



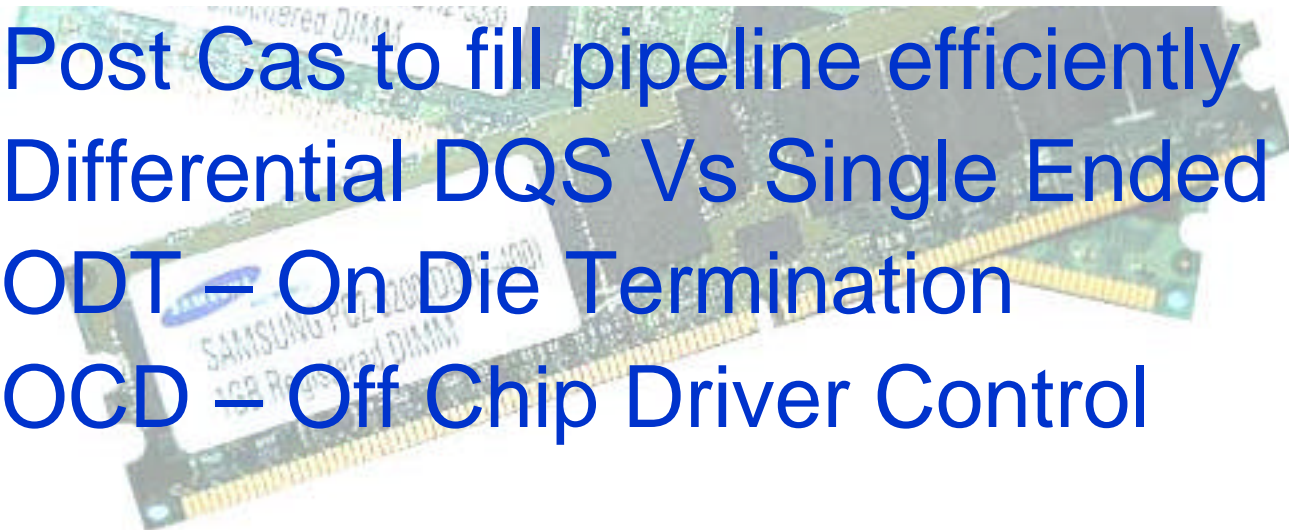
New Challenge - DDR2 Module Testing

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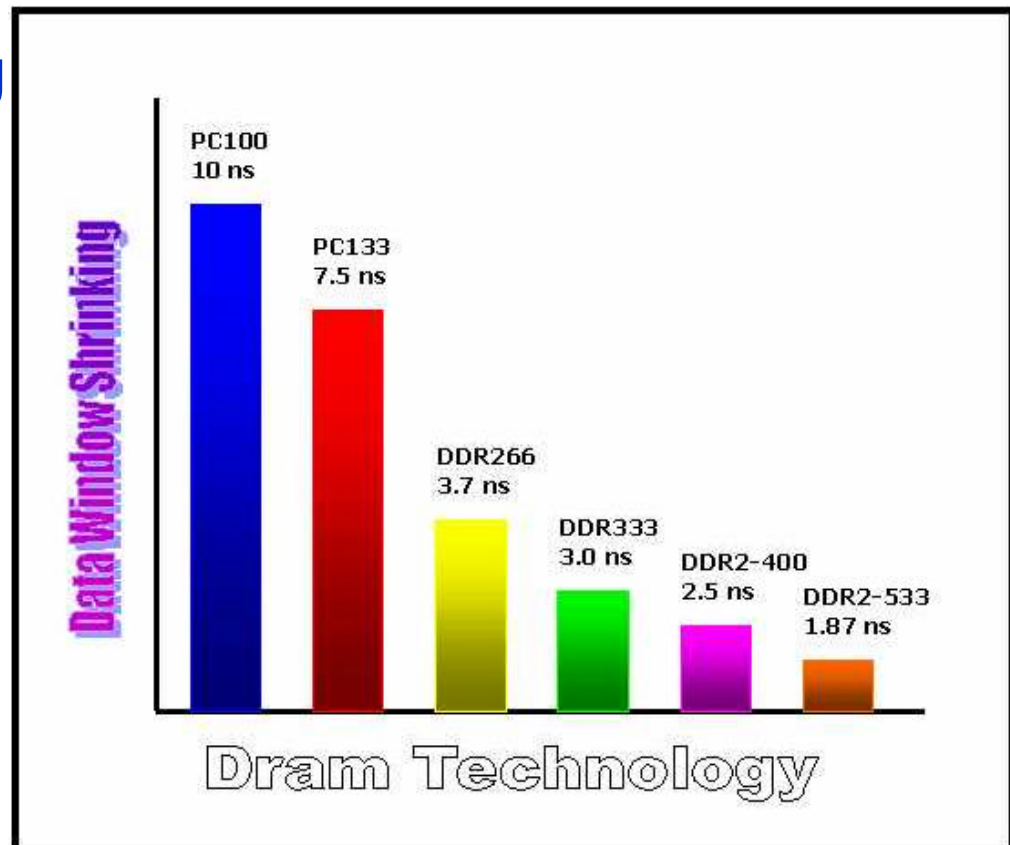
DDR2 Module Difference

- Vcc = SSTL 1.8V Vs SSTL 2.5V
- BGA package Vs TSOP
- Post Cas to fill pipeline efficiently
- Differential DQS Vs Single Ended
- ODT – On Die Termination
- OCD – Off Chip Driver Control



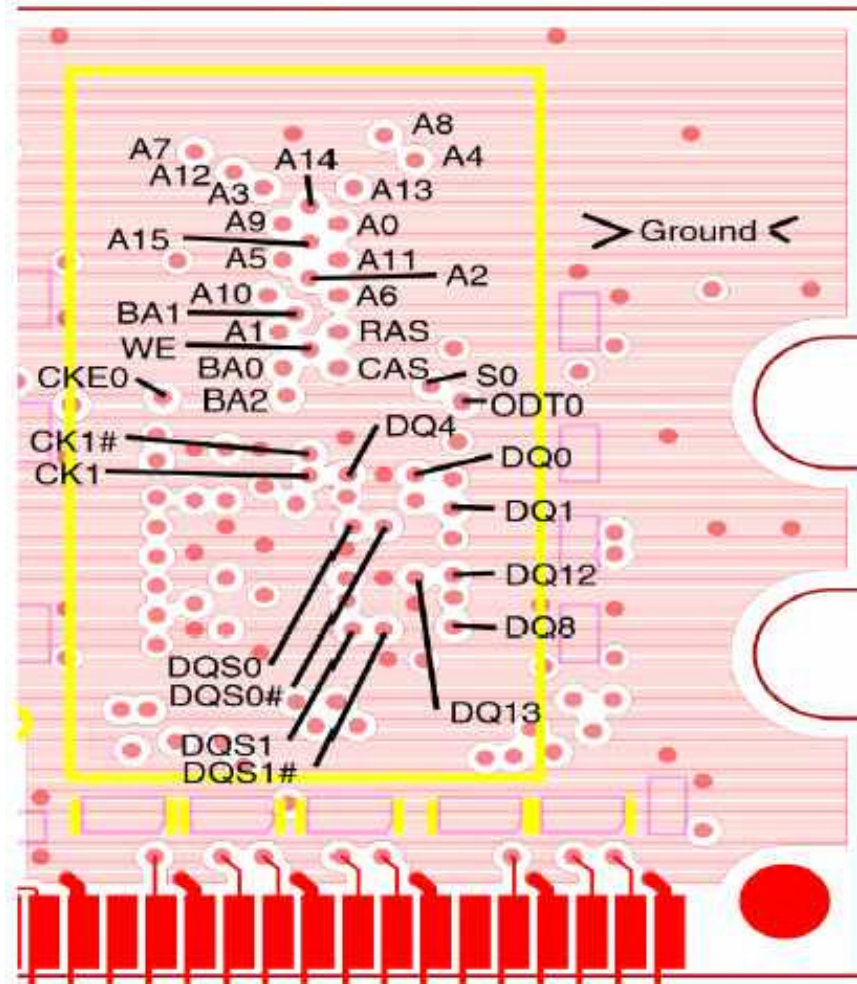
Higher Frequency, Less Margin, & Cycle Time

- Data window shrinking
- PC100 = 10ns
- PC133 = 7.5ns
- DDR 266 = 3.7ns
- DDR 333 = 3.0ns
- DDR2 400 = 2.5ns
- DDR2 533 = 1.87ns



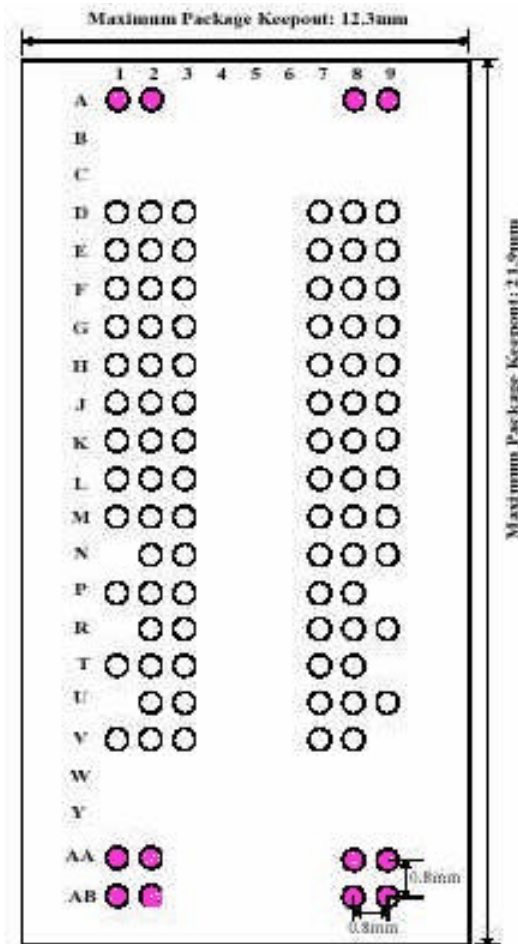
BGA Package Creates Probing Problem

- Probe points are hard to get to.



BGA Package are Creating Mechanical Problem

- Mechanical balls were added to give strength. But is it enough?



Motherboard Test No Longer Effective

- Open/Short circuit cause no POST, test cannot continue
- Short circuits might damage mother board
- Test result vary from board to board
- Hide some problem if not careful

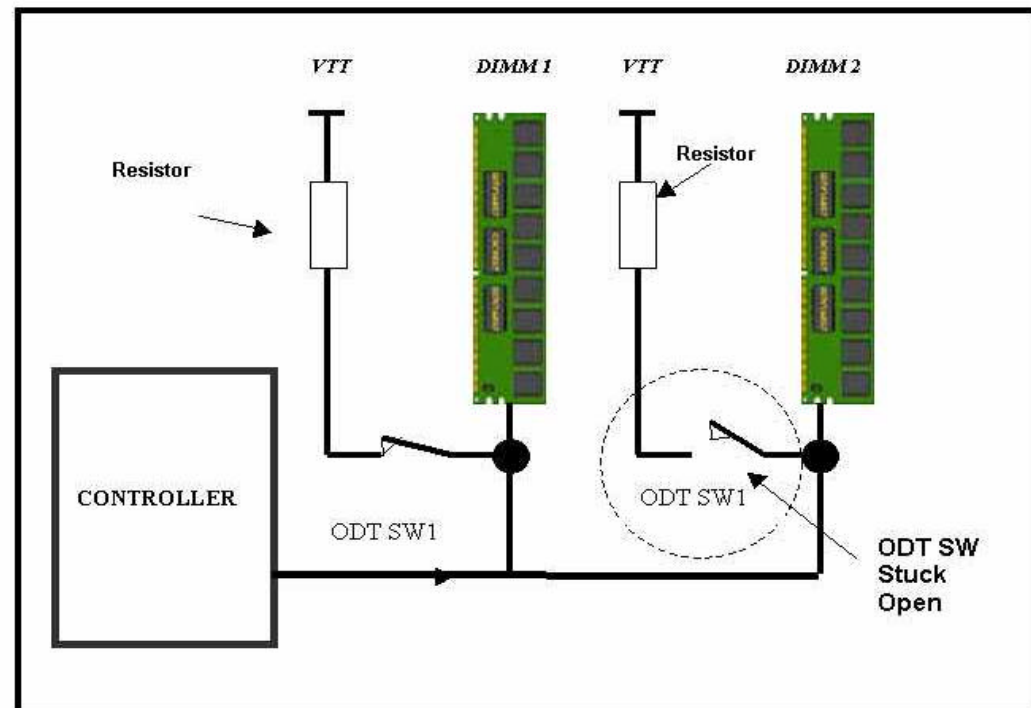
Open/short Major Issue, Low Cost Tester to Help

- Walk address test pattern to detect address problem
- Walk data test to pinpoint data line problem
- Marching test to cycle out bad cells and cross talk error
- Control line tests to ensure control line integrity.



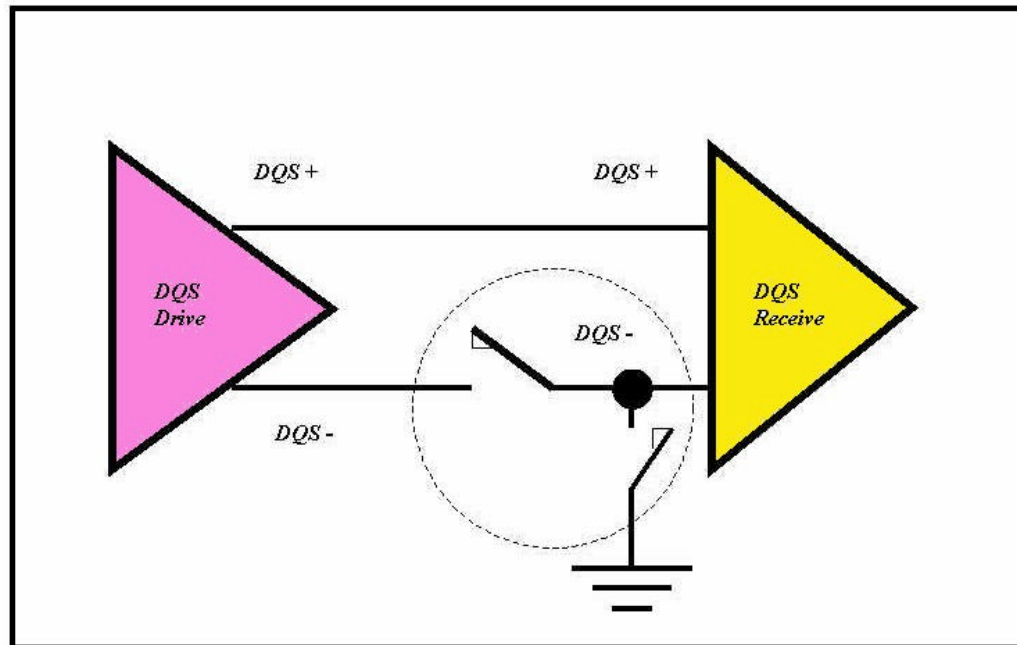
ODT Problem Not Detected on Motherboard

- Cross Vtt bias from another module might allow module to function even when ODT switch is opened.



Differential DQS Fault Not Detected

- One side of the differential DQS can be shorted to ground, module still work
- One side of differential DQS can be open, module still work.



DDR2 DIMM Test Focus - Detecting Broken Joints

- Functional test a must – detecting address and data failure
- Control line test a must – detecting CS, DM, WE, Ras, Cas line problems
- Special algorithm for testing ODT, OCD and DQS lines

The SPD Challenge

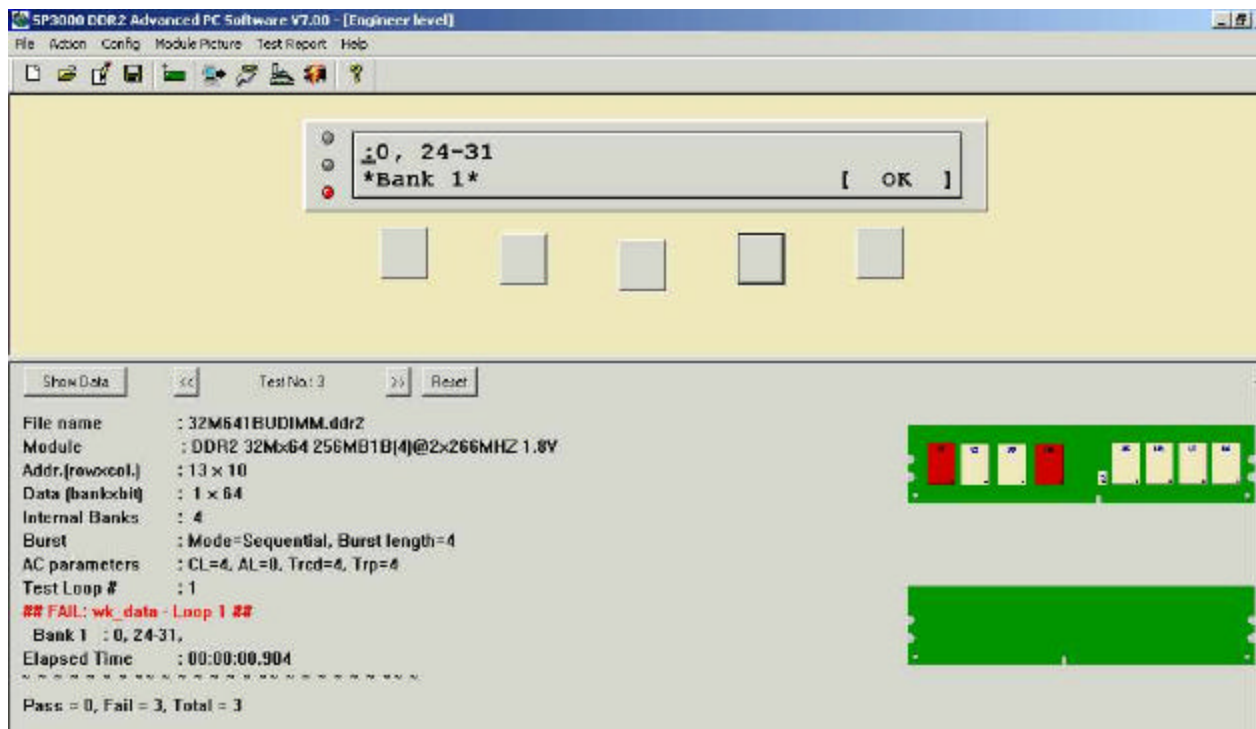
- DDR2 SPD requires SWP
- New chips has RSWP

Command	PIN			Preamble							RW
	A2	A1	A0	B7	B6	B5	B4	B3	B2	B1	B0
SET PSWP	SA2	SA1	SA0	0	1	1	0	SA2	SA1	SA0	0
SET RSWP	0	0	VHV	0	1	1	0	0	0	1	0
CLEAR RSWP	0	1	VHV	0	1	1	0	0	1	1	0

	Min	Max	Units	
VHV	7	10	V	Note: VHV-VCC > 4.8 V

Fault Focusing

- Since BGA does not allow visual inspection of joints
- Special algorithm added to pin point problem and location



Gentle Test Handling Required

- Automatic handler eliminates human error
- It utilize soft landing and output stacker.
- Automatic handler greatly reduce breakage



RoboFlex-II

END

