

# AN3479FBP

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

## ■ Overview

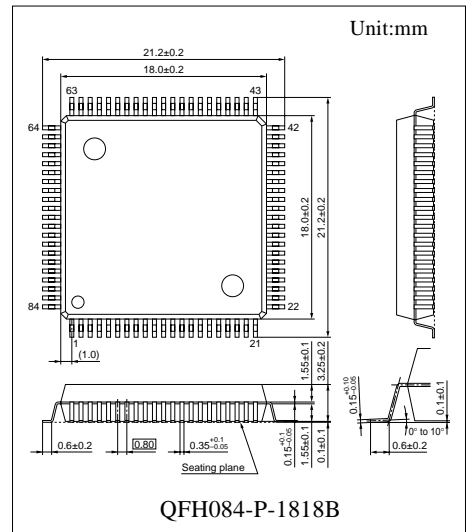
The AN3479FBP is an IC designed for NTSC-dedicated VHS VCR signal processing and incorporates circuits for processing RF and normal audio signals as well as luminance and chroma signals.

## ■ Features

- Compatible with I<sup>2</sup>C-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)





## ■ 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 <sub>CC</sub>	—	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 <sub>CC</sub>	—
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 <sub>C</sub> Adj.	125 kΩ
20	Tuner In	105 kΩ	54	PB RF EQ INT/EXT SW	Open base
21	Lumi V <sub>CC</sub>	—	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 <sub>CC</sub>	—	78	REC AFC/PB APC Det	Collector base
69	NA Line Out	Push-pull	79	2f <sub>SC</sub> 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 <sub>REF</sub>	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 <sub>CC</sub>	5.5	V
Supply current	I <sub>CC</sub>	222	mA
Power dissipation *2	P <sub>D</sub>	958	mW
Operating ambient temperature *1	T <sub>opr</sub>	-20 ~ +70	°C
Storage temperature *1	T <sub>stg</sub>	-55 ~ +150	°C

Note) \*1 : T<sub>a</sub> = 25 °C except operating ambient temperature and storage temperature.

\*2 : Power dissipation of the package at T<sub>a</sub> = 70 °C.

### ■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V <sub>CC</sub>	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	$I_{REC}$	$V_{CC} = 5\text{ V}$ , Rec.- mode	116	140	175	mA
Circuit current 2	$I_{PB}$	$V_{CC} = 5\text{ V}$ , PB-mode	125	150	188	mA
Acknowledge output driver current	$I_{ACK}$	$V_{CC} = 5\text{ V}$	1.8	2.5	5.0	mA
SCL, SDA signals input "H" level	$V_{SHI}$	$V_{CC} = 5\text{ V}$	3.1	—	5.0	V
SCL, SDA signals input "L" level	$V_{SLO}$	$V_{CC} = 5\text{ V}$	0	—	0.9	V
SCL clock frequency	$f_{SCL}$	$V_{CC} = 5\text{ V}$	—	—	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 $V_{PP}/0.5\text{ }V_{PP}$ In : Pin18, Out : Pin25	—	—	1.0	dB
Y AGC frequency characteristic	$\Delta G_{AGC}$	Sin 100 mV $V_{PP}$ , 5 MHz/1 MHz In : Pin18, Out : Pin25	-1.5	—	0.5	dB
Y MLPF frequency characteristic 1	$\Delta G_{YL1}$	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	$\Delta G_{YL2}$	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	$\mu\text{s}$
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 <sub>pp</sub> (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 <sub>pp</sub> (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 <sub>pp</sub> In : Pin18,Out : Pin30	—	—	100	mV <sub>pp</sub>
Vertical emphasis X-value gain	$G_{VEX}$	Sin 40 mV <sub>pp</sub> ,150 kHz,Pin31 : open In : Pin30,Out : Pin33	-15.0	-11.5	-8.0	dB
Non-linear emphasis frequency characteristic 1	$\Delta G_{NLE1}$	Sin 400 mV <sub>pp</sub> (0 dB),2 MHz/100 kHz SLP/EDIT-mode In : Pin18,Out : Pin33	-0.2	—	1.0	dB
Non-linear emphasis frequency characteristic 2	$\Delta G_{NLE2}$	Sin 40 mV <sub>pp</sub> (-20 dB),1 MHz/100 kHz SLP/EDIT-mode In : Pin18,Out : Pin33	3.67	—	6.47	dB
Non-linear emphasis frequency characteristic 3	$\Delta G_{NLE3}$	Sin 40 mV <sub>pp</sub> (-20 dB),2 MHz/100 kHz SLP/EDIT-mode In : Pin18,Out : Pin33	4.24	—	7.24	dB
Non-linear emphasis frequency characteristic 4	$\Delta G_{NLE4}$	Sin 40 mV <sub>pp</sub> (-20 dB),2 MHz SP/SLP-mode In : Pin18,Out : Pin33	-1.76	—	0.84	dB
Main emphasis gain	$G_{ME}$	Sin 60 mV <sub>pp</sub> (Pin5),150 kHz Pin31 : 0.1 $\mu$ F In : Pin18,Out : Pin33	13.1	—	15.5	dB
Dark clip level	DC	Video(W-100 %),1 V <sub>pp</sub> In : Pin18,Out : Pin33	51	61	71	%
White clip level	WC	Video(W-100 %),1 V <sub>pp</sub> In : Pin18,Out : Pin33	190	200	210	%
FM carrier interleave	$\Delta f_{CI}$	$f_H$ Pulse,5 V <sub>pp</sub> ,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	$\Delta f_{DEV}$	Video(W-100 %),1 V <sub>pp</sub> 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 <sub>pp</sub>
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 <sub>pp</sub> ,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 <sub>pp</sub> ,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 <sub>pp</sub> ,5.4 MHz,7 MHz SQPB-mode In : Pin50,Out : Pin38	1.4	1.6	1.8	—
Sub LPF frequency characteristic	$\Delta G_{SL}$	Sin 350 mV <sub>pp</sub> ,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 <sub>pp</sub> (0 dB),4 MHz In : Pin50,Out : Pin25	-21	-17	-13	dB
Drop-out detector off level	$S_{DOFF}$	Sin 350 mV <sub>pp</sub> (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 <sub>pp</sub> ,1 kHz,4 MHz In : Pin50,14,Out : Pin25	180	222	270	$\mu\text{s}$
Drop-out compensator SW DC offset	$\Delta V_{DOC}$	AM 350 mV <sub>pp</sub> ,4 MHz In : Pin50,Out : Pin25	-125	0	125	mV
Non-linear de-emphasis frequency characteristic 1	$\Delta G_{NLD1}$	Sin 200 mV <sub>pp</sub> (0 dB),2 MHz/150 kHz LP-mode In : Pin38,Out : Pin5	-4.8	—	-1.8	dB
Non-linear de-emphasis frequency characteristic 2	$\Delta G_{NLD2}$	Sin 20 mV <sub>pp</sub> (-20 dB),2 MHz/150 kHz LP-mode In : Pin38,Out : Pin5	-9.3	—	-5.3	dB
Non-linear de-emphasis frequency characteristic 3	$\Delta G_{NLD3}$	Sin 20 mV <sub>pp</sub> (-20 dB),2 MHz SP/LP-mode In : Pin38,Out : Pin5	1.8	—	4.2	dB
Non-linear de-emphasis frequency characteristic 4	$\Delta G_{NLD4}$	Sin 20 mV <sub>pp</sub> (-20 dB),1 MHz/150 kHz LP-mode In : Pin38,Out : Pin5	-7.4	—	-3.4	dB
Non-linear de-emphasis frequency characteristic 5	$\Delta G_{NLD5}$	Sin 20 mV <sub>pp</sub> (-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 <sub>pp</sub> -400 mV <sub>pp</sub> (Pin27) In : Pin38,Out : Pin29	-23	—	23	mV <sub>pp</sub>
YNR EDNC(1-K)value gain	$G_{EDK}$	Sin 160 mV <sub>pp</sub> ,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 <sub>pp</sub> ,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 <sub>pp</sub> ,LP/EDIT mode In : Pin38,Out : Pin30	—	—	100	mV <sub>pp</sub>

■ 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 <sub>pp</sub> ,LP-mode In : Pin38,Out : Pin30	—	—	100	mV <sub>pp</sub>
YNR EDNC X-value gain	$G_{EDX}$	Sin 40 mV <sub>pp</sub> ,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 <sub>pp</sub> ,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 <sub>pp</sub> ,150 kHz In : Pin30,Out : Pin25	12	25	90	mV <sub>pp</sub>
YNR limiter output amplitude 2	$V_{YL2}$	Sin 300 mV <sub>pp</sub> ,150 kHz In : Pin30,Out : Pin25	20	70	160	mV <sub>pp</sub>
YNR limiter output amplitude 3	$V_{YL3}$	Sin 800 mV <sub>pp</sub> ,150 kHz In : Pin30,Out : Pin25	25	85	190	mV <sub>pp</sub>
Noise canceller frequency characteristic 1	$\Delta G_{NC1}$	Sin 12.6 mV <sub>pp</sub> (-30 dB),1 MHz/150 kHz Normal-mode In : Pin27,Out : Pin25	-7	—	-1	dB
Noise canceller frequency characteristic 2	$\Delta G_{NC2}$	Sin 12.6 mV <sub>pp</sub> (-30 dB),2 MHz/150 kHz Normal-mode In : Pin27,Out : Pin25	-9	—	-3	dB
Picture control frequency characteristic 1	$\Delta G_{PC1}$	Sin 100 mV <sub>pp</sub> ,3 MHz,Sharpest In : Pin27,Out : Pin25	-3.5	—	0.5	dB
Picture control frequency characteristic 2	$\Delta G_{PC2}$	Sin 100 mV <sub>pp</sub> ,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 <sub>pp</sub> In : Pin27,Out : Pin25	0.80	0.95	1.10	V
Video VV output artificial V DC offset	$\Delta V_{DV}$	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 <sub>pp</sub>
Rec. chrominance output amplitude	$V_{RC}$	Video(Y+C),1 V <sub>pp</sub> In : Pin18,Out : Pin41	60.5	65.0	69.5	mV <sub>pp</sub>
Burst-up gain	$G_{BU}$	Sin 300 mV <sub>pp</sub> , $f_{SC}$ ,SP-mode In : Pin14,18,Out : Pin33	5	6	7	dB
Burst-up DC offset	$\Delta V_{BU}$	Out : Pin41	—	—	16	mV
Rec. ACC control characteristic	$S_{ACC1}$	Burst : Chroma = 1 : 1 845 mV <sub>pp</sub> /53 mV <sub>pp</sub> ,Rotary : "H" In : Pin14,18,Out : Pin5	—	—	3	dB
VXO free-run frequency	$f_{VXO}$	Out : Pin79	-100	—	100	Hz
VXO control characteristic	$\beta_{VXO}$	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 <sub>PP</sub> In : Pin18,Out : Pin41	—	—	-39	dB
Rec. killer off sensitivity	$S_{RKOFF}$	Burst : Chroma=1 : 1,17 mV <sub>PP</sub> In : Pin18,Out : Pin41	-22	—	—	dB
Rec. C MBPF frequency characteristic 1	$\Delta G_{RBP1}$	Sin 286 mV <sub>PP</sub> ,1.7 MHz/3.58 MHz In : Pin18,Out : Pin5	—	—	-15	dB
Rec. C MBPF frequency characteristic 2	$\Delta G_{RBP2}$	Sin 286 mV <sub>PP</sub> ,3.08 MHz/3.58 MHz In : Pin18,Out : Pin5	-4.6	—	-0.6	dB
Rec. C MBPF frequency characteristic 3	$\Delta G_{RBP3}$	Sin 286 mV <sub>PP</sub> ,4.08 MHz/3.58 MHz In : Pin18,Out : Pin5	-5.5	—	-1.5	dB
Rec. C MBPF frequency characteristic 4	$\Delta G_{RBP4}$	Sin 286 mV <sub>PP</sub> ,7 MHz/3.58 MHz In : Pin18,Out : Pin5	—	—	-10	dB
Rec. C MBPF group delay	$t_{DRBP}$	Sin 286 mV <sub>PP</sub> ,3.58 MHz In : Pin18,Out : Pin5	540	—	660	ns
Rec. AFC pull-in range "H"level	$f_{AFH}$	Pulse 5 V <sub>PP</sub> , $f_H + 1.22\text{ kHz}$ In : Pin18,14,Out : Pin5	1.2	—	—	kHz
Rec. AFC pull-in range "L"level	$f_{AFL}$	Pulse 5 V <sub>PP</sub> , $f_H - 1.22\text{ kHz}$ In : Pin18,14,Out : Pin5	—	—	-1.2	kHz
VCO control characteristic	$\beta_{VCO}$	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 <sub>PP</sub> , $f_{SC} + 500\text{ Hz}$ In : Pin18,14,Out : Pin79	500	—	—	Hz
Rec. APC pull-in range "L"level	$f_{APL}$	Sin 300 mV <sub>PP</sub> , $f_{SC} - 500\text{ Hz}$ In : Pin18,14,Out : Pin79	—	—	-500	Hz
Rec. chrominance output variable range max.	$V_{RC1}$	Video signal 1 V <sub>PP</sub> In : Pin18,Out : Pin41	2.0	4.7	7.0	dB
Rec. chrominance output variable range min.	$V_{RC2}$	Video signal 1 V <sub>PP</sub> In : Pin18,Out : Pin41	-7.0	-4.2	-2.0	dB
VCO frequency (40 $f_H$ equivalent)	$f_{VCO}$	Sin 300 mV <sub>PP</sub> , $f_{SC} = 3.579545\text{ MHz}$ Pin78 = 2.0 V In : Pin82,Out : Pin5	469	629	789	kHz
Rec. comb depth	$G_{RECC}$	Sin 250 mV <sub>PP</sub> ,SLP In : Pin6,Out : Pin33	—	—	-27	dB
Rec. comb 40 $f_H$ shift	$\Delta t_{RECC}$	Sin 250 mV <sub>PP</sub> ,SLP In : Pin6,Out : Pin33	-10	—	10	ns
Main BM carrier-leak	$C_{LBM}$	Sin 100 mV <sub>PP</sub> ,629 kHz In : Pin34,14,Out : Pin3	—	—	-38	dB
Burst-down gain 1	$G_{BD1}$	Sin 100 mV <sub>PP</sub> , $f_{SC}$ ,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 <sub>PP</sub> , $f_{SC}$ ,LP-mode In : Pin34,14,Out : Pin3	0	—	2	dB
PB chrominance output amplitude	$V_{PBC}$	Sin 100 mV <sub>PP</sub> ,629 kHz In : Pin34,14,Out : Pin3	365	450	535	mV <sub>PP</sub>
PB ACC control characteristic	$S_{ACC}$	Sin 140/8.9 mV <sub>PP</sub> ,629 kHz In : Pin34,14,Out : Pin12	-3	—	—	dB
PB killer on sensitivity	$S_{PKON}$	Sin 0.89 mV <sub>PP</sub> ,629 kHz In : Pin34,14,Out : Pin3	—	—	-43	dB
PB killer off sensitivity	$S_{PKOFF}$	Sin 2.81 mV <sub>PP</sub> ,629 kHz In : Pin34,14,Out : Pin3	-28	—	—	dB
PB chrominance undesired ingredient	$\Delta G_{PB}$	Sin 35 mV <sub>PP</sub> ,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 <sub>PP</sub>
Chrominance mix. gain	$G_{MIX}$	Sin 5 mV <sub>PP</sub> , $f_{SC}$ ,SP-mode In : Pin6,Out : Pin25	4.8	—	8.8	dB
CNR output gain	$G_{CNR}$	Sin 200 mV <sub>PP</sub> , $f_{SC}$ In : Pin6,Out : Pin5	-2.5	—	3.5	dB
CNR limiter gain	$G_{LIM}$	Sin 5 mV <sub>PP</sub> , $f_{SC}$ In : Pin1,Out : Pin3	4.5	—	10.5	dB
CNR K-value gain	$G_{CNRK}$	Sin 5 mV <sub>PP</sub> , $f_{SC}$ In : Pin6,Out : Pin3	0.60	0.73	0.85	dB
CCD comb LPF frequency characteristic	$\Delta G_{CDL}$	Sin 200 mV <sub>PP</sub> ,7.16 MHz/630 kHz In : Pin10,Out : Pin5	—	—	-27	dB
CCD AGC control sensitivity	$G_{PBCCD}$	Sin 200 mV <sub>PP</sub> ,629 kHz,SP In : Pin6,Out : Pin5	-1	—	1	dB
PB comb depth	$G_{PBC}$	Sin 200 mV <sub>PP</sub> ,40 $f_{H-1}/2 f_H$ In : Pin6,Out : Pin5	—	—	-27	dB
PB comb 40 $f_H$ shift	$\Delta t_{PBC}$	Sin 200 mV <sub>PP</sub> ,40 $f_{H-1}/2 f_H$ In : Pin6,Out : Pin5	-10	—	10	ns
Rec. RF EQ frequency characteristic 1	$\Delta G_{REQ1}$	Sin 40 mV <sub>PP</sub> ,2.05 MHz/4 MHz In : Pin34,Out : Pin41	1.1	—	4.1	dB
Rec. RF EQ frequency characteristic 2	$\Delta G_{REQ2}$	Sin 40 mV <sub>PP</sub> ,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	$V_{ATI}$	Sin 80 mV <sub>PP</sub> ,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 <sub>pp</sub> ,4 MHz,SP-mode In : Pin41,Out : Pin40	2.25	—	2.75	V
Auto tracking I/O characteristic 3	$V_{AT3}$	Sin 1 V <sub>pp</sub> ,4 MHz,SP-mode In : Pin41,Out : Pin40	3.6	—	—	V
Auto tracking I/O characteristic 4	$V_{AT4}$	Sin 200 mV <sub>pp</sub> ,4 MHz,SLP-mode In : Pin41,Out : Pin40	2.85	—	3.35	V
PB RF AGC output amplitude	$V_{PRFA}$	Sin 200 mV <sub>pp</sub> ,4 MHz In : Pin41,Out : Pin44	110	—	250	mV <sub>pp</sub>
PB RF AGC control sensitivity	$S_{PRFA}$	Sin 650/160 mV <sub>pp</sub> ,4 MHz In : Pin41,Out : Pin44	-3	—	3	dB
PB RF EQ output amplitude	$V_{PEQ}$	Sin 200 mV <sub>pp</sub> ,4 MHz In : Pin41,Out : Pin33	320	—	580	mV <sub>pp</sub>
PB RF EQ frequency characteristic 1	$\Delta G_{PEQ1}$	Sin 60 mV <sub>pp</sub> ,630 kHz/4.9 MHz In : Pin41,Out : Pin33	—	—	-15	dB
PB RF EQ frequency characteristic 2	$\Delta G_{PEQ2}$	Sin 60 mV <sub>pp</sub> ,1 MHz/4.9 MHz In : Pin41,Out : Pin33	-14.5	—	-9.5	dB
PB RF EQ frequency characteristic 3	$\Delta G_{PEQ3}$	Sin 60 mV <sub>pp</sub> ,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	$\Delta G_{RO1}$	Sin -29 dBV,1 kHz,SP-mode In : Pin71,Out : Pin65	4.9	5.9	6.9	dB
Rec. output gain 2	$\Delta G_{RO2}$	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	$\Delta G_{FT1}$	Sin -29 dBV,12 kHz In : Pin73,Out : Pin69	-2.5	0	2.5	dB
$f_H$ trap2 frequency characteristic	$\Delta G_{FT2}$	Sin -29 dBV,15.75 kHz In : Pin73,Out : Pin69	—	—	-2	dB
Mute/Line DC offset	$\Delta V_{ML}$	Out : Pin69	-65	—	65	mV
Mute/Tuner DC offset	$\Delta V_{MT}$	Out : Pin69	-65	—	65	mV
Mute/PB-line DC offset	$\Delta V_{MP}$	Out : Pin69	-40	—	60	mV

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

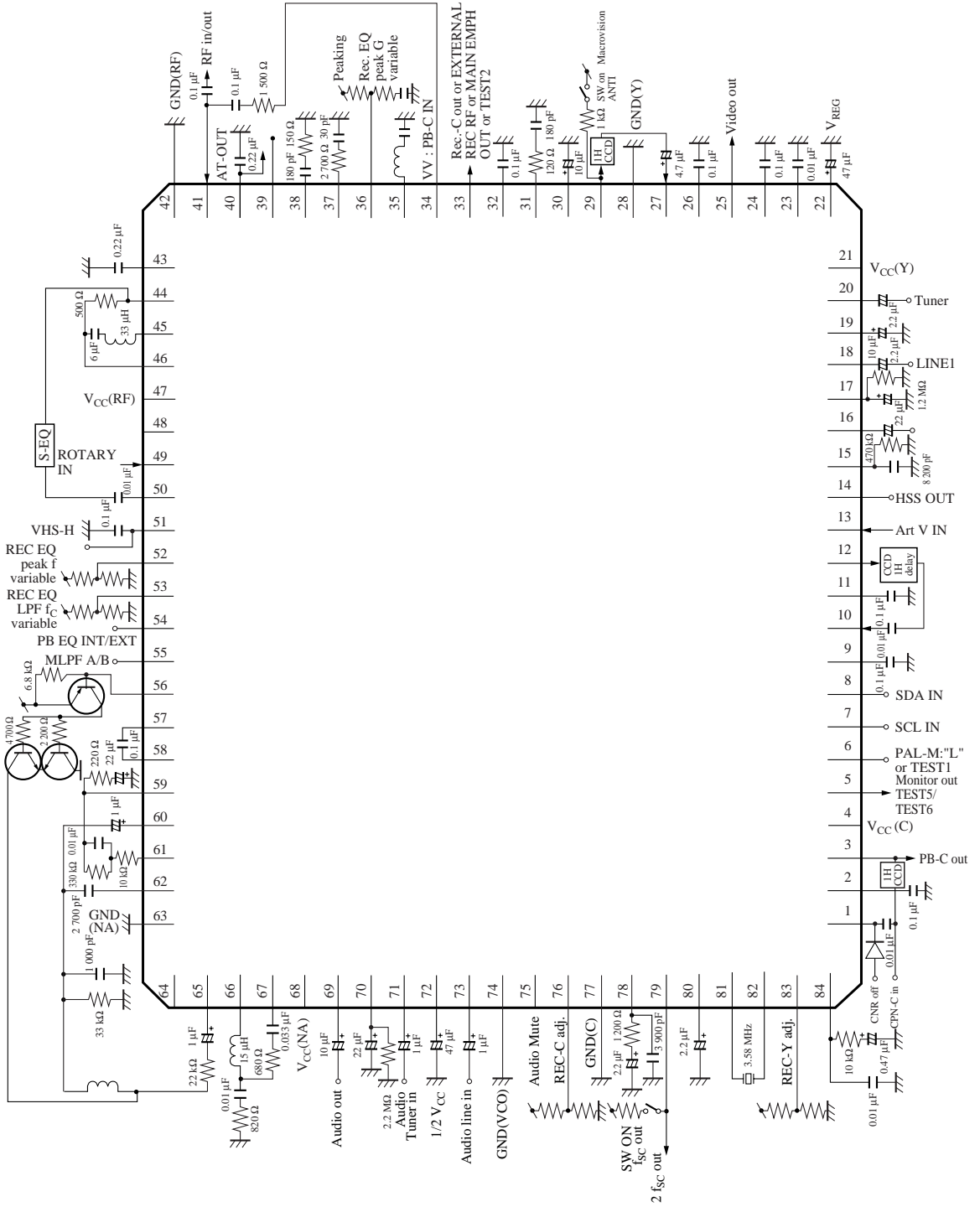
Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Mute gain attenuation	$\Delta G_M$	Sin $-68.3\text{ dBV}$ , 1 kHz In : Pin60, Out : Pin69	—	—	$-80$	dB
Rec. output max. level	$v_{RMAX}$	Sin $-70.8\text{ dBV}$ , 1 kHz In : Pin73, Out : Pin65	$-0.5$	—	—	dBV
Non-rec. on SW output drive current	$I_{NREC}$	In : I <sup>2</sup> C bus, Out : Pin56	500	—	—	$\mu\text{A}$
PB line output gain	$G_{PLO}$	Sin $-68.3\text{ dBV}$ , 1 kHz, SP-mode In : Pin60, Out : Pin69	59.5	60.0	60.5	dB
PB line output differential signal gain	$\Delta G_{PLO}$	Sin $-70.8\text{ dBV}$ , 1 kHz, SLP-mode In : Pin60, Out : Pin69	2.6	3.1	3.6	dB
PB line output harmonic distortion	$D_{PO}$	Sin $-70.8\text{ dBV}$ , 1 kHz, SLP-mode In : Pin60, Out : Pin69	—	0.50	0.95	%
PB line output S/N 1	$V_{PSN1}$	Pin60 = 1.5 k $\Omega$ , (R-GND), SLP-mode Out : Pin69	—	—	3.5	$\mu\text{V}_{rms}$
PB line output S/N 2	$V_{PSN2}$	Pin60 = 1.5 k $\Omega$ , (R-GND), SP-mode Out : Pin69	—	—	1.8	$\mu\text{V}_{rms}$
PB line output max. level	$v_{LMAX}$	Sin $-70.8\text{ dBV}$ 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	—	—	$\mu\text{s}$
Start condition set-up time	$t_{SU-STA}$	$V_{CC} = 5\text{ V}$	4.0	—	—	$\mu\text{s}$
Start condition hold time	$t_{HD-STA}$	$V_{CC} = 5\text{ V}$	4.0	—	—	$\mu\text{s}$
SCL clock "L" period	$t_{LOW}$	$V_{CC} = 5\text{ V}$	4.0	—	—	$\mu\text{s}$
SCL clock "H" period	$t_{HIGH}$	$V_{CC} = 5\text{ V}$	4.0	—	—	$\mu\text{s}$
SCL, SDA signals rise time	$t_{RISE}$	$V_{CC} = 5\text{ V}$	—	—	1.0	$\mu\text{s}$
SCL, SDA signals fall time	$t_{FALL}$	$V_{CC} = 5\text{ V}$	—	—	0.35	$\mu\text{s}$
Data set-up time(White)	$t_{SU-DATA}$	$V_{CC} = 5\text{ V}$	0.25	—	—	$\mu\text{s}$
Data hold time(White)	$t_{HD-DATA}$	$V_{CC} = 5\text{ V}$	0	—	—	$\mu\text{s}$
Acknowledge set-up time	$t_{SU-ACK}$	$V_{CC} = 5\text{ V}$	—	—	3.5	$\mu\text{s}$
Acknowledge hold time	$t_{HD-ACK}$	$V_{CC} = 5\text{ V}$	0	—	—	$\mu\text{s}$
Stop condition set-up time	$t_{SU-STO}$	$V_{CC} = 5\text{ V}$	4.0	—	—	$\mu\text{s}$

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

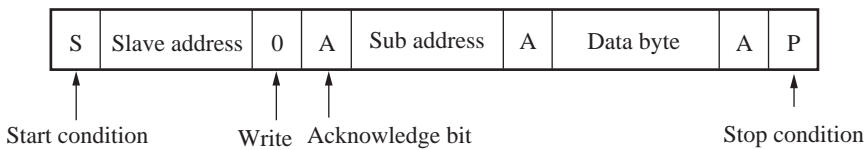
• I<sup>2</sup>C-bus

1. Provided with Auto-increment function

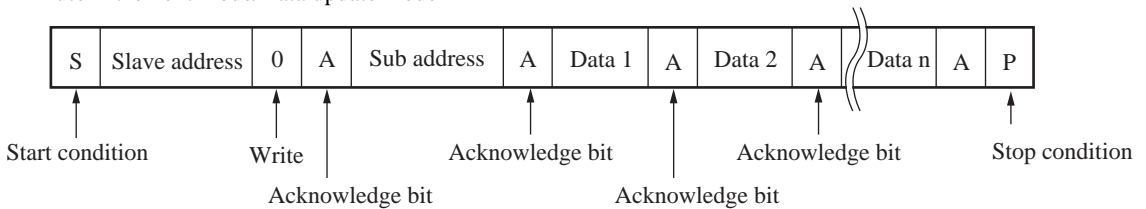
- Sub address 0\* : Auto-increment mode  
(Sending data sequentially, sub address changes sequentially and data are input.)
- Sub address 8\* : Data update mode  
(Sending data sequentially, data are input keeping the same sub address.)

2. I<sup>2</sup>C-bus protocol

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



- Auto-increment mode/Data update mode



### ■ Technical Information(continued)

#### • I<sup>2</sup>C-bus(continued)

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

Sub	Data byte							
Address	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 : Combina- tion 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 I<sup>2</sup>C-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

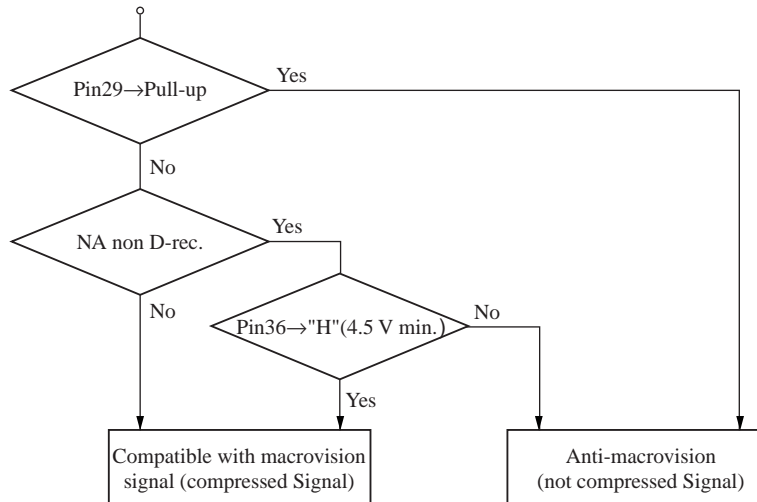
## ■ Technical Information(continued)

### • I<sup>2</sup>C-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 <sub>th</sub> = 2.5 V
75	NA-mute	—	Nor	Mute		V <sub>th</sub> = 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 $\Omega$

Note) \* : Anti-macrovision Specifications.



## ■ Technical Information(continued)

### • I<sup>2</sup>C-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
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■ Technical Information(continued)

• I<sup>2</sup>C-bus(continued)

4.Bus control(continued)

Function	Description	Appendx																																				
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