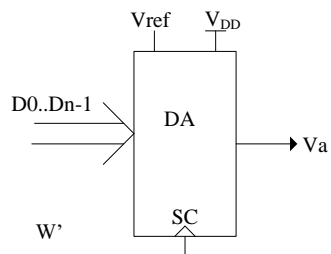


DA konverzija



1

Klasična DA konverzija



Retko u mikrokontrolerima

Ako ih i ima sa malim brojem bita

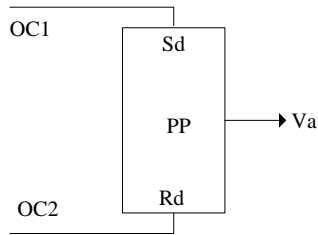
Tačnost konverzije određena referentnim naponom

Broj bita definiše preciznost

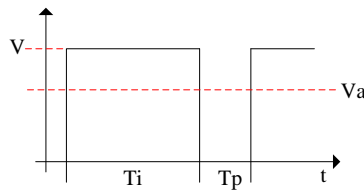


2

Impulsno širinska modulacija



Rezolucija - broj bita brojača

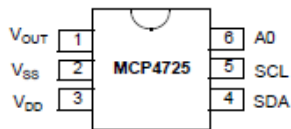


$$V_a = \frac{T_i}{T_i + T_p} V$$



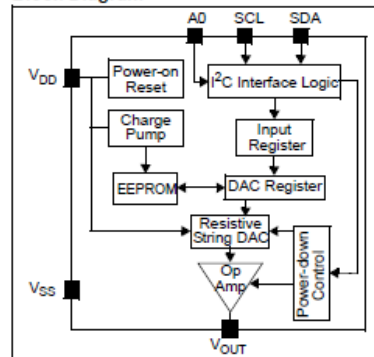
3

Integrisane komponente van SoCa



- 12-Bit Resolution
- On-Board Non-Volatile Memory (EEPROM)
- ± 0.2 LSB DNL (typical)
- External A0 Address Pin
- Normal or Power-Down Mode
- Fast Settling Time: 6 μ s (typical)
- External Voltage Reference (V_{DD})
- Rail-to-Rail Output
- Low Power Consumption
- Single-Supply Operation: 2.7V to 5.5V
- I²C™ interface:
 - Eight Available Addresses
 - Standard (100 kbps), Fast (400 kbps), and High-Speed (3.4 Mbps) Modes
- Small 6-lead SOT-23 Package
- Extended Temperature Range: -40°C to +125°C

Block Diagram



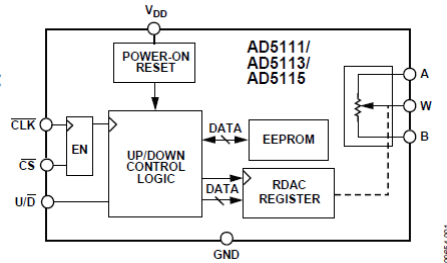
Komunikacija I²C



4

Integrirani van SoCa – digitalni potencijometar

Nominal resistor tolerance error: $\pm 8\%$ maximum
Wiper current: ± 6 mA
Rheostat mode temperature coefficient: 35 ppm/ $^{\circ}$ C
Low power consumption: 2.5 μ A max @ 2.7 V and 125 $^{\circ}$ C
Wide bandwidth: 4 MHz (5 k Ω option)
Power-on EEPROM refresh time < 50 μ s
50-year typical data retention at 125 $^{\circ}$ C
1 million write cycles
2.3 V to 5.5 V supply operation
Chip select enable multiple device operation
Wide operating temperature: -40° C to $+125^{\circ}$ C
Thin, 2 mm \times 2 mm \times 0.55 mm 8-lead LFCSP package



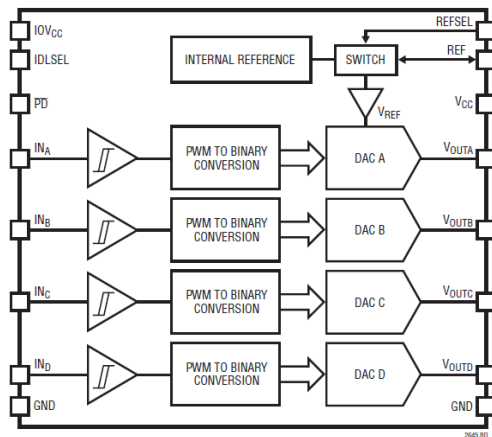
APPLICATIONS

- Mechanical potentiometer replacement
- Portable electronics level adjustment
- Audio volume control
- Low resolution DAC
- LCD panel brightness and contrast control
- Programmable voltage to current conversion
- Programmable filters, delays, time constants
- Feedback resistor programmable power supply
- Sensor calibration

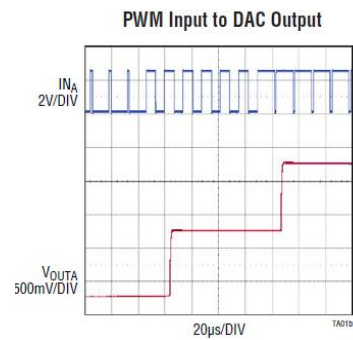


5

Integrirani van SoCa – PWM to DA

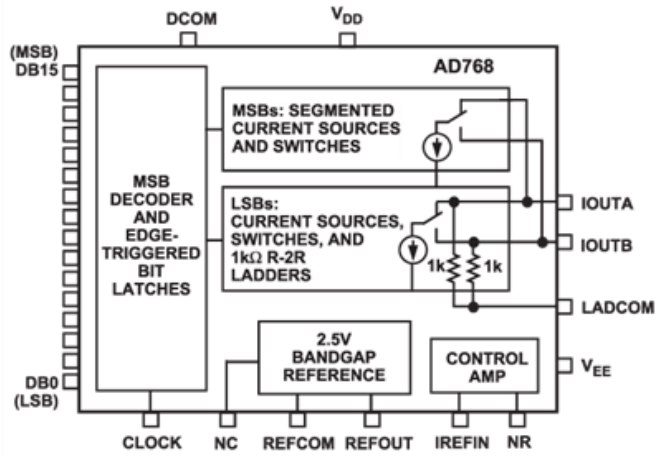


Quad 12-/10-/8-Bit PWM to V_{OUT}
DACs with 10ppm/ $^{\circ}$ C Reference



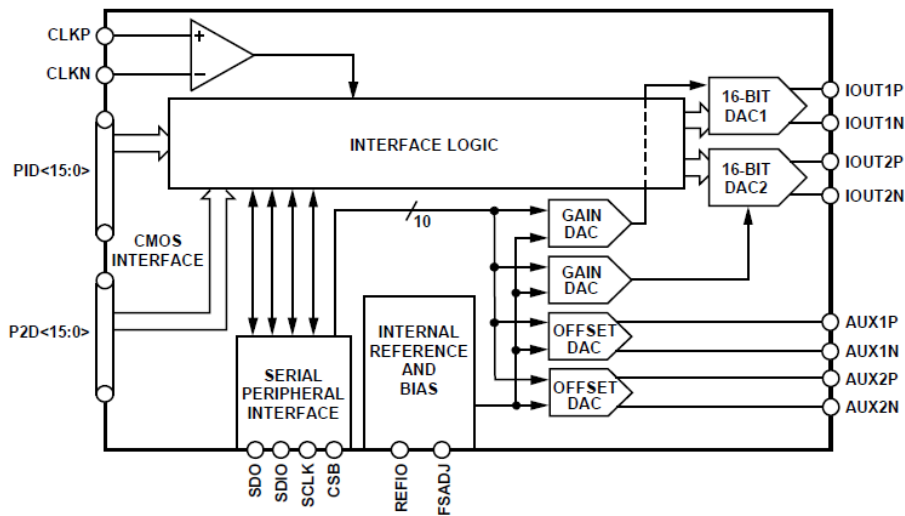
6

Paralelni pristup



7

Za telekomunikacije



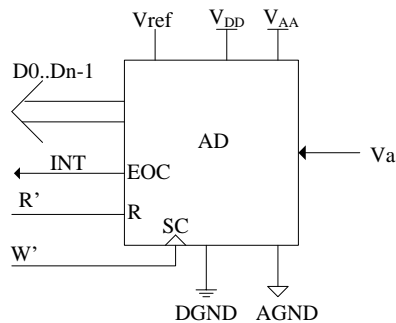
8

AD konverzija



Klasična AD konverzija

Često u mikrokontrolerima



Razdvojene mase
Pogotovo kod preciznih

1. Start konverzije
2. Čekanje na prekid ili poliranje
3. Čitanje rezultata konverzije

Tipovi:

1. Fleš – retko
2. Sukcesivne aproksimacije – jako često
3. Sigma delta – sve češće

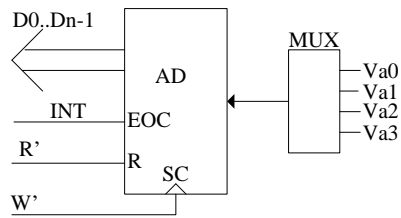
Tačnost određena referentnim naponom
Broj bita preciznost

Trajanje konverzije
Brzina rada konvertora
Broj semplova u sekundi

Prati pamti kolo – sastavni deo



Multiplexiranje - Često u mikrokontrolerima

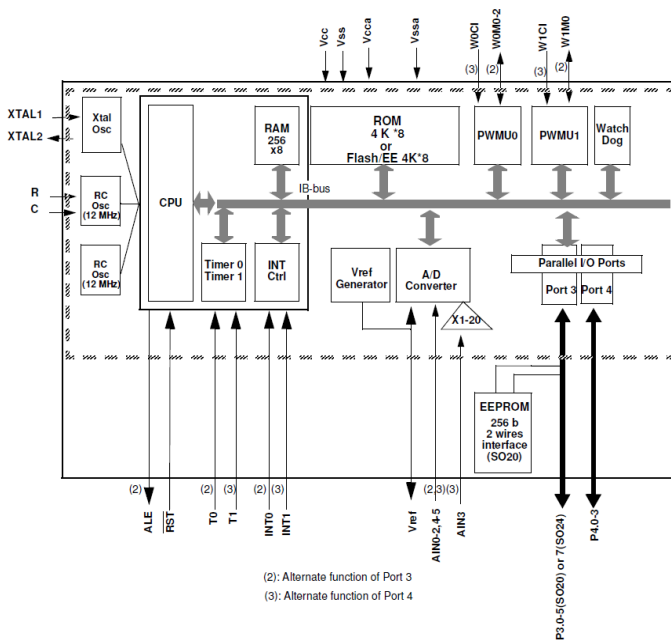


Sekvenca upravljanja

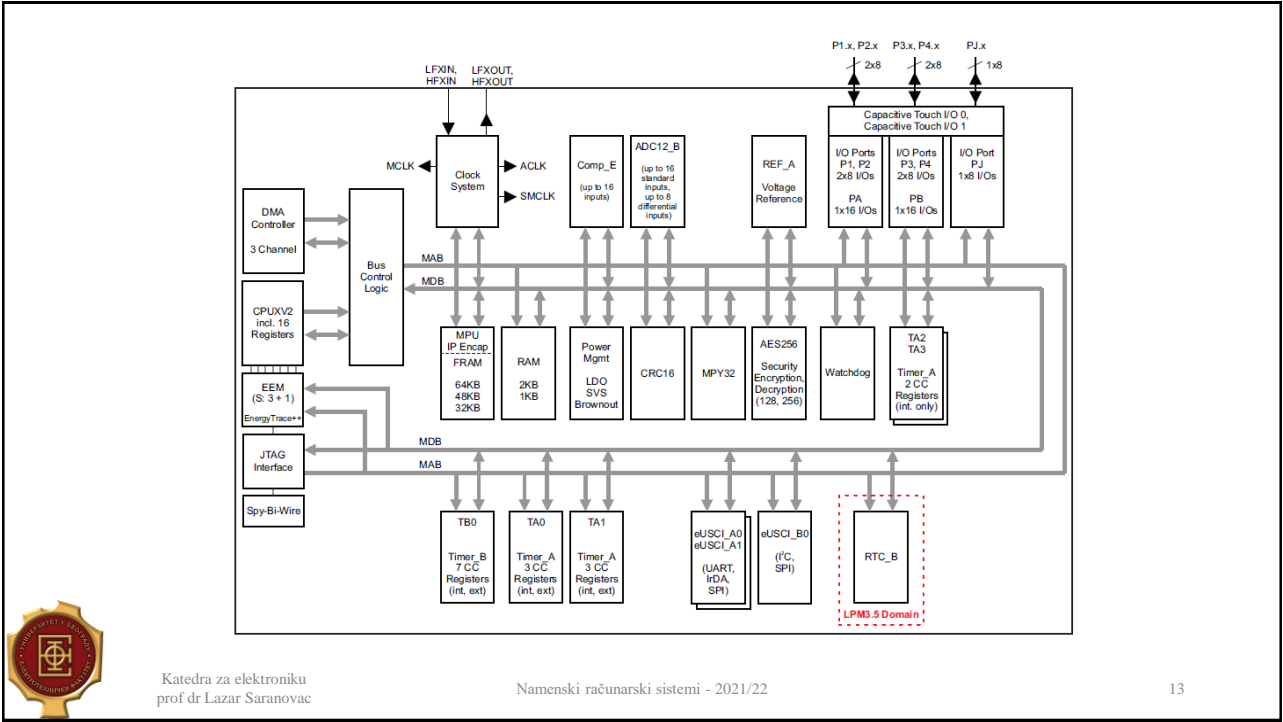
- 1 Selekcija ulaza multipleksera
- 2 Čekanje
- 3 Start konverzije
- 4 Čekanje na EOC poliranje ili prekid
- 5 Čitanje podatka



11



12



Integrirane komponente van SoCa

- $\pm 0.5\text{ppm INL (Typ)}$
- 104dB SNR (Typ) at 1Msps
- 148dB Dynamic Range (Typ) at 61sps
- Guaranteed 32-Bit No Missing Codes
- Configurable Digital Filter with Synchronization
 - Relaxed Anti-Aliasing Filter Requirements
- Dual Output 32-Bit SAR ADC
 - 32-Bit Digitally Filtered Low Noise Output
 - 24-Bit Differential + 7-Bit Common Mode 1Msps Output with Overrange Detection
- Wide Input Common Mode Range
 - Guaranteed Operation to 85°C
 - 1.8V to 5V SPI-Compatible Serial I/O
 - Low Power: 24mW at 1Msps
 - 24-Lead 7mm x 4mm DFN Packages

TOP VIEW

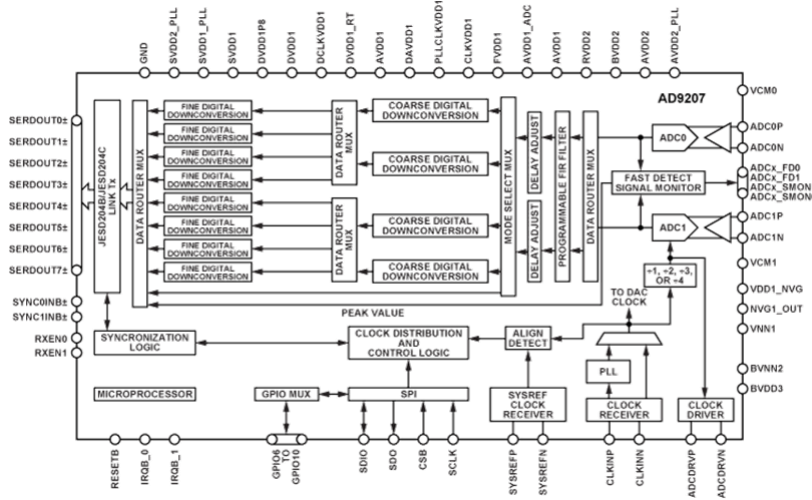
63\$

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Specijalizovani AD konvertori



- ▶ Flexible reconfigurable common platform design
- ▶ Supports single, dual, and quad band per channel
- ▶ Datapaths and DSP blocks are fully bypassable
- ▶ On-chip PLL with multichip synchronization
- ▶ External RFCLK input option for off-chip PLL
- ▶ Support clock input frequencies up to 12 GHz
- ▶ Maximum ADC sample rate up to 6 GSPS
- ▶ Useable analog bandwidth to 8 GHz
- ▶ Maximum data rate up to **6 GSPS**

900\$

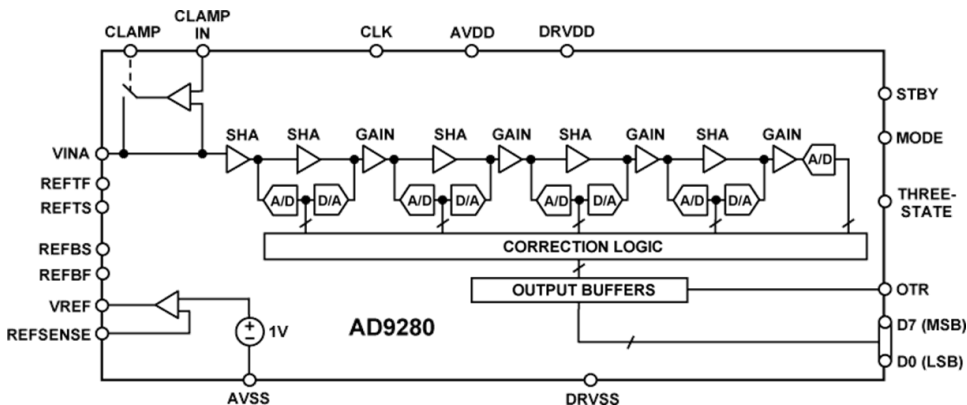


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15



The AD9280 is a monolithic, single supply, 8-bit, 32 MSPS analog-to-digital converter with an on-chip sample-and-hold amplifier and voltage reference. The AD9280 uses a multistage differential pipeline architecture at 32 MSPS data rates and guarantees no missing codes over the full operating temperature range.

2.5\$



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Aplikacione note

