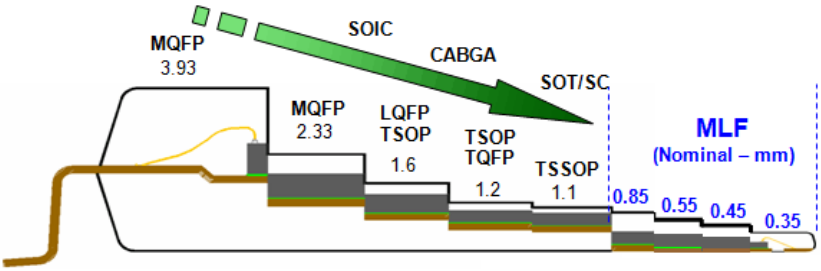
Solving the Dilemma of Small Parts Handling

Trends in semiconductor packaging are being driven by the need for higher density (higher pin count), smaller and thinner ICs to support small form factor products. Wafer Level Chip-Scale Packing (WLCSP) is primed to dominate the internet of things (IoT) industry, provided IoT manufacturers find reasonable solutions to safely handle and program their devices. Manufacturers are looking to preprogram small form factor ICs and bake in security at the same time rather than bolting it on as an afterthought. Advancements in robotics handling, socketing technologies and embedded security software are paving the way for new offline automated programming solutions specifically designed for handling and securing small parts.

Wafer Level Chip Scale Package (WLCSP)

Demand for Wafer Level Chip-Scale Packaging (WLCSP) is increasing rapidly, driven largely by adoption in smart phones and tablets. WLCSP is ideally suited for these mobile applications. Nearly 100% of connectivity devices in handsets now make use of WLCSP, and roughly 92% of all WLCSP packages are assembled into handsets.



Source: Amkor Technology

WLCSP packages can be less than 0.4mm thick and are in high demand by leading mobile phone designers. Wafer-Level-Chip-Scale Packaging is gaining more and more significance as smaller form-factor tablets, smartphones, wearables and the coming wave of internet of things (IoT) products as the ramp-up demands.

Handling of WLCSP Packaging

Until recently the only option available for programming WLCSP package was on board at-test or on a dedicated bed-of-nails programmer. Implementing both programming and security via on-board programming at-test has proven to be too high-risk and costly to implement. All experts agree that embedding seeds-of-trust and managing security keys earliest in the build process (at the component level) provides the highest level of product security.

At the same time, traditional preprogramming equipment with claims to handle very small packages simply don't work in high-volume production environments. Machines often require customized set-up parameters to process each small package. This leads to longer changeover times, less production uptime and higher levels of frustration. In addition, sockets may not be designed to safely secure and program small packages with acceptable yield performance resulting in higher volumes of scrap.

The good news is companies like Data I/O Corporation have stepped up to address the needs for handling and securing small parts. Data I/O's PSV7000 automated programming system is engineered with a recipe specifically designed to handle the very smallest parts and program them cost effectively.

Data I/O's PSV7000

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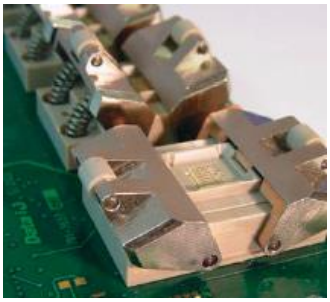
High Insertion Count (HIC) Sockets

Data I/O's High Insertion Count Socket Adapters are designed for use in high-volume production environments where continuous uptime and high programming yields are required to maximize production utilization. Contact pins made from the highest quality materials deliver low-noise programming signals for clean signal integrity to the device pins. In addition, stainless steel/gold plated spring probe contacts provide accurate repeatability for long insertion life.

HIC sockets are proven to both protect and program very small package types in high-volume production. Each socket is warranted for 250,000 insertions per socket with typical programming yields at 99.8% or higher. Data I/O's HIC sockets are engineered to deliver the highest levels of package protection and performance for even the smallest device packaging.



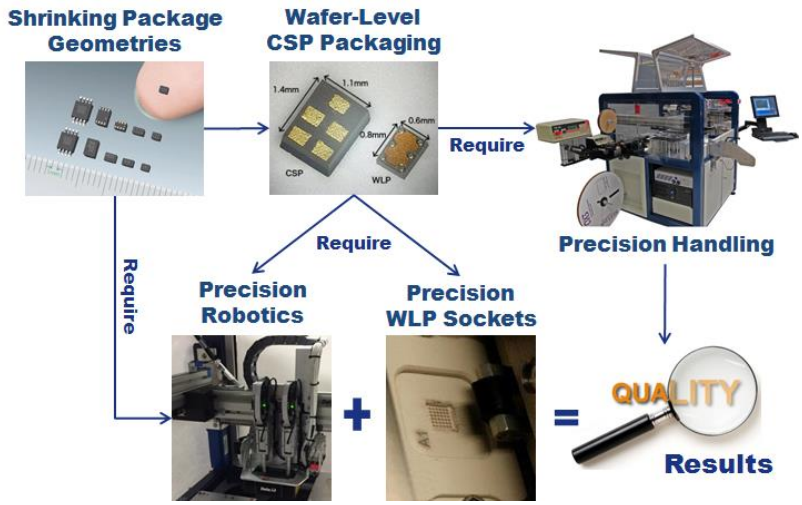
Source: Data I/O Corporation

The Recipe for Handling and Marking Small Parts:

1. A sturdy rigid frame to minimize machine vibration
2. Base mounted H-Bot gantry eliminates vibration and wear typically associated with traditional overhead X-Y gantries
3. Linear X-Y encoders for precision device placement into sockets and output media
4. Dual pick-and-place probes with brushless DC servo-motors deliver precision linear stability and vision accuracy
5. Devices align-on-the fly to their target destination, minimizing moves while boosting overall system throughput
6. SMT compliant probe tips safely and securely pick-and-place parts utilizing non-slip rubber tip seals
7. High-insertion count (HIC) sockets deliver up to 250,000 insertions per socket and typical yields at 99.8% or higher
8. Advanced Fiber Laser technology with superior depth control to safely and legibly mark the smallest package

Source: Data I/O

Small Parts Handling - Problem Solved



Data I/O's PSV7000 is field proven to handle the smallest parts with the highest performance in terms of programming yield and throughput.

Data I/O's exclusive high-insertion-count (HIC) socket adapters are designed to ensure proper form, fit and functionality to safely protect the smallest parts.

As demands for Wafer Level Chip-Scale Packages (WLCSP) increase, production managers are taking notice of offline automated programming solutions like Data I/O's PSV7000, designed with small parts handling in mind.