# AUTOMOTIVE DIGITAL CLOCK IC   IN7100

DESCRIPTION

IN7100 is a automotive digital clock, CMOS LSI. It drives fluorescent indicator panel directly. It can be driven by a 4.194304 MHz crystal oscillator or an external clock signal (1024 Hz). It has 4-ways display brightness control function and its display format is 12 hours.

DIP-40

FEATURES

- 4.194304 MHz crystal oscillator
- 4-ways display brightness control
(Segment signal duty: 1, 1/4, 1/8, 1/16)
- Hours and Minutes Setting
- ± 30 seconds auto correction
- 1024 Hz external clock drive
- 1024 Hz SIGNAL output
- Segment Output: P-channel open drain
- 40 DIP package MS-011AC
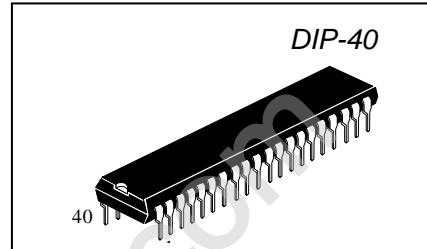
ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C)

Parameter	Symbol	Specification	Unit
Power Supply Voltage	V_{DD} - V_{SS}	$-0.5 \sim +8.0$	V
Input Voltage	V_{IN}	$V_{SS} - 0.3 \sim V_{DD} + 0.3$	V
Output Voltage	V_{OUT}	$V_{DD} - 30 \sim V_{DD} + 0.3$	V
Operating Temperature	T_a	$-40 \sim +85$	°C
Storage Temperature	T_{STG}	$-55 \sim +125$	°C

DC CHARACTERISTICS (Ta=25°C, RH≤70%, CD=CG=15pF, Xtal=4.194304MHz)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Power Supply Voltage	V_{DD}-V_{SS}		3.0	—	7.0	V
Power Supply Current	I_{DD}	No output loads, V_{DD}=6V	—	0.3	0.5	mA
Leakage Current	I_{OFF}	V_{DD}-V_{SS} =5.0V			5.0	μA
High Level Output Current[1]	I_{OH1}	V_{DD}-V_{SS}=3.0V, V_{DD}-V_{OUT}=0.5V	300	—	1500	μA
High Level Output Current[2]	I_{OH2}	V_{DD}-V_{SS}=3.0V, V_{DD}-V_{OUT}=0.5V	500	—	1800	μA
Low Level Output Current[3]	I_{OL}	V_{DD}-V_{SS}=3.0V, V_{OUT} $-V_{SS}$=0.5V	500	—		μA
High Level Input Current[4]	I_{IH1}	V_{IN}=V_{DD}=6V	—	15	30	μA
High Level Input Current[5]	I_{IH2}	V_{IN}=V_{DD}=6V	—	120	600	μA
External Clock Duty	C_{LD}		40	50	60	%
OSC. Feedback Resistance	R_F	V_{DD}=6V		3		MΩ

(VDD-VSS=3.0~7.0V, Ta = −40 ~ +85°C, RH≤70%, CD=CG=15pF, Xtal=4.194304MHz)

| Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Power Supply Current	I_{DD}	No output loads	—	—	0.5	mA
High Level Output Current[1]	I_{OH1}	$V_{DD}-V_{SS}=3.0V$, $V_{DD}-V_{OUT}=0.5V$	250	—	—	μA
High Level Output Current[2]	I_{OH2}	$V_{DD}-V_{SS}=3.0V$, $V_{DD}-V_{OUT}=0.5V$	400	—	—	μA

(1) for segment other than bc4, ad2, 1Hz
(2) for segment bc4, ad2, 1Hz and CLOUT
(3) for CLOUT
(4) for DS1, DS2, RES, HS, MS and BLK
(5) for T1, T2, T3 and AC

PIN CONFIGURATION

```
       BLK  ┌─┐ 1        ⌣        40 ┌─┐  V_DD
       DS1  ┌─┐                      ┌─┐  T3
       DS2  ┌─┐                      ┌─┐  T2
       bc4  ┌─┐                      ┌─┐  f3
        g3  ┌─┐                      ┌─┐  a3
        e3  ┌─┐                      ┌─┐  b3
        d3  ┌─┐                      ┌─┐
        c3  ┌─┐                      ┌─┐  1HZ
        g2  ┌─┐                      ┌─┐  f2
        e2  ┌─┐      IN7100          ┌─┐  ad2
        c2  ┌─┐                      ┌─┐  b2
        g1  ┌─┐                      ┌─┐  f1
        e1  ┌─┐                      ┌─┐  a1
        d1  ┌─┐                      ┌─┐  b1
        c1  ┌─┐                      ┌─┐  T1
            ┌─┐                      ┌─┐  MS
       CLK  ┌─┐                      ┌─┐  HS
     CLOUT  ┌─┐                      ┌─┐  RES
        AC  ┌─┐                      ┌─┐  OI
       V_SS ┌─┐ 20               21  ┌─┐  OO
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40-DIP MS-011AC

IK Semiconductor
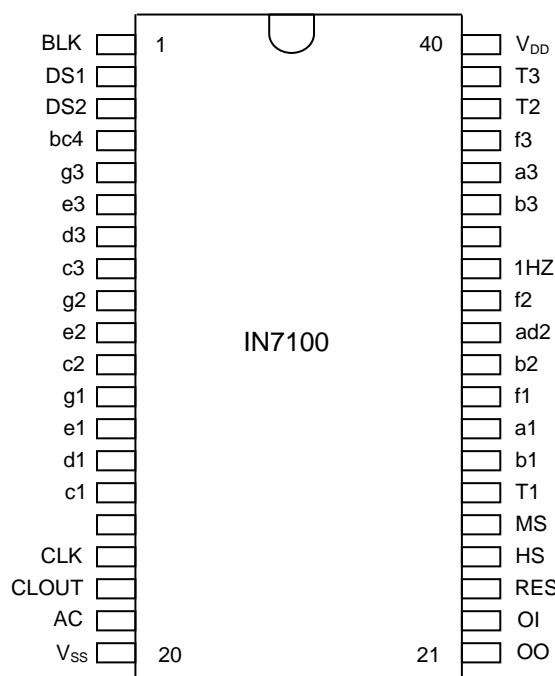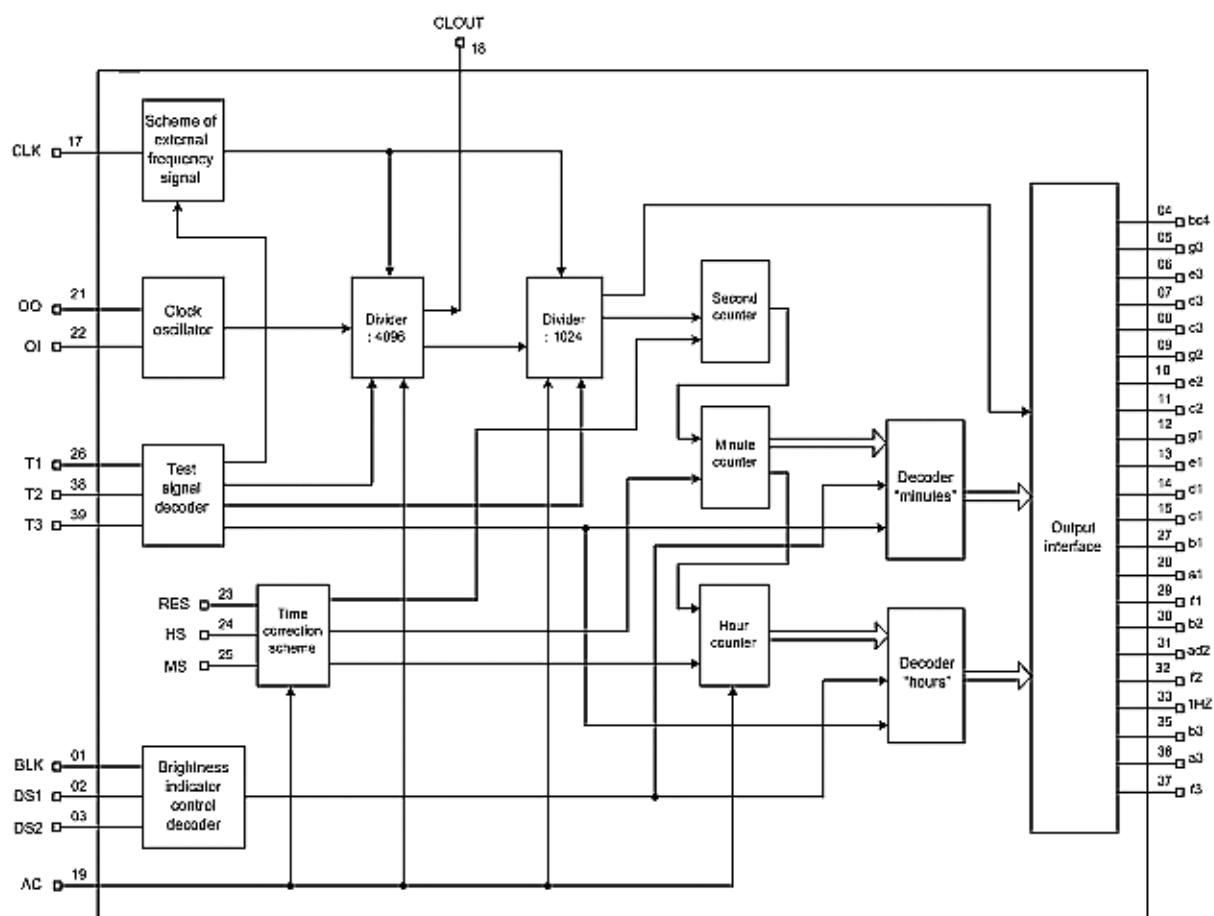
Block Diagram

Block Diagram (for die)
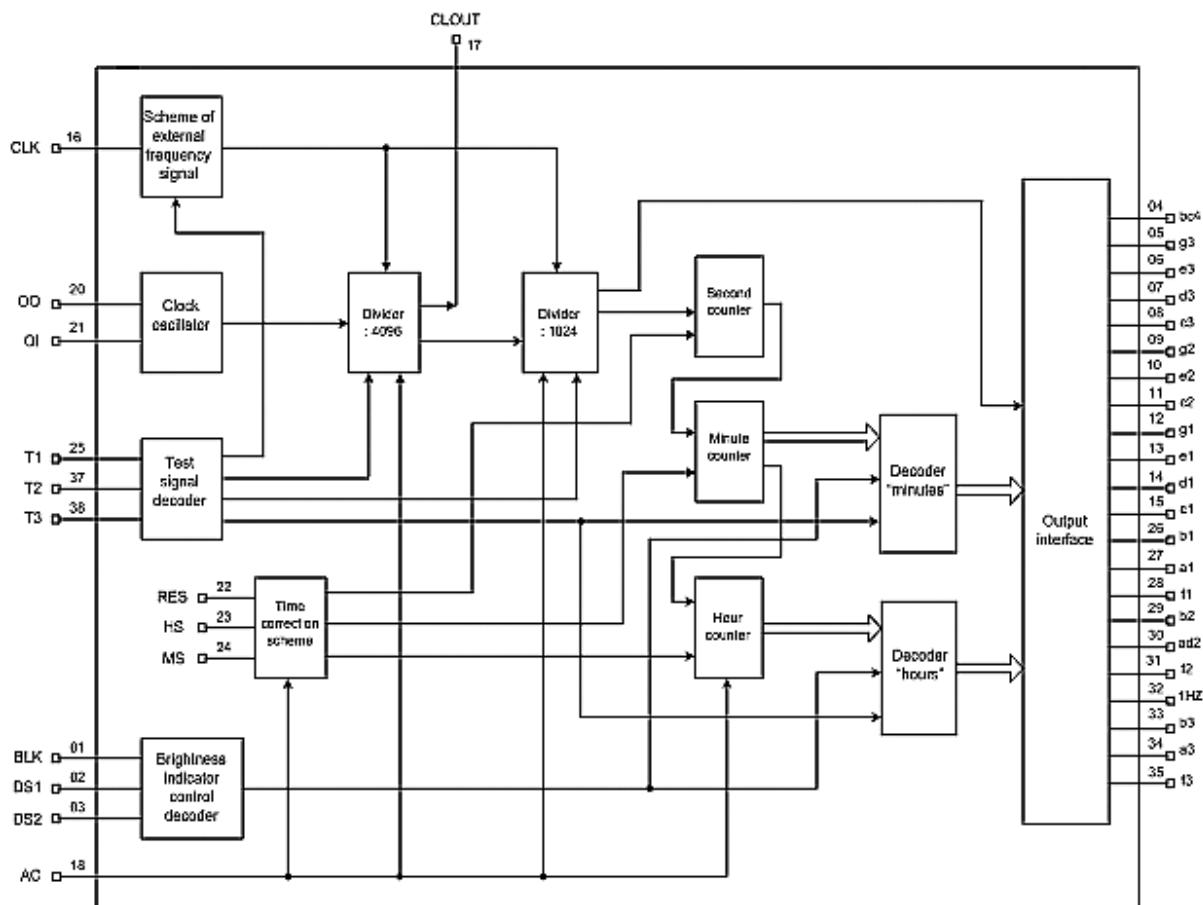
APPLICATION CIRCUIT
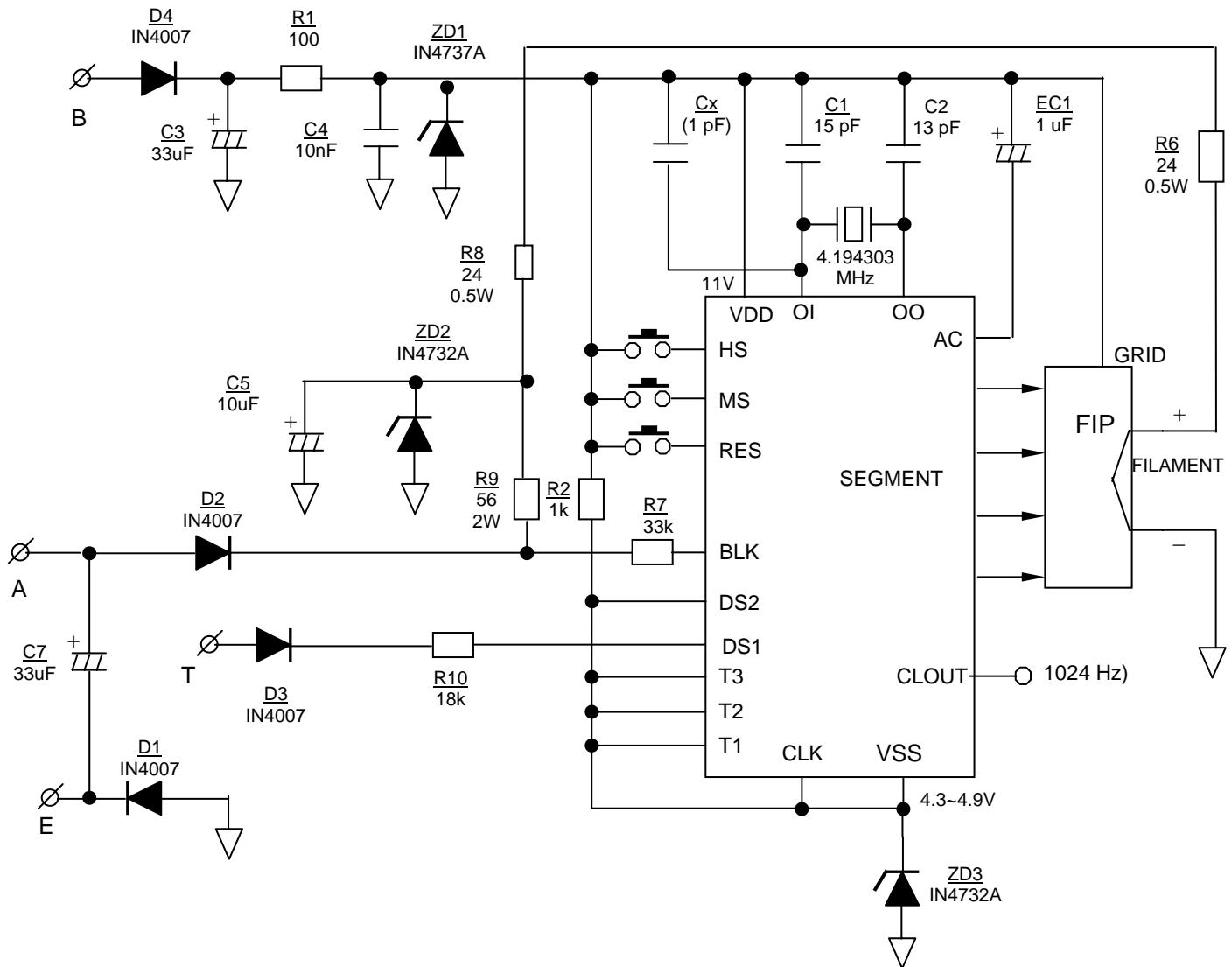
PIN DESCRIPTION

| PIN #	NAME H	I/O	DESCRIPTION
1	BLK	I	BLANCKING INPUT; When this pin is low state, FIP is off and the operation of HS, MS, RES, switch is blocking, or vice versa
2	DS1	I	DIMMER INPUT1, DIMMER INPUT2; This PIN control the brightness of FIP. Duty of segment output is determined depend on the level of DS1, DS2
3	DS2	I	

DS1	V_{DD}	V_{SS}	V_{DD}	V_{SS}
DS2	V_{DD}	V_{DD}	V_{SS}	V_{SS}
DUTY	1/16	1/8	1/4	1

PIN #	NAME H	I/O	DESCRIPTION
4	bc4	O	SEGMENT OUTPUT
5	g3	O	SEGMENT OUTPUT
6	e3	O	SEGMENT OUTPUT
7	d3	O	SEGMENT OUTPUT
8	c3	O	SEGMENT OUTPUT
9	g2	O	SEGMENT OUTPUT
10	e2	O	SEGMENT OUTPUT
11	c2	O	SEGMENT OUTPUT
12	g1	O	SEGMENT OUTPUT
13	e1	O	SEGMENT OUTPUT
14	d1	O	SEGMENT OUTPUT
15	c1	O	SEGMENT OUTPUT
16	--	--	*NO CONNECTION*
17	CLK	I	EXTERNAL CLOCK INPUT; External clock of 1024 Hz frequency can drive the IC operation
18	CLOUT	O	CLOCK OUTPUT; Clock of 1024 Hz frequency is generated when using 4.194304 MHz crystal
19	AC	I	CLEAR INPUT (power on reset input pin)
20	VSS	I	GROUND
21	OO	O	OSCILLATOR OUTPUT (4.194304 MHz crystal output)
22	OI	I	OSCILLATOR INPUT (4.194304 MHz crystal input)
23	RES	I	RES INPUT ($\pm$30 minutes auto correction Input)
24	HS	I	HOUR ADJUST INPUT
25	MS	I	MINUTE ADJUST INPUT
26	T1	I	TEST PIN1
27	b1	O	SEGMENT OUTPUT
28	a1	O	SEGMENT OUTPUT
29	f1	O	SEGMENT OUTPUT
30	b2	O	SEGMENT OUTPUT
31	ad2	O	SEGMENT OUTPUT
32	f2	O	SEGMENT OUTPUT
33	1HZ	O	SEGMENT OUTPUT (colon)
34	--	--	*NO CONNECTION*
35	b3	O	SEGMENT OUTPUT
36	a3	O	SEGMENT OUTPUT
37	f3	O	SEGMENT OUTPUT
38	T2	I	TEST PIN2
39	T3	I	TEST PIN3
40	V_{DD}	I	POWER SUPPLY

INTERNAL STATE
pull down: BLK, DS1, DS2, AC, RES, HS, MS, TE1, TE2, TE3
P-ch OPEN DRAIN: bc4, g3, e3, d3, c3, g2, e2, c2, g1, e1, d1, c1, b1, a1, f1, b2, ad2, f2, 1Hz, b3, a3, f3

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40-Pin Plastic Dual-in-Line
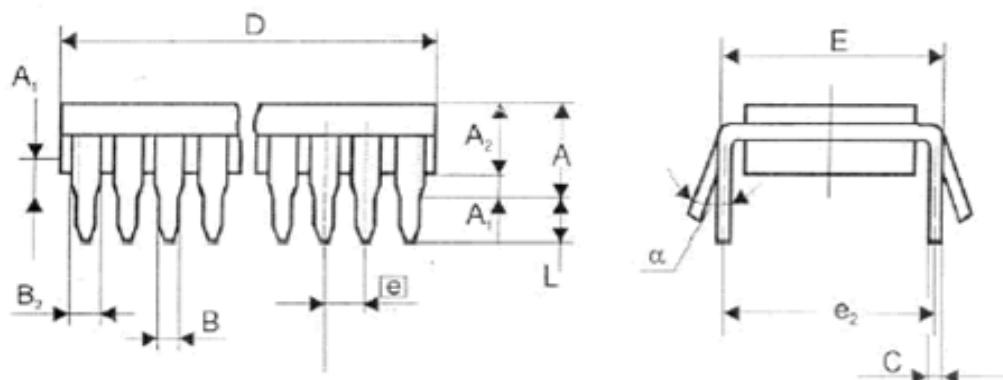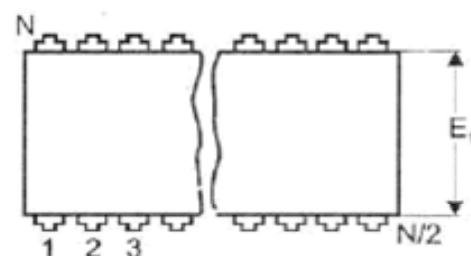
Dimension, mm		
A	max	6.35
A₁	min	0.38
A₂	min	3.18
	max	4.95
B	min	0.36
	max	0.56
B₂	min	0.77
	max	1.78
C	min	0.20
	max	0.38
D	min	50.30
	max	53.20
E	min	15.24
	max	15.87
E₁	min	12.32
	max	14.73
e	nom	2.54
e₂	nom	15.24
L	min	2.92
	max	5.08
α	min	0°
	max	10°

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