

# COM91C32

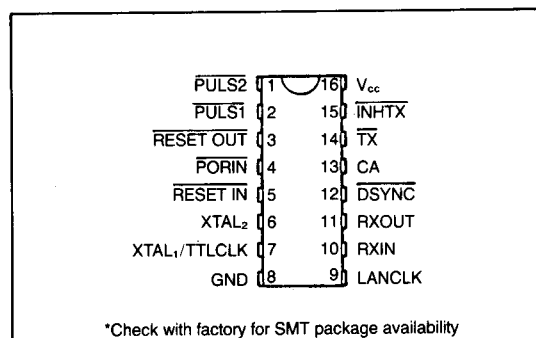
## Local Area Network Transceiver

### LANT

#### FEATURES

- ☐ Compatible with the COM9026 and COM90C26 LANCs
- ☐ Compatible with the HYC9058 HIT
- ☐ Compatible with the HYC9068 LAND
- ☐ Functionally compatible with the COM90C32
- ☐ Reduces node chip count
- ☐ Built-in 20MHz crystal oscillator
- ☐ Internal Power On Reset for COM9026/COM90C26
- ☐ Provides all clocks for COM9026/COM90C26
- ☐ Low power CMOS technology
- ☐ TTL compatible
- ☐ 5V only power supply

#### PIN CONFIGURATION\*



#### GENERAL DESCRIPTION

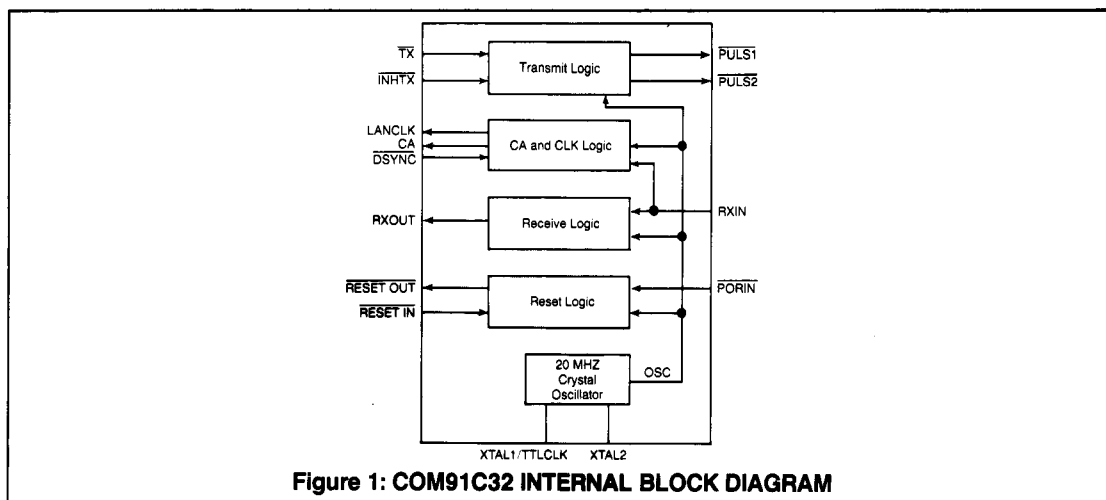
The COM91C32 local area network transceiver (LANT) is an improved version of the COM90C32. It reduces both node cost and board real estate. The COM91C32 is a companion chip to either the COM9026 or COM90C26 local area network controller (LANC), the HYC9068 local area network driver (LAND), and the HYC9058 high impedance transceiver (HIT).

The COM91C32 contains two circuits not available on the COM90C32. A 20MHz crystal oscillator has been built in to eliminate the need for an external oscillator. In addition, the external power on reset circuit required by the COM9026/COM90C26 has been integrated inside the COM91C32 to reduce the number of components, their related costs, and board real estate.

The COM91C32 performs the functions necessary to allow simple interface to the transmission media for ARCNET®

local area networks. The COM91C32 produces two 5MHz clocks for the COM9026/COM90C26. The first one (LANCLK) is free running and feeds the clock input (pin 19) of the COM9026/COM90C26. The second one (CA) has start/stop capability controlled by the DSYNC output of the COM9026/COM90C26 as well as the data received from the network.

During data reception, the COM91C32 will convert incoming serial receive data from the HIT or LAND circuit to NRZ form which will directly feed the RX input of the COM9026/COM90C26 (pin 38). During transmission, the COM91C32 converts the transmit data from the COM9026/COM90C26 TX, (pin 37) into the waveforms necessary to drive the HYC9058 or HYC9068 as shown in figure 2.



### DESCRIPTION OF PIN FUNCTIONS (refer to figure 2)

COM 9026 Interface			
PIN NO.	NAME	SYMBOL	FUNCTION
2	PULSE 1	$\overline{\text{PULS1}}$	$\overline{\text{PULS1}}$ AND $\overline{\text{PULS2}}$ carry the transmit data information encoded in pulse format.
1	PULSE 2	$\overline{\text{PULS2}}$	
3	RESET OUT	$\overline{\text{RESET OUT}}$	This output signal provides a reset signal capable of ensuring proper reset of the COM9026/COM90C26. It is TTL compatible. The $\overline{\text{RESETOUT}}$ pulse width equals $102.4\mu\text{sec} + (\overline{\text{RESETIN}}$ or $\overline{\text{PORIN}}$ pulse width).
10	RECEIVE IN	RXIN	This input carries the receive data information from the cable interface circuitry.
11	RECEIVE OUT	RXOUT	This output provides the NRZ encoded receive data to the COM9026/COM90C26.
12	DELAYED SYNC	$\overline{\text{DSYNC}}$	This active low input is asserted by the COM9026 and is used to synchronize the CA clock.
13	CA	CA	This output is a 5 MHz start/stop clock that halts when $\overline{\text{DSYNC}}$ goes active. It is used to synchronize the CA clock output to the RX OUT received data.
14	TRANSMIT DATA	$\overline{\text{TX}}$	This input represents the serial data transmitted by the COM9026/COM90C26.
15	TRANSMIT INHIBIT	INHTX	This active low input inhibits the COM91C32 from transmitting by forcing $\overline{\text{PULS1}}$ and $\overline{\text{PULS2}}$ high.
System Clock Interface			
4	POWER ON RESET IN	$\overline{\text{PORIN}}$	This input signal, which is controlled by $C_1$ (fig. 2) on Power up, disables the transmitter portion of the COM91C32 and generates the $\overline{\text{RESET OUT}}$ signal. This pin has a schmitt trigger input.
5	RESET IN	$\overline{\text{RESET IN}}$	This input signal disables the transmitter portion of the COM91C32 and generates the $\overline{\text{RESET OUT}}$ signal. This pin has a TTL compatible input.
7 6	CRYSTAL	XTAL1 XTAL2	An external 20 MHz crystal is connected to these pins. If an external 20 MHz TTL clock is used, it should be connected to XTAL1 (pin 7) with a 390 ohm pullup resistor; XTAL2 must be left floating.
9	LAN CLOCK	LANCLK	This output supplies a 5 MHz free running clock for the COM9026/COM90C26.
8	GROUND	GND	Ground
16	+5V SUPPLY	VCC	+5 Volt Power Supply

## FUNCTIONAL DESCRIPTION

The COM9026/COM90C26, when transmitting data on TX, will produce a negative pulse of 200 nanoseconds to indicate a logic "1" and no pulse to indicate a logic "0." Referring to figure 4, a 200 nanosecond pulse on TX is converted to 2, 100 nanosecond nonoverlapping pulses shown as PULS1 and PULS2. The signals PULS1 and PULS2 drive the HYC9058 or the HYC9068 which in turn creates a 200 nanosecond dipulse signal on the cable as shown in figure 2.

At the receiving nodes, each dipulse appearing on the cable is coupled through the RF transformer of the HYC9058 or HYC9068 to produce a positive pulse. These pulses are captured by the COM91C32 and are converted to NRZ data. As each byte is received by the COM91C32, the CA clock is stopped by the COM9026/COM90C26 (via DSYNC) until the zero bit of the next byte is received. This will automatically restart the CA clock. The COM9026/COM90C26 uses the CA clock to sample the NRZ data and these sample points are shown in figure 5.

Typically, RXIN pulses occur at multiples of 400 nanoseconds. The COM91C32 can tolerate distortion of plus or minus 100 nanoseconds and still correctly capture and convert the RXIN pulses to NRZ format.

### RESETTING THE COM91C32

The PORIN active low input signal is generated by turning the power on to generate the RESET OUT signal to the COM9026/COM90C26. The recommended capacitor value (C1 in figure 2) required to properly reset the COM9026/COM90C26 on power up is 0.1  $\mu$ F.

The RESET IN active low input signal is provided to generate the RESET OUT signal used to reset the COM9026/COM90C26. The pulse width of the RESET OUT signal is 102.4 microseconds, which is wide enough to properly reset the COM9026/COM90C26 local area network controller device.

$$\text{RESET OUT} = \text{RESET IN (pulse width)} + 102.4 \text{ microseconds}$$

$$\text{RESET OUT} = \text{PORIN (pulse width)} + 102.4 \text{ microseconds}$$

In addition to initializing the COM91C32 to an idle state, the RESET IN signal disables the transmitter portion of the COM91C32 during reset.

During reset, the COM91C32 output pins are as follows:

- PULS1 - is inactive (high)
- PULS2 - is inactive (high)
- LANCLK - is free running during and after reset
- CA - is free running during and after reset

The minimum RESET IN pulse width is 120 nanoseconds (or  $2T + 20$  nanoseconds for input clocks different than 20 MHz). For the 20 MHz clocks, T equals 50 nanoseconds.

### RESET IN/OUT TIMING

The COM91C32 incorporates a digital filter that will suppress glitches on the RESET IN and POR IN pins. The digital filter will filter all RESET IN and PORIN glitches that are narrower than 40ns (1T-10ns). It will allow RESET IN and POR IN pulses that are wider than 120 ns ( $2T+20$ ns). The RESET OUT pulse width is equal to the RESET IN pulse width plus 102.4 microseconds.

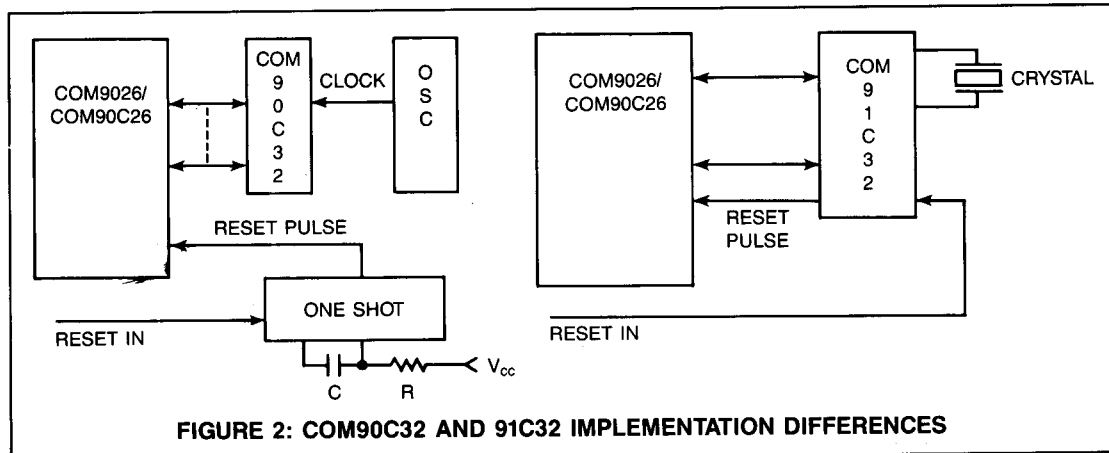
### THE INTERNAL OSCILLATOR

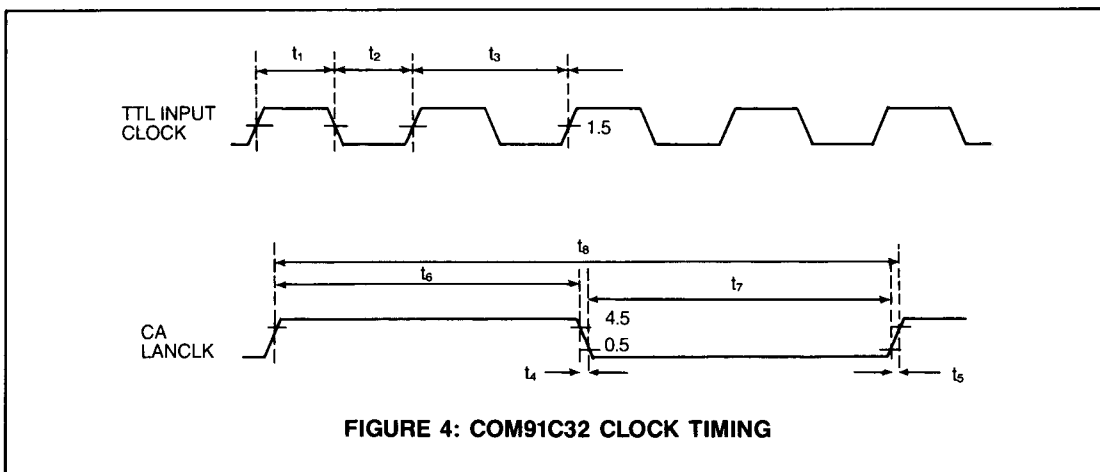
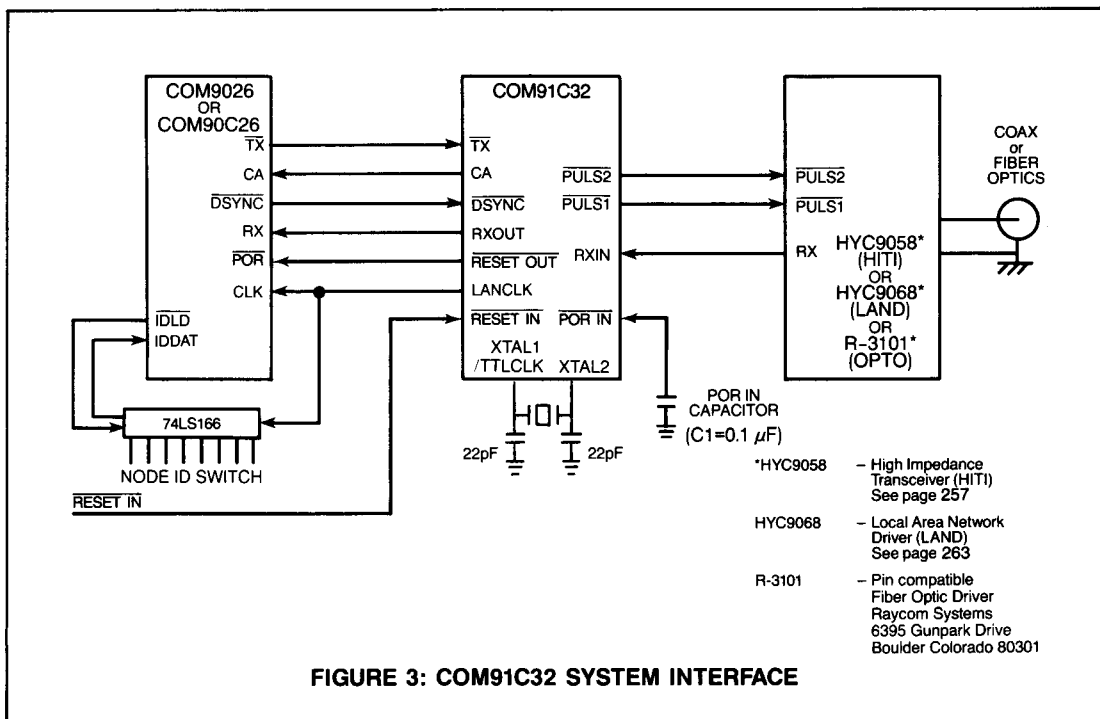
The COM91C32 incorporates on-board circuitry which, in conjunction with an external parallel resonant crystal, forms an oscillator. The oscillator frequency may vary between 8 MHz and 20 MHz to allow for a variable data rate from 1.0 Mbps to 2.5 Mbps.

The oscillator input is divided by 4 to produce the CA and the LANCLK output clocks to the COM9026/COM90C26.

The COM91C32 XTAL oscillator has been designed to work with a parallel resonant crystal and does not require an external resistor. Only two capacitors are needed (one from each leg of the XTAL to ground.) The values of the capacitors are two times the load capacitance of the crystal. Typical capacitor values are 22 pF.

The external crystal must have an accuracy of 0.020% or better.





**TABLE 1 - COM91C32 ELECTRICAL CHARACTERISTICS**

**MAXIMUM GUARANTEED RATINGS\***

Operating Temperature Range	0°C to 70°C
Storage Temperature Range	-55°C to 150°C
Lead Temperature (soldering, 10 sec.)	325°C
Positive Voltage on any Pin	$V_{cc} + 0.3$
Negative Voltage on any Pin	-0.3V
Maximum $V_{cc}$	+ 7.0V

\*Stresses above those listed may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or at any other condition above those indicated in the operational sections of this specification is not implied.

**DC CHARACTERISTICS** ( $T_a = 0^\circ\text{C}$  to  $+70^\circ\text{C}$ ,  $V_{cc} = 5\text{V} \pm 5\%$ )

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
<b>INPUT VOLTAGES</b>					
$V_{IH1}$ High Input Voltage	2.7			V	except for TTL CLK and $\overline{\text{PORIN}}$
$V_{IL1}$ Low Input Voltage			0.8	V	
$V_{IH2}$ High Input Voltage	$V_{cc}-0.5\text{V}$			V	for TTL CLK IN
$V_{IL2}$ Low Input Voltage			1	V	
$V_{IH3}$ High Input Voltage	3.6			V	for $\overline{\text{PORIN}}$
$V_{IL3}$ Low Input Voltage			1.0	V	
<b>OUTPUT VOLTAGES</b>					
$V_{OH1}$ High Output Voltage	$V_{cc}-1.0$			V	$\text{IOH} = 400\ \mu\text{A}$ except for CA, LANCLK
$V_{OL1}$ Low Output Voltage			0.4	V	$\text{IOL} = 4.0\ \text{mA}$ except for CA, LANCLK
$V_{OH2}$ High Output Voltage	$V_{cc}-0.5$			V	$\text{IOH} = 100\ \mu\text{A}$ for CA, LANCLK
$V_{OL2}$ Low Output Voltage			0.4	V	$\text{IOL} = 100\ \mu\text{A}$ for CA, LANCLK
<b>INPUT LEAKAGE CURRENT</b>					
$I_L$		$\pm 10$		$\mu\text{A}$	
<b>INPUT CAPACITANCE</b>					
$C_{IN}$			15	pF	
<b>POWER SUPPLY CURRENT</b>					
$I_{cc}$			20	mA	

**AC CHARACTERISTICS** ( $T_a = 0^\circ\text{C}$  to  $+70^\circ\text{C}$ ,  $V_{cc} = 5\text{V} \pm 5\%$ )

FIG NO.	PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Fig. 3	<b>TTL CLOCK INPUT TIMING</b> $t_1$ Input Clock High Time $t_2$ Input Clock Low Time $t_3$ Input Clock Period	20 20	50		ns ns ns	@ $V_{cc}-0.5\text{V}$ @ 1V
Fig. 3	<b>CA, LANCLK OUTPUT TIMING</b> $t_4$ Clock Out Fall Time $t_5$ Clock Out Rise Time $t_6$ Clock Out High Time $t_7$ Clock Out Low Time $t_8$ Clock Out Period	75 75	200	20 20	ns ns ns ns ns	@ 50 pF max @ 50 pF max @ 50 pF max @ 50 pF max @ 50 pF max
Fig. 4	<b>TRANSMIT TIMING</b> $t_9$ TX Setup to CA falling edge $t_{10}$ TX Hold after CA falling edge $t_{11}$ Xtal rising edge to PULS1/2 $t_{12}$ PULS1/2 Pulse Width $t_{13}$ INHTX to Pulse inactive	50 10	60 2 ( $t_3$ )	100	ns ns ns ns ns	
Fig. 5	<b>RECEIVE TIMING</b> $t_{15}$ RXIN Pulse Width $t_{16}$ RXIN to RXOUT delay $t_{17}$ RXOUT Pulse Width $t_{18}$ XTAL RISING EDGE TO RXOUT	10	5 ( $t_3$ ) + 70 400	70	ns ns ns ns	
Fig. 5	<b>DSYNC, CA TIMING</b> $t_{19}$ DSYNC Setup to CA rising edge		20		ns	
Fig. 6	<b>RESET TIMING</b> $t_{30}$ RESET IN Pulse Width $t_{31}$ RESET IN falling edge to RESET OUT falling edge $t_{32}$ RESET IN rising edge to RESET OUT rising edge $t_{33}$ RESET OUT Pulse Width	120 102	102.4 $t_{30}+t_{32}-2t_3$	170 103	ns ns us	(NOTE 1) (NOTE 2)
	<b>INPUT CLOCK FREQUENCY</b>	8.0		20	MHz	

NOTE 1: For Input clock frequencies of less than 20 MHz,  $t_{30} = 2t_3 + 20\ \text{ns}$ NOTE 2: For Input clock frequencies of less than 20 MHz,  $t_{31} = 2t_3 = 70\ \text{ns}$ \*ALL TYPICAL VALUES ARE AT  $V_{cc} = 5.0\ \text{V}$  and TEMPERATURE =  $25^\circ\text{C}$

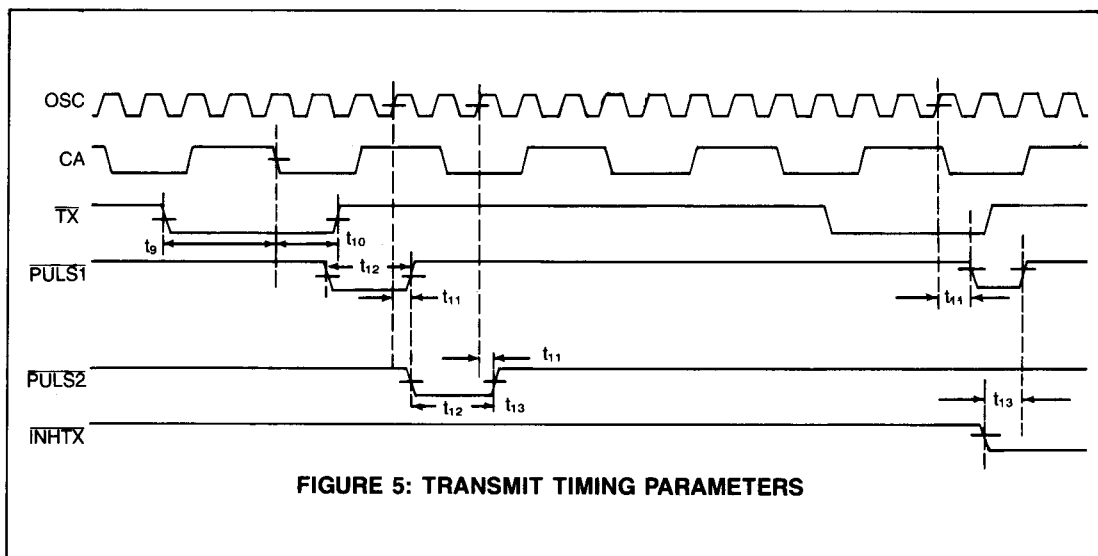


FIGURE 5: TRANSMIT TIMING PARAMETERS

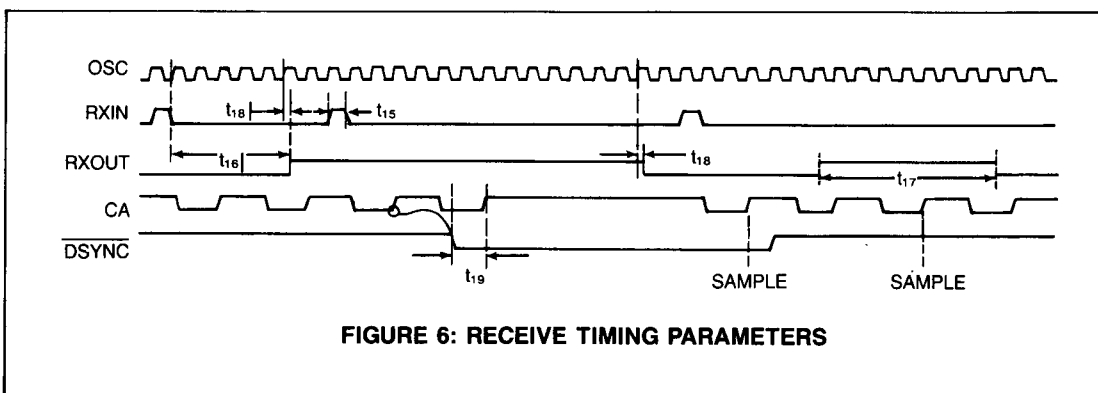


FIGURE 6: RECEIVE TIMING PARAMETERS

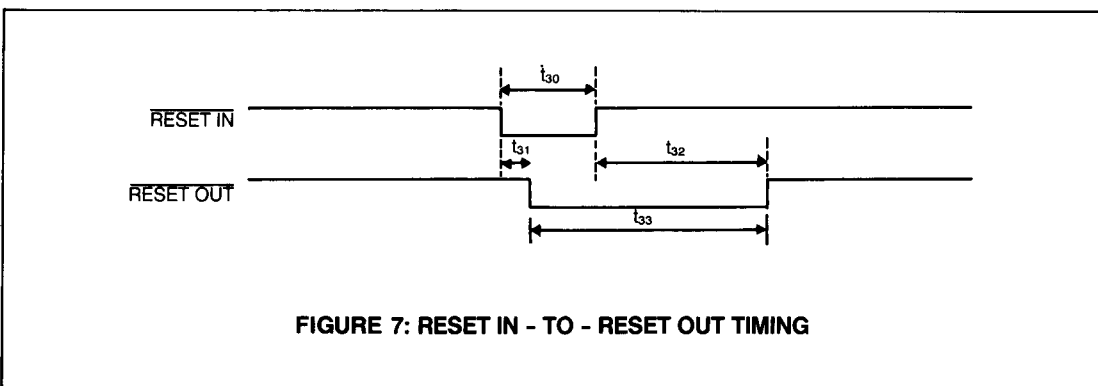


FIGURE 7: RESET IN - TO - RESET OUT TIMING