

INDEPENDENT TX AND RX BAUD RATE GENERATOR

1.0 INTRODUCTION

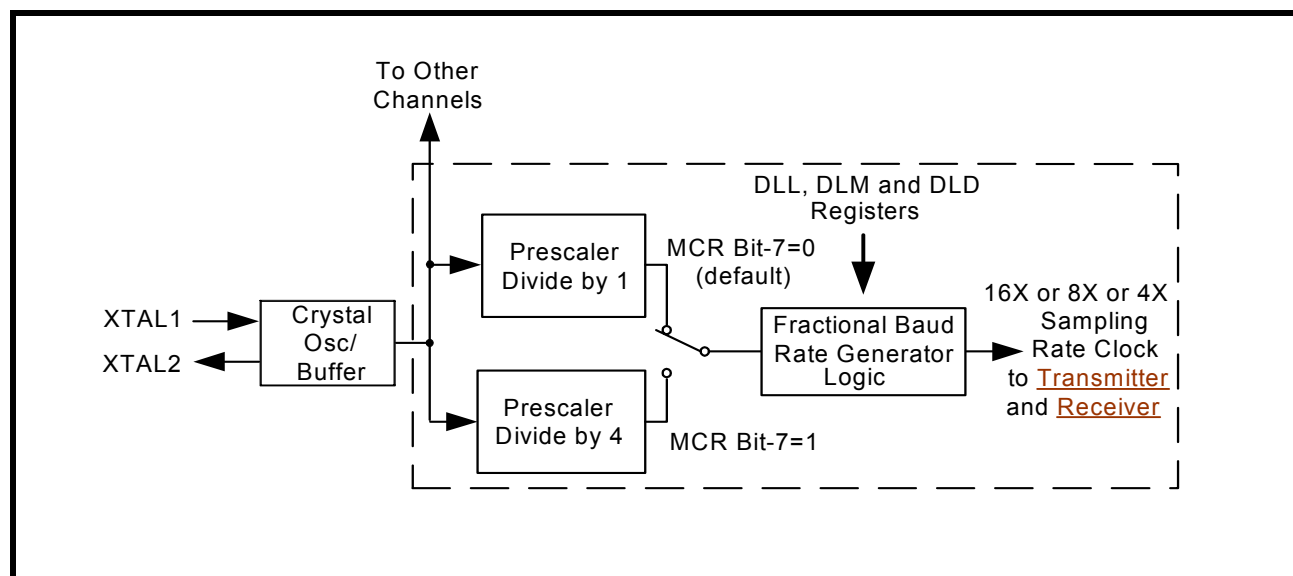
This application note describes the independent TX and RX baud rate generator feature of Exar's new low power and high speed XR16Mxxx single channel UART family.

2.0 BAUD RATE GENERATOR (BRG)

2.1 PREVIOUS BAUD RATE GENERATOR ON UARTs

The TX and RX of previous generation UARTs share the same baud rate generator, as shown in **Figure 1**. For the same channel, TX and RX always run at the same baud rate. That is, setting up DLL, DLM & DLD registers (some UARTs don't have DLD register) actually decide the data rate for both TX and RX.

FIGURE 1. BAUD RATE GENERATOR ON PREVIOUS GENERATION UARTs

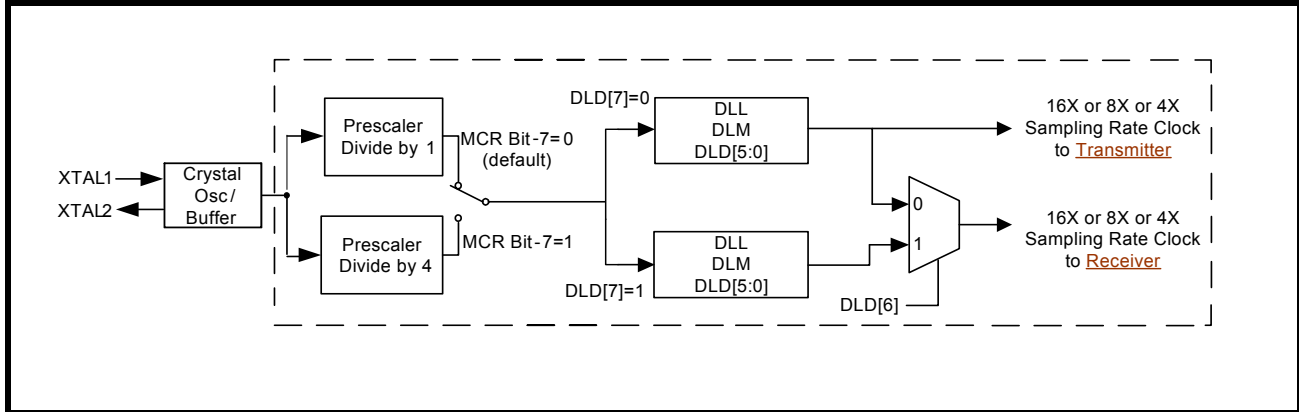


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2.2 BAUD RATE GENERATOR FOR M SINGLE CHANNEL UARTS

The XR16Mxxx single channel UART family has the independent baud rate generator feature. Thus, the transmitter and receiver can run at different baud rates (see **Figure 2**). DLL, DLM and DLD needs to be initialized for both TX and RX.

FIGURE 2. BAUD RATE GENERATOR FOR M SINGLE CHANNEL FAMILY UARTS



By default, the TX and RX uses the same BRG. Different BRGs can be enabled by DLD[6]. While initializing, DLD[7] selects the BRG that is being configured.

3.0 PROGRAMMING FOR INDEPENDENT TX AND RX BAUD RATE GENERATOR

By setting DLD, XR16Mxxx single channel UART family can operate transmitter (TX) and receiver (RX) in different baud rate. The following examples show different set-ups. The first 2 examples use the same baud rate generator (BRG) for both TX and RX. Others use different BRGs for TX and RX.

3.1 TX AND RX BAUD RATES ARE 921.6 KBPS WITH 14.7456 MHZ FREQUENCY

This example uses the default 16X sampling rate and the default BRG prescaler value 1 for both TX and RX.

```

write(LCR, 0xBF);
write(EFR, 0x10); //EFR[4] = 1 to enable the access of DLD
write(LCR, 0x80);
write(DLD, 0x0); //TX and RX use same BRG
write(DLL, 0x1);
write(DLM, 0x0);
write(LCR, 0x3); //Set data format 8 data bit and 1 stop bit
    
```

3.2 TX AND RX BAUD RATES ARE 921.6 KBPS WITH 24 MHZ FREQUENCY

This example uses the 8X sampling rate and the default BRG prescaler value 1 for both TX and RX.

```

write(LCR, 0xBF);
write(EFR, 0x10); //EFR[4] = 1 to enable the access of DLD
write(LCR, 0x80);
write(DLD, 0x14); //TX and RX use same BRG; Enable 8X mode; Set the fractional baud rate
write(DLL, 0x3);
write(DLM, 0x0);
write(LCR, 0x3); //Set data format 8 data bit and 1 stop bit
    
```

3.3 TX BAUD RATE IS 921.6 KBPS AND RX BAUD RATE IS 9600 BPS WITH 14.7456 MHZ FREQUENCY

This example sets the 4X sampling rate and the default BRG prescaler value 1 for both TX and RX.

```
write(LCR, 0xBF);
write(EFR, 0x10); //EFR[4] = 1 to enable the access of DLD
write(LCR, 0x80);
write(DLD, 0x60); //Select to configure TX baud rate generator; Select 4X sampling rate;
write(DLL, 0x4); //Set TX baud rate to 921.6 kbps
write(DLM, 0x0);
write(DLD, 0xE0); //Select to configure RX baud rate generator; Select 4X sampling rate;
write(DLL, 0x80); //Set RX baud rate to 9600 bps
write(DLM, 0x1);
write(LCR, 0x3); //Set data format 8 data bit and 1 stop bit
```

3.4 TX BAUD RATE IS 921.6 KBPS AND RX BAUD RATE IS 9600 BPS WITH 24 MHZ FREQUENCY

This example sets the 4X sampling rate and the BRG prescaler value 4 for both TX and RX.

```
write(LCR, 0xBF);
write(EFR, 0x10); //EFR[4] = 1 to enable the access of DLD
write(LCR, 0x80);
write(MCR, 0x80); //Set prescaler to 4
write(DLD, 0x6A); //Select to configure TX baud rate generator; Select 4X sampling rate;
write(DLL, 0x1); //Set TX baud rate to 921.6 Kbps
write(DLM, 0x0);
write(DLD, 0xE0); //Select to configure RX baud rate generator; Select 4X sampling rate;
write(DLL, 0x80); //Set RX baud rate to 9600 bps
write(DLM, 0x1);
write(LCR, 0x3); //Set data format 8 data bit and 1 stop bit
```

3.5 TX BAUD RATE IS 921.6 KBPS AND RX BAUD RATE IS 9600 BPS WITH 14.7456 MHZ FREQUENCY

This example sets the 4X sampling rate for the TX and 8X sampling rate for the RX while the default BRG prescaler value 1 for both TX and RX.

```
write(LCR, 0xBF);
write(EFR, 0x10); //EFR[4] = 1 to enable the access of DLD
write(LCR, 0x80);
write(DLD, 0x60); //Select to configure TX baud rate generator; Select 4X sampling rate;
write(DLL, 0x4); //Set TX baud rate to 921.6 kbps
write(DLM, 0x0);
write(DLD, 0xD0); //Select to configure RX baud rate generator; Select 4X sampling rate;
write(DLL, 0xC0); //Set RX baud rate to 9600 bps
write(DLM, 0x0);
write(LCR, 0x3); //Set data format 8 data bit and 1 stop bit
```



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4.0 TECHNICAL SUPPORT

For any questions regarding the independent TX and RX baud rate generator (BRG), send email to uarttech-support@exar.com.

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