

Sundance Multiprocessor Technology Limited Design Specification

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Unit / Module Name:	CameraLink Receiver Module
Unit / Module Number:	SMT949
Used On:	SMT339,SMT351T
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1 Introduction

The SMT949 is a Camera Link interface, SLB expansion card. Its can be attached to a number of TIM modules to allow interfacing of Camera Link devices.

The SMT949 provides a Base, Medium and Full configuration Camera Link Interfaces through 2x 3M MDR connector. The interface also implements two serial interfaces between the card and the camera (one to the camera, one from the camera) as well as the four control lines to the camera.

When using base camera Links is it possible to configure the second connector as a second Base Camera Link input. Thus allowing the provision for attaching two cameras simultaneously. The SMT949 uses 3 DS90CR288A LVDS decoders. These can each have a data rate output of up to 85MHz. Using the full capacity of 3 links data rates of upto 765 Mbytes per second can be achieved.

The module uses the [Sundance Local Bus \(SLB\)](#) in single ended mode in order to interface to DSP modules such as the [SMT339](#).

1.1 Related Documents

[Sundance Local Bus \(SLB\)](#) – Sundance Specification.

[SMT339](#) – Advanced Video Processing DSP Module.

2 Functional Description

Base Camera Link mode uses one Camera Link connectors and one of the Decoder IC's. The 24bit Data is fed with syncs and clocks to a LVTTTL to 2.5V level converter before being fed to the SLB connector. The Medium and Full Camera Link modes use the remaining connector and IC's in order to provide 2 and 3 times the data widths respectively.

The maximum permitted data clock for the interface is 85Mhz therefore allowing a theoretical maximum throughput of 765 M Bytes/Second.

2.1 CameraLink Receiver

The receiver is based on the DS90CR288A. These devices convert the four LVDS data streams back into 28 bits of LVCMOS/LVTTTL data per device. For single link operation only one of these devices is used. When Medium CameraLink is used both connectors and 2 DS90CR288A are utilised. In Full CameraLink mode both connectors and all 3 receivers are used. The table in Figure 1 summarises the different modes the SMT949 is capable of.

Configuration	Ports	Supported Number of Chips	Number of Connectors
Base	A, B, C	1	1
Medium	A, B, C, D, E, F	2	2
Full	A, B, C, D, E, F, G, H	3	2

Figure 1 :Port Assignments According to Configuration

A port is defined as an 8-bit word. The Least Significant Bit (LSB) is bit 0, and the Most significant Bit (MSB) is bit 7. The Camera Link interface utilizes the 8 ports of A-H.

2.2 SLB Header

The **Sundance Local Bus (SLB)** allows data from each video decoder to be streamed, using embedded or separate sync formats, to the main processing module. All signals are LVPECL at 2.5V.

2.2.1 SLB Power Supplies

When using the SLB interface a separate SLB power header (BKT) is used to supply the Daughterboard. Details of this connector pinout can be found in the [SLB Reference Guide](#).

2.3 Block Diagram

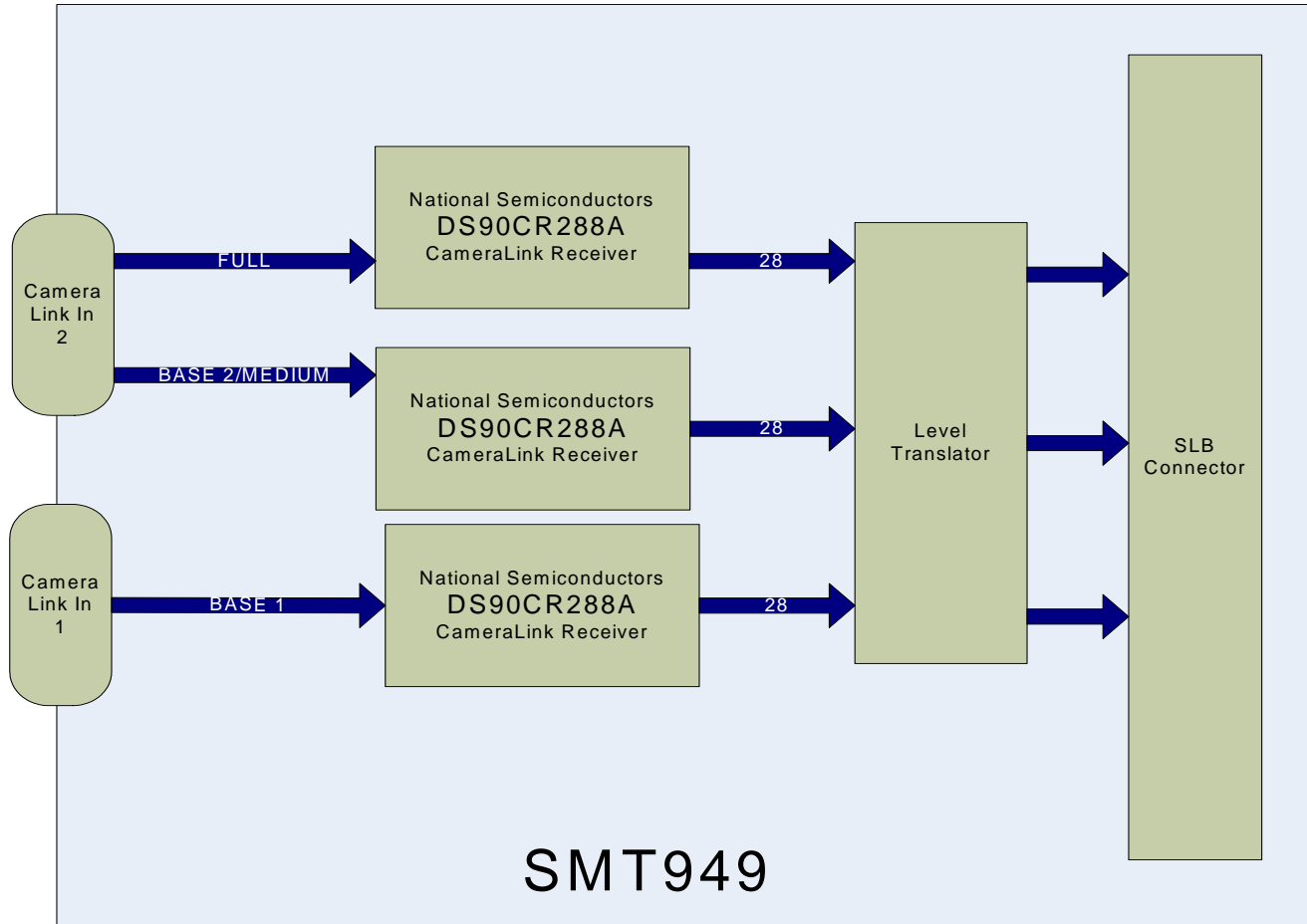


Figure 2 : SMT949 Block Diagram

3 Mechanical Interface

The host board provides power, Ground, data and control lines between the module.

4 Electrical Interface

For pinout and information of the SLB signal and power connectors see :

[Sundance Local Bus \(SLB\)](#) (SLB) Specifications – Sundance.

4.1 Camera Link Connector (J3)

SMT949 Connector Part No. [3M N10226-5212PC](#)

Mating Connector Part No. [3M 10126-6000EC](#)

Pin	Signal	Pin	Signal
1	Inner Shield	14	Inner Shield
2	CAM_CTRL4+	15	CAM_CTRL4-
3	CAM_CTRL3+	16	CAM_CTRL3-
4	CAM_CTRL2+	17	CAM_CTRL2-
5	CAM_CTRL1+	18	CAM_CTRL1-
6	Ser_TFG+	19	Ser_TFG-
7	Ser_TC-	20	Ser_TC+
8	CAM_X3+	21	CAM_X3-
9	CAM_CLKX+	22	CAM_CLKX-
10	CAM_X2+	23	CAM_X0-
11	CAM_X1+	24	CAM_X1-
12	CAM_X0+	25	CAM_X0-
13	Inner Shield	26	Inner Shield

4.2 Camera Link Connector (J4)

SMT949 Connector Part No. [3M N10226-5212PC](#)

Mating Connector Part No. [3M 10126-6000EC](#)

Pin	Signal Base2 / MediumFull	Pin	SignalBase2 / MediumFull
1	Inner Shield	14	Inner Shield
2	CAM_CTRL2_4+ / CAM_Z3+	15	CAM_CTRL2_4- / CAM_Z3-
3	CAM_CTRL2_3+ / CAM_Z2+	16	CAM_CTRL2_3- / CAM_Z2-
4	CAM_CTRL2_2+ / CAM_Z1+	17	CAM_CTRL2_2- / CAM_Z1-
5	CAM_CTRL2_1+ / CAM_Z0+	18	CAM_CTRL2_1- / CAM_Z0-
6	Ser_TFG2+	19	Ser_TFG2-
7	Ser_TC2-	20	Ser_TC2+
8	CAM_X3+ / CAM_Y3+	21	CAM_X3- / CAM_Y3-
9	CAM_CLKX+ / CAM_CLKY+	22	CAM_CLKX- / CAM_CLKY-

10	CAM_X2+ / CAM_Y2+	23	CAM_X0- / CAM_Y2-
11	CAM_X1+ / CAM_Y1+	24	CAM_X1- / CAM_Y1-
12	CAM_X0+ / CAM_Y0+	25	CAM_X0- / CAM_Y0-
13	Inner Shield	26	Inner Shield

4.3 SLB Interface Connector(J7)

SMT949 Connector Part No. [Samtec QSH-060-01-F-D-DP-A](#)

Mating Cable Part No. Samtec [HFHM2-060-T-5.00-DP](#)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	CAMERA PF5	2	CAMERA PG0	3	CAMERA_B2_LVAL	4	CAMERA PG1
5	CAMERA B2_FVAL	6	CAMERA PG2	7	CAMERA B2_DVAL	8	CAMERA PG3
9	CAMERA PD6	10	CAMERA PG4	11	CAMERA PF4	12	CAMERA PG5
13	CAMERA PF3	14	CAMERA PG6	15	CAMERA PF2	16	CAMERA PG7
17	CAMERA PF1	18		19	CAMERA PF7	20	
21	CAMERA PF0	22	CAMERA PF6	23	CAMERA PE5	24	CAMERA PE4
25	CAMERA PE7	26	CAMERA PE3	27	CAMERA PE6	28	CAMERA PE2
29	CAMERA PE0	30	CAMERA PE1	31	CAMERA PD5	32	CAMERA PD7
33	CAMERA PD3	34	CAMERA PD4	35	CAMERA PD0	36	CAMERA PD1
37		38		39	CAMERA 2 SerTC	40	CAMER 2 SerTFG
41		42	CAMERA 2 CLK	45		44	
45	CAMERA CTL1	46	CAMERA CTL2	47	CAMERA CTL3	48	CAMERA CTL4
49		50		51		52	
53		54		55	CAMERA 1 CLK	56	
57		58		59		60	
61		62		63		64	
65	CAMERA 2 CTL1	66	CAMERA 2 CTL4	67	CAMERA 2 CTL2	68	
69	CAMERA 2 CTL3	70		71		72	
73		74		75		76	
77		78		79		80	
81	CAMERA PC5	82		83	CAMERA LVAL	84	
85	CAMERA FVAL	86		87	CAMERA DVAL	88	
89	CAMERA PA6	90		91	CAMERA PC4	92	
93	CAMERA PC3	94		95	CAMERA PC2	96	
97	CAMERA PC1	98		99	CAMERA PC7	100	
101	CAMERA PC0	102	CAMERA PC6	103	CAMERA PB5	104	CAMERA PB4
105	CAMERA PB7	106	CAMERA PB3	107	CAMERA PB6	108	CAMERA PB2
109	CAMERA PB0	110	CAMERA PB1	111	CAMERA PA5	112	CAMERA PA7
113	CAMERA PA3	114	CAMERA PA4	115	CAMERA PA0	116	CAMERA PA1
117	CAMERA PA0	118	CAMERA Clock	119	CAMERA SerTC	120	CAMER SerTFG

5 Verification Procedures

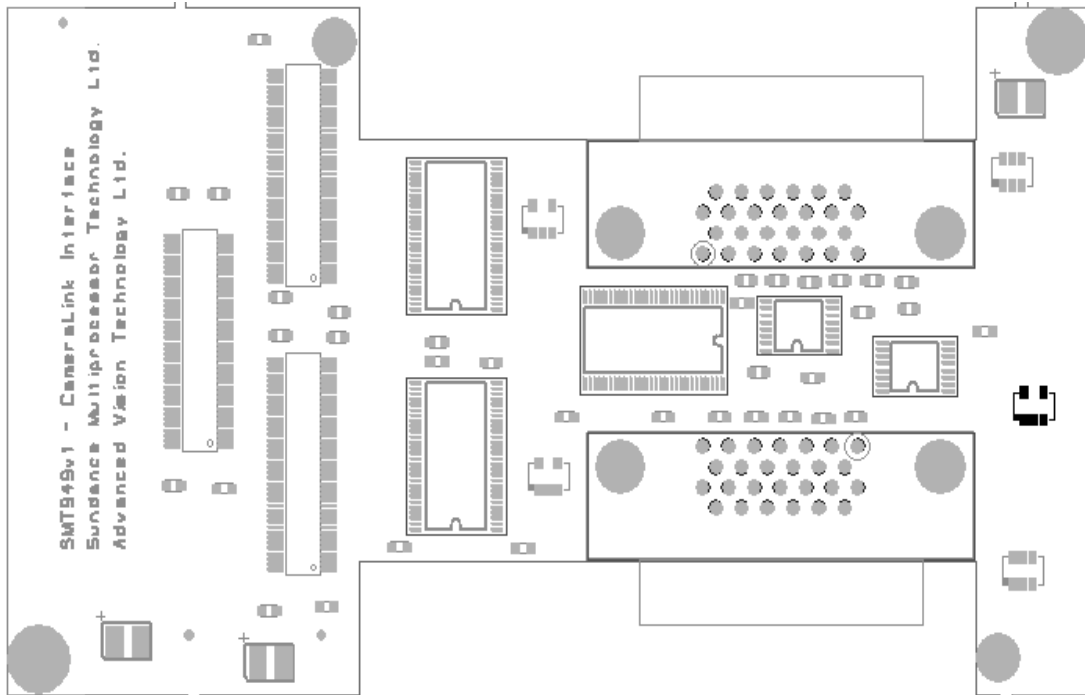
The verification procedure for the module is as follows.

1. A Base configuration Camera is connected to Primary connector and the image is verified with a series of test patterns aquired with the camera.
2. The same Camera is connected to the Secondary connector and the Base 2 camera connection is validated as in 1.
3. The Camera control signals are validated using a simple test program lights up the control LED's on the SMT949
4. The camera parameters are varied in both Base link positions to validate the 2 way communications

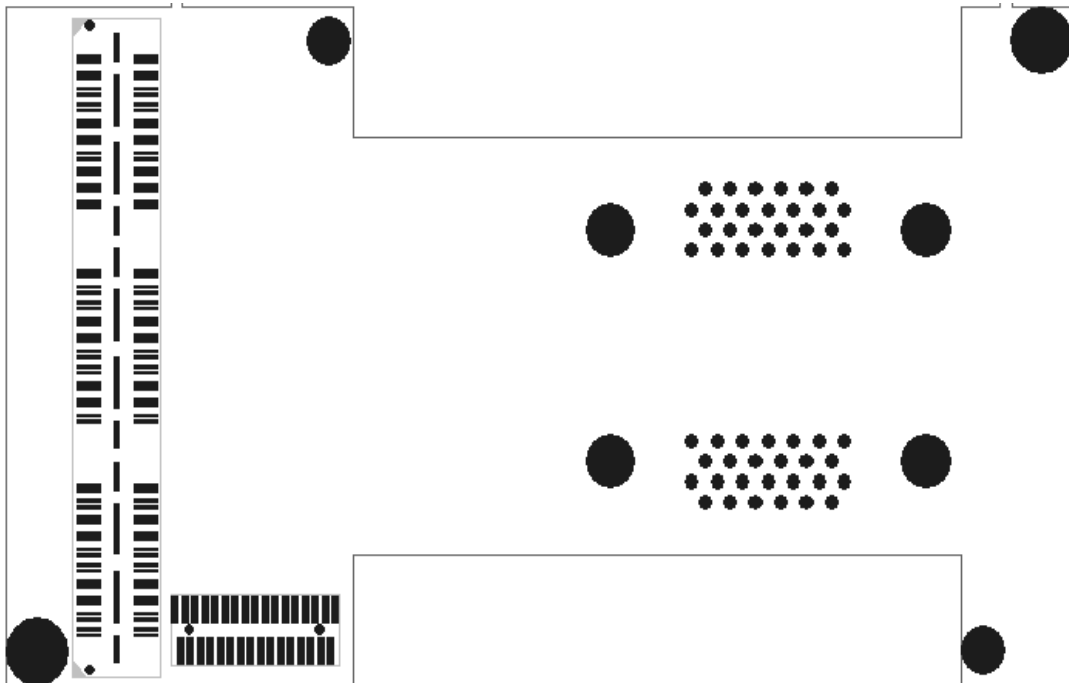
5.

6 PCB Layout Details

6.1 Top Side



6.2 Bottom Side



7 Safety

This module presents no hazard to the user.

8 EMC

This module is designed to operate from within an enclosed host system, which is build to provide EMC shielding. Operation within the EU EMC guidelines is not guaranteed unless it is installed within an adequate host system.

This module is protected from damage by fast voltage transients originating from outside the host system which may be introduced through the output cables.

Short circuiting any output to ground does not cause the host PC system to lock up or reboot.