

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA1241AN

## DEFLECTION PROCESSOR IC FOR TVs

Ideal for large-inch CRT, the TA1241AN is an IC for deflection correction and vertical / horizontal picture size adjustment, with a 24-pin plastic package.

The TA1241AN can control all kinds of picture adjustment functions through I<sup>2</sup>C-bus communications.

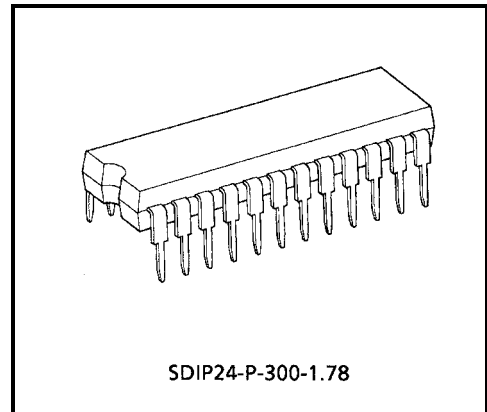
### FEATURES

#### BUS write mode

- Vertical amplitude adjustment
- Vertical position adjustment
- Vertical linearity correction
- Vertical S correction
- Vertical | correction
- Vertical EHT correction
- Trapezium correction
- Horizontal amplitude correction
- Horizontal EHT correction
- Parabola correction
- Corner correction
- Center curve correction (SAW, PAR)

#### BUS read mode

- V-guard detection
- LVP detection
- V output detection
- E / W output detection



Weight: 1.22 g (Typ.)

#### Pin output

- V centering (DAC)
- H centering (DAC)
- Dynamic focus (DAC)
- Analog blanking
- LVP detection

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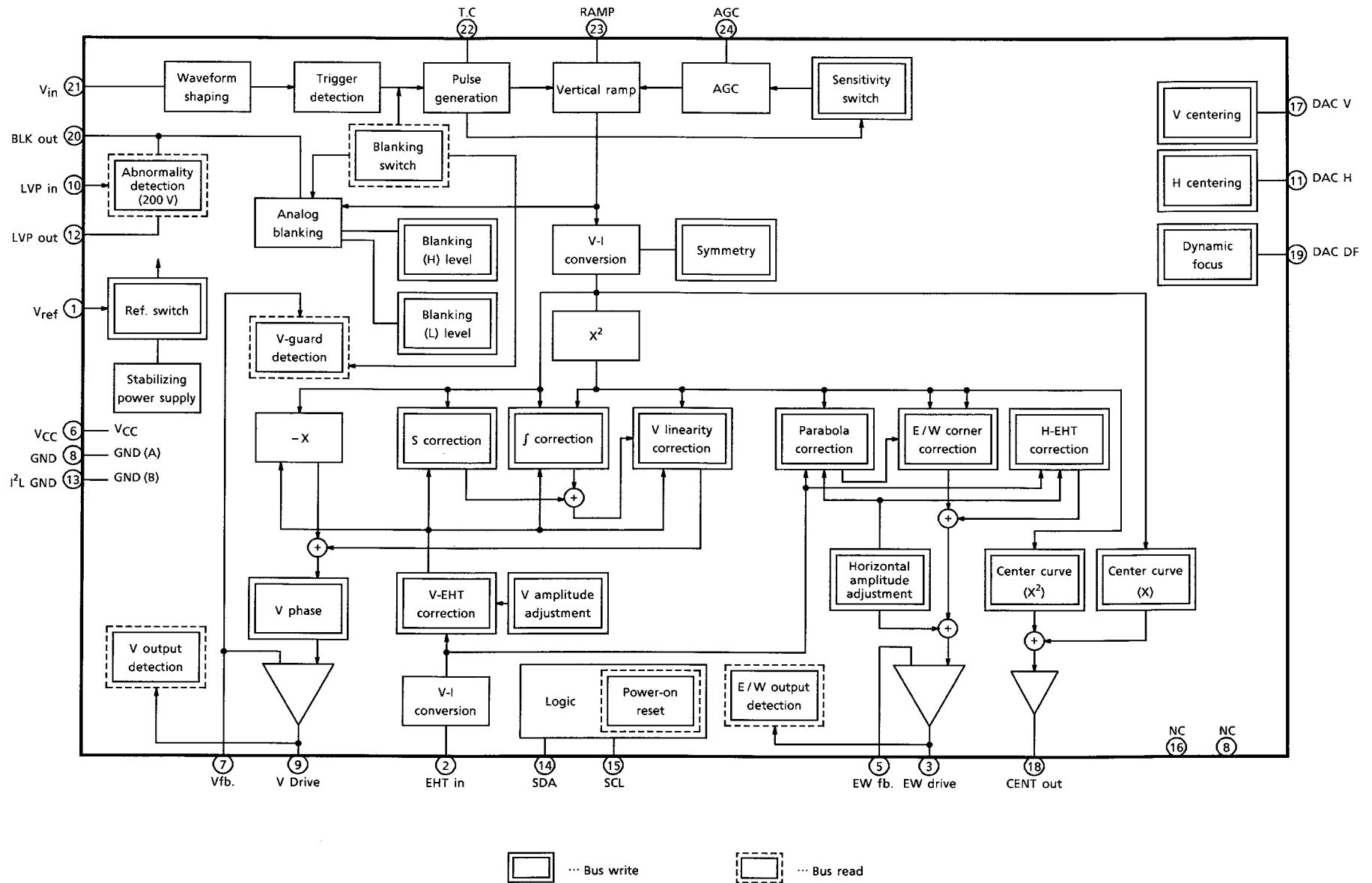
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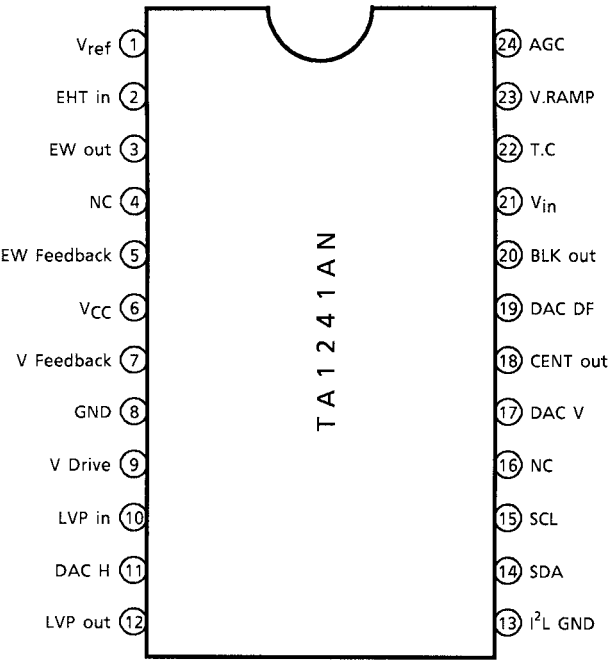
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## BLOCK DIAGRAM



PIN CONNECTION

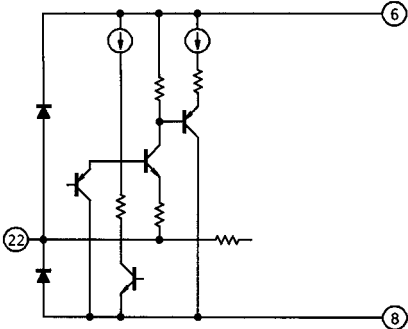
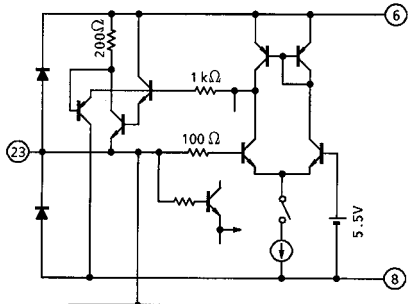

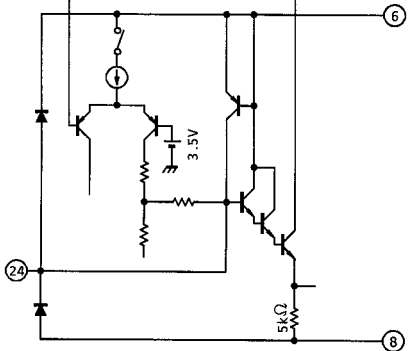


## PIN FUNCTION

| PIN No. | PIN NAME         | FUNCTION   | INTERFACE | INPUT / OUTPUT SIGNAL |
|---------|------------------|--|-----------|-----------------------|
| 1       | V <sub>ref</sub> | Bias voltage external input pin for the V and E / W blocks. BUS write mode controls the switching. |           | —                     |
| 2       | EHT in           | EHT input pin.   |           | —                     |
| 3       | EW Drive         | E / W drive output pin. Also performs E / W detection in BUS read mode.                            |           | —                     |
| 5       | EW Feedback      | E / W feedback pin.  |           |                       |
| 4       | NC               | —  | —         | —                     |
| 6       | V <sub>CC</sub>  | V <sub>CC</sub> pin. Connect 9 V (Typ.).   | —         | —                     |

| PIN No. | PIN NAME             | FUNCTION  | INTERFACE | INPUT / OUTPUT SIGNAL      |
|---------|----------------------|---|-----------|----------------------------|
| 7       | V Feedback           | Vertical negative feedback input pin. When voltage on this pin equals or exceeds 6 V, the device outputs a blanking signal to pin 20 and sends discriminating data to BUS read. |           | —                          |
| 9       | V Drive              | Vertical signal output pin. Also performs vertical output detection in BUS read mode.   |           |                            |
| 8       | GND                  | GND pin.  | —         | —                          |
| 10      | LVP in               | Used to connect reference voltage to protect the deflection block from a low-voltage.   |           | —                          |
| 12      | LVP out              | Outputs abnormal power supply detection result. Also performs LVP detection in BUS read mode.   |           | OK : DC0.7V<br>NG : DC5.0V |
| 11      | DAC H                | DAC output pin for horizontal centering.  |           | —                          |
| 17      | DAC V                | DAC output pin for vertical centering.  |           | —                          |
| 19      | DAC DF               | DAC output pin for dynamic focus.   |           | —                          |
| 13      | I <sup>2</sup> L GND | GND pin for the I <sup>2</sup> L block.   | —         | —                          |
| 14      | SDA                  | SDA pin for the I <sup>2</sup> C BUS.   |           | —                          |

| PIN No. | PIN NAME | FUNCTION  | INTERFACE | INPUT / OUTPUT SIGNAL |
|---------|----------|---|-----------|-----------------------|
| 15      | SCL      | SCL pin for the I <sup>2</sup> C BUS.   |           | —                     |
| 16      | NC       | —   | —         | —                     |
| 18      | CENT out | Outputs center curve correction waveform.   |           | —                     |
| 20      | BLK out  | Analog blanking output pin. Open collector output. In BUS write mode, outputs a vertical blanking signal for the vertical RAMP. |           |                       |
| 21      | V in     | Inputs trigger pulse. Detects the falling edge of the input pulse and generates a trigger pulse to the next-stage circuit.      |           |                       |

| PIN No. | PIN NAME | FUNCTION  | INTERFACE   | INPUT / OUTPUT SIGNAL   |
|---------|----------|---|---|---|
| 22      | T.C      | This pin connects a pulse-shaping filter.   |   | —   |
| 23      | V RAMP   | Used to connect a capacitor to generate a vertical RAMP signal.                           |   |  |
| 24      | AGC      | Used to connect a filter to automatically adjust the vertical RAMP oscillation amplitude. |  | —   |

## I<sup>2</sup>C BUS MAP

Write data map

IC address : 10001100 (8CH)

| FUNCTION                    | SUB ADDRESS |     | DATA |     | PRESET |     | RANGE |   |                               |   |   |   |   |   |   |                     |             |
|-----------------------------|-------------|-----|------|-----|--------|-----|-------|---|-------------------------------|---|---|---|---|---|---|---------------------|-------------|
|                             | MSB         | LSB | MSB  | LSB | MSB    | LSB |       |   |                               |   |   |   |   |   |   |                     |             |
| PICTURE HEIGHT              | 0           | 0   | 0    | 0   | 0      | 0   | 0     | 0 | 0                             | 0 | 0 | 0 | 0 | 0 | 0 | -48~+48%            |             |
| V-LINIARITY                 | 0           | 0   | 0    | 0   | 0      | 0   | 0     | 1 | x                             | x | x | 0 | 0 | 0 | 0 | -13~+13%            |             |
| V-S CORRECTION              | 0           | 0   | 0    | 0   | 0      | 0   | 1     | 0 | x                             | x | 0 | 0 | 0 | 0 | 0 | -24~+24%            |             |
| V-SHIFT. AGC, REG           | 0           | 0   | 0    | 0   | 0      | 0   | 1     | 1 | x                             | v | x | A | x | 0 | 0 | -570~+570 mV        |             |
| v-COMPENSATION              | 0           | 0   | 0    | 0   | 0      | 1   | 0     | 0 | x                             | x | x | x | x | 0 | 0 | 0~9%                |             |
| PICTURE WIDTH               | 0           | 0   | 0    | 0   | 0      | 1   | 0     | 1 | x                             | x | 0 | 0 | 0 | 0 | 0 | 1.7~6.5 V           |             |
| E-W PARABORA                | 0           | 0   | 0    | 0   | 0      | 1   | 1     | 0 | x                             | x | 0 | 0 | 0 | 0 | 0 | 0~4.4 V             |             |
| E-W CORNER                  | 0           | 0   | 0    | 0   | 0      | 1   | 1     | 1 | x                             | x | x | 0 | 0 | 0 | 0 | -3.2~+3.2%          |             |
| TRAPEZIUM                   | 0           | 0   | 0    | 0   | 1      | 0   | 0     | 0 | x                             | 0 | 0 | 0 | 0 | 0 | 0 | 0~2.4 V             |             |
| H-COMP, H-CENT DAC          | 0           | 0   | 0    | 0   | 1      | 0   | 0     | 1 | H-CENT DAC<br>x 0 0 0 x 0 0 0 |   |   | 0 | 0 | 0 | 0 | 0                   | 0~9%, 1~5 V |
| V- $\gamma$ CORRECT, BLK-SW | 0           | 0   | 0    | 0   | 1      | 0   | 1     | 0 | x                             | x | B | x | 0 | 0 | 0 | 0~4%                |             |
| V CENT DAC                  | 0           | 0   | 0    | 0   | 1      | 0   | 1     | 1 | x                             | 0 | 0 | 0 | 0 | 0 | 0 | 0.5~5 V             |             |
| ANAROG BLK-VH               | 0           | 0   | 0    | 0   | 1      | 1   | 0     | 0 | x                             | x | x | 0 | 0 | 0 | 0 | -640~+640 mV        |             |
| ANAROG BLK-VL               | 0           | 0   | 0    | 0   | 1      | 1   | 0     | 1 | x                             | x | x | 0 | 0 | 0 | 0 | -640~+640 mV        |             |
| CENT PAR, SAW               | 0           | 0   | 0    | 0   | 1      | 1   | 1     | 0 | x                             | 0 | 0 | 0 | x | 0 | 0 | -4~+4 V,<br>-2~+2 V |             |
| DYNAMIC FORCUS              | 0           | 0   | 0    | 0   | 1      | 1   | 1     | 1 | x                             | x | 0 | 0 | 0 | 0 | 0 | -0.5~5 V            |             |

Note: O : Used bit, x : Unused bit  
 A : AGC switching (DATA = 0...HIGH response, DATA = 1...LOW response)  
 V : Power supply switching  
 (DATA = 0...Stabilization power supply, DATA = 1...External power supply)  
 B : Blanking switch (DATA = 0...Enabled, DATA = 1...Disabled)  
 When the uppermost bit of the subaddress is high, auto-increment mode is set.


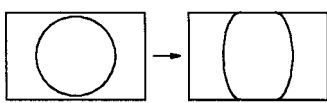

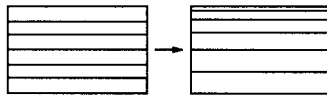

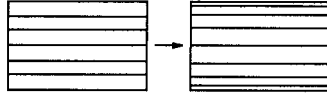
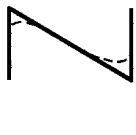
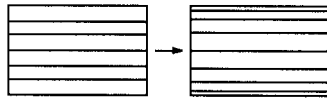
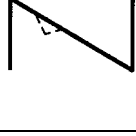
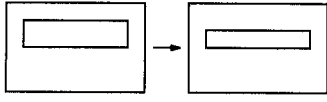
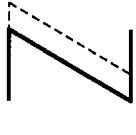
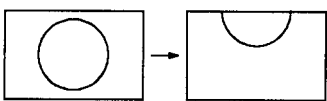
Read data map

IC address 10001101 (8DH)

| FUNCTION<br>DATA | MSB |     |     |     | LSB    |           |           |                     |
|------------------|-----|-----|-----|-----|--------|-----------|-----------|---------------------|
|                  | NON | NON | NON | LVP | V-GUAD | E-Wout    | Vout      | POW DISCRIMI-NATION |
| 0                | —   | —   | —   | OFF | OFF    | No signal | No signal | OFF                 |
| 1                | —   | —   | —   | ON  | ON     | Signal    | Signal    | ON                  |



## DEFLECTION CORRECTION TABLE

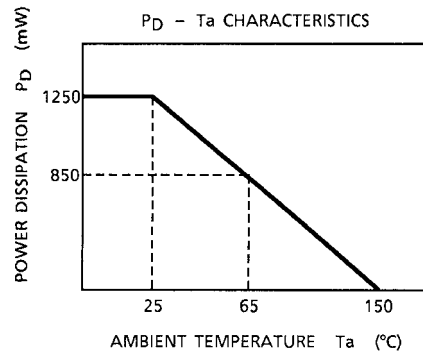
| FUNCTION  | OUTPUT WAVEFORM   | PICTURE CHANGE   | VARIABLE RANGE |
|---|---|--|----------------|
| Vertical Amplitude Adjustment<br>[PICTURE HEIGHT] |    | <p>Typ. Large value</p>  <p>(Solid line at left) (Dotted line at left)</p>               | -48~+48%       |
| Vertical Linearity Correction<br>[V-LINEARITY]    |    | <p>Typ. Large value</p>  <p>(Solid line at left) Lower stretching, upper compression</p> | -13~+13%       |
| Vertical S Correction<br>[V-S CORRECTION]         |    | <p>Typ. Large value</p>  <p>(Solid line at left) Upper and lower compression</p>         | -24~+24%       |
| Vertical J Correction<br>[V-J CORRECTION]         |  | <p>Typ. Large value</p>  <p>(Solid line at left) Upper and lower compression</p>        | 0~4%           |
| Vertical EHT Correction<br>[V-COMPENSATION]       |  | <p>Typ. Large value</p>  <p>(Solid line at left) (Dotted line at left)</p>             | 0~9%           |
| Vertical Phase Correction<br>[V-SHIFT]            |  | <p>Typ. Large value</p>  <p>(Solid line at left) (Dotted line at left)</p>             | -800~+800 mV   |

| FUNCTION   | OUTPUT WAVEFORM | PICTURE CHANGE  | VARIABLE RANGE |
|--|-----------------|---|----------------|
| Parabola Amplitude Adjustment<br>[E-W PARABOLA]    |                 | <p>Typ. Small value</p> <p>(Solid line at left) (Dotted line at left)</p> | 0~5.6 V        |
| Corner Correction<br>[E-W CORNER]                  |                 | <p>Typ. Large value</p> <p>(Solid line at left) (Dotted line at left)</p> | -3.2~+3.2 V    |
| Horizontal EHT Correction<br>[H-COMPENSATION]      |                 | <p>Typ. Large value</p> <p>(Solid line at left) (Dotted line at left)</p> | 0~+9%          |
| Horizontal Amplitude Adjustment<br>[PICTURE WIDTH] |                 | <p>Typ. Large value</p> <p>(Solid line at left) (Dotted line at left)</p> | 1.6~7.3 V      |
| Parabola Symmetry Correction<br>[TRAPEZIUM]        |                 | <p>Typ. Small value</p> <p>(Solid line at left) (Dotted line at left)</p> | -9~+9%         |
| Center Curve SAW Correction<br>[CENT SAW]          |                 | <p>Typ. Large value</p> <p>(Solid line at left) (Dotted line at left)</p> | -2~+2 V        |
| Center Curve Parabola Correction<br>[CENT PAR]     |                 | <p>Typ. Large value</p> <p>(Solid line at left) (Dotted line at left)</p> | -1~+1 V        |

## MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTICS       | SIGNAL             | RATING      | UNIT             |
|-----------------------|--------------------|-------------|------------------|
| Power Supply Voltage  | V <sub>CC</sub>    | 12          | V                |
| Power Dissipation     | P <sub>D</sub> MAX | 1250 (Note) | mW               |
| Input Signal Voltage  | e <sub>in</sub>    | 9           | V <sub>p-p</sub> |
| Operating Temperature | T <sub>opr</sub>   | -20 to 65   | °C               |
| Storage Temperature   | T <sub>stg</sub>   | -55 to 150  | °C               |

Note: When using at temperatures higher than 25°C, decrease maximum power dissipation by 10 mW for every 1°C over 25°C.



## RECOMMENDED POWER SUPPLY VOLTAGE

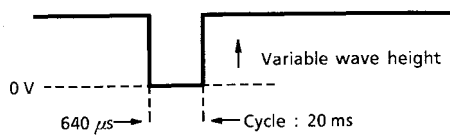
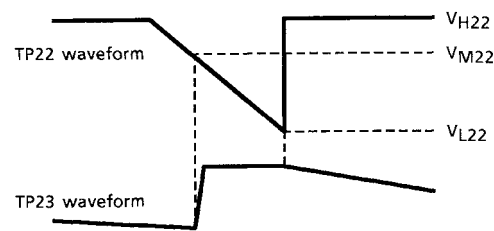
| CHARACTERISTICS      | SYMBOL          | MIN | TYP. | MAX | UNIT |
|----------------------|-----------------|-----|------|-----|------|
| Power Supply Voltage | V <sub>CC</sub> | 8.5 | 9.0  | 9.5 | V    |

## ELECTRICAL CHARACTERISTICS

### DC ELECTRICAL CHARACTERISTICS (Test circuit 1)

| PIN No.  | PIN NAME    | SYMBOL   | UNIT | ELECTRICAL CHARACTERISTICS |      |      | TEST METHOD (CONDITIONS $V_{CC} = 9\text{ V}$ , $T_a = 25 \pm 3^\circ\text{C}$ ) |                                     |      |              |  |
|--|-------------|----------|------|----------------------------|------|------|--|-------------------------------------|------|--------------|--|
|  |             |          |      | LIMITS                     |      |      | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA                        | TEST METHOD                         |      |              |  |
|  |             |          |      | MIN                        | TYP. | MAX  |  |                                     |      |              |  |
| 1  | $V_{ref}$   | $V_1$    | V    | 6.0                        | 6.3  | 6.6  | No bus input   | Measure the DC voltage of each pin. |      |              |  |
| 2  | EHT         | $V_2$    |      | 5.7                        | 6.2  | 6.7  |  |                                     |      |              |  |
| 3  | EW Drive    | $V_3$    |      | 5.2                        | 5.5  | 5.8  |  |                                     |      |              |  |
| 5  | EW Feedback | $V_5$    |      | 8.7                        | 9.0  | 9.3  |  |                                     |      |              |  |
| 7  | V Feedback  | $V_7$    |      | 2.0                        | 2.4  | 2.8  |  |                                     |      |              |  |
| 9  | V Drive     | $V_9$    |      | 0.5                        | 0.8  | 3.4  |  |                                     |      |              |  |
| 10   | LVP in      | $V_{10}$ |      | 8.85                       | 8.95 | 9.05 |  |                                     |      |              |  |
| 11   | DAC H       | $V_{11}$ |      | 0.5                        | 1.3  | 2.1  |  |                                     |      |              |  |
| 12   | LVP out     | $V_{12}$ |      | 0.0                        | 0.8  | 1.6  |  |                                     |      |              |  |
| 14   | SDA         | $V_{14}$ |      | 4.8                        | 5.1  | 5.4  |  |                                     |      |              |  |
| 15   | SCL         | $V_{15}$ |      | 4.8                        | 5.1  | 5.4  |  |                                     |      |              |  |
| 17   | DAC V       | $V_{17}$ |      | 0.0                        | 0.8  | 1.6  |  |                                     |      |              |  |
| 18   | CENT out    | $V_{18}$ |      | 5.5                        | 6.0  | 6.5  |  |                                     |      |              |  |
| 19   | DAC DF      | $V_{19}$ |      | 0.0                        | 0.8  | 1.6  |  |                                     |      |              |  |
| 20   | BLK out     | $V_{20}$ |      | 0.0                        | 0.0  | 1.0  |  |                                     |      |              |  |
| 21   | $V_{in}$    | $V_{21}$ |      | —                          | 0.0  | —    |  |                                     |      |              |  |
| 22   | T.C         | $V_{22}$ |      | 3.7                        | 4.0  | 4.3  |  |                                     |      |              |  |
| 23   | V.RAMP      | $V_{23}$ |      | 2.2                        | 2.5  | 2.8  |  |                                     |      |              |  |
| 24   | AGC         | $V_{24}$ |      | —                          | 0.0  | —    |  |                                     |      |              |  |
| Power Supply Current ( $V_{CC} = 9\text{ V}$ ) |             | $I_{CC}$ |      | mA                         | 31.0 | 47.0 |  |                                     | 63.0 | No bus input | Open openland, connect an ammeter between TP4A and TP4B, and measure the sink current. |

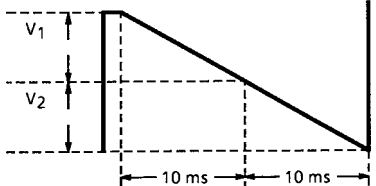
## AC ELECTRICAL CHARACTERISTICS (Test circuit 2)

| No. | CHARACTERISTIC                            | SYMBOL     | UNIT      | ELECTRICAL CHARACTERISTICS |      |     | TEST METHOD (CONDITIONS $V_{CC} = 9V$ , $T_a = 25 \pm 3^\circ C$ ) |   |
|-----|---|------------|-----------|----------------------------|------|-----|--|---|
|     |   |            |           | LIMITS                     |      |     | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA          | TEST METHOD   |
|     |   |            |           | MIN                        | TYP. | MAX |  |   |
| 1   | Vertical Trigger Input Shaping Voltage    | $V_{TH21}$ | V         | 0.7                        | 1.0  | 1.4 | All PRESET values, all SW-A  | <p>(1) TP21 input : The following symbols (trigger pulse)</p>  <p>(2) Change the wave height of the trigger pulse on TP21. Then read the wave height of the trigger pulse when a timing pulse is output to TP22.</p> |
| 2   | Pulse Generator Circuit Clamping Voltage  | $V_{H22}$  | V         | 3.8                        | 4.0  | 4.2 | All PRESET values, all SW-A  | <p>(1) TP21 input : The above trigger pulse<br/>Wave height = 3 V</p> <p>(2) Observe the TP22 and TP23 waveforms with an oscilloscope. Measure the following <math>V_{H22}</math> voltage:</p>                       |
| 3   | Pulse Generator Circuit Shaping Voltage 1 | $V_{M22}$  | V         | 2.8                        | 3.0  | 3.2 | All PRESET values, all SW-A  | Measure $V_{M22}$ as above.   |
| 4   | Pulse Generator Circuit Shaping Voltage 2 | $V_{L22}$  | V         | 0.9                        | 1.0  | 1.1 | All PRESET values, all SW-A  | Measure $V_{L22}$ as above.   |
| 5   | Vertical Ramp Amplitude                   | $V_{P23}$  | $V_{p-p}$ | 1.9                        | 2.0  | 2.1 | All PRESET values, all SW-A  | <p>(1) TP21 input : Same as 2 above (trigger pulse).</p> <p>(2) Measure the TP23 waveform (vertical ramp) amplitude.</p>  |

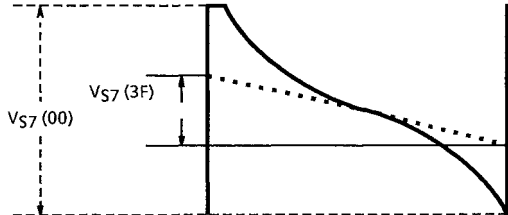
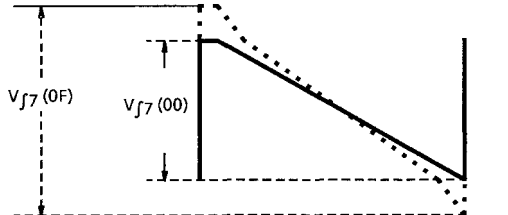
Note: Unless otherwise specified in the bus data and SW mode column, use PRESET values and W-A.

| No. | CHARACTERISTIC                      | SYMBOL     | UNIT      | ELECTRICAL CHARACTERISTICS |            |            | TEST METHOD (CONDITIONS $V_{CC} = 9V$ , $T_a = 25 \pm 3^\circ C$ ) |  |
|-----|-------------------------------------|------------|-----------|----------------------------|------------|------------|--|--|
|     |                                     |            |           | LIMITS                     |            |            | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA          | TEST METHOD  |
|     |                                     |            |           | MIN                        | TYP.       | MAX        |  |  |
| 6   | Vertical AMP Amplification          | $G_V$      | dB        | 20                         | 23         | 26         | All PRESET values, all SW <sub>7</sub> -B                          | (1) No TP21 input<br>(2) $V_{DC}$ input : DC voltage is variable (0 to 6 V)<br>(3) Measure the TP9 voltage change in relation to the change in the TP7 voltage and calculate the following $G_V$ .<br>   |
| 7   | Vertical AMP Maximum Output Voltage | $V_{H9}$   | V         | 1.80                       | 2.60       | 3.40       | All PRESET values, SW <sub>7</sub> -B                              | Measure $V_{H9}$ as above.   |
| 8   | Vertical AMP Minimum Output Voltage | $V_{L9}$   | V         | 0                          | 0          | 0.3        | All PRESET values, SW <sub>7</sub> -B                              | Measure $V_{L9}$ as above.   |
| 9   | Vertical AMP Maximum Output Current | $I_{max9}$ | mA        | 18.0                       | 25.0       | 32.0       | All PRESET values, SW <sub>7</sub> -B                              | (1) Set $V_{DC}$ to 6V as above.<br>(2) Connect an ammeter between TP9 and GND and measure the current.  |
| 10  | Vertical NF Saw Wave Amplitude      | $V_{P7}$   | $V_{p-p}$ | 1.40                       | 1.60       | 1.80       | All PRESET values, all SW-A  | (1) TP21 input : Same as 2 above (trigger pulse).<br>(2) Measure the TP7 vertical saw wave amplitude.  |
| 11  | Vertical Amplitude Variable Range   | $V_{PH}$   | %         | $\pm 45.0$                 | $\pm 48.0$ | $\pm 51.0$ | [00] (00) (7F), all SW-A   | (1) TP21 input : Same as 2 above (trigger pulse).<br>(2) Measure the TP7 amplitude $V_{P7}$ (00) when set the subaddress [00] to (00).<br>(3) Next, measure the TP7 amplitude $V_{P7}$ (7F) when set the subaddress [00] to (7F).<br>$V_{PH} = \pm \frac{V_{P7}(7F) - V_{P7}(00)}{V_{P7}(7F) + V_{P7}(00)} \times 100(\%)$ |

Note: Unless otherwise specified in the bus data and SW mode column, use PRESET values and SW-A.

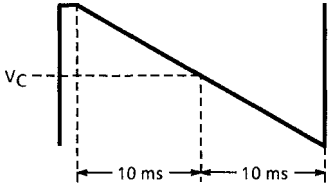
| No. | CHARACTERISTIC                        | SYMBOL | UNIT | ELECTRICAL CHARACTERISTICS |            |            | TEST METHOD (CONDITIONS $V_{CC} = 9V$ , $T_a = 25 \pm 3^\circ C$ ) |   |
|-----|---------------------------------------|--------|------|----------------------------|------------|------------|--|---|
|     |                                       |        |      | LIMITS                     |            |            | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA          | TEST METHOD   |
|     |                                       |        |      | MIN                        | TYP.       | MAX        |  |   |
| 12  | Vertical Linearity Maximum Correction | $V_L$  | %    | $\pm 10.0$                 | $\pm 12.5$ | $\pm 15.0$ | [08] adjustment, all SW-A<br>[01] (00) (10) (1F)                   | <p>(1) Set the data of subaddress [06] to (3F). Set the data of subaddress [05] to (3F). Change the subaddress [08] data so that the TP5 parabola waveform is symmetrical.</p> <p>(2) Set the data of subaddress [06] to (00). Set the data of subaddress [05] to (20).</p> <p>(3) When set the data of subaddress [01] to (10), measure the TP7 waveform <math>V_1</math> (10) and <math>V_2</math> (10)</p> <p>(4) Likewise, when set the data of subaddress [01] to (00) and (1F), measure <math>V_1</math> (00), <math>V_2</math> (00), <math>V_1</math> (1F), and <math>V_2</math> (1F).</p>  $V_L = \pm \frac{V_1(00) - V_1(1F) + V_2(1F) - V_2(00)}{2 \times [V_1(10) + V_2(10)]} \times 100$ |

Note: Unless otherwise specified in the bus data and SW mode column, use PRESET values and SW-A.

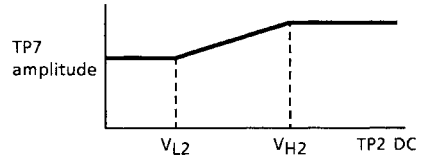

| No. | CHARACTERISTIC                | SYMBOL | UNIT | ELECTRICAL CHARACTERISTICS |            |            | TEST METHOD (CONDITIONS $V_{CC} = 9V$ , $T_a = 25 \pm 3^\circ C$ ) |   |
|-----|-------------------------------|--------|------|----------------------------|------------|------------|--|---|
|     |                               |        |      | LIMITS                     |            |            | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA          | TEST METHOD   |
|     |                               |        |      | MIN                        | TYP.       | MAX        |  |   |
| 13  | Vertical S Maximum Correction | $V_S$  | %    | $\pm 20.0$                 | $\pm 24.0$ | $\pm 28.0$ | [08] adjustment, all SW-A<br>[02] (00) (3F)                        | <p>(1) Same as 12 above.</p> <p>(2) Measure the amplitude <math>V_{S7(00)}</math> of TP7 when set the data of subaddress [02] to (00).</p> <p>(3) Measure the amplitude <math>V_{S7(3F)}</math> of TP7 when set the data of subaddress [02] to (3F).</p>  $V_S = \pm \frac{V_{S7(00)} - V_{S7(3F)}}{V_{S7(00)} + V_{S7(3F)}} \times 100\%$ |
| 14  | Vertical J Maximum Correction | $V_J$  | %    | 3.0                        | 5.0        | 7.0        | [08] adjustment, all SW-A<br>[0A] (00) (0F)                        | <p>(1) Same as 13 above.</p> <p>(2) Measure the amplitude <math>V_{J7(00)}</math> of TP7 when set the data of subaddress [0A] to (00).</p> <p>(3) Measure the amplitude <math>V_{J7(0F)}</math> of TP7 when set the data of subaddress [0A] to (0F).</p>  $V_J = \pm \frac{V_{J7(0F)} - V_{J7(00)}}{V_{J7(00)}} \times 100\%$             |

Note: Unless otherwise specified in the bus data and SW mode column, use PRESET values and SW-A.

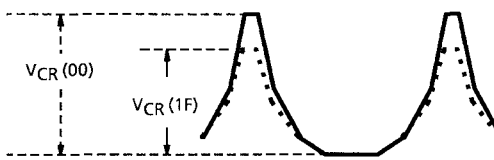


| No. | CHARACTERISTIC             | SYMBOL    | UNIT | ELECTRICAL CHARACTERISTICS |           |           | TEST METHOD (CONDITIONS $V_{CC} = 9V$ , $T_a = 25 \pm 3^\circ C$ ) |   |
|-----|----------------------------|-----------|------|----------------------------|-----------|-----------|--|---|
|     |                            |           |      | LIMITS                     |           |           | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA          | TEST METHOD   |
|     |                            |           |      | MIN                        | TYP.      | MAX       |  |   |
| 15  | Vertical NF Center Voltage | $V_C$     | V    | 3.8                        | 4.0       | 4.2       | [08] adjustment, all SW-A  | <p>(1) Same as 12 above.</p> <p>(2) Observe the TP7 waveform and measure the <math>V_C</math> shown below.</p>   |
| 16  | Vertical NF DC Change      | $V_{DC}$  | mV   | $\pm 480$                  | $\pm 560$ | $\pm 640$ | [08] adjustment, all SW-A<br>[03] (00) (06)                        | <p>(1) Same as 15 above.</p> <p>(2) Measure the vertical NF center voltage <math>V_C</math> (00) when set the data of subaddress [03] to (00).</p> <p>(3) Measure the vertical NF center voltage <math>V_C</math> (06) when set the data of subaddress [03] to (06).</p> $V_{DC} = \pm \frac{V_C(06) - V_C(00)}{2} \text{ (mV)}$  |
| 17  | Vertical NF EHT Correction | $V_{EHT}$ | %    | 8                          | 9         | 10        | [08] adjustment, SW <sub>2</sub> -B<br>[04] (00) (07)              | <p>(1) Same as 12 above.</p> <p>(2) <math>V_{DC}</math> input : DC voltage=0V</p> <p>(3) Observe TP7 waveform.</p> <p>(4) Measure the amplitude <math>V_{EHT}</math> (00) of TP7 when set the data of subaddress [04] to (00).</p> <p>(5) Measure the amplitude <math>V_{EHT}</math> (07) of TP7 when set the data of subaddress [04] to (07).</p> $V_{EHT} = \frac{V_{EHT}(00) - V_{EHT}(07)}{V_{EHT}(00)} \times 100(\%)$ |

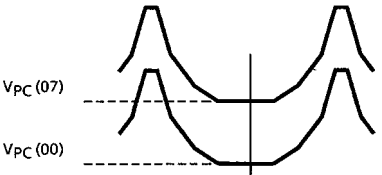

Note: Unless otherwise specified in the bus data and SW mode column, use PRESET values and SW-A.

| No. | CHARACTERISTIC                  | SYMBOL   | UNIT      | ELECTRICAL CHARACTERISTICS |      |     | TEST METHOD (CONDITIONS $V_{CC} = 9V$ , $T_a = 25 \pm 3^\circ C$ ) |   |
|-----|---------------------------------|----------|-----------|----------------------------|------|-----|--|---|
|     |                                 |          |           | LIMITS                     |      |     | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA          | TEST METHOD   |
|     |                                 |          |           | MIN                        | TYP. | MAX |  |   |
| 18  | EHT Input D Range 1             | $V_{H2}$ | V         | 5.7                        | 6.2  | 6.7 | [08] adjustment, SW <sub>2</sub> -B<br>[04] (07)                   | (1) Same as 17 above.<br>(2) Change the $V_{DC}$ voltage from 1V to 7V.<br>(3) Measure the change in the TP7 voltage at this time and measure the TP2 voltage $V_{H2}$ .<br> |
| 19  | EHT Input D Range 2             | $V_{L2}$ | V         | 1.3                        | 1.8  | 2.3 | [08] adjustment, SW <sub>2</sub> -B<br>[04] (07)                   | Measure the TP2 voltage $V_{L2}$ as above.  |
| 20  | E / W NF Maximum DC Value       | $V_{H5}$ | V         | 5.5                        | 6.2  | 6.9 | [08] adjustment, SW-A<br>[05] (00)                                 | (1) Same as 12 above.<br>(2) Measure the TP5 voltage.   |
| 21  | E / W NF Minimum DC Value       | $V_{L5}$ | V         | 1.5                        | 1.7  | 1.9 | [08] adjustment, all SW-A<br>[05] (3F)                             | (1) Same as 12 above.<br>(2) Measure the TP5 voltage.   |
| 22  | E / W NF Maximum Parabola Value | $V_{PB}$ | $V_{p-p}$ | 3.0                        | 3.9  | 4.8 | [08] adjustment, SW <sub>2</sub> -B<br>[05] (3F)<br>[06] (3F)      | (1) $V_{DC}$ input : 7V.<br>(2) Measure the TP5 parabola amplitude.<br>   |


Note: Unless otherwise specified in the bus data and SW mode column, use PRESET values and SW-A.

| No. | CHARACTERISTIC                      | SYMBOL    | UNIT      | ELECTRICAL CHARACTERISTICS |            |            | TEST METHOD (CONDITIONS $V_{CC} = 9V$ , $T_a = 25 \pm 3^\circ C$ )              |   |
|-----|-------------------------------------|-----------|-----------|----------------------------|------------|------------|---|---|
|     |                                     |           |           | LIMITS                     |            |            | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA                       | TEST METHOD   |
|     |                                     |           |           | MIN                        | TYP.       | MAX        |   |   |
| 23  | E / W NF Corner Correction 1        | $V_{CR1}$ | $V_{p-p}$ | 1.80                       | 2.50       | 3.20       | [08] adjustment, SW <sub>2</sub> -B<br>[05] (3F)<br>[06] (3F)<br>[07] (10) (1F) | (1) $V_{DC}$ input : 7 V<br>(2) Observe the TP5 parabola amplitude.<br>(3) Measure the amplitude $V_{CR1}$ (10) when set the data of subaddress [07] to (10).<br>(4) Measure the amplitude $V_{CR1}$ (1F) when set the data of subaddress [07] to (1F).<br><br>$V_{CR1} = V_{CR1}(10) - V_{CR1}(1F)$ |
| 23' | E / W NF Corner Correction 2        | $V_{CR2}$ | $V_{p-p}$ | 2.30                       | 3.20       | 4.10       | [08] adjustment, SW <sub>2</sub> -B<br>[05] (3F)<br>[06] (20)<br>[07] (00) (1F) | (1) $V_{DC}$ input : 7 V<br>(2) Measure the TP5 parabola amplitude.<br>(3) Measure the amplitude $V_{CR2}$ (00) when set the data of subaddress [07] to (00).<br>(4) Measure the amplitude $V_{CR2}$ (1F) when set the data of subaddress [07] to (1F).<br>$V_{CR2} = V_{CR2}(00) - V_{CR2}(1F)$  |
| 24  | Parabola Symmetry Correction Change | $V_{TR}$  | %         | $\pm 11.0$                 | $\pm 13.0$ | $\pm 15.0$ | [08] (00) (7F), all SWA   | (1) Measure the following as in 15 above.<br>(2) Measure the TP7 center voltage $V_C$ (00) when set the data of subaddress [08] to (00).<br>(3) Measure the voltage $V_C$ (7F) when set the data of subaddress [07] to (7F).<br>$V_{TR} = \pm \frac{V_C(00) - V_C(7F)}{2 \times V_{P7}} \times 100(\%)$ $V_{P7}$ is the value measured in 10 above.                                     |

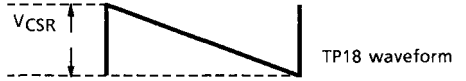
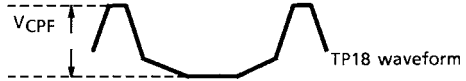

Note: Unless otherwise specified in the bus data and SW mode column, use PRESET values and SW-A.

| No. | CHARACTERISTIC                      | SYMBOL     | UNIT    | ELECTRICAL CHARACTERISTICS |      |      | TEST METHOD (CONDITIONS $V_{CC} = 9V$ , $T_a = 25 \pm 3^\circ C$ )              |   |
|-----|-------------------------------------|------------|---------|----------------------------|------|------|---|---|
|     |                                     |            |         | LIMITS                     |      |      | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA                       | TEST METHOD   |
|     |                                     |            |         | MIN                        | TYP. | MAX  |   |   |
| 25  | E / W Parabola<br>EHT Correction    | $V_{EH1}$  | %       | 2.0                        | 3.3  | 4.5  | [08] adjustment, SW <sub>2</sub> -B<br>[05] (3F)<br>[06] (3F)                   | (1) $V_{DC}$ input : DC voltage is variable<br>(2) Measure the TP5 parabola amplitude $V_{EH}$ (7) when DC = 7 V.<br>(3) Likewise, measure the amplitude $V_{EH}$ (1) when DC = 1 V.<br><br>$V_{EH1} = \frac{V_{EH(7)} - V_{EH(1)}}{V_{EH(7)}} \times 100(\%)$  |
| 26  | E / W DC<br>EHT Correction          | $V_{EH2}$  | V       | 0.6                        | 1.0  | 1.4  | [08] adjustment, SW <sub>2</sub> -B<br>[05] (3F)<br>[06] (3F)<br>[09] (00) (07) | (1) $V_{DC}$ input : DC voltage = 1 V<br>(2) Measure the TP5 parabola phase center voltage $V_{PC}$ (00) when set the data of subaddress [09] to (00).<br>(3) Likewise, measure the voltage $V_{PC}$ (07) when set the data of subaddress [09] to (07).<br><br><br><br>$V_{EH2} = V_{PC} (07) - V_{PC} (00) (V)$ |
| 27  | E / W Amp<br>Maximum Output Current | $I_{max3}$ | mA      | 0.14                       | 0.20 | 0.27 | All PRESET values, all SW-A   | (1) Connect an ammeter between TP3 and GND.<br>(2) Read the current.  |
| 28  | AGC Operating Current 1             | $I_{AGC0}$ | $\mu A$ | 250                        | 330  | 410  | All PRESET values, SW <sub>24</sub> -B  | (1) TP21 input : Same as 2 above (trigger pulse).<br>(2) Monitor the TP24 waveform. Measure the $V_x$ below.<br><br><br><br>$I_{AGC0} = V_x \div 200 (\mu A)$<br>$(I_{AGC1})$  |

Note: Unless otherwise specified in the bus data and SW mode column, use PRESET values and SW-A.

| No. | CHARACTERISTIC   | SYMBOL     | UNIT      | ELECTRICAL CHARACTERISTICS |           |           | TEST METHOD (CONDITIONS $V_{CC} = 9V$ , $T_a = 25 \pm 3^\circ C$ ) |  |
|-----|--|------------|-----------|----------------------------|-----------|-----------|--|--|
|     |  |            |           | LIMITS                     |           |           | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA          | TEST METHOD  |
|     |  |            |           | MIN                        | TYP.      | MAX       |  |  |
| 29  | AGC Operating Current 2                                | $I_{AGC1}$ | $\mu A$   | 60                         | 83        | 105       | [03] (12) SW <sub>24</sub> -B                                      | Calculate, as above, $I_{AGC1}$ when set the data of subaddress [03] to (12).  |
| 30  | Analog Blanking Output Current                         | $I_{B20}$  | mA        | 0.400                      | 0.650     | 0.800     | All PRESET values, SW <sub>7</sub> -B                              | (1) $V_{DC}$ input : DC voltage = 5.5 V<br>(2) Connect an ammeter between TP20 and GND and measure the current.  |
| 31  | Upper Blanking Level                                   | $V_{H20}$  | V         | 5.25                       | 5.50      | 5.75      | All PRESET values, SW <sub>7</sub> -B                              | (1) Same as 30 above.<br>(2) $V_{DC}$ input : DC voltage = variable (4.0 to 5.5 V)<br>(3) Measure the $V_{DC}$ input voltage $V_{H20}$ when the output current reaches half the output current measured above. |
| 32  | Upper Blanking Change                                  | $V_{HC20}$ | mV        | $\pm 485$                  | $\pm 570$ | $\pm 655$ | [0C] (00) (1F) SW <sub>7</sub> -B                                  | Measure $V_{H20}$ (00) and $V_{H20}$ (1F) when set the data of subaddress [0C] to (00) and (1F) respectively.<br>$V_{HC20} = \pm[V_{H20} (1F) - V_{H20} (00)] / 2$ (mV)  |
| 33  | Lower Blanking Level                                   | $V_{L20}$  | V         | 3.30                       | 3.50      | 3.70      | All PRESET values, SW <sub>7</sub> -B                              | (1) Same as 30 above.<br>(2) $V_{DC}$ input : DC voltage = variable (2.5 to 4.0 V)<br>(3) Measure the $V_{DC}$ input voltage $V_{L20}$ when the output current reaches half the output current of 30 above.    |
| 34  | Lower Blanking Change                                  | $V_{LC20}$ | mV        | $\pm 485$                  | $\pm 570$ | $\pm 655$ | [0D] (00) (1F) SW <sub>7</sub> -B                                  | Measure $V_{L20}$ (00) and $V_{L20}$ (1F) when set the data of subaddress [0D] to (00) and (1F) respectively.<br>$V_{LC20} = \pm[V_{L20} (1F) - V_{L20} (00)] / 2$ (mV)  |
| 35  | Center Curve Saw Positive Correction Maximum Amplitude | $V_{CSF}$  | $V_{p-p}$ | 3.2                        | 3.6       | 4.0       | [08] adjustment, all SW-A<br>[0E] (47)                             | (1) Same as 12 above.<br>(2) Measure the TP18 output amplitude when set the data of subaddress [0E] to (47).<br>          |

Note: Unless otherwise specified in the bus data and SW mode column, use PRESET values and SW-A.

| No. | CHARACTERISTIC  | SYMBOL    | UNIT      | ELECTRICAL CHARACTERISTICS |      |     | TEST METHOD (CONDITIONS $V_{CC} = 9V$ , $T_a = 25 \pm 3^\circ C$ ) |   |
|-----|---|-----------|-----------|----------------------------|------|-----|--|---|
|     |   |           |           | LIMITS                     |      |     | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA          | TEST METHOD   |
|     |   |           |           | MIN                        | TYP. | MAX |  |   |
| 36  | Center Curve Saw Negative Correction Maximum Amplitude      | $V_{CSR}$ | $V_{p-p}$ | 3.2                        | 3.6  | 4.0 | [08] adjustment, all SW-A<br>[0E] (40)                             | As above, measure the TP18 output amplitude when set the data of subaddress [0E] to (40).<br>                    |
| 37  | Center Curve Parabola Positive Correction Maximum Amplitude | $V_{CPF}$ | $V_{p-p}$ | 1.2                        | 1.8  | 2.4 | [08] adjustment, all SW-A<br>[0E] (74)                             | (1) Same as 12 above.<br>(2) Measure the TP18 output amplitude when set the data of subaddress [0E] to (74).<br> |
| 38  | Center Curve Parabola Negative Correction Maximum Amplitude | $V_{CPR}$ | $V_{p-p}$ | 1.2                        | 1.8  | 2.4 | [08] adjustment, all SW-A<br>[0E] (04)                             | As above, measure the TP18 output amplitude when set the data of subaddress [0E] to (04).<br>                    |
| 39  | Horizontal Centering Maximum Output Voltage                 | $V_{H11}$ | V         | 4.8                        | 5.0  | 5.2 | [09] (40), all SW-A  | Measure the TP11 voltage $V_{H11}$ when set the data of subaddress [09] to (70).  |
| 40  | Horizontal Centering Minimum Output Voltage                 | $V_{L11}$ | V         | 0.5                        | 1.3  | 2.1 | All PRESET values, all SW-A  | Measure the TP11 voltage $V_{L11}$ when set the data of subaddress [09] to (00).  |
| 41  | Vertical Centering Maximum Output Voltage                   | $V_{H17}$ | V         | 4.8                        | 5.0  | 5.2 | [0B] (4F), all SW-A  | Measure the TP17 voltage $V_{H17}$ when set the data of subaddress [0B] to (7F).  |
| 42  | Vertical Centering Minimum Output Voltage                   | $V_{L17}$ | V         | 0.0                        | 5.0  | 1.6 | All PRESET values, all SW-A  | Measure the TP17 voltage $V_{L17}$ when set the data of subaddress [0B] to (00).  |
| 43  | Dynamic Focus Correction Maximum Output Voltage             | $V_{H19}$ | V         | 4.8                        | 5.0  | 5.2 | [0F] (3F), all SW-A  | Measure the TP19 voltage $V_{H19}$ when set the data of subaddress [0F] to (3F).  |

Note: Unless otherwise specified in the bus data and SW mode column, use PRESET values and SW-A.

| No. | CHARACTERISTIC                                  | SYMBOL    | UNIT | ELECTRICAL CHARACTERISTICS |      |      | TEST METHOD (CONDITIONS $V_{CC} = 9\text{ V}$ , $T_a = 25 \pm 3^\circ\text{C}$ ) |   |
|-----|---|-----------|------|----------------------------|------|------|--|---|
|     |   |           |      | LIMITS                     |      |      | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA                        | TEST METHOD   |
|     |   |           |      | MIN                        | TYP. | MAX  |  |   |
| 44  | Dynamic Focus Correction Minimum Output Voltage | $V_{L19}$ | V    | 0.0                        | 0.8  | 1.6  | All PRESET values, all SW-A  | Measure the TP19 voltage $V_{L19}$ when set the data of subaddress [0F] to (00).  |
| 45  | LVP Input Discrimination Voltage                | $V_{LVP}$ | V    | 5.5                        | 5.8  | 6.1  | All PRESET values, SW <sub>10</sub> -B, READ-MODE                                | (1) $V_{DC}$ input : C voltage = variable;<br>Initial value = 9 V<br>(2) Lower the $V_{DC}$ input voltage and measure the TP10 voltage when the fifth bit from the LSB (in READ mode) changes from 0 to 1.  |
| 46  | LVP Maximum Output Voltage                      | $V_{H12}$ | V    | 4.8                        | 5.0  | 5.2  | All PRESET values, SW <sub>10</sub> -B   | (1) $V_{DC}$ input : DC voltage = 0 V<br>(2) Measure the TP12 voltage.  |
| 47  | LVP Minimum Output Voltage                      | $V_{L12}$ | V    | 0.0                        | 0.8  | 1.6  | All PRESET values, SW <sub>10</sub> -B   | (1) $V_{DC}$ input : DC voltage = 9 V<br>(2) Measure the TP12 voltage.  |
| 48  | LVP Detection Output Current                    | $I_{L20}$ | mA   | 0.43                       | 0.65 | 0.87 | All PRESET values, SW <sub>10</sub> -B, SW <sub>7</sub> -B                       | (1) $V_{DC}$ input : DC voltage = 4 V<br>(2) Connect an ammeter between TP20 and GND and measure the current.   |
| 49  | V-GUARD Discrimination Voltage                  | $V_{GRD}$ | V    | 5.8                        | 6.0  | 6.2  | All PRESET values, SW <sub>7</sub> -B, READ-MODE                                 | (1) $V_{DC}$ input : C voltage = variable;<br>Initial value = 4 V<br>(2) Raise the $V_{DC}$ input voltage and measure the TP7 voltage when the data of the fourth bit from the LSB (when in READ mode) changes from 0 to 1.   |
| 50  | V-GUARD Detection Output Current                | $I_{G20}$ | mA   | 0.43                       | 0.65 | 0.87 | All PRESET values, SW <sub>7</sub> -B  | (1) $V_{DC}$ input : voltage = 7 V<br>(1) Connect an ammeter between TP20 and GND and measure the current.  |
| 51  | $V_{ref}$ Vertical Amplitude Control Ratio      | $V_r$     | %    | 24                         | 30   | 36   | [03] (44) SW <sub>1</sub> -B   | (1) $V_{DC}$ input : DC voltage = variable;<br>Initial value = 6.2 V<br>(2) Set the data of subaddress [03] to (42).<br>(3) Measure the change in the TP7 amplitude when the DC voltage changes from 6.1 to 6.3V.<br>$V_r = \frac{V(6.1) - V(6.3)}{0.2} \times 100(\%)$ |

Note: Unless otherwise specified in the bus data and SW mode column, use PRESET values and SW-A.

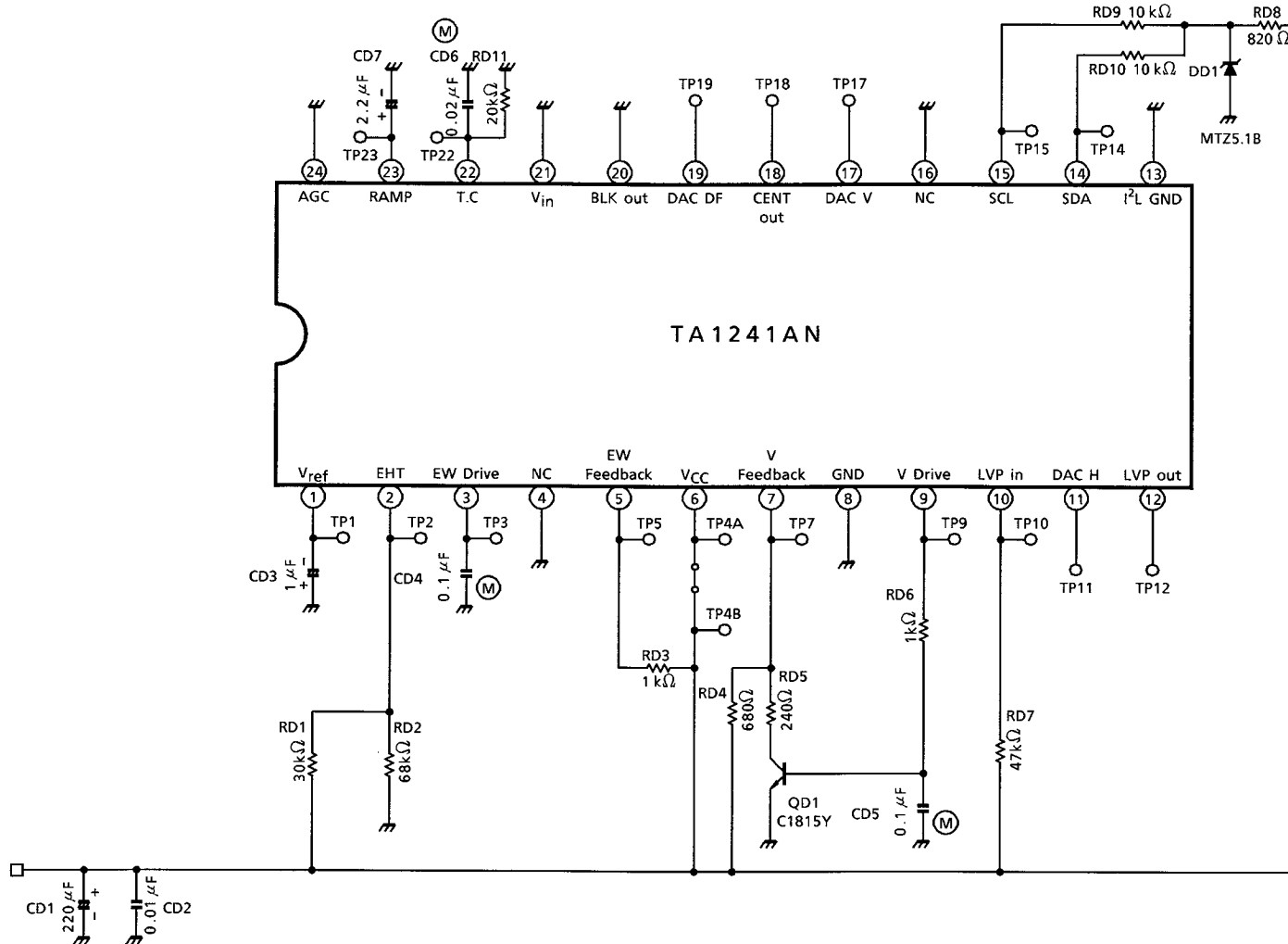
| No. | CHARACTERISTIC                  | SYMBOL | UNIT | ELECTRICAL CHARACTERISTICS |       |     | TEST METHOD (CONDITIONS $V_{CC} = 9\text{ V}$ , $T_a = 25 \pm 3^\circ\text{C}$ ) |   |
|-----|---------------------------------|--------|------|----------------------------|-------|-----|--|---|
|     |                                 |        |      | LIMITS                     |       |     | BUS DATA AND SWITCHING MODE<br>[ ]; SUBADDRESS, ( ); DATA                        | TEST METHOD   |
|     |                                 |        |      | MIN                        | TYP.  | MAX |  |   |
| 52  | Self-Diagnosis Vertical Output  | —      | —    | —                          | Check | —   | All PRESET values, all SW-A, READ · MODE   | (1) Turn the power on with no input to TP21.<br>(2) Check that in READ mode, the B <sub>2</sub> data = 0.<br>(3) Check that when a trigger pulse is input to TP21, the B <sub>2</sub> data = 1. |
| 53  | Self-Diagnosis E / W Output     | —      | —    | —                          | Check | —   | All PRESET values, all SW-A, READ · MODE   | Check the B <sub>3</sub> data in the same way as above.   |
| 54  | Power On Reset Read Detection   | —      | —    | —                          | Check | —   | All PRESET values, all SW-A, READ · MODE   | —   |
| 55  | Blanking Switch Operation Check | —      | —    | —                          | Check | —   | [0A] (20), all SW-A  | (1) Input a trigger pulse to TP21.<br>(2) Measure TP22 when set the data of subaddress [0A] to (20). Check that TP22 outputs no signal.   |

Note: Unless otherwise specified in the bus data and SW mode column, use PRESET values and SW-A.



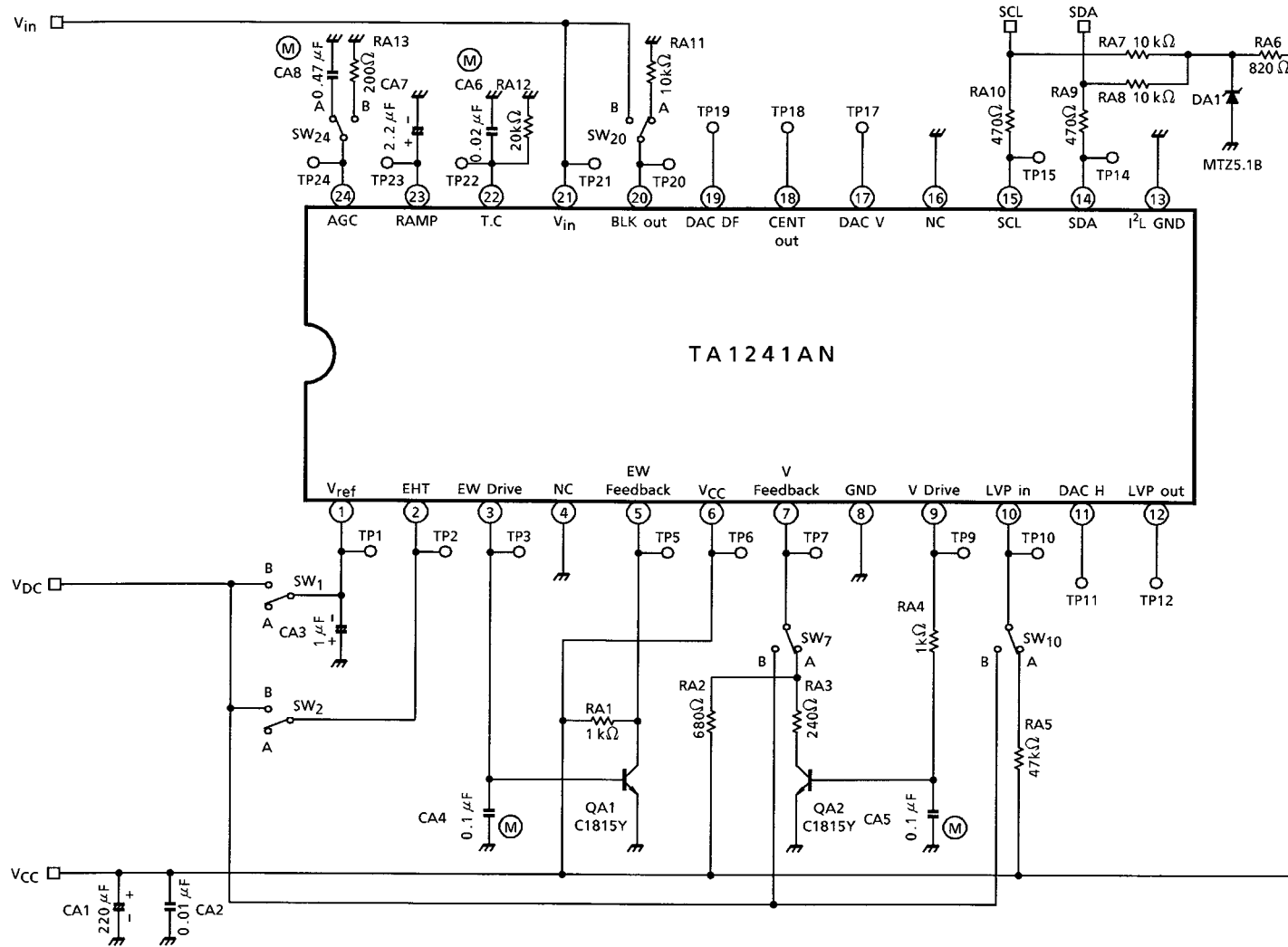
## TEST CIRCUIT 1

### DC characteristics

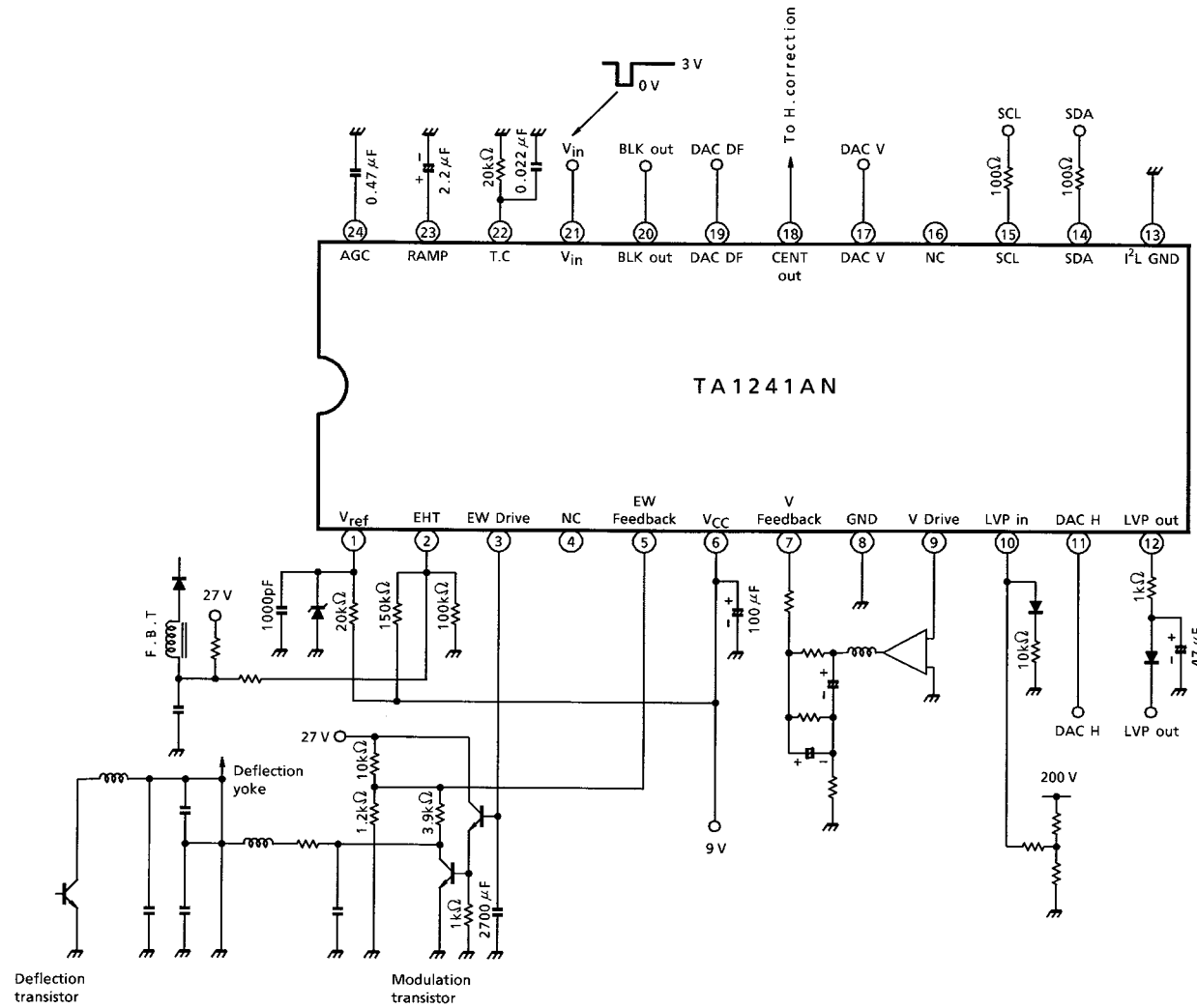


## TEST CIRCUIT 2

### AC characteristics



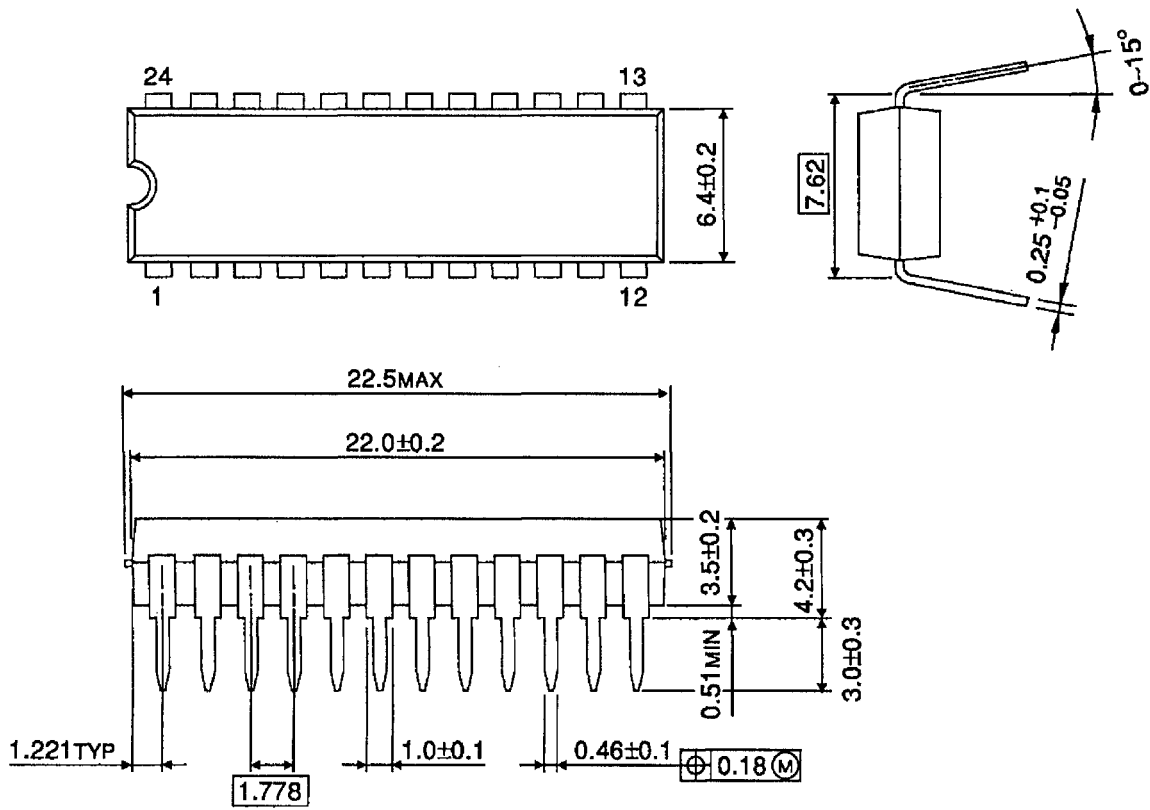
## APPLICATION CIRCUIT



## PACKAGE DIMENSIONS

SDIP24-P-300-1.78

Unit : mm



Weight: 1.22g (Typ.)