# AN5817NK

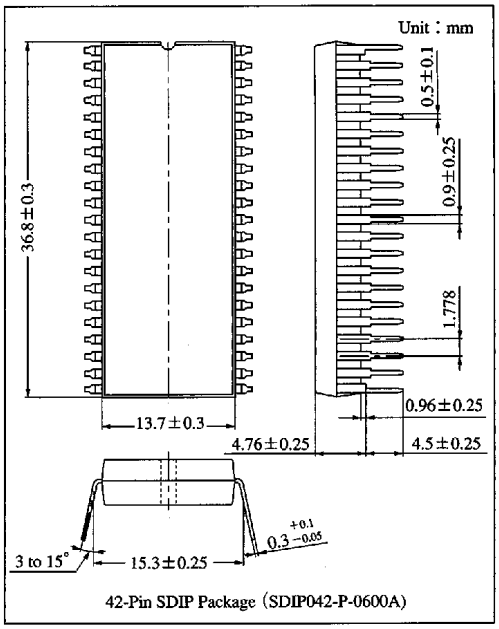
## Multiplex Sound Demodulator IC for TV in the U.S.A.

### ■ Overview

The AN5817NK is a TV multiplex sound signal processor IC for TV in the U.S.A. It includes all multiplex sound demodulator functions needed for U.S.A. TV standard.

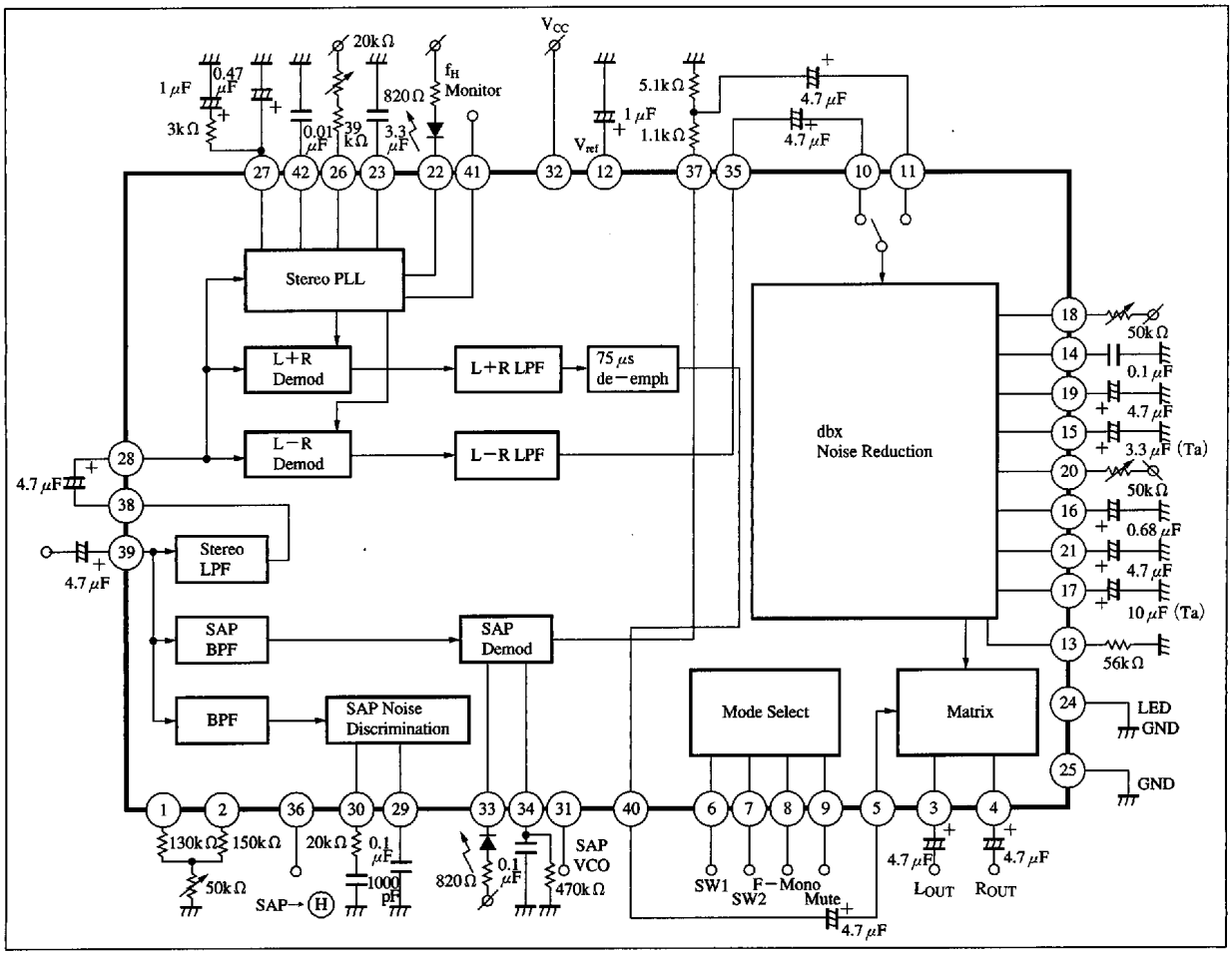
### ■ Features

- Single chip IC of TV multiplex sound demodulator for the USA standard (combined Zenith with dbx method)
- Only 4 adjustment points (two separation adjustments, one filter adjustment, and one VCO adjustment)
- Supply voltage : 9±1V




42-Pin SDIP Package (SDIP042-P-0600A)

### ■ Block Diagram



## ■ Absolute Maximum Ratings

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Supply voltage | $V_{CC}$ | 11.0 | V |
| Supply current | $I_{CC}$ | 50 | mA |
| Power dissipation Note 2) | $P_D$ | 760 | mW |
| LED driving current Note 3) | $I_{LED}$ | 20 | mA |
| Operating ambient temperature Note 1) | $T_{opr}$ | −20 to +75 | ℃ |
| Storage temperature Note 1) | $T_{stg}$ | −55 to +150 | ℃ |

Note 1) Ta=25℃ except operating ambient temperature and storage temperature.
Note 2) Allowable power dissipation of the package at Ta=70℃.
Note 3) Flow-in currents to Pin㉒, ㉝

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

| Parameter | Symbol | Range |
|---|---|---|
| Operating supply voltage range | $V_{CC}$ | 8.0V to 10.0V |

## ■ Electrical Characteristics ($V_{CC}$=9V, Ta=25±2℃)

| Parameter | Symbol | Condition | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Total circuit current | $I_{CC}$ | No signal | 22 | 30 | 38 | mA |
| Monaural output level | $V_{0\,(Mon)}$ | f=1kHz (Mono.) 100%mod. | 450 | 500 | 550 | mVrms |
| Monaural frequency characteristics−1 | $V_{1\,(Mon)}$ | f=300Hz (Mono.) 30%mod. | −0.5 | 0 | +0.5 | dB |
| Monaural frequency characteristics−2 | $V_{2\,(Mon)}$ | f=8kHz (Mono.) 30%mod. | −1.7 | −1.0 | +0.3 | dB |
| Monaural distortion rate | $THD_{(Mon)}$ | f=1kHz (Mono.) 100%mod. | — | — | 0.7 | % |
| Monaural noise level | $Vn_{(Mon)}$ | Input short BPF (A curve) | — | — | −65 | dBV |
| (L), (R) output voltage difference | $V_{LR\,(Mon)}$ | f=300Hz (Mono.) 100%mod. | −0.5 | 0 | +0.5 | dB |
| Stereo output level | $V_{0\,(st)}$ | f=1kHz (L (R)−only) 100%mod. | 400 | 500 | 600 | mVrms |
| Stereo frequency characteristics−1 | $V_{1\,(st)}$ | f=300Hz (L (R)−only) 30%mod. | −0.7 | 0 | +0.7 | dB |
| Stereo frequency characteristics−2 | $V_{2\,(st)}$ | f=3kHz (L (R)−only) 30%mod. | −1.0 | 0 | +1.0 | dB |
| Stereo frequency characteristics−3 | $V_{3\,(st)}$ | f=8kHz (L (R)−only) 30%mod. | −2.0 | −1.0 | 0 | dB |
| Stereo distortion rate | $THD_{(st)}$ | f=1kHz (L (R)−only) 100%mod. | — | — | 1.0 | % |
| Stereo noise level | $Vn_{(st)}$ | f=15.73kHz ($f_H$) $v$=0.084$V_{P-P}$, BPF | — | — | −65 | dBV |
| Stereo discrimination level | $V_{TH\,(st)}$ | f=15.73kHz ($f_H$) | 10 | 15 | 22 | mVrms |
| Stereo discrimination hysteresis | $V_{HY\,(st)}$ | f=15.73kHz ($f_H$) | −10 | — | −3 | dB |
| SAP output level | $V_{0\,(SAP)}$ | f=1kHz (SAP) 100%mod. | 400 | 500 | 600 | mVrms |
| SAP frequency characteristics−1 | $V_{1\,(SAP)}$ | f=300Hz (SAP) 30%mod. | −1.0 | 0 | +1.5 | dB |
| SAP frequency characteristics−2 | $V_{2\,(SAP)}$ | f=3kHz (SAP) 30%mod. | −1.5 | 0 | +1.0 | dB |
| SAP distortion rate | $THD_{(SAP)}$ | f=1kHz (SAP) 100% | — | — | 1.5 | % |

※Input level (at 100% modulation) L+R : 0.424$V_{P-P}$, L−R : 0.848$V_{P-P}$, pilot : 0.084$V_{P-P}$, SAP : 0.254$V_{P-P}$

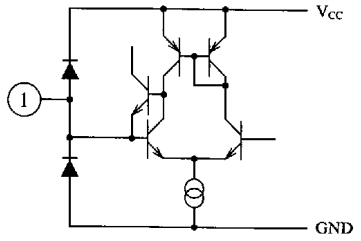
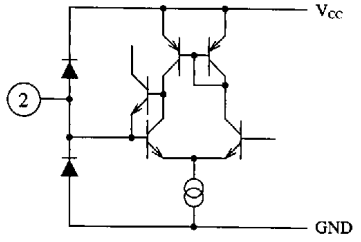
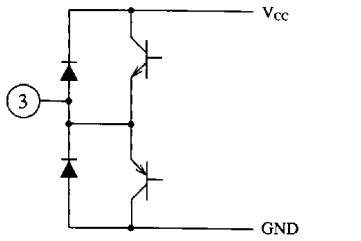
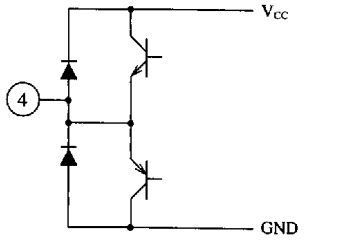
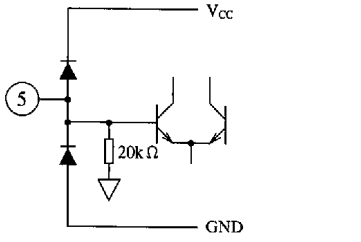
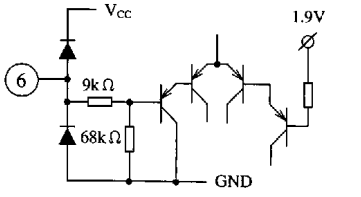
ICs for TV

## ■ Electrical Characteristics (cont.) ($V_{CC}$=9V, Ta=25±2℃)

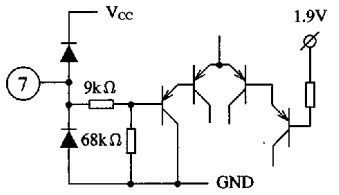
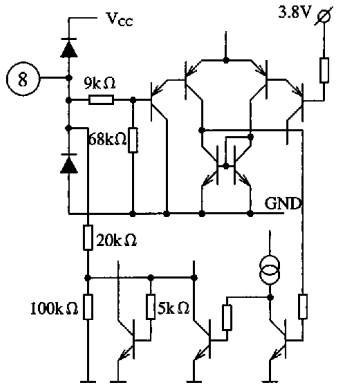
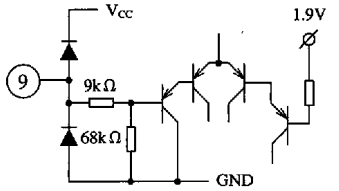
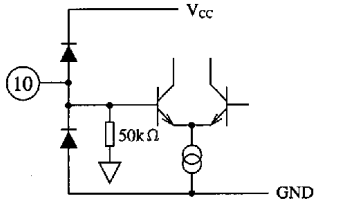
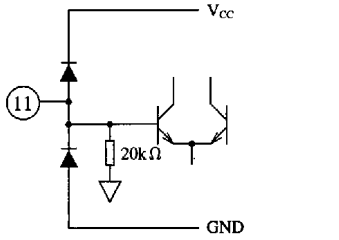
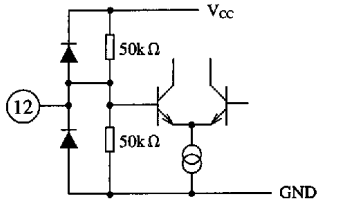
| Parameter | Symbol | Condition | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| SAP noise level | $V_{n\,(SAP)}$ | f=78.7kHz ($5f_H$) $v$=0.42$V_{P-P}$, BPF | — | — | −75 | dBV |
| SAP discrimination level | $V_{TH\,(SAP)}$ | f=78.7kHz ($5f_H$) | 20 | — | 60 | mVrms |
| SAP discrimination hysteresis | $V_{HY\,(SAP)}$ | f=78.7kHz ($5f_H$) | −4.0 | — | −1.0 | dB |
| SAP−OUT output level | $V_{0\,(SAPO)}$ | f=1kHz (SAP, dbx−off) 100%mod. | 400 | 500 | 600 | mVrms |
| SAP−OUT frequency characteristics−1 | $V_{1\,(SAPO)}$ | f=300Hz (SAP, dbx−off) 30%mod. | −0.5 | 0 | +0.5 | dB |
| SAP−OUT frequency characteristics−2 | $V_{2\,(SAPO)}$ | f=3kHz (SAP, dbx−off) 30%mod. | −0.5 | 0 | +0.5 | dB |
| SAP−OUT distortion rate | $THD_{(SAPO)}$ | f=1kHz (SAP, dbx−off) 100%mod. | — | — | 2.0 | % |
| SAP−OUT noise level | $V_{n\,(SAPO)}$ | f=78.7kHz ($5f_H$) $v$=0.42$V_{P-P}$, BPF | — | — | −46 | dBV |
| SAP→Stereo crosstalk | $CT_1$ | (SAP) 1kHz, 100%mod. (Stereo) pilot−signal | — | — | −50 | dB |
| Stereo→SAP crosstalk | $CT_2$ | (Stereo) 1kHz, 100%mod. (SAP) carrier−signal | — | — | −50 | dB |
| Mute | Mute | (Mon) 1kHz, 100%mod. | — | — | −56 | dB |
| Stereo separation (30%) −1 | $Sep_{30-1}$ | f=300Hz L (R) −only 30%mod. | (25) | — | — | dB |
| Stereo separation (30%) −2 | $Sep_{30-2}$ | f=1kHz L (R) −only 30%mod. | (25) | — | — | dB |
| Stereo separation (30%) −3 | $Sep_{30-3}$ | f=3kHz L (R) −only 30%mod. | (25) | — | — | dB |
| Stereo separation (30%) −4 | $Sep_{30-4}$ | f=8kHz L (R) −only 30%mod. | (20) | — | — | dB |
| Stereo separation (100%) −1 | $Sep_{100-1}$ | f=300Hz L (R) −only 100%mod. | (25) | — | — | dB |
| Stereo separation (100%) −2 | $Sep_{100-2}$ | f=1kHz L (R) −only 100%mod. | (20) | — | — | dB |
| Stereo separation (100%) −3 | $Sep_{100-3}$ | f=3kHz L (R) −only 100%mod. | (25) | — | — | dB |
| Stereo separation (100%) −4 | $Sep_{100-4}$ | f=8kHz L (R) −only 100%mod. | (15) | — | — | dB |
| Stereo separation (10%) −1 | $Sep_{10-1}$ | f=300Hz L (R) −only 10%mod. | (25) | — | — | dB |
| Stereo separation (10%) −2 | $Sep_{10-2}$ | f=1kHz L (R) −only 10%mod. | (20) | — | — | dB |
| Stereo separation (10%) −3 | $Sep_{10-3}$ | f=3kHz L (R) −only 10%mod. | (25) | — | — | dB |
| Stereo separation (10%) −4 | $Sep_{10-4}$ | f=8kHz L (R) −only 10%mod. | (20) | — | — | dB |
| SAP→Mono crosstalk | $CT_3$ | (SAP) 1kHz 100%mod. (Mono) 1kHz 0%mod. | — | (−53) | — | dB |
| Mono→SAP crosstalk | $CT_4$ | (SAP) 1kHz 0%mod. (Mono) 1kHz 100%mod. | — | (−60) | (−56) | dB |

Note) The characteristics value in parentheses is not a guaranteed value, but reference one on design.

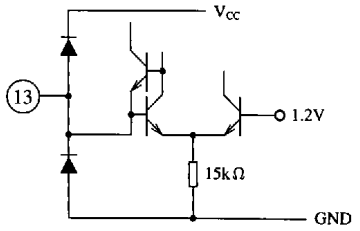
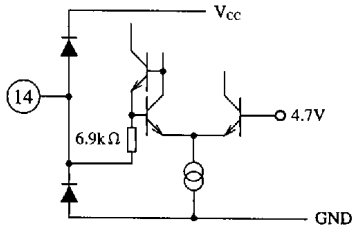
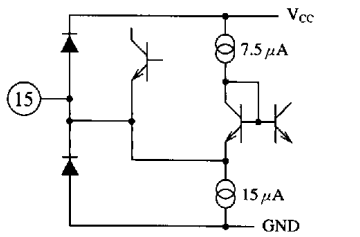
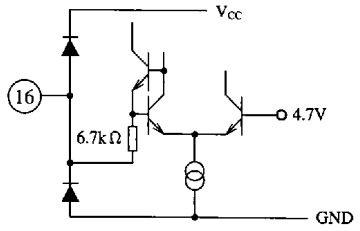
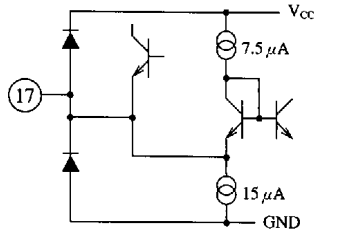
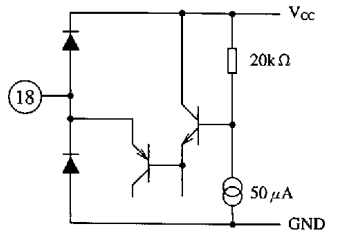
## Pin Descriptions

| Pin No. | Pin name | Pin voltage ($V_{CC}$=9V) | Equivalent circuit | Description |
|---|---|---|---|---|
| 1 | dbx filter adjustment | 1.2V |  | Adjustment of dbx filter control current |
| 2 | SAP0/stereo filter adj. | 1.2V |  | Adjustment of SAP/stereo filter control current |
| 3 | L output | 4.7V |  | (L) Line-Out output |
| 4 | R output | 4.7V |  | (R) Line-Out output |
| 5 | Matrix (L+R) input | 4.7V |  | Matrix Circuit (L+R) signal input |
| 6 | SAP mode change-over | 0V |  | Under the SAP output condition,<br>Lout Rout<br>H (L+R) (SAP) more than 2.5V<br>L (SAP) (SAP) less than 0.8V |

## ■ Pin Descriptions (cont.)

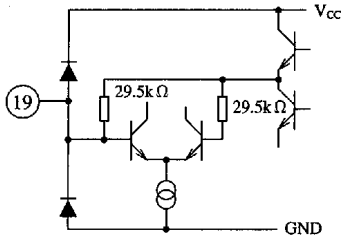
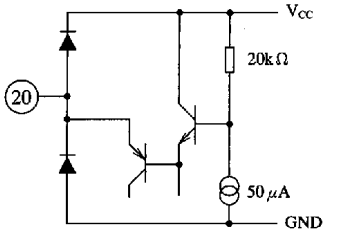
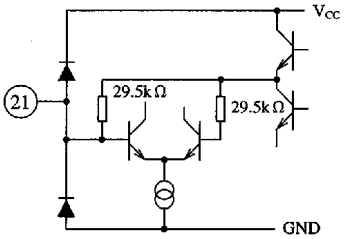
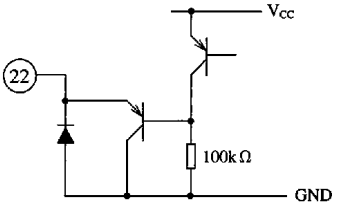
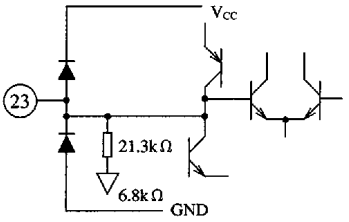
| Pin No. | Pin name | Pin voltage ($V_{CC}$=9V) | Equivalent circuit | Description |
|---|---|---|---|---|
| 7 | Stereo/SAP change-over | 0V |  | H : Stereo output mode, more than 2.5V<br>L : SAP output mode, up to 0.8V |
| 8 | Forced monaural switching | 0V |  | H : (more than 4.2V)<br>Stereo output mode<br>M: (2.2V to 3.2V)<br>Forced monaural mode<br>LED off<br>L : (Up to 0.8V)<br>Forced monaural mode<br>LED on |
| 9 | Mute switching | 0V |  | H : Mute mode<br>Output mute, more than 2.5V<br>LED off |
| 10 | L−R dbx input | 4.7V |  | dbx NR input for L−R signal |
| 11 | SAP dbx input | 4.7V |  | dbx NR input for SAP signal |
| 12 | Reference | 4.5V |  | Stabilizing signal for reference power supply |

## ■ Pin Descriptions (cont.)

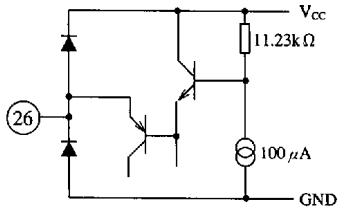
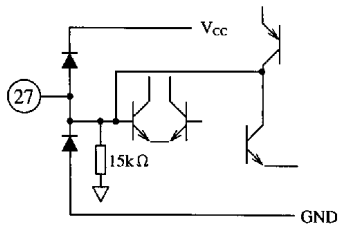
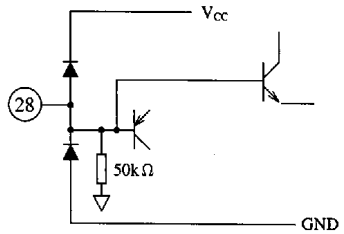
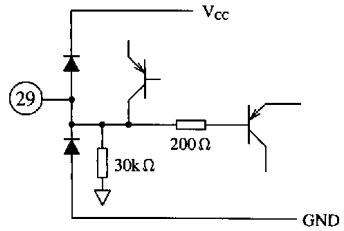
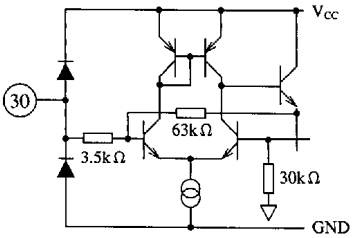
| Pin No. | Pin name | Pin voltage ($V_{CC}$ = 9V) | Equivalent circuit | Description |
|---|---|---|---|---|
| 13 | dbx timing current | 1.2V |  | Control of the timing current for dbx r.m.s. value detection |
| 14 | Spectral level sensor input | 4.7V |  | Input for the r.m.s. value detection circuit for variable emphasis |
| 15 | Spectral timing | 0.2V |  | Control of the r.m.s. value detection recovery-time for variable emphasis |
| 16 | Wide-band level sensor input | 4.7V |  | Input for the r.m.s. value detection circuit for wide-band expander |
| 17 | Wide-band timing | 0.2V |  | Control of the r.m.s. value detection recovery-time for wide-band expander |
| 18 | Spectral level adjustment | 8.0V |  | Control of the level of variable emphasis |

ICs for TV

## ■ Pin Descriptions (cont.)

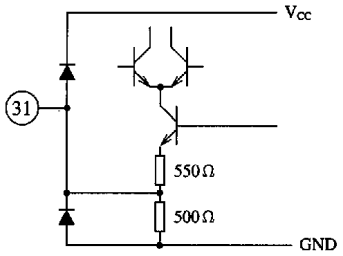
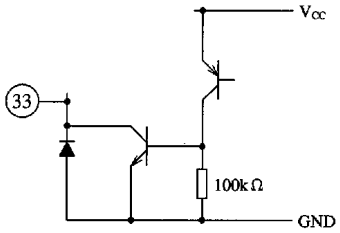
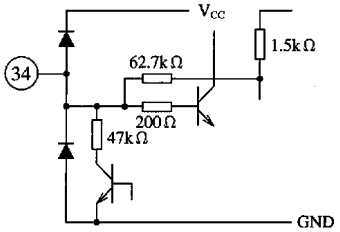
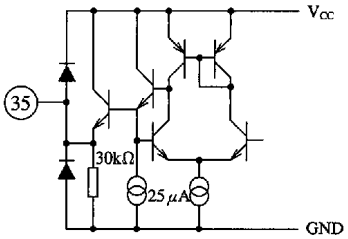
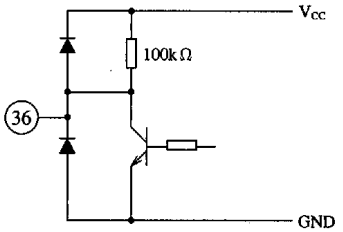
| Pin No. | Pin name | Pin voltage ($V_{CC}$=9V) | Equivalent circuit | Description |
|---|---|---|---|---|
| 19 | Spectral CCA offset elimination | 4.7V |  | To eliminate the DC offset for variable emphasis CCA |
| 20 | Wide-band level adjustment | 8.0V |  | To adjust the level of wide-band expander |
| 21 | Wide-band CCA offset elimination | 4.7V |  | To eliminate the DC offset for wide-band expander CCA |
| 22 | Stereo LED | — |  | To connect the stereo LED |
| 23 | Pilot signal detection | 6.8V |  | To detect the stereo pilot signal |
| 24 | LED GND | 0V | ——— | GND pin for LED lighting circuit |

## ■ Pin Descriptions (cont.)

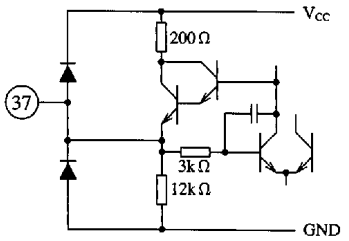
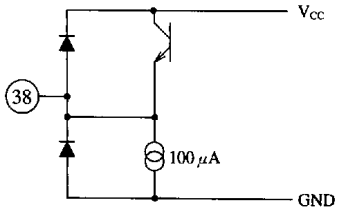
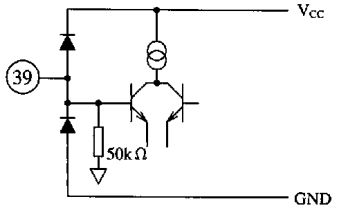
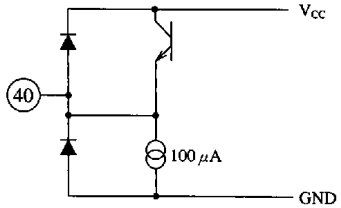
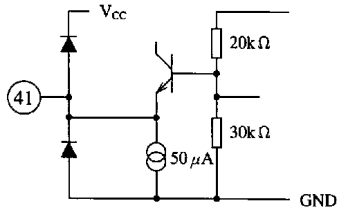
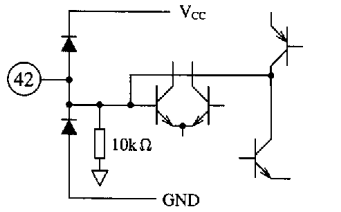
| Pin No. | Pin name | Pin voltage ($V_{CC}$=9V) | Equivalent circuit | Description |
|---|---|---|---|---|
| 25 | GND | 0V | ——— | Ground |
| 26 | Stereo VCO adjustment | 7.8V |  | To adjust the stereo PLL−VCO oscillation frequency |
| 27 | Stereo PLL filter | 4.7V |  | To connect the stereo PLL low pass filter |
| 28 | Stereo demodulation input | 4.7V |  | Input pin of the stereo demodulation circuit |
| 29 | SAP noise level setting | 3V |  | To detect the noise of SAP-malfunction prevention-circuit<br>(Mutes the SAP demodulation at noise detection) |
| 30 | SAP noise level setting | 3V |  | To set the noise level of SAP-malfunction prevention-circuit |

ICs for TV

## ■ Pin Descriptions (cont.)

| Pin No. | Pin name | Pin voltage ($V_{CC}$=9V) | Equivalent circuit | Description |
|---|---|---|---|---|
| 31 | SAP VCO adjustment | 0.1V |  | Fine adjustment of oscillation frequency of SAP-VCO (Normally, not used) |
| 32 | $V_{CC}$ | 9V |  | $V_{CC}$ pin |
| 33 | SAP-LED | — |  | To a SAP-LED |
| 34 | SAP carrier detection | 2V |  | To detect the carrier level of SAP-signal |
| 35 | (L−R) demodulation output | 4.0V |  | (L−R) demodulation signal-output |
| 36 | SAP output detection | 0V (9V at SAP ON 9V) |  | When SAP is output to the line-out, HIGH (9V) is output. |

## ■ Pin Descriptions (cont.)

| Pin No. | Pin name | Pin voltage ($V_{CC}$=9V) | Equivalent circuit | Description |
|---|---|---|---|---|
| 37 | SAP demodulation output | 3.5V |  | SAP-demodulation signal-output |
| 38 | Stereo filter output | 4.0V |  | Stereo-filter output |
| 39 | Composite input | 4.7V |  | Composite-signal input |
| 40 | (L+R) demodulation output | 4.0V |  | (L+R) demodulation-signal output |
| 41 | $f_H$ monitor output | 4.3V<br>2.3V<br>Stereo<br>at LED ON |  | Stereo-PLL VCO-oscillation monitor |
| 42 | Quasi-sine wave filter | 4.7V |  | To a low-pass filter of the quasi-sine-wave circuit |