

# PulseCore Semiconductor pushes EMI suppression boundaries with Ellisys.

## Client

**PulseCore Semiconductor Corporation**

Active EMI suppression specialists  
[www.pulsecoresemi.com](http://www.pulsecoresemi.com)



## Challenge

Enabling electronics manufacturers to eliminate effects of harmful EMI.

## Solution

PulseCore uses the Ellisys USB Explorer 200 PRO to ensure EMI suppression in their products.

## Benefits

The Ellisys analyzer enables PulseCore to provide active EMI suppression solutions for use in a wide range of electronic devices.

## Quote

*"The Ellisys Explorer 200 PRO USB Analyzer was instrumental in conducting our tests, which confirmed that at the 3X frequency deviation, the USB products that we checked remained USB functional."*

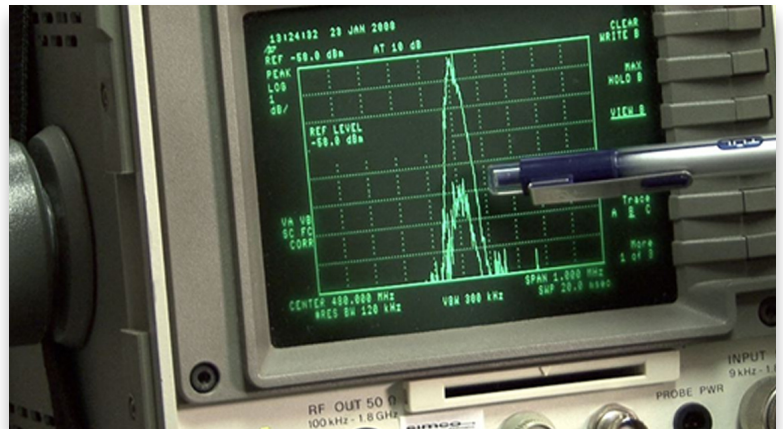
Dan Hariton,  
 Director of Engineering,  
 PulseCore Semiconductor Corporation

PulseCore Semiconductor provides a versatile, predictable and deterministic approach to electro-magnetic interference (EMI) suppression. PulseCore's analog and mixed-signal integrated circuits use spread spectrum modulation (SSM) and a variety of proprietary technologies for low cost, highly reliable EMI management that meets today's industry standards and system requirements.

Modern material and technology produce electro-static discharge (ESD) and electro-magnetic interface (EMI). Consider mobile phones, for instance. If enough USB radiates at 480 MHz with harmonics above 480 MHz, that interference makes the mobile phone drop the call or prevent dialling.

## No guesswork needed

Engineers appreciate PulseCore's ability to eliminate the guesswork in reducing EMI. When designing a system that incorporates USB functionality, these systems must be both functional and compliant with the USB 2.0 specification. Engineers can incorporate components such as the USB EMI Reduction IC into their products at the design stage, helping them achieve functionality and compliance.



Compliance means almost no frequency deviations are permitted, according to PulseCore's Director of Engineering Dan Hariton. The specification states that the clock frequency of the signalling rate must be plus/minus 500 parts per million (ppm). This range of 1,000 parts per million peak-to-peak is commonly called a 1X deviation.

PulseCore's customers research, develop, and manufacture a variety of electronic devices, including PC/data processing products, PC peripherals, high resolution LCD displays, mobile handsets and other consumer products.

These customers value PulseCore's active EMI suppression solutions, since passive EMI shielding components are typically heavy. "The consumer must carry the weight," Hariton noted of materials such as ferrite beads.

"The EMI suppression provided by passive components reduces the length at which the signal could be propagating to the wire," Hariton continued, "while our active EMI chip does not have the same limitation, because it does not create a low pass filtering effect."

# ellisys™

Ellisys is a leading supplier of cutting-edge USB, Wireless USB and Ultrawideband Protocol Analyzers. The company's products help hardware, software and test engineers save development effort, improve quality, and accelerate time to market. Ellisys protocol analyzers range from simple and cost-effective tools to high-end fully-featured equipment.



Giving you the edge

PulseCore Semiconductor is a fabless semiconductor company and a leading provider of standard and custom high-speed and low power analog and mixed-signal silicon solutions. With more than ten years specializing in EMI optimization, PulseCore products include EMI reduction, clocking, power management and system monitoring ICs.

**"The Ellisys protocol analyzer is self-explanatory when you look at the box: these are the ports, this is what you have to do. It's not complicated, there are no knobs to turn on the protocol analyzer, and in the software you can retrieve results very quickly."**

The customer can also adjust the amount of EMI suppression that the chip provides – even turn suppression off if need be, like a hot switch, while the chip is in the system. "Some customers need to know if there are any differences in functionality with EMI suppression turned on or off," Hariton explained.

"Customers typically perform their own system EMI measurement in a specifically equipped anechoic chamber," said Hariton. "They can turn EMI reduction off and see the EMI-radiated noise increasing, allowing them to create an immediate 'before and after' comparison."

Why would somebody go out of their way to decertify a USB-compliant system and make it non-compliant? Because the need to reduce EMI becomes much greater than the need for the USB logo. This does not work against the logo – it just gives the customer more choices.

PulseCore customers who face extreme EMI problems use this aspect of PulseCore's products. "They will trade off USB compliance for EMI abatement," said Hariton. "There is a 3X safety margin of compliance that gives these specific customers the ability to range the amount of dB reduction that they want to implement in their system with their system remaining USB functional."

One PulseCore customer, who had several radios within 30 centimetres of a USB computing system, asked Hariton: "How much attenuation can we get using your chip?" The dB attenuation numbers quickly followed. "They will not get a USB logo, but they might not need it in a specific closed-circuit application."

### Pushing the limits of value

"When we extended our analysis and inquiry beyond the physical layer, we push our silicon to its limits to see if USB communication fails because our chip introduces too much frequency deviation," Hariton explained. "It's a double benefit to us. It tells us there is so much headroom and USB functionality is maintained."

Thanks to Ellisys-assisted insight, PulseCore can unequivocally state that interference will be reduced by a certain number of dB in a system if customers use PulseCore chips at the crystal oscillator source.

"We have good control over how much frequency deviation this chip provides, and our customers can confirm, adjust and determine their own limits for what hardware they want to produce," said Hariton.

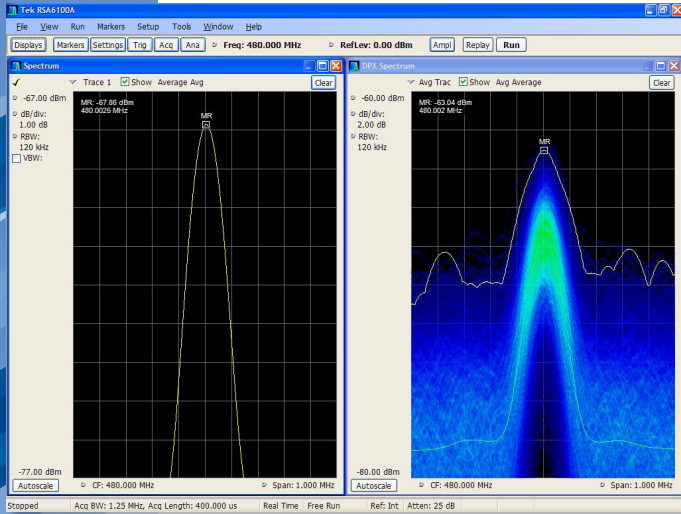
Ellisys has achieved much the same status in the field of USB analyzers that PulseCore commands in the arena of EMI suppression.

On usability: "There is a learning curve associated with every type of new equipment," said Hariton. "The Ellisys protocol analyzer is self-explanatory when you look at the box: these are the ports, this is what you have to do. It's not complicated, there are no knobs to turn on the protocol analyzer, and in the software you can retrieve results very quickly."

"It's important when we have to tackle the problem of determining functionality beyond USB certification limits, that we can do it in a quick manner and communicate results to our customers."

The analyzer's physical dimensions also prove a great fit. "We are not looking for something that is heavy," Hariton said. "The Ellisys analyzer is like a portable radio: light, easy to carry, easy to use."

Hariton is also pleased at how Ellisys supports its products, and by extension its customers. "At a time when we were not able to perform a critical test, Ellisys jumped in and said 'Yes, this is easy to do. This is how you do it.' And the problem was resolved," he said.



PulseCore's USB 2.0 Peak EMI Reduction IC greatly simplifies EMI reduction while reducing or eliminating the need for expensive metal shielding, ferrite beads, conductive paint, filtering networks and other costly, space-consuming alternatives.

"In certain applications, system clock frequency deviation tolerances are very tight. If you increase frequency deviation beyond a certain limit on an imaging system, for instance, you are going to see optical artefacts on the screen, like snow."

### Supporting EMI suppression

Clients rely on PulseCore for effective EMI suppression. In turn, PulseCore relies on Ellisys USB analyzers to ensure the quality of the solutions they deliver to their clients.

For instance, Hariton and his team researched the consequences of increasing USB frequency deviation beyond USB compliance. "Is the fall like that from a cliff or is it a gradual degradation?" Hariton wondered. "We found out that we can go to 2X and 3X and remain USB functional."

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Published in August 2008.