Glossary of Multiplier Terminology

bandwidth – Frequency range over which the specifications of minimum output power will be met for a given input power level. In some cases a 3 dB bandwidth is specified, denoting the minimum frequency range over which power drops by half (3 dB) of a given fixed input power level.

cascading – Arranging one multiplier to power a second multiplier for an overall frequency multiplication of the product of the two multipliers. To maintain the bandwidth of both multipliers, an isolator of the same bandwidth must be included between the two cascaded multipliers. For narrow band cascades, however, an isolator may not be necessary.

efficiency – The efficiency of the conversion from the input frequency to the desired harmonic frequency. The ratio of output power to input power under specified conditions. Note that efficiency changes with input power level. Generally expressed as a percentage. Also expressed in dB as conversion loss.

external bias – The DC voltage and current necessary for efficient frequency multiplication is provided by a manually adjustable separate biasing box. The ability to change the biasing level of a multiplier extends the input power level range which may be used to efficiently drive the multiplier. Care must be taken whenever an external bias connection is broken or reconnected to avoid electrostatic discharge (ESD).

internal bias – The DC voltage and current necessary for efficient frequency multiplication is provided internally. The voltage which is set for a particular multiplier is set for a particular input power level to that multiplier.

integral feedhorn – The means by which the output power from the multiplier is launched into free space. Integral refers to the feedhorn and transition from a waveguide to feedhorn aperture being

machined into the multiplier body, rather than being a separate unit. This reduces the losses associated with waveguide flanges, which can be very high for submillimeter wave connections.

mechanically tunable – A multiplier with one or more micrometer drives extending from the multiplier body, which are necessary for tuning to achieve optimum bandwidth and power. Data is included with each multiplier indicating the optimum tuning positions used during testing of the multiplier.

resistive multiplier – A frequency multiplier which predominantly uses the resistance modulation of a diode for harmonic generation. Resistive multipliers are wider bandwidth, but lower efficiency than varactor multipliers.

spurious harmonic content - The power level at frequencies harmonic to the input, other than the desired harmonic, at the output port of a multiplier. This power level is usually expressed in dB relative to the power level of the desired harmonic frequency, as – X dBc, i.e., as X dB below the level of the carrier.

varactor multiplier – A frequency multiplier which predominantly uses the capacitance modulation of a diode for harmonic generation. Varactor multipliers are higher efficiency, but narrower bandwidth than resistive multipliers.