Microwave Test Cable Assembly Validation

Reliable microwave testing is not only dependent on the quality of the test equipment, but also on the components connected to that equipment. After equipment calibration, test cables may become the most important variable in the measurement. Small changes in phase, insertion loss, and return loss occur in all microwave cables when they are bent or moved, regardless of manufacturer or cable type. This Application Note will help the user determine when that change is beyond acceptable limits.

Even with the best care and handling, microwave test cable assemblies will wear out. CarlisleIT recommends that test cable assemblies be validated before every use as detailed below.

Procedure

If any of the following conditions are found, replace the test cable assembly immediately.

Visual and Mechanical Inspection
» Examine the cable for dents or any flattening. Check the jacket for cuts or other abrasions.
» Pay special attention to the connector to cable junction, this is a high wear point. Ensure that the connector is still firmly attached to the cable by applying a light twist to the connector. There should be no movement of the connector relative to the cable.
» Using magnification, examine the connector interfaces for damage or excessive wear. Damage may be in the form of bent pins, missing tines, surface scratches, mushroomed rims, or displaced dielectric. Always clean the interface prior to every use.
» Gage the pin and dielectric (if applicable) for excessive recession or protrusion against the manufacturers specified limits.

Electrical Inspection
Measure insertion loss and return loss (VSWR). The insertion loss trace should be smooth and continuous. Compare results against original test certificate. Results should not differ by more than 10%. With the cable connected to a vector network analyzer, normalize the insertion loss and phase. Bend the test cable assembly in various directions (ensuring not to exceed the minimum bend radius) while watching the insertion loss and phase traces on the screen. Record the maximum variation and compare against the original measurement. For most high quality test cables, the insertion loss should not vary by more than 5% and the phase by more than 0.5° /GHz, for example: 5° at 10 GHz or 10° at 20 GHz.

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www.carlisleit.com

(+1) 610.495.0110, Pottstown.Sales@CarlisleIT.com