

AN7399S

Spatializer sound processor IC

Overview

A spatializer audio processor is the Desper Inc.'s proprietary signal processing technology exclusively developed for the consumer electronics and multimedia market. It is based on the Desper's professional 3D audio production system "PRO-Spatializer". You can enjoy a sound enhancement and extension effect with the conventional two-speaker stereo system by using the innovative technology adopted in this equipment.

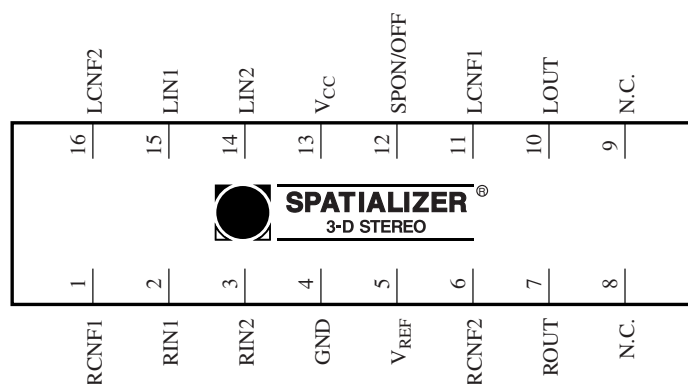
Features


- Fewer external parts (minimum parts count: 4)
- Wide operating supply voltage: 4.5 V to 10 V
- A sound source in the center position is necessarily positioned in center regardless of the spatializer effect value.

Applications

- Radio cassette recorder, stereo-sound TV and VCR, personal computer, active speaker

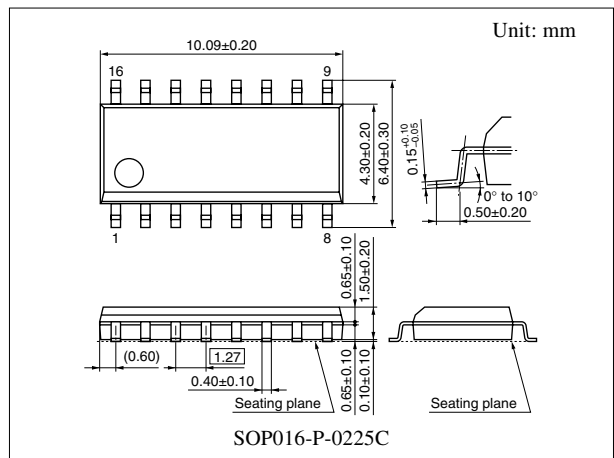
Pin Assignment



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

This product can be used with the consent of the Desper Products Inc.

Under the terms of the agreement between Matsushita Electric and Desper Products Inc., no technical information on the Spatializer, which is applied to this product, shall be provided.



Note) The package of this product will be changed to lead-free type (SOP016-P-0225F). See the new package dimensions section later of this datasheet.

■ Pin Descriptions

| Pin No. | Description | Pin No. | Description |
|---------|------------------|---------|-----------------|
| 1 | RCNF1 | 9 | N.C. |
| 2 | RIN1 | 10 | LOUT |
| 3 | RIN2 | 11 | LCNF1 |
| 4 | GND | 12 | SPON/OFF |
| 5 | V _{REF} | 13 | V _{CC} |
| 6 | RCNF2 | 14 | LIN2 |
| 7 | ROUT | 15 | LIN1 |
| 8 | N.C. | 16 | LCNF2 |

■ Absolute Maximum Ratings

| Parameter | Symbol | Rating | Unit |
|---------------------------------|------------------|-------------|------|
| Supply voltage | V _{CC} | 10.5 | V |
| Supply current | I _{CC} | 3.0 | mA |
| Power dissipation | P _D | 31.5 | mW |
| Operating ambient temperature * | T _{opr} | -25 to +75 | °C |
| Storage temperature * | T _{stg} | -55 to +150 | °C |

Note) *: Except for the operating ambient temperature and storage temperature, all ratings are for T_a = 25°C.

■ Recommended Operating Range

| Parameter | Symbol | Range | Unit |
|----------------|-----------------|-------------|------|
| Supply voltage | V _{CC} | 4.5 to 10.0 | V |

■ Electrical Characteristics at V_{CC} = 9 V, freq. = 1 kHz, T_a = 25°C

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---------------------------------------|--------------------|--|-----|------|-----------------|---------|
| Off mode gain *1 | VFFG | V _{IN} = 1 V[rms], f = 1 kHz | -1 | 0 | 1 | dB |
| Off mode total harmonic distortion *1 | THD _{FF} | V _{IN} = 1 V[rms], f = 1 kHz | — | 0.01 | 0.05 | % |
| On mode total harmonic distortion *1 | THD _{ON} | V _{IN} = 0.4 V[rms], f = 1 kHz | — | 0.02 | 0.1 | % |
| Off mode output residual noise *2 | N _{FF} | V _{IN} = 0 mV[rms], R _G = 4.7 kΩ | — | 5 | 15 | μV[rms] |
| On mode output residual noise *2 | N _{ON} | V _{IN} = 0 mV[rms], R _G = 4.7 kΩ | — | 7 | 20 | μV[rms] |
| Crosstalk (off mode) *1 | CT | V _{IN} = 1 V[rms], f = 1 kHz | — | -95 | -75 | dB |
| Maximum input level (off mode) *1 | V _{MAX} | THD = 1%, f = 1 kHz | 2.0 | 2.4 | — | V[rms] |
| Total circuit current at no load | I _{TOTAL} | V _{IN} = 0 mV[rms] | 0.8 | 1.4 | 2.0 | mA |
| Off mode changeover voltage | V _{OFF} | | 0.0 | — | 0.5 | V |
| On mode changeover voltage | V _{ON} | | 2.7 | — | V _{CC} | V |

Note) *1: Use DIN audio filter.

*2: Use A-characteristic curve filter.

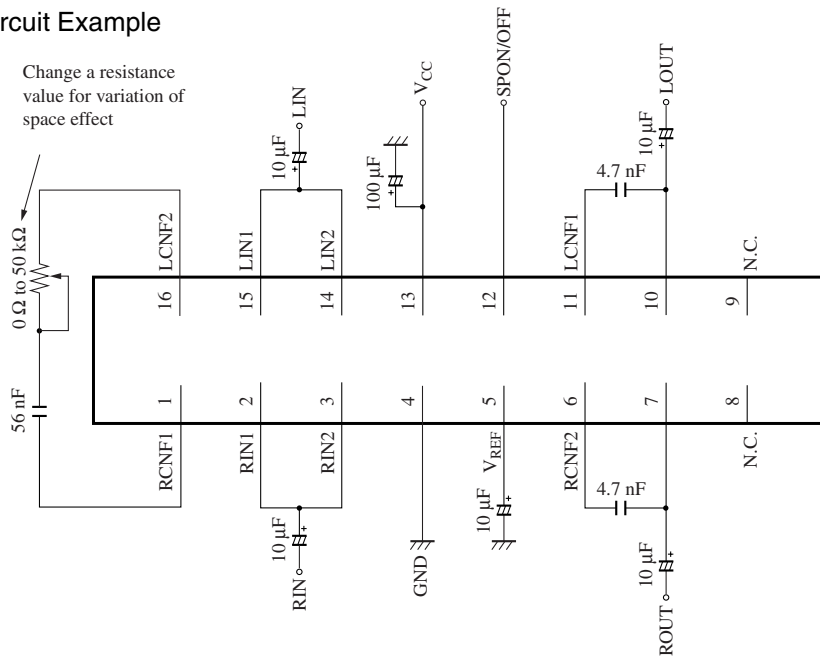
■ Terminal Equivalent Circuits

| Pin No. | Symbol | Equivalent circuit | Description | Voltage |
|---------|------------------|--------------------|-----------------------------------|---------|
| 1 | RCNF1 | — | Capacitor pin 1 | 4.5 V |
| 2 | RIN1 | | R-ch. input pin 1 | 4.5 V |
| 3 | RIN2 | | R-ch. input pin 2 | 4.5 V |
| 4 | GND | — | GND pin | 0 V |
| 5 | V _{REF} | | Reference voltage stabilizing pin | 4.5 V |
| 6 | RCNF2 | — | Capacitor pin 2 | 4.5 V |
| 7 | ROUT | | R-ch. output pin | 4.5 V |
| 8 | N.C. | — | — | — |
| 9 | N.C. | — | — | — |

■ Terminal Equivalent Circuits (continued)

| Pin No. | Symbol | Equivalent circuit | Description | Voltage |
|---------|----------|--------------------|---------------------|-------------------------------------|
| 10 | LOUT | | L-ch. output pin | 4.5 V |
| 11 | LCNF1 | — | Capacitor pin 3 | 4.5 V |
| 12 | SPON/OFF | | Mode changeover pin | V_{CC} to 2.7 V / 0.5 V to 0 V |
| 13 | V_{CC} | — | Supply pin | V_{CC} |
| 14 | LIN1 | | L-ch. input pin 1 | 4.5 V |
| 15 | LIN2 | | L-ch. input pin 2 | 4.5 V |
| 16 | LCNF2 | — | Capacitor pin 4 | 4.5 V |

■ Application Circuit Example



■ Conceptual Description on Spatializer Operation

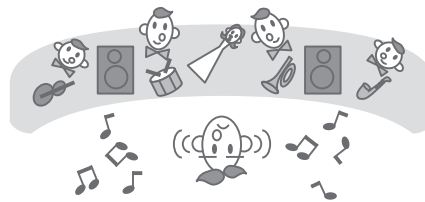
• Stereo normal mode

All sound are heard from between both left and right speakers.



• Conventional surround system

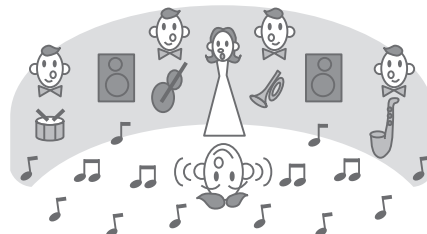
Sound expands outside the speakers but the sound position is not stable.



• Spatializer

The sound expands outside the two speakers and the sound position is stable.

The sound come to have its expansion and depth. And also, a sound source in the center position is necessarily positioned in center regardless of the spatializer effect value.

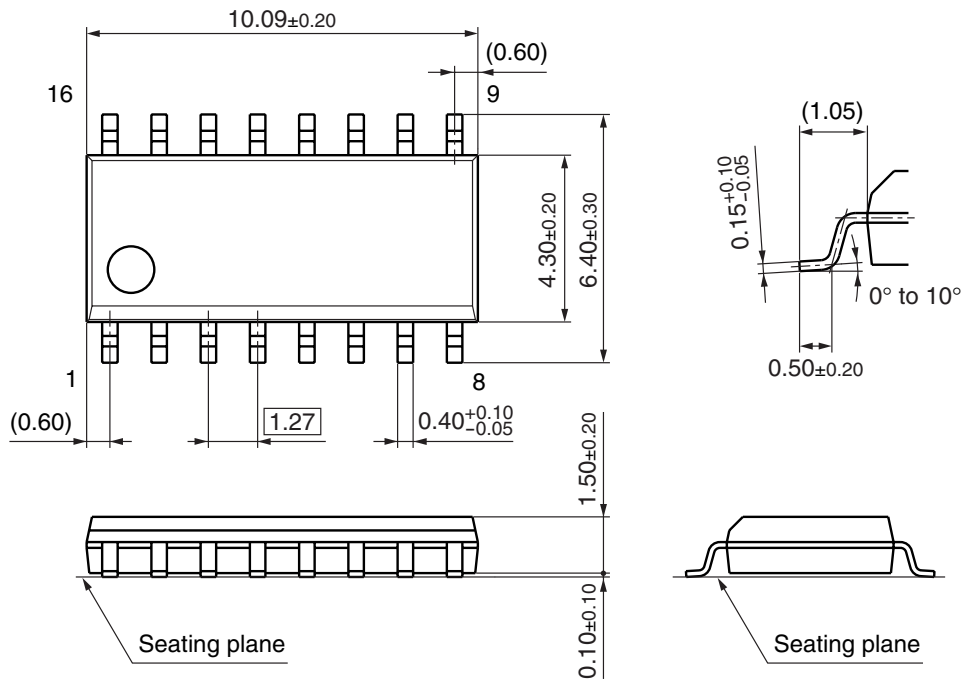


■ Usage Notes

1. Do not apply 0.3 V or more to pin 12 because it relates with pin 13 (V_{CC} pin)
2. If more than 0.3 V is applied to pin 12, the current flows to pin 13 (V_{CC} pin) via a surge protection diode connected to pin 12.

■ New Package Dimensions (Unit: mm)

- SOP016-P-0225F (Lead-free package)



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