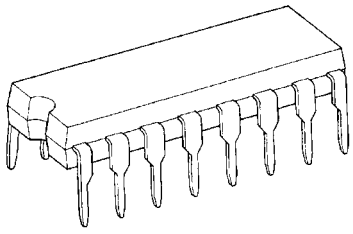
TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TD62308AP,TD62308F,TD62308AF

4CH LOW INPUT ACTIVE HIGH−CURRENT DARLINGTON SINK DRIVER

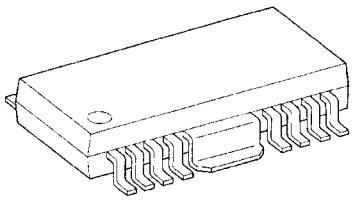
The TD62308AP/F/AF is a non−inverting transistor array which is comprised of four NPN darlington output stages and PNP input stages.
This device is low−level input active driver and is suitable for operation with 5−V TTL, 5−V CMOS and 5−V Microprocessor which have sink current output drivers.
Application include relay, hammer, lamp and stepping motor drivers.

TD62308AP



DIP16-P-300-2.54A

TD62308F
TD62308AF



HSOP16-P-300-1.00

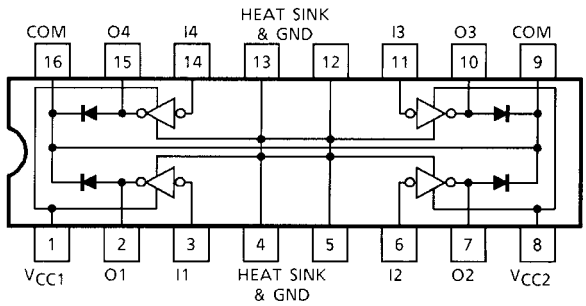
Weight
DIP16−P−300−2.54A : 1.11 g (Typ.)
HSOP16−P−300−1.00 : 0.50 g (Typ.)

FEATURES

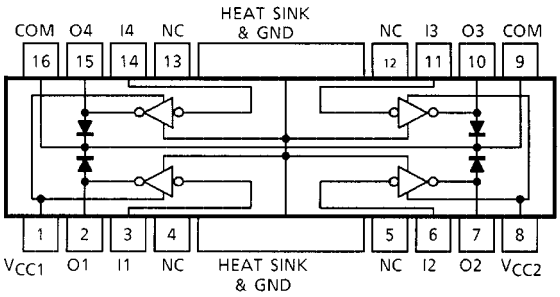
- Output current (single output) 1.5 A (Max)
- High sustaining voltage output 35 V (Min) (TD62308F)
  50 V (Min)
  (TD62308AP, TD62308AF)
- Output clamp diodes
- Input compatible with TTL and 5 V CMOS
- Low level active inputs
- Standard supply voltage
- Two V_{CC} terminals V_{CC1}, V_{CC2} (separated)
- GND and SUB terminal = heat sink
- Package type−AP : DIP−16 pin
- Package type−F, AF : HSOP−16 pin

PIN CONNECTION (TOP VIEW)

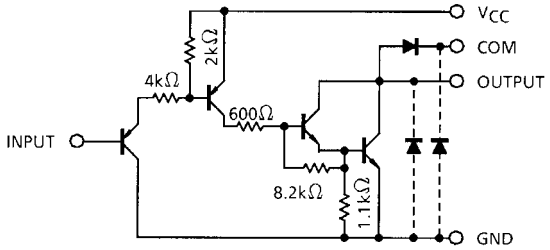
TD62308AP



TD62308F, TD62308AF



SCHEMATICS (EACH DRIVER)



Note : The input and 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 TD62308AP/F/AF 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}	−0.5~10	V
Output Sustaining Voltage	F	$V_{CE\ (SUS)}$	−0.5~35	V
	AP, AF		−0.5~50	
Output Current		I_{OUT}	1.5	A / ch
Input Current		I_{IN}	−10	mA
Input Voltage		V_{IN}	−0.5~30	V
Clamp diode Reverse Voltage	F	V_R	35	V
	AP, AF		50	
Clamp Diode Forward Current		I_F	1.5	A
Power Dissipation	AP	P_D	1.47 / 2.7 (Note 1)	W
	F, AF		0.9 / 1.4 (Note 2)	
Operating Temperature		T_{opr}	−40~85	°C
Storage Temperature		T_{stg}	−55~150	°C

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 50%)

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

CHARACTERISTIC		SYMBOL	CONDITION		MIN	TYP.	MAX	UNIT
Supply Voltage		V_{CC}	—		4.5	—	5.5	V
Output Sustaining Voltage	F	$V_{CE\ (SUS)}$	—		0	—	35	V
	AP, AF		—		0	—	50	
Output Current		I_{OUT}	DC 1 circuit, Ta = 25°C		0	—	1250	mA / ch
	AP		T_{pw} = 25 ms 4 circuits Ta = 85°C T_j = 120°C	Duty = 10%	0	—	1250	
				Duty = 50%	0	—	700	
	F, AF			Duty = 10%	0	—	1250	
				Duty = 50%	0	—	390	
Input Voltage		V_{IN}	—		0	—	25	V
Input Voltage	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	F	V_R	—		—	—	35	V
	AP, AF		—		—	—	50	
Clamp Diode Forward Current		I_F	—		—	—	1.25	A
Power Dissipation	AP	P_D	Ta = 85°C	(Note 1)	—	—	1.4	W
	F, AF		Ta = 85°C	(Note 2)	—	—	0.7	

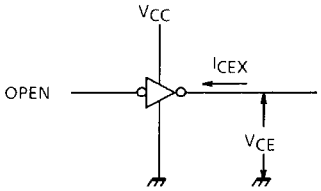
Note 1: On Glass Epoxy PCB (50 × 50 × 1.6 mm Cu 50%)
Note 2: On Glass Epoxy PCB (60 × 30 × 1.6 mm Cu 50%)

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

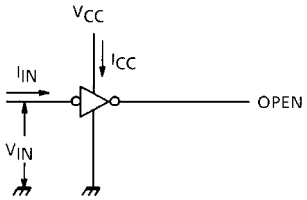
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP.	MAX	UNIT
Output Leakage Current	AP, AF	I_{CEX}	1	V_{CE} = 50 V, Ta = 25°C		—	—	50	μA
				V_{CE} = 50 V, Ta = 85°C		—	—	100	
	F			V_{CE} = 35 V, Ta = 25°C		—	—	50	
				V_{CE} = 35 V, Ta = 85°C		—	—	100	
Output Saturation Voltage		$V_{CE\ (sat)}$	3	I_{OUT} = 1.25 A		—	—	1.8	V
				I_{OUT} = 0.7 A		—	—	1.3	
Input Voltage	"H" Level	V_{IH}	—	—		V_{CC} −1.6	—	25	V
	"L" Level	V_{IL}	—	—		—	—	V_{CC} −3.6	
Input Current	"H" Level	I_{IH}	—	—		—	—	10	μA
	"L" Level	I_{IL}				—	−0.05	−0.36	mA
Clamp Diode Reverse Current	AP, AF	I_R	4	V_R = 50 V, Ta = 25°C		—	—	50	μA
	F			V_R = 35 V, Ta = 25°C		—	—	50	
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	$I_{CC\ (OFF)}$		V_{CC} = 5.5 V, V_{IN} = V_{CC}		—	—	1.0	μA
Turn−On Delay	F	t_{ON}	6	C_L = 15 pF	V_{OUT} = 35 V, R_L = 28 Ω	—	0.2	—	μs
	AP, AF				V_{OUT} = 50 V, R_L = 40 Ω				
Turn−Off Delay	F	t_{ON}			V_{OUT} = 35 V, R_L = 28 Ω	—	5.0	—	
	AP, AF				V_{OUT} = 35 V, R_L = 40 Ω				

TEST CIRCUIT

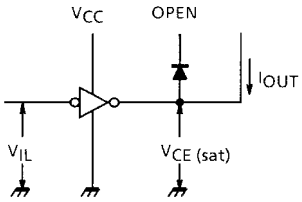
1. I_{CEX}



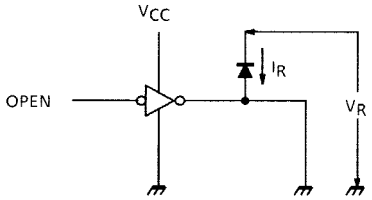
2. I_{CC}



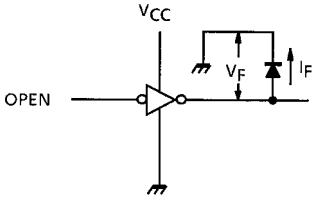
3. $V_{CE\ (sat)}$



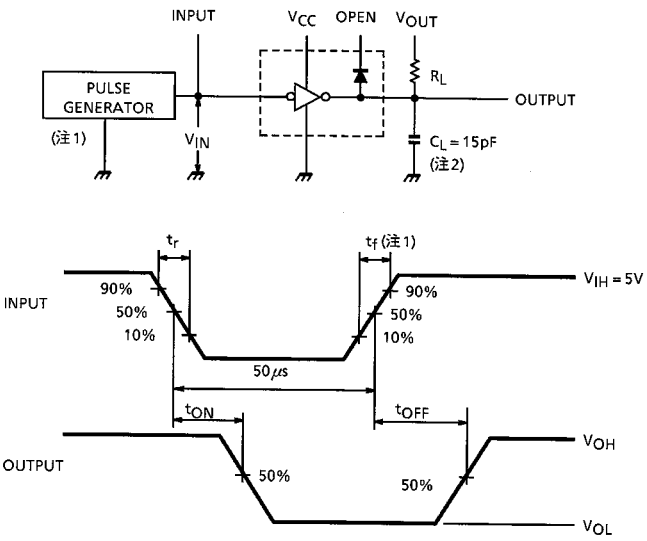
4. IR



5. V_F

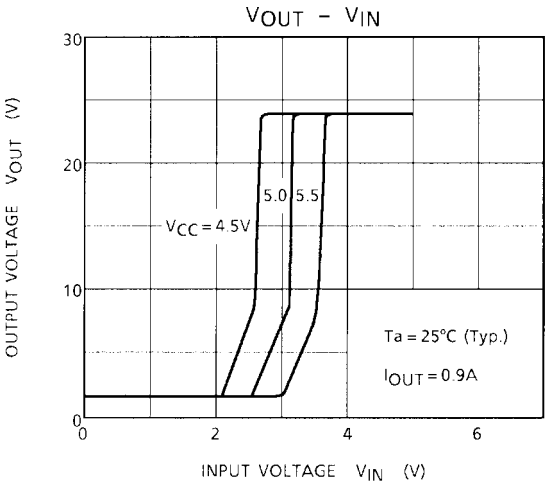


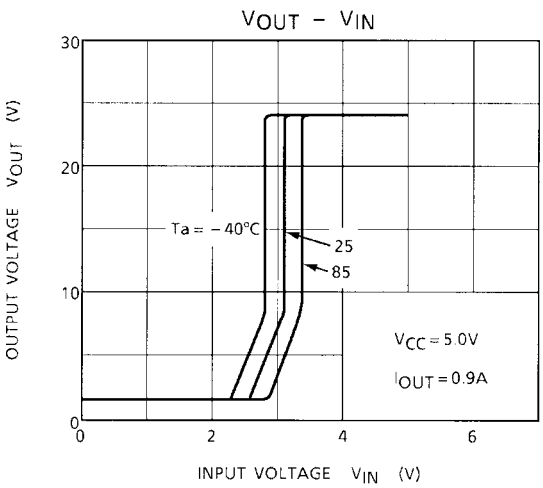
6. t_{ON}、t_{OFF}

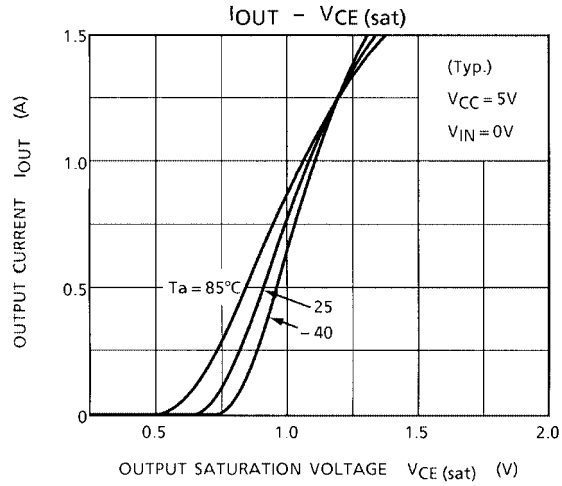


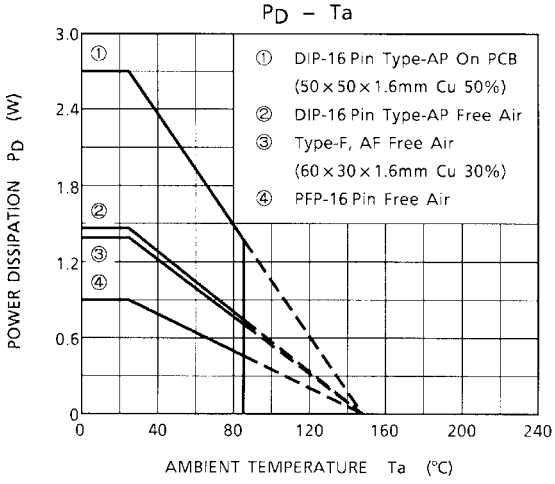
Note 1: Pulse width 50 μs, duty cycle 10%
Output impedance 50 Ω tr ≤ 5 ns, tf ≤ 10 ns

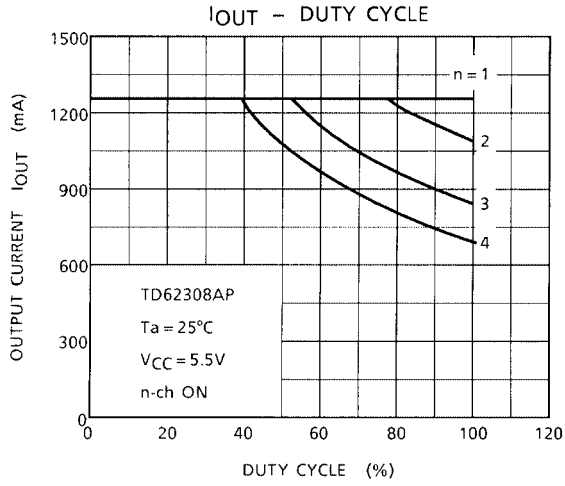
Note 2: CL includes probe and jig capacitance.

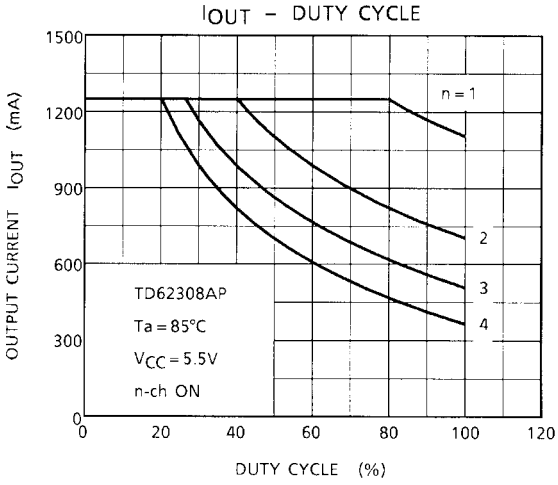

VOUT – VIN
OUTPUT VOLTAGE VOUT (V)
INPUT VOLTAGE VIN (V)
VCC = 4.5V
5.0
5.5
Ta = 25°C (Typ.)
IOUT = 0.9A

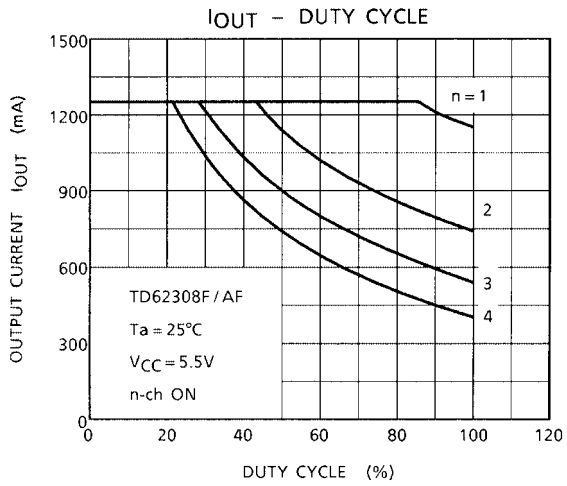

VOUT – VIN
OUTPUT VOLTAGE VOUT (V)
INPUT VOLTAGE VIN (V)
Ta = – 40°C
25
85
VCC = 5.0V
IOUT = 0.9A

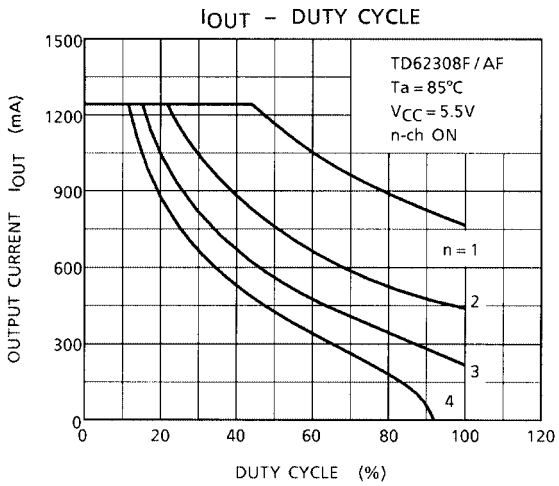

IOUT – VCE (sat)
OUTPUT CURRENT IOUT (A)
OUTPUT SATURATION VOLTAGE VCE (sat) (V)
(Typ.)
VCC = 5V
VIN = 0V
Ta = 85°C
25
– 40


PD – Ta
POWER DISSIPATION PD (W)
AMBIENT TEMPERATURE Ta (°C)
① DIP-16 Pin Type-AP On PCB (50 × 50 × 1.6mm Cu 50%)
② DIP-16 Pin Type-AP Free Air
③ Type-F, AF Free Air (60 × 30 × 1.6mm Cu 30%)
④ PFP-16 Pin Free Air


IOUT – DUTY CYCLE
OUTPUT CURRENT IOUT (mA)
DUTY CYCLE (%)
n = 1
2
3
4
TD62308AP
Ta = 25°C
VCC = 5.5V
n-ch ON

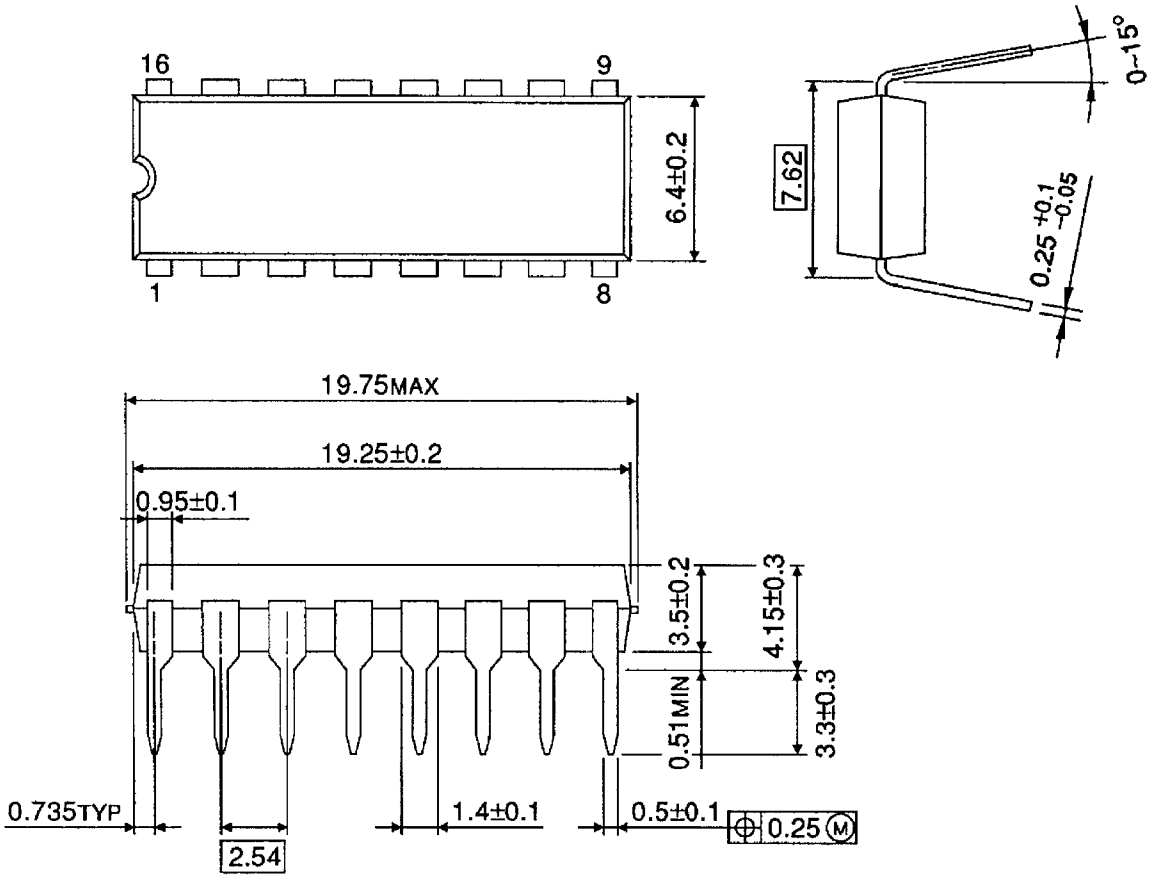

IOUT – DUTY CYCLE
OUTPUT CURRENT IOUT (mA)
DUTY CYCLE (%)
n = 1
2
3
4
TD62308AP
Ta = 85°C
VCC = 5.5V
n-ch ON


IOUT – DUTY CYCLE
OUTPUT CURRENT IOUT (mA)
1500
1200
900
600
300
0
0
20
40
60
80
100
120
DUTY CYCLE (%)
n = 1
2
3
4
TD62308F / AF
Ta = 25°C
VCC = 5.5V
n-ch ON


IOUT – DUTY CYCLE
OUTPUT CURRENT IOUT (mA)
1500
1200
900
600
300
0
0
20
40
60
80
100
120
DUTY CYCLE (%)
TD62308F / AF
Ta = 85°C
VCC = 5.5V
n-ch ON
n = 1
2
3
4

PACKAGE DIMENSIONS

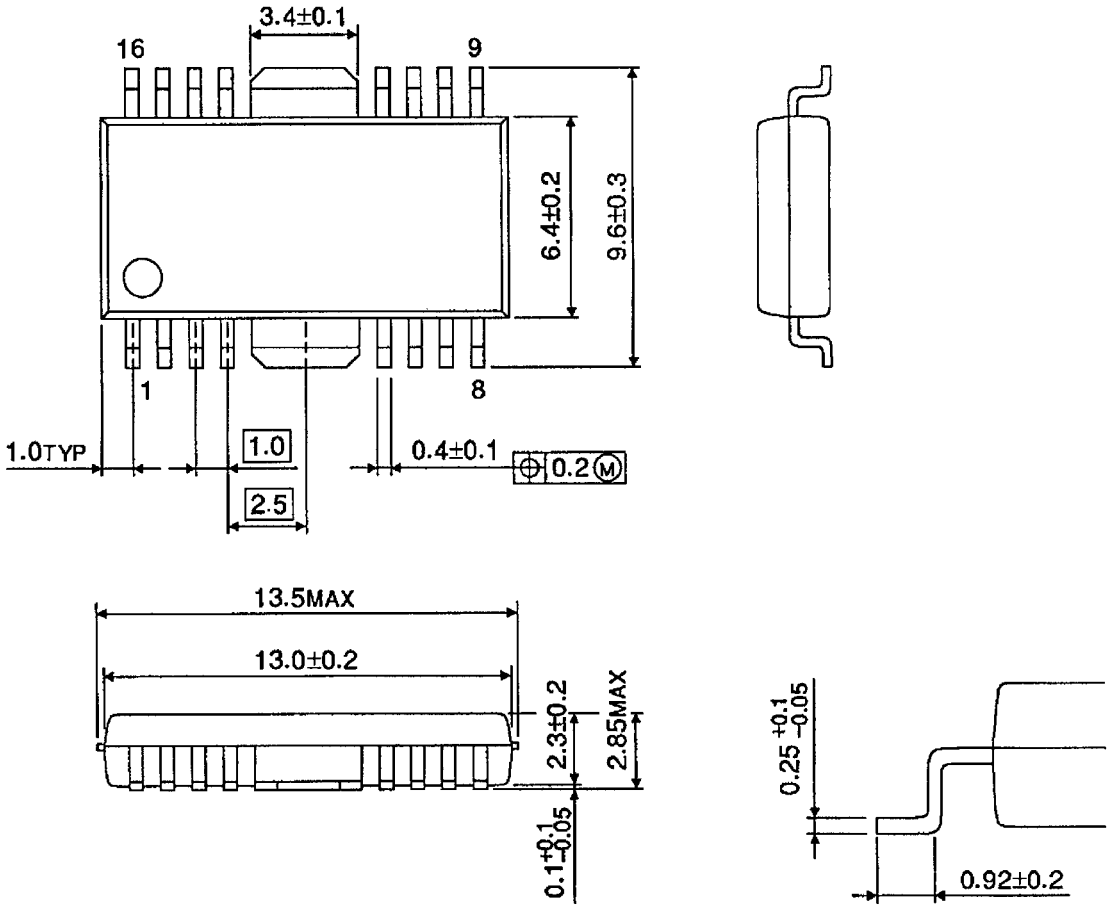
DIP16−P−300−2.54A Unit: mm



Weight: 1.11 g (Typ.)

PACKAGE DIMENSIONS

HSOP16−P−300−1.00 Unit: mm



Weight: 0.50 g (Typ.)

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000707EBA

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