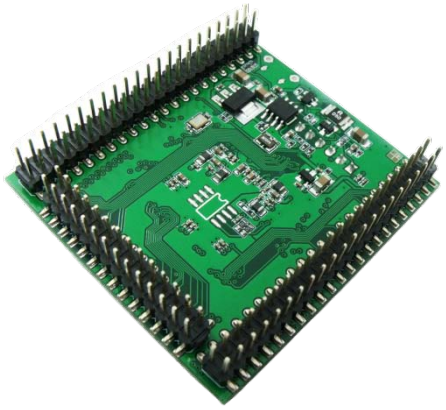
1 Summary

The Arduino Due is a microcontroller board based on the Atmel SAM3X8E ARM Cortex-M3 CPU. It is the first Arduino board based on a 32-bit ARM Cortex-M3 core microcontroller.



DUE-CORE is a compact version of DUE , It integrates all peripherals required for MCU , and all GPIO are connected to the 2.54mm connectors for users. As a standard MCU core board, apart from main features with DUE also has the following features:

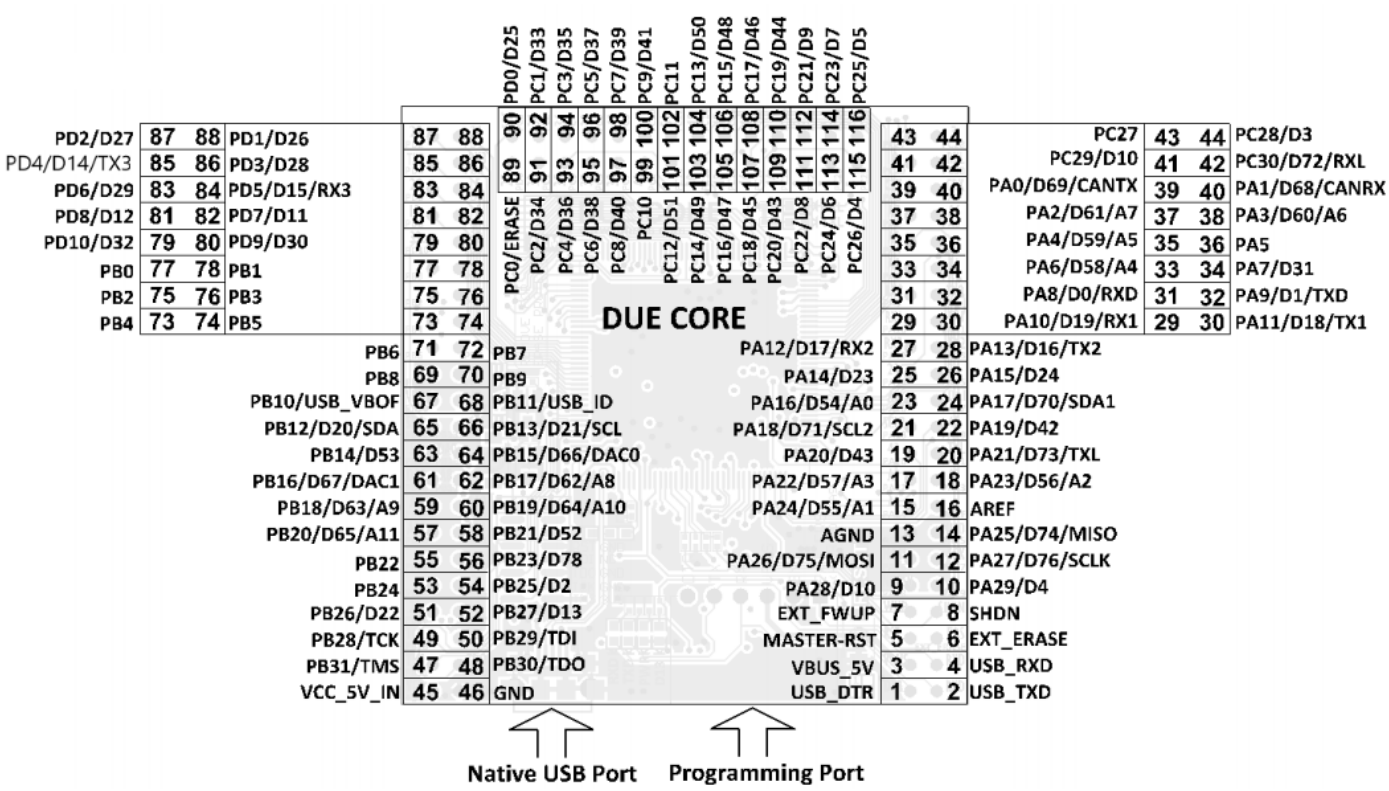
- **Compact size:** All components are put on a 54 x 58mm 4-Layers PCB. All IO are connected to 116pin 2.54 standard connector. User can apply the PCBA to any application even the size is very compact.
- **Easy to use:** All IO are connected to 116pin 2.54 standard connector. Only a 5V power to the board to make it work.
- **Stable design:** adopt high-cost 4-layer PCB layout , two 5V to 3.3V LDO onboard , one is for digital part and one is for analog part. Separate AVCC and AGND, to ensure the best analog performance.
- **Easy to set up the development environment:** Fully development on Arduino IDE , uploading sketch through standard Arduino 6pin UART interface, standard Micro usb connector , full use of existing resources .
- **User-friendly design:** Rich LED status indication, two onboard buttons, one is for MCU reset , and other one is for Flase Erase. **Unique jumper erase protection against the flash erased by mistake operation.**
- **Rich resource:** All IO are connected out for the user, even if not defined Arduino. Onboard I2C EEPROM designed to compensate for the shortcomings of SAM3X8E no built-in EEPROM.

2 Parameters

Microcontroller:	AT91SAM3X8E LQFP-144
Operation Voltage:	3.3V
Input voltage:	5V
Total connector pins:	44 + 44 + 28 = 116Pins
Flash:	2 x 256 Kbytes
SRAM:	64 + 32 Kbytes
Clock Speed:	84 MHz
Number of PIOs:	103
NAND Flash Controller (NFC):	Yes
SHDN Pin:	Yes
EMAC:	MII/RMII
External Bus Interface:	16-bit data / 8 chip selects / 23-bit address
Central DMA:	6
12-bit ADC:	16 ch
12-bit DAC:	2 ch

32-bit Timer:	9 ch
PDC Channels:	17
USART/UART:	3 / 2 (USART3 in UART mode (RXD3 and TXD3 available))
SPI:	1 SPI controller,4 chip selects +3 USART with SPI mode
HSMCI:	1 slot, 8 bits
Clock Speed:	84 MHz
Board dimension:	54 x 58mm
Arduino resource support:	https://www.arduino.cc/en/Main/ArduinoBoardDue

3 Pin Description



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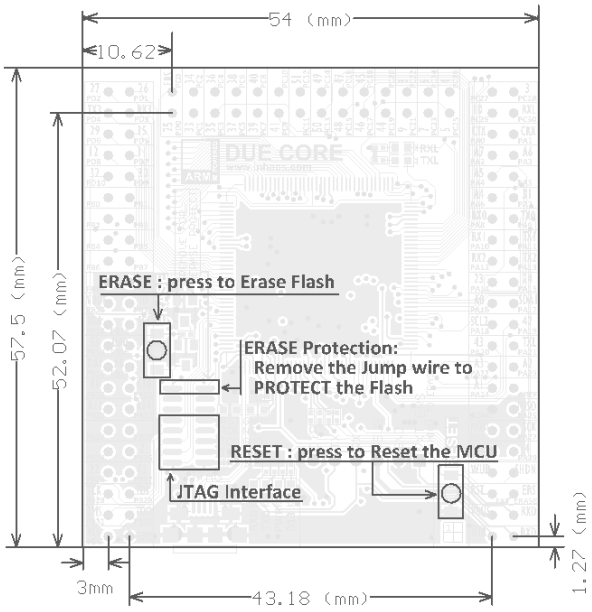


Pin No.	MCU Pin Function	Arduino Pin Fuction
1	**USB DTR** (Pull low this pin will reset the MCU)	
2	**USB TXD** (USB UART bridge's RXD <-> MCU PA8/RXD0)	
3	**VBUS_5V** (USB 5V)	
4	**USB RXD** (USB UART bridge's RXD <-> MCU PA9/TXD0)	
5	**Master-Reset** (MCU Reset output signal for periphery device)	
6	**EXT_Erase** (Pull High this pin for Erase the Flash of MCU)	
7	**EXT_FWUP**	---
8	**SHDN**	---
9	**PA28**/SPI0_NPCS0/PCK2/WKUP11	D10
10	**PA29**/SPI0_NPCS1/NRD	D4
11	**PA26**/SPI0_MOSI/A19	D75/MOSI
12	**PA27**/SPI0_SCPK_A20_WKUP10	D76/SCLK
13	**AGND**	
14	**PA25**/SPI0_MISO/A18	D74/MISO
15	**PA24**/MCDA3/PCK1/AD6	D55/A1
16	**AREF**	
17	**PA22**/MCDA1/TCLK3/AD5	D57/A3
18	**PA23**/MCDA2/TCLK4/AD5	D56/A2
19	**PA20**/MCCDA/PWML2	D43
20	**PA21**/MCDA0/PWML0	D73/TXL
21	**PA18**/TWCK0/A20/WKUP9	D71/SCL2
22	**PA19**/MCCK/PWMH1	D42
23	**PA16**/SPCK1/TD/AD7	D54/A0
24	**PA17**/TWD0/SPCK0	D70/SDA1
25	**PA14**/RTS1/TK	D23
26	**PA15**/CTS1/TF/WKUP8	D24
27	**PA12**/RXD1/PWML1/WKUP7	D17/RX2
28	**PA13**/TXD1/PWMH2	D16/TX2
29	**PA10**/RXD0/DATRG/WKUP5	D19/RX1
30	**PA11**/TXD0/ADTRG/WKUP6	D18/TX1
31	**PA8**/URXD/PWMH0/WKUP4	D0/RXD
32	**PA9**/UTXD/PWMH3	D1/TXD
33	**PA6**/TIOB2/NCS0/AD3	D58/A4
34	**PA7**/TCLK2/NCS1/WKUP3	D31
35	**PA4**/TCLK1/NWAIT/AD2	D59/A5
36	**PA5**/TIOA2/PWMFI0/WKUP2	---
37	**PA2**/TIOA1/NANDRDY/AD0	D61/A7
38	**PA3**/TIOB1/PWMFI1/AD1/WKUP1	D60/A6
39	**PA0**/CANTX0/PWML3	D69/CANTX
40	**PA1**/CANRX0/PCK0/WKUP0	D68/CANRX
41	**PC29**/A8/TIOB7	D10
42	**PC30**/A9/TCLK7	D72/RXL
43	**PC27**/A6/TCLK6	---
44	**PC28**/A7/TIOA7	D3
45	**VCC_5V_IN** (Module power supply) ***4.75~5.25V***	
46	**GND**	
47	**PB31**/TMS/SWDIO	TMS
48	**PB30**/TDO/TRACESWO	TDO
49	**PB28**/TCK/SWCLK	TCK
50	**PB29**/TDI	TDI
51	**PB26**/CTS0/TCLK0/WKUP15	D22
52	**PB27**/NCS3/TIOB0	D13
53	**PB24**/SCK2/NCS2	---
54	**PB25**/RTS0/TIOA0	D2
55	**PB22**/RTS2/PCK0	---
56	**PB23**/CTS2/SPI0_NPCS3/WKUP14	D78
57	**PB20**/TXD2/SPI0_NPCS1/AD13	D65/A11
58	**PB21**/RXD2/SPI0_NPCS2/AD14/WKUP13	D52

Pin No.	MCU Pin Function	Arduino Pin Fuction
59	**PB18**/RD/PWML2/AD11	D63/A9
60	**PB19**/RK/PWML3/AD12	D64/A10
61	**PB16**/TCLK5/PWML0/DAC1	D67/DAC1
62	**PB17**/RF/PWML1/AD10	D62/A8
63	**PB14**/CANTX1/PWMH2	D53
64	**PB15**/CANRX1/PWMH3/DAC0/WKUP12	D66/DAC0
65	**PB12**/TWD1/PWHH0/AD8	D20/SDA
66	**PB13**/TWCK1/PWMH1/AD9	D21/SCL
67	**PB10**/UOTGVBOF/A18	USB_VBOF
68	**PB11**/UOTGID/A19	USB_ID
69	**PB8**/EMDC/PWML6	---
70	**PB9**/DMDIO/PWML7	---
71	**PB6**/ERX1/PWML4	---
72	**PB7**/ERXER/PWML5	---
73	**PB4**/ECRSDV/ERXDV/TIOA5	---
74	**PB5**/ERX0/TIOB5	---
75	**PB2**/EXT0/TIOA4	---
76	**PB3**/EXT1/TIOB4	---
77	**PB0**/ETXCK/EREFCK/TIOA3	---
78	**PB1**/EXTEN/TIOB3	---
79	**PD10**/NWR1/NBS1	D32
80	**PD9**/A22/NANDCLE/TCLK8	D30
81	**PD8**/A21/NANDALE/TIOB8	D12
82	**PD7**/A17/BA1/TIOA8	D11
83	**PD6**/A16/BA0/PWMF12	D29
84	**PD5**/A15/RXD3	~~D13/RX3~~ D15/RX3
85	**PD4**/A14/TXD3	~~D13/TX3~~ D14/TX3
86	**PD3**/A13/MCDA7	D28
87	**PD2**/A12/MCDA6	D27
88	**PD1**/A11/MCDA5	D26
89	PC0/ERASE	ERASE
90	**PD0**/A10/MCDA4	D25
91	PC2/D0/PWML0	D34
92	PC1	D33
93	PC4/D2/PWML1	D36
94	PC3/D1/PWMH0	D35
95	PC6/D4/PWML2	D38
96	PC5/D3/PWMH1	D37
97	PC8/D6/PWML3	D40
98	PC7/D5/PWMH2	D39
99	PC10/D8/ECRS	---
100	PC9/D7/PWMH3	D41
101	PC12/D10/ERX3	D51
102	PC11/D9/ERX2	---
103	PC14/D12/ERXCK	D49
104	PC13/D11/ECOL	D50
105	PC16/D14/ETX3	D47
106	PC15/D13/ETX2	D48
107	PC18/NWR0/NWE/PWMH6	D45
108	PC17/D15/ETXER	D46
109	PC20/NANDWE/PWMH4	D43
110	PC19/NANDOE/PWMH5	D44
111	PC22/A1/PWML5	D8
112	PC21/A0/NBS0/PWML4	D9
113	PC24/A3/PWML7	D6
114	PC23/A2/PWML6	D7
115	PC26/A5/TIOB6	D4
116	PC25/A4/TIOA6	D5

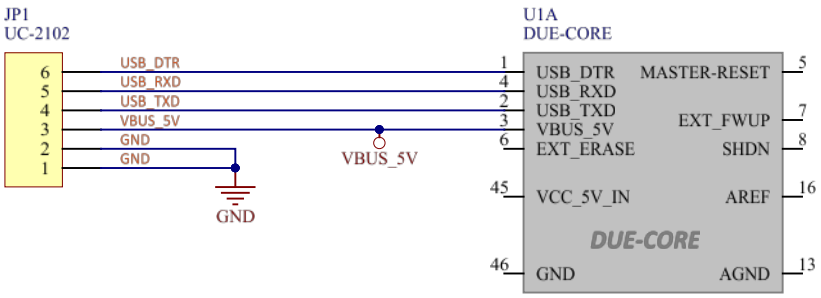
Notes:

- D4 connected to both PA29 andPC26
- D10 connected to both PA28 andPC29
- The board can be powered by Pin45/46 VCC_5V_IN and GND , also can be powered by USB or Programming port.
- If VCC_5V_IN and USB or Programming port are connected at the same time , the board will VCC_5V_IN is priority.
- The VCC_5V_IN must limit tolerance within +/-5% , which means the voltage range is 4.75-5.25V

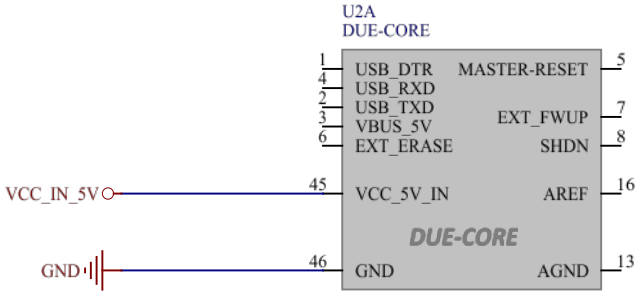
- The GND(Pin-46) and AGND(Pin-13) are connected by onboard 0R resistor.

4 Typical application

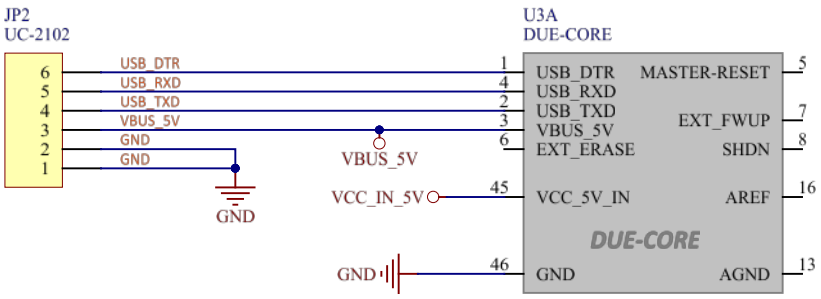
Power Connection 1: powered by Programming port, in this case , the module can be powered by VBUS_5V form the USB to UART cable (Recommend UC-2102). The connection as below :



Power Connection 2: powered by VCC_IN_5V, in this case , The VCC_5V_IN must limit tolerance within +/-5% , which means the voltage range is 4.75-5.25V. The connection as below :



Power Connection 3: Both Programming port and VCC_5V_IN are connected , In this case , the VCC_IN_5V is priority, The connection as below :



NOTE: THE POWER SUPPLY TO THE MODULE IS 5V , BUT THE MCU IS WOKING UNDER 3.3V , THE ONBOARD LDO WILL REGULATE THE 5V POWER TO 3.3V.

5 Uploading Sketch

The AT91SAM3X8E is already build in bootlaoder , user can be uploading sketch by two ways with Arduino IDE:

Native port: To use this port, select "Arduino Due (Native USB Port)" as your board in the Arduino IDE. The Native USB port is connected directly to the SAM3X. Connect the Due's Native USB port to your computer. Opening and closing the Native port at 1200bps triggers a 'soft erase' procedure: the flash memory is erased and the board is restarted with the bootloader. If the MCU crashed for some reason it is likely that the soft erase procedure won't work as this procedure happens entirely in software on the SAM3X. Opening and closing the native port at a different baudrate will not reset the SAM3X.

Programming port: To use this port, select "Arduino Due (Programming Port)" as your board in the Arduino IDE. Connect the Due's programming port to your computer through a standard USB to Serial convertor (UC-2102). The UC-2102 use CP-2102 as a USB-to-serial chip connected to the first UART of the SAM3X (RX0 and TX0). The UC-2102 DTR pin is contorl the Reset pins of the SAM3X. Press the “ERASE button” on the module will triggers a “hard erase” procedure of the SAM3X chip, activating the Erase pins on the SAM3X before communicating with the UART. This is the recommended port for programming the Due. It is more reliable than the "soft erase" that occurs on the Native port, and it should work even if the main MCU has crashed.

Erase Protection: In order to prevent misoperation to erase Flash data, DUE CORE designed a jumper to connection ERASE buttons and MCU Erase Pin, remove the jumper ERASE buttons and MCU pins can be disconnected, even if this time the ERASE button is pressed, it will not erase Flash data. When your program development is completed, officially delivered to the user in use, remove the jumper, it can be prevent Flash data loss caused by user errors operation.

6 For more about DUE , please refer link: https://www.arduino.cc/en/Main/ArduinoBoardDue