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## NTE2004 Integrated Circuit Dolby® Noise Reduction Circuit

**Description:**

The NTE2004 is a monolithic audio noise reduction circuit in a 16-Lead DIP type package designed for use in Dolby® B-Type noise reduction systems. This device is used to reduce the level of background noise introduced during recording and playback of audio signals on magnetic tape and to improve the noise level in FM broadcast reception.

**Features:**

- Accurate Record Mode Frequency Response
- Excellent Frequency Response Tracking with Temperature and  $V_{CC} \pm 0.4\text{dB Typ}$
- Excellent Back-to-Back Dynamic Response – DC Shift Less Than 20mV Typ
- Improved Stability of all OP Amps
- High Reliability Packaging

**Absolute Maximum Ratings:**

Supply Voltage,  $V_{CC}$  ..... 24V  
 Operating Temperature Range,  $T_{opr}$  ..... 0° to +70°C  
 Storage Temperature Range,  $T_{stg}$  ..... -65° to +150°C  
 Lead Temperature (During Soldering, 60sec max),  $T_L$  ..... +300°C

**Electrical Characteristics:** ( $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 12\text{V}$ ,  $f = 20\text{Hz to } 20\text{kHz}$ . All levels referenced to  $580\text{mV}_{rms}(0\text{dB})$  unless otherwise specified)

Parameter	Test Conditions	Min	Typ	Max	Unit
Supply Voltage Range		8	–	20	V
Supply Current	$V_{CC} = 12\text{V}$	–	16	24	mA
Voltage Gain (Pin5–3)	$f = 1\text{kHz}$ , Pin6 and Pin2 Connected	24.5	26.0	27.5	dB
(Pin3–7)	$f = 1\text{kHz}$ , 0dB at Pin3, Noise Reduction Out	-0.5	0	+0.5	dB
Total Harmonic Distortion 2 <sup>nd</sup> Harmonic	$f = 20\text{Hz to } 10\text{kHz}$ , 0dB	–	0.05	0.2	%
3 <sup>rd</sup> Harmonic	$f = 20\text{Hz to } 10\text{kHz}$ , +10dB	–	0.2	0.5	%
Signal Handling	$V_{CC} = 12\text{V}$ , 1% Distortion at 1kHz	+12	+15	–	dB
Signal-to-Noise Ratio Record Mode	Note 1	64	72	–	dB
Playback Mode		74	82	–	dB

Note 1. All noise levels are measured CCIR/ARM weighted using a 10K source with respect to Dolby® level.

**Electrical Characteristics (Cont'd):** ( $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 12\text{V}$ ,  $f = 20\text{Hz}$  to  $20\text{kHz}$ . All levels referenced to  $580\text{mV}_{\text{rms}}$  (0dB) unless otherwise specified)

Parameter	Test Conditions	Min	Typ	Max	Unit	
Record Mode Frequency Response (At Pin7) Referenced to Encode Monitor Point (Pin3)	f = 1.4kHz	0dB	-1.5	0	+1.5	dB
		-20dB	-17.1	-15.6	-14.1	dB
		-30dB	-24.0	-22.5	-21.0	dB
	f = 5kHz	0dB	-1.2	+0.3	+1.8	dB
		-20dB	-18.3	-16.8	-15.3	dB
		-30dB	-23.3	-21.8	-20.3	dB
-40dB		-30.2	-29.7	-28.2	dB	
Back-to-Back Frequency Response	Using Typical Record Mode Frequency Response Test Points	-1.5	0	+1.5	dB	
Input Resistance	Pin5	35	50	65	k $\Omega$	
	Pin2	3.1	4.2	5.3	k $\Omega$	
Output Resistance	Pin6	1.9	2.4	3.1	k $\Omega$	
	Pin3	-	80	120	k $\Omega$	
	Pin7	-	80	120	k $\Omega$	
Back-to-Back Frequency Response Shift Versus Temperature	0° to +70°C	-	$\pm 0.4$	-	dB	
	Versus Supply Voltage	8V to 20V	-	$\pm 0.4$	-	dB

