

T-75-33-09



AY58116/8116T

AY58136/8136T

Dual Baud Rate Generator

FEATURES

- Single +5V power supply
- On-chip crystal oscillator 8116/8136 or external frequency input 8116/8116T/8136/8136T
- Direct compatibility with UART/USRT
- Dual selectable 16x clock outputs
- High frequency reference output (Available only on 8136/8136T)
- Reprogrammable ROM allowing generation of non-standard frequencies
- TTL, MOS compatibility
- Pin for pin and functionally compatible with SMC's COM 8116/8116T/8136/8136T
- Microchip Technology Advanced N-Channel Silicon Gate Process

DESCRIPTION

The Microchip Technology AY58116/8136 Series is a very versatile family of Dual Baud Rate Generators. The AY58116/8116T and AY58136/8136T are pin for pin functionally equivalent to SMC's COM 8116/8116T and COM 8136/8136T, respectively.

The AY58116/8136 is designed to generate the full spectrum of 16 asynchronous /synchronous data communication frequencies for use with 16x and 32x UART/USRT devices.

An on-chip crystal oscillator available on the 8116 and 8136 is capable of providing a master reference frequency. Alternatively, complimentary TTL level clock signals can be input to pins 1 and 18. The 8116T and 8136T are only suitable for this external TTL reference. When using TTL outputs to drive the XTAL/EXT inputs, they should not be used to drive other TTL inputs due to excessive loading which may result in a reduction of noise immunity.

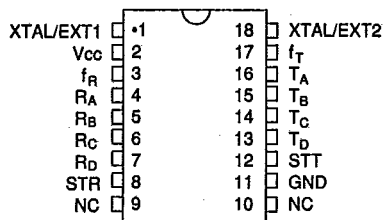
Dividers are used on the output of the oscillator/buffer which generate the output frequencies f_1 and f_2 . These dividers can divide any integer from 6 to $2^{19} + 1$, inclusive. When using an even divisor, the output will be square; an odd divisor will cause the output to be high longer than it is low by one clock period ($1/f_1$). The clock

PIN CONFIGURATIONS

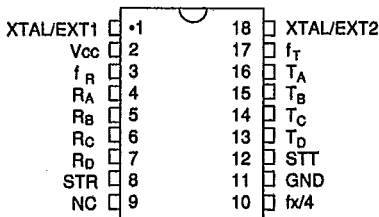
18 LEAD DUAL INLINE

AY58116/8116T

Top View



Top View



frequency (f_x) is used by the 8136/8136T to provide a high frequency output ($f_x/4$).

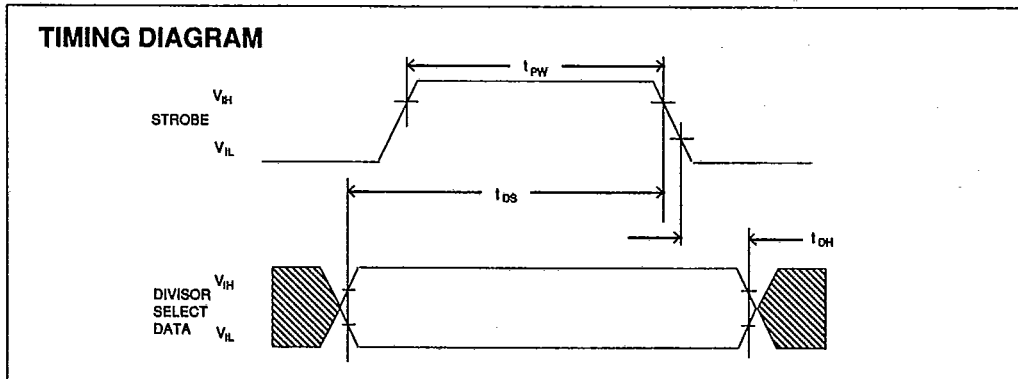
The 8116/8136 family allows generation of other frequencies with the use of its two divisor ROMs which contain 16 divisors, each 19 bits wide, allowing for up to 32 different divisors on custom parts.

Externally strobed data latches are used to hold the divisor select bits, R_A-R_D and T_A-T_D. The strobe inputs, STR or STT, allow data to pass directly through the data latch when in the high state. A new frequency is initiated within 3.5 μsec of a change in any of the four divisor select bits read by the device. Pull-up resistors are provided on the divisor select inputs which are not present on the strobe inputs.

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PIN FUNCTIONS

| Pin Number | Signal | Function |
|------------|---|--|
| 1 | XTAL/EXT1 | Input is either one pin of the crystal package or one polarity of the external input. |
| 2 | V _{CC} | Positive power supply - normally +5V. |
| 3 | f _R | This output runs at a frequency selected by the Receiver divisor select data bits. |
| 4-7 | R _A , R _B , R _C , R _D | These inputs, as shown in Table 1, select the receiver output frequency, f _R . |
| 8 | STR | 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 | |
| 10 | NC or f _X /4 | NC (8116/8116T), f _X /4 (8136/8136T). |
| 11 | GND | Ground. |
| 12 | STT | 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 | These inputs, as shown in Table 1, select the transmitter output frequency, f _T . |
| 17 | f _T | This output runs at a frequency selected by the transmitter divisor select data bits. |
| 18 | XTAL/EXT2 | This input is either the other pin of the crystal package or the other polarity of the external input. |



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ELECTRICAL CHARACTERISTICS

Maximum Ratings*

Operating Temperature Range 0°C to +70°C
 Storage Temperature Range -55°C to +150°C
 Positive Voltage on any Pin,
 with respect to ground +8.0V
 Negative Voltage on any Pin,
 with respect to ground -0.3V

* Exceeding these ratings could cause permanent damage to the device. This is a stress rating only and functional operation of this device at these conditions is not implied. Operating ranges are specified in Standard Conditions. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Data labeled "typical" is presented for design guidance only and is not guaranteed.

Standard Conditions (unless otherwise noted):

T_A = 0°C to +70°C, V_{CC} = +5V ±5%

DC CHARACTERISTICS

| Characteristic | Sym | Min | Typ | Max | Unit | Conditions |
|------------------------------|-----------------|-----|-----|------|------|---|
| Input Voltage Levels | | | | | | |
| Low Level | V _{IL} | - | - | 0.8 | V | excluding XTAL inputs |
| High Level | V _{IH} | 2.0 | - | - | V | |
| Output Voltage Levels | | | | | | |
| Low Level | V _{OL} | - | - | 0.4 | V | I _{OL} = 1.6mA, for f _X /4, I _{OL} = 3.2mA, for f _R , f _T I _{OH} = -100µA |
| | | | | 0.4 | V | |
| High Level | V _{OH} | 3.5 | - | - | V | |
| Input Current | | | | | | |
| Low Level | I _{IL} | - | - | -0.1 | mA | V _{IN} = GND, R _A -R _D & T _A -T _D only |
| Input Capacitance All inputs | | | 5 | 10 | pF | V _{IN} = GND, excluding XTAL inputs |
| Power Supply Current | I _{CC} | - | - | 50 | mA | |

AC CHARACTERISTICS

| Characteristic | Sym | Min | Typ | Max | Unit | Conditions |
|-------------------------------|-----------------|------|-----|-----|------|------------------------------|
| Clock Frequency | f _X | 0.01 | - | 5.1 | MHz | XTAL/EXT, 50% Duty Cycle ±5% |
| 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 | |

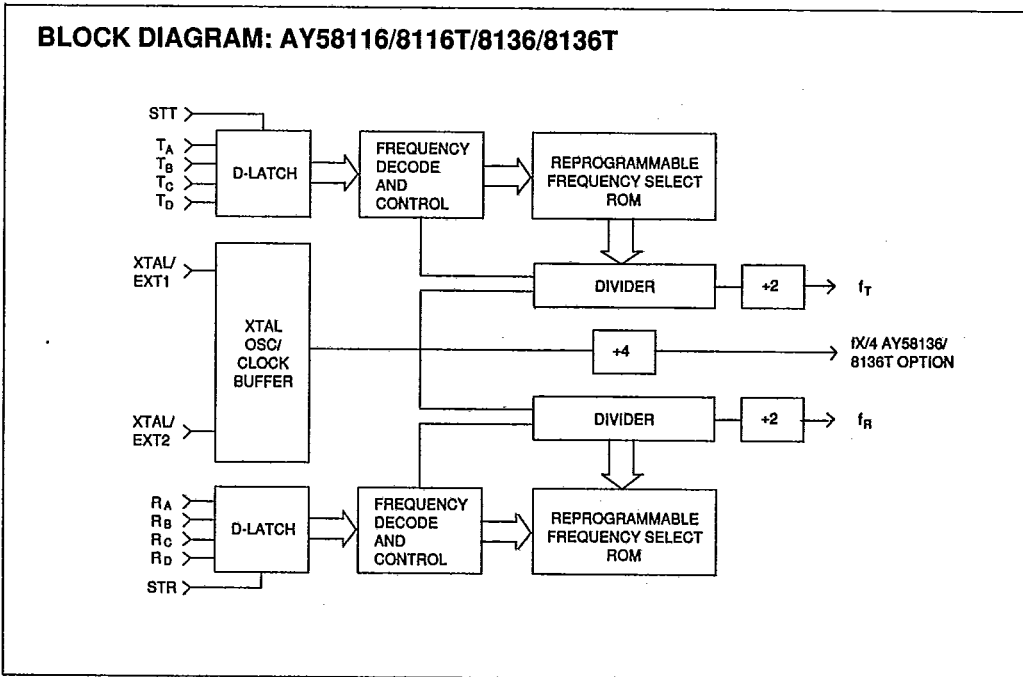
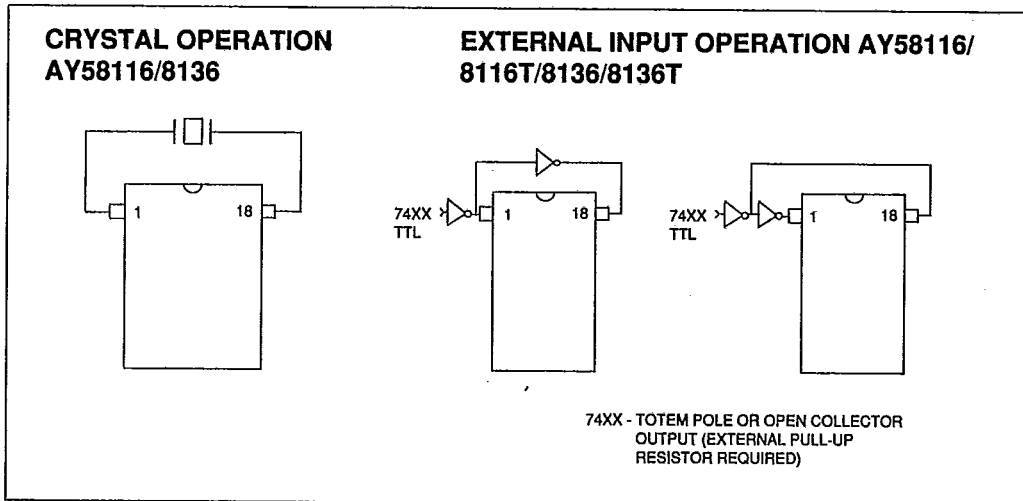
CRYSTAL SPECIFICATIONS

Temperature range 0°C to +70°C
 Series resistance ≤50Ω
 Series resonant
 Overall tolerance ± 0.01%

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Table 1 Output Frequency AY58116/8116T/8136/8136T
REFERENCE FREQUENCY = 5.068800 MHz

| Divisor Select DCBA | Desired Baud Rate | Clock Factor | Desired Frequency (KHz) | Divisor | Actual Baud Rate | Actual Frequency (KHz) | Deviation |
|---------------------|-------------------|--------------|-------------------------|---------|------------------|------------------------|-----------|
| 0000 | 50.00 | 16X | 0.80000 | 6336 | 50.00 | 0.800000 | 0.0000% |
| 0001 | 75.00 | 16X | 1.20000 | 4224 | 75.00 | 1.200000 | 0.0000% |
| 0010 | 110.00 | 16X | 1.76000 | 2880 | 110.00 | 1.760000 | 0.0000% |
| 0011 | 134.50 | 16X | 2.15200 | 2355 | 134.52 | 2.152357 | 0.0166% |
| 0100 | 150.00 | 16X | 2.40000 | 2112 | 150.00 | 2.400000 | 0.0000% |
| 0101 | 300.00 | 16X | 4.80000 | 1056 | 300.00 | 4.800000 | 0.0000% |
| 0110 | 600.00 | 16X | 9.60000 | 528 | 600.00 | 9.600000 | 0.0000% |
| 0111 | 1200.00 | 16X | 19.20000 | 264 | 1200.00 | 19.200000 | 0.0000% |
| 1000 | 1800.00 | 16X | 28.80000 | 176 | 1800.00 | 28.800000 | 0.0000% |
| 1001 | 2000.00 | 16X | 32.00000 | 158 | 2005.06 | 32.081013 | 0.2532% |
| 1010 | 2400.00 | 16X | 38.40000 | 132 | 2400.00 | 38.400000 | 0.0000% |
| 1011 | 3600.00 | 16X | 57.60000 | 88 | 3600.00 | 57.600000 | 0.0000% |
| 1100 | 4800.00 | 16X | 76.80000 | 66 | 4800.00 | 76.800000 | 0.0000% |
| 1101 | 7200.00 | 16X | 115.20000 | 44 | 7200.00 | 115.200000 | 0.0000% |
| 1110 | 9600.00 | 16X | 153.60000 | 33 | 9600.00 | 153.600000 | 0.0000% |
| 1111 | 19200.00 | 16X | 307.20000 | 16 | 19800.00 | 316.800000 | 3.1250% |

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Table 1 (Cont.) Output Frequency AY58116/8116T/8136/8136T-005 *T-75-33-09*
 REFERENCE FREQUENCY = 4.915200 MHz

| Divisor Select DCBA | Desired Baud Rate | Clock Factor | Desired Frequency (KHz) | Divisor | Actual Baud Rate | Actual Frequency (KHz) | Deviation |
|---------------------|-------------------|--------------|-------------------------|---------|------------------|------------------------|-----------|
| 0000 | 50.00 | 16X | 0.80000 | 6144 | 50.00 | 0.800000 | 0.0000% |
| 0001 | 75.00 | 16X | 1.20000 | 4096 | 75.00 | 1.200000 | 0.0000% |
| 0010 | 110.00 | 16X | 1.76000 | 2793 | 109.93 | 1.758983 | 0.0100% |
| 0011 | 134.50 | 16X | 2.15200 | 2284 | 134.50 | 2.152000 | 0.0000% |
| 0100 | 150.00 | 16X | 2.40000 | 2048 | 150.00 | 2.400000 | 0.0000% |
| 0101 | 300.00 | 16X | 4.80000 | 1024 | 300.00 | 4.800000 | 0.0000% |
| 0110 | 600.00 | 16X | 9.60000 | 512 | 600.00 | 9.600000 | 0.0000% |
| 0111 | 1200.00 | 16X | 19.20000 | 256 | 1200.00 | 19.200000 | 0.0000% |
| 1000 | 1800.00 | 16X | 28.80000 | 171 | 1796.49 | 28.743859 | 0.1949% |
| 1001 | 2000.00 | 16X | 32.00000 | 154 | 1994.81 | 31.916883 | 0.2597% |
| 1010 | 2400.00 | 16X | 38.40000 | 128 | 2400.00 | 32.000000 | 0.0000% |
| 1011 | 3600.00 | 16X | 57.60000 | 85 | 3614.11 | 57.825882 | 0.3921% |
| 1100 | 4800.00 | 16X | 76.80000 | 64 | 4800.00 | 76.800000 | 0.0000% |
| 1101 | 7200.00 | 16X | 115.20000 | 43 | 7144.19 | 114.306976 | 0.7751% |
| 1110 | 9600.00 | 16X | 153.60000 | 32 | 9600.00 | 153.600000 | 0.0000% |
| 1111 | 19200.00 | 16X | 307.20000 | 16 | 19200.00 | 307.200000 | 0.0000% |

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Table 1 (Cont.) Output Frequency AY58116/8116T/8136/8136T-006

REFERENCE FREQUENCY = 5.068800 MHz

| Divisor Select DCBA | Desired Baud Rate | Clock Factor | Desired Frequency (KHz) | Divisor | Actual Baud Rate | Actual Frequency (KHz) | Deviation |
|---------------------|-------------------|--------------|-------------------------|---------|------------------|------------------------|-----------|
| 0000 | 50.00 | 32X | 1.60000 | 3168 | 50.00 | 1.60000 | 0.0000% |
| 0001 | 75.00 | 32X | 2.40000 | 2112 | 75.00 | 2.40000 | 0.0000% |
| 0010 | 110.00 | 32X | 3.52000 | 1440 | 110.00 | 3.52000 | 0.0000% |
| 0011 | 134.50 | 32X | 4.30400 | 1177 | 134.52 | 4.30600 | 0.0600% |
| 0100 | 150.00 | 32X | 4.80000 | 1056 | 150.00 | 4.80000 | 0.0000% |
| 0101 | 200.00 | 32X | 6.40000 | 792 | 200.00 | 6.40000 | 0.0000% |
| 0110 | 300.00 | 32X | 9.60000 | 528 | 300.00 | 9.60000 | 0.0000% |
| 0111 | 600.00 | 32X | 19.20000 | 264 | 600.00 | 19.20000 | 0.0000% |
| 1000 | 1200.00 | 32X | 38.40000 | 132 | 1200.00 | 38.40000 | 0.0000% |
| 1001 | 1800.00 | 32X | 57.60000 | 88 | 1800.00 | 57.60000 | 0.0000% |
| 1010 | 2400.00 | 32X | 76.80000 | 66 | 2400.00 | 76.80000 | 0.0000% |
| 1011 | 3600.00 | 32X | 115.20000 | 44 | 3600.00 | 115.20000 | 0.0000% |
| 1100 | 4800.00 | 32X | 153.60000 | 33 | 4800.00 | 153.60000 | 0.0000% |
| 1101 | 7200.00 | 32X | 230.40000 | 22 | 7200.00 | 230.40000 | 0.0000% |
| 1110 | 9600.00 | 32X | 307.20000 | 16 | 9900.00 | 316.80000 | 3.1250% |
| 1111 | 19200.00 | 32X | 614.40000 | 8 | 19800.00 | 633.60000 | 3.1250% |

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SALES AND SUPPORT

To order or to obtain information, e.g., on pricing or delivery, please use the listed part numbers, and refer to the factory or the listed sales offices.

