

AN3479FBP

VCR Signal(Luminance, Chroma and Normal Audio Signals) Processing IC

■ Overview

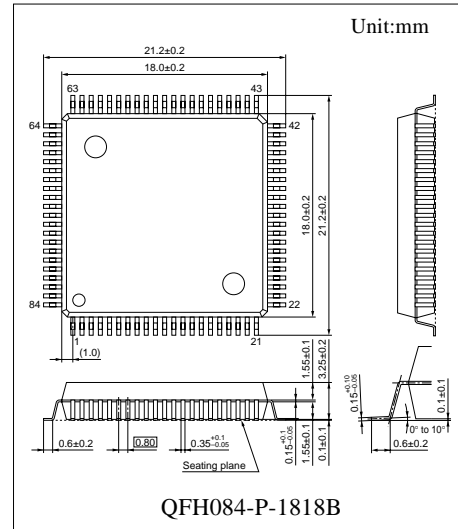
The AN3479FBP is an IC designed for NTSC-dedicated VHS VCR signal processing and incorporates circuits for processing RF and normal audio signals as well as luminance and chroma signals.

■ Features

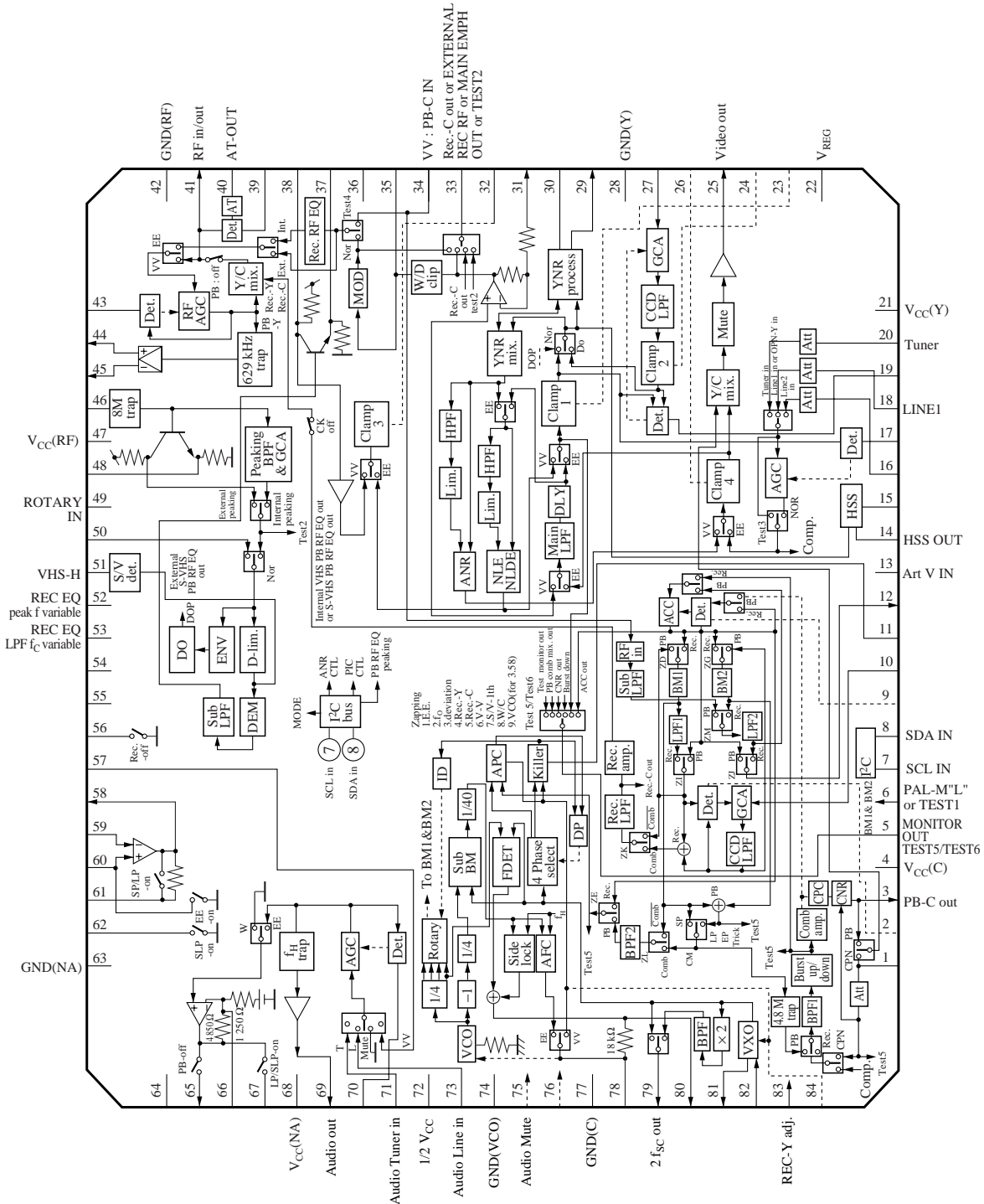
- Compatible with I²C-bus
- Totally free of adjustments
- Low-frequency comb system
- An improved chroma S/N ratio ensured by built-in CNR and CPC(chroma phase compensator) circuits
- Compatible with SQPB

■ Applications

- VCR(NTSC)



■ Block Diagram



■ Pin Descriptions

| Pin No. | Descriptions | Impedance | Pin No. | Descriptions | Impedance |
|---------|---------------------------|----------------|---------|-------------------------------------|--------------------------------|
| 1 | CCD DL In (C)/CPN C In | 32 kΩ | 36 | REC RF EQ Peak Gain Adj. | 125 kΩ |
| 2 | CCD AGC Det.(C) | Push-pull | 37 | Peaking | E.F. |
| 3 | CCD DL Out(C) | Push-pull | 38 | Main De-emphasis Out | 5.6 kΩ |
| 4 | C-V _{CC} | — | 39 | Auto Tracking Gain Adj. | 90 kΩ |
| 5 | Test5/Test Monitor | Push-pull | 40 | Auto Tracking Out | C.C |
| 6 | PAL-M : "L"/TEST1 | 29.6 kΩ | 41 | RF In/Out | 27 kΩ/Push-pull |
| 7 | SCL In | Open base | 42 | RF GND | — |
| 8 | SDA In | Base collector | 43 | RF AGC Det. | 540 Ω + E.F. |
| 9 | ACC Det. | 920 + E.F. | 44 | Phase Shift POS./S-EQ Out | Push-pull |
| 10 | C-Comb In | 21.6 kΩ | 45 | Phase Shift NEG. | Push-pull |
| 11 | Killer Det. | Push-pull | 46 | 8M Trap In | 10 kΩ |
| 12 | C-Comb Out | Push-pull | 47 | RF V _{CC} | — |
| 13 | Artificial Sync. Pluse In | 76.6 kΩ | 48 | PB RF EQ Peaking (Normally open) | E.F. |
| 14 | HSS Out | C.C. | | | |
| 15 | Sync Sepa. Det. | 500 + E.F. | 49 | Rotary Pulse In | 400 kΩ |
| 16 | Line2 In | 105 kΩ | 50 | S EQ In | 30 kΩ |
| 17 | AGC Det. | 60 + E.F. | 51 | S/V Det.(VHS : "H") | 2.1 kΩ + E.F. |
| 18 | Line1 In | 105 kΩ | 52 | REC RF EQ Peak F Adj. | 125 kΩ |
| 19 | CCD AGC Det.(Y) | Push-pull | 53 | REC RF EQ LPF f _C Adj. | 125 kΩ |
| 20 | Tuner In | 105 kΩ | 54 | PB RF EQ INT/EXT SW | Open base |
| 21 | Lumi V _{CC} | — | 55 | Y MAIN LPF A/B SW | 35 kΩ |
| 22 | VREG(2.0 V) | E.F. | 56 | NA SW Control Out | Open collector |
| 23 | F.B.Clamp Det. 1 | Push-pull | 57 | NA PB Amp. In | 35 kΩ |
| 24 | F.B.Clamp Det. 2 | Push-pull | 58 | NA PB EQ Out | E.F. |
| 25 | Video Out | E.F. | 59 | NA PB NF | 800 Ω + E.F. |
| 26 | F.B.Clamp Det. 4 | Push-pull | 60 | NA PB In | PB : 80 kΩ Rec. : E.F. |
| 27 | CCD DL In(Y) | 30 kΩ | | | |
| 28 | Lumi Gnd | — | 61 | NA PB EQ SW | SP/LP : E.F. SLP : 12.5 kΩ |
| 29 | CCD DL Out(Y) | Push-pull | | | |
| 30 | YNR Lim DC | 10 kΩ | 62 | NA PB SLP SW | SP/LP : 100 kΩ SLP : <100 Ω |
| 31 | Main Emphasis F.B. In | 5.6 kΩ | | | |
| 32 | F.B.Clamp Det. 3 | Push-pull | 63 | NA GND | — |
| 33 | TEST2 Monitor | E.F. | 64 | NA Auto Bias Detector In | C in |
| 34 | PB RF C In | 20 kΩ | 65 | NA Rec. Out | Push-pull |
| 35 | External Trap | 540 Ω | 66 | NA Rec. NF | 5 kΩ |

■ Pin Descriptions(continued)

| Pin No. | Descriptions | Impedance | Pin No. | Descriptions | Impedance |
|---------|---------------------|--------------------------------------|---------|------------------------------|----------------|
| 67 | NA REC EQ LP/SLP SW | SP : 100 kΩ LP/SLP : Push-pull | 75 | NA Mute | 211 kΩ |
| | | | 76 | REC C Adj | 200 kΩ |
| | | | 77 | C Gnd | — |
| 68 | NA V _{CC} | — | 78 | REC AFC/PB APC Det | Collector base |
| 69 | NA Line Out | Push-pull | 79 | 2f _{SC} Out/fsc Out | Push-pull |
| 70 | NA AGC Det | 222 Ω + E.F. | 80 | Side Lock Det | C.C. |
| 71 | NA Tuner In | 30 kΩ | 81 | XO/VCXO Out | Push-pull |
| 72 | NA V _{REF} | 25 kΩ | 82 | XO/VCXO In | 1 900 Ω |
| 73 | NA Line In | 30 kΩ | 83 | REC Y Adj. | 105 kΩ |
| 74 | VCO Gnd | — | 84 | REC APC Det | Collector base |

■ Absolute Maximum Ratings

| Parameter | Symbol | Rating | Unit |
|----------------------------------|------------------|------------|------|
| Supply voltage | V _{CC} | 5.5 | V |
| Supply current | I _{CC} | 222 | mA |
| Power dissipation *2 | P _D | 958 | mW |
| Operating ambient temperature *1 | T _{opr} | -20 ~ +70 | °C |
| Storage temperature *1 | T _{stg} | -55 ~ +150 | °C |

Note) *1 : T_a = 25 °C except operating ambient temperature and storage temperature.

*2 : Power dissipation of the package at T_a = 70 °C.

■ Recommended Operating Range

| Parameter | Symbol | Range | Unit |
|----------------|-----------------|-----------|------|
| Supply voltage | V _{CC} | 4.7 ~ 5.3 | V |

■ Electrical Characteristics $T_a = 25\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$

| Parameter | Symbol | Conditions | min. | typ. | max. | Unit |
|------------------------------------|-------------------------|--|-------|-------|-------|-----------------|
| Circuit current 1 | I_{REC} | $V_{\text{CC}} = 5\text{ V}$, Rec.- mode | 116 | 140 | 175 | mA |
| Circuit current 2 | I_{PB} | $V_{\text{CC}} = 5\text{ V}$, PB-mode | 125 | 150 | 188 | mA |
| Acknowledge output driver current | I_{ACK} | $V_{\text{CC}} = 5\text{ V}$ | 1.8 | 2.5 | 5.0 | mA |
| SCL, SDA signals input "H" level | V_{SHI} | $V_{\text{CC}} = 5\text{ V}$ | 3.1 | — | 5.0 | V |
| SCL, SDA signals input "L" level | V_{SLO} | $V_{\text{CC}} = 5\text{ V}$ | 0 | — | 0.9 | V |
| SCL clock frequency | f_{SCL} | $V_{\text{CC}} = 5\text{ V}$ | — | — | 100 | kHz |
| Video EE output amplitude | V_{EE} | Video(W-100%), 1 V_{PP} In : Pin18, Out : Pin25 | 1.995 | 2.100 | 2.205 | V_{PP} |
| Y tuner/line 1 crosstalk | CT_{TL1} | Sin 100 mV V_{PP} , 1 MHz In : Pin18, Out : Pin25 | — | — | -45 | dB |
| Y line 2/line 1 crosstalk | CT_{L2L1} | Sin 100 mV V_{PP} , 1 MHz In : Pin18, Out : Pin25 | — | — | -45 | dB |
| Y tuner/line 2 crosstalk | CT_{TL2} | Sin 100 mV V_{PP} , 1 MHz In : Pin16, Out : Pin25 | — | — | -45 | dB |
| Y line 1/line 2 crosstalk | CT_{L1L2} | Sin 100 mV V_{PP} , 1 MHz In : Pin16, Out : Pin25 | — | — | -45 | dB |
| Y line 1/tuner crosstalk | CT_{L1L} | Sin 100 mV V_{PP} , 1 MHz In : Pin20, Out : Pin25 | — | — | -45 | dB |
| Y line 2/tuner crosstalk | CT_{L2T} | Sin 100 mV V_{PP} , 1 MHz In : Pin20, Out : Pin25 | — | — | -45 | dB |
| Keyed AGC control sensitivity | S_{KAGC} | Video(W-100%), 2.0 V_{PP} /0.5 V_{PP} In : Pin18, Out : Pin25 | — | — | 1.0 | dB |
| Y AGC frequency characteristic | ΔG_{AGC} | Sin 100 mV V_{PP} , 5 MHz/1 MHz In : Pin18, Out : Pin25 | -1.5 | — | 0.5 | dB |
| Y MLPF frequency characteristic 1 | ΔG_{YL1} | Sin 100 mV V_{PP} , 2.7 MHz/320 kHz In : Pin18, Out : Pin5 | -7.8 | -6.3 | -4.8 | dB |
| Y MLPF frequency characteristic 2 | ΔG_{YL2} | Sin 100 mV V_{PP} , 3.58 MHz/320 kHz In : Pin18, Out : Pin5 | — | — | -29 | dB |
| Y MLPF group delay 1 | t_{DYL1} | Sin 100 mV V_{PP} , 320 kHz In : Pin18, Out : Pin5 | 970 | 1 050 | 1 130 | ns |
| Y MLPF group delay 2 | t_{DYL2} | Sin 100 mV V_{PP} , 1.8 MHz In : Pin18, Out : Pin5 | -100 | -70 | -40 | ns |
| Sync.-sepa. min. input sensitivity | S_{SS} | Video(W-100%) In : Pin18, Out : Pin14 | — | — | 33 | % |
| Sync.-sepa. front edge delay | t_{DSS} | Video(W-100%), 1 V_{PP} In : Pin18, Out : Pin14 | 1.6 | 1.8 | 2.0 | μs |
| Sync.-sepa. output amplitude | V_{SS} | Video(W-100%), 1 V_{PP} , LP-mode In : Pin18, Out : Pin14 | 4.0 | — | — | V_{PP} |

■ Electrical Characteristics(continued) $T_a = 25\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$

| Parameter | Symbol | Conditions | min. | typ. | max. | Unit |
|---|-------------------|---|-------|-------|------|------------------|
| Vertical emphasis(1-K)value gain 1 | G_{VE1} | Sin 400 mV _{pp} (Pin5)150 kHz,LP-mode In : Pin18,Out : Pin29 | -3.0 | -1.5 | 0 | dB |
| Vertical emphasis(1-K)value gain 2 | G_{VE2} | Sin 400 mV _{pp} (Pin5)2 MHz,LP-mode In : Pin18,Out : Pin29 | -1.5 | 0 | 1.5 | dB |
| Vertical emphasis differential signal amplitude | V_{VE} | Video(W-100 %),1 V _{pp} In : Pin18,Out : Pin30 | — | — | 100 | mV _{pp} |
| Vertical emphasis X-value gain | G_{VEX} | Sin 40 mV _{pp} ,150 kHz,Pin31 : open In : Pin30,Out : Pin33 | -15.0 | -11.5 | -8.0 | dB |
| Non-linear emphasis frequency characteristic 1 | ΔG_{NLE1} | Sin 400 mV _{pp} (0 dB),2 MHz/100 kHz SLP/EDIT-mode In : Pin18,Out : Pin33 | -0.2 | — | 1.0 | dB |
| Non-linear emphasis frequency characteristic 2 | ΔG_{NLE2} | Sin 40 mV _{pp} (-20 dB),1 MHz/100 kHz SLP/EDIT-mode In : Pin18,Out : Pin33 | 3.67 | — | 6.47 | dB |
| Non-linear emphasis frequency characteristic 3 | ΔG_{NLE3} | Sin 40 mV _{pp} (-20 dB),2 MHz/100 kHz SLP/EDIT-mode In : Pin18,Out : Pin33 | 4.24 | — | 7.24 | dB |
| Non-linear emphasis frequency characteristic 4 | ΔG_{NLE4} | Sin 40 mV _{pp} (-20 dB),2 MHz SP/SLP-mode In : Pin18,Out : Pin33 | -1.76 | — | 0.84 | dB |
| Main emphasis gain | G_{ME} | Sin 60 mV _{pp} (Pin5),150 kHz Pin31 : 0.1 μ F In : Pin18,Out : Pin33 | 13.1 | — | 15.5 | dB |
| Dark clip level | DC | Video(W-100 %),1 V _{pp} In : Pin18,Out : Pin33 | 51 | 61 | 71 | % |
| White clip level | WC | Video(W-100 %),1 V _{pp} In : Pin18,Out : Pin33 | 190 | 200 | 210 | % |
| FM carrier interleave | Δf_{CI} | f_H Pulse,5 V _{pp} ,SLP-mode In : Pin49,Out : Pin33 | 6.8 | — | 9.0 | kHz |
| Sync. tip frequency | f_O | Out : Pin 33 | 3.43 | 3.50 | 3.57 | MHz |
| FM deviation | Δf_{DEV} | Video(W-100 %),1 V _{pp} In : Pin18,Out : Pin33 | 0.95 | 1.00 | 1.05 | MHz |
| Rec. FM output amplitude | V_{YR} | No input In : Pin18,Out : Pin41 | 188 | 200 | 212 | mV _{pp} |
| FM modulator 2nd harmonic distortion | D_{2FMOD} | Out : Pin33 | — | — | -35 | dB |
| Rec. Y output variable range max. | v_{RY1} | No input In : Pin18,Out : Pin41 | -8.5 | — | -3.5 | dB |
| Rec. Y output variable range min. | v_{RY2} | No input In : Pin18,Out : Pin41 | 1.0 | — | 6.0 | dB |
| S/V discrimination frequency | f_{SV} | Sin 350 mV _{pp} ,Frequency variable SQPB \rightarrow VHS In : Pin41,50,Out : Pin31 | 4.25 | 4.40 | 4.55 | MHz |

■ Electrical Characteristics(continued) $T_a = 25\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$

| Parameter | Symbol | Conditions | min. | typ. | max. | Unit |
|---|--------------------------|---|------|------|------|------------------|
| FM demodulator sensitivity 1 | S_{DEMV} | Sin 350 mV _{pp} ,3.5 MHz,4.5 MHz VHS-mode In : Pin46,Out : Pin38 | 0.10 | 0.16 | 0.22 | V/MHz |
| FM demodulator sensitivity 2 | S_{DEMS} | Sin 350 mV _{pp} ,5.4 MHz,7 MHz SQPB-mode In : Pin50,Out : Pin38 | 1.4 | 1.6 | 1.8 | — |
| Sub LPF frequency characteristic | ΔG_{SL} | Sin 350 mV _{pp} ,4 MHz/3 MHz In : Pin46,Out : Pin37 | -1.9 | -0.4 | 1.1 | dB |
| Drop-out detector on level | S_{DON} | Sin 350 mV _{pp} (0 dB),4 MHz In : Pin50,Out : Pin25 | -21 | -17 | -13 | dB |
| Drop-out detector off level | S_{DOFF} | Sin 350 mV _{pp} (0 dB),4 MHz (On level-off level) In : Pin50,Out : Pin25 | 0.9 | 2.5 | 4.5 | dB |
| Drop-out compensator inhibition time | t_{DOFF} | AM 350 mV _{pp} ,1 kHz,4 MHz In : Pin50,14,Out : Pin25 | 180 | 222 | 270 | μs |
| Drop-out compensator SW DC offset | ΔV_{DOC} | AM 350 mV _{pp} ,4 MHz In : Pin50,Out : Pin25 | -125 | 0 | 125 | mV |
| Non-linear de-emphasis frequency characteristic 1 | ΔG_{NLD1} | Sin 200 mV _{pp} (0 dB),2 MHz/150 kHz LP-mode In : Pin38,Out : Pin5 | -4.8 | — | -1.8 | dB |
| Non-linear de-emphasis frequency characteristic 2 | ΔG_{NLD2} | Sin 20 mV _{pp} (-20 dB),2 MHz/150 kHz LP-mode In : Pin38,Out : Pin5 | -9.3 | — | -5.3 | dB |
| Non-linear de-emphasis frequency characteristic 3 | ΔG_{NLD3} | Sin 20 mV _{pp} (-20 dB),2 MHz SP/LP-mode In : Pin38,Out : Pin5 | 1.8 | — | 4.2 | dB |
| Non-linear de-emphasis frequency characteristic 4 | ΔG_{NLD4} | Sin 20 mV _{pp} (-20 dB),1 MHz/150 kHz LP-mode In : Pin38,Out : Pin5 | -7.4 | — | -3.4 | dB |
| Non-linear de-emphasis frequency characteristic 5 | ΔG_{NLD5} | Sin 20 mV _{pp} (-20 dB),100 kHz SQPB/SLP-mode In : Pin38,Out : Pin5 | 0.3 | — | 1.8 | dB |
| CCD AGC control sensitivity | V_{CCD} | f_{H} pulse,800 mV _{pp} -400 mV _{pp} (Pin27) In : Pin38,Out : Pin29 | -23 | — | 23 | mV _{pp} |
| YNR EDNC(1-K)value gain | G_{EDK} | Sin 160 mV _{pp} ,150 kHz,LP/EDIT-mode In : Pin38,Out : Pin29 | 2.3 | 3.8 | 5.3 | dB |
| YNR VNC(1-K)value gain | G_{VNK} | Sin 160 mV _{pp} ,150 kHz,LP-mode In : Pin38,Out : Pin29 | 0.5 | 2.0 | 3.5 | dB |
| YNR EDNC differential signal amplitude | V_{ED} | f_{H} pulse 160 mV _{pp} ,LP/EDIT mode In : Pin38,Out : Pin30 | — | — | 100 | mV _{pp} |

■ Electrical Characteristics(continued) $T_a = 25\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$

| Parameter | Symbol | Conditions | min. | typ. | max. | Unit |
|--|------------------|--|-------|-------|-------|------------------|
| YNR VNC differential signal amplitude | V_{VN} | f_H pulse 160 mV _{pp} , LP-mode In : Pin38, Out : Pin30 | — | — | 100 | mV _{pp} |
| YNR EDNC X-value gain | G_{EDX} | Sin 40 mV _{pp} , 150 kHz, LP/EDIT-mode In : Pin30, Out : Pin25 | -2.7 | -0.7 | 1.0 | dB |
| YNR VNC X-value gain | G_{VNX} | Sin 40 mV _{pp} , 150 kHz, LP-mode In : Pin30, Out : Pin25 | 1.8 | 3.3 | 4.8 | dB |
| YNR limiter output amplitude 1 | V_{YL1} | Sin 100 mV _{pp} , 150 kHz In : Pin30, Out : Pin25 | 12 | 25 | 90 | mV _{pp} |
| YNR limiter output amplitude 2 | V_{YL2} | Sin 300 mV _{pp} , 150 kHz In : Pin30, Out : Pin25 | 20 | 70 | 160 | mV _{pp} |
| YNR limiter output amplitude 3 | V_{YL3} | Sin 800 mV _{pp} , 150 kHz In : Pin30, Out : Pin25 | 25 | 85 | 190 | mV _{pp} |
| Noise canceller frequency characteristic 1 | ΔG_{NC1} | Sin 12.6 mV _{pp} (-30 dB), 1 MHz/150 kHz Normal-mode In : Pin27, Out : Pin25 | -7 | — | -1 | dB |
| Noise canceller frequency characteristic 2 | ΔG_{NC2} | Sin 12.6 mV _{pp} (-30 dB), 2 MHz/150 kHz Normal-mode In : Pin27, Out : Pin25 | -9 | — | -3 | dB |
| Picture control frequency characteristic 1 | ΔG_{PC1} | Sin 100 mV _{pp} , 3 MHz, Sharpest In : Pin27, Out : Pin25 | -3.5 | — | 0.5 | dB |
| Picture control frequency characteristic 2 | ΔG_{PC2} | Sin 100 mV _{pp} , 3 MHz, Softest In : Pin27, Out : Pin25 | -8.5 | — | -2.0 | dB |
| F.B. clamp det. DC voltage | V_{FBCL} | Video(W-100 %), 320 mV _{pp} In : Pin27, Out : Pin25 | 0.80 | 0.95 | 1.10 | V |
| Video VV output artificial V DC offset | ΔV_{DV} | Pin13 = 5 V Out : Pin25 | -80 | 0 | 80 | mV |
| Video VV output amplitude | V_W | FM, 3.5 MHz, 4.5 MHz In : Pin41, Out : Pin25 | 1.995 | 2.100 | 2.205 | V _{pp} |
| Rec. chrominance output amplitude | V_{RC} | Video(Y+C), 1 V _{pp} In : Pin18, Out : Pin41 | 60.5 | 65.0 | 69.5 | mV _{pp} |
| Burst-up gain | G_{BU} | Sin 300 mV _{pp} , f_{SC} , SP-mode In : Pin14, 18, Out : Pin33 | 5 | 6 | 7 | dB |
| Burst-up DC offset | ΔV_{BU} | Out : Pin41 | — | — | 16 | mV |
| Rec. ACC control characteristic | S_{ACC1} | Burst : Chroma = 1 : 1 845 mV _{pp} /53 mV _{pp} , Rotary : "H" In : Pin14, 18, Out : Pin5 | — | — | 3 | dB |
| VXO free-run frequency | f_{VXO} | Out : Pin79 | -100 | — | 100 | Hz |
| VXO control characteristic | β_{VXO} | Pin84 : DC, 2.6 V, 2.2 V, In : Pin14, Out : Pin79 | 1.0 | — | 4.0 | Hz/mV |

■ Electrical Characteristics(continued) $T_a = 25\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$

| Parameter | Symbol | Conditions | min. | typ. | max. | Unit |
|--|--------------------------|--|------|------|------|-------|
| Rec. killer on sensitivity | S_{RKON} | Burst : Chroma=1 : 1,4.8 mV _{PP} In : Pin18,Out : Pin41 | — | — | -39 | dB |
| Rec. killer off sensitivity | S_{RKOFF} | Burst : Chroma=1 : 1,17 mV _{PP} In : Pin18,Out : Pin41 | -22 | — | — | dB |
| Rec. C MBPF frequency characteristic 1 | ΔG_{RBP1} | Sin 286 mV _{PP} ,1.7 MHz/3.58 MHz In : Pin18,Out : Pin5 | — | — | -15 | dB |
| Rec. C MBPF frequency characteristic 2 | ΔG_{RBP2} | Sin 286 mV _{PP} ,3.08 MHz/3.58 MHz In : Pin18,Out : Pin5 | -4.6 | — | -0.6 | dB |
| Rec. C MBPF frequency characteristic 3 | ΔG_{RBP3} | Sin 286 mV _{PP} ,4.08 MHz/3.58 MHz In : Pin18,Out : Pin5 | -5.5 | — | -1.5 | dB |
| Rec. C MBPF frequency characteristic 4 | ΔG_{RBP4} | Sin 286 mV _{PP} ,7 MHz/3.58 MHz In : Pin18,Out : Pin5 | — | — | -10 | dB |
| Rec. C MBPF group delay | t_{DRBP} | Sin 286 mV _{PP} ,3.58 MHz In : Pin18,Out : Pin5 | 540 | — | 660 | ns |
| Rec. AFC pull-in range "H"level | f_{AFH} | Pulse 5 V _{PP} , $f_{\text{H}} + 1.22\text{ kHz}$ In : Pin18,14,Out : Pin5 | 1.2 | — | — | kHz |
| Rec. AFC pull-in range "L"level | f_{AFL} | Pulse 5 V _{PP} , $f_{\text{H}} - 1.22\text{ kHz}$ In : Pin18,14,Out : Pin5 | — | — | -1.2 | kHz |
| VCO control characteristic | β_{VCO} | Pin78 : DC,2.1 V,1.9 V In : Pin82,14,Out : Pin5 | 0.2 | 0.5 | 0.8 | Hz/mV |
| Rec. APC pull-in range "H"level | f_{APH} | Sin 300 mV _{PP} , $f_{\text{SC}} + 500\text{ Hz}$ In : Pin18,14,Out : Pin79 | 500 | — | — | Hz |
| Rec. APC pull-in range "L"level | f_{APL} | Sin 300 mV _{PP} , $f_{\text{SC}} - 500\text{ Hz}$ In : Pin18,14,Out : Pin79 | — | — | -500 | Hz |
| Rec. chrominance output variable range max. | V_{RC1} | Video signal 1 V _{PP} In : Pin18,Out : Pin41 | 2.0 | 4.7 | 7.0 | dB |
| Rec. chrominance output variable range min. | V_{RC2} | Video signal 1 V _{PP} In : Pin18,Out : Pin41 | -7.0 | -4.2 | -2.0 | dB |
| VCO frequency (40 f_{H} equivalent) | f_{VCO} | Sin 300 mV _{PP} , $f_{\text{SC}} = 3.579545\text{ MHz}$ Pin78 = 2.0 V In : Pin82,Out : Pin5 | 469 | 629 | 789 | kHz |
| Rec. comb depth | G_{RECC} | Sin 250 mV _{PP} ,SLP In : Pin6,Out : Pin33 | — | — | -27 | dB |
| Rec. comb 40 f_{H} shift | Δt_{RECC} | Sin 250 mV _{PP} ,SLP In : Pin6,Out : Pin33 | -10 | — | 10 | ns |
| Main BM carrier-leak | C_{LBM} | Sin 100 mV _{PP} ,629 kHz In : Pin34,14,Out : Pin3 | — | — | -38 | dB |
| Burst-down gain 1 | G_{BD1} | Sin 100 mV _{PP} , f_{SC} ,SP-mode In : Pin34,14,Out : Pin3 | -5.1 | -4.1 | -3.1 | dB |

■ Electrical Characteristics(continued) $T_a = 25\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$

| Parameter | Symbol | Conditions | min. | typ. | max. | Unit |
|--|-------------------|--|------|------|------|------------------|
| Burst-down gain 2 | G_{BD2} | Sin 100 mV _{PP} , f_{SC} ,LP-mode In : Pin34,14,Out : Pin3 | 0 | — | 2 | dB |
| PB chrominance output amplitude | V_{PBC} | Sin 100 mV _{PP} ,629 kHz In : Pin34,14,Out : Pin3 | 365 | 450 | 535 | mV _{PP} |
| PB ACC control characteristic | S_{ACC} | Sin 140/8.9 mV _{PP} ,629 kHz In : Pin34,14,Out : Pin12 | -3 | — | — | dB |
| PB killer on sensitivity | S_{PKON} | Sin 0.89 mV _{PP} ,629 kHz In : Pin34,14,Out : Pin3 | — | — | -43 | dB |
| PB killer off sensitivity | S_{PKOFF} | Sin 2.81 mV _{PP} ,629 kHz In : Pin34,14,Out : Pin3 | -28 | — | — | dB |
| PB chrominance undesired ingredient | ΔG_{PB} | Sin 35 mV _{PP} ,629 kHz In : Pin34,14,Out : Pin3 | — | — | -33 | dB |
| XO free-run frequency | f_{XO} | Out : Pin79 | -50 | — | 50 | Hz |
| 2 f_{SC} output amplitude | V_{ISC} | Out : Pin79 | 290 | 435 | 580 | mV _{PP} |
| Chrominance mix. gain | G_{MIX} | Sin 5 mV _{PP} , f_{SC} ,SP-mode In : Pin6,Out : Pin25 | 4.8 | — | 8.8 | dB |
| CNR output gain | G_{CNR} | Sin 200 mV _{PP} , f_{SC} In : Pin6,Out : Pin5 | -2.5 | — | 3.5 | dB |
| CNR limiter gain | G_{LIM} | Sin 5 mV _{PP} , f_{SC} In : Pin1,Out : Pin3 | 4.5 | — | 10.5 | dB |
| CNR K-value gain | G_{CNRK} | Sin 5 mV _{PP} , f_{SC} In : Pin6,Out : Pin3 | 0.60 | 0.73 | 0.85 | dB |
| CCD comb LPF frequency characteristic | ΔG_{CDL} | Sin 200 mV _{PP} ,7.16 MHz/630 kHz In : Pin10,Out : Pin5 | — | — | -27 | dB |
| CCD AGC control sensitivity | G_{PBCCD} | Sin 200 mV _{PP} ,629 kHz,SP In : Pin6,Out : Pin5 | -1 | — | 1 | dB |
| PB comb depth | G_{PBC} | Sin 200 mV _{PP} ,40 $f_{H-1}/2 f_H$ In : Pin6,Out : Pin5 | — | — | -27 | dB |
| PB comb 40 f_H shift | Δt_{PBC} | Sin 200 mV _{PP} ,40 $f_{H-1}/2 f_H$ In : Pin6,Out : Pin5 | -10 | — | 10 | ns |
| Rec. RF EQ frequency characteristic 1 | ΔG_{REQ1} | Sin 40 mV _{PP} ,2.05 MHz/4 MHz In : Pin34,Out : Pin41 | 1.1 | — | 4.1 | dB |
| Rec. RF EQ frequency characteristic 2 | ΔG_{REQ2} | Sin 40 mV _{PP} ,5 MHz/8 MHz In : Pin34,Out : Pin41 | 1.4 | — | 4.9 | dB |
| Auto tracking output DC voltage without signal | V_{ATO} | C-GND(Pin41) Out : Pin40 | — | — | 0.7 | V |
| Auto tracking I/O characteristic 1 | V_{AT1} | Sin 80 mV _{PP} ,4 MHz,SP-mode In : Pin41,Out : Pin40 | 1.3 | — | 1.8 | V |

■ Electrical Characteristics(continued) $T_a = 25\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$

| Parameter | Symbol | Conditions | min. | typ. | max. | Unit |
|--------------------------------------|-------------------|--|-------|------|------|------------------|
| Auto tracking I/O characteristic 2 | V_{AT2} | Sin 200 mV _{pp} ,4 MHz,SP-mode In : Pin41,Out : Pin40 | 2.25 | — | 2.75 | V |
| Auto tracking I/O characteristic 3 | V_{AT3} | Sin 1 V _{pp} ,4 MHz,SP-mode In : Pin41,Out : Pin40 | 3.6 | — | — | V |
| Auto tracking I/O characteristic 4 | V_{AT4} | Sin 200 mV _{pp} ,4 MHz,SLP-mode In : Pin41,Out : Pin40 | 2.85 | — | 3.35 | V |
| PB RF AGC output amplitude | V_{PRFA} | Sin 200 mV _{pp} ,4 MHz In : Pin41,Out : Pin44 | 110 | — | 250 | mV _{pp} |
| PB RF AGC control sensitivity | S_{PRFA} | Sin 650/160 mV _{pp} ,4 MHz In : Pin41,Out : Pin44 | -3 | — | 3 | dB |
| PB RF EQ output amplitude | V_{PEQ} | Sin 200 mV _{pp} ,4 MHz In : Pin41,Out : Pin33 | 320 | — | 580 | mV _{pp} |
| PB RF EQ frequency characteristic 1 | ΔG_{PEQ1} | Sin 60 mV _{pp} ,630 kHz/4.9 MHz In : Pin41,Out : Pin33 | — | — | -15 | dB |
| PB RF EQ frequency characteristic 2 | ΔG_{PEQ2} | Sin 60 mV _{pp} ,1 MHz/4.9 MHz In : Pin41,Out : Pin33 | -14.5 | — | -9.5 | dB |
| PB RF EQ frequency characteristic 3 | ΔG_{PEQ3} | Sin 60 mV _{pp} ,8 MHz/4.9 MHz In : Pin41,Out : Pin33 | — | — | -23 | dB |
| Line output gain | G_{LO} | Sin -29 dBV,1 kHz In : Pin73,Out : Pin69 | 19.8 | 21.0 | 22.2 | dB |
| Rec. output gain 1 | ΔG_{RO1} | Sin -29 dBV,1 kHz,SP-mode In : Pin71,Out : Pin65 | 4.9 | 5.9 | 6.9 | dB |
| Rec. output gain 2 | ΔG_{RO2} | Sin -29 dBV,1 kHz,SLP-mode In : Pin71,Out : Pin65 | 0.2 | 0.7 | 1.2 | dB |
| Rec. output harmonic distortion | D_{RO} | Sin -29 dBV,1 kHz,SLP-mode In : Pin71,Out : Pin65 | — | — | 0.95 | % |
| Rec. output S/N | v_{RO} | SLP-mode Out : Pin65 | — | -68 | -62 | dB |
| AGC control sensitivity | S_{AGC} | Sin -9 dBV,1 kHz In : Pin73,Out : Pin69 | -1.0 | 1.0 | 3.0 | dB |
| Line output harmonic distortion | D_{LO} | Sin -29 dBV,1 kHz In : Pin73,Out : Pin69 | — | — | 0.6 | % |
| f_H trap1 frequency characteristic | ΔG_{FT1} | Sin -29 dBV,12 kHz In : Pin73,Out : Pin69 | -2.5 | 0 | 2.5 | dB |
| f_H trap2 frequency characteristic | ΔG_{FT2} | Sin -29 dBV,15.75 kHz In : Pin73,Out : Pin69 | — | — | -2 | dB |
| Mute/Line DC offset | ΔV_{ML} | Out : Pin69 | -65 | — | 65 | mV |
| Mute/Tuner DC offset | ΔV_{MT} | Out : Pin69 | -65 | — | 65 | mV |
| Mute/PB-line DC offset | ΔV_{MP} | Out : Pin69 | -40 | — | 60 | mV |

■ Electrical Characteristics(continued) $T_a = 25\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$

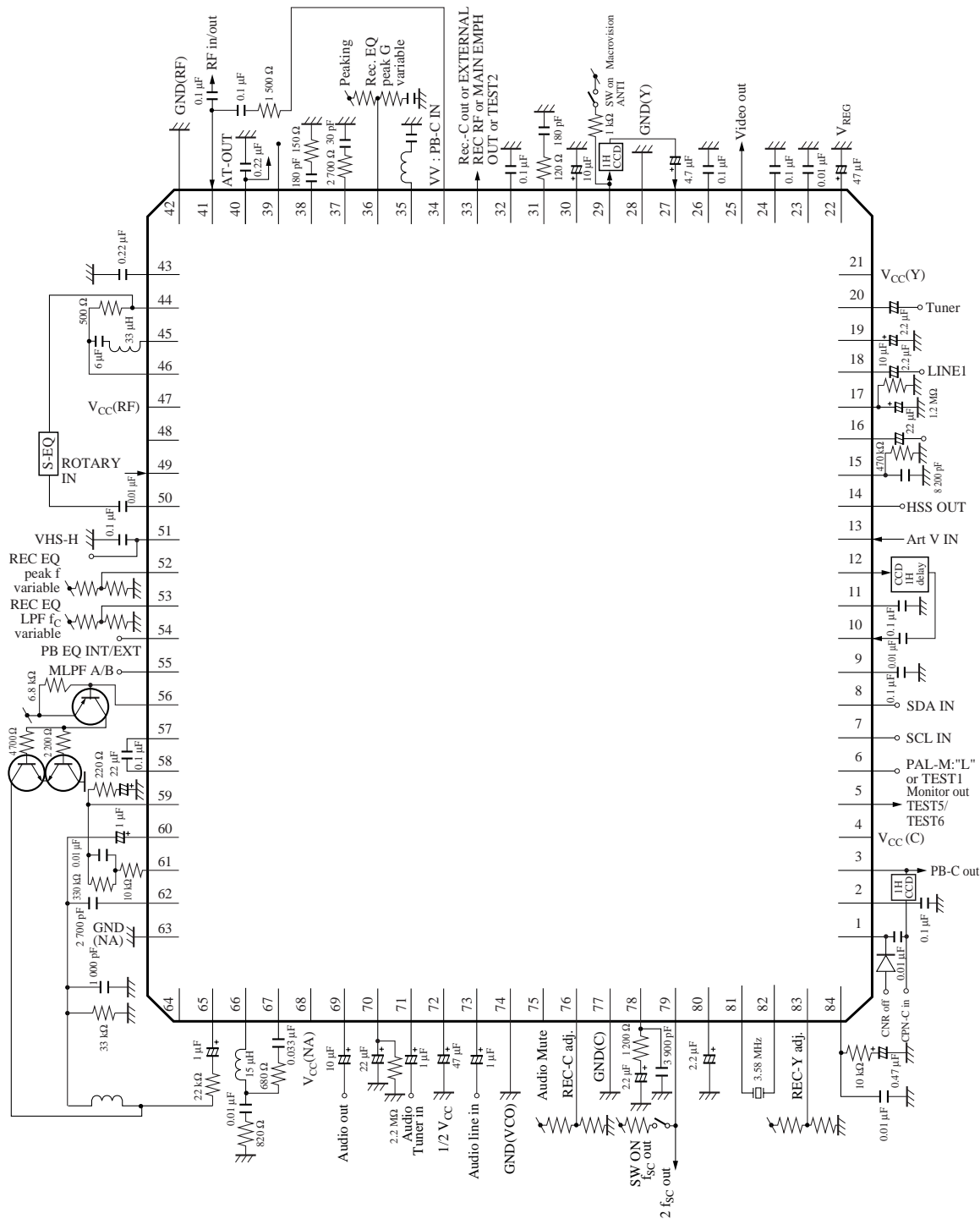
| Parameter | Symbol | Conditions | min. | typ. | max. | Unit |
|---|------------------|---|--------|------|-------|----------------------------|
| Mute gain attenuation | ΔG_M | Sin -68.3 dBV , 1 kHz In : Pin60, Out : Pin69 | — | — | -80 | dB |
| Rec. output max. level | v_{RMAX} | Sin -70.8 dBV , 1 kHz In : Pin73, Out : Pin65 | -0.5 | — | — | dBV |
| Non-rec. on SW output drive current | I_{NREC} | In : I ² C bus, Out : Pin56 | 500 | — | — | μA |
| PB line output gain | G_{PLO} | Sin -68.3 dBV , 1 kHz, SP-mode In : Pin60, Out : Pin69 | 59.5 | 60.0 | 60.5 | dB |
| PB line output differential signal gain | ΔG_{PLO} | Sin -70.8 dBV , 1 kHz, SLP-mode In : Pin60, Out : Pin69 | 2.6 | 3.1 | 3.6 | dB |
| PB line output harmonic distortion | D_{PO} | Sin -70.8 dBV , 1 kHz, SLP-mode In : Pin60, Out : Pin69 | — | 0.50 | 0.95 | % |
| PB line output S/N 1 | V_{PSN1} | Pin60 = 1.5 k Ω , (R-GND), SLP-mode Out : Pin69 | — | — | 3.5 | μV_{rms} |
| PB line output S/N 2 | V_{PSN2} | Pin60 = 1.5 k Ω , (R-GND), SP-mode Out : Pin69 | — | — | 1.8 | μV_{rms} |
| PB line output max. level | v_{LMAX} | Sin -70.8 dBV 1 kHz In : Pin60, Out : Pin69 | -1.5 | — | — | dBV |

• Design reference data

Note) The characteristic values below are theoretical values for designing and not guaranteed.

| Parameter | Symbol | Conditions | min. | typ. | max. | Unit |
|-----------------------------|---------------|-----------------------|------|------|------|---------------|
| Before start bus free time | t_{BUF} | $V_{CC} = 5\text{ V}$ | 4.0 | — | — | μs |
| Start condition set-up time | t_{SU-STA} | $V_{CC} = 5\text{ V}$ | 4.0 | — | — | μs |
| Start condition hold time | t_{HD-STA} | $V_{CC} = 5\text{ V}$ | 4.0 | — | — | μs |
| SCL clock "L" period | t_{LOW} | $V_{CC} = 5\text{ V}$ | 4.0 | — | — | μs |
| SCL clock "H" period | t_{HIGH} | $V_{CC} = 5\text{ V}$ | 4.0 | — | — | μs |
| SCL, SDA signals rise time | t_{RISE} | $V_{CC} = 5\text{ V}$ | — | — | 1.0 | μs |
| SCL, SDA signals fall time | t_{FALL} | $V_{CC} = 5\text{ V}$ | — | — | 0.35 | μs |
| Data set-up time(White) | $t_{SU-DATA}$ | $V_{CC} = 5\text{ V}$ | 0.25 | — | — | μs |
| Data hold time(White) | $t_{HD-DATA}$ | $V_{CC} = 5\text{ V}$ | 0 | — | — | μs |
| Acknowledge set-up time | t_{SU-ACK} | $V_{CC} = 5\text{ V}$ | — | — | 3.5 | μs |
| Acknowledge hold time | t_{HD-ACK} | $V_{CC} = 5\text{ V}$ | 0 | — | — | μs |
| Stop condition set-up time | t_{SU-STO} | $V_{CC} = 5\text{ V}$ | 4.0 | — | — | μs |

Application Circuit Example



■ Precautions for use

1. The latch-up level of pin 8 is low about 140 V(200 pF).
Please be careful when handling the pin.
2. Pay attention well to the handling because upside-down mounting may result in over-current, and characteristics deterioration or damage.

■ Technical Information

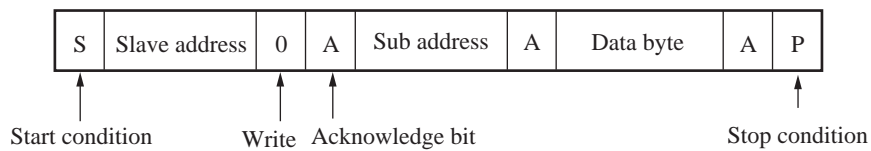
• I²C-bus

1. Provided with Auto-increment function

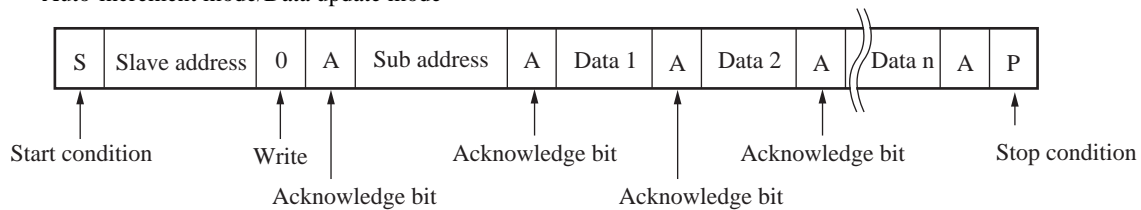
- Sub address 0* : Auto-increment mode
(Sending data sequentially, sub address changes sequentially and data are input.)
- Sub address 8* : Data update mode
(Sending data sequentially, data are input keeping the same sub address.)

2. I²C-bus protocol

- Slave address : 11100100(E4H)
- Format(normal)



- Auto-increment mode/Data update mode



■ Technical Information(continued)

• I²C-bus(continued)

3.Sub address byte and byte format : (80H) : Initial state

| Sub Address | Data byte | | | | | | | |
|--------------|--|--|--|---|---|--|--|--|
| | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 00 (80 H) | Y/C1 0 : VV 1 : EE | Y/C2 0 : — 1 : Trick | Y/C3 0 : Rec. 1 : PB | Y/C4 PB comb On/Off 0 : On 1 : Off | Y/C5 0 : Tuner 1 : Line | Y/C6 0 : Line1 1 : Line2 | NA1 0 : EE 1 : VV | NA2 0 : ND-rec. 1 : D-rec. |
| 01 (80 H) | NA3 0 : Tuner 1 : Line | 0 : SP 1 : LP | 0 : — 1 : SLP | Rec.-comb 0 : SP=off LP/SLP=on 1 : Off | Edit 0 : Edit=off 1 : Edit=on | C-mix. 0 : Nor 1 : Combination mode | Rec.-RFEQ Int./Ext. 0 : Int. 1 : Ext. | PB-RFEQ Peaking 0 : Int. 1 : Ext. |
| 02 (80 H) | IIL-RSET 0 : Reset 1 : Nor | Color Killer1 0 : Auto 1 : Forced Off | Color Killer2 0 : — 1 : Forced On | DOC Nor/On 0 : Nor 1 : On | Test1 Pin6 0 : Nor 1 : Test H1 | Test2(Pin33) 000 : White clip 011 : RECCL 010 : MOLO 100 : MONI6 | | |
| 03 (80 H) | Test3 AGC/THRO 0 : AGC 1 : THRO | Test4 Rec.-RFEQ 0 : Nor 1 : Test4 | Test5(Pin5) 000 : MONI1 100 : MONI5 001 : MONI2 101 : MONIY 010 : MONI3 110 : IILTEST 011 : MONI4 | | | Test6(Pin5) 000 : 1/4 VCO 100 : PALFF2 001 : BLK 101 : CO180 010 : ROTCC 110 : FHT 011 : NN33B 111 : BGP | | |
| 04 (80 H) | ANR CTL 000 : ANR=off | | | Y/C7 0 : Composite 1 : Component | PB-RF-EQ (Peak gain control) | | | PB-RF-EQ (Peak f control) |
| 05 (80 H) | Picture CTL 000 : Pict=off | | | Test7 0 : Nor 1 : DEV-stop | PB-RF-EQ (Peak Q control) | | | |

Note) *1 : There is no I²C-bus control on Rec.-Y/C level.

*2 : Refer to the following for other modes.

| Pin No. | Function | Precaution | L | M | H | Note |
|---------|-----------------------|------------|---------------------------|---------------------------------------|---------|---|
| 1 | C-mix.-in&VCO-ext.-in | — | Nor | | CNR-off | Clock conditions : 1.25 ± 0.5, Pin81 = Low |
| 6 | System | — | PAL-M Pull-down with R | NTSC (With no external components) | | Common to Test1 |

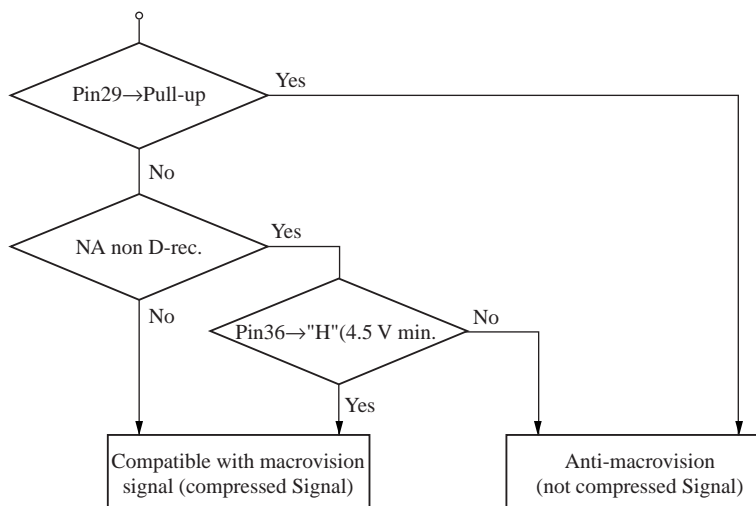
■ Technical Information(continued)

• I²C-bus(continued)

3.Sub address byte and byte format : (80H) : Initial state

| Pin No. | Function | Precaution | L | M | H | Note |
|---------|----------------------------|------------|---|------|----------------------------|--------------------------------------|
| 29 | * | — | — | | | Anti-macrovision function selection |
| 36 | Rec. EQ peak-G variable | — | Rec. EQ peak-G variable | | * | Anti-macrovision function selectable |
| 52 | Rec. EQ peak-F variable | — | Rec. EQ peak-F variable | | | — |
| 53 | Rec. EQ LPF f_C variable | — | Rec. EQ LPF f_C variable | | Pin5 : CNR Pin33 : W/C | Monitor out fixed at V=5.0 V |
| 54 | PB RF EQ int./ext. | — | PB RF EQ int. | | PB RF EQ ext. | V _{th} = 2.5 V |
| 75 | NA-mute | — | Nor | Mute | | V _{th} = 2.0 V |
| 79 | $f_{SC}/2 f_{SC}$ | — | 2 f_{SC} (With no external components) | | f_{SC} Pull-up with R | R = 1 k Ω |

Note) * : Anti-macrovision Specifications.



■ Technical Information(continued)

• I²C-bus(continued)

4. Bus control

| Function | Description | Appendx | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|---|---------|------------|----|--|---|---|---|-----------|---|---|---|------------|---|---|---|------------|---|---|---|---------|---|---|---|---------|---|---|---|-------|---|---|---|---------|---|---|---|----------|------------------|
| ANR control | <table border="1"> <thead> <tr> <th>D7</th> <th>D6</th> <th>D5</th> <th></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>Off(Edit)</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>Shallowest</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>Shallower</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>Shallow</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>Typical</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>Deep</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>Deeper</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>Deepest</td> </tr> </tbody> </table> | D7 | D6 | D5 | | 0 | 0 | 0 | Off(Edit) | 0 | 0 | 1 | Shallowest | 0 | 1 | 0 | Shallower | 0 | 1 | 1 | Shallow | 1 | 0 | 0 | Typical | 1 | 0 | 1 | Deep | 1 | 1 | 0 | Deeper | 1 | 1 | 1 | Deepest | Sub address : 04 |
| D7 | D6 | D5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | Off(Edit) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | Shallowest | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 0 | Shallower | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 1 | Shallow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | Typical | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 1 | Deep | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 0 | Deeper | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | Deepest | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PB-RFEQ Peak gain control | <table border="1"> <thead> <tr> <th>D3</th> <th>D2</th> <th>D1</th> <th></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>-2</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>-1</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>0(Typical)</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>+1</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>+2</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>+3</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>+4</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>+5</td> </tr> </tbody> </table> | D3 | D2 | D1 | | 0 | 0 | 0 | -2 | 0 | 0 | 1 | -1 | 0 | 1 | 0 | 0(Typical) | 0 | 1 | 1 | +1 | 1 | 0 | 0 | +2 | 1 | 0 | 1 | +3 | 1 | 1 | 0 | +4 | 1 | 1 | 1 | +5 | Sub address : 04 |
| D3 | D2 | D1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | -2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | -1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 0 | 0(Typical) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 1 | +1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | +2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 1 | +3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 0 | +4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | +5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| picture control | <table border="1"> <thead> <tr> <th>D7</th> <th>D6</th> <th>D5</th> <th></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>Off(Edit)</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>Softest</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>Softer</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>Soft</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>Typical</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>Sharp</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>Sharper</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>Sharpest</td> </tr> </tbody> </table> | D7 | D6 | D5 | | 0 | 0 | 0 | Off(Edit) | 0 | 0 | 1 | Softest | 0 | 1 | 0 | Softer | 0 | 1 | 1 | Soft | 1 | 0 | 0 | Typical | 1 | 0 | 1 | Sharp | 1 | 1 | 0 | Sharper | 1 | 1 | 1 | Sharpest | Sub address : 05 |
| D7 | D6 | D5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | Off(Edit) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | Softest | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 0 | Softer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 1 | Soft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | Typical | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 1 | Sharp | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 0 | Sharper | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | Sharpest | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

■ Technical Information(continued)

- I²C-bus(continued)

4.Bus control(continued)

| Function | Description | Appendx | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------|--|-------------------|-------------------|----|---|---|----|---|----|------------|---|---|----|---|---|----|--------------------------------------|---|---|---|----|---|---|---|----|---|---|---|----|---|---|---|----|---|---|---|----|------------------|
| PB-RFEQ Peak Q control | <table border="1"> <thead> <tr> <th>D3</th> <th>D2</th> <th>D1</th> <th></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>-2</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>-1</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>0(Typical)</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>+1</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>+2</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>+3</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>+4</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>+5</td> </tr> </tbody> </table> | D3 | D2 | D1 | | 0 | 0 | 0 | -2 | 0 | 0 | 1 | -1 | 0 | 1 | 0 | 0(Typical) | 0 | 1 | 1 | +1 | 1 | 0 | 0 | +2 | 1 | 0 | 1 | +3 | 1 | 1 | 0 | +4 | 1 | 1 | 1 | +5 | Sub address : 05 |
| D3 | D2 | D1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | -2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | -1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 0 | 0(Typical) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 1 | +1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | +2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 1 | +3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 0 | +4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | +5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PB-RFEQ Peak f control | <table border="1"> <thead> <tr> <th>Sub AD : 04 D0</th> <th>Sub AD : 05 D0</th> <th></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>+1</td> </tr> <tr> <td>1</td> <td>0</td> <td>0(Typical)</td> </tr> <tr> <td>0</td> <td>1</td> <td>-1</td> </tr> <tr> <td>1</td> <td>1</td> <td>-2</td> </tr> </tbody> </table> | Sub AD : 04 D0 | Sub AD : 05 D0 | | 0 | 0 | +1 | 1 | 0 | 0(Typical) | 0 | 1 | -1 | 1 | 1 | -2 | Sub address : 04 Sub address : 05 | | | | | | | | | | | | | | | | | | | | | |
| Sub AD : 04 D0 | Sub AD : 05 D0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | +1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0(Typical) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | -1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | -2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |