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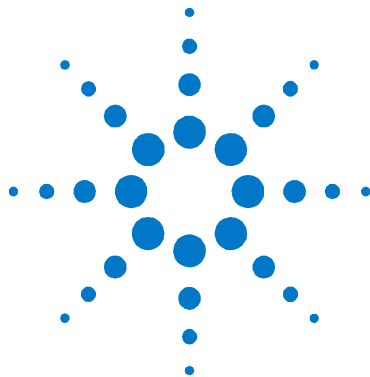
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**Agilent N4237A**

**DDR2 DRAM BGA Probe**

**User's Guide**



**Agilent Technologies**

## Notices

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### WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

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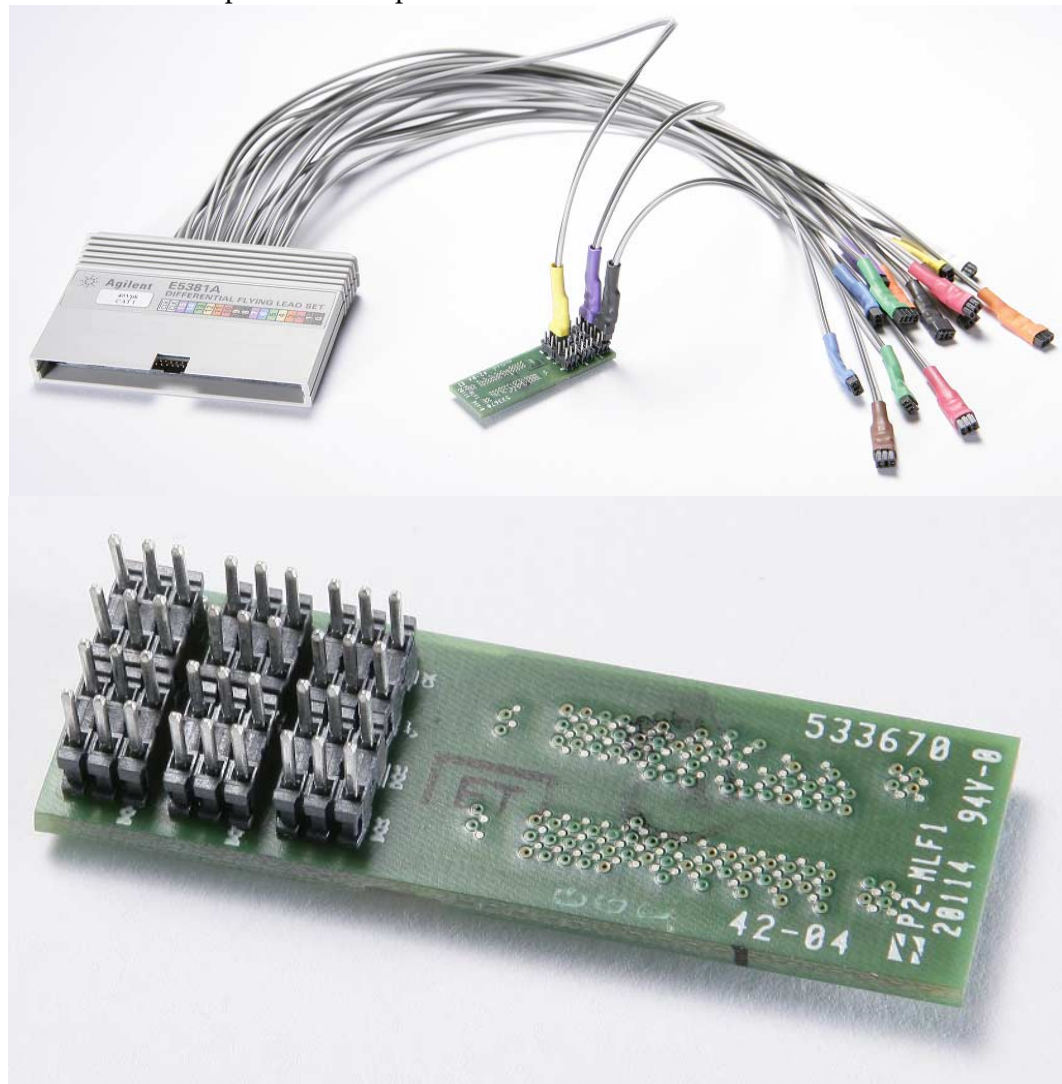
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## Introduction

This *User's Guide* provides operation and programming information for the N4237A DDR2 DRAM BGA probe. This information also applies to the N4239A probe, which comes without the flying leads. The illustrations below show the overall features and connection points for the probe:



## N4237A DDR2 DRAM BGA Probe Description

The N4237A DDR2 DRAM BGA probe enables logic analyzer state and timing measurements of the DQ, DQS, and clock signals of x4 and x8 DRAMs using the JEDEC standard common DDR2 DRAM footprint. The N4237A probe interposes between the DRAM being probed and the PC board where the DRAM would normally be soldered. It is designed to be soldered to the PCB footprint for the DRAM and the DRAM being probed is then soldered to the top side of the probe. Each DRAM signal in the common footprint (including those defined for x16 DRAMS) passes directly from the bottom side of the probe to the top side of the probe. Buried probe resistors placed at the DRAM balls connect the probed signals to 0.050" headers designed to mate with Agilent E5381A differential flying lead probes. These resistors minimize capacitive loading on the DRAM signals and allow high speed operation.

The 0.050" headers on the N4237A probe are also compatible with the Agilent InfiniMax oscilloscope probes. This allows low load scope probing of the DRAM signals.

### Fixture Technical Feature Summary

- Probing of DDR2 x4 and x8 DRAMS in BGA package using JEDEC standard common BGA footprint.
- Logic analyzer (using E5381A differential flying leads) and oscilloscope (using InfiniMax socketed probe head) connection to DQ0-7, DQS, DQS#, and CK/CK# signals.
- Pass through of all signals for x16 support x16 operation while probing the lower-byte signals.
- Differential or single ended probing of DQS and CLK signals.
- Interposer design probes signals between DRAM BGA balls and DIMM.
- Probe height profile avoids interference with decoupling capacitors on top of FB-DIMM boards.
- Use of separate flying lead probes for connection to the logic analyzer optimizes use of analyzer channels by allowing assignment of analyzer channels to 4 or 8 bits on each DRAM.
- Tin plating of the DRAM footprint on the top side of the probe is compatible with leaded and no-lead DRAM balls.

## **Equipment Supplied**

### **N4237A**

The following components have been shipped with your N4237A fixture:

- Nine N4237-66401 DDR2 DRAM BGA probes
- E5381A-61601 differential flying lead probe set
- This *User's Guide*

### **N4239A**

The following components have been shipped with your N4239A fixture:

- Nine N4237-66401 DDR2 DRAM BGA probes
- This *User's Guide*

Part numbers are subject to change without notice.

## DDR2 DRAM BGA probe Operation

### Installing the Probe

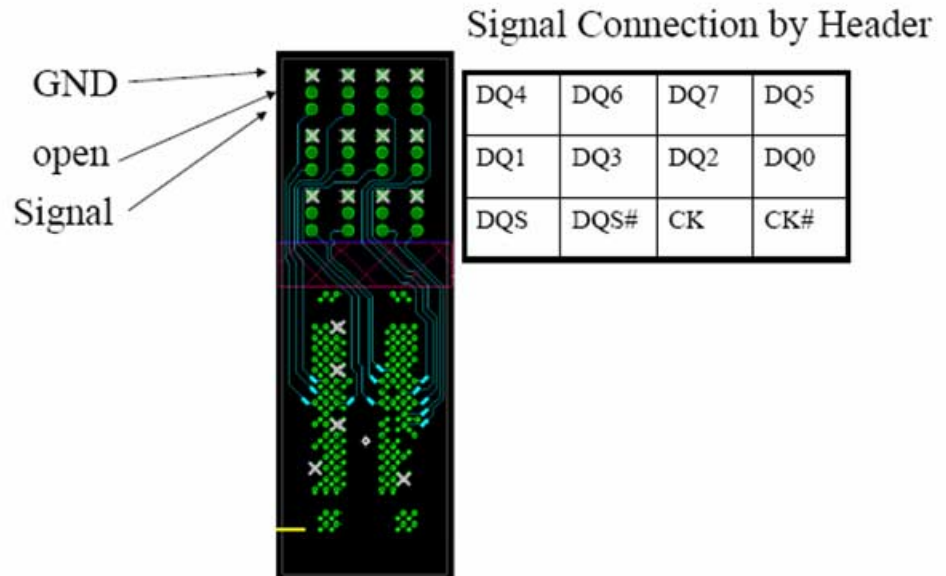
The N4237A probe is installed by soldering it to the BGA footprint on a PC Board where the DRAM would normally be soldered. The DRAM to be probed may then be soldered to the top side of the probe. The bottom side of the N4237A has lead-free solder balls that correspond to the solder balls on a normal DRAM. Therefore, lead-free temperature profiles must be used to solder the probe. This soldering is usually done at a BGA rework station. Due to wide variations in the type of rework stations a standard procedure cannot be defined. However, some general guidelines can be given:

- The center of gravity of the probe is not the same as it is for a DRAM (which is usually the center of the package). This is due to the location and weight of the headers that connect to the logic analyzer or scope. When soldering the probe, it is usually necessary to support the top end of the probe (under the headers) to keep the probe flat against the surface of the DIMM. This may be as simple as a small piece of 50 mil PCB placed under the headers.
- When soldering the DRAM onto the probe the temperature may need to rise to the point where the solder balls under the probe soften. A means of holding the probe in place when soldering the DRAM may be necessary.
- Normal surface cleaning and preparation procedures for BGA soldering are recommended.



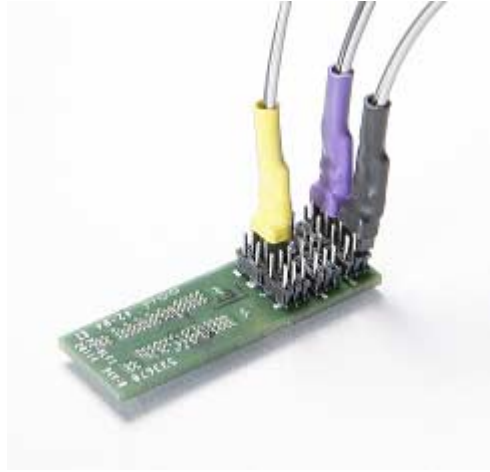
### Connecting test equipment to the N4237A probe

Twelve 0.050" headers are provided on the N4237A to allow connection to a logic analyzer or oscilloscope probe. One header is provided for each of the following signals: DQ[0:7], DQS, DQS#, CLK, CLK#. The layout of these headers is shown below (top view):



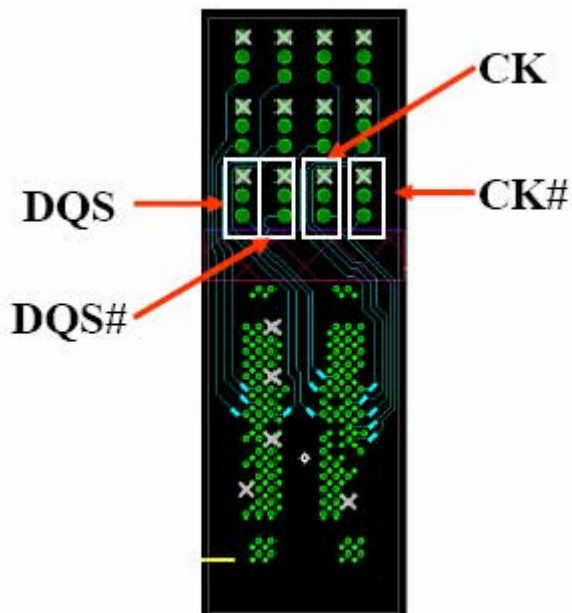
## Logic Analyzer connection to the N4237A

The E5381A differential flying lead set supplied with the N4237A is used to connect the probe to the logic analyzer. The E5281A plugs into any desired logic analyzer pod cable, and the flying leads plug into the N4237A headers as shown below:

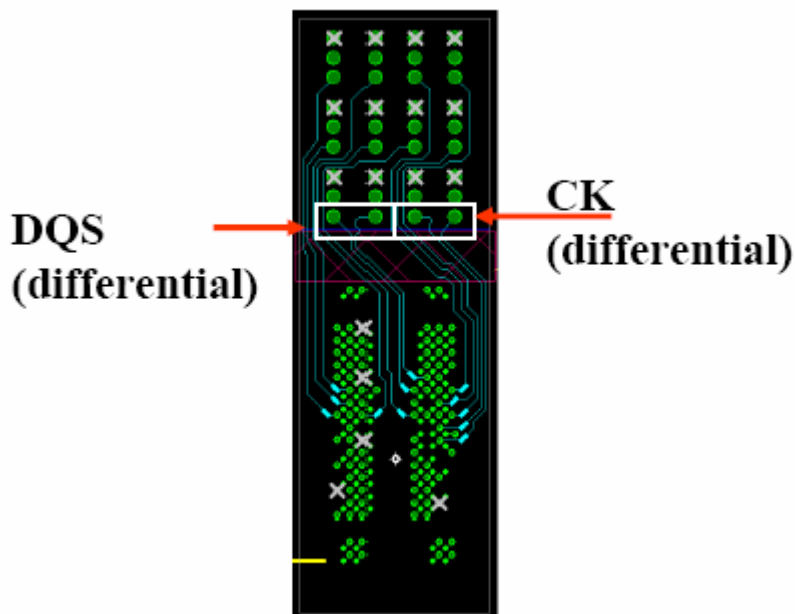


When plugging into adjacent headers on the N4237A the heat shrink tubing sleeves around the connector body at the end of each differential flying lead may force a tight fit. If this occurs, the portion of the sleeve around the connector body may be trimmed. This will allow connection to adjacent headers without interference. Be sure to not trim away the heat shrink tubing from the flying lead area above the actual connector body.

Note that the orientation of the DQS/DQS# and CLK/CLK# headers is such that these signals can be probed differentially or as a pair of single ended signals. To probe these signals as single ended pairs, the scope or logic analyzer probe should be plugged into the probe as shown in the diagram below:



To probe differentially, plug the logic analyzer or scope leads as shown below:



## Logic Analyzer configuration file setup with the N4237A

Because the mapping of specific RAM signals on specific DRAMS to each logic analyzer channel depends on which DRAMS on a DIMM are probed and how the flying leads are arranged when connecting to the N4237A, there is no single logic analyzer configuration file setup. For example, when probing x4 DRAMS, only four analyzer channels will be connected to each DRAM. The logic analyzer Buses/Signals setup dialog will allow you to assign descriptive labels to each analyzer channel that associate each channel with the particular DRAM and DRAM signal being probed.

## Characteristics, Regulatory, and Safety Information

### Operating Characteristics

The following operating characteristics are not specifications, but are typical operating characteristics for the analysis probe with interposer.

**Table 1** Environmental Characteristics (Operating)

<b>Temperature</b>	20° to + 30° C (+68° to +86° F)
<b>Altitude</b>	4,600 m (15,000 ft)
<b>Humidity</b>	Up to 50% noncondensing. Avoid sudden, extreme temperature changes which could cause condensation on the circuit board. For indoor use only.

**Table 2** Inputs and Outputs

<b>To probe</b>	Memory bus signals from target system
<b>From probe</b>	High-density connectors for an Agilent 16700- or 16900-series logic analysis system.

### Safety Notices

This apparatus has been designed and tested in accordance with IEC Publication 1010, Safety Requirements for Measuring Apparatus, and has been supplied in a safe condition. Before applying power, verify that the correct safety precautions are taken (see the following warnings). In addition, note the external markings on the instrument that are described under "Safety Symbols."

### Warnings

Use only the recommended power supply.

## Safety Notices

If you energize this instrument by an auto transformer (for voltage reduction or mains isolation), the common terminal must be connected to the earth terminal of the power source.

Whenever it is likely that the ground protection is impaired, you must make the instrument inoperative and secure it against any unintended operation.

Service instructions are for trained service personnel. To avoid dangerous electric shock, do not perform any service unless qualified to do so. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

Do not install substitute parts or perform any unauthorized modification to the instrument.

Capacitors inside the instrument may retain a charge even if the instrument is disconnected from its source of supply.

Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Do not use the instrument in a manner not specified by the manufacturer.

## To clean the instrument

Do not attempt to clean this product.

## Safety Symbols



Instruction manual symbol: the product is marked with this symbol when it is necessary for you to refer to the instruction manual in order to protect against damage to the product.



Hazardous voltage symbol.



Earth terminal symbol: Used to indicate a circuit common connected to grounded chassis.



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