

MN54ACT161-X REV 2A0

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Synchronous Presettable Binary Counter

General Description

The ACT161 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 multistage counters. The ACT161 has an asynchronous Master Reset Input that overrides all other inputs and forces the outputs LOW.

Industry Part Number

54ACT161

Prime Die

J161

NS Part Numbers

 54ACT161DMQB
 54ACT161FMQB
 54ACT161LMQB

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

Features

- Icc reduced by 50%
- Synchronous counting and loading
- High-speed synchronous expansion
- Typical count rate of 125 MHz
- Outputs source/sink 24 mA
- ACT161 has TTL-compatible inputs
- Standard Military Drawing (SMD)
- ACT161: 5962-89848

(Absolute Maximum Ratings)

(Note 1)

Supply Voltage (Vcc)	-0.5V to +7.0V
DC Input Diode Current (Iik)	
Vi = -0.5V	-20 mA
Vi = Vcc +0.5V	+20 mA
DC Input Voltage (Vi)	-0.5V to Vcc +0.5V
DC Output Diode Current (Iok)	
Vo = -0.5V	-20 mA
Vo = Vcc +0.5V	+20 mA
DC Output Voltage (Vo)	-0.5V to Vcc +0.5V
DC Output Source or Sink Current (Io)	±50 mA
DC Vcc or Ground Current per Output Pin (Icc or Ignd)	±50 mA
Storage Temperature (Tstg)	-65 C to +150 C
Junction Temperature (Tj)	175 C
CDIP	

Note 1: Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. National does not recommend operation of FACT™ circuits outside databook specifications.

Recommended Operating Conditions

Supply Voltage (Vcc)	4.5V to 5.5V
Input Voltage (Vi)	0V to Vcc
Output Voltage (Vo)	0V to Vcc
Operating Temperature (Ta)	-55 C to +125 C
Minimum Input Edge Rate (Delta V/Delta t)	
ACT Devices	
Vin from 0.8V to 2.0V	
Vcc @ 4.5V, 5.5V	125 mV/ns

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
 DC: VCC 4.5V to 5.5V, Temp. Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 3 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
VOL	Low Level Output Voltage	VCC=4.5V, IOL=50.0uA, VIL=0.8V, VIH=3.0V	1, 2, 8	OUTPUT		.10	V	1, 2, 3
		VCC=5.5V, IOL=50.0uA, VIL=0.8V, VIH=3.0V	1, 2, 8	OUTPUT		.10	V	1, 2, 3
		VCC=4.5V, IOL=24.0mA, VIL=0.8V, VIH=3.0V	1, 2, 8	OUTPUT		.36	V	1
			1, 2, 8	OUTPUT		.50	V	2, 3
		VCC=5.5V, IOL=24.0mA, VIL=0.8V, VIH=3.0V	1, 2, 8	OUTPUT		.36	V	1
			1, 2, 8	OUTPUT		.50	V	2, 3
VOH	High Level Output Voltage	VCC=4.5V, IOH=-50.0uA, VIL=0.8V, VIH=3.0V	1, 2, 8	OUTPUT	4.40		V	1, 2, 3
		VCC=5.5V, IOH=-50.0uA, VIL=0.8V, VIH=3.0V	1, 2, 8	OUTPUT	5.40		V	1, 2, 3
		VCC=4.5V, IOH=-24.0mA, VIL=0.8V, VIH=3.0V	1, 2, 8	OUTPUT	3.86		V	1
			1, 2, 8	OUTPUT	3.70		V	2, 3
		VCC=5.5V, IOH=-24.0mA, VIL=0.8V, VIH=3.0V	1, 2, 8	OUTPUT	4.86		V	1
			1, 2, 8	OUTPUT	4.70		V	2, 3
ICCH	Supply Current Outputs HIGH	VCC=5.5V, VIH=5.5V	1, 2, 8	VCC		4.0	uA	1
			1, 2, 8	VCC		80	uA	2, 3
ICCL	Supply Current Outputs LOW	VCC=5.5V, VIL=0.0V	1, 2, 8	VCC		4.0	uA	1
			1, 2, 8	VCC		80	uA	2, 3
ICCT	Supply Current per Input	VCC=5.5V, VINH=3.4V	1, 2, 8	VCC		1.0	mA	1
			1, 2, 8	VCC		1.6	mA	2, 3
IIH	High Level Input Current	VCC=5.5V, VIH=5.5V	1, 2, 8	INPUT		0.1	uA	1
			1, 2, 8	INPUT		1.0	uA	2, 3

Electrical Characteristics

DC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
 DC: VCC 4.5V to 5.5V, Temp. Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 3 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIL	High Level Input Current	VCC=5.5V, VIH=5.5V	1, 2, 8	INPUT		-0.1	uA	1
			1, 2, 8	INPUT		-1.0	uA	2, 3
VIOL	Dynamic output current LOW	VCC=5.5V, IOL=50.0mA, VIL=0.0V, VIH=5.5V	1, 2, 5, 8	OUTPUT		1.65	V	1, 2, 3
VIOH	Dynamic Output Current HIGH	VCC=5.5V, IOH=-50.0mA, VIL=0.0V, VIH=5.5V	1, 2, 5, 8	OUTPUT	3.85		V	1, 2, 3

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
 AC: CL=50pF, RL=500 OHMS, TRISE/TFALL=3.0nS, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

tpLH(1)	Propagation Delay	VCC=4.5V	3, 4, 7, 8	CP to Qn (COUNT)	1.5	9.0	ns	9
			3, 4, 7, 8	CP to Qn (COUNT)	1.5	10.5	ns	10, 11
tpHL(1)	Propagation Delay	VCC=4.5V	3, 4, 7, 8	CP to Qn (COUNT)	1.5	9.5	ns	9
			3, 4, 7, 8	CP to Qn (COUNT)	1.5	10.5	ns	10, 11
tpLH(2)	Propagation Delay	VCC=4.5V	3, 4, 7, 8	CP to Qn (LOAD)	1.5	8.5	ns	9
			3, 4, 7, 8	CP to Qn (LOAD)	1.5	10.0	ns	10, 11
tpHL(2)	Propagation Delay	VCC=4.5V	3, 4, 7, 8	CP to Qn (LOAD)	1.5	8.0	ns	9
			3, 4, 7, 8	CP to Qn (LOAD)	1.5	9.5	ns	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, TRISE/TFALL=3.0nS, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpLH(3)	Propagation Delay	VCC=4.5V	3, 4, 7, 8	CP to TC	1.5	12.0	ns	9
			3, 4, 7, 8	CP to TC	1.5	14.0	ns	10, 11
tpHL(3)	Propagation Delay	VCC=4.5V	3, 4, 7, 8	CP to TC	1.5	11.0	ns	9
			3, 4, 7, 8	CP to TC	1.5	12.5	ns	10, 11
tpLH(4)	Propagation Delay	VCC=4.5V	3, 4, 7, 8	CET to TC	1.5	8.0	ns	9
			3, 4, 7, 8	CET to TC	1.5	9.5	ns	10, 11
tpHL(4)	Propagation Delay	VCC=4.5V	3, 4, 7, 8	CET to TC	1.5	8.5	ns	9
			3, 4, 7, 8	CET to TC	1.5	9.5	ns	10, 11
tpHL(5)	Propagation Delay	VCC=4.5V	3, 4, 7, 8	MR to Qn	1.5	8.5	ns	9
			3, 4, 7, 8	MR to Qn	1.5	10.0	ns	10, 11
tpHL(6)	Propagation Delay	VCC=4.5V	3, 4, 7, 8	MR to TC	1.5	10.0	ns	9
			3, 4, 7, 8	MR to TC	1.5	11.5	ns	10, 11
Fmax(1)	Maximum Count Frequency	VCC=4.5V	6, 8	CP	100		Mhz	9
			6, 8	CP	85		Mhz	10, 11
tw(H/L)(1)	Pulse Width (HIGH or LOW)	VCC=4.5V	6, 8	CP (COUNT)	5.0		ns	9, 10, 11
tw(H/L)(2)	Pulse Width (HIGH or LOW)	VCC=4.5V	6, 8	CP (LOAD)	5.0		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, TRISE/TFALL=3.0ns, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tw(L)(3)	Pulse Width (LOW)	VCC=4.5V	6, 8	\overline{MR}	5.0		ns	9
			6, 8	\overline{MR}	6.5		ns	10, 11
ts(H/L)(1)	Setup Time (HIGH or LOW)	VCC=4.5V	6, 8	Pn to CP	9.5		ns	9
			6, 8	Pn to CP	13.0		ns	10, 11
th(H/L)(1)	Hold Time (HIGH or LOW)	VCC=4.5V	6, 8	Pn to CP	0.0		ns	9, 10, 11
ts(H/L)(2)	Setup Time (HIGH or LOW)	VCC=4.5V	6, 8	\overline{PE} to CP	8.5		ns	9
			6, 8	\overline{PE} to CP	11.0		ns	10, 11
th(H/L)(2)	Hold Time (HIGH or LOW)	VCC=4.5V	6, 8	\overline{PE} to CP	0.0		ns	9, 10, 11
ts(H/L)(3)	Setup Time (HIGH or LOW)	VCC=4.5V	6, 8	CET or CEP to CP	5.5		ns	9
			6, 8	CET or CEP to CP	7.0		ns	10, 11
th(H/L)(3)	Hold Time (HIGH or LOW)	VCC=4.5V	6, 8	CET or CEP to CP	0.5		ns	9, 10, 11
TREC(1)	Recovery Time		6, 8	\overline{MR} to CP	0.0		ns	9
			6, 8	\overline{MR} to CP	0.5		ns	10, 11

- Note 1: SCREEN TESTED 100% ON EACH DEVICE AT +25C & +125C TEMPERATURE, SUBGROUPS 1, 2, 7, & 8.
- Note 2: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C & +125C TEMP SUBGROUPS A1, 2, 7 & 8.
- Note 3: SCREEN TESTED 100% ON EACH DEVICE AT +25C TEMPERATURE ONLY, SUBGROUP A9.
- Note 4: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C & +125C TEMPERATURE, SUBGROUPS A9 & 10.
- Note 5: TRANSMISSION LINE DRIVING TEST, GUARDBANDED LIMITS SET FOR +25C, 2 MSEC DURATION MAX.
- Note 6: DESIGN CHARACTERIZATION DATA ONLY.
- Note 7: +25C & +125C MIN LIMITS GUARANTEED FOR 5.5V BY GUARDBANDING 4.5V MINIMUM LIMITS.
- Note 8: GENERAL NOTE: DUE TO THE INTERNAL NOISE PROBLEMS THIS COMPONENT CANNOT MEET THE THRESHOLD LIMITS REQUIRED PER MIL-STD-883, TEST METHOD 5005, FOR VIH (VIH=2.0V +20 PERCENT). FOR FUNTIONAL TESTS, USE VIH=3.0V + 5 PERCENT FOR ALL INPUTS. THE VIL LIMIT (0.8V - 50 PERCENT) REMAINS UNCHANGED. USERS ARE CAUTIONED TO VERIFY THAT THIS CHANGE WILL NOT AFFECT THEIR SYSTEMS.