

## **Rochester Electronics Manufactured Components**

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

## **Quality Overview**

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
  - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

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The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.



## MICROCIRCUIT DATA SHEET

**CN74F161A-X REV 1B0**

Original Creation Date: 12/16/96

Last Update Date: 06/19/97

Last Major Revision Date: 04/17/97

### SYNCHRONOUS PRESETTABLE BINARY COUNTER

#### General Description

The F161A is a high-speed synchronous modulo-16 binary counter. It is synchronously presettable for application in programmable dividers and has two types of Count Enable inputs plus a Terminal Count output for versatility in forming synchronous multi-stage counters. The F161A has an asynchronous Master-Reset input that overrides all other inputs and forces the outputs LOW. The F161A is a high-speed version of the 'F161.

#### Industry Part Number

74F161A

#### NS Part Numbers

74F161ADC

#### Prime Die

M161A

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#### Processing

#### Quality Conformance Inspection

#### Subgrp Description Temp (°C)

1	Static tests at	+25
2	Static tests at	+70
3	Static tests at	0
4	Dynamic tests at	+25
5	Dynamic tests at	+70
6	Dynamic tests at	0
7	Functional tests at	+25
8A	Functional tests at	+70
8B	Functional tests at	0
9	Switching tests at	+25
10	Switching tests at	+70
11	Switching tests at	0

**Features**

- Typical Count Frequency of 120 MHz
- Synchronous Counting and Loading
- High-speed Synchronous Expansion
- Guaranteed 4000V Minimum ESD Protection

**(Absolute Maximum Ratings)**

(Note 1)

Storage Temperature	-65 C to +150 C
Ambient Temperature under Bias	-55 C to +125 C
Junction Temperature under Bias	-55 C to +175 C
Vcc Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30 mA to +5.0mA
Voltage Applied to Output in HIGH State (with Vcc=0V)	
Standard Output	-0.5V to Vcc
TRI-STATE Output	-0.5V to +5.5V
Current Applied to Output in LOW State (Max)	twice the rated Iol (mA)

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

**Recommended Operating Conditions**

Free Air Ambient Temperature Commercial	0 C to +70 C
Supply Voltage Commercial	+4.5V to +5.5V

## Electrical Characteristics

### DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
DC: VCC 4.5V to 5.5V, 0C to +70C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
VIH	Input HIGH Voltage	Recognized as a HIGH Signal	1	INPUTS	2.0		V	1, 2, 3
VIL	Input LOW Voltage	Recognized as a LOW Signal	1	INPUTS		0.8	V	1, 2, 3
VCD	Input Clamp Diode Voltage	VCC=4.5V, IIN=-18mA	2, 3	INPUTS		-1.2	V	1, 2, 3
VOH	Output HIGH Voltage	VCC=4.5V, IOH=-1.0mA	2, 3	OUTPUTS	2.5		V	1, 2, 3
		VCC=4.75V, IOH=-1.0mA	2, 3	OUTPUTS	2.7		V	1, 2, 3
VOL	Output LOW Voltage	VCC=4.5V, IOL = 20mA	2, 3	OUTPUTS		0.5	V	1, 2, 3
IIH	Input HIGH Current	VCC=5.5V, VIN=2.7V	2, 3	INPUTS		5.0	μA	1, 2, 3
IBVI	Input HIGH Current Breakdown Test	VCC=5.5V, VIN=7.0V	2, 3	INPUTS		7.0	μA	1, 2, 3
ICEX	Output HIGH Leakage Current	VCC=5.5V, VOUT = VCC	2, 3	OUTPUTS		100	μA	1, 2, 3
VID	Input Leakage Test	VCC = 0.0V, IID = 1.9μA, All other pins grounded	2, 3	INPUTS	4.75		V	1, 2, 3
IOD	Output Leakage Circuit Current	VCC = 0.0V, VIOD = 150mV, All other pins grounded	2, 3	OUTPUTS		4.75	μA	1, 2, 3
IIL	Input LOW Current	VCC=5.5V, VIN=0.5V (CEP,CP,MR,P0-P3)	2, 3	INPUTS		-0.6	mA	1, 2, 3
		VCC=5.5V, VIN=0.5V (CET,PE)	2, 3	INPUTS		-1.2	mA	1, 2, 3
IOS	Output Short-Circuit Current	VCC=5.5V, VOUT = 0V	2, 3	OUTPUTS	-60	-150	mA	1, 2, 3
ICC	Power Supply Current	VCC=5.5V	2, 3	VCC		55	mA	1, 2, 3

### AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
AC: CL=50pF, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS. Temp Range: 0C to +70C

fMAX	Maximum Shift Frequency	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4		100		MHZ	9
			4		90		MHZ	10, 11
tpLH(1)	Propagation Delay (PE input HIGH)	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	CP to Qn	3.5	7.5	ns	9

## Electrical Characteristics

### AC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)  
AC: CL=50pf, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS. Temp Range: 0C to +70C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpLH(1)	Propagation Delay (PE input HIGH)	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	CP to Qn	3.5	8.5	ns	10, 11
tpHL(1)	Propagation Delay (PE input HIGH)	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	CP to Qn	3.5	10.0	ns	9
tpHL(1)	Propagation Delay (PE input HIGH)	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	CP to Qn	3.5	11.0	ns	10, 11
tpLH/HL(2)	Propagation Delay (PE input LOW)	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	CP to Qn	4.0	8.5	ns	9
tpLH/HL(2)	Propagation Delay (PE input LOW)	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	CP to Qn	4.0	9.5	ns	10, 11
tpLH/HL(3)	Propagation Delay	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	CP to TC	5.0	14.0	ns	9
			2, 3	CP to TC	5.0	15.0	ns	10, 11
tpLH/HL(4)	Propagation Delay	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	CET to TC	2.5	7.5	ns	9
			2, 3	CET to TC	2.5	8.5	ns	10, 11
tpHL(5)	Propagation Delay	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	$\overline{MR}$ to Qn	5.5	12.0	ns	9
			2, 3	$\overline{MR}$ to Qn	5.5	13.0	ns	10, 11
tpHL(6)	Propagation Delay	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	$\overline{MR}$ to TC	4.5	10.5	ns	9
			2, 3	$\overline{MR}$ to TC	4.5	11.5	ns	10, 11
ts (H/L)1	Setup Time HIGH or LOW	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	Pn to CP	5.0		ns	9, 10, 11
th (H/L)1	Hold Time HIGH or LOW	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	Pn to CP	2.0		ns	9, 10, 11
ts (H) 2	Setup Time HIGH	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	$\overline{PE}$ to CP	11.0		ns	9
			4	$\overline{PE}$ to CP	11.5		ns	10, 11
ts (L) 2	Setup Time LOW	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	$\overline{PE}$ to CP	8.5		ns	9
			4	$\overline{PE}$ to CP	9.5		ns	10, 11
th (H) 2	Hold Time HIGH	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	$\overline{PE}$ to CP	2.0		ns	9, 10, 11

## Electrical Characteristics

### AC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)  
AC: CL=50pf, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS. Temp Range: 0C to +70C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
th (L) 2	Hold Time LOW	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	$\overline{PE}$ to CP	0.0		ns	9, 10, 11
ts (H) 3	Setup Time HIGH	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	CEP to CP	11.0		ns	9
			4	CEP to CP	11.5		ns	10, 11
ts (L) 3	Setup Time LOW	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	CEP to CP	5.0		ns	9, 10, 11
th (H) 3	Hold Time HIGH	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	CEP to CP	0.0		ns	9, 10, 11
th (L) 3	Hold Time LOW	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	CEP to CP	0.0		ns	9, 10, 11
tw (H)	Pulse Width HIGH (Load)	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	CP	5.0		ns	9, 10, 11
tw (L)	Pulse Width LOW (Load)	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	CP	5.0		ns	9, 10, 11
tw (H)	Pulse Width HIGH (count)	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	CP	4.0		ns	9, 10, 11
tw (L)	Pulse Width LOW (count)	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	CP	6.0		ns	9
			4	CP	7.0		ns	10, 11
tw (L)	Pulse Width LOW	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	$\overline{MR}$	5.0		ns	9, 10, 11
tREC	Recovery Time	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	$\overline{MR}$ to CP	6.0		ns	9, 10, 11

Note 1: Guaranteed by applying specific input condition and testing VOL & VOH.

Note 2: Screen tested 100% on each device at +75 C temperature only, subgroups A2 & A10.

Note 3: Sample tested (Method 5005, Table 1) on each MFG. lot at +75C temperature only, subgroups A2 & A10.

Note 4: Guaranteed but not tested.

**Revision History**

Rev	ECN #	Rel Date	Originator	Changes
1B0	M0001329	06/19/97	Donald B. Miller	