Alternative X2Y® Component Attachment for Power Filtering

Summary

The purpose of this application note is to specifically address the performance results of the X2Y® Technology when the power return is referenced to the chassis in addition to G1 and G2 terminations on the X2Y® component.

Application Notes 2004 - Ferrite Bead Removal and 2005 - X2Y® DC Power Filtering (Ceramic, Ferrite, MOV) use a Circuit 1 configuration where the power and return leads of a single board computer are attached to the A and B terminals of X2Y® component. The G1 and G2 terminals of the X2Y® component are connected to a floating metal enclosure (Figure 1).

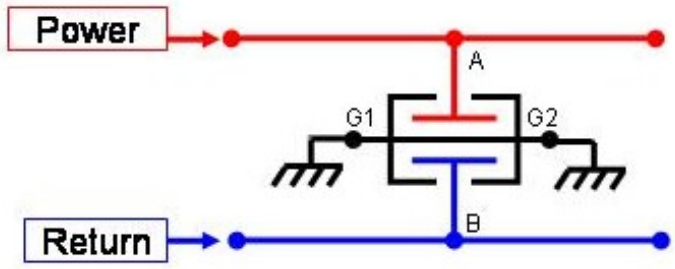

Figure 1. *X2Y® component schematic of a Circuit 1 configuration. For more information on the Circuit 1 configuration see Application Note #1006 X2Y® Circuit 1 & Circuit 2 Configurations.*

Several engineers from leading OEMs have said that their specific applications require the return to be referenced to the chassis and have requested test data with the X2Y® component attached as shown in Figure 2.

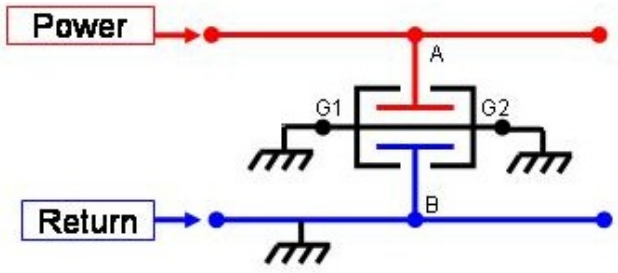

Figure 2. *X2Y® component schematic of a modified Circuit 1 configuration.*

Experiment Setup

The experiment protocol will consist of a CMD-11E1 single board computer manufactured by Axiom Manufacturing Inc. Hook-up wire is soldered to the board input power outlet. The single board computer is placed into a metal enclosure. Two small holes are drilled into the enclosure for access to the power leads. An array of D cell batteries is attached to the power leads to provide a 6-volt DC power supply (Figure 3).

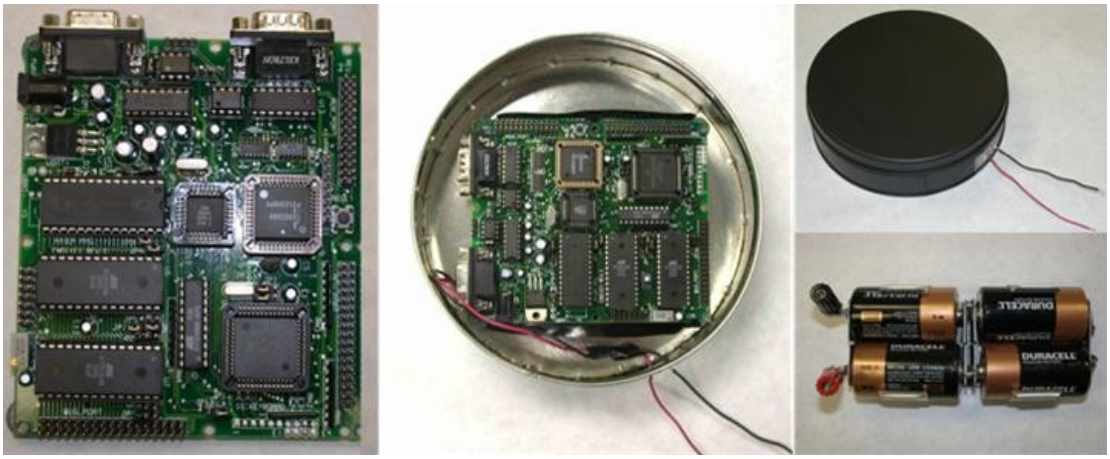

Figure 3. *Left-to-right, CMD-11E1; CMD-11E1 in metal enclosure; metal enclosure closed (top); DC power supply (bottom)*.

The DUT will be an 180nF 1206 ceramic X2Y® component placed on a small PCB located at the power lead's exit point of the metal enclosure (Figure 4).

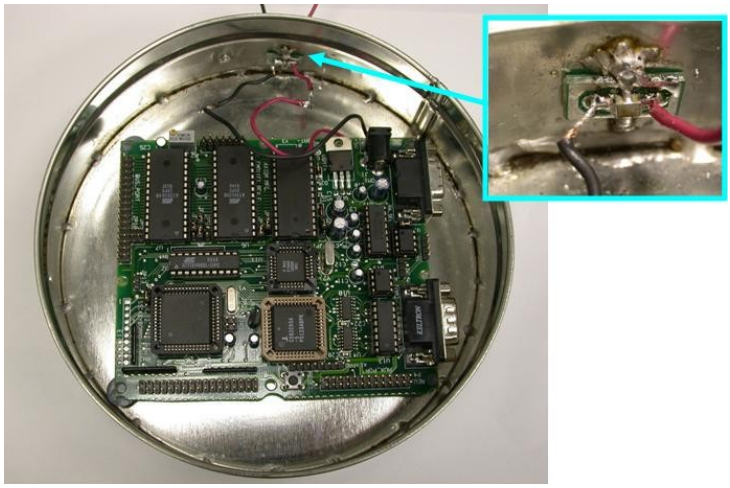

Figure 4. *DUT placement on metal enclosure*.

The laboratory equipment used in this experiment are a GTEM (ETS-Lindgren IC-GTEM 250) (Figure 5), spectrum analyzer (IFR AN920) (Figure 6), and a preamp (AR LN1000) (Figure 7).

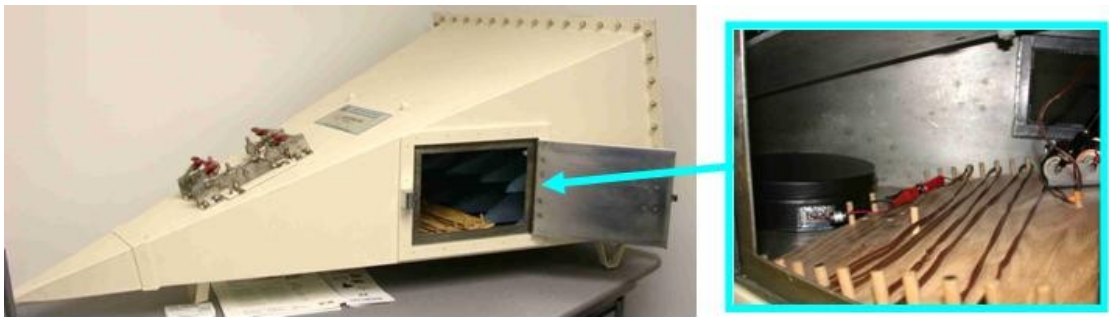

Figure 5. *GTEM (ETS-Lindgren IC-GTEM 250) to measure radiated emissions (left); DUT placement in GTEM (right)*.

Figure 6. *Spectrum analyzer (IFR AN920)*.

Figure 7. *Preamp (AR LN1000) used to amplify the frequencies 200 MHz to 1 GHz*.

Radiated Emissions From 9kHz to 500kHz

The radiated emission was measured with 501 data points from 9kHz to 500kHz. Figure 8 shows the test setup and plot of the results.

IFR An920 Spectrum Analyzer
Frequency Range: 9kHz - 500kHz
Sweep: 8 x20 ms
Bandwidth: 9 Khz
Video: none
Atten:0 dB
Gain: 30 dB
Measurement: dBuV
Gtem: *ETS-Lindgren IC-GTEM 250*
Voltage: 6V
Preamp: AR LN1000

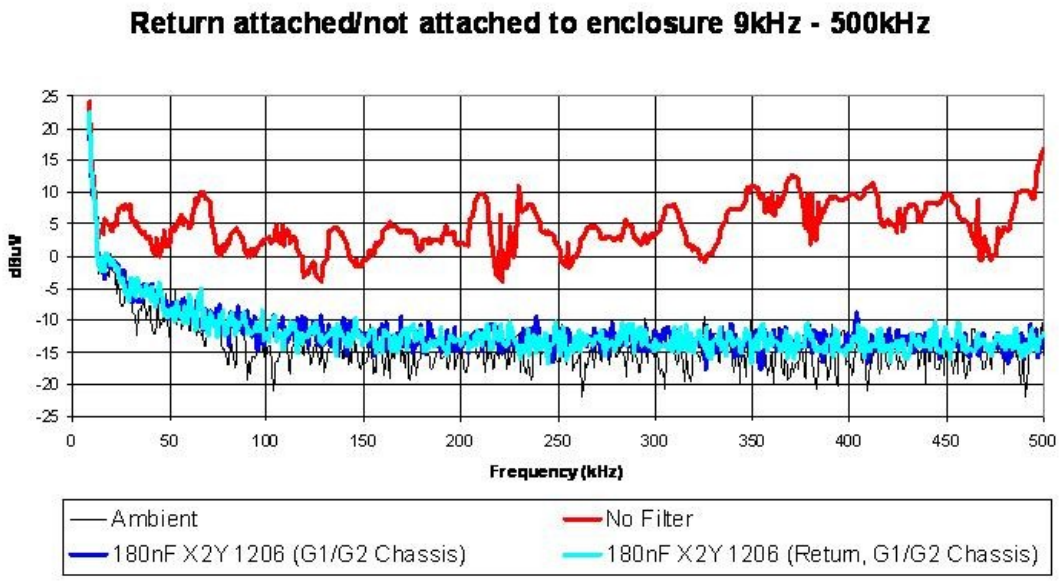

Figure 8. *Test setup and results from 9kHz – 500kHz*.

Radiated Emissions From 100kHz to 200MHz

The radiated emission was measured with 501 data points from 100kHz to 200MHz. Figure 9 shows the test setup and plot of the results.

IFR An920 Spectrum Analyzer
Frequency Range: 100 KHz - 200 MHz
Sweep: 8 x 5 ms
Bandwidth: 120 Khz
Video: none
Atten: 20 dB
Gain: 30 dB
Measurement: dBuV
Gtem: ETS-Lindgren IC-GTEM 250
Voltage: 6V
Preamp: AR LN1000

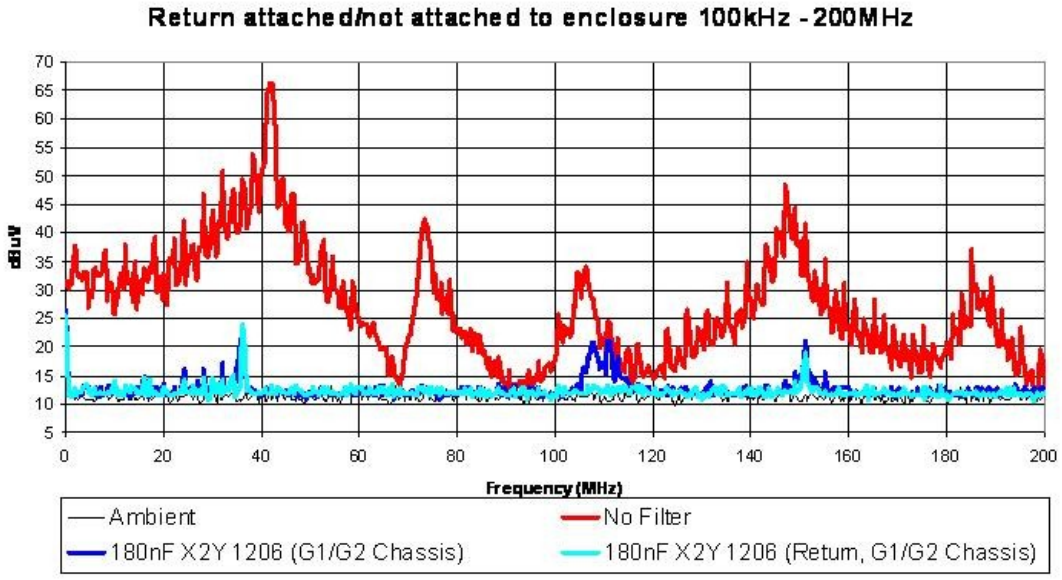

Figure 9. *Test setup and results from 100kHz – 200MHz*.

Radiated Emissions From 200MHz to 1GHz

The radiated emission was measured with 501 data points from 200MHz to 1GHz. Figure 10 shows the test setup and plot of the results.

IFR An920 Spectrum Analyzer
Frequency Range: 200 MHz - 1 GHz
Sweep: 8 x10 ms
Bandwidth: 120 Khz
Video: none
Atten:0 dB
Gain: 30 dB
Measurement: dBuV
Gtem: ETS-Lindgren IC-GTEM 250
Voltage: 6V
Preamp: AR LN1000

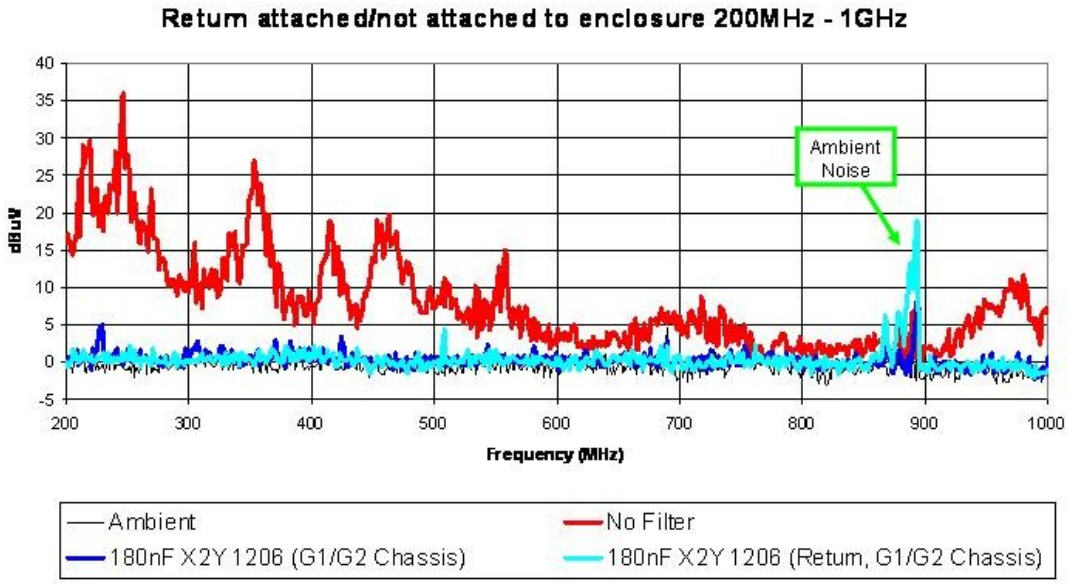

Figure 10. *Test setup and results from 200MHz – 1GHz*.

Conclusion

Test results show nominal differences between the two different attachment configurations.

For more information on the X2Y® Technology used in power filtering applications, circuit configurations and benefits go to www.x2y.com, or use the contact information at the end of this application note to get answers to questions that are unique to your application.

Note: Performance results reported in this and other application notes can only be achieved with patented X2Y® components sourced from X2Y® licensed manufacturers or their authorized distribution channels.

Contact Information

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