Features

- The PT8A992AP works as the encoder and the PT8A993AP works as the decoder
- 11 output pins, 4 for forward, backward, left and right functions, and 7 functional keys
- Operation power supply: 3.0V to 5.5V
- Auto power-off if no key pressed (PT8A992A)
- Low operating current
- On-chip oscillator with an external resistor
- On-chip receiving amplifiers
- Few external components needed

General Description

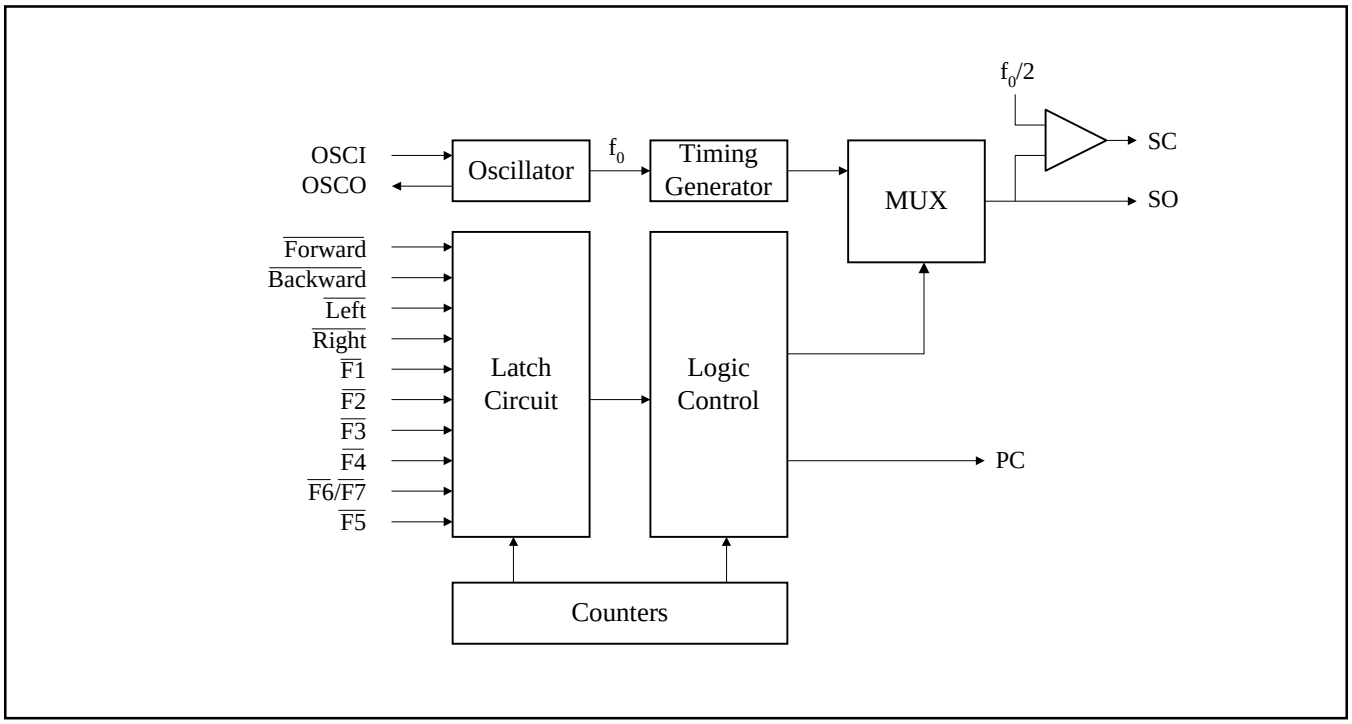
The PT8A992A/993A is a pair of CMOS LSIs designed for remote controlled toy car application. They have 11 control keys for controlling the corresponding motion (i.e. forward, backward, left, right and 7 other functions) of the remote controlled car.

Ordering Information

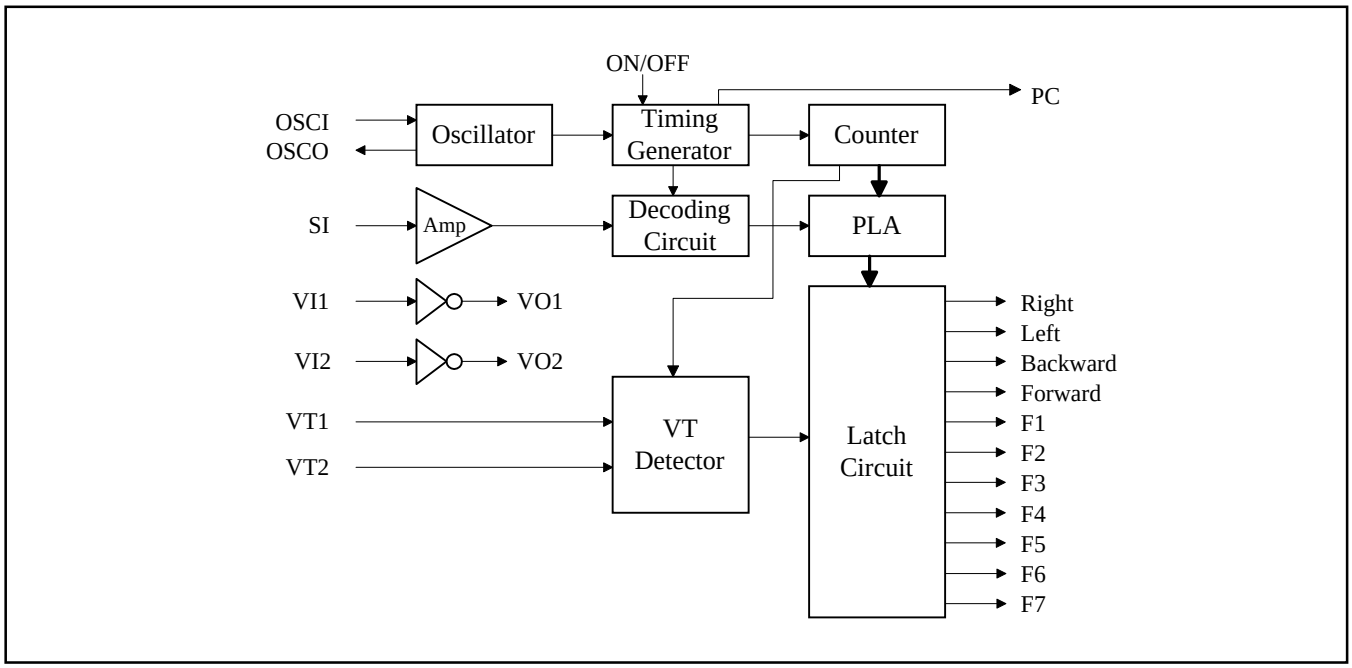
Part Number	Package
PT8A992AP	18 - Pin PDIP
PT8A993AP	24 - Pin PDIP

Block Diagram

Block Diagram of PT8A992A



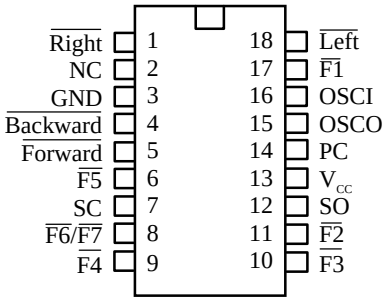
Block Diagram of PT8A993A



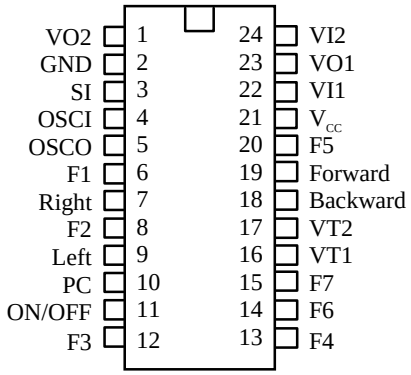
Package and Pin Assignment

Package and Pin Assignment

PT8A992AP
18-Pin PDIP



PT8A993AP
24-Pin PDIP



Top View

Pin Description

Pin Description of PT8A992AP

Pin No	Pin Name	Type	Description
1	$\overline{\text{Right}}$	I	The rightward function selected if this pin connected to GND
2	NC		No connection
3	GND	GND	Ground
4	$\overline{\text{Backward}}$	I	Backward function selected if this pin connected to GND
5	$\overline{\text{Forward}}$	I	Forward function selected if this pin connected to GND
6	$\overline{\text{F5}}$	I	Function 5 select if this pin connected to GND
7	SC	O	Output pin of the encoding signal with carrier freqency
8	$\overline{\text{F6}}$/$\overline{\text{F7}}$	I	Connect to GND to toggle between F6 and F7 of PT8A993A when working with PT8A993A
9	$\overline{\text{F4}}$	I	Function 4 selected if connected to GND
10	$\overline{\text{F3}}$	I	Function 3 selected if connected to GND
11	$\overline{\text{F2}}$	I	Function 2 selected if connected to GND
12	SO	O	Output pin of the encoding signal without carrier freqency
13	V_{CC}	P	Power supply
14	PC	O	Power control output pin
15	OSCO	O	Oscillator output pin
16	OSCI	I	Oscillator input pin
17	$\overline{\text{F1}}$	I	Function 1 selected if connected to GND
18	$\overline{\text{Left}}$	I	Leftward function selected if this pin connected to GND

Pin Description of PT8A993AP

Pin No	Pin Name	Type	Description
1, 23	VO1, VO2	O	Output pins of inverter 1 and 2 for Signal amplifier
2	GND	GND	Ground
3	SI	I	Input pin for encoded signal
4	OSCI	I	Oscillator input pin
5	OSCO	O	Oscillator output pin
6	F1	O	F1 function output pin
7	Right	O	Rightward output pin
8	F2	O	F2 function output pin
9	Left	O	Leftward output pin
10	PC	O	Power control pin
11	ON/OFF	I	ON/OFF pin
12	F3	O	F3 function output pin
13	F4	O	F4 function output pin
14	F6	O	F6 function output pin
15	F7	O	F7 function output pin
16	VT1	I	Auto shut off input pin: if the voltage on this pin keeps higher than $0.095V_{CC}$ for 3 seconds, all outputs will be shut off automatically.
17	VT2	I	Auto shut off input pin: if the voltage on this pin keeps higher than $0.095V_{CC}$ for 3 seconds, all outputs will be shut off automatically.
18	Backward	O	Backward output pin
19	Forward	O	Forward output pin
20	F5	O	F5 function output pin
21	V_{CC}	P	Power supply
22, 24	VI1,VI2	I	Input pins of invertor 1 and 2 for signal amplifier

Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested)

Storage Temperature ..... -25°C to +85°C
Ambient Temperature with Power Applied ..... 0°C to +70°C
Supply Voltage to Ground Potential (Inputs & V_{cc} Only) .... -0.5 to +5.5V
Supply Voltage to Ground Potential (Outputs & D/O Only) -0.5 to +5.5V
DC Input Voltage ..... -0.5 to +5.5V
DC Output Current 20mA
Power Dissipation 500mW

Note:
Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended Operation Conditions

Sym	Description	Test Conditions	Min	Typ	Max	Units
V_{CC}	Supply Voltage		3	4	5	V
V_{IH}	Input HIGH Voltage		$0.7V_{CC}$	4	-	V
V_{IL}	Input LOW Voltage		-	0	$0.3V_{CC}$	V
F_{OSC}	Oscillator Frequency		109	128	146	kHz
T_A	Operation Temperature		0	-	70	°C

DC Electrical Characteristics

DC Electrical Characteristics of PT8A992A

Sym	Description	Test Conditions	Min	Typ	Max	Units
I_{STB}	Stand-by Current	T_A = 70°C, Off State			2	uA
I_{CC}	Supply Current	Output Unloaded			300	uA
I_{OH}	Output HIGH Current - PC and SO Pins	V_{OH} = 3.5V, T_A = 25°C	-1	-2		mA
	Output HIGH Currentl - SC Pin		-3	-4		mA
	Output HIGH Current - OSCO Pin		-400			uA
I_{OL}	Output LOW Current - SC, PC and SO Pins	V_{OL} = 0.5V, T_A = 25°C	1			mA
	Output LOW Current - OSCO Pin		400			uA
I_{IH}	Input HIGH Current - $\overline{\text{Forward}}$, $\overline{\text{Backward}}$, $\overline{\text{Left}}$, $\overline{\text{Right}}$, $\overline{\text{F1}}$, $\overline{\text{F2}}$, $\overline{\text{F3}}$, $\overline{\text{F4}}$, $\overline{\text{F5}}$, $\overline{\text{F6}}$/$\overline{\text{F7}}$, OSCI Pins	V_{CC} = 5.5V, V_{IH} = V_{CC}, T_A = 25°C			10	uA
I_{IL}	Input LOW Current - $\overline{\text{Forward}}$, $\overline{\text{Backward}}$, $\overline{\text{Left}}$, $\overline{\text{Right}}$, $\overline{\text{F1}}$, $\overline{\text{F2}}$, $\overline{\text{F3}}$, $\overline{\text{F4}}$, $\overline{\text{F5}}$, $\overline{\text{F6}}$/$\overline{\text{F7}}$ Pins	V_{CC} = 5.5V, V_{IL} = 0V, T_A = 25°C	-15	-25	-100	uA
	Input LOW Current - OSCI Pin				-10	

Note: These specifications apply for V_{CC} = 4.0V and 0°C ≤ T_A ≤ 70°C, unless otherwise specified.

DC Electrical Characteristics of PT8A993A

Sym	Description	Test Conditions	Min	Typ	Max	Units
I_{STB}	Stand-by Current	Off State		3	20	uA
I_{CC}	Supply Current	Output Unloaded			700	uA
I_{OH}	Output HIGH Current - VO1, VO2 and OSCO Pins	V_{OH} = 3.5V, T_A = 25°C	-300			uA
	Output HIGH Current - Forward, Backward, Left and Right Pins		-2	-5		mA
	Output HIGH Current - F1, F2, F3 F4, F5 and F6 Pins		-2	-5		
	Output HIGH Current - PC Pin		-2	-3		
I_{OL}	Output LOW Current - VO1, VO2 and OSCO Pins	V_{OL} = 0.5V, T_A = 25°C	150			uA
	Output LOW Current - Forward, Backward, Left and Right Pins		1	3		mA
	Output LOW Current - F1, F2, F3, F4, F5 and F6 Pins		1	3		
	Output LOW Current - PC Pin		2			
I_{IH}	Input HIGH Current - VT1 and VT2 Pins	V_I = V_{CC}, T_A = 25°C	20	30	100	uA
	Input HIGH Current - SI, VI1, VI2, ON/OFF and OSCI Pins				10	
I_{IL}	Input LOW Current - SI, VI1, VI2, VT1, VT2 and OSCI Pins	V_I = 0V, T_A = 25°C			-10	uA
	Input LOW Current - ON/OFF Pin		-20	-30	-100	
VT	Over-Current Limit - VT1 and VT2 Pins	Forward is high.	0.35		0.45	V

Note: These specifications apply for V_{CC} = 4.0V and 0°C ≤ T_A ≤ 70°C, unless otherwise specified.

AC Electrical Characteristics

AC Electrical Characteristics of PT8A992A

Sym	Description	Test Conditions	Min	Typ	Max	Units
f_{OSC} (Note2)	Oscillator Frequency	T_A=25°C, R_f = 180kΩ	109	128	146	kHz
t_{FUN}	Period of Function Code	f_{OSC} = 128kHz, T_A = 25°C	1.7	2	2.3	ms
f_{CSC}	Carrier Frequency	f_{OSC} = 128kHz, T_A = 25°C		64	-	kHz

AC Electrical Characteristics of PT8A993A

Sym	Description	Test Conditions	Min	Typ	Max	Units
f_{OSC} (Note2)	Oscillator Frequency	T_A=25°C, R_f = 180kΩ	109	128	146	kHz
t_{FUN}	Period of Function Code	f_{OSC} = 128kHz, T_A = 25°C	1.7	2	2.3	ms

Note:
1. These specifications apply for V_{CC} = 4.0V and 0°C ≤ T_A ≤ 70°C, unless otherwise specified.
2. The frequency of standard samples is tested on standard testing-board.

Typical Application Circuit of PT8A992A

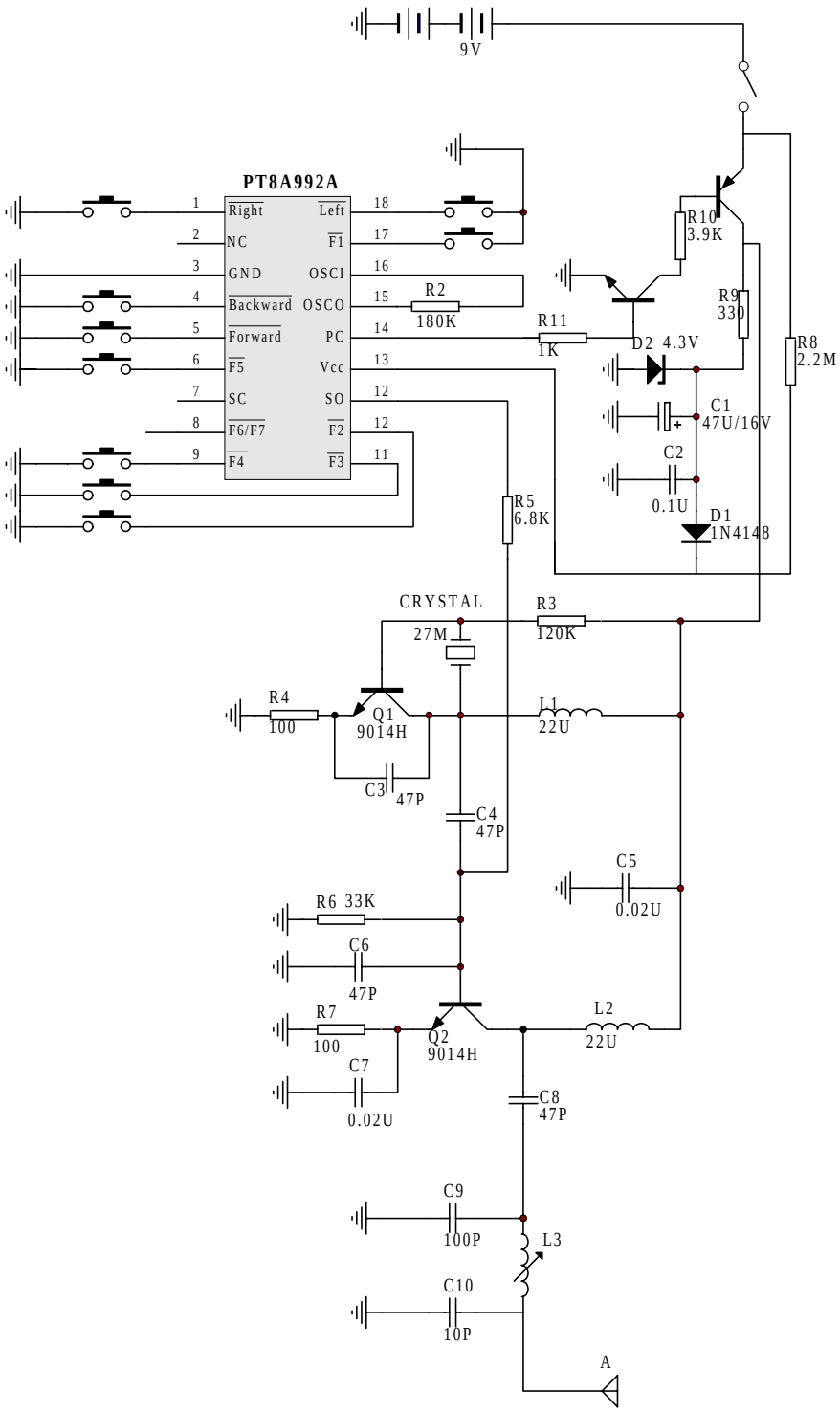
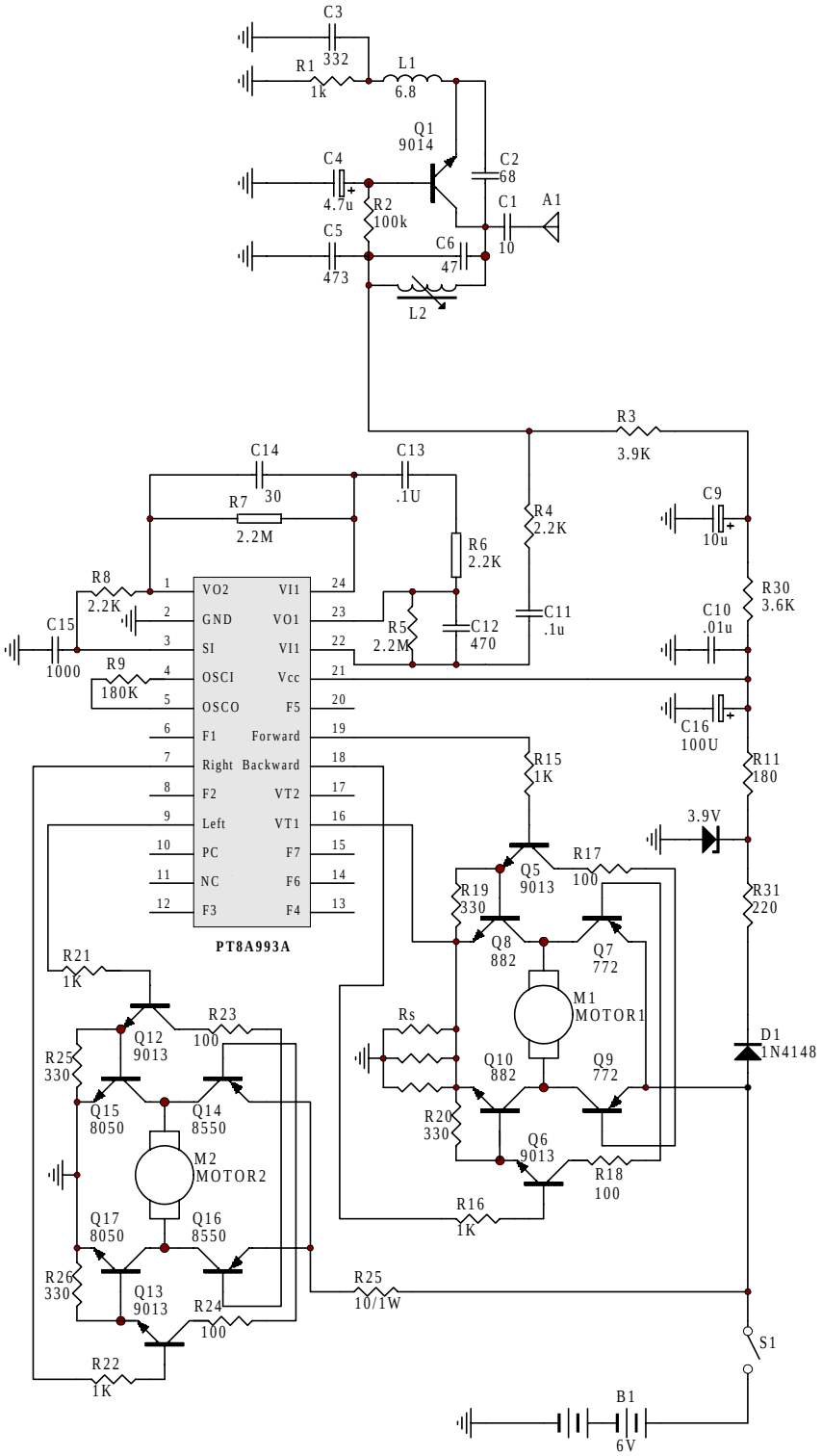


Figure 6. Typical Application Circuit of PT8A993A



Notes

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