

lamaPLC: Multi-channel Solid State Relay Module

Microcontroller-compatible *Solid-State Relays (SSRs)* connect low-power microcontrollers to high-power AC devices. Unlike traditional mechanical relays, SSRs lack moving parts and instead use light and semiconductors for safe, quiet switching of electrical power.

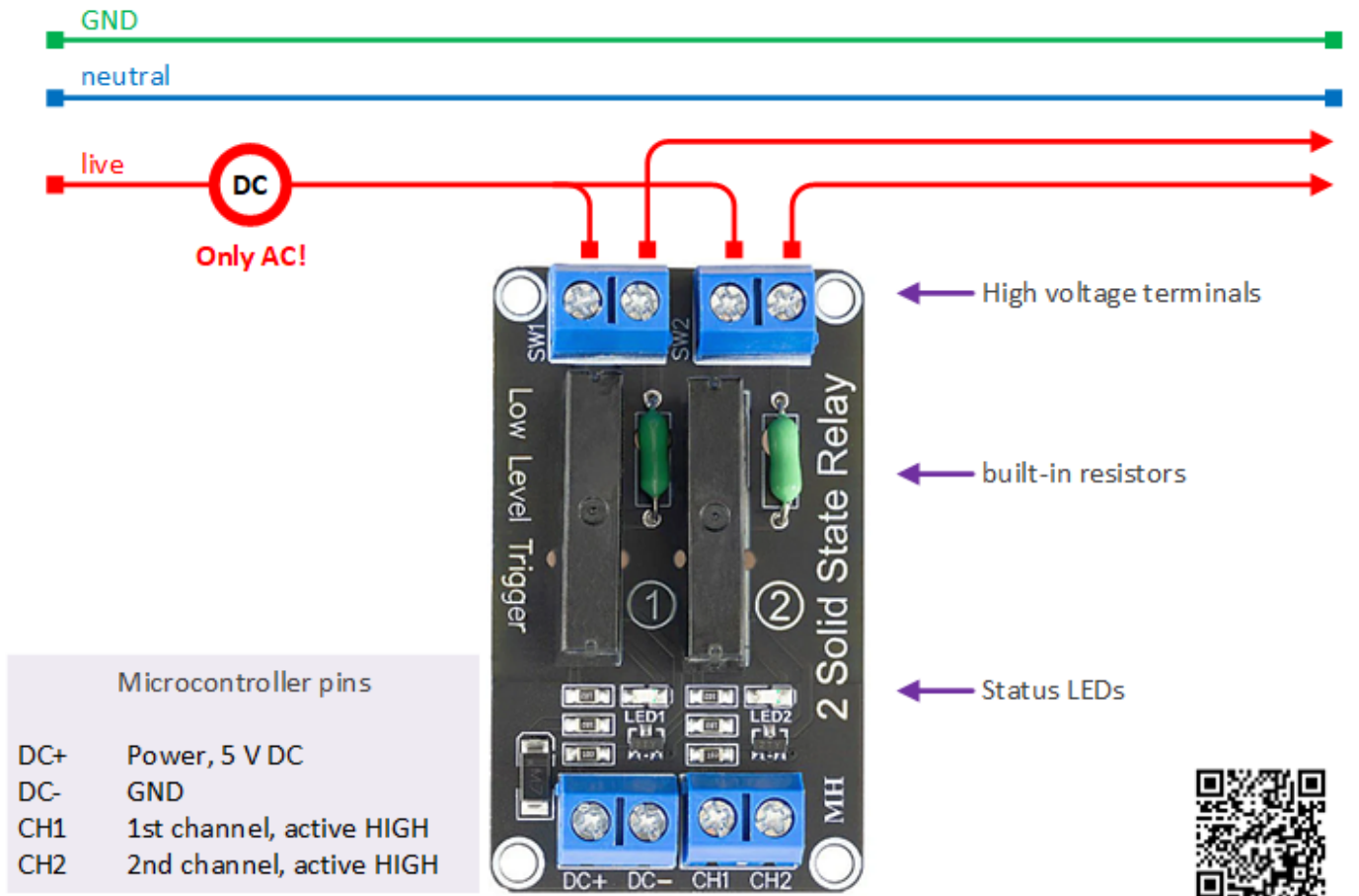


A key feature of an SSR is safety via optical isolation. When an Arduino pin outputs a HIGH signal (usually **5V** or **3.3V**), it activates a small internal Infrared (IR) LED. The chip contains a physical gap that prevents high-voltage AC from returning to the microcontroller while allowing light to pass. A light-sensitive semiconductor, such as a phototriac, is positioned opposite the LED. When it detects IR light, it becomes conductive, completing the circuit and powering the load.

Crucial Limitations

- **AC Loads Only:** The SSR uses a TRIAC output and cannot switch DC loads. Attempting to control a DC motor or LED strip will keep the relay in the “ON” position until power is completely disconnected.
- **Minimum Load Requirement:** SSRs have a small leakage current of approximately 1.5 mA. If you connect a load that draws very little current, such as a tiny 0.5W LED bulb, the light may glow faintly or flicker even when the relay is off.
- **SSR cannot be used for PWM dimming:** A zero-cross SSR like the G3MB-202P cannot be used to dim AC lights or adjust fan speeds through Arduino's `analogWrite()` (**PWM**). This relay waits for the next 0V crossing and ignores fast PWM signals, causing erratic flickering, flashing, or the relay remaining fully on. Conversely, zero-cross switching is optimized for resistive loads, providing clean switching for heating elements such as wires, soldering stations, and small heaters, as well as incandescent bulbs, which helps reduce the initial current spike that can burn out bulbs.

If you want to switch DC or increase power on AC, consider using a [multi-channel \(optocoupled\) relay module](#).



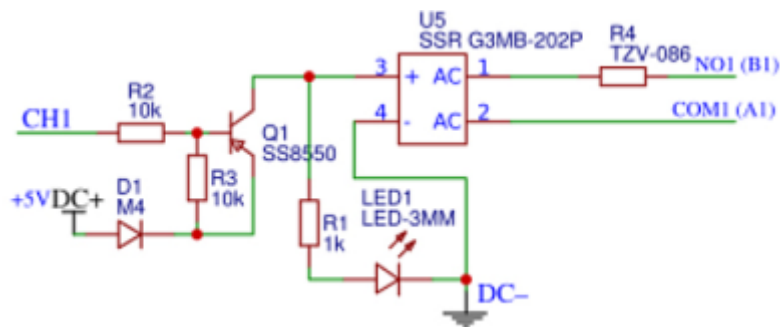
https://lamaplc.com/doku.php?id=actor:ssr_moduls



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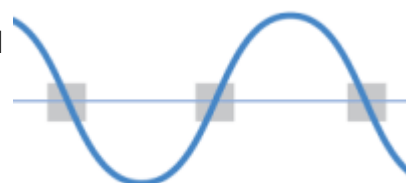
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Zero-Cross function

A Zero-Cross function is a feature in AC Solid State Relays (SSRs) that synchronizes switching. It ensures the relay opens the circuit precisely when the AC voltage sine wave crosses zero volts, minimizing electrical noise and stress. In typical household outlets, AC voltage oscillates smoothly between positive and negative peaks, such as +325V and -325V, at 50 or 60 Hz.



If your Arduino sends an “ON” signal at the peak of the wave (+230V) *without a Zero-Cross function*:

- A massive, instantaneous rush of current enters the load.
- This generates Electromagnetic Interference (EMI) and radio noise.
- It creates severe electrical stress on the component, shortening its lifespan.

The Solution: How the Zero-Cross Circuit Works

1. **The Trigger:** Arduino outputs a 5V signal to the SSR input.
2. **The Hold:** The internal zero-cross detector captures this signal. If the AC waveform is at a high voltage, the detector keeps the switch open.
3. **The Cross:** The AC waveform drops to 0 volts.
4. **The Action:** The detector immediately triggers the internal TRIAC, turning on the load smoothly with zero initial voltage.

G3MB-202P Multi-Channel Solid State Relay Module

The OMRON G3MB-202P is a low-cost, subminiature, PCB-mounting *Solid State Relay (SSR)* designed for high-density applications. It is widely used in DIY electronics, Arduino, and Raspberry Pi projects to safely switch AC loads up to 2A using low-voltage DC signals.

Key Specifications

- **Load Voltage:** 100 to 240 V AC (50/60 Hz).
- **Maximum Load Current:** 2 A.
- **Input Control Voltage:** 5 V DC (standard model variant).
- **Switching Method:** Zero-cross function (turns on when AC voltage crosses zero to reduce noise).
- **Form Factor:** 4-pin compact SIP (Single In-line Package) layout.

Sensor topics on lamaPLC

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<ul style="list-style-type: none"> • lamaPLC project: Arduino - OLED SH1106 with AHT20/BMP280 Sensor 	2026/04/23 21:51	bmp280 , aht20 , temperature , humidity , pressure , sensor , arduino , oled , sh1106 , arduino code
<ul style="list-style-type: none"> • lamaPLC project: Arduino - Vibration sensors 	2026/04/15 17:21	vibration , sensor , piezoelectric , mems , eddy-current , electrodynamic , gxfm0459 , ldtm-028k , arduino , arduino code

- [lamaPLC project: Digitales Potentiometer Board Moduls](#) 2026/04/11 18:29 [sensor, module, arduino code, renesas, x9c series, x9c102, x9c103, x9c104, x9c503, xdcp, digitally controlled potentiometer](#)
- [lamaPLC project: Sension SCD CO² measurement module](#) 2026/04/15 19:34 [scd30, scd40, scd41, iaq, ndir, sensor, i2c, arduino code](#)
- [lamaPLC: A0221AU / A02YYUW Waterproof Ultrasonic Distance Sensor with UART communication](#) 2026/04/23 21:52 [a0221au, a02yyuw, waterproof, ultrasonic, distance, sensor, uart, ip67, serial, sen0311, dfrobot](#)
- [LamaPLC: AHT10 Modul](#) 2026/03/22 03:14 [communication, i2c, temperature, humidity, sensor, aht, aht 10, modul](#)
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- [LamaPLC: Allegro ACS758 Hall-effect linear current sensors](#) 2026/04/23 21:52 [cjmcu, cjmcu-758, acs758, acs758lcb-050b, acs758lcb-100b, acs758kcb-150b, acs758ecb-200b, hall-effect, current, sensor, analog, arduino, code](#)
- [LamaPLC: APDS - Avago ALS and proximity detection sensors with I²C communication](#) 2026/04/23 21:52 [avago, apds-9900, apds-9930, apds-9960, als, proximity, detection, gesture recognition, gesture, i2c, communication, sensor, arduino, code](#)
- [lamaPLC: Arduino Modul: BME680](#) 2026/05/12 18:40 [code, c, 2026, arduino, bme680, sensor, i2c, comunication](#)
- [lamaPLC: AS5600 Magnetic Induction Angle Measurement Sensor Module](#) 2026/05/13 00:06 [communication, i2c, as5600, as-5600, magnetic, induction, angle, sensor](#)
- [LamaPLC: BMP/BME Bosch Temperature/Humidity/Pressure sensors with I²C communication](#) 2026/04/23 21:52 [bme280, bme680, bme688, bmp180, bmp280, hw-611, hw611, bosch, temperature, humidity, pressure, sensor, arduino, i2c, communication, ai, cjmcu, volatile organic compounds, vocs, volatile sulfur compounds, vscs, iaq](#)
- [LamaPLC: BQ25570 / CJMCU-2557 - Texas Instruments nano-power management IC and module](#) 2026/04/23 21:52 [bq25570, sensor, texas instruments, nano-power management, dc-dc boost charger, mppt, solar, thermoelectric, piezoelectric, energy harvesting, eh](#)
- [LamaPLC: CJMCU-219/INA-219 breakout board/IC with I²C communication](#) 2026/04/23 21:52 [cjmcu-219, ina-219, ina219, breakout board, i2c, communication, sensor, voltage, current, arduino, code, cjmcu](#)
- [LamaPLC: CJMCU-3216 / AP-3216 integrated digital ambient light and proximity sensor module/IC with I²C communication](#) 2026/04/23 21:52 [cjmcu-3216, cjmcu, ap-3216, ap3216, ambient light, proximity, sensor, arduino, code, i2c, communication](#)
- [LamaPLC: CJMCU-3901/PMW-3901 compact optical flow sensor module/IC by PixArt with SPI communication](#) 2026/04/23 21:52 [cjmcu-3901, cjmcu, pmw3901, pmw-3901, optical flow, sensor, pixart, spi, communication, arduino, code, pmw3901mb-txqt](#)

• LamaPLC: CJMCU-6701: Biosensor for measuring Galvanic Skin Response (GSR) with SPI communication	2026/04/23 21:52	cjmcu, cjmcu-6701, acs758, acs-758, galvanic skin response, gsr, electrodermal activity, eda, spi, communication, arduino, code, sensor, healthcare
• LamaPLC: CJMCU-6814 combined gas sensor module for CO, NO ₂ , NH ₃	2026/04/23 21:52	analog, cjmcu, cjmcu-6814, mics6814, mics-6814, sensor, arduino, code, carbon monoxide, co, ammonia, nh ₃ , nitrogen dioxide, no ₂
• lamaPLC: CJMCU-811 CCS811 Gas Sensor (VOCs TVOC CO ₂)	2026/04/23 21:52	cjmcu-811, ccs811, gas, sensor, vocs, tvoc, eco2, co2, arduino, air quality metal oxide, mox, i2c, micropython, rp2040-eth
• LamaPLC: CJMCU-8221 Analog Devices Precision instrumentation amplifier module	2026/04/23 21:52	cjmcu-8221, ad8221ar, analog devices, amplifier, sensor, cjmcu
• LamaPLC: D6T Omron Non-Contact Thermal Sensors with I ² C communication	2026/04/23 21:52	d6t, d6t-32l, d6t-44l, d6t-8l, d6t-1a, omron, non-contact, thermal, sensor, i2c, arduino, code
• LamaPLC: DHT Temperature /Humidity sensors with 1-wire / I ² C communication	2026/04/23 21:52	dht11, dht20, dht22, temperature, humidity, pressure, sensor, 1-wire, arduino, code
• LamaPLC: DPS Infineon Temperature/Pressure sensors with I ² C communication	2026/04/23 21:52	dps310, infineon, temperature, pressure, sensor, arduino, i2c, communication, code
• lamaPLC: DS18B20 1-Wire Digital Thermometer	2026/04/23 21:52	ds18b20, sensor, 1-wire, communication, arduino, thermometer, parasitic mode
• lamaPLC: Energy, power, current, and voltage	2025/05/31 23:32	i2c, i c, communication, arduino, energy, power, current, sensor, ina226
• LamaPLC: ENS ScioSense Multi-gas sensors with I ² C communication	2026/04/23 21:52	ens160, sciosense, gas-quality, i2c, communication, sensor, arduino, code, eco ₂ , tvoc, aqi, indoor air quality, iaq, co ₂ , voc
• lamaPLC: ENS160 + AHT21 Air Quality Sensor - CO, ECO, TVOC, Temp & Humidity Module	2026/04/23 21:52	arduino, ens160, aht21, air quality, sensor, co, eco, tvoc, module, aqi
• LamaPLC: Gas sensors	2023/07/01 17:29	gas, sensor, i2c, onewire, communication, mq-3, mq-4, mq-5, mq-6, mq-7, mq-8, mq-9, mq-135, gm-102b, gm-302b, gm-502b, gm-702b, alcohol, ch4, natural gas, smoke, lng, co, co2, lpg, h2, iso-butane, nox, nh3, benzene, town gas, formaldehyde, propane, humidity, temperature, voc, grv gas sens v2
• LamaPLC: GM MEMS Gas-sensors	2026/04/23 21:52	gm-102b, gm-302b, gm-502b, gm-702b, mems, gas-quality, sensor, arduino, code, nitrogen dioxide, no ₂ , volatile organic compounds, voc, carbon monoxide, co, ethyl alcohol, c ₂ h ₅ ch, formaldehyde, ch ₂ o, alcohol, c ₂ h ₅ oh

• lamaPLC: GY-511 6DOF sensor module	2026/04/23 21:52	stmicroelectronics , lsm303dlhc , i2c , lsm303 , sensor , gy-511 , 6dof , pololu , module , arduino
• LamaPLC: HC-SR04 Ultrasonic Sensor Module	2026/04/23 21:52	hc-sr04 , ultrasonic , sensor , arduino , code
• LamaPLC: HDC Texas Instruments Temperature/humidity sensors with I²C communication	2026/04/23 21:52	sht21 , htu21 , si7021 , gy-21 , gy-213v , hdc1080 , gy-213v-hdc1080 , cjmcu , cjmcu-1080 , texas instruments , temperature , humidity , sensor , i2c , communication , arduino , code
• LamaPLC: HTU TE Connectivity temperature/humidity sensors with I²C communication	2026/04/23 21:52	htu , htu31d , htu21d , htu20d , sht20 , htu20 , sht21 , htu21 , si7021 , gy-21 , gy-213v , hdc1080 , si702 , gy-20 , sht31 , htu31 , si7031 , gy-31 , te connectivity , temperature , humidity , i2c , communication , sensor , arduino , code
• LamaPLC: HX711 24-bit analog-to-digital converter (ADC)	2026/04/11 18:28	hx711 , hx-711 , analog-to-digital , adc , converter , load cell , wheatstone bridge , weight , sensor , communication , arduino , code
• lamaPLC: INA modules with Arduino libraries	2026/04/23 21:52	i2c , i c , communication , arduino , energy , power , current , monitor , sensor , ina219 , gy-219 , ina226 , gy-216 , ina228 , gy-228 , ina237 , ina238 , ina260 , ina3221 , ina
• lamaPLC: INA226 - current/voltage/power monitor with I²C communication	2026/04/23 21:52	i2c , i c , communication , arduino , energy , power , current , monitor , sensor , ina226 , ina219 , ina
• lamaPLC: LTC3588 - Nanopower energy harvesting power supply IC	2026/04/23 21:52	communication , arduino , sensor , energy harvesting , eh , energy , ambient power
• LamaPLC: M01 - V0.4 Laser ranging sensor with UART communication	2026/04/23 21:52	distance measurement , laser , distance , sensor , m01
• LamaPLC: MAX30100/MAX30102 Heart Rate Click Sensor Module	2026/04/23 21:52	max30102 , max30100 , heart rate click , sensor , communication , i2c , arduino , code
• lamaPLC: Max31865 RTD to Digital Converter - PT100/PT1000 Platine	2026/04/23 21:52	max31865 , rtd , pt 100 , pt 1000 , temperature , spi , platinum , arduino , code , sensor , adafruit
• LamaPLC: MAX4466/MAX9814: Low-noise Microphone Preamplifiers	2026/04/23 21:52	audio , microphone , analogue audio , max4466 , max9814 , max 4466 , max 9814 , agc , preamplifiers , sensor , arduino , code
• LamaPLC: MH-Z19 series of NDIR CO₂ sensors	2026/04/23 21:52	mh-z19 , mh-z19d , mh-z19c , mh-z19b , mh-z19e , ndir , co₂ , sensor , winsen , uart , pwm , communication , non-dispersive infrared , infrared , ir , temperature , arduino , code , tasmota
• lamaPLC: MPU-6050 (HW-123, GY-521) 6-axis MotionTracking device	2026/04/23 21:52	mpu-6050 , hw-123 , gy-521 , 6-axis motiontracking , dmp , temperature , sensor , mems , arduino code , arduino , accelerometer , gyroscope , tilt

• LamaPLC: MQ Winsen Gas-sensors	2026/04/23 21:52	mq, mq-2, mq-3, mq-4, mq-5, mq-6, mq-7, mq-8, mq-9, mq-131, mq-135, mq-137, winsen, gas-sensor, sensor, arduino, code, alcohol, c2h5oh, benzine gas, smoke, lpg, propane, c3h8, hydrogen, h2, methane, ch4, iso-butane, town gas, ammonia, nh3
• LamaPLC: PIR sensors	2026/04/23 21:52	hc-sr501, hc-sr505, am-312, ekmb ekmc, pir, motion, sensor, arduino, code
• LamaPLC: Pixart PAJ7620U2 Gesture recognition sensors/module with I²C communication	2026/04/23 21:52	paj7620u2, gy-paj7620, pixart, gesture recognition, i2c, communication, sensor, arduino, code
• lamaPLC: PT100 / PT1000	2025/09/23 18:59	pt100, pt1000, temperature, sensor, platine, rtd
• lamaPLC: PTA8C04 4-channel PT100 Modbus Modul	2026/02/14 18:42	pta8c04, sensor, modbus, rtu, rs-485, communication, platine, um72
• LamaPLC: RCWL - Microwave radar sensor	2026/04/23 21:52	rcwl-0516, rcwl, microwave, radar, sensor, arduino, code
• lamaPLC: RD-xx - Ai-Thinker Radar Module with UART communication	2026/04/23 21:52	radar, s3km1110, fmcw, rd-01, rd-03, rd-03d, ai-thinker, k-band, 24 ghz, sensor, distance, micro-movements
• lamaPLC: RP2040_ETH_Modul: Read BME 680/688 sensor data	2026/05/12 21:06	code, micropython, 2026, rp2040 eth, bme680, i2c, sensor, communication
• lamaPLC: RP2040_ETH_Modul: Read BME 680/688 sensor data and store in Modbus input registers	2026/05/12 18:58	code, micropython, 2026, rp2040 eth, bme680, i2c, sensor, communication
• LamaPLC: SGP Sensirion TVOC/VOC sensors with I²C communication	2026/04/15 19:41	sgp30, sgp40, sgp41, sensirion, gas-sensor, i2c, communication, sensor, arduino, code, eco2, voc, tvoc, indoor air quality, iaq, nox, hydrogen
• LamaPLC: SHT Sensirion Temperature/humidity sensor with I²C communication	2026/04/23 21:52	sht20, sht21, sht25, sht30, sht31, sht35, sht40, gy21, temperature, humidity, i2c, communication, sensor, arduino, code
• LamaPLC: Texas Instruments ADCs: Delta-sigma multi-channel Analog Converters with SPI communication	2026/04/23 21:52	ads111x, ads12xx, delta-sigma, converter, texas instruments, adc, spi, communication, sensor, arduino, code, ads1110, ads1112, ads1113, ads1114, ads1115, ads1118, ads1119, ads1220, ads1232, ads1234, ads1256, ads1261, ads1263, multi channel
• LamaPLC: TOFnnnC STMicroelectronics Time-of-Flight (ToF) sensors with I²C communication	2026/04/23 21:52	tof050c, vl6180, tof200c, vl53l0x, tof400c, vl53l1x, stmicroelectronics, time-of-flight, tof, i2c, communication, sensor, arduino, code
• LamaPLC: UICPAL Temp.humi.sensor	2023/06/25 00:43	simatic, s7, modbus, communication, temperature, humidity, sensor
• LamaPLC: VL53Lnn STMicroelectronics time-of-flight (ToF) laser-ranging sensors with I²C communication	2026/04/23 21:52	vl53l0x, vl53l1x, vl53l0 1xv2, gy-530, time-of-flight, tof, laser-ranging, i2c, communication, sensor, arduino, code

- [LamaPLC: VL6180X STMicroelectronics Time-of-Flight \(ToF\) sensor with I²C communication](#) 2026/04/23 21:52 [vl6180x, stmicroelectronics, time-of-flight, tof, i2c, communication, sensor, arduino, code](#)
- [LamaPLC: Waveshare TOF Laser Range Sensor with UART / I²C communication](#) 2026/04/23 21:52 [distance measurement, laser, range, sensor, tof, waveshare communication, i2c, sensor, modul, pressure, cfsensor, xgzp68xx, xgzp6810d, xgzp6857d, xgzp6859d, xgzp6887d, xgzp6897d, xgzp6899a, piezoresistive, capacitive](#)
- [lamaPLC: XGZP68xx: Silicon Pressure Sensors/Module](#) 2026/05/15 15:17 [communication, modbus, rtu, sensor, weight, yr-3180, hx710b, arduino, ttl, rs-485](#)
- [lamaPLC: YR-3180 - Weight sensor module with UART or Modbus communication](#) 2026/02/15 00:00 [communication, analog, lm393, lm-393, flame, ir, sound, hall, sensor, ky-026, hw-484, ky-037, ky-038, fc-03, hc-89, ky-024, modul](#)
- [LM393: Dual differential comparator \(flame, light, sound sensors\)](#) 2026/05/12 22:18 [magnetic angle sensor, magnetic flux, sensor, spi, i2c, pwm, communication, modul, as5047p, as5600, mt6701, mt6816, mt6835, tle5012b, amr, gmr, tmr, anisotropic magnetoresistive](#)
- [Magnetic angle sensors](#) 2026/04/23 21:52 [nt18b07, sensor, modbus, rtu, rs-485, communication, platine](#)
- [NT18B07: 7 Kanal RS485 Temperatur Sensor with Modbus RTU](#) 2026/02/14 18:49 [rtd, pt100, pt1000, sensor, temperature](#)
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