



Product Service

Choose certainty.
Add value.

Report On

FCC Testing of the
Microlise Ltd MTU4-A (Internal Antenna)
In accordance with FCC CFR 47 Part 15B

COMMERCIAL-IN-CONFIDENCE

FCC ID: OUUMTU4

Document 75916503 Report 05 Issue 2

July 2012



Product Service

TÜV SÜD Product Service Ltd, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuvps.co.uk

COMMERCIAL-IN-CONFIDENCE

REPORT ON

FCC Testing of the
Microlise Ltd MTU4-A (Internal Antenna)
In accordance with FCC CFR 47 Part 15B

Document 75916503 Report 05 Issue 2

July 2012

PREPARED FOR

Microlise Ltd
Farrington Way
Eastwood
Nottingham
NG16 3AG

PREPARED BY


Natalie Bennett
Senior Administrator (Technical)

APPROVED BY


Mark Jenkins
Authorised Signatory

DATED

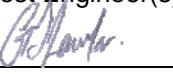
30 July 2012

This report has been up-issued to Issue 2 to remove highlighting on page 9.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 15B. The sample tested was found to comply with the requirements defined in the applied rule s.

Test Engineer(s);


G Lawler



COMMERCIAL-IN-CONFIDENCE



CONTENTS

Section	Page No
1 REPORT SUMMARY	3
1.1 Introduction	4
1.2 Brief Summary of Results	5
1.3 Application Form	6
1.4 Product Information	9
1.5 Test Conditions	9
1.6 Deviations from the Standard	9
1.7 Modification Record	9
2 TEST DETAILS	10
2.1 Radiated Emissions	11
3 TEST EQUIPMENT USED	14
3.1 Test Equipment Used	15
3.2 Measurement Uncertainty	16
4 ACCREDITATION, DISCLAIMERS AND COPYRIGHT.....	17
4.1 Accreditation, Disclaimers and Copyright.....	18



Product Service

SECTION 1

REPORT SUMMARY

FCC Testing of the
Microlise Ltd MTU4-A (Internal Antenna)
In accordance with FCC CFR 47 Part 15B



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the Microlise Ltd MTU4-A (Internal Antenna) to the requirements of FCC CFR 47 Part 15B.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Microlise Ltd
Model Number(s)	MTU4-A
Serial Number(s)	301934040760729
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15B (2011)
Incoming Release Date	Application Form 23 January 2012
Disposal Reference Number	Held Pending Disposal
Date	Not Applicable
Order Number	PO241451
Date	22 December 2011
Start of Test	7 July 2012
Finish of Test	8 July 2012
Name of Engineer(s)	G Lawler



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 15B is shown below.

Section	Spec Clause	Test Description	Result	Comments/Base Standard
Idle - Internal Antenna				
2.1	15.109	Radiated Emissions	Pass	



1.3 APPLICATION FORM

APPLICANT'S DETAILS	
COMPANY NAME :	Microlise Limited
ADDRESS :	Farrington Way, Eastwood, Nottingham, NG16 3AG
NAME FOR CONTACT PURPOSES :	Ian Dickinson
TELEPHONE NO: + 44 (1773) 537306	FAX NO: +44 (1773) 537373 E-MAIL: ian.dickinson@microlise.com

EQUIPMENT INFORMATION			
Model name/number	MTU4-A	Identification/Part number	MTU4-A
Hardware Version	1.0	Software Version	1.0
Manufacturer	Microlise Limited	Country of Origin	United Kingdom.
FCC ID	OUUUMTU4	Industry Canada ID	Not yet issued
Technical description (a brief description of the intended use and operation) Vehicle tracking and telematics device			
<u>Supply Voltage:</u> <input type="checkbox"/> AC mains State AC voltage V and AC frequency Hz <input checked="" type="checkbox"/> DC (external) State DC voltage 6-36 V and DC current ...2 A <input checked="" type="checkbox"/> DC (internal) State DC voltage 3.7 V and Battery type Li-ion.....			
Frequency characteristics: (Telit GE864 GSM module)			
Transmitter Frequency range	824.2 MHz to 1909.8 MHz	Channel spacing	200 kHz. (if channelized)
Receiver Frequency range	869.2 MHz to 1989.8 MHz	Channel spacing	200 kHz (if channelized)
Designated test frequencies: Bottom: MHz Middle: MHz Top: MHz			
Intermediate Frequencies :	 MHz	
Highest Internally Generated Frequency :	 MHz	
<u>Power characteristics:</u> Maximum transmitter power 2 W Minimum transmitter power W <input type="checkbox"/> Continuous transmission <input checked="" type="checkbox"/> Intermittent transmission State duty cycle ...100% (worst case)... If intermittent, can transmitter be set to continuous transmit test mode? N			
<u>Antenna characteristics:</u> <input checked="" type="checkbox"/> Antenna connector (MTU4-A-B only) State impedance 50 ohm <input type="checkbox"/> Temporary antenna connector State impedance ohm <input checked="" type="checkbox"/> Integral antenna (MTU4-A-A only) State gain -1.5 to -1.3 dBi			
<u>Modulation characteristics:</u> <input type="checkbox"/> Amplitude <input checked="" type="checkbox"/> Other <input type="checkbox"/> Frequency Details: GMSK <input type="checkbox"/> Phase (GMSK, QSPK etc) Can the transmitter operate un-modulated? N ITU Class of emission: 300KGXW.			
Frequency characteristics: (Bluegigga WT32 Bluetooth module)			
Transmitter Frequency range	2400. MHz to 2483.5 MHz	Channel spacing	1 MHz(if channelized)
Receiver Frequency range	2400. MHz to 2483.5. MHz	Channel spacing	1 MHz(if channelized)
Designated test frequencies: Bottom: MHz Middle: MHz Top: MHz			
Intermediate Frequencies : 1.5 MHz			
Highest Internally Generated Frequency : MHz			



EQUIPMENT INFORMATION

Power characteristics:

Maximum transmitter power 0dBm Minimum transmitter power W
(if variable)

[] Continuous transmission
 [] Intermittent transmission State duty cycle 80%.....
 If intermittent, can transmitter be set to continuous transmit test mode? N

Antenna characteristics:

[] Antenna connector State impedance ohm
 [] Temporary antenna connector State impedance ohm
 [] Integral antenna State gain 1.5 dBi

Modulation characteristics:

[] Amplitude [X] Other
 [] Frequency Details: ...GFSK / n/4DQPSK / 8DQPSK..
 [] Phase (GMSK, QSPK etc)

Can the transmitter operate un-modulated?

N

ITU Class of emission: ...1M00F9W.....

Frequency characteristics: (uBlox LEA-6 GPS receiver)Transmitter Frequency range ...N/A..... MHz to MHz Channel spacing
 (if channelized)Receiver Frequency range 1575.42 MHz to MHz Channel spacing
 (if different)

Designated test frequencies:

Bottom: MHz Middle: MHz Top: MHz
 Intermediate Frequencies : MHz

Highest Internally Generated Frequency : MHz

Power characteristics: (Not applicable – receive only)Maximum transmitter power W Minimum transmitter power W
(if variable)

[] Continuous transmission
 [] Intermittent transmission State duty cycle
 If intermittent, can transmitter be set to continuous transmit test mode? Y/N

Antenna characteristics:

[X] Antenna connector (MTU4-A-B only) State impedance ...50..... ohm
 [] Temporary antenna connector State impedance ohm
 [] Integral antenna (MTU4-A-A only) State gain 26 dB (inc. LNA)

Modulation characteristics:

[] Amplitude [] Other
 [] Frequency Details:
 [] Phase (GMSK, QSPK etc)

Can the transmitter operate un-modulated?

Y/N

ITU Class of emission:

Battery/Power Supply

Model name/number MTU4-A battery pack..... Identification/Part number SPEC-MI71331/04 .
 Manufacturer PML Limited..... Country of Origin United Kingdom.....

Ancillaries (if applicable)

Model name/number Identification/Part number
 Manufacturer Country of Origin

Extreme conditions:

Maximum temperature 85 °C Minimum temperature -40 °C
 Maximum supply voltage 36 V Minimum supply voltage 6 V



Product Service

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

A handwritten signature in black ink, appearing to read "Ian Dickinson".

Signature :

Name : Ian Dickinson

Position held : Director of Technical Services

Date : 23 January 2012



1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Microlise Ltd MTU4-A (Internal Antenna). A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 12 V DC supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard or test plan were made during testing.

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.



Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
Microlise Ltd MTU4-A (Internal Antenna)
In accordance with FCC CFR 47 Part 15B



2.1 RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47 Part 15B, Clause 15.109

2.1.2 Equipment Under Test and Modification State

MTU4-A S/N: 301934040760729 - Modification State 0

2.1.3 Date of Test

7 July 2012 & 8 July 2012

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

A preliminary profile of the Spurious Radiated Emissions is obtained up to the 5th harmonic of the EUT's highest internally generated fundamental frequency. For frequencies from 30MHz to 18GHz the EUT is placed on a test table 800mm above the ground plane. For frequencies above 18GHz, the EUT height is increased by 200mm to a height of 1000mm. This is to ensure the beam width of the measuring antenna gives sufficient vertical coverage of the EUT.

During characterisation the turntable azimuth is adjusted from 0 to 360 degrees with the measuring antenna in one polarity. It is then repeated for the other polarity. Any frequencies of interest are noted for formal measuring later. The distance from the measuring antenna to the boundary of the EUT is 3m. Above 18GHz this distance may be reduced to 1m.

During formal measurement the spectrum analyser is tuned to the frequency of the emission. The turntable azimuth is adjusted from 0 to 360 degrees to determine the point at which the maximum emission level occurs. Then the height of the measuring antenna is adjusted from a height of 1m to 4m to determine the height at which the maximum emission level occurs. Once the point of maximum emission has been determined the emission is measured. Emissions in the 30MHz to 1GHz range are measured using a CISPR Quasi – Peak detector function in a 120kHz bandwidth. Emissions in the range 1GHz to 40GHz require Peak and Average measurements. The Peak measurements are made using a peak detector with 1MHz Resolution and Video bandwidths. The average measurements employ a peak detector with a Resolution bandwidth of 1MHz and a Video bandwidth of 10Hz. If measurements are made at a 1m measuring distance, then 10dB is added to the specification limit.

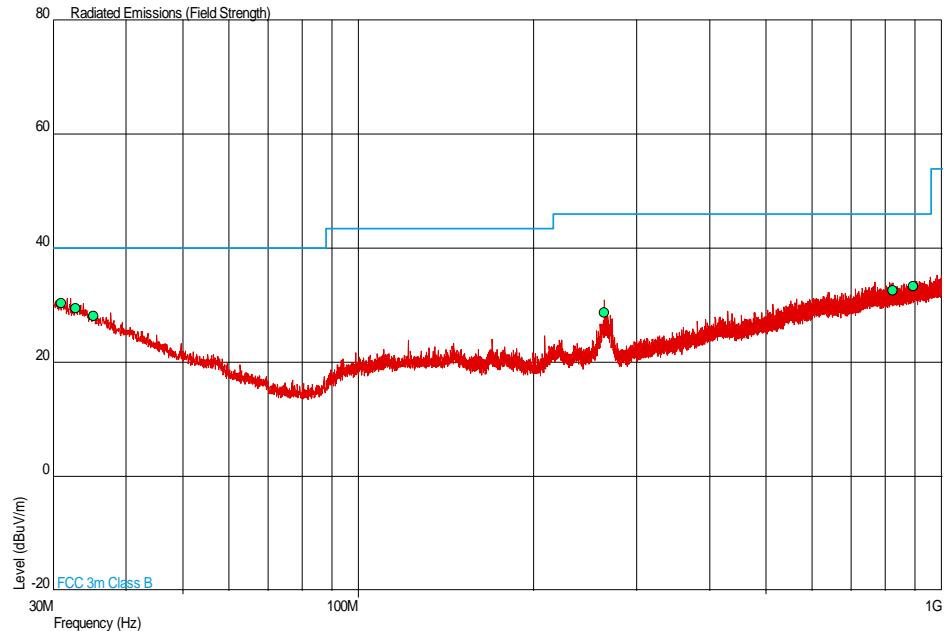
2.1.6 Environmental Conditions

Ambient Temperature	18.5 - 18.7°C
Relative Humidity	69.0%



2.1.7 Test Results

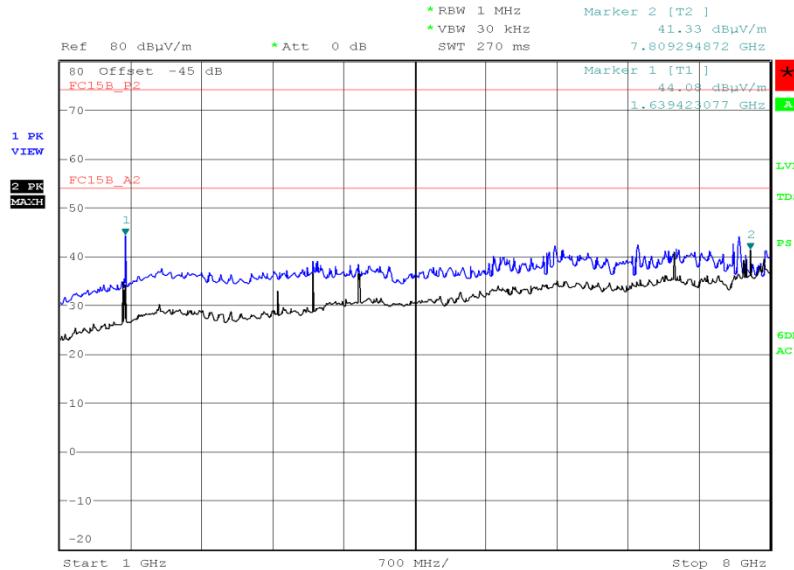
30 MHz to 1 GHz



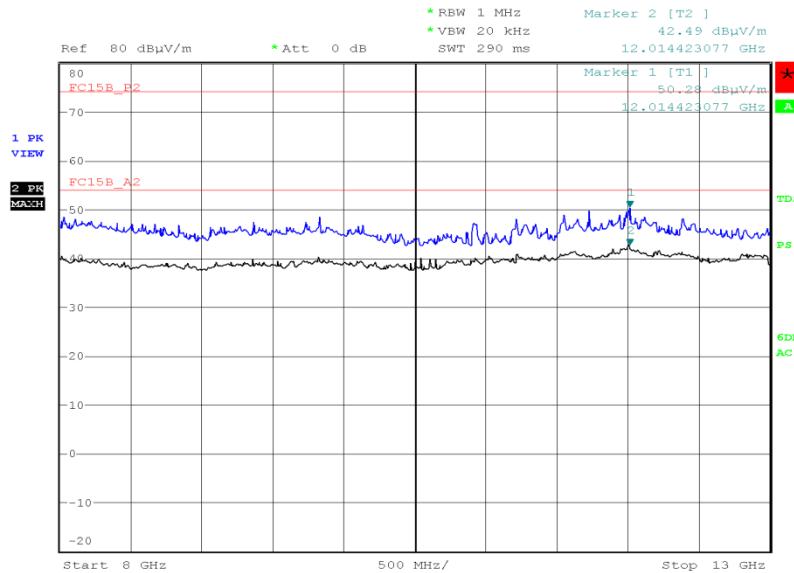
Frequency (MHz)	QP Level (dB μ V/m)	QP Level (μ V/m)	QP Limit (dB μ V/m)	QP Limit (μ V/m)	QP Margin (dB μ V/m)	QP Margin (μ V/m)	Angle (Deg)	Height (m)	Polarity
30.961	30.4	33.1	40.0	100	-9.6	66.9	327	3.87	Vertical
32.764	29.5	29.9	40.0	100	-10.5	70.1	0	2.54	Horizontal
35.232	28.1	25.4	40.0	100	-11.9	74.6	48	1.00	Vertical
264.048	28.7	27.2	46.0	200	-17.3	172.8	56	1.37	Horizontal
823.966	32.7	43.2	46.0	200	-13.3	156.8	13	1.00	Vertical
892.300	33.4	46.8	46.0	200	-12.6	153.2	182	1.51	Horizontal



Product Service

1 GHz to 3 GHz

Date: 7.JUL.2012 10:59:16

3 GHz to 8 GHz

Date: 7.JUL.2012 08:24:31



Product Service

SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 - Radiated Emissions					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	8-Dec-2012
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	14-Nov-2012
Antenna (Double Ridge Guide)	Q-Par Angus Ltd	QSH 180K	1511	24	2-Aug-2012
Pre-Amplifier	Phase One	PS04-0086	1533	12	20-Sep-2012
Pre-Amplifier	Phase One	PS04-0087	1534	12	26-Sep-2012
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
GSM Test Set	Rohde & Schwarz	CMU 200	2809	12	8-Jun-2013
Antenna (Bilog)	Chase	CBL6143	2904	24	12-May-2013
High Pass Filter (3GHz)	RLC Electronics	F-100-3000-5-R	3349	12	29-May-2013
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	20-Dec-2012
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	29-Sep-2012
3 GHz High Pass Filter	K&L Microwave	11SH10-3000/X18000-O/O	3552	12	16-Apr-2013
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
'3.5mm' - '3.5mm' RF Cable (2m)	Rhophase	3PS-1803-2000-3PS	3702	12	27-Jan-2013
'3.5mm' - '3.5mm' RF Cable (2m)	Rhophase	3PS-1803-2000-3PS	3703	-	TU
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	12	26-Aug-2012
Tilt Antenna Mast	matureo GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	matureo GmbH	NCD	3917	-	TU
Low Noise Amplifier	Wright Technologies	APS04-0085	3969	12	8-Jul-2012

TU – Traceability Unscheduled



Product Service

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Radiated Emissions	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB



Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
(Not UKAS Accredited).

This report must not be reproduced, except in its entirety, without the written permission of
TÜV SÜD Product Service Limited

© 2012 TÜV SÜD Product Service Limited