TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

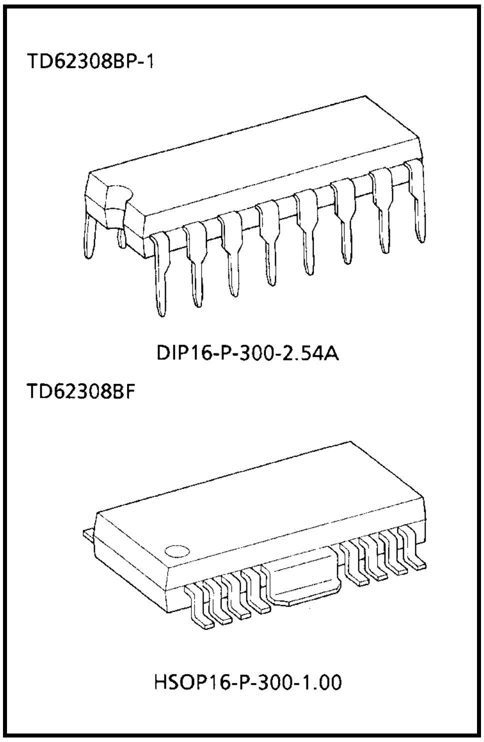
TD62308BP−1,TD62308BF

4CH LOW INPUT ACTIVE HIGE−CURRENT DARLINGTON SINK DRIVER

The TD62308BP−1 and TD62308BF are non−inverting transistor array which are comprised of four NPN darlington output stages and PNP input stages.

This device is low level input active driver and are suitable for operation with TTL, 5 V CMOS and 5V Microprocessor which have sink current output drivers.

Applications include relay, hammer, lamp and stepping motor drivers.



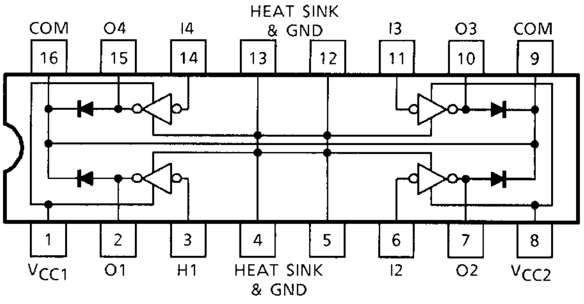
Weight
DIP16−P−300−2.54A : 1.11 g (Typ.)
HSOP16−P−300−1.00 : 0.50 g (Typ.)

FEATURES

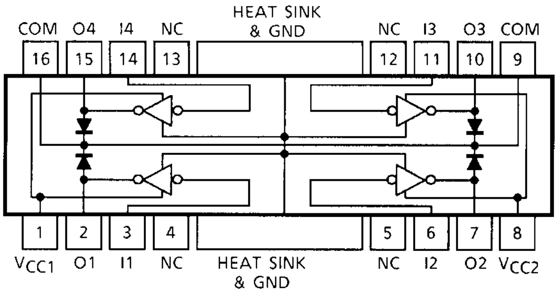
- Two V_{CC} Terminals V_{CC1}, V_{CC2} (Separated)
- Package Type BP−1 : DIP−16 pin
  BF : HSOP−16 pin
- High Sustaining Voltage Output: $V_{CE\ (SUS)} = 80$ V (Min)
- Output Current (Single Output): $I_{OUT} = 1.5$ A (Max)
- Output Clamp Diodes
- Low Level Active Input
- GND and SUB Terminal = Heat Sink
- Input Compatible with TTL and 5 V CMOS
- Standard Supply Voltage

PIN CONNECTION (TOP VIEW)

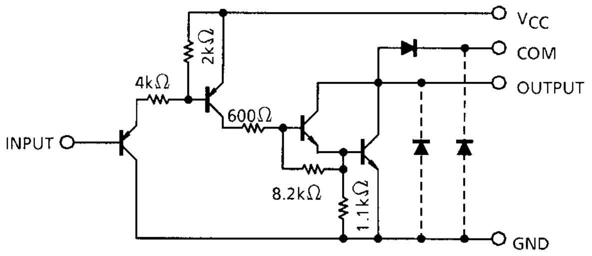
TD62308BP−1



TD62308BF



SCHEMATICS (EACH DRIVER)



Note : The Output parasitic diodes cannot be used as clamp diodes.

PRECAUTIONS for USING

(1) This IC does not include built-in protection circuits for excess current or overvoltage.
If this IC is subjected to excess current or overvoltage, it may be destroyed.
Hence, the utmost care must be taken when systems which incorporate this IC are designed.
Utmost care is necessary in the design of the output line, VCC, COMMON and GND line since IC may be destroyed due to short−circuit between outputs, air contamination fault, or fault by improper grounding.

(2) If a TD62308BP-1/BF is being used to drive an inductive load (such as a motor, solenoid or relay), Toshiba recommends that the diodes (pins 9 and 16) be connected to the secondary power supply pin so as to absorb the counter electromotive force generated by the load. Please adhere to the device's maximum ratings.
Toshiba recommends that zener diodes be connected between the diodes (pins 9 and 16) and the secondary power supply pin (as the anode) so as to enable rapid absorption of the counter electromotive force. Again, please adhere to the device's maximum ratings.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	7	V
Output Sustaining Voltage		$V_{CE\ (SUS)}$	−0.5~80	V
Parasitic Transistor Output Voltage		V_{CEF} (Note 1)	80	V
Output Current		I_{OUT}	1.5	A / ch
Input Current		I_{IN}	−10	mA
Input Voltage		V_{IN}	7	V
Clamp Diode Reverse Voltage		V_R	80	V
Clamp Diode Forward Current		I_F	1.5	A
Power Dissipation	BP−1	P_D	1.47 / 2.7 (Note 2)	W
	BF		0.9 / 1.4 (Note 3)	
Operating Temperature		T_{opr}	−40~85	°C
Storage Temperature		T_{stg}	−55~150	°C

Note 1: Parasitic Transistor (COMMON - GND - OUTPUT) Output Voltage
Note 2: On Glass Epoxy PCB (50 × 50 × 1.6 mm Cu 50%)
Note 3: On Glass Epoxy PCB (60 × 30 × 1.6 mm Cu 30%)

RECOMMENDED OPERATING CONDITIONS (Ta = −40~85°C)

CHARACTERISTIC		SYMBOL	CONDITION		MIN	TYP.	MAX	UNIT
Supply Voltage		V_{CC}	—		4.5	—	5.0	V
Output Sustaining Voltage		$V_{CE\ (SUS)}$	—		0	—	80	V
Output Current		I_{OUT}	DC 1 Circuit, Ta = 25°C		0	—	1.25	A / ch
	BP−1 (Note1)		T_{pw} = 25 ms 4 Circuits T_j = 120°C Ta = 85°C	Duty = 10%	0	—	1.20	
				Duty = 50%	0	—	0.35	
	BP−1 (Note2)			Duty = 10%	0	—	0.75	
				Duty = 50%	0	—	0.18	
Input Voltage		V_{IN}	—		0	—	25	V
	Output On	$V_{IN\ (ON)}$	—		0	—	V_{CC} −3.6	V
	Output Off	$V_{IN\ (OFF)}$	—		V_{CC} −1.0	—	V_{CC}	
Clamp Diode Reverse Voltage		V_R	—		—	—	80	V
Clamp Diode Forward Current		I_F	—		—	—	1.25	A
Power Dissipation	BP−1	P_D	Ta = 85°C	(Note 1)	—	—	1.4	W
	BF		Ta = 85°C	(Note 2)	—	—	0.7	

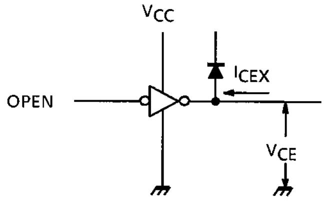
Note 1: On Glass Epoxy PCB (50 × 50 × 1.6 mm Cu 50%)
Note 2: On Glass Epoxy PCB (60 × 30 × 1.6 mm Cu 30%)

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

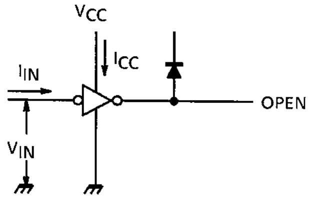
CHARACTERISTIC		SYMBOL	TEST CIR−CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Input Voltage	"H" level	V_{IH}	—	—	V_{CC} −1.6	—	V_{CC}	V
	"L" level	V_{IL}	—	—	—	—	V_{CC} −3.6	
Input Current	"H" level	I_{IH}	2	—	—	—	10	μA
	"L" level	I_{IL}	2	V_{CC} = 5.5 V, V_{IN} = 0.4 V	—	−0.05	−0.36	mA
Output Leakage Current		I_{CEX}	1	V_{OUT} = 80 V, Ta = 25°C	—	—	50	μA
				V_{OUT} = 80 V, Ta = 85°C	—	—	100	
Output Saturation Voltage		$V_{CE\ (sat)}$	3	V_{CC} = 4.5 V, I_{OUT} = 1.25 A	—	1.3	1.8	V
Clamp Diode Reverse Current		I_R	4	V_R = 80 V, Ta = 25°C	—	—	50	μA
Clamp Diode Forward Voltage		V_F	5	I_F = 1.25 A	—	1.5	2.0	V
Supply Current	Output On	$I_{CC\ (ON)}$	2	V_{CC} = 5.5 V, V_{IN} = 0 V	—	8.5	12.5	mA / ch
	Output Off	$I_{CC\ (OFF)}$	2	V_{CC} = 5.5 V, V_{IN} = V_{CC}	—	—	10	μA
Turn−On Delay		t_{ON}	6	V_{OUT} = 80 V, RL = 68 Ω	—	0.2	—	μs
Turn−Off Delay		t_{OFF}			—	5.0	—	
Parasitic Transistor Output Voltage		V_{CEF}	7	I_{CEF} = 150 mA	80	—	—	V

TEST CIRCUIT

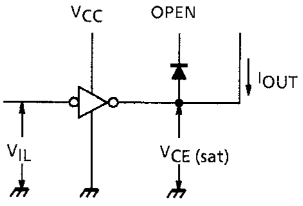
1. I_{CEX}



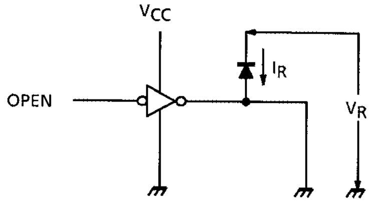
2. I_{CC}, I_{IN}



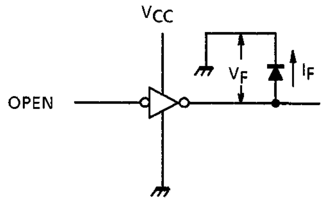
3. V_{CE} (sat)



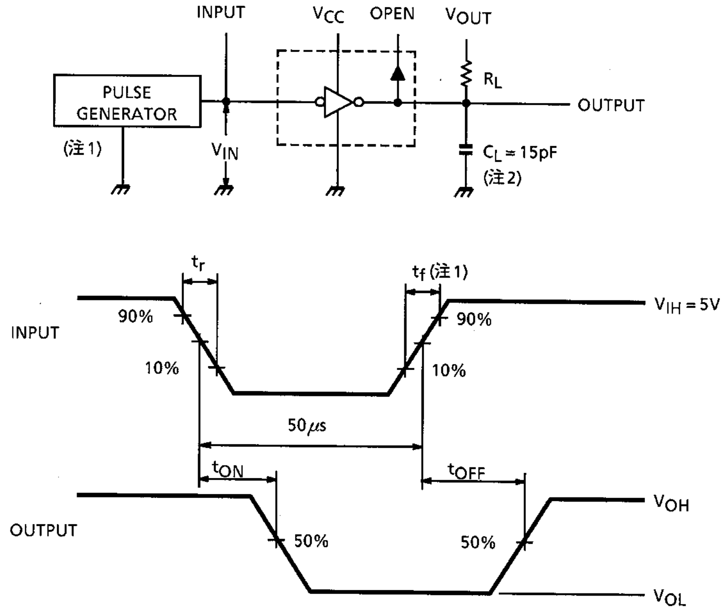
4. I_R



5. V_F



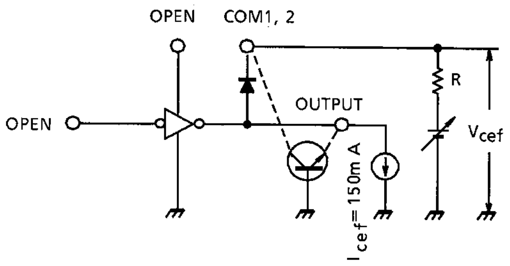
6. t_{ON}, t_{OFF}



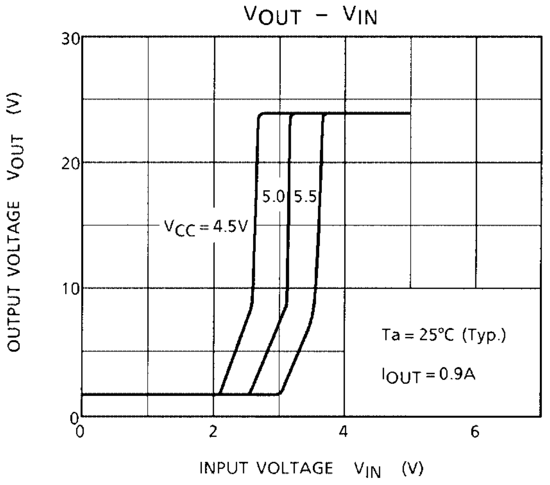
Note 1: Pulse width 50 μs, Duty Cycle 10%
Output Impedance 50 Ω tr ≤ 5 ns, tf ≤ 10 ns

Note 2: C_L includes probe and jig capacitance.

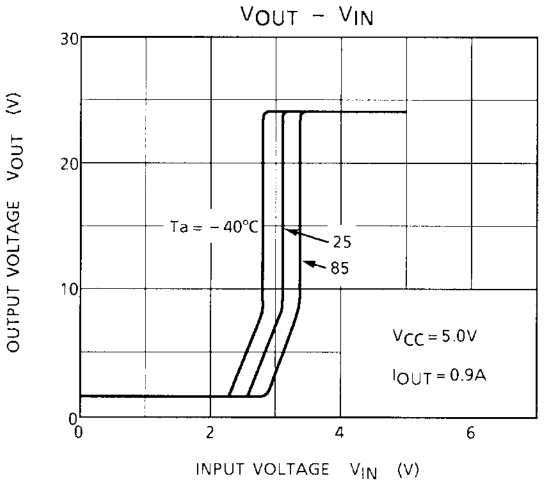
7. V_{cef}



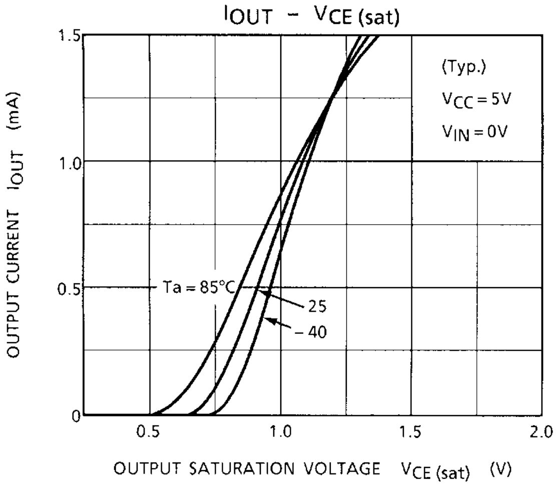
I_{cef} = 150mA
(at Single Pulse = 5ms)



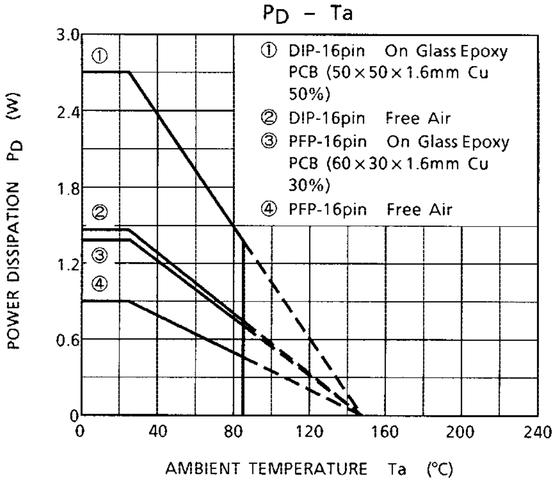
V_{OUT} – V_{IN}
OUTPUT VOLTAGE V_{OUT} (V)
30
20
10
0
INPUT VOLTAGE V_{IN} (V)
0
2
4
6
V_{CC} = 4.5V
5.0
5.5
Ta = 25°C (Typ.)
I_{OUT} = 0.9A



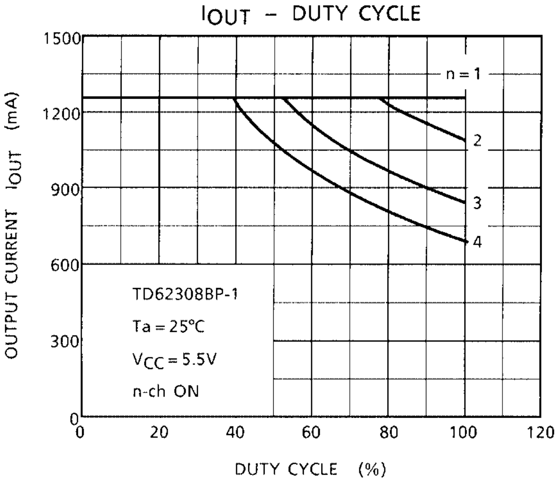
V_{OUT} – V_{IN}
OUTPUT VOLTAGE V_{OUT} (V)
30
20
10
0
INPUT VOLTAGE V_{IN} (V)
0
2
4
6
Ta = – 40°C
25
85
V_{CC} = 5.0V
I_{OUT} = 0.9A



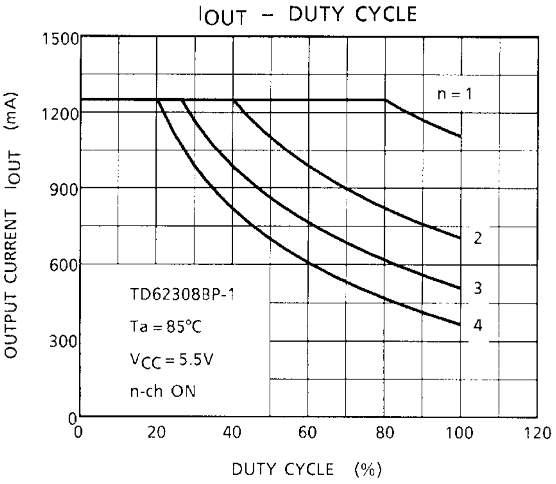
I_{OUT} – $V_{CE (sat)}$
OUTPUT CURRENT I_{OUT} (mA)
1.5
1.0
0.5
0
OUTPUT SATURATION VOLTAGE $V_{CE (sat)}$ (V)
0.5
1.0
1.5
2.0
(Typ.)
V_{CC} = 5V
V_{IN} = 0V
Ta = 85°C
25
– 40



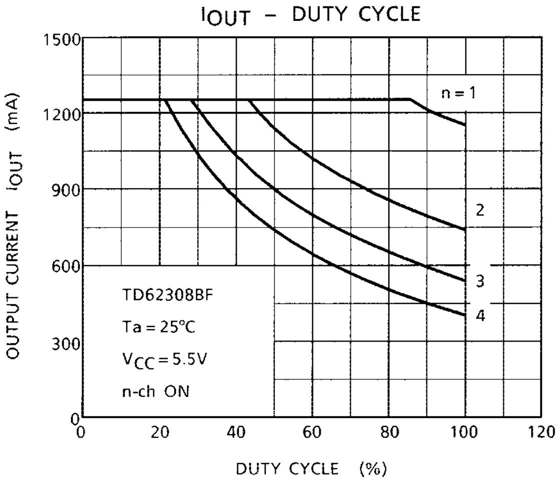
P_D – Ta
POWER DISSIPATION P_D (W)
3.0
2.4
1.8
1.2
0.6
0
AMBIENT TEMPERATURE Ta (°C)
0
40
80
120
160
200
240
①
②
③
④
① DIP-16pin On Glass Epoxy PCB (50 × 50 × 1.6mm Cu 50%)
② DIP-16pin Free Air
③ PFP-16pin On Glass Epoxy PCB (60 × 30 × 1.6mm Cu 30%)
④ PFP-16pin Free Air

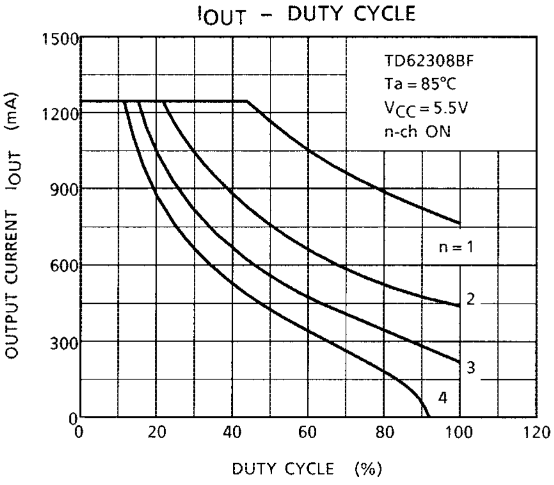


I_{OUT} – DUTY CYCLE
OUTPUT CURRENT I_{OUT} (mA)
1500
1200
900
600
300
0
DUTY CYCLE (%)
0
20
40
60
80
100
120
n = 1
2
3
4
TD62308BP-1
Ta = 25°C
V_{CC} = 5.5V
n-ch ON



I_{OUT} – DUTY CYCLE
OUTPUT CURRENT I_{OUT} (mA)
1500
1200
900
600
300
0
DUTY CYCLE (%)
0
20
40
60
80
100
120
n = 1
2
3
4
TD62308BP-1
Ta = 85°C
V_{CC} = 5.5V
n-ch ON

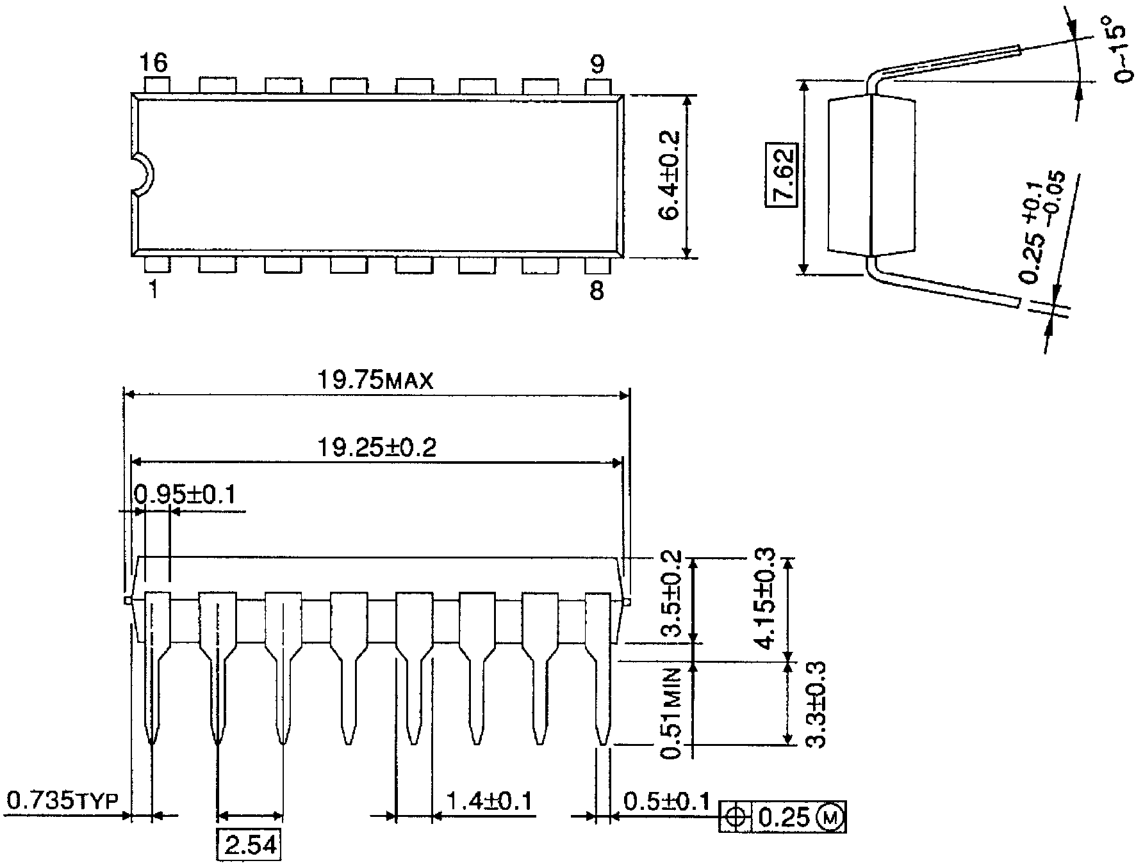

I_{OUT} – DUTY CYCLE
OUTPUT CURRENT I_{OUT} (mA)
1500
1200
900
600
300
0
0
20
40
60
80
100
120
DUTY CYCLE (%)
n = 1
2
3
4
TD62308BF
Ta = 25°C
V_{CC} = 5.5V
n-ch ON


I_{OUT} – DUTY CYCLE
OUTPUT CURRENT I_{OUT} (mA)
1500
1200
900
600
300
0
0
20
40
60
80
100
120
DUTY CYCLE (%)
TD62308BF
Ta = 85°C
V_{CC} = 5.5V
n-ch ON
n = 1
2
3
4

PACKAGE DIMENSIONS

DIP16−P−300−2.54A

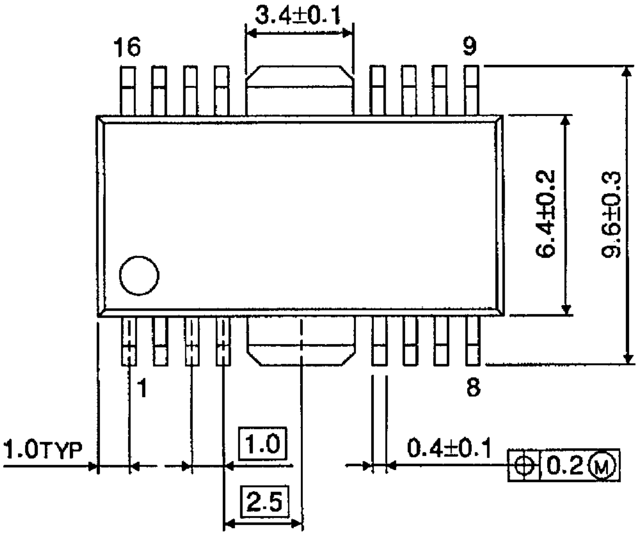
Unit: mm

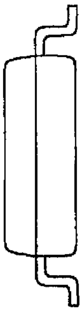


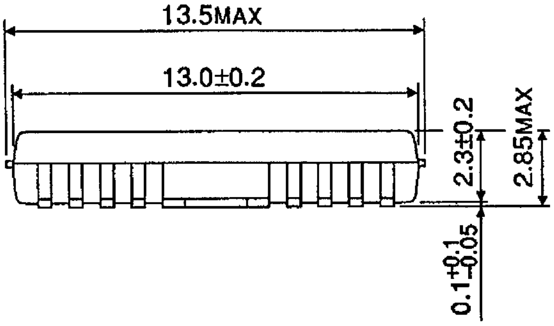
Weight: 1.11 g (Typ.)

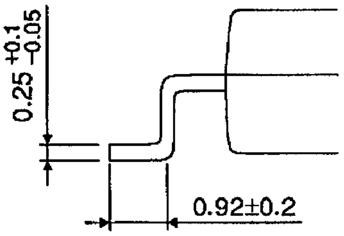
PACKAGE DIMENSIONS

HSOP16−P−300−1.00 Unit: mm









Weight: 0.50 g (Typ.)

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