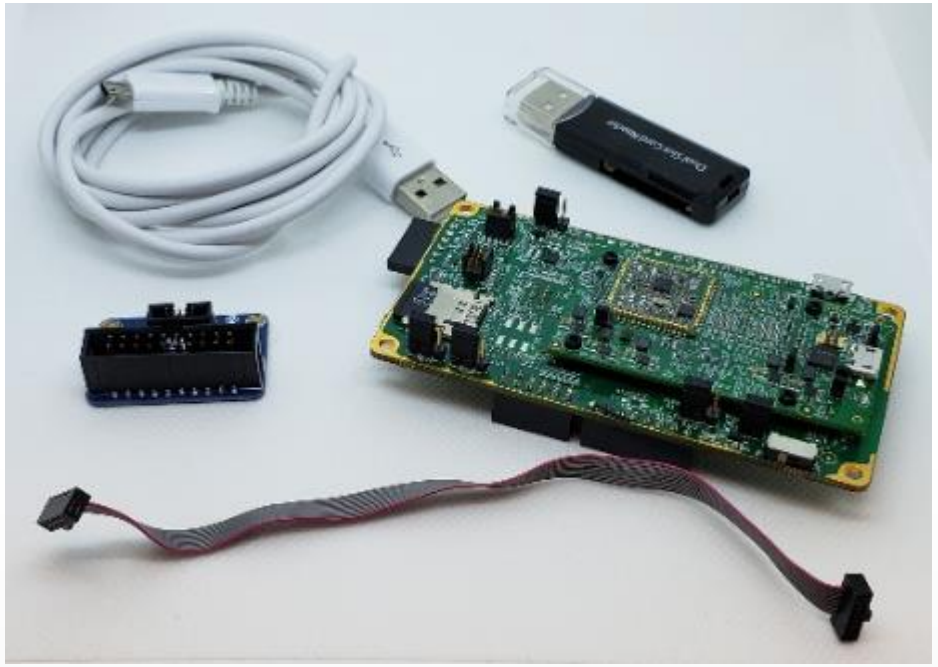
Introduction to QuickAI™ EOS-S3-AI Hardware Development Platforms (HDKs)

Board: Merced Rev 1.1
Document Rev 1.2 (January 22, 2019)

HDK PLATFORMS



MERCED 1.1 HDK

- Merced 1.1 HDK: Industrial Applications
  - Time series data collection & model generation
  - Time series Application development
  - Support Arduino form-factor to take advantage of available modules
  - All S3AI pins are available for expansion

HDK PLATFORMS

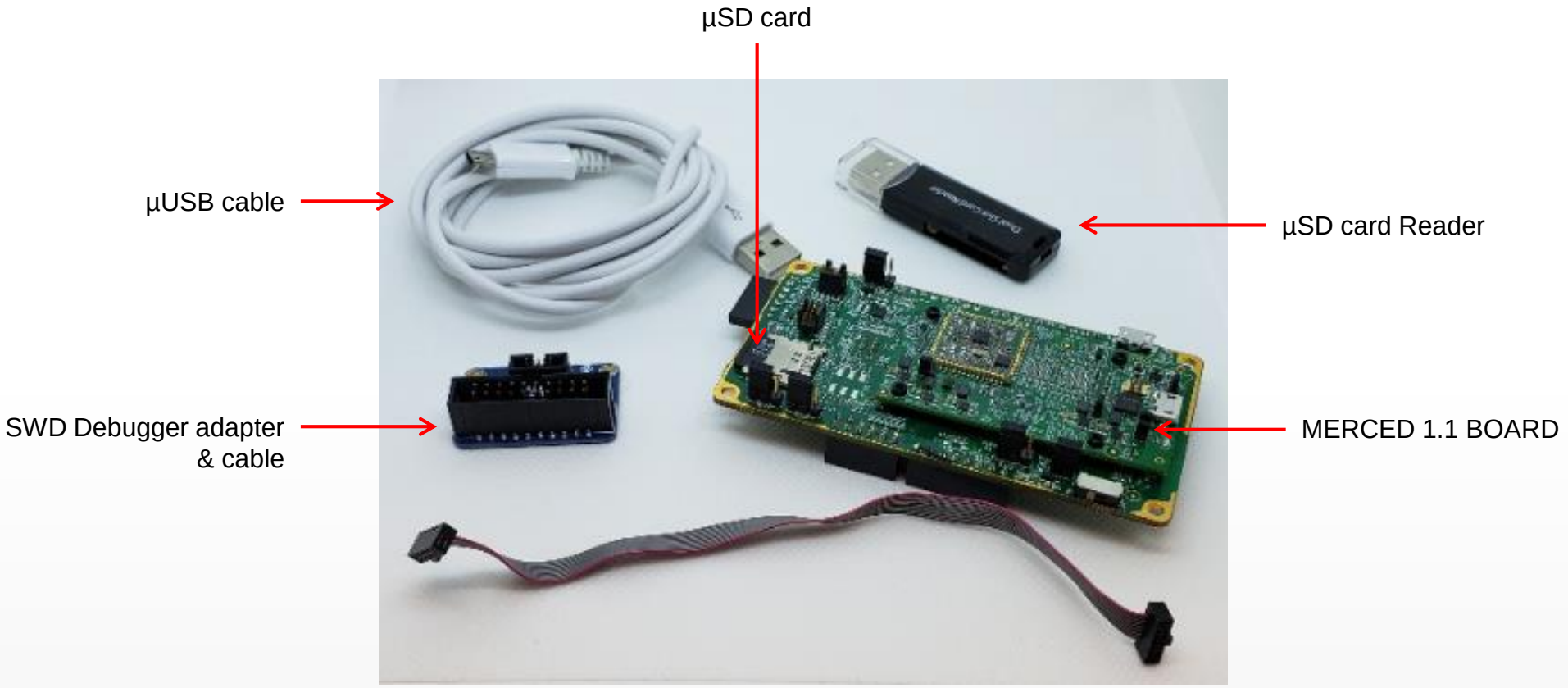
- Chillkat HDK: Consumer Applications
  - Wearable/Mobile Application demo
  - Small Form-Factor (watch like)
  - Limited available IO for feature expansion

CHILLKAT HDK

HDK PLATFORMS: COMPARE & CONTRAST

- Merced 1.1 HDK
  - What you received today
  - Includes SD Card Feature for AI data Capture
    - Code supports this, but not demonstrated today.
    - BLE Transfer speed is limit to about 100HZ
    - Can stream much more data directly to SD Card
  - This board is in the top of the Fan Demo
- Chillkat HDK
  - Demo & Shown – not handed out
    - Limited supply – if needed, contact QuickLogic Marketing
  - Fits the Wearables-AI market
  - Can do everything Merced 1.1 can do – except NO SD Card
  - Light Sensor and Vibration Motor

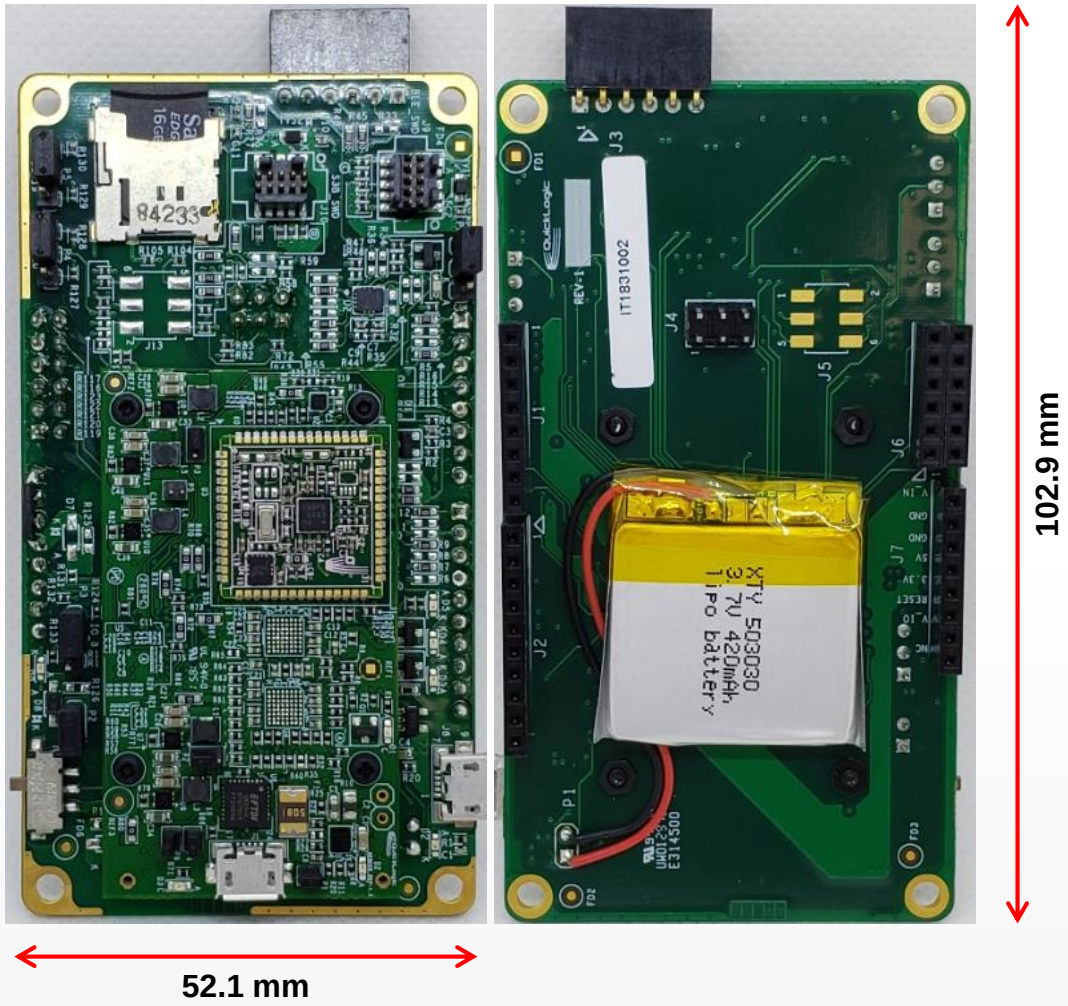
MERCED 1.1 HDK: CONTENT

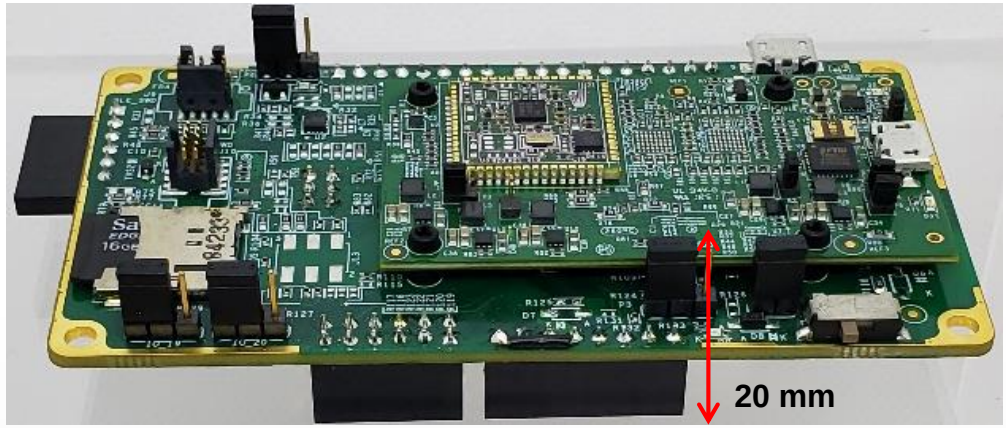


MERCED 1.1 HDK: FEATURES

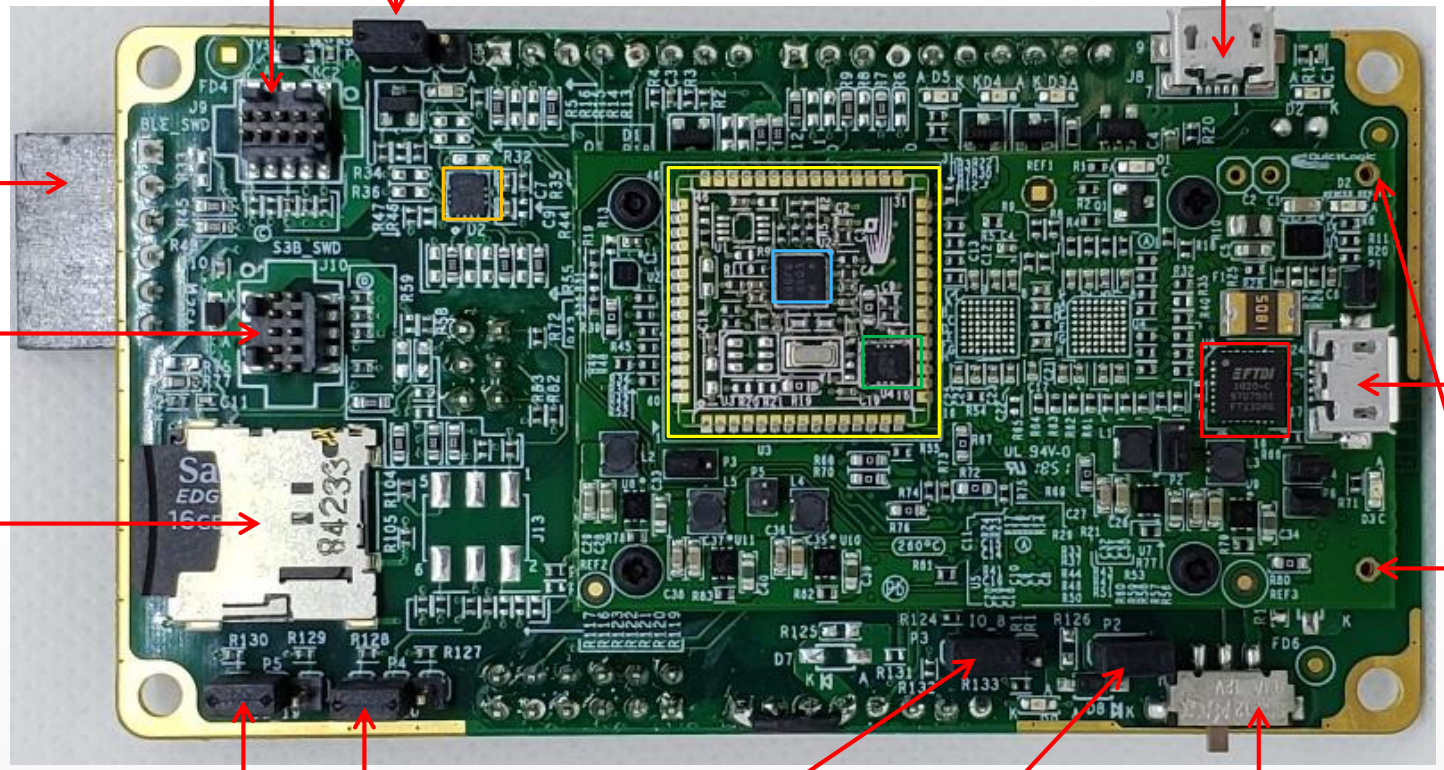
- QuickAI™ S3AI (BGA package)
- Sensors:
  - 6-axis Accel/Gyro sensor (LSM6DSL)
  - 3-axis Compass (AKM9915)
  - Pulse Density Modulation Microphones (Knowles SPH0641LM4H) – 2x
- 4MB SPI Flash for system information
- USB to UART for system control and debug (FTDI-FT232R)
- Onboard BLE module (BMD200 – nRF51822)
- Arduino connectors
- Boot mode jumpers
- IO Voltage selection jumpers (1.8V and 3.3V)
- Standard ARM SWD Debug connectors
- Li-ion battery and battery charging circuit (see next slide)

MERCED 1.1 HDK: DIMENSION





MERCED 1.1 HDK: CLOSER LOOK (TOP)



SWD Connector BLE (J10)

SPI CSn select Jumper (P6)

Battery Charger Connector (J8)

External PDM Mic Expansion (J3)

SWD Connector S3AI (J9)

uSD Card Slot (J12)

USB2UART Connector (M-J1)

PDM Mic Ports

Bootstrap Jumpers (P5 & P4)

UART IO Jumper (P3)

Charger circuit Jumper (P2)

Battery Switch (SW1)

EOS S3AI

Accel/Gyro sensor

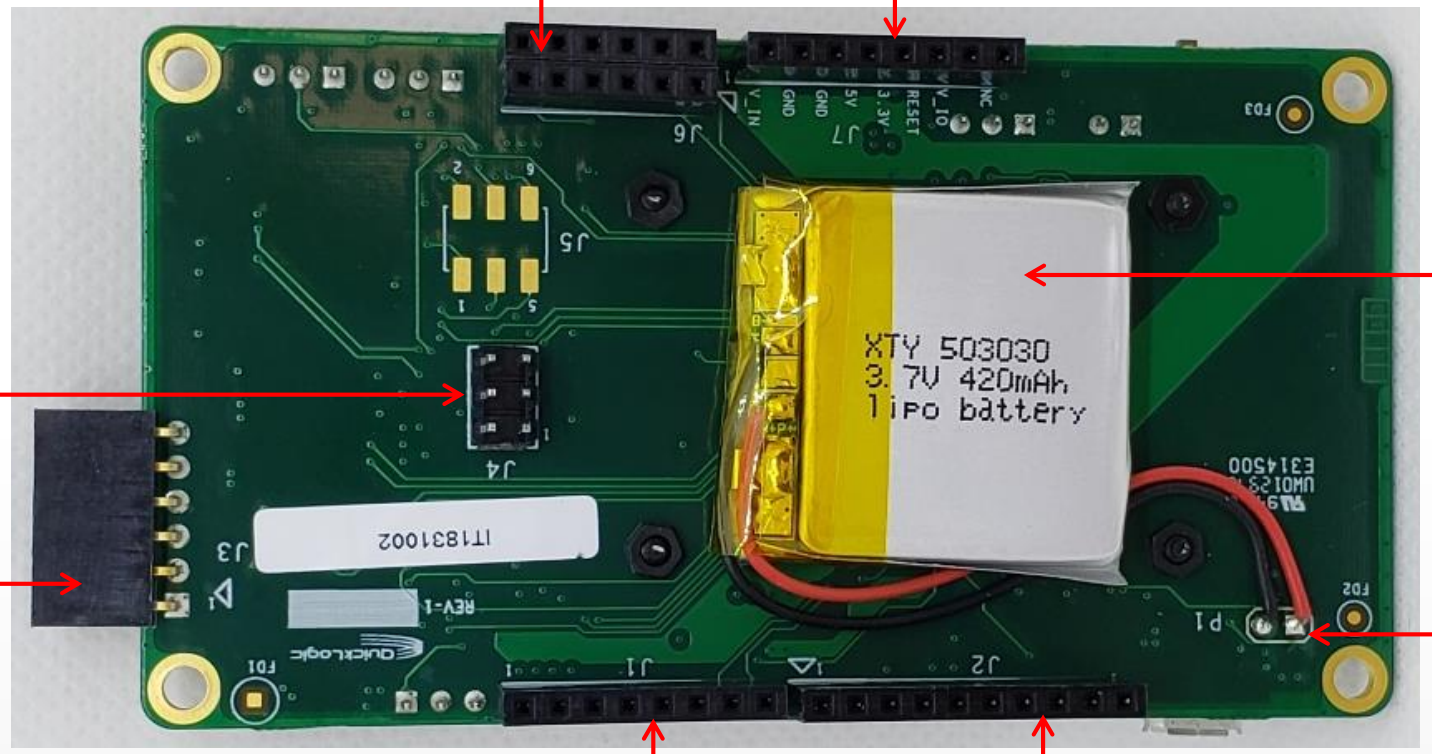
Yosemite

Compass sensor

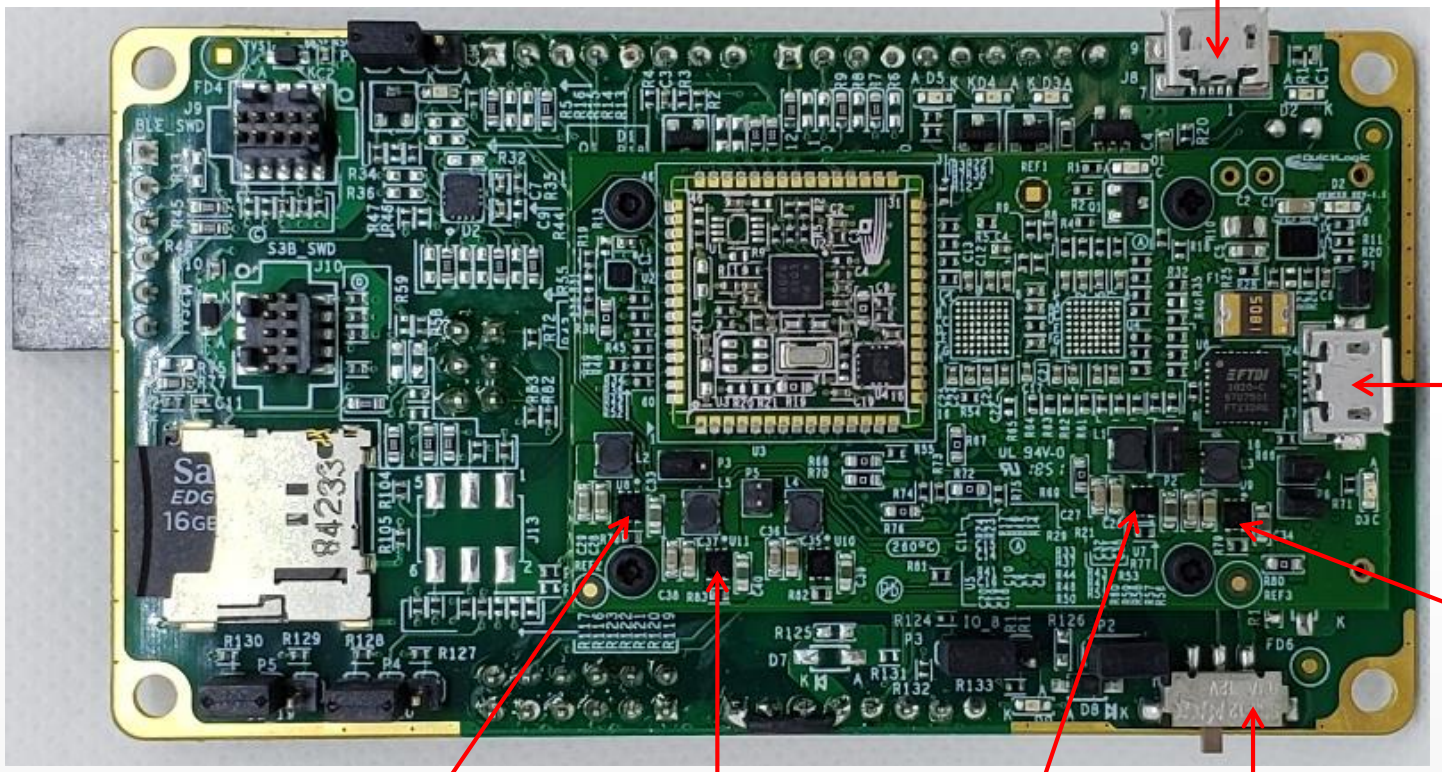
USB2UART

Not visible: BLE Module
Mounted on back of Merced Board
Inside the board sandwhich

MERCED 1.1 HDK: CLOSER LOOK (BOTTOM)

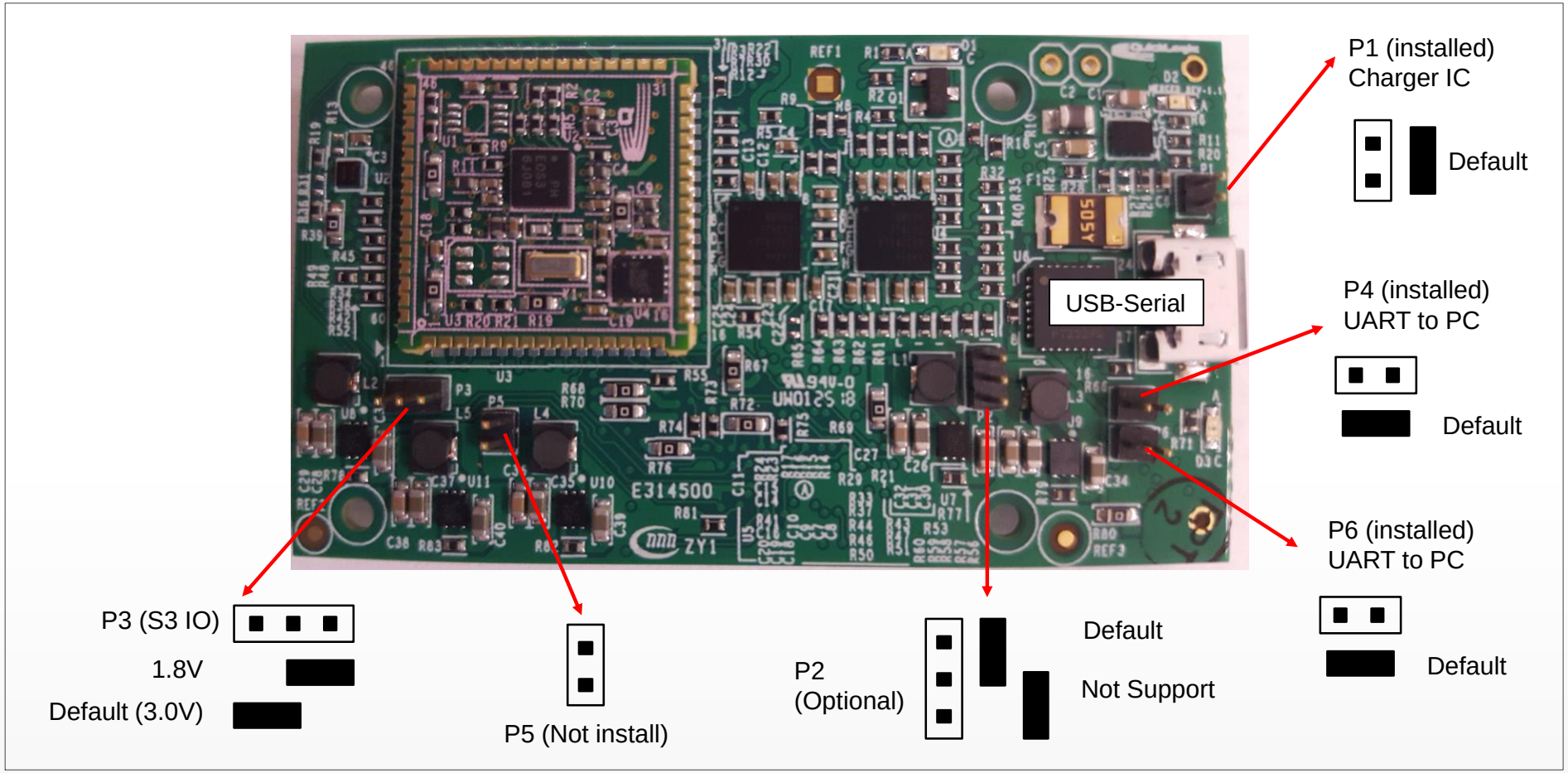


MERCED 1.1 HDK: OPERATIONS - POWER

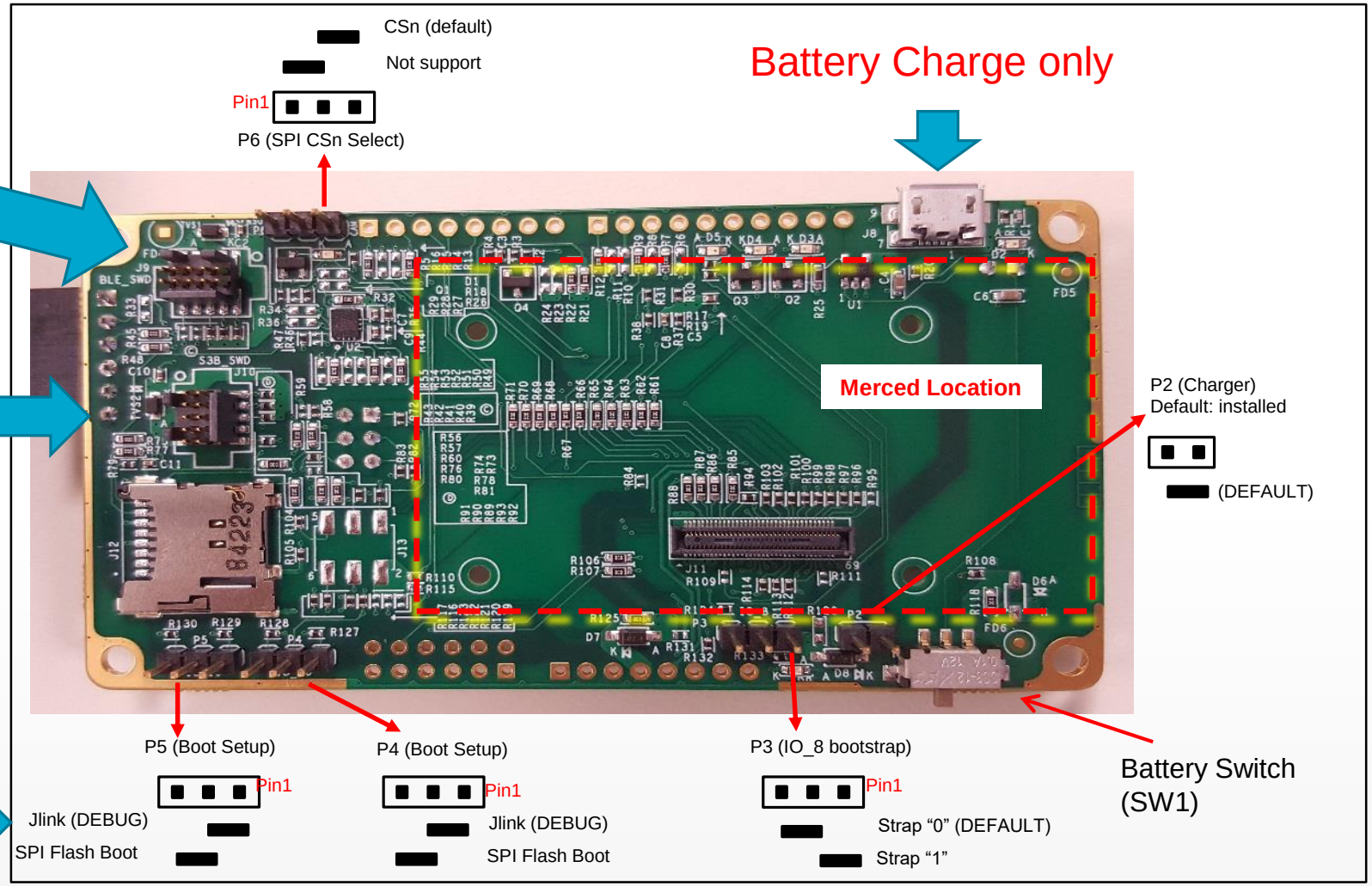


Note: Use USB cable and connect to USB Supply source (J8 or M-J1)

MERCED 1.1 Jumpers

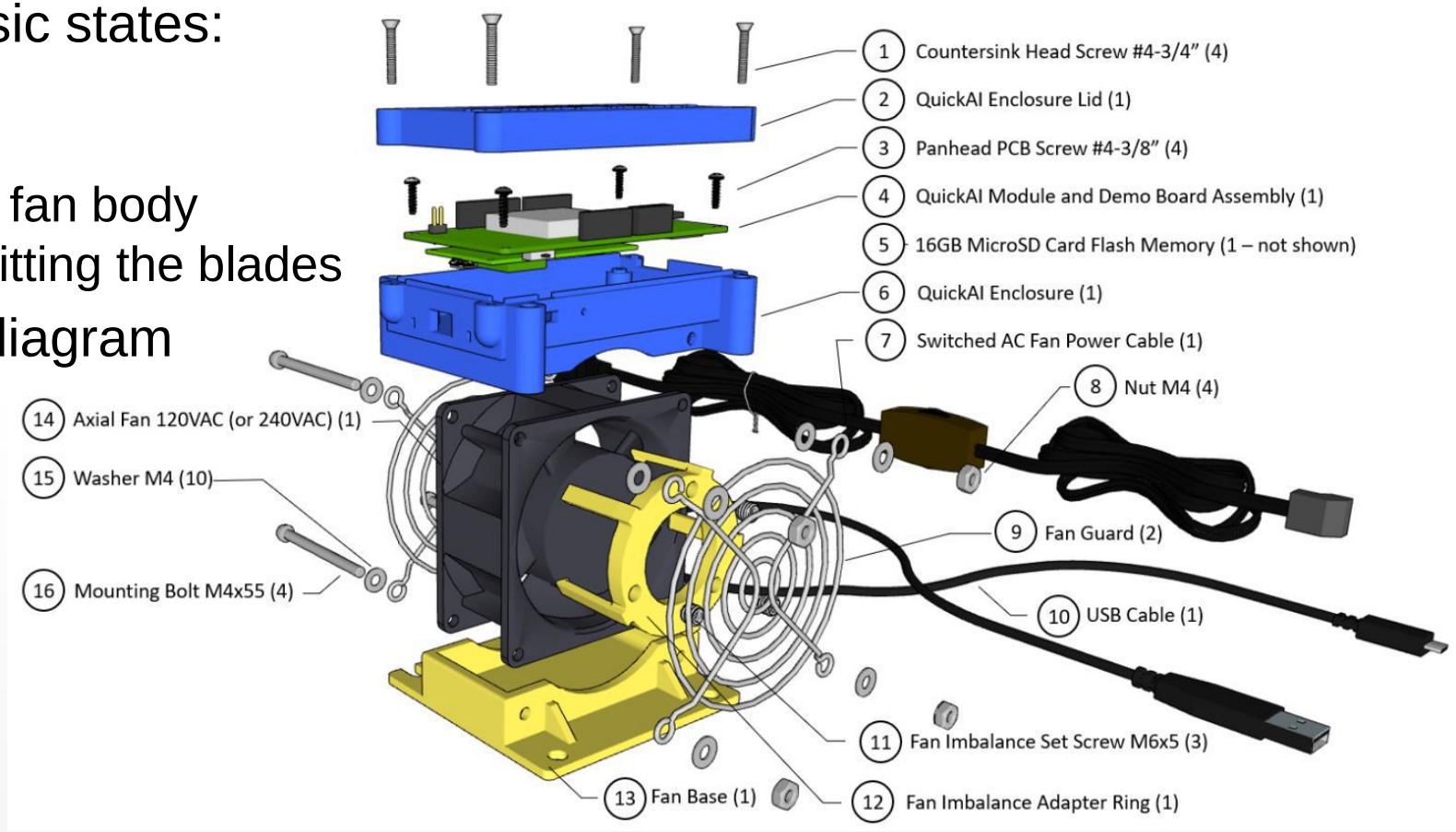


MERCED 1.1 Debug Board Jumpers



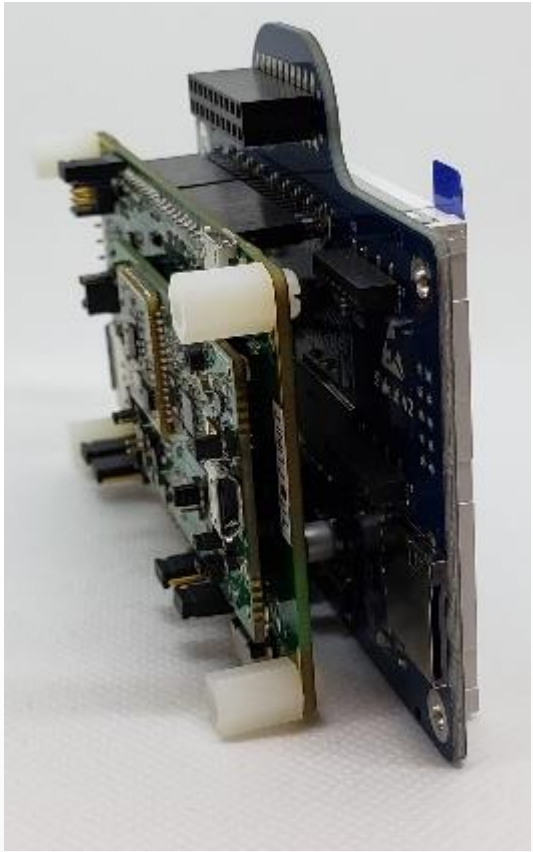
MERCED 1.1 HDK: PrePrograming

- Pre-Programed Software
  - The Merced Board is programed with a “Fan Demo”
- The AI-model can detect 4 basic states:
  - Off – no vibration
  - On – some vibration
  - Shock – striking or hitting the fan body
  - Imped – On, but something hitting the blades
- See item (4) in the assembly diagram



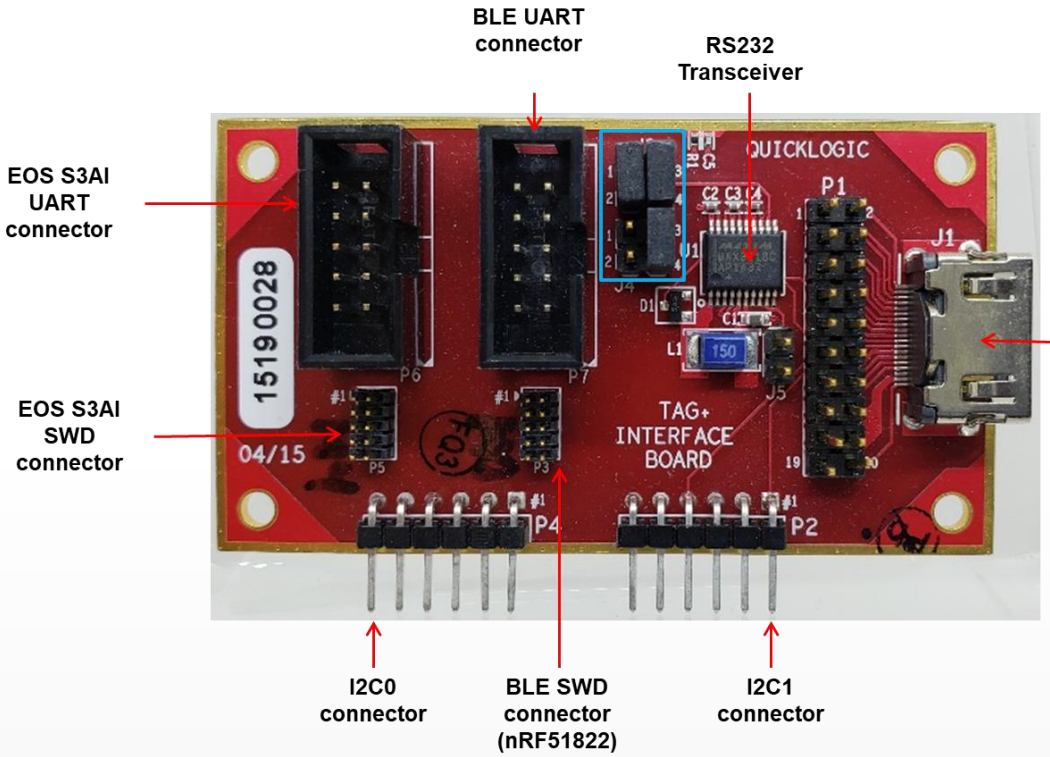
MERCED 1.1 HDK: Connecting to external devices/modules

- Direct connection to available Arduino shields; standard Arduino signals (I2C bus, SPI Master, GPIO, ADC) and DC supplies (1.8V and 3.3V) are available via connector J1, J2, J4, J6, J7.
- External PDM Microphone signals are available via connector J3.
- Blue-wiring is possible for external sensors that support either I2C or SPI bus protocol



CHILLKAT HDK: CONTENT

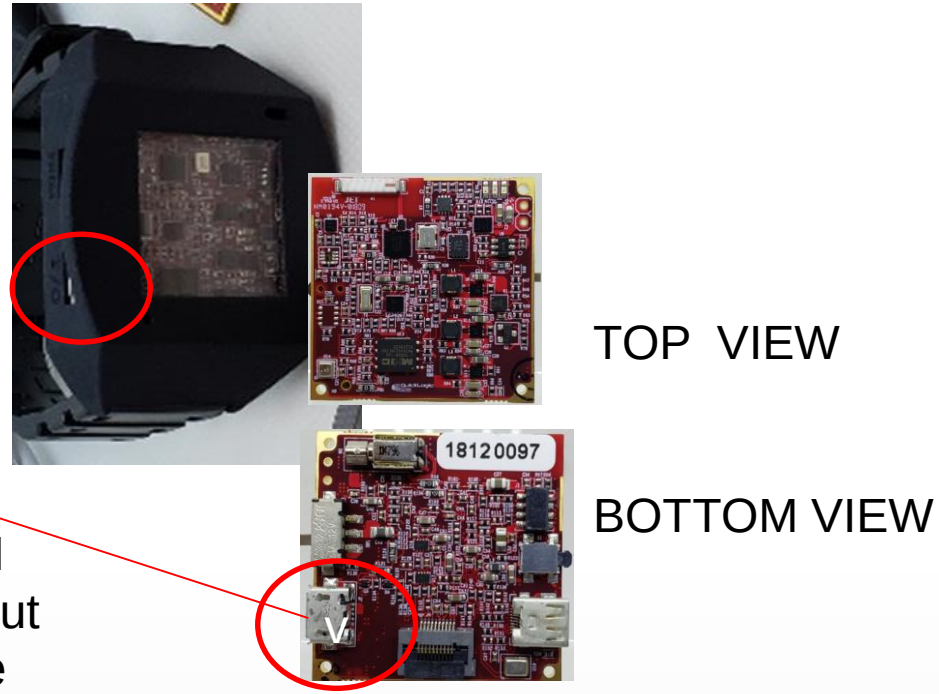
Chillkat Break Out Board – Via HDMI Cable



UART connection configuration: Null Modem / Normal

HDMI connector J1

HDMI Breakout Cable



TOP VIEW

BOTTOM VIEW

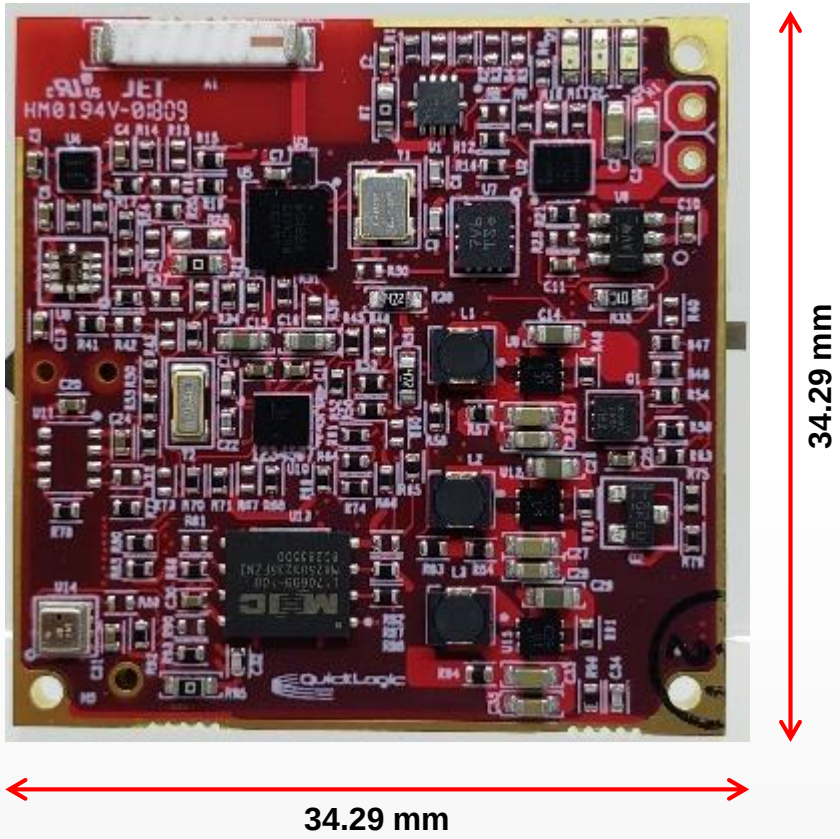
Micro HDMI Connector

CHILLKAT HDK: FEATURES

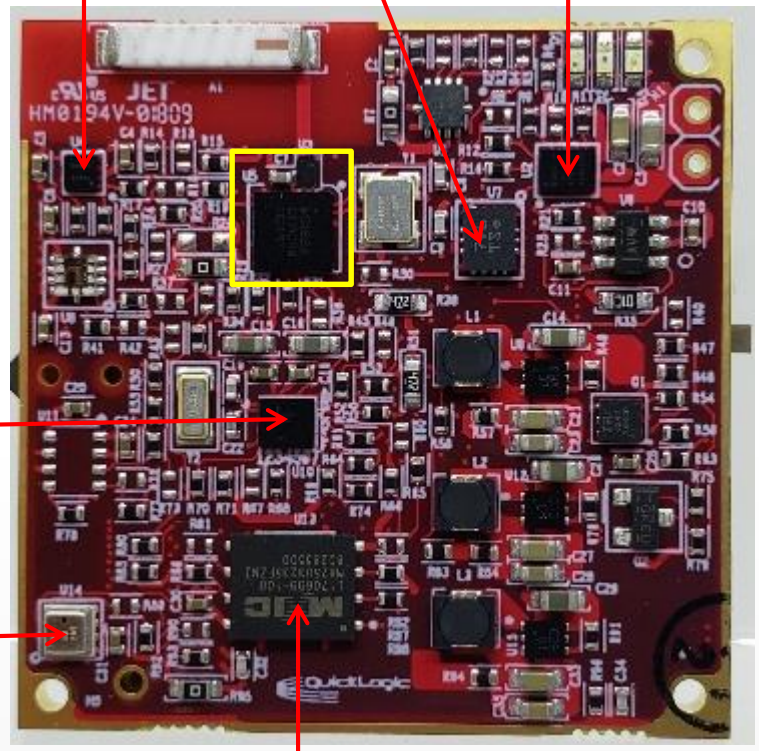
- QuickAI™ S3AI WLCSP (Wafer Level Chip Scale Package)
- Sensors:
  - 6-axis Accel/Gyro sensor (Bosch BMI160)
  - 3-axis Compass (AKM9915)
  - UV+Ambient Light sensor (Si1132) – not on Merced HDK
  - Pulse Density Modulation Microphones (Knowles SPH0641LM4H)
- 4MB Serial NOR Flash for system information
- Onboard BLE device (nRF51822)
- µHDMI connector + cable for expansion features
- Standard ARM SWD Debug connectors via Debug Board
- Li-ion battery and battery charging circuit
- Onboard vibrator motor – not on Merced HDK
- Watch band housing to emphasize freedom of movement (Sam?)

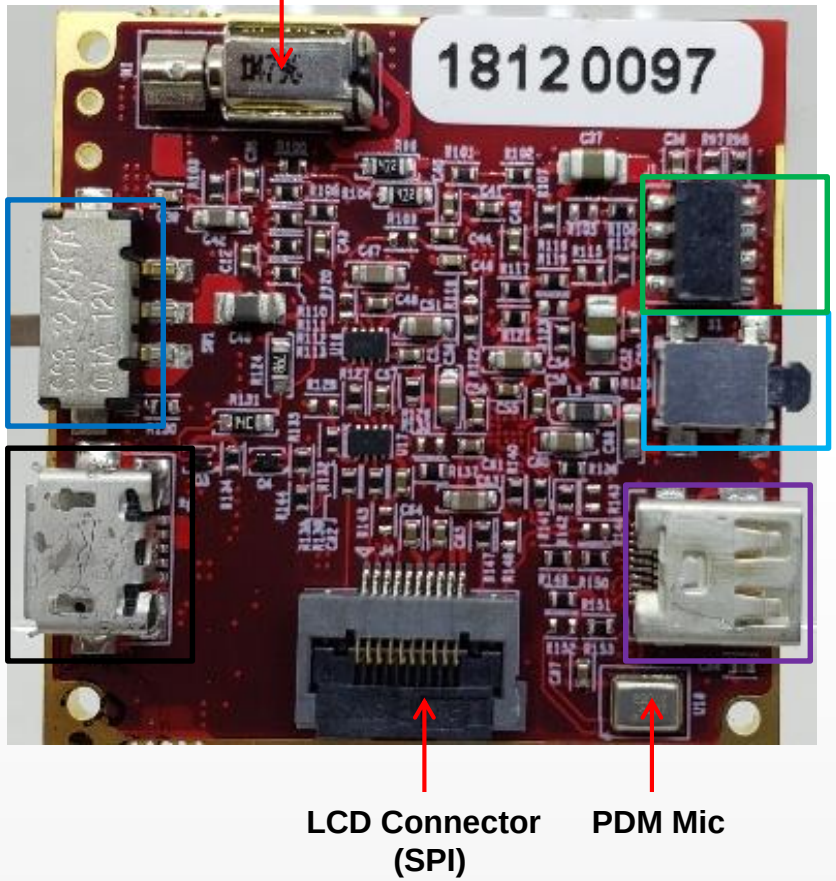
CHILLKAT HDK: CHILLKAT BOARD DIMENSION

Thickness: 4 mm



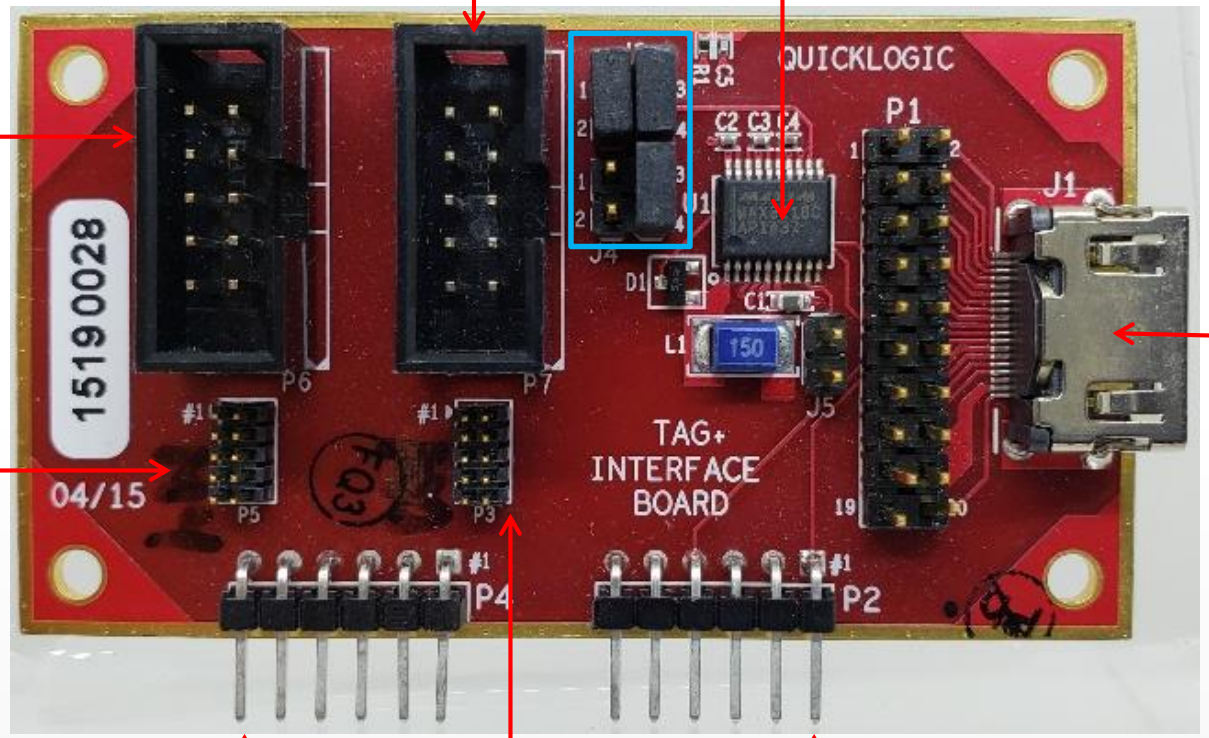
CHILLKAT HDK: CHILLKAT BOARD CLOSE LOOK





- USB Power
- Power Switch
- BLE (nRF51822)
- Expansion connector
- Reset button
- I2C with Power expansion port

CHILLKAT HDK: DESPLAINES BOARD CLOSE LOOK



GOOD TO KNOW

- BGA/ WLCSP package available now, QFN available 2019Q2
- SW SDK available now – Supports Eclipse/GCC and IAR
  - On your thumb drive
- S3AI core current measurement via jumper shunt
  - See HDK docs for details
- Merced 1.1 – you have this
  - If Chilkat needed please contact Quicklogic for availability
- Out of box demo:
  - Android App: SensiML – Data Collection Lab (DCL)
  - Android App: SensiML – Test App
  - Merced v1.1 come pre-programed with “SensiML Gesture Demo”