

AN5601K

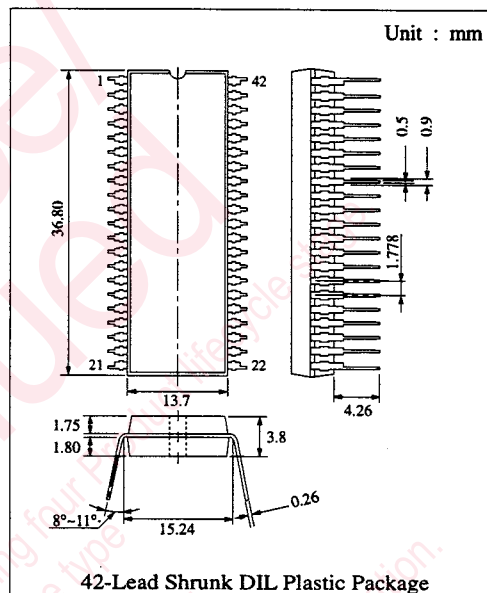
PAL/NTSC Video, Chrominance, and Deflection Signal Processing IC

Description

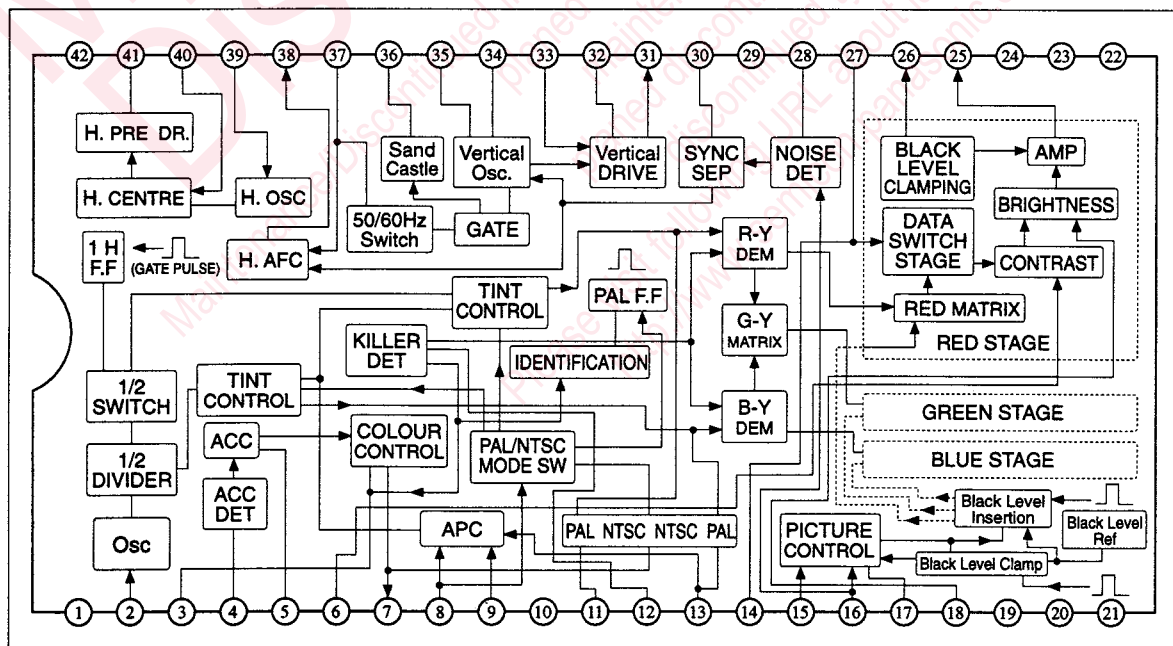
The AN5601K is an integrated circuits consisting of a Video, Chrominance and Deflection Signal Processing for use in PAL/NTSC CTV.

Features

- PAL/NTSC signal processing possible
- External R G B signal input pin provided
- Can be compatible with the world CTV set in combination with SECAM signal processing IC (AN5633K)
- Vertical 50/60Hz switching possible
- Dual loop horizontal AFC used
- Sand-castle pulse output pin available



Block Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply Voltage	V _{CC1}	13.8	V
	V _{CC2}	6	V
	V _{CC3}	9.5	V
Power Dissipation	P _D	1200*	mW
Operating Ambient Temperature	T _{opr}	-20 ~ +70	°C
Storage Temperature	T _{stg}	-55 ~ +150	°C

* : Value at Ta=70°C when the substrate is mounted

■ Recommended Operating Range (Ta=25°C)

Item	Symbol	Range
Operating Supply Voltage Range	V _{CC1}	9.6V ~ 13.8V
Operating Supply Voltage Range	V _{CC2}	4.0V ~ 6.0V
Operating Supply Current Range	I _{CC3}	12.0mA ~ 19.0mA

■ Electrical Characteristics (Ta=25°C)

Item	Symbol	Condition	min.	typ.	max.	Unit
Circuit Current	I _{CC1}	V _{CC1} =12V typ. V _{CC2} =5V	47	66	80	mA
Circuit Current	I _{CC2}	V _{CC2} =5V typ. V _{CC1} =12V	8	12	15.5	mA
Circuit Current	I _{CC3}	V _{CC1} =12V, V _{CC2} =5V, Pin 42 = 8.6V	9.5	13.5	17.5	mA
Pin 2 Voltage	V ₂₋₁	V _{CC1} =12V, V _{CC2} =5V	2.05	2.6	3.15	V
Pin 5 Voltage	V ₅₋₁	V _{CC1} =12V, V _{CC2} =5V	2.15	2.7	3.25	V
Pin 11 Voltage	V ₁₁₋₁ (PAL)	V _{CC1} =12V, V _{CC2} =5V (PAL Mode)	2.75	3.3	3.85	V
Pin 13 Voltage	V ₁₃₋₁ (PAL)	V _{CC1} =12V, V _{CC2} =5V (PAL Mode)	2.75	3.3	3.85	V
Pin 11 Voltage	V ₁₁₋₁ (NTSC)	V _{CC1} =12V, V _{CC2} =5V (NTSC Mode)	1.55	2.1	2.65	V
Pin 13 Voltage	V ₁₃₋₁ (NTSC)	V _{CC1} =12V, V _{CC2} =5V (NTSC Mode)	1.55	2.1	2.65	V

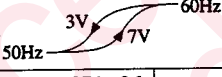
Chroma System

ACC Characteristics	Acc	Colour Bar input signal, Burst 150mVpp, -20dB Demodulation output	0.65	0.8	1.12	Times
Demod. Colour Difference 1	e ₀₁	Colour Bar input Colour: max., Contrast: max.	6	7		Vo-p
Demod. Colour Difference Ratio R/B	R/B	Rainbow input	0.72	0.83	0.9	Times
Demod. Colour Difference Ratio G/B	G/B	Rainbow input	0.31	0.37	0.42	Times
Colour Killer Tolerance (PAL)	e _K (PAL)	Colour Bar input burst 150mVpp=0dB Pin 12 - V _{CC1} 1.8MΩ connected (PAL)	29	34	39	dB
Colour Killer Tolerance (NTSC)	e _K (NTSC)	Colour Bar input burst 150mVpp=0dB Pin 12 - V _{CC1} 1.8MΩ connected (NTSC)	31	36	41	dB
fo Change with Supply Voltage	Δf _{ov}	V _{CC1} =13.8~9.6V		± 60	± 120	Hz
Tint Variable Range	Δθ	Tint control voltage, max. ~ min.	± 35	± 45	± 55	deg

Video Output System

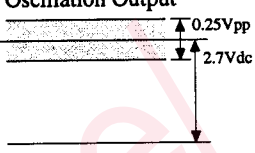
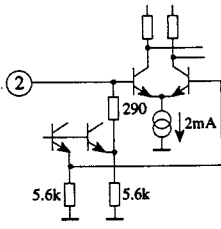
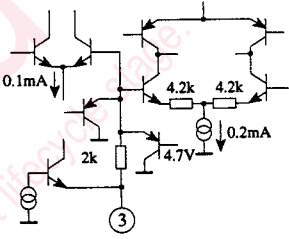
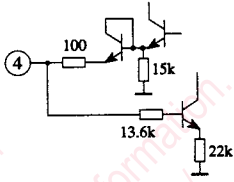
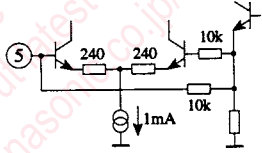
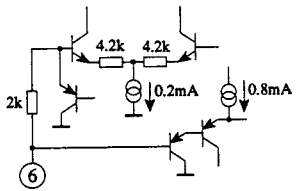
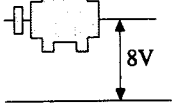
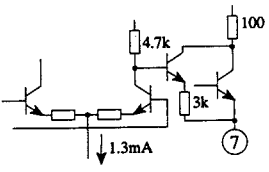
Video Signal Output 1	A _{V1}	Input Stair Step, 350mVop, Cont: max.	5	5.7	6.4	Vo-p
Picture Quality Variable Range	Δf _{vp}	Sinewave input, f=2.5MHz	13.5	17	20	dB
DC Regeneration Rate	T _{DC}	Input Stair Step, APL 10~90% variable	91	95		%
Data Blanking Level	Data Blk SW	Data Blk. voltage variable when internal video signal is input and when output is ON/OFF	0.35		0.85	V

■ Electrical Characteristics (Continue)

Item	Symbol	Condition	min.	typ.	max.	Unit	
Deflection System							
Vertical Oscillation Start Voltage	Vfv	Voltage of Pin 29			6.2	V	
Vertical Pulse Width	Wpv	Pin 33 C. R open (PAL) 	500	600	820	μS	
Horizontal Oscillation Start Voltage	VfH	Pin 42 voltage measurement		5.8	6.2	V	
Change with Horizontal Oscillation Frequency Supply Voltage	ΔfHO(V)	VCC3=6.7~8.5V		60	100	Hz	
Horizontal Oscillation Frequency Oscillation Sensitivity	βHOSC	IO=100μA	18.5	21	23.5	Hz/μA	
50/60Hz Switching Level (50Hz)	V50/60(1)	Pin 37 input 	2.5	3	3.5	V	
50/60Hz Switching Level (60Hz)	V50/60(2)		6.5	7	7.5	V	
Sand-castle Pulse Burst Gate Width	WP(Burst)	Output waveform of Pin 36 Burst gate width measurement	PAL	3.8	4	4.2	μs
			NTSC	2.8	3	3.2	
Sand-castle Pulse Burst V. Blanking Width	WP(V BLK)	Output waveform of Pin 36 V BLK width measurement	50Hz	1.28	1.34	1.4	ms
			60Hz	1.02	1.08	1.14	



Pin Descriptions

Pin No.	Pin Name	Pin Description	Typical Waveform	Equivalent Circuit
1	GND			
2	Chroma VCO Oscillation	VCO Xtal connection	Oscillation Output  8.86MHz (PAL) 7.16MHz (NTSC)	
3	Colour Control	Control the colour difference amplitude by changing the Pin voltage from 0 to 5V		
4	ACC Filter	ACC amp controlling filter	5.1Vdc	
5	Chroma Signal Input	Chroma Signal Input	Standard input (Colour Bar Input)  Signal : 330mV Burst : 150mV	
6	Contrast Control	Control the output amplitude by changing the Pin voltage from 1 to 5V. Forcible blanking is activated at a Pin voltage of 1V or less		
7	Chroma Signal Output	ACC amp output	(Colour Bar Input) Burst level : 800mVpp 	

Pin Descriptions (Continue)

Pin No.	Pin Name	Pin Description	Typical Waveform	Equivalent Circuit
8	Phase Detection 1	APC PAL/NTSC switching	PAL : 9.6Vdc or more NTSC : 9.4Vdc or less	
9	Phase Detection 2			
10	Supply Voltage (5V)	Apply 5V Supply Voltage		
11	R-Y Input	R-Y component input	Colour Bar Input 	
13	B-Y Input	B-Y component input	Burst Level : 100mVpp 3.3Vdc (PAL) 	
12	Colour Killer Filter	Colour Killer amp control filter		
14	Data Blanking	Switching the interval Video Signal and external RGB Signal R = 11k Ω	Hi : External RGB Signal Lo : Internal Video Signal	
15	Video Signal Input 1	Video Signal Input	Standard input : 450mVpp Signal comp. : 315mVpp Sync. comp. : 135mVpp Max. input : 900mVpp 	
16	Video Signal Input 2			
17	Picture Control	Control the picture quality by changing the Pin voltage from 0 to 5V		

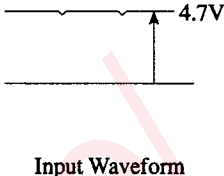
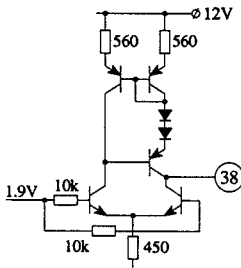
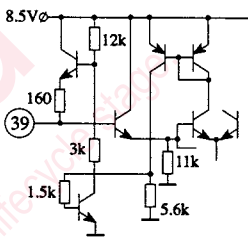
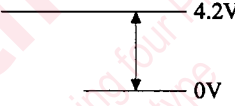
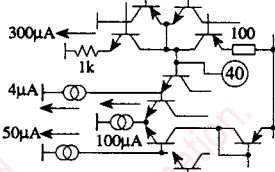
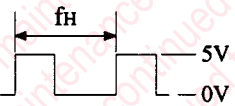
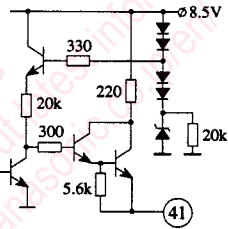
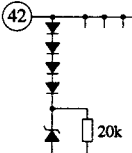
■ Pin Descriptions (Continue)

Pin No.	Pin Name	Pin Description	Typical Waveform	Equivalent Circuit
18	Brightness Control	Control the pedestal level of output by changing the Pin voltage from 0 to 5V		
19	Output Clamp (B)	Connect the output clamp capacitor	10.3Vdc (when VCC1=12V)	
20	Output Clamp (G)			
26	Output Clamp (R)			
21	G-OUT	R G B Original colour	Original Colour : Max 10.4Vpp	
24	B-OUT			
25	R-OUT			
22	External (G)	External R G B signal input R=1.3kΩ	Standard input : 900mVpp 	
23	External (B)			
27	External (R)			
28	Synchronous Separation Clamp Noise Canceller	Bias output pin for supplying the compare voltage to the synchronous separation noise canceller circuit	DC 9V	
29	Supply Voltage (12V) VCC1	Supply voltage Pin	DC 12V	
30	Synchronous Separation Filter	Pin for cutting a video signal for synchronous separation and determining the sampling level of a synchronizing signal		

Pin Descriptions (Continue)

Pin No.	Pin Name	Pin Description	Typical Waveform	Equivalent Circuit
31	Vertical Output VOUT	Vertical Drive output pin		
32	Feedback Input	Output feedback pin for compensating the linearity of vertical output and improving responsibility		
33	Vertical Oscillation	Performs 45 to 60Hz Vertical Oscillation		
34	Vertical Hold	Pin for generating sawtooth wave voltage for vertical drive		
35	Vertical Integration	Pin for performing the vertical synchronous separation and pulling in vertical oscillation		
36	Sand Castle Pulse Output	Superimpose V _{BLK} , H _{BLK} and BP pulses for output. BP=3μs/4μs H _{BLK} =11~12μs V _{BLK} =1100μs/1350μs		
37	50Hz/60Hz Switching Flyback Pulse Input	Serve as the Pin for switching F B pulse input and V _{BLK} pulse width at 50Hz & 60Hz		

Pin Descriptions (Continue)

Pin No.	Pin Name	Pin Description	Typical Waveform	Equivalent Circuit
38	Horizontal AFC Output	AFC current push-pull Pin		
39	Horizontal Oscillation	Performs 30 to 32kHz horizontal oscillation (double f_H oscillation)		
40	Horizontal Center Adjustment	Performs the adjustment for the screen position in horizontal direction		
41	Horizontal Output	Horizontal drive output Pin		
42	Horizontal Supply Voltage VCC3	Require the horizontal supply voltage Pin ICC3 of 12mA by the internal zener	DC 8.6V	

Supplementary Explanation

Design Reference Value in Electrical Characteristics (Ta=25°C)

Item	Symbol	Condition	min.	typ.	max.	Unit
Chroma System						
fo Change with Ambient Temperature	Δf_{OT}	$V_{CC1} = 12V, V_{CC2} = 5V$		-2		Hz/°C
Demod. Angle (Colour Diff.) $\angle R$	$\angle R$	Based on $\angle B$	86.5	90	93.5	deg
Demod. Angle (Colour Diff.) $\angle G$	$\angle G$	Based on $\angle B$	229	236	244	deg
APC Pull-in Range (1)	$f_{P(PAL)}$	PAL Mode 4.43MHz	500	700		Hz
APC Pull-in Range (2)	$f_{P(NTSC)}$	NTSC Mode 3.58MHz	500	700		Hz

■ Supplementary Explanation (Continue)

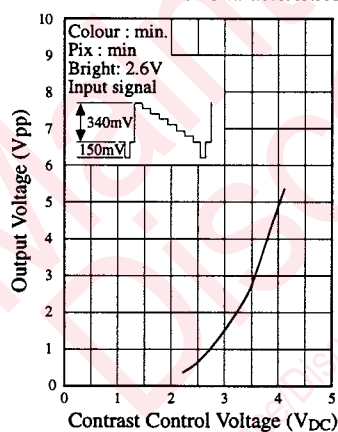
● Design Reference Value in Electrical Characteristics (Ta=25°C)

Item	Symbol	Condition	min.	typ.	max.	Unit
Video Output System						
Bright Control Sensitivity	SBR	$\Delta(\text{Output DC})/\Delta(\text{Bright Voltage})$	1.7	1.9	2.1	
Video Frequency Characteristics	f _v	Picture at typ. -3dB point	6			MHz
RGB External Input Signal Internal RGB Signal Crosstalk	CT INT-EXT	Crosstalk when data blanking is switched	46			dB
Data Switching Time	t _d	V _{CC1} =12V, V _{CC2} =5V			20	ns
PAL/NTSC Switching Level	V _{SPAL/NTSC}	PAL/NTSC demodulation when PAL signal input and R-Y output	8.8	9.2	9.7	V
Deflection System						
Change with Vertical Oscillation Frequency Ambient Temperature	$\Delta f_{VO-(T)}$	-20 ~ +70°C V _{CC1} =12V, V _{CC2} =5V Temperature change	-220	-170	0	ppm/°C
Change with Horizontal Oscillation Frequency Ambient Temperature	$\Delta f_{HO-(T)}$	-20 ~ +70°C V _{CC1} =12V, V _{CC2} =5V Temperature change	-210	-100	0	ppm/°C
Sand Castle Pulse Level (V)	V _{SC-V}	V _{CC1} =12V, V _{CC2} =5V, Pin 36 Output	1.8	2.3	2.8	V
Sand Castle Pulse Level (H)	V _{SC-H}	V _{CC1} =12V, V _{CC2} =5V, Pin 36 Output	4.8	5.3	5.8	V
Sand Castle Pulse Level (Burst Gate)	V _{SC-Burst}	V _{CC1} =12V, V _{CC2} =5V, Pin 36 Output	10.5	11	11.5	V

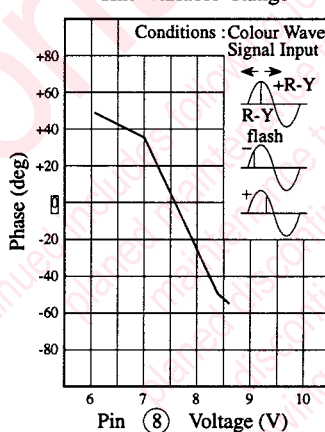
Note : The above values are reference values for design purposes, not for guarantee values.

■ Characteristic Curve Diagrams

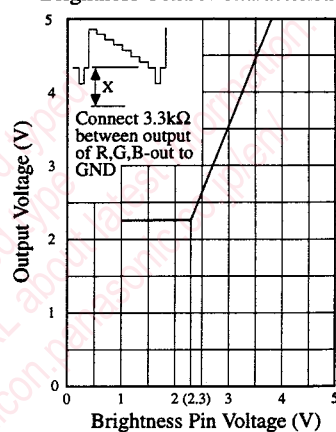
Contrast Control Characteristics



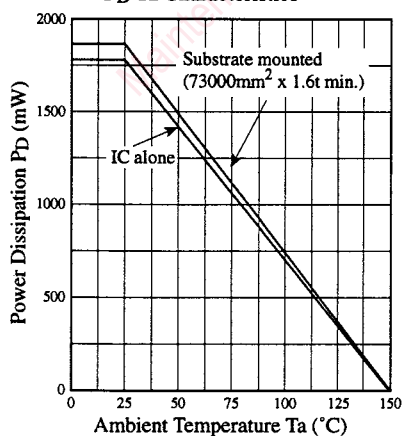
Tint Variable Range



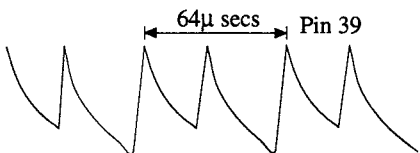
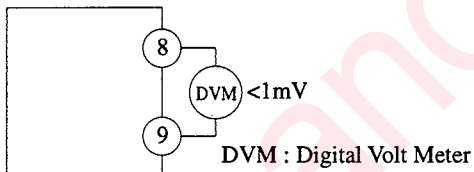
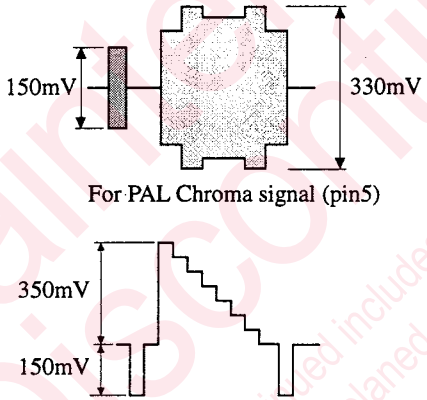
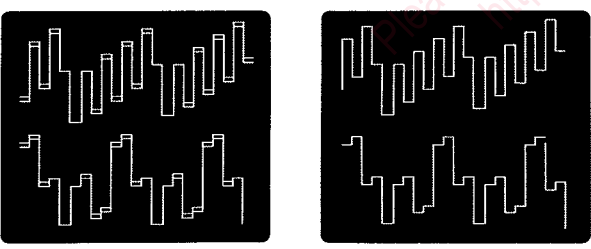
Brightness Control Characteristics



P_D Ta Characteristics



■ Adjustment Procedure of AN5601K

S/NO	Item	Adjustment Procedure
1a	No signal to chroma input pin 5 and video input pin 15  Fig. A	Adjust the 5kΩ variable resistor at pin 39 to obtain the waveform as in Fig. A
1b	No signal to chroma input pin 5 and video input pin 15  Fig. B	Adjust the 5kΩ variable resistor between pin 8 and pin 9, so that the voltage across them is less than 1mV see Fig. B
2	Input the signals (Chroma and Luminance Signal)  For PAL Chroma signal (pin 5) For Video input signal (pin 15)	
3	Colour control Pin 3 is connected to Vcc1 (12V). Pin 8 and 9 are connected together.	Adjust the Trimmer slowly at Pin 2 to obtain the waveform as shown in Fig. C and D
4	Input Chroma signal. Colour = 3.25Vdc Contrast = 4.6Vdc Bright = 4.0Vdc Picture = Min.  Fig. C Unmatched waveform Fig. D Matched waveform	Adjust the 1kΩ variable resistor and transformer at pin 11 or pin 13 to obtain the matched waveform as shown in Fig. C and Fig. D

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