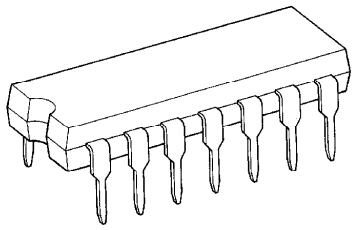
TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TD62306P, TD62306F

6CH LOW SATURATION SINK DRIVER

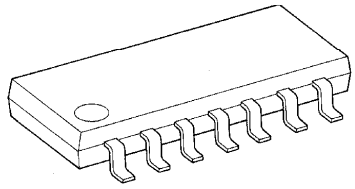
The TD62306P, TD62306F are comprised of six NPN low saturation drivers.
All units feature integral clamp diodes for switching inductive loads and protective diodes against a negative input voltage.
Applications include relay, hammer, lamp and LED driver.

TD62306P



DIP14-P-300-2.54

TD62306F



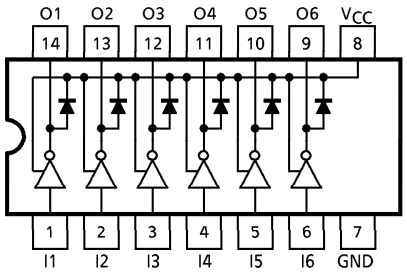
SOP14-P-225-1.27

Weight
DIP14-P-300-2.54 : 1.11g (Typ.)
SOP14-P-225-1.27 : 0.16g (Typ.)

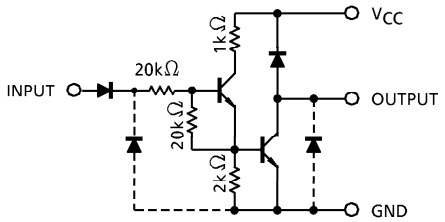
FEATURES

- Low saturation output voltage : $V_{CE\ (sat)} = 0.6V$ (Max.) @$I_{OUT} = 120mA$
- Output rating (single output) 20V (Min.) / 150mA (Max.)
- Inputs compatible with 5~15V PMOS, CMOS
- Input protective diodes against a negative input voltage
- Package type-P : DIP-14 pin
- Package type-F : SOP-14 pin

PIN CONNECTION (TOP VIEW)



SCHEMATICS (EACH DRIVER)



(Note) The input and output parasitic diodes cannot be used as clamp diodes.

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- 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.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	−0.5~20	V
Output Sustaining Voltage		$V_{CE\ (SUS)}$	−0.5~V_{CC} + 0.5	V
Output Current		I_{OUT}	150	mA / ch
Input Voltage		V_{IN}	−37~20	V
Input Current		I_{IN}	1.5	mA
Clamp Diode Reverse Voltage		V_R	20	V
Clamp Diode Forward Current		I_F	120	mA
Power Dissipation	P	P_D	1.0	W
	F		0.625 (Note)	
Operating Temperature	P	T_{opr}	−30~75	°C
	F		−40~85	
Storage Temperature		T_{stg}	−55~150	°C

(Note) On Glass Epoxy PCB (50 × 50 × 1.6mm Cu 30%)

RECOMMENDED OPERATING CONDITIONS (Ta = −40 ~ 85°C for Type-F and Ta = −30 ~ 75°C for Type-P)

CHARACTERISTIC		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage		V_{CC}	—	4.75	—	18	V
Output Current		I_{OUT}	DC 1 Circuit	0	—	120	mA / ch
			T_{pw} = 25ms, Duty = 10%, 6 Circuits	0	—	100	
Input Voltage		V_{IN}	—	−35	—	V_{CC}	V
Clamp Diode Reverse Voltage		V_R	—	—	—	18	V
Clamp Diode Forward Current		I_F	—	—	—	120	mA
Power Dissipation	P	P_D	—	—	—	0.44	W
	F		(Note)	—	—	0.325	

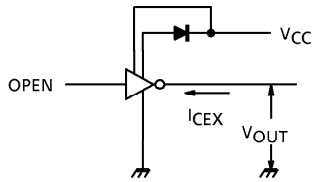
(Note) On Glass Epoxy PCB (50 × 50 × 1.6mm Cu 30%)

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

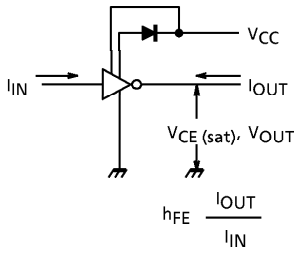
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Leakage Current	P	I_{CEX}	1	V_{CC} = 18V, V_{OUT} = 18V	Ta = 75°C	—	—	100	μA
	F				Ta = 85°C	—	—	100	
Output Saturation Voltage		$V_{CE\ (sat)}$	2	V_{CC} = 5V, I_{IN} = 0.2mA, I_{OUT} = 120mA		—	0.45	0.6	V
DC Forward Current Transfer Ratio		h_{FE}	2	V_{CC} = 5V, V_{OUT} = 2V, I_{OUT} = 120mA		1000	—	—	—
Input Current	Output On	$I_{IN\ (ON)}$	3	V_{IN} = 5V, I_{OUT} = 120mA		—	0.16	0.23	mA
				V_{IN} = 15V, I_{OUT} = 120mA		—	0.66	0.94	
	Output Off	$I_{IN\ (OFF)}$	4	V_{IN} = − 35V		—	—	− 10	μA
Clamp Diode Forward Voltage		V_F	5	I_F = 120mA		—	1.25	1.6	V
Supply Current	Output On	$I_{CC\ (ON)}$	6	V_{CC} = V_{IN} = 5V		—	4.0	6.0	mA / Gate
				V_{CC} = V_{IN} = 15V		—	14.0	22	
	Output Off	$I_{CC\ (OFF)}$	6	V_{CC} = 18V, V_{IN} = 0V		—	—	10	μA
Turn-On Delay		t_{ON}	7	V_{CC} = 18V, R_L = 150Ω, C_L = 15pF		—	0.1	—	μs
Turn-Off Delay		t_{OFF}				—	0.8	—	μs

TEST CIRCUIT

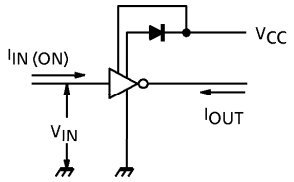
1. I_{CEX}



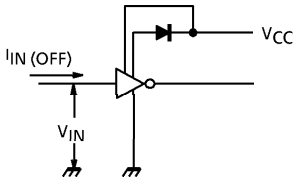
2. h_{FE}, $V_{CE\ (sat)}$



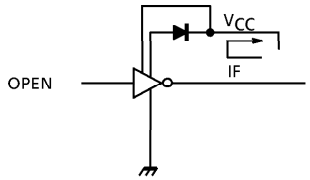
3. $I_{IN\ (ON)}$



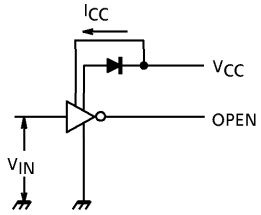
4. $I_{IN\ (OFF)}$



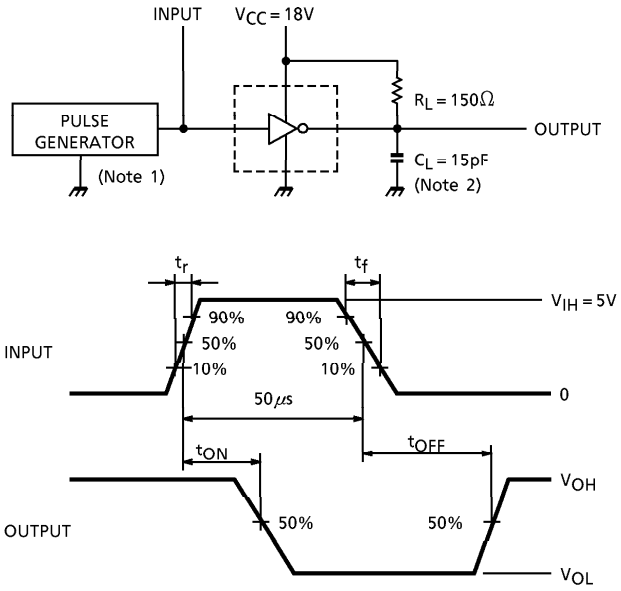
5. V_F



6. I_{CC}



7. t_{ON}, t_{OFF}



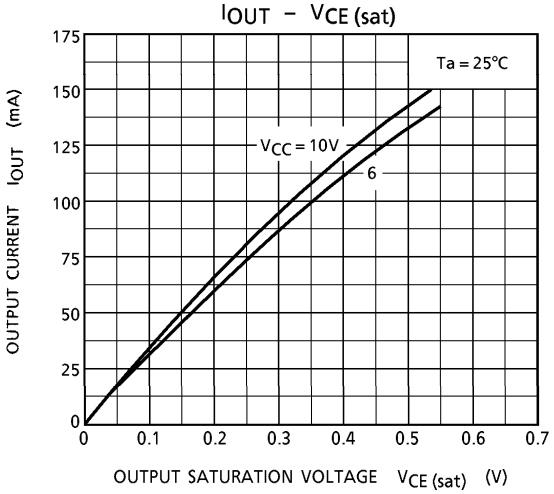
(Note 1) Pulse Width 50μs, Duty Cycle 10%
Output Impedance 50Ω, $t_r \leqq$ 5ns, $t_f \leqq$ 10ns

(Note 2) C_L includes probe and jig capacitance.

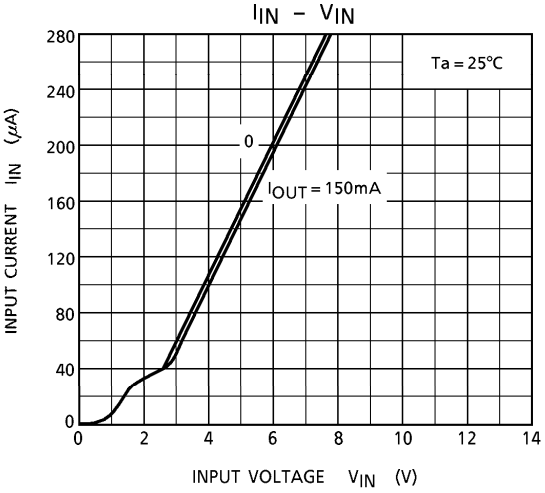
PRECAUTIONS for USING

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

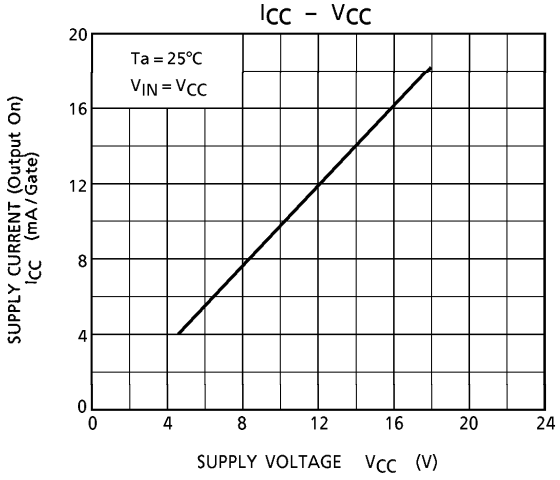
I_{OUT} – $V_{CE\,(sat)}$



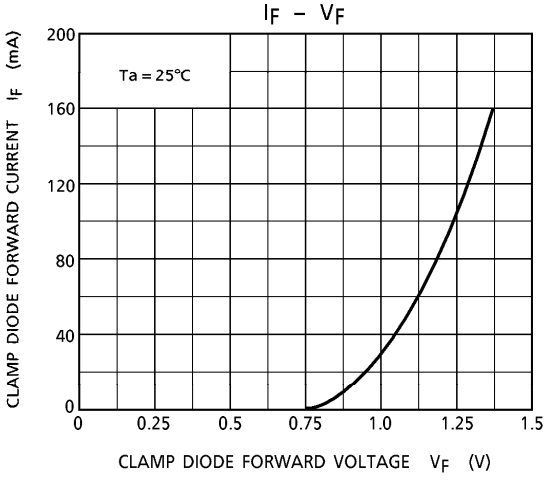
I_{IN} – V_{IN}



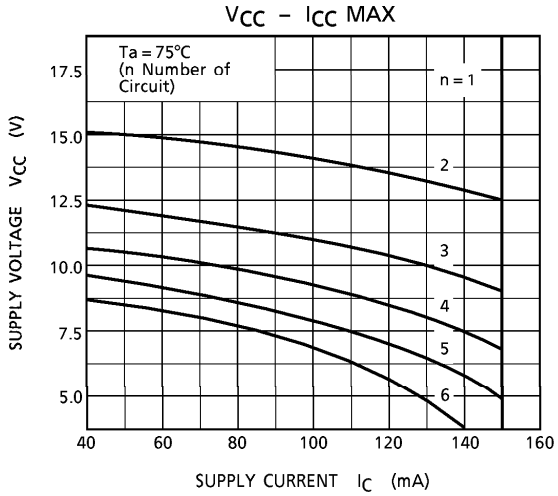
I_{CC} – V_{CC}



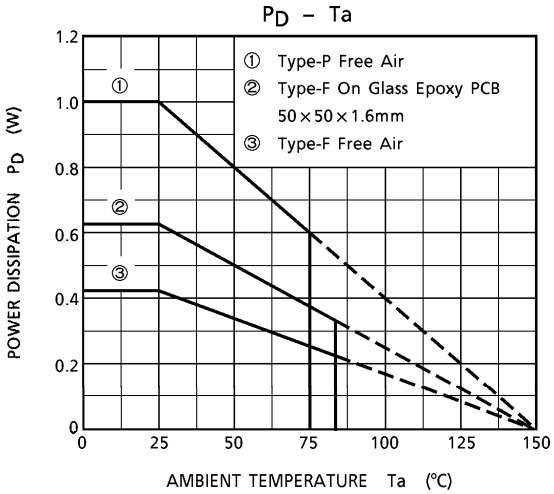
I_F – V_F



V_{CC} – I_{CC} MAX

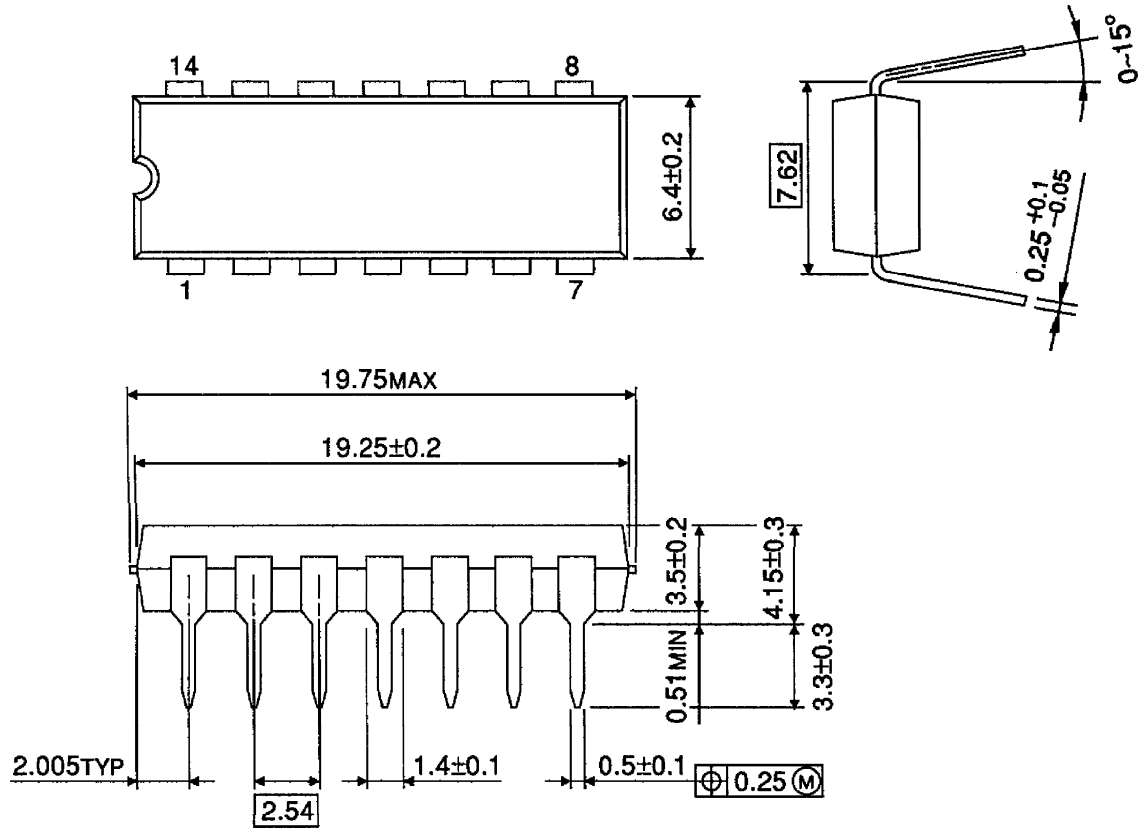


P_D – Ta



OUTLINE DRAWING

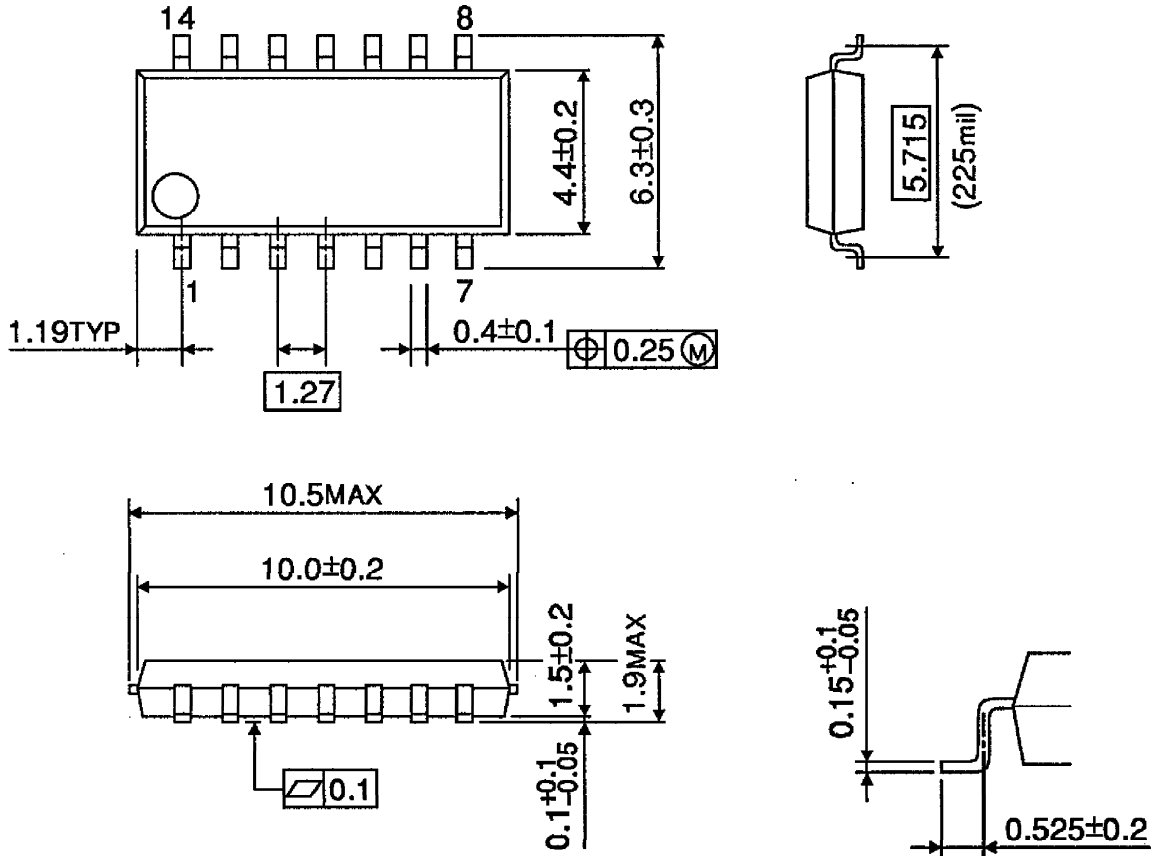
DIP14-P-300-2.54 Unit : mm



Weight : 1.11g (Typ.)

OUTLINE DRAWING

SOP14-P-225-1.27 Unit : mm



Weight : 0.16g (Typ.)