IDB-HCS12DP
Evaluation Board
For Motorola MC9S12DP256

User's Manual

1. Introduction

Overview

The IDB-HCS12DP Evaluation Board demonstrates the capabilities of the 112-pin MC9S12DP256 device. The IDB-HCS12DP Evaluation Board can be used as a standalone application or with an emulator system, such as inDART-HCS12, through a standard BDM connection.

Board Features

The IDB-HCS12DP Evaluation Board has the following hardware features:

1. An "MCU" section containing:
    - An MC9S12DP256 microcontroller (in LQFP112 package);
    - A connector area to access the I/O pins of the microcontroller for expansion prototyping;
    - A 16-MHz oscillator, together with a jumper for the oscillator source selection.
2. An "MCU SETTINGS" section which defines the MCU operating mode upon reset;

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SofTec Microsystems

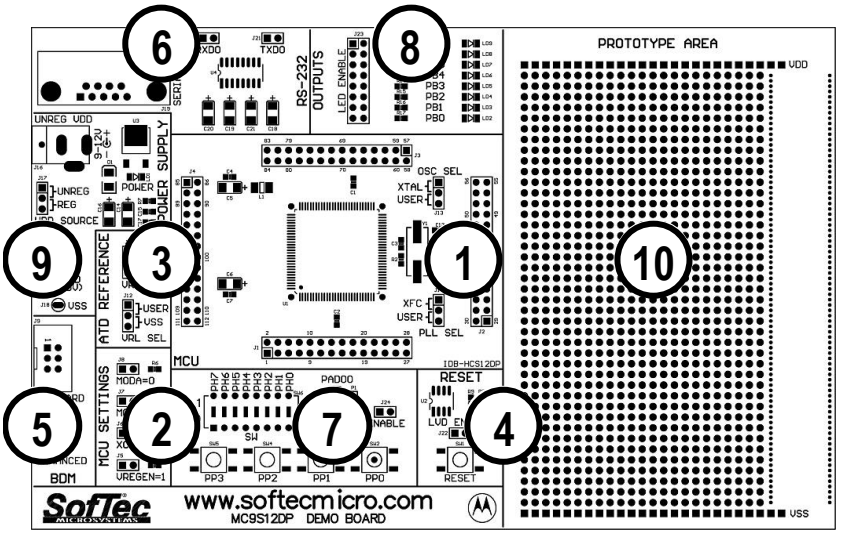
E-mail (general information): info@softecmicro.com

E-mail (marketing department): marketing@softecmicro.com

E-mail (technical support): support@softecmicro.com

Web: http://www.softecmicro.com

3. An “ATD REFERENCE” section which allows you to define the high and low threshold for the MCU internal A/D converter;
4. A “RESET” section containing the LVD circuitry and a push-button connected to the MCU RESET pin;
5. A “BDM” section, containing a standard BDM connector for in-circuit debugging/programming plus an additional connector for advanced debugging (MODA, MODB, ECLK);
6. An “RS-232” section providing a D-SUB 9-pin female connector together with two jumpers to connect/disconnet the RXD0 and TXD0 pins to/from the RS-232 circuitry;
7. An “INPUTS” section containing:
   - Four push-buttons, connected to PP0, PP1, PP2 and PP3;
   - Eight general-purpose DIP-switched connected to Port H;
   - A potentiometer, together with a jumper to connect/disconnect it to/from PAD00.
8. An “OUTPUTS” section containing eight high-efficiency (low-current) LEDs connected to Port B, together with eight jumpers to connect/disconnect each of the eight LEDs to/from their respective Port B pins;
9. A “POWER SUPPLY” section containing a connector for a 9-12 V, 500 mA (unregulated) power supply plus an auxiliary connector for a 5 V (max., regulated) power supply, together with a jumper to select the power supply source;
10. A prototyping area.



The IDB-HCS12DP Demo Board

Recommended Reading

Motorola MC9S12DP256 Device User Guide;

Motorola HCS12 Core User Guide, and all of the MC9S12DP256 individual “Block User Guides”;

inDART-HCS12 User’s Manual.

2. Getting Started

Overview

The IDB-HCS12DP Evaluation Board may be used as a standalone application or with a BDM-based emulator/programmer (host mode).

Powering Up the Board

The IDB-HCS12DP Evaluation Board can be powered either via the "UNREG VDD" connector (J16) or the "REG VDD" connector (J15).

- The "UNREG VDD" connector accepts 9-12 V DC, 500 mA wall plug-in power supply with a 2.1 mm pin and sleeve plug with positive in the center and sleeve as ground. When powering the board through this connector, make sure the "VDD SOURCE" jumper (J17) selects the "UNREG" position. The "UNREG VDD" voltage is internally regulated to 5 V DC.
- The "REG VDD" connector accepts 5 V DC (max.) When powering the board through this connector, make sure the "VDD SOURCE" jumper (J17) selects the "REG" position. The "REG VDD" voltage directly powers the microcontroller and the rest of the board. The "REG VDD" connector has been designed to be used together with inDART-HCS12.

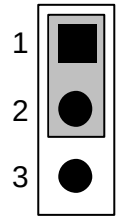
Running the Example

The IDB-HCS12DP Evaluation Board can be used in conjunction with a BDM-based emulator/programmer, such a SofTec Microsystems inDART-HCS12 In-Circuit Debugger/Programmer or a Motorola development tool.

If you use the evaluation board with SofTec Microsystems inDART-HCS12, a sample application is available, where the program execution is controlled by the host PC. You can use the PC, additionally, to debug the application by, for example, execute the program step by step and watching how the microcontroller registers vary, by using the Metrowerks CodeWarrior HC12 IDE provided with inDART-HCS12. Please refer to the inDART-HCS12 user's manual for a step-by-step tutorial.

3. Hardware Reference

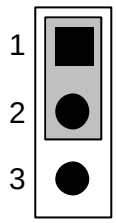
"MCU" Section



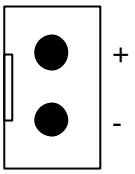
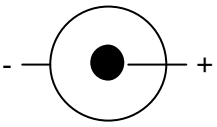
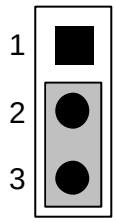
J13 – OSC SEL

1-2 Enables on-board oscillator (default)

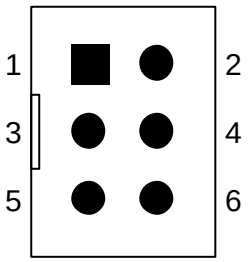
2-3 User-provided clock (to EXTAL pin)

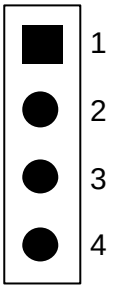
	**J14 – PLL SEL** **1-2 Enables on-board PLL filter (default)** 2-3 User-provided PLL filter (to XFC pin)

"POWER SUPPLY" Section

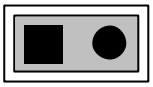
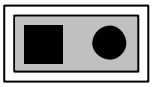
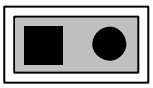
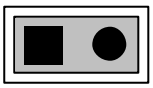
	**J15 – REG VDD** Input: 5 V DC (max.) No internal regulator used.
	**J16 – UNREG VDD** Input: 9-12 V DC (500 mA max.) Internally regulated to 5 V DC.
	**J17 – VDD SOURCE** 1-2 Use the "UNREG VDD" connector (J16) **2-3 Use the "REG VDD" connector (J15) (default)**

"BDM" Section

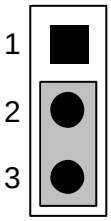
	**J9 – STANDARD BDM CONNECTOR** 1 BKGD 2 GND 3 N.C. 4 RESET# 5 N.C. 6 VDD

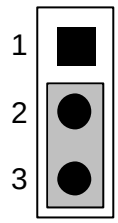
	**J10 – ENHANCED BDM CONNECTOR** 1 MODA 2 MODB 3 ECLK 4 VSS

"MCU SETTINGS" Section

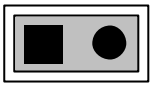
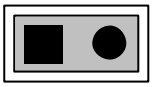
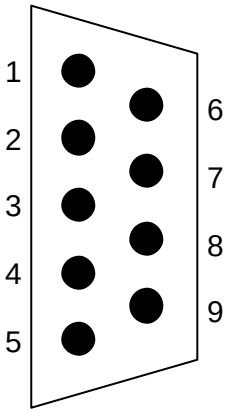
	**J5 – VREGEN=1** **Installed: VREGEN pin pulled to VDD via 10K (default)** Not Installed: VREGEN pin N.C. (user)
	**J6 – XCLKS=1** **Installed: XCLKS# pin pulled to VDD via 10K (default)** Not Installed: XCLKS# pin N.C. (user)
	**J7 – MODB=0** **Installed: MODB pin pulled to VSS via 10K (default)** Not Installed: MODB pin N.C.
	**J8 – MODA=0** **Installed: MODA pin pulled to VSS via 10K (default)** Not Installed: MODA pin N.C.

"ATD REFERENCE" Section

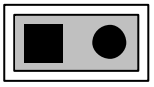
	**J11 – VRH SEL** 1-2 VRH pin N.C. (user) **2-3 VRH pin connected to VDDA pin (default)**

	**J12 – VRL SEL** 1-2 VRL pin N.C. (user) **2-3 VRH pin connected to VSS (default)**

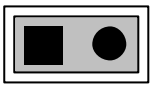
"RS-232" Section

	**J20 – RX ENABLE** **Installed: RXD0 pin used by RS-232 circuitry (default)** Not Installed: RXD0 pin N.C. (user)
	**J21 – TX ENABLE** **Installed: TXD0 pin used by RS-232 circuitry (default)** Not Installed: TXD0 pin N.C. (user)
	**J19 – RS-232 CONNECTOR** **(Note: RS-232 functionality is guaranteed only if the target microcontroller is powered at 5 V).** 1 N.C. 2 TX 3 RX 4 N.C. 5 VSS 6 N.C. 7 N.C. 8 N.C. 9 N.C.

"RESET" Section

	**J22 – LVD ENABLE** **Installed: RESET pin used by LVD circuitry (default)** Not Installed: RESET pin N.C. (user)

"INPUTS" Section

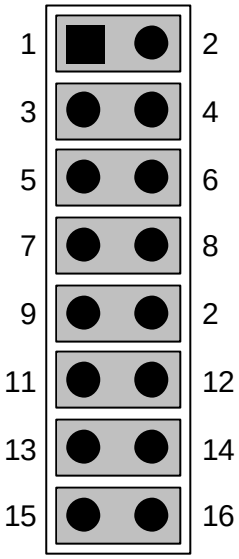


J24 – POTENTIOMETER ENABLE

Installed: **Potentiometer connected to PAD00 pin (default)**

Not Installed: PAD00 pin N.C. (user)

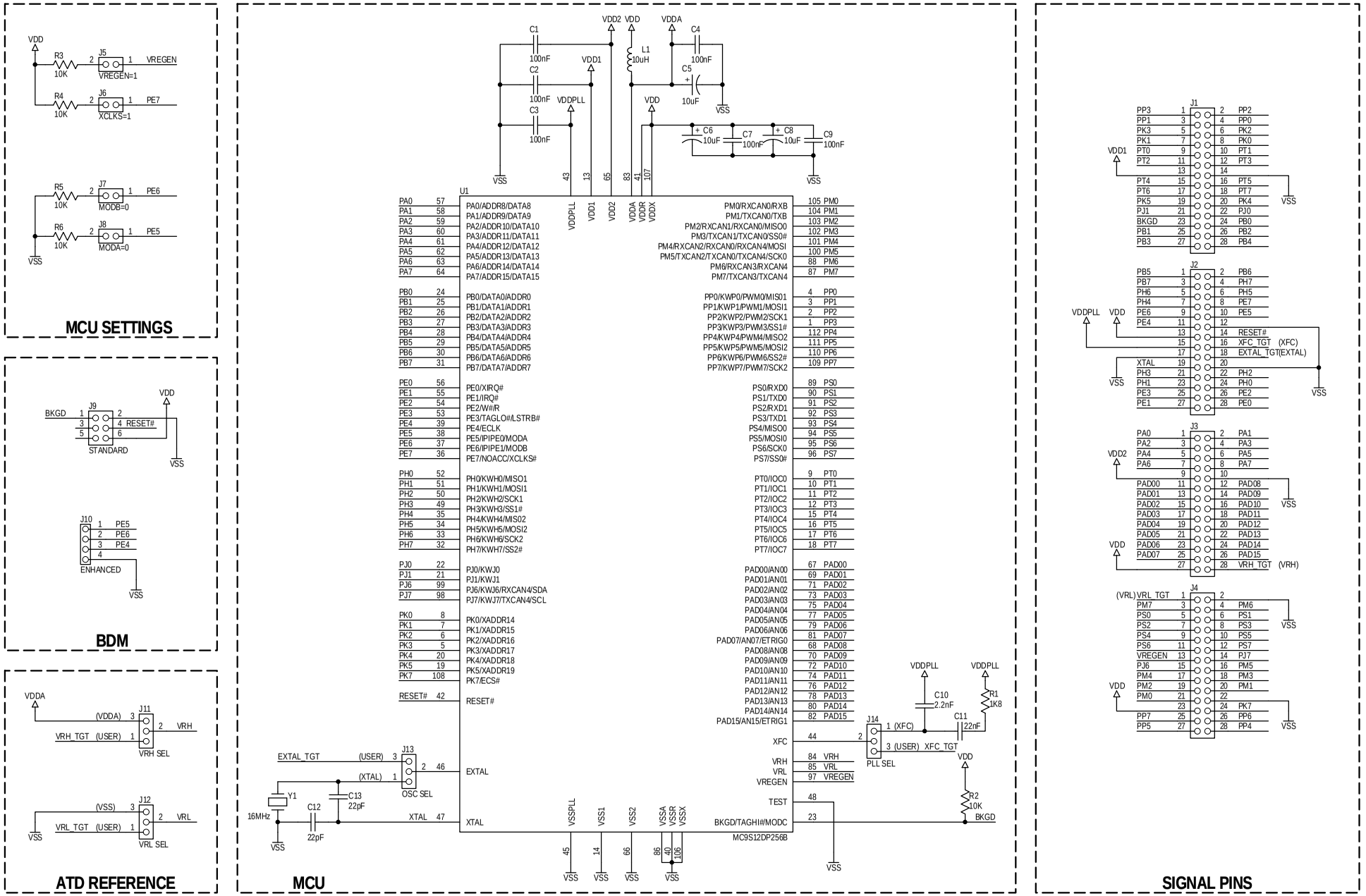
"OUTPUTS" Section



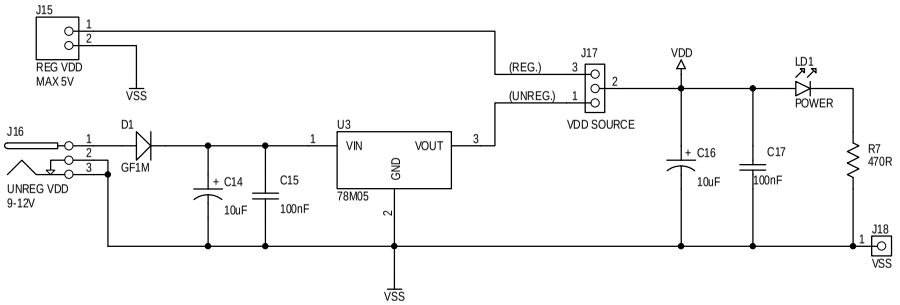
J23 – LED ENABLE

Each jumper, when installed, connects a LED to the respective PBx pin.

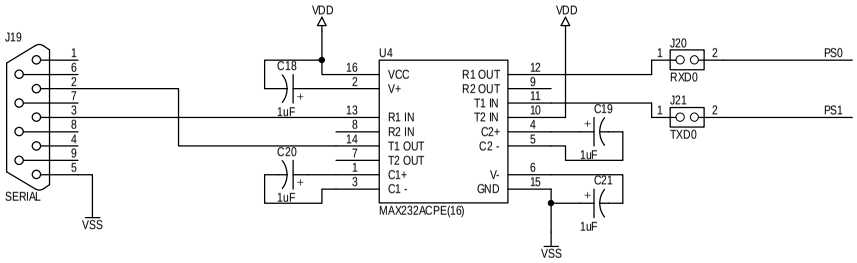
When a jumper is not installed, the respective PBx pin is N.C. (user).



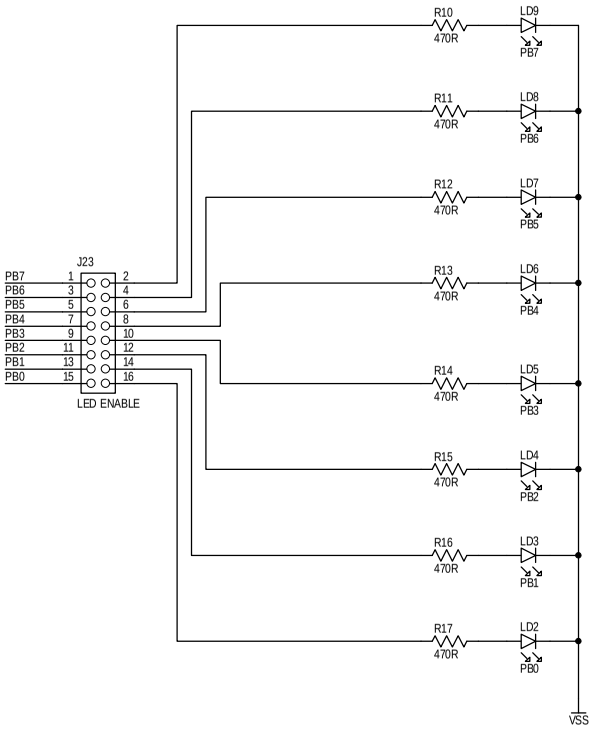
SofTec MICROSYSTEMS	www.softecmicro.com	ID: SD00329	IDB-HCS12DP (CPU)	Date: 04/07/2003	Sheet: 1/2



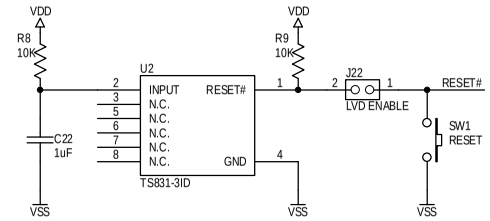
POWER SUPPLY



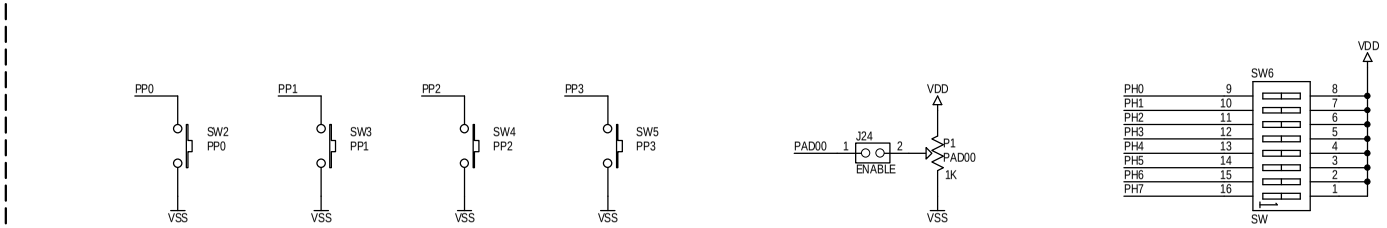
RS-232



OUTPUTS



RESET



INPUTS

SofTec MICROSYSTEMS	www.softecmicro.com	ID: SD00329	IDB-HCS12DP (Power & I/0)	Date: 04/07/2003	Sheet: 2/2