Manuals+ — User Manuals Simplified.

K PERFORMANCE SM3 plus Module User Manual

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K PERFORMANCE SM3 plus Module

Product Information

The SM3+ Module R1.5 is a circuit based on MegaSquirt 3 and pinout of the KdFi1.4 modules. It is designed to be backward compatible with MS2 KdFi1.4 users and boards. The module is 100% AEC-Q100 compliant and includes a performance Wideband Lambda Controller with a Bosch LSU 4.9 sensor.

The package includes the following items:

- SM3+ Module and/or additional PCB
- USB plug
- User manual
- Molex connector, inserts & solder header

Product Usage Instructions

USB Port
The USB port of the SM3+ Module is equipped with 8kV ESD protection for VBUS and Data lines. The USB chip is USB powered, which simplifies the start-up behavior. Any standard USB cable can be used as a connection cable, preferably with a FERRIT core to avoid ESD spikes.

Electrical Connections
All electrical connections must be preceded by a fuse based on the cable section. Recommended cable types should be used.

Fuses
A 3A fuse is recommended for protecting the SM3+ Module. The board also has an integrated automated 5A PTCC fuse that will reset itself after cooling down or resolving an issue or short circuit.

Onboard LED Functions
The SM3+ Module has multiple onboard LEDs with different functions. Here are the details:

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

Onboard O2 Controller LED Functions
The onboard O2 controller also has LED functions. Here are the details:

LED Status	Function
Blinking Fast	Heating sensor status
Solid Blinking	Operational measuring status
Blinking Slow	Standby and/or error status

Pinouts KdFi

The SM3+ Module has various pinouts for KdFi. Here are the details:

KdFi Pin Label	In-/Output	Function
A1	Input	Ignition output cylinder 1
B1	Input	Ignition output cylinder 2
C1	Input	Ignition output cylinder 3
D1	Input	Ignition output cylinder 4
E1	Input	Ignition output cylinder 5
F1	Input	Ignition output cylinder 6
INJ1 – INJ6	Output	Injection valve 1-6
12v	Input	Input Voltage 8-16V
GND	Input	Input Voltage GND
FP	Output	Fuel Pump Relay
FDLC	Output	Idle controller 3-pin – CLOSED
FDLO	Output	Idle controller 3-pin – OPEN
RPM1	Input	Trigger input GND
RPM2	Input	VR input Trigger input
IAC1 – IAC2	Output	General Output 1 and 2 (max 2A)
AIR	Input	Air temperature sensor
CLT	Input	Coolant Temp sensor input
TPS	Input	Throttle Position Signal
OXY – OXY_2	Input	Lambda sensor signal bank 1 and bank 2

SM3+ Module R1.5 User Manual Kperformance

SM3+ User manual
Software,drivers and latest info can be downloaded at **www.Kperformance.be**

Introduction

Congratulation for buying the SM3+. The circuit is based on MegaSquirt 3 and pinout of the KdFi1.4 modules.

Making the SM3 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 SM3 board. A Bosch LSU 4.9 sensor can be connected directly without a extra controller.

Included in Delivery

- SM3+ Module and/or additional PCB
- USB plug*
- User manual
- Molex connector,inserts & solder header

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 SM3 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 0.35 mm²
- Others: min 0.35 mm²

Fuses
Recommend using a 3A fuse for protecting the SM3. A automated 5A PTCC fuse is integrated on the board. It will reset itself after cooling down/solving issue or short circuit.

Onboard LED functions

LED Label	Color	Function
LD2	ORANGE	5V power supply
LD3	ORANGE	O2 controller standby blinking/power solid
LD4	ORANGE	O2 controller heating 2Hz/measering blinking 1hz
LD5	ORANGE	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

Onboard O2 controller LED functions

LED	Status	Function
STS	Blinking Fast	Heating sensor status
PWR	Solid	
STS	Blinking Slow	Operational measuring status
PWR	Solid	
STS	Blinking	Standby and/or error status
PWR	Blinking	

Pinouts

KdFi 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	Fuel Pump Relay
FDLC	FIdle Valve Output	Idle controller 3-pin -CLOSED
FDLO	FIdle Valve Output	Idle controller 3-pin -OPEN
RPM1	Trigger input	Input speed Crankshaft
GND_RPM	GND VR input	Ground speed sensor
RPM2	Trigger 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
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 Supply	5V Power Supply
TBL	Input	Table Switch
Additional P1 connector pinout SM3 (see image pg7)		
EGT+	K-Type Input	EGT sensor input+
AIN1/Flex	Analog Input	General analog input
AIN2/JS12	Analog Input	General analog input
PP1	Analog Input	General analog input
PT4	Spare CPU pin	!!!Direct CPU pin!!!
DIN1/NitroIN	DigitalInput	NitroIn input
AIN0/ExtMap	Analog Input	General analog input
DIN6/PT6/Datalo g in	Digital Input	Digital logging start input
PT1	Spare CPU pin	!!!Direct CPU pin!!!
DIN4/Launch	Digital input	Digital launch input
GPO4/Boost	General Output	Programmable Output 1A
GPO2/Nitro2	General Output	Programmable Output 2A
GPO7/VVT	General Output	Programmable Output 2A
GPO5/Tacho	General Output	Programmable Output 2A
GPO8/Idle	General Output	Programmable Output 2A
GPO3/Nitro	General Output	Programmable Output 2A
PK7	Spare CPU pin	!!!Direct CPU pin!!!
AIN3/AD7	Analog Input	General analog input
PT3	Spare CPU pin	!!!Direct CPU pin!!!
Knock1	Knock Input	Knock Sensor Input1
Knock2	Knock Input	Knock Sensor Input2
PP0	Spare CPU pin	!!!Direct CPU pin!!!
PT5	Spare CPU pin	!!!Direct CPU pin!!!
EGT-	K-Type Input	EGT sensor input-
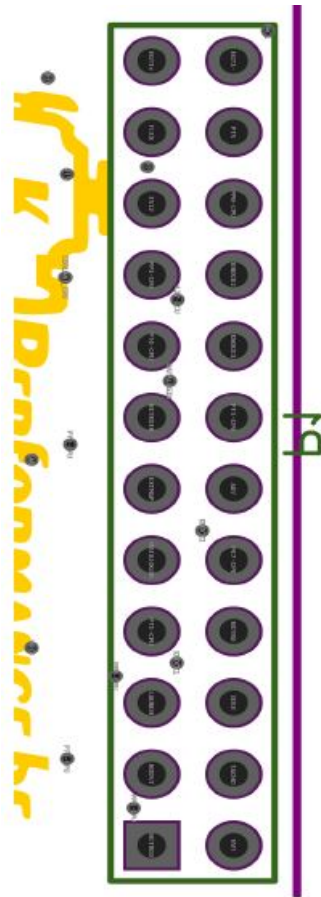
Engine Speed Measurement

Please use the DIP switches(Retro-Fit KdFi v1.4 boards) to select the type of inputs 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 may require a pull-up resistor of 1k to 10k ohm between signal-out and +5V.

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.

Spare CPU pins

BE very careful when using these !!Direct CPU Pins!! they have no RC-filtering nor safety components. Incorrect usage can destroy CPU inputs,
Preferable use GND activated inputs

Analog Inputs
There are analog inputs that can be used for example as"Additional temp". The corresponding function has to be defined in TunerStudio.

Idle Speed Controller (Fidle)
The SM3 supports both the 2-pin and the 3-pin idle speed valves.

Pin connections of the idle speed control:

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

The FDLO & FDLC are automatic inverted on the PCB, use Fidle control under TunerStudio,

Ignition
The ignition coils can be activated by the integrated power drivers in combination with bottom PCB equipped with 4-5or6 power drivers enabling sequential activation of passive ignition coils.

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 SM3

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
Optional bleutooth or wifi connection only in combination with Full SM3+ ECU

**Onboard Wideband Lambda Controller**
A Bosch LSU 4.9 sensor can be connected directly without the need to buy a further controller.

Calibration data TUNERSTUDIO custom linear wideband:

0V = Lambda 10.20 = AFR 22.35
4V = Lambda 0.650 = AFR 9.50

Starting of the controller can be done by grounding GP2(left solder bridge) via dipswitch (Retro-Fit KdFi v1.4 boards) 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 tuner studio
Not grounding GP2 will result in a standby lambda controller.
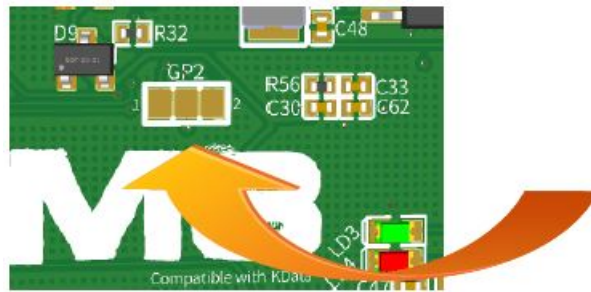
Onboard Knock

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

Knock Wiring

Knock Sensor1-> Knock1 ECU input and ECU ground Knock Sensor2-> Knock2 ECU input and ECU ground

Onboard datalogging

The board is equipped with 1Gb of onboard SMD-sized memory.
Ready to be used under SD datalogging menu

Onboard RTC (real time clock)

The board is equipped with a very accurate RTC, giving the possibility to add 'time stamps' to the onboard data logging feature!
Making data logs easier to read, easier fault and/or tuning improvements.

CAN Bus

Like 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

Documents / Resources

K PERFORMANCE SM3 plus Module [pdf] User Manual
1.5b, R1.5, SM3 plus Module, SM3 plus, Module

References

- **KPerformance**
- **KPerformance**