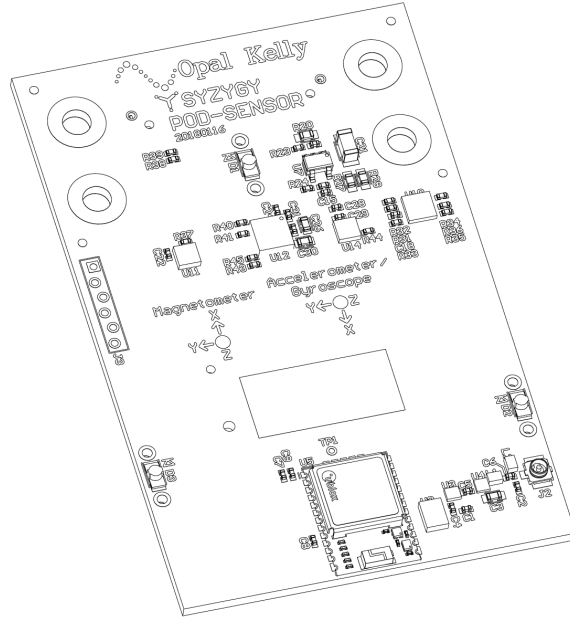


SZG-SENSOR

A SYZYGY standard all-in-one multi-sensor module with the following capabilities:

- Ambient Light & Proximity Sensor (Silicon Labs Si1153-AA00-GMR)
- Three IR illuminator LEDs
- GNSS Module, GPS / Galileo / GLONASS / BeiDou (u-blox CAM-M8Q)
- Internal or external GPS antenna
- Accelerometer, gyroscope, magnetometer (ST Microelectronics LSM9DS1)
- Pressure sensor (ST Microelectronics LPS22HB)
- Temperature and humidity sensor (ST Microelectronics HTS221)



Resources

- [Aligni PLM](#) - See the **Attachments** tab for schematics and Altium Designer project files.
- [SYZYGY Specification](#)
- [SYZYGY GitHub Site](#) - Several projects that could be helpful.

SYZYGY Information

Compatibility Table

Compatibility Parameter	Specification
Port type	SYZYGY Standard
Width	Single
5V supply required	Yes
Nominal 5V supply current	150mA
Nominal 3.3V supply current	< 10mA
VIO supply voltage	1.8V to 3.3V
Nominal VIO supply current	< 10mA
Total number of I/O	28
Number of differential I/O pairs	0

DNA Data

This data is stored in the SYZYGY DNA microcontroller on the SZG-SENSOR peripheral.

DNA Parameter	Data
Max 5V Load	150 mA
Max 3.3V Load	0 mA
Max VIO Load	10 mA

IS_LVDS	False
IS_DOUBLEWIDE	False
VIO Min	1.8V
VIO Max	3.3V

Pinout

SYZYG (J1)	Connection
5 (S0)	CAM_M8Q_SPI_CS_N
6 (S1)	HTS221_CS
7 (S2)	CAM_M8Q_EXTINT
8 (S3)	HTS221_DRDY
9 (S4)	CAM_M8Q_TIMEPULSE
10 (S5)	HTS221_SPI_SDI_SDO
11 (S6)	CAM_M8Q_D_SEL
12 (S7)	LSM9DS1_DEN_AG
13 (S8)	CAM_M8Q_SAFEBOOT_N
14 (S9)	LSM9DS1_INT2_AG
15 (S10)	CAM_M8Q_UART_TXD_SPI_MISO
16 (S11)	LSM9DS1_INT1_AG
17 (S12)	CAM_M8Q_UART_RXD_SPI_MOSI
18 (S13)	LSM9DS1_INT_M
19 (S14)	GNSS_EXT_ANT_EN
20 (S15)	LSM9DS1_CS_M
21 (S16)	LPS22HB_SPI_SDI_SDO
22 (S17)	LSM9DS1_DRDY_M
23 (S18)	LPS22HB_SPI_SDO
24 (S19)	LSM9DS1_CS_AG
25 (S20)	LPS22HB_INT_DRDY
26 (S21)	LSM9DS1_SPI_SDO_M
27 (S22)	LPS22HB_CS
28 (S23)	LSM9DS1_SPI_SDO_AG
29 (S24)	SI1153_SCL
30 (S25)	LSM9DS1_SPI_SDI_SDO
31 (S26)	SI1153_SDA
32 (S27)	SI1153_INT
34 (C2P_CLKp)	SPI_CLK

Design

The circuits used in this design are heavily influenced by the respective manufacturer datasheets and evaluation board application circuits. Please refer to the references below for more information

Additional Documentation & References

Sensor Interfaces

Sensor	Interface to FPGA	Type
SI1153	I2C	Ambient Light + Proximity
CAM-M8Q	UART	GNSS (GPS, Galileo, GLONASS, BeiDou)
HTS221	SPI*	Humidity + Temperature
LPS22HB	SPI*	Pressure
LSM9DS1	SPI*	Accelerometer + Gyro + Magnetometer

*All sensors connected over the SPI interface share the same SPI clock signal connected to pin 34 (C2P_CLKp) of the SYZYG connector.

CAM-M8x data sheet

<https://www.u-blox.com/en/product/cam-m8-series>

CAM-M8x evaluation kit

<https://www.u-blox.com/en/product/evk-m8xcam>

Si1153 data sheet

<https://www.silabs.com/products/sensors/optical/si1153>

LSM9DS1 data sheet

<https://www.st.com/en/mems-and-sensors/lsm9ds1.html>

HTS221 data sheet

<https://www.st.com/en/mems-and-sensors/hts221.html>

LPS22HB data sheet

<https://www.st.com/en/mems-and-sensors/lps22hb.html>