

---

## EBL4300CI-EVALZ

QLx4300-S45 Evaluation Board

AN1515  
Rev 0.00  
January 18, 2010

---

## Table of Contents

<b>Introduction</b> .....	<b>2</b>
<b>Operation of Evaluation Board</b> .....	<b>2</b>
QLx4300-S45 Evaluation Board .....	2
Power Supply .....	2
Providing Power from External 5V Power Supply .....	3
High Speed Data_I/O Interface Connectors .....	3
Detection Threshold (DT) .....	4
Impedance Select .....	4
Boost Setting Control Pins .....	5
<b>Evaluation Board Schematic</b> .....	<b>7</b>
<b>QLx4300-S45 Bill of Materials</b> .....	<b>8</b>
<b>About Q:ACTIVE®</b> .....	<b>9</b>

## Introduction

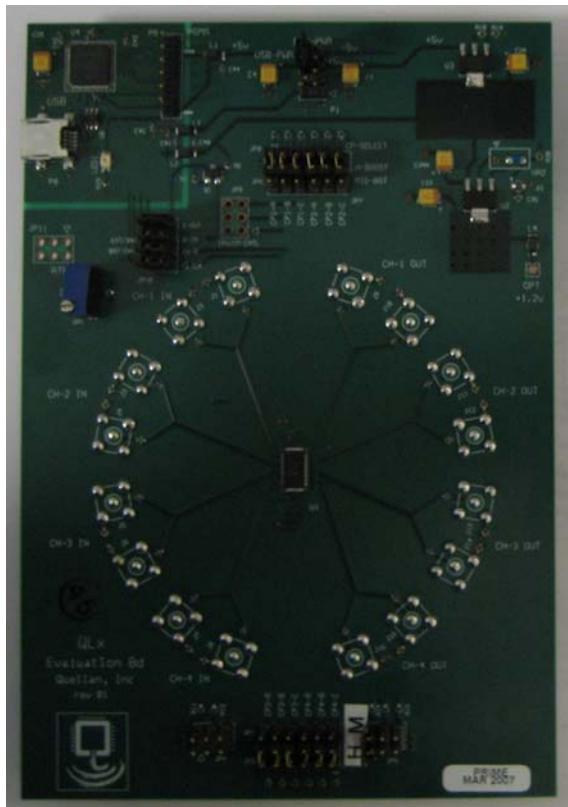
The QLx4300-S45 Lane Extender Evaluation Board is a versatile stand-alone card developed to evaluate the performance of Intersil QLx4300-S45 Series Quad Equalizer.

Evaluation Kit Includes:

- EBL4300CI-EVALZ evaluation board
- Power cable

## Key Features

- QLx4300-S45 series IC
- Single 5V external power supply
- On-board regulators provide all voltages required for MCU and IC operation
- On-board DC/DC converter that provides the 1.2V supply to the IC
- Optional on-board boost selection for each channel via two sets of headers
- Adjustable Detection Threshold for quiescent modes
- 8 sets of SMA connectors for high speed signals input and output



## Operation of Evaluation Board

After a brief description of the board design and layout, the different features and options to operate the board are highlighted.

- Providing power to the board through an external supply
- The eight high speed differential I/O
- The impedance select function
- The variable Detection Threshold
- Controlling the equalizer boost via Control Pins

### QLx4300-S45 Evaluation Board

The QLx4300-S45 Evaluation Board is a 4-layer, 4"(w)x5.6"(h)x0.059"(t) in dimension, and fabricated with (Allied-Signal) FR-408 dielectric material. 100Ω differential signal traces are laid out with 0.0062" width and 0.0058" spacing. 50Ω single-ended traces are 0.009" wide. Figure 1 shows the top view of the board.

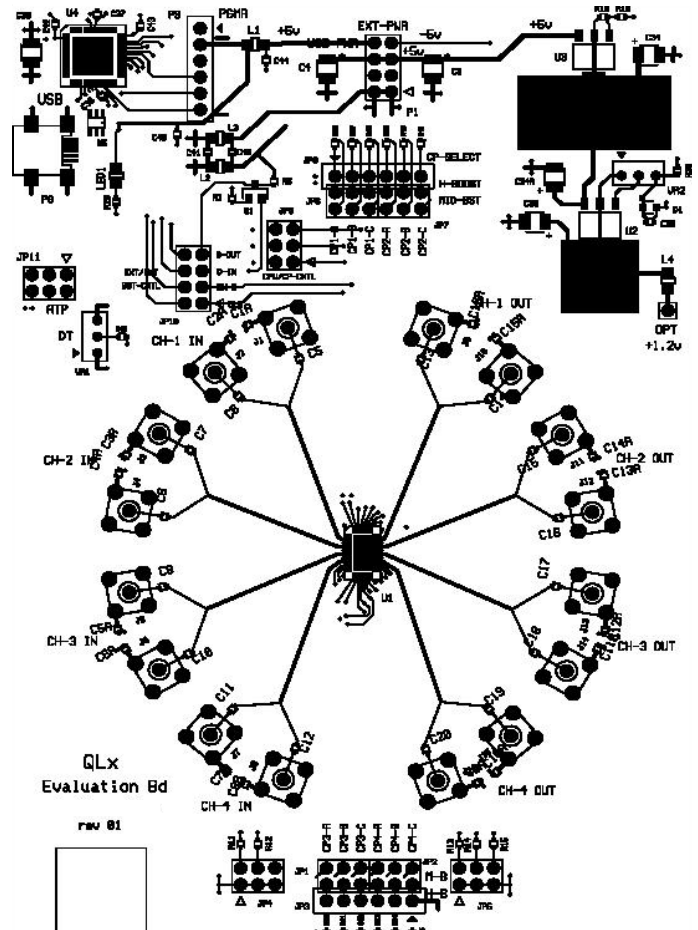


FIGURE 1. QLx4300-S45 EVALUATION BOARD PCB OUTLINE

### Power Supply

Power can be supplied to the board by using an external power supply. On board voltage regulators supply the appropriate 1.2V to the QLx4300-S45 IC.

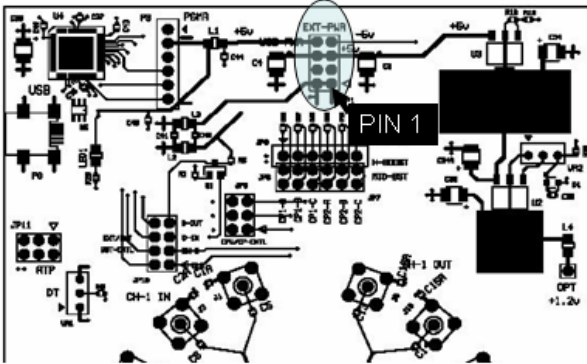
**PROVIDING POWER FROM EXTERNAL 5V POWER SUPPLY**

The evaluation board can also be powered by an independent external 5.0V power supply via header P1 as highlighted on Figure 2. The maximum current consumption for the board including the voltage regulators, microcontroller circuits, and the IC together is approximately 245mA with all channels active.

Table 1 provides description of the connector P1. A power cable is provided with the evaluation kit.

**TABLE 1. P1 CONNECTOR DESCRIPTION**

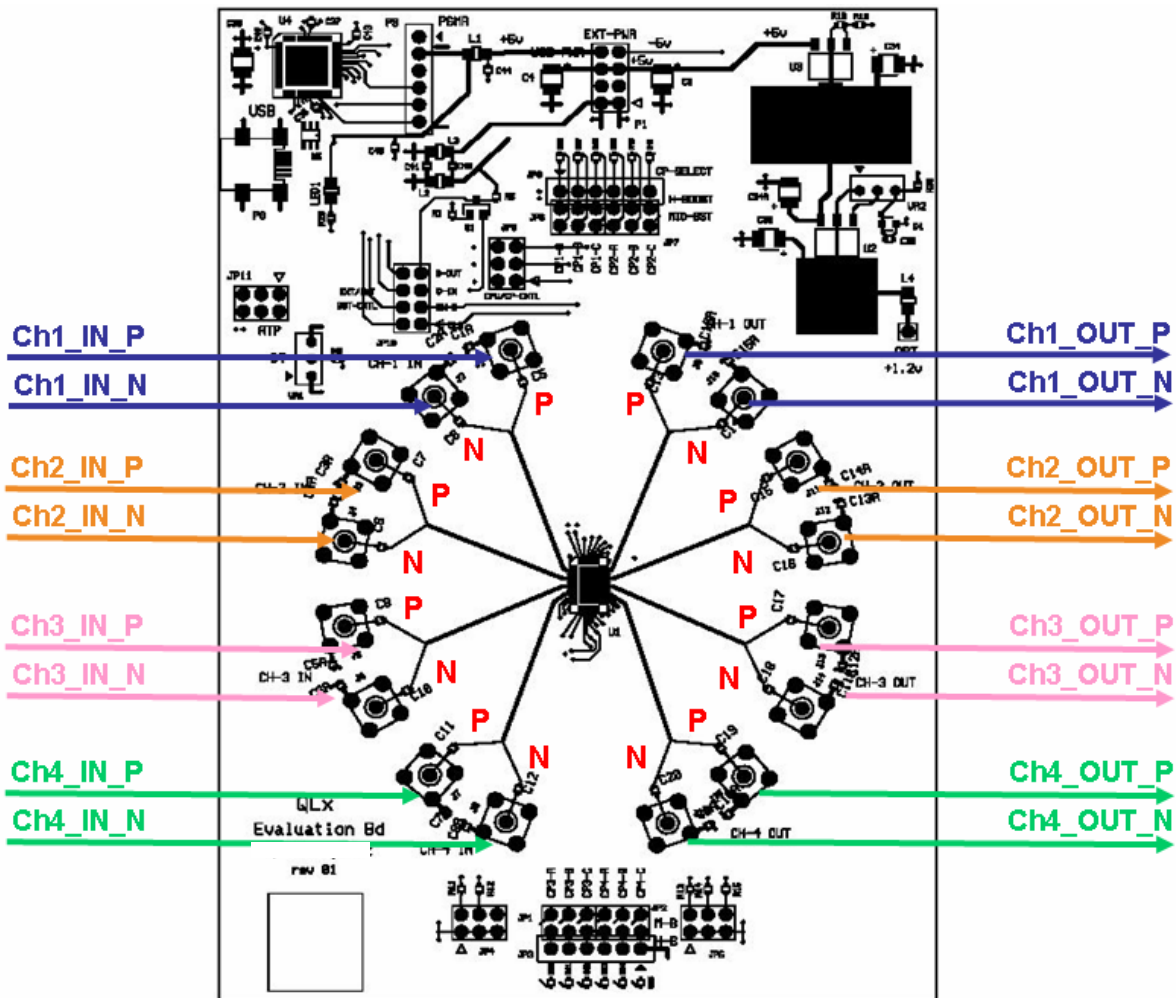
8 – NC	7 – NC
6 – 5.0V	5 – 5.0V
4 – NC	3 – NC
2 – GND	1 – GND



**FIGURE 2. QLx4300-S45 EVALUATION BOARD EXTERNAL POWER SUPPLY POWER CONNECTOR**

**High Speed Data\_I/O Interface Connectors**

There are sixteen SMA connectors on the board, eight for the CML differential inputs and eight for the CML differential outputs. All the connections from the SMA connectors to the QLx4300-S45 Series chip are AC-coupled with a 220nF broad band capacitor. Figure 3 shows each channel by their name, direction, and their polarities.



**FIGURE 3. QLx4300-S45 EVALUATION BOARD RF-I/O INTERFACE**

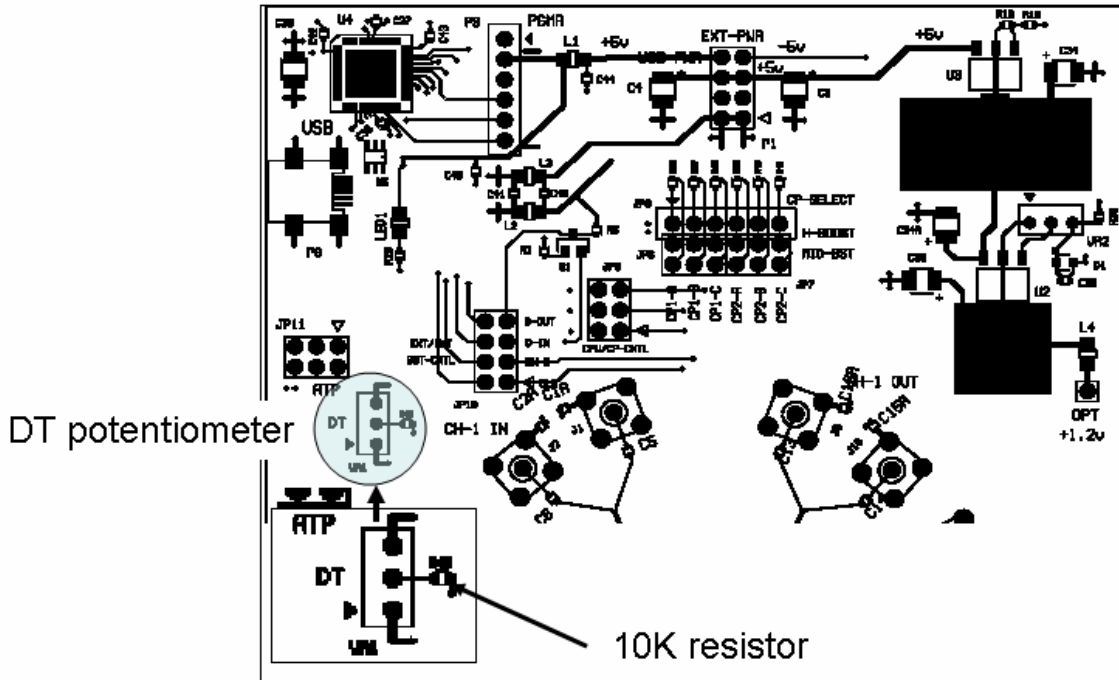


FIGURE 4. QLx4300-S45 EVALUATION BOARD DT POTENTIOMETER

**Detection Threshold (DT)**

The DT is another very important feature of the QLx4300-S45 Series IC. On the evaluation board, the DT can be changed by adjusting the potentiometer VR1 (Figure 4).

In normal operation, the potentiometer should be set so that the voltage across the adjacent 10k resistor is 0V.

For applications that need to adjust this level it can be simply done by changing the potentiometer and reading the voltage across the 10k resistor in order to infer the current coming from the DT pin.

For example, measuring a voltage of -200mV across the 10k resistor indicates a 20µA current from the DT pin.

**Impedance Select**

Two 3x2 headers, JP4 and JP5, provide interfaces to the “impedance select” pins of the QLx4300-S45 Series ICs. With this function, the user can put any equalizer channel into a standby or reset state by placing a jumper across the header for the selected channel. When in the reset state, the single-ended input impedance of the equalizer channel goes in excess of 200kΩ (from its nominal value of 50Ω) to indicate to a transmitter that the receiver channel is down and not passing data. Additionally, power consumption for a channel is reduced when in the standby state.

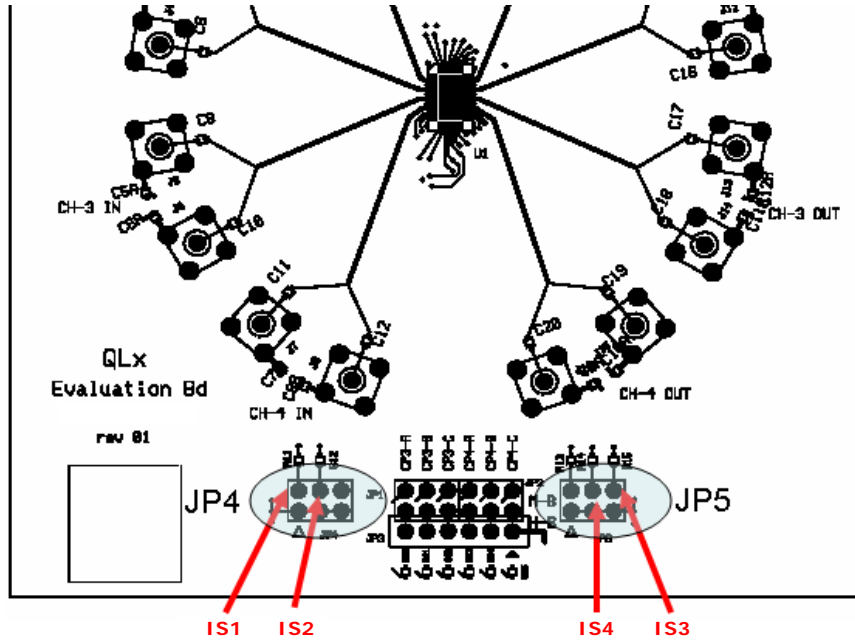


FIGURE 5. QLx4300-S45 EVALUATION BOARD IMPEDANCE SELECT

TABLE 2. DESCRIBES JP4 AND JP5 CONNECTIVITY

JP4			JP5		
2- IS1	4- IS2	6- GND	2- Mode	4- IS4	6- IS3
1- GND	3- GND	5- GND	1- GND	3- GND	5- GND

**Boost Setting Control Pins**

In order to enable boost setting control via Control Pins, JP5-pin2 must be jumpered to ground.

The boost setting configuration (compensation setting) for each individual equalizer channel is done through a 3x3 header. There are four sets of headers, one for each equalizer channel. Figure 6 illustrates the location of the headers.

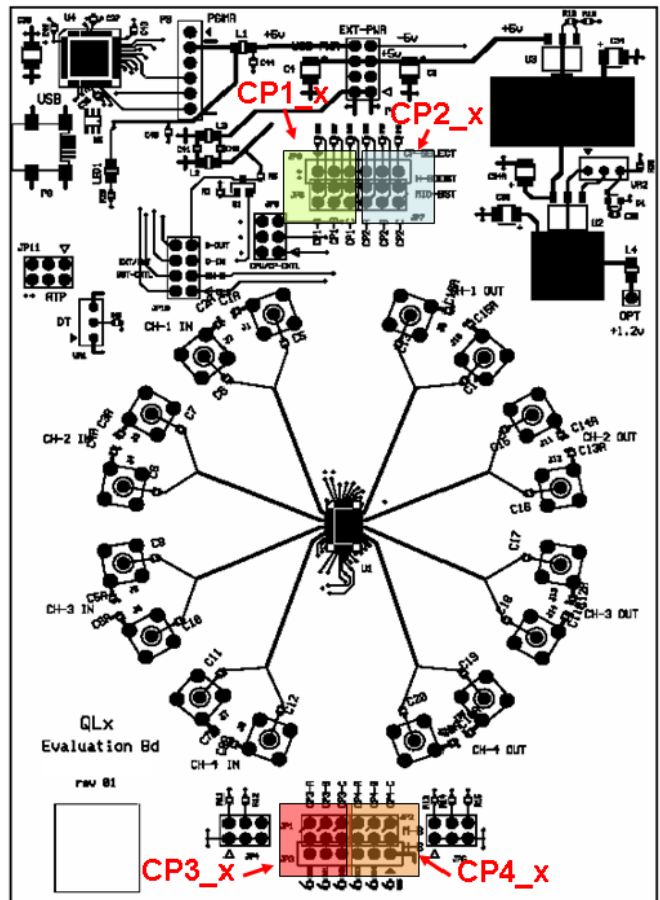


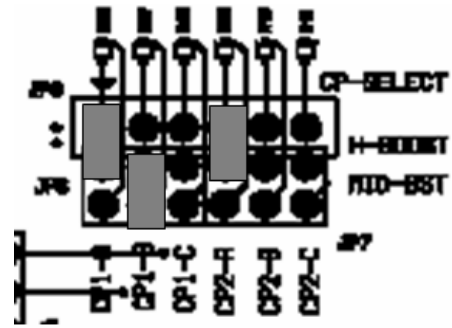
FIGURE 6. EQUALIZER BOOST CONTROL HEADERS

The notation CP[1-4]\_[A – C] refers to the QLx4300-S45 quad equalizer CPs. They are associated with the 4 channels 3-digit number where 'A' is the MSB and 'C' is the LSB. Table 3 describes the relationship between the CPs and the equalizer boost setting. Bit A can only take one of two values, either Low (L) or High (H), while bit B and C can take one of three values, Low (L), Middle (M) and High (H). Hence eighteen of the thirty-two different boost levels are accessible through the CPs for each equalizer channel.

**TABLE 3. CP AND EQUALIZER BOOST SETTING RELATIONSHIP**

CP[1-4]_A	CP[1-4]_B	CP[1-4]_C	BOOST
L	L	L	0
L	L	M	2
L	L	H	4
L	M	L	6
L	M	M	8
L	M	H	10
L	H	L	12
L	H	M	14
L	H	H	15
H	L	L	16
H	L	M	18
H	L	H	19
H	M	L	21
H	M	M	23
H	M	H	25
H	H	L	27
H	H	M	29
H	H	H	31

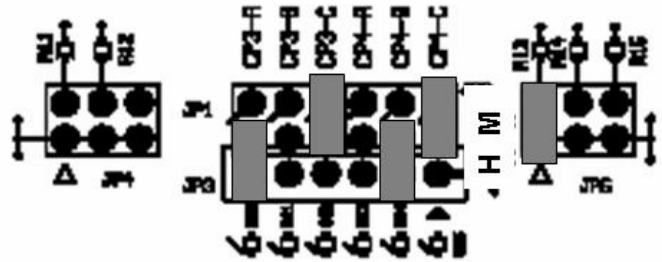
For channels 1 and 2, the headers JP6-8 are used to set the CPs. High state is achieved by placing a jumper between the top two pins of the header and the middle state is achieved by placing a jumper between the bottom two pins. Low state is simply achieved by using no jumper at all. Figure 7 illustrates how one could set the CPs for a QLx4300-S45 Series IC boost value of 21 (H,M,L) on channel 1 and a boost of 16 (H,L,L) on channel 2.



**FIGURE 7. ILLUSTRATION OF SETTINGS FOR CP1 = (H,M,L) AND CP2 = (H,L,L)**

For channels 3 and 4, we use headers JP1-3 in a similar fashion except High is achieved using the bottom two pins and middle is achieved by using the top two pins. Figure 9 illustrates how one could set the CPs for a boost value of 18 (H,L,M) on channel 3 and a value of 14 (L,H,M) on channel 4.

On Figure 8 please also note how pin 2 on JP5 is jumpered to ground in order to enable the CP control feature.



**FIGURE 8. ILLUSTRATION OF SETTINGS FOR CP3 = (H,L,M) AND CP4 = (L,H,M)**

# Evaluation Board Schematic

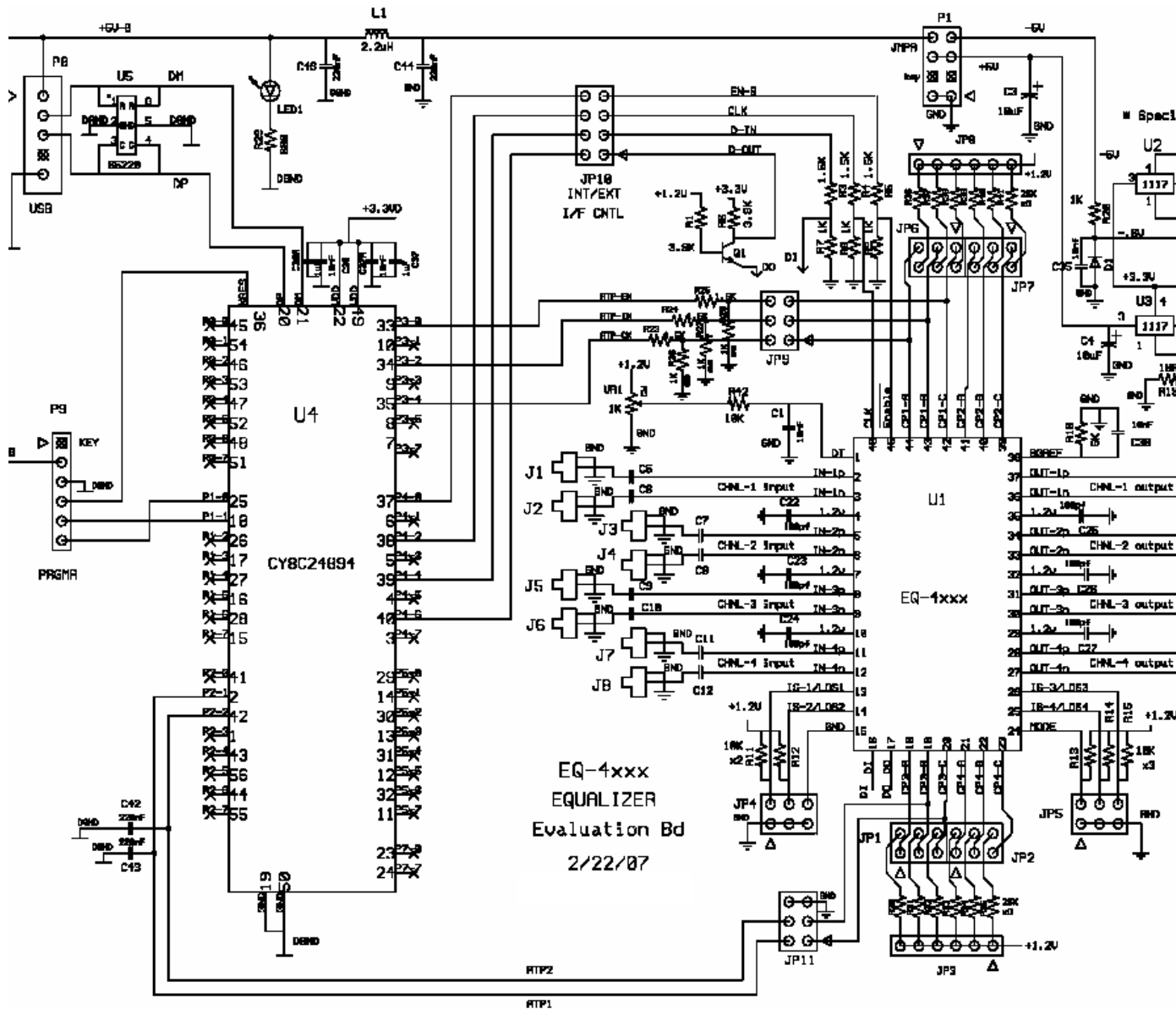


FIGURE 9. SCHEMATIC OF THE QLx4300-S45 EVALUATION BOARD

## QLx4300-S45 Bill of Materials

Ref Des	Description	Part No. (Digikey)	Qty	25 Brd Qty	Notes
C-1,37,38	10nF	PCC103BQCT-ND	5	125	Do not install C-35
C-35,36	10nf/1uf doublestack	PCC103BQCT-ND / PCC2268CT-ND	2 / 2	50 / 50	
C-22 ~ 27	100pF	PCC101CQCT-ND	6	150	
C-3,4,33,34,34a,39	10uF TANT CAP	478-1673-1-ND	6	150	
C-40,41,42,43,44,46	220nF	PCC2272CT-ND	6	150	
C-5 ~ 20	DLI + 220nF double-stack	P42BN820Z5S (DLI) / PCC2272CT-ND	16 / 16	400 / 400	
C1A~C16A	10nF	PCC103BQCT-ND	16	400	
D-1	SMD DIODE	Install 0 ohm 0603, P0.0GCT-ND	1	25	Real P/N MAJ11600LCT-ND
J-1 ~ 16	SMA FLUSH MNT	A24691-ND	16	400	
JP-1,2,4,5,6,7,9,11	2x3 HDR	WM26806-ND	6	150	Do not install JP-9 and JP-11
JP-10, P-1	2x4 HDR	WM26808-ND	2	50	
JP-3, JP-8, P-9	1x6	WM6506-ND	2	50	
L-1,2,3,4	1206 SMD IND	LQH31CN2R2M03L (Murata)	4	100	
L-5,6	BEAD	do not install	2	50	
LED-1	1206 LED	350-1566-1-ND	1	25	
P-8	USB CONN	H2959CT-ND	1	25	
Q1	NPN XSISTOR	2SC248000LCT-ND	1	25	
R-1,6	3.9K	P3.9KJCT-ND	2	50	
R-10	6K	P6.04KLCT-ND	1	25	
R-11 ~ 15	10K	311-10.0KLRCT-ND	5	125	
R-18	100	311-100JRCT-ND	1	25	
R-29	680 ohm	P680JCT-ND	1	25	
R-3,4,5,23,24,25	1.5K	P1.5KJCT-ND	6	150	
R-30 ~ 41	25K	541-25.5KLCT-ND	12	300	
R-42	10K	P10KJCT-ND	1	25	
R-7,8,9,20,26,27,28	1K	RHM1.00KLCT-ND	6	150	Do not install R-20
R-19	180	P180JCT-ND	1	25	
U-1	EQ-4xxx	Quellan Part - do not install	1	25	
U-2,3	LM-1117 VOLT REG	LM1117MP-ADJCT-ND	2	50	
U-4	CY8C24894 MCU	CY8C24894-24LFXI (Cypress)	1	25	
U-5	65220 ESD	296-9694-1-ND	1	25	
VR-1	1K TRIM POT	CT94EW102-ND	1	25	
VR-2	500 TRIM POT	CT94EW501-ND	1	25	Do not install. Short two "outboard pads"



## About Q:ACTIVE®

Intersil has long realized that to enable the complex server clusters of next generation datacenters, it is critical to manage the signal integrity issues of electrical interconnects. To address this, Intersil has developed its groundbreaking Q:ACTIVE® product line. By integrating its analog ICs inside cabling interconnects, Intersil is able to achieve unsurpassed improvements in reach, power consumption, latency, and cable gauge size as well as increased airflow in tomorrow's datacenters. This new technology transforms passive cabling into intelligent "roadways" that yield lower operating expenses and capital expenditures for the expanding datacenter.

Intersil Lane Extenders allow greater reach over existing cabling while reducing the need for thicker cables. This significantly reduces cable weight and clutter, increases airflow, and improves power consumption.

## Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.  
"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.  
"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.  
Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.
6. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.  
(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.  
(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)



### SALES OFFICES

Renesas Electronics Corporation

<http://www.renesas.com>

Refer to "<http://www.renesas.com/>" for the latest and detailed information.

**Renesas Electronics America Inc.**  
1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.  
Tel: +1-408-432-8888, Fax: +1-408-434-5351

**Renesas Electronics Canada Limited**  
9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3  
Tel: +1-905-237-2004

**Renesas Electronics Europe Limited**  
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K  
Tel: +44-1628-651-700, Fax: +44-1628-651-804

**Renesas Electronics Europe GmbH**  
Arcadiastrasse 10, 40472 Düsseldorf, Germany  
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

**Renesas Electronics (China) Co., Ltd.**  
Room 1709 Quantum Plaza, No.27 ZhichunLu, Haidian District, Beijing, 100191 P. R. China  
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

**Renesas Electronics (Shanghai) Co., Ltd.**  
Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, 200333 P. R. China  
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

**Renesas Electronics Hong Kong Limited**  
Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong  
Tel: +852-2265-6688, Fax: +852-2886-9022

**Renesas Electronics Taiwan Co., Ltd.**  
13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan  
Tel: +886-2-8175-9600, Fax: +886-2-8175-9670

**Renesas Electronics Singapore Pte. Ltd.**  
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949  
Tel: +65-6213-0200, Fax: +65-6213-0300

**Renesas Electronics Malaysia Sdn.Bhd.**  
Unit 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia  
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

**Renesas Electronics India Pvt. Ltd.**  
No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India  
Tel: +91-80-67208700, Fax: +91-80-67208777

**Renesas Electronics Korea Co., Ltd.**  
17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea  
Tel: +82-2-558-3737, Fax: +82-2-558-5338

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Interface Development Tools](#) category:*

*Click to view products by [Renesas](#) manufacturer:*

Other Similar products are found below :

[CY4607M](#) [DP130SSEVM](#) [ISO3086TEVM-436](#) [SP338EER1-0A-EB](#) [ADM00276](#) [ADP5585CP-EVALZ](#) [PEX8724-CA RDK](#) [PEX 8732-CA RDK](#) [PEX8747-CA RDK](#) [CHA2066-99F](#) [AS8650-DB](#) [MLX80104 TESTINTERFACE](#) [I2C-CPEV/NOPB](#) [ISO35TEVM-434](#) [KIT33978EKEVB](#) [XR17D158CV-0A-EVB](#) [XR17V358/SP339-E4-EB](#) [XR18910ILEVB](#) [XR22804IL56-0A-EB](#) [ZSC31050KIT V3.1](#) [ZSC31150KIT V1.2](#) [SCRUBBER-EVM](#) [SI838XISO-KIT](#) [73931-3022](#) [XIO2200AEVM](#) [XIB-E](#) [XBIB-U-SP](#) [TW-DONGLE-USB](#) [EVAL-ADM2483EBZ](#) [EVAL-ADM2491EEBZ](#) [ATUSB-PCB-80146](#) [EVB-USB83340](#) [MAX9921EVKIT](#) [MAXREFDES23DB#](#) [MAX9291COAXEVKIT#](#) [MAX3535EEVKIT+](#) [MAX3100EVKIT](#) [MAX13235EEVKIT](#) [MAX14970EVKIT#](#) [MAX14826EVKIT#](#) [3298](#) [XR21B1424IV64-0A-EVB](#) [XR21B1421IL24-0A-EVB](#) [XTIB-U](#) [XR17D152CM-0A-EVB](#) [XR22802IL56-0A-EB](#) [9291COAXEVKIT#](#) [XTIB-R](#) [SERDESUR-43USBNOPB](#) [CMAXQUSB+](#)