

# AN7280S

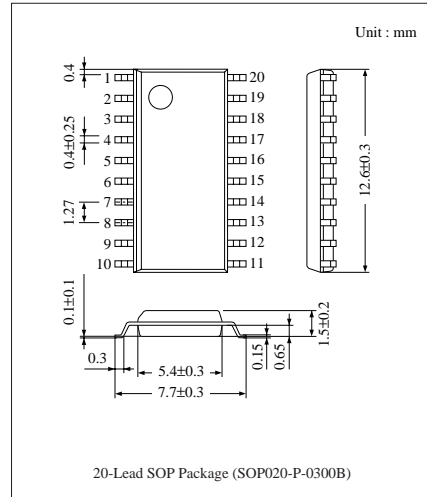
## FM Front-end IC for Car Radio

### ■ Overview

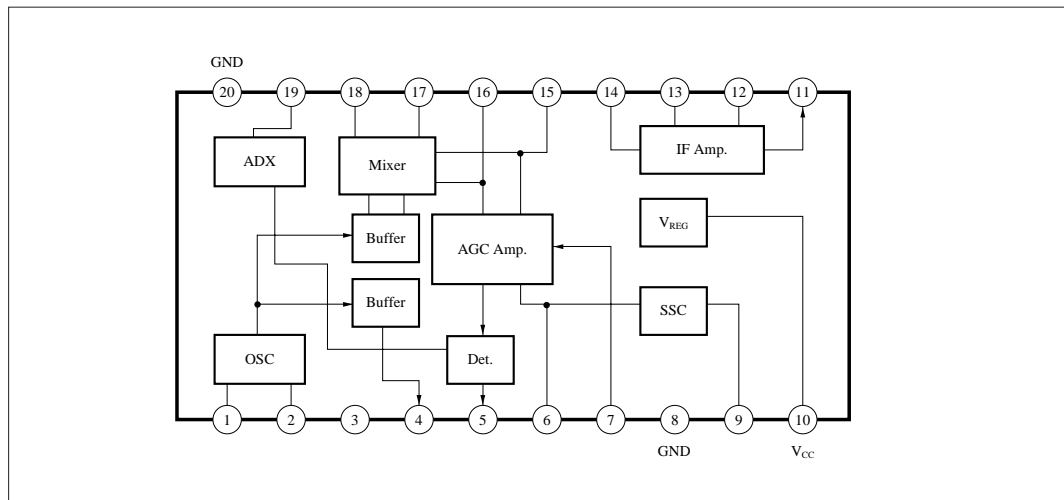
The AN7280S is an FM front-end IC designed for DTS except RF amp. of car radio. It features built-in local oscillation frequency buffer output, PIN diode driver for antenna damping and SSC (search stop control).

### ■ Features

- High sensitivity, high S/N ratio
- Good IM characteristics at strong input
- Available for two loop AGC (keyed AGC)
- Pre IF amp. gain variable
- PIN diode driver (ADX) built-in



### ■ Block Diagram



### ■ Absolute Maximum Ratings (Ta=25°C)

| Parameter                     | Symbol           | Rating      | Unit |
|-------------------------------|------------------|-------------|------|
| Supply Voltage                | V <sub>CC</sub>  | 9.2         | V    |
| Supply Current                | I <sub>CC</sub>  | 50          | mA   |
| Power Dissipation             | P <sub>D</sub>   | 460         | mW   |
| Operating Ambient Temperature | T <sub>opr</sub> | -40 ~ + 85  | °C   |
| Storage Temperature           | T <sub>stg</sub> | -55 ~ + 150 | °C   |

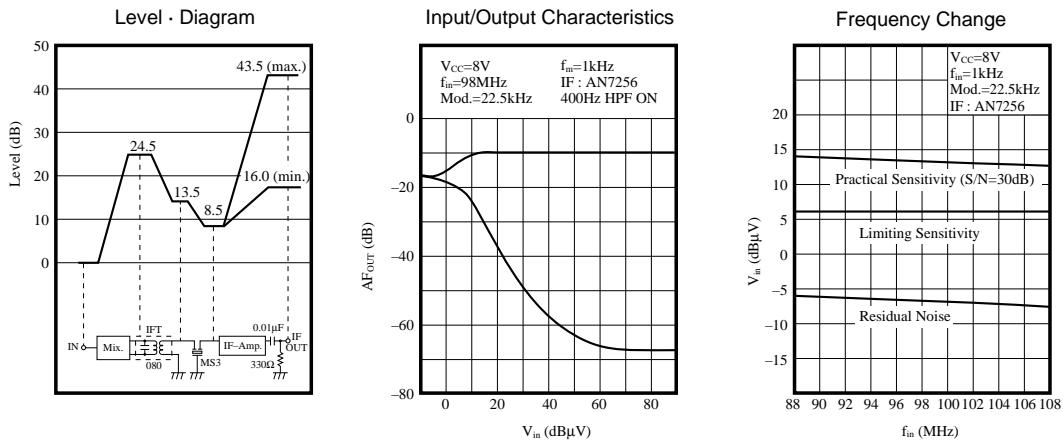
### ■ Recommended Operating Range (Ta=25°C)

| Parameter                      | Symbol          | Range       |
|--------------------------------|-----------------|-------------|
| Operating Supply Voltage Range | V <sub>CC</sub> | 6.8V ~ 9.2V |

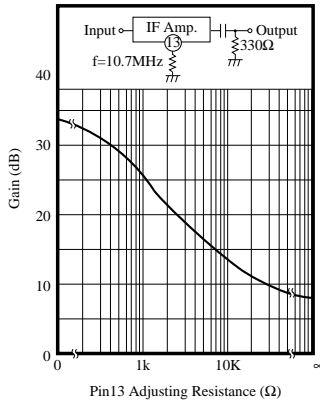
### ■ Electrical Characteristics (Ta=25°C)

| Parameter               | Symbol              | Condition                                                                                                 | min. | typ. | max. | Unit |
|-------------------------|---------------------|-----------------------------------------------------------------------------------------------------------|------|------|------|------|
| S/N Ratio               | N <sub>OUT</sub>    | V <sub>CC</sub> = 8V, V <sub>in</sub> =17dBμ No modulation<br>However, S= output at 400Hz, 30% modulation | 22   | 30   | —    | dB   |
| Local Oscillation Level | V <sub>OSC</sub>    | V <sub>CC</sub> = 8V, f <sub>osc</sub> = 108.7MHz<br>Measured by Pin4, No signal input                    | 219  | 384  | 435  | mV   |
| IF Output Level         | V <sub>OUT</sub>    | V <sub>CC</sub> = 8V, V <sub>in</sub> = 51dBμ                                                             | 41   | 58   | 82   | mV   |
| AGC Level (L)           | V <sub>AGC(L)</sub> | V <sub>CC</sub> = 8V, V <sub>in</sub> = 67dBμ                                                             | —    | 0.05 | 0.5  | V    |
| AGC Level (H)           | V <sub>AGC(H)</sub> | V <sub>CC</sub> = 8V, V <sub>in</sub> = 53dBμ                                                             | 6    | 6.5  | —    | V    |

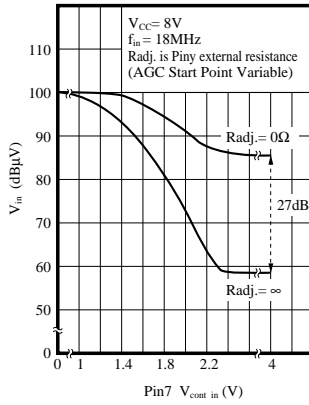
### ■ Characteristics Curve



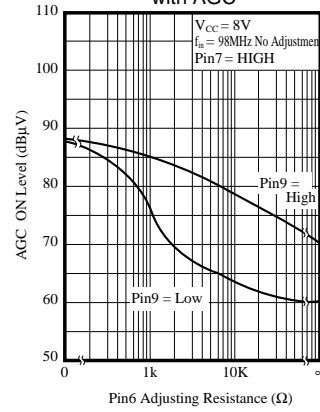
IF-Amp. Gain Adjustment



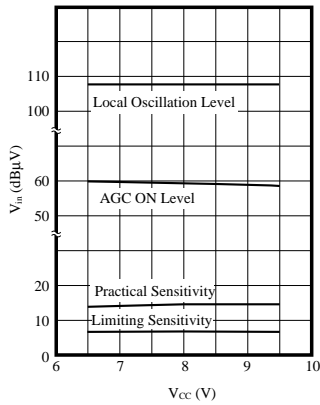
AGC ON Level



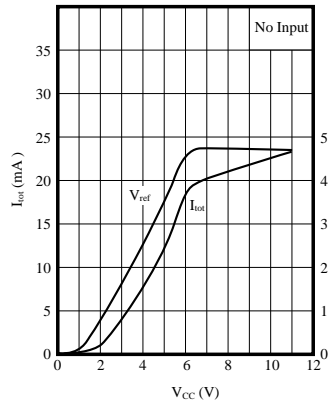
Amp. Gain Adjustment with AGC



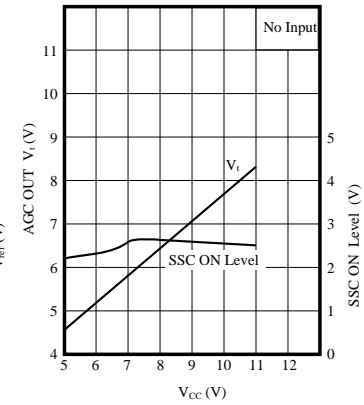
Supply Voltage Change



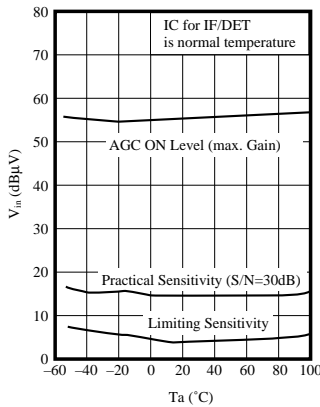
Supply Voltage Dependence



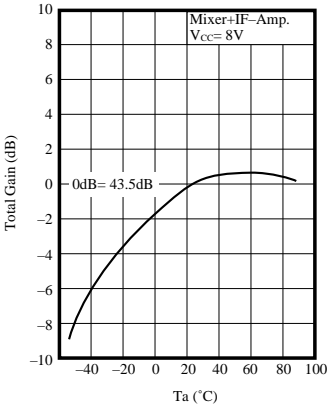
Supply Voltage Dependence



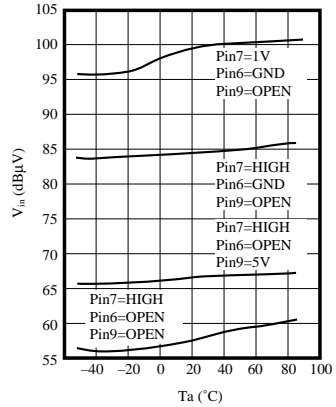
Temperature Characteristics



Total Gain Temperature Characteristics



AGC Start Point Temperature Characteristics





■ Pin Descriptions

| Pin No. | Pin Name                  | Description                                                                        | Equivalent Circuit |
|---------|---------------------------|------------------------------------------------------------------------------------|--------------------|
| 1       | OSC Emitter               | Local oscillation transistor emitter pin                                           |                    |
| 2       | OSC Base                  | Local oscillation transistor base pin                                              |                    |
| 3       | OSC By-pass               | $V_{ref}$ by-pass pin for mixer, OSC buffer, OSC section                           |                    |
| 4       | OSC Buffer Output         | Pin for output OSC signal to pre-scaler                                            |                    |
| 5       | Level Detection Output    | AGC signal output pin for RF-Amp. secondary gate                                   |                    |
| 6       | AGC- Amp. Gain Adjustment | Pin for adjusting AGC Amp. gain by external resistance                             |                    |
| 7       | Control Signal Input      | Pin for adjusting AGC-Amp. gain through input of control signal from IF section    |                    |
| 8       | GND                       | _____                                                                              | _____              |
| 9       | SSC Input                 | Pin for adjusting AGC-Amp. gain through input of control signal from microcomputer |                    |
| 10      | $V_{cc}$                  | _____                                                                              | _____              |

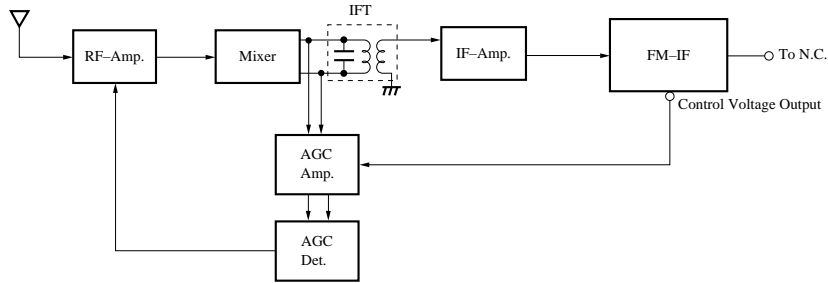
## ■ Pin Descriptions (Cont.)

| Pin No. | Pin Name                | Description                                                                                               | Equivalent Circuit |
|---------|-------------------------|-----------------------------------------------------------------------------------------------------------|--------------------|
| 11      | IF-Amp.                 | IF-Amp. output pin                                                                                        |                    |
| 12      | IF-Amp. By-pass         | IF-Amp. by-pass pin                                                                                       |                    |
| 14      | IF-Amp. Input           | IF-Amp. input pin                                                                                         |                    |
| 13      | IF-Amp. Gain Adjustment | Pin for adjusting IF-Amp. gain by external resistance                                                     |                    |
| 15      | Mix. Output             | Mixer output pin                                                                                          |                    |
| 16      |                         |                                                                                                           |                    |
| 17      | Mix. By-pass            | Mixer by-pass pin                                                                                         |                    |
| 18      | Mix. Input              | Mixer input pin                                                                                           |                    |
| 19      | ADX Output              | PIN diode driver output pin<br>Determine maximum current to PIN diode by Pin19 external resistance value. |                    |
| 20      | GND                     | Oscillator GND                                                                                            |                    |

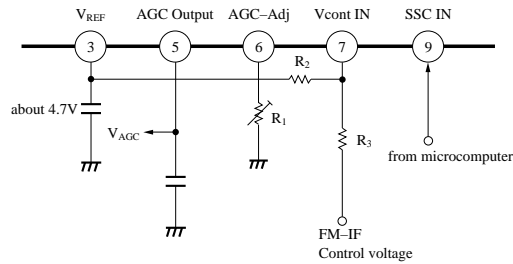
■ Operational Description

• Loop AGC

The AN7280S uses 2Loop AGC for AGC circuit. 2Loop AGC controls AGC output by using mixer output (IFT first side) signal and FM-IF control voltage (level meter output), which is a very favorable system for disturbance characteristics, etc.



- AGC start point (Mixer input level at  $V_{AGC} < 3V$ ) changes in proportion to Pin6 external resistance (following  $R_1$ ), Pin 7 applied voltage (Determine IF control voltage by  $R_2$ ,  $R_3$  resistance division) SSC ON/OFF
  - Variable width at  $R_1$ , 28dB (however,  $V_7 \geq 3V$ ,  $V_9 = 0V$ )
  - Variable width at  $R_2$ , 40dB (however,  $R_1 = \infty$ ,  $V_9 = 0V$ )
  - Variable width at  $R_3$ , 10dB (however,  $R_1 = \infty$ ,  $V_7 \geq 3V$ )



• SSC

Change AGC start point by microcomputer control signal at seek/reception time.

Use at SSC ON .....  $V_9 > 3.5V$

Use at SSC OFF .....  $V_9 < 1.5V$

\* SSC is designed as precondition for switching operation at microcomputer control signal.