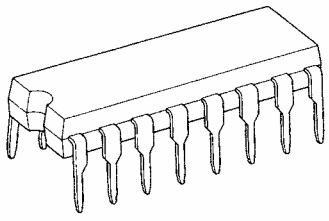
TOSHIBA Bipolar Digital Integrated Circuit Silicon Monolithic

TD62164BPG,TD62164BFG

4ch High-Current Darlington Sink Driver

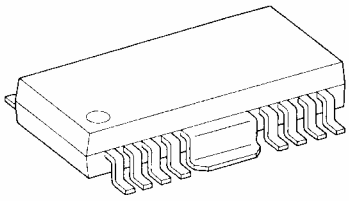
The TD62164BPG and TD62164BFG are high-voltage, high-current darlington drivers comprised of four NPN darlington pairs.
All units feature integral clamp diodes for switching inductive loads.
Applications include relay, hammer, lamp and stepping motor drivers.
Please observe the thermal condition for using.

TD62164BPG



DIP16-P-300-2.54A

TD62164BFG



HSOP16-P-300-1.00

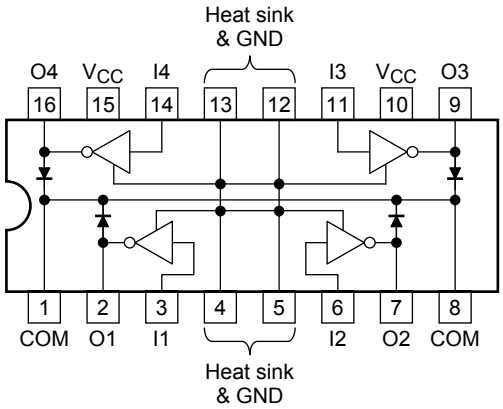
Weight
DIP16-P-300-2.54A : 1.11 g (typ.)
HSOP16-P-300-1.00 : 0.50 g (typ.)

Features

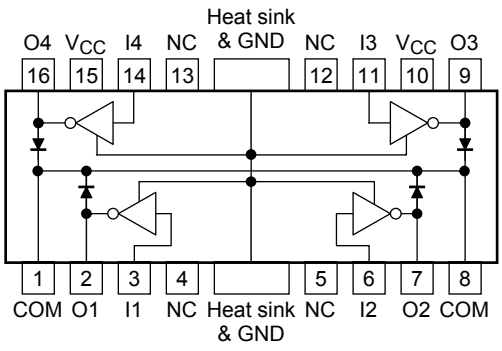
- Two V_{CC} terminals (Separated)
- Package type BPG : DIP16 pin
  BFG : HSOP16 pin
- High sustaining voltage output: $V_{CE\ (SUS)}$ = 80 V (min)
- Output current (single output): I_{OUT} = 700 mA/ch (max)
- Output clamp diodes
- Input compatible with TTL and 5-V CMOS
- GND and SUB terminal heat sink

Pin Connection (top view)

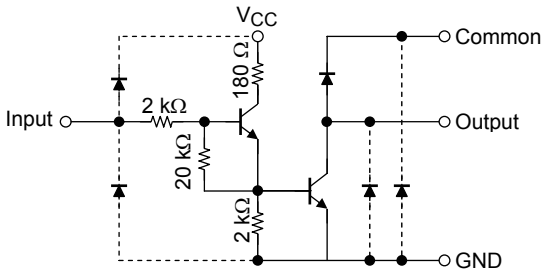
TD62164BPG



AD62164BFG



Schematics (each driver)



Note: The input and output parasitic diodes cannot be used as clamp diodes.

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Supply voltage		V_{CC}	−0.5 to 17	V
Output sustaining voltage		$V_{CE\ (SUS)}$	−0.5 to 80	V
Output current		I_{OUT}	700	mA/ch
Input current		I_{IN}	50	mA
Input voltage		V_{IN}	17	V
Clamp diode reverse voltage		V_R	80	V
Clamp diode forward current		I_F	700	mA
Power dissipation	BPG	P_D	1.47/2.7 (Note 1)	W
	BFG		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	Condition		Min	Typ.	Max	Unit
Supply voltage		V_{CC}			4.5	—	5.5	V
Output sustaining voltage		$V_{CE\ (SUS)}$			0	—	80	V
Output current		I_{OUT}	DC 1 circuit, Ta = 25°C		0	—	570	mA/ch
	BPG (Note 1)		T_{pw} = 25 ms, 4 circuits, Ta = 85°C, T_j = 120°C	Duty = 10%	0	—	570	
				Duty = 50%	0		520	
	BFG (Note 2)			Duty = 10%	0	—	570	
				Duty = 50%	0	—	270	
Input voltage		V_{IN}			0	—	15	V
	Output on	$V_{IN\ (ON)}$	I_{OUT} = 500 mA	h_{FE} = 150	10.0	—	15	V
				h_{FE} = 2000	2.4	—	15	
	Output off	$V_{IN\ (OFF)}$			0	—	0.4	
Input current		I_{IN}			0	—	20	mA
Clamp diode reverse voltage		V_R			—	—	80	V
Clamp diode forward voltage		I_F			—	—	700	mA
Power dissipation	BPG	P_D	Ta = 85°C	(Note 1)	—	—	1.4	W
	BFG		Ta = 85°C	(Note 2)	—	—	0.7	

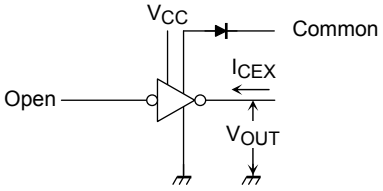
Note 1: On glass epoxy PCB (50 × 50 × 1.6 mm Cu 50%)
Note 2: On glass epoxy PCB (60 × 30 × 1.6 mm Cu 30%)

Electrical Characteristics (Ta = 25°C)

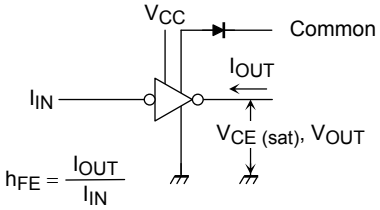
Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output leakage current		I_{CEX}	1	V_{CE} = 80 V, Ta = 25°C	—	—	50	μA
				V_{CE} = 80 V, Ta = 85°C	—	—	100	
Output saturation voltage		$V_{CE\ (sat)}$	2	I_{OUT} = 500 mA, V_{CC} = 5 V	—	—	0.8	V
				I_{OUT} = 200 mA, V_{CC} = 5 V	—	—	0.45	
DC current transfer ratio		h_{FE}	2	V_{CE} = 2 V, I_{OUT} = 500 mA	2000	—	—	
Input voltage (Output on)		$V_{IN\ (ON)}$	3	I_{OUT} = 500 mA, h_{FE} = 150	7.0	—	10.0	V
				I_{OUT} = 500 mA, h_{FE} = 2000	1.8	—	2.4	
Clamp diode leakage current		I_R	4	V_R = 80 V, Ta = 25°C	—	—	50	μA
				V_R = 80 V, Ta = 85°C	—	—	100	
Clamp diode forward voltage		V_F	5	I_F = 500 mA	—	—	2.0	V
Supply current	Output on	$I_{CC\ (ON)}$	3	V_{CC} = 5.5 V, V_{IN} = 2.4 V	—	35	40	mA/ch
	Output off	$I_{CC\ (OFF)}$		V_{CC} = 5.5 V, V_{IN} = 0.4 V	—	—	10	μA
Input capacitance		C_{IN}	6	V_{IN} = 0 V, f = 1 MHz	—	15	—	pF
Turn-on delay		t_{ON}	7	V_{OUT} = 80 V, R_L = 125 Ω Ta = 60°C, V_{CC} = 5.0 V, C_L = 15 pF	—	0.2	0.4	μs
Turn-off delay		t_{OFF}			—	4.0	8.0	

Test Circuit

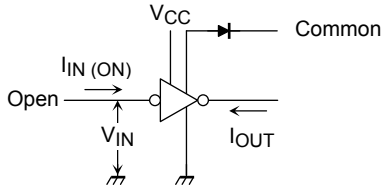
1. I_{CEX}



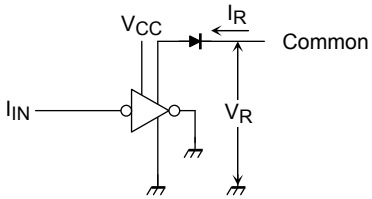
2. h_{FE}, $V_{CE\ (sat)}$



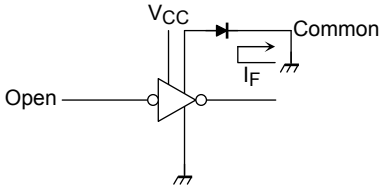
3. $V_{IN\ (ON)}$



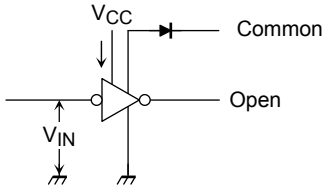
4. I_R



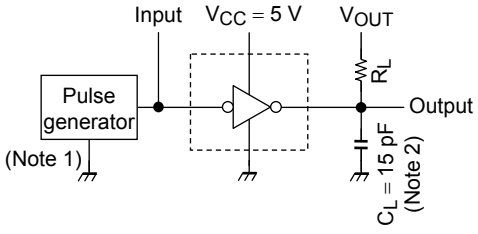
5. V_F

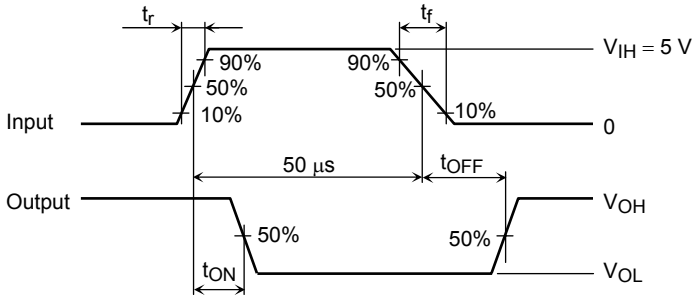


6. $I_{CC\ (ON)}$, $I_{CC\ (OFF)}$



7. t_{ON}, t_{OFF}





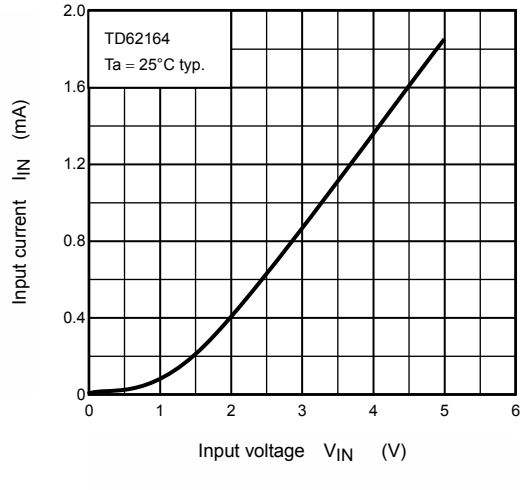
Note 1: Pulse width 50 μs, duty cycle 10%, output impedance 50 Ω, $t_r \leq 5$ ns, $t_f \leq 10$ ns.

Note 2: C_L includes probe and jig capacitance.

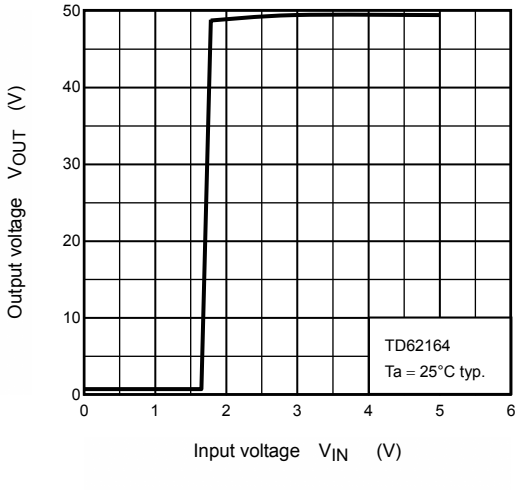
Precautions for Using

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.

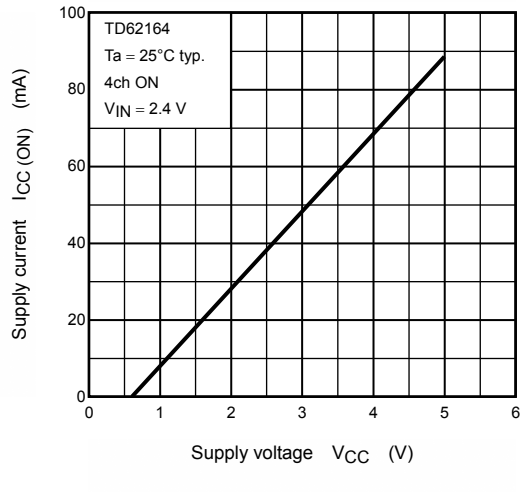
$I_{IN} – V_{IN}$



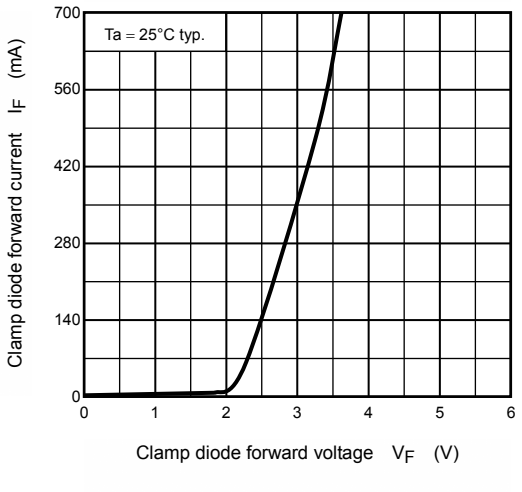
$V_{OUT} – V_{IN}$



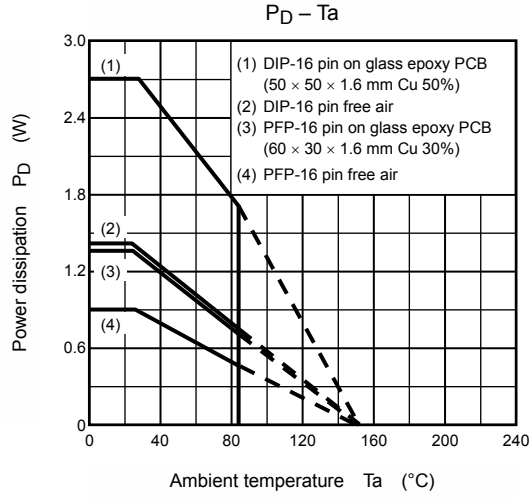
$I_{CC\ (ON)} – V_{CC}$

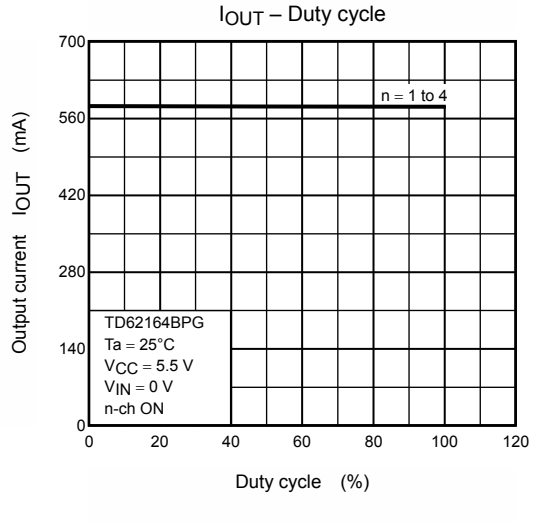


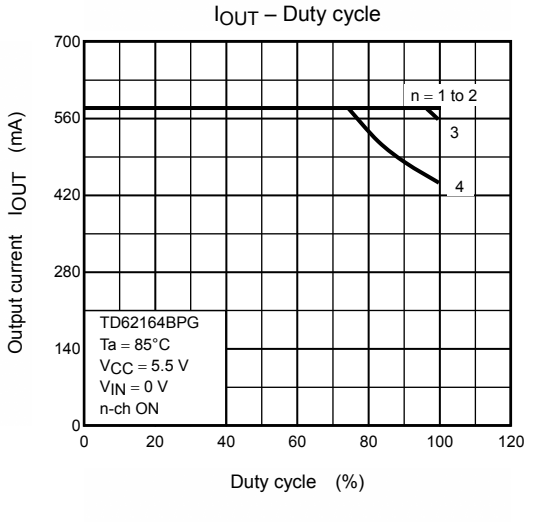
$I_F – V_F$

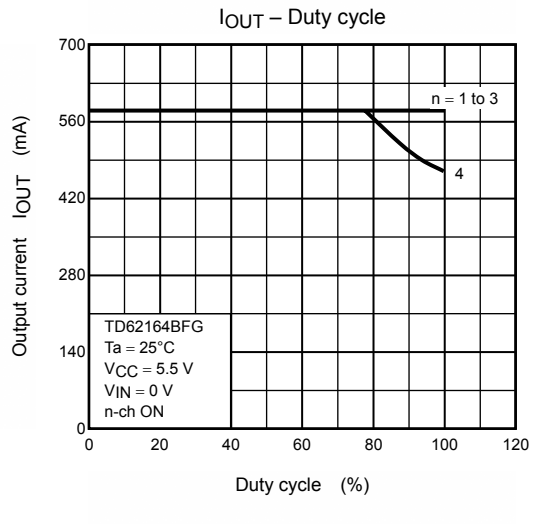


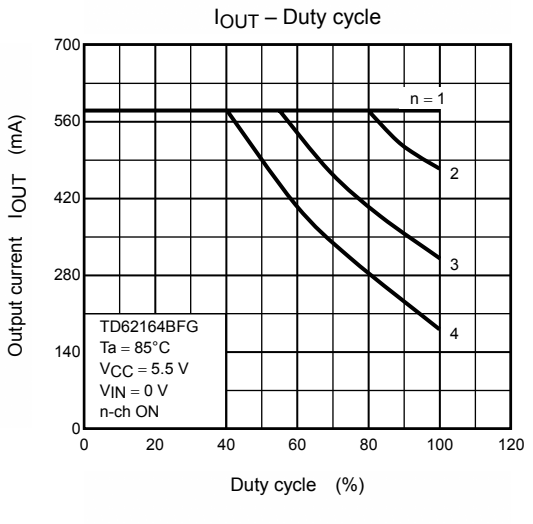
$P_D – Ta$




I_{OUT} – Duty cycle
Output current I_{OUT} (mA)
700
560
420
280
140
0
n = 1 to 4
TD62164BPG
Ta = 25°C
V_{CC} = 5.5 V
V_{IN} = 0 V
n-ch ON
0 20 40 60 80 100 120
Duty cycle (%)

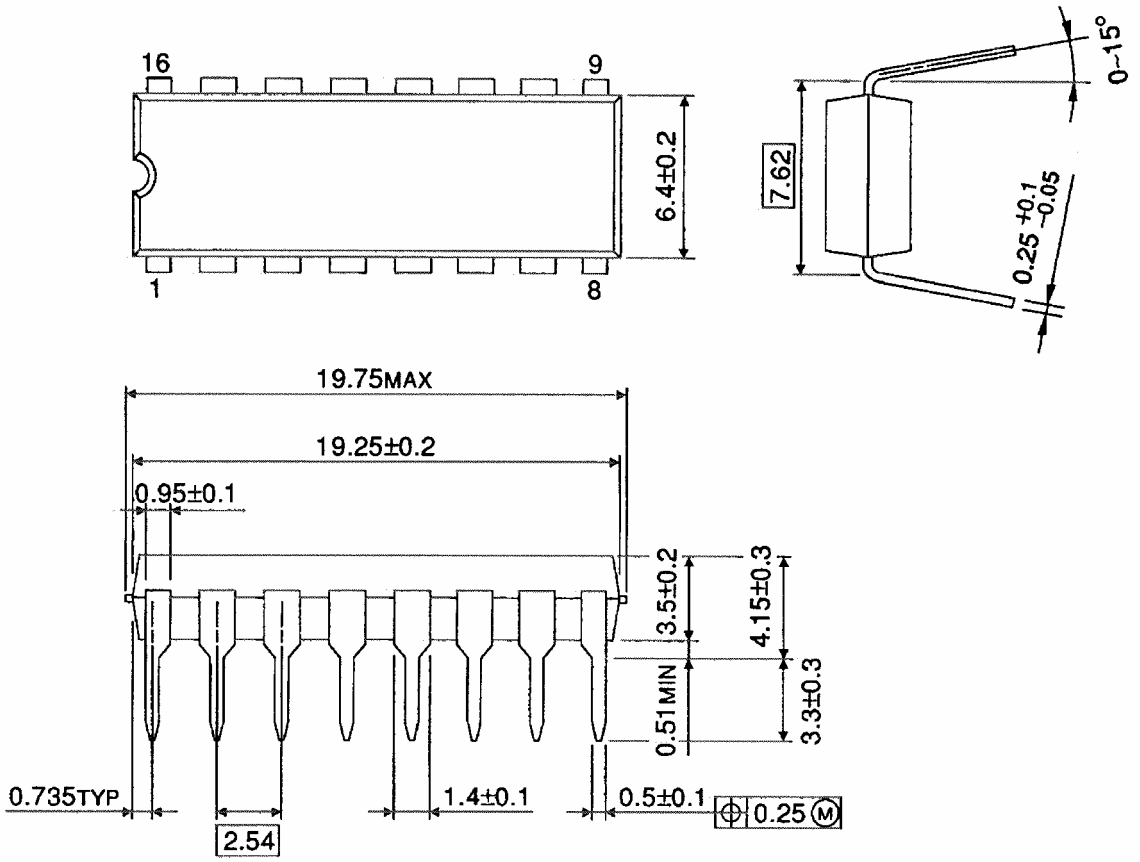

I_{OUT} – Duty cycle
Output current I_{OUT} (mA)
700
560
420
280
140
0
n = 1 to 2
3
4
TD62164BPG
Ta = 85°C
V_{CC} = 5.5 V
V_{IN} = 0 V
n-ch ON
0 20 40 60 80 100 120
Duty cycle (%)


I_{OUT} – Duty cycle
Output current I_{OUT} (mA)
700
560
420
280
140
0
n = 1 to 3
4
TD62164BFG
Ta = 25°C
V_{CC} = 5.5 V
V_{IN} = 0 V
n-ch ON
0 20 40 60 80 100 120
Duty cycle (%)


I_{OUT} – Duty cycle
Output current I_{OUT} (mA)
700
560
420
280
140
0
n = 1
2
3
4
TD62164BFG
Ta = 85°C
V_{CC} = 5.5 V
V_{IN} = 0 V
n-ch ON
0 20 40 60 80 100 120
Duty cycle (%)

Package Dimensions

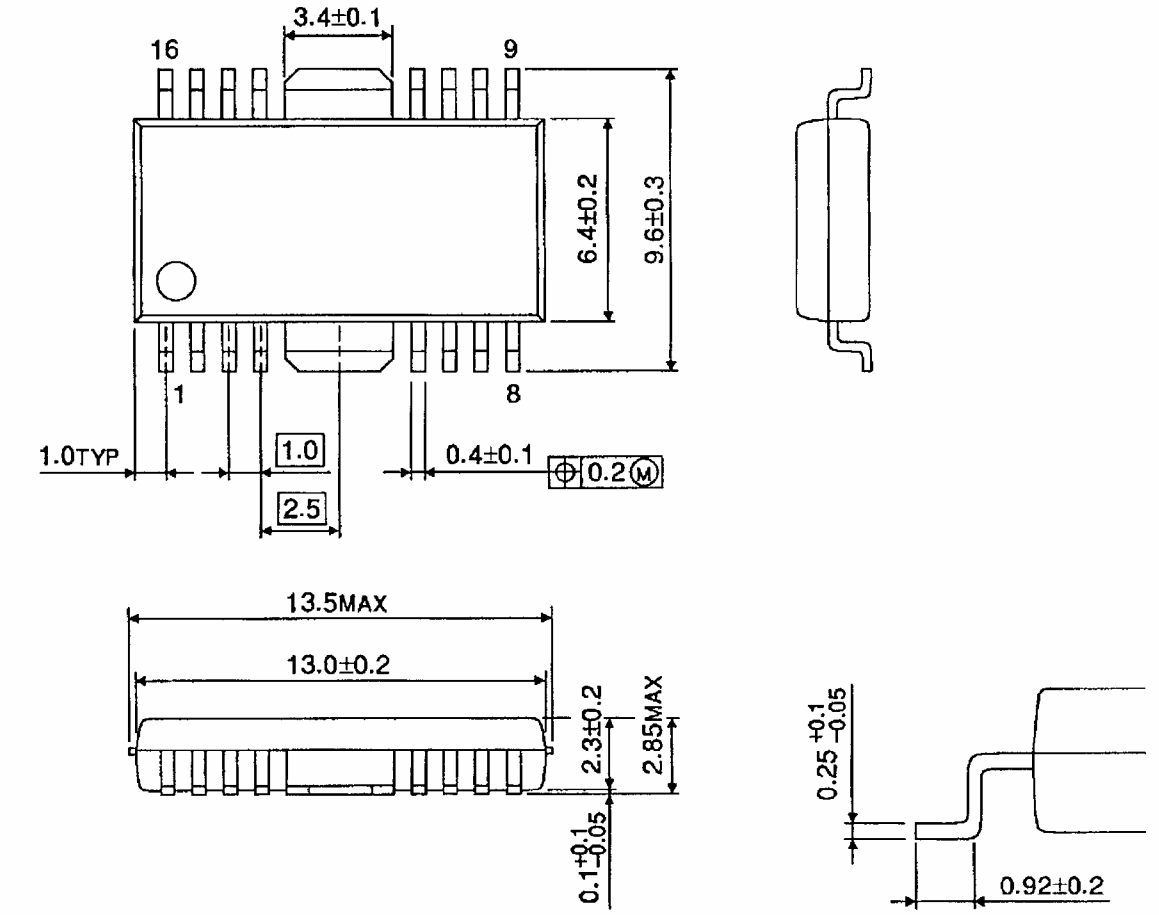
DIP16-P-300-2.54A Unit : mm



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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