

# AN2145NFHP, AN2146FHP, AN2147FHP

## CCD Video Camera Signal Processor ICs

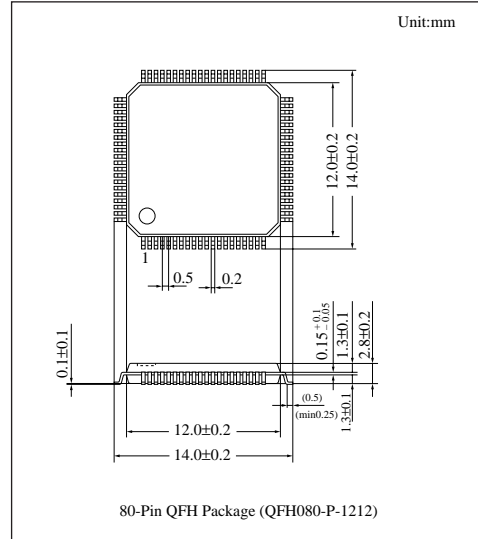
### ■ Overview

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 adjustment-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



### ■ Absolute Maximum Ratings (Ta=25 °C)

Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	5.5	V
Supply current	I <sub>CC</sub>	100	mA
Power dissipation <sup>Note 2)</sup>	P <sub>D</sub>	357	mW
Operating ambient temperature <sup>Note 1)</sup>	T <sub>opr</sub>	-20 to +75	°C
Storage temperature <sup>Note 1)</sup>	T <sub>stg</sub>	-55 to +125	°C

Note 1) Ta=25°C except operating ambient temperature and storage temperatures unless otherwise specified.

Note 2) Allowable power dissipation of the package at Ta=70°C.

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

Parameter	Symbol	Range
Operating supply voltage range	V <sub>CC</sub>	4.4V to 4.8V

## ■ Electrical Characteristics (VCC=4.6V, Ta=25±2°C)

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

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.

## ■ Electrical Characteristics (cont.) (VCC=4.6V, Ta=25±2°C)

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

Note A) Sine waves with BLK and pedestal

Note B) Sine waves with BLK

Note C) For the AN2147FHP, 450mV<sub>P-P</sub> min., 665mV<sub>P-P</sub> typ., and 880mV<sub>P-P</sub> max. under the conditions

V<sub>48</sub>=10STEP 200mV<sub>P-P</sub> and V<sub>50</sub>=10STEP 200mV<sub>P-P</sub>.

Note D) 90ns typ. for the AN2146FHP and the AN2147FHP

Note E) 6.0dB typ. for the AN2147FHP

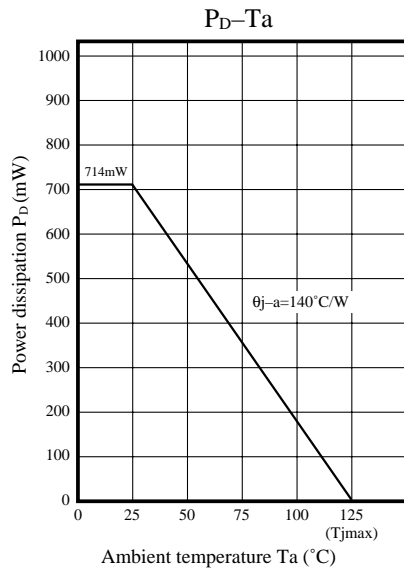
The value in the above characteristics is not a guaranteed value, but reference one on design.

## Pin Descriptions

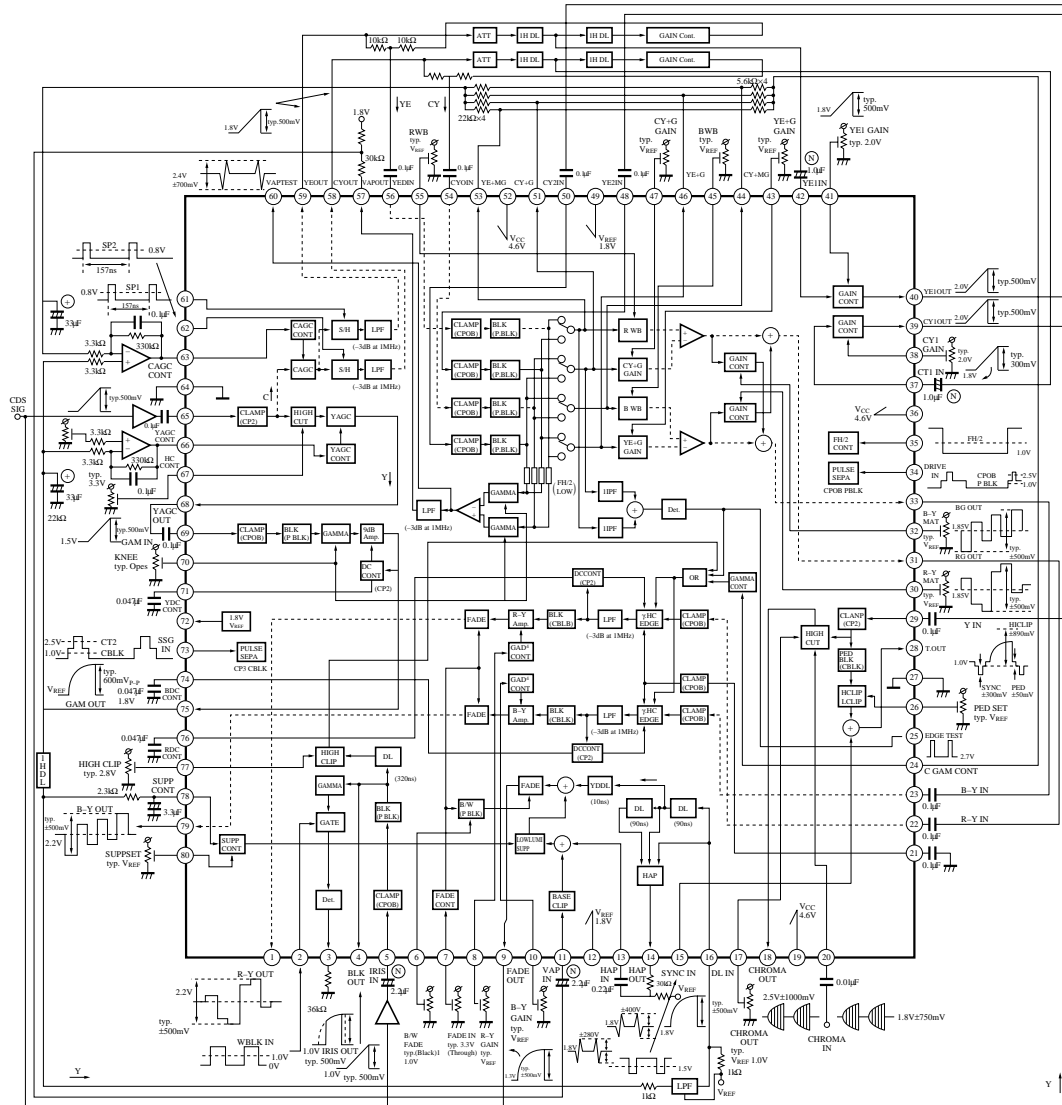
Pin No.	Pin name	Pin No.	Pin name
1	R-Y-Out	21	Dclamp
2	WBLK-In	22	R-Y-In
3	Iris-Out	23	B-Y-In
4	BLK-Out	24	C $\gamma$ -Cont
5	Iris-In	25	Edge-Test
6	BW-Fade	26	Ped-Set
7	Fade-In	27	GND1
8	R-Y-Gain	28	Y-Out
9	Fade-Out	29	Y-In
10	B-Y-Gain	30	R-Y-Matrix
11	VAP-In	31	RG-Out
12	Vref1 (Typ. 1.8V In)	32	B-Y-Matrix
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 <sub>CC2</sub> (Typ. 4.6V)
17	Chroma-Clip	37	CY1-In
18	Chroma-Out	38	CY1-Gain
19	V <sub>CC1</sub> (Typ. 4.6V)	39	CY1-Out
20	Chroma-In	40	YE1-Out

Pin No.	Pin name	Pin No.	Pin name
41	YE1-Gain	61	SPI-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	$\gamma$ -In
50	CY2-In	70	Knee-Cont
51	CY+G-Out	71	YDC-Cont
52	V <sub>CC3</sub> (Typ. 4.6V)	72	Vre (Typ. 1.8V Out)
53	YE+MG-Out	73	SSG-In (Cp2, C. Blk)
54	CY0-In	74	BDC-Cont
55	RWB-Gain	75	$\gamma$ -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)

