



ARDUINO UNO Revision 3 BOARD



The Arduino Uno is one of the most common and widely used Arduino processor boards. There are a wide variety of shields (plugging in boards adding functionality). It is relatively inexpensive (about \$25 - \$35). The latest version as of this writing (3/2014) is Revision 3 (r3):

- Revision 2 added a pull-down resistor to the 8U2 HWB line, making it easier to put into DFU (Device Firmware Update) mode
- Revision 3 added
 - SDA and SCL pins are now brought out to the header near the AREF pin (upper left on picture). SDA and SCL are for the I2C interface
 - IOREF pin (middle lower on picture that allows shields to adapt to the voltage provided
 - Another pin not connected reserved for future use

The board can be powered from the USB connector (usually up to 500ma for all electronics including shield), or from the 2.1mm barrel jack using a separate power supply when you cannot connect the board to the PC's USB port.

Links:

- Arduino web site: <http://www.arduino.cc/>
- Arduino Uno overview and image source: http://arduino.cc/en/Main/arduinoBoardUno#_UxNpBk2YZuG
- DFU Mode (Device Firmware update) explanation: http://arduino.cc/en/Hacking/DFUProgramming8U2#_UxNpXc2YZuE
- Arduino Uno schematic: <http://arduino.cc/en/uploads/Main/ArduinoUnoRev3schematic.pdf>
- Arduino Uno Eagle PCB Files: <http://arduino.cc/en/uploads/Main/arduinoUnoRev3-02-TH.zip>
- Eagle PCB design software (use License = "Run as Freeware"): <https://www.cadsoftusa.com/download-eagle/>
- Hardware Index – past and present boards: http://arduino.cc/en/Main/Boards#_UxNpG9UZYZuE
- Specifications comparison chart: http://arduino.cc/en/Products/Compare#_UxNpG9UZYZuE
- Board comparison chart: http://arduino.cc/en/Products/Compare#_UxNpG9UZYZuE
- Sources
 - MP3Car: <http://store.mp3car.com/SearchResults.asp?search=arduino>
 - Sparkfun: <https://www.sparkfun.com/>
 - Adafruit: <http://www.adafruit.com/category/12>
 - Amazon: http://www.amazon.com/s/ref=nb_sb_noss_1?url=search-alias%3Daps&field-keywords=Arduino
 - Pololu: <http://www.pololu.com/search?query=Arduino>

ARDUINO UNO Revision 3 Specifications



- Microcontroller: ATmega328
- Operating Voltage: 5V
- Uno Board Recommended Input Voltage: 7 – 12 V
- Uno Board Input Voltage Limits: 6 – 20 V
- Digital I/O Pins: 14 total – 6 of which can be PWM
- Analog Input Pins: 6
- Maximum DC Current per I/O pin at 5VDC: 40ma
- Maximum DC Current per I/O pin at 3.3 VDC: 50ma
- Flash Memory: 32KB (0.5KB used by bootloader)
- SRAM Memory: 2KB
- EEPROM: 1KB
- Clock Speed: 16 Mhz

Links:

- Arduino specifications and image page: <http://arduino.cc/en/Main/arduinoBoardUno#toc0LK2VZuH>

ARDUINO UNO Revision 3 Processor Peripherals (Atmel ATmega 328)



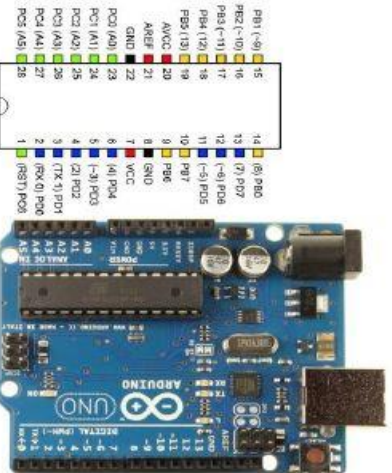
- Two 8-bit Timer/Counters with Separate Prescaler and Compare Mode
- One 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture Mode
- Real Time Counter with Separate Oscillator
- Six PWM channels
- Six channel 10 bit ADC including temperature measurement
- Programmable Serial USART
- Master/Slave SPI Serial Interface
- Byte-oriented 2 wire Serial Interface (Philips I2C compatible)
- Programmable Watchdog Timer with Separate On-chip Oscillator
- On-chip Analog Comparator

Links:

- Source of above diagram: <http://tekkpinoy.com/wp-content/uploads/2013/10/1.jpg>
- AT Mega 328 datasheet: <http://www.atmel.com/Images/doc8161.pdf>

AIAA OC Rocketry (Revision 3 April 27, 2014 - <http://aiaacrocketry.org>)

ARDUINO UNO Revision 3 and ATmega328 processor



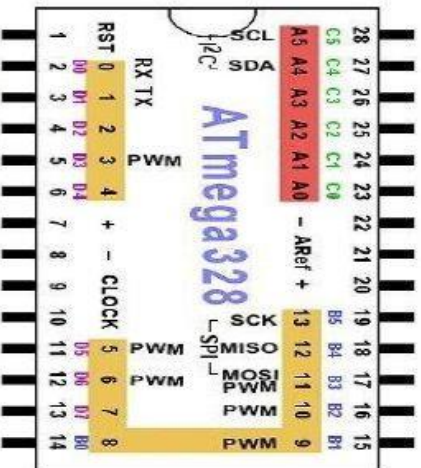
The Arduino board makes it very easy to use the ATmega328 processor by providing easy access to most of the pins via the headers. In addition, it provides:

- 5 VDC regulated power from the 6 – 20 VDC input jack
- 3.3 VDC regulated power available for other electronics
- The crystal oscillator
- A reset switch
- USB access to the serial port
- Headers for connection and for shields

Links:

- Arduino specifications and image page: http://arduino.cc/en/Main/arduinoBoardUno#_UxOOLk2TZuH
- ATmega328 processor image modified from image found at: <http://www.protosack.com/microcontrollers/atmega328-pu-atmel-8-bit-32k-avr-microcontroller>

ARDUINO UNO Revision 3 Processor Pinout (Atmel ATmega328) – Commonly Used



Pin Definition

- PORT B (PB0 – PB7) is an 8 bit bidirectional I/O port with internal pull-ups. Processor pins 14 – 17 bring PB0 to PB5 out.
 - PB0 – PB5 are also interrupts 0-5 respectively
 - PB2 can also be used as a PWM output
 - PB2 can also be SPI Bus Master Slave Select (*SS) or PWM output
 - PB3 can also be or SPI Bus Master Out/Slave In (MOSI) or PWM output
 - PB4 can also be SPI Bus Master In/Slave Out (MISO)
 - PB5 can also be SPI Bus Master Clock Input (SCK)
 - PB6 and PB7 are brought out on Processor pins 9 and 10 for the crystal clock oscillator
- PORT C (PC0 – PC5) is a 7 bit bidirectional I/O port with internal pull-up resistors. Processor pins 23 – 28 bring PC0 to PC5 out.
 - PC0 – PC5 are also interrupts 8-13 respectively
 - PC0 – PC5 can also be used as A/D inputs
 - PC4 and PC5 can also be used as SDA and SCL for I2C
 - PC6 is brought out on processor pin 1 as reset
- PORT D (D0 – D7) is an 8 bit bidirectional I/O port with internal pull-ups. Processor pins 2 – 6 and 11 – 13 bring all pins out.
 - PD0 can also be USART Input (RXD)
 - PD1 can also be USART Output (TXD)
 - PD3 can also be used as a PWM output
 - PD5 can also be used as a PWM output
 - PD6 can also be used as a PWM output

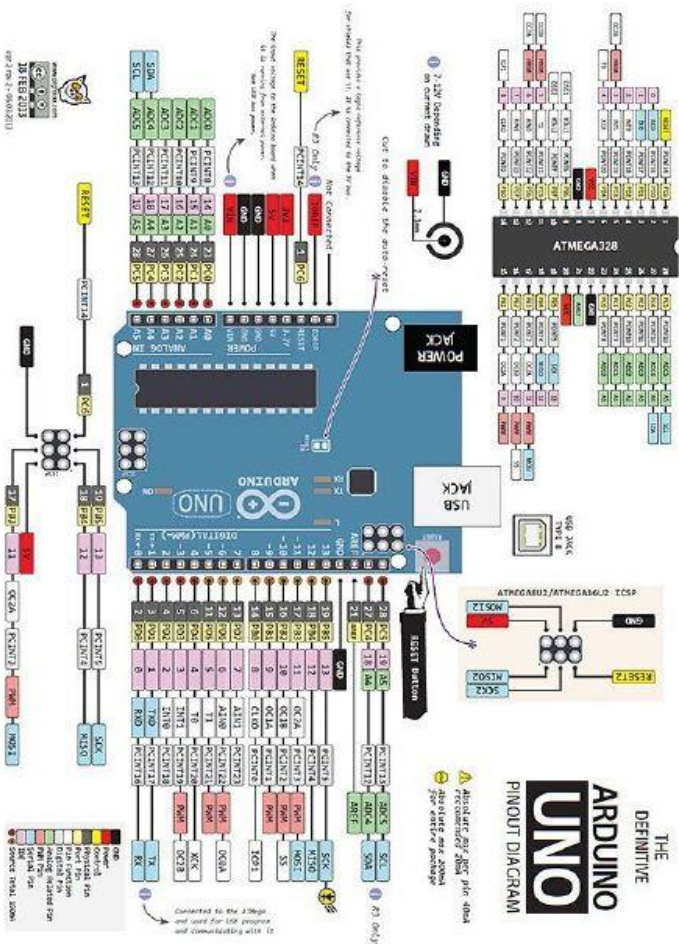
Links:

- Source of above diagram: <http://www.hobbytronics.co.uk/arduino-atmega328-pinout>
- AT Mega 328 datasheet: <http://www.atmel.com/Images/doc8161.pdf>

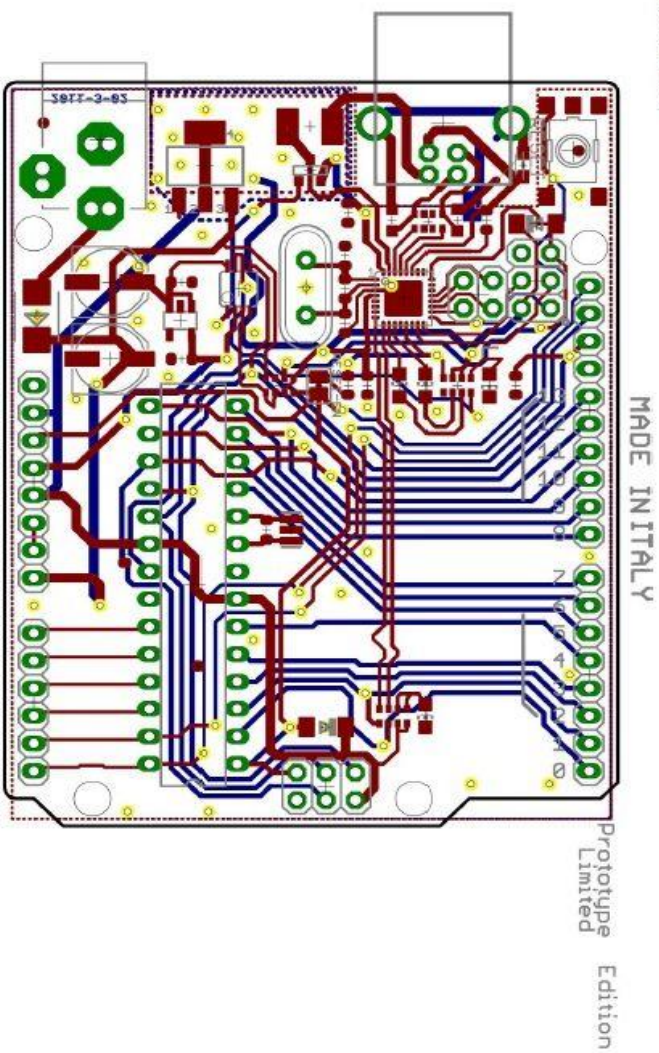
ARDUINO UNO Revision 3 Processor Pinout (Atmel ATmega 328) – Other functions

Arduino function	Pin Definition
anal digital pin 0 (RX) digital pin 1 (TX) digital pin 2 digital pin 3 (PWM) digital pin 4 VCC GND crystal digital pin 5 (PWM) digital pin 6 (PWM) digital pin 7 digital pin 8	PORTB (PCINT0-PCINT7) PORTC (PCINT8-PCINT15) PORTD (PCINT16-PCINT23) PORTF (PCINT24-PCINT31) PORTG (PCINT32-PCINT39) PORTH (PCINT40-PCINT47) PORTK (PCINT48-PCINT55) PORTL (PCINT56-PCINT63) PORTM (PCINT64-PCINT71) PORTN (PCINT72-PCINT79) PORTP (PCINT80-PCINT87) PORTQ (PCINT88-PCINT95) PORTR (PCINT96-PCINT103) PORTS (PCINT104-PCINT111) PORTT (PCINT112-PCINT119) PORTU (PCINT120-PCINT127) PORTV (PCINT128-PCINT135) PORTW (PCINT136-PCINT143) PORTX (PCINT144-PCINT151) PORTY (PCINT152-PCINT159) PORTZ (PCINT160-PCINT167) PORTAA (PCINT168-PCINT175) PORTBB (PCINT176-PCINT183) PORTCC (PCINT184-PCINT191) PORTDD (PCINT192-PCINT199) PORTEE (PCINT200-PCINT207) PORTFF (PCINT208-PCINT215) PORTGG (PCINT216-PCINT223) PORTHH (PCINT224-PCINT231) PORTII (PCINT232-PCINT239) PORTJJ (PCINT240-PCINT247) PORTKK (PCINT248-PCINT255) PORTLL (PCINT256-PCINT263) PORTMM (PCINT264-PCINT271) PORTNN (PCINT272-PCINT279) PORTOO (PCINT280-PCINT287) PORTPP (PCINT288-PCINT295) PORTQQ (PCINT296-PCINT303) PORTRR (PCINT304-PCINT311) PORTSS (PCINT312-PCINT319) PORTTT (PCINT320-PCINT327) PORTUU (PCINT328-PCINT335) PORTVV (PCINT336-PCINT343) PORTWW (PCINT344-PCINT351) PORTXX (PCINT352-PCINT359) PORTYY (PCINT360-PCINT367) PORTZZ (PCINT368-PCINT375) PORTAAA (PCINT376-PCINT383) PORTBBB (PCINT384-PCINT391) PORTCCC (PCINT392-PCINT399) PORTDDD (PCINT400-PCINT407) PORTEEE (PCINT408-PCINT415) PORTFFF (PCINT416-PCINT423) PORTGGG (PCINT424-PCINT431) PORTHHH (PCINT432-PCINT439) PORTIII (PCINT440-PCINT447) PORTJJJ (PCINT448-PCINT455) PORTKKK (PCINT456-PCINT463) PORTLLL (PCINT464-PCINT471) PORTMMM (PCINT472-PCINT479) PORTNNN (PCINT480-PCINT487) PORTOOO (PCINT488-PCINT495) PORTPPP (PCINT496-PCINT503) PORTQQQ (PCINT504-PCINT511) PORTRRR (PCINT512-PCINT519) PORTSSS (PCINT520-PCINT527) PORTTTT (PCINT528-PCINT535) PORTUUU (PCINT536-PCINT543) PORTVVV (PCINT544-PCINT551) PORTWWW (PCINT552-PCINT559) PORTXXX (PCINT560-PCINT567) PORTYYY (PCINT568-PCINT575) PORTZZZ (PCINT576-PCINT583) PORTAAA (PCINT584-PCINT591) PORTBBB (PCINT592-PCINT599) PORTCCC (PCINT600-PCINT607) PORTDDD (PCINT608-PCINT615) PORTEEE (PCINT616-PCINT623) PORTFFF (PCINT624-PCINT631) PORTGGG (PCINT632-PCINT639) PORTHHH (PCINT640-PCINT647) PORTIII (PCINT648-PCINT655) PORTJJJ (PCINT656-PCINT663) PORTKKK (PCINT664-PCINT671) PORTLLL (PCINT672-PCINT679) PORTMMM (PCINT680-PCINT687) PORTNNN (PCINT688-PCINT695) PORTOOO (PCINT696-PCINT703) PORTPPP (PCINT704-PCINT711) PORTQQQ (PCINT712-PCINT719) PORTRRR (PCINT720-PCINT727) PORTSSS (PCINT728-PCINT735) PORTTTT (PCINT736-PCINT743) PORTUUU (PCINT744-PCINT751) PORTVVV (PCINT752-PCINT759) PORTWWW (PCINT760-PCINT767) PORTXXX (PCINT768-PCINT775) PORTYYY (PCINT776-PCINT783) PORTZZZ (PCINT784-PCINT791) PORTAAA (PCINT792-PCINT799) PORTBBB (PCINT800-PCINT807) PORTCCC (PCINT808-PCINT815) PORTDDD (PCINT816-PCINT823) PORTEEE (PCINT824-PCINT831) PORTFFF (PCINT832-PCINT839) PORTGGG (PCINT840-PCINT847) PORTHHH (PCINT848-PCINT855) PORTIII (PCINT856-PCINT863) PORTJJJ (PCINT864-PCINT871) PORTKKK (PCINT872-PCINT879) PORTLLL (PCINT880-PCINT887) PORTMMM (PCINT888-PCINT895) PORTNNN (PCINT896-PCINT903) PORTOOO (PCINT904-PCINT911) PORTPPP (PCINT912-PCINT919) PORTQQQ (PCINT920-PCINT927) PORTRRR (PCINT928-PCINT935) PORTSSS (PCINT936-PCINT943) PORTTTT (PCINT944-PCINT951) PORTUUU (PCINT952-PCINT959) PORTVVV (PCINT960-PCINT967) PORTWWW (PCINT968-PCINT975) PORTXXX (PCINT976-PCINT983) PORTYYY (PCINT984-PCINT991) PORTZZZ (PCINT992-PCINT999) PORTAAA (PCINT1000-PCINT1007) PORTBBB (PCINT1008-PCINT1015) PORTCCC (PCINT1016-PCINT1023) PORTDDD (PCINT1024-PCINT1031) PORTEEE (PCINT1032-PCINT1039) PORTFFF (PCINT1040-PCINT1047) PORTGGG (PCINT1048-PCINT1055) PORTHHH (PCINT1056-PCINT1063) PORTIII (PCINT1064-PCINT1071) PORTJJJ (PCINT1072-PCINT1079) PORTKKK (PCINT1080-PCINT1087) PORTLLL (PCINT1088-PCINT1095) PORTMMM (PCINT1096-PCINT1103) PORTNNN 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(PCINT2952-PCINT2959) PORTLLL (PCINT2960-PCINT2967) PORTMMM (PCINT2968-PCINT2975) PORTNNN (PCINT2976-PCINT2983) PORTOOO (PCINT2984-PCINT2991) PORTPPP (PCINT2992-PCINT2999) PORTQQQ (PCINT3000-PCINT3007) PORTRRR (PCINT3008-PCINT3015) PORTSSS (PCINT3016-PCINT3023) PORTTTT (PCINT3024-PCINT3031) PORTUUU (PCINT3032-PCINT3039) PORTVVV (PCINT3040-PCINT3047) PORTWWW (PCINT3048-PCINT3055) PORTXXX (PCINT3056-PCINT3063) PORTYYY (PCINT3064-PCINT3071) PORTZZZ (PCINT3072-PCINT3079) PORTAAA (PCINT3080-PCINT3087) PORTBBB (PCINT3088-PCINT3095) PORTCCC (PCINT3096-PCINT3103) PORTDDD (PCINT3104-PCINT3111) PORTEEE (PCINT3112-PCINT3119) PORTFFF (PCINT3120-PCINT3127) PORTGGG (PCINT3128-PCINT3135) PORTHHH (PCINT3136-PCINT3143) PORTIII (PCINT3144-PCINT3151) PORTJJJ (PCINT3152-PCINT3159) PORTKKK (PCINT3160-PCINT3167) PORTLLL (PCINT3168-PCINT3175) PORTMMM (PCINT3176-PCINT3183) PORTNNN (PCINT3184-PCINT3191) PORTOOO (PCINT3192-PCINT3199) PORTPPP (PCINT3200-PCINT3207) PORTQQQ (PCINT3208-PCINT3215) PORTRRR (PCINT3216-PCINT3223) PORTSSS (PCINT3224-PCINT3231) PORTTTT (PCINT3232-PCINT3239) PORTUUU (PCINT3240-PCINT3247) PORTVVV (PCINT3248-PCINT3255) PORTWWW (PCINT3256-PCINT3263) PORTXXX (PCINT3264-PCINT3271) PORTYYY (PCINT3272-PCINT3279) PORTZZZ (PCINT3280-PCINT3287) PORTAAA (PCINT3288-PCINT3295) PORTBBB (PCINT3296-PCINT3303) PORTCCC (PCINT3304-PCINT3311) PORTDDD (PCINT3312-PCINT3319) PORTEEE (PCINT3320-PCINT3327) PORTFFF (PCINT3328-PCINT3335) PORTGGG (PCINT3336-PCINT3343) PORTHHH (PCINT3344-PCINT3351) PORTIII (PCINT3352-PCINT3359) PORTJJJ (PCINT3360-PCINT3367) PORTKKK (PCINT3368-PCINT3375) PORTLLL (PCINT3376-PCINT3383) PORTMMM (PCINT3384-PCINT3391) PORTNNN (PCINT3392-PCINT3399) PORTOOO (PCINT3400-PCINT3407) PORTPPP (PCINT3408-PCINT3415) PORTQQQ (PCINT3416-PCINT3423) PORTRRR (PCINT3424-PCINT3431) PORTSSS (PCINT3432-PCINT3439) PORTTTT (PCINT3440-PCINT3447) PORTUUU (PCINT3448-PCINT3455) PORTVVV (PCINT3456-PCINT3463) PORTWWW (PCINT3464-PCINT3471) PORTXXX (PCINT3472-PCINT3479) PORTYYY 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APPENDIX A



APPENDIX D



From arduino_Uno_Rev3-02 TH zip file at <http://arduino.cc/en/Main/ArduinoBoardUno#Ux49aL2VYyA>

Eagle PCB software: Eagle PCB design software (use license = "Run as Freeware"); <https://www.cadsoftusa.com/download-eagle/>

2 CHANNEL 5V 10A RELAY MODULE



Description

The relay module is an electrically operated switch that allows you to turn on or off a circuit using voltage and/or current much higher than a microcontroller could handle. There is no connection between the low voltage circuit operated by the microcontroller and the high power circuit. The relay protects each circuit from each other.

The each channel in the module has three connections named NC, COM, and NO. Depending on the input signal trigger mode, the jumper cap can be placed at high

level effective mode which 'closes' the normally open (NO) switch at high level input and at low level effective mode which operates the same but at low level input.

Specifications

- On-board EL817 photoelectric coupler with photoelectric isolating anti-interference ability strong
- On-board 5V, 10A / 250VAC, 10A / 30VDC relays
- Relay long life can absorb 100000 times in a row
- Module can be directly and MCU I/O link, with the output signal indicator
- Module with diode current protection, short response time
- PCB Size: 45.8mm x 32.4mm

Pin Configuration



1. **VCC**: 5V DC
2. **COM**: 5V DC
3. **IN1**: high/low output
4. **IN2**: high/low output
5. **GND**: ground



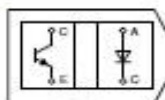
TCRT5000, TCRT5000L

Vishay Semiconductors

Reflective Optical Sensor with Transistor Output



19152_2



Top view

19152_1

FEATURES

- Package type: leaded
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 10.2 x 5.8 x 7
- Peak operating distance: 2.5 mm
- Operating range within > 20 % relative collector current: 0.2 mm to 15 mm
- Typical output current under test: $I_C = 1$ mA
- Daylight blocking filter
- Emitter wavelength: 950 nm
- Lead (Pb)-free soldering released
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC



RoHS
compliant

DESCRIPTION

The TCRT5000 and TCRT5000L are reflective sensors which include an infrared emitter and phototransistor in a leaded package which blocks visible light. The package includes two mounting clips. TCRT5000L is the long lead version.

APPLICATIONS

- Position sensor for shaft encoder
- Detection of reflective material such as paper, IBM cards, magnetic tapes etc.
- Limit switch for mechanical motions in VCR
- General purpose - wherever the space is limited

PRODUCT SUMMARY

PART NUMBER	DISTANCE FOR MAXIMUM CTR _{typ} (1) (mm)	DISTANCE RANGE FOR RELATIVE I _{out} > 20 % (mm)	TYPICAL OUTPUT CURRENT UNDER TEST (2) (mA)	DAYLIGHT BLOCKING FILTER INTEGRATED
TCRT5000	2.5	0.2 to 15	1	Yes
TCRT5000L	2.5	0.2 to 15	1	Yes

Notes

(1) CTR: current transfer ratio, I_{out}/I_{in}

(2) Conditions like in table basic characteristics/sensors

ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME (1)	REMARKS
TCRT5000	Tube	MOQ: 4500 pcs, 50 pcs/tube	3.5 mm lead length
TCRT5000L	Tube	MOQ: 2400 pcs, 48 pcs/tube	15 mm lead length

Note

(1) MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (1)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT (EMITTER)				
Reverse voltage		V_{IR}	5	V
Forward current		I_F	60	mA
Forward surge current	$t_p \leq 10 \mu s$	I_{FSM}	3	A
Power dissipation	$T_{amb} \leq 25^\circ C$	P_V	100	mW
Junction temperature		T_J	100	$^\circ C$

TCRT5000, TCRT5000L

Vishay Semiconductors

Reflective Optical Sensor with Transistor Output



ABSOLUTE MAXIMUM RATINGS ⁽¹⁾				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
OUTPUT (DETECTOR)				
Collector emitter voltage		V_{CE0}	70	V
Emitter collector voltage		V_{EC0}	5	V
Collector current		I_C	100	mA
Power dissipation	$T_{amb} \leq 55^\circ\text{C}$	P_V	100	mW
Junction temperature		T_J	100	$^\circ\text{C}$
SENSOR				
Total power dissipation	$T_{amb} \leq 25^\circ\text{C}$	P_{tot}	200	mW
Ambient temperature range		T_{amb}	-25 to +85	$^\circ\text{C}$
Storage temperature range		T_{stg}	-25 to +100	$^\circ\text{C}$
Soldering temperature	2 mm from case, $t \leq 10$ s	T_{sd}	260	$^\circ\text{C}$

Note

(1) $T_{amb} = 25^\circ\text{C}$, unless otherwise specified

ABSOLUTE MAXIMUM RATINGS

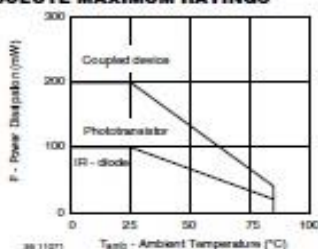


Fig. 5 - Power Dissipation Limit vs. Ambient Temperature

BASIC CHARACTERISTICS ⁽¹⁾						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT (EMITTER)						
Forward voltage	$I_F = 60$ mA	V_F		1.25	1.5	V
Junction capacitance	$V_{BI} = 0$ V, $f = 1$ MHz	C_J		17		pF
Radiant intensity	$I_F = 60$ mA, $t_F = 20$ ms	I_R			21	mW/sr
Peak wavelength	$I_F = 100$ mA	λ_P	940			nm
Virtual source diameter	Method: 83 % encircled energy	d		2.1		mm
OUTPUT (DETECTOR)						
Collector emitter voltage	$I_C = 1$ mA	V_{CE0}	70			V
Emitter collector voltage	$I_E = 100$ μ A	V_{EC0}	7			V
Collector dark current	$V_{CE} = 20$ V, $I_E = 0$ A, $E = 0$ lx	I_{C0}		10	200	nA
SENSOR						
Collector current	$V_{CC} = 5$ V, $I_C = 10$ mA, $D = 12$ mm	I_C (2) (3)	0.5	1	2.1	mA
Collector emitter saturation voltage	$I_C = 10$ mA, $I_E = 0.1$ mA, $D = 12$ mm	V_{CEsat} (2) (3)			0.4	V

Note

(1) $T_{amb} = 25^\circ\text{C}$, unless otherwise specified

(2) See figure 3

(3) Test surface: mirror (Mfr. Spindler & Hoyer, Part No. 340005)

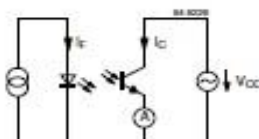


Fig. 2 - Test Circuit

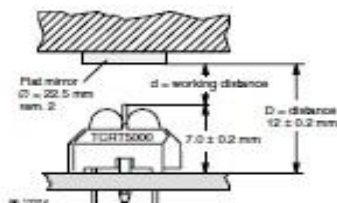


Fig. 3 - Test Circuit

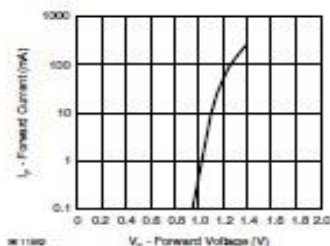
BASIC CHARACTERISTICS
 $T_{amb} = 25^{\circ}\text{C}$, unless otherwise specified


Fig. 4 - Forward Current vs. Forward Voltage

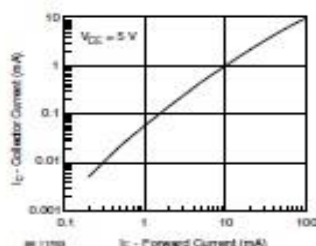


Fig. 6 - Collector Current vs. Forward Current

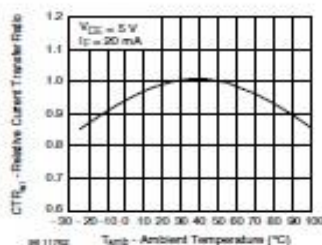


Fig. 5 - Relative Current Transfer Ratio vs. Ambient Temperature

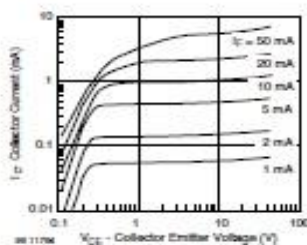


Fig. 7 - Collector-Emitter Saturation Voltage vs. Collector Current

TCRT5000, TCRT5000L

Vishay Semiconductors

Reflective Optical Sensor with Transistor Output

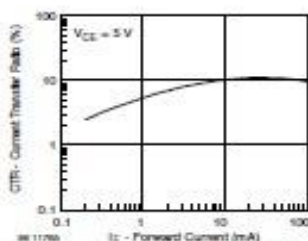


Fig. 8 - Current Transfer Ratio vs. Forward Current

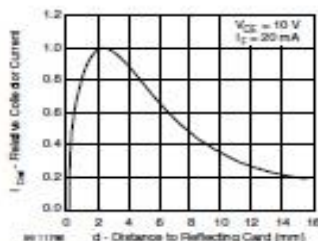
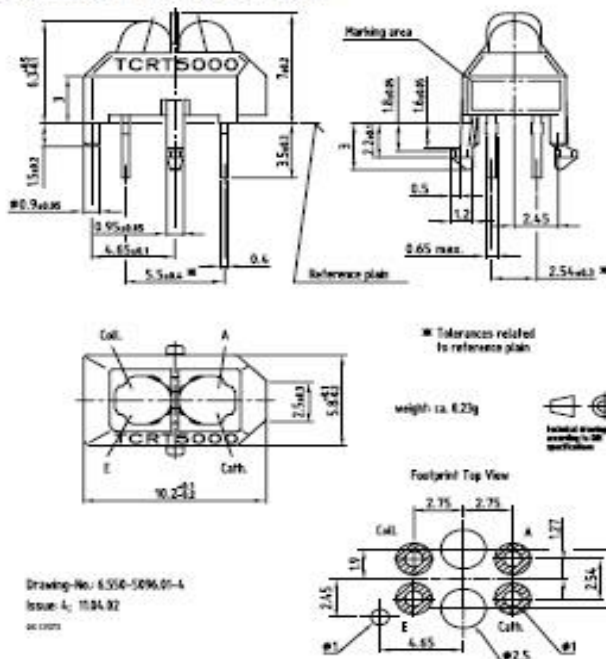


Fig. 9 - Relative Collector Current vs. Distance

PACKAGE DIMENSIONS in millimeters, TCRT5000



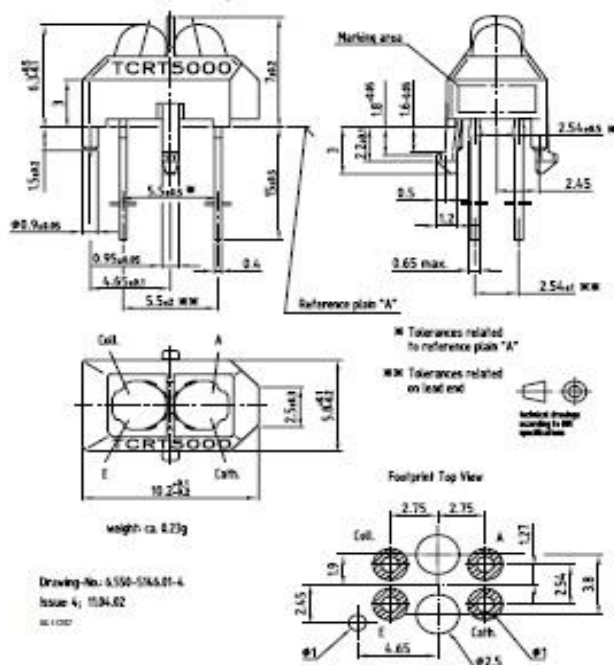


TCRT5000, TCRT5000L

Reflective Optical Sensor with
Transistor Output

Vishay Semiconductors

PACKAGE DIMENSIONS in millimeters, TCRT5000L



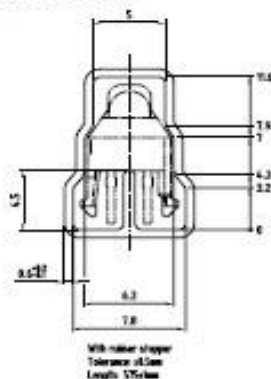
TCRT5000, TCRT5000L

Vishay Semiconductors

Reflective Optical Sensor with
Transistor Output

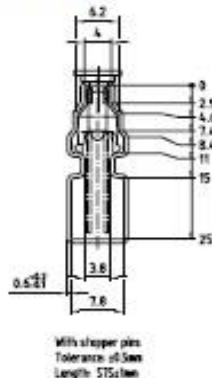


TUBE DIMENSIONS in millimeters, TCRT5000



Drawing No: 1700-5118.01-4
Issue 1: 10.05.06

TUBE DIMENSIONS in millimeters, TCRT5000L



Drawing No: 1700-5118.01-4
Issue 1: 25.02.06

Packaging and Ordering Information

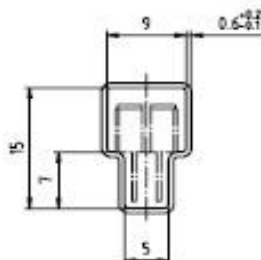
PART NUMBER	MOQ (1)	PCS PER TUBE	TUBE SPEC. (FIGURE)	CONSTITUENTS (FORMS)
CNY70	4000	80	1	28
TCPT1300X01	2000	Reel	(2)	29
TCRT1000	1000	Bulk	-	26
TCRT1010	1000	Bulk	-	26
TCRT5000	4500	50	2	27
TCRT5000L	2400	48	3	27
TCST1030	5200	65	5	24
TCST1030L	2600	65	6	24
TCST1103	1020	85	4	24
TCST1202	1020	85	4	24
TCST1230	4800	60	7	24
TCST1300	1020	85	4	24
TCST2103	1020	85	4	24
TCST2202	1020	85	4	24
TCST2300	1020	85	4	24
TCST5250	4860	30	8	24
TCUT1300X01	2000	Reel	(2)	29
TCZT8020-PAER	2500	Bulk	-	22

Notes

(1) MOQ: minimum order quantity

(2) Please refer to datasheets

TUBE SPECIFICATION FIGURES



with rubber stopper

Tolerance: ±0.5mm

Length: 575±1mm

Drawing-No: 9.700-5097.01-4

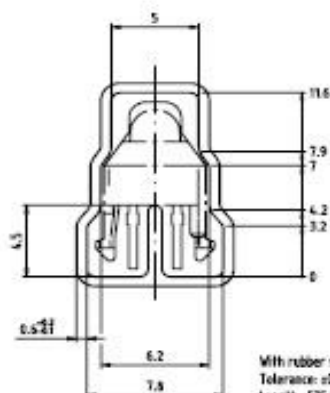
Issue: 1, 25.02.09

15.100

Fig. 1

Packaging and Ordering Information

Vishay Semiconductors Packaging and Ordering Information

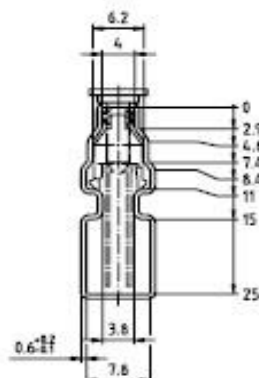


Drawing-No: 9.788-5139.01-4
Issue: 1; 10.05.09

Drawing refers to following types: TCR1 5000

10210

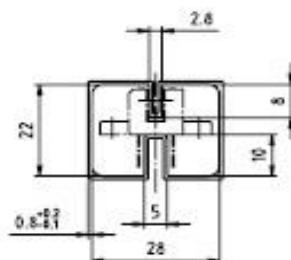
Fig. 2



Drawing-No: 9.760-5178.01-4
Issue: 1; 25.02.00

10201

Fig. 3

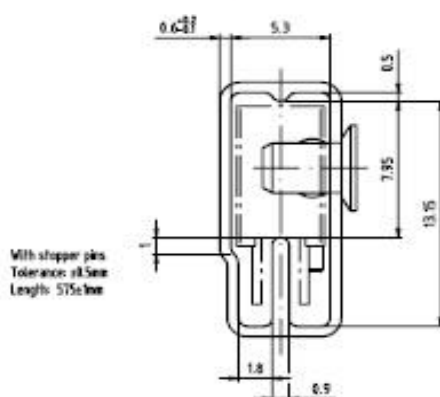


With rubber stopper
Tolerance: $\pm 0.5\text{mm}$
Length: 575 $\pm$ mm

Drawing-No: 9.700-5100.01-4
Issue: 1; 25.02.00

10/080

Fig. 4



With stopper pins
Tolerance: $\pm 0.5\text{mm}$
Length: 575 $\pm$ mm

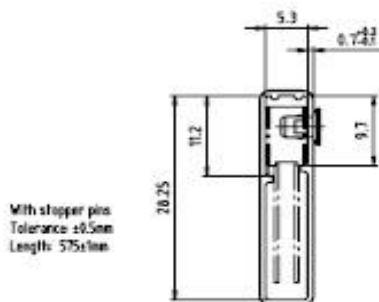
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Issue: 1; 25.02.00

10/080

Fig. 5

Packaging and Ordering Information

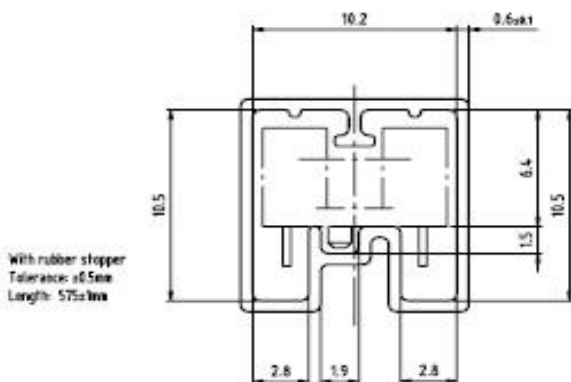
Vishay Semiconductors Packaging and Ordering Information



Drawing No: 9700-5205.01-4
Issue: 1, 25.02.00

IS-106

Fig. 6



Drawing No: 9700-5205.01-4
Issue: 1, 25.02.00

IS-106

Fig. 7

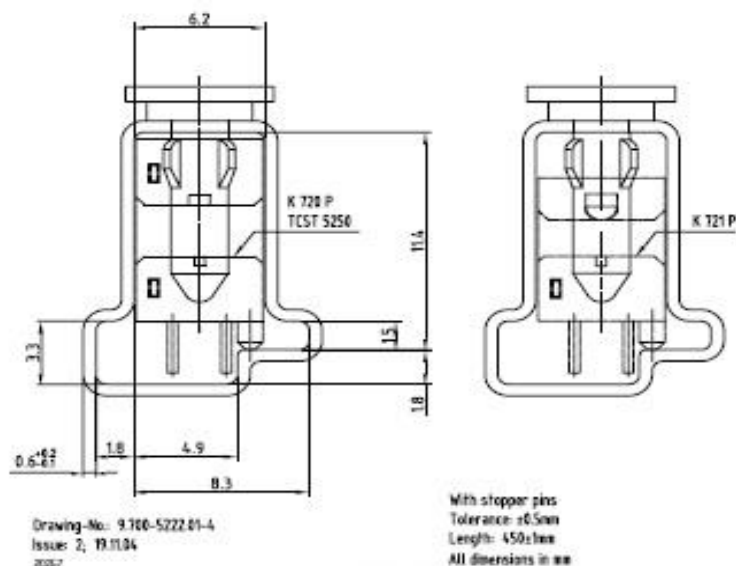


Fig. 8



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TCRT5000 Line Tracking Sensor Module



TCRT5000 sensor of infrared emission diode constantly launch infrared, the infrared ray is emitted when the intensity of reflected back has not been reflected or but is not big enough,

Rating: Not Rated Yet

Price:

Variant price modifier:

Base price with tax:

Price with discount: 200,00 ?

Saleprice with discount:

Sales price: 200,00 ?

Sales price without tax: 200,00 ?

Discount:

Tax amount:

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Description

Think it... Make it... Invent!

The TCRT5000 Line Tracking Breakout Board was made with Line Following Robot designs in mind. The TCRT5000 itself is a combination of both phototransistor and IR LED enclosed in a small plastic package which is convenient when designing space constrained prototypes. A mounting hole is placed at the middle of the module with enough space to accommodate screws for affixing it onto the prototype. Three headers are also provided and labeled for power, ground and the signal. There is also an LED mounted at the back of the board to serve as an indicator if it detects a white surface. The connected comparator circuit makes use of a 74HC14 IC which can provide up to 25mA of current, enough to power an LED, a small buzzer and to drive logic inputs. The sensor can detect white surfaces of a distance 2.5mm-13mm.

Sensors & Sensor Modules : TCRT5000 Line Tracking Sensor Module

For the TCRT5000 datasheet please follow this link: [TCRT5000](#)

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Module Specifications:

- Operating voltage : 5V
- Sensor detection distance (white surfaces) : 2.5mm - 13mm
- Output Current : 25mA
- Output Voltage : 4.5V - 5V

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Package Includes:

1 x TCRT5000 Line Tracking Sensor

Reviews

There are yet no reviews for this product.



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This letter is to certify that the abstract of the thesis below

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has been endorsed by Pusat Bahasa UM Surabaya for further approval by the examining committee of the faculty.

Surabaya, 22 August 2016

Wafiq Ismail, M.Pd.

