TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

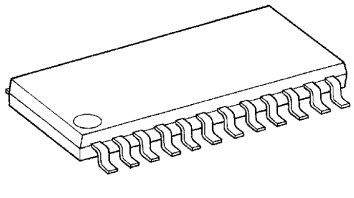
TA8805F, TA8836F, TA1207F

FOR LCD TVS, PIF AND SIF SYSTEM

FEATURES

PIF circuit

- High input sensitivity
- 3-stage variable-gain PIF amplifier
- Output with black noise inverter (TA8805F)
- Output without black noise inverter (TA8836F, TA1207F)
- High-speed response peak AGC with dual time constant
- Reverse RF AGC output (Emitter follower type)
- Built-in AFT detection circuit with AFT mute



SSOP24-P-300-1.00

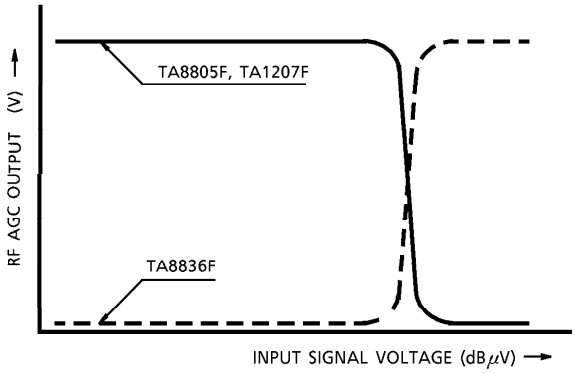
Weight : 0.32 g (Typ.)

SIF circuit

- 4-stage SIF amplifier
- Quadrature-type detection circuit
- Use of a ceramic discriminator device makes the SIF circuit adjustment-free
- Electronic volume control
- Built-in audio amplifier (output power : 30 mW (Typ.))

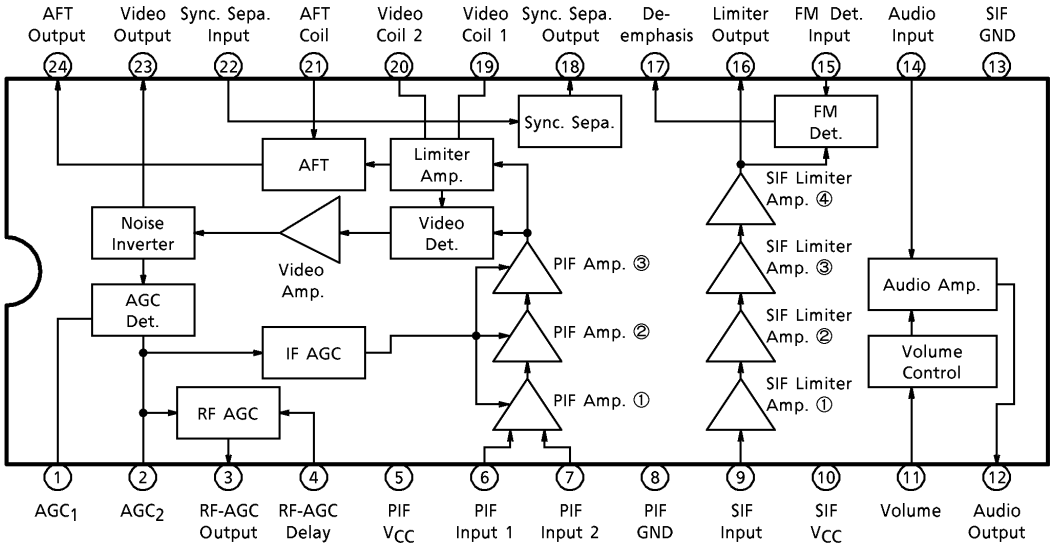
Product No.	RF AGC Polarity	Black noise inverter
TA8805F	Reverse Type	Built-in
TA8836F	Forward Type	Not Built-in
TA1207F	Reverse Type	Not Built-in

RF AGC CURVE

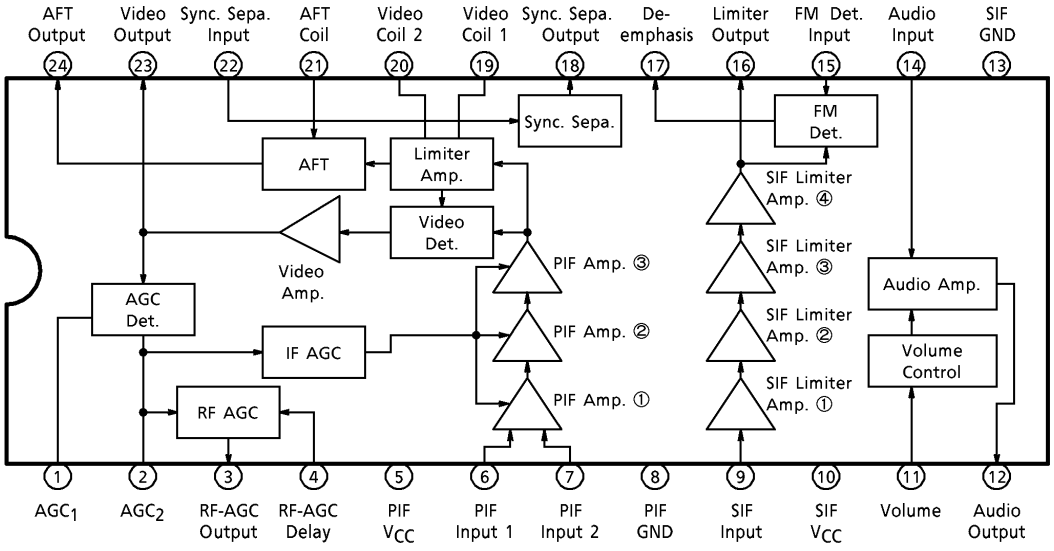


980910EBA1

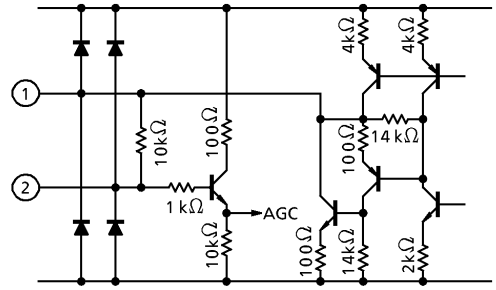
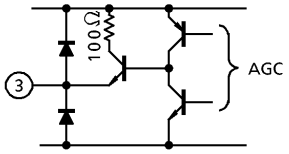
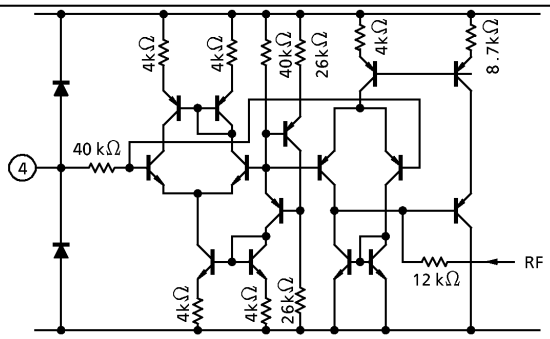
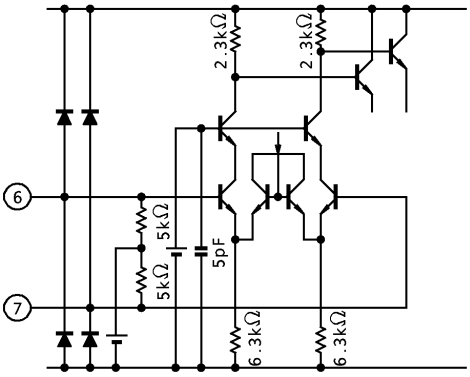
BLOCK DIAGRAM (TA8805F)

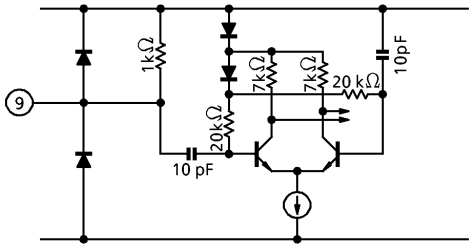
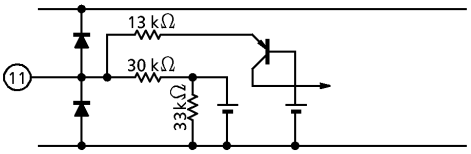
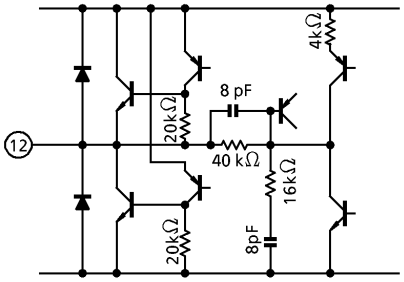
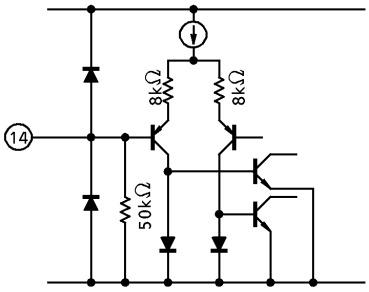
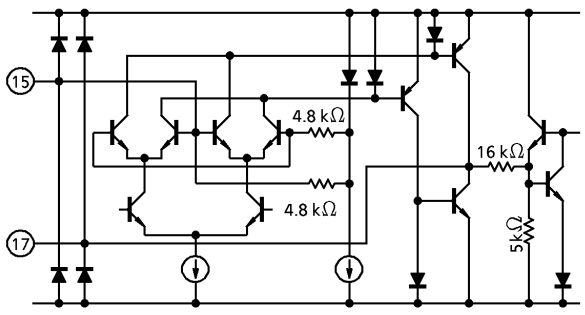


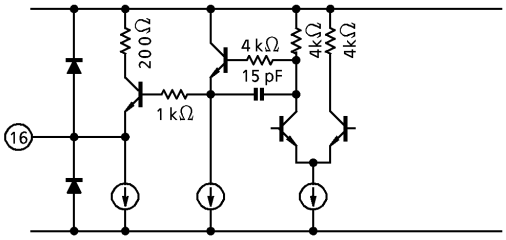
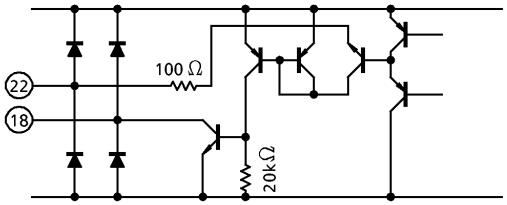
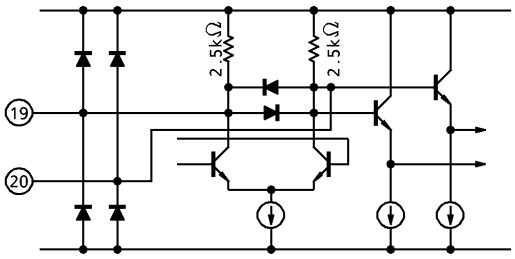
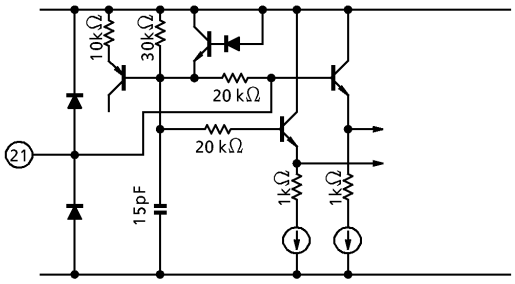
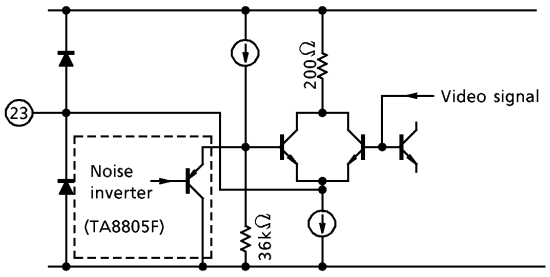
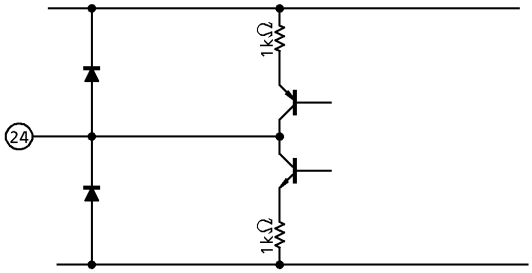
BLOCK DIAGRAM (TA8836F, TA1207F)



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 to GND.	
3	RF AGC Output	RF AGC output terminal (Emitter follower type) Output current : 3 mA (Typ.)	
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 B pF between this terminal and pin 23.	
10	SIF V_{CC}	Connect bypass capacitor between this terminal and SIF GND with shortest wiring.	—
11	Volume	Control audio amp. gain. (Control range 70 dB (Typ.))	
12	Audio Output	Audio signal output terminal. (Output power : 30 mW (Typ.))	
13	SIF GND	Connect bypass capacitor between this terminal and SIF V_{CC} with shortest wiring.	—
14	Audio Input	Audio signal input terminal. Input audio signal from pin 17 through filter.	
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	De-emphasis	Audio signal output terminal.	

PIN No.	PIN NAME	FUNCTION	INTERFACE
16	Limiter Output	Limiter output terminal. Connect FM coil between this terminal and pin 15. Applying ceramic discriminator sets this circuit to non-adjustable circuit.	
18 22	Sync. Sepa.	Sync. sepa. output and input terminal.	
19 20	Video Coil 1 Video Coil 2	Connect video connection coil.	
21	AFT Coil	Connect AFT detection coil. AFT output is defeated when this terminal connected to GND.	
23	Video Output	Video signal output terminal.	
24	AFT Output	AFT detector output terminal based on double balanced multiplier. AFT output is muted when AFT coil terminal is connected to GND.	

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	7.5	V
9	SIF V_{CC}	3.5	4.5	7.5	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	3.6	3.8	4.0	
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	Volume control	Audio volume control	2.0	2.2	2.4	
12	Audio output	Audio output	0.9	1.3	1.7	
13	SIF GND	SIF GND	—	0	—	
14	Audio input	Audio input	—	—	0.5	
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	De-emphasis	Audio de-emphasis	1.15	1.45	1.75	
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	1.40	1.85	2.30	
24	AFT output	AFT output	1.3	1.8	3.2	

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)	0.7	1.0	1.3	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	87.5% AM, standard color-bar signal	0.6	0.8	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) (TA8805F)	0.4	0.6	0.8	V
Black Noise Clamp Level	V_{BCL}			1.0	1.2	1.4	
AFT Control Steepness	Δf / ΔV	2	Load : 100 kΩ / 100 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	
PIF Amp. Input Impedance	R_{IN}	2	—	—	5	—	kΩ
	C_{IN}	2	—	—	3.8	—	pF
Video Signal Output Impedance	P_{OUT}	2	—	—	200	—	Ω
Video Amp. Output Impedance	R_{OUT}	2	—	—	200	—	Ω

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	$dB\mu V$
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 – 3dB	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
Audio Amp. Voltage Gain	G_{AF}	2	(Note 19)	7.0	10.0	13.0	dB
Audio Amp. Total Harmonic Distortion	THD_{AF}	2	(Note 20)	—	0.3	1.0	%
Audio Amp. Maximum Attenuation	ATT_{MAX}	2	(Note 21)	60	70	—	dB
Audio Amp. S / N	S / N_{AF}	2	(Note 22)	40	50	—	dB
Audio Amp. Output Power	P_O	2	(Note 23)	15	30	—	mW

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, standard TV signal (V / S = 10 : 4 Ramp)
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.

$$\text{Signal-noise ratio} = 20\ell\text{og}\,(V_1 \times 6 / V_2)\ [\text{dB}]$$

(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 } Input
f_s = 54.25 MHz, 74 dBμV, CW

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.

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

(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 dBμV
Supply 0 V 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.

$$\text{Signal-noise ratio} = 20\,\ell\text{og}\,(V_1 / V_2)\ [\text{dB}]$$

(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.

(Note 19) Audio amp. voltage gain

Audio input : f = 1 kHz, V_{IN} = 100 mV_{rms}, Pin 11 : V_{CC}

(Note 20) Audio amp. total harmonic distortion

Audio input : f = 1 kHz, V_{IN} = 100 mV_{rms}, Pin 11 = V_{CC}

(Note 21) Audio amp. maximum attenuation

Audio input : f = 1 kHz, V_{IN} = 100 mV_{rms}
Audio output (Pin 11: V_{CC}) = V_{max}
Audio output (Pin 11: GND) = V_{min}
$ATT_{max} = 20 \ell og\ (V_{max} / V_{min})$

(Note 22) Audio amp. S / N

(1) Audio input : f = 1 kHz, V_{IN} = 100 mV_{rms}, Pin 11 = V_{CC}
Measure audio output : V_1

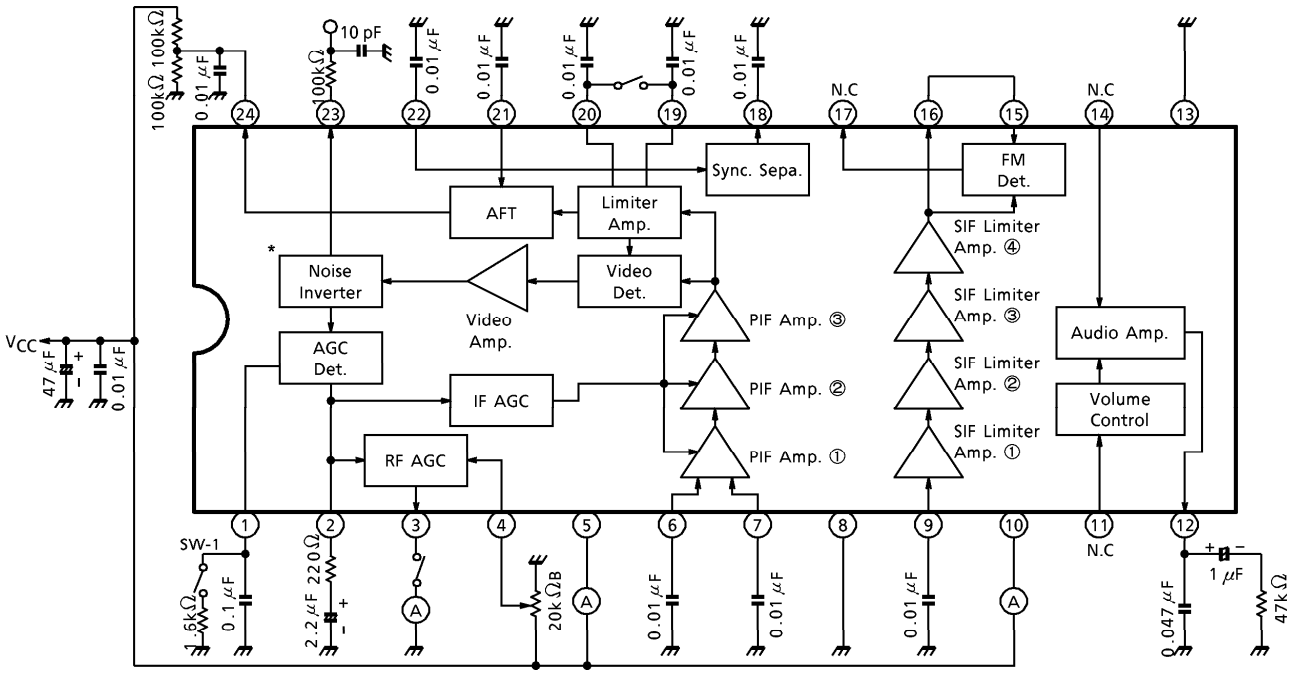
(2) Audio input : No signal
Measure audio output : V_2

$S / N = 20 \ell og\ (V_1 / V_2)$ [dB]

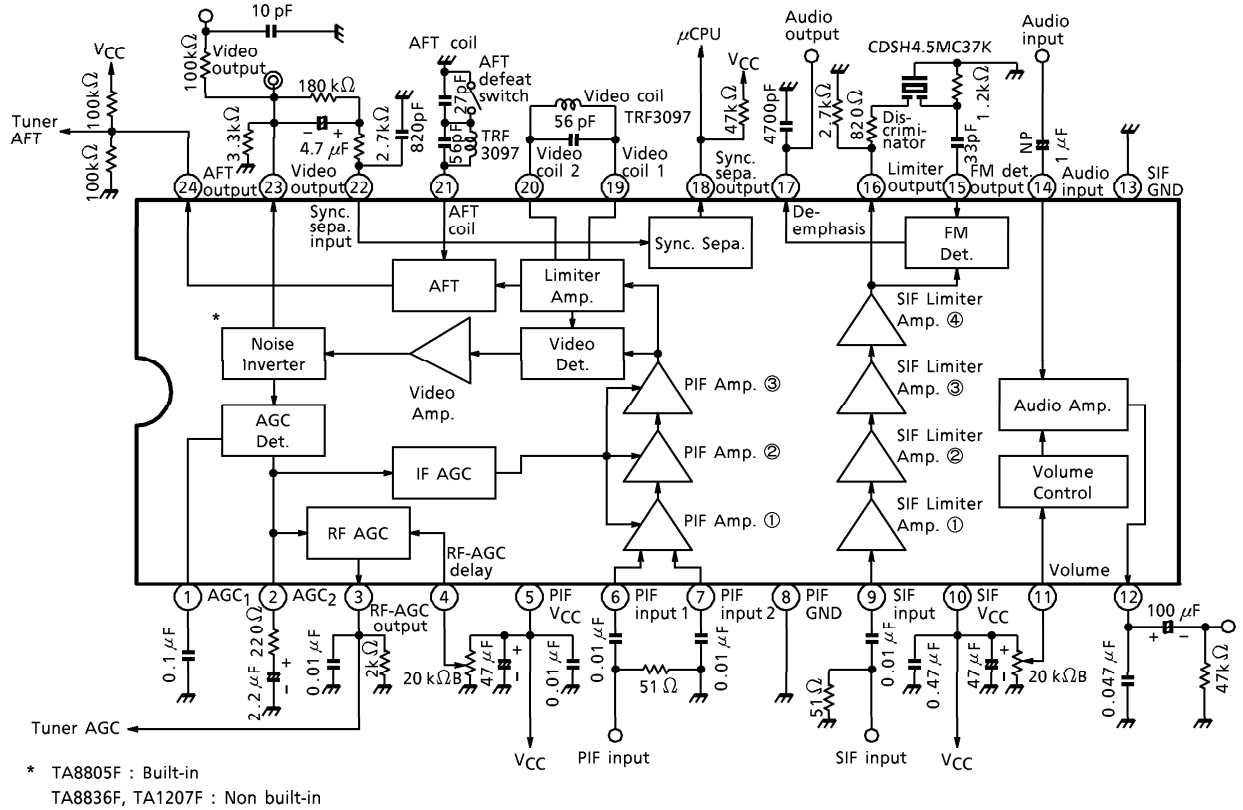
(Note 23) Audio amp. output power

Audio input : f = 1 kHz, Pin 11 = V_{CC}, Load = 8 Ω
Raise input signal voltage gradually, measure output signal voltage when THD is 5%.
$P_O = V^2 / 8$ [W]

TEST CIRCUIT 1 (DC CHARACTERISTIC)

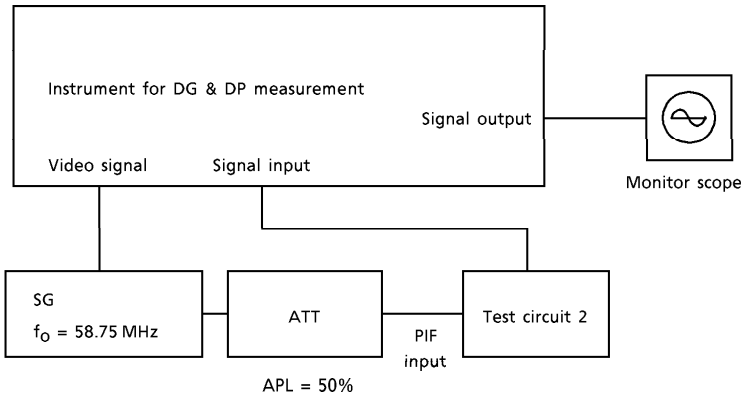


TEST CIRCUIT 2 (AC CHARACTERISTIC)

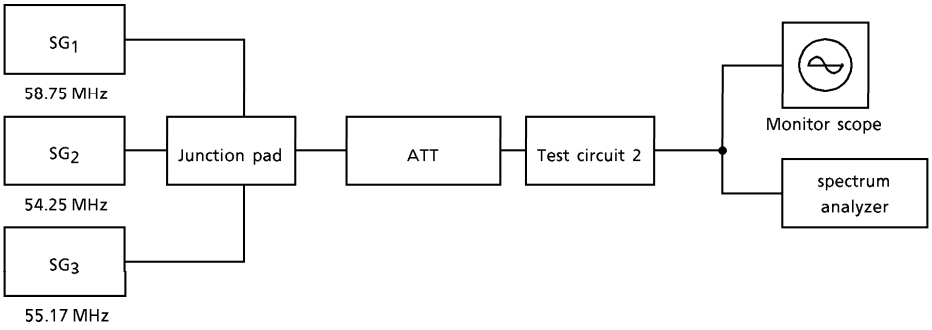


* TA8805F : Built-in
TA8836F, TA1207F : Non built-in

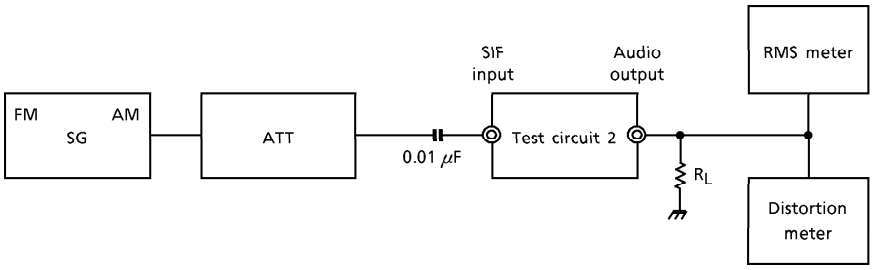
TEST CIRCUIT 3 (DG, DP)



TEST CIRCUIT 4 (INTERMODULATION)



TEST CIRCUIT 5 (AMR)



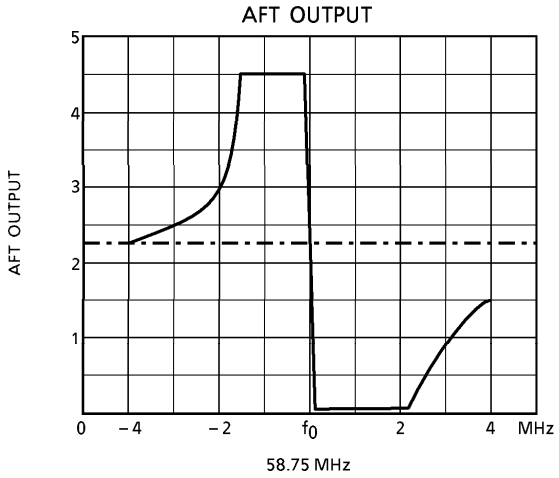
COIL ADJUSTMENT

- Video coil

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

- AFT coil

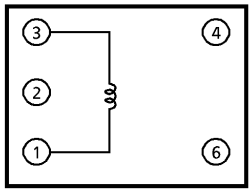
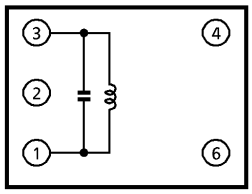
  Measure video signal output AFT voltage.
  PIF input : 54~62 MHz (sweep signal), 84 dBμV
  Adjust AFT coil so that AFT output signal is following figure.



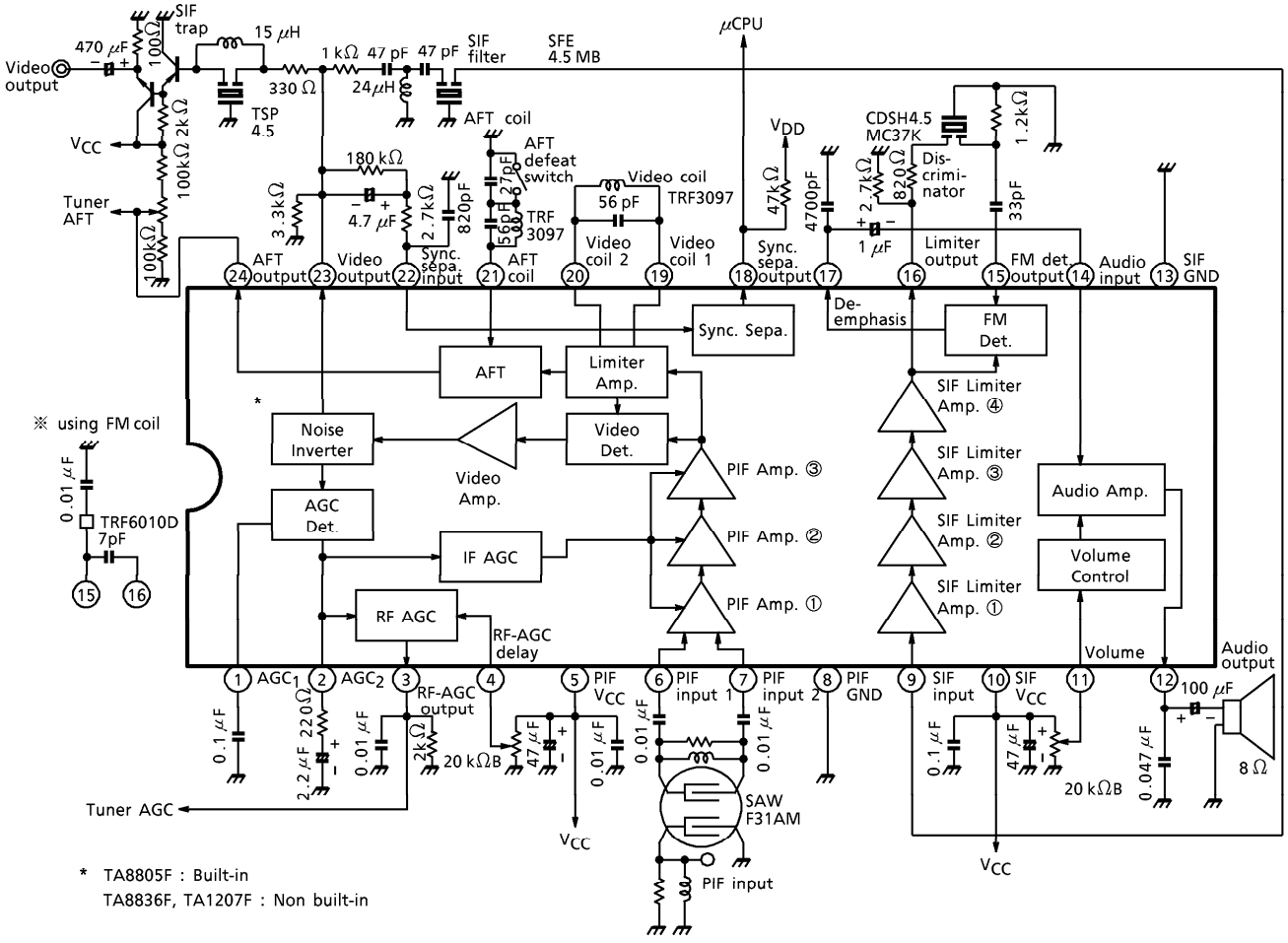
- SIF coil

  SIF input : f_O = 4.5 MHz, 84 dBμV, CW
  Adjust SIF coil so that pin 17 voltage is 1/2 V_{CC}.

COILE SPECIFICATION

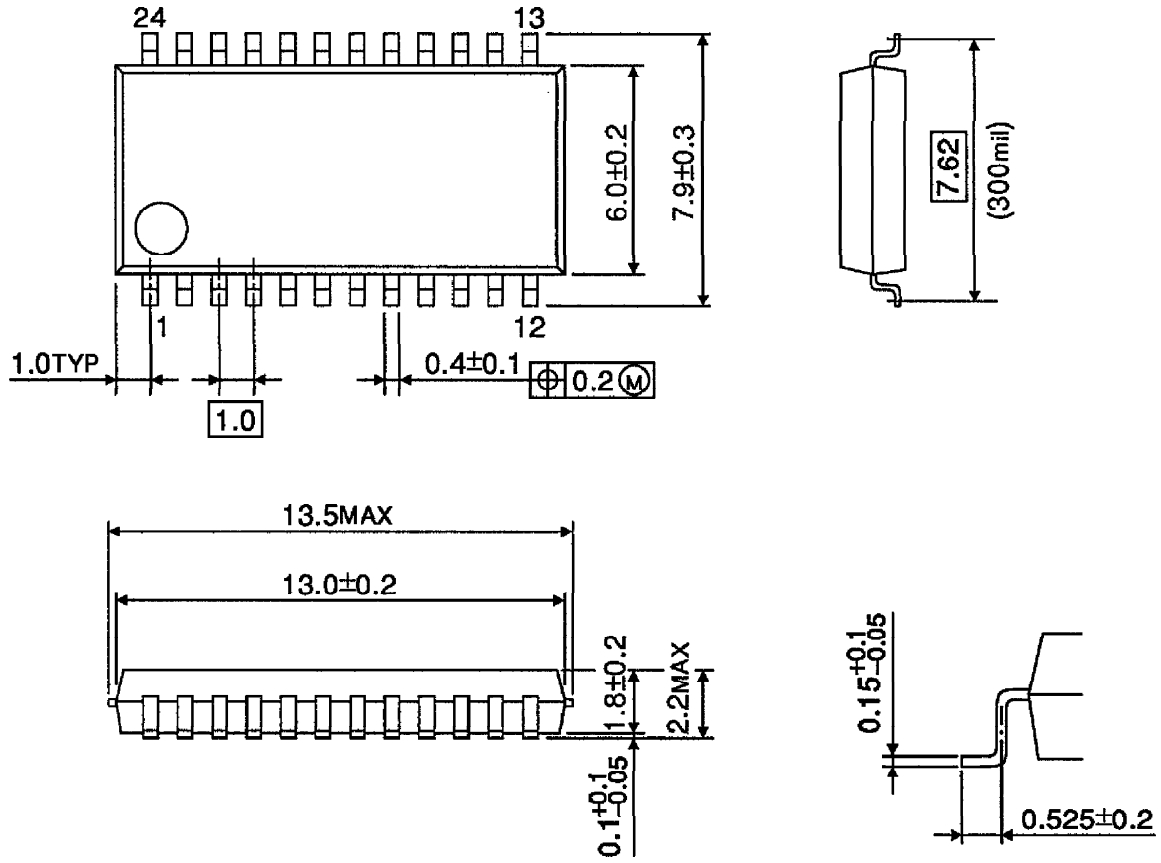
COIL NAME	PART NUMBER	CONNECTION	SPECIFICATION
Video AFT	TRF-3097 (TOSHIBA) 611SNS-1065Z (TOKO)		Center frequency : 58.75 MHz Internal capacitor : — External capacitor : — Frequency adjustment range : ±4% Qu : 72 ± 20% Size : 5 mm × 5 mm
SIF	TRF-6010D (TOSHIBA) F292MCAS-3297IB (TOKO)		Center frequency : 4.5 MHz Internal capacitor : 100 pF External capacitor : — Frequency adjustment range : ±3% Qu : 20 ± 20% Size : 7 mm × 7 mm

APPLICATION CIRCUIT



OUTLINE DRAWING

SSOP24-P-300-1.00 Unit : mm



Weight : 0.32 g (Typ.)