AN7399, 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.

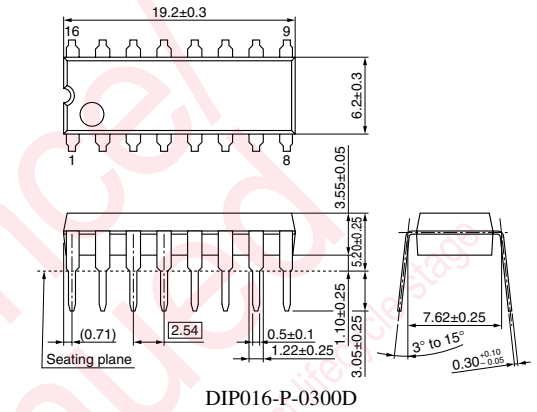
■ Features

- 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

AN7399 Unit: mm



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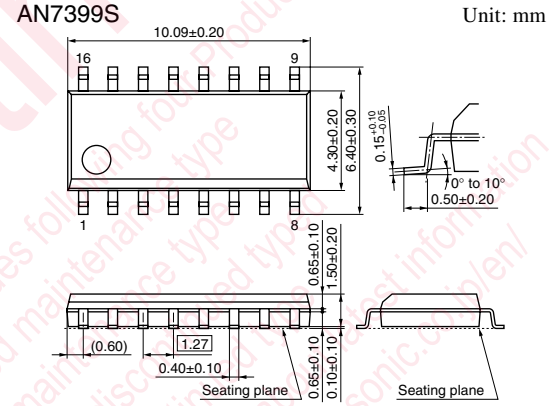
AN7399S Unit: mm



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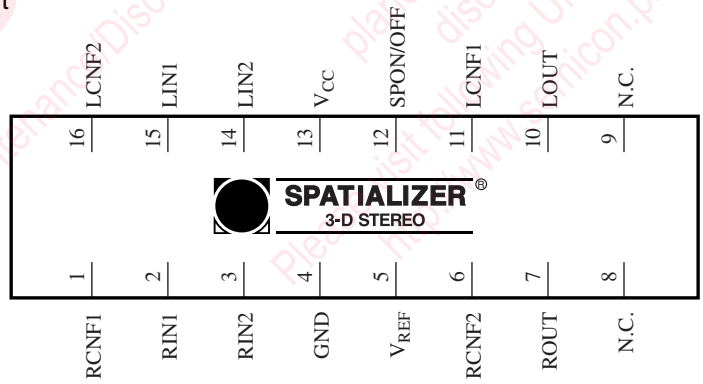
■ Pin Assignment



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 Electronics and Desper Products Inc., no technical information on the Spatializer, which is applied to this product, shall be provided.

■ 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

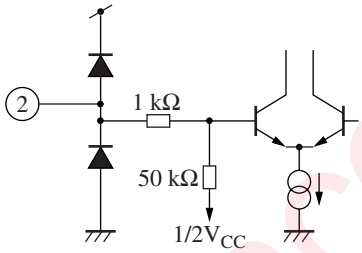
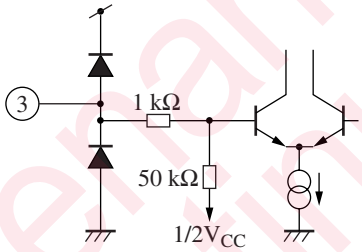
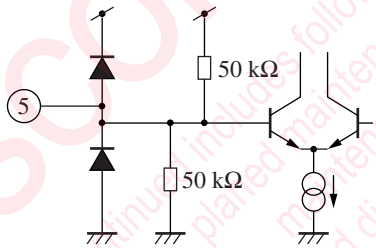
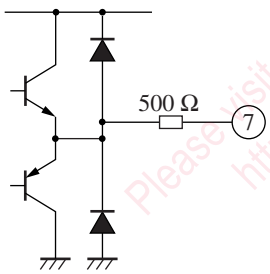
Parameter	Symbol	Range	Unit
Supply voltage	V_{CC}	4.5 to 10.0	V

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

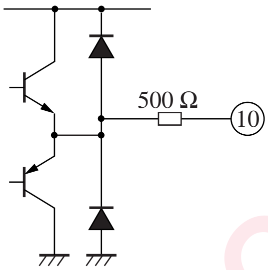
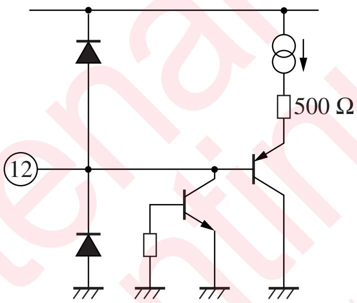
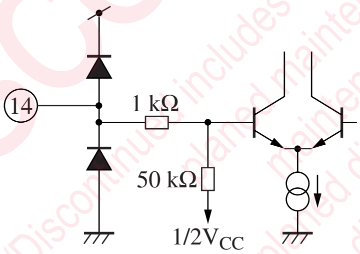
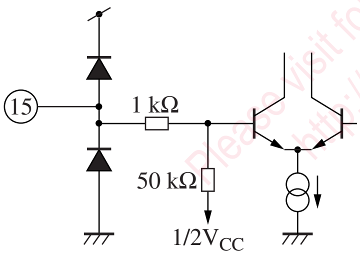
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off mode gain *1	VFFG	V_{IN} = 1 V[rms], f = 1 kHz	−1	0	1	dB
Off mode total harmonic distortion *1	THD_{FF}	V_{IN} = 1 V[rms], f = 1 kHz	—	0.01	0.05	%
On mode total harmonic distortion *1	THD_{ON}	V_{IN} = 0.4 V[rms], f = 1 kHz	—	0.02	0.1	%
Off mode output 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.

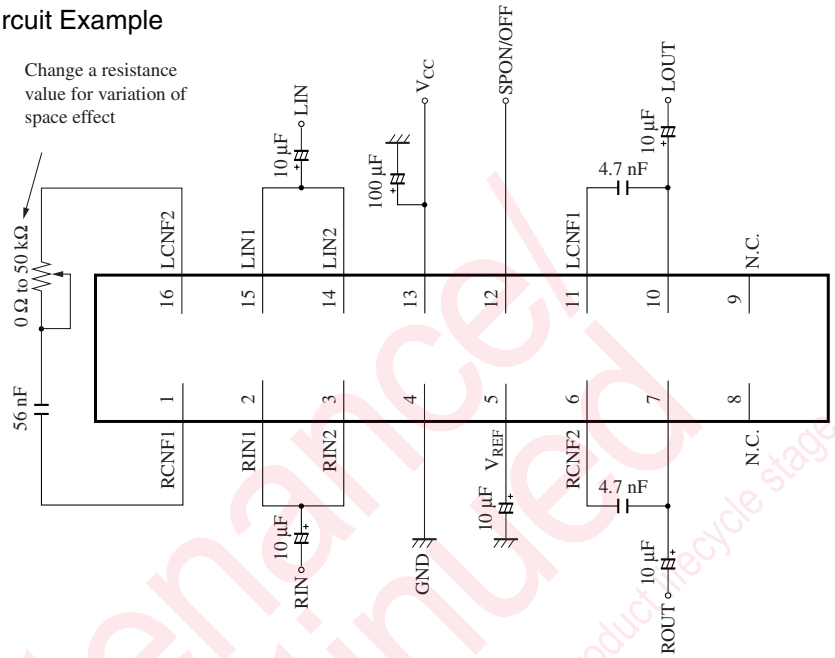
■ Terminal Equivalent Circuits

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)

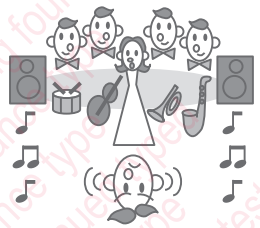
Pin No.	Symbol	Equivalent circuit	Description	Voltage
10	LOUT		L-ch. output pin	4.5 V
11	LCNF1	—	Capacitor pin 3	4.5 V
12	SPON/OFF		Mode changeover pin	V_{CC} to 2.7 V / 0.5 V to 0 V
13	V_{CC}	—	Supply pin	V_{CC}
14	LIN1		L-ch. input pin 1	4.5 V
15	LIN2		L-ch. input pin 2	4.5 V
16	LCNF2	—	Capacitor pin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

■ Application Circuit Example

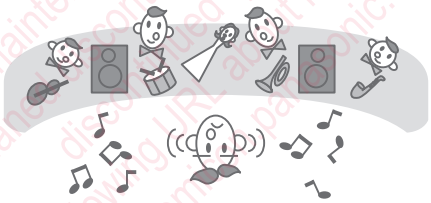


■ Conceptual Description on Spatializer Operation

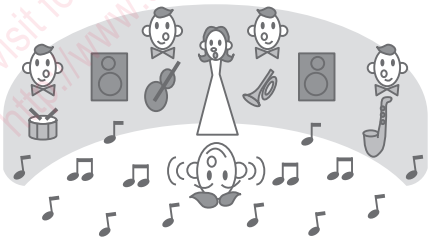
- Stereo normal mode
  All sound are heard from between both left and right speakers.



- 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.

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