



# Getting Started

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## Mpression LVDS Interface Card

Revision 1.0.0

2014/03/01

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# 1. For Ensuring Safe Use



Be sure to follow the instructions given in this Manual which are intended to prevent harm to the user and others as well as material damage.


## 1.1 Legend

 <b>Danger</b>	Indicates an imminent hazardous situation which if not avoided will result in death or serious injury.
 <b>Warning</b>	Indicates a potentially hazardous situation which if not avoided could result in death or serious injury.
 <b>Caution</b>	Indicates a potentially hazardous situation which if not avoided may result in minor or moderate injury or in property damage.

## 1.2 Cautions

 <b>Danger</b>	<p>Make sure to use the AC adapter (if uses or required) that is specified in this Manual or included one in package.</p> <p>Using an AC adapter not meeting the specifications described in this Manual will cause the kit to emit heat, explode, or ignite.</p>
 <b>Warning</b>	<p>Do not apply strong impacts or blows to the kit.</p> <p>Doing so may cause the kit to emit heat, explode, or ignite, or the equipment in the kit to fail or malfunction. This may also cause fire.</p> <p>Do not put the main unit or the AC adapter in cooking appliances such as microwave ovens, or high-pressure containers.</p> <p>Doing so might cause the main unit or AC adapter to emit heat, explode, ignite, or emit smoke, or its parts to break or warp.</p> <p>Do not wrap the main unit that is in use with cloth or other materials that are likely to allow heat to build up inside the wrapping.</p> <p>This will cause heat to build up inside the wrapping which may cause the main unit to ignite or malfunction.</p> <p>When disposing of the main unit, do not dispose of it along with general household waste.</p> <p>Throwing the main unit into fire may cause it to explode. Dispose of the main unit following the laws, regulations, and ordinances governing waste disposal.</p> <p>Do not use the kit in places subject to extremely high or low temperatures or severe temperature changes.</p> <p>Doing so may cause the kit to fail or to malfunction.</p> <p>Always be sure to use the kit in a temperatures ranging from 5°C to 35°C and a humidity range of 0% to 85%.</p>

 <b>Warning</b> (Continued from previous page)	<p>Do not pull the power supply cable with excessive force or place heavy items on it. Do not damage, break, bundle, or tamper with the power supply cable. Damaged parts of the power supply cable might cause a short circuit resulting in fire or accidents involving electrical shock.</p>
	<p>Do not unplug the power plug with wet or moist hands. This might cause injuries or equipment malfunctions or failures due to electrical shock.</p>
	<p>Plug the power plug securely into the outlet. If the power plug is not securely plugged into the outlet, it may cause accidents involving electrical shock or fire due to heat emitted.</p>
	<p>Do not connect many electrical cords to a single socket or connect an AC adapter to an outlet that is not rated for the specified voltage. Failing to do so may cause the equipment to malfunction or fail, or lead to accidents involving electrical shock or fire due to heat emitted.</p>
	<p>Periodically remove any dust accumulated on the power plug and around the outlet (socket). Do not use a power plug with dust accumulated on it because doing so will lead to insulation failure due to moisture which may lead to fire. Remove any dust on the power plug and around the outlet with dried cloth.</p>
	<p>Do not place any containers such as cups or vases filled with water or other liquid on this Board. If this Board is exposed to water or other liquids it may cause the Board to malfunction or lead to accidents involving electrical shock. If you spilled water or other liquid on this Board, immediately stop using the Board, turn off the power, and unplug the power plug. If you have any requests for repairs or technical consultation, please contact the Manufacturer.</p>
 <b>Caution</b>	<p>Do not place the kit on unstable places such as shaky stands or tilted locations. Doing so may cause injuries or cause this Board to malfunction if the Board should fall.</p>
	<p>Do not attempt to use or leave the kit in places subject to strong direct sunlight or other places subject to high temperatures such as in cars in hot weather. Doing so might cause the kit to emit heat, break, ignite, run out of control, warp, or malfunction. Also, some parts of the equipment might emit heat causing burn injuries.</p>
	<p>Unplug the power supply cable when carrying out maintenance of devices in which the main unit is embedded. Failure to do so may lead to accidents involving electrical shock.</p>
	<p>Do not place this Board in locations where excessive force is applied to the Board. Failure to do so may cause the PC board to warp, leading to breakage of the PC board, missing parts or malfunctioning parts.</p>
	<p>When using the kit together with expansion boards or other peripheral devices, be sure to carefully read each of their manuals and to use them correctly. Manufacturer does not guarantee the operation of specific expansion boards or peripheral devices when used in conjunction with this Board unless they are specifically mentioned in this Manual or their successful operation with this Board has been confirmed in separate documents.</p>
	<p>Be sure to turn off the power switch when moving this Board to connect to other devices. Failure to do so may cause this Board to fail or lead to accidents involving electrical shock.</p>

 <b>Caution</b> (Continued from previous page)	<p>Do not clean this Board by using a rag containing chemicals such as benzine or thinner.</p> <p>Failure to do so will likely to cause this Board to deteriorate. When using a chemical cloth be sure to comply with any directions or warnings.</p>
	<p>Do not immediately turn on the power if you find that water or moisture had condensed onto the main unit after removing the board from the package.</p> <p>Condensation might occur on this Board when taking it out of the box, if the board is cool yet the room temperature is warm.</p> <p>Do not apply power to the Board while water or moisture has condensed on it because the moisture may cause the Board to break or may shorten the service life of the parts.</p> <p>When you first take this Board out of the box be sure to leave it at room temperature for a while before using it. If condensation or moisture has occurred on this Board, first wait for the moisture to fully evaporate before installing or connecting the Board to other devices.</p>
	<p>Do not disassemble, dismantle, modify, alter, or recycle parts unless they are clearly described as customizable in this Manual.</p> <p>Although this kit is customizable, if parts not specified in this Manual as customizable are modified in any way, then the overall product operation cannot be guaranteed.</p> <p>Please consult with Manufacturer beforehand if you wish to customize or modify any parts that are not described in this Manual as customizable.</p>

## 1.3 Developer Information

The Developer of this product is:

Altima Corp.

1-5-5 Shin-Yokohama, Kouhoku-ku, Yokohama, 222-8563 JAPAN

<http://www.altima.co.jp>

## 1.4 Inquiries

In case you have any inquiries about the use this product, please contact your local Macnica company or make inquiries through the contact form in the following web site:

<http://www.m-pression.com/contact>

Macnica companies:

- |                  |                       |   |
|------------------|-----------------------|---|
| • China & HK:    | Cytech Technology     | <a href="http://www.cytech.com/">http://www.cytech.com/</a>                     |
| • ASEAN & India: | Cytech Global         | <a href="http://www.cytechglobal.com/">http://www.cytechglobal.com/</a>         |
| • Taiwan:        | Galaxy Far East Corp. | <a href="http://www.gfec.com.tw/">http://www.gfec.com.tw/</a>                   |
| • North America: | Macnica Americas      | <a href="http://www.macnica-na.com/">http://www.macnica-na.com/</a>             |
| • Brazil:        | Macnica DHW           | <a href="http://www.macnicadhw.com.br/en/">http://www.macnicadhw.com.br/en/</a> |
| • Japan:         | Altima                | <a href="http://www.altima.co.jp">http://www.altima.co.jp</a>                   |
|                  | Elsena                | <a href="http://www.elsena.co.jp">http://www.elsena.co.jp</a>                   |

## 2. Introduction

Thank you for purchasing our LVDS Interface Card (hereinafter, this Card).

This manual “Getting Started—LVDS Interface Card” (hereinafter, this Manual) includes instructions for use of this Card for connection to the HSMC port of ALTERA’s development kit. Before using this Card, carefully read this Manual and be sure to use this Card correctly. Be sure to keep this Manual and Card together.

### 2.1 Before use

Make sure all of the following items are included.

LVDS Interface Card: 1 set	
Cable for LVDS Interface Card (30 cm): 2 pcs. (BANDO DENSEN Co., Ltd.)	
Spacer : 2 sets	
Package List/Precautions	
The manuals and other documents shown to the right are available at the URL specified in the “Package List/Precautions.”	This Manual
	Schematic for this Card
	Reference Design for LVDS Interface Card
	Reference Manual for LVDS Interface Card

After opening the package, check that all items are included and check for damage. If any item is missing or any visible damage is found, contact our sales personnel within 30 days of receiving the package.

## 3. Functions and Features

### 3.1 Key features

This Card is a daughter card that can be mounted on an HSMC and has a board that can be used with an FPGA development board equipped with an HSMC.

- This Card can be used for the development and verification of an LVDS interface for ALTERA FPGA.

#### 3.1.1 Basic specifications

The product specifications of this Card are as follows:

Product specifications	ALTHSMCLVDS
Dimensions	105 mm × 78.105 mm
HMSC	Samtec ASP-122952-01
HSMC port B	Samtec ASP-122953-01
LVDS I/F connector	JAE Electronics FI-RE51S-HF
Level conversion buffer	TI SN74LVC541APW
I2C level conversion buffer	TI PCA9306DCTR
Printed circuit board	FR4 six-layer

#### 3.1.2 Block diagram of this Card

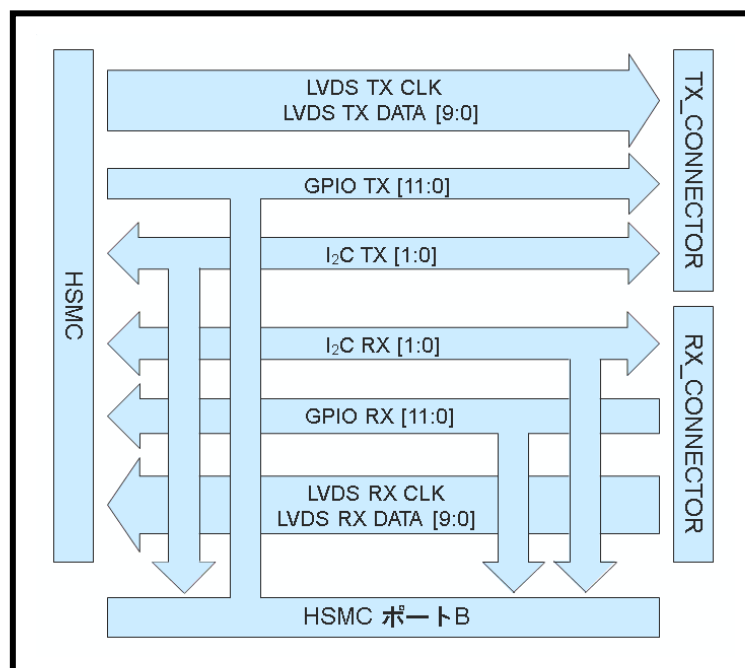


Fig. 3-1. Block diagram of this Card

## 3.2 Layout

### 3.2.1 Layout and component name

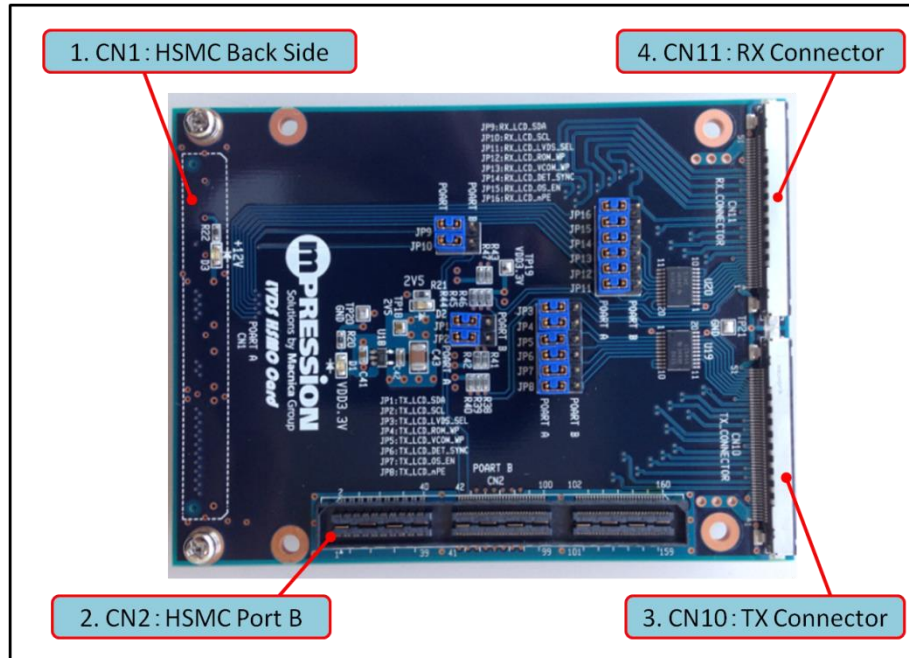


Fig. 3-2. Layout of this Card

- |                       |   |
|-----------------------|---|
| 1. HSMC (CN1)         | ... HSMC connection connector for the ALTERA FPGA development board                 |
| 2. HSMC Port B (CN2)  | ... HSMC connection connector for the ALTERA FPGA development board<br>(See 2-1-1.) |
| 3. TX_CONNECTOR(CN10) | ... LVDS TX I/F cable connection connector  |
| 4. RX_CONNECTOR(CN11) | ... LVDS RX I/F cable connection connector  |

## 3.3 Hardware specifications

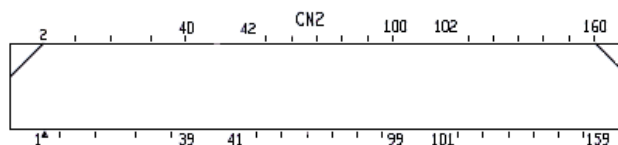
### 3.3.1 Connector pin assignment

01. CN1 (HSMC)



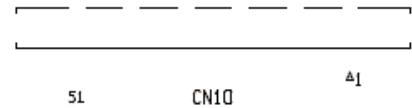
Pin #	Pin name	Pin #	Pin name	Pin #	Pin name	Pin #	Pin name
1		2		87	VDD.3.3V	88	+12V
3		4		89	TX_A0+	90	RX_A0+
5		6		91	TX_A0-	92	RX_A0-
7		8		93	VDD.3.3V	94	+12V
9		10		95	TX_ACK+	96	RX_ACK+
11		12		97	TX_ACK-	98	RX_ACK-
13		14		99	VDD.3.3V	100	+12V
15		16		101	TX_A1+	102	RX_A1+
17		18		103	TX_A1-	104	RX_A1-
19		20		105	VDD.3.3V	106	+12V
21		22		107	TX_A2+	108	RX_A2+
23		24		109	TX_A2-	110	RX_A2-
25		26		111	VDD.3.3V	112	+12V
27		28		113	TX_A3+	114	RX_A3+
29		30		115	TX_A3-	116	RX_A3-
31		32		117	VDD.3.3V	118	+12V
33	TX_LCD_SCL_A	34	RX_LCD_SCL_A	119	TX_A4+	120	RX_A4+
35		36		121	TX_A4-	122	RX_A4-
37		38		123	VDD.3.3V	124	+12V
39		40	GND	125	TX_B0+	126	RX_B0+
41	TX_LCD_SDA_A	42	RX_LCD_SDA_A	127	TX_B0-	128	RX_B0-
43	TX_LCD_LVDS_SELA	44	RX_LCD_LVDS_SELA	129	VDD.3.3V	130	+12V
45	VDD.3.3V	46	+12V	131	TX_B1+	132	RX_B1+
47	TX_LCD_ROM_WP_A	48	RX_LCD_ROM_WP_A	133	TX_B1-	134	RX_B1-
49	TX_LCD_VCOM_WP_A	50	RX_LCD_VCOM_WP_A	135	VDD.3.3V	136	+12V
51	VDD.3.3V	52	+12V	137	TX_B2+	138	RX_B2+
53	TX_LCD_DET_SYNC_A	54	RX_LCD_DET_SYNC_A	139	TX_B2-	140	RX_B2-
55	TX_LCD_OS_EN_A	56	RX_LCD_OS_EN_A	141	VDD.3.3V	142	+12V
57	VDD.3.3V	58	+12V	143	TX_B3+	144	RX_B3+
59	TX_LCD_nPE_A	60	RX_LCD_nPE_A	145	TX_B3-	146	RX_B3-
61		62		147	VDD.3.3V	148	+12V
63	VDD.3.3V	64	+12V	149	TX_B4+	150	RX_B4+
65		66		151	TX_B4-	152	RX_B4-
67		68		153	VDD.3.3V	154	+12V
69	VDD.3.3V	70	+12V	155	TX_BCK+	156	RX_BCK+
71		72		157	TX_BCK-	158	RX_BCK-
73		74		159	VDD.3.3V	160	GND
75	VDD.3.3V	76	+12V	161	GND	162	GND
77		78		163	GND	164	GND
79		80		165	GND	166	GND
81	VDD.3.3V	82	+12V	167	GND	168	GND
83		84		169	GND	170	GND
85		86		171	GND	172	GND

## 02. CN2 (HSMC Port B)



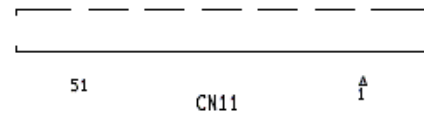
Pin #	Pin name	Pin #	Pin name	Pin #	Pin name	Pin #	Pin name
1		2		87		88	
3		4		89		90	
5		6		91		92	
7		8		93		94	
9		10		95		96	GND
11		12		97		98	GND
13		14		99		100	
15		16		101		102	
17		18		103		104	
19		20		105		106	
21		22		107		108	
23		24		109		110	
25		26		111		112	
27		28		113		114	
29		30		115		116	
31		32		117		118	
33		34		119		120	
35		36		121		122	
37		38		123		124	
39		40	GND	125		126	
41	TX_LCD_SDA_B	42	RX_LCD_SDA_B	127		128	
43	GND	44	GND	129		130	
45		46		131		132	
47	TX_LCD_SCL_B	48	RX_LCD_SCL_B	133		134	
49	GND	50	GND	135		136	
51		52		137		138	
53	TX_LCD_LVDS_SEL_B	54	RX_LCD_LVDS_SEL_B	139		140	
55	GND	56	GND	141		142	
57		58		143		144	
59	TX_LCD_ROM_WP_B	60	RX_LCD_ROM_WP_B	145		146	
61	GND	62	GND	147		148	
63		64		149		150	
65	TX_LCD_VCOM_WP_B	66	RX_LCD_VCOM_WP_B	151		152	
67	GND	68	GND	153		154	
69		70		155		156	GND
71	TX_LCD_DET_SYNC_B	72	RX_LCD_DET_SYNC_B	157		158	GND
73	GND	74	GND	159		160	GND
75		76		161	GND	162	GND
77	TX_LCD_OS_EN_B	78	RX_LCD_OS_EN_B	163	GND	164	GND
79	GND	80	GND	165	GND	166	GND
81		82		167	GND	168	GND
83	TX_LCD_nPE_B	84	RX_LCD_nPE_B	169	GND	170	GND
85	GND	86	GND	171	GND	172	GND

### 03. CN10



Pin #	Pin name	Pin #	Pin name	Pin #	Pin name	Pin #	Pin name
1	+12V	2	+12V	31	GND	32	TX_ACK+
3	+12V	4	+12V	33	TX_ACK-	34	GND
5	+12V	6	GND	35	TX_A2+	36	TX_A2-
7	GND	8	GND	37	TX_A1+	38	TX_A1-
9	GND	10	GND	39	TX_A0+	40	TX_A0-
11	TX_B4+	12	TX_B4-	41	GND	42	TX_LCD_nRE_1
13	TX_B3+	14	TX_B3-	43	TX_LCD_OS_EN_1	44	TX_LCD_DET_SYNC_1
15	GND	16	TX_BCK+	45	TX_LCD_VCOM_WP_1	46	TX_LCD_ROM_WP_1
17	TX_BCK-	18	GND	47	TX_LCD_LVDS_SEL_1	48	N.C.
19	TX_B2+	20	TX_B2-	49	TX_LCD_SCL_1	50	TX_LCD_SDA_1
21	TX_B1+	22	TX_B1-	51	GND	G1	GND
23	TX_B0+	24	TX_B0-	G2	GND	G3	GND
25	GND	26	GND	G4	GND	G5	GND
27	TX_A4+	28	TX_A4-	G6	GND	G7	GND
29	TX_A3+	30	TX_A3-	G8	GND	G9	GND

### 04. CN11



Pin #	Pin name	Pin #	Pin name	Pin #	Pin name	Pin #	Pin name
1	GND	2	RX_LCD_SDA_1	31	RX_B1+	32	RX_B2-
3	RX_LCD_SCL_1	4	N.C.	33	RX_B2+	34	GND
5	RX_LCD_LVDS_SEL_1	6	RX_LCD_ROM_WP_1	35	RX_BCK-	36	RX_BCK+
7	RX_LCD_VCOM_WP_1	8	RX_LCD_DET_SYNC_1	37	GND	38	RX_B3-
9	RX_LCD_OS_EN_1	10	RX_LCD_nRE_1	39	RX_B3+	40	RX_B4-
11	GND	12	RX_A0-	41	RX_B4+	42	GND
13	RX_A0+	14	RX_A1-	43	GND	44	GND
15	RX_A1+	16	RX_A2-	45	GND	46	GND
17	RX_A2+	18	GND	47	+12V	48	+12V
19	RX_ACK-	20	RX_ACK+	49	+12V	50	+12V
21	GND	22	RX_A3-	51	+12V	G1	GND
23	RX_A3+	24	RX_A4-	G2	GND	G3	GND
25	RX_A4+	26	GND	G4	GND	G5	GND
27	GND	28	RX_B0-	G6	GND	G7	GND
29	RX_B0+	30	RX_B1-	G8	GND	G9	GND

### 3.3.2 Switch specifications

Fig. 3-3 shows the layout of the switches.

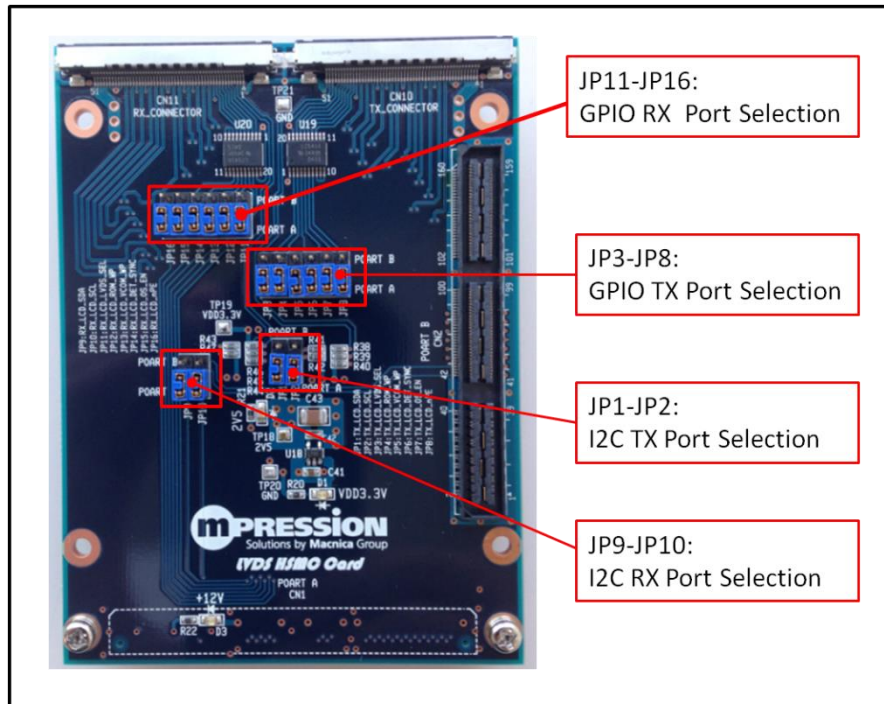


Fig. 3-3. Switch layout

The following shows the function of each switch.

Location	Function name	Default	Function
JP1	TX_LCD_SDA	Port A	Port A: Connection from CN10 to CN1 Port B: Connection from CN10 to CN2
JP2	TX_LCD_SCL	Port A	
JP3	TX_LCD_LVDS_SEL	Port A	
JP4	TX_LCD_ROM_WP	Port A	
JP5	TX_LCD_VCOM_WP	Port A	
JP6	TX_LCD_DET_SYNC	Port A	
JP7	TX_LCD_OS_EN	Port A	
JP8	TX_LCD_nPE	Port A	
JP9	RX_LCD_SDA	Port A	Port A: Connection from CN11 to CN1 Port B: Connection from CN11 to CN2
JP10	RX_LCD_SCL	Port A	
JP11	RX_LCD_LVDS_SEL	Port A	
JP12	RX_LCD_ROM_WP	Port A	
JP13	RX_LCD_VCOM_WP	Port A	
JP14	RX_LCD_DET_SYNC	Port A	
JP15	RX_LCD_OS_EN	Port A	
JP16	RX_LCD_nPE	Port A	

## 4. When Using this Card

### 4.1 Instructions and precautions for use of this Card

The following describes instructions and precautions for use of this Card.

#### 4.1.1 When using HSMC port B

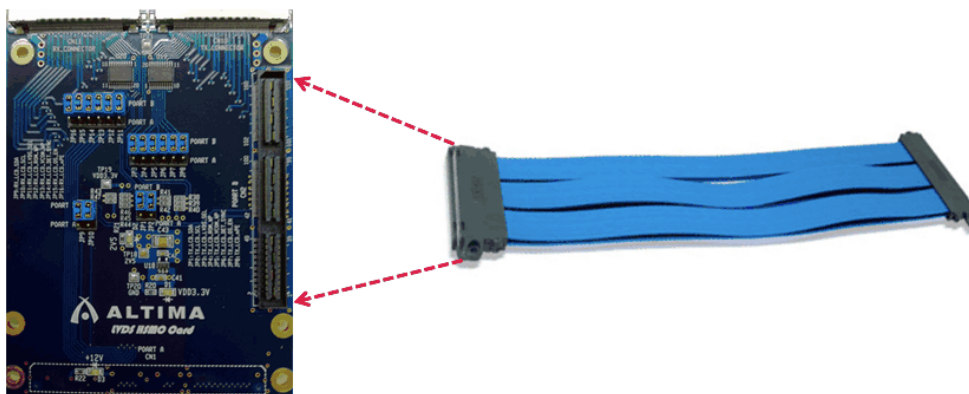
In place-and-route process when using Quartus® II for design with LVDS, depending on the device family, an error may occur causing the following message to appear.

“Error (169079): Pad 174 of non-differential I/O pin '<pin name>' in pin location <pin location> is too close to pad <pad number> of differential I/O pin '<pin name>' in pin location <pin location> -- pads must be separated by a minimum of 4 pads. Use the Pad View of Pin Planner to debug.”

This is because when an LVDS differential pin is placed, no single-ended input pin can be placed within 4 pads and no output pin can be placed within 5 pads from the differential pin. In this case, connect only the pin causing an error to port B. Or, use the Assignment Editor of Quartus II and set the toggle rate of the pin to 0 to prevent this error. For more information, refer to the handbook of the device.

#### 4.1.2 Mounting the HSMC connector

Using HSMC port B requires a Terasic HSMC High Speed Cable to be connected to the pin header (CN2) of this Card.



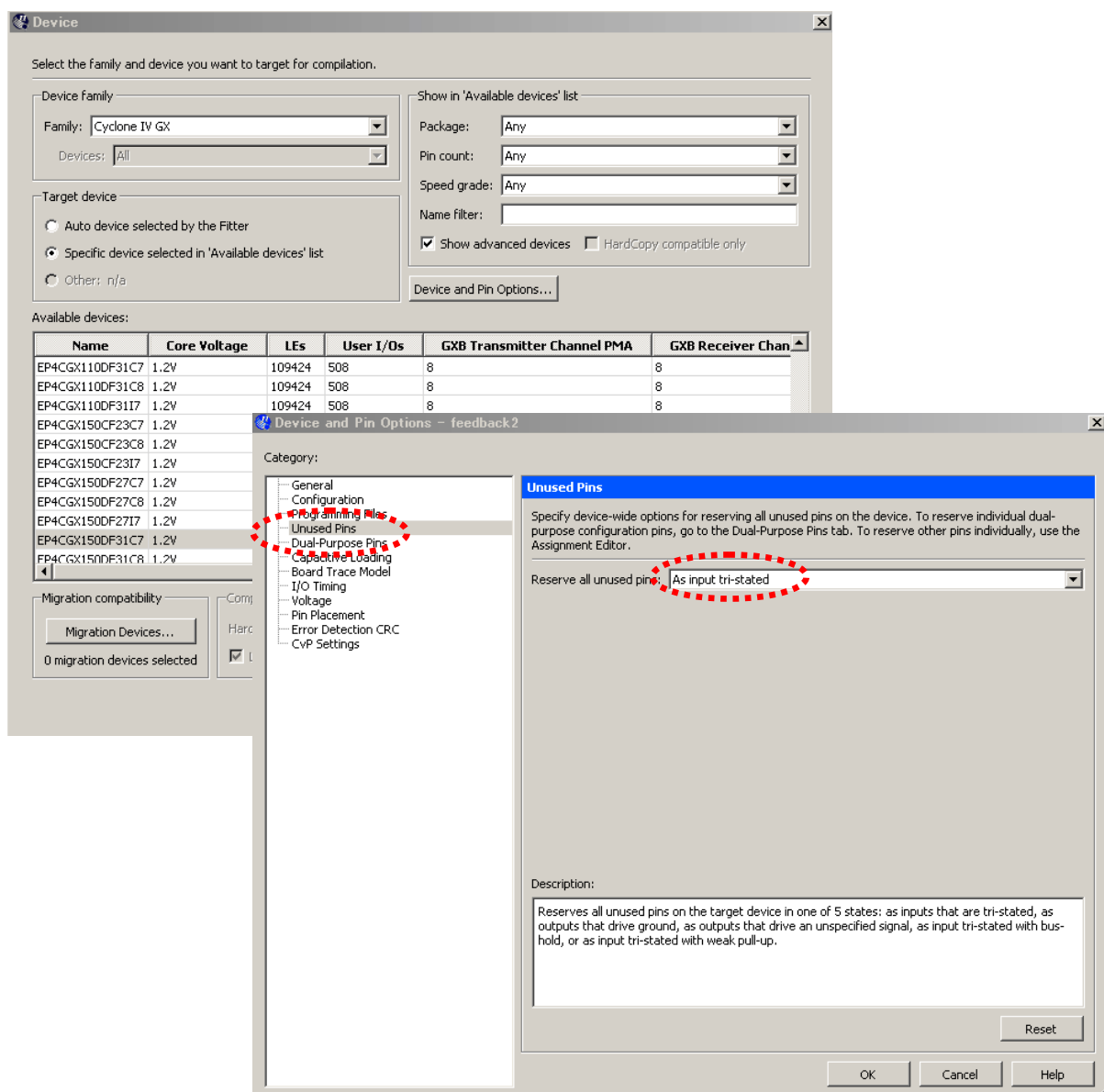
If you need the Terasic HSMC High Speed Cable shown at the URL below, contact our sales personnel.

<http://www.terasic.com.tw/cgi-bin/page/archive.pl?Language=English&CategoryNo=75&No=598>

## 4.2 Mode selection for unused pins

To prevent pins not used in hardware design of FPGA (unused pins) from malfunctioning, we recommend that you select the tri-stated mode for unused pins.

1. Select the **Assignments** menu and then **Device**.
2. Click the [Device & Pin Options] button.  
The Device & Pin Options window appears.
3. In the Category window, select **Unused Pins**.
4. In the **Reserve all unused pins** field, select **As input tri-stated**.
5. Click the [OK] button.
6. Click the [OK] button to close the Device & Pin Options window.



## 5. Document Revision History

Date	Revision	Changes
2014/03/01	1.0	Document released

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Macnica Inc.

Mpression Promotion Department, Strategy & Technology Division

1-6-3 Shin-Yokohama, Kouhoku-ku, Yokohama, 222-8561 JAPAN Website: <http://www.m-pression.com>

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