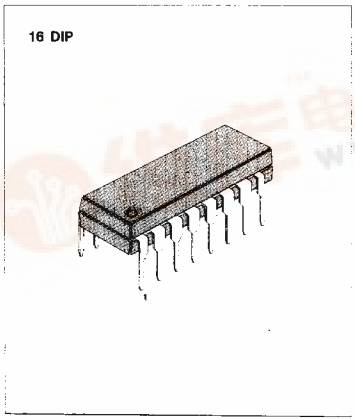
## VHF BAND RF MODULATOR

The KA2981 is a monolithic integrated circuit in a 16-lead dual in-line package designed for use in the VHF RE converter for VCRs, video game machines and so on.




## FUNCTIONS

- Video clamp
- White clip
- Video AM modulator
- FM modulator
- Sound carrier modulator
- RF carrier oscillator

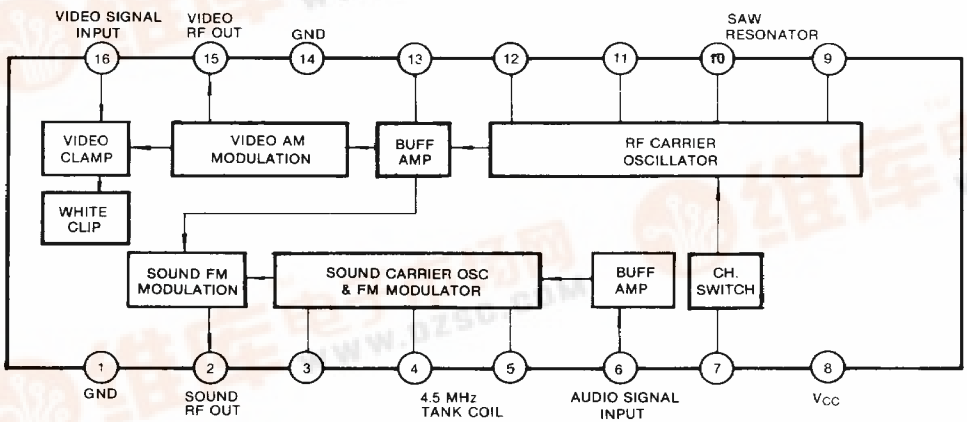
## FEATURES

- **Output level & picture/sound ratio can be controlled by external resistor**

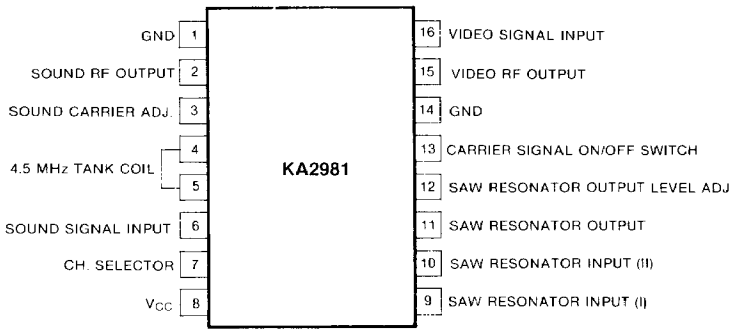
## ORDERING INFORMATION

| Device | Package | Operating Temperature |
|---|---|---|
| KA2981 | 16 DIP | − 10 ~ + 70°C |

## BLOCK DIAGRAM



## PIN CONFIGURATION




## ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Supply Voltage | $V_{CC}$ | 10 | V |
| Power Dissipation | $P_d$ | 330 | mW |
| Input Pin Signal Voltage | $E_{in}$ | 2.5 | $V_{p-p}$ |
| Input Pin Supply Voltage | $V_{in}$ | GND − 0.3 ~ $V_{CC}$ + 0.3 | V |
| Operating Temperature | $T_{opr}$ | − 10 ~ + 70 | °C |
| Storage Temperature | $T_{stg}$ | − 55 ~ + 155 | °C |

## ELECTRICAL CHARACTERISTICS

### A. DC Characteristics ($V_{CC}$ = 6.2V, Ta = 25°C)

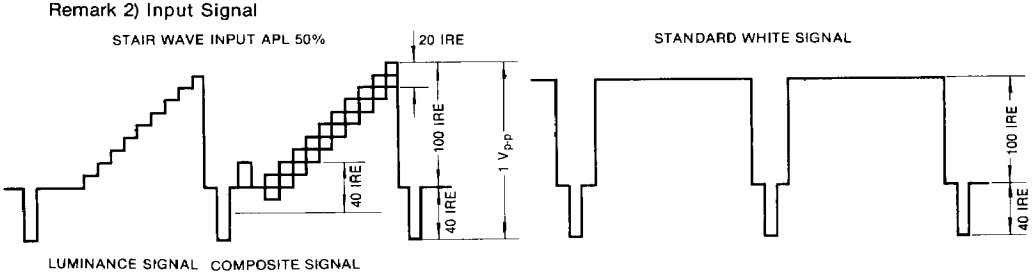
| Characteristic | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Quiescent Current | $I_Q$ | $S_2$ = OFF<br>$S_1 = S_3$ = ON | 16.5 | 21.5 | 28.0 | mA |
| Video Signal Input Voltage | $V_6 - V_{14}$ | | | 3.45 | | V |
| Sound Signal Input Voltage | $V_1 - V_6$ | | | 3.0 | | V |
| Video Output Pin Voltage | $V_{15} - V_{14}$ | | | 4.3 | | V |
| Sound Output Pin Voltage | $V_1 - V_2$ | | | 4.25 | | V |
| SAW Input (1) Pin Voltage (1) | $V_9 - V_{14}$ | $S_2$ = OFF<br>$S_1 = S_3$ = ON | | 2.25 | | V |
| SAW Input (1) Pin Voltage (2) | | $S_1$ = OFF<br>$S_2 = S_3$ = ON | | | 0.3 | V |
| SAW Input (2) Pin Voltage (2) | $V_{10} - V_{14}$ | $S_2$ = OFF<br>$S_1 = S_3$ = ON | | | 0.3 | V |
| SAW Input (2) Pin Voltage (2) | | $S_1$ = OFF<br>$S_2 = S_3$ = ON | | 2.25 | | V |

## B. AC Characteristics ($V_{CC}$ = 6.2V, Ta = 25°C)

| Characteristic | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Operating Voltage | $V_{CC}$ | — | 5.7 | 6.2 | 6.7 | V |
| Video Output Level | $V_O$ (fp) | $V_{CC}$ = 6.2V, $V_{i1}$ = No Signal | 85 | 87 | 89 | dBμ |
| Thermal Sensitivity of Video Output Level | $V_b$ (fp) | Ta = −10°C ~ 70°C | — | — | ±2 | dBμ |
| Video Modulation | mP | $V_{i1}$ = 1.0$V_{p\text{-}p}$ | 73 | 76 | 79 | % |
| Interchannel Video Modulation Difference | △mP | $V_{i1}$ = 1.0$V_{p\text{-}p}$, △mP = $mP_1$ ~ $mP_2$ | — | — | ±3 | % |
| Maximum Video Modulation | $mP_1$ (max) | $V_{i1}$ = 2.0$V_{p\text{-}p}$ | 92 | 96 | — | % |
| Audio RF Output Level | $V_O$ (fs) | $V_{CC}$ = 6.2V, $V_{i2}$ = No Signal | 81 | 83 | 85 | dBμ |
| Audio FM Modulation Sensitivity | $ß_S$ | $V_{i3}$ = Pin 6 DC ± 0.2V<br>$ß_S$ = △$F_O$/400mV | 0.35 | 0.45 | 0.55 | KHz/mV |
| Maximum Sound FM Modulation | mS (max) | $V_{i3}$ = Pin 6 DC ± 1.0V<br>mS (max) = $\frac{F_O}{50(KHz)} \times 100(\%)$ | 800 | 1200 | — | % |
| Video Output Synchronous Signal Ratio | $V_S$ | $V_{i1}$ = 1$V_{p\text{-}p}$,<br>Sync./Video = 3/10 | 2.6 | 3.0 | 3.3 | — |
| Audio Modulation | mS | $V_{i2}$ = 136m$V_{p\text{-}p}$, 1KHz | — | ±25 | — | KHz |
| Video Input Impedance | $Z_{inV}$ | $V_{i4}$ = 1.0$V_{rms}$,<br>200KHz ~ 4.2MHz sweep | 0.3 | 1 | 1.5 | KΩ |
| Audio Input Impedance | $Z_{inA}$ | $V_{i3}$ = 1.4$V_{p\text{-}p}$,<br>100Hz ~ 10KHz sweep | 50 | | | KΩ |

Remark 1) FM modulation △$f$ = ±25KHz = 100%

Remark 2) Input Signal

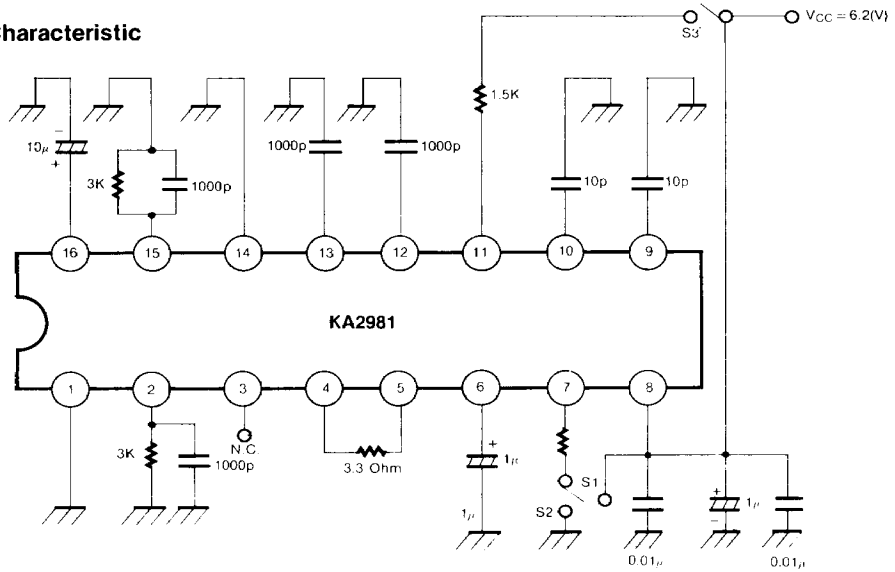



Remark 3) Switch operating for channel selection

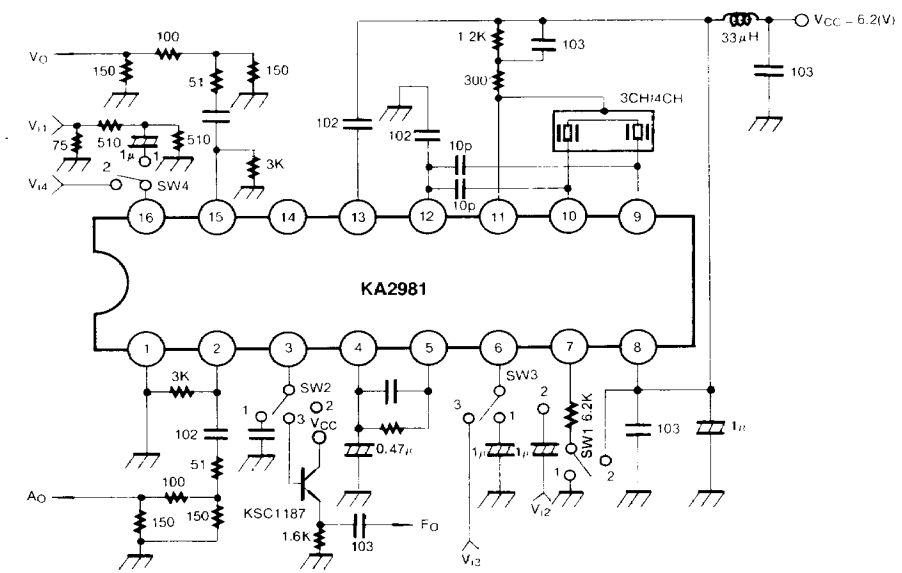
| Channel | Saw Oscillator | |
|---|---|---|
| | Pin 9 | Pin 10 |
| High | On | Off |
| Low | Off | On |

## TEST CIRCUIT

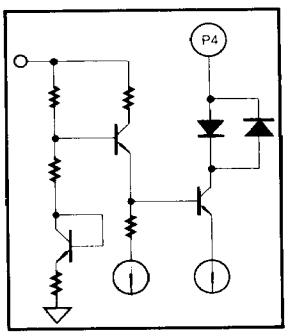
### A. DC Characteristic

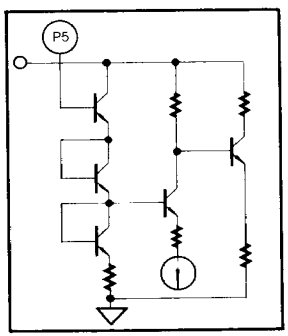


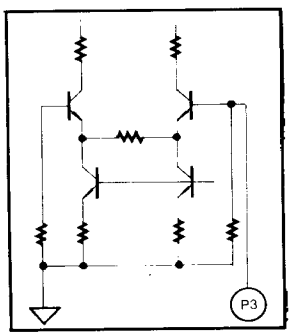

### B. AC Characteristic

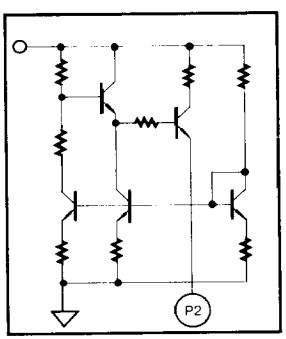


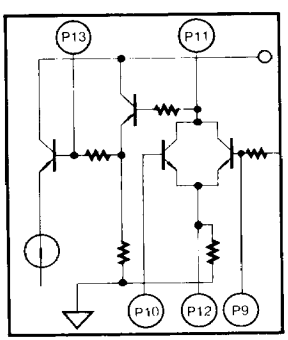
## INTERNAL STRUCTURE WITH PIN

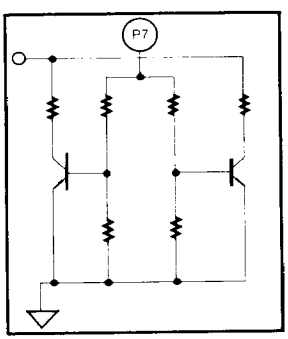


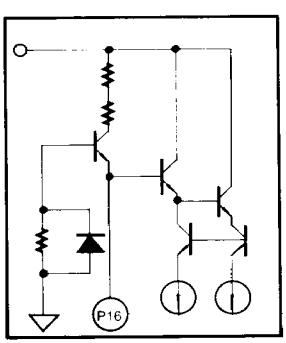



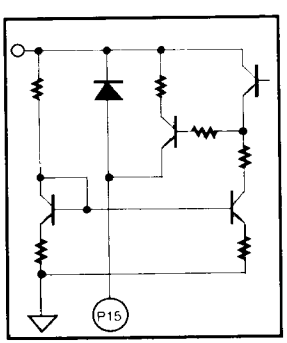



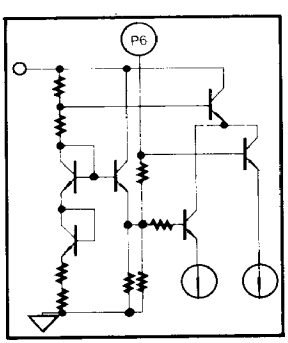



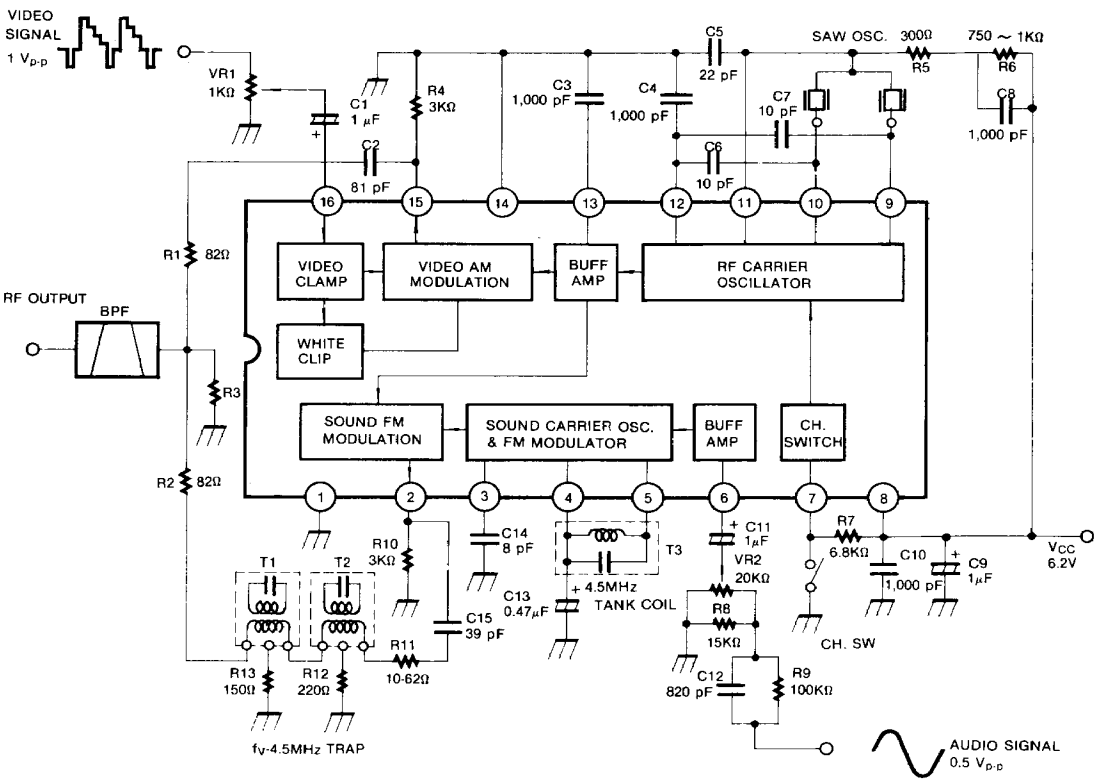



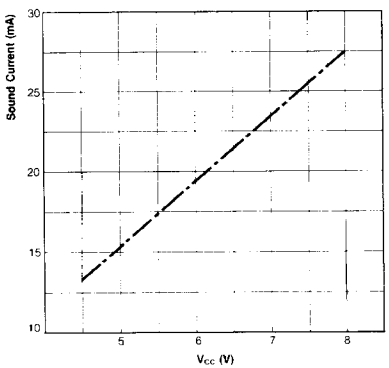



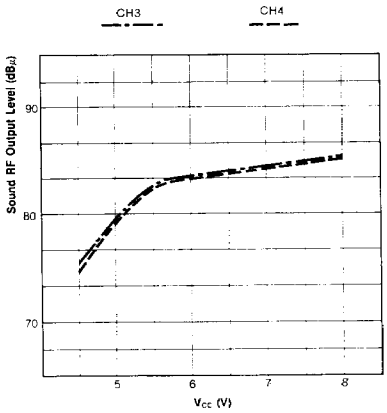
## APPLICATION CIRCUIT



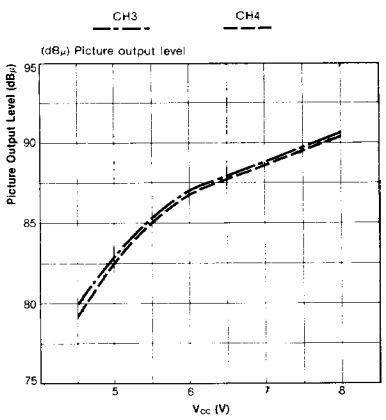
**Supply Voltage & Supply Current**




**Supply Voltage & Sound RF Output Level**




**Supply Voltage & Picture Output Level**




**Supply Voltage & Picture Modulation**