

VEHICLE TELEMATICS

MiX 4000

The Ultimate Vehicle Telematics Device

MiX 4000 is a hard-wired, onboard computer that provides a full view of fleet operations by tracking the precise location of vehicles using GPS and GSM technology, whilst providing critical fleet data. The MiX 4000 series is a range of fleet products that incorporates the latest market trends.

It consists mainly of an on-board computer, a modem, a GNSS, an accelerometer, Low Energy Bluetooth, I/O, 2 x CAN, 2 x RS232, 4 x positive drives and 434 / 915 MHz short range transceiver.

The range includes variants with LTE CAT1/CAT M1, with 2G fall-back modems.

All these variants make use of the same PCB, the only difference is the modem to be populated and all the modems have the same footprint.

Gather vehicle diagnostics (such as average speed, idling time, fuel consumption and more). Manage trips from start to finish for improved efficiency & recover stolen vehicles more easily.

With MiX 4000 you can track your vehicle locations in real-time as well as historically. Create virtual geographic boundaries and detect misuse by drivers.



Key features



3-axis accelerometer for motion sensing



Over-the-air firmware downloads



1 x buzzer for driver notifications



Backup battery



Buffered messaging (20,000) for data logging during coverage loss



1 x red LED (GSM) and 1 green LED (GNSS) to provide feedback on unit status



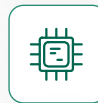
Designed to Revolutionise Your Fleet Operations



On-board computer



GNSS



Accelerometer



Bluetooth Low Energy (BLE)



Short-range transceiver



4x Positive drives



Technical Specifications

General

3 Axis accelerometer	The 3-axis motion sensor capable of measuring accelerations with an output data rate of 1 Hz to 5 kHz. Dynamically selectable full-scale: $\pm 2g/\pm 4g/\pm 8g/\pm 16g$
Dimensions	L = 94 mm (Length with FAKRA connector is 110 mm) W = 103 mm (Width with mounting ears is 116 mm) H = 36 mm
Weight	~156 g (with battery included: ~208 g)
Enclosure Material	Bayblend FR1514 (UL recognition 94 V-0 at 1.5 mm; flame retardant; Vicat/B 120 = 136°C; ball bend indentation temperature $\geq 125^\circ\text{C}$) (PC + ABS blend)

Environment

Temperature	Standards: DIN EN 60068-2-1, DIN EN 60068-2-2 Recommended storage temperature: 0°C to $+45^\circ\text{C}$ Battery charging temperature: 0°C to $+45^\circ\text{C}$ Operating temperature with battery: -20°C to $+65^\circ\text{C}$ Operating temperature without battery: -20°C to $+85^\circ\text{C}$
IP Rating	IP20
Vibration	In accordance with ISO 16750-3:2007(E) for 9h in each of the perpendicular axes. The vibration profile is as per table 14 of ISO16750-3:2007(E)
LED Indicators	In accordance with Mil-Std-810F method 516.5 at a level 30g and with pulse duration of 11ms. The test consists of three shocks to be executed in each major axis and for both positive and negative directions resulting in a total of 18 shocks (in all 3 perpendicular axes).
Mechanics: Free fall	DIN EN60068-2-32: According to automotive guidelines 3 drops from 1 m height (outside packaging)
Humidity	Perform the test as specified in IEC 60068-2-30, Db, Variant 1 <ul style="list-style-type: none">• Upper temperature: $+55^\circ\text{C}$,• Number of cycles: 6. Perform a functional test (operating mode 3.2 according to ISO 16750-1) when the maximum cycle temperature is reached.

Technical Specifications (cont'd)

Power Supply

Primary power supply	Rated voltage (Vnominal): 10.5 to 33 VDC
Current consumption at 12V (primary side)	Out of trip: < 20 mA (configurable) Airport Mode: < 2 mA Drive / Recovery Mode: < 180mA, consumption depends on instantaneous conditions
Current consumption at 24V (primary side)	Out of trip: < 15 mA (configurable) Airport Mode: < 1.5 mA Drive / Recovery Mode: < 70mA, consumption depends on instantaneous conditions
Power consumption	< 1800 mW
Circuit protection	ISO7637-2 Over voltage rating: 56 V DC for 60 s
Reverse polarity protection	Standard: ISO7637-2 Reverse Polarity rating: -30 V for 60 s
Backup battery	3,2 V; 1600 mAh LiFePO4 Battery (60.5 × 50.5 × 6.5 mm) Backup period: >24 hours in the absence of external power; *dependent on operational conditions

GNSS (Internal and External Antennas)

Receiver Type	ZOE-M8Q 72-channel u-blox M8 engine The MiX 4000 supports GPS L1C/A and GLONASS L1OF
Protocols	NMEA, UBX binary and RTCM
Operational limits	Dynamics: ≤ 4 g Velocity: 500 m/s Altitude: 50,000m (unpressurised) Velocity Accuracy: 0.05 m/s Heading Accuracy: 0.3 degrees
A-GPS	Supports AssistNow Online and AssistNow Offline, OMA SUPL compliant

Technical Specifications (cont'd)

Optional GNSS External Antenna

	GNSS	BAND	FREQ
Centre frequency	GPS	L1-C/A	1563MHz-1587MHz
	GLONASS	L1-OF	1593MHz - 1610MHz
Bandwidth	20 MHz min @ -10 dB		
Impedance	50 Ω		
VSWR	<1.5		
Peak Gain	4 dBic Min		
Polarization	RHCP		

Microprocessor

Processor	STM32F2427IIH6
Memory capability	2 MB Program space 256 + 4 kB of RAM 16 MB of SPI NOR FLASH

Modem

Variants	MiX 4401 MiX 4401-B	MiX 4452 MiX 4452-B	MiX 4441 MiX 4441-B
Modem	BG96	EG915N-EA	EG915U-LA
Description	LTE Cat M1/2G (Region 1&2&3)	CAT1/2G (Region 1&3)	CAT1/2G (Region 2)
Output Power Class	LTE FDD: Class 3 (23 dBm \pm 2dB) GSM850/EGSM900: Class 4 (33 dBm \pm 2dB) DCS1800/PCS1900: Class 1 (30 dBm \pm 2dB) GSM850/EGSM900 8-PSK: Class E2 (27 dBm \pm 3dB) DCS1800/PCS1900 8-PSK: Class E2 (26 dBm \pm 3dB)	LTE FDD/TDD: Class 3 (23 dBm \pm 2dB) GSM850/EGSM900: Class 4 (33 dBm \pm 2dB) DCS1800/PCS1900: Class 1 (30 dBm \pm 2dB) GSM850/EGSM900 8-PSK: Class E2 (27 dBm \pm 3dB) DCS1800/PCS1900 8-PSK: Class E2 (26 dBm \pm 3dB)	LTE-FDD: Class 3 (23 dBm \pm 2 dB) GSM850/EGSM900: Class 4 (33 dBm \pm 2 dB) DCS1800/PCS1900: Class 1 (30 dBm \pm 2dB)

Technical Specifications (cont'd)

Band	<p>LTE:</p> <p>FDD Band 1 (2100 MHz)</p> <p>FDD Band 2 (1900 MHz) PCS</p> <p>FDD Band 3 (1800 MHz)</p> <p>FDD Band 4 (1700 MHz) AWS-1</p> <p>FDD Band 5 (850 MHz)</p> <p>FDD Band 8 (900 MHz)</p> <p>FDD Band 12 (700a MHz)</p> <p>FDD Band 13 (700c MHz)</p> <p>FDD Band 18 (800 lower MHz)</p> <p>FDD Band 19 (800 upper MHz)</p> <p>FDD Band 20 (800 MHz)</p> <p>FDD Band 25 (1) (1900+ MHz)</p> <p>FDD Band 26 (2) (850+ MHz)</p> <p>FDD Band 28 (700 MHz) APT</p> <p>2G:</p> <p>PCS Band 2 (1900 MH)</p> <p>DCS Band 3 1800 MHz)</p> <p>GSM Band 5 (850 MHz)</p> <p>E-GSM Band 8 (900 MHz)</p>	<p>LTE:</p> <p>FDD Band 1 (2100 MHz)</p> <p>FDD Band 3 (1800 MHz)</p> <p>FDD Band 7 (2600 MHz)</p> <p>FDD Band 8 (900 MHz)</p> <p>FDD Band 20 (800 MHz)</p> <p>FDD Band 28 (700 MHz) APT</p> <p>2G:</p> <p>DCS Band 3 1800 MHz)</p> <p>E-GSM Band 8 (900 MHz)</p>	<p>LTE:</p> <p>FDD Band 2 (1900 MHz)</p> <p>FDD Band 3 (1800 MHz)</p> <p>FDD Band 4 (1700 MHz)</p> <p>AWS-1</p> <p>FDD Band 5 (850 MHz)</p> <p>FDD Band 7 (2600 MHz)</p> <p>FDD Band 8 (900 MHz)</p> <p>FDD Band 28 (700 MHz) APT</p> <p>FDD Band 66 (AWS-3 1700/2100 MHz)</p> <p>2G:</p> <p>PCS Band 2 (1900 MH)</p> <p>DCS Band 3 1800 MHz)</p> <p>GSM Band 5 (850 MHz)</p> <p>E-GSM Band 8 (900 MHz)</p>
Data Transmission / Rate	<p>LTE FDD:</p> <p>Max 375 Kbps (DL) / Max 375 Kbps (UL)</p> <p>GPRS:</p> <p>Max 107 Kbps (DL) / Max 85.6Kbps (UL)</p> <p>EDGE:</p> <p>296 Kbps (DL) / 236.8 Kbps (UL)</p>	<p>LTE:</p> <p>FDD: Max 10 Mbps (DL) / Max 5 Mbps (UL)</p> <p>LTE TDD:</p> <p>Max 8.96 Mbps (DL) / Max 3.1 Mbps (UL)</p> <p>GPRS:</p> <p>Max 85.6 Kbps (DL) / Max 85.6Kbps (UL)</p> <p>EDGE:</p> <p>236.8 Kbps (DL) / 236.8 Kbps (UL)</p>	<p>LTE FDD:</p> <p>Max 10 Mbps (DL) / Max 5 Mbps (UL)</p> <p>GPRS:</p> <p>Max 85.6 Kbps (DL) Max 85.6Kbps (UL)</p>
Protocol Stack	3GPP E-UTRA Release 13	3GPP E-UTRA Release 9	3GPP E-UTRA Release 13
Antenna	50 Ω		
General	<p>Jamming detection</p> <p>Automatic thermal-shutdown</p>		<p>Automatic thermal-shutdown</p>

SIM Card

Format	Nano (4FF)
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Technical Specifications (cont'd)

Bluetooth

Module	nRF52832 (Nordic)
Module	<div>2.4 GHz transceiver</div> <ul style="list-style-type: none">• -96 dBm sensitivity in Bluetooth® low energy mode• Supported data rates: 1 Mbps, 2 Mbps Bluetooth® low energy mode• On-chip balun (single-ended RF)• 5.3 mA peak current in TX (0 dBm)• 5.4 mA peak current in RX• RSSI (1 dB resolution)
Power	-20 to +4 dBm TX power, configurable in 4 dB steps

Relay Circuit

Current specifications for relay coil	< 250mA (Max)
Maximum continuous voltage on pin	33V
Protection	Transients are clamped

RS232 Ports

Maximum speed	115200 kB/s (higher rates up to a maximum of 300 kB/s are possible with hardware flow control)
Protection (Transient)	IEC1000-4-2 Air Discharge, 15kV, IEC1000-4-2 Direct Contact, 8kV
Protection (DC)	-12V , +12V

I²C Bus

Use	Driver ID
Normal Operating Speed	Capable of rates up to 400 kbp
Maximum Supply Current (CLK)	< 4mA
Protection	ESD: ISO 10605:2001 level 2 DC +/-30V

Technical Specifications (cont'd)

Real Time Clock (RTC)

Time loss	< 10 Minutes per year (typical) < 5 seconds when a GPS is used (auto synchronisation) *temperature change affects the accuracy of the RTC crystal; it's most accurate at +25°C.
Battery backup life	> 5 Years typical at -30°C to +70°C

Auxiliary Inputs and Outputs

Analog inputs	2 x Analog inputs with 12-bit accuracy Voltages are measured in the two ranges: <ul style="list-style-type: none">• 0 – 37.95 volts in steps of approximately 9.3 mV• 0 – 4.95 V in steps of 1.2 mV
Frequency inputs	2 x Frequency/Speed/RPM Inputs (0-5 V and 0-36 V) The input impedance is <100 kΩ. Frequencies of up to 20 kHz can be measured. Maximum signal voltage level = 36V Disconnection of this input can be detected using open-wire detect
Outputs	4 output lines (1 × 1.5 A and 3 × 0.25 A with open load detect and current sense). The 0.25 A ports are the best choice to drive relays
Ignition input	Used to monitor the ignition switch status. Maximum 36V input, impedance > 100kOhm. Disconnection of this wire can be detected with open-wire detect

LED

LED	1 Red LED (GSM) and 1 Green LED (GNSS) is available to provide feedback on the status of the unit
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Buzzers

Buzzer	1x Buzzer included in main harness
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Technical Specifications (cont'd)

Magix: 434 Transceiver (MiX 4412/-B and MiX 4401/-B)

RF Transceiver	Receiver frequency:	434.3 MHz
	Frequency deviation:	10 kHz
	RF Bandwidth:	39.2 kHz
	RF Radiated Output Power:	10 mW max
	Modulation:	2 Level FSK
	Data rate:	19200bps

Magix:915 Mhz Transceiver (Not on MiX 4412 / MiX 4412-B)

RF Transceiver	Receiver frequency:	915 MHz
	Channel spacing:	400 kHz
	Channel 1:	902.2 kHz
	Channel 64:	927.8MHz
	RF Radiated Output Power:	50 mW max
	Modulation:	2 Level FSK
	Date rate:	19200bps

CALIFORNIA PROPOSITION 65



WARNING

This product can expose you to chemicals including Carbon black and Nickel, which are known to the State of California to cause cancer, and including Bisphenol A and 1,3-Butadiene, which are known to the State of California to cause birth defects or other reproductive harm.

For more information go to www.P65Warnings.ca.za.

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