■ DESCRIPTION

The AA51890 is a BJT integrated circuit for servo motor control applications. It has the feature of internal circuit of maintaining constant voltage which helps stabilizing from fluctuation caused by voltage source and the ambient temperature. It can control external H-Bridge driver for large servo motor application.

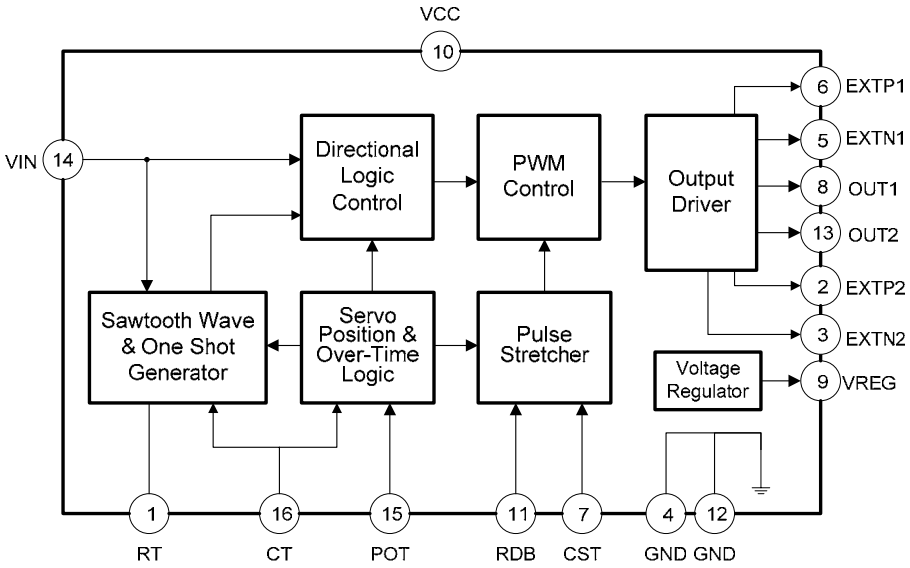
■ FEATURES

- Built-in voltage regulator.
- Adjustable dead band range control.
- Setting up the dead band by the internal constant.
- Incorporates a protection circuit for "H-Bridge" driving configuration.
- Small outline package – TSSOP16L.

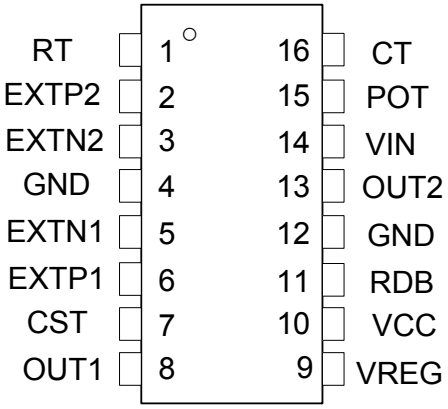
■ APPLICATIONS

- Servo motor control.
- Radio controlled car, boat, and airplane.
- IA products (such as air-condition).
- Remote positioning.

■ BLOCK DIAGRAM



■ PIN DESCRIPTION



TOP VIEW

PIN NO.	PIN NAME	FUNCTION
1	RT	Timing Resistor
2	EXTP2	Connect to the base of the external PNP transistor
3	EXTN2	Connect to the base of the external NPN transistor
4	GND	Ground pin
5	EXTN1	Connect to the base of the external NPN transistor
6	EXTP1	Connect to the base of the external PNP transistor
7	CST	Stretcher capacitor
8	OUT1	Output Driver 1 (connect to motor)
9	VREG	Regulated Voltage output
10	VCC	Power supply pin
11	RDB	Error pulse output
12	GND	Ground pin
13	OUT2	Output Driver 2 (connect to motor)

PIN NO.	PIN NAME	FUNCTION
14	VIN	Input signal
15	POT	Servo position voltage
16	CT	Timing Capacitor

■ ABSOLUTE MAXIMUM RATINGS

Ta=25℃

SYMBOL	PARAMETER	RATINGS	UNIT
VCC	Supply voltage	3.2~7.5	V
IO	Output current	40	mA
PD	Power dissipation	300	mW
TSTG	Storage temperature range	—25~+125	℃

■ ELECTRICAL CHARACTERISTICS

Ta=25℃, Vcc=5V

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
VCC	Supply voltage		3.2	5	7	V
ICC	Operating current	When output is OFF	---	5	7	mA
		When output is ON	---	7	10	mA
IOUT	Output current		---	30	36	mA
VREG	Regulator output voltage	Load capacitor 0.1uF	2.35	2.5	2.65	V
IREG	Regulator output current	Load resistor 500Ω	4	---	---	mA

■ FUNCTIONAL DESCRIPTION

(1) Voltage Regulator

This circuit is composed of a band gap circuit, and outputs a 2.5-volt temperature compensated reference voltage. This reference voltage is stabilized when the supply voltage is variable.

(2) Sawtooth wave & One-Shot Generator

Connect a capacitor to CT pin will generate a triangular wave by constant current charging. A typical value is 0.1uF. The constant current is determined by a resistor connected to RT pin. A typical capacitor of approximately 0.1uF should be connected in parallel with the resistor to increase stability.

(3) Servo Position & Over-Time logic

This circuitry consists of a pulse width comparator, which compares the servo position detection signal (POT pin) from the one-shot timer (CT pin) whose period depends on the resistance of a potentiometer connected to the servo's drive shaft. This feedback is what provides the stability for the control circuitry.

(4) Pulse Stretcher

The difference between the servo control signal and the feedback signal is the error signal. This error signal is used to toggle the direction the current flows through the servo. The function of this pulse stretcher is to “stretch” the small error signal long enough and increases the duty cycle to the motor for it can maintain sufficient holding force. The circuit also implements a “dead band” function that prevents servo jitter and hunting. This is a range over which differences between the input and reference signals will not cause servo operation. When the signal differences exceed this “dead band” range, drive to the motor occurs. Servo’s drive shaft. The dead band will change according to the value of resistor connected to the RDB pin.

(5) Directional Logic Control

The comparator circuit compares pulses from the servo control input (VIN pin) and the voltage controlled pulse generator and provides either a positive or a negative output depending on whether the signal pulse width is larger or smaller than the position generator’s output pulse (POT pin). Application of this error voltage to the motor driver circuit causes the motor to turn in a direction that will minimize the error until both pulse widths are the same.

(6) PWM Control

This signal generated by directional logic control block is used to control a flip-flop that toggles the direction the current flows through the motor. The outputs of the flip-flop drive an external H-Bridge output driver that handles the high current going through the motor. This output of this block will be turned on or off with each input pulse based on the status of the directional

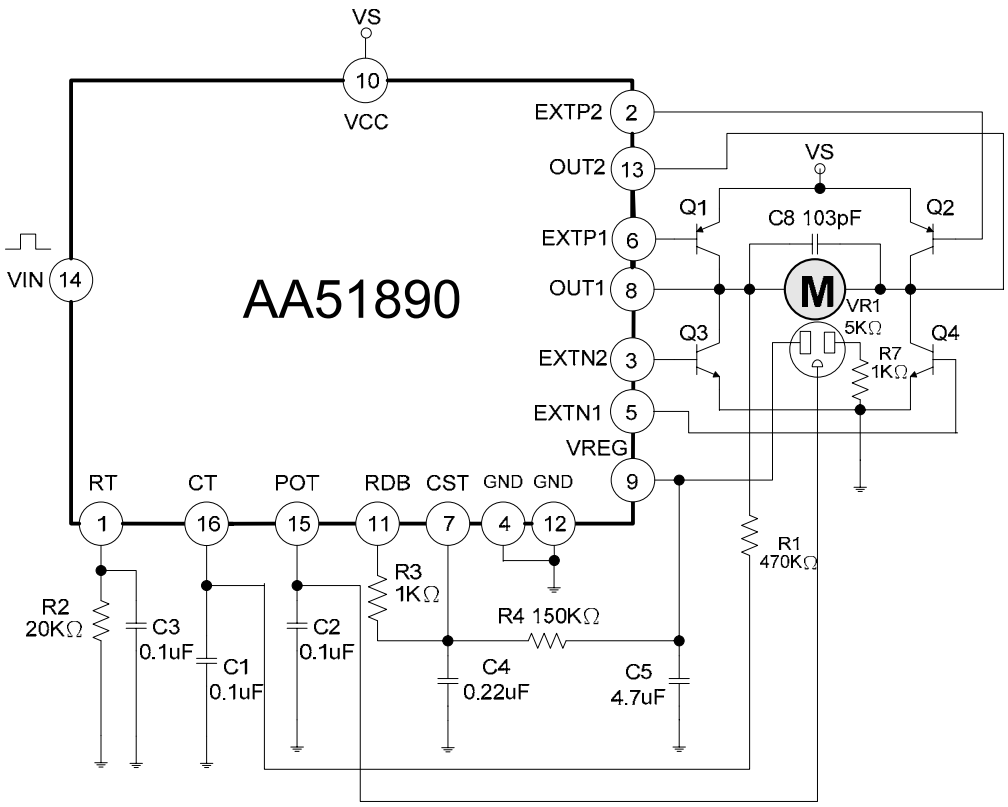
logic. The PWM drive techniques provide the benefits of reduced power dissipation, improved servo motor performance and positively affect system efficiency.

(7) Output driver

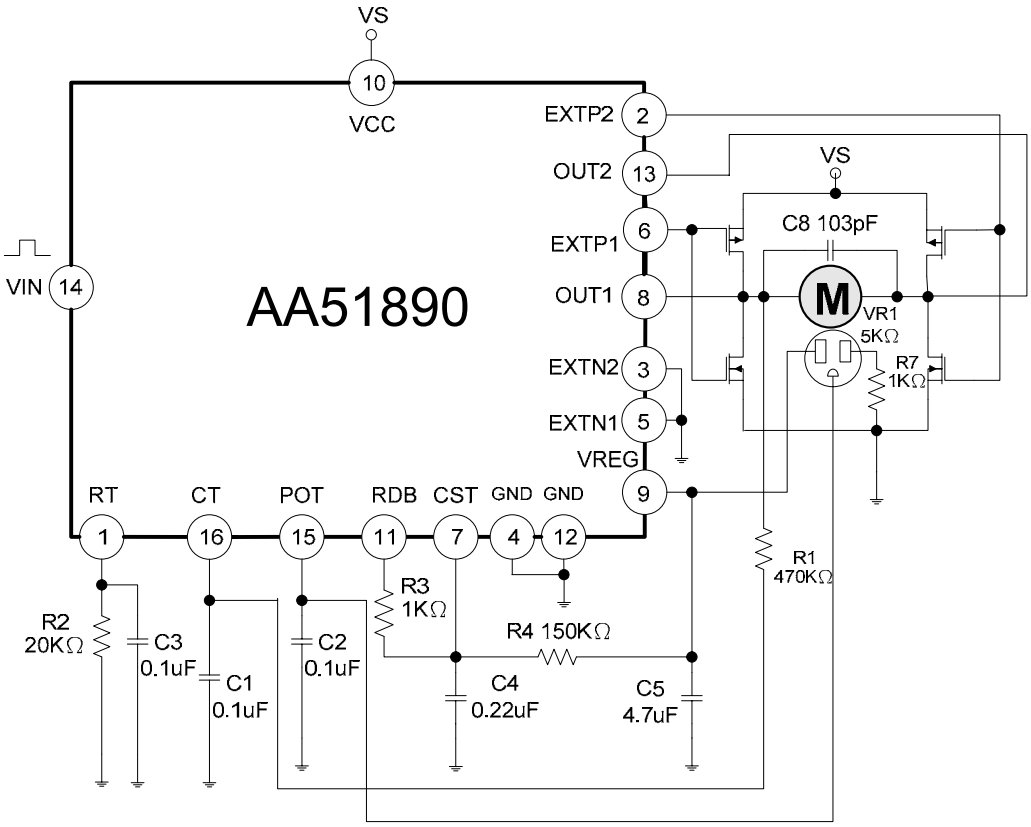
The output driver controls the servo current direction. For heavy load application, the EXTP1 and EXTP2 pin will be connected to the base of the external PNP transistors and the EXTN1 and EXTN2 pin will be connected to the base of the external NPN transistors.

■ TYPICAL APPLICATION EXAMPLE

A. H-Bridge TRANSISTOR Driver



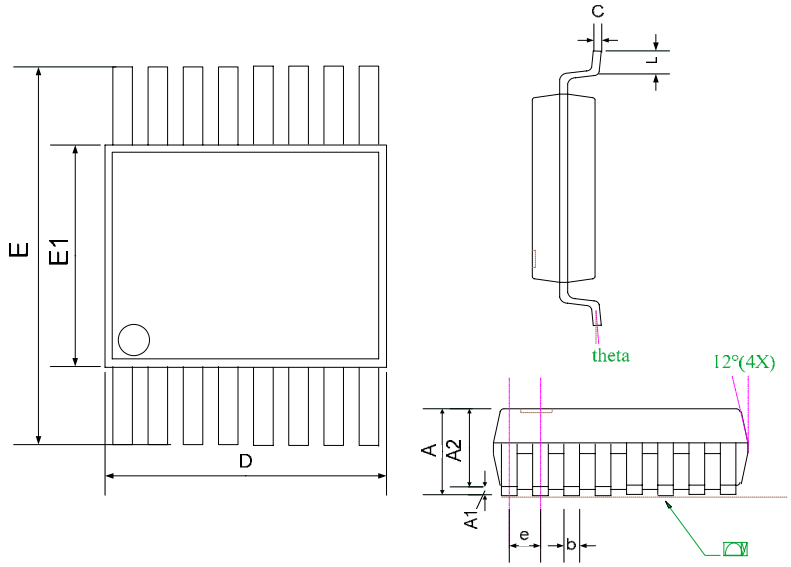
B. H-Bridge MOSFET Driver



■ ORDERING INFORMATION

ORDER NO.	PACKAGE	PACKING	Q'TY	MARK CHART
AA51890A	TSSOP 16L	TAPE & REEL	2,500ea	AA51890 XXXX A

■ PACKAGE DIMENSIONS



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	1.20	---	---	0.048
A1	0.05	---	0.15	0.002	---	0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19	---	0.30	0.007	---	0.012
C	0.09	---	0.20	0.004	---	0.008
D	4.90	5.00	5.10	0.193	0.197	0.201
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.177
e	---	0.65	---	---	0.026	---
L	0.45	0.60	0.75	0.018	0.024	0.030
y	---	---	0.10	---	---	0.004
theta	0°	---	8°	0°	---	8°

NOTE
1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS
2. TOLERANCE +/- 0.1 mm UNLESS OTHERWISE SPECIFIED
3. COPLANARITY : 0.1 mm
4. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
5. FOLLOWED FROM JEDEC MO-153

■ NOTES ON USE

- The specifications for the product described in this document are for reference only. Upon actual use, therefore, please request that specifications to be separately delivered.
- The application circuit examples explain typical applications of the products, and do not guarantee the success of any specific mass-production design.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- Take account of common impedance when designing the earth line on a printed wiring board.