



# Infrared Digital Voice Module

*Nextel, France, has created a better way for motorcyclists to communicate, by using digital infrared transceivers controlled by Xilinx Spartan FPGAs.*

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Talking to someone located just a few inches away from you may seem easy, but on a motorcycle it can be quite difficult and hazardous. Infrared IrDa devices are widely used in computers and mobile telephones, which makes them inexpensive. Digitizing voice is also a simple task, because there are many codecs available on the market. The problem is to design the interface between the half-duplex IrDa transceiver and the codec to make a full-duplex infrared voice transceiver. The logic design is quite complex.

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as possible to address the consumer market. We found all our answers at Xilinx, thanks to the new Spartan FPGAs.

We selected the XCS05XL 5000-gate FPGA. With a sample from our local distributor, Compress, we made a new breadboard, but this time with very few components. For a few French francs we got very powerful yet easy to use software from Xilinx (Foundation Series) to develop the FPGA, and after just two weeks the design was complete. Development time was



*The Infrared Module*

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greatly reduced thanks to everyday support from the Compress application engineers.

The FPGA was used to generate the clocks for the codec, transform the NRZ signal from the codec to RZ signal for the infrared transceiver (and vice versa), and synchronize the incoming data. There were also enough gates left over to add features such as low battery audio alert and communication quality control.

### **The Finished Product**

The module is mounted in a hermetic box with an infrared transparent front. It is connected to the microphone and the speaker inside the helmet by a 4-wire cable. The box is tied to the helmet with an elastic strap. The box may be removed from the helmet in just a few seconds

by removing the strap and disconnecting a small connector hidden in the helmet as shown in the pictures.



### **Conclusion**

Xilinx Spartan FPGAs are used in many unique applications. This Digital Infrared Voice Module is the smartest way to communicate on a motorbike; there is no interference at all, it is totally confidential, and it is inexpensive. ⚡

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