National Semiconductor

MICROCIRCUIT DATA SHEET

MN11C90-X REV 1A0

Original Creation Date: 06/23/98
Last Update Date: 10/14/98
Last Major Revision Date: 09/30/98

High Speed Prescaler

General Description

NOTE: THIS DEVICE IS NOT INTENDED FOR NEW DESIGNS!

The 11C90 is a high-speed prescaler designed specifically for communication and instrumentation applications. The 11C90 will divide by 10 or 11. The division ratio is controlled by the Mode Control. The divide by 10 or 11 capability allows the use of pulse swallowing techniques to control high-speed counting modulos by lower-speed circuits. The 11C90 may be used with either ECL or TTL power supplies. In addition to the ECL outputs Q and Q, the 11C90 contains an ECL-to-TTL converter and a TTL output. The TTL output operates from the same VCC and VEE levels as the counter, but a separate pin is used for the TTL circuit VEE. This minimizes noise coupling when the TTL output switches and also allows power consumption to be reduced by leaving the separate VEE pin open if the TTL output is not used. To facilitate capacitive coupling of the clock signal, a 400 ohm resistor (VREF) is connected internally to the VBB reference. Connecting this resistor to the Clock Pulse input (CP) automatically centers the input about the switching threshold. Maximum frequency operation is achieved with a 50% duty cycle. Each of the Mode Control inputs is connected to an internal 2k ohm resistor with the other end uncommitted (RM1 and RM2). An M input can be driven from a TTL circuit operating from the same VCC by connecting the free end of the associated 2k ohm resistor to VCCA. When an M input is driven from the ECL circuit, the 2k ohm resistor can be left open or, if required, can be connected to VEE to act as a pull-down resistor.

Industry Part Number

11C90

NS Part Numbers

11C90DMQB

Prime Die

KC90

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

- THIS DEVICE IS NOT INTENDED FOR NEW DESIGNS!

(Absolute Maximum Ratings)
(Note 1)

Storage Temperature (Tstg)	-65 C to +150 C
Maximum Junction Temperature (Tj)	+175 C
Vee Pin Potential to Ground Pin	-7.0V to GND
Input Voltage (DC)	VEE to GND
Output Current (DC Output HIGH)	-50mA

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

Recommended Operating Conditions

Case Temperature (Tc)	-55 C to +125 C
Supply Voltage (Vee)	-5.7V to -4.7V
Supply Voltage (VCC) VCC = VCCA	GND

Electrical Characteristics

DC PARAMETERS - ECL OPERATION

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: VEE = -5.2V, VCC=VCCA=GND, TC = -55C to +125C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIH	Input HIGH Current	VEE = -5.2V, VM = VIH	2, 4	M1, M2		250	uA	1
			2, 4	CP, MS		400	uA	1
IIL	Input LOW Current	VEE = -5.2V, VM = VIL	2, 4	INPUTS	0.5		uA	1
VOH	Output HIGH Voltage	VEE = -5.2V, VIL, VIH, LOADING 100 OHMS TO -2.0V	1, 3	OUTPUTS	-980	-820	mV	1
			1, 3	OUTPUTS	-910	-670	mV	2
			1, 3	OUTPUTS	-1100	-900	mV	3
VOL	Output LOW Voltage	VEE = -5.2V, VIL, VIH, LOADING: 100 Ohms to -2.0V	1, 3	OUTPUTS	-1820	-1620	mV	1, 2, 3
VREF	Reference Voltage	VEE = -5.2V, IREF = -10uA	2, 4	VREF	-1550	-1150	mV	1
VIH	Input HIGH Voltage	VEE = -5.2V	7	INPUTS	-1100	-810	mV	1
			7	INPUTS	-980	-690	mV	2
			7	INPUTS	-1195	-910	mV	3
VIL	Input LOW Voltage	VEE = -5.2V	7	INPUTS	-1850	-1480	mV	1
			7	INPUTS	-1800	-1430	mV	2
			7	INPUTS	-1890	-1520	mV	3
IEE	Power Supply Current	VEE = -5.2V, Inputs Open	1, 3	VEE	-46	-110	mA	1
			1, 3	VEE	-46	-118	mA	2, 3

DC PARAMETERS - TTL OPERATION

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: VCC = 5.0V, VEE = 0.0V, TC = -55C TO +125C

IIL	Input Low Current	VCC = 5.5V, VIL = 0.4V	1, 3	INPUTS		-5.0	mA	1, 2, 3
ISC	Output Short Circuit Current	VCC = 5.5V, VM = 0.0V	1, 3	QTTL	-20	-80	mA	1, 2, 3
VOH	Output High Voltage	VCC = 5.0V, VIL, VIH, IOH = -640uA	1, 3	QTTL	2.3		V	1, 2, 3
VOL	Output Low Voltage	VCC = 5.0V, VIL, VIH, IOL = 20mA	1, 3	QTTL		0.5	V	1, 2, 3
VIH	Input High Voltage	VCC = 5.0V	7	INPUTS	4.1		V	1, 2, 3
VIL	Input Low Voltage	VCC = 5.0V	7	INPUTS		3.3	V	1, 2, 3

Electrical Characteristics

AC PARAMETERS - ECL OPERATION

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: VEE = -5.2V, VCC=VCCA= 0.0V, TC = -55C TO +125C, LOADING: 100 OHMS TO -2.0V

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpLH tpHL	Propagation Delay	VEE = -5.2V, VM = 50%	5	CP to Q	1.3	3.0	ns	9
tpLH	Propagation Delay	VEE = -5.2V, VM = 50%	5	MS TO Q		6.0	ns	9
ttLH ttHL	Output Transition Time	VEE = -5.2V, VM = 20% to 80% or 80% to 20%	5	OUTPUTS		2.0	ns	9
ts(H/L)	Setup time High or Low	VEE = -5.2V	5	M to CP	4.0		ns	9
th(H/L)	Hold time High or Low	VEE = -5.2V	5	M to CP	0.0		ns	9
FMAX	Maximum Clock Frequency	VEE = -5.2V	5	CP	600		MHz	9

AC PARAMETERS - TTL OPERATION

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: VCC = 5.0V, VEE = 0.0V, TC = -55C TO +125C, LOADING: HIGH IMPEDANCE

tpLH tpHL	Propagation Delay	VCC = 5.0V, VM = 50%	5	CP to QTTL	6.0	14.0	ns	9
tpLH	Propagation Delay	VCC = 5.0V, VM = 50%	5	MS to QTTL		17.0	ns	9
ts(H/L)	Setup Time High or Low	VCC = 5.0V	5	M to CP	4.0		ns	9
th(H/L)	Hold Time High or Low	VCC = 5.0V	5	M to CP	0.0		ns	9
FMAX	Maximum Clock Frequency	VCC = 5.0V	5	CP	600		MHz	9

Note 1: Screen tested 100% on each device at -55 C, +25 C and +125 C temperature, subgroups 1, 2, 3, 7 & 8.
Note 2: Screen tested 100% on each device at +25C temperature only, subgroup 1.
Note 3: Sample tested (Method 5005, Table 1) on each MFG. lot at -55C, +25C and +125C temperature, subgroups 1, 2, 3, 7 & 8.
Note 4: Sample tested, (Method 5005, Table 1) at +25C temperature only, subgroup 1.
Note 5: Guaranteed at +25 C temperature only, subgroup 9.
Note 6: Sample tested at +25C temperature only, 2% LTPD.
Note 7: Guaranteed by applying specific input condition and testing VOH/VOL.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
0A0	M0002937	10/14/98	Donald B. Miller	Initial MDS Release. Archive Table 1 rev 0.0 Release MDS MN11C90-X rev 0A0.
1A0	M0003023	10/14/98	Donald B. Miller	Revision change from 0A0 to 1A0: On page 5, "AC parameters - ECL operation" section, change the FMAX note from 6 "Sample tested at +25C temperature only, 2% LTPD" to note 5 "guaranteed at +25C temperature only, subgroup 9".