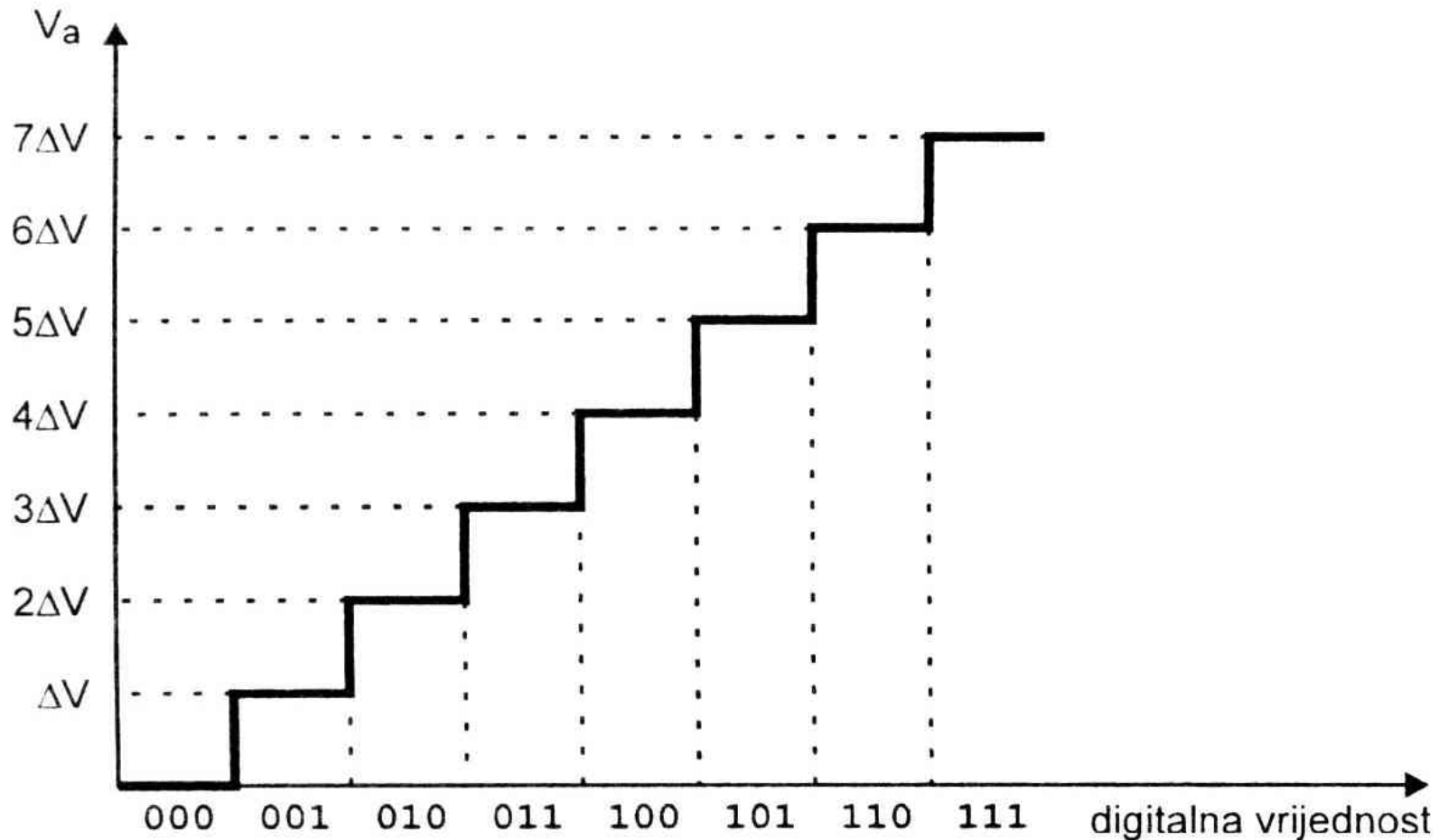


Analogno-

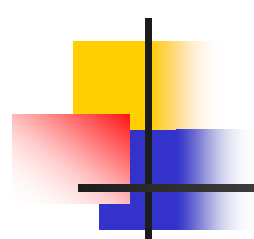
digitalni

konvertori

ADC ima inverznu funkciju od DACa



Zavisnost: analogni napon / digitalna vrijednost



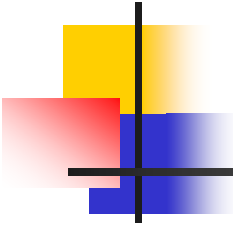
Analogne velicine
mogu da se mjere i
prikazuju pomoću
analognih instrumenata

Čovjek obavlja funkciju AD
konverzije (očitava skalu)



Ponekad očitavanje nije lako,
a čovjek može i da pogriješi





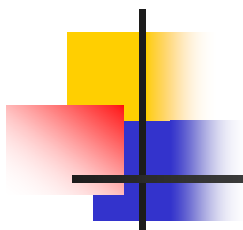
Savremeni uređaji koriste AD konvertore (skraćeno ADC)

- Mobilni telefoni
- Skeneri svih vrsta
- Džojstik uređaji
- Digitalni fotoaparati (kamere)
- Digitalni snimači zvuka
- Uređaji za najrazličitija mjerenja poput:
vlage, temperature, kiselosti rastvora, čistoće
vode, intenziteta buke, intenziteta svijetla,
krvnog pritiska, napona, struje, otpora, težine,
- itd.



Mobilni telefoni u sebi sadrže obje vrste konvertora:

- AD konvertor (uz mikrofon)
- DA konvertor (uz zvučnik)



Skener
pomoću
ADC-a
pretvara
sliku u
digitalne
signale

Džojstik pomoću ADC-a konvertuje položaj u broj

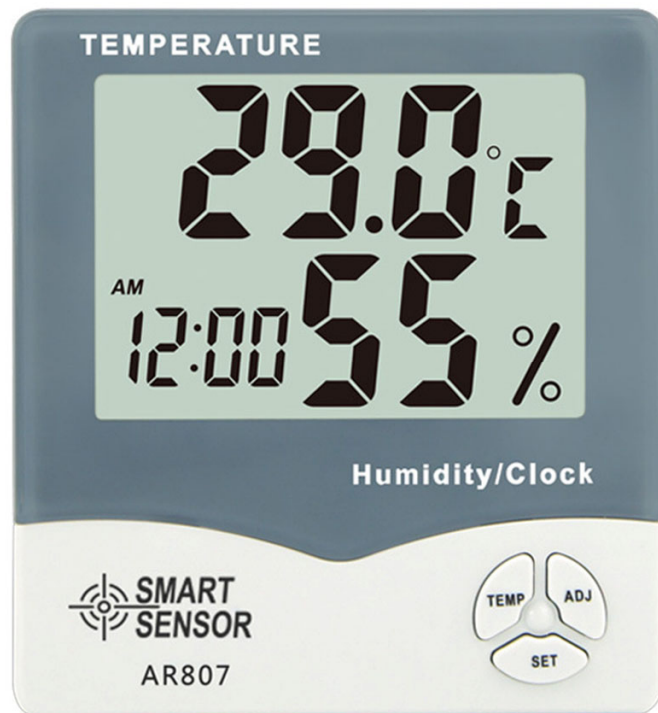
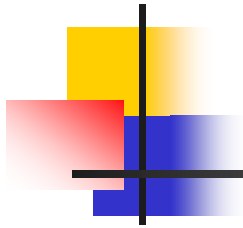


Digitalni fotoaparati (kamera)



Digitalno snimanje zvuka

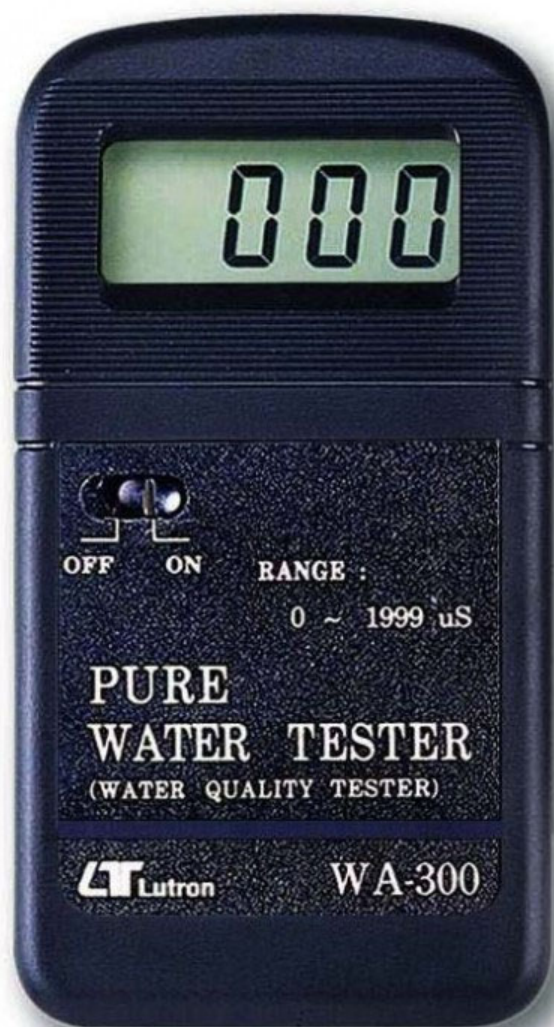




Mjerenje vlage
i temperature



Mjerenje i
prikaz
kiselosti
rastvora



Mjerenje
čistoće
vode

Ispitivanje
kvaliteta
vode

Schallpegel

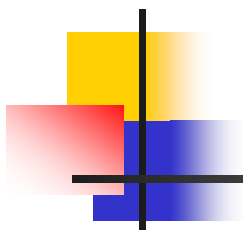
35 bis

35 bis 130 dB
31.5 bis 8000 Hz

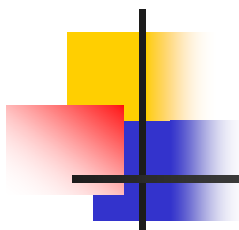


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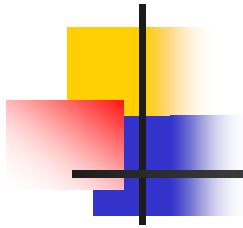
b
u
ke



Mjerenje
intenziteta
svijetla



Mjerenje
krvnog
pritiska



Digitalni
multi-
metar

AVO
metar



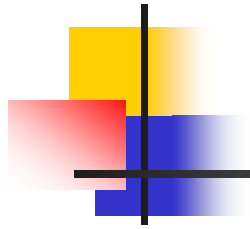
DIGITAL VOLTMETER

Digitalna vaga



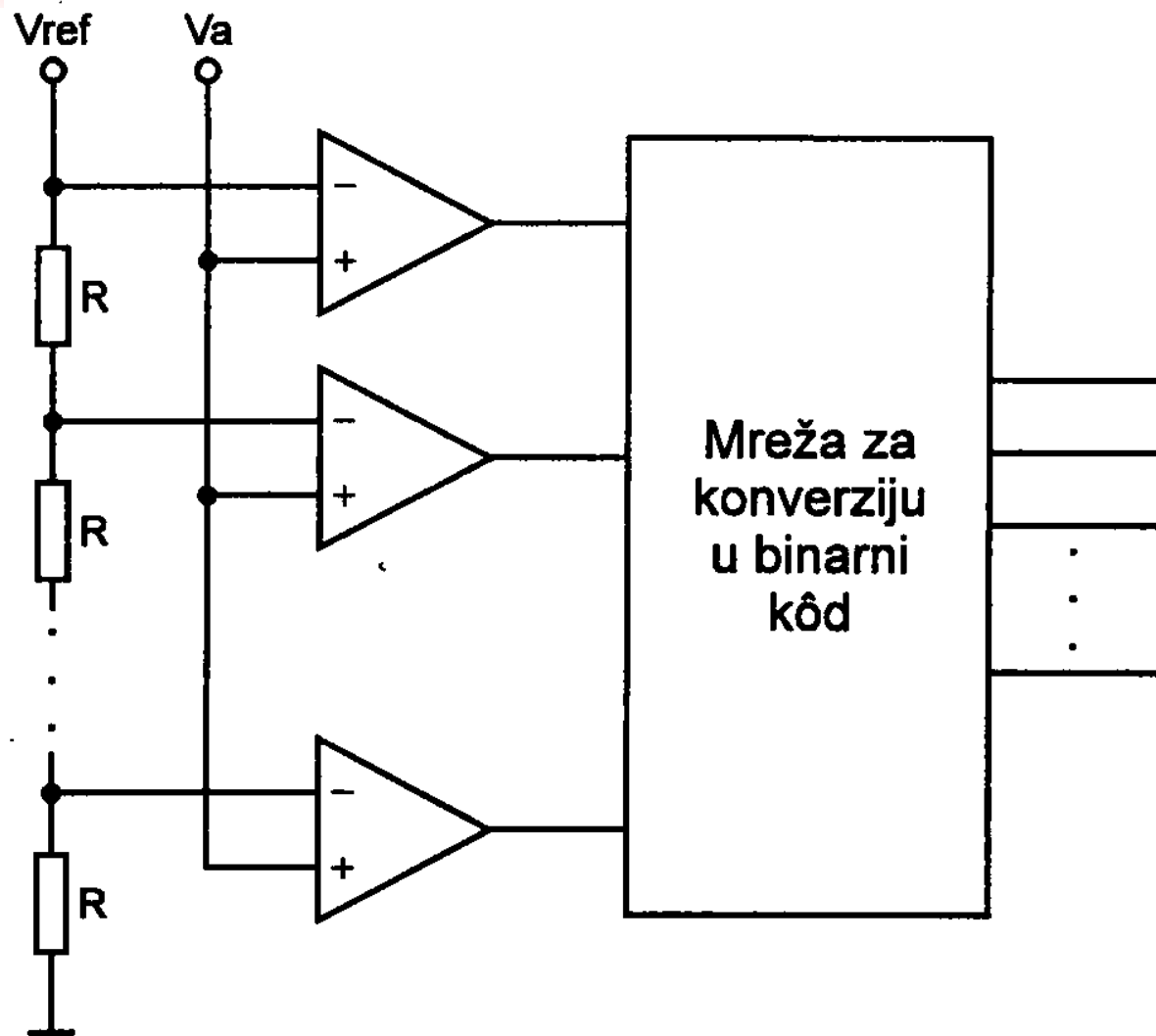
Digitalni osciloskop





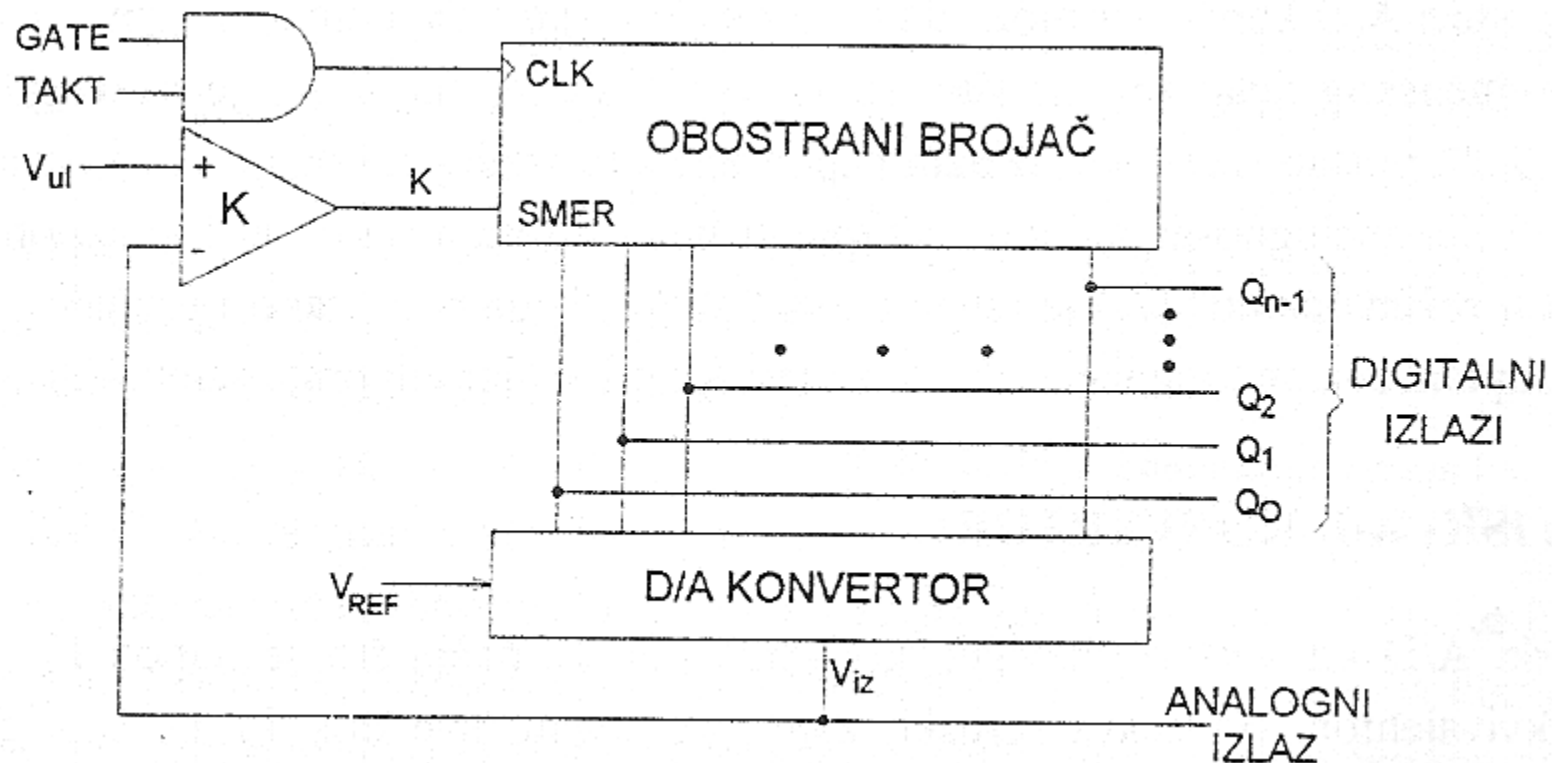
**Princip rada
AD konvertora
Kako ADC radi?**

Paralelni (fleš) AD konvertori



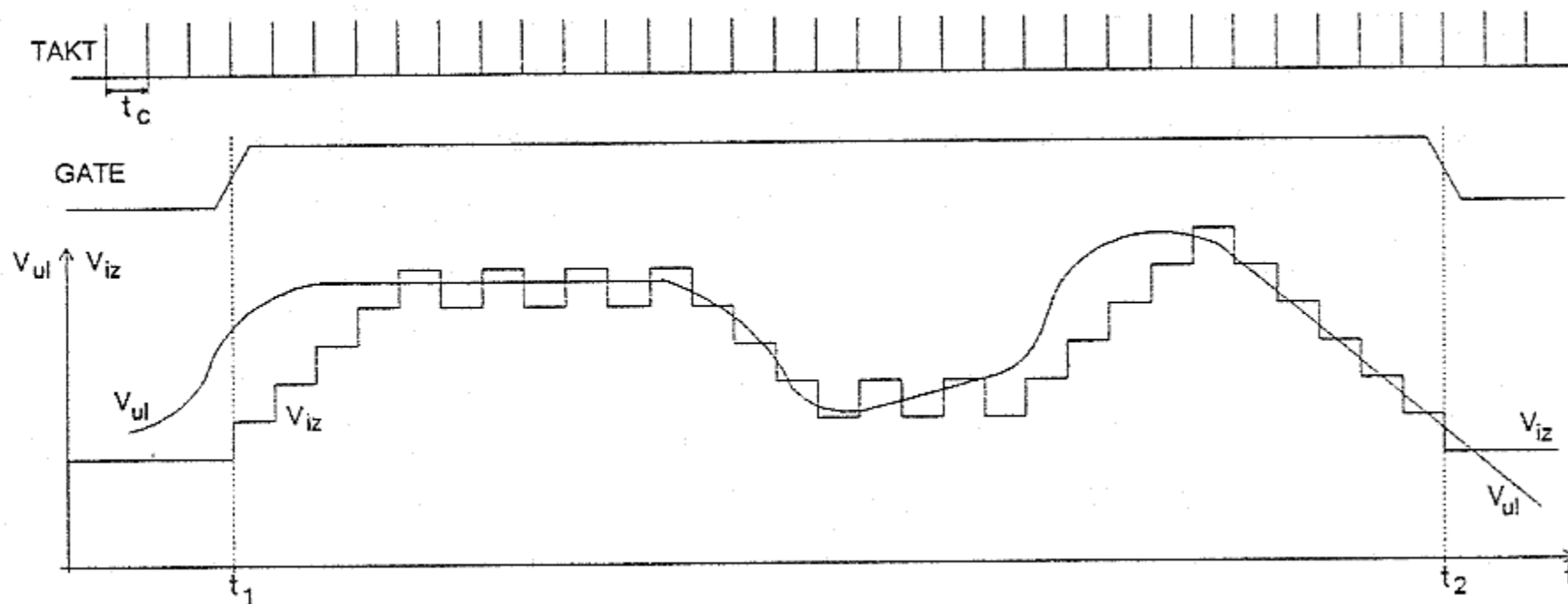
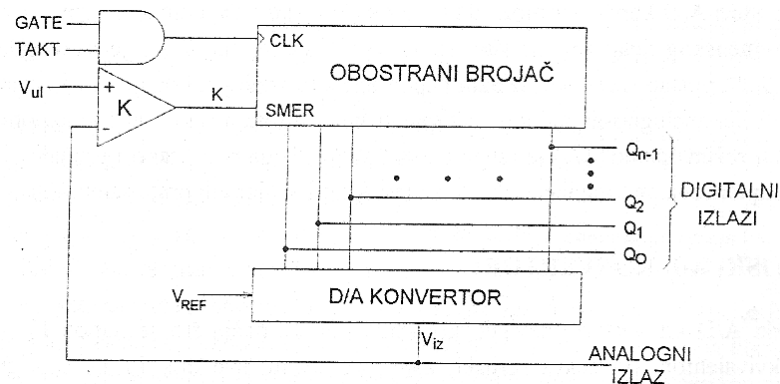
Najbrži,
ali male
preciznosti
(4 do 8 bitova)

Hardverska realizacija prateće ADC

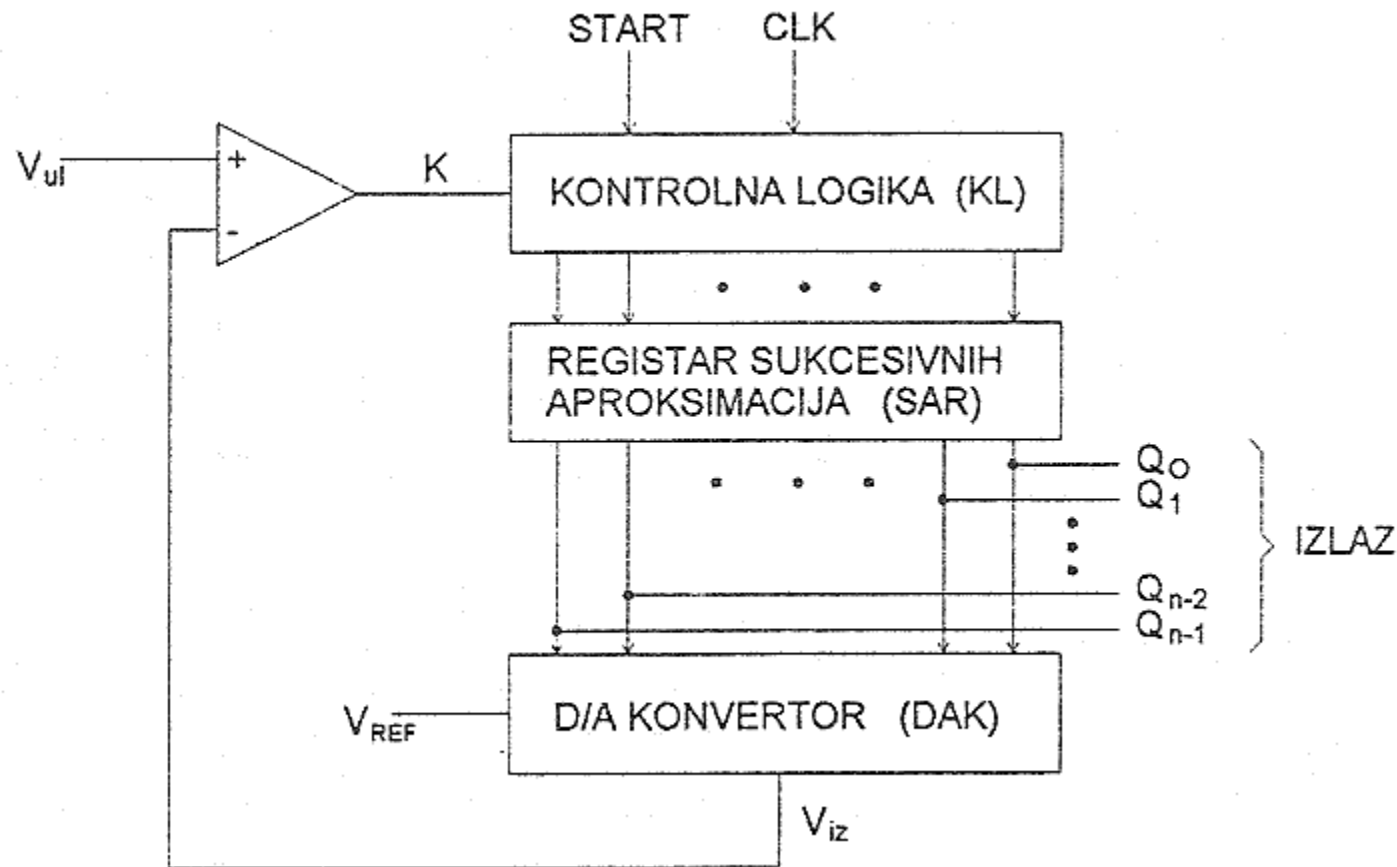


Zavisno od toga da li je ulazni napon veći ili manji od napona postavljenog na D-A konvertoru, komparator komanduje brojaču da broji naviše ili naniže.

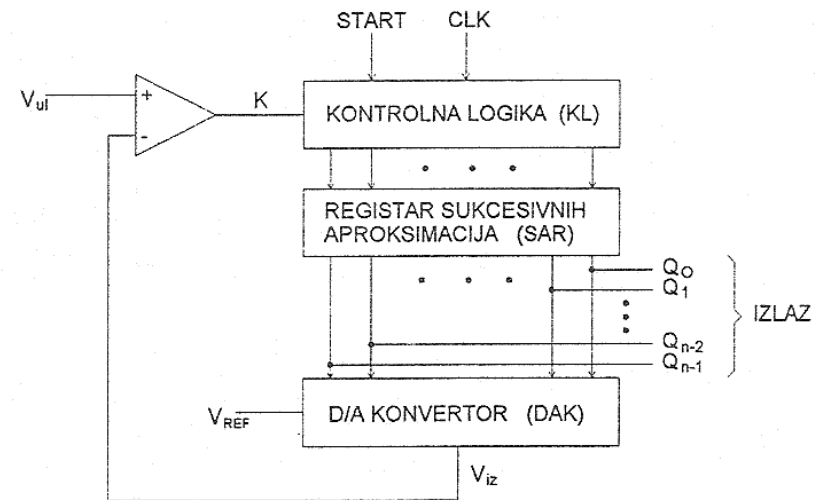
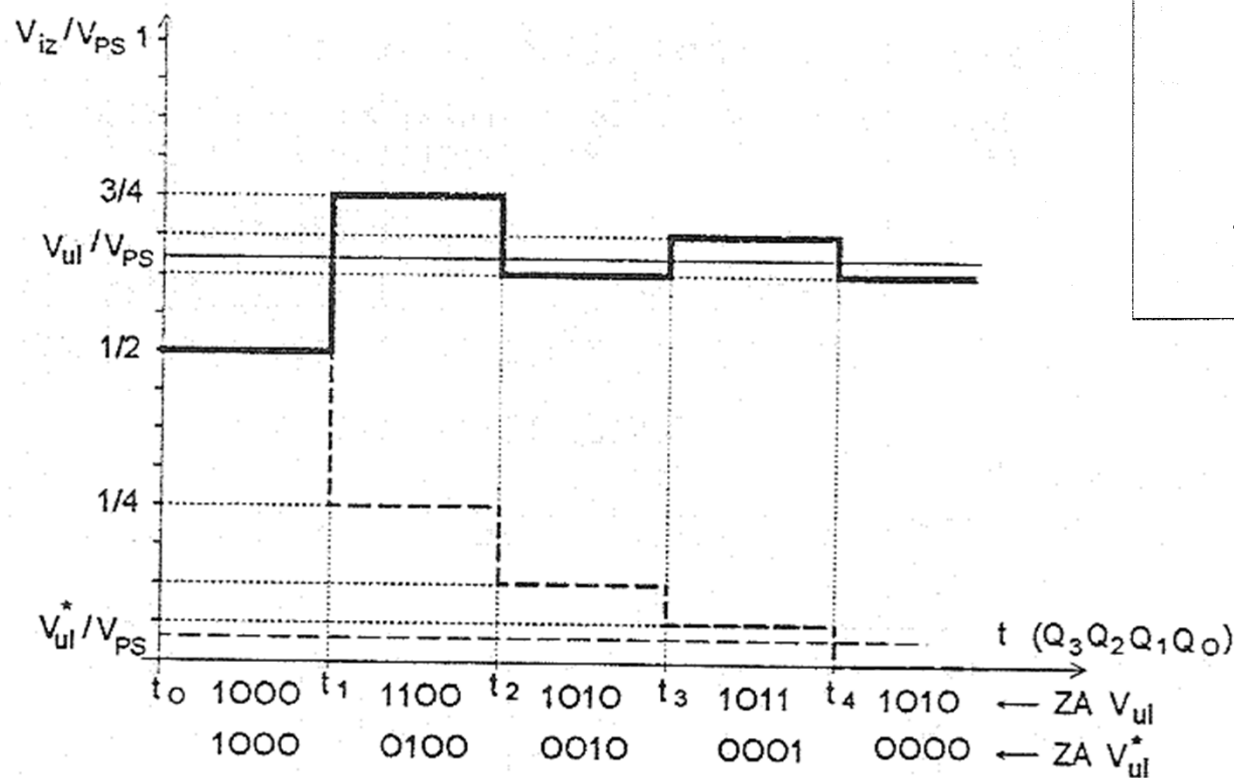
Hardverska realizacija prateće ADC



Hardverska realizacija sukcesivne AD konverzije



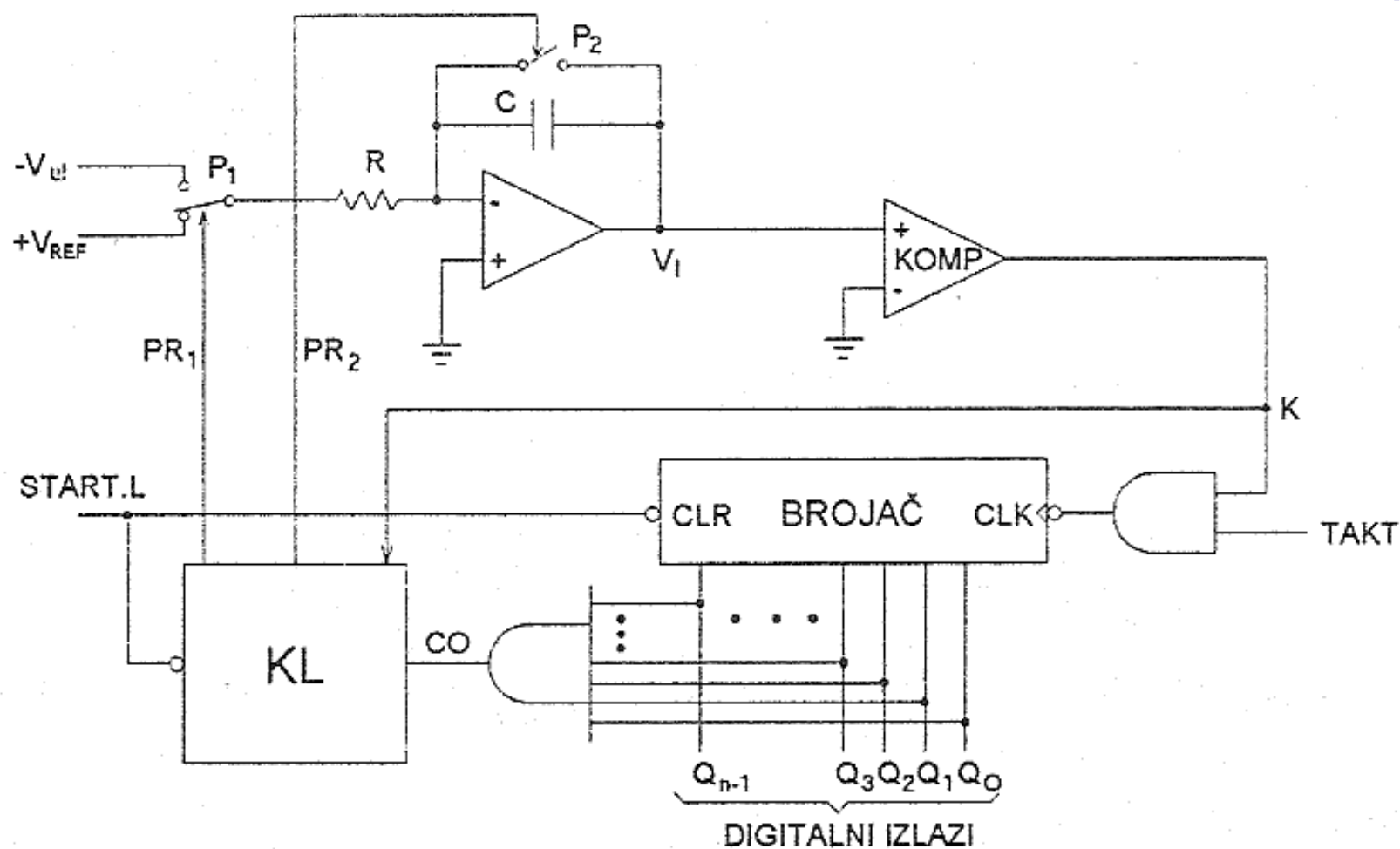
Hardverska realizacija sukcesivne AD konverzije



Napon na izlazu DAC prilikom A/D konverzije

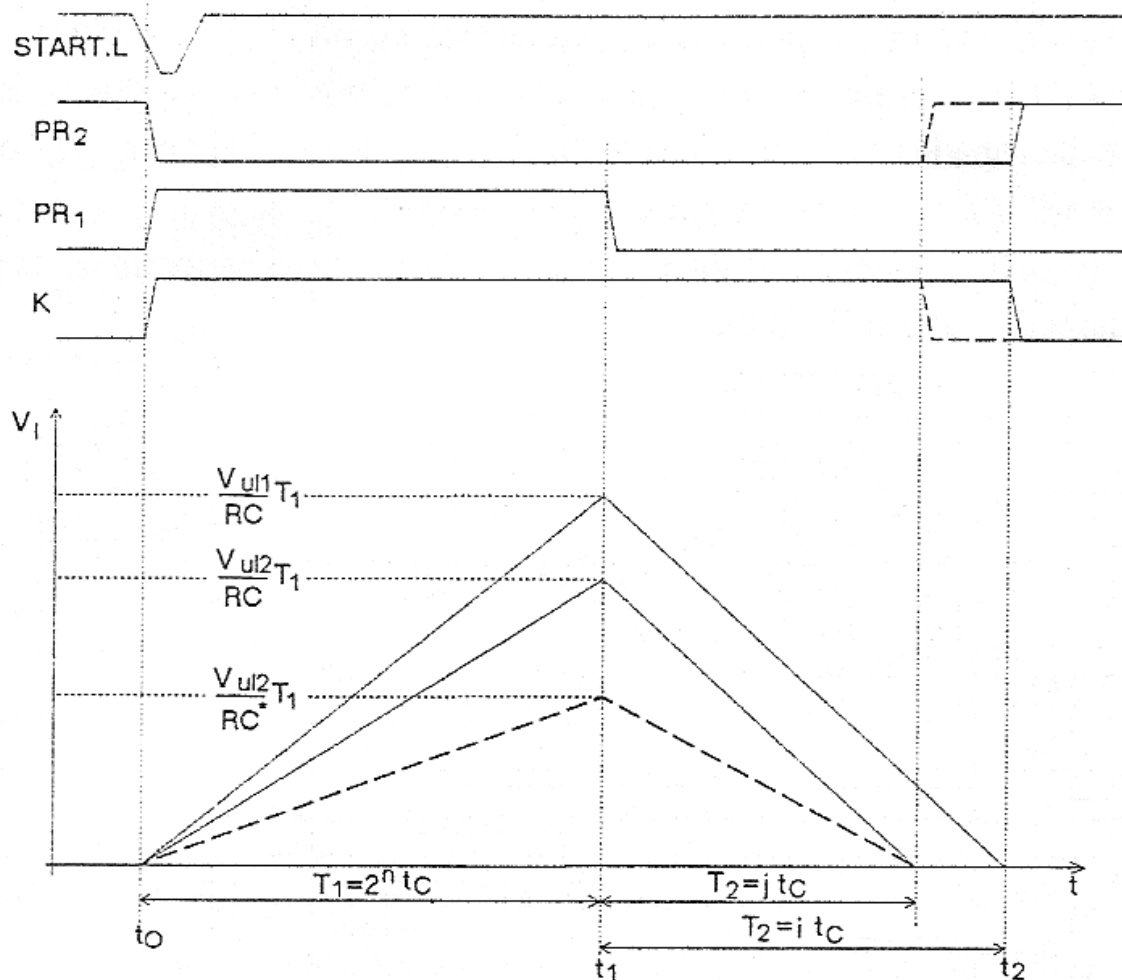
Konvertori sa dvojnou integracijom

Precizni, ali spori.



Konvertori sa dvojnou integracijom

Integrator usrednjava mjereni signal i eliminiše smetnje



$$V_I(t_1) = \frac{1}{RC} \cdot \int_{t_0}^{t_1} V_{ul} dt$$

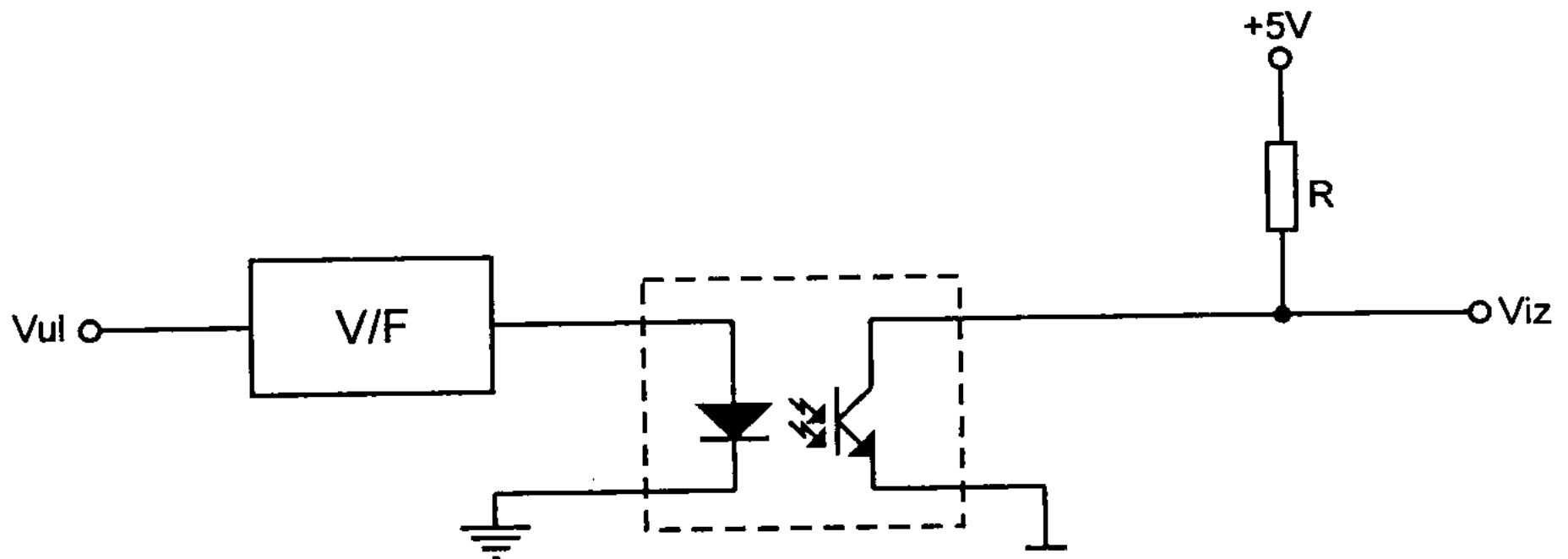
$$V_I(t_1) = \frac{V_{ul}}{RC} \cdot T_1 = \frac{V_{ul}}{RC} \cdot 2^n t_c$$

$$V_I(t_2) = -\frac{1}{RC} \cdot \int_{t_1}^{t_2} V_{REF} dt = V_I(t_1) - \frac{V_{REF}}{RC} \cdot T_2 = 0$$

$$\frac{V_{ul}}{RC} \cdot 2^n \cdot t_c - \frac{V_{REF}}{RC} \cdot j \cdot t_c = 0$$

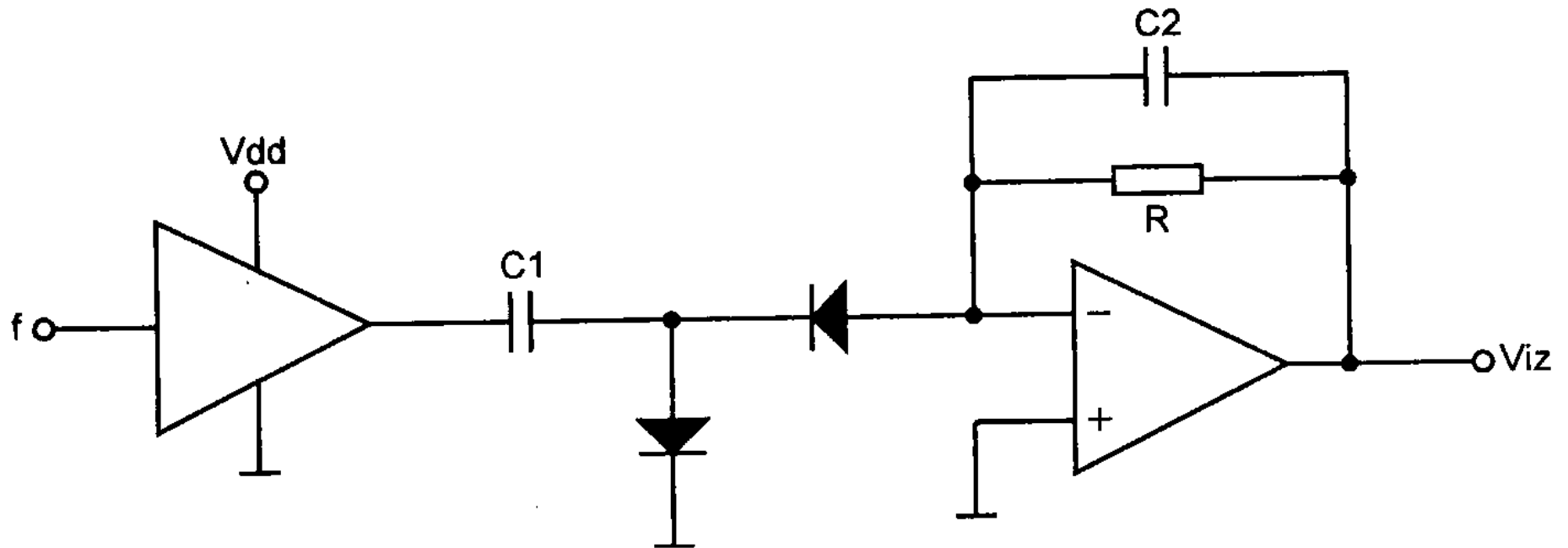
$$j = \frac{2^n}{V_{REF}} \cdot V_{ul}$$

V/F konvertor



Od svih vrsta ADC, VF konvertor je najpogodniji za galvansko odvajanje.
Na slici je dat primjer galvanskog optičkog razdvajanja.

F/V konverzija na bazi diodne pumpe i kola za usrednjavanje



$$V_{iz} = R \cdot C_1 \cdot V_{dd} \cdot f = K \cdot f$$

$$(K = R \cdot C_1 \cdot V_{dd} = \text{const})$$