LAMPIRAN

NodeMCU v3

NodeMCU v3 is a development board which runs on the ESP8266 with the Espressif Non-OS SDK, and hardware based on the ESP-12 module. The device features 4MB of flash memory, 80MHz of system clock, around 50k of usable RAM and an on chip Wifi Transceiver.

Pin Mapping

Flash Layout

The NodeMCU v3 device features a 4 MB (32 Mb) flash memory organized in sectors of 4k each. The flash memory address starts at 0x40200000 and can be read and written from a Zerynth program using the internal flash module.

Warning

If flash memory must be used in a Zerynth program, it is recommended to begin using it from secure addresses towards the end the bytecode (start address of the bytecode can be found in the log console of Zerynth Studio during the **uplink** operation), leaving a minimum safe place to minimize the chance of clashes.

The internal flash of NodeMCU v3 can be organized in different ways. The standard VM is a non-FOTA VM with the VM code beginning at 0x0000, followed by the esp8266 ir0m image at 0x20000 and the esp_init_data at 0x3fc000. The VM is based on the Espressif RTOS SDK 1.4.1.

Device Summary

Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106

Operating Voltage: 3.3V

Input Voltage: 7-12V

Digital I/O Pins (DIO): 16

Analog Input Pins (ADC): 1

UARTs: 1

SPIs: 1

I2Cs: 1

Flash Memory: 4 MB

SRAM: 64 KB

Clock Speed: 80 Mhz

Wi-Fi: IEEE 802.11 b/g/n:

- Integrated TR switch, balun, LNA, power amplifier and matching network
- WEP or WPA/WPA2 authentication, or open networks

Power

Power to the NodeMCU v3 is supplied via the on-board USB Micro B connector or directly via the "VIN" pin. The power source is selected automatically.

The device can operate on an external supply of 6 to 20 volts. If using more than 12V, the voltage regulator may overheat and damage the device. The recommended range is 7 to 12 volts.

Connect, Register, Virtualize and Program

The NodeMCU v3 exposes the serial port of the ESP8266 module via CH340 USB to UART chip which is also connected to the boot pins of the module, allowing for a seamless virtualization of the device.

Drivers for the CH340 Module can be downloaded here and are needed for **Windows and Mac platforms**.

Once connected to a USB port the NodeMCU v3 device can be seen as a Virtual Serial port and it is automatically recognized by Zerynth Studio. The next steps are:

- **Select** the NodeMCU v3 on the **Device Management Toolbar** (disambiguate if necessary);
- **Register** the device by clicking the "Z" button from the Zerynth Studio;
- **Create** a Virtual Machine for the device by clicking the "Z" button for the second time;
- **Virtualize** the device by clicking the "Z" button for the third time.

After virtualization, the NodeMCU v3 device is ready to be programmed and the Zerynth scripts **uploaded**. Just **Select** the virtualized device from the "Device Management Toolbar" and **click** the dedicated "upload" button of Zerynth Studio.

Firmware Over the Air update (FOTA)

The Firmware Over the Air feature allows to update the device firmware at runtime. Zerynth FOTA in the NodeMCU v3 device is available for bytecode only.

Flash Layout is shown in table below:

| Start address	Size	Content
0x40200000	448 Kb	VM Slot
0x40270000	256 Kb	Bytecode Slot 0
0x402B0000	320 Kb	Bytecode Slot 1

Important

FOTA Record (small segment of memory where the current and desired state of the firmware is store) for the NodeMCU v3 is allocated in the RTC memory.
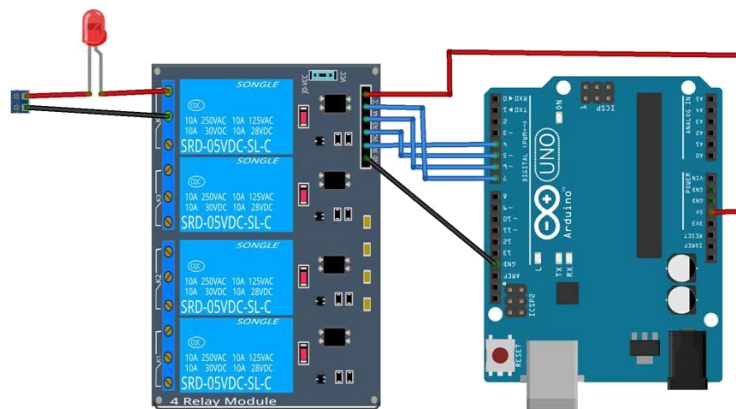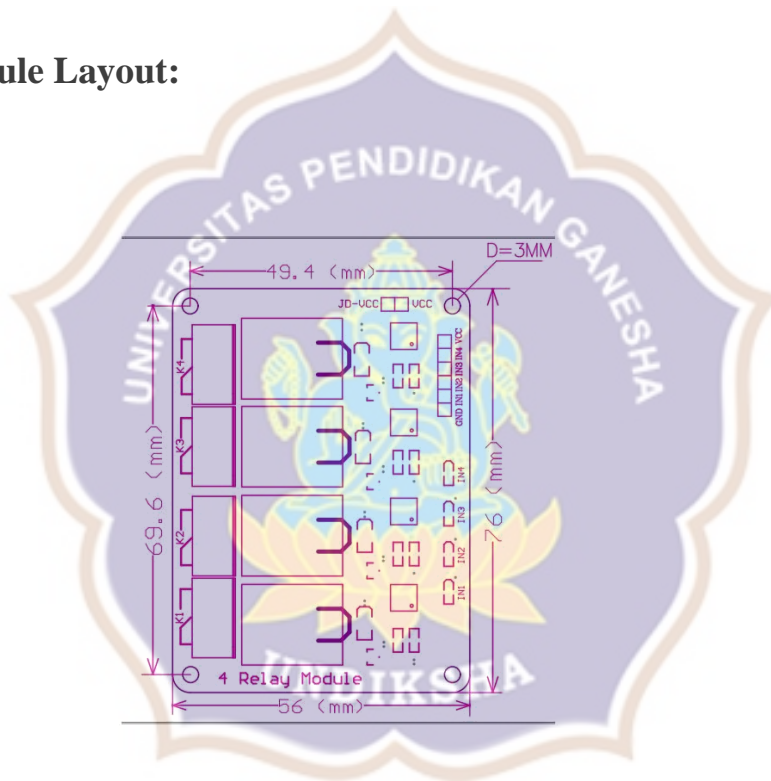
Power Management

Power Management feature allows to optimize power consumption by putting the device in low consumption state. More information in Power Management - ESP8266 section.

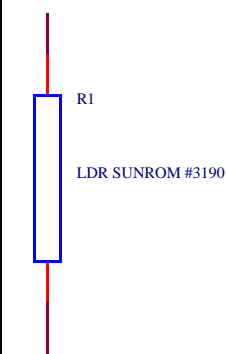**4 Channel 5V Optical Isolated Relay Module**
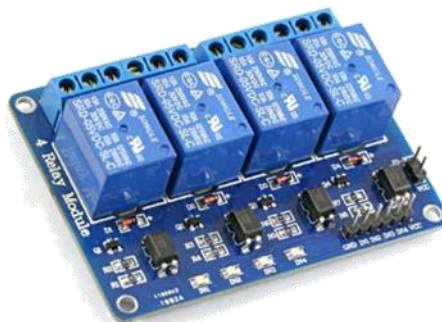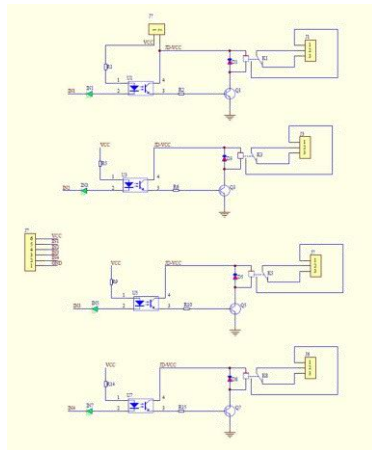
Module Layout:

Light Dependent Resistor - LDR

Parameter	Conditions	Min	Typ	Max	Unit
Cell resistance	1000 LUX	-	400	-	Ohm
	10 LUX	-	9	-	K Ohm
Dark Resistance	-	-	1	-	M Ohm
Dark Capacitance	-	-	3.5	-	pF
Rise Time	1000 LUX	-	2.8	-	ms
	10 LUX	-	18	-	ms
Fall Time	1000 LUX	-	48	-	ms
	10 LUX	-	120	-	ms
Voltage AC/DC Peak		-	-	320	V max
Current		-	-	75	mA max
Power Dissipation				100	mW max
Operating		-60	-	+75	Deg. C

Light source Illumination	LUX
Moonlight	0.1
60W Bulb at 1m	50
1W MES Bulb at 0.1m	100
Fluorescent Lighting	500
Bright Sunlight	30,000

FIGURE 1 CIRCUIT SYMBOL

R1

LDR SUNROM #3190

.144 (3.66) / .164 (4.17)

.070 (1.78) / .090 (2.29)

1.38 (35.05) / 1.62 (41.15)

AWG 24 TINNED COPPER LEADS

5

2

.172 (4.37) / .192 (4.88)

.090 (2.29) / .110 (2.79)

PLASTIC COATED TO PROTECT ACTIVE SURFACE

LEAD DIA. & PLASTIC COATING NOT CONTROLLED WITHIN .10 (2.5) OF CERAMIC SUBSTRATE
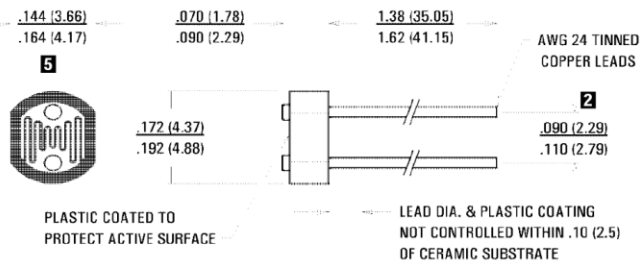
Figure 6 Sensitive light operated relay

IN4148

+12V

12V RELAY (min 110Ω)

NORP12

1.5k

2N3053

300

VR₁

5k

0V
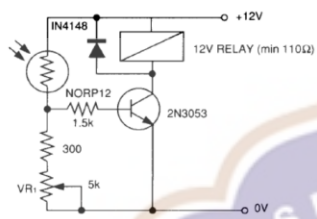
Relay energised when light level increases above the level set by VR₁

Figure 9 Logarithmic law photographic light meter

R₁

SW

OFF

+3V

NORP12

R₂

METER 100µA

0V
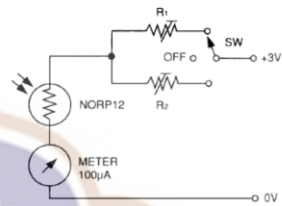
Typical value $R^1 = 100k\Omega$
$R^2 = 200k\Omega$ preset to give two overlapping ranges.
(Calibration should be made against an accurate meter.)