

Visual Characteristics of Ceramic Filters

Introduction

This Technical Brief addresses visual characteristics of RF filters that are the result of tuning the filters and normal manufacturing processes. Ceramic RF Filters manufactured by CTS Electronic Components are comprised of three basic features:

- A ceramic block
- Silver coating
- An optional shield or bracket

RF filters typically require final tuning in order to meet the stringent electrical performance required for most applications. CTS ceramic filters are tuned and electrically tested for 100% compliance prior to shipment.

The Ceramic Block

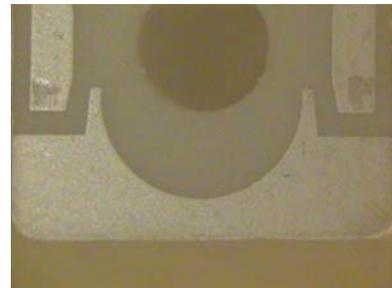
Ceramic blocks are manufactured by CTS with a specially formulated dielectric material. The size and shape of the block as well as the size and placement of the resonator cells (holes in the ceramic filter) determine the electrical properties of the finished filter. Chips that may be visible in the ceramic, if covered by silver, do not affect the electrical performance of the filter and are acceptable as long as the filter passes final electrical tests.



Silver Metallization

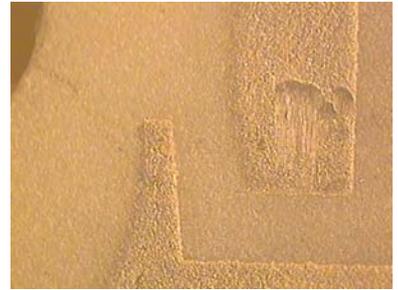
The outer surface of the filter including the resonator walls (with the exception of the top pattern) is covered with silver metal. The silver functions as an electrical connection for the filter as well as being a feature of the component. Voids in the silver covering less than 4 mm at their longest dimension are acceptable as long as the filter passes final electrical testing.

The silver is subject to tarnishing (oxidation). The extent of the tarnish is dependent on the exposure to high temperature and humidity. Storing the filter in an environment that controls both excessive heat and humidity can minimize tarnish. Tarnish on the filter does not affect the electrical performance. Concerns for the solderability of a tarnished filter can be addressed by using an aggressive flux during the soldering application. Silver is a soft metal and may exhibit scoring or scratches from handling or processing. These scores or scratches do not affect the electrical performance of the filter.



Final Testing

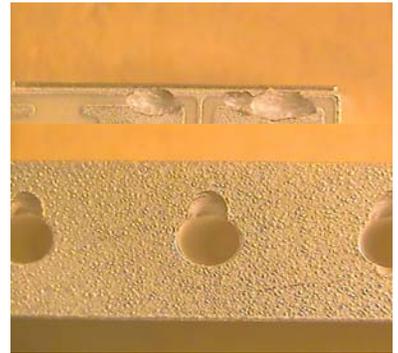
CTS final testing uses pogo pins that may leave small marks on the I/O pads. These marks are acceptable and do not degrade the filter performance. The top pattern of the filter establishes the electrical performance. The pattern should be protected from solder or other materials that could possibly create an electrical short during the assembly process.



Filter Tuning Procedure

Most filters must be fine-tuned to meet all of the required electrical parameters. This fine-tuning is accomplished by removing portions of the silver material and/or ceramic using a grinding tool.

Tuning voids or chips may be found on the top pattern or on the bottom of the filter. The amount of tuning required varies by model and by part. Tuning marks on the top pattern or bottom of the filter are a part of the CTS manufacturing process and are acceptable.



Summary

The visible features of CTS ceramic filters identified in this document are the result of manufacturing processes and can be found on almost any filter. These filters will have gone through accelerated life testing and all are subject to on-going reliability testing. It is important to understand that these visible features do not affect filter performance and do not degrade product reliability.