A Wireless Real-Time On-Chip Bus Trace System

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Background

- Inductive coupling technique
  - High speed, low power
  - Communication range: 10um-1mm
- New applications: Wireless detachable interface
  - Real time on chip bus trace system
  - High speed memory access
  - Wireless connector

- Real time on chip bus trace system

Probe (FCB)

Target LSI

FCB Inductors

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Problems

• Real time on chip bus trace system
  ◆ several hundred Mb/s
• High speed communication
  by arranging channels in parallel

Previous work[1]

20Mb/s

160Mb/s/ch

This work

480Mb/s

• Crosstalk and timing margin must be considered

Quasi-Synchronous System

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<thead>
<tr>
<th></th>
<th>Sync</th>
<th>Async</th>
<th>Quasi-Sync</th>
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<tbody>
<tr>
<td>Noise immunity</td>
<td>O</td>
<td>X</td>
<td>O</td>
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<tr>
<td>Timing margin</td>
<td>X</td>
<td>O</td>
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Die Photo

- Technology
  - 0.25µm CMOS
  - Standard digital process

- Die size
  - 4mm x 4mm
BER measurement

Received Pulse
Pulse width
Enable Pulse

Graph showing BER measurements for different pulse widths:
- 0.6nsec
- 0.7nssc
- 1.2nsec
- 300psec

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Conclusion

- Wireless real-time on-chip bus trace system is developed using a 0.25μm CMOS process
- The quasi-synchronous system is proposed to obtain an enough timing margin and high noise immunity
- Timing margin of 300psec is obtained with a BER less than $10^{-9}$