OBU Hardware

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3 months ago · Updated

Enclosure

The enclosure is described in MK5 OBU Specification Document.

Carrier Board

The MK5 OBU shares the same carrier board as the MK5 RSU.

The carrier board is also described in MK5 OBU Specification Document.

Installation Guidelines

The MK5 OBU can be connected directly to the 12V of the vehicle
The enclosure is not watertight, it must be installed within the car.

The antenna should be installed horizontal on top of the roof with no obstacles e.g. railings
It requires a conductive ground plane. If the car roof is made out of non conductive material (er.g. glas, plastic) a ground plane with at least 30 cm diameter should be provided.
Every conductive material (e.g. metal, aluminum, PCB board with copper coating) will do

Don't bent or squeeze the antenna cable. This will degrade the antenna performance

Audio

The audio is no longer available

USB

The USB connector is a standard micro-AB USB connector providing a USB 2.0 On-The-Go Interface. An OTG can work either as host or as device. When operating as host it provides 5V/500mA power to the USB device.

A 5th pin on Micro-USB connector defines whether it works as an host or device. Often you can’t tell from from looking at the cable whether it is a OTG cable or a standard USB cable.

You can check a cable whether it is OTG capable or not by

1. Measuring the resistance between pin 4 and 5.
   If the resistance is 0 Ohm it is an OTG cable
   Due to the size of the MicroUSB it is difficult to do
2. Testing the cable with an USB-stick.
   If the USB stick is recognized or a LED on the USB-Stick turns on, it is an OTG cable

Ethernet

The Ethernet Connector is a standard RJ-45 connector. This is an 10/100Mb Ethernet with an Auto-MDIX port. It can be connected directly to a PC.

Vehicle Interface Connector (VIC)

The Vehicle Interface Connector is a DB-9 (male) connector which contains signals for a high speed CAN interface and three 12V-tolerant general purpose digital inputs.

The CAN bus needs an 120 Ohm terminating resistors in addition

The general purpose inputs can be used for vehicle sensors such as odometer pulses and/or reverse direction indicators.

Pin	Use
Shell	GND
1	GPIN0
2	CAN-L
3	GND
4	--
5	GPIN1
6	GPIN2
7	CAN-H
8	--
9	+12V out, 100mA

Power

The MK5 OBU comes with a 30cm long power cable. For Europe only the cable has a filter build in

The two red wires should be connected to +7-36V and the two black wires should be connected to GND. The power input is protected against transients and polarity reversal and can be connected directly to a vehicle power supply

The MK5 needs maximum 10W power. A 12V power supply should have a minimum current rating of 1A.

Any laboratory or desktop power supply will do it. e.g. CUI Inc. SDI65-12-U-P5 from DigiKey

If required an additional power cable can be constructed using a connector Molex Micro-fit 3.0.
It consists of the housing 0430250400 and the female crimp terminals 0430300001

Pin layout looking at the back of the connector

+12V	GND
+12V	GND

MicroSD

The micro SD slot accepts a standard microSD card. Main usage is providing additional storage for logging. It can also used for an easy firmware upgrade. Both 1-bit and 4-bit transfers are supported. Up to 64GB cards can be used. The microSD is automatically mounted to /mnt/src after power-up or reboot.

GNSS

The GNSS antenna connector is a male FAKRA Type C connector. It provides 5V/50mA for an

active GNSS antenna. No damage is done if the GNSS antenna is not connected.

1PPS LED

Power applied	Green
3D Fix	Flashing Green-Red

Ant 1 & Ant 2

The 5.9GHz antenna connector is a male FAKRA Type Z connector. The antenna impedance is 50 Ohm.

The maximum input signal level is at the antenna connector -20dBm. For connecting two MK5 through cables you need to insert a 20dBm attenuator on each side for avoiding too strong input signals.

Please make sure that you have either antennas or terminating resistors (50 Ohms load) connected to the antennas before you power on the units

Warning: Operating the MK5 with open antenna connectors can damage the power amplifiers of the MK5

FLT & PWR LEDs

Power applied	PWR Green, FLT Red
Linux startup	PWR Green, FLT Green
Radio initialized	PWR Flashing Green-Green, FLT Green
MK5 initialized	PWR Flashing Green-Green, FLT Red
Radio transmitting	PWR Flashing Green-Green, FLT Flashing Green-Red

Antennas and Adapter

The MK5 comes with a Mobilemark MGW-303 antenna. It combines two 5.9GHz antennas for DSCR with a active GNSS antenna. It has a magnetic mount for easy mounting on metallic car roofs.
You can find its specification and radiation pattern in https://www.mobilemark.com/product/smw-303-2xwifi-gps/

Fakra to SMA - Amphenol APH-FKJ-SMAJ
Available through DigiKey

50 Ohm SMA Terminator
Available through Mini-Circuits ANNE-50+

Attenuator with SMA connectors from -1dB to -30dB
Available through Mini-Circuits VAT

CWD-P0052-OBU-SPEC-WW01-186-MK5_OBU_Specification.pdf

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