

Mimosa Networks Inc. A5 Tuneup / Calibration Procedure

The A5 transmitter power calibration procedure is performed on every A5 product after assembly, as a final stage in manufacturing. Devices are tested to comply with the specified system power range of 22-30dBm (16-24dBm per 90 degree sector) within +/-2dB across the operating frequency range of 4.94GHZ – 4.99 GHz and 5.15GHZ – 5.85GHZ.

The system architecture of the A5 consists of a power amplifier for each of the four 90 degree sector antenna arrays. Each of these power amplifiers contains an integrated diode detector that provides a voltage output indicating the transmitted RF power at the output. These diode detector voltages are then fed back into ADCs integrated in the baseband IC, which assigns a digital value to the instantaneous transmitter output power.

During calibration, 4 power levels (approximately 2dB apart) are selected at the RFIC level, intended to typically produce an output within the range of 16-24dBm at the port terminal. For each power level, the actual output power of the port is measured using a precision calibrated power meter, and the A5 baseband also captures the digital value produced from the on board diode detector voltage. After capturing this data for each of the 4 power levels, a linear regression is performed on the 4 data points (external meter measured power vs. baseband digital value). This regression then assigns expected power detector levels for each power setting in the range of 16-24dBm. The RFIC is then able to adjust its power to reach the power detector level assigned to each power setting. This calibration procedure is applied to each of the 4 transmitter chains, using a BPSK signal with a 80MHz wide channel centered at 5550MHz. If the power output does not provide a linear model based on the points selected or the power steps are not separated by 1-3db, the calibration is rejected.

This power calibration is then tested across frequency within the band of interest, typically at center frequencies of 5250MHz, 5550MHz and 5775MHz. At each frequency, for each chain, with an 80MHz wide BPSK modulated signal, output power is measured at 15dBm, 17dBm, 19dBm, and 21dBm. If a variance of greater than 2dB from nominal is measured, the calibration is rejected.

As power is being measured and compensated for at the transmitter output stage, the design does not anticipate that there will be significant variation in output power during changes in signal modulation level or change in channel bandwidth. The power detector used in the design behaves agnostically of modulation or bandwidth changes, and only varies as a function of output power. Regardless if power levels change at the baseband level, the power detector feedback at the output will ensure that the same target power will be maintained through continuous closed loop compensation. This has been measured and documented to be the case at bandwidths of 20, 40 and 80MHz, as well as modulation schemes from BPSK to 256-QAM.