

# Multilayer Ceramic Capacitors

## Planar Array Capability

## Arrays

### Introduction

Syfer Technology Limited has been manufacturing and supplying Planar Capacitor Arrays since 1990. The multilayer Planar Array is an application specific component designed for use in multi-line EMI filter circuits, typically found in filtered connectors. Planar Array technology affords the user weight and volumetric efficiency as well as performance and reliability advantages compared to other capacitor technologies.

Syfer's position as the world's leading supplier has been achieved through utilisation of the advantages inherent in our "Wet-Stack" process. A stress-free component is produced with mechanical precision, enabling a filter assembly to withstand the most rigorous of electrical specifications.

### Capability

The Planar Array is a unitary block of ceramic containing capacitors or a combination of capacitors, feedthrus and ground lines. Our current capability extends from a simple 2 hole unit to a complex 155-way device. Individual line connection is made to each capacitor through a terminated hole, whilst the ground connection is made at the device perimeter. Very low impedances are encountered as signals are presented with multi-directional paths to ground.

### Mechanical

Working with customers in the EMC field has enabled Syfer to develop a comprehensive range of planforms. These include the following:-

- Circular (MIL-C-38999 and similar)
- ARINC 404 and 600
- "D" SUB (Rectangular and Trapezoidal)
- High Density "D" SUB
- Micro-D (MIL - C - 83513)
- Nano-D

Special custom shapes are also available. Component thicknesses are produced from a minimum of 1.40 mm (0.055 inches) to a maximum 3.18mm (0.125 inches).

### Electrical

The holes within the planar array are required to perform differing electrical functions. This could embrace the following:-

- Multiple capacitance values (to a wide ratio)
- Hole to hole insertion loss specification
- Hole grounding to a specified maximum resistance
- Functionless holes (Feedthru's)

Maximum capacitance values obtainable are determined by a number of parameters. These include :-

- Dielectric material (C0G & X7R)
- Product dimensions
- Voltage ratings

Typical capacitance ranges for C0G and X7R dielectric are 47pF to 4nF and 250pF to 600nF respectively.

**Product dimensions.** Hole pitch, hole diameter and product thickness are the major mechanical influences on maximum capacitance value. Preferred dimensions for standard layouts are available on request.

**Voltage rating.** The more common voltage ratings are 100, 200 and 300 volts DC but parts are available to a dielectric withstand voltage (DWV) capability of 3,000 volts DC. Transient voltage capability may be specified.

### Quality Assurance

Syfer's Planar Array manufacture is an integral part of its overall facility for the high-volume fabrication of Multilayer Ceramic Capacitors. It is afforded the benefit of sophisticated and highly automated material, manufacturing, test and quality assurance procedures commensurate with Syfer's ISO9001 approval and its reputation as a leading supplier in this field.

Statistical Process Control techniques are employed throughout and all Planar lots built are subject to both external visual inspection and internal examination by micro-section.

Our final test facility is fully automated. All parts are 100% tested for the following parameters:-

- Capacitance value
- Dissipation factor
- Insulation resistance
- Dielectric withstand voltage up to 2000V DC

### General Information

#### Termination Material

**Periphery.** Two termination materials are offered as standard. These are either gold plating over nickel or silver-palladium, both of which are suitable for use with a ground spring connection. For applications where a solder joint is required, silver-platinum may be substituted. Generally, Planar Arrays are large devices and direct attachment to connector shell or printed circuit board is not recommended as a result of mismatch between coefficients of thermal expansion.

**Holes.** Gold over nickel or a silver-platinum material is used for both the hole termination and the surrounding pads. These materials offer good solder wetting and a high level of resistance to solder leaching.

#### High Voltage Parts

Syfer's maximum 100% DWV test capability is 2000 Volts DC. Lots requiring DWV specification at higher voltages are subject to A.Q.L. testing at the specified DWV level after being fully tested at 2000V DC. A similar A.Q.L. test is conducted on the dielectric breakdown voltage of the lot.

All parts requiring a DWV test at voltages above 750 V DC are lacquer coated to prevent surface flashover under conditions of high humidity.

#### Orientation

Identifying notches are provided in the device periphery to facilitate recognition of orientation during manufacture and use. Rectangular planforms have a single notch close to the hole (pin) 1 position. Circular planforms have a notch as near to the 12 o'clock position as the layout permits. For multi-function circular planforms, normally, an additional pair of notches is provided in the right hand quadrant of the pin engaging face.

#### Compliant spring clips

An option for the planar arrays is to supply them with compliant spring clips. The clips are soldered to each hole in the array, allowing the user to push the connector contact through the clip without soldering.

This enables a quicker assembly procedure and an improved yield, both factors contributing to a reduction in overall cost of assembly. An additional benefit is that any movement or stress on the contact does not transfer stress to the ceramic array. Four sizes of clip are available

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## Planar Arrays

## Arrays

### Planar Array Outlines

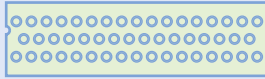
The following outlines represent a small selection from Syfer's Planar Array manufacturing capability.

### Rectangular Planar Arrays

Syfer's manufacturing capability allows the production of a wide range of outlines from 150 hole DOD-STD 1842 down to the 9 way microminiature NANO style.

Multi-capacitance values, grounded holes and feedthroughs can be accommodated in most outlines.

50 WAY 'D' MIL STD 18277



37 WAY 'D' MIL STD 18276



9 WAY 'D' MIL STD 18273



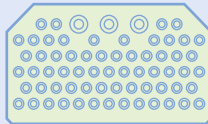
25 WAY SUB MINIATURE MIL STD 83513



150 WAY DOD STD 1842



67 WAY MS 3157



78 WAY HIGH DENSITY MIL STD 18277



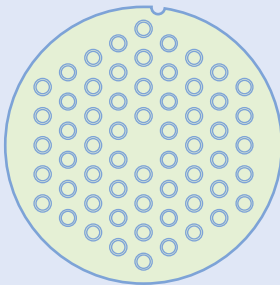
9 WAY NANO



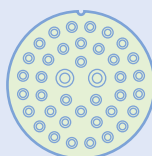
### Circular Planar Arrays

Various MIL-STD designs can be supplied with diameters ranging from 8.1 mm (0.32 ins) to 50.8 mm (2.0 ins). The Planar Arrays can contain multi-capacitance values, grounded holes and feedthroughs.

40-62 MIL STD 1651



20-39 MIL STD 1669



14-35 MIL STD 1560A



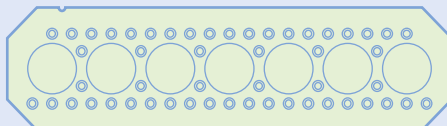
8-35 MIL STD 1560A



### Special Designs

Syfer is always pleased to consider the manufacture of custom arrays, two examples of which are shown below. We will be pleased to offer design guidance to engineers if required.

59 WAY SPECIAL



20T4 DOD STD 1842 (SPECIAL)

