SLICE Power Management and Temperature Considerations

SLICE systems are fundamentally designed to be robust mechanically and thermally. This document provides information specific to power and thermal considerations.

Power Management

SLICE employs numerous power management techniques to minimize power consumption and control heat dissipation. When you initially apply power to SLICE, it boots up in its lowest power state with all analog circuits and sensor excitation sources off. In this condition, each Stack draws ~0.05 A (50 mA), regardless of the number of measurement channels in the Stack, and very little heat is generated. (If a SLICE NANO Stack Battery is used, it may increase power consumption to over 100 mA, depending on the charge condition of the battery.)

When initializing your SLICE system for data collection, moving from the *Prepare* tab to the *Diagnostics* tab turns on sensor power and all analog electronics. The system will draw a little more power than this when storing data to memory, but the power consumption in *Diagnostics*, *Real-time*, or *Acquire* is essentially the same. In this state, SLICE may need to dissipate significant heat. The amount of heat generated by a fully active SLICE system depends on the number of channels in each Stack and the sensor load. (A 350 Ω bridge sensor draws much more power than 5000 Ω sensor.)

Heat Dissipation During Normal Use

It is normal for SLICE systems to become warm or even hot during *Diagnostics*, *Real-time*, or *Acquire* functions. High-performance signal conditioning and recording electronics are contained in an incredibly small volume. The complex circuits draw relatively little power, but the small heat dissipating area means SLICE gets warm.

SLICE will continue to function normally at temperatures approaching 100°C (far too hot to touch), but it is not desirable to allow the system to operate that hot. SLICE systems should always be bolted to a heat sink of some kind to draw heat away from the SLICE Stack. Any metal plate or surface will do, but the surface should be flat and free from dirt and oil. Mounting SLICE to even a small added mass will reduce operating temperatures greatly. Using a heat sink is particularly important if SLICE is to be used in an elevated temperature environment. SLICE NANO is particularly susceptible to self-heating as there is very little surface area to support heat dissipation naturally.

Using SLICE at Extreme Temperatures

SLICE has been tested for proper operation in -40 to +90°C environments, however certain precautions and recommended practices apply.

Elevated Temperature Considerations

It is mandatory that SLICE be mounted to a suitable heat sink in elevated temperature environments (40 to 90°C). This will help keep the internal electronics from rising above their rated operating temperatures.

Low Temperature Considerations

DTS and some of our customers have tested SLICE in thermal chambers to confirm proper operation at temperatures as low as -50°C. Boot-up reliability below 0°C is not guaranteed, but normal internal heating can keep SLICE operating down to the lowest possible temperatures. There are several things to keep in mind when operating at low temperatures.

1. At 0°C or above, there are no concerns.
2. For operation below 0°C, boot the SLICE system at ≥0°C and put it in one of the higher power states such as *Diagnostics*, *Real-time* or Armed in *Acquire*.
3. Self-heating will allow operation down to -40°C and perhaps as low as -50°C.
4. Remember that once the programmed data acquisition mission is complete, the system automatically returns to its lower power state.

DTS is working continually to improve our products and to extend the unrestricted operating temperature range of SLICE specifically. Please contact DTS Technical Support if you have questions regarding power management, temperature management or calculating power consumption.