TOSHIBA Bipolar Digital Integrated Circuit Silicon Monolithic

TD62308APG, TD62308AFG

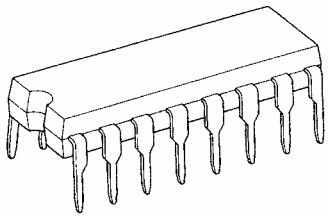
4ch Low Input Active High-Current Darlington Sink Driver

The TD62308APG/AFG 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.

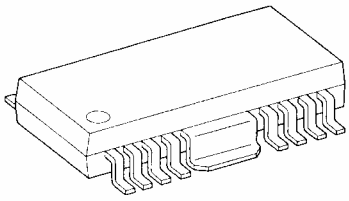
Application include relay, hammer, lamp and stepping motor drivers.

TD62308APG



DIP16-P-300-2.54A

TD62308AFG



HSOP16-P-300-1.00

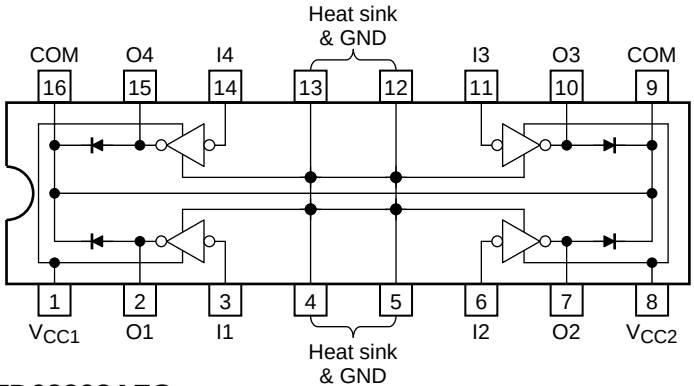
Weight
DIP16-P-300-2.54A: 1.11 g (typ.)
HSOP16-P-300-1.00: 0.50 g (typ.)

Features

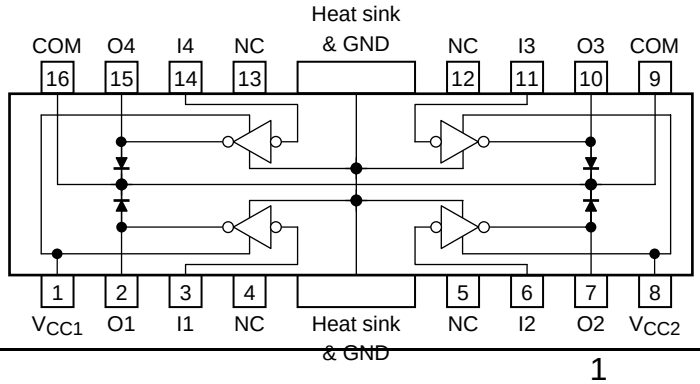
- Output current (single output): 1.5 A (max)
- High sustaining voltage output: 50 V (min) (TD62308APG, TD62308AFG)
- Output clamp diodes
- Input compatible with TTL and 5 V CMOS
- Low level active inputs
- Standard supply voltage
- Two V_{CC} terminals V_{CC1}, V_{CC2} (separated)
- GND and SUB terminal = Heat sink
- Package type-APG: DIP-16 pin
- Package type-AFG: HSOP-16 pin

Pin Assignment (top view)

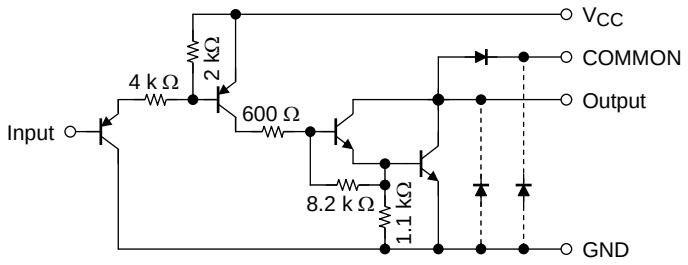
TD62308APG



TD62308AFG



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, V_{CC}, 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 TD62308APG/AFG 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)

Characteristics		Symbol	Rating	Unit
Supply voltage		V_{CC}	−0.5 to 10	V
Output sustaining voltage		$V_{CE\ (SUS)}$	−0.5 to 50	V
Output current		I_{OUT}	1.5	A/ch
Input current		I_{IN}	−10	mA
Input voltage		V_{IN}	−0.5 to 30	V
Clamp diode reverse voltage		V_R	50	V
Clamp diode forward current		I_F	1.5	A
Power dissipation	APG	P_D	1.47/2.7 (Note 1)	W
	AFG		0.9/1.4 (Note 2)	
Operating temperature		T_{opr}	−40 to 85	°C
Storage temperature		T_{stg}	−55 to 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 30%)

Recommended Operating Conditions (Ta = −40 to 85°C)

Characteristics		Symbol	Test Condition		Min	Typ.	Max	Unit
Supply voltage		V_{CC}	—		4.5	—	5.5	V
Output sustaining voltage		$V_{CE\ (SUS)}$	—		0	—	50	V
Output current		I_{OUT}	DC1 circuit, Ta = 25°C		0	—	1250	mA/ch
	APG		T_{pw} = 25 ms, 4 circuits, Ta = 85°C, T_j = 120°C	Duty = 10%	0	—	1250	
				Duty = 50%	0	—	700	
	AFG			Duty = 10%	0	—	1250	
				Duty = 50%	0	—	390	
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	—		—	—	50	V
Clamp diode forward current		I_F	—		—	—	1.25	A
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%)

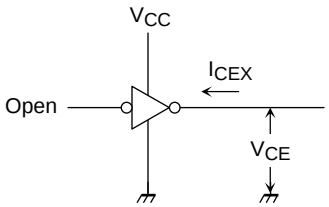
Note 2: On glass epoxy PCB (60 × 30 × 1.6 mm Cu 30%)

Electrical Characteristics (Ta = 25°C)

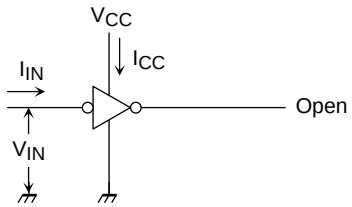
Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output leakage current		I_{CEX}	1	V_{CE} = 50 V, Ta = 25°C	—	—	50	μA
				V_{CE} = 50 V, Ta = 85°C	—	—	100	
Output saturation voltage		$V_{CE\ (sat)}$	3	I_{OUT} = 1.25 A	—	—	1.8	V
				I_{OUT} = 0.75 A	—	—	1.3	
Input voltage	High level	V_{IH}	—	—	V_{CC} −1.6	—	25	V
	Low level	V_{IL}	—	—	—	—	V_{CC} −3.6	
Input current	High level	I_{IH}	—	—	—	—	10	μA
	Low level	I_{IL}	—	—	—	−0.05	−0.36	mA
Clamp diode reverse current		I_R	4	V_R = 50 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	$I_{CC\ (OFF)}$		V_{CC} = 5.5 V, V_{IN} = V_{CC}	—	—	1.0	μA
Turn-ON delay		t_{ON}	6	C_L = 15 pF, V_{OUT} = 50 V, R_L = 40 Ω	—	0.2	—	μs
Turn-OFF delay		t_{OFF}	6	C_L = 15 pF, V_{OUT} = 35 V, R_L = 40 Ω	—	5.0	—	μs

Test Circuit

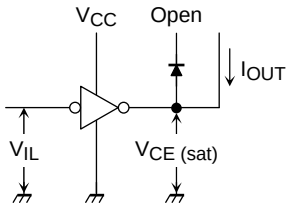
1. I_{CEX}



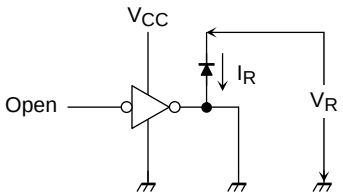
2. I_{CC}



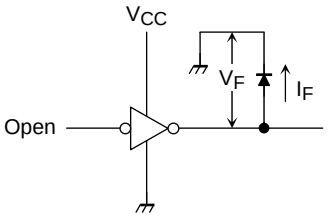
3. $V_{CE\ (sat)}$



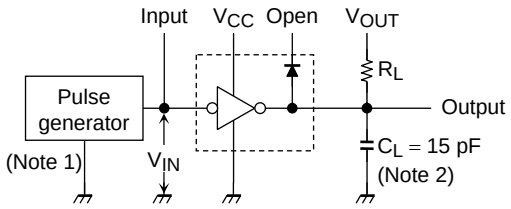
4. I_R

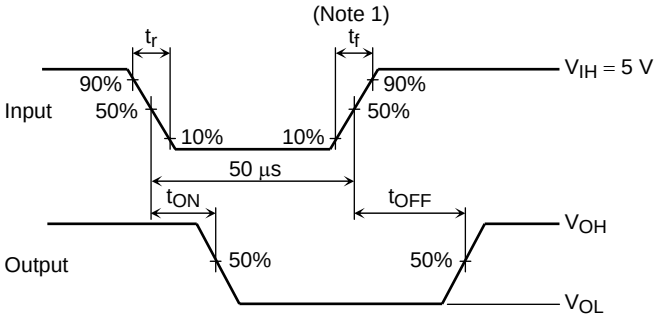


5. V_F



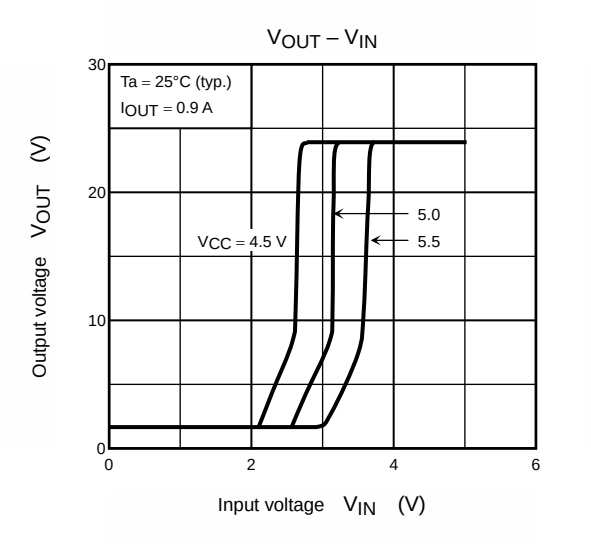
6. t_{ON}, t_{OFF}

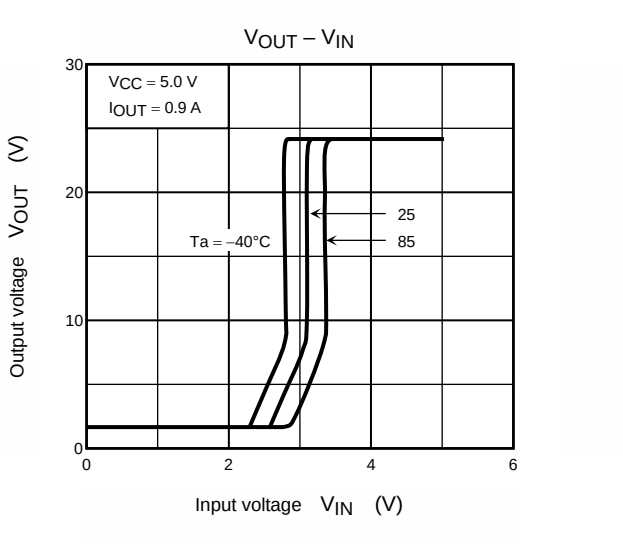


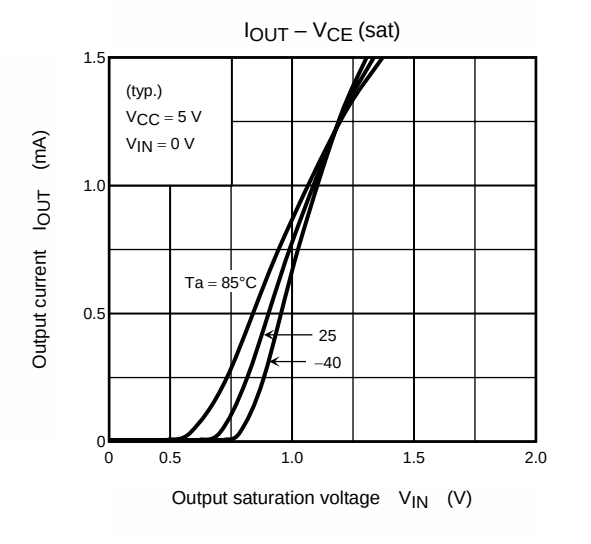


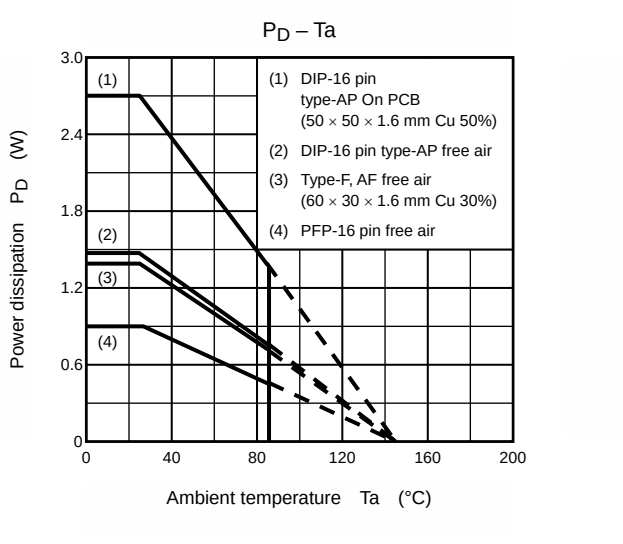
Note 1: Pulse Width 50 μs, Duty Cycle 10%
Output Impedance 50 Ω, $t_r \leq 5$ ns, $t_f \leq 10$ ns

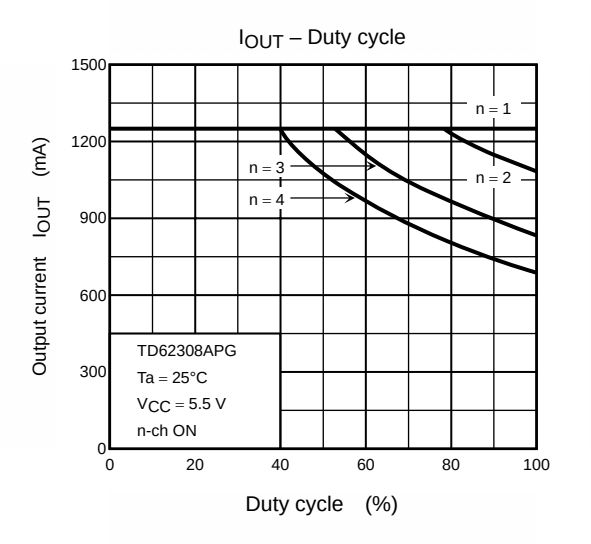
Note 2: C_L includes probe and jig capacitance

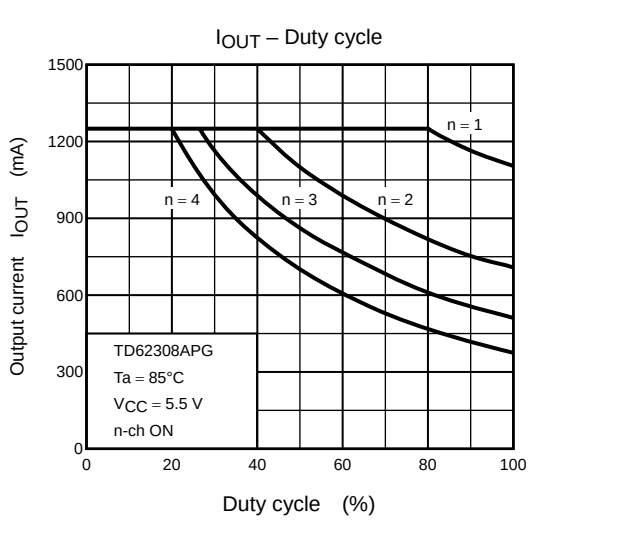

VOUT – VIN
Ta = 25°C (typ.)
IOUT = 0.9 A
VCC = 4.5 V
5.0
5.5
Output voltage VOUT (V)
Input voltage VIN (V)
0
10
20
30
0
2
4
6

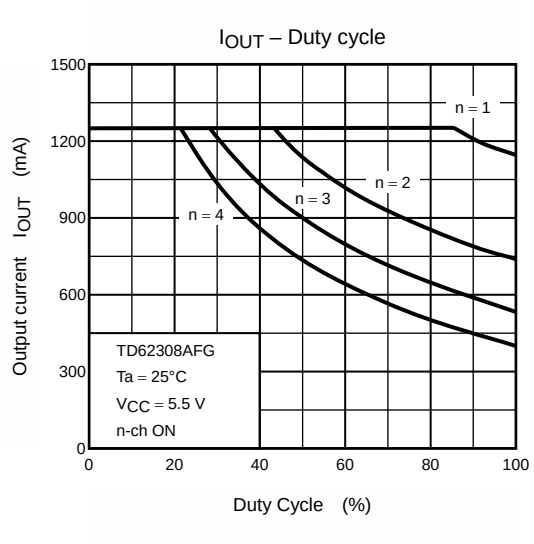

VOUT – VIN
VCC = 5.0 V
IOUT = 0.9 A
Ta = –40°C
25
85
Output voltage VOUT (V)
Input voltage VIN (V)
0
10
20
30
0
2
4
6

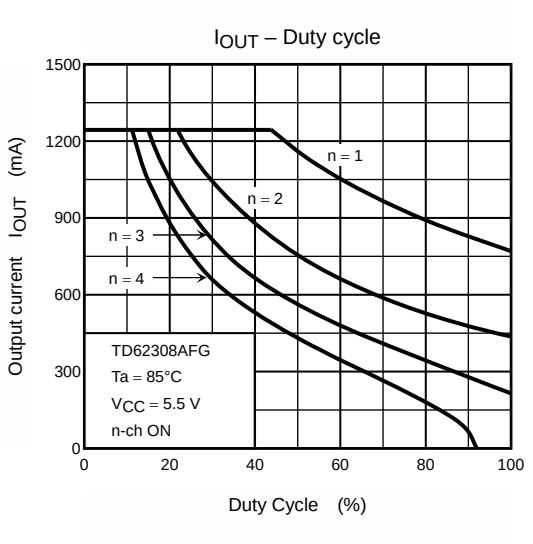

IOUT – VCE (sat)
(typ.)
VCC = 5 V
VIN = 0 V
Ta = 85°C
25
–40
Output current IOUT (mA)
Output saturation voltage VIN (V)
0
0.5
1.0
1.5
0
0.5
1.0
1.5
2.0


PD – Ta
(1) DIP-16 pin type-AP On PCB (50 × 50 × 1.6 mm Cu 50%)
(2) DIP-16 pin type-AP free air
(3) Type-F, AF free air (60 × 30 × 1.6 mm Cu 30%)
(4) PFP-16 pin free air
Power dissipation PD (W)
Ambient temperature Ta (°C)
0
0.6
1.2
1.8
2.4
3.0
0
40
80
120
160
200


IOUT – Duty cycle
n = 1
n = 2
n = 3
n = 4
TD62308APG
Ta = 25°C
VCC = 5.5 V
n-ch ON
Output current IOUT (mA)
Duty cycle (%)
0
300
600
900
1200
1500
0
20
40
60
80
100

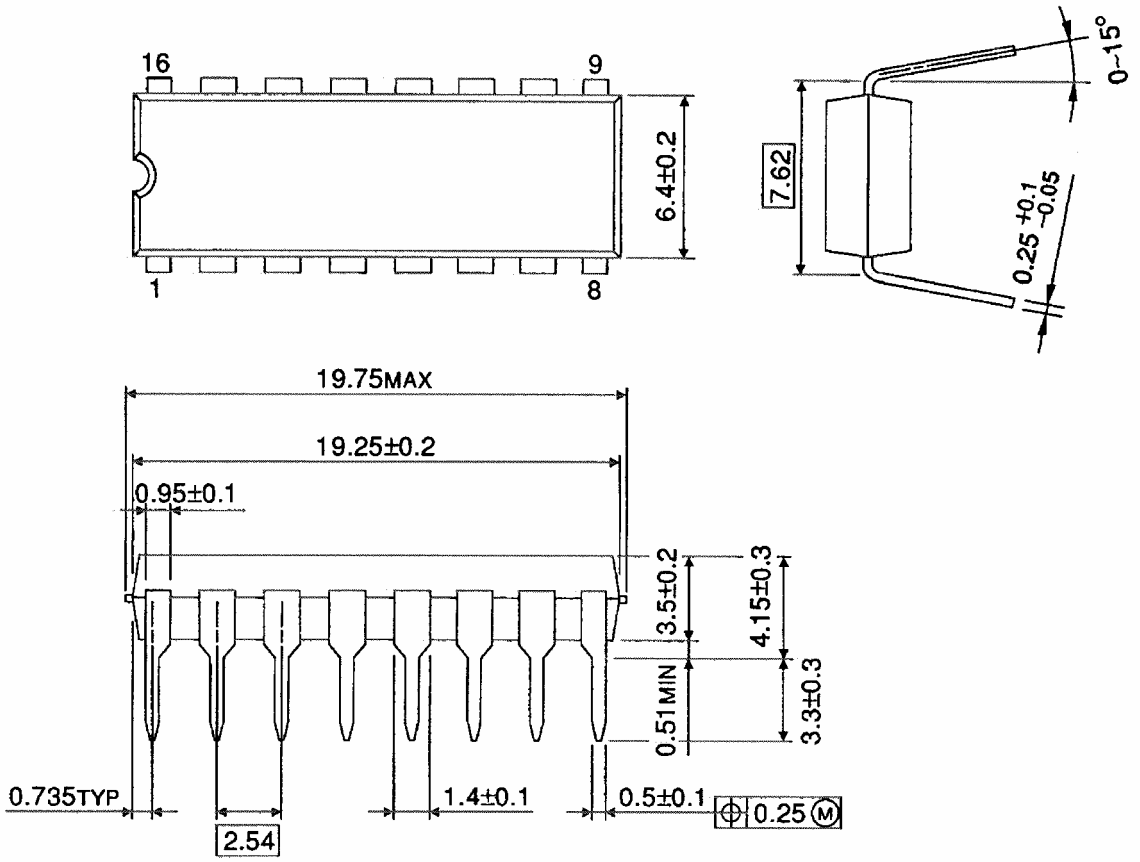

IOUT – Duty cycle
n = 1
n = 2
n = 3
n = 4
TD62308APG
Ta = 85°C
VCC = 5.5 V
n-ch ON
Output current IOUT (mA)
Duty cycle (%)
0
300
600
900
1200
1500
0
20
40
60
80
100


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
TD62308AFG
Ta = 25°C
V_{CC} = 5.5 V
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
TD62308AFG
Ta = 85°C
V_{CC} = 5.5 V
n-ch ON

Package Dimensions

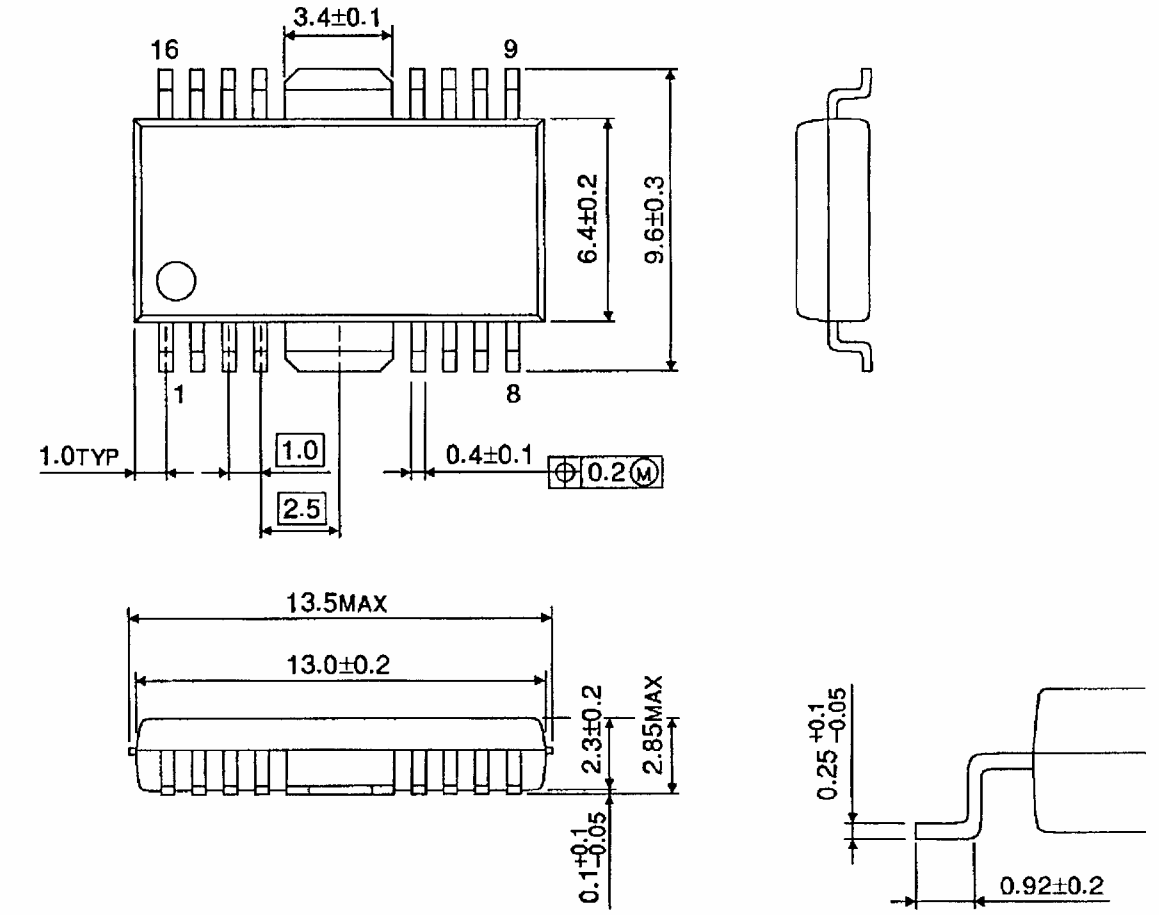
DIP16-P-300-2.54A Unit : mm



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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030619EBA

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