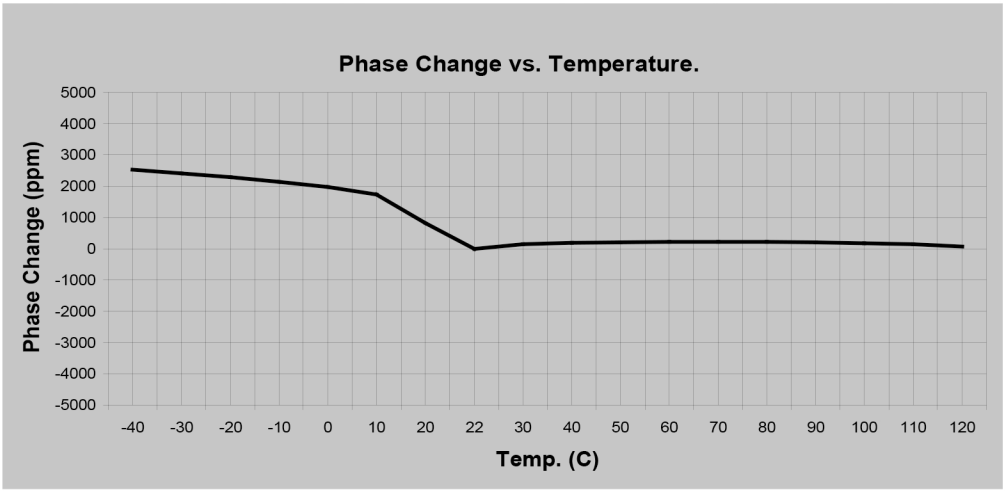
Phase Stability over Temperature



Phase Change:
The electrical length for a given frequency will "shift" as a result of environmental changes.
The ***degree*** of change is based on mechanical stresses, connector torque and thermal conditions.

The ***degree*** of phase shift as a result of temperature variation can be calculated by using the following formula:

$$\Delta\varphi = \varphi * \left(\frac{ppm}{10^6}\right)$$

Before calculating the excepted phase shift there are a few additional questions that need to be answered.
→ What is the mecyhanical length of the assembly (ft)
→ What is the frequency of interest (Ghz)
→ What is the electrical length at the frequency of interest (φ)
→ What is the dielectric constant of the insulation (E)
→ What is the temperature of interest (°C)
Once these questions are answered the phase shift can be calculated.

For example, what would be the change in phase for a 10 ft of cable assembly of HLL142 at 80°C at 18 Ghz?

Step 1: Calculate the electrical length using the following formula:

$\varphi = 365.7 * \sqrt{E} * (ft) \times (Ghz)$

$\varphi = 365.7 * \sqrt{L478} * 10 \times 18 = 80{,}032°$

Step 2: Using the chart above determine the parts per million (ppm) at 80°C

Step 3: Now solve

$$\Delta\varphi = \varphi * \left(\frac{ppm}{10^6}\right)$$

$$\Delta\varphi = 80{,}032° * \left(\frac{212}{10^6}\right) = 16.97°$$

The cable assembly will become 16.97° longer at 80°C at 18 Ghz

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