

DEMOACEX

Peripheral Expansion Board

Hardware User Guide



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REVISION

Date	Rev	Comments
April 3, 2008	A	Initial Release.

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 DEMOACEX board:
 - a) This product, as shipped from the factory with associated power supplies and cables, has been verified to meet with FCC requirements as a **CLASS A** 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 product operation from the factory default as shipped may effect its performance and cause interference with other apparatus in the immediate vicinity. If such interference is detected, suitable mitigating measures should be taken.

TERMINOLOGY

This development board applies option selection jumpers. Terminology for application of the option jumpers is as follows:

Jumper on, in, or installed = jumper is a plastic shunt that fits across 2 pins and the shunt is installed so that the 2 pins are connected with the shunt.

Jumper off, out, or idle = jumper or shunt is installed so that only 1 pin holds the shunt, no 2 pins are connected, or jumper is removed. It is recommended that the jumpers be placed idle 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 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.

Signal names followed by an asterisk (*) denote active-low signals.

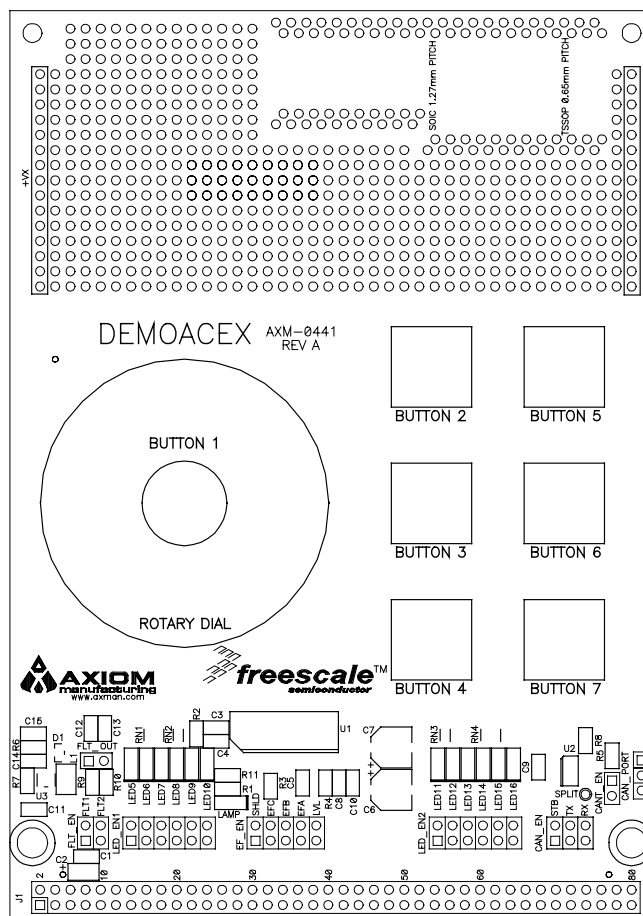
FEATURES

The DEMOACEX is a peripheral expansion board designed to interface with the DEMOAC board. The DEMOACEX applies the Freescale MC33794 E-Field Imaging Sensor connected to touch-pad in various arrangements. An 80-pin IO header allows the DEMOACEX to connect directly to the DEMOAC board.

DEMOACEX Features:

- 80-pin MCU PORT connects to DEMOAC board
- 9ch, E-Field Sensor
- E-Field Touch Pad including Rotary Dial and Push-Buttons
- 2 Low-Pass RC Filters
- 5V – 12V Boost Switcher Power Supply for E-Field Sensor
- LEDs – 10 User, 1 E-Field Lamp
- CAN 2.0 A/B PHY w/ 3-pos header
- Jumpers to disconnect all IO signals
- SOIC and TSSOP pads for external IC's
- Large thru-hole prototyping area w/ +adjacent 5V and GND

DEMOACEX Board Size: 6.0" x 4.5" MCU Modules:



REFERENCES

The following documents should be referenced during application development using the DEMOAC and DEMOACEX. These documents are available on the Axiom Manufacturing web site at www.axman.com/support.

DEMOACEX_UG.pdf	DEMOACEX User Guide (this document)
DEMOACEX_QSG.pdf	DEMOACEX Quick Start Guide
DEMOACEX_SCH_A.pdf	DEMOACEX Schematic
DEMOACEX_Silk_A.pdf	DEMOACEX Top Silk

GETTING STARTED

To get started quickly, please refer to the DEMOACEX Quick Start Guide. This quick start will illustrate connecting the board to a PC, installing the correct version of CodeWarrior Development Studio, and running a simple program.

APPLICATION DEVELOPMENT

The DEMOACEX is designed for use with the DEMOAC board. Please refer to the DEMOAC documentation for details on application development.

HARDWARE CONFIGURATION

The DEMOACEX applies the Freescale MC33794 E-Field sensor, 12 green LEDs, a CAN PHY, and 2 RC filters. Inputs to the E-Field sensor are provided from touch-pads in various configurations.

POWER

Power to the DEMOACEX is provided from IO header on pins J1-1 and J1-3. Pin J1-1 is connected directly to the +5V rail on the DEMOACEX. Pin J1-3 is connected directly to the GND rail. No protection is provided on this power input. When powering the board, other than through the DEMOAC, care must be used to prevent overdriving this input.

E-FIELD SENSOR

The DEMOACEX applies the Freescale MC33794 E-Field Sensor and touch-pads in various configurations. Refer to the MC33794 data sheet for details on using the device.

Touch-pads configurations include a rotary dial with center button, 3 solid push buttons using a single electrode input and 3 intertwined push buttons using 2 electrodes each. The rotary dial is created using 3 touch-pads of non-uniform shape intertwined in a circular pattern. The solid push-button touch-pads are created using a solid electrode placed over a solid shield. The intertwined push buttons are created by interlacing 2 electrode inputs. Use of the intertwined push buttons does not require activating the shield electrode.

Touch-pads are connected to the E-Field Sensor inputs as shown in the table below.

Table 1 : E-Field Sensor Input Configuration

Sensor Input	E-Field Sensor Electrode
Push-Buttons:	
Button 1	E7
Button 2	E3
Button 3	E2
Button 4	E1
Button 5	E3 & E1
Button 6	E3 & E2
Button 7	E2 & E1
Rotary Dial:	
Left Hand Lobe	E6
Center Lobe	E4
Right Hand Lobe	E5

Three electrode selection inputs on the E-Field Sensor select the active electrode. The Shield_EN input on the sensor enables or disables the e-field shield. These inputs are connected to PTC signals on the DEMOAC board through the IO header.

A single level output from the sensor provides the detected analog level output to the DEMOAC board through the IO header. This signal is available on AD1P11 on the DEMOAC.

A yellow LAMP LED indicates normal operation. This LED is normally on. When OFF this LED indicates a fault condition. Refer to the MC337094 Datasheet for further details.

CAN PORT

The DEMOACEX applies the TJA1040 CAN PHY. The PHY is connected to the IO header through the CAN_EN option header. Installing a shunt enables the associated signal. Removing the shunt disables the associated signal.

Figure 1: CAN_EN Option Header

CAN_EN		ON	OFF
•	•	Enabled	Disabled
•	•	Enabled	Disabled
•	•	Enabled	Disabled

Differential CAN signal termination is applied. A 120 ohm termination resistor with option jumper allows termination to be applied or removed. The CANT_EN option jumper applies or removes the CAN termination.

User LED's

Twelve user LED's are provided for output indication and are configured for active-low signaling. The table below details the LED connections to the target MCU

Table 2: User LED's

LED	J1-	DEMOAC Signal
LED5	13	PTE2/RGPIO2/FTM1CH0
LED6	15	PTE3/RGPIO3/FTM1CH1
LED7	23	PTE4/RGPIO4/SS1*
LED8	19	PTE5/RGPIO5/MISO1
LED9	17	PTE6/RGPIO6/MOSI1
LED10	21	PTE7/RGPIO7/SPSCK1
LED11	50	PTA2
LED12	52	PTA3/ACMP20
LED13	54	PTA4/ACMP2-
LED14	56	PTA5/ACMP2+
LED15	58	PTA6/AD1P16
LED16	60	PTA7/AD1P17

NOTE: LED5 input signal also provides RC filter input

LED11 input signal also provides CAN PHY standby control

IO HEADER

The IO Header provides access to on-board signals. The Figure below shows the pin-out of the IO header

Figure 2: IO Header Connector

	VDD	1	2	
	VSS	3	4	
		5	6	
		7	8	
		9	10	
		11	12	
	PTE2/RGPIO2/FTM1CH0	13	14	
	PTE3/RGPIO3/FTM1CH1	15	16	
	PTE6/RGPIO6/MOSI1	17	18	
	PTE5/RGPIO5/MISO1	19	20	
	PTE7/RGPIO7/SPSCK1	21	22	
	PTE4/RGPIO4/SS1*	23	24	
		25	26	PTA0/TXCAN
	PTD3/KBI1P6/AD1P11	27	28	PTA1/RXCAN
		29	30	
		31	32	
		33	34	
		35	36	PTC4/SS2*
	PTF4/RGPIO12/FTM2CH0	37	38	
		39	40	
		41	42	PTC0/SCL1
		43	44	PTC1/SDA1
		45	46	PTC2/MCLK
		47	48	
		49	50	PTA2
		51	52	PTA3/ACMP2O
		53	54	PTA4/ACMP2-
		55	56	PTA5/ACMP2+
		57	58	PTA6/AD1P16
		59	60	PTA7/AD1P17
		61	62	
		63	64	
		65	66	
		67	68	
		69	70	
		71	72	
		73	74	
		75	76	
		77	78	
		79	80	

TROUBLESHOOTING

The DEMOACEX is fully tested and operational before shipping. If it fails to function properly, inspect the board for obvious physical damage first.

Most common problems are related to improperly configured options or communications parameters.

1. Verify default option jumper settings.
2. Verify the yellow LAMP LED is ON.
3. Verify the DEMOACEX is properly and securely attached to the DEMOAC board
4. Ensure the DEMOAC board is configured properly and that power is applied.
5. If possible, verify an approximately 120 kHz square wave output at E-Field sensor (U2-24)

If the above Troubleshooting Tips fail to correct the problem, please contact Freescale Semiconductors for further assistance. Please refer to the Technical Information Card (TIC) included in the kit. Users may also contact Axiom Manufacturing at support@axman.com for additional support.