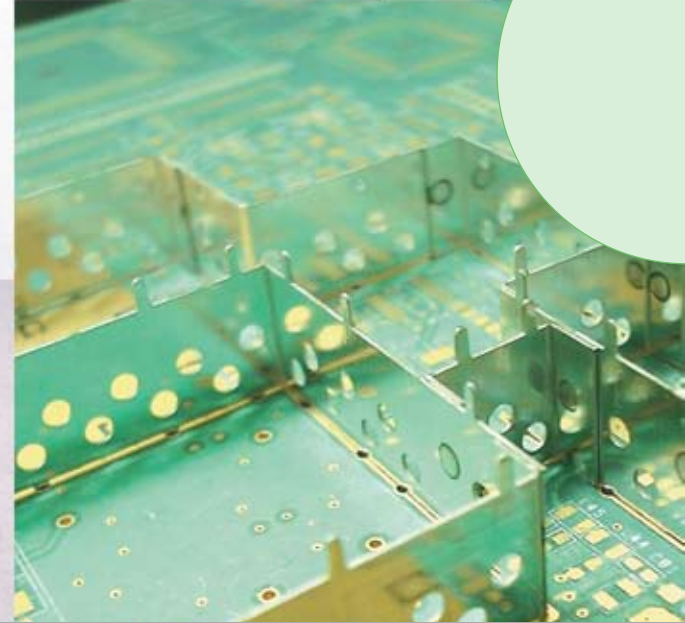
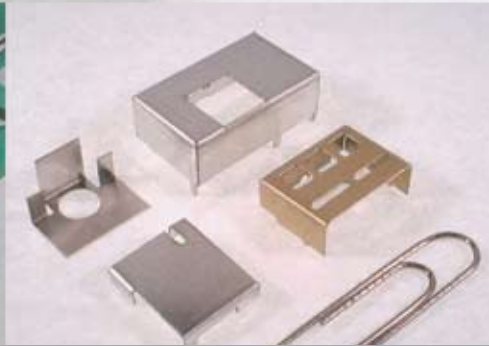
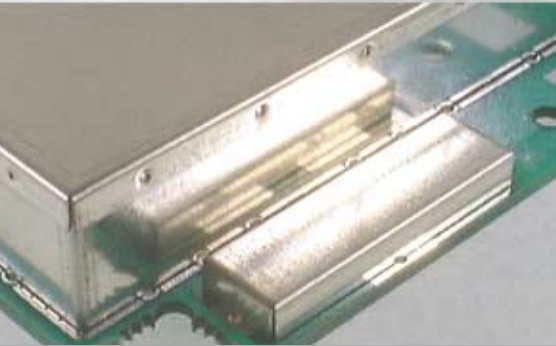
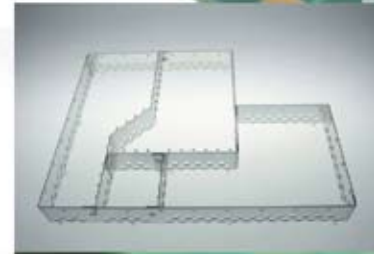
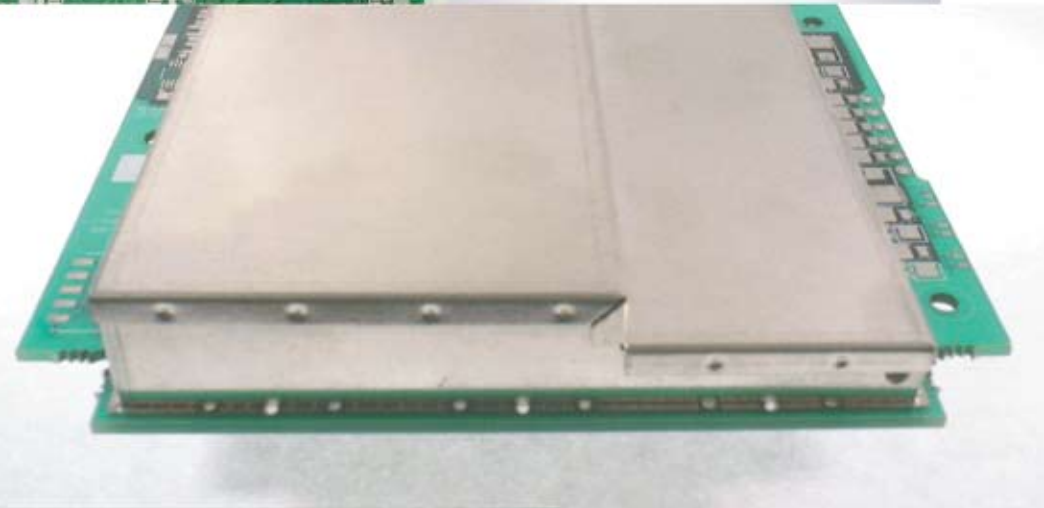
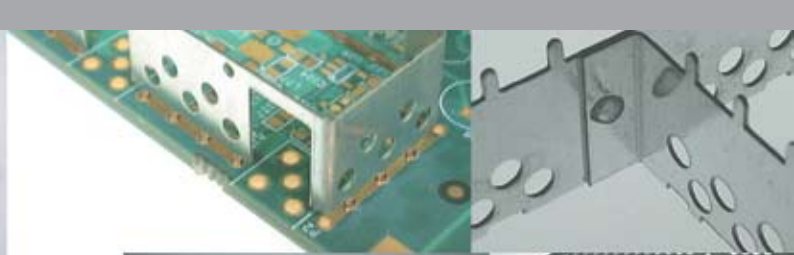




Advanced RF/EMI PCB Shielding Solutions

electronic hardware made easy™



Advanced RF/EMI PCB shielding solutions

APPLICATIONS

The wireless age is here and you are driving it forward with creative new products designed to liberate the potential of mobile computing. You know what your customers are asking for and your design takes RF technology to the cutting edge. You seek to maximize the speed and performance of your device even as you shrink it as small as you can. Today you will find out how it works! That is... unless there's interference. And we don't mean the latest wish list from the Marketing department.

FLEXIBILITY IN DESIGN

The 3Gmetalworx system has been proven in hundreds of wireless devices used in applications such as GPS, WLAN, Last Mile & Broadband Access, PDAs and Remote Asset Management. This advanced RF/EMI shielding system is in use today for a number of Central Office and Wireless Base Station applications, enabling superior RF performance in a variety of demanding environments. Chances are that if you are using a wireless communication network, you are relying on circuitry protected by 3Gmetalworx shielding solutions. If you design or develop RF communication equipment, 3Gmetalworx can provide the PCB-based RF/EMI management solutions you need.



broadband access wireless LAN GPS transceivers
remote asset management
last mile solutions metropolitan WLAN
2.5G & 3G base station hardware
wireless hand held assistants

Reliability and compliance



NEEDS

It may be your RF components interfering with your digital circuitry, or it may be an unwanted source of external noise. It may be coming from your antenna, or the device in the office next door. But whatever the source, it compromises the performance of your device and robs it of the speed you know it can achieve. It adds to your development costs while your design team struggles to rectify the problem. It increases your time to market and allows the competition an advantage in your marketplace. In any case, 20/20 hindsight tells you that interference is the problem and that effective RF/EMI management is the answer.



SOLUTIONS

The 3Gmetalworx system is designed to ensure reliability of performance and predictability of compliance by providing a proven platform and methodology for developing RF/EMI shielding solutions specifically tailored to your PCB.

A flexible product architecture enables design of a solution uniquely suited to your application, coupled with the manufacturing agility you require to meet your deadlines. Manufacturing volumes are scalable from prototype to full production, ensuring stable supply and consistent quality for the entire product lifecycle.

scalability of volume
flexibility of design
agility of deployment
stability of supply
consistency of quality
reliability of performance

Corporate overview



WHO IS 3GMETALWORX?

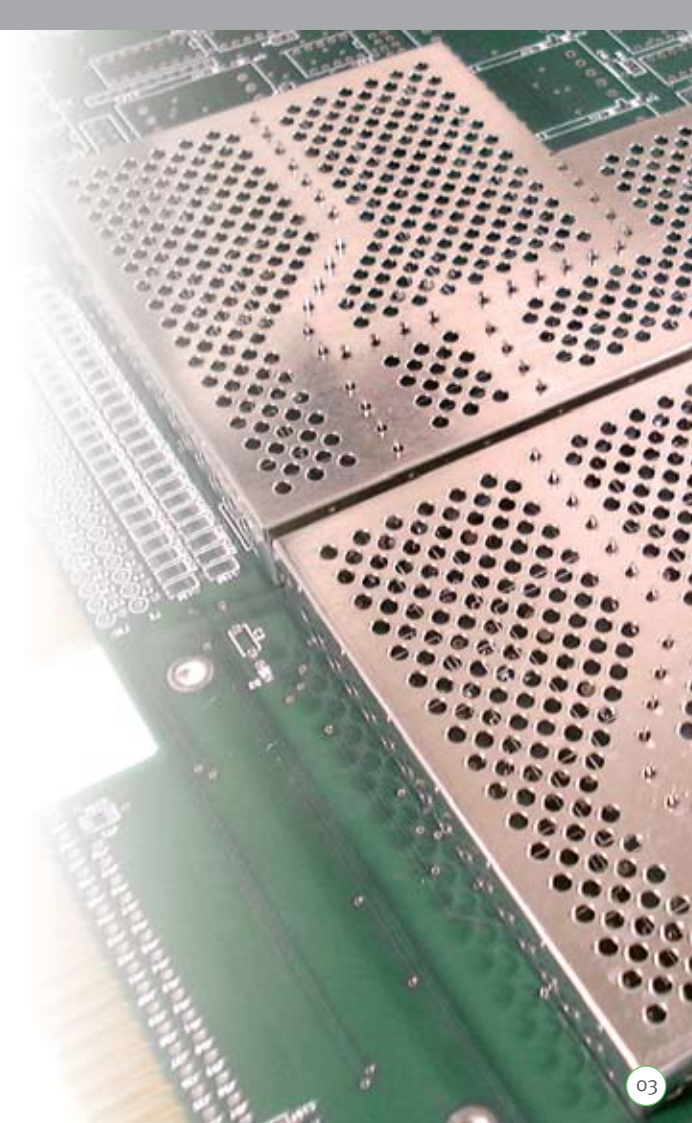
Since 1994, leading electronics companies have relied on 3Gmetalworx to deliver cutting edge solutions for advanced electronic applications. Based in the industrial heartland of Ontario, Canada, we ship millions of shielding components per year. Our organization's success is the result of uncompromising commitment to quality and service, a commitment backed up not by empty promises and wishful thinking, but by proven performance and reliable results. We believe in earning our clients' loyalty by delivering on every promise we make, on every order we take. Are you tired of empty commitments and broken promises? Then call us and find out for yourself that it doesn't need to be that way.



WHAT DOES 3GMETALWORX DO?

3Gmetalworx is a specialized manufacturer of PCB-level RF/EMI shielding metalwork for electronic devices of all kinds. We are a service-oriented enterprise focused on serving a global clientele with application-specific solutions for their needs. From prototyping and design services to JIT manufacturing supply, our clients depend on us to provide a seamless service pathway supporting the entire product lifecycle. Each one is fabricated to a unique specification designed for optimal application performance, covering the full spectrum from prototypes to mature products.

quality trust
reliability service innovation
responsiveness



Markets commercial



BASE STATIONS & ACCESS POINTS

3Gmetalworx provides PCB shielding solutions to leading base station and access point manufacturers, operating in a wide cross-section of frequencies and technologies. From indoor-based coverage enhancement to outdoor-mounted high-speed networks, we offer comprehensive solutions for wireless network access points. Our multi-cavity solutions enable the tightest physical configurations possible while providing the required performance levels for long-life and reliable operation.



END-USER DEVICES AND NETWORK GEAR

We support central office or end-user devices such as wireless or satellite modems, precision GPS receivers, wireless terminals, wireless routers, radio modules, test instruments, marine transmitters, scientific devices, and any other electronic appliances requiring PCB-level shielding for performance or compliance reasons.

GPS receiver, instrumentation
access point, satellite router, OEM module
pole-mount hardware
base station



Markets defense



TACTICAL COMMUNICATIONS

As communications and information management become central to defense operations, 3Metalworx is advancing the state of the art with our military clientele. Advanced and robust communication solutions require specialized shielding metalwork from a capable and trusted supplier. 3Metalworx is approved to handle ITAR requirements and supplies shielding metalwork to leading North American defense contractors in support of military programs.



ELECTRONIC SYSTEMS & DEVICES

Our solutions can be found in many defense application scenarios ranging from warfare simulation to real-time battlefield communications. The flexibility of our product system allows for full optimization of the shielding package to exact requirements. Where size, performance and weight are critical factors, our products provide unparalleled ability to meet operational challenges in the most extreme service conditions.

ITAR compliance
remote surveillance
sensor systems
tactical communication
future warrior.
robust construction



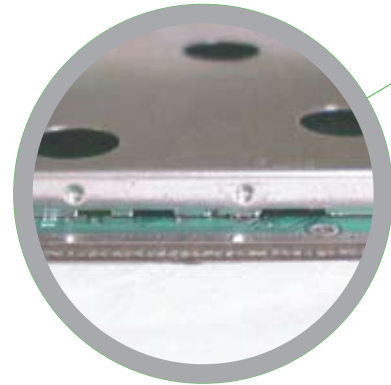
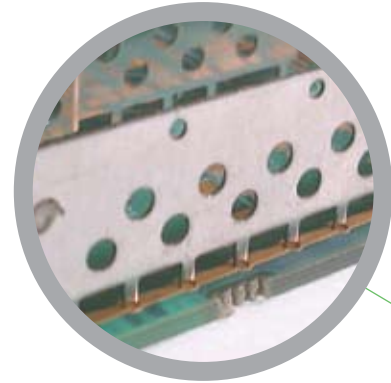
Product features

PCB INTERFACE

Engagement tabs are employed to position the shield on the PCB and help to constrain shape geometry prior to soldering. A number of standard styles are available and pre-tooled to offer cost savings. Non-standard styles can be produced on demand but may require tooling lead time, and you are encouraged to inquire in advance about special features. *

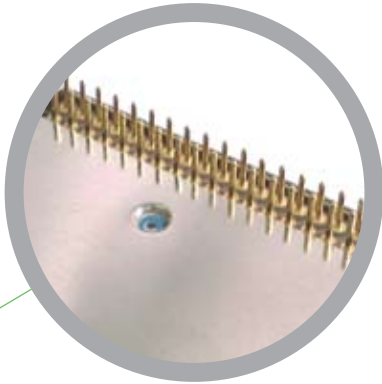
TRACE/COMPONENT RELIEF

Where traces or components come into potential contact with the metalwork, cut-out features can be incorporated into the design with virtually no restrictions on the shape or size of the opening. The top of openings can be square or radial with varying heights as required. For components that intrude into cover flanges, openings can be coordinated into the cover as well.



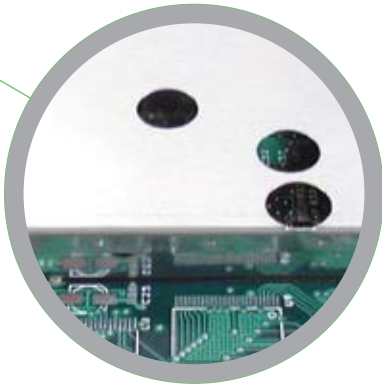
*See page 22 for PCB interface feature details.

Product features



CONNECTOR INTERFACE

Connectors that pass through the metalwork often require specialized assistance in design, especially those that require an opening affecting both the side and top of the package. Situations often arise where structural weakness is created with larger openings and this often requires additional consideration in design.



TUNING/INSPECTION ACCESS/THERMAL RELIEF

Tuning and access holes for inspecting or dialing in the design can be produced in many shapes and sizes, and at any position required. A standard perforation pattern for thermal relief is provided, but in each design case there will be an optimal configuration of this pattern we can suggest. *

*See page 23 for thermal relief feature detail.

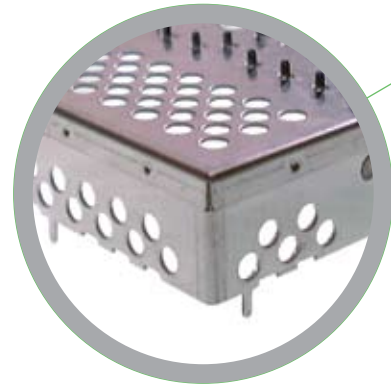
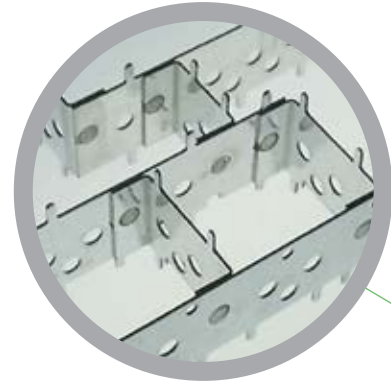
Product features

WELDED CONSTRUCTION

Shielding fences are constructed using proprietary resistance welding technology, producing a reliable assembly with dimensional accuracy and physical integrity. Complex multi-cavity shapes can be reliably produced as monolithic solutions, ready for assembly and needing no additional processing. We encourage early discussion at the concept stage of multi-cavity designs in order to leverage value engineering opportunities.

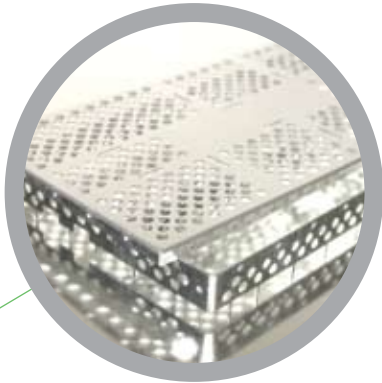
COVER RETENTION

Cover retention features include formed dimples that latch the cover to the fence. Multi-cavity designs can include aperture segmentation features for internal partitions, which can also be used to provide mechanical retention. For absolutely positive retention under aggressive shock loads, features such as fold-down or twist tabs are used in addition to dimples. *



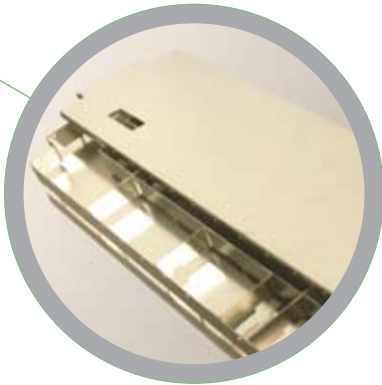
*See page 23 for retention feature detail.

Product features



MATERIALS

For indoor or commercial applications, we offer pre-plated Tin Plated Mild Steel, due to its obvious cost advantage. For outdoor, marine, avionic or defense applications, we offer Nickel Silver Alloy, which offers excellent corrosion resistance and solderability without requiring additive finishes. Both standard material options are stocked in a range of thicknesses suitable for a wide range of applications. *



SOLDERABILITY & ROHS COMPLIANCE

All our products are thoroughly degreased prior to shipment, ensuring optimum solderability. The standard material options both provide ideal soldering characteristics and RoHS compliance without post-fabrication additive plating, together with mechanical properties suitable for reliable fabrication and processing.



*See page 21 for material application data.

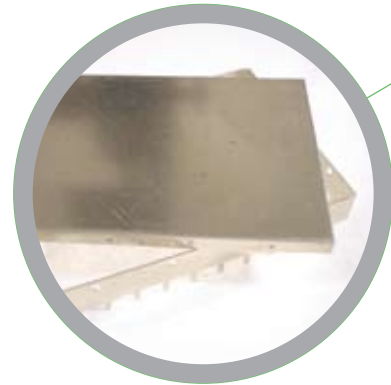
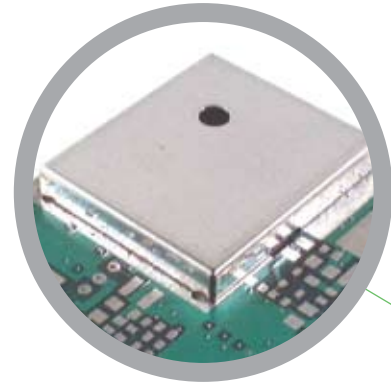
Configurations

BASIC SHIELDING CANS

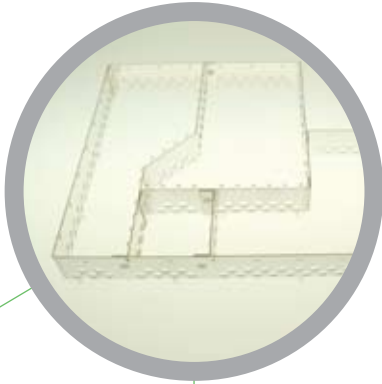
Basic PCB shielding cans provide low-cost solutions to many RF/EMI shielding requirements. Basic cans may incorporate engagement tabs, trace/component relief, tuning/access openings, thermal relief, and can be built to nonstandard shapes as required. In cases where irregular shapes produce undesirable openings, inserts can be resistance welded into place. Corner seams can be resistance welded with the addition of internal flanges to increase performance. Typical cans, however, do not allow for the removal of the shield for rework since they are usually soldered directly to the PCB.

SINGLE-CAVITY SHIELD SETS

In cases where a more significant degree of access is required, a single-cavity fence with a removable cover is recommended. Such fence and cover packages are designed to shield a single circuit area, with a fence soldered directly to the PCB and a cover that can be removed and re-installed as required. Single-cavity sets usually incorporate many product features and can be built in a wide range of footprint sizes and package heights. Versatile solutions providing unrestricted access and effective shielding performance for just about any circuit.

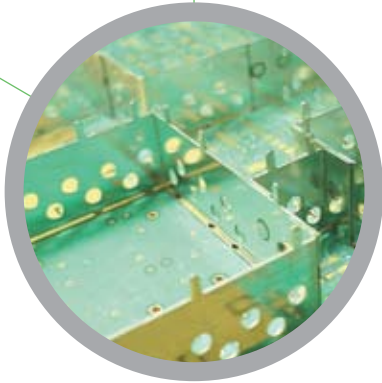


Configurations



MULTI-CAVITY SHIELD SETS

To scale down the physical size and cost of a product, multi-cavity shields are often utilized to bring together a number of single-cavity shields, which reduces the overall cost and footprint of the metalwork. Due to the complex nature of such designs and the related circuitry, multi-cavity designs have removable covers to allow access. A wide cross-section of supporting features such as engagement tabs, trace/component relief, thermal relief, and connectors are available. It is possible to build multi-cavity fence sets assembled from dozens of discreet components and having a proportionate number of cavities, opening up a world of design possibilities.



3Gmetalworx remains the industry leader in true multi-cavity solutions, and we continue to push the boundaries of complexity in multi-cavity design. Our proprietary assembly process results in a robust and accurate shield, easily handled and assembled to the PCB, and providing superior shielding performance as the result. The most sophisticated applications often use a multi-cavity shield from 3Gmetalworx to comprehensively address shielding needs.



FLEXIBILITY OF CONFIGURATION

The 3Gmetalworx system allows for the configuration of a shield package with the exact feature set required by the application. Package footprint, package height and feature position are variable in increments of 0.001", allowing for intricate mechanical design and meeting legacy and envelope challenges. Each application is unique, and each product supplied by 3Gmetalworx is unique for its application.



DESIGN SERVICES

In order to help clients express requirements, 3Gmetalworx provides a full suite of documentation services in support of our products. After understanding your needs and obtaining a starting point for a design, we can provide a full set of mechanical drawings and solid models for your review. We can work directly from your PCB data and provide you with exact digital format documentation for any part we build. 3Gmetalworx is pleased to consult on any application at the earliest stage. Supporting new product development initiatives is a key part of our mission.

electronic hardware made easy™



Technical Reference Guide

Frequently asked questions



WHAT MATERIAL CHOICES ARE AVAILABLE?

3Metalworx offers two choices of material. For commercial or indoor applications, we recommend Tin Plated Mild Steel, which is pre-plated. For defense, marine, avionics or outdoor applications, we recommend Nickel Silver alloy, which offers excellent corrosion protection with no additive plating required.



WHICH MATERIAL IS BETTER?

For cost containment, Tin Plated Mild Steel is better. But because it is pre-plated, any cut edge will be exposed steel. In certain environments or applications where corrosion is a concern, a non-ferrous alloy like Nickel Silver should be used to eliminate the possibility of failure due to corrosion. Steel should be the starting point, but where corrosion concerns dictate, Nickel Silver alloy should be specified.



WHAT SHAPES CAN BE PRODUCED?

Almost any shape can be produced for cans or fence sets, but most designs are rectangular in nature. Multi-cavity shapes are often more complex and can result in irregular perimeters. Costs can be reduced by keeping shapes as basic as possible during PCB layout, and by designing footprint corners in increments of 45 degrees. In legacy cases where optimization is no longer possible, any feasible configuration can be fabricated.



ARE THERE HEIGHT RESTRICTIONS?

There are practical minimums in terms of heights, but this depends somewhat on other shield parameters. Cans at 0.080" or taller and fences at 0.140" or taller usually require no special consideration, and there is no maximum height restriction. It is possible to go below these figures, but early consultation is recommended. Multi-cavity packages, or those with connectors, can often run into other design factors that affect package height considerations.

Frequently asked questions

WHAT IF THERE ARE CIRCUIT TRACES OR COMPONENTS PASSING THROUGH A SHIELD WALL?

Trace relief notches at the PCB plane can be produced to allow circuit traces to pass through walls or partitions. Similarly, openings can be designed to suit components that interfere with the shield in any way. The shape and size can be varied and the top of such openings can be radial or square.

WHAT ABOUT CONNECTORS OR OPENINGS FOR INSPECTION AND TESTING?

Any required openings can be incorporated into the design. For some connector designs, both the cover and fence may require special openings. Some openings will result in structural weakness which may require additional consideration. In such cases, we can advise on the exact design solution for incorporating connectors. Simpler openings require no special consideration.

CAN VENTILATION BE PROVIDED FOR HEAT DISSIPATION?

Perforations can be provided on cans or covers, and where the package height permits, on fence walls. For multi-cavity designs, thermal relief may be employed selectively on certain cavities to reduce cost. It is best to resist the temptation to perforate everything and to think optimally in terms of airflow condition and heat sources. In extreme cases, however, it is possible to perforate most of the metalwork while preserving effective shielding performance.

HOW MANY CAVITIES CAN BE PROVIDED IN MULTI-CAVITY CONFIGURATION?

Some designs that are complex may require ten or more cavities while others may require only two or three. One multi-cavity package can usually accommodate as many individual shields as required provided that the height of all cavities is kept uniform. Packages with a stepped cover can be produced, although not all such designs are feasible.

Frequently asked questions



HOW DOES THE COVER ATTACH TO THE FENCE?

There are dimples formed on the inside of the cover flanges and coordinated holes pierced through the fence walls. When the cover is placed on the fence, the dimples snap into the holes, providing secure retention. This feature is standard on all fence and cover packages. For additional retention, we offer folding or twisting tabs that pass through the cover to provide positive retention under shock loads.



ARE YOUR PRODUCT SOLUTIONS ROHS COMPLIANT?



Yes, both standard material options are compliant. On request, we offer RoHS Certification on either of our standard materials, with certification specific to the part number. Our shields contain only metal and are entirely recyclable as well.



HOW CAN I ENSURE EFFECTIVE GROUNDING OF THE INTERNAL PARTITIONS TO THE COVER?

In many cases, no additional steps are required. In certain cases, absorbers are utilized together with metalwork. For multi-cavity designs, we can provide a number of aperture segmentation strategies designed to limit inter-compartmental leakage. Generally, gaskets are not utilized for managing cavity leakage.



HOW DOES YOUR PRODUCT PERFORM?

In a test comparing a 3Gmetalworx solution to our leading competitor's equivalent product, our product delivered an attenuation advantage of 10dB at lower frequencies and 20dB at 3 GHz.

Shield design methodology

STEP 1 – CONSIDER CONFIGURATION FORMAT

If the application requires the shielding of a small circuit or a component, then a basic can will always provide the most cost-effective solution. In cases where significant test or rework is foreseen, a removable cover single-cavity package would be most suitable. If there are multiple shields required, then a multi-cavity option would be worth exploring.

STEP 2 – CONSIDER MATERIAL CHOICE

For most applications Tin Plated Mild Steel offers adequate performance and cost effectiveness. In demanding environments or service conditions Nickel Silver is recommended for its excellent corrosion resistance properties.

STEP 3 – CONSIDER PACKAGE HEIGHT

Examine your design to determine your minimum required internal height. Normally, this will be determined by the tallest component plus a desired amount of clearance.

Shield design methodology



STEP 4 – CONSIDER SHIELD FOOTPRINT

Most applications are rectangular in shape, but your needs may require something different. The best way of approaching this is to create an outline drawing or sketch showing the center-line of all required walls. Keep in mind that flexibility allows for non-standard shapes. Try to keep angles between walls to 45 or 90 degrees, since this will help reduce costs. For multi-cavity designs, consider the placement of any internal partitions as you would an outside wall.



STEP 5 – CONSIDER ENGAGEMENT TAB PLACEMENT AND STYLE

All shields benefit from the use of engagement tabs for placement on the PCB. A variety of styles are offered for your selection. Generally speaking, the larger the footprint, the more engagement tabs that should be employed. As a general rule, avoid placing tabs within 0.3” of any corner or intersection between walls. Position of engagement tabs on the footprint is up to the client.



STEP 6 – CONSIDER TRACE OR COMPONENT RELIEF

In most applications, there are traces or components that pass through walls or internal partitions. Relief notches can be provided at all locations where this occurs, with the width and height as required for the situation. Placement of these features is usually centered on the trace or component.

Shield design methodology



STEP 7 – CONSIDER INTERCONNECTS

If your application uses connectors, please consider the assembly sequence closely. In some cases connectors are assembled to the PCB before the shield, and in others after. The shape of the opening may require a particular configuration in order to facilitate assembly. For fences, this may result in structural weakness, which may require additional consideration in design.



STEP 8 – CONSIDER TUNING/INSPECTION ACCESS/THERMAL RELIEF

Even for applications with removable covers it is worth considering the addition of openings for tuning, inspection or test. For thermally challenging applications, the cover can be generally perforated to provide thermal relief. In some cases fences can be perforated as well, but only with significant package heights.



STEP 9 – CONSIDER MULTI-CAVITY ISSUES

There may be cases in multi-cavity solutions where some cavities are noisier or more sensitive than others. In such cases, it may be desirable to consider segmentation and grounding strategies for partitions separating such cavities. Strategies vary depending on the case, but the goal is generally to divide the aperture at the top of the partition into a smaller number of segments, each below a critical dimension.

Communicating your needs



INPUT FILE FORMAT

3Gmetalworx can work with full mechanical specifications, or with as little data as the PCB layout. We accept GERBER or DXF data as a starting point, and can handle most solid models, although IGES and STEP are preferred. Many clients provide the top layer of the PCB in DXF format for positional data together with a list of parameters such as package height and material choice, and we take care of the rest.



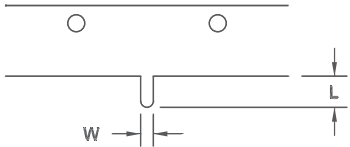
3GMETALWORX DOCUMENTATION SERVICES

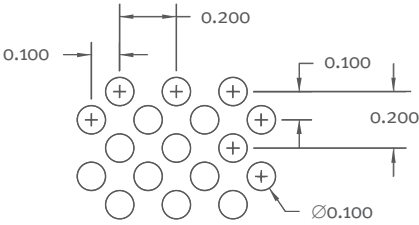
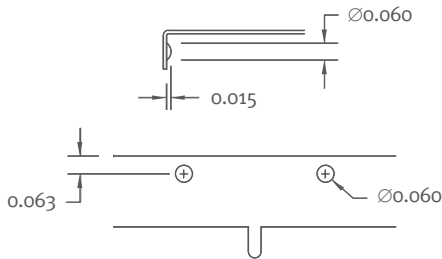
As part of our first pass on any new product, we communicate fully the intended solution and enable our clients to review and adjust the design prior to build. We model all designs exactly as they will be built, eliminating miscommunication and guesswork. Our mechanical drawings are fully documented specifications provided in PDF format. We offer solid geometry for electronic fit checking in SolidWorks native format, IGES or STEP. You can depend on 3Gmetalworx for end to end support of your design activities.

STANDARD MATERIAL THICKNESS APPLICATION CHART		
APPLICATION	TIN PLATED STEEL	NICKEL SILVER
Cans, smaller than 2.5" X 2.5" (63 mm X 63 mm)	.012" (0.30 mm)	.012" (0.30 mm)
Cans, larger than 2.5" X 2.5" (63 mm X 63 mm)	.016" (0.41 mm)	.012" (0.30 mm)
Cans, for SMT clip applications (Autosplice)	.008" (0.20 mm)	.012" (0.30 mm)
	.012" (0.30 mm)	.012" (0.30 mm)
	.016" (0.41 mm)	N/A
	.008" (0.20 mm)	.012" (0.30 mm)
Cans, for SMT clip applications (Harwin)	.012" (0.30 mm)	.012" (0.30 mm)
Single Cavity Fences	.016" (0.41 mm)	.012" (0.30 mm)
Multi Cavity Fences	.016" (0.41 mm)	.012" (0.30 mm)
Covers for Fences	.012" (0.30 mm)	.012" (0.30 mm)

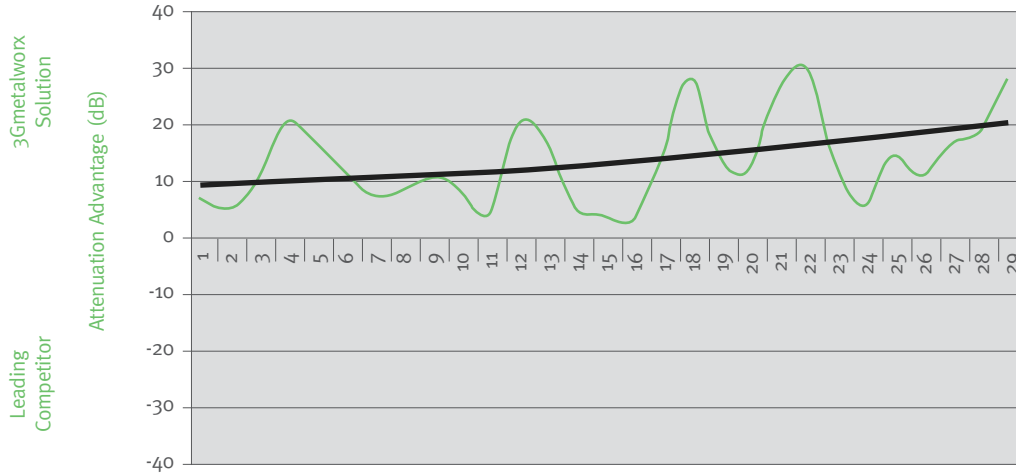
Technical reference

PCB ENGAGEMENT TAB STYLE CHART

STANDARD PCB ENGAGEMENT TAB STYLES			
		<ul style="list-style-type: none"> • All tab styles shown are standard. • All tab styles feature full radius on PCB end for ease of insertion. • PCB Hole Size is recommended minimum hole diameter. 	
STYLE NO	DIM 'W'	DIM 'L'	PCB HOLE SIZE
T1	.032" (0.81 mm)	.045" (1.14 mm)	.035" (0.89 mm)
T2	.045" (1.14 mm)	.057" (1.45 mm)	.050" (1.27 mm)
T3	.045" (1.14 mm)	.085" (2.16 mm)	.050" (1.27 mm)
T4	.045" (1.14 mm)	.110" (2.79 mm)	.050" (1.27 mm)
T5	.020" (0.51 mm)	.025" (0.64 mm)	.023" (0.58 mm)
T6	.045" (1.14 mm)	.135" (3.43 mm)	.050" (1.27 mm)
T7	.060" (1.52 mm)	.160" (4.06 mm)	.065" (1.65 mm)
T8	.030" (0.76 mm)	.110" (2.79 mm)	.033" (0.84 mm)
T9	.025" (0.64 mm)	.020" (0.51 mm)	.028" (0.71 mm)
T10	.040" (1.02 mm)	.057" (1.45 mm)	.045" (1.14 mm)

STANDARD THERMAL RELIEF AND COVER RETENTION FEATURES	
	<ul style="list-style-type: none"> • Perforation pattern shown is standard. • Shape and size of perforated area can be varied to suit application. • Can be applied to cans, covers, and where height allows, fence walls. <p>(dims in inches)</p>
	<ul style="list-style-type: none"> • Standard cover retention dimple is shown. • 0.040" diameter (1.02 mm) version available for low profile designs. • Pitch between dimples can be varied to suit application. <p>(dims in inches)</p>

Technical reference



Frequency (x100 MHz)

The above plot shows the comparative advantage provided by a 3Gmetalworx solution tested against our leading competitor's product, as measured by an independent and accredited third party laboratory. The test was conducted for a frequency range from 30 MHz to 2.9 GHz, and shows a steadily increasing attenuation advantage for the 3Gmetalworx shield, from 10 dB at the low end of the range to 20dB at the high end.



From concept to volume delivery, 3Gmetalworx is the supplier you need to help you meet your exacting requirements for electronic metalwork.

Not just products...Not just services...but an integrated approach designed to maximize your development capabilities and minimize your production headaches.

Complete metalwork solutions for your needs, leveraging our unique product designs and unparalleled service platforms across all demand levels.

A supplier that is eager to serve, committed to innovation, and focused on continually improving our processes.

If you build electronic products, and require a metalworking partner you can trust, your search is over.

We are standing by, waiting for the opportunity to prove to you that there is indeed a better way...

It's called [3Gmetalworx](#).

And it's here now.



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