

## Underwriters Laboratories “Standard for Safety 3111-1” Compliance Statement

OML, Inc.’s family of millimeter wave test equipment frequency extension products (modules) is designed to expand the capability of any company involved in the design and manufacturer of microwave equipment and components. The product lines include frequency extensions for: scalar network analysis, 33 to 110 GHz, spectrum analysis, 18 to 325 GHz, vector network analysis, 33 to 220 GHz, multipliers, up/down converters for both narrow and full waveguide bandwidths, 18 to 325 GHz. These units are portable electrical measurement and test accessories. These products are constructed in module form and can be fitted with an outside housing as specified or supplied by a specific OEM for purposes of resale as a finished product. OML also sells these products, directly to end users, with or without housings depending on the general use of the item.

The modules, in their respective finished states, are small, ergonomically safe, and light weight (less than 5 pounds). They can be powered from the microwave equipment to be enhanced, as dictated by a reselling OEM, or from +12 or +15 VDC as is the case when sold directly by OML. They are ruggedly constructed and possess sufficient heat dissipation capability to maintain a pleasant operating temperature (25 to 35 degrees C typically) when used in the intended laboratory ambient environment.

The modules convert low level microwave energy from other manufacturers’ equipment to low level millimeter wave energy. Depending on the design parameters, these modules have built-in detectors or mixers for detection or down conversion of that energy as well as can be used with associated external OML Transmission Detectors for the detection of that energy. The millimeter wave energy generated and the detection; or mixing process; are used by the end user to test and measure their “device under test (DUT)”.

The modules, as resold by an OEM reseller, can be used only with that OEM’s microwave equipment. This is to accommodate the specific signal interface requirements and power supply capabilities of that equipment. When sold directly by OML, the modules can be used with any equipment manufacturers’ microwave equipment subject to the end user obtaining and using the proper OEM signal interface adapters. The end user must also supply his own commercial test equipment grade +12 to +15 VDC power supply for DC power. The OML supplied cable is equipped with a polarized power plug for connection to the module, and individual positive and negative plugs, color coded to industry standard, for connection to the power source.

The OML frequency extension modules are defined as passive devices, creating no energy when in a static state, unattached to any other equipment. Incoming energy is not changed to a higher, more hazardous level. None of the material contained in the OML modules has been classified as hazardous in its own right or in combination with the other materials in the product. The OML Modules can be disposed of or recycled by normal and accepted industry procedures. Because of

the sensitive and specialized nature of the design and adjustments contained in product, the OML modules can not be serviced or otherwise repaired by any but OML factory personnel or OML authorized reselling OEM test equipment repair and calibration technicians.

### Safety Issues Addressed During the Module Design

Per current OML/OEM agreements, the OEMs are responsible for the equipment housing, power connector, and labeling for the OML equipment that they purchase for resale. OML, as an informal accommodation to the OEM, may attach such item as a label onto the housing end plate, install the power connector on the end plate, and then install the OML product into that housing with end plates. The assembled equipment is then shipped to OEM for their testing, completion and packaging for final sale.

In response to request from OEMs and others for information as to the safety consideration involved in the design of the OML product, OML submits the following:

The OML module has been designed to meet the intent of:

- 1) the Underwriters Laboratories Inc. “Standard for Safety” UL3111-1, dated: June 30, 1994,
- 2) falling under the “Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: *General requirements*,
- 3) Section 1 *Scope and Object*,
  - A) Item 1.1 *Scope*, -measurement and test;
    - a) Electrical measurement and test equipment,
  - B) Item 1.2 *Object*.  
which describes the hazards to be addressed.
  - C) Item 1.4 *Environmental conditions*.”  
which defines the conditions under which the product is intended to be used.

All items addressed in the discussion below refer to the citations in the referenced Underwriters Laboratories Standard. The addressed items include:

As defined by Item 3.1.3 *Definitions*, the OML product is a “Portable Equipment”.

As designed, the OML product does not present an “Accessible” or “Hazardous Live” voltage as defined by Item 3.5 *Safety terms*.

The requirement of Section 5 *Marking and documentation*, under the current OML/OEM agreements, are the responsibility of OEM. Also, because the product is being sold as an OEM resale, OML can not be responsible for the labeling and document content. Examples of OML labeling and documentation for items sold to end users are available for inspection upon receipt of request.

As designed, the OML product satisfies Section 6 *Protection against electric shock* due to the inaccessible nature of the internal components and voltages and the low voltage utilized, i.e., <+26 VDC. The power is supplied to the OML product via an OEM supplied cable, through a “keyed” OEM supplied connector, and from an OEM manufactured power source. +26 VDC is not considered hazardous as defined per Item 6.3.1.1 *Voltage*.

The OML product, as installed in an OEM supplied or specified housing, has been designed to and appears to meet all of the intended requirements of: Section 7 *Protection against mechanical hazards* including the “NOTE” under 7.1 *General*, Section 8 *Mechanical resistance to shock, vibration and impact*, and Section 9 *Equipment temperature limits and protection against the spread of fire*. Primary responsibility with the requirements of “9” rests with the OEM in their implementation of power supply safety circuitry.

The OML product is not impacted, because of the nature of its construction (mainly aluminum), by the requirements of Section 10 *Resistance to heat*, and Section 11 *Resistance to moisture and liquids*.

Radiation from the OML product is limited to only millimeter wave energy (above 18 GHz) and does not include any of the others listed in Section 12 *Protection against radiation,.....* The millimeter wave energy emitted by the OML module at the test port is less than 50 milliwatts, far below the limit of 10 watts per meter squared imposed by Item 12.4 *Microwave radiation*.

By the nature of its construction (mainly aluminum) and contents the OML product is not impacted by the requirements of Section 13 *Protection against liberated gases, explosion, and implosion*, and Section 14 *Components*.

Those sections of the UL Standard that are not addressed above fall outside of the intent of this discussion, which is the safety issues addressed by OML during the design of the Test Equipment Frequency Extension product.

This information has been provided at no cost to the customer. Should any questions or additional issues arise, please contact OML and we shall be happy to discuss any potential impacts that result.

Sincerely,

OML Management

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