AN5707NS

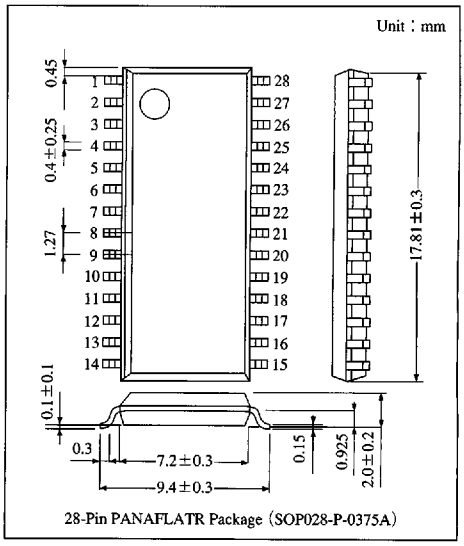
TV Electronic Tuner-Control IC

■ Overview

The AN5707NS is an integrated circuit for tuner-control circuit of auto-search-tuning system.

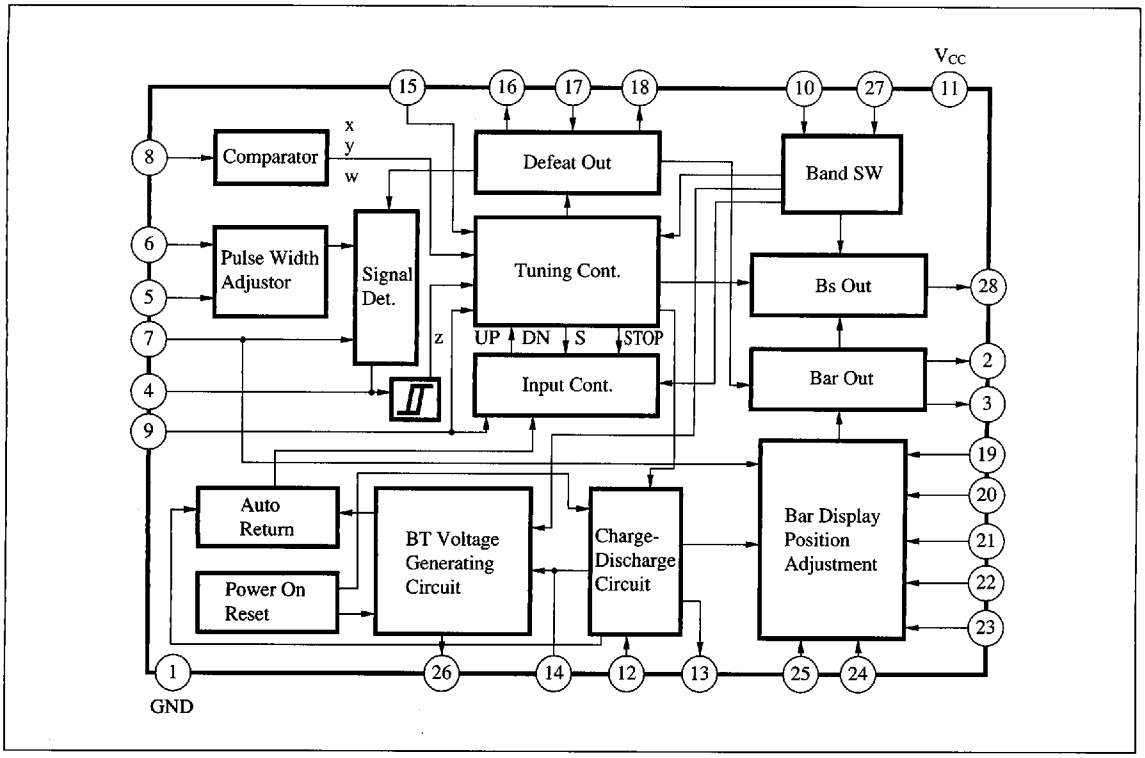
■ Features

- Low supply-voltage operation (V_{CC}=4.2 to 5.5V)
- Low power consumption by Bi-CMOS Process (30mW typ.)
- Auto search by Up-Down Switch
- Bar display on the screen (tuning channel)



28-Pin PANAFLATR Package (SOP028-P-0375A)

■ Block Diagram



■ Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	6	V
Pin voltage	V_{28-1}	10	V
Supply current	I_{CC}	12	mA
Pin current	I_2	−1 to 0	mA
	I_3	−1 to 0	
	I_{26}	−0.2 to +0.2	
	I_{28}	0 to +2	
Power dissipation	P_D	72	mW
Operating ambient temperature	T_{opr}	−20 to +70	℃
Storage temperature	T_{stg}	−40 to +125	℃

■ Recommended Operating Range (Ta=25℃)

Parameter	Symbol	Range
Operating supply voltage range	V_{CC}	4.2V to 5.5V

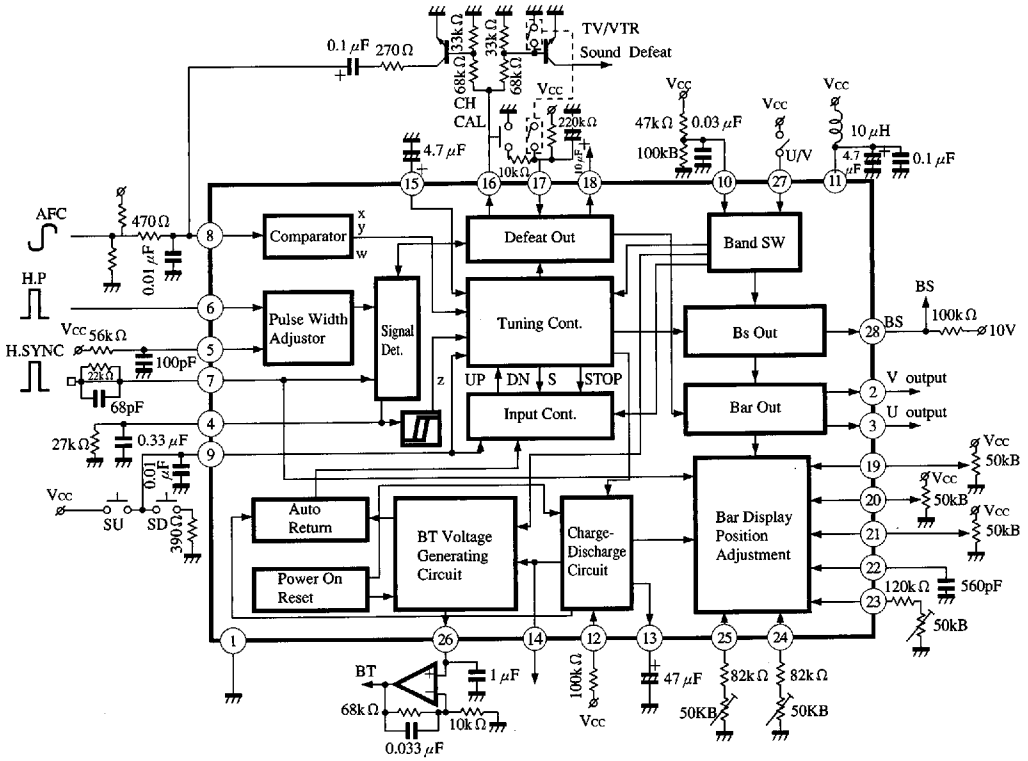
■ Electrical Characteristics (Ta=25℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Circuit current	I_{11}	V_{CC}=5V	4	6	8.5	mA
Pin voltage	V_{9-1}	V_{CC}=5V	2.2	2.5	2.8	V
Flyback pulse input threshold voltage	V_{TH6}	V_{CC}=5V	1	1.5	2.4	V
Horizontal synchronous signal input threshold voltage	V_{TH7}	V_{CC}=5V	2.6	3.1	3.6	V
BS output voltage "H"	$V_{28-1(H)}$		9.1	9.5	—	V
BS output voltage "L"	$V_{28-1(L)}$	I_{28}=1mA	—	0.1	0.4	V
Tuning control (1)	$V_{16-1(H)}$	Except the case during reception (S=0)	3.9	4.2	4.6	V
Tuning control (2)	$V_{16-1(L)}$	During reception (S=1)	−0.2	0	0.2	V
Charging/discharging current (1)	$I_{CHA(1)}$	V_{13-1}=2.5V, during VHF search-up	−47	—	−20	μA
Charging/discharging current (2)	$I_{CHA(2)}$	V_{13-1}=2.5V, during VHF search-down	8	—	17.5	μA
Charging/discharging current (3)	$I_{CHA(3)}$	V_{13-1}=2.5V, during VHF tuning preparation (+)	−14	—	−5	μA
Charging/discharging current (4)	$I_{CHA(4)}$	V_{13-1}=2.5V, during VHF tuning preparation (−)	3.2	—	7.8	μA
Charging/discharging current (5)	$I_{CHA(5)}$	V_{13-1}=2.5V, during UHF search-up	−21.5	—	−9.5	μA
Charging/discharging current (6)	$I_{CHA(6)}$	V_{13-1}=2.5V, during UHF search-down	4.8	—	10.5	μA
Charging/discharging current (7)	$I_{CHA(7)}$	V_{13-1}=2.5V, during UHF tuning preparation (+)	−4	—	−1.6	μA
Charging/discharging current (8)	$I_{CHA(8)}$	V_{13-1}=2.5V, during UHF tuning preparation (−)	1.4	—	3.8	μA
Channel call input threshold voltage	V_{TH17}	V_{CC}=5V	1.9	2.4	2.9	V
Output saturation voltage	$V_{CE(sat)}$ (Pin⑱)	I_{18}=300μA	—	0.1	0.4	V
BT amp. characteristics VHFL (1)	$V_{26-1(1)}$	V_{14-1}=1.5V	−0.2	0	0.2	V
BT amp. characteristics VHFL (2)	$V_{26-1(2)}$	V_{14-1}=3.5V	3.9	4.25	4.6	V
BT amp. inclination (1) VHF_L	$\Delta V_{26-1(1)}$	V_{14-1}=2.8−2.2V	2.1	2.45	2.8	V
BT amp. characteristics (1) UHF	$V_{26-1(3)}$	V_{14-1}=2V	−0.2	0	0.2	V
BT amp. characteristics (2) UHF	$V_{26-1(4)}$	V_{14-1}=5V	4	4.3	4.6	V
BT amp. inclination (2) UHF	$\Delta V_{26-1(2)}$	V_{14-1}=3.4−2.8V	0.5	0.85	1.2	V
BT amp. inclination (3)	$\Delta V_{26-1(2)}$	V_{14-1}=4.4−4V	0.7	1.1	1.5	V

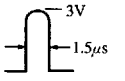
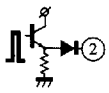
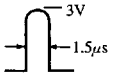
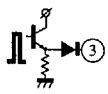
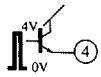
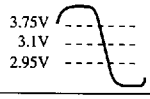
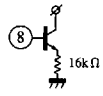
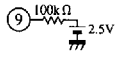
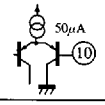
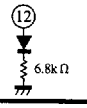
■ Electrical Characteristics (cont.) (Ta=25℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Bar display output pulse width (VHF_H)	τ_{VHFH}	V_{CC}=5V	1	1.4	1.8	μs
Bar display output pulse width (UHF)	τ_{UHF}	V_{CC}=5V	1	1.4	1.8	μs
Bar display output pulse peak value (VHF_H)	V_{VHFH}	V_{CC}=5V	2.7	3	—	V_{PP}
Bar display output pulse peak value (UHF)	V_{UHF}	V_{CC}=5V	2.7	3	—	V_{PP}
Auto return lower limit threshold voltage	$V_{L.L}$	V_{CC}=5V	0.12	0.22	0.3	V
Auto return upper limit threshold voltage	$V_{H.L}$	V_{CC}=5V	4.25	4.45	4.65	V

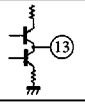
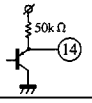
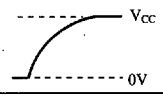
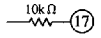
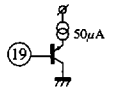
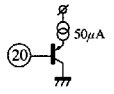
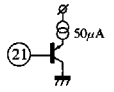
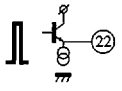
■ Application Circuit



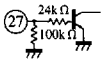
Pin Descriptions

Pin No.	Pin name	Typ. waveform	Description	I/O impedance	Equivalent circuit
1	GND	———	GND pin.	—	———
2	Bar display output (VHF)		Outputs a pulse of positive polarity for bar display at the time of VHF reception.	500Ω	
3	Bar display output (UHF)		Outputs a pulse of positive polarity for bar display at the time of UHF reception.	500Ω	
4	Signal detection		Determines the presence/absence of a TV signal by the DC voltage of this pin. Connect the CR filter externally.	High impedance	
5	H.P. waveform shaping mono/multi		Filter pin for H.P. pulse-waveform shaping circuit. The output pulse width is changed by the CR of time constant.	High impedance	
6	Flyback pulse input		Input a horizontal flyback pulse (positive polarity) to detect a signal.	56kΩ	
7	Horizontal signal input		Input a horizontal synchronous separation signal (positive polarity) to detect a signal.	68kΩ	
8	AFC input		Filter the AFC signal for input, which is significant for search tuning.	<1MΩ	
9	Search-up/-down input	———	Search-up is started when this pin is set to V_{CC} and search-down is started when it is set to GND.	100kΩ	
10	Lch/hch switching voltage input	———	Lch/Hch switching point setting pin. Lch/Hch of VHF is automatically switched.	100kΩ	
11	Supply voltage	———	Supply current is 6mA and the operating supply voltage range is 4.2 to 5.5V. V_{CC} should be regulated before use.	—	———
12	Search speed adjustment	———	The search speed is varied with constant-current to be input to this pin.	7kΩ	

■ Pin Descriptions (cont.)

Pin No.	Pin name	Typ. waveform	Description	I/O impedance	Equivalent circuit
13	Charging capacitor connection	———	Pin for generating MANU ⑭ voltage in auto search. Insert the capacitor of about 47 μF with great care of leak.	High impedance	
14	BT voltage generation (Manual)	———	Pin for generating BT voltage ㉕ in manual search. Should be opened in auto search.	$>1k\Omega$	
15	Temporary stop capacitor connection		Insert the capacitor of about 4.7 μF between this pin and GND in order to stop temporarily at the tuned channel during auto search.	100kΩ	
16	Defeat output	———	Used for switching of audio defeat, and of time constant of AFC filter, etc. Search : H, Tuning : OPEN	—	
17	Channel call	———	A channel display bar appears when this pin is set to GND and does not appear when it is set to V_{CC}.	10kΩ	
18	Bright output	———	Pin for darkening the screen when a channel display bar appears, and this pin is connected to the brightness volume. Search : 0V, Tuning : OPEN	—	
19	Bar display position adjustment (1)	———	Pin for adjusting the position of a channel-display-bar at the time of VHF reception. The position of a channel-display-bar is varied with the DC voltage to be given to this pin.	$<100k\Omega$	
20	Bar display position adjustment (2)	———	Pin for adjusting the position of a channel-display-bar at the time of VHF Lch reception. The position of a channel-display-bar is varied with the DC voltage to be given to this pin.	$<100k\Omega$	
21	Bar display position adjustment (3)	———	Pin for adjusting the position of a channel-display-bar at the time of VHF Hch reception. The position of a channel-display-bar is varied with the DC voltage to be given to this pin.	$<100k\Omega$	
22	Filter		To generate a sawtooth wave for determining the position of a channel-display-bar. Insert the capacitor of about 560pF between this pin and GND.	—	
23	Bar display position adjustment (4)	———	Pin for determining the amplitude, on the panel, of a channel-display-bar at the time of VHF reception (the position of a display bar on the panel when the highest channel is received). The amplitude is varied with the quantity of current flowing out of this pin.	—	

■ Pin Descriptions (cont.)

Pin No.	Pin name	Typ. waveform	Description	I/O impedance	Equivalent circuit
24	Bar display position adjustment (5)	———	Pin for determining the amplitude, on the panel, of a channel-display-bar at the time of VHF Hch reception (the position of a display bar on the panel when the highest channel is received). The amplitude is varied with the quantity of current flowing out of this pin.	—	
25	Bar display position adjustment (6)	———	Pin for determining the amplitude, on the panel, of a channel-display-bar at the time of VHF Lch reception (the position of a display bar on the panel when the highest channel is received). The amplitude is varied with the quantity of current flowing out of this pin.	—	
26	BT voltage generation	———	Pin for outputting BT-voltage for tuner. Compensation of tuner-characteristics is applied.	12kΩ	
27	U/V switching	———	UHF/VHF switching pin. V_{CC}·····VHF GND or OPEN·····UHF	24kΩ	
28	BS output	———	Tuner BS output pin, which is opened-collector output. Used at 10V or less.	—	

Band	VHF		UHF
	Lch :	Hch :	
BS	OPEN	0V	0V

ICs for TV

■ Supplementary Explanation

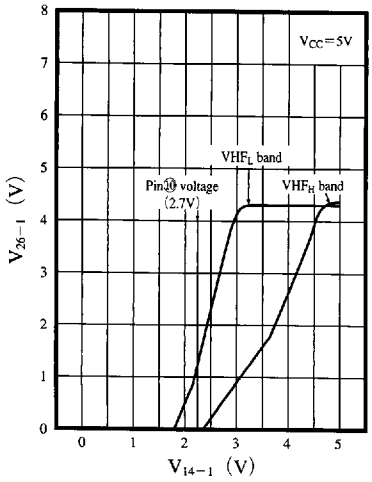
• Design Reference Value of Electrical Characteristics (Ta=25℃)

Parameter	Symbol	Condition	min	typ	max	Unit
AFC threshold voltage (1)	V_{AFC} (1)	V_{CC}=5V	—	3.75	4.1	V
AFC threshold voltage (2)	V_{AFC} (2)	V_{CC}=5V	—	3.1	—	V
AFC threshold voltage (3)	V_{AFC} (3)	V_{CC}=5V	2.6	2.9	—	V
Search-up threshold voltage	V_{TH9} (U)	V_{CC}=5V	—	3.5	4	V
Search-down threshold voltage	V_{TH9} (D)	V_{CC}=5V	1	1.5	—	V

Note) The value in the above characteristics is not a guaranteed value, but reference one on design.

• Characteristic Curve

V_{14} – V_{26} Characteristics (VHF)



V_{14} – V_{26} Characteristics (UHF)