pytheas
flight computer / nathan myers

IMU
Address: 0x6A

AC2
LSM6DSOXTR

+3V3
12 CS
13 SCL — I2C_SCL
14 SDA — I2C_SDA
5 VDDIO — +3V3
C77 100nF
4 INT1
9 INT2
10 OCS_AUX
11 SDO_AUX
8 VDD — +3V3
C78 100nF
GND_1 GND_2 SDO/SA0 SDX SCX
6 7 1 2 3

5V Power Supply Connectors
+5V
J14 Conn_01x02
1 2
C24 470uF EDH477M016A9MAA
C23 100uF
+5V
J13 Conn_01x02
1 2

5V Buck Regulator
IC3
MIC24054YJL-TR

1 PVDD — PVDD
28 VDD — VDD
C14 2.2uF
C15 1uF
25 PG — PG_5V
R13 1k
+3V3
R11 10k
26 EN — EN
PVIN
3 NC
31 EP_PGND
23 SGND
2 PGND_1
5 PGND_2
6 PGND_3
7 PGND_4
8 PGND_5
21 PGND_6

20 BST — BST
D1 SD103AWS-E3-08
PVDD
C16 100nF
29 EP_SW
4 SW_1
10 SW_2
11 SW_3
5 SW_4
12 SW_5 — SW
L1 2.7uH PAA3d3.272NLT
22 CS — VOUT
Direct trace from SW to CS
R10 8k_1% Rf1
C18 4.7nF Cff
C13 100uF
C17 100uF
+5V
24 FB — FB
R12 1k5_1% Rf2
30 EP_PVIN
13 PVIN_1
14 PVIN_2
15 PVIN_3
16 PVIN_4
17 PVIN_5
18 PVIN_6
19 PVIN_7
27 VIN
PVIN
+BATT
C19 47uF
C20 47uF

Vout = 5.0V
Vfb = 0.8V
R2 = (Vfb*R1)/(Vout−Vfb)
For R2 = 1k5, Vout = −5.07V

MCU
IC2
ATSAMD21G18A-MFT

+3V3
17 VDDIO_1
36 VDDIO_2
44 VDDIN
43 VDDCORE — VDDCORE
C6 10uF
C5 100nF
C3 100nF
C4 1uF
VDD_CORE TP2

XIN32
XOUT32
40 RESET — RESET
48 PB03
47 PB02
46 PA31 — SWDIO
45 PA30 — SWCLK
41 PA28
39 PA27
38 PB23
37 PB22
34 USB_DP/PA25 — USB_D+
33 USB_DM/PA24 — USB_D−
32 PA23 — I2C_SCL
31 PA22 — I2C_SDA
30 PA21
29 PA20
28 PA19
27 PA18 — MCU_LED_STAT
26 PA17 — PG_5V
25 PA16 — BMP_INT

PA00
PA01
3 PA02
4 PA03 — GPIO0
7 PB08 — GPIO1
8 PB09 — GPIO2
9 PA04 — GPIO3
10 PA05 — GPIO4
11 PA06 — GPIO5
12 PA07 — GPIO6
13 PA08 — GPIO7
14 PA09 — GPIO8
15 PA10 — GPIO9
16 PA11

6 VDDANA — VDDANA
C1 100nF
C2 10uF
5 GNDANA
GND_1 GND_2 GND_3 GND_4
18 35 42 49

Supplemental GPIO (1.27mm)
J7 Conn_01x05
19 PB10
20 PB11
21 PA12
22 PA13
23 PA14
24 PA15
1 xGPIO10
2 xGPIO11
3 xGPIO12
4 xGPIO13
5 xGPIO14

Serial Out — TagConnect
+3V3   +3V3
J3 TagConnect_NL
1 VCC
3 RESET — RESET
R3 1k
2 SWCLK — SWCLK
4 SWDIO — SWDIO
6 SWO
5 GND

Serial Out — DuPont
+3V3
J4 Conn_02x03
SWCLK 1 2 SWDIO
3 4
RESET 5 6

Battery Connector
+BATT
J15 Conn_01x02
1 2

Status LEDs
+3V3
LED4 LO_R976-PS-1
R36 1k
MCU_LED_STAT
Orange
+3V3
LED3 LS_R976-NR-1
R37 1k
Red

Mounts
H1 MH_P
H2 MH_P
H3 MH_P

Logic Pinouts
+3V3
J8 Conn_01x02
1 2
J9 Conn_01x02
1 2
I2C_SCL
I2C_SDA
J10 Conn_01x02
1 2

Fiducials
FID1 Fiducial
FID2 Fiducial
FID3 Fiducial

3.3V Logic LDO
IC4
TLV1117LV33DCYR
+5V
C22 1uF
3 INPUT
1 GND
2 OUTPUT_1 — +3V3
4 OUTPUT_2
C21 1uF

SW2 SW_Push_Dual
R1 10k
+3V3
1 2
3 4
RESET
C7 100nF
R2 330R

Low-Frequency Crystal Oscillator
C8 18pF
XIN32
Y1 32.768kHz
XOUT32
C9 18pF

For capacitor details see ATSAMD21G18A-MFT datasheet.
Exact CLOAD = 18.52097pF
CLOAD = ((CX1N+CLOAD1)(CXOUT+CLOAD2))/((CX1N+CLOAD1)+(CXOUT+CLOAD2))+CSTRAY

GPIO Banks (2.54mm)
GPIO0 1
GPIO1 2
GPIO2 3
GPIO3 4
GPIO4 5
J5 Conn_01x05
GPIO5 1
GPIO6 2
GPIO7 3
GPIO8 4
GPIO9 5
J6 Conn_01x05

R6 2k2
R7 2k2
+3V3

MCU Programming USB
VUSB
U2 USBLC6-2SC6
USB_D−6
USB_D+4
USB_SHIELD
R8 1M
C10 4.7nF
R5 5k1
R4 5k1

J2 USB_C_Receptacle_USB2.0_14P
A4 VBUS
A5 CC1 — USB_CC1
B5 CC2 — USB_CC2
A7 D− — USB_D−
B7 D−
A6 D+ — USB_D+
B6 D+
A1 GND
S1 SHIELD — USB_SHIELD

Route as 90Ω differential pair

Pressure Sensor
Address: 0x77
IC1 BMP390
+3V3
C12 100nF
C11 100nF
10 VDD
1 VDDIO
2 SCK/SCL — I2C_SCL
4 SDI/SDA — I2C_SDA
7 INT — BMP_INT
9 VSS_3
8 VSS_2
3 VSS_1
5 SDO — TP5 SDO
6 CSB
+3V3
R9 10k

Designed by Nathan Myers on 11/18/2025
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Princeton University
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