

SPORT: Synchronous Serial Peripheral Port

Sport interface supports a variety of serial data communication protocols. Key features and capability of SPORT interface are

- Continuously running clock
- Serial data words from 3 to 32 bits in lengths, either MSB or LSB first
- Two synchronous transmit and two synchronous receive data signals and buffers to double the total supported data stream
- Configurable frame synchronisation signals

$$SPORT\ TSCLK = \frac{SCLK}{(2 \times (SPORT\ TCLKDIV + 1))}$$

SCLK = 120MHz

SPORT_TCLKDIV = 0 to 65535

$$TSCLK\ Max = \left(\frac{(120M)}{(2 \times (1 + 1))} \right) = 60\ MHz$$

$$TSCLK\ Min = \left(\frac{(120M)}{(2 \times (65535 + 1))} \right) \approx 915.52\ Hz$$

Other allowable values : 60MHz, 30MHz, 20MHz, 12MHz, 10MHz, 7.5MHz, 6MHz

NOTE : The value of Transmit Frame Sync Frequency is a function of the clock frequency of the transmit clock. SPORT_TFSDIV is the number of serial clock cycles between frame sync assertions.

$$SPORT\ TFS = \left(\frac{TSCLK}{SPORT} TFSDIV + 1 \right)$$

SPORT_TFSDIV must be greater than the serial word length -1. This ensures that the the frame sync is deasserted prior to reassertion for the the framed word. Therefore depending on the word size chosen for data transmission and the clock frequency selected the Frame Sync frequency will vary. Taking a 60MHz TSCLK and a serial wordlength of 32. The minimum and maximum SPORT TFS are calculated as follows

$$SPORT\ TFS\ Max = \left(\frac{(60\ M)}{(32 + 1)} \right) \approx 1800000\ Hz$$

$$SPORT\ TFS\ Min = \left(\frac{(60\ M)}{(65536 + 1)} \right) \approx 1000\ Hz$$

Rates available can be calculated similarly to the TSCLK and the TFS rates

$$SPORT\ RSCLK = \left(\frac{SCLK}{(2 \times (SPORT\ RCLKDIV + 1))} \right)$$

SCLK = 120MHz

SPORT_RCLKDIV = 0 to 65535
 RSCLK Max = 60MHz, RSCLK MIN ≈ 915.52Hz

$$SPORT\ RFS = \left(\frac{RSCLK}{(SPORT\ RFS\ DIV + 1)} \right)$$

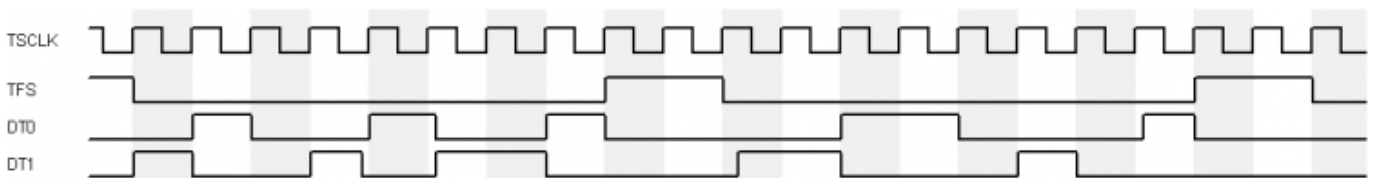
Pin Blackfin Name	Pin 120 Pin Connector Name	Description
DTxPRI	SPORT_DT0	Transmit Data Primary
DTxSEC	SPORT_DT1	Transmit Data Secondary
TSCLKx	SPORT_TSCLK	Transmit Clock
TFSx	SPORT_TFS	Transmit Frame Sync
DRxPRI	SPORT_DR0	Receive Data Primary
DRxSEC	SPORT_DR1	Receive Data Secondary
RSCLKx	SPORT_RSCLK	Receive Clock
TRSx	SPORT_RFS	Receive Frame Sync

Table 1: SPORT Pin Assignments

There are two transmit and two receive channels in the SPORT interface. By default the primary transmit and receive channels, DT0 and DR0, are enabled and the secondary transmit and receive channels, DT1 and DR1, are disabled. To enable the secondary transmit and receive channels, set the secEnable property in the SPORT object to true and wire the second transmit and receive lines to DT1 and DR1. The max clock frequency which can be used in this case is now halved, so 30MHz SPORT TSCLK and RSCLK. The data sent down to the SDP should be interleaved, the every second location containing data for DT0 and DT1 respectively. Below is a timing example showing the transmit clock, frame sync and data lines with SecEnable set to true.

To achieve the example below the array transmitted over the SPORT interface is

Index	Element	Channel
0	0x49	DT0
1	0x96	DT1
2	0x31	DT0
3	0xC6	DT1



Similarly data read from the SDP SPORT Interface in secEnable mode must be de-interleaved in the top level application to separate the data into data from DR0 and DR1.

Understanding the Frame Sync Signal

An Early Frame Sync Signal will be active for one clock pulse, and then become deactivate. Once the signal has been deactivated, valid data will be available.

A Late Frame Sync Signal frames the valid data, so is active for the length of time that valid data is available and is deactivated once the word to be transmitted or received has been fully sent.

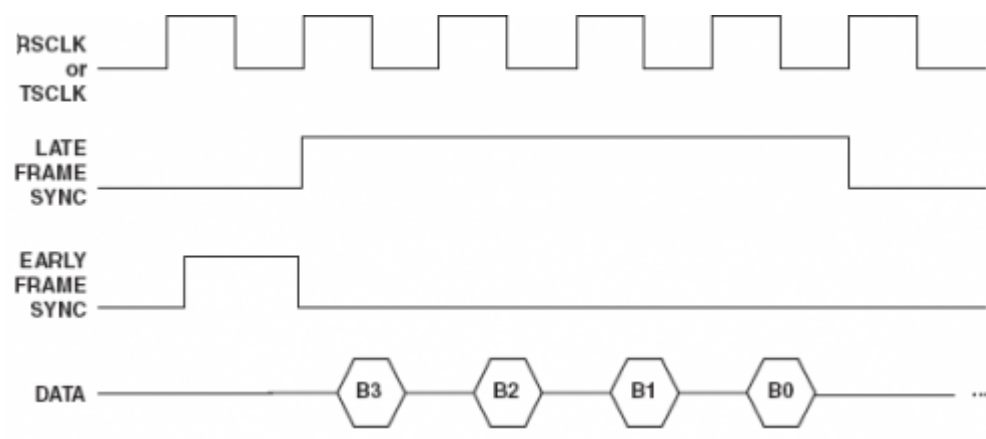
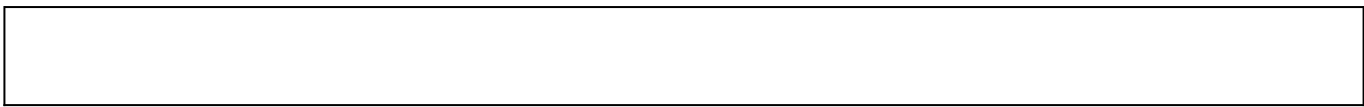


Figure 1 : SPORT Frame Sync Signals

Receive Data

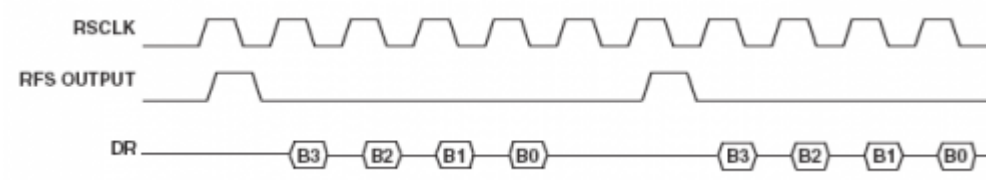


Figure 2 : SPORT_DR0/SPORT_DR1 & early frame sync

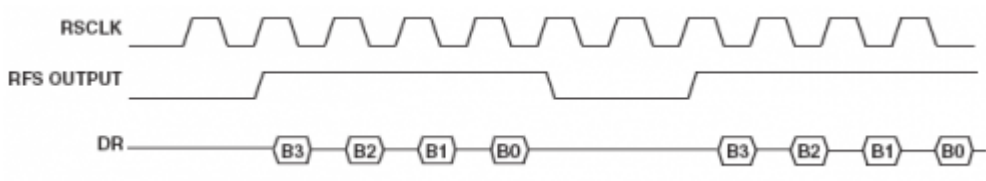


Figure 3 : SPORT_DR0/SPORT_DR1 & late frame sync

Transmit Data

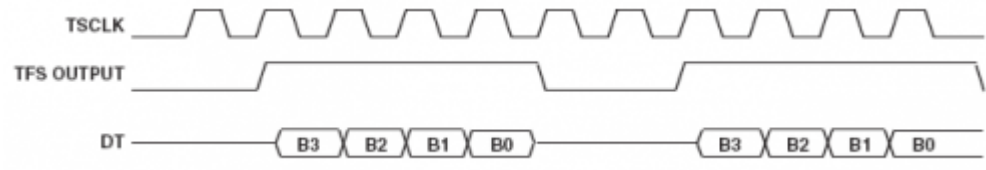


Figure 4 : SPORT_DT0/SPORT_DT1 & late frame sync

There are two SPORT Controllers on the Blackfin BF527 and these are exposed through the two connectors on the SDP-B. SPORT0 is on Connector A of the SDP, SPORT1 is on Connector B of the SDP. The SPORT Interface Pins are 3.3V tolerant only.

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