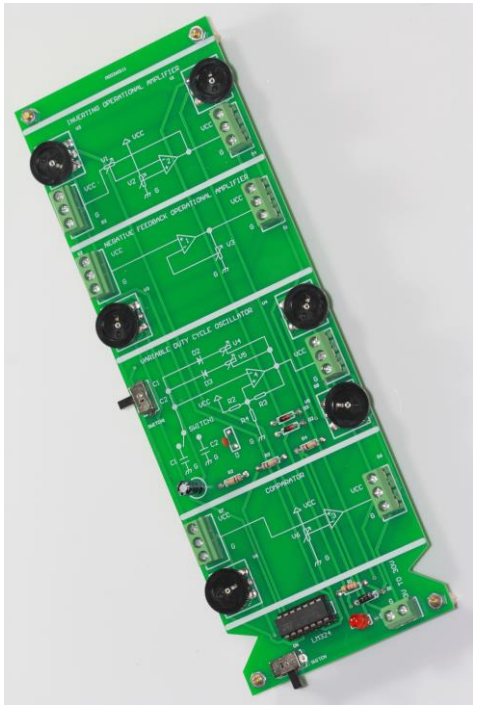
LM324 WITH FOUR USEFUL FUNCTIONS FOR DEVELOPER

PRODUCT CODE: M00270064



FEATURE:

- This is very useful for electronic developer and not only for learning the basic logic of Operational Amplifier.
- This comes with “Inverting Operational Amplifier”, “Negative Feedback Operational Amplifier”, “Variable Duty Cycle Oscillator”, “Comparator”.
- Assembly is needed.
- The design is a foolproof design, the user would not damage the kit even the user reverses the polarity of power supply.
- LED is to indicate if the equipment is on or not.
- On/Off switch is provided.

READ BEFORE INSTALLATION:

- Put the component on the side of screen printing and solder on the back of PCB without printing.

FIGURE 1

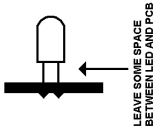


FIGURE 2

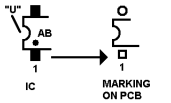


FIGURE 3

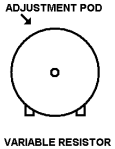


FIGURE 4

FIGURE 5

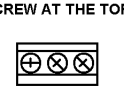


FIGURE 6

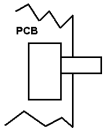


FIGURE 7

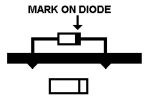


FIGURE 8

CIRCUIT EXPLANATION:

- 3V to 30V for power input.
- For Operational Amplifier 2 and left-hand side of Fig 9, this is a “Inverting Operational Amplifier”. From the formula, you may feel this is too complex and no any meaningful message. Just understand in this way. Due to characteristic of operational Amplifier, the voltage at V- would be similar to V+. The result is that if there is any waveform such as sine wave at VSIN before Capacitor C. The voltage would swing at V- (Or V+) for amplifying at the Operational Amplifier. Now R1, R2, Rf, Rg is replaced by a variable resistor in the kit.
- For Operational Amplifier 1 and right-hand side of Fig 9 This is a “Negative Feedback Operational Amplifier”. R3 and R4 is replaced by a variable resistor in the kit.
- For Operational Amplifier 3, this is simple “comparator”. Because Operational Amplifier have very large amplifying, the output would become max or min when the voltage input at “+” and “- “of Operational Amplifier have little different.
- For Operational Amplifier 4, this is a “Variable Duty Cycle Oscillator”. The function of D2, D3, V4, V5 is to adjust the duty cycle of the square oscillator.

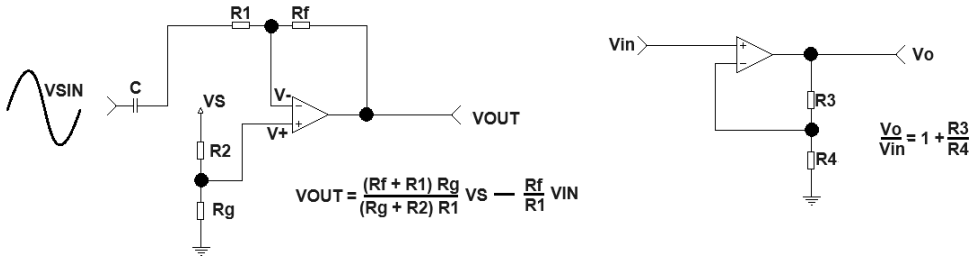


FIGURE 9

INSTALLATION:

Just install the component to the PCB M00260111 according to below table.

ITEM	SYMBOL ON PCB	DESCRIPTION	OUTLOOK	DIRECTION ON INSTALLATION? AND OTHER
1	R1	RESISTOR, 10K ohms	BROWN, BLACK, ORANGE	NO
2	R2	RESISTOR, 100K ohms	BROWN, BLACK, YELLOW	NO
3	R3	RESISTOR, 100K ohms	BROWN, BLACK, YELLOW	NO
4	R4	RESISTOR, 100K ohms	BROWN, BLACK, YELLOW	NO
5	V1	VARIABLE RESISTOR, 100K ohms	FIGURE 4	YES
6	V2	VARIABLE RESISTOR, 100K ohms	FIGURE 4	YES
7	V3	VARIABLE RESISTOR, 100K ohms	FIGURE 4	YES
8	V4	VARIABLE RESISTOR, 100K ohms	FIGURE 4	YES
9	V5	VARIABLE RESISTOR, 100K ohms	FIGURE 4	YES
10	V6	VARIABLE RESISTOR, 100K ohms	FIGURE 4	YES
11	D1	DIODE, IN4001	FIGURE 8 (MOSTLY BLACK)	YES, FIGURE 8
12	D2	DIODE, IN60P	FIGURE 8 (MOSTLY TRANSPARAENT RED)	YES, FIGURE 8
13	D3	DIODE, IN60P	FIGURE 8 (MOSTLY TRANSPARAENT RED)	YES, FIGURE 8
14	C1	CAPACITOR, 1uF	MARK WITH 1uF OR SAME MEANING OF VALUE	YES, NOTE 1
15	C2	CAPACITOR, 102	MARK WITH 102 OR SAME MEANING OF VALUE	NO
16	S1	OUTPUT FOR OPERATIONAL AMPLIFIER 1	FIGURE 6	YES, NOTE 2
17	S2	INPUT FOR OPERATIONAL AMPLIFIER 1	FIGURE 6	YES, NOTE 2
18	S3	INPUT FOR OPERATIONAL AMPLIFIER 2	FIGURE 6	YES, NOTE 2
19	S4	OUTPUT FOR OPERATIONAL AMPLIFIER 2	FIGURE 6	YES, NOTE 2
20	S5	POWER IN	FIGURE 5	YES, NOTE 2
21	S6	OUTPUT FOR OPERATIONAL AMPLIFIER 3	FIGURE 6	YES, NOTE 2
22	S7	INPUT FOR OPERATIONAL AMPLIFIER 3	FIGURE 6	YES, NOTE 2
23	S8	OUTPUT FOR OPERATIONAL AMPLIFIER 4	FIGURE 6	YES, NOTE 2
24	SWITCH	SLIDE SWITCH	SIX LEGS	YES, FIGURE 7
25	SWITCH1	SLIDE SWITCH FOR CHOICE OF FREQUENCY	SIX LEGS	YES, FIGURE 7
26	L1	LED	RED	YES, FIGURE 1, FIGURE 2, NOTE 1
27	U1	DIP 14 SOCKET	14 LEGS	NO
28	ON THE TOP OF ITEM 27	IC, LM324	14 LEGS	YES, FIGURE 3

29	/	HEX CAP SCREW AND IS THE LEG OF KITS	LONG METAL	NOTE 3
30	/	HEX CAP SCREW AND IS THE LEG OF KITS	LONG METAL	NOTE 3
31	/	HEX CAP SCREW AND IS THE LEG OF KITS	LONG METAL	NOTE 3
32	/	HEX CAP SCREW AND IS THE LEG OF KITS	LONG METAL	NOTE 3
33	/	HEX NUTS, ON TOP OF ITEM 33	/	NOTE 3
34	/	HEX NUTS, ON TOP OF ITEM 34	/	NOTE 3
35	/	HEX NUTS, ON TOP OF ITEM 35	/	NOTE 3
36	/	HEX NUTS, ON TOP OF ITEM 36	/	NOTE 3

- NOTE 1. On component, longer leg is “+”.
- NOTE 2. Metal terminal is facing outside the PCB.
- NOTE 3. Put item 29 to 32 to the four holes of PCB. This is the leg of kits. Then screw item 33 to 36 on the top of this.

CIRCUIT DIAGRAM:

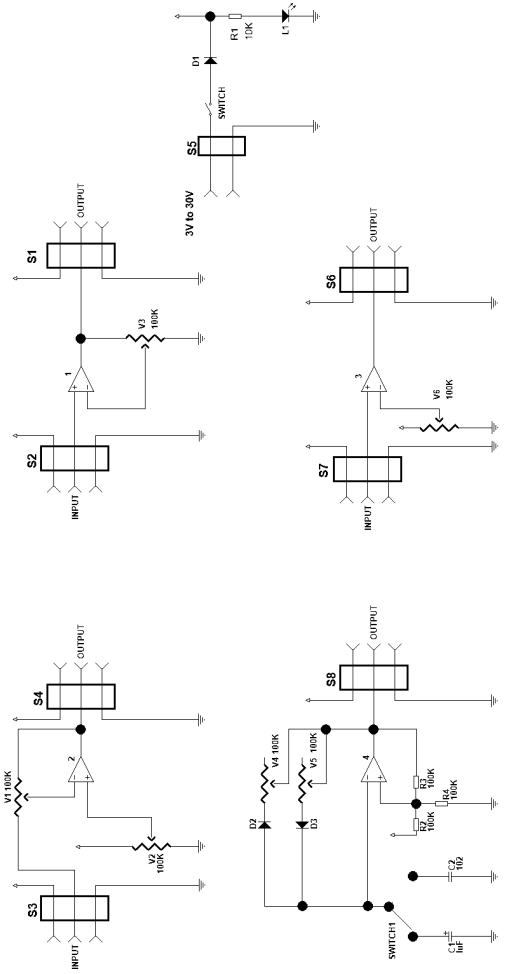


FIGURE 10