Test Sockets & Adapter

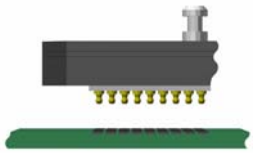
E-tec test sockets are custom made high temperature sockets to test IC packages on a PCB (BGA, LGA, CGA, QFN, GullWing type, etc.).
Generally used for prototyping, pre-production and test & burn-in, the E-tec test sockets allow the customer to insert an IC package into the socket, test it in its original condition and remove it again for final soldering to the PCB after all tests have been completed. The sockets are easily adaptable to customer requirements.

Main questions on how to choose a socket

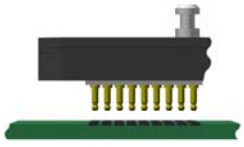
- **Which IC package needs to be tested?**
  - **E-tec offers socket solutions for any chip types**
    The mechanical dimensions of the IC package are critical for defining the appropriate socket, thus a dimensional drawing always needs to be submitted.
- **Which contact style should be chosen?**
  - **Generally depends on contact durability, operating temperatures and/or frequency.**
    Three main contact styles are available:
    - **E-tec patented Probe pins (standard) up to 3.4 GHz**
    - **High Speed Probe pins (up to 30 GHz)**
    - **Elastomer interposers (up to 30 GHz)**
- **How to connect the socket to the PCB?**
  - **SMT (standard or raised)**
  - **Thru-hole**
  - **Solderless compression (probe pin or elastomer interposer)**
- **Which socket retainer style is needed?**
  - **Various factors will influence the choice of the retainer solution chosen, such as:**
    - **How many times will the socket be opened each day?**
    - **Cost of socket?**
    - **Is there any space limitation for the socket ?**
    - **Access required to the die of chip / heat dissipation (open top?)**

Options for attaching the socket to the PCB

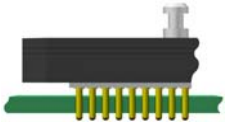
SMT soldering type
(Low profile, short signal path)



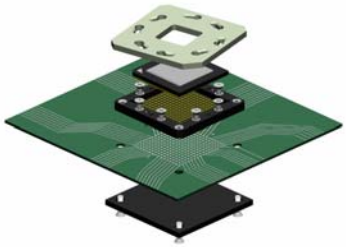
Raised SMT type
(lifts socket above close-by components)



Thru hole soldering type
(Generally for test & burn-in applications)

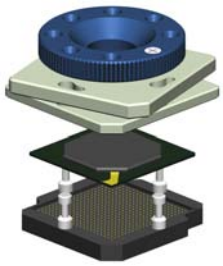


Solderless Compression type
(short signal path, avoids soldering process)

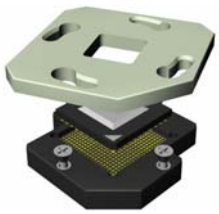


Available Retention frames

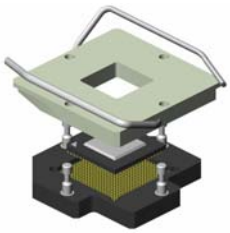
FastLock



TwistLock

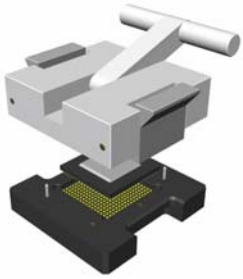


LeverLock

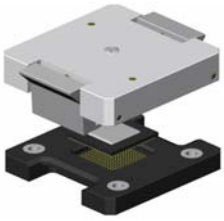


QuickLock

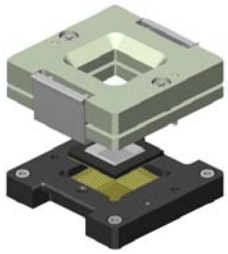
with lever
for high pincount



without lever
for low pincount

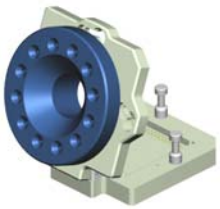


open top
(on request)



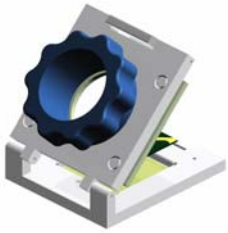
ClamShell

Economy
Open top

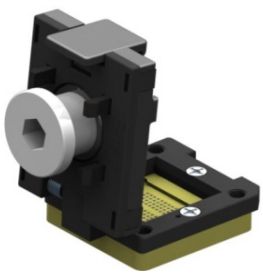


Professional
closed top

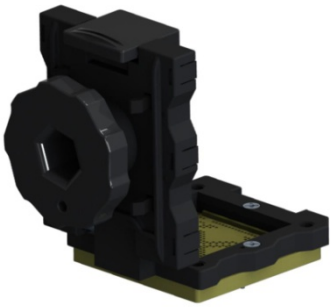
Professional
open top (on request)



Injection Molded Type M1
for Chips up to 17x17mm



Injection Molded Type M2
for Chips up to 25 x 25mm

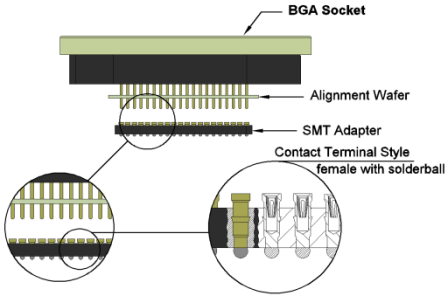


Injection Molded Type M3
for Chips up to 35 x 35mm

SMT Adapter solution
for plugging a test socket

- solderball or solid pin surface mount sockets
- easy to solder (especially high pincount)
- easy plugging of test socket after soldering

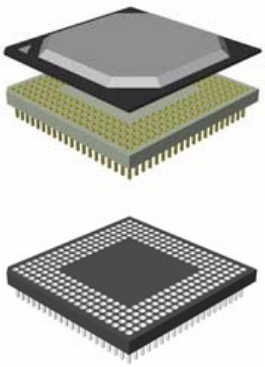
Step 1: solder mini-grid socket to PCB
Step 2: plug test socket into mini-grid socket



Converter Adapter solution

- generally for high volume requirements
- mini-grid sockets available with
  solder balls or regular solid pins

Step 1: mini-grid socket soldered
to PCB
Step 2: chip soldered to adapter board
(converting BGA to PGA)
Step 3: Plug adapter board into
mini-grid socket



Test Sockets & Adapter

Socket & Retention System Selector Guides

The below Socket & Retention System Selector Guides will help you to make the right choice.

The options indicated refer to standard options. If you should not find what you need or if your specs should vary from the below chart, please contact your closest E-tec office, since we will most likely be able to offer a customized solution also.

Socket Selector Guide

Socket style	Lowest Pitch	Contact interface			Available Temperature range	Chip types						
		Regular Probe pin (up to 3.4 GHz)	High speed (up to 30 GHz)	Replaceable contacts		BGA/CSP	CGA	LGA	QFN	LCC	Gullwing (QFP, TSOP, SSOP, etc)	Others
Surface Mount	0.50mm	Yes	No	No	-55°C to +125°C	Yes	Yes	Yes	Yes	Yes	Yes	on request
Raised Surface Mount	0.50mm	Yes	No	No	-55°C to +125°C	Yes	Yes	Yes	Yes	Yes	Yes	on request
Thru-hole	0.50mm	Yes	No	No	-55°C to +125°C	Yes	Yes	Yes	Yes	Yes	Yes	on request
Solderless Probe pin	0.40mm	Yes	Yes	only high speed probes	-55°C to +125°C	Yes	Yes	Yes	Yes	Yes	Yes	on request
Solderless Elastomer	0.30mm	n/a	Yes	Yes	-35°C to +125°C	Yes	No	Yes	Yes	No	Yes	on request

Retention System Selector Guide

Retention frame style	Socket Cost	Open top	Open/close cycles	Socket size	Socket height above board	Tools required to open/close	Torque tool option	available with integrated heatsink	Recommended for SMT sockets	Accepted chip heights	Accepted max. chip height variations from min to max	Accepted min/max chip size	Available for elastomer sockets	Available for "gullwing chip" sockets	Available for gulling chips with "tie bar" attached to legs
TwistLock / ScrewLock	Low	Yes	1000	smallest	lowest	Yes	Yes	Yes	Yes	no limit	no limit	min 4x4mm max no limit	Yes	Yes	Yes
FastLock	Low	Yes	10000	small	medium	No	Yes	Yes	Yes, with locating pegs	no limit	2.5mm	min 4x4mm max 52x52mm	Yes	Yes	Yes
Economy ClamShell	Low	Yes	10000	small	medium	No	Yes	Yes	Yes, with locating pegs	no limit	2.5mm	min 7x7mm max 50x50mm	Yes	No	No
LeverLock	Medium	Yes	1000	small	low	No	No	No	Yes, with locating pegs	no limit	0.40mm	min 15x15mm max 40x40mm	Yes	No	No
QuickLock	Medium to High	on request	10000	medium	high	No	No	No	Yes	min 0.5mm max 3.5mm	3.0mm	min 4x4mm max 36x36mm	Yes	Yes	No
Professional ClamShell	High	on request	10000	largest	high	No	No	No	Yes, with locating pegs	min 0.5mm max 4.0mm	3.5mm	min 7x7mm max 40x40mm	Yes	Yes	No
Injection Molded ClamShell	Low	Yes M2 and M3	5000	medium	medium	No	No	No	Yes, with locating pegs	min 0.5mm max 4.0mm	3.5mm	min 10x10mm max 35x35mm	Yes	No	No
Adapter solution (mini-grid socket & pluggable Test socket)	Depends on retention system	Depends on retention system	Depends on retention system	small adapter base	high	Depends on retention system	Depends on retention system	Depends on retention system	Yes with small size locking systems	Depends on retention system	Depends on retention system	Depends on retention system	Yes	Yes	Yes

General Socket Recommendations

TwistLock Test Socket

1. Use the E-tec torque tool **TOL-7CN-TORQUE** with appropriate torque setting for TwistLock sockets. Generally 7cNm up to 800 pins and 7cNm to 10cNm for higher pin counts.
2. Close the screws of the retainer with light tightening first and then fully tighten the screws one after each other. For sockets with 4 or 8 screws tighten the screws “cross wise” to apply equal forces.

SMT Test Socket

1. Use solder paste without silver or less than 0.5% silver content.
2. Solder profile & socket mounting recommendations are available for download from our homepage www.e-tec.com
3. Whenever possible use locating pegs which are tin plated for soldering to the PCB. This avoids the solder joints from being stressed during handling of the socket. Socket life cycle can be heavily reduced if used without locating pegs.
4. For high pin count sockets, it’s preferable to solder a light weight mini-grid adapter to the PCB first and then plug the test socket into that adapter.
5. Choose the raised SMT socket for lifting the socket above close-by components. Special clearances in the socket body can also be offered on request.

Solderless Test Socket

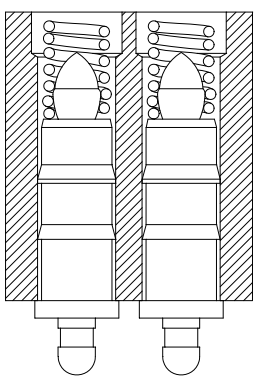
1. Use gold plated PCB pads (hard gold if possible).
2. PCB pads must be flush or higher than the solder mask for reliable interconnection with the socket.
3. Clearance for close-by components or components underneath the PCB can be offered on request.

Test Socket with Mini-Grid SMT Adapter

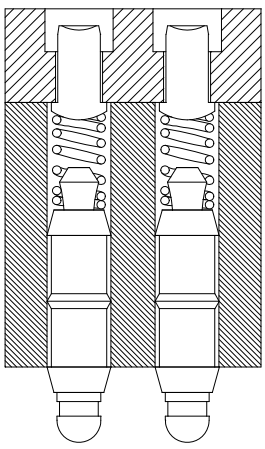
When inserting the test socket into the mini-grid adapter, make sure that the pin alignment plate has been positioned at the tip of the test socket pins. During insertion, this plate will then be pressed backwards and remain seated in-between the socket and the mini-grid adapter. This pin alignment board ensures correct alignment of the test socket pins onto the pins of the mini-grid adapter and thus reduces the risk of damaging the test socket pins during insertion. If the adapter socket has been removed from the mini-grid socket, then this pin alignment board needs to be pushed back to the tip of the test socket pins prior to reinserting the test socket into the mini-grid adapter.

E-tec Patented Probe Pin Designs

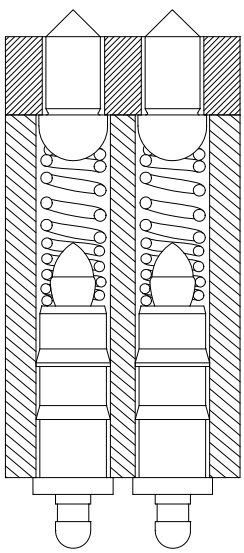
BGA ball grid array contact design
(patented)
standard size solderballs



BGA ball grid array contact design
(patented)
small size solderballs



LGA land grid array contact design
(patented)



CGA Column grid contact design
(patented)