

TOSHIBA Bi-CMOS INTEGRATED CIRCUIT SILICON MONOLITHIC

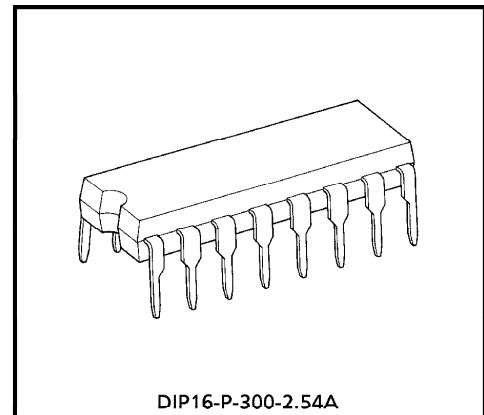
TB6501P

Bridge Driver with Rotation Detector

The TB6501P is Bridge Driver.
Forward Rotation, Reverse Rotation, Stop and Breaking Operations are available.

FEATURES

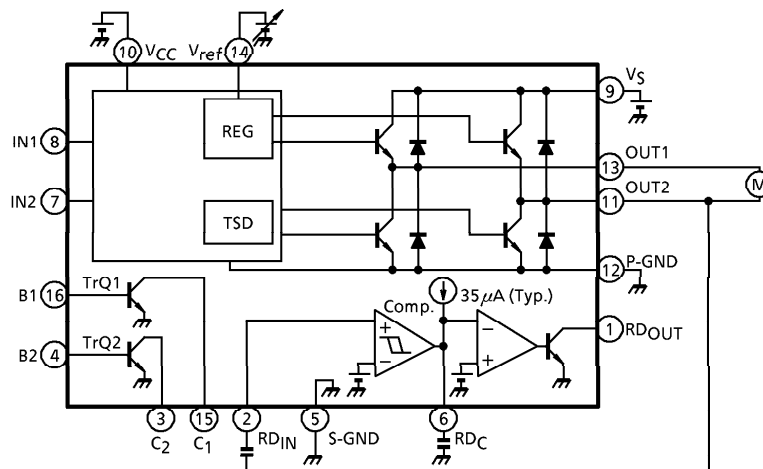
- TB6501P has RD (Rotation Detector).
- Output current up to 0.4A (AVE.) to 1.0A (PEAK).
- Wide Range of Operating Supply Voltage
 $V_{CC} (opr.) = 4.5 \sim 20V$
 $V_S (opr.) = 0 \sim 20V$
 $V_{ref} (opr.) = 0 \sim 20V (V_{ref} \leq V_S)$
- Thermal shutdown, Over current protector, and Standby circuit built in.



DIP16-P-300-2.54A

Weight : 1.11g (Typ.)

BLOCK DIAGRAM



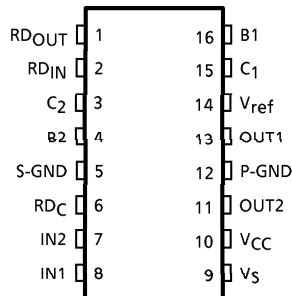
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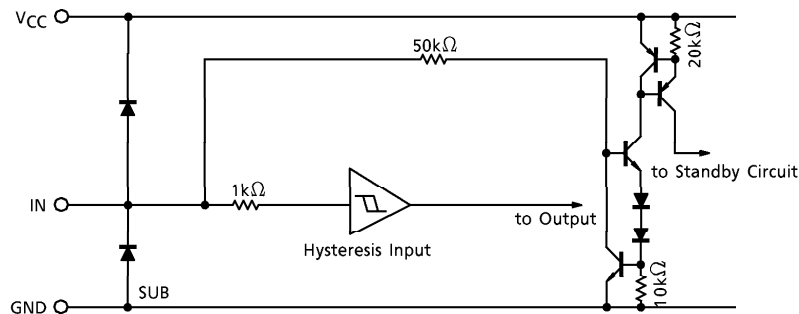
PIN FUNCTION

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION
1	RD _{OUT}	Rotation detector output terminal
2	RD _{IN}	Rotation detector input terminal
3	C ₂	NPN transistor collector terminal
4	B2	NPN transistor base terminal
5	S-GND	Signal GND terminal
6	RD _C	Rotation detector capacitor connection terminal
7	IN2	Input 2 terminal
8	IN1	Input 1 terminal
9	V _S	Power voltage supply terminal for motor driver
10	V _{CC}	Power voltage supply terminal for logic
11	OUT2	Output 2 terminal
12	P-GND	Power GND terminal
13	OUT1	Output 1 terminal
14	V _{ref}	Power voltage supply terminal for controller
15	C ₁	NPN transistor collector terminal
16	B1	NPN transistor base terminal

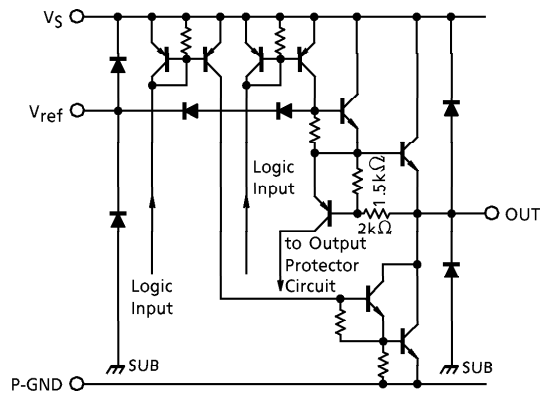
PIN CONNECTION



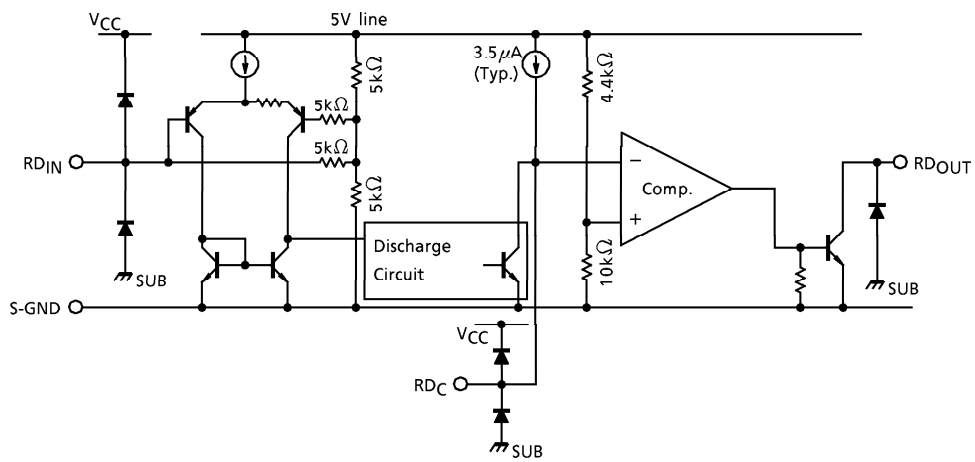
INPUT CIRCUIT



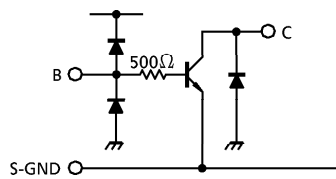
OUTPUT CIRCUIT



ROTATION DETECTOR CIRCUIT



TrQ1, TrQ2 CIRCUIT



FUNCTION

INPUT		OUTPUT		MODE
IN1	IN2	OUT1	OUT2	MOTOR
0	0	∞	∞	STOP
1	0	H	L	CW / CCW
0	1	L	H	CCW / CW
1	1	L	L	BRAKE

∞ : High Impedance

(Note) Inputs are all high active type.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	25	V
Motor Drive Voltage	V _S	25	V
Reference Voltage	V _{ref}	25	V
Output Current	PEAK	I _O (PEAK)	(Note) 1.0
	AVE.	I _O (AVE.)	0.4
	RD	I _{RD} (PEAK)	(Note) 20
	TR	I _{TR} (PEAK)	(Note) 50
Power Dissipation	P _D	1.2	W
Operating Temperature	T _{opr}	- 30~75	°C
Storage Temperature	T _{stg}	- 55~150	°C

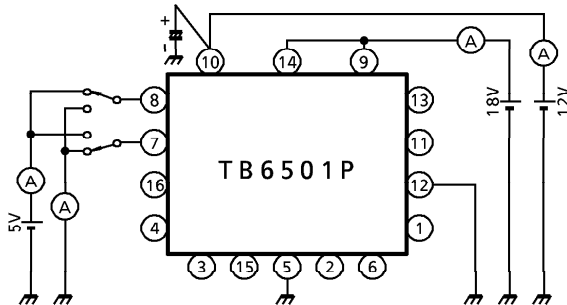
(Note) t = 0.1s

ELECTRICAL CHARACTERISTICS (Ta = 25°C, VCC = 12V, VS = 18V)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current		ICC1	—	Output open CW / CCW mode	—	8.2	12	mA
		ICC2	—	Output open STOP mode	—	400	750	μA
		ICC3	—	Output open BREAK mode	—	8.2	12	mA
		IS1	—	Output open CW / CCW mode Vref = VS	—	5.2	11	mA
		IS2	—	Output open STOP mode Vref = VS	—	0	50	μA
		IS3	—	Output open BREAK mode Vref = VS	—	6.8	13	mA
Input Operating Voltage	1 (High)	VIN1	—	Tj = 25°C	3.5	—	5.5	V
	2 (Low)	VIN2	—	Tj = 25°C	GND	—	0.8	
Input Current		IIN	—	シンク VIN = 5V	—	37	80	μA
Input Hysteresis Voltage		ΔVT	—	—	—	0.55	—	V
Saturation Voltage		VSAT U-1	—	Vref = VS IO = 0.2A Output VS CW / CCW mode	—	1.6	—	V
		VSAT L-1	—	Vref = VS IO = 0.2A Output GND CW / CCW mode	—	0.8	—	V
		VSAT U-2	—	Vref = VS IO = 0.4A Output VS CW / CCW mode	—	1.75	2.3	V
		VSAT L-2	—	Vref = VS IO = 0.4A Output GND CW / CCW mode	—	0.9	1.3	V
		VSAT U-3	—	Vref = VS IO = 1.0A Output VS CW / CCW mode	—	2.25	2.6	V
		VSAT L-3	—	Vref = VS IO = 1.0A Output GND CW / CCW mode	—	1.2	1.6	V
Output Voltage		VSAT U-1'	—	Vref = 10V IO = 0.2A Output GND CW / CCW mode	9.3	10	10.7	V
		VSAT U-2'	—	Vref = 10V IO = 0.4A Output GND CW / CCW mode	9.3	10	10.7	V
Leaking Current		ILU	—	VL = 25V	—	0	50	μA
		ILL	—	VL = 25V	—	0	50	
Diode Forward Voltage	Upper	VF U-1	—	IF = 0.4A	—	1.5	—	V
		VF U-2	—	IF = 1A	—	2.5	—	
	Lower	VF L-1	—	IF = 0.4A	—	1.0	—	
		VF L-2	—	IF = 1A	—	1.3	—	
Reference Current		Iref	—	Vref = 10V Source Typ.	—	1	—	mA
RD Output Saturation Voltage		VSAT RD	—	IRD = 5mA	—	0.18	0.35	V
TR Output Saturation Voltage		VSAT TR	—	ITR = 10mA	—	4	0.65	V
RDC Charge Current		IRDC	—	—	21	35	55	μA
RD Detective Sensitivity	Detective Level	RD (ON)	—	AC coupling sine wave input RDC = 10μF	14	—	—	mV
	Undetective Level	RD (OFF)	—		—	—	7	
Thermal Shutdown Operating Temperature		TTSD	—	Tj	160	—	—	°C

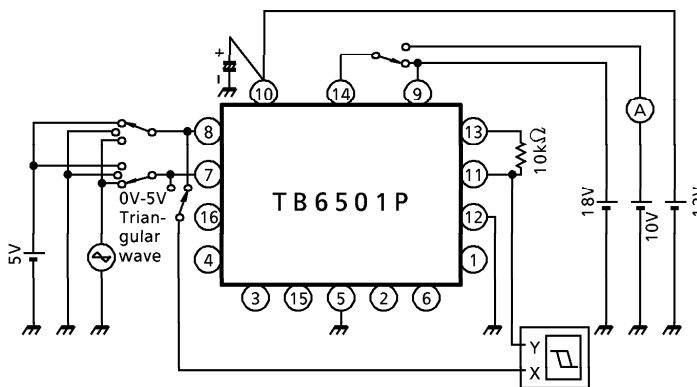
TEST CIRCUIT 1

I_{CC1} , I_{CC2} , I_{CC3} , I_{IN} , I_{S1} , I_{S2} , I_{S3}



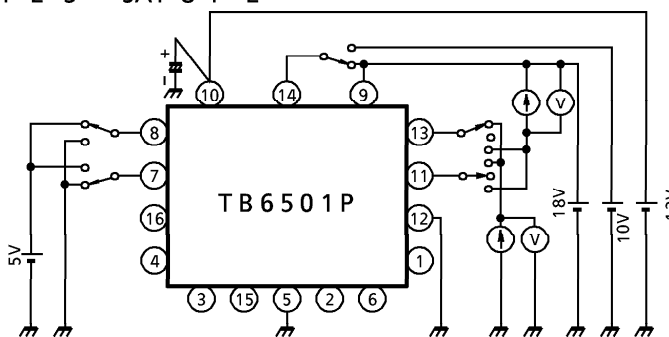
TEST CIRCUIT 2

V_{IN1} , V_{IN2} , ΔV_T



TEST CIRCUIT 3

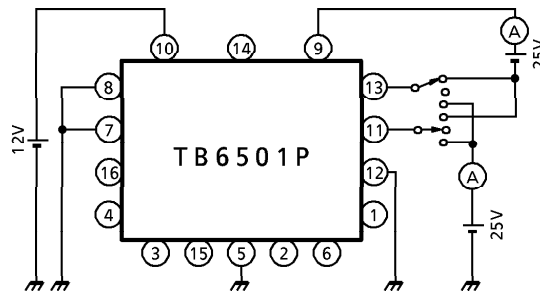
$V_{SAT U-1, 2, 3}$ $V_{SAT L-1, 2, 3}$ $V_{SAT U-1', 2'}$



(Note) Calibrate I_O to 0.2/0.4/1.0A by R_L .

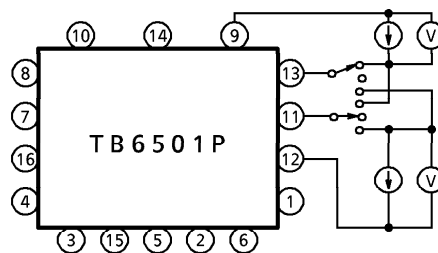
TEST CIRCUIT 4

I_{LU} , I_{LL}



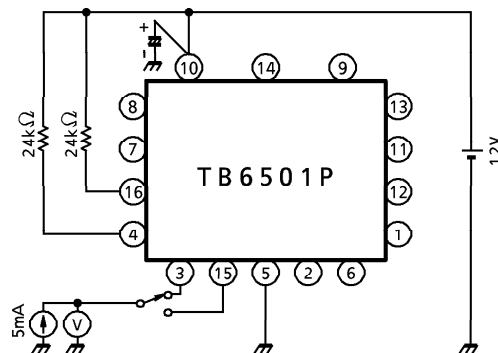
TEST CIRCUIT 5

V_F U-1, 2 V_F L-1, 2



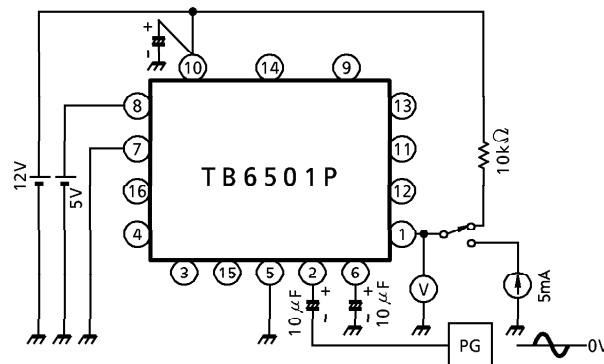
TEST CIRCUIT 6

V_{SAT} TR.



TEST CIRCUIT 7

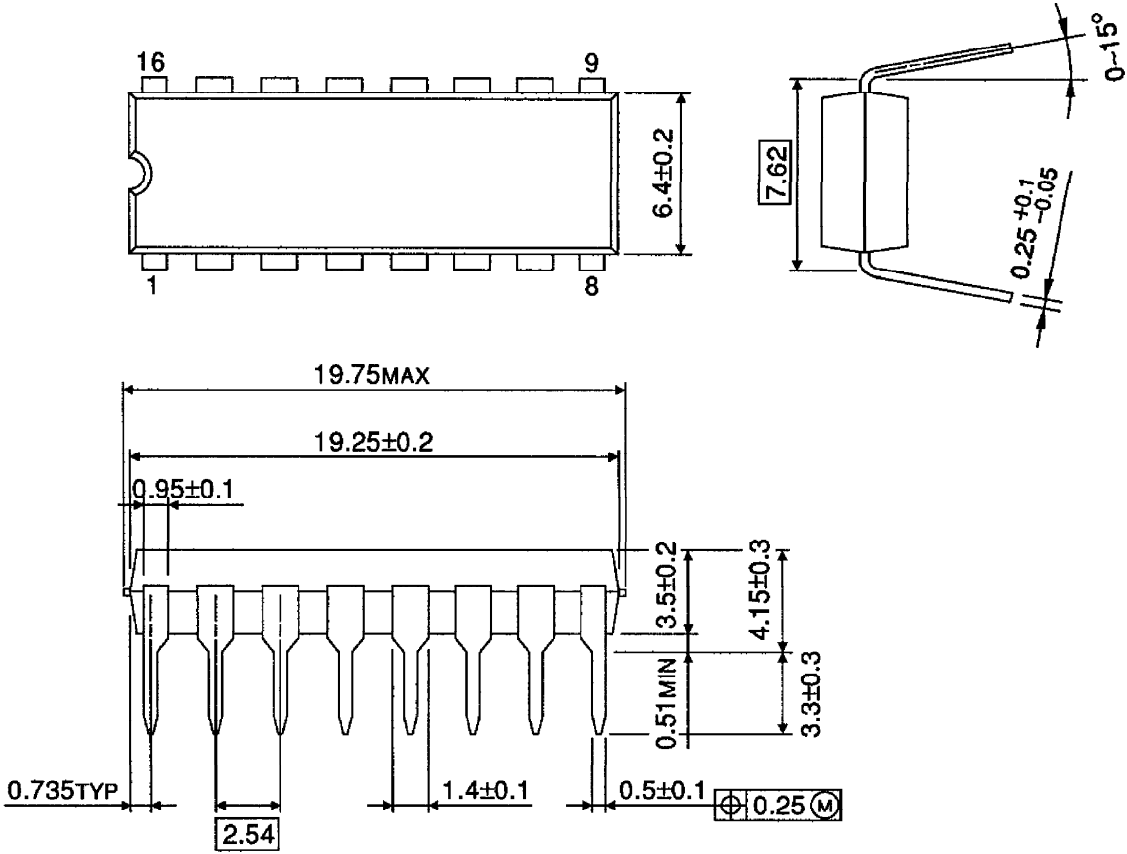
V_{SAT} RD RD Sensitivity



(Note) Utmost care is necessary in the design of the output line, V_S , V_{CC} and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

OUTLINE DRAWING
DIP16-P-300-2.54A

Unit : mm



Weight : 1.11g (Typ.)