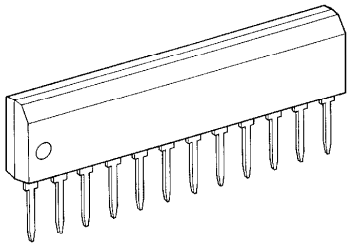
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8703S

QUASI-SIF SYSTEM FOR TV

FEATURES

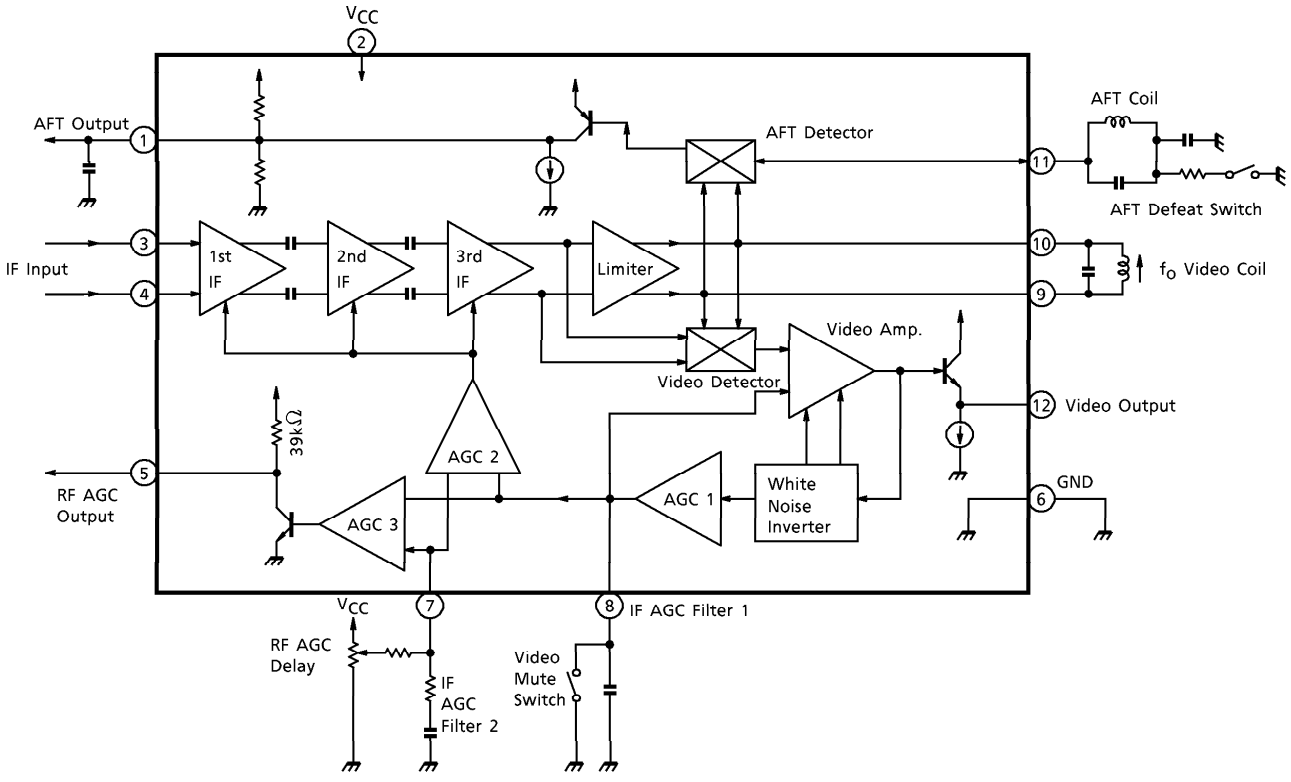
- QUASI-SIF IC for TV
- 3-stage, gain-controlled intermediate frequency (IF) amplifier
  The IF amplifier has three stages. Automatic gain control (AGC) is used to control this 3-stage amplifier circuit.
- Doubled time constant for accelerated AGC response
  AGC is peak value type.
- AFT voltage is output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



SSIP12-P-1.78

Weight : 0.71g (Typ.)

BLOCK DIAGRAM



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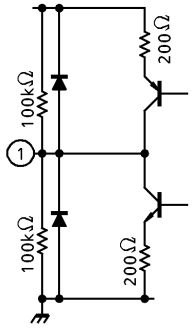
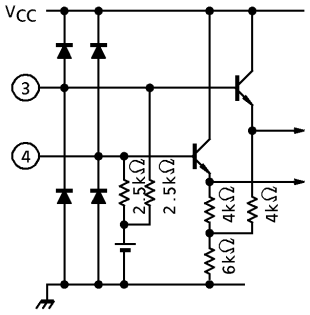
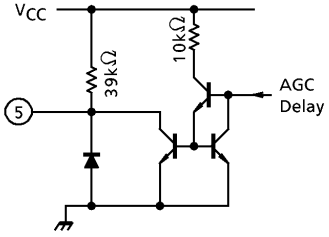
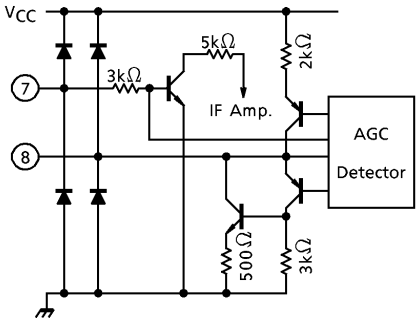
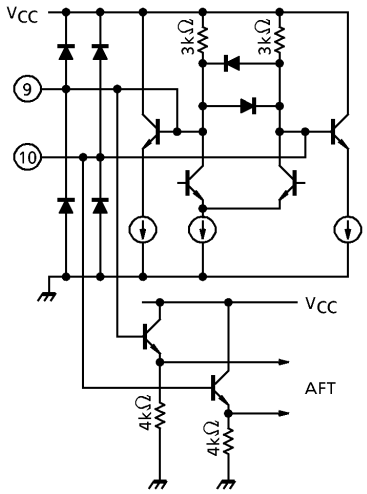
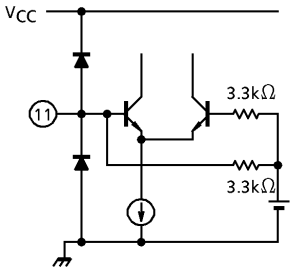
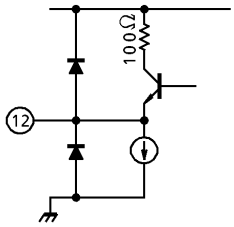
TERMINAL FUNCTION

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
1	AFT Output	AFT signal output.	
2	IF V_{CC}	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 = 2.5kΩ (typ.) and C = 4pF (typ.).	
5	RF AGC Output	Output pin for AGC (RF-AGC) supplied to the tuner. A 39kΩ resistor is connected internally between pin 5 and the internal power supply terminal.	
6	PIF GND	GND terminal for the IF amplifier. Connect a capacitor between pins 2 and 6.	—

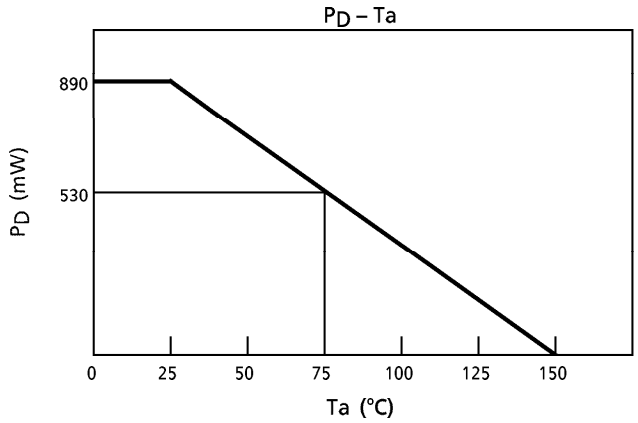
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
7 8	AGC Filter	Terminal used to connect a CR filter for AGC. To accelerate AGC response, the CR filter time constant is doubled. Connecting these terminals to GND considerably reduces the amplitude of the video output signal (pin 12 output signal). (Video mute is applied.)	
9 10	Video Coil	Connects video signal detector coil.	
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 5.1kΩ between pin 11 and the GND terminal switches to AFT defeat mode (defeats the AFT function).	

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	V_{CC}	15	V
Power Dissipation	P_D (Note)	890	mW
Operating Temperature	T_{opr}	−25~75	°C
Storage Temperature	T_{stg}	−55~150	°C

(Note) When using the device at above Ta = 25°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	V_{CC}	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		I_{CC}	1	—	18	28	38	mA
Terminal Voltage	Pin 1	V_1	1	—	3.3	4.4	5.5	V
	Pin 3	V_3		—	3.6	4.0	4.4	
	Pin 4	V_4		—	3.6	4.0	4.4	
	Pin 5	$V_{5\,(1)}$		SW : A	8.8	—	—	
		$V_{5\,(2)}$		SW : B	—	—	0.1	
	Pin 9	V_9		—	5.6	6.2	6.8	
	Pin 10	V_{10}		—	5.6	6.2	6.8	
	Pin 11	V_{11}		—	2.5	3.0	3.5	
	Pin 12	V_{12}		—	4.0	4.5	5.0	

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

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Sensitivity		V_{IN}MIN	2	(Note 1)	30	35	40	dBμV
Maximum Input Voltage		V_{IN}MAX	2	—	90	95	—	dBμV
IF AGC Range		ΔA	2	(Note 2)	50	60	—	dB
Differential Gain		DG	3	(Note 3)	—	—	20	%
Differential Phase		DP			—	—	5	°
No-signal Output Level		V_{12}	2	(Note 4)	4.0	4.5	5.5	V
Sync Tip Level		V_{SYNC}	2	(Note 5)	2.15	2.35	2.55	V
Video Output Amplitude		V_{OUT}	2	(Note 6)	1.35	1.65	1.95	V_{p-p}
White Noise Inverter Level		V_{WTH}	2	(Note 7)	—	5.2	—	V
White Noise Clamp Level		V_{WCL}			—	3.5	—	
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	25	35	kHz / V
AFT Output Voltage	Min.	V_L	2	—	—	0.1	0.5	V
	Max.	V_U			8.0	8.8	—	
Inter Modulation		I_{920}	4	(Note 11)	30	38	—	dB

TEST CONDITIONS

(Note 1) Input sensitivity
Input the following signal (PIF signal) to pins 3 and 4.
Center (carrier wave) frequency f_O = 58.75MHz
Frequency of modulation signal f_m = 15.7kHz
Percentage modulation (AM modulation) = 30%
Signal amplitude (signal level) = 84dBμV
Measure the amplitude (level) of the input signal when the amplitude of output level of the IC (pin 12 output signal) = $0.6V_{p\text{-}p}$.

(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) = $0.6V_{p\text{-}p}$.
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) = $0.6V_{p\text{-}p}$.
Substitute those values, V_1 and V_2, in the following expression and determine ΔA.
$\Delta A = 20\ell og\ (V_1 / V_2)$

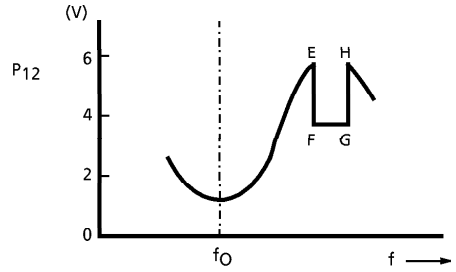
(Note 3) Differential gain, differential phase
Input the following (PIF) signal to pins 3 and 4.
Center (carrier wave) frequency f_O = 58.75MHz
Modulation signal is the ramp waveform signal.
Percentage modulation (AM modulation) = 87.5%
Signal amplitude (signal level) = 84dBμV
Adjust the AGC voltage (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_O = 58.75MHz
Modulation signal : 100% white video signal
Percentage modulation (AM modulation) = 87.5%
Signal amplitude (signal level) = 84dBμV
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) = 84dBμV
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_O = 58.75MHz
Modulation signal is 100% white video signal.
Percentage modulation (AM modulation) = 87.5%
Signal amplitude (signal level) = 84dBμV
Adjust the pin 7 voltage so that the amplitude of the IC output signal (pin 12 output signal) = 2.0$V_{p\text{-}p}$.
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 2$V_{p\text{-}p}$ 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 2$V_{p\text{-}p}$ 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_O = 58.75MHz.
signal amplitude (signal level) = 84dBμV
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 58.75MHz and signal amplitude (picture signal) of 84dBμV

Signal with frequency of 54.25MHz and signal amplitude (sound signal) of 78dBμV

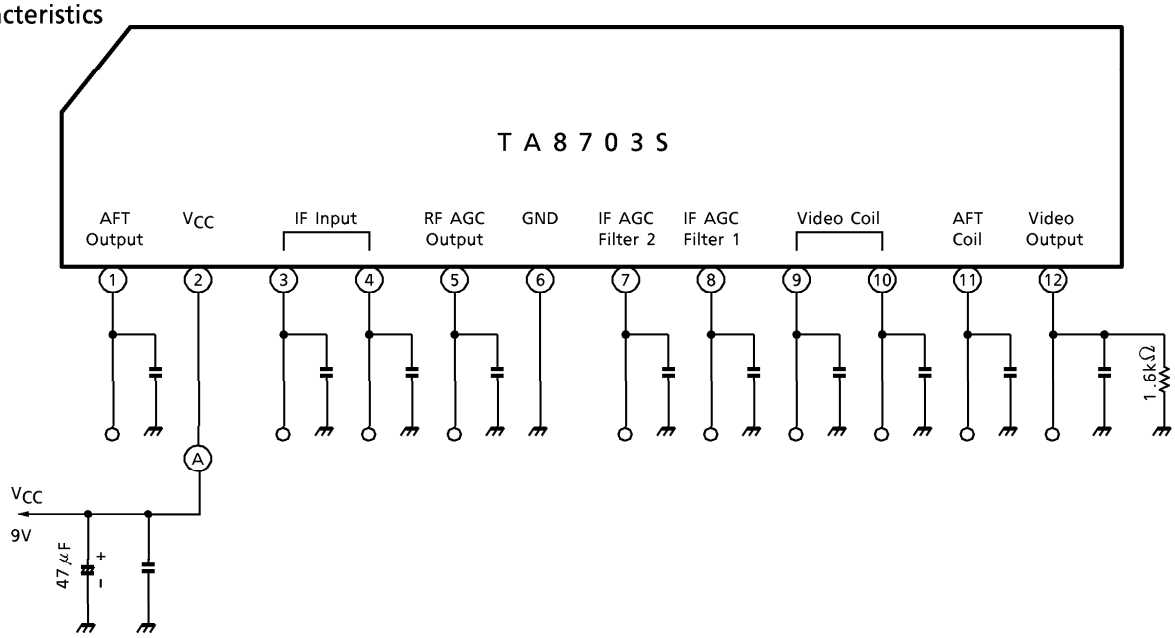
Signal with frequency of 55.17MHz and signal amplitude (chroma signal) of 78dBμV

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) = 2.0V.

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.

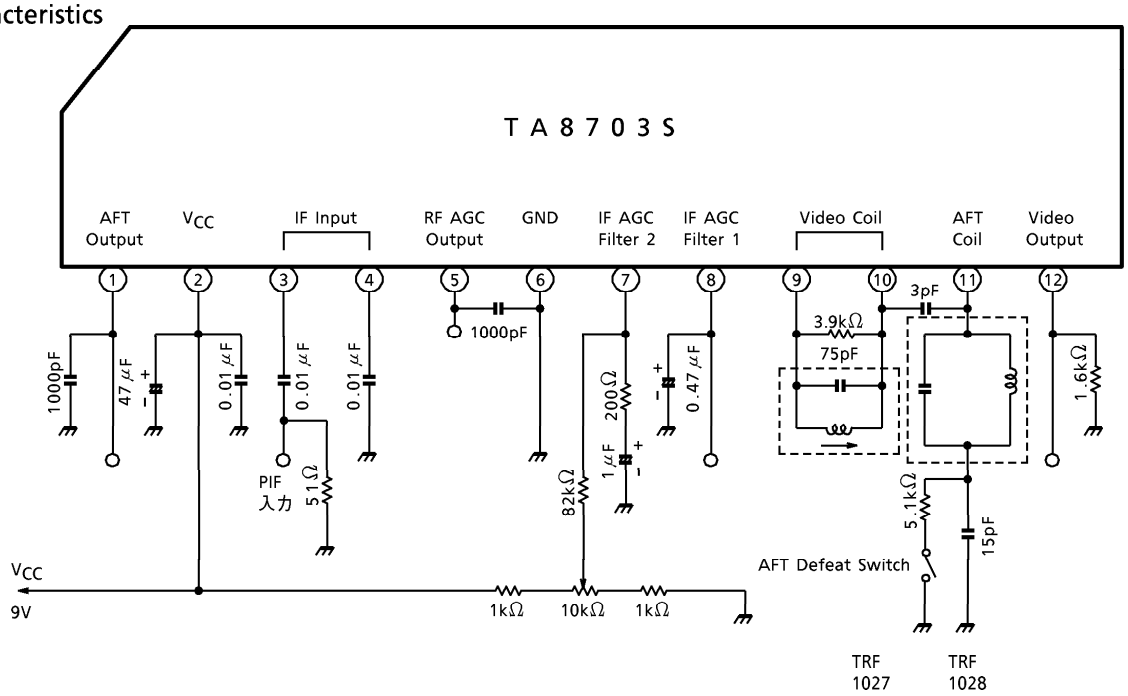
DC characteristics



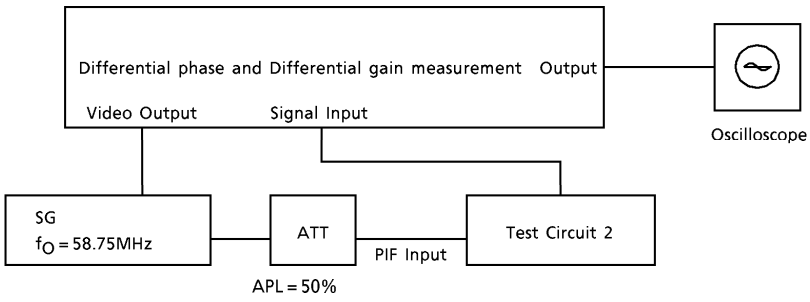
In test circuit 1, capacitors without specified values are 0.01μF.

TEST CIRCUIT 2.

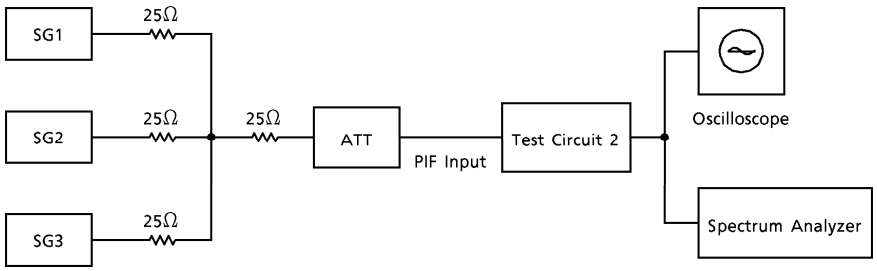
AC characteristics



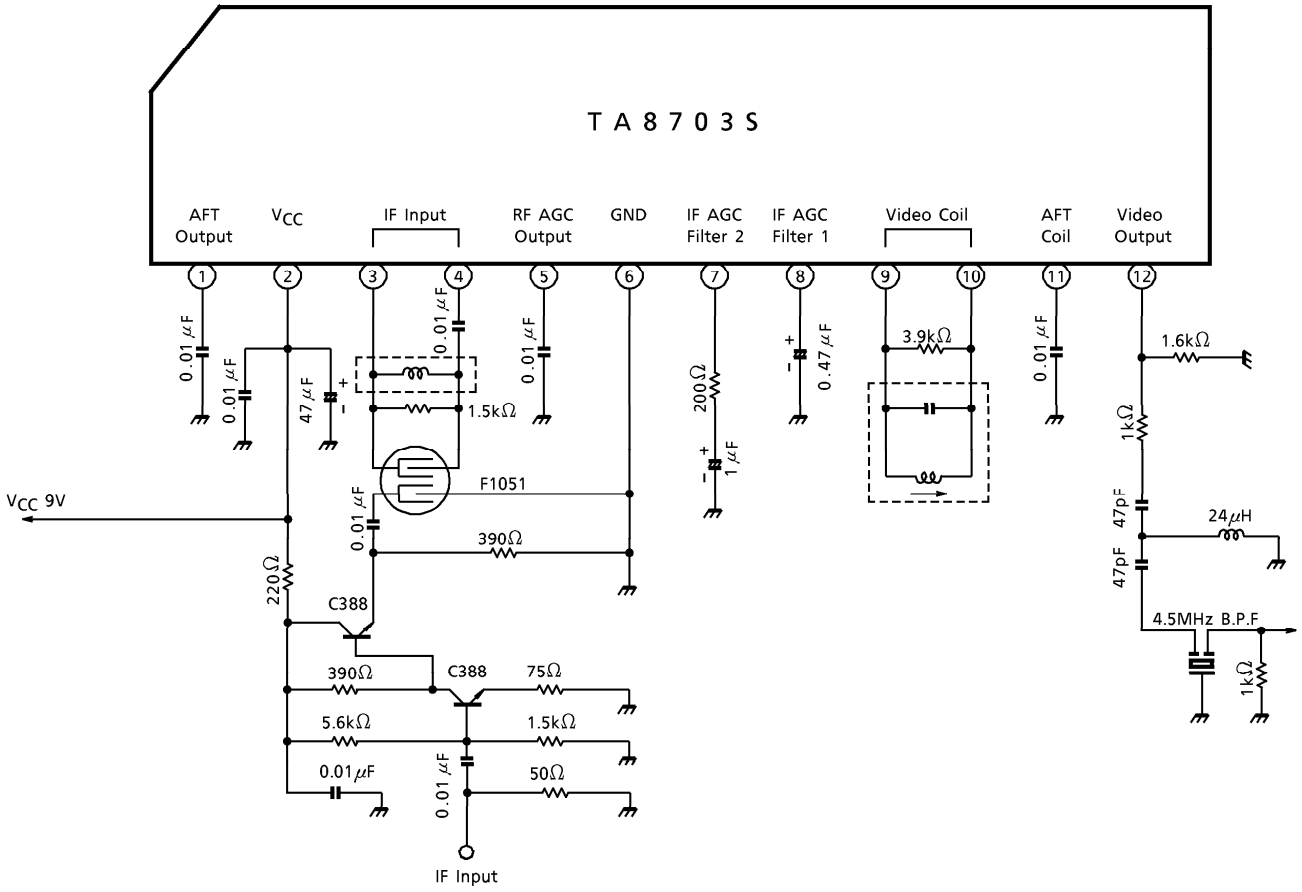
TEST CIRCUIT 3.
Differential phase, Differential gain
Measuring instrument for Differential phase and gain



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



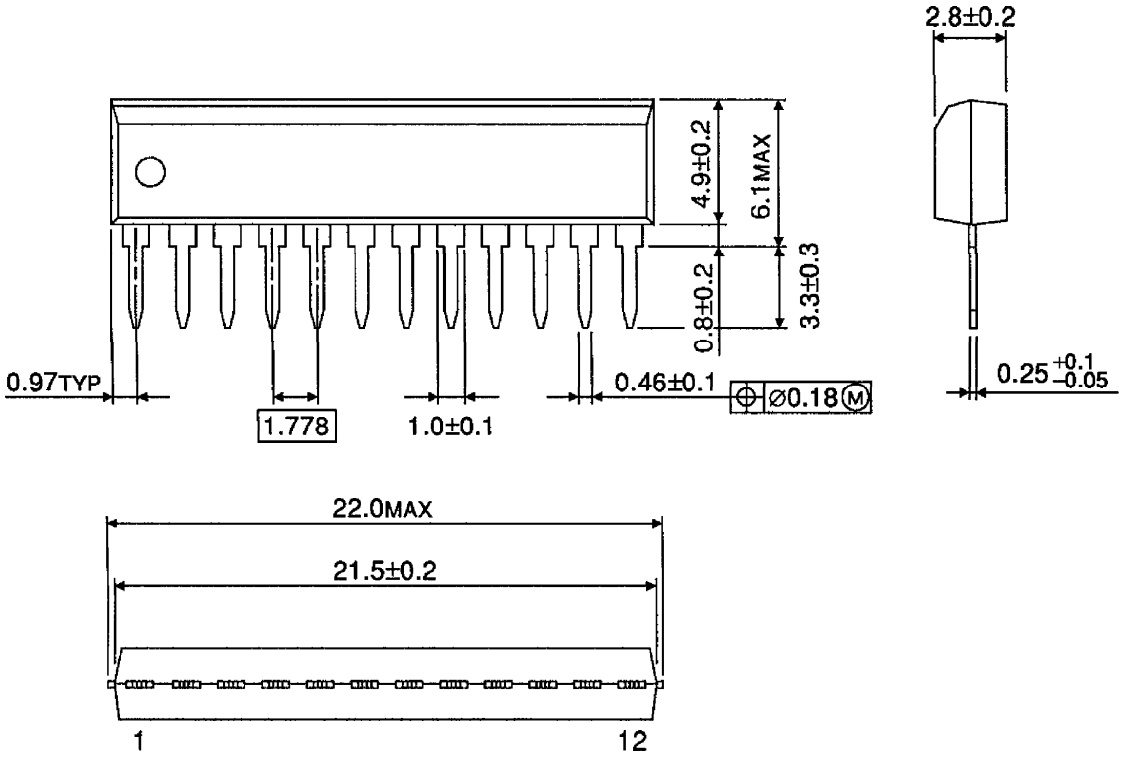
APPLICATION CIRCUIT



OUTLINE DRAWING

SSIP12-P-1.78

Unit : mm



Weight : 0.71g (Typ.)