

# AN96A07K

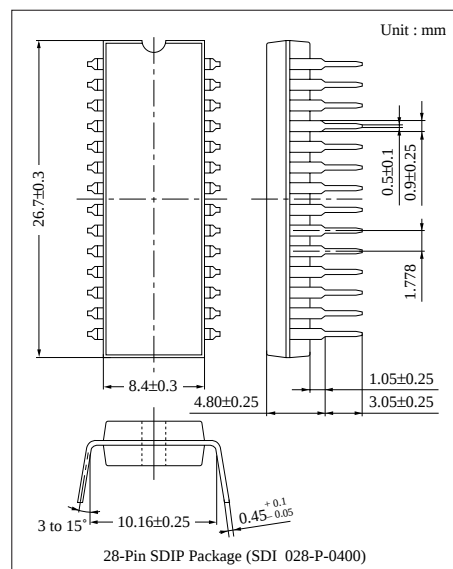
## Dynamic Focus Controller IC for CRT Monitor

### ■ Overview

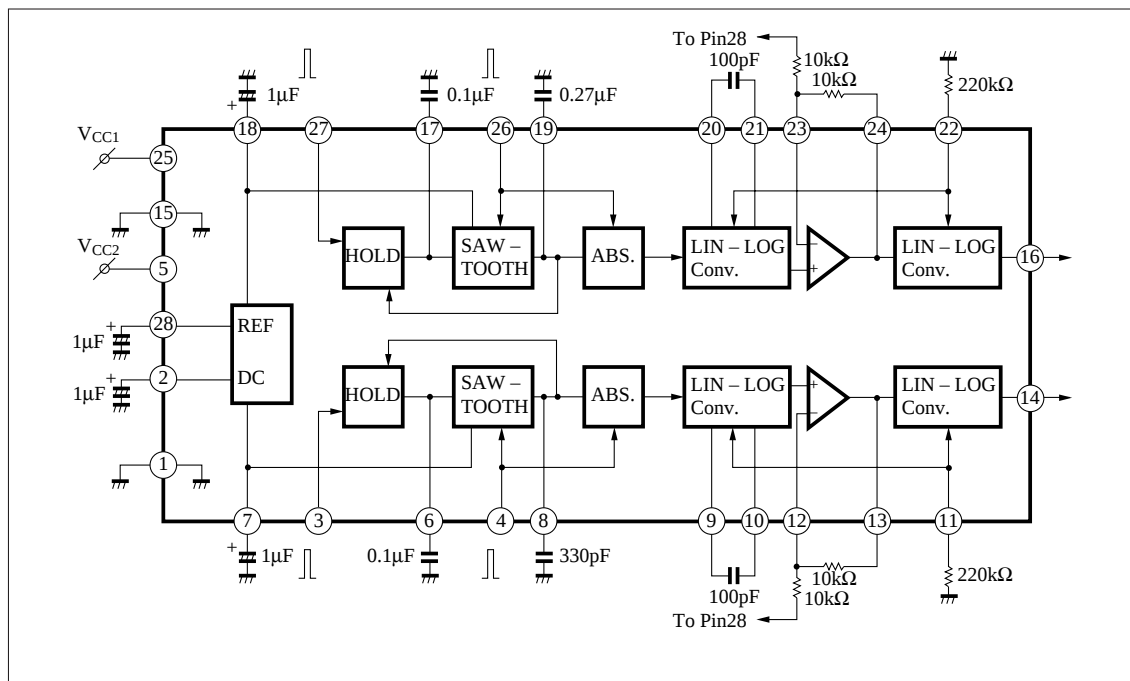
The AN96A07K is a dynamic astigmatism and focus (DAF)IC for CRT monitor. It outputs parabola waves for focus control.

### ■ Features

- $f_H = 15$  to  $90\text{kHz}$ ,  $f_V = 50$  to  $120\text{Hz}$
- Constant-amplitude parabola-wave output following input frequency
- Coefficient of parabola-wave is controlled by an external resistor



### ■ Block Diagram



### ■ Pin Descriptions

| Pin No. | Pin name                                 | Pin No. | Pin name                                 |
|---------|------------------------------------------|---------|------------------------------------------|
| 1       | GND                                      | 15      | GND                                      |
| 2       | Reference bias output (6V)               | 16      | Ver. parabola output                     |
| 3       | Hor. sampling pulse input                | 17      | Holding                                  |
| 4       | Hor. phase shift pulse input             | 18      | Ver. system reference bias output (2V)   |
| 5       | V <sub>CC1</sub> (12V)                   | 19      | Triangular waveform generation capacitor |
| 6       | Holding                                  | 20      | Oscillation prevention capacitor         |
| 7       | Hor. system reference bias output (2V)   | 21      | Oscillation prevention capacitor         |
| 8       | Triangular waveform generation capacitor | 22      | Ver. parabola output amplitude adj.      |
| 9       | Oscillation prevention capacitor         | 23      | Feedback input                           |
| 10      | Oscillation prevention capacitor         | 24      | Feedback output                          |
| 11      | Hor. parabola output amplitude adj.      | 25      | V <sub>CC2</sub> (12V)                   |
| 12      | Feedback input                           | 26      | Ver. phase shift pulse input             |
| 13      | Feedback output                          | 27      | Ver. sampling pulse input                |
| 14      | Hor. parabola output                     | 28      | Reference bias output (4V)               |

### ■ Absolute Maximum Ratings

| Parameter                                        | Symbol           | Rating        | Unit |
|--------------------------------------------------|------------------|---------------|------|
| Supply voltage                                   | V <sub>CC</sub>  | 13.4          | V    |
| Supply current                                   | I <sub>CC</sub>  | 30            | mA   |
| Power dissipation <sup>Note 2)</sup>             | P <sub>D</sub>   | 402           | mW   |
| Operating ambient temperature <sup>Note 1)</sup> | T <sub>opr</sub> | − 20 to + 75  | °C   |
| Storage temperature <sup>Note 1)</sup>           | T <sub>stg</sub> | − 55 to + 150 | °C   |

Note 1) Ta= 25°C except operating ambient temperature and storage temperature.

Note 2) Allowable power dissipation of the package at Ta=75°C.

### ■ Recommended Operating Range (Ta= 25°C)

| Parameter                      | Symbol          | Range         |
|--------------------------------|-----------------|---------------|
| Operating supply voltage range | V <sub>CC</sub> | 9.6V to 13.2V |

# ■ Electrical Characteristics (Ta=25±2°C)

| Parameter                                          | Symbol                | Condition                                            | min   | typ   | max   | Unit             |
|----------------------------------------------------|-----------------------|------------------------------------------------------|-------|-------|-------|------------------|
| Circuit current                                    | I <sub>CC</sub>       | See table 1                                          | 14    | 19    | 24    | mA               |
| Circuit voltage                                    | V <sub>2-1.15</sub>   |                                                      | 5.7   | 6.2   | 6.7   | V                |
| Circuit voltage                                    | V <sub>28-1.15</sub>  |                                                      | 3.7   | 4.2   | 4.7   | V                |
| Circuit voltage                                    | V <sub>7-1.15</sub>   |                                                      | 1.4   | 1.9   | 2.4   | V                |
| Circuit voltage                                    | V <sub>18-1.15</sub>  |                                                      | 1.4   | 1.9   | 2.4   | V                |
| Hold charging current (1)                          | I <sub>6 (C)</sub>    |                                                      | − 450 | − 370 | − 290 | μA               |
| Hold charging current (2)                          | I <sub>17 (C)</sub>   |                                                      | − 450 | − 370 | − 290 | μA               |
| Hold discharging current (1)                       | I <sub>6 (D)</sub>    |                                                      | 290   | 370   | 450   | μA               |
| Hold discharging current (2)                       | I <sub>17 (D)</sub>   |                                                      | 290   | 370   | 450   | μA               |
| Hold leak voltage (1)                              | I <sub>6 (L)</sub>    |                                                      | −1.0  | —     | +1.0  | μA               |
| Hold leak voltage (2)                              | I <sub>17 (L)</sub>   |                                                      | −1.0  | —     | +1.0  | μA               |
| Triangular wave output voltage (1)                 | V <sub>8-7</sub>      |                                                      | —     | —     | 0.2   | V                |
| Triangular wave output voltage (2)                 | V <sub>19-18</sub>    |                                                      | —     | —     | 0.2   | V                |
| Triangular wave charging current (1)               | I <sub>8 (C1)</sub>   |                                                      | − 28  | − 20  | − 12  | μA               |
| Triangular wave charging current (2)               | I <sub>19 (C1)</sub>  |                                                      | − 28  | − 20  | − 12  | μA               |
| Triangular wave charging current (3)               | I <sub>8 (C2)</sub>   |                                                      | −165  | −135  | −105  | μA               |
| Triangular wave charging current (4)               | I <sub>19 (C2)</sub>  |                                                      | −165  | −135  | −105  | μA               |
| Triangular wave linearity (1)                      | ΔI <sub>8 (R)</sub>   |                                                      | − 3   | 0     | + 3   | μA               |
| Triangular wave linearity (2)                      | ΔI <sub>19 (R)</sub>  |                                                      | − 3   | 0     | + 3   | μA               |
| Triangular wave discharging current (1)            | I <sub>8 (D)</sub>    |                                                      | 7.0   | 8.5   | 9.5   | mA               |
| Triangular wave discharging current (2)            | I <sub>19 (D)</sub>   |                                                      | 7.0   | 8.5   | 9.5   | mA               |
| Parabola output voltage (1)                        | V <sub>14 (1)</sub>   |                                                      | 3.7   | 4.2   | 4.7   | V                |
| Parabola output voltage (2)                        | V <sub>14 (2)</sub>   |                                                      | 8.0   | 9.5   | 11.0  | V                |
| Parabola output voltage (3)                        | ΔV <sub>14 (3)</sub>  |                                                      | − 0.3 | 0     | + 0.3 | V                |
| Parabola output voltage (4)                        | ΔV <sub>14 (4)</sub>  |                                                      | − 4.5 | − 3.5 | − 2.5 | V                |
| Parabola output voltage (5)                        | V <sub>16 (5)</sub>   |                                                      | 3.7   | 4.2   | 4.7   | V                |
| Parabola output voltage (6)                        | V <sub>16 (6)</sub>   |                                                      | 8.0   | 9.5   | 11.0  | V                |
| Parabola output voltage (7)                        | ΔV <sub>16 (7)</sub>  |                                                      | − 0.3 | 0     | + 0.3 | V                |
| Parabola output voltage (8)                        | ΔV <sub>16 (8)</sub>  |                                                      | − 4.5 | − 3.5 | − 2.5 | V                |
| Clamp output voltage (1)                           | V <sub>14 (CL)</sub>  |                                                      | 10.2  | 10.7  | 11.2  | V                |
| Clamp output voltage (2)                           | V <sub>16 (CL)</sub>  |                                                      | 10.2  | 10.7  | 11.2  | V                |
| Horizontal operation frequency (max.)              | f <sub>H (max.)</sub> | Operable upper limit frequency                       | —     | (100) | —     | kHz              |
| Vertical operation frequency (max.)                | f <sub>V (max.)</sub> | Operable upper limit frequency                       | —     | (150) | —     | Hz               |
| Horizontal triangular wave output amplitude        | e <sub>1</sub>        | f <sub>H</sub> =15 to 90kHz                          | —     | (4)   | —     | V <sub>P-P</sub> |
| Vertical triangular wave output amplitude          | e <sub>2</sub>        | f <sub>V</sub> = 50 to 120Hz                         | —     | (4)   | —     | V <sub>P-P</sub> |
| Horizontal parabola wave output amplitude          | e <sub>3</sub>        | f <sub>H</sub> = 64kHz<br>I <sub>11</sub> = − 20μA   | —     | (4)   | —     | V <sub>P-P</sub> |
| Vertical parabola wave output amplitude            | e <sub>4</sub>        | f <sub>V</sub> = 90Hz<br>I <sub>22</sub> = − 20μA    | —     | (4)   | —     | V <sub>P-P</sub> |
| Parabola wave exponential coefficient (horizontal) | α <sub>H</sub>        | 10kΩ between Pin12 to 13<br>10kΩ between Pin12 to 28 | —     | (2)   | —     | —                |
| Parabola wave exponential coefficient (vertical)   | α <sub>V</sub>        | 10kΩ between Pin23 to 24<br>10kΩ between Pin23 to 28 | —     | (2)   | —     | —                |

Note) The value in the above characteristics is not a guaranteed value, but reference one on design.

Table 1

| No. | Parameter                              | Symbol               | Measure-<br>ment pin<br>No. | Pin No. |   |      |      |     |     |   |               |   |    |    |    |    |    |    |      |    |               |    |    |    |    |    |    |      |      |      |    |
|-----|----------------------------------------|----------------------|-----------------------------|---------|---|------|------|-----|-----|---|---------------|---|----|----|----|----|----|----|------|----|---------------|----|----|----|----|----|----|------|------|------|----|
|     |                                        |                      |                             | 1       | 2 | 3    | 4    | 5   | 6   | 7 | 8             | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16   | 17 | 18            | 19 | 20 | 21 | 22 | 23 | 24 | 25   | 26   | 27   | 28 |
| 1   | Circuit current                        | I <sub>CC</sub>      | 5                           | 0V      |   | 0V   | 0V   | 12V | 0V  |   |               |   |    |    |    |    | 0V |    | 0V   |    |               |    |    |    |    |    |    | to 5 | 0V   | 0V   |    |
| 2   | Circuit voltage                        | V <sub>2-1.15</sub>  | 2                           | 0V      |   | 0V   | 0V   | 12V | 0V  |   |               |   |    |    |    |    | 0V |    | 0V   |    |               |    |    |    |    |    |    | to 5 | 0V   | 0V   |    |
| 3   | Circuit voltage                        | V <sub>28-1.15</sub> | 28                          | 0V      |   | 0V   | 0V   | 12V | 0V  |   |               |   |    |    |    |    | 0V |    | 0V   |    |               |    |    |    |    |    |    | to 5 | 0V   | 0V   |    |
| 4   | Circuit voltage                        | V <sub>7-1.15</sub>  | 7                           | 0V      |   | 0V   | 0V   | 12V | 0V  |   |               |   |    |    |    |    | 0V |    | 0V   |    |               |    |    |    |    |    |    | to 5 | 0V   | 0V   |    |
| 5   | Circuit voltage                        | V <sub>18-1.15</sub> | 18                          | 0V      |   | 0V   | 0V   | 12V | 0V  |   |               |   |    |    |    |    | 0V |    | 0V   |    |               |    |    |    |    |    |    | to 5 | 0V   | 0V   |    |
| 6   | Hold charging current (1)              | I <sub>6 (C)</sub>   | 6                           | 0V      |   | 2.5V | 0V   | 12V | 6V  |   | 5.7V          |   |    |    |    |    | 0V |    | 6V   |    | to 8          |    |    |    |    |    |    | to 5 | 0V   | to 3 |    |
| 7   | Hold charging current (2)              | I <sub>17 (C)</sub>  | 17                          | 0V      |   | 2.5V | 0V   | 12V | 6V  |   | 5.7V          |   |    |    |    |    | 0V |    | 6V   |    | to 8          |    |    |    |    |    |    | to 5 | 0V   | to 3 |    |
| 8   | Hold discharging current (1)           | I <sub>6 (D)</sub>   | 6                           | 0V      |   | 2.5V | 0V   | 12V | 6V  |   | 6.7V          |   |    |    |    |    | 0V |    | 6V   |    | to 8          |    |    |    |    |    |    | to 5 | 0V   | to 3 |    |
| 9   | Hold discharging current (2)           | I <sub>17 (D)</sub>  | 17                          | 0V      |   | 2.5V | 0V   | 12V | 6V  |   | 6.7V          |   |    |    |    |    | 0V |    | 6V   |    | to 8          |    |    |    |    |    |    | to 5 | 0V   | to 3 |    |
| 10  | Hold leak current (1)                  | I <sub>6 (L)</sub>   | 6                           | 0V      |   | 0V   | 0V   | 12V | 11V |   | 6.7V          |   |    |    |    |    | 0V |    | 11V  |    | to 8          |    |    |    |    |    |    | to 5 | 0V   | to 3 |    |
| 11  | Hold leak current (2)                  | I <sub>17 (L)</sub>  | 17                          | 0V      |   | 0V   | 0V   | 12V | 11V |   | 6.7V          |   |    |    |    |    | 0V |    | 11V  |    | to 8          |    |    |    |    |    |    | to 5 | 0V   | to 3 |    |
| 12  | Triangle waveform output voltage (1)   | V <sub>8-7</sub>     | 8<br>7                      | 0V      |   | 0V   | 2.5V | 12V | 11V |   |               |   |    |    |    |    | 0V |    | to 6 |    |               |    |    |    |    |    |    | to 5 | to 4 | to 3 |    |
| 13  | Triangle waveform output voltage (2)   | V <sub>19-18</sub>   | 19<br>18                    | 0V      |   | 0V   | 2.5V | 12V | 11V |   |               |   |    |    |    |    | 0V |    | to 6 |    |               |    |    |    |    |    |    | to 5 | to 4 | to 3 |    |
| 14  | Triangle waveform charging current (1) | I <sub>8 (C1)</sub>  | 8                           | 0V      |   | 0V   | 0V   | 12V | 3V  |   | 4V            |   |    |    |    |    | 0V |    | to 6 |    | 4V            |    |    |    |    |    |    | to 5 | to 4 | to 3 |    |
| 15  | Triangle waveform charging current (2) | I <sub>19 (C1)</sub> | 19                          | 0V      |   | 0V   | 0V   | 12V | 3V  |   | 4V            |   |    |    |    |    | 0V |    | to 6 |    | 4V            |    |    |    |    |    |    | to 5 | to 4 | to 3 |    |
| 16  | Triangle waveform charging current (3) | I <sub>8 (C2)</sub>  | 8                           | 0V      |   | 0V   | 0V   | 12V | 11V |   | 4V            |   |    |    |    |    | 0V |    | to 6 |    | 4V            |    |    |    |    |    |    | to 5 | to 4 | to 3 |    |
| 17  | Triangle waveform charging current (4) | I <sub>19 (C2)</sub> | 19                          | 0V      |   | 0V   | 0V   | 12V | 11V |   | 4V            |   |    |    |    |    | 0V |    | to 6 |    | 4V            |    |    |    |    |    |    | to 5 | to 4 | to 3 |    |
| 18  | Triangle waveform linearity (1)        | ΔI <sub>8 (R)</sub>  | 8                           | 0V      |   | 0V   | 0V   | 12V | 6V  |   | 2V<br>↓<br>6V |   |    |    |    |    | 0V |    | to 6 |    |               |    |    |    |    |    |    | to 5 | to 4 | to 3 |    |
| 19  | Triangle waveform linearity (2)        | ΔI <sub>19 (R)</sub> | 19                          | 0V      |   | 0V   | 0V   | 12V | 6V  |   |               |   |    |    |    |    | 0V |    | to 6 |    | 2V<br>↓<br>6V |    |    |    |    |    |    | to 5 | to 4 | to 3 |    |

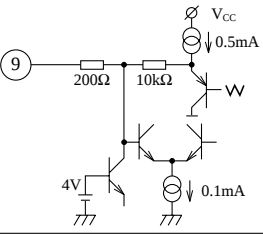
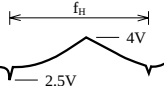
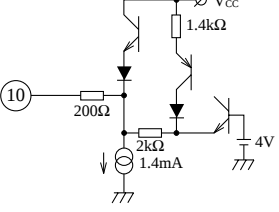
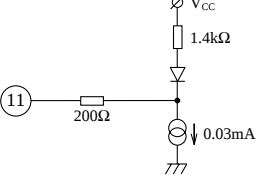
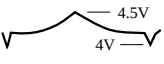
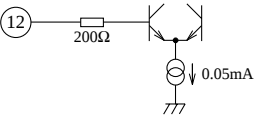
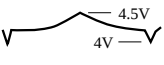
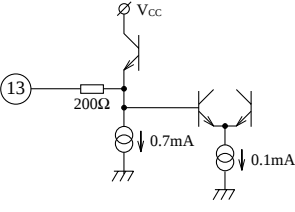
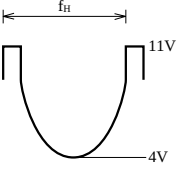
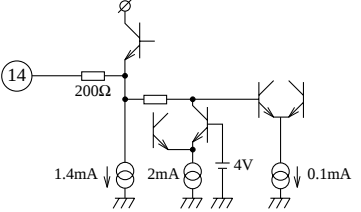
Table 1 (cont.)

| No. | Parameter                                    | Symbol             | Measure-<br>ment pin<br>No. | Pin No. |   |    |      |     |    |              |                          |   |    |                          |              |              |    |    |    |    |              |                          |    |    |                          |              |              |      |      |      |              |
|-----|----------------------------------------------|--------------------|-----------------------------|---------|---|----|------|-----|----|--------------|--------------------------|---|----|--------------------------|--------------|--------------|----|----|----|----|--------------|--------------------------|----|----|--------------------------|--------------|--------------|------|------|------|--------------|
|     |                                              |                    |                             | 1       | 2 | 3  | 4    | 5   | 6  | 7            | 8                        | 9 | 10 | 11                       | 12           | 13           | 14 | 15 | 16 | 17 | 18           | 19                       | 20 | 21 | 22                       | 23           | 24           | 25   | 26   | 27   | 28           |
| 20  | Triangle waveform<br>discharging current (1) | $I_{8(D)}$         | 8                           | 0V      |   | 0V | 2.5V | 12V | 6V | 180Ω<br>to 1 | 6V                       |   |    |                          |              |              |    | 0V |    | 6V |              | 6V                       |    |    |                          |              |              | to 5 | to 4 | to 3 |              |
| 21  | Triangle waveform<br>discharging current (2) | $I_{19(D)}$        | 19                          | 0V      |   | 0V | 2.5V | 12V | 6V |              | 6V                       |   |    |                          |              |              |    | 0V |    | 6V | 180Ω<br>to 1 | 6V                       |    |    |                          |              |              | to 5 | to 4 | to 3 |              |
| 22  | Parabola output<br>voltage (1)               | $V_{14(1)}$        | 14                          | 0V      |   | 0V | 0V   | 12V | 0V |              | 0μA                      |   |    | -20μA                    | 10k<br>to 28 | 10k<br>to 12 |    | 0V |    | 0V |              |                          |    |    |                          |              |              | to 5 | 0V   | 0V   | 20k<br>to 8  |
| 23  | Parabola output<br>voltage (2)               | $V_{14(2)}$        | 14                          | 0V      |   | 0V | 0V   | 12V | 0V |              | 100μA                    |   |    | -20μA                    | 10k<br>to 28 | 10k<br>to 12 |    | 0V |    | 0V |              |                          |    |    |                          |              |              | to 5 | 0V   | 0V   | 20k<br>to 8  |
| 24  | Parabola output<br>voltage (3)               | $\Delta V_{14(3)}$ | 14                          | 0V      |   | 0V | 0V   | 12V | 0V |              | 100μA<br>↓<br>-100<br>μA |   |    | -20μA                    | 10k<br>to 28 | 10k<br>to 12 |    | 0V |    | 0V |              |                          |    |    |                          |              |              | to 5 | 0V   | 0V   | 20k<br>to 8  |
| 25  | Parabola output<br>voltage (4)               | $\Delta V_{14(4)}$ | 14                          | 0V      |   | 0V | 0V   | 12V | 0V |              | 100μA                    |   |    | -20μA<br>↓<br>-150<br>μA |              | 10k<br>to 12 |    | 0V |    | 0V |              |                          |    |    |                          |              |              | to 5 | 0V   | 0V   | 20k<br>to 8  |
| 26  | Parabola output<br>voltage (5)               | $V_{16(5)}$        | 16                          | 0V      |   | 0V | 0V   | 12V | 0V |              |                          |   |    |                          |              |              |    | 0V |    | 0V |              | 0μA                      |    |    | -20μA                    | 10k<br>to 28 | 10k<br>to 23 | to 5 | 0V   | 0V   | 20k<br>to 19 |
| 27  | Parabola output<br>voltage (6)               | $V_{16(6)}$        | 16                          | 0V      |   | 0V | 0V   | 12V | 0V |              |                          |   |    |                          |              |              |    | 0V |    | 0V |              | 100μA                    |    |    | -20μA                    | 10k<br>to 28 | 10k<br>to 23 | to 5 | 0V   | 0V   | 20k<br>to 19 |
| 28  | Parabola output<br>voltage (7)               | $\Delta V_{16(7)}$ | 16                          | 0V      |   | 0V | 0V   | 12V | 0V |              |                          |   |    |                          |              |              |    | 0V |    | 0V |              | 100μA<br>↓<br>-100<br>μA |    |    | -20μA                    | 10k<br>to 28 | 10k<br>to 23 | to 5 | 0V   | 0V   | 20k<br>to 19 |
| 29  | Parabola output<br>voltage (8)               | $\Delta V_{16(8)}$ | 16                          | 0V      |   | 0V | 0V   | 12V | 0V |              |                          |   |    |                          |              |              |    | 0V |    | 0V |              | 100μA                    |    |    | -20μA<br>↓<br>-150<br>μA | 10k<br>to 28 | 10k<br>to 23 | to 5 | 0V   | 0V   | 20k<br>to 19 |
| 30  | Clamp output<br>voltage (1)                  | $V_{14(CL)}$       | 14                          | 0V      |   | 0V | 2.5V | 12V | 0V |              | 0μA                      |   |    | -20μA                    | 10k<br>to 28 | 10k<br>to 12 |    | 0V |    | 0V |              |                          |    |    |                          |              |              | to 5 | to 4 | 0V   | 20k<br>to 8  |
| 31  | Clamp output<br>voltage (2)                  | $V_{16(CL)}$       | 16                          | 0V      |   | 0V | 2.5V | 12V | 0V |              |                          |   |    |                          |              |              |    | 0V |    | 0V |              | 0μA                      |    |    | -20μA                    | 10k<br>to 28 | 10k<br>to 23 | to 5 | to 4 | 0V   | 20k<br>to 19 |

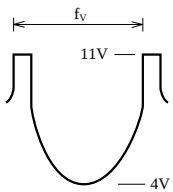
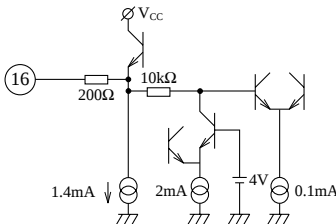
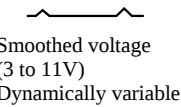
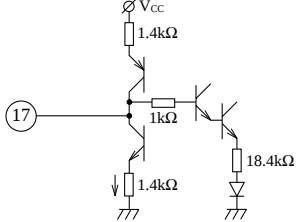
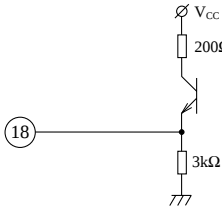
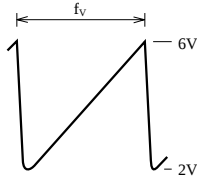
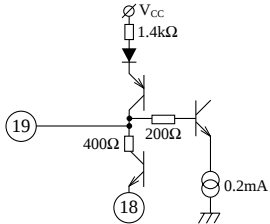
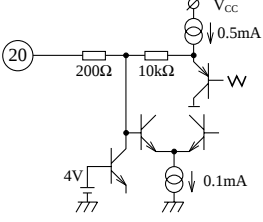
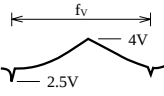
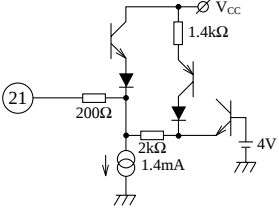
### ■ Pin Descriptions

| Pin No. | Pin name                                 | Waveform  | Equivalent circuit | Function                                                                                                                                      |
|---------|------------------------------------------|-----------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | GND                                      | 0V        |                    | GND for horizontal system                                                                                                                     |
| 2       | Reference bias output (6V)               | DC (6.0V) |                    | Reference bias output (6V)                                                                                                                    |
| 3       | Hor. sampling pulse input                |           |                    | Input of sampling pulse (0.1 to 0.2μs) for detecting triangular waveform amplitude                                                            |
| 4       | Hor. phase shift pulse input             |           |                    | Pulse input (0.5 to 2μs) for discharging triangular waveform voltage                                                                          |
| 5       | V <sub>CC1</sub> (12V)                   | 12V       |                    | Power supply for horizontal system                                                                                                            |
| 6       | Holding                                  |           |                    | Determines the charging current of triangular waveform. Dynamically variable with $f_M$ .                                                     |
| 7       | Hor. system reference bias output (2V)   | DC (2.0V) |                    | Reference bias for horizontal system (2V)                                                                                                     |
| 8       | Triangular waveform generation capacitor |           |                    | Triangular waveform generation capacitor<br>The discharging current of triangular waveform sinks into the 2V-reference-voltage source (Pin7). |

## ■ Pin Descriptions (cont.)

| Pin No. | Pin name                                  | Waveform                                                                            | Equivalent circuit                                                                   | Function                                                                                                                                                             |
|---------|-------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9       | Oscillation prevention capacitor          |    |    | Oscillation prevention capacitor<br>If the parabola output oscillates, a capacitor of several 10pF must be connected between this pin and Pin10.                     |
| 10      | Oscillation prevention capacitor          |    |    | Oscillation prevention capacitor<br>If the parabola output oscillates, capacitor of several 10 pF must be connected between this pin and Pin9.                       |
| 11      | Hor. parabola output amplitude adjustment | DC (11.2V)                                                                          |   | Control pin of the amplitude of horizontal parabola output.<br>If the current is increased by inserting a resistor between this pin and GND, the amplitude decrease. |
| 12      | Feedback input                            |  |  | Feedback input for gain adjustment                                                                                                                                   |
| 13      | Feedback output                           |  |  | Feedback output-pin for gain adjustment<br>The gain is set by a resistor which is connected between Pins12 and 28.                                                   |
| 14      | Hor. parabola output                      |  |  | Output of horizontal parabola waveform                                                                                                                               |
| 15      | GND                                       | 0V                                                                                  |                                                                                      | GND for vertical system                                                                                                                                              |

## ■ Pin Descriptions (cont.)

| Pin No. | Pin name                          | Waveform                                                                            | Equivalent circuit                                                                   | Function                                                                                                                                         |
|---------|-----------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 16      | Ver. parabola output              |    |    | Output of vertical parabola waveform                                                                                                             |
| 17      | Holding                           |    |    | Control pin of the charging current of vertical-system triangular-waveform<br>Dynamically changable with $f_v$ .                                 |
| 18      | Ver. system reference bias output | DC (2.0V)                                                                           |    | Reference bias of vertical system (2V)                                                                                                           |
| 19      | Triangular generation capacitor   |  |  | Triangular waveform-generation capacitor<br>The discharging current of triangular waveform sinks into the 2V reference voltage source (Pin18).   |
| 20      | Oscillation prevention capacitor  |  |  | Oscillation-prevention capacitor<br>If the parabola output oscillates, a capacitor of several 10pF must be connected between this pin and Pin21. |
| 21      | Oscillation prevention capacitor  |  |  | Oscillation-prevention capacitor<br>If the parabola output oscillates, a capacitor of several 10pF must be connected between this pin and Pin20. |

## ■ Pin Descriptions (cont.)

| Pin No. | Pin name                            | Waveform   | Equivalent circuit | Function                                                                                                                                                            |
|---------|-------------------------------------|------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 22      | Ver. parabola output amplitude adj. | DC (11.2V) |                    | Control pin of the amplitude of vertical parabola output<br>When the current is increased by inserting a resistor between this pin and GND, the amplitude decrease. |
| 23      | Feedback input                      |            |                    | Feedback input for gain adjustment                                                                                                                                  |
| 24      | Feedback output                     |            |                    | Feedback output for gain adjustment<br>The gain is set by the value of a resistor which is connected between Pins 23 and 28.                                        |
| 25      | V <sub>CC2</sub> (12V)              | 12V        |                    | Ver. system power supply                                                                                                                                            |
| 26      | Ver. phase shift pulse input        |            |                    | Pulse (200 to 700μs) input for discharging triangular waveform                                                                                                      |
| 27      | Ver. Sampling pulse input           |            |                    | Input of sampling pulse (50 to 80μs) which detects the amplitude of triangular waveform                                                                             |
| 28      | Reference bias output (4V)          | DC (4.0V)  |                    | Output for reference bias (4V)                                                                                                                                      |

## ■ Application Circuit

