

VHF BAND RF MODULATOR

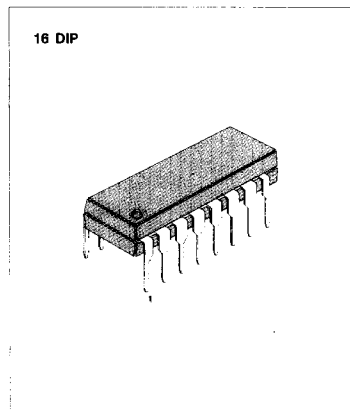
The KA2981 is a monolithic integrated circuit in a 16-lead dual in-line package designed for use in the VHF RE converter for VCRs, video game machines and so on.

FUNCTIONS

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

FEATURES

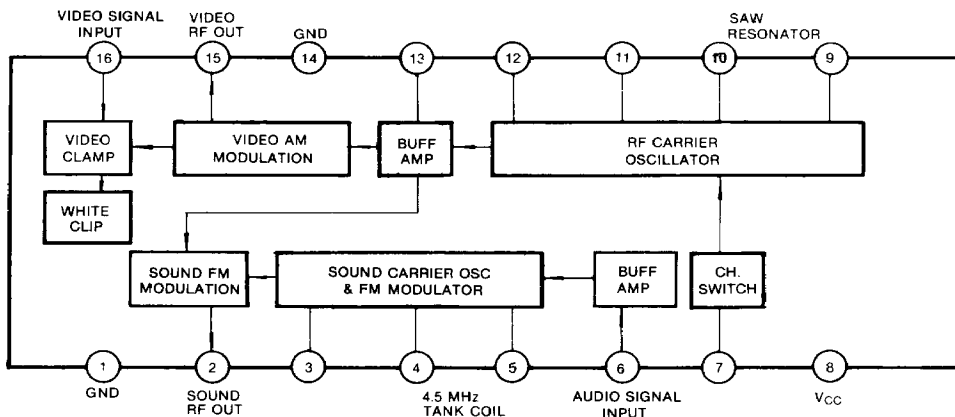
- Output level & picture/sound ratio can be controlled by external resistor



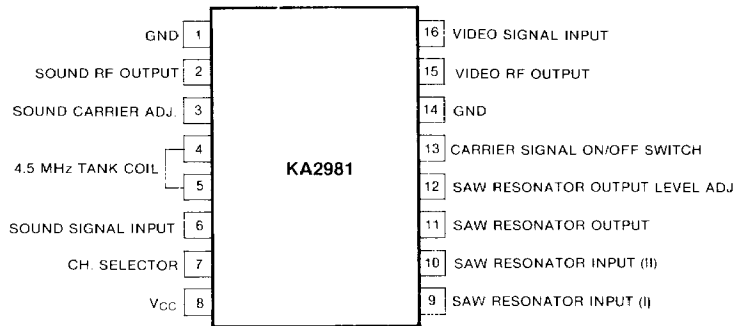
ORDERING INFORMATION

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

BLOCK DIAGRAM



## PIN CONFIGURATION

ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

| Characteristic           | Symbol    | Value                        | Unit             |
|--------------------------|-----------|------------------------------|------------------|
| Supply Voltage           | $V_{CC}$  | 10                           | V                |
| Power Dissipation        | $P_d$     | 330                          | mW               |
| Input Pin Signal Voltage | $E_{in}$  | 2.5                          | $V_{DD}$         |
| Input Pin Supply Voltage | $V_{in}$  | GND $-0.3 \sim V_{CC} + 0.3$ | V                |
| Operating Temperature    | $T_{opr}$ | $-10 \sim +70$               | $^\circ\text{C}$ |
| Storage Temperature      | $T_{stg}$ | $-55 \sim +155$              | $^\circ\text{C}$ |

## ELECTRICAL CHARACTERISTICS

A. DC Characteristics ( $V_{CC} = 6.2\text{V}$ ,  $T_a = 25^\circ\text{C}$ )

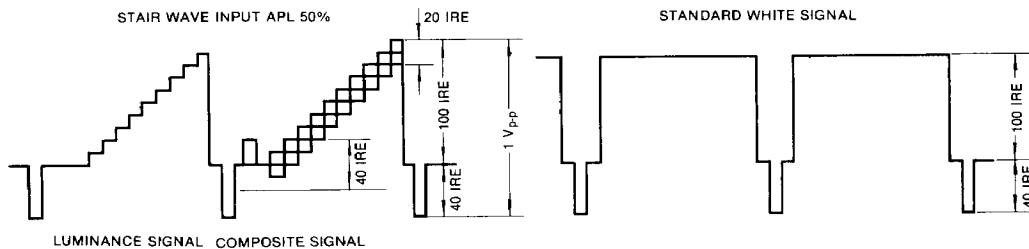
| Characteristic                | Symbol            | Test Condition                                | Min  | Typ  | Max  | Unit |
|-------------------------------|-------------------|---|------|------|------|------|
| Quiescent Current             | $I_Q$             | $S_2 = \text{OFF}$<br>$S_1 = S_3 = \text{ON}$ | 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) | $V_9 - V_{14}$    | $S_2 = \text{OFF}$<br>$S_1 = S_3 = \text{ON}$ |      | 2.25 |      | V    |
| SAW Input (1) Pin Voltage (2) |                   | $S_1 = \text{OFF}$<br>$S_2 = S_3 = \text{ON}$ |      |      | 0.3  | V    |
| SAW Input (2) Pin Voltage (2) |                   | $S_2 = \text{OFF}$<br>$S_1 = S_3 = \text{ON}$ |      |      | 0.3  | V    |
| SAW Input (2) Pin Voltage (2) | $V_{10} - V_{14}$ | $S_1 = \text{OFF}$<br>$S_2 = S_3 = \text{ON}$ |      | 2.25 |      | V    |

B. AC Characteristics ( $V_{CC} = 6.2V$ ,  $T_a = 25^\circ C$ )

| 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)   | $V_{CC} = 6.2V$ , $V_{i1} = \text{No Signal}$  | 85   | 87       | 89      | $dB\mu$   |
| Thermal Sensitivity of Video Output Level | $V_b$ (fp)   | $T_a = -10^\circ C \sim 70^\circ C$  | —    | —        | $\pm 2$ | $dB\mu$   |
| Video Modulation                          | mP           | $V_{i1} = 1.0V_{p-p}$  | 73   | 76       | 79      | %         |
| Interchannel Video Modulation Difference  | $\Delta$ mP  | $V_{i1} = 1.0V_{p-p}$<br>$\Delta$ mP = $mP_1 \sim mP_2$  | —    | —        | $\pm 3$ | %         |
| Maximum Video Modulation                  | $mP_1$ (max) | $V_{i1} = 2.0V_{p-p}$  | 92   | 96       | —       | %         |
| Audio RF Output Level                     | $V_O$ (fs)   | $V_{CC} = 6.2V$ , $V_{i2} = \text{No Signal}$  | 81   | 83       | 85      | $dB\mu$   |
| Audio FM Modulation Sensitivity           | $\beta_S$    | $V_{i3} = \text{Pin 6 DC} \pm 0.2V$<br>$\beta_S = \Delta F_O / 400mV$                          | 0.35 | 0.45     | 0.55    | KHz/mV    |
| Maximum Sound FM Modulation               | mS (max)     | $V_{i3} = \text{Pin 6 DC} \pm 1.0V$<br>$mS \text{ (max)} = \frac{F_O}{50(KHz)} \times 100(\%)$ | 800  | 1200     | —       | %         |
| Video Output Synchronous Signal Ratio     | $V_S$        | $V_{i1} = 1V_{p-p}$<br>Sync./Video = 3/10  | 2.6  | 3.0      | 3.3     | —         |
| Audio Modulation                          | mS           | $V_{i2} = 136mV_{p-p}$ , 1KHz  | —    | $\pm 25$ | —       | KHz       |
| Video Input Impedance                     | $Z_{inV}$    | $V_{i4} = 1.0V_{rms}$ ,<br>200KHz $\sim$ 4.2MHz sweep  | 0.3  | 1        | 1.5     | $K\Omega$ |
| Audio Input Impedance                     | $Z_{inA}$    | $V_{i3} = 1.4V_{p-p}$<br>100Hz $\sim$ 10KHz sweep  | 50   |          |         | $K\Omega$ |

Remark 1) FM modulation  $\Delta f = \pm 25KHz = 100\%$ 

Remark 2) Input Signal

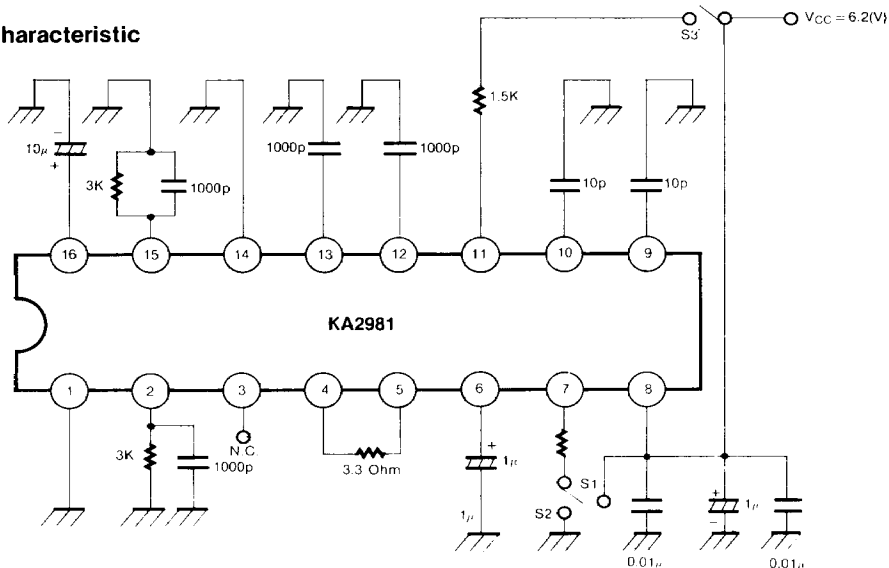


Remark 3) Switch operating for channel selection

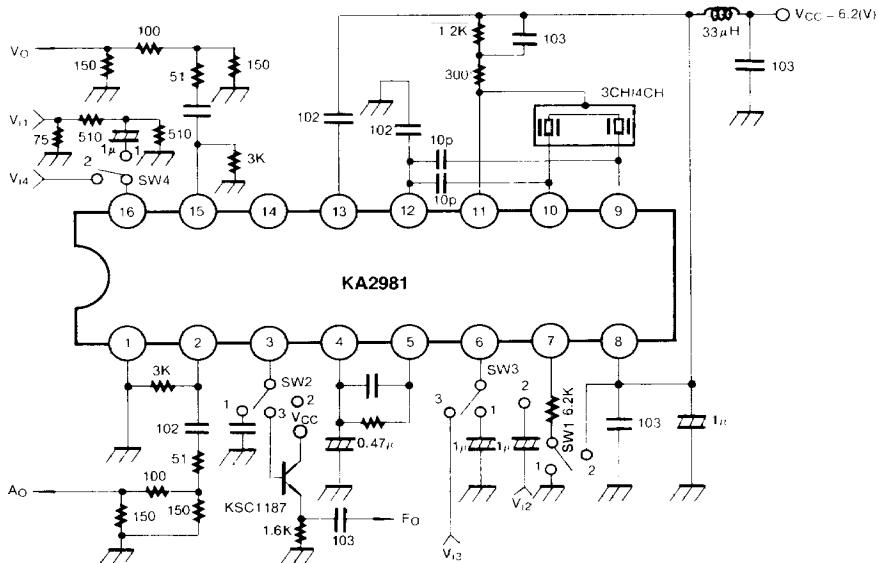
| Channel | Saw Oscillator |        |
|---------|----------------|--------|
|         | Pin 9          | Pin 10 |
| High    | On             | Off    |
| Low     | Off            | On     |

TEST CIRCUIT

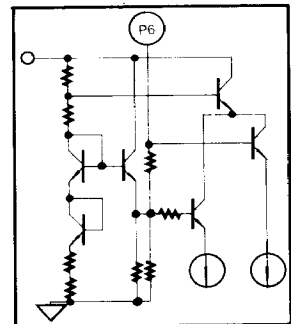
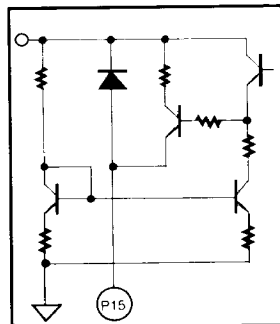
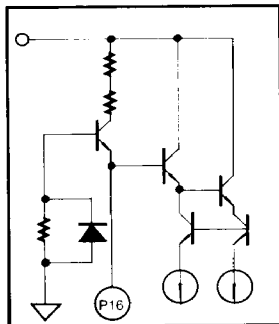
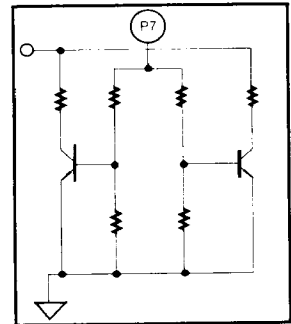
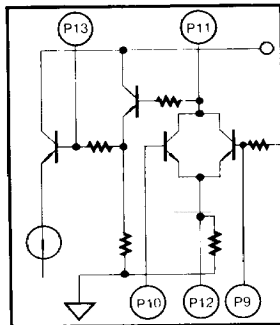
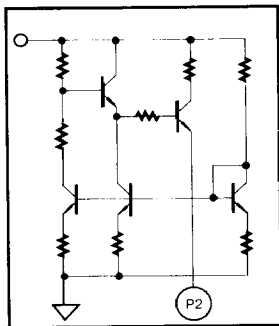
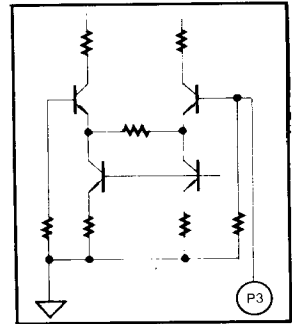
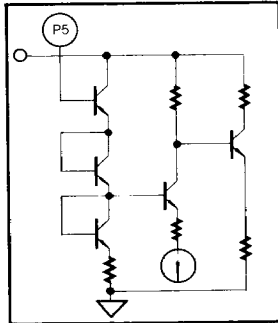
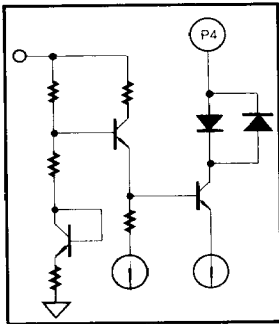
A. DC Characteristic



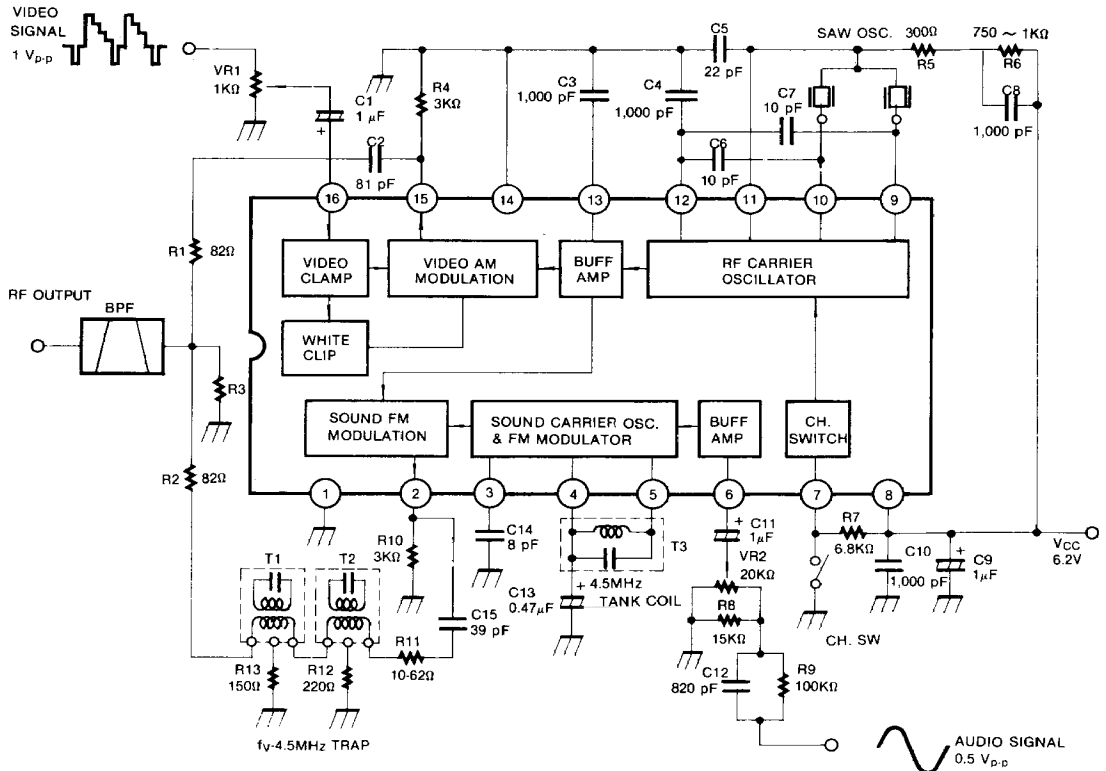
B. AC Characteristic



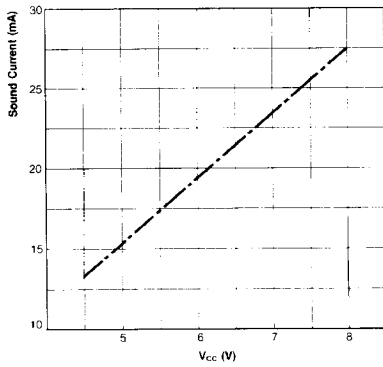
INTERNAL STRUCTURE WITH PIN



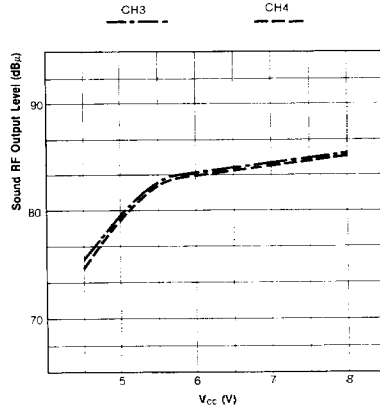
APPLICATION CIRCUIT



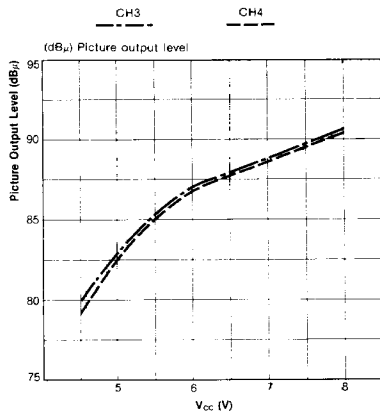
Supply Voltage & Supply Current



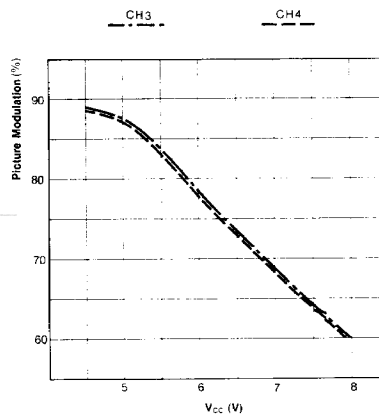
Supply Voltage & Sound RF Output Level



Supply Voltage & Picture Output Level



Supply Voltage & Picture Modulation



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