

Features

- H bridge drive with Built-in PMOS/NMOS power switch;
- provide with load motor forward/reverse/stop/brake functions;
- low standby current (typ.0.1uA);
- low quiescent operation current (typ.300uA,VCC=3V);
- Build-in spark-killing diode, eliminate motor spark(up to 28V pp/0.2mS)
- wide operation voltage range (1.8V~6.5V);
- low output impedance(0.5Ω);
- the peak current value of DIP8 is 2.5A,continue at 1.3A; and the peak current of SOP8 is 1.5A,continue at 1.0A.
- built-in Hysteresis effect thermal shutdown (TSD).

Applications

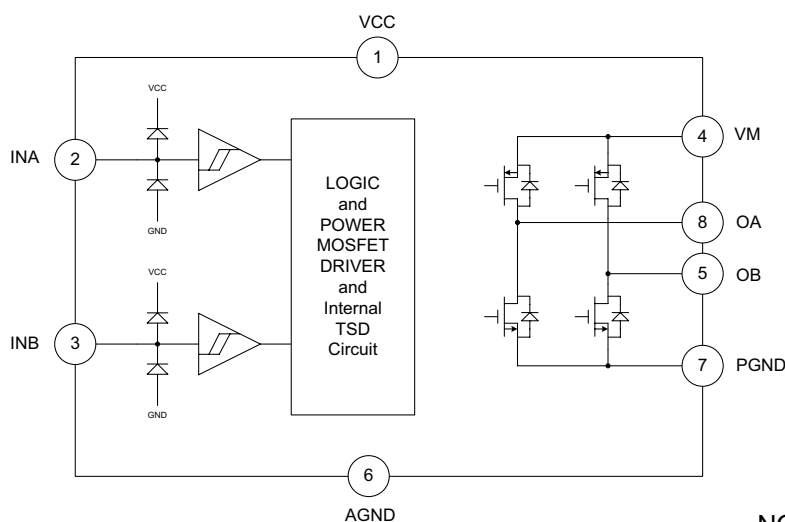
- 2-4 batteries occasions toy motor drive
- electronic toy robot

Description

BPM4510 is a single channel toy dc motor drive IC for the system worked under low voltage. It contains H bridge drive, use PMOS/NMOS power transistors with low output resistance. And the low conduction resistance ensures low power consumption when the circuit worked under sustained huge current, make the circuit worked sustainly for a long time.

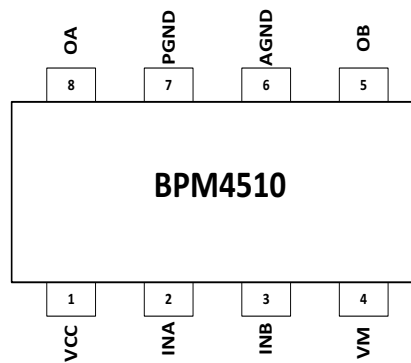
BPM4510 contains built-in thermal shutdown function, when the low resistances load motor plugging turn or output short circuit, the output current and power consumption of the circuit increase at a moment, and the chip temperature(Type150°C, and the outside surface temperature is lower than 71°C)rise sharply. When the chip temperature exceed the internal protection circuit highest temperature, the internal circuit will shut off the BPM4510 build-in power switch tube, then cut off the load current, eliminate the security hidden danger as plastic packaging smoking and firing by excessively high temperature. The build-in temperature hysteresis circuit ensures that when circuit recovery to safety temperature, then re-control the circuit.

Internal Function Module



NOTE: BPM4510 Pin No.

Pins Configuration



Ordering Information

Part Number	package	operation temperature
BPM4510D	8 - DIP	-20 °C ~ 85 °C
BPM4510S	8 - SOP	-20°C ~ 85°C

Pins Description

Pin No.	Pin Name	Output/Input	Functional Description
1	VCC	-	power end of Logic control circuit
2	INA	I	forward logical input
3	INB	I	reverse logical input
4	VM	-	power supply for motor
5	OB	O	reverse output
6	AGND	-	logical circuit GND
7	PGND	-	output power pipe GND
8	OA	O	forward output

Absolute Maximum Ratings (T_A=25 °C)

parameter	symbol	value	unit
Max. logic and power control voltage	VCC(MAX)	7.0	V
Max. power supply for motor	VM(MAX)	8.0	V
Max. output plus voltage	VOUT(MAX)	VM	V
Max. input plus voltage	VIN(MAX)	VCC	V
Channel peak output voltage(DIP-8)	IOUT(PEAK)	2.5	A
Channel peak output voltage(SOP-8)	IOUT(PEAK)	1.5	A
Max. Power Consumption	DIP8	1.16	W
	SOP8	0.85	W
junction environmental thermal resistance θ _{JA}	DIP8	107	°C/W
	SOP8	164	°C/W
operating temperature range	T _{opr}	-20~+85	°C
junction temperature	T _J	150	°C
storage temperature	T _{stg}	-55~150	°C
soldering temperature	T _{LED}	260°C, 10 second	

NOTE: (1) The maximum power consumption under different temperature according to the following relationship calculation

$$P_D = (T_J - T_A) / \theta_{JA}$$

T_J is junction temperature of working circuit, T_A is environment temperature of working circuit, calculation of packaging thermal resistance according to JESD 51-7.

(2) Calculation of circuit consumption according to

$$P = I * I * R$$

P is circuit consumption, I is sustained output current, R is Output conduction resistance. circuit power consumption p must be smaller than the maximum power consumption P_D

Recomended Operating Conditions(T_A=25 °C)

parameter	symbol	Min.	Typ.	Max.	Unit
logic and power control voltage ¹	VCC	1.8		6	V
power supply for motor	VM	1.8		6.5	V
Channel sustained output current ²	DIP8 package		±1.3	2.5	A
	SOP8 package		±1.0	1.5	A

NOTE:

- Logic control power supply VCC and internal power sources VM fully independent, can supply power respectively.
- V_m = V_{cc} = 5.0V

Electrical Characteristics Parameters

($T_A=25^{\circ}\text{C}$, $V_{CC}=3\text{V}$, $V_{DD}=3\text{V}$ Unless otherwise specified)

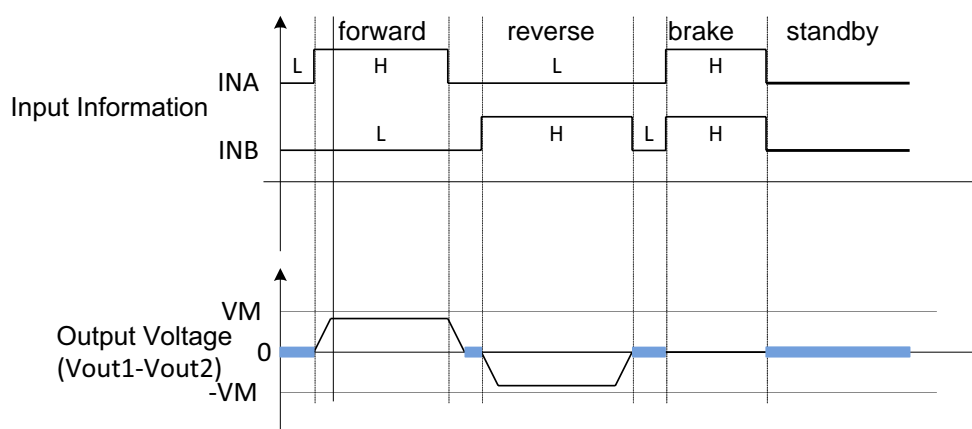
parameter	symbol	condition	Min.	Typ.	Max.	Unit
VCC standby current	ICCST	INA=INB= L	--	0	10	uA
VM standby current	IVMST	VM=VCC=6V	--	0	10	uA
VCC static source current	ICC	INA=H, INB=L or INA=L, INB=H or INA=H, INB=H	--	0.3	1	mA
VM static source current	IVM	INA=H, INB=L or INA=L, INB=H or INA=H, INB=H	--	0.1	1	mA
Input high electrical level	VINH		0.8VCC	--	--	V
Input low electrical level	VINL		--	--	0.2VCC	V
Output resistance	RON	$I_O = \pm 200\text{mA}$	--	0.5	0.9	Ω
Spark-killing diode stray current	IDLEAK		--	--	100	uA
Spark-killing diode voltage drop	VD	$I_{OUT}=400\text{mA}$	--	0.8	1	V
Storage Temperature	TSD		--	150	--	$^{\circ}\text{C}$
TSD hysteresis	TSDH		--	25	--	$^{\circ}\text{C}$

Function Description

Logic Truth Table

INA	INB	OA	OB	Function
L	L	Z	Z	Standby/Stop
H	L	H	L	Forward
L	H	L	H	Reverse
H	H	L	L	Brake

Type Waveform Figure



Application Reference

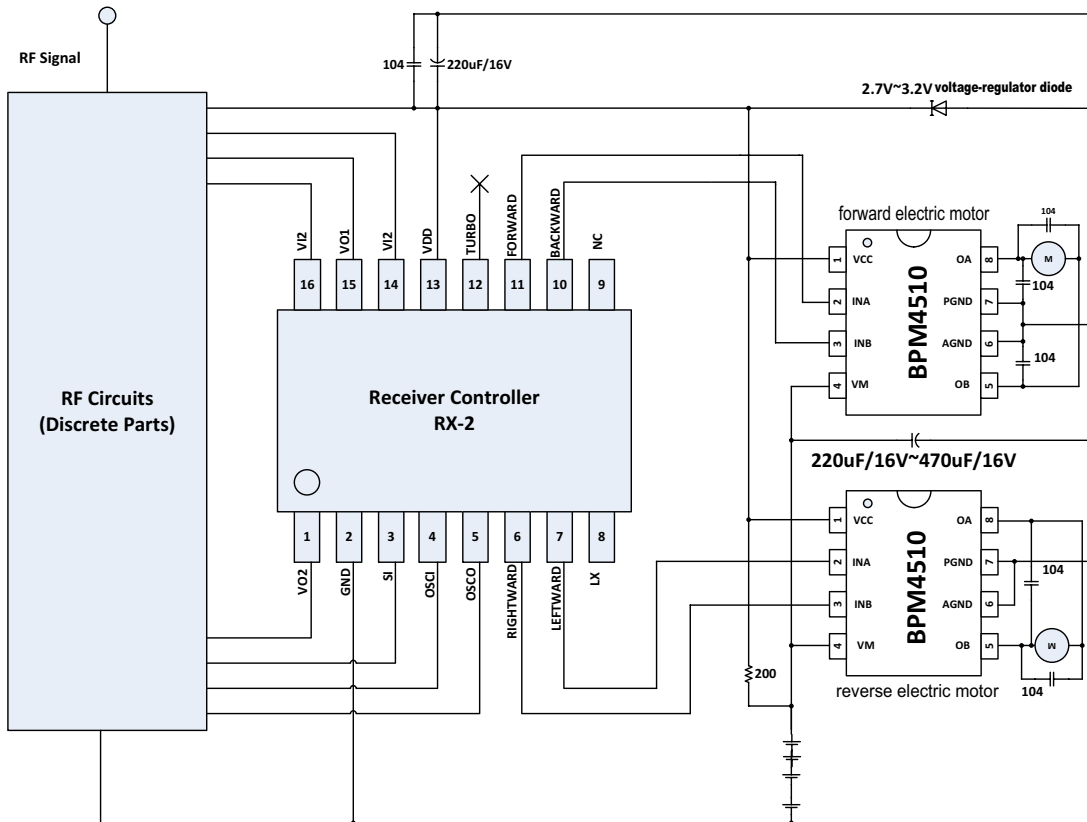


Figure 1 Typical application with four series 1.5 V batteries for power

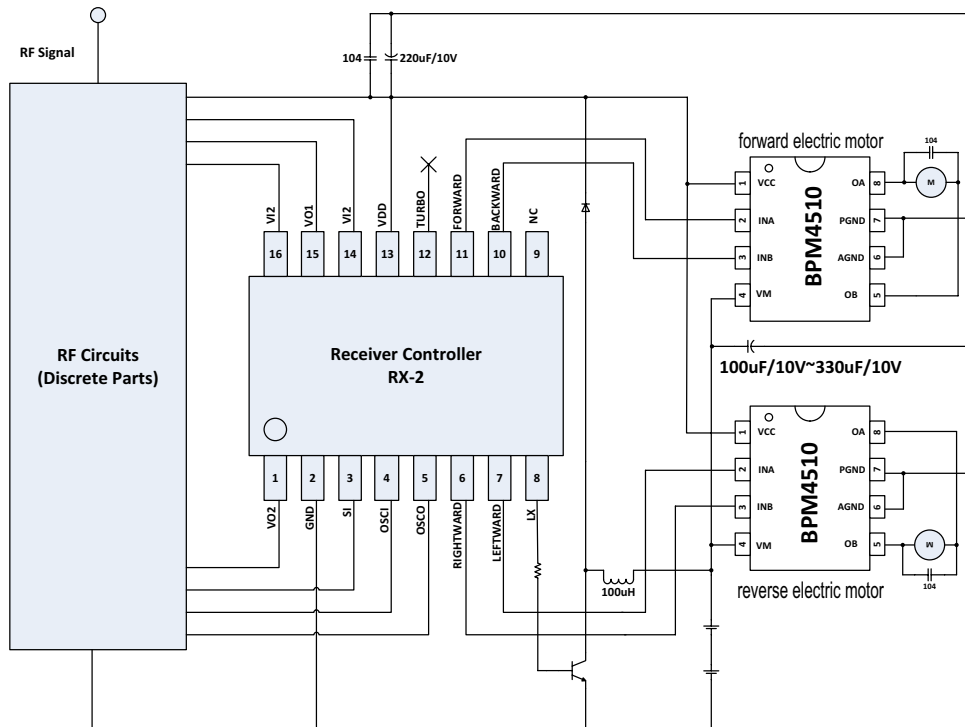
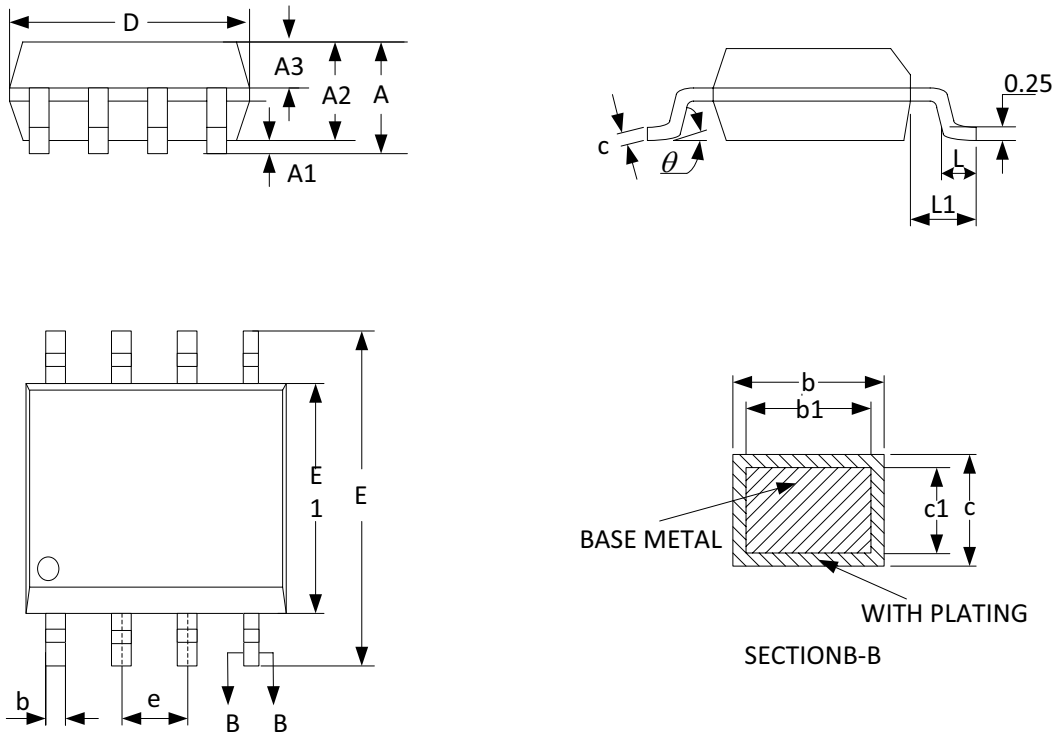


Figure 2 Typical application with two series 1.5 V batteries for power

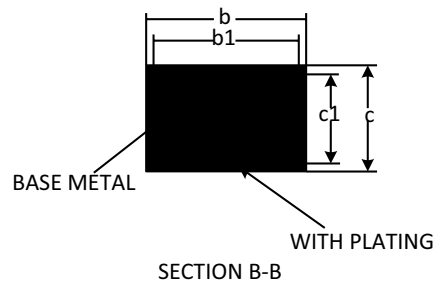
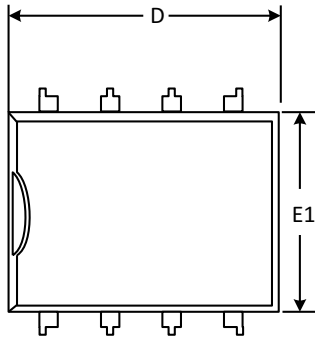
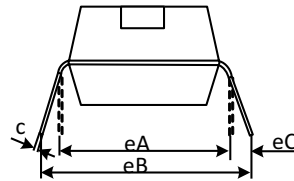
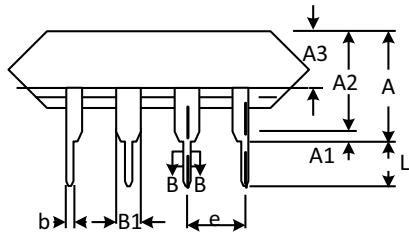
Outer Package Dimension Figure

SOP8:



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	--	--	1.77
A1	0.08	0.18	0.28
A2	1.20	1.40	1.60
A3	0.55	0.65	0.75
b	0.39	--	0.48
b1	0.38	0.41	0.43
c	0.21	--	0.26
c1	0.19	0.20	0.21
D	4.70	4.90	5.10
E	5.80	6.00	6.20
E1	3.70	3.90	4.10
e	1.27BSC		
L	0.50	0.65	0.80
L1	1.05BSC		
θ	0	--	8°

DIP8:



SECTION B-B

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	3.60	3.80	4.00
A1	0.51	—	—
A2	3.10	3.30	3.50
A3	1.50	1.60	1.70
b	0.44	—	0.53
b1	0.43	0.46	0.48
B1	1.52BSC		
c	0.25	—	0.31
c1	0.24	0.25	0.26
D	9.05	9.25	9.45
E1	6.15	6.35	6.55
e	2.54BSC		
eA	7.62BSC		
eB	7.62	—	9.50
eC	0	—	0.94
L	3.00	—	—

Note for power connection:

- 1、BPM4510 logic power supply VCC and the controller chip (RX2) VDD must be connected together.
- 2、BPM4510 power end VM connected directly to the battery positive.
- 3、BPM4510 logic GND power low GND connected directly and connected to GND of RX2.

Model selection and cautions:

- 1、Recommended BPM4510S to front wheel steering
- 2、If the drive rear wheel continue current does not exceed 800mA , please chose BPM4510B. Otherwise BPM4510D is a batter chose.
- 3、A electrolytic capacitor is need between BPM4510 VDD AND GND, close to two chips--recommended 220uF/16V~470uF/16V, specific size please according to the actual application.
- 4、The working rear wheels motor is easy to cause large peak voltage,and to avoid chip damage,suggest to pick up a capacitance 104 on land close to each output end of the chip BPM4510 used for the rear wheels motor drive.
- 5、the current of front wheel steering motor is small, and the peak voltage is smaller then rear wheels, still can cause damage to the circuit due to the high power supply voltage, suggest to pick up a capacitor 104 by cross nearby output side OA and OB ,or according to the connection of rear wheels. As shown in figure 1.
- 6、4 batteries can chose connect front wheel steering motor capacitor or not according to actual situation,but for rear wheel steering suggest according to figure 1.

Special notes for chip use:

- 1、Above recommended circuit and parameters apply only to ordinary remote control toy car,for other toys and motor driver please according to the practice.
- 2、BPM4510 input line can't appear the situation of wire control state.
- 3、Continuous current driver ability can be influenced by package form / VM / VCC / chip differences and environmental temperature and other factors. Parameter Instructions provide are for reference only. Suggest to consider a surplus in practice.