TSC2007EVM and TSC2007EVM-PDK User's Guide

This user's guide describes the characteristics, operation, and use of the TSC2007EVM, both by itself and as part of the TSC2007EVM-PDK. This evaluation module (EVM) is a 4-wire touch screen controller EVM which also has auxiliary input and temperature measurement capabilities. A complete circuit description, schematic diagram, and bill of materials are included.

The following related documents are available through the Texas Instruments Web site at www.ti.com.

Table 1. EVM-Compatible Device Data Sheets

DEVICE	LITERATURE NUMBER
TSC2007	SBAS405
TAS1020B	SLES025
REG1117-5	SBVS001
TPS767D318	SLVS209
SN74LVC125A	SCAS290
SN74LVC1G125	SCES223
SN74LVC1G07	SCES296

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1 EVM Overview

1.1 Features

- Full-featured evaluation board for the TSC2007 4-wire resistive touch screen controller (TSC).
- Modular design for use with a variety of DSP and microcontroller interface boards.

The TSC2007EVM-PDK is a complete evaluation kit, which includes a USB-based motherboard and evaluation software for use with a personal computer running Microsoft Windows™ operating systems.

1.2 Introduction

The TSC2007EVM is in the Texas Instruments modular EVM form factor, which allows direct evaluation of the performance and operating characteristics of the TSC2007, and eases software development and system prototyping. This EVM is compatible with the 5-6K Interface Evaluation Module (SLAU104) from Texas Instruments and additional third-party boards such as the NI Speedy-33™ from National Instruments Corporation. (www.ni.com)

The TSC2007EVM-PDK is a complete evaluation/demonstration kit, which includes a USB-based motherboard called the USB-MODEVM interface board and evaluation software for use with a personal computer running Microsoft Windows operating systems.

2 Analog Interface

For maximum flexibility, the TSC2007EVM is designed for easy interfacing to multiple analog sources. Samtec part numbers SSW-110-22-F-D-VS-K and TSM-110-01-T-DV-P provide a convenient 10-pin, dual-row header/socket combination at J1. This header/socket provides access to the analog input pins of the TSC. Consult Samtec at www.samtec.com, or call 1-800-SAMTEC-9 for a variety of mating connector options.

Table 2. Analog Interface Pinout

PIN NUMBER	SIGNAL	DESCRIPTION
J1.2	X+	Touch screen X+ electrode
J1.4	X-	Touch screen X- electrode
J1.6	Y+	Touch screen Y+ electrode
J1.8	Y-	Touch screen Y- electrode
J1.10	Unused	
J1.12	AUX	Auxiliary input, 0 V to VREF
J1.14	Unused	
J1.16	Unused	
J1.18	Unused	
J1.20	Unused	
J1.15	Unused	
J1.1-J1.19 (odd)	AGND	Analog ground connections (except J1.15)

NI Speedy-33 is a trademark of Hyperception, Inc.
I^2C is a trademark of Koninklijke Philips Electronics N.V., The Netherlands.
Windows is a trademark of Microsoft Corporation.
SPI is a trademark of Motorola, Inc.

3 Digital Interface

The TSC2007EVM is designed to easily interface with multiple control platforms. Samtec part numbers SSW-110-22-F-D-VS-K and TSM-110-01-T-DV-P provide a convenient 10-pin, dual-row header/socket combination at J2. This header/socket provides access to the digital control and serial data pins of the TSC. Consult Samtec at www.samtec.com or call 1-800-SAMTEC-9 for a variety of mating connector options.

Table 3. Digital Interface Pinout

PIN NUMBER	SIGNAL	DESCRIPTION
J2.15	$\overline{\text{PENIRQ}}$	Pen Interrupt Output from TSC
J2.16	SCL	I^2C™ bus serial clock
J2.4, J2.10, J2.18	DGND	Digital ground
J2.1-J2.19 (odd, except J2.15)	Unused	
J2.20	SDA	I^2C bus data line

4 Power Supplies

J3 provides connection to the common power bus for the TSC2007EVM. Power is supplied on the pins listed in Table 4.

Table 4. Power Supply Pinout

SIGNAL	PIN NUMBER		SIGNAL
Unused	1	2	Unused
Unused	3	4	Unused
DGND	5	6	AGND
+1.8VD	7	8	Unused
+3.3VD	9	10	Unused

When power is supplied to J3, JMP1 allows for one of two different DC voltages to be selected as power for the TSC. See the schematic and PCB silkscreen for details.

The TSC2007EVM-PDK motherboard (the USB-MODEVM interface board) supplies power to J3 of the TSC2007EVM. Power for the motherboard is supplied either through its USB connection or via terminal blocks on the board.

4.1 TSC Power

Power for the TSC2007 VCC can be supplied either from the +1.8VD terminal or from the +3.3VD terminal. JMP1 selects which of these voltages is routed to the TSC2007. When JMP1 is in the default factory condition (shunt on pins 2-3), power to the TSC comes from J3.9 (+3.3VD). When the shunt is installed on JMP1 pins 1-2, power comes from J3.7 (+1.8VD). Removing the shunt on JMP1, the user can connect any DC power supply between 1.2VD and 3.6VD to VCC by connecting the power to JMP1 pin 2.

Table 5. Power Selection Options - JMP1

SHUNT ON PINS	VDD	VOLTAGE FROM J3 PIN
1-2	+1.8VD	7
2-3	+3.3VD	9
Removed	+1.2VD and +3.6VD	External

4.2 Stand-Alone Operation

When used as a stand-alone EVM, power can be applied to TP1, referenced to TP3.

CAUTION

Verify that all power supplies are within the safe operating limits shown on the TSC2007 data sheet (SBAS405) before applying power to the EVM.

4.3 USB-MODEVM Interface Power

The USB-MODEVM interface board can be powered from several different sources:

- USB
- 6 VDC-10 VDC AC/DC external wall supply (not included)
- Laboratory power supply

When powered from the USB connection, JMP6 should have a shunt from pins 1-2 (this is the default factory configuration). When powered from 6 VDC-10 VDC, either through the J8 terminal block or J9 barrel jack, JMP6 should have a shunt installed on pins 2-3. If power is applied in any of these ways, onboard regulators generate the required supply voltages, and no further power supplies are necessary.

If laboratory supplies are used to provide the individual voltages required by the USB-MODEVM interface board, JMP6 should have no shunt installed. Voltages then are applied to J2 (+5VA), J3 (+5VD), J4 (+1.8VD), and J5 (+3.3VD). The +1.8VD and +3.3VD also can be generated on the board by the onboard regulators from the +5VD supply; to enable this supply, the switches on SW1 need to be set to enable the regulators by placing them in the ON position (lower position, looking at the board with text reading right-side up). If +1.8VD and +3.3VD are supplied externally, disable the onboard regulators by placing SW1 switches in the OFF position.

Each power supply voltage has an LED (D1-D7) which lights when the power supplies are active.

5 EVM Operation

The following section provides information on the analog input, digital control, and general operating conditions of the TSC2007EVM.

5.1 Analog Input

The analog input sources (touch screen and auxiliary input) can be applied directly to J1 (top or bottom side) or through signal-conditioning modules available for the modular EVM system.

5.2 Digital Control

The digital control signals can be applied directly to J2 (top or bottom side). The modular TSC2007EVM also can be connected directly to a DSP or microcontroller interface board, such as the USB-MODEVM interface board if purchased as part of the TSC2007EVM-PDK. See the product folder for the TSC2007 for a current list of compatible interface and/or accessory boards.

5.3 Default Jumper Locations

Table 6 provides a list of jumpers found on the EVM and their factory default conditions.

Table 6. List of Jumpers

JUMPER	SHUNT POSITION	JUMPER DESCRIPTION
JMP1	2-3	Analog power select (default is +3.3VD)
JMP2	Closed	EEPROM address select. When installed and used with the USB-MODEVM, firmware for the motherboard is executed from the EEPROM on the TSC2007EVM. This is the default mode.

6 Kit Operation

The following section provides information on using the TSC2007EVM-PDK, including setup, program installation, and program usage.

6.1 TSC2007EVM-PDK Block Diagram

A block diagram of the TSC2007EVM-PDK is shown in Figure 1. The evaluation kit consists of two circuit boards connected together. The motherboard is designated as the USB-MODEVM interface board; the daughtercard is the TSC2007EVM described previously in this manual.

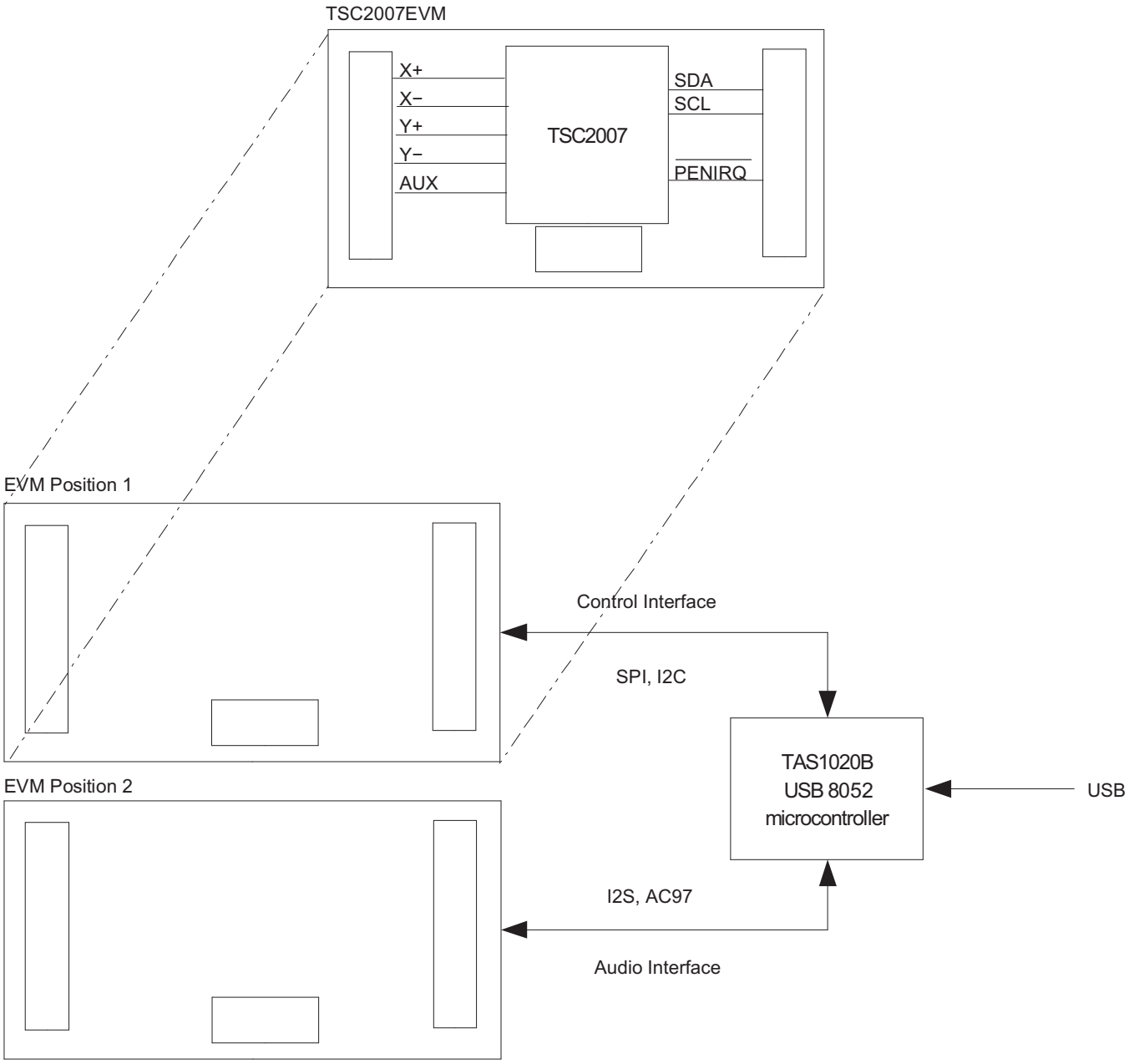


Figure 1. TSC2007EVM-PDK Block Diagram

The USB-MODEVM interface board is intended to be used in USB mode, where control of the installed EVM is accomplished using the onboard USB controller device. However, provision is made for driving all the data buses (I^2C, SPI™, and I^2S/AC97) externally. The source of these signals is controlled by SW2 on the USB-MODEVM.

6.2 Quick Start

Before installing the TSC2007EVM board on top of the USB-MODEVM board, check SW2-1, SW2-2, and SW2-3 on the USB-MODEVM board to ensure that at least one of these three is OFF

Ensure that the TSC2007EVM is installed on the USB-MODEVM interface board. The TSC2007EVM should be installed in the topmost position, using J11, J12, and J13 on the USB-MODEVM.

Place the CD-ROM into your PC CD-ROM drive. Locate the Setup program on the disk, and run it. The Setup program will install the TSC2007 Evaluation software on your PC.

Accept the license agreement, and continue the installation.

When the installation completes, click *Finish* on the TSC2007EVM installer window. You may be prompted to restart your computer.

When installation is complete, attach a USB cable from your PC to the USB-MODEVM interface board. As configured at the factory, the board is powered from the USB interface; so, the power indicator LEDs on the USB-MODEVM should light. Once this occurs, launch the TSC2007 evaluation software on your PC. It is suggested that users read the *readme_install.txt* file for up-to-date, step-by-step instructions.

The software should automatically find the TSC2007EVM, and a screen similar to the one shown in Figure 2 should appear.

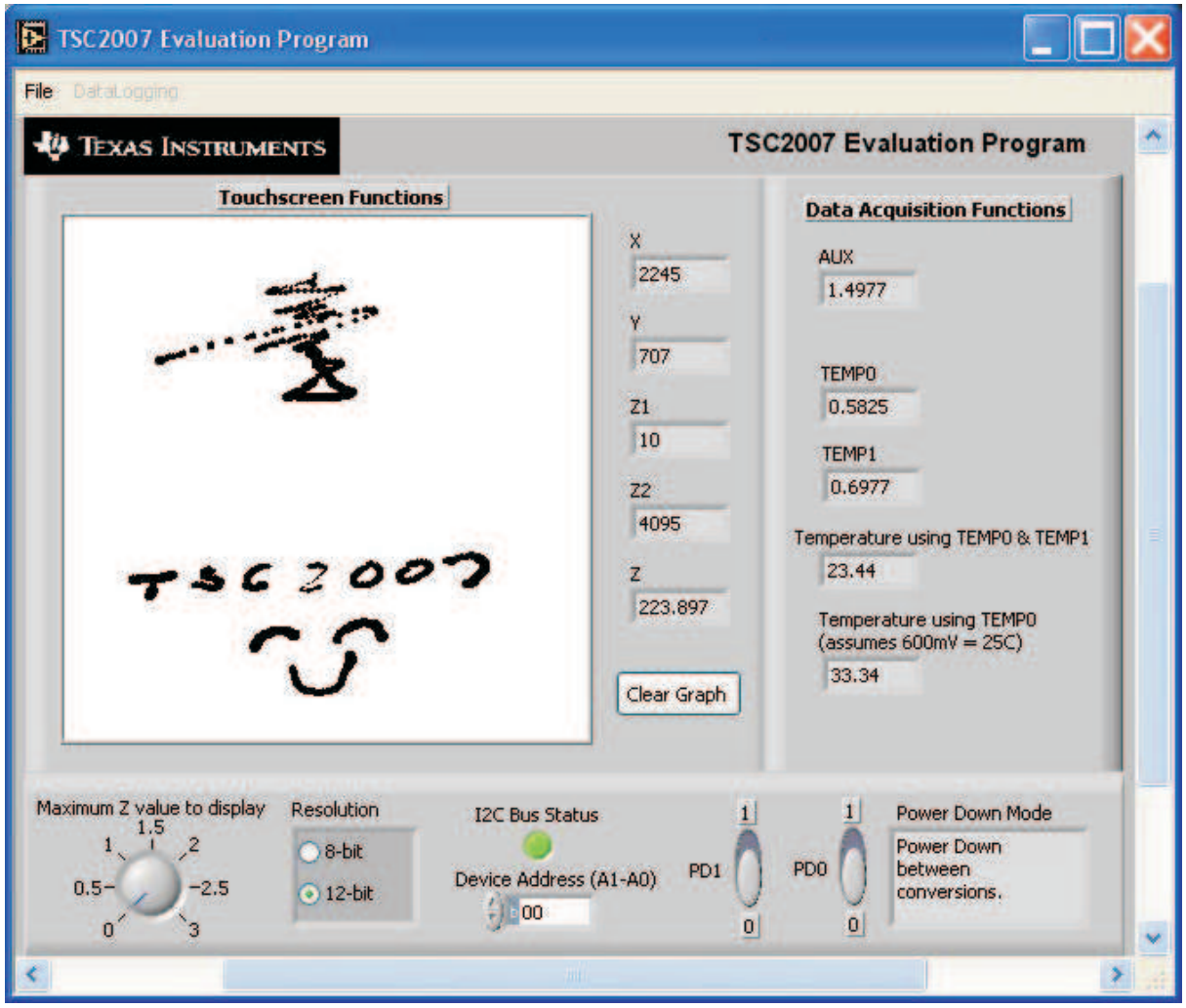


Figure 2. Default Software Screen

In order to use the touch screen features, a user needs to connect a 4-wire resistive touch screen to J1 of the TSC2007EVM, as described previously.

6.3 USB-MODEVM Interface Board

The simple diagram shown in Figure 1 shows only the basic features of the USB-MODEVM interface board. The board is built around a TAS1020B streaming audio USB controller with an 8051-based core. The board features two positions for modular EVMs, or one double-wide serial modular EVM may be installed.

For use with the TSC2007, the TSC2007EVM is installed in the topmost EVM slot, which connects the TSC2007 digital control interface to the I^2C port, realized using the TAS1020B. Because the TSC2007 has no audio features, the lower EVM slot, which is connected to the TAS1020B digital audio interface, is not used.

As configured from the factory, the board is ready to use with the TSC2007EVM except for SW2, in which case at least one of SW2-1, SW2-2, and SW2-3 must be set to OFF.

6.4 Program Description

After the TSC2007EVM-PDK software installation (described in Section 6.2), evaluation and development with the TSC2007 can begin.

6.4.1 Touch Screen Functions Panel

The touch screen box in this panel is updated when a touch is detected on the touch screen. As the touch screen is drawn on, the motion on the touch screen is translated into pixels on this box. The software takes X, Y, and Z readings which are shown to the right of the touch screen box. As the touch pressure is increased, the pixel size increases; a lighter touch results in smaller pixel sizes.

The Z-value displayed is not what is described in the TSC2007 data sheet, because in the data sheet equation, it is assumed that the sheet resistance of the touch screen being used is known. The value used in this program is calculated by Equation 2 of the TSC2007 data sheet, but without multiplying it by the $R_{X\text{-plate}}$ resistance. This value ranges from 0 to 3, and larger, with larger numbers representing a more forceful press on the screen. Using the **Maximum Z Value to Display** knob, you can set a threshold so that the program does not display lightly pressed points. This threshold setting helps to eliminate display of spurious points that may result from touch screen mechanical bouncing.

The display can be cleared by pressing the **Clear Graph** button on the screen.

6.4.2 Data Acquisition Functions Panel

The TSC2007 has provision for measuring one auxiliary input voltages (AUX1) and temperature. This panel displays the measured values for these parameters. Measurements are updated only when the touch screen is not being pressed.

Temperature is displayed using both methods described in the TSC2007 data sheet. Using the TEMP0 and TEMP1 measurements, a temperature reading with 2°C resolution and accuracy is achieved. Using only the TEMP0 measurement, a reading with 0.3°C resolution is possible, but this option requires knowing the TEMP0 value at +25°C; this would normally be a calibration that the user would perform. This program assumes that TEMP0 = 600 mV at +25°C.

6.4.3 Configuration Panel

The TSC2007 can be configured to operate in 8-bit or 12-bit resolution modes. Control over the mode used is selected in this panel.

In the middle of this panel is an indicator light that shows the I^2C Bus Status. If the TSC2007 is acknowledging the address sent, the light is green; if the TSC2007 cannot acknowledge, the light is red. The address to which the TSC2007 is set is shown in binary format in the box labeled *Device Address A1-A0*. The address set here should be "00" when using the TSC2007EVM. Even though the TSC2007 has two pins, A0 and A1, for users to select four different I2C addresses, the TSC2007EVm has only a fixed address 1001000b, where A0=A1="0", because both A0 and A1 are tied to ground. See the TCS2007EVM schematic provided in this document.

The two power-down bits of the TSC2007 can be set from this panel as well. A brief description of the mode selected is shown on the screen when setting these bits; see Table 3 (*Command Byte Definitions*) of the TSC2007 data sheet (SBAS405) for details on what these bits do.

6.4.4 Datalogging

The software can record the data it takes from the TSC2007 to a tab-delimited file, suitable for importing into spreadsheets. To do this, first go into the *File* menu, and select *Log Data to File...*, which opens a file-select window and allows you to specify a file to which to write the data. At the same time, this enables the Datalogging menu.

When ready to begin recording data to a file, select *Datalogging* → *Start Logging*. Data is written to the file until *Datalogging* → *Stop Logging* is selected. When the screen is not touched, the AUX and TEMP values are written to the file, and the X, Y, Z1, and Z2 parameters are written to the file with values of **9999**, to indicate that they are not updated. When the screen is touched, the X, Y, Z1, and Z2 parameters are written while the AUX and TEMP values are written to the file as **9999**. Because the program constantly updates at a rate of about 400 readings per second, datalog files can quickly grow large; therefore, log only that data which is necessary.

The format of the data file has the first column as the time in milliseconds (which is just a timer in the program; it can arbitrarily start at any number), then X, Y, Z1, Z2, AUX, TEMP0, and TEMP1 columns. Every new reading is a new row in the file.

7 EVM Bill of Materials

Table 7 and Table 8 contain a complete bill of materials for the modular TSC2007EVM evaluation board and the USB-MODEVM interface board, respectively (included only in the TSC2007EVM-PDK).

Table 7. TSC2007EVM Bill of Materials

Reference Designator	Description	Manufacturer	Manufacturer's Part Number
R1	100Ω 1/8W 5% Chip Resistor	Panasonic	ERJ-6GEYJ101V
R2, R3	2.7kΩ 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ272V
R4	20kΩ 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ272V
C1, C3, C8	0.1µF 16V Ceramic Chip Capacitor, +/ - 10%, X7R	TDK	C1608X7R1C105K
C2	10µF 16V Ceramic Chip Capacitor, +/ - 20%, X5R	TDK	C3216X5R1C106M
C4-C7	Ceramic Chip Capacitor - Not installed		
U1	I^2C Touch Screen Controller	Texas Instruments	TSC2007IZZZ
U2	64K I^2C EEPROM	MicroChip	24AA64-I/SN
	TSC2007EVM PCB	Texas Instruments	6486822
J1A, J2A	20-pin SMT plug	Samtec	TSM-110-01-L-DV-P
J1B, J2B	20-pin SMT socket	Samtec	SSW-110-22-F-D-VS-K
J3A	10-pin SMT plug	Samtec	TSM-105-01-L-DV-P
J3B	10-pin SMT socket	Samtec	SSW-105-22-F-D-VS-K
JMP2	2-position jumper , 0 .1" spacing	Samtec	TSW-102-07-L-S
JMP1	3-position jumper , 0 .1" spacing	Samtec	TSW-103-07-L-S
TP1	Miniature test point terminal	Keystone Electronics	5000
TP2	Miniature test point terminal	Keystone Electronics	5001
TP4, TP5, TP6, TP7	Miniature test point terminal	Keystone Electronics	5002
TP8	Miniature test point terminal	Keystone Electronics	5004
TP9, TP10, TP11	Miniature test point terminal	Keystone Electronics	5003
	Header shorting block	Samtec	SNT-100-BK-G-H

Table 8. USB-MODEVM Bill of Materials

Reference Designator	Description	Manufacturer	Manufacturer's Part Number
R4	10Ω 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ100V
R10, R11	27.4Ω 1/16W 1% Chip Resistor	Panasonic	ERJ-3EKF27R4V
R20	75Ω 1/4W 1% Chip Resistor	Panasonic	ERJ-14NF75R0U
R19	220Ω 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ221V
R14, R21, R22	390Ω 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ391V
R13	649Ω 1/16W 1% Chip Resistor	Panasonic	ERJ-3EKF6490V
R9	1.5KΩ 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ152V
R1, R2, R3, R5, R6, R7, R8	2.7KΩ 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ272V
R12	3.09KΩ 1/16W 1% Chip Resistor	Panasonic	ERJ-3EKF3091V
R15, R16	10KΩ 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ103V
R17, R18	100KΩ 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ104V
RA1	10KΩ 1/8W Octal Isolated Resistor Array	CTS Corporation	742C163103JTR
C18, C19	33pF 50V Ceramic Chip Capacitor, ±5%, NPO	TDK	C1608C0G1H330J
C13, C14	47pF 50V Ceramic Chip Capacitor, ±5%, NPO	TDK	C1608C0G1H470J
C20	100pF 50V Ceramic Chip Capacitor, ±5%, NPO	TDK	C1608C0G1H101J
C21	1000pF 50V Ceramic Chip Capacitor, ±5%, NPO	TDK	C1608C0G1H102J
C15	0.1µF 16V Ceramic Chip Capacitor, ±10%,X7R	TDK	C1608X7R1C104K
C16, C17	0.33µF 16V Ceramic Chip Capacitor, +/-20%,Y5V	TDK	C1608X5R1C334K
C9, C10, C11, C12, C22, C23, C24, C25, C26, C27, C28	1µF 6.3V Ceramic Chip Capacitor, ±10%, X5R	TDK	C1608X5R0J105K
C1, C2, C3, C4, C5, C6, C7, C8	10µF 6.3V Ceramic Chip Capacitor, ±10%, X5R	TDK	C3216X5R0J106K
D1	50V, 1A, Diode MELF SMD	Micro Commercial Components	DL4001
D2	Yellow Light Emitting Diode	Lumex	SML-LX0603YW-TR
D3, D4, D6, D7	Green Light Emitting Diode	Lumex	SML-LX0603GW-TR
D5	Red Light Emitting Diode	Lumex	SML-LX0603IW-TR
Q1, Q2	N-Channel MOSFET	Zetex	ZXMN6A07F
X1	6MHz Crystal SMD	Epson	MA-505 6.000M-C0
U8	USB Streaming Controller	Texas Instruments	TAS1020BPFB
U2	5V LDO Regulator	Texas Instruments	REG1117-5
U9	3.3V/1.8V Dual Output LDO Regulator	Texas Instruments	TPS767D318PWP
U3, U4	Quad, Tri-State Buffers	Texas Instruments	SN74LVC125APW
U5, U6, U7	Single IC Buffer Driver with Open Drain o/p	Texas Instruments	SN74LVC1G07DBVR
U10	Single Tri-State Buffer	Texas Instruments	SN74LVC1G125DBVR
U1	64K 2-Wire Serial EEPROM I^2C	Microchip	24LC64I/SN
	USB-MODEVM PCB	Texas Instruments	6463995

Table 8. USB-MODEVM Bill of Materials (continued)

Reference Designator	Description	Manufacturer	Manufacturer's Part Number
TP1, TP2, TP3, TP4, TP5, TP6, TP9, TP10, TP11	Miniature test point terminal	Keystone Electronics	5000
TP7, TP8	Multipurpose test point terminal	Keystone Electronics	5011
J7	USB Type B Slave Connector Thru-Hole	Mill-Max	897-30-004-90-000000
J1, J2, J3, J4, J5, J8	2-position terminal block	On Shore Technology	ED555/2DS
J9	2.5mm power connector	CUI Stack	PJ-102B
J10	BNC connector, female, PC mount	AMP/Tyco	414305-1
J11A, J12A, J21A, J22A	20-pin SMT plug	Samtec	TSM-110-01-L-DV-P
J11B, J12B, J21B, J22B	20-pin SMT socket	Samtec	SSW-110-22-F-D-VS-K
J13A, J23A	10-pin SMT plug	Samtec	TSM-105-01-L-DV-P
J13B, J23B	10-pin SMT socket	Samtec	SSW-105-22-F-D-VS-K
J6	4-pin double row header (2x2) 0.1"	Samtec	TSW-102-07-L-D
J14, J15	12-pin double row header (2x6) 0.1"	Samtec	TSW-106-07-L-D
JMP1-JMP4	2-position jumper, 0.1" spacing	Samtec	TSW-102-07-L-S
JMP8-JMP14	2-position jumper, 0.1" spacing	Samtec	TSW-102-07-L-S
JMP5, JMP6	3-position jumper, 0.1" spacing	Samtec	TSW-103-07-L-S
JMP7	3-position dual row jumper, 0.1" spacing	Samtec	TSW-103-07-L-D
SW1	SMT, half-pitch 2-position switch	C&K Division, ITT	TDA02H0SK1
SW2	SMT, half-pitch 8-position switch	C&K Division, ITT	TDA08H0SK1
	Jumper plug	Samtec	SNT-100-BK-T

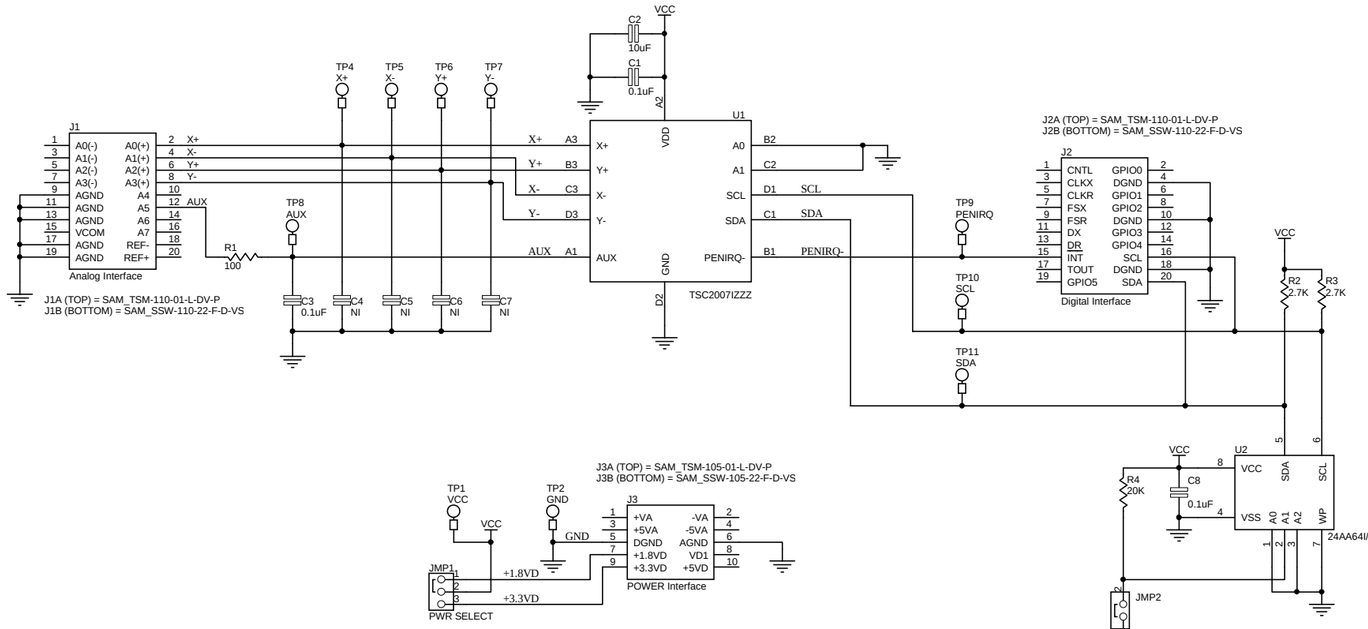
8 TSC2007EVM Schematic

The schematic diagram is provided as a reference.

9 USB-MODEVM Schematic

The schematic diagram is provided as a reference.

REVISION HISTORY		
REV	ENGINEERING CHANGE NUMBER	APPROVED



ENGINEER **WENDY FANG**		TITLE **TSC2007EVM**	
DRAWN BY **STEVE LEGGIO**			
DOCUMENT CONTROL NO.**6486825**	SIZE **B**	DATE **5-Jan-2007**	REV **A**
SHEET **1** OF **1**	FILE		

TEXAS INSTRUMENTS

DATA ACQUISITION PRODUCTS
HIGH-PERFORMANCE ANALOG DIVISION
SEMICONDUCTOR GROUP

12500 T.I. Boulevard, Dallas, Texas 75243 USA

REVISION HISTORY		
REV	ENGINEERING CHANGE NUMBER	APPROVED

IOVDD
Q1 ZXMN6A07F
SDA
J6
EXTERNAL I2C
Q2 ZXMN6A07F
SCL
TP10
TP9
+3.3VD
R3 2.7K
R5 2.7K
+3.3VD
U1
VCC SDA SCL
VSS A0 A1 A2 WP
C9 1uF
24LC64I/SN
C18 33pF
X1
MA-505 6.000M-C0
6.00 MHZ
C19 33pF
J7 USB SLAVE CONN
GND D+ D- VCC
897-30-004-90-000000
R9 1.5K
R10 27.4
R11 27.4
C20 100pF
C21 .001uF
R12 3.09K
C13 47pF
C14 47pF
U8
TAS1020BPFB
SCL SDA VREN RESET MCLKO2 MCLKO1 CSCLK CDATO CDATI CSYNC CRESET CSCHNE
XTALO XTALI PLLFILI PLLFILO MCLKI PUR DP DM DVSS DVSS DVSS AVSS
P1.7 P1.6 P1.5 P1.4 P1.3 P1.2 P1.1 P1.0 DVDD DVDD DVDD AVDD
MRESET TEST EXTEN RSTO P3.0 P3.1 P3.2/XINT P3.3 P3.4 P3.5 NC NC
TP11 MRESET
+3.3VD
R13 649
USB ACTIVE
D2 SML-LX0603YW-TR
YELLOW
JMP8 P1.3
JMP9 P1.2
JMP10 P1.1
JMP11 P1.0
JMP12 P3.5
JMP13 P3.4
JMP14 P3.3
C24 1uF
C10 1uF
C11 1uF
C12 1uF
+3.3VD
U3
SN74LVC125APW
USB MCK
USB I2S
1OE 2OE 3OE 4OE
VCC GND
MCLK
I2SDIN
BCLK
LRCLK
I2SDOUT
C22 1uF
IOVDD
C28 1uF
U10
SN74LVC1G125DBV
J10 EXT MCLK
R20 75
+3.3VD
RA1 10K
SW2
A0 A1 A2 USB I2S USB MCK USB SPI USB RST EXT MCK
SW DIP-8
+3.3VD
R6 2.7K
U5
SN74LVC1G07DBV
C23 1uF
IOVDD
J14
EXTERNAL AUDIO DATA
PWR_DWN
+3.3VD
R7 2.7K
C26 1uF
IOVDD
U7
SN74LVC1G07DBV
MISO
MOSI
SS
SCLK
RESET
C27 1uF
IOVDD
U4
SN74LVC125APW
J15
EXTERNAL SPI
USB RST
USB SPI
+3.3VD
R8 2.7K
C25 1uF
IOVDD
U6
SN74LVC1G07DBV
INT
J8
ED555/2DS
EXT PWR IN
6VDC-10VDC IN
JMP6
PWR SELECT
+5VD
R14 390
D3 SML-LX0603GW-TR
GREEN
J9
CUI-STACK PJ102-B
2.5 MM
D1 DL4001
C15 0.1uF
C16 0.33uF
U2
REG1117-5
VIN GND VOUT
C6 10uF
+5VD
+3.3VD
+1.8VD
IOVDD
JMP7
IOVDD SELECT
TP6
SW1
1.8VD ENABLE
3.3VD ENABLE
REGULATOR ENABLE
R15 10K
R16 10K
U9
TPS767D318PWP
1IN 1IN 1EN 1GND 2GND 2EN 2IN 2IN
1RESET 1OUT 1OUT 2RESET 2OUT 2OUT
R17 100K
R18 100K
C7 10uF
C8 10uF
C17 0.33uF
+1.8VD
R19 220
D4 SML-LX0603GW-TR
GREEN
R4 10
D5 SML-LX0603IW-TR
RED

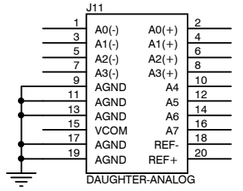
TEXAS INSTRUMENTS

DATA ACQUISITION PRODUCTS
HIGH PERFORMANCE ANALOG DIVISION
SEMICONDUCTOR GROUP
6730 SOUTH TUCSON BLVD., TUCSON, AZ 85706 USA

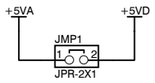
TITLE **USB-MODEVM INTERFACE**

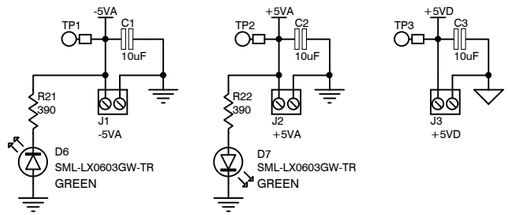
ENGINEER **RICK DOWNS**			
DRAWN BY **ROBERT BENJAMIN**			
DOCUMENT CONTROL NO. **6463996**	SIZE **B**	DATE **10-Jun-2004**	REV **A**
SHEET **1** OF **2**	FILE **G:\USB Motherboard - Modular Evm\Schematic\USB Motherboard - ModEvm.ddb - Docume**		

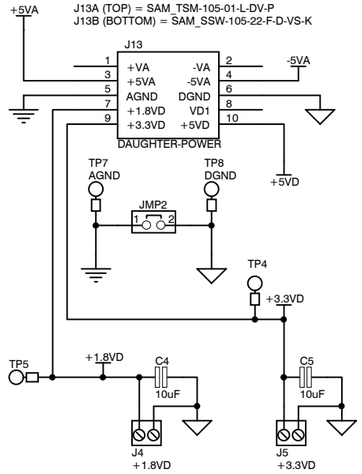
REVISION HISTORY		
REV	ENGINEERING CHANGE NUMBER	APPROVED



J11A (TOP) = SAM_TSM-110-01-L-DV-P
J11B (BOTTOM) = SAM_SSW-110-22-F-D-VS-K







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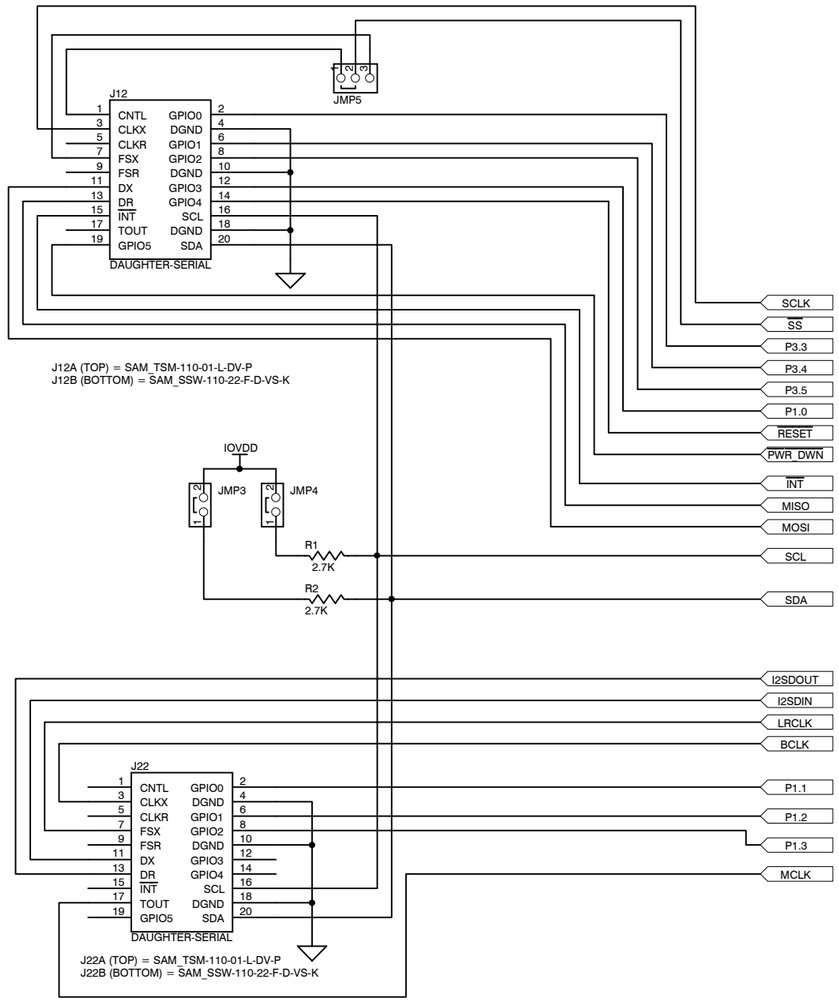
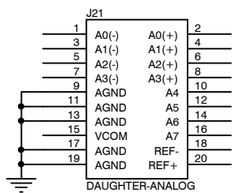
J13B (BOTTOM) = SAM_SSW-105-22-F-D-VS-K

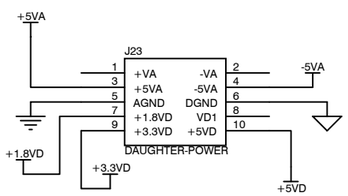


J12A (TOP) = SAM_TSM-110-01-L-DV-P
J12B (BOTTOM) = SAM_SSW-110-22-F-D-VS-K

J22A (TOP) = SAM_TSM-110-01-L-DV-P
J22B (BOTTOM) = SAM_SSW-110-22-F-D-VS-K



J21A (TOP) = SAM_TSM-110-01-L-DV-P
J21B (BOTTOM) = SAM_SSW-110-22-F-D-VS-K



J23A (TOP) = SAM_TSM-105-01-L-DV-P
J23B (BOTTOM) = SAM_SSW-105-22-F-D-VS-K

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During normal operation, some circuit components may have case temperatures greater than 30°C. The EVM is designed to operate properly with certain components above 85°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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