TMS570LS04 Hercules Development Kit (HDK)

User's Guide

![Texas Instruments logo]

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About This Manual

This document describes the board level operations of the TMS570LS04 Hercules™ Development Kit (HDK). The HDK is based on the Texas Instruments TMS570LS0432 Microcontroller. The TMS570LS04 HDK is a table top card that allows engineers and software developers to evaluate certain characteristics of the TMS570LS0432 microcontroller to determine if the microcontroller meets the designer application requirements. Evaluators can create software to execute on board or expand the system in a variety of ways.

Notational Conventions

This document uses the following conventions.

The TMS570LS04 HDK will sometimes be referred to as the HDK.

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 Documentation From Texas Instruments

Information regarding this device can be found at the following Texas Instruments website:
http://www.ti.com/rm4

Introduction

The TMS570LS0432 HDK is a low cost and easy to use hardware and software platform for evaluating the functionality of the Texas Instruments TMS570LS0432 microcontroller family. Project collateral, schematics and PCB layouts discussed in this application report can be downloaded from the following URL:

(http://processors.wiki.ti.com/index.php/TMS570LS04x_HDK_Kit).

1.1 Scope of Document

This user guide will list the contents of the development kit, point out the features of the major components, and provide the instructions necessary to verify your development kit is in working order. Any additional usage instructions or details fall outside the scope of this document. Additional resources are listed at the end of this user guide.

1.2 TMS570LS04 HERCULES Development Kit (HDK) Features

The HDK comes with a full complement of on board devices that suit a wide variety of application environments. Key features include:

- A Hercules TMS570LS0432 100-pin QFP microcontroller
- Integrated USB JTAG emulator (XDS100v2)
- External JTAG headers (ARM® 20 pin and TI compact 20-pin CTI)
- One DIP switch to select pull-up or pull-down for JTAG nTRST
- Two CAN transceivers (SN65HVDA541Q1) and screw terminal blocks
- One ambient light sensor
- One ambient temperature sensor
- Microcontroller's serial communications interface (SCI) universal asynchronous receiver/transmitter (UART) accessible through a USB virtual COM port
- Four user programmable white LEDs
- One user programmable pushbutton
- Three expansion connectors for hardware prototyping
- Reset and power-on reset pushbuttons (nRST and nPORRST)
- One pushbutton simulating external oscillator failure
- One Jumper to select clock source for MCU: crystal or crystal oscillator
- One crystal socket (HC-18)
- One SD card slot (SPI mode)
- Current measurement capability for 3.3 V IO, 3.3 V analog-to digital converter (ADC) and, 1.2 V core voltage
- May be powered by USB or an external power supply in case additional power is required (for expansion boards)
- Accepts an external power supply between +5 V and +12 V

1.3 HDK Board Block Diagram
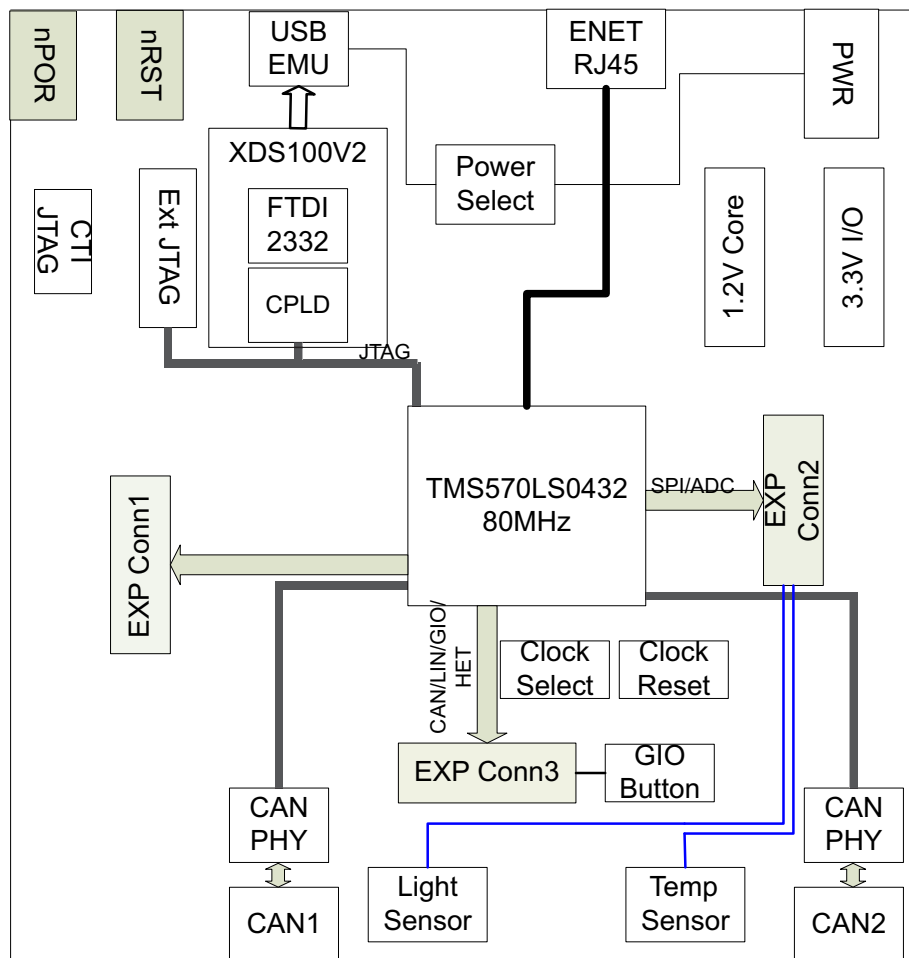
Figure 1-1. TMS570LS04 HDK Board Block Diagram

1.4 TMS570LS04 HDK Contents

The kit contains everything needed to develop and run applications for TMS570LS04 microcontrollers including:

- Cables and Accessories:
  - 12 V power supply with power adapters for US, or Europe
  - Type A to mini B USB cable for using on board XDS100V2 JTAG emulator
  - Flashlight for light sensor demo
- CCS DVD Containing:
  - Texas Instruments' Code Composer Studio™ Integrated Development Environments (IDE)
- Hercules DVD Containing:
  - Hercules Safety Demos
  - Hardware Abstraction Layer Code Generator (HALCoGen)
  - Training Videos
  - Device Documentation

1.5 HDK Specifications

- Board supply voltage: 5 V to 12 V DC
- Board supply current: 130 mA typ (fully active, CPU at 100 MHz)
- Dimensions: 4.90" x 4.30" x 0.85" (LxWxH)

1.6 Basic Operation

The HDK is designed to work with TI's Code Composer Studio and other third party ARM IDEs. The IDEs communicate with the board through the embedded emulator or an external JTAG emulator. To get started, follow the instructions in the Quick Start Guide to install Hercules specific software. This process will install all of the necessary development tools, documentation, and drivers.

1.7 Memory Map

The TMS570LS04 family of MCUs have a large byte addressable address space. Table 1-1 shows the address space of a TMS570LS0432 microcontroller on the left with specific details of how each region is used on the right. On-chip Flash memory starts at the beginning of the address space where the exception vector table is located.

Table 1-1. TMS570LS0432 Memory Map

Start Address	End Address	HDK
0x0000 0000	0x0005 FFFF	384KB Flash
0x0800 0000	0x0800 7FFF	32KB RAM
0x0840 0000	0x0840 7FFF	RAM-ECC

1.8 Power Supply

The HDK board operates from either +5V supplied from the USB connector (J4) or +5 V to +12 V supplied from the power supply connected to the main power input (P1), a 2.5 MM, barrel-type plug. Internally, the power input is converted into +1.2 V, +3.3 V using Texas Instruments voltage regulators. The +1.2 V supply is used for the MCU core while the +3.3 V supply is used for the MCU's I/O buffers and other component on the board.

The power used for operation is determined by the options listed in Table 1-2.

Table 1-2. Power Supply Selection

Power Used for the Board	USB VBUS (+5 V) (USB Cable is Plugged or Not)	Power From P1(5 V to 12 V) (Power Cable is Plugged or Not)
From P1	ON	ON
From P1	OFF	ON
From VBUS	ON	OFF

There are multiple power test points on the HDK board. The three main test point pairs provide a convenient mechanism to check the HDK's current for each supply. Table 1-3 shows the voltages for each test point and what the supply is used for.

Table 1-3. Power Test Points

Test Point Pair	Voltage	Voltage Use
TP11 and TP12	1.2 V	MCU core
TP3 and TP4	3.3 V	MCU IO and logic
TP22 and TP23	3.3 V	MCU ADC power

Physical Description

This chapter describes the physical layout of the TMS570LS04 HDK board and its interfaces.

2.1 Board Layout

The TMS570LS04 HDK board a 4.9 x 4.3 inch (125 x 109 mm.) six layer printed circuit board that is powered by either +5 V USB power from an external +5 V to +12 V only power supply or by USB VBUS. Figure 2-1 shows the layout of the TMS570LS04 HDK board.
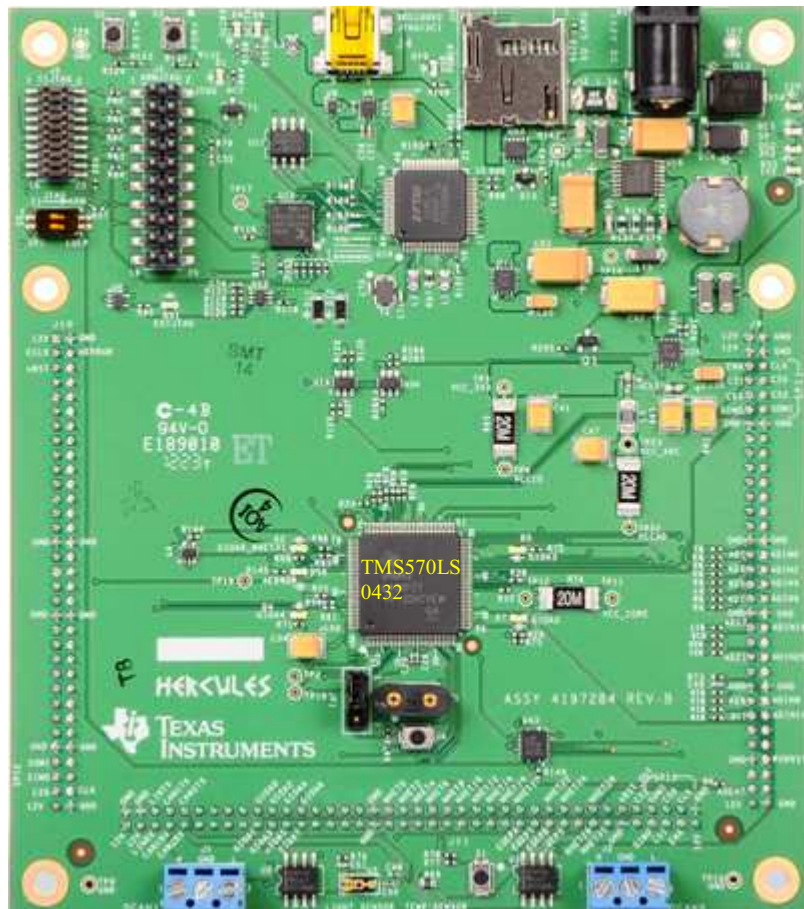

Figure 2-1. TMS570LS04 HDK Board

2.2 Connectors

The HDK board has ten interfaces to various peripherals. These interfaces are described in Table 2-1.
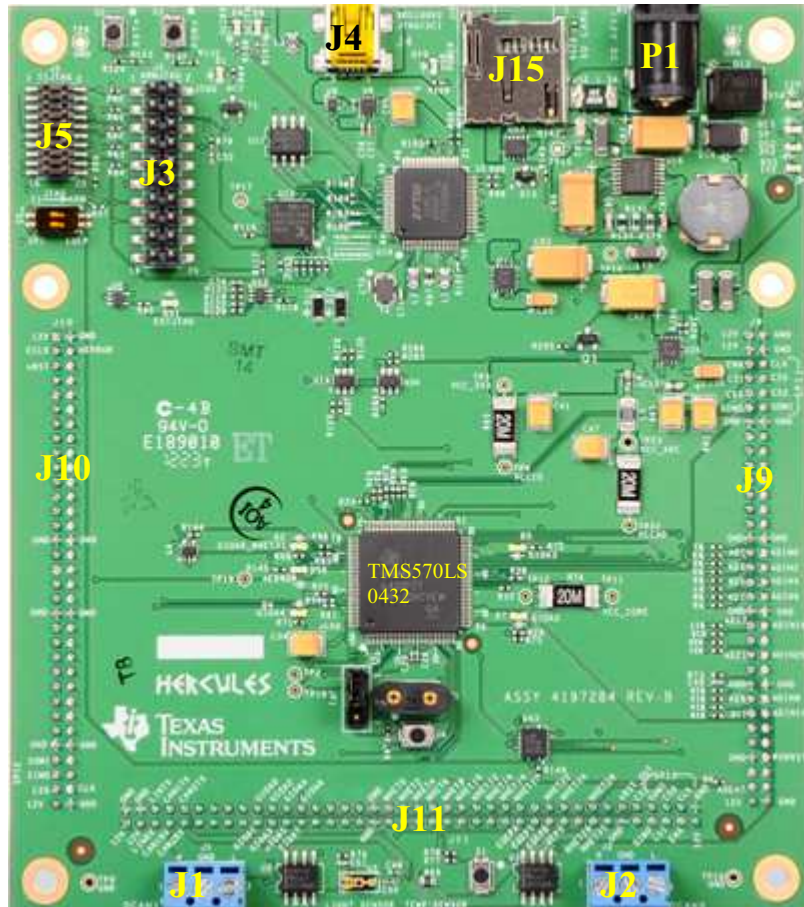
Figure 2-2. Connectors on TMS570LS04 HDK Table

Table 2-1. Connectors on HDK Board

Connector	Size	Function
J1	3, 2,54mm	DCAN1
J2	3, 2.54mm	DCAN2
J3	10x2, 2.54mm	ARM 20-pin JTAG header
J4	4pin, Mini-B USB	XDS100V2 USB
J5	10x2, 2mm	Compact TI 20-pin JTAG header
J9	33x2, 2mm	Exp P1, SPI1, ADC, nPORRST
J10	33x2, 2mm	EXP P2, SPI2, nRST, ECLK, nERROR
J11	40x2, 2mm	EXP P3, GIO, CAN, LIN, EQEP, NHET, SPI3
J15	Micro SD slot	SD card
P1	2.5mm	+12 V In

2.2.1 20-Pin ARM JTAG Header

In addition to on board XDS100V2 JTAG. One 20-pin ARM JTAG header is added for using an external emulator. This is the standard interface used by JTAG emulators to interface to ARM microcontrollers. The pinout of the connector is shown in Table 2-2.

Table 2-2. 20-Pin ARM JTAG Header

Signal Name	Pin Number	Pin Number	Signal Name
Vref	1	2	V_{CC}
nTRST	3	4	GND
TDI	5	6	GND
TMS	7	8	GND
TCK	9	10	GND
RTCK	11	12	GND
TDO	13	14	GND
nRST	15	16	GND
NC	17	18	GND
NC	19	20	GND

2.2.2 20-Pin Compact TI JTAG Header

We also implemented a compact TI JTAG header (CTI) on the board. This is the standard interface used by TI and Spectrum Digital JTAG emulators. The pinout for the connector is shown in Table 2-3.

Table 2-3. 20-Pin CTI JTAG Header

Signal Name	Pin Number	Pin Number	Signal Name
TMS	1	2	nTRST
TDI	3	4	TDIS
VTRef	5	6	KEY
TDO	7	8	GND
RTCLK	9	10	GND
TCLK	11	12	GND
NA	13	14	NA
SYSRSTn	15	16	GND
NA	17	18	NA
NA	19	20	GND

2.2.3 CAN Interface

The TMS570LS0432 has two DCAN interfaces which provide a high-speed serial interface. Two 3 pin screw terminal blocks, J1 and J2, are used to interface with 12 the DCAN bus. The pinouts for this connector are shown in Figure 2-3. H means CAN High (CAN H), and L means CAN Low (CAN L).

CAN Bus termination is used to minimize signal reflection on the bus. ISO-11898 requires that the CAN bus have a nominal characteristic line impedance of 120 Ω. Therefore, the typical terminating resistor value for each end of the bus is 120 Ω. A split termination method is used to help increase EMC performance. Split termination is a concept that is growing in popularity because emission reduction can be achieved very easily. Split termination is a modified standard termination in which the single 120 Ω resistor on each end of the bus is split into two 60 Ω resistors, with a bypass capacitor tied between the resistors and to ground. The two resistors should match as close as possible.
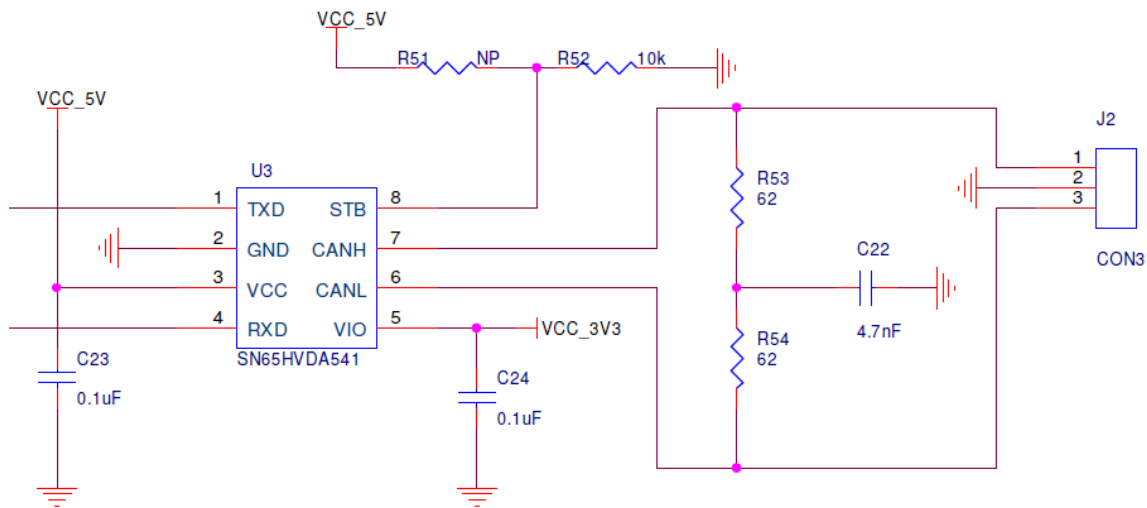
Figure 2-3. CAN Bus Termination

Figure 2-4. J1, J2 Screw Terminal Block for CAN Bus

2.2.4   J4, XDS100V2 USB JTAG Interface

The USB connector J4 is used to connect to the host development system which is running the software development IDE (CCS for example).

Before the board is shipped, the XDS100V2 port1 is configured as JTAG, and port2 is configured as SCI. The CPLD is also programmed to route the JTAG signals to the MCU.

There is a circuitry to detect an external JTAG emulator. If an external emulator is plugged onto the header J3 and J5, the DS1 LED will turn on, and XDS100V2 JTAG will be disabled.

2.2.5   P1, +5 V to +12 V Input

Connector P1 is the input power connector. This connector brings +5V to +12 V to the HDK board. This is a 2.5 mm. jack. Figure 2-5 shows this connector as viewed from the card edge.
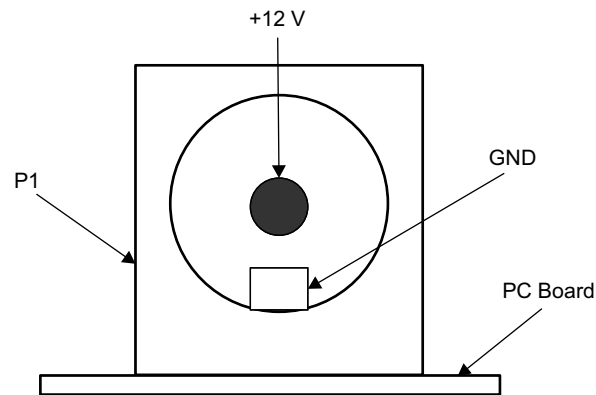
Figure 2-5. +12 V Input Jack

2.2.6 Virtual COM Port Interface

The internal SCI on the TMS570LS0432 device is connected to the second port of the XDS100V2. The XDS100V2 USB driver makes the second channel of FT2232H appear as a virtual COM port (VCP). This allows the user to communicate with the USB interface via a standard PC serial emulation port.

2.2.7 Daughter Card Interface

The HDK provides expansion connectors that can be used to accept plug-in daughter cards. The daughter card allows users to build on their EVM platform to extend its capabilities and provide customer and application specific I/O. The expansion connectors are for all major interfaces including SPIs, ADCs, GIOs, NHETs, and EQEP, and so forth.

There are three daughter card interfaces, J9, J10, and J11. These connectors are described in Table 2-4.

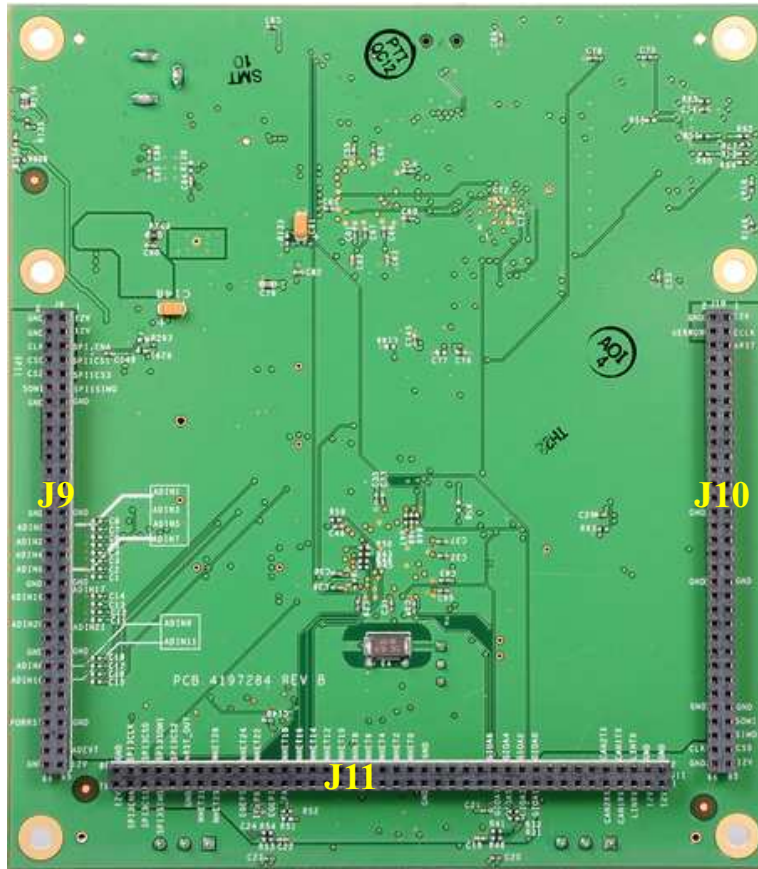**Figure 2-6. J9, J10 and J11 Connectors**

Table 2-4. Expansion Connector P2 (J9, Right, TopView)

Signal Name	Pin Number	Number	Number	Pin Number	Signal Name
EXP_12V		1	2		GND
EXP_12V		3	4		GND
SPI1ENA/NHET23/NHET30	68	5	6	67	SPI1CLK
SPI1CS[1]	93	7	8	73	SPI1CS[0]
SPI1CS[3]/NHET26	39	9	10	27	SPI1CS[2]/NHET19/NHET20
SPI1SIMO	65	11	12	66	SPI1SOMI
GND		13	14		GND
NC		15	16		NC
NC		17	18		NC
NC		19	20		NC
NC		21	22		NC
NC		23	24		NC
NC		25	26		NC
NC		27	28		NC
GND		29	30		GND
AD1IN[1]	49	31	32	42	AD1IN[0]
AD1IN[3]	52	33	34	51	AD1IN[2]
AD1IN[5]	55	35	36	54	AD1IN[4]

Table 2-4. Expansion Connector P2 (J9, Right, TopView) (continued)

Signal Name	Pin Number	Number	Number	Pin Number	Signal Name
AD1IN[7]	43	37	38	56	AD1IN[6]
GND		39	40		GND
AD1IN[17]	41	41	42	40	AD1IN[16]
NC		43	44		NC
AD1IN[21]	45	45	46	44	AD1IN[20]
NC		47	48		NC
AGND		49	50		GND
AD1IN[9]	48	51	52	57	AD1IN[8]
AD1IN[11]	53	53	54	50	AD1IN[10]
NC		55	56		NC
NC		57	58		NC
GND		59	60	31	nPORRST
NC		61	62		NC
AD1EVT/NHET28	58	63	64		NC
EXP_12V		65	66		GND

Table 2-5. Expansion Connector P1 (J9, Left, TopView)

Signal Name	Pin Number	Number	Number	Pin Number	Signal Name
EXP_12V		1	2		GND
ECLK	84	3	4	82	nERROR
nRST	81	5	6		NC
NC		7	8		NC
NC		9	10		NC
NC		11	12		NC
NC		13	14		NC
NC		15	16		NC
NC		17	18		NC
NC		19	20		NC
NC		21	22		NC
NC		23	24		NC
NC		25	26		NC
NC		27	28		NC
GND		29	30		GND
NC		31	32		NC
NC		33	34		NC
NC		35	36		NC
NC		37	38		NC
GND		39	40		GND
NC		41	42		NC
NC		43	44		NC
NC		45	46		NC
NC		47	48		NC
NC		49	50		NC
NC		51	52		NC
NC		53	54		NC
NC		55	56		NC
GND		57	58		GND

Table 2-5. Expansion Connector P1 (J9, Left, TopView) (continued)

Signal Name	Pin Number	Number	Number	Pin Number	Signal Name
SPI2_SOMI	69	59	60		NC
SPI2_SIMO	70	61	62		NC
SPI2_CS0	23	63	64	71	SPI2_CLK
EXP_12V		65	66		GND

Table 2-6. Expansion Connector P3 (J11, Bottom One, TopView)

Signal Name	Pin Number	Number	Number	Pin Number	Signal Name
EXP_12V		1	2		GND
EXP_12V		3	4		GND
LINRX	94	5	6	95	LINTX
CAN1RX	63	7	8	62	CAN1TX
CAN2RX	92	9	10	91	CAN2TX
NC		11	12		NC
NC		13	14		NC
NC		15	16		NC
NC		17	18		NC
GIOA[1]/SPI3CS2	2	19	20	1	GIOA[0]
GIOA[3]/SPI3CS3	8	21	22	5	GIOA[2]
GIOA[5]/EXTCLKIN	10	23	24	9	GIOA[4]
GIOA[7]/NHET29	18	25	26	12	GIOA[6]
NC		27	28		NC
NC		29	30		NC
NC		31	32		NC
NC		33	34		NC
GND		35	36		GND
NC		37	38	19	NHET1[0]
NC		39	40	22	NHET1[2]
NC		41	42	25	NHET1[4]
NC		43	44	26	NHET1[6]
NC		45	46	74	NHET1[8]
NC		47	48	83	NHET1[10]
NC		49	50	89	NHET1[12]
NC		51	52	90	NHET1[14]
NC		53	54	97	NHET1[16]
EQEPA	36	55	56	98	NHET1[18]
EQEPI	38	57	58		NC
EQEPB	37	59	60	11	NHET1[22]
EQEPS	93	61	62	64	NHET1[24]
NC		63	64		
GIOA7/NHET29	18	65	66	58	ADEVT/NHET28
GIOA6/SPI2CS1/NHET31	12	67	68		NC
GND		69	70		nRST
GIOA0/SPI3CS3	1	71	72	2	GIOA1/SPI3CS2
SPI3SIMO		73	74	34	SPI3SOMI
GIOA2/SPI3CS1	5	75	76	38	SPI3CS0
SPI3ENA		77	78	36	SPI3CLK
EXP_12V		79	80		GND

2.3 LEDs

The TMS570LS04 HDK board has fourteen (14) LEDs. Four of them are under user control. Those LEDs are controlled and programmed by GIO signals.

LED DS2, DS3, DS4, and DS5 indicate the presence of the power (+1.2 V, +5 V, 3.3 V, and 12 V) on the board. The LED functions are summarized in Table 2-7 and Table 2-8.

Table 2-7. Demo LEDs

LED Number	Location	Signals	Color
D2	Left Top	GIOA6	White
D4	Left Bottom	GIOA4	White
D5	Right Top	GIOA3	White
D7	Right Bottom	GIOA2	White

Table 2-8. Other LEDs as Indicator

Number	LED	Color
DS6	nERROR	Red
D9	XDS100V2 SCI RX	Blue
D8	XDS100V2 SCI TX	Blue
D10	XDS100V2 PWRENn	Blue
D1	JTAG TDI	Blue
DS1	External JTAG Emulator Used	Blue
DS5	VCC_1V2	Blue
DS3	VCC_5V	Blue
DS2	VCC_3V3	Blue
DS4	VCC_12V	Blue

2.4 Emulator and Pin Multiplexing Selection DIP Switch

There is one 2-position DIP switch (S5) located at 20-pin CTI JTAG header. By default, all of the channels are set to the "OFF" position.
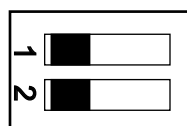
Figure 2-7. DIP Switch Settings

Table 2-9. S5 DIP Switch Functions

Switch	OFF Position (left)	ON Position (right)
S5:1 [1]	TI emulator	ARM Emulator
S5:2	SPI	EQEP

[1] S5:1 indicates slide 1 on the S5 switch, S5:2 indicates slide 2 on the S5.

2.5 Jumpers

HDK board has one jumper to select crystal or oscillator for MCU.

Table 2-10. Jumpers

Switch	Position 1 - 2	Position 2 - 3
JP1	Oscillator Y3	Crystal Y2

2.6 S3, Power-On Reset Switch

TMS570LS04 MCU has two resets: Warm Reset (nRST) and Power-On Reset (nPORRST). Switch S3 is a momentary switch that asserts power on reset to the TMS570LS0432 device. The nPORRST condition is intended to reset all logic on the device including the test and emulation circuitry.

2.7 S2, System Reset Switch

Switch S2 is used to assert a warm reset to reset the TMS570LS0432 device. Warm reset does not reset any test or emulation logic. The reset signal from window watchdog will also assert a warm reset to MCU. The System Reset can be invoked by pushing nRST button, or by RESET signals from XDS100 CPLD, ARM JTAG SREST, and CTI JTAG SREST.

2.8 S4, Pushbutton for Clock Failure Test

Switch S4 is a momentary switch that will short the OSCIN pin of the crystal to ground through a current limiting resistor. Pushing this button simulates a crystal failure and causes a CLKDET hardware fault on MCU. By default this detection will trigger the Error Signaling Module (ESM) to drive the nERROR pin. On TMS570LS04 HDK, the red LED will then light. The error can be cleared by the nPORRST (S3), cycling the power to the MCU or via safety software executed on the MCU.

Operation Notices

The user assumes all responsibility and liability for proper and safe handling of the boards. It is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge.

A.1 Support Resources

- If you have problems or need additional information regarding the embedded emulation please refer to the XDS100 USB wiki on the TI web site. The URL for this site is:
http://tiexpressdsp.com/index.php?title=XDS100

- Code Composer Studio support is available via a forum at: http://community.ti.com/forums/138.aspx

- Hercules MCU support is available via a forum at: http://www.ti.com/hercules-support

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For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

General Statement for EVMs including a radio

User Power/Frequency Use Obligations: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant

Caution

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For EVMs annotated as IC – INDUSTRY CANADA Compliant

This Class A or B digital apparatus complies with Canadian ICES-003.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Concerning EVMs including radio transmitters

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concerning EVMs including detachable antennas

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

Concernant les EVMs avec appareils radio

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

【Important Notice for Users of this Product in Japan】

This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,

2. Use this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or

3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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2. 実験局の免許を取得後ご使用いただく。
3. 技術基準適合証明を取得後ご使用いただく。

なお、本製品は、上記の「ご使用にあたっての注意」を譲渡先、移転先に通知しない限り、譲渡、移転できないものとします。

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EVALUATION BOARD/KIT/MODULE (EVM) ADDITIONAL TERMS

Texas Instruments (TI) provides the enclosed Evaluation Board/Kit/Module (EVM) under the following conditions:

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies TI from all claims arising from the handling or use of the goods.

Should this evaluation board/kit not meet the specifications indicated in the User's Guide, the board/kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Please read the User's Guide and, specifically, the Warnings and Restrictions notice in the User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For additional information on TI's environmental and/or safety programs, please visit www.ti.com/esh or contact TI.

No license is granted under any patent right or other intellectual property right of TI covering or relating to any machine, process, or combination in which such TI products or services might be or are used. TI currently deals with a variety of customers for products, and therefore our arrangement with the user is not exclusive. TI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein.

REGULATORY COMPLIANCE INFORMATION

As noted in the EVM User's Guide and/or EVM itself, this EVM and/or accompanying hardware may or may not be subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

General Statement for EVMs including a radio

User Power/Frequency Use Obligations: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant

Caution

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For EVMs annotated as IC – INDUSTRY CANADA Compliant

This Class A or B digital apparatus complies with Canadian ICES-003.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Concerning EVMs including radio transmitters

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concerning EVMs including detachable antennas

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西新宿三井ビル
http://www.tij.co.jp

EVALUATION BOARD/KIT/MODULE (EVM)
WARNINGS, RESTRICTIONS AND DISCLAIMERS

For Feasibility Evaluation Only, in Laboratory/Development Environments. Unless otherwise indicated, this EVM is not a finished electrical equipment and not intended for consumer use. It is intended solely for use for preliminary feasibility evaluation in laboratory/development environments by technically qualified electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems and subsystems. It should not be used as all or part of a finished end product.

Your Sole Responsibility and Risk. You acknowledge, represent and agree that:

1. You have unique knowledge concerning Federal, State and local regulatory requirements (including but not limited to Food and Drug Administration regulations, if applicable) which relate to your products and which relate to your use (and/or that of your employees, affiliates, contractors or designees) of the EVM for evaluation, testing and other purposes.

2. You have full and exclusive responsibility to assure the safety and compliance of your products with all such laws and other applicable regulatory requirements, and also to assure the safety of any activities to be conducted by you and/or your employees, affiliates, contractors or designees, using the EVM. Further, you are responsible to assure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard.

3. You will employ reasonable safeguards to ensure that your use of the EVM will not result in any property damage, injury or death, even if the EVM should fail to perform as described or expected.

4. You will take care of proper disposal and recycling of the EVM's electronic components and packing materials.

Certain Instructions. It is important to operate this EVM within TI's recommended specifications and environmental considerations per the user guidelines. Exceeding the specified EVM ratings (including but not limited to input and output voltage, current, power, and environmental ranges) may cause property damage, personal injury or death. If there are questions concerning these ratings please contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, some circuit components may have case temperatures greater than 60°C as long as the input and output are maintained at a normal ambient operating temperature. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors which can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during normal operation, please be aware that these devices may be very warm to the touch. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use these EVMs.

Agreement to Defend, Indemnify and Hold Harmless. You agree to defend, indemnify and hold TI, its licensors and their representatives harmless from and against any and all claims, damages, losses, expenses, costs and liabilities (collectively, "Claims") arising out of or in connection with any use of the EVM that is not in accordance with the terms of the agreement. This obligation shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if the EVM fails to perform as described or expected.

Safety-Critical or Life-Critical Applications. If you intend to evaluate the components for possible use in safety critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, such as devices which are classified as FDA Class III or similar classification, then you must specifically notify TI of such intent and enter into a separate Assurance and Indemnity Agreement.

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TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

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In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have *not* been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components which meet ISO/TS16949 requirements, mainly for automotive use. Components which have not been so designated are neither designed nor intended for automotive use; and TI will not be responsible for any failure of such components to meet such requirements.

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