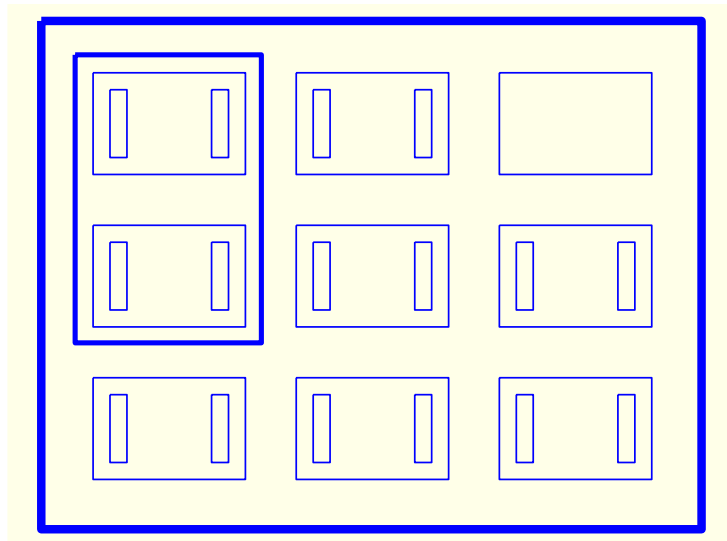


	1
	3
30	9
LM311	12
ICL8038	15



						A/D	D/A
予			位				
	U/F		F/U				
		JP11	JP12	JP13	JP14	JP15	
		220V					
220V						±5V	±12V
						±15V	0
							30V
						ON	
							OFF
	220V						

1

2

3

4

5

6

7

仪

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1 A_{ud} $CMRR$ U_{os} U_{oppm} I_{os} GW

2

3

4

1

2

3

4

1 U_{os} mV U_{os}

8-DIP

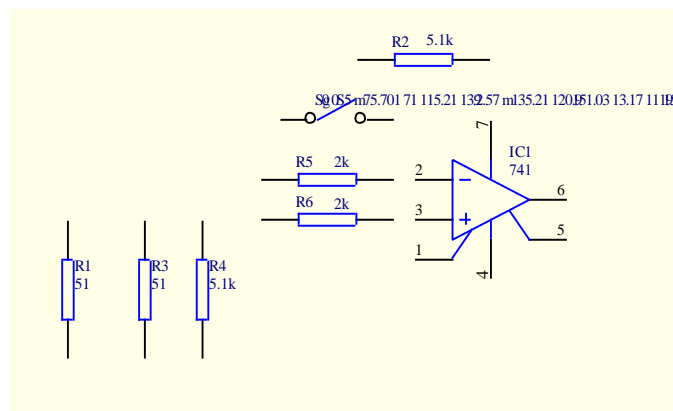
TO-99

2 3 6 7 4

8 1 5 1 5 5

1 5

1-1



1-1

S1 S2

U_{O1}

$$A_{uf} = \frac{U_{O1}}{U_{OS}} = \frac{R_1 + R_2}{R_1}$$

$$U_{OS} = \frac{R_1}{R_1 + R_2} \cdot U_{O1} = \frac{1}{101} \cdot U_{O1} \quad 1-1$$

$$U_{OS} \quad \pm 1 \quad 20 \quad \text{mV} \quad U_{OS} \quad 1\text{mV}$$

2 I_{OS}

$$I_{OS} = |I_{B+} - I_{B-}|$$

$$I_{OS}$$

$$1-1 \quad I_{OS} \quad S1 \quad S2 \quad U_{O1'}$$

$$I_{OS} = \frac{U_{O1'} - U_{O1}}{A_{uf} \cdot R_5} = \frac{R_1}{R_1 + R_2} \cdot \frac{U_{O1'} - U_{O1}}{R_5} \quad 1-2$$

$$I_{OS} \quad 1\text{nA}$$

3 A_{ud}

$$\Delta U_o$$

$$\Delta U_{id}$$

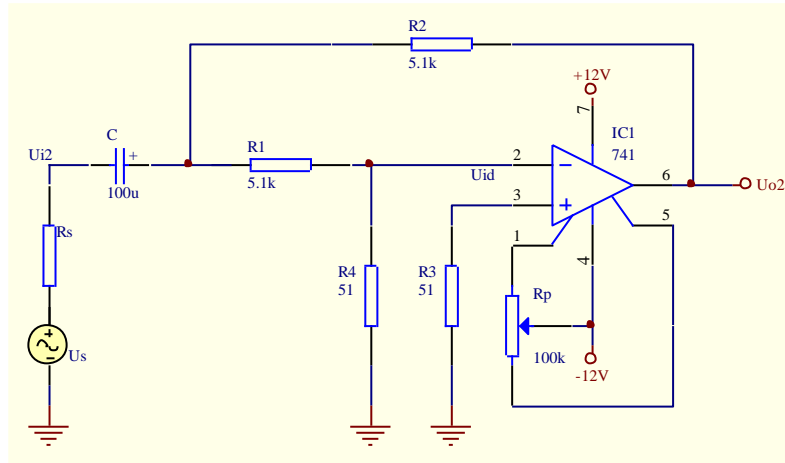
$$A_{ud} = \frac{\Delta U_o}{\Delta U_{id}}$$

dB

$$A_{ud}(\text{dB}) = 20 \lg \left(\frac{\Delta U_o}{\Delta U_{id}} \right) \quad (\text{dB})$$

Hz

1-2



$$A_{ud} = \frac{R_2}{R_1} \left(1 + \frac{R_1}{R_4} \right) \cdot \frac{U_{O2}}{U_{i2}} \quad (1-2)$$

$$A_{ud}(\text{dB}) = 20 \lg \left(\frac{\Delta U_{o2}}{\Delta U_{id}} \right) = 20 \lg \left[\left(1 + \frac{R_1}{R_4} \right) \cdot \frac{U_{O2}}{U_{i2}} \right] \cdot (\text{dB}) \quad (1-3)$$

100dB
4

CMRR

A_{ud}

A_{uc}

$$CMRR = \frac{A_{ud}}{A_{uc}}$$

dB **CMRR**

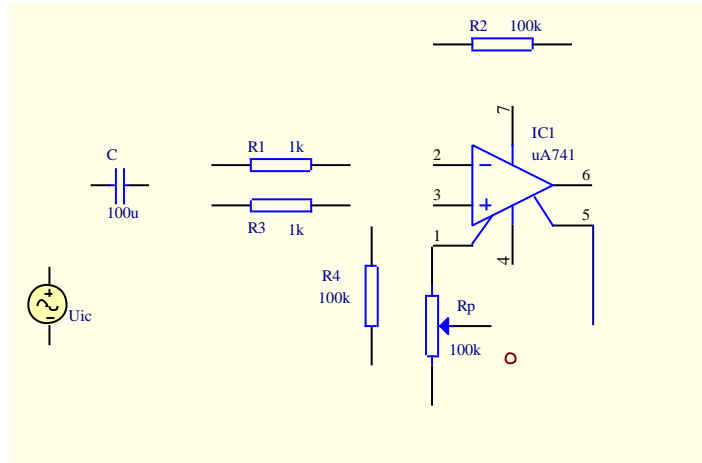
$$CMRR = 20 \lg \left(\frac{A_{ud}}{A_{uc}} \right) (\text{dB})$$

CMRR

CMRR

1-3

CMRR



1-3 *CMRR*

$$|A_{ud}| = \frac{R_2}{R_1}$$

$$|A_{uc}| = \frac{U_{oc}}{U_{ic}}$$

CMRR

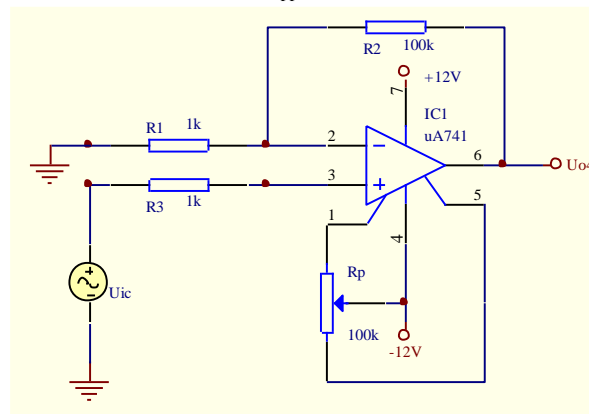
$$CMRR = 20 \lg \left(\frac{R_2 U_{ic}}{R_1 U_{oc}} \right) \text{ (dB)}$$

1-4

5

U_{oc} U_{ic} *CMRR* *CMRR* 80dB
 U_{oppm}
 U_{oppm} 仪
 10V

1-4



1-4

U_{oppm}

6

GW
 GW 1
 0.707

$$GW = A_{ud} f$$

1-5

U_{O4}
 U_{oppm}
 Sc OFF
5 **GW**
 1 Sd ON
 2 U_{i5} 100mV
 SR2

$$A_u = \frac{U_{o5}}{U_{i5}} = 0.707$$

Sd OFF

予

1 U_{OS} I_{OS} A_{ud} $CMRR$ U_{oppm} GW
 2
 3

1 U_{OS} I_{OS}

2 U_{OS} I_{OS}

3

4

5

30

1
2

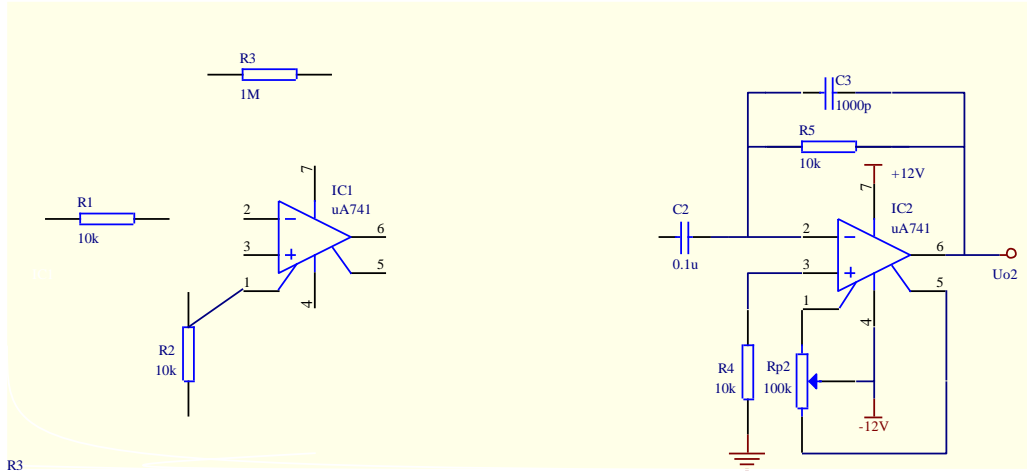
仪

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1 30

8-DIP

TO-99



2-1

2-1 S1 IC1 仪

$$u_{o1}(t) = -\frac{1}{R_1 C_1} \int u_{i1}(t) dt \quad 2-1$$

3

2-1 S1 S2 IC2 仪

$$u_{o2}(t) = -R_5 C_2 \frac{du_{i2}(t)}{dt} \quad 2-2$$

4

2-1 S2 S1 IC1 IC2 仪

1

1	S1					
2		u_{i1}		u_{O1}		Rp1
$U_{O1}=0$	U_{O1}					
3			u_{i1}		u_{O1}	1kHz
$\pm 2V$		u_{i1}	u_{O1}		u_{i1}	u_{O1}
			u_{i1}	u_{O1}		
4		u_{i1}	u_{O1}		u_{i1}	160Hz
1V		u_{i1}	u_{O1}		u_{i1}	u_{O1}
		u_{i1}	u_{O1}			

LM311

1
2 LM311
3

1
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3

5ns

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TTL ECL HTL NMOS PMOS

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LM311

1 LM311

LM311 万

±5V ±15V

100nA

6.0nA

±30V

TTL DTL

MOS

LM311

8-DIP

TO-99

3-1

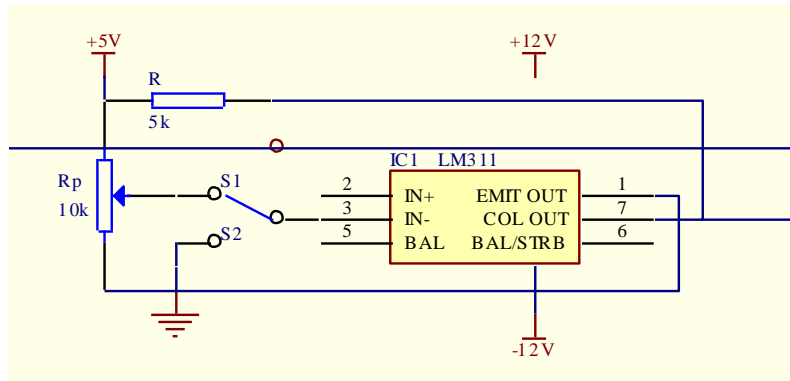
LM311

3-1 LM311

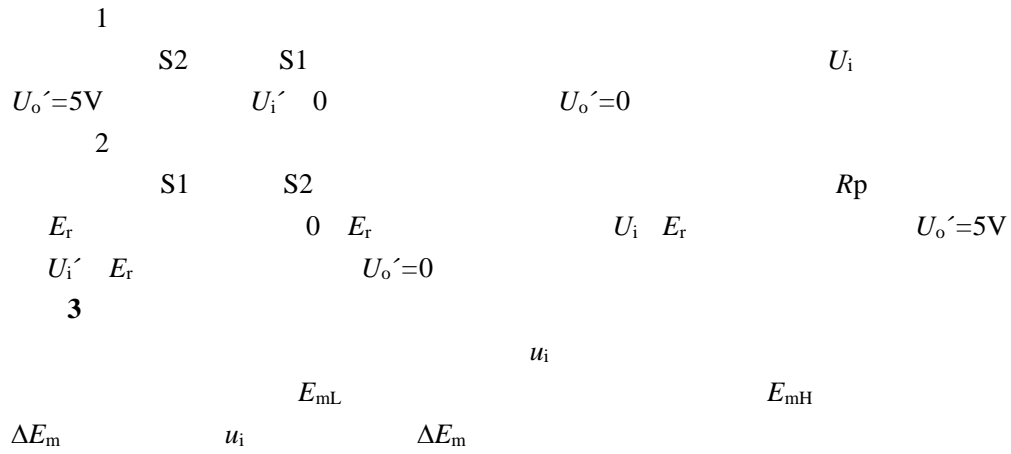
1	GND	3	IN	5	BALANCE	7	OUT
2	IN+	4	V	6	BALANCE/STROBE	8	V+

2

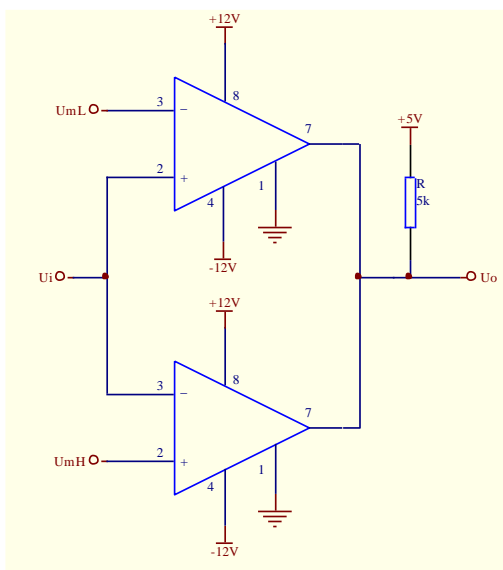
3-1



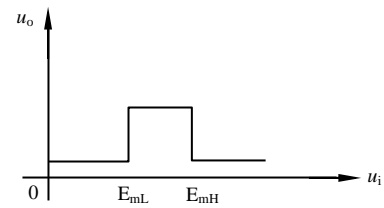
3-1



3-2



3-2



3-3

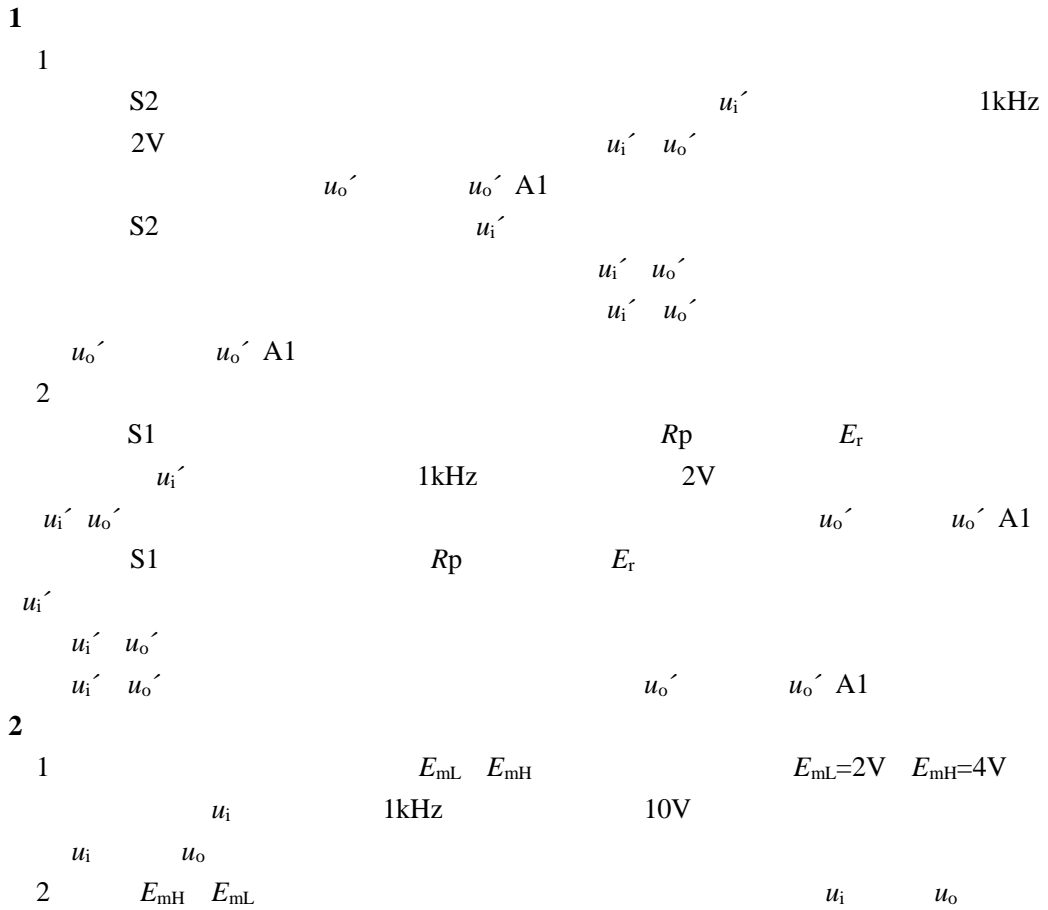
3-2 IC2 IC3 万 LM311 LM311

U_i E_{mL} E_{mH} IC2 IC3

U_i E_{mH} IC2 IC3

E_{mL} U_i E_{mH} IC2 IC3

3-3



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- 1
- 2
- 3

ICL8038

1 ICL8038
 2 ICL8038
 3

1
 2

1 ICL8038

ICL8038 些 IC ICL8038 些 IC
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ICL8038

0.001Hz 500kHz
 0.5

+10V +30V ±5V ±15V
 50ppm/°C

仪

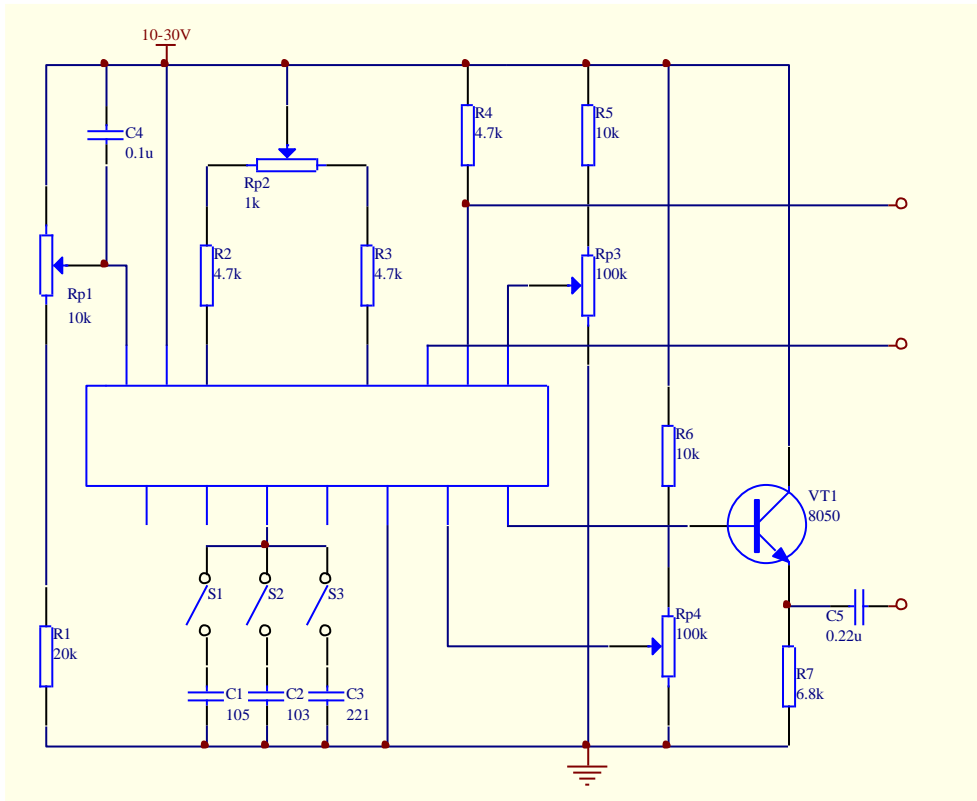
ICL8038 14-DIP 4-1 ICL8038

4-1 ICL8038

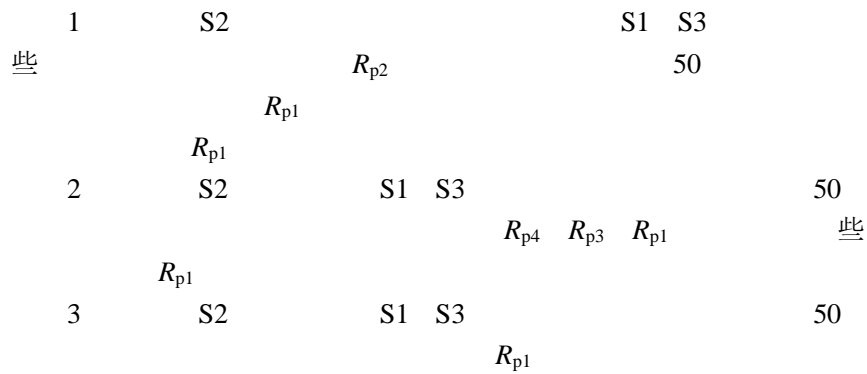
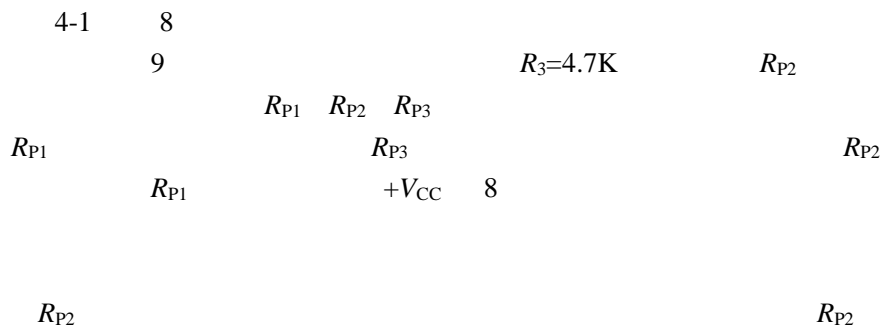
1	SINE WAVE SINADJ ₁	6	V ₊	11	V OR AND
2	SINE WAVE OUT	7	FM BIAS	12	SINE WAVE SINADJ ₂
3	TRIANGLE OUT	8	FM SWEEP INPUT	13	NC
4	DUTY CYCLE	9	SQUARE WAVE OUT	14	NC
5	FREQUENCY DFADJ	10	TIMING CAPACITOR		

2 ICL8038

4-1 ICL8038



4-1 ICL8038



4		3		S1		S2	S3		S2
	S1	S3		S1	S2				R_{p2}
10		90							
5		4		R_{p1}	R_{p2}	R_{p3}	R_{p4}		

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1		1	2	3
2		4		
3		5		
4				