

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA8700AN

PIF / SIF IC FOR TV / VTR

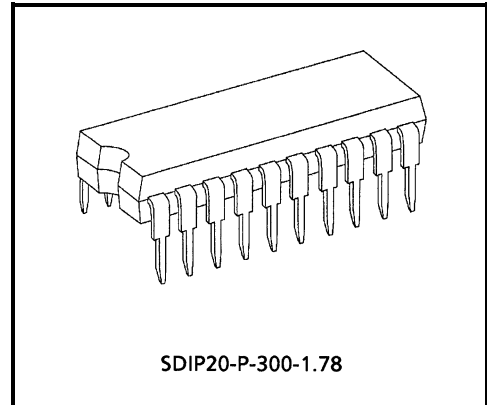
## FEATURES

### PIF section

- RF-Pre Amp. less by high input sensitivity
- 3-Stage IF amplifier with variable gain
- High-Speed response AGC with dual time constants
- Single end AFT output with defeat function
- Delayed RF AGC output (Reverse AGC)
- Output with white / black noise inverter
- Output without white / black noise inverter
- Video mute switch

### SIF section

- 3-stage limiter amplifier
- Quadrature-type detection circuit
- Use of a ceramic discriminator device makes the SIF circuit adjustment-free
- Sound mute switch



Weight: 1.02g (Typ.)

000707EBA1

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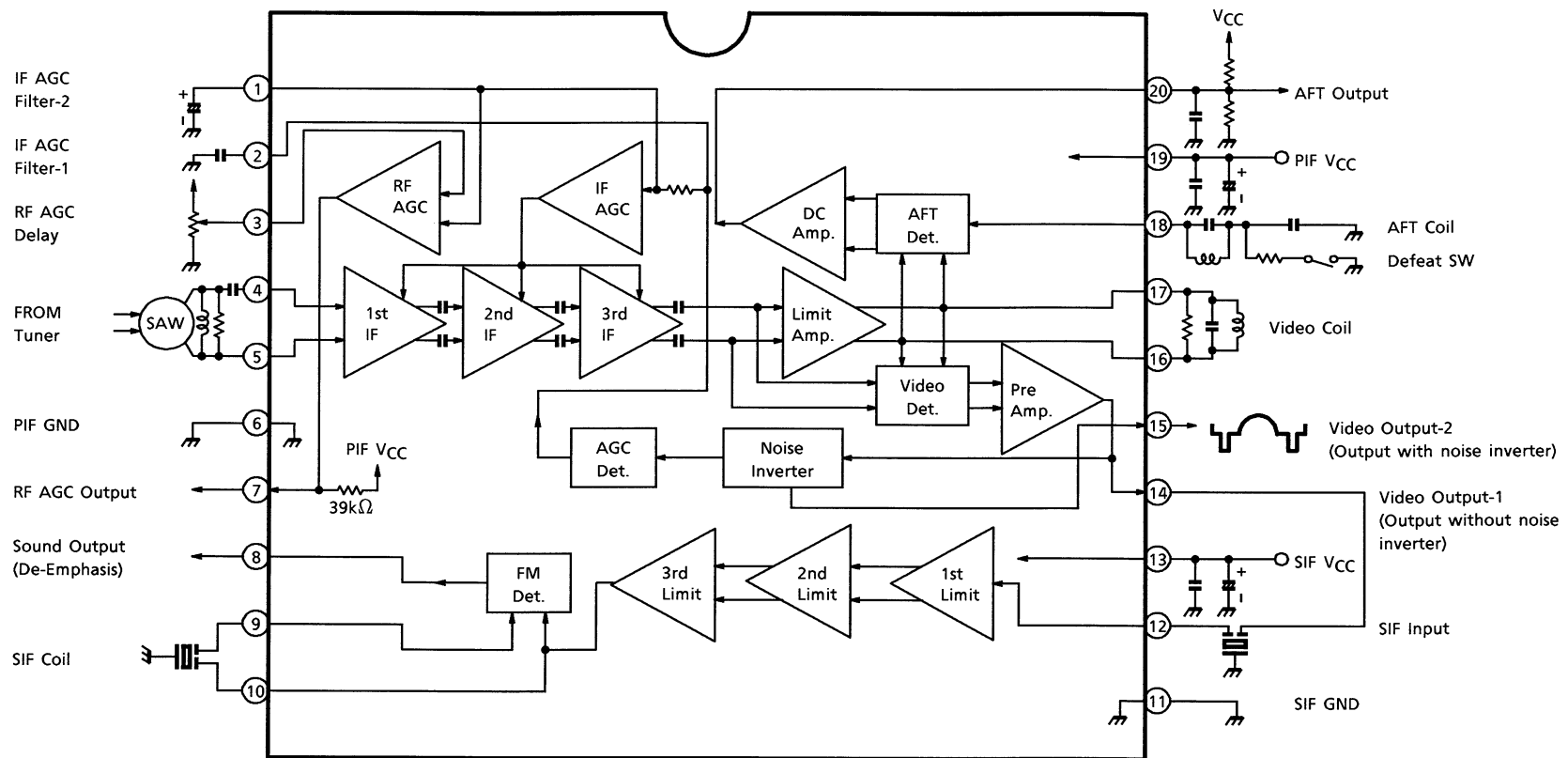
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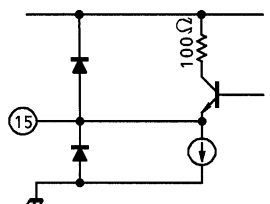
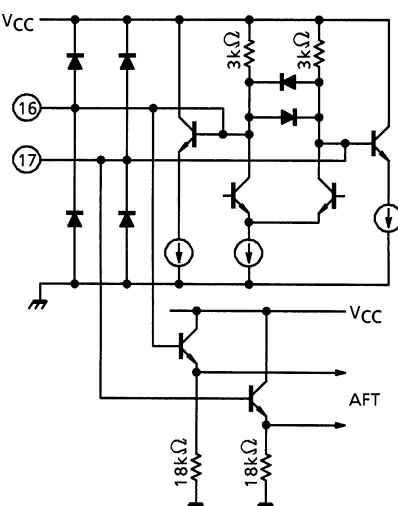
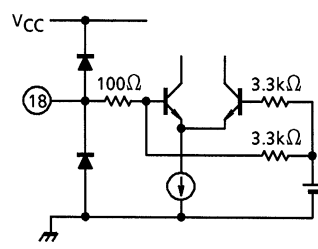
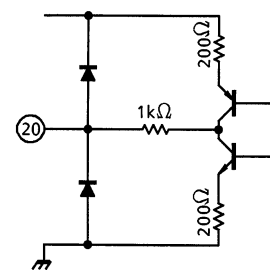
## BLOCK DIAGRAM



**TERMINAL FUNCTION**

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
1 2	AGC Filter	This filter is a dual time constant system to speed up AGC. By connecting the primary filter terminal of pin 2 to GND, the picture muting is executed.	
3	AGC Delay	This terminal adjusts the delay point of RF AGC by varying the reference voltage of comparator.	
4 5	PIF Input	This is an input terminal of PIF signal using an emitter follower. The input impedance is typical 2.5kΩ, 4pF.	
6	PIF GND	GND pin for the PIF amplifier. Connect a capacitor between pins 19 and 6.	—
7	RF AGC Output	Output pin for RF-AGC supplied to the tuner. (A 39kΩ resistor is connected internally between pin 7 and the internal power supply pin.)	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
8	FM Det Output (De-emphasis)	This is an output terminal of FM detector circuit. (Supply this signal to the de-emphasis circuit.)	
9 10	SIF Coil	This terminal connects FM detector Coil. Use of a ceramic discriminator device makes the SIF circuit adjustment-free. By connecting pin 9 to GND, the Audio muting is executed.	
11	SIF GND	GND pin for the SIF amplifier. Connect a capacitor between pins 13 and 11.	—
12	SIF Input	Limiter amplifier input terminal.	
13	SIF VCC	VCC pin for the SIF amplifier. Connect a capacitor between pins 11 and 13.	—
14	Video signal Output-1 (N.I. OFF)	This is an output terminal of Video output. By Connecting pin 2 to GND, a muting is executed. Output signal supplied to the sound IF (SIF) circuit. (Example for diversity antenna circuit.)	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
15	Video signal Output-2 (N.I. ON)	This is an output terminal of video output. By connecting pin 2 to GND, a muting is executed.	
16 17	Video Coil	This terminal connects video detector Coil.	
18	AFT Coil	Supply a control signal by single end. This method is that the phase difference is treated as current and voltage is converted by an external resistor. There-fore, this can be connected to AFT using only one pin. By connecting a resistor of 5.1kΩ to GND, an AFT defeat can be executed.	
19	PIF VCC	VCC pin for the PIF amplifier. Connect a capacitor between pins 6 and 19.	—
20	AFT Output	This is an output terminal of AFT.	

## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CC</sub>	15	V
Power Dissipation	P <sub>D</sub> (Note)	1.2	W
Operating Temperature	T <sub>opr</sub>	-20 ~ 65	°C
Storage Temperature	T <sub>stg</sub>	-55 ~ 150	°C

Note: When using the device at above Ta = 25°C, decrease the power dissipation by 9.6mW for each increase of 1°C.

## RECOMMENDED SUPPLY VOLTAGE

PIN No.	PIN NAME	MIN	TYP.	MAX	UNIT
13	PIF V <sub>CC</sub>	8.1	9.0	9.9	V
19	SIF V <sub>CC</sub>	8.1	9.0	9.9	V

## ELECTRICAL CHARACTERISTICS

### DC CHARACTERISTICS (Unless otherwise specified, V<sub>CC</sub> = 9V, Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Supply Current		I <sub>CC</sub>	1	—	28	38	48	mA
Terminal Voltage	Pin 3	V <sub>3</sub>	1	SW <sub>2</sub> : b	5.7	6.2	6.7	V
	Pin 4	V <sub>4</sub>		—	3.5	4.0	4.5	
	Pin 5	V <sub>5</sub>		—	3.5	4.0	4.5	
	Pin 7	V <sub>7(1)</sub>		SW <sub>1</sub> : a, SW <sub>2</sub> : c	8.8	—	—	
				SW <sub>1</sub> : b, SW <sub>2</sub> : a	—	—	0.5	
	Pin 8	V <sub>8</sub>		SW <sub>3</sub> : b	3.3	3.9	4.5	
	Pin 9	V <sub>9</sub>		SW <sub>3</sub> : a	2.2	2.7	3.2	
	Pin 10	V <sub>10</sub>		—	3.2	3.7	4.2	
	Pin 12	V <sub>12</sub>		—	2.5	3.0	3.5	
	Pin 14	V <sub>14</sub>		—	4.2	4.7	5.2	
	Pin 15	V <sub>15</sub>		—	4.2	4.7	5.2	
	Pin 16	V <sub>16</sub>		—	5.8	6.3	6.8	
	Pin 17	V <sub>17</sub>		—	5.8	6.3	6.8	
	Pin 18	V <sub>18</sub>		SW <sub>4</sub> : a	2.3	2.8	3.3	
Pin 20	V <sub>20</sub>	SW <sub>4</sub> : b	2.5	4.0	5.5			

## AC CHARACTERISTICS (Unless otherwise specified, $V_{CC} = 9V$ , $T_a = 25^\circ C$ )

### PIF section (When using the specified video coil)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Input Sensitivity	$V_{in}$ MIN	2	(Note 1)	36	41	46	$dB\mu V$
Maximum Input Level	$V_{in}$ MAX	2	(Note 2)	100	110	—	$dB\mu V$
IF AGC Range	$\Delta A$	2	—	50	62	—	dB
Differential Gain	DG	3	(Note 3)	—	—	8	%
Differential Phase	DP			—	—	6	°
No-signal Output Level	$V_{14}, V_{15}$	2	(Note 4)	4.0	4.6	5.2	V
Sync. Tip Level	$V_{SYNC}$	2	(Note 5)	2.0	2.3	2.6	V
Video Output Amplitude	$V_{OUT}$	2	(Note 6)	1.7	2.0	2.3	$V_{p-p}$
White Noise Inverter Level	$V_{WTH}$	2	(Note 7)	—	5.0	—	V
White Noise Clamp Level	$V_{WCL}$			—	3.8	—	
Black Noise Inverter Level	$V_{BTH}$			0.9	1.2	1.5	
Black Noise Clamp Level	$V_{BCL}$			3.2	3.5	3.8	
Carrier Wave Rejection Ratio	$C_L$	4	(Note 8)	40	—	—	dB
Harmonic Rejection Ratio	$I_{2nd}$	4	(Note 9)	40	—	—	dB
AFT Sensitivity	$\Delta F / \Delta V$	2	(Note 10)	—	20	30	kHz / V
AFT Output Voltage	Min.	$V_L$	2	—	0.1	0.5	V
	Max.	$V_U$					
Intermodulation	$I_{920}$	4	(Note 11)	30	38	—	dB

### SIF section (When using the specified SIF coil)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
FM Detector Output Level	$V_{OD}$	5	(Note 12)	350	550	750	$mV_{rms}$
Limiting Sensitivity	$V_{INLIM}$	5	(Note 13)	—	40	50	$dB\mu V$
AM Suppression Ratio	AMR	5	(Note 14)	40	—	—	dB
-3dB Bandwidth	$\pm \Delta f_G$	5	(Note 15)	60	80	—	kHz
Distortion Bandwidth	$\pm \Delta f_D$	5	(Note 16)	50	70	—	kHz

## TEST CONDITIONS

**Note 1: Input sensitivity**

PIF input (Pin 4) :  $f_0=58.75\text{MHz}$ ,  $f_m=15.75\text{kHz}$ , 30% AM,  $84\text{dB}\mu\text{V}$ .

Gradually reduce the input level. Measure the input level when the detection output at video output (Pin 15-a) will be  $-3\text{dB}$ .

**Note 2: Maximum input level**

PIF input (Pin 4) : Input same as Note 1.

Gradually raise the input level. Measure the input level when the detection output at video output (Pin 15-a) is at the noise inverter threshold.

**Note 3: Differential gain / Differential phase**

PIF input (Pin 4) :  $f_0=58.75\text{MHz}$ , Standard television signal (V / S=10 : 4 ramp waveform), 87.5% AM,  $84\text{dB}\mu\text{V}$ .  
IF AGC=Free.

Measure the differential gain and differential phase with a vector scope. (Pin 15-b)

**Note 4: No-signal output level**

PIF input (Pin 4) : No input. 2nd AGC terminal (Pin 1) : GND, Measure DC voltage at video output Pin 15-a).

**Note 5: Sync. Tip level**

PIF input (Pin 4) : Input same as Note 3. Measure Sync. Tip DC voltage at video output (Pin 15-b).

**Note 6: Video output amplitude**

PIF input (Pin 4) : Input same as Note 3. Measure amplitude level at video output (Pin 15-b).

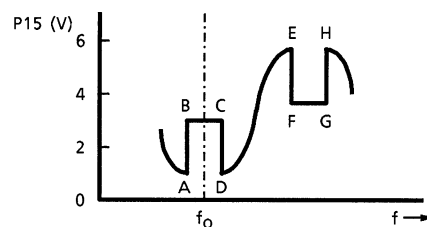
**Note 7: Noise inverter**

PIF input (Pin 4) :  $f_0=57\sim 65\text{MHz}$  (Sweep Signal),  $84\text{dB}\mu\text{V}$ .

Connect monitor scope to video output (Pin 15-b).

Measure the 2nd AGC terminal (Pin 1) voltage and fix the terminal to that voltage using the external power supply.

Then, 2nd AGC Voltage variable when a waveform like that in the accompanying diagram is output.



AD: Black noise inverter level.

BC: Black noise clamp level.

EH: White noise inverter level.

FG: White noise clamp level.



**Note 8: Carrier wave rejection ratio**

PIF input (Pin 4) :  $f_0=58.75\text{MHz}$ ,  $f_m=15.75\text{kHz}$ , 78% AM,  $84\text{dB}\mu\text{V}$ .

Add the voltage 2nd AGC terminal (Pin 1), So that the video output (Pin 15-b) can be  $2V_{p-p}$ . Calculate the following equation by setting the modulation off and measuring the output carrier level. ( $V_{no-mod}$ )

$$C_L = 20 \log \frac{2.0}{V_{no-mod} (V_{p-p})} \text{ [dB]}$$

**Note 9: Harmonic rejection ratio**

Measure as is Note 8, above, and calculate the secondary harmonic level (117.5MHz component) at video output (Pin 15-b).

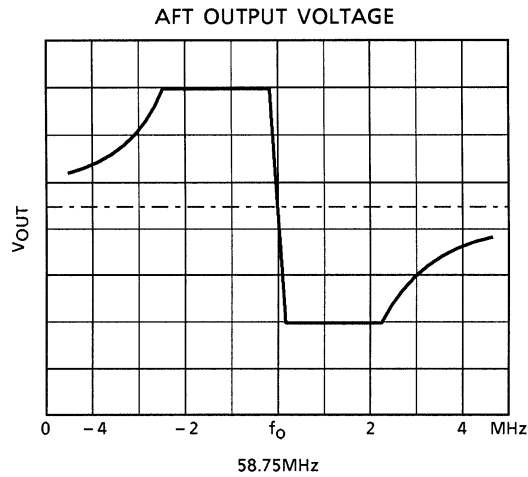
**Note 10: AFT sensitivity**

PIF input (Pin 4) :  $f_0=58.75\text{MHz}$ ,  $84\text{dB}\mu\text{V}$ , CW.

Input the above signal and adjust the AFT coil so that the AFT output pin (Pin 20) voltage is  $4.5\text{V}$ .

Measure the output voltage differential ( $\Delta V$ ) of the AFT output pin when the frequency is raised by  $20\text{kHz}$ . Then, calculate the ratio using the following formula.

$$\frac{\Delta f}{\Delta V} = \frac{20}{\Delta V} \text{ [kHz / V]}$$



Note 11: Intermodulation

PIF input (Pin 4) : Input the following composite signals to the PIF input.

- (1) SG1 : 58.75MHz (P) 84dB $\mu$ V
- (2) SG2 : 54.25MHz (S) 74dB $\mu$ V
- (3) SG3 : 55.17MHz (C) 74dB $\mu$ V

Monitor the video output (Pin 15-b) detection output waveform. Apply external voltage to the 2nd AGC terminal (Pin 1) so that the waveform's lowest level matches the sync. Tip level.

Using a spectrum analyzer, measure the difference between the level of the chroma signal component and 920kHz signal component.

Note 12: FM detection output level

SIF input (Pin 12) :  $f_o = 4.5\text{MHz}$ ,  $f_m = 400\text{Hz}$ , 25kHz / devi, 100dB $\mu$ V.

Measure the sound detection output of the sound output terminal (Pin 8).

Note 13: Limiting sensitivity

SIF input (Pin 12) : Input same as Note 12. Gradually reduce the input signal. Measure the input level when the sound detection output of the sound output terminal (Pin 8) will be -3dB.

Note 14: AM Suppression ratio

SIF input (Pin 12) :  $f_o = 4.5\text{MHz}$ , 84dB $\mu$ V.

Measure the sound detection output level of the sound output terminal (Pin 8) when the above signals are modulated as follows. Calculate The ratio.

- (1) AM modulation:  $f_m = 400\text{Hz}$ , 30%
- (2) FM modulation:  $f_m = 400\text{Hz}$ , 25kHz / devi

$$\text{AMR} = 20 \log \left[ \frac{\text{with FM modulation (mV}_{\text{rms}})}{\text{with AM modulation (mV}_{\text{rms}})} \right] \text{ [dB]}$$

Note 15: -3dB bandwidth

SIF input (Pin 12) :  $f_o=4.5\text{MHz}$ ,  $f_m=400\text{Hz}$ , 7.5kHz / devi, 100dB $\mu$ V.

- (1)  $f_{AFh}$ : Gradually raise the frequency. Measure the input frequency when the sound detection output of the sound output terminal will be -3dB.
- (2)  $f_{AFl}$ : Gradually lower the frequency. Measure the input frequency when the sound detection output of the sound output terminal will be -3dB.

$$\text{-3dB bandwidth} = (f_{AFh} - f_{AFl}) \text{ [kHz]}$$

Note 16: Distortion bandwidth (1.5%)

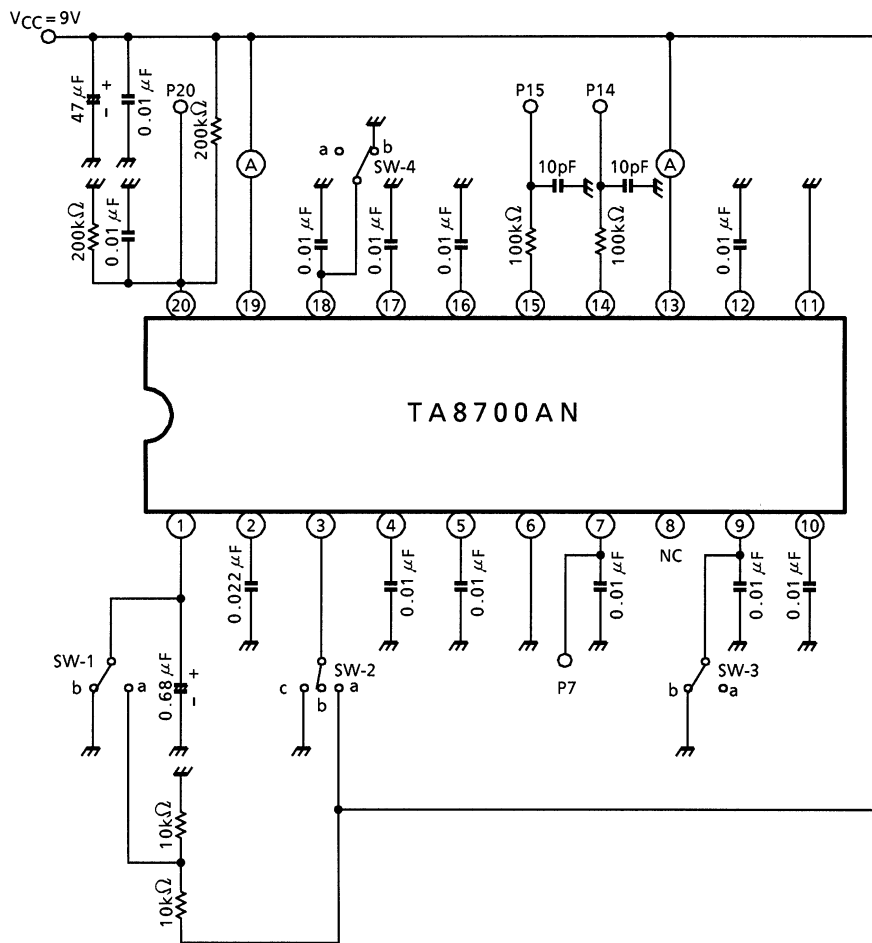
SIF input (Pin 12) : Input same as Note 15.

- (1)  $f_{DAFh}$ : Gradually raise the frequency. Measure the Input frequency when the sound distortion ratio of the sound output terminal will be 1.5%.
- (2)  $f_{DAFl}$ : Gradually lower the frequency. Measure the input frequency when the sound distortion ratio of the sound output terminal will be 1.5%.

$$\text{Distortion bandwidth} = (f_{DAFh} - f_{DAFl}) \text{ [kHz]}$$

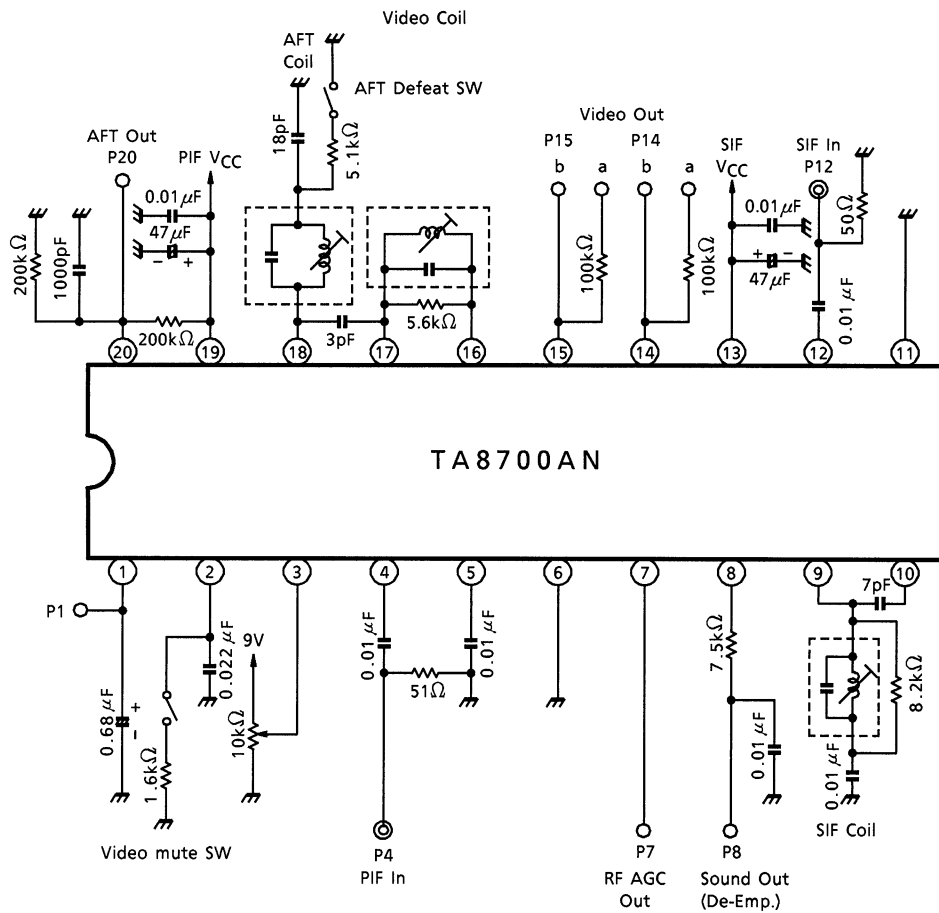
## TEST CIRCUIT 1

### DC characteristic



## TEST CIRCUIT 2

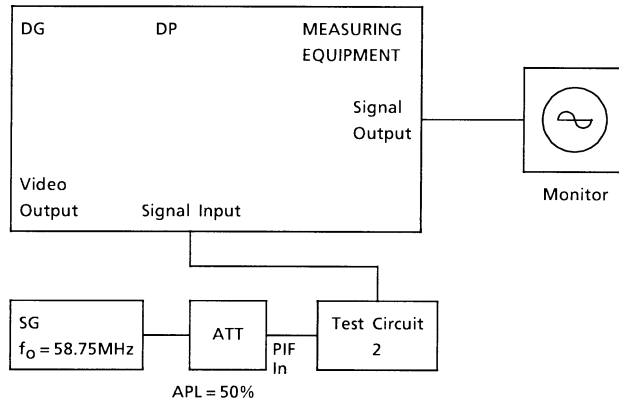
### AC characteristic



COIL	JAPAN	USA
VIDEO	292YCS-3390BS	T119KC-14969NK
AFT	292GCS-3388BS	T119KC-14969NK
SIF	F292MCAS-3297IB	F292MCAS-3297IB

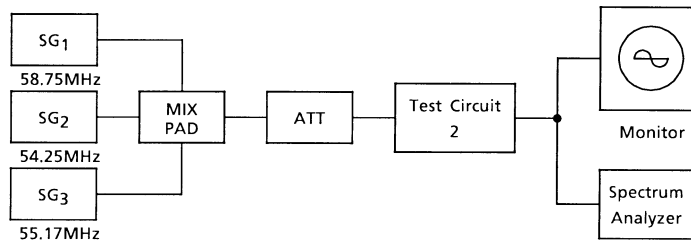
## TEST CIRCUIT 3

DG / DP



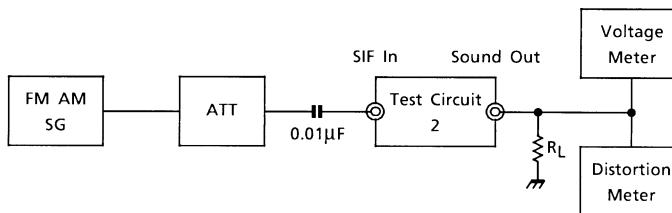
## TEST CIRCUIT 4

Carrier wave rejection ratio, harmonic rejection ratio and intermodulation

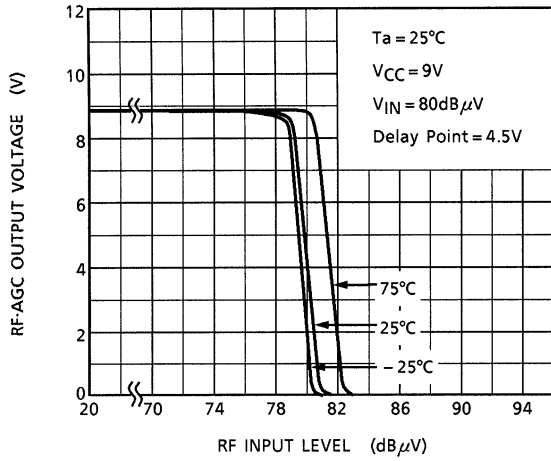


## TEST CIRCUIT 5g,

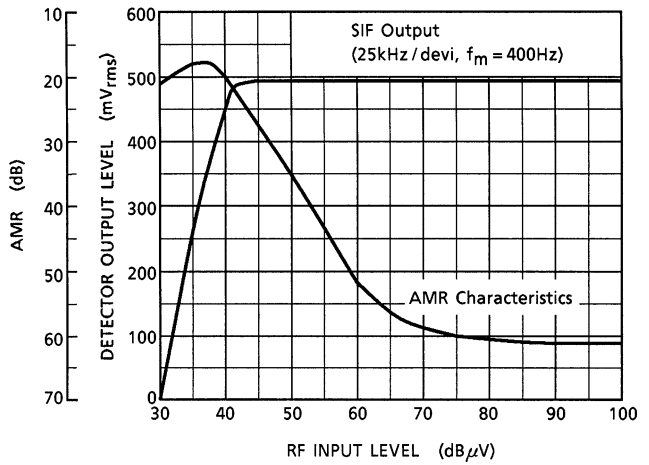
$V_{IN(LIM)}$ , AMR,  $V_{OD}$ ,  $\Delta f_G$ ,  $\Delta f_D$



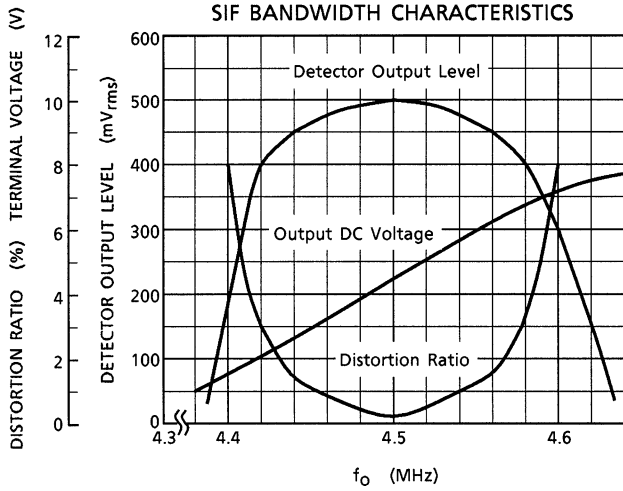
**RF-AGC DELAY POINT TEMPERATURE CHARACTERISTICS**



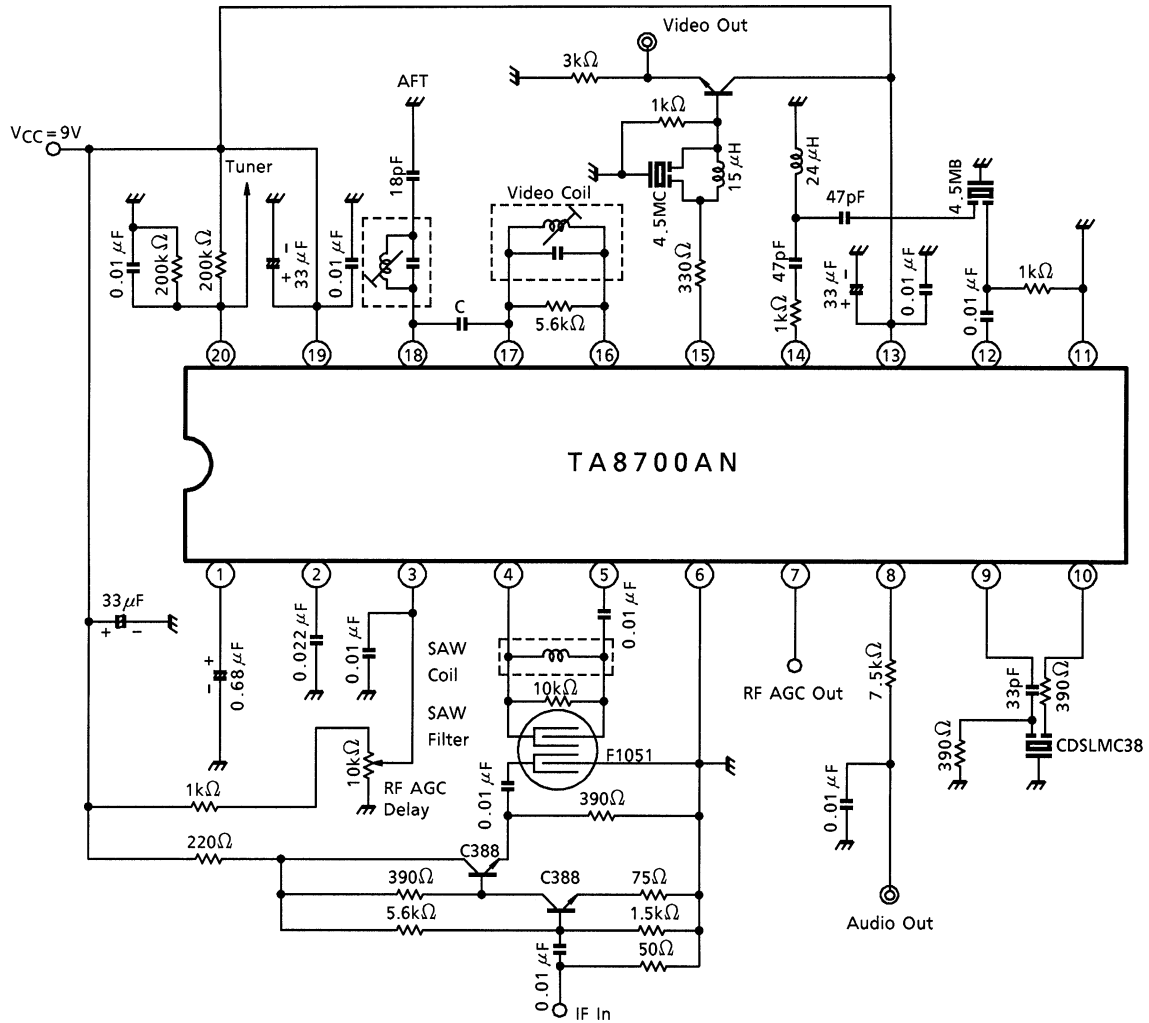
**SIF / AMR CHARACTERISTICS**



**SIF BANDWIDTH CHARACTERISTICS**



## APPLICATION CIRCUIT

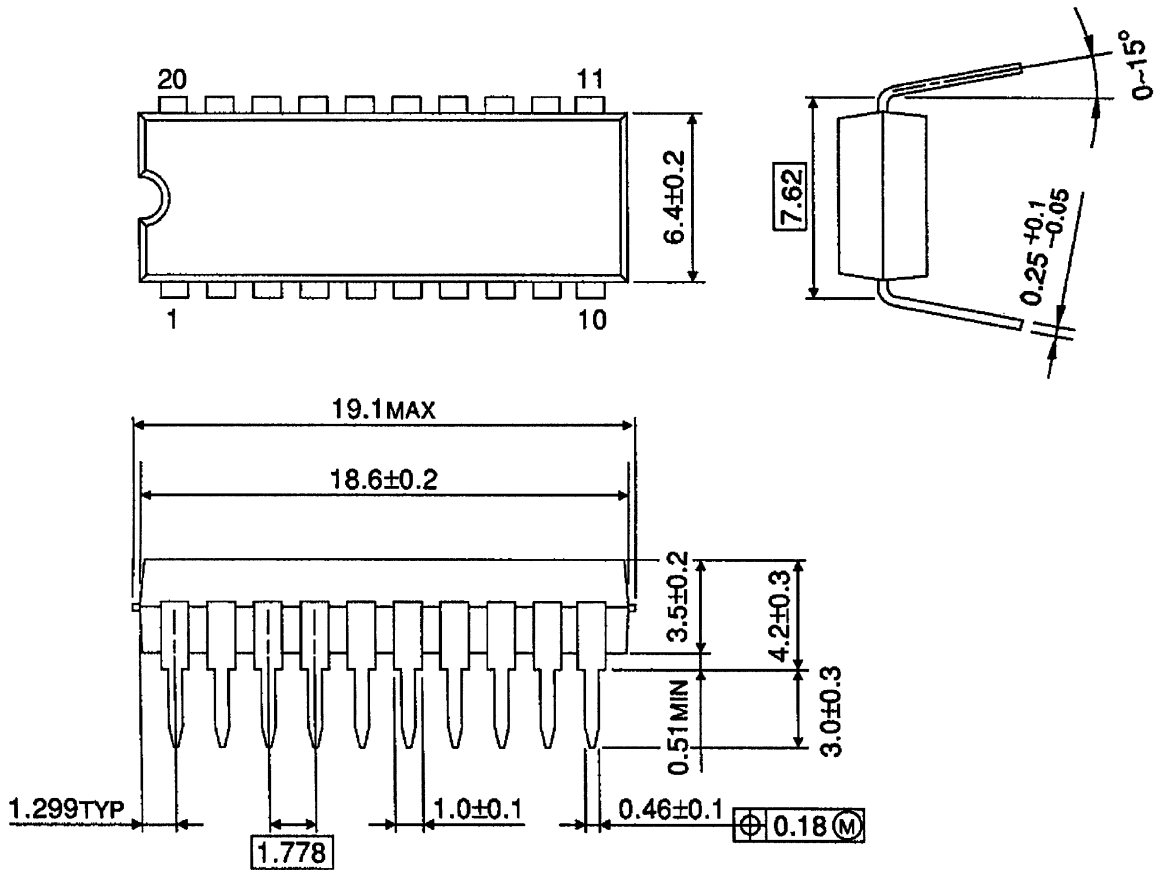


COIL	JAPAN	USA
VIDEO	292YCS-3390BS	T119KC-14969NK
AFT	292GCS-3388BS	T119KC-14969NK
SIF	F292MCAS-3297IB	F292MCAS-3297IB

## PACKAGE DIMENSIONS

SDIP20-P-300-1.78

Unit : mm



Weight: 1.02g (Typ.)