

AiyeCam-Talpa-DB Datasheet

Version 1.0

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1. About AiyeCam-Talpa-DB

1.1 Overview

The **AiyeCam-Talpa-DB** is a development board designed for the [AiyeCam-Talpa series](#), which focuses on machine vision applications with less stringent precision requirements. The AiyeCam-Talpa series is built around the NB1001 AI SoC, which integrates a monochrome CMOS Image Sensor (CIS) and a microcontroller (MCU) into a single chip, removing the need for an external processor to manage image processing.

The development board, **Talpa-DB**, includes **2.54mm pin headers**, providing convenient access to pins for various applications. It features a built-in **CH341 programmer** with a **micro USB connector** for flashing the memory. Additionally, the board incorporates an image output FPC connector on the backside, **enabling easy connection to an image display module for debugging purposes**.

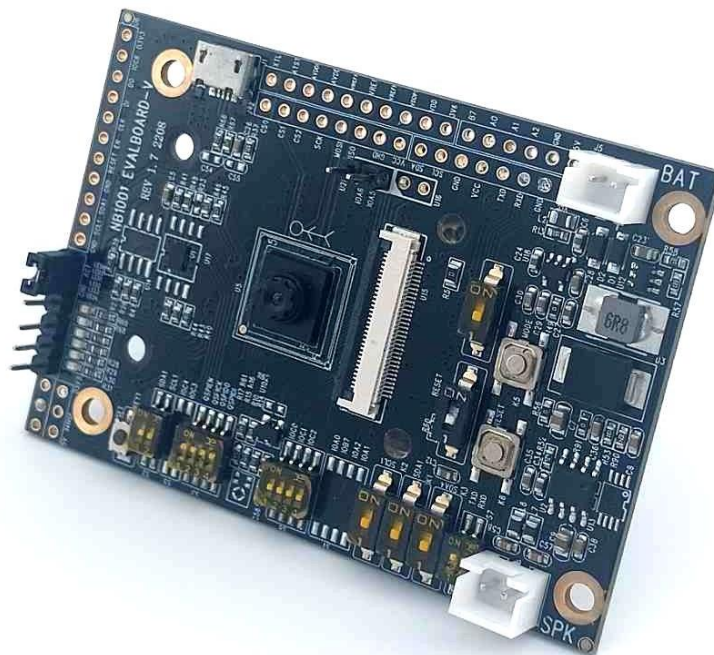


Figure 1: AiyeCam-Talpa-DB



1.2 Features

- Chip Overview
 - clock rate up to 96 Mhz
 - 288kB on-chip SRAM
 - Resolution: 320x320
 - Embedded Monochrome CIS
 - Sensitivity: 1.2v/lux-sec
 - Pixel Size: 3μm x 3μm
 - Sensor Size: 1108μm x 1024μm
 - 1 UART
 - 1 SPI controller
 - 1 I2C controller
 - 1 I2S controller
 - 8 PWM channels
 - 21 GPIO Pins
- Development Board Overview
 - Micro-USB B connector for power and data (and for reprogramming the Flash)
 - Speaker output port
 - 5V power supply port
 - FPC connector for image output
 - Comprehensive SDK and documentation
- Optical lens with HFOV:54°, VFOV:52°
- AI Model for vision-based applications
 - Human Detection
 - Face Detection

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2. Hardware Specifications

2.1 Technical Overview

Development Board Specification:

Electrical				
Description	Min	Typical	Max	Unit
Power supply voltage		5		V
Operating Current		300		mA
I/O Rail(V _{io})		3.3		V
I/O Output Current		10		mA
I/O Input High Level	0.7 xV _{io}			V
I/O Input Low Level			0.3xV _{io}	V
I/O Output High Level	V _{io} -0.45			V
I/O Input Low Level			0.45	V
Reset Pin Internal pull-up Resistance		100		kΩ
Connector				
Name	Model (from Digikey)		Function	
USB-Connector	CONN RCPT USB2.0 MICRO B SMD R/A		CH341A Programmer Connector	
32 Pin 0.5 Pitch FPC Connector	CONN FFC BOTTOM 32POS 0.5MM R/A		Image Output for Image Display Module	
Power Supply	CONN HEADER VERT 2POS 2.5MM		Power Supply Input	
Speaker	CONN HEADER VERT 2POS 2.5MM		Audio Signal Output	
Environmental:				
Ambient Operating Temperature	0°C~70°C			
Storage Temperature	-50°C~150°C			

Table 1: Development Board Characteristic

SoC Specification:

Clock Rate	up to 96 Mhz
Memory	288kB on-chip SRAM
Image Sensing Processor	• Color Filter: Monochrome • Shutter Type: Rolling Shutter • Optical Format: 1/13" • Max Frame Rate: 90fps@full resolution • Resolution: 320x320 • Sensitivity: 1.2v/lux-sec • Pixel Size: 3μm x 3μm • Sensor Size: 1108μm x 1024μm
Peripherals	• 1 UART Controller • 1 SPI controller • 1 I2C controller • 1 I2S controller • 8 PWM channels • 21 GPIO Pins

Table 2: SoC Characteristic

2.2 Dimensions

The following image shows the mechanical dimensions of the Talpa-DB, measured in millimeters (mm).

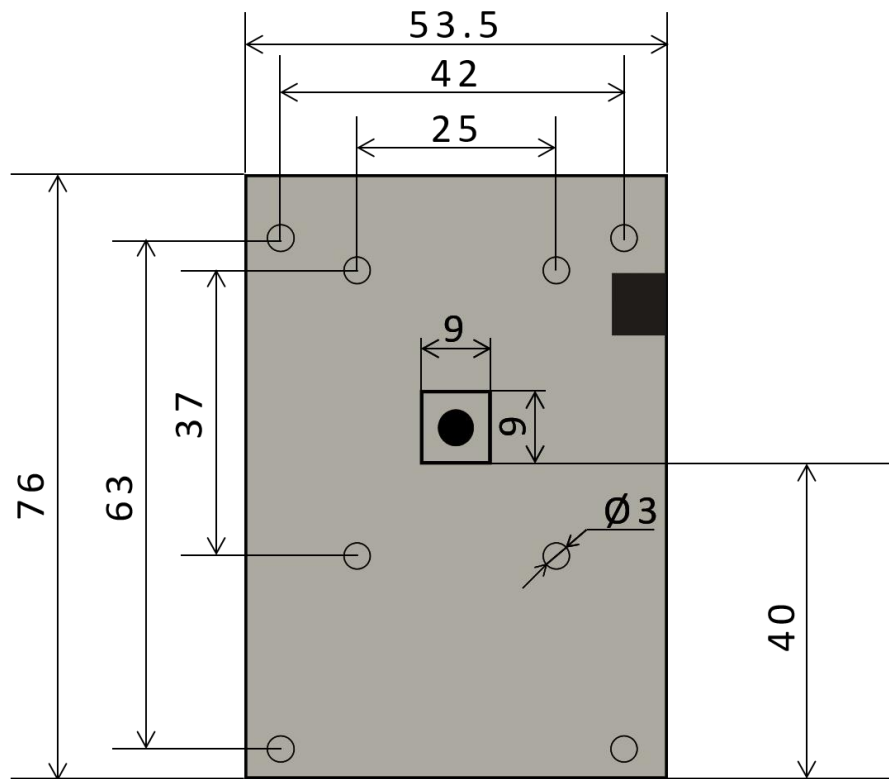


Figure 2: Dimensions

- Front Side

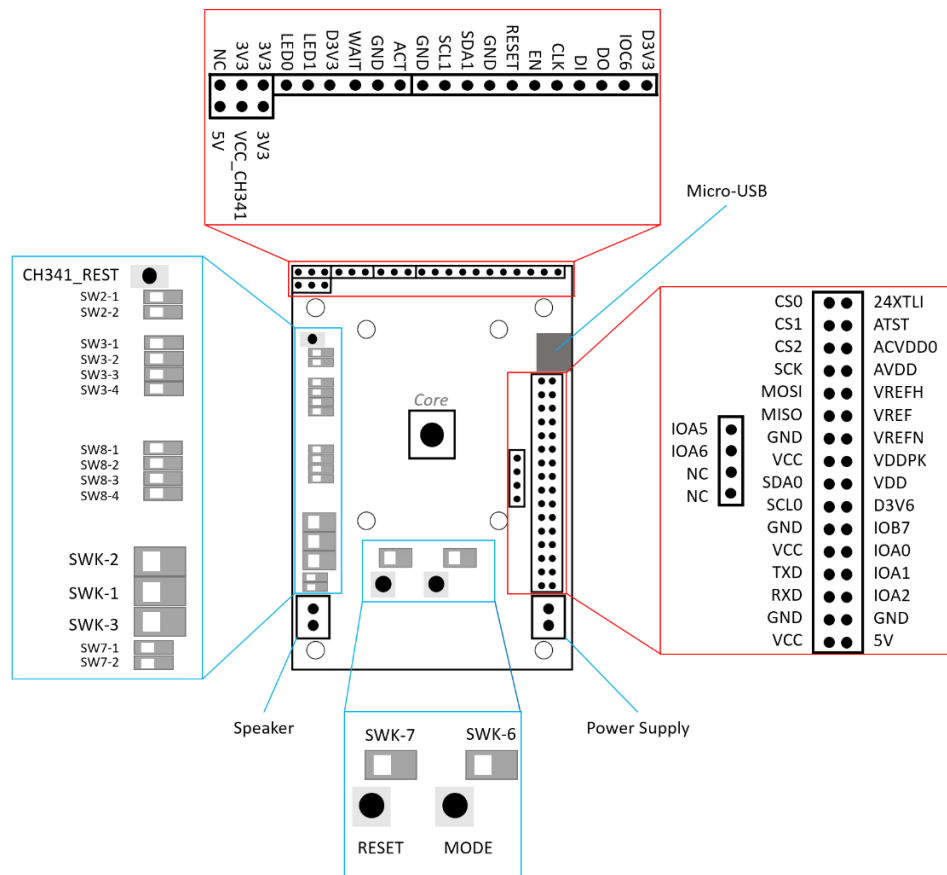


Figure 3: Components Overview, Front Side

- Back Side

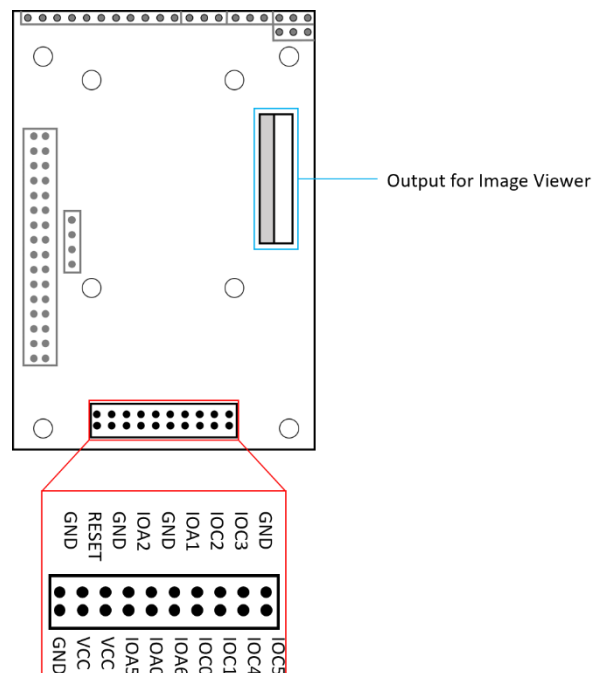


Figure 4: Components Overview, Back Side



2.3.1 Switches, Buttons and Connectors

Name	Description
CH341_REST	CH341A reset button
SW2-1	Switch to enable pin SDA0
SW2-2	Switch to enable pin SCL0
SW3-1	Switch to enable pin CS0
SW3-2	Switch to enable pin SCK
SW3-3	Switch to enable pin MOSI
SW3-4	Switch to enable pin MISO
SW8-1	Deprecated
SW8-2	Deprecated
SW8-3	Deprecated
SW8-4	Deprecated
SWK-2	Deprecated
SWK-1	Deprecated
SWK-3	Switch to enable Speaker control pin (IOA4)
SW7-1	Switch to enable pin TXD
SW7-2	Switch to enable pin RXD
SWK-7	System reset switch, reset when ON
SWK-6	Switch to enable external input button(MODE)
RESET	System reset button,
MODE	External input button, enabled by SWK-6, connected with IOA7
Speaker	Speaker with MIX2037 amplifier
Power Supply	5V power supply port
Micro-USB	USB Micro-B connector
Output for Image Viewer	FPC connector to image viewer board

Table 3: Components Overview - Switches



2.3.2 Pins

Name	Description	Switch to enable
24XTLI	24Mhz Crystal Oscillator Input.	
ATST	Analog Test Pin	
AVDDO	CIS2.8V Analog LDO Output	
AVDD	CIS2.8V Analog Power Input	
VREFH	CIS Reference Voltage	
VREF	CIS Reference Voltage	
VREFN	CIS Reference Voltage	
VDDPK	Power Keep LDO Output	
VDD	1.2V Digital Core Supply	
D3V6	LDO 3.6V Output	
IOB7	Pin IOB7	
IOA0	Pin IOA0	
IOA1	Pin IOA1	
IOA2	Pin IOA2	
GND	Ground	
5V	LDO 5V Output	
CS0	SPI Chip Select 0 - IOB1	SW3-1
CS1	Deprecated	
CS2	Deprecated	
SCK	SPI SCK - IOB2	SW3-2
MOSI	SPI MISO - IOB4	SW3-3
MISO	SPI MOSI - IOB3	SW3-4
GND	Ground	
VCC	3.3V Vcc	
SDA0	I2C SDA - IOA4	SW2
SCL0	I2C SCL - IOA3	SW2



GND	Ground	
VCC	3.3V Vcc	
TXD	UART RX - IOA5	SW7-1
RXD	UART TX - IOA6	SW7-2
GND	Ground	
VCC	3.3V Vcc	
IOA5	Pin IOA5	
IOA6	Pin IOA6	
NC	No Connection	
NC	No Connection	
D3V3	3.3V Output	
IOC6	Pin IOC6	
D0	QSPID0 - IOB3	
DI	QSPID1 - IOB4	
CLK	QSPISCK - IOB2	
EN	QSPIEN - IOB1	
RESET	Pull-Down System Reset Pin	
GND	Ground	
SDA1	I2C_SDA - IOA4	
SCL1	I2C_SCL - IOA5	
GND	Ground	
ACT	CH341A_ACT	
GND	Ground	
WAIT	CH341A_WT	
D3V3	3.3V Output	
LED1	Deprecated	
LED0	Deprecated	
3V3	3.3V Output	
3V3	3.3V Output	



3V3	3.3V Output	
VCC_CH341	CH341A Programmer Vcc	
NC	No Connection	
5V	LDO 5V Output	
GND	Ground	
IOC3	Pin IOC3	
IOC2	Pin IOC2	
IOA1	Pin IOA1	
GND	Ground	
IOA2	Pin IOA2	
GND	Ground	
RESET	Pull-Down System Reset Pin	
IOC5	Pin IOC5	
IOC4	Pin IOC4	
IOC1	Pin IOC1	
IOC0	Pin IOC0	
IOA6	Pin IOA6	
IOA0	Pin IOA0	
IOA5	Pin IOA5	
VCC	3.3V Vcc	
VCC	3.3V Vcc	
GND	Ground	

Table 4: Components Overview - Pins



2.3.3 Pin Assignment Table

No.	Pin	Function 0	Function 1	Function 2	Function 3	Function 4	Function 5
0	IOA0	SPI2_CK	SPI2_CK		PWM3	N/A	GPIO0
1	IOA1	SPI2_DI	SPI2_DI		PWM4	N/A	GPIO1
2	IOA2	SPI2_D0	SPI2_D0		PWM5	N/A	GPIO2
3	IOA3		I2C_SCK			N/A	GPIO3
4	IOA4		I2C_SDA			N/A	GPIO4
5	IOA5	UART_SIN	SPI2_D2	PWM0		N/A	GPIO5
6	IOA6	UART_SOUT	SPI2_D3	PWM1	I2S_BCLK	N/A	GPIO6
7	IOA7		I2S_MCLK	PWM2	CLK24_O	N/A	GPIO7
9	IOB1	QSPI_EN				N/A	GPIO9
10	IOB2	QSPI_CK				N/A	GPIO10
11	IOB3	QSPI_D0				N/A	GPIO11
12	IOB4	QSPI_D1				N/A	GPIO12
13	IOB5	QSPI_D2				N/A	GPIO13
14	IOB6	QSPI_D3				N/A	GPIO14
15	IOB7	SPI2_EN	SPI1_EN		PWM2	N/A	GPIO15
16	IOC0		I2S_BCLK	PWM3	CLK32_O	N/A	GPIO16
17	IOC1		I2S_WS	PWM4		N/A	GPIO17
18	IOC2		I2S_DI0	PWM5		N/A	GPIO18
19	IOC3		I2S_DO0	PWM6		N/A	GPIO19
20	IOC4		UART_CTS	CLK24_O	FSYN	N/A	GPIO20
21	IOC5		UART_RTS	CLK31_O	PWM7	N/A	GPIO21
22	IOC6	PWM0	UART_SIN	UART_CTS	I2S_DI0	N/A	GPIO22

Table 5: Pin Assignment Table

3. Development

3.1 Software Development Kit and AI models

The AiyeCam-Talpa SDK is used for software development with AiyeCam-Talpa series products. For more details about the AiyeCam-Talpa SDK, please visit the [Github repository](https://github.com/IADIY/AiyeCam-Talpa/). <https://github.com/IADIY/AiyeCam-Talpa/>

The current available AI models will be keep updating in our [Github repository](#). If you are interested AI model that does not be listed in our [Github repository](#), please feel free to [contact](#) us for customization.

3.2 Image Display Module

AiyeCam-Talpa-DB includes an FPC connector for the image display module, enabling the display of data from the embedded image sensor on the core chip. To connect the image display module and AiyeCam-Talpa-DB, please refer to the images below.

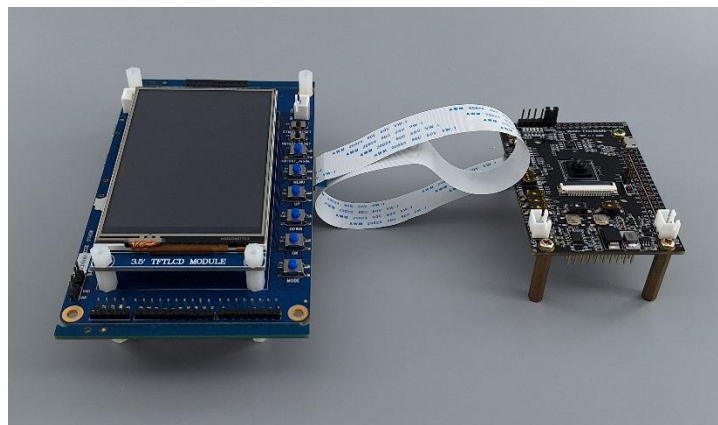


Figure 5: Image Display Module, Back Side

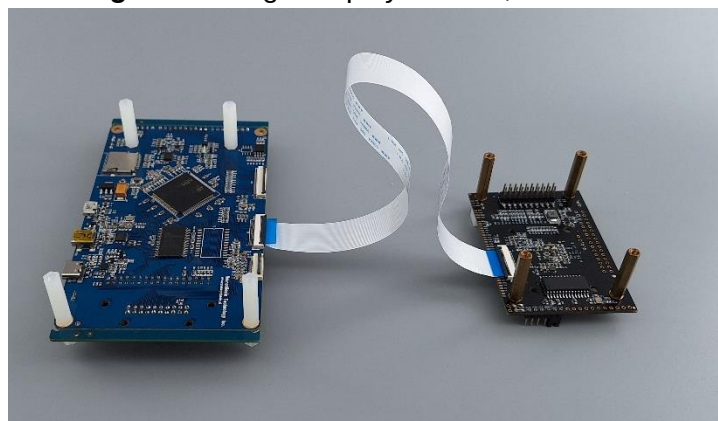


Figure 6: Image Display Module, Front Side