Measurements were made of Doppler broadened CO$_2$ transitions in the (30013) $\leftarrow$ (00001) band near 1.6 $\mu$m using frequency-stabilized cavity ring-down spectroscopy (FS-CRDS). These absolute measurements were directly linked to a cesium atomic clock by the use of an octave-spanning, self-referenced optical frequency comb. Combined standard uncertainties as low as 18 kHz were achieved for these weak transitions. A global fit was then performed which included these measurements as well as an ensemble of absolute mid-infrared and far-infrared data. The resulting spectroscopic parameters provide secondary frequency standards over a wide spectral region and should benefit atmospheric remote sensing missions.