

LOW VOLTAGE DOLBY NOISE REDUCTION CIRCUIT

NE648/49

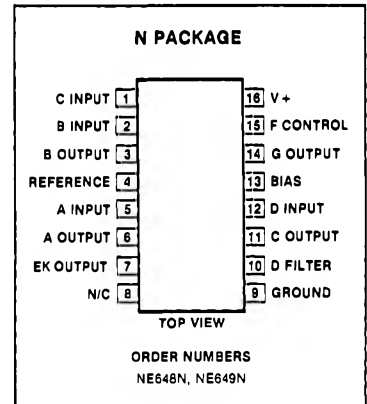
DESCRIPTION

The NE648/649 is an audio noise reduction circuit designed for use in low voltage entertainment systems. The circuit is used to reduce the level of background noise introduced during the recording and playback of audio signals on magnetic tape and improve the noise level in FM broadcast reception. The circuit is intended for use in automotive and portable cassette Dolby® B-Type noise reduction systems. This circuit is available only to licensees of Dolby Laboratories Licensing Corp., San Francisco.

NOTE

*T.M. Dolby Laboratories Licensing Corporation

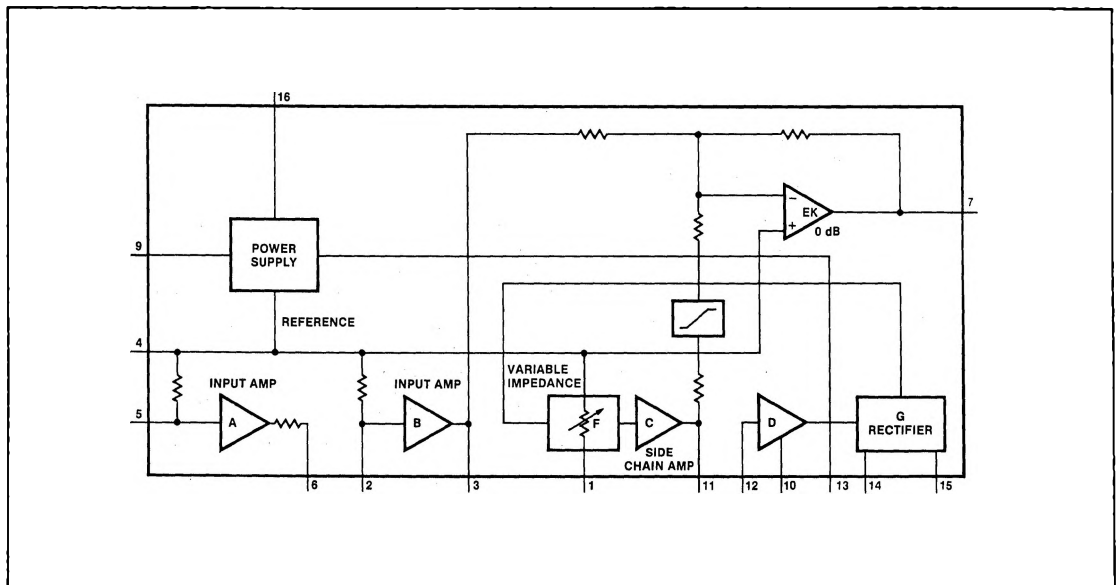
PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
Supply voltage	16	V
Temperature range		
Operating	- 40 to + 85	°C
Storage	- 65 to + 150	°C
Lead temperature (soldering 60sec)	+ 300	°C

BLOCK DIAGRAM



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DC ELECTRICAL CHARACTERISTICS

$V_{CC} = 9V$, $f = 20Hz$ to $20kHz$.

All levels referenced to 580mVrms (0dB) at pin 3, $T_A = +25^{\circ}C$ unless otherwise noted.

PARAMETER	TEST CONDITIONS	NE648			NE649			UNIT
		Min	Typ	Max	Min	Typ	Max	
Supply voltage range ³		6	9	14	6	9	14	V
Minimum voltage supply for 8dB headroom 10dB headroom	$f = 1.4kHz$ THD < 1%	6.5 7.5			6.5 7.5			V V
Supply Current, I_{CC}			11	18		11	18	mA
Supply Current, ¹ I_{CC}				20			20	mA
Voltage gain (pins 5-3)	$f = 1kHz$ (pins 6 and 2 connected)	24.5	26	27.5	24.5	26	27.5	dB
Voltage gain (pins 3-7)	$f = 1kHz$, 0dB at pin 3, noise reduction out	- 0.5	0	+ 0.5	- 0.5	0	+ 0.5	dB
Distortion	$f = 20kHz$ to $10kHz$, 0dB $f = 20Hz$ to $10kHz$, + 10dB		0.05 0.2	0.1 0.3		0.05 0.2	0.2 0.5	% %
Signal Handling (See Performance Characteristics)								
Signal-to-noise ratio ²	Record (pins 6 and 2 connected)	67	72		64	72		dB
	Playback (pins 6 and 2 connected)	77	82		74	82		dB
Record mode frequency response (at pin 7) referenced to encode monitor point (pin 3)	$f = 1.4kHz$ 0dB	- 1	0	+ 1	- 1.5	0	+ 1.5	dB
	- 20dB	- 16.6	- 15.6	- 14.6	- 17.1	- 15.6	- 14.1	dB
	- 30dB	- 23.5	- 22.5	- 21.5	- 24.0	- 22.5	- 21.0	dB
	$f = 5kHz$ 0dB	- 0.7	+ 0.3	+ 1.3	- 1.2	+ 0.3	+ 1.8	dB
	- 20dB	- 17.8	- 16.8	- 15.8	- 18.3	- 16.8	- 15.3	dB
	- 30dB	- 22.8	- 21.8	- 20.8	- 23.3	- 21.8	- 20.3	dB
	- 40dB	- 30.2	- 29.7	- 28.7	- 30.2	- 29.7	- 28.2	dB
	$f = 20kHz$ 0dB	- 0.3	+ 0.7	+ 1.7	- 0.8	+ 0.7	+ 2.2	dB
	- 20dB	- 18.3	- 17.3	- 16.3	- 18.8	- 17.3	- 15.8	dB
	- 30dB	- 24.5	- 23.5	- 22.5	- 25.0	- 23.5	- 22.0	dB
Back-to-back frequency response	Using typical record mode response		± 1.0			± 1.5		dB
Input resistance	Pin 5	35	50	65	35	50	65	k Ω
	Pin 2	3.1	4.2	5.3	3.1	4.2	5.3	k Ω
Output resistance	Pin 6	1.9	2.4	3.1	1.9	2.4	3.1	k Ω
	Pin 3		80	120		80	120	Ω
	Pin 7		80	120		80	120	Ω
Record mode frequency response shift								
Versus temperature	0 to $70^{\circ}C$ - 40 to $85^{\circ}C$		± 0.3 ± 0.5					dB dB
Versus V_{CC}	6 to 14V		0.2					dB/V

NOTES

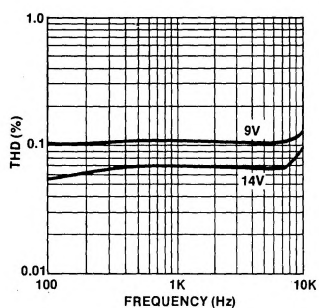
1. With electronic switching.
2. All noise levels are measured CCIR/ARM weighted using a 10K source with respect to Dolby level. See Dolby Laboratories Bulletin 19.
3. The circuit will function as low as $V_{CC} = 4.5V$ (i.e. output signal present). See graphs of I_{CC} and signal handling vs V_{CC} .

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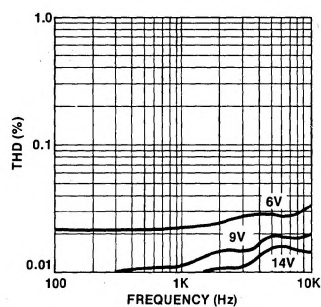
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PERFORMANCE CHARACTERISTICS

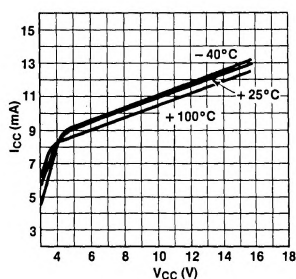
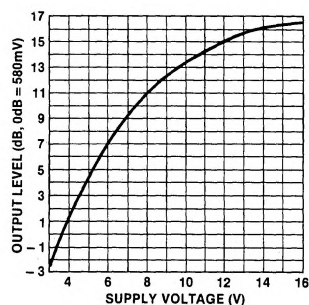
(+10dB) THD vs FREQUENCY



(0dB) THD vs FREQUENCY



CURRENT vs SUPPLY VOLTAGE

MAXIMUM SIGNAL HANDLING vs SUPPLY VOLTAGE
FOR 1% THD (RECORD)

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DOLBY ENCODER Output for constant level input (single tone frequency response)

Frequency (kHz)	Input Level (dB)								
	0 (Dolby Level)	-5	-10	-15	-20	-25	-30	-35	-40
0.1	0	0.1	0	0.1	0	0	0	0	0
0.14	0	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1
0.2	0	0.3	0.4	0.5	0.5	0.6	0.6	0.5	0.5
0.3	0	0.3	0.6	1.1	1.3	1.3	1.3	1.3	1.3
0.4					2.0	2.1	2.2	2.3	2.1
0.5	0	0.3	0.8	1.8	2.6	2.9	2.9	3.0	2.9
0.6						3.6	3.7	3.8	3.7
0.7	0	0.4	0.9	2.1	3.5	4.3	4.4	4.5	4.4
0.8						4.8	5.0	5.3	5.1
0.9							5.6	5.8	5.6
1.0	0	0.4	1.0	2.3	4.2	5.7	6.1	6.3	6.2
1.2							6.9	7.1	7.1
1.4	0	0.3	0.9	2.3	4.4	6.6	7.5	7.7	7.7
2.0	0.1	0.4	0.9	2.2	4.3	7.0	8.5	8.9	8.9
3.0	0.2	0.6	0.9	1.9	3.9	6.6	8.8	9.7	9.7
5.0	0.3	0.6	1.0	1.7	3.2	5.4	8.2	10.0	10.3
7.0	0.3	0.6	1.0	1.7	2.8	4.7	7.3	9.7	10.4
10.0	0.4	0.7	1.1	1.7	2.6	4.2	6.5	9.1	10.4
14.0	0.5	0.8	1.1	1.8	2.7	4.4	6.5	8.7	10.3
20.0	0.7	0.7	1.2	1.9	2.7	4.4	6.5	8.7	10.3

NOTE

The figures given in this table are the average response of many of Dolby Laboratories' professional encoders, and are not intended to be taken as required consumer equipment performance characteristics. Thus, no inference should be drawn on the tolerances which licensees must retain in consumer equipment. The figures can, however, be used to plot typical characteristics.

TEST CIRCUIT NE648/49

