FAIRCHILD
A Schlumberger Company

11C05
1 GHz Divide-By-Four Counter

11C ECL Product

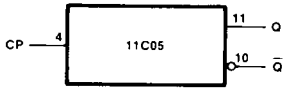
Description

The 11C05 is an ECL Divide-By-Four Counter with a maximum operating frequency above 1 GHz over the 0°C to +75°C temperature range. The input may be DC or AC (capacitively) coupled to the signal source. The emitter follower outputs (Q and $\overline{Q}$) are capable of driving 50Ω lines. The outputs are voltage-compensated and provide standard ECL output levels.

Pin Names

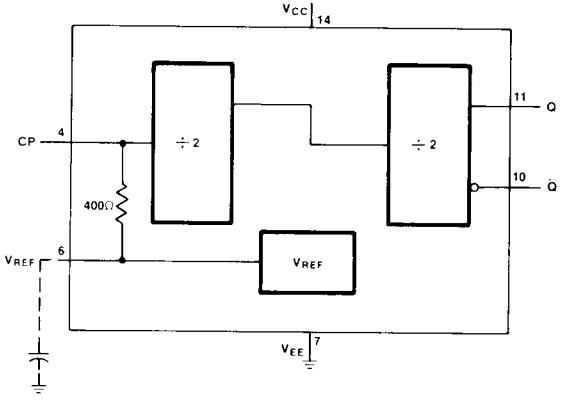
CP	Clock Input
V_{REF}	Reference Input
Q, $\overline{Q}$	Counter Outputs

Logic Symbol



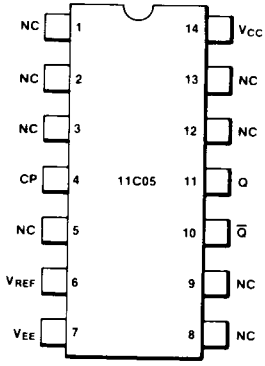
V_{CC} - Pin 14
V_{EE} Pin 7
Bias Filter Pin 6

Logic Diagram



Connection Diagram

14-Pin DIP (Top View)



Ordering Information

Package	Outline	Order Code
Ceramic DIP	4I	DC

Absolute Maximum Ratings Above which the useful life may be impaired

Storage Temperature	-65°C to +150°C
Maximum Junction Temperature (T_J)	+150°C
Supply Voltage Range	-7.0 V to GND
Input Voltage (DC)	V_{EE} to GND
Output Current (DC Output HIGH)	-50 mA
Operating Range	-5.5V to -4.75V
Lead Temperature (Soldering 10 sec.)	300°C

Guaranteed Operating Ranges

Supply Voltage (V_{EE})			Ambient Temperature (T_A)
Min	Typ	Max	
-5.25V	-5.0V	-4.75V	0°C to +75°C Commercial
-5.5V	-5.0V	-4.75V	-55°C to +125°C Military

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Commercial DC Characteristics: V_{EE} = -5.0 V, V_{CC} = GND

Symbol	Characteristic	Min	Typ	Max	Unit	T_A	Condition
V_{OH}	Output Voltage HIGH	-1060 -1025 -980	-995 -960 -910	-910 -880 -830	mV	0°C +25°C +75°C	V_{IN} = V_{IH} or V_{IL}, Loading 50 Ω to -2 V
V_{OL}	Output Voltage LOW	-1810	-1705	-1620	mV	0°C to +75°C	
V_{IH}	Input Voltage HIGH	-2.45 -2.50 -2.60			V	0°C +25°C +75°C	Guaranteed Input HIGH
V_{IL}	Input Voltage LOW			-3.25 -3.30 -3.40	V	0°C +25°C +75°C	Guaranteed Input LOW
I_{EE}	Power Supply Current	-90	-65		mA	+25°C	Input Open
V_{EE}	Supply Voltage Range	-5.25	-5.0	-4.75	V	0°C to +75°C	
V_{REF}	Input Reference Voltage		-2.9		V	+25°C	

Military DC Characteristics: V_{EE} = -5.0 V, V_{CC} = GND

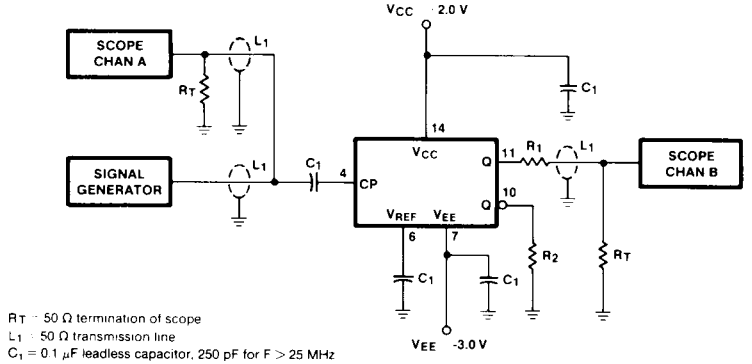
Symbol	Characteristic	Min	Typ	Max	Unit	T_A	Condition
V_{OH}	Output Voltage HIGH	-1100 -980 -910	-1030 -910 -820	-950 -820 -720	mV	-55°C +25°C +125°C	V_{IN} = V_{IH} or V_{IL}, Loading 100Ω to -2 V
V_{OL}	Output Voltage LOW	-1810	-1705	-1620	mV	-55°C to +125°C	
V_{IH}	Input Voltage HIGH	-2.35 -2.50 -2.70			V	-55°C +25°C +125°C	Guaranteed Input HIGH
V_{IL}	Input Voltage LOW			-3.15 -3.30 -3.50	V	-55°C +25°C +125°C	Guaranteed Input LOW
I_{EE}	Power Supply Current	-90	-65		mA	+25°C	Input Open
V_{EE}	Supply Voltage Range	-5.5	-5.0	-4.75	V	-55°C to +125°C	
V_{REF}	Input Reference Voltage		-2.9		V	+25°C	

Commercial and Military AC Characteristics: V_{EE} = −5 V, V_{CC} = GND, T_A - 55°C to +125°C unless otherwise noted

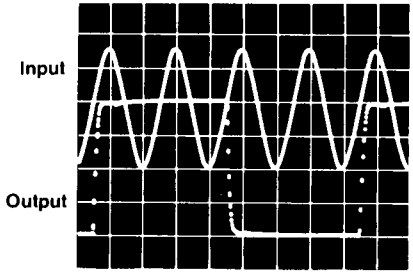
Symbol	Characteristic	Min	Typ	Max	Unit	Condition	
f_{COUNT}	Maximum Sinusoidal Input Frequency	1000			MHz	0°C to +75°	AC Coupled 800 mV Peak-to-Peak Input See Note 2
		950				-55°C to +125°C	
f_{COUNT}	Minimum Sinusoidal Input Frequency		25		MHz		
SR_{MIN}	Slew Rate of Squarewave		50		V/μs	See Note 1	

NOTES:
1. Very low frequency operation is possible as long as sufficient slew rate of the input pulse edges is maintained.
2. Input drive shall not exceed 1.5 V peak-to-peak max.

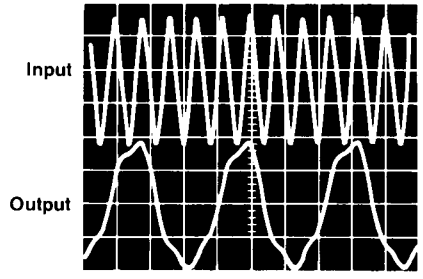
Figure 1 AC Test Circuit



R_T = 50 Ω termination of scope
L_1 = 50 Ω transmission line
C_1 = 0.1 μF leadless capacitor, 250 pF for F > 25 MHz
R_1 = 0 Ω for commercial grade, 50 Ω for military grade
R_2 = 50 Ω for commercial grade, 100 Ω for military grade

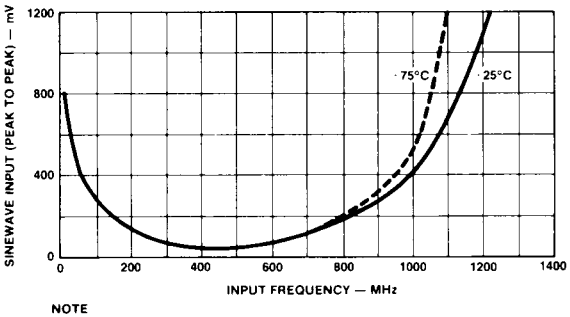


25 MHz Operation
Horizontal Scale = 20 ns/div
Vertical Scale = 200 mV/div



1.2 GHz Operation
Horizontal Scale = 1 ns/div
Vertical Scale = 200 mV/div

Figure 2 AC Input Requirements



NOTE
Trigger amplitudes refer to the circuit end of the input cable as opposed to the signal generator end

A DC coupled input should be designed to provide specified V_{IH} and V_{IL} levels. For AC coupling, an external resistor may or may not be necessary depending on the application. If an input signal is always present, only the capacitor is required because an internal 400 Ω resistor connected between CP and V_{REF} centers the AC signal about mid-threshold. For applications in which an input signal is not always present, AC coupling requires that an external 10 KΩ resistor be connected between CP and V_{EE}. This offsets the input sufficiently to avoid extreme sensitivity to noise when no signal is present. Otherwise, noise triggering can lead to oscillation at about 450 MHz. For best operation, both outputs should be equally loaded.