

AN5637

SECAM decoder IC

■ Overview

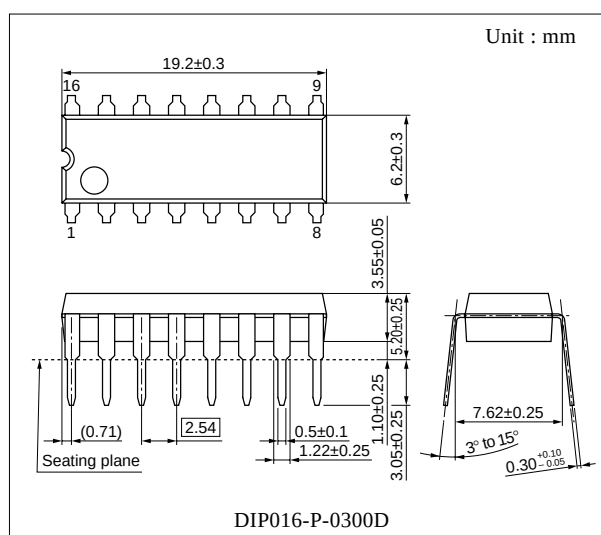
The AN5637 is a chroma signal processing circuit for use in SECAM system. It outputs the color difference signal.

■ Features

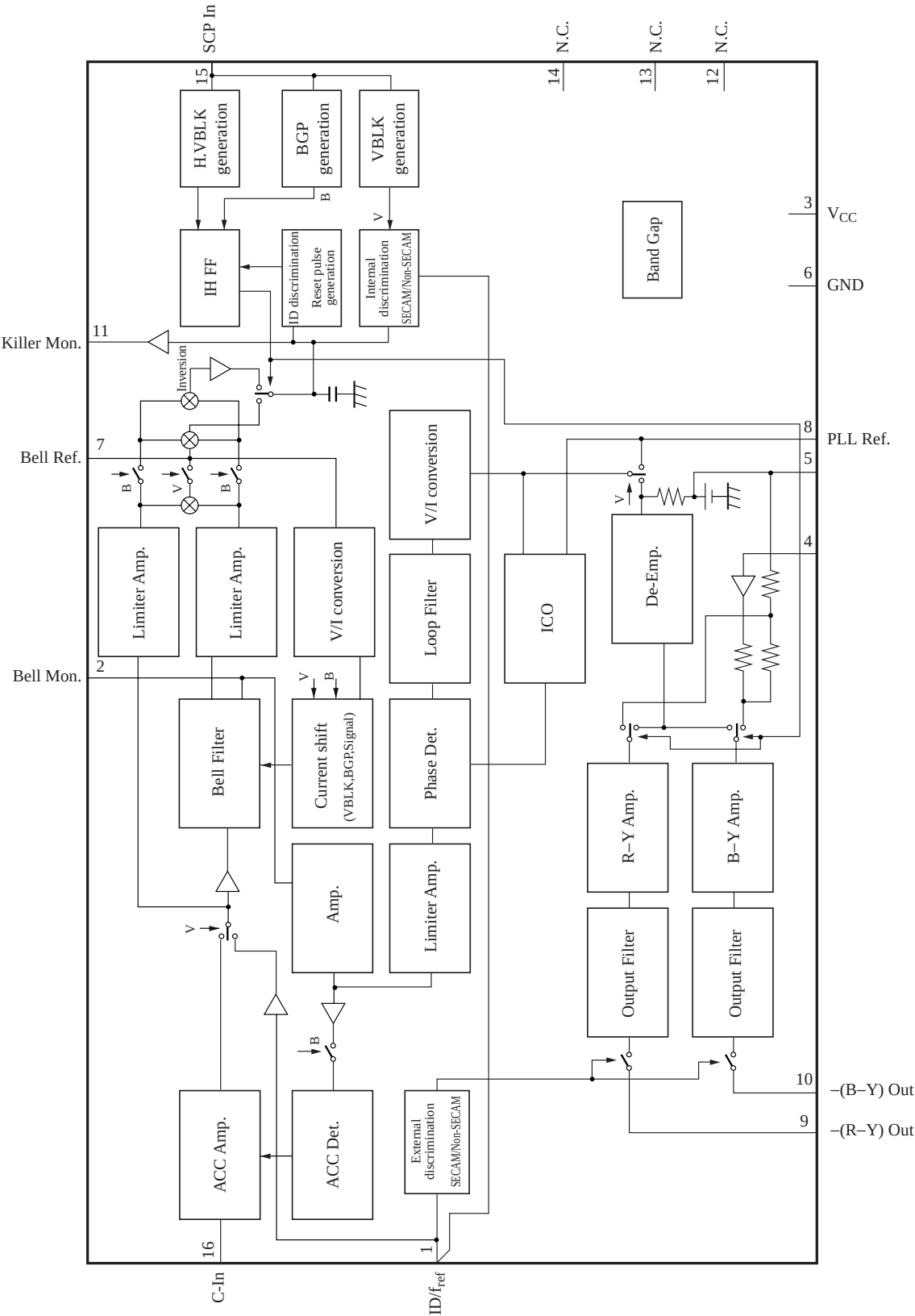
- Built-in bell filter, deemphasis circuit
- One point adjustment
- Small number of external components

■ Applications

- SECAM system TV



■ Block Diagram



■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	Reference frequency signal/ Ident input pin	8	PLL filter automatic adjustment sample hold pin
2	Bell filter output monitor pin	9	– (R–Y) output pin
3	Power supply pin	10	– (B–Y) output pin
4	Black level adjustment voltage input pin	11	Killer voltage monitor pin
5	Black level adjustment reference voltage output pin	12	N.C.
		13	N.C.
6	Grounding pin	14	N.C.
7	Bell filter automatic adjustment sample hold pin	15	Sand castle pulse input pin
		16	SECAM signal input pin

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	11.0	V
Supply current	I_{CC}	73	mA
Power dissipation *2	P_D	777	mW
Operating ambient temperature *1	T_{opr}	–20 to +70	°C
Storage temperature *1	T_{stg}	–55 to +150	°C

Note) *1 : $T_a = 25\text{ °C}$ except operating ambient temperature and storage temperature.

*2 : Power dissipation of the package at $T_a = 70\text{ °C}$.

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V_{CC}	7.2 to 9.9	V

■ Electrical Characteristics at $V_{CC} = 9\text{ V}$, $T_a = 25\text{ °C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Power supply						
Supply current	I_3	Current when $V_{CC} = 9\text{ V}$	30	40	50	mA
Pin voltage	V_5	Voltage when $V_{CC} = 9\text{ V}$	2.9	3.2	3.5	V

■ Electrical Characteristics at $V_{CC} = 9\text{ V}$, $T_a = 25\text{ }^{\circ}\text{C}$ (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input(Pin16)		Typical input : (Pin16) Color bar signal, (Pin15) Sand castle pulse, (Pin1) 4.43362 MHz sine wave 350 mV[p-p], V-BLK period				
Input dynamic range	V_{DR16}	Composite signal input amplitude range	—	1.0	1.5	V
Chroma signal input amplitude *1	$V_{ch.16}$	Chroma signal input amplitude range	—	—	300	mV[p-p]
Input impedance	Z_{16}	DC measurement	17	25	33	k Ω
Bell filter		Typical input : (Pin16) 4.0 MHz to 4.6 MHz sine wave 10 mV[p-p], (Pin15) Sand castle pulse, (Pin1) 4.43362 MHz sine wave 350 mV[p-p], V-BLK period				
Bell adjusting voltage	V_{ADB}	Sample hold pin voltage at bell filter automatic adjustment	2.8	3.9	5	V
Center frequency	f_{OB}	Center frequency of bell filter (Signal period)	4.202	4.262	4.322	MHz
Band width	B	Band width of bell filter (Signal period)	250	310	370	kHz
ACC		Typical input : (Pin16) Color bar signal (Composite) 1 V[p-p], (Pin15) Sand castle pulse, (Pin1) 4.43362 MHz sine wave 350 mV[p-p], V-BLK period				
ACC characteristics 1	ACC1	Output change amount when discrimination signal changes from 150 mV[p-p] to 300 mV[p-p]	-6	0	6	%
ACC characteristics 2	ACC2	Output change amount when discrimination signal changes from 150 mV[p-p] to 15 mV[p-p]	-6	0	6	%
Demodulator/Output		Typical input : (Pin16) Color bar signal (Composite) 1 V[p-p], (Pin15) Sand castle pulse, (Pin1) 4.43362 MHz sine wave 350 mV[p-p], V-BLK period				
PLL adjusting voltage	V_{ADV}	Sample hold pin voltage at PLL automatic adjustment	3.1	3.7	4.3	V
R-Y output amplitude	V_{RY}	Color bar (Composite) signal input (1 V[p-p])	0.85	1.00	1.15	V[p-p]
B-Y output amplitude	V_{BY}	Color bar (Composite) signal input (1 V[p-p])	1.07	1.27	1.47	V[p-p]
Detector output linearity	L_O	Color bar (Composite) signal input (1 V[p-p])	-6	0	6	%
R-Y/B-Y output ratio	(R-Y)/(B-Y)	Amplitude ratio of V_{RY} and V_{BY}	1.12	1.27	1.42	Times
Black level adjusting voltage *2	V_{AD4}	Pin4 voltage when difference of B-Y black level becomes 0	1.45	2.1	2.75	V
Black level error (R-Y) *2	f_{BER}	Value referred to input frequency	—	—	10	kHz

Note) *1 : Refer to "Explanations of testing method 1"

*2 : Refer to "Explanations of testing method 2"

■ Electrical Characteristics at $V_{CC} = 9\text{ V}$, $T_a = 25\text{ }^{\circ}\text{C}$ (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Demodulator/Output (continued)	Typical input : (Pin16) Color bar signal (Composite) 1 V[p-p], (Pin15) Sand castle pulse, (Pin1) 4.43362 MHz sine wave 350 mV[p-p], V-BLK period					
Blanking period output DC voltage	V_{BLK}	Stable sine wave is necessary in V period (4.4336 MHz)	2.2	2.7	3.2	V
SN ratio *3	S/N	Amplitude ratio when Deviation = 460 kHz/0 kHz (Pin10 measurement)	30	—	—	dB
Residual high frequency amplitude	V_{RH}	Harmonic content with 100 % white signal input (Pin10 measurement)	—	—	10	mV[p-p]
Output impedance (when SECAM) Pin9	Z_{OS9}	DC measurement, Pin1 = 5 V	260	460	660	Ω
Output impedance (when non SECAM) Pin9	Z_{ON9}	DC measurement, Pin1 = 1.5 V	1	—	—	M Ω
Output impedance (when SECAM) Pin10	Z_{OS10}	DC measurement, Pin1 = 5 V	260	460	660	Ω
Output impedance (when non SECAM) Pin10	Z_{ON10}	DC measurement, Pin1 = 1.5 V	1	—	—	M Ω
Sand castle pulse	Typical input : (Pin1) 4.43362 MHz sine wave 350 mV[p-p], V-BLK period					
Horizontal and vertical BLK level *4	V_{BL}	Measurement of slice level of H, V blanking pulse	0.5	1	1.5	V
Burst gate level *5	V_{BG}	Measurement of slice level of burst gate pulse	3.4	3.9	4.4	V
Reference signal/interface	Typical input : (Pin1) 4.43362 MHz sine wave 350 mV[p-p], V-BLK period					
Reference signal amplitude	V_{ref}	Amplitude range of sine wave (4.43362 MHz) of Pin1 input	0.20	—	0.50	V[p-p]
System SW discrimination level	V_{SS}	Voltage when Pin10 becomes open if Pin1 is 5 V to 1 V variable	2.5	3.0	3.5	V
IDENT	Typical input : (Pin16) Color bar signal (Chroma), (Pin15) Sand castle pulse, (Pin1) 4.43362 MHz sine wave 350 mV[p-p], V-BLK period					
Color On/Off hysteresis	H_C	Difference between color turn On or Off and Off to On level	0.5	2	6	dB
Killer sensitivity	K	Color turn Off level when discrimination signal changes 150 mV[p-p] to 0 mV[p-p]	—	—	-32	dB

Note) *3 : Refer to "Explanations of testing method 3"

*4 : Refer to "Explanations of testing method 4"

*5 : Refer to "Explanations of testing method 5"

■ Electrical Characteristics at $V_{CC} = 9\text{ V}$, $T_a = 25\text{ °C}$ (continued)

• Design reference data

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

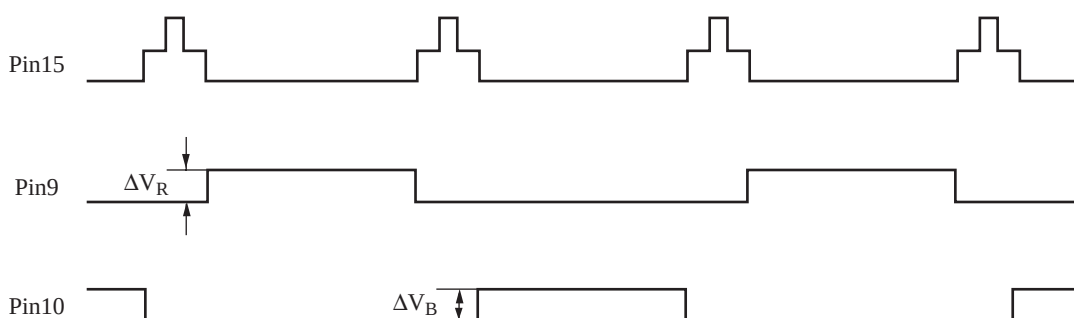
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reference signal/interface						
Sink current	I_{SS}	Sink current of Pin1 when SECAM signal input	150	175	220	μA
Bell filter						
Center frequency power supply voltage dependency	$\Delta f_{OB}/\Delta V_{CC}$	Amount of center frequency fluctuation when $V_{CC} = 7.2\text{ V}$ to 9.9 V	—	0.23	—	kHz/V
Center frequency ambient temperature dependency	$\Delta f_{OB}/\Delta T$	Amount of center frequency fluctuation when $T_a = 30\text{ °C}$ to 80 °C	—	0.25	—	kHz/°C
Demodulator/Output						
Output signal bandwidth	B_S	Bandwidth of demodulator output signal (Pin9, 10)	—	1.3	—	MHz
Deemphasis pole-frequency	f_{PD}	Automatic adjustment period	—	85	—	kHz
Pole zero point frequency ratio	f_{PD}/f_{OD}	Automatic adjustment period	—	3	—	Times
R–Y output amplitude power supply voltage dependency	$\Delta V_{RY}/\Delta V_{CC}$	Fluctuation amount of R–Y output amplitude when $V_{CC} = 7.2\text{ V}$ to 9.9 V	—	1.5	—	%
R–Y output amplitude ambient temperature dependency	$\Delta V_{RY}/\Delta T$	Fluctuation amount of R–Y output amplitude when $T_a = -30\text{ °C}$ to $+80\text{ °C}$	—	0.36	—	mV[p-p]/°C
B–Y output amplitude power supply voltage dependency	$\Delta V_{BY}/\Delta V_{CC}$	Fluctuation amount of B–Y output amplitude when $V_{CC} = 7.2\text{ V}$ to 9.9 V	—	2.0	—	%
B–Y output amplitude ambient temperature dependency	$\Delta V_{BY}/\Delta T$	Fluctuation amount of B–Y output amplitude when $T_a = -30\text{ °C}$ to $+80\text{ °C}$	—	0.55	—	mV[p-p]/°C
Black level error (R–Y) power supply voltage dependency	$\Delta f_{BER}/\Delta V_{CC}$	Fluctuation amount of black level error (R–Y) when $V_{CC} = 7.2\text{ V}$ to 9.9 V	—	1	—	kHz/V
Black level error (R–Y) ambient temperature dependency	$\Delta f_{BER}/\Delta T$	Fluctuation amount of black level error (R–Y) when $T_a = -30\text{ °C}$ to $+80\text{ °C}$	—	50	—	Hz/°C
Black level error (B–Y) power supply voltage dependency	$\Delta f_{BEB}/\Delta V_{CC}$	Fluctuation amount of black level error (B–Y) when $V_{CC} = 7.2\text{ V}$ to 9.9 V	—	2	—	kHz/V
Black level error (B–Y) ambient temperature dependency	$\Delta f_{BEB}/\Delta T$	Fluctuation amount of black level error (B–Y) when $T_a = -30\text{ °C}$ to $+80\text{ °C}$	—	90	—	Hz/°C

■ Electrical Characteristics at $V_{CC} = 9\text{ V}$, $T_a = 25\text{ }^{\circ}\text{C}$ (continued)

• Explanations of testing method

1. Measurement of B–Y discrimination signal amplitude

2.



Input 100 % white signal and adjust the voltage of Pin4 so that ΔV_B becomes 0 mV. Let the adjusted voltage be V_{AD4} .

And let the value of ΔV_R based on input frequency at that time be f_{BER} , black level error (R–Y).

3. Calculate by using the value of Pin10 (B–Y) output amplitude V_{BY} when the color bar signal (Deviation = 460 kHz) is input to Pin16 and the value of Pin10 output V_{NOISE} when the color bar signal (Deviation = 0 Hz) is input.

$$S/N = 20 \log_{10} |V_{BY}/V_{NOISE}|$$

4. The horizontal and vertical blanking level V_{BL} is determined by the internal stabilizing power supply circuit.

5. The burst gate level V_{BG} is determined by dividing the IC built-in resistor between V_{CC} -GND.

$$V_{BG} = V_{CC} \times 3.8/9 \text{ (typ.)}$$

■ Terminal Equivalent Circuits

Pin No.	Equivalent circuit	Description	Voltage
1		Reference frequency signal/ Ident input Pin : • Input and output pin for interfacing with AN5192/95. • The circuit becomes non-SECAM mode if DC voltage of Pin1 becomes 3 V or less. • Current of 175 μA sinks into Pin1 in SECAM.	AC + DC DC 1.1 V or 4.4 V AC 350 mV[p-p] or 0
2		Bell filter output monitor pin	AC + DC DC 4.3 V AC 200 mV[p-p]
3	—	Power supply pin	DC : 9 V
4		Black level adjustment voltage input pin : • Monitoring $-(B-Y)$ Out (Pin10), adjust Pin4 voltage so that pedestal step difference becomes 0. (using external volume) • Pin4 voltage is generated by resistor dividing Pin5 voltage so as not to be affected by V_{CC} and temperature fluctuation.	DC 1.45 V to 2.75 V
5		Black level adjustment reference voltage output pin	DC : 3.2V

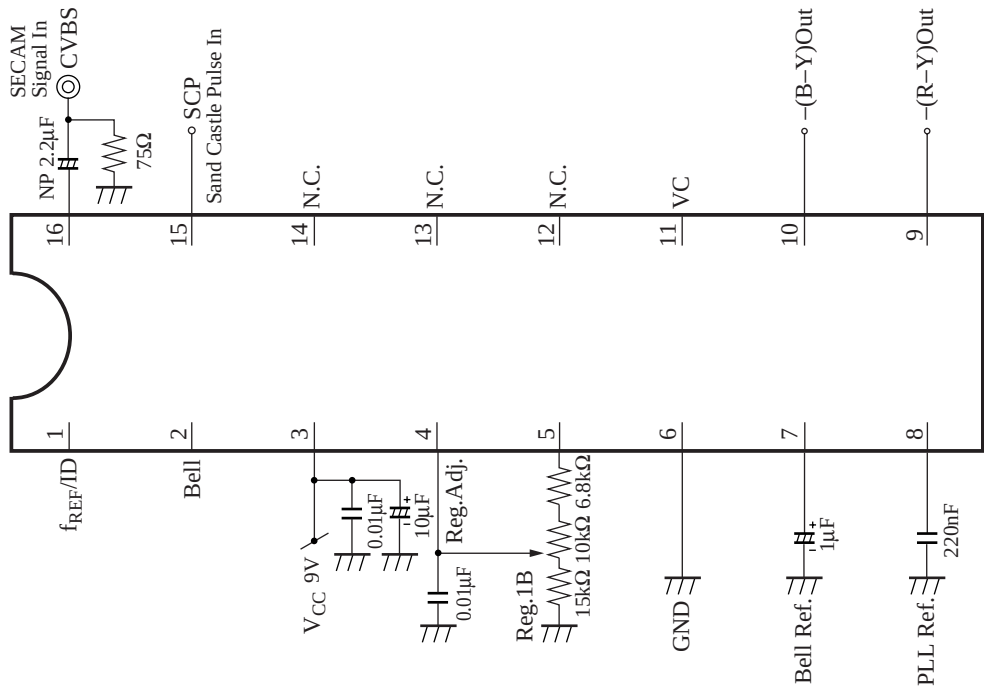
■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Description	Voltage
6	—	Grounding pin	DC : 0 V
7		Bell filter automatic adjustment sample hold pin	DC 2.5 V to 5.0 V
8		PLL automatic adjustment sample hold pin	DC 3.6 V to 3.9 V
9 10		Pin9 ; -(R-Y) output pin Pin10; -(B-Y) output pin	AC + DC AC -(R-Y) -(B-Y) DC : 2.9 V

■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Description	Voltage
11		Killer voltage monitor pin When SECAM more than 4 V When non-SECAM 3 V	DC 1.5 V to 5 V
12	—	N.C.	—
13	—	N.C.	—
14	—	N.C.	—
15		Sand castle pulse input pin	AC
16		SECAM signal input pin	AC 1.0 V[p-p]

■ Application Circuit Example



Note) The following signal is inputted to Pin1 from the AN5192/95.

• System discrimination

1. Pin1 is the input and output pin for the three pieces of information
 - (1) Reference frequency signal input pin (AC)
 - (2) System discrimination signal input pin (DC voltage)
 - (3) SECAM/Non-SECAM discrimination output pin (DC current)

AN5637 System discrimination	Pin1 input DC voltage	Pin1 sink current	Pin9, 10 output
SECAM	"H" (4.6 V)	175 μ A	Color difference signal output
	"L" (1.3 V)	175 μ A	Open
Non-SECAM	"H" (4.6 V)	0 μ A	DC voltage output
	"L" (1.5 V)	0 μ A	Open

2. Reference frequency signal

The reference frequency signal input for Pin1 is used for the following 4 signals ;

- (1) Bell filter automatic adjustment
- (2) PLL(VCO) automatic adjustment
- (3) Deemphasis automatic adjustment
- (4) Ident discrimination

Be sure to input the high precision PAL carrier signal (4.43362 MHz) only in the vertical retrace period.