FMM650 General description

Teltonika FMM650 is a direct successor to current most popular 4G PROFESSIONAL lineup device – FMM640. FMM650 has 4G (LTE Cat M1) network coverage including 2G (GSM) fallback compatibility. Device equipped with GNSS and LTE modules, external GNSS and LTE antennas. Separate GNSS module improves the accuracy of the track, making FMM650 more suitable for free flow electronic tolling system integration. Compared to FMM640 – FMM650 has a new processor that improves the devices computation power along with increased device internal memory it can be tailored to more specific use cases. Switchable CAN terminators that will allow you to use the device in CAN network with numerous nodes. Lastly, it can be powered via USB for easier configuration process. All the features that are supported by FMM640 is also supported by FMM650, therefore it will maximize your fleet efficiency with features like FMS CAN data (J1939), fuel CAN data (J1708), tachograph live data (K-Line), remote tachograph file download, various third party RS232 or RS485 devices support and Dual-SIM or eSIM compatibility. Terminal is suitable for applications like international logistics, refrigerated transport, agriculture, construction & mining, security & emergency services and even more.

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Contents

Package contents

Usually the FMM650 device sample is supplied to the customer in a cardboard box containing all the equipment that is necessary for operation. The package contains:

- FMM650 device;
- 4 screws for assembling device
- GPS/GLONASS antenna
- GSM antenna
- USB cable
- Ni-MH Rechargeable battery, 8.4V, 550 mA.
- Input and output power supply cable with 2x10 connection pins.

Basic characteristics

Cellular:

Technology	Supported bands
2G bands	FMM650-Q3X50: B2/B3/B5/B8
4G bands & NB Iot FMM650-Q3X50:	B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B27/B28/B66/B71/B85
Data transfer	LTE FDD: LTE: Max. 588Kbps (DL)/Max.1119Kbps (UL) GPRS: Max. 107Kbps (DL)/Max. 85.6Kbps (UL)
Transmit power	Class 4 for GSM850/900: 23±2dBm Class 1 for GSM1800/1900: 20±2dBm Class 3 for LTE-TDD: 23±2.7dBm Class 3 for LTE-FDD: 23±2.7dBm

GNSS features:

- module name: Airoha AG3335MB
- GPS, GLONASS, GALILEO, BEIDOU, QZSS
- L1 and L5 dual-band GNSS receiver
- -165 dBM sensitivity
- Hot start <1.5s
- Warm Start < 25s
- Cold start < 32s
- Accuracy < 2.5 CEP

Hardware features:

- NXP i.MX RT1064 processor;
- 16 MB internal Flash memory;
- External memory card slot;
- Built-in accelerometer;
- Built-in Bluetooth 5.0;
- Internal backup battery included;

Interface:

- Integrated KLINE
- Dual CAN J1939
- J1708 CAN
- RS485 and 2x RS232 support
- 4 Digital Inputs for object status monitoring
- 4 Digital Open-collector Outputs (controlling external relays, LED, buzzers, etc.)
- 4 Analog Inputs
- 1-wire interface
- Ni-Mh 550 mAh internal battery
- MicroSD card
- 2 status LED
- Dimensions: L(104,1mm)xW(76,8mm)xH(31,5mm)

- Configuration and firmware update (via FOTA and USB cable)
- External GSM antenna for higher sensitivity
- External GNSS antenna for higher sensitivity

Special features:

- Fast position fix;
- High Quality track even in high density urban canyon;
- Ultra small case;
- Ready for harsh environment;
- Easy to mount in limited access areas;
- Firmly fasten;
- 2 LED status indication;
- Real time tracking;
- Smart data acquisition based on:
    - Time;
    - Speed;
    - Angle;
    - Distance;
- Ignition or any other I/O event;
- Sending acquired data via GPRS;
- GPRS and SMS I/O events;
- Virtual odometer;
- Jamming detection;
- Configurable using Secured SMS Commands;
- 2x SIM card; 1x eSIM;
- Overvoltage protection (compatible with pulse 5a and pulse 5b);
- Reverse polarity protection;

Description	Voltage	Duration
Normal operation	+8 ... +32 V	Unlimited
Protection turns on, device turns off	34 V	Unlimited
Maximum voltage	< 70 V	Unlimited
Maximum voltage impulse	90 V	5 ms

Technical features

Part name	Physical specification
Navigation indication	LED
Modem indication	LED
Socket	Soldered inner socket

USB	Mini USB socket
GNSS	External GNSS antenna
GSM	External GSM antenna

Technical details

2 W max. Current consumption at 12 V	GPRS: average 60 mA Nominal: average 45 mA GNSS sleep: average 32 mA Deep Sleep: average 4 mA Online Deep Sleep: average 11 mA
2 W max. Current consumption at 24 V	GPRS: average 35 mA Nominal: average 24 mA GNSS sleep: average 17 mA Deep Sleep: average 2,9 mA Online Deep Sleep: average 7 mA
Battery charge current	Average 55 mA
Operating temperature (without battery)	-40..+85
Storage temperature (without battery)	-40..+85
Storage relative humidity	5..95% (no condensation)
Device + case + battery weight	201 g

Dimension drawing:

Technical information about internal battery

Internal back-up battery	Battery voltage (V)	Nominal Capacity (mAh)	Charging temperature (°C)
Ni-MH rechargeable battery	8.4⎵10.0	550	0 – 45

Batteries are covered by 6 month warranty support.

 CAUTION: RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.

Battery should not be disposed of into general household waste.
 Bring damaged or worn-out batteries to your local recycling center or dispose them into a battery recycle bin commonly found in supermarkets.

Battery tests

The amount of time the device will work from internal battery depends on the battery health, how often the device saves/sends information to the server, external peripherals connected to the device and the results may also differ depending on firmware used.

For general comparison purpose, and to see what results can be achieved, you can refer to the following internal test results in different modes and sending frequencies:

Mode:	Min Period (data saving frequency)	Send Period (data sending frequency)	Starting Voltage	Cut off Voltage	Time achieved
Operating	10 seconds	60 seconds	10,1V	7,0V	452 min (7 hours 32 minutes)
Operating	60 seconds	60 seconds	10,1V	7,0V	507 min (8 hours 27 minutes)
Deep Sleep	12 hours	12 hours	10,2V	8,2V	5040 min (84 hours 0 minutes)
Online Deep Sleep	12 hours	12 hours	10,0V	8,6V	1440 min (24 hours 0 minutes)

Electrical characteristics

Characteristic description	Value			
	Min.	Typ.	Max.	Unit
Supply Voltage:				
Supply Voltage (Recommended Operating Conditions)	+8		+32	V
Digital Output (Open Drain grade):				
Drain current (Digital Output OFF)			120	µA
Drain current (Digital Output ON, Recommended Operating Conditions)			0.5	A
Static Drain-Source resistance (Digital Output ON)		400	300	mΩ
Digital Input:				
Input resistance (DIN1)	15			kΩ
Input resistance (DIN2)	15			kΩ
Input resistance (DIN3)	15			kΩ
Input voltage (Recommended Operating Conditions)	0		Supply voltage	V
Input Voltage threshold (DIN1)		7.5		V
Input Voltage threshold (DIN2, DIN3, DIN4)		2.5		V

Characteristic description	Min.	Typ.	Max.	Unit
Analog Input:				
Input voltage (Recommended Operating Conditions), Range 1	0		+10	V
Input resistance, Range 1		120		kΩ
Input voltage (Recommended Operating Conditions), Range 2	0		+30	V
Input resistance, Range 2		147		kΩ
Output Supply Voltage 1-Wire:				
Supply voltage	+3.3		+3.9	V
Output inner resistance		7		Ω
Output current ($U_{out} > 3.0$ V)		30		mA
Short circuit current ($U_{out} = 0$)		75		mA
CAN Interface:				
Internal terminal resistors CAN bus		120/60		Ω
Differential input resistance	19	30	52	kΩ
Recessive output voltage	2	2.5	3	V
Differential input resistance	0.5	0.7	0.9	V
Common mode input voltage	-30		30	V
Power supply current (Hardware version with internal battery):				
Deep Sleep, average, Icc.ds		2.5	4	mA
Sleep, average, Icc.ds, Vcc=10V		45		mA
Sleep, average, Icc.ds, Vcc=30V		25		mA
Ucc=12.6V, all modules fully working, internal battery is charging, Icc1			350	mA
Ucc=12.6V, all modules fully working, internal battery is charging, Icc2			300	mA
Ucc=25.2V, all modules fully working, internal battery is charging, Icc3			195	mA
Ucc=25.2V, all modules fully working, internal battery is charging, Icc4			140	mA
RS232/RS485 Input Voltage:				
RS232 input voltage range (common-mode voltage)	-15		+15	V
RS485 input voltage range on A or B pin (common-mode voltage)	-7		+12	V

❌ **Analog Input error margin can increase if temperature varies.**

Absolute maximum ratings

Characteristic description	Value			
	Min.	**Typ.**	**Max.**	**Unit**

Supply Voltage (Absolute Maximum Ratings)	-32	+32	V
Drain-Source clamp threshold voltage (Absolute Maximum Ratings), ($I_{drain} = 2$ mA)		+36	V
Digital Input Voltage (Absolute Maximum Ratings)	-32	+32	V
Analog Input Voltage (Absolute Maximum Ratings)	-32	+32	V
RS232 Input Voltage (Absolute Maximum Ratings)	-25	+25	V