

11C05



Not Intended For New Designs

T-45-23-21

11C05

1 GHz Divide-By-Four Counter

General 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 $\bar{Q}$) are capable of driving 50Ω lines. The outputs are voltage-compensated and provide standard ECL output levels.

Ordering Code: See Section 6

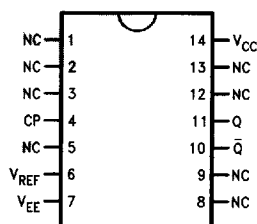
Logic Symbol



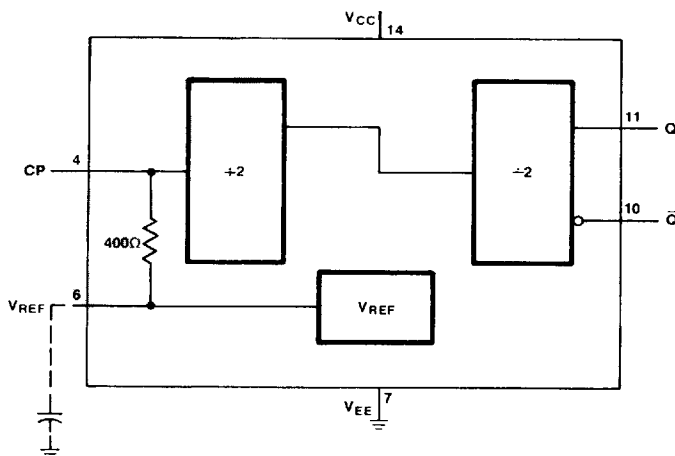
Pin Names	Description
CP	Clock Input
V _{REF}	Reference Input
Q, $\bar{Q}$	Counter Outputs

Connection Diagram

14-Pin DIP



Logic Diagram



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	-7.0V 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

Recommended Operating Conditions

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

Commercial DC Electrical Characteristics

V_{EE} = 5.0V, V_{CC} = GND

Symbol	Parameter	Min	Typ	Max	Units	T _A	Conditions
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 50Ω to -2V
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	
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 Electrical Characteristics

V_{EE} = -5.0V, V_{CC} = GND

Symbol	Parameter	Min	Typ	Max	Units	T _A	Conditions
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 -2V
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	
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	

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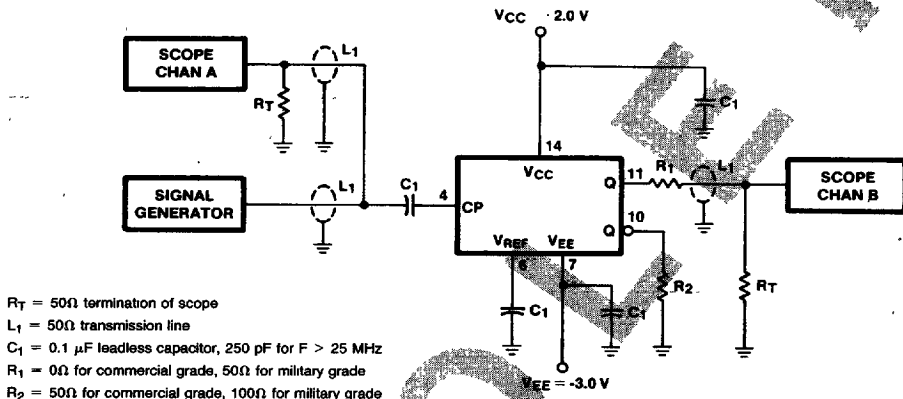
Commercial and Military AC Electrical Characteristics

$V_{EE} = -5V$, $V_{CC} = GND$, $T_A = -55^{\circ}C$ to $+125^{\circ}C$ unless otherwise noted

Symbol	Parameter	Min	Typ	Max	Units	Conditions	
f_{COUNT}	Maximum Sinusoidal Input Frequency	1000			MHz	$0^{\circ}C$ to $+75^{\circ}C$	AC Coupled 800 mV Peak-to-Peak Input (Note 2)
		950				$-55^{\circ}C$ to $+125^{\circ}C$	
f_{COUNT}	Minimum Sinusoidal Input Frequency		25		MHz		
SR_{MIN}	Slew Rate of Squareware		50		V/ μs	(Note 1)	

Note 1: Very low frequency operation is possible as long as sufficient slow rate of the input pulse edges is maintained.

Note 2: Input drive shall not exceed 1.5V peak-to-peak max.



$R_T = 50\Omega$ termination of scope

$L_1 = 50\Omega$ transmission line

$C_1 = 0.1 \mu F$ leadless capacitor, 250 pF for $F > 25$ MHz

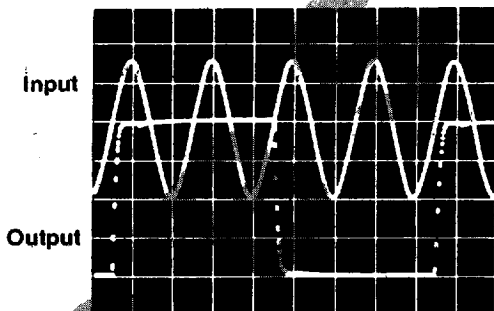
$R_1 = 0\Omega$ for commercial grade, 50 Ω for military grade

$R_2 = 50\Omega$ for commercial grade, 100 Ω for military grade

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FIGURE 1. AC Test Circuit

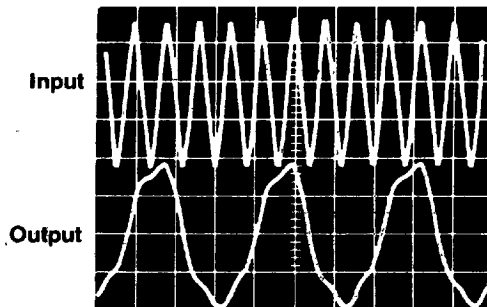
Horizontal Scale = ns/div
Vertical Scale = 200 mV/div



25 MHz Operation

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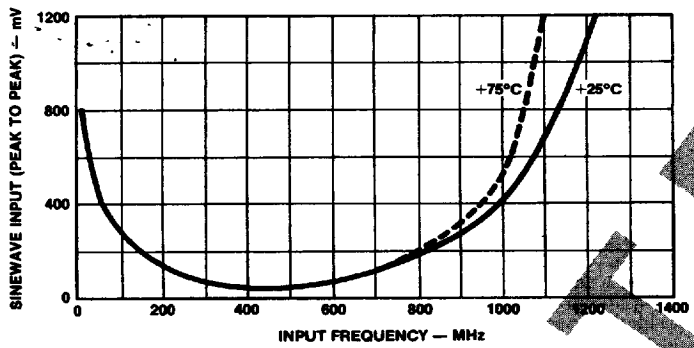
Horizontal Scale = 1 ns/div
Vertical Scale = 200 mV/div



1.2 GHz Operation

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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 400Ω 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 $10\text{ K}\Omega$ 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.