# AN7395K, AN7395S

## Spatializer IC (3-D Surround)

### ■ Overview

Spatializer Audio Processor is a signal processing technology, monopolized by Desper Products, Inc., that was developed for commercial electronics and multimedia markets, and is based on Desper's “PRO Spatializer” that is a 3-D audio production system for business use. The AN7395K, AN7395S utilizes the innovative technology adopted in that system, and provides sound enhancement effect and sound expansion with the conventional 2-speaker stereo system.

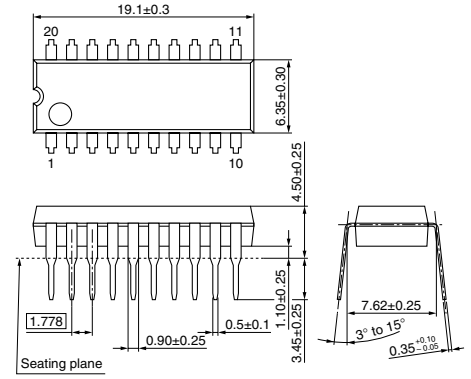
### ■ Features

- Provides deep 3-D sound with conventional 2-speaker system.
- The audio signal recorded through this IC can be reproduced with usual stereo system.
- Performs optimal processing to the sound source recorded with surround-effect so as not to give double effects.
- Sound expansion effect can be varied.
- A pseudo stereo effect for the monaural audio signal is achieved.
- Positions and moves each sound source on 270° arc in real time.

### ■ Applications

- Televisions, videos, audio equipment, personal computers, and game machines

AN7395K Unit: mm

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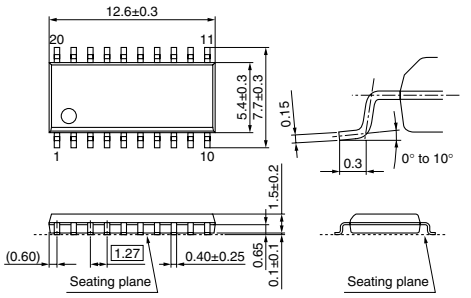
AN7395S Unit: mm

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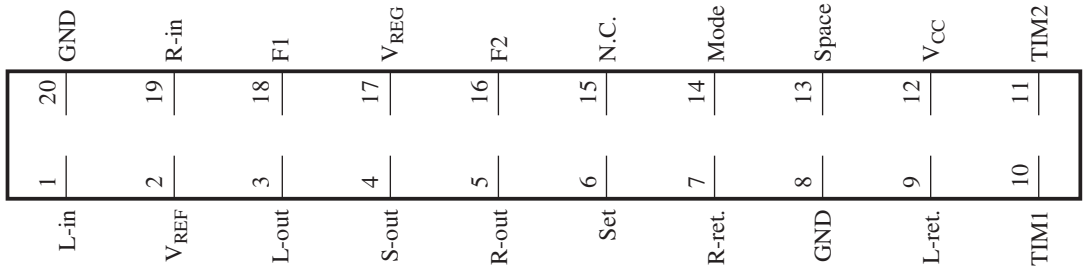
### ■ Pin Assignment




Note) Spatializer® and the device trademark of circle-in-square ◙ are owned by Desper Products Inc..
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## ■ Pin Descriptions

| Pin No. | Descriptions | Pin No. | Descriptions |
|---|---|---|---|
| 1 | L-in | 11 | TIM2 |
| 2 | $V_{REF}$ | 12 | $V_{CC}$ |
| 3 | L-out | 13 | Space |
| 4 | S-out | 14 | Mode |
| 5 | R-out | 15 | N.C. |
| 6 | Set | 16 | F2 |
| 7 | R-ret. | 17 | $V_{REG}$ |
| 8 | GND | 18 | F1 |
| 9 | L-ret. | 19 | R-in |
| 10 | TIM1 | 20 | GND |

## ■ Absolute Maximum Ratings

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Supply voltage | $V_{CC}$ | 11 | V |
| Supply current | $I_{CC}$ | 100 | mA |
| Power dissipation *2 | $P_D$ | 230 | mW |
| Operating ambient temperature *1 | $T_{opr}$ | –25 to +75 | °C |
| Storage temperature *1 | $T_{stg}$ | –55 to +125 | °C |

Note) *1: Except for the operating ambient temperature and storage temperature, all ratings are for $T_a$ = 25°C.
*2: The power dissipation shown is the value for $T_a$ = 75°C

## ■ Recommended Operating Range

| Parameter | Symbol | Range | Unit |
|---|---|---|---|
| Supply voltage | $V_{CC}$ | 6.0 to 10.0 | V |

■ Electrical Characteristics at $V_{CC}$ = 9 V, f = 1 kHz, $T_a$ = 25°C ± 2°C

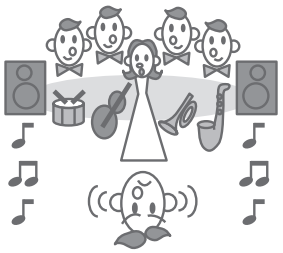
| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Total circuit current | $I_{TOTAL}$ | $V_{IN}$ = 0 mV | 5 | 11 | 17 | mA |
| Maximum output voltage *3 | $V_{OUT1}$ | L-in, R-in THD = 1% | 2.0 | 2.8 | — | V[rms] |
| Output noise voltage 1 *1, 4 | $V_{NO1}$ | L-out, R-out $R_G$ = 4.7 kΩ | — | 20 | 100 | μV[rms] |
| Voltage gain 1 *3 | $G_{V1}$ | L-out, R-out $V_{IN}$ = 400 mV | –2 | 0 | 2 | dB |
| Total harmonic distortion 1 *2, 3 | $THD_1$ | L-out, R-out $V_{IN}$ = 400 mV | — | 0.05 | 0.3 | % |
| Output noise voltage 2 *1, 5 | $V_{NO2}$ | S-out $R_G$ = 4.7 kΩ | — | 160 | 600 | μV[rms] |
| Voltage gain 2 *6 | $G_{V2}$ | S-out $V_{IN}$ = 60 mV | 200 | 280 | 400 | mV[rms] |
| Total harmonic distortion 2 *2, 6 | $THD_2$ | S-out $V_{IN}$ = 60 mV | — | 0.05 | 0.3 | % |
| Mono mode switching voltage | $V_M$ | | 4.2 | — | $V_{CC}$ | V |
| Off mode switching voltage | $V_{OFF}$ | | 0 | — | 0.9 | V |
| Stereo mode switching voltage | $V_{ST}$ | | 2.1 | — | 2.8 | V |

Note) ∗1: In measuring, the filter with A-characteristic curve is used.
∗2: In measuring, the filter for the range of 15 Hz to 30 kHz (12 dB/OCT) is used.
∗3: Mode: ST, L-in + R-in, VCA min.
∗4: Mode: ST, VCA min.
∗5: Mode: ST, VCA max.
∗6: Mode: ST, VCA max. for either L-in or R-in.

## ■ Conceptual Explanation of Spatializer Operation

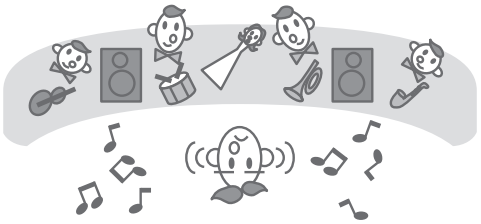
• Normal stereo

All sounds are heard from only between two speakers, right and left.



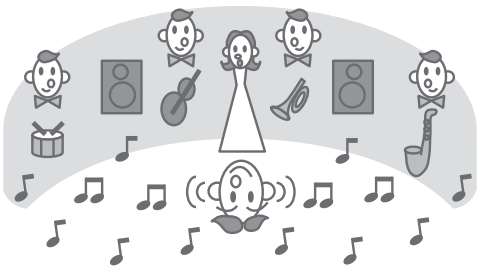
• Conventional surround

The sound expands toward the outside of the speaker system, but the sound position comes apart mostly in the conventional systems.

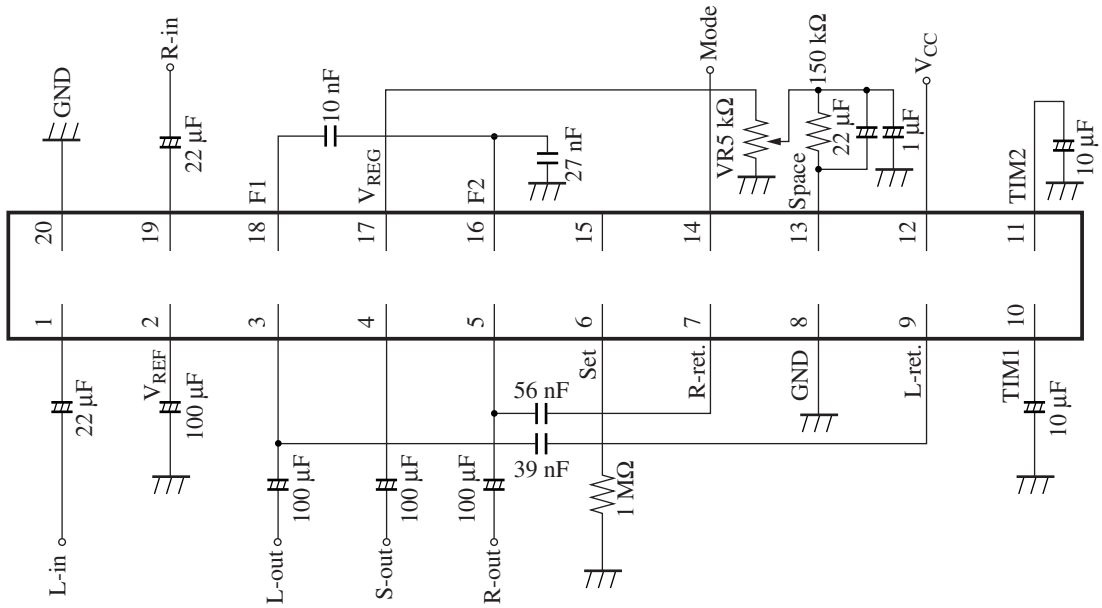


• Spatializer

The sound expands toward the outside of the two speakers, and yet their positions are stable and an expanded, deep sound are gotten.



■ Application Circuit Example (Basic circuitry)




Note) When switching noise occurs at mode switching, insert a capacitor between pin 14 and GND.

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