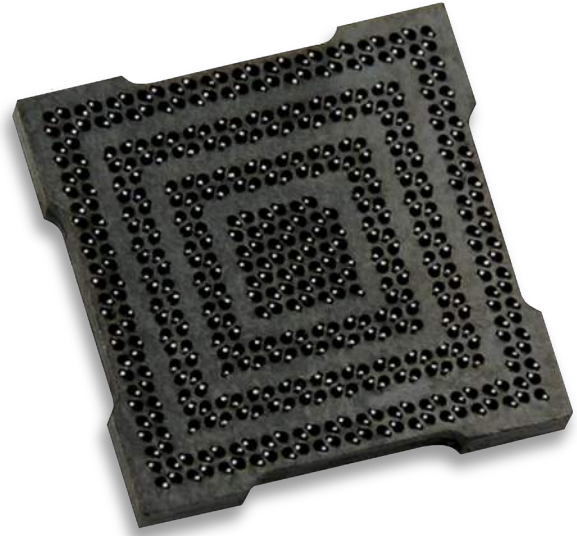


HSIO technologies

Grypper G40

**High performance, 0.4mm–0.5mm pitch
net zero package footprint engineering
test sockets for BGA style packaged
devices**



HSIO Technologies Grypper series test socket is the next best thing to not having a socket at all. The Grypper G40 as the superior test socket solution for low-to-high-ball-count BGA packages. Sized to match the package, the G40 Grypper test socket eliminates the need to make any tradeoffs in your board design to accommodate test socket-mounting holes or additional hardware. Instead, the device-footprint Grypper G40 test socket is SMT soldered to the target PCB using conventional reflow methods. The test sockets come standard with lead-free solder balls attached helping to achieve seamless application process implementation between package and test socket. No test socket lid is required, allowing easy access to the backside of the device. By design, the Grypper G40 is the ideal BGA test socket for engineering development and characterization.

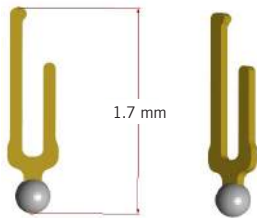
FEATURES AND BENEFITS

| | |
|---------------------------------------|---|
| Package-size PCB footprint | Since the PCB footprint of Grypper is identical to the package, only one PCB design is required, enabling a seamless transition from test and validation through production and reducing overall test costs |
| Low insertion force | Unique contact design reduces the insertion force required to insert and retain higher-ball-count packages safely and securely within the test socket |
| Oxide cutting wipe action | The contact design wipes the side of the solder ball during insertion, breaking through solder oxides ensuring a good electrical connection between contact and solder ball |
| Signal integrity | A short signal path achieves low inductance and low insertion loss, providing a nearly invisible electrical connection |
| Test socket has solder balls attached | The G40 contacts have solder balls reflowed onto the contacts to ensure reliable solder volume at the PCB to test socket solder interface |

TEST SOCKET DESCRIPTION

G40 Grypper test sockets are available for a wide range of BGA grid patterns, including custom designs. The unique contact design provides excellent signal fidelity for today's high-frequency applications. Each test socket is designed to match the package PCB footprint, giving designers the freedom to design PCBs without the additional time or expense of socket-mounting holes or hardware considerations. A support press is available so the insertion force can be distributed evenly across the package. Plus, an easy-to-use device extraction tool is available to enable simple lifting/peeling of the package from the G40 contacts.

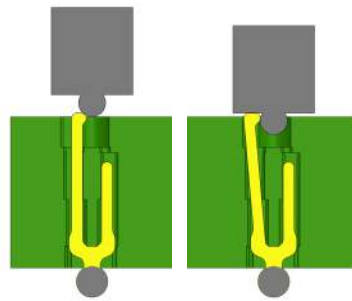
CONTACTS



| Pitch (mm) | Ball Diameter* (mm) | Ball Exposure |
|------------|---------------------|---------------|
| 0.4 | 0.35±0.05 | 0.250 min |
| 0.4 | 0.30±0.05 | 0.225 min |
| 0.4 | 0.25±0.05 | 0.175 min |
| 0.5 | 0.30±0.05 | 0.225 min |

*Standard designs available. Contact HSIOTechnology for designs for other dimensions.

METHODOLOGY



Cross section view of test socket and package.

ELECTRICAL SPECIFICATIONS

| P2A Configuration | 0.4 mm Pitch, 0.25 mm Ball * | 0.5 mm Pitch, 0.3 mm Ball |
|---|-------------------------------------|----------------------------------|
| GSG Loop inductance | 0.770 nH | 0.918 nH |
| Self inductance | 0.43 nH | 0.56 nH |
| Mutual inductance** | 0.054 nH | 0.056 nH |
| Capacitance (GSG - Signal pin to Return) | 0.183 pF | 0.170 pF |
| Mutual capacitance** | 0.022 pF | 0.019 pF |
| S21 Insertion loss / GSG | -1 dB @ 24.5 GHz | -1 dB @ 20.7 GHz |
| S11 Return Loss / GSG | -20 dB @ 4.5 GHz | -20 dB @ 2.8 GHz |
| S41 Crosstalk GSSG Thru*** | -20 dB @ 5.0 GHz | -20 dB @ 14.5 GHz |
| Impedance | 64.9 Ω | 73.5 Ω |
| Time delay | 11.1 ps | 12.4 ps |
| Current Carrying Capacity | 1 A | 1 A |
| CRES | < 50 mΩ | < 50 mΩ |

* Specification based on lab measurements. Contact factory for additional electrical reports on other pitches and ball sizes.

**These values are determined through curve-fit approximation, as they can not be measured directly.

***All GSSG and GSGSG Crosstalk values are based on simulation.

| P8A Configuration | 0.4 mm Pitch, 0.25 mm Ball | 0.5 mm Pitch, 0.3 mm Ball |
|---|--------------------------------------|--------------------------------------|
| GSG Loop inductance | 0.54 nH | 0.56 nH |
| Self inductance | 0.43 nH | 0.56 nH |
| Capacitance (GSG - Signal pin to Return) | 0.239 pF | 0.291 pF |
| S21 Insertion loss / GSG | -1 dB @ 27 GHz | -1 dB @ 25.8 GHz |
| S11 Return Loss / GSG | -10 dB @ 24 GHz -20 dB @ 13.8 GHz | -10 dB @ 25.6 GHz -20 dB @ 12 GHz |
| Impedance | 47.5 Ω | 51.4 Ω |
| Time delay | 10.0 ps | 9.4 ps |
| Current Carrying Capacity | 1 A | 1 A |
| CRES | < 50 mΩ | < 50 mΩ |

MECHANICAL SPECIFICATIONS

| | |
|------------------|--------------------|
| Contact life | 50 insertions |
| Insertion Force* | 20 grams / contact |
| Contact Length | 1.7 mm |

*Insertion force based on 0.4 mm pitch, 0.25 mm diameter SAC 305 solder balls.

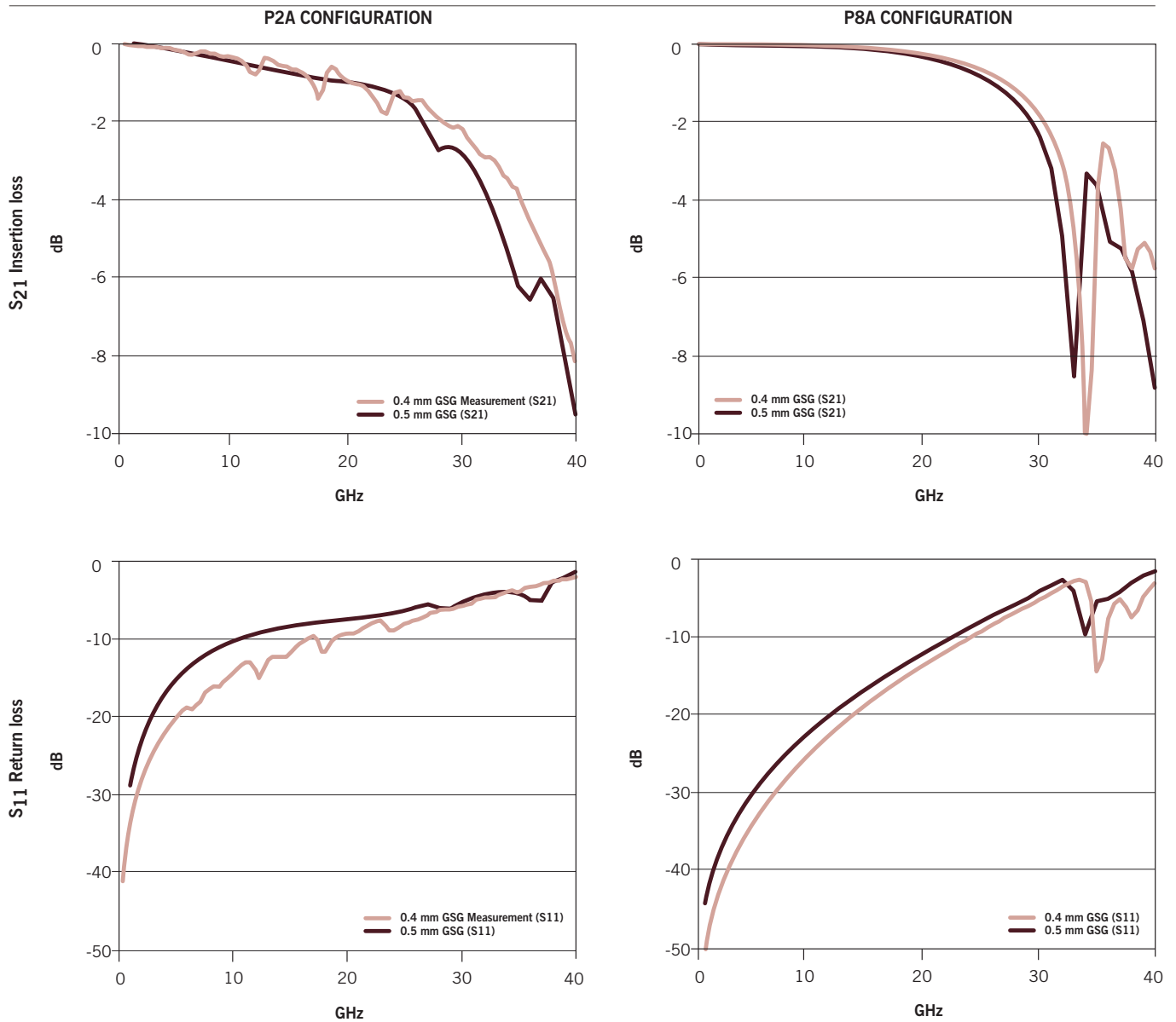
MATERIAL SPECIFICATIONS

| | |
|-----------------------|----------------------------|
| Contact base material | Copper (Cu) alloy |
| Contact plating | Gold (Au) over Nickel (Ni) |
| Housing | Polyimide (Cirlex®) |
| Solder ball* | SAC 305 |
| Environmental | Contact factory |

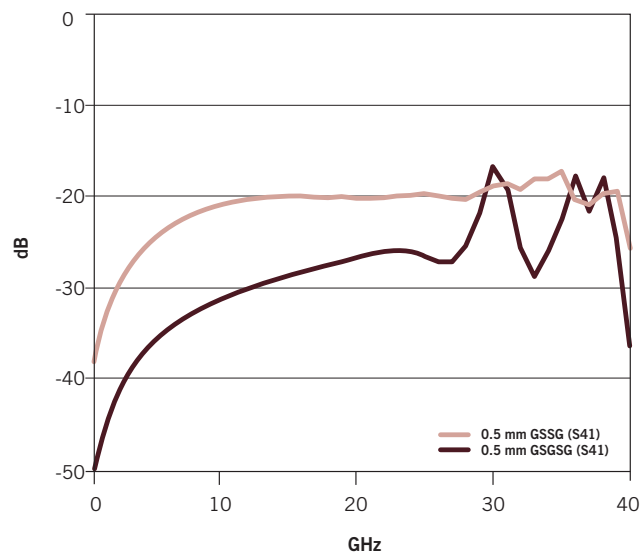
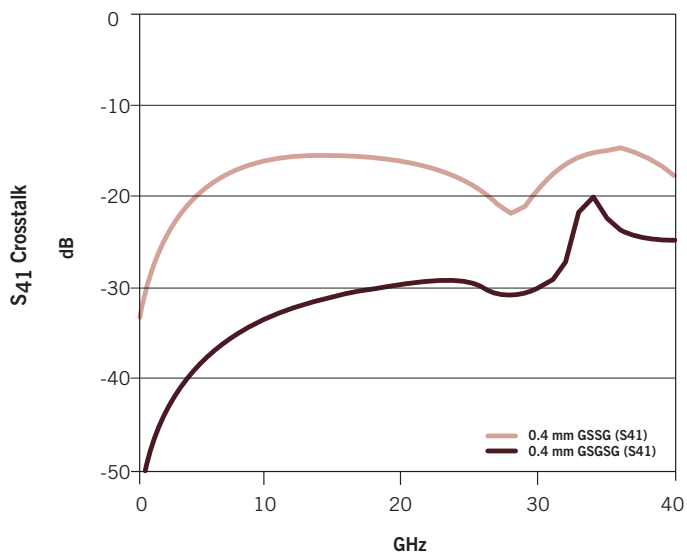
Performance may vary based on application and compliance requirements. Additional performance data may be available on request.

* The G40 has lead-free solder balls pre-attached.

PERFORMANCE



PERFORMANCE



OPTIONS/SPARES

Package press

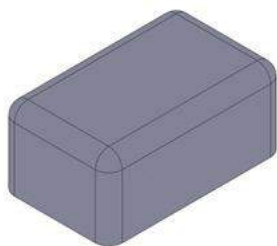
The package press provides uniform surface to press the package into the socket

Extraction tool

This tool assists removing the device from the contactor

Alignment frame

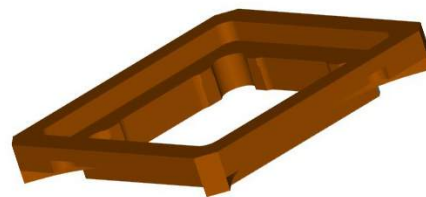
Alignment frame provided with each G40 socket



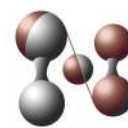
Device Press



Extraction tool



Alignment frame



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