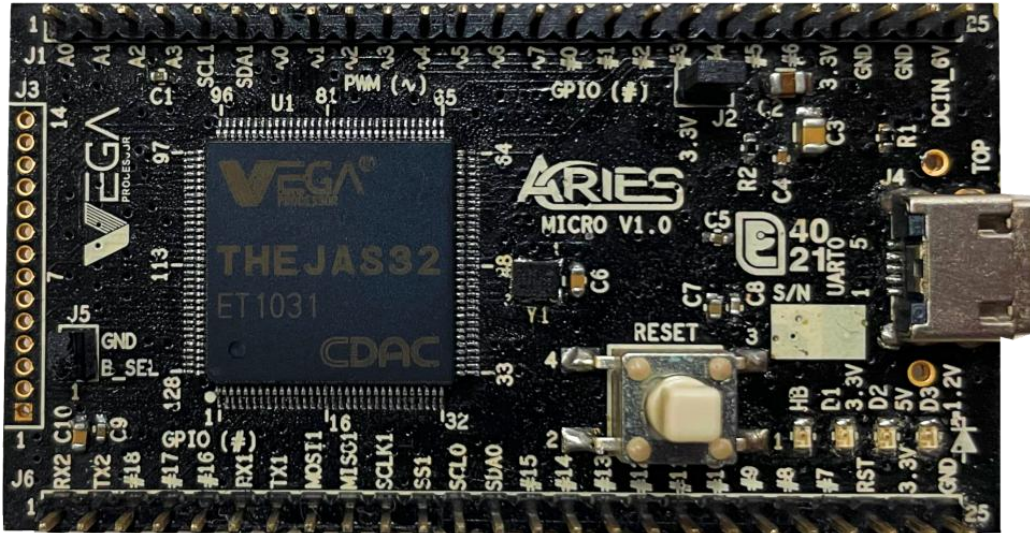


Product Reference Manual



Description

The **ARIES MICRO v1.0** is a fully indigenous and a “Made in India” product to get started with basic microprocessor programming and embedded systems. This board is built upon a RISC-V ISA compliant VEGA Processor with easy-to-use hardware and software. The VEGA SDK also provides full ecosystem with numerous examples and support documentation. This board is designed and developed by Centre for Development of Advanced Computing (C-DAC) as part of the Digital India RISC-V (DIR-V) Program, by the Ministry of Electronics and Information Technology, Government of India.

Target areas/Applications

Low power IoT, Sensor fusion, Smart Meter, System supervisors, Remote sensors, Wearable devices, Toy and electronic education equipment, Legacy 8/16-bit applications, Industrial networking and many more...

Features

Controller

THEJAS32 SoC with **VEGA ET1031** Microprocessor

Memory

2MB Flash

256KB SRAM

Peripherals

- PWM Pins : 8 nos
- Analog Input Pins : 4 nos
- SPI : 3 nos
- UART : 3 nos
- I2C : 2 nos
- GPIOs : 25 nos

Clock Speed

Clock Speed : 100MHz

Power

- Input Voltage : 5-6V
- DC Current per I/O Pin : 12 mA
- IO Voltage : 3.3 V

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1. The Board

ARIES MICRO v1.0 is a development platform based on THEJAS32 ASIC which operates at a frequency of 100MHz. THEJAS32 SoC includes VEGA ET1031 Microprocessor, 256KB internal SRAM, Three UARTs, Four SPIs, Three TIMERS, Eight PWMs, Three I2C interfaces, 32 GPIOs etc. This board contains everything needed to support standalone operation. To get started simply connect the board to a computer with a USB cable or a battery.

2. Ratings

2.1 Recommended Operating Conditions

Symbol	Description	Min	Max
	Conservative thermal limits for the whole board:	-0 °C (100°F)	85 °C (185°F)

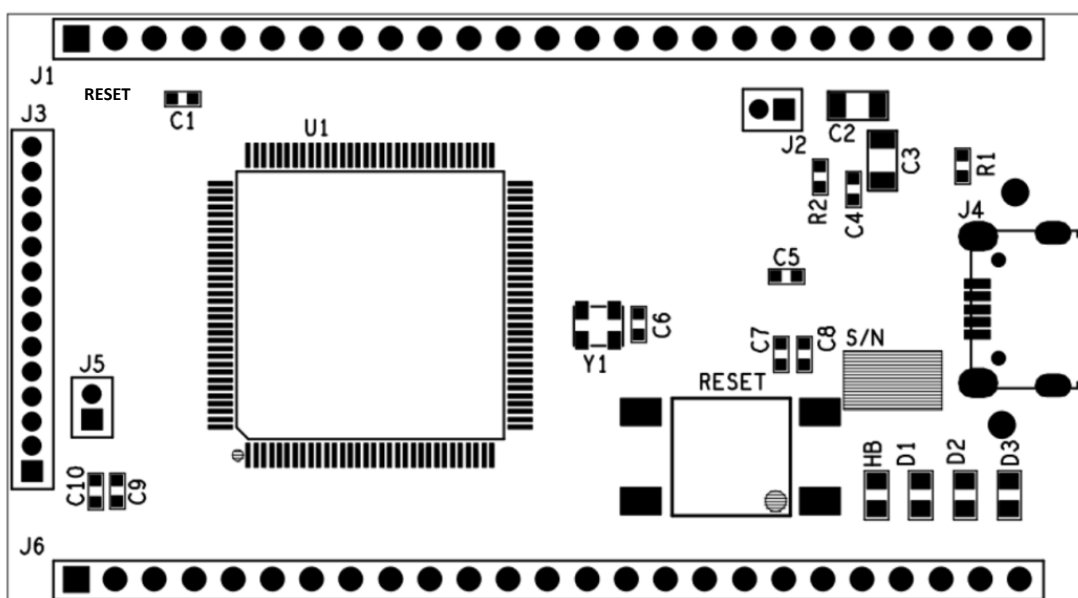
2.2 Power Consumption

Symbol	Description	Min	Typ	Max	Unit
VINMax	Maximum input voltage from VIN pad	5	-	6	V
VUSBMax	Maximum input voltage from USB connector	-	5.5	V	
PMax	DC Current per I/O Pin	-	-	12	mA

3. Functional Overview

3.1 Board Topology

Top view



Ref.	Description	Ref.	Description
J4	USB B Connector	U1	THEJAS32 SoC
J5	Boot Select Header	RESET	Reset Button
J2	3.3V Regulator Output	Y1	100 MHz Oscillator

3.2 Processor

The main controller is THEAJS32 SoC which operates at a frequency of 100MHz. It includes VEGA ET1031 Microprocessor, 256KB internal SRAM, Three UARTs, Four SPIs, Three TIMERS, Eight PWMs, Three I2C interface, 32 GPIOs. Most of its pins are connected to the external headers, however some are reserved for internal communication.

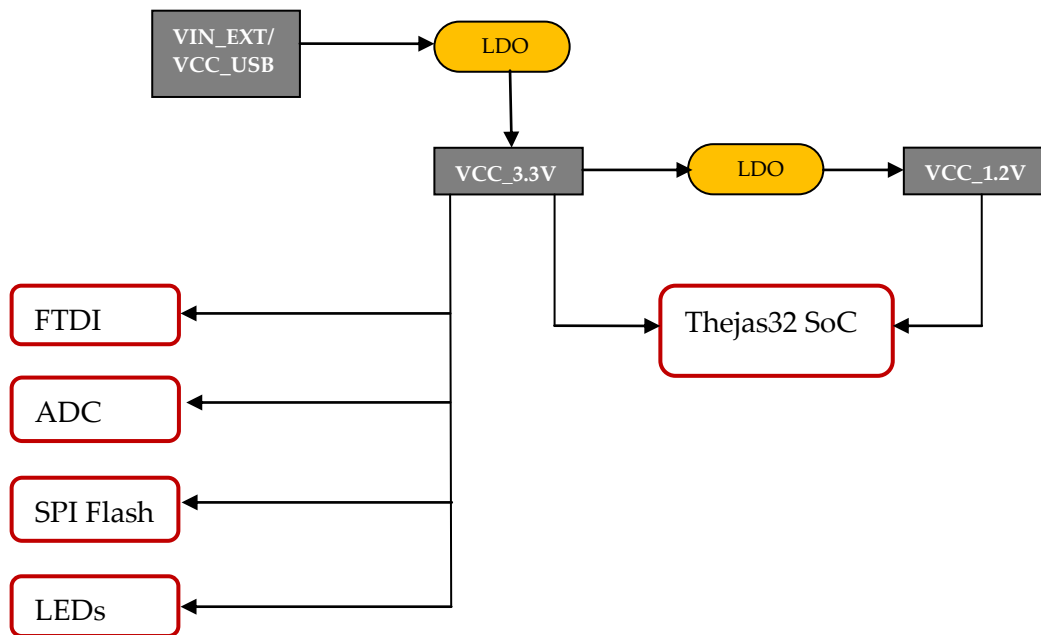
3.3 THEJAS32 pinout

Pin #	Pin Name	Pin Description
1	GPIO1(3)	General purpose IO.
2	GPIO1(2)	General purpose IO.
3	PVSSIOC23	Ground reference for IO pins.
4	PVDDIO23	Positive supply for IO pins. Connect to 3.3V supply.
5	GPIO1(1)	General purpose IO.
6	GPIO1(0)	General purpose IO.
7	SPI3MOSI	SPI 3 Master Out Slave In.
8	PVDDC18	Positive supply for logic. Connect to 1.2V supply.
9	PVSSC18	Ground reference for logic.
10	SPI3MISO	SPI 3 Master In Slave Out.
11	SPI3CLK	SPI 3 Clock.
12	SPI3CSN	SPI 3 Chip Select.
13	PVSSIOC21	Ground reference for IO pins.
14	PVDDIO21	Positive supply for IO pins. Connect to 3.3V supply.
15	BOOT	Boot select.
16	PROCBT	Heart beat signal.
17	TEDTUPD	Connect to GND.
18	PVDDC17	Positive supply for logic. Connect to 1.2V supply.
19	PVSSC17	Ground reference for logic.
20	TSTCLK	Connect to GND through a 1K resistor.
21	TJTAGTDO	JTAG TDO. Left unconnected.
22	TJTAGTMS	JTAG TMS. Connect to GND through a 1K resistor.
23	TJTAGTDI	JTAG TDI. Connect to GND through a 1K resistor.
24	PVSSIOC19	Ground reference for IO pins.
25	PVDDIO19	Positive supply for IO pins. Connect to 3.3V supply.
26	PVDDC16	Positive supply for logic. Connect to 1.2V supply.
27	PVSSC16	Ground reference for logic.
28	TJTAGTCK	JTAG TCK. Connect to GND through a 1K resistor
29	TJTAGTRST	JTAG TRST. Connect to GND through a 1K resistor
30	TSTMODE	Test mode select. Connect to GND through a 1K resistor.
31	IIC2SDA	I2C 2 Serial Data.

32	IIC2SCL	I2C 2 Serial Clock.
33	IIC0SCL	I2C 0 Serial Clock.
34	IIC0SDA	I2C 0 Serial Data.
35	PVSSC14	Ground reference for logic.
36	PVDDC14	Positive supply for logic. Connect to 1.2V supply.
37	PVDDIO17	Positive supply for IO pins. Connect to 3.3V supply.
38	PVSSIOC17	Ground reference for IO pins.
39	SPI1CSN	SPI 1 Chip Select.
40	SPI1CLK	SPI 1 Clock.
41	SPI1MISO	SPI 1 Master In Slave Out.
42	SPI1MOSI	SPI 1 Master Out Slave In.
43	RSTIN	Reset.
44	CLKSYS	System Clock.
45	URT1SOUT	UART 1 Serial Out / Transmit.
46	PVDDIO15	Positive supply for IO pins. Connect to 3.3V supply.
47	PVSSIOC15	Ground reference for IO pins.
48	PVSSC12	Ground reference for logic.
49	PVDDC12	Positive supply for logic. Connect to 1.2V supply.
50	URT1SIN	UART 1 Serial In / Receive.
51	GPIO0(15)	General purpose IO.
52	GPIO0(14)	General purpose IO.
53	GPIO0(13)	General purpose IO.
54	GPIO0(12)	General purpose IO.
55	GPIO0(11)	General purpose IO.
56	PVSSC11	Ground reference for logic.
57	PVDDC11	Positive supply for logic. Connect to 1.2V supply.
58	GPIO0(10)	General purpose IO.
59	PVDDIO13	Positive supply for IO pins. Connect to 3.3V supply.
60	PVSSIOC13	Ground reference for IO pins.
61	GPIO0(9)	General purpose IO.
62	GPIO0(8)	General purpose IO.
63	GPIO0(7)	General purpose IO.
64	GPIO0(6)	General purpose IO.
65	GPIO0(5)	General purpose IO.
66	GPIO0(4)	General purpose IO.
67	PVSSC9	Ground reference for logic.
68	PVDDC9	Positive supply for logic. Connect to 1.2V supply.
69	PVDDIO11	Positive supply for IO pins. Connect to 3.3V supply.
70	PVSSIOC11	Ground reference for IO pins.
71	GPIO0(3)	General purpose IO.
72	GPIO0(2)	General purpose IO.
73	GPIO0(1)	General purpose IO.
74	GPIO0(0)	General purpose IO.
75	PWM(7)	Pulse Width Modulation.
76	PWM(6)	Pulse Width Modulation.
77	PWM(5)	Pulse Width Modulation.
78	PVSSC7	Ground reference for logic.
79	PVDDC7	Positive supply for logic. Connect to 1.2V supply.
80	PWM(4)	Pulse Width Modulation.

81	PWM(3)	Pulse Width Modulation.
82	PWM(2)	Pulse Width Modulation.
83	PVDDIO8	IO Power Supply VDD pin.
84	PVSSIOC8	Ground reference for IO pins.
85	PWM(1)	Pulse Width Modulation.
86	PWM(0)	Pulse Width Modulation.
87	SPI0MOSI	SPI 0 Master Out Slave In.
88	PVSSC6	Ground reference for logic.
89	PVDDC6	Positive supply for logic. Connect to 1.2V supply.
90	SPI0MISO	SPI 0 Master In Slave Out.
91	SPI0CLK	SPI 0 Clock.
92	SPI0CSN	SPI 0 Chip Select.
93	PVDDIO6	Positive supply for IO pins. Connect to 3.3V supply.
94	PVSSIOC6	Ground reference for IO pins.
95	IIC1SDA	I2C 1 Serial Data.
96	IIC1SCL	I2C 1 Serial Clock.
97	SPI2MOSI	SPI 2 Master Out Slave In.
98	SPI2MISO	SPI 2 Master In Slave Out.
99	PVDDC4	Positive supply for logic. Connect to 1.2V supply.
100	PVSSC4	Ground reference for logic.
101	SPI2CLK	SPI 2 Clock.
102	SPI2CSN	SPI 2 Chip Select.
103	PVSSIOC4	Ground reference for IO pins.
104	PVDDIO4	Positive supply for IO pins. Connect to 3.3V supply.
105	URT2SIN	UART 2 Serial In / Receive.
106	URT2SOUT	UART 2 Serial Out / Transmit.
107	URT0SIN	UART 0 Serial In / Receive.
108	URT0SOUT	UART 0 Serial Out / Transmit.
109	GPIO1(15)	General purpose IO.
110	GPIO1(14)	General purpose IO.
111	GPIO1(13)	General purpose IO.
112	PVDDC2	Positive supply for logic. Connect to 1.2V supply.
113	PVSSC2	Ground reference for logic.
114	PVSSIOC2	Ground reference for IO pins.
115	PVDDIO2	Positive supply for IO pins. Connect to 3.3V supply.
116	GPIO1(12)	General purpose IO.
117	GPIO1(11)	General purpose IO.
118	GPIO1(10)	General purpose IO.
119	GPIO1(9)	General purpose IO.
120	GPIO1(8)	General purpose IO.
121	GPIO1(7)	General purpose IO.
122	GPIO1(6)	General purpose IO.
123	PVSSIOC0	Ground reference for IO pins.
124	PVDDIO0	Positive supply for IO pins. Connect to 3.3V supply.
125	PVDDC0	Positive supply for logic. Connect to 1.2V supply.
126	PVSSC0	Ground reference for logic.
127	GPIO1(5)	General purpose IO.
128	GPIO1(4)	General purpose IO.

3.4 Power Tree



4. Board Operation

4.1 Getting Started

- To use Vega Arduino IDE for programming follow the steps given in the link below
 - For Linux; <https://bit.ly/vega-linux>
 - For Windows; <https://bit.ly/vega-windows>
- To use Eclipse IDE for programming follow the steps given in the link below
 - <https://cdac-vega.gitlab.io/sdkuserguide.html>

4.2 To Power up

- Three ways of powering Aries Micro v1.0 board:
 - Using the built-in USB micro connector.
 - Supplying 5V-6V to the DCIN_6V* (J1.25) pin as external supply.
 - Supplying 3.3V directly to the VCC_3V3 (J1.22 or J6.24) pin.

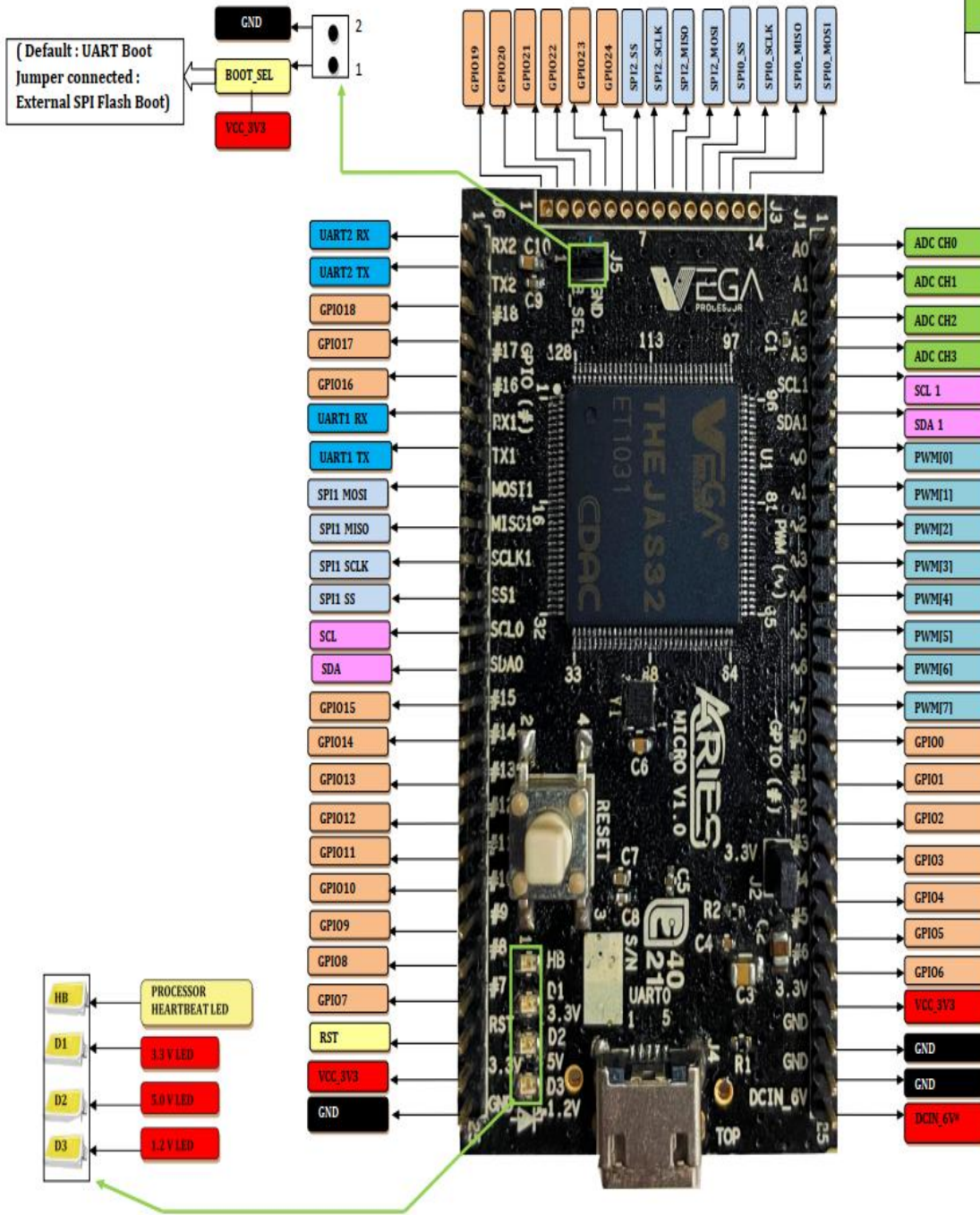
Note : Do not power this board through USB and an external power supply at the same time.

5. Connector Pinouts

ARIES_MICRO V1.0
PINOUT DIAGRAM

LEGEND

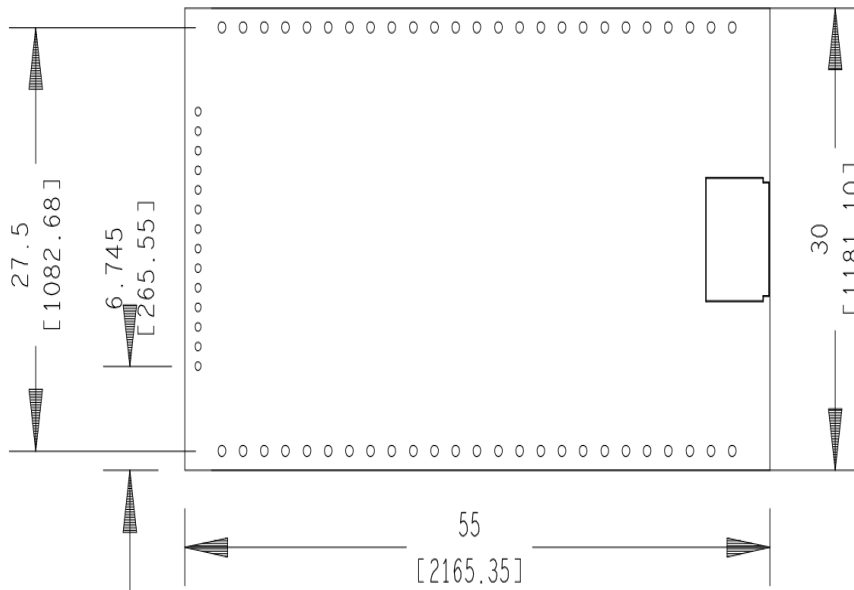
- POWER
- GROUND
- ANALOG
- SPI
- UART
- I2C
- PWM
- GPIO
- CONTROL



SL NO.	SPECIFICATIONS	THEJAS 32	ARIES MICRO v1.0 BOARD	REMARKS
1	SPI (4)	SPI0_SS	J3_11	Connected to HEADER J3
2		SPI0_SCLK	J3_12	
3		SPI0_MISO	J3_13	
4		SPI0_MOSI	J3_14	
5		SPI1_SS	J6_11	Connected to HEADER J6
6		SPI1_SCLK	J6_10	
7		SPI1_MISO	J6_9	
8		SPI1_MOSI	J6_8	Connected to HEADER J3
9		SPI2_SS	J3_7	
10		SPI2_SCLK	J3_8	
11		SPI2_MISO	J3_9	
12		SPI2_MOSI	J3_10	Connected to SPI BOOT FLASH IC
13		SPI3_SS	U7_1	
14		SPI3_SCLK	U7_6	
15		SPI3_MISO	U7_2	
16		SPI3_MOSI	U7_5	
17	I2C (3)	SCL	J6_12	Connected to HEADER J6
18		SDA	J6_13	
19		SCL_1	J1_5	Connected to HEADER J1
20		SDA_1	J1_6	
21		SCL_2	U2_10	Connected to I2C ADC IC
22		SDA_2	U2_9	
23	UART (3)	UART0_RXD	U5_15	Connected to UART TO USB INTERFACE IC
24		UART0_TXD	U5_2	
25		UART1_RX	J6_6	Connected to HEADER J6
26		UART1_TX	J6_7	
27		UART2_RX	J6_1	Connected to HEADER J6
28		UART2_TX	J6_2	
29	PWM (8)	PWM[0]	J1_7	Connected to HEADER J1
30		PWM[1]	J1_8	
31		PWM[2]	J1_9	
32		PWM[3]	J1_10	
33		PWM[4]	J1_11	
34		PWM[5]	J1_12	
35		PWM[6]	J1_13	
36		PWM[7]	J1_14	
37	GPIO (32)	GPIO0	J1_15	Connected to HEADER J1
38		GPIO1	J1_16	
39		GPIO2	J1_17	
40		GPIO3	J1_18	
41		GPIO4	J1_19	
42		GPIO5	J1_20	
43		GPIO6	J1_21	Connected to HEADER J6
44		GPIO7	J6_22	
45	GPIO8	J6_21		

46		GPI09	J6_20		
47		GPI010	J6_19		
48		GPI011	J6_18		
49		GPI012	J6_17		
50		GPI013	J6_16		
51		GPI014	J6_15		
52		GPI015	J6_14		
53		GPI016	J6_5		
54		GPI017	J6_4		
55		GPI018	J6_3		
56		GPI019	J3_1		Connected to HEADER J3
57		GPI020	J3_2		
58		GPI021	J3_3		
59		GPI022	J3_4		Connected to HEADER J3
60		GPI023	J3_5		
61		GPI024	J3_6		
62		GPI025	R25-R24		Connected to Pullup - Pulldown Resistors
63		GPI026	R23-R22		
64		GPI027	R19-R18		
65		GPI028	R15-R14		
66		GPI029	R13-R12		
67		GPI030	R11-R10		
68		GPI031	R7-R6		
69	CLOCK	CLK_100M	Y1_3	Connected to OSCILLATOR	
70	RESET	PUSH_RESETN	U 6_1	Connected to RESET IC	
71	HEART BEAT LED	PROC_HEART_BEAT	HB_1	Connected to LED	
72	BOOT SELECT	BOOT_SEL	J5_1	Connected to HEADER J5	
73	ADC_CH0	-	J1_1 U2_4	ANALOG INTPUTS Connected to HEADER J1 & I2C ADC IC	
74	ADC_CH1	-	J1_2 U2_5		
75	ADC_CH2	-	J1_3 U2_6		
76	ADC_CH3	-	J1_4 U2_7		

5.1 Board Outline



(Dimensions in mm[mil])

6. Company Information

Company name	C-DAC
Company Address	Hardware Design Group Centre for Development of Advanced Computing (C-DAC) Thiruvananthapuram, Kerala – 695033 Fax: 0471-2723456 Email: vega@cdac.in www.vegaprocessors.in www.cdac.in

7. Reference Documentation

Reference	Link
ARIES MICRO v1.0 details	www.vegaprocessors.in/devboards/ariesmicro.html