LEADER TECH a HEICO company

The Leading Edge In EMI Shielding Technology

Leader Tech Inc. Multicavity Shields

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Leader Tech Multicavity Shields can save space, weight, and manufacturing time, while also improving circuit performance. Combining multiple shields into a one-part Multicavity shield greatly reduces the amount of footprint area, saving from 25-65% of the solder land or footprint area. Consider two shields in close proximity. If combined into a Multicavity shield, the footprint of one wall and the distance between the two shields is eliminated. Do this with six or more shields and the savings add up. The cavity-to-cavity (circuit lead lengths) distance is now reduced to about .1 inch. These reduced circuit lead lengths improve overall circuit performance. Multicavity Shields also weigh 5% and 20% less than individual shields. The optimum Multicavity shield creates a group of Faraday cages that share interconnecting walls that have a 100% shield-to-board solder connection, a good EMI contact between the inner walls and the cover, and have no apertures between cavities. Leader Tech provides customers with one-part Multicavity Shields with all of these features and save customers board real estate, design time, design cost, precious development time and production costs.

There are three major types of Multicavity circuit board shields.

- Custom unique photo etched, formed and assembled
- Custom unique hard tool stampings
- Standard off-the-shelf modular fence and cover

One-part Multicavity Shields can be designed and etched from one piece of metal. However, this type of shield is always a unique design with no economies of scale. These designs often require customers to form and align the inner walls during installation into the circuit card. This task can be difficult and expensive. The etched designs usually have undesirable apertures between cavities. Stamped one-piece designs usually have large apertures between cavities. Stamped multi-piece designs require assembly and alignment during installation into the circuit card – slowing circuit card manufacturing processes.

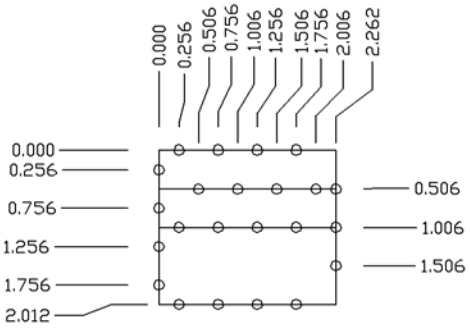
A big obstacle in etched or stamped designs is the customer is required to fully design every detail of the circuit board to shield mounting area before the circuit card is designed. The mechanical design of the shield is often provided by the photo etch house or metal stamping house. Costs, for the mechanical design and especially the hard tooling, can be prohibitive at the design start up level. Moreover, these costs do not include the learning curve and design time necessary for the shield itself. And finally, it is just not practical to expect an engineer to design a perfect EMI Shield before the electronic design is completed and tested. During research and development, electronic circuits change and often force modification of the shields. With etched or stamped designs, modifications require repeating the expensive custom tooling process.

The key to a successful implementation of Multicavity Shields is using modular off-the-shelf components, easily modified and properly assembled to yield a truly custom Multicavity design without the need for expensive unique custom etching or stamping tools. Leader Tech has developed the necessary manufacturing techniques, fixtures and craftsmanship to create, hold and join the interconnecting pieces with the same precision associated with single shields. While Leader Tech designs and produces, photo etched multi-part and custom stamped frame and cover shields, most customer ask for the Leader Tech “standard off-the-shelf modular fence and cover“ type shield. As the world leader in individual “standard off-the-shelf modular “fence and cover” CBS shields”, Leader Tech expects to become the leader in “standard off-the-shelf modular “fence and cover” Multicavity Shields.

Leader Tech collaboration with customers starts before the circuit card layout is created. The optimum design and involves several steps. The following is a typical process:

1. A cursory discussion will establish the shield style is established.
   - The overall size (height is paramount)
   - Attachment method (surface mount, through-hole, & solder requirements)
   - Inter-cavity circuit connections (notches, feed-through components)
   - EMI environment (clock frequencies) & ventilation requirements
   - Material requirements, and plating finish are determined.
2. The shield style will be reviewed, often the shield style changes after the discussion in step 1.
3. A short business discussion is appropriate at this point. Depending on the quantity or the schedule, certain design, tooling and manufacturing options are considered.
4. Pin patterns are developed and approved by both the customer and Leader Tech.
5. A decision for the standard Leader Tech go/no-go pin gage.
6. The circuit board is laid out.
7. If required, prototypes or first articles may be made.
8. Customer approves and submits final drawings.
9. Leader Tech is ready for a Purchase Order.

Similar to the construction of a tall skyscraper building, Multicavity Shields are built from a good foundation. In the case of our Multicavity Shield, the foundation is the pin pattern. All dimensions and features begin with and are in reference to the pin pattern. Layout is critical because fence bend allowances cause the alignment locations of the pin pattern to offset from the nominal fence pitch grid. Customers begin by calling (telephone –813-855-6921 or email dyarbrough@leadertechinc.com) or sending a block sketch of the shield shape with gross dimensions based on the standard pitch of the fence (usually .25 inch). For instance, using figure 4, this shield can be described as a 2.0 inch x 2.25-inch shield with 2 inner walls that run from outside wall to outside wall across the shield in the long direction. This creates a 3-cavity shield. There is one large cavity approximately 1.0 inch x 2.25 inch, and two small cavities approximately .5 inch x 2.25 inch.



Using these gross dimensions, Leader Tech can provide the customer with a .DWG layout for the exact pin pattern the customer desires. Next the customer sends the board layout .DWG to the shield Leader Tech for checking. Further collaboration with the customer confirms or resolves any problems in the layout prior to order placement. All fences will stretch when bent at right angles. Most Leader Tech fences stretch .006 inch in both the X and Y directions each time the fence is bent.

Leader Tech is famous for having the strongest fingers (on the CBS fence) in the world. This renowned finger strength is what keeps our covers in place. Leader Tech patented this CBS design almost a decade ago. Since then we have expanded and improved on this design. Today, using our experience in cover retention, inner wall attachment, EMI gasket placement, ventilation holes, locating pins, anti-vibration dimples, etc., Leader Tech customers are provided essentially "standard" design solutions and avoid the high costs and headaches associated with unique in-house designs. Leader Tech assists its customers by quickly designing and prototyping Multicavity Shields to meet narrow time-to-market windows. This winning combination of "standard off-the-shelf modular components" and rapid customer service allows customers to make modifications at any time during the life of the design – without the need for expensive tooling costs. Saving space, weight, and cost enable design engineers to provide far superior EMI shielding solutions and ultimately bring better products to market.

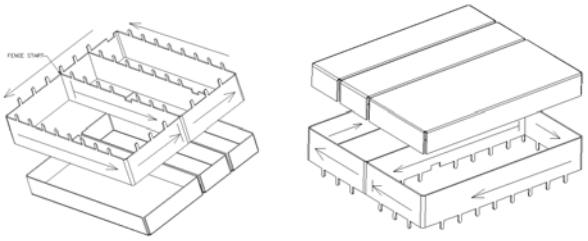
In summary, customers are no longer required to pay expensive tooling costs and wait for today's new one-part fence and cover Multicavity Shields. These shields provide the ultimate in performance by quickly and inexpensively placing a complete Faraday cage around each circuit. Multiplied by the number of potential shields in one Multicavity design, the savings can be considerable. Manufacturing and Purchasing managers also appreciate the "single part" versus "multiple part" approach -- fewer parts, fewer inventories to stock, less assembly, and lower design costs.

Leader Tech Multicavity Shields

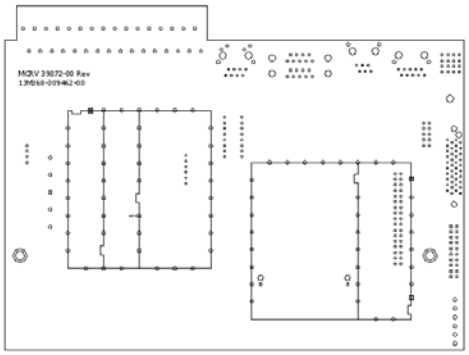
Features	Benefits
Leader Tech standard modular off-the-shelf fence and cover design	Fast cost-effective design, samples, prototypes and production quantities
Multiv-cavity footprint area = 25-65% less	Saves precious circuit board area
No clearance space between cavities	Reduces cavity-to-cavity distance to .1 inch
Knife-edge fence solder connection between cavities	No apertures for multi-gigahertz shielding
BeCu gasket seal between internal fences and cover	No apertures for multi-gigahertz shielding
One part design	Saves design resources
One drawing	Reduces documentation costs
One circuit board layout	Provides fast accurate layout
One part procurement	Reduces materials management costs
One part installation	Saves installation time & manufacturing costs
Std. Leader Tech fence and cover design techniques	Fast design and quick prototypes
Std. Leader Tech thru-hole pins and SMT mounting	Mature technology.
Various materials and plating available	Performs well in all environments
Standard Leader Tech modifications	Dimples, locking dimples, ventilation holes, notches, special shapes, locating pins
Enhanced system level economies	Reduced size, weight, manufacturing procedures, and cost.

Excellent system level EMI performance	More complete faraday shield. Reduced via lengths improve circuit designs.
Inter-cavity distance = .1 inch	Reduces circuit via lengths & improves circuit speed
Leader Tech standard modular off-the-shelf fence and cover design	Fast cost-effective design, samples, prototypes and production quantities

Small Multicavity Shield



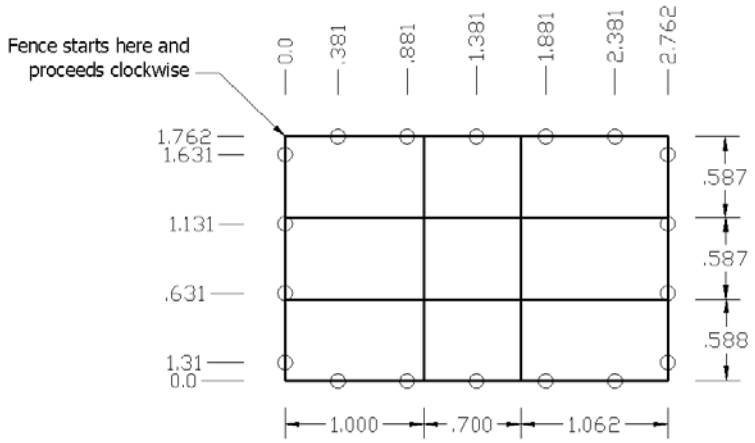
Multiple Multicavity Shield



Low profile Multicavity using the 14R-CBS

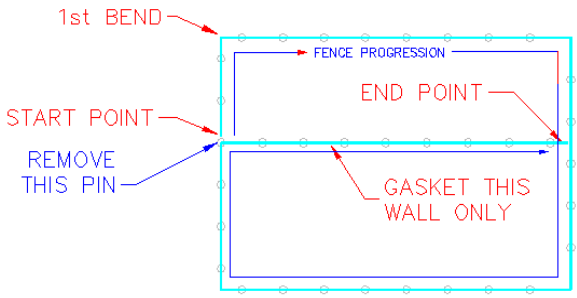
Special notes:

- The inner walls need not be aligned with the pin pattern.
- The inner walls are welded to the outside walls.
- Inner wall EMI gaskets are optional.



Notes:

1. Form a 54-CBSF-3.0x4.25x.5 figure 8 shield with pin pattern as shown.
2. Insert 3-23TV30-SN gasket in inner wall as shown.
3. Remove pin as shown.
4. Ship formed fence and cover as separate pieces.

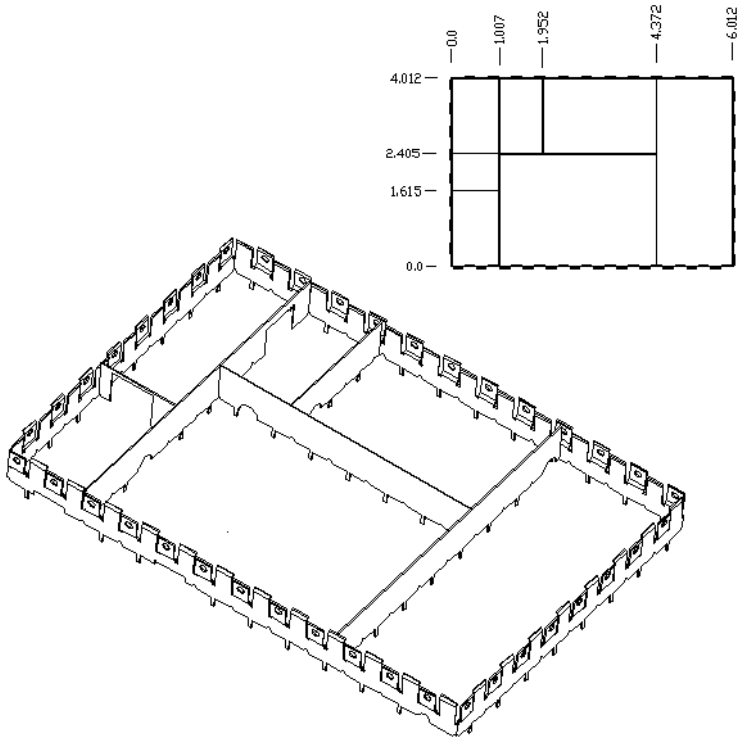


Simple Figure 8 style

- The foot print reduction is .425 inches.
- The interconnections are about .1 inch less.
- Manufacturing installed one shield in lieu of two.
- FEDEXed sample within one hour of telephone call.
- For Leader Tech Inc this is a piece of cake.
- For the customer this is speed and not tooling costs.

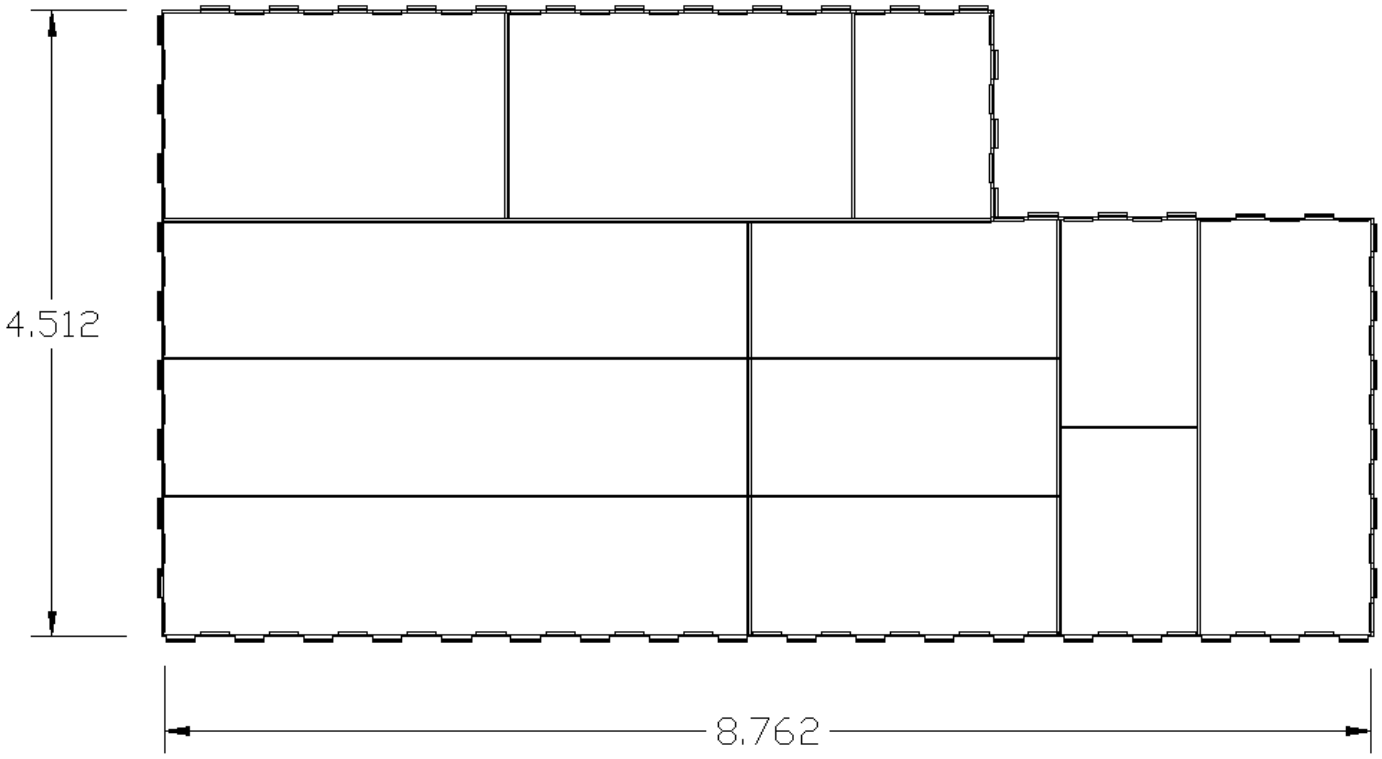
7-Cavity 44-CBS Series

- Standard Leader Tech pin pattern.
- Standard Leader Tech fence and cover.
- Standard Leader Tech 3-23TV-SN BeCu gasket seal between inner walls and cover.
- Custom notches for telecom application.
- Special Note: Inner walls can be located anywhere. Inner walls locations are dimensioned form centerline on the inner wall fence to the centerline pin pattern for the outer walls.
- Special Note: The outer fence is reversed.



12-Cavity 59 Series

Standard Leader Tech L-shape 59-CBS reversed fence & cover.
Standard Leader Tech blade fence inner walls.
Standard Leader Tech 3-23TV-SN EMI gaskets.
Standard LT pin pattern.
Customer aligned inner walls on LT pin pattern for his convenience.
Standard LT Pin gage fixture required.



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Modified T-Shape 10/20 CBS

- Standard LT L-shape 24-CBS fence & cover.
- Standard LT blade fence inner walls.
- Standard LT 3-23TV-SN EMI gaskets.
- Standard LT pin pattern.
- Standard Leader Tech on standard pin pattern.
- Blade fence inner walls welded to outer walls.
- 3-23TV-SN EMI gaskets on inner walls.
- Inner walls are customer specific with custom dimensions.
- Standard LT Pin gage fixture required.

- Customer completed this excellent design without assistance.