TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT   SILICON MONOLITHIC

TA8800N

PLL PIF / SIF IC FOR TV / VTR

The TA8800N is a PIF / SIF IC built in a complete synchronous detection function with PLL circuit.
The IC package has its size reduced by employment of shrink-type 24 pins, contributing to circuit board size reduction.
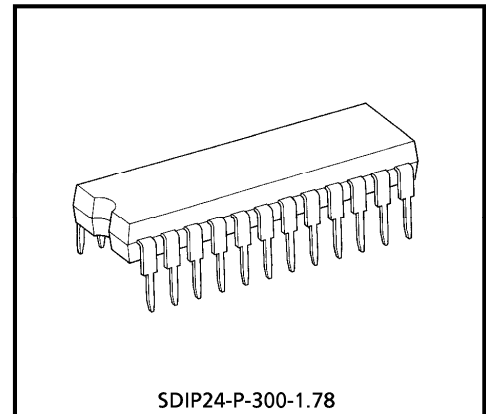
FEATURES
The PIF circuit has the following features :
● Complete synchronous detection function with PLL circuit
● 3-stage IF amplifier with variable gain
● Double time constant for AGC filter for faster AGC responses
● AGC of peak-detection type
● Single-polarity AFT Out voltage
● AFT defeat function provided
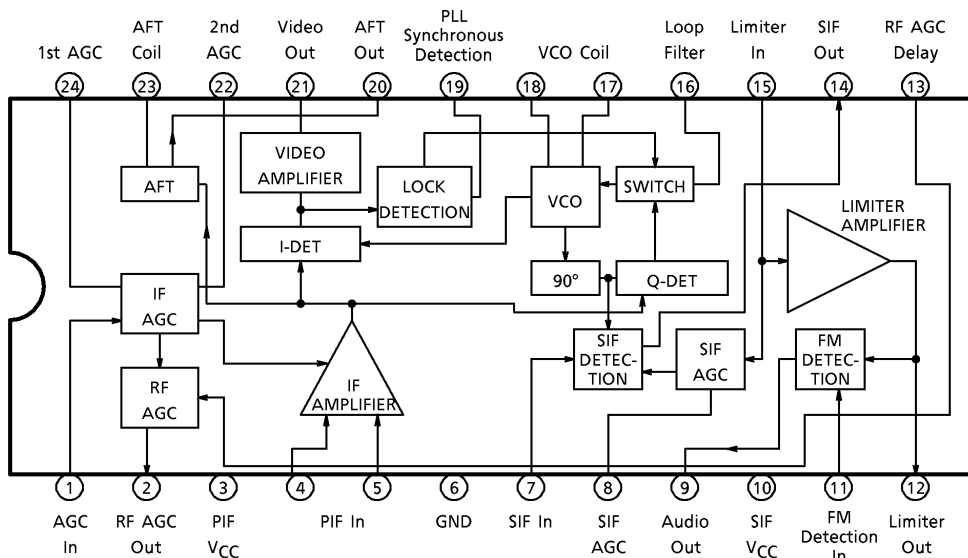● Reverse RF AGC supplied to tuner
The SIF circuit has the following features :
● IF amplifier with variable gain
● Quadrature-type detection circuit
● Use of a ceramic discriminator device makes the SIF circuit adjustment-free.

SDIP24-P-300-1.78

Weight : 1.22g (Typ.)

BLOCK DIAGRAM

980910EBA2

TERMINAL FUNCTION

PIN No.	PIN NAME	FUNCTION
1	AGC In	AGC input pin. Supply Video Out (pin 21) signal to this pin. This pin generates AGC voltage from the Video Out (pin 21) signal.
2	RF AGC Out	Tuner AGC voltage output pin. Connect this pin to the tuner.
13	RF AGC Delay	Tuner AGC voltage delay adjustment pin. To this pin, supply DC voltage for adjusting the AGC delay.

3	PIF V$_{CC}$	PIF circuit power supply pin. To this pin, supply external DC voltage (9V±10%). External signals could be mixed into the IC, causing various characteristics to be deteriorated. To prevent it, insert the following trap filters between the external power supply and this pin :
		   PIF carrier frequency trap filter
		   Horizontal scanning frequency (f$_H$) trap filter
		In the sample circuits shown in page 12 of this document, the trap filters have inductance 68μH.

4 5	PIF In 1 PIF In 2	Input pins for picture intermediate frequency amplifier. The amplifier input stage is a differential amplifier. The standard input signal level is 84dBμV.
6	SIF GND PIF GND	PIF circuit GND and SIF circuit GND pins.
7	SIF In	SIF circuit input pin. The standard input signal level is 75dBμV. The SIF circuit has an AGC range of approximately ±10dB.
8	SIF AGC	SIF circuit AGC filter pin. Insert a capacitor between this pin and GND.
9	Audio Out	Audio signal output pin. The standard output level is 1V$_{p-p}$. Supply this signal to the de-emphasis circuit. The de-emphasis circuit has the following time constant : 75μs for NTSC method, 50μs for PAL method

10	SIF V$_{CC}$	Audio detection circuit power supply pin. To this pin, supply external DC voltage (9V±10%). External signals could be mixed into the IC, causing various characteristics to be deteriorated. To prevent it, insert the following trap filters between the external power supply and this pin :
		   PIF carrier frequency trap filter
		   Horizontal scanning frequency (f$_H$) trap filter
		In the sample circuits shown in page 12 of this document, the trap filters have inductance 68μH.

PIN No.	PIN NAME	FUNCTION
11	FM Detection In	Generate a signal with the phase shifted 90 degrees necessary for FM detection (Audio detection) and supply it to this pin. Insert a capacitor between this pin and Limiter Out (pin 12) and also insert a resonator between this pin and GND. Thus, a phase difference of 90 degrees is generated between pin 12 and this pin. If a ceramic resonator is used, adjustment is not necessary when assembling the FM detection circuit (Audio detection circuit) (that is, it can made adjustment free). To demodulate multiplexed Audio signals, connect a resistor in parallel to the resonance circuit. It reduces Q of the resonance circuit and expands the frequency band. The Audio muting mode is set under the following conditions : DC voltage at pin $11 \leqq 0.3V$. In the Audio muting mode, the pin 12 DC voltage is $\approx 4.5V$.
12	Limiter Out	Amplitude limit circuit output pin. Insert a capacitor between this pin and FM Detection In pin (pin 11). In the Audio muting mode, the DC voltage of this pin is approximately 4.5V.
14	SIF Out	SIF detection output pin. Insert the following filters between this pin and Limiter In pin : 　　4.5MHz BPF for sampling SIF detection signals 　　f_H (horizontal scanning frequency) trap filter
15	Limiter In	Amplitude limiter input pin. The standard input level is $100dB\mu V$.
16	Loop Filter	PLL circuit loop filter pin. Insert a capacitor and resistor between this pin and GND. The resistance and capacitance determine the loop filter time constant.
17 18	VCO Coil 1 VCO Coil 2	VCO coil pins. Adjust the resonance frequency by changing the variable capacitor in the IC. The frequency adjusting range should be as follows : 　　When the resonance circuit has capacitor of 30pF and resonance frequency of 58.75MHz, the frequency should be adjusted to 2~3MHz.
19	PLL Synchronous Detection	PLL synchronous detection circuit filter pin. This is the pin of the filter used to detect the PIF detection output signal amplitude average. Insert a capacitor between this pin and GND.

PIN No.	PIN NAME	FUNCTION
20	AFT Out	AFT voltage output pin. The AFT voltage is output with a single polarity. When a resistor of 5.1kΩ is connected between the AFT Coil pin (pin 23) and GND, the AFT function is defeated.
21	Video Out	Pin for outputting video signal after PIF signal detection. The standard output level is $2V_{p-p}$.
22 24	2nd AGC 1st AGC	AGC circuit filter pins. Insert a resistor and capacitor between pin 22 and GND, and a capacitor between pin 24 and GND. This IC uses a peak-type AGC. The PIF circuit has a 3-stage amplifier.
23	AFT Coil	Pin for connecting the AFT coil. Insert an AFT coil, capacitor, AFT defeat switch, and resistor between this pin and GND. For AFT defeat, connect a 5.1kΩ resistor between this pin and GND.

TERMINAL INTERFACE CIRCUIT
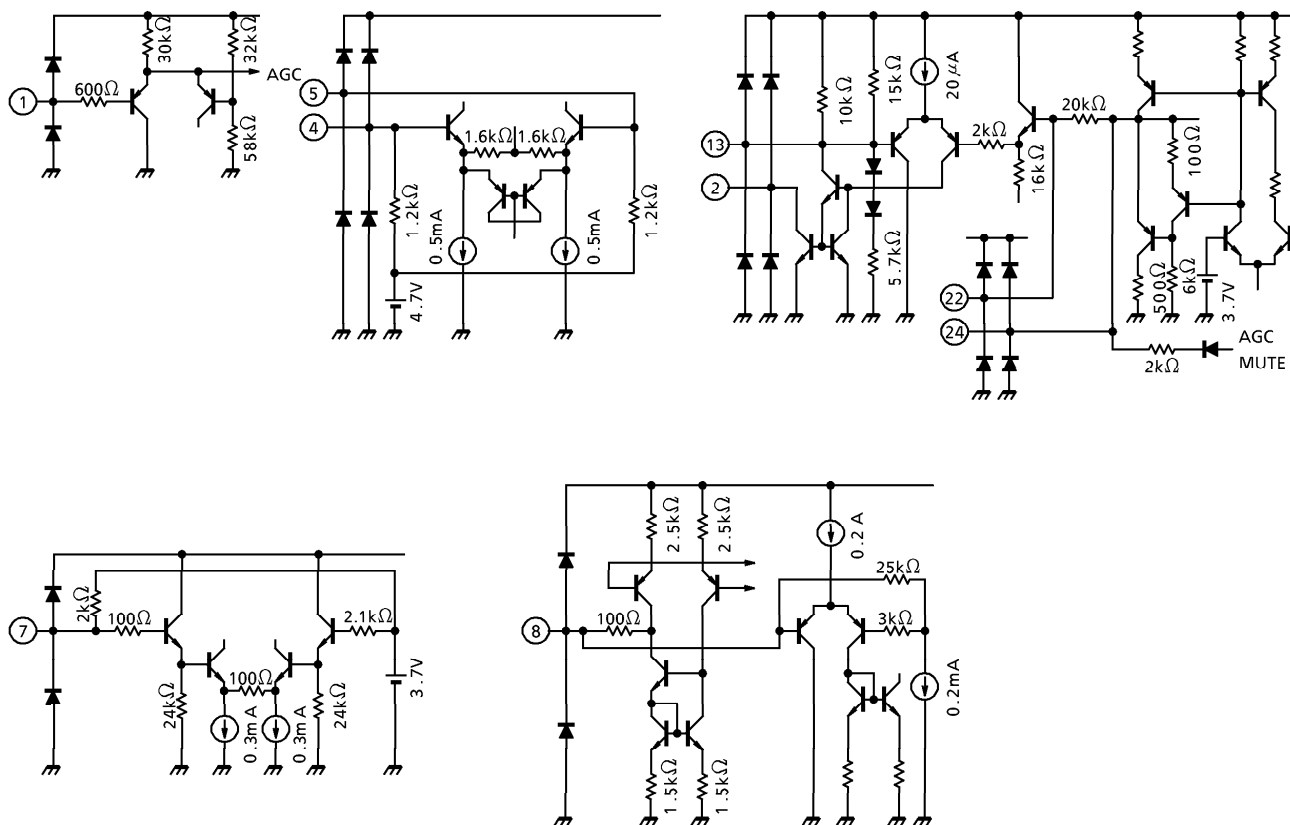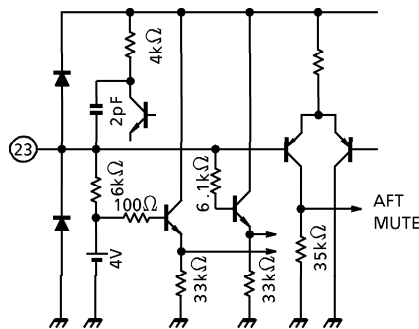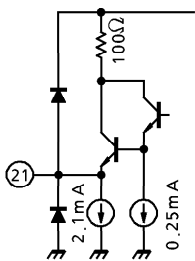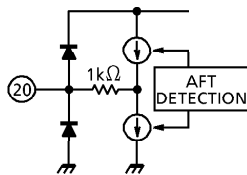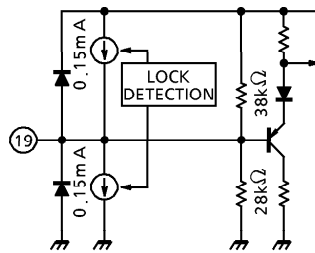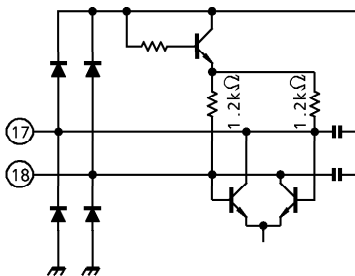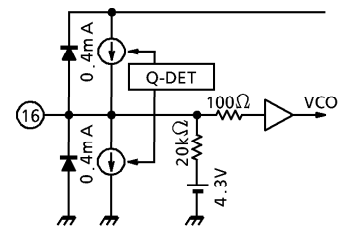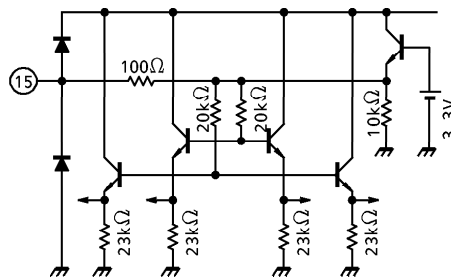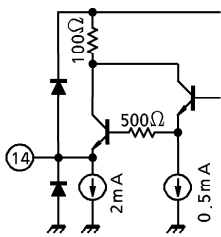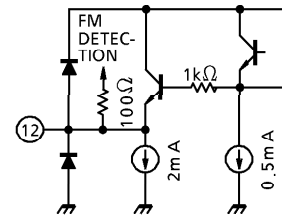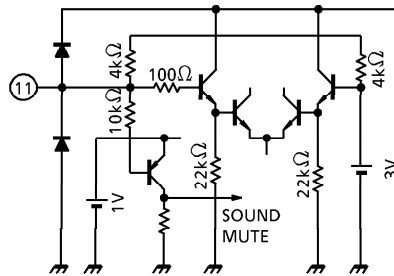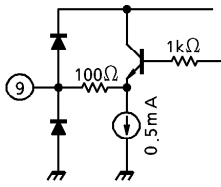
MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	15	V
Power Dissipation	P_D (Note)	1.4	W
Operating Temperature	T_{opr}	$-20 \sim 65$	°C
Storage Temperature	T_{stg}	$-55 \sim 150$	°C

(Note) When using the device at above Ta = 25°C, decrease the power dissipation by 11.2mW for each increase of 1°C.

RECOMMENDED SUPPLY VOLTAGE

PIN No.	PIN NAME	MIN.	TYP.	MAX.	UNIT
3	PIF V_{CC}	8.1	9.0	9.9	V
10	SIF V_{CC}				

ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS (Unless otherwise specified, V_{CC} = 9V, Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Power Current PIF	I_{PIF}	1	(Note)	11.5	23	34.5	mA
Power Current SIF	I_{SIF}			12.5	25	37.5	mA
Terminal Voltages	V_4	1	(Note)	4.3	4.6	4.9	V
	V_5			4.3	4.6	4.9	
	V_7			3.0	3.4	3.8	
	V_9			4.3	4.6	4.9	
	V_{14}			2.6	2.9	3.2	
	V_{15}			2.6	2.9	3.2	
	V_{16}			3.7	4.0	4.3	
	V_{21}			4.8	5.1	5.4	
	V_{23}			3.5	3.8	4.1	

(Note) PIF In : No input. Pins 8, 11, 22, and 24 : GND

AC CHARACTERISTICS (Unless otherwise specified, $V_{CC} = 9V$, Ta = 25°C, specified coil used)
PIF stage

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Sensitivity	$V_{in\ MIN}$	1	(Note 1)	—	42	45	$dB\mu V$
Maximum Input	$V_{in\ MAX}$	1	(Note 2)	100	106	—	$dB\mu V$
Differential Gain	D_G	1	(Note 3)	—	3.0	5.0	%
Differential Phase	D_P			—	1.5	3.0	°
No-Signal Level	V_{21}	1	(Note 4)	4.7	5.0	5.3	V
Sync. Tip Level	V_{SYNC}	1	(Note 5)	2.6	2.9	3.2	V
Picture Output	V_{OUT}	1	(Note 6)	1.7	2.0	2.3	V_{p-p}
Picture S / N Ratio	S / N	1	(Note 7)	50	53	—	dB
Carrier Suppression Ratio	C_L	1	(Note 8)	50	—	—	dB
Harmonic Suppression Ratio	I 2nd	1	(Note 9)	50	—	—	dB
Intermediate Modulation	I 920	1	(Note 10)	45	50	—	dB
Video Frequency Characteristics	f_c	1	(Note 11)	6	8	10	MHz

AGC stage

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
IF AGC Range	$R_{IF\ AGC}$	1	(Note 12)	58	64	68	dB
IF AGC Minimum Output	$V_{IF\ min}$	1	(Note 13)	—	—	3.7	V
IF AGC Maximum Output	$V_{IF\ max}$	1	(Note 14)	8.3	—	—	V
RF AGC Minimum Output	$V_{RF\ min}$	1	(Note 15)	—	—	0.5	V
RF AGC Maximum Output	$V_{RF\ max}$	1	(Note 16)	8.5	—	—	V

AFT stage

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
AFT Sensitivity	$\Delta F / \Delta V$	1	(Note 17)	—	20	25	kHz / V
AFT Center Voltage	V_{cent}	1	(Note 18)	2.5	4.5	6.5	V
AFT Minimum Output	V_L	1	(Note 19)	—	0.3	0.7	V
AFT Maximum Output	V_U	1	(Note 20)	8.3	8.6	—	V

VCO stage

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Pull-In Range 1 (H)	f_{pH1}	1	(Note 21)	—	500	—	kHz
Pull-In Range 1 (L)	f_{pL1}	1	(Note 22)	—	500	—	kHz
Pull-In Range 2 (H)	f_{pH2}	1	(Note 23)	500	750	—	kHz
Pull-In Range 2 (L)	f_{pL2}	1	(Note 24)	500	750	—	kHz
Hold Range (H)	f_{hH}	1	(Note 25)	—	800	—	kHz
Hold Range (L)	f_{hL}	1	(Note 26)	—	800	—	kHz
Control Sensitivity	β	1	(Note 27)	—	2.5	—	MHz / V

SIF stage

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
FM Detection Output	V_{OD}	1	(Note 28)	350	450	600	mV_{rms}
Input Sensitivity	V_{LIM}	1	(Note 29)	—	35	45	$dB\mu V$
AM Suppression Ratio	AMR	1	(Note 30)	45	55	—	dB
−3dB Band Width	$\pm\Delta f_G$	1	(Note 31)	±70	±110	—	kHz
S / N Ratio	S / N DET	1	(Note 32)	50	60	—	dB
Distortion Rate	kF AF	1	(Note 33)	—	0.3	1.0	%

COIL ADJUSTMENT

This section explains how to adjust the VCO, AFT, and SIF coils. Be sure to adjust these coils before measuring the IC characteristics.

1. Adjusting the VCO coil
   The PIF In pins (pin 4 and pin 5) in no-signal (no-input) state and connect the 2nd AGC pin (pin 22) to GND.
   Measure the Loop Filter (pin 16) DC voltage (V_A).
   Then, disconnect the 2nd AGC pin (pin 22) from GND and supply the following signal to the PIF In pins (pins 4 and 5) :
      Carrier frequency : f_O = 58.75MHz
      Signal amplitude = 90dBμV
   Now, measure the Loop Filter pin (pin 16) DC voltage V_B and adjust the VCO coil so that $V_A = V_B$.

2. Adjusting the AFT coil
   Supply the following signal to the PIF In pins (pins 4 and 5) :
      Carrier frequency : f_O = 58.75MHz
      Signal amplitude = 90dBμV
   Then, turn the AFT Defeat switch (connected to pin 23) to OFF (open) and measure the AFT Out pin (pin 23) DC voltage.
   While observing the DC voltage changes, adjust the AFT coil. Determine the area the DC voltage significantly changes and, within this range, further adjust the AFT coil until the following condition is met :
      AFT pin (pin 23) DC voltage = 4.5V

3. Adjusting the SIF coil

Supply the following signal to the limiter In pin (pin 15) :

Carrier frequency : $f_O = 4.5$MHz

Signal amplitude = 100dBμV

Then, turn the Audio muting switch (connected to pin 11) to OFF (open) and measure the Audio Out pin (pin 9) DC voltage.

While observing the DC voltage changes, adjust the SIF coil until the following condition is met :

Audio Out pin (pin 9) DC voltage = 4.5V

MEASUREMENT CONDITIONS

<PIF circuit>

(Note 1) Input sensitivity

As the PIF In signal, supply the following external signal to pins 4 and 5 :

Carrier frequency : $f_O = 58.75$ MHz

Modulation signal frequency : $f_m = 15.75$kHz

Amplitude modulation factor : 30%

Change the input signal amplitude (level of signals supplied to pins 4 and 5) and, when the Video Out (pin 21) signal amplitude = -3dB, measure the input signal amplitude. The reference value (0dB) is the pin 21 signal amplitude when input signal amplitude = 90dBμV.

(Note 2) Maximum input

As the PIF In signal, supply the following external signal to pins 4 and 5 :

Carrier frequency : $f_O = 58.75$MHz

Modulation signal frequency : $f_m = 15.75$kHz

Amplitude modulation factor : 30%

Change the input signal amplitude (level of signals supplied to pins 4 and 5) and, when the Video Out (pin 21) signal amplitude = $+0.5$dB, measure the input signal amplitude. The reference value (0dB) is the pin 21 signal amplitude when input signal amplitude = 90dBμV.

(Note 3) DG and DP

As the PIF In signal, supply the following external signal to pins 4 and 5 :

Carrier frequency : $f_O = 58.75$MHz

Modulation signal = TV standard signal (video amplitude : sync amplitude = 10 : 4), ramp waveform signal.

Amplitude modulation factor : 87.5%

Signal amplitude = 90dBμV

Measure DG and DP of the Video Out (pin 21) signal using a vector scope.

(Note 4) No-signal level

Measure the video Out (pin 21) DC voltage when pins 4 and 5 are in the no-signal state and the 2nd AGC pin (pin 22) voltage = 0V.

(Note 5)   Sync. Tip level
As the PIF In signal, supply the following external signal to pins 4 and 5 :
Carrier frequency : $f_O = 58.75$MHz
Modulation signal = TV standard signal (video amplitude : sync amplitude = 10 : 4), ramp waveform signal.
Amplitude modulation factor : 87.5%
Signal amplitude = 90dBμV
Measure the DC level at the video Out (pin 21) Sync. Tip level.

(Note 6)   Video output amplitude
As the PIF In signal, supply the following external signal to pins 4 and 5 :
Carrier frequency : $f_O = 58.75$MHz
Modulation signal = TV standard signal (video amplitude : sync amplitude = 10 : 4), ramp waveform signal.
Amplitude modulation factor : 87.5%
Signal amplitude = 90dBμV
Measure the video Out (pin 21) signal amplitude.

(Note 7)   Picture Signal S / N ratio
As the PIF In signal, supply the following external signal to pins 4 and 5 :
Carrier frequency : $f_O = 58.75$MHz
Modulation signal frequency : $f_m = 15.75$kHz
Amplitude modulation factor : 30%
Signal amplitude (input signal level) = 90dBμV
Measure the Video Out (pin 21) signal amplitude V_1 using an effective voltmeter. Then, change the modulation factor to 0% and measure the Video Out (pin 21) signal amplitude V_2. Assign V_1 and V_2 to the following formula to get the picture signal S / N ratio :
S / N ratio = 20ℓog $(6\ V_1 / V_2)$ [dB]

(Note 8)   Carrier suppression ratio
As the PIF In signal, supply the following external signal to pins 4 and 5 :
Carrier frequency : $f_O = 58.75$MHz
Modulation signal frequency : $f_m = 15.75$kHz
Amplitude modulation factor : 78%
Signal amplitude (input signal level) = 90dBμV
Monitor the Video Out (pin 21) signal with a spectrum analyzer and measure the 15.75kHz and 58.75MHz components. Assign these component values to the following formula to get the carrier suppression ratio :
Carrier suppression ratio = 20ℓog (15.75kHz component / 58.75MHz component)

(Note 9)   Harmonic suppression ratio

As the PIF In signal, supply the following external signal to pins 4 and 5 :

Carrier frequency : $f_O = 58.75MHz$
Modulation signal frequency : $f_m = 15.75kHz$
Amplitude modulation factor : 78%
Signal amplitude $= 90dB\mu V$

Monitor the Video Out (pin 21) signal with a spectrum analyzer and measure the 15.75kHz and the second harmonic ($58.75 \times 2 = 117.5MHz$) components. Assign these component values to the following formula to get the harmonic suppression ratio :

Harmonic suppression ratio $= 20\ell og$ (15.75kHz component / second harmonic component)

(Note 10) Intermediate modulation

As the PIF In signal, supply the mixture of the following signals to pins 4 and 5 :

SG1 (frequency $= 58.75MHz$ (P), signal amplitude $= 90dB\mu V$)
SG2 (frequency $= 54.25MHz$ (S), signal amplitude $= 80dB\mu V$)
SG3 (frequency $= 55.17MHz$ (C), signal amplitude $= 80dB\mu V$)

Then, supply external DC voltage to the 2nd AGC pin (pin 22). Monitor the Video Out (pin 21) signal waveform and adjust the DC voltage supplied to pin 22 so that the following condition is met :

Sine wave signal bottom level $=$ Sync. Tip DC voltage

Next, monitor the Video Out (pin 21) signal with a spectrum analyzer and measure the chrominance signal and 920kHz components. Calculate the intermediate modulation from the following :

Intermediate modulation $=$ chrominance signal component $-$ 920kHz signal component

(Note 11) Video frequency characteristics

As the PIF In signal, supply the following external signal to pins 4 and 5 :

Frequency : $f_O = 58.75MHz$, Sine wave
Signal amplitude $= 90dB\mu V$

Measure the 2nd AGC pin (pin 22) DC voltage.

Next, supply the same external voltage as this voltage to the 2nd AGC pin (pin 22) and clamp it. Then, as the PIF In signal, supply the mixture of the following signals to pins 4 and 5 :

SG1 (frequency $= 58.75MHz$ fixed, signal amplitude $= 90dB\mu V$)
SG2 (frequency $= 58.65$ to 45.00MHz sweeped, signal amplitude $= 70dB\mu V$)

Monitor the Video Out (pin 21) signal with a spectrum analyzer and measure the input signal frequency when the signal amplitude is $-3dB$ of the reference value. Calculate the difference between the input signal frequency measured and 58.75MHz.
The reference value (0dB) is the pin 21 signal amplitude when inputting 58.65MHz.

<AGC circuit>

(Note 12) IF AGC range

Assign the PIF circuit maximum input value and input sensitivity to the following formula to get the IF AGC range :

IF AGC range = maximum input value − input sensitivity [dB]

(Note 13) IF AGC min. output

As the PIF In signal, supply the following external signal to pins 4 and 5 :

Carrier frequency : f_O = 58.75MHz

Modulation signal frequency : f_m = 15.75kHz

Amplitude modulation factor : 30%

Signal amplitude = 110dBμV

Measure the 2nd AGC pin (pin 22) DC voltage.

(Note 14) IF AGC max. output

Place pins 4 and 5 in the no-signal state and measure the 2nd AGC pin (pin 22) DC voltage.

(Note 15) RF AGC min. output

As the PIF In signal, supply the following external signal to pins 4 and 5 :

Carrier frequency : f_O = 58.75MHz

Modulation signal frequency : f_m = 15.75kHz

Amplitude modulation factor : 30%

Signal amplitude = 110dBμV

Connect the RF AGC Delay pin (pin 13) to GND. Then, measure the RF AGC pin (pin 2) DC voltage.

(Note 16) RF AGC max. output

Place pins 4 and 5 in the no-signal state and connect the RF AGC Delay pin (pin 13) to V_{CC}. Then, measure the RF AGC pin (pin 2) DC voltage.

<AFT circuit>

(Note 17) AFT sensitivity

As the PIF In signal, supply the following external signal to pins 4 and 5 :

Frequency : $f_O = 58.75MHz$, Sine wave

Signal amplitude = 90dBμV

Adjust the AFT coil so that the following condition is met :

4.4V $\leqq$ AFT Out pin (pin 20) voltage $\leqq$ 4.6V

Then, measure the AFT Out pin (pin 20) voltage (V_1).

Change the frequency to the following value :

Sine wave signal frequency = 58.75MHz + 20kHz = 58.77MHz

Then, measure the AFT Out pin (pin 20) voltage (V_2).

Assign V_1 and V_2 to the following formula to get the AFT sensitivity :

AFT sensitivity = $(\Delta F / \Delta V)$ = $(58.77 - 58.75 = 20 / |V_1 - V_2|)$ [kHz]

(Note 18) AFT center voltage

Place pins 4 and 5 in the no-signal state and connect the 2nd AGC pin (pin 22) to GND.

Then, measure the AFT Out pin (pin 20) DC voltage.

(Note 19) AFT min. output

As the PIF In signal, supply the following external signal to pins 4 and 5 :

Frequency : $f_O = 58.75MHz + 50kHz = 59.25MHz$, Sine wave

Signal amplitude = 90dBμV

Measure the AFT Out pin (pin 20) voltage.

(Note 20) AFT max. output

As the PIF In signal, supply the following external signal to pins 4 and 5 :

Frequency : $f_O = 58.75MHz - 50kHz = 58.25MHz$, Sine wave

Signal amplitude = 90dBμV

Measure the AFT Out pin (pin 20) voltage.

(Note 21) VCO pull-in range 1 (H)

As the PIF In signal, supply the following external signal to pins 4 and 5 :

Carrier frequency : $f_O = 58.75MHz$

Modulation signal frequency : $f_m = 15.75kHz$

Amplitude modulation factor : 30%

Signal amplitude = 90dBμV

Supply external DC voltage to the PLL Synchronous Detection pin (pin 19) so that pin 19 voltage is 2V. Next, gradually decrease the carrier frequency from 62.00MHz to 58.75MHz. Measure the carrier frequency when the Video Out pin (pin 21) starts generating a horizontal blanking signal from the no-signal state.

Calculate the difference between this frequency and 58.75MHz.

(Note 22) VCO pull-in range 1 (L)

    As the PIF In signal, supply the following external signal to pins 4 and 5 :

      Carrier frequency : f_o = 58.75MHz

      Modulation signal frequency : f_m = 15.75kHz

      Amplitude modulation factor : 30%

      Signal amplitude (signal level) = 90dBμV

    Supply external DC voltage to the PLL Synchronous Detection pin (pin 19) so that pin 19 voltage is 2V. Next, gradually increase the carrier frequency from 55.00MHz to 58.75MHz. Measure the carrier frequency when the Video Out pin (pin 21) starts generating a horizontal blanking signal from the no-signal state.

    Calculate the difference between this frequency and 58.75MHz.

(Note 23) VCO pull-in range 2 (H)

    Same as Note 21 above, except the following :

    The PLL Synchronous Detection pin (pin 19) voltage should be 6V.

(Note 24) VCO pull-in range 2 (L)

    Same as Note 22 above, except the following :

    The PLL Synchronous Detection pin (pin 19) voltage should be 6V.

(Note 25) VCO hold range (H)

    As the PIF In signal, supply the following external signal to pins 4 and 5 :

      Carrier frequency : f_o = 58.75MHz

      Modulation signal frequency : f_m = 15.75kHz

      Amplitude modulation factor : 30%

      Signal amplitude = 90dBμV

    Gradually increase the carrier frequency from 58.75MHz. Measure the carrier frequency when the following changes start to occur :

      PLL unlocked

      The Video Out pin (pin 21) stops generating horizontal blanking signals.

      The Video Out pin (pin 21) starts generating beat signals.

    Calculate the difference between this frequency and 58.75MHz.

(Note 26) VCO hold range (L)

As the PIF In signal, supply the following external signal to pins 4 and 5 :

Carrier frequency : $f_O = 58.75$MHz

Modulation signal frequency : $f_m = 15.75$kHz

Amplitude modulation factor : 30%

Signal amplitude $= 90$dBμV

Gradually decrease the carrier frequency from 58.75 MHz. Measure the carrier frequency when the following changes start to occur :

PLL unlocked

The Video Out pin (pin 21) stops generating horizontal blanking signals.

The Video Out pin (pin 21) starts generating beat signals.

Calculate the difference between this frequency and 58.75MHz.

(Note 27) Control sensitivity

Place pins 4 and 5 in the no-signal state, supply external DC bias voltage to the Loop Filter pin (pin 16), connect the Loop Filter pin (pin 16) output to the spectrum analyzer, and then perform the following measurements :

Adjust the Loop Filter pin (pin 16) DC bias voltage so that the VCO oscillating frequency $= 58.75$MHz and measure the pin 16 voltage (V_1).

Set the pin 16 voltage to ($V_1 + 0.2$V) and measure the VCO frequency (F_1).

Set the pin 16 voltage to ($V_1 - 0.2$V) and measure the VCO frequency (F_2).

Assign F_1 and F_2 to the following formula to get the control sensitivity :

Control sensitivity $= (|F_1 - F_2| / 0.4)$ [MHz / V]

<SIF circuit>

(Note 28) FM detection

As an SIF In signal, supply the following external signal to the Limiter Input pin (pin 15) :

Carrier frequency : $f_O = 4.5$MHz

Modulation signal frequency : $f_m = 400$Hz

Modulation mode : FM (frequency modulation)

Frequency modulation factor : 25kHz / devi

Signal amplitude : 100dBμV

Measure the amplitude of the signal output from the Audio Out (pin 9).

(Note 29) Limiting sensitivity

As an SIF In signal, supply the following external signal to the Limiter Input pin (pin 15) :

Carrier frequency : $f_O = 4.5MHz$

Modulation signal frequency : $f_m = 400Hz$

Modulation mode : FM (frequency modulation)

Frequency modulation factor : 25kHz / devi

Signal amplitude : 100dBμV

Change the signal amplitude so that the Audio Out (pin 9) signal amplitude = −3dB. Measure the signal amplitude. The reference value (0dB) is the Audio Out (pin 9) signal amplitude when the signal amplitude is 100dBμV.

(Note 30) AM suppression ratio

As an SIF In signal, supply the external signal to the Limiter In pin (pin 15) :

Carrier frequency : $f_O = 4.5MHz$

Modulation signal frequency : $f_m = 400Hz$

Modulation mode : FM (frequency modulation)

Frequency modulation factor : 25kHz / devi

Signal amplitude = 100dBμV

Measure the signal amplitude root mean square value V_1 of the signal output from the Audio Out (pin 9).

Then, supply the external signal to the Limiter In pin (pin 15) :

Carrier frequency : $f_O = 4.5MHz$

Modulation signal frequency : $f_m = 400Hz$

Modulation mode : AM (amplitude modulation)

Amplitude modulation factor : 30%

Signal amplitude = 100dBμV

Measure the signal amplitude root mean square value V_2 of the signal output from the Audio Out (pin 9).

Assign V_1 and V_2 to the following formula to get the AM suppression ratio (AMR) :

$AMR = 20\log (V_1 / V_2)$ [dB]

(Note 31) − 3dB band width
      As an SIF In signal, supply the following external signal to the Limiter In pin (pin 15) :
          Carrier frequency : $f_0 = 4.5MHz$
          Modulation signal frequency : $f_m = 400Hz$
          Modulation mode : FM (frequency modulation)
          Frequency modulation factor : 25kHz / devi
          Signal amplitude = 100dBμV
      Measure the amplitude of the signal output from the Audio Out pin (pin 9). Using this value
      as the reference (0dB), perform the following measurements :
          Gradually increase the carrier frequency from the initial value (4.5MHz) so that the Audio
          Out (pin 9) signal amplitude = − 3dB. Measure the current carrier frequency FAFh.
          Next, gradually decrease the carrier frequency from the initial value (4.5MHz) so that the
          Audio Out (pin 9) signal amplitude = − 3dB. Measure the current carrier frequency FAFl.
      Assign FAFh and FAFl to the following formula to get the − 3dB band width :
          − 3dB band width = FAFh − FAFl [kHz]

(Note 32) Audio S / N ratio
      As an SIF In signal, supply the following external signal to the Limiter In pin (pin 15) :
          Carrier frequency : $f_0 = 4.5MHz$
          Modulation signal frequency : $f_m = 400Hz$
          Modulation mode : FM (frequency modulation)
          Frequency modulation factor : 25kHz / devi
          Signal amplitude = 100dBμV
      When the FM factor is 25kHz / devi, measure the amplitude root mean square value (V_1) of
      the signal output from the Voice Out pin (pin 9). Next, when the FM factor is 0 (no
      modulation), measure the amplitude root mean square value (V_2). Assign V_1 and V_2 to the
      following formula to get the Audio S / N ratio :
          Audio S / N ratio = $20\log (V_1 / V_2)$ [dB]

(Note 33) Distortion rate
      As an SIF In signal, supply the following external signal to the Limiter In pin (pin 15) :
          Carrier frequency : $f_0 = 4.5MHz$
          Modulation signal frequency : $f_m = 400Hz$
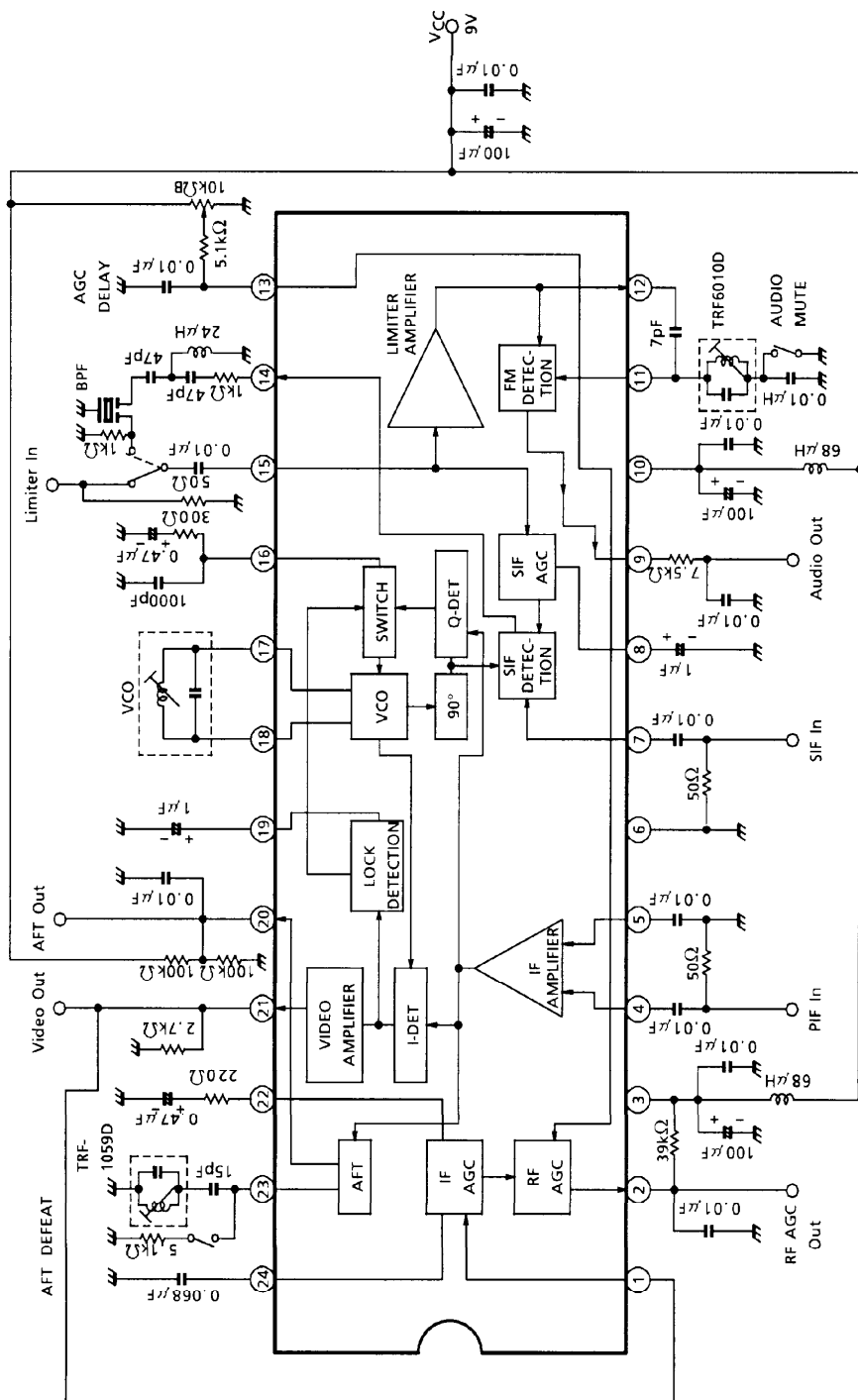   Modulation mode : FM (frequency modulation)
          Frequency modulation factor : 25kHz / devi
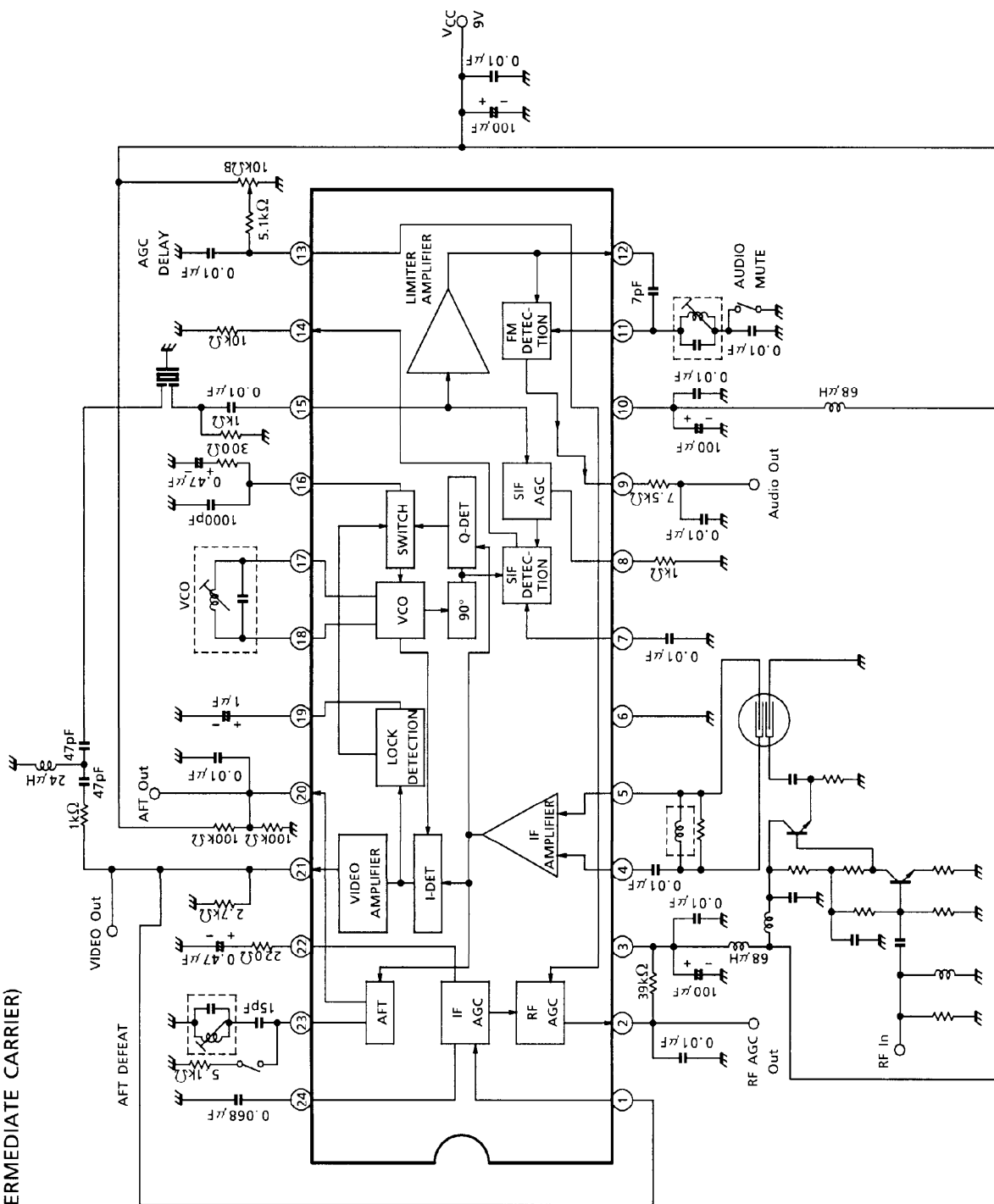   Signal amplitude = 100dBμV
      Measure the distortion rate of the signal output from the Audio Out pin (pin 9).
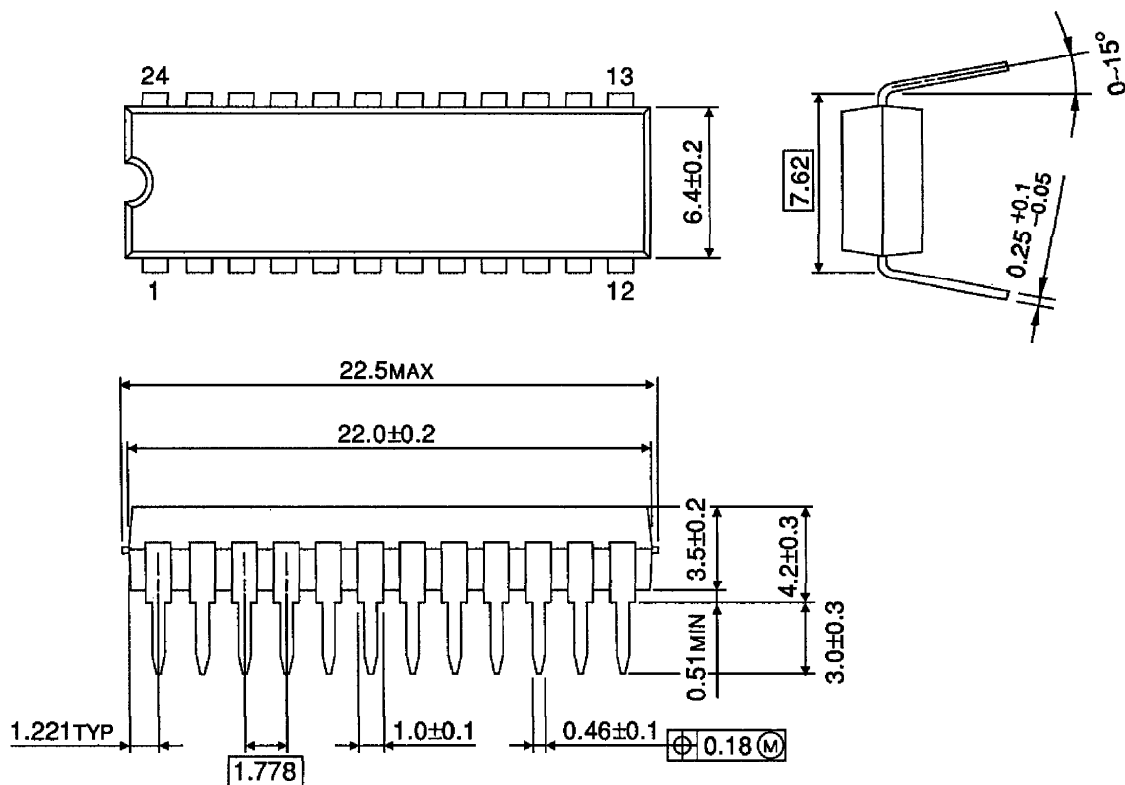
TEST CIRCUIT 1

DC/AC CHARACTERISTICS

APPLICATION CIRCUIT 1

(SPLIT CARRIER)

APPLICATION CIRCUIT 2
(INTERMEDIATE CARRIER)

TA8800N—20

OUTLINE DRAWING

SDIP24-P-300-1.78

Unit : mm

24   13

6.4±0.2

1   12

0~15°

7.62

0.25 +0.1 -0.05

22.5MAX

22.0±0.2

3.5±0.2

4.2±0.3

0.51MIN

3.0±0.3

1.221TYP

1.778

1.0±0.1

0.46±0.1

⊕ 0.18 Ⓜ

Weight : 1.22g (Typ.)