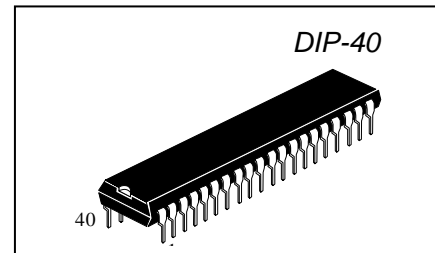


AUTOMOTIVE DIGITAL CLOCK IC

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.



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 ~ + 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 ~ + 85	°C
Storage Temperature	T_{STG}	- 55 ~ + 125	°C

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

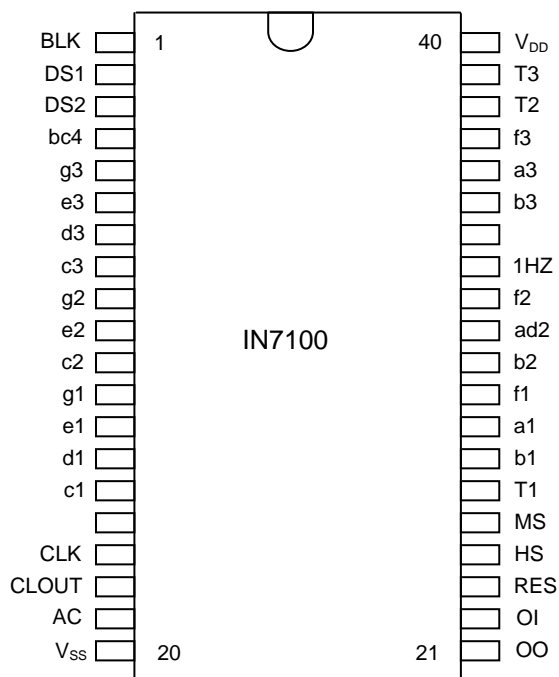
Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Power Supply Voltage	$V_{DD}-V_{SS}$		3.0	—	7.0	V
Power Supply Current	I_{DD}	No output loads, $V_{DD}=6V$	—	0.3	0.5	mA
Leakage Current	I_{OFF}	$V_{DD}-V_{SS}=5.0V$			5.0	μA
High Level Output Current ⁽¹⁾	I_{OH1}	$V_{DD}-V_{SS}=3.0V, V_{DD}-V_{OUT}=0.5V$	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

($V_{DD}-V_{SS}=3.0\sim 7.0V, T_a = -40 \sim +85^\circ C, RH\leq 70\%, CD=CG=15pF, Xtal=4.194304MHz$)

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

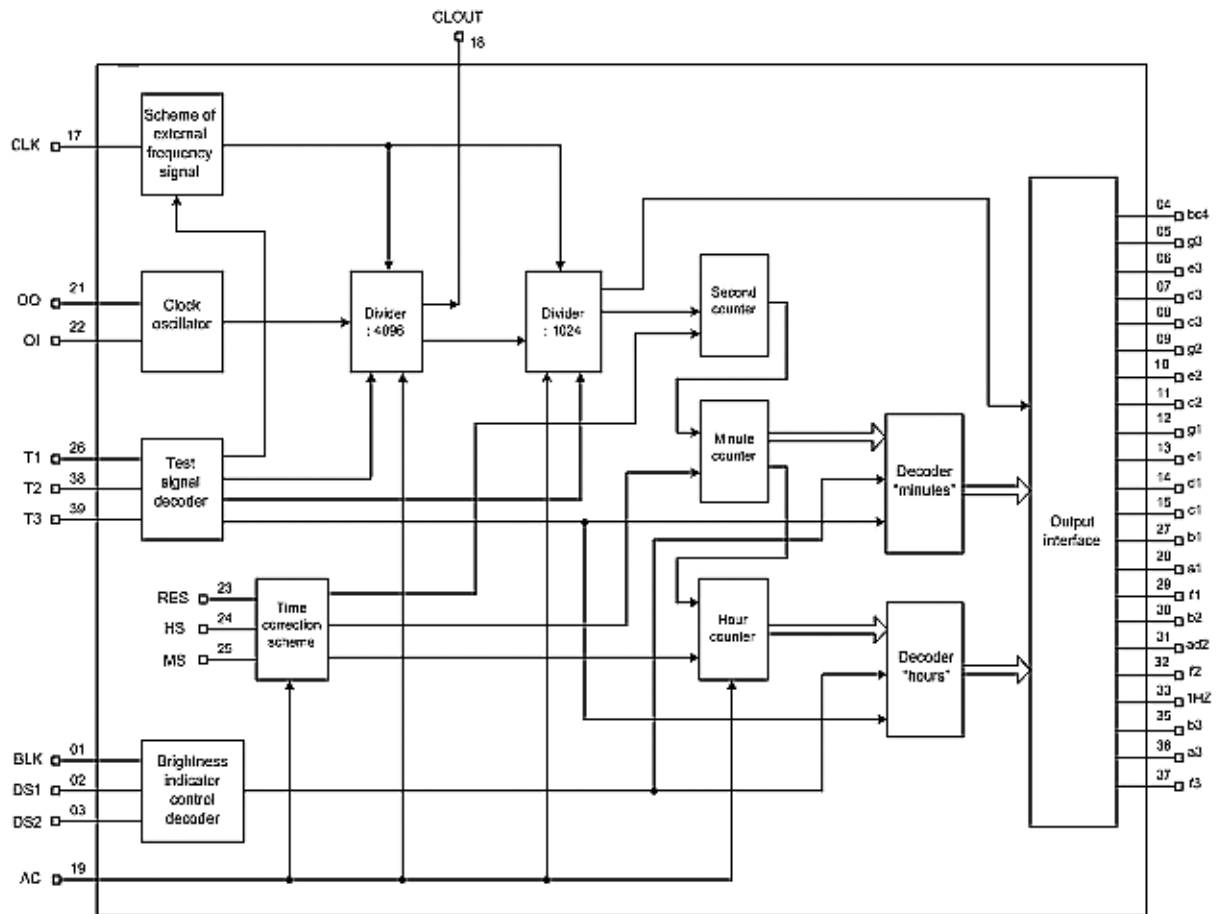
- (1) for segment other than bc4, ad2, 1Hz
- (2) for segment bc4, ad2, 1Hz and CLOUT
- (3) for CLOUT
- (4) for DS1, DS2, RES, HS, MS and BLK
- (5) for T1, T2, T3 and AC

PIN CONFIGURATION

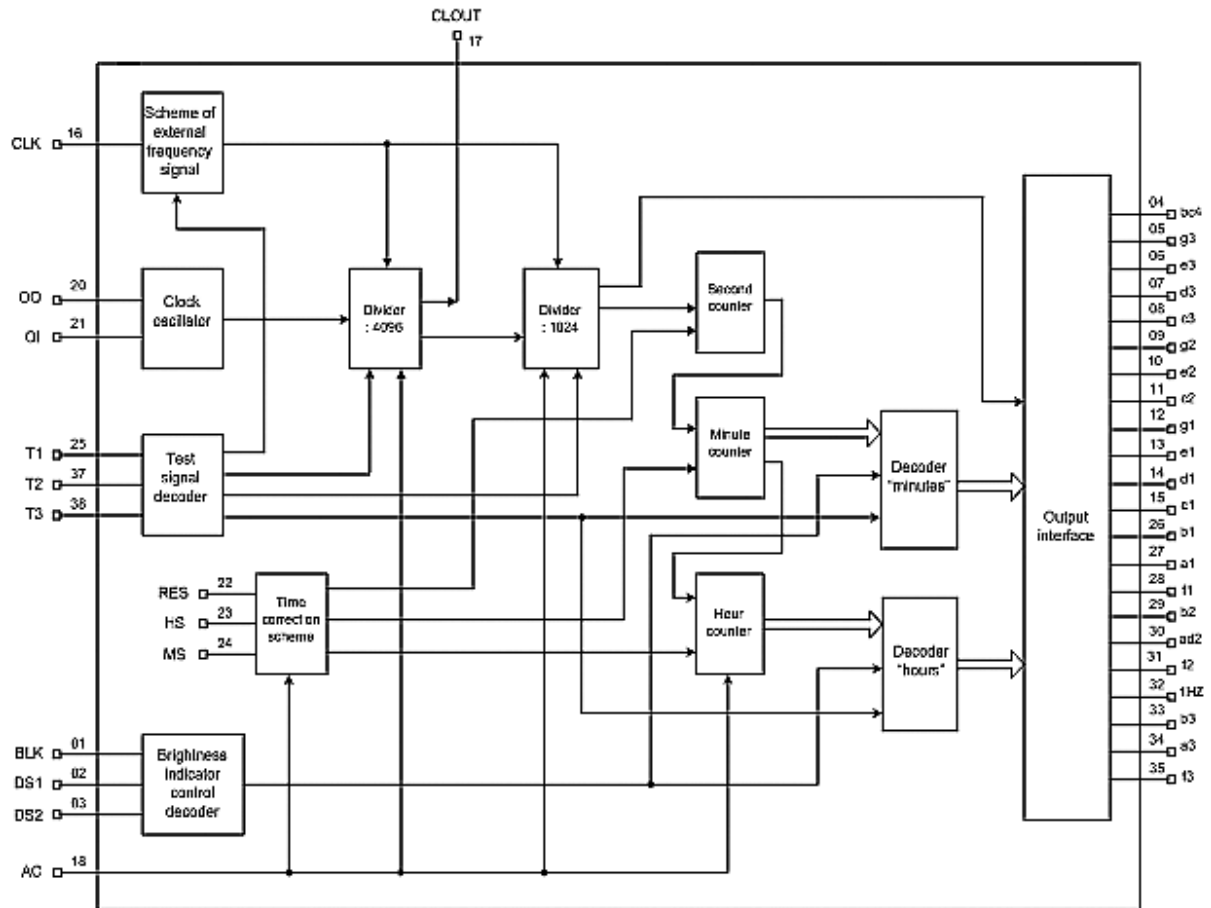


40-DIP MS-011AC

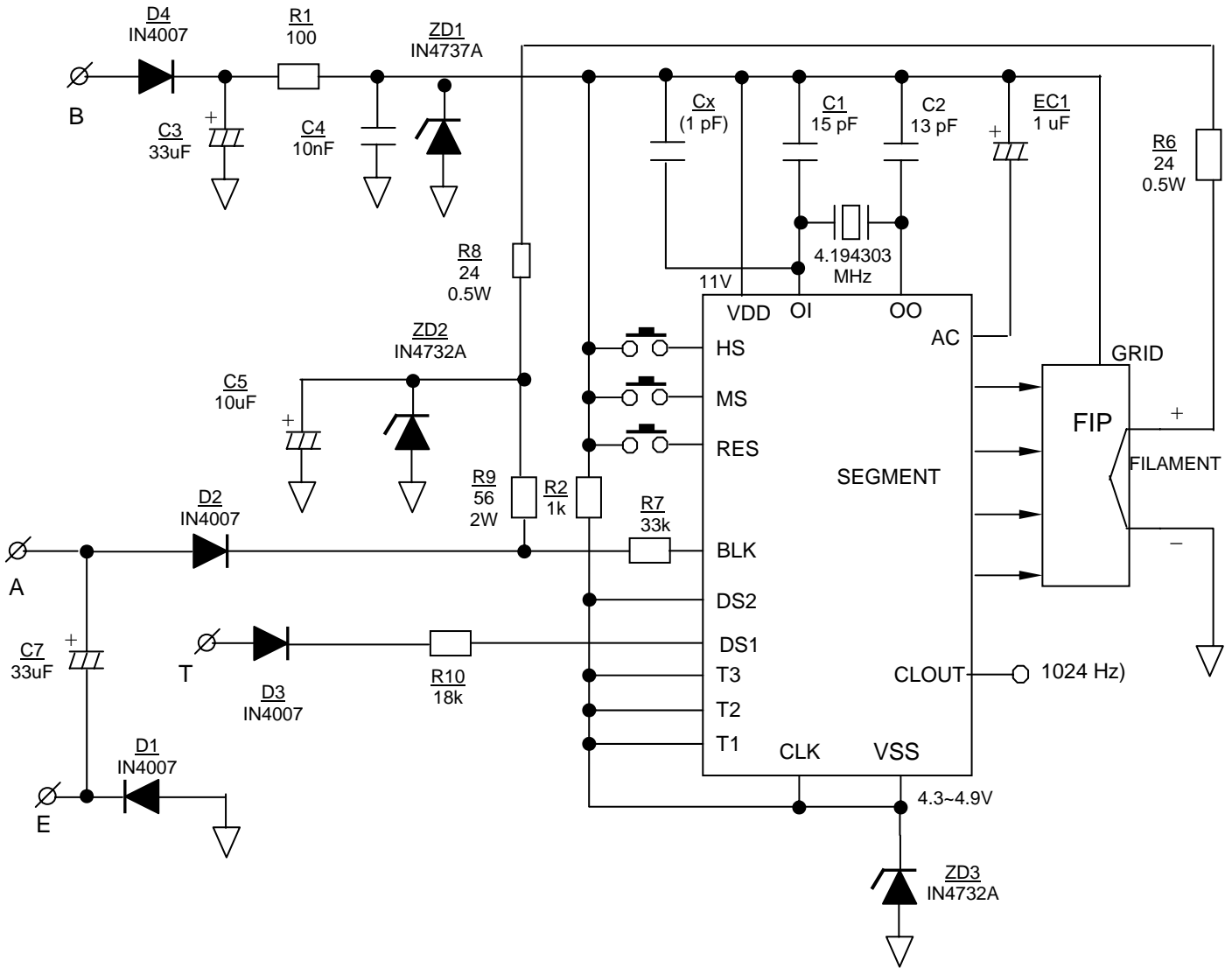
Block Diagram



Block Diagram (for die)



APPLICATION CIRCUIT



PIN DESCRIPTION

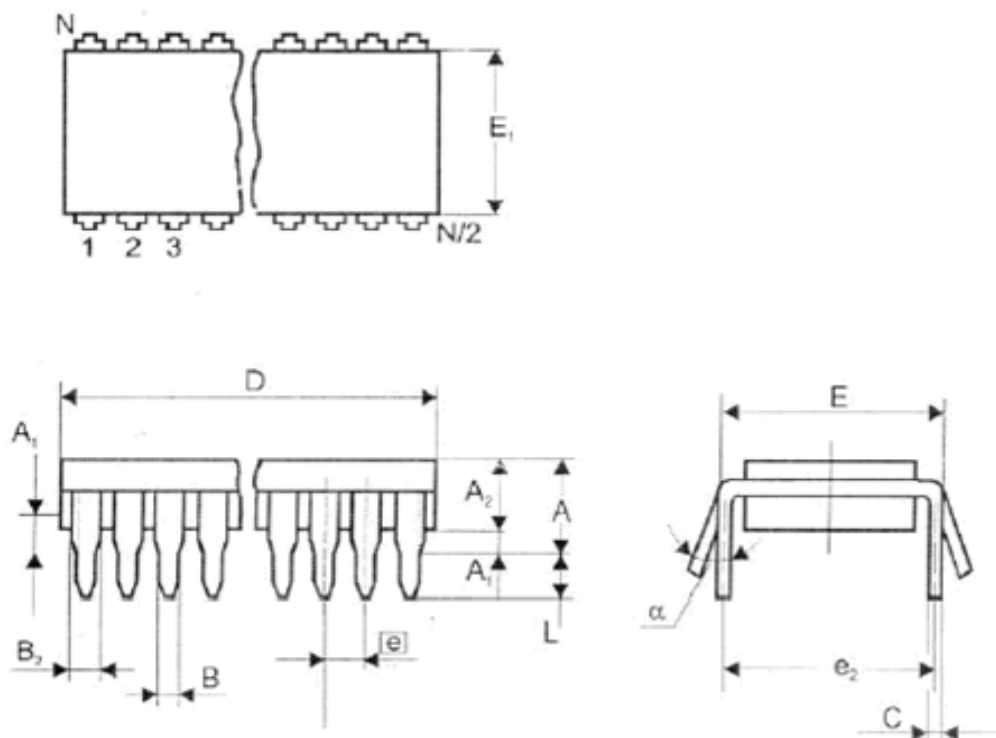
PIN #	NAME H	I/O	DESCRIPTION															
1	BLK	I	BLANCKING INPUT; When this pin is low state, FIP is off and the operation of HS, MS, RES, switch is blocking, or vice versa															
2	DS1	I	DIMMER INPUT1, DIMMER INPUT2; This PIN control the brightness of FIP. Duty of segment output is determined depend on the level of DS1, DS2															
3	DS2	I																
			<table border="1"> <tr> <td>DS1</td> <td>V_{DD}</td> <td>V_{SS}</td> <td>V_{DD}</td> <td>V_{SS}</td> </tr> <tr> <td>DS2</td> <td>V_{DD}</td> <td>V_{DD}</td> <td>V_{SS}</td> <td>V_{SS}</td> </tr> <tr> <td>DUTY</td> <td>1/16</td> <td>1/8</td> <td>1/4</td> <td>1</td> </tr> </table>	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
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														
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 (± 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

40-Pin Plastic Dual-in-Line



<i>Dimension, mm</i>		
A	max	6.35
A ₁	min	0.38
A ₂	min	3.18
	max	4.95
B	min	0.36
	max	0.56
B ₂	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
E ₁	min	12.32
	max	14.73
e	nom	2.54
e ₂	nom	15.24
L	min	2.92
	max	5.08
α	min	0°
	max	10°