

Summary

This application note is the fourth in a series that deal with DC motor design. The first application note ([Application Note #4001](#)) provided 4 Principles to follow when designing for EMC compliance. The second ([Application Note #4002](#)) and third ([Application Note #4003](#)) application notes provided practical examples of how to apply the 4 Principles correctly.

This application note is a practical example of Principle #2.E. It demonstrates the performance improvement when the power leads exit the motor housing close together versus space apart.

End-Cap Design

Principle 2.E. in [Application Note #4001](#) discussed power lead location when exiting the motor housing and the placement of the X2Y[®] component with respect to the power leads. The following reviews the three key reasons for locating the power lead close together:

- Reducing the current loop, thereby using mutual inductance to cancel noise.
- Reducing lead length to the X2Y[®] component, thereby lowering lead inductance.
- Making the physical attachment of the X2Y[®] component easier to implement.

To demonstrate the performance improvements, a small DC motor was prototyped with a printed circuit board (PCB) with a 1410 400nf X2Y[®] component. Two sets of power leads were soldered on the PCB (Figure 1).

1. Power leads #1 – soldered next to the A and B nodes of the X2Y[®] component.
2. Power leads #2 – soldered ½" away from the X2Y[®] component and ¾" apart.

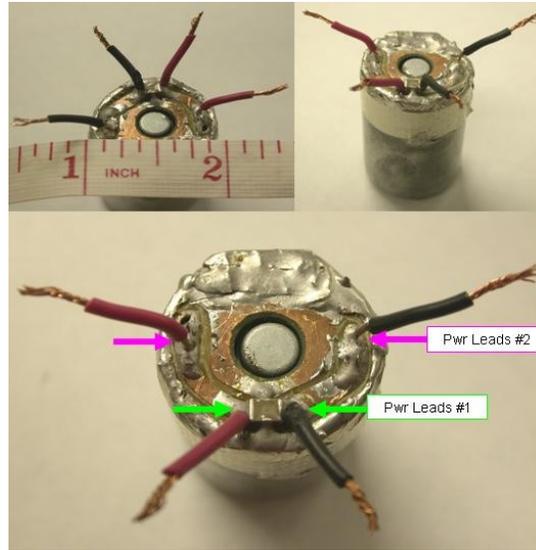


Figure 1. Prototype DC motor with two placements for power leads.

Radiated emissions were then measured for power supplied to each set of leads from 100KHz to 1GHz using a GTem cell, preamp, and a spectrum analyzer.

Radiated Emissions Results

Figure 2 is the plot of the measured radiated emissions from the two sets of power leads. The power leads next to the X2Y® component reduced emissions from 5-10dB across the spectrum.

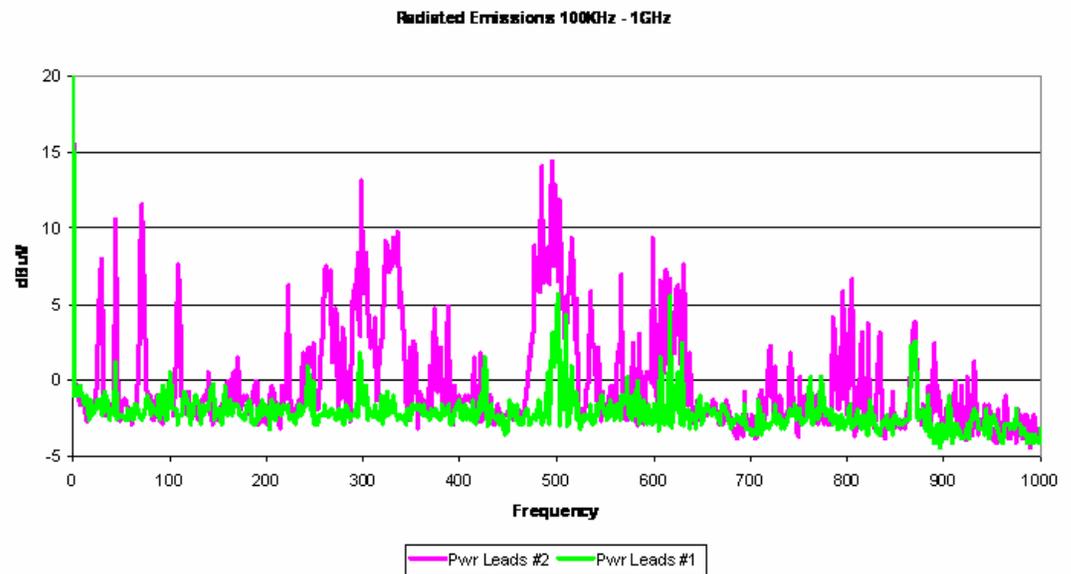


Figure 2. Radiated emissions from 100KHz to 1GHz.

Conclusion

This application note demonstrated that properly locating the power leads with respect to an X2Y® component can dramatically improve the radiated emissions performance.

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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