Installation Guide

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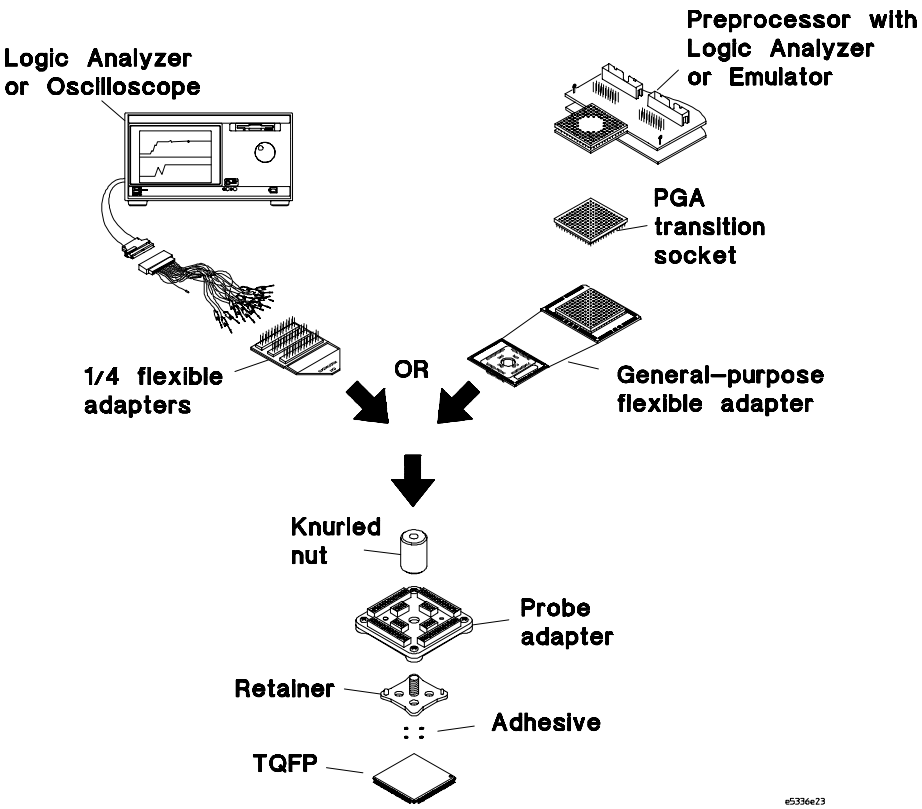
Elastomeric Probe Adapter for the 144-pin 0.5mm TQFP

Installation at a Glance



This Installation Guide explains how to use Hewlett-Packard's advanced probing system for 0.5 mm pitch Thin Quad Flat Pack (TQFP) surface-mounted integrated circuits. This probing system provides a quick and reliable connection from these devices to Hewlett-Packard oscilloscopes, logic analyzers, and emulators.

This information also explains how to use optional flexible adapter cables that will enhance the adapter's use in particular probing situations. Drawings are included to help you in laying out printed circuit boards with the proper component spacing to allow correct use of the probe adapter.

In This Book

This manual is organized in three chapters.

Chapter 1 contains the procedure for installing the probe adapter onto your TQFP.

Chapter 2 contains the instructions for installing optional flexible adapters.

Chapter 3 contains reference information such as retainer and adhesive removal, and replaceable or additional parts list.

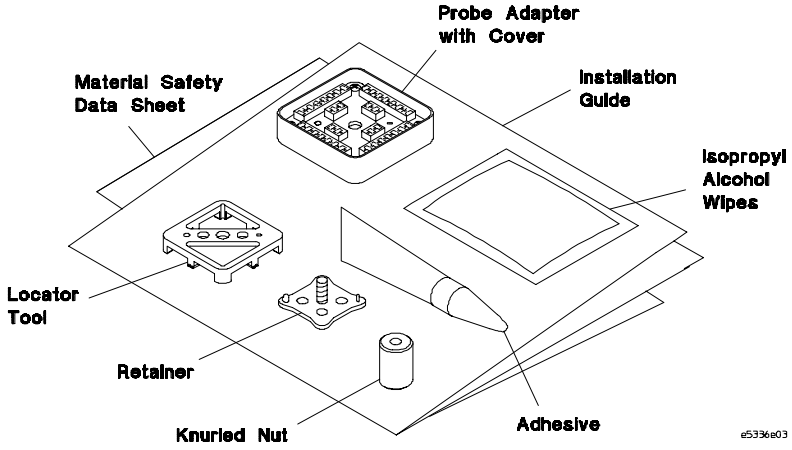
Contents

This chapter includes the procedure for installing the probe adapter onto your TQFP. The major steps are:

Installation of the Elastomeric Probe Adapter

To install the TQFP elastomeric probe adapter

You should have the items shown in the following illustration to install the probe adapter.



Electrical Characteristics

Operating Voltage	< 40 V (dc + Peak ac)
Operating Current	0.5 Amps Maximum
Insulation Resistance	> 100 MΩ

Model Parameters:

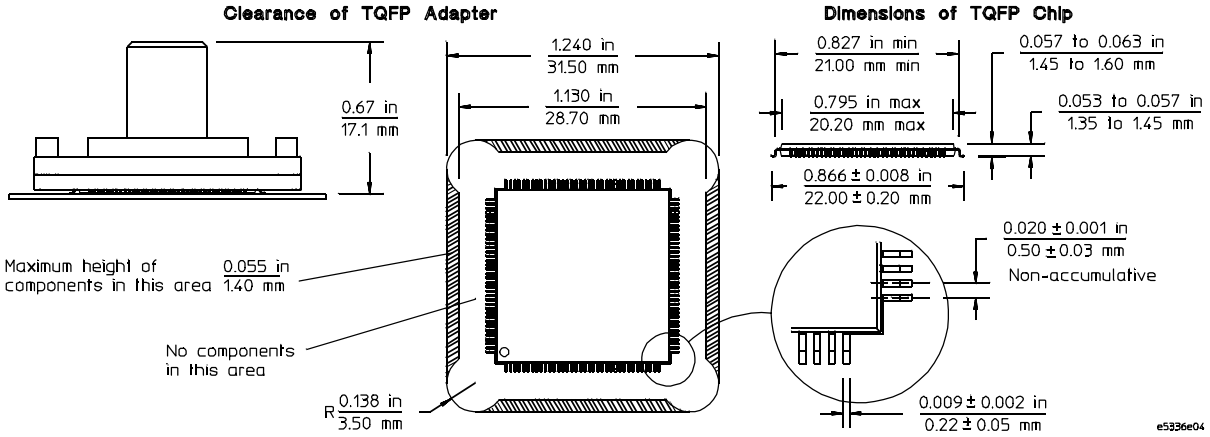
Capacitance between Contacts	0.5 pF (Typical)
Self-Inductance	10 nH (Typical)
Contact Resistance	< 0.25 Ω (Typical)
Operating Bandwidth	dc – 750 MHz (Typical)

Environmental Characteristics

Operating Temperature	0 °C to 55 °C
Maximum Operating Humidity	75% Relative Humidity

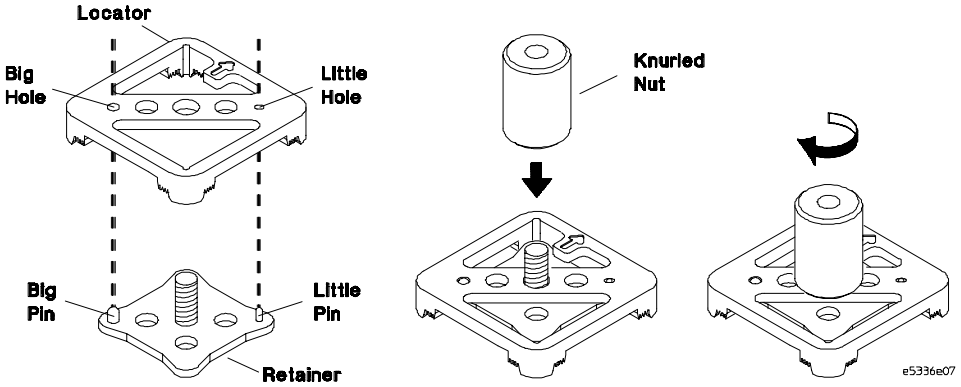
Prepare to attach the retainer to the TQFP

1 Check the area around the package to be probed. The minimum required clearance from the package and any components is shown in the illustrations below. The probe will work within the parameters shown.



2 Assemble the locator and the retainer, using the knurled nut to hold them together.

Align the big and little pins of the retainer with the big and little holes of the locator tool.

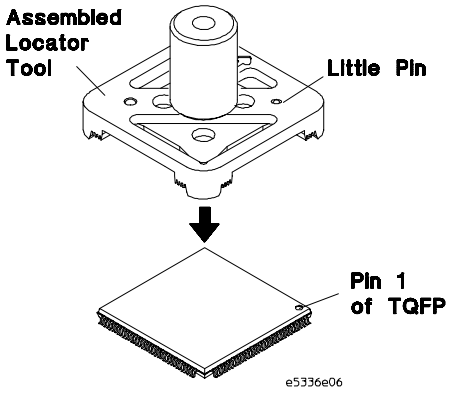


Test the alignment before adhering the retainer

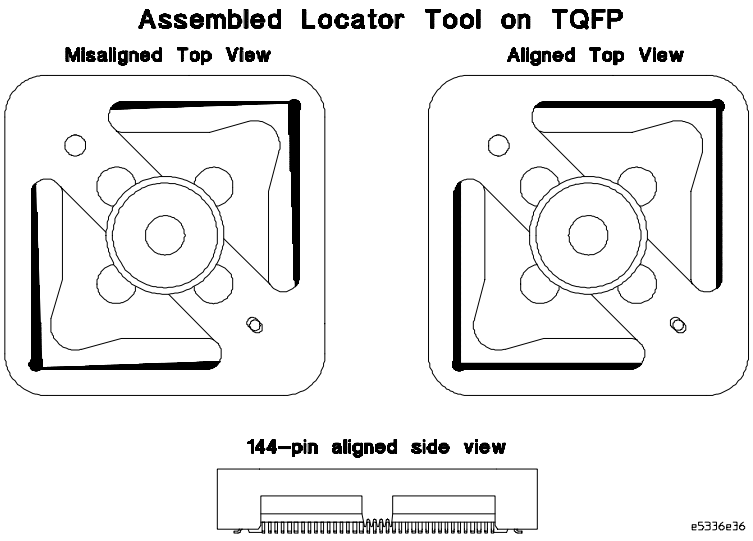
CAUTION Turn off the power to your TQFP when using the metal locator tool. Failure to do so could cause damage to your IC.

CAUTION Use grounded wrist straps and mats when installing or performing any service to your probe adapter. Electrostatic discharge can damage electronic components.

1 Make sure the little pin corner of the assembled locator tool is in the same corner as pin 1 on the TQFP.

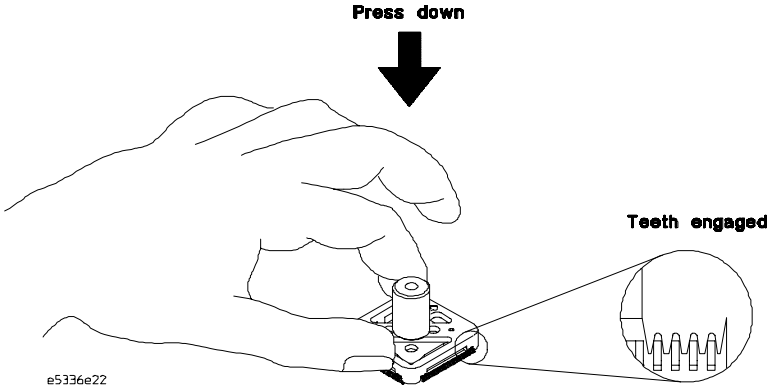


2 Place the assembled locator tool on the TQFP, making sure that it aligns squarely. You will feel the teeth drop between the TQFP legs when it is aligned.



3 Press down on the middle of both sides of the locator tool.

If the tool is down far enough, it will not rock when pressed on the sides.

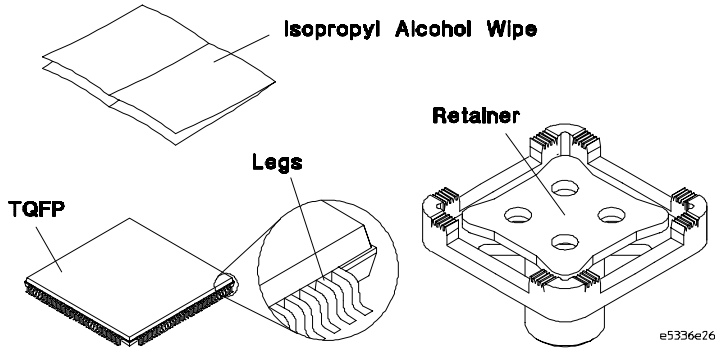


4 Remove the assembled locator tool and prepare surfaces before applying adhesive.

a Use a single edged razor (or equivalent) to remove foreign material, such as stickers or adhesive, from the top surface of the TQFP.

b Remove any remaining debris from the top surface and legs of the TQFP with precision dusting cleaner (also known as inert dusting gas or compressed air in a can).

c Clean the the bottom of the retainer, and the top surface and legs of the TQFP by wiping with an Isopropyl Alcohol wipe provided in the Retainer Kit. Do not use other cleaners or solvents.



Adhere the retainer to your TQFP

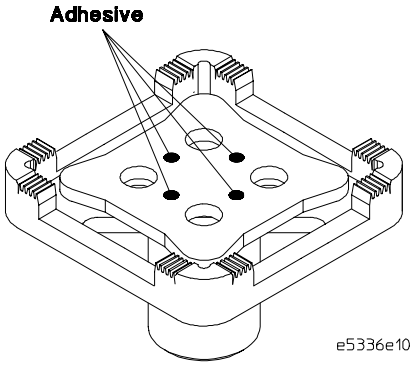
CAUTION You will use adhesive to attach a retainer to the top of the TQFP. The retainer ensures precise alignment between the probe adapter and the device. Read the following steps to understand the process of applying adhesive before doing them.

CAUTION Make sure you can control the amount of adhesive. Excess adhesive can cause problems, so it is better to use too little than too much. Follow the manufacturer's recommended temperature parameters for the adhesive.

WARNING Read the Material Safety Data Sheet enclosed for handling precautions on the Loctite 4204 Prism Instant Adhesive or call Loctite Corporation at (860) 571-5100.

Cyanoacrylate adhesive is a very fast setting and strong adhesive. It bonds human tissue including skin in seconds. Experience has shown that accidents due to cyanoacrylates are handled best by passive, nonsurgical first aid. Treatment of specific types of accidents are given in the data sheet.

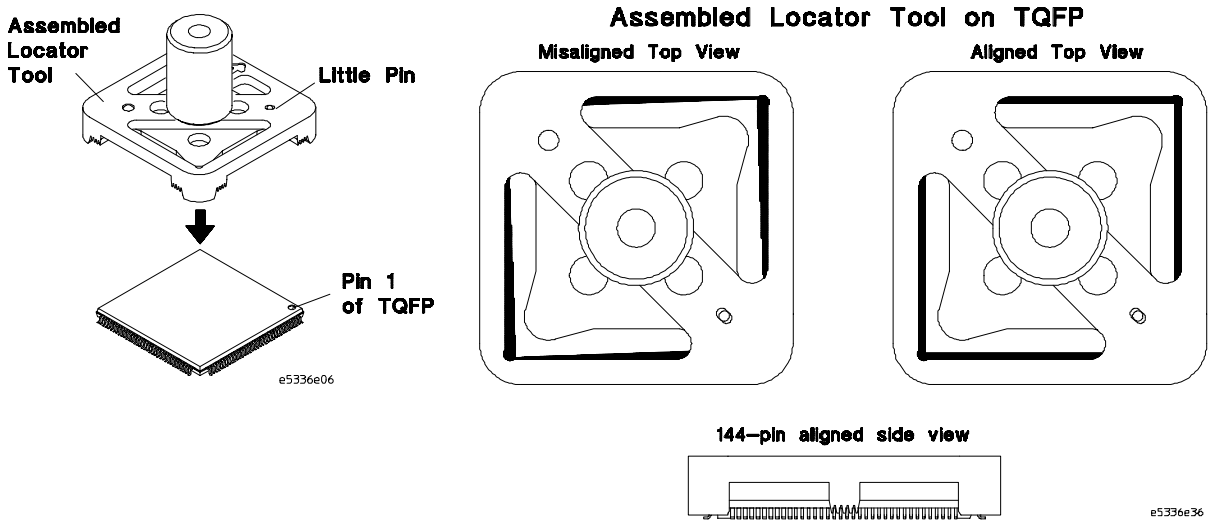
1 Apply four small drops of adhesive to the underneath side of the retainer as shown.



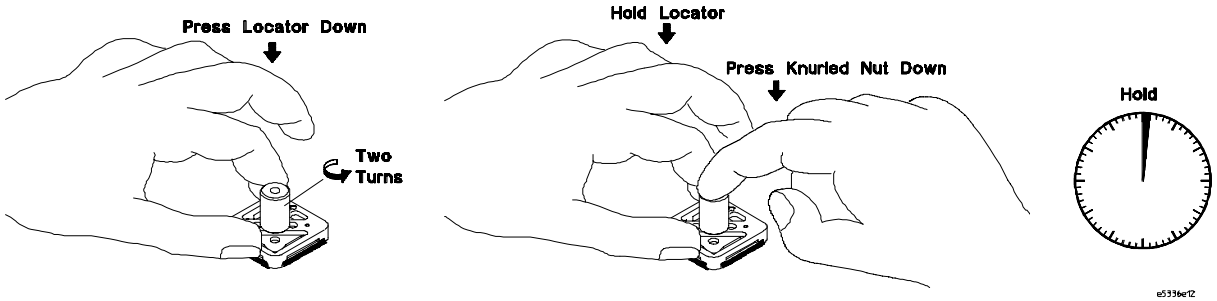
CAUTION Turn off the power to your TQFP when using the metal locator tool. Failure to do so could cause damage to your IC

2 Place the locator tool on top of the TQFP as you did to test the alignment.

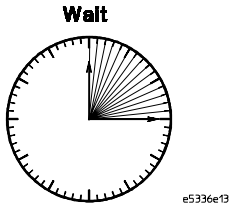
The adhesive on the retainer will not touch the TQFP until the next step and the adhesive will not solidify until the retainer and TQFP touch, so there is plenty of time to adjust the tool if necessary.



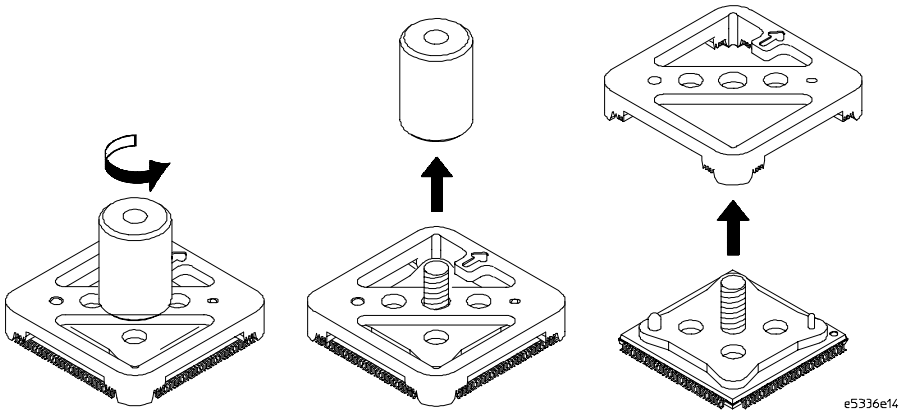
3 Hold down on the sides of the locator tool and loosen the knurled nut two turns. Continue to hold down on the sides of the locator tool and press down on the knurled nut to drop the retainer onto the top of the TQFP. Hold for 45 seconds.



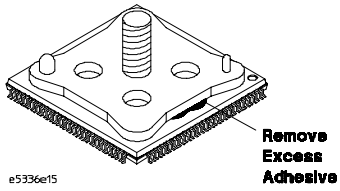
4 Wait 15 minutes for the adhesive to cure.



5 Remove the locator tool, by completely unscrewing the knurled nut and lifting the locator off the TQFP.



6 Remove any adhesive that leaked out the edges of the retainer, using a knife, so that the probe adapter will seat properly.

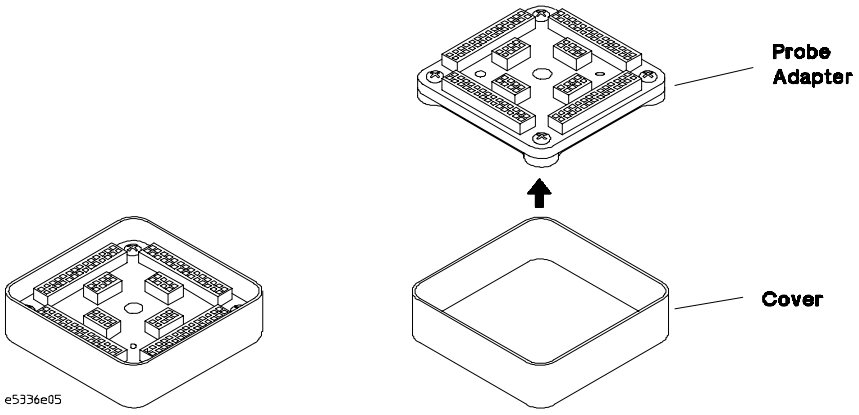


If a retainer ever breaks off of the TQFP, a new retainer can be re-attached. There are some contaminates that are not removed with Isopropyl Alcohol in preparing the surfaces before adhering. If a retainer breaks off, the adhesive from the initial installation usually removes any remaining contamination. The bond strength of a second retainer is usually higher than the bond strength of the first. Repeat all steps in this section to re-attach a new retainer.

Install the probe adapter

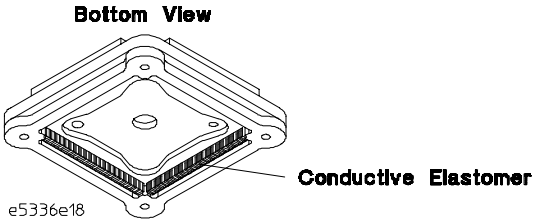
1 Remove the cover.

When you store the probe adapter, put the cover back on to protect the conductive elastomer from dust or damage.



CAUTION

Do not touch the contact area on the conductive elastomer, which is on the bottom of the probe adapter. Contamination or damage to the conductive elastomer will cause shorts or poor contact.



2 Install the elastomeric probe adapter on the retainer.

a Place the probe adapter over the retainer so that the threaded stud passes through the center hole of the adapter, and the dowel pins of the retainer enter the holes in the adapter.

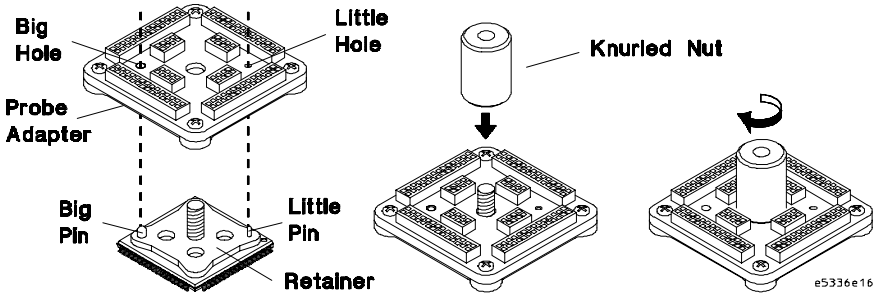
b Avoid touching the elastomers to the threaded stud or dowel pins of the retainer as the probe is inserted.

c Make sure the dowels on the retainer are inserted in the holes on the probe adapter and that it is laying flat against the TQFP before tightening the nut.

3 Turn the knurled nut until it stops.

CAUTION

Do not over-tighten the knurled nut. Over tightening the nut will make it difficult to remove.



A pinout map showing the pin numbers of the probe adapter and your TQFP is in the Reference chapter of this document.

2

This chapter includes procedures to install optional flexible adapters for use with Hewlett-Packard logic analyzers, oscilloscopes, and emulators.

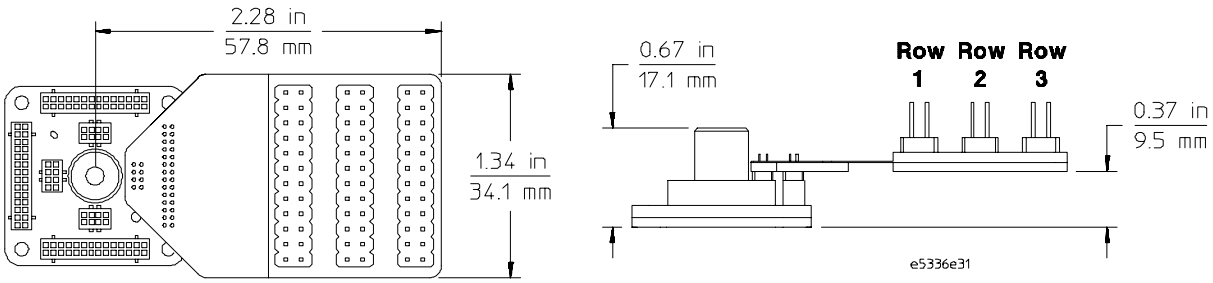
Installation of Optional Flexible Adapters

The HP E5340A 1/4 flexible adapters

The HP E5340A 1/4 flexible adapters can be used with any Hewlett-Packard oscilloscope or logic analyzer. They provide a flexible mechanical interface while maintaining the electrical performance to the probe tip. They allow you to probe selected pins or every pin on your QFP. Use one to four flexible adapters depending on your needs.

Performance characteristics of the HP E5340A 1/4 flexible adapters

Electrical Characteristics		
	Operating Voltage	< 40 V (dc + Peak ace)
	Operating Current	0.5 Amps Maximum
	Insulation Resistance	> 100 M Ω
Model Parameters		
	Pin-to-Ground Capacitance	3 pF Typical First Row 4 pF Typical Second Row 6 pF Typical Third Row
	Pin-to-Pin Capacitance	2 pF Typical
	Self-Inductance	15 nH Typical First Row 25 nH Typical Second Row 35 nH Typical Third Row
	Operating Band width	350 Mhz Typical
Environmental Characteristics		
	Operating Temperature	0 °C to 55 °C
	Maximum Operating Humidity	75% Relative Humidity



To connect an HP logic analyzer or oscilloscope using a 1/4 flexible adapter

1 Power-off the analysis probe (preprocessor), logic analyzer, and target system.

2 Follow the steps in chapter 1 to install the elastomeric probe adapter.

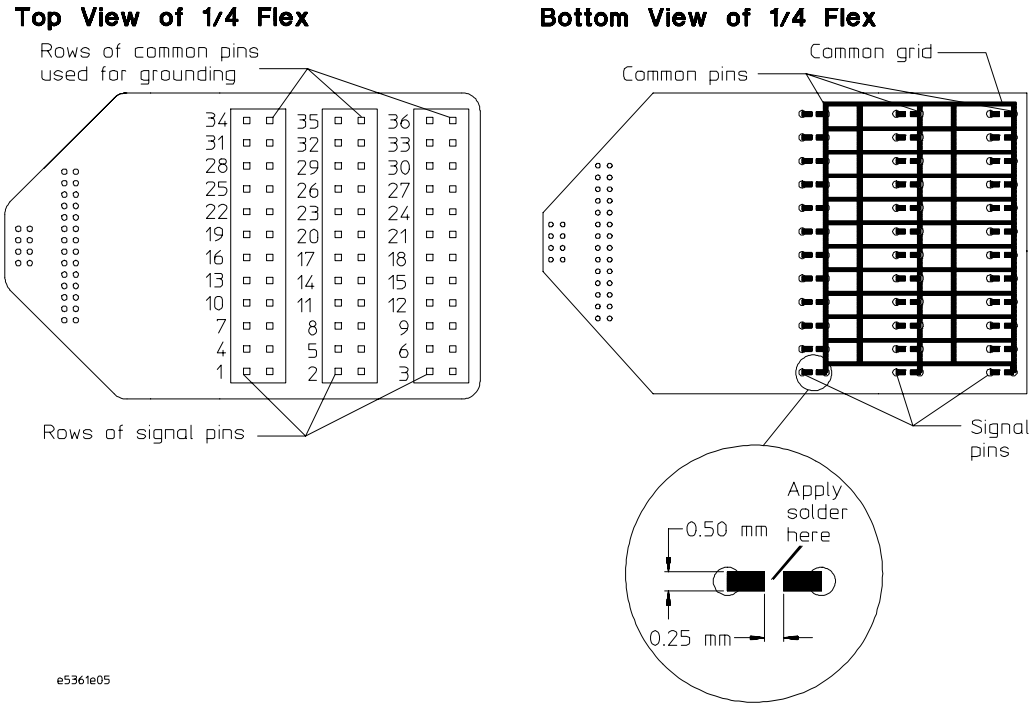
CAUTION

Damage to the TQFP. Once the 1/4 flexible adapter has had its common pins connected to ground it should not be used in any other quadrant of the elastomeric probe adapter or in any other device. Remove the solder connecting the common pins to ground before reuse.

3 Apply a small amount of solder across the gap between the signal pins that are ground on your device under test and the common pins of the 1/4 flexible adapter. This will facilitate the connection of the HP logic analyzer or oscilloscope probe ground.

All of the common pins are connected together through a grid on the bottom of the flexible adapter as shown below.

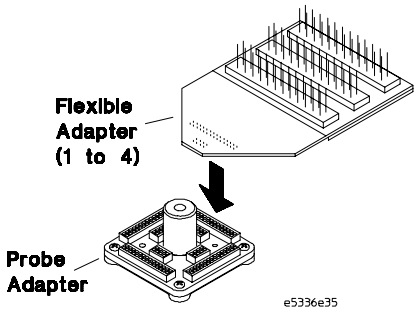
The pin numbers printed on the flexible adapter correspond to the pins in one quadrant of the probe adapter. Refer to the pinout and cross-reference maps in the Reference chapter of this document when using multiple 1/4 flexible adapters.



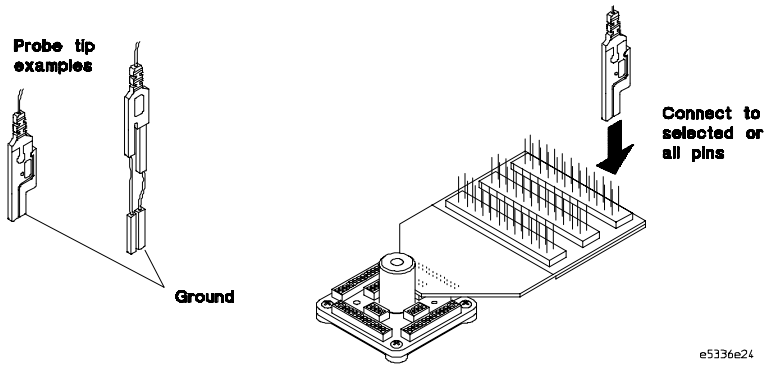
CAUTION

To prevent pin damage and ensure a proper connection, make sure the pins of the flexible adapter are aligned and seated correctly in the sockets on the probe adapter.

4 Plug 1 to 4 flexible adapters into the sockets on the top of the probe adapter assembly as shown in the following illustration.



5 Connect the appropriate logic analyzer or oscilloscope probe to the correct circuit as indicated by the adapter pin numbers.

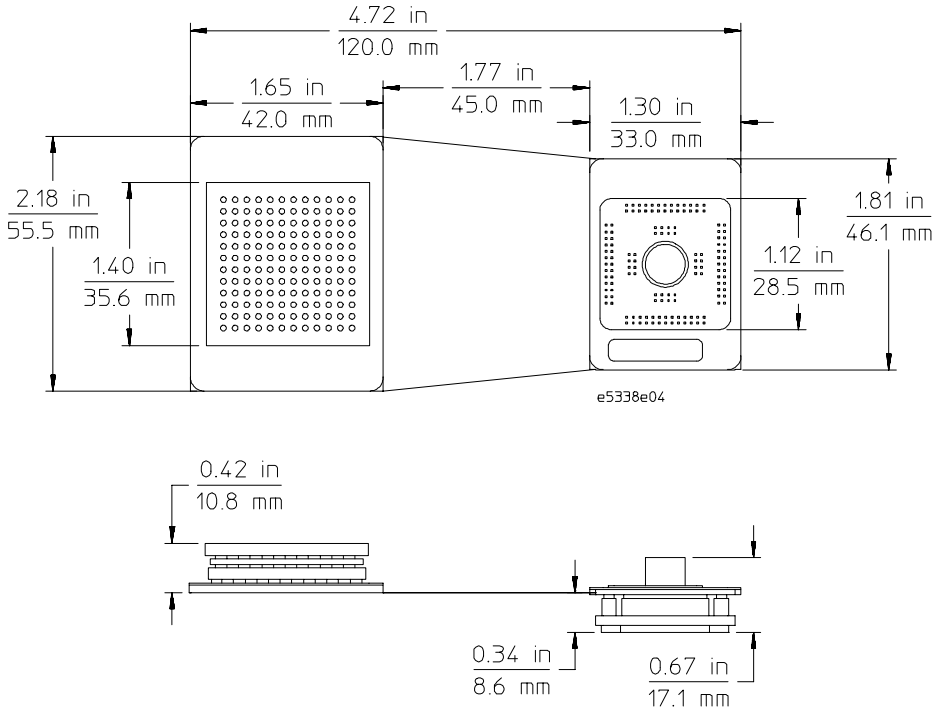


The HP E5338A general-purpose flexible adapter

The HP E5338A general-purpose adapter gives you access to predefined processor support for a Hewlett-Packard analysis probe (preprocessor) and logic analyzer or emulator.

Performance characteristics of the HP E5338A general-purpose flexible adapter

Processor Specific Connection	68332 analysis probe (preprocessor) 80386EX emulator 80386EX analysis probe (preprocessor)	HP E5341A PGA trans. socket HP E3442A PGA trans. socket HP E3442A PGA trans. socket
Electrical Characteristics	Signal loading per line in addition to emulator or analysis probe (preprocessor) load	25 pF maximum
	Maximum operating frequency	25 MHz
Environmental Characteristics	Operating Temperature	0 °C to 55°C
	Maximum Operating Humidity	75% Relative Humidity



To connect an HP logic analyzer or oscilloscope using a general-purpose flexible adapter

1. Power-off the target system, analysis probe (preprocessor) and logic analyzer, or emulator.
2. Follow the steps in chapter 1 to install the elastomeric probe adapter.

CAUTION

Serious equipment damage. Ensure that the analysis probe (preprocessor) or emulator probe is aligned with the proper pins when connecting to the general-purpose flexible adapter. Serious equipment damage can result from improper connection. The final connection should match the orientation you select from your HP analysis probe (preprocessor) or emulator manual.

3. Refer to the orientation illustration in your HP analysis probe (preprocessor) or emulator manual to select one of four possible orientations.

   The general-purpose flexible adapter can be attached to the probe adapter in one of four orientations to avoid interfering with tall components on the target system.

CAUTION

To prevent pin damage and ensure a proper connection, make sure the pins of the analysis probe (preprocessor), transition board, general-purpose flexible adapter, and elastomeric probe adapter are aligned and seated correctly in the sockets.

4. Connect the analysis probe (preprocessor), transition board, general-purpose flexible adapter, and elastomeric probe adapter using the orientation selected in the previous step.

   Refer to the pinout and cross-reference maps in the Reference chapter of this document for pin numbers on the general-purpose flexible adapter.

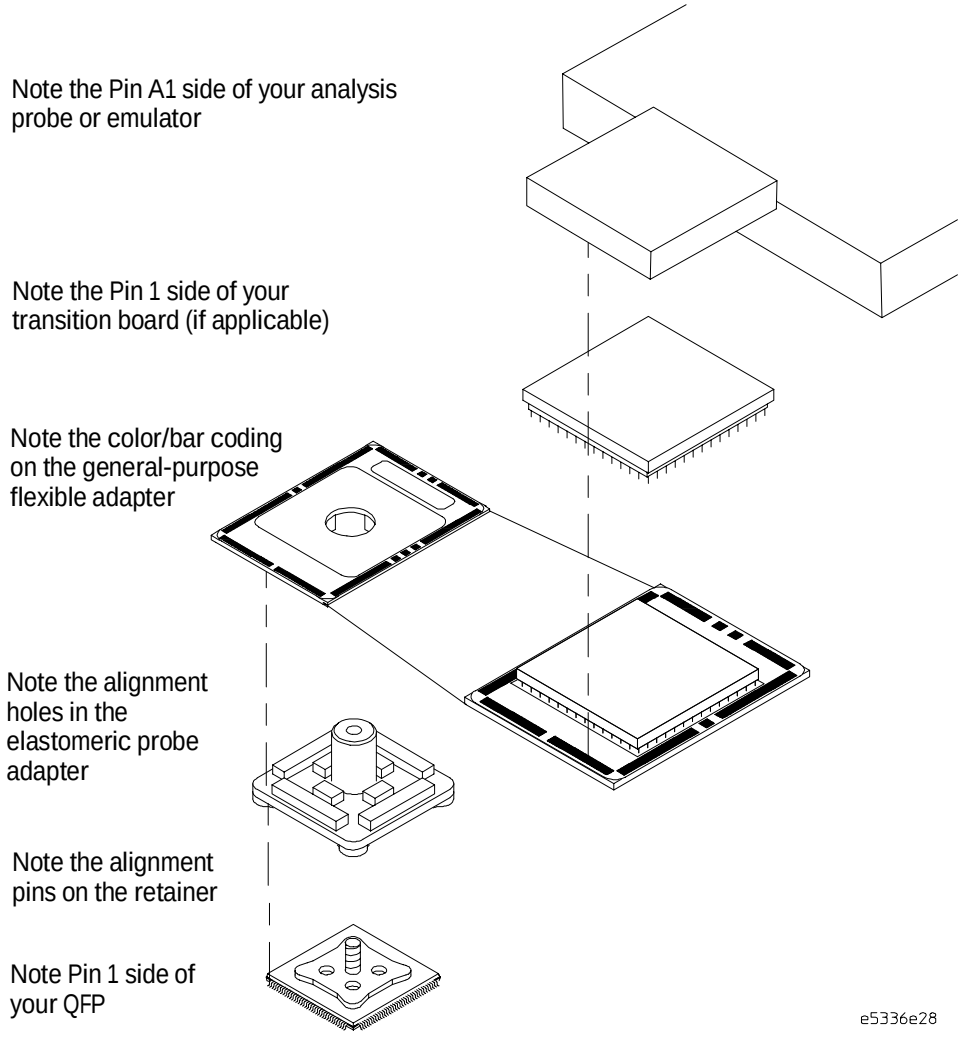
See Also

Refer to your HP analysis probe (preprocessor) or emulator manual for information on connecting to and using the analysis probe (preprocessor) or emulator.

Example

The following illustration shows one of four possible orientations for connecting the QFP elastomeric probing system using the general-purpose flexible adapter.

Refer to your HP analysis probe (preprocessor) or emulator manual to select the orientation which allows the best access to your target system.



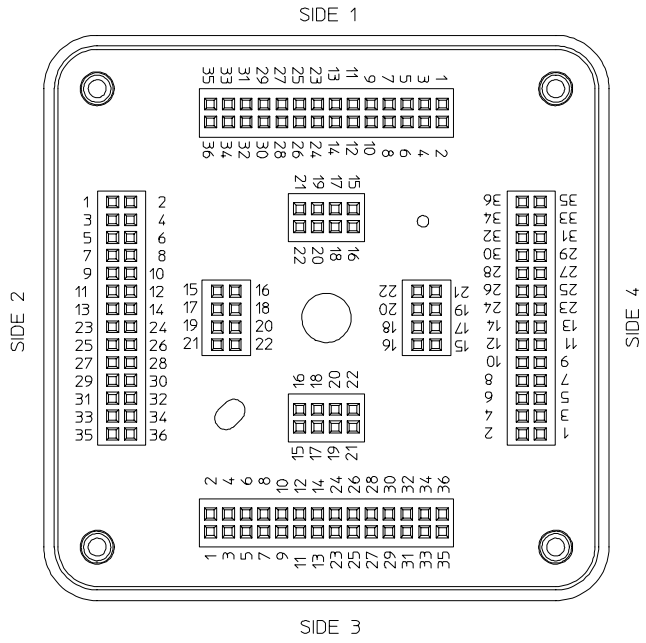
3

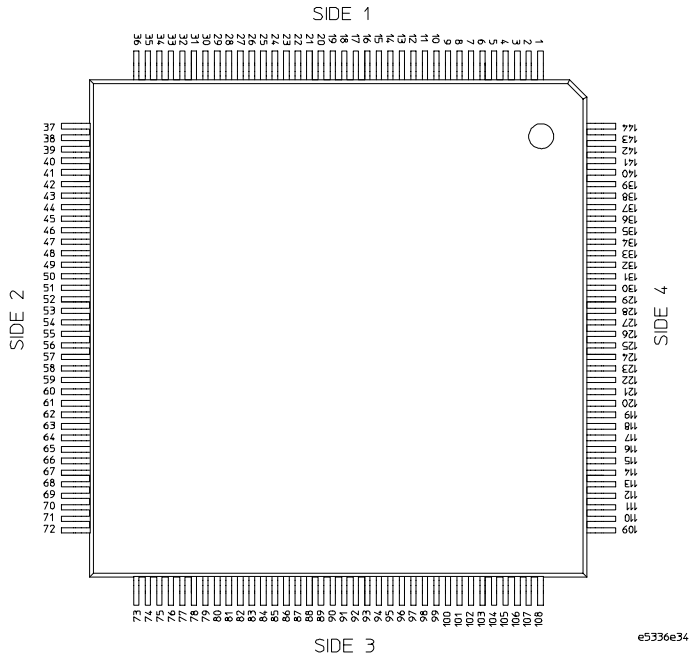
This chapter includes the following reference information:

- Pinout and cross-reference maps
- Replaceable parts
- Removing a retainer and adhesive

Reference

Probe adapter and TQPF pinout maps





Cross-reference for multiple 1/4 flexible adapters and TQFP

144–pin QFP and 1/4 flexible adapters

Side 1

QFP	FLEX	QFP	FLEX	QFP	FLEX
34	34	35	35	36	36
31	31	32	32	33	33
28	28	29	29	30	30
25	25	26	26	27	27
22	22	23	23	24	24
19	19	20	20	21	21
16	16	17	17	18	18
13	13	14	14	15	15
10	10	11	11	12	12
7	7	8	8	9	9
4	4	5	5	6	6
1	1	2	2	3	3

Side 2

QFP	FLEX	QFP	FLEX	QFP	FLEX
70	34	71	35	72	36
67	31	68	32	69	33
64	28	65	29	66	30
61	25	62	26	63	27
58	22	59	23	60	24
55	19	56	20	57	21
52	16	53	17	54	18
49	13	50	14	51	15
46	10	47	11	48	12
43	7	44	8	45	9
40	4	41	5	42	6
37	1	38	2	39	3

Side 3

QFP	FLEX	QFP	FLEX	QFP	FLEX
106	34	107	35	108	36
103	31	104	32	105	33
100	28	101	29	102	30
97	25	98	26	99	27
94	22	95	23	96	24
91	19	92	20	93	21
88	16	89	17	90	18
85	13	86	14	87	15
82	10	83	11	84	12
79	7	80	8	81	9
76	4	77	5	78	6
73	1	74	2	75	3

Side 4

QFP	FLEX	QFP	FLEX	QFP	FLEX
142	34	143	35	144	36
139	31	140	32	141	33
136	28	137	29	138	30
133	25	134	26	135	27
130	22	131	23	132	24
127	19	128	20	129	21
124	16	125	17	126	18
121	13	122	14	123	15
118	10	119	11	120	12
115	7	116	8	117	9
112	4	113	5	114	6
109	1	110	2	111	3

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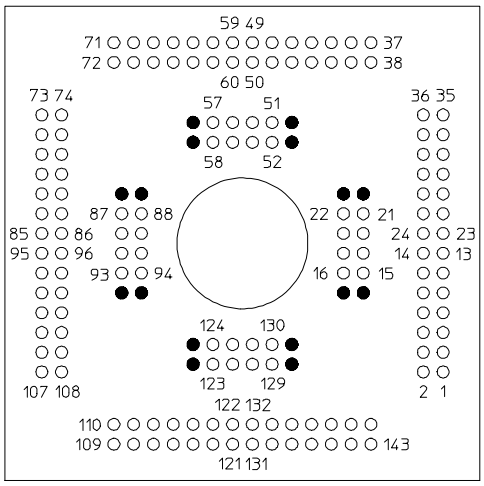
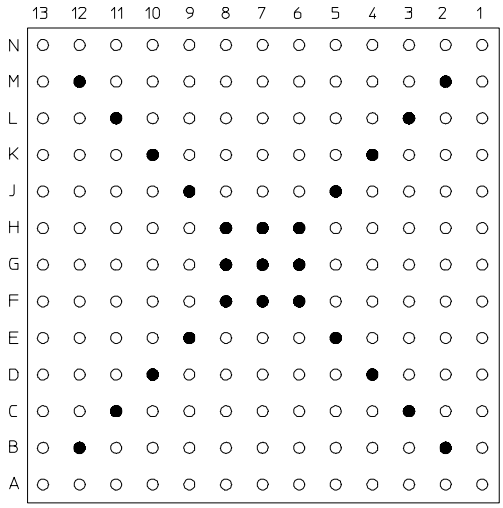
Cross reference for general-purpose flexible adapter and TQFP

Target End



Darkened holes are grounds.

Probe End



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QFP PIN	13x13 PIN
1	B13
2	C13
3	C12
4	D13
5	D12
6	D11
7	E12
8	E11
9	F13
10	F12
11	F10
12	F9
13	G12
14	G11
15	E10
16	E13
17	G13
18	F11
19	G10
20	H12
21	H9
22	J11
23	G9
24	H13
25	H11
26	H10
27	J13
28	J12
29	J10
30	K13
31	K12
32	K11
33	L13
34	L12
35	M13
36	N13

QFP PIN	13x13 PIN
37	N12
38	N11
39	M11
40	N10
41	M10
42	L10
43	M9
44	L9
45	N8
46	M8
47	K8
48	J8
49	M7
50	L7
51	K9
52	N9
53	N7
54	L8
55	K7
56	M6
57	J6
58	L5
59	J7
60	N6
61	L6
62	K6
63	N5
64	M5
65	K5
66	N4
67	M4
68	L4
69	N3
70	M3
71	N2
72	N1

QFP PIN	13x13 PIN
73	M1
74	L1
75	L2
76	K1
77	K2
78	K3
79	J2
80	J3
81	H1
82	H2
83	H4
84	H5
85	G2
86	G3
87	J4
88	J1
89	G1
90	H3
91	G4
92	F2
93	F5
94	E3
95	G5
96	F1
97	F3
98	F4
99	E1
100	E2
101	E4
102	D1
103	D2
104	D3
105	C1
106	C2
107	B1
108	A1

QFP PIN	13x13 PIN
109	A2
110	A3
111	B3
112	A4
113	B4
114	C4
115	B5
116	C5
117	A6
118	B6
119	D6
120	E6
121	B7
122	C7
123	D5
124	A5
125	A7
126	C6
127	D7
128	B8
129	E8
130	C9
131	E7
132	A8
133	C8
134	D8
135	A9
136	B9
137	D9
138	A10
139	B10
140	C10
141	A11
142	B11
143	A12
144	A13

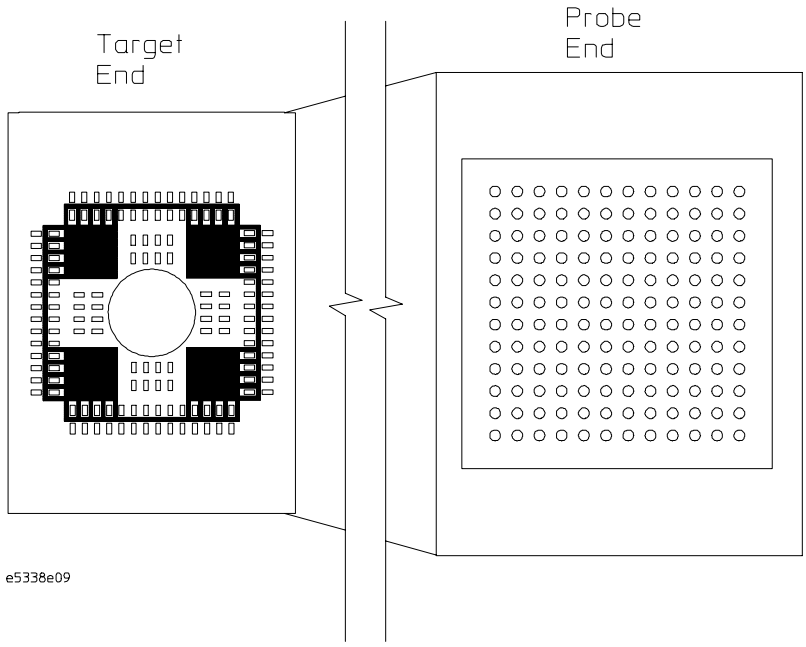
Grounding

The general-purpose flexible adapter cable has a ground grid that can be used to provide a low impedance path for ground signals. Because the flexible cable is a generic solution, no probed signals are connected to this low impedance ground. The exposed pads and metal areas on the top of the target end of the cable allow you to individually ground signals. Connect ground signals from the target (small rectangular pads) to the large square pads which are connected to the ground grid.

CAUTION

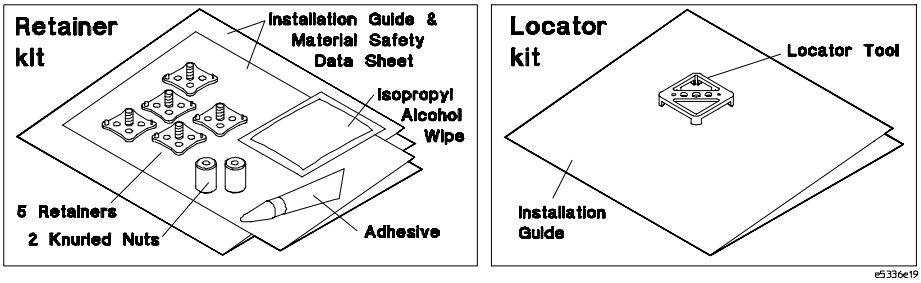
Damage to the target. Be careful not to connect any target signals to the ground grid. See the previous pin-out maps and cross-reference tables to determine which pads correspond to ground signals.

Connecting target grounds to the flexible cable ground will provide a low impedance path for return currents resulting in more accurate measurements by your instrument. This increases the load capacitance seen by your target system. In some cases you may not need to connect ground signals in order to get accurate measurements, but it is recommended that you do so to ensure optimal signal fidelity at your measurement tool.



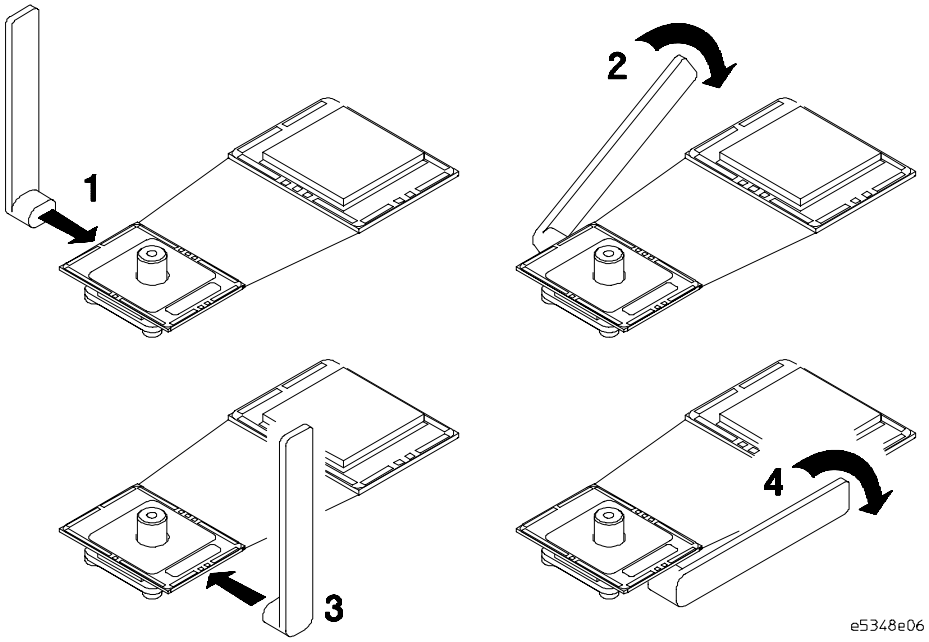
Replaceable Parts

144-Pin Part Description	HP Part Number
Elastomeric Probe Adapter	E5336A
1/4 flexible adapter	E5340A
General-purpose flexible adapter	E5338A
80386EX transition board for analysis probe (preprocessor) or emulator	E3442A
68332 transition board for analysis probe (preprocessor) only	E5341A
Retainer Kit (shown in the following illustration)	E5336A opt. 201
Locator Kit (shown in the following illustration)	E5336A opt. 202



To remove the general-purpose flexible adapter

Gently pry the flexible adapter from the probe adapter using the pry tool as shown.

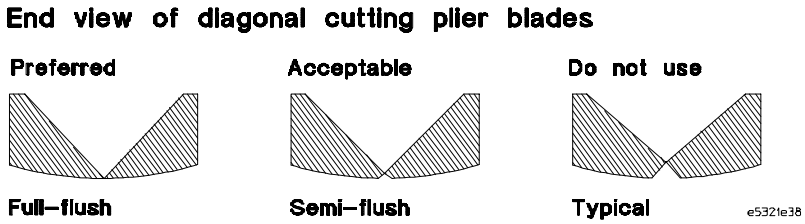


To remove a retainer and adhesive

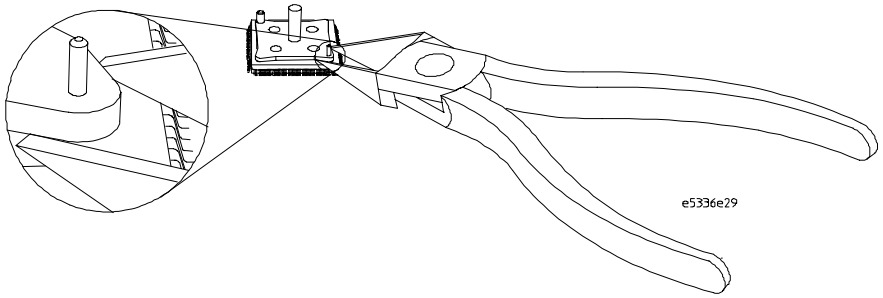
WARNING **Eye injury.** Use protective eye-wear during removal to avoid injury.

CAUTION The following procedure could cause damage to some TQFPs, depending upon the construction of the part and surface condition.
Power off the DUT before attempting to remove a retainer.

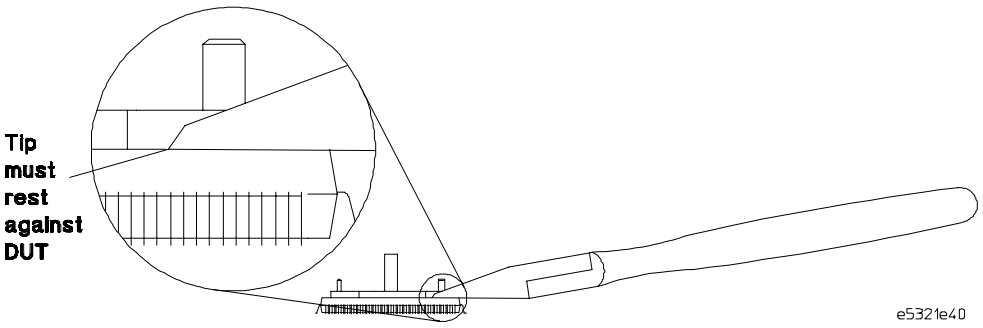
1 Use a semi-flush or full-flush cutting plier with approximately 5-inch handles, such as HP part number 8170-0006, to remove the retainer.



2 Place the tip of the plier against the slanted edge of the retainer.

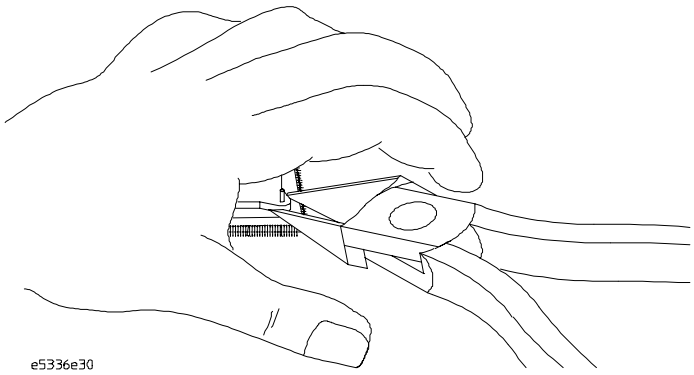


3 Ensure that the tip edge of the plier is as nearly parallel as possible and resting on the surface of the TQFP.



WARNING **Possible injury.** Exercise care when using any sharp cutting tool.

4 Hold your hand over the TQFP during removal to prevent the part from flying when it pops off.



CAUTION Prevent the retainer from landing on any electrical circuits which might cause shorting.

5 Squeeze the pliers to pop the retainer off.

6 Discard the retainer.

WARNING **Possible injury.** Exercise care when using any sharp cutting tool.

7 Scrape the adhesive off the top of your TQFP using a single-edge razor blade or similar tool.

Do not use solvent because the solvent might dissolve the adhesive onto the leads of your TQFP causing unreliable probing.

8 Make sure all adhesive has been removed and that there are no rough spots on the top of the TQFP.

9 If you want to attach another retainer to your TQFP, follow the installation procedure in chapter 1.

Index

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This apparatus has been designed and tested in accordance with IEC Publication 348, Safety Requirements for Measuring Apparatus, and has been supplied in a safe condition. This is a Safety Class I instrument (provided with terminal for protective earthing). 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."

Warning

- Before turning on the instrument, you must connect the protective earth terminal of the instrument to the protective conductor of the (mains) power cord. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. You must not negate the protective action by using an extension cord (power cable) without a protective conductor (grounding). Grounding one conductor of a two-conductor outlet is not sufficient protection.
- Only fuses with the required rated current, voltage, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired fuses or short-circuited fuseholders. To do so could cause a shock or fire hazard.
- 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.
- If you energize this instrument by an auto transformer (for voltage reduction), make sure the common terminal is connected to the earth terminal of the power source.
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- 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 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.
- Use caution when exposing or handling the CRT. Handling or replacing the CRT shall be done only by qualified maintenance personnel.

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.

WARNING

The Warning sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a Warning sign until the indicated conditions are fully understood and met.

CAUTION

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