MIL-STD-1275A SOLUTION
USING
RANTEC HIGH DENSITY MODULES

This paper documents the results of a multi-output power supply configuration based on Rantec's High Density Modules (HDM) and accessories that is MIL-STD-1275A compliant for low line transient conditions and has low output voltage ripple and noise. This power supply was constructed in a day using existing modules, and is a good example of how fast a modular design approach can be achieved that meets one of the more difficult input voltage conditions.

Below are a block diagram (Figure 1) and photographs of the test setup (Figure 2 & Figure 3), and the documented results (Figures 4 through Figures 28). Tests were conducted at Rantec in support of a product development effort in anticipation of military programs requiring low ripple and noise and MIL-STD-1275A compliance using DC-to-DC converters.

The power supply used standard Rantec, 48V input HDM-100 modules, boost converter, and HDF-22 EMI filter (for MIL-STD-461E compliance). The input voltage ranged from 14VDC to 30VDC steady state, and 9VDC to 40VDC transients. The output voltages were 3.3V, 5V, and +/-15V. The output voltage of the boost converter was set for 50VDC. As shown, no external parts were required for the HDM based power supply, as is typical with the majority of COTS modules.

The key to the power supplies wide input voltage performance (9V to 40V) is the boost converter. It is a non-isolated converter that boosts the unregulated input line voltage to 50VDC. This approach allows the use of standard 48V input, telecom DC-to-DC converter modules and takes the pressure off the modules by providing a steady input voltage. In addition, increasing the boost output voltage to 65VDC would provide additional hold-up time for a given implementation. This would be beneficial for applications which must also meet MIL-STD-704A requirements.

The 3.3 and 5 volt output ripple and noise were well within typical standards for VME applications at less than 50mV p-p. As shown, no external circuitry was required to achieve these ripple and noise levels.

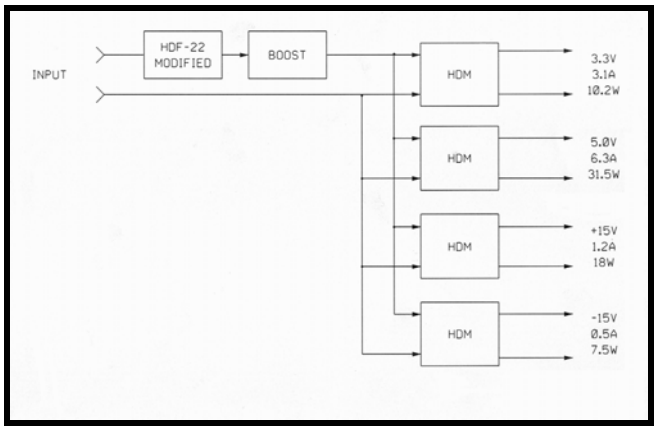

Figure 1 - Power Supply Block Diagram

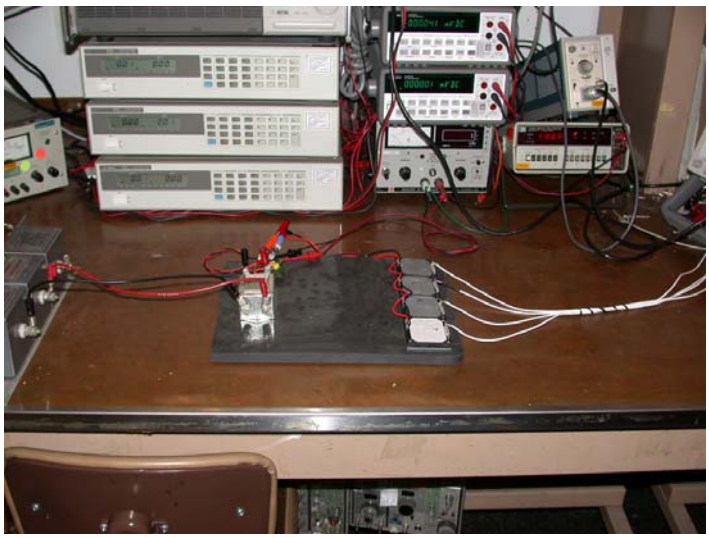

Figure 2 - Test Setup with HDM Modules

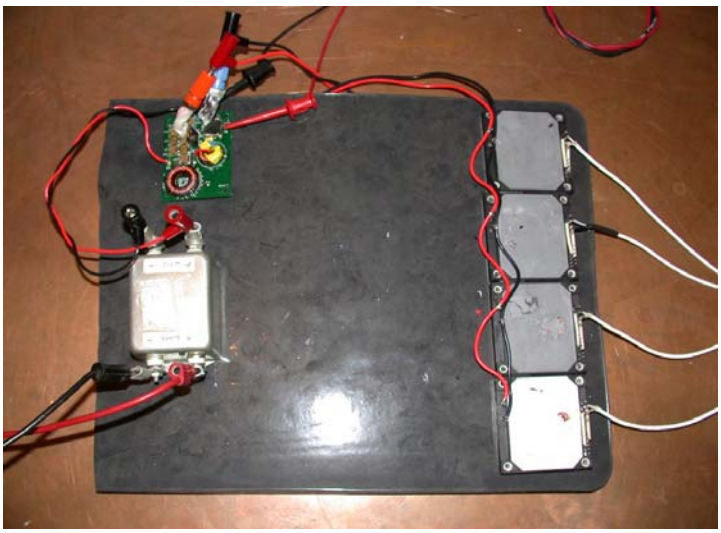

Figure 3 - Close up view of boost converter, HDF and HDM Modules

Vin	Load	3.3v	5.0V	15V	(-)15V
9	NL	3.30	5.04	15.01	15.00
9	FL	3.31	5.02	15.01	15.00
14	NL	3.31	5.04	15.01	15.00
14	FL	3.31	5.02	15.00	15.00
28	NL	3.31	5.05	15.01	15.01
28	FL	3.31	5.02	15.01	15.00

Figure 4 - Steady State Line & Load Data

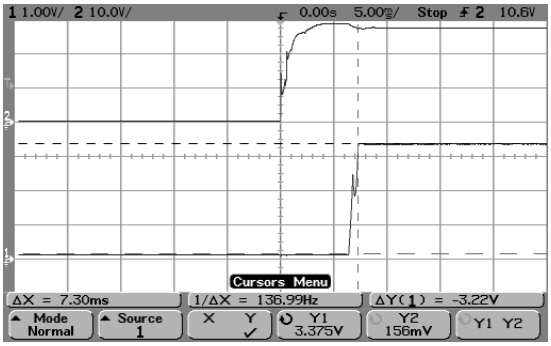

Figure 5 - 3.3V Turn-On Delay Time @ FL

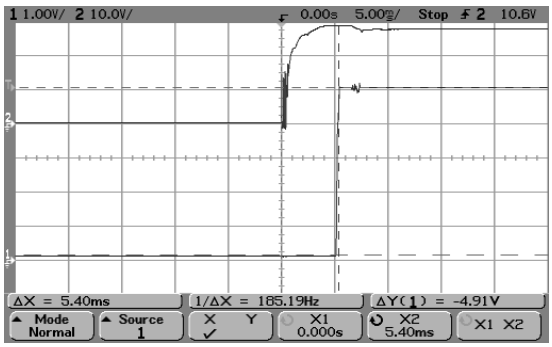

Figure 6 - 5V Turn-On Delay Time @ FL

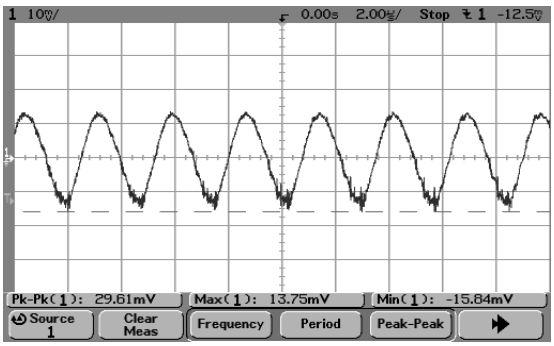

Figure 7 - 3.3V Ripple @ ½ Load

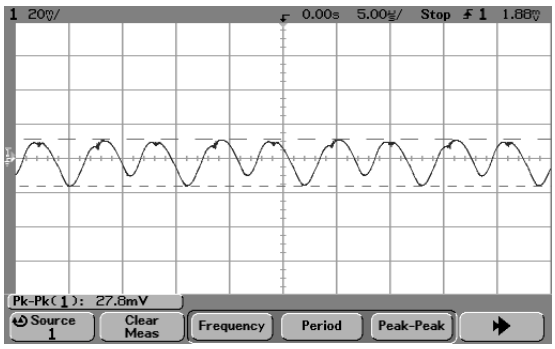

Figure 8 - 5V Ripple @ ½ Load

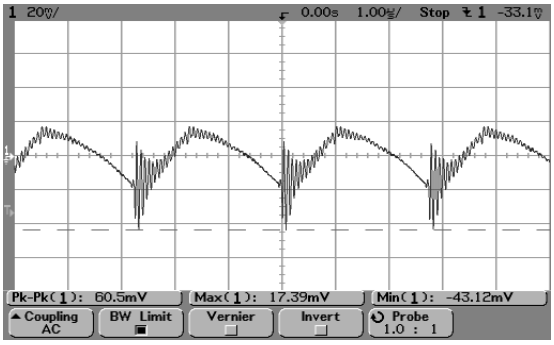

Figure 9 - 15V Ripple @ ½ Load

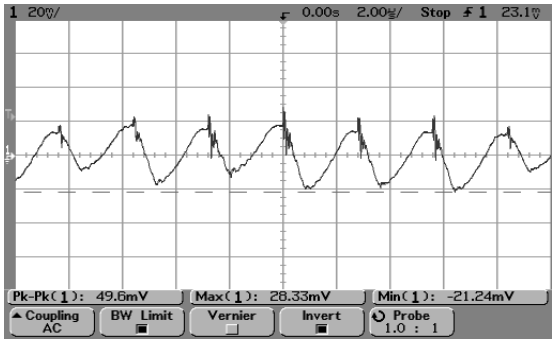

Figure 10 - (-)15V Ripple @ ½ Load

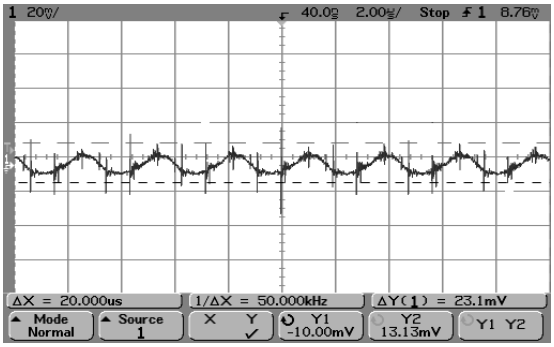

Figure 11 - 3.3V Ripple @ FL

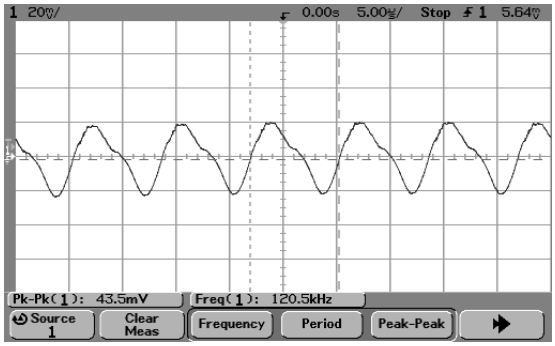

Figure 12 - 5V Ripple @ FL

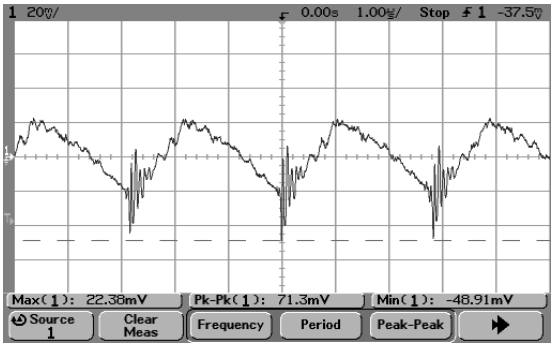

Figure 13 - 15V Ripple @ FL

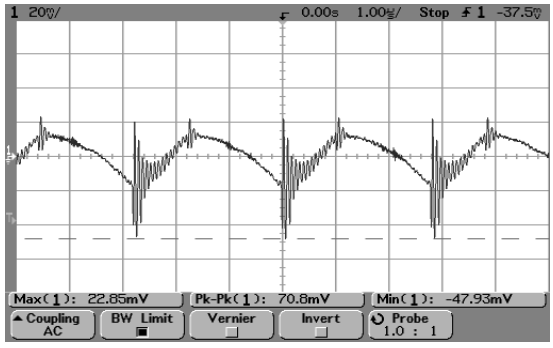

Figure 14 - (-)15V Ripple @ FL

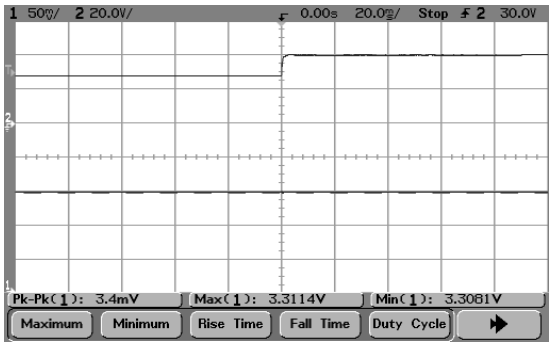

Figure 15 - 3.3V Input Line Transient 28-40V @ FL

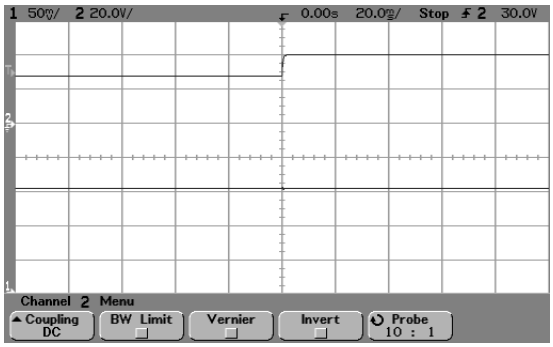

Figure 16 - 5V Input Line Transient 28-40V @ FL

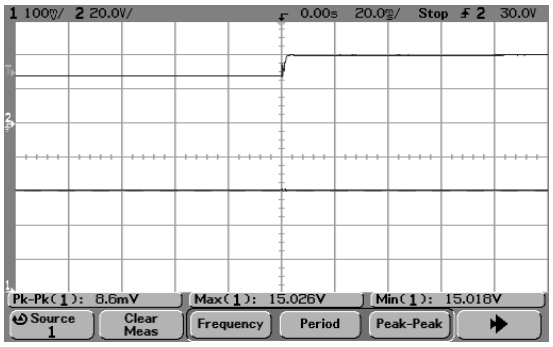

Figure 17 - 15V Input Line Transient 28-40V @ FL

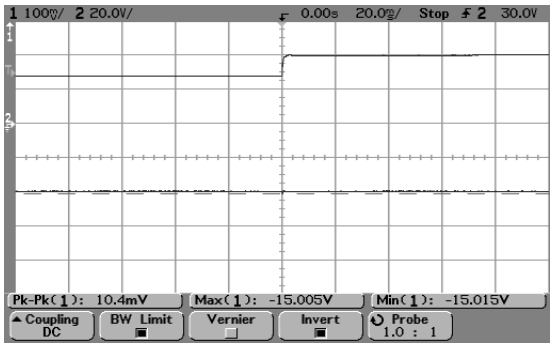

Figure 18 – (-)15V Input Line Transient 28-40V @ FL

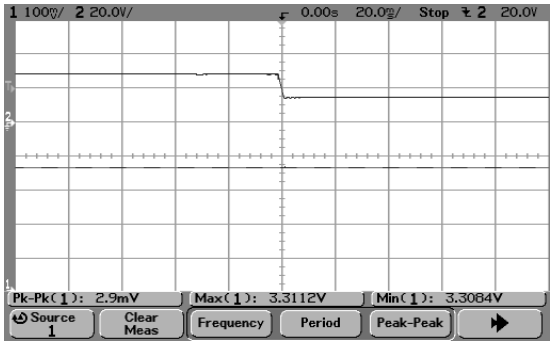

Figure 19 - 3.3V Input Line Transient 28-14V @ FL

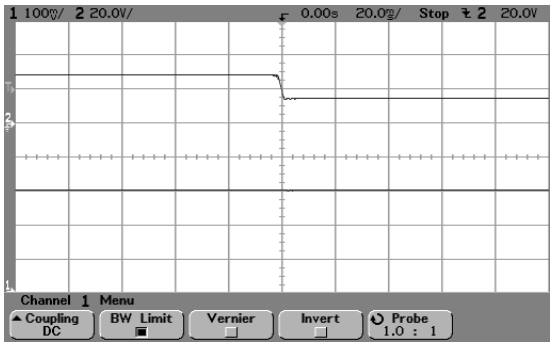

Figure 20 - 5V Input Line Transient 28-14V @ FL

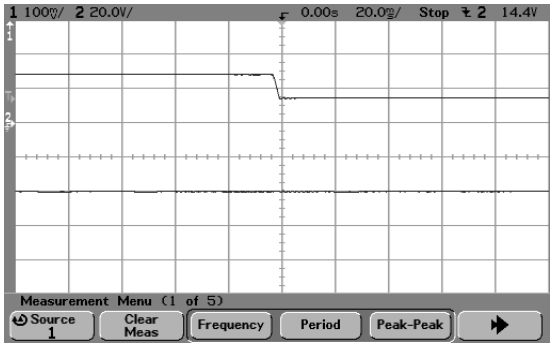

Figure 21 - 15V Input Line Transient 28-14V @ FL

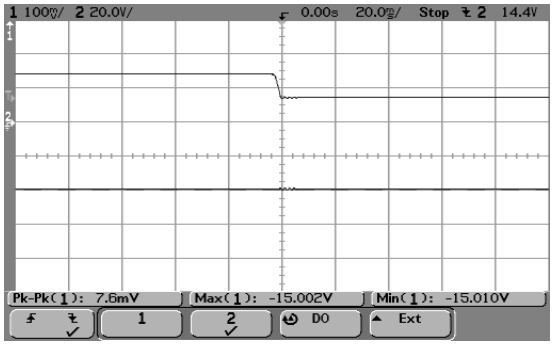

Figure 22 – (-)15V Input Line Transient 28-14V @ FL

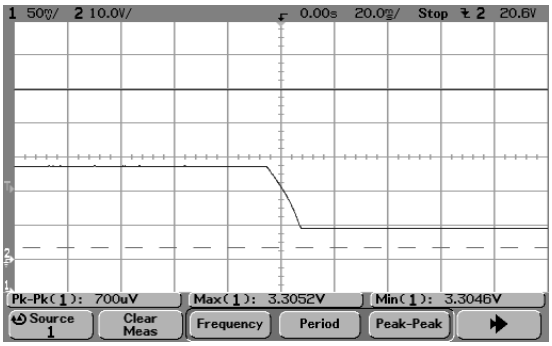

Figure 23 - 3.3V Input Line Transient 28-9V @ FL

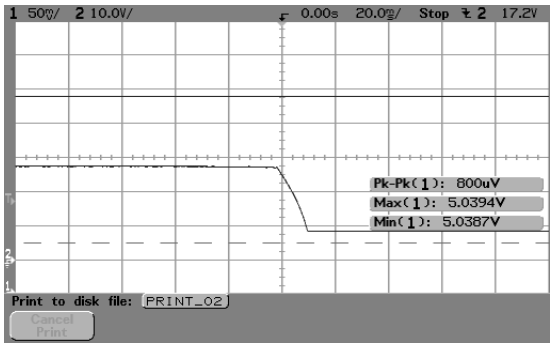

Figure 24 - 5V Input Line Transient 28-9V @ FL

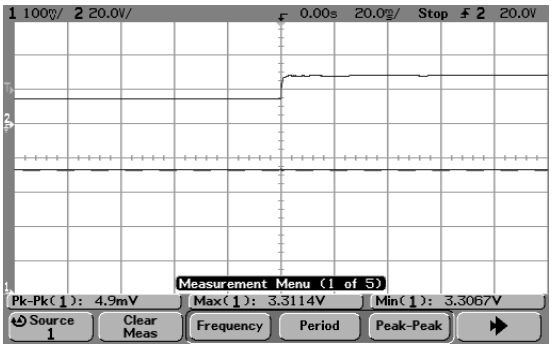

Figure 25 - 3.3V Input Line Transient 14-28V @ FL

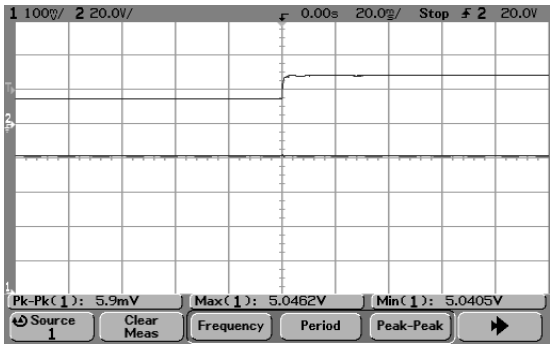

Figure 26 - 5V Input Line Transient 14-28V @ FL

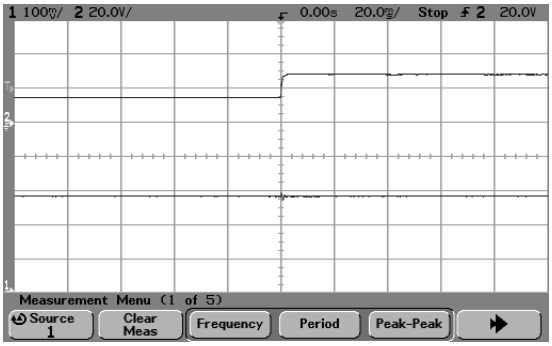

Figure 27 - 15V Input Line Transient 14-28V @ FL

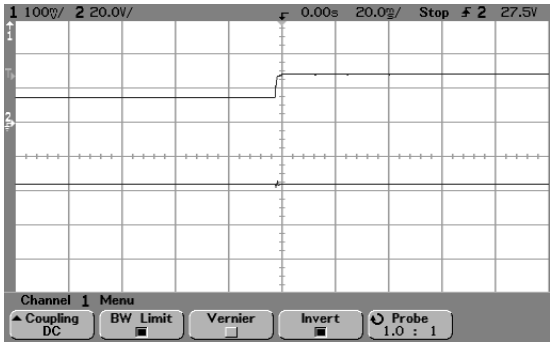

Figure 28 – (-)15V Input Line Transient 14-28V @ FL

The results obtained show how well the modular based design performs and how quickly a design can be put together using a mix of Rantec modules. All of Rantec's modules are designed for full compatibility with each other, ensuring low technical risk and a straightforward implementation. More information on Rantec HDM modules and other products can be found on our website www.rantec.com.

Please contact us at Rantec Power Systems for information on how we can assist you in configuring a system to your custom requirements.