# AN5101SC

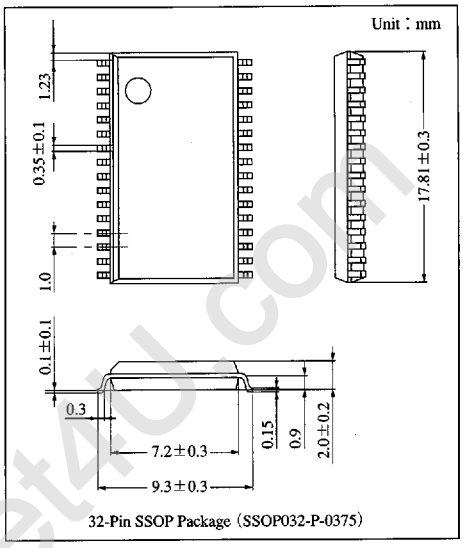
## VIF/SIF Signal Processor IC for TV and VCR

### ■ Overview

The AN5101SC is a VIF/SIF signal processor IC for TV and VCR.

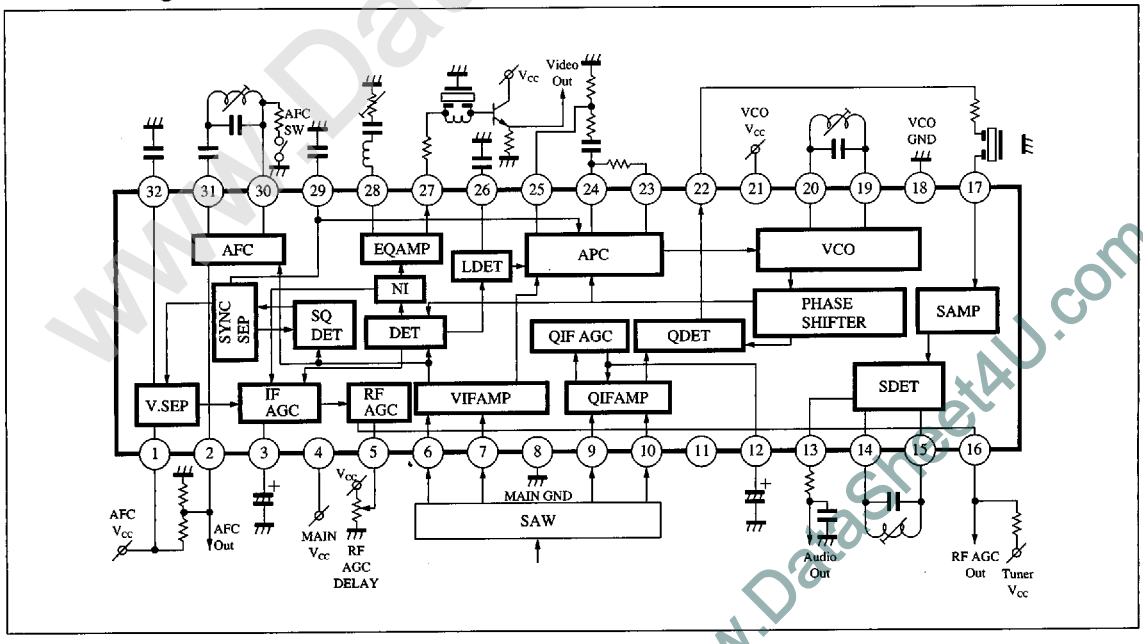
### ■ Features

- Including a quasi-separate sound circuit for better audio performance
- Adopting the gated-PLL technique for better second-sound-channel buzz-beat characteristics (for sound multiplex broadcasting service) or enhancement of video over-modulation characteristics.
- Low power consumption : $P_C$=240mW typ. at $V_{CC}$= 5.0V




32-Pin SSOP Package (SSOP032-P-0375)

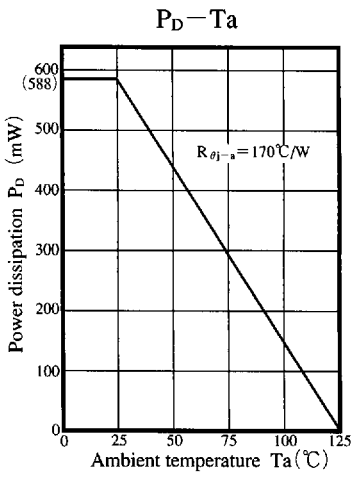
### ■ Block Diagram



## Pin Descriptions

| Pin No. | Pin name | Pin No. | Pin name |
|---|---|---|---|
| 1 | Power supply $V_{CC1}$ (for AFC output) | 17 | SIF input |
| 2 | AFC output | 18 | GND (for VCO) |
| 3 | VIF AGC filter | 19 | VCO coil |
| 4 | Power supply $V_{CC2}$ (for MAIN) | 20 | VCO coil |
| 5 | RF AGC DELAY adj. | 21 | Power supply $V_{CC3}$ (for VCO) |
| 6 | VIF input | 22 | QIF detection output |
| 7 | VIF input | 23 | APC detection output |
| 8 | GND (for MAIN) | 24 | VCO control |
| 9 | QIF input | 25 | APC time constant switching |
| 10 | QIF input | 26 | Lock detection |
| 11 | NC | 27 | Video detection output |
| 12 | QIF AGC filter | 28 | Feedback |
| 13 | Audio output | 29 | Sync. signal separation |
| 14 | SIF coil | 30 | AFC coil |
| 15 | SIF coil | 31 | AFC coil |
| 16 | RF AGC output | 32 | Vert. sync. signal separation |

## Reference




ICs for TV

## Absolute Maximum Ratings

| Parameter | Symbol | | Rating | Unit |
|---|---|---|---|---|
| Supply voltage | $V_{CC}$ | $V_{CC2,3}$ | 6.0 | V |
| | | $V_{CC1}$ | 12.5 | |
| Supply current | $I_{CC}$ | $I_{CC2,3}$ | 65.0 | mA |
| | | $I_{CC1}$ | 1.8 | |
| Circuit voltage | $V_{16-8,18}$ | | 0 to 12.5 | V |
| | $V_{25-8,18}$ | | 0 to 12.5 | V |
| Power dissipation Note 2) | $P_D$ | | 320 | mW |
| Operating ambient temperature Note1) | $T_{opr}$ | | −20 to +70 | ℃ |
| Storage temperature Note1) | $T_{stg}$ | | −55 to +125 | ℃ |

Note 1) Ta=25℃ except operating ambient temperature and storage temperature.
Note 2) Allowable power dissipation of the package at Ta=70℃.

## Recommended Operating Range (Ta=25℃)

| Parameter | Symbol | Range |
|---|---|---|
| Operating supply voltage range | $V_{CC2,3}$ | 4.5V to 5.5V |
| | $V_{CC1}$ | $V_{CC2,3}$ to 12.2V |

## ■ Electrical Characteristics ($V_{CC}$=5V, Ta=25±2℃)

| Parameter | Symbol | Condition | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| **VIF AMP DET Section** | | | | | | |
| Video detection output | $V_{O27}$ | Typical color signal (white color contained) m=87.5%, $v$in=80dB$\mu$ | 1.7 | 2.0 | 2.3 | $V_{P-P}$ |
| Video frequency characteristics | $f_e$ | Attenuation value at 8MHz | −4.0 | −1.0 | +0 | dB |
| Synchronous peak voltage | $V_P$ | | 1.1 | 1.3 | 1.5 | V |
| **PLL Section** | | | | | | |
| APC pull-in range<h> | $f_{Ph}$ | | 1.0 | — | — | MHz |
| APC pull-in range<I> | $f_{pl}$ | | — | — | −1.0 | MHz |
| VCO control sensitivity | $\beta$ | $V_{24}$=2.3 to 2.5V | 1.5 | 2.0 | 2.5 | kHz/mV |
| **AGC Section** | | | | | | |
| RF AGC operation sensitivity | $v_{RF\ AGC}$ | | 0 | 1.0 | 3.0 | dB |
| RF AGC maximum pull-in current | $I_{16\ max.}$ | | 1.5 | 2.1 | 2.7 | mA |
| RF AGC minimum pull-in current | $I_{16\ min.}$ | | −3.0 | 0 | 3.0 | $\mu$A |
| **AFC Section** | | | | | | |
| AFC discrimination sensitivity | $\mu_{AFC}$ | $R_L$=150kΩ//150kΩ | 18 | 26 | 34 | mV/kHz |
| AFC center voltage | $I_2$ | | 5.0 | 6.0 | 7.0 | V |
| AFC maximum output voltage | $V_{2max.}$ | f=$f_0$−500kHz | 10.5 | 11.2 | — | V |
| AFC minimum output voltage | $V_{2min.}$ | f=$f_0$+500kHz | — | 0.7 | 1.5 | V |
| **QIF AMP DET Section** | | | | | | |
| QDET output level | $v_{QDET}$ | | 95 | 100 | 105 | dB$\mu$ |
| **SIF Section** | | | | | | |
| Sound detection output | $V_{O13}$ | $f_0$=4.5MHz $v$in=100dB$\mu$ $\Delta$f=±25kHz fm=400Hz $R_D$=6.8kΩ | 327 | 385 | 443 | mVrms |
| **DC Characteristics** | | | | | | |
| Circuit current (1) (Pin④, Pin㉑) | $I_{4+21}$ | | 36.5 | 46.5 | 56.5 | mA |
| Circuit current (2) (Pin①) | $I_1$ | | 0.8 | 1.1 | 1.4 | mA |
| VIF input pin voltage | $V_{6,7}$ | | 2.6 | 3.0 | 3.4 | V |
| QIF input pin voltage | $V_{9,10}$ | | 2.6 | 3.0 | 3.4 | V |
| Audio output pin voltage | $V_{13}$ | | 1.5 | 2.0 | 2.5 | V |
| SIF coil pin voltage | $V_{14,15}$ | | 4.0 | 4.2 | 4.5 | V |
| SIF input pin voltage | $V_{17}$ | | 1.2 | 1.5 | 1.8 | V |
| VCO coil pin voltage | $V_{19,20}$ | | 2.7 | 3.2 | 3.7 | V |
| QDET output pin voltage | $V_{22}$ | | 2.5 | 2.9 | 3.3 | V |
| VCO control pin voltage | $V_{24}$ | | 2.0 | 2.45 | 2.9 | V |
| APC time constant switching pin | $V_{25}$ | | 4.5 | 5.0 | — | V |
| Video detection output pin voltage | $V_{27}$ | | 3.2 | 3.7 | 4.2 | V |
| AFC coil pin voltage | $V_{30,31}$ | | 2.4 | 2.8 | 3.2 | V |
| **VIF AMP DET Section** | | | | | | |
| Input sensitivity | $v_{SV}$ | $V_{O27}$=−3dB | — | (42) | (46) | dB$\mu$ |
| Maximum tolerant input | $v_{max.v}$ | | (97) | (102) | — | dB$\mu$ |
| SN ratio | S/N | | (50) | (55) | — | dB |
| Differential gain | DG | | — | (2) | (5) | % |
| Differential phase | DP | | — | (2) | (5) | deg |
| Black noise detection level | $\Delta V_{BN}$ | $V_{BN}-V_P$ | — | (−0.85) | — | V |

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

## ■ Electrical Characteristics (cont.) ($V_{CC}$=5V, Ta=25±2℃)

| Parameter | Symbol | Condition | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Black noise clamp level | $\Delta V_{BNC}$ | $V_{BNC}-V_P$ | — | (0.6) | — | V |
| White noise clamp level | $\Delta V_{WNC}$ | $V_{WNC}-V_P$ | — | (1.9) | — | V |
| Intermodulation | IM | | (45) | (50) | — | dB |
| Input registance (Pin⑥) | $R_{i6}$ | | — | (1.2) | — | kΩ |
| Input capacitance (Pin⑥) | $C_{i6}$ | | — | (3.2) | — | pF |
| Output resistance (Pin㉗) | $R_{O27}$ | | — | (10) | — | Ω |
| PLL Section | | | | | | |
| VCO maximum variable range (1) | $\Delta f_{VU}$ | $V_{24}$=1.0V | (1.8) | — | — | MHz |
| VCO maximum variable range (2) | $\Delta f_{VD}$ | $V_{24}$=4.0V | — | — | (−1.8) | MHz |
| VCO frequency SW ON drift | $\Delta f_{VON}$ | 3 minute after SW ON | (−0.1) | (0) | (+0.1) | MHz |
| VCO frequency temperature drift | $\Delta f_{VT}$ | −20℃ to +70℃ | — | (−0.2) | — | MHz |
| VCO reference oscillation level | $v_{VCO}$ | | (100) | (106) | (112) | dBμ |
| VCO 2nd harmonics level | $v_{VCO2}$ | | — | (70) | — | dBμ |
| AGC Section | | | | | | |
| RFAGC Delay point temperature drift | $\Delta v_{RFDT}$ | −20℃ to +70℃ | — | (+1) | — | dB |
| Noise canceller operation voltage (W) | $\Delta V_{NC(W)}$ | $V_{NC(W)}-V_P$ | — | (2.6) | — | V |
| Noise canceller operation voltage (B) | $\Delta V_{NC(B)}$ | $V_{NC(B)}-V_P$ | — | (−0.85) | — | V |
| IF AGC filter charge current | $I_{3C}$ | | (−15.0) | (−8.5) | (−4.0) | μA |
| IF AGC filter discharge current | $I_{3D}$ | | (340) | (470) | (600) | μA |
| AFC Section | | | | | | |
| AFC defeat SW operation voltage | $V_{AFC-SW}$ | | — | (0.9) | — | V |
| QIF AMP DET | | | | | | |
| Input sensitivity | $v_{SQ}$ | $v_{QDET}$=−3dB | — | (46) | (50) | dBμ |
| Maximum tolerant input | $v_{max.Q}$ | | (99) | (104) | — | dBμ |
| Input resistance (Pin⑨) | $R_{i9}$ | f=54.25MHz | — | (1.2) | — | kΩ |
| Input capacitance (Pin⑨) | $C_{i9}$ | f=54.25MHz | — | (3.2) | — | pF |
| Output resistance (Pin㉒) | $R_{O22}$ | f=4.5MHz | — | (170) | — | Ω |
| SIF Section | | | | | | |
| Input limiting voltage | $v_{i(lim)}$ | $V_{O13}$=−3dB | — | (37) | — | dBμ |
| AM rejection ratio | AMR | $v_{in}$=90dBμ | (45) | (55) | — | dB |
| Total harmonics distortion | THD | | — | (0.15) | — | % |
| Input resistance (Pin⑰) | $R_{i17}$ | f=4.5MHz | — | (1.1) | — | kΩ |
| Input capacitance (Pin⑰) | $C_{i17}$ | f=4.5MHz | — | (8.0) | — | pF |
| Detector input resistance (Pin⑬) | $R_{i13}$ | f=4.5MHz | — | (10) | — | kΩ |
| Detector input capacitance (Pin⑬) | $C_{i13}$ | f=4.5MHz | — | (25) | — | pF |
| Output resistance (Pin⑫) | $R_{O12}$ | f=500kHz | — | (400) | — | Ω |

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