

TOSHIBA**TB6501P**

TOSHIBA Bi-CMOS INTEGRATED CIRCUIT SILICON MONOLITHIC

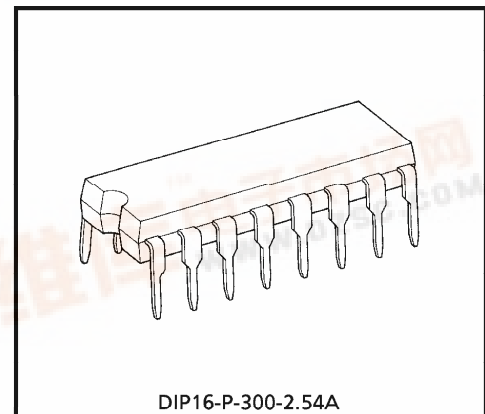
TB6501P

Bridge Driver with Rotation Detector

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

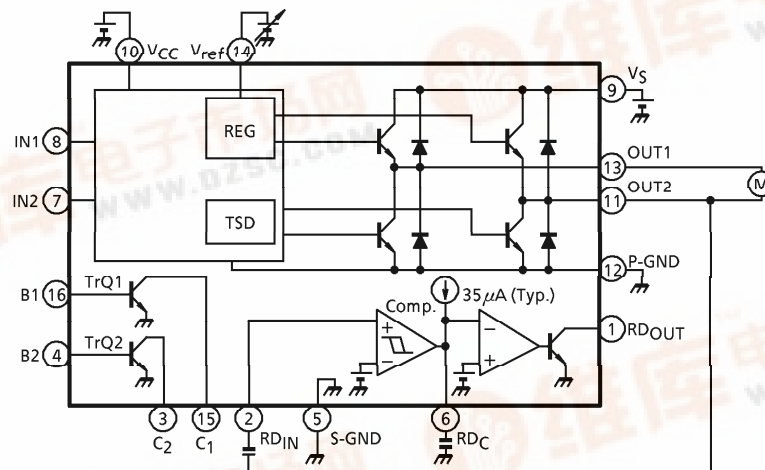
FEATURES

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



Weight : 1.11g (Typ.)

BLOCK DIAGRAM



961001EBA2

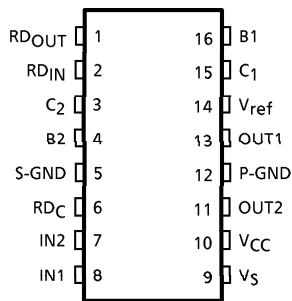
- TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.
- The products described in this document are subject to foreign exchange and foreign trade control laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.



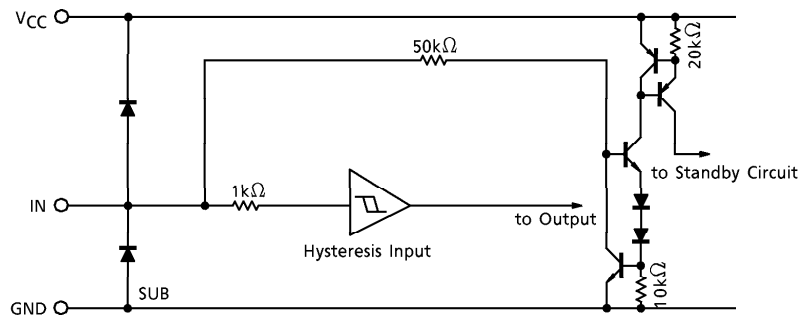
PIN FUNCTION

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	B ₂	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	B ₁	NPN transistor base terminal

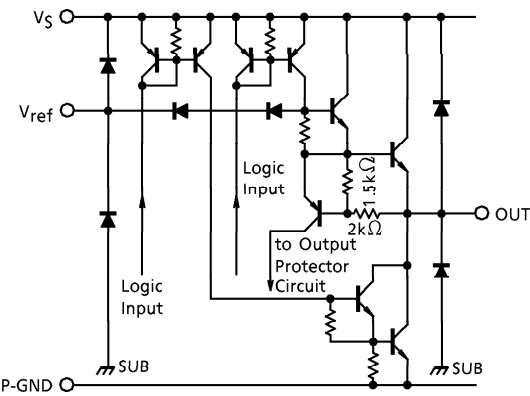
PIN CONNECTION



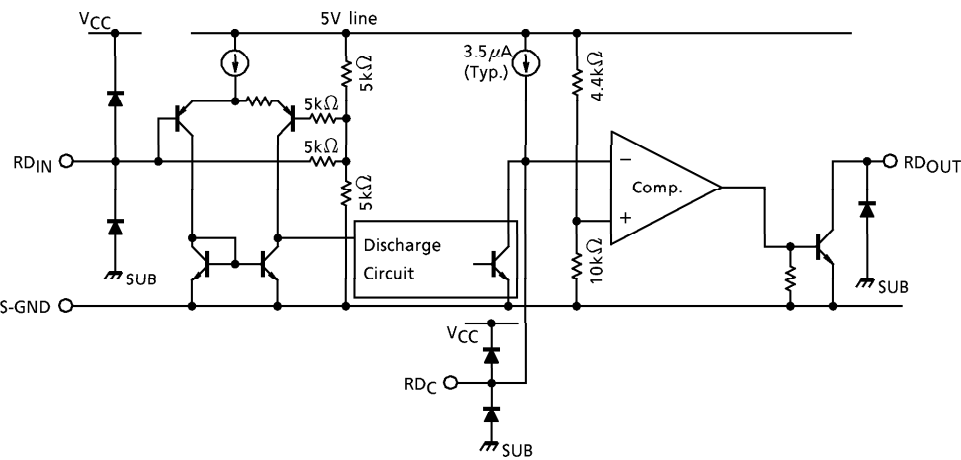
INPUT CIRCUIT



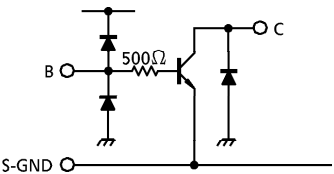
OUTPUT CIRCUIT



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	A
	AVE.	I _O (AVE.)	0.4	
	RD	I _{RD} (PEAK)	(Note) 20	mA
	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

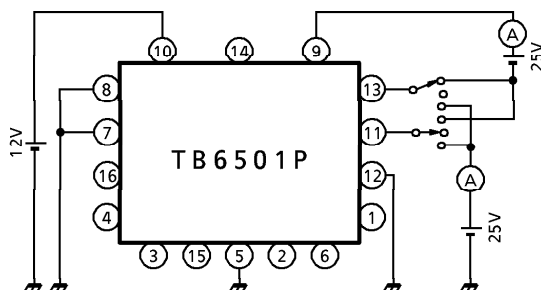
(Note) t = 0.1s

ELECTRICAL CHARACTERISTICS (Ta = 25°C, V_{CC} = 12V, V_S = 18V)

CHARACTERISTIC		SYMBOL	TEST CIR- CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current		I _{CC1}	—	Output open CW / CCW mode	—	8.2	12	mA
		I _{CC2}	—	Output open STOP mode	—	400	750	μA
		I _{CC3}	—	Output open BREAK mode	—	8.2	12	mA
		I _{S1}	—	Output open CW / CCW mode V _{ref} = V _S	—	5.2	11	mA
		I _{S2}	—	Output open STOP mode V _{ref} = V _S	—	0	50	μA
		I _{S3}	—	Output open BREAK mode V _{ref} = V _S	—	6.8	13	mA
Input Operating Voltage	1 (High)	V _{IN1}	—	T _j = 25°C	3.5	—	5.5	V
	2 (Low)	V _{IN2}	—	T _j = 25°C	GND	—	0.8	
Input Current		I _{IN}	—	シンク V _{IN} = 5V	—	37	80	μA
Input Hysteresis Voltage		ΔV _T	—	—	—	0.55	—	V
Saturation Voltage		V _{SAT U-1}	—	V _{ref} = V _S Output V _S I _O = 0.2A CW / CCW mode	—	1.6	—	V
		V _{SAT L-1}	—	V _{ref} = V _S Output GND I _O = 0.2A CW / CCW mode	—	0.8	—	V
		V _{SAT U-2}	—	V _{ref} = V _S Output V _S I _O = 0.4A CW / CCW mode	—	1.75	2.3	V
		V _{SAT L-2}	—	V _{ref} = V _S Output GND I _O = 0.4A CW / CCW mode	—	0.9	1.3	V
		V _{SAT U-3}	—	V _{ref} = V _S Output V _S I _O = 1.0A CW / CCW mode	—	2.25	2.6	V
		V _{SAT L-3}	—	V _{ref} = V _S Output GND I _O = 1.0A CW / CCW mode	—	1.2	1.6	V
Output Voltage		V _{SAT U-1'}	—	V _{ref} = 10V Output GND I _O = 0.2A CW / CCW mode	9.3	10	10.7	V
		V _{SAT U-2'}	—	V _{ref} = 10V Output GND I _O = 0.4A CW / CCW mode	9.3	10	10.7	V
Leaking Current		I _{LU}	—	V _L = 25V	—	0	50	μA
		I _{LL}	—	V _L = 25V	—	0	50	
Diode Forward Voltage	Upper	V _{F U-1}	—	I _F = 0.4A	—	1.5	—	V
		V _{F U-2}	—	I _F = 1A	—	2.5	—	
	Lower	V _{F L-1}	—	I _F = 0.4A	—	1.0	—	
		V _{F L-2}	—	I _F = 1A	—	1.3	—	
Reference Current		I _{ref}	—	V _{ref} = 10V Source Typ.	—	1	—	mA
RD Output Saturation Voltage		V _{SAT RD}	—	I _{RD} = 5mA	—	0.18	0.35	V
TR Output Saturation Voltage		V _{SAT TR}	—	I _{TR} = 10mA	—	4	0.65	V
RDC Charge Current		I _{RDC}	—	—	21	35	55	μA
RD Detective Sensitivity	Detective Level	RD (ON)	—	AC coupling sine wave input	14	—	—	mV
	Undetective Level	RD (OFF)	—	RDC = 10μF	—	—	7	
Thermal Shutdown Operating Temperature		T _{TSD}	—	T _j	160	—	—	°C

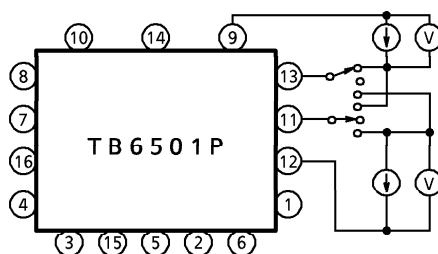
TEST CIRCUIT 4

I_{LU} , I_{LL}



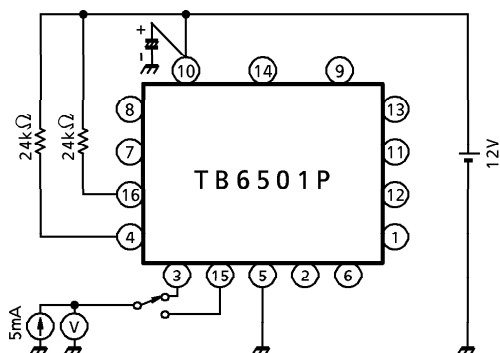
TEST CIRCUIT 5

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



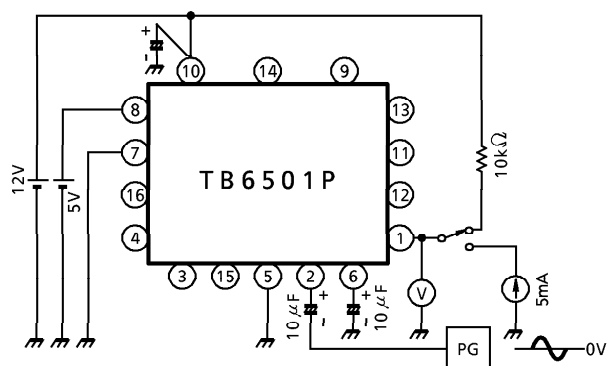
TEST CIRCUIT 6

V_{SAT} TR.



TEST CIRCUIT 7

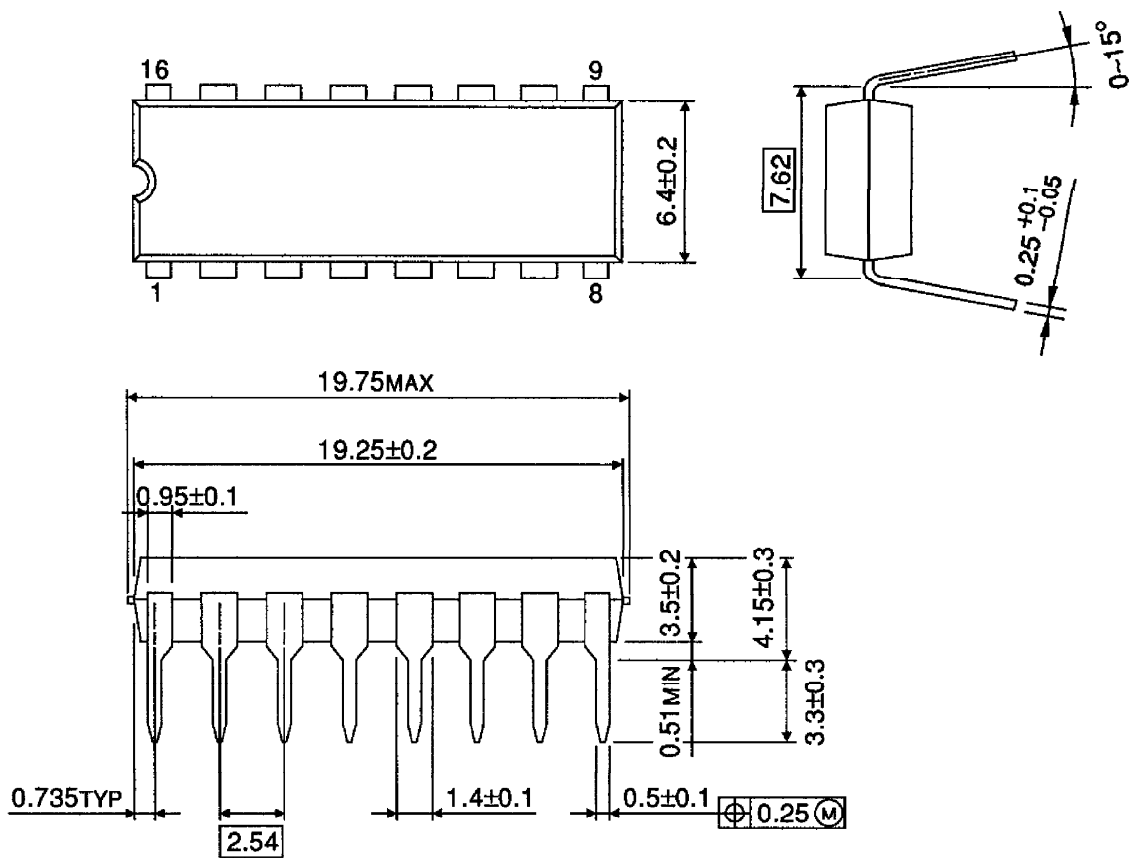
V_{SAT} RD RD Sensitivity



(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.)