

# Touch Screen LCD Kit Users Manual

## CARRIER & LCDCARRIER 5.7” or LCDCARRIER 3-5

Copyright ©2009, Future Designs, Inc., All Rights Reserved

***FDI*** ***Future Designs, Inc.***  
*Your Development Partner*  
2702 Triana Boulevard SW, Huntsville, AL 35805

# Table of Contents

1. Introduction	1
2. Functional Description	1
3. ESD Warning	2
4. Requirements	2
5. Board Layout	3
CARRIER BOARD	3
LCDCARRIER (5.7" QVGA Shown)	5
6. Functional Block Diagram	6
7. I/O Connector Descriptions	7
CARRIER	7
DC Power Input – P5	7
Alternate Power Input – J8	7
USB Device – P6	7
USB Host – P1	8
Ethernet – J5	8
CAN/RS485 – P3	9
RS232 – P4	9
External I2C – J6	10
External I2S Audio – J9 (Rev 1 PCB only)	10
External I2S Stereo Audio – J9 & J10 (Rev 2 PCB and later)	10
LCDCARRIER	11
8. On Board Functions	12
CARRIER	12
User I/O Expander – U8	12
Real Time Clock – U10	12
Accelerometer – U9	13
Temperature Sensor – U11	13
Optional WiFi Module – U6 (Rev 2 PCB and later)	13
LCDCARRIER	14
Touch Screen Controller TSC2046 – U2 (Not supported on LCDCARRIER 3-5)	14
Backlight Generator LCDCARRIER 5.7": LT1932 - U1, LCDCARRIER 3-5: LT3591 – U4	14
9. CARRIER Expansion Connector Descriptions	15
J2	15

J3	16
J4	17
10. CARRIER Jumper Details	18
JP1 Real Time Clock Interrupt Enable	18
JP2 3-Axis Accelerometer Interrupt Enable	18
JP3 RS232 DCE<>DTE Configuration (Rev 2 PCB and later)	19
JP4 – JP7 RS485 or CAN Mode Select for P3 (Rev 2 PCB and later)	20
JP8 UART RCV Data Disable – only used for ISP support on DIMM modules (Rev 2 PCB and later)	20
JP9 Optional WiFi Module Interrupt Enable (Rev 2 PCB and later)	20
JP10 Optional WiFi Module Chip Enable (Rev 2 PCB and later)	20
11. SOMDIMM Module Installation	21
12. Mechanical Details	22
CARRIER	22
LDCARRIER	23
13. Software	24
14. Schematics	24
15. Table of Figures	24

Information in this document is provided solely to enable the use of Future Designs products. FDI assumes no liability whatsoever, including infringement of any patent or copyright. FDI reserves the right to make changes to these specifications at any time, without notice. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of Future Designs, Inc. 2702 Triana Blvd, Huntsville, AL 35805

**NOTE:** The inclusion of vendor software products in this kit does not imply an endorsement of the product by Future Designs, Inc.

© 2009 Future Designs, Inc. All rights reserved.

uEZ™ is a registered trademark of Future Designs, Inc.

Microsoft, MS-DOS, Windows, Windows XP, Microsoft Word are registered trademarks of Microsoft Corporation.

Other brand names are trademarks or registered trademarks of their respective owners.

FDI PN: MA00013

Revision: 3, 11/13/2009 8:39:00 AM

Printed in the United States of America

## 1. Introduction

The DK-TS-KIT is optimized to save development time in typical embedded control applications. Its modular format uses a base carrier board, a core CPU DIMM board and an LCD carrier board. The base carrier board includes expansion connectors for added flexibility and a range of configurations.

This manual supports the following DK-TS-KIT part numbers:

- **DK-57TS-LPC2478** 5.7" QVGA Touch Screen LCD Kit for the LPC2478, Toshiba PN: LTA057A344F or equivalent
- **DK-57TS-LPC3250** 5.7" QVGA Touch Screen LCD Kit for the LPC3250, Toshiba PN: LTA057A344F or equivalent
- **DK-57VTS-LPC2478** 5.7" VGA Touch Screen LCD Kit for the LPC2478, Okaya PN: RV640480T-5X7WP or equivalent
- **DK-35TS-LPC2478** 3.5" QVGA Touch Screen LCD Kit for the LPC2478, Okaya PN: RH320240T-3X5WP-A or equivalent
- **DK-57VTS-LPC3250** 5.7" VGA Touch Screen LCD Kit for the LPC3250, Okaya PN: RV640480T-5X7WP or equivalent

## 2. Functional Description

### CARRIER

- 200 pin SO-DIMM Socket
- RS232 Serial Port (Male DB9)
- CAN Port (Male DB9) – alternate with RS485
- RS485 Full Duplex (Male DB9) – alternate with CAN
- 10/100 Ethernet Connector
- Optional 802.11 b/g WiFi Module
- USB Type-A Host Connector
- USB Mini-B Device Connector
- LM75 Temperature Sensor
- 3-axis Accelerometer
- Real-time Clock with Super-Cap Backup
- Four User Pushbuttons
- Four User LEDs
- Speaker
- External I2C Connector (Optional)
- Reset Button

### LDCARRIER

- 5.7" Active TFT QVGA LCD (320x240) mounted to LDCARRIER 5.7 Board  
Or
- 5.7" Active TFT VGA LCD (640x480) mounted to LDCARRIER 3-5 Board
- 5.7" Active TFT QVGA LCD (320x240) mounted to LDCARRIER 3-5 Board
- 3.5" Active TFT QVGA LCD (320x240) mounted to LDCARRIER 3-5 Board
- Touch Screen
- LED Backlight

### **3. ESD Warning**

The DK-TS-KIT is shipped in a protective anti-static package. The Kit must not be subjected to high electrostatic potentials. Damage may occur to the Kit that will not be covered under warranty. General practice for working with static sensitive devices should be followed when working with the DK-TS-KIT.

### **4. Requirements**

The DK-TS-KIT comes with all necessary cables to begin development right away. The Kit includes a Type-A to Mini-B USB cable, a CAT5 Ethernet cable, a 5.0VDC, 2A, AC Wall Adapter and either the Segger JTAG Debugger or a USB-ICP-LPC2K mini ISP programmer. A PC will be required to install the development tools to program the SOMDIMMs. The DK-TS-KIT will be powered using the 5VDC AC Wall Adapter included in the kit and may be plugged into any standard 110VAC wall socket. An available Ethernet network will be needed for using the Ethernet connection on the CARRIER and a free USB port will be needed for using the available USB connections.

**CAUTION: DO NOT POWER THE DK-TS-KIT WITH ANY OTHER POWER THAN 5VDC. USE OF ANY OTHER ADAPTER MAY DAMAGE THE BOARD AND VOID THE WARRANTY.**

# 5. Board Layout

## CARRIER BOARD

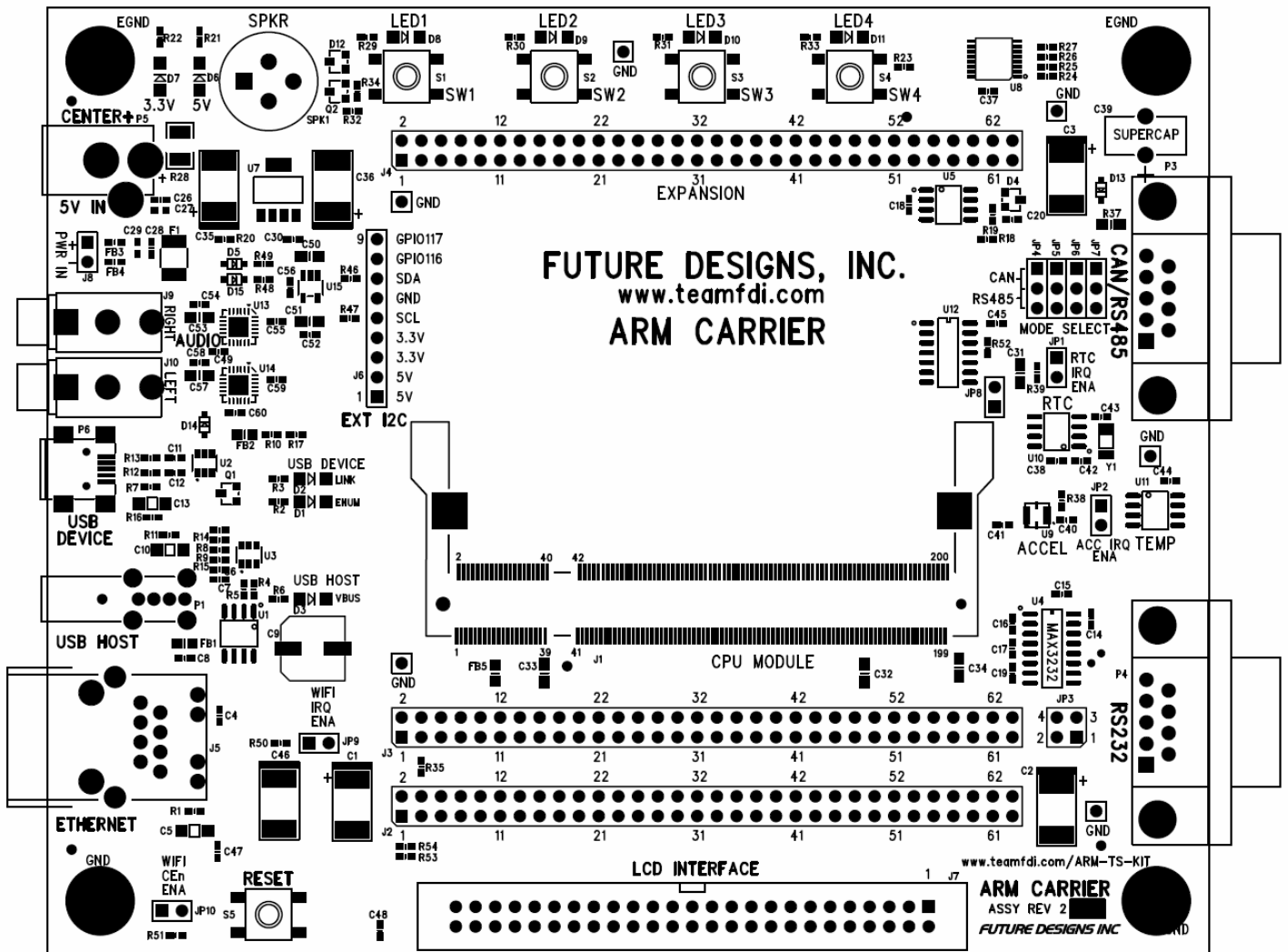


Figure 1 – CARRIER Top Side  
(Rev 2 Shown)

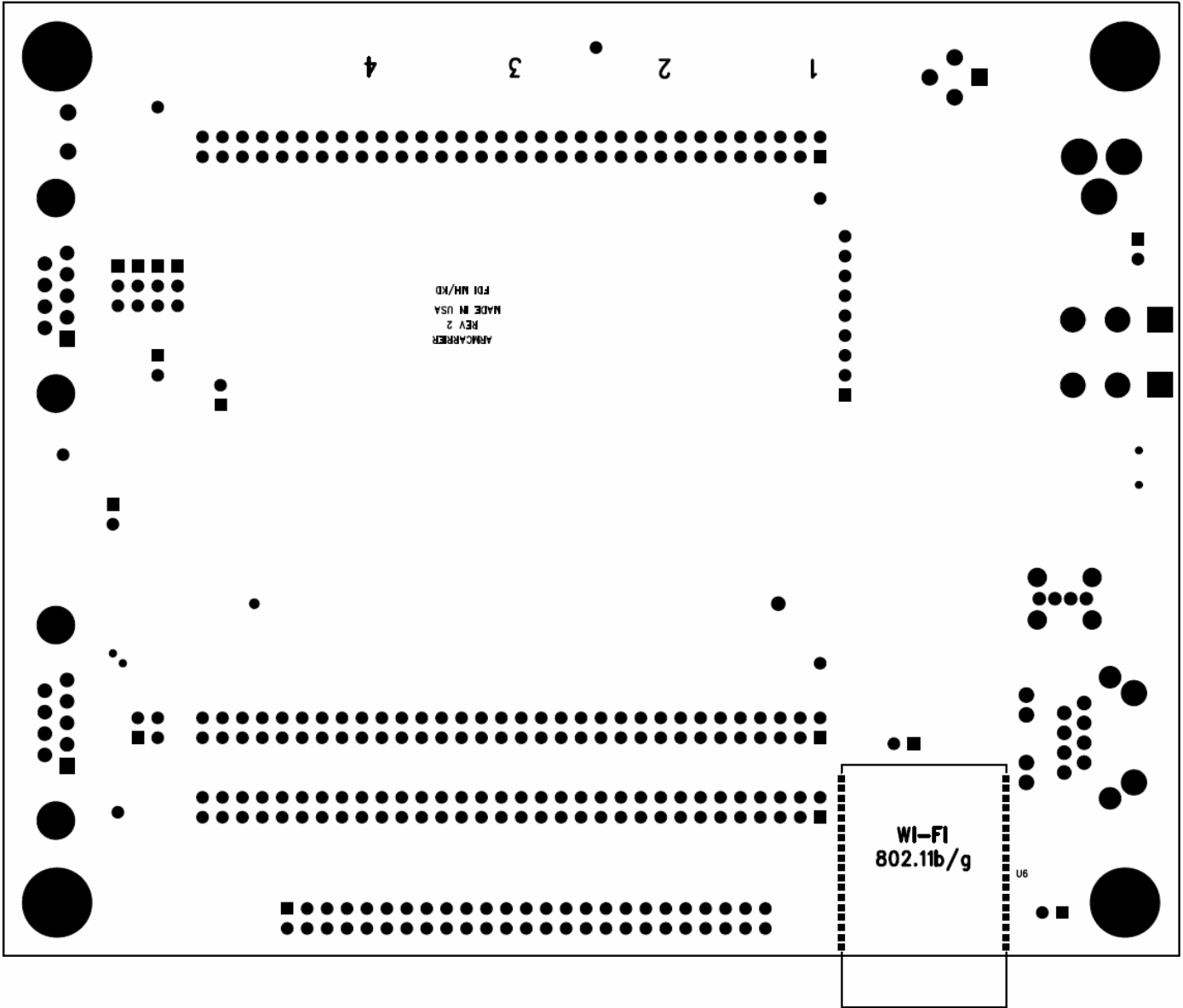


Figure 2 – CARRIER Bottom Side  
 (Rev 2 Shown)

LDCARRIER (5.7" QVGA Shown)

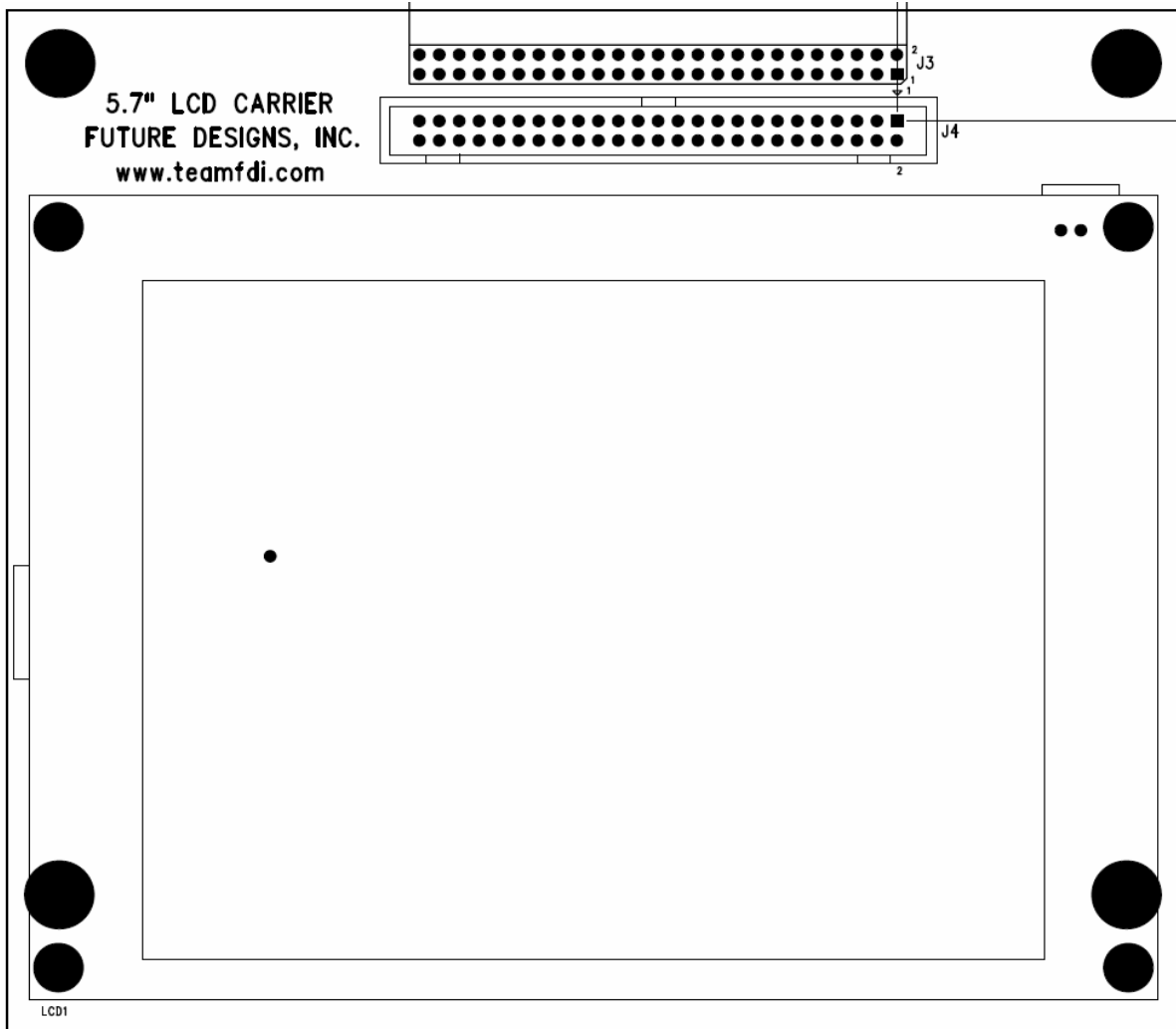


Figure 3 – LDCARRIER Top Side

Note: The LDCARRIER 3-5 Board is identical from the top side but also supports optional 3.5" or 5.7" LCDs from several vendors.



## 6. Functional Block Diagram

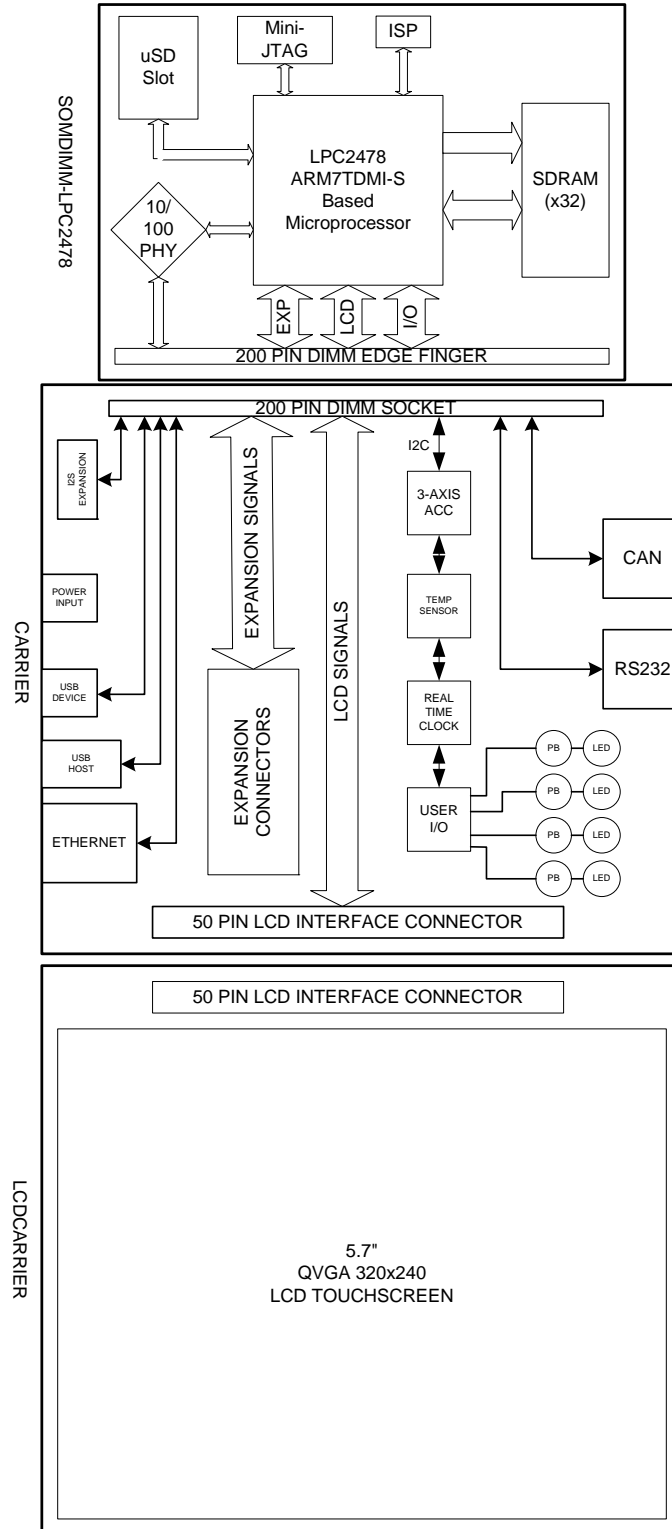


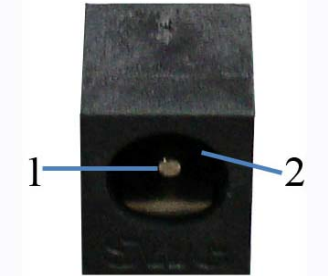
Figure 4 – DK-TS-KIT System Block Diagram (LPC2478 Shown)

## 7. I/O Connector Descriptions

### CARRIER

#### DC Power Input - P5

The Touch Screen Kit utilizes a 5VDC 2.3A Power Supply. The connector is 2.1mm with center positive.

	Pin Number	Description
	1	5VDC, +/- 10%, 2.0A (min)
	2	Power Supply Ground

#### Alternate Power Input - J8

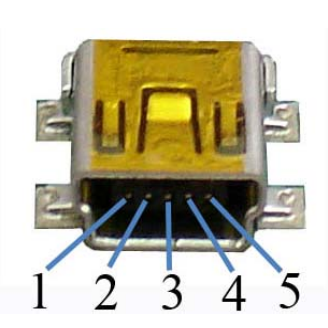
The CARRIER Board includes an optional alternate power input connector, J8. This connector provides an optional input connection for the on-board DC-DC regulator.

Pin Number	Description
1	5VDC, +/- 10%, 2.0A (min)
2	Power Supply Ground

#### USB Device - P6

The CARRIER Board includes one USB Device Interface allowing the unit to be connected to a USB Host, such as a PC. Through this connection, the CARRIER represents a peripheral to the USB Host. The operational mode of the port is dependent on the software utilized (i.e. Mass Storage or Human-Interface).

The CARRIER Board may also be powered via the USB Device connector. Care must be taken to not overload the USB Host since 500mA is the maximum current allowable via USB. The LCD Backlight may be disabled or the brightness dimmed to facilitate this USB Powered mode. When D1 is on it indicates a "good link" on the USB Device port. When D2 is on it indicates that the USB Device port is enabled. D2 will also blink during re-enumeration.

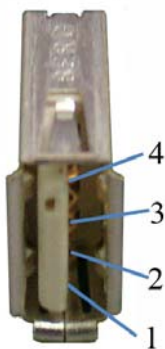
	Pin Number	Description
	1	USB 5V
	2	D-
	3	D+
	4	NC
	5	Signal Ground

## USB Host - P1

The CARRIER Board includes one USB Host Port allowing the unit to interface to various USB peripherals such as a USB Flash Drive (Thumb Drive). The operational mode of this port is dependent on the software utilized (i.e. driver support)

Please refer to the specific details of the processor module being utilized for support of the USB Host function.

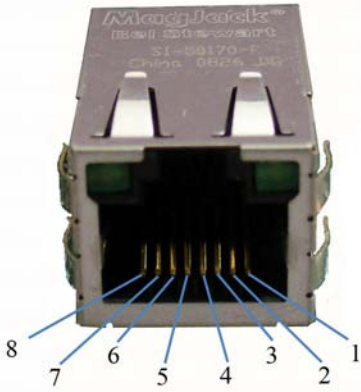
D3 indicates VBUS power is good for the USB Host port.

	Pin Number	Description
	1	USB VBus
	2	D-
	3	D+
	4	Signal Ground

## Ethernet - J5

The CARRIER Board includes one 10/100 Ethernet Port to interface to a local area network via CAT5 cable.

Please refer to the specific details of the processor module being utilized for support of the Ethernet Port function.

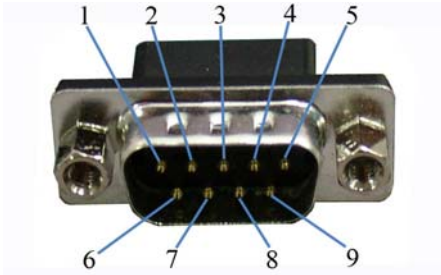
	Pin Number	Description
	1	Tx+
	2	3.3V
	3	Tx-
	4	Rx+
	5	3.3V
	6	Rx-
	7	No Connect
8	Signal Ground	

### CAN/RS485 - P3

The CARRIER Board includes one Male DB9 Interface Connector that supports either CAN or RS485 (Rev 2 and later) depending on the configuration of jumpers JP4 – JP7. The CAN interface utilizes an NXP TJA1040TD high speed transceiver IC to provide fully ISO 11898 standard interface at up to 1MBaud. The TJA1040 allows up to 110 nodes and very low electromagnetic emissions.

Note: Rev 1 PCB only supports CAN on P3

Please refer to the specific details of the processor module being utilized for support of the CAN interface function.

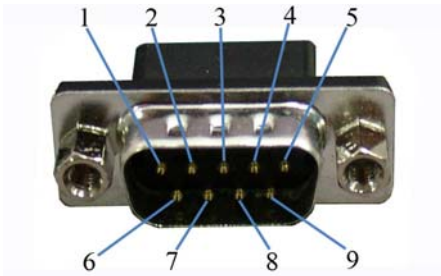
	Pin Number	CAN Mode	RS485 Mode (Rev 2 and later only)
	1	No Connect	No Connect
2	CANL	485_RDB-	
3	Signal Ground	485_TDA+	
4	Signal Ground	Signal Ground	
5	Signal Ground	Signal Ground	
6	Signal Ground	Signal Ground	
7	CANH	485_RDA+	
8	No Connect	485_TDB-	
9	5V	No Connect	

### RS232 - P4

The CARRIER Board includes one RS232 Serial Port Connector. This connector is a Male DB9 configured as either DCE or DTE (Rev 2 and later only) depending on the configuration of jumper block JP3. The interface includes optional RTS & CTS handshaking signals that are brought to test points that the user may connect as needed (see page 5 of the schematic). Please verify proper connectivity of this connector to the proper TXD<>RXD orientation. TXD is an OUTPUT from the CARRIER Board and RXD is an INPUT to the CARRIER Board.

Note: Rev 1 PCB only supports DCE on P4

Please refer to the specific details of the processor module being utilized for support of the RS232 Serial Port function.

	Pin Number	DCE Mode	DTE Mode (Rev 2 and later only)
	1	No Connect	No Connect
2	TXD (Output)	RXD (Input)	
3	RXD (Input)	TXD (Output)	
4	No Connect	No Connect	
5	Signal Ground	Signal Ground	
6	No Connect	No Connect	
7	(OPT) RTS	(OPT) RTS	
8	(OPT) CTS	(OPT) CTS	
9	No Connect	No Connect	

## External I2C - J6

The CARRIER board provides an external I2C connector for users to connect to the I2C bus of the microprocessor.

CARRIER Rev 1

Pin Number	Description
1	3.3V
2	Signal Ground
3	GPIO67_ESCL
4	GPIO66_ESDA

CARRIER Rev 2 and later

Pin Number	Description
1	5V
2	5V
3	3.3V
4	3.3V
5	GPIO75_SCL
6	Signal Ground
7	GPIO74_SDA
8	GPIO116
9	GPIO117

Please refer to the specific details of the processor module for connectivity details.

## External I2S Audio - J9 (Rev 1 PCB only)

The Rev 1 CARRIER board provides an external I2S Audio Expansion Connector.

Please refer to the specific details of the processor module for connectivity details.

Description	Pin	Pin	Description
3.3V	1	2	Signal Ground
GPIO51_I2SRX_CLK	3	4	GPIO52_I2SRX_WS
5.0V	5	6	GPIO53_I2SRX_SDA
GPIO54_I2STX_CLK	7	8	GPIO55_I2STX_WS
Signal Ground	9	10	GPIO56_I2STX_SDA

## External I2S Stereo Audio - J9 & J10 (Rev 2 PCB and later)

The I2S audio circuitry is not currently loaded and thus not supported at this time.

## LDCARRIER

J4 – Male 25x2 Header for Ribbon Cable connection to CARRIER Board (Default)

J3 – Female 25x2 Right Angle Socket for Board-to-Board Straight Connection to CARRIER Board (Optional)

Pin	Signal Name	SOMDIMM Connection	Pin	Signal Name	SOMDIMM Connection
1	GND	Signal Ground	2	GND	Signal Ground
3	LCD_TS_XL	GPIO72	4	LCD_TS_YD	GPIO73
5	LCDVD2	GPIO127	6	LCD_R1	GPIO128
7	LCD_R2	GPIO31	8	LCD_R3	GPIO32
9	LCD_R4	GPIO33	10	LCD_R5	GPIO34
11	GND	Signal Ground	12	GND	Signal Ground
13	SCL <sup>(1)</sup>	I2C Clock	14	SDA <sup>(1)</sup>	I2C Data
15	LCD_G0	GPIO88	16	LCD_G1	GPIO89
17	LCD_G2	GPIO90	18	LCD_G3	GPIO91
19	LCD_G4	GPIO92	20	LCD_G5	GPIO93
21	GND	Signal Ground	22	GND	Signal Ground
23	NC	No connect	24	NC	No connect
25	LCDVD18	GPIO45	26	LCD_B1	GPIO46
27	LCD_B2	GPIO94	28	LCD_B3	GPIO95
29	LCD_B4	GPIO96	30	LCD_B5	GPIO97
31	GND	Signal Ground	32	GND	Signal Ground
33	LCDPWR	GPIO25	34	LCDLE	GPIO26
35	LCD_VSYNC	GPIO28	36	LCDENAB	GPIO29
37	LCD_HSYN	GPIO30	38	LCDDCLK	GPIO27
39	GND	Signal Ground	40	KEY	No connect
41	3.3V	3.3V Power Supply	42	5.0V	5.0V Power Supply
43	EXT_SCK	GPIO62	44	EXT_MOSI	GPIO65
45	EXT_MISO	GPIO64	46	LCD_TS_YU	GPIO71
47	LCD_TS_XR	GPIO70	48	LCD_SPI_CS	GPIO36 <sup>(2)</sup>
49	EXT_IRQ	GPIO69	50	LED_BR	GPIO86

(1) No Connect on LDCARRIER 5.7" Rev 2 assembly

(2) Rev 2 CARRIER Only

Note: GPIOxx references the pin number of the DIMM socket, ex: GPIO45 is connected to pin 45 of the DIMM socket.

## 8. On Board Functions

### CARRIER

#### User I/O Expander – U8

User Input/Output functions are provided by an NXP PCA9551. The PCA9551 LED blinker blinks LEDs in I2C-bus and SMBus applications where it is necessary to limit bus traffic or free up the I2C-bus master's CPU timer. The uniqueness of this device is the internal oscillator with two programmable blink rates. The PCA9551 LED blinker requires only the initial set-up command to program BLINK RATE 1 and BLINK RATE 2 (i.e., the frequency and duty cycle) for each individual output. From then on, only one command from the bus master is required to turn each individual open-drain output on, off, or to cycle at BLINK RATE 1 or BLINK RATE 2. Any bits not used for controlling the LEDs can be used for General Purpose parallel Input/Output (GPIO) expansion. The active LOW hardware reset pin (RESET) and Power-On Reset (POR) initializes the registers to their default state, all zeroes, causing the bits to be set HIGH (LED off).

#### Pushbuttons

There are four pushbuttons for general purpose user input; SW1, SW2, SW3, & SW4. These pushbuttons are connected to the PCA9551 signals LED0 – LED3 respectively.

#### LEDs

There are four LEDs for program status output to the user; LED1, LED2, LED3, LED4. These LEDs are connected to the PCA9551 signals LED4 – LED7 respectively.

#### **PCA9551 Device I2C Address = 0xC0**

For detailed information, please refer to the specific data sheet for this device available from the manufacturer.

#### Real Time Clock – U10

The CARRIER Board provides a low power Real Time Clock IC, an NXP PCF8563. This device is backed up by a 0.33F Super-Cap. At a typical standby current of 250 nA, the Super-Cap may provide backup power for up to 660 hours to the PCF8563 (at room temperature). The PCF8563 contains sixteen 8-bit registers with an auto-incrementing address register, an on-chip 32.768 kHz oscillator with one integrated capacitor, a frequency divider which provides the source clock for the Real-Time Clock/calendar (RTC), a programmable clock output, a timer, an alarm, a voltage-low detector and a 400 kHz I2C-bus interface.

#### **PCF8563 Device I2C Address = 0xA2**

For detailed information, please refer to the specific data sheet for this device available from the manufacturer.

### Accelerometer - U9

The CARRIER Board provides a 3-axis Digital Accelerometer from Bosch, BMA150. Offering many smart functional features, the BMA150 is aimed for consumer market applications. It allows measurement of accelerations in 3 perpendicular axes. An internal evaluation circuit converts the output of a three-channel micromechanical acceleration sensing structure that works according to the differential capacitance principle.

**BMA150 Device I2C Address = 0x70**

For detailed information, please refer to the specific data sheet for this device available from the manufacturer.

### Temperature Sensor - U11

The CARRIER Board provides a Digital Temperature sensor from NXP, LM75A. The LM75A uses the on-chip band gap sensor to measure the device temperature with the resolution of 0.125 °C and stores the 11-bit 2's complement digital data, resulted from 11-bit A-to-D conversion, into the device Temp register. This Temp register can be read at any time by a controller on the I2C-bus. Reading temperature data does not affect the conversion in progress during the read operation. The LM75A has an accuracy of  $\pm 2^{\circ}$  C at  $-25^{\circ}$  C to  $+100^{\circ}$  C.

**LM75 Device I2C Address = 0x92**

For detailed information, please refer to the specific data sheet for this device available from the manufacturer.

### Optional WiFi Module - U6 (Rev 2 PCB and later)

The CARRIER Board optionally provides WiFi connectivity capability via the WiFi Module from Zero-G, PN: ZG2100MC. The WiFi module is optional and may not be loaded on all kit configurations but can be purchased and added by the customer if desired. The WiFi module is connected to the SPI Bus and requires the use of an interrupt output for proper operation. The interrupt is shared with the Real Time Clock. For specific details on the WiFi module, please refer to the specific data sheet for this device available from the manufacturer.



## LDCARRIER

### Touch Screen Controller TSC2046 – U2 (Not supported on LDCARRIER 3-5)

The LDCARRIER 5.7” Rev 2 includes an optional TSC2046 Touch Screen Controller IC for a SPI-based touch screen application. This IC is not normally needed and is not loaded since the default touch screen interface is implemented by using discrete signals to the ARM® CPU. If the user desires to populate this device and use the SPI-bus to facilitate the touch screen interface, refer to the schematic for details on the changes required.

The LDCARRIER 3-5 Rev 1 does not include the optional TSC2046 Touch Screen Controller IC. For detailed information, please refer to the specific data sheet for this device available from the manufacturer.

### Backlight Generator LDCARRIER 5.7”: LT1932 - U1, LDCARRIER 3-5: LT3591 – U4

The LDCARRIER 5.7” utilizes a Linear Tech LT1932 constant current backlight driver IC to generate the required voltage and current for the LED backlight of the LCD Graphics Module. The LDCARRIER 3-5 utilizes a Linear Tech LT3591. The backlight circuit supports PWM brightness control via the ‘LED\_BR’ signal that is connected to the microprocessor SOMDIMM. On the QVGA model, there is also an optional ‘ON/OFF’ control via the ‘LCDPWR’ signal. Refer to the microprocessor module user’s manual for specific connectivity of these signals.

For detailed information, please refer to the specific data sheet for this device available from the manufacturer.

## 9. CARRIER Expansion Connector Descriptions

### J2

Pin	Name	Details	Pin	Name	Details
1	GND	GROUND	2	3V3	3.3V
3	GND	GROUND	4	3V3	3.3V
5	RESET_IN	RESET INPUT TO POR	6	RESET_OUT	RESET OUTPUT FROM POR
7	3.3VA	ADC VDD	8	VSSA	ANALOG GROUND (ADC)
9	VREF	ADC REFERENCE VOLTAGE	10	NC	
11	GPIO57_TXD	SERIAL TRANSMIST DATA	12	GPIO58_RXD	SERIAL RECEIVE DATA
13	GPIO59_USBH_VBUS	USB HOST VBUS SENSE	14	GPIO60_USBD_UPLD	USB DEVICE UP LED
15	GPIO65_MOSI	SPI MOSI	16	GPIO67_ESCL	EXTERNAL I <sup>2</sup> C CLK
17	GPIO69_TPIRQ	TOUCH PANEL IRQ	18	GPIO71_AD0.1	ADC0 BIT 1
19	GPIO73_AD0.3	ADC0 BIT 3	20	NC	
21	GPIO79		22	GPIO81	
23	GPIO83		24	GPIO85	
25	GPIO87_USBH_PPWR	USB HOST PORT PWR	26	GPIO89_LCDVD11	LCD VIDEO BIT 11
27	GPIO91_LCDVD13	LCD VIDEO BIT 13	28	GPIO93_LCDVD15	LCD VIDEO BIT 15
29	GPIO132		30	GPIO134	
31	GPIO136		32	GPIO138	
33	GPIO140		34	GPIO142	
35	GPIO144		36	GPIO146	
37	GPIO148		38	GPIO150	
39	GPIO152		40	GPIO154	
41	GPIO156		42	GPIO158	
43	GPIO160		44	GPIO162	
45	GPIO168		46	GPIO170	
47	GPIO172		48	GPIO174	
49	GPIO176		50	GPIO178	
51	GPIO180		52	GPIO182	
53	GPIO184		54	GPIO186	
55	GPIO188		56	GPIO190	
57	GPIO192		58	GPIO194	
59	GPIO196		60	GPIO198	
61	GND	GROUND	62	3V3	3.3V
63	GND	GROUND	64	3V3	3.3V

Note: GPIOxx references the pin number of the DIMM socket, ex: GPIO45 is connected to pin 45 of the DIMM socket.

### J3

Pin	Name	Details	Pin	Name	Details
1	GND	GROUND	2	3V3	3.3V
3	GND	GROUND	4	3V3	3.3V
5	GPIO25_LCDPWR	LCD PANEL POWER ENABLE	6	GPIO26_LCDLE	LCD LINE END
7	GPIO27_LCDCLK	LCD PANEL CLK	8	GPIO28_LCDFP	LCD VERT SYNC
9	GPIO29_LCDENAB	LCD DATA ENABLE OUTPUT	10	GPIO30_LCDLP	LCD HORZ SYNC
11	GPIO31_LCDVD4	LCD VIDEO BIT 4	12	GPIO32_LCDVD5	LCD VIDEO BIT 5
13	GPIO33_LCDVD6	LCD VIDEO BIT 6	14	GPIO34_LCDVD7	LCD VIDEO BIT 7
15	GPIO53_I2SRX_SDA	I <sup>2</sup> S RECEIVE DATA	16	GPIO55_I2STX_WS	I <sup>2</sup> S TRANSMIT WORD SELECT
17	GPIO61_USBD_CON	USB DEVICE CONNECT CNTRL	18	GPIO63_TPCS	SPI SLAVE SELECT
19	GPIO95_LCDVD21	LCD VIDEO BIT 21	20	GPIO97_LCDVD23	LCD VIDEO BIT 23
21	GPIO99_AD0.5	ADC0 BIT 5	22	NC	
23	NC		24	NC	
25	NC		26	NC	
27	GPIO131		28	GPIO133	
29	GPIO135		30	GPIO137	
31	GPIO139		32	GPIO141	
33	GPIO143		34	GPIO145	
35	GPIO147		36	GPIO149	
37	GPIO151		38	GPIO153	
39	GPIO155		40	GPIO157	
41	GPIO159		42	GPIO161	
43	NC		44	NC	
45	GPIO167		46	GPIO169	
47	GPIO171		48	GPIO173	
49	GPIO175		50	GPIO177	
51	GPIO179		52	GPIO181	
53	GPIO183		54	GPIO185	
55	GPIO187		56	GPIO189	
57	GPIO191		58	GPIO193	
59	GPIO195		60	GPIO197	
61	GND	GROUND	62	3V3	3.3V
63	GND	GROUND	64	3V3	3.3V

Note: GPIOxx references the pin number of the DIMM socket, ex: GPIO45 is connected to pin 45 of the DIMM socket.

J4

Pin	Name	Details	Pin	Name	Details
1	GND	GROUND	2	3V3	3.3V
3	GND	GROUND	4	3V3	3.3V
5	VBAT_IN	RTC POWER SUPPLY	6	ALARM	RTC ALARM
7	GPIO35		8	GPIO36	
9	GPIO45_LCDVD18	LCD VIDEO BIT 18	10	GPIO46_LCDVD19	LCD VIDEO BIT 19
11	GPIO47_RD	CAN1 RECEIVER INPUT	12	GPIO48_TD	CAN1 TRANSMIT OUTPUT
13	GPIO49		14	GPIO50	
15	GPIO51_I2SRX_CLK	I <sup>2</sup> S RECEIVE CLK	16	GPIO52_I2SRX_WS	I <sup>2</sup> S RECEIVE WORD SELECT
17	GPIO54_I2STX_CLK	I <sup>2</sup> S TRANSMIT CLK	18	GPIO56_I2STX_SDA	I <sup>2</sup> S TRANSMIT DATA
19	GPIO62_SCK	SPI CLK	20	GPIO64_MISO	SPI MISO
21	GPIO66_ESDA	EXTERNAL I <sup>2</sup> C DATA	22	GPIO68_USBH_OVC	USB HOST OVER CURR
23	GPIO70_AD0.0	ADC0 BIT 0	24	GPIO72_AD0.2	ADC0 BIT 2
25	GPIO74_SDA	I <sup>2</sup> C DATA	26	GPIO75_SCL	I <sup>2</sup> C CLK
27	GPIO78_ACC_IRQ	ACC IRQ	28	GPIO80_RTC_IRQ	RTC IRQ
29	GPIO82		30	GPIO84	
31	GPIO86_LED_BR	LED BACKLIGHT	32	GPIO88_LCDVD10	LCD VIDEO BIT 10
33	GPIO90_LCDVD12	LCD VIDEO BIT 12	34	GPIO92_LCDVD14	LCD VIDEO BIT 14
35	GPIO94_LCDVD20	LCD VIDEO BIT 20	36	GPIO96_LCDVD22	LCD VIDEO BIT 22
37	GPIO98_USBD_PWRD	USB DEVICE PORT PWR	38	GPIO100	
39	NC		40	5V0	5.0V
41	NC		42	5V0	5.0V
43	NC		44	NC	
45	GPIO116		46	GPIO118	
47	GPIO120		48	GPIO122	
49	GPIO124		50	GPIO126	
51	GPIO128_LCDVD3	LCD VIDEO BIT 3	52	NC	
53	GPIO115		54	GPIO117	
55	GPIO119		56	GPIO121	
57	GPIO123_MAT3.0	SPEAKER	58	GPIO125	
59	GPIO127_LCDVD2	LCD VIDEO BIT 2	60	NC	
61	GND	GROUND	62	3V3	3.3V
63	GND	GROUND	64	3V3	3.3V

Note: GPIOxx references the pin number of the DIMM socket, ex: GPIO45 is connected to pin 45 of the DIMM socket.

## 10. CARRIER Jumper Details

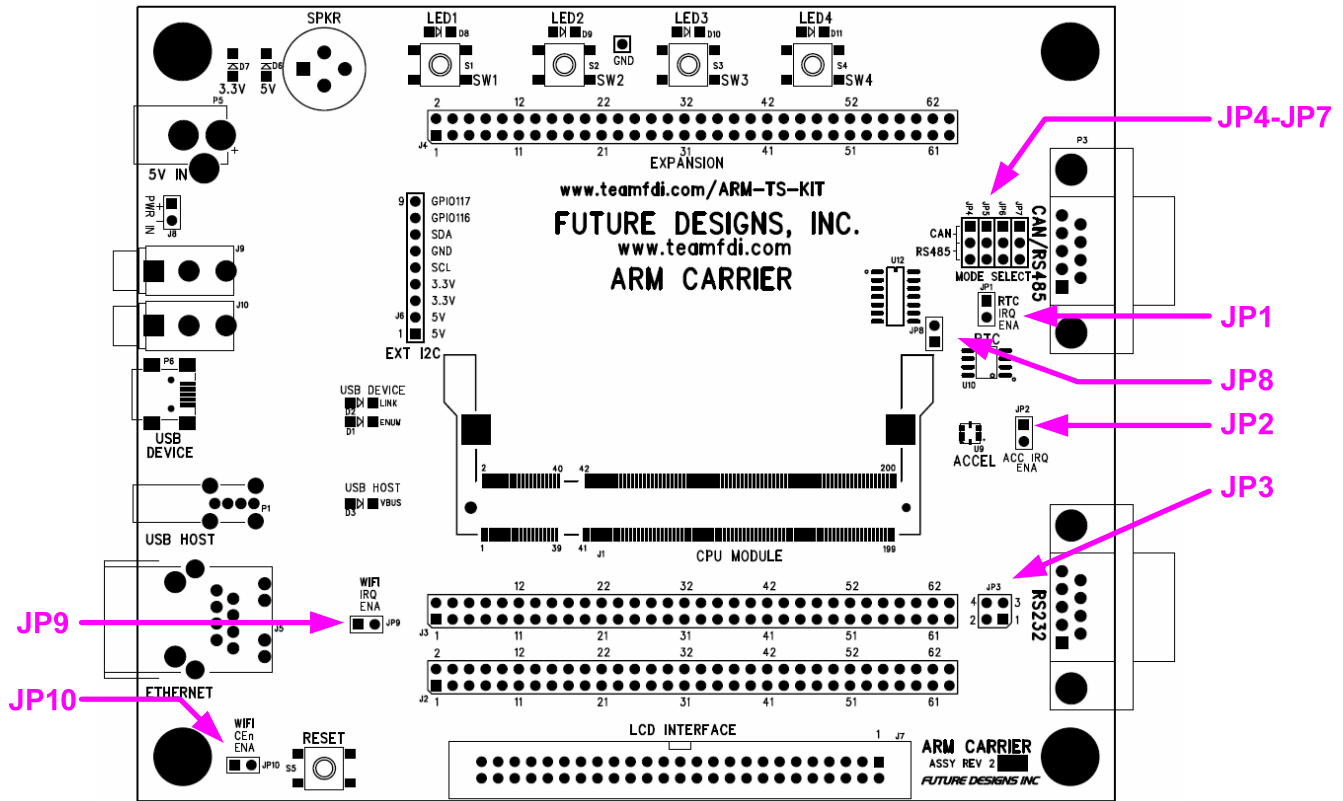


Figure 5 – Jumper Locations  
(Rev 2 PCB shown)

### JP1 Real Time Clock Interrupt Enable

JP1 enables the interrupt output from the PCF8563 connected to GPIO80\_RTC\_IRQ. Refer to the specific details for the processor module to determine the location this signal is connected. The default for this jumper is shorted in artwork. To disable this function, the trace must be cut and a 2-pin jumper installed to re-enable.

For functional information on the interrupt capability of the PCF8563, please refer to the data sheet for the Real Time Clock.

### JP2 3-Axis Accelerometer Interrupt Enable

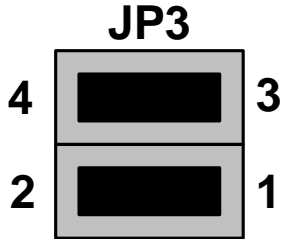
JP2 enables the interrupt out from the 3-Axis Accelerometer SMA150 connected to GPIO78\_ACC\_IRQ. Refer to the specific details for the processor module to determine the location this signal is connected. The default for this jumper is shorted in artwork. To disable this function, the trace must be cut and a 2-pin jumper installed to re-enable.

For functional information on the interrupt capability of the SMA150, please refer to the data sheet for the Bosch Accelerometer.

## JP3 RS232 DCE<>DTE Configuration (Rev 2 PCB and later)

JP3 allows the on-board RS232 port (P4) to be configured as either DCE or DTE by loading the jumpers either horizontally or vertically.

### DCE MODE



### DTE MODE

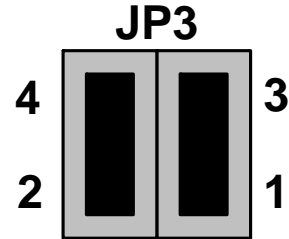


Figure 6 – JP3 Illustration

P4 PINOUT DETAILS		
Pin	DCE Mode	DTE Mode
1	NO CONNECT	NO CONNECT
2	TXD OUTPUT	RXD INPUT
3	RXD INPUT	TXD OUTPUT
4	NO CONNECT	NO CONNECT
5	SIGNAL GROUND	SIGNAL GROUND
6	NO CONNECT	NO CONNECT
7	OPTIONAL RTS (DTE MODE ONLY)	OPTIONAL RTS (DTE MODE ONLY)
8	OPTIONAL CTS (DTE MODE ONLY)	OPTIONAL CTS (DTE MODE ONLY)
9	NO CONNECT	NO CONNECT

## JP4 – JP7 RS485 or CAN Mode Select for P3 (Rev 2 PCB and later)

JP4 through JP7 allow the selection of either CAN or RS485 functionality for the Male DB9 Connector P3.

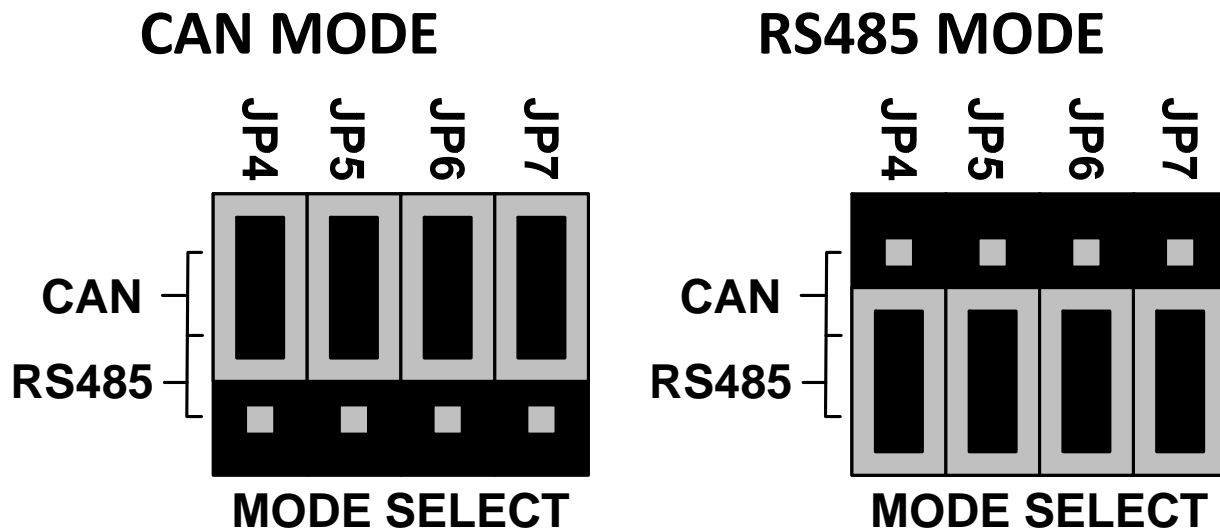


Figure 7 – JP4 to JP7 Illustration

## JP8 UART RCV Data Disable – only used for ISP support on DIMM modules (Rev 2 PCB and later)

JP8 allows the user to disable the UART receive data on the RS485 port (P3) for microprocessors that support ISP programming via the ISP header (J1) on the DIMM module. The default for this jumper is shorted in artwork. To disable this function, the trace must be cut and then a 2-pin jumper installed to re-enable data after ISP. Please refer to the specific documentation for the module/processor being utilized to determine if ISP is supported.

## JP9 Optional WiFi Module Interrupt Enable (Rev 2 PCB and later)

JP9 enables the interrupt output from the WiFi Module ZG2100MC connected to GPIO80\_RTC\_IRQ. Refer to the specific details for the processor module to determine the location this signal is connected. The default for this jumper is shorted in artwork. To disable this function, the trace must be cut and a 2-pin jumper installed to re-enable.

For functional information on the interrupt capability of the WiFi module ZG2100MC, please refer to the data sheet.

## JP10 Optional WiFi Module Chip Enable (Rev 2 PCB and later)

JP10 enables the chip enable input to the WiFi Module ZG2100MC. The default for this jumper is shorted in artwork. To disable this function, the trace must be cut and a 2-pin jumper installed to re-enable.

For functional information on the chip enable capability of the WiFi module ZG2100MC, please refer to the data sheet.

## 11. SOMDIMM Module Installation

The SOMDIMM should be inserted into the DIMM Socket as shown below and then locked into place by pushing down to the Carrier Board. Ensure the SOMDIMM is inserted completely into the socket prior to locking. The socket utilized on the CARRIER Board is rated for a minimum of 25 insertions.

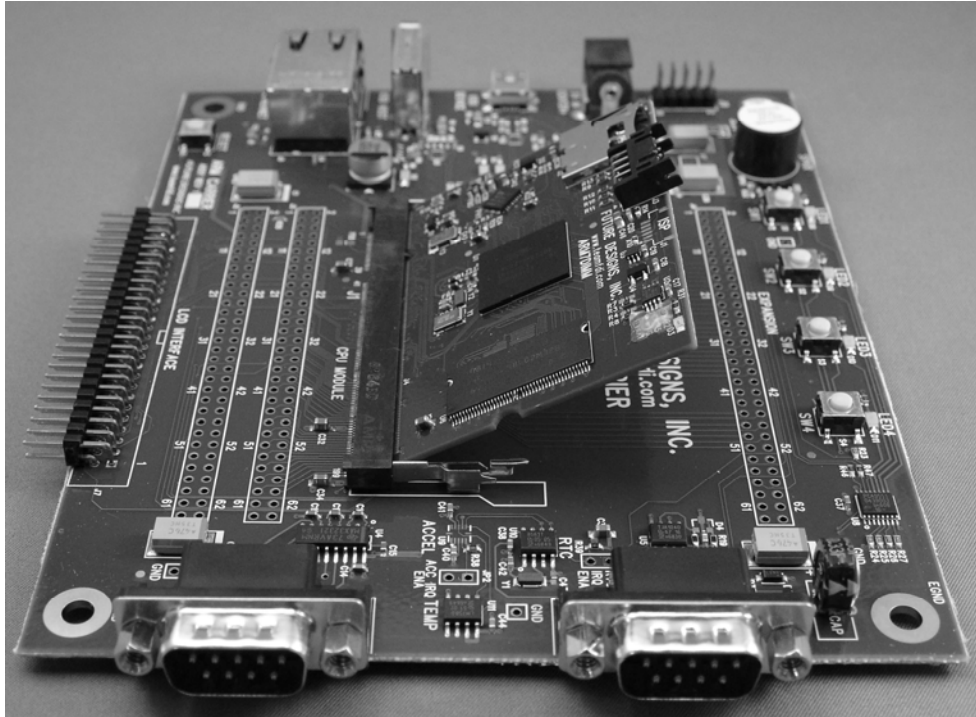


Figure 8 – SOMDIMM Insertion





## LDCARRIER

Below is an illustration showing dimensions of the LDCARRIER PCB Assy.

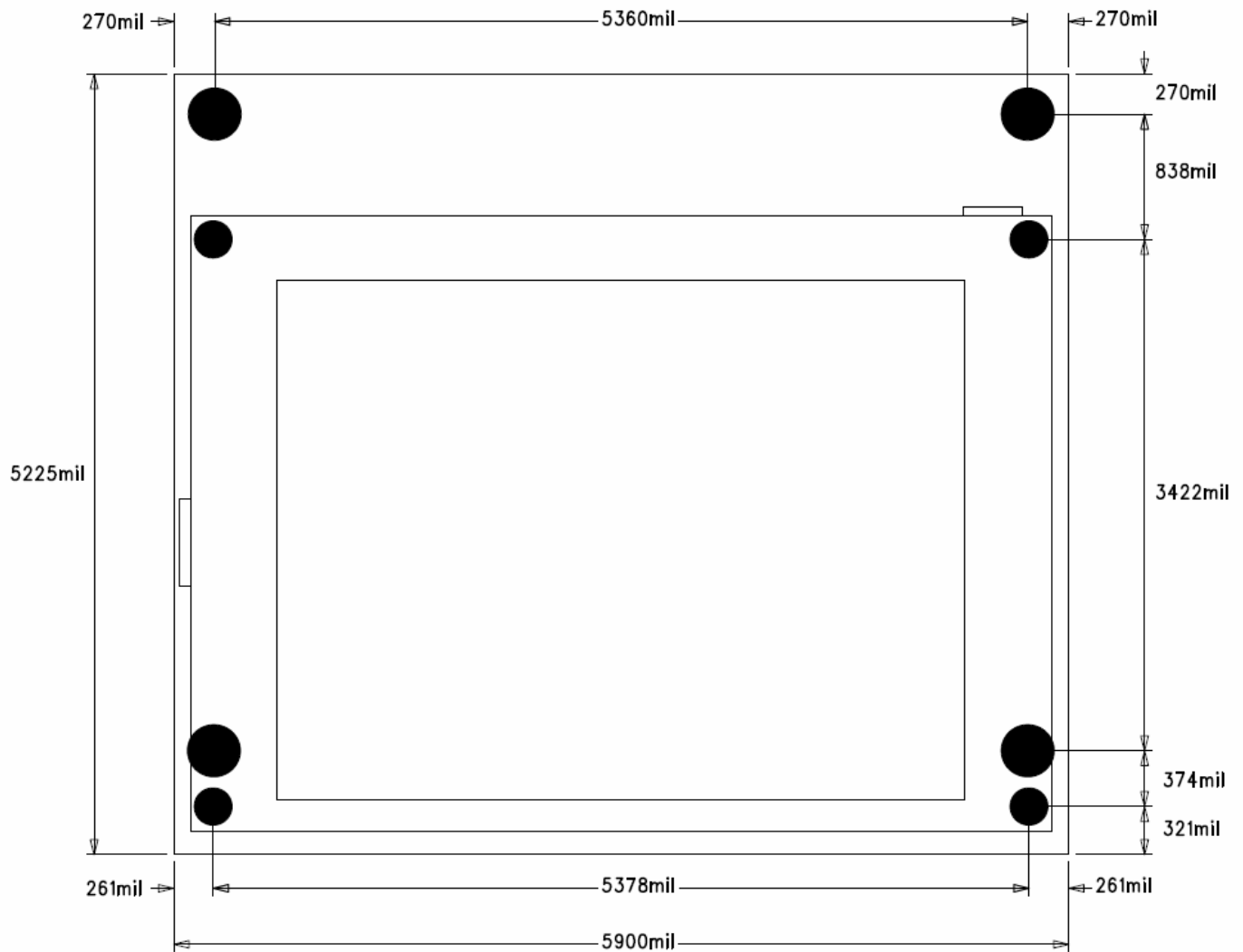


Figure 10 – LDCARRIER Mechanical Details

## 13. Software

Please refer to the Software section of the SOMDIMM Users Manual included with your kit for details on the software.

## 14. Schematics

Please visit the FDI website at: <http://www.teamfdi.com/DK-TS-KIT>

## 15. Table of Figures

Figure 1 – CARRIER Top Side .....	3
Figure 2 – CARRIER Bottom Side .....	4
Figure 3 – LCDCARRIER Top Side .....	5
Figure 4 – DK-TS-KIT System Block Diagram (LPC2478 Shown) .....	6
Figure 5 – Jumper Locations .....	18
Figure 6 – JP3 Illustration .....	19
Figure 7 – JP4 to JP7 Illustration .....	20
Figure 8 – SOMDIMM Insertion .....	21
Figure 9 – CARRIER Mechanical Details .....	22
Figure 10 – LCDCARRIER Mechanical Details .....	23