

# AN5308NK

Single chip IC for color TV (Built-in I<sup>2</sup>C bus interface)

## ■ Overview

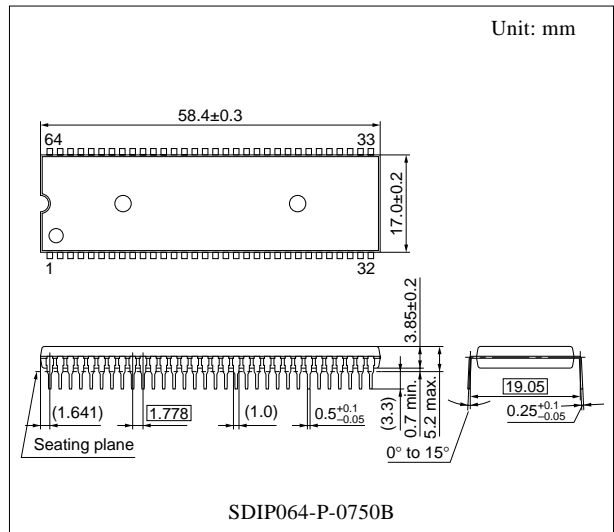
The AN5308NK is an IC in which NTSC video, chroma, RGB, sync. and deflection signal processing circuits are integrated on a single chip incorporating I<sup>2</sup>C bus controller.

## ■ Features

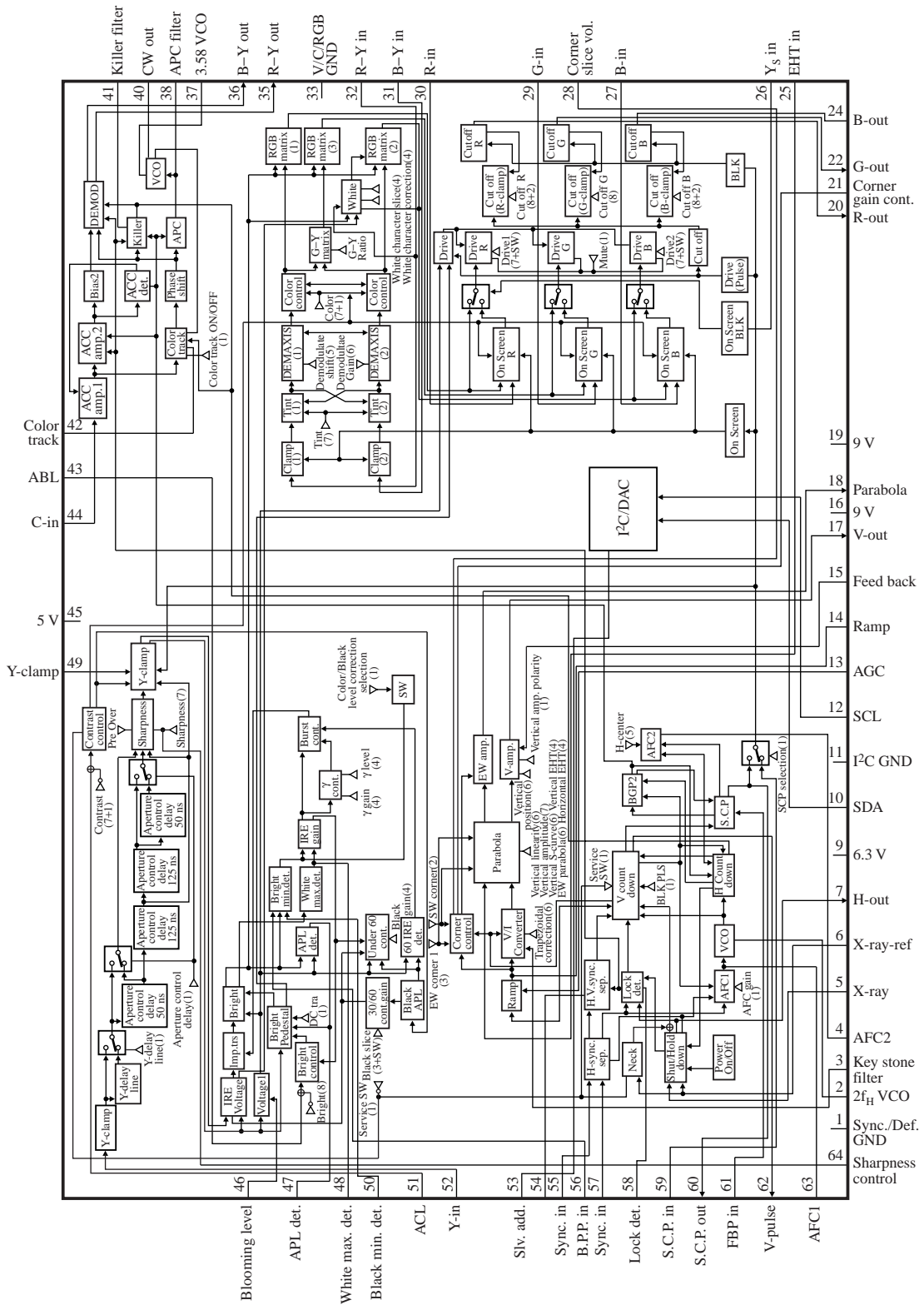
- Video block : Built-in wide band width filter, pre-shoot and over-shoot amount adjustment, aperture changeover possible and with ABL pin
- Chroma block : Built-in ACC filter and with color difference output pin
- RGB block : With color difference signal input pin and analog RGB
- Sync. block : With sync. BLK in/output pin,  $\mu$  changeover and H center adjustment possible
- Deflection block: Built-in screen distortion correction circuit

## ■ Applications

- TV



■ Block Diagram



## ■ Pin Descriptions

| Pin No. | Description                              | Pin No.       | Description                            |
|---------|--|---------------|--|
| 1       | Sync., Def. GND                          | 35            | R–Y output                             |
| 2       | 503 kHz VCO                              | 36            | B–Y output                             |
| 3       | Vertical position transition DAC output  | 37            | 3.58 MHz VCO                           |
| 4       | AFC2 filter                              | 38            | Chroma APC filter                      |
| 5       | High-tention detection input (X-ray)     | 40            | VCO output                             |
| 6       | High-tention detection reference voltage | 41            | Killer filter                          |
| 7       | Horizontal drive pulse output            | 42            | Color track filter                     |
| 9       | Horizontal power supply (H $V_{CC}$ )    | 43            | ABL input                              |
| 10      | I <sup>2</sup> C SDA input               | 44            | Chroma input                           |
| 11      | I <sup>2</sup> C GND                     | 45            | 5 V power supply ( $V_{CC2}$ )         |
| 12      | I <sup>2</sup> C SCL input               | 46            | Blooming level input                   |
| 13      | Reference ramp wave form AGC             | 47            | APL detection use filter               |
| 14      | Reference ramp wave form generation      | 48            | White detection use filter             |
| 15      | Corner slice level                       | 49            | Y-clamp                                |
| 16      | Sync. 9 V power supply                   | 50            | Black detection filter/color control   |
| 17      | Vertical deflection sawtooth wave output | 51            | ACL input                              |
| 18      | EW output                                | 52            | Y-signal input                         |
| 19      | 9 V power supply ( $V_{CC1}$ )           | 53            | Slave address changeover               |
| 20      | R-output                                 | 54            | V-sync. sep. filter                    |
| 21      | Corner gain control                      | 55            | H-sync. input                          |
| 22      | G-output                                 | 56            | Black detection inhibition pulse input |
| 24      | B-output                                 | 57            | V-sync. input                          |
| 25      | EHT voltage detection                    | 58            | Lock det. filter                       |
| 26      | $Y_S$ input                              | 59            | Sandcastle pulse input                 |
| 27      | On-screen B-input                        | 60            | Sandcastle pulse output                |
| 28      | Corner slice volume                      | 61            | Flyback pulse (FBP) input              |
| 29      | On-screen G-input                        | 62            | V-pulse output                         |
| 30      | On-screen R-input                        | 63            | AFC1 filter                            |
| 31      | B–Y input                                | 64            | Sharpness control output               |
| 32      | R–Y input                                | 8, 23, 34, 39 | Non-connection                         |
| 33      | V/C/RGB GND                              |               |  |

### ■ Absolute Maximum Ratings

| Parameter                                      | Symbol    |                           | Rating      | Unit             |
|--|-----------|---------------------------|-------------|------------------|
| Supply voltage                                 | $V_{CC}$  | $V_{CC1}$                 | 9.6         | V                |
|  |           | $V_{CC2}$                 | 5.6         |                  |
| Supply current                                 | $I_{CC}$  | $I_{CC1} (I_{16}+I_{19})$ | 113         | mA               |
|  |           | $I_{CC2} (I_{45})$        | 89          |                  |
|  |           | $I_9$                     | 26          |                  |
| Power dissipation ( $T_a = 70^\circ\text{C}$ ) | $P_D$     |                           | 947         | mW               |
| Operating ambient temperature *1               | $T_{opr}$ |                           | -20 to +70  | $^\circ\text{C}$ |
| Storage temperature *1                         | $T_{stg}$ |                           | -55 to +150 | $^\circ\text{C}$ |

Note) \*1: Except for the operating ambient temperature and storage temperature, all ratings are for  $T_a = 25^\circ\text{C}$ .

### ■ Recommended Operating Range

| Parameter      | Symbol                          | Range             | Unit |
|----------------|---------------------------------|-------------------|------|
| Supply voltage | $V_{CC1}$<br>$V_{19-1, 11, 33}$ | 8.5 to 9.0 to 9.5 | V    |
|                | $V_{CC2}$<br>$V_{45-1, 11, 33}$ | 4.5 to 5.0 to 5.5 |      |
| Supply current | $I_9$                           | 15 to 20 to 25    | mA   |

### ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$

| Parameter                  | Symbol      | Conditions   | Min | Typ | Max | Unit |
|----------------------------|-------------|--|-----|-----|-----|------|
| DC characteristics         |             |  |     |     |     |      |
| Supply current             | $I_{16+19}$ | $V_{CC1}: 9\text{ V}, V_{CC2}: 5\text{ V}, \text{pin } 9: 12\text{ V}$<br>with $380\ \Omega$ | 74  | 90  | 106 | mA   |
| Supply current             | $I_{45}$    | $V_{CC1}: 9\text{ V}, V_{CC2}: 5\text{ V}, \text{pin } 9: 12\text{ V}$<br>with $380\ \Omega$ | 59  | 71  | 83  | mA   |
| Sync. input pin voltage    | $V_{55-1}$  | $V_{CC1}: 9\text{ V}, V_{CC2}: 5\text{ V}, \text{pin } 9: 12\text{ V}$<br>with $380\ \Omega$ | 0.8 | 1.3 | 1.8 | V    |
| Sync. input pin voltage    | $V_{57-1}$  | $V_{CC1}: 9\text{ V}, V_{CC2}: 5\text{ V}, \text{pin } 9: 12\text{ V}$<br>with $380\ \Omega$ | 0.8 | 1.3 | 1.8 | V    |
| Video input pin voltage    | $V_{7-33}$  | $V_{CC1}: 9\text{ V}, V_{CC2}: 5\text{ V}, \text{pin } 9: 12\text{ V}$<br>with $380\ \Omega$ | 2.7 | 3.2 | 3.7 | V    |
| ABL input pin voltage      | $V_{43-33}$ | $V_{CC1}: 9\text{ V}, V_{CC2}: 5\text{ V}, \text{pin } 9: 12\text{ V}$<br>with $380\ \Omega$ | 2.5 | 3.0 | 3.5 | V    |
| ACL input pin voltage      | $V_{51-33}$ | $V_{CC1}: 9\text{ V}, V_{CC2}: 5\text{ V}, \text{pin } 9: 12\text{ V}$<br>with $380\ \Omega$ | 2.5 | 3.0 | 3.5 | V    |
| Blooming level pin voltage | $V_{46-33}$ | $V_{CC1}: 9\text{ V}, V_{CC2}: 5\text{ V}, \text{pin } 9: 12\text{ V}$<br>with $380\ \Omega$ | 2.2 | 2.7 | 3.2 | V    |
| Chroma input pin voltage   | $V_{44-33}$ | $V_{CC1}: 9\text{ V}, V_{CC2}: 5\text{ V}, \text{pin } 9: 12\text{ V}$<br>with $380\ \Omega$ | 1.5 | 2.0 | 2.5 | V    |

**■ Electrical Characteristics at  $T_a = 25^\circ\text{C}$  (continued)**

| Parameter  | Symbol                          | Conditions  | Min       | Typ    | Max    | Unit          |
|--|---------------------------------|---|-----------|--------|--------|---------------|
| DC characteristics (continued)                       |                                 |   |           |        |        |               |
| B–Y output pin voltage                               | $V_{31-33}$                     | $V_{CC1}$ : 9 V, $V_{CC2}$ : 5 V, pin 9: 12 V with 380 $\Omega$                 | 2.3       | 2.8    | 3.3    | V             |
| R–Y output pin voltage                               | $V_{32-33}$                     | $V_{CC1}$ : 9 V, $V_{CC2}$ : 5 V, pin 9: 12 V with 380 $\Omega$                 | 2.3       | 2.8    | 3.3    | V             |
| Horizontal signal processing                         |                                 |   |           |        |        |               |
| Horizontal stabilized supply voltage                 | $HV_{CC}$                       | $V_{CC1}$ : 9 V, $V_{CC2}$ : 5 V, pin 9: 12 V with 380 $\Omega$                 | 5.9       | 6.3    | 6.7    | V             |
| Constant voltage operating resistance                | $RHV_{CC}$                      | $I_9$ : 15 mA to 25 mA  | —         | —      | 30     | $\Omega$      |
| Horizontal free-running oscillation frequency 1      | $f_{HO-1}$                      |   | 15.434    | 15.734 | 16.034 | kHz           |
| Horizontal free-running oscillation frequency 2      | $f_{HO-2}$                      | At hold down  | 16.3      | 16.4   | 16.8   | kHz           |
| Variation of $f_{HO}$ , when supply voltage start-up | $\frac{\Delta f_{HO}}{V_{CC3}}$ | $f_{HO}$ frequency difference, when other power supply off→on                   | 0         | 100    | 200    | Hz            |
| Horizontal output pulse duty cycle                   | $\tau_{HO}$                     | Hold down off   | 34.4      | 37.5   | 40.6   | %             |
| Horizontal output starting voltage                   | $V_{fH(S)}$                     | $f = 10$ kHz to 20 kHz, when horizontal oscillation voltage is 1 V[p-p] or more | —         | —      | 5.2    | V             |
| Horizontal output level                              | $V_{fH}$                        |   | 2.4       | 2.9    | 3.4    | V             |
| Horizontal pull-in range                             | $f_{PH}$                        | $f_{HO} = 15.73$ kHz  | $\pm 400$ | —      | —      | Hz            |
| H-center changeable range 1                          | $T_{DH}$                        | Phase lead of 1A[10]→[00]   | 1.8       | 2.5    | 3.2    | $\mu\text{s}$ |
| H-center changeable range 2                          | $T_{DH}$                        | Phase lead of 1A[10]→[1F]   | –3.0      | –2.3   | –1.6   | $\mu\text{s}$ |
| Lock detector output voltage 1                       | $V_{58-M}$                      | Synchronous   | 5.1       | 5.8    | 6.5    | V             |
| Lock detector output voltage 2                       | $V_{58-L}$                      | Asynchronous  | –0.1      | 0      | 0.5    | V             |
| Lock detector output voltage 3                       | $V_{58-T}$                      | Hold down   | 7.6       | 8.3    | 9.0    | V             |
| Burst gate pulse width                               | $T_{BGP}$                       | Sandcastle output   | 1.8       | 2.5    | 3.2    | $\mu\text{s}$ |
| Sandcastle pulse output level (BGP)                  | $V_{BGP}$                       | $V_{CC}$ : typ.   | 4.0       | 4.3    | 4.6    | V             |
| Sandcastle pulse output level (HBLK)                 | $V_{HBLK}$                      | $V_{CC}$ : typ.   | 2.7       | 3      | 3.3    | V             |
| Sandcastle pulse output level (VBLK)                 | $V_{VBLK}$                      | $V_{CC}$ : typ.   | 1.2       | 1.5    | 1.8    | V             |
| Vertical signal processing                           |                                 |   |           |        |        |               |
| Vertical output pulth width                          | $\tau_{VO}$                     |   | 360       | 380    | 400    | $\mu\text{s}$ |
| Vertical output level                                | $V_{62H}$                       |   | 3.8       | 4.3    | 4.8    | V             |
| Vertical output free-running frequency               | $f_{VO}$                        |   | 58.8      | 60.0   | 61.2   | Hz            |
| Vertical blanking pulse width                        | $\tau_{VBLK}$                   |   | 1.09      | 1.12   | 1.15   | ms            |

**■ Electrical Characteristics at  $T_a = 25^\circ\text{C}$  (continued)**

| Parameter                               | Symbol           | Conditions  | Min   | Typ  | Max  | Unit |
|---|------------------|---|-------|------|------|------|
| Y-signal processing (continued)         |                  |   |       |      |      |      |
| Video voltage gain                      | $AY_G$           | Cont.: max., Sharp.: min.   | 17    | 20   | 23   | dB   |
| Video voltage gain relative ratio       | $AY$             | Ratio between channels, Drive: typ.   | -2.5  | 0    | 2.5  | dB   |
| Video voltage gain relative ratio DL    | $AY_{GD1}$       | Y delay line on/off   | -1.5  | 0    | 1.5  | dB   |
| Sharpness 1                             | $AG_{SH1}$       | f = 4 MHz, Aperture control SW: 00  | 11.5  | 14.5 | 17.5 | dB   |
| Sharpness 2                             | $AG_{SH2}$       | f = 3 MHz, Aperture control SW: 02  | 11.5  | 14.5 | 17.5 | dB   |
| Contrast control range max. value       | $AG_{CON}$       | Sharp.: min., Cont.: typ.   | 3.5   | 6.0  | 8.5  | dB   |
| Contrast control range min. value       | $yG_{CONmin}$    | Contrast: min.  | —     | 30   | 100  | mV   |
| Brightness changeable amount            | $V_{BR}$         | No input, Bright: min.→max.   | 3.0   | 3.7  | 4.4  | V    |
| DC re-generation factor 1               | TDC1             | APL10%→90% DC transmission amount changeover: - direction                             | 90    | 96   | 102  | %    |
| DC re-generation factor 2               | TDC2             | APL10%→90% DC transmission amount changeover: + direction                             | 96    | 103  | 110  | %    |
| Y-signal delay time 1                   | $\tau_{DL1}$     | Y delay line: On  | 260   | 325  | 390  | ns   |
| Y-signal delay time 2                   | $\tau_{DL2}$     | Y delay line: Off   | 160   | 205  | 250  | ns   |
| Y-frequency characteristics 1           | $\Delta y_{1Y}$  | 10 MHz attenuation amount<br>DL: On for f = 3 MHz                                     | -6    | -3   | 1    | dB   |
| Y-frequency characteristics 2           | $\Delta y_{2Y}$  | 10 MHz attenuation amount<br>DL: Off for f = 3 MHz                                    | -5    | -2   | 2    | dB   |
| ACL characteristics                     | $\Delta y_{ACL}$ | Pin 51: 3 V→3.5 V   | 8     | 11   | 14   | dB/V |
| ABL characteristics                     | $\Delta y_{ABL}$ | Pin 43: 2.7 V→3.5 V   | 2.7   | 3.4  | 4.1  | V/V  |
| Black extension amount 1                | $\Delta Y_{BL1}$ | Input: Whole black, pin 50: 5 V→<br>CR filter   | -0.1  | 0    | 0.1  | V    |
| Black extension gain                    | $\Delta Y_{BL2}$ | Input: Whole black, pin 50: 3 V<br>black gain: min.→max.                              | 1.60  | 1.95 | 2.3  | V    |
| Black extension start point             | $\Delta Y_{BL3}$ | Pin 50: 5 V, set contrast to 2.7 V[p-p],<br>after that with pin 50 CR filter          | -0.12 | 0    | 0.12 | V    |
| Black extension amount 2                | $\Delta Y_{BL4}$ | Black level: min., set contrast to<br>0.8 V[p-p], after that with pin 50 CR<br>filter | 0.08  | 0.18 | 0.28 | V    |
| $\gamma$ correction amount min. to max. | $Y_\gamma$       | White $\gamma$ gain: max., white $\gamma$ gain:<br>min. to max.                       | 0.50  | 0.85 | 1.20 | V    |
| Blooming level variation amount         | $\Delta Y_{BLM}$ | Blooming DC pin 46: 0.5 V→4.5 V   | 3.2   | 3.9  | 4.6  | V    |
| Pedestal level (typical)                | $Y_G$            | Cut off: 80   | 2.0   | 2.4  | 2.8  | V    |
| Chroma signal processing                |                  |   |       |      |      |      |
| ACC characteristics 1                   | ACC1             | Color bar signal (Burst 300 mV[p-p])  | -1    | 0    | 1    | dB   |
| ACC characteristics 2                   | ACC2             | Color bar signal (Burst 15 mV[p-p])   | -4    | -1.5 | 1    | dB   |

**■ Electrical Characteristics at T<sub>a</sub> = 25°C (continued)**

| Parameter  | Symbol                | Conditions  | Min  | Typ  | Max   | Unit    |
|--|-----------------------|---|------|------|-------|---------|
| Chroma signal processing (continued)                           |                       |   |      |      |       |         |
| Killer tolerance on  | eK                    | Color bar burst 0 dB = 150 mV[p-p]  | -48  | -43  | -38   | dB      |
| Killer tolerance off   | eK                    | Color bar signal hysteresis   | —    | 2    | 4     | dB      |
| Detection output amplitude B-Y                                 | e <sub>OB</sub>       | Color bar signal (Burst 150 mV[p-p])  | 1.04 | 1.57 | 2.1   | V[p-p]  |
| Detection output amplitude R-Y                                 | e <sub>OR</sub>       | Color bar signal (Burst 150 mV[p-p])  | 0.82 | 1.26 | 1.7   | V[p-p]  |
| De-modulated output ratio                                      | R/B                   | Rainbow signal R-Y/B-Y output ratio   | 0.48 | 0.56 | 0.64  | Time    |
| De-modulation angle (B-Y)                                      | ∠B                    |   | -8.0 | -2.5 | 3.0   | degree  |
| De-modulation angle (R-Y)                                      | ∠R                    |   | 83   | 88   | 93    | degree  |
| Color residual   | e <sub>KILLER</sub>   | Killer filter pin, grounded with 20 kΩ  | —    | —    | 50    | mV[p-p] |
| Detection output residual carrier                              | e <sub>CAR</sub>      | No-signal input   | —    | —    | 50    | mV[p-p] |
| APC pull-in range low  | f <sub>PULL</sub>     | Burst frequency change  | 500  | 600  | —     | Hz      |
| APC pull-in range high   | f <sub>PULL</sub>     | Burst frequency change  | -500 | -600 | —     | Hz      |
| CW output amplitude  | e <sub>CW</sub>       |   | 600  | 800  | 1 100 | mV[p-p] |
| Free running frequency   | f <sub>CO</sub>       | Deviation from 3.579545 MHz   | -200 | 0    | 200   | Hz      |
| RGB processing circuit   |                       |   |      |      |       |         |
| Tint center * <sup>1</sup>                                     | θ <sub>T</sub>        | Pin 31: 356 mV[p-p], pin 32: 200 mV[p-p], DAC value, when R, B output are equal | [2F] | [3A] | [4A]  | —       |
| Tint variable range max. * <sup>1</sup>                        | Δθ <sub>1</sub>       | Tint: typ.→max.   | 40   | 65   | —     | degree  |
| Tint variable range min. * <sup>1</sup>                        | Δθ <sub>2</sub>       | Tint: typ.→min.   | -37  | -50  | —     | degree  |
| R-Y demodulation axis variable range max. * <sup>1</sup>       | Δθ <sub>DEM</sub>     | Demodulation axis: min.→max.  | 16   | 28   | 39    | degree  |
| B-Y ratio variable range 1 * <sup>1</sup>                      | AB-Y <sub>min</sub>   | Demodulation ratio: typ.→min.   | —    | 0    | 0.25  | Time    |
| B-Y ratio variable range 2 * <sup>1</sup>                      | AB-Y <sub>min</sub>   | Demodulation ratio: typ.→min.   | 1.25 | 1.50 | 1.75  | Time    |
| R-Y/B-Y ratio * <sup>1</sup>                                   | eR/eB                 | Pin 31: 356 mV[p-p], pin 32: 200 mV[p-p]  | 0.65 | 0.79 | 0.94  | Time    |
| G-Y/R-Y ratio 1 * <sup>1</sup>                                 | eG/eR <sub>1</sub>    | G-Y ratio changeover: type2   | 0.47 | 0.57 | 0.67  | Time    |
| G-Y/R-Y ratio 2 * <sup>1</sup>                                 | eG/eR <sub>2</sub>    | G-Y ratio changeover: type1   | 0.27 | 0.35 | 0.44  | Time    |
| G-Y/B-Y ratio 1 * <sup>1</sup>                                 | eG/eB <sub>1</sub>    | G-Y ratio changeover: type2   | 0.18 | 0.27 | 0.36  | Time    |
| G-Y/B-Y ratio 2 * <sup>1</sup>                                 | eG/eB <sub>2</sub>    | G-Y ratio changeover: type1   | 0.30 | 0.36 | 0.42  | Time    |
| RGB output blanking voltage                                    | E <sub>BLK</sub>      | Brightness: typ., cutoff  | 0.7  | 1.1  | 1.5   | V       |
| Color control range max. * <sup>1</sup>                        | A <sub>B-YCLmax</sub> | Cont.: typ., Color: typ.→max.   | 3.4  | 5.0  | 6.6   | dB      |
| Color control min. value * <sup>1</sup>                        | A <sub>B-YCLmin</sub> | Cont.: typ., Color: typ.→min.   | —    | 25   | 50    | mV      |
| Color difference signal contrast variable range * <sup>1</sup> | A <sub>B(CON)</sub>   | Color: typ., Cont.: typ.→max.   | 3.5  | 6.0  | 8.5   | dB      |

Note) \*1: Under the condition that pin 52 is adjusted for the Drive I, II by inserting Y-signal, and R and B-output amplitude equal that of G-output.

**■ Electrical Characteristics at  $T_a = 25^\circ\text{C}$  (continued)**

| Parameter  | Symbol          | Conditions   | Min   | Typ  | Max  | Unit   |
|--|-----------------|--|-------|------|------|--------|
| RGB processing circuit (continued)                 |                 |  |       |      |      |        |
| Drive control range                                | $A_{R(DR)}$     | Drive SW: 00→04, drive: min.→max.  | 4     | 6    | 8    | dB     |
| Cut-off R.B control range                          | $V_{CO}$        | Cutoff SW, cutoff: min.→max.   | 1.6   | 2.1  | 2.6  | V      |
| Cut-off G control range                            | $V_{(CO)G}$     | Cutoff: min. to max.   | 0.6   | 1.1  | 1.6  | V      |
| On-screen voltage gain                             | $A_{yG}$        | $Y_S = 1\text{ V}$ , contrast: max.  | 8     | 10   | 12   | dB     |
| On-screen contrast range                           | $A_{yG(ON)}$    | $Y_S = 1\text{ V}$ typ.→max.   | 0     | 1.5  | 3.5  | dB     |
| On-screen contrast min. value                      | $A_{yG(ON)min}$ | 0.5 V input  | 0.1   | 0.3  | 0.5  | V[p-p] |
| On-screen frequency characteristics                | $\Delta e$      | Attenuation amount of $f = 10\text{ MHz}$<br>to $f = 3\text{ MHz}$   | -6    | -3   | 1    | dB     |
| Deflection signal processing                       |                 |  |       |      |      |        |
| Standard vertical output amplitude                 | $V_{OUT}$       |  | 2.2   | 2.6  | 3.0  | V[p-p] |
| Standard EW output amplitude                       | $V_{EW}$        |  | 1.8   | 2.2  | 2.6  | V[p-p] |
| Color track  |                 |  |       |      |      |        |
| Color track off/on variation amount 1<br>Blue *1   | $\Delta e_{BB}$ | B-Y: 1.39 V, R-Y: 1.1 V<br>After tint color adjustment   | -160  | 0    | 160  | mV     |
| Color track off/on variation amount 2<br>Red *1    | $\Delta e_{BR}$ | Variation amount at color track<br>On, 0E : 03→04  | -100  | 100  | 300  | mV     |
| Color track off/on variation amount 3<br>Yellow *1 | $\Delta e_{RY}$ |  | -350  | -200 | -16  | mV     |
| C/Y ratio  | $V_{CY}$        | Y: 0.36 $V_{B-W}$ , C: Color bar typ.,<br>Color: typ., contrast: typ.<br>G-Y/Y zero peak ratio at G-output | 0.285 | 0.42 | 0.56 | Time   |

Note) \*1: Under the condition that pin 52 is adjusted for the Drive I, II by inserting Y-signal, and R and B-output amplitude equal that of G-output.

**• Design reference data**

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

| Parameter   | Symbol                | Conditions                                       | Min | Typ  | Max | Unit   |
|---|-----------------------|--|-----|------|-----|--------|
| Horizontal signal processing                            |                       |  |     |      |     |        |
| Sync. separation possible input                         | $V_{IN}$              | Input: Whole black sync. level                   | 0.2 | 1.0  | —   | V[p-p] |
| Ambient temperature dependence<br>of $f_{HO}$           | $\frac{Df_{HO}}{T_a}$ | $T_a = -20^\circ\text{C}$ to $+70^\circ\text{C}$ | —   | 5.5  | —   | Hz/°C  |
| Horizontal oscillation frequency<br>control sensitivity | $\beta_H$             |  | —   | 1.2  | —   | Hz/mV  |
| AFC1 reference current 1                                | $I_{63(1)}$           | 0D[30]   | —   | 0.83 | —   | mA     |
| AFC1 reference current 2                                | $I_{63(2)}$           | 0D[20]   | —   | 1.33 | —   | mA     |
| AFC1 reference current 3                                | $I_{63(3)}$           | 0D[10]   | —   | 1.83 | —   | mA     |
| AFC1 reference current 4                                | $I_{63(4)}$           | 0D[00]   | —   | 2.33 | —   | mA     |



## ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$ (continued)

### • Design reference data (continued)

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

| Parameter  | Symbol                         | Conditions   | Min  | Typ  | Max  | Unit          |
|--|--------------------------------|--|------|------|------|---------------|
| Horizontal signal processing (continued)                           |                                |  |      |      |      |               |
| F.B.P slice level (blanking)                                       | $V_{\text{FBP-1}}$             |  | —    | 0.7  | —    | V             |
| F.B.P slice level (AFC1)   | $V_{\text{FBP-2}}$             |  | —    | 2.5  | —    | V             |
| F.B.P delay time range   | $T_{\text{H-FBP}}$             | H-center: typ. From $H_{\text{OUT}}$ rising edge to FBP center | —    | —    | 19   | $\mu\text{s}$ |
| B.G.P start position   |                                | From H. sync. rear edge to burst gate pulse front edge         | —    | 0.3  | —    | $\mu\text{s}$ |
| Sandcastle pulse output temperature characteristics                | $\Delta V_{60(T_a)}$           |  | —    | 1.8  | —    | mV/deg        |
| Sandcastle pulse input threshold level temperature characteristics | $\Delta V_{59(T_a)}$           |  | —    | 0    | —    | mV/deg        |
| F.B.P input threshold level temperature characteristics (HBLK)     | $\Delta V_{61(T_a)}$           |  | —    | -1.8 | —    | mV/deg        |
| F.B.P input threshold level temperature characteristics (AFC1)     |                                |  | —    | 1    | —    | mV/deg        |
| X-ray inside reference temperature characteristics                 |                                | Zener temperature characteristics: +1.8 mV/deg                 | —    | 0    | —    | mV/deg        |
| Sandcastle pulse output vs. supply voltage dependence (BGP)        |                                | $V_{\text{CC2}}: 5\text{ V} \pm 0.5\text{ V}$                  | —    | 1    | —    | V/V           |
| Sandcastle pulse output vs. supply voltage (HBLK)                  |                                | $V_{\text{CC2}}: 5\text{ V} \pm 0.5\text{ V}$                  | —    | 0.74 | —    | V/V           |
| Sandcastle pulse output vs. supply voltage (VBLK)                  |                                | $V_{\text{CC2}}: 5\text{ V} \pm 0.5\text{ V}$                  | —    | 0.44 | —    | V/V           |
| Hold down operation voltage  | $V_{\text{HTH}}$               | $V_{\text{REF}} (= \text{pin } 6) = 6.2\text{ V}$              | 2.71 | 2.81 | 2.91 | V             |
| Vertical signal processing   |                                |  |      |      |      |               |
| Vertical BLK phase (wide)  | PVBLK(W)                       | Period from VBLK rising edge to vertical sync. falling edge    | —    | 3.87 | —    | ms            |
| Vertical BLK phase (normal)  | PVBLK                          | Period from VBLK rising edge to vertical sync. falling edge    | —    | 0.2  | —    | ms            |
| Neck break operation pin 60 voltage                                | $V_{60}$                       | Pin 6: 1.5 V   | 1.5  | —    | —    | V             |
| Vertical BLK pulse width (wide)                                    | TVBLK(W)                       |  | —    | 5.05 | —    | ms            |
| Y-signal processing  |                                |  |      |      |      |               |
| Contrast variable range  | $A_{yG(\text{CON})\text{min}}$ | Contrast: min.   | —    | 40   | —    | dB            |
| Y-output amplitude $V_{\text{CC}}$ dependence                      | $\Delta y_{G(V_{\text{CC}})}$  |  | —    | 0.4  | —    | dB/V          |
| Y-output DC voltage $V_{\text{CC}}$ dependence                     | $\Delta y_{G(V_{\text{CC}})}$  |  | —    | 0.18 | —    | V/V           |
| Y-noise level  | $V_{Y_{\text{NL}}}$            |  | —    | 7    | 50   | mV            |
| Delay line dynamic range   | $V_{\text{DLmax}}$             |  | —    | 0.7  | —    | V             |

## ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$ (continued)

### • Design reference data (continued)

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

| Parameter   | Symbol                               | Conditions  | Min  | Typ | Max | Unit |
|---|--------------------------------------|---|------|-----|-----|------|
| Y-signal processing (continued)                         |                                      |   |      |     |     |      |
| Y-output amplitude vs. ambient temperature (R)          | $\Delta y_{R(T_a)}$                  | $-20^\circ\text{C}$ to $+70^\circ\text{C}$                              | —    | -6  | —   | %    |
| Y-output amplitude vs. ambient temperature (G)          | $\Delta y_{G(T_a)}$                  | $-20^\circ\text{C}$ to $+70^\circ\text{C}$                              | —    | -8  | —   | %    |
| Y-output amplitude vs. ambient temperature (B)          | $\Delta y_{B(T_a)}$                  | $-20^\circ\text{C}$ to $+70^\circ\text{C}$                              | —    | -6  | —   | %    |
| APL detection voltage                                   | $A_{\text{APL}}$                     | Detection voltage ratio at APL<br>50% $\rightarrow$ 100%                | 1    | 2   | 4   | Time |
| Sharpness output voltage                                | $V_{64}$                             | Sharpness: typ.   | 1.8  | 2.1 | 2.4 | V    |
| Sharpness output variable range                         | $\Delta V_{64}$                      | Sharpness: min. $\rightarrow$ max.                                      | 2.7  | 3.0 | 3.3 | V    |
| Chroma signal processing                                |                                      |   |      |     |     |      |
| Detection output amplitude $V_{\text{CC}}$ dependence   | $e_{\text{O-V}}$                     |   | —    | 0   | —   | dB/V |
| VCO $V_{\text{CC}}$ dependence                          | $\Delta f_{\text{CO-V}}$             |   | —    | 220 | —   | Hz/V |
| Allowance of ratio between burst and chroma             | $\Delta e_{\text{O(bst)}}$           | Burst compression tolerance for color bar chroma                        | —    | -40 | —   | %    |
| Demodulated output ambient temperature dependency (R-Y) | $\Delta e_{\text{R-Y}(T_a)}$         | $-20^\circ\text{C}$ to $+70^\circ\text{C}$                              | —    | -3  | —   | %    |
| Demodulated output ambient temperature dependency (B-Y) | $\Delta e_{\text{B-Y}(T_a)}$         | $-20^\circ\text{C}$ to $+70^\circ\text{C}$                              | —    | -3  | —   | %    |
| RGB signal processing                                   |                                      |   |      |     |     |      |
| Y $\rightarrow$ RGB cross talk                          | $e_{\text{CT}_1}$                    | Crosshatch  | —    | -45 | —   | dB   |
| RGB $\rightarrow$ Y cross talk                          | $e_{\text{CT}_2}$                    | Crosshatch  | —    | -40 | —   | dB   |
| Color difference input dynamic range                    | $AV_{\text{max}}$                    |   | —    | 2.2 | —   | V    |
| Internal-external pedestal difference voltage           | $\Delta E_{\text{YS}}$               |   | -100 | 0   | 100 | mV   |
| OSD input dynamic range                                 | $AV_{\text{max}}$                    |   | —    | 1.5 | —   | V    |
| RGB output amplitude $V_{\text{CC}}$ dependence         | $\Delta e_{\text{G}(V_{\text{CC}})}$ | $V_{\text{CC}1}$ : 8.5 V to 9.5 V,<br>$V_{\text{CC}2}$ : 4.5 V to 5.5 V | —    | 0.4 | —   | V/V  |
| OSD output amplitude $V_{\text{CC}}$ dependence         | $\Delta e_{\text{g}(V_{\text{CC}})}$ | $V_{\text{CC}1}$ : 8.5 V to 9.5 V,<br>$V_{\text{CC}2}$ : 4.5 V to 5.5 V | —    | 0   | —   | V/V  |
| RGB color difference amplitude temperature dependence   | $\Delta e_{\text{G}(T_a)}$           | $-20^\circ\text{C}$ to $+70^\circ\text{C}$                              | —    | 20  | —   | %    |
| OSD color difference amplitude temperature dependence   | $\Delta e_{\text{g}(T_a)}$           | $-20^\circ\text{C}$ to $+70^\circ\text{C}$                              | —    | 6   | —   | %    |

## ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$ (continued)

### • Design reference data (continued)

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

| Parameter   | Symbol                       | Conditions   | Min  | Typ  | Max  | Unit   |
|---|------------------------------|--|------|------|------|--------|
| RGB signal processing (continued)                 |                              |  |      |      |      |        |
| Color control range (External)                    | $\Delta e_{\text{COLOR}}$    | 0E: [40] versus DAC control ratio                  | —    | 28   | —    | %      |
| White character slice level range                 | $V_W$                        | Blooming: DC 2.5 V, color difference no-input      | 0.6  | 0.8  | 1.0  | V      |
| White character correction amount                 | $\Delta V_W$                 | Blooming: DC 2.5 V, color difference no-input      | 0.6  | 0.8  | 1.0  | V      |
| Demodulation angle R *1                           | $\angle R_{\text{OUT}}$      | Tint: Tint center                                  | —    | 87   | —    | degree |
| Demodulation angle G 1 *1                         | $\angle G_{\text{OUT1}}$     | Tint: Tint center, G-Y ratio change-over: Type1    | —    | 216  | —    | degree |
| Demodulation angle G 2 *1                         | $\angle G_{\text{OUT2}}$     | Tint: Tint center, G-Y ratio change-over: Type2    | —    | 236  | —    | degree |
| Deflection signal processing                      |                              |  |      |      |      |        |
| Vertical amplitude min. value                     | $V_{\text{AMPmin}}$          |  | 1.75 | 2.0  | 2.25 | V[p-p] |
| Vertical amplitude max. value                     | $V_{\text{AMPmax}}$          |  | 2.8  | 3.2  | 3.6  | V[p-p] |
| Vertical amplitude variation ratio                | $\Delta V_{\text{AMP}}$      | Vertical amplitude: typ.→max.,min.                 | ±10  | ±19  | ±28  | %      |
| Vertical linearity variation width                | $\Delta V_{\text{LIN}}$      | Vertical linearity: typ.→max.,min.                 | ±5   | ±12  | ±19  | %      |
| Vertical S letter amplitude variation ratio       | $\Delta V_{\text{SC}}$       | Vertical S letter: max.→min.                       | −33  | −18  | −3   | %      |
| Vertical position center voltage                  | $V_{\text{CENTER}}$          |  | 2.53 | 2.85 | 3.17 | V      |
| Vertical position variation width                 | $\Delta V_{\text{SHIFT}}$    | Vertical S position: min.→max.                     | 0.6  | 0.8  | 1.0  | V      |
| Vertical EHT amplitude variation ratio            | $\Delta V_{\text{EHT}}$      | Pin 25 = 0 V vertical EHT: typ.→max., min.         | ±3   | ±11  | ±19  | %      |
| EW parabola amplitude min. value                  | $V_{\text{PARAmin}}$         |  | 0.02 | 0.29 | 0.59 | V[p-p] |
| EW parabola amplitude max. value                  | $V_{\text{PARAmax}}$         |  | 3.0  | 4.3  | 5.6  | V[p-p] |
| EW parabola variation width                       | $\Delta V_{\text{PARABOLA}}$ | EW parabola amplitude: min.→max.                   | 2.0  | 3.2  | 4.4  | V[p-p] |
| Horizontal amplitude variation width              | $\Delta V_{\text{H-WIDTH}}$  | Horizontal amplitude: min.→max.                    | 3.4  | 4.6  | 5.8  | V      |
| Horizontal amplitude min. DC value                | $V_{\text{H-WIDTH}}$         |  | 1.5  | 1.9  | 2.3  | V      |
| Trapezoidal distortion correction variation ratio | $\Delta V_{\text{TRAPZ}}$    | Trapezoidal distortion correction: typ.→max., min. | ±48  | ±72  | ±96  | %      |
| Corner correction variation ratio 1               | $\Delta V_{\text{CORNER}}$   | EW corner 1: min.→max.                             | −40  | −28  | −16  | %      |
| Corner correction variation ratio 2               | $\Delta V_{\text{CORNER}}$   | EW corner 2: min.→max.                             | −38  | −26  | −14  | %      |
| Horizontal EHT correction variable range          | $\Delta V_{\text{H-EHT}}$    | Pin 25 = 1 V, horizontal EHT:                      | 1.4  | 2.2  | 3.0  | V      |

Note) \*1: Under the condition that pin 52 is adjusted for the Drive I, II by inserting Y-signal, and R and B-output amplitude equal that of G-output.

## ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$ (continued)

### • Design reference data (continued)

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

| Parameter   | Symbol                  | Conditions  | Min | Typ       | Max | Unit          |
|---|-------------------------|---|-----|-----------|-----|---------------|
| Deflection signal processing (continued)                    |                         |   |     |           |     |               |
| Horizontal EHT correction min. DC value                     | $V_{H-EHT}$             |   | 1.8 | 2.8       | 3.8 | V             |
| Vertical position variation width at trapezoidal correction | $\Delta V_{SH-TRAP}$    | Trapezoidal correction: min.→max.                         | 0.4 | 0.65      | 0.9 | V             |
| Corner correction slice level pin voltage                   | $V_{28}$                |   | —   | 0.55      | —   | V             |
| Corner correction gain adjustment pin voltage               | $V_{20}$                |   | —   | 2.5       | —   | V             |
| EW output $V_{CC}$ variation                                | $\Delta V_{EW(V_{CC})}$ | $V_{CC1}$ : 8.5 V to 9.5 V,<br>$V_{CC2}$ : 4.5 V to 5.5 V | —   | 0         | —   | %             |
| Ramp waveform (normal)                                      | $\Delta V_{RAMP}$       | 0D[00]  | —   | 2.5       | —   | V[p-p]        |
| Ramp waveform (wide)  | $\Delta V_{RAMP(W)}$    | 0D[40]  | —   | 2.5       | —   | V[p-p]        |
| AGC input/output current                                    | $I_{13}$                | Service SW: On, pin 14 sweep                              | —   | $\pm 140$ | —   | $\mu\text{A}$ |
| Ramp input/output current 1                                 | $I_{14}$                | Pin 13: 1.5 V, pin 14: 2.5 V,<br>$V_{PULSE}$ : On         | —   | 4.4       | —   | mA            |
| Ramp input/output current 2                                 | $I_{14}$                | Pin 13: 1.5 V, pin 14: 2.5 V,<br>$V_{PULSE}$ : Off        | —   | -90       | —   | $\mu\text{A}$ |
| Ramp wave pin voltage at V-OSC stopping                     | $V_{14-SW}$             | 0D[80]  | —   | 1.2       | —   | V             |
| Input signal  |                         |   |     |           |     |               |
| Chroma input allowable level                                | $e_{CIN}$               | Color bar chroma, 330 mV[p-p] burst level                 | 90  | 150       | —   | mV[p-p]       |
| Y-input allowable level                                     | $y_{IN}$                | Sync. to white 100%                                       | —   | 0.5       | 0.7 | V[p-p]        |
| H-sync. input allowable level                               | $V_{HIN}$               | Sync. to pedestal   | 0.5 | 1.0       | 2.0 | V[p-p]        |
| V-sync. input allowable level                               | $V_{VIN}$               | Sync. to pedestal   | 0.5 | 1.0       | 2.0 | V[p-p]        |
| Sandcastle pulse external input BGP                         | $V_{BGPIN}$             | $V_{CC}$ : typ.   | 4.0 | 4.3       | 4.6 | V[p-p]        |
| Sandcastle pulse external input HBLK                        | $V_{HBLKIN}$            | $V_{CC}$ : typ.   | 2.7 | 3.0       | 3.3 | V[p-p]        |
| Sandcastle pulse external input VBLK                        | $V_{VBLKIN}$            | $V_{CC}$ : typ.   | 1.2 | 1.6       | 1.8 | V[p-p]        |
| FBP input   | $V_{FBPIN}$             | $V_{CC}$ : typ.   | —   | —         | 3.5 | V             |
| $Y_S$ input threshold voltage                               | $V_{26}$                | $V_{CC}$ : typ.   | 0.4 | 0.7       | 1.2 | V             |
| On-screen input R   | $e_{30}$                |   | —   | 0.71      | 1.0 | V[p-p]        |
| On-screen input G   | $e_{29}$                |   | —   | 0.71      | 1.0 | V[p-p]        |
| On-screen input B   | $e_{27}$                |   | —   | 0.71      | 1.0 | V[p-p]        |

■ Electrical Characteristics at  $T_a = 25^\circ\text{C}$  (continued)

• Design reference data (continued)

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

| Parameter                                 | Symbol          | Conditions               | Min | Typ | Max              | Unit |
|---|-----------------|--------------------------|-----|-----|------------------|------|
| Input signal (continued)                  |                 |                          |     |     |                  |      |
| I <sup>2</sup> C bus SDA input level high | V <sub>I0</sub> | V <sub>CC2</sub> (= 5 V) | 4.0 | —   | V <sub>CC2</sub> | V    |
| I <sup>2</sup> C bus SDA input level low  | V <sub>I0</sub> | V <sub>CC2</sub> (= 5 V) | 0   | —   | 0.7              | V    |
| I <sup>2</sup> C bus SCL input level high | V <sub>I2</sub> | V <sub>CC2</sub> (= 5 V) | 4.0 | —   | V <sub>CC2</sub> | V    |
| I <sup>2</sup> C bus SCL input level low  | V <sub>I2</sub> | V <sub>CC2</sub> (= 5 V) | 0   | —   | 0.7              | V    |
| ACL pin voltage range                     | V <sub>51</sub> | V <sub>CC</sub> : Typ.   | 2.7 | —   | 4.5              | V    |

■ Terminal Equivalent Circuits

| Pin No. | Pin name                              | Equivalent circuit | Description  | Pin waveform |
|---------|---------------------------------------|--------------------|--|--------------|
| 1       | GND                                   | —                  | Sync. and DEF GND  | —            |
| 2       | 503 kHz VCO                           |                    | Horizontal oscillation pin<br>• Oscillates by connecting crystal oscillator of 503 kHz<br>• DC = 1.6 V             |              |
| 3       | Vertical position movement DAC output |                    | Trapezoidal correction control DAC output  | DC           |
| 4       | AFC2 filter                           |                    | Phase detection filter for picture position adjustment<br>• Phase adjustment<br>High: Phase Lead<br>Low: Phase Lag |              |

■ Terminal Equivalent Circuits (continued)

| Pin No. | Pin name                             | Equivalent circuit | Description   | Pin waveform |
|---------|--------------------------------------|--------------------|---|--------------|
| 5       | High tension detection input (X-ray) |                    | Hold-down input pin<br>• Threshold voltage 2.81 V   | DC           |
| 6       | High tension reference voltage       |                    | Hold-down reference (comparison) voltage<br>• DC = 6.2 V  | DC           |
| 7       | Horizontal drive pulse output        |                    | Output pin of horizontal drive pulse<br>• High: 2.9 V<br>• Low: 0 V   |              |
| 8       | N.C.                                 | —                  | —   | —            |
| 9       | H V <sub>CC</sub>                    |                    | Power supply voltage pin of horizontal block<br>• With an external resistor, V <sub>CC</sub> of 6.3 V are generated in advance. | DC           |
| 10      | I <sup>2</sup> C SDA input           |                    | SDA signal input pin for I <sup>2</sup> C and ACK signal output pin   |              |
| 11      | I <sup>2</sup> C Ground              | —                  | Ground pin for I <sup>2</sup> C   | —            |

■ Terminal Equivalent Circuits (continued)

| Pin No. | Pin name   | Equivalent circuit | Description   | Pin waveform |
|---------|--|--------------------|---|--------------|
| 12      | I <sup>2</sup> C SCL input                         |                    | SCL signal input pin for I <sup>2</sup> C   |              |
| 13      | Reference ramp waveform AGC pin (Ramp-AGC)         |                    | AGC capacitor connection pin to make the amplitude of saw-tooth wave generating at pin 14 constant. |              |
| 14      | Reference ramp waveform (Ramp-Gen)                 |                    | Capacitor pin to generate reference saw-tooth wave performed AGC.                                   |              |
| 15      | Corner slice level                                 |                    | Corner slice level correction use pin   | —            |
| 16      | 9 V power supply (V <sub>CC1</sub> )               | —                  | 9 V power supply  | —            |
| 17      | Vertical deflection saw-tooth wave output (V-ramp) |                    | Pin for vertical deflection saw-tooth output with various deflection corrections                    |              |

■ Terminal Equivalent Circuits (continued)

| Pin No. | Pin name  | Equivalent circuit   | Description   | Pin waveform  |
|---------|---|--|---|---|
| 18      | Pincushion distortion correction wave output pin (EW-out) | <p><math>V_{CC} = 9\text{ V}</math>, <math>189\ \mu\text{A}</math>, <math>126\ \mu\text{A}</math>, EW-parabola, H-rate saw-tooth wave, 4.5 V, (18)</p> | Pin for pincushion correction with various deflection corrections                       |   |
| 19      | 9 V power supply ( $V_{CC1}$ )                            | —  | 9 V power supply  | —   |
| 20      | R-output  | <p>9 V, 1 k<math>\Omega</math>, 10 k<math>\Omega</math>, 100 <math>\Omega</math>, 500 <math>\mu\text{A}</math>, 1.7 V, (20)</p>                        | R-signal output   | <p>At contrast max. of input (R-Y: 1.0 V[p-p], Y: 0.5 V[p-p])</p> <p>3.75 V[p-p], 2.5 V (Pedestal), 1 V (BLK)</p> |
| 21      | Corner gain control                                       | <p><math>V_{CC} = 5\text{ V}</math>, 15 k<math>\Omega</math>, 200 <math>\Omega</math>, 15 k<math>\Omega</math>, (21)</p>                               | Picture corner correction gain adjustment pin<br>• Adjustable with an external resistor | —   |
| 22      | G-output  | <p>9 V, 1 k<math>\Omega</math>, 10 k<math>\Omega</math>, 100 <math>\Omega</math>, 500 <math>\mu\text{A}</math>, 1.7 V, (22)</p>                        | G-signal output   | <p>At contrast max. of Y: 0.5 V[p-p] (R-Y: 1.0 V[p-p], B-Y: 1.27 V[p-p])</p> <p>3.75 V[p-p], 2.5 V, 1 V</p>       |



■ Terminal Equivalent Circuits (continued)

| Pin No. | Pin name                  | Equivalent circuit | Description   | Pin waveform   |
|---------|---------------------------|--------------------|---|--|
| 23      | N.C.                      | —                  | —   | —  |
| 24      | B-output                  |                    | B-signal output   | When contrast max. of<br>Y: 0.5 V[p-p],<br>B-Y: 1.27 V[p-p]<br>          |
| 25      | EHT voltage detection pin |                    | High tension variation detection input pin for vertical and horizontal EHT correction | Move linearly with 4.0 V to 2.0 V of DC voltage (Normally 4.0 V or more) |
| 26      | Y <sub>S</sub> input      |                    | TV/on-screen change-over pin at on-screen input<br><br>Threshold level: 0.7 V(typ.)   | —  |
| 27      | On-screen B-input         |                    | On-screen B-input   | On-screen data<br>   |

■ Terminal Equivalent Circuits (continued)

| Pin No. | Pin name                   | Equivalent circuit | Description                | Pin waveform |
|---------|----------------------------|--------------------|----------------------------|--------------|
| 28      | Corner slice level         |                    | Connects to pin 15         | —            |
| 29      | On-screen G-input          |                    | On-screen G-input          |              |
| 30      | On-screen R-input          |                    | On-screen R-input          |              |
| 31      | Color difference B-Y input |                    | Color difference B-Y input |              |

■ Terminal Equivalent Circuits (continued)

| Pin No. | Pin name                    | Equivalent circuit | Description                             | Pin waveform |
|---------|-----------------------------|--------------------|---|--------------|
| 32      | Color difference R-Y input  |                    | Color difference R-Y input              |              |
| 33      | Ground for V/C/RGB          | —                  | GND pin for video, chroma and RGB block | —            |
| 34      | N.C.                        | —                  | —                                       | —            |
| 35      | Color difference R-Y output |                    | Color difference signal R-Y output      |              |
| 36      | Color difference B-Y output |                    | Color difference signal B-Y output      |              |
| 37      | 3.58 MHz oscillator pin     |                    | 3.58 MHz VCO oscillator pin             |              |

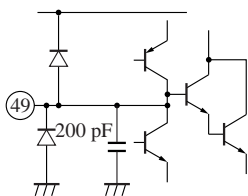
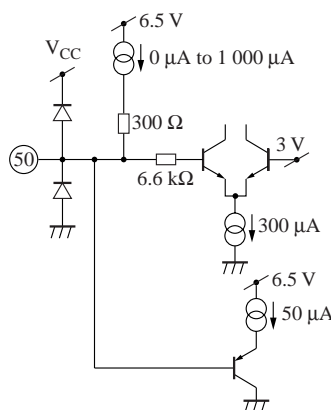
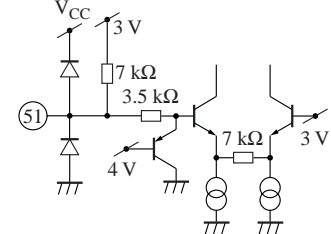
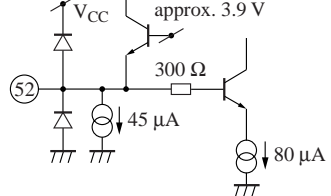
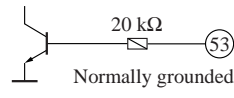
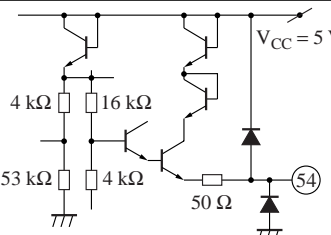
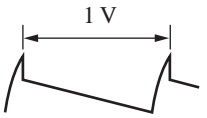
■ Terminal Equivalent Circuits (continued)

| Pin No. | Pin name           | Equivalent circuit | Description  | Pin waveform |
|---------|--------------------|--------------------|--|--------------|
| 38      | APC filter         |                    | Chroma APC filter pin  |              |
| 39      | N.C.               | —                  | —  | —            |
| 40      | 3.58 MHz CW output |                    | 3.58 MHz VCO oscillation output                                    |              |
| 41      | Killer filter      |                    | Killer detection filter pin<br>• Killer detection at 3.5 V or less |              |
| 42      | Color track filter |                    | Filter pin for phase shift   |              |

■ Terminal Equivalent Circuits (continued)

| Pin No. | Pin name                       | Equivalent circuit | Description   | Pin waveform   |
|---------|--------------------------------|--------------------|---|--|
| 43      | ABL input pin for brightness   |                    | Brightness variable pin                               | Has adjustment range of $3\text{ V} \pm 0.8\text{ V}$ at DC input                    |
| 44      | Chroma input                   |                    | Chroma input pin                                      | Color bar signal<br><br>Burst reference<br>$0\text{ dB} = 150\text{ mV}[\text{p-p}]$ |
| 45      | 5 V power supply ( $V_{CC2}$ ) | —                  | 5 V power supply                                      | —  |
| 46      | Blooming level input pin       |                    | Input pin to determine blooming level                 | DC<br>$2.7\text{ V}$ at open   |
| 47      | Filter pin for APL detection   |                    | Filter pin to detect APL of video signal              | DC voltage of $0\text{ V}$ to $3\text{ V}$   |
| 48      | Filter pin for white detection |                    | Filter pin to detect white max. value of video signal | DC voltage of $2\text{ V}$ to $4\text{ V}$   |

■ Terminal Equivalent Circuits (continued)

| Pin No. | Pin name  | Equivalent circuit  | Description   | Pin waveform  |    |    |     |    |      |   |
|---------|---|---|---|---|----|----|-----|----|------|---|
| 49      | Y-clamp filter  |    | Luminance clamp filter pin  | DC voltage 2.5 V to 8 V   |    |    |     |    |      |   |
| 50      | Filter pin for black detection<br><br>Color control input pin |    | 1. Filter pin to detect black min. value of video signal<br><br>2. Input pin to control color   | 1. Case of black detection pin<br>DC voltage 2 V to 4 V<br><br>2. Color control voltage 2 V to 4V |    |    |     |    |      |   |
| 51      | ACL input pin for contrast                                    |   | Contrast variable pin   | With adjustment range of DC input 2.7 V to 4.5 V  |    |    |     |    |      |   |
| 52      | Y-signal input pin  |  | Y-signal input pin  | 0.5 V [p-p] typical input<br>0.36 V (Pedestal to white)   |    |    |     |    |      |   |
| 53      | Slave address setting   |  | <table border="1" data-bbox="795 1313 960 1487"> <tr> <td>Pin</td> <td>53</td> </tr> <tr> <td>8A</td> <td>Low</td> </tr> <tr> <td>8C</td> <td>High</td> </tr> </table> <p>8A has been registered by Philips Semiconductors.</p> | Pin   | 53 | 8A | Low | 8C | High | — |
| Pin     | 53  |   |   |   |    |    |     |    |      |   |
| 8A      | Low   |   |   |   |    |    |     |    |      |   |
| 8C      | High  |   |   |   |    |    |     |    |      |   |
| 54      | V-sync. Sep.  |  | Integrating filter pin for vertical sync. signal  |              |    |    |     |    |      |   |

■ Terminal Equivalent Circuits (continued)

| Pin No. | Pin name                                       | Equivalent circuit | Description  | Pin waveform   |
|---------|--|--------------------|--|--|
| 55      | Sync. in (H)                                   |                    | Input pin for sync. separation   |  |
| 56      | Black detection inhibition                     |                    | —  | —  |
| 57      | Sync. in (V)                                   |                    | Input pin for sync. separation   |  |
| 58      | Lock det. filter                               |                    | Filter pin for horizontal oscillation frequency and sync. detection of input sync., common use as hold-down detection.   | At sync.: 6 V<br>At async.: 0 V<br>At hold-down: 8.3 V |
| 59      | Sandcastle pulse input<br>For AFC<br>FBP input |                    | Input pin for vertical and horizontal blanking pulses on which a burst gate pulse has been super-imposed.<br>• Threshold voltage<br>Burst gate pulse : 3.5 V<br>Horizontal blanking pulse : 2.2 V<br>Vertical blanking pulse : 1.0 V |  |

■ Terminal Equivalent Circuits (continued)

| Pin No. | Pin name                | Equivalent circuit | Description   | Pin waveform |
|---------|-------------------------|--------------------|---|--------------|
| 60      | Sandcastle pulse output |                    | <p>Output pin for vertical and horizontal blanking pulse and pulse which is superimposed burst gate pulse in order to synchronize with AN5308NK and other IC.</p> <ul style="list-style-type: none"> <li>• Threshold voltage : 3.5 V</li> </ul> |              |
| 61      | Flyback pulse input     |                    | <p>Input pin of flyback pulse</p> <ul style="list-style-type: none"> <li>• Threshold voltage AFC: 2.5 V</li> <li>• Blanking: 0.7 V</li> </ul>   |              |
| 62      | V <sub>OUT</sub>        |                    | <p>Output pin of vertical oscillation pulse</p>   |              |
| 63      | AFC1 filter             |                    | <p>Output pin of horizontal AFC current</p> <ul style="list-style-type: none"> <li>• Horizontal AFC is operated when RC for filter is connected.</li> <li>• Frequency adjustment High: Frequency to low Low: Frequency to high</li> </ul>       |              |
| 64      | Sharpness control       |                    | <p>External sharpness control pin</p> <ul style="list-style-type: none"> <li>• Interlocks to internal sharpness</li> </ul>  |              |



