INTEGRATED CIRCUIT

TECHNICAL DATA

TA7659P

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT

SILICON MONOLITHIC

PIF SUBSYSTEM FOR A TV RECEIVER

The TA7659P is a picture IF subsystem that provides 3-stage IF amplifier, Video detector and AFT detector for a TV receiver.

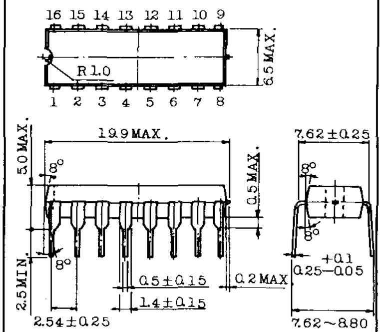
The TA7659P also provides internal AGC for the IF amplifier stages and delayed forward AGC for an external RF amplifier stage of the front-end.

The average type AGC or the keyed AGC can be selected by the external circuit configuration.

The average type AGC makes the TA7659P suitable for a SECAM PIF subsystem or a NTSC PIF subsystem of the TV sound multiplex receiver.

The TA7659P utilizes a 16 leads dual-in-line type plastic package.

Unit in mm



Lead pitch is 2.54 and tolerance is ±0.25 against theoretical center of each lead that is obtained on the basis of No.1 and No.16 leads.

JEDEC	—
TOSHIBA	5−22E

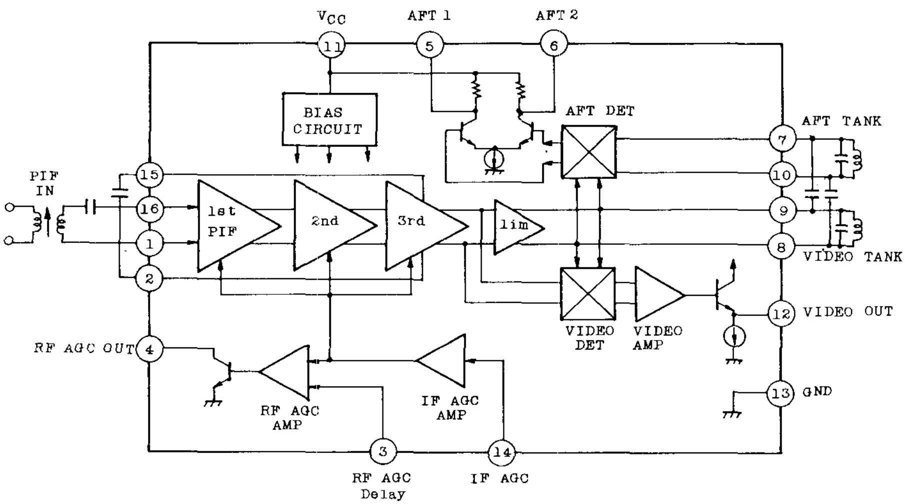
. High Sensitivity 3-stage IF Amplifier;
  58.75MHz 100μV_{rms} Typ.
. Gain Reduction with Excellent Stability;
  Reduction Range 65dB Typ.
. Video Detector with Linear Characteristics.
. 2 Types AGC Option; Keyed or Average Type.
. Delayed AGC for a Front-end.
. Balanced AFT Output.
. Minimal External Components and Adjustments Required.

MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	15	V
Breakdown Voltage	V_4	15	V
Video DC Output Current	I_{12}	6	mA
Power Dissipation (Note)	P_D	1.4	W
Storage Temperature	Tstg	-55 ~ 150	°C
Operating Temperature	Topr	-20 ~ 65	°C

Note: Derate linearly to 150°C at 11.2mW/°C.

BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS (Unless otherwise specified, V_{CC}=12V, Ta=25°C)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage		V_{CC},V_{11}	-	-	10.8	12.0	13.2	V
Supply Current		I_{CC},I_{11}	Fig.1	Note 1	42.0	51.0	63.0	mA
Video DC Output Voltage		V_{12}	Fig.1	Note 1	2.0	2.3	2.6	V
AFT DC Output Voltage		V_5	Fig.1	Note 1	5.3	6.8	8.3	V
		V_6			5.3	6.8	8.3	V
AFT Output Offset Voltage		V_5-V_6	Fig.1	Note 1	-1.5	0	1.5	V
RF AGC Residual Output Voltage		V_4 SAT	Fig.1	Note 2	-	-	0.5	V
RF AGC Leakage Current		I4 LEAK	Fig.1	Note 3	-	-	1.0	μA
Video Sensitivity		V_{IN}	Fig.2	Note 4	50	100	220	μV_{rms}
AGC Range		GR(IF)	Fig.2	Note 5	60.0	65.0	-	dB
AGC Threshold Level		$V_{AGC\ TH}$	Fig.2	Note 6	3.3	3.6	3.9	V
Video Frequency Respons		f_{BW}	Fig.2	Note 7	4.5	5.5	-	MHz
Suppression of Carrier		CL	Fig.4	Note 8	40.0	50.0	-	dB
Suppression	2nd Carrier	I 2nd	Fig.4	Note 9	40.0	45.0	-	dB
	920kHz Beat	I 920		Note 10	35.0	40.0	-	dB
Differential	Phase	DP	Fig.3	Note 11	-	3.5	6.0	Deg.
	Gain	DG		Note 12	-	7.0	10.0	%
Input Impedance		R_{in}	Fig.5	Note 13	2.0	3.0	4.0	kΩ
		C_{in}			-	3.0	10.0	pF
AFT Sensitivity		df/ d(V_5-V_6)	Fig.2	Note 14	-	16.0	-	kHz/2V
AFT Output Upper Voltage		V_5,V_6 U	Fig.2	Note 15	11.7	11.9	12.0	V
AFT Output Lower Voltage		V_5,V_6 L	Fig.2	Note 16	1.8	2.3	2.8	V
Maximum Available Current		I4 MAX.	Fig.1	Note 17	7.0	-	-	mA
Picture to Noise Ratio		P/N 50mV	Fig.2	Note 18	50	-	-	dB
		P/N 100mV		Note 19				
RF Delay*		RFD1	Fig.2	Note 20	10.6	-	-	V
		RFD2		Note 21	-	-	10.4	V

NOTES

Note 1 V_{CC}=12V, SW1=ON, SW2=ON, SW3=2, SW4=2 (V_{14}=5V)

Note 2 V_{CC}=12V, SW1=OFF, SW2=OFF, SW3=1, SW4=2 (V_{14}=3V)

Note 3 V_{CC}=12V, SW1=OFF, SW2=OFF, SW3=2, SW4=1 (V_{14}=5V)

Note 4 V_{CC}=12V, V_{AGC}(TP14 EXT. Applying Voltage)=3V
PIF IN: f=58.75MHz no modulation
Measure PIF IN so that the detected output of TP12A will be such that
(The detected DC output-V_{12}) equals 1V DC

Note 5 V_{CC}=12V, V_{AGC}=5V
Measure PIF IN' same as Note 4
GR=LOG(PIF IN'/PIF IN) × 20dB

Note 6 V_{CC}=12V
PIF IN; f=58.75MHz no modulation 15mV_{rms}
Measure DC level of TP14

Note 7 V_{CC}=12V, V_{AGC}=3.65V*
PIF IN; f(p)=58.75MHz no modulation SG1
f(s)=58.65MHz to 35MHz variable SG2
no modulation
Set output of SG1 so that the DC level of TP12A will be 4.0V*
Then set output of SG2 so that the AC level of TP12A will be 0.5V_{p-p}
Decreasing frequency of SG2 until the AC level of TP12A will be 0.35V_{p-p}
(-3dB of 0.5V_{p-p}) then read f_{SG2}=F, f_{BW}=58.75-F MHz

Note 8 V_{CC}=12V
PIF IN; f=58.75MHz, 1kHz, 80% AM modulation 100mV_{rms} SG1
SG2=OFF, SG3=OFF, ATT=0dB
Set V_{AGC} so that the output AC level of TP12A will be 2.7V_{p-p}
Measure CL of TP12A after setting to 0% AM of SG1

Note 9 Measure I_{2nd} of TP12A same as Note 8

Note 10 V_{CC}=12V, V_{AGC}=variable

PIF IN; f(p)=58.75MHz, 0% AM (100mV_{rms} SG1)

f(s)=54.25MHz, 0% AM (32mV_{rms} SG2-10dB of SG1)

f(c)=55.17MHz, 0% AM (32mV_{rms} SG3-10dB of SG1)

Set V_{AGC} so that the output tip level (upper) of TP12A will be 5V*

Measure the level difference (dB) between c-level and 920kHz level

Note 11 V_{CC}=12V, V_{AGC}=variable

PIF IN; f=58.75MHz Video signal (ramp) 87.5% AM 100mV_{p-p}

Set V_{AGC} so that the white level of TP12A will be 5V* DC

Measure DP

Note 12 Measure DG same as Note 11

Note 13 V_{CC}=12V, V_{AGC}=5V, f=58.75MHz

Measure Rin, Cin

Note 14 V_{CC}=12V

PIF IN; f=58.75MHz +/- 100kHz variable or sweep 0% AM 15mV_{rms}

Set the frequency of the SG so that V_5-V_6 will be -1V DC

Read the frequency of the SG f=f1

Then set the frequency of the SG so that V_5-V_6 will be +1V DC

Read the frequency of the SG f=f2

df/V_5-V_6=f1-f2 kHz/2V

Note 15 V_{CC}=12V

Note 16 PIF IN; f=59.75MHz 0% AM Measure V_{5L}, V_{6U}

f=57.75MHz 0% AM Measure V_{5U}, V_{6L}

Note 17 V_{CC}=12V, SW1=OFF, SW2=OFF, SW3=1, SW4=1 (V_{14}=3V)

Note 18 V_{CC}=12V, V_{AGC}=variable

PIF IN; f=58.75MHz, 50mV_{rms}

a) Adjust V_{AGC} so that the DC voltage of TP12A will be 5V*

b) Change ATT to -6dB

c) Measure RMS noise at TP12A Monitor with oscilloscope to detect interference

d) Calculate picture to noise ratio as

$$P/N = 20 \times LOG\left[\frac{(5-V12) \times 0.625}{\text{RMS Noise}}\right] \text{ dB}$$

Note 19 Same as Note 18 but PIF IN 15mV_{rms}

Note 20 V_{CC}=12V
PIF IN; f=58.75MHz, 20mV_{rms}
Rotate AGC pot so that the DC voltage of pin 3 will be maximum level
(V_{TP15} will increase and show the maximum value)

Note 21 PIF IN; f=58.75MHz, 100mV_{rms}
Rotate AGC pot so that the DC voltage of pin 3 will be minimum level
(V_{TP15} will decrease and show the minimum value)

* marked values are not fixed.

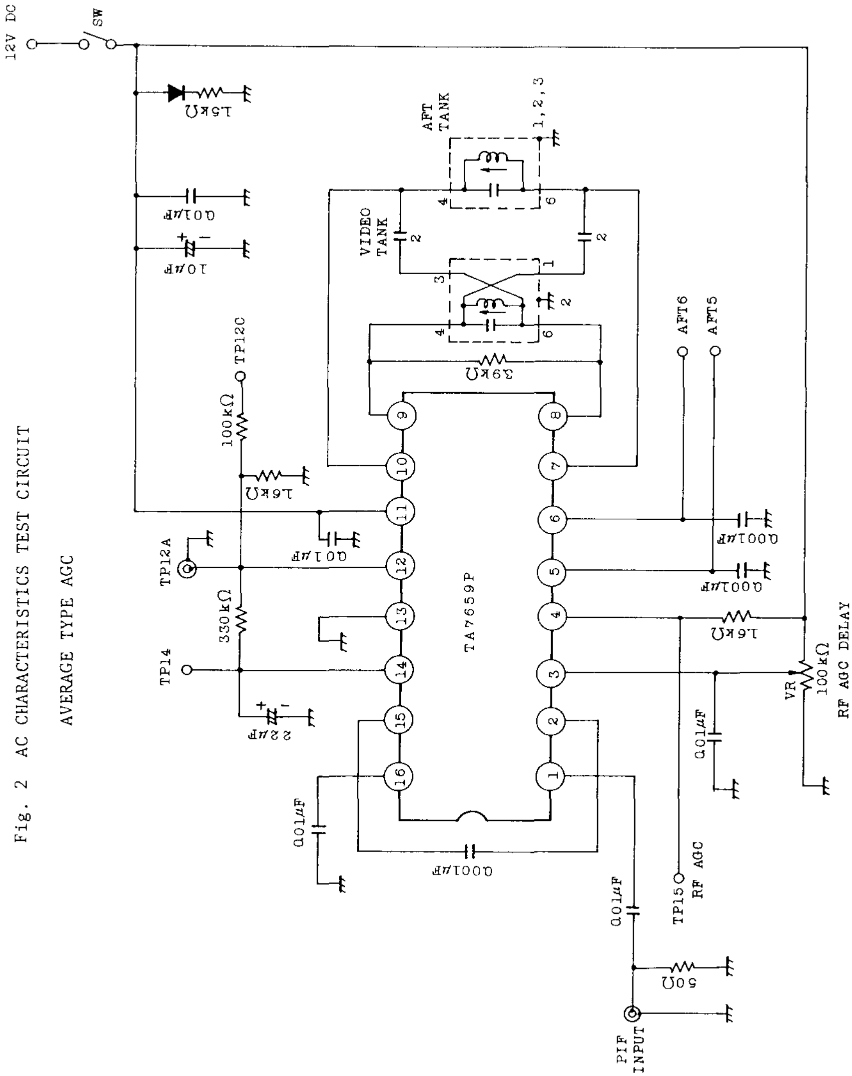


Fig. 2 AC CHARACTERISTICS TEST CIRCUIT

AVERAGE TYPE AGC

Fig. 1 DC CHARACTERISTICS TEST CIRCUIT

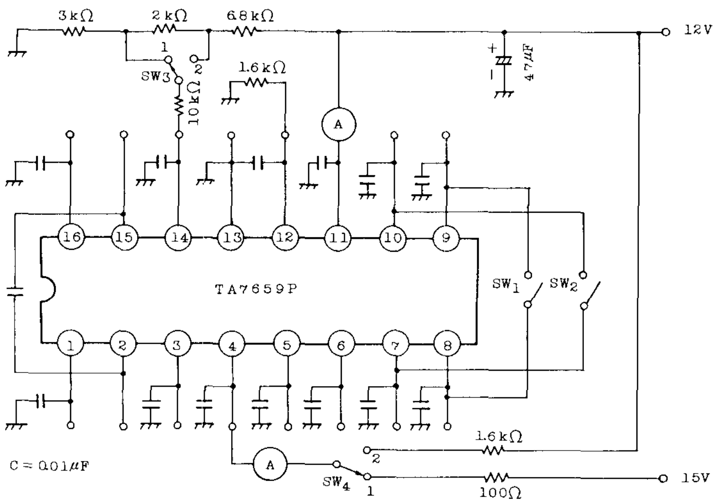
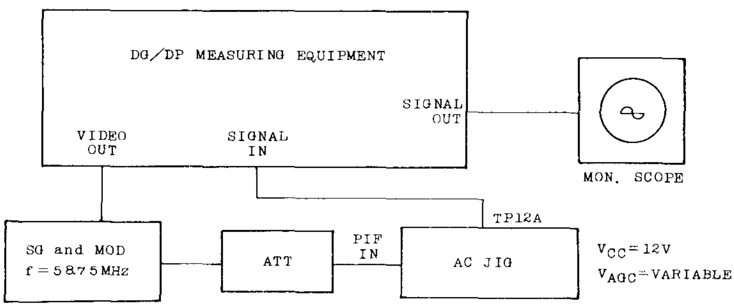


Fig. 3 DG/DP TEST CIRCUIT



APL=50%

ATT=Adjust PIF IN 100mV_{p-p}

V_{AGC}=Adjust White level of TP12A to DC 5V

Fig. 4 INTER MODULATION TEST CIRCUIT

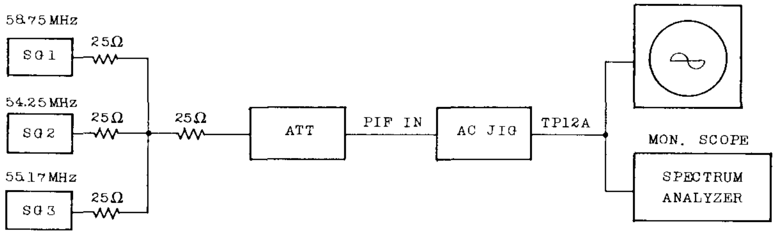


Fig. 5 INPUT IMPEDANCE TEST CIRCUIT