AN7293NSC

FM-IF, NC, MPX IC for car radio

■ Overview

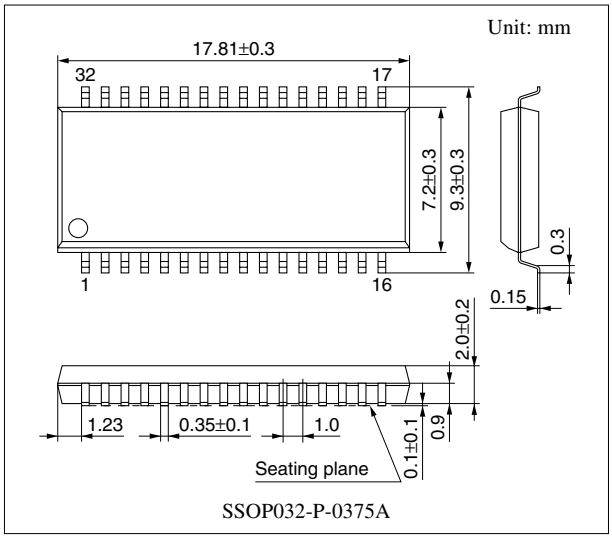
The AN7293NSC is an IC having FM-IF, NC and MPX functions for car radio. A tuner block of car radio can be constructed in combination with the AN7289NFBQ/NSC. Small outline package product (the AN7293NFBQ) is also available.

■ Features

- A less number of external components is required (8 components reduction compared with our conventional IC)
- Neighbouring-station interference characteristics improvement by band-ATC function
- Band-mute on/off function

■ Applications

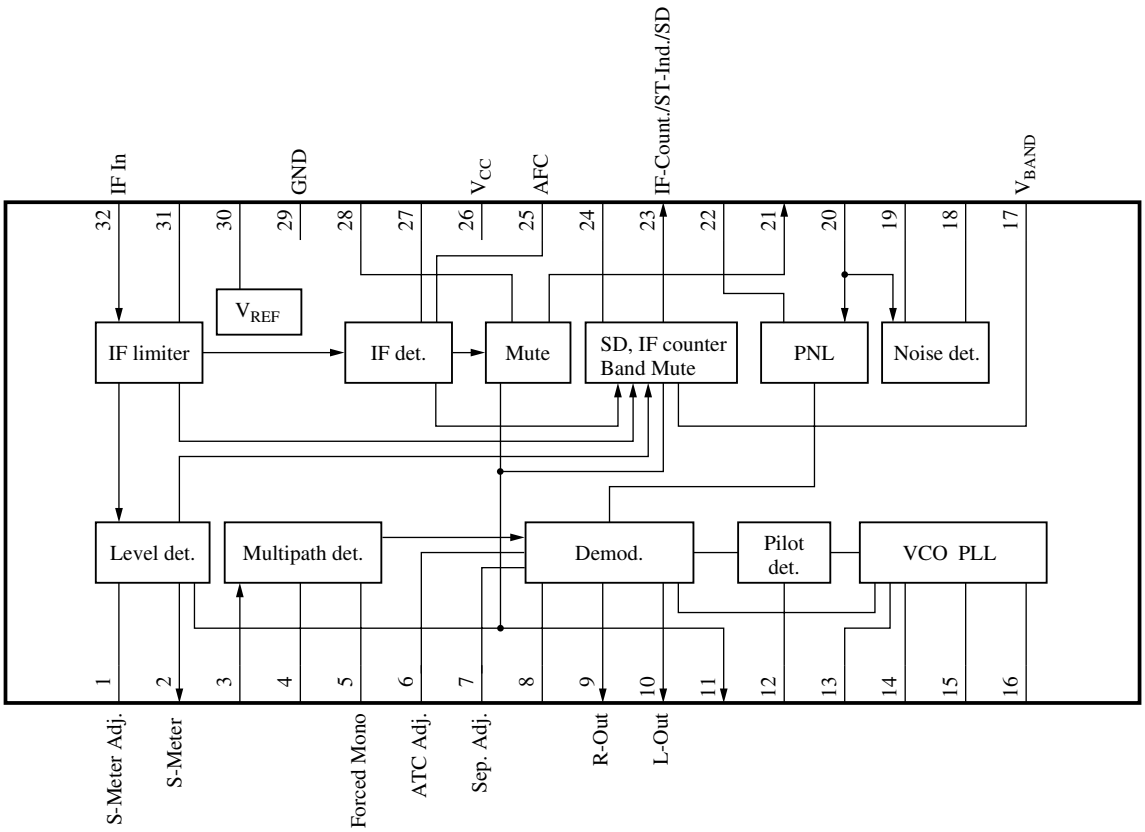
- Car radios



SSOP032-P-0375A

Note) The package of this product will be changed to lead-free type (SSOP032-P-0375C). See the new package dimensions section later of this datasheet.

■ Block Diagram



■ Pin Description

Pin No.	Description	Pin No.	Description
1	Control voltage adjustment	17	Band signal output/band mute SW
2	Control voltage	18	PNL low-pass filter
3	Multiple-path noise input	19	PNL AGC
4	Multiple-path detection	20	PNL input
5	ASC adjustment/forced monaural	21	Detection output
6	ATC adjustment	22	PNL output hold
7	Separation adjustment	23	SD/FM-IF counter output/stereo indicator
8	ATC low-pass filter	24	SD sensitivity adjustment
9	R-channel output	25	AFC voltage
10	L-channel output	26	V_{CC}
11	Mute voltage	27	FM detection
12	Pilot detection low-pass filter	28	Soft mute adjustment
13	PLL low-pass filter	29	GND
14	PLL low-pass filter	30	V_{REF}
15	VCO	31	IF bypass
16	Pilot cancel control low-pass filter	32	IF input

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	9.1	V
Supply current	I_{CC}	45	mA
Power dissipation *2	P_D	380.2	mW
Operating ambient temperature *1	T_{opr}	−30 to +80	°C
Storage temperature *1	T_{stg}	−55 to +125	°C

Note) ∗1: T_a = 25°C except power dissipation, operating ambient temperature and storage temperature.
∗2: T_a = 80°C

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V_{CC}	7.2 to 9.0	V

■ Electrical Characteristics at T_a = 25°C

Unless otherwise specified, V_{CC} = 8V, V_{IN1} is f = 10.70 MHz, Mod. = 1 kHz, 30%
FM modulation stereo input is L + R = 90% V_P = 10%

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Control voltage (1)	V_{C1}	Without signal input, pin 2 DC voltage	0.0	0.3	0.9	V
Control voltage (2)	V_{C2}	V_{IN1} = 40 dBμ, pin 2 DC voltage	0.7	1.2	1.7	V
Control voltage (3)	V_{C3}	V_{IN1} = 70 dBμ, pin 2 DC voltage	2.5	3.2	3.9	V
Control voltage (4)	V_{C4}	V_{IN1} = 100 dBμ, pin 2 DC voltage	4.5	5.3	5.8	V
Control voltage (5)	V_{C5}	$V_{C5} = V_{C3} - V_{C2}$	1.8	2.0	2.2	V
Control voltage (6)	V_{C6}	$V_{C6} = V_{C4} - V_{C3}$	1.9	2.1	2.3	V
Output level L-channel	V_{OL}	V_{IN1} = 70 dBμ, pin 10 AC voltage	85	105	125	mV[rms]
Output level R-channel	V_{OR}	V_{IN1} = 70 dBμ, pin 9 AC voltage	85	105	125	mV[rms]
Channel balance	CB	$CB = 20 \cdot \log (V_{OL}/V_{OR})$	−1.0	0	1.0	dB
Residual pilot voltage	V_{PC}	V_P = 10% modulation, V_{IN1} = 70 dBμ, pin 22 output voltage	—	4	14	mV[rms]
Stereo lamp turn-on level	$LAMP_{ON}$	19 kHz modulation, Modulation factor at which pin 23 becomes under 1 V	1.3	4.0	6.3	%
Separation L-channel	Sep_L	L+R = 90%, V_P = 10% Larger separation value after changing over pin 7 external resistor	25	33	—	dB
Separation R-channel	Sep_R		25	33	—	dB
Capture range	CR	Modulation at V_P = 6.5% Referred to 19 kHz	±0.4	±0.7	—	%
Counter output level (1)	VIF_1	V_{IN1} = 100 dBμ, V_{24} = 2 V pin 23 output voltage	120	140	160	mV[rms]
Counter output level (2)	VIF_2	V_{IN1} = 100 dBμ, V_{24} = 5 V pin 23 output voltage	0	2	5	mV[rms]
Monaural THD (L)	THD_L	V_{IN2} monaural input, 500 mV[0-p] 1 kHz, L-ch. output distortion factor	—	0.1	0.3	%
Monaural THD (R)	THD_R	V_{IN2} monaural input, 500 mV[0-p] 1 kHz, R-ch. output distortion factor	—	0.1	0.3	%
Stereo THD (L)	THD_{STL}	V_{IN2} stereo input, 500 mV[0-p] 1 kHz, L-ch. output distortion factor	—	0.1	0.3	%
Stereo THD (R)	THD_{STR}	V_{IN2} stereo input, 500 mV[0-p] 1 kHz, R-ch. output distortion factor	—	0.1	0.3	%
PNL-AGC voltage (1)	V_{AGC1}	V_{IN2} = Without input pin 19 DC voltage	1.2	1.4	1.7	V
PNL-AGC voltage (2)	V_{AGC2}	Input V_{IN2} = 100 mV, f = 100 kHz Difference from V_{AGC1}	0.1	0.35	0.60	V
Residual noise voltage	V_{NR}	V_{IN2} = (pulse width 10 μs, 1 V[p-p] 1 kHz), L-ch. output	0.0	0.2	0.7	mV[rms]

■ Electrical Characteristics at T_a = 25°C

Unless otherwise specified, V_{CC} = 8V, V_{IN1} is f = 10.70 MHz, Mod. = 1 kHz, 30%
FM modulation stereo input is L + R = 90% V_P = 10%

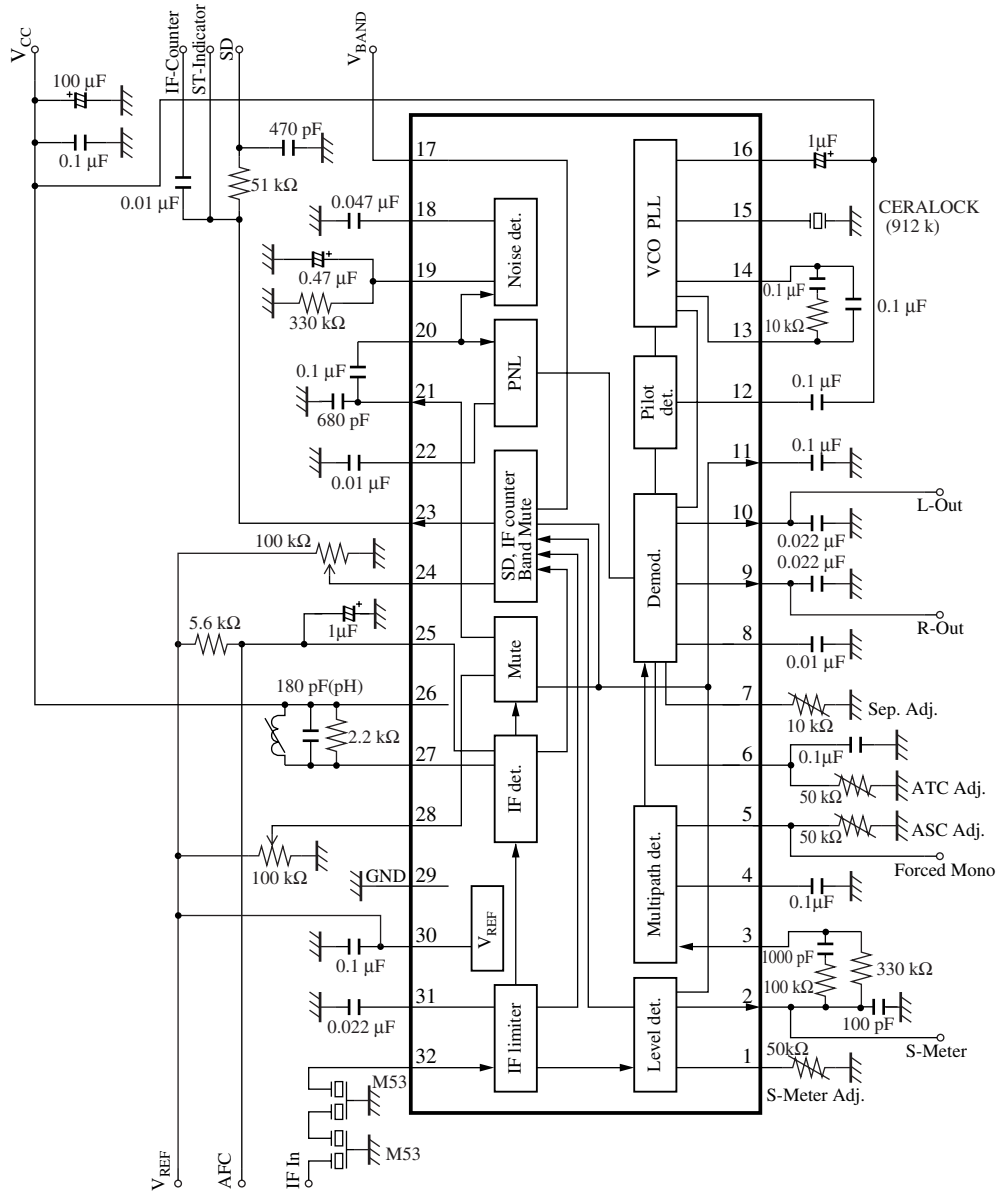
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
SD sensitivity	SD_S	V_{IN1} when V_{24} = 2 V, V_{23} > 2 V	68	78	88	dBμ
SD bandwidth	SD_W	V_{IN} bandwidth when V_{24} = 2 V, and V_{23} > 2 V, V_{IN1} = 100 dBμ	100	130	160	kHz
Supply current	I_{TOT}	Without input	30	37	44	mA
Limiting sensitivity	V_{LIM}	V_{IN1} input level when pin 9 AC voltage drops by 3 dB	24	32	38	dBμ
ATC	V_{ATC}	L-ch. output ratio when V_6 = 2 V and 0 V	6	10	14	dB
Gate pulse width	PW	V_{IN2} = (pulse width 1 μs, 0.3 V[p-p] 1 kHz) pin 22 output pulse width	16	23	30	μs

• Design reference data

Note) The following characteristics are the reference values for design and not guaranteed values.

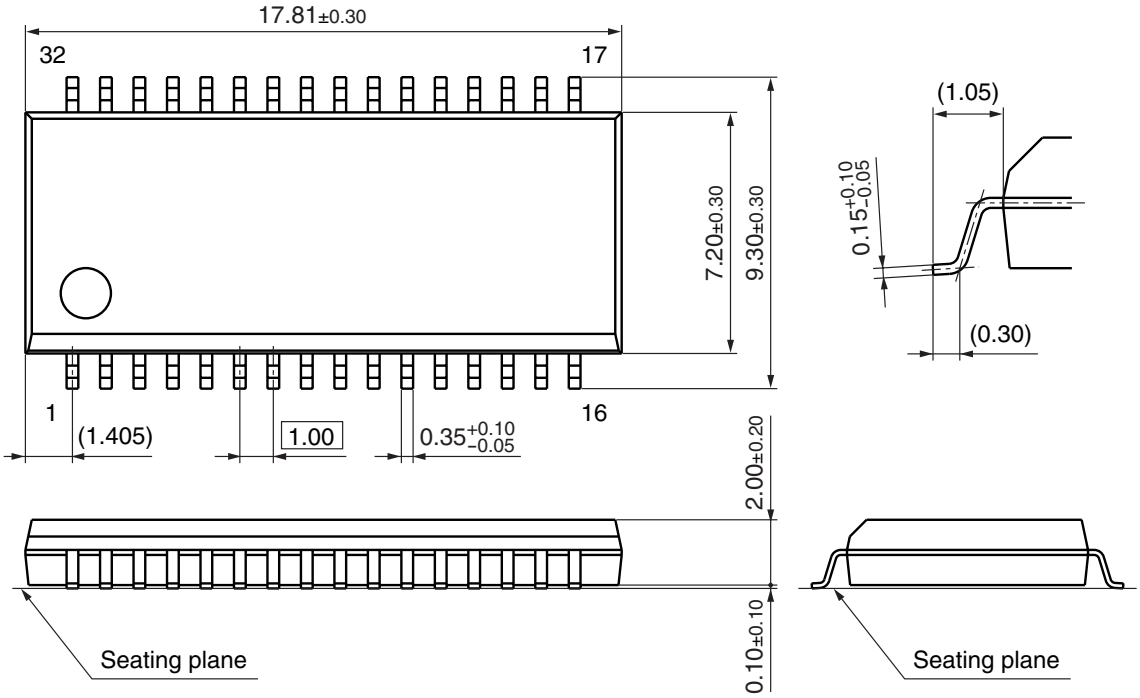
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Stereo lamp turn-off level	$LAMP_{OFF}$	Ratio between the modulation factor when pin 23 becomes 2 V or higher and $LAMP_{ON}$	2.0	6.0	10.0	dB
AFC offset voltage	V_{AFC}	Without signal input, DC potential difference between pin 25 and pin 30	− 0.1	0.0	0.1	V

■ Application circuit Example



■ New Package Dimensions (Unit: mm)

• SSOP032-P-0375C (Lead-free package)



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