
SEVENTEENTH ANNUAL
BiTS
Burn-in & Test Strategies Workshop
March 6 - 9, 2016
Hilton Phoenix / Mesa Hotel
Mesa, Arizona
Archive- Session 4
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BiTS 2016 Burn-in & Test Strategies Workshop

Session 4
Marc Mössinger
Session Chair

BiTS Workshop 2016 Schedule

Performance Day

Tuesday March 8 - 8:00 am

Frequently High

"High Speed BGA Sockets from a System Perspective"

Don Thompson - R&D Altanova

"A Solution of Test, Inspection and Evaluation for Blind Signal Waveform on a Board"

Tatsumi Watabe, Makoto Kawamura, Hiroyuki Yamakoshi - S.E.R. Corporation

"Device Packaging and How It Affects RF Performance"

Noureen Sajid, Jeff Sherry - Johnstech International

"Automotive Radar Test"

Jason Mroczkowski - Xcerra Corporation

BiTS 2016 Burn-in & Test Strategies Workshop

A Solution of Test, Inspection and Evaluation for Blind Signal Waveform on a Board

Tatsumi Watabe, Makoto Kawamura, & Hiroyuki Yamakoshi
S.E.R. Corporation

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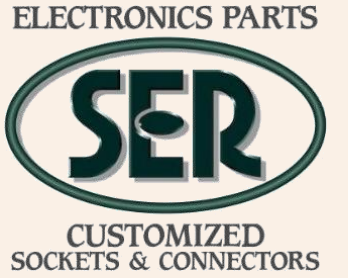
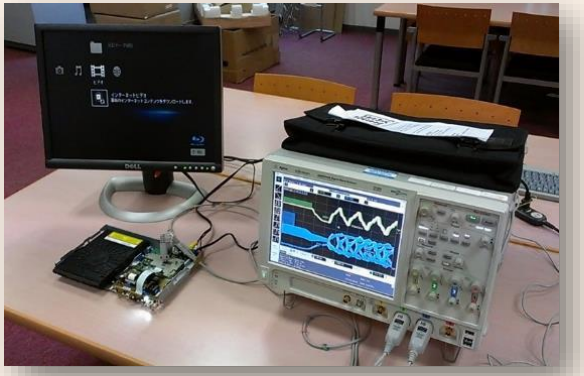


Purpose

- Blind signal waveform analysis on the system board by using **Signal Probe Socket.**

Conclusion

- Got a real signal waveform by introduction S-parameter data of signal probe socket and **InfiniiSim** performance.

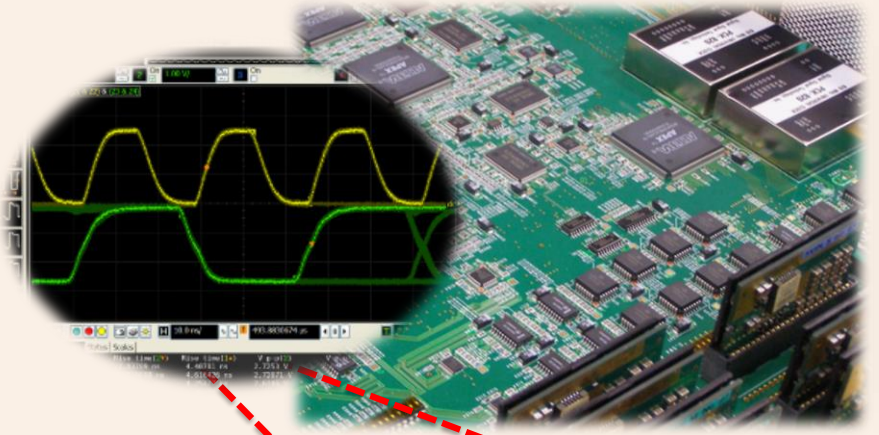


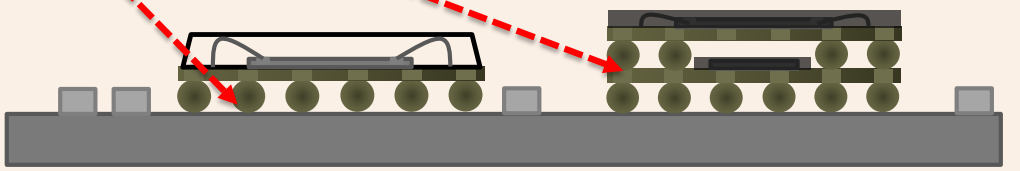
Agenda

1) What is a blind signal analysis?
2) Signal probe socket !
   2-1) YOROI ???
3) Blind signal measurement & data
4) Conclusion & summary

1) What is a blind signal analysis ?

Blind Signal !





Blind signal analysis !

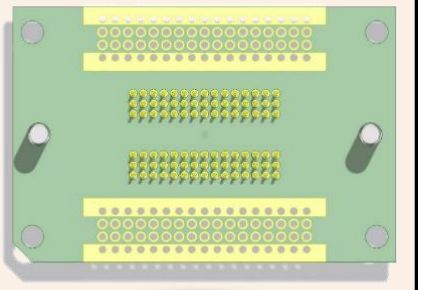
- Timing analysis between DDR and CPU.
- Measure and confirm a blind signal waveform directly underneath IC package.
- Define different approach for identification of a failure point when not re-appearance on LSI tester.
- Qualification of memory and CPU.
- Moving measurement point by using InfiniiSim.

Timing signal & waveform

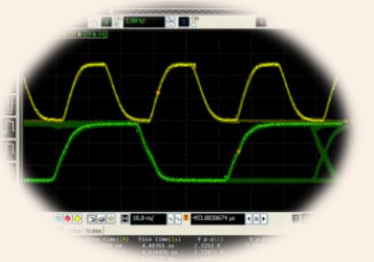
Timing analysis
Verification
Quality control

Blind signal measurement

1. **All signals** of 0.8mm pitch device should be accessible for measurement.

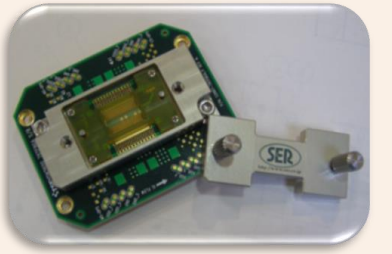


2. Support of **high- speed** signal measurements over 3.5 Gbps.

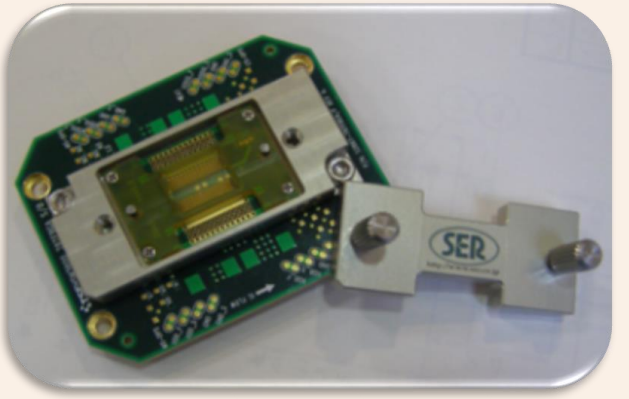


3. **Solderless mount.**

(Easy to replace the target IC)

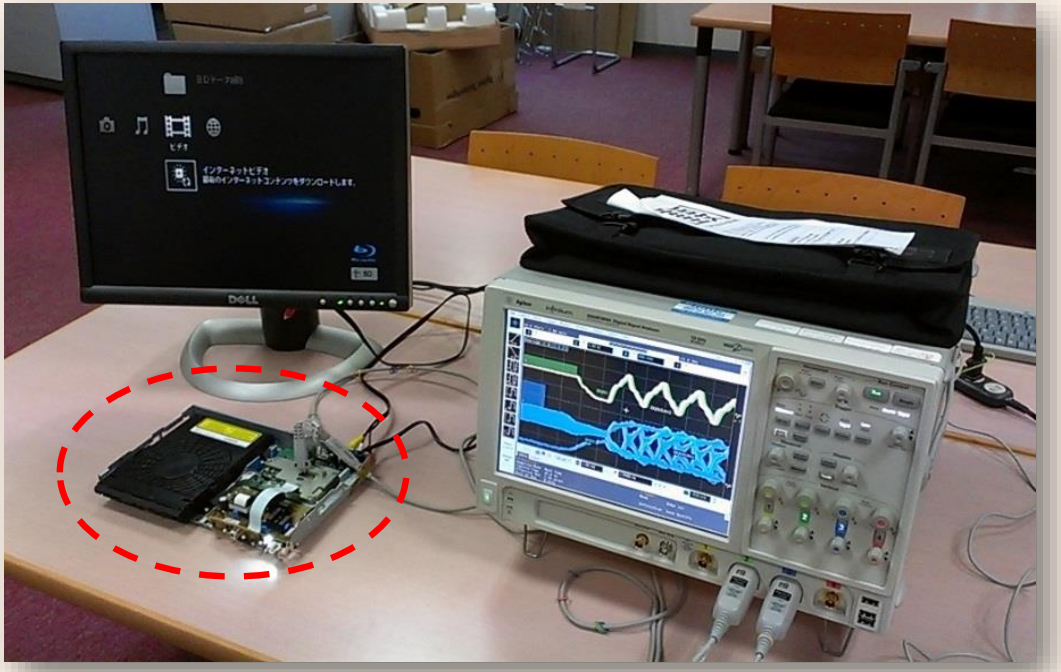


2) Signal Probe Socket !

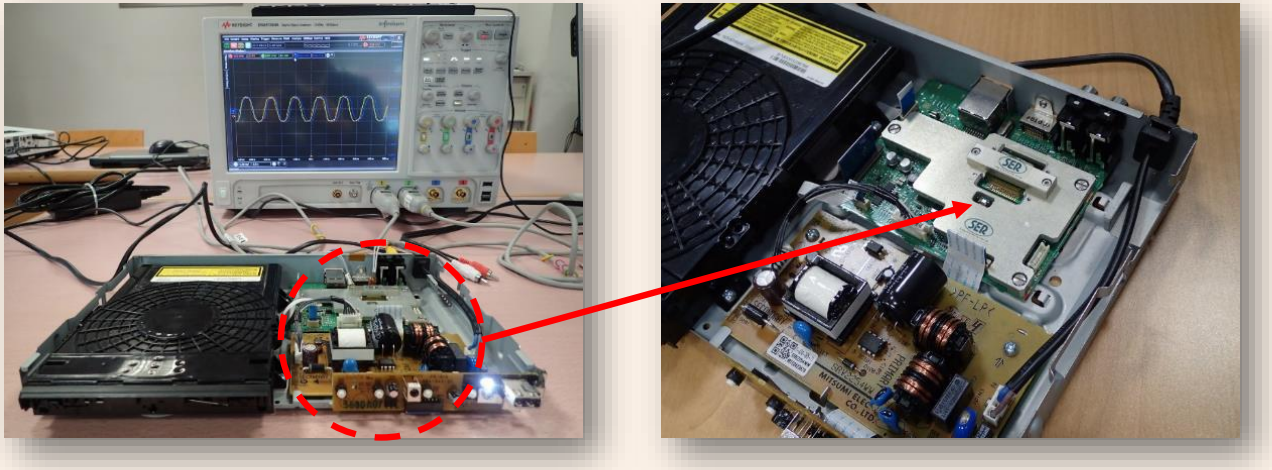


Blind signal probing

Signal measurement on DVD player



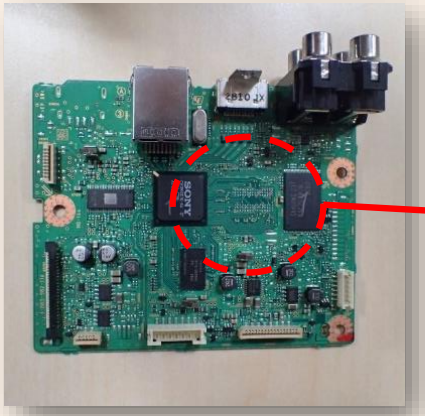
Blind signal probing



Signal probe socket is on a board of DVD player and connected to the oscilloscope.

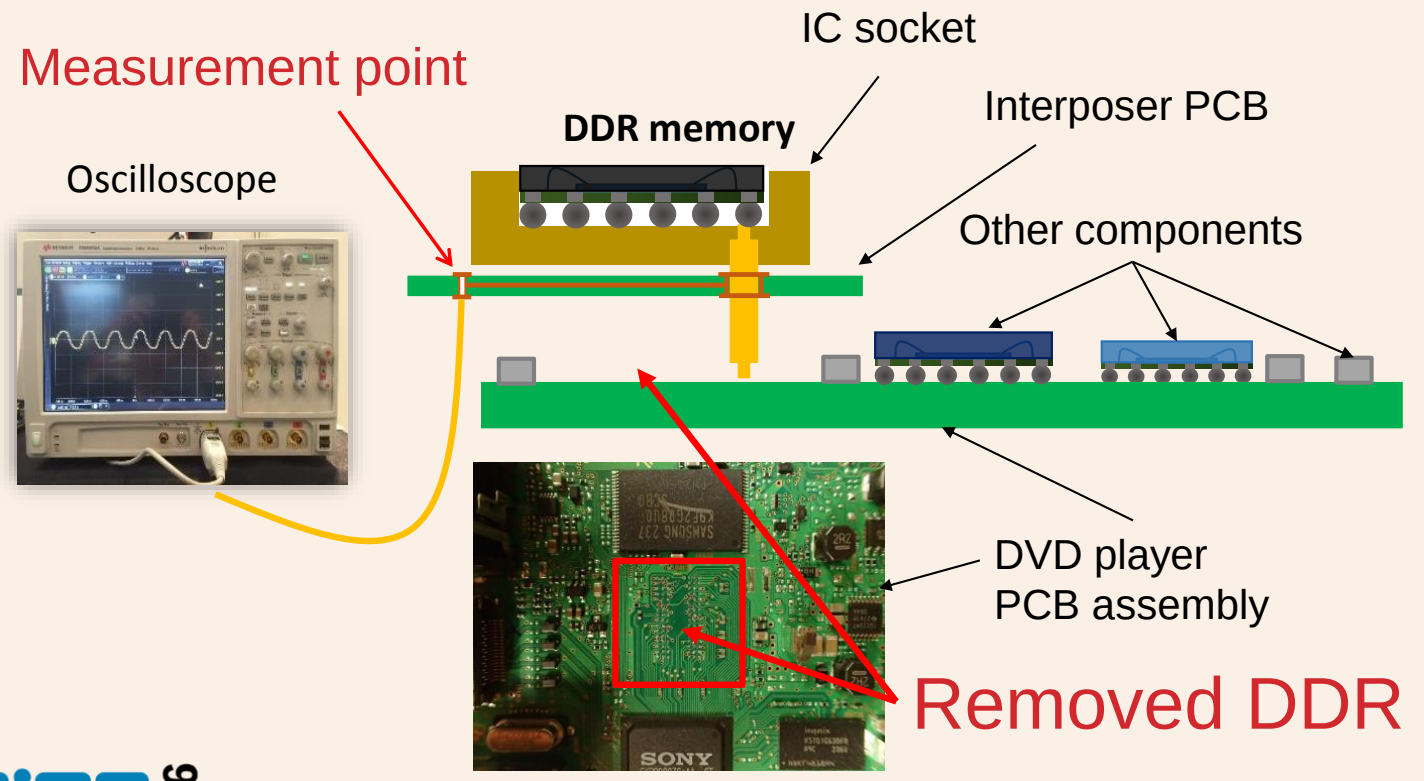
Blind signal probing

Removed DDR memory and mounted signal probe socket worn YOROI.

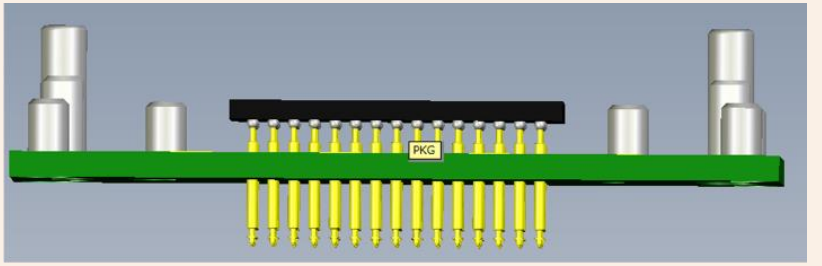


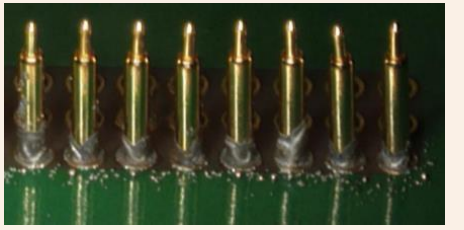
+

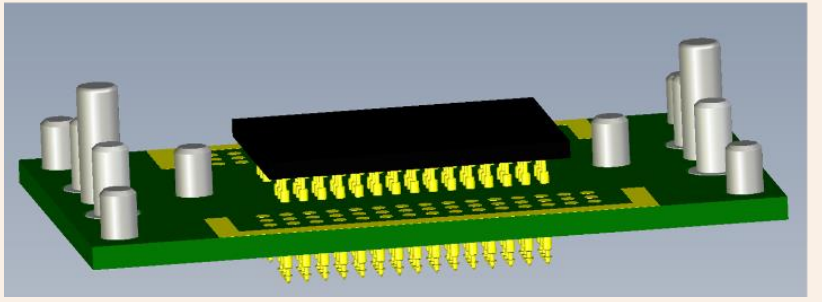
Setup for DDR memory's blind signal measurement



Signal probe socket basic structure





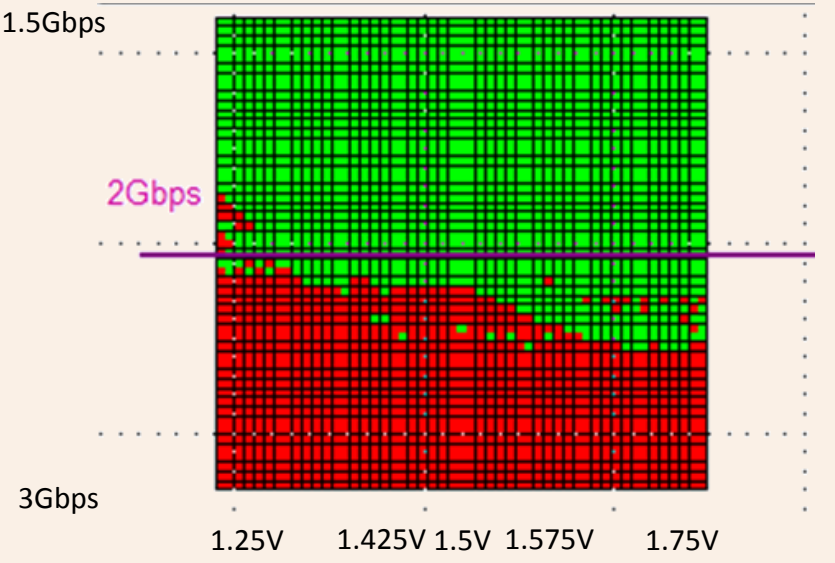


Example
PKG: BGA (DDR3 memory)
Pitch: 0.8mm
Pin count: 96 pin

Actual performance of DDR memory's signal probe socket

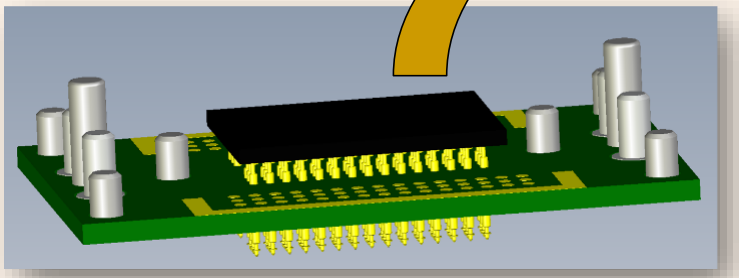
Shmoo plot analysis result

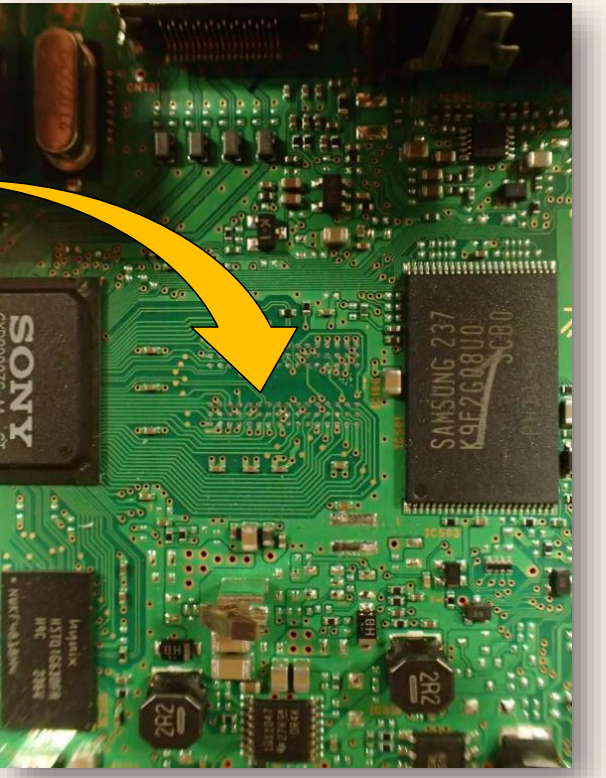
Tester
-Verigy
-V93000
-HSM3600



Blind signal probing design structure

YOROI structured mount is required for signal probe socket





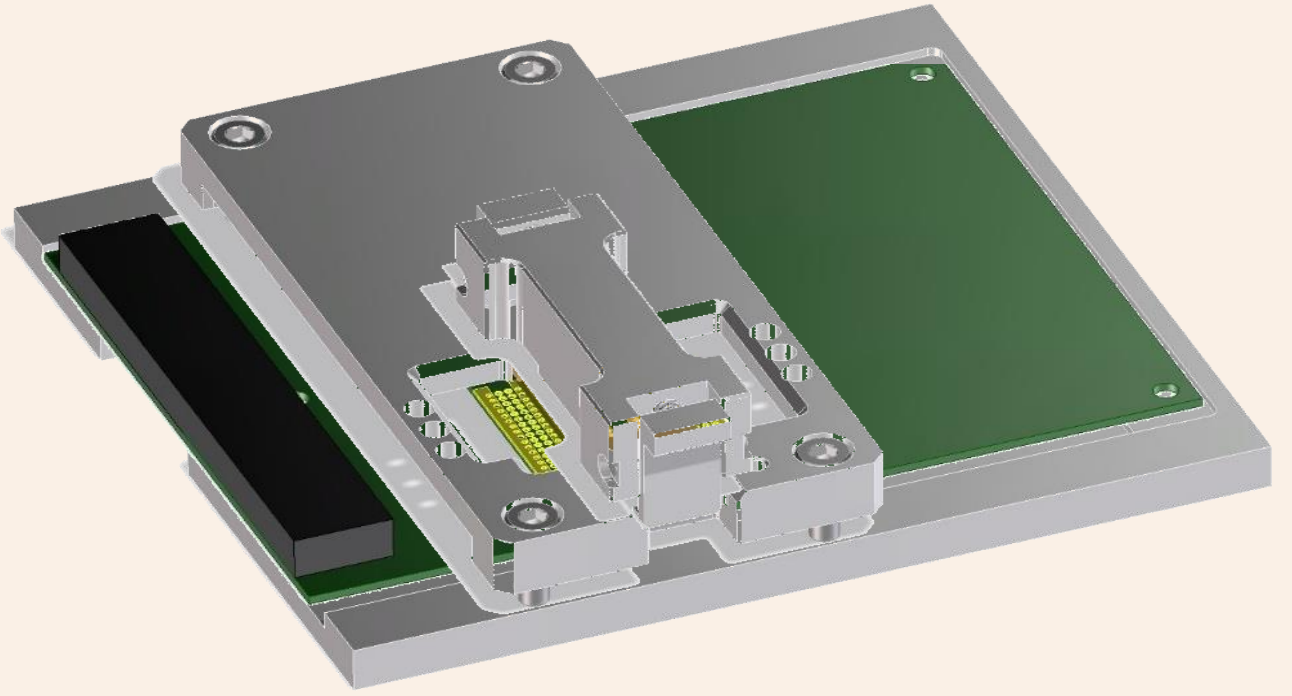
2)-1 YOROI ???

SAMURAI wore YOROI for fighting.

And signal probe socket also must be.

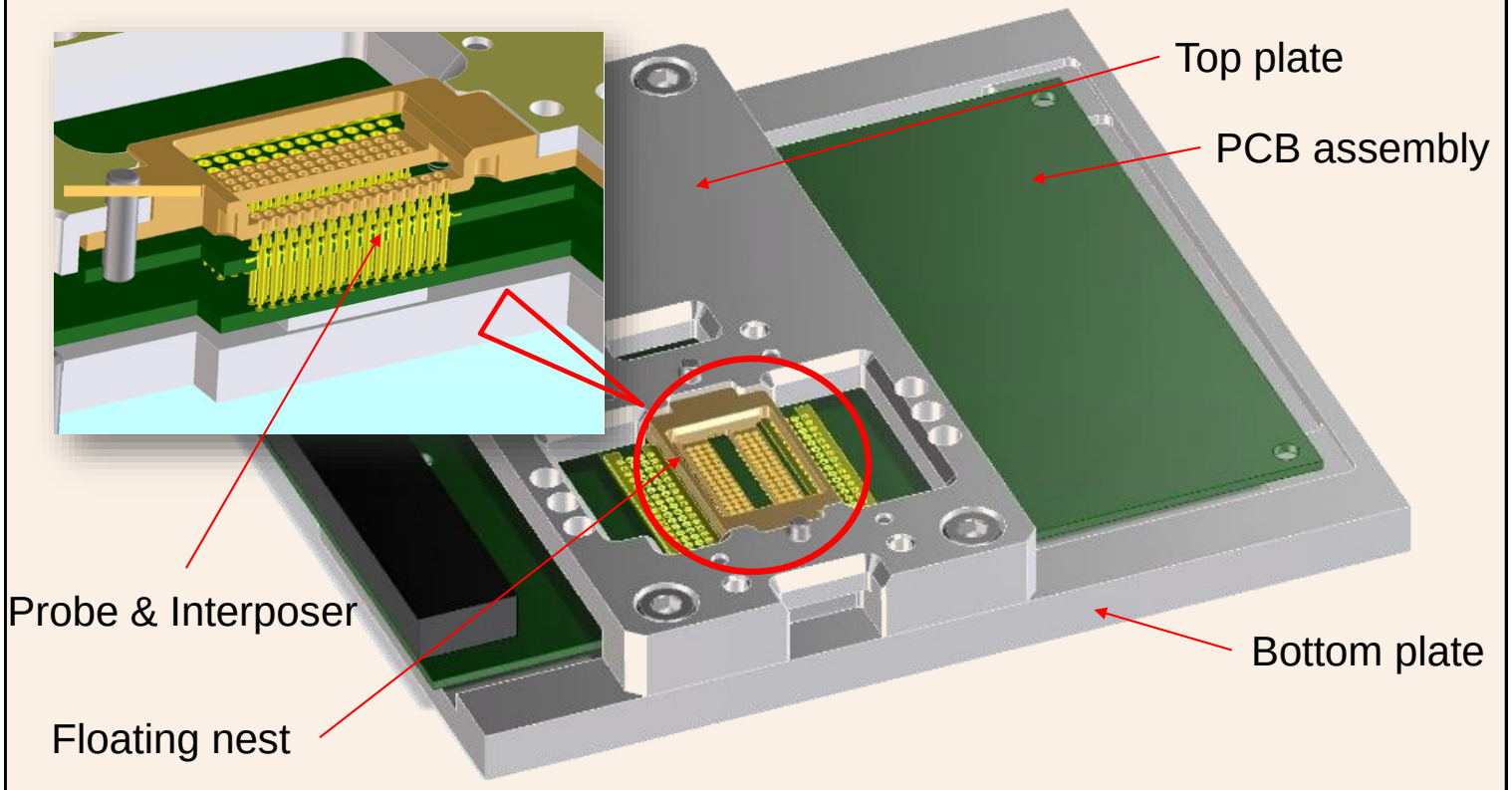
Why ?

YOROI structure for signal probe socket



(Patent pending)

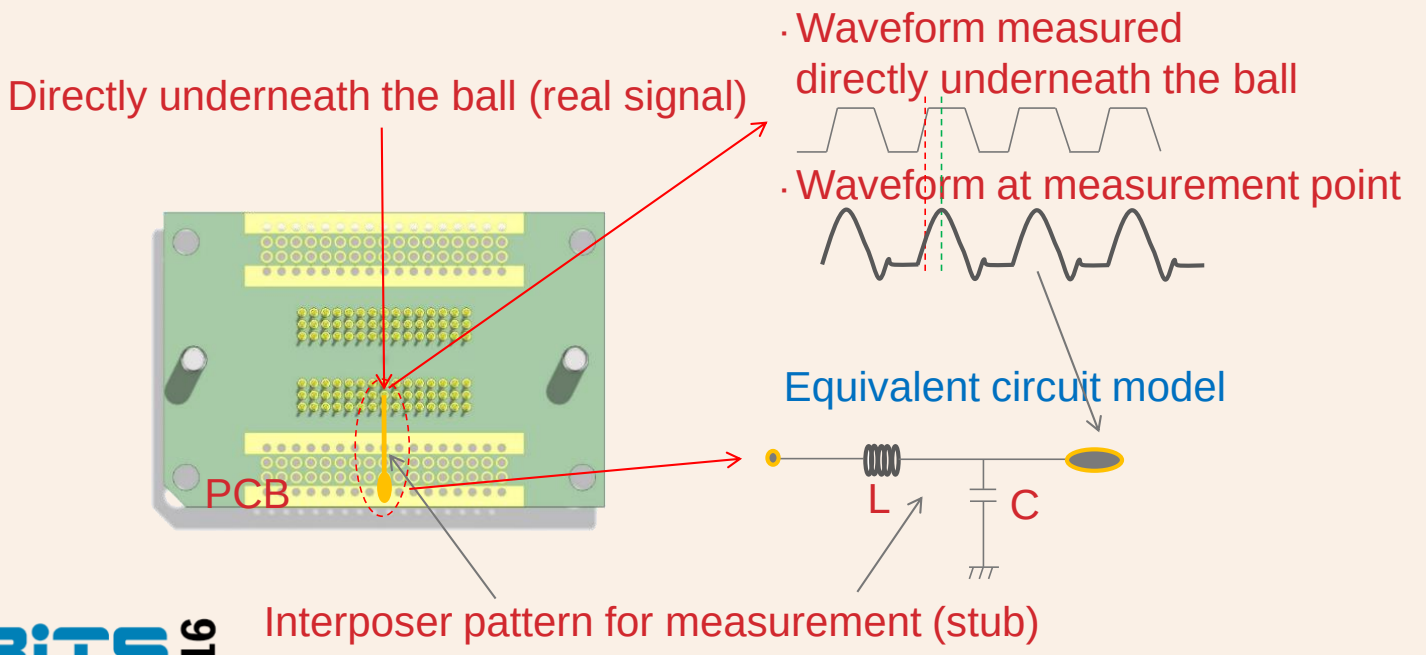
Signal probe socket worn YOROI



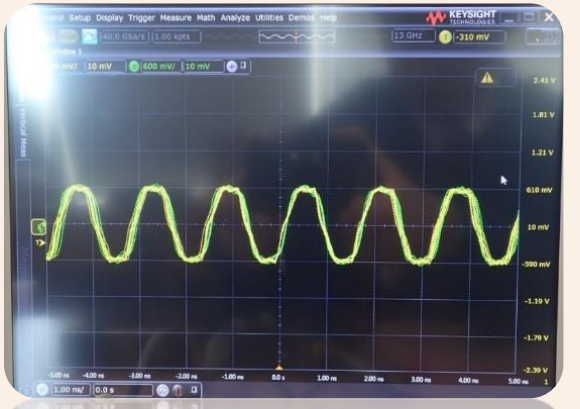
(Patent pending)

Interposer element

It influences the measurement of the blind signal waveform.

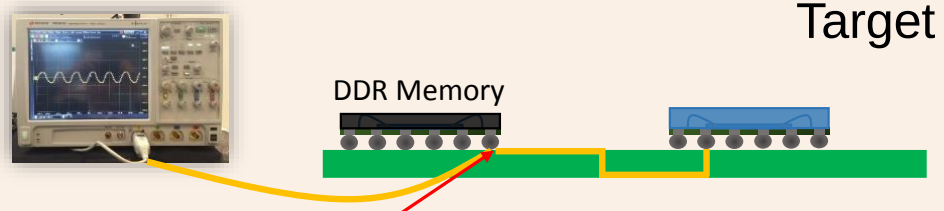


3) Blind signal measurement & data

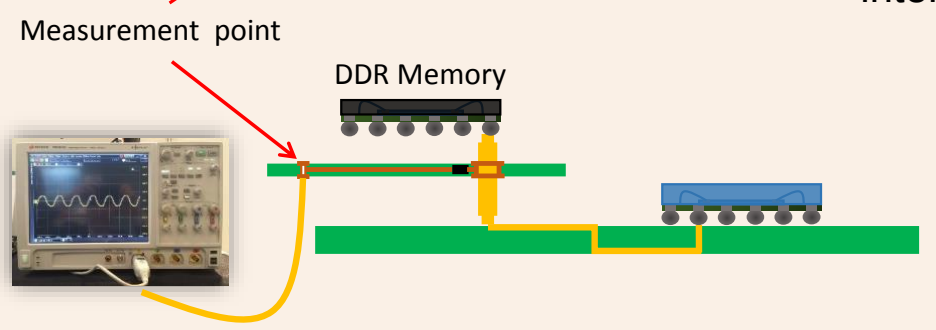


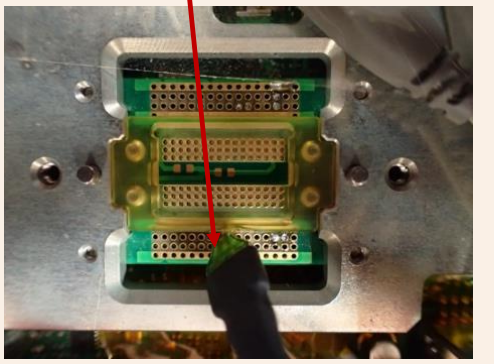
Testing procedure & method

Target is this signal waveform

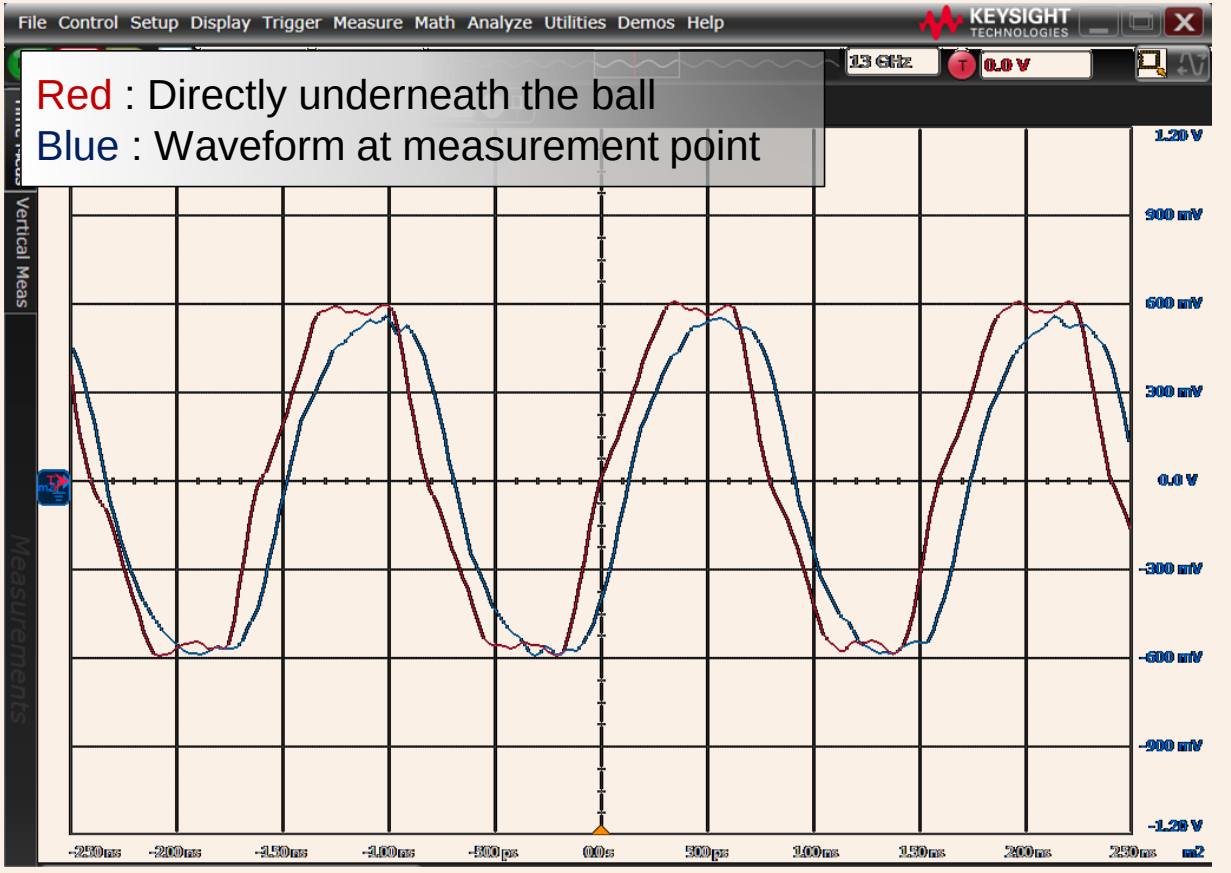


Measurement point on interposer



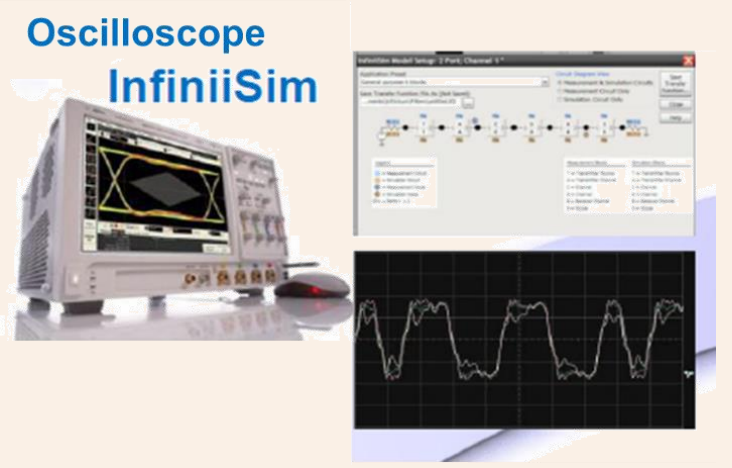


Actual DDR clock signal waveform



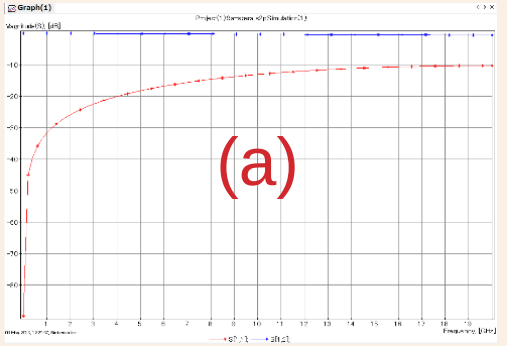
Waveform transformation

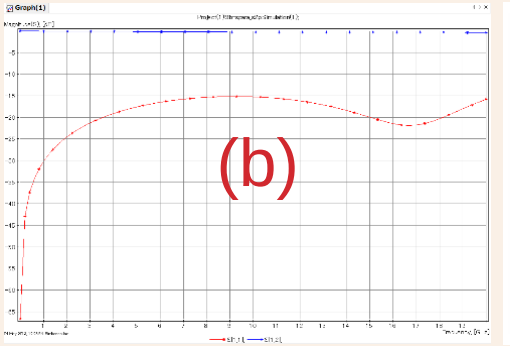
InfiniiSim by Keysight Technologies

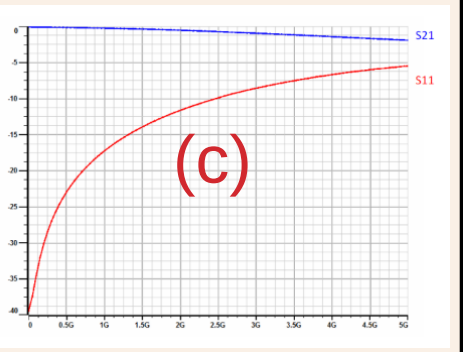


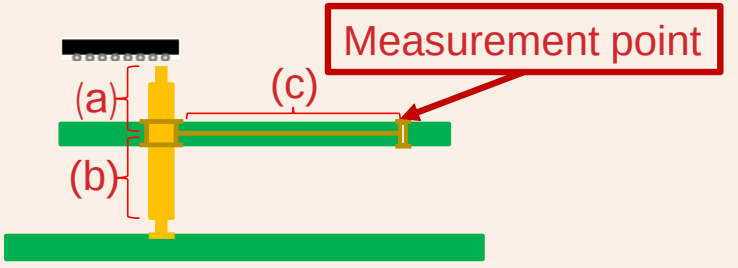
S-parameters of signal probe socket

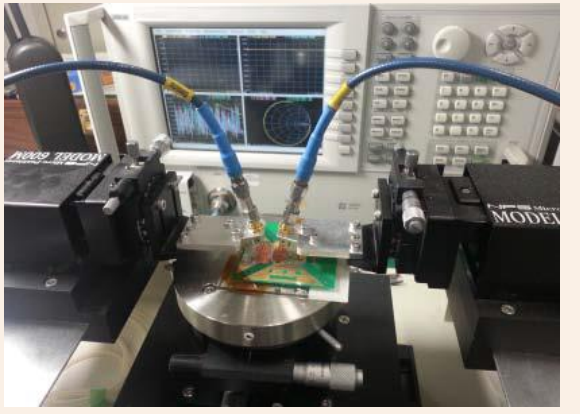
Actual S-parameter data of signal probe socket







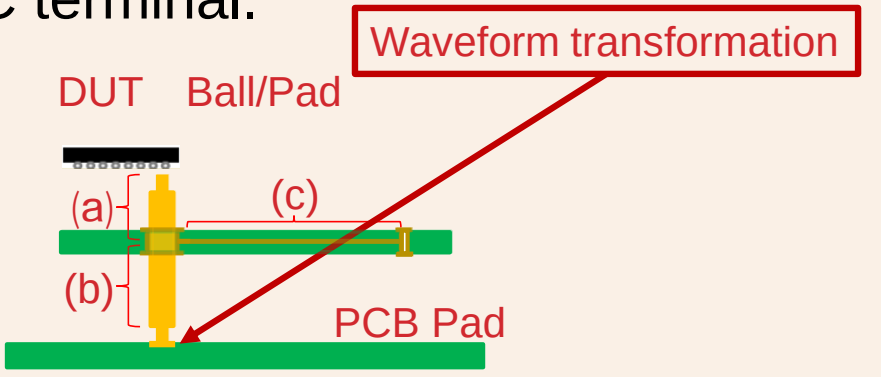




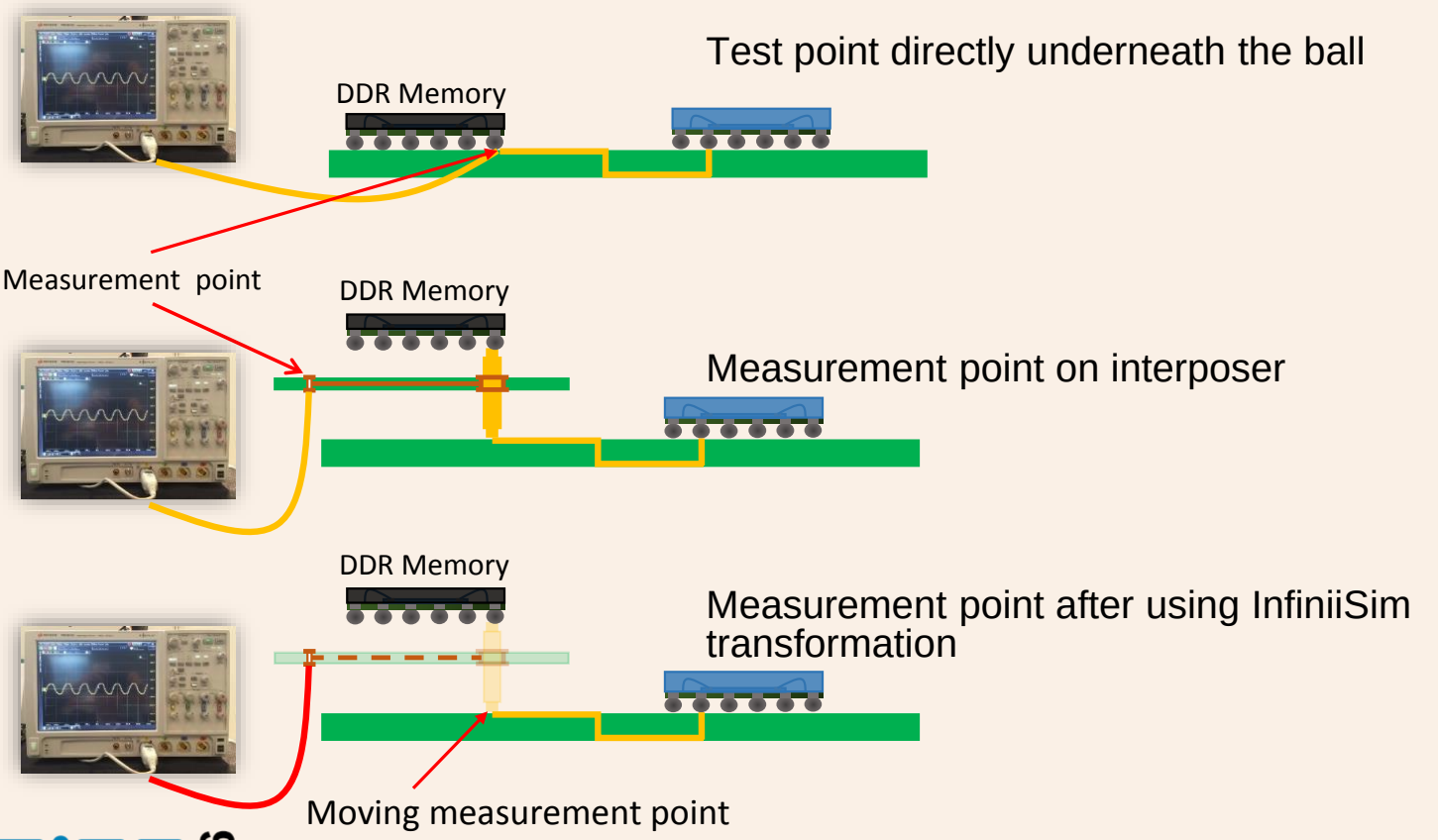
Waveform transformation

Measurement point waveform includes all S-parametric data of (a),(b) and (c)

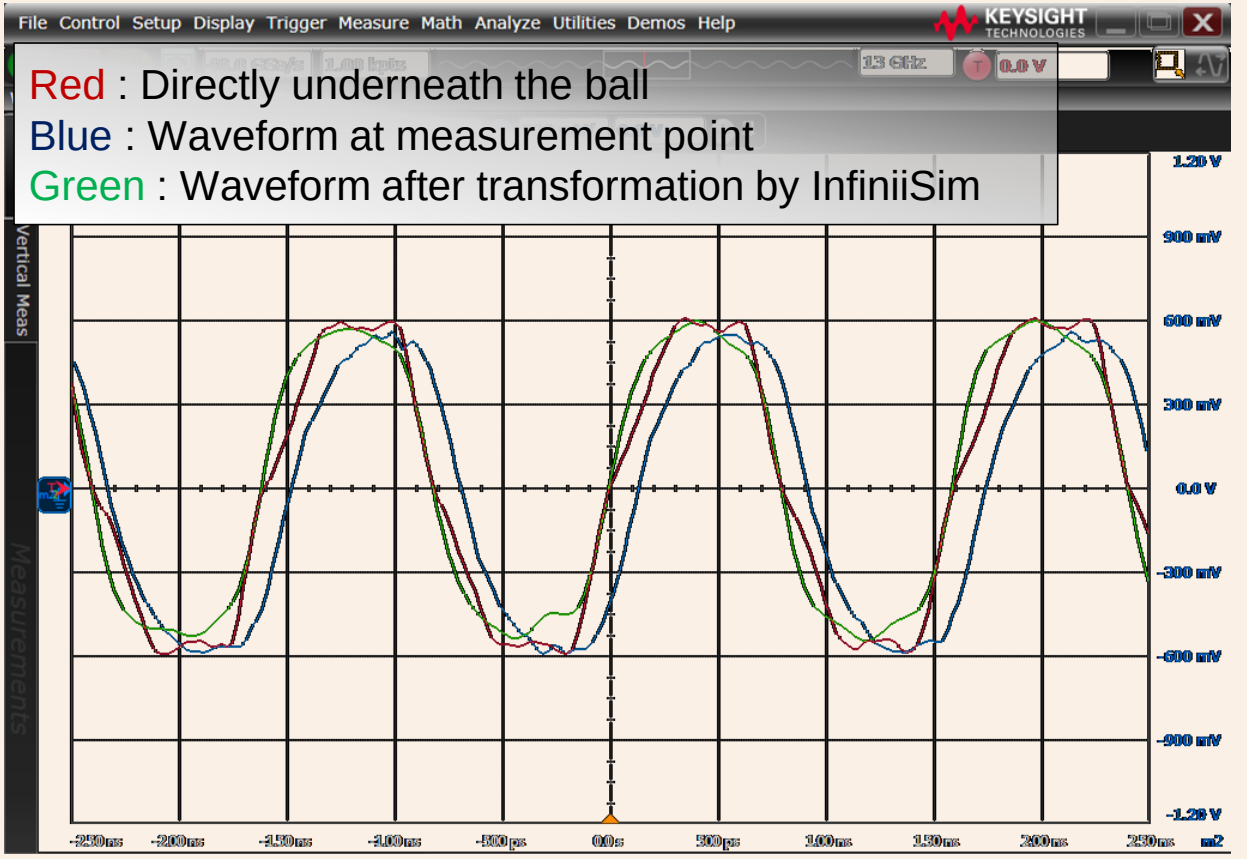
(a),(b) and (c) must be subtracted from measurement waveform to get the actual data of the IC terminal.



Testing procedure & method



DDR clock signal waveform transformed



4) Conclusion & Summary

Conclusion & Summary

1. The signal probe socket can measure blind signal waveform behind of IC package.

2. Blind signal waveform is able to reform by InfiniiSim using S-parameter data of signal probe socket.

3. It bring system engineers significant system performance information detail.

4. It is a new approach for evaluation & analysis in the world.

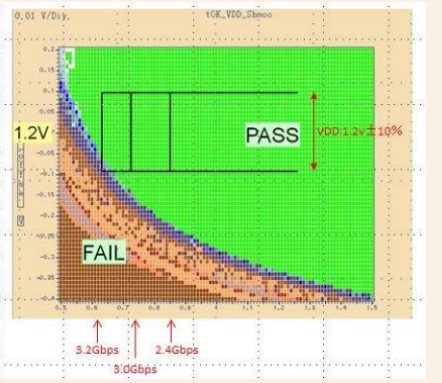
Future works

1. Support high speed **DDR4** memory

   Minimize stub

   Minimize probe length

   4.3mm ⇒2.6mm



And for 10GHz speed requirement

2. Approach **power integrity** analysis

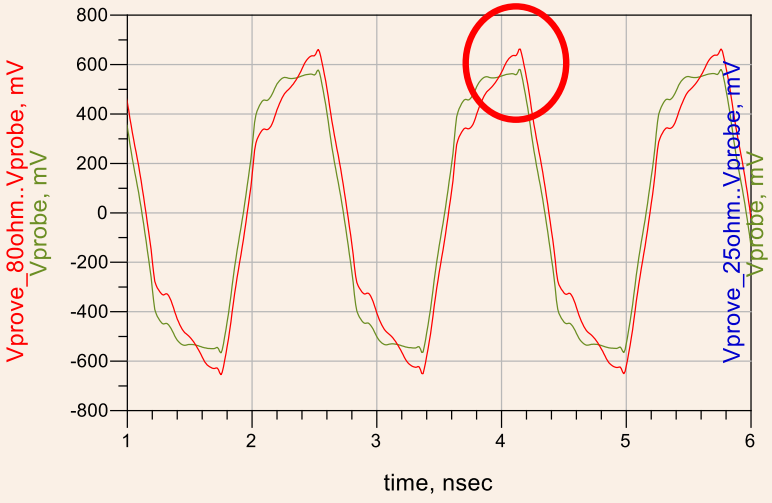
Acknowledgements

Keysight Technologies Japan

Hiroyuki Shimada（MoDech inc)

Appendix

R= 80 Ω



R= 25 Ω