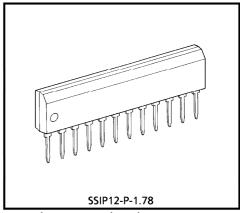
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# **TA8703S**

## **QUASI-SIF SYSTEM FOR TV**

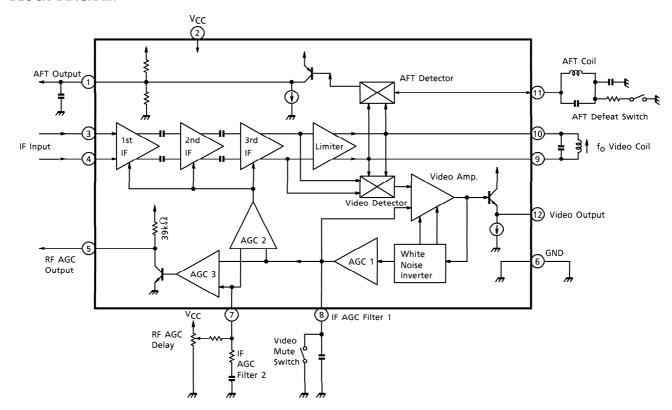
#### **FEATURES**

- QUASI-SIF IC for TV
- 3-stage, gain-controlled intermediate frequency (IF) amplifier
  - The IF amplifier has three stages. Automatic gain control (AGC) is used to control this 3-stage amplifier circuit.
- Doubled time constant for accelerated AGC response AGC is peak value type.
- AFT voltage is output single-polarity with a defeat function
- RF-AGC supplied to the tuner is reverse type.
- White noise inverter circuit.



Weight: 0.71g (Typ.)

#### **BLOCK DIAGRAM**



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## **TERMINAL FUNCTION**

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
1	AFT Output	AFT signal output.	100kΩ © 100kΩ 200Ω 200Ω
2	IF V <sub>CC</sub>	IF circuit power supply. Connect a capacitor between pins 2 and 6.	_
3 4	IF Input	IF amplifier input. The first stage of the IF amplifier is an emitter follower circuit, so input impedance is high. The input impedance value is $R=2.5k\Omega$ (typ.) and $C=4pF$ (typ.).	6kΩ 4kΩ 4kΩ 4kΩ
5	RF AGC Output	Output pin for AGC (RF-AGC) supplied to the tuner. A $39k\Omega$ resistor is connected internally between pin 5 and the internal power supply terminal.	S AGC Delay
6	PIF GND	GND terminal for the IF amplifier. Connect a capacitor between pins 2 and 6.	_

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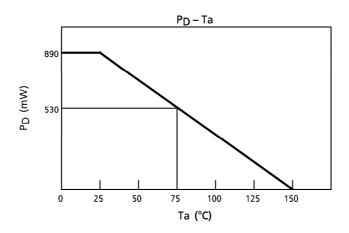
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
7 8	AGC Filter	Terminal used to connect a CR filter for AGC. To accelerate AGC response, the CR filter time constant is doubled. Connecting these terminals to GND considerably reduces the amplitude of the video output signal (pin 12 output signal). (Video mute is applied.)	VCC  3kΩ  F Amp.  AGC  Detector
9	Video Coil	Connects video signal detector coil.	AFT AFT ASSUMENT OF THE PROPERTY OF THE PROPER
11	AFT Coil	Connects the AFT coil. When control current is supplied to pin 11 for the AFT coil, the amount of current varies in response to small differences between the frequency of the control signal and that of the coil resonant. The current is supplied to the resistor and the amount of current is converted to the amount of voltage. The external circuit configuration is simple. Just connect the AFT coil to the terminal. Connecting a resistor of $5.1k\Omega$ between pin 11 and the GND terminal switches to AFT defeat mode (defeats the AFT function).	V <sub>CC</sub> 3.3kΩ 3.3kΩ

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT			
12	Video Signal Output Pin	Output signal supplied to the sound IF (SIF) circuit.				

## **MAXIMUM RATINGS** (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	Vcc	15	V
Power Dissipation	P <sub>D</sub> (Note)	890	mW
Operating Temperature	T <sub>opr</sub>	<b>- 25∼75</b>	°C
Storage Temperature	T <sub>stg</sub>	<b>- 55∼150</b>	°C

(Note) When using the device at above  $Ta = 25^{\circ}C$ , decrease the power dissipation by 7.12mW for each increase of 1°C.



## RECOMMENDED SUPPLY VOLTAGE

PIN No.	PIN NAME	MIN.	TYP.	MAX.	UNIT
2	Vcc	8.1	9.0	9.9	V

## **ELECTRICAL CHARACTERISTICS**

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

CHARACTERISTIC		SYMBOL	TEST CIR- CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current		lcc	1	_	18	28	38	mA
	Pin 1	V <sub>1</sub>		_	3.3	4.4	5.5	
	Pin 3	V <sub>3</sub>		_	3.6	4.0	4.4	
	Pin 4	V <sub>4</sub>		<b>—</b> 3.6		4.0	4.4	
Terminal Voltage	Pin 5	V <sub>5 (1)</sub>		SW: A	8.8	_	_	
		V <sub>5</sub> (2)	1	SW : B	_	_	0.1	
	Pin 9	V <sub>9</sub>		_	5.6	6.2	6.8	
	Pin 10	V <sub>10</sub>	]	_	5.6	6.2	6.8	
	Pin 11	V <sub>11</sub>		_	2.5	3.0	3.5	
	Pin 12	V <sub>12</sub>	1	<del>-</del>	4.0	4.5	5.0	

# AC CHARACTERISTICS (unless otherwise specified, $V_{CC} = 9V$ , Ta = 25°C, with specified coil)

CHARACTERISTIC		TEST CIR- CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
	V <sub>IN</sub> MIN	2	(Note 1)	30	35	40	$dB\muV$
je	V <sub>IN</sub> MAX	2	_	90	95	_	$dB\muV$
	ΔA	2	(Note 2)	50	60	_	dB
	DG	2	(1) ( 2)	_	_	20	%
	DP	3	(Note 3)	_	_	5	٥
	V <sub>12</sub>	2	(Note 4)	4.0	4.5	5.5	V
	VSYNC	2	(Note 5)	2.15	2.35	2.55	V
e		2	(Note 6)	1.35	1.65	1.95	V <sub>p-p</sub>
evel			(Note 7)	_	5.2	_	V
/el				_	3.5	_	
	CL	4	(Note 8)	40	_	_	dB
Harmonic Rejection Ratio		4	(Note 9)	40	_	_	dB
AFT Sensitivity		2	(Note 10)	20	25	35	kHz/V
Min.	٧L	- 2	_	_	0.1	0.5	V
Max.	٧ <sub>U</sub>			8.0	8.8	<u> </u>	
Inter Modulation		4	(Note 11)	30	38	_	dB
	de evel vel Min.	Page   VINMAX   ΔA   DG   DP   V12   VSYNC   VOUT   Evel   VWTH   Vel   VWCL   CL   CL   tio   I2nd   ΔF/ΔV   Min.   VL   VL   VL   VL   VL   VL   VL   V	SYMBOL CURCUIT           VINMIN         2           Je         VINMAX         2           ΔA         2           DG         3           DP         V12         2           VSYNC         2           de         VOUT         2           evel         VWTH         2           Vel         VWCL         4           tio         I2nd         4           ΔF/ΔV         2           Min.         VL         2           Max.         VU         2	SYMBOL   CIR-CUIT   TEST CONDITION	SYMBOL CUIT         CIR-CUIT         TEST CONDITION         MIN.           VINMIN         2         (Note 1)         30           Je         VINMAX         2         —         90           ΔA         2         (Note 2)         50           DG         3         (Note 3)         —           V12         2         (Note 4)         4.0           VSYNC         2         (Note 5)         2.15           de         VOUT         2         (Note 6)         1.35           evel         VWTH         2         (Note 7)         —           Vel         VWCL         4         (Note 8)         40           tio         I2nd         4         (Note 9)         40           ΔF/ΔV         2         (Note 10)         20           Min.         VL         —         —         8.0	SYMBOL CIR-CUIT         TEST CONDITION         MIN. TYP.           VINMIN         2 (Note 1)         30         35           Ie         VINMAX         2         —         90         95           Image: AA         2         (Note 2)         50         60           DB         3         (Note 3)         —         —           Image: DP         3         (Note 3)         —         —         —           Image: DP         3         (Note 3)         —<	SYMBOL CUIT         TEST CONDITION         MIN.         TYP.         MAX.           VINMIN         2         (Note 1)         30         35         40           Ie         VINMAX         2         —         90         95         —           AA         2         (Note 2)         50         60         —           DG         3         (Note 3)         —         —         20           DP         3         (Note 3)         —         —         20           V12         2         (Note 4)         4.0         4.5         5.5           VSYNC         2         (Note 5)         2.15         2.35         2.55           de VOUT         2         (Note 6)         1.35         1.65         1.95           evel VWTH         2         (Note 7)         —         5.2         —           Vel VWCL         4         (Note 8)         40         —         —           tio         I2nd         4         (Note 9)         40         —         —           tio         I2nd         4         (Note 10)         20         25         35           Min.         VL         —

#### **TEST CONDITIONS**

## (Note 1) Input sensitivity

Input the following signal (PIF signal) to pins 3 and 4.

Center (carrier wave) frequency  $f_0 = 58.75MHz$ 

Frequency of modulation signal  $f_m = 15.7kHz$ 

Percentage modulation (AM modulation) = 30%

Signal amplitude (signal level) =  $84dB\mu V$ 

Measure the amplitude (level) of the input signal when the amplitude of output level of the IC (pin 12 output signal) =  $0.6V_{D-D}$ .

### (Note 2) IF AGC range

When pin 7 voltage = 9V, measure, as  $V_1$ , the amplitude (level) of the input signal when the amplitude of the output signal of the IC (pin 12 output signal) =  $0.6V_{D-D}$ .

Next, when the pin 7 voltage = 3V, measure the amplitude (level) of the input signal as  $V_2$  with this IC output signal (pin 12 output signal) =  $0.6V_{D-D}$ .

Substitute those values,  $V_1$  and  $V_2$ , in the following expression and determine  $\Delta A$ .  $\Delta A = 20log (V_1 / V_2)$ 

## (Note 3) Differential gain, differential phase

Input the following (PIF) signal to pins 3 and 4.

Center (carrier wave) frequency  $f_0 = 58.75MHz$ 

Modulation signal is the ramp waveform signal.

Percentage modulation (AM modulation) = 87.5%

Signal amplitude (signal level) =  $84dB\mu V$ 

Adjust the AGC voltage (pin 7 voltage) externally supplied to this IC so that the amplitude of the sync signal part of the output signal (pin 12 output signal) of the IC is 2.0V. In the above state, measure the differential gain (DG) and differential phase (DP).

#### (Note 4) No-signal output level

When no signals are input to pins 3 and 4 (PIF signal), measure the DC voltage of the output signal of the IC (pin 12 output signal).

Use a probe with input capacitance of 10pF (Cin = 10pF).

## (Note 5) Sync. tip level

Input the following signal (PIF signal) to pins 3 and 4.

Center (carrier wave) frequency  $f_0 = 58.75MHz$ 

Modulation signal: 100% white video signal

Percentage modulation (AM modulation) = 87.5%

Signal amplitude (signal level) =  $84dB\mu V$ 

In the above state, measure the DC voltage of the sync tip level part of the output signal of the IC (pin 12 output signal).

## (Note 6) Video output amplitude

Measure the amplitude of the video signal part of the output signal of the IC (pin 12 output signal).

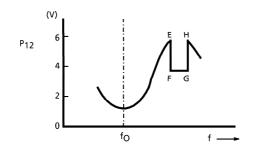
(Note 7) White noise inverter level, white noise clamp level

Input the following signals to pins 3 and 4.

Signal obtained by sweeping the frequency between 57 to 65MHz.

Signal amplitude (signal level) =  $84dB\mu V$ 

In this state, when the voltage on pin 7 is changed, measure the amplitude change of the output signal of the IC (pin 12 output signal), graph the result as shown below.



EH white noise : inverter level FG white noise : clamp level

(Note 8) Carrier wave rejection ratio

Input the following (PIF signal) to pins 3 and 4.

Center (carrier wave) frequency  $f_0 = 58.75MHz$ 

Modulation signal is 100% white video signal.

Percentage modulation (AM modulation) = 87.5%

Signal amplitude (signal level) =  $84dB\mu V$ 

Adjust the pin 7 voltage so that the amplitude of the IC output signal (pin 12 output signal) =  $2.0V_{p-p}$ .

In this state, change the input signal (PIF signal) to an unmodulated signal (percentage modulation = 0%), then measure the amplitude of the carrier wave signal (leakage amount of carrier wave signal) included in the pin 12 output signal.

Determine the relative value (dB value) of the measured leakage amount using  $2V_{p-p}$  as a reference value.

(Note 9) Harmonic rejection ratio

Under the same conditions as (Note 8), measure the leakage amount of the second harmonic signal, then determine the relative value (dB value) of the measured leakage amount using  $2V_{D-D}$  as a reference value.

(Note 10) AFT sensitivity

Input the following signal (PIF signal) to pins 3 and 4.

Unmodulated signal (carrier wave) of frequency  $f_0 = 58.75MHz$ .

signal amplitude (signal level) =  $84dB\mu V$ 

After adjusting the video detector coil, adjust the AFT coil so that the AFT output voltage (pin 1 output voltage) = 4.5V.

In this state, alter the frequency of the input signal and measure the change in the AFT output voltage (pin 1 output voltage) versus the change in frequency.

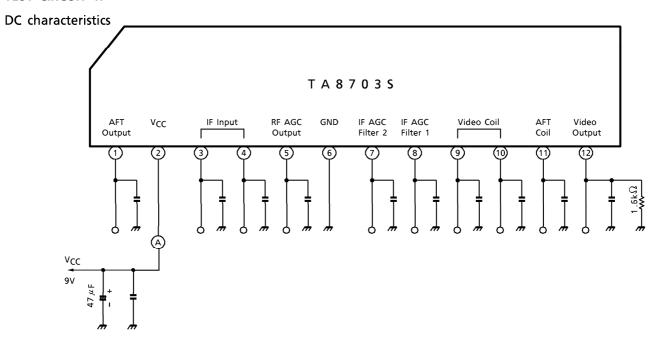
#### (Note 11) Inter modulation

Composite the following three signals, then input the result as the PIF signal to pins 3 and 4.

Signal with frequency of 58.75 MHz and signal amplitude (picture signal) of  $84 dB \mu V$  Signal with frequency of 54.25 MHz and signal amplitude (sound signal) of  $78 dB \mu V$  Signal with frequency of 55.17 MHz and signal amplitude (chroma signal) of  $78 dB \mu V$  Next, adjust the AGC voltage (pin 7 externally supplied voltage) supplied externally to the IC so that the amplitude of the sync tip level part of the output signal of the IC (pin 12 output signal) = 2.0 V.

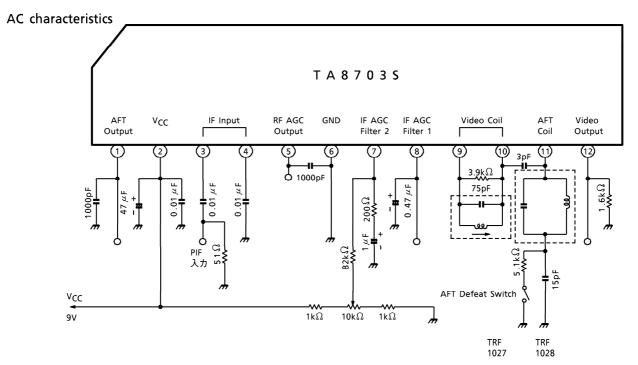
In this state, measure the amplitude of the chroma signal included in the output signal of the IC (pin 12 output signal) and the amplitude of the 920kHz signal, then determine the difference between the measured amplitude values.

## **TEST CIRCUIT 1.**

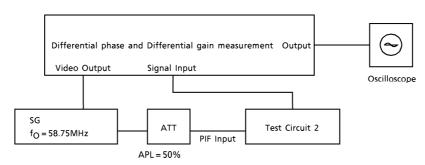


In test circuit 1, capacitors without specified values are 0.01 $\mu$ F.

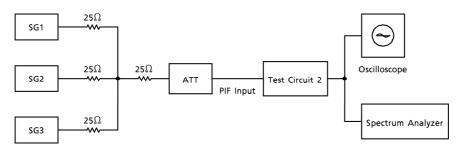
## **TEST CIRCUIT 2.**

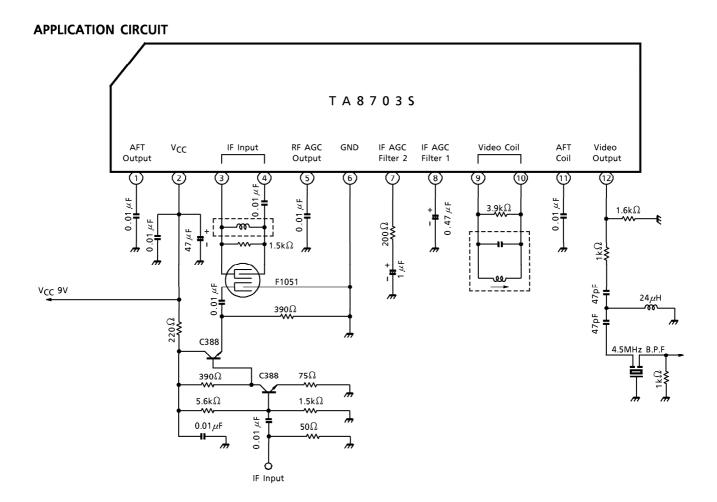


**TEST CIRCUIT 3.**Differential phase, Differential gain
Measuring instrument for Differential phase and gain



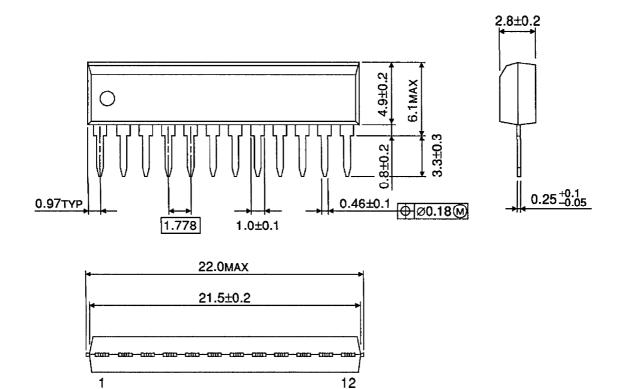
**TEST CIRCUIT 4.**Carrier wave, Second harmonic rejection ratio, Intermodulation





# OUTLINE DRAWING

SSIP12-P-1.78 Unit: mm



Weight: 0.71g (Typ.)