

TA8889AP

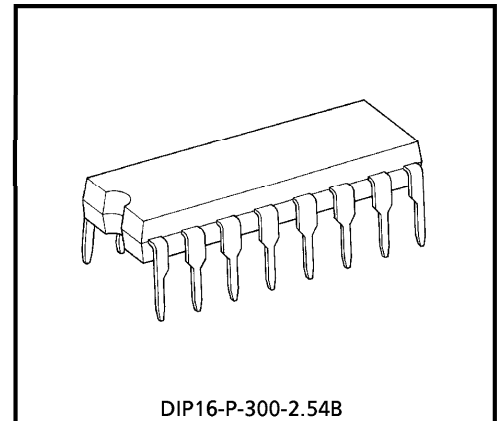
RGB CUT OFF DRIVE CONTROL IC

The TA8889AP is 16pin DIP package IC which has RGB Cut off/Drive control circuit.

The feature of TA8889AP is controlled via I²C bus.

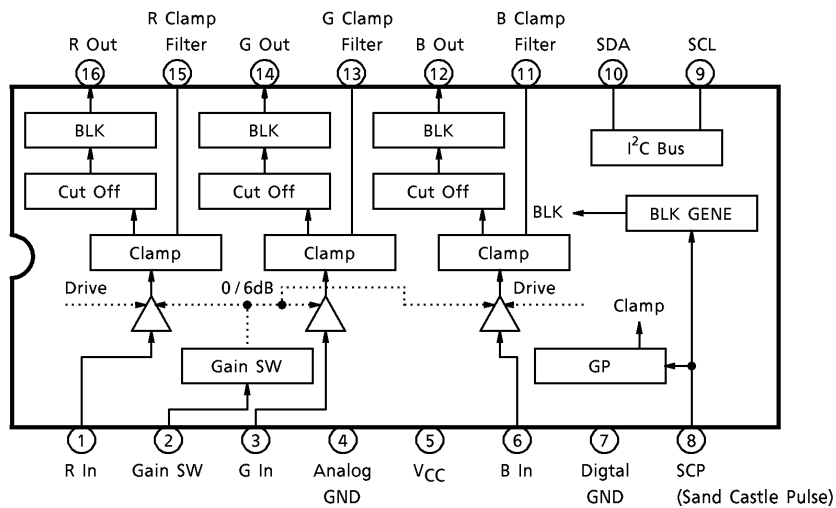
FEATURES

- 3 independents cut off control for 3 primary color.
- Independent drive control for blue and green color.
- 0dB / 6dB gain SW
- I²C bus interface circuit



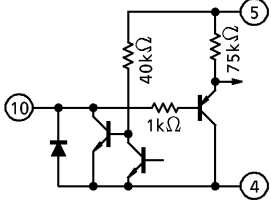
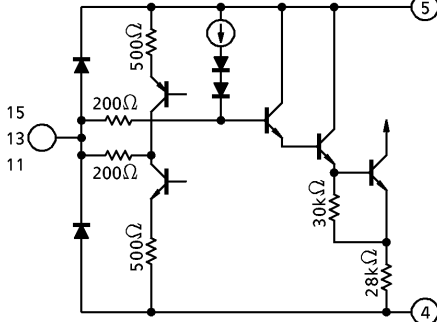
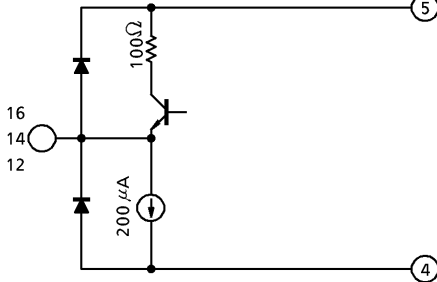
DIP16-P-300-2.54B
Weight : 1.11g (Typ.)

BLOCK DIAGRAM



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 | VCC | This is common VCC 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 ² L 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 ² C 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 ² C bus. Because its is week for surge impulse, connect external devices for protection against surge if necessary. |  |
| 15 13 11 | R Clamp Filter G Clamp Filter 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 14 12 | R Out G Out 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, T_a = ±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 | Not available |
| GND (GND~2.3V) | | Available |

I²C BUS CONTROL MAP

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

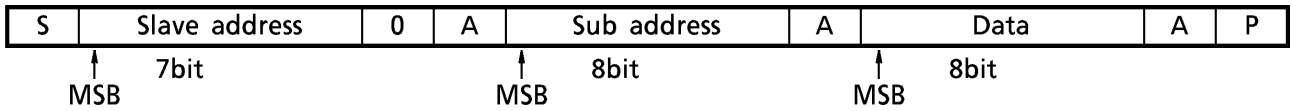
| SUB ADDRESS | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | PRESET | |
|-------------|---------|-------------------------------------|---------------------------------|---|---|---|---|-------|-----|----------------|----------------|
| 00 | (I) | Red color cut off control (10bit) | | | | | | | | LSB | 00000000 (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

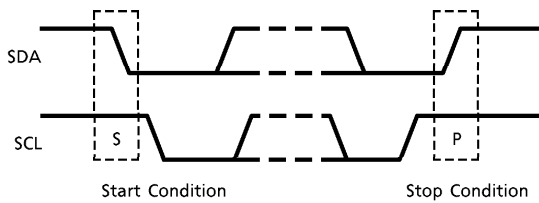


S : Start Condition

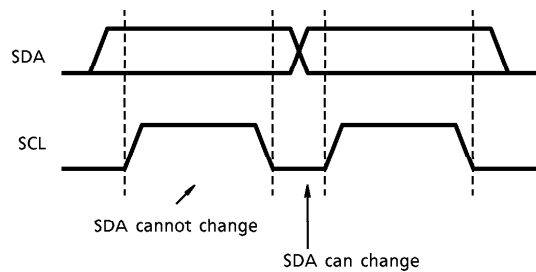
P : Stop Condition

A : Acknowledge

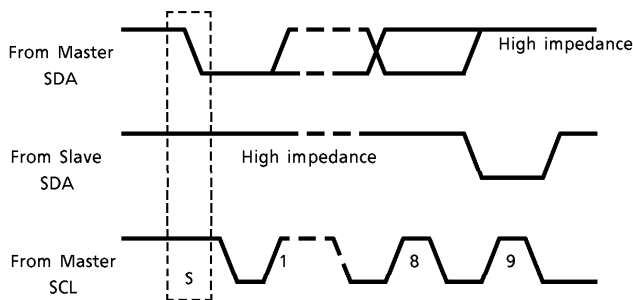
(1) Start and stop condition



(2) Bit transfer



(3) Acknowledge



(4) Slave address

| A6 | A5 | A4 | A3 | A2 | A1 | A0 | R/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} | — | 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 | 46 | 56 | 70 | mA |
| Terminal Voltage | V ₁₁ | — | | 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, $V_{CC} = 12V$, $T_a = 25 \pm 3^\circ C$)

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_{JDA} | — | (Note 5) | 6.5 | 7.0 | — | V | |
| | Min. DC | G_{JDI} | | | — | 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 | | |

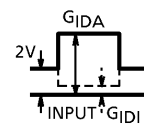
Threshold circuit

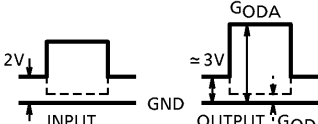
| CHARACTERISTIC | | SYMBOL | TEST CIR-CUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT | |
|------------------|---------|------------|---------------|----------------|-----------|------|------|------|---|
| S.C.P. Threshold | GATE P | V_{GP} | — | — | 6.2 | 6.5 | 6.8 | V | |
| | Hori. P | V_{HP} |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

TEST CONDITION

Drive circuit

| NOTE No. | ITEM | TERMINAL 2 MODE | SUB ADDRESS & DATA | | | MEASUREMENT METHOD | |
|----------|--------------------------|-----------------|--------------------|------|------------|--|---|
| | | | (I) | (II) | (III) | | |
| 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. | ↑ | ↑ | 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. | | | 6dB (7.5V) | | 80H |
| | | Min. | | | 00H | | |
| 4 | 0dB Mode Gain | Max. | ↑ | ↑ | 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. | | | 0dB (GND) | | 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 _I DA (4) Make input signal smaller to output signal saturation level. Measure the input level. →G _I DI |
| | | Min. DC | | | | | |

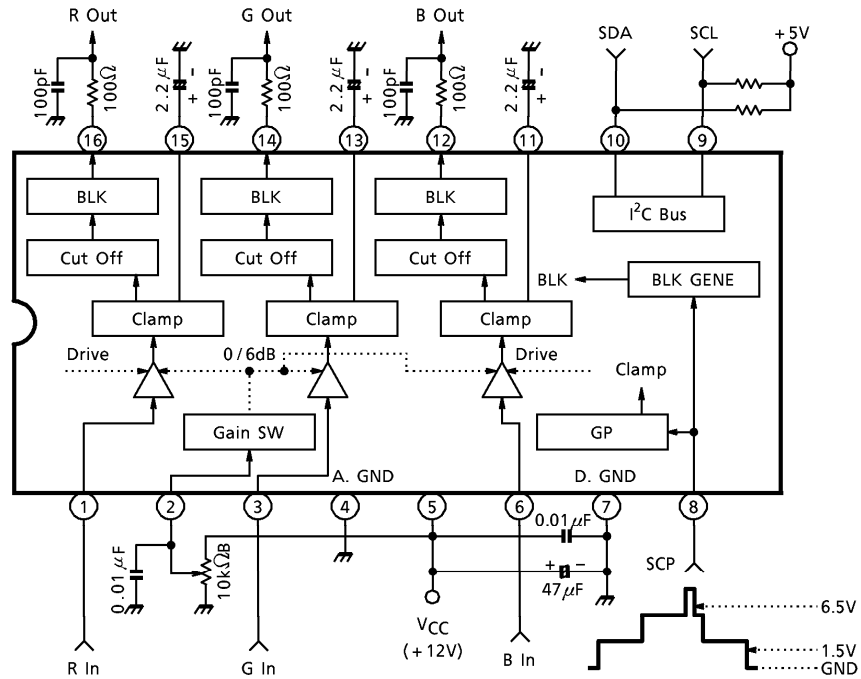


| NOTE No. | ITEM | | TERMINAL 2 MODE | SUB ADDRESS & DATA | | | MEASUREMENT METHOD |
|----------|----------------------|---------|-----------------|--------------------|------|-------|---|
| | | | | (I) | (II) | (III) | |
| 6 | OUTPUT Dynamic Range | Max. DC | 6dB (7.5V) | 00H | 02H | FFH | (1) Pin 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. →GODA (4) Make input signal smaller to output signal saturation level. Measure the output level. →GODI  |
| | | Min. DC | | | | | |

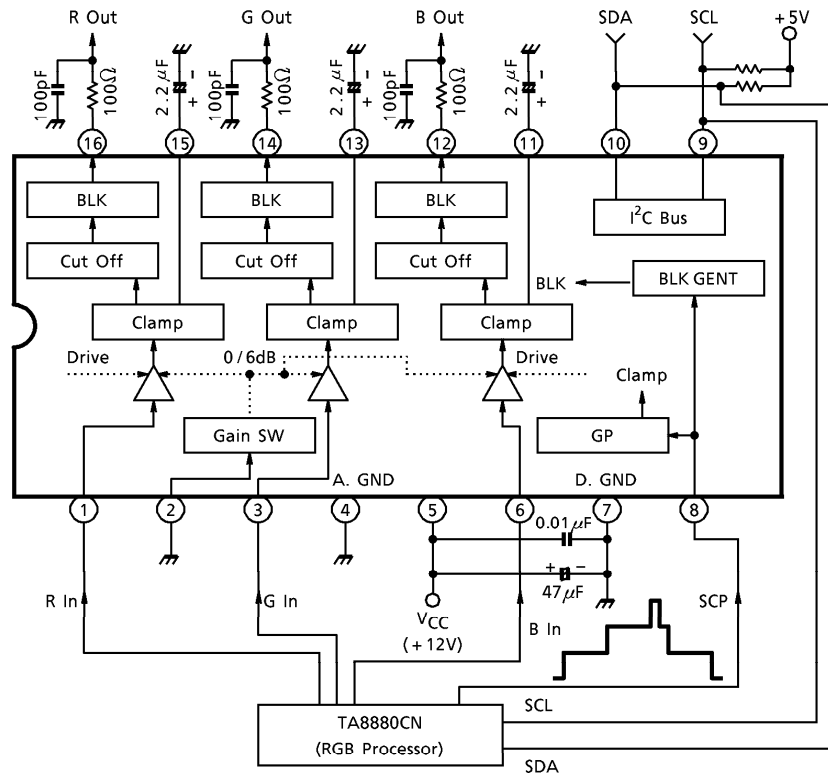
Cut off circuit

| NOTE No. | ITEM | | TERMINAL 2 MODE | SUB ADDRESS & DATA | | | MEASUREMENT METHOD |
|----------|-----------------------|-----------|-----------------|---------------------|------|-------|---|
| | | | | (I) | (II) | (III) | |
| 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) Subaddress 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 _I MA (3) Decrease input DC level to output DC saturation level, Measure the output DC level. →V _O MI (4) SA (I) (II) : FF03H ; Decrease input DC level to output DC saturation level, Measure the input DC level. →V _I MI (5) Increase input DC level to output DC saturation level, Measure the output DC level. →V _O MA |
| | 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

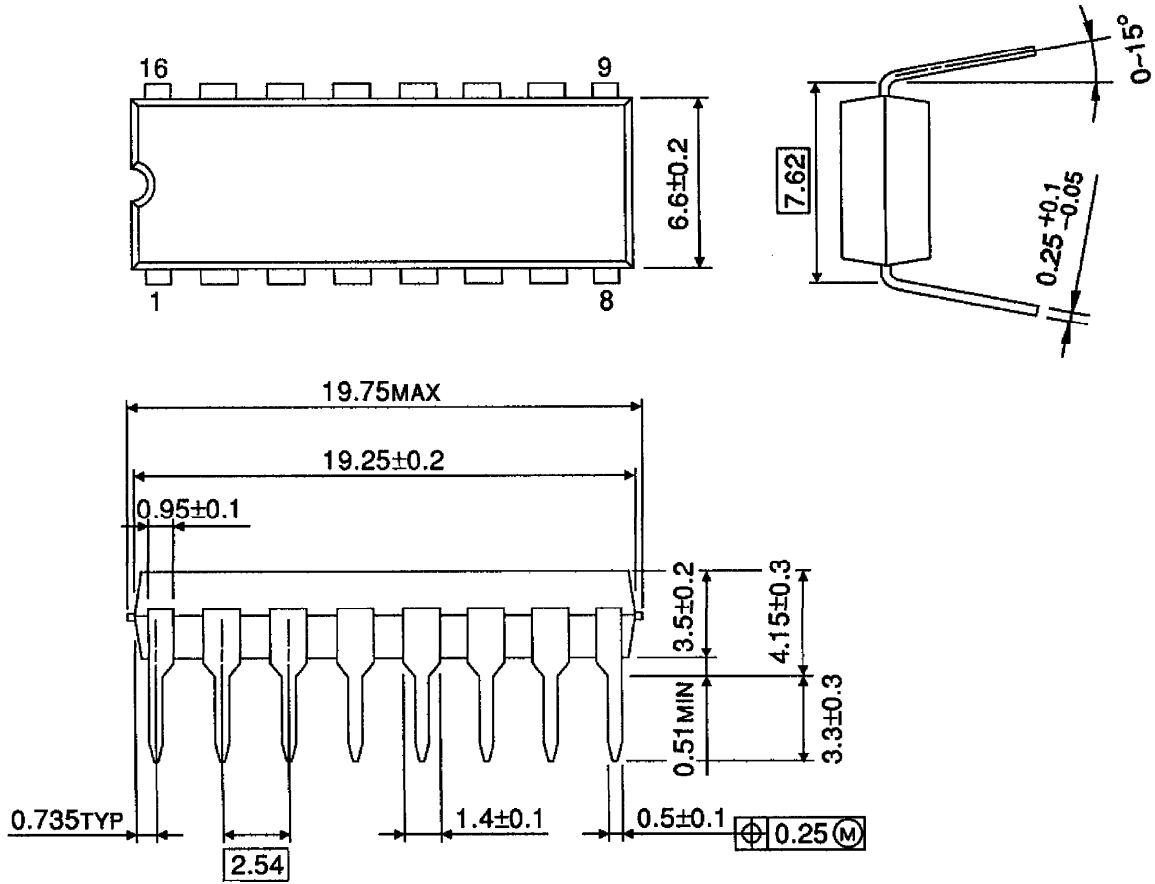


APPLICATION CIRCUIT



PACKAGE DIMENSIONS
DIP16-P-300-2.54B

Unit : mm



Weight : 1.11g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

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