CLAIMS:

1. A packaging system for shipping a temperature sensitive payload, the packaging system comprising:

a housing comprising a bottom wall, a top wall located above and in spaced vertical alignment with the bottom wall, and side walls extending vertically between the bottom wall and the top wall, the housing defining a payload compartment for holding the payload;

a cooling system comprising one or more arrays of cold heat pipes, one or more arrays of warm heat pipes, a top layer of cold phase change material (PCM) and a bottom layer of warm PCM material;

each array of cold heat pipes located within the housing and comprising one or more cold heat pipes, each cold heat pipe shaped like an inverted “U” and comprising a horizontal section connecting two downwardly extending vertical sections;

each array of warm heat pipes located within the housing and comprising one or more warm heat pipes, each warm heat pipe shaped like a “U” and comprising a horizontal section connecting two upwardly extending vertical sections;

a first phase change material (PCM) located within each cold heat pipe, the first phase change material conditioned to a first temperature;

a second phase change material (PCM) located within each warm heat pipe, the second phase change material conditioned to a second temperature that is warmer than the first temperature;

the top layer of cold phase change material is in thermal contact with the

horizontal section of each cold heat pipe; and

the bottom layer of warm phase change material is in thermal contact with the horizontal section of each warm heat pipe.

2. The packaging system of claim 1 further comprising:

a first thermally conductive plate in thermal contact with the top layer of cold phase change material.

3. The packaging system of claim 2 wherein:

the cold heat pipes are welded to the first thermally conductive plate.

4. The packaging system of claim 2 wherein:

the cold heat pipes are embedded in the first thermally conductive plate.

5. The packaging system of claim 1 further comprising:

a second thermally conductive plate in thermal contact with the bottom layer of warm phase change material.

6. The packaging system of claim 5 wherein:

the warm heat pipes are welded to the second thermally conductive plate.

7. The packaging system of claim 5 wherein:

the warm heat pipes are embedded in the second thermally conductive plate.

8. The packaging system of claim 1 wherein:

the vertical sections of each heat pipe has an inner surface that defines grooves to facilitate capillary flow of the phase change material in a condensed state.

9. A packaging system for shipping a temperature sensitive payload, the packaging system comprising:

a housing comprising an internal wall separating a payload compartment from a refrigerant compartment;

a cooling system comprising an array of heat pipes arranged in a parallel array, the array of heat pipes located within the housing, each heat pipe comprising a lower horizontal section having an end located in the refrigerant compartment, an upper horizontal section located in the payload compartment and a vertical section connecting the lower horizontal section to the upper horizontal section; and

a refrigerant comprising one or more phase change bottles, the refrigerant located in the refrigerant compartment adjacent to and in thermal contact with the lower horizontal heat pipe section.