

AN6881

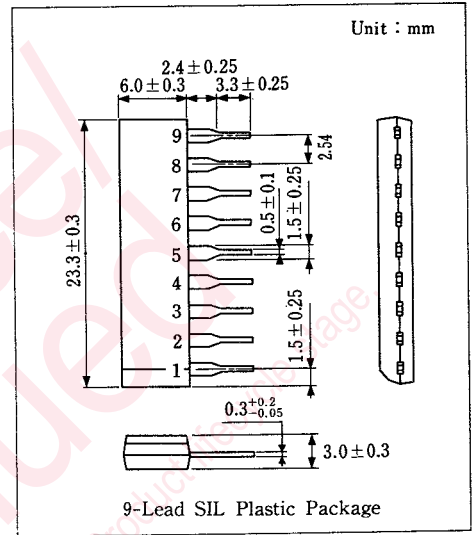
2~16 Frequency Divider

Outline

The AN6881 is an integrated circuit in which any integer ratios of 2 to 16 can be divided by inputting 4-bit binary code in combination of 4 flip-flops and the reset input pin is provided, and the operating supply voltage range is wide.

Features

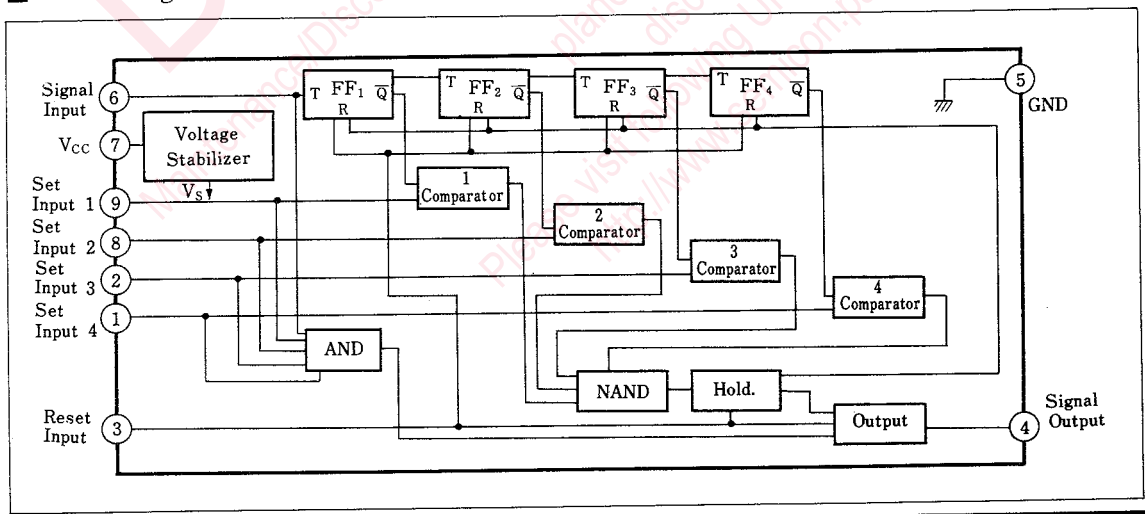
- 2~16 divided ratio programmable
- With set terminal divided ratio can be set up (open or short)
- With reset terminal
- With power-on reset
- Wide range of operating voltages : $V_{CC(oper.)} = 5 \sim 10V$



Pin

Pin No.	Pin Name
1	Set Input (4)
2	Set Input (3)
3	Reset Input
4	Signal Output
5	GND
6	Signal Input
7	Vcc
8	Set Input (2)
9	Set Input (1)

Block Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply Voltage	V _{CC}	11	V
Supply Current	I _{CC}	13	mA
Power Dissipation	P _D	350	mW
Operating Ambient Temperature	T _{opr}	-20 ~ +75	°C
Storage Temperature	T _{stg}	-55 ~ +125	°C

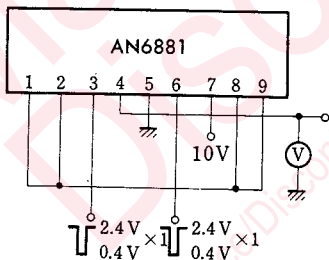
■ Electrical Characteristics (Ta=25°C)

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
High Level Input Voltage	V _{IH}	1	V ₇ =10V, V _{1.2.8.9} =2.4V	2.4		10	V
Low Level Input Voltage	V _{IL}	2	V ₇ =10V, V _{1.2.8.9} =0.4V	0		0.4	V
High Level Input Current	I _{IH}	3	V ₇ =10V			10	μA
Low Level Input Current	I _{IL}	4	V ₇ =10V	-50			μA
High Level Output Voltage	V _{OH}	5	V ₇ =5V, V _{1.2.8} =0V, I ₄ =-200μA	2.4		4.3	V
Low Level Output Voltage	V _{OL}	6	V ₇ =10V, I ₄ =5mA			0.4	V
Total Circuit Current (1)	I _{CC1}	7	V ₇ =10V, V _{1.2.3.8.9} =0V	2.4	5	8	mA
Total Circuit Current (2)	I _{CC2}	7	V ₇ =10V, V _{1.2.3.8.9} =0V	3.2	7.3	11.5	mA
Input Frequency	f	8	V ₇ =5V, V _{2.8.9} =0V, f ₁ =200kHz			200	kHz
Divided Ratio	N	9	V ₇ =5V	2		16	

Note 1 : Operating supply voltage range V_{CC} (opr)=5~10V

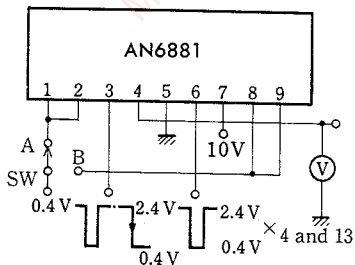
Note 2 : ⊕ shows flow-in current to IC and ⊖ shows flow-out current from IC.

Test Circuit 1 (V_{IH})



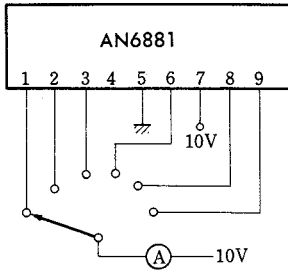
After applying one negative pulse to Pin ③, apply 2.4V to Pins ①,②,③,⑧ and 16 negative pulses to Pin ⑥ and then check that Pin ④ output is "H".

Test Circuit 2 (V_{IL})

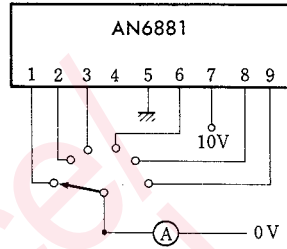


- 1) Connect SW to A and apply one negative pulse to Pin ③. Then, apply 4 negative pulses to Pin ⑥ and check that Pin ④ output is "H".
- 2) Next, connect SW to B and apply one negative pulse to Pin ⑥. Then, take out 200 μA from Pin ④ and measure Pin ④ output voltage.

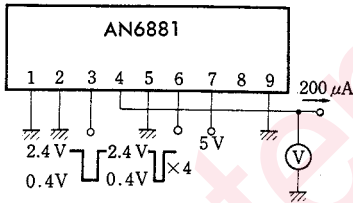
Test Circuit 3 (I_{IH})



Test Circuit 4 (I_{IL})

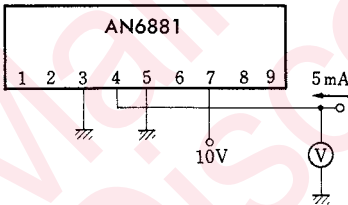


Test Circuit 5 (V_{OH})



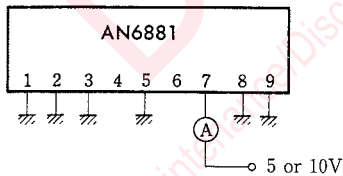
Apply one negative pulse to Pin ③ and 4 negative pulses to Pin ⑥. Then, take out 200 μ A from Pin ④ and measure Pin ④ output voltage.

Test Circuit 6 (V_{OL})



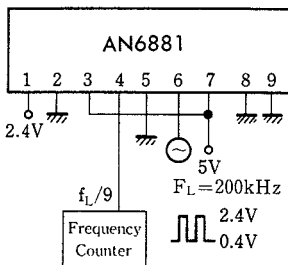
Flow 5 mA into Pin ④ and measure Pin ④ output voltage.

Test Circuit 7 ($I_{CC1,2}$)

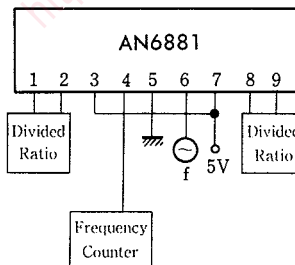


Measurement is made at $V_{CC}=5V$ or $10V$.

Test Circuit 8 (f)



Test Circuit 9 (N)

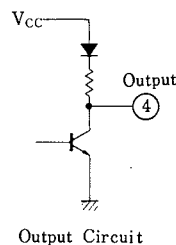
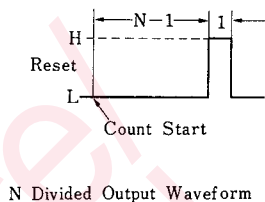


Note : According to the table of divided ratio, set the divided ratio. Input signal of frequency f to Pin ⑥ and measure Pin ④ output frequency.

■ Divided Ratio Set

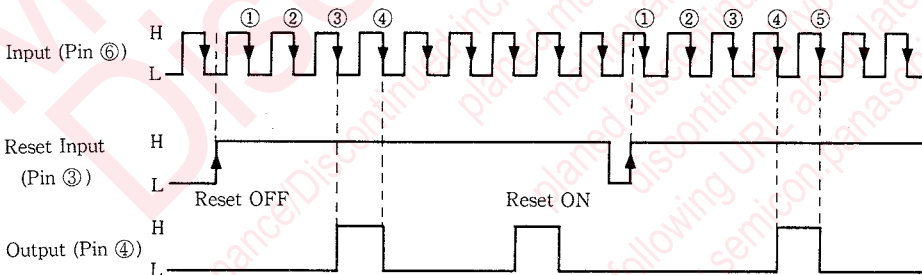
Ratio \ Pin No.	1	2	8	9
2 "	L	L	L	H
3 "	L	L	H	L
4 "	L	L	H	H
5 "	L	H	L	L
6 "	L	H	L	H
7 "	L	H	H	L
8 "	L	H	H	H
9 "	H	L	L	L
10 "	H	L	L	H
11 "	H	L	H	L
12 "	H	L	H	H
13 "	H	H	L	L
14 "	H	H	L	H
15 "	H	H	H	L
16 "	H	H	H	H

■ Output Form



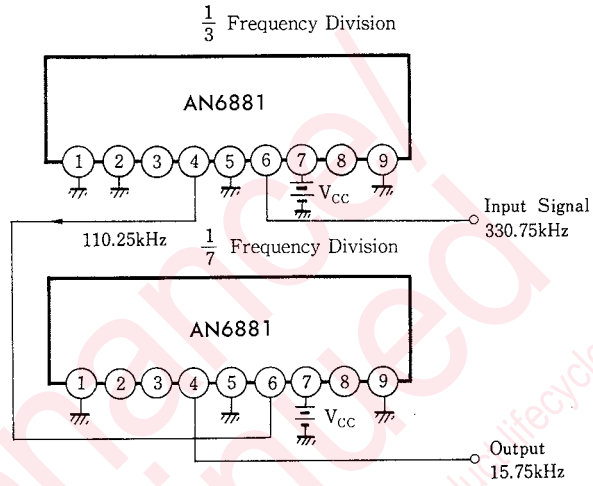
■ Application

- Timing Chart in case of $\frac{1}{4}$ Frequency Division



- Note :
- If reset is released when Pin ⑥ is "L", Pin ④ output becomes "H" when the third input is "L", while "L" at the fourth input. The same operations will be made afterwards.
 - If reset is released when Pin ⑥ input is "H", Pin ④ output becomes "H" when the fourth input is "L" at the first one cycle. Pin ④ output becomes "L" at the fifth input and thereafter "H" when the third input is "L". Thus, reset timing must be fully taken into account.

- Example of $\frac{1}{21}$ Frequency Division circuit by using 2 ICs



Maintenance/Discontinued

includes following four Product lifecycle stage.

planned maintenance type

maintenance type

planned discontinued type

discontinued type

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