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NTE3470
Integrated Circuit
Floppy Disk Read Amplifier System

Description:

The NTE3470 is a monolithic READ Amplifier System for obtaining digital information from floppy disk storage. It is designed to accept the differential AC signal produced by the magnetic head and produce a digital output pulse that corresponds to each peak of the input signal. The gain stage amplifies the input waveform and applies it to an external filter network, enabling the active differentiator and time domain filter to produce the desired output.

Features:

- Combines All the Active Circuitry to Perform the Floppy Disk Read Amplifier Function in One Circuit
- Improved (Positive) Gain T_C and Tolerance
- Improved Input Common Mode

Absolute Maximum Ratings: (T_A = +25°C, Note 1 unless otherwise specified)

Power Supply Voltage (Pin11), V_{CC1} 7V
Power Supply Voltage (Pin18), V_{CC2} 16V
Input Voltage (Pin1 and Pin2), V_I . . . . . –0.2 to +7.0V
Output Voltage (Pin10), V_O . . . . . –0.2 to +7.0V
Operating Ambient Temperature Range, T_A . . . . . 0° to +70°C
Operating Junction Temperature, T_J . . . . . +150°C
Storage Temperature Range, T_{stg} . . . . . –65° to +150°C

Note 1. “Absolute Maximum Ratings” are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the device should be operated at these limits. The table of “Electrical Characteristics” provides conditions for actual device operation.

Recommended Operating Conditions:

Power Supply Voltage, V_{CC}
(V_{CC1}) . . . . . +4.75 to +5.25V
(V_{CC2}) . . . . . +10 to +14V
Operating Ambient Temperature Range, T_A . . . . . 0° to +70°C

Electrical Characteristics: (T_A = 0° to +70°C, V_{CC1} = 4.75 to 5.25V, V_{CC2} = 10 to 14V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Differential Voltage Gain	A_{VD}	f = 200kHz, V_{iD} = 7mV_{RMS}	80	100	130	V/V
Input Base Current	I_{IB}		–	–10	–25	µA
Input Common Mode Range, Linear Operation	v_{iCM}	5% Max THD	–0.1	–	1.5	V
Differential Input Voltage, Linear Operation	v_{iD}	5% Max THD	–	–	25	$mV_{P–P}$
Output Voltage Swing Differential	v_{oD}		3	4	–	$V_{P–P}$
Output Source Current, Toggled	I_O		–	8.0	–	mA
Output Sink Current (Pin16 and Pin17)	I_{OS}		2.8	4.0	–	mA
Small Signal Input Resistance	r_i	T_A = +25°C	100	250	–	kΩ
Small Signal Output Resistance, Single Ended	r_o	T_A = +25°C, V_{CC1} = 5V, V_{CC2} = 12V	–	15	–	Ω
Bandwidth, –3dB	BW	v_{iD} = 2mV_{RMS}, T_A = +25°C, V_{CC1} = 5V, V_{CC2} = 12V	10	–	–	MHz
Common Mode Rejection Ratio	CMRR	T_A = +25°C, f = 100kHz, A_{VD} = 40dB, v_{in} = 200m$V_{P–P}$, V_{CC1} = 5V, V_{CC2} = 12V	50	–	–	dB
V_{CC1} Supply Rejection Ratio		T_A = +25°C, V_{CC2} = 12V, 4.75V ≤ V_{CC1} ≤ 5.25V, A_{VD} = 40dB	50	–	–	dB
V_{CC2} Supply Rejection Ratio		T_A = +25°C, V_{CC1} = 5V, 10V ≤ V_{CC2} ≤ 14V, A_{VD} = 40dB	50	–	–	dB
Differential Output Offset	V_{DO}	T_A = +25°C, v_{iD} = v_{in} = 0V	–	–	0.4	V
Common Mode Output Offset	V_{CO}	v_{iD} = v_{in} = 0V, Differential and Common Mode	–	3.0	–	V
Differential Noise Voltage Referred to Input	e_n	T_A = +25°C, BW = 10Hz to 1MHz	–	15	–	µV_{RMS}
Supply Current	I_{CC}	V_{CC1} = 5.25V, S_1 to Pin12 or Pin13	–	40	–	mA
		V_{CC2} = 14V	–	4.8	–	mA
Active Differentiator Section						
Differentiator Output Sink Current, Pin12 and Pin13	I_{OD}	V_{OD} = V_{CC1}	1.0	1.4	–	mA
Peak Shift	PS	Note 2	–	–	5	%
Differentiator Input Resistance, Differential	r_{iD}		–	30	–	kΩ
Differentiator Output Resistance, Differential	r_{oD}	T_A = +25°C	–	40	–	Ω

Note 2. f = 250kHz, v_{iD} = 1$V_{P–P}$, i_{cap} = 500µA

where $PS = 1/2 \frac{t_{PS1} - t_{PS2}}{t_{PS1} + t_{PS2}} \times 100\%$

V_{CC1} = 5V, V_{CC2} = 12V

Electrical Characteristics (Cont'd): (T_A = 0° to +70°C, V_{CC1} = 4.75 to 5.25V, V_{CC2} = 10 to 14V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Digital Section						
Output Voltage High Logic Level, Pin10	V_{OH}	V_{CC1} = 4.75V, V_{CC2} = 12V, I_{OH} = –0.4mA	2.7	–	–	V
Output Voltage Low Logic Level, Pin10	V_{OL}	V_{CC1} = 4.75V, V_{CC2} = 12V, I_{OH} = 8mA	–	–	0.5	V
Output Rise Time, Pin10	t_{TLH}		–	–	20	ns
Output Fall Time, Pin10	t_{THL}		–	–	25	ns
Timing Range Mono #1 (t_{1A} and t_{1B})	t_{1A}, t_{1B}		500	–	4000	ns
Timing Accuracy Mono #1	E_{t1}	t1 = 1µs = 0.625 R1C1 + 200ns, Note 3, Note 4, Note 5	85	–	115	%
Timing Range Mono #2	t2		150	–	1000	ns
Timing Accuracy Mono #2	E_{t2}	t2 = 200ns = 0.625 R2C2, Note 6, Note 7	85	–	115	%

Note 3. R1 = 6.4kΩ, C1 = 200pF.

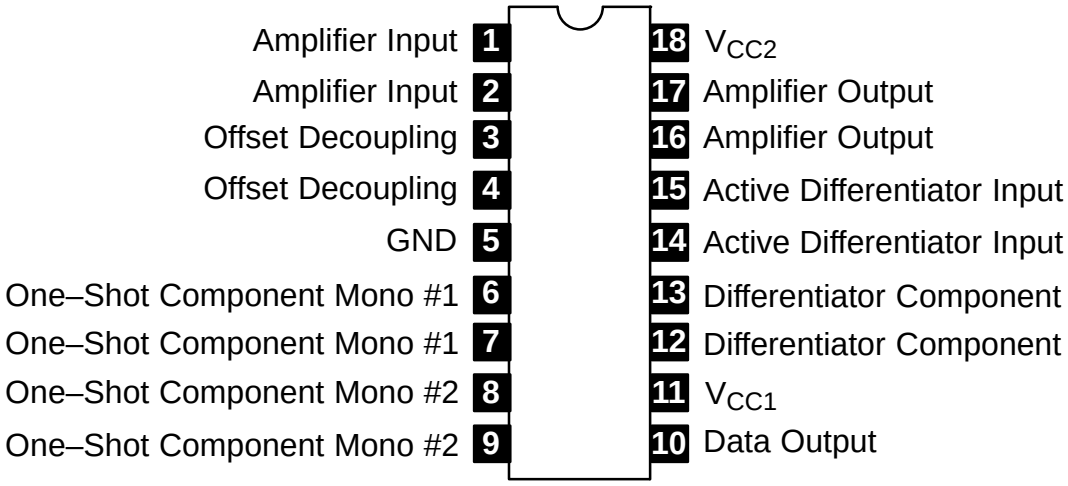
Note 4. Accuracy guaranteed for R1 in the range 1.5kΩ ≤ R1 ≤ 10kΩ and C1 in the range 150pF ≤ C1 ≤ 680pF.

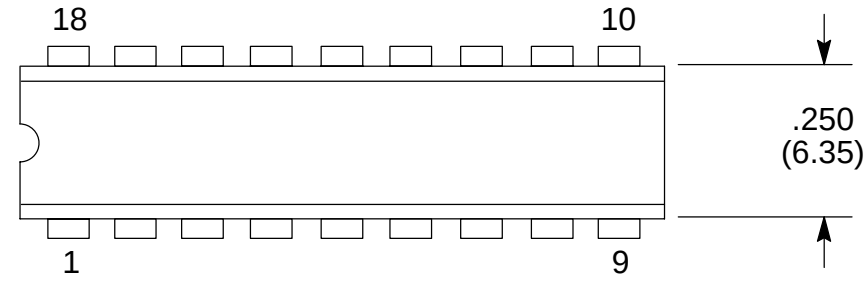
Note 5. To minimize current transients, C1 should be kept as small as is convenient.

Note 6. R2 = 1.6kΩ, C2 = 200pF.

Note 7. Accuracy guaranteed for R2 in the range 1.5kΩ ≤ R2 ≤ 10kΩ and C2 in the range 100pF ≤ C1 ≤ 800pF.

Pin Connection Diagram




18
10
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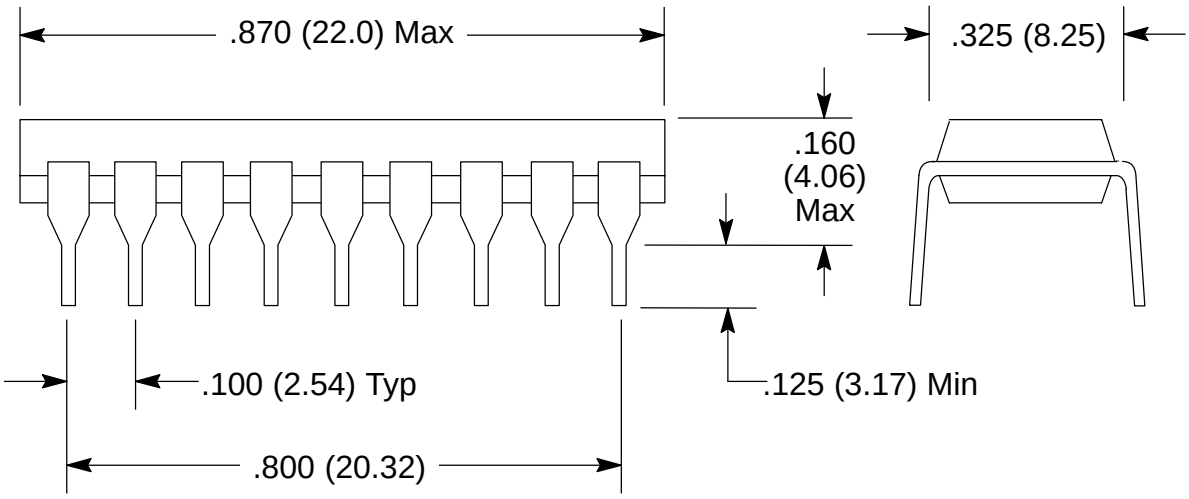
(6.35)
1
9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.160
(4.06)
Max
.100 (2.54) Typ
.125 (3.17) Min
.800 (20.32)