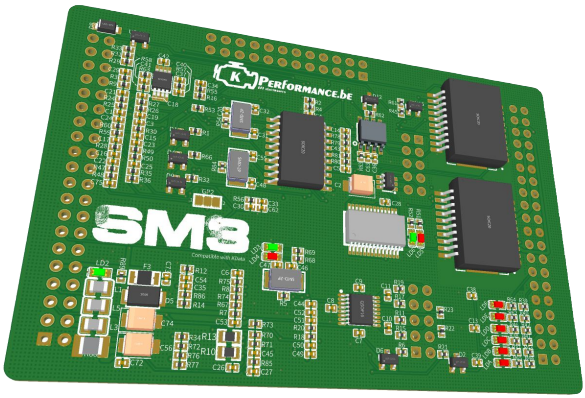
SM3a User manual

Software,drivers and latest info can be downloaded at www.Kperformance.be



Introduction

Congratulation for buying the SM3a. The circuit is based on Megasquirt 3 and pinout of the KdFi1.4 modules. Making the SM3a backwards compatible with the MS2 KdFi1.4 users and boards. It was refined and build 100% AEC-Q100 compliant. A KPerformance Wideband Lambda Controller is also part of the SM3a board. A Bosch LSU 4.9 sensor can be connected directly without a extra controller. Even a optional Oled-display can be connected to visualy see Lambda and temp values of the sensor. (4.2 can also be connected with small resistor changes)

Included in Delivery

- SM3a Module and/or additional PCB
- USB plug
- User manual

Software

Recommended tuning software TUNERSTUDIO and/or Megalog viewer

USB Driver

The onboard FTDI chip simulates a serial RS232 connection:

Tunerstudio – Communications – Settings: USB and Wireless (only in registered Version), Auto , 115200 Baud

USB Port

The USB port of the SM3a is equipped with 8kV ESD protection of VBUS and Data lines. The data chip and ESD protection is "USB powered". This simplifies the start-up behaviour significantly when you restart the ignition, the PC wont download the USB driver each time. The USB chip is downwards compatible, it can be used both with USB 3.0, 2.0 and 1. Each standard USB cable can be used as connection cable, but preferable with FERRIT core further avoiding ESD spikes.

Electrical connections

Like all other voltage supplied parts - must be preceded by a fuse in function of cable section.

Recommended cable types:

- Ignition: min 1.5 mm²
- Injection: min 1.5 mm²
- VR sensor: min 0.5 mm²
- shielded Sensors: min 0.5 mm²
- Others: min 0.75 mm²

Fuses

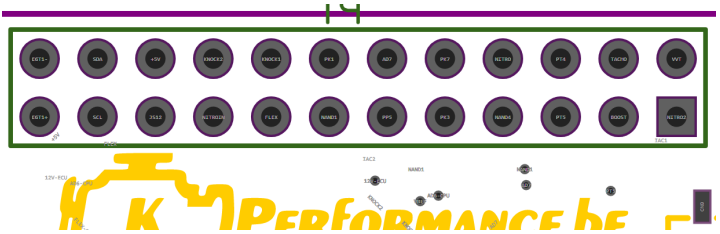
Recommend using a 2A fuse for protecting the SM3a. A automated 5A PTCC fuse is integrated on the board. It will reset itself after cooling down/solving issue or short circuit.

Pinouts

Pin Label	In-/Output	Function
A1	IGN output	Ignition output cylinder 1
B1	IGN output	Ignition output cylinder 2
C1	IGN output	Ignition output cylinder 3
D1	IGN output	Ignition output cylinder 4
E1	IGN output	Ignition output cylinder 5
F1	IGN output	Ignition output cylinder 6
INJ1	INJ output	Injection valve 1
INJ2	INJ output	Injection valve 2
INJ3	INJ output	Injection valve 3
INJ4	INJ output	Injection valve 4
INJ5	INJ output	Injection valve 5
INJ6	INJ output	Injection valve 6
12v	Power input	Input Voltage 8-16V
GND	Power Input	Input Voltage GND
FP	Fuel Pump Output	Fuel Pump Relay
FDLC	Idle Valve Output	Idle controller 3-pin -CLOSED
FDLO	Idle Valve Output	Idle controller 3-pin -OPEN
RPM	VR sensor input	Input speed Crankshaft
GND_RPM	GND VR input sensor	Ground speed sensor
CAM	CAM sensor input	Input speed camshaft
IAC1	General Output	General Output 1 max2A
IAC2	General Output	General Output 2 max2A
AIR	Sensor input	Air temperature sensor
CLT	Sensor input	Coolant Temp sensor input
TPS	Sensor input	Throttle Position Signal
OXY	Input	Lambda sensor signal bank 1
OXY_2	Input	Lambda sensor signal bank 2
LSU BLACK	O2 Sensor input	Bosch LSU BLACK
LSU YELLOW	O2 Sensor input	Bosch LSU YELLOW

Bosch LSU RED	O2 Sensor input	Bosch LSU RED
LSU GREY	O2 Sensor Heating	Bosch LSU GREY
LSU WHITE	O2 Sensor Heating	Bosch LSU WHITE
LSU GREEN	O2 Sensor input	Bosch LSU GREEN
5V	Sensor Power Supply	5V Power Supply
TBL	Input	Table Switch
Additional connector pinout SM3		
SDA	Output Oled	O2 Oled screen data
SCL	Output Oled	O2 Oled screen clock
EGT-	K-Type Input	EGT sensor input-
EGT+	K-Type Input	EGT sensor input+
JS12	Analog Input	General analog input
NitroIn	Digital Input	Nitro Input
Knock1	Input knock1	Knock sensor 1 input
Knock2	Input knock2	Knock sensor 2 input
Flex	Analog Input	Flex Sensor Input
NAND1	General In/Output	Direct CPU pin connection
NAND4	General In/Output	Direct CPU pin connection
AD7	Analog input	Analog input
Launch	Digital input	Digital launch input
PK1	Spare CPU pin	Direct CPU pin connection
PK3	Spare CPU pin	Direct CPU pin connection
PK7	Spare CPU pin	Direct CPU pin connection
PT4	Digital input	Direct CPU pin connection
PT5	Digital input	General Digital Input
Nitro	General Output	Output Nitro max2A
Nitro2	General Output	Output Nitro2 max2A
Tacho	General Output	Output Tacho max2A
Boost	General Output	Output solenoid max2A
VVT	General Output	Output solenoid max2A

Additional connector pinout custom SM3



Onboard LED's functions

LED Label	Color	Function
LD2	GREEN	5V power supply
LD3	GREEN	O2 controller standby blinking/power solid
LD4	ORANGE	O2 controller heating 2Hz/measering blinking 1hz
LD5	GREEN	USB Data packets
LD6	ORANGE	USB Data packets
LDA	ORANGE	Ignition pulse A
LDB	ORANGE	Ignition pulse B
LDC	ORANGE	Ignition pulse C
LDD	ORANGE	Ignition pulse D
LDE	ORANGE	Ignition pulse E
LDF	ORANGE	Ignition pulse F

Engine Speed Measurement

Please use the DIP switches to select the type of input you need.

Switches 1 and 2 are for the primary input which can also be the CAM signal e.g. in the distributor if you don´t have a Cranksignal.

Switches 3 and 4 are for the second input if you use crank (1) and cam (2) input. Please do not activate VR and HALL for one sensor at the same time. This will not work properly.

1. VR Sensor The measurement via VR sensor is the most widespread way in Europe for car engines. An AC voltage is induced in the coil of the VR sensor by a trigger wheel with 60-2 or 36-1 tooth.

2. HALL sensor With different Hall sensors you possibly need a resistor of 1 to 10 ohm between signal and +5.

Throttle Potentiometer

The throttle potentiometer is connected up by a 3-wire cable. +5V and GND are connected to the outer static pins of the potentiometer. The voltage relating to the throttle position is tapped via the sliding contact and connected to the input TPS (Throttle Position Sensor). The covered distance of the potentiometer may be longer than the rotation of the throttle axle. The corresponding calibration is done via “Tools” – “Calibrate TPS”

Digital Inputs

There are digital inputs that can be used for example as “Launch Control”. The corresponding function has to be defined in Tunerstudio.

Idle Speed Controller

The SM3a supports both the 2-pin and the 3-pin idle speed controller. Pin connections of the idle speed control:

2-pin: +12V and FDLO

3-pin: +12V and FDLO (open) and FDLC (closed)

Ignition

The ignition coils can be activated directly by the integrated power drivers. We recommend using a shielded multi-conductor cable for connection. The SM3a in combination with bottom PCB equipped with 6 power drivers enabling sequential activation of 6 passive ignition coils or 12 in wasted spark.

Injection

There are 6 injector outputs (INJ1-6) ; The injection valves are supplied with +12 V via the ignition switch and the ground wires of the injectors are activated via the SM3a

Attention:

The setting whether the injection valves are of high or of low resistance has to be entered in Basic Settings" – "Injector Characteristics" strictly before the first test run because wrong settings can cause destruction of the injection valves or of the SM3a.

Starting values (no guarantee):

High impedance: PWM Current Limit (%): 100 PWM Time Threshold (ms): 25.5

Low impedance: PWM Current Limit (%): 30 PWM Time Threshold (ms): 1.5

Bluetooth or Wifi Connection

Near futur an optional bleutooth or wifi connection will be available.

Onboard Wideband Lambda Controller

A Bosch LSU 4.9 sensor can be connected directly without the need to buy a further controller. (4.2 can also be connected with 2 small resistor changes) Even an optional I2C Oled-display can be connected to visual see Lambda and temp values of the sensor. (SDA CLK 5V GND)

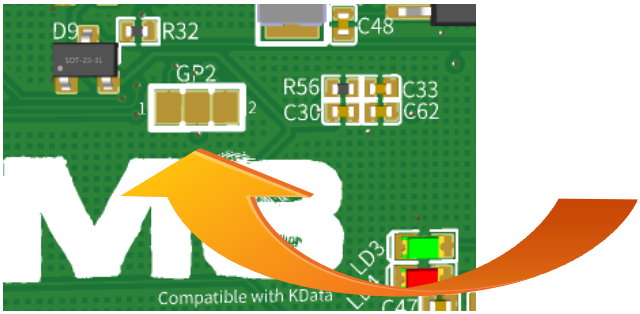
Calibration data TUNERSTUDIO custom linear wideband:

0V= AFR 20

4V= AFR 10

Starting of the controller can be done by grounding GP2(left solder bridge) via dipswitch or software wise by selecting Output “Ignition G”(right solder bridge) with customer requirements setting. Ie start lambda controller after 30sec of engine start under tunerstudio

No grounding will result in a standby lambda controller. Blinking green LED



Onboard Knock

The knock IC uses a purpose designed knocksensing amplifier chip to filter knock signals.

The internal module uses signals:

PM2,PM3,PM4,PM5,JS11

Highly experimental implemented

CAN Bus

Like for Megasquirt the CAN Bus hardware is populated on the board, but has to be programmed accordingly by the user if desired. For further information on this item please read the respective Megasquirt /MSextra websites.

User Remarques and info