Document Type: User Manual

Revision: 1.0

Product: GPSCAN MK2 IMU Sensor Fusion

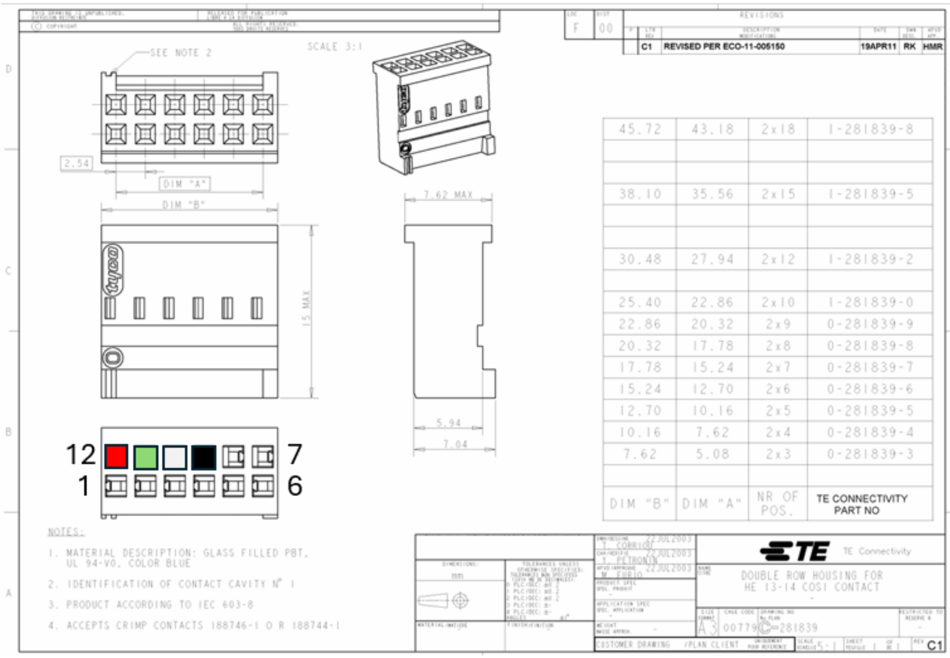
Contents

Connector Type

AMPMODU HE14 series 2x6 Header	281839-6
Socket	182734-2

Connector Pinout

1	Black GND
2	White SWCDLK
3	Green
4	-
5	Green
6	White
7	-
8	-
9	Black GND
10	White CAN Hi
11	Green CAN LO
12	Red 12V



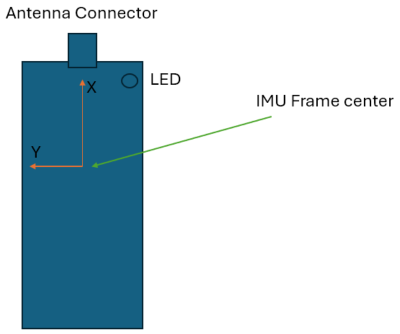
NOTE: For normal operation, only pins 9-12 are needed. Other pins are for firmware updates and other operations.

Pin		
9	Battery Negative	
10	CAN HI	CAN bus has to be terminated externally
11	CAN LO	
12	Battery Positive	+5 - 36V. No polarity protection

Device Installation

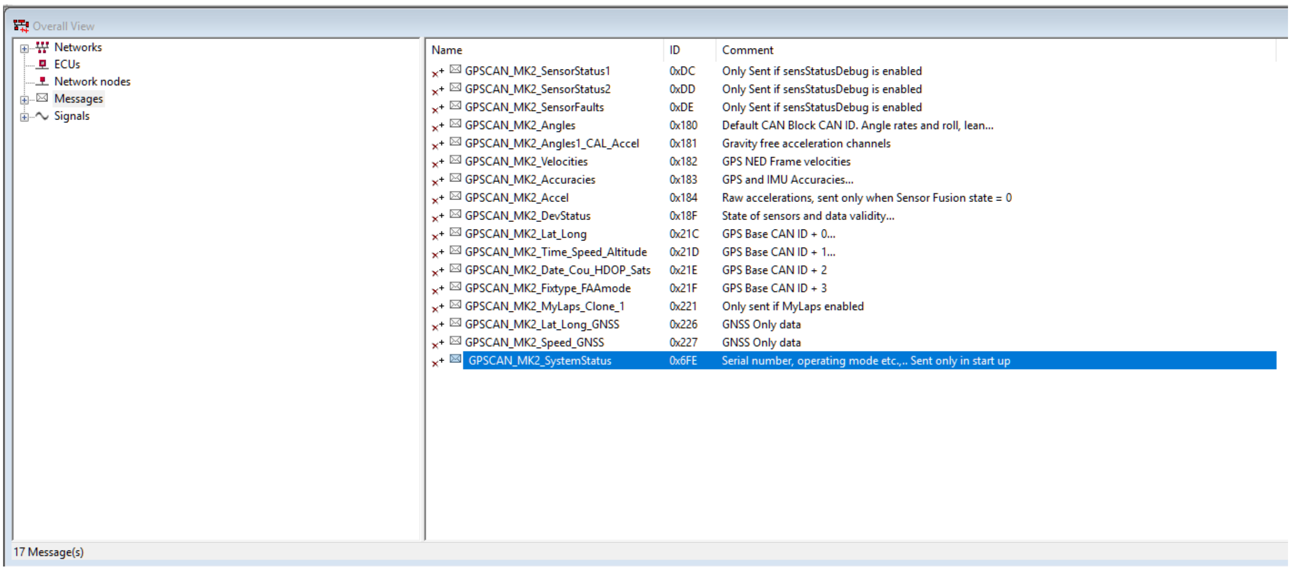
Location

Device should be installed into the Center of Gravity in the vehicle installation frame and installed securely so that it can't vibrate. Vibration can prevent the device from entering the Fusion Mode.



Install the device so that the antenna is facing front, and the LED is pointing up.

CAN ID’s



Name	ID	Comment
GPSCAN_MK2_SensorStatus1	0xDC	Only Sent if sensStatusDebug is enabled
GPSCAN_MK2_SensorStatus2	0xDD	Only Sent if sensStatusDebug is enabled
GPSCAN_MK2_SensorFaults	0xDE	Only Sent if sensStatusDebug is enabled
GPSCAN_MK2_Angles	0x180	Default CAN Block CAN ID. Angle rates and roll, lean...
GPSCAN_MK2_Angles1_CAL_Accel	0x181	Gravity free acceleration channels
GPSCAN_MK2_Velocities	0x182	GPS NED Frame velocities
GPSCAN_MK2_Accuracies	0x183	GPS and IMU Accuracies...
GPSCAN_MK2_Accel	0x184	Raw accelerations, sent only when Sensor Fusion state = 0
GPSCAN_MK2_DevStatus	0x18F	State of sensors and data validity...
GPSCAN_MK2_Lat_Long	0x21C	GPS Base CAN ID + 0...
GPSCAN_MK2_Time_Speed_Altitude	0x21D	GPS Base CAN ID + 1...
GPSCAN_MK2_Date_Cou_HDOP_Sats	0x21E	GPS Base CAN ID + 2
GPSCAN_MK2_Fixtype_FAAmode	0x21F	GPS Base CAN ID + 3
GPSCAN_MK2_MyLaps_Clone_1	0x221	Only sent if MyLaps enabled
GPSCAN_MK2_Lat_Long_GNSS	0x226	GNSS Only data
GPSCAN_MK2_Speed_GNSS	0x227	GNSS Only data
GPSCAN_MK2_SystemStatus	0x6FE	Serial number, operating mode etc.,.. Sent only in start up

GPS messages. Always active.

Base CAN ID for GPS data is 0x21C and the data is sent in MoTeC M1 System 1.4 format.
For programming and changing the address, see Changing settings.

CAN Block messages. Always active.

Default CAN ID is 0x180, same as default MoTeC M1 CAN Block 0 address and data is sent in MoTeC format.
For programming and changing the address, see Changing settings.

E Lean (Optional, If enabled)

E Lean default CAN ID’s are sent and can’t be modified. Data starts from 0x2F0.
For individual message details, see E Lean DBC file.
Plug&Play with Standard MoTeC M1 E Lean module.

Wheel Speed Input

Optional Wheel speed message can be sent to the device. If MoTeC M1 system is used, it is taken automatically from the Vehicle Speed and doesn't need to be sent, it is read internally and sent to the device.
Message is sent to 0x200 and is 2 bytes, bytes 2 and 3, in big endian format.
Note that the data needs to be sent in m/s. not in kmh. 10ms interval is recommended.

For programming, see Changing settings.

Sensor Fusion mode

After the vehicle speed is over 10kmh, the device tries to activate the Sensor Fusion mode. After that gravity free accelerations and roll, pitch is valid. Sensor Fusion initialization starts at speed over 10kmh and takes few seconds.

Acceleration sensor and angles data

Sensor Fusion state	Raw accelerations	Gravity free accelerations
0	Sent to CAN	Sent, but data is set to 0
1	Not sent	Sent to CAN

Roll and PitchValid channels

	pitchValid	rollValid
0	Data not calibrated and should not be trusted	Data not calibrated and should not be trusted
1	Pitch Data OK	Roll Data Ok

Speed and location data

GPS Speed and GPS Location data is corrected by Sensor Fusion algorithm. GNSS only speed is available if activated in the settings.

IMPORTANT: It is important that the installation angles are set correctly. If not, the device will not be able to activate the Sensor Fusion mode.

IMU and acceleration sensor filter

By default, data is not filtered.

2 filters can be enabled

40ms IMU filter	Deactivated by default. This filter is used to filter IMU data when the device has difficulties entering or staying in Sensor Fusion state due to vibration. Deactivated by default.

LP filter, Alpha 0.1	Deactivated by default.

For programming, see Changing settings.

GPS Fast Fix

Fast Fix is a mechanism to find the GPS fix faster and for faster Fusion Mode activation.

Fast Fix is saved when all this is true:

- More than 5 satellites
- Vehicle is stationary
- Device is in Fusion Mode
- 180secs have elapsed from the startup or from the previous save.

Features are active by default in all devices and can't be turned off.

Changing settings

Device settings are stored in EEPROM and can be changed through the CAN Bus. For details, see Programming document: GPSCAN MK2 Programming.xlsx.

CAN ID: 0x6FF
Message format: Big Endian
Programming Index: Byte 0
Values: B1-B6
Serial Number: B7

Notes:

- Serial number is sent at start up in message 0x6FE. Programming is not performed if the serial number doesn't match. It can be also queried with index 0xFF
- Use max 1Hz interval or manual sending in order not to damage the memory.
- Do not send messages during normal operation since it will degrade the performance.

Firmware updates

Contact eTesta for additional information how to update the firmware.