

Custom Board Level Shielding (5300 Series)

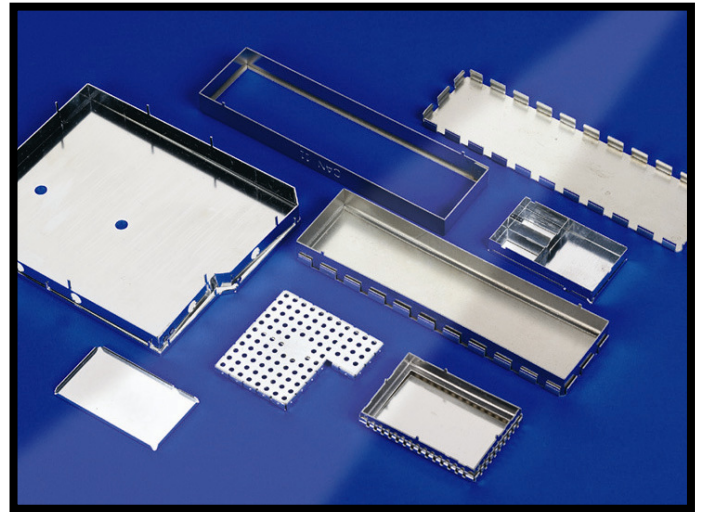
Product Summary

MAJR specializes in the design and production of custom shielding solutions, shielding cans manufactured specifically to meet the requirements of specific EMI/RFI applications. Using precision Photo Etching techniques, MAJR can supply custom tailored solutions in a matter of days, so there can be little justification for maintaining stocks of cans with compromised, standard, design and dimensions. Ideally, cans should be designed to suit the application and not vice versa. This 'custom' approach is essential if functionality and the use of 'real estate' are to be optimized.

Product Application

Non-conventional manufacturing techniques enable MAJR to offer fabricated parts of high complexity without the need for expensive hard tooling:

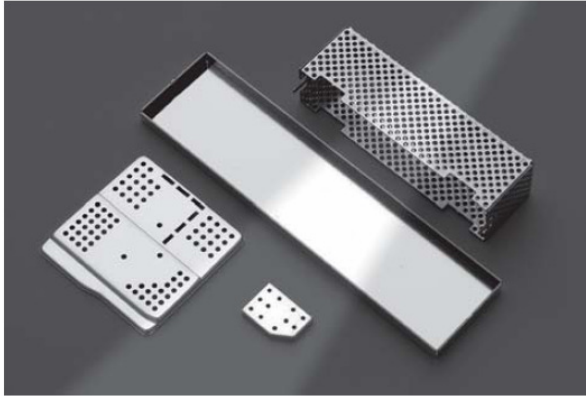
- Manufacturing methods offer greater design scope and flexibility
- Low cost tooling represents a low risk entry strategy
- Integral bend lines enable more intricate geometries
- Bend lines offer greater coplanarity for easier assembly
- Use of digital tooling reduces lead-times
- Any mounting method, (conventional through hole, SMT or mechanical) can be Accommodated
- Unique design features ease assembly and optimize performance
- I/D marks and legends available at no extra cost
- High efficiency heat dissipation venting available at no extra cost
- Easily formed manually or with 'soft' tooling



Custom Board Level Shielding (5300 Series) (Cont.)

Shielding can types

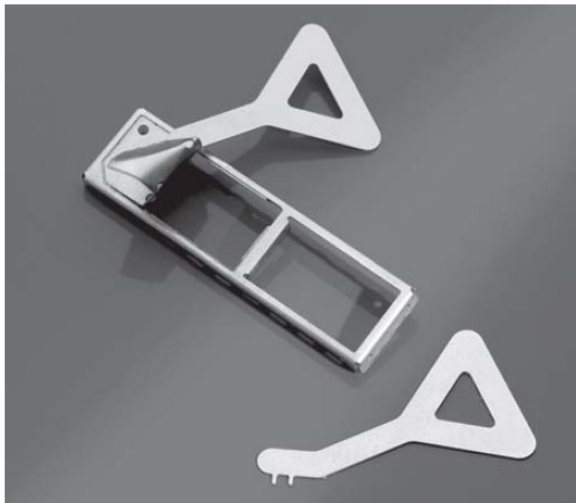
One-piece shielding cans



Custom one-piece cans with half-etched bend lines and 'Quiet' construction features offer outstanding attenuation combined with excellent coplanarity for ease of assembly. These can be shipped fully formed or flat pack for self-assembly, either manually or with soft tooling. They can be virtually any size and can incorporate a wide variety of design features to enhance performance and ease of use.

Seam soldering is also available for complete can integrity, if required.

One-piece cans with peelable top



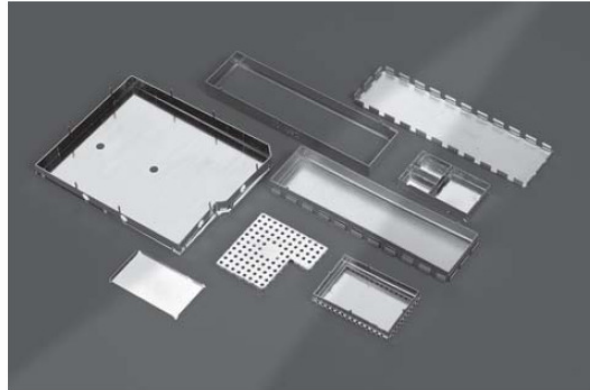
These cans, produced in a variety of materials, have a solid top, with etched lines that allow peel-off when access to components enclosed within the can is necessary.

This allows inspection without subjecting the board to a further thermal excursion, which could affect the enclosed components and

joins. Peeling off the lid is achieved using a simple hook tool or tweezers.

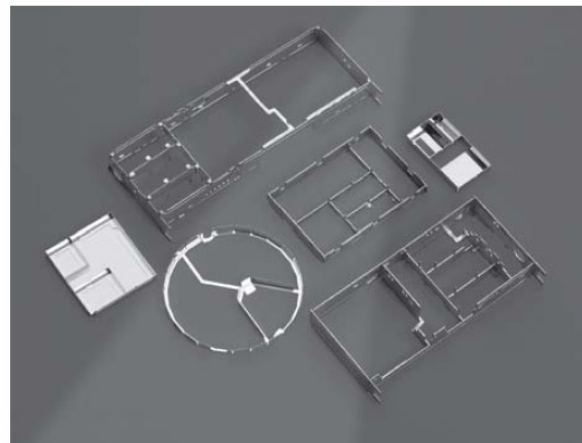
These cans can be resealed with a lid if required and are ideal for inspecting faulty devices. It is also suitable for use when only the occasional device needs tuning.

Two-piece cans



Custom circuit board shielding cans with removable lids are designed to protect sensitive components from noise while giving access for rework and adjustments. Removable fingered lids provide easy access to the enclosure contents and high attenuation in service.

Labyrinth / multi-compartment shielding cans



A multi-compartmental screening can is an effective alternative to multiple cans. It is cost effective to produce and offers significant savings in terms of initial cost, assembly time and real estate management. A matrix of walls, all folding easily from a single sheet and complemented with a separate lid, provides an efficient enclosure with enhanced accessibility for rework or the tuning of devices.

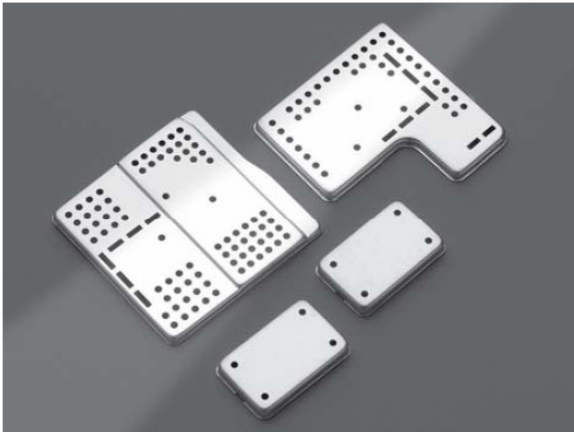
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Multi-level shielding can



Where space is at a premium, cans may be produced to combine different heights within a single structure. This system may also be used to accommodate boards with irregular topography.

Single-piece drawn shielding cans



Pressed from a single piece for complete integrity and optimized attenuation in high frequency applications. These cans are manufactured to customers' specifications with hard press tooling, in a wide variety of materials.

Drawn cans as they are commonly referred to, can be manufactured with cooling perforations although they are more commonly seen as a contiguous conductive barrier. This type of can is more commonly specified in large volume applications. The piece cost can be less than that of an etched can of similar dimensions but the initial set-up and tooling cost can be prohibitive for small runs.

Design complexity is always reflected in the cost of press tooling. Hard tooling manufacturing time should be taken into account when calculating time to market. There is a limit to the aspect ratio achievable economically with drawing which does not apply to photo etched and folded cans.

To circumvent tooling delays, some manufacturers will use photo etched cans until the volumes are sufficient to warrant tooling being laid down, or to meet manufacturing requirements while the tools are being made.

Materials

Tin plated steel and other high permeability materials are considered the best choices for shielding low frequency applications (transformers, coils etc.) while non-ferrous materials such as tin plated copper, phosphor bronze and beryllium copper are preferred above 200MHz (microprocessors, fast switching devices, power supplies etc.). Beryllium copper is generally specified where spring properties are required.

However, Nickel Silver is fast becoming the preferred alloy for the majority of board level shielding tasks. The material is replacing traditional plated steel and yellow metals across the board and certainly for those applications above 15 MHz where shielding effectiveness becomes more of a skin (conductivity) effect than a bulk effect.

Nickel Silver is less conductive than copper or brass but far stronger. It is an alloy of copper, zinc and nickel, the 'silver' terminology being descriptive of its appearance rather than its constituents. Nickel Silver is far more corrosion resistant than steel, copper or brass, and exhibits outstanding aesthetic qualities and excellent solderability in its natural state.

Although this RoHS compliant material is marginally more expensive, the fact that it doesn't need plating to improve its solderability or corrosion resistance means that finished shielding cans manufactured in nickel silver are invariably less expensive than plated alternatives and they are available on a shorter lead time.

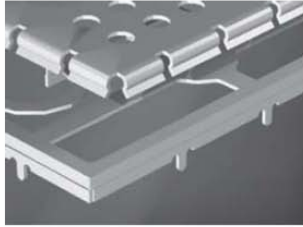
- A wide range of materials is available from stock, including brass, copper, steel, nickel silver and beryllium copper.
- Plating may be specified to improve the attenuation performance of a shield while tin and solder plating are often used to enhance solderability preservation.
- Dielectric coatings are available for insulating purposes.

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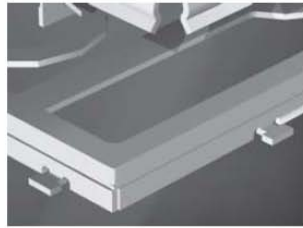
Product Technical Data

Design features for attachment / assembly

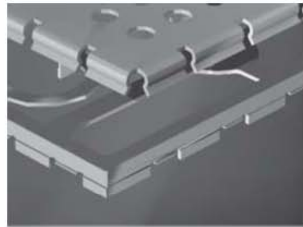
■ **Location pins** for through hole attachment during wave soldering and securing the can for manual soldering. If necessary, these pins can be given a 'rounded' profile by post etching.



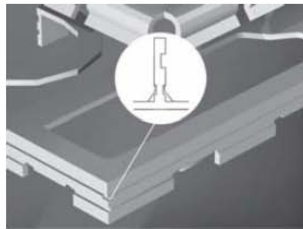
■ **SMT feet** are effectively small pads for solder attach to an earth circuit or ground plane in a multi-layer construction by way of micro vias.



■ **Serrated base edge** Surface mount cans requiring solder attach along an entire wall can have base serrations incorporated to enable the molten solder to flow through the wall and equalize the solder fillet for optimum strength.



■ **SAM line** SAM is a Solder Anti-Migration feature, essentially a partially etched lateral line on the walls of a shielding can that discourages 'wicking' of the solder up the walls of the can that might scavenge material from the joint area.



■ **Pick and place lands** can be provided, even on two-piece cans, to enable automatic handling and placement. Typically on a one-piece ventilated can, an area on the top is left without perforations to enable vacuum manipulation. In a two-piece can a special land is designed into the can body. It can be easily removed with a simple twist after assembly and before the lid is finally positioned.



■ Mech Mount

Several solderless through hole attachment designs whereby the pins maintain constant electrical contact with PTH (plated through holes). This enables cans to be attached or be removed and replaced a limited number of times, without the need for a further thermal excursion.

Design features for attenuation and noise reduction

'Quiet' Venting

As devices carry more power, they generate more heat and require ever more cooling. The addition of a shielding may raise the operating temperature of the device past the critical limit.

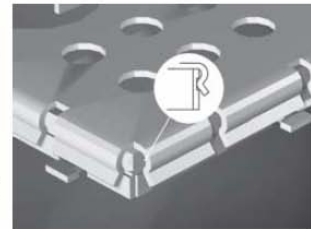
Perforations have been made in shielding cans for many years, the maximum permissible dimension being a function of the device frequency and the level of attenuation desired. Contact MAJR for optimization.

Quiet venting can increase the open area of a can for optimum cooling by perforating a pattern of very small holes, effectively a mesh, into both the walls and tops of cans. This process also reduces the 'maximum linear dimension' to improve attenuation performance and does not add significantly to the part cost of the can. To perforate the walls of a 'drawn' can requires multi-stage tooling which can be costly.

Quiet venting also has the additional benefit of enabling some vision systems to 'look' inside the can to check component existence and correct placement.

'Quiet' Finger-clip Lids

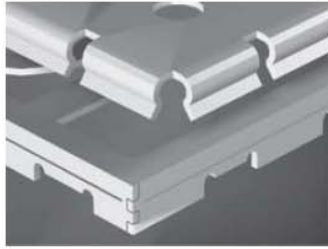
The new 'quiet' design for securing lids in two-piece and labyrinth can types provides positive engagement of the lid with an etch line in the can wall. The design gives maximum conductivity and a snap-fit that makes disassembly just as easy. This design offers excellent anti-rattle performance.



Custom Board Level Shielding (5300 Series) (Cont.)

'Quiet' finger-joint corners

Profiled and folded shielding cans offer many benefits including bespoke design, exceptional co-planarity, low tooling costs etc; however one drawback to date has been the corner seam which has the potential to act as an emitter antenna in high frequency applications.



This corner seam can be soldered for complete integrity but in the majority of instances simply reducing the 'maximum linear dimension' is satisfactory.

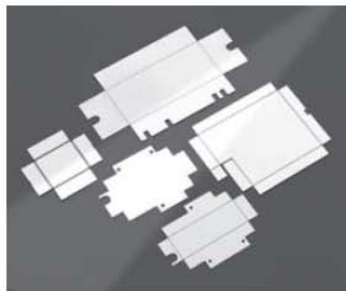
MAJR Products has successfully addressed this potential problem through the introduction of a finger joint arrangement on the corner seam. The two adjacent can walls simply interlock along the corner seam.

Named by MAJR Products as a 'Quiet' finger joint corner arrangement, the design has been tested and shown to improve noise attenuation with the added benefit of improving the mechanical stability of the shielding can.

Other design features

Integral marking

Cans can be manufactured with legends, logos, part numbers and other identification marks at no additional cost... features that can simplify the assembly set-up process and distinguish a component or even a board.



Flat-Pack

Choosing a Photo-etch with bend lines solution enables shipping in the flat form, which reduces transport costs significantly. Storage space requirement is also reduced if cans are erected as required.

Packaging and Presentation

A variety of packing and presentation options is available to suit customers' specific needs, including

- Flat-pack, with half etched form lines
- Fully formed with half etch form lines
- Formed and tray packed with orientation
- Tape and reel mounted for small items