

# AN7289NSC

## FM-FE+AM IC for car radio

### Overview

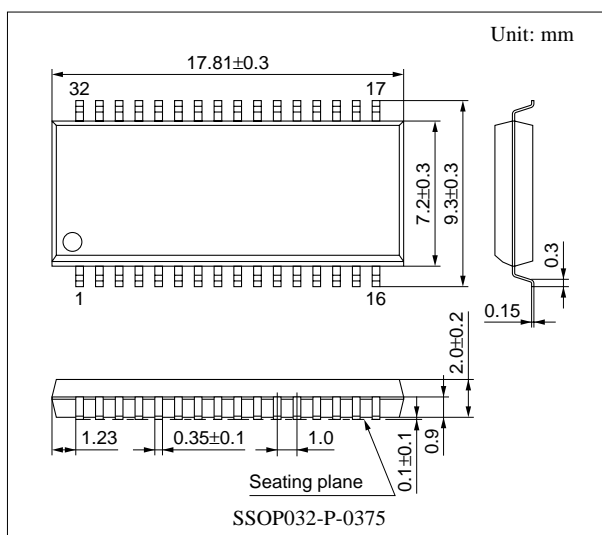
The AN7289NSC is an IC having FM-FE+AM functions for car radio. A tuner block of car radio can be constructed by combination of this IC and the AN7293NSC / NFBQ.

### Features

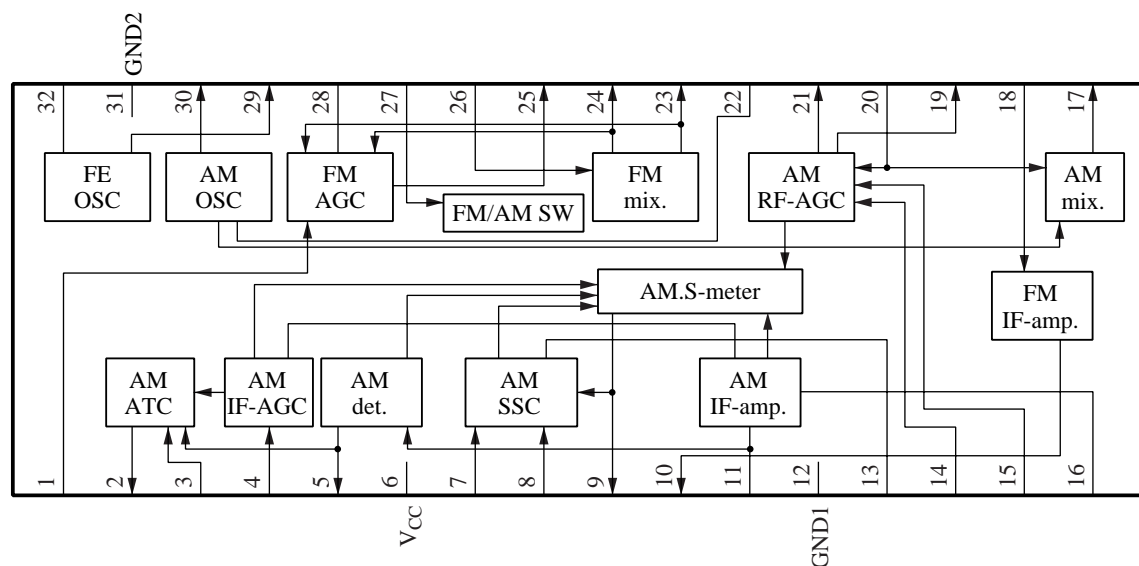
- A less number of electrolytic capacitors is required (3 capacitors reduction compared with our conventional IC)
- AM: Practical sensitivity is improved by 2 dB by ATC
- AM: Strong input characteristics is improved by 2-loop AGC function

### Applications

- Car radios



### Block Diagram



## ■ Pin Description

Pin No.	Description	Pin No.	Description
1	FM-keyed-AGC input	18	FM-IF input
2	AM-AF output / LO setting	19	AM-RF gain control
3	AM-ATC input	20	AM-mix. input
4	AM-IF level detection	21	FM-PIN-diode driver
5	AM detection output	22	AM-OSC coil pin
6	V <sub>CC1</sub>	23	FM-mix. output (2)
7	AM-IF counter output / DX / LO SW	24	FM-mix. output (1)
8	AM-SD output	25	FM-PIN-diode driver
9	AM-signal meter output	26	FM-mix. input
10	FM-IF output	27	V <sub>CC2</sub> / FM / AM SW
11	AM-IF output	28	FM-AGC output
12	GND1	29	FM-OSC buffer output
13	SSC	30	AM-OSC buffer output / FE-AGC sensitivity setting
14	AM-RF level detection		
15	AM-WAGC detection / DX setting	31	GND2
16	AM-IF input	32	FM-OSC coil pin
17	AM-mix. output		

## ■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	9.1	V
Supply current	I <sub>CC</sub>	56	mA
Power dissipation *2	P <sub>D</sub>	380.2	mW
Operating ambient temperature *1	T <sub>opr</sub>	−35 to +80	°C
Storage temperature *1	T <sub>stg</sub>	−55 to +125	°C

Note) \*1: Except for the power dissipation, operating ambient temperature, and storage temperature, all ratings are for T<sub>a</sub> = 25°C.

\*2: T<sub>a</sub> = 80°C

## ■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V <sub>CC</sub>	7.2 to 9.0	V

# ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$

## 1. AM mode $V_{CC} = 8.0\text{ V}$ , $f_{IN} = 1\text{ MHz}$

AM tuning condition: OSC output frequency =  $1\,450\text{ kHz} \pm 500\text{ Hz}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
AM consumption current	$\text{amI}_{t1}$	Without input	28	36	44	mA
AM-AF output	$\text{amV}_O$	AM-AF output at $V_{IN2} = 74\text{ dB}\mu$ , 400 Hz 30%	100	125	155	mA
AM signal-to-noise ratio	$\text{amSN}$	AM-AF output S/N at $V_{IN2} = 74\text{ dB}\mu$ , 400 Hz 30%	48	52	58	dB
AM-AGC width	$\text{amW}$	AM-AF output when input changes -10 dB at $V_{IN2} = 74\text{ dB}\mu$ , 400 Hz 30%	55	59	63	dB
AM-ATC operation	$\text{amATC}$	(Output ratio [dB] of 400 Hz and 3 kHz when $V_{IN2} = 18\text{ dB}\mu$ ) - (Output ratio [dB] of 400 Hz and 3 kHz when $V_{IN2} = 74\text{ dB}\mu$ ) 80% Mod., AM-AF Out output	3.5	6.5	9.5	dB
AM-distortion 1	$\text{amT}_1$	$V_{IN2} = 74\text{ dB}\mu$ 400 Hz 80% AM-AF output distortion	0.01	0.5	1.5	%
AM-distortion 2	$\text{amT}_2$	$V_{IN2} = 130\text{ dB}\mu$ 400 Hz 80% AM-AF output distortion	0.01	0.5	1.5	%
AM wide band AGC on input	$\text{amV}_W$	$f_{IN2} = 1.4\text{ MHz}$ Input when pin 15 voltage becomes below 3 V	97	103	109	dB $\mu$
AM local oscillation buffer output	$\text{amV}_{OS}$	Without input	160	210	260	mV
AM-IF count output 1	$\text{amIF}_1$	$V_{IN2} = 40\text{ dB}\mu$	150	210	270	mV
AM-IF count output 2	$\text{amIF}_2$	Without input	—	—	10	mV
AM-SD output 1	$\text{amSD}_1$	$V_{IN2} = 40\text{ dB}\mu$	4.5	4.9	5.1	V
AM-SD output 2	$\text{amSD}_2$	Without input	0.0	0.2	0.5	V
AM signal meter output 1	$\text{amV}_{S1}$	Without input, pin 9 voltage	1	50	200	mV
AM signal meter output 2	$\text{amV}_{S2}$	Pin 9 voltage at $V_{IN2} = 30\text{ dB}\mu$	0.7	0.95	1.2	V
AM signal meter output 3	$\text{amV}_{S3}$	Pin 9 voltage at $V_{IN2} = 130\text{ dB}\mu$	4.1	4.8	5.1	V
AM search sensitivity DX	$\text{amDX}$	AM-IF count output is 120 mV or over $V_{IN2}$ when $f$ becomes $450\text{ kHz} \pm 2\text{ kHz}$	24	30	36	dB $\mu$
AM search sensitivity LO	$\text{amLO}$	AM-IF count output is 120 mV or over $V_{IN2}$ when $f$ becomes $450\text{ kHz} \pm 2\text{ kHz}$	44	50	56	dB $\mu$

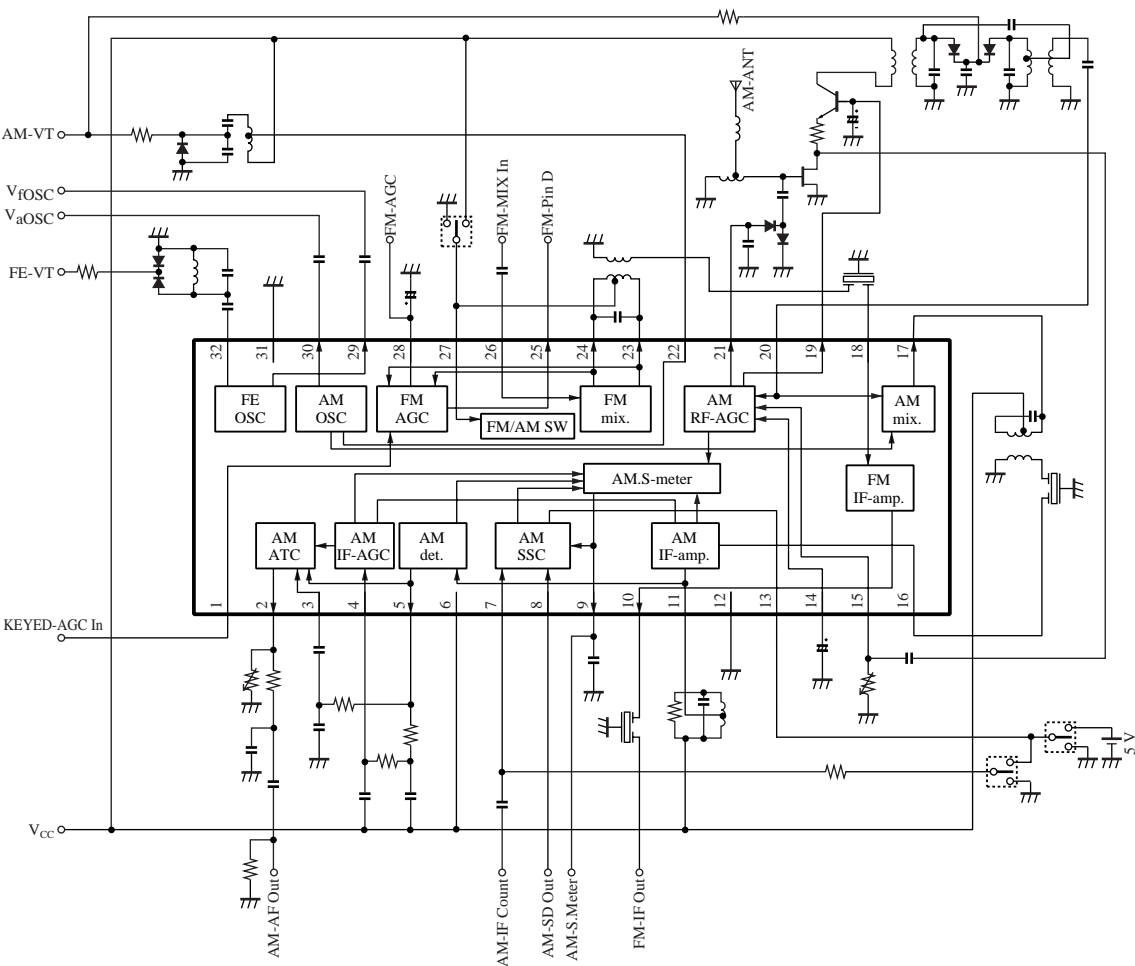
■ Electrical Characteristics at  $T_a = 25^\circ\text{C}$  (continued)

2. FM mode  $V_{CC} = 8.0\text{ V}$ ,  $f_{IN1} = 98\text{ MHz}$

FM tuning condition: OSC output frequency =  $108.7\text{ MHz} \pm 10\text{ kHz}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
FM local oscillation buffer output	fmV <sub>OS</sub>	$f_{OSC} = 108.7\text{ MHz}$ without input	140	200	260	mV
FM-IF output level	fmIF	$V_{IN1} = 71\text{ dB}\mu$	50	95	140	mV
FM-AGC sensitivity	fmAGC	$V_{IN1}$ level when $V_{28}$ becomes 3 V	59	63	67	dB $\mu$
FM-AGC voltage (high)	fmV <sub>aH</sub>	$V_{IN1} = 70\text{ dB}\mu$ $V_{28}$	6.0	6.4	6.8	V
FM-AGC voltage (low)	fmV <sub>aL</sub>	$V_{IN1} = 82\text{ dB}\mu$ $V_{28}$	—	0.05	0.5	V
FM consumption current	fmI <sub>t</sub>	Without input	26	35	44	mA

■ Application Circuit Example



## Request for your special attention and precautions in using the technical information and semiconductors described in this material

- (1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.
- (2) The technical information described in this material is limited to showing representative characteristics and applied circuit examples of the products. It does not constitute the warranting of industrial property, the granting of relative rights, or the granting of any license.
- (3) The products described in this material are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).  
Consult our sales staff in advance for information on the following applications:
  - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
  - Any applications other than the standard applications intended.
- (4) The products and product specifications described in this material are subject to change without notice for reasons of modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (5) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.  
Even when the products are used within the guaranteed values, redundant design is recommended, so that such equipment may not violate relevant laws or regulations because of the function of our products.
- (6) When using products for which dry packing is required, observe the conditions (including shelf life and after-unpacking standby time) agreed upon when specification sheets are individually exchanged.
- (7) No part of this material may be reprinted or reproduced by any means without written permission from our company.

## Please read the following notes before using the datasheets

- A. These materials are intended as a reference to assist customers with the selection of Panasonic semiconductor products best suited to their applications.  
Due to modification or other reasons, any information contained in this material, such as available product types, technical data, and so on, is subject to change without notice.  
Customers are advised to contact our semiconductor sales office and obtain the latest information before starting precise technical research and/or purchasing activities.
- B. Panasonic is endeavoring to continually improve the quality and reliability of these materials but there is always the possibility that further rectifications will be required in the future. Therefore, Panasonic will not assume any liability for any damages arising from any errors etc. that may appear in this material.
- C. These materials are solely intended for a customer's individual use.  
Therefore, without the prior written approval of Panasonic, any other use such as reproducing, selling, or distributing this material to a third party, via the Internet or in any other way, is prohibited.