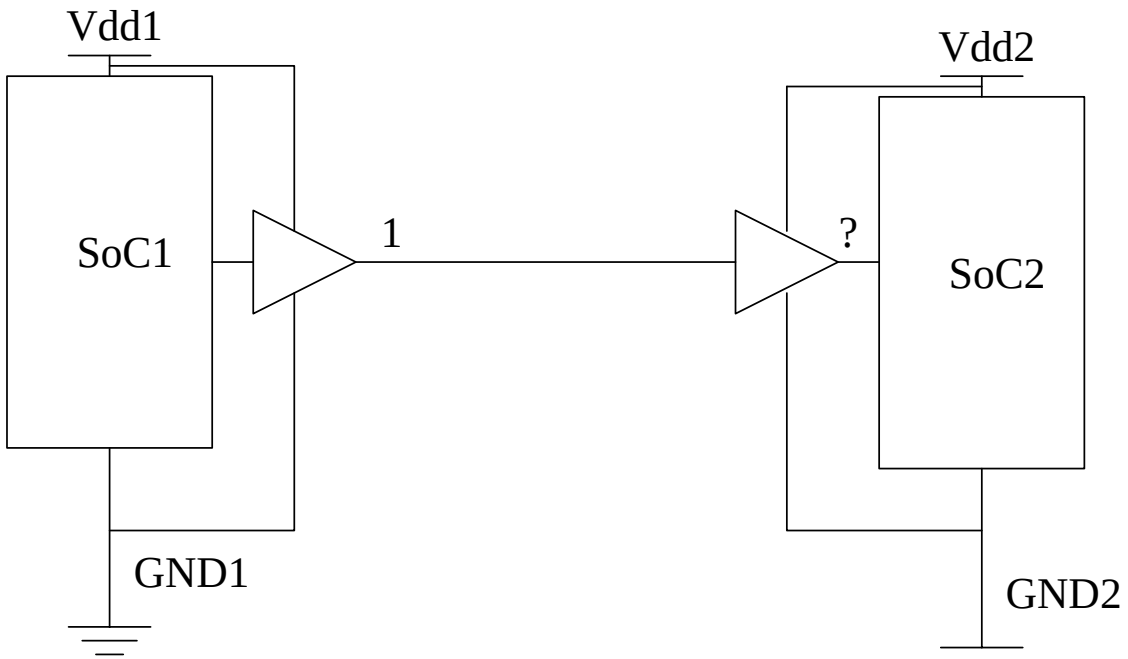
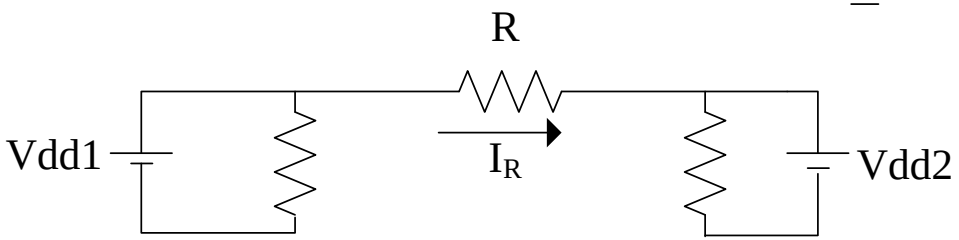
Galvanska izolacija

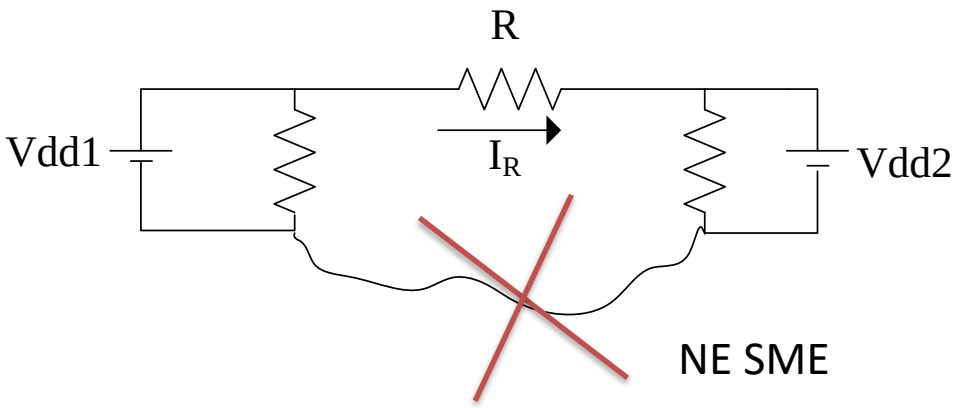




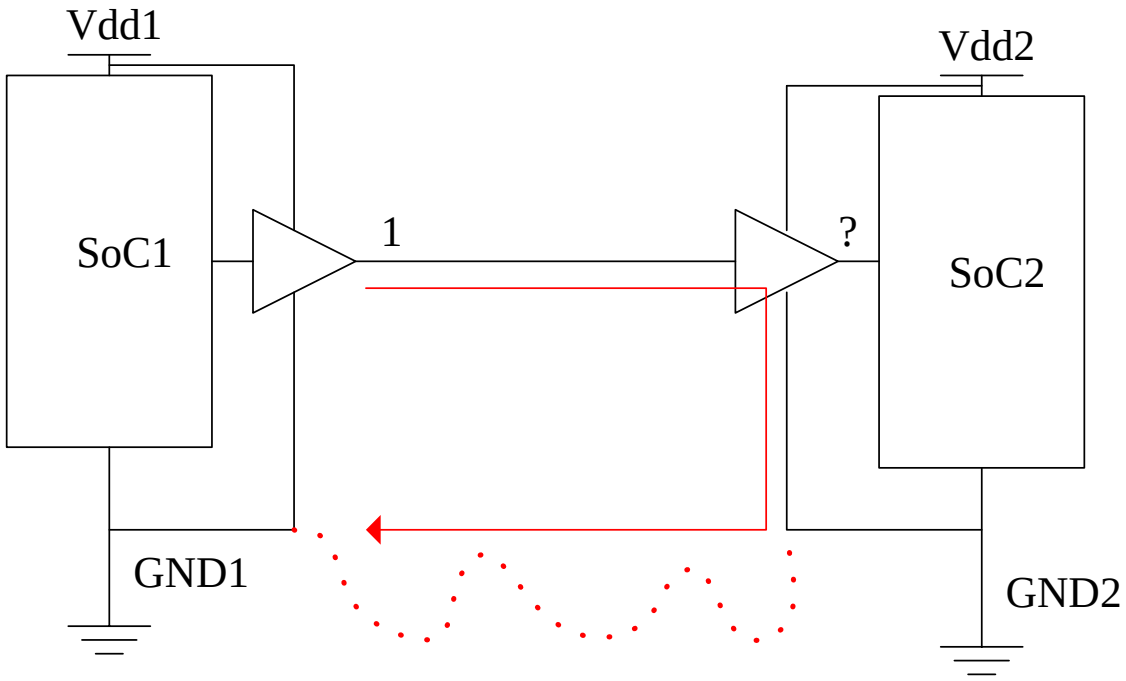
?

$$I_R = \frac{V_{dd1} - V_{dd2}}{R}$$

Galvanska izolacija



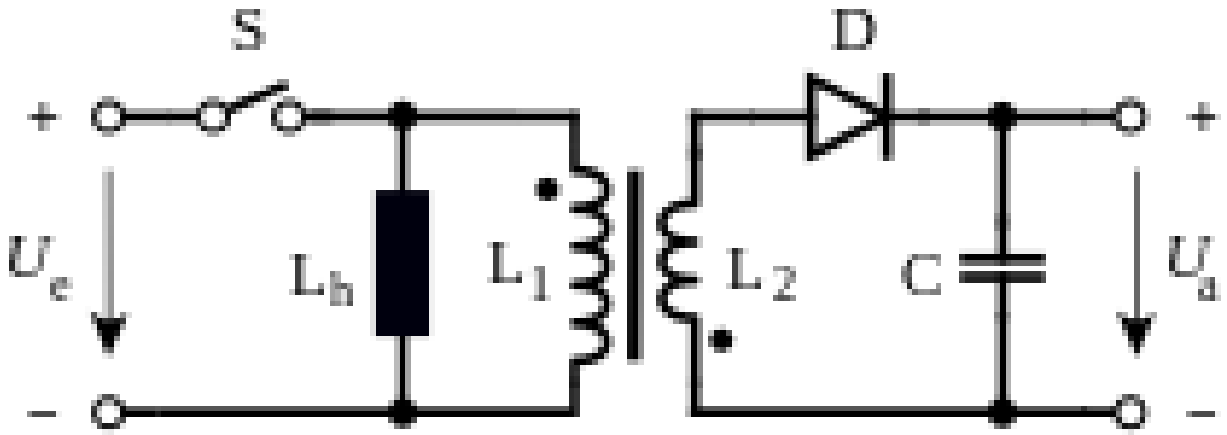
$$I_R = \frac{V_{dd1} - V_{dd2}}{R}$$



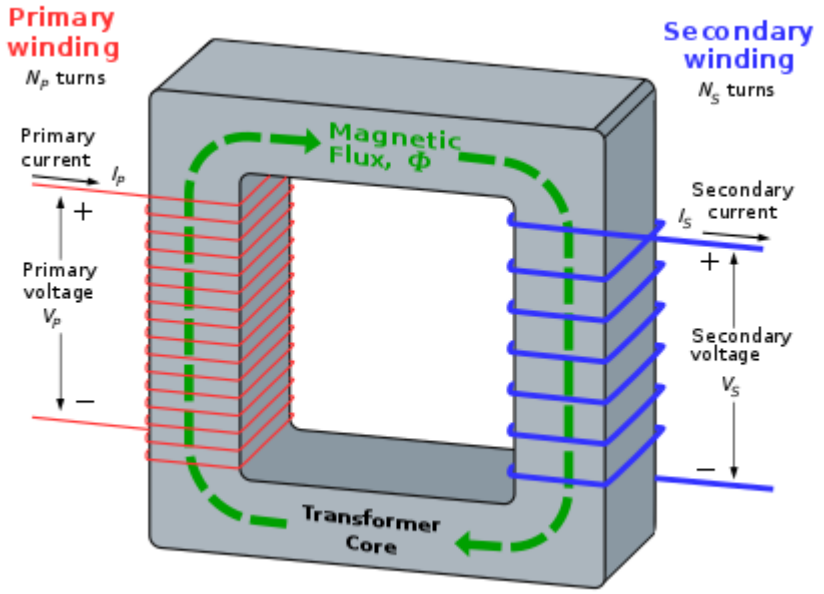
Masa je povratni put signala – ne postoji

Galvanska izolacija

Transformator



Galvanski izolovano napajanje



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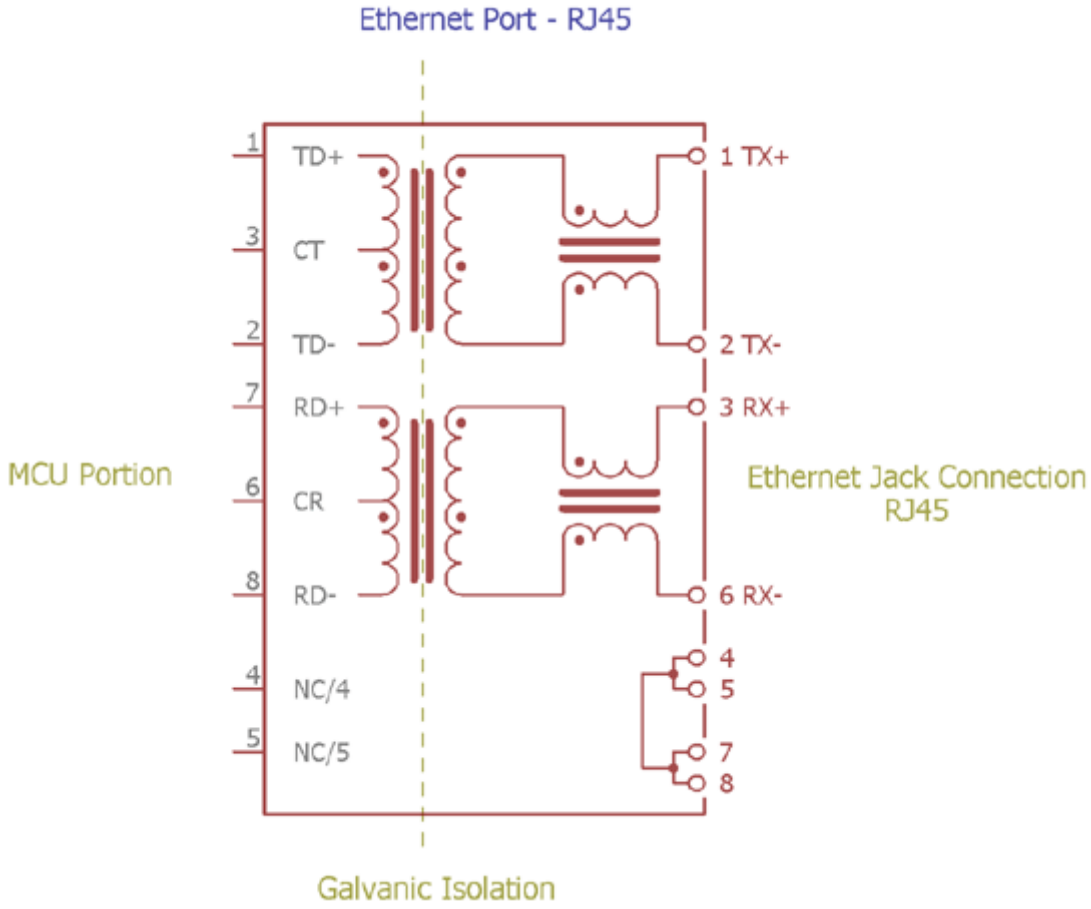
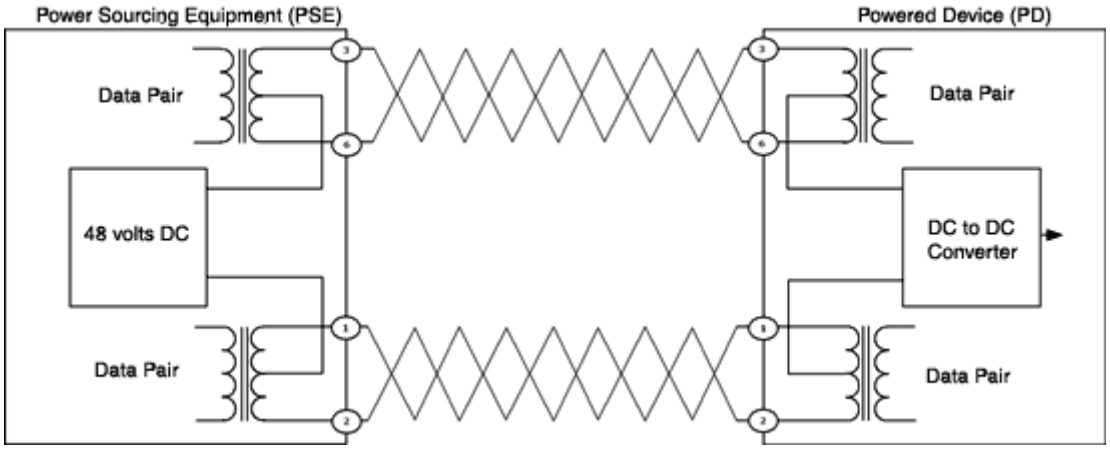


Galvanska izolacija signala

Galvanska izolacija

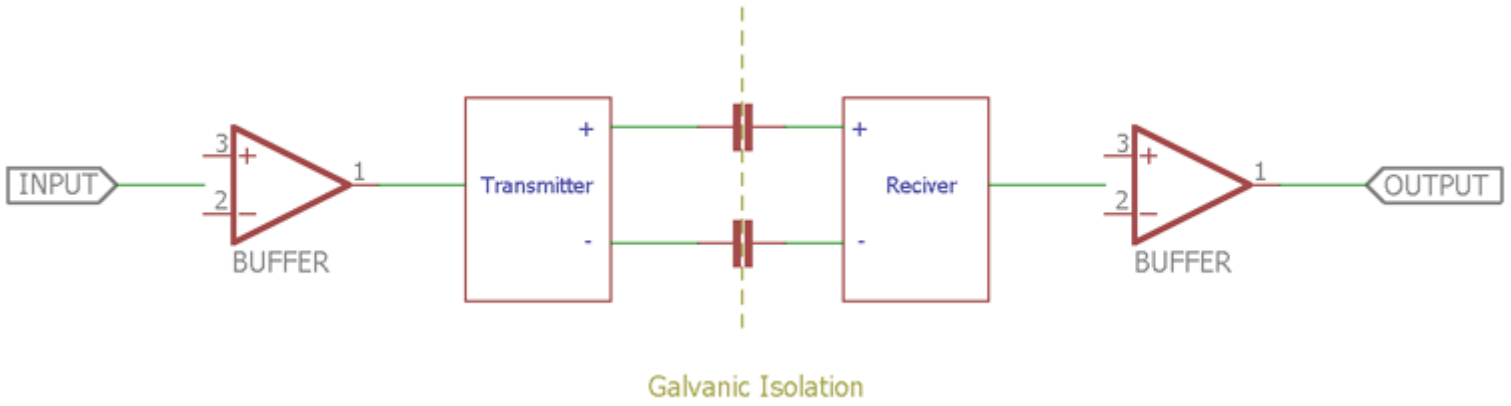
Transformator



Galvanska izolacija signala – prenos napajanja PoE

Galvanska izolacija

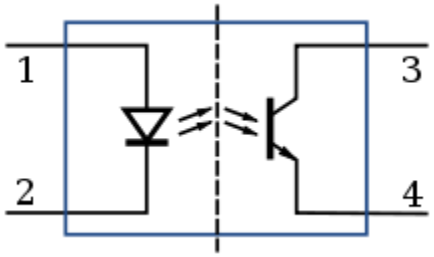
Kapacitivnosti

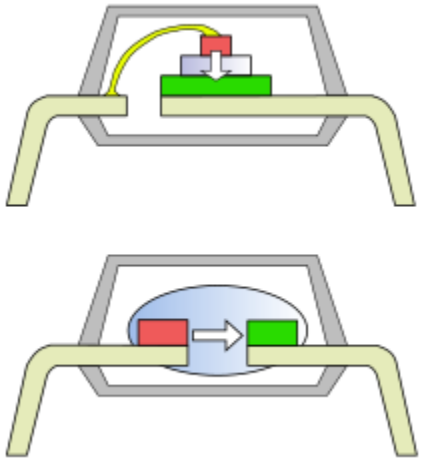


Galvanska izolacija signala

Galvanska izolacija

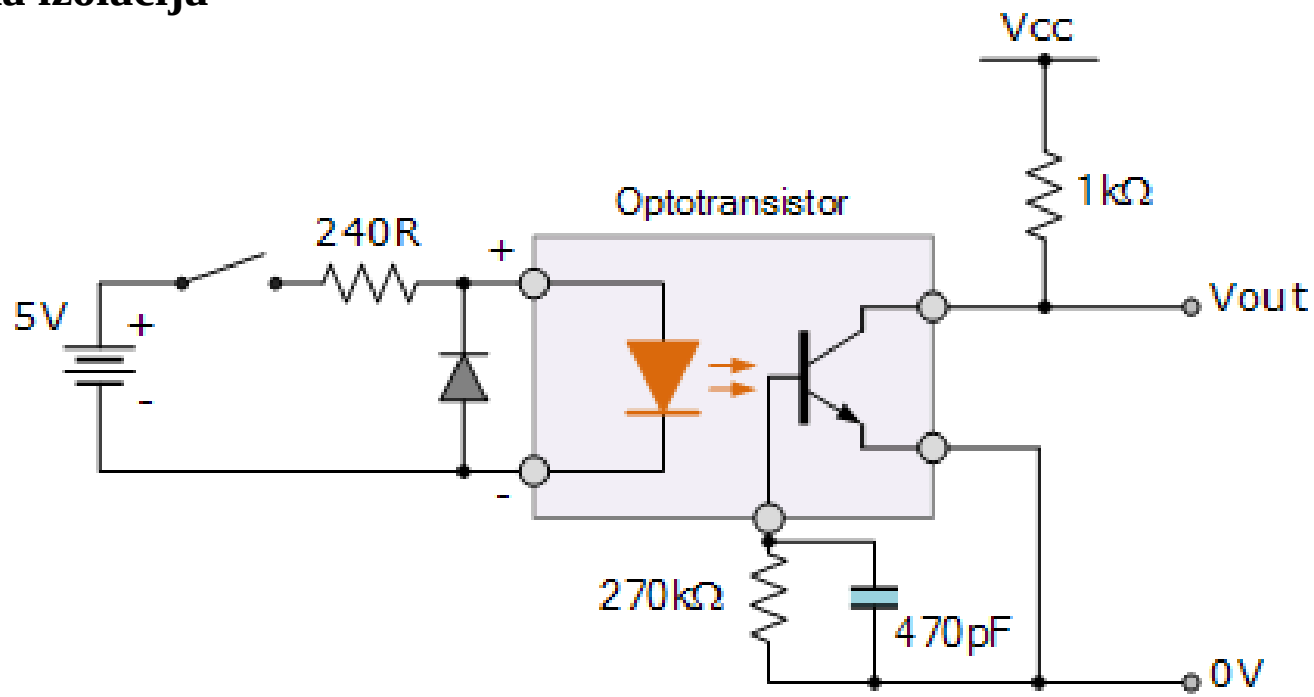
Optokapler

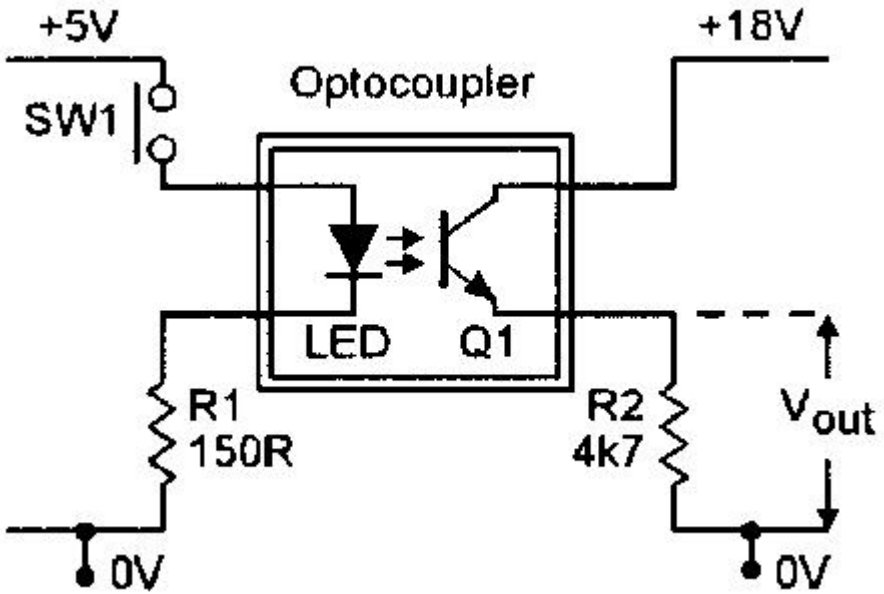




Galvanska izolacija signala

Galvanska izolacija





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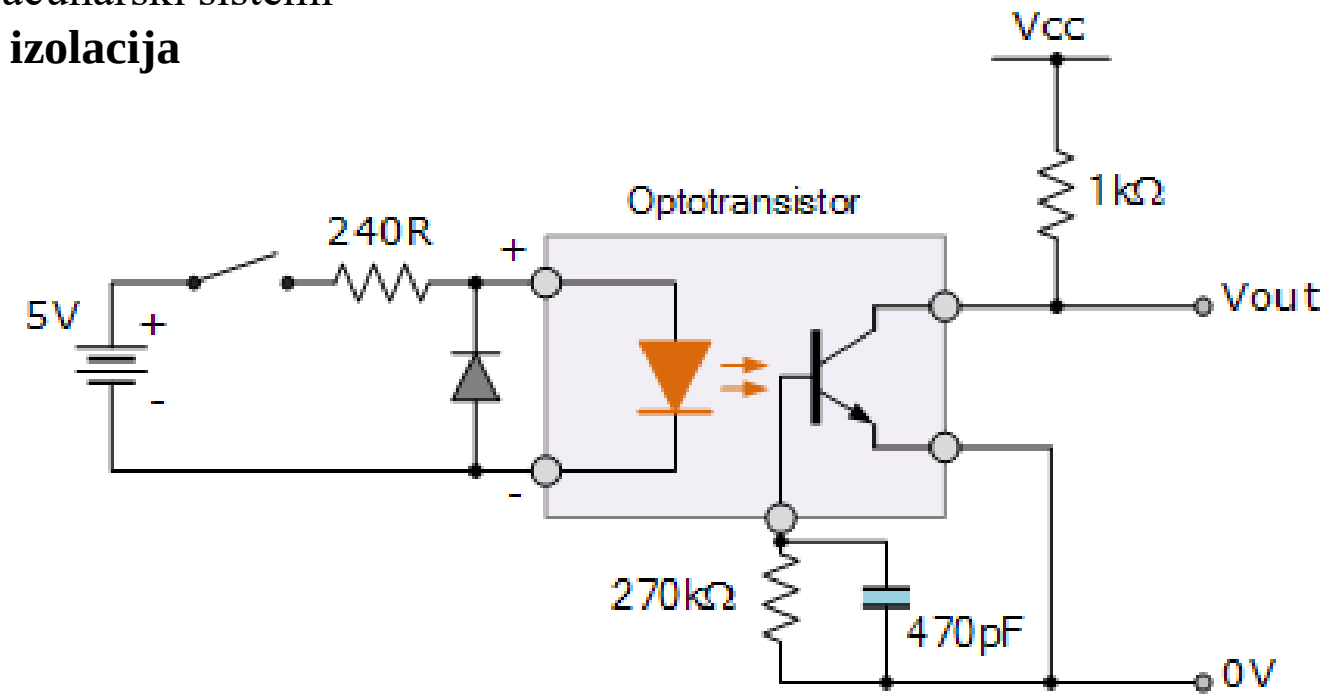

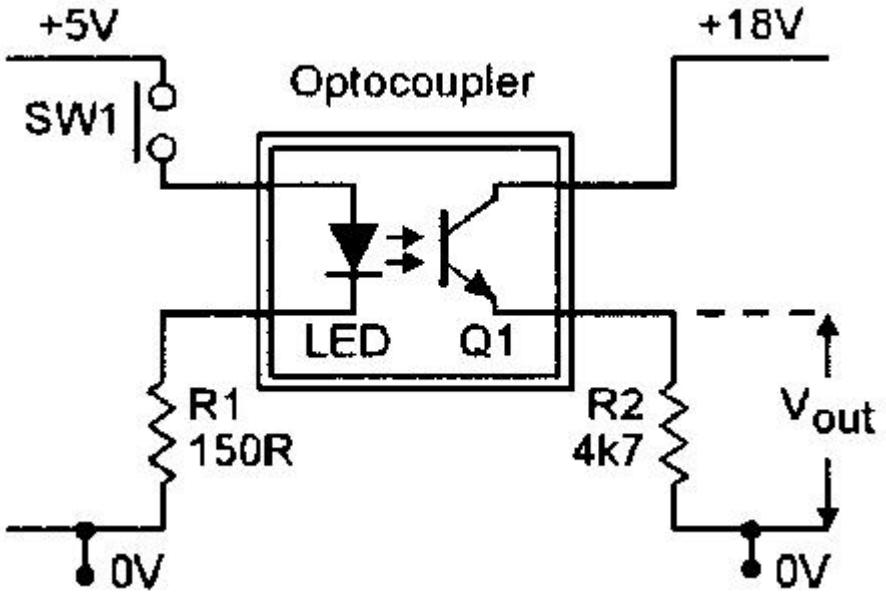

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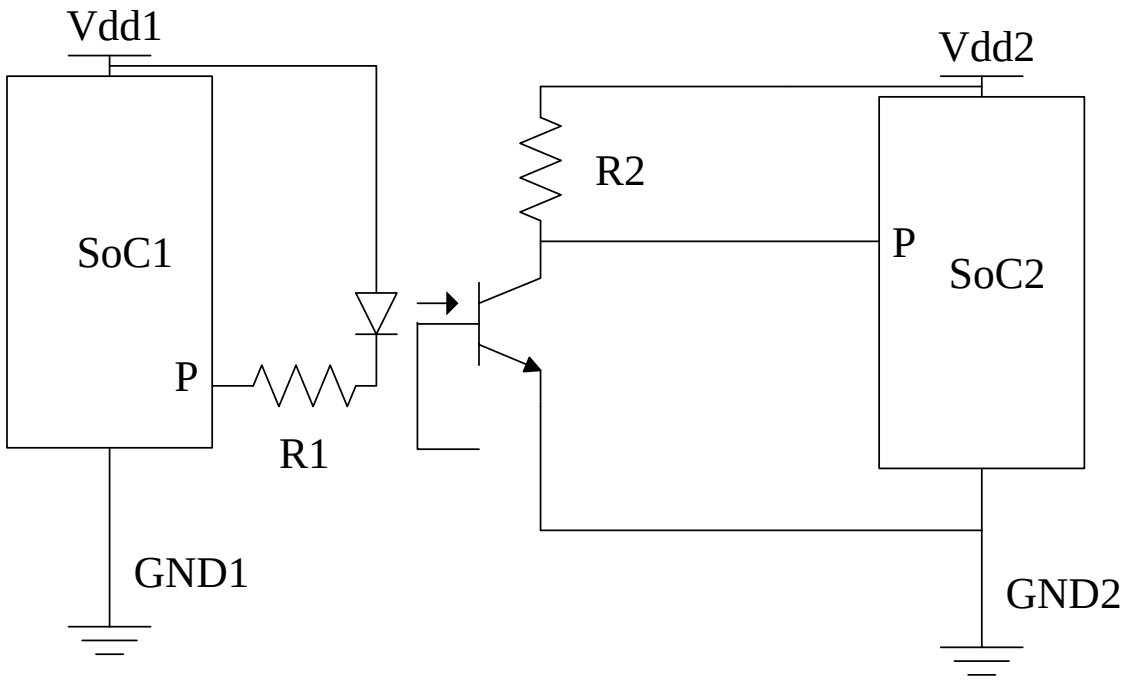
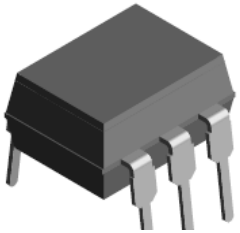
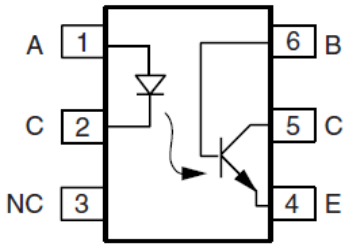


Izbor R1 i R2

Galvanska izolacija





4N35

ABSOLUTE MAXIMUM RATINGS (1)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Reverse voltage		V_R	6	V
Forward current		I_F	50	mA
Surge current	t ≤ 10 µs	I_{FSM}	1	A
Power dissipation		P_{diss}	70	mW
OUTPUT				
Collector emitter breakdown voltage		V_{CEO}	70	V
Emitter base breakdown voltage		V_{EBO}	7	V
Collector current		I_C	50	mA
	t ≤ 1 ms	I_C	100	mA
Power dissipation		P_{diss}	70	mW
COUPLER				
Isolation test voltage		V_{ISO}	5000	V_{RMS}
Creepage			≥ 7	mm
Clearance			≥ 7	mm
Isolation thickness between emitter and detector			≥ 0.4	mm

Galvanska izolacija

ELECTRICAL CHARACTERISTICS (1)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Junction capacitance	V_R = 0 V, f = 1 MHz		C_j		50		pF
Forward voltage (2)	I_F = 10 mA		V_F		1.3	1.5	V
	I_F = 10 mA, T_{amb} = - 55 °C		V_F	0.9	1.3	1.7	V
Reverse current (2)	V_R = 6 V		I_R		0.1	10	µA
Capacitance	V_R = 0 V, f = 1 MHz		C_O		25		pF
OUTPUT							
Collector emitter breakdown voltage(2)	I_C = 1 mA	4N35	BV_{CEO}	30			V
		4N36	BV_{CEO}	30			V
		4N37	BV_{CEO}	30			V
Emitter collector breakdown voltage(2)	I_E = 100 µA		BV_{ECO}	7			V
OUTPUT							
Collector base breakdown voltage (2)	I_C = 100 µA, I_B = 1 µA	4N35	BV_{CBO}	70			V
		4N36	BV_{CBO}	70			V
		4N37	BV_{CBO}	70			V
Collector emitter leakage current (2)	V_{CE} = 10 V, I_F = 0	4N35	I_{CEO}		5	50	nA
		4N36	I_{CEO}		5	50	nA
	V_{CE} = 10 V, I_F = 0	4N37	I_{CEO}		5	50	nA
	V_{CE} = 30 V, I_F = 0, T_{amb} = 100 °C	4N35	I_{CEO}			500	µA
		4N36	I_{CEO}			500	µA
		4N37	I_{CEO}			500	µA
Collector emitter capacitance	V_{CE} = 0		C_{CE}		6		pF
COUPLER							
Resistance, input output (2)	V_{IO} = 500 V		R_{IO}	10^{11}			Ω
Capacitance, input output	f = 1 MHz		C_{IO}		0.6		pF

Galvanska izolacija

CURRENT TRANSFER RATIO							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
DC current transfer ratio (1)	V_{CE} = 10 V, I_F = 10 mA	4N35	CTR_{DC}	100			%
		4N36	CTR_{DC}	100			%
		4N37	CTR_{DC}	100			%
	V_{CE} = 10 V, I_F = 10 mA, T_A = - 55 °C to + 100 °C	4N35	CTR_{DC}	40	50		%
		4N36	CTR_{DC}	40	50		%
		4N37	CTR_{DC}	40	50		%

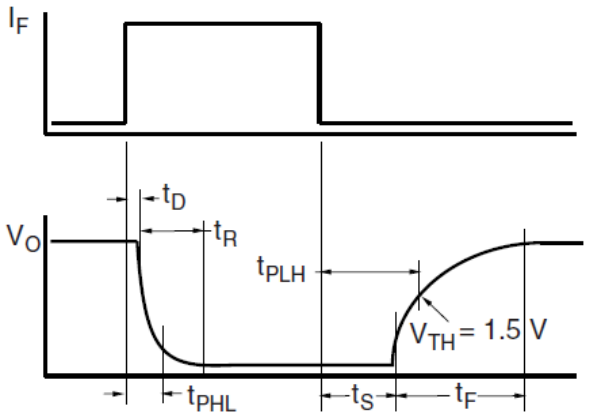
Note
(1) Indicates JEDEC registered values.

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Switching time (1)	V_{CC} = 10 V, I_C = 2 mA, R_L = 100 Ω	t_{on}, t_{off}		10		µs

Note
(1) Indicates JEDEC registered values.

TYPICAL CHARACTERISTICS

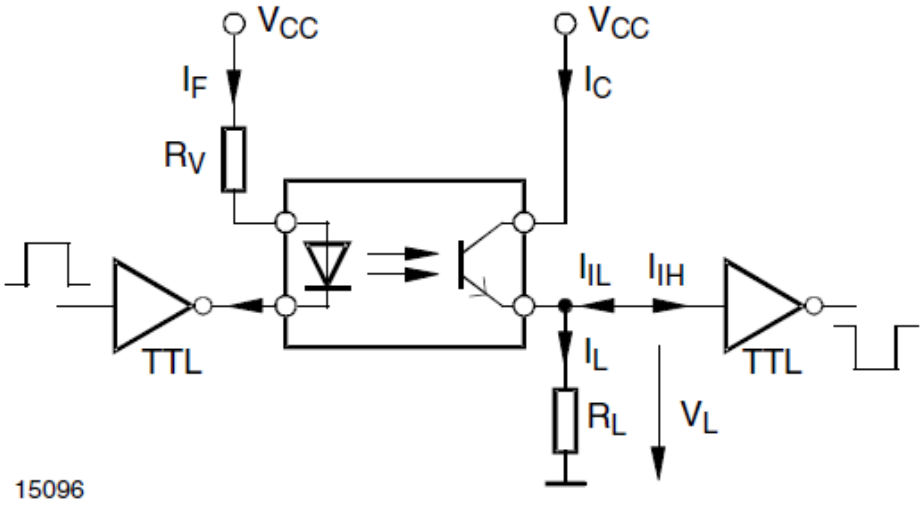
T_{amb} = 25 °C, unless otherwise specied

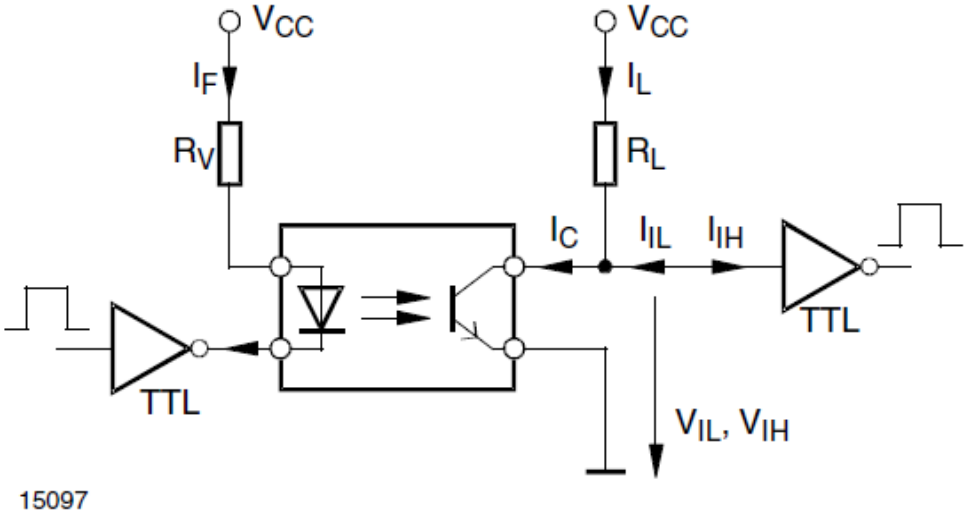


i4n25_13

Fig. 13 - Switching Timing

Galvanska izolacija





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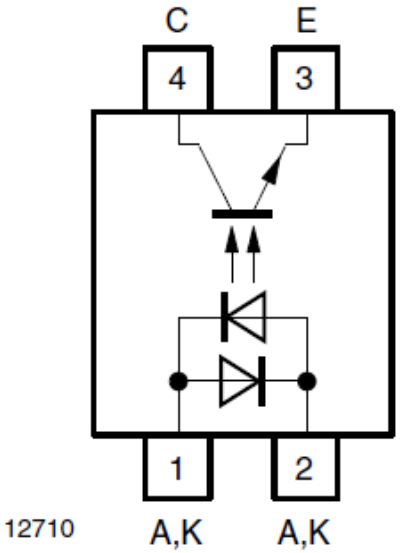
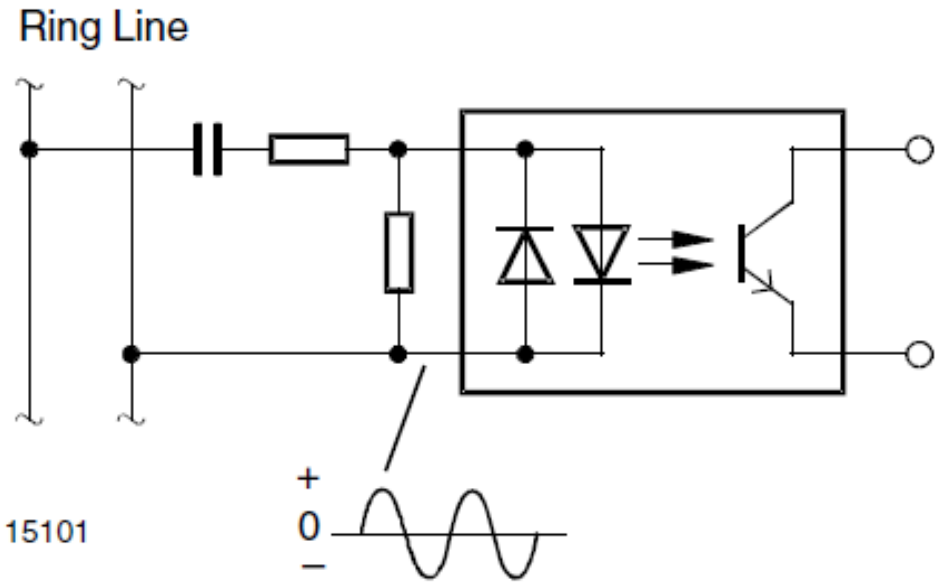
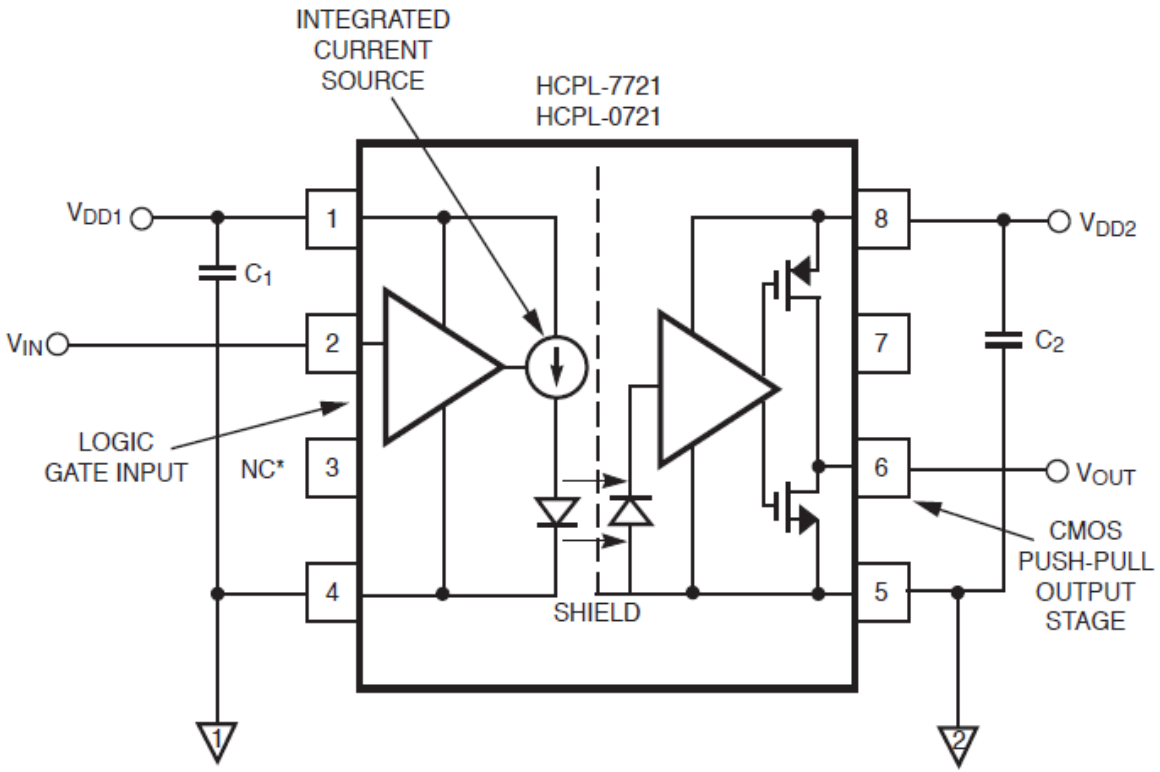




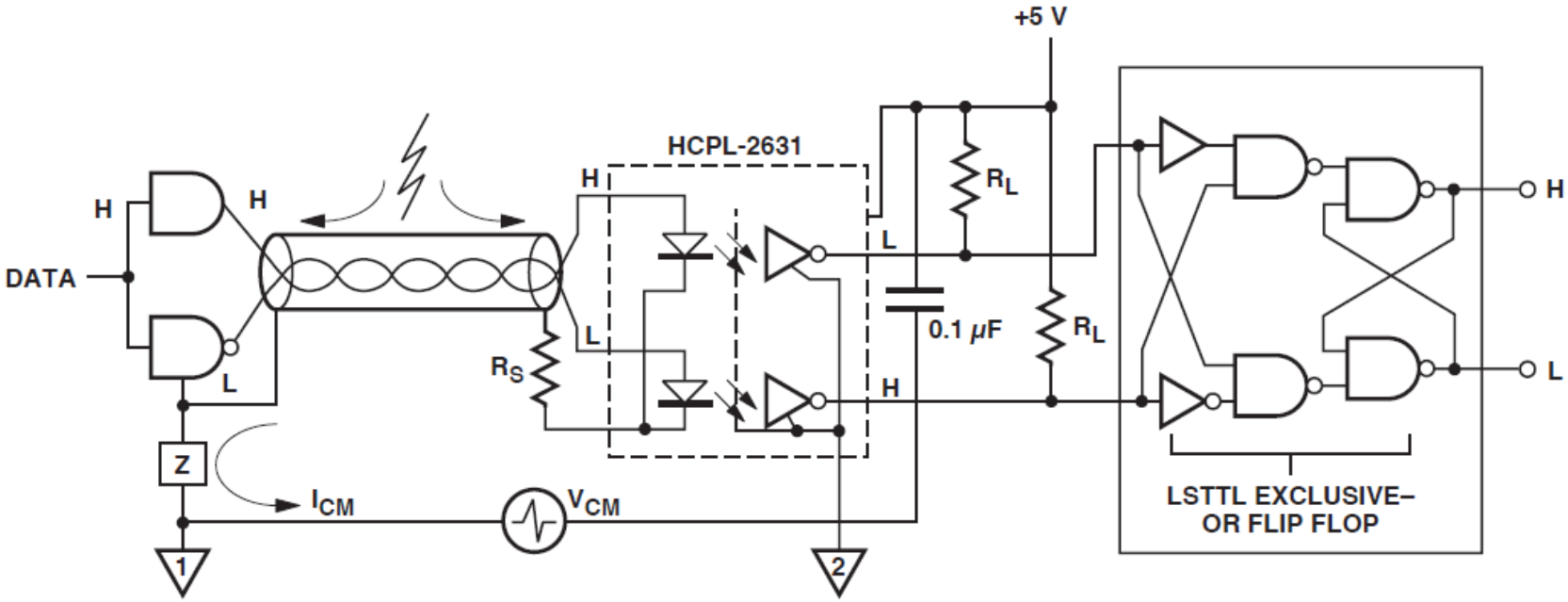
Galvanska izolacija

High speed



Galvanska izolacija

High speed - diferencijalni prenos



Galvanska izolacija

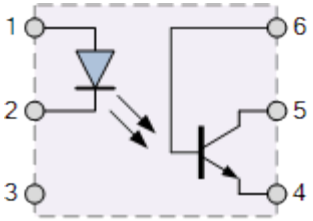


Photo-transistor

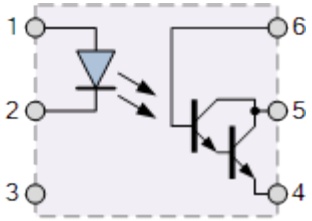
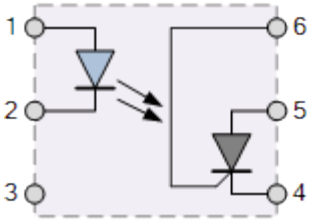


Photo-darlington



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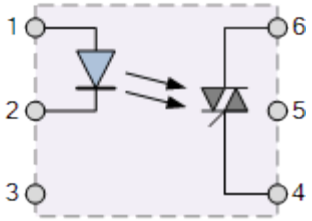
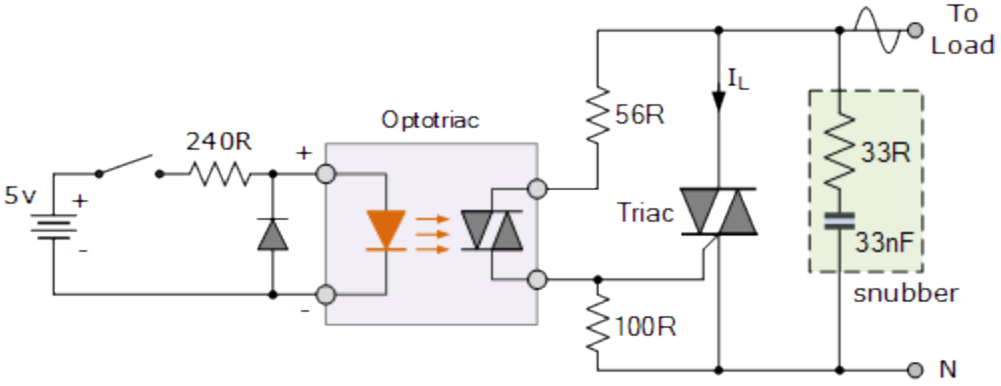
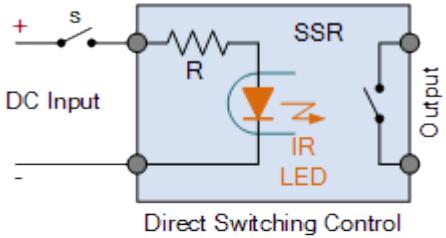


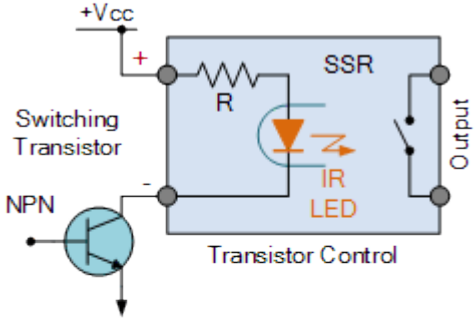
Photo-TRIAC

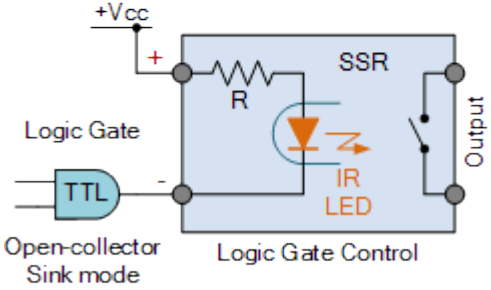


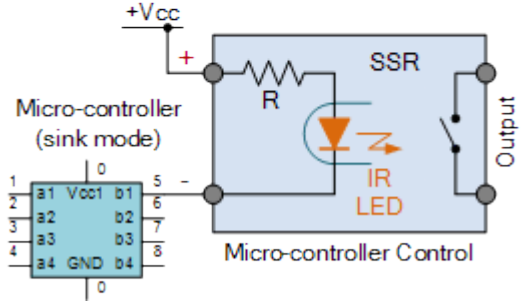
Galvanska izolacija

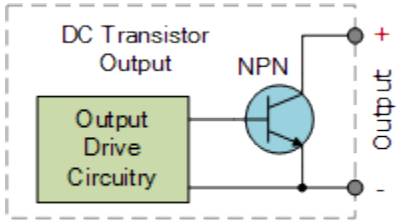
Solid state relay

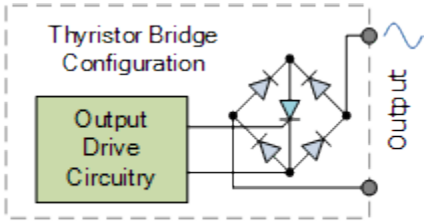


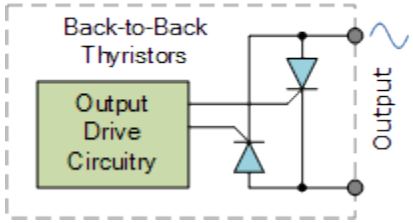


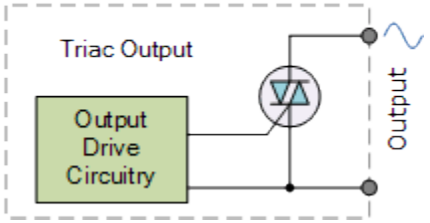






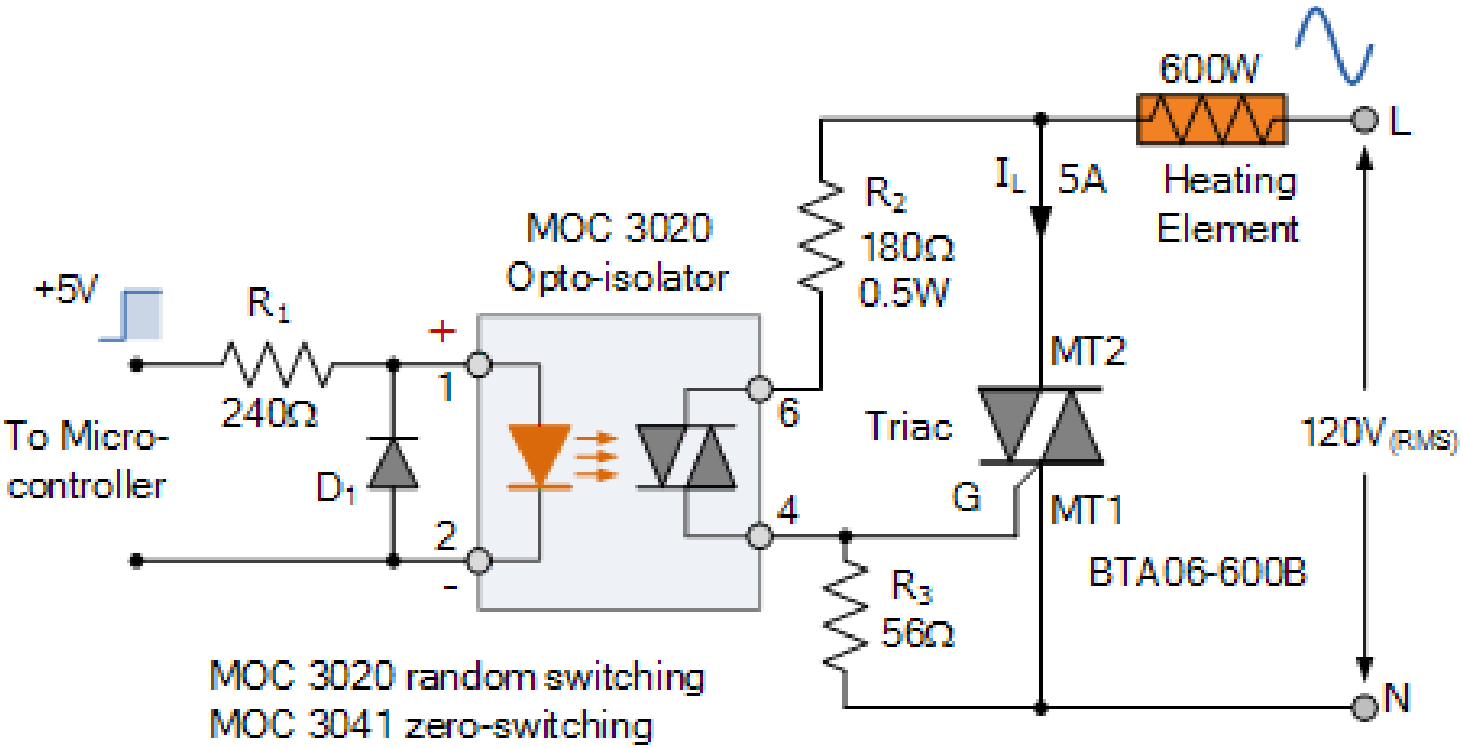






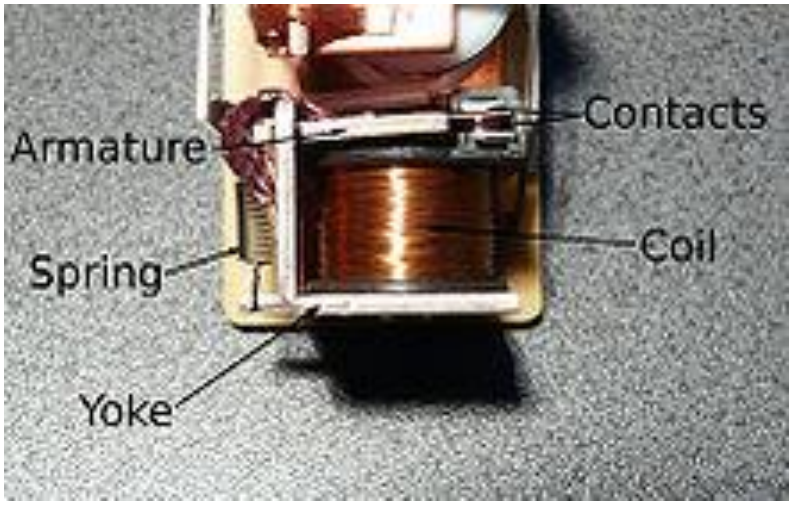
Galvanska izolacija

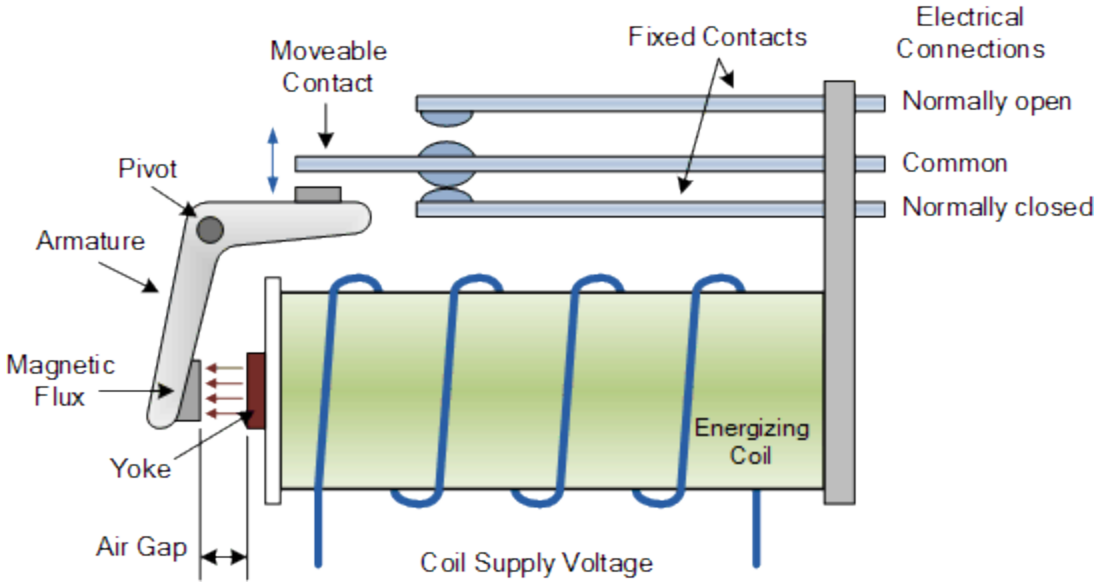
Solid state relay



Galvanska izolacija

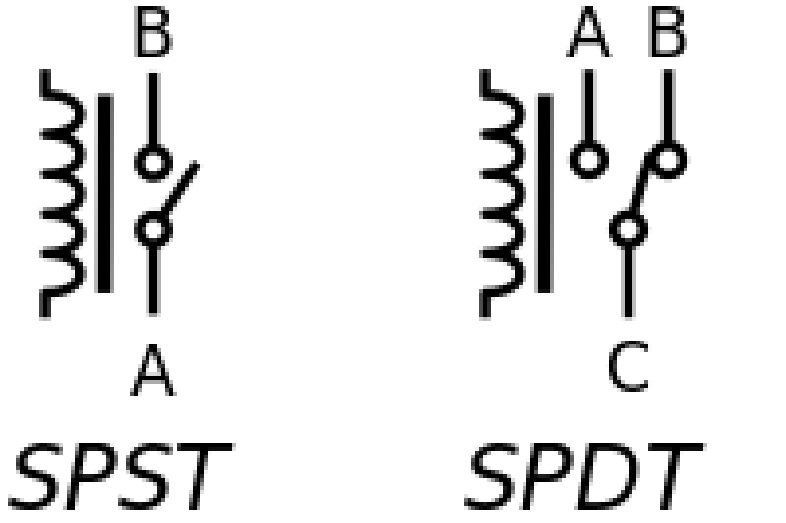
Relay

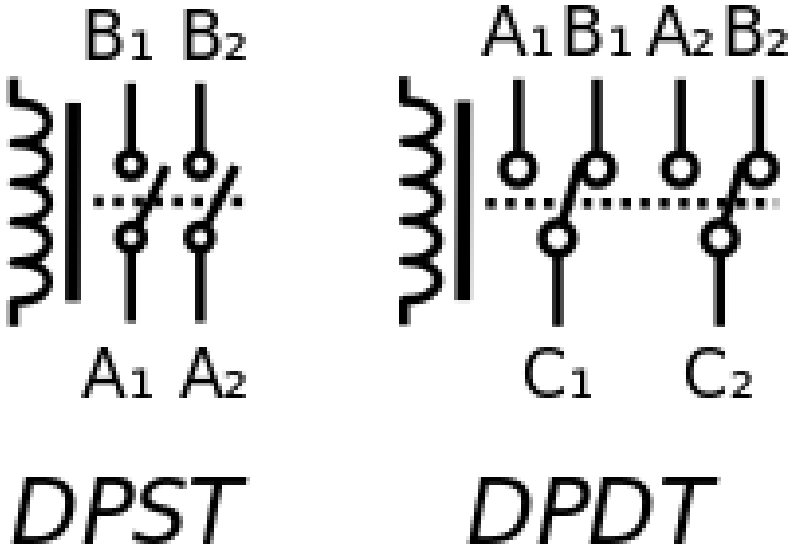




Galvanska izolacija

Relay





Galvanska izolacija

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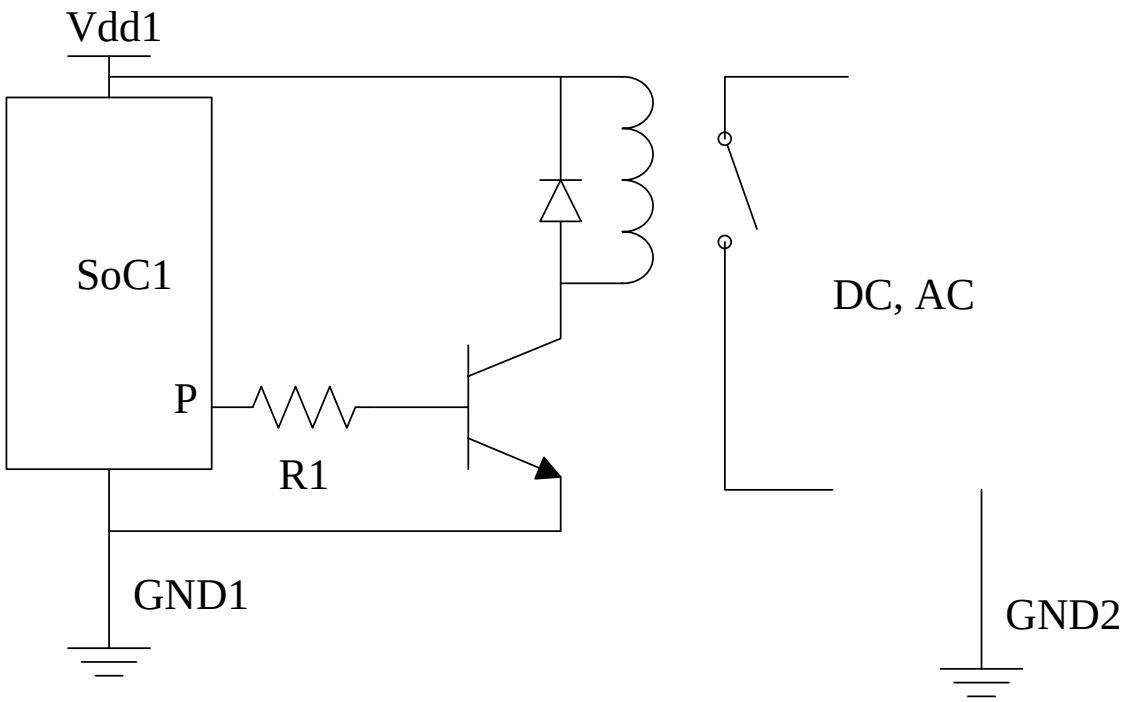

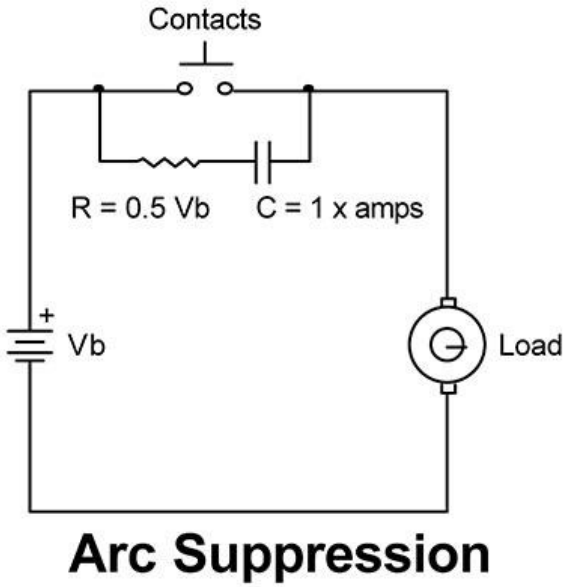

Galvanska izolacija

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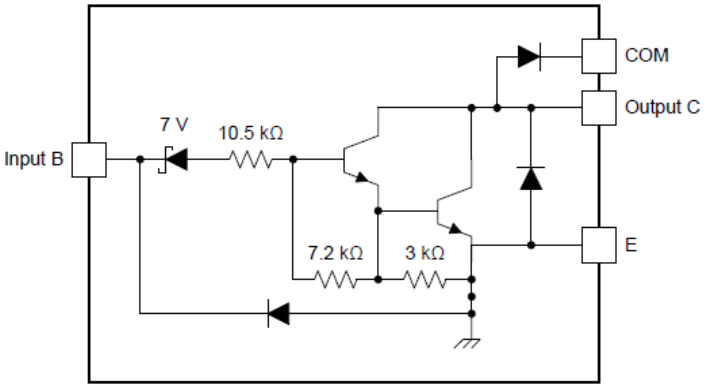


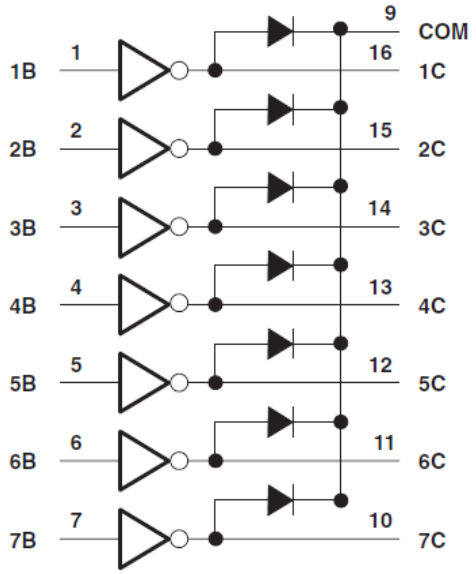


Figure 19. ULN2002A Block Diagram

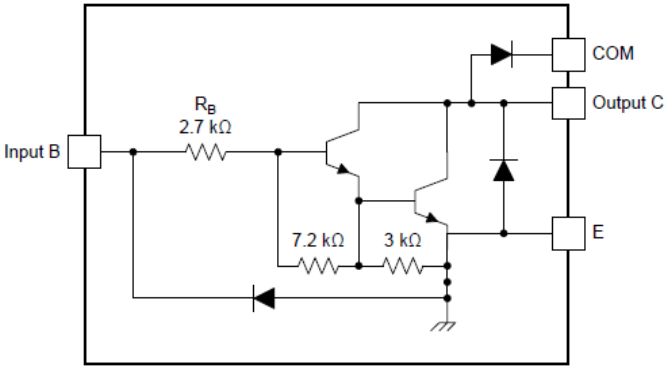


Figure 20. ULN2003A, ULQ2003A and ULN2003AI Block Diagram

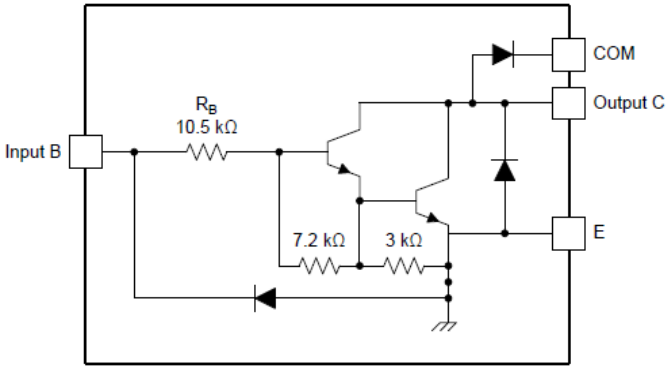
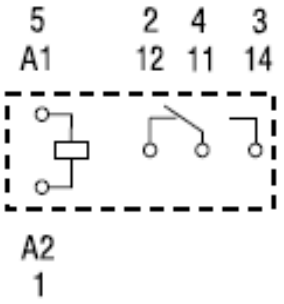
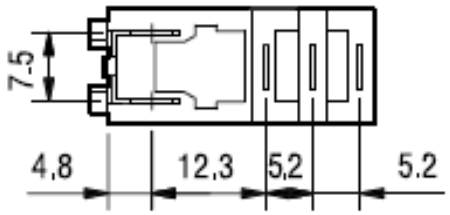


Figure 21. ULN2004A and LQ2004A Block Diagram

Relay





Contact specification				
Contact configuration		2 CO (DPDT)	1 CO (SPDT)	
Rated current/Maximum peak current	A	8/15	16/25*	*
Rated voltage/ Maximum switching voltage	V AC	250/440	250/440	
Rated load AC1	VA	2000	4000	
Rated load AC15 (230 V AC)	VA	350	750	
Single phase motor rating (230 V AC)	kW	0.37	0.55	
Breaking capacity DC1: 30/110/220 V	A	6/0.5/0.15	12/0.5/0.15	
Minimum switching load	mW (V/mA)	300 (5/5)	300 (5/5)	
Standard contact material		AgNi	AgNi	

Galvanska izolacija

Relay

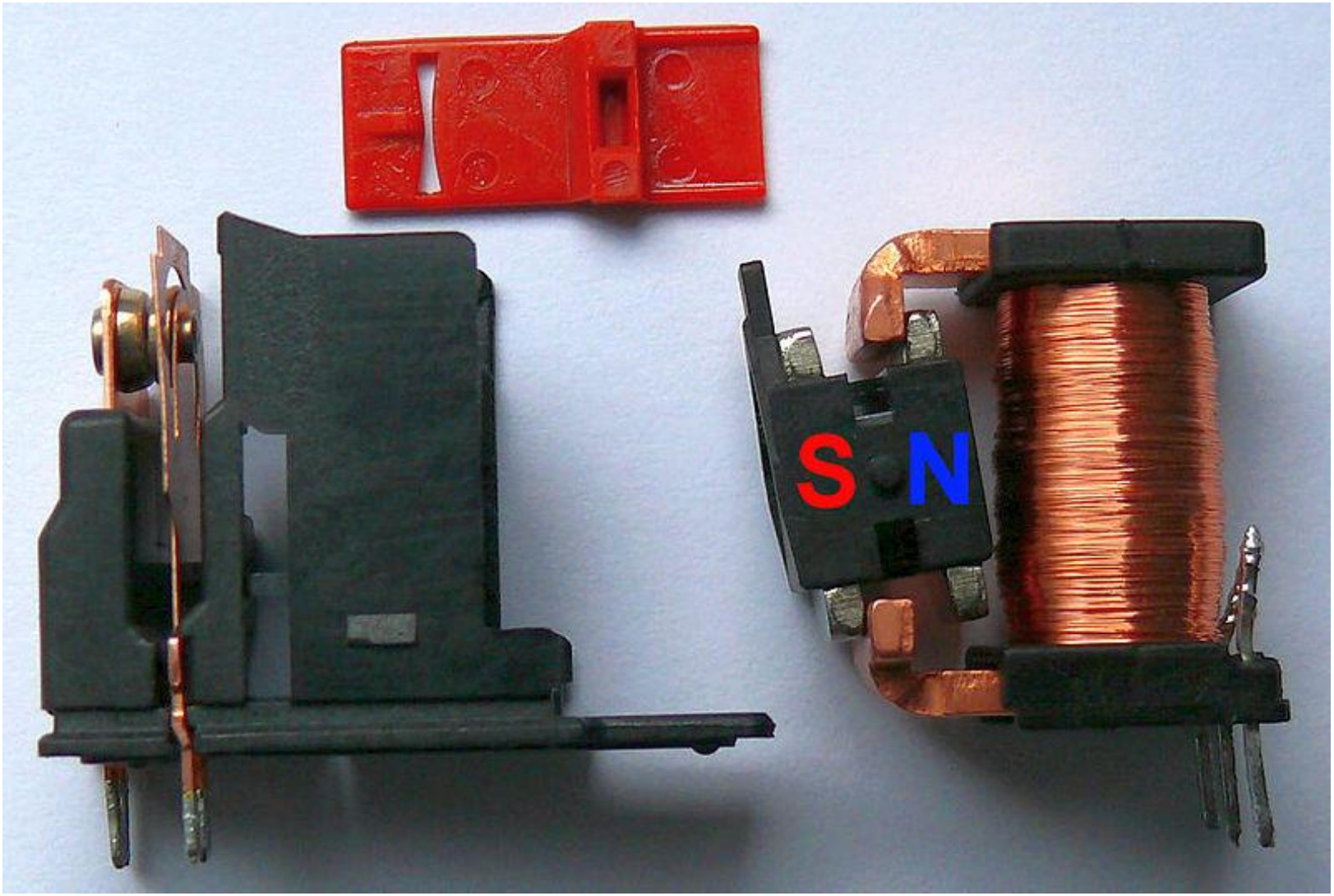
Coil specification			
Nominal voltage (U_N)	V AC (50/60 Hz)	12 - 24 - 48 - 110 - 120 - 230 - 240	
	V DC	12 - 24 - 48 - 110 - 125	
Rated power	VA/W	1.2/0.5	1.2/0.5
Operating range	AC	$(0.8…1.1)U_N$	$(0.8…1.1)U_N$
	DC	$(0.73…1.1)U_N$	$(0.73…1.1)U_N$
Holding voltage	AC/DC	$0.8\ U_N / 0.4\ U_N$	$0.8\ U_N / 0.4\ U_N$
Must drop-out voltage	AC/DC	$0.2\ U_N / 0.1\ U_N$	$0.2\ U_N / 0.1\ U_N$
Technical data			
Mechanical life AC/DC	cycles	$10 \cdot 10^6$	$10 \cdot 10^6$
Electrical life at rated load AC1	cycles	$100 \cdot 10^3$	$100 \cdot 10^3$
Operate/release time	ms	10/3	15/5
Insulation between coil and contacts (1.2/50 µs)	kV	6 (8 mm)	6 (8 mm)
Dielectric strength between open contacts	V AC	1000	1000
Ambient temperature range	°C	–40…+70	–40…+70
Environmental protection		RT II	RT II

Galvanska izolacija

Relay

Monostabilna

Bistabilna - latching

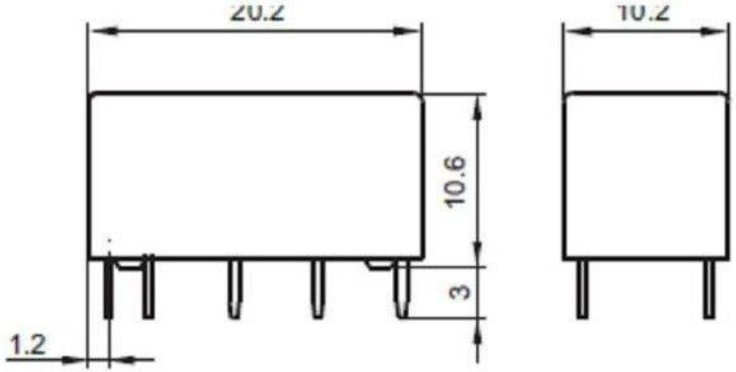


Galvanska izolacija

Relay

Monostabilna

Bistabilna



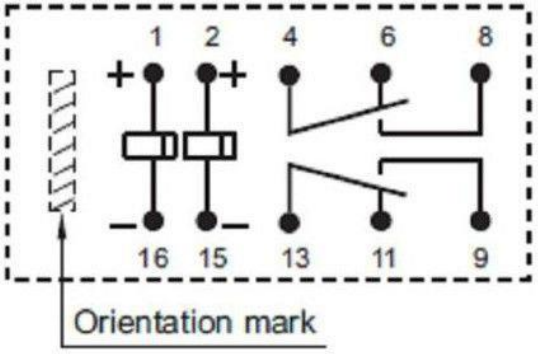
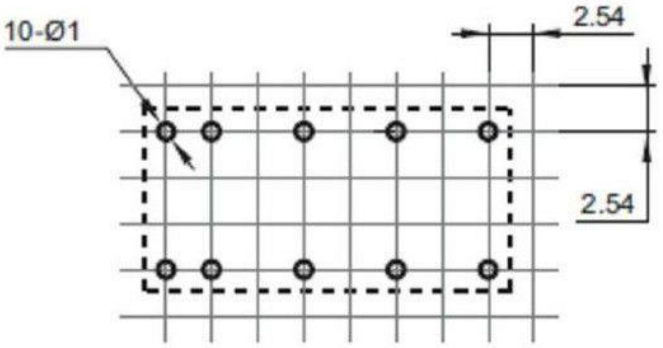


Diagram shows the "reset" position
Energize terminals 1 and 16 to "set"
Energize terminals 2 and 15 to "reset"



Matching 16 pin IC socket

Galvanska izolacija

Relay

Monostabilna

Bistabilna - latching

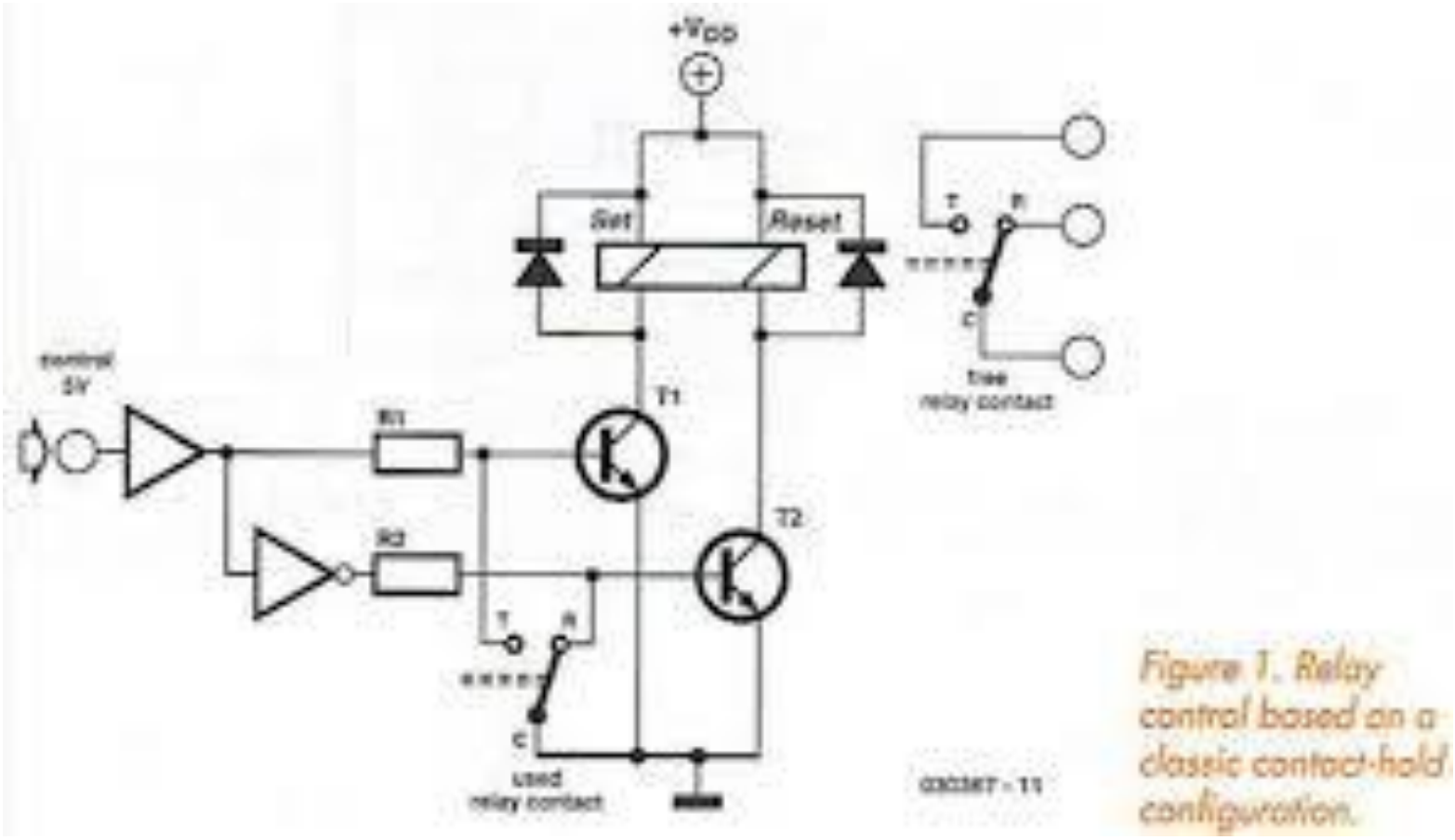
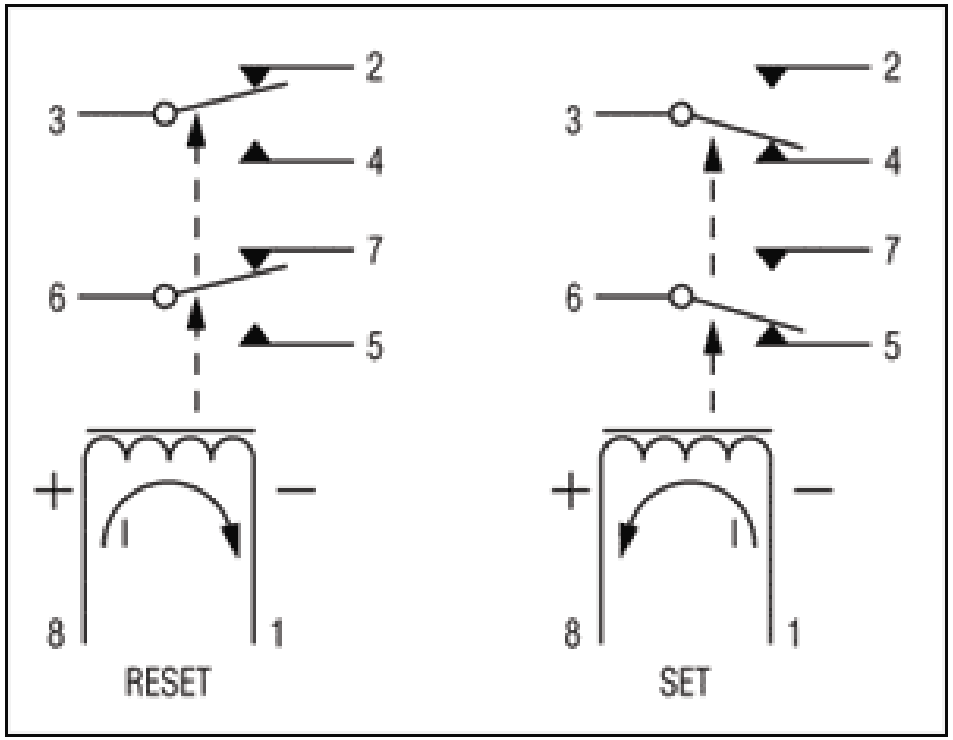


Figure 1. Relay control based on a classic contact-hold configuration.

Galvanska izolacija

Relay

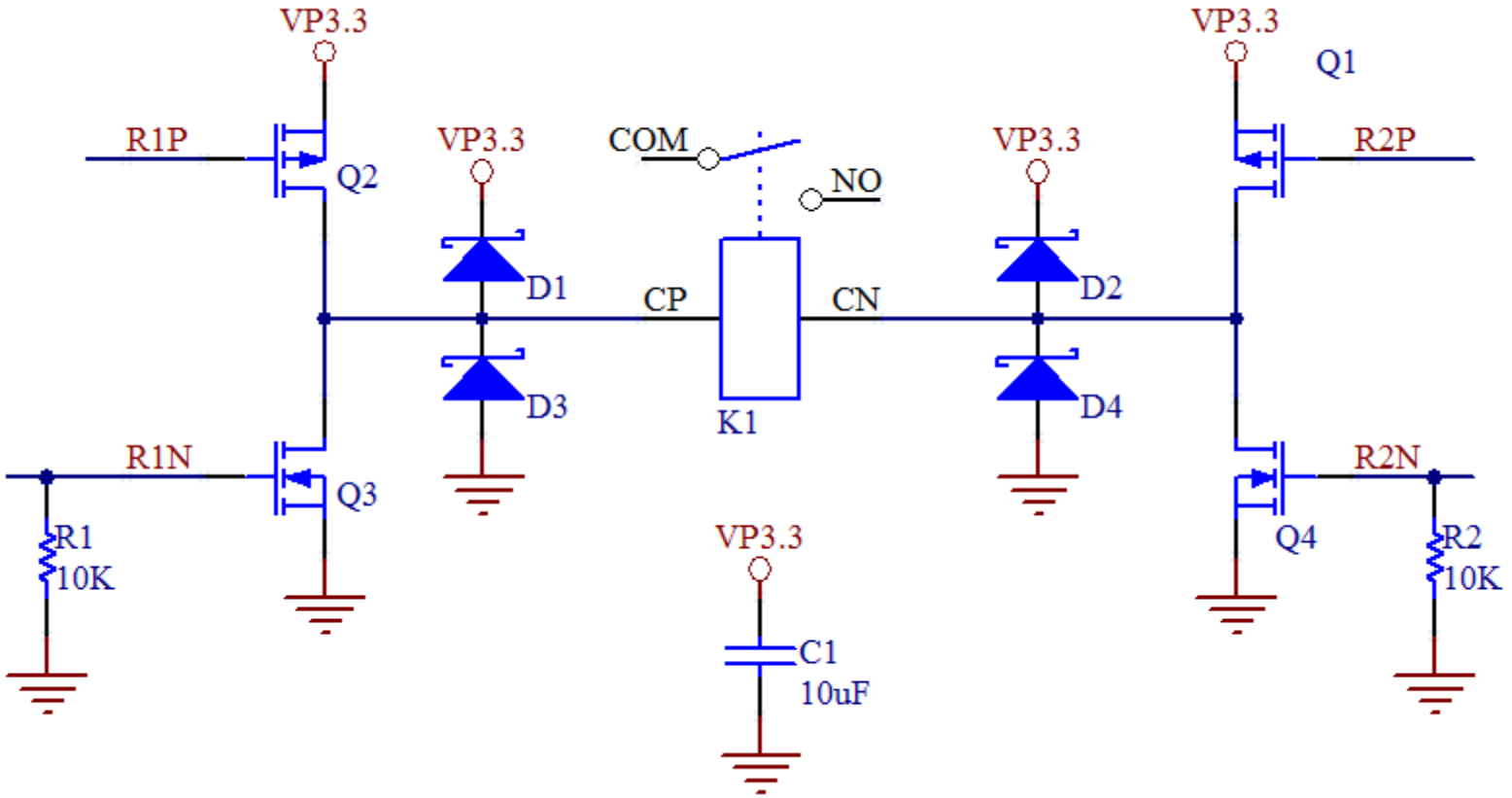
Bistabilna sa jednim namotajem



Galvanska izolacija

Relay

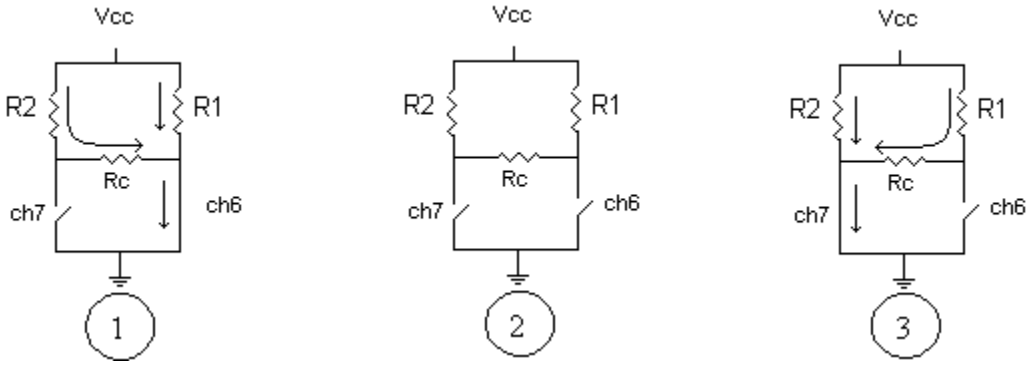
Bistabilna sa jednim namotajem

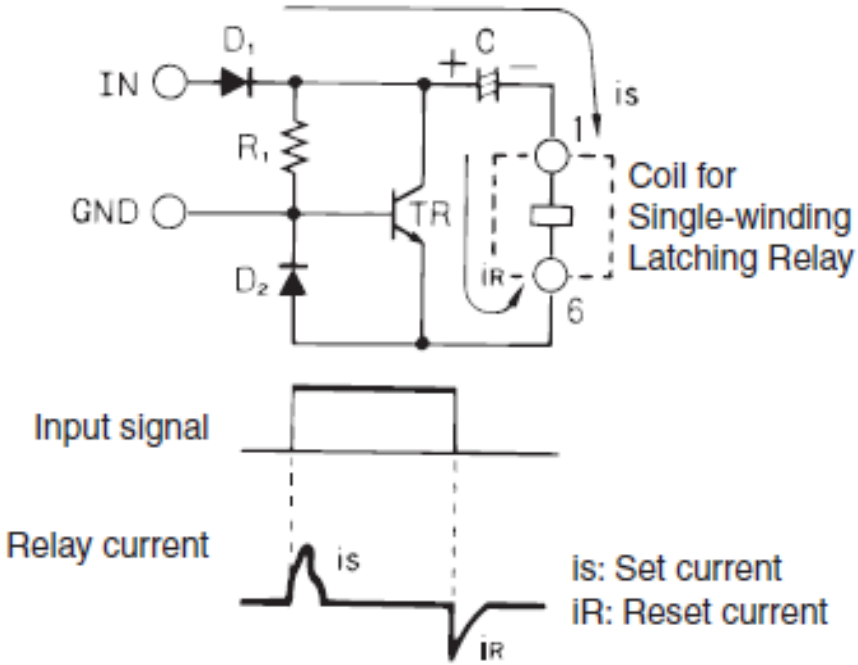


Galvanska izolacija

Relay

Bistabilna sa jednim namotajem





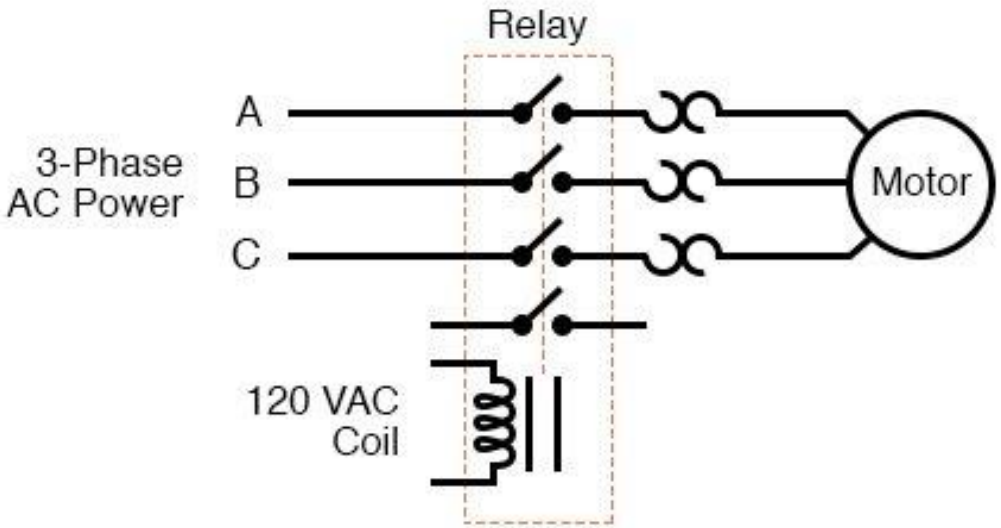
Namenski računarski sistemi

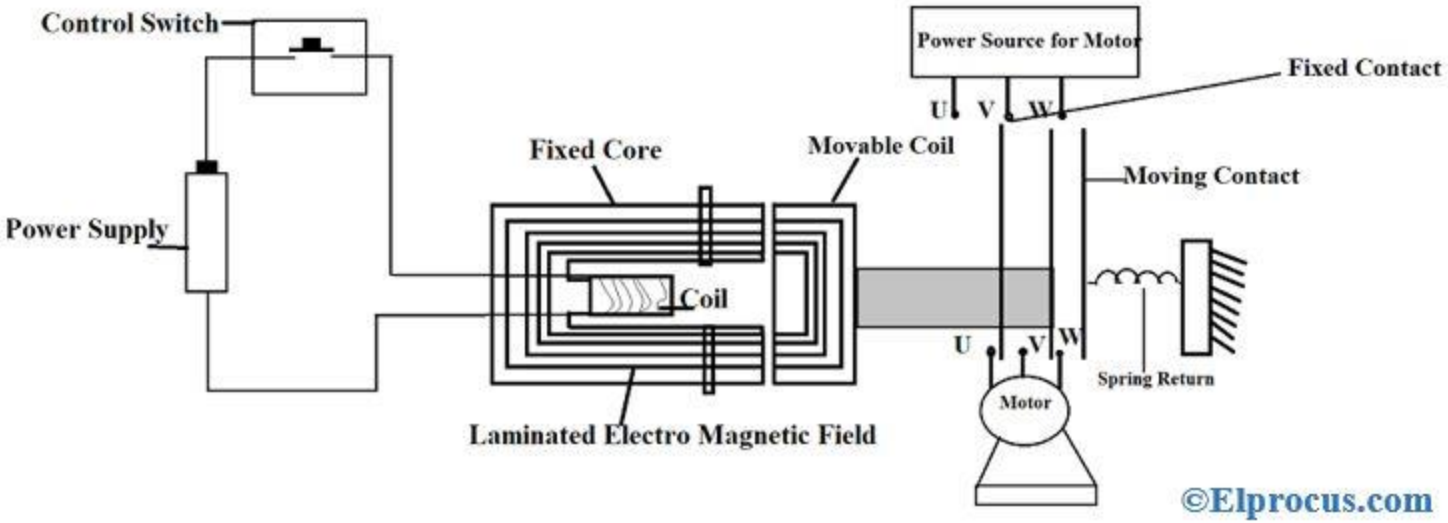
Galvanska izolacija

kontaktor

Galvanska izolacija

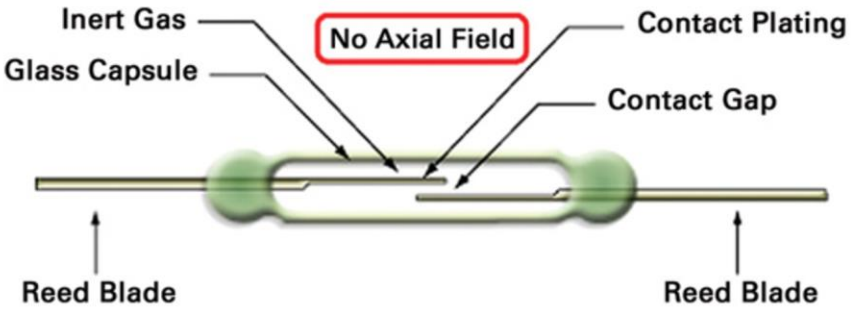
kontaktor

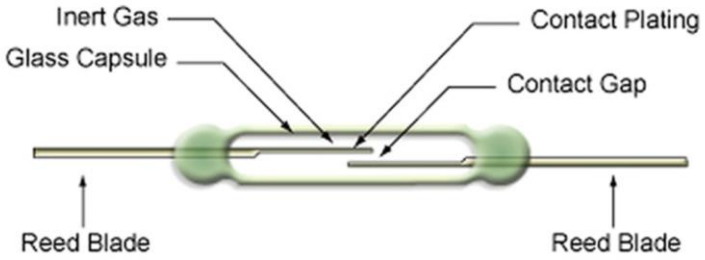


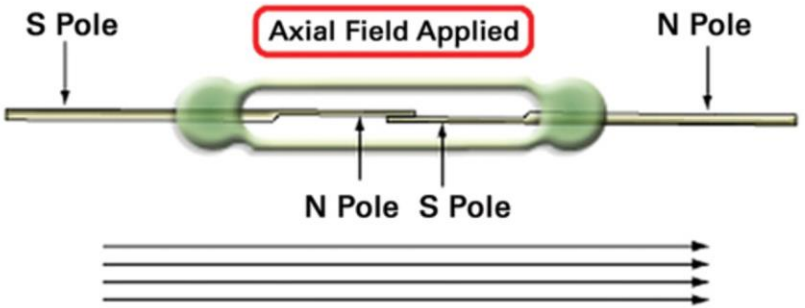


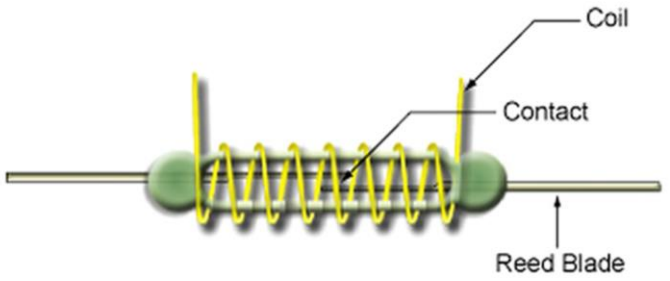
Galvanska izolacija

Reed relay









Galvanska izolacija

Reed switch