

DESCRIPTION

The AA51881 is a BJT integrated circuit to be applied on servo motor control applications. The built-in voltage regulator provides the AA51881 with extremely stable output voltage. It also incorporates a linear one-shot and pulse-width demodulator for improved positional accuracy.

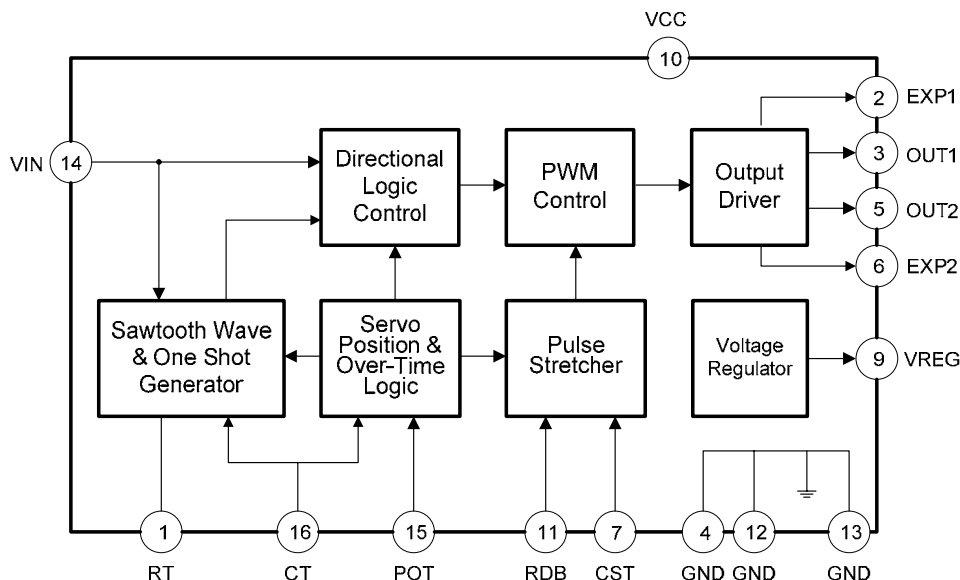
FEATURES

- Built-in voltage regulator.
- Larger driving capability.
- Internal output NPN power transistor.
- Adjustable dead band range control.
- Incorporates a protection circuit for "H-Bridge" driving configuration.
- Small outline package.

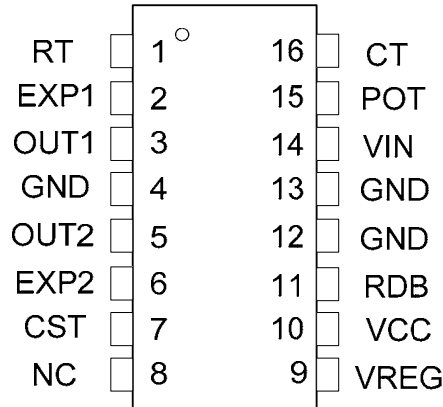
APPLICATIONS

- 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	EXP1	External PNP Transistor 1 output
3	OUT1	Output Driver 1
5	OUT2	Output Driver 2
6	EXP2	External PNP Transistor 2 output
7	CST	Stretcher capacitor
8	NC	No Connection
9	VREG	Regulated Voltage output
10	VCC	Power supply pin
11	RDB	Error pulse output
4,12,13	GND	Ground pin
14	VIN	Input signal
15	POT	Servo position voltage
16	CT	Timing Capacitor

■ ABSOLUTE MAXIMUM RATINGS

Ta=25°C

SYMBOL	PARAMETER	RATINGS	UNIT
VCC	Supply voltage	4.8~7	V
PD	Power dissipation	300	mW
TSTG	Storage temperature range	-25~+125	°C

■ ELECTRICAL CHARACTERISTICS

Ta=25°C, Vcc=4.8V

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
ICC	Operating current	When output is OFF	---	5	8	mA
		When output is ON	---	25	28	mA
VOL	Output voltage "L"	Load resistor 20Ω	---	0.1	0.2	V
VOH	Output voltage "H"	Load resistor 240Ω	3.5	---	---	V
IPNP	External PNP transistor drive current	Load resistor 240Ω	30	---	---	mA
VREG	Regulator output voltage	Load capacitor 0.1uF	2.3	2.45	2.6	V
IREG	Regulator output current	Load resistor 500Ω	4	---	---	mA

■ FUNCTIONAL DESCRIPTION

(1) Voltage Regulator

This circuit outputs a 2.45-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

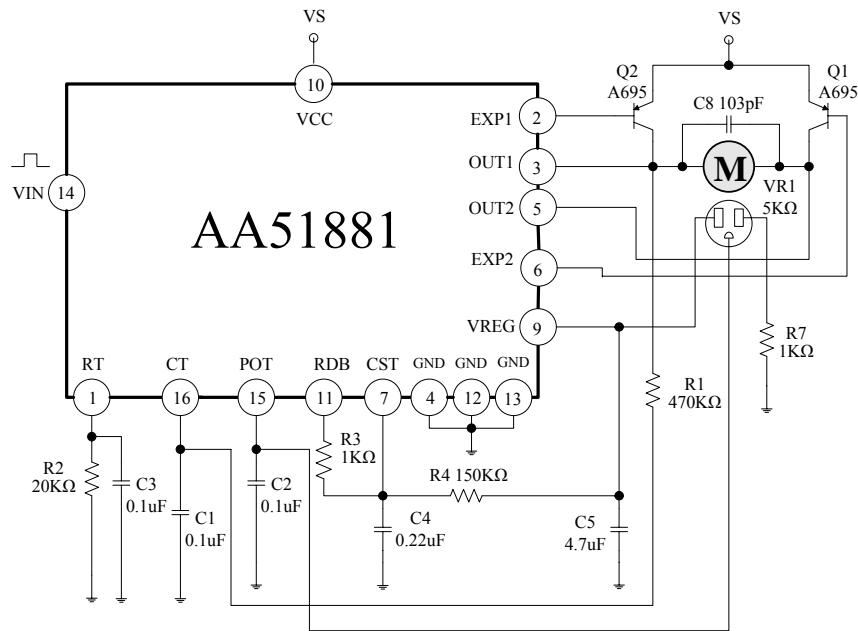
This signal generated by directional logic control block is used to control a flip-flop that toggles the direction the current flows through the motor. The outputs of the flip-flop drive an H-Bridge output driver block that handles the high current going through the motor. This blocks output will be 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

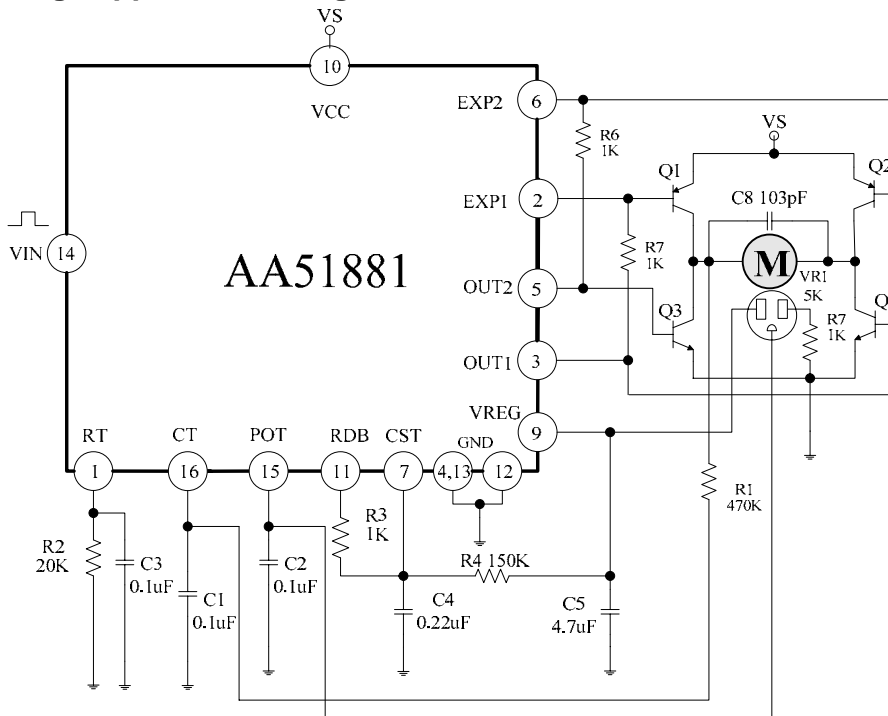
The output driver controls the servo current direction. For light load application, the servo can be connected with OUT1 and OUT2 pin only. For heavy load application, the EXP1 and EXP2 pin will be connected to the base of the external PNP transistor. It drives in an H-bridge configuration (The sink NPN drivers are built inside the chip).

TYPICAL APPLICATION EXAMPLE

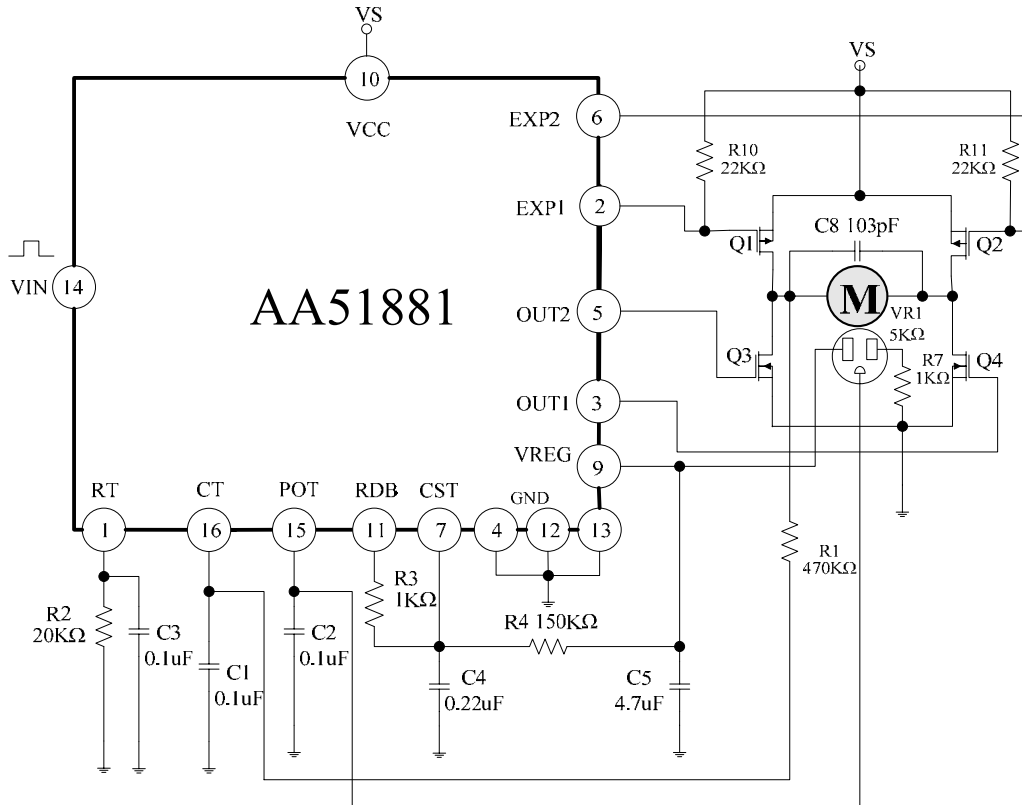
A. Half H-Bridge application using two external PNPs



B. Full H-Bridge application using two PNPs and two NPNs



C. Full H-Bridge application using two PMOSs and two NMOSs

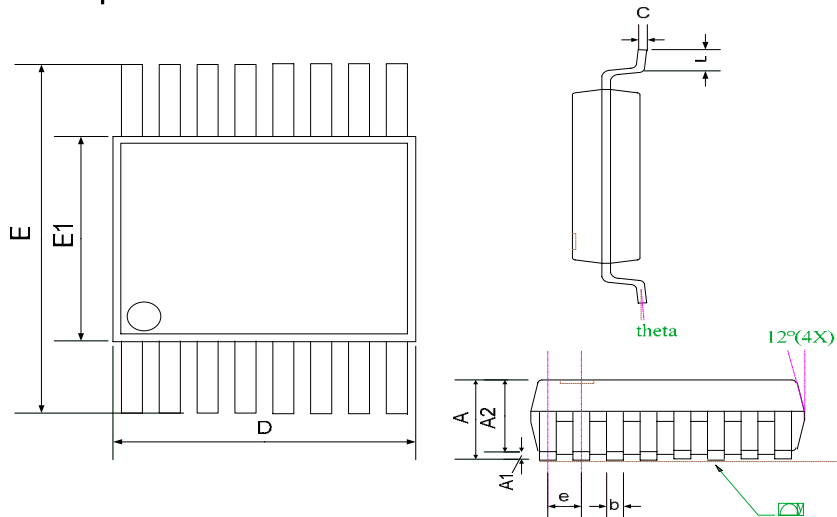


ORDERING INFORMATION

ORDER NO.	PACKAGE	PACKING	Q'TY	MARK CHART
AA51881C	SSOP 16L	TAPE & REEL	2,500ea	

PACKAGE DIMENSIONS

16-pin Plastic SSOP



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.35	1.60	1.75	0.053	0.064	0.069
A1	0.10	---	0.25	0.004	---	0.010
A2	---	1.45	---	---	0.057	---
b	0.20	0.25	0.30	0.008	0.010	0.012
C	0.19	---	0.25	0.007	---	0.010
D	4.80	---	5.00	0.189	---	0.197
E	5.80	---	6.20	0.228	---	0.244
E1	3.80	---	4.00	0.150	---	0.157
e	---	0.64	---	---	0.025	---
L	0.40	---	1.27	0.016	---	0.050
y	---	---	0.10	---	---	0.004
theta	0°	---	8°	0°	---	8°

NOTE

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS
2. DIMENSION L IS MEASURED IN GAGE PLANE
3. TOLERANCE ± 0.1 mm UNLESS OTHERWISE SPECIFIED
4. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
5. FOLLOWED FROM JEDEC MO-137

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.