Electromagnetic emissions of our A2 product :

I received your email concerning electromagnetic emissions of our A2 product. Unfortunately, the A2 has many possible ways in which electromagnetic energy may escape: 2 layer circuit board, plastic housing, no filtering of energy on the cable, to name a few. As it stands right now, there are probably only a few things you can do to try to reduce emissions to an acceptable level. We are in the process of moving to a multi-layer circuit board, which will improve the product, but unfortunately this has not been released as of yet; I've requested a status update on when the new circuit boards will appear in the production environment, and I will pass that along when I learn the release date.

In the meantime, you have a few options. My first recommendation would be that you try applying a ferrite filter to the SEI cable that connects to the A2. These may be purchased, for instance, from DigiKey here in the United States; no doubt a similar product may be available in France. Here is a link to a page describing one such filter:

http://www.digikey.com/scripts/DkSearch/dksus.dll?Detail?Ref=194705&Row=57856&Site=US

Here is a manufacturer link for such products:

http://www.steward.com/web_parts.asp?line=EMC+%2F+EMI+Board+Level+and+Cable+Core+Products&family=Ferrite+Cores+for+Cables+%2D++Wiring+Harnesses+%2D+Connectors&progroup=1%2E+Round+and+Cylindrical+Cores&product=Broadband+Split+%2F+Snap%2Don+Ferrite+Cores+for+Round+Cables

or http://tinyurl.com/bqvl9

This kind of filter must be installed as close to the A2 device as possible; typically one would lay the cable in one half of the device, or perhaps even wrap the cable around twice if the inner diameter permits, and then close the two halves of the device. This traps the cable so that it passes through the center of the device one or two times. This kind of filter will reduce the amount of electromagnetic energy that can be radiated from the cable, which is often acting as a long antenna. You might want to pick up two of these ferrite cores, and put the second one on the cable near the computer end.

Once emissions from the cable have been reduced, you still have the possibility of direct emissions from the circuit board. Since the stock housing is plastic, direct emissions from the circuit boards can be substantial. You may have some success wrapping the unit in cheap conductive aluminum foil; the key is in how you ground it. You must cover the entire assembly, and it is a good idea to use conductive aluminum or copper tape to seal any seams. The grounding must be done in such a way as to have a low-inductance path to a substantial chassis ground. Low inductance paths are flat and wide, so one thing to try is to get some wide (12.5mm or 19mm) conductive metal tape (make sure the adhesive is conductive, too), and use this tape to connect the foil-wrapped device to a nearby metal chassis. Warning: good tape is not cheap! Digikey carries the 3M product:

http://www.digikey.com/scripts/DkSearch/dksus.dll?Criteria?Ref=202938&Site=US&Cat=32638089

Another option is to recommend that your users purchase the HD25A version. This comes in a machined aluminum metal case that will likely have lower emissions if properly grounded. You will still need ferrites for the cable, and proper grounding of the housing.

Unfortunately, there is probably not much that can be done with regard to the oscillator. The product already uses a resonator in place of a crystal, and resonators typically have a softer EMI profile than crystals. The spikes that you're seeing probably are the harmonics of the 7.37 MHz resonator. We could change to a slightly different frequency, like 8 MHz, but then we would also have to tweak the firmware to make the baud rates come out right. Usually there is a charge for that kind of special product, so unless you are confident that we can move those spectra to a more benign frequency this would not make sense. For instance, if the noise you're seeing on the 144 MHz band is actually the 19th harmonic (140 MHz) or 21st harmonic (154.8 MHz), then moving to an 8 MHz resonator will shift that spectra to 152 or 168 MHz. Would these frequencies be far enough away from your communication bands to limit interference? I think that the fact that you mentioned wideband noise probably means that this is not a productive approach.

Kind regards,

Kurt Liebezeit

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