Unit / Module Name:	Dual Multi-channel Video Decoder Interface Module
Unit / Module Number:	SMT909
Used On:	SMT339,SMT351T
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Revision History

Issue	Changes Made	Date	Initials
0.9	Initial Draft	01/03/06	AJP
0.91	Rename to SMT909	21/03/07	AJP
1.0	First Release	06/09/07	AJP
1.01	Added new style block diagram	07/09/07	CH
1.02	Added Connector Information & Board Profile	16/07/08	AH
1.03	Board Profile Modification	05/09/08	AH

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1 Introduction

The SMT909 is a Dual video decoder, SLB expansion card. The SMT909 utilises two Philips SAA7118 video decoder, which supports a wide variety of analogue inputs. Using both decoders up to 16 inputs can be utilised. As the 16 inputs are shared between 2 video decoders simultaneous capture of 2 channels is possible.

The Module features a single 'Philips Semiconductors' SAA7118 video decoder that accept most PAL and NTSC standards.

Each decoder can decode the colour of PAL, SECAM and NTSC signals into ITU 601 compatible colour component values. The SAA7118 accepts CVBS or S-video (Y/C) as analogue inputs from TV or VCR sources, including weak and distorted signals as well as baseband component signals Y-P_B-P_R or RGB

Key features of each decoder include

- High performance SAA7118E video decoder/s
- Supports PAL B, G, D, H, I and N, combination PAL N, PAL M, NTSC M, NTSC-Japan, NTSC 4.43 and SECAM standards.
- Up to 8 analogue CVBS inputs per decoder
- Up to 8 Y+C inputs per decoder
- Up to 2 analogue component inputs, with embedded or separate syncs, per decoder

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) Specifications – Sundance.

TIM specifications.

MMCX Connectors – Hubert Suhner.

SMT339 – Advanced Video Processing DSP Module.

2 Functional Description

2.1 Video Decoder

The decoder is based on the 'Philips Semiconductors'SAA7118. This provides decoding of PAL, NTSC and SECAM signal standards. On-board scaling circuitry allows the output image size to be specified by the DSP using the I^2C interface. Two inputs are available through on-board connectors. These can be defined as CVBS , Y/C channel RGB etc, again configured over the I^2C interface.

2.1.1 I^2C Addresses

Decoder A, IC8 has an address of 40H/41H and its input connectors connected to J1 – J8

Decoder B, IC9 has an address of 42H/43H and its input connectors connected to J9 – J16

2.1.2 Mode Configurations

2.1.2.1 IC8 - Decoder A

CVBS

Mode	J1	J2	J3	J4	J5	J6	J7	J8
00	CVBS1	-	-	-	-	-	-	-
01	-	-	-	-	CVBS2	-	-	-
04	-	CVBS5	-	-	-	-	-	-
05	-	-	-	-	-	CVBS6	-	-
14	-	-	-	CVBS13	-	-	-	-
15	-	-	-	-	-	-	-	CVBS14
1E	-	-	CVBS15	-	-	-	-	-
1F	-	-	-	-	-	-	CVBS16	-

SY-PB-PR

Mode	J1	J2	J3	J4	J5	J6	J7	J8
2E		SYNCY[2]	CB	CR	-	-	-	-
2E	SYNC[1]	Y	CB	CR	-	-	-	-
2F	-	-	-	-	-	SYNCY[2]	CB	CR
2F	-	-	-	-	SYNC[1]	Y	CB	CR

RGB

Mode	J1	J2	J3	J4	J5	J6	J7	J8
3E		SYNCG[2]	B	R	-	-	-	-
3E	SYNC[1]	G	B	R	-	-	-	-
3F	-	-	-	-		SYNCG[2]	B	R
3F	-	-	-	-	SYNC[1]	G	B	R

IC9 - Decoder B

CVBS

Mode	J9	J10	J11	J12	J13	J14	J15	J16
00	CVBS1	-	-	-	-	-	-	-
01	-	-	-	-	CVBS2	-	-	-
04	-	CVBS5	-	-	-	-	-	-
05	-	-	-	-	-	CVBS6	-	-
14	-	-	-	CVBS13	-	-	-	-
15	-	-	-	-	-	-	-	CVBS14
1E	-	-	CVBS15	-	-	-	-	-
1F	-	-	-	-	-	-	CVBS16	-

SY-PB-PR

Mode	J9	J10	J11	J12	J13	J14	J15	J16
2E	-	SYNCY[2]	CB	CR	-	-	-	-
2E	SYNC[1]	Y	CB	CR	-	-	-	-
2F	-	-	-	-	-	SYNCY[2]	CB	CR
2F	-	-	-	-	SYNC[1]	Y	CB	CR

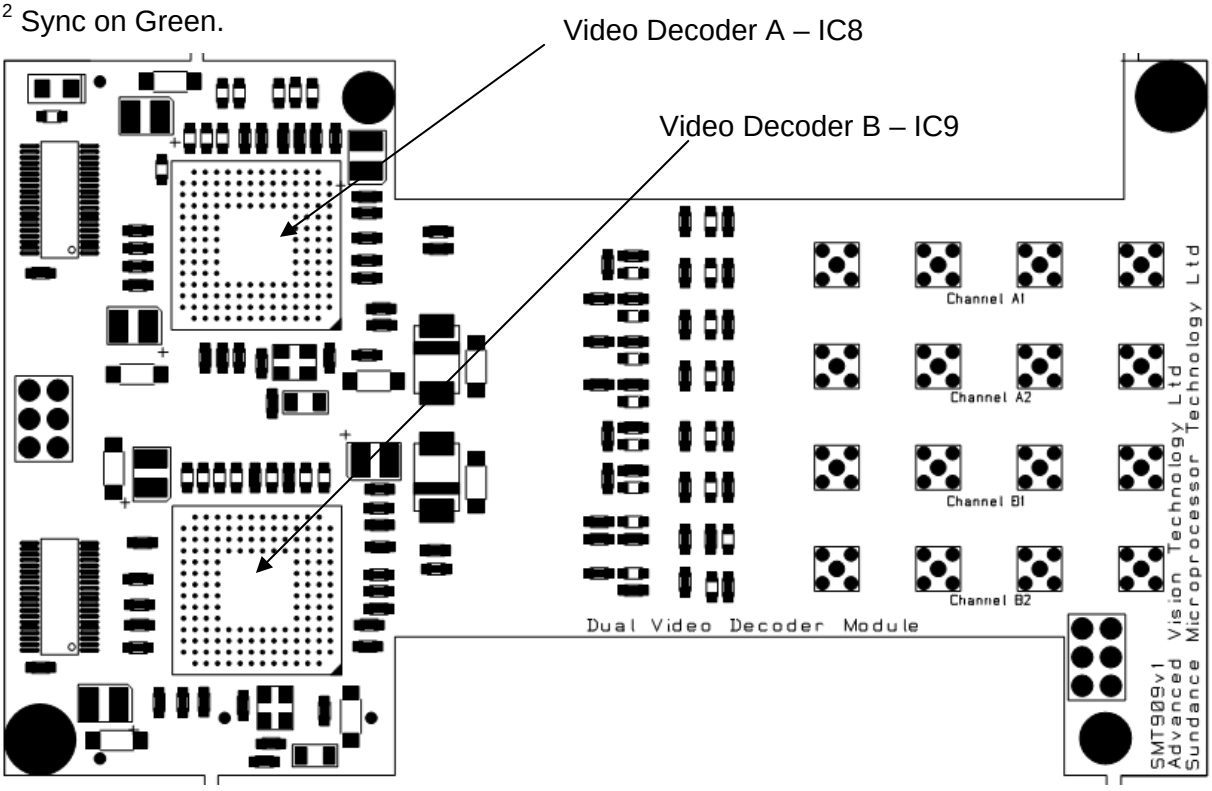
RGB

Mode	J9	J10	J11	J12	J13	J14	J15	J16
3E		SYNCG[2]	B	R	-	-	-	-
3E	SYNC[1]	G	B	R	-	-	-	-
3F	-	-	-	-		SYNCG[2]	B	R
3F	-	-	-	-	SYNC[1]	G	B	R

Note:

[1] Separate Sync.

[2] Sync on Green.



2.2 SLB Header

The **S**undance **L**ocal **B**us (SLB) allows data from each video decoder to be streamed, using embedded or separate sync formats, to the main processing module. All signals using LVTTL at 2.5V. The I2C interface lines on the SLB connector allows the host processor to configure each decoder independently.

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

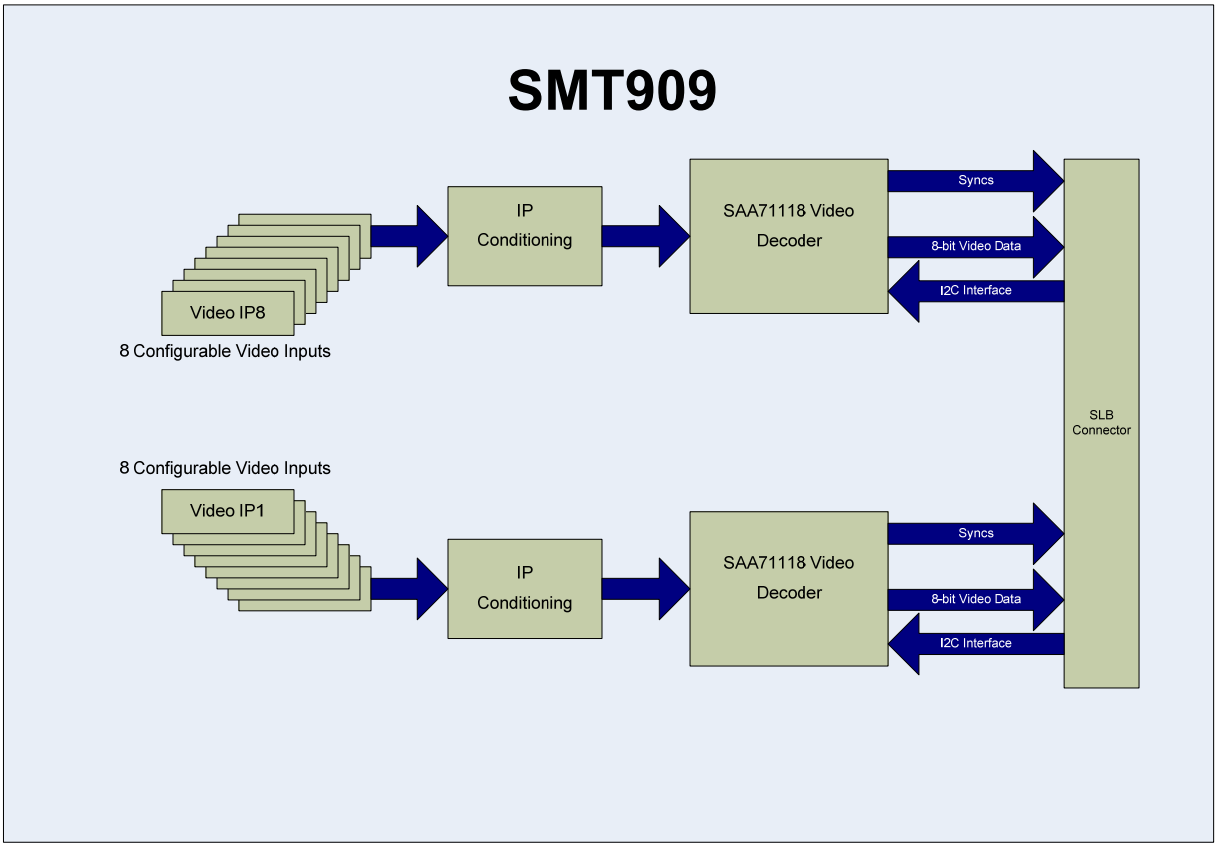


Figure 1 : SMT909 Block Diagram

3 Mechanical Interface

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

3.1 Video Input Connectors

Video input signals are all connected to the *SMT909* via MMCX connectors,

3.2 Dimensions

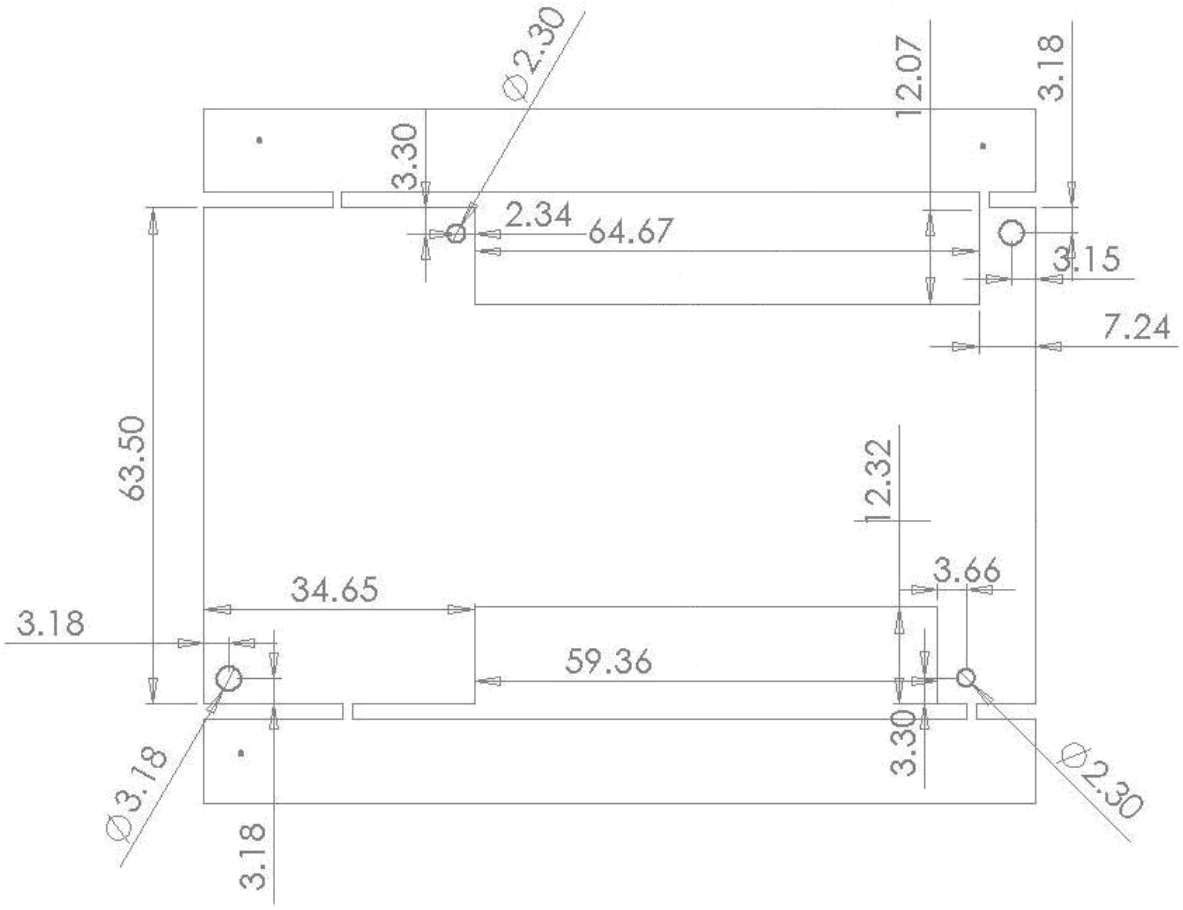


Figure 2 – Board Dimensions

4 Electrical Interface

4.1 SLB Interface Connector (J18)

SMT909 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	NC	2	EXP10DD	3	NC	4	EXP1HS
5	NC	6	EXP1VS	7	NC	8	EXPY7
9	NC	10	EXP1Y5	11	NC	12	EXPY6
13	VID_RST_A	14	EXP1Y3	15	NC	16	EXPY4
17	NC	18	EXP1Y0	19	NC	20	EXPY1
21	EXP1DE	22	EXP1Y2	23	NC	24	NC
25	NC	26	NC	27	NC	28	NC
29	NC	30	NC	31	NC	32	NC
33	NC	34	NC	35	NC	36	NC
37	NC	38	NC	39	NC	40	NC
41	NC	42	NC	45	NC	44	NC
45	NC	46	NC	47	NC	48	NC
49	NC	50	NC	51	NC	52	NC
53	NC	54	NC	55	NC	56	NC
57	NC	58	NC	59	EXP1CLK1	60	NC
61	NC	62	NC	63	EXP2CLK1	64	NC
65	NC	66	NC	67	NC	68	NC
69	N/C	70	VREF	71	TCK	72	TMS
73	TDI	74	TDO	75	N/C	76	N/C
77	N/C	78	N/C	79	N/C	80	N/C
81	NC	82	EXP20DD	83	NC	84	EXP2HS
85	NC	86	EXP2VS	87	NC	88	EXP2Y7
89	NC	90	IICDATA	91	NC	92	IICLK
93	NC	94	EXP2Y5	95	NC	96	EXP2Y6
97	NC	98	EXP2Y3	99	NC	100	EXP2Y4
101	NC	102	EXP2Y0	103	NC	104	EXP2Y1
105	NC	106	EXP2Y2	107	NC	108	NC
109	NC	110	NC	111	NC	112	NC
113	NC	114	EXP2DE	115	NC	116	NC
117	NC	118	NC	119	NC	120	NC

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

Sundance Local Bus (SLB) Specifications – Sundance.

4.2 Video Inputs (J1-J16)

SMT909 Connector Part No: Huber & Suhner MMCX connector: 22645958

Mating Cable Part No: Any MCX plug cable

Pin	Signal	Pin	Signal
1	Signal	2	GND
3	GND	4	GND
5	GND		

4.3 JTAG Connector (J21)

Pin	Signal	Pin	Signal
1	Vref	2	TCK
3	TMS	4	TDI
5	TDO	6	GND

4.4 SLB Power Connector (J17)

SMT959 Connector Part No:.Samtec BKS-133-03-F-V-A

Mating PCB connector: Samtec BKS-133-01-F-V-A

Pin #	Description	Pin #	Description
1	3.3V	2	GND
3	3.3V	4	GND
5	3.3V	6	GND
7	3.3V	8	GND
9	5V *	10	GND
11	5V *	12	GND
13	5V *	14	GND
15	5V *	16	GND
17	+12V *	18	GND
19	+12V *	20	GND
21	-12V *	22	GND
23	-12V *	24	GND
25	GND	26	DSP JTAG0*
27	DSP JTAG1*	28	DSP JTAG2*
29	DSP JTAG3 *	30	DSP JTAG4*
31	DSP JTAG5 *	32	DSP JTAG6 *
33	GND		

*Note, not used on SMT909

5 Verification Procedures

The verification procedure for the module is as follows.

5.1 Video Encoder/Decoder

Each Video Input is fed with a composite video PAL source. The Module is plugged onto a SMT339 which outputs the video picture onto a monitor in PAL format. Various Test images are Generates to verify, resolution, colour contrast and brightness.

6 PCB Layout Details

6.1 Top Side

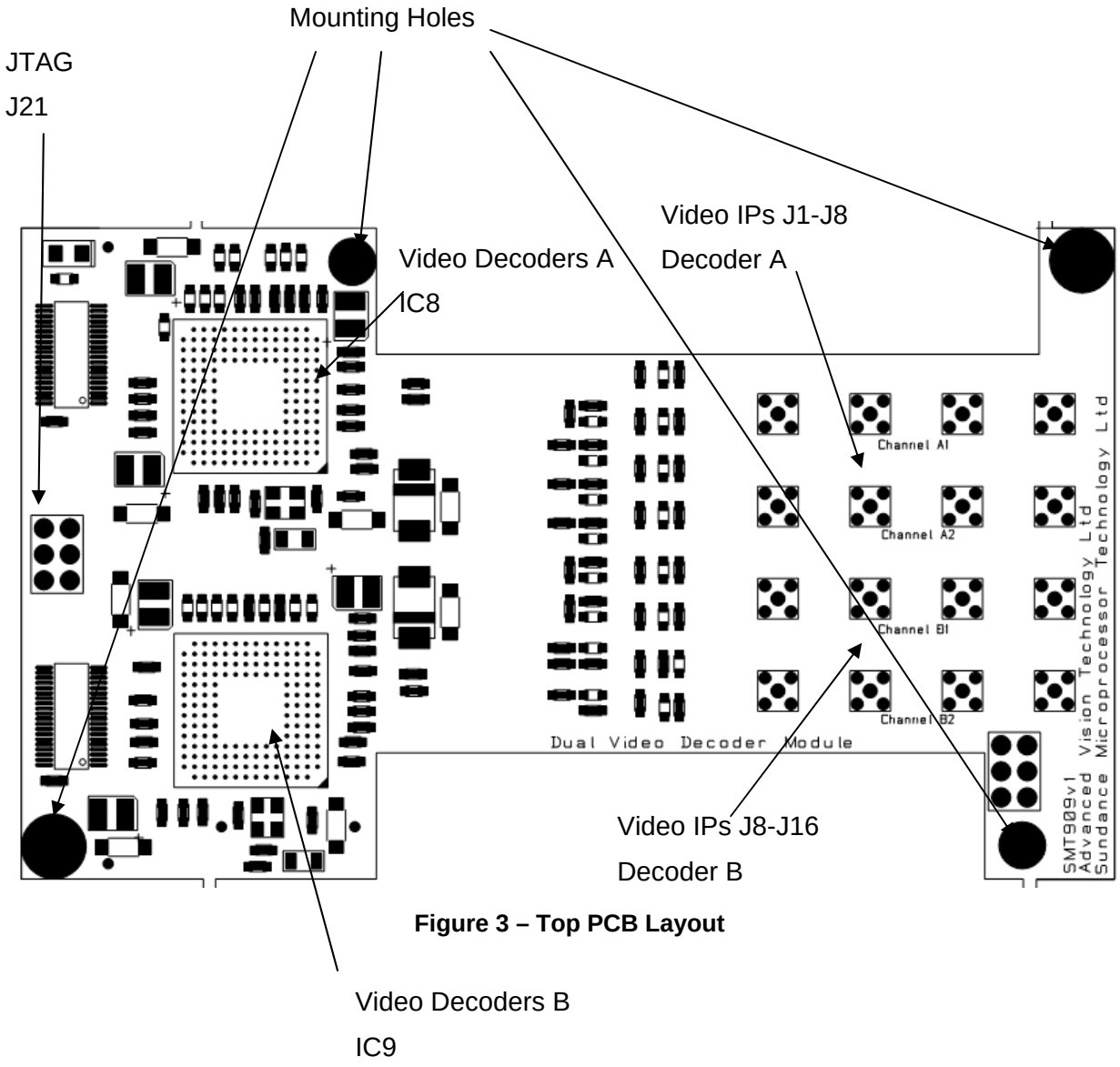


Figure 3 – Top PCB Layout

6.2 Bottom Side

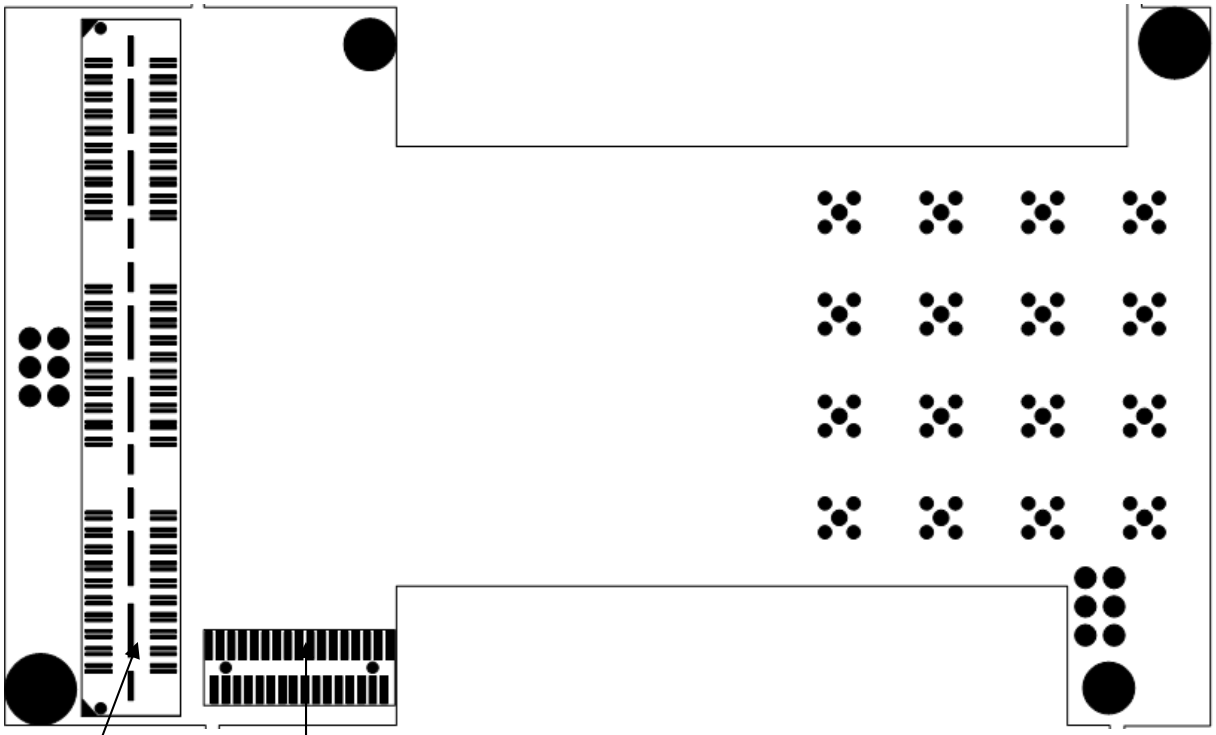


Figure 4 – Bottom PCB Layout

SLB Power Connector J17

SLB Interface Connector J18

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.