M52370AFP

S-VHS SYSTEM VCR CHROMA SIGNAL PROCESSOR

DESCRIPTION

With visual systems becoming increasingly larger and more sophisticated, the demand is growing for video cassette recorders that are able to reproduce high-definition images. We have developed many signal processing ICs for use with such VCRs. One of our latest developments, M52370AFP, is for use with advanced PAL VCRs. A single chip has all functions that are necessary to process PAL color signals. It is equipped with a color noise reduction (CNR) circuit that reduces color noise, ensuring improved image quality.

FEATURES

- Can be used with either NTSC, PAL, or MESECAM system.
- Built-in CNR circuit prevents color noise, improving color signal S/N.
- The CNR circuit has an uncorrelation prohibition input, preventing color blur.
- Direct conversion system is used, reducing the number of external BPF.
- Recording low-pass filter is built in, reducing the number of external circuits.
- Automatic color control is provided for each field, reducing amplitude modulation noise.
- High-speed ACC is used in the trick mode, improving responding characteristics.
- Differential phase correcting function prevents tint failure at picture corners during PAL playback.
- Automatic frequency control current correction function prevents tint disorder at picture corners during recording.
- Dropout preventing input is provided, improving coloring after noise bar.

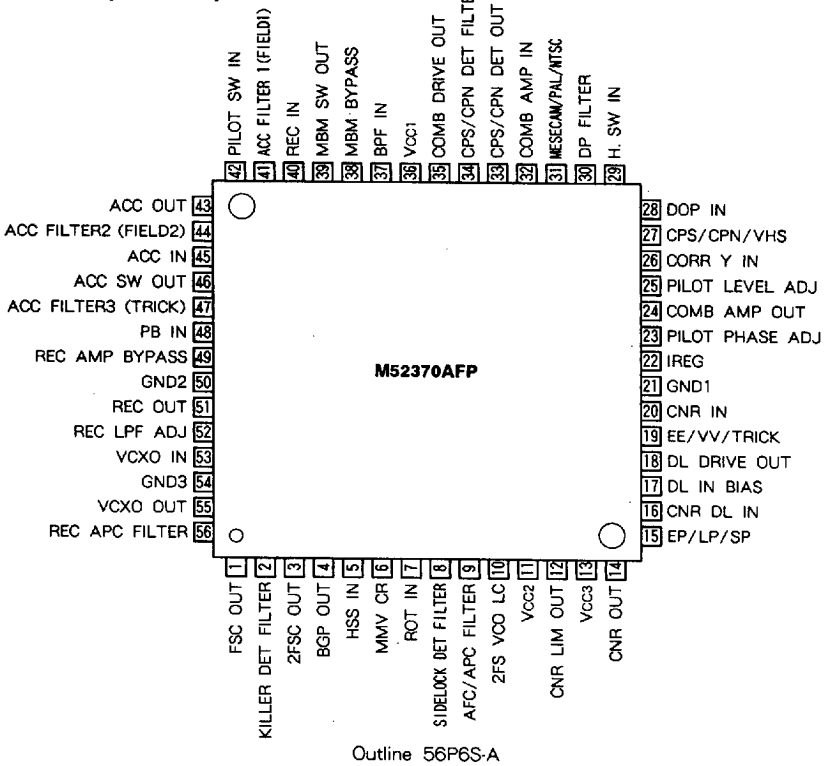
APPLICATION

S-VHS and VHS VCR

RECOMMENDED OPERATING CONDITION

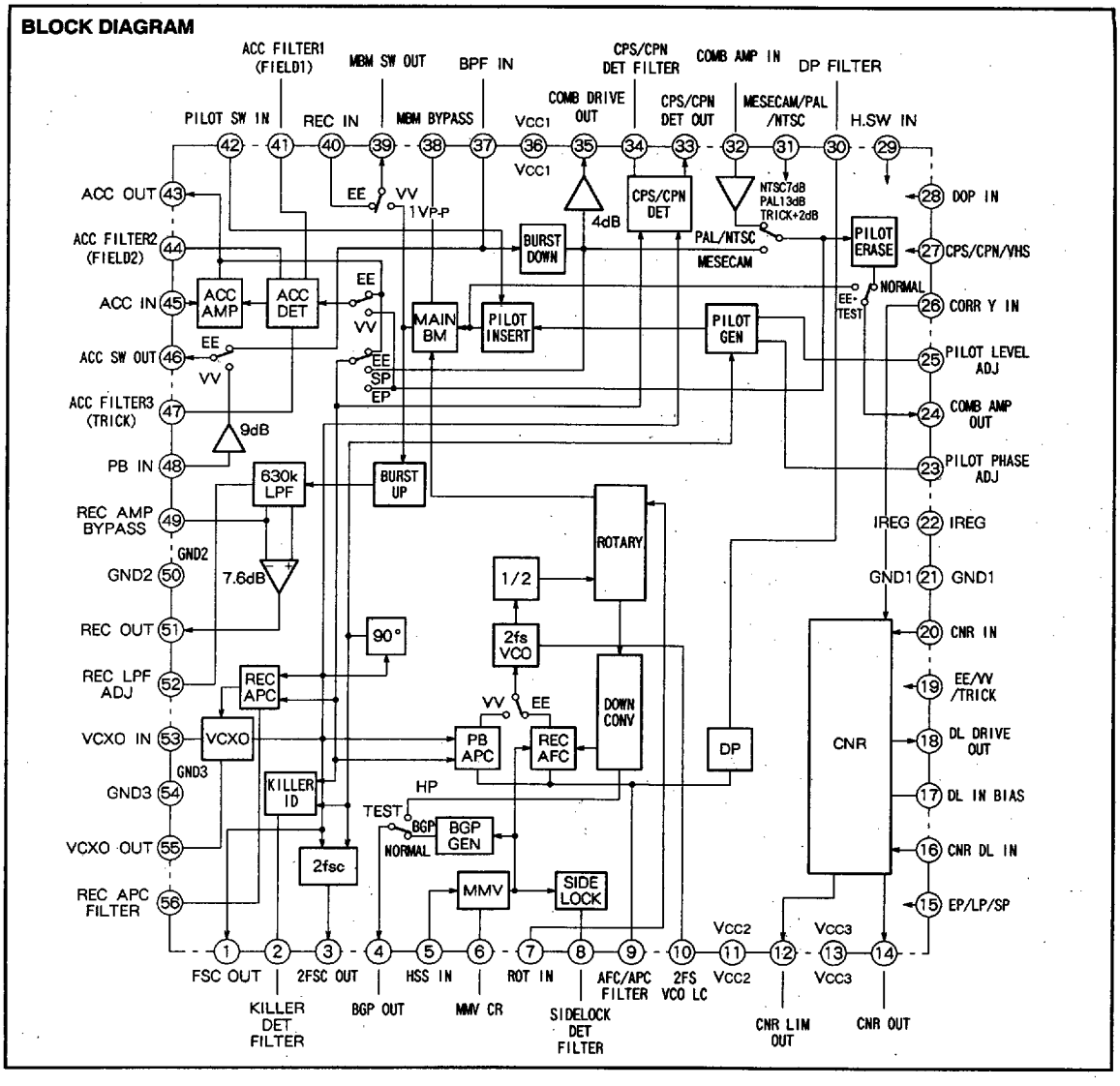
Supply voltage range ..... 4.5~5.5V
Rated supply voltage 5V

PIN CONFIGURATION (TOP VIEW)



Outline 56P6S-A

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta = 25℃ unless otherwise noted)

Symbol	Parameter	Ratings	Unit
Vcc	Supply voltage	6	V
Pd	Power dissipation	1.47	W
Topr	Operating temperature	−20~75	℃
Tstg	Storage temperature	−40~125	℃
Kθ	Thermal derating (Ta≧25℃;as on circuit board)	14.7	mW/℃

ELECTRICAL CHARACTERISTICS (Ta = 25℃, Vcc = 5.0V unless otherwise noted)

Symbol	Parameter	Test conditions					Limits			Unit
		Input	Measured item	Mode	Adjustment circuit	Remarks	Min.	Typ.	Max.	
ADvco	VCO adjustment				A					
ADvi	Pilot adjustment				A					
ADcnr	CNR adjustment				B					
Icc	Circuit current	Vcc = 5.0V	Measure currents that flow to pins ⑪, ⑬ and ㊳.	PAL VV SP			65	85	105	mA
GPI	PB input amplifier gain	Pin㊽ : 630kHz Sine wave : 0.1VP-P	Measure pin㊻ input/output amplitude ratio.	PAL VV SP			7.0	9.0	11.0	dB
Vracc	RECACC output amplitude	Pin⑤:15.625kHz sync input Pin㊵:Reference chroma input (chroma 0.5VP-P)	Measure pin㊸ chroma amplitude.	PAL EE SP			0.4	0.5	0.6	VP-P
Cracc1	RECACC control range 1	Pin⑤ : Sync input Pin㊵ : Reference chroma inpt (+6dB)	Measure pin㊸ chroma amplitude.	PAL EE SP		Ratio in amplitude to Vracc	0.0		3.0	dB
Cracc2	RECACC control range 2	Pin⑤ : Sync input Pin㊵ : Reference chroma input (−18dB)	Measure pin㊸ chroma amplitude.	PAL EE SP		Ratio in amplitude to Vracc	−3.0		0.0	dB
Vpacc	PBACC output amplitude	Pin⑤:Sync input Pin㊾:Low frequency converted chroma input (chroma70mVP-P)	Measure pin㉔ chroma amplitude.	PAL VV SP			0.4	0.5	0.6	VP-P
Cpacc1	PBACC control range 1	Pin⑤:Sync input Pin㊾:Low frequency converted chroma input (chroma+6dB)	Measure pin㉔ chroma amplitude.	PAL VV SP		Ratio in amplitude to Vpacc	0.0		3.0	dB
Cpacc2	PBACC control range 2	Pin⑤:Sync input Pin㊾:Low frequency converted chroma input (chroma−18dB)	Measure pin㉔ chroma amplitude.	PAL VV SP		Ratio in amplitude to Vpacc	−3.0		0.0	dB
Gmbm	Main BM gain	Pin㊷ : 630kHz, sine wave 0.5VP-P Pin㊽ : 0V (BM/L)	Measure pin㊴ input/output amplitude ratio.	PAL VV SP			6.0	7.0	8.0	dB
CLmbm	Main BM carrier leak	Pin㊷ : 630kHz, sine wave 0.5VP-P Pin⑩ :10.12MHz, sine wave 1.0VP-P	Measure 5.06MHz element with reference to 4.43MHz element at pin㊴.	PAL VV SP			−	−45	−35	dB
SPmbm	Main BM spurious	Pin㊷ : 630kHz, sine wave 0.5VP-P Pin⑩ :10.12MHz, sine wave 1.0VP-P	Measure 3.81MHz element with reference to 4.43MHz element at pin㊴.	PAL VV SP			−	−45	−35	dB
DGbu	BURST UP rate	Pin㊵ : 4.43MHz, sine wave 0.5VP-P Pin⑤ : Sync input	Measure gain ratio between chroma section and burst section at pin㊿.	NTSC EE SP			5.0	6.0	7.0	dB
Gro1	RECOUT gain 1	Pin㊷ : 630kHz, sine wave 0.5VP-P Pin㊽ : 0V (BM/L)	Measure pin㊿ input/output amplitude ratio.	PAL EE SP			3.0	4.4	6.0	dB
Gro2	RECOUT gain 2	Pin㊷ : 4.43MHz, sine wave 0.5VP-P Pin㊽ : 0V (BM/L)	Measure pin㊿ input/output amplitude ratio.	PAL EE SP			−	−35	−20	dB
Gbd	BURST DOWN gain	Pin㊼ : 4.43MHz, sine wave 0.2VP-P	Measure pin㊺ input/output amplitude ratio.	PAL VV SP			9.5	11.5	13.5	dB
Gbd2	BURST DOWN gain 2	Pin㊼ : 4.43MHz, sine wave 0.2VP-P	Measure pin㉔ input/output amplitude ratio.	SECAM VV SP			7.0	8.0	9.0	dB

ELECTRICAL CHARACTERISTICS (cont.) (Ta = 25℃, Vcc = 5.0V unless otherwise noted)

Symbol	Parameter	Test conditions					Limits			Unit
		Input	Measured item	Mode	Adjustment circuit	Remarks	Min.	Typ.	Max.	
DGbd	BURST DOWN rate	Pin㉗ : 4.43MHz, sine wave 0.2Vp-p Pin⑤ : Sync input	Measure pin㉕ amplitude in burst section and chroma section.	NTSC VV SP		Gain ratio between chroma section and burst section	−6.5	−5.5	−4.5	dB
GCOM1	COMB amplifier gain 1	Pin㉜ : 4.43MHz Sine wave : 0.2Vp-p	Measure pin㉔ input/output amplitude ratio.	NTSC VV SP			5.0	6.5	8.0	dB
GCOM2	COMB amplifier gain 2	Pin㉜ : 4.43MHz Sine wave : 0.2Vp-p	Measure pin㉔ input/output amplitude ratio.	NTSC TRICK SP			7.0	8.5	10.0	dB
GCOM3	COMB amplifier gain 3	Pin㉜ : 4.43MHz Sine wave : 0.1Vp-p	Measure pin㉔ input/output amplitude ratio.	PAL VV SP			11.0	13.0	15.0	dB
GCOM4	COMB amplifier gain 4	Pin㉜ : 4.43MHz Sine wave : 0.1Vp-p	Measure pin㉔ input/output amplitude ratio.	PAL TRICK SP			13.0	15.0	17.0	dB
Gcnr1	CNR gain 1	Pin㉙ : 4.433619MHz Sine wave : 0.5Vp-p	Measure pin⑭ input/output amplitude ratio.	PAL VV SP			2.0	4.0	6.0	dB
Gcnr2	CNR gain 2	Pin㉙4.433619MHz Sine wave : 0.5Vp-p Pin㉘ : 0V	Measure pin⑭ input/output amplitude ratio.	PAL VV SP			2.0	4.0	6.0	dB
Ncnr1	CNR serration depth 1	Pin㉙ : 4.429713MHz Sine wave 0.05Vp-p	Measure pin⑭ output amplitude ratio.	PAL VV SP		Ratio in amplitude to Gcnr1 output	−	−10.0	−5.0	dB
Ncnr2	CNR serration depth 2	Pin㉙ : 4.429713MHz Sine wave 0.16Vp-p	Measure pin⑭ output amplitude ratio.	PAL VV SP		Ratio in amplitude to Gcnr1 output	−	−3.0	−1.0	dB
Vcnrd1	CNR DL drive gain	Pin㉙ : 4.433619MHz Sine wave 0.5Vp-p	Measure pin⑱ input/output amplitude ratio.	PAL VV SP			2.0	4.0	6.0	dB
Vvcxo	VCXO output level		Measure pin① output amplitude.	PAL VV SP			0.3	0.5	0.7	Vp-p
V2fsc	2FSC output level		Measure pin③ output amplitude (R.L.C. load).	PAL EE SP			0.3	0.5	0.7	Vp-p
Idopsld	Side lock inhibition during DOP	Pin⑩ : 1Vp-p, 11MHz Pin⑤ : Sync input Pin㉘ : 0V	Check that there is no output from pin⑧.	VV SP			−	0.0	0.0	kHz
Vkilh	Output voltage during killer operation	Pin② : 0V (KILLER)	Measure pin㊶ DC voltage.	PAL EE SP			3.0	3.4	3.8	V
DET PB1	Pilot burst distinguish item 1	Pin㊽:Reference low frequency converted chroma(pilot/burst phase, V axis) Pin⑤:Sync input Pin㉗:2.5V or 5V	Measure pin㉝ voltage	PAL VV SP		Composite	4.5	5.0	−	V
DET PB2	Pilot burst distinguish item 2	Pin㊽:Reference low frequency converted chroma(pilot/burst phase, −V axis) Pin⑤:Sync input Pin㉗:2.5V or 5V	Measure pin㉝ voltage	PAL VV SP		Component	−	0	0.5	V

ELECTRICAL CHARACTERISTICS (cont.) (Ta = 25℃, Vcc = 5.0V unless otherwise noted)

Symbol	Parameter	Test conditions					Limits			Unit
		Input	Measured item	Mode	Adjustment circuit	Remarks	Min.	Typ.	Max.	
Vireg	IREG voltage		Measure pin㉒ voltage	PAL VV SP			3.1	3.5	3.9	V
MDcnr1	CNR operation mode 1	Pin⑯ : 4.43MHz 0.1Vp-p	Measure pin⑫ output amplitude.	PAL VV SP			60	100	140	mVp-p
MDcnr2	CNR operation mode 2	Pin⑯ : 4.43MHz 0.1Vp-p Pin㉕ : 5V	Measure pin⑫ output amplitude.	PAL VV SP			–	0	30	mVp-p
MDcnr3	CNR operation mode 3	Pin⑯ : 4.43MHz 0.1Vp-p	Measure pin⑫ output amplitude.	NTSC VV SP			–	0	30	mVp-p
MDcnr4	CNR operation mode 4	Pin⑯ : 4.43MHz 0.1Vp-p Pin㉕ : 5V	Measure pin⑫ output amplitude.	NTSC VV SP			60	100	140	mVp-p
Vdsw	Unrelated input sensitivity	Pin㉖:20kHz Input level variable Pin⑳:4.43MHz, 0.5Vp-p	Measure input amplitude when pin⑫ output disappears.	PAL VV SP			50	100	150	mVp-p

Notes 1. The current flow to IC is expressed with mark "+."

2. To switch the mode : Pin㉛ : MESECAM = Vcc PAL = 1/2VCC NTSC = GND
Pin⑲ : EE = Vcc VV = 1/2Vcc TRICK = GND
Pin⑮ : EP = Vcc LP = 1/2Vcc SP = GND

ELECTRICAL CHARACTERISTICS TEST METHODE

Icc

Measure current (Icc) to pins⑪, ⑬and ㊳ when CNR is in operation.

GPI

When pin㊽ input signal level is 0.1V_{P-P}, measure 630kHz signal level V_2 at pin㊻, and calculate with an equation given below :

$$GPI = 20 \log \frac{V_2}{0.1V_{P-P}} \text{ (dB)}$$

Vracc

Input HSS to pin⑤, and input reference chroma (chroma section signal level : 0.5V_{P-P}) that is synchronous with HSS to pin㊸. Measure chroma signal level V_3 at pin㊸.

$Vracc_1$, $Vracc_2$

Under the same conditons as for Vracc measurement, set pin㊵ signal level to + 6dB and − 18dB. Measure chroma section signal levels V_4 and V_5 at pin ㊸, and calculate with equations given below :

$$Vracc_1 = 20 \log \frac{V_4}{V_3} \text{ (dB)}$$

$$Vracc_2 = 20 \log \frac{V_5}{V_3} \text{ (dB)}$$

Vpacc

Input HSS to pin⑤, and input low-pass chroma (chroma section signal level : 70mV_{P-P}) that is synchronous with HSS to pin㊽. Measure chroma signal level V_6 at pin㉔.

$Vpacc_1$, $Vpacc_2$

Under the same conditions as for Vpacc measurement, set pin㊽ signal level to + 6dB and − 18dB. Measure chroma section signal levels V_7 and V_8 at pin㉔, and calculate with equations given below :

$$Vracc_1 = 20 \log \frac{V_7}{V_6} \text{ (dB)}$$

$$Vracc_2 = 20 \log \frac{V_8}{V_6} \text{ (dB)}$$

Gmbm

When pin㊷ input signals are a sine wave of 0.5V_{P-P} and 630kHz, measure pin㊴ 630kHz element signal level V_9 when pin㊽ output 0V. Calculate with an equation given below :

$$Gmbm = 20 \log \frac{V_9}{0.5V_{P-P}} \text{ (dB)}$$

CLmbm, SPmbm

When pin㊷ input signals are a sine wave of 0.5V_{P-P} and 630kHz, as well as when pin⑩ input signals are 1.0V_{P-P} and 10.12MHz, measure pin㊴ 3.81MHz element V_{381}, 4.43MHz element V_{443} and 5.06MHz element V_{506}.

$$CLmbm = 20 \log \frac{V_{506}}{V_{443}} \text{ (dB)}$$

$$SPmbm = 20 \log \frac{V_{381}}{V_{443}} \text{ (dB)}$$

DGbu

Input HSS to pin⑤, and input a sine wave of 0.5V_{P-P} and 4.43MHz to pin㊵. Measure pin㊶ chroma section level $V_{12\text{-}1}$ and burst section level $V_{12\text{-}2}$. Calculate with an equation given below :

$$DGbu = 20 \log \frac{V_{12\text{-}2}}{V_{12\text{-}1}} \text{ (dB)}$$

Gro_1

When pin㊷ input signals are a sine wave of 0.5V_{P-P} and 630kHz, and when pin㊽ output is 0V, measure pin㊶ signal level V_{13}. Calculate with an equation given below :

$$Gro_1 = 20 \log \frac{V_{13}}{0.5V_{P-P}} \text{ (dB)}$$

Gro_2

When pin㊷ input signals are a sine wave of 0.5V_{P-P} and 4.43MHz, and when pin㊽ output is 0V, measure pin㊶ signal level V_{14}. Calculate with an equation given below :

$$Gro_2 = 20 \log \frac{V_{14}}{0.5V_{P-P}} \text{ (dB)}$$

Gdb, Gdb_2

When pin㊲ input signals are a sine wave of 0.2V_{P-P} and 4.43MHz, measure pin㊺ and pin㉔ signal levels V_{15} and V_{16}. Calculate with an equation given below :

$$Gbd = 20 \log \frac{V_{15}}{0.2V_{P-P}} \text{ (dB)}$$

$$Gbd_2 = 20 \log \frac{V_{16}}{0.2V_{P-P}} \text{ (dB)}$$

DGbd

Input HSS to pin⑤, and input a sine wave of 0.2V_{P-P} and 4.43MHz to pin㊲. Measure pin㊺ chroma section level $V_{17\text{-}1}$ and burst section level $V_{17\text{-}2}$. Calculate with an equation given below :

$$DGbd = 20 \log \frac{V_{17\text{-}2}}{V_{17\text{-}1}} \text{ (dB)}$$

G_{COM1}, G_{COM2}, G_{COM3}, G_{COM4}

Input a sine wave of 0.2V_{P-P} and 4.43MHz to pin㊷, and measure pin㉔ signal levels V_{18}, V_{19}, V_{20} and V_{21}. Calculate with an equation given below :

$$G_{COM1} = 20 \log \frac{V_{18}}{0.2V_{P-P}} \text{ (dB)}$$

Calculate G_{COM2}, G_{COM3} and G_{COM4} in the same way.

$Gcnr_1$, $Gcnr_2$

Input a sine wave of 0.5V_{P-P} and 4.433619MHz to pin㉑, and measure pin⑭ signal level V_{22}. Calculate with an equation given below :

$$Gcnr_1 = 20 \log \frac{V_{22}}{0.5V_{P-P}} \text{ (dB)}$$

For $Gcnr_2$, set pin㊳ ouput to 0V.

Ncnr1, Ncnr2

Measure under the same conditions as for Gcnr1, except that pin㉑ level is set to 0.05V_{P-P} and 0.16V_{P-P}. Measure pin⑭ levels V_{24} and V_{25}, respectively, and calculate with equations given below :

$$Ncnr1 = 20 \log \frac{V_{24}}{V_{22}} \quad [dB]$$

$$Ncnr2 = 20 \log \frac{V_{25}}{V_{22}} \quad [dB]$$

Vcnrd1

Input a sine wave of 0.5V_{P-P}, 4.433619MHz to pin㉑, and measure pin⑱ signal level V_{26}. Calculate with an equation below :

$$Vcnrd1 = 20 \log \frac{V_{26}}{0.5V_{P-P}} \quad [dB]$$

Vvcxo

Measure the pin① signal level.

V2fsc

Measure the pin③ signal level.

Idopsld

Input HSS to pin⑤, and input a sine wave of 1V_{P-P} and 11MHz to pin⑩. Then check that there is no output from pin⑧. Pin㉘ output is set to 0V.

Vkilh

Set pin② to 0V, and measure pin㊶ voltage.

DET PB1

Input HSS to pin⑤, and input low-pass chroma signal that is synchronous with HSS to pin㊽. Measure pin㉝ voltage.

Pilot burst phase : V axis

Pin㉗ : 5V

DET PB2

Input HSS to pin⑤, and input low-pass chroma signal that is synchronous with HSS to pin㊽. Measure pin㉝ voltage.

Pilot burst phase : − V axis

Pin㉗ : 2.5V

Vlreg

Measure pin㉒ voltage.

MDcnr1, MDcnr2, MDcnr3, MDcnr4

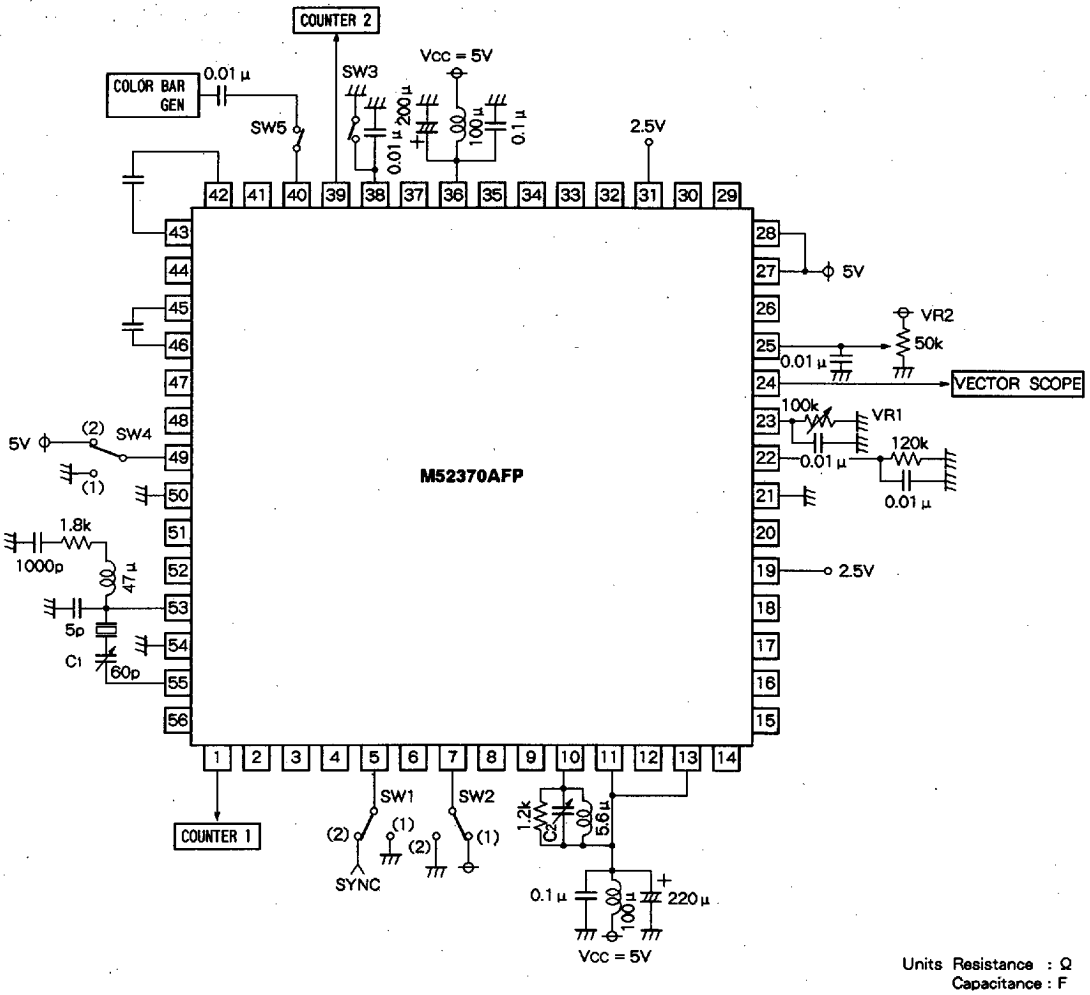
Input a sine wave of 0.1V_{P-P} and 4.43MHz to pin⑯, and measure pin⑫ level.

For MDcnr2 and MDcnr4, pin㉕ output is set to 5V.

Vdsw

Input a sine wave of 0.5V_{P-P} and 4.43MHz to pin㉑, and input a sine wave of 20kHz to pin㉘. Change the 20kHz sine wave level, and when pin⑫ output disappears, measure the input level.

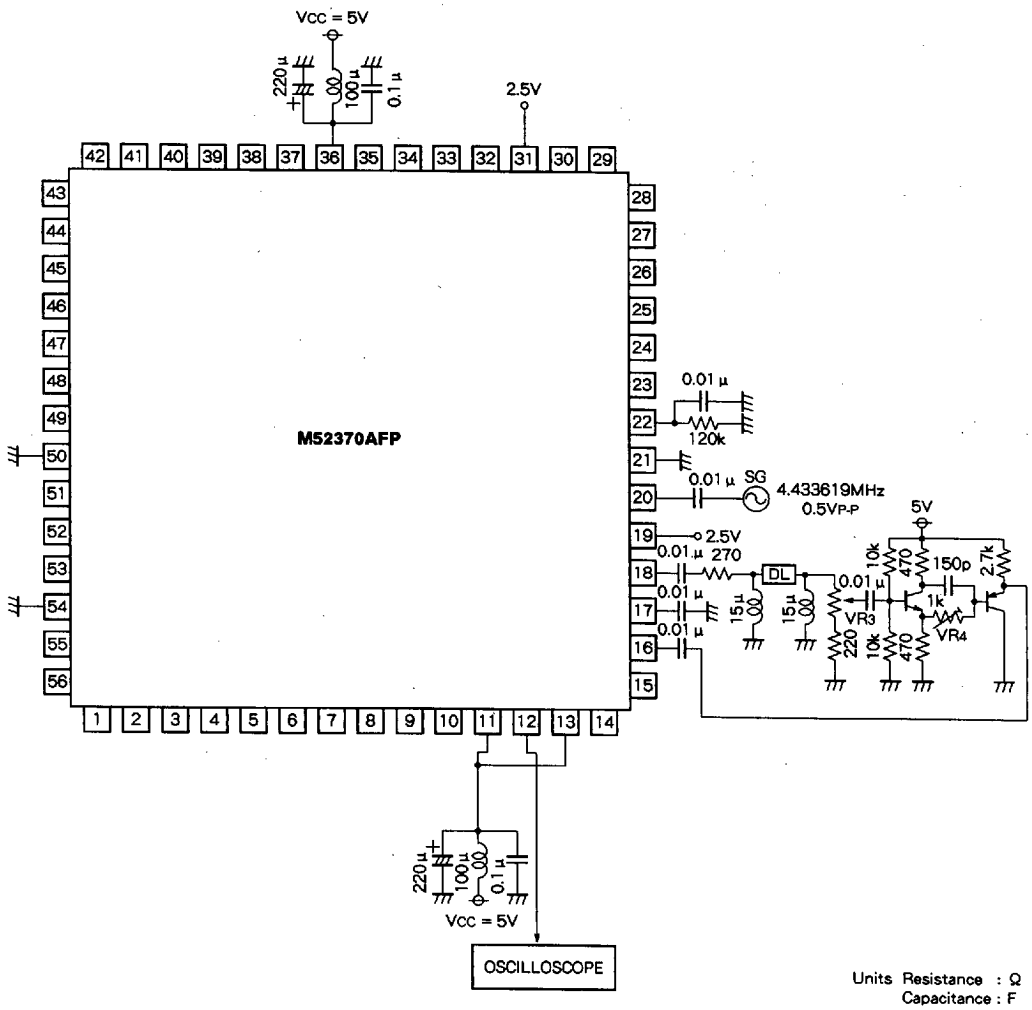
ADJUSTMENT CIRCUIT A



Units Resistance : Ω
Capacitance : F

1. VCXO free run frequency adjustment ··· Set SW1 and SW4 to (1), and adjust C1 for counter 1 frequency to be 4.433619MHz.
2. VCO free run frequency adjustment ··· Set SW1, SW2 and SW4 to (1), and set SW3 to ON. Adjust C2 for counter 2 frequency to be 5.06057MHz.
3. Pilot burst phase adjustment ··· Set SW1 and SW4 to (2), and set SW5 to ON. Adjust VR1 for pilot burst phase to be on the V axis as on vector scope.
4. Pilot burst amplitude adjustment ··· Set SW1 and SW4 to (2), and set SW5 to ON. Ajust VR2 for pilot burst amplitude to be 110% of the burst as on vector scope.

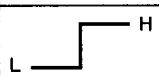
ADJUSTMENT CIRCUIT B



Units Resistance : Ω
Capacitance : F

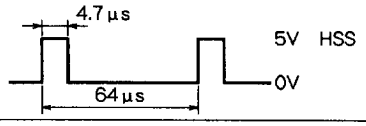
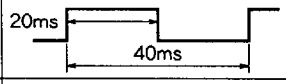
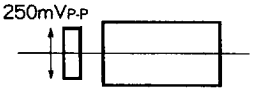
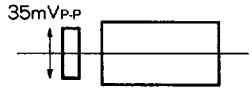
CNR adjustment ··· Adjust VR3 and VR4 for pin⑫ output to be minimum.

CONTROL INPUT AND OUTPUT SPECIFICATIONS

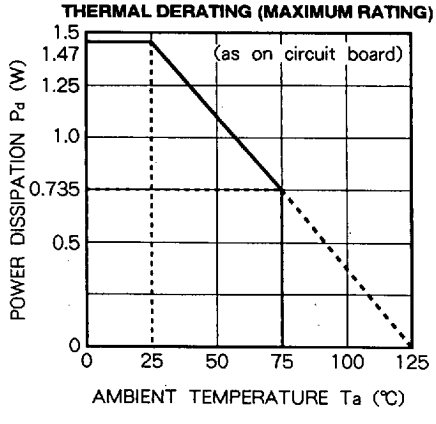
I/O	Pin	Name	Status	Threshold voltage	I/O type	Remarks
Input	⑤	HSS IN	Active "H" 	H > 2.5V > L	Input impedance : 30kΩ (typical)	C.SYNC input
	⑦	ROT IN		H > 2.5V > L	High impedance	Rotation control
	⑮	EP/LP/SP	EP : H LP : M SP : L	H > 3.2V > M > 1.1V > L	High impedance	Mode control
	⑲	EE/VV/TRICK	EE : H VV : M TRICK : L	H > 3.2V > M > 1.1V > L	High impedance	Mode control
	㉕*	3.58MHz MODE (PILOT LEVEL)	3.58MHz : H 4.43MHz : L	H > 3.8V > L	–	Apply pilot level adjusting voltage of less than 3.8V normally.
	㉗	CPS/CPN/VHS	CPS : H CPN : M VHS : L	H > 3.2V > M > 1.1V > L	High impedance	Mode control
	㉘	DOP IN	Active "L" 	H > 2.5V > L	High impedance	Used for control of side lock or other characteristics with dropout pulses.
	㉙	H.SW IN		H > 2.5V > L	High impedance	Used for screen upper portion detection control with head switch input.
	㉛	MESECAM /PAL/NTSC	MESECAM : H PAL : M NTSC : L	H > 3.2V > M > 1.1V > L	High impedance	Mode control
	㊾*	TEST/FREE RUN (REC AMP BIAS)	TEST : H FREE RUN : L	H > 3.8V 1.8V > L	–	Open normally. (Typical self-bias potential : 3.3V)
Output	④	BGP OUT	Active "H" 	–	Open collector	HP pulses are output during test
	㉝	CPS/CPN DET OUT	CPS detection:H CPN detection:L	–	Open collector	VHS : H KILLER : L
	㊿*	KILLER OUT (REC OUT)	KILLER : H (DC3.1V typically)	–	Emitter follower	Used for recording output normally (DC 2.3V typically).

Note 3. * : Pins㉕, ㊾ and ㊿ are used for two purposes.

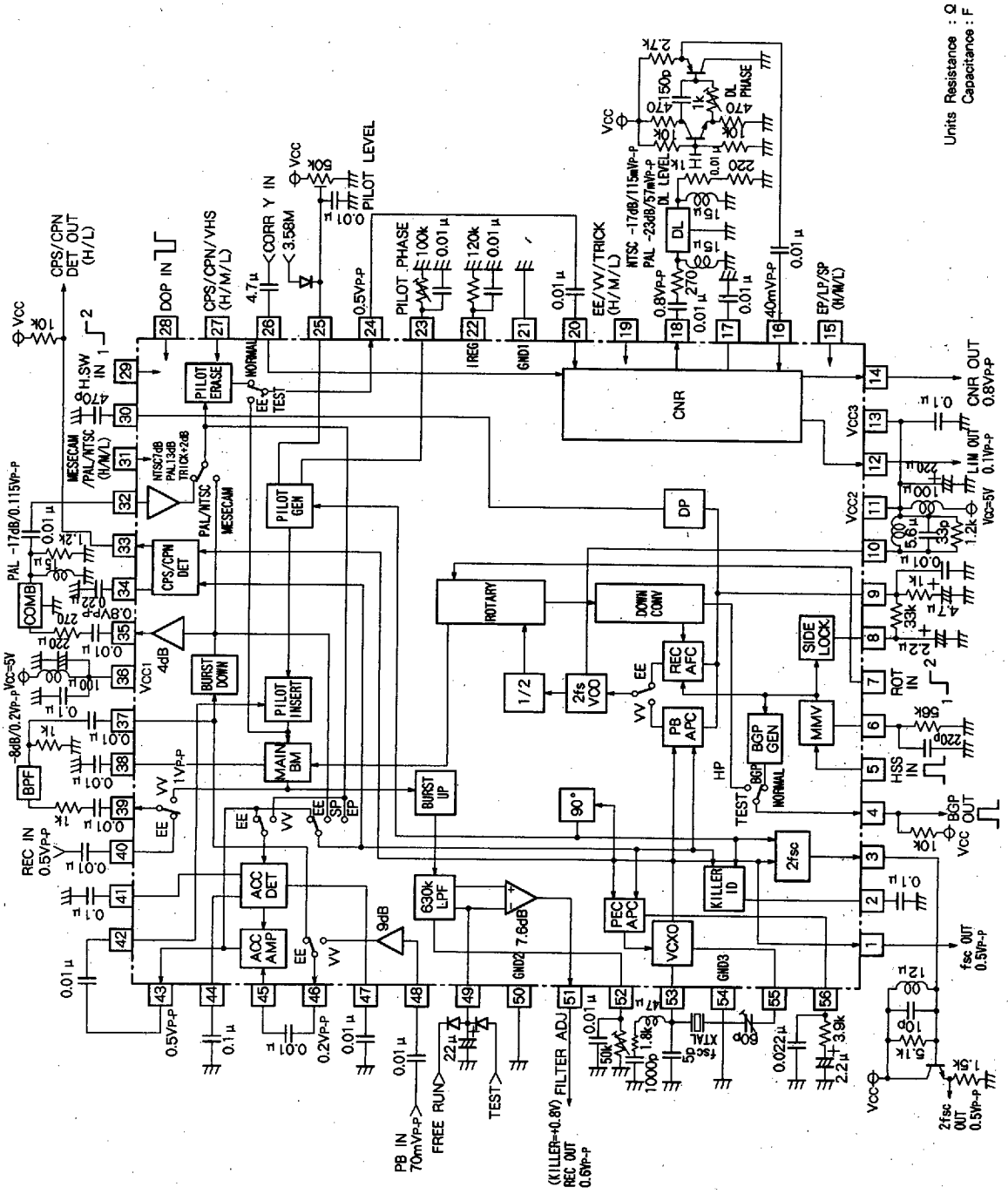
INPUT SIGNAL

Pin	Input signal
⑤	
⑦ ㉙	
㊵	 Reference chroma Frequency : 4.43361875MHz Input level : 0.5VP-P
㊽	 Low-pass chroma Frequency : 626.95kHz Input level : 70mVP-P

TYPICAL CHARACTERISTICS



APPLICATION EXAMPLE



PIN VOLTAGE AND WAVEFORM

Pin No.	Name	DC voltage	Waveform
①	fsc out	DC 2.7V	4.43MHz, 0.5Vp-p
②	KILLER DET	DC 3.3V	DC
③	2fsc out	When 470Ω is loaded : DC ≒ 5V	8.86MHz, 70mV
④	BGP OUT (output)	Open collector output	5V, 0V, 4μs, 64μs
⑤	HSS IN (input)		5V, 0V, 4.7μs, 64μs
⑥	MMV		4.4V, 1.4V, 1H
⑦	ROT IN (input)		5V, 0V, 1V
⑧	SIDE LOCK DET	DC 3.3V	REC, PB
⑨	AFC/APC FILTER	PB APC 3.3V REC AFC 3.3V	PB REC
⑩	2VCO LC	DC 5V	0.6Vp-p
⑪	Vcc2	Vcc = 5V	
⑫	CNR LIM OUT (output)	PB 3.5V	(Limiter waveform) PB, 1V
⑬	Vcc3	Vcc = 5V	
⑭	CNR OUT (output)	PB 2.5V	800mVp-p
⑮	EP/LP/SP SW (input)	EP 5.0V LP 2.5V SP 0V	
⑯	CNR DL IN (input)	PB 3.0V	40mVp-p

Pin No.	Name	DC voltage	Waveform
⑰	DL IN BYPASS	DC 3.0V	DC
⑱	CNR DL DRIVE (output)	PB 2.5V	800mVp-p
⑲	EE/VV/ TRICK SW (input)	EE 5.0V VV 2.5V TRICK 0V	
⑳	CNR IN (input)	PB 3.8V	500mVp-p
㉑	GND1	GND	
㉒	IREG	3.5V	DC
㉓	PILOT PHASE ADJ	2.8V	DC
㉔	COMB AMP OUT (output)	PB 3.0V	500mVp-p
㉕	PILOT LEVEL ADJ	DC input DC ≧ 3.8V 3.58MODE	
㉖	CORR Y IN (input)	PB 3.5V	An uncorrelation detection pulse
㉗	CPS/CPN/ VHS SW (input)	CPS 5.0V CPN 2.5V VHS 0V	
㉘	DOP IN (input)	DOP "L"	5V, 0V
㉙	H. SW (30Hz) IN		5V, 0V
㉚	DP FILTER	2.8V DC DC ≧ 3.8V DP OFF	
㉛	MESECAM/ PAL/NTSC SW (input)	MESECAM 5.0V PAL 2.5V NTSC 0V	
㉜	COMB AMP IN	PB 3.3V	PAL 110mVp-p NTSC 230mVp-p
㉝	CPS/CPN/ OUT	Open collector DC CPS 5.0V CPN 0V	

PIN VOLTAGE AND WAVEFORM (cont.)

Pin No.	Name	DC voltage	Waveform
㉞	CPS/CPN DET FILTER	CPS 3.8V	1H
		CPN 2.6V	1H
㉟	COMB DRIVE	PB 2.2V	800mVP-P
㊱	VCC1	VCC = 5V	
㊲	BPF OUT	PB 3.8V	200mVP-P
		REC 3.8V	200mVP-P
㊳	MBM BYPASS	2.8V	DC
㊴	BPF DRIVE	PB 3.5V	1VP-P
		REC 3.5V	500mVP-P
㊵	REC IN (input)	PB 3.0V	DC
		REC 3.0V	500mVP-P
㊶	ACC LFIL1	3.8V	DC
㊷	PLTSW IN	PB 3.3V	500mVP-P
		REC 3.3V	500mVP-P
㊸	ACC OUT (output)	PB REC 2.5V	500mVP-P
㊹	ACC LFIL2	3.8V	DC

Pin No.	Name	DC voltage	Waveform
㊺	ACC IN	PB 3.0V	200mVP-P
		REC 3.8V	200mVP-P
㊻	SW OUT	PB 2.9V	200mVP-P
		REC 2.9V	200mVP-P
㊼	ACC SFIL	PB TRICK 3.8V	DC
㊽	PB IN	PB 3.5V	70mVP-P
		REC 3.5V	DC
㊾	REC BIAS	3.3V	DC
㊿	GND2	GND	
(51)	REC OUT	PB 2.6V	DC
		REC 2.6V	500mVP-P
		During killer : DC 3.4V During color recording : 2.6V	
(52)	LPF ADJ	2.6V	DC
(53)	VCXO IN	3.0V	600mV
(54)	GND3	GND	
(55)	VCXO OUT	3.5V	400mVP-P 4.43MHz
(56)	REC APC FILTER	4.0V	PB 1H REC 1H

MAJOR BLOCK FUNCTION TABLE

○: Available × : Not available

Block		Mode			Remarks
		NTSC	PAL	MESECAM	
CNR	3.58MHz mode (pin㉕="H")	○	Through	Through	Available during VV operation, or EE/TEST operation
	4.43MHz mode (pin㉕="L")	Through	○	Through	
BURST UP		○	X	X	Available in SP/EP mode Not Available in LP mode
BURST DOWN		○	X	X	
COMB filter		○	○	Through	
		COMB amplifier: 7dB	COMB amplifier: 13dB	–	Gain increases 2dB during TRICK operation.
VCXO	EE	REC APC	REC APC	Fix	Indicates VCXO status.
	VV	Fix	Fix	Fix	
VCO	EE	AFC	AFC	AFC	Indicates VCO status.
	VV	PB APC	PB APC	AFC	
SIDE LOCK		○	○	○	Available during EE or VV operation.
KILLER		○	○	Forced color	
ID		○	○	X	Available only during VV operation.
PB APC	VV・SP	Before COMB	Before COMB	X	Indicates APC loop switching status. [EE / SP : Before COMB / EP : After COMB / APC SW]
	VV・LP/EP	After COMB	After COMB	X	
	TRICK SP	After COMB	Before COMB	X	
	TRICK LP/EP	After COMB	After COMB	X	
DP correction		X	○	X	Available only during VV operation.
ROTARY	Pin⑦="H"	90 degrees ahead	Fixed	Fixed	Indicates subcarrier phase.
	Pin⑦="L"	90 degrees behind	90 degrees behind	Fixed	
Pilot insertion	CPS/CPN	X	○	X	Available only during EE operation. CPS, V axis ; CPN, – V axis Test mode : Inserted into chroma section
	VHS	X	X	X	
Pilot erasing	CPS/CPN	X	○	X	Available only during VV operation.
	VHS	X	X	X	
Pilot detection	CPS/CPN	X	○	X	CPS detection = "H" CPN detection = "L" (KILLER = "L", VHS = "H")
	VHS	X	X	X	

INSTRUCTIONS

1. To forcedly change CNR status to "through" from external devices, apply DC voltage of 4V or more, or 3V or less, to pin㉘ (unrelated Y input).
2. To adjust the pilot signal insertion level and phase, turn on TEST mode (pin㉙="H") during EE operation. Signals that are the same as pilot signals in the level and phase are inserted to chroma section. Connect vector scope or other components to pin⑭ (CNR output) and conduct the adjustment.(Adjustment may be easier if pin ㉘ is set to "H" or "L" to put CNR status to "through.")
3. If pin㉘ (dropout pulse input) is not used, connect it to power (Vcc).
4. The optimal constants for VCXO peripheral components are different depending on the crystal oscillator uset, printed circuit board wiring capacity, or other factors. Determine them on experiment.
5. We recommend that L/C – integrated VCO tank circuit be used, because it features high frequency precision (approximately ± 2%). Frequency may be adjusted by using coil or capacitance as trimmer. The optimal constants are different depending on printed circuit board wiring capacity or other factors. Determine them by experiment.
6. The optimal constant for pin③ (2fsc output) tank circuit is diffferent depending on the printed circuit board wiring capacity, or other factors. Determine it on experiment.
7. Connect pin⑬ (V_{CC3}) power supply bypass capacitance as close to pin⑭ (GND3) as possible to ensure good VCO performance.
8. Connect pin㉕ pilot level adjustment resistance to power pin⑪ (V_{CC2})
9. Resistance connected to pin㉒ is used to adjust CNR reference rated current. Use as precise resistance as possible.(E.g. Metal coating resistance ± 2%)
10. Be sure that pin㉓ (pilot phase adjustment) and pin㉝ (low – pass filter adjustment) are not short – circuited with GND.

TRICK LOGIC

1. APC operation

APC current switching

	VV			TRICK		
	EP	LP	SP	EP	LP	SP
PAL	1	1	2	1	1	2
NTSC	2	2	4	2	2	2

Set current to "1" during PAL/VV/LEP operation.

BGP switching

VV	BGPAN (burst reference)
TRICK	BGPDN (input SYNC reference)

2. ACC operation

ACC operation

VV	ACC for each field	Pins ㊶ and ㊹ : Switched depending on filter and field
TRICK	ACC	Pin ㊼ filter