
Installing TO-8 Oscillators

Application Note—M022

All TO-8 thin-film oscillators are designed to operate with unconditional stability and performance equal to or better than their guaranteed specifications when installed in a properly designed 50-ohm microstripline PC board. Problems encountered with systems using TO-8 oscillators can be directly traced to improper layout of the PC board, improper grounding of the devices to the board or the board to the case or chassis in which it is installed, or the lack of RF bypassing on DC leads when required.

In this section basic information on microstrip circuit design will be presented to allow designers to properly plan their custom microstrip board.

Microstripline Characteristics

A microstrip transmission line is fabricated with a single narrow conductor on one side of a relatively thin sheet of dielectric medium with a large area of ground plane on the other side. Generally the dielectric sheet is in the form of either a ceramic

substrate for thin- and thick-film hybrid integrated circuits or PC board material for assemblies.

Electrically, a microstripline behaves like a two-wire transmission line with the second conductor formed by the image of the physical conductor appearing on the ground plane.

The characteristic impedance of a microstripline is determined by the width of the conductors and the dielectric constant and thickness of the substrate material on which it is fabricated. For the 0.062 in. thick, G-10 glass epoxy PC board material (1 oz. clad, both sides), a 50-ohm stripline is always 0.10 in. wide.

In a practical application, other conductors also appear on the microstrip board for DC bias and control voltages. The widths of these conductors are relatively unimportant so long as they are narrow compared to the large grounded areas which make up the bulk of the conductor side of the board to provide as much shielding and isolation as possible.

Figure 1 shows the standard mounting kit for TO-8 oscillators. Also shown is the correct installation for PC board mounting.

All connections to the pins on the modular devices are made via conductors on the bottom, or circuit, side of the board. The top, or ground plane, is left completely clad except for clearances milled around the holes drilled to pass device pins to prevent unintentional short circuits.

Since the ground plane side of the board is left completely clad, it assures both a good ground and effective heat sink when modules are clamped to it. Modules may also be secured with conductive epoxy or other means, so long as the cases are in intimate thermal and electrical contact with the ground plane.

On the conductor side of the board, all of the unused conductor areas are effectively interconnected to the ground plane, and the entire board is grounded to the case or chassis via mounting hardware.

Assembly Instructions For Customer-Designed Circuit Boards

The steps below apply to the assembly of Agilent Technologies's modules into microstrips or stripline circuits. CAUTION: The Agilent modules are designed for use in a 50-ohm microstrip system and the package must be adequately grounded!

1. Cut all four pins to a length of approximately 3/16 inch.
2. After cutting the pins per

Step 1, install the module directly on the circuit board ground plane with the Tune Voltage, RF output and DC Voltage pins (see Figure 1) passing through the board to the circuit on the other side. Be careful that these pins do not short out to the ground plane.

3. Using the clamp provided, secure the module firmly to the ground plane. Figure 1 shows the proper positioning and installation of the mounting clamp. This step ensures

positive contact between the module package and the ground plane so that no problems with VSWR in a multistage system will be encountered.

4. Bend the Tune Voltage, RF Output, DC Voltage and GND pins flat against the proper portions of the printed circuit, then solder in place.

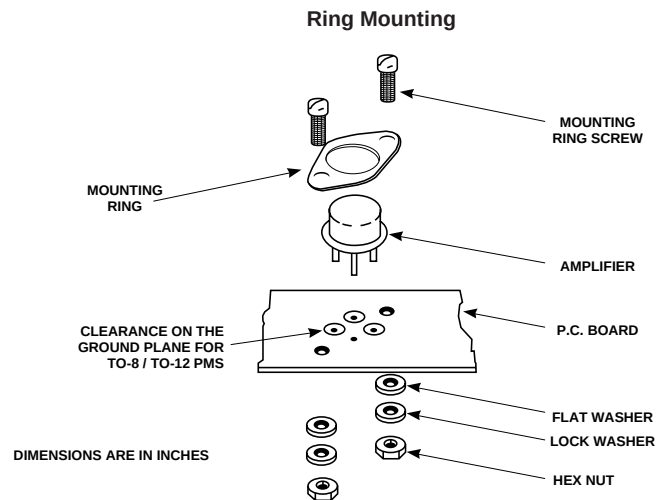
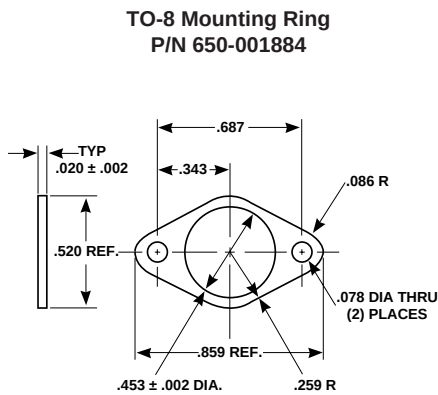


Figure 1. Mounting Kit for Standard TO-8 Packaged Oscillators