

FCC Testing of the
MiX Telematics International (Pty) Ltd
MiX41MC-3G Electronic Unit, Model: 440FT0426
In accordance with FCC 47 CFR Part 15B

Prepared for: MiX Telematics Europe Limited
Cherry Orchard North
Kembrey Park
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SN1 2NR
United Kingdom

FCC ID: 2AFMS-41MC3G



Product Service

Choose certainty.
Add value.

COMMERCIAL-IN-CONFIDENCE

Date: February 2017

Document Number: 75936634-10 | Issue: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Steven White	27 March 2017	
Authorised Signatory	Matthew Russell	27 March 2017	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

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 47 CFR Part 15B. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Jack Tuckwell	27 March 2017	

FCC Accreditation

90987 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY

A sample of this product was tested and found to be in compliance with FCC 47 CFR Part 15B: 2015.



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Contents

1 **Report Summary2**

1.1 Report Modification Record.....2

1.2 Introduction.....2

1.3 Brief Summary of Results3

1.4 Application Form1

1.5 Product Information4

1.6 Deviations from the Standard.....4

1.7 EUT Modification Record4

1.8 Test Location.....4

2 **Test Details5**

2.1 Radiated Emissions.....5

3 **Measurement Uncertainty10**



1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	27 March 2017

Table 1

1.2 Introduction

Applicant	Mix Telematics Europe Limited
Manufacturer	Mix Telematics International (Pty) Ltd
Model Number(s)	MiX41MC-3G
Serial Number(s)	40000279
Hardware Version(s)	V5A [V2E (pcb)]
Software Version(s)	V1.0.9
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15B : 2015
Order Number	PO086320
Date	18-October-2016
Date of Receipt of EUT	03-November-2016
Start of Test	03-November-2016
Finish of Test	03-November-2016
Name of Engineer(s)	Jack Tuckwell
Related Document(s)	ANSI C63.4 (2014)



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1.3 Brief Summary of Results

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

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Idle				
2.1	15.109	Radiated Emissions	Pass	ANSI C63.4

Table 2



1.4 Application Form

EQUIPMENT DESCRIPTION	
Model Name/Number	MiX41MC-3G
Part Number	440FT0426
Hardware Version	V5A [V2E (pcb)]
Software Version	V1.0.9
FCC ID (if applicable)	AFMS-41MC3G
Industry Canada ID (if applicable)	
Technical Description (Please provide a brief description of the intended use of the equipment)	The MiX4000 is a high-end Fleet Management product integrating GSM modem, GPS receiver, Blue Tooth Low Energy, 434 / 915MHz short range transceiver and CAN bus.

POWER SOURCE	
☐ AC mains	State voltage
AC supply frequency (Hz)	
VAC	
Max Current	
Hz	
☐ Single phase	☐ Three phase
And / Or	
☒ External DC supply	
Nominal voltage	12 V Max Current 0.500 A
Extreme upper voltage	33 V
Extreme lower voltage	10.5 V
Battery	
☐ Nickel Cadmium	☐ Lead acid (Vehicle regulated)
☐ Alkaline	☐ Leclanche
☐ Lithium	☐ Other Details :
Volts nominal.	
End point voltage as quoted by equipment manufacturer	V



FREQUENCY INFORMATION					
Frequency Range	902 to 928	MHz			
Channel Spacing (where applicable)	400 kHz				
Receiver Frequency Range (if different)	902 to 928	MHz			
Channel Spacing (if different)					
Test Frequencies*	Bottom	902.2	MHz	Channel Number (if applicable)	0
	Middle	915	MHz	Channel Number (if applicable)	32
	Top	927.8	MHz	Channel Number (if applicable)	64
Intermediate Frequencies	MHz				
Highest Internally Generated Frequency :	2100 MHz				

POWER CHARACTERISTICS			
Maximum TX power	0.1	W	
Minimum TX power	W (if variable)		
Is transmitter intended for :			
Continuous duty	☐ Yes		☒ No
Intermittent duty	☒ Yes		☐ No
If intermittent state DUTY CYCLE			
Transmitter ON	0 seconds		
Transmitter OFF	seconds		

ANTENNA CHARACTERISTICS					
☐	Antenna connector			State impedance	Ohm
☐	Temporary antenna connector			State impedance	Ohm
☒	Integral antenna	Type	PCB Helical	State gain	0 dBi
☐	External antenna	Type		State gain	dBi

MODULATION CHARACTERISTICS			
☐	Amplitude	☒	Frequency
☐	Phase	☐	Other (please provide details):
Can the transmitter operate un-modulated?			☐ Yes ☐ No

CLASS OF EMISSION USED	
ITU designation or Class of Emission:	
1 25K0F1D	
(if applicable) 2	
(if applicable) 3	
If more than three classes of emission, list separately:	



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BATTERY POWER SUPPLY	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

ANCILLARIES (If applicable)	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

EXTREME CONDITIONS					
Extreme test voltages (Max)	33	V	Extreme test voltages (Min)	10.5	V
Nominal DC Voltage	12	V	DC Maximum Current	0.5	A
Maximum temperature	-20	°C	Minimum temperature	60	°C

I hereby declare that the information supplied is correct and complete.

Name: Steve Dawes

Position held: Engineering Manager

Date: 03/11/16

1.5 Product Information

1.5.1 Technical Description

The MiX4000 is a high-end Fleet Management product integrating GSM modem, GPS receiver, Bluetooth Low Energy, 434 / 915MHz short range transceiver and CAN bus

1.6 Deviations from the Standard

No deviations from the applicable standard were made during testing.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Serial Number: 440FT0426			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.8 Test Location

TÜV SÜD Product Service conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: Idle		
Radiated Emissions	Jack Tuckwell	UKAS

Table 4

Office Address:

Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire
PO15 5RL
United Kingdom



2 Test Details

2.1 Radiated Emissions

2.1.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.109

2.1.2 Equipment Under Test and Modification State

MiX41MC-3G, S/N: 40000279 - Modification State 0

2.1.3 Date of Test

03-November-2016

2.1.4 Test Method

The test was performed in accordance with ANSI C63.4, clause 8.

2.1.5 Environmental Conditions

Ambient Temperature 19.1 °C

Relative Humidity 35.0 %

2.1.6 Test Results

Idle

Highest frequency generated or used within the EUT: 2100 MHz

Upper frequency test limit: 13 GHz

30 MHz to 1 GHz

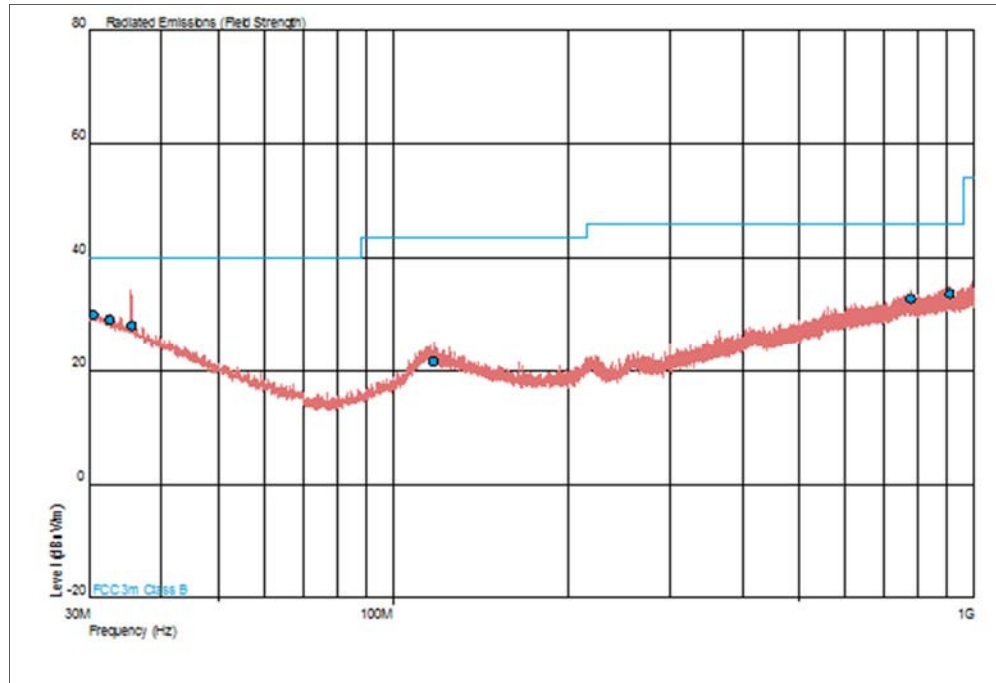


Figure 2 - Horizontal and Vertical Polarity

Frequency (MHz)	QP Level (dBµV/m)	QP Limit (dBµV/m)	QP Margin (dBµV/m)	Angle(Deg)	Height(m)	Polarity
30.582	30.0	40.0	-10.0	360	1.00	Horizontal
32.564	29.0	40.0	-11.0	150	1.00	Horizontal
35.492	28.0	40.0	-12.0	300	1.00	Horizontal
117.329	21.6	43.5	-21.9	29	1.00	Horizontal
778.758	32.7	46.0	-13.3	195	1.00	Horizontal
908.855	33.6	46.0	-12.4	2	1.00	Horizontal

Table 5

1 GHz to 13 GHz

Frequency (GHz)	Result (µV/m)		Limit (µV/m)		Margin (µV/m)		Angle (°)	Height (m)	Polarisation
	Peak	Average	Peak	Average	Peak	Average			
*									

Table 6

* No emissions were detected within 6 dB of the limit



Frequency (GHz)	Result (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)		Angle (°)	Height (m)	Polarisation
	Peak	Average	Peak	Average	Peak	Average			
*									

Table 7

* No emissions were detected within 6 dB of the limit

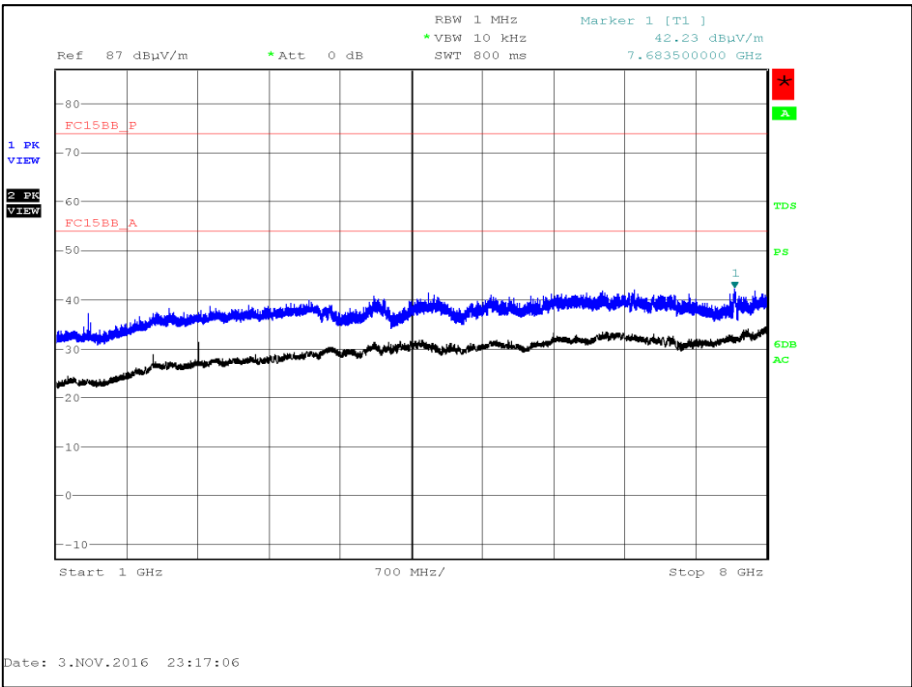


Figure 3 - Horizontal and Vertical Polarity - 1 GHz to 8 GHz



Product Service

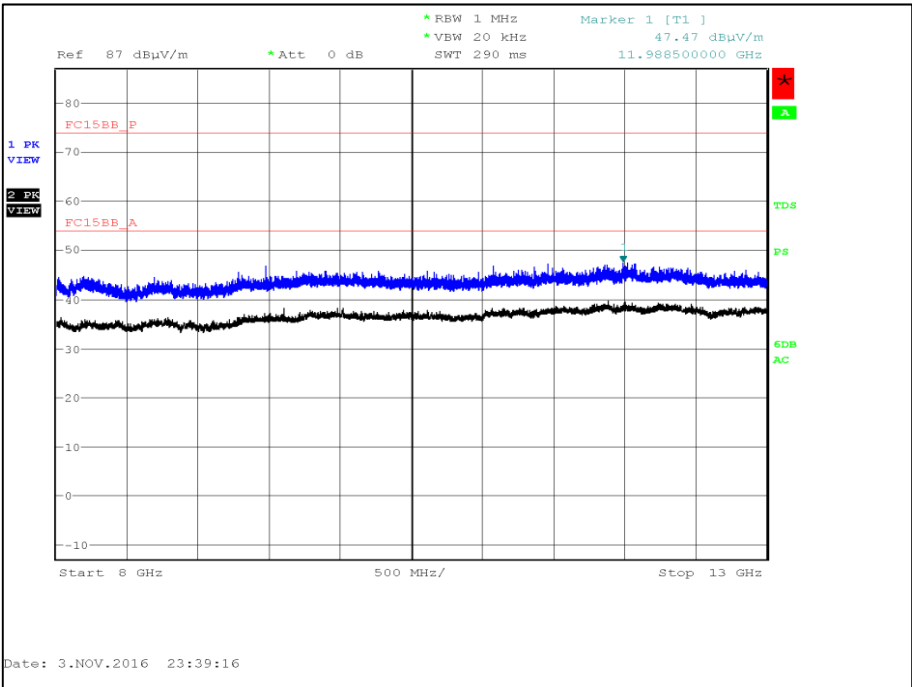


Figure 4 - Horizontal and Vertical Polarity - 8 GHz to 13 GHz

FCC 47 CFR Part 15, Limit Clause 15.109

Frequency of Emission (MHz)	Field Strength (μV/m)
30 to 88	100.0
88 to 216	150.0
216 to 960	200.0
Above 960	500.0

Frequency of Emission (MHz)	Field Strength (dBμV/m)	
	Linear Average Detector	Peak Detector
Above 1000	49.5	69.5

2.1.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Pre-Amplifier	Phase One	PS04-0086	1533	12	29-Jul-2017
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
Compliance 5 Emissions	Schaffner	C5e Software V.5.00.00	3275	-	N/A - Software
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	12-Nov-2017
Tilt Antenna Mast	matur GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	matur GmbH	NCD	3917	-	TU
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	17-Oct-2017
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016

Table 8

TU - Traceability Unscheduled



3 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Radiated Emissions	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB

Table 9