

# European LVDS Driver Development and ESCC Evaluation and Qualification – an update

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# Quick introduction

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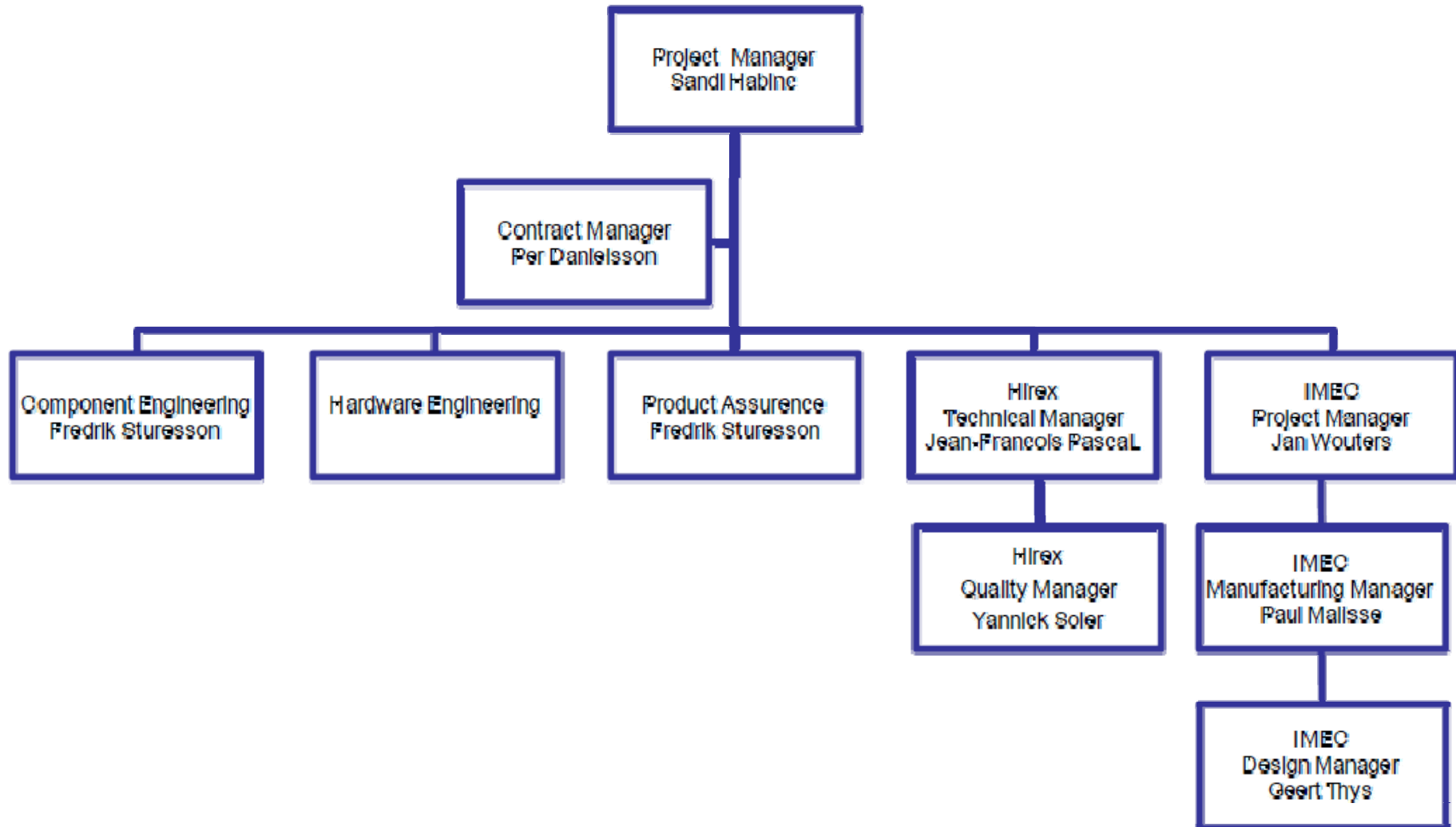


- ▼ **ESA Contract (ECI phase 3)**
- ▼ **24 month development in three phases:**
  - Definition and preliminary design
  - Design, prototype manufacture, test (**current**)
  - ECSS qualification
- ▼ **Development and ESCC Qualification of 2 LVDS ICs:**
  - Dual Transceiver, 16 pin (type: National Semi. **DS90LV049Q**)
  - 4x4 Cross-Point Switch, 40 pin (type: Texas Instrument **SN65LVDS125a**)
- ▼ **Based on technologies and companies with space heritage**
  - Rad Hard CMOS
  - Hermetic sealed ceramic flat package
  - ESCC assembly and test



- ▼ **Aeroflex Gaiser**
  - Requirement Definition
  - Package development
  - IC Assembly
  - System Validation
  - Evaluation board development and manufacturing
  - Radiation Testing
  - Product Documentation
  - ESCC Evaluation and Qualification
  - Commercialization of the product
- ▼ **IMEC**
  - IC Design and Verification
  - Management of Wafer production
- ▼ **Hirex Engineering**
  - Functional and Electrical validation testing
  - ESCC Evaluation testing and Screening testing
  - ESCC Qualification testing

# Project team



# Key features

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- ▼ **TIA/EIA-644 compliant LVDS inputs and outputs**
- ▼ **3.3V single supply**
- ▼ **3.3V LVTTTL compatible input / output**
- ▼ **Up to 400 Mbps switching rates**
- ▼ **Tri-state output control**
  
- ▼ **Robust design, ESD, voltage tolerance, failsafe, coldsparring**
- ▼ **Radiation hard**

# Robustness (1/2)

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- ▼ **ESD robustness**
  - 8 kV HBM ESD Level
- ▼ **Overvoltage tolerant (transients)**
  - Supply: -0.5V / 4.6V
  - LVTTTL: -1V / +6V
  - LVDS: -5V / 6V

**Low risk of failure propagation at overvoltage, powered and un-powered.**

# Robustness (2/2)

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- ▼ **Receiver Extended Common Mode Input**
  - -4V / +5V
- ▼ **Receiver with Active Failsafe Operation**
  - High state at floating or shortened inputs
- ▼ **Cold Spare outputs**
  - For cold spare redundancy in multi-point systems
  
- ▼ **5V tolerant TTL inputs**

# Radiation

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- ▼ **TID hard**  
    **> 300 krad(si)**
  
- ▼ **SEL immune**  
    **> 110 MeV-cm<sup>2</sup>/mg**
  
- ▼ **SEU/SET immune**  
    **> 80 MeV-cm<sup>2</sup>/mg**

*by proven Rad Hard CMOS technology*



# Library extension for DARE 180 nm

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- ▼ **Receiver Extended Common Mode Input**
- ▼ **Receiver Failsafe Operation**
- ▼ **Cold Spare Functionality**
- ▼ **8 kV HBM ESD Level**
  
- ▼ **Single Supply Capability**
- ▼ **Removal of External Resistor Requirement**

# The LVDS IC devices



▼ **Dual Transceiver LVDS IC features the following pin types and counts (16 pins in total):**

- LVDS receiver pairs (+/-) 2 (2 pins each)
- LVDS transmitter pairs (+/-) 2 (2 pins each)
- LVTTTL receiver output 2
- LVTTTL transmitter input 2
- LVTTTL enable (positive/negative) 2
- Supply 2

▼ **The 4x4 Cross-point Switch features the following pin types and counts (38 pins in total):**

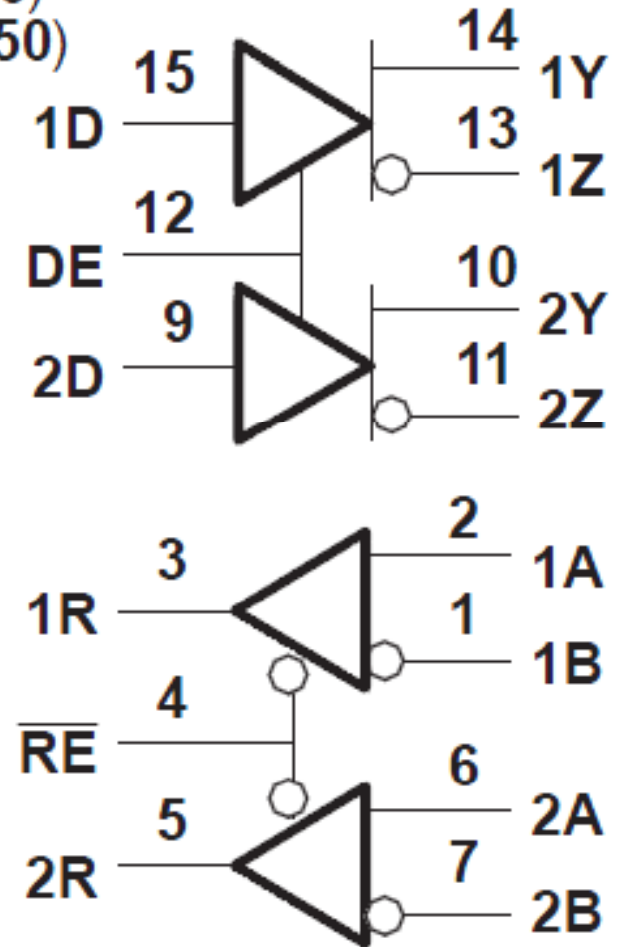
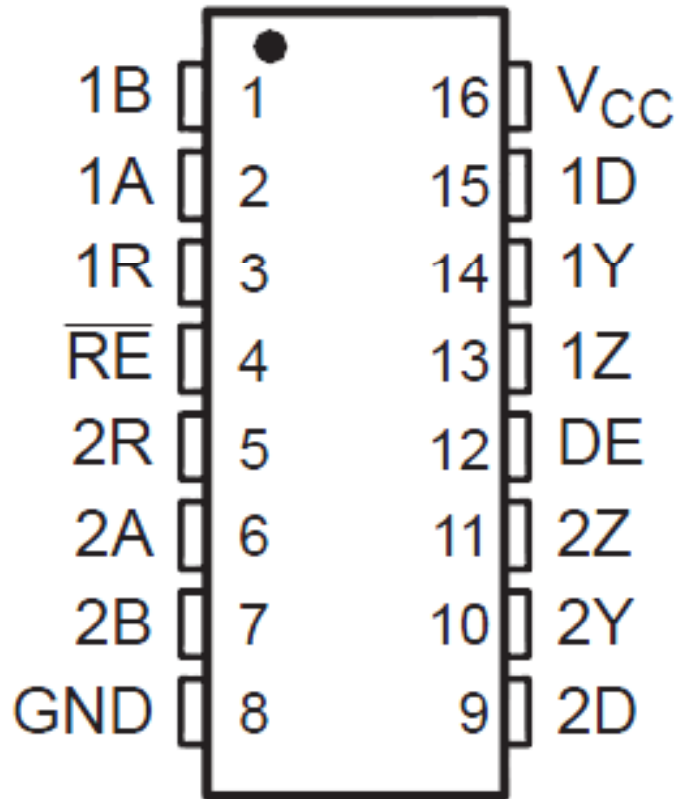
- LVDS receiver pairs (+/-) 4 (2 pins each)
- LVDS transmitter pairs (+/-) 4 (2 pins each)
- LVTTTL selectors 8
- LVTTTL enables 4
- Supply 10



# Dual LVDS Transceiver - alternative



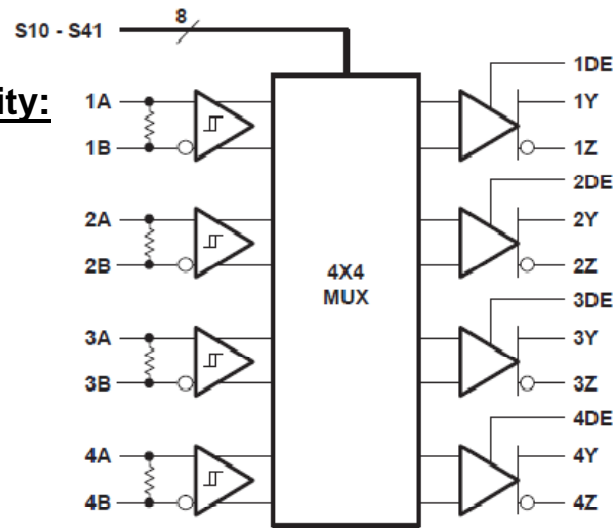
SN65LVDS050D (Marked as LVDS050)  
 SN65LVDS050PW (Marked as LVDS050)  
 (TOP VIEW)



# 4x4 Cross-Point Switch (1/2)



- ▼ **Functionality and pin compatibility:**
  - TI SN65LVDS125A



NC	- 1	40	- NC
S10	- 2	39	- VCC
S11	- 3	38	- GND
1A	- 4	37	- 1Y
1B	- 5	36	- 1Z
S20	- 6	35	- 1DE
S21	- 7	34	- 2Y
2A	- 8	33	- 2Z
2B	- 9	32	- 2DE
GND	- 10	31	- GND
VCC	- 11	30	- VCC
GND	- 12	29	- GND
3A	- 13	28	- 3Y
3B	- 14	27	- 3Z
S30	- 15	26	- 3DE
S31	- 16	25	- 4Y
4A	- 17	24	- 4Z
4B	- 18	23	- 4DE
S40	- 19	22	- GND
S41	- 20	21	- VCC

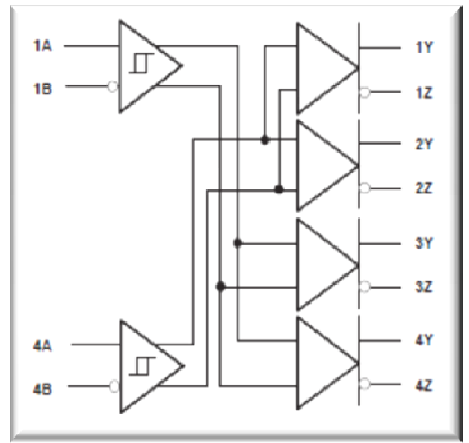
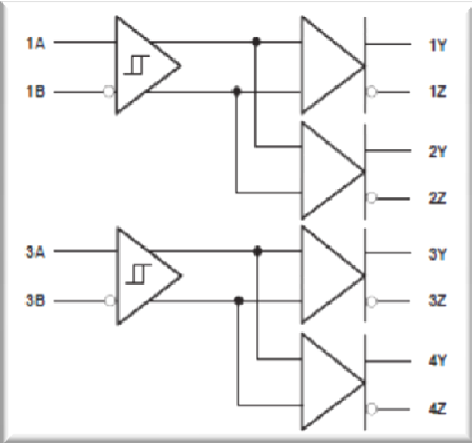
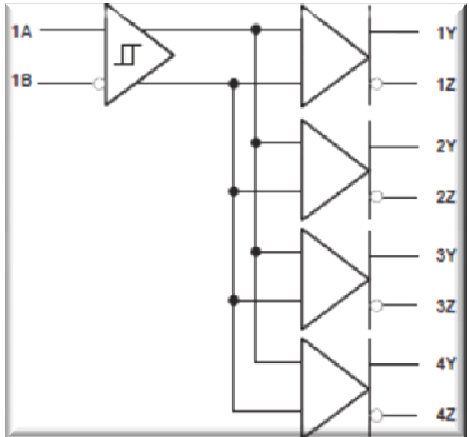
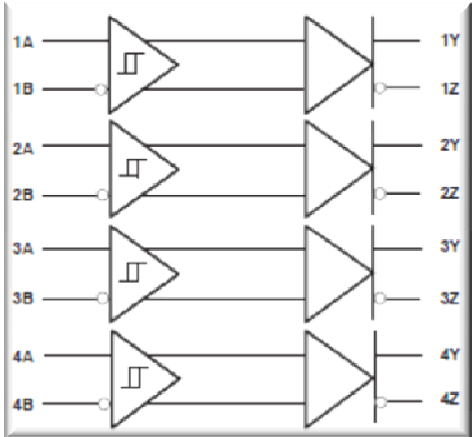
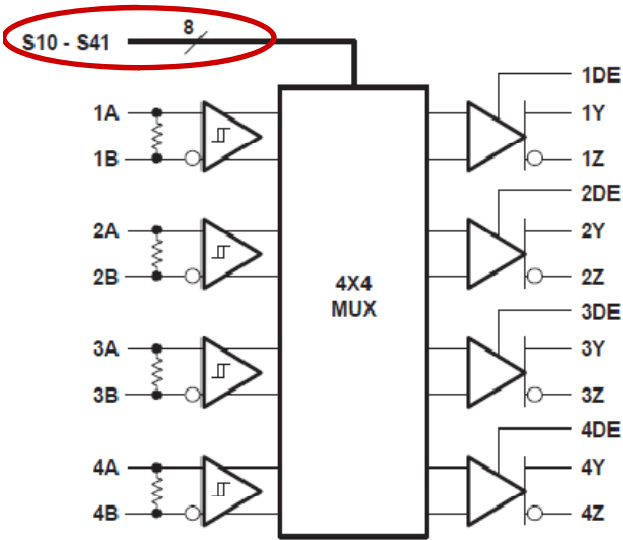
- ▼ **Ceramic flat package (baseline):**
  - 40 leads bottom brazed
  - 0.635 mm pitch
  - New package development

# 4x4 Cross-Point Switch (2/2)



## Configuration Examples:

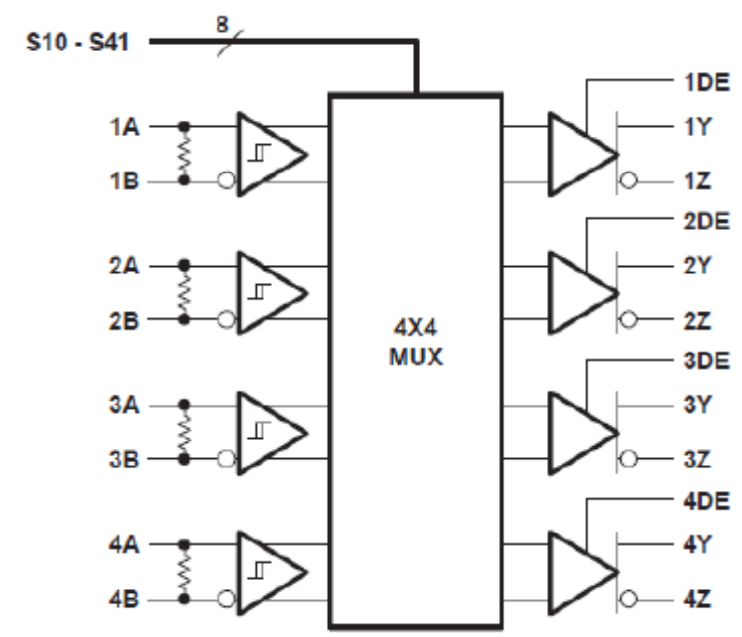
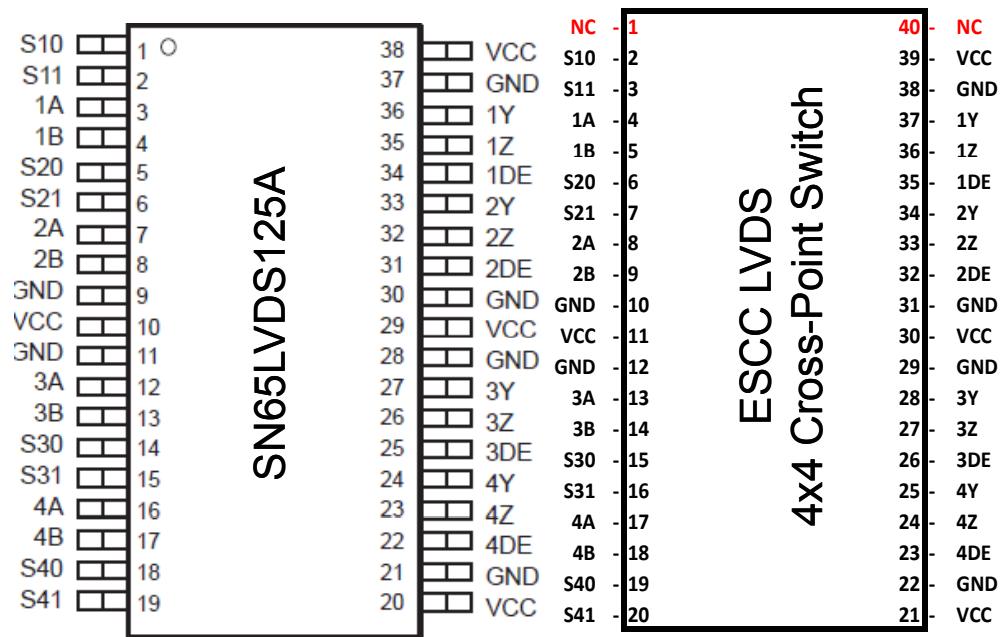
- Selection with S10-S41



# Feedback: 4x4 Cross-point Switch



	SNLVDS125A	UT54LVDM288	UT54LVDM328	DS90LV049Q & UT54LVDM055		UT54LVDS031	UT54LVDS032	Custom
	Single 4x4 crosspoint	Quad 2x2 crosspoint	Octal repeater	Dual Rx & Tx		Quad Tx	Quad Rx	Redundant Rx & Tx
	Single	Dual	Quad	Dual	Quad	Quad	Quad	Dual
Signal / Mode	"00"	"00"	"01"	"10"	"10"	"10"	"10"	"11"
LVDS TX	8	8	8	4	8	8		8
LVDS RX	8	8	8	4	8		8	8
LVTTL DATA IN				2	4	4		2
LVTTL DATA OUT				2	4		4	2
ENABLE	4	4	4 (not 1)	2	4	4 (not 1+1)	4 (not 1+1)	4
SELECT	8	4						1
GND	6	6	6	6	6	6	6	6
VCC	4	4	4	4	4	4	4	4



# Schedule



- ▼ **Dual transceiver / receiver**
  - CDR#1 **21<sup>st</sup> of February 2013**
  - Wafer production **8<sup>th</sup> of April 2013**
  - Prototypes available **August 2013**
  - Prototype boards available **August 2013**
  - ...
  - ESCC qualification och ESCC QPL **October 2014**
  
- ▼ **4x4 cross-point switch**
  - CDR#2 **August 2013**
  - Wafer production **September 2013**
  - Prototypes available **February 2014**
  - Prototype boards available **February 2014**
  - ...
  - ESCC qualification och ESCC QPL **October 2014**



# Aeroflex Gaisler and space components

## ▼ GR712RC, Dual Core LEON3FT processor

- 240 pin CQFP
- Prototypes
- MIL-STD-883 space flow

Q2 2011

Q2 2013

## ▼ SpaceWire Router

- 256 pin CQFP
- Prototypes
- ESCC 9000

Q3 2013

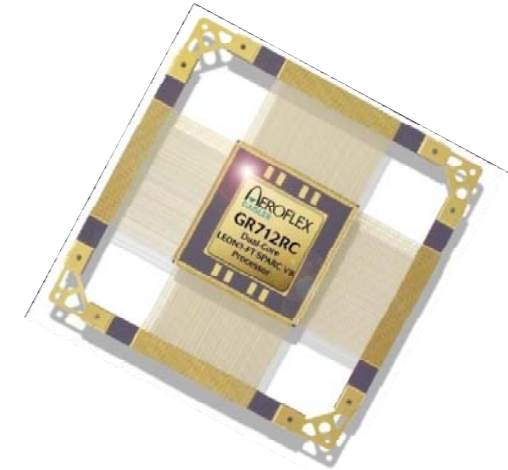
Q4 2014

## ▼ LVDS components

- 16 pin FP & 40 pin FP
- Prototyper
- ESCC qualification

Q3 2013 / Q1 2014

Q3 2014



# Contact information

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## ▼ IP cores information:

<http://www.Aeroflex.com/Gaisler>

## ▼ Board information:

<http://www.Aeroflex.com/Gaisler>

## ▼ Software and tools information:

<http://www.Aeroflex.com/Gaisler>

## ▼ Contact:

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