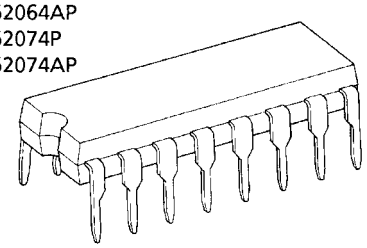
TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TD62064P,TD62064AP,TD62064F,TD62064AF
TD62074P,TD62074AP,TD62074F,TD62074AF

4CH HIGH−CURRENT DARLINGTON SINK DRIVER

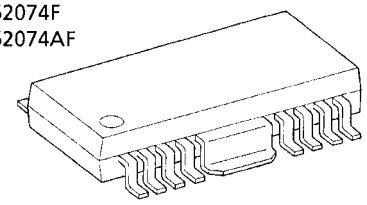
The TD62064P / AP / F / AF and TD62074P / AP / F / AF are high−voltage, high−current darlington drivers comprised of four NPN darlington pairs.
All units feature integral clamp diodes for switching inductive loads and all units of TD62074P / AP / F / AF feature uncommitted collectors and emitters for isolated darlington applications.
For proper operation, the substrate (SUB) must be connected to the most negative voltage.
Applications include relay, hammer, lamp and stepping motor drivers.

TD62064P
TD62064AP
TD62074P
TD62074AP



DIP16-P-300-2.54A

TD62064F
TD62064AF
TD62074F
TD62074AF



HSOP16-P-300-1.00

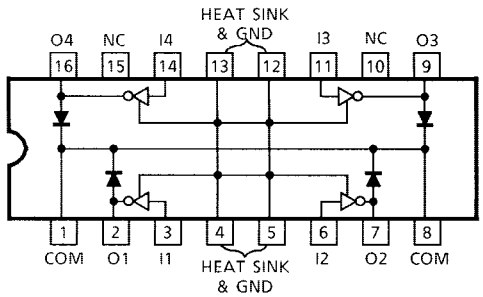
Weight
DIP16−P−300−2.54A : 1.11 g (Typ.)
HSOP16−P−300−1.00 : 0.50 g (Typ.)

FEATURES

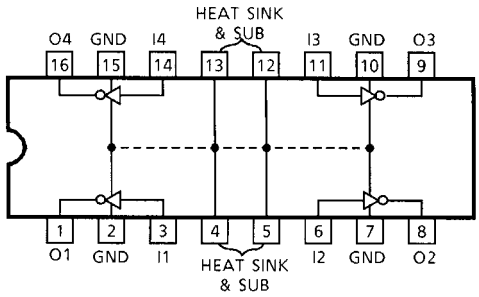
- Output current (single output) 1.5 A (Max)
- High sustaining voltage output
  35 V (Min) (TD62064P / F, 074P / F)
  50 V (Min) (TD62064AP / AF, 074AP / AF)
- Output clamp diodes : TD62064P / AP / F / AF
- Isolated darlington array : TD62074P / AP / F / AF
- Input compatible with TTL and 5 V CMOS
- GND and SUB terminal = heat sink
- Package type−P, AP: DIP−16 pin
- Package type−F, AF: HSOP−16 pin

PIN CONNECTION (TOP VIEW)

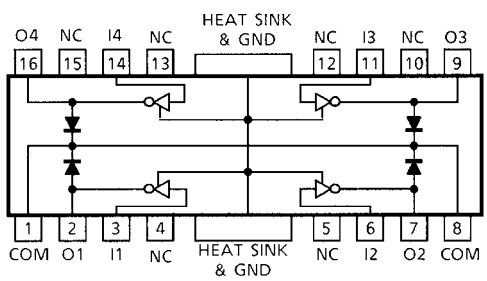
TD62064P / AP



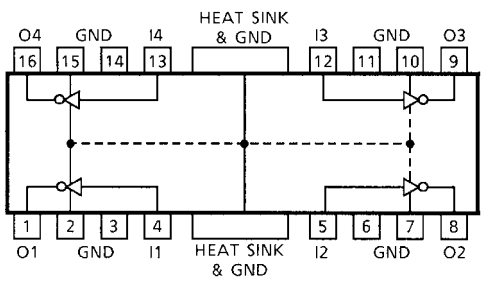
TD62074P / AP



TD62064F / AF

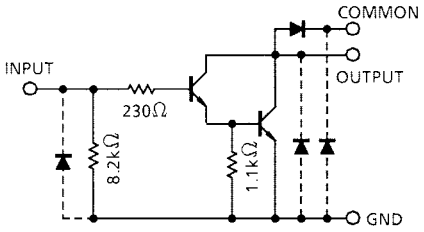


TD62074F / AF

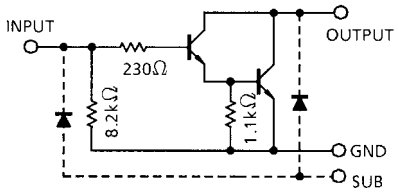


SCHEMATICS (EACH DRIVER)

TD62064P / AP / F / AF



TD62074P / AP / F / AF



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, 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 TD62064P/AP/F/AF is being used to drive an inductive load (such as a motor, solenoid or relay), Toshiba recommends that the diodes (pins 1 and 8) 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 1 and 8) 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.

If a TD62074P/AP/F/AF is being used to drive an inductive load (such as a motor, solenoid or relay), Toshiba recommends that a diode be connected between the output pin (as the anode) and the secondary power supply pin. Please adhere to the device's maximum ratings.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Output Sustaining Voltage	P, 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}	50	mA
Input Voltage		V_{IN}	−0.5~17	V
Clamp Diode Reverse Voltage	P, F	V_R (Note 1)	35	V
	AP, AF		50	
Clamp Diode Forward Current		I_F (Note 1)	1.5	A / ch
Isolated Voltage	P, F	V_{SUB} (Note 2)	35	V
	AP, AF		50	
Power Dissipation	P, AP	P_D	1.47 / 2.7 (Note 3)	W
	F, AF		0.9 / 1.4 (Note 4)	
Operating Temperature		T_{opr}	−40~85	°C
Storage Temperature		T_{stg}	−55~150	°C

Note 1: TD62064P / AP / F / AF
Note 2: TD62074P / AP / F / AF
Note 3: On Glass Epoxy PCB (50 × 50 × 1.6 mm Cu 50%)
Note 4: On Glass Epoxy PCB (60 × 30 × 1.6 mm Cu 30%)

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

CHARACTERISTIC		SYMBOL	TEST CONDITION		MIN	TYP.	MAX	UNIT
Output Sustaining Voltage	P, F	$V_{CE\ (SUS)}$			0	—	35	V
	AP, AF				0	—	50	
Output Current		I_{OUT}	DC1 Circuit, Ta = 25°C		0	—	1250	mA / ch
	P, AP (Note 1)		T_{pw} = 25 ms 4 Circuits T_j = 120°C Ta = 85°C	Duty = 10 %	0	—	1250	
				Duty = 50 %	0	—	390	
	F, AF (Note 2)			Duty = 10 %	0	—	907	
				Duty = 50 %	0	—	172	
Input Voltage		V_{IN}			0	—	8	V
	(Output On)	$V_{IN\ (ON)}$	I_{OUT} = 1.25 A		2.5	—	8	V
	(Output Off)	$V_{IN\ (OFF)}$			0	—	0.4	V
Input Current		I_{IN}			0	—	20	mA
Clamp Diode Reverse Voltage	P, F	V_R	TD62064P / AP / F / AF		0	—	35	V
	AP, AF				0	—	50	
Clamp Diode Forward Current		I_F			—	—	1.25	A
Isolation Voltage	P, F	V_{SUB}	TD62074P / AP / F / AF		—	—	35	V
	AP, AF				—	—	50	
Power Dissipation	P, AP	P_D	Ta = 85°C	(Note 1)	—	—	1.4	W
	F, AF		Ta = 85°C	(Note 2)	—	—	0.7	

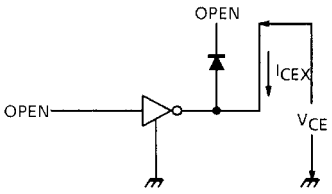
Note 1: On Glass Epoxy PCB (50 × 50 × 1.6 mm Cu 50%)
Note 2: On Glass Epoxy PCB (60 × 30 × 1.6 mm Cu 30%)

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

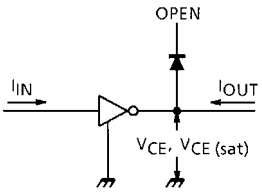
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP.	MAX	UNIT
Output Leakage Current	AP, AF	I_{CEX}	1	V_{CE} = 50 V, Ta = 25°C		—	—	50	μA
				V_{CE} = 50 V, Ta = 85°C		—	—	500	
	P, F			V_{CE} = 35 V, Ta = 25°C		—	—	50	
				V_{CE} = 35 V, Ta = 85°C		—	—	500	
Collector−Emitter Saturation Voltage		$V_{CE\ (sat)}$	2	I_{OUT} = 1.25 A, I_{IN} = 2 mA		—	—	1.6	V
				I_{OUT} = 0.75 A, I_{IN} = 935 μA		—	—	1.25	
DC Current Transfer Ratio		h_{FE}	2	V_{CE} = 2 V	I_{OUT} = 1.0 A	—	800	—	
					I_{OUT} = 0.25 A	—	1500	—	
Input Voltage (Output On)		$V_{IN\ (ON)}$	3	I_{OUT} = 1.25 A, I_{IN} = 2 mA		—	—	2.4	V
Clamp Diode Leakage Current	AP, AF	I_R	4	V_R = 50 V, Ta = 25°C		—	—	50	μA
				V_R = 50 V, Ta = 85°C		—	—	100	
	F			V_R = 35 V, Ta = 25°C		—	—	50	
				V_R = 35 V, Ta = 85°C		—	—	100	
Clamp Diode Forward Voltage		V_F	5	I_F = 1.25 A		—	—	2	V
Input Capacitance		C_{IN}	6	V_{IN} = 0 V, f = 1MHz		—	15	—	pF
Turn−On Delay	P, F	t_{ON}	7	C_L = 15 pF	V_{OUT} = 35 V, R_L = 29 Ω	—	0.1	—	μs
	AP, AF				V_{OUT} = 50 V, R_L = 42 Ω				
Turn−Off Delay	P, F	t_{OFF}			V_{OUT} = 35 V, R_L = 29 Ω	—	1.0	—	
	AP, AF				V_{OUT} = 50 V, R_L = 42 Ω				

TEST CIRCUIT

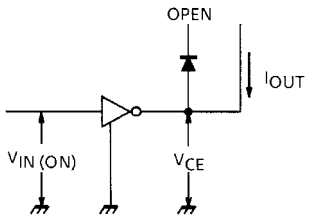
1. I_{CEX}



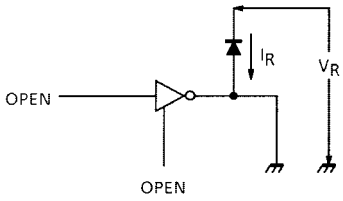
2. $V_{CE\ (sat)}$, h_{FE}



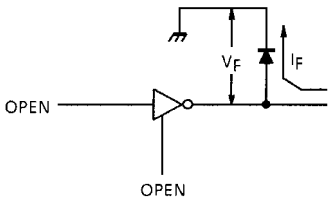
3. $V_{IN\ (ON)}$



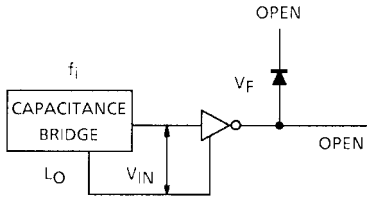
4. I_R



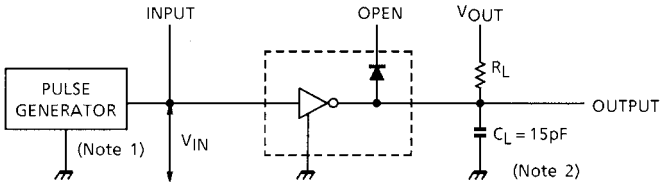
5. V_F

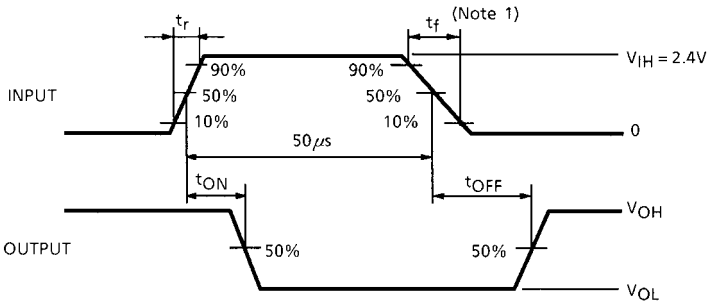


6. C_{IN}



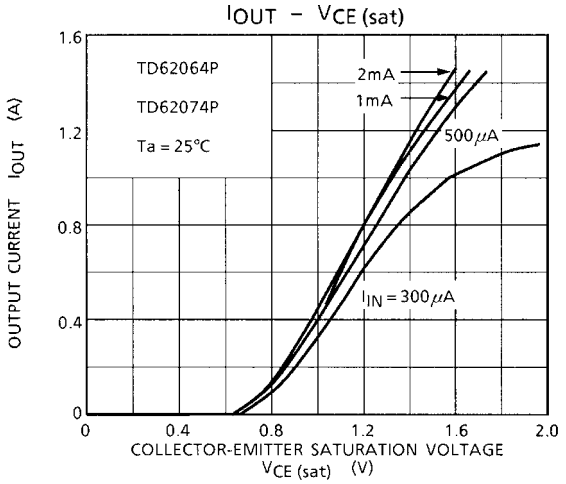
7. t_{ON}, t_{OFF}

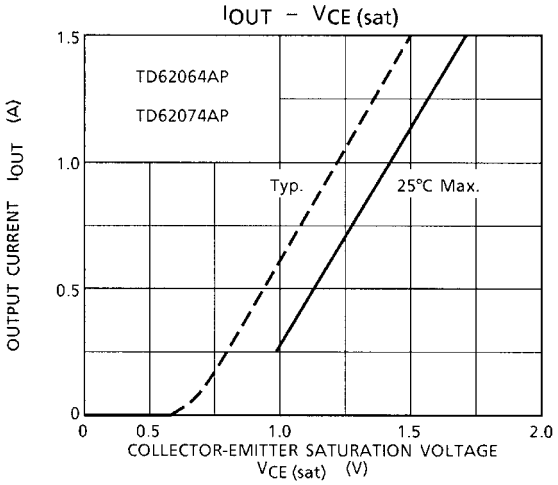


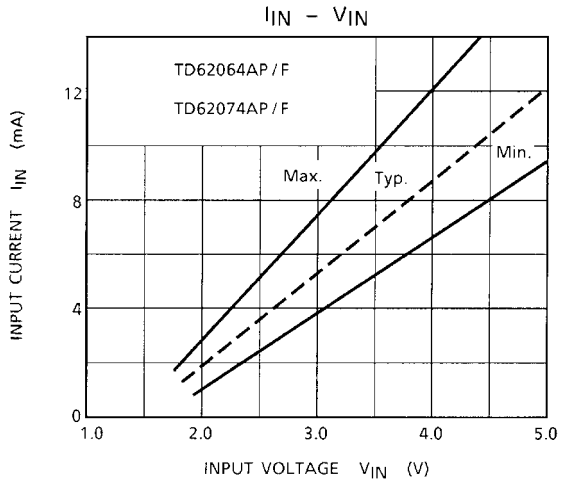


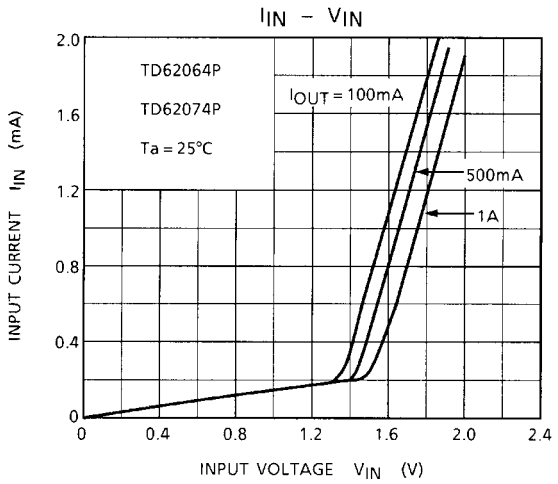
Note 1: Pulse Width 50 μs, Duty Cycle 10%
Output Impedance 50 Ω, $t_r \leq 5$ns, $t_f \leq 10$ns

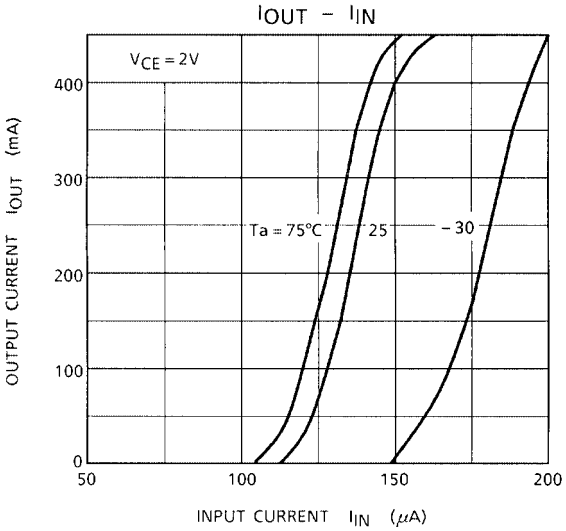
Note 2: C_L includes probe and jig capacitance

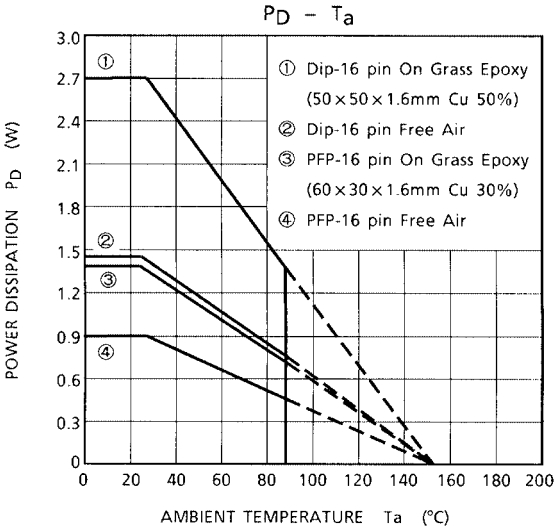

I_{OUT} – V_{CE} (sat)
TD62064P
TD62074P
Ta = 25°C
2mA
1mA
500μA
I_{IN} = 300μA
OUTPUT CURRENT I_{OUT} (A)
COLLECTOR-EMITTER SATURATION VOLTAGE
$V_{CE (sat)}$ (V)

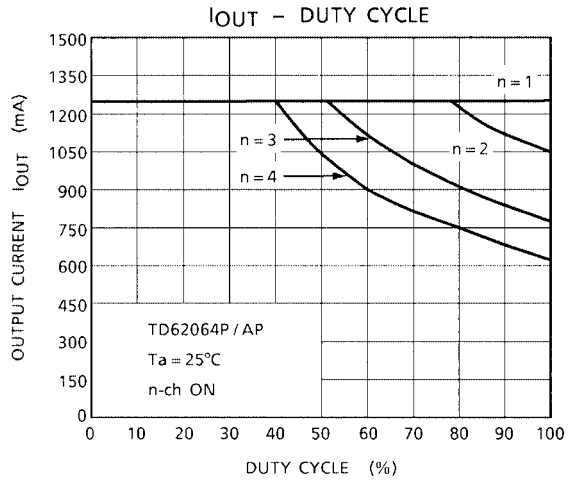

I_{OUT} – V_{CE} (sat)
TD62064AP
TD62074AP
Typ.
25°C Max.
OUTPUT CURRENT I_{OUT} (A)
COLLECTOR-EMITTER SATURATION VOLTAGE
$V_{CE (sat)}$ (V)

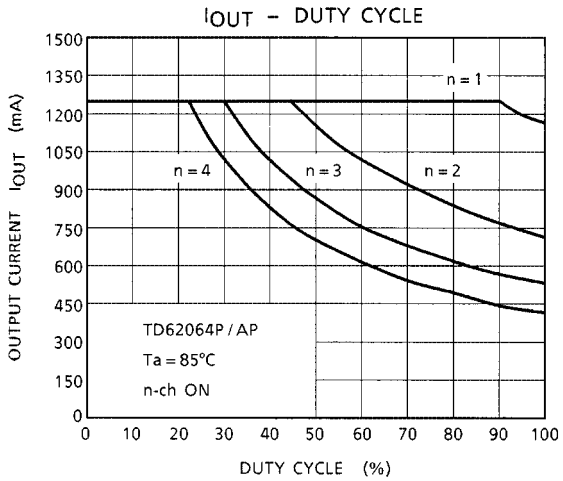

I_{IN} – V_{IN}
TD62064AP / F
TD62074AP / F
Max.
Typ.
Min.
INPUT CURRENT I_{IN} (mA)
INPUT VOLTAGE V_{IN} (V)

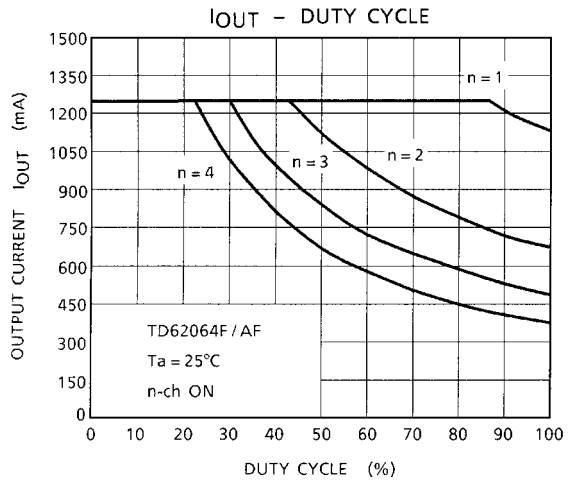

I_{IN} – V_{IN}
TD62064P
TD62074P
Ta = 25°C
I_{OUT} = 100mA
500mA
1A
INPUT CURRENT I_{IN} (mA)
INPUT VOLTAGE V_{IN} (V)

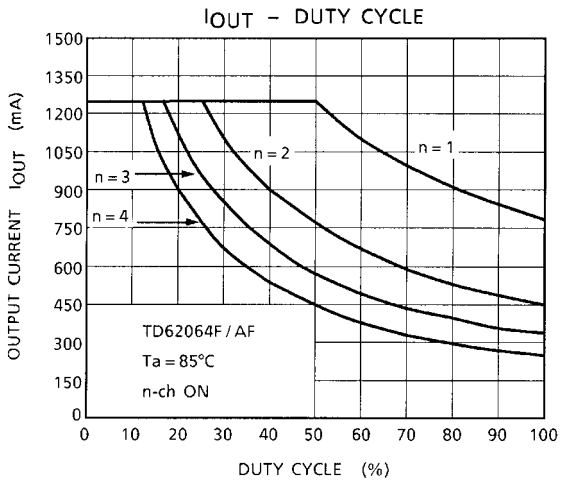

I_{OUT} – I_{IN}
V_{CE} = 2V
Ta = 75°C
25
– 30
OUTPUT CURRENT I_{OUT} (mA)
INPUT CURRENT I_{IN} (μA)


P_D – Ta
① Dip-16 pin On Grass Epoxy
(50×50×1.6mm Cu 50%)
② Dip-16 pin Free Air
③ PFP-16 pin On Grass Epoxy
(60×30×1.6mm Cu 30%)
④ PFP-16 pin Free Air
POWER DISSIPATION P_D (W)
AMBIENT TEMPERATURE Ta (°C)


IOUT – DUTY CYCLE
OUTPUT CURRENT IOUT (mA)
DUTY CYCLE (%)
n = 1
n = 2
n = 3
n = 4
TD62064P / AP
Ta = 25°C
n-ch ON

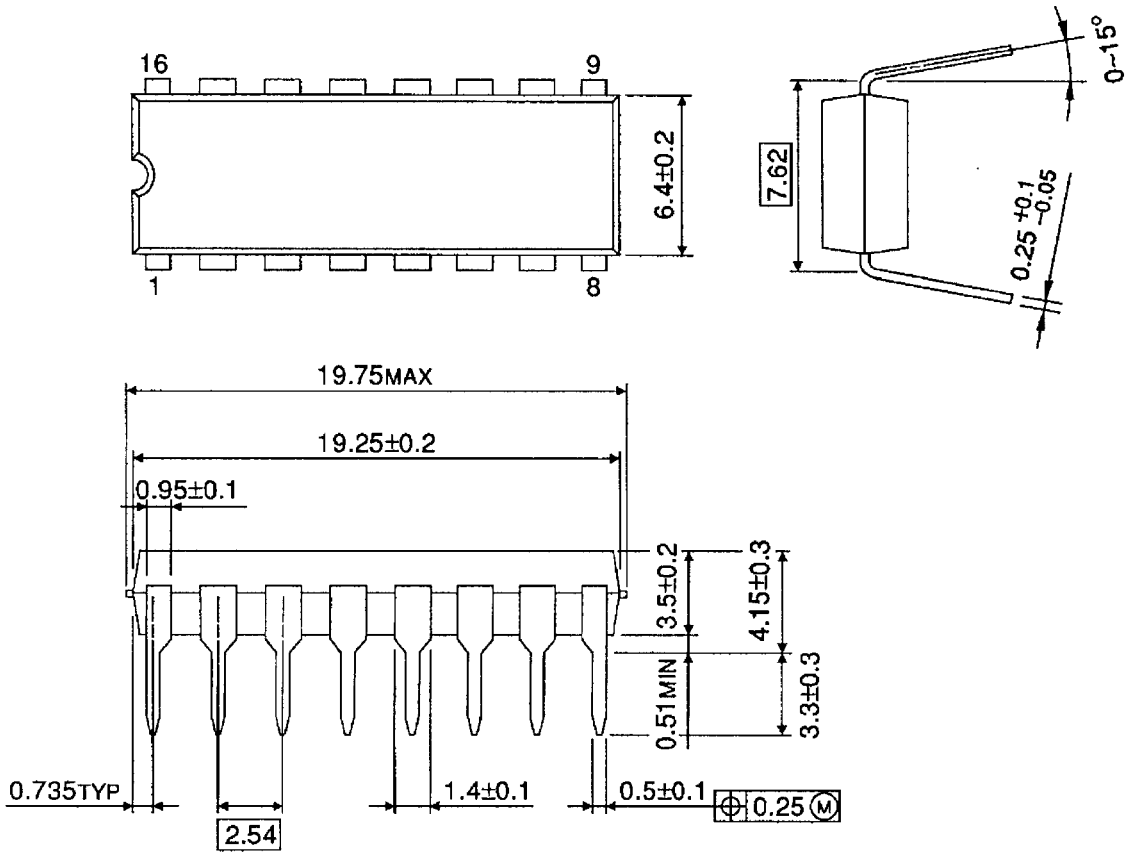

IOUT – DUTY CYCLE
OUTPUT CURRENT IOUT (mA)
DUTY CYCLE (%)
n = 1
n = 2
n = 3
n = 4
TD62064P / AP
Ta = 85°C
n-ch ON


IOUT – DUTY CYCLE
OUTPUT CURRENT IOUT (mA)
DUTY CYCLE (%)
n = 1
n = 2
n = 3
n = 4
TD62064F / AF
Ta = 25°C
n-ch ON


IOUT – DUTY CYCLE
OUTPUT CURRENT IOUT (mA)
DUTY CYCLE (%)
n = 1
n = 2
n = 3
n = 4
TD62064F / AF
Ta = 85°C
n-ch ON

PACKAGE DIMENSIONS

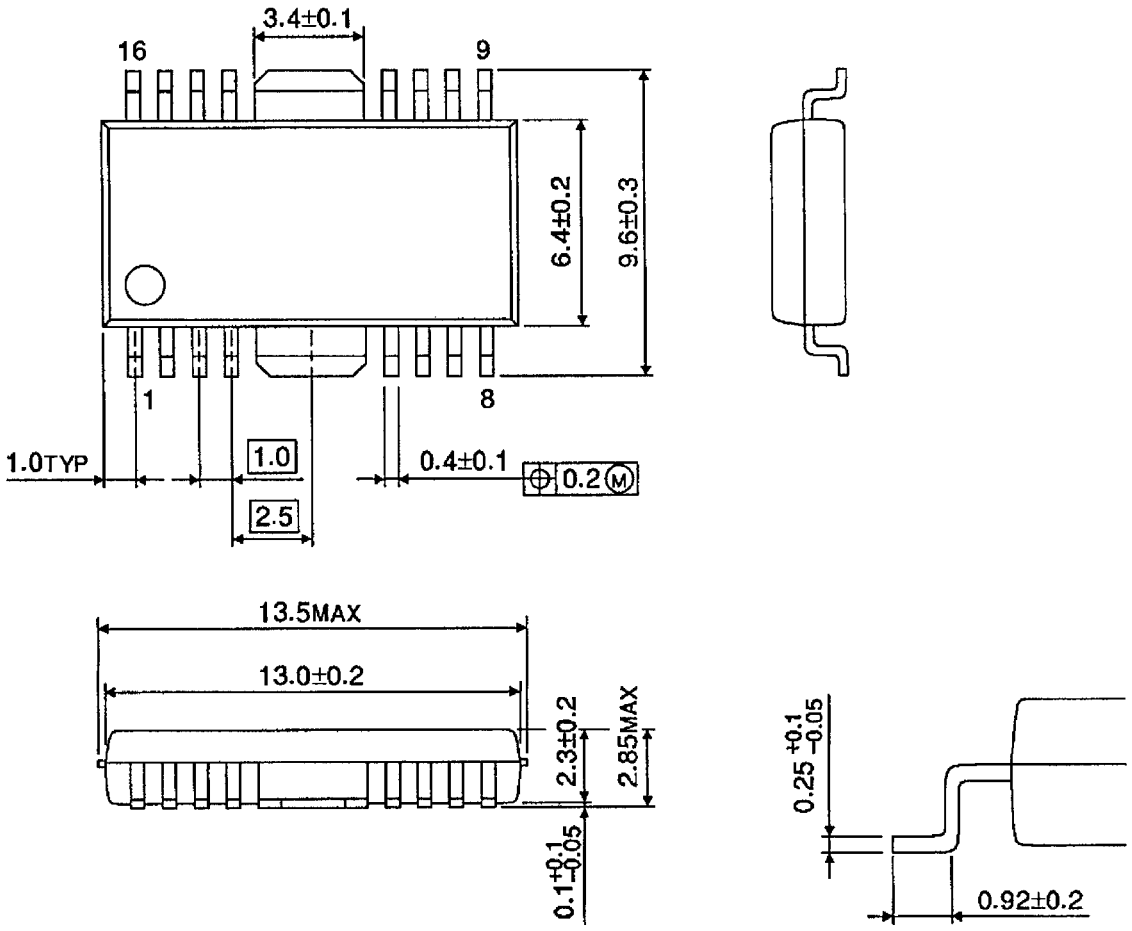
DIP16−P−300−2.54A Unit : mm



Weight: 1.11 g (Typ.)

PACKAGE DIMENSIONS

HSOP16−P−300−1.00 Unit : mm



Weight: 0.50 g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

- TOSHIBA is continually working to improve the quality and 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 comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products 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 TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer’s own risk.
- The products described in this document are subject to the foreign exchange and foreign trade 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.