_S02_1.81.00.0000	Torso

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	N/A1

*Not Accredited

N/A1 not tested as this parameter is unlikely to be affected by the change in the Power Amplifier

Statement of Compliance

The TMBK5B MOBILE transceiver as tested in this report was found to conform to the following standards:

47CFR 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 28 March → 19 April 2022, and under the following conditions:

Ambient Temperature 15° C → 30° C

Relative Humidity 20% → 75%

Standard Test Voltage 13.8 V_{DC}

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	<input type="checkbox"/>
1.705 – 108	1000	<input type="checkbox"/>
108 – 500	2000	<input type="checkbox"/>
500 – 1000	5000	<input checked="" type="checkbox"/>
Above 1000	5 th Harmonic of highest frequency or 40 GHz, whichever is lower	<input type="checkbox"/> 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 762.025 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~
12.5 kHz Channel Spacing 768.025 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~
12.5 kHz Channel Spacing 769.075 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~
12.5 kHz Channel Spacing 774.9MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~
12.5 kHz Channel Spacing 775.975 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~
12.5 kHz Channel Spacing 857.5 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~
12.5 kHz Channel Spacing 768.025MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~

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Radiated Spurious Emissions - continued

12.5 kHz Channel Spacing 769.075 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~
12.5 kHz Channel Spacing 774.9 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~
12.5 kHz Channel Spacing 775.975 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~
12.5 kHz Channel Spacing 856.025 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~
12.5 kHz Channel Spacing 865.025 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~
12.5 kHz Channel Spacing 869.975 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~
12.5 kHz Channel Spacing 851.025 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (µV/m)
~	~

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Radiated Spurious Emissions – continued

12.5 kHz Channel Spacing		860.025 MHz Receive / Tx Standby	
Emission Frequency (MHz)		Level ($\mu\text{V}/\text{m}$)	
~		~	
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

Measurement Uncertainty	≤12.75 GHz ± 2.8 dB
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MEASUREMENT RESULTS:

12.5 kHz Channel Spacing 762.025 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
12.5 kHz Channel Spacing 768.025 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
12.5 kHz Channel Spacing 769.075 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
12.5 kHz Channel Spacing 774.9MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
12.5 kHz Channel Spacing 775.975 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~

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Conducted Spurious Emissions - continued

12.5 kHz Channel Spacing 857.5 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
12.5 kHz Channel Spacing 768.025MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
12.5 kHz Channel Spacing 769.075 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
12.5 kHz Channel Spacing 774.9 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
12.5 kHz Channel Spacing 775.975 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
12.5 kHz Channel Spacing 856.025 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
12.5 kHz Channel Spacing 865.025 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~

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Conducted Spurious Emissions - continued

12.5 kHz Channel Spacing 869.975 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
12.5 kHz Channel Spacing 851.025 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
12.5 kHz Channel Spacing 860.025 MHz Receive / Tx Standby	
Emission Frequency (MHz)	Level (nW)
~	~
No emissions were detected within 20 dB of Limit.	

LIMITS:

LIMIT	2 nW (-57 dBm)
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TEST EQUIPMENT LIST

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

Equipment Type	Information	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
Antenna	18GHz DRG	Emco	DRG3115	2084	E3076	12-Jul-24
Antenna	Log Periodic	Schwarzbeck	VUSLP	9111-219	E4617	
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	OATS Turntable Cable 1	Intelcom	RG214	OATS1	E4621	11-Jan-23
Coax Cable	OATS Tower Cable	Intelcom	RG214	OATS2	E4622	11-Jan-23
Coax Cable	Reverb - 4.5m Multiflex 141	TeltestBlue6	MF 141	TeltestBlue6	E4843	11-Jan-23
Coax Cable	Reverb - 2m Multiflex 141	TeltestBlue5	MF 141	TeltestBlue5	E4844	11-Jan-23
Coax Cable	Reverb - 2m Multiflex 141	TeltestBlue4	MF 141	TeltestBlue4	E4845	11-Jan-23
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue3	MF 141	TeltestBlue3	E4846	11-Jan-23
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue2	MF 141	TeltestBlue2	E4847	10-Jan-23
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue1	MF 141	TeltestBlue1	E4848	11-Jan-23
Coax Cable	OATS Turntable Cable 2	Intelcom	RG215	OATS3	E4995	11-Jan-23
Coax Cable	2m Black	Suhner	RG214HF/Nm/Nm/2000	TeltestBlack7	E5004	11-Jan-23
Coax Cable	2m Black	Suhner	RG214HF/Nm/Nm/2000	TeltestBlack8	E5005	11-Jan-23
Coax Cable	1.5m Blue	Suhner	Sucoflex 126EA	502868/126EA	E5028	23-Dec-22
Power Supply		Rohde & Schwarz	NGS M32/10 192.0810.31	Fnr 434	E3556	17-May-22
Power Supply	40V/38A	Agilent	N5766A	US09E4663L	E4719	4-Oct-23
RF Amplifier	+21.7 dB 1GHz	Tait	ZFL-1000LN	E3660	E3360	2-Aug-22
RF Amplifier	Pre-amplifier	Agilent	87405C	MY47010688	E4941	19-Oct-22
RF Attenuator	10dB 50W	Weinschel	24-10-34	BC3293	E4364	22-Dec-22
RF Attenuator	3dB 0.5W	Weinschel	Model 1	CH6843	E5011	22-Dec-22
RF Attenuator	3dB 0.5W	Weinschel	Model 1	CH6857	E5012	22-Dec-22
RF Chamber	S-LINE TEM CELL	Rohde & Schwarz	1089.9296.02	338232/003	E3636	28-Oct-22
RF Chamber	Reverb - Stirrer controller for reverb chamber	Teseq	Stirrer Controller	29765.1	E4854	
RF Chamber	Reverb - 0.5 - 18GHz Reverb Chamber	Teseq	RVC XS	29765	E4855	
RF Combiner	TREVA2	Minicircuits	ZFSC-4-1	-	E4084	
RF Load	50W	Weinschel	F1426	AE2490	E3624	22-Dec-22
Signal Generator	Analog 4GHz	Agilent	E4422B	GB40050320	E3788	16-Oct-22
Signal Generator	Digital 4GHz	Agilent	E4437B	US39260389	E4764	19-Oct-23
Spectrum Analyser	13.2GHz	Agilent	PSA E4445A	MY42510072	E4139	7-Oct-22
Spectrum Analyser	26.5GHz	Agilent	PXA N9030A	MY49432161	E4907	3-Oct-22

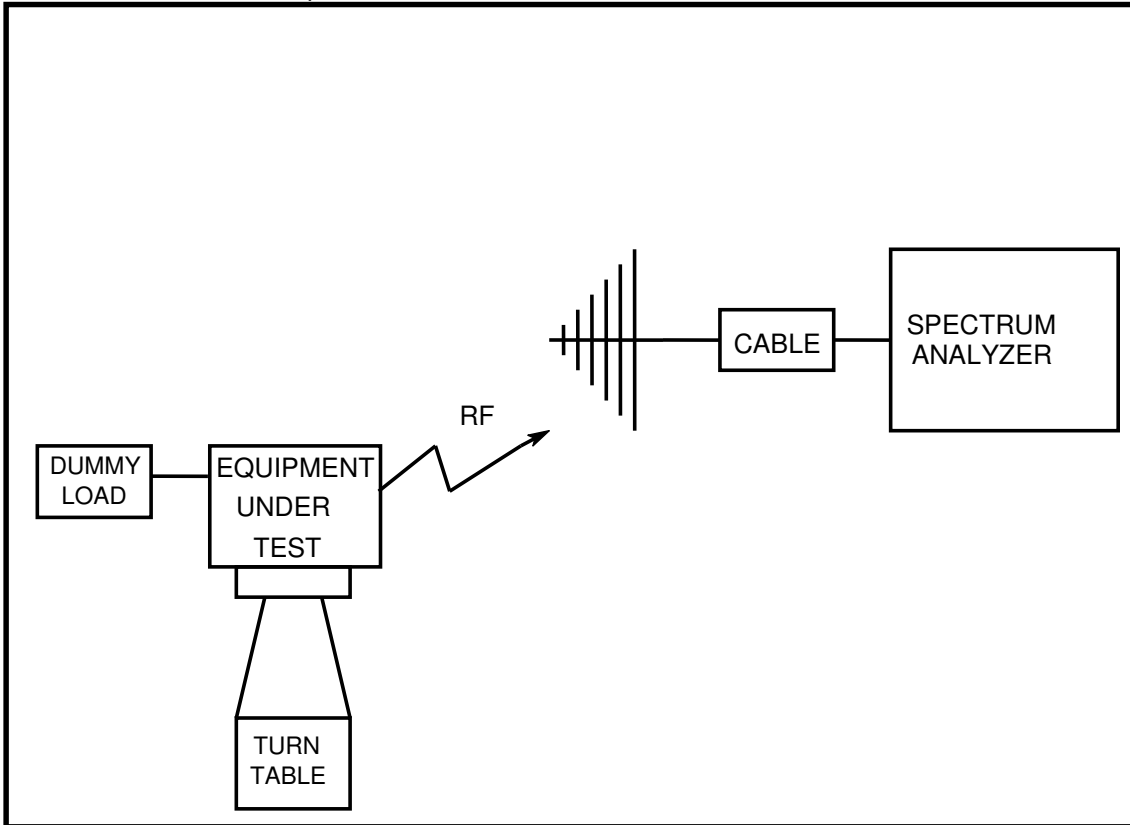
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Equipment Type	Information	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
Temp & Humidity datalogger		Hobo	U21-011	10134275	E4980	25-Jul-22
TREVA 2		Teltest	-	2	-	
Testware	Conducted Emissions		March 2018	-	-	
Testware	Reverb Emissions		TTEL_REVEMIS 2.00.02	-	-	
Testware	S-Line Radiated Emissions		TTEL_SLINERADEM 2.00.01	-	-	
Testware	TREVA		TTEL_TREVA 2.00.00	-	-	
Testware	Spec An Correction Loader		June 2019	-	-	

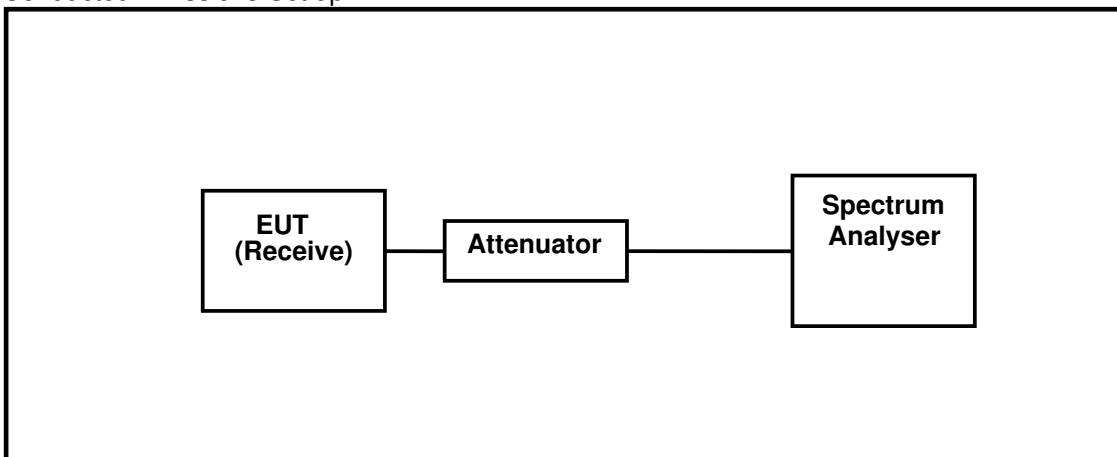
ANNEX A

TEST SETUP DETAILS

Radiated Emissions Set up.



Conducted Emissions Set up.



END OF REPORT