Evaluation Board

REVISION HISTORY

Revision	Date	Change Description
91125F-UM100-R	02/18/04	Initial release.

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Section 1: Product Overview

INTRODUCTION

The BCM91125F evaluation board is an evaluation platform intended to support the needs of prospective users of the BCM1125H processor. This user manual provides information on how to get the BCM91125F evaluation board up and running quickly. This manual also describes how to locate, configure, and observe the various connectors, switches, jumpers, and LEDs on the BCM91125F, allowing software development and evaluation of the BCM1125H processor to begin.

For additional information on this board and the BCM1125H processor, go to:
http://sibyte.broadcom.com/public.

ITEMS INCLUDED WITH THE SHIPMENT

The following items are included with the BCM91125F evaluation board shipment:

- BCM91125F evaluation board
- OCDemon Macraigor Systems Wiggler parallel port JTAG probe
- 120–240V AC to 5V DC power adapter
- Viosoft ARRIBA® Embedded Edition CD
- This document

FEATURES

This section describes the BCM91125F's features.

HARDWARE

- BCM1125H processor
- Half-length PCI card form factor
- 128 MB of DDR SDRAM
- Two 10/100/1000 Mbps Ethernet interfaces with RJ45 connectors
- One UART with RS232 interface
- Universal 32-bit, 33/66-MHz capable PCI connector
- 16-MB Flash ROM
- Two SMBus channels with the following devices connected:
    - RTC
    - EEPROMs
    - temperature sensor
- EJTAG connector
- Four-character LED display

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FIRMWARE

The Common Firmware Environment (CFE) is designed to be easily portable to designs incorporating current and future Broadcom MIPS64-compatible broadband processors. Supported platforms include Broadcom's SiByte processor family (BCM1250, BCM1125H, and so forth), 32-bit and 64-bit memory models, and big and little-endian operation. There are many parameters configurable at build time that can be used to customize CFE to suit diverse customer requirements.

On the BCM91125F, CFE can load programs (such as S-records, raw binary, or ELF formatted) from bootstrap devices in a variety of ways, including:

- Via either Ethernet port, from a TFTP server
- Via the serial port (S-records only)

For additional information on CFE, refer to the *Common Firmware Environment (CFE) Specification* document that can be found in the CFE source code distribution at: http://sibyte.broadcom.com/public.

Section 2: Getting Started

Complete the following steps to get to a BCM91125F CFE (firmware) prompt.

1 Connect a 9-pin null modem cable to the serial port of the BCM91125F and to a serial port on a workstation/PC.

2 Use a terminal program and set it to 115200 bps, 8-bit data, 1-stop bit, no parity, and no flow control.

3 Power up the BCM91125F using one of the methods described in "Powering Up the Board" on page 6.

After a short delay, the CFE initialization output and serial console prompt should display. The following is an example of the output:

```
CFE version 1.0.40 for BCM91125F (64bit,MP,BE,MIPS)
Build Date: Wed Jan 14 15:07:22 PST 2004
Copyright (C) 2004 Broadcom Corporation.

Initializing Arena.
Initializing PCI. [normal]
HyperTransport not initialized: InitDone not set
Initializing Devices.
BCM91125F board revision 0
Config switch: 2
CPU: 1125H A2
L2 Cache: 256KB
SysCfg: 0080000008C20600 [PLL_DIV: 12, IOB0_DIV: CPUCLK/4, IOB1_DIV: CPUCLK/3]
CPU type 0x40103: 600MHz
Total memory: 0x8000000 bytes (128MB)

Total memory used by CFE:  0x87E96360 - 0x88000000 (1481888)
Initialized Data:          0x87E96360 - 0x87E9FE80 (39712)
BSS Area:                  0x87E9FE80 - 0x87EA05A0 (1824)
Local Heap:                0x87EA05A0 - 0x87FA05A0 (1048576)
Stack Area:                0x87FA05A0 - 0x87FA25A0 (8192)
Text (code) segment:       0x87FA25A0 - 0x87FFFFB4 (383508)
Boot area (physical):      0x07E55000 - 0x07E95000
Relocation Factor:         I:E83A25A0 - D:05F96360

CFE>
```

4 At the prompt, a program can be run via the network from a TFTP server by doing the following:

   a. Connect the BCM91125F Ethernet port E0 with an Ethernet cable to a switch, repeater, or directly to the Ethernet port of the file server.

> **Note:** Because the Broadcom PHYs handle direct connects automatically, a crossover cable for direct connects is not needed.

   b. To initialize Ethernet port E0, type the following:

```
ifconfig eth0 -auto
```

> **Note:** The ifconfig eth0 -auto command can only be used with a DHCP server.

   c. To run a program, type the following:

```
boot -elf tftp_server:/path_to_software/program
```

Section 3: Physical Description

The BCM91125F is implemented in the standard half-length PCI card format. The following figure shows a top view of the BCM91125F.
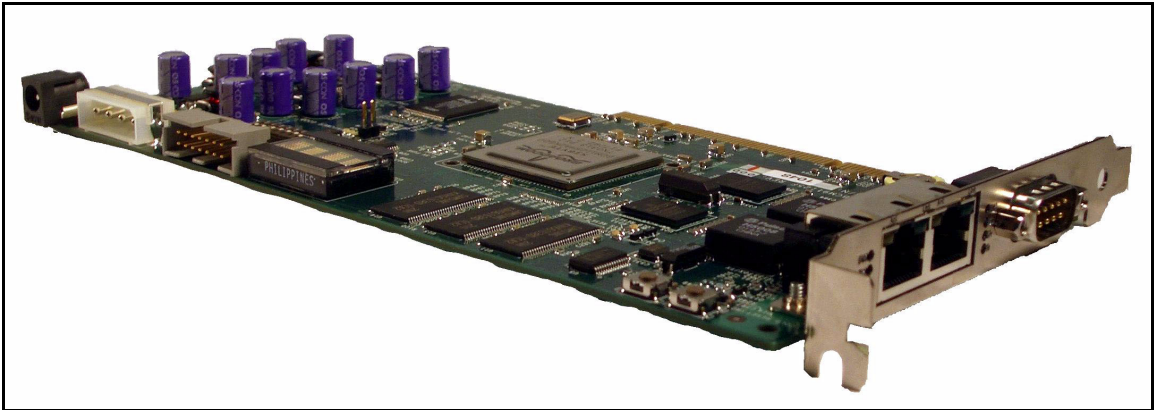

Figure 1: Top View

BLOCK DIAGRAM

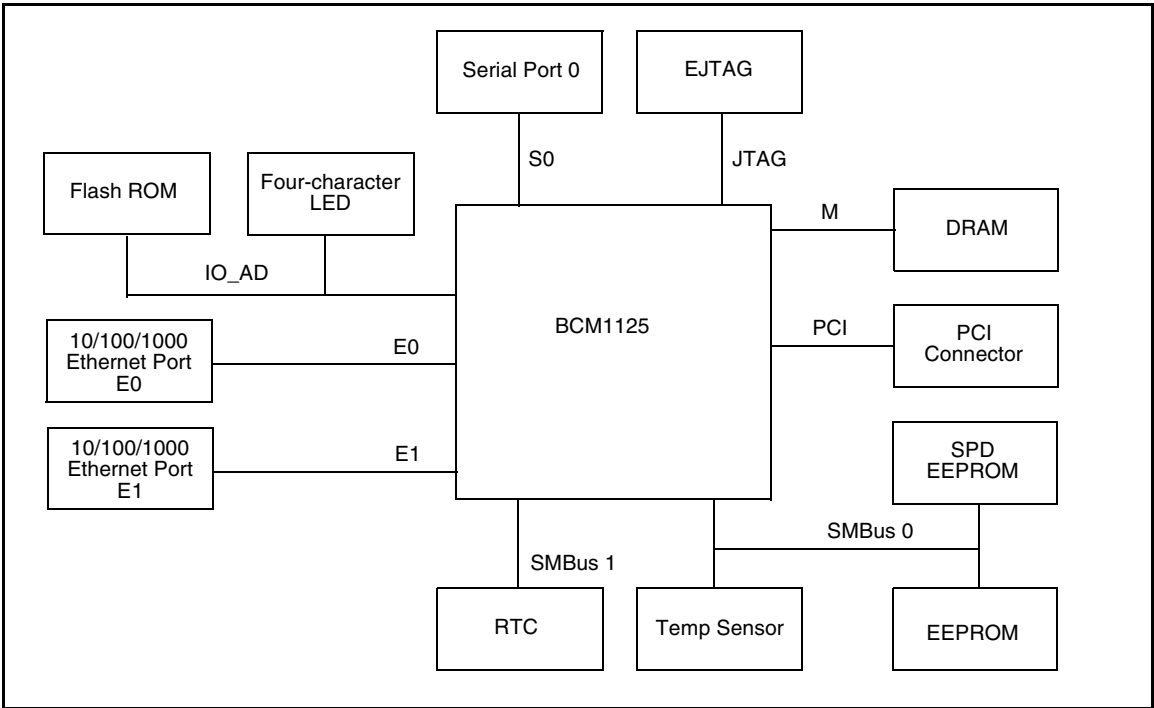The following figure shows a block diagram of the BCM91125F.

Figure 2: Block Diagram

CONNECTORS

Figure 3 shows the board and identifies connectors numerically. For a description of each connector callout, compare Figure 3's number callouts with Table 1.
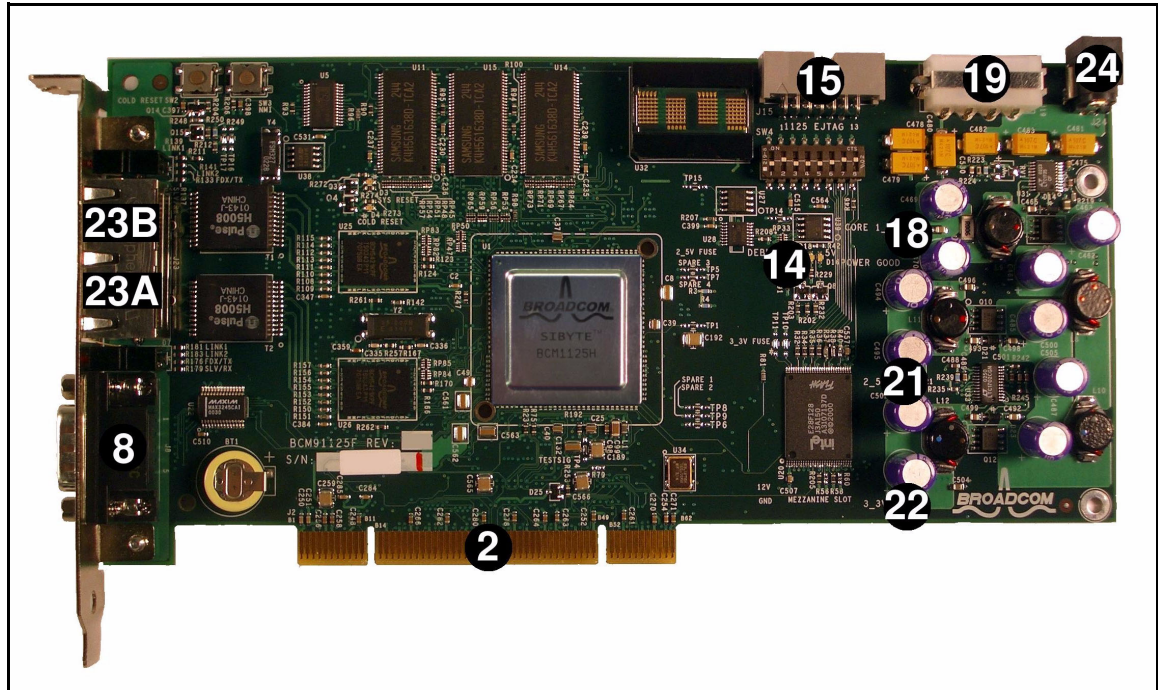
Figure 3: Connector Callouts

The following table shows the BCM91125F connectors.

Table 1: *Connector Descriptions*

Board ID	Description
J2 ***	Dual-sided 62-pin edge finger PCI connector.
J8	Serial port 0 RS-232 connector.
J14	DEBUG_L trigger for scope (pin1 * = GND, pin2 = DEBUG_L).
J15	EJTAG connector.
J18	1.2V core supply sense (pin1 ** = GND, pin2 = 1.2V).
J19 ***	Standard hard drive power supply connector.
J23A	10/100/1000 Mbps Ethernet Port E1.
J21	2.5V supply sense (pin1 ** = GND, pin2 = 2.5V).
J22	3.3V supply sense (pin1 ** = GND, pin2 = 3.3V).
J23B	10/100/1000 Mbps Ethernet Port E0.
J24 ***	5V power supply jack.

* = Pin1 located by viewing the back side of the board for the square solder point.
** = Pin1 located by viewing the front of the board for the square solder pad.
*** = Important: Use only one of the three available power supplies.

POWERING UP THE BOARD

Any *one* of the following three methods supply power to the board by plugging in:

- The BCM91125F board's PCI connector (J2) to a PCI slot on a motherboard.
- A HDD power cable from a standard PC power supply to the HDD connector (J19).
- The supplied 120–240V AC to 5V DC adapter to the 5V DC connector (J24).

Only *one* of these methods should be employed at any given time.

LEDS

Figure 4 shows the positions of the LEDs numerically. Compare Figure 4's number callouts with a description of each LED in Table 2 on page 7.
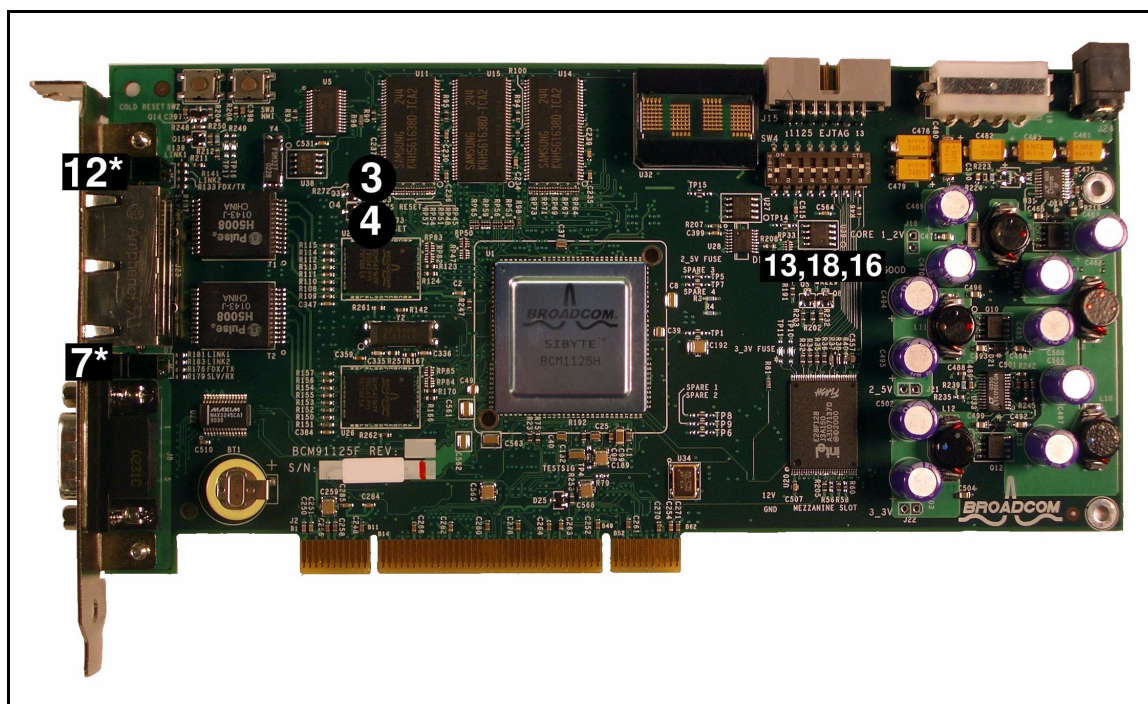

Figure 4: LED Callouts

Table 2: *LED Descriptions*

Board ID	Color	Description
D3	Amber	System reset.
D4	Amber	Cold reset.
D7 *		**Ethernet Port E1 PHY LEDs**
	Red	Link2 = Speed indicator.
	Green	Link1 = Speed indicator.
	Yellow	Fdx = Full-duplex indicator.
	Green	Slv = Slave indicator.
	Yellow	Act = Transmit and receive activity indicator.
	Green	Link = Link quality indicator.
D12 *		**Ethernet Port E0 PHY LEDs**
	Red	Link2 = Speed indicator.
	Green	Link1 = Speed indicator.
	Yellow	Fdx = Full-duplex indicator.
	Green	Slv = Slave indicator.
	Yellow	Act = Transmit and receive activity indicator.
	Green	Link = Link quality indicator.
D13	Green	Debug LED.
D16	Green	3.3V power good.
D18	Green	5V.
* = LEDs visible from the board's side panel.		

FUSE AND BATTERY

Figure 5 shows the positions of the fuse and battery numerically. Compare Figure 5's number callouts with a description of each fuse and battery in Table 3.
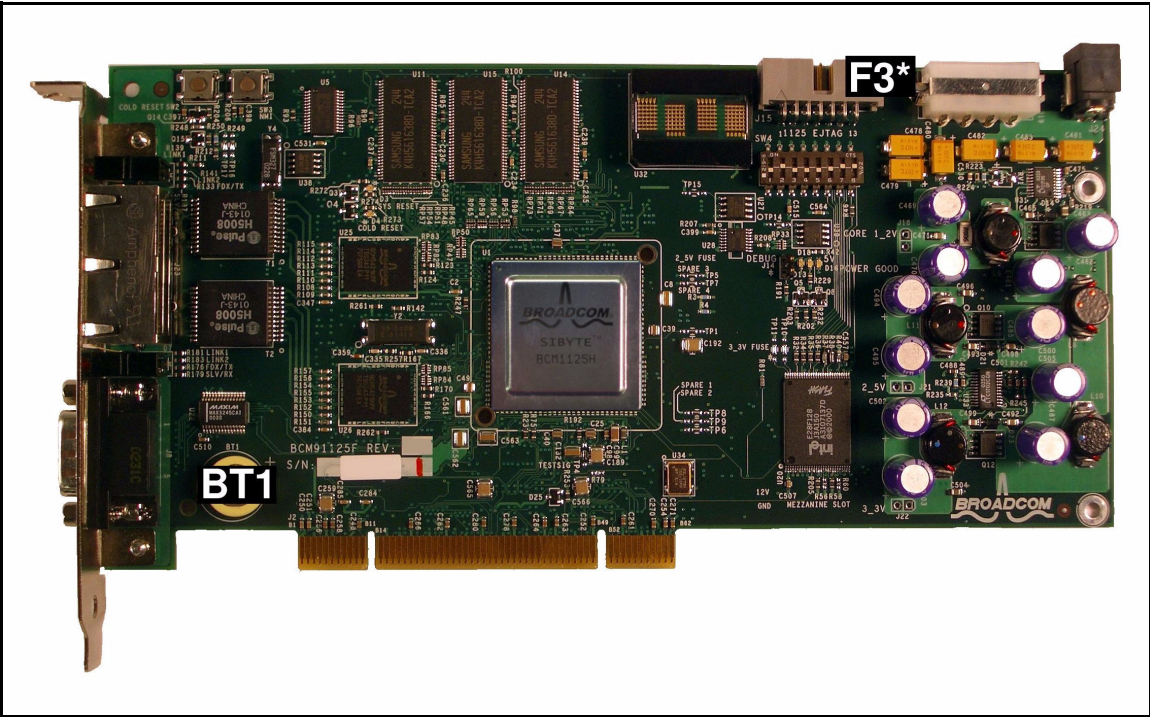

Figure 5: Fuse and Battery Callouts

Table 3: *Fuse and Battery Descriptions*

Board ID	Function
F3 *	EJTAG current limiting fuse
BT1	RTC battery

* = Fuse located on the back side of the board.

SWITCHES

Figure 6 shows the positions of switches numerically. Compare Figure 6's number callouts with a description of each switch in Table 4.
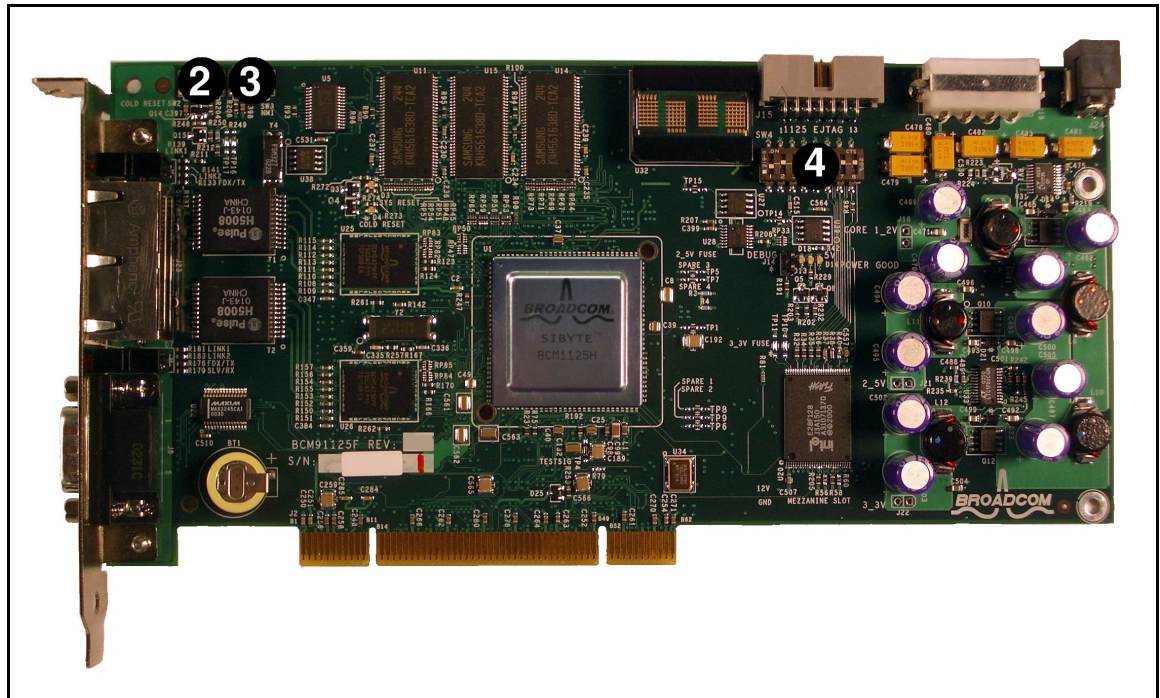
Figure 6: Switch Callouts

Table 4: *Switch Descriptions*

Board ID	Function	Default
SW2	Cold reset asserted when the button is pressed	NA
SW3	NMI (GPIO 8) asserted when the button is pressed	NA
SW4	8-position DIP switch, used for board configuration	0b01000010
	dip[8] = GPIO[15]	0b0
	dip[7] = System byte order (1 = big endian; 0 = little endian)	0b1
	dip[6:1] = BCM1125H SW config[5:0]	0b000010

BCM1125H PERIPHERAL DEVICES

Table 5: *SMBus Peripherals*

SMBus Channel	SMBus Address	Description
0	0x2A	Maxim MAX6654 temperature sensor.
0	0x50	Microchip 28LC128C EEPROM.
0	0x54	Atmel$^®$ AT24C02 SPD EEPROM*.
1	0x68	ST Microelectronic M41T81 RTC.
* = Overwriting the data on the SPD EEPROM could adversely affect the firmware's ability to configure the DRAM correctly.		

Table 6: *Generic Bus Peripherals*

Chip Select #	Description
CS0	Intel$^®$ E28F128J3A boot ROM.
CS6	HP HDLO-2416 LED display.

Table 7: *GPIO Map*

GPIO Pin #	BCM1125H Pin Direction	Description
0	Output	DEBUG_LED (LED D13).
1	Input	OUT from RTC.
7	Input	PHY_INT_L (ORed PHY interrupt from both BCM5421 PHY chips).
8	Input	NMI_L from switch SW3.
9	Input	TEMP_ALERT_L from the temperature sensor.
15	Input	Undefined SW config from the switch (SW4 dip[8]).

Table 8: *PCI Interrupt Map*

Description	Interrupt Map
32-bit universal PCI connector.	BCM1125H PCI INTA = PCI Connector (J2) INTA

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Section 4: Firmware Configuration

The firmware image in the flash is bi-endian, so it supports both big and little-endian operation. The following table describes where and how much physical memory the firmware maps to the chip selects on the generic bus.

Table 9: *Firmware Generic Bus Memory Mapping*

Chip Select	Description	Physical Memory Address	Size
CS0	Boot ROM	0x1FC0_0000	16 MB
CS6	LED Display	0x1D0A_0000	64 KB

Table 10: *Firmware Configuration Bits Mapping*

SW Config Bit #	Name	Action
0	autostartup	CFE attempts to execute the value stored in the STARTUP environment variable after initialization.
1	config PCI	CFE configures PCI for device mode operation during initialization. This switch should be set for use in a host PC/ workstation.

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Section 5: Troubleshooting

CORRECTIVE PROCEDURES

1 When CFE is not able to initialize the system and reach the console prompt, the four-character alphanumeric LED display may be used to help debug the initialization sequence. When the Cer2 message appears, a cache error has occurred. This frequently occurs when the BCM1125H is either undercooled or is in a low-voltage situation. Ensure that the correct voltage and cooling is being provided. For other LED message descriptions, refer to the *Common Firmware Environment (CFE) Specification* document.

2 There is no output coming from the serial boot console, but the four-character LED displays *CFE*. Because CFE uses serial port 0 by default, ensure that a standard 9-pin RS232 null-modem cable connection is being used. Also ensure that the terminal program is set to a baud rate of 115200, 8-bit, no parity, no flow control.

3 PCI problems may be encountered when placing the BCM91125F board into a PCI slot on a host PC or workstation. The BCM91125F is hardwired in PCI device mode. Problems may occur if the BCM91125F is reset, which clears the host-configured PCI registers in the BCM1125H without the host's knowledge.

If this problem occurs and the PCI interface is being used only for the purpose of powering the BCM91125F, remove the board from the PCI slot and choose one of the other methods for powering the board. If the host system needs to be connected to the BCM91125F through the PCI, then the system must reconfigure the BCM1125H registers after the BCM91125F is reset, which may include rebooting the host system.

REPLACEMENT PARTS

Table 11: *Replacement Parts*

Board ID	Description	Manufacturer	Manufacturer ID	Web Information
F3	EJTAG connector 0.5A 32V surface mounted fuse.	Littelfuse®	434.500	http://www.littelfuse.com/PDFs/Products/434.pdf
N/A	110–240V~1.6A AC to 5V 6A DC power supply.	Globtek®, Inc.	GT-21097-3005	http://www.globtek.com/datasheets/pdf/GT(M)21097.pdf
BT1	RTC battery.	Panasonic	BR1225/1HC	http://www.panasonic.com/industrial/battery/oem/chem/lith/coin1.htm

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Section 6: Web Resources

SiByte

Table 12: *SiByte Web Resources*

Resource	Website
BCM1250 and BCM1125H User Manual	http://sibyte.broadcom.com/public/resources/
SB1 Core User Manual	http://sibyte.broadcom.com/public/resources/
General information	http://sibyte.broadcom.com/public/

Peripherals

Table 13: *Peripheral Web Resources*

Resource	Website
Maxim MAX6654 temperature sensor	http://pdfserv.maxim-ic.com/en/ds/MAX6654.pdf
Microchip 24LC128C serial EEPROM	http://www.microchip.com/1010/pline/memory/memdvice/ic/64to512/devices/24lc128/index.htm
ST Microelectronic M41T81serial RTC	http://www.st.com/stonline/products/families/memories/rtc/nv_t81.htm
HP HDLO-2416 four-character alphanumeric display	http://literature.agilent.com/litweb/pdf/5988-3269EN.pdf
Atmel AT24C02 serial EEPROM (SPD for memory)	http://www.atmel.com/dyn/products/product_card.asp?family_id=647&family_name=Serial+EEPROM&part_id=2805
Samsung K4H561638D-TCA2 256Mb DDR SDRAM	http://www.samsung.com/Products/Semiconductor/DRAM/DDRSDRAM/DDRSDRAMcomponent/256Mbit/K4H561638D/K4H561638D.htm
Intel E28F128J3A 128 Mbit Strataflash® Memory	http://www.intel.com/design/flcomp/datashts/290667.htm
Broadcom BCM5421 10/100/1000BASE-T Gigabit Copper Transceiver	http://www.broadcom.com/products/product.php?product_id=BCM5421&cookiecheck=1

Bus Interface

Table 14: *Bus Interface Web Resources*

Resource	Website
EJTAG specification	http://www.mips.com/content/Documentation/MIPSDocumentation/EJTAG/doclibrary/
PCI specification	http://www.pcisig.com/specifications/conventional/

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