

TOSHIBA

TA1272AF

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA1272AF

FOR LCD TVS, PIF AND SIF SYSTEM

FEATURES

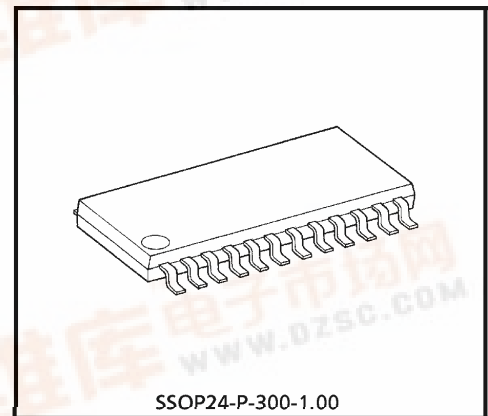
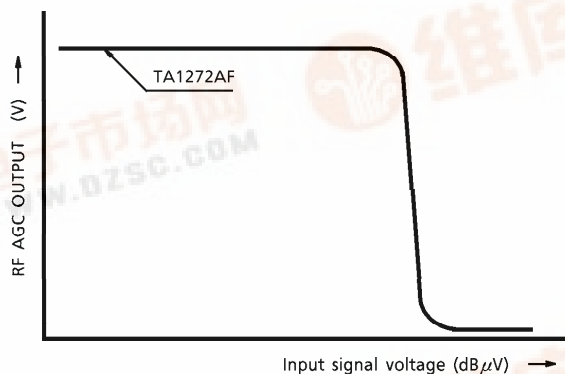
PIF circuit

- High input sensitivity
- 3-stage variable-gain PIF amplifier
- Output with black noise inverter
- Output without black noise inverter
- High-speed response peak AGC with dual time constant
- Reverse RF AGC output
- Built-in AFT detection circuit with AFT mute

SIF circuit

- 4-stage SIF amplifier
- Quadrature-type detection circuit

RF AGC CURVE

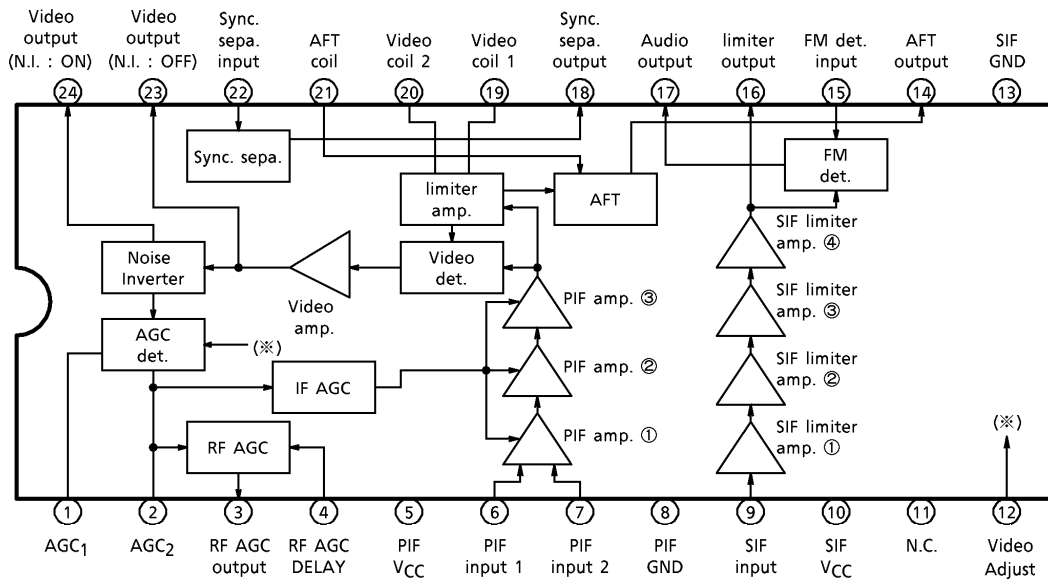


Weight : 0.32 g (Typ.)

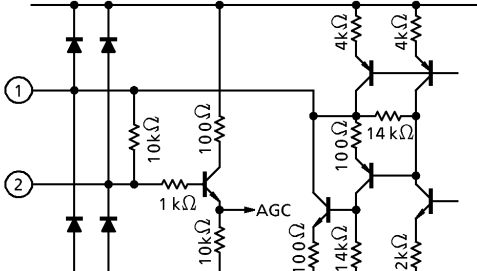
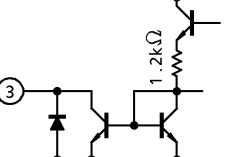
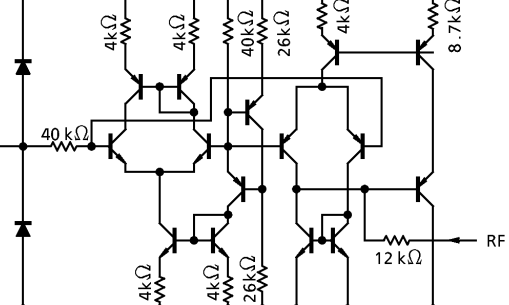
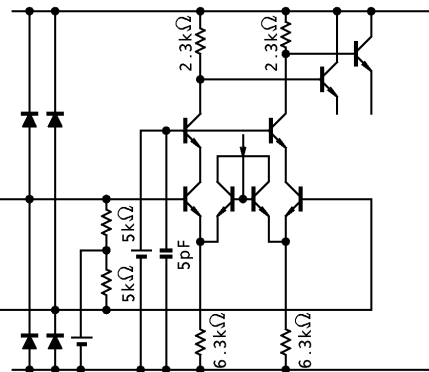
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BLOCK DIAGRAM



TERMINAL FUNCTION

| PIN No. | PIN NAME | FUNCTION | INTERFACE |
|---------|--|---|--|
| 1 2 | PIF AGC ₁ PIF AGC ₂ | This IC is adopted dual time constant AGC circuit to improve AGC responsibility. To mute picture, connect 1.6 kΩ between pin 1 and GND. |  |
| 3 | RF AGC Output | RF AGC output terminal (open-collector output) |  |
| 4 | RF AGC Delay | Changing comparator reference voltage adjusts RF AGC delay point. |  |
| 5 | PIF V _{CC} | Connect bypass capacitor between this terminal and PIF GND with shortest wiring. | — |
| 6 7 | PIF Input 1 PIF Input 2 | PIF input terminal. Input impedance 5 kΩ (Typ.) |  |
| 8 | PIF GND | Connect bypass capacitor between this terminal and PIF V _{CC} with shortest wiring. | — |

| PIN No. | PIN NAME | FUNCTION | INTERFACE |
|---------|---------------------|---|-----------|
| 9 | SIF Input | Connect BPF between this terminal and pin 23. | |
| 10 | SIF V _{CC} | Connect bypass capacitor between this terminal and SIF GND with shortest wiring. | — |
| 11 | N.C. | — | — |
| 12 | Video Adjust | <p>Video signal output voltage adjustment terminal. Changing this terminal voltage, it is possible to adjust video signal output voltage to 1.0 V_{p-p}. (In case of use on adjustment free, connect resistor (330 kΩ) (※) to GND.) To prevent noise, connecting capacitor (0.01 μF) to GND is recommended. (※ resistance tolerance : ± 5%)</p> | |
| 13 | SIF GND | Connect bypass capacitor between this terminal and SIF V _{CC} with shortest wiring. | — |
| 14 | AFT Output | <p>AFT detector output terminal based on double balanced multiplier. AFT output is muted when AFT coil terminal is connected to GND.</p> | |

| PIN No. | PIN NAME | FUNCTION | INTERFACE |
|----------|------------------------------|---|-----------|
| 15 | FM Det. Input | Quadrature input terminal for FM detection circuit. Connect FM coil between this terminal and pin 16. Audio output is muted when this terminal is connected to GND. | |
| 17 | Audio Output | Audio signal output terminal. | |
| 16 | Limiter Output | Limiter output terminal. Connect FM coil between this terminal and pin 15. | |
| 18 22 | Sync. Sepa. | Sync. sepa. output and input terminal. | |
| 19 20 | Video Coil 1 Video Coil 2 | Connect video connection coil. | |

| PIN No. | PIN NAME | FUNCTION | INTERFACE |
|----------|--|---|-----------|
| 21 | AFT Coil | Connect AFT detection coil. AFT output is defeated when this terminal connected to GND. | |
| 23 24 | Video Output 1 Video Output 2 | Video signal output terminal. Pin 23 is the output without noise inverter, and can thus be used for diversity circuit, for example. Pin 24 is the output with noise inverter. | |

MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|-----------------------|-----------------------|---------|------|
| Power Supply Voltage | V _{CC} | 8 | V |
| Power Dissipation | P _D (Note) | 500 | mW |
| Operating Temperature | T _{opr} | -20~65 | °C |
| Storage Temperature | T _{stg} | -55~150 | °C |

(Note) When using the device at above Ta = 25°C, decrease the power dissipation by 4 mW for each increase of 1°C.

RECOMMENDED POWER SUPPLY

| PIN No. | PIN NAME | MIN. | TYP. | MAX. | UNIT |
|---------|---------------------|------|------|------|------|
| 5 | PIF V _{CC} | 3.5 | 4.5 | 5.5 | V |
| 9 | SIF V _{CC} | 3.5 | 4.5 | 5.5 | V |

ELECTRIC CHARACTERISTICS (Unless otherwise specified, V_{CC} = 4.5 V, Ta = 25°C)

DC CHARACTERISTICS

| PIN No. | PIN NAME | FUNCTION | MIN. | TYP. | MAX. | UNIT |
|---------|---------------------|---|------|------|------|------|
| 1 | AGC ₁ | 1st AGC filter | — | 4.2 | — | V |
| 2 | AGC ₂ | 2nd AGC filter | — | 4.2 | — | |
| 3 | RF AGC | RF AGC output | — | — | — | |
| 4 | RF AGC delay | RF AGC delay | — | — | — | |
| 5 | PIF V _{CC} | PIF V _{CC} | — | 4.5 | — | |
| 6 | PIF input 1 | IF input | 2.5 | 2.9 | 3.2 | |
| 7 | PIF input 2 | IF input | 2.5 | 2.9 | 3.2 | |
| 8 | PIF GND | PIF GND | — | 0 | — | |
| 9 | SIF input | SIF input | 4.3 | 4.45 | 4.6 | |
| 10 | SIF V _{CC} | SIF V _{CC} | — | 4.5 | — | |
| 11 | N.C. | — | — | — | — | |
| 12 | Video Adjust | Video Adjust | 0.55 | 0.85 | 1.15 | |
| 13 | SIF GND | SIF GND | — | 0 | — | |
| 14 | AFT output | AFT output | 1.3 | 1.8 | 3.2 | |
| 15 | FM det. input | FM det. output | 3.5 | 3.7 | 3.9 | |
| 16 | Limiter output | SIF limiter output | 2.55 | 2.75 | 2.95 | |
| 17 | Audio output | Audio signal output | 1.7 | 2.1 | 2.5 | |
| 18 | Sync. sepa. output | Sync. sepa. signal output | — | — | — | |
| 19 | Video coil 1 | PIF carrier output | 4.05 | 4.15 | 4.25 | |
| 20 | Video coil 2 | PIF carrier output | 4.05 | 4.15 | 4.25 | |
| 21 | AFT coil | Connecting AFT coil | 4.35 | 4.45 | 4.55 | |
| 22 | Sync. sepa. input | Sync. sepa. signal output | — | — | — | |
| 23 | Video output 1 | Video signal output (noise inverter : OFF) | 1.40 | 1.85 | 2.30 | |
| 24 | Video output 2 | Video signal output (noise inverter : ON) | 1.40 | 1.85 | 2.30 | |

AC CHARACTERISTICS (Unless otherwise specified, $V_{CC} = 4.5\text{ V}$, $T_a = 25^\circ\text{C}$)

PIF circuit

| CHARACTERISTIC | SYMBOL | TEST CIRCUIT | CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|-----------------------|--------------|--|------|---------|------|------------------------|
| Power Supply Current at No Signal | I_{PIF} | 1 | — | — | 11 | 16 | mA |
| Output Signal Voltage | V_D | 2 | (Note 1) | 0.8 | 1.0 | 1.2 | V_{p-p} |
| PIF Input Signal Voltage Sensitivity | V_i MIN | 2 | (Note 2) | — | 43 | 50 | $\text{dB}\mu\text{V}$ |
| Maximum input Signal Voltage | V_i MAX | 2 | (Note 3) | 95 | 114 | — | $\text{dB}\mu\text{V}$ |
| – 3 dB Video Band Width | BW | 2 | (Note 4) | 5 | 6.5 | — | MHz |
| Dependence of Output Signal Voltage On Power Supply Voltage | V_D/V_{CC} | 2 | (Note 5) | — | ± 5 | — | % / V |
| Deferential Gain | DG | 3 | (Note 6) | — | 5 | 10 | % |
| Deferential Phase | DP | | | — | 4 | 8 | $^\circ$ |
| Signal-Noise Ratio | S / N | 2 | (Note 7) | 40 | 45 | — | dB |
| Intermodulation | IM | 4 | (Note 8) | 30 | 35 | — | dB |
| Suppression of Picture Career | CR | 2 | (Note 9) | 45 | 50 | — | dB |
| Sync. Voltage Level | V_p | 2 | White 100% | 0.5 | 0.75 | 1.0 | V |
| Output Voltage at No Signal | V_z | 2 | (Note 10) | 1.6 | 2.0 | 2.4 | V |
| Black Noise Inverter Level | V_{BTH} | 2 | (Note 11) Video output 2 | 0.4 | 0.6 | 0.8 | V |
| Black Noise Clamp Level | V_{BCL} | | | 1.0 | 1.2 | 1.4 | |
| AFT Control Steepness | $\Delta f / \Delta V$ | 2 | Load : $75\text{ k}\Omega / 75\text{ k}\Omega$ | 10 | 20 | 30 | kHz / V |
| AFT maximum Output Voltage | V_{MAX} | | | 4.0 | 4.3 | 4.5 | V |
| AFT minimum Output Voltage | V_{MIN} | | | — | 0.3 | 0.5 | |
| AFT Mute Voltage | V_{MUTE} | | | 2.1 | 2.25 | 2.4 | |

SIF circuit

| CHARACTERISTIC | SYMBOL | TEST CIR-CUIT | CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|----------------------------------|---------------|-----------|------|------|------|-------------------|
| Power Supply Current at No Signal | ISIF | 1 | — | — | 6 | 11 | mA |
| Output Signal Voltage | VOD | 2 | (Note 12) | 120 | 150 | 180 | mV _{rms} |
| SIF Input Signal Voltage Sensitivity | V _{LIM} | 2 | (Note 13) | 30 | 35 | 40 | dB _{μV} |
| Total Harmonic Distortion | THD (DET) | 2 | (Note 14) | — | 0.4 | 1.0 | % |
| AM Rejection | AMR | 5 | (Note 15) | 30 | 45 | — | dB |
| Signal-Noise Ratio | S/N DET | 2 | (Note 16) | 50 | 65 | — | dB |
| – 3 dB Bandwidth | BW – 3 dB | 2 | (Note 17) | 180 | 230 | — | kHz |
| Dependence of Output Signal Voltage On Power Supply Voltage | V _{OD} /V _{CC} | 2 | (Note 18) | — | 10 | 15 | % / V |

Sync. sepa. circuit

| CHARACTERISTIC | SYMBOL | TEST CIR-CUIT | CONDITION | MIN. | TYP. | MAX. | UNIT |
|------------------------------------|-----------------------|---------------|--------------|------|------|------|------|
| Sync. Sepa. input Voltage | V _{SYNC.IN} | 2 | — | 1.8 | 2.1 | 3.0 | V |
| Sync. Sepa. Minimum Output Voltage | V _{SYNC.MIN} | 2 | Load : 47 kΩ | 0 | 0.2 | 0.4 | V |
| Sync. Sepa. Maximum Output Voltage | V _{SYNC.MAX} | 2 | | 4.3 | 4.5 | — | V |

TEST CONDITION

<PIF circuit>

(Note 1) Output signal voltage

PIF input : $f_o = 58.75$ MHz, 87.5% AM, 84 dB μ V, White 100%
Measure output video signal voltage.

(Note 2) PIF input signal voltage sensitivity

PIF input : $f_o = 58.75$ MHz, $f_m = 15.75$ kHz, 30% AM, 84 dB μ V
Measure output video signal voltage (that voltage is 0 dB) Lower input signal voltage gradually, measure input PIF signal voltage when output video signal voltage is -3 dB.

(Note 3) Maximum input signal voltage

PIF input : $f_o = 58.75$ MHz, $f_m = 15.75$ kHz, 30% AM, 84 dB μ V
Measure output video signal voltage (that voltage is 0 dB) Raise input signal voltage gradually, measure input PIF signal voltage when output video signal voltage is +3 dB

(Note 4) -3 dB video band width

(1) PIF input :

$f_o = 58.75$ MHz, 84 dB μ V, CW

Measure IF AGC voltage and supply that voltage from external source.

(2) Input following composite signals to the PIF input :

| | | |
|---|--------|--|
| { | SG : 1 | 58.75 MHz, 84 dB μ V (frequency : fixed) |
| | SG : 2 | 58.65~45 MHz, 64 dB μ V (frequency : variable) |

Monitor spectrum of output signal at pin 24. Change frequency of SG : 2, measure frequency of SG : 2, when video output signal is -3 dB.

Difference between that frequency and 58.75 MHz is -3 dB band width.

(Note 5) Dependence of output signal voltage on power supply voltage

PIF input : $f_o = 58.75$ MHz, 87.5% AM, 84 dB μ V, standard TV signal (V/S = 10 : 4 Ramp)

Measure the output video signal voltage when power supply voltage are 3.5 V and 5.5 V. (4.5 \pm 1.0 V)

Compare those voltage and the output video signal voltage when power supply voltage is 4.5 V.

(Note 6) Deferential gain / Deferential phase

PIF input : $f_o = 58.75$ MHz, 87.5% AM, 84 dB μ V, standard TV signal (V/S = 10 : 4 Ramp) IF AGC : free

Measure deferential gain and deferential phase.

(Note 7) Signal-noise ratio

(1) PIF input : $f_o = 58.75$ MHz, $f_m = 15.75$ kHz, 30%AM, 84 dB μ V
 Measure IF AGC voltage and supply that voltage from external source.

(2) Measure output video signal voltage. : V_1

(3) PIF input : $f_o = 58.75$ MHz, 84 dB μ V, CW
 Measure output video signal voltage. : V_2
 Signal-noise ratio is calculated by following equality.

$$\text{Signal-noise ratio} = 20 \log (V_1 \times 6 / V_2) \text{ (dB)}$$

(Note 8) Intermodulation

(1) PIF input : $f_o = 58.75$ MHz, 84 dB μ V, CW
 Supply DC voltage to IF AGC from external source to fix IF AGC voltage.

(2) PIF input : following composite signals
 $f_o = 58.75$ MHz, 84 dB μ V, CW
 $f_c = 55.17$ MHz, 74 dB μ V, CW
 $f_s = 54.25$ MHz, 74 dB μ V, CW } Input

Measure the difference of signal level at pin 24 920 kHz component and 3.58 MHz component (Chroma sub-carrier).

(Note 9) Suppression of picture career

(1) PIF input : $f_o = 58.75$ MHz, $f_m = 15.75$ kHz, 78%AM, 84 dB μ V
 Measure IF AGC voltage and supply that voltage from external source.

(2) Measure output video signal voltage. : V_1

(3) PIF input : $f_o = 58.75$ MHz, 84 dB μ V, CW
 Measure signal level of 58.75 MHz component at pin 24. : V_2
 Signal-noise ratio is calculated by following equality.

$$\text{Suppression of picture career} = 20 \times \log (V_1 / V_2) \text{ [dB]}$$

(Note 10) Output voltage at no signal

PIF input : no input IF AGC : GND
 Measure output video signal DC voltage.

(Note 11) Black noise inverter level / Black noise clamp level

PIF input : $f_o = 58.75$ MHz, $f_m = 15.75$ kHz, 78%AM, 84 dB μ V
 Supply 0V to IF AGC from external source. Raise that voltage gradually, measure black noise inverter level.

<SIF circuit>

(Note 12) Output signal voltage

SIF input : $f_o = 4.5 \text{ MHz}$, $f_m = 400 \text{ Hz}$, 25 kHz / devi , $84 \text{ dB}\mu\text{V}$
Measure output audio signal voltage.

(Note 13) SIF input signal voltage sensitivity

SIF input : $f_o = 4.5 \text{ MHz}$, $f_m = 400 \text{ Hz}$, 25 kHz / devi , $84 \text{ dB}\mu\text{V}$
Measure output audio signal voltage (that voltage is 0 dB). Lower input SIF signal voltage gradually, measure input SIF signal voltage when output audio signal voltage is -3 dB .

(Note 14) Total harmonic distortion

SIF input : $f_o = 4.5 \text{ MHz}$, $f_m = 400 \text{ Hz}$, 7.5 kHz / devi , $84 \text{ dB}\mu\text{V}$

(Note 15) AM Rejection

SIF input :

(1) FM : $f_o = 4.5 \text{ MHz}$, $f_m = 400 \text{ Hz}$, 25 kHz / devi , $84 \text{ dB}\mu\text{V}$

(2) AM : $f_o = 4.5 \text{ MHz}$, $f_m = 400 \text{ Hz}$, $30\% \text{ AM}$, $84 \text{ dB}\mu\text{V}$

Measure difference of output audio signal voltage between (1) and (2).

(Note 16) Signal-noise ratio

SIF input : $f_o = 4.5 \text{ MHz}$, $f_m = 400 \text{ Hz}$, 25 kHz / devi , $84 \text{ dB}\mu\text{V}$
Measure audio signal output voltage. : $V_1 \text{ [mV}_{\text{rms}}]$

SIF input : $f_o = 4.5 \text{ MHz}$, $f_m = 400 \text{ Hz}$, 25 kHz / devi , $84 \text{ dB}\mu\text{V}$
Measure audio signal output voltage. : $V_2 \text{ [mV}_{\text{rms}}]$
Signal-noise ratio is calculated by following equality.

$$\text{Signal-noise ratio} = 20 \log (V_1 / V_2) \text{ (dB)}$$

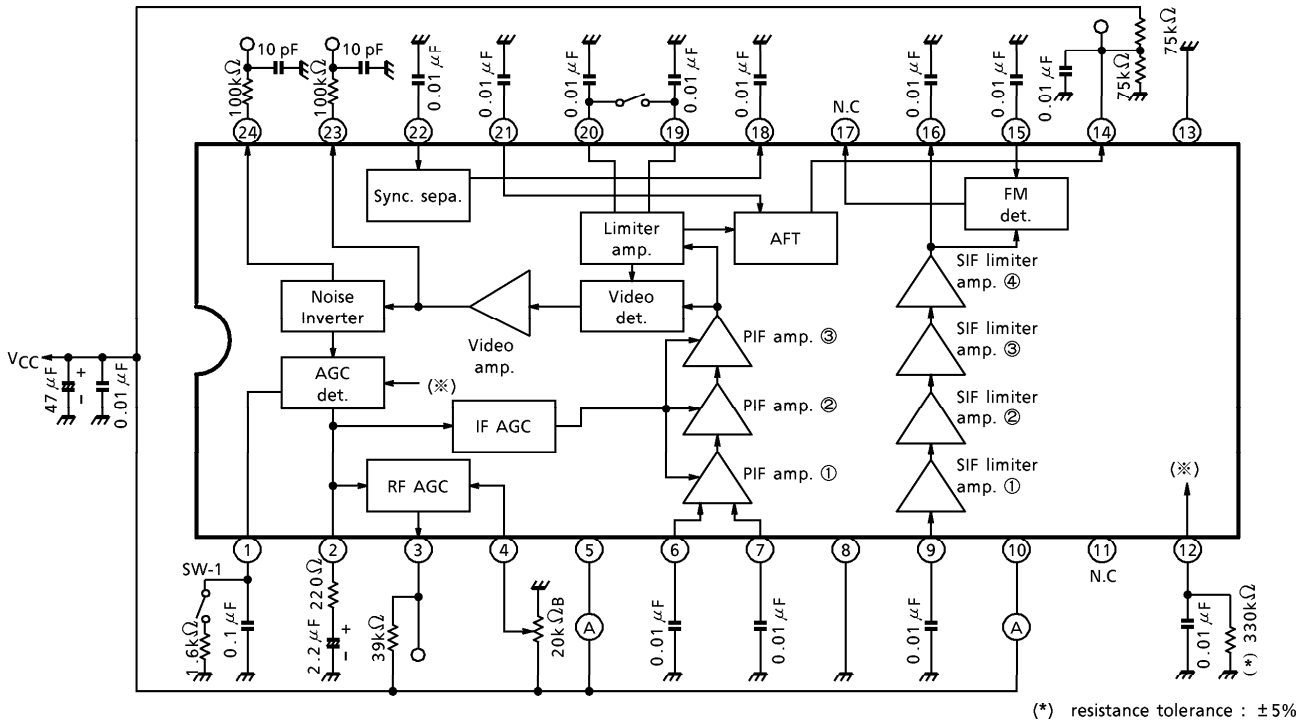
(Note 17) -3 dB bandwidth

SIF input : $f_o = 4.5 \text{ MHz}$, $f_m = 400 \text{ Hz}$, 25 kHz / devi , $84 \text{ dB}\mu\text{V}$
Measure audio signal output voltage. (that voltage is 0 dB) Then change input signal frequency, measure bandwidth that audio signal output voltage within -3 dB .

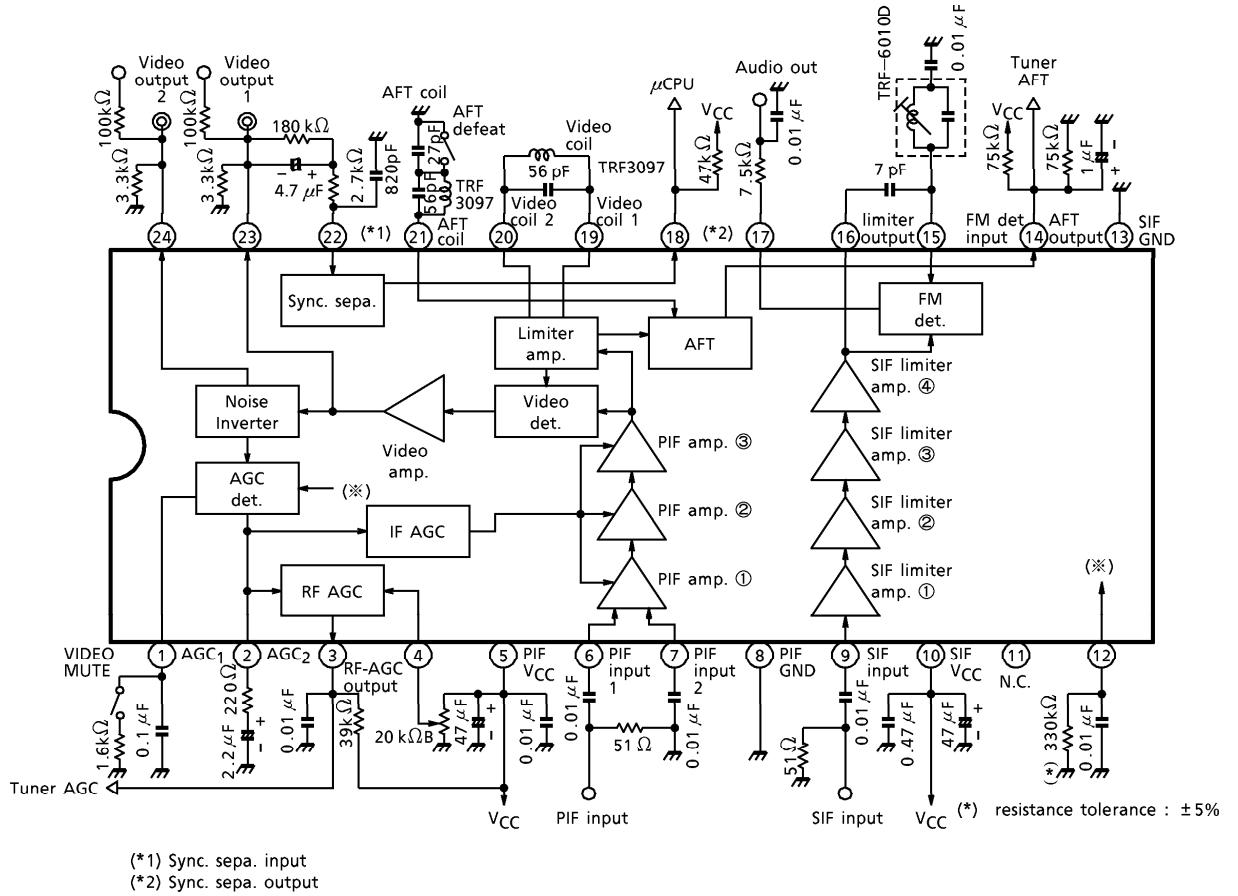
(Note 18) Dependence of output signal voltage on power supply voltage

SIF input : $f_o = 4.5 \text{ MHz}$, $f_m = 400 \text{ Hz}$, 25 kHz / devi , $84 \text{ dB}\mu\text{V}$
Measure the audio signal output voltage when power supply voltage are 3.5 V and 5.5 V . ($4.5 \pm 1.0 \text{ V}$)
Compare those voltage and audio signal output voltage when power supply voltage is 4.5 V .

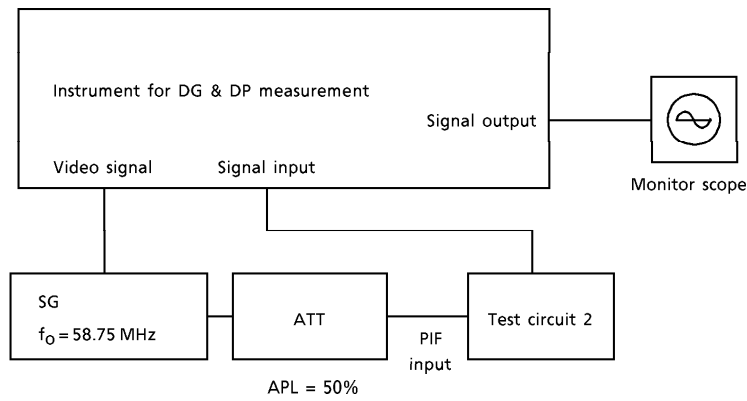
TEST CIRCUIT 1 (DC CHARACTERISTIC)



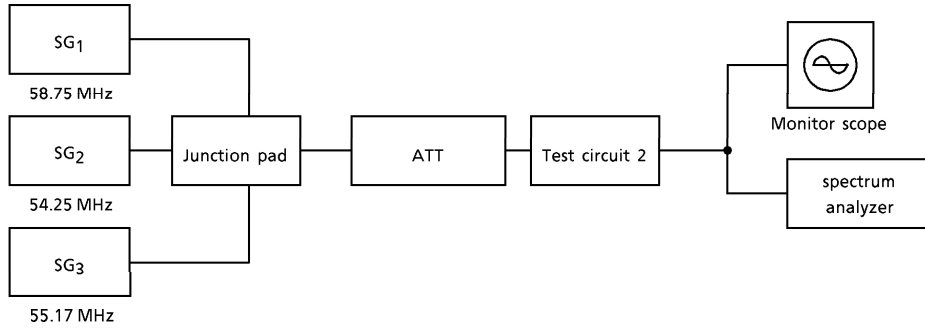
TEST CIRCUIT 2 (AC CHARACTERISTIC)



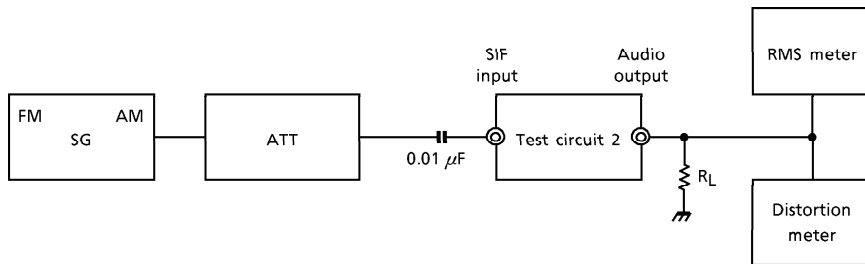
TEST CIRCUIT 3 (DG, DP)



TEST CIRCUIT 4 (INTERMODULATION)



TEST CIRCUIT 5 (AMR)



COIL ADJUSTMENT

● Video coil

Measure video signal output DC voltage.

IF AGC : Fix voltage for external voltage source /

PIF input : 58.75 MHz, 84 dB μ V, CW

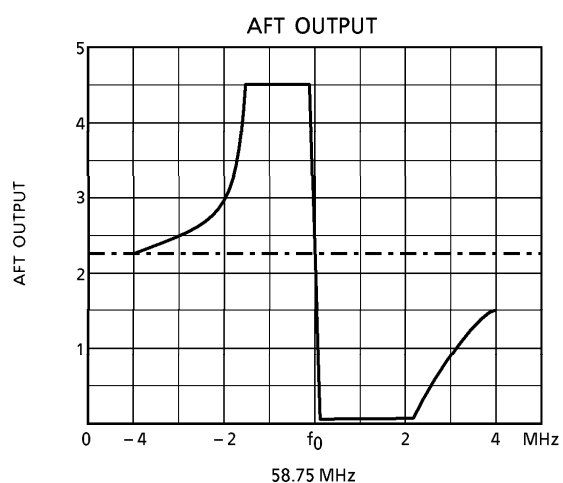
Adjust video coil so that video signal output DC voltage is lowest.

● AFT coil

Measure video signal output AFT voltage.

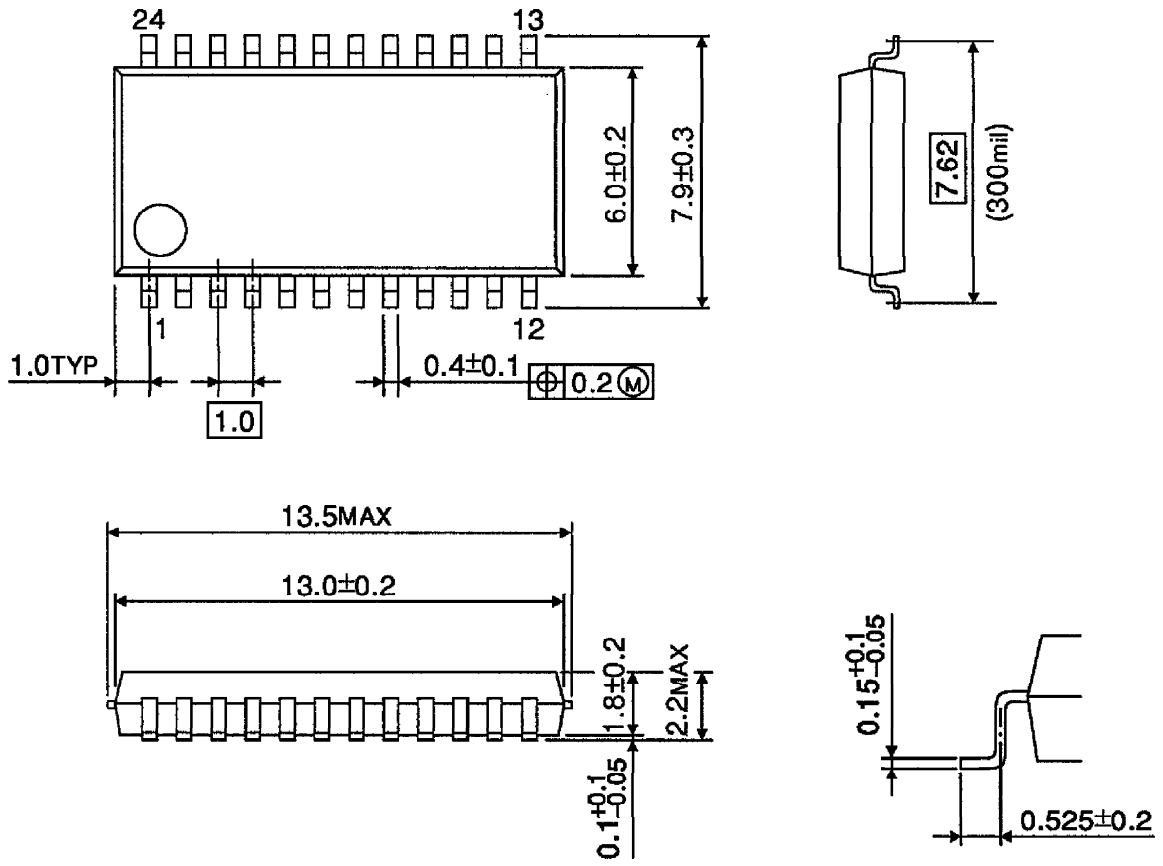
PIF input : 54~62 MHz (sweep signal), 84 dB μ V

Adjust AFT coil so that AFT output signal is following figure.



OUTLINE DRAWING
SSOP24-P-300-1.00

Unit : mm



Weight : 0.32 g (Typ.)