



April 19, 2023

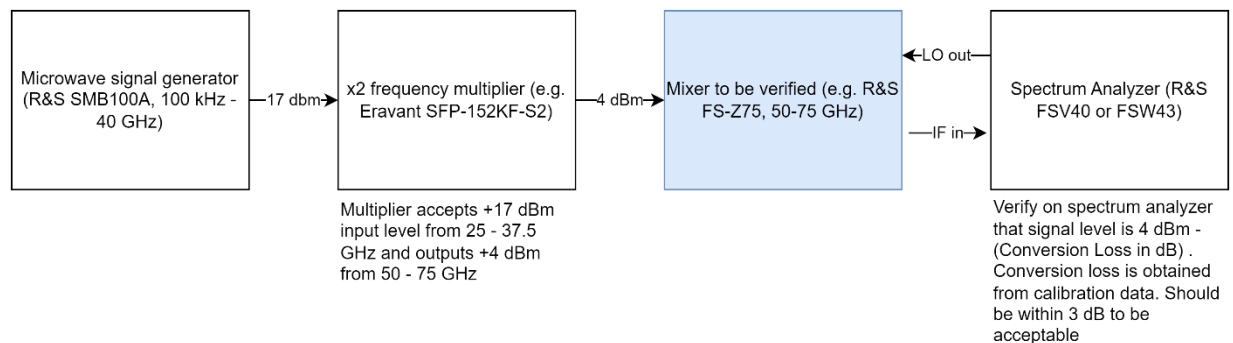
To whom it may concern,

Nemko USA, Inc employ a range of microwave mixers to enable emission measurements in the range 40 GHz to 325 GHz. These mixers are purchased with calibration data showing their conversion loss as a function of frequency in dB.

These mixers are passive devices and are only used occasionally. Their performance is highly unlikely to degrade over time in storage and the most common failure mechanisms are catastrophic from physical damage such as from being dropped, electrostatic discharge events or RF connector damage (connections are exclusively made using a suitable torque wrench). For this reason, they are not re-calibrated at regular intervals but rather, are verified before use when needed. The verification is performed as follows:

1. Connect the mixer to a suitable calibrated spectrum analyzer (typically a Rohde & Schwarz FSV40 or FSW43 is used).
2. A calibrated microwave signal generator source is connected to the mixer input. Due to the high frequencies involved, the microwave signal generator is connected to a suitable frequency multiplier with a waveguide output matching the input of the mixer. The frequency multipliers have a known output level for a given input signal.
3. The signal generator is turned on at a suitable frequency and level as defined for the multiplier.
4. The level of the down-converted signal is verified on the spectrum analyzer. Measured values should be within 3 dB of the expected value (calculated from the conversion loss table for the mixer) to be acceptable.

See below for a block diagram of a representative verification setup of one mixer:



By following this methodology, Nemko is assured that emissions measurements above 40 GHz are valid.

Kind regards,

James Cunningham
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