

MC3470, MC3470A FLOPPY DISK READ-AMPLIFIER SYSTEMS

D2759, NOVEMBER 1983—REVISED FEBRUARY 1988

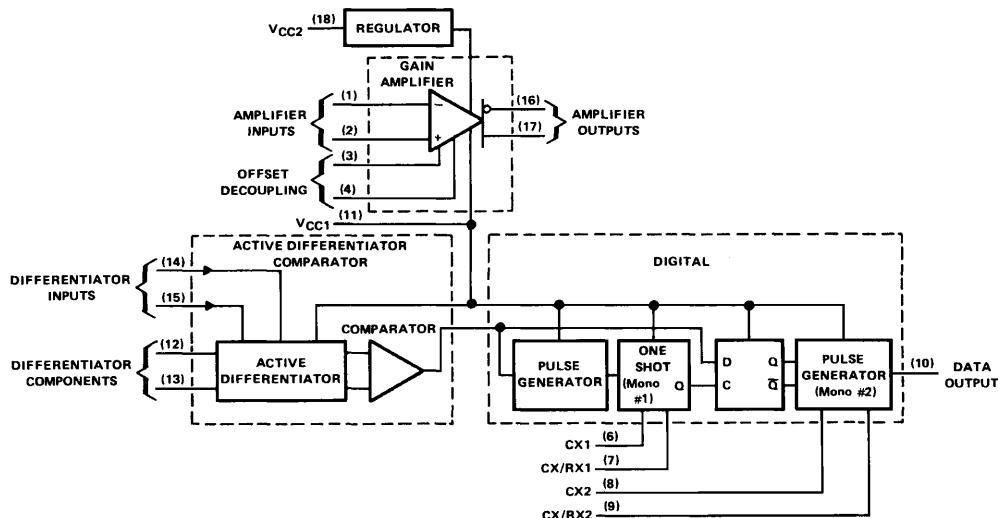
- Combines All Read-Amplifier Active Circuitry into One Monolithic Circuit
- Peak Shift . . . 2% Max (MC3470A)
- Designed to be Interchangeable with Motorola MC3470

description

The MC3470 and MC3470A are monolithic read-amplifier systems each containing all the active circuitry necessary for obtaining digital information from floppy disk storage. They are designed to accept the ac differential signal from the magnetic head and produce a digital output pulse corresponding 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.

The MC3470 and MC3470A are characterized for operation from 0°C to 70°C.

functional block diagram



4

Special Functions

PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

POST OFFICE BOX 655012 • DALLAS, TEXAS 75265

Copyright © 1983, Texas Instruments Incorporated

MC3470, MC3470A FLOPPY DISK READ-AMPLIFIER SYSTEMS

absolute maximum ratings over operating temperature range (unless otherwise noted)

Supply voltage, V _{CC1} (see Note 1)	7 V
Supply voltage, V _{CC2}	16 V
Input voltage range (amplifier inputs)	-0.2 V to 7 V
Output voltage, V _O (data output)	-0.2 V to 7 V
Operating free-air temperature range	0°C to 70°C
Storage temperature range	-65°C to 150°C

NOTE 1: All voltage values are with respect to network ground terminal.

recommended operating conditions

		MIN	NOM	MAX	UNIT
Supply voltage V _{CC1}		4.75	5	5.25	V
Supply voltage V _{CC2}		10	12	14	V
Timing capacitor CX1 (see Note 2)		150	680	pF	
Timing capacitor CX2		100	800	pF	
Timing resistors RX1 and RX2		1.5	10	kΩ	
Timing of digital section	Monostable no. 1	500	4000		ns
	Monostable no. 2	150	1000		
Operating free-air temperature, T _A		0	70		°C

NOTE 2: To minimize current transients, CX1 should be kept as small as convenient.

MC3470, MC3470A
FLOPPY DISK READ-AMPLIFIER SYSTEMS

**electrical characteristics over recommended ranges of supply voltages and operating free-air temperature
 (unless otherwise noted)**

gain amplifier section

PARAMETER		TEST CONDITIONS	MIN	TYP [†]	MAX	UNIT
AVD amplification	MC3470	V _{id} = 5 mV rms, f = 200 kHz	80	100	120	V/V
	MC3470A		100	110	130	
I _{IB}	Input bias current				-10	-25
V _{ICR}	Common-mode input voltage range	THD ≤ 5%			-0.1 to 1.5	V
V _{IDR}	Differential input voltage range	THD ≤ 5%			±25	mV
V _{OPP}	Peak-to-peak differential output voltage				3 4	V
V _{OC}	Common-mode output voltage	V _I = 0, V _{ID} = 0			3	V
V _{OD}	Differential output offset voltage	V _I = 0, V _{ID} = 0, T _A = 25°C			0.4	V
I _{OS}	Short-circuit output current (each amplifier output)	Output shorted to ground			-8	mA
		Output shorted to V _{CC1}			2.8 4	
r _i	Small-signal input resistance	T _A = 25°C			100 250	kΩ
r _o	Small-signal output resistance (single-ended)	V _{CC1} = 5 V, V _{CC2} = 12 V, T _A = 25°C			15	Ω
BW	Bandwidth (3 dB)	V _{id} = 2 mV rms, V _{CC1} = 5 V, V _{CC2} = 12 V, T _A = 25°C			5	MHz
CMRR	Common-mode rejection ratio	V _{CC1} = 5 V, AVD = 40 dB, T _A = 25°C	V _{IPP} = 200 mV, f = 100 kHz,		50	dB
k _{SVR}	Supply voltage rejection ratio	AVD = 40 dB, T _A = 25°C	V _{CC1} = 5 ± 0.25 V, V _{CC2} = 12 V		50	
			V _{CC1} = 5 V, V _{CC2} = 12 ± 2 V		60	
V _n	Equivalent input noise voltage	BW = 10 Hz to 1 MHz, T _A = 25°C			15	µV

[†]All typical values are at V_{CC1} = 5 V, V_{CC2} = 12 V, T_A = 25°C.

4

Special Functions

MC3470, MC3470A FLOPPY DISK READ-AMPLIFIER SYSTEMS

active-differentiator section

PARAMETER		TEST CONDITIONS	MIN	TYP [†]	MAX	UNIT
I_{sink}	Sink current at pins 12 and 13	$V_{OD} = V_{CC1}$		1	1.4	mA
	Peak shift	MC3470	$V_{CC1} = 5 \text{ V}$, $V_{CC2} = 12 \text{ V}$,		5%	
		MC3470A	$V_{IDPP} = 1 \text{ V}$, $f = 250 \text{ kHz}$, $I_{cap} = 500 \mu\text{A}$, See Figure 1		2%	
r_{id}	Differential input resistance			30		$\text{k}\Omega$
r_{od}	Differential output resistance			40		Ω

digital section

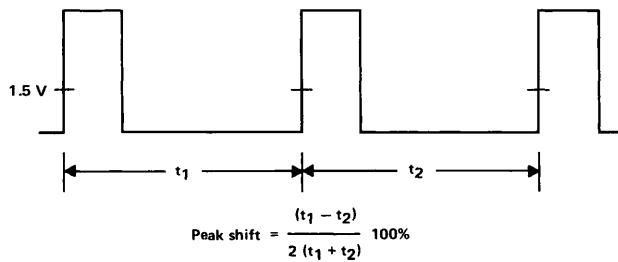
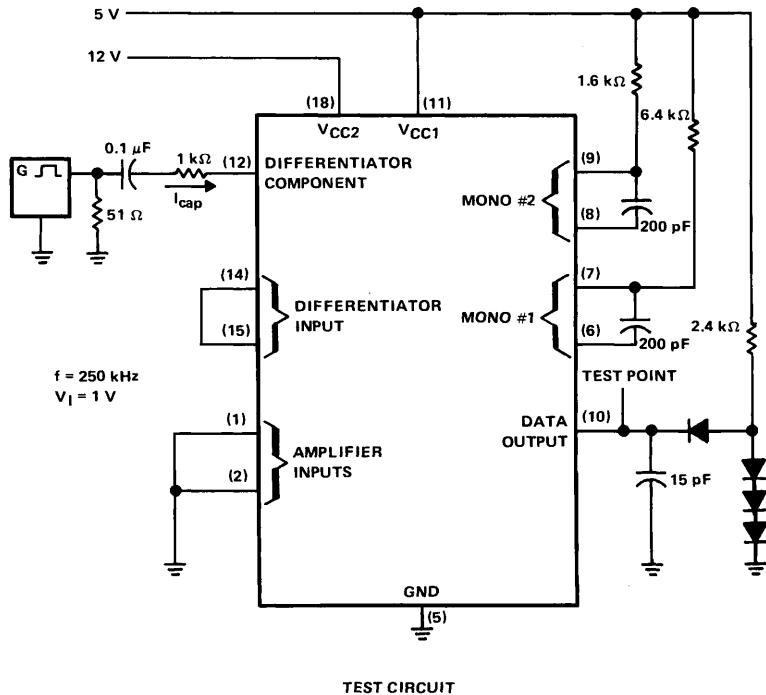
PARAMETER	TEST CONDITIONS	MIN	TYP [†]	MAX	UNIT
V_{OH}	$V_{CC1} = 4.75 \text{ V}$, $V_{CC2} = 12 \text{ V}$, $I_{OH} = -0.4 \text{ mA}$		2.7		V
V_{OL}	$V_{CC1} = 4.75 \text{ V}$, $V_{CC2} = 12 \text{ V}$, $I_{OL} = 8 \text{ mA}$			0.5	V
I_{CC1}	$V_{CC1} = 5.25 \text{ V}$		35	50	mA
I_{CC2}	$V_{CC2} = 14 \text{ V}$		4.5	10	mA

timing characteristics over recommended ranges of supply voltages and operating free-air temperature (unless otherwise noted) (see Figure 2)

PARAMETER	TEST CONDITIONS	MIN	TYP [†]	MAX	UNIT
t_r	Rise time (pin 10)			20	ns
t_f	Fall time (pin 10)			25	ns
	Timing accuracy of monostable no. 1 compared to $0.625 \text{ RX}_1 + \text{CX}_1 + 200 \text{ ns}$	$\text{RX}_1 = 1.5 \text{ k}\Omega \text{ to } 10 \text{ k}\Omega$, $\text{CX}_1 = 150 \text{ pF to } 680 \text{ pF}$	85%	115%	
	Timing accuracy of monostable no. 2 compared to $0.625 \text{ RX}_2 + \text{CX}_2$	$\text{RX}_2 = 1.5 \text{ k}\Omega \text{ to } 10 \text{ k}\Omega$, $\text{CX}_2 = 100 \text{ pF to } 800 \text{ pF}$	85%	115%	

[†]All typical values are at $V_{CC1} = 5 \text{ V}$, $V_{CC2} = 12 \text{ V}$, $T_A = 25^\circ\text{C}$.

PARAMETER MEASUREMENT INFORMATION



VOLTAGE WAVEFORMS

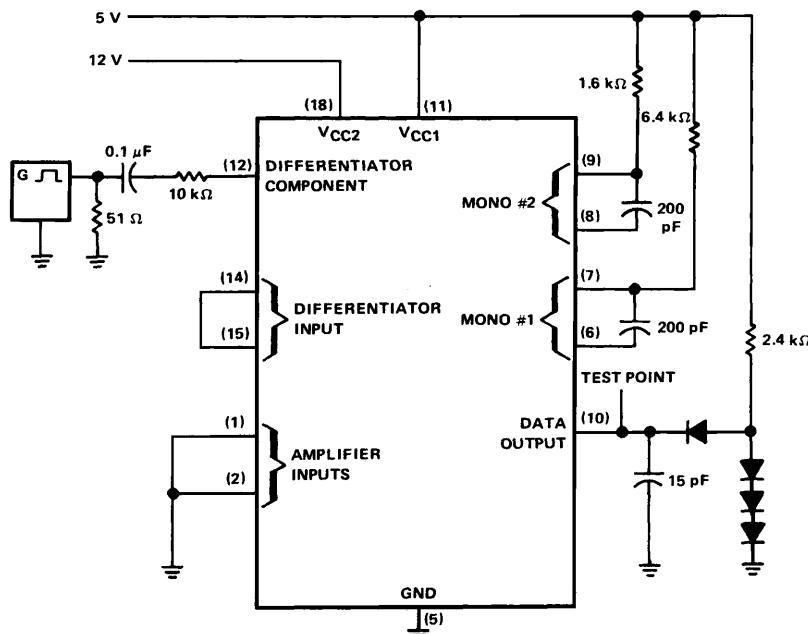
FIGURE 1. PEAK SHIFT

4

Special Functions

**MC3470, MC3470A
FLOPPY DISK READ-AMPLIFIER SYSTEMS**

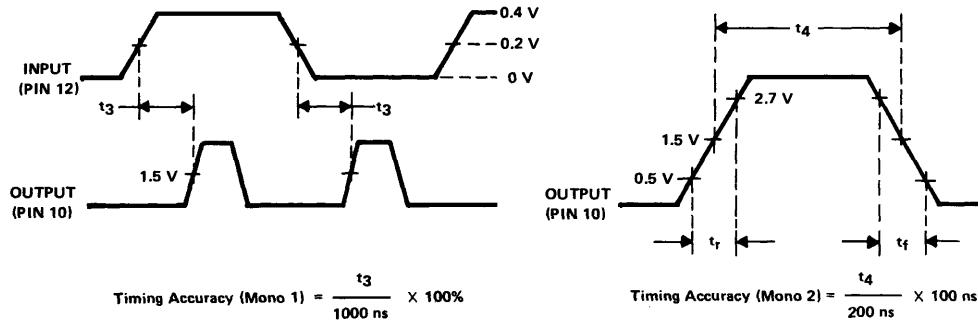
PARAMETER MEASUREMENT INFORMATION



4

TEST CIRCUIT

Special Functions



VOLTAGE WAVEFORMS

FIGURE 2. TIMING ACCURACY

TYPICAL CHARACTERISTICS

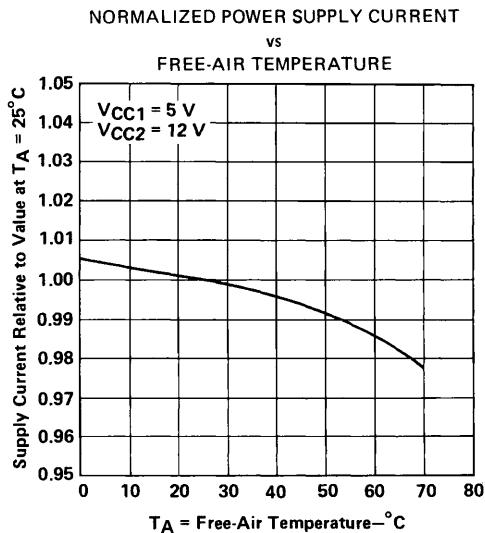


FIGURE 3

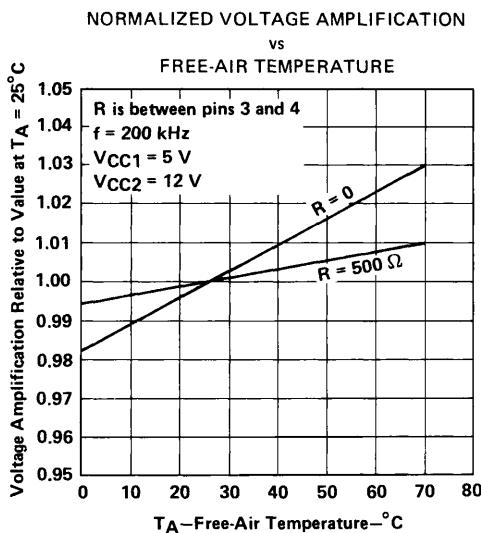


FIGURE 4

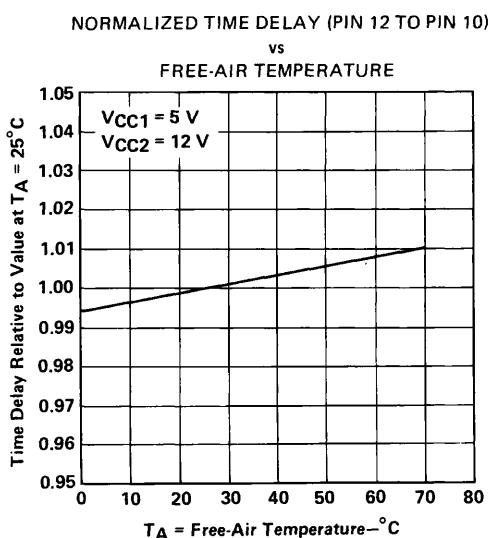


FIGURE 5

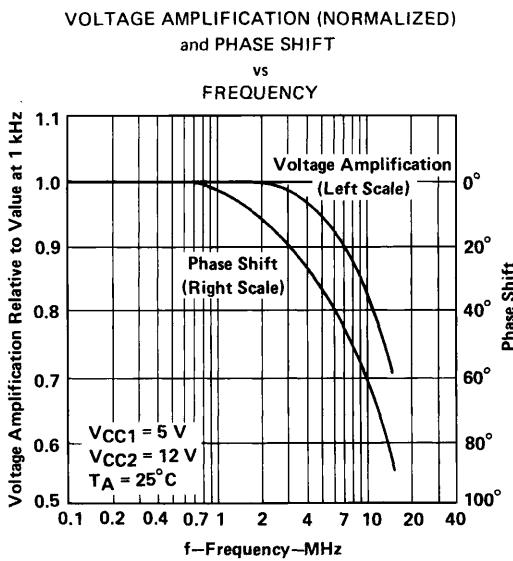


FIGURE 6

4

Special Functions

**MC3470, MC3470A
FLOPPY DISK READ-AMPLIFIER SYSTEMS**

TYPICAL APPLICATION INFORMATION

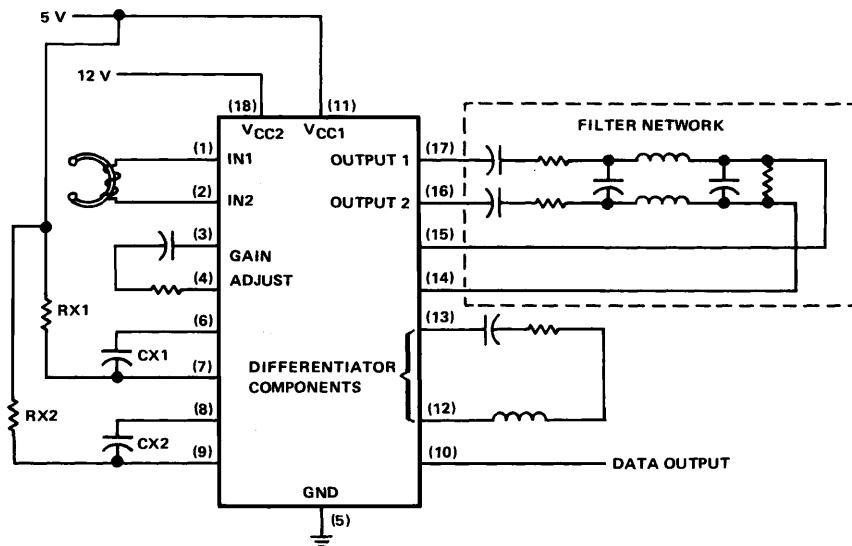


FIGURE 7

4

Special Functions