

« »

• • • • •

621.398

621.398.7

，

· · · ，

· · · “ -

”： - ∴ - ，2015.

，

·

230100，

·

2015 (II), · · · ,

60 84/16 · · ·

, 111250, , .

，

“ ”

， .14

©

， 2015 .

1.

1.1.

1.2.

d1,...,Xd8,

,

Y1

1.3.

Y2, Y3 Y4

Xa5, Xa6, Xa7

1.4.

1.5.

1.6.

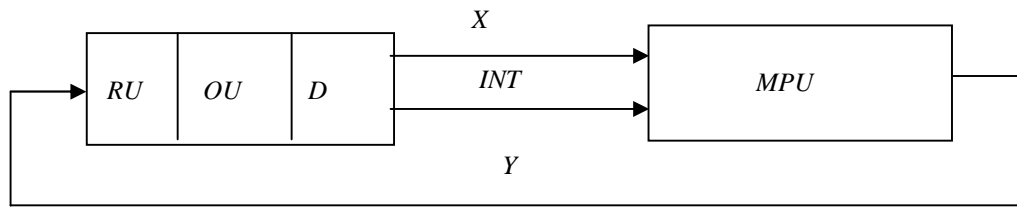
2.

2.1.

2.2.

·
·
·

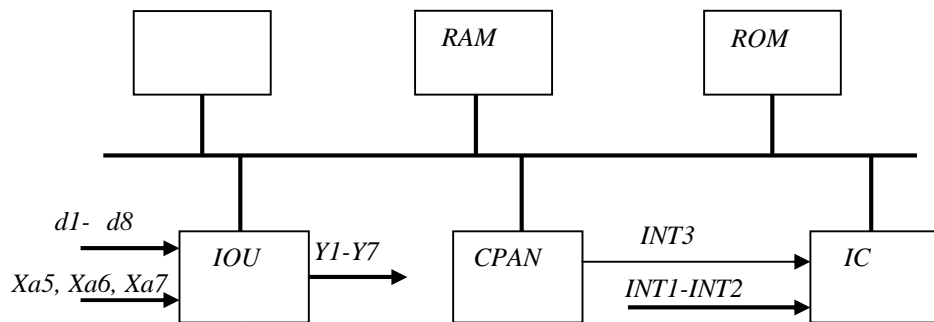
()
 (MPU) { } (. 1).
 (D), (U)
 {Y} (RU).
 {INT}



. 1. ,

(. 2)
 (), (RAM ROM),
 (IOU), (IC)
 (CPAN), (B).

MSC51 (-)
 . 1.



. 2.

) (, - .1, - .2, - .3, - .4, - .5.

1

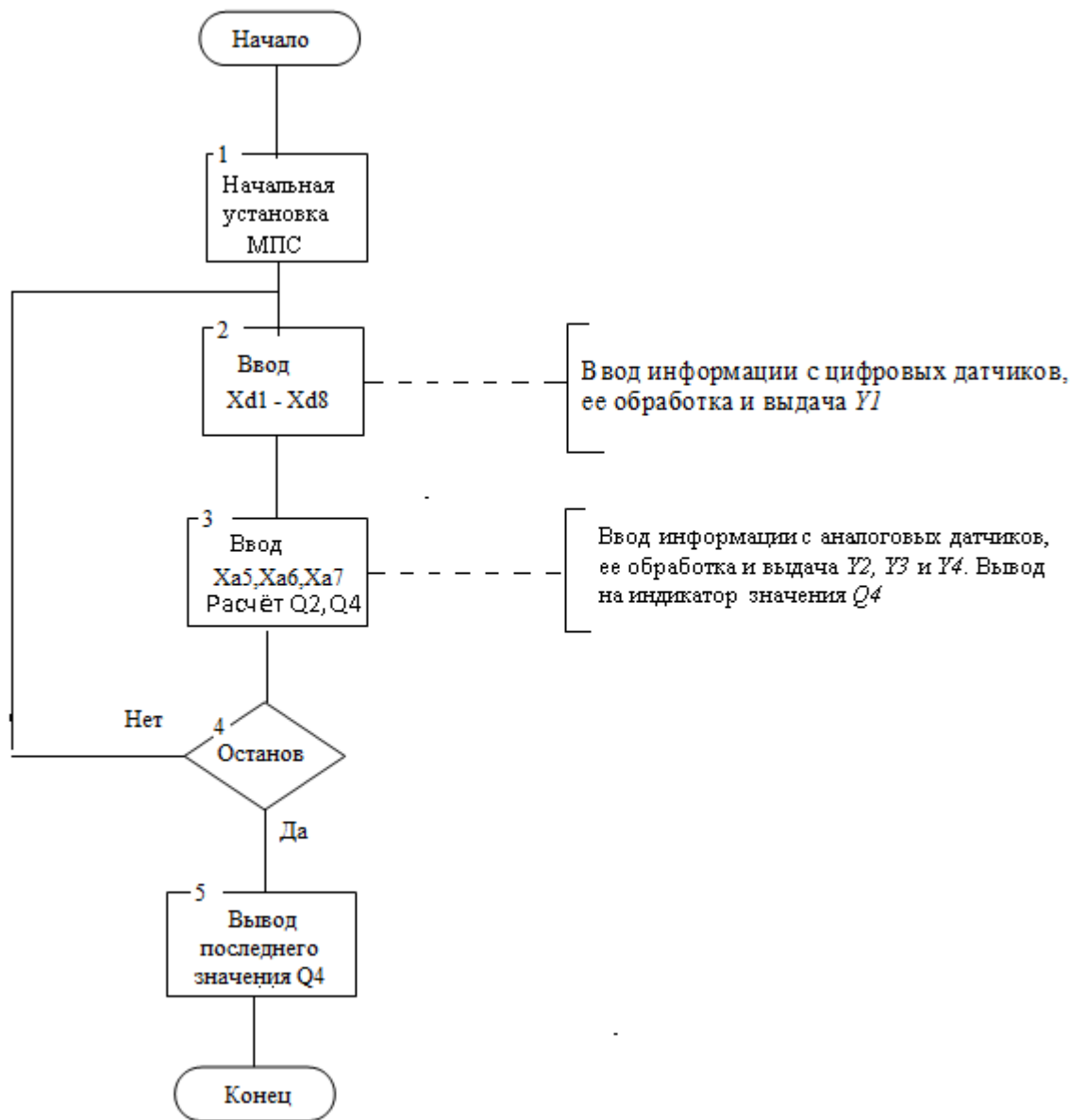
MSC51

1	T89 51IC2	[1]
2	89S53	[1]
3	89 52	[1]
4	89C51IC2	[1]
5	89S53	[1]
6	C8051F34x	[2]

1.

1.1.

, : . 3. 1 -
 , ... 2 -
 : *d1, ..., Xd8* -
Y1. 3 *Xa5,*
Xa6, Xa7 , *N5, N6,*
N7
Y2, Y3, Y4.



. 3.

$Y2$ $Y3$

, $Y4$ –

4

-

5

-

$Q4$

1.2.

, $d1, \dots, Xd8,$
 $Y1$

()
 $d1, \dots, Xd8$

$Y1$ 1. d_i $Y1$ 1
 . 2.
 1 d_i 2

	$Y1$	$T1, c$	$Y1$
	d_i		
1	$d1$	10	
2	$d2$	100	
3	$d3$	60	
4	$d4$	40	
5	$d5$	90	
6	$d6$	200	
7	$d7$	50	
8	$Xd8$	70	

1.3.

$Xa5, Xa6, Xa7$
 2, 3 4

$Xa5, Xa6$ $Xa7$ $N5, N6$

()

$$Q2 = F(N5, N6, K),$$

$$0 - (2^n - 1), \quad n$$

$$Q2 \quad Q0,$$

$$(2^n - 1)/2. \quad U / LSB, \quad U -$$

$$, \quad LSB \quad U_{ref}/2^n, U_{ref} -$$

(CPAN).

$Xa5$ $Xa6$

$$V_{IN}, \quad (0 - U_{ref}) ,$$

$$U_{ref} = (2,048 \quad 4,096)$$

$Y2$

$$2, \quad Q2 < Q0,$$

$Y3$

$$1 \quad 2, \quad Q2 \quad Q0,$$

$$3. \quad Q2, \quad 2, 3$$

U

. 3.

Q2

-

$$Q2 = \left(\sum_{i=1}^N Q2_i \right) / N,$$

N

a5

a6.

. 4

Y2 Y3.

3

Q2

2

3

	$Q2 = F(N5, N6, K)$	2,	3,
1	$Q2_i = N5_i + N6_i + K$	20	40
2	$Q2_i = N5_i / 2 + N6_i + K$	30	60
3	$Q2_i = N5_i - N6_i / 2 + K$	40	20
4	$Q2_i = N5_i / 4 - N6_i + K$	30	90
5	$Q2_i = (N5_i - N6_i) / 2 + K$	35	85
6	$Q2_i = (N5_i - N6_i) * 2 + K$	60	120
7	$Q2_i = N5_i - 2 * N6_i + K$	60	200
8	$Q2_i = 2 * N5_i - N6_i + K$	80	40

2, 3,

-

Xa7

$$Q4 = N7 * \frac{c}{1}, \quad 1$$

(ROM)

N7,

N7 1

1

Q4 (

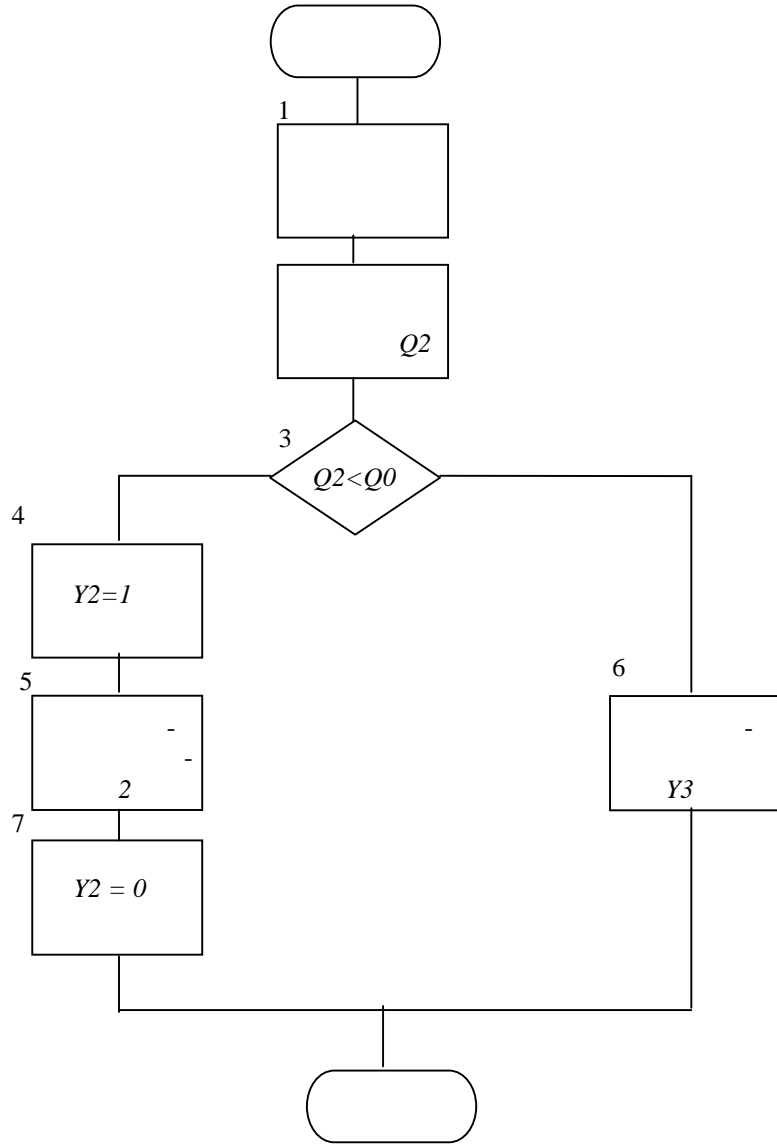
(

),

(CPAN),

()

Y4,



. 4.

Y2 Y3

U_{ref} -
LSB

Y4.

(IOU).

0,1%, ...

10

. 4

(Maxim, Dallas Analog Devices).
a5, a6, a7

() .

.4.

4

-	-		
1	AD7993 <i>I2C</i>	AD5341	T89 51IC2
2	MAX1082 <i>SPI</i>	MAX503	89S53
3	<i>RS232</i> () AD7811	<i>RS232</i> () AD5310	89 52
4	AD7470	<i>I2C</i> AD5612	T89 51IC2
5	AD7933	<i>SPI</i> MAX504	89S53
6*			C8051F34x

*

1.4.

(CPAN)

(), :

1. : 25, 16 16- (0
- F : , , , , -

, , , , ,
..

(-

,) . -
-
; -
2. (RESET);
3. *Xd1,..., Xd8*;
4. *Q4* .
(-
),
).
; -
5. : - c
2 ; - 500 .
. -
(.3) -
. -
(ENTER). -

1.5.

INT1, *INT2* :
INT3 (*INT1*, *INT2* - *INT3*). -
: -
1. ,
2. (*CPAN*) ; ,
3. ,
INT3. -

1.6.

CPAN .) (, , -

2.

2.1.

- :
 - (-
 -),
 - ;
 - ;
 ROM RAM,
 - ;
 - .
 : (, , ,
) [3,4,5], . . [6];
 - ROM RAM, RAM.
 ROM RAM 10-20 ,
 - ; (IOU)
 - (CPAN). IOU CPAN
 [6, 7, 8].
 - .
 - ,
 . 5,
 ROM, RAM,
 ;
 5

1	ROM
2	RAM
3	RAM
4	-

-
 -);
 -
 {Y}, [9].
 (, , { }
 ROM 573 6.
 , .

2.2.

- :
 - ;
 - $d1, d2, \dots, Xd8$
 - $Y1;$
 - $Xa5 \quad Xa6$
 - $Xa7$ $Y2, Y3;$
 - $Y4;$
 -
 - $INT1, INT2$
 -
 - $INT3$
 -
 - (watch dog -
 - “ ”)
 -
 -
 -
 - $ROM \quad RAM.$

(.lst) . -
 (.
).

1. AT89C51
<http://www.atmel.com>
2. C8051Fxxx
 SiliconLaboratories
 « - 1», 2008. – 336 . – («
 ») ISBN 978-5-94120-162-4
3. , 1994. – 490 .
4. . – .
 , 1990. – 224 c.
5. , 1992. – 52 .
6. 1533, 1554.
 , 1993. – 1 – 254 ., 2 – 497 .
7. 1. – ., 1996. – 384 .
8. , , .
 : . . , . . , . . . ;
9. , 1997. – 592 .
 , 1995. –
 272 .

	7-0	8-0	9-0	12-0
1	16151	57222	13353	66424
2	52255	61316	36427	44511
3	32332	13443	22534	16645
4	23446	45537	43611	51752
5	64533	32634	52145	23516
.
.
.
25	26147	11211	41352	26423

:

,

-

.

« »

p

pc p

"

"

: . p - 1111, .

:

1.

. 1 - 5, (A0, A1, ,) .
(11111,).

T89 51IC2

:
1.1.

$d1$

$Y1$

$d1, \dots, Xd8$

$l=50$;

1.2.

$Xa5, Xa6$

AD7993

, $N5$ $N6$
 $U/LSB, U -$

$Q2=(N5-N6)*2+K,$
 LSB

$Y2$

$Y3$

1

$2=60$

$Q2 < Q0,$
 $Q2 Q0,$
2

$3=120$

$U = 0.014$;

1.3.

$Xa7$

AD7993

$N7$

$Q4 = N7 * 1,$

$l=2.$

$Q4$

AD5341

$Y4,$

;


```

1.4.          AD7933          -
                I2C.
1.5.          AD5341          -
                ;
1.6.          25,          16          -
                ;
1.7.          d1,..., d8          , Q4
                (
1.8.          );
                :
-          2 ,          Q4
-          ;
-          ;
-          .
-          ROM;
-          .
-          :
-          (
-          );
-          1, 2, 3, 4
-          Y1.
-          ;
-          5, 6 7          Y2, Y3 Y4;
-          ;
-          .
-          .

```

2. p p p p p

	, %	
1.	10	2 .
2.	30	4 .
3.	5	5 .
4.	10	6 .
5.	35	10 .
6.	10	12 .
7.		13 .
8.		14 – 15 .

3. p p p

- . (2).
 - . (1).

4. P p p

3 – 4

P : p : / . ./
 : / .

.4. Analog Devices.

(datasheet)

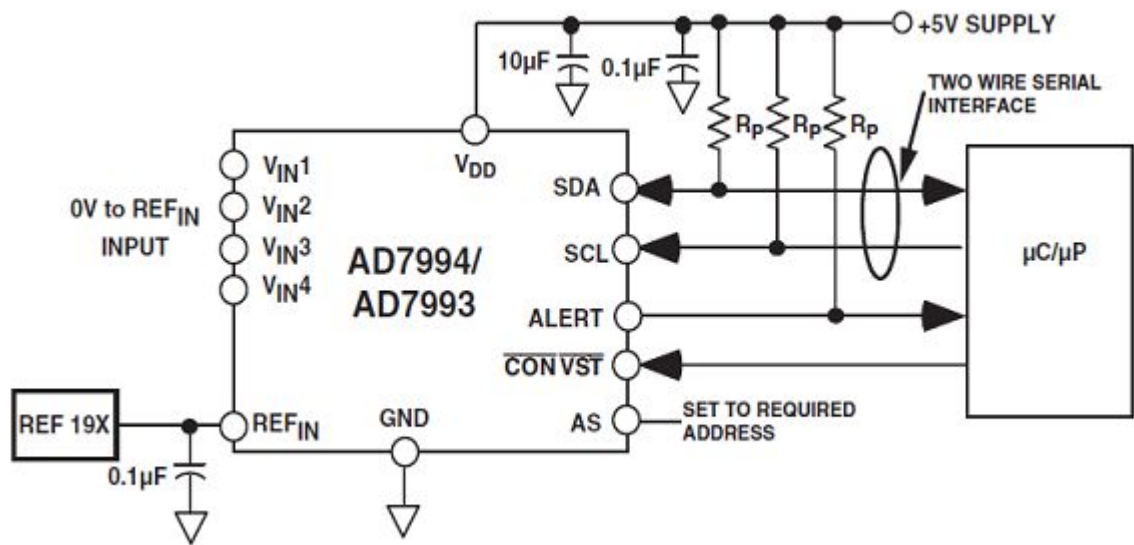
Maxim, Dallas

AD7993

10-

4-

I2C



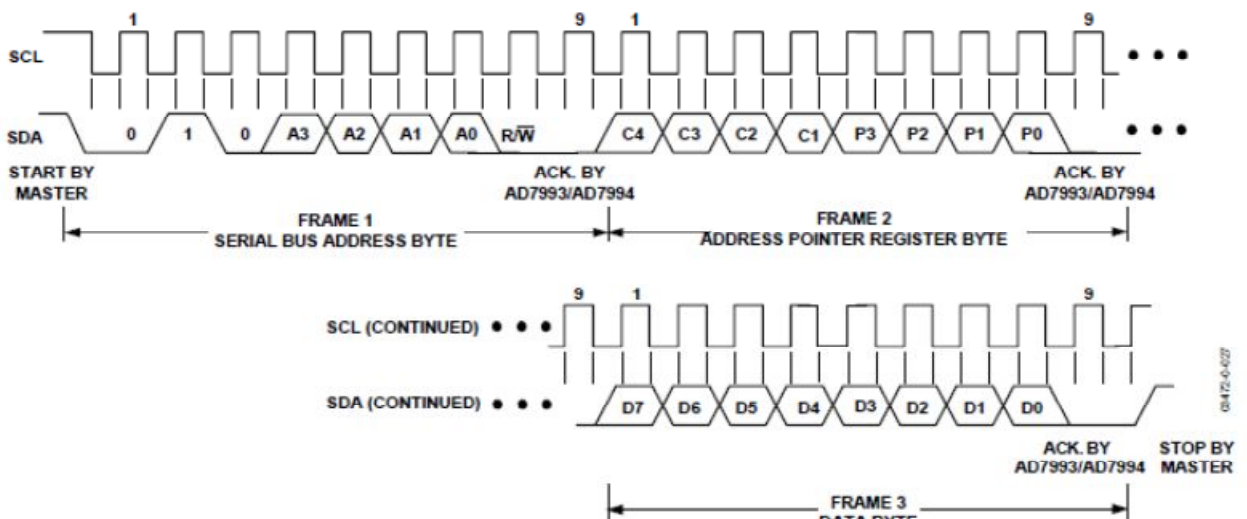
. 1.

AD7993

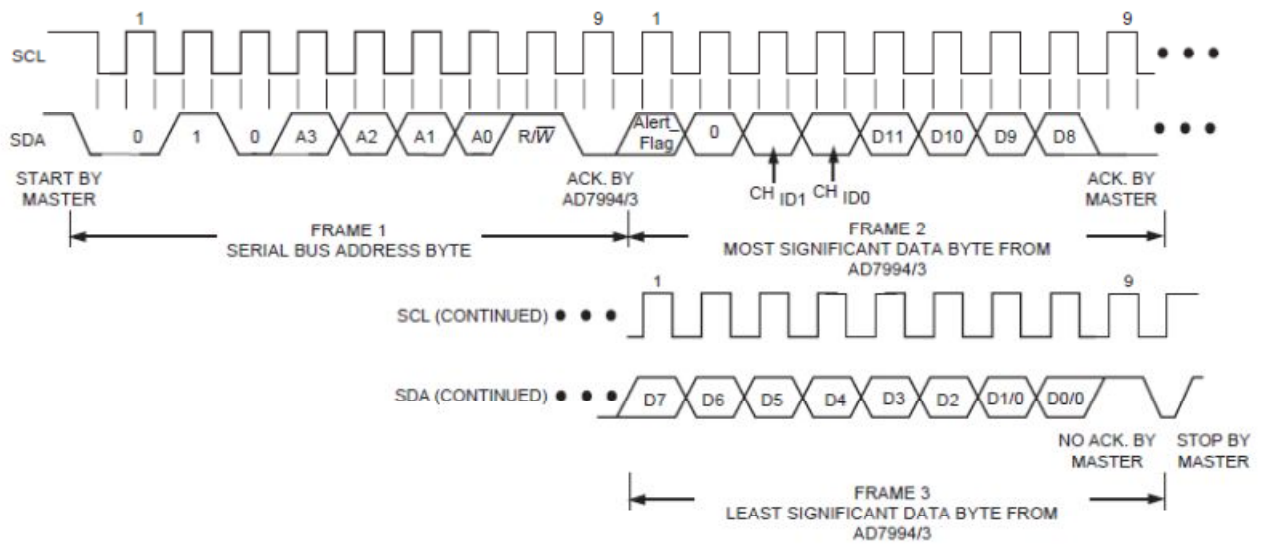
. 1

µ /µP.

I2C



. 2



3.

MAX1082

10- MAX1083, 4- (T/H), MAX1082/

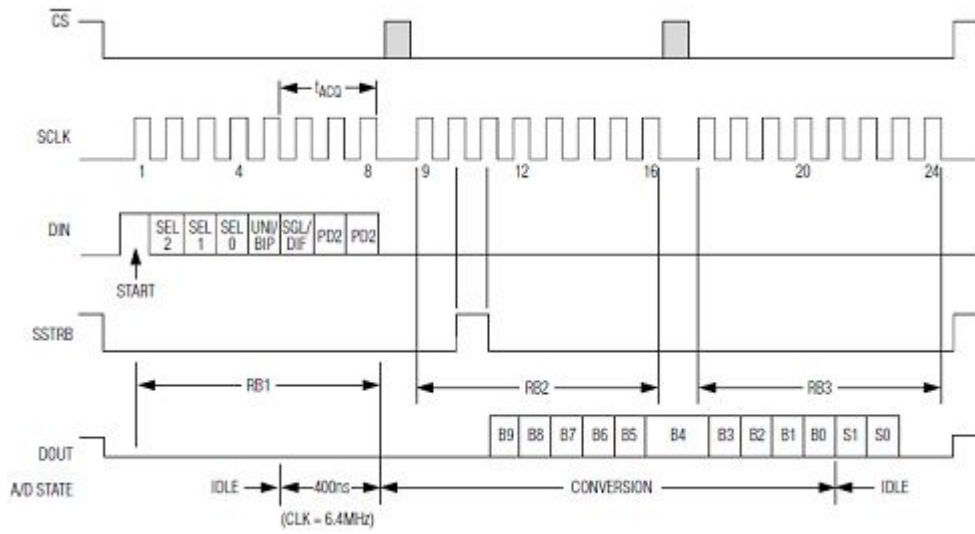
+4.5 +5.5 ; MAX1083
+2.7 +3.6

SPI™/QSPI™ MICROWIRE™,

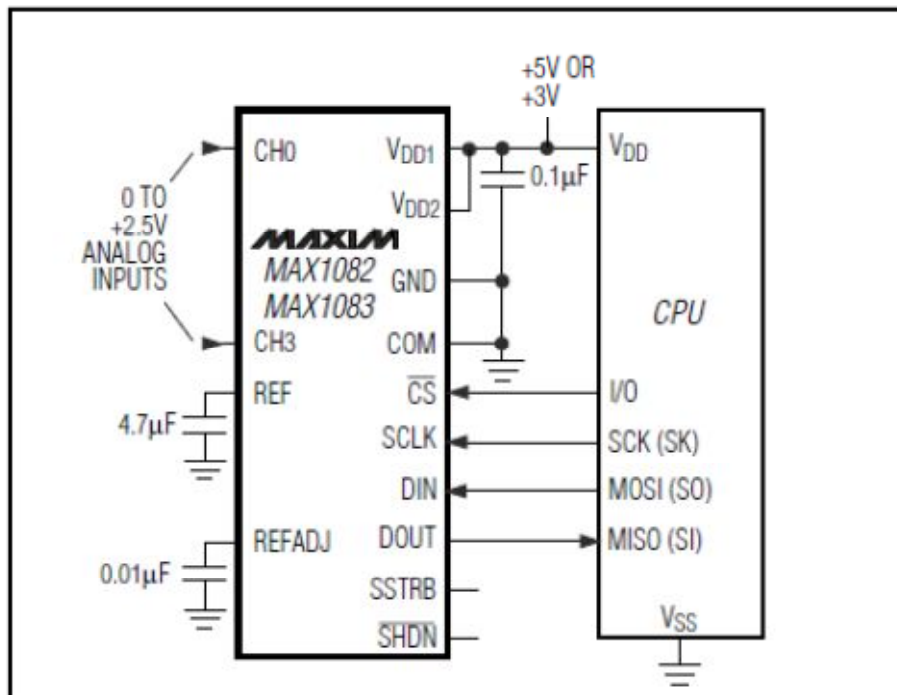
TMS320.

MAX1082/MAX1083

() +2.5
1.5%
1 VDD1.



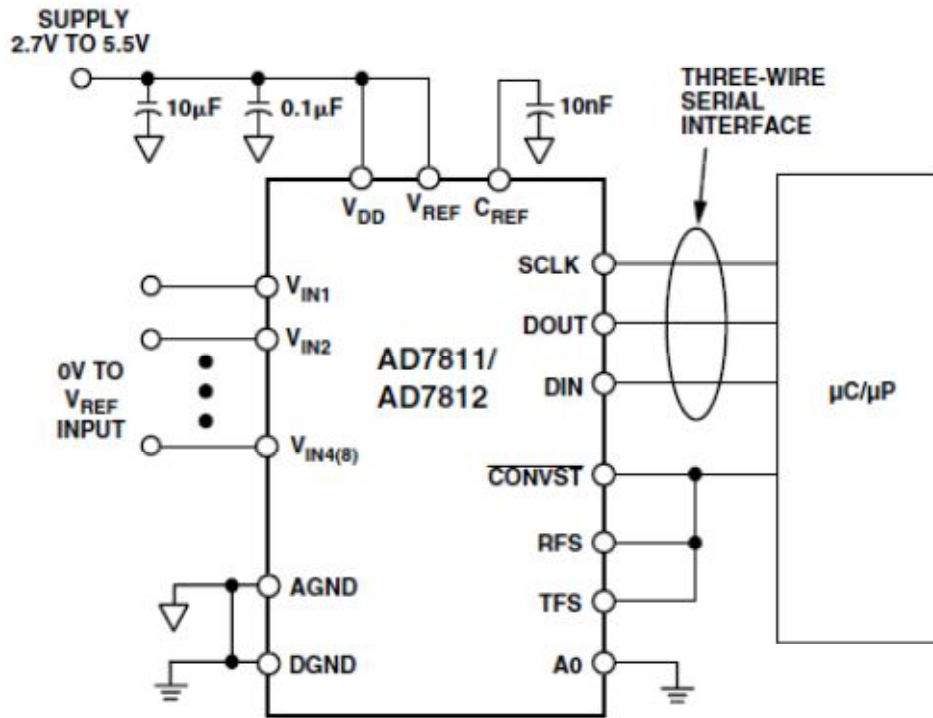
4.



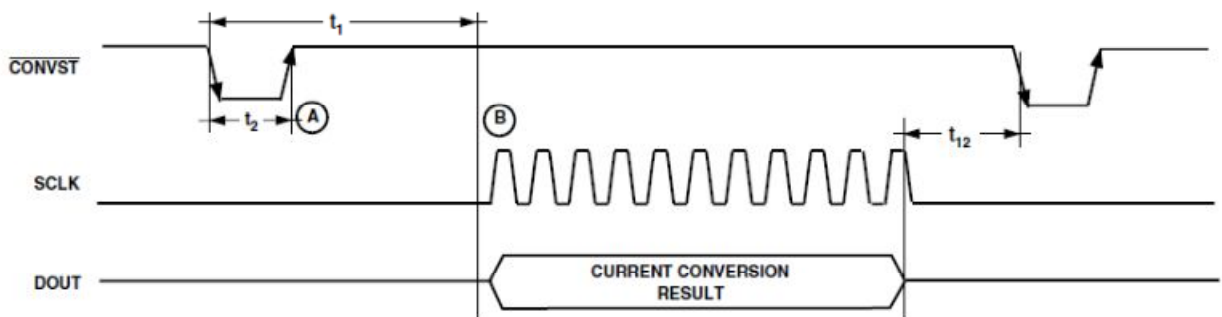
4.
SPI

Max1082

AD 7811



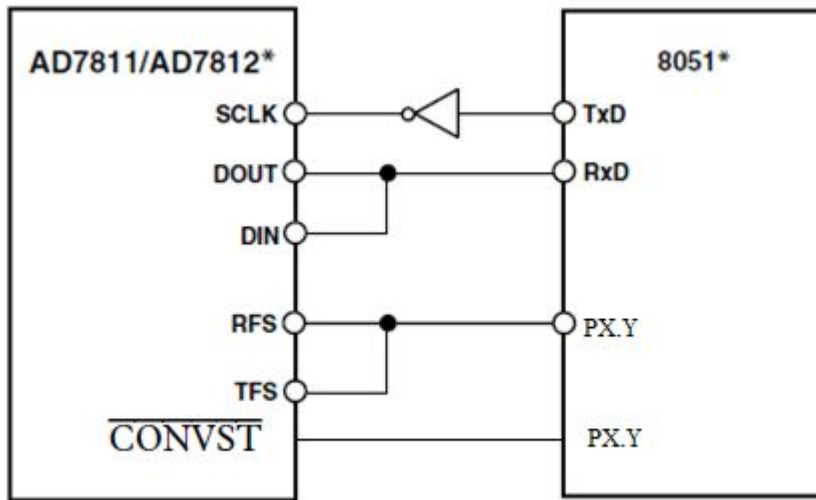
. 5.



. 6.

CONVST $t_2=20$ ns,

t_1 2,3 ().



. 7.

MCS51.

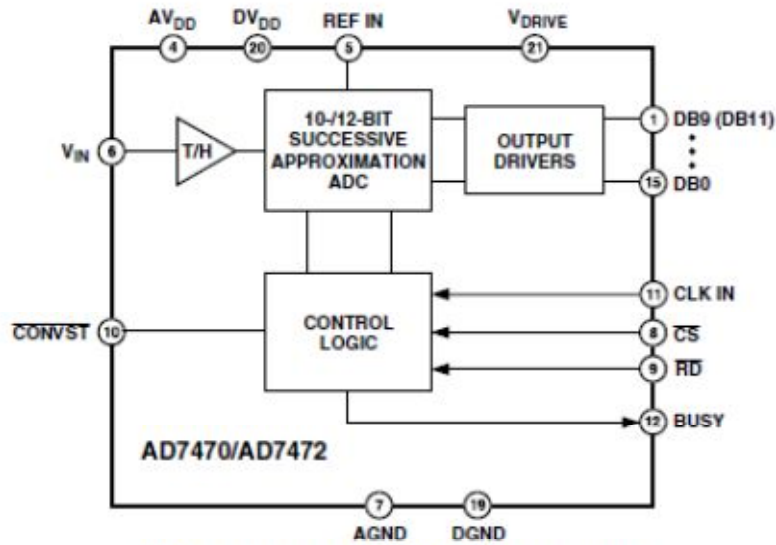
CONVST
DOUT

0

UART

-

AD7440



AD7470 IS A 10-BIT PART WITH DB0 TO DB9 AS OUTPUTS.
AD7472 IS A 12-BIT PART WITH DB0 TO DB11 AS OUTPUTS.

8.

AD7470

AD7470 - 10

5.25

1.75 MSPS.

2,7

1

nonCONVST,

BUSY

531.66

nonCONVST,

nonCS RD.

AD7470

AD7470 3

1.5 MSPS

1.1

5

1.75 MSPS

1.6

500 kSPS

AD7470 3

944

kSPS

AD7470
100 kSPS

3

124

5

171

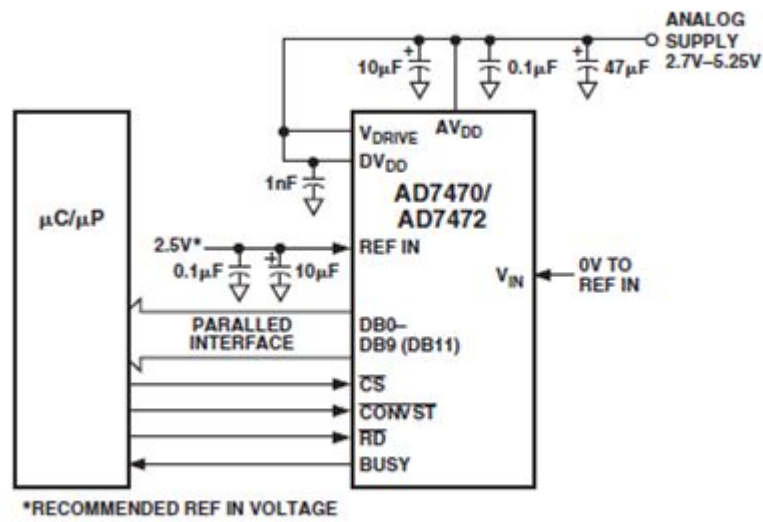
100

REF IN.

REF IN.

0

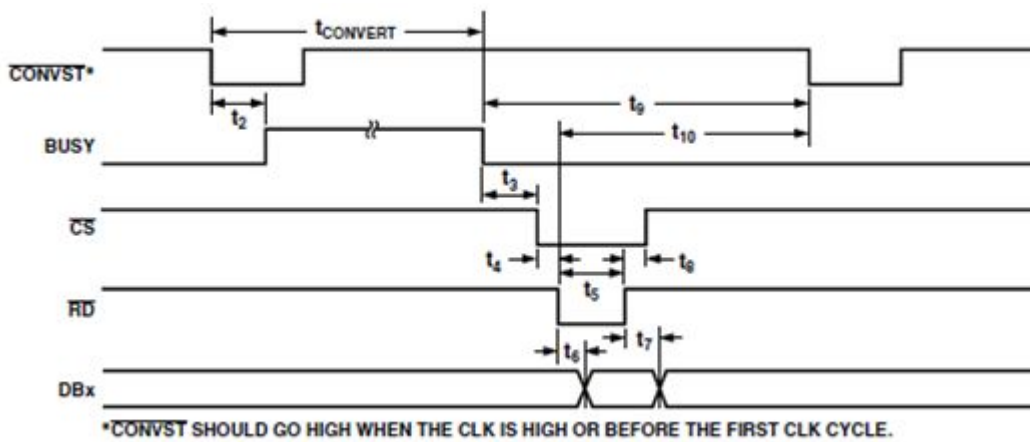
()



9.

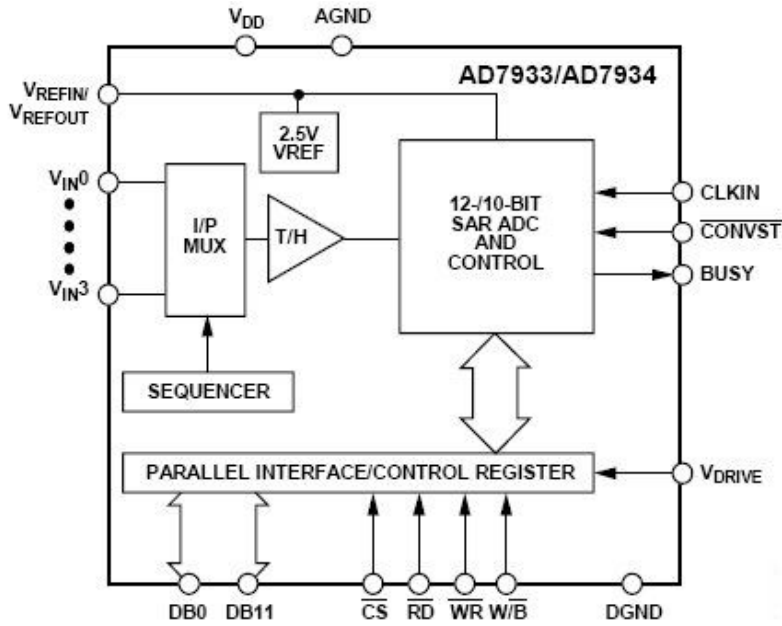
16-

8-



10.

AD7933



11.

AD7934/AD7933

AD7934/AD7933 -

12- 10-

(SAR).

2.7 5.25

1.5 MSPS.

20

AD7934/AD7933

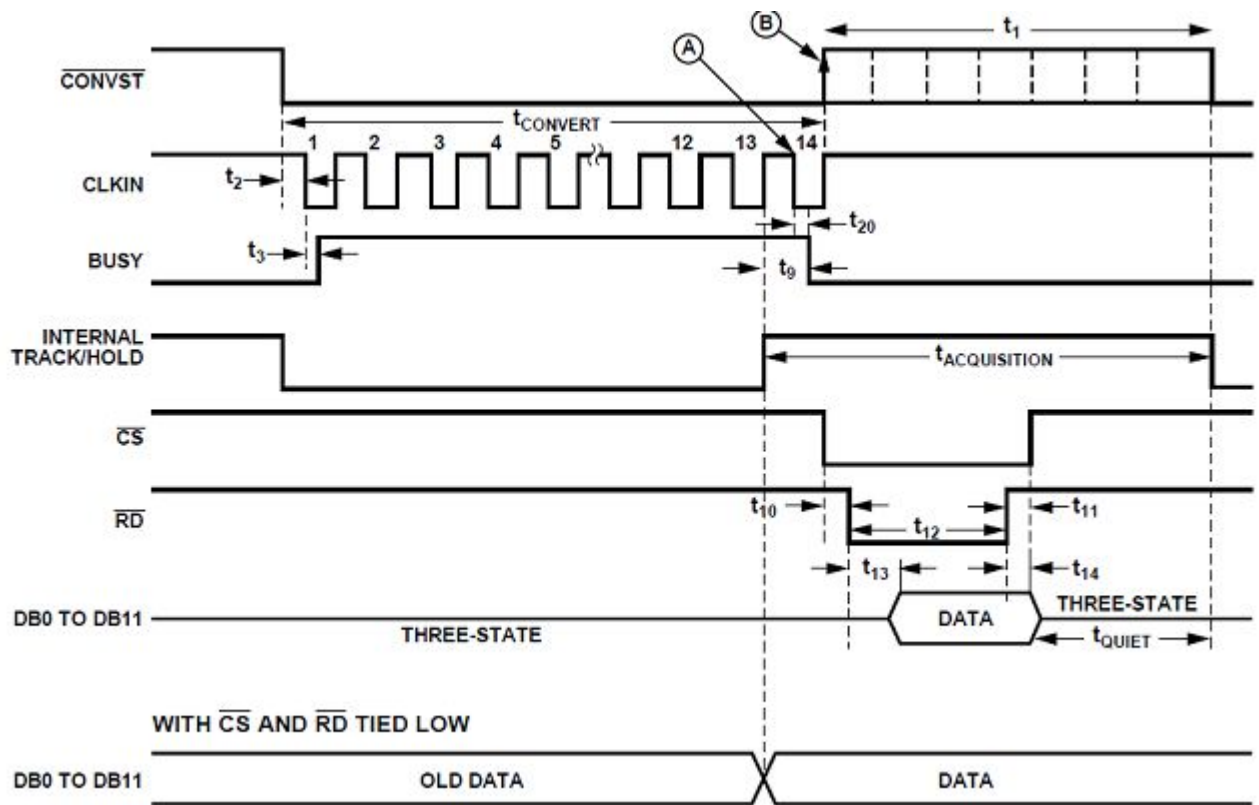
4

nonCONVST.

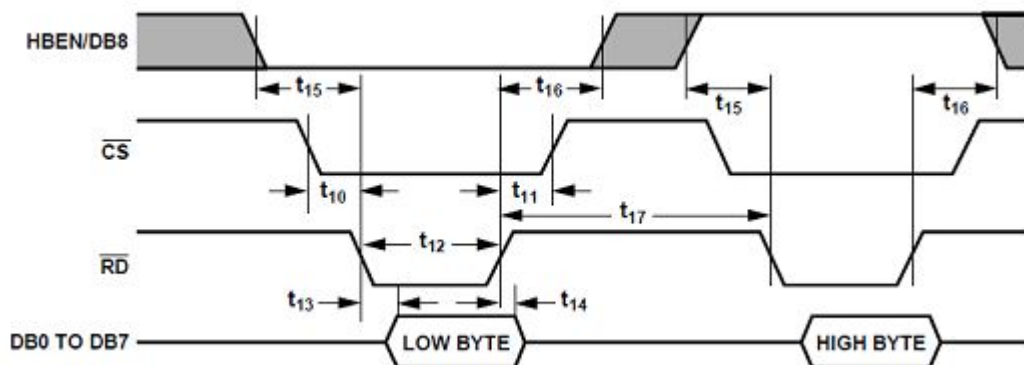
AD7934/AD7933

2.5
100

3.5



12.



13.

8-

AD5341

AD5330, AD5331, AD5340, AD5341-

8/10/12-

+2.5

+5.5

115

3

80

AD5330, AD5340, AD5341

()

AD5330, AD5331, AD5340, AD5341

CS ()

WR

GAIN

0- V_{REF} , 0- $2V_{REF}$.

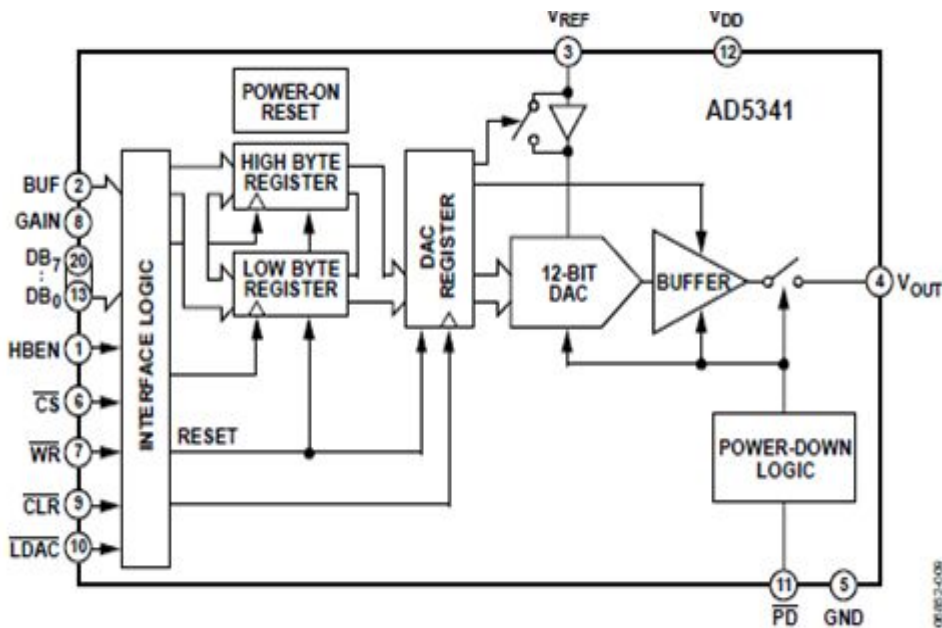
(

).

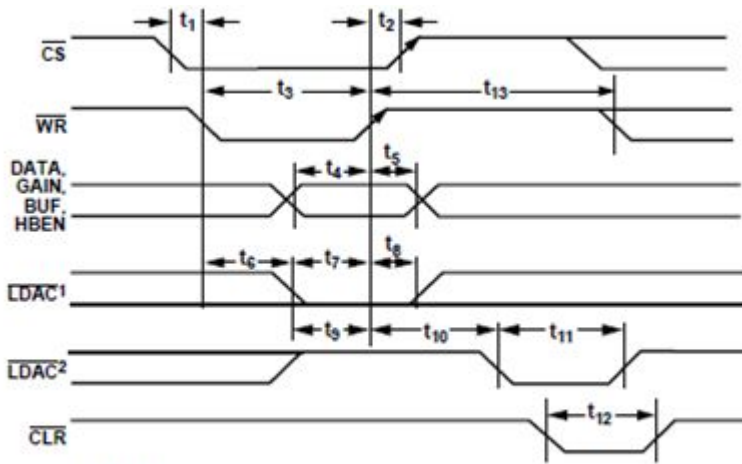
LDAC.

CLR

«0»



14.



NOTES:
 1 SYNCHRONOUS LDAC UPDATE MODE
 2 ASYNCHRONOUS LDAC UPDATE MODE

. 15.

16-

8-

HBEN -
 HBEN -

Maxim, Dallas503

MAX503

, 10 -

5 ,

()

5

()

5

250

SSOP

8 - pin DIP. 10 -

0.1

+2.048

, 0

+4.096

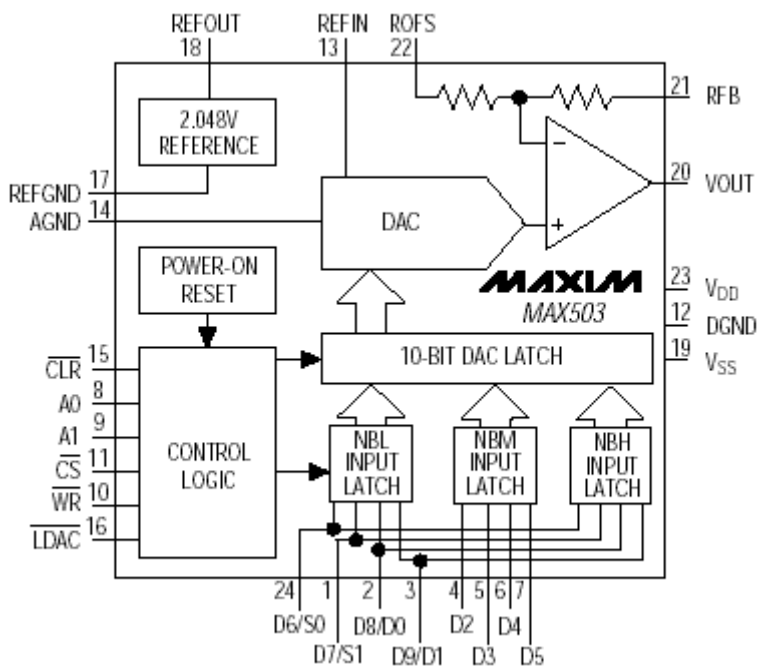
,

2.048

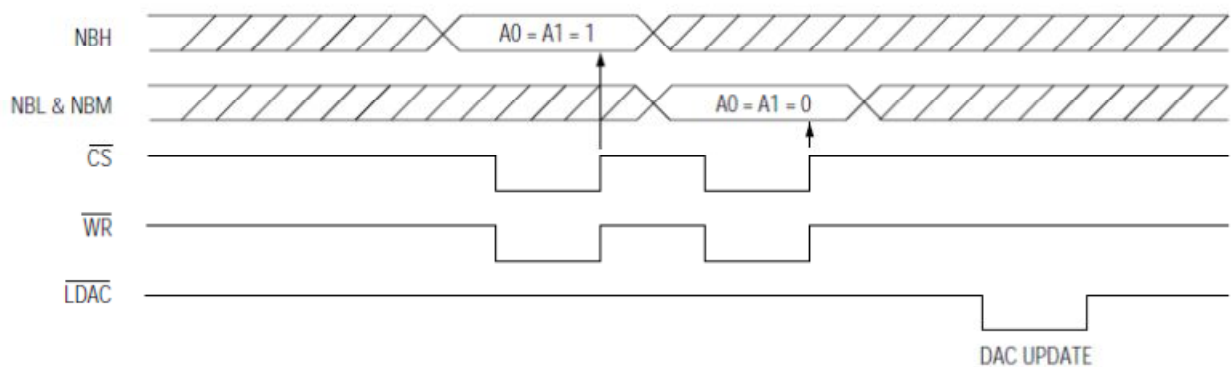
. 4-

0

16-

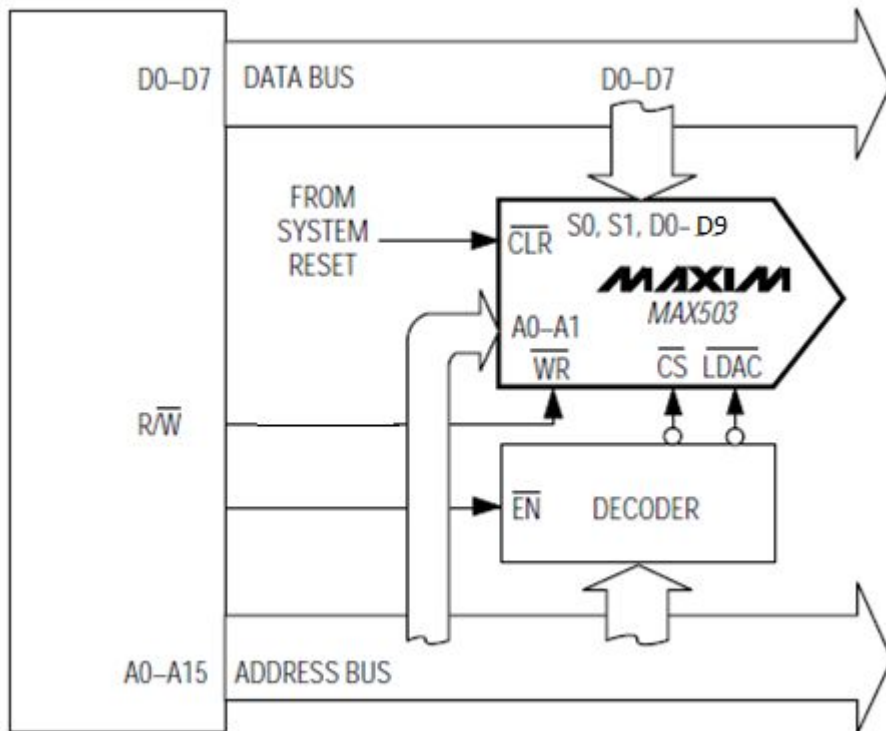


. 16.



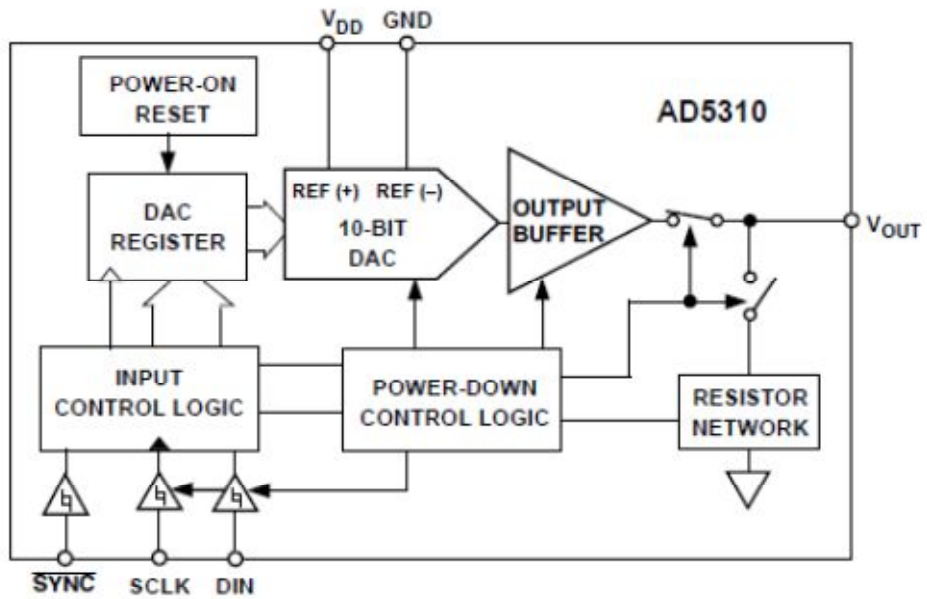
. 17.

D6-D9), NBH ((-
S0, S1, D0-D5) NBL&NBM (-



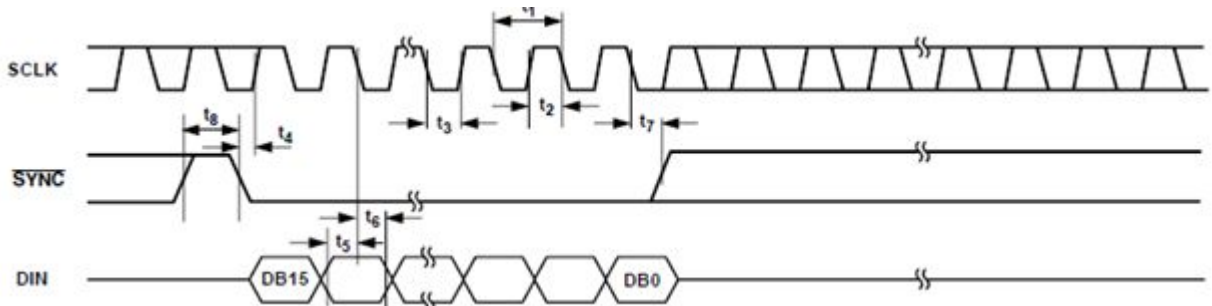
. 18.

AD5310



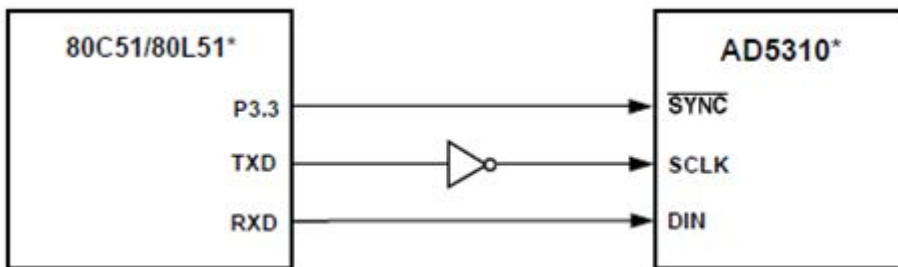
19.

AD5310



20.

AD5310

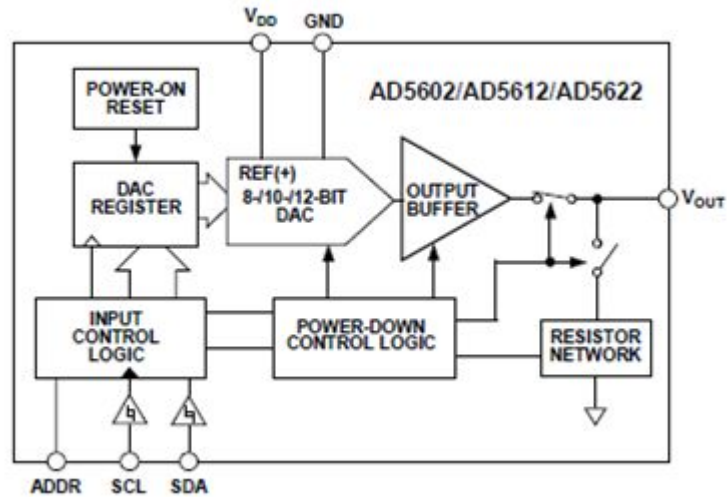


*ADDITIONAL PINS OMITTED FOR CLARITY

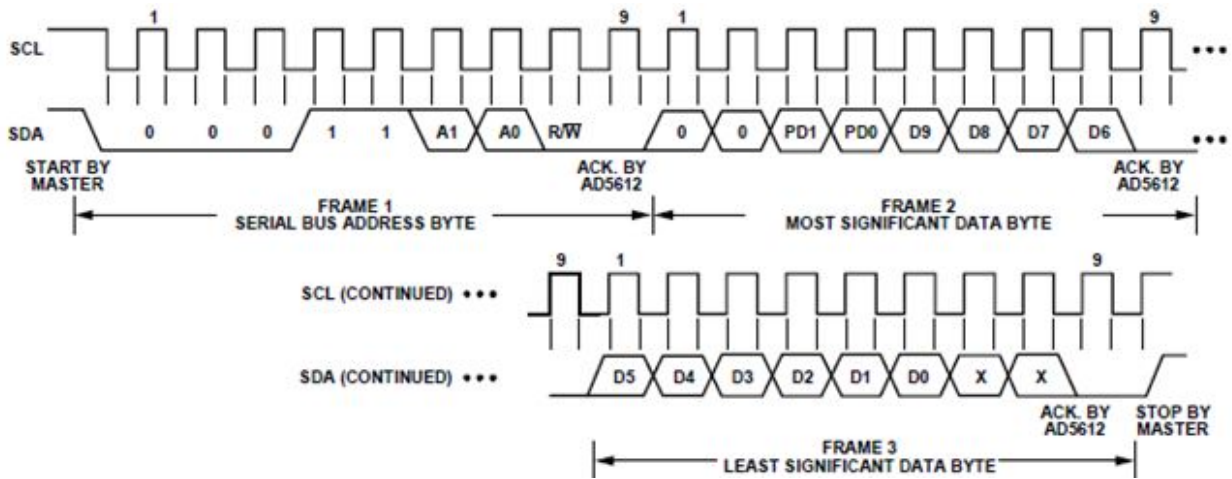
21.

AD5310

AD5612



. 22.



. 23.

Maxim, Dallas504

MAX504/MAX515

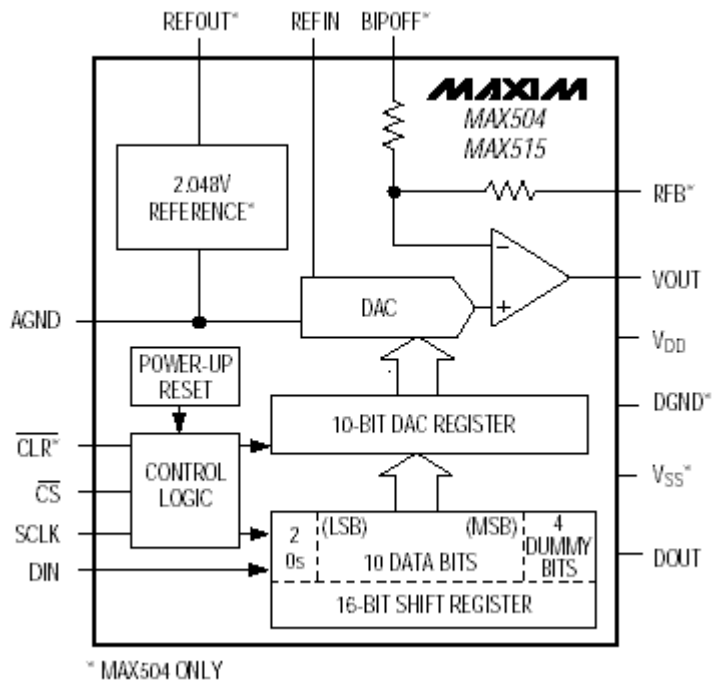
, 10-

+5 . MAX504,

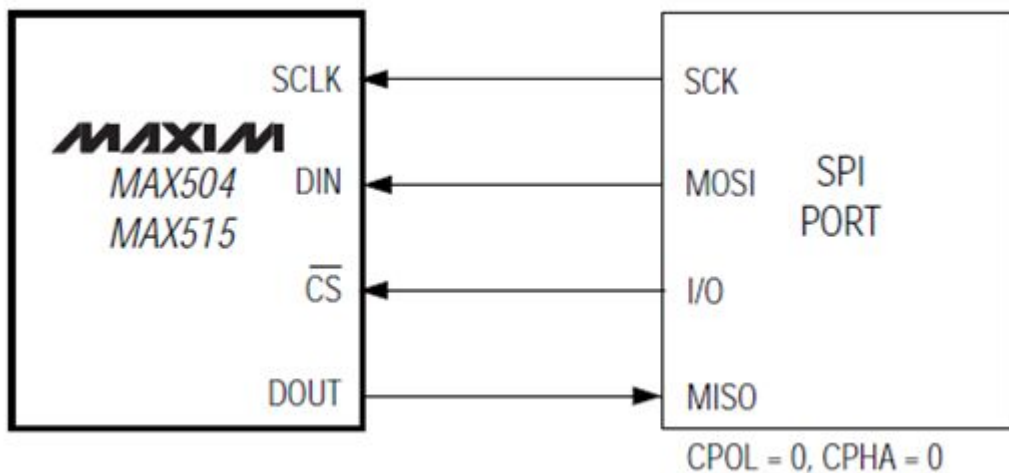
5 . MAX515

140 , MAX504 (MAX515) -
 260 . MAX515 8-Pin DIP SO,
 , MAX504 14-Pin DIP SO.

2. MAX515
 MAX504
 1 2, , /
 . MAX504 , ,



. 24.



. 25.