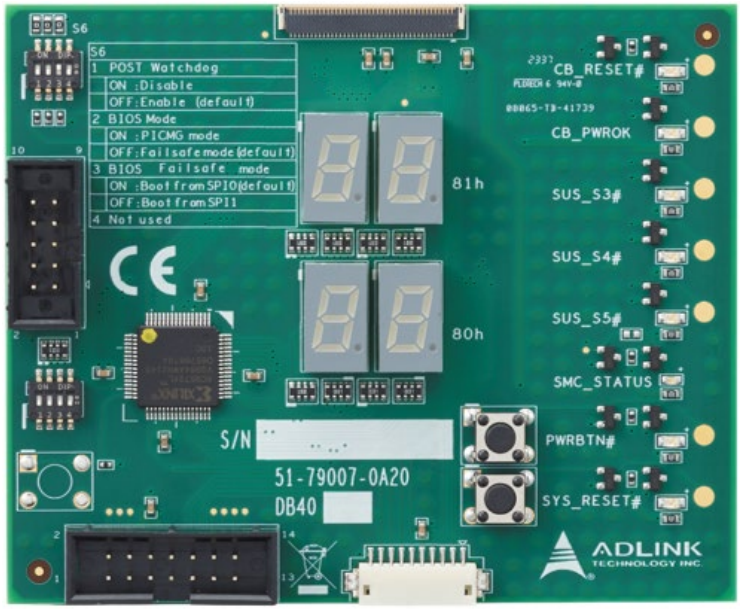
DB40 Debug Board

User's Guide



COM Express®

Revision:	Rev. 1.0
Date:	2024-06-11
Part Number:	50M-79007-1000

ADLINK
LEADING EDGE COMPUTING

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Revision History

Revision	Description	Date	Author
1.0	Initial release	2024-06-11	AL

Copyright © 2024 ADLINK Technology, Inc.
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Preface

Disclaimer

Information in this document is provided in connection with ADLINK products. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in ADLINK´s Terms and Conditions of Sale for such products, ADLINK assumes no liability whatsoever, and ADLINK disclaims any express or implied warranty, relating to sale and/or use of ADLINK products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right. If you intend to use ADLINK products in or as medical devices, you are solely responsible for all required regulatory compliance, including, without limitation, Title 21 of the CFR (US), Directive 2007/47/EC (EU), and ISO 13485 & 14971, if any. ADLINK may make changes to specifications and product descriptions at any time, without notice.

Environmental Responsibility

ADLINK is committed to fulfil its social responsibility to global environmental preservation through compliance with the European Union's Restriction of Hazardous Substances (RoHS) directive and Waste Electrical and Electronic Equipment (WEEE) directive. Environmental protection is a top priority for ADLINK. We have enforced measures to ensure that our products, manufacturing processes, components, and raw materials have as little impact on the environment as possible. When products are at their end of life, our customers are encouraged to dispose of them in accordance with the product disposal and/or recovery programs prescribed by their nation or company.





California Proposition 65 Warning: This product can expose you to chemicals including acrylamide, arsenic, benzene, cadmium, Tris(1,3-dichloro-2-propyl)phosphate (TDCPP), 1,4-Dioxane, formaldehyde, lead, DEHP, styrene, DINP, BBP, PVC, and vinyl materials, which are known to the State of California to cause cancer, and acrylamide, benzene, cadmium, lead, mercury, phthalates, toluene, DEHP, DIDP, DnHP, DBP, BBP, PVC, and vinyl materials, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Trademarks

Product names mentioned herein are used for identification purposes only and may be trademarks / registered trademarks of respective companies.

Copyright © 2024 ADLINK Technology Incorporated

This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

Copyright © 2024 ADLINK Technology, Inc.
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Safety Instructions

For user safety, please read and follow all Instructions, **WARNING**s, **CAUTION**s, and **NOTE**s marked in this manual and on the associated equipment before handling/operating the equipment.

Read these safety instructions carefully.

1. Keep this manual for future reference.
2. Read the specifications section of this manual for detailed information on the operating environment of this equipment.
3. Turn off power and unplug any power cords/cables when installing/mounting or un-installing/removing equipment.
4. To avoid electrical shock and/or damage to equipment:
5. Keep equipment away from water or liquid sources;
6. Keep equipment away from high heat or high humidity;
7. Keep equipment properly ventilated (do not block or cover ventilation openings);
8. Make sure to use recommended voltage and power source settings;
9. Always install and operate equipment near an easily accessible electrical socket outlet;
10. Secure the power cord (do not place any object on/over the power cord);
11. Only install/attach and operate equipment on stable surfaces and/or recommended mountings;
12. If the equipment will not be used for long periods of time, turn off the power source and unplug the equipment.

Copyright © 2024 ADLINK Technology, Inc.
ADLINK LEADING EDGE COMPUTING
LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Conventions

The following conventions may be used throughout this manual, denoting special levels of information

Note: This information adds clarity or specifics to text and illustrations.

Caution: This information indicates the possibility of minor physical injury, component damage, data loss, and/or program corruption.

Warning: This information warns of possible serious physical injury, component damage, data loss, and/or program corruption.

Copyright © 2024 ADLINK Technology, Inc.
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Getting Service

Ask an Expert: https://www.adlinktech.com/en/Askanexpert

ADLINK Technology, Inc.
No. 66, Huaya 1st Rd., Guishan District, Taoyuan City 333411, Taiwan
Tel: +886-3-216-5088
Fax: +886-3-328-5706
Email: service@adlinktech.com

Ampro ADLINK Technology, Inc.
6450 Via Del Oro, San Jose, CA 95119-1208, USA
Tel: +1-408-360-0200
Toll Free: +1-800-966-5200 (USA only)
Fax: +1-408-600-1189
Email: info@adlinktech.com

ADLINK Technology (China) Co., Ltd.
300 Fang Chun Rd., Zhangjiang Hi-Tech Park, Pudong New Area, Shanghai, 201203, China
Tel: +86-21-5132-8988
Fax: +86-21-5132-3588
Email: market@adlinktech.com

ADLINK Technology GmbH
Hans-Thoma-Strasse 11, D-68163 Mannheim, Germany
Tel: +49-621-43214-0
Fax: +49-621 43214-30
Email: emea@adlinktech.com

Please visit the Contact page at www.adlinktech.com for information on how to contact the ADLINK regional office nearest you.

Copyright © 2024 ADLINK Technology, Inc.
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Table of Contents

Revision History 2

Preface 3

1. Introduction 8
   1.1. Supported Computer-on-Modules (COM) 9
2. Specifications 10
   2.1. Basic Information 10
3. Block Diagram 11
4. Connector and Pinout Descriptions 13
   4.1. 40-pin FFC Connector to COM Express Modules 13
   4.2. BIOS 14-Pin Connector 14
   4.3. BMC 10-pin Header 15
5. Debug board 16
   5.1. Debug Board Pin Connectors 17
   5.2. Buttons and Switches 17
   5.3. Display and LEDs 18
      5.3.1 Boot-up Procedure – Hexadecimal Display 18
      5.3.2 LED Indicator Table 18
      5.3.3 BMC Status LED 19

Copyright © 2024 ADLINK Technology, Inc.

ADLINK LEADING EDGE COMPUTING

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1. Introduction

The DB40 Debug card is designed for debugging COM Express and PC/104 boards.

It includes the following features:

- Port 80/81 decoding for Power-On Self-Test (POST) via LPC
- Interface to SPI Flash for BIOS updates
- Interface to Board Management Controller (BMC) for update
- Power and reset buttons and status LEDs The DB40 Debug card can only be used on products that have the appropriate FFC debug connector designed for this purpose. (Includes DB40 Debug Module, two 40-pin FFC cables, and 14-pin cable for SP100 DediProg USB to SPI programmer.)

Copyright © 2024 ADLINK Technology, Inc.
ADLINK LEADING EDGE COMPUTING
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.1. Supported Computer-on-Modules (COM)

The DB40 Debug board is compatible with the COM Express modules listed below.

Product Name	Description
Express-CFR	Basic size COM Express Type 6 module based on Intel Coffee Lake-H Refresh platform
Express-CF/CFE	Basic size COM Express Type 6 module based on Intel Coffee Lake-H platform
cExpress-WL	Compact size COM Express Type 6 module based on Intel Whiskey Lake platform
Express-DN7	Basic size COM Express Type 7 module based on Intel Denverton-NS platform
Express-KL/KLE	Basic size COM Express Type 6 module based on Intel Kaby Lake-H platform
cExpress-KL	Compact size COM Express Type 6 module based on Intel Kaby Lake-U platform
Express-BD7/BD7	Basic size COM Express Type 7 module based on Intel Broadwell-DE platform
cExpress-AL	Compact size COM Express Type 6 module based on Intel Apollo Lake platform
nanoX-AL	mini size COM Express Type 10 module based on Intel Apollo Lake platform
cExpress-BW	Compact size COM Express Type 6 module based on Intel Braswell platform
Express-SL/SLE	Basic size COM Express Type 6 module based on Intel Sky Lake-H platform
cExpress-SL	Compact size COM Express Type 6 module based on Intel Sky Lake-U platform
Express-BL	Basic size COM Express Type 6 module based on Intel Broadwell platform
cExpress-BL	Compact size COM Express Type 6 module based on Intel Broadwell ULT platform
cExpress-BT	Compact size COM Express Type 6 module based on Intel Baytrail platform
cExpress-BT2	Compact size COM Express Type 2 module based on Intel Baytrail platform
nanoX-BT	mini size COM Express Type 10 module based on Intel Baytrail platform
Express-HL/HLE	Basic size COM Express Type 6 module based on Intel Haswell platform
Express-HL2	Basic size COM Express Type 2 module based on Intel Haswell platform
cExpress-HL	Compact size COM Express Type 6 module based on Intel Haswell ULT platform

Copyright © 2024 ADLINK Technology, Inc.
ADLINK LEADING EDGE COMPUTING
LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2. Specifications

2.1. Basic Information

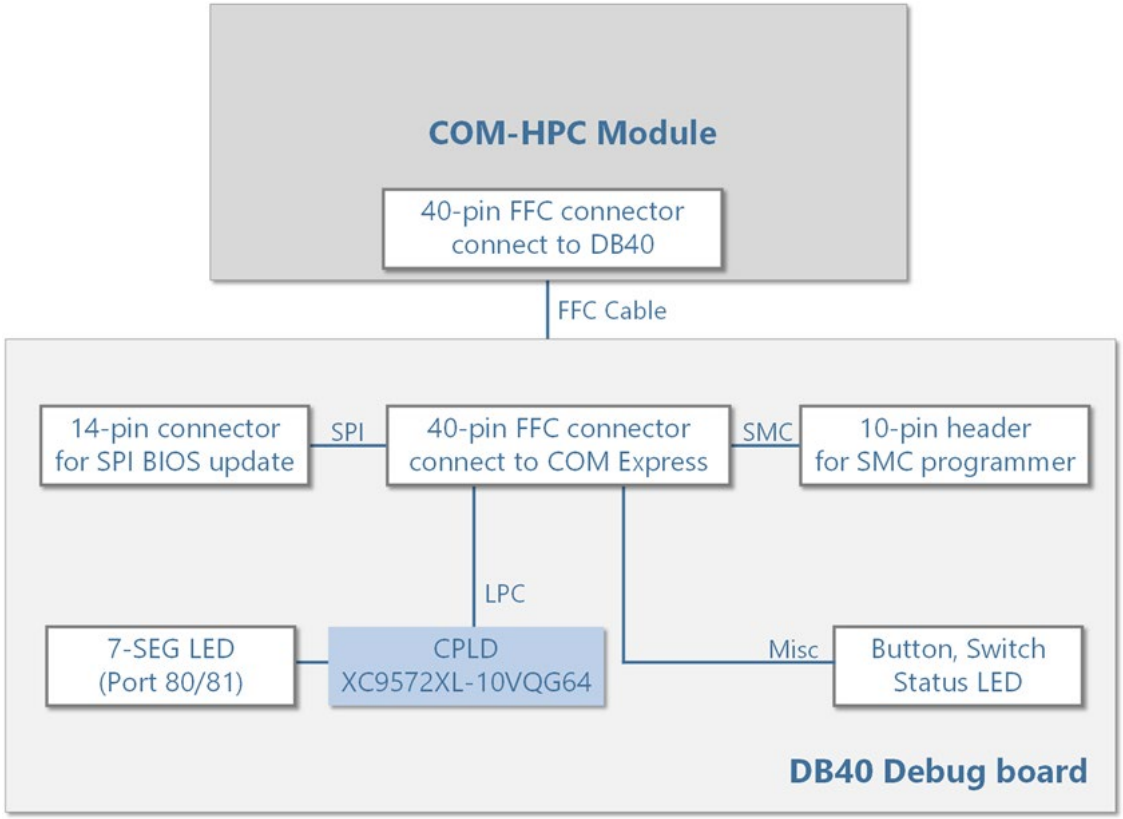
Dimensions: 70 x 73 x 1.6 mm (WxHxD)

Operating temperature: 0°C to 60°C

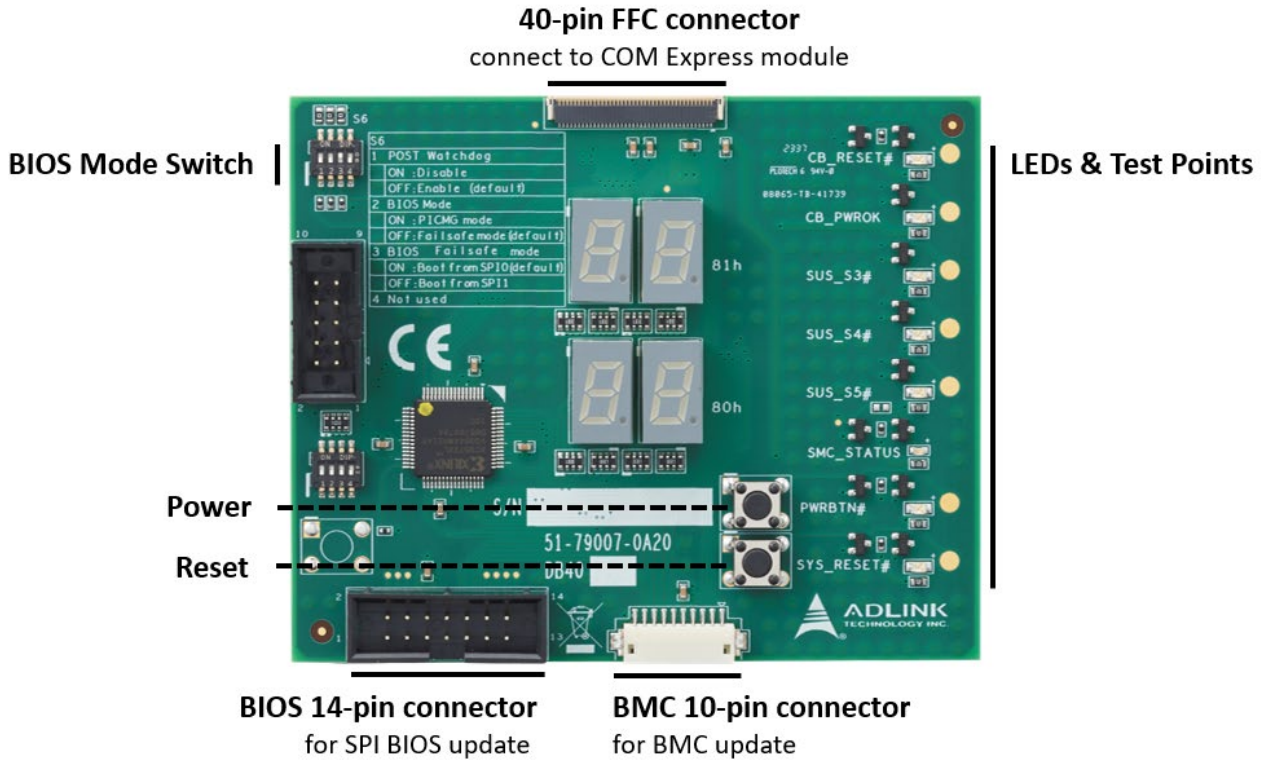
Ordering number: 91-79007-0020
(ADLINK P/N, includes DB40 Debug card and its necessary cables)

Copyright © 2024 ADLINK Technology, Inc.
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3. Block Diagram



Copyright © 2024 ADLINK Technology, Inc.
ADLINK LEADING EDGE COMPUTING
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



Copyright © 2024 ADLINK Technology, Inc.
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4. Connector and Pinout Descriptions

This section describes the available connectors and pinouts on the board

4.1. 40-pin FFC Connector to COM Express Modules

This interface utilizes FFC (FlexFoil cable) to connect the debug board to the COM Express Module.

Connector type: FFC 40-pin, 0.5mm pitch

Pin #	Description
1	SPI-VCC
2	GND
3	SPI_BIOS_CS0#
4	SPI_BIOS_CS1#
5	SPI_BIOS_MISO
6	SPI_BIOS_MOSI
7	SPI_BIOS_CLK
8	LPC-3.3V
9	GND
10	BIOS_DIS0
11	LPC_RESET#
12	LPC_CLK33
13	LPC_FRAME#
14	LPC_AD3
15	LPC_AD2
16	LPC_AD1
17	LPC_AD0
18	BMC-VCC
19	3.3V-STANDBY
20	GND

Pin #	Description
21	BMC_TXD
22	BMC_RXD
23	BMC_FLMD0
24	BMC_RESET_IN#
25	BMC_DATA
26	BMC_CLOCK
27	BMC_OCDA0
28	BMC_OCDB0
29	PWRBTN#
30	RSTBTN#
31	CB_RESET#
32	CB_PWROK
33	SUS_S3#
34	SUS_S4#
35	SUS_S5#
36	POST WTD DISABLE#
37	SELECT BIOS
38	BIOS_MODE
39	SMC_STATUS
40	RESERVED

Copyright © 2024 ADLINK Technology, Inc.
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.2. BIOS 14-Pin Connector

This interface is used for updating the SPI BIOS flash located on the COM EXPRESS module. It requires a compatible SPI programmer, such as the DEDIPROG SF100.

Connector type: IDC 14-pin, 2.54mm pitch

Pin #	Description
1	Not connected
2	Not connected
3	SPI_BIOS_CS1#
4	Not connected
5	VCC_SPI
6	GND
7	SPI_BIOS_CS0#
8	SPI_BIOS_CLOCK
9	SPI_BIOS_MISO
10	SPI_BIOS_MOSI
11	Not connected
12	Not connected
13	Not connected
14	Not connected

Copyright © 2024 ADLINK Technology, Inc.
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.3. BMC 10-pin Header

This interface facilitates the updating of the BMC located on the COM EXPRESS module using a compatible programmer.

Header type: Hirose DF13 10pin

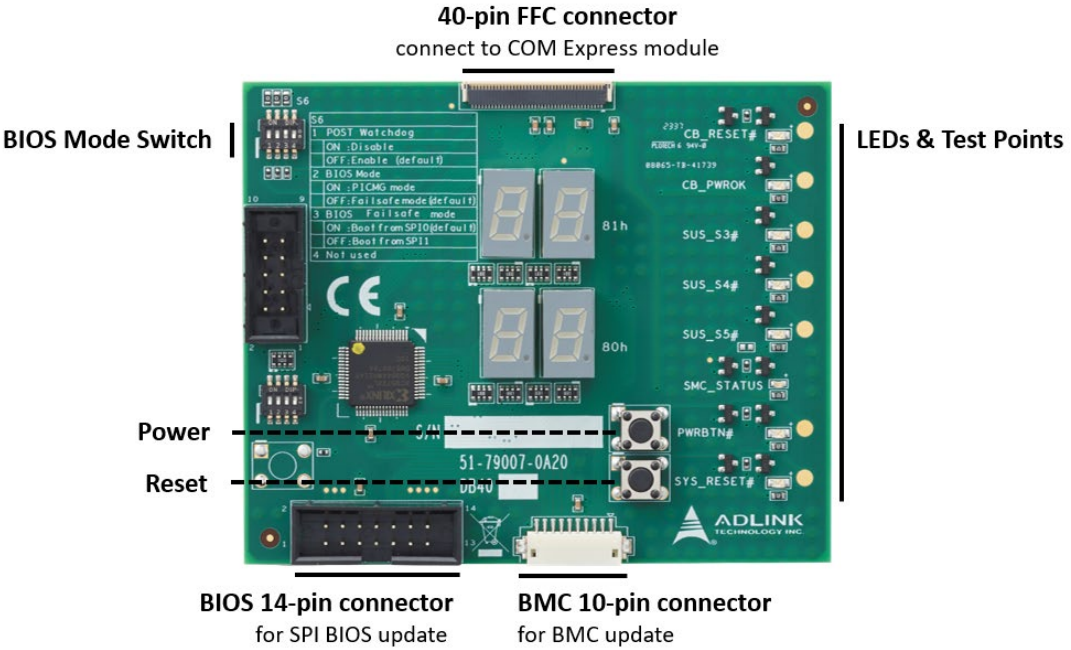
Pin #	Description
1	BMC_RESET_IN#
2	BMC_TXD
3	BMC_RXD
4	BMC_FLMD0
5	VCC_BMC
6	BMC_DATA
7	BMC_CLOCK
8	BMC_OCD0A
9	BMC_OCD0B
10	GND

Copyright © 2024 ADLINK Technology, Inc.
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5. Debug board

The DB40 Debug board is used for COM Express modules during a project's development stage. It includes the following features:

- **Interface to SPI Flash** for BIOS update
- **Interface to BMC** for BMC update
- **Power and Reset Buttons**
- **Status LEDs and Test Points** for CB_REST#, CB_PWROK, SLP_S3#, SLP_S4#, SLP_S5#, EC_STATUS, PWR_BTN#, SYS_RESET#
- **Port 80 Decoding Interface** with hexadecimal LED display for Power on and Self-test (POST) via LPC bus

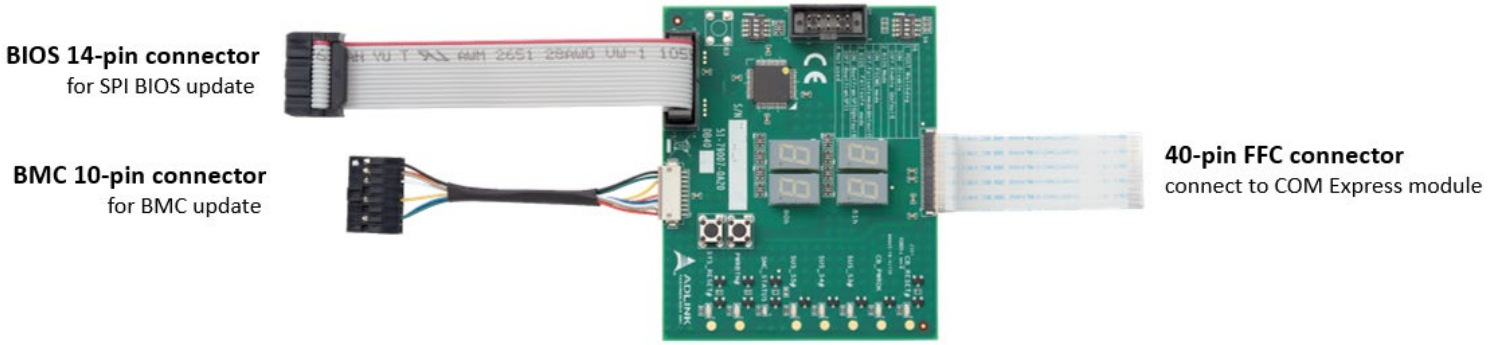


Caution: The DB40 Debug board can only be used on products that have the appropriate FFC debug connector for this usage.

Copyright © 2024 ADLINK Technology, Inc.
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5.1. Debug Board Pin Connectors

For firmware updates, make sure to connect the following three cables as shown below.



5.2. Buttons and Switches

This section describes the buttons and switches on the DB40 Debug board.

Power Button (PWRBTN): This button triggers the PWRBTN# signal of a COM EXPRESS module.

Reset Button (RESET): This button triggers the SYS_RESET# signal of a COM EXPRESS module.

Mode Switch: This 4-pole DIP switch allows selection of various modes available

Switch #	Function
1	POST WATCHDOG ON = Disable OFF = Enable (default)
2	BIOS MODE ON = PICMG MODE OFF = FAILSAFE MODE (default)
3	BIOS FAILSAFE MODE ON = Boot from SPI0 (default) OFF = Boot from SPI1
4	NOT USED

Copyright © 2024 ADLINK Technology, Inc.
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5.3. Display and LEDs

This section describes the hexadecimal display and LED functionality

5.3.1 Boot-up Procedure – Hexadecimal Display

During power-up and BIOS execution, the CPU will first retrieve commands from POST and executes them. Each command is assigned a corresponding debug port data code or BIOS POST checkpoint code. The LED display shows the results from each checkpoint, enabling technicians or administrators to debug the system properly.

- The POST code is written on I/O port 80 hex.
- The POST code is shown on the two 7-segment LED displays on the debug board.
- The Port 80 decoding interface is dependent on the module design.

5.3.2 LED Indicator Table

The table below shows the state of system signals indicated by the LED indicator.

LED	Function
CB_RESET#	LED will lit on active reset signal of the carrier board
CB_PWROK	LED will lit on active power of the COM EXPRESS module
SLP_S3#	LED will lit on released SUS_S3# signal from the COM EXPRESS module
SLP_S4#	LED will lit on released SUS_S4# signal from the COM EXPRESS module
SLP_S5#	LED will lit on released SUS_S5# signal from the COM EXPRESS module
EC_STATUS	LED will show the status of the EC on the COM EXPRESS module
PWR_BTN#	LED will lit on active power button signal of the COM EXPRESS module
SYS_RESET#	LED will lit on active reset signal of the COM EXPRESS module

Copyright © 2024 ADLINK Technology, Inc.
ADLINK LEADING EDGE COMPUTING
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5.3.3 BMC Status LED

The table below shows the BMC status via Embedded Controller (EC) status LEDs.

Behavior	Description
Blinking status LED	It indicates a failure during power-up. The number of flashes indicates an error code.This signaling code indicates issues such as a missing/wrong system voltage, being stuck on the reset line, BIOS failure, or an unexpected shutdown of an on-board power supply. The error codes are board-specific. Please refer to the corresponding COM EXPRESS module manual for details.
Bright blue flash	A system state has changed due to power-button activity, reset-button activity, PCI_RST# activity, or activity on SLP_Sx signals.
Fast blinking status LED	If and when the board is running on Fail-Safe-BIOS.
Blue flashes every 4s	System is in suspend-to-RAM.

Copyright © 2024 ADLINK Technology, Inc.
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000