

MN54ACT3301-X REV 0A0

 Original Creation Date: 12/03/98
 Last Update Date: 02/03/99
 Last Major Revision Date: 12/03/98

Crystal Clock Generator

General Description

This device is a crystal controlled CMOS oscillator requiring a minimum of external components. It provides selectable output divide ratio (and selectable crystal drive level). The circuit is designed to operate over a wide frequency range using fundamental model or overtone crystals.

Industry Part Number

54ACT3301

NS Part Numbers

54ACT3301W-QML

Prime Die

J3301

Controlling Document

5962-98621

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

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

Features

- Programmable oscillator drive
- Output current drive of 48 mA for IOL/IOH
- FACT CMOS output levels
- Output has a high speed short circuit protection
- Basic oscillator type: Pierce
- Hysteresis inputs to improve noise margin

(Absolute Maximum Ratings)

(Note 1)

Supply Voltage (Vcc)	-0.5V to +7.0V
DC Input Diode Current (Iik)	±9 mA
DC Input Voltage (Vi)	-0.5V to Vcc +7.0V
DC Output Voltage (Vo)	-0.5V to Vcc +0.5V
DC Output Source or Sink Current (Io)	±70 mA
Storage Temperature (Tstg)	-65 C to +150 C
Junction Temperature (Tj)	175 C

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 high-level input voltage (VIH)	
OE _H , OE _L @ VCC=4.5V to 5.5V	2.0V
DIVA @ VCC=4.5V	3.15V
@ VCC=5.5V	3.85V
DIVB, OSC_DR @ VCC=4.5V	4.05V
@ VCC=5.5V	4.95V
Minimum low-level input voltage (VIL)	
OE _H , OE _L @ VCC=4.5V to 5.5V	0.8V
DIVA @ VCC=4.5V	1.35V
@ VCC=5.5V	1.65V
DIVB, OSC_DR @ VCC=4.5V	0.45V
@ VCC=5.5V	0.55V
Minimum 1/2 level input voltage (V _{1/2})	
DIVB, OSC_DR @ VCC=4.5V	1.8V
@ VCC=5.5V	2.2V
Maximum 1/2 level input voltage (V _{1/2})	
DIVB, OSC_DR @ VCC=4.5V	2.7V
@ VCC=5.5V	3.3V

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.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIH1	High Level Input Current	VCC=5.5V, VM=5.5V	1, 2	DIVA, DIVB, OSC_DR)	200	380	uA	1, 2, 3
IIH2	High Level Input Current	VCC=5.5V, VM=5.5V	1, 2	OEL	85	175	uA	1, 2, 3
IIH3	High Level Input Current	VCC=5.5V, VM=5.5V	1, 2	OEH		6.0	uA	1, 2, 3
IIH4	High Level Input Current	VCC=5.5V, VM=5.5V	1, 2	OSC_IN	20	125	uA	1, 2, 3
IIL1	Low Level Input Current	VCC=5.5V, VM=0.0V	1, 2	DIVB, OSC_DR	-200	-380	uA	1, 2, 3
IIL2	Low Level Input Current	VCC=5.5V, VM=0.0V	1, 2	OEH	-85	-175	uA	1, 2, 3
IIL3	Low Level Input Current	VCC=5.5V, VM=0.0V	1, 2	DIVA, OEL		-6.0	uA	1, 2, 3
IIL4	Low Level Input Current	VCC=5.5V, VM=0.0V	1, 2	OSC_IN	-20	-125	uA	1, 2, 3
VOL1	Low Level Output Voltage	VCC=4.5V, IOL=50uA	1, 2	OUT		.10	V	1, 2, 3
		VCC=5.5V, IOL=50uA	1, 2	OUT		.10	V	1, 2, 3
		VCC=4.5V, IOL=48mA	1, 2	OUT		0.44	V	1, 2, 3
		VCC=5.5V, IOL=48mA	1, 2	OUT		0.44	V	1, 2, 3
VIOL	Dynamic Output Current LOW	VCC=5.5V, IOL=75.0mA	1, 2, 5	OUT		1.65	V	1, 2, 3
VOH1	High Level Output Voltage	VCC=4.5V, IOH=-50.0uA	1, 2	OUT	4.40		V	1, 2, 3
		VCC=5.5V, IOH=-50.0uA	1, 2	OUT	5.40		V	1, 2, 3
		VCC=4.5V, IOH=-48.0mA	1, 2	OUT	3.76		V	1, 2, 3
		VCC=5.5V, IOH=-48.0mA	1, 2	OUT	4.76		V	1, 2, 3
VI0H	Dynamic Output Current HIGH	VCC=5.5V, IOH=-75.0mA	1, 2, 5	OUT	3.85		V	1, 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.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
VOL2	Low Level Output Voltage	VCC=4.5V, IOL=150uA	1, 2	OSC_OUT		0.74	V	1, 2, 3
		VCC=5.5V, IOL=150uA	1, 2	OSC_OUT		0.74	V	1, 2, 3
		VCC=4.5V, IOL=600 uA	1, 2	OSC_OUT		0.74	V	1, 2, 3
		VCC=5.5V, IOL=600 uA	1, 2	OSC_OUT		0.74	V	1, 2, 3
		VCC=4.5V, IOL=1.0 mA	1, 2	OSC_OUT		0.74	V	1, 2, 3
		VCC=5.5V, IOL=1.0 mA	1, 2	OSC_OUT		0.74	V	1, 2, 3
VOH2	High Level Output Voltage	VCC=4.5V, IOH=-150uA	1, 2	OSC_OUT	3.46		V	1, 2, 3
		VCC=5.5V, IOH=-150uA	1, 2	OSC_OUT	4.46		V	1, 2, 3
		VCC=4.5V, IOH=-600uA	1, 2	OSC_OUT	3.46		V	1, 2, 3
		VCC=5.5V, IOH=-600uA	1, 2	OSC_OUT	4.46		V	1, 2, 3
		VCC=4.5V, IOH=-1.0mA	1, 2	OSC_OUT	3.46		V	1, 2, 3
		VCC=5.5V, IOH=-1.0mA	1, 2	OSC_OUT	4.46		V	1, 2, 3
IOZH	Maximum TRI-STATE	VCC=4.5V, VM=4.5V	1, 2	OUT		5.0	uA	1, 2, 3
		VCC=5.5V, VM=5.5V	1, 2	OUT		5.0	uA	1, 2, 3
IOZL	Maximum TRI-STATE	VCC=4.5V, VM=0.0V	1, 2	OUT		-150	uA	1, 2, 3
		VCC=5.5V, VM=0.0V	1, 2	OUT		-180	uA	1, 2, 3
ICCH	Supply Current Outputs HIGH	VCC=5.5V	1, 2	VCC		45.0	uA	1, 2, 3
ICCL	Supply Current Outputs LOW	VCC=5.5V	1, 2	VCC		240	uA	1, 2, 3
ICCZ	Supply Current Outputs Tri-State	VCC=5.5V	1, 2	VCC		45.0	uA	1, 2, 3
ICCT	Supply Current per Input	VCC=5.5V, VIHT=VCC-2.1V	1, 2	VCC		1.5	mA	1, 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.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
ICC3L	Supply Current per Input	VCC=5.5V,	1, 2	VCC		1.5	mA	1, 2, 3
ICCQ6	Supply Current for Low Drive Oscillator	VCC=4.5V	1, 2	VCC	0.6		mA	1, 2, 3
ICCQ5	Supply Current for Low Drive Oscillator	VCC=5.5V	1, 2	VCC		6.5	mA	1, 2, 3
ICCQ4	Supply Current for Medium Drive Oscillator	VCC=4.5V	1, 2	VCC	1.7		mA	1, 2, 3
ICCQ3	Supply Current for Medium Drive Oscillator	VCC=5.5V	1, 2	VCC		12.4	mA	1, 2, 3
ICCQ2	Supply Current for High Drive Oscillator	VCC=4.5V	1, 2	VCC	5.5		mA	1, 2, 3
ICCQ1	Supply Current for High Drive Oscillator	VCC=5.5V	1, 2	VCC		31.5	mA	1, 2, 3
VIKL	Negative Input Clamp Voltage	VCC=4.5V, VM=-9.0mA	1, 2	INPUT		-1.2	V	1, 2, 3
VIKH	Positive Input Clamp Voltage	VCC=4.5V, VM=9.0mA	1, 2	INPUT		5.7	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.

tpZH	Output Enable	VCC=4.5V	3, 4, 7	OE to OUT	1.0	31.5	ns	9, 10, 11
tpZL	Output Enable	VCC=4.5V	3, 4, 7	OE to OUT	1.0	28.0	ns	9, 10, 11
tpHZ	Output Disable	VCC=4.5V	3, 4, 7	OE to OUT	1.0	21.5	ns	9, 10, 11
tpLZ	Output Disable	VCC=4.5V	3, 4, 7	OE to OUT	1.0	16.0	ns	9, 10, 11

Note 1: SCREEN TESTED 100% ON EACH DEVICE AT +25C, +125C, & -55C TEMPERATURE, SUBGROUPS 1, 2, 3, 7, & 8.

Note 2: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C, +125C, & -55C TEMPERATURE, SUBGROUPS A1, 2, 3, 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, & -55C TEMPERATURE, SUBGROUPS A9, 10, & 11.

Note 5: TRANSMISSION LINE DRIVING TEST, GUARDBAND LIMITS SET FOR +25C, 2 MSEC DURATION MAX.

Note 6: GUARANTEED BUT NOT TESTED (DESIGN CHARACTERIZATION DATA).

Note 7: +25C & +125C MIN LIMITS GUARANTEED FOR 5.5V BY GUARDBANDING 4.5V MINIMUM LIMITS.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
0A0	M0003234	02/03/99	Linda Collins	Initial MDS Release