

# Contention Detection

Induction Training

Version 1.0

Block Owner

Si-Vision

Authors

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## 2 Revision History

Version	Date	Author(s)	Revision Notes	Owner Approval
1.0				

### 3 Overview

The ContentionDetection module is designed to monitor and detect contention conditions on three low-power transmission lines: A, B, and C. It compares the transmitter's control (LpTxX) with the receiver (LpRxX) and contention detection signals (LpCdX) for each line to identify whether contention occurs during active transmission or idle state.

## 4 Operation and Description

### 4.1 Digital Interface

#### 4.1.1 Parameters Names

Parameter Name	Default	Description
None	-	-

#### 4.1.2 Ports Names

Port Name	Port Width	Port Type	Description
LpRxA	1 bit	Input	Receiver signal for low-power line A.
LpRxB	1 bit	Input	Receiver signal for low-power line B.
LpRxC	1 bit	Input	Receiver signal for low-power line C.
LpCdA	1 bit	Input	Contention detection feedback for line A. Used to confirm proper signal reflection or termination.
LpCdB	1 bit	Input	Contention detection feedback for line B. Used to confirm proper signal reflection or termination.
LpCdC	1 bit	Input	Contention detection feedback for line C. Used to confirm proper signal reflection or termination.
LpTxA	1 bit	Input	Transmit enable for line A. When high, the transmitter is actively driving the line.
LpTxB	1 bit	Input	Transmit enable for line B. When high, the transmitter is actively driving the line.
LpTxC	1 bit	Input	Transmit enable for line C. When high, the transmitter is actively driving the line.
ErrContentionP0	1 bit	Output	Indicates unexpected activity while the transmitter transmits 0 on the lines.
ErrContentionP1	1 bit	Output	Indicates unexpected activity while the transmitter transmits 1 on the lines.

#### 4.1.3 CDC Table

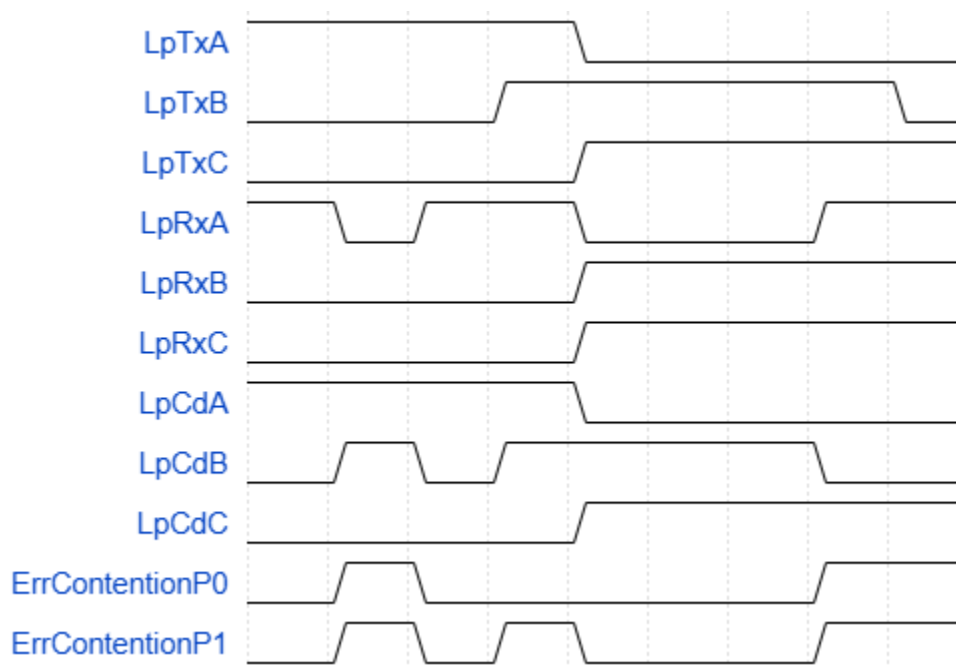
CDC signal	Source Domain	Destination Domain	Synchronization method

#### 4.2 Functional Description

This module monitors the three low power A, B and C lines and compare the transmitter's control lines with Receiver's control lines and contention detection signals for each line and produce one of the two errors in these cases:

- 1- If any of the transmitter's lines (LpTxA, LpTxB or LpTxC) is equal to 1 but the correspond line in the Receiver or contention not equal to 1 then ErrContentionP1 is asserted to 1 so that contention error has been detected else ErrContentionP1= 0.  
Ex: LpTxA = 1, LpRxA = 1 and LpCdA = 0 then ErrContentionP1 = 1.
- 2- If any of the transmitter's lines (LpTxA, LpTxB or LpTxC) is equal to 0 but the correspond line in the Receiver or contention not equal to 1 then ErrContentionP0 is asserted to 1 so that contention error has been detected else ErrContentionP0 = 0.  
Ex: LpTxA = 0, LpRxA = 1 and LpCdA = 0 then ErrContentionP0 = 1.

#### 4.3 Timing Diagram



#### 4.4 Verification Requirements

- **No Contention Condition**

If line behavior matches the transmission state (i.e.,  $T_x$ ,  $R_x$ , and  $C_d$  are aligned), no error should be reported.

- **Passive Contention Detection (ErrContentionP0)**

When  $LpTxX = 0$  and either  $LpRxX = 1$  or  $LpCdX = 1$ , the corresponding ErrContentionP0 bit must assert.

- **Active Contention Detection (ErrContentionP1)**

When  $LpTxX = 1$  and either  $LpRxX = 0$  or  $LpCdX = 0$ , the corresponding ErrContentionP1 bit must assert.

- **Multi-Line Contention**

Ensure that contention is correctly detected independently and simultaneously on lines A, B, and C.