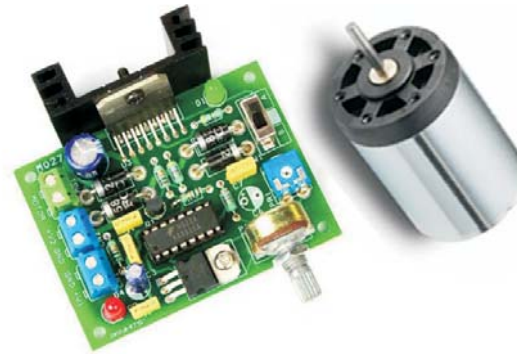


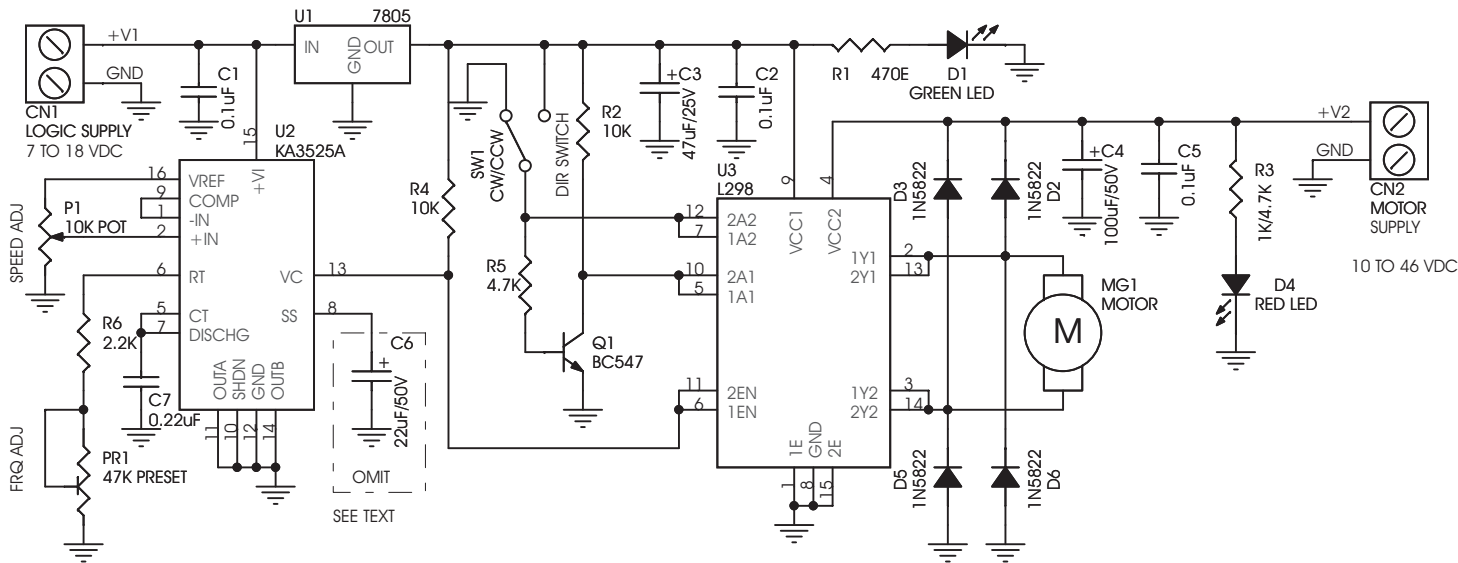
M027 PWM DC MOTOR SPEED & DIRECTION CONTROLLER

PWM DC Motor Speed & Direction Controller kit is based on L298 and SG3525 IC. L298 is been used as H bridge for direction controller and SG3525 IC provides PWM for speed control.

- Motor Supply : 10 to 46 VDC, 2 A
- Logic Supply : 7 to 18 VDC
- Motor Load 10 to 46 V @ peak 2 A current
- PWM Duty cycle 0 to 100% (+/- 5%)
- Frequency adjustable to avoid audible 1 KHz - 29 KHz via onboard preset
- Onboard direction control switch
- Onboard potentiometer for speed control
- Protection diodes
- Onboard indication for logic and motor supply input
- Ideal for brush DC motors
- Heatsink for IC provided
- For 12 to 24 V Motor single supply
- Four mounting holes of 3.2 mm each
- PCB dimensions 73 mm x 54 mm



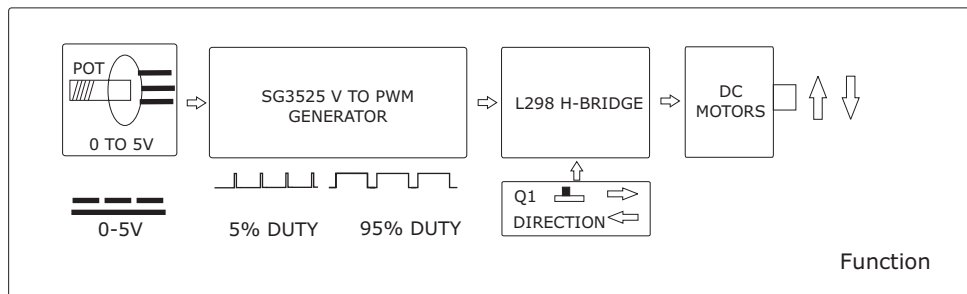
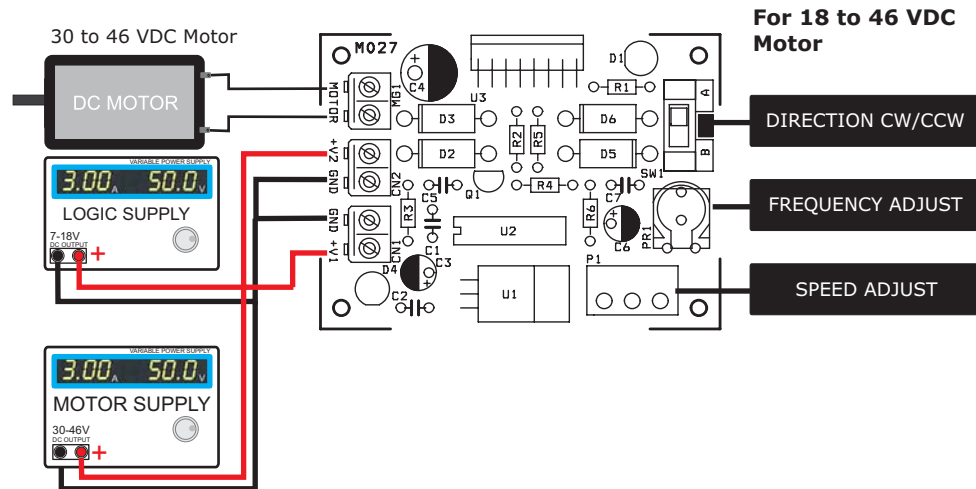
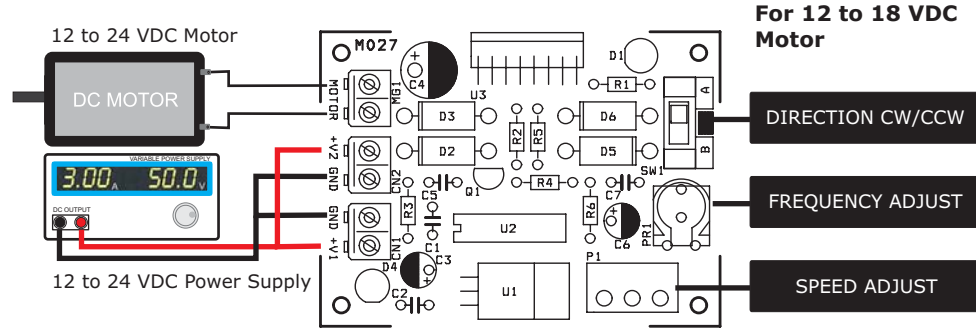
- Application**
- Robotics
 - Automation
 - Animatronics
 - Fan Motors
 - Scissors Lift
 - Turn Table
 - Hobby Drills and Laths
 - Linear Actuators Driver
 - Scientific Equipments



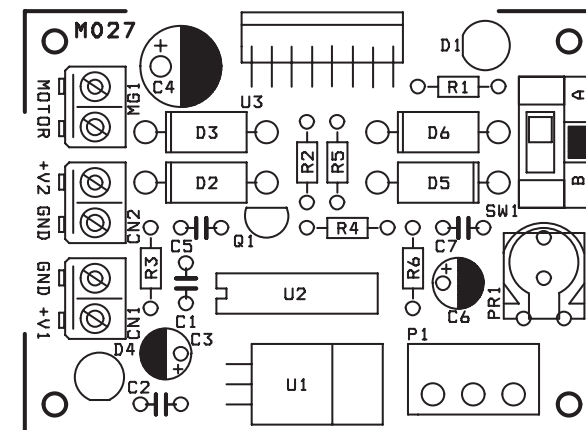
C6 Capacitor omit please see text
 R3 1K for 18 VDC Motor Supply
 R3 4.7K for 46 VDC Motor Supply



Applications and Wiring Diagram



SR.	QTY.	REF.	DESCRIPTION
1	1	CN1	2 PIN SCREW TERMINAL CONNECTOR
2	1	CN2	2 PIN SCREW TERMINAL CONNECTOR
3	3	C1,C2,C5	0.1uF
4	1	C3	47uF/25V
5	1	C4	100uF/50V
6	1	C6	OMIT
7	1	C7	0.22uF
8	1	D1	GREEN LED
9	4	D2,D3,D5,D6	1N5822/FR306
10	1	D4	RED LED
11	1	MG1	2 PIN SCREW TERMINAL CONNECTOR
12	1	PR1	47K/50K PRESET
13	1	P1	10K POTENTIOMETER
14	1	Q1	BC547
15	1	R1	470E
16	2	R2,R4	10K
17	1	R3	1K/4.7K
18	1	R5	4.7K
19	1	R6	2.2K
20	1	SW1	SLIDE SWITCH
21	1	U1	7805
22	1	U2	KA3525A/SG3525A
23	1	U3	L298
24	1	SOCKET	16 PIN DIP IC SOCKET
25	1	HEATSINK	HS09045
26	1	SCREW	SC02909
27	1	NUT	NT02900



Testing :

Connect everything as per the wiring diagram. Recheck the connections.

Move the preset (PR1) halfway, this position Corresponds to a frequency of 15 KHz (approx).

Rotate the potentiometer (P1) full counter clock wise, to set at 0% duty cycle.

Switch on the power supply.

LED D4 and D1 will glow indicating motor power supply and logic power supply respectively.

Now move the potentiometer (P1) gradually clock wise to increase the duty cycle hence increase the motor speed.

Slide switch (SW1) can be used to change the motor direction.

Operations and Circuit Description :

This control circuit is ideal for accurate control of DC motors speed and direction. The circuit generates PWM, such that the pulse duration is directly proportion to the value of input voltage. The advantage of such kit is that very low power is lost in the control circuit. There are two methods to control the DC motor speed, current control and voltage control. Voltage control is not a good idea as on low voltages you loose the torque, hence the best way to control the speed is by current control and PWM is a very good method to control the current precisely.

PWM :

Pulse Width Modulation, abbreviated as PWM, is a method of transmitting information on a series of pulses. In other words, pulse width modulation is a modulation technique for generating variable width pulses. IC KA3525 does the same job. Pulse width modulation is used to reduce the total power delivered to a load without resulting in loss, which normally occurs when a power source is limited by a resistive element. The underlying principle in the whole process is that the average power delivered is directly proportional to the modulation duty cycle. This method is commonly used in lot of applications like DC Motor Speed control, SMPS, DC-DC converters, Light dimmers, and Audio amplifier.

The kit is based on two main parts KA3525 IC voltage to PWM generator and L298 H-Bridge.

The circuit uses a KA3525 PWM generator, this chip is designed for switch mode power supply and it has dual alternating outputs open collectors (pins 11 & 14) each of which can be on from 0 to 50% of the cycle time. But these outputs are connected to ground. And pin 13 open collector has been used as output with pull high resistor to achieve 0 to 100% duty span. The oscillator frequency is controlled by the variable resistor PR1 47K and capacitor connected to pins 6 & 7. The speed input from the slider of the pot is fed to pin 2 this is the input of a conventional op-amp which gets ramped later inside. Pin 16 is 5V ref voltage output which has been used for 5V reference to control the PWM via POT. The output PWM is fed to Pin 6 and 11 enable pins of L298.

L298 has two H-bridge these two H-bridge have been used in parallel to achieve double current that's why pin 6+11, 12+7, 5+10 Direction control, 2+13 Output A, 3+14 Output B are shorted together. Slide switch SW1 is for direction control. Q1 generates complementary signals for direction control. D2, D3, D4, D7 protects the IC from back EMF generated, LED D4 is motor supply indicator, LED D1 is logic supply indicator. U1 is 5V regulator provide 5V logic supply. 12 to 18 VDC motor can be driven via single supply, but one has to loop external jumpers to motor supply as shown in wiring diagram. If Motor is rated more then 18V it requires two power supplies, one of 7 to 18 VDC for logic and motor supply depending on the motor voltage rating (12 to 46 VDC). The circuit can also be used in applications where voltage to speed control is required via applying 0-5V at pin 2 of KA3525 instead of POT. C6 is Timer capacitor is for soft/hard start applications, it is omitted here and advisable not to use in general motor applications. If high torque is required on start up only then this capacitor should be used, it will give full speed for 1-2 seconds when you start the power.

