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TMS320C5502 eZdspTM ***Development Kit***

*Technical
Reference*

TMS320C5502 eZdsp™
Development Kit
Technical Reference

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About This Manual

This document describes the board level operations of the TMS320C5502 eZdsp. The TMS320C5502 eZdsp is based on the Texas Instruments TMS320C5502 Digital Signal Processor.

The TMS320C5502 eZdsp multi-layer printed circuit board (PCB) that allows engineers and software developers to evaluate certain characteristics of the TMS320C5502 DSP.

Notational Conventions

This document uses the following conventions.

The TMS320C5502 eZdsp will sometimes be referred to as the or C5502 eZdsp, or eZdsp.

Program listings, program examples, and interactive displays are shown in a special italic typeface. Here is a sample program listing.

```
equations  
!rd = !strobe&rw;
```

Information About Cautions

This book may contain cautions.

This is an example of a caution statement.

A caution statement describes a situation that could potentially damage your software, or hardware, or other equipment. The information in a caution is provided for your protection. Please read each caution carefully.

Related Documents

Texas Instruments Code Composer Studio IDE Users Guide
Data sheet for the TMS320C5502

Chapter 1

Introduction to the TMS320C5502 eZdsp Development Kit

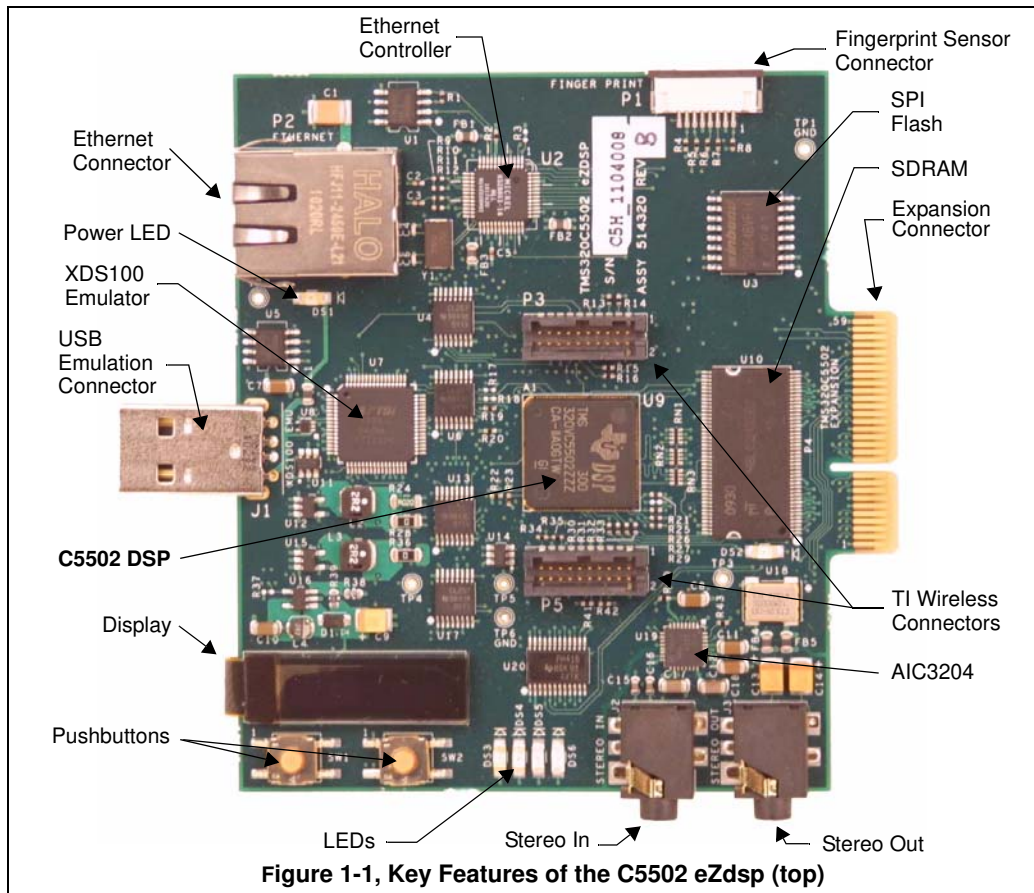
This chapter provides you with a description of the C5502 eZdsp along with the key features.

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1.0 Overview of the C5502 eZdsp

The C5502 eZdsp is an evaluation tool for the Texas Instruments TMS320C5502 Digital Signal Processor (DSP). This USB bus powered tool allows the user to evaluate the following items:

- The TMS320C5502 processor along with its peripherals
- The TLV320AIC3204 codec
- The Code Composer Studio IDE™ software development tools



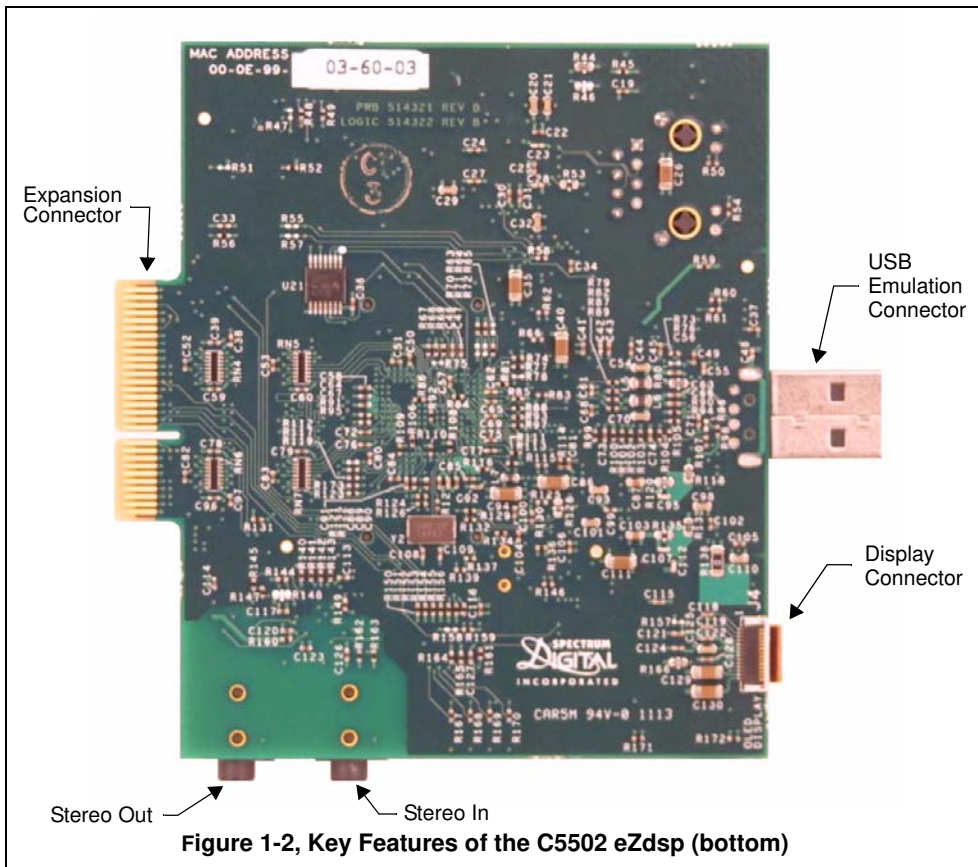


Figure 1-2, Key Features of the C5502 eZdsp (bottom)

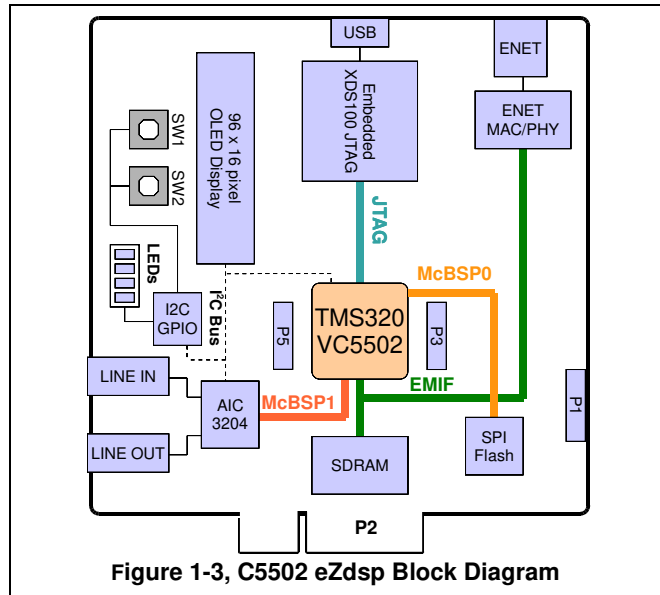
1.1 Key Features of the C5502 eZdsp

The C5502 eZdsp has the following features:

- Texas Instrument's TMS320C5502 Digital Signal Processor
- Texas Instruments TLV320AIC3204 Stereo Codec (stereo in, stereo out)
- 10/100 Ethernet controller with RJ45 interface
- Fingerprint sensor interface
- 64 Megabit SPI Flash (boot default)
- 8 Megabytes of SDRAM (32 bits wide)
- I²C OLED display
- 5 user controlled LEDs
- 2 user readable push button switches
- Embedded USB XDS100v2 JTAG emulator with UART interface option
- TI Wireless interface connectors
- Expansion edge connector
- Power provided by USB interface
- Compatible with Texas Instruments Code Composer Studio v4
- USB extension cable

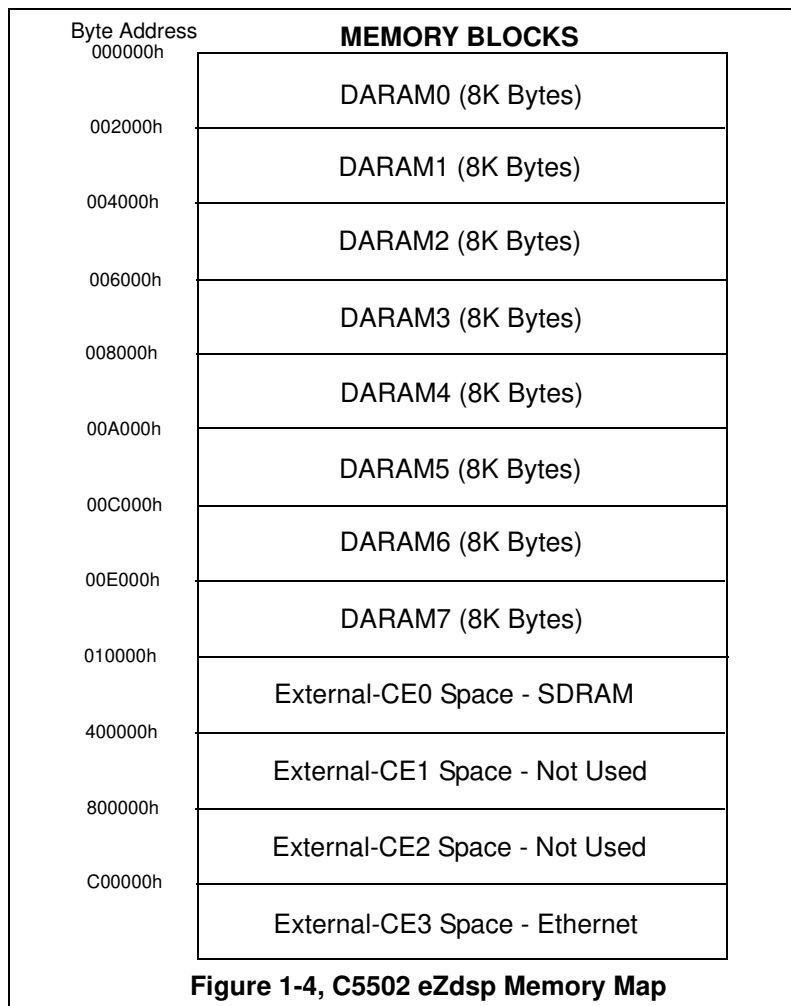
1.2 C5502 eZdsp Block Diagram

The block diagram of the C5502 eZdsp is shown below.



1.3 C5502 eZdsp Memory Map

The C5502 eZdsp supports on chip DARAM, off chip SDRAM, and a memory mapped Ethernet controller. The addressing for each of these memory blocks is shown in the figure below.



1.4 C5502 eZdsp I²C Addressing

The C5502 eZdsp has multiple I²C devices for different purposes. The table below shows the addresses of these devices on the I²C bus.

Table 1: C5502 eZdsp I²C Addresses

eZdsp I ² C Device	I ² C Address	Function
TLV320AIC3204	0x18	Audio CODEC
TCA6416PW	0x21	I ² C Expander bit I/O
OSD9616GLBGG01	0x3C	OLED Display

1.4.1 I²C Expander Definition

The C5502 eZdsp board incorporates a 16 bit I²C Expander to implement user bit I/O and the selecting/enabling of on-board multiplexing options.

The expander is configured as two 8-bit ports, Port0 and Port1. The bit functions for Port0 are shown in the table below.

Table 2: Port0 I²C Expander Definition

Port0 Bit Number	I/O Direction	Function
P00	I/O	Expansion connector
P01	I/O	Expansion connector
P02	I	SW2 Push Button
P03	I	SW1 Push Button
P04	O	DS3, "0" turns on LED
P05	O	DS4, "0" turns on LED
P06	O	DS5, "0" turns on LED
P07	O	DS6, "0" turns on LED

The bit functions for Port1 are shown in the table below

Table 3: Port1 I²C Expander Definition

Port1 Bit Number	I/O Direction	Function
P10	I/O	Expansion connector
P11	I/O	Expansion connector
P12	I/O	Expansion connector
P13	O	Enable FTDI UART on XDS100v2 0 = enables 5502 UART to FTDI chip 1 = disables 5502 UART to FTDI chip
P14	O	BSP_Sel1_enable 0 = enables McBSP1 Mux 1 = disables McBSP1 Mux
P15	O	BSP_Sel1 0 = Selects McBSP1 to on board AIC when enabled 1 = Selects McBSP1 to finger print connector
P16	O	BSP_Sel0_enable 0 = enables McBSP0 Mux 1 = disables McBSP0 Mux
P17	O	BSP_Sel0 0 = Selects McBSP0 to TI wireless connectors I ² S channel ON when enable is low 1 = Selects McBSP0 to SPI channel on TI wireless connectors when enable is low

Physical Description

This chapter describes the physical layout of the TMS320C5502 eZdsp.

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2.0 Board Layout

The C5502 eZdsp is a 3.4 x 3.7 inch six (6) layer printed circuit board which is powered off the USB bus of personal computer or laptop computer. This means this board does not require an external power supply.

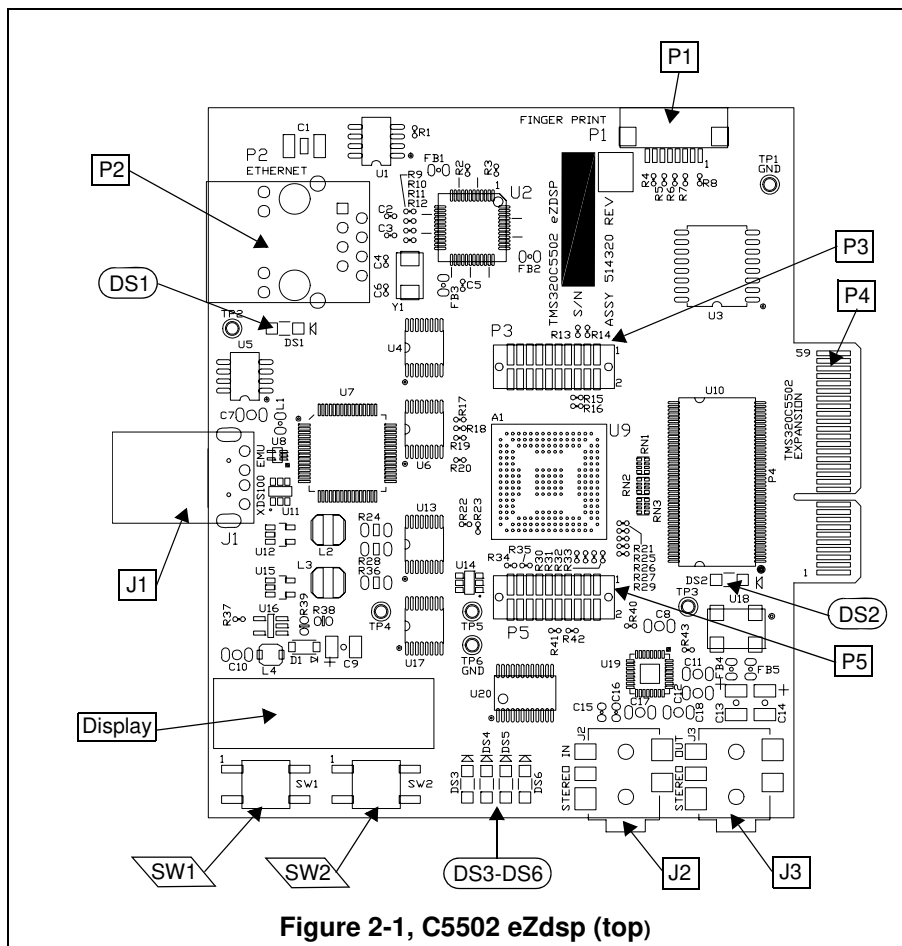
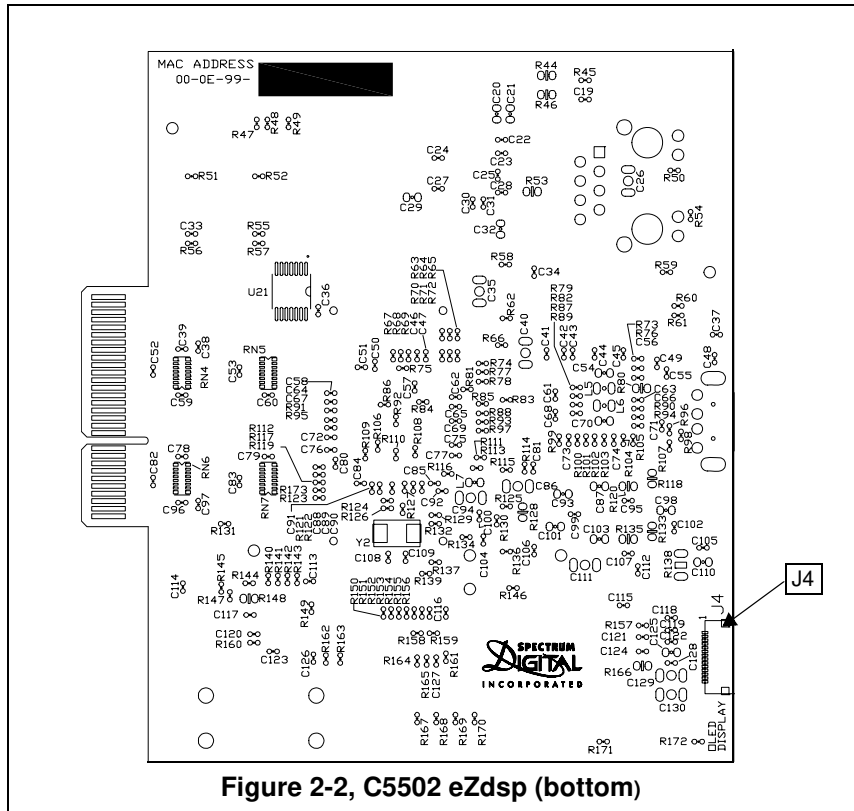


Figure 2-1, C5502 eZdsp (top)



2.1 Connector Index

The C5502 eZdsp has nine (9) connectors which provide the user access to various signals on the C5502 eZdsp. These connectors are shown in the table below.

Table 1: C5502 eZdsp Connectors

Connector	# Pins	Function	Schematic Page	Board Side
J1	6	Emulation USB	17	Top
J2	2	Stereo In	11	Top
J3	2	Headphones Out	11	Top
J4	14	LCD Interface	13	Bottom
P1	8	Fingerprint Sensor Interface	15	Top
P2	16	Ethernet Interface	12	Top
P3	20	TI Wireless Interface	9	Top
P4	30 x 2	Expansion	16	Top/Bottom
P5	20	TI Wireless Interface	9	Top

The following manufacturer and parts numbers can be used to interface to the connectors on the C5502 eZdsp:

Table 2: C5502 eZdsp Mating Connectors

Connector	Manufacturer	Part #
J1	PC or laptop	
J3	CUI Inc	CUI SP-3501, Digi-Key CP-3502-ND
J4	CUI Inc	CUI SP-3501, Digi-Key CP-3502-ND
P4	Samtec	Samtec MEC1-130-02-S-D-A, Digi-Key SAM8118-ND Samtec MEC1-130-02-S-D-RAI-SL

2.1.1 J1, XDS100 USB Connector

The USB connector, J1, is used to attach the C5502 eZdsp to a personal computer or laptop. This allows the user to develop and debug software on the C5502 eZdsp. The signals on the pins of this connector are shown below.

Table 3: J1, XDS100 USB Connector

Pin #	Signal Name
1	5V_USB
2	D+
3	D-
4	GND
5	Shield Ground
6	Shield Ground

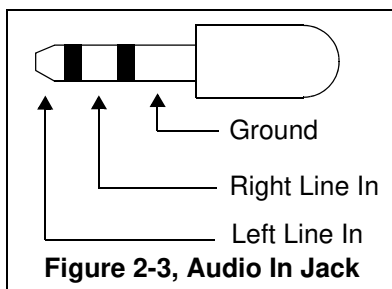
2.1.2 J2, Stereo In Connector

The Stereo In connector, J2, is used to bring signals into the TLV320AIC3204 codec. The signals on the pins of this connector are shown below.

Table 4: J2, Stereo In Connector

Pin #	Signal Name	AIC3204 Pin #
1	GND-AIC	
2	AIC_LINE2L	15
3	AIC_LINE2R	16
4	No connect	
5	No connect	

The figure below shows a typical stereo jack.



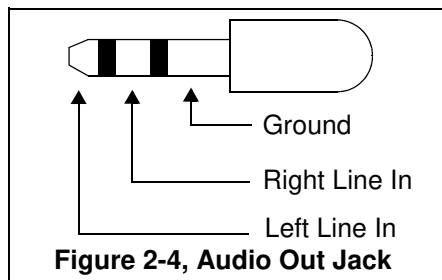
2.1.3 J3, Headphones Out Connector

The Headphones Out connector, J3, is used to bring signals from the TLV320AIC3204 codec. The signals on the pins of this connector are shown below.

Table 5: J3, Headphones Out Connector

Pin #	Signal Name	AIC3204 Pin #
1	GND-AIC	
2	HEADPHONE_LOUT	25
3	HEADPHONE_ROUT	27
4	No connect	
5	No connect	

The figure below shows a typical headphone jack.



2.1.4 J4, LCD Interface

Connector, J4, is used to interface to an LCD character display. The signals on the pins of this connector are shown below.

Table 6: J4, LCD Interface

Pin #	Signal Name
1	C2P
2	C2N
3	C1P
4	C1N
5	VBAT
6	VBREF
7	VSS / GND
8	VDD / VCC_3V3
9	RESn / TARGET_PWR_GOOD
10	SCL / I2C_SCL
11	SDA / I2C_SDA
12	IREF / GND
13	VCOMH
14	VCC / V13

2.1.5 P1, Fingerprint Sensor Interface

Connector P1 is a 1 x 8 pin connector that allows a fingerprint sensor to be plugged into the C5502 eZdsp. The signals on this connector are shown in the table below.

Table 7: P1, Fingerprint Sensor Interface

Pin #	Signal Name
1	SPI_RX
2	VCC_3V3
3	SPI_RESET
4	SPI_CLK
5	GND
6	SPI_DX
7	SPI_CS
8	GND

2.1.6 P2, Ethernet Interface

Connector P2 is a standard RJ45 Ethernet connector allowing the C5502 eZdsp to communicate over Ethernet. The signals present on this connector are shown in the table below.

Table 8: P2, Ethernet Interface

Pin #	Signal Name
1	TXD+ / TXP1, U2, Pin 19
2	TXD- / TXM1, U2, Pin 20
3	RXD+ / RXP1, U2, Pin 16
4	TXD-CT / ENET_3V3A
5	RXD-CT / ENET_3V3A
6	RXD- / RXM1, U2, Pin 17
7	NC1
8	GND
9	LED1+ / VCC_3V3
10	LED1- / P1LED0
11	LED2+ / VCC_3V3
12	LED2- / P1LED1
MH1	NC
MH2	NC
SH1	GND_E_ENET
SH2	GND_E_ENET

The unique Ethernet MAC address for each C5502 eZdsp is programmed into non-volatile memory on the board. It is also shown on the bottom side of the board. The figure shows the position of the MAC address (different for each eZdsp).



Figure 2-5, Ethernet MAC Address Location

2.1.7 P3, P5, TI Wireless Interface

Connectors P3, and P5 are expansion connectors used to provide an interface to TI Wireless modules board. The signals on the pins of these connectors are shown in the tables below.

Table 9: P3, TI Wireless Interface

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	NC
3	UART_RTS/GPIO3	4	NC
5	TIMER/TIM0	6	NC
7	UARTTX	8	NC
9	UARTRX	10	GPIO6
11	I2C_SDA	12	GPIO7
13	I2C_SCL	14	CC_SPI_CS
15	NC	16	CC_SPI_CLK
17	NC	18	CC_SPI_MOSI
19	GND	20	CC_SPI_MOSO

Table 10: P5, TI Wireless Interface

Pin #	Signal Name	Pin #	Signal Name
1	NC	2	GND
3	NC	4	NC
5	NC	6	NC
7	VCC_3V3	8	CC_I2S_RX
9	VCC_3V3	10	CC_I2S_TX
11	CC_I2S_FS	12	NC
13	GPIO25	14	NC
15	GPIO26	16	NC
17	CC_I2S_CLK	18	GPIO5
19	GPIO26	20	GPIO35

2.1.8 P4, Expansion Connector

The Expansion connector, P4, is used to bring signals from C5502 DSP out to a connector for user interface. This card edge connector has all of the odd number (1,3,...,59) tabs on the top side of the board and all of the even number tabs (2,4,...,46) on the bottom side of the board. The diagram below shows the position of these tabs.

