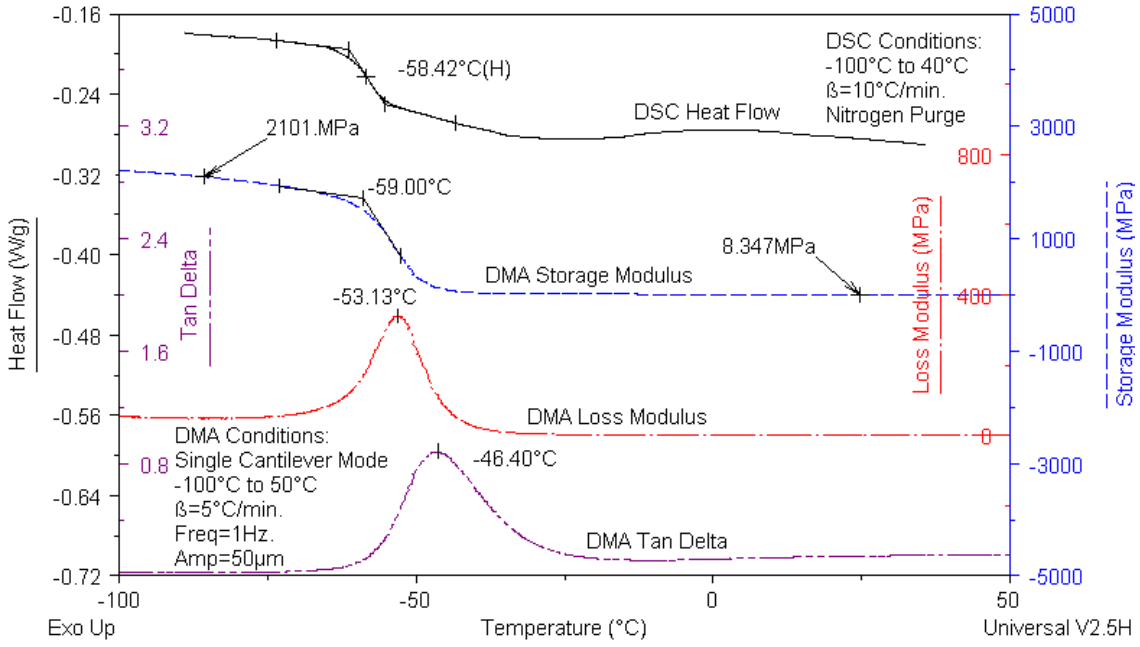
THERMAL SOLUTIONS

Characterization of EPDM Rubber by DSC and DMA



DSC measures the temperatures and heat flows associated with transitions in materials as a function of temperature or time in a controlled atmosphere. This technique provides quantitative and qualitative information about physical and chemical changes that involve endothermic or exothermic processes, or changes in heat capacity.

DMA measures the modulus (stiffness) and damping (energy dissipation) properties of materials as the materials are deformed under a periodic stress. These measurements provide quantitative and qualitative information about the performance of materials. DMA is particularly useful for evaluating polymeric materials that exhibit time, frequency, and temperature effects on mechanical properties because of their viscoelastic nature.

The above plot shows how DSC and DMA can be used to characterize the properties of an EPDM rubber sample. With unfilled samples, both DSC and DMA can be used to determine the glass transition temperature of a sample. DMA, because of its inherent sensitivity to the glass transition, is an ideal technique for identifying the Tg of highly filled systems. Absolute modulus numbers, both below and above the glass transition temperature, can be determined by plotting the storage modulus signal as a function of sample temperature. Noise and vibration damping performance can be assessed by looking at the tan delta signal. DSC and DMA are valuable thermal analysis techniques that can be used to accurately characterize both thermal and mechanical properties of materials over a wide temperature range.