

# PARALLAX

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Re: George (Beau) Schwabe IV, IC Layout Engineer  
Date: 2 October 2014  
From: Chip Gracey, Founder of Parallax, Inc.

To Whom It Concerns,

Beau Schwabe has been employed at Parallax for the past nine years doing our IC layout work. He has successfully laid out many blocks which have been proven on test chips. This work has been at the 180nm node. His layout work has included:

- Complete set of standard cells for 1.8V and 3.3V, including logic, flipflops, and clock gates
- 8192 x 32 SRAM, single-port, byte-write
- 512 x 32 SRAM, 3 read ports and 1 write port
- 256 x 32 SRAM, dual-port
- Several small ROMs
- Phase-locked loop with 300MHz VCO
- Delta-sigma ADC, first-order, variable resolution
- Brown-out detector with bandgap reference
- Fast DAC, 9-bit, 75-ohm, 2ns settle-time
- 20MHz Crystal oscillator with integrated load capacitors
- 20MHz/20KHz RC oscillator
- Clock switcher with deglitcher
- Poly fuse with blow and read circuits
- Various analog blocks incorporating concentric layout techniques
- Pads for digital and analog I/O, crystal oscillator, power, and ground, including ESD circuits
- Entire pad frame, including power rings

Beau's layout work is very compact and clean. I've always been very satisfied with his quality. Though Beau's time at Parallax was spent on 180nm processes, he would certainly adapt to 28nm, or smaller, learning anything requisite in the process.

Beau has been into electronics since he was young and he has developed many board-level circuits for servo control and inductive sensing. So, he has an intrinsic understanding of things that would dictate IC wire widths and such. I suppose this has made my work with him very easy, as he always did the right thing without detailed instruction.

We have let Beau go because we've decided to outsource our future layout work. Our utilization of Beau has been low lately and it's not cost-effective for us to keep a full-time layout engineer on the payroll. Had we more layout work, we would certainly be keeping him on staff.

If you have any questions about Beau's work at Parallax, you can reach me at (916) 899-7991.

Sincerely,



Chip Gracey  
Parallax, Inc.  
[www.parallax.com](http://www.parallax.com)