

A Lightweight 7W/80K Pulse Tube Cryocooler

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For the demands of higher cooling power, lower mass and higher efficiency of the pulse tube cryocooler (PTC) used in space, a lightweight single-stage coaxial 7W/80K PTC was successfully developed by the Key Laboratory of Space Energy Conversion Technologies, CAS. In this paper, the details of the cooling performance are presented at different input powers ranging from 65W to 150W. Experimental results shows that this PTC typical provides a cooling power over 7W at 80K with an electric power of 150W. By means of increase operating frequency, the weight of PTC was decreased a lot. At present, the optimal frequency is 78Hz, the mass of compressor is about 2.0kg, the mass of cold-finger and phase-shifter is 1.2kg. Therefore, the total PTC is only 3.2kg in weight. The specific mass (cooling capacity/mass) is up to 2.2W/kg.