HX62A 180° Hybrid Coupler Insertion Loss Measurements, Whitham D. Reeve, 19 January 2023

HX62A couplers were installed on two Coupler PCBs (the Coupler PCB is used in the FEE Test Fixture) along with a 50 ohm termination resistor on the coupler sum port and an SMA-F connector on the difference port. The two PCBs were mounted back-to-back with the connectors facing outward using ½ in x 10-32 stainless steel spacers and hardware (figure 1).

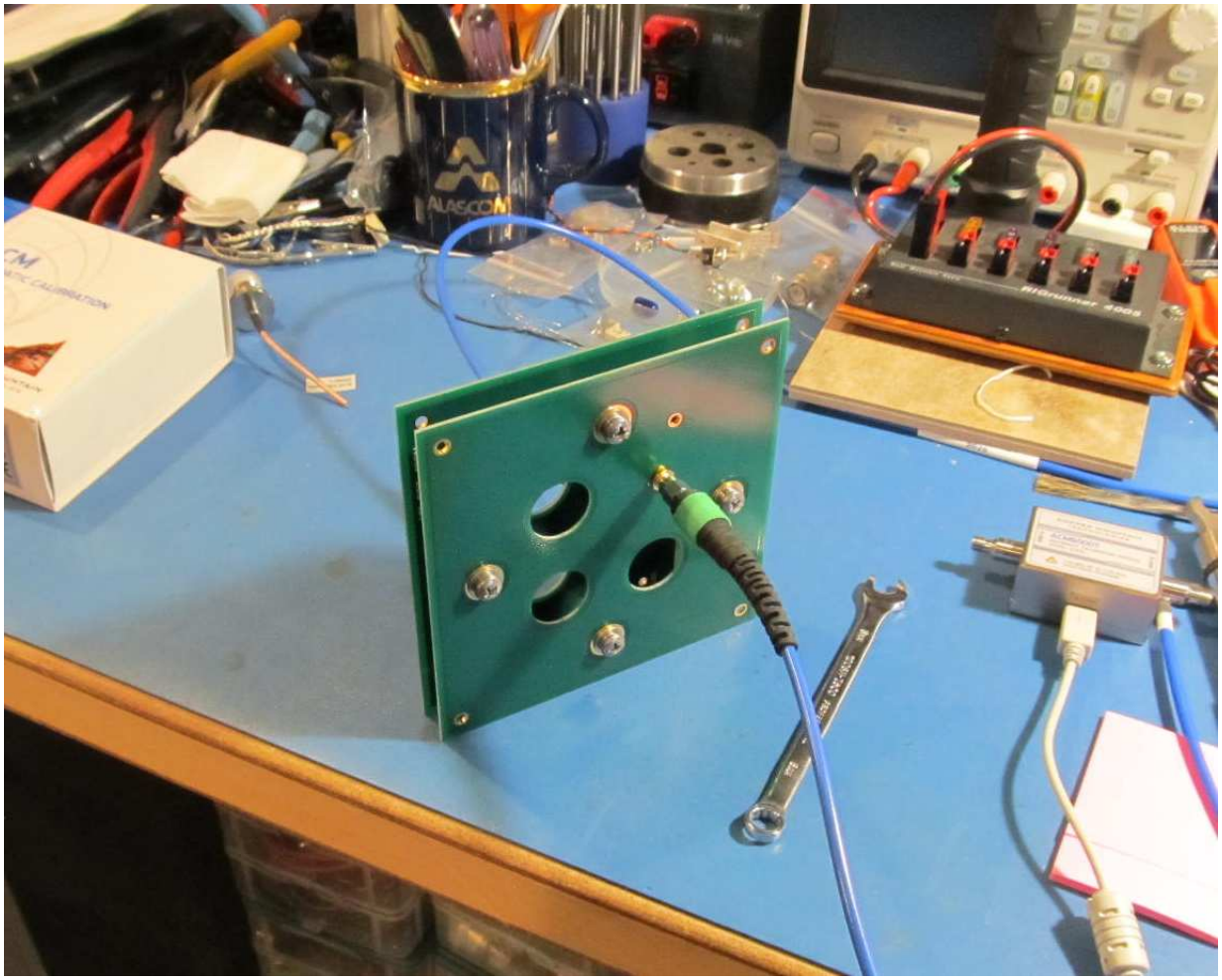

Figure 1 ~ Coupler PCBs with HX62A hybrid couplers and mounted back-to-back with four spacers.

A CMT M5045 VNA was calibrated with the CMT ACM6000T Automatic Coupler Module over a frequency range of 5 to 200 MHz with 1001 measurements points and 1 kHz IF bandwidth. Two MCL ULC-1M-SMNM+ test cables were used in the calibration and to connect the PCBs to the VNA.

Two sets of measurements were made, one with the coupler A and B ports in-phase (A-A and B-B, figure 2) and one with the ports out-phase (A-B and B-A, figure 3). As a practical matter, there are no differences between the two connection polarities. The S21 and S12 transmission coefficients are equivalent to the insertion loss of two couplers. For an individual coupler, the S21 and S12 measurements must be divided by 2.

Associated with this document are two S2P files with filenames *HX62Ax2_HybridCoupler_In-PhaseMeasurements_19Jan2023.s2p* and *HX62Ax2_HybridCoupler_Out-PhaseMeasurements_19Jan2023.s2p*.

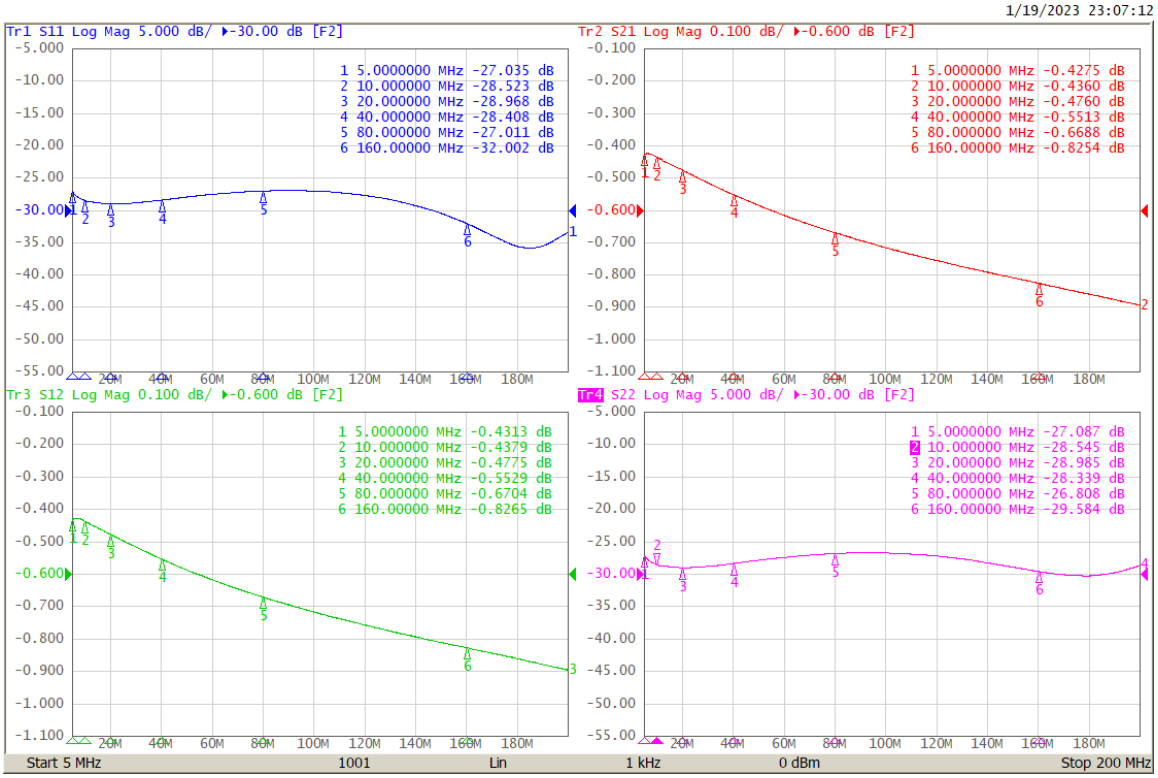

Figure 2 ~ S-Parameters for two HX62A couplers connected In-Phase (A-A and B-B). For individual coupler, divide S21 and S12 by 2.

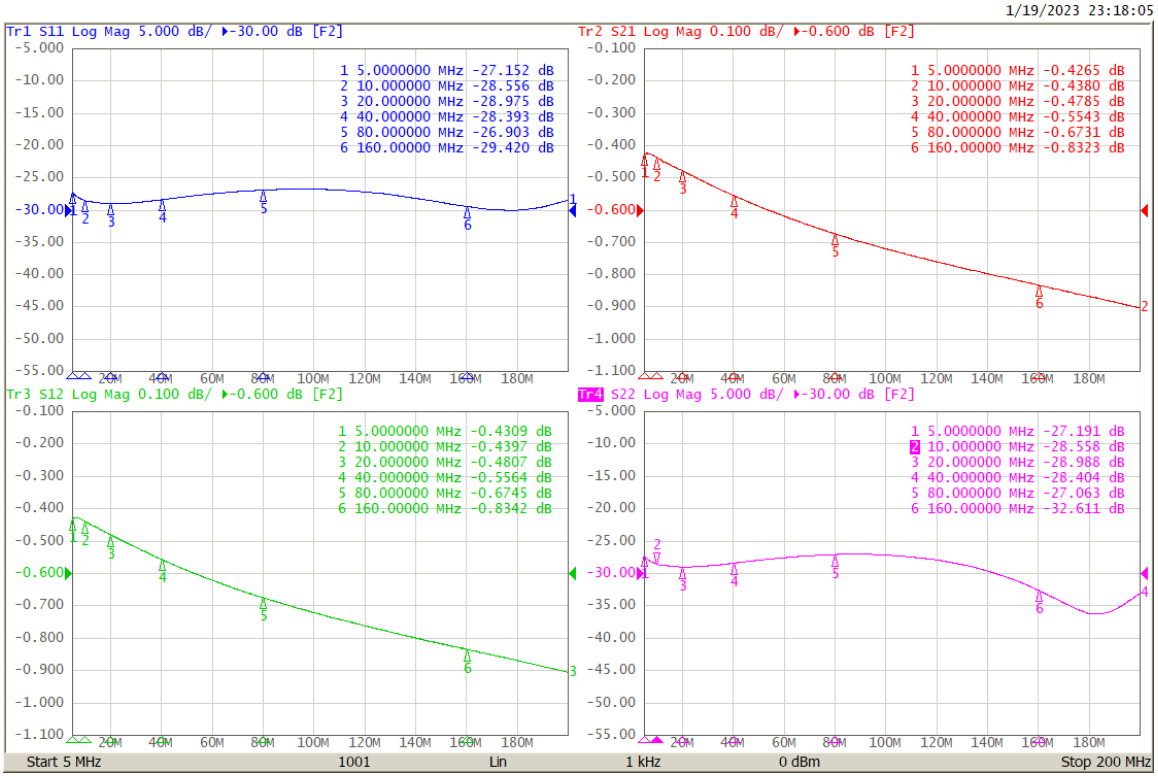

Figure 3 ~ S-Parameters for two HX62A couplers connected Out-Phase (A-B and B-A). For individual coupler, divide S21 and S12 by 2.