TOSHIBA Bipolar Digital Integrated Circuit Silicon Monolithic

TD62064APG, TD62064AFG, TD62074APG, TD62074AFG

4ch High-Current Darlington Sink Driver

The TD62064APG/AFG and TD62074APG/AFG 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 TD62074APG/AFG feature uncommitted collectors and emitters for isolated darlington applications.

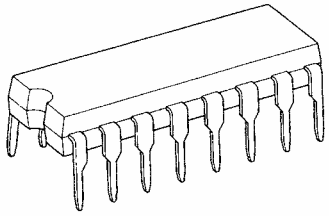
For proper operation, the substrate (SUB) must be connected to the most negative voltage.

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

Features

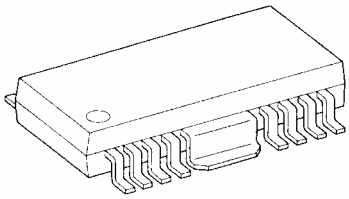
- Output current (single output) 1.5 A (max)
- High sustaining voltage output
  50 V (min) (TD62064APG/AFG, 074APG/AFG)
- Output clamp diodes: TD62064APG/AFG
- Isolated darlington array: TD62074APG/AFG
- Input compatible with TTL and 5 V CMOS
- GND and SUB terminal = Heat sink
- Package type-APG: DIP-16 pin
- Package type-AFG: HSOP-16 pin

TD62064APG
TD62074APG



DIP16-P-300-2.54A

TD62064AFG
TD62074AFG

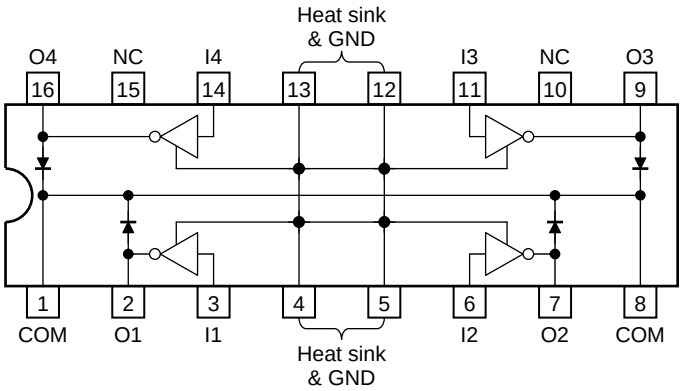


HSOP16-P-300-1.00

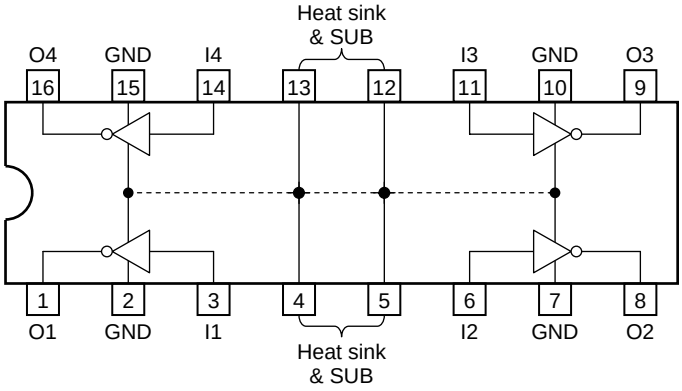
Weight
DIP16-P-300-2.54A: 1.11 g (typ.)
HSOP16-P-300-1.00: 0.50 g (typ.)

Pin Assignment (top view)

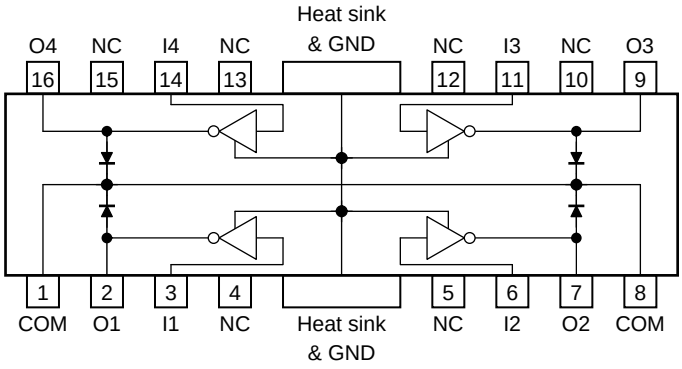
TD62064APG



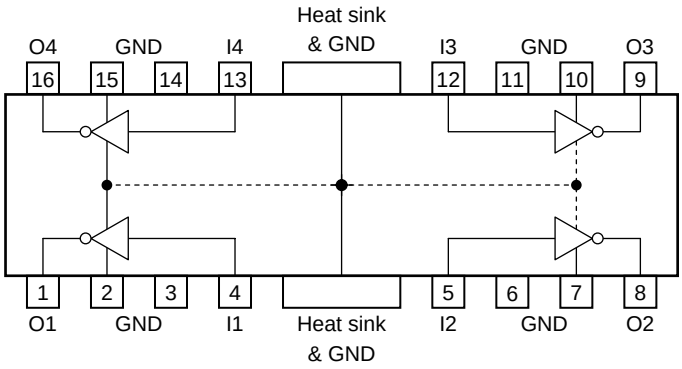
TD62074APG



TD62064AFG

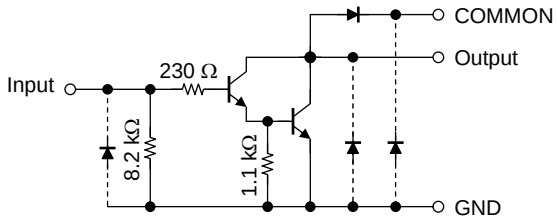


TD62074AFG

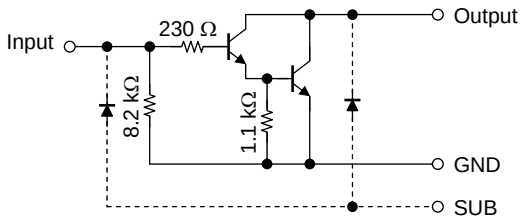


Schematics (each driver)

TD62064APG/AFG



TD62074APG/AFG



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 TD62064APG/AFG 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 TD62074APG/AFG 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)

Characteristics		Symbol	Rating	Unit
Output sustaining voltage		$V_{CE\ (SUS)}$	−0.5 to 50	V
Output current		I_{OUT}	1.5	A/ch
Input current		I_{IN}	50	mA
Input voltage		V_{IN}	−0.5 to 17	V
Clamp diode reverse voltage		V_R (Note 1)	50	V
Clamp diode forward current		I_F (Note 1)	1.5	A
Isolated voltage		V_{SUB} (Note 2)	50	V
Power dissipation	APG	P_D	1.47/2.7 (Note 3)	W
	AFG		0.9/1.4 (Note 4)	
Operating temperature		T_{opr}	−40 to 85	°C
Storage temperature		T_{stg}	−55 to 150	°C

Note 1: TD62064APG/AFG

Note 2: TD62074APG/AFG

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 to 85°C)

Characteristics		Symbol	Test Condition		Min	Typ.	Max	Unit
Output sustaining voltage		$V_{CE\ (SUS)}$	—		0	—	50	V
Output current		I_{OUT}	DC1 circuit, Ta = 25°C		0	—	1250	mA/ch
	APG (Note 1)		T_{pw} = 25 ms 4 circuits T_j = 120°C Ta = 85°C	Duty = 10%	0	—	1250	
				Duty = 50%	0	—	390	
	AFG (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	
	Output OFF	$V_{IN\ (OFF)}$	—		0	—	0.4	
Input current		I_{IN}	—		0	—	20	mA
Clamp diode reverse voltage		V_R	TD62064APG/AFG		0	—	50	V
Clamp diode forward current		I_F	—		—	—	1.25	A
Isolation voltage		V_{SUB}	TD62074APG/AFG		—	—	50	V
Power dissipation	APG	P_D	Ta = 85°C	(Note 1)	—	—	1.4	W
	AFG		Ta = 85°C	(Note 2)	—	—	0.7	

Note 1: On glass epoxy PCB (50 × 50 × 1.6 mm Cu 50%)

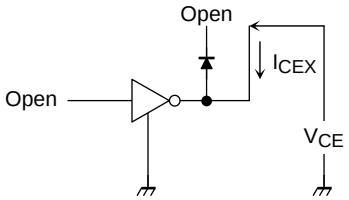
Note 2: On glass epoxy PCB (60 × 30 × 1.6 mm Cu 30%)

Electrical Characteristics (Ta = 25°C)

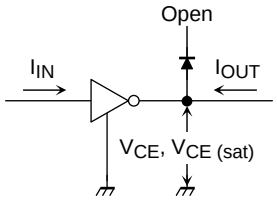
Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output leakage current	I_{CEX}	1	V_{CE} = 50 V, Ta = 25°C		—	—	50	μA
			V_{CE} = 50 V, Ta = 85°C		—	—	500	
Output saturation voltage	$V_{CE\ (sat)}$	2	I_{OUT} = 1.25 A, I_{IN} = 2 mA		—	—	1.6	V
			I_{OUT} = 0.75 A, I_{IN} = 935 μA		—	—	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	I_R	4	V_R = 50 V, Ta = 25°C		—	—	50	μA
			V_R = 50 V, Ta = 85°C		—	—	100	
Clamp diode forward voltage	V_F	5	I_F = 1.25 A		—	—	2.0	V
Input capacitance	C_{IN}	6	V_{IN} = 0 V, f = 1 MHz		—	15	—	pF
Turn-ON delay	t_{ON}	7	C_L = 15 pF, V_{OUT} = 50 V, R_L = 42 Ω		—	0.1	—	μs
Turn-OFF delay	t_{OFF}	7	C_L = 15 pF, V_{OUT} = 50 V, R_L = 42 Ω		—	1.0	—	μs

Test Circuit

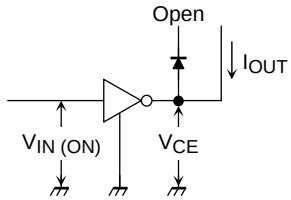
1. I_{CEX}



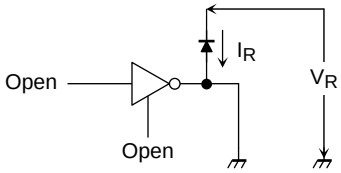
2. $V_{CE\ (sat)}$, h_{FE}



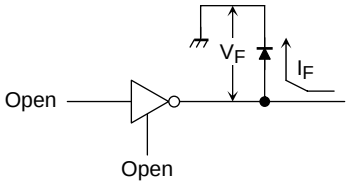
3. $V_{IN\ (ON)}$



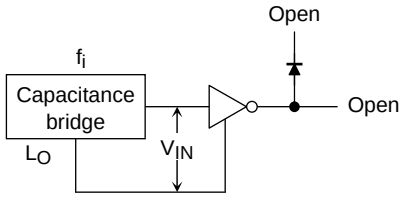
4. I_R



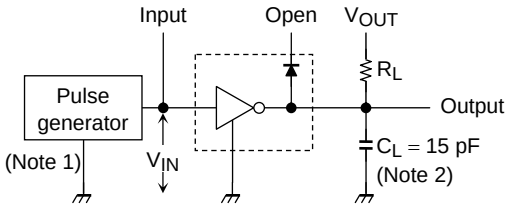
5. V_F

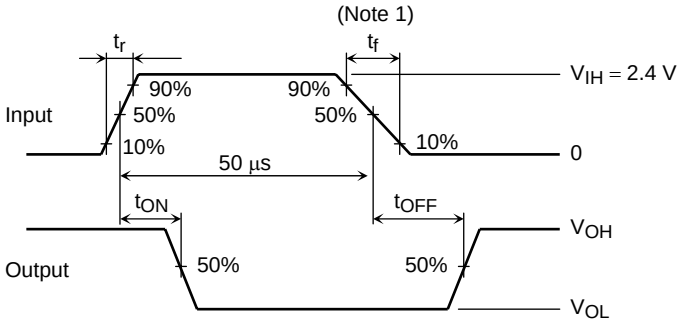


6. C_{IN}



7. t_{ON}, t_{OFF}

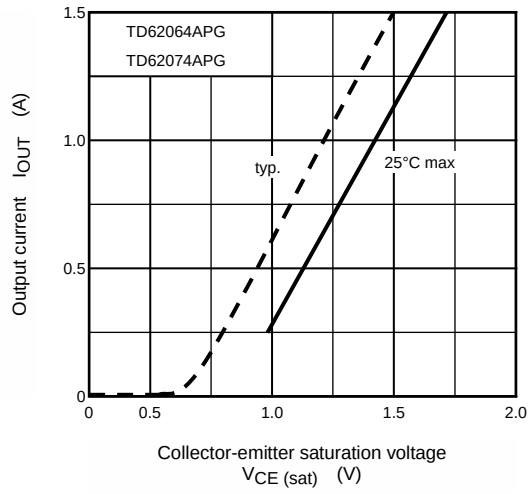




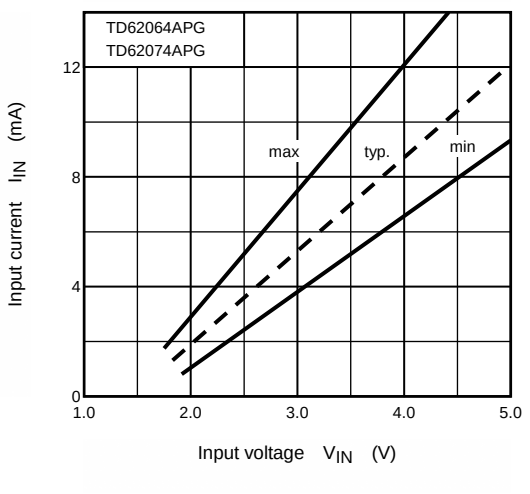
Note 1: Pulse Width 50 μs, Duty Cycle 10%
Output Impedance 50 Ω, $t_r \leq 5$ ns, $t_f \leq 10$ ns

Note 2: C_L includes probe and jig capacitance

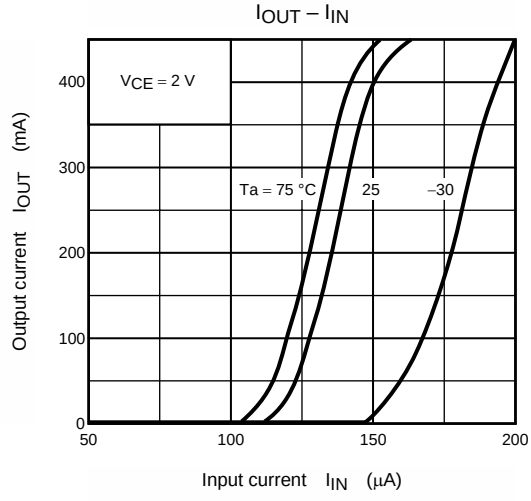
I_{OUT} – V_{CE} (sat)



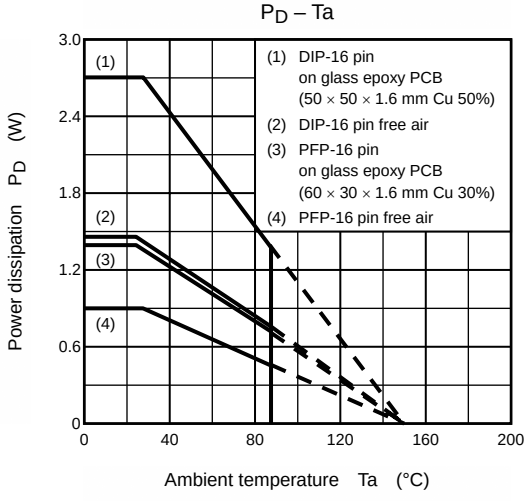
I_{IN} – V_{IN}



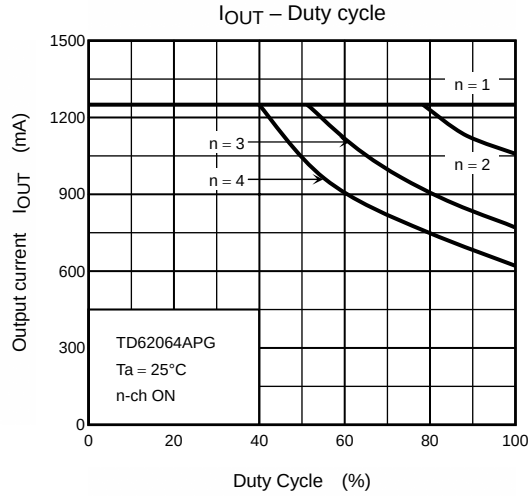
I_{OUT} – I_{IN}



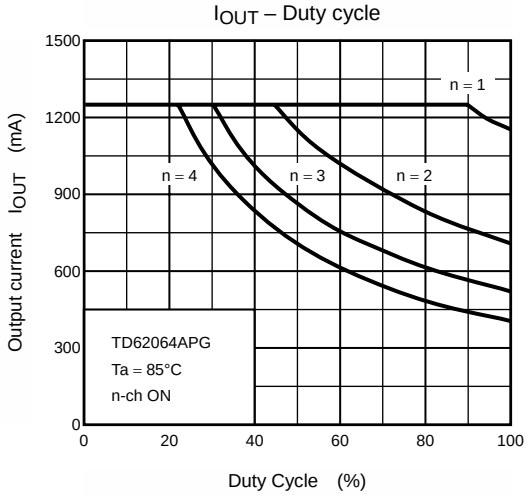
P_D – Ta

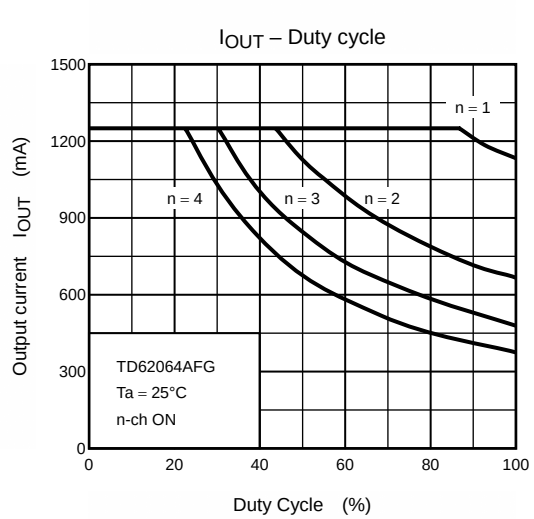


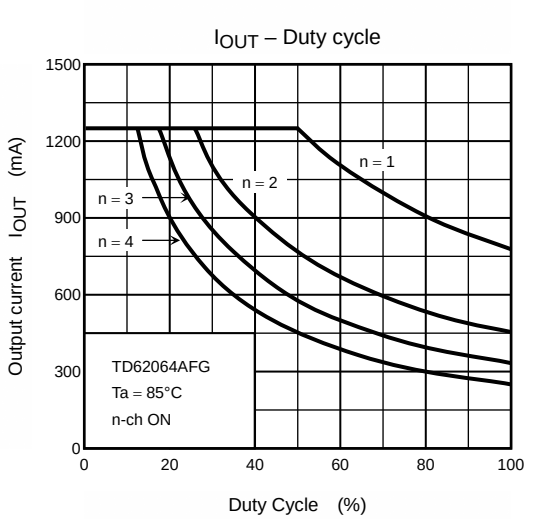
I_{OUT} – Duty cycle



I_{OUT} – Duty cycle

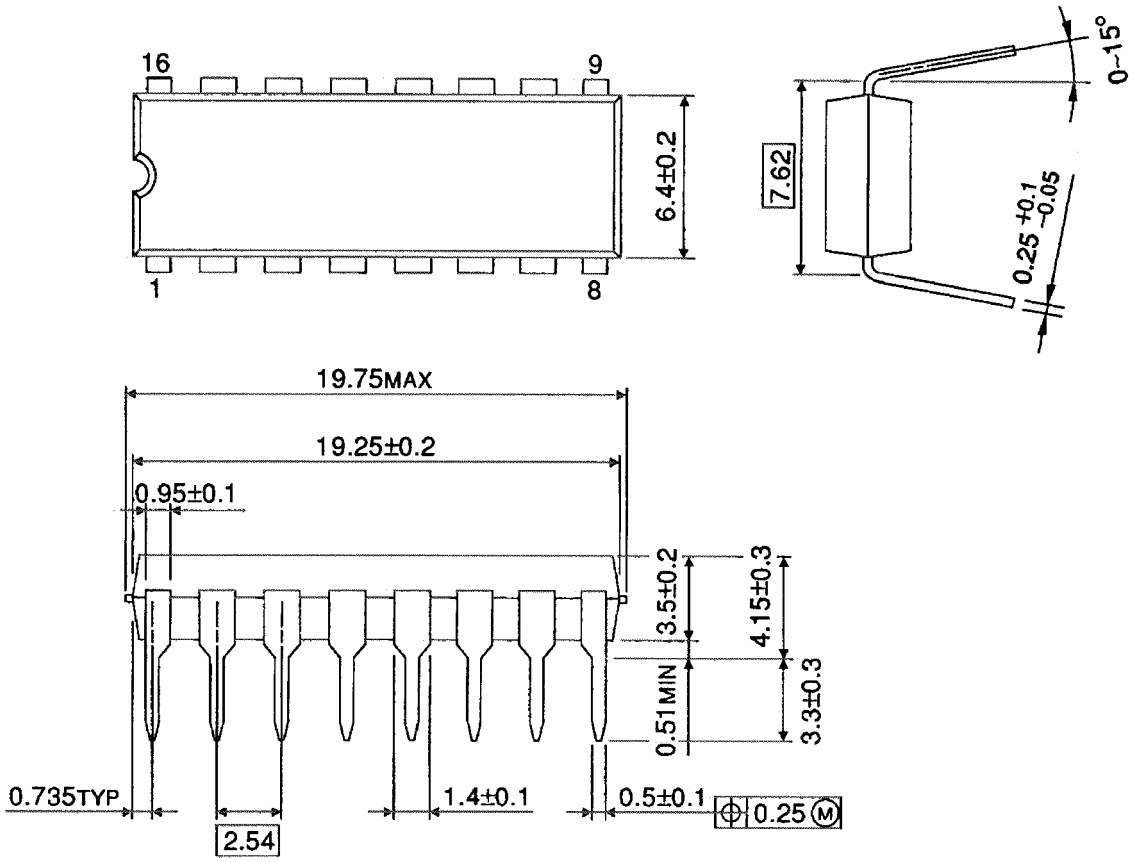



I_{OUT} – Duty cycle
Output current I_{OUT} (mA)
1500
1200
900
600
300
0
0
20
40
60
80
100
Duty Cycle (%)
n = 1
n = 2
n = 3
n = 4
TD62064AFG
Ta = 25°C
n-ch ON


I_{OUT} – Duty cycle
Output current I_{OUT} (mA)
1500
1200
900
600
300
0
0
20
40
60
80
100
Duty Cycle (%)
n = 1
n = 2
n = 3
n = 4
TD62064AFG
Ta = 85°C
n-ch ON

Package Dimensions

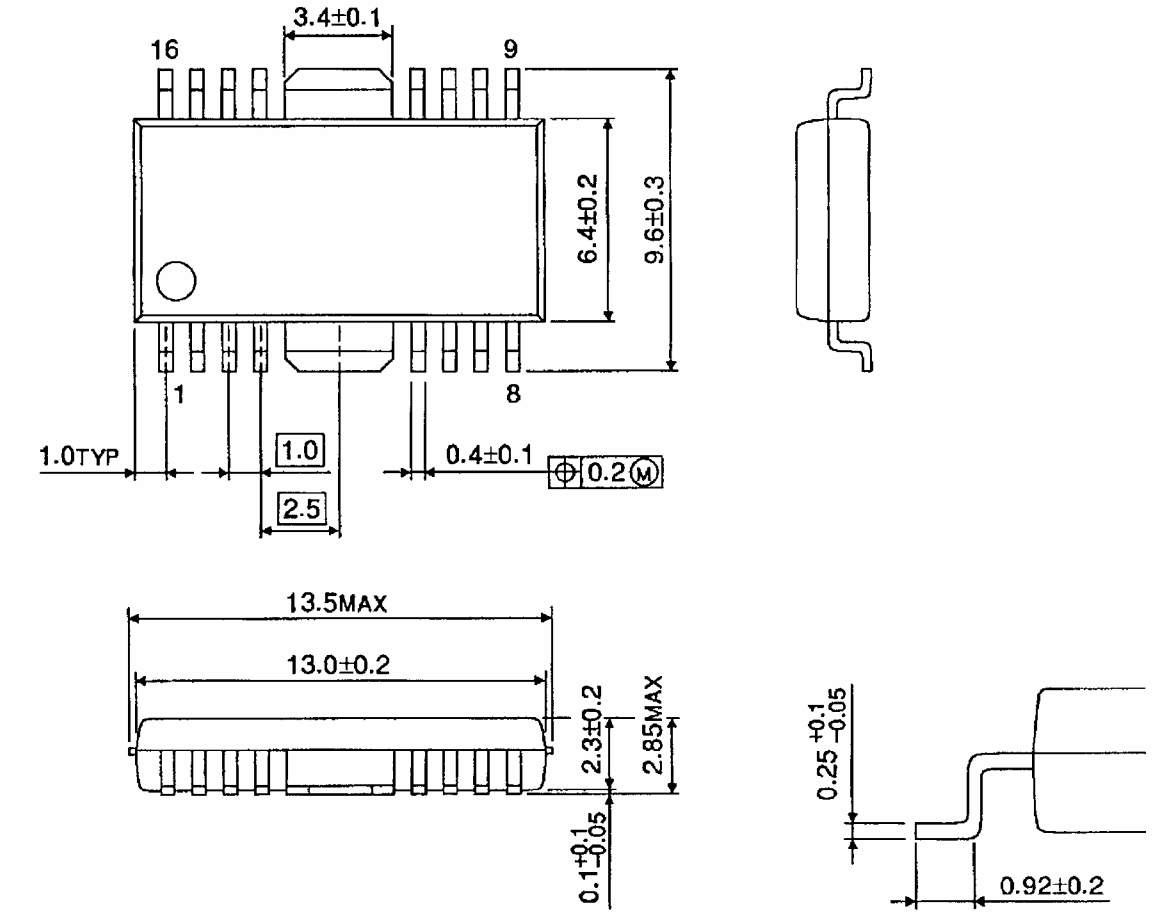
DIP16-P-300-2.54A Unit : mm



Weight: 1.11 g (typ.)

Package Dimensions

HSOP16-P-300-1.00 Unit : mm



Weight: 0.50 g (typ.)

About solderability, following conditions were confirmed

- Solderability

  (1) Use of Sn-63Pb solder Bath
  - solder bath temperature = 230°C
  - dipping time = 5 seconds
  - the number of times = once
  - use of R-type flux

  (2) Use of Sn-3.0Ag-0.5Cu solder Bath
  - solder bath temperature = 245°C
  - dipping time = 5 seconds
  - the number of times = once
  - use of R-type flux

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