AN2145NFHP, AN2146FHP, AN2147FHP

CCD Video Camera Signal Processor ICs

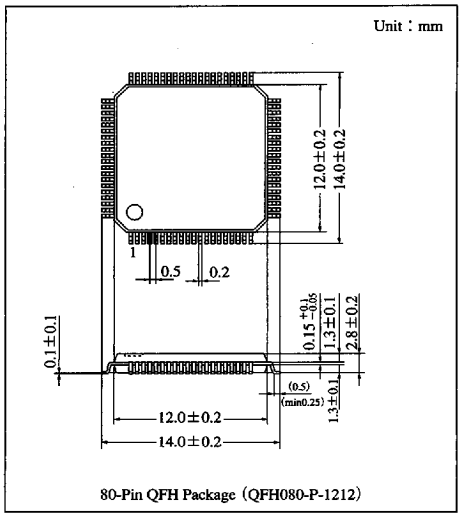
■ Overview

The AN2145NFHP is a CCD video camera signal processor IC for 510H CCD. It incorporates full chroma signal LPFs and horizontal aperture correction circuits. Because carrier-balance is rationalized and ajustment-free, adjustments and necessary external components are reduced half in number as compared with conventional versions of ours.

The AN2146FHP is for 670H CCD, and the AN2147FHP is for 768HCCD.

■ Features

- Improved color reproduction with 4-channel white balance
- Built-in high-luminance color-suppression circuit
- Improved S/N ratio at low brightness



80-Pin QFH Package (QFH080-P-1212)

■ Absolute Maximum Ratings (Ta=25 ℃)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	5.5	V
Supply current	I_{CC}	100	mA
Power dissipation Note 2)	P_D	357	mW
Operating ambient temperature Note 1)	T_{opr}	−20 to +75	℃
Storage temperature Note 1)	T_{stg}	−55 to +125	℃

Note 1) Ta=25℃ except operating ambient temperature and storage temperatures unless otherwise specified.
Note 2) Allowable power dissipation of the package at Ta=70℃.

■ Recommended Operating Range (Ta=25℃)

Parameter	Symbol	Range
Operating supply voltage range	V_{CC}	4.4V to 4.8V

■ Electrical Characteristics (V_{CC}=4.6V, Ta=25±2℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Total circuit current	Itot		42	60	78	mA
Reference voltage (or V_{REF} output voltage)	V_{REF}		1.68	1.8	1.92	V
Pulse separation level CPOB	V_{CPOB}		2.1	2.5	2.9	V
Pulse separation level PBLK	V_{PBLK}		0.6	1.0	1.4	V
Pulse separation level CP2	V_{CP2}		2.1	2.5	2.9	V
Pulse separation level CBLK	V_{CBLK}		0.6	1.0	1.4	V
Pulse separation level FH/2	$V_{FH/2}$		0.6	1.0	1.4	V
Pulse separation level SP	V_{SP}		0.4	0.8	1.2	V
Pulse separation level WBLK	V_{WBLK}		0.6	1.0	1.4	V
Pulse separation level SYNC	V_{DSYN}		1.1	1.5	1.9	V
Luminance AGC max. gain	V_{YMAX}	V_{65}=10STEP 50mV_{P-P}	22.5	26	28.5	dB
Luminance AGC mini. gain	V_{YMIN}	V_{65}=10STEP 1500mV_{P-P}	−9	−6	−4	dB
Color difference AGC min. gain Note A)	V_{CMAX}	V_{65}=Sin500kHz 50mV_{P-P}	22.5	26	28.5	dB
Color difference AGC max. gain Note A)	V_{CMIN}	V_{65}=Sin500kHz 1500mV_{P-P}	−9	−6	−4	dB
Luminance γ characteristics (1)	V_{YGAM1}	V_{69}=10STEP 1000mV_{P-P} 3rd step	350	470	600	mV_{P-P}
Luminance γ characteristics (2)	V_{YGAM2}	V_{69}=10STEP 1000mV_{P-P} 5 step	470	630	810	mV_{P-P}
Luminance γ characteristics (3)	V_{YGAM3}	V_{69}=10STEP 1000mV_{P-P} 10 step	720	970	1260	mV_{P-P}
Luminance fade characteristics	V_{YFADE}	V_{16}=10STEP 300mV_{P-P}	—	—	−26	dB
Horizontal AP generation circuit characteristics Note A)	V_{HAP}	V_{16}=Sin3.5kHz 100mV_{P-P}	18.5	22	24.5	dB
Base clip characteristics Note B)	V_{BCLIP}	V_{11}=Sin500kHz 40mV_{P-P}	—	—	60	mV_{P-P}
Output luminance signal amplitude	V_{YOUT}	V_{29}=10STEP 600mV_{P-P}	580	680	800	mV_{P-P}
Output high-clip characteristics	V_{HCLIP}	V_{29}=10STEP 1000mV_{P-P}	800	890	1100	mV
Output low-clip characteristics	V_{LCLIP}	V_{29}=10STEP 200mV_{P-P} (reverse)	−50	−28	−12	mV
Synchronous signal level	V_{SYNC}	V_{29}=C−GND	268	295	322	mV_{P-P}
Pedestal control characteristics (1)	V_{PED1}	V_{29}=C−GND	40	60	100	mV
Pedestal control characteristics (2)	V_{PED2}	V_{29}=C−GND	−30	−10	0	mV
Chroma clip characteristics Note B)	V_{CCLIP}	V_{20}=Sin3.5MHz 600mV_{P-P} (V_{29}=white signal)	—	—	−20	dB
S/H characteristics	V_{SH}	V_{65}=square wave 500kHz 1V_{P-P}	300	450	600	mV_{P-P}
Switch level	V_{SW}	V_{48}, V_{50}, V_{54}, V_{56}=C−GND	−12	0	12	mV
Switch DC offset	V_{SWOFF}	V_{48}, V_{50}, V_{54}, V_{56}=C−GND	−30	0	30	mV
RWB control characteristics	V_{RWB}	V_{56}=10STEP 200mV_{P-P}	420	580	760	mV_{P-P}
CY+G control characteristics	V_{CYG}	V_{54}=10STEP 200mV_{P-P}	420	580	760	mV_{P-P}
BWB control characteristics	V_{BWB}	V_{50}=10STEP 200mV_{P-P}	420	580	760	mV_{P-P}
YE+G control characteristics	V_{YEG}	V_{48}=10STEP 200mV_{P-P}	420	580	760	mV_{P-P}
R-Y matrix control characteristics	V_{RMAT}	V_{50}=10STEP 200mV_{P-P}	380	520	710	mV_{P-P}
B-Y matrix control characteristics	V_{BMAT}	V_{56}=10STEP 200mV_{P-P}	380	520	710	mV_{P-P}
γ control signal leak	V_{GAML}	V_{24}=10STEP 500mV_{P-P}	—	—	100	mV_{P-P}
Color difference γ characteristics (1)	V_{CGAM1}	V_{22}=10STEP 500mV_{P-P} V_{24}=10STEP 1V_{P-P} 3rd step	300	410	530	mV_{P-P}
Color difference γ characteristics (2)	V_{CGAM2}	V_{22}=10STEP 500mV_{P-P} V_{24}=10STEP 1V_{P-P} 5 step	380	530	690	mV_{P-P}

Note A) Sine wave with BLK and pedestal
Note B) Sine wave with BLK
The value in the above characteristics is not a guaranteed value, but reference one on design.

ICs for Video Camera

■ Electrical Characteristics (cont.) (V_{CC}=4.6V, Ta=25±2℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Color difference γ characteristics (3)	V_{CGAM3}	V_{22}=10STEP 500mV_{P-P} V_{24}=10STEP 1V_{P-P} 10 step	510	720	930	mV_{P-P}
Between channels γ characteristics	V_{GAM4}	V_{23}=10STEP 500mV_{P-P} V_{24}=10STEP 1V	−2	0	2	dB
Color difference gain control characteristics (1) Note B)	V_{CGC1}	V_{22}=Sin500kHz 600mV_{P-P}	700	1150	1500	mV_{P-P}
Color difference gain control characteristics (2) Note B)	V_{CGC2}	V_{23}=Sin500kHz 600mV_{P-P}	700	1150	1500	mV_{P-P}
Iris γ characteristics (1)	V_{IGAM1}	V_5=10STEP 1V_{P-P} 3rd step	220	300	390	mV_{P-P}
Iris γ characteristics (2)	V_{IGAM2}	V_5=10STEP 1V_{P-P} 5 step	350	480	620	mV_{P-P}
Iris γ characteristics (3)	V_{IGAM3}	V_5=10STEP 1V_{P-P} 10 step	470	630	800	mV_{P-P}
Luminance signal blanking level	V_{YBLK}	V_{69}=C−GND	−20	0	20	mV
Iris signal blanking level	V_{IBLK}	V_5=C−GND	−20	0	20	mV
R-Y blanking level	V_{RBLK}	V_{22}=C−GND	−20	0	20	mV
B-Y blanking level	V_{BBLK}	V_{23}=C−GND	−20	0	20	mV
VAP generation circuit gain Note C)	V_{VAP}	V_{54}=10STEP 200mV_{P-P} V_{56}=10STEP 200mV_{P-P}	310	450	610	mV_{P-P}
Edge suppression characteristics (1) Note B)	V_{EDGE1}	V_{22}=Sin500kHz 600mV_{P-P}	—	—	−20	dB
Edge suppression characteristics (2) Note B)	V_{EDGE2}	V_{23}=Sin500kHz 600mV_{P-P}	—	—	−20	dB
Luminance high-cut characteristics	V_{HC}	V_{65}=10STEP 1500mV_{P-P}	—	350	—	mV
AP mix circuit luminance amplification characteristics	V_{APY}	V_{16}=10STEP 300mV_{P-P}	—	6.9	—	dB
Horizontal APDL group delay Note A, D)	V_{APDL}	V_{16}=Sin3.5MHz 100mV_{P-P}	—	120	—	ns
Aperture mix circuit HAP gain Note B)	V_{APHAP}	V_{13}=Sin3.5MHz 600mV_{P-P}	—	3.4	—	dB
Aperture mix circuit VAP gain Note B, E)	V_{APVAP}	V_{11}=Sin500kHz 600mV_{P-P}	—	3.3	—	dB
Aperture suppression characteristics Note B)	V_{LLSP}	V_{13}=Sin3.5MHz 600mV_{P-P}	—	−12	—	dB
White fade characteristics	V_{WFADE}	V_{16}=Vref	—	515	—	mV
Delay signal amp. gain (1) Note A)	V_{DLAMP1}	V_{37}=Sin500kHz 500mV_{P-P} (V_{38}=0.5V)	—	0	—	dB
Delay signal amp. gain (2) Note A)	V_{DLAMP2}	V_{42}=Sin500kHz 500mV_{P-P} (V_{41}=0.5V)	—	0	—	dB
Delay signal amp. gain (3) Note A)	V_{DLAMP3}	V_{37}=Sin500kHz 500mV_{P-P} (V_{38}=3.0V)	—	8	—	dB
Delay signal amp. gain (4) Note A)	V_{DLAMP4}	V_{42}=Sin500kHz 500mV_{P-P} (V_{41}=3.0V)	—	8	—	dB
Color difference high-clip characteristics Note B)	V_{CHC}	V_{22}=V_{23}=Sin500kHz 600mV_{P-P} (V_5=white)	—	−26	—	dB
Color difference fade characteristics Note B)	V_{CFADE}	V_{22}=V_{23}=Sin500kHz 600mV_{P-P}	—	−26	—	dB
S/H LPF characteristics Note A)	V_{SHLPF}	V_{65}=Sin3.5MHz 1500mV_{P-P}	—	−30	—	dB
Color difference LPF characteristics Note B)	V_{CLPF}	V_{22}=V_{23}=Sin3.5MHz 600mV_{P-P}	—	−26	—	dB
VAP LPF characteristics (1) Note A)	V_{VLPF1}	V_{48}=V_{50}=Sin500kHz 200mV_{P-P}	—	0	—	dB
VAP LPF characteristics (2) Note A)	V_{VLPF2}	V_{48}=V_{50}=Sin3.5MHz 200mV_{P-P}	—	−25	—	dB
Edge HPF characteristics Note A)	V_{EHPF}	V_{54}=V_{56}=Sin500kHz 500mV_{P-P}	—	−4	—	dB

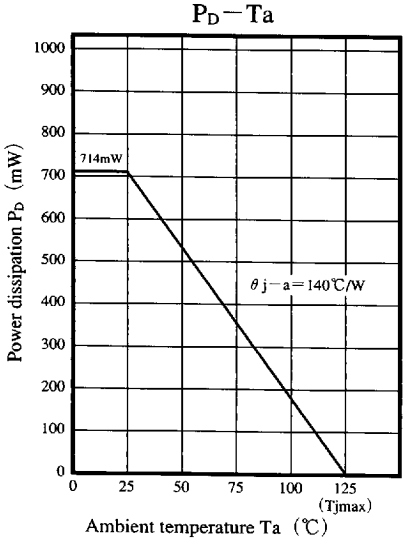
Note A) Sine waves with BLK and pedestal
Note B) Sine waves with BLK
Note C) For the AN2147FHP, 450mV_{P-P} min., 665mV_{P-P} typ., and 880mV_{P-P} max. under the conditions V_{48}=10STEP 200mV_{P-P} and V_{50}=10STEP 200mV_{P-P}.
Note D) 90ns typ. for the AN2146FHP and the AN2147FHP
Note E) 6.0dB typ. for the AN2147FHP
The value in the above characteristics is not a guaranteed value, but reference one on design.

■ Pin Descriptions

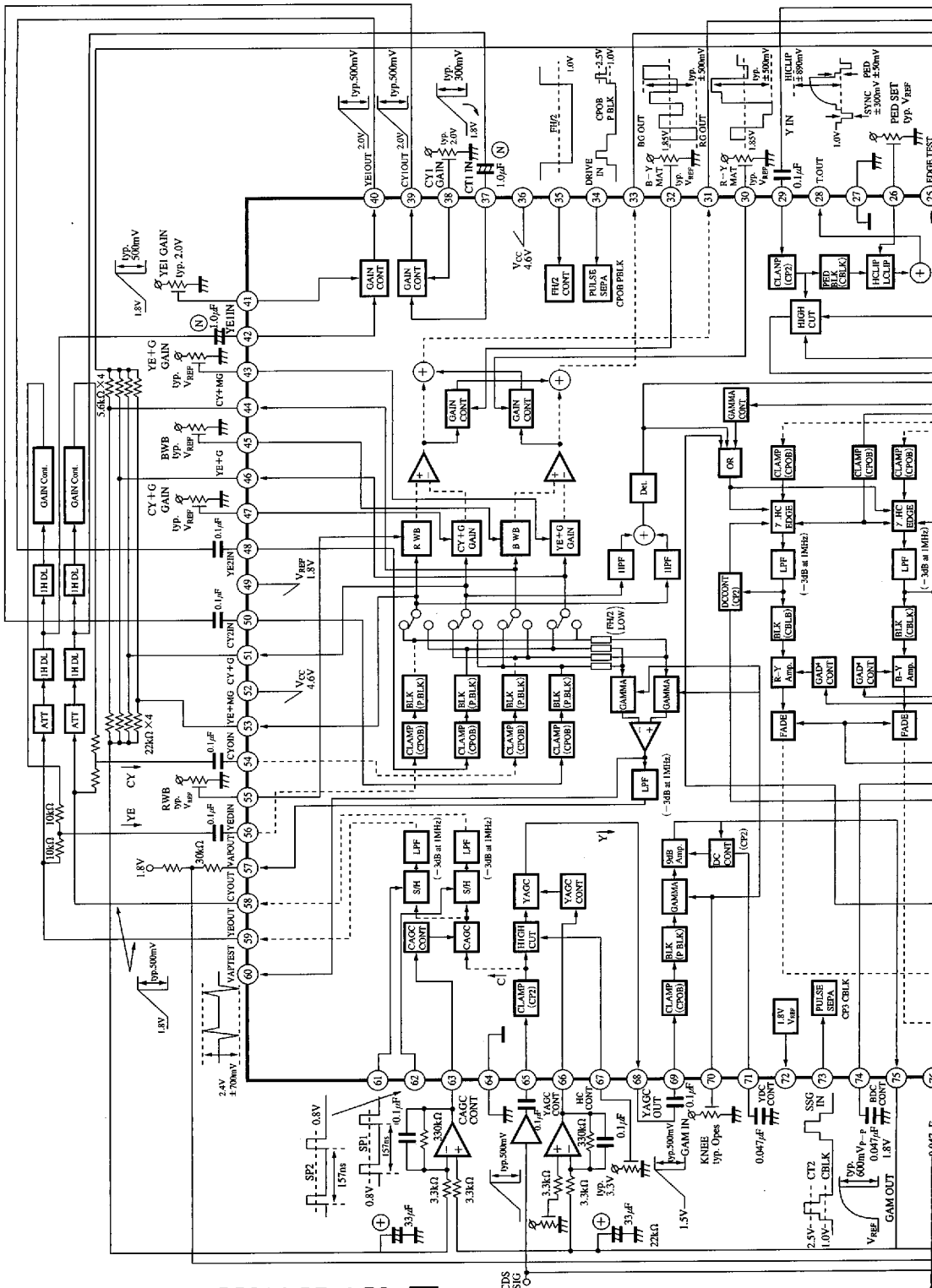
Pin No.	Pin name	Pin No.	Pin name
1	R−Y · Out	21	Dclamp
2	WBLK · In	22	R−Y · In
3	Iris · Out	23	B−Y · In
4	BLK · Out	24	Cγ · Cont
5	Iris · In	25	Edge · Test
6	BW · Fade	26	Ped · Set
7	Fade · In	27	GND1
8	R−Y · Gain	28	Y · Out
9	Fade · Out	29	Y · In
10	B−Y · Gain	30	R−Y · Matrix
11	VAP · In	31	RG · Out
12	Vref1 (Typ. 1.8V In)	32	B−Y · Matrix
13	HAP · In	33	BG · Out
14	HAP · Out	34	Drive · In (Cpob, P. Blk)
15	Sync · In	35	FH2 · In
16	DL · In	36	V_{CC2} (Typ. 4.6V)
17	Chroma · Clip	37	CY1 · In
18	Chroma · Out	38	CY1 · Gain
19	V_{CC1} (Typ. 4.6V)	39	CY1 · Out
20	Chroma · In	40	YE1 · Out

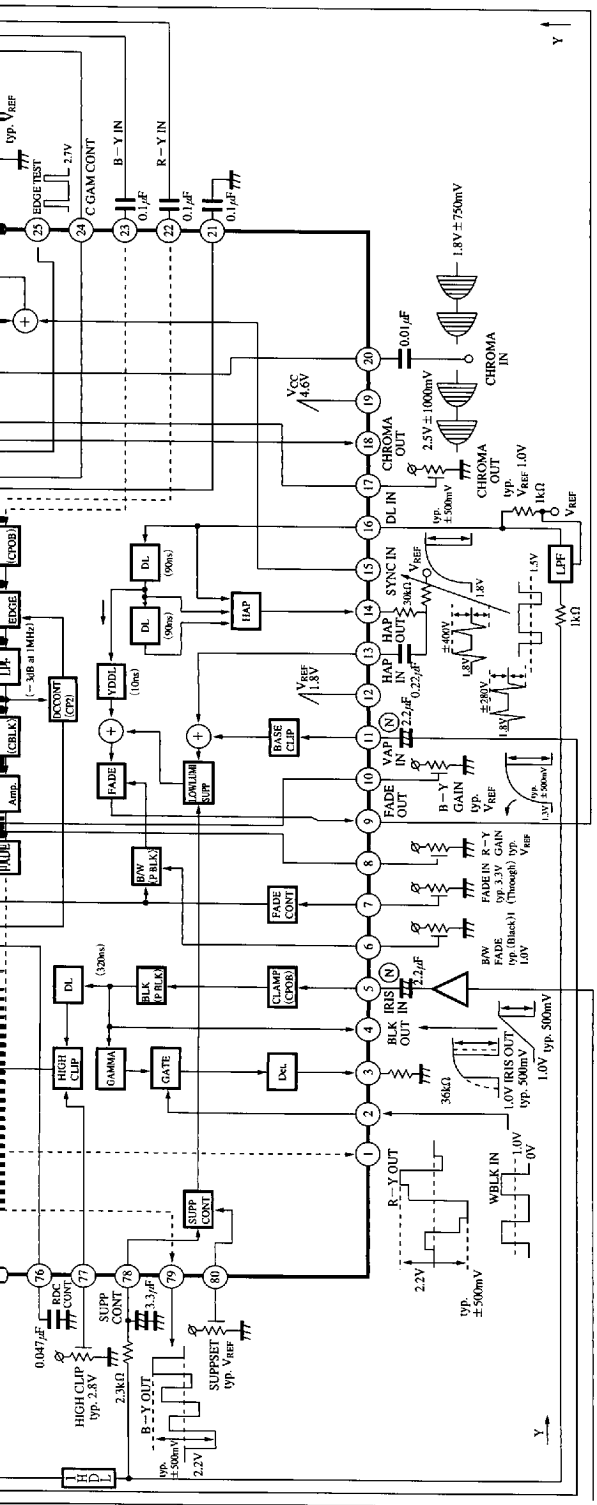
Pin No.	Pin name	Pin No.	Pin name
41	YE1 · Gain	61	SP1 · In
42	YE1 · In	62	SP2 · In
43	YE+G · Gain	63	CAGC · Cont
44	CY+Mg · Out	64	GND2
45	BWB · Gain	65	Sig · In
46	YE+G · Out	66	YAGC · Cont
47	CY+G · Gain	67	HC · Cont
48	YE2 · In	68	YAGC · Out
49	Vref2 (Typ. 1.8V In)	69	γ · In
50	CY2 · In	70	Knee · Cont
51	CY+G · Out	71	YDC · Cont
52	V_{CC3} (Typ. 4.6V)	72	Vref (Typ. 1.8V Out)
53	YE+MG · Out	73	SSG · In (Cp2, C. Blk)
54	CY0 · In	74	BDC · Cont
55	RWB · Gain	75	γ · Out
56	YE0 · In	76	RDC · Cont
57	VAP · Out	77	High · Clip
58	CY · Out	78	SUPP · Cont
59	YE · Out	79	B−Y · Out
60	VAP · Test	80	SUPP · Set

■ Reference



■ Block Diagrams (AN2145NFHP, AN2146FHP)





■ Block Diagram (AN2147FHP)