ThermoStream® Application Note 1: ESD Protection on TP04300/TP04310 Series ThermoStream Systems

Introduction

ESD protection is an issue when handling or testing any electronic equipment or device. As a result, special consideration should be given to equipment used in the production and test areas. This document describes the design of the TP04300/TP04310 range of ThermoStream Systems and techniques that can be used to minimize any risk while testing electronic devices. To illustrate the point, a series of simple steps is listed using a simple example.

Background

The ThermoStream Systems use a stream of air that is regulated to the required temperature and applied to the unit under test (UUT). The system supports a temperature range of up to -90ºC to +225ºC. To avoid ice build up when operating at the low end of the temperature range, the air must be dry. Electrostatic charge generation can be caused from friction in the air stream. This ionization is more likely when the air is dry or if there are particles in the air.

Independent testing of the design of the ThermoStream has been conducted. These measurements of the electric field in the vicinity of the jet of air do not indicate the presence of a significant or measurable number of charged particles.

Design

The TP04300/4310A Series of ThermoStreams are designed to minimize any static buildup. The output nozzle of the system, shown in Figure 1, is connected to ground at the output. This is to ensure that any charge present in the stream of air is dissipated upon exit from the system.

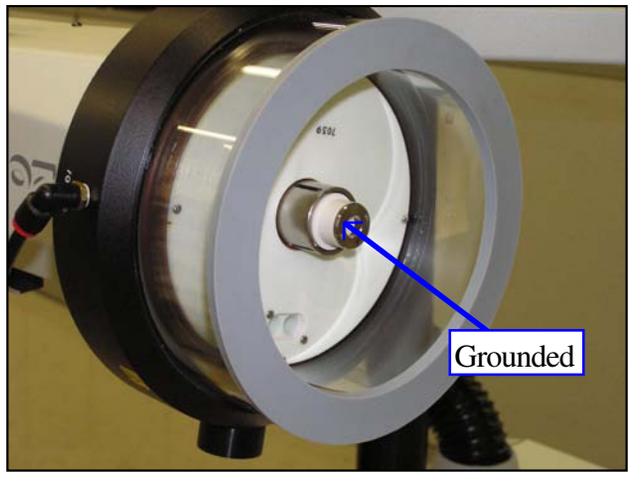

Figure 1

Example

The steps listed below show the procedure that should be used to minimize any ESD concerns. Figure 2 considers the test of the two devices located in the center of the printed circuit board.

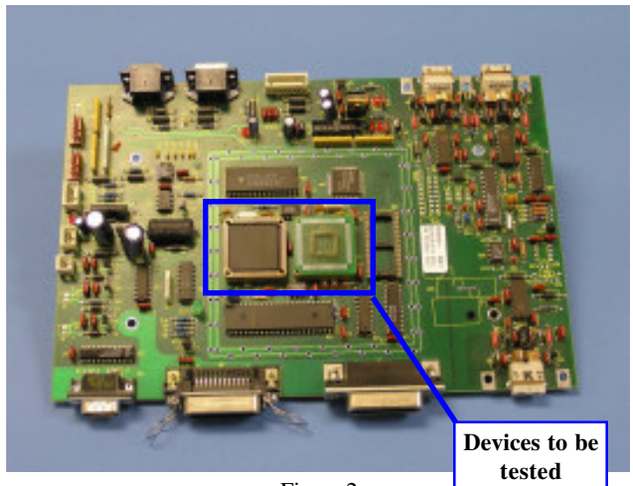

Figure 2

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STEP 1: In order to thermally protect the other devices on the board, it is necessary to put a layer of non-conductive insulating foam on the board, with a hole cut to expose the two devices to be tested. This is shown in Figures 3 and 4.

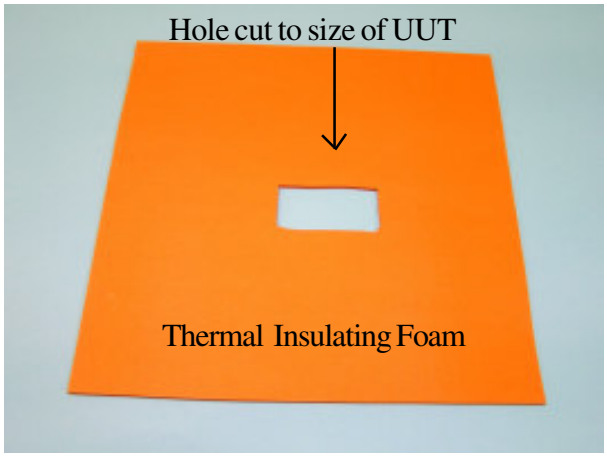

Figure 3

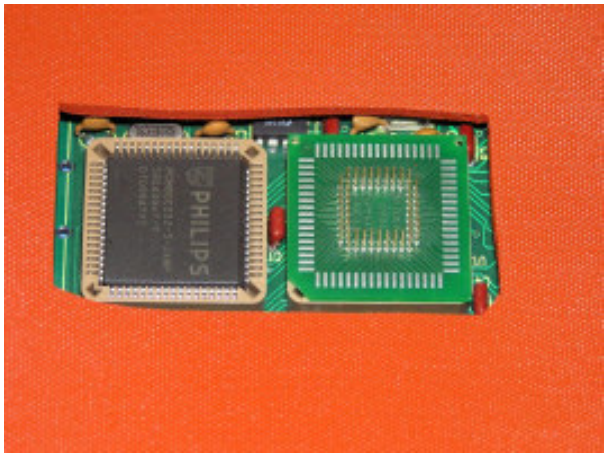

Figure 4

STEP 2: Place a layer of electrically conductive foam on top of the insulation, again with a hole cut to expose the UUT, as shown in Figure 5. Note: a ground strap is connected to the conductive foam.

Figure 5

STEP 3: Place a conductive shroud (in a size which fits over the UUT) onto the ThermoStream nozzle. Figure 6 shows a conductive shroud on the nozzle. Note: the nozzle tip is connected to the system ground.

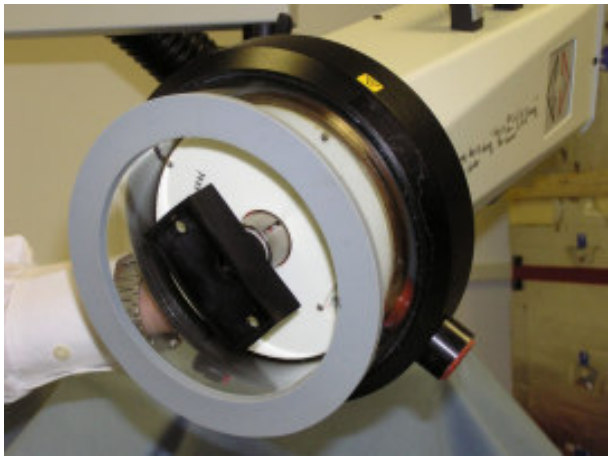

Figure 6

STEP 4: The thermal cap and shroud can now be lowered into position on top of the UUT, as shown in Figure 8.

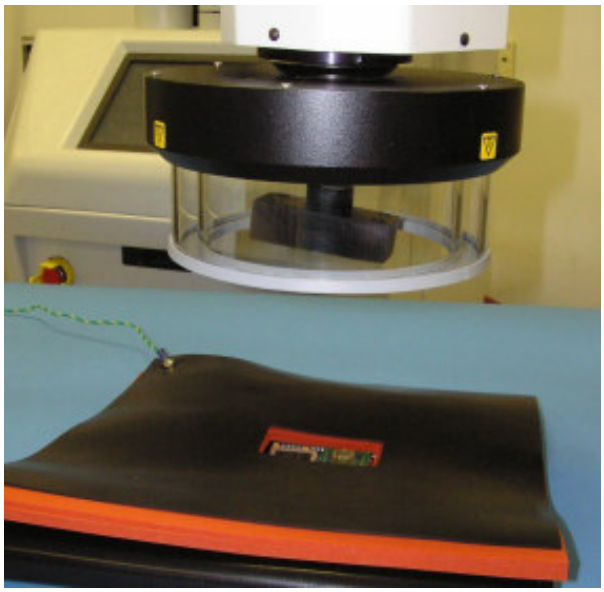

Figure 7

Once the ThermoStream head is lowered, the grounded nozzle which is connected to the shroud and the conductive foam, provide a good degree of ESD protection.

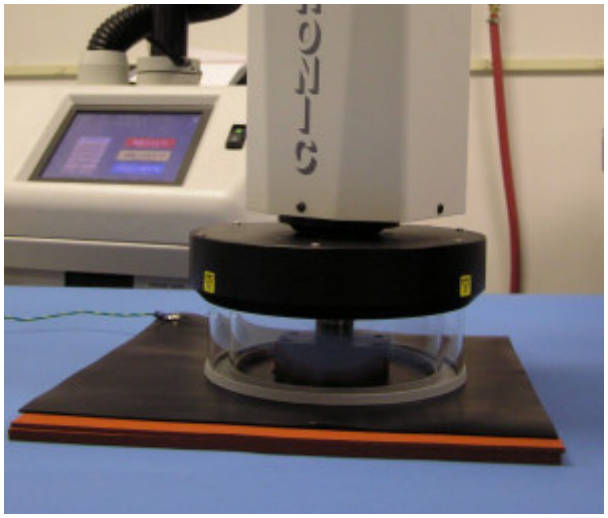

Figure 8

Conclusion

A safe ESD environment can be achieved while using the ThermoStream. Figure 9 below shows the setup that should be used.

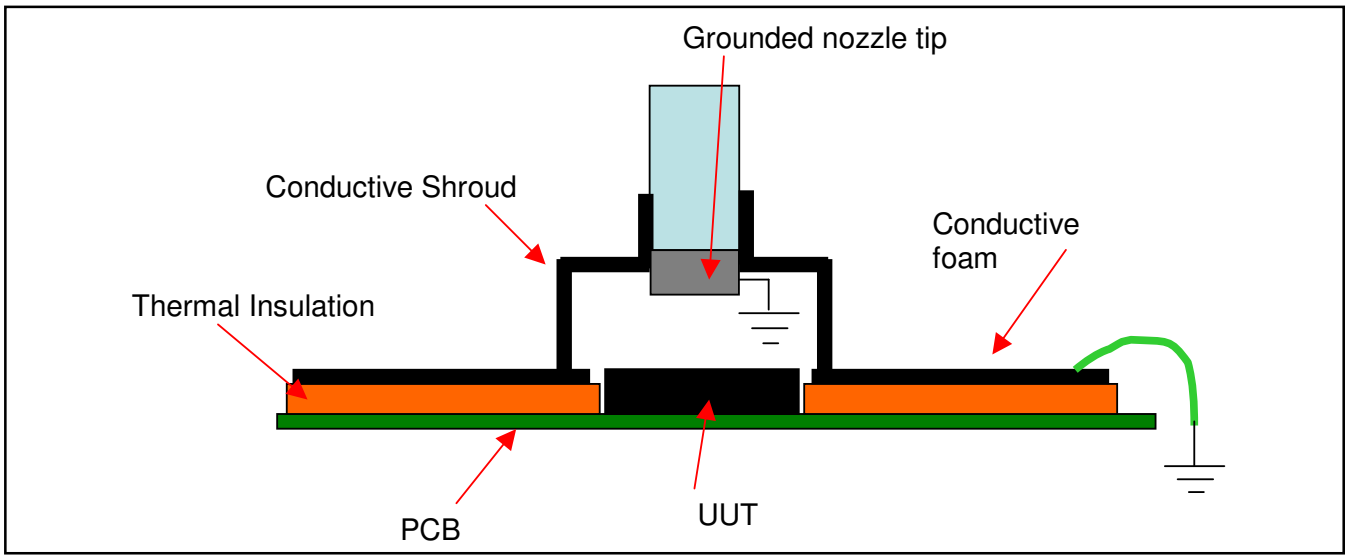

Figure 9

Figure10

A range of conductive shrouds as well as conductive and insulating foam are available from Temptronic Corporation, as shown in Figure 10.

See Appendix A for information.

Appendix A.

The following kits, shrouds & foam are available from Temptronic:

SHROUD KITS

ZAK41311 Non-Conductive Shroud Kit Nozzle

ZAK41312 Conductive Shroud Kit Nozzle

The above kits contain 3 shrouds (1 each) with the following dimensions:
25.4mm diameter X 19.1mm (1.0" diameter X .75")
34.8mm X 25.4mm X 19.1mm (1.37" X 1.00" X 0.75")
71.1mm X 33.0mm X 19.1mm (2.80" X 1.30" X 0.75")

ZAK41321 Non-Conductive Shroud Kit Nozzle

ZAK41322 Conductive Shroud Kit Nozzle

The above kits contain 2 shrouds (1 each) with the following dimensions:
33.0mm X 88.9mm X 19.1mm (1.18" X 3.50" X 0.75")
63.5mm X 63.5mm X 19.1mm (2.50" X 2.50" X 0.75")

ZAK65121 Conductive Shroud Kit Nozzle

ZAK65122 Non-Conductive Shroud Kit Nozzle

The above kits contain 5 shrouds (1 each) with dimensions as noted above.

INSULATION

ZAK40480 12" sq Non-Conductive Foam Kit Insulate Fixture

The above kit contains 1 each of the following 4 items:

ZZ00690	12" sq X 1/8" Non-Conductive Foam Insulate Fixture
ZZ00700	12" sq X 1/4" Non-Conductive Foam Insulate Fixture
ZZ00710	12" sq X 1/2" Non-Conductive Foam Insulate Fixture
ZZ00720	Adhesive (4.7 oz) Insulate Fixture

SA22450 18" sq Non-Conductive Foam Kit Insulate Fixture

The above kit contains 1 each of the following 4 items:

ZZ01010	18" sq X 1/8" Non-Conductive Foam Insulate Fixture
ZZ01020	18" sq X 1/4" Non-Conductive Foam Insulate Fixture
ZZ01030	18" sq X 1/2" Non-Conductive Foam Insulate Fixture
ZZ00720	Adhesive (4.7 oz) Insulate Fixture

ZZ06740	36" sq X 1/8" Non-Conductive Foam Insulate Fixture
ZZ06750	36" sq X 1/4" Non-Conductive Foam Insulate Fixture
ZZ06760	36" sq X 1/2" Non-Conductive Foam Insulate Fixture
ZZ03020	12" sq X 1/16" Conductive Sheet Insulate Fixture
ZZ03030	18" sq X 1/16" Conductive Sheet Insulate Fixture

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