

MN11C91-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 11C91 is a high-speed prescaler designed specifically for communication and instrumentation applications. The 11C91 will divide by 5 or 6. The division ratio is controlled by the Mode Control. The divide by 5 or 6 capability allows the use of pulse swallowing techniques to control high-speed counting modulus by lower-speed circuits. The 11C91 may be used with either ECL or TTL power supplies. In addition to the ECL outputs Q and \bar{Q} , the 11C91 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

11C91

NS Part Numbers

11C91DMQB

Prime Die

KC91

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 | M0002934 | 10/14/98 | Donald B. Miller | Initial MDS Release. Archive Table 1 rev 0.0 Release MDS MN11C91-X rev 0A0. |
| 1A0 | M0003024 | 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". |