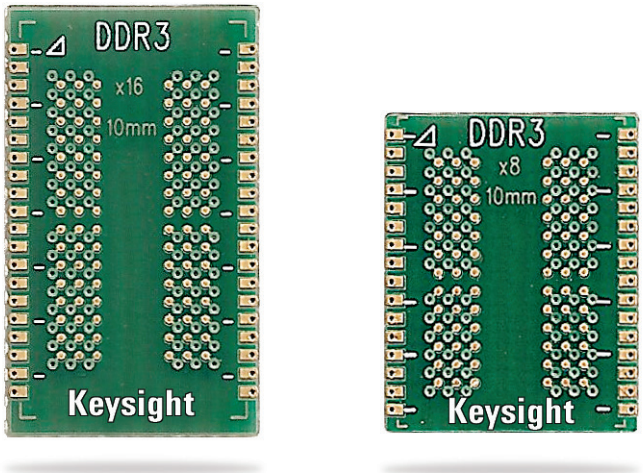
Keysight Technologies

W2635A and W2636A DDR3 BGA Probe Adapter for Infiniium Oscilloscopes

Superior probing for DDR3 compliance test and debug

Data Sheet



KEYSIGHT TECHNOLOGIES

The Keysight Technologies, Inc. W2635A and W2636A DDR3 BGA probe adapters provide signal access to the clock, strobe, data, address and command signals of the DDR3 BGA package for making electrical and timing measurements with an Infiniium oscilloscope. The DDR3 JEDEC[1] specification (JESD79-3C) is defined at the DRAM ballout, and the ballout is difficult to access. The BGA probe adapter provides direct signal access to the BGA package for true compliance testing.

The W2635A and W2636A DDR3 BGA probe adapters are soldered in between the DRAM and PC board or DIMM raw card where the DRAM would normally be soldered. They are designed with the PCB or DIMM footprint on the bottom side and the DRAM footprint on the top side. The BGA adapter passes the signals from the memory controller chip and DRAM directly to the top side of the BGA probe adapter where they can be accessed with oscilloscope probes.

Buried resistors placed at the signals inside the BGA probe adapter connect the probed signals to solder pads designed to work with Keysight InfiniiMax E2677A, N5381A, N5425A, and N5426A differential solder-in probe heads. These resistors isolate the DDR3 signal and the probe loading effect. This design minimizes capacitive loading of the probe heads and allows high-speed operation without impact on signal integrity.

Probing at the right location is also an important consideration for DDR3 measurement. Many designs have vias or designed-in probe points, but they do not always produce good signal integrity. Probing at the wrong location could cause signal reflection, resulting in non-monotonic edges. This will cause error in your tests such as slew rate, setup and hold time measurements.

When used with Keysight's U7231A DDR3 compliance test application, the BGA adapter provides a fast and easy way to test, debug and characterize your DDR3 designs. The tests covered by the U7231A software are based on the JEDEC (JESD79-3C) DDR3 SDRAM Specification. The test application offers a user-friendly setup wizard and a comprehensive report that includes margin analysis.

1 The JEDEC (Joint Electronic Device Engineering Council) Solid State Technology Association is a semiconductor engineering standardization body of the Electronic Industries Alliance (EIA), a trade association that represents all areas of the electronic industry.

Superior probing for DDR3 compliance test and debug

Features

- Provides signal access points for DDR3 DRAM x4, x8 and x16 packages using JEDEC-standard common BGA footprints to the oscilloscope
- 10-mm and 11-mm BGA probe adapter widths for different spacing requirement between the DRAM placements on the PCB or DIMM
- Buried resistors provide signal isolation and minimize capacitive loading
- Probing compatibility with InfiniiMax probe, which includes E2677A, N5381A, and N5425A/ N5426A differential solder-in probe heads

Installing the DDR3 BGA probe adapter

The W2635A and W2636A DDR3 BGA probe adapter is installed by soldering it to the BGA footprint on the PC board or DIMM card where the DRAM normally would be soldered. Then you can solder the DDR3 DRAM to the top side of the BGA probe adapter. These attachment steps may occur in any order.

The probe is designed to tolerate lead-free soldering temperature profiles. However, we recommend you apply the minimum temperature required for soldering and you use the minimum number of heating and cooling cycles to reduce risk of any damage to the probe. The probe is supplied without solder balls attached. Depending on the exact attachment order, you may prefer to use either leaded or lead-free solder to attach the BGA probe adapter.

We recommend you attach the BGA probe during the manufacturing process. For designs that are manufactured, it will require expertise to attach the BGA probe adapter. If you lack the in-house expertise to attach the BGA probe adapter, you may wish to work with a contract manufacturer with this expertise that may be willing to perform the attachment for a fee. You can find more information on BGA soldering and rework techniques that may be useful in attaching the probe at:

http://www.circuitrework.com/guides/9-0.shtm
http://www.keysight.com/find/ddr3bga-scope

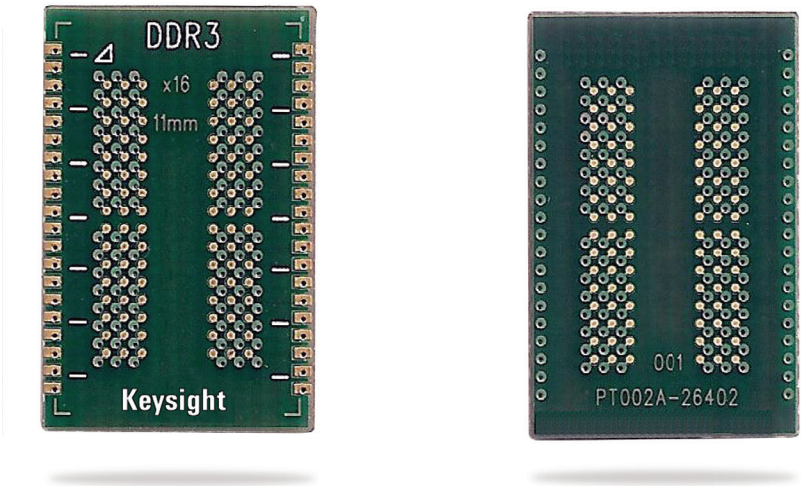


Figure 1. The diagram above shows the top (left) and bottom (right) view of the W2636A DDR3 BGA probe adapter. The top side shows the footprint for DDR3 DRAM and the bottom side shows the footprint for a PC board or DIMM card.

Superior probing for DDR3 compliance test and debug, continued

Installing the InfiniiMax probe

You can use the DDR3 BGA probe adapter with various InfiniiMax solder-in probes. Instructions that come with the InfiniiMax probe provide details on the proper soldering procedures for the InfiniiMax probe heads.

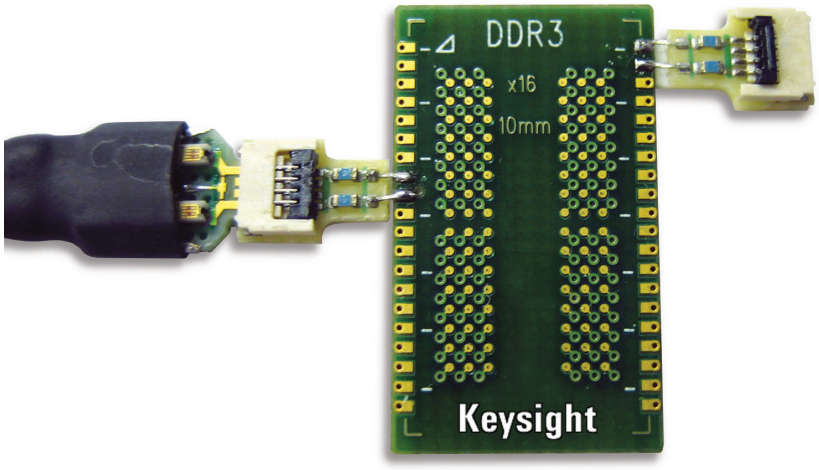


Figure 2. The picture above shows the InfiniiMax N5425A and N5426A ZIF probe head connected to the W2636A DDR3 BGA probe adapter.

DDR3 BGA probe adapters dimensions, pad numbering and location

W2635A-010 dimensions, pad numbering and location	
Size	Height = 13.97 mm (0.550 in) Width = 11.176 mm (0.440 in) Thickness = 1.575 mm (0.062 in)
Brings 20 signals to SMT pads for probing	
Provides 12 GND pads (6 on either side of DDR3 BGA probe adapter)	
75-ohm buried tip resistor	

Pin #	Signal
1	GND
2	LDQS
3	LDQS#
4	GND
5	RAS
6	CAS
7	GND
8	ODT
9	CS0
10	GND
11	CS1
12	WE
13	GND
14	BA0
15	BA2
16	GND

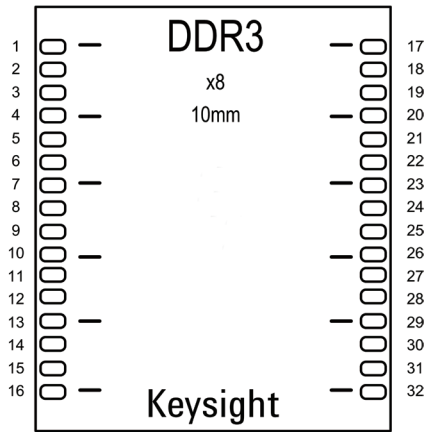


Table 1. W2635A-010 pad numbering

Signal	Pin #
GND	17
DQ1	18
DQ3	19
GND	20
DQ7	21
DQ5	22
GND	23
CK	24
CK#	25
GND	26
CKE	27
A10	28
GND	29
BA1	30
A12	31
GND	32

DDR3 BGA probe adapters dimensions, pad numbering and location, continued

W2635A-011 dimensions, pad numbering and location	
Size	Height = 13.97 mm (0.550 in) Width = 12.192 mm (0.480 in) Thickness = 1.575 mm (0.062 in)
Brings 20 signals to SMT pads for probing	
Provides 12 GND pads (6 on either side of DDR3 BGA probe adapter)	
75-ohm buried tip resistor	

Pin #	Signal
1	GND
2	LDQS
3	LDQS#
4	GND
5	RAS
6	CAS
7	GND
8	ODT
9	CS0
10	GND
11	CS1
12	WE
13	GND
14	BA0
15	BA2
16	GND

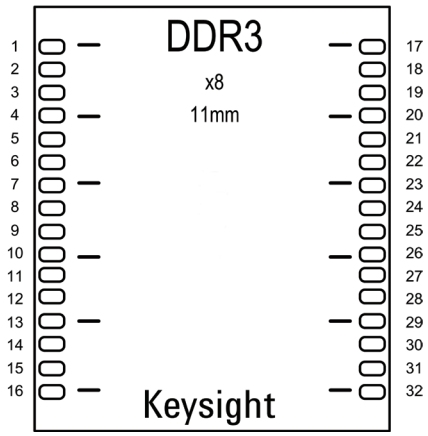


Table 2. W2635A-011 pad numbering

Signal	Pin #
GND	17
DQ1	18
DQ3	19
GND	20
DQ7	21
DQ5	22
GND	23
CK	24
CK#	25
GND	26
CKE	27
A10	28
GND	29
BA1	30
A12	31
GND	32

DDR3 BGA probe adapters dimensions, pad numbering and location, continued

W2636A-010 dimensions, pad numbering and location	
Size	Height = 19.05 mm (0.750 in) Width = 11.176 mm (0.440 in) Thickness = 1.575 mm (0.062 in)
Brings 26 signals to SMT pads for probing	
Provides 14 GND pads (7 on either side of DDR3 BGA probe adapter)	
75-ohm buried tip resistor	

Pin #	Signal
1	GND
2	DQ13
3	DQ9
4	GND
5	DQ0
6	LDQS
7	GND
8	LDQS#
9	RAS
10	GND
11	CAS
12	ODT
13	GND
14	CS0
15	CS1
16	GND
17	WE
18	BA0
19	GND
20	BA2

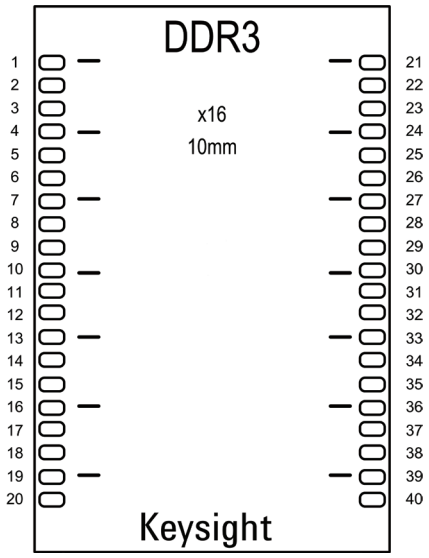


Table 3. W2636A-010 pad numbering

Signal	Pin #
GND	21
DQ12	22
DQ14	23
GND	24
UDQS#	25
UDQS	26
GND	27
DQ3	28
DQ5	29
GND	30
CK	31
CK#	32
GND	33
CKE	34
A10	35
GND	36
BA1	37
A12	38
GND	39
A11	40

DDR3 BGA probe adapters dimensions, pad numbering and location, continued

W2636A-011 dimensions, pad numbering and location	
Size	Height = 19.05 mm (0.750 in) Width = 12.192 mm (0.480 in) Thickness = 1.575 mm (0.062 in)
Brings 26 signals to SMT pads for probing	
Provides 14 GND pads (7 on either side of DDR3 BGA probe adapter)	
75-ohm buried tip resistor	

Pin #	Signal
1	GND
2	DQ13
3	DQ9
4	GND
5	DQ0
6	LDQS
7	GND
8	LDQS#
9	RAS
10	GND
11	CAS
12	ODT
13	GND
14	CS0
15	CS1
16	GND
17	WE
18	BA0
19	GND
20	BA2

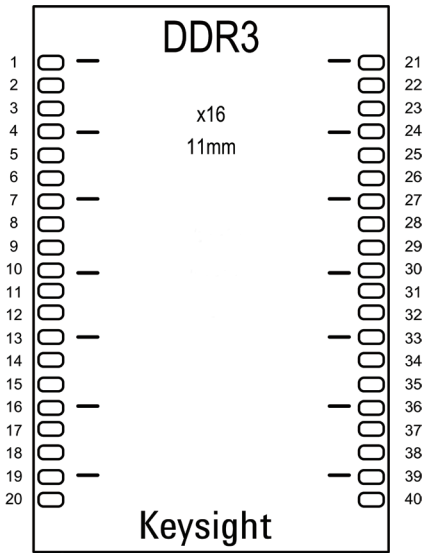


Table 4. W2636A-011 pad numbering

Signal	Pin #
GND	21
DQ12	22
DQ14	23
GND	24
UDQS#	25
UDQS	26
GND	27
DQ3	28
DQ5	29
GND	30
CK	31
CK#	32
GND	33
CKE	34
A10	35
GND	36
BA1	37
A12	38
GND	39
A11	40

Ordering information

DDR3 BGA probe adapter model numbers and options. Each model comes with a kit of 10 BGA probe adapters.

Model number	Description
W2635A-010	x8, 10 mm width DDR3 BGA probe adapter for x4 and x8 DRAM package
W2635A-011	x8, 11 mm width DDR3 BGA probe adapter for x4 and x8 DRAM package
W2636A-010	x16, 10 mm width DDR3 BGA probe adapter for x16 DRAM package
W2636A-011	x16, 11 mm width DDR3 BGA probe adapter for x16 DRAM package

Infiniium oscilloscope and InfiniiMax oscilloscope probe amplifiers and probe heads that are recommended for use with the DDR3 BGA probe adapters

Product	Description
9000 Series	
9404A	4-GHz 4-channels 10 GSa/s Infiniium scope
90000 Series	
90404A	4-GHz, 4 channels Infiniium scope
90604A	6-GHz, 4 channels Infiniium scope
90804A	8-GHz, 4 channels Infiniium scope
91204A	12-GHz, 4 channels Infiniium scope
91304A	13-GHz, 4 channels Infiniium scope
90000 X-Series	
X91604A	16-GHz, 4 channel Infiniium scope
X92004A	20-GHz, 4 channel Infiniium scope
X92504A	25-GHz, 4 channels Infiniium scope
X92804A	28-GHz, 4 channels Infiniium scope
X93204A	32-GHz, 4 channels Infiniium scope

Ordering information Continued

Probe accessories

InfiniiMax probe amplifiers

Model number	Description
1169A	12-GHz differential probe amplifier
1168A	10-GHz differential probe amplifier
1134A	7-GHz differential probe amplifier
1132A	5-GHz differential probe amplifier
1131A	3.5-GHz differential probe amplifier

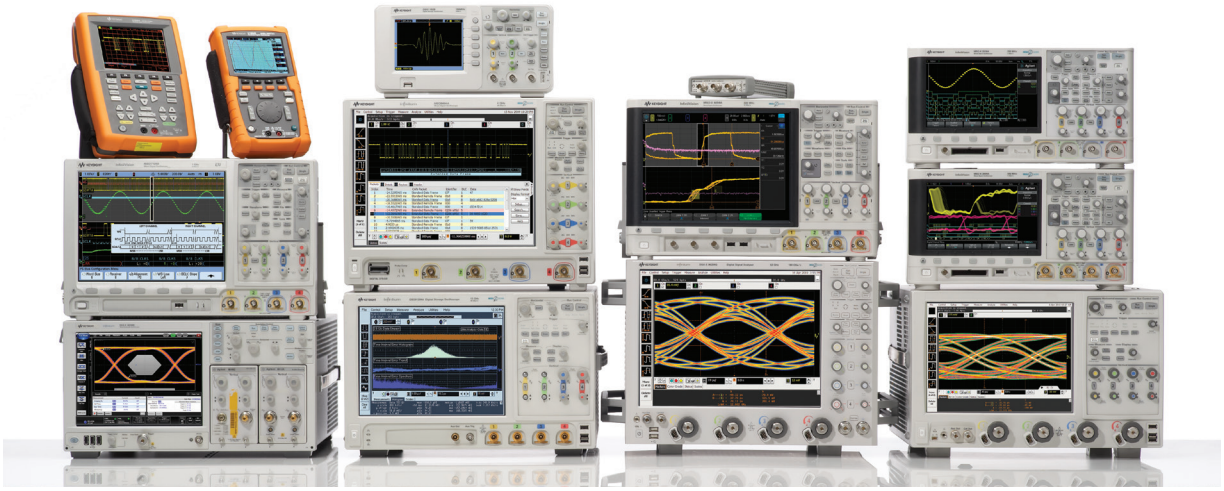
InfiniiMax probe heads

Model number	Description
N5381A	InfiniiMax II 12-GHz differential solder-in probe head and accessories
N5382A	InfiniiMax II 12-GHz differential browser
E2677A	InfiniiMax 12-GHz differential solder-in probe head and accessories
N5425A	InfiniiMax 12-GHz ZIF probe head
N5426A	InfiniiMax ZIF tips (x10) (requires both N5425A and N5426A)
N5451A	InfiniiMax differential long wire ZIF tip (x10) (requires both N5425A and N5451A)

Related literature

Publication title	Publication type	Publication number
Infiniium 90000 Series Oscilloscopes and InfiniiMax Series Probes	Data sheet	5989-7819EN
Infiniium 90000X-Series Oscilloscopes	Data sheet	5990-5271EN
Keysight InfiniiScan Event Identification Software for Infiniium Series Oscilloscopes (N5414A and 5415A)	Data sheet	5989-4605EN
Keysight Technologies E2688A, N5384A High-Speed Serial Data Analysis and Clock Recovery Software for Infiniium Series Oscilloscopes	Data sheet	5989-0108EN
Keysight Technologies EZJIT and EZJIT Plus Jitter Analysis Software for Infiniium Series Oscilloscopes	Data sheet	5989-0109EN
A Time-Saving Method for Analyzing Signal Integrity in DDR Memory Buses	Application note	5989-6664EN

To download copies of these publications go to www.keysight.com/find/ddr3bga-scope



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Published in USA, August 3, 2014
5989-7643EN
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