AN5290S

Antenna diversity IC for on-vehicle TV

■ Overview

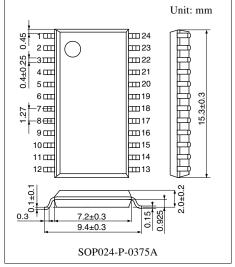
The AN5290S is an on-vehicle television antennadiversity IC in which the noise detection circuit and antenna changeover circuit are integrated on a single chip. It is destined for NTSC/PAL system.

■ Features

- Built-in vertical and horizontal synchronizing circuit
- It outputs changeover pulse for noise canceler.
- Built-in antenna changeover stop function

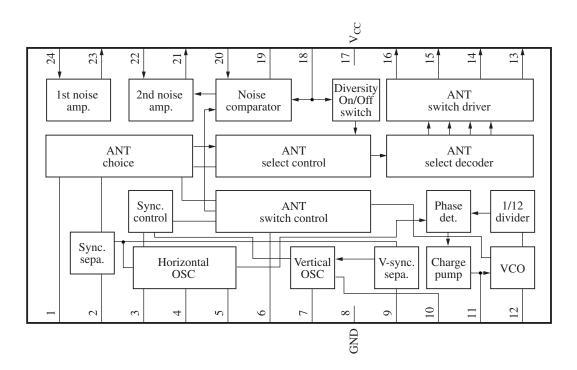
Applications

• On-vehicle televisions



Note) The package of this product will be changed to lead-free type (SOP024-P-0375C). See the new package dimensions section later of this datasheet.

■ Block Diagram



■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	Antenna selection level holding capacitance	12	VCO oscillation time-constant setting
2	Sync. separation video signal input	13	Antenna selection output 4
3	Horizontal sync. signal AFC output	14	Antenna selection output 3
4	Horizontal sync. signal oscillation time-	15	Antenna selection output 2
	constant setting	16	Antenna selection output 1
5	Horizontal sync. signal output	17	Power supply
6	Output for noise canceler	18	Noise comparator level setting/diversity off
7	Vertical sync. signal output	19	Noise level hold capacitor
8	GND	20	Noise comparator input
9	Vertical sync. signal separation time constant	21	2nd noise amplifier output
	setting	22	Video clamp input
10	Vertical sync. signal oscillation time constant	23	1st noise amplifier output
	setting	24	Video signal input
11	Charge pump integral time-constant setting		

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit	
Supply voltage	V _{CC}	5.6	V	
Supply current	I_{CC}	30.0	mA	
Power dissipation *	P_{D}	168	mW	
Operating ambient temperature	T _{opr}	-30 to +80	°C	
Storage temperature	T_{stg}	-55 to +125	°C	

Note) 1. Except for the power dissipation, operating ambient temperature, and storage temperature, all ratings are for $T_a = 25^{\circ}\text{C}$.

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V _{CC}	4.5 to 5.5	V

^{2.} In order to protect the IC, do not use the IC by rotating it 180 degrees.

^{3.} To protect the IC, do not connect the open collector pins (pin 5, pin 6, pin 7, pin 13, pin 14, pin 15 and pin 16) directly to the power supply. Use the protection resistors (1 k Ω or larger for pin 5, pin 6 and pin 7, and 200 Ω or larger for pin 13, pin 14, pin 15 and pin 16). Use the IC within the range of its power dissipation.

^{4. * :} $T_a = 80 \, ^{\circ}C$.

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\blacksquare Electrical Characteristics at $V_{CC}=5~V,~T_a=25^{\circ}C$

Parameter Symbol Conditions		Min	Тур	Max	Unit	
Quiescent current without load	I_{CC}	Without input	12.0	20.0	28.0	mA
Horizontal sync. oscillation frequency *	f_H	Without input, pin 5 frequency	15.58	15.68	15.78	kHz
PLL sync. oscillation frequency	12f _H	Without input, pin 12 frequency	186	188.2	190	kHz
Vertical sync. oscillation frequency	f_V	Without input, pin 7 frequency	36.0	42.0	48.0	Hz
Electric field judgment period	f_{FJ}	Without input, pin 21 frequency	36.0	42.0	48.0	Hz
Output frequency for N.C.	f _{NC}	Asynchronous, at changing over	36.0	42.0	48.0	Hz
		antenna, pin 6 frequency				
Antenna selection 1 on voltage	V _{AS1ON}	Voltage, when pin 16 is on	_	0.2	0.5	V
Antenna selection 1 off voltage	V _{AS1OFF}	Voltage, when pin 16 is off	4.9	5.0	_	V
Antenna selection 2 on voltage	V _{AS2ON}	Voltage, when pin 15 is on	_	0.2	0.5	V
Antenna selection 2 off voltage	V _{AS2OFF}	Voltage, when pin 15 is off	4.9	5.0	_	V
Antenna selection 3 on voltage	V _{AS3ON}	Voltage, when pin 14 is on	_	0.2	0.5	V
Antenna selection 3 off voltage	V _{AS3OFF}	Voltage, when pin 14 is off	4.9	5.0	_	V
Antenna selection 4 on voltage	V _{AS4ON}	Voltage, when pin 13 is on	_	0.2	0.5	V
Antenna selection 4 off voltage	V _{AS4OFF}	Voltage, when pin 13 is off	4.9	5.0	_	V

Note) *: The Horizontal oscillation frequency is a frequency after adjustment.

• Design reference data

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

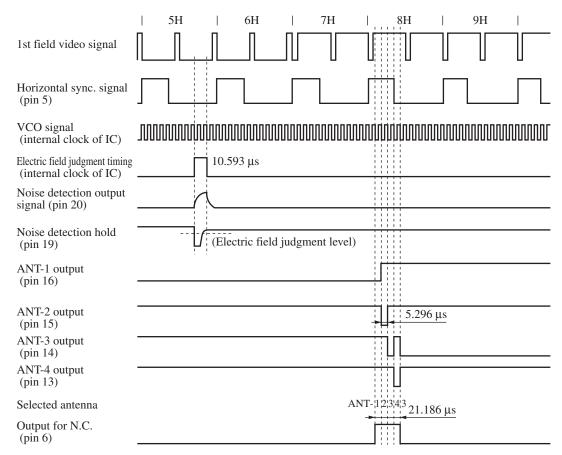
Parameter	Symbol	Conditions	Min	Тур	Max	Unit
1st amplifier voltage gain	A _{N1}	$V_{IN} = 10 \text{ mV[p-p]}, f_{IN} = 10 \text{ kHz},$ at 1st amp. active	-	17.0	_	dB
2nd amplifier voltage gain	A _{N2}	$V_{IN} = 10 \text{ mV[p-p]}, f_{IN} = 10 \text{ kHz},$ at 2st amp. active	_	17.5		dB
Output voltage, when 2nd amplifier is on	V _{NON2}	At 2st amp. active, pin 21 DC voltage	_	1.51	_	V
Output voltage, when 2nd amplifier is off	V _{NOF2}	At 2nd amp. inactive, pin 21 DC voltage	_	4.20	_	V
Antenna input amplifier voltage gain	A _C	$V_{IN} = 50 \text{ mV[p-p]}, f_{IN} = 10 \text{ kHz},$ at input amp. active	_	5.5	_	dB
Level hold output bias voltage	V _{NOB2}	At input amp. active, pin 1 DC voltage	_	1.43	_	V
Antenna switch output sink current 1	I _{AS1}	Antenna selection output pin, max. current, when pin 16 is on	10.0	_	_	mA
Antenna switch output sink current 2	I _{AS2}	Antenna selection output pin, max. current, when pin 15 is on	10.0		_	mA
Antenna switch output sink current 3	I _{AS3}	Antenna selection output pin, max. current, when pin 14 is on	10.0	_		mA
Antenna switch output sink current 4	I _{AS4}	Antenna selection output pin, max. current, when pin 13 is on	10.0	_	_	mA

■ Technical Information

Note) The following characteristics are the reference value for design and not guaranteed value. The timing chart is for explaining the IC operation plainly. Those vary depending on input condition.

1. Timing chart 1

When NTSC reception (in horizontal and vertical synchronization) antenna is selected.
Electric field judgment and antenna selection timing when the change over from ANT-1 to ANT-3 by the antenna selection is done.



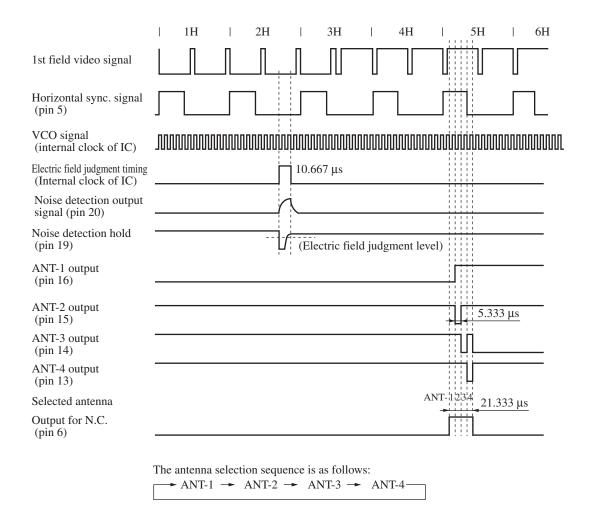
(In the above timing chart, the 1st field video signal is not an internal signal but an input signal, and some signals which do not outputted to pins, as VCO signal, are included.)

■ Technical Information (continued)

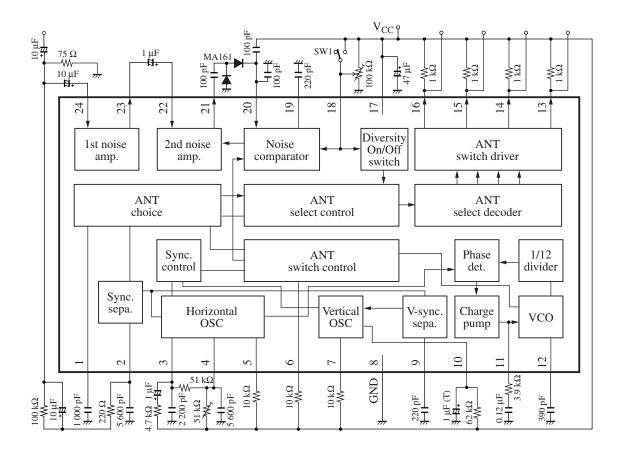
2. Timing chart 2

• When PAL reception (in horizontal and vertical synchronization) antenna is selected.

Electric field judgment and antenna selection timing when the change over from ANT-1 to ANT-3 by the antenna selection is done.



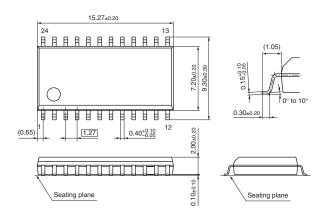
■ Application Circuit Example



The circuit shows an example of application circuit and circuit constant but does not guarantee the design of mass-production set.

■ New Package Dimensions (Unit: mm)

• SOP024-P-0375C (Lead-free package)



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