Interplex

Tech Bulletin

Creating Cost-Effective Sensor Housings with Integrated Molding and Wire Bondable Plated Stampings

The optimal housing solution for Sensors, MEMs, LEDs, Power Electronics and other emerging applications.

This Tech Bulletin describes the benefits of streamlining the process for creating electronic sensor housings and supporting internal/external interconnect requirements through the use of wire bondable plated stampings that can be directly integrated as a cohesive part of the module housings.

Proliferation of Housing & Interconnection Requirements

Applications requiring electronic module packaging are proliferating and the diversity of requirements is also driving a need for new and better methods for creating interconnections - both internally within the modules and also to provide external connections from the modules.

Many emerging applications utilizing electronic systems are demanding fully Integrated, modular, 'plug & play' package units with multiple internal connection platforms that support the combination of various technologies from chip-level up through mini-board and module level. Even as feature-rich complexity of the module designs continues to increase, the associated interconnect complexity needs to be held to a minimum.

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The Growing Challenges of Interconnect Complexity

With the increasing functionality in today's modules, interconnection complexity can often become a major obstacle to achieving overall application goals. High performance sensors and multi-level circuitry (chips and mini-boards) within the modules tends to drive up interconnect complexity, which can result in both higher production costs and potential product reliability risks.

By holding down the number of interconnection levels and reducing interconnect complexity, the overall packaging design can be optimized to match application performance needs while also improving yields, boosting reliability and reducing production costs.

Considering all of the issues involved with designing and developing both package technology and interconnection technology, the need for integration of both disciplines is emerging as the ideal solution for future electronic systems. An integrated connector package module will offer a range of advantages which can meet or exceed the needs for increasing complexity at lower cost.

Benefits of Integrating Molding, Stamping and Wire Bondable Plating Processes

Interplex Engineered Products (IEP) has been developing a range of technologies that address these issues by bringing together injection molding with fine precision stamping of metal interconnection platforms that can be pre-plated for a variety of application-specific wire bond requirements.

This enables the production of complex feature sensor housings that suit a range of applications from automotive systems to consumer product units and other emerging applications. Combined with the capability of producing wire-bondable surfaces with precious metal finishes, this integrated housings approach offers the module designer opportunities to reduce costs by bonding sensor parts, along with control elements directly into the housings.

The integrated approach of combining molding, stamping and plating processes allows cost-effective production of housings with the following features:

- Stamped and etched single Lead frame & multiple level Interconnects
- A range of Base metal alloys - Thermal & Non Thermal capabilities
- Plating alternatives for Wire bonding and connector needs
    - New options - Nickel Phosphorus & Palladium etc.
- Standard or custom Connector styles and plated metal finishes
- High performance Thermo-Plastic options - LCP & Glass Filled Nylons, etc.
- Multi-level 'Open Cavity' capabilities
- Lids with features for mechanical, epoxy or laser sealing
    - Also with apertures and in-built filter membranes

Wire Bondable Plated Stamping Options

The base metals used for stamping are typically copper alloys, however Brass, Phosphor Bronze and other alloys are available. The process can involve requirements for forming and shaping the metals to create connectors, conductors and/or thermal management features within the housings. For thin material requirements, chemical Etching is available utilizing stainless steel, copper-based alloys, alloy 42 or copper-clad polyimides from 0.035 to 0.50 mm thick.

The surfaces of the stamped frames are plated with finishes that will enable reliable and efficient interconnection, whether it is through wirebond or press-fit connector. The surface can be plated with

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Gold (Hard & Soft), Nickel, Nickel Palladium, Copper or a mixture of these finishes. Deposition is by high speed continuous spot plating or step & repeat spot plating to yield high performance although lower cost selective stripe or brush and controlled depth processes can be used.

Molding and Housing Integration Processes

It is important to have up to date, state of the art, injection mold equipment that can offer a wide range of options for the housing design. The options should include reel-to-reel and rotary insert mold machines. The mold tool designs can be critical and design rules have been developed to enable complex 3-dimensional structures and features to be built into housings.

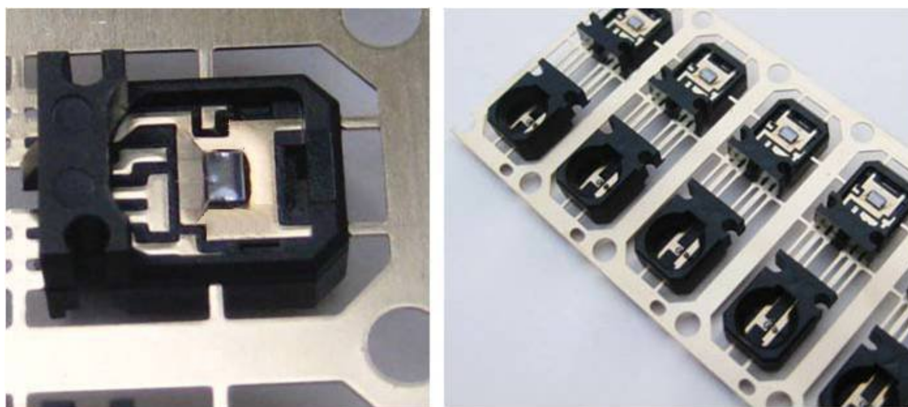
In addition to molded thermoplastic parts, in a variety of engineering polymers, IEP manufactures housings that use Liquid Crystal Polymer (LCP) plastics, which require specialized mold and process capabilities There are a range of LCP materials that have high strength, high resistance to moisture and chemical ingress and will withstand very high temperatures (>300°C), which make them ideal for many sensor applications as well as housings for power modules.

Summary:
Reduced Complexity, Higher Reliability, and Better Design Flexibility
Plus Improved Yields and Lower Production Costs

Sensors and MEMS devices are one of the fastest growth application areas requiring specialized often open cavity packages. Most packages are application specific and require non-standard surface finishes to suit the type of sensing medium as well as to interconnect the sensor within the package housing.

All in all, the use of an integrated housing design and production process enables more cost effective designs, producing definitive application specific electronic system module housings. By starting with the end application goals for the module, IEP housing design engineers will take a customer concept and provide a full engineering review, recommending the best technical options at competitive costs.

The bottom line with the integrated housing design approach is a blend of increased design flexibility, improved reliability, reduced complexity and lower production costs.



Wirebonded opto-sensor with clear epoxy sealing

More information regarding Interplex Engineered Products and custom design capabilities can also be found on the web by visiting http://www.interplex.com/iep or by calling (401) 434 6543.

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