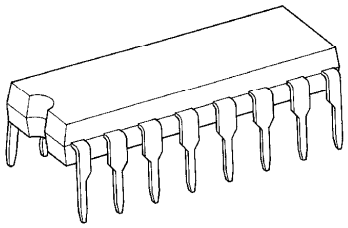
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8889AP

RGB CUT OFF DRIVE CONTROL IC

The TA8889AP is 16pin DIP package IC which has RGB Cut off / Drive control circuit.
The feature of TA8889AP is controlled via via I^2C bus.

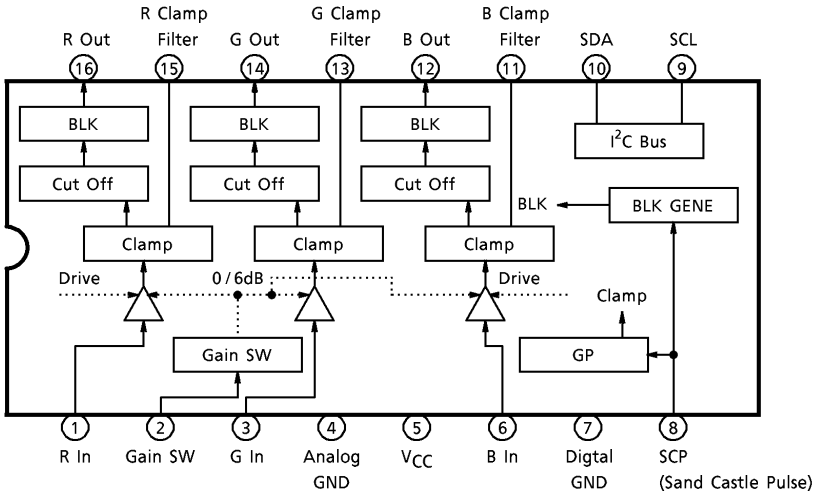


DIP16-P-300-2.54B
Weight : 1.11g (Typ.)

FEATURES

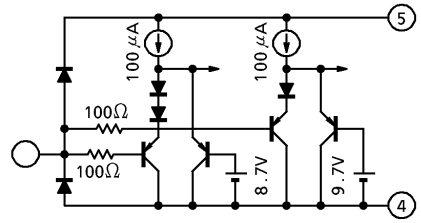
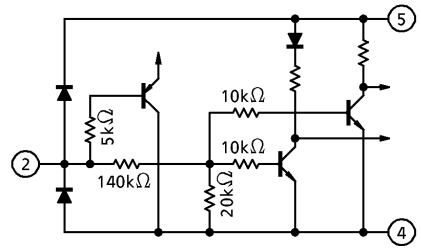
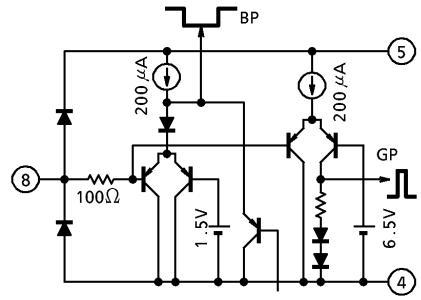
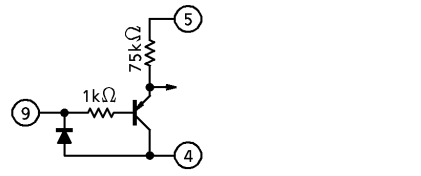
- 3 independents cut off control for 3 primary color.
- Independent drive control for blue and green color.
- 0dB / 6dB gain SW
- I^2C bus interface circuit

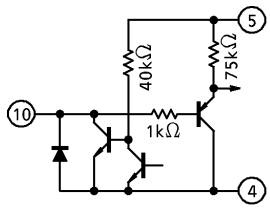
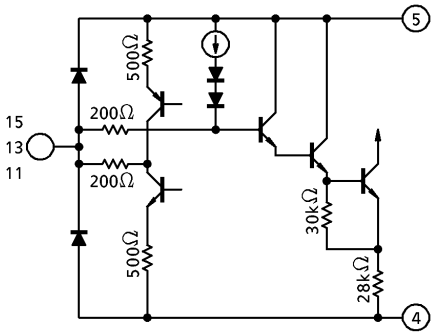
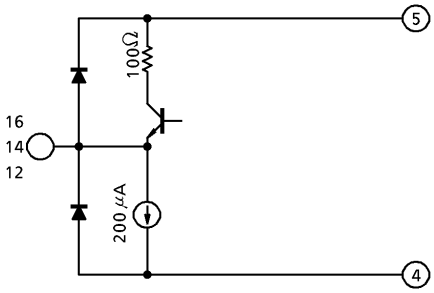
BLOCK DIAGRAM



961001EBA2

TERMINAL FUNCTION

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
1 3 6	R In G In B In	These are primary color input terminals. The signal which pedestal DC level is 2V should be inputted.	
2	Gain SW	This is the switch terminal for gain 0dB / 6dB and blanking pulse. Please refer gain SW mode table for detail.	
4	Analog GND	This is the GND terminal for analog circuit.	—
5	V_{CC}	This is common V_{CC} terminal for analog and digital circuit. The coupling capacitor should be connected between this terminal and digital GND.	—
7	Digital GND	This is GND terminal for I^2L circuit. The coupling capacitor should be connected between this terminal and digital GND.	—
8	S.C.P.	This is S.C.P. input terminal. The threshold level of clamp pulse is 6.5V and more (typ.), that of blanking pulse is 1.5V and less (typ.).	
9	SCL	This is SCL terminal for I^2C bus. Because its is week for surge impulse, connect external devices for protection against surge if necessary.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
10	SDA	This is SDA terminal for I^2C bus. Because its is week for surge impulse, connect external devices for protection against surge if necessary.	
15 R Clamp Filter 13 G Clamp Filter 11 B Clamp Filter		This is the clamp filter terminal for R / G / B signal which is the signal after cut off and drive circuit.	
16 R Out 14 G Out 12 B Out		This is the R / G / B signal output terminal. We recommend its connects L.P.F. for removing high frequency noise.	

TERMINAL 2 (GAIN SW) OUTPUT MODE TABLE
(V_{CC} = 12V, Ta = ±3°C)

TERMINAL VOLTAGE	GAIN	BLANKING
V_{CC} (9.7V~V_{CC})	6dB	Available
7.5V (6.7V~8.3V)		Not available
4.5V (3.7V~5.3V)	0dB	
GND (GND~2.3V)		Available

I²C BUS CONTROL MAP

- Slave address : 10011000 (98H)
- Sub address

SUB ADDRESS		7	6	5	4	3	2	1	0	PRESET
00	(Ⅰ)	Red color cut off control (10bit)							LSB	00000000 (00H)
01	(Ⅱ)	×	×	×	×	×	×	MSB ↑		00000000 (00H)
02	(Ⅰ)	Green color cut off control (10bit)							LSB	00000000 (00H)
03	(Ⅱ)	×	×	×	×	×	×	MSB ↑		00000000 (00H)
04	(Ⅰ)	Blue color cut off control (10bit)							LSB	00000000 (00H)
05	(Ⅱ)	×	×	×	×	×	×	MSB ↑		00000000 (00H)
06	(Ⅲ)	MSB	Red color drive control (8bit)						LSB	00000000 (00H)
07	(Ⅲ)	MSB	Blue color drive control (8bit)						LSB	00000000 (00H)

(Note) ×bit : don't care

I²C BUS CONTROLLED FORMAT SUMMARY

Bus controlled format of TA8889AP is based on I²C bus control format of Philips.

Data transfer format

S	Slave address	0	A	Sub address	A	Data	A	P

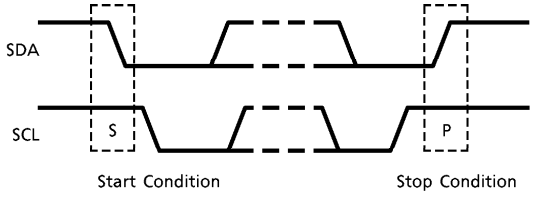
MSB 7bit MSB 8bit MSB 8bit

S : Start Condition

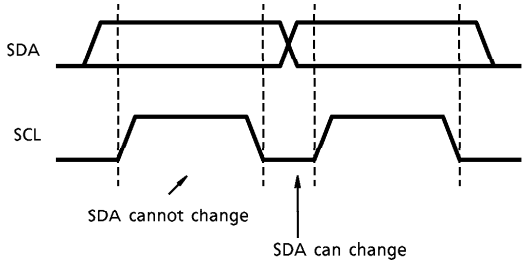
P : Stop Condition

A : Acknowledge

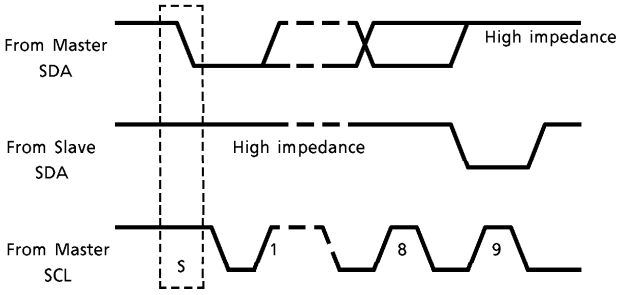
(1) Start and stop condition



(2) Bit transfer



(3) Acknowledge



(4) Slave address

A6	A5	A4	A3	A2	A1	A0	R/$\overline{W}$
1	0	0	1	1	0	0	0

Purchase of TOSHIBA I²C components conveys a license under the Philips I²C Patent Rights to use these components in an I²C system, provided that the system conforms to the I²C Standard Specification as defined by Philips.

MAXIMUM RATINGS (Ta = 25°C ± 3°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{CC}	15	V
Power Dissipation	P_D (Note 1)	1.4	W
Input Signal Voltage	e_{in}	7	V_{p-p}
Terminal Voltage	V_{in} (Note 2)	GND − 0.3~V_{CC} + 0.3	V
Operating Temperature	T_{opr}	− 20~65	°C
Storage Temperature	T_{stg}	− 65~150	°C

(Note 1) When using the device at above Ta = 25°C, decrease the power dissipation by 11.2mW for each increase of 1°C.
(Note 2) Rating of pin 9 and 10 is GND − 0.3V~5.5V.

RECOMMENDED SUPPLY VOLTAGE

PIN No.	PIN NAME	MIN.	TYP.	MAX.	UNIT
5	V_{CC}	10.8	12.0	13.2	V

ELECTRICAL CHARACTERISTICS
DC characteristics (Unless otherwise specified, V_{CC} = 12V, Ta = 25 ± 3°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply Current	I_{CC}	—		46	56	70	mA
Terminal Voltage	V_{11}	—	Pin 1, 3, 6-DC 2V input Pin 8-S.C.P. input Pin 2-6dB MODE Sub address (Ⅰ) = 00H (Ⅱ) = 02H (Ⅲ) = 80H	5.0	6.0	7.0	V
	V_{12}			2.8	3.0	3.2	
	V_{13}			5.0	6.0	7.0	
	V_{14}			2.8	3.0	3.2	
	V_{15}			5.0	6.0	7.0	
	V_{16}			2.8	3.0	3.2	

AC characteristics (Unless otherwise specified, V_{CC} = 12V, Ta = 25 ± 3°C)

Drive circuit

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Frequency Characteristic		f_c	—	(Note 1)		10	20	30	MHz
Cross-talk		C_V	—	(Note 2)		45	50	—	dB
6dB Mode Gain	Max.	G_{6MA}	—	(Note 3)	SA (III) : FFH	9.0	10.0	11.5	dB
	Typ.	G_{6TY}			SA (III) : 80H	3.5	5.5	7.5	
	Min.	G_{6MI}			SA (III) : 00H	1.0	2.0	3.0	
0dB Mode Gain	Max.	G_{0MA}	—	(Note 4)	SA (III) : FFH	3.0	4.0	5.5	dB
	Typ.	G_{0TY}			SA (III) : 80H	1.5	−0.5	−2.5	
	Min.	G_{0MI}			SA (III) : 00H	−3.0	−4.0	−5.5	
Gain Control Range	Max.	G_{VMA}	—	(Max. Gain / Min. Gain) − (Typ. Gain) Both 0 / 6dB mode		3.0	5.0	6.0	dB
	Min.	G_{VMI}				3.0	3.5	4.0	
Input Dynamic Range	Max. DC	G_{IDA}	—	(Note 5)		6.5	7.0	—	V
	Min. DC	G_{IDI}				—	1.0	1.5	
Output Dynamic Range	Max. DC	V_{ODA}	—	(Note 6)		10.0	10.5	—	V
	Min. DC	V_{ODI}				—	1.0	1.5	

Cut off circuit

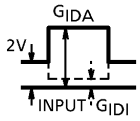
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Min. Control Range		V_{LSB}	—	(Note 7)		—	3.0	5.0	mV
DC Voltage Control Range	Max.	V_{CVI}	—	(Note 8)	(I) (II) : FF03H	4.25	4.5	—	V
	Min.	V_{CVA}			(I) (II) : 0000H	—	1.6	1.8	
	Range	V_{CV}		(Max) − (Min)		2.5	2.9	—	
Center Off-set		V_{COF}	—	(Note 9)	(I) (II) : 0002H	0.8	1.0	1.2	V
Max. Input DC Level		V_{IMA}	—	(Note 10)	(I) (II) : 0000H	—	4.5	5.0	V
Min. Input DC Level		V_{IMI}			(I) (II) : FF03H	0.3	0.5	—	
Max. Output DC Level		V_{OMA}			(I) (II) : FF03H	—	5.4	6.0	
Min. Output DC Level		V_{OMI}			(I) (II) : 0000H	1.2	1.5	—	
Non Linear Point Value	SA : 7F00	V_{AC1}	—	(Note 11)		—	—	3.0	mV
	SA : FF00	V_{AC2}				—	—	3.0	
	SA : FF01	V_{AC3}				—	—	3.0	

Threshold circuit

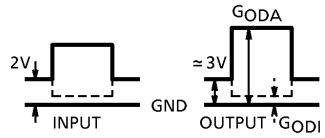
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
S.C.P. Threshold	GATE P	V_{GP}	—	—	6.2	6.5	6.8	V
	Hori. P	V_{HP}			1.2	1.5	1.8	
	Vert. P	V_{VP}			1.2	1.5	1.8	
Blanking Level	VBLNK	V_{BL}	—	(Note 12)	0.20	0.25	0.30	V

TEST CONDITION

Drive circuit

NOTE No.	ITEM		TERM-INAL 2 MODE	SUB ADDRESS & DATA (I)	(II)	(III)	MEASUREMENT METHOD
1	Frequency Characteristic		6dB (7.5V)	00H	02H	FFH	(1) Pin 1 (Pin 3, 6) : DC 4V. (2) Adjust the input voltage at Pin 15 (Pin 13, 11) to make Output voltage = 5.5V. (3) Pin 1 (Pin 3, 6) : 1MHz, 300mV$_{p-p}$, DC 4V, sine wave. Measure the output level (vout). (4) Measure the input level to make Output level = (vout – 3dB)
2	Cross-talk		0dB (GND)	↑	↑	80H	(1) The same as Note 1. (2) The same as Note 1. (3) Pin 1 (Pin 3, 6) : 5MHz, DC 4V, sine wave. (4) Measure the cross-talk.
3	6dB Mode Gain	Max.	6dB (7.5V)	↑	↑	FFH	(1) Pin 8 : S.C.P. or Gate pulse. (2) Pin 1 (Pin 6) : signal = (pedestal level = 2V, amplitude 3V). (3) Measure the output level. Calculate the 20log (output level / input level).
		Typ.				80H	
		Min.				00H	
4	0dB Mode Gain	Max.	0dB (GND)	↑	↑	FFH	(1) The same as Note 3. (2) Pin 1 (Pin 6) : signal = (pedestal level = 2V, amplitude 1.5V). (3) The same as Note 3.
		Typ.				80H	
		Min.				00H	
5	Input Dynamic Range	Max. DC	↑	↑	↑	00H	(1) The same as Note 3. (2) Pin 1 (Pin 6) : signal = (under Fig.) (3) Make input signal larger to output signal saturation level. Measure the input level. →G_{IDA} (4) Make input signal smaller to output signal saturation level. Measure the input level. →G_{IDI} 
		Min. DC					

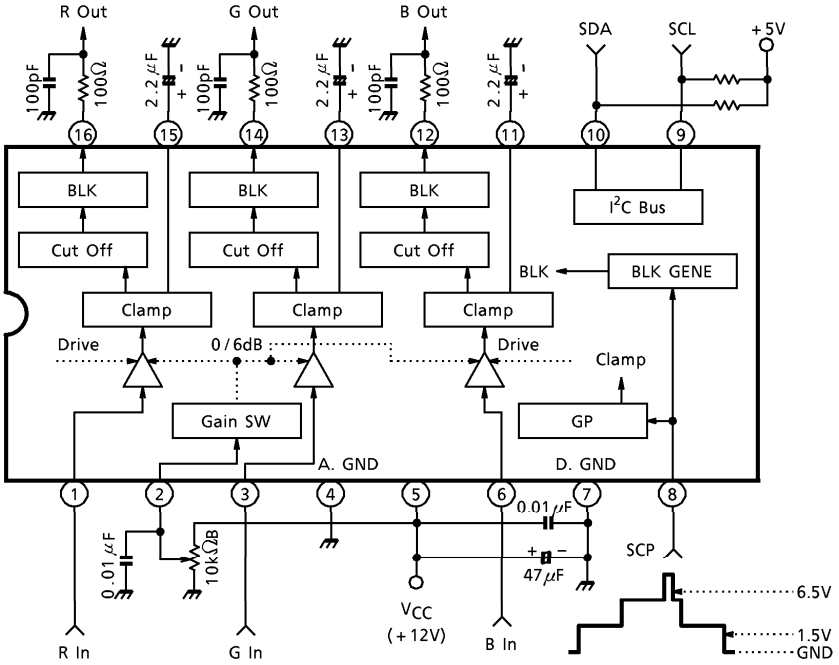
NOTE No.	ITEM		TERM-INAL 2 MODE	SUB ADDRESS & DATA (Ⅰ)	(Ⅱ)	(Ⅲ)	MEASUREMENT METHOD
6	OUTPUT Dynamic Range	Max. DC	6dB (7.5V)	00H	02H	FFH	(1) Pin 8 : S.C.P. or Gate pulse. (2) Pin 1 (pin 6) : signal = (under Fig.) (3) Make input signal larger to output signal saturation level. Measure the output level. →G_{ODA} (4) Make input signal smaller to output signal saturation level. Measure the output level. →G_{ODI}
		Min. DC					



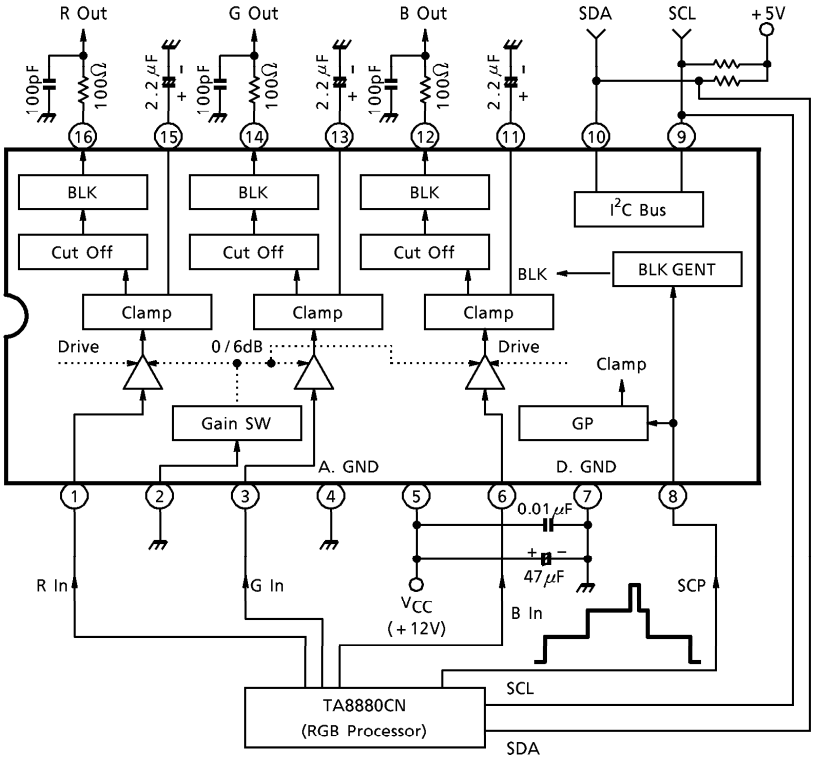
Cut off circuit

NOTE No.	ITEM		TERM-INAL 2 MODE	SUB ADDRESS & DATA (Ⅰ)	(Ⅱ)	(Ⅲ)	MEASUREMENT METHOD
7	Min. Variable Range		0dB (GND)	00H ↓ 01H	00H	80H	(1) The same as Note 6. (2) Pin 1 (Pin 3, 6) : DC 2V. (3) Subaddrss data (Ⅰ) : 00H→01H. Measure the DC voltage gap of output DC level.
8	Control Range	Max.	↑	FFH	03H	↑	(1) The same as Note 6. (2) The same as Note 7. (3) SA (Ⅰ) (Ⅱ) : FF03H, 0000H ; Measure the output DC level of each DATA.
		Min.		00H	00H		
9	Center Off-set		↑	00H	02H	↑	(1) The same as Note 6. (2) The same as Note 7. (3) (Output DC level) – (Input DC level 2V)
10	Max. Input DC Level		↑	00H	00H	↑	(1) The same as Note 6. (2) SA (Ⅰ) (Ⅱ) : 0000H ; Increase input DC level to output DC saturation level, Measure the input DC level. →V_{IMA} (3) Decrease input DC level to output DC saturation level, Measure the output DC level. →V_{OMI} (4) SA (Ⅰ) (Ⅱ) : FF03H ; Decrease input DC level to output DC saturation level, Measure the input DC level. →V_{IMI} (5) Increase input DC level to output DC saturation level, Measure the output DC level. →V_{OMA}
	Min. Input DC Level		↑	FFH	03H	↑	
	Max. Output DC Level		↑	00H	03H	↑	
	Min. Output DC Level		↑	FFH	03H	↑	
11	Non Liner Point Value	SA : 7F00	↑	7F00H ↓ 8000H		↑	(1) The same as Note 6. (2) Pin 1 (Pin 3, 6) : DC 2V. (3) SA (Ⅰ) (Ⅱ) : 7F00H→8000H, FF00H→0001H, FF01H→0002H ; Measure the DC voltage gap of each point.
		SA : FF00		7F00H ↓ 8000H			
		SA : FF01		7F00H ↓ 8000H			
12	Blanking Level		0dB (GND)	00H	02H	↑	(1) Pin 8 : S.C.P. or Gate pulse. (2) Pin 1 (Pin 3, 6) : DC 2V. (3) Measure The BLANKING LEVEL.

TEST CIRCUIT



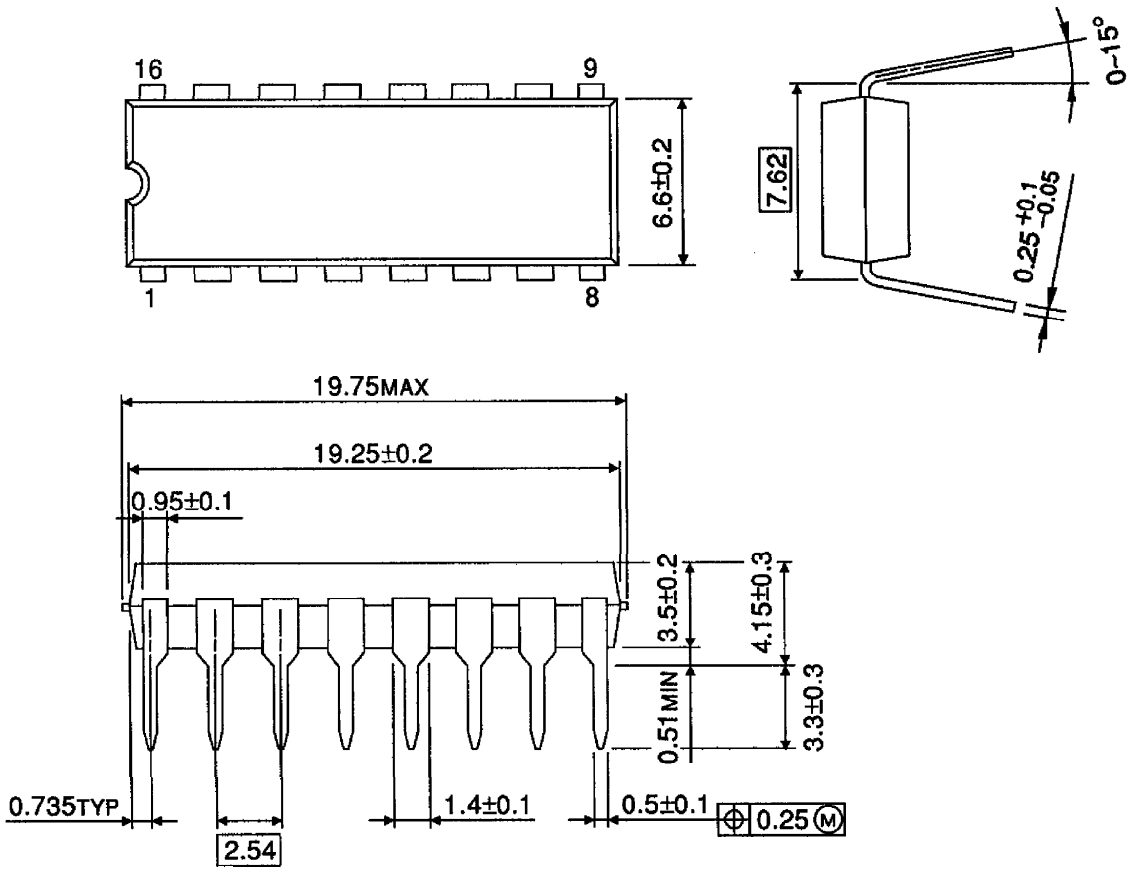
APPLICATION CIRCUIT



OUTLINE DRAWING

DIP16-P-300-2.54B

Unit : mm



Weight : 1.11g (Typ.)