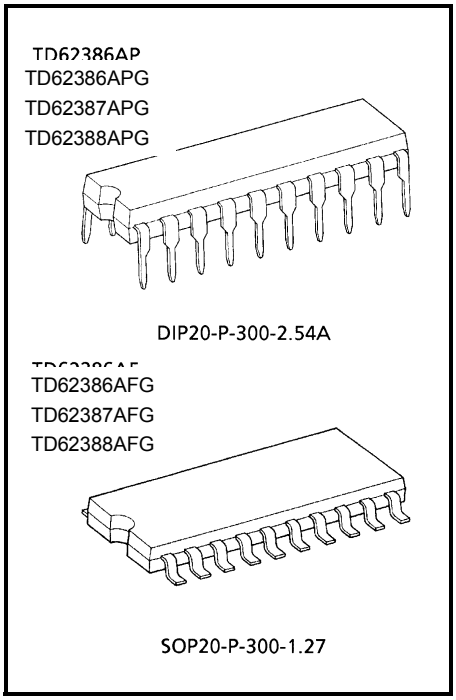
TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TD62386APG, TD62386AFG, TD62387APG TD62387AFG, TD62388APG, TD62388AFG

8 CH LOW INPUT ACTIVE DARLINGTON SINK DRIVER

The TD62386APG, TD62386AFG, TD62387APG, TD62387AFG and TD62388APG, TD62388AFG are non−inverting transistor arrays, which are comprised of eight NPN darlington output stages and PNP input stages.
All units feature integral clamp diodes for switching inductive loads.
These devices are Low Level input active drivers and are suitable for operations with TTL, 5 V CMOS and 5 V Microprocessor which have sink current output drivers.
Applications include relay, hammer, lamp and LED driver.
This devices are a product for the Pb free(Sn-Ag).



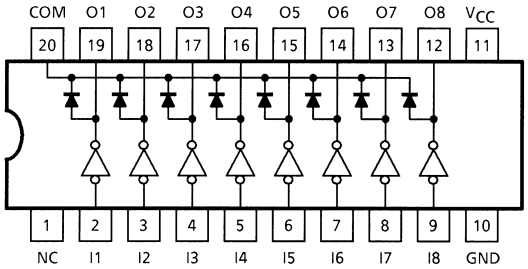
Weight
DIP20−P−300−2.54A : 2.25 g (Typ.)
SOP20−P−300−1.27 : 0.25 g (Typ.)

FEATURES

- Output current (single output) 500 mA (Max)
- High sustaining voltage 50 V (Min)
- Output clamp diodes
- Low level active input
- Standard supply voltage
- Inputs compatible with TTL and 5 V CMOS
- Package type−APG: DIP−20 pin
- Package type−AFG: SOP−20 pin

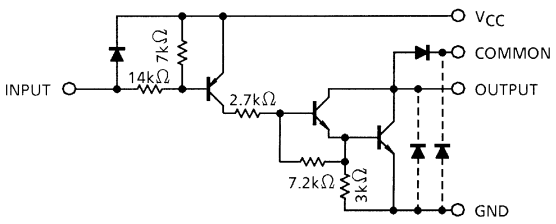
TYPE	$V_{IN\ (ON)}$
TD62386APG, TD62386AFG	−20 V~V_{CC} − 2.8 V
TD62387APG, TD62387AFG	0 V~V_{CC} − 3.7 V
TD62388APG, TD62388AFG	

PIN CONNECTION (TOP VIEW)

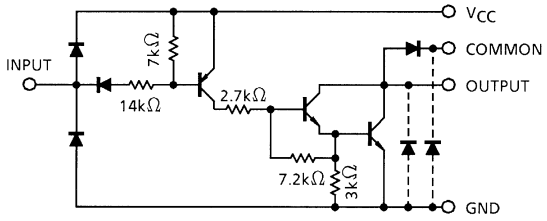


SCHEMATICS (EACH DRIVER)

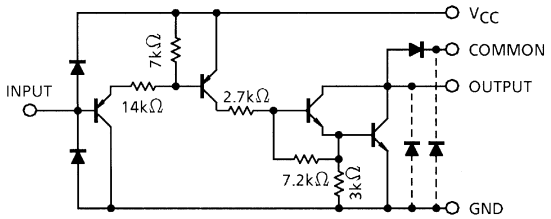
TD62386APG, TD62386AFG



TD62387APG, TD62387AFG



TD62388APG, TD62388AFG



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

MAXIMUM RATINGS

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	−0.5~7.0	V
Output Sustaining Voltage	APG	$V_{CE\ (SUS)}$	−0.5~50	V
	AFG		−0.5~35	
Output Current		I_{OUT}	500	mA / ch
Input Voltage		V_{IN} (Note 1)	−22~V_{CC} + 0.5	V
		V_{IN} (Note 2)	−0.5~7	
Input Current		I_{IN}	−10	mA
Clamp Diode Reverse Voltage		V_R	50	V
Clamp Diode Forward Current		I_F	500	mA
Power Dissipation	APG	P_D (Note 3)	1.38	W
	AFG		1.0 (Note 4)	
Operating Temperature		T_{opr}	−40~85	°C
Storage Temperature		T_{stg}	−55~150	°C

Note 1: TD62386APG, TD62386AFG only
Note 2: TD62387APG, TD62387AFG, TD62388APG, TD62388AFGonly
Note 3: Delated above 25°C in the proportion of 11.7 mW / °C (APG−Type), 7.7 mW / °C (AFG−Type).
Note 4: On PCB (50 × 50 × 1.6 mm Cu 40% Glass Epoxy)

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

CHARACTERISTIC		SYMBOL	CONDITION	MIN	TYP.	MAX	UNIT
Supply Voltage		V_{CC}	—	4.5	5.0	5.5	V
Output Sustaining Voltage		$V_{CE\ (SUS)}$	—	0	—	50	V
Output Current		I_{OUT}	Tpw = 25 ms, Duty = 10% 8 Circuits	0	—	270	mA / ch
Input Voltage	TD62386APG TD62386AFG	V_{IN}	—	−20	—	V_{CC}	V
	TD62387APG TD62387AFG TD62388APG TD62388AFG		—	0	—	5.5	
Clamp Diode Reverse Voltage		V_R	—	—	—	50	V
Clamp Diode Forward Current		I_F	—	—	—	400	mA
Power Dissipation	APG	P_D	—	—	—	0.52	W
	AFG		(Note 1)	—	—	0.4	

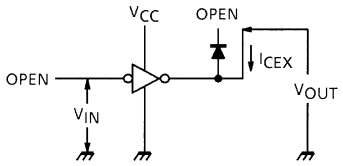
Note 1: On Glass Epoxy PCB (50 × 50 × 1.6 mm Cu 40%)

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

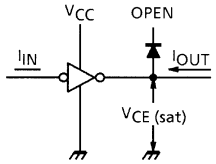
CHARACTERISTIC		SYMBOL	TEST CIR−CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Output Leakage Current		I_{CEX}	1	V_{CC} = 5.5 V, I_{IN} = 0 V_{OUT} = 50 V, Ta = 85°C	—	—	100	μA
Output Saturation Voltage		$V_{CE\ (sat)}$	2	V_{CC} = 4.5 V, V_{IN} = $V_{IN\ (ON)\ MAX.}$ I_{OUT} = 350 mA	—	1.4	2.0	V
Input Current	Output On	$I_{IN\ (ON)}$	3	V_{CC} = 5.5 V, V_{IN} = 0.4 V	—	−0.32	−0.45	mA
				V_{CC} = 5.5 V, V_{IN} = −20 V	—	—	−2.6	
	Output Off	$I_{IN\ (OFF)}$	4	—	—	—	−4.0	μA
Input Voltage (Output on)	TD62386APG TD62386AFG	$V_{IN\ (ON)}$	5	—	—	—	V_{CC} − 2.8	V
	TD62387APG TD62387AFG TD62388APG TD62388AFG			—	—	—	V_{CC} − 3.7	
Clamp Diode Reverse Current		I_R	6	V_R = 50 V, Ta = 25°C	—	—	50	μA
				V_R = 50 V, Ta = 85°C	—	—	100	
Clamp Diode Forward Voltage		V_F	7	I_F = 350 mA	—	—	2.0	V
				I_F = 280 mA	—	—	1.8	
Supply Current		$I_{CC\ (ON)}$	8	V_{CC} = 5.5 V, V_{IN} = 0	—	17	22	mA
		$I_{CC\ (OFF)}$		V_{CC} = 5.5 V, V_{IN} = V_{CC}	—	—	100	μA
Turn−On Delay		t_{ON}	9	V_{CC} = 5 V, V_{OUT} = 50 V R_L = 125Ω, C_L = 15 pF	—	0.1	—	μs
Turn−Off Delay		t_{OFF}			—	3	—	

TEST CIRCUIT

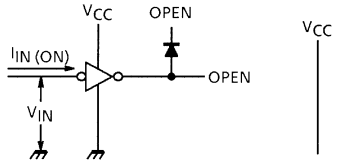
1. I_{CEX}



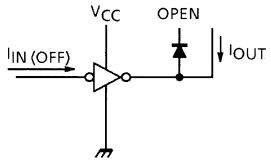
2. $V_{CE\ (sat)}$



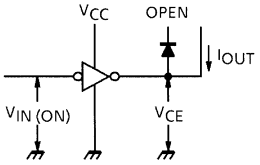
3. $I_{IN\ (ON)}$



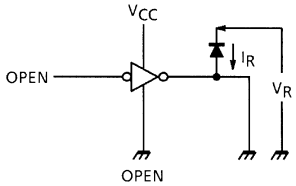
4. $I_{IN\ (OFF)}$



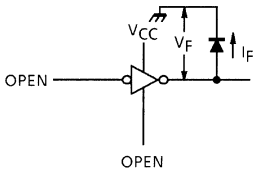
5. $V_{IN\ (ON)}$



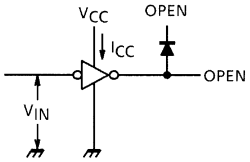
6. I_R



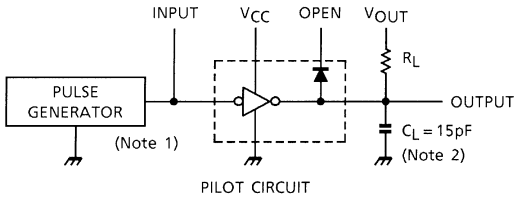
7. V_F

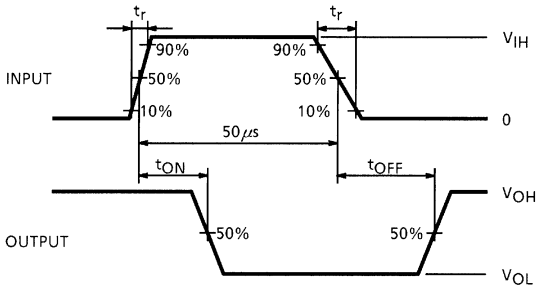


8. I_{CC}



9. t_{ON}, t_{OFF}





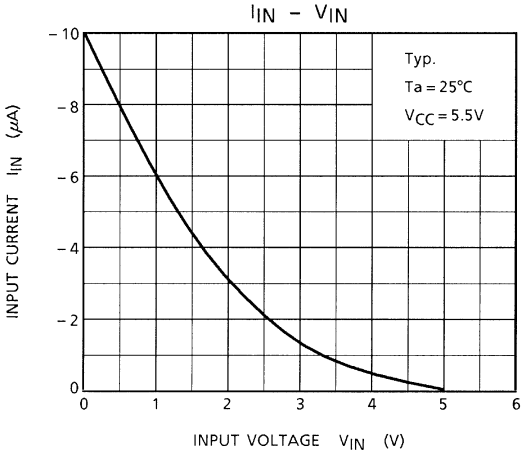
Note 1: Pulse Width 50 μs, Duty Cycle 10%
Output Impedance 50 Ω, $t_r \leq 5$ ns, $t_f \leq 10$ ns

Note 2: C_L includes probe and jig capacitance.

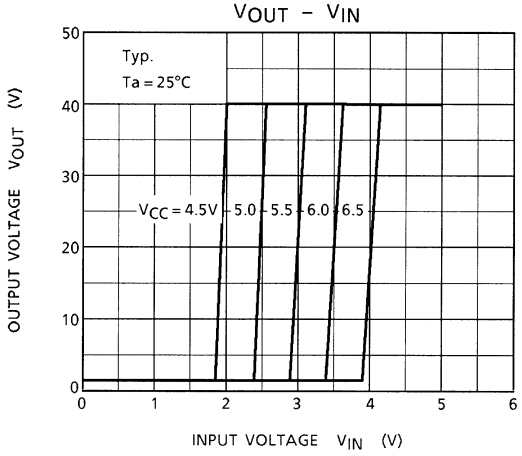
PRECAUTIONS for USING

This IC does not integrate protection circuits such as overcurrent and overvoltage protectors.
Thus, if excess current or voltage is applied to the IC, the IC may be damaged. Please design the IC so that excess current or voltage will not be applied to the IC.
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.

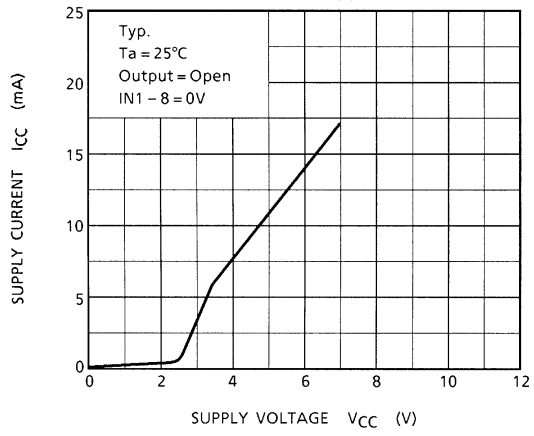
I_{IN} – V_{IN}



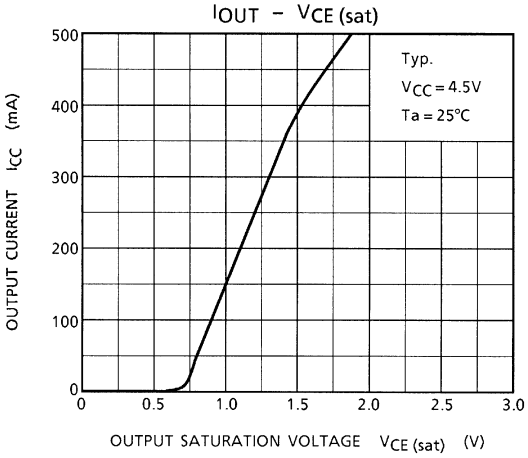
V_{OUT} – V_{IN}



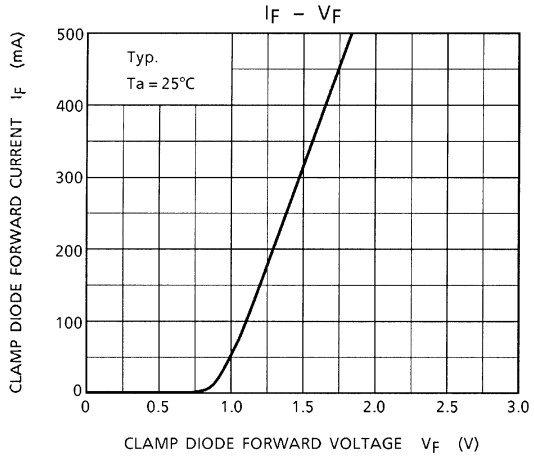
I_{CC} – V_{CC}



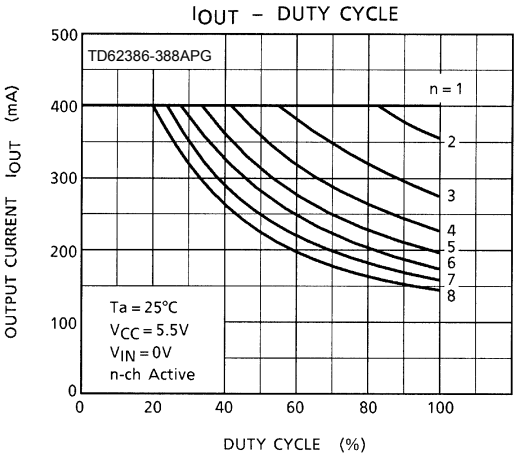
I_{OUT} – $V_{CE\ (sat)}$



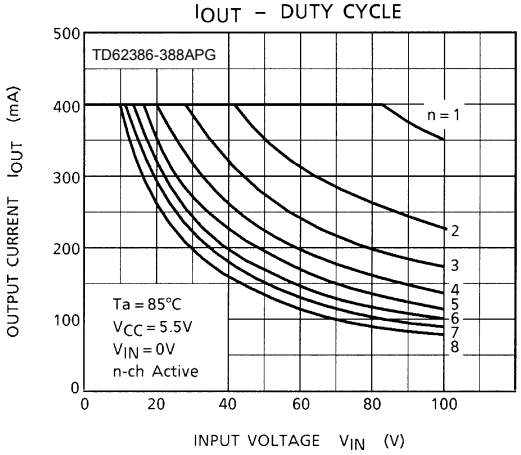
I_F – V_F



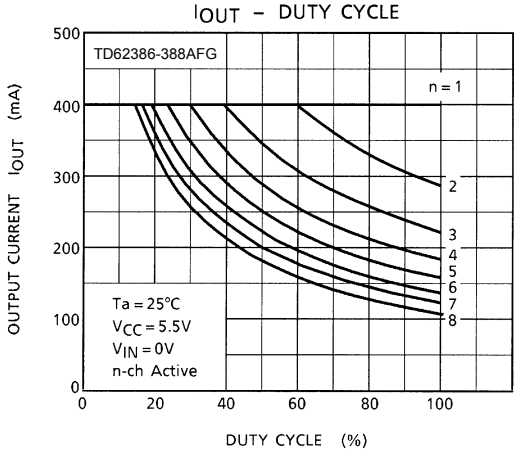
I_{OUT} – DUTY CYCLE



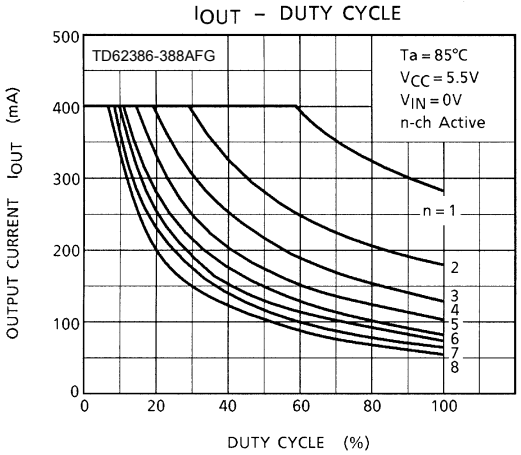
I_{OUT} – DUTY CYCLE



I_{OUT} – DUTY CYCLE

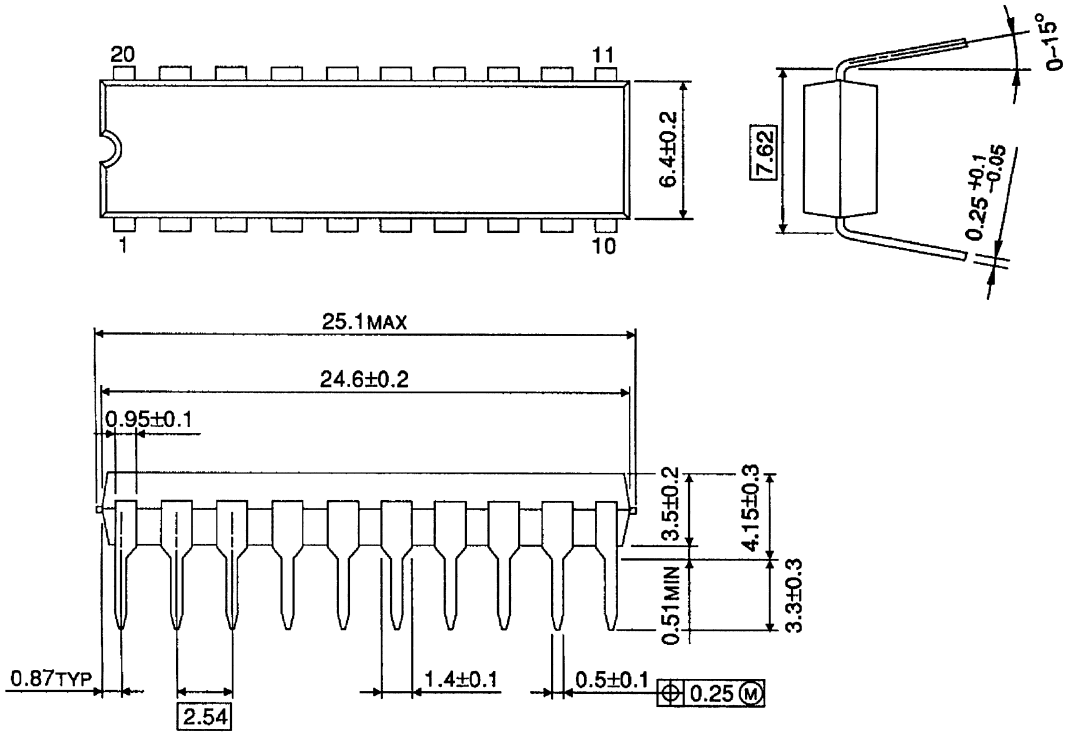


I_{OUT} – DUTY CYCLE



PACKAGE DIMENSIONS

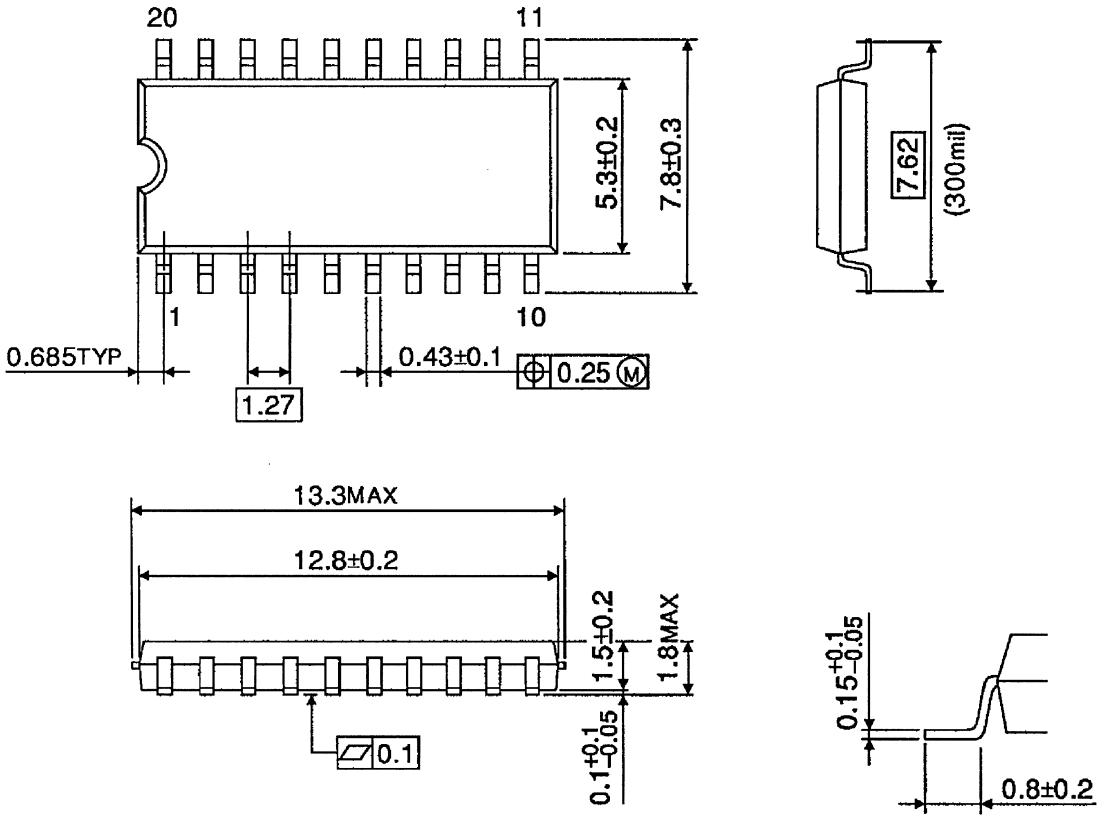
DIP20−P−300−2.54A Unit: mm



Weight: 2.25 g (Typ.)

PACKAGE DIMENSIONS

SOP20−P−300−1.27 Unit: mm



Weight: 0.25 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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