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Freescale Semiconductor

CSM-56F801

Development Module for Freescale DSP56F801

freescale™ semiconductor

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REVISION

Date	Rev	Comments
December 2, 2005	C	Updated format and revision

CAUTIONARY NOTES

1) Electrostatic Discharge (ESD) prevention measures should be used when handling this product. ESD damage is not a warranty repair item.

2) Axiom Manufacturing does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under patent rights or the rights of others.

3) EMC Information on the CSM-56F801 module:

   a) This product as shipped from the factory with associated power supplies and cables, has been verified to meet with requirements of CE and the FCC as a **CLASS B** product.

   b) This product is designed and intended for use as a development platform for hardware or software in an educational or professional laboratory.

   c) In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate prevention measures.

   d) Attaching additional wiring to this product or modifying the products operation from the factory default as shipped may effect its performance and cause interference with nearby electronic equipment. If such interference is detected, suitable mitigating measures should be taken.

TERMINOLOGY

This development module uses option selection jumpers and cut-traces to setup default configuration. Terminology for application of the option jumpers is as follows:

Jumper – a plastic shunt that connects 2 terminals electrically

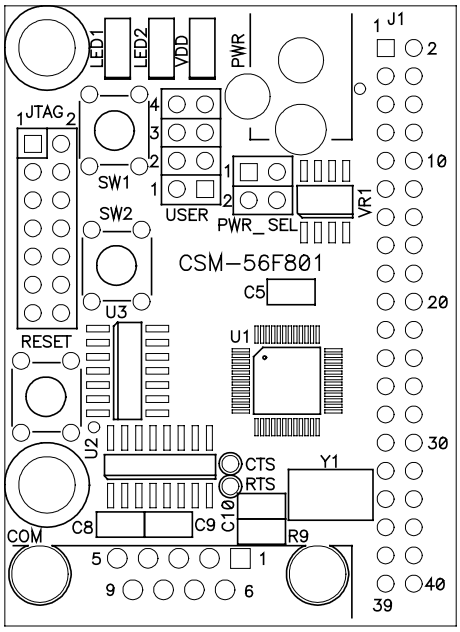
Jumper on, in, or installed - jumper is installed such that 2 pins are connected together

Jumper off, out, or idle - jumper is installed on 1 pin only. It is recommended that jumpers be idled by installing on 1 pin so they will not be lost.

Cut-Trace – a circuit trace connection between component pads. The circuit trace may be cut using a razor knife to break the default connection. To reconnect the circuit, simply install a suitably sized 0-ohm resistor or attach a wire across the pads.

CSM-56F801

The CSM-56F801 is an evaluation or demonstration board for the DSP56F801 digital signal processor. The included wall plug, DB9 serial cable, sample software tools, examples, and debug monitor make application development quick and easy. A JTAG port is provided for development tool application and is compatible with JTAG interface cables and software. A 40-pin MPU I/O connector allows connecting the CSM-56F801 module to an expanded evaluation environment.



FEATURES

- DSP56F801 DSP, 48 LQFP
  - 40 MIPS
  - 16K Byte Data Flash
  - 4K Byte Program Flash
  - 2K Byte Boot Flash
  - 2K Byte Data RAM
  - 2K Byte Program RAM
  - Low-Voltage Interrupt
  - Internal Relaxation Oscillator
  - 2 General Purpose Quad Timers
  - 11 I/O Lines
  - Embedded PLL
  - SCI and SPI Ports
  - JTAG/OnCE Port
  - Two 4-Ch, 12-bit ADC
  - 6-Ch, 15-bit Edge- or Center-Aligned PWM
- 40 pin connector provides access to MPU I/O signals
- Power Input Selection Jumper
- Regulated +3.3V power supply
- Optional power input from MPU I/O Port connector
- Optional power output through MPU I/O Port connector
- Optional Ceramic Resonator
- RS-232 Serial Port w/ DB9 Connector
- User Components Provided
  - 3 Push Button Switches: 2 User, RESET
  - 3 LED Indicators: 2 User, VDD
- Jumpers
  - Disable User Functions
  - Power Select
- Connectors
  - 40-pin Connector
  - 2.0mm Barrel Connector Power Input
  - JTAG Connector
  - DB9 Communications Connector
- Supplied with DB9 Serial Cable, Documentation (CD), Manual, and Wall plug type power supply.

Specifications:
Module Size 2.2” x 1.6”
Power Input: +9VDC @ 200 mA typical, +4 to +16VDC range

GETTING STARTED

The CSM-56F801 single board computer is a fully assembled, fully functional development module for the Freescale DSP56F801 digital signal processor. The module comes with a serial cable, power supply, and installed binary monitor for stand-alone operation. Support software for this development module is provided for Windows 95/98/NT/2000/XP operating systems.

Users should be familiar with the hardware and software operation of the target MPU. Refer to the DSP56F801 User Manual and Reference Manual for details on MPU operation. The module's purpose is to promote the features of the DSP56F801 and to assist the user in quickly developing an application in a known working environment. Users should be familiar with memory mapping, memory types, and embedded software design for quick, successful, application development.

Use of the CSM-56F801 module requires Metrowerks CodeWarrior for Freescale DSP and an Axiom Manufacturing JTAG cable. Both items are available in the CSM-56F801KIT. The JTAG cable supports communications between the CSM-56F801 module and a standard PC.

REFERENCE DOCUMENTATION

Reference documents are provided on the support CD in Acrobat Reader format.

CSM56F801_SCH_B.pdf	CSM-56F801 Module Schematic Rev B
CSM56F801_UG.pdf	CSM-56F801 User Guide (this document)
DSP56F801-7UM.pdf	DSP56F80x Users Manual
DPSP56F801.pdf	Technical Data Sheet
DSOP56F800.pdf	DSOP56F800 Family Manual
AN1909.pdf	Multiple Target Features Using CodeWarrior

CSM-56F801 OPERATION

The CSM-56F801 module provides input and output features to assist embedded application development. Access to MPU port signals is available through connector J1. This connector may also be used to input power to the module or to output power to attached modules. RS-232 communications signals may also be input through connector J1. Care must be exercised when using the J1 to power the module, as only regulated +3.3VDC (+/- 5%) should be supplied to this connection

Five option jumpers and 3 cut-traces control module operation. Enabling a jumper option requires installing a shunt across the associated header pins. Removing the shunt disables the associated option. An option enabled by a cut-trace can be disabled by removing the circuit trace between the cut-trace component pads. Use a sharp knife to cut the embedded circuit trace. Be careful not to damage adjacent circuitry. To re-enable the option, simply install a suitably sized 0-ohm resistor or piece of wire across the cut-trace component pads.

MEMORY MAP

The DSP56F801 utilizes two independent memory spaces, data and program, configured in a Harvard architecture. RAM and Flash memory are used for on-chip data memory and on-chip program memory. Refer to the DSP56F801 User Guide for details on accessing Program and Data memory.

Table 1: Program Memory Map

Program Memory – Mode 0A	
0x0000 - 0x0003	Boot Flash
0x0004 - 0x1FFF	Program Flash
0x 2000 - 0x7BFF	Reserved
0x7C00 - 0x7FFF	Program RAM
0x8000 - 0x87FF	Boot Flash
0x8800 – 0xFFFF	Reserved

NOTE: The first 4 logical addresses are a reflection of the first 4 physical addresses of Boot Flash

Table 2: Data Memory Map

Ex = 0	
0x0000 – 0x3FFF	Data RAM
0x4000 – 0xBFFF	Reserved
0xC000 – 0x0FFF	Peripherals
0x1000 – 0x17FF	Data Flash
0x1800 – 0xFF7F	Reserved
0xFF80 – 0xFFFF	Core Registers

NOTE: EX = 1 address external memory. This function is not supported for the DSP56F801.

Power Supply

Power is supplied to the module through a 2mm barrel connector at location PWR or through connector J1. Power may also be sourced off-module through connector J1. The PWR_SEL jumper determines the source of input power.

PWR

The PWR barrel connector accepts 2.0 – 2.1 mm barrel plug and allows the module to be powered from a transformer plugged into a standard wall outlet. Input voltage should be limited to between +4VDC and +12VDC. Input voltage of +9VDC @ 200 mA is typical.

Connector J1

Power may be supplied to the module through the pins J1-1 and J1-2. Use of this option requires a regulated voltage input limited to +3.3VDC (+/- 5%). This input is connected directly to the module power and ground planes. Care should be exercised not to over-drive this input.

This connection may also be used to power external modules attached to connector J1. The PWR_SEL option header determines how power is routed to the module.

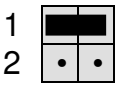
PWR_SEL

The PWR_SEL jumper selects the source of power input to the DSP-56F801 module or allows regulated +3.3VDC to be provided to J1 for use by external circuits. The module may be powered from the 2.0mm barrel connector (PWR) or from the 40-pin MCU connector (J1). Power input at the PWR jack must be DC voltage between +5V and +16V. Power input on the MCU connector **must be** regulated voltage between +3.0VDC and +3.3VDC. The MCU_PORT connector input allows use of batteries, or other alternate sources, to power the module. Damage may occur if the MCU_PORT power input pins are over-driven. Refer to the table below to determine correct PWR_SEL jumper setting.

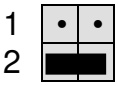
CAUTION: Module damage may occur if the MCU_PORT power input pin (J1-1) is over-driven.

The PWR_SEL option jumper provides 3 possible configurations; source power from the PWR connector, source power from J1, or source power from PWR and supply power to J1. The figures below show the settings for each configuration.

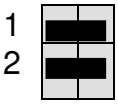
Figure 1: PWR_SEL Jumper Settings



Module powered from external +3.0VDC - +3.3VDC input connected to J1-1 (+) and J1-3 (-)



Module powered from external +5VDC - +16VDC connected to PWR Terminal Block. J1-1 is open or not connected.



Module powered from external +3.0VVDC - +3.3VDC connected to J1-1 (+) and J1-3 (-). Module provides +3.3VDC output (up to 50 mA) at pin J1 for use by external circuits.

Reset Switch

The RESET switch provides a method to apply an asynchronous reset to the module. Pressing the RESET switch applies a low voltage level to the RESET input. Logic on this signal prevents unwanted RESET inputs to the MPU.

Low-Voltage Detect

The MPU includes an internal POR and Low-Voltage Interrupt circuit. This circuit protects against low-voltage and under-voltage conditions. The system consists of a POR circuit and a low-voltage interrupt (LVI) circuit. The POR circuit holds the MPU in reset until voltage reaches an acceptable level. The LVI provides an interrupt out when voltage falls below the trip level. Refer to the MPU User Guide for further details.

Timing

The MPU function from either an internal relaxation oscillator or an external timing source. A location for an external timing source has been provided. Component size for the external timing source is based on an 8 MHz ceramic resonator from Panasonic, P/N EFO-S8004E5A. This part is not populated in the default module configuration. Refer to the MPU User Guide for further details

Communications

The CSM-56F801 module provides a single RS-232 communications port. An RS-232 transceiver (U2) provides RS-232 signal level to TTL/CMOS logic level translation on the first RS-232 channel. RS232 signals TXD0 and RXD0 are routed between the transceiver and the MCU. These signals are also routed to connector J1. RS-232 communication signals input on J1 must be TTL/CMOS logic levels; no translation support is provided through this path. The transceiver output may also be driven off-module if the signals are suitably buffered. As added development support, hardware flow control signals RTS and CTS are available on the logic side of U2. These signals are routed to vias located near the transceiver (U2). RTS has been biased properly to support 2-wire RS-232 communications.

Use of the J1 connector to input RS-232 signals requires disabling the on-board RS-232 transceiver. Otherwise, signal corruption may occur. Disabling the on-board transceiver is accomplished by opening cut-traces CT4, and CT5. Simply remove the circuit trace between the cut-trace pads to open the circuit. To restore the circuit functionality, install a 1206 size, 0-ohm, resistor or a short piece of wire across the cut-trace pads.

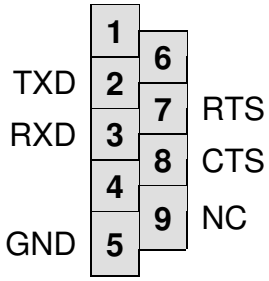
Table 3: COM Signal Connections

COM Signal	MPU Port	Connector J1	Signal Disable
TXD0	GPIOB0/TXD0	5	CT4
RXD0	GPIOB1/RXD0	7	CT4

COM Connector

A standard 9-pin Dsub connector provides external connections for the COM port. The COM port is used by default with the debug monitor. Component U2 provides RS-232 translation services. The figure below details the DB9 connector.

Figure 2: COM Connector



Female DB9 connector that interfaces to the MPU serial port via the U2 RS232 transceiver. It provides simple 2 wire asynchronous serial communications without flow control. Flow control is provided at test points on the module.

Pins 1, 4, and 6 are connected together.

User Options

Indicators LED1 and LED2 are connected to the MPU I/O ports by the USER option bank. When the appropriate USER jumper is installed, the assigned LED is active. Each LED is active low. A low voltage level driven out on the appropriate MPU port causes the LED to light. MPU ports PWMA0 and PWMA1 drive LED1 and LED2 respectively.

Two push button switches provide momentary, active low, input to the MPU for user applications. Switches SW1 and SW2 are connected to the MPU I/O ports by the USER option bank. SW1 and SW2 provide input to MCUI/O ports TD0 and TD1 respectively. The table below shows the user jumper settings.

Table 4: User Option Jumper Settings

Jumper	On	Off	MPU Signal
User 1	Enable SW1	Disable SW1	PWMA0
User 2	Enable SW2	Disable SW2	PWMA1
User 3	Enable LED1	Disable LED1	TD0
User 4	Enable LED2	Disable LED2	TD1

I/O Connectors

JTAG / OnCE

The JTAG/OnCE 14 pin connector is compatible with the Freescale On Chip Emulation (OnCE) development port. This connector allows the connection of a OnCE style background debug cable for software development, programming and debugging in real-time.

Figure 3: JTAG / OnCE BDM Connection

TDI	1	2	GND
TDO	3	4	GND
TCK	5	6	GND
	7	8	N/C (key)
/RESET	9	10	TMS
V_{DD}	11	12	
/DE	13	14	/TRST

J1 Connector

Connector J1 provides access to CSM-56F801 I/O port signals. This connector may also be used to power the module or to power off-module circuitry.

Figure 4: MCU I/O Connector

V_X	1	2	IREQA*
GND	3	4	RESET*
TxD0	5	6	
RxD0	7	8	
	9	10	
TD0	11	12	
TD1	13	14	
TD2	15	16	
MOSI	17	18	ANA0
MISO	19	20	ANA1
SCLK	21	22	
SS*	23	24	FAULTA0
	25	26	
	27	28	
ANA2	29	30	PWMA0
ANA3	31	32	PWMA1
ANA4	33	34	PWMA2
ANA5	35	36	PWMA3
ANA6	37	38	PWMA4
ANA7	39	40	PWMA5

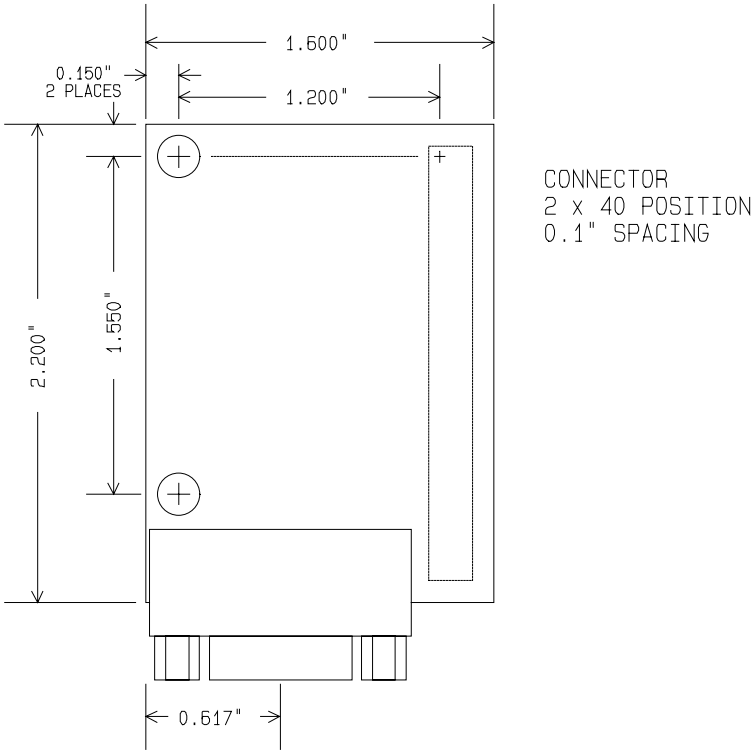
Default Signal Assignment

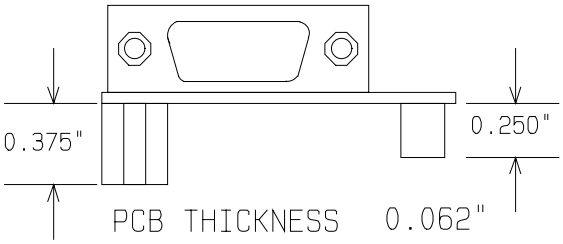
MCU Port	Signal	Disable
TxD0	COM1 TXD	CT-4
RxD0	COM1 RXD	CT-5
TD0	SW1	User1
TD1	SW2	User2
PWMA0	LED1	User3
PWMA1	LED2	User4

Note: Default signal assignment should be disabled to use the signal at connector J1

APPENDIX A

Mechanical Details





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Document Number: CSM56F801SLKUG
Rev. 0, Draft A
07/2006

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