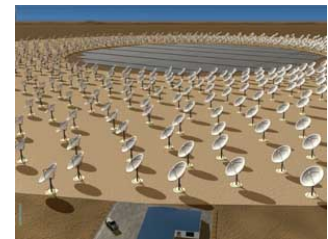




SILANNA SEMICONDUCTOR

SpaceWire Link Isolation



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Product Marketing

Seventeenth SpaceWire Working Group Meeting

December 15, 2011

Noordwijk, NL



Topics

- Silanna Semiconductor Intro
 - Silanna High Speed Digital Isolation
 - Current Isolator Features applied to SpaceWire Isolation Requirements
- Proposed SpaceWire Link Isolation Product
 - Block Diagram
 - Product Features & Benefits
 - Application Examples



Silanna Overview

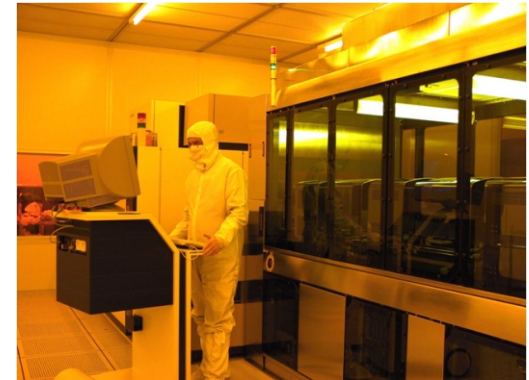
- Founded in 1965 by AWA (Amalgamated Wireless Australasia) Microelectronics Ltd
- Sydney fab facilities was a joint venture w/ AWA, British Aerospace, & NSW government
- Previously part of Quality Semiconductor, Integrated Device Technology (IDT), & Peregrine Semiconductor
- Joined the Silanna Group Pty Ltd in 2008
- Long term strategy of becoming global technology company
- 45+ yrs in semiconductor manufacturing
- Just completed \$30M fab extension
- 100+ staff (25% growth in 18 months)
- Expanding w/ offices in US and UK





Silanna Capabilities

- Wafer fabrication facility (Sydney)
- Silicon-on-Sapphire processes (0.25 μm & 0.5 μm)
- Low cost reduced-mask-set prototyping service
- III-V wafer fabrication (GaN, AlN, AlGaN)
- Growing IC Design team
- Advanced Technology Development team
- Prototype assembly facility (Brisbane)
- Wafer probe test facility
- ISO9001 and AS9100 certified
- 100s millions of devices shipped
- 100's RF/mixed signal designs (PLLs, switches, attenuators etc.)
- Large multi-national end customers





Silanna Space & Defence

- For Non-US customers ... we are *ITAR FREE!*
- For US customers ... ONLY non-US company to receive Accreditation of Trust (Trusted Foundry)
- Technologies for Space/Defence applications
 - Ideal for Complex RF/Mixed Signal designs
 - Radiation hard properties
- 10 years experience supplying Space/Defence ICs
- Manufacturing obsolete parts; and
- Developing new products for the market
- Boutique fab - able to handle small runs
- Aerospace certification: AS9100 Rev B (Rev C in process)





Technology Overview

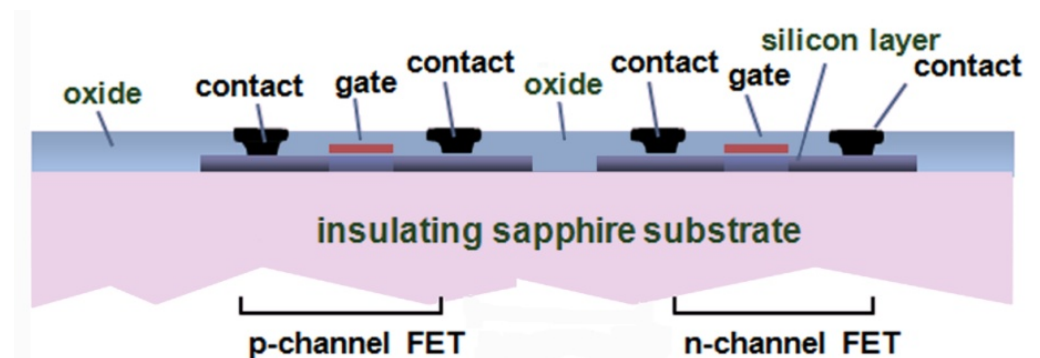
Silicon-on-Sapphire (SoS)

Insulating substrate eliminates parasitic capacitance and enables:

- Excellent RF performance (e.g. L-band, S-band, X-band)
- High Q passives (e.g. 5nH Inductor with $Q > 40$ at 2GHz)
- Low cross-talk
- High isolation (e.g. good RF switches)
- High linearity transistors (e.g. higher bandwidth per channel)

Intrinsic Radiation Hardness:

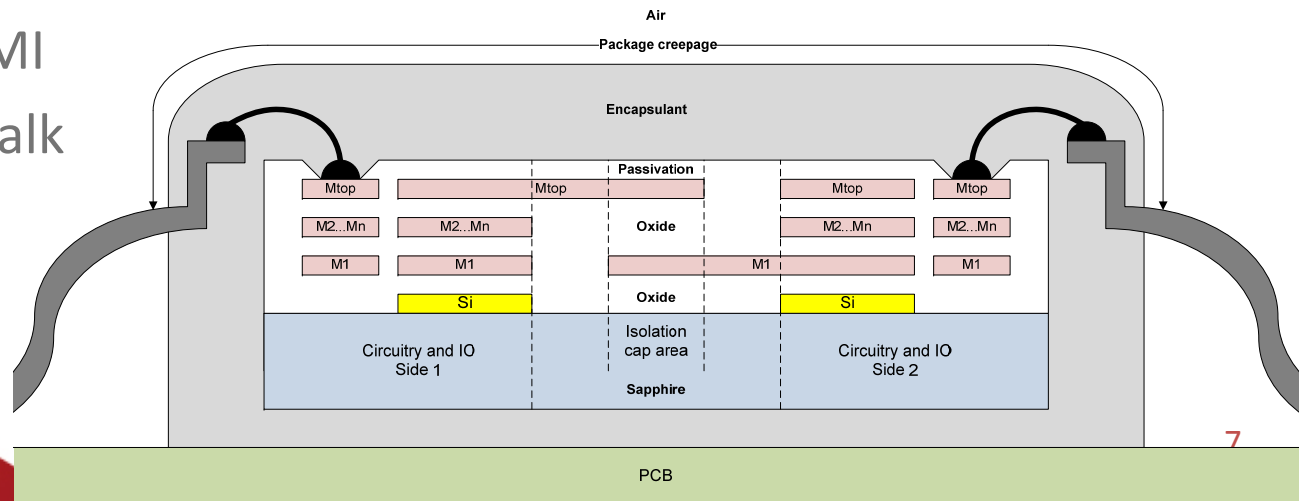
- Total dose, SEU + SEL immunity





Silanna Digital Isolators

- Higher speed / Lower jitter
 - >250Mbps on all channels in single-ended device
 - >>500Mbps in differential IO devices
- Enables isolation of higher speed protocols:
 - e.g. USB 2.0 HS (480 Mbps), SpaceWire, VME, Ethernet
- Higher channel density / Smaller Footprint
- Multiple channels in a single die e.g. 4 bi-dir channels @ 250Mbps
- Integration with other circuitry (analog / logic / high quality passives)
- Industry standards for transient galvanic isolation (2.5kV and 5.0kV)
- Insensitive to EMI
- Minimal Cross-talk





Current Isolator Features

Applicable to SpaceWire

General Purpose Isolators – SIL104xL

- LVTTTL (single-ended) I/Os
- 400 Mbps operation
- High voltage galvanic isolation – 2.5 kVrms & 5 kVrms
- Selectable failsafe mode
- Low channel-channel skew (<100 ps typ)

USB 2.0 High-speed Isolators – SIL11USBx

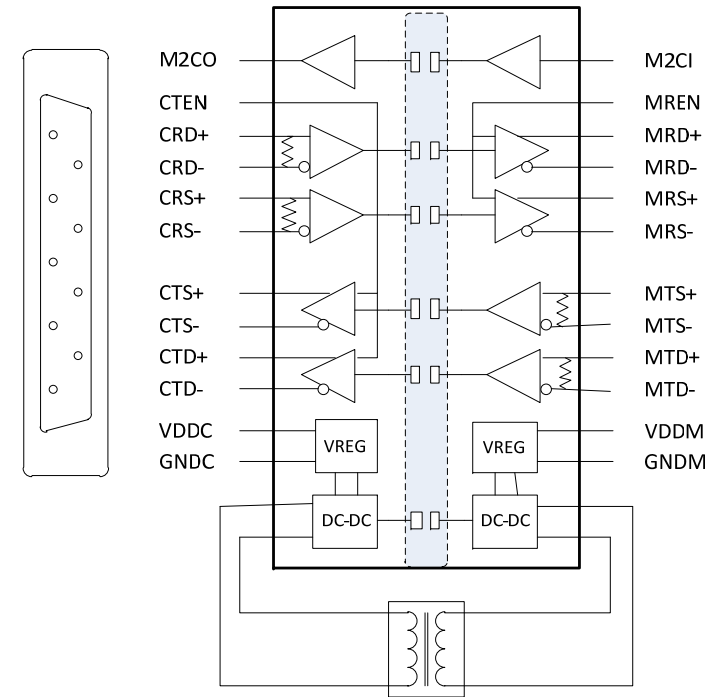
- 1.5 Mbps, 12 Mbps, & 480 Mbps operation w/ auto speed negotiation
- Bidirectional differential signalling
- Adaptive I/O & terminations for High-speed low-swing differential transmission line operation
- USB datastreams are non-DC-balanced
- Working voltage >100V (for wide common mode range)



Proposed SpaceWire Link Isolator

Target Features

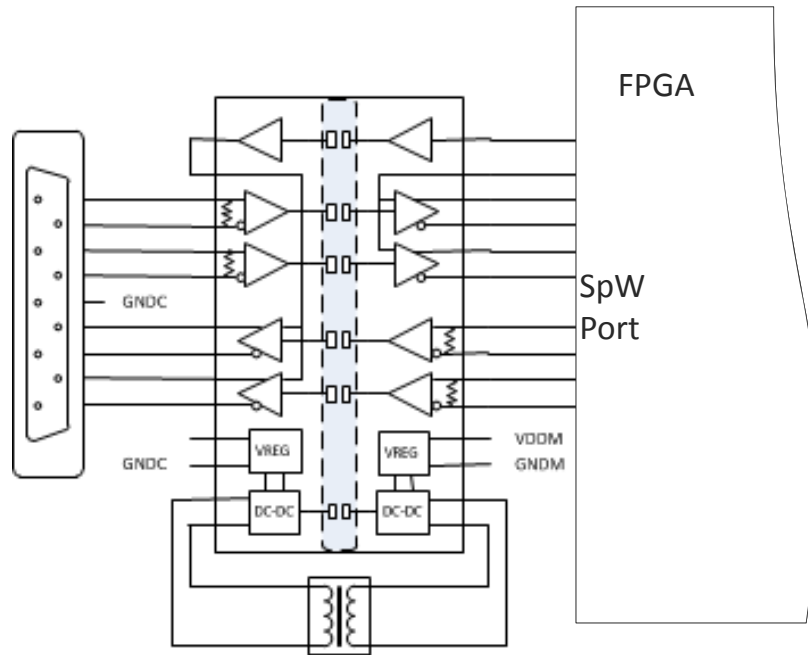
- 4 high speed (400 Mbps) channels
 - 2 transmit, 2 receive (Data+Strobe)
- Cable-side: LVDS
- Module-side: LVDS or LVTTTL
 - MTS-/MTD- can be used to select LVTTTL mode for Mxx+ lines
- LVDS failsafe
- Isolation voltage: 2.5 kVrms (tbd)
- External transformer for DC-to-DC isolation to power cable-side from module-side
- M2Cx to allow CTxx output enable/disable (via CTEN) from module-side
- Cable-side data lines align well w/ SpW cable connection



C: cable-side, M: module-side, R: receive, T: transmit, D: data, S: strobe

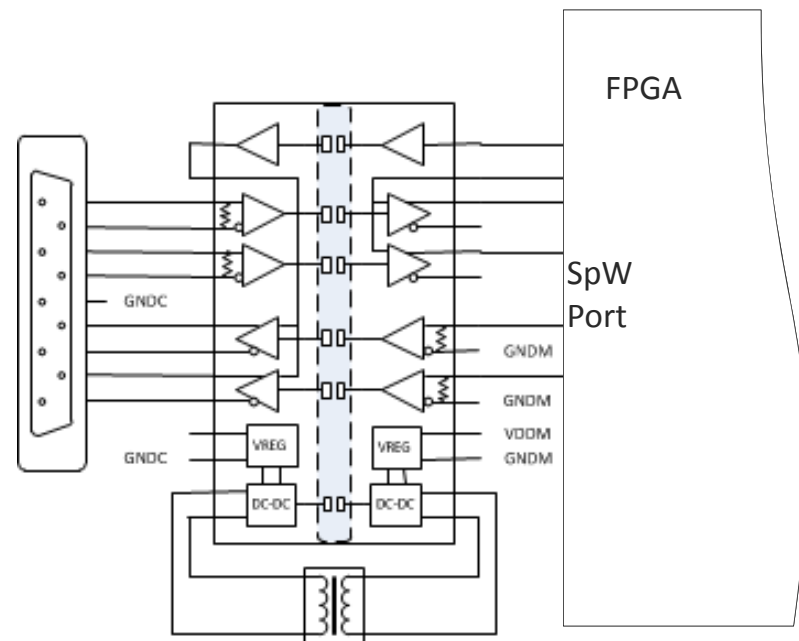


Application Examples



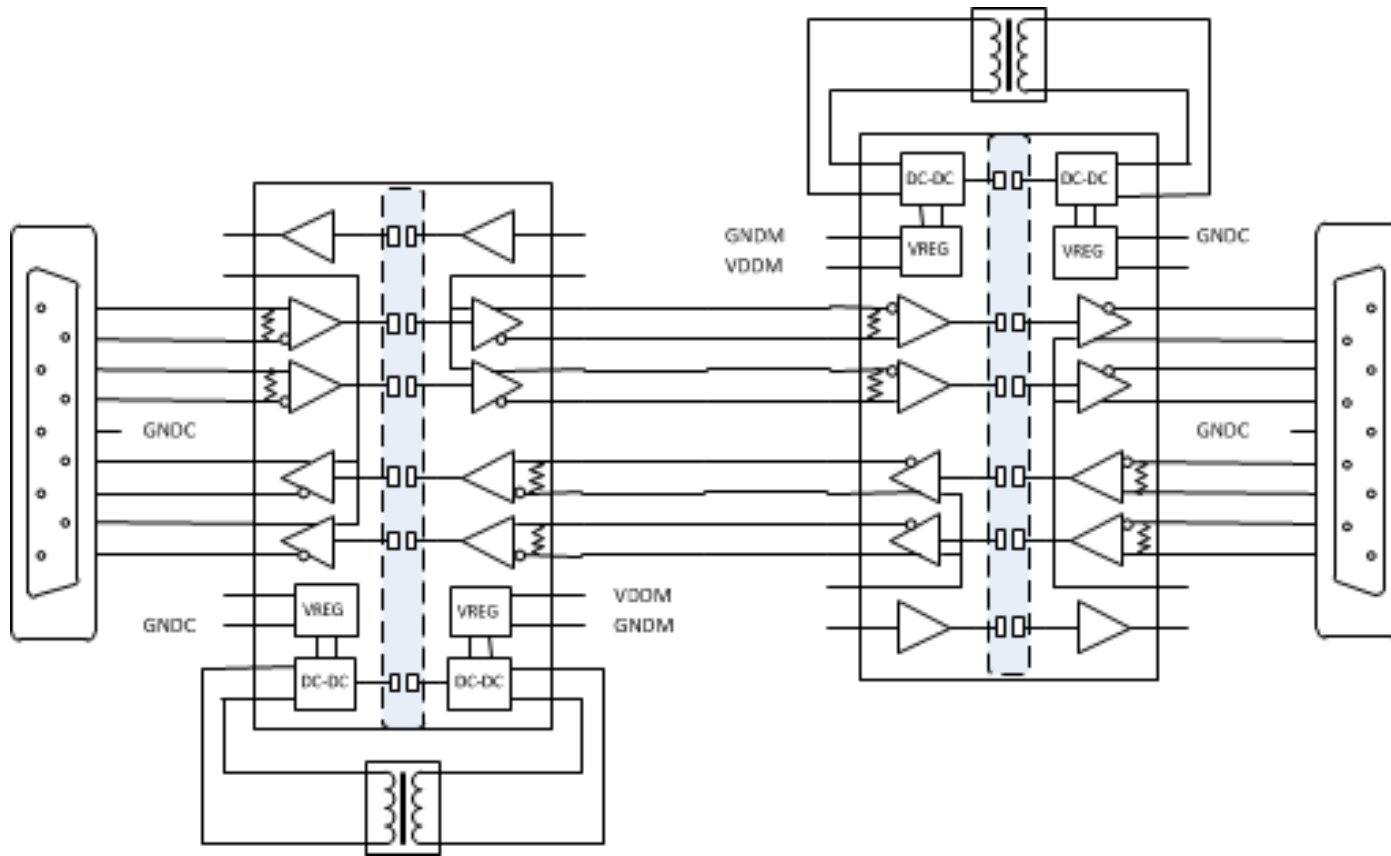
w/ Embedded SpW I/O

Replace Discrete Driver/Receiver





Application Examples



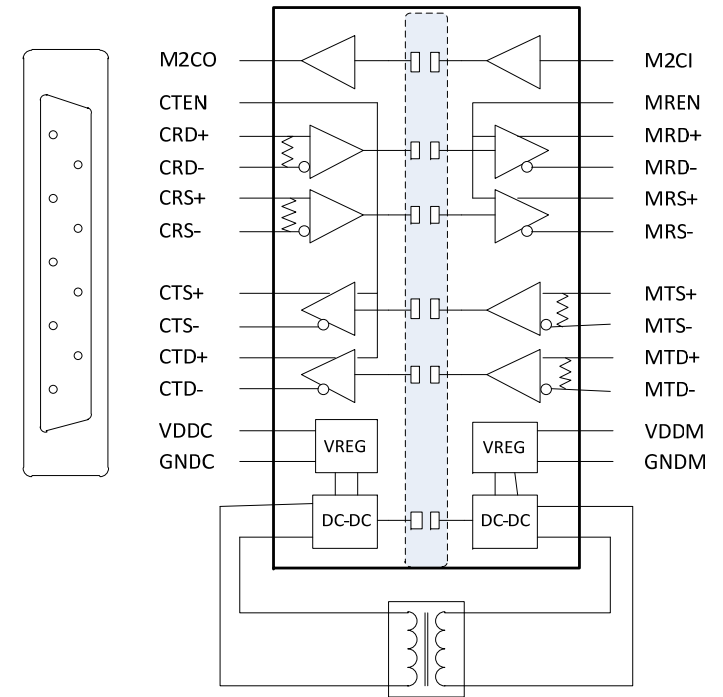
Repeater



Other Features

- ? Isolation voltage: 1 kVrms, 2.5 kVrms?
- ? Control lines to disable CRxx & MTxx input terminations when external termination resistors are used
- ? Control line to disable CRxx input termination for half-duplex operation
- ? Cold sparing on all pins

Feedback



C: cable-side, M: module-side, R: receive, T: transmit, D: data, S: strobe