

TOSHIBA Bi-CMOS INTEGRATED CIRCUIT SILICON MONOLITHIC

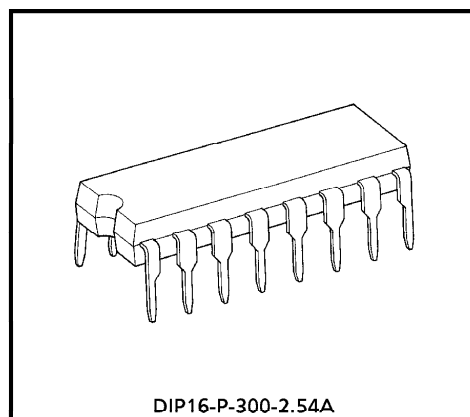
TB6501P

Bridge Driver with Rotation Detector

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

FEATURES

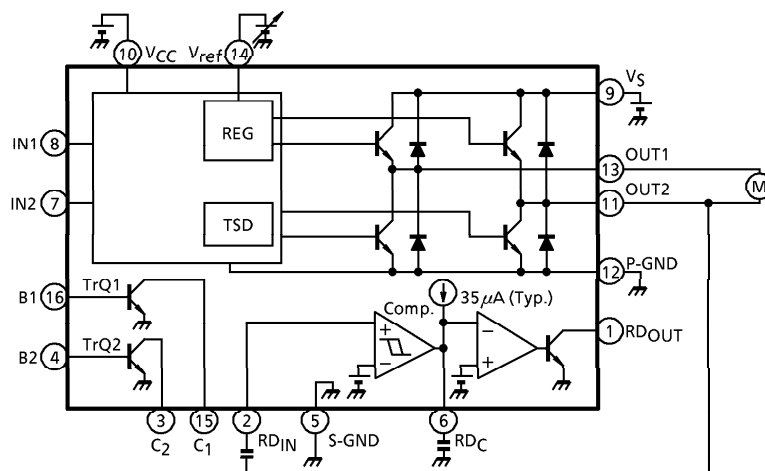
- TB6501P has RD (Rotation Detector).
- Output current up to 0.4A (AVE.) to 1.0A (PEAK).
- Wide Range of Operating Supply Voltage
 $V_{CC}(\text{opr.}) = 4.5 \sim 20V$
 $V_S(\text{opr.}) = 0 \sim 20V$
 $V_{ref}(\text{opr.}) = 0 \sim 20V$ ($V_{ref} \leq V_S$)
- Thermal shutdown, Over current protector,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



DIP16-P-300-2.54A

Weight : 1.11g (Typ.)

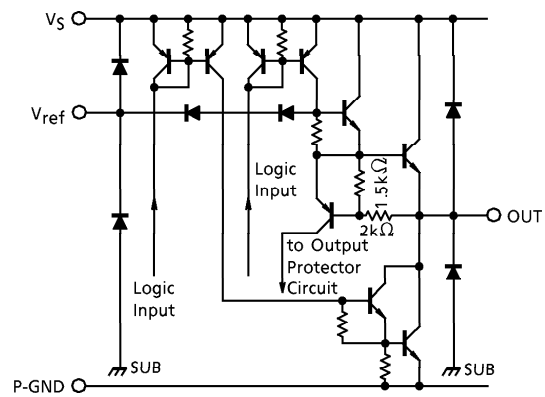
BLOCK DIAGRAM



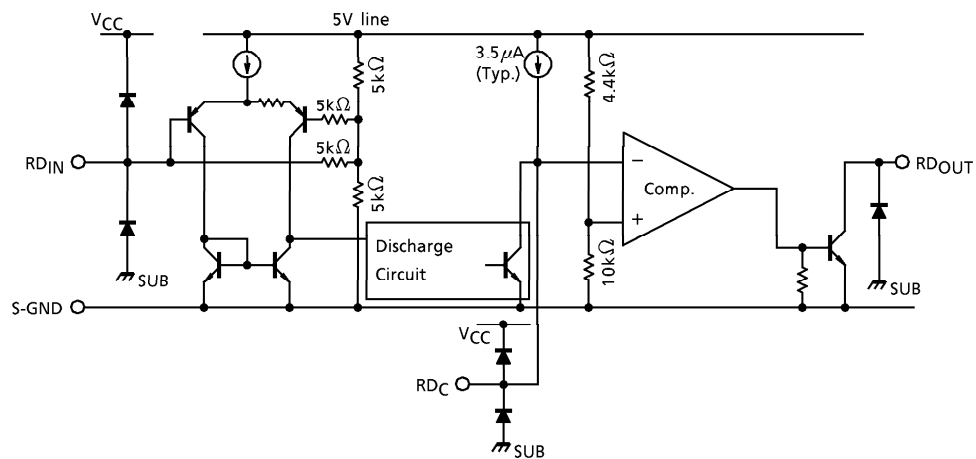
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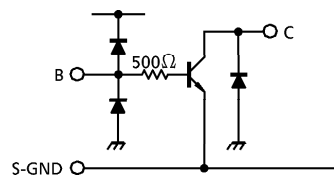
OUTPUT CIRCUIT



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.

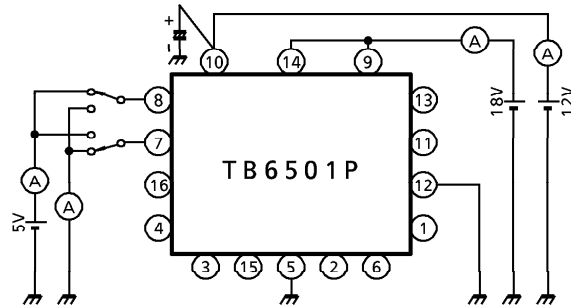
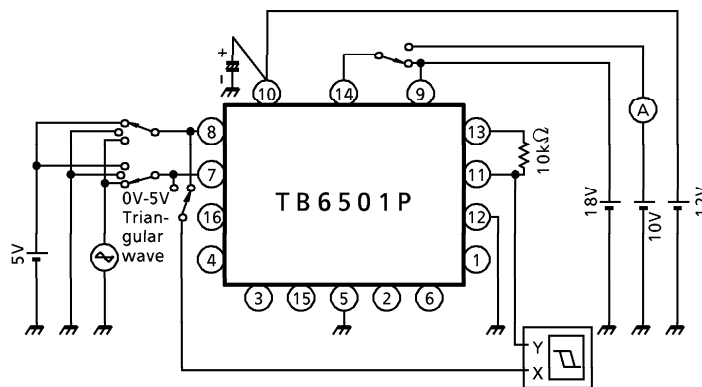
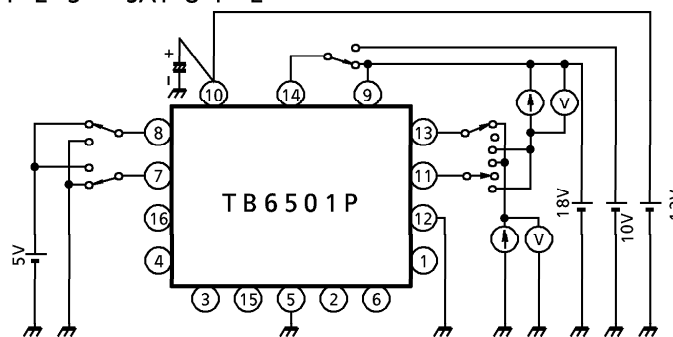
MAXIMUM RATINGS (Ta = 25°C)

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)

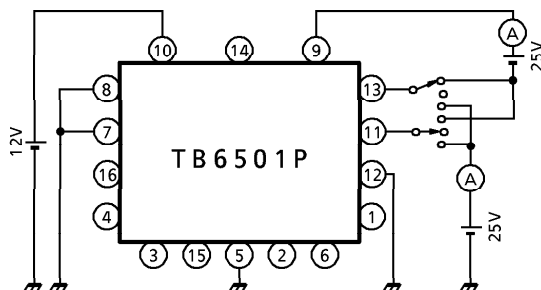
CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current		I _{CC1}	—	Output open CW / CCW mode	—	8.2	12	mA
		I _{CC2}	—	Output open STOP mode	—	400	750	μA
		I _{CC3}	—	Output open BREAK mode	—	8.2	12	mA
		I _{S1}	—	Output open CW / CCW mode V _{ref} = V _S	—	5.2	11	mA
		I _{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 I _O = 0.2A Output V _S CW / CCW mode	—	1.6	—	V
		V _{SAT} L-1	—	V _{ref} = V _S I _O = 0.2A Output GND CW / CCW mode	—	0.8	—	V
		V _{SAT} U-2	—	V _{ref} = V _S I _O = 0.4A Output V _S CW / CCW mode	—	1.75	2.3	V
		V _{SAT} L-2	—	V _{ref} = V _S I _O = 0.4A Output GND CW / CCW mode	—	0.9	1.3	V
		V _{SAT} U-3	—	V _{ref} = V _S I _O = 1.0A Output V _S CW / CCW mode	—	2.25	2.6	V
		V _{SAT} L-3	—	V _{ref} = V _S I _O = 1.0A Output GND CW / CCW mode	—	1.2	1.6	V
Output Voltage		V _{SAT} U-1'	—	V _{ref} = 10V I _O = 0.2A Output GND CW / CCW mode	9.3	10	10.7	V
		V _{SAT} U-2'	—	V _{ref} = 10V I _O = 0.4A Output GND 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 Detect Sensitivity	Detective Level	RD (ON)	—	AC coupling sine wave input RDC = 10μF	14	—	—	mV
	Undetective Level	RD (OFF)	—		—	—	7	
Thermal Shutdown Operating Temperature		T _{TSD}	—	T _j	160	—	—	°C

$I_{CC1}, I_{CC2}, I_{CC3}, I_{IN}, I_{S1}, I_{S2}, I_{S3}$  $V_{IN1}, V_{IN2}, \Delta V_T$ 
$$V_{SAT} \text{ U-1, 2, 3} \quad V_{SAT} \text{ L-1, 2, 3} \quad V_{SAT} \text{ U-1', 2'}$$


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

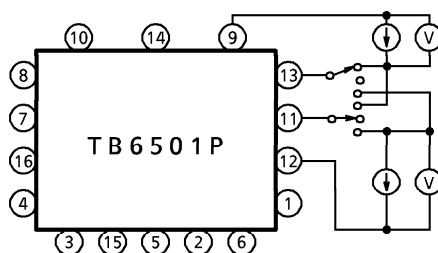
TEST CIRCUIT 4

I_{LU} , I_{LL}



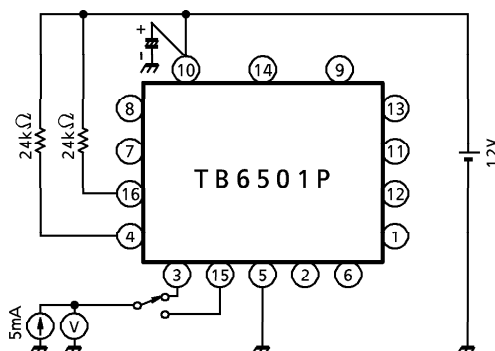
TEST CIRCUIT 5

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



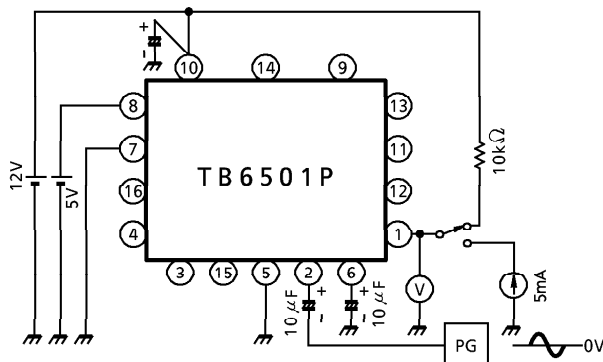
TEST CIRCUIT 6

V_{SAT} TR.



TEST CIRCUIT 7

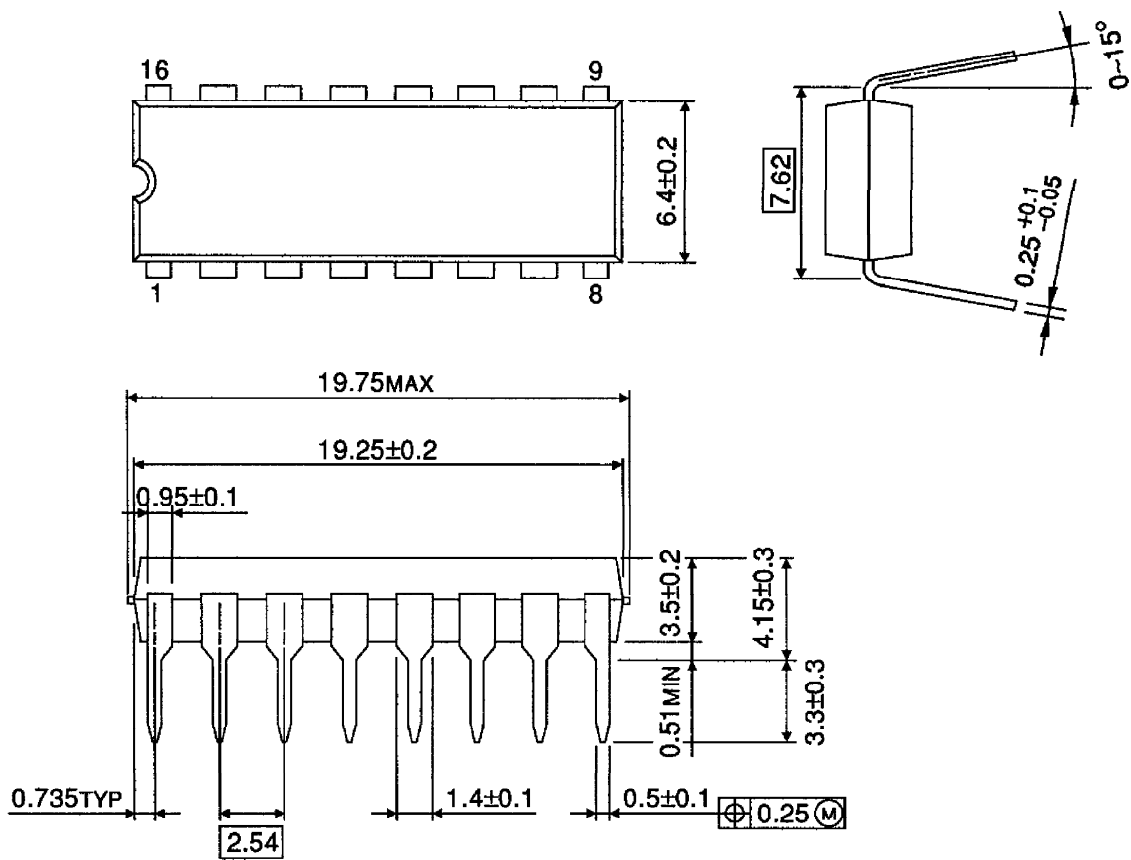
V_{SAT} RD RD Sensitivity



(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.)