TECHNICAL SPOTLIGHT

Subject: Transformer Rectifier Unit (TRU) Competitive Evaluation

Purpose: To benchmark the functional and durability performance of the Champion Passively Controlled TRU (PCTRU) vs a competitive GE Smith Regulated TRU (RTRU).

Scope: Ripple Voltage as well as High Voltage Transients were tested in order to determine the quality of power the converter supplies to the aircraft's DC bus.

Conclusions: Champion's PCTRU provides higher power quality than a RTRU by delivering low ripple voltage, transient voltage surge suppression, high efficiency and the highest reliability without the added failures modes inherent to the RTRU.

Results:

Ripple Voltage

Ripple voltage is defined as the variation of voltage about the steady state DC voltage during steady state electric system operation. Many TRUs being installed on aircraft today produce ripple voltage greater than 1.5 Vpk-pk. This generates significant concerns with the overall system integration with regards to electronic system faults, compatibility, and performance degradations in advanced electronic systems. **Figure 1** depicts the ripple voltage of GE Smiths' RTRU which produces a ripple voltage of 1.7 Vpk-pk. High ripple voltage (greater than 1.5 Vpk-pk) can have a "poisoning" effect on equipment causing it to degrade over time. Shown in **Figure 2**, Champion Aerospace's simple passive techniques in the PCTRU provide a typical ripple voltage of 0.40 Vpk-pk which is a 90-95 percent improvement beyond competitive aircraft power supplies.

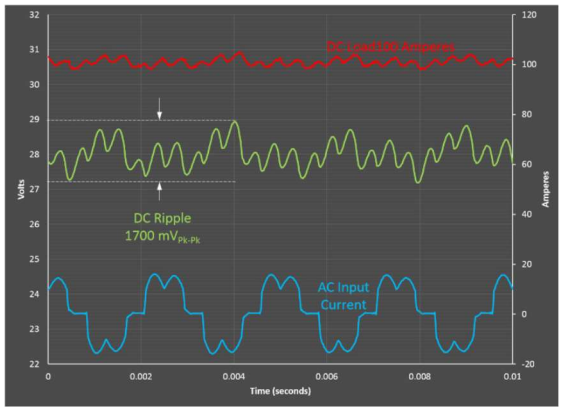

Figure 1: GE Smiths' RTRU

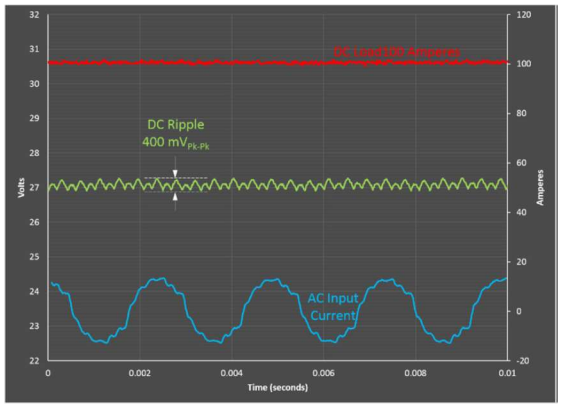

Figure 2: Champion's PCTRU

High Voltage Transients

High voltage transients are generally understood as “life altering events” for utilization equipment containing semiconductor devices. Nearly all advanced electronic utilization equipment contains semiconductors that are susceptible to these high voltage transients. Shown in **Figure 3**, Smiths’ RTRU allows high voltage transients of greater than 40 volts to pass through the converter and on to the aircraft’s utilization equipment. High voltage transients greater than 40 Volts are known to cause equipment to fail catastrophically, and/or prematurely, resulting in the loss of avionics and increasing maintenance costs.

Champion’s PCTRU, shown in **Figure 4**, incorporates transient voltage surge suppression to keep high voltage transients under 40 volts. Champion’s PCTRU suppresses high voltage transients without using active feedback inherent to RTRUs. This transient voltage surge suppression method protects utilization equipment without adding a high steady state failure mode associated with RTRUs. **Figure 5** depicts the same input transient with the output from both the Champion PCTRU **(Black)** and GE Smiths RTRU (**Red)**.

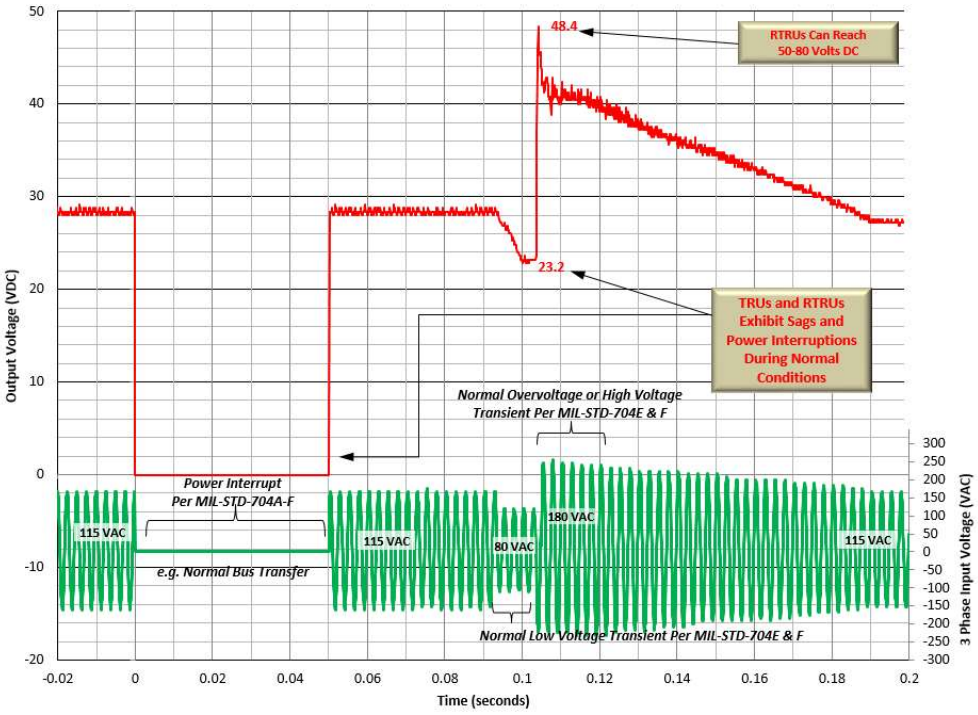

Figure 3: GE Smiths’ RTRU

Figure 4: Champion's PCTRU

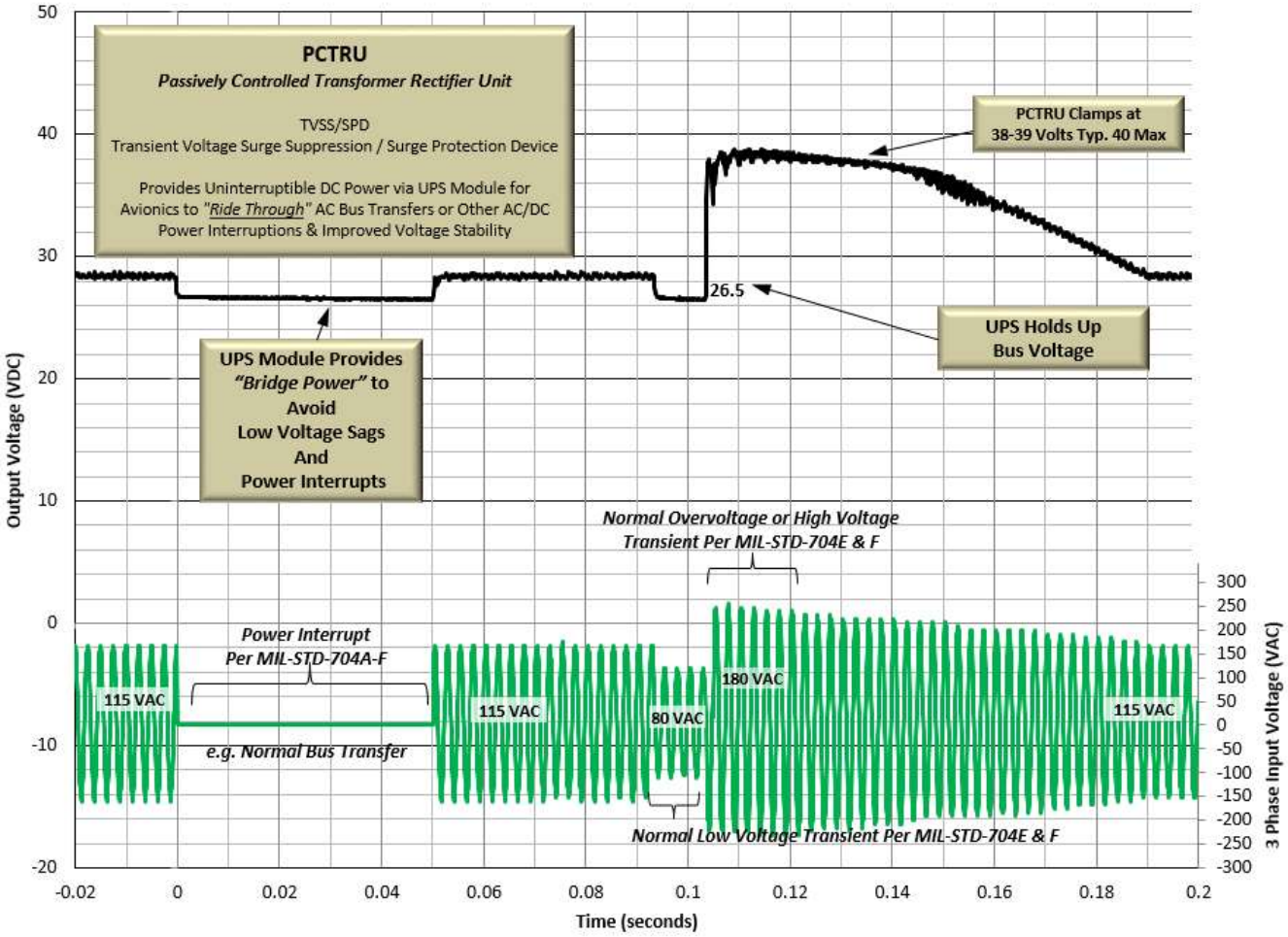

Figure 5: Champion's PCTRU and GE Smiths RTRU Performance Comparison