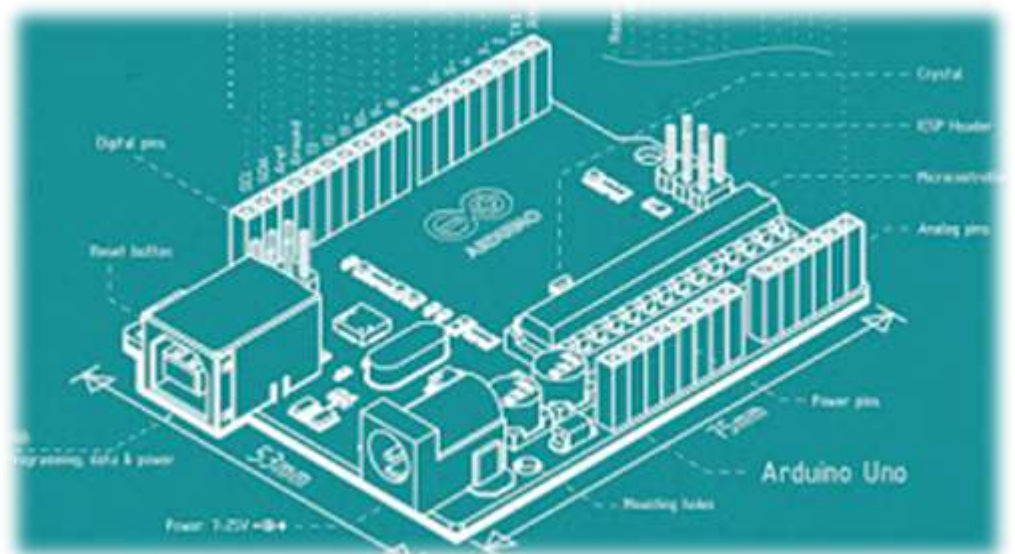


Panduan Instrumentasi



zidCreative

3D Printing



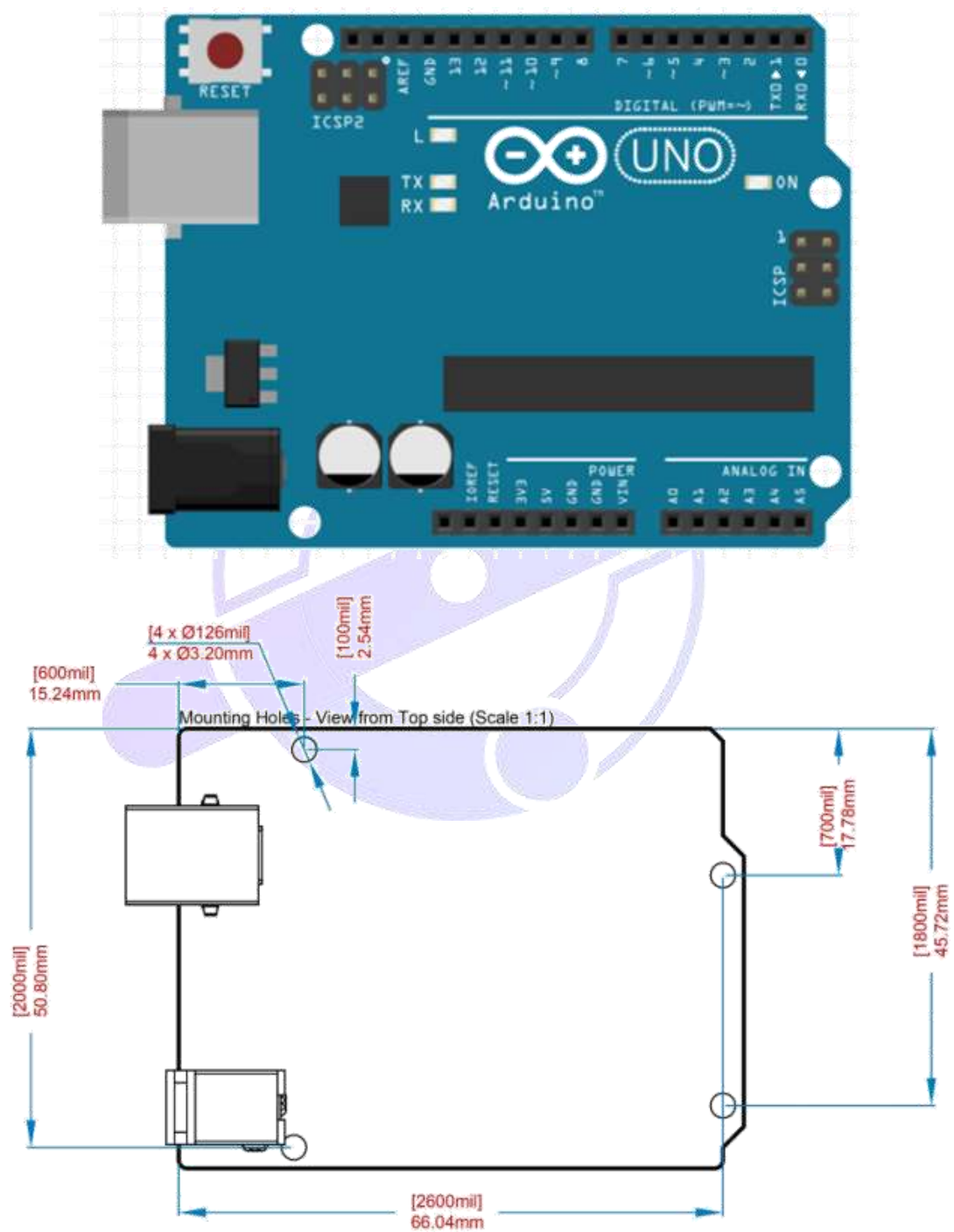
Daftar Isi

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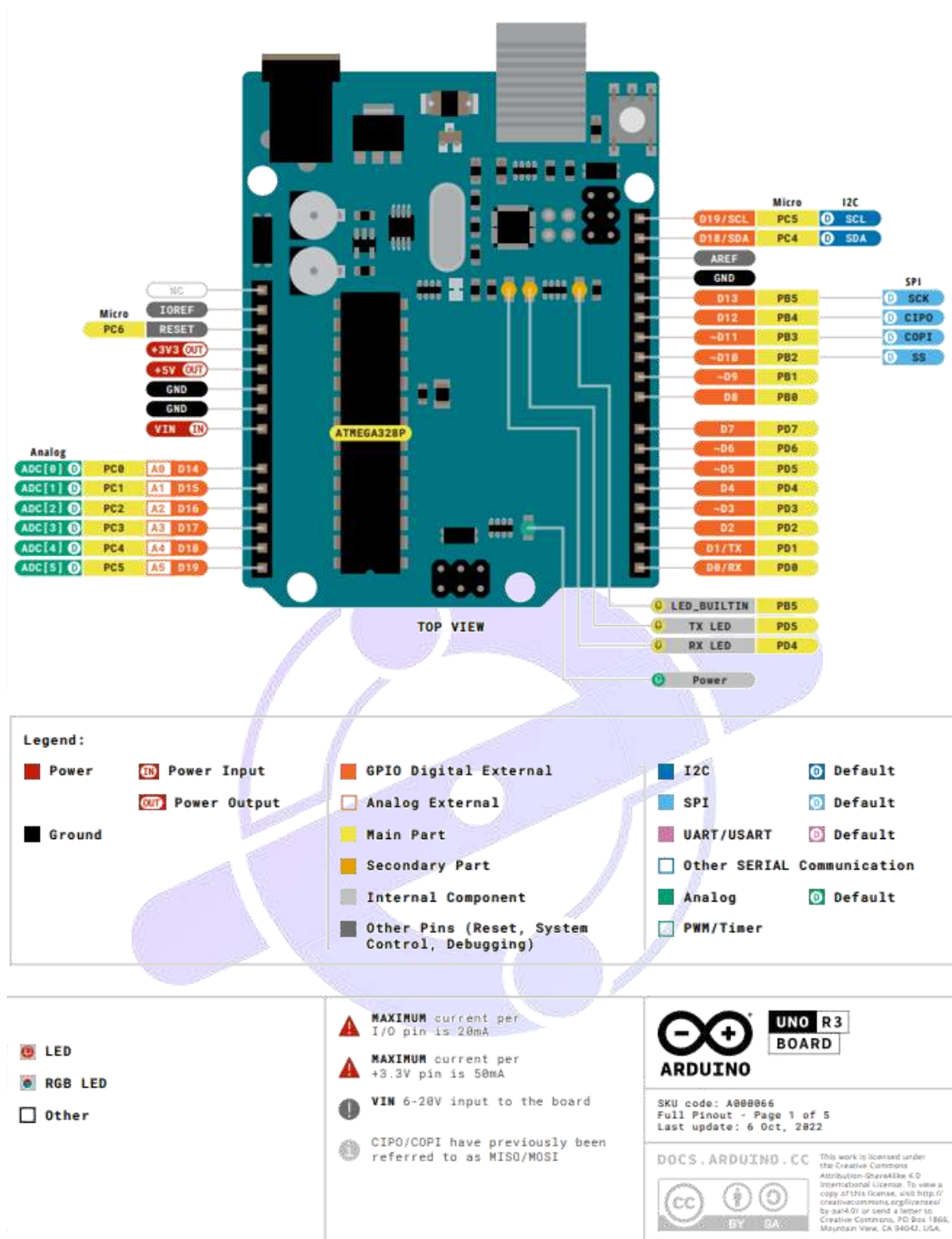
Arduino Uno

➤ Dimensi



➤ Interface

GPIO



➤ Spesifikasi

5.1 JANALOG

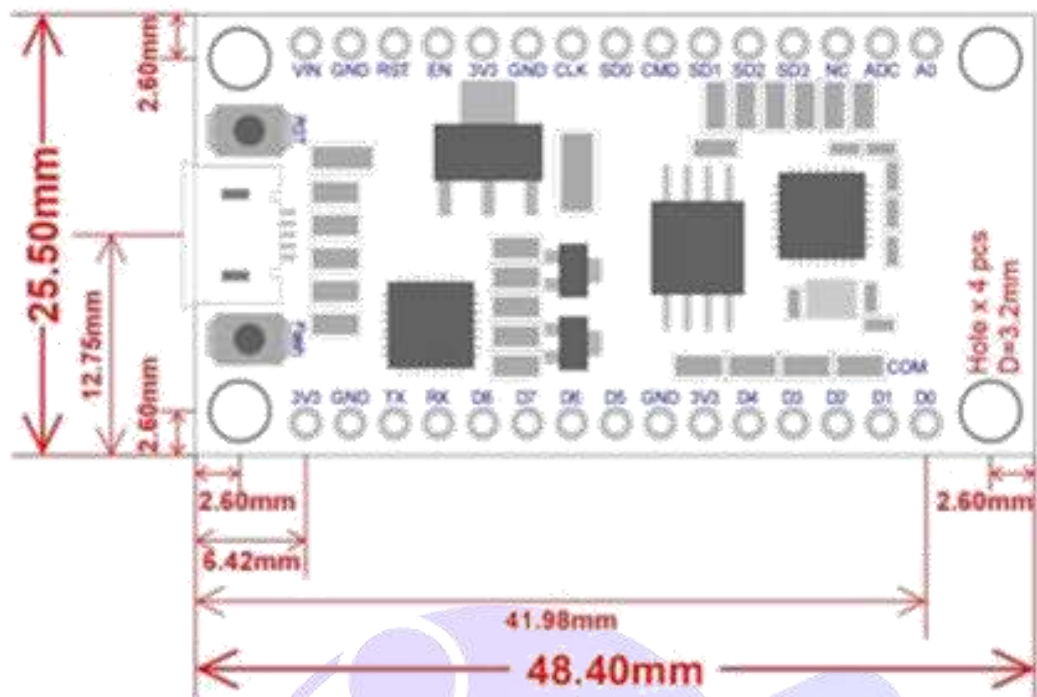
Pin	Function	Type	Description
1	NC	NC	Not connected
2	IOREF	IOREF	Reference for digital logic V - connected to 5V
3	Reset	Reset	Reset
4	+3V3	Power	+3V3 Power Rail
5	+5V	Power	+5V Power Rail
6	GND	Power	Ground
7	GND	Power	Ground
8	VIN	Power	Voltage Input
9	A0	Analog/GPIO	Analog input 0 /GPIO
10	A1	Analog/GPIO	Analog input 1 /GPIO
11	A2	Analog/GPIO	Analog input 2 /GPIO
12	A3	Analog/GPIO	Analog input 3 /GPIO
13	A4/SDA	Analog input/I2C	Analog input 4/I2C Data line
14	A5/SCL	Analog input/I2C	Analog input 5/I2C Clock line

5.2 JDIGITAL

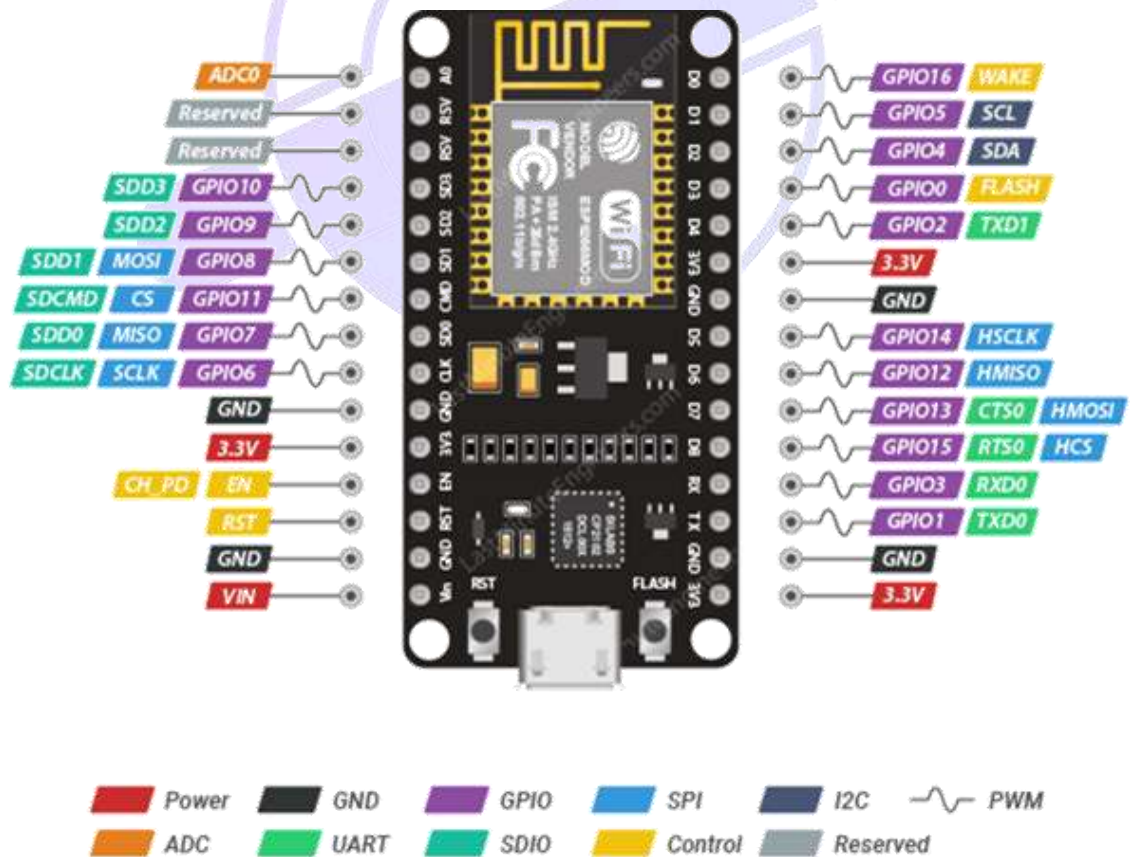
Pin	Function	Type	Description
1	D0	Digital/GPIO	Digital pin 0/GPIO
2	D1	Digital/GPIO	Digital pin 1/GPIO
3	D2	Digital/GPIO	Digital pin 2/GPIO
4	D3	Digital/GPIO	Digital pin 3/GPIO
5	D4	Digital/GPIO	Digital pin 4/GPIO
6	D5	Digital/GPIO	Digital pin 5/GPIO
7	D6	Digital/GPIO	Digital pin 6/GPIO
8	D7	Digital/GPIO	Digital pin 7/GPIO
9	D8	Digital/GPIO	Digital pin 8/GPIO
10	D9	Digital/GPIO	Digital pin 9/GPIO
11	SS	Digital	SPI Chip Select
12	MOSI	Digital	SPI1 Main Out Secondary In
13	MISO	Digital	SPI Main In Secondary Out
14	SCK	Digital	SPI serial clock output
15	GND	Power	Ground
16	AREF	Digital	Analog reference voltage
17	A4/SD4	Digital	Analog input 4/I2C Data line (duplicated)
18	A5/SD5	Digital	Analog input 5/I2C Clock line (duplicated)

NodeMCU ESP8266

➤ Dimensi_____



➤ Interface



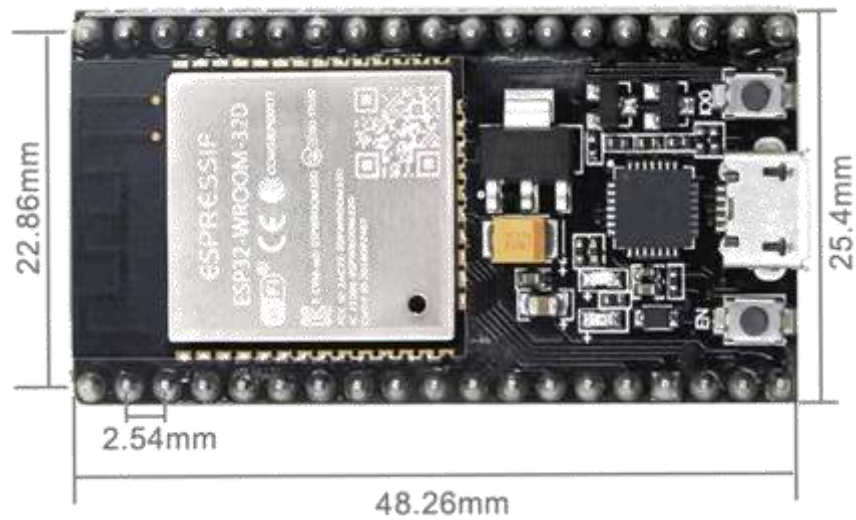
➤ Spesifikasi

Parameters	Conditions	Min	Typical	Max	Unit
Operating Temperature Range	-	-40	Normal	125	°C
Maximum Soldering Temperature	IPC/JEDEC J-STD-020	-	-	260	°C
Working Voltage Value	-	2.5	3.3	3.6	V
I/O	V_{IL}	-0.3	-	$0.25 V_{IO}$	V
	V_{IH}	$0.75 V_{IO}$	-	3.6	
	V_{OL}	-	-	$0.1 V_{IO}$	
	V_{OH}	$0.8 V_{IO}$	-	-	
	I_{MAX}	-	-	12	mA
Electrostatic Discharge (HBM)	TAMB = 25 °C	-	-	2	KV
Electrostatic Discharge (CDM)	TAMB = 25 °C	-	-	0.5	KV

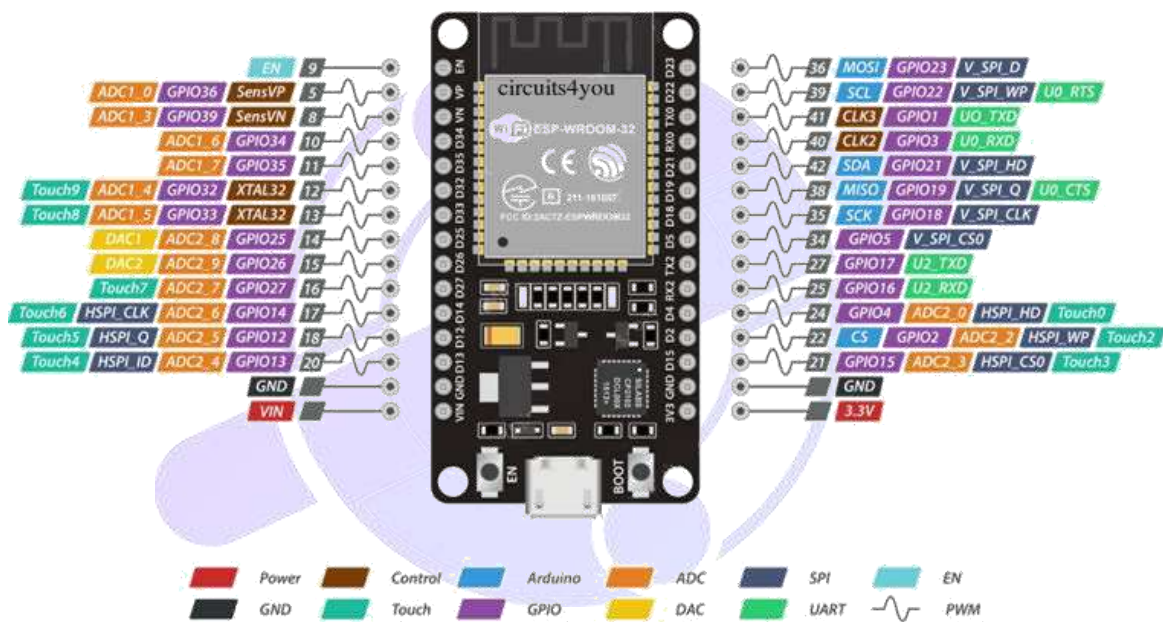
GPIO NO.	Pin NO.	Pin name
GPIO0	pin15	GPIO0_U
GPIO1	pin26	U0TXD_U
GPIO2	pin14	GPIO2_U
GPIO3	pin25	U0RXD_U
GPIO4	pin16	GPIO4_U
GPIO5	pin24	GPIO5_U
GPIO6	pin21	SD_CLK_U
GPIO7	pin22	SD_DATA0_U
GPIO8	pin23	SD_DATA1_U
GPIO9	pin18	SD_DATA2_U
GPIO10	pin19	SD_DATA3_U
GPIO11	pin20	SD_CMD_U
GPIO12	pin10	MTDI_U
GPIO13	pin12	MTCK_U
GPIO14	pin9	MTMS_U
GPIO15	pin13	MTDO_U

NodeMCU ESP32

➤ Dimensi_____



➤ Interface



➤ Spesifikasi

Name	No.	Type	Function
Analog			
VDDA	1	P	Analog power supply (2.3 V ~ 3.6 V)
LNA_IN	2	I/O	RF input and output
VDD3P3	3	P	Analog power supply (2.3 V ~ 3.6 V)
VDD3P3	4	P	Analog power supply (2.3 V ~ 3.6 V)
VDD3P3_RTC			
SENSOR_VP	5	I	GPIO36, ADC1_CH0, RTC_GPIO0
SENSOR_CAPP	6	I	GPIO37, ADC1_CH1, RTC_GPIO1
SENSOR_CAPN	7	I	GPIO38, ADC1_CH2, RTC_GPIO2
SENSOR_VN	8	I	GPIO39, ADC1_CH3, RTC_GPIO3
CHIP_PU	9	I	High: On; enables the chip Low: Off; the chip shuts down Note: Do not leave the CHIP_PU pin floating.
VDET_1	10	I	GPIO34, ADC1_CH6, RTC_GPIO4
VDET_2	11	I	GPIO35, ADC1_CH7, RTC_GPIO5
32K_XP	12	I/O	GPIO32, ADC1_CH4, RTC_GPIO9, TOUCH9, 32K_XP (32.768 kHz crystal oscillator input)
32K_XN	13	I/O	GPIO33, ADC1_CH5, RTC_GPIO8, TOUCH8, 32K_XN (32.768 kHz crystal oscillator output)
GPIO25	14	I/O	GPIO25, ADC2_CH8, RTC_GPIO6, DAC_1, EMAC_RXD0
GPIO26	15	I/O	GPIO26, ADC2_CH9, RTC_GPIO7, DAC_2, EMAC_RXD1
GPIO27	16	I/O	GPIO27, ADC2_CH7, RTC_GPIO17, TOUCH7, EMAC_RX_DV
MTMS	17	I/O	GPIO14, ADC2_CH6, RTC_GPIO16, TOUCH6, EMAC_TXD2, HSPICLK, HS2_CLK, SD_CLK, MTMS
MTDI	18	I/O	GPIO12, ADC2_CH5, RTC_GPIO15, TOUCH5, EMAC_TXD3, HSPICLK, HS2_DATA2, SD_DATA2, MTDI
VDD3P3_RTC	19	P	Input power supply for RTC IO (2.3 V ~ 3.6 V)
MTCK	20	I/O	GPIO13, ADC2_CH4, RTC_GPIO14, TOUCH4, EMAC_RX_ER, HSPID, HS2_DATA3, SD_DATA3, MTCK
MTDO	21	I/O	GPIO15, ADC2_CH3, RTC_GPIO13, TOUCH3, EMAC_RXD3, HSPICLK, HS2_CMD, SD_CMD, MTDO

Name	No.	Type	Function
GPIO2	22	I/O	GPIO2, ADC2_CH2, RTC_GPIO12, TOUCH2, HSPWP, HS2_DATA0, SD_DATA0
GPIO0	23	I/O	GPIO0, ADC2_CH1, RTC_GPIO11, TOUCH1, EMAC_TX_CLK, CLK_OUT1,
GPIO4	24	I/O	GPIO4, ADC2_CH0, RTC_GPIO10, TOUCH0, EMAC_TX_ER, HSPID, HS2_DATA1, SD_DATA1
VDD_SDIO			
GPIO16	25	I/O	GPIO16, HS1_DATA4, U2RXD, EMAC_CLK_OUT
VDD_SDIO	26	P	Output power supply: 1.8 V or the same voltage as VDD3P3_RTC
GPIO17	27	I/O	GPIO17, HS1_DATA5, U2TXD, EMAC_CLK_OUT_180
SD_DATA_2	28	I/O	GPIO9, HS1_DATA2, U1RXD, SD_DATA2, SPIHD
SD_DATA_3	29	I/O	GPIO10, HS1_DATA3, U1TXD, SD_DATA3, SPIWP
SD_CMD	30	I/O	GPIO11, HS1_CMD, U1RTS, SD_CMD, SPICLK
SD_CLK	31	I/O	GPIO6, HS1_CLK, U1CTS, SD_CLK, SPIQ
SD_DATA_0	32	I/O	GPIO7, HS1_DATA0, U2RTS, SD_DATA0, SPIQ
SD_DATA_1	33	I/O	GPIO8, HS1_DATA1, U2CTS, SD_DATA1, SPID
VDD3P3_CPU			
GPIO5	34	I/O	GPIO5, HS1_DATA6, VSPICLK, EMAC_RX_CLK
GPIO18	35	I/O	GPIO18, HS1_DATA7, VSPICLK
GPIO23	36	I/O	GPIO23, HS1_STROBE, VSPID
VDD3P3_CPU	37	P	Input power supply for CPU IO (1.8 V ~ 3.6 V)
GPIO19	38	I/O	GPIO19, U0CTS, VSPICLK, EMAC_TXD0
GPIO22	39	I/O	GPIO22, U0RTS, VSPWP, EMAC_TXD1
U0RXD	40	I/O	GPIO3, U0RXD, CLK_OUT2
U0TXD	41	I/O	GPIO1, U0TXD, CLK_OUT3, EMAC_RXD2
GPIO21	42	I/O	GPIO21, VSPID, EMAC_TX_EN
Analog			
VDDA	43	P	Analog power supply (2.3 V ~ 3.6 V)
XTAL_N	44	O	External crystal output
XTAL_P	45	I	External crystal input
VDDA	46	P	Analog power supply (2.3 V ~ 3.6 V)
CAP2	47	I	Connects to a 3.3 nF (10%) capacitor and 20 kΩ resistor in parallel to CAP1

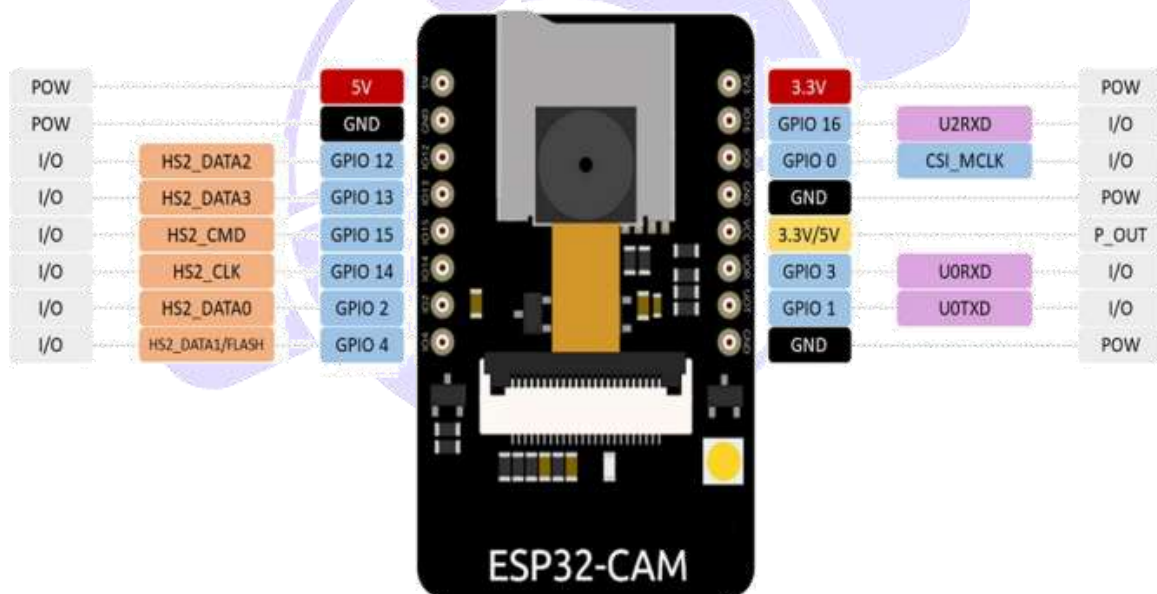
Name	No.	Type	Function
CAP1	48	I	Connects to a 10 nF series capacitor to ground
GND	49	P	Ground

ESP32-CAM

➤ Dimensi



➤ Interface



➤ Spesifikasi

Module Model	ESP32-CAM
Package	DIP-16
Size	27*40.5*4.5 (±0.2) mm
SPI Flash	Default 32Mbit
RAM	520KB SRAM +4M PSRAM
Bluetooth	Bluetooth 4.2 BR/EDR and BLE standards
Wi-Fi	802.11 b/g/n/
Support interface	UART、SPI、I2C、PWM
Support TF card	Maximum support 4G
IO port	9
UART Baudrate	Default 115200 bps
Image Output Format	JPEG(OV2640 support only),BMP,GRAYSCALE
Spectrum Range	2412 ~2484MHz
Antenna	Onboard PCB antenna, gain 2dBi
Transmit Power	802.11b: 17±2 dBm (@11Mbps) 802.11g: 14±2 dBm (@54Mbps) 802.11n: 13±2 dBm (@MCS7)
Receiving Sensitivity	CCK, 1 Mbps : -90dBm CCK, 11 Mbps: -85dBm 6 Mbps (1/2 BPSK): -88dBm 54 Mbps (3/4 64-QAM): -70dBm MCS7 (65 Mbps, 72.2 Mbps): -67dBm
Power Dissipation	Turn off the flash lamp:180mA@5V Turn on the flash lamp and turn on the brightness to the maximum:310mA@5V Deep-sleep: Minimum power consumption can be achieved 6mA@5V Modern-sleep: Minimum up to 20mA@5V Light-sleep: Minimum up to 6.7mA@5V
Security	WPA/WPA2/WPA2-Enterprise/WPS
Power Supply Range	5V
Operating Temperature	-20 °C ~ 85 °C
Storage Environment	-40 °C ~ 90 °C , < 90%RH

Arduino Nano

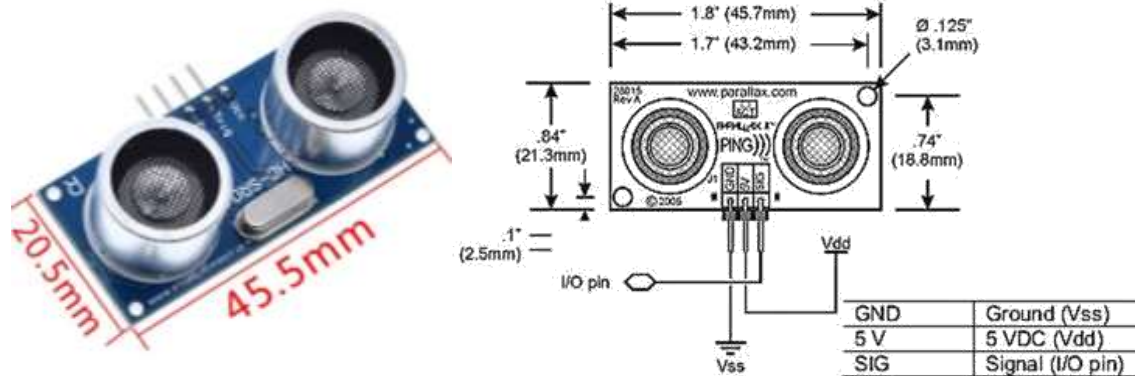
➤ Dimensi_____



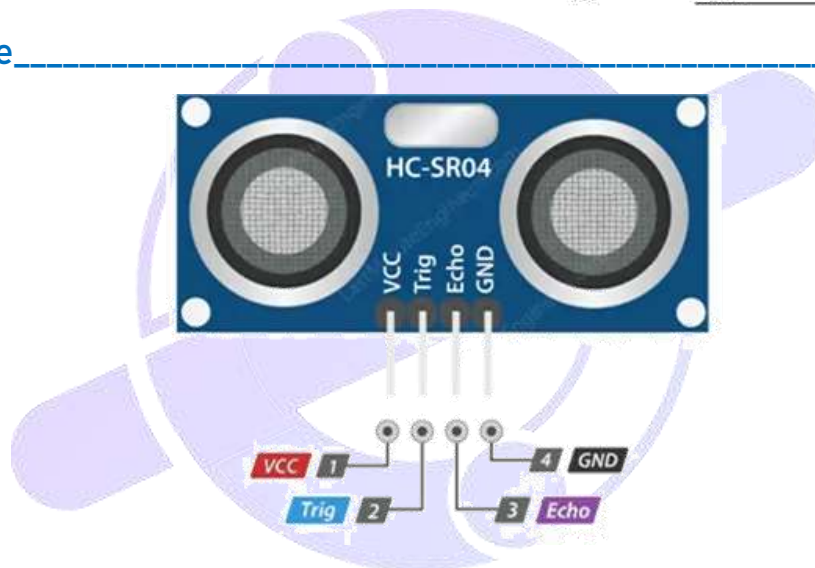
SENSOR

Sensor HCSR-04

➤ Dimensi



➤ Interface



➤ Spesifikasi

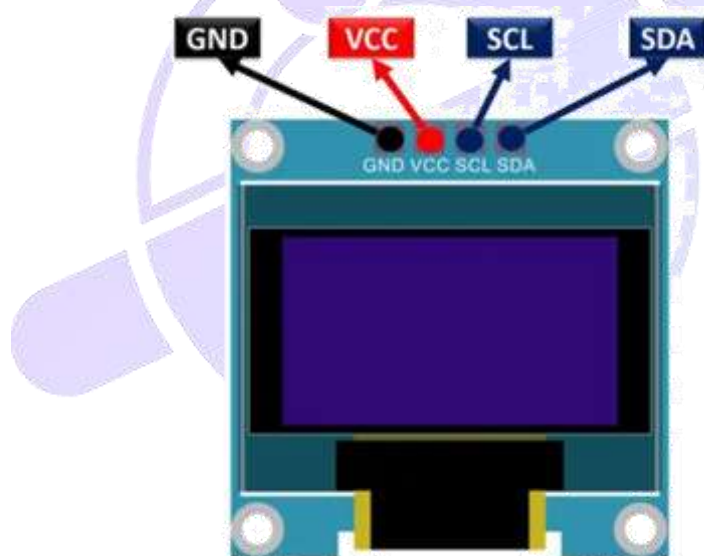
Working Voltage	DC 5 V
Working Current	15mA
Working Frequency	40Hz
Max Range	4m
Min Range	2cm
MeasuringAngle	15 degree
Trigger Input Signal	10uS TTL pulse
Echo Output Signal	Input TTL lever signal and the range in proportion
Dimension	45*20*15mm

OLED Display

➤ Dimensi



➤ Interface

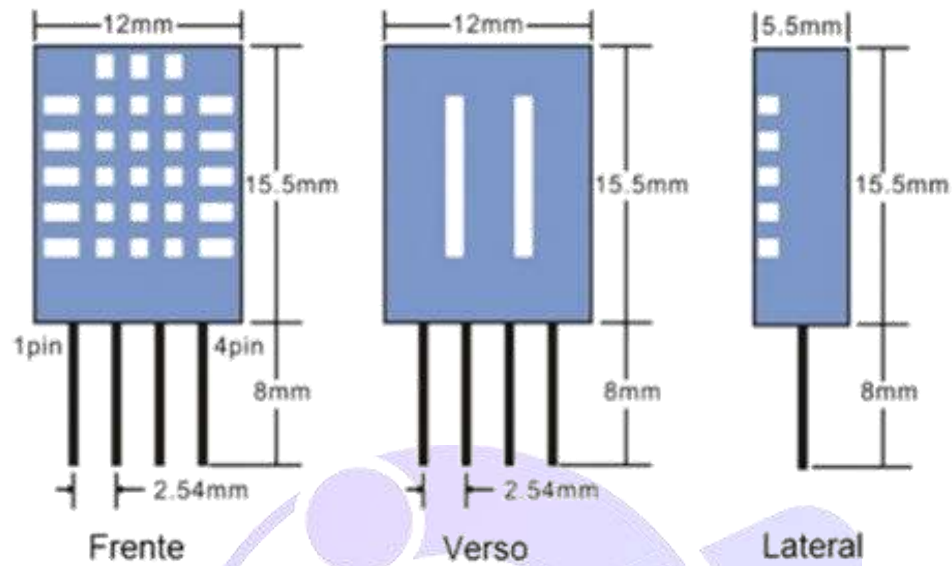


➤ Spesifikasi

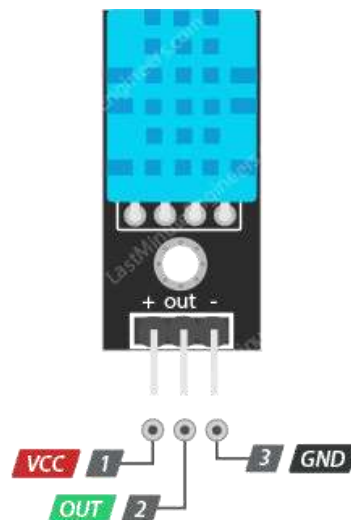
Item	Symbol	Min	Max	Unit	Note
Supply Voltage for Operation	V_{DD}	-0.3	4	V	Note 1, 2
Supply Voltage for Display	V_{CC}	0	11	V	
Operating Temperature	T_{op}	-30	70	°C	
Storage Temperature	T_{stg}	-40	80	°C	
Static Electricity	Be sure that you are grounded when handling displays.				

DHT11

➤ Dimensi



➤ Interface



➤ Spesifikasi

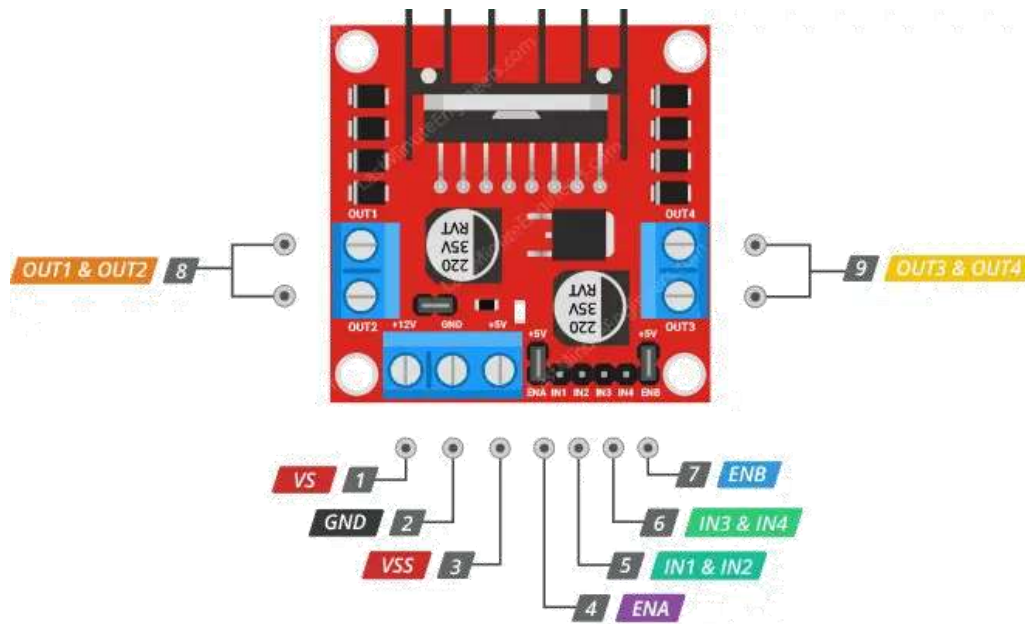
Parameters	Conditions	Minimum	Typical	Maximum
Humidity				
Resolution		1%RH	1%RH	1%RH
			8 Bit	
Repeatability			±1%RH	
Accuracy	25°C		±4%RH	
	0-50°C			±5%RH
Interchangeability Fully Interchangeable				
Measurement Range	0°C	30%RH		90%RH
	25°C	20%RH		90%RH
	50°C	20%RH		80%RH
Response Time (Seconds)	1/e(63%)25°C, 1m/s Air	6 S	10 S	15 S
Hysteresis			±1%RH	
Long-Term Stability	Typical		±1%RH/year	
Temperature				
Resolution		1°C	1°C	1°C
		8 Bit	8 Bit	8 Bit
Repeatability			±1°C	
Accuracy		±1°C		±2°C
Measurement Range		0°C		50°C
Response Time (Seconds)	1/e(63%)	6 S		30 S

Driver Motor L298N

➤ Dimensi



➤ Interface



➤ Spesifikasi

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_S	Power supply	50	V
V_{SS}	Logic supply voltage	7	V
V_i, V_{en}	Input and enable voltage	-0.3 to 7	V
I_O	Peak output current (each channel):		
	• Non repetitive ($t = 100\text{ ms}$)	3	A
	• repetitive (80% on -20% off, $t_{on} = 10\text{ ms}$)	2.5	A
	• DC operation	2	A
V_{sens}	Sensing voltage	-1 to 2.3	V
P_{tot}	Total power dissipation ($t_{case} = 75\text{ }^{\circ}\text{C}$)	25	W
T_{op}	Junction operating temperature	-25 to 130	$^{\circ}\text{C}$
T_{stg}, T_j	Storage and junction temperature	-40 to 150	$^{\circ}\text{C}$

Table 2. Thermal data

Symbol	Parameter		Power SO20	Multiwatt 15	Unit
$R_{th\ j-case}$	Thermal resistance junction-case	Max.	—	3	$^{\circ}\text{C/W}$
$R_{th\ j-amb}$	Thermal resistance junction-ambient	Max.	13 ⁽⁵⁾	35	$^{\circ}\text{C/W}$

Table 3. Pin function

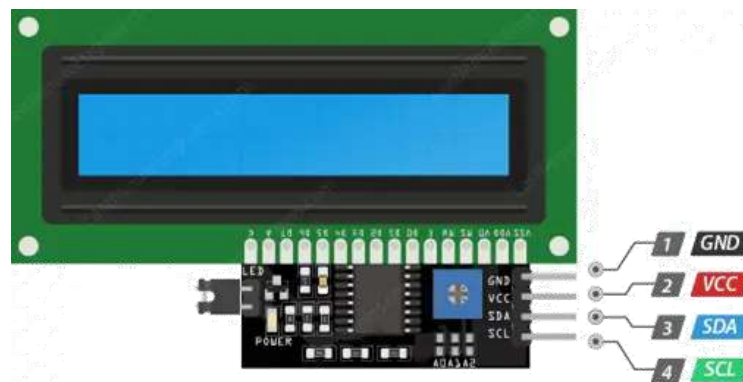
MW.15	Power SO	Name	Function
1, 15	2, 19	Sense A, Sense B	Between this pin and ground is connected the sense resistor to control the current of the load.
2, 3	4, 5	Out 1, Out 2	Outputs of the bridge A; the current that flows through the load connected between these two pins is monitored at pin 1.
4	6	V _S	Supply voltage for the power output stages. Anon-inductive 100nF capacitor must be connected between this pin and ground.
5, 7	7, 9	Input 1, Input 2	TTL compatible inputs of the bridge A.
6, 11	8, 14	Enable A, Enable B	TTL compatible enable input: the L state disables the bridge A (enable A) and/or the bridge B (enable B).
8	1, 10, 11, 20	GND	Ground.
9	12	VSS	Supply voltage for the logic blocks. A 100nF capacitor must be connected between this pin and ground.
10, 12	13, 15	Input 3, Input 4	TTL compatible inputs of the bridge B.
13, 14	16, 17	Out 3, Out 4	Outputs of the bridge B. The current that flows through the load connected between these two pins is monitored at pin 15.
–	3, 18	N.C.	Not connected

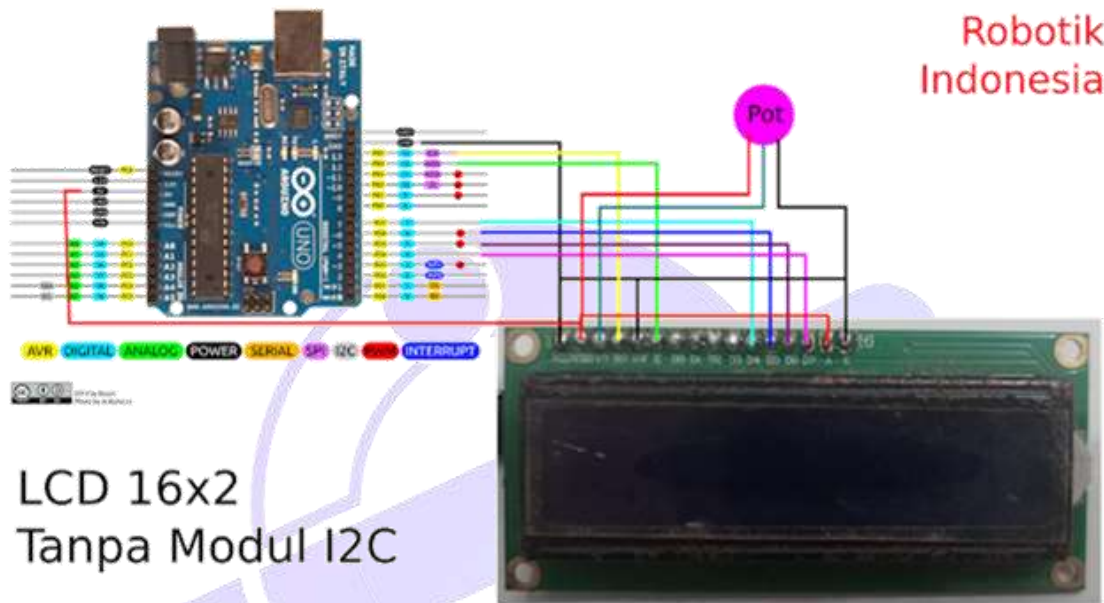
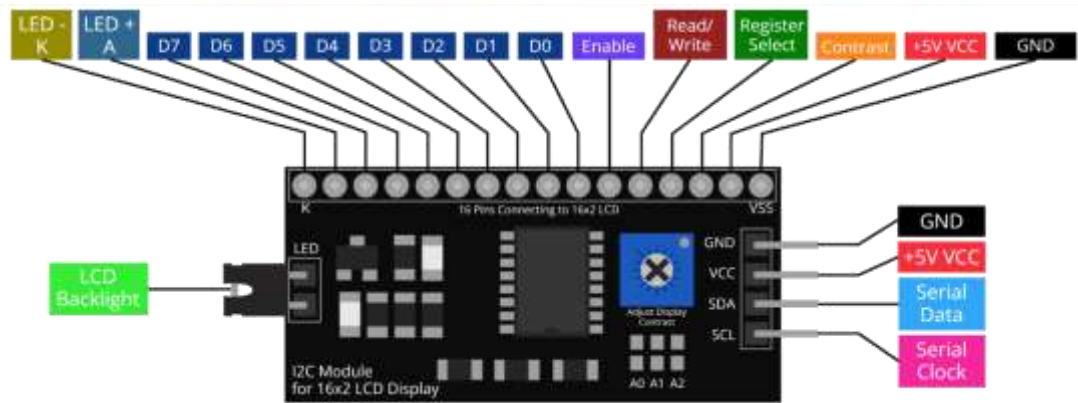
LCD I2C

► **Dimensi.**



➤ Interface





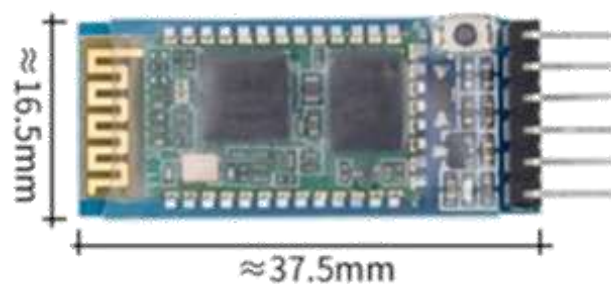
LCD 16x2
Tanpa Modul I2C

➤ Spesifikasi

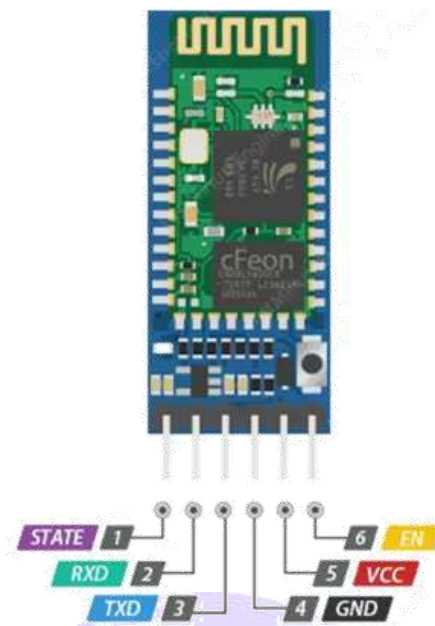
Pin	Description
VCC	3.3V/5V power input
GND	Ground
SCL	I2C clock cable
SDA	I2C data cable

Bluetooth HC05

➤ Dimensi



➤ Interface



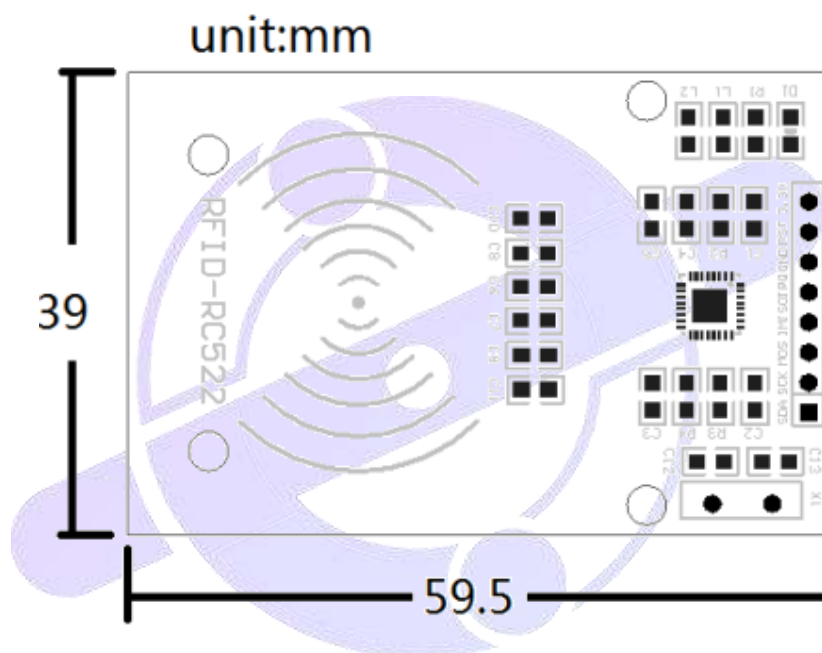
➤ Spesifikasi

Pin Number	Pin Name	Description
1	Enable / Key	This pin is used to toggle between Data Mode (set low) and AT command mode (set high). By default it is in Data mode
2	Vcc	Powers the module. Connect to +5V Supply voltage
3	Ground	Ground pin of module, connect to system ground.
4	TX – Transmitter	Transmits Serial Data. Everything received via Bluetooth will be given out by this pin as serial data.
5	RX – Receiver	Receive Serial Data. Every serial data given to this pin will be broadcasted via Bluetooth
6	State	The state pin is connected to on board LED, it can be used as a feedback to check if Bluetooth is working properly.

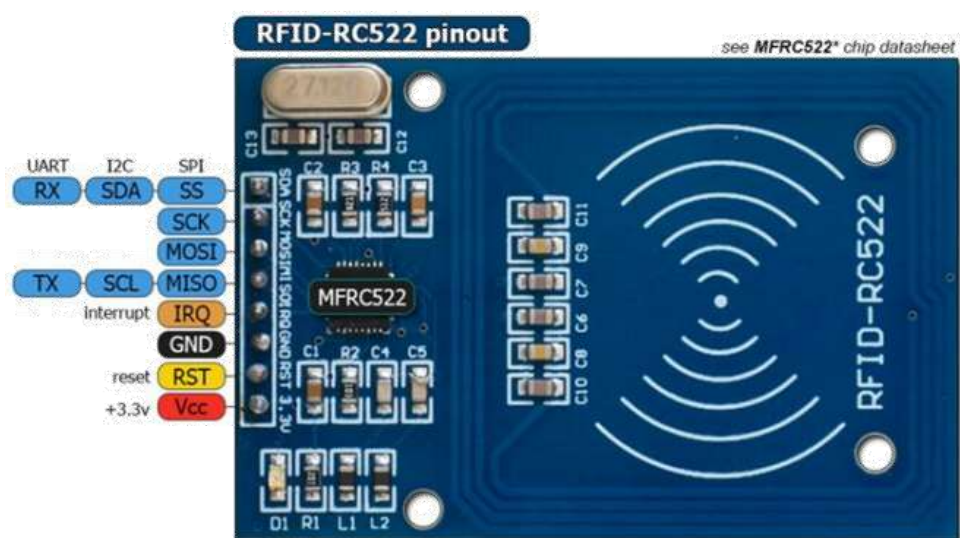
7	LED	Indicates the status of Module • Blink once in 2 sec: Module has entered Command Mode • Repeated Blinking: Waiting for connection in Data Mode • Blink twice in 1 sec: Connection successful in Data Mode
8	Button	Used to control the Key/Enable pin to toggle between Data and command Mode

RFID MFRC522

➤ Dimensi



➤ Interface



➤ Spesifikasi_____

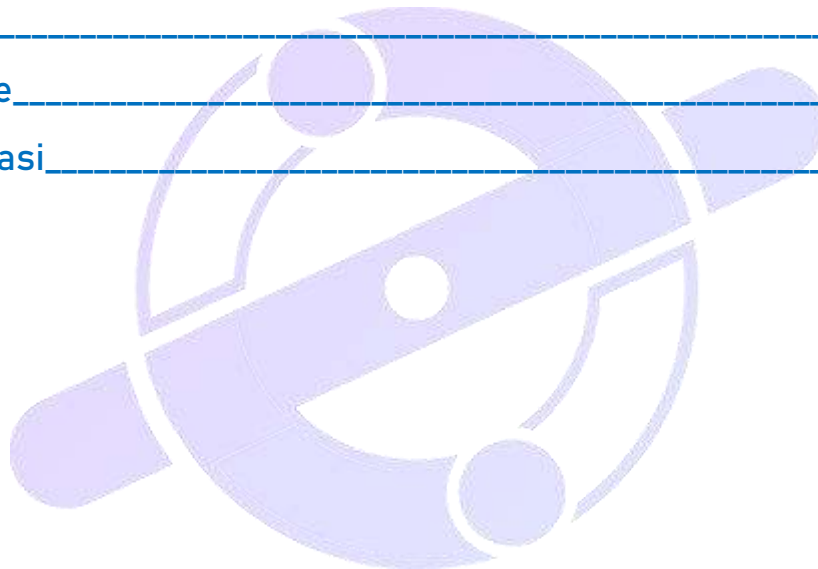
- Operating Voltage: 2.5V~3.3V.
- Operating/Standby current: 13~26mA/10~13mA.
- Operating Frequency: 13.56MHz.
- Supports ISO/IEC 14443A higher transfer speed communication up to 848 KBd.
- SPI bus speed up to 10Mbit/s.
- I2C-bus interface up to 400 kBd in Fast mode, up to 3400 kBd in High-speed mode.
- RS232 Serial UART up to 1228.8 kBd, with voltage levels dependant on pin voltage supply.
- Compatible with MIFARE and ISO 14443A cards.
- Typical operating distance in Read/Write mode up to 50 mm depending on the antenna size and tuning.

LCD I2C

➤ Dimensi_____

➤ Interface_____

➤ Spesifikasi_____



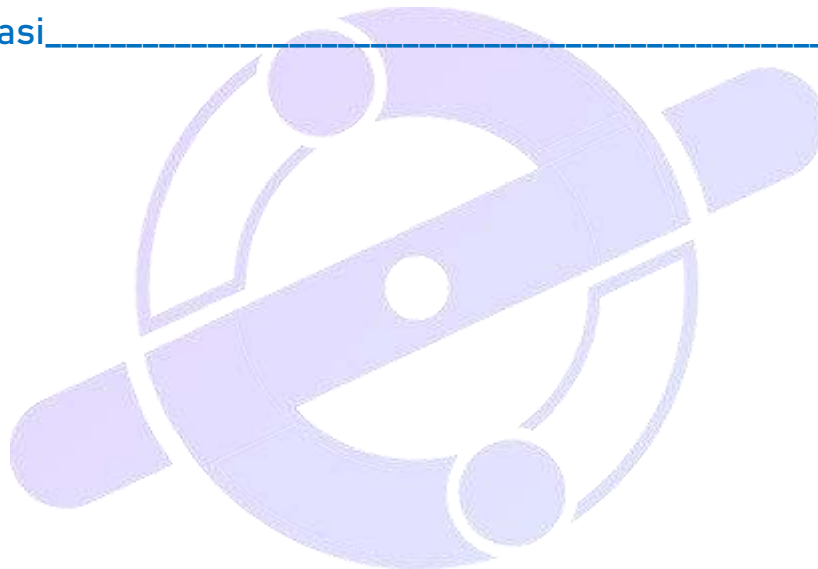
AKTUATOR

Micro Servo

- Dimensi_____
- Interface_____
- Spesifikasi_____

Stepper Motor

- Dimensi_____
- Interface_____
- Spesifikasi_____



SOFTWARE

LCD 12 X 6 I2C

- Software Fritzing
- Arduino IDE
- Miro Website
- ChatGPT openAI

