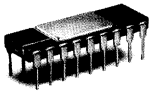


Baud Rate Generator

Part Number	Description	Features	Power Supplies	Package	Page
COM 5016	Dual Baud Rate Generator	On-chip oscillator or external frequency input (use 8116 for new designs)	+5, +12	18 DIP	265-266
COM 5016T[1]	Dual Baud Rate Generator	External frequency input	+5, +12	18 DIP	265-266
COM 5026	Single Baud Rate Generator	On-chip oscillator or external frequency input (use 8126 for new designs)	+5, +12	14 DIP	267-272
COM 5026T[1]	Single Baud Rate Generator	External frequency input	+5, +12	14 DIP	267-272
COM 5036	Dual Baud Rate Generator	COM 5016 with additional output of input frequency ÷ 4 (use 8136 or 81C36 for new designs)	+5, +12	18 DIP	265-266
COM 5036T[1]	Dual Baud Rate Generator	COM 5016T with additional output of input frequency ÷ 4	+5, +12	18 DIP	265-266
COM 5046	Single Baud Rate Generator	COM 5026 with additional output of input frequency ÷ 4 (use 8146 for new designs)	+5, +12	14 DIP	267-272
COM 5046T[1]	Single Baud Rate Generator	COM 5026T with additional output of input frequency ÷ 4	+5, +12	14 DIP	267-272
COM 8046	Single Baud Rate Generator	32 baud rates; 1X, 16X, 32X clock outputs; single +5 volt supply	+5	16 DIP	273-274
COM 8046T[1]	Single Baud Rate Generator	COM 8046 with external frequency input only	+5	16 DIP	273-274
COM 8116	Dual Baud Rate Generator	Single +5 volt version of COM 5016	+5	18 DIP	275-276
COM 8116T[1]	Dual Baud Rate Generator	Single +5 volt version of COM 5016T	+5	18 DIP	275-276
COM 8126	Single Baud Rate Generator	Single +5 volt version of COM 5026	+5	14 DIP	277-284
COM 8126T[1]	Single Baud Rate Generator	Single +5 volt version of COM 5026T	+5	14 DIP	277-284
COM 8136	Dual Baud Rate Generator	Single +5 volt version of COM 5036	+5	18 DIP	275-276
COM 8136T[1]	Dual Baud Rate Generator	Single +5 volt version of COM 5036T	+5	18 DIP	275-276
COM 8146	Single Baud Rate Generator	Single +5 volt version of COM 5046	+5	14 DIP	277-284
COM 8146T[1]	Single Baud Rate Generator	Single +5 volt version of COM 5046T	+5	14 DIP	277-284
COM 8156	Dual Baud Rate Generator	High-frequency clock input version of COM 8116 with additional outputs of input frequency ÷ 2 and ÷ 8	+5	18 DIP	285-288
COM 8156T[1]	Dual Baud Rate Generator	External clock input version of COM 8156	+5	18 DIP	285-288
COM 81C66[2]	Timer/Clock Generator	CMOS User Programmable Clock and Timer	+5	16 DIP	289-290
COM 81C66T[2]	Timer/Clock Generator	External Frequency Input version of COM 8166T	+5	16 DIP	289-290

[1] May be custom mask programmed [2] For future release

STANDARD MICROSYSTEMS CORPORATION

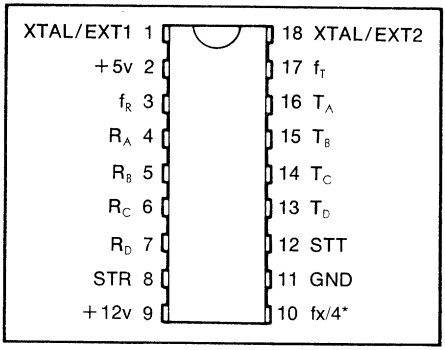
COM 5016
COM 5016T
COM 5036
COM 5036T

Dual Baud Rate Generator
Programmable Divider

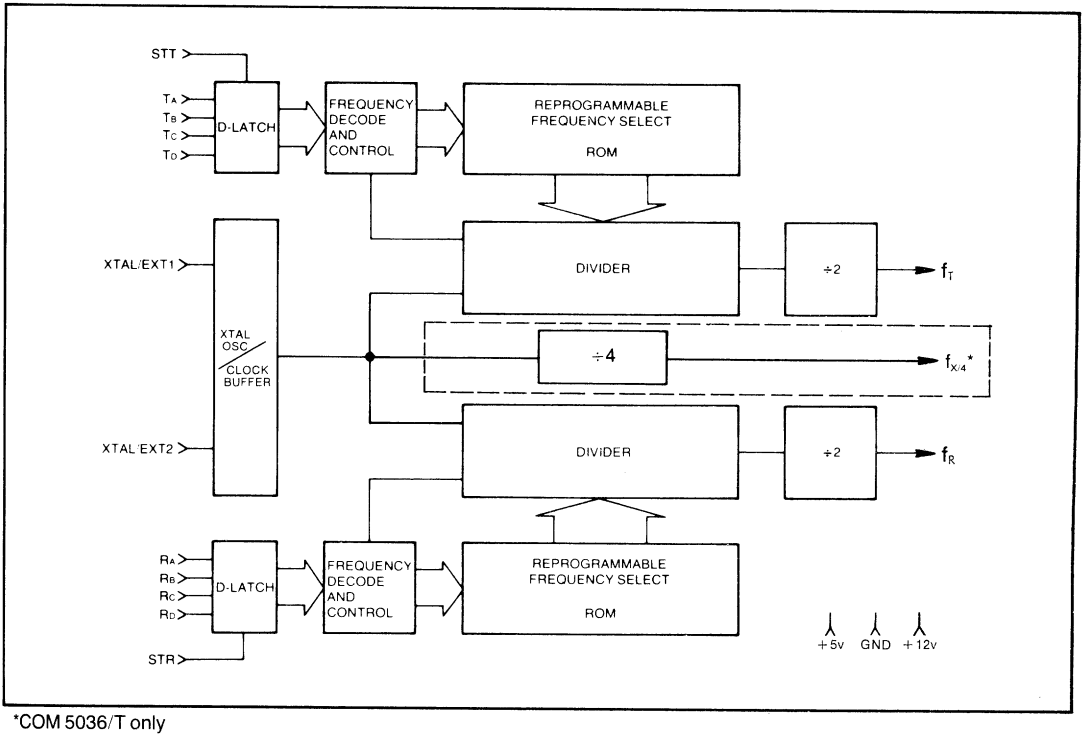
FEATURES

- ☐ On chip crystal oscillator or external frequency input
- ☐ Choice of 2 x 16 output frequencies
- ☐ 16 asynchronous/synchronous baud rates
- ☐ DIRECT UART/USRT/ASTRO/USYNRT compatibility
- ☐ Full duplex communication capability
- ☐ High frequency reference output*
- ☐ TTL, MOS compatibility

PIN CONFIGURATION



BLOCK DIAGRAM



*COM 5036/T only

General Description

The Standard Microsystems COM 5016/COM 5036 Dual Baud Rate Generator/Programmable Divider is an N-channel COPLAMOS® MOS/LSI device which, from a single crystal (on-chip oscillator) or input frequency is capable of generating 32 externally selectable frequencies.

The COM 5016/COM 5036 is specifically dedicated to generating the full spectrum of 16 asynchronous/synchronous data communication frequencies as shown in Table 1. One of the sixteen output frequencies is externally selected by four address inputs, on each of the independent dividers, as shown in Table 1.

Internal re-programmable ROM allows the generation of other frequencies from other crystal frequencies or input frequencies. The four address inputs on each divider section may be strobe (150ns) or DC loaded. As the COM 5016/COM 5036 is a dual baud rate generator, full duplex (independent receive and transmit frequencies) operation is possible.

The COM 5016/COM 5036 is basically a programmable 15-stage feedback shift register capable of dividing any modulo up to $(2^{15}-1)$.

By using one of the frequency outputs it is possible to generate additional divisions of the master clock frequency by cascading COM 5016/COM 5036's. The frequency output is fed into the XTAL/EXT input on a subsequent device. In this way one crystal or input frequency may be used to generate numerous output frequencies.

The COM 5016/COM 5036 can be driven by either an external crystal or TTL logic level inputs; COM 5016T/COM 5036T is driven by TTL logic level inputs only.

The COM 5036 provides a high frequency reference output at one-quarter (1/4) the XTAL/EXT input frequency.

Description of Pin Functions

Pin No.	Symbol	Name	Function
1	XTAL/EXT1	Crystal or External Input 1	This input is either one pin of the crystal package or one polarity of the external input.
2	V_{CC}	Power Supply	+5 volt supply
3	f_R	Receiver Output Frequency	This output runs at a frequency selected by the Receiver divisor select data bits.
4-7	R_A, R_B, R_C, R_D	Receiver-Divisor Select Data Bits	The logic level on these inputs, as shown in Table 1, selects the receiver output frequency, f_R.
8	STR	Strobe-Receiver	A high level input strobe loads the receiver data (R_A, R_B, R_C, R_D) into the receiver divisor select register. This input may be strobed or hard-wired to a high level.
9	V_{DD}	Power Supply	+12 volt supply
10	$f_X/4$*	$f_X/4$	¼ crystal/clock frequency reference output.
11	GND	Ground	Ground
12	STT	Strobe-Transmitter	A high level input strobe loads the transmitter data (T_A, T_B, T_C, T_D) into the transmitter divisor select register. This input may be strobed or hard-wired to a high level.
13-16	T_D, T_C, T_B, T_A	Transmitter-Divider Select Data Bits	The logic level on these inputs, as shown in Table 1, selects the transmitter output frequency, f_T.
17	f_T	Transmitter Output Frequency	This output runs at a frequency selected by the Transmitter divisor select data bits.
18	XTAL/EXT2	Crystal or External Input 2	This input is either the other pin of the crystal package or the other polarity of the external input.

*COM 5036/T only

For electrical characteristics, see page 221.

STANDARD MICROSYSTEMS CORPORATION

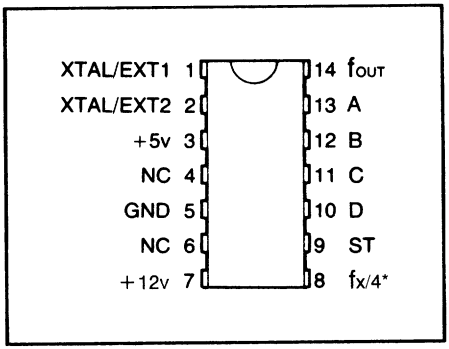
COM 5026
COM 5026T
COM 5046
COM 5046T

Baud Rate Generator
Programmable Divider

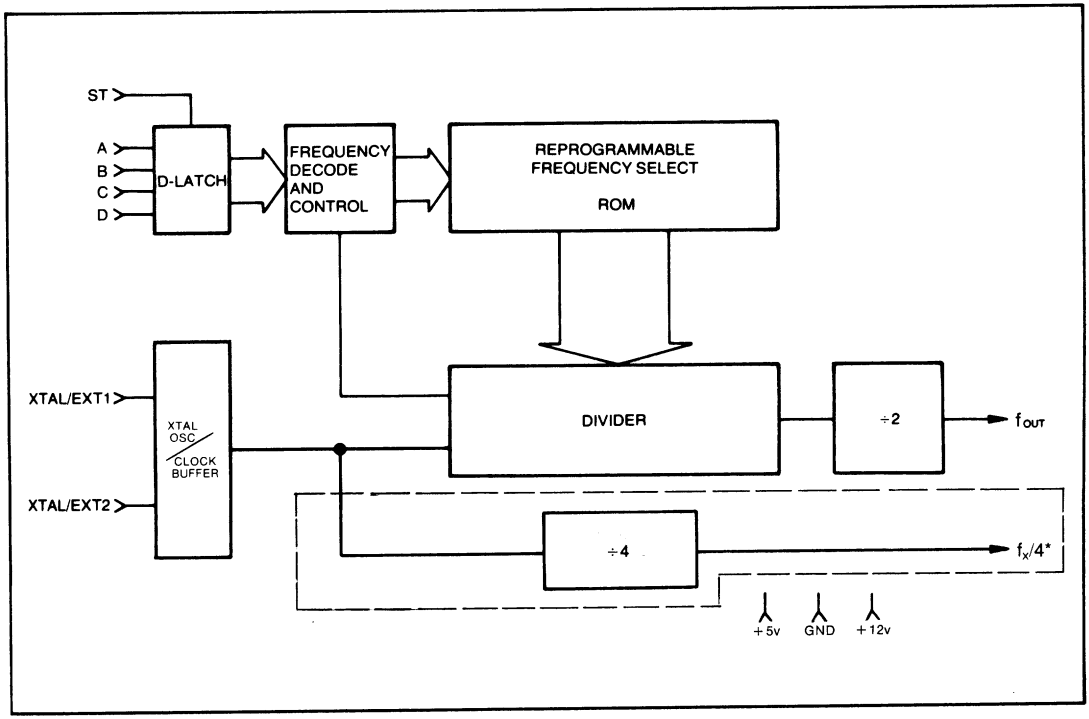
FEATURES

- ☐ On chip crystal oscillator or external frequency input
- ☐ Choice of 16 output frequencies
- ☐ 16 asynchronous/synchronous baud rates
- ☐ Direct UART/USRT/ASTRO/USYNRT compatibility
- ☐ High frequency reference output*
- ☐ TTL, MOS compatibility

PIN CONFIGURATION



BLOCK DIAGRAM



*COM 5046/T only

GENERAL DESCRIPTION

The Standard Microsystems COM 5026/COM 5046 Baud Rate Generator/Programmable Divider is an N-channel COPLAMOS® MOS/LSI device which, from a single crystal (on-chip oscillator) or input frequency is capable of generating 16 externally selectable frequencies.

The COM 5026/COM 5046 is specifically dedicated to generating the full spectrum of 16 asynchronous/synchronous data communication frequencies as shown in Table 1. One of the sixteen output frequencies is externally selected by four address inputs; as shown in Table 1.

Internal re-programmable ROM allows the generation of other frequencies from other crystal frequencies or input frequencies. The four address inputs may be strobe (150ns) or DC loaded.

The COM 5026/COM 5046 is basically a programmable 15-stage feedback shift register capable of dividing any modulo up to $(2^{15}-1)$.

By using the frequency output, it is possible to generate additional divisions of the master clock frequency by cascading COM 5026/COM 5046's. The frequency output is fed into the XTAL/EXT input on a subsequent device. In this way one crystal or input frequency may be used to generate numerous output frequencies.

The COM 5026/COM 5046 can be driven by either an external crystal or TTL logic level inputs COM 5026T/COM 5046T is driven by TTL logic level inputs only.

THE COM 5046 provides a high frequency reference output at one-quarter (1/4) the XTAL/EXT input frequency.

Description of Pin Functions

Pin No.	Symbol	Name	Function
1	XTAL/EXT1	Crystal or External Input 1	This input is either one pin of the crystal package or one polarity of the external input.
2	XTAL/EXT2	Crystal or External Input 2	This input is either the other pin of the crystal package or the other polarity of the external input.
3	V_{CC}	Power Supply	+5 volt Supply.
4,6	NC	No Connection	
5	GND	Ground	Ground
7	V_{DD}	Power Supply	+12 volt Supply.
8	fx/4*	Reference Frequency	High frequency reference output @ (1/4) f_{IN}
9	ST	Strobe	A high-level strobe loads the Input Address (A_A, A_B, A_C, A_D) into the Input Address register. This input may be strobed or hard wired to a high-level,
10-13	A_D. A_C. A_B. A_A	Input Address	The logic level on these inputs. as shown in Table 1, selects the output frequency.
14	f_{OUT}	Output Frequency	This output runs at a frequency as selected by the Input Address.

*COM 5046/T only

ELECTRICAL CHARACTERISTICS COM5016, COM5016T, COM5026, COM5026T, COM5036, COM5036T, COM5046, COM5046T

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, with respect to ground ..... +18.0V
Negative Voltage on any Pin, with respect to ground ..... −0.3V

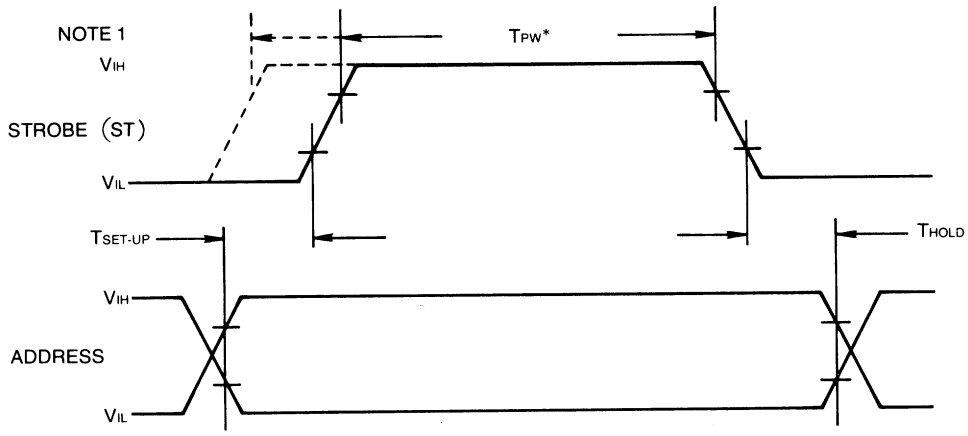
*Stresses above those listed may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or at any other condition above those indicated in the operational sections of this specification is not implied.

ELECTRICAL CHARACTERISTICS (T_A = 0°C to 70°C, V_{CC} = +5V ±5%, V_{DD} = +12V ±5%, unless otherwise noted)

Parameter	Min.	Typ.	Max	Unit	Comments
D.C. CHARACTERISTICS					
INPUT VOLTAGE LEVELS					
Low-level, V_{IL}			0.8	V	excluding XTAL inputs
High-level, V_{IH}	2.0		V_{CC}	V	
OUTPUT VOLTAGE LEVELS					
Low-level, V_{OL}			0.4	V	I_{OL} = 1.6ma
			0.5	V	I_{OL} = 3.2ma
High-level, V_{OH}	V_{CC}−1.5	4.0		V	I_{OH} = 100μA
INPUT CURRENT					
Low-level, I_{IL}			0.3	mA	V_{IN} = GND, excluding XTAL inputs
INPUT CAPACITANCE					
All inputs, C_{IN}		5	10	pf	V_{IN} = GND, excluding XTAL inputs
EXT INPUT LOAD		8	10		Series 7400 unit loads
POWER SUPPLY CURRENT					
I_{CC}		28	45	mA	
I_{DD}		12	22	mA	
A.C. CHARACTERISTICS					T_A = +25°C
CLOCK FREQUENCY		5.0688		MHz	XTAL, EXT
PULSE WIDTH					
Clock					50% Duty Cycle ±5%
Strobe	150		DC	ns	See Note 1.
INPUT SET-UP TIME					
Address	50			ns	See Note 1.
INPUT HOLD TIME					
Address	50			ns	
STROBE TO NEW FREQUENCY DELAY			3.5	μs	= 1/f_{IN} (18)

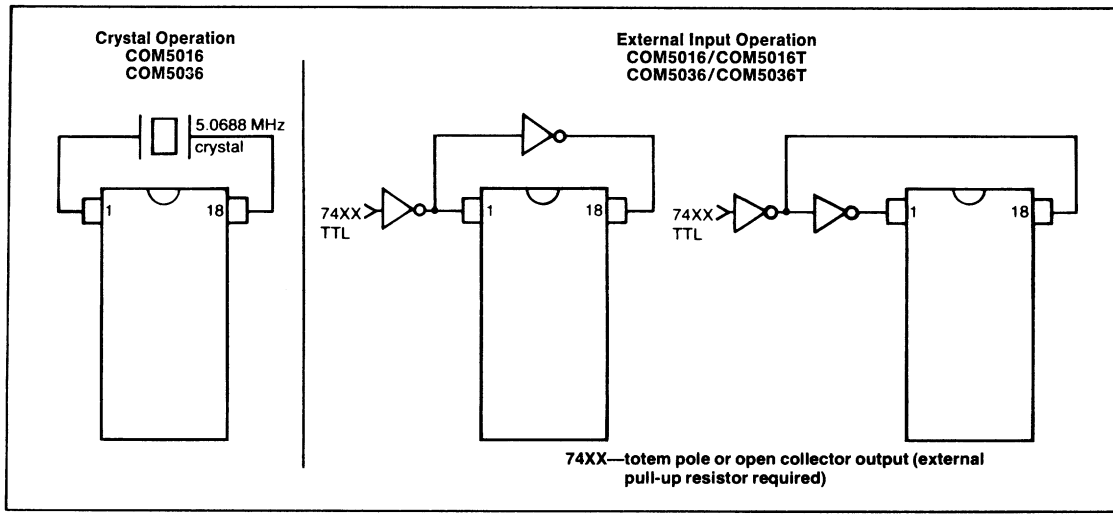
Note 1: Input set-up time can be decreased to ≥ 0ns by increasing the minimum strobe width by 50ns to a total of 200ns.

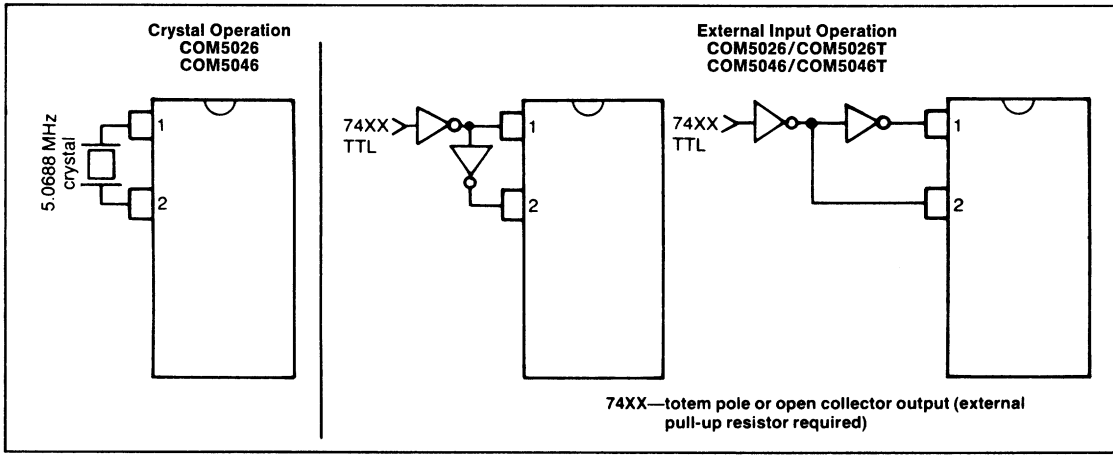
TIMING DIAGRAM



*Address need only be valid during the last TPW, Min time of the input strobe.

SECTION IV





For ROM re-programming SMC has a computer program available whereby the customer need only supply the input frequency and the desired output frequencies. The ROM programming is automatically generated.

Crystal Specifications

User must specify termination (pin, wire, other)

Prefer: HC-18/U or HC-25/U

Frequency — 5.0688 MHz, AT cut

Temperature range 0°C to 70°C

Series resistance $<50\ \Omega$

Series Resonant

Overall tolerance ± .01% or as required

Crystal manufacturers (Partial List)

Northern Engineering Laboratories
357 Beloit Street
Burlington, Wisconsin 53105
(414) 763-3591

Bulova Frequency Control Products
61-20 Woodside Avenue
Woodside, New York 11377
(212) 335-6000

CTS Knights Inc.
101 East Church Street
Sandwich, Illinois 60548
(815) 786-8411

Crystek Crystals Corporation
1000 Crystal Drive
Fort Myers, Florida 33901
(813) 936-2109

APPLICATIONS INFORMATION

Charge pump techniques using the +5 volt power supply can be used to generate the +12 volt power supply required. The +12 volt power supply of figure 1 will supply the 22 milli-amps that is typically required.

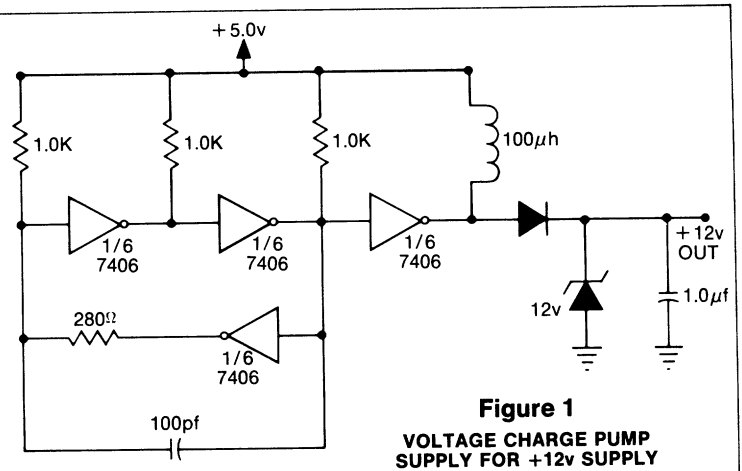


Figure 1
VOLTAGE CHARGE PUMP SUPPLY FOR +12v SUPPLY

When powering this device from laboratory or system power supplies, it is important that the Absolute Maximum Ratings not be exceeded or device failure can result. Some power supplies exhibit voltage spikes or "glitches" on their outputs when the AC power is switched on and off. In addition, voltage transients on the AC power line may appear on the DC output. For example, the bench power supply programmed to deliver +12 volts may have large voltage transients when the AC power is switched on and off. If this possibility exists it is suggested that the clamp circuit of figure 2 or a Semtech* bi-polarity silicon transient suppressor such as the 1N6110 be used.

*SEMTECH CORPORATION
652 Mitchel Road
Newbury Park, California 91320
213-628-5392

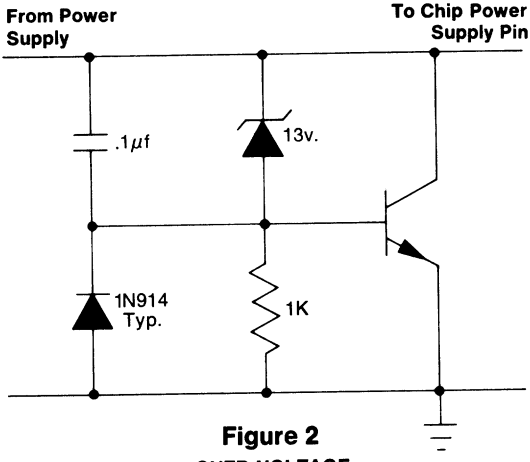


Figure 2
OVER-VOLTAGE PROTECTION CIRCUIT

Baud Rate Generator Output Frequency Options

Table 1. (16X clock)

CRYSTAL FREQUENCY = 5.0688 MHz

Tr'mit/Receive Address D	C	B	A	Baud Rate	Theoretical Frequency 16X Clock	Actual Frequency 16X Clock	Percent Error	Duty Cycle %	Divisor
0	0	0	0	50	0.8 KHz	0.8 KHz	—	50/50	6336
0	0	0	1	75	1.2	1.2	—	50/50	4224
0	0	1	0	110	1.76	1.76	—	50/50	2880
0	0	1	1	134.5	2.152	2.1523	0.016	50/50	2355
0	1	0	0	150	2.4	2.4	—	50/50	2112
0	1	0	1	300	4.8	4.8	—	50/50	1056
0	1	1	0	600	9.6	9.6	—	50/50	528
0	1	1	1	1200	19.2	19.2	—	50/50	264
1	0	0	0	1800	28.8	28.8	—	50/50	176
1	0	0	1	2000	32.0	32.081	0.253	50/50	158
1	0	1	0	2400	38.4	38.4	—	50/50	132
1	0	1	1	3600	57.6	57.6	—	50/50	88
1	1	0	0	4800	76.8	76.8	—	50/50	66
1	1	0	1	7200	115.2	115.2	—	50/50	44
1	1	1	0	9600	153.6	153.6	—	48/52	33
1	1	1	1	19.200	307.2	316.8	3.125	50/50	16

Table 2. (16X clock)

CRYSTAL FREQUENCY = 4.9152 MHz

Tr'mit/Receive Address D	C	B	A	Baud Rate	Theoretical Frequency 16X Clock	Actual Frequency 16X Clock	Percent Error	Duty Cycle %	Divisor
0	0	0	0	50	0.8 KHz	0.8 KHz	—	50/50	6144
0	0	0	1	75	1.2	1.2	—	50/50	4096
0	0	1	0	110	1.76	1.7589	−0.01	*	2793
0	0	1	1	134.5	2.152	2.152	—	50/50	2284
0	1	0	0	150	2.4	2.4	—	50/50	2048
0	1	0	1	300	4.8	4.8	—	50/50	1024
0	1	1	0	600	9.6	9.6	—	50/50	512
0	1	1	1	1200	19.2	19.2	—	50/50	256
1	0	0	0	1800	28.8	28.7438	−0.19	*	171
1	0	0	1	2000	32.0	31.9168	−0.26	50/50	154
1	0	1	0	2400	38.4	38.4	—	50/50	128
1	0	1	1	3600	57.6	57.8258	0.39	*	85
1	1	0	0	4800	76.8	76.8	—	50/50	64
1	1	0	1	7200	115.2	114.306	−0.77	*	43
1	1	1	0	9600	153.6	153.6	—	50/50	32
1	1	1	1	19,200	307.2	307.2	—	50/50	16

Table 3. (32X clock)

CRYSTAL FREQUENCY = 5.0688 MHz

Tr'mit/Receive Address D	C	B	A	Baud Rate	Theoretical Frequency 32X Clock	Actual Frequency 32X Clock	Percent Error	Duty Cycle %	Divisor
0	0	0	0	50	1.6 KHz	1.6 KHz	—	50/50	3168
0	0	0	1	75	2.4	2.4	—	50/50	2112
0	0	1	0	110	3.52	3.52	—	50/50	1440
0	0	1	1	134.5	4.304	4.306	.06	*	1177
0	1	0	0	150	4.8	4.8	—	50/50	1056
0	1	0	1	200	6.4	6.4	—	50/50	792
0	1	1	0	300	9.6	9.6	—	50/50	528
0	1	1	1	600	19.2	19.2	—	50/50	264
1	0	0	0	1200	38.4	38.4	—	50/50	132
1	0	0	1	1800	57.6	57.6	—	50/50	88
1	0	1	0	2400	76.8	76.8	—	50/50	66
1	0	1	1	3600	115.2	115.2	—	50/50	44
1	1	0	0	4800	153.6	153.6	—	*	33
1	1	0	1	7200	230.4	230.4	—	50/50	22
1	1	1	0	9600	307.2	316.8	3.125	50/50	16
1	1	1	1	19,200	614.4	633.6	3.125	50/50	8

OUTPUT FREQUENCY OPTIONS

Part No.	Dash Number		
	Table 1	Table 2	Table 3
5016/5016T	STD	−5	−6
5026/5026T	STD	−5	−6
5036/5036T	STD	N/A	N/A
5046/5046T	STD	N/A	N/A

*When Duty Cycle is not exactly 50%, it is 50% ± 10%.

STANDARD MICROSYSTEMS CORPORATION

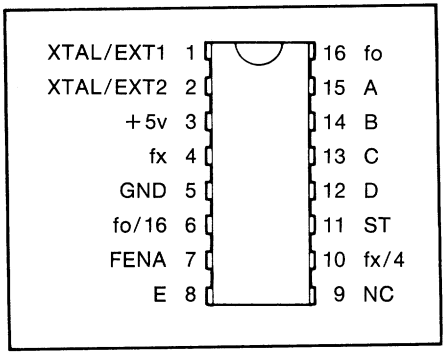
COM 8046
COM 8046T

Baud Rate Generator
Programmable Divider

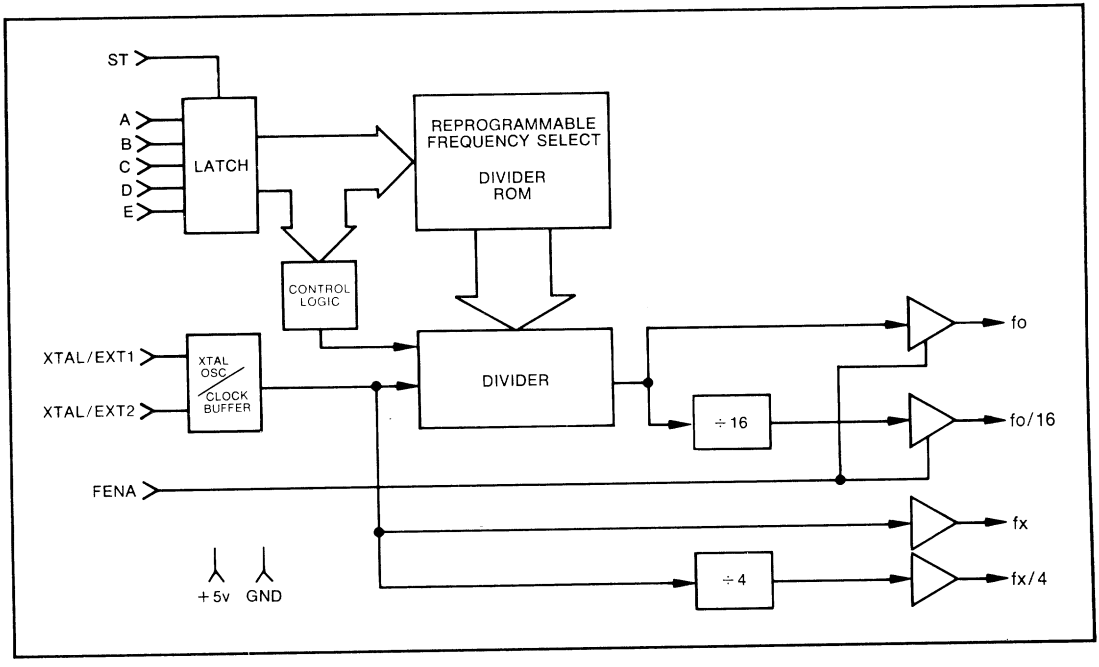
FEATURES

- ☐ On chip crystal oscillator or external frequency input
- ☐ Single +5v power supply
- ☐ Choice of 32 output frequencies
- ☐ 32 asynchronous/synchronous baud rates
- ☐ Direct UART/USRT/ASTRO/USYNRT compatibility
- ☐ Re-programmable ROM via CLASP® technology allows generation of other frequencies
- ☐ TTL, MOS compatible
- ☐ 1X Clock via fo/16 output
- ☐ Crystal frequency output via fx and fx/4 outputs
- ☐ Output disable via FENA

PIN CONFIGURATION



BLOCK DIAGRAM



General Description

The Standard Microsystems COM 8046 is an enhanced version of the COM 5046 Baud Rate Generator. It is fabricated using SMC's patented COPLAMOS® and CLASP® technologies and employs depletion mode loads, allowing operation from a single +5v supply.

The standard COM 8046 is specifically dedicated to generating the full spectrum of 16 asynchronous/synchronous data communication frequencies for 1X, 16X and 32X UART/USRT/ASTRO/USYNRT devices.

The COM 8046 features an internal crystal oscillator which may be used to provide the master reference frequency. Alternatively, an external reference may be supplied by applying complementary TTL level signals to pins 1 and 2. Parts suitable for use only with an external TTL reference are marked COM 8046T. TTL outputs used to drive the COM 8046 or COM 8046T should not be used to drive other TTL inputs, as noise immunity may be compromised due to excessive loading.

The reference frequency (fx) is used to provide two high frequency outputs: one at fx and the other at fx/4. The fx/4 output will drive one standard 7400 load, while the fx output will drive two 74LS loads.

The output of the oscillator/buffer is applied to the divider for generation of the output frequency f_O. The divider is capable of dividing by any integer from 6 to $2^{19} + 1$, inclusive. If the divisor is even, the output will be square; otherwise the output will be high longer than it is low by one fx clock period. The output of the divider is also divided internally by 16 and made available at the $f_O/16$ output pin. The $f_O/16$ output will drive one and the f_O output will drive two standard 7400 TTL loads. Both the f_O and $f_O/16$ outputs can be disabled by supplying a low logic level to the FENA input pin. Note that the FENA input has an internal pull-up which will cause the pin to rise to approximately V_{CC} if left unconnected.

The divisor ROM contains 32 divisors, each 19 bits wide, and is fabricated using SMC's unique CLASP® technology. This process permits reduction of turn-around-time for ROM patterns.

The five divisor select bits are held in an externally strobed data latch. The strobe input is level sensitive: while the strobe is high, data is passed directly through to the ROM. Initiation of a new frequency is effected within 3.5μs of a change in any of the five divisor select bits; strobe activity is not required. This feature may be disabled through a CLASP® programming option causing new frequency initiation to be delayed until the end of the current f_O half-cycle All five data inputs have pull-ups identical to that of the FENA input, while the strobe input has no pull-up.

Description of Pin Functions

Pin No.	Symbol	Name	Function
1	XTAL/EXT1	Crystal or External Input 1	This input is either one pin of the crystal package or one polarity of the external input.
2	XTAL/EXT2	Crystal or External Input 2	This input is either the other pin of the crystal package or the other polarity of the external input.
3	V_{CC}	Power Supply	+5 volt supply
4	f_X	f_X	Crystal/clock frequency reference output
5	GND	Ground	Ground
6	$f_O/16$	$f_O/16$	1X clock output
7	FENA	Enable	A low level at this input causes the f_O and $f_O/16$ outputs to be held high. An open or a high level at the FENA input enables the f_O and $f_O/16$ outputs.
8	E	E	Most significant divisor select data bit. An open at this input is equivalent to a logic high.
9	NC	NC	No connection
10	$f_X/4$	$f_X/4$	¼ crystal/clock frequency reference output.
11	ST	Strobe	Divisor select data strobe. Data is sampled when this input is high, preserved when this input is low.
12-15	D,C,B,A	D,C,B,A	Divisor select data bits. A=LSB. An open circuit at these inputs is equivalent to a logic high.
16	f_O	f_O	16X clock output

For electrical characteristics, see page 231.

STANDARD MICROSYSTEMS CORPORATION

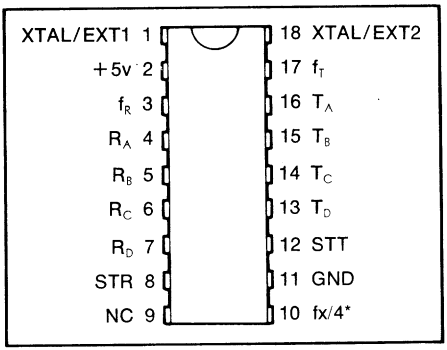
COM 8116
COM 8116T
COM 8136
COM 8136T

Dual Baud Rate Generator
Programmable Divider

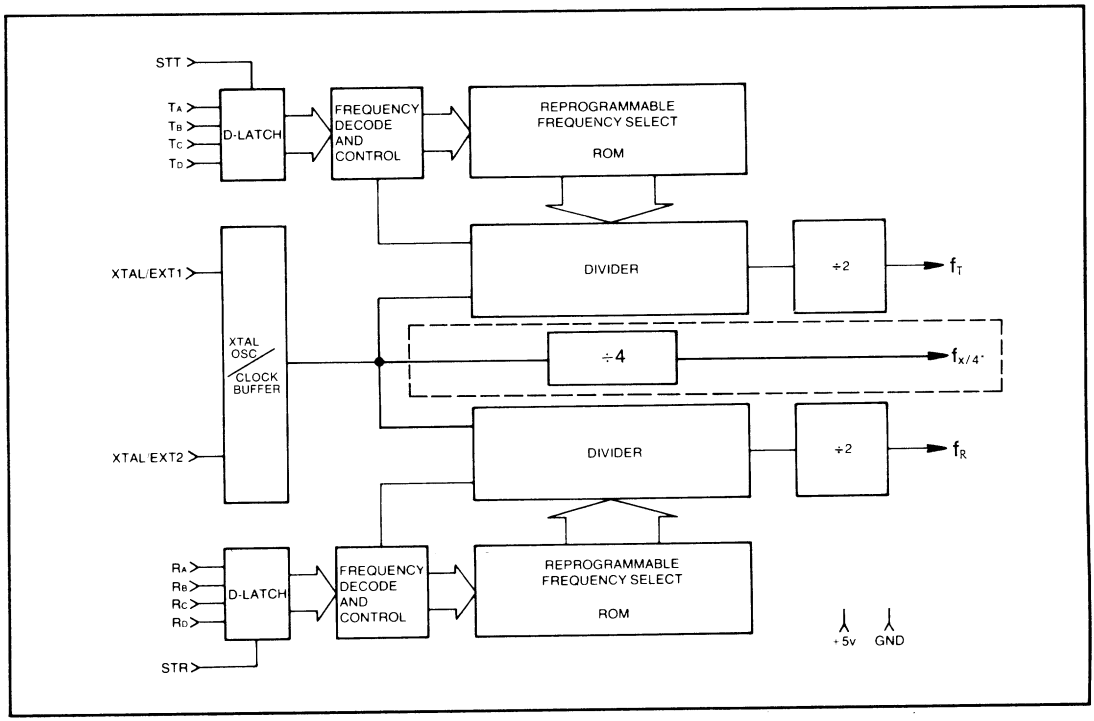
FEATURES

- ☐ On chip crystal oscillator or external frequency input
- ☐ Single +5v power supply
- ☐ Choice of 2 x 16 output frequencies
- ☐ 16 asynchronous/synchronous baud rates
- ☐ Direct UART/USRT/ASTRO/USYNRT compatibility
- ☐ Full duplex communication capability
- ☐ High frequency reference output*
- ☐ Re-programmable ROM via CLASP® technology allows generation of other frequencies
- ☐ TTL, MOS compatibility
- ☐ Compatible with COM 5016/COM 5036

PIN CONFIGURATION



BLOCK DIAGRAM



*COM 8136/T only

General Description

The Standard Microsystem's COM 8116/COM 8136 is an enhanced version of the COM 5016/COM 5036 Dual Baud Rate Generator. It is fabricated using SMC's patented COPLAMOS® and CLASP® technologies and employs depletion mode loads, allowing operation from a single +5v supply.

The standard COM 8116/COM 8136 is specifically dedicated to generating the full spectrum of 16 asynchronous/synchronous data communication frequencies for 16X UART/USRT devices. A large number of the frequencies available are also useful for 1X and 32X ASTRO/USYNRT devices.

The COM 8116/COM 8136 features an internal crystal oscillator which may be used to provide the master reference frequency. Alternatively, an external reference may be supplied by applying complementary TTL level signals to pins 1 and 18. Parts suitable for use only with an external TTL reference are marked COM 8116T/COM 8136T. TTL outputs used to drive the COM 8116/COM 8136 or COM 8116T/COM 8136T XTAL/EXT inputs should not be used to drive other TTL inputs, as noise immunity may be compromised due to excessive loading.

The output of the oscillator/buffer is applied to the dividers for generation of the output frequencies f_T, f_R. The dividers are capable of dividing by any integer from 6 to $2^{19} + 1$, inclusive. If the divisor is even, the output will be square; otherwise the output will be high longer than it is low by one fx clock period.

The reference frequency (fx) is used to provide a high frequency output at fx/4 on the COM 8136/T.

Each of the two divisor ROMs contains 16 divisors, each 19 bits wide, and is fabricated using SMC's unique CLASP® technology allowing up to 32 different divisors on custom parts. This process permits reduction of turn-around time for ROM patterns. Each group of four divisor select bits is held in an externally strobed data latch. The strobe input is level sensitive: while the strobe is high, data is passed directly through to the ROM. Initiation of a new frequency is effected within 3.5μs of a change in any of the four divisor select bits (strobe activity is not required). The divisor select inputs have pull-up resistors; the strobe inputs do not.

Description of Pin Functions

Pin No.	Symbol	Name	Function
1	XTAL/EXT1	Crystal or External Input 1	This input is either one pin of the crystal package or one polarity of the external input.
2	V_{CC}	Power Supply	+5 volt supply
3	f_R	Receiver Output Frequency	This output runs at a frequency selected by the Receiver divisor select data bits.
4-7	R_A, R_B, R_C, R_D	Receiver-Divisor Select Data Bits	The logic level on these inputs, as shown in Table 1, selects the receiver output frequency, f_R.
8	STR	Strobe-Receiver	A high level input strobe loads the receiver data (R_A, R_B, R_C, R_D) into the receiver divisor select register. This input may be strobed or hard-wired to a high level.
9	NC	No Connection	
10	$f_X/4$*	$f_X/4$	¼ crystal/clock frequency reference output.
11	GND	Ground	Ground
12	STT	Strobe-Transmitter	A high level input strobe loads the transmitter data (T_A, T_B, T_C, T_D) into the transmitter divisor select register. This input may be strobed or hard-wired to a high level.
13-16	T_D, T_C, T_B, T_A	Transmitter-Divider Select Data Bits	The logic level on these inputs, as shown in Table 1, selects the transmitter output frequency, f_T.
17	f_T	Transmitter Output Frequency	This output runs at a frequency selected by the Transmitter divisor select data bits.
18	XTAL/EXT2	Crystal or External Input 2	This input is either the other pin of the crystal package or the other polarity of the external input.

*COM 8136/T only

For electrical characteristics, see page 231.

STANDARD MICROSYSTEMS CORPORATION

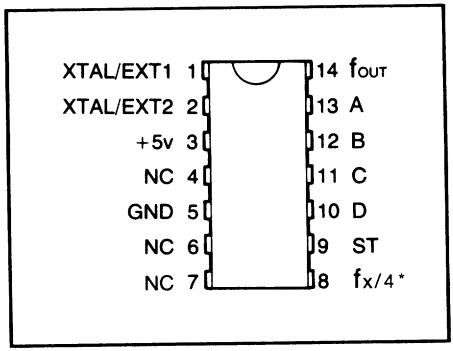
COM 8126
COM 8126T
COM 8146
COM 8146T

Baud Rate Generator
Programmable Divider

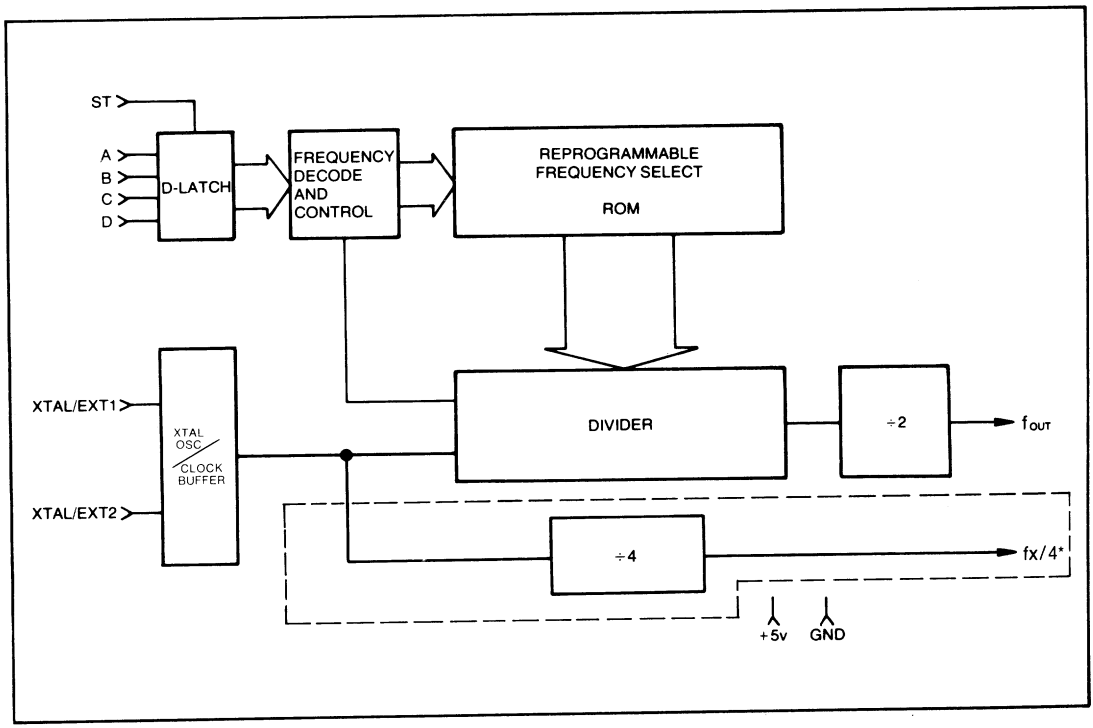
FEATURES

- ☐ On chip crystal oscillator or external frequency input
- ☐ Single +5v power supply
- ☐ Choice of 16 output frequencies
- ☐ 16 asynchronous/synchronous baud rates
- ☐ Direct UART/USRT/ASTRO/USYNRT compatibility
- ☐ High frequency reference output*
- ☐ Re-programmable ROM via CLASP® technology allows generation of other frequencies
- ☐ TTL, MOS compatibility
- ☐ Compatible with COM 5026/COM 5046

PIN CONFIGURATION



BLOCK DIAGRAM



*COM 8146/T only

General Description

The Standard Microsystem's COM 8126/COM 8146 is an enhanced version of the COM 5026/COM 5046 Baud Rate Generator. It is fabricated using SMC's patended COPLAMOS® and CLASP® technologies and employs depletion mode loads, allowing operation from a single +5v supply.

The standard COM 8126/COM 8146 is specifically dedicated to generating the full spectrum of 16 asynchronous/synchronous data communication frequencies for 16X UART/USRT devices. A large number of the frequencies available are also useful for 1X and 32X ASTRO/USYNRT devices.

The COM 8126/COM 8146 features an internal crystal oscillator which may be used to provide the master reference frequency. Alternatively, an external reference may be supplied by applying complementary TTL level signals to pins 1 and 2. Parts suitable for use only with an external TTL reference are marked COM 8126T/COM 8146T. TTL outputs used to drive the COM 8126/COM 8146 or COM 8126T/COM 8146T XTAL/EXT inputs should not be used to drive other TTL inputs, as noise immunity may be compromised due to excessive loading.

The output of the oscillator/buffer is applied to the divider for generation of the output frequency. The divider is capable of dividing by any integer from 6 to $2^{19} + 1$, inclusive. If the divisor is even, the output will be square; otherwise the output will be high longer than it is low by one fx clock period.

The reference frequency (fx) is used to provide a high frequency output at fx/4 on the COM 8146/T.

The divisor ROM contains 16 divisors, each 19 bits wide, and is fabricated using SMC's unique CLASP® technology. This process permits reduction of turnaround time for ROM patterns. The four divisor select bits are held in an externally strobed data latch. The strobe input is level sensitive: while the strobe is high, data is passed directly through to the ROM. Initiation of a new frequency is affected within 3.5μs of a change in any of the four divisor select bits (strobe activity is not required). This feature may be disabled through a CLASP® programming option causing new frequency initiation to be delayed until the end of the current f_{OUT} half-cycle. The divisor select inputs have pull-up resistors; the strobe input does not.

Description of Pin Functions

Pin No.	Symbol	Name	Function
1	XTAL/EXT1	Crystal or External Input 1	This input is either one pin of the crystal package or one polarity of the external input,
2	XTAL/EXT2	Crystal or External Input 2	This input is either the other pin of the crystal package or the other polarity of the external input.
3	V_{CC}	Power Supply	+5 volt supply
4,6,7	NC	No Connection	
5	GND	Ground	Ground
8	$f_X/4$ *	$f_X/4$	¼ crystal/clock frequency reference output.
9	ST	Strobe	A high level strobe loads the input data (A, B, C, D) into the input divisor select register. This input may be strobed or hard-wired to a high level.
10-13	D,C,B,A	Divisor Select Data Bits	The logic level on these inputs as shown in Table 1, selects the output frequency.
14	f_{OUT}	Output Frequency	This output runs at a frequency selected by the divisor select data bits.

*COM 8146/T only

ELECTRICAL CHARACTERISTICS COM8046, COM8046T, COM8116, COM8116T, COM8126, COM8126T, COM8136, COM8136T, COM8146, COM8146T

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, with respect to ground	+8.0V
Negative Voltage on any Pin, with respect to ground	−0.3V

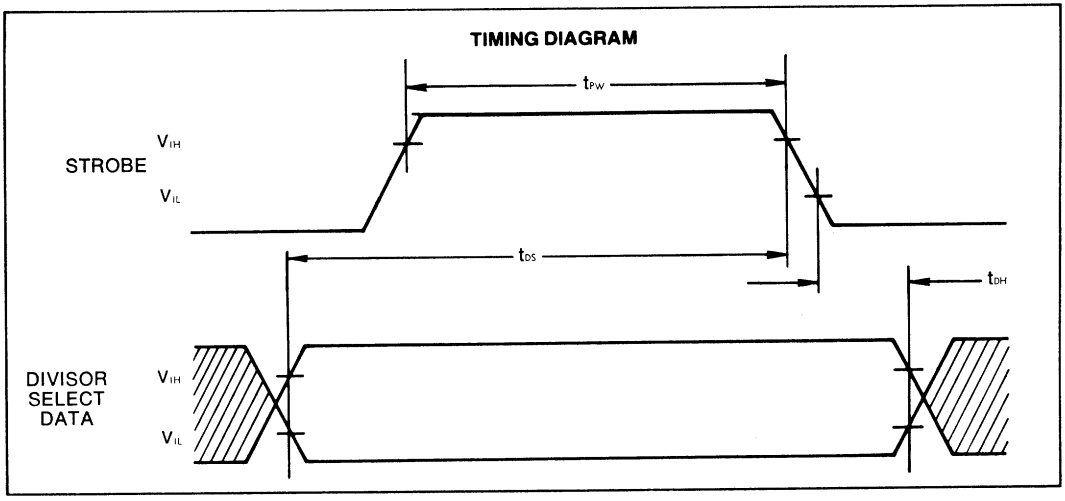
*Stresses above those listed may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or at any other condition above those indicated in the operational sections of this specification is not implied.

NOTE: When powering this device from laboratory or system power supplies, it is important that the Absolute Maximum Ratings not be exceeded or device failure can result. Some power supplies exhibit voltage spikes or "glitches" on their outputs when the AC power is switched on and off. In addition, voltage transients on the AC power line may appear on the DC output. If this possibility exists it is suggested that a clamp circuit be used.

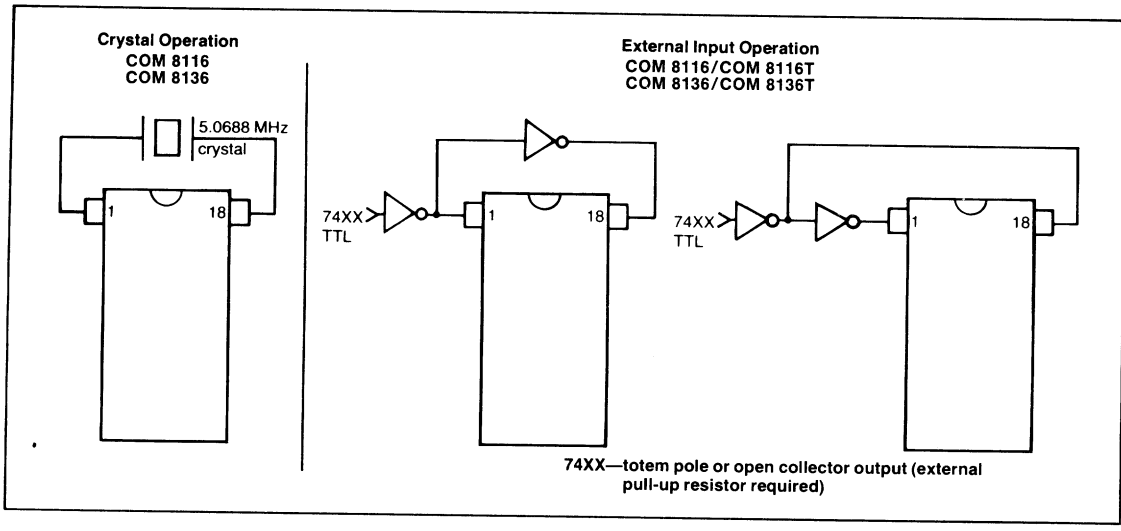
ELECTRICAL CHARACTERISTICS (T_A=0°C to 70°C, V_{CC} = +5V ±5%, unless otherwise noted)

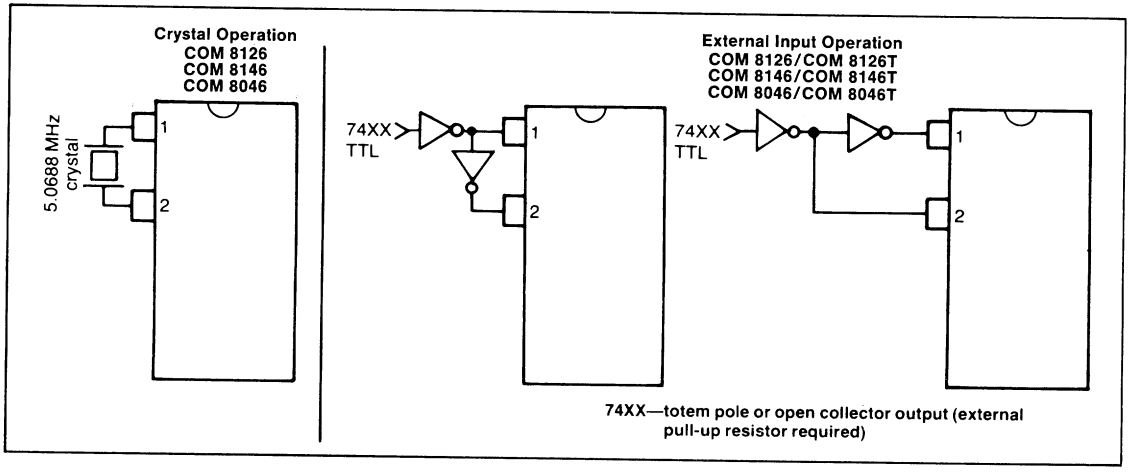
Parameter	Min.	Typ.	Max.	Unit	Comments
D.C. CHARACTERISTICS					
INPUT VOLTAGE LEVELS					
Low-level, V_{IL}			0.8	V	
High-level, V_{IH}	2.0			V	excluding XTAL inputs
OUTPUT VOLTAGE LEVELS					
Low-level, V_{OL}			0.4	V	I_{OL} = 1.6mA, for $f_X/4$, $f_O/16$
			0.4	V	I_{OL} = 3.2mA, for f_O, f_{R1}, f_T
			0.4	V	I_{OL} = 0.8mA, for f_X
High-level, V_{OH}	3.5			V	I_{OH} = −100μA; for f_X, I_{OH} = −50μA
INPUT CURRENT					
Low-level, I_{IL}			-0.1	mA	V_{IN} = GND, excluding XTAL inputs
INPUT CAPACITANCE					
All inputs, C_{IN}		5	10	pF	V_{IN} = GND, excluding XTAL inputs
EXT INPUT LOAD		8	10		Series 7400 equivalent loads
POWER SUPPLY CURRENT					
I_{CC}			50	mA	
A.C. CHARACTERISTICS					T_A = +25°C
CLOCK FREQUENCY, f_{IN}	0.01		7.0	MHz	XTAL/EXT, 50% Duty Cycle ±5% COM 8046, COM 8126, COM 8146
	0.01		5.1	MHz	XTAL/EXT, 50% Duty Cycle ±5% COM 8116, COM 8136
STROBE PULSE WIDTH, t_{PW}	150		DC	ns	
INPUT SET-UP TIME					
t_{DS}	200			ns	
INPUT HOLD TIME					
t_{DH}	50			ns	
STROBE TO NEW FREQUENCY DELAY			3.5	μs	@ f_X = 5.0 MHz

TIMING DIAGRAM



SECTION IV





For ROM re-programming SMC has a computer program available whereby the customer need only supply the input frequency and the desired output frequencies. The ROM programming is automatically generated.

Crystal Specifications

User must specify termination (pin, wire, other)
Prefer: HC-18/U or HC-25/U
Frequency — 5.0688 MHz, AT cut
Temperature range 0°C to 70°C
Series resistance $<50\ \Omega$
Series Resonant
Overall tolerance ± .01%
or as required

Crystal manufacturers (Partial List)

Northern Engineering Laboratories
357 Beloit Street
Burlington, Wisconsin 53105
(414) 763-3591

Bulova Frequency Control Products
61-20 Woodside Avenue
Woodside, New York 11377
(212) 335-6000

CTS Knights Inc.
101 East Church Street
Sandwich, Illinois 60548
(815) 786-8411

Crystek Crystals Corporation
1000 Crystal Drive
Fort Myers, Florida 33901
(813) 936-2109

COM 8046
COM 8046T

Table 2

REFERENCE FREQUENCY = 5.068800MHz

Divisor Select EDCBA	Desired Baud Rate	Clock Factor	Desired Frequency (KHz)	Divisor	Actual Baud Rate	Actual Frequency (KHz)	Deviation
00000	50.00	32X	1.60000	3168	50.00	1.600000	0.0000%
00001	75.00	32X	2.40000	2112	75.00	2.400000	0.0000%
00010	110.00	32X	3.52000	1440	110.00	3.520000	0.0000%
00011	134.50	32X	4.30400	1177	134.58	4.306542	0.0591%
00100	150.00	32X	4.80000	1056	150.00	4.800000	0.0000%
00101	200.00	32X	6.40000	792	200.00	6.400000	0.0000%
00110	300.00	32X	9.60000	528	300.00	9.600000	0.0000%
00111	600.00	32X	19.20000	264	600.00	19.200000	0.0000%
01000	1200.00	32X	38.40000	132	1200.00	38.400000	0.0000%
01001	1800.00	32X	57.60000	88	1800.00	57.600000	0.0000%
01010	2400.00	32X	76.80000	66	2400.00	76.800000	0.0000%
01011	3600.00	32X	115.20000	44	3600.00	115.200000	0.0000%
01100	4800.00	32X	153.60000	33	4800.00	153.600000	0.0000%
01101	7200.00	32X	230.40000	22	7200.00	230.400000	0.0000%
01110	9600.00	32X	307.20000	16	9900.00	316.800000	3.1250%
01111	19200.00	32X	614.40000	8	19800.00	633.600000	3.1250%
10000	50.00	16X	0.80000	6336	50.00	0.800000	0.0000%
10001	75.00	16X	1.20000	4224	75.00	1.200000	0.0000%
10010	110.00	16X	1.76000	2880	110.00	1.760000	0.0000%
10011	134.50	16X	2.15200	2355	134.52	2.152357	0.0166%
10100	150.00	16X	2.40000	2112	150.00	2.400000	0.0000%
10101	300.00	16X	4.80000	1056	300.00	4.800000	0.0000%
10110	600.00	16X	9.60000	528	600.00	9.600000	0.0000%
10111	1200.00	16X	19.20000	264	1200.00	19.200000	0.0000%
11000	1800.00	16X	28.80000	176	1800.00	28.800000	0.0000%
11001	2000.00	16X	32.00000	158	2005.06	32.081013	0.2532%
11010	2400.00	16X	38.40000	132	2400.00	38.400000	0.0000%
11011	3600.00	16X	57.60000	88	3600.00	57.600000	0.0000%
11100	4800.00	16X	76.80000	66	4800.00	76.800000	0.0000%
11101	7200.00	16X	115.20000	44	7200.00	115.200000	0.0000%
11110	9600.00	16X	153.60000	33	9600.00	153.600000	0.0000%
11111	19200.00	16X	307.20000	16	19800.00	316.800000	3.1250%

Baud Rate Generator Output Frequency Options

Table 1. (16X clock)

CRYSTAL FREQUENCY = 5.0688 MHz

Tr'mit/Receive Address D	C	B	A	Baud Rate	Theoretical Frequency 16X Clock	Actual Frequency 16X Clock	Percent Error	Duty Cycle %	Divisor
0	0	0	0	50	0.8 KHz	0.8 KHz	—	50/50	6336
0	0	0	1	75	1.2	1.2	—	50/50	4224
0	0	1	0	110	1.76	1.76	—	50/50	2880
0	0	1	1	134.5	2.152	2.1523	0.016	50/50	2355
0	1	0	0	150	2.4	2.4	—	50/50	2112
0	1	0	1	300	4.8	4.8	—	50/50	1056
0	1	1	0	600	9.6	9.6	—	50/50	528
0	1	1	1	1200	19.2	19.2	—	50/50	264
1	0	0	0	1800	28.8	28.8	—	50/50	176
1	0	0	1	2000	32.0	32.081	0.253	50/50	158
1	0	1	0	2400	38.4	38.4	—	50/50	132
1	0	1	1	3600	57.6	57.6	—	50/50	88
1	1	0	0	4800	76.8	76.8	—	50/50	66
1	1	0	1	7200	115.2	115.2	—	50/50	44
1	1	1	0	9600	153.6	153.6	—	48/52	33
1	1	1	1	19.200	307.2	316.8	3.125	50/50	16

Table 2. (16X clock)

CRYSTAL FREQUENCY = 4.9152 MHz

Tr'mit/Receive Address D	C	B	A	Baud Rate	Theoretical Frequency 16X Clock	Actual Frequency 16X Clock	Percent Error	Duty Cycle %	Divisor
0	0	0	0	50	0.8 KHz	0.8 KHz	—	50/50	6144
0	0	0	1	75	1.2	1.2	—	50/50	4096
0	0	1	0	110	1.76	1.7589	−0.01	*	2793
0	0	1	1	134.5	2.152	2.152	—	50/50	2284
0	1	0	0	150	2.4	2.4	—	50/50	2048
0	1	0	1	300	4.8	4.8	—	50/50	1024
0	1	1	0	600	9.6	9.6	—	50/50	512
0	1	1	1	1200	19.2	19.2	—	50/50	256
1	0	0	0	1800	28.8	28.7438	−0.19	*	171
1	0	0	1	2000	32.0	31.9168	−0.26	50/50	154
1	0	1	0	2400	38.4	38.4	—	50/50	128
1	0	1	1	3600	57.6	57.8258	0.39	*	85
1	1	0	0	4800	76.8	76.8	—	50/50	64
1	1	0	1	7200	115.2	114.306	−0.77	*	43
1	1	1	0	9600	153.6	153.6	—	50/50	32
1	1	1	1	19,200	307.2	307.2	—	50/50	16

Table 3. (32X clock)

CRYSTAL FREQUENCY = 5.0688 MHz

Tr'mit/Receive Address D	C	B	A	Baud Rate	Theoretical Frequency 32X Clock	Actual Frequency 32X Clock	Percent Error	Duty Cycle %	Divisor
0	0	0	0	50	1.6 KHz	1.6 KHz	—	50/50	3168
0	0	0	1	75	2.4	2.4	—	50/50	2112
0	0	1	0	110	3.52	3.52	—	50/50	1440
0	0	1	1	134.5	4.304	4.306	.06	*	1177
0	1	0	0	150	4.8	4.8	—	50/50	1056
0	1	0	1	200	6.4	6.4	—	50/50	792
0	1	1	0	300	9.6	9.6	—	50/50	528
0	1	1	1	600	19.2	19.2	—	50/50	264
1	0	0	0	1200	38.4	38.4	—	50/50	132
1	0	0	1	1800	57.6	57.6	—	50/50	88
1	0	1	0	2400	76.8	76.8	—	50/50	66
1	0	1	1	3600	115.2	115.2	—	50/50	44
1	1	0	0	4800	153.6	153.6	—	*	33
1	1	0	1	7200	230.4	230.4	—	50/50	22
1	1	1	0	9600	307.2	316.8	3.125	50/50	16
1	1	1	1	19,200	614.4	633.6	3.125	50/50	8

OUTPUT FREQUENCY OPTIONS

Dash Number		
Table 1	Table 2	Table 3
STD	−5	−6
STD	−5	−6

*When Duty Cycle is not exactly 50%, it is 50% ± 10%.

Baud Rate Generator Output Frequency Options

COM 8116T-013

CRYSTAL FREQUENCY = 2.76480 MHz

Transmit/ Receive Address D	C	B	A	Baud Rate	Theoretical Frequency 16X Clock	Actual Frequency 16X Clock	Percent Error	Duty Cycle %	Divisor
0	0	0	0	50	0.8 KHz	0.8 KHz	0	50/50	3456
0	0	0	1	75	1.2	1.2	0	50/50	2304
0	0	1	0	110	1.76	1.76	−.006	50/50	1571
0	0	1	1	134.5	2.152	2.152	−.019	50/50	1285
0	1	0	0	150	2.4	2.4	0	50/50	1152
0	1	0	1	200	3.2	3.2	0	50/50	864
0	1	1	0	300	4.8	4.8	0	50/50	576
0	1	1	1	600	9.6	9.6	0	50/50	288
1	0	0	0	1200	19.2	19.2	0	50/50	144
1	0	0	1	1800	28.8	28.8	0	50/50	96
1	0	1	0	2000	32.0	32.149	+.465	50/50	86
1	0	1	1	2400	38.4	38.4	0	50/50	72
1	1	0	0	3600	57.6	57.6	0	50/50	48
1	1	0	1	4800	76.8	76.8	0	50/50	36
1	1	1	0	9600	153.6	153.6	0	50/50	18
1	1	1	1	19,200	307.2	307.2	0	44/56	9

COM 8116T-003

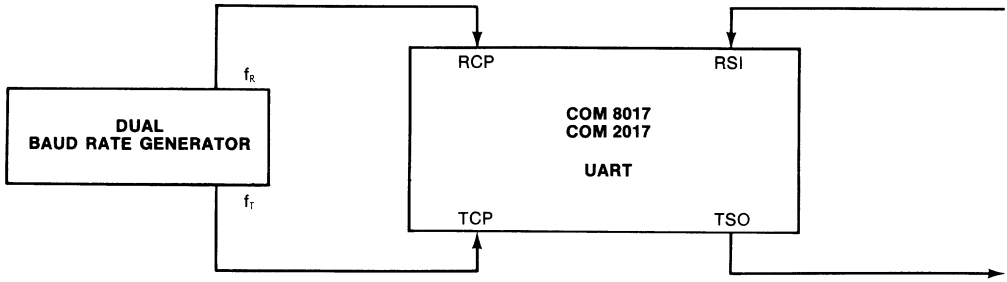
CRYSTAL FREQUENCIES = 6.01835 MHz

Transmit/ Receive Address D	C	B	A	Baud Rate	Theoretical Frequency 16X Clock	Actual Frequency 16X Clock	Percent Error	Duty Cycle %	Divisor
0	0	0	0	50	0.8 KHz	799.9 Hz	0	50/50	7523
0	0	0	1	75	1.2	1200.0	0	50/50	5015
0	0	1	0	110	1.76	1759.7	0	50/50	3420
0	0	1	1	134.5	2.152	2151.7	0	50/50	2797
0	1	0	0	150	2.4	2399.6	0	50/50	2508
0	1	0	1	200	3.2	3199.5	0	50/50	1881
0	1	1	0	300	4.8	4799.3	0	50/50	1254
0	1	1	1	600	9.6	9598.6	0	50/50	627
1	0	0	0	1200	19.2	19227.9	+0.14	50/50	313
1	0	0	1	1800	28.8	28795.9	0	50/50	209
1	0	1	0	2000	32.0	32012.5	0	50/50	188
1	0	1	1	2400	38.4	38333.4	−0.17	50/50	157
1	1	0	0	3600	57.6	57868.7	+0.46	50/50	104
1	1	0	1	4800	76.8	77158.3	+0.46	50/50	78
1	1	1	0	9600	153.6	154316.6	+0.46	50/50	39
1	1	1	1	19,200	307.2	300917.5	2.04	50/50	20

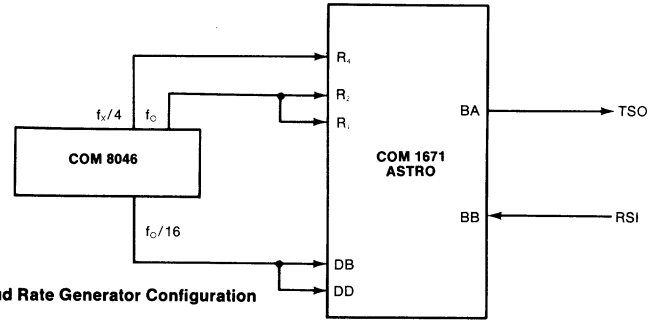
COM 8116T-013A

CRYSTAL FREQUENCY—5.52960 MHz

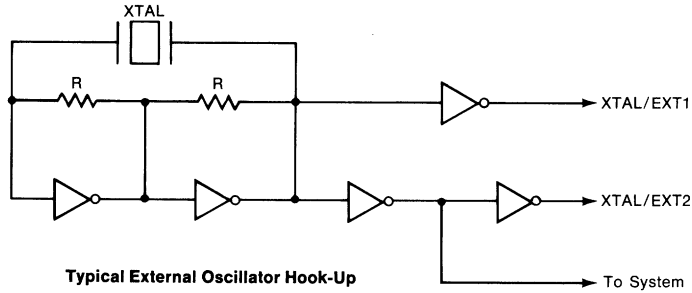
Transmit/ Receive Address D	C	B	A	Baud Rate	Theoretical Frequency 16X Clock	Actual Frequency 16X Clock	Percent Error	Duty Cycle %	Divisor
0	0	0	0	100	1.6 KHz	1.6 KHz	0	50/50	3456
0	0	0	1	150	2.4	2.4	0	50/50	2304
0	0	1	0	220	3.52	3.5197	−.006	50/50	1571
0	0	1	1	269	4.304	4.3032	−.019	50/50	1285
0	1	0	0	300	4.8	4.8	0	50/50	1152
0	1	0	1	400	6.4	6.4	0	50/50	864
0	1	1	0	600	9.6	9.6	0	50/50	576
0	1	1	1	1200	19.2	19.2	0	50/50	288
1	0	0	0	2400	38.4	38.4	0	50/50	144
1	0	0	1	3600	57.6	57.6	0	50/50	96
1	0	1	0	4000	64.0	64.298	+.466	50/50	86
1	0	1	1	4800	76.8	76.8	0	50/50	72
1	1	0	0	7200	115.2	115.2	0	50/50	48
1	1	0	1	9600	153.6	153.6	0	50/50	36
1	1	1	0	19,200	307.2	307.2	0	50/50	18
1	1	1	1	38,400	614.8	614.8	0	44/56	9



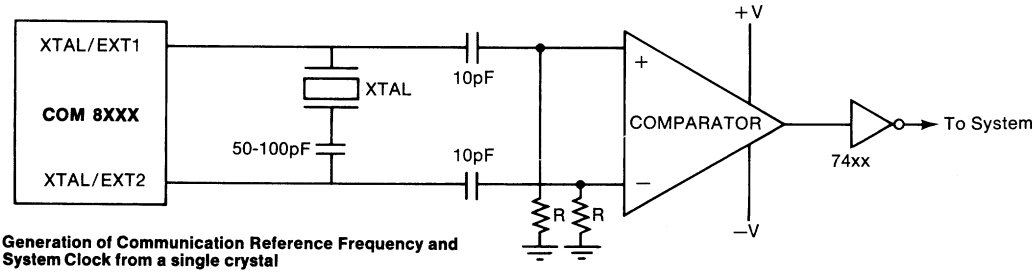
Typical UART—Dual Baud Rate Generator Configuration
Full Duplex—Split Speed



Typical ASTRO—Baud Rate Generator Configuration



Typical External Oscillator Hook-Up



Generation of Communication Reference Frequency and System Clock from a single crystal

STANDARD MICROSYSTEMS CORPORATION

COM 8156
COM 8156T
PRELIMINARY

Dual Baud Rate Generator
Programmable Divider

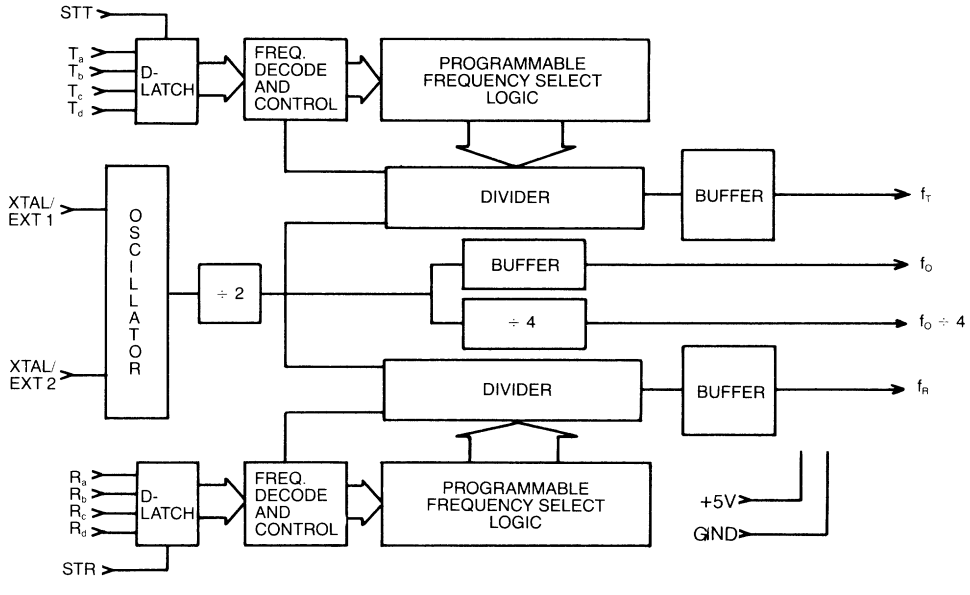
FEATURES

- ☐ On chip crystal oscillator or external frequency input
- ☐ High crystal/clock frequency operation
- ☐ Choice of 2 x 16 output frequencies
- ☐ 16 asynchronous/synchronous baud rates
- ☐ High frequency reference outputs
- ☐ Direct UART/USRT/ASTRO/USYNRT compatibility
- ☐ Full duplex communication capability
- ☐ N-channel silicon gate technology
- ☐ Single $+5_V$ power supply
- ☐ TTL, MOS compatibility
- ☐ Re-programmable ROM technology allows generation of other frequencies

PIN CONFIGURATION

Rb	1	18	Ra
Rc	2	17	f_R
Rd	3	16	Vcc
STR	4	15	$XTAL_1$
$XTAL_2$	5	14	fo
fo/4	6	13	f_T
GND	7	12	Ta
STT	8	11	Tb
Td	9	10	Tc

BLOCK DIAGRAM



GENERAL DESCRIPTION

The Standard Microsystem's COM8156 is a dual baud rate generator that operates at twice the crystal/clock frequency of the COM8116/36. It is fabricated using SMC's patented COPLAMOS™ technology and employs depletion mode loads allowing operation from a single +5V supply.

The standard COM8156 is specifically dedicated to generating the full spectrum of 16 asynchronous/synchronous data communication frequencies for 16X UART/USRT devices. A large number of the frequencies available are also useful for 1X and 32X ASTRO/USYNRT devices.

The COM8156 features an internal crystal oscillator which may be used to provide the master reference frequency. Alternatively, an external reference may be supplied by applying complementary TTL level signals to pins 1 and 9. Parts suitable for use only with an external TTL reference are marked COM 8156T. TTL outputs used to drive the COM8156 or COM8156T XTAL/EXT inputs should not be used to drive other TTL inputs, as noise immunity may be compromised due to excessive loading.

The output of the oscillator/buffer is applied to the dividers for generation of the output frequencies f_T, f_R. The dividers are capable of dividing by an integer from 6 to $2^{19} + 1$, inclusive. If the divisor is even, the output will be square; otherwise the output will be high longer that it is low by one f_O clock period.

The crystal frequency is divided by two to give (f_O) and again by four to give ($f_{O/4}$). The transmit (f_T) and receive (f_R) frequencies are obtained by dividing (f_O) by N. Up to 32 different divisors can be mask-programmed on custom parts to accommodate different crystal frequencies and divider schemes. Each group of four divisor select bits is held in an externally strobed data latch. The strobe input is level sensitive: while the strobe is high, data is passed directly through to the ROM. Initiation of a new frequency is effected within 3.5us of a change in any of the four divisor select bits (strobe activity is not required). The divisor select bits (strobe activity is not required). The divisor select inputs and the strobe inputs have pull-up resistors.

DESCRIPTION OF PIN FUNCTIONS

PIN NO.	SYMBOL	NAME	FUNCTION
15	XTAL/EXT 1	Crystal	This input receives one pin of the crystal package.
16	V_{CC}	Power Supply	+5 Volt Supply.
17	f_R	Receiver Output	This output runs at a frequency selected by the Receiver Address Inputs.
18 1-3	R_a R_b R_c, R_d	Receiver Divisor Select Address	The logic level on these inputs as shown in Table 1, selects the receiver output frequency, f_R.
4	STR	Strobe-Receiver Address	A high-level input strobe loads the receiver address (R_a, R_b, R_c, R_d) into the receiver address register. This input may be strobed or hard wired to +5V.
5	XTAL/EXT 2	Crystal	This input receives one pin of the crystal package.
6	$f_{O/4}$	Oscillator Output	This output runs at a frequency selected by the crystal ÷ 8.
7	GND	Ground	Ground
8	STT	Strobe-Transmitter Address	A high-level input strobe loads the transmitter address (T_a, T_b, T_c, T_d) into the transmitter address register. This input may be strobed or hard wired to +5V.
9-12	T_d T_c, T_b T_a	Transmitter Divisor Select Address	The logic level on these inputs, as shown in Table 1, selects the transmitter output frequency, f_T.
13	f_T	Transmitter Output Frequency	This output runs at a frequency selected by the Transmitter Address inputs.
14	f_o	Oscillator Output Frequency	This output runs at a frequency selected by the crystal ÷ 2.

ELECTRICAL CHARACTERISTICS

COM8156, COM8156T

MAXIMUM GUARANTEED RATINGS*

Operating Temperature Range ..... 0°C to +70°C
Storage Temperature Range ..... −55° to +150°C
Lead Temperature (soldering, 10 sec.) ..... +325°C
Positive Voltage on any Pin, with respect to ground ..... +8.0V
Negative Voltage on any Pin, with respect to ground ..... −0.3V

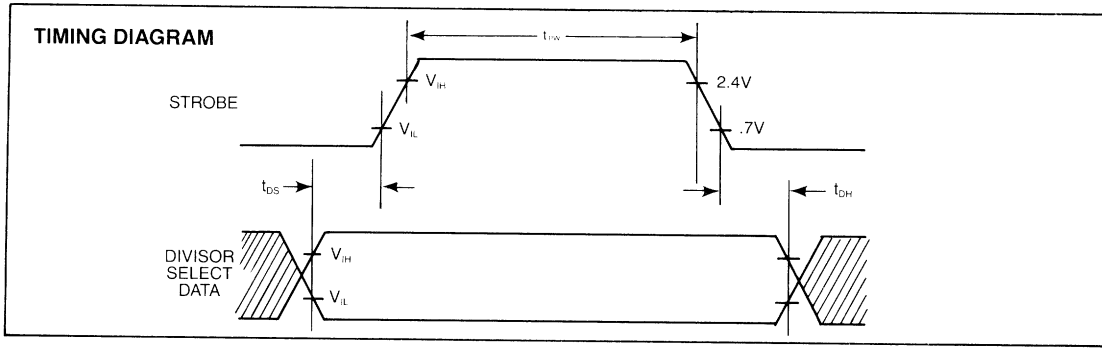
*Stresses above those listed may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or at any other condition above those indicated in the operational sections of this specification is not implied.

NOTE: When powering this device from laboratory or system power supplies, it is important that the Absolute Maximum Ratings not be exceeded or device failure can result. Some power supplies exhibit voltage spikes or "glitches" on their outputs when the AC power is switched on and off. In addition, voltage transients on the AC power line may appear on the DC output. If this possibility exists it is suggested that a clamp circuit be used.

ELECTRICAL CHARACTERISTICS (T_A = 0°C to 70°C, V_{CC} = +5V ±5%, unless otherwise noted)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
DC CHARACTERISTICS					
INPUT VOLTAGE LEVELS					
Low Level V_{IL}			0.8	V	
High Level V_{IH}	2.0			V	excluding XTAL inputs
OUTPUT VOLTAGE LEVELS					
Low Level V_{OL}			0.4	V	I_{OL} = 1.6 mA, for f_{O4}
			0.4	V	I_{OL} = 3.2 mA, for f_R, f_T
High Level V_{OH}			0.5	V	I_{OL} = 3.2 mA, for f_O
	2.4			V	I_{OH} = −100 µA
INPUT CURRENT					
Low-level, I_{IL}			−0.1	mA	V_{IN} = GND, excluding XTAL inputs
INPUT CAPACITANCE					
All inputs, C_{IN}		5	10	pF	V_{IN} = GND, excluding XTAL inputs
EXT INPUT LOAD		8	10		Series 7400 equivalent loads
POWER SUPPLY CURRENT					
I_{CC}			60	mA	
AC CHARACTERISTICS					
CLOCK FREQUENCY, f_{IN}	5.0		11.0	MHz	XTAL/EXT, 50% Duty Cycle ±5%
STROBE PULSE WIDTH, t_{PW}	150		DC	ns	
INPUT SET-UP TIME					
t_{DS}	50			ns	
INPUT HOLD TIME					
T_{DH}	50			ns	
STROBE TO NEW FREQ. DELAY			3.5	µs	
OUTPUT CLOCKS DUTY CYCLE					
f_O	40		60	%	@ 1.5V LEVEL
f_{O4}	45		55	%	@ 1.5V LEVEL
f_R, f_T	48		52	%	@ 1.5V LEVEL
CRYSTAL CHARACTERISTICS					
Series Crystal Resistance		30	70		@ Resonance
Crystal Shunt Capacitance	2	5	10	pf	

TIMING DIAGRAM



Baud Rate Generator Output Frequency Options

COM8156/COM8156T (16X clock)

CRYSTAL FREQUENCY = 10.1376 MHz

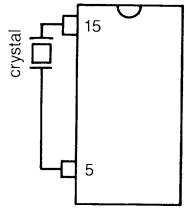
Tr'mit/Receive Address D	C	B	A	Baud Rate	Theoretical Frequency 16X Clock	Actual Frequency 16X Clock	Percent Error	Duty Cycle %	Divisor
0	0	0	0	50	0.8 KHz	0.8 KHz	—	50/50	6336
0	0	0	1	75	1.2	1.2	—	50/50	4224
0	0	1	0	110	1.76	1.76	—	50/50	2880
0	0	1	1	134.5	2.152	2.1523	0.016	50/50	2355
0	1	0	0	150	2.4	2.4	—	50/50	2112
0	1	0	1	300	4.8	4.8	—	50/50	1056
0	1	1	0	600	9.6	9.6	—	50/50	528
0	1	1	1	1200	19.2	19.2	—	50/50	264
1	0	0	0	1800	28.8	28.8	—	50/50	176
1	0	0	1	2000	32.0	32.081	0.253	50/50	158
1	0	1	0	2400	38.4	38.4	—	50/50	132
1	0	1	1	3600	57.6	57.6	—	50/50	88
1	1	0	0	4800	76.8	76.8	—	50/50	66
1	1	0	1	7200	115.2	115.2	—	50/50	44
1	1	1	0	9600	153.6	153.6	—	48/52	33
1	1	1	1	19.200	307.2	316.8	3.125	50/50	16

COM8156-005/COM8156T-005 (16X clock)

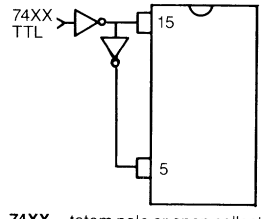
CRYSTAL FREQUENCY = 9.8304 MHz

Tr'mit/Receive Address D	C	B	A	Baud Rate	Theoretical Frequency 16X Clock	Actual Frequency 16X Clock	Percent Error	Duty Cycle %	Divisor
0	0	0	0	50	0.8 KHz	0.8 KHz	—	50/50	6144
0	0	0	1	75	1.2	1.2	—	50/50	4096
0	0	1	0	110	1.76	1.7589	−0.01	*	2793
0	0	1	1	134.5	2.152	2.152	—	50/50	2284
0	1	0	0	150	2.4	2.4	—	50/50	2048
0	1	0	1	300	4.8	4.8	—	50/50	1024
0	1	1	0	600	9.6	9.6	—	50/50	512
0	1	1	1	1200	19.2	19.2	—	50/50	256
1	0	0	0	1800	28.8	28.7438	−0.19	*	171
1	0	0	1	2000	32.0	31.9168	−0.26	50/50	154
1	0	1	0	2400	38.4	38.4	—	50/50	128
1	0	1	1	3600	57.6	57.8258	0.39	*	85
1	1	0	0	4800	76.8	76.8	—	50/50	64
1	1	0	1	7200	115.2	114.306	−0.77	*	43
1	1	1	0	9600	153.6	153.6	—	50/50	32
1	1	1	1	19.200	307.2	307.2	—	50/50	16

Crystal Operation



External Input Operation



74XX—totem pole or open collector output (external pull-up resistor required)

For ROM re-programming SMC has a computer program available whereby the customer need only supply the input frequency and the desired output frequencies. The ROM programming is automatically generated.

Crystal Specifications

User must specify termination (pin, wire, other)
Prefer: HC-18/U or HC-25/U
Frequency: 10.1376 MHz, AT cut
Temperature range 0°C to 70°C
Series resistance $<50\ \Omega$
Series Resonant
Overall tolerance $\pm .01\%$
or as required

Crystal manufacturers (Partial List)

Northern Engineering Laboratories
357 Beloit Street
Burlington, Wisconsin 53105
(414) 763-3591

Bulova Frequency Control Products
61-20 Woodside Avenue
Woodside, New York 11377
(212) 335-6000

CTS Knights Inc.
101 East Church Street
Sandwich, Illinois 60548
(815) 786-8411

Crystek Crystals Corporation
1000 Crystal Drive
Fort Myers, Florida 33901
(813) 936-2109

STANDARD MICROSYSTEMS CORPORATION
35 Marcus Blvd. Hauppauge, N.Y. 11788
(516) 273-3100 TWX: 510-227-8898

STANDARD MICROSYSTEMS CORPORATION

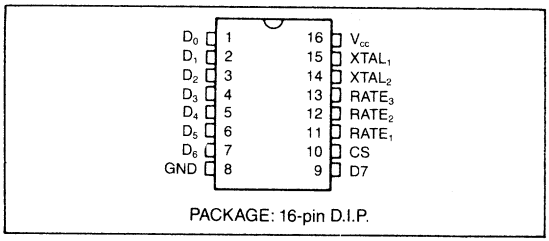
COM81C66
PRELIMINARY

Universal Rate Generator & Timer

FEATURES

- ☐ Three independent 32 bit programmable counters
- ☐ Clock input from DC to 16 MHz
- ☐ Low power CMOS
- ☐ 8/16-pin Dual-In-Line package
- ☐ Uses a crystal or a TTL signal as frequency source
- ☐ Single +5 Volt power supply

PIN CONFIGURATION



PACKAGE: 16-pin D.I.P.

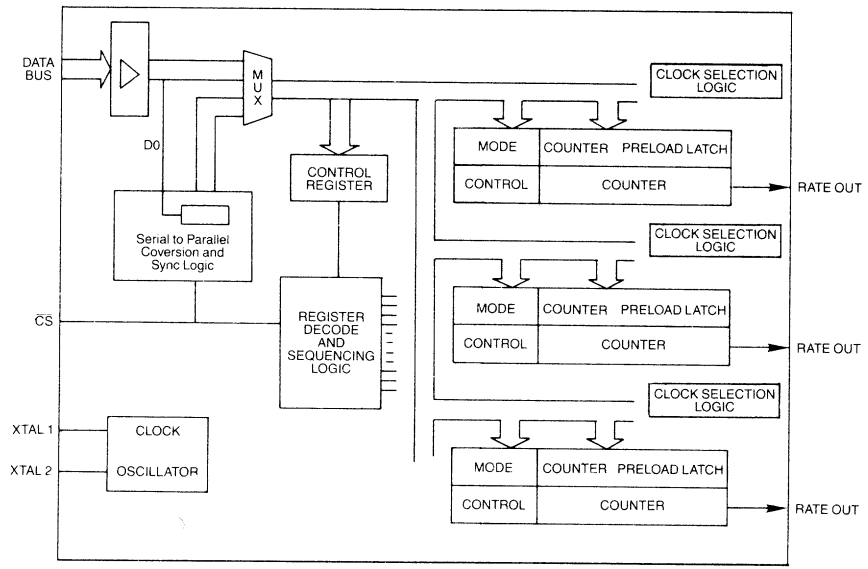
SECTION IV

GENERAL DESCRIPTION

The TIMER chip is a device designed to provide a convenient and inexpensive solution to applications requiring programmable multiple clock divider sources. The source frequency can be either an integrated crystal controlled oscillator, or an external TTL signal. The TIMER consists of a data input portion, a register addressing block and three counter blocks.

The counter blocks are accessed and programmed independently and they can be configured to operate in various modes simultaneously.

The TIMER chip serves a broad range of applications some of which are: Programmable rate generations, pulse generation, motor control, real time clock, interrupt applications and others.



COM8166 BLOCK DIAGRAM