TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA1272AF

FOR LCD TVS, PIF AND SIF SYSTEM

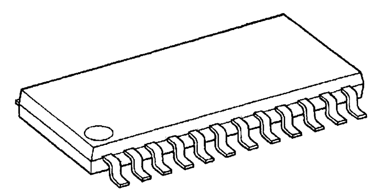
FEATURES

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

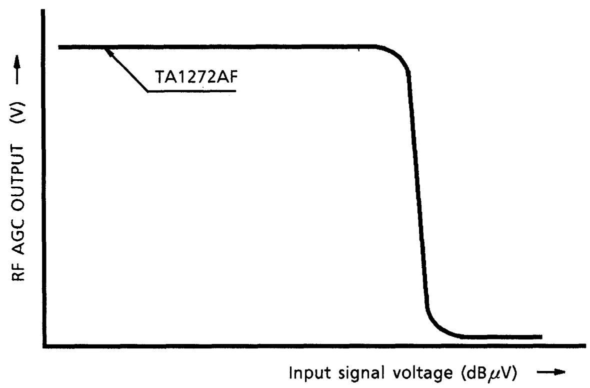
SIF circuit

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



Weight: 0.32g (Typ.)

RF AGC CURVE



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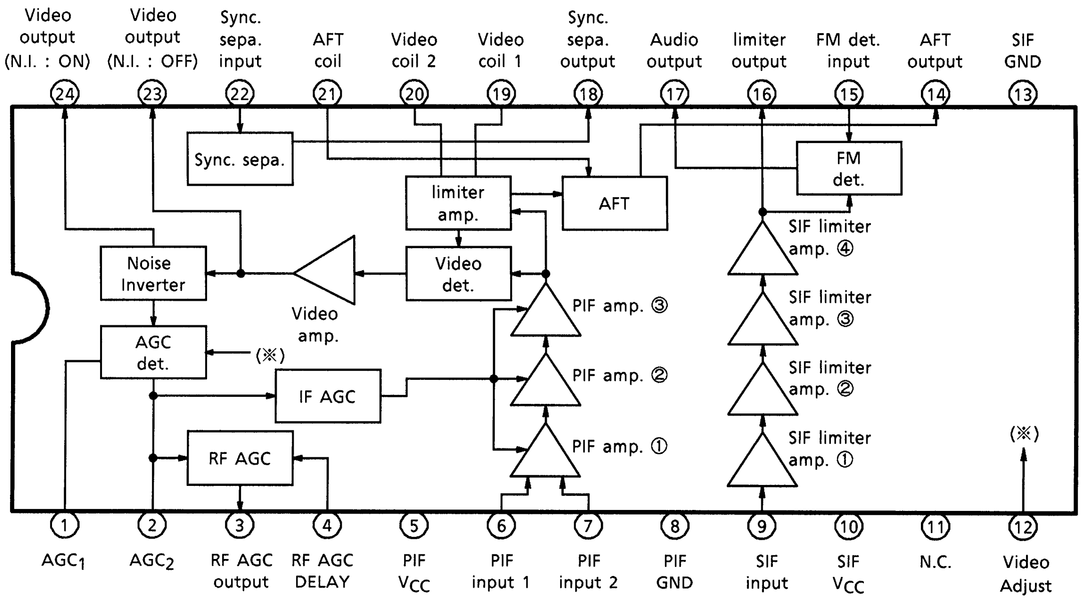
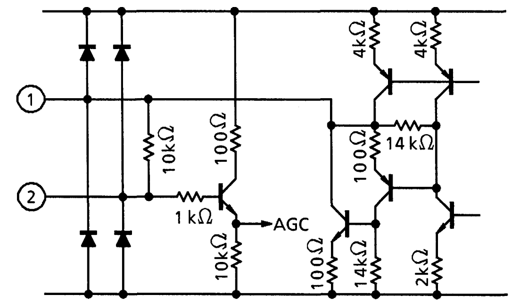
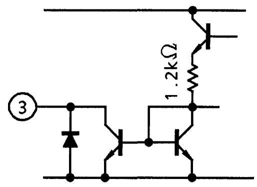
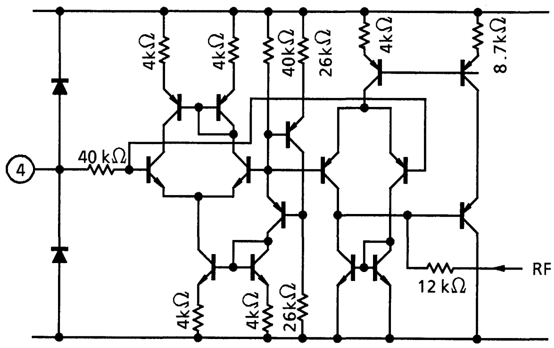
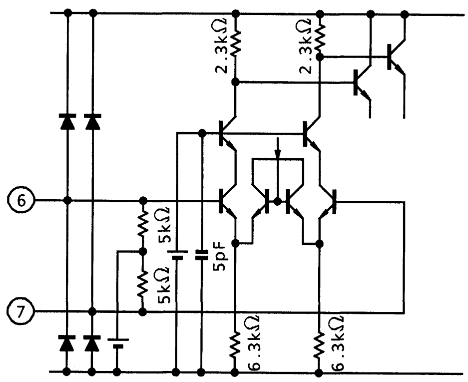
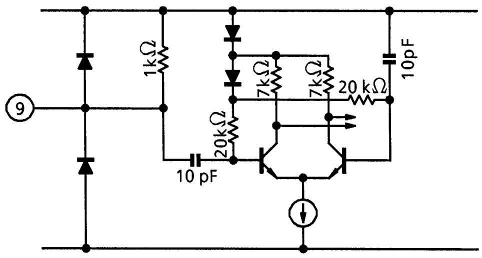
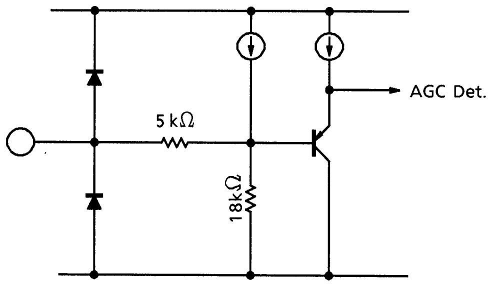
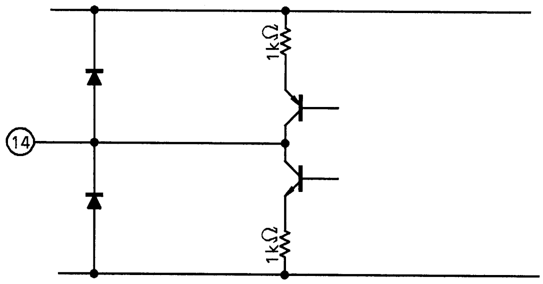
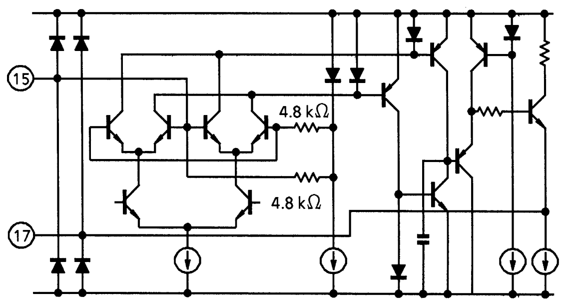
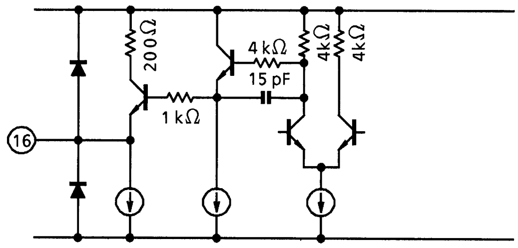
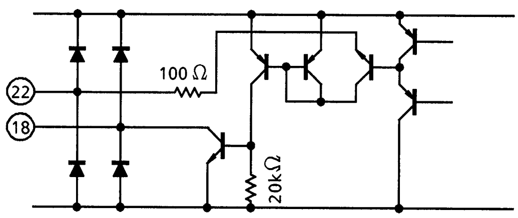
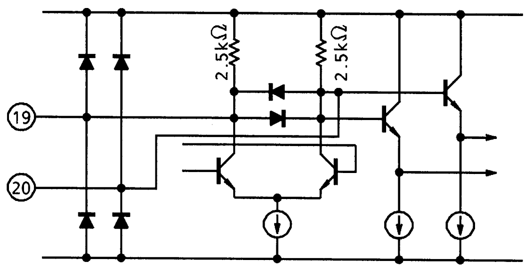
BLOCK DIAGRAM

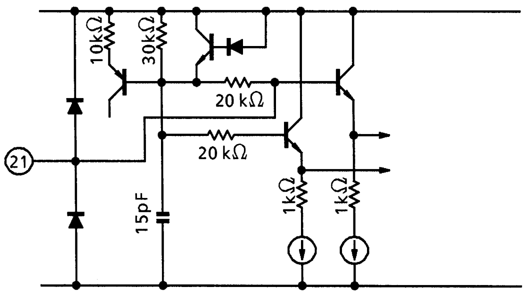
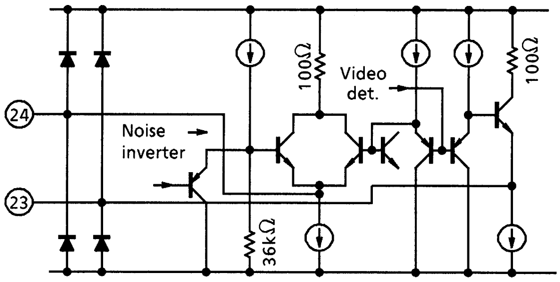


TERMINAL FUNCTION

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.	—

<table>
<tr><th>PIN No.</th><th>PIN NAME</th><th>FUNCTION</th><th>INTERFACE</th></tr>
<tr><td>9</td><td>SIF Input</td><td>Connect BPF between this terminal and pin 23.</td><td>
</td></tr>
<tr><td>10</td><td>SIF V_{CC}</td><td>Connect bypass capacitor between this terminal and SIF GND with shortest wiring.</td><td>—</td></tr>
<tr><td>11</td><td>N.C.</td><td>—</td><td>—</td></tr>
<tr><td>12</td><td>Video Adjust</td><td>Video signal output voltage adjustment terminal.
Chaging 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%)</td><td>
</td></tr>
<tr><td>13</td><td>SIF GND</td><td>Connect bypass capacitor between this terminal and SIF V_{CC} with shortest wiring.</td><td>—</td></tr>
<tr><td>14</td><td>AFT Output</td><td>AFT detector output terminal based on double balanced multiplier.
AFT output is muted when AFT coil terminal is connected to GND.</td><td>
</td></tr>
</table>

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 detection 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 noiseinverter, and can thus be used for diversity circuit, for example. Pin 24 is the output with noiseinverter.	

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 V, Ta = 25°C)
PIF circuit

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	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	dBμV
Maximum input Signal Voltage	$V_{i\ MAX}$	2	(Note 3)	95	114	—	dBμV
−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	°
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)	0.4	0.6	0.8	V
Black Noise Clamp Level	V_{BCL}		Video output 2	1.0	1.2	1.4	
AFT Control Steepness	Δf / ΔV	2	Load : 75 kΩ / 75 kΩ	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	I_{SIF}	1	—	—	6	11	mA
Output Signal Voltage	V_{OD}	2	(Note 12)	120	150	180	mV_{rms}
SIF Input Signal Voltage Sensitivity	V_{LIM}	2	(Note 13)	30	35	40	dBμV
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 dBμV, 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 dBμV
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 dBμV
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 dBμV, 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 dBμV (frequency : fixed)
SG : 2 58.65~45 MHz, 64 dBμV (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 dBμV, 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 ± 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 dBμV, 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 dBμV
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 dBμV, CW
Measure output video signal voltage. : V_2
Signal-noise ratio is calculated by following equality.
Signal-noise ratio = $20 \ \ell og \ (V_1 \times 6 / V_2)$ [dB]

Note 8: Intermodulation
(1) PIF input : f_o = 58.75 MHz, 84 dBμV, 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 dBμV, CW
f_c = 55.17 MHz, 74 dBμV, CW
f_s = 54.25 MHz, 74 dBμV, 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 dBμV
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 dBμV, CW
Measure signal level of 58.75 MHz component at pin 24. : V_2
Signal-noise ratio is calculated by following equality.
Suppression of picture career = $20 \times \ \ell og \ (V_1 / V_2)$ [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 dBμV
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 MHz, f_m = 400 Hz, 25 kHz / devi, 84 dBμV
Measure output audio signal voltage.

Note 13: SIF input signal voltage sensitivity
SIF input : f_o = 4.5 MHz, f_m = 400 Hz, 25 kHz / devi, 84 dBμV
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 MHz, f_m = 400 Hz, 7.5 kHz / devi, 84 dBμV

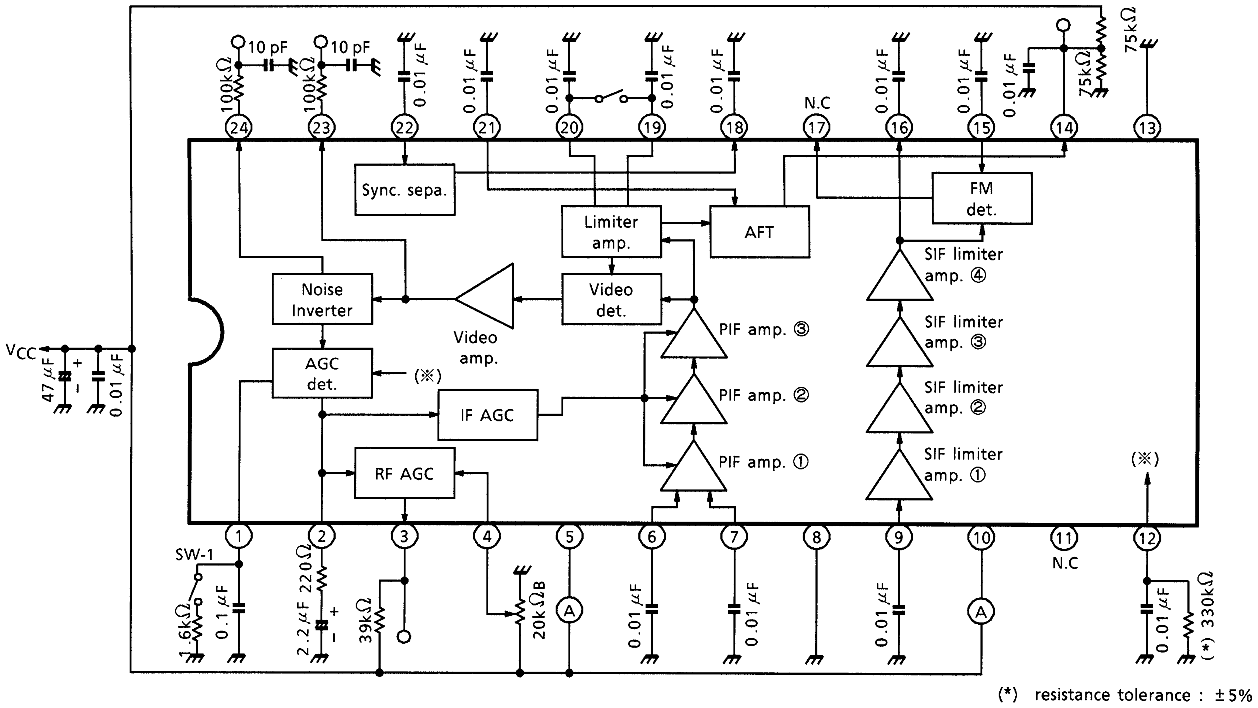
Note 15: AM Rejection
SIF input :
(1) FM : f_o = 4.5 MHz, f_m = 400 Hz, 25 kHz / devi, 84 dBμV
(2) AM : f_o = 4.5 MHz, f_m = 400 Hz, 30%AM, 84 dBμV
Measure difference of output audio signal voltage between (1) and (2).

Note 16: Signal-noise ratio
SIF input : f_o = 4.5 MHz, f_m = 400 Hz, 25 kHz / devi, 84 dBμV
Measure audio signal output voltage. : V_1 [mV_{rms}]
SIF input : f_o = 4.5 MHz, f_m = 400 Hz, 25 kHz / devi, 84 dBμV
Measure audio signal output voltage. : V_2 [mV_{rms}]
Signal-noise ratio is calculated by following equality.
Signal-noise ratio = 20 ℓog (V_1 / V_2) [dB]

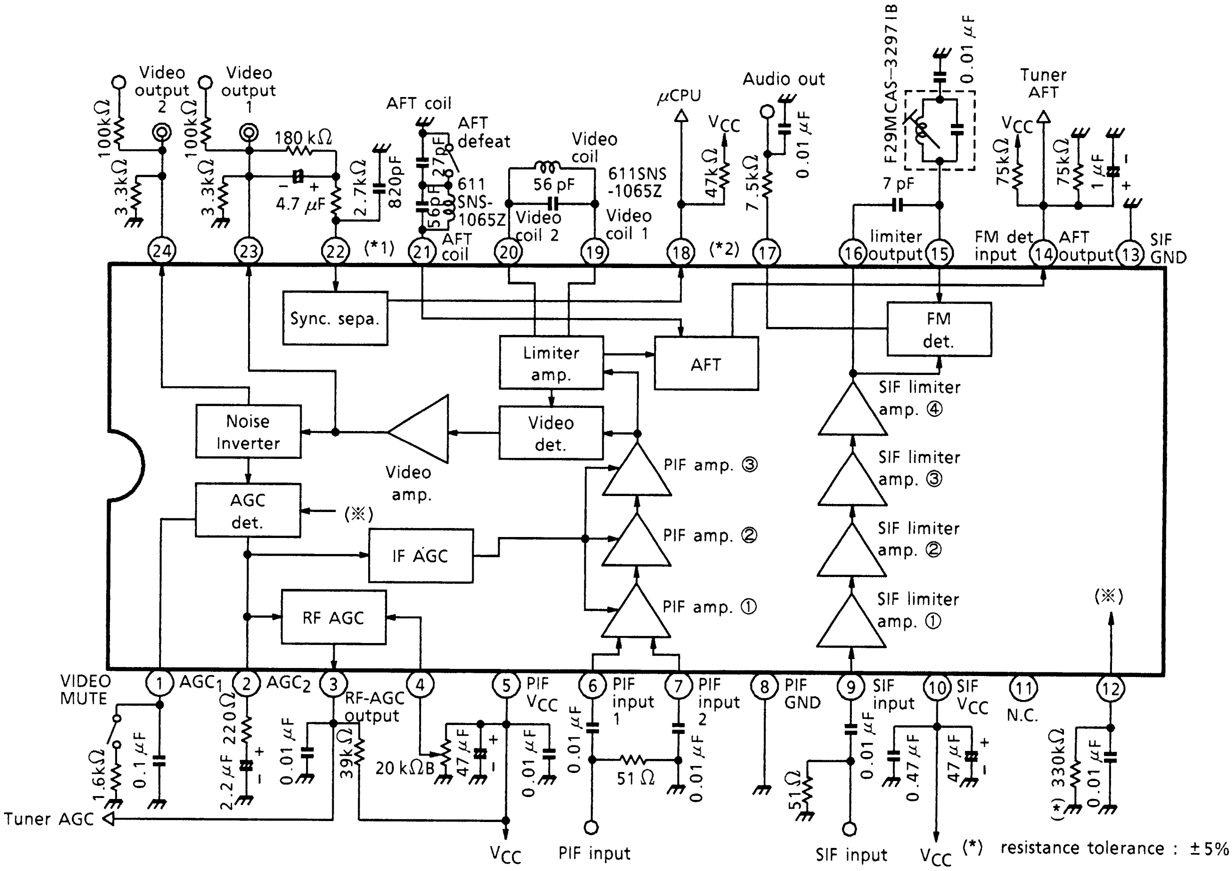
Note 17: −3 dB bandwidth
SIF input : f_o = 4.5 MHz, f_m = 400 Hz, 25 kHz / devi, 84 dBμV
Measure audio signal output voltage. (that voltage is 0 dB) Then change input signal frequency, measure bandwidth that audio signal output voltage within −3 dB.

Note 18: Dependence of output signal voltage on power supply voltage
SIF input : f_o = 4.5 MHz, f_m = 400 Hz, 25 kHz / devi, 84 dBμV
Measure the audio signal output voltage when power supply voltage are 3.5 V and 5.5 V. (4.5 ± 1.0 V)
Compare those voltage and audio signal output voltage when power supply voltage is 4.5 V.

TEST CIRCUIT 1 (DC CHARACTERISTIC)

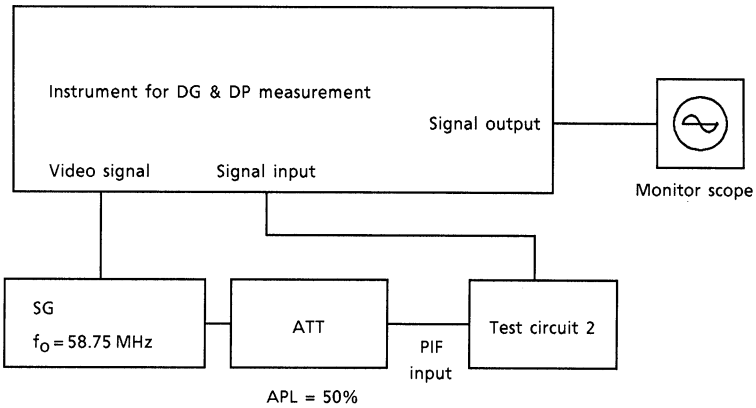


TEST CIRCUIT 2 (AC CHARACTERISTIC)

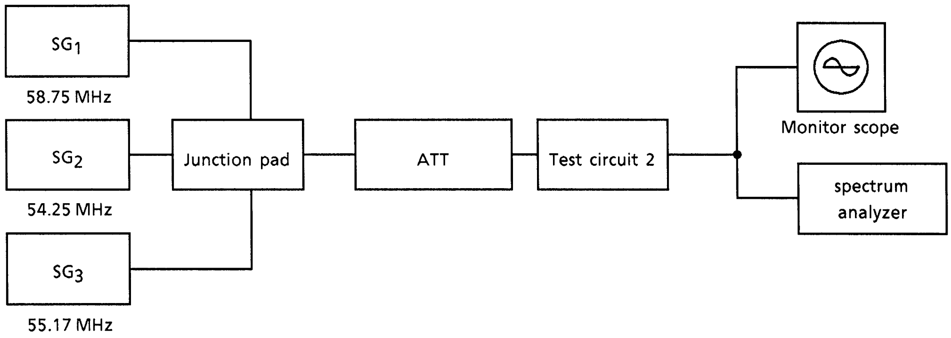


(*1) Sync. sepa. input
(*2) Sync. sepa. output

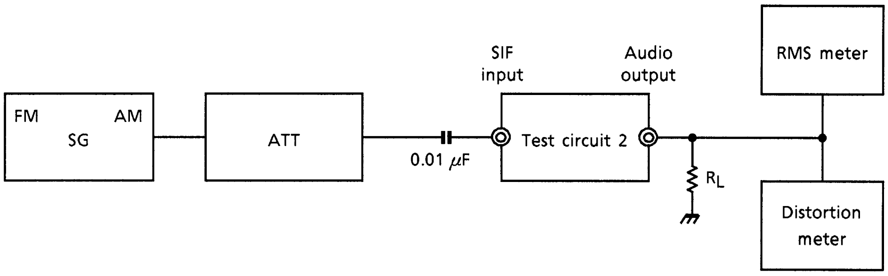
TEST CIRCUIT 3 (DG, DP)



TEST CIRCUIT 4 (INTERMODULATION)



TEST CIRCUIT 5 (AMR)



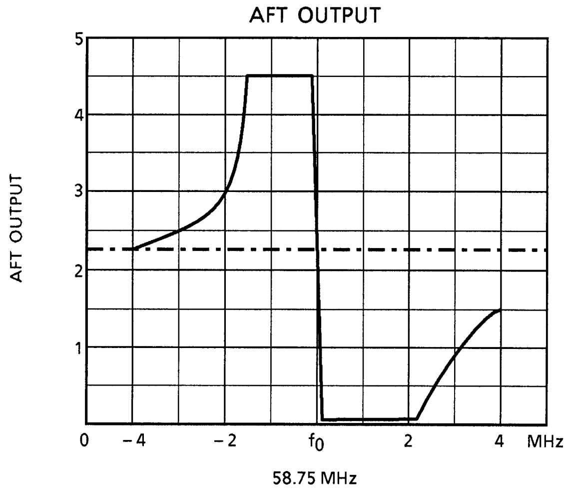
COIL ADJUSTMENT

- Video coil

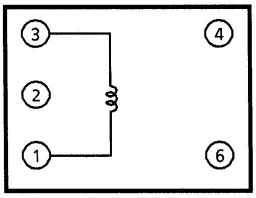
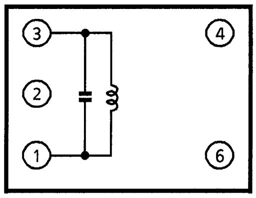
  Measure video signal output DC voltage.
  IF AGC : Fix voltage for external voltage source /
  PIF input : 58.75MHz, 84dBμV, CW
  Adjust video coil so that video signal output DC voltage is lowest.

- ATF coil

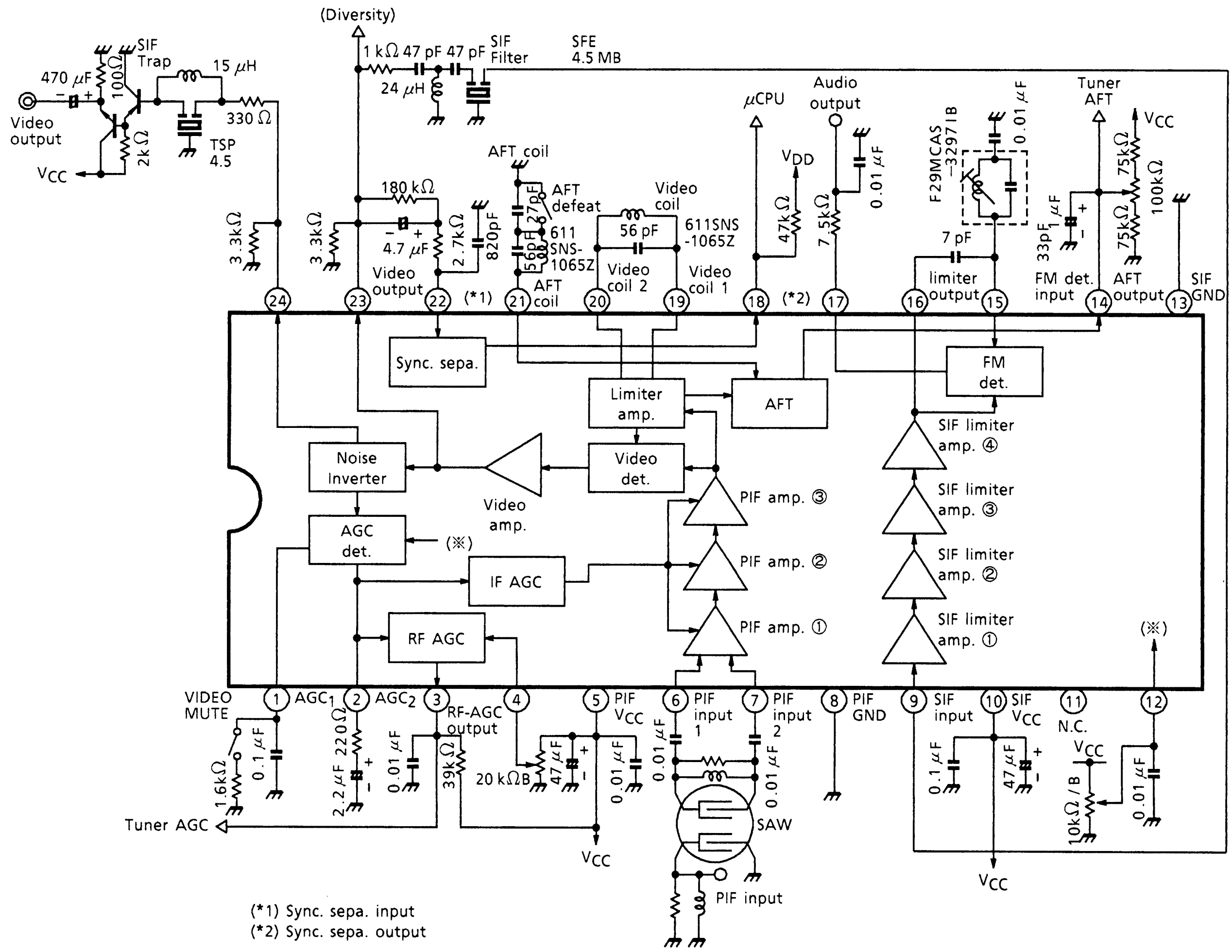
  Measure video signal output AFT voltage.
  PIF input : 54~62HMz (seep signal), 84 dBμV
  Adjust AFT coil so that AFT output signal is following figure.



COILE SPECIFICATION

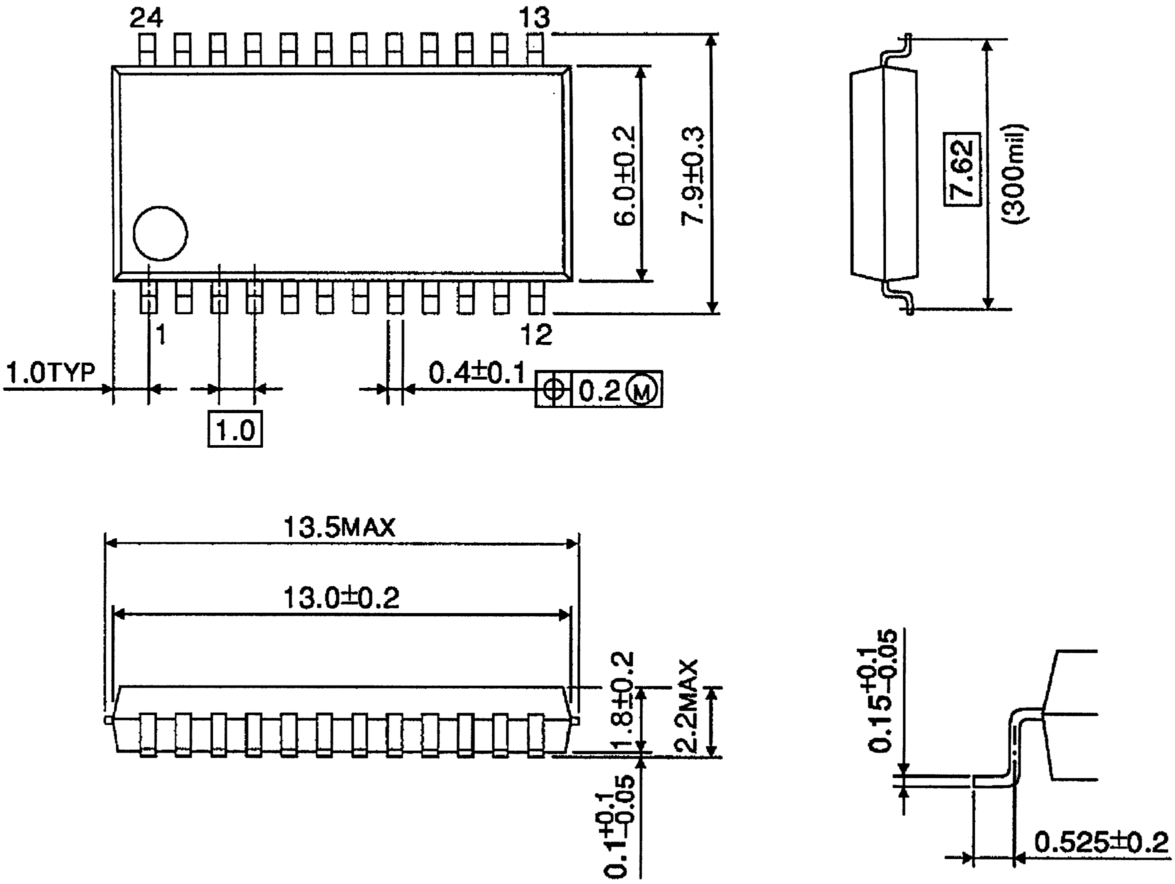
COIL NAME	PART NUMBER	CONNECTION	SPECIFICATION		
Video AFT	611SNS-1065Z (TOKO)		Center frequency	:	58.75 MHz
			Internal capacitor	:	—
			External capacitor	:	—
			Frequency adjustment range	:	±4%
			Qu	:	72 ± 20%
			Size	:	5 mm × 5 mm
FM	F29MCAS-3297IB (TOKO)		Center frequency	:	4.5 MHz
			Internal capacitor	:	100 pF
			Demodulation output	:	77 mV ± 10 mV (STD)
			Tuning frequency	:	4.467 MHz ± 11 kHz or above (STD)
			3dB bandwidth	:	4.467 MHz ± 75 kHz or above (STD)
			Size	:	7 mm × 7 mm

APPLICATION CIRCUIT



PACKAGE DIMENSIONS

SSOP24-P-300-1.00 Unit : mm



Weight: 0.32g (Typ.)