# AN5633K

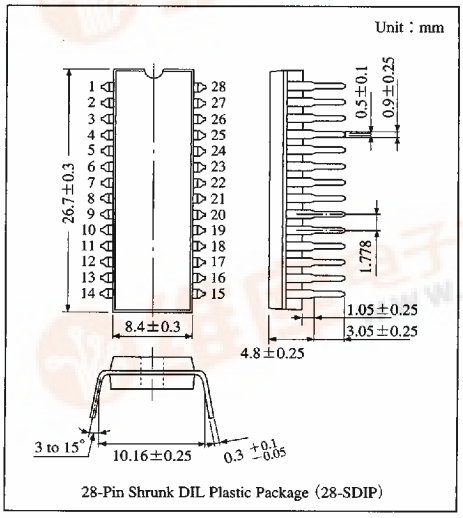
## SECAM-PAL Signal-Conversion IC

### Overview

The AN5633K is an integrated circuit designed for conversion from SECAM color-signal to quasi-PAL color signal that is line-sequential 2-phase quadrature modulation.

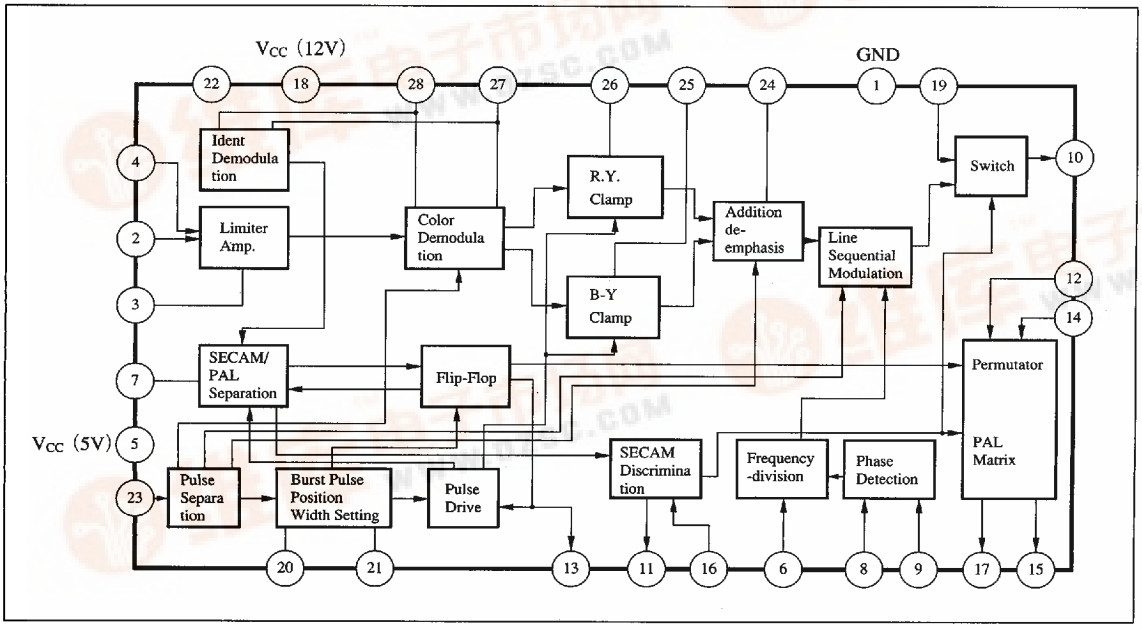
### Features

- Reduction of line-crawling by line-sequential detection (12dB as compared with the conventional one)
- SECAM/PAL discriminating capability is improved by detecting color killer voltage of PAL demodulation IC.
- Reduced external parts number like transformer,and adjustment processes




28-Pin Shrunk DIL Plastic Package (28-SDIP)

### Block Diagram



## ■ Absolute Maximum Ratings (Ta=25℃)

| Parameter | Symbol | Rating | | Unit |
|---|---|---|---|---|
| Supply voltage | $V_{CC}$ | 14.4 | | V |
| Supply current | $I_{CC}$ | 82.7 | | mA |
| Circuit voltage | $V_2$, $V_4$, $V_{11}$, $V_{13}$, $V_{16}$, $V_{22}$, $V_{23}$, | 0 | $V_{18-1}$ | V |
| | $V_5$ | 0 | 6 | |
| | $V_6$ | 0 | 8 | |
| | $V_{12}$, $V_{14}$, $V_{19}$, | 0 | 7 | |
| Circuit current | $I_8$ | −1 | 0 | mA |
| | $I_9$ | −3 | 0 | |
| | $I_{13}$ | 0 | 10 | |
| | $I_{20}$, $I_{21}$ | −0.05 | 2 | |
| Power dissipation | $P_D$ | 1142 | | mW |
| Storage temperature | $T_{stg}$ | −55 to +150 | | ℃ |
| Operating ambient temperature | $T_{opr}$ | −20 to +70 | | ℃ |

## ■ Recommended Operating Range (Ta=25℃)

| Parameter | Symbol | Range |
|---|---|---|
| Operating supply voltage range | $V_{CC}$ | 9.6V to 14.4V |

ICs for TV

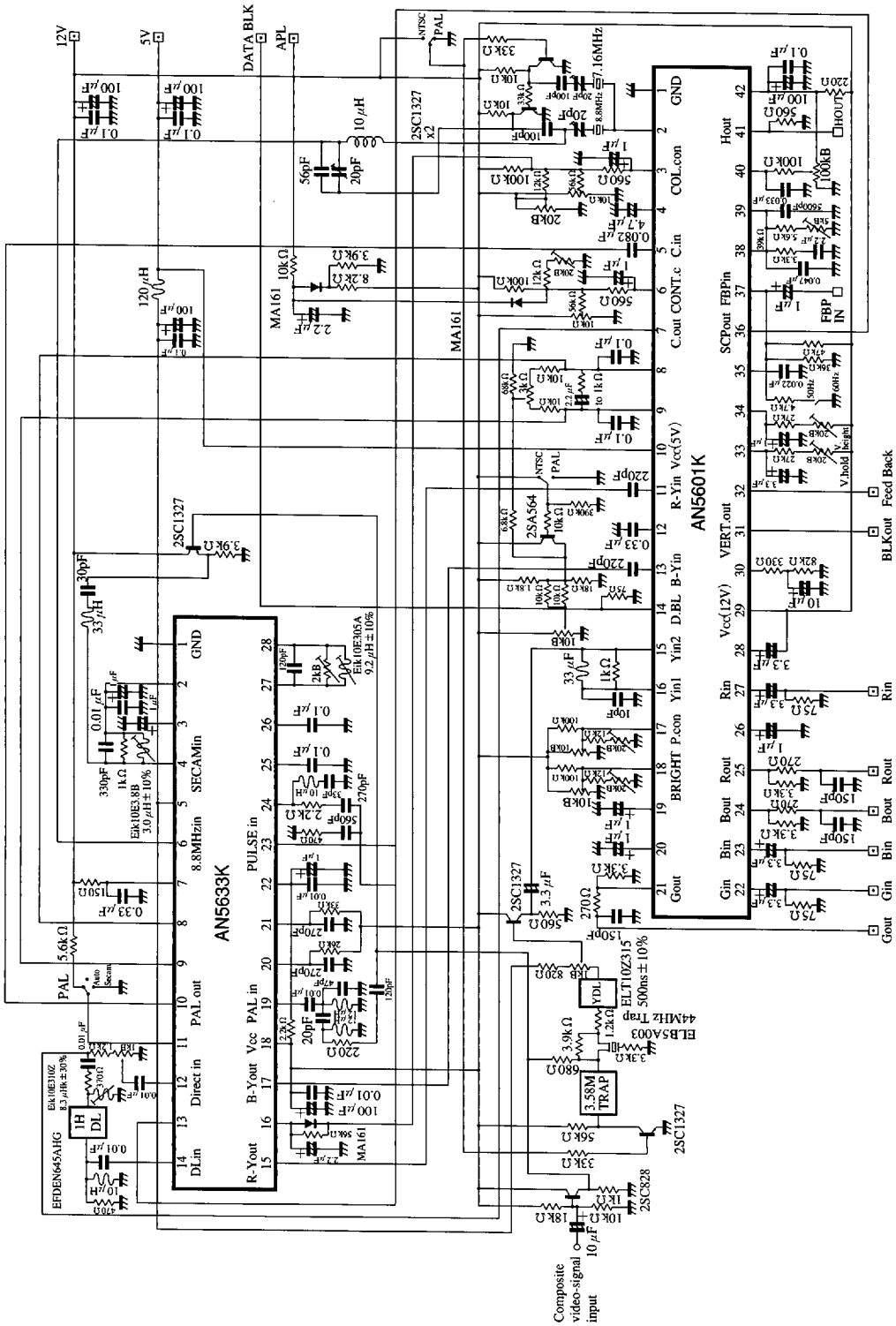
## ■ Electrical Characteristics (Ta=25℃)

| Parameter | Symbol | Condition | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| DC Section | | | | | | |
| Circuit current 12V | $I_{CC1}$ | $V_{CC1}$=12V, $V_{CC2}$=5V, | 37 | 50 | 63 | mA |
| Circuit current 5V | $I_{CC2}$ | $V_{CC1}$=12V, $V_{CC2}$=5V, | 10 | 13 | 16 | mA |
| AC Section | | | | | | |
| Chroma Section | | | | | | |
| SECAM input signal limiting | $V_{O(lim)}$ | 4.433618MHz input of Pin④ 10 to 300mV$_{PP}$ output of Pin㉘ | −1 | 0 | 1 | dB |
| Limiter amp. gain | $G_{V(lim)}$ | Ratio of 4.433618MHz input of Pin④ to 1mV$_{PP}$ output of Pin㉘ | 28 | 32 | 36 | dB |
| SECAM demodulator color difference ratio (B−Y/R−Y) | B−Y/R−Y | SECAM color bar input of Pin④ : 200mV$_{PP}$ Ratio of B of DB to R of DR of Pin㉔ when the white levels of DB and DR of Pin㉔ are matched | 0.67 | 0.74 | 0.81 | Times |
| SECAM output signal voltage | $e_{O(SECAM)}$ | SECAM color bar input of Pin④ : 200mV$_{PP}$ R of output DR of Pin㉔ when the white levels of DB and DR of Pin㉔ | 60 | 180 | 300 | mV$_{PP}$ |
| Ratio of burst to chroma | $\frac{e_{O(SECAM)}}{e_{O(Burst)}}$ | SECAM color bar input of Pin④ : 200mV$_{PP}$ Ratio of burst to R of output DR of Pin㉔ when the white levels of DB and DR of Pin㉔ | 1.8 | 2.6 | 3.4 | Times |
| PAL input-signal voltage | $V_{i(PAL)}$ | PAL input signal of Pin⑲ | — | — | 1100 | mV$_{PP}$ |
| PAL output-signal voltage | $e_{O(PAL)}$ | PAL input of Pin⑲ : 750mV$_{PP}$, output of Pin⑲ | 490 | 620 | 750 | mV$_{PP}$ |
| Discrimination Section | | | | | | |
| Killer tolerance | $e_K$ | Killer ON level to SECAM color bar input of Pin④ : 0dB (100mV$_{PP}$) | −38 | −31 | −24 | dB |
| Killer detection-voltage SECAM color | $V_{11-1\ SECAM}$ | Voltage of Pin⑪ when SECAM color bar input of Pin④ is −17dB | 0 | 0.25 | 0.5 | V |
| Killer detection-voltage SECAM off | $V_{11-1\ OFF}$ | Voltage of Pin⑪ when SECAM color bar input of Pin④ is −43dB | 0.5 | 1.3 | 2.1 | V |

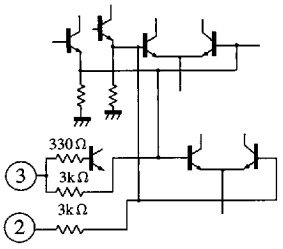
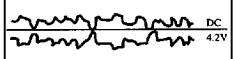
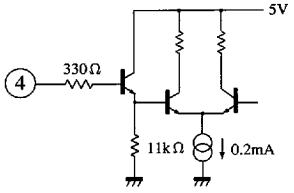
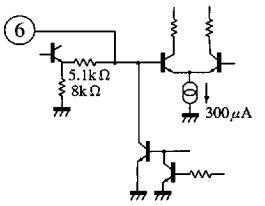
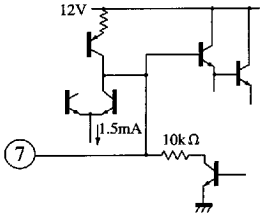
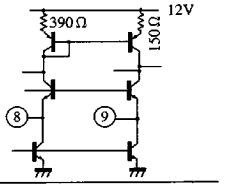
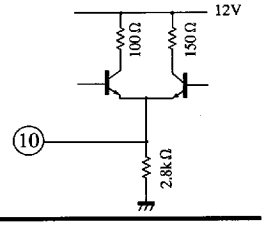
## ■ Electrical Characteristics (cont.) (Ta=25℃)

| Parameter | Symbol | Condition | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Discrimination Section (cont.) | | | | | | |
| Ident detection voltage PAL | $V_{I1-1PAL}$ | Voltage of Pin⑪ when PAL color bar input burst of Pin④ is 150m$V_{PP}$ | 0.5 | 1.3 | 2.1 | V |
| Pulse Input | | | | | | |
| BLK detection voltage | $V_{BLK}$ | Blanking pulse input voltage range of Pin㉓ | 1 | 1.5 | 2 | V |
| H pulse detection voltage | $V_H$ | H pulse input voltage range of Pin㉓ | 3 | 3.5 | 4 | V |
| Burst gate pulse detection voltage | $V_{BGP}$ | Burst gate pulse input voltage range of Pin㉓ | 6.5 | 7 | 7.5 | V |
| Burst Phase Width Adjustment Section | | | | | | |
| Comparator threshold level | $V_{21LH}$ | Voltage of Pin⑳ at which L is changed to H when 3kΩ $V_{CC}$ of Pin⑳ and 100μA of Pin㉑ are applied | 2.6 | 3.1 | 3.6 | V |
| SECAM Switch, PAL Matrix | | | | | | |
| PAL amplification | $A_{PAL}$ | Gain of Pin⑫ input to Pin⑮ output, in case of SECAM | 0.9 | 1.1 | 1.3 | Times |
| PAL amplification error | $\Delta A_{PAL}$ | Error between gain of Pin⑫ input to Pin⑮ output, and gain of Pin⑭ input to Pin⑮ output | 0 | 5 | 10 | % |
| SECAM amplification | $A_{SECAM}$ | Gain of Pin⑫ input to Pin⑮ output, in case of PAL | 1.8 | 2.2 | 2.6 | Times |
| De-emphasis Switch Output | | | | | | |
| De-emphasis switch output DR | $V_{13-1DR}$ | Pin⑬ output when $V_{CC1}$=12V, Pin④ is SECAM color bar DR input | 11 | 12 | 13 | V |
| De-emphasis switch output DB | $V_{13-1DB}$ | Pin⑬ output when $V_{CC1}$=12V, Pin④ is SECAM color bar DB input | 0 | 0.25 | 0.5 | V |

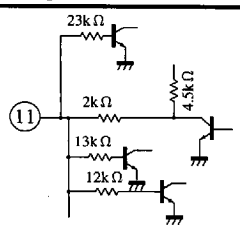
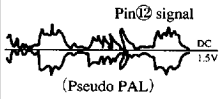
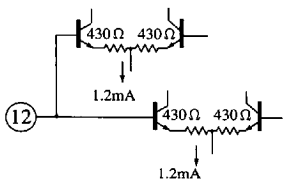
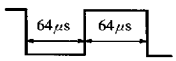
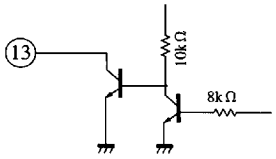
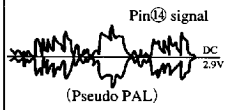
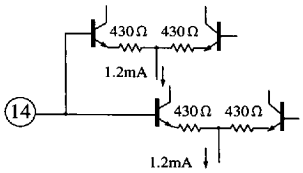
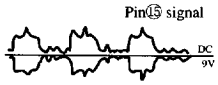
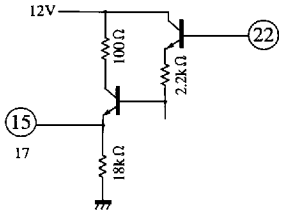
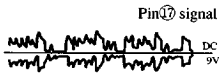
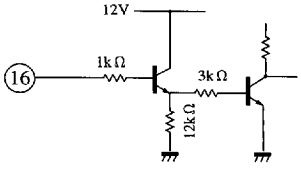
## ■ Application Circuit



## ■ Pin Descriptions

| Pin No. | Pin name | Typ. waveform | Description | Equivalent circuit |
|---|---|---|---|---|
| 1 | GND | ——— | GND pin. | ——— |
| 2<br>———<br>3 | Limiter feedback | ——— | Filter pin for keeping DC balance of limiter circuit. |  |
| 4 | SECAM signal input | Pin④ signal<br>  <br>Amplitude almost becomes flat after passing through the bell filter. | SECAM input pin.<br>PAL signal after input is separated at the latter-Ident section and the switch selection according to PAL is made. |  |
| 5 | Power supply (5V) | ——— | 5V power pin. | ——— |
| 6 | 8.8MHz CW input |  | Input 8.8MHz of the AN5601K. |  |
| 7 | System discrimination hold capacitance | ——— | Filter pin for holding the result discriminated by the system at the Ident section. |  |
| 8<br>———<br>9 | Phase detection | ——— | Pin for inputting the result of chroma-carrier-phase of quasi-PAL signal discriminated by the AN5601K. Proper phase is given by the entire system. |  |
| 10 | Output (PAL/quasi-PAL) | Pin⑩ signal<br>  <br>(quasi-PAL) | Pin for output signal which was converted into the quasi-PAL signal of SECAM. |  |

## ■ Pin Descriptions (cont.)

| Pin No. | Pin name | Typ. waveform | Description | Equivalent circuit |
|---|---|---|---|---|
| 11 | System discriminating switch | ——— | Output pin for determining whether the signal input to Pin④ is PAL or SECAM. It also has the function to switch the internal system manually. |   |
| 12 | Direct signal input |   | Pin for signal which is directly input to the PAL matrix in case of PAL and to the permutator circuit in case of SECAM. Connect to the ACC output pin of the AN5601K. |   |
| 13 | De-emphasis switch |   | Pin for switching the filter for de-emphasizing Pin㉔. |   |
| 14 | Delay signal input |   | Pin for 1H-delayed signal which is input to the PAL matrix in case of PAL and to the permutator circuit in case of SECAM. |   |
| 15 | R–Y signal output |   | Continuous modulation R–Y signal output pin. |   |
| 17 | B–Y signal output |   | Continuous modulation B–Y signal output pin. | |
| 16 | PAL color killer discrimination input | ——— | Pin for inputting color killer discriminating voltage of the AN5601K. The PAL/SECAM discriminating capability is increased by the internal logic circuit. |   |

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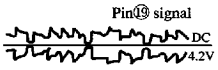
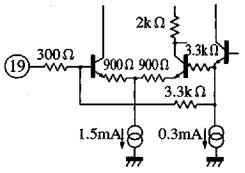
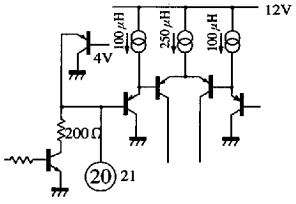
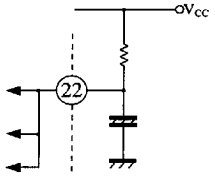
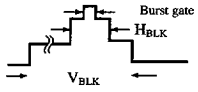
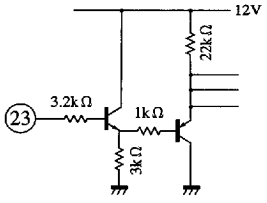
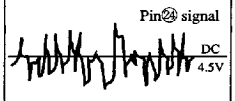
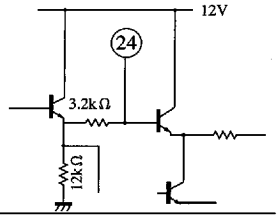
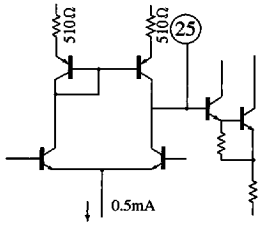
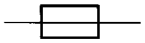
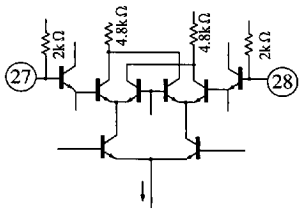
## ■ Pin Descriptions (cont.)

| Pin No. | Pin name | Typ. waveform | Description | Equivalent circuit |
|---|---|---|---|---|
| 18 | Power supply (12V) | ——— | 12V power pin. | ——— |
| 19 | PAL signal input |  | Signal, together with Pin④ input, is output directly from Pin⑲ to Pin⑩ in case of PAL. |  |
| 20 | Burst gate pulse fall setting | ——— | Pin for setting the falling point of internal burst-sampling pulse. |  |
| 21 | Burst gate pulse rise setting | ——— | Pin for setting the rising point of internal burst-sampling pulse. | |
| 22 | Reference bias voltage | ——— | Filter pin for applying noise-free reference-voltage to the internal circuit. |  |
| 23 | Pulse signal input |  | Pin for taking in sand-castle pulse of the AN5601K. |  |
| 24 | De-emphasis |  | Pin for de-emphasizing a signal to which SECAM signal is demodulated in line-sequence. |  |
| 25 | B–Y clamping capacitance | ——— | Clamping capacitance pin for regenerating DC voltage in B–Y line in which SECAM signal is demodulated in line-sequence. |  |
| 26 | R–Y clamping capacitance | ——— | Clamping capacitor pin for regenerating DC voltage in R–Y line in which SECAM signal is demodulated in line-sequence. | |

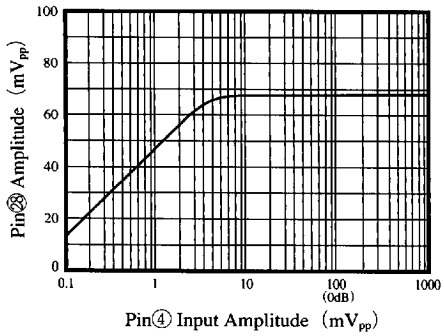
## ■ Pin Descriptions (cont.)

| Pin No. | Pin name | Typ. waveform | Description | Equivalent circuit |
|---|---|---|---|---|
| 27<br>—<br>28 | Discriminator |  | Discriminator pin for SECAM demodulation. R.L.C parallel resonator is externally connected. |  |

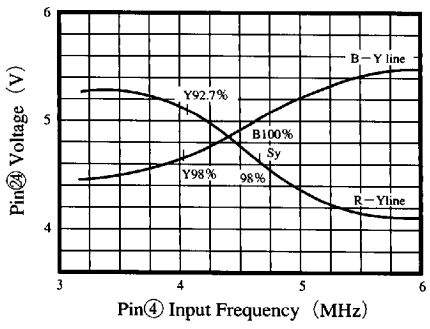
## ■ Supplementary Explanation

### • Characteristic Curve

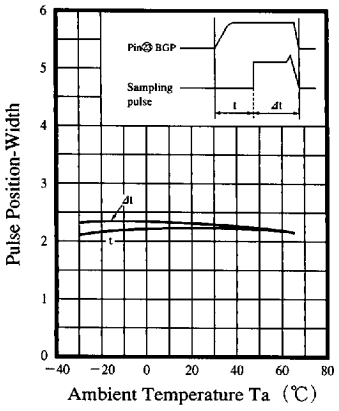
Limiter-Up Characteristics



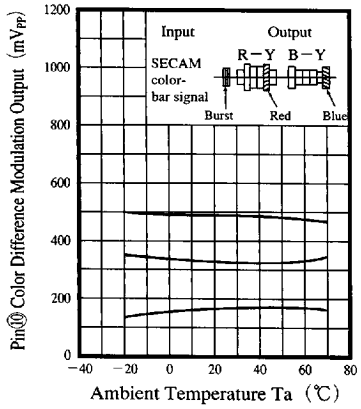

Discriminator S-Characteristics



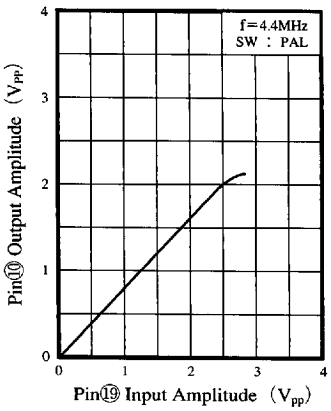

Change between Pulse Position-Width and Temperature




Color Difference Output Temperature Change




PAL Amp I/O Characteristics



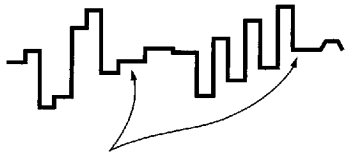
## • How to Adjust the AN5633K

After adjusting the AN5601K, adjust in the following procedure:

1. Set Pins⑪ and ⑯ to 0V and fix the SECAM mode.

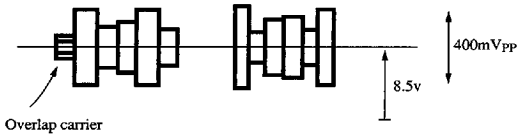
a. Adjust the discriminating transformer between Pins㉘ and ㉗ and allow white (black) level DC to coincide.

Pin㉔




b. Adjust the resistance volume between Pins㉘ and ㉗ and overlap the white level carrier.

Pin⑩




c. Adjust the input capacitance of Pin⑥ and make the smallest amplitude of $A_{CC}$ output Pin⑦ of the AN5601K.

Return Pins⑪ and ⑯ to the Auto mode

| | | | |
|---|---|---|---|
| Pin⑪ in Auto | SECAM color | 0V | Generated automatically in the AN5633K |
| | Other | up to 1V | |
| Pin⑯ in Auto | PAL color | 1.5V or more | Get from the AN5601K |
| | PAL killer | 0V | |