

PRODUCT FACT SHEET

MiX 294E-2G-B / MiX 294D-2G-B



Overview

The MiX 2000 Next Generation Series consists of variants that caters for a variety of needs namely:

- a) Entry level Fleet (FLT) variant with 2G modem with 434 MHz SRD (IP65)
- b) Low cost vehicle tracking Consumer (CSR) variant with 2 G modem and 434 MHz SRD (IP 54)

Below is a summary of the main features for the two variants:

Features	Model	MiX 294E-2G-B FLEET	MiX 294D-2G-B CONSUMER
	Part Number		440FT0057
Category		Entry level Fleet	SVR
Modem		SARA-G450 (2G)	SARA-G450 (2G)
Magix (SRD)		434 MHz	434 MHz
IP Rating		IP65	IP54
GNSS		ZOE-M8Q	ZOE-M8Q
SIM card		Nano SIM (4FF)	Nano SIM (4FF)
Serial communication		RS-232	TTL
	Description	Number per variant	
Analog Inputs	Digital inputs can be configured to monitor any device that generates a change in voltage, e.g. seat belts, headlights, refrigeration units, temperature sensors, emergency lights, doors, PTO, UDS, trailer coupling etc.	2	0
Relay Output	The relay drive output can be used to drive a relay. The output impedance (driving low) is less than 1.5 Ohm.	1	0
Buzzer	A buzzer is available to warn the driver and provide feedback on the vehicle's status.	1	0
LED	LEDs provide feedback on the status of the unit.	2	2
Ignition Input	Used to monitor the ignition switch status. Maximum 33V input, impedance > 100kOhm.	1	1
Internal Backup Battery	An internal battery provides power for between 4 and 8 hours if the supply from the vehicle's battery is removed.	1	1
Frequency	Wheel speed sensor/ RPM	1	0
Code Plug	Driver Identification	1	0
Mounting Clip	Provision for convenient mount and dismounting	1	1
Supply	10.5 – 33 V DC	1	1

General Features applicable to both variants

Trip Data Recording	The following data is recorded: date and time, distance travelled, journey duration, vehicle speed, journey departure and arrival time, driver name, driver ID and vehicle ID.
Driving Violations	The following standard violations are recorded: over speeding, harsh braking, harsh acceleration, harsh cornering moderate and severe impact detected.
Driver Identification	Using the driver code-plug it is possible to know which drivers committed driving violations such as speeding, harsh braking, harsh acceleration, etc. as every trip will have a driver associated with it.
Access Control	Vehicle access can be restricted through the starter interrupt feature. Note the MiX 2000 does not support defined access control lists, any valid blue plug will enable starting of the vehicle.
Customisable Events	Rename input lines to generate customised events such as driver door opening, hazard lights activated, panic button pressed.
Servicing and Licencing	Set reminders for your vehicle's next service or vehicle/driver licence expiry.
GPS Data Recording	Essential information is recorded with every GNSS tracking point, e.g. vehicle and driver ID, date and time, latitude and longitude, altitude, heading, velocity, number of satellites, etc.
Active Tracking	Track your vehicle movements in real-time using automated vehicle location (AVL) updates from the vehicle Replay routes taken on street level or satellite maps.
Active Events	Be notified via email and/or text/SMS message, when selected standard or user-defined events occur.

Technical Specifications

General (applicable to both variants)	
Power	Automatic 12/24V operation Voltage monitoring with low power modes Backup Battery 3.2 V; 1600 mAh LiFePO4 Battery
Communication	GSM/GPRS Quad-Band Internal GSM antenna Over-the-air firmware downloads 20,000 buffered messages for data logging during coverage loss
Location	High sensitivity GNSS Internal GNSS antenna
Events	Over-speeding Harsh Acceleration Harsh Braking Harsh Cornering Moderate/ Severe Impact Low Vehicle Battery Vehicle Battery Disconnect / Vehicle Battery Reconnect Ignition On / Ignition Off
Inputs/Outputs	1 x Ignition input (on both variants) 2 X Status LEDs
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	33 x 75 x 100 mm
Weight	SVR: ~120 g FLEET: ~140 g
General (applicable to Fleet variant only)	
Location	Optional external GNSS antenna
Events	Input 1 High / Input 1 Low Input 2 High / Input 2 Low
Inputs/Outputs (Harness dependent) (only on Fleet)	Driver ID via code plug 1 x Output for starter interrupt immobiliser 2 x Digital inputs
Environment	
Temperature	DIN EN 60068-2-1 DIN EN 60068-2-2 (Recommended Storage) 0°C to +50°C (Operating) -20°C to +55°C (limited by Li-Po battery) (Charging) 0°C to +45°C GSM and GPS functionality extends to -40°C and +85°C
IP Rating	MiX 294D-2G-B Consumer: IP54 MiX 294E-2G-B Fleet: IP65
Vibration	In accordance with ISO 16750-3:2007(E) for 9h (at least 1 unit was tested in each perpendicular axis). The vibration profile is as per table 14 of ISO16750-3:2007(E)
Shock	In accordance with Mil-Std-810F method 516.5 at a level 30g and with pulse duration of 11ms.
Mechanics: Free fall	DIN EN60068-2-32: According to automotive guidelines 3 drops from 1 m height (outside packaging)
Humidity	Compliance with MIL-STD-810F figure 507.4-1 (Duration: 5 x 48 h cycles)
Power Supply	
Primary power supply	Rated voltage ($V_{nominal}$): 10.5 to 33 VDC

Current Consumption at 12V (primary side)	Out of trip: < 20 mA Sleep Mode: < 20 mA Drive / Recovery Mode: < 100mA, consumption depends on instantaneous conditions Battery charge current: < 200 mA (internally managed by firmware)					
Current Consumption at 24V (primary side)	Out of trip: < 15 mA Sleep Mode: < 15 mA Drive / Recovery Mode: < 50mA, consumption depends on instantaneous conditions Battery charge current: < 100 mA (internally managed by firmware)					
Power Consumption	< 1800 mW					
Circuit protection	ISO7637-2 Over voltage rating: 56 V DC for 60 s					
Reverse Polarity Protection	ISO7637-2					
Backup Battery	3.2 V; 1600 mAh LiFePO4 Battery (4* hours in the absence of vehicle battery power, *dependent on operational conditions)					
GNSS (with external antenna)						
Receiver Type	ZOE-M8Q 72-channel u-blox M8 engine GPS L1C/A, SBAS L1C/A, QZSS L1C/A, QZSS L1 SAIF, GLONASS L1OF, BeiDou B1I, Galileo E1B/C					
Protocols	NMEA, UBX binary and RTCM					
RTC	Share RTC oscillator with Microprocessor- used for faster warm and hot starts					
Max Navigation Update Rate	GNSS	GPS & GLONASS	GPS	GLONASS	BeiDou	Galileo
	ROM	10 Hz	18 Hz	18 Hz	18 Hz	18 Hz
	Flash	5 Hz	10 Hz	10 Hz	10 Hz	10 Hz
Horizontal Position Accuracy ¹	GPS & GLONASS	GPS	GLONASS	BeiDou		
¹ (CEP, 50%, 24 hours static, -130dBm, > 6VS)	2.5 m	2.5 m	4 m	3 m		
Start-up Time / Acquisition ²	Time-To-First-Fix ²	GPS & GLONASS	GPS	GLONASS	BeiDou	Galileo
(² All satellites at -130 dBm, except Galileo at -127 dBm)	Cold start	26 s	29 s	30 s	34 s	45 s
	Hot start	1 s	1 s	1 s	1 s	1 s
	Aided starts ³	2 s	2 s	2 s	3 s	7 s
³ (Dependent on aiding data connection speed and latency)						
Sensitivity ⁴		GPS & GLONASS	GPS	GLO NASS	BeiDou	Galileo
(⁴ Demonstrated with a good active antenna)	Tracking & Navigation	-167 dBm	-166 dBm	-166 dBm	-160 dBm	-159 dBm
	Reacquisition	-160 dBm	-160 dBm	-156 dBm	-157 dBm	-153 dBm
	Cold start	-148 dBm	-148 dBm	-145 dBm	-143 dBm	-138 dBm
	Hot start	-157 dBm	-157 dBm	-156 dBm	-155 dBm	-151 dBm
Operational Limits ⁵	Velocity: 500 m/s Altitude: 50000m (assuming airborne) Dynamics: ≤ 4 g					
(⁵ Assuming airborne < 4G platform)						
A-GPS	Supports AssistNow Online and AssistNow Offline, OMA SUPL compliant					

GNSS Antenna (optional external - only on Fleet)			
Centre Frequency	GNSS	BAND	FREQ
	GPS	L1-C/A	1563MHz-1587MHz
	Galileo	E1-B/C (E1 only, excluding E2)	1587-1591MHz
	GLONASS	L1-OF	1593MHz - 1610MHz
	BeiDou	B1i	1561.098MHz
	QZSS	L1-SAIF	1575.42MHz
Bandwidth	10 MHz		
Impedance	50 Ω		
VSWR	<1.5		
Peak gain	4 dBic		
Microprocessor			
Processor	STM32F205VE (Cortex ARM-based 32-bit MCU, 150DMIPs, up to 1 MB Flash/128+4KB RAM)		
Memory capability	512kB of Flash memory 512 bytes of OTP memory 128 + 4 Kbytes of SRAM		

Modem for MiX 294E-2G	
Processor	SARA-G450
Mobile Station Class	Class B ¹ ¹ Device can be attached to both GPRS and GSM services (i.e. Packet Switch and Circuit Switch mode) using one service at a time.
GSM/GPRS Band	GSM 850 MHz E-GSM 900 MHz DCS 1800 MHz PCS 1900 MHz
Transmit Power	Class 4 (2W) for GSM850 Class 4 (2W) for EGSM900 Class 1 (1W) for DCS1800 Class 1 (1W) for PCS1900
Packet switched data rate	GPRS multi-slot class 12 ² Coding scheme CS1-CS ⁴ Up to 85.6 kb/s DL ³ Up to 85.6 kb/s UL ³ ² GPRS multi-slot class 12 implies a maximum of 4 slots in Down-Link (reception) and 4 slots in Up-Link (transmission) with 5 slots in total. The SARA-G450 modules can be configured as GPRS multi-slot class 10 by means of AT command ³ The maximum bit rate of the module depends on the current network settings
Connectivity	Dual stack IPv4/IPv6 Embedded TCP/IP, UDP/IP HTTP/FTP/SSL (Secure Socket Layer) SSL TLS 1.2 (for embedded TCP/IP)
GSM/GPRS Protocol Stack	3 GPP Release 99
GSM Antenna	
Type	Quad band
Impedance	50 Ω
Relay Circuit (only on Fleet)	
Current Specifications	< 400mA (Max)
Maximum Continuous Voltage on Pin	33V
Protection	Transients will be clamped
RS232 Ports (only on Fleet)	
Maximum Speed	115200 Baud (higher rates 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 kbps
Maximum Supply Current (CLK)	< 4mA
Protection	ESD: ISO 10605:2001 level 2 DC +/-30V

Real Time Clock	
Time Loss	< 10 Minutes per year (typical) < 5 seconds when a GPS is used (auto synchronization)* *temperature change affects the accuracy of the RTC crystal; it's most accurate at +25°C.
Battery Backup Life	> 5 Years (typical at -30° to +70°C)
Auxiliary Inputs and Outputs	
Inputs (only on Fleet)	<ul style="list-style-type: none"> • 2 x Digital Inputs • 1 x Ignition Input (maximum 33v input, impedance > 100k Ohm)
Outputs (only on Fleet)	1 x Relay Drive output with a maximum current consumption of up to 400mA.
Ignition Input	Used to monitor the ignition switch status. Maximum 33V input, impedance > 100kOhm
LED	
LED	2 x LED (GSM, GPRS)
Buzzers (only on Fleet)	
Buzzer	1x Buzzer included in main harness
434 MHz Transceiver	
Current	During transmission: 90 mA During receiving: 21 mA
RF Transceiver	Receiver frequency: 434.3 MHz Frequency deviation: 10 kHz RF Bandwidth: 39.2 kHz RF Radiated Output Power: 10 mW max

Statutory and Regulatory Compliance

ICASA (TA-2019/007)
 E11 (10R05/01 10645) / CE
 ANATEL