DSP56L811EVM

User's Manual

Revision 1

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Introduction

This document supports the DSP56L811 Evaluation Module (DSP56L811EVM), including a description of its basic structure and operation, the equipment required to use it, the specifications of the key components, the provided software (such as the demonstration code, the self-test code, and the software required to develop and debug sophisticated applications), schematic diagrams, and a parts list. **Section 1** is a Quick Start Guide. **Section 2** provides detailed information about key components in the evaluation module. **Appendix A** has detailed schematics. **Appendix B** lists the Bill Of Materials (BOM) for the board. This document has been designed for users experienced with DSP development tools. For users with little or no DSP experience, detailed information is provided in the additional documents supplied with this kit.

Previous printing 1996

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SECTION 1

QUICK START GUIDE

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1.1 OVERVIEW

The DSP56L811 Evaluation Module (DSP56L811EVM) was designed to operate as a stand-alone product or with the Motorola Application Development System (ADS). When used as a stand-alone product, the module allows the user to evaluate and test the basic DSP56L811 chip functionality. When used with the Motorola ADS, the module facilitates development, debug, and test of complex software applications and hardware products designed for the DSP56L811. Detailed information about the Motorola ADS is provided in the Motorola *ADS User's Manual* (order # DSPADSUM/AD).

Subsection 1.2 of this document gives a summary description of the additional equipment a user must supply to use the DSP56L811EVM as a stand-alone product and the equipment required to use the module with the Motorola ADS.

Subsection 1.3 describes installation instructions, including:

- Preparing the module for installation
- Installing the module
- Installing the software
- Testing the installation

Each of these sections provides information for using the module as a stand-alone product or with the Motorola ADS.

Note: Detailed information about the design and operation of the DSP56L811EVM is provided in this manual in **Section 2** and **Appendices A** and **B**.

1.2 REQUIRED USER-SUPPLIED EQUIPMENT

For use as a stand-alone product, the user must supply the following:

- Power supply—9–12 V dc, 500 mA, with 2.5 mm receptacle (inside positive) power connector
- RS-232 cable (DB9 plug to DB9 receptacle)
- IBM PC compatible computer (386 class or higher) running Windows 3.1 and DOS 6.0 (or higher), or Windows 95, with an RS-232 serial port capable of 9,600–57,600 bit-per-second operation, 4 Mbytes RAM, 3-1/2 inch diskette drive, CD-ROM drive, hard drive with 4 Mbyte of free disk space, and a mouse

For use with the Motorola ADS (and the appropriate interface card), the user must supply one of the following host computer systems:

- PC-compatible computer (486 class or higher) with:
  - MS-DOS version 6.0 or later or Windows 3.1 or later or Windows 95
  - 8 Mbytes RAM
  - One open 16-bit ISA or a PCI expansion slot
  - Free I/O addresses ($100–$102, $200–202, or $300–$303)
  - CD-ROM drive
  - Hard drive with 4 Mbyte of free disk space
  - Mouse
- Hewlett Packard HP7xx Workstation running HPUX Version 9.x (Version 10.x is not supported), one open EISA expansion slot, CD-ROM drive, and a mouse
- Sun Microsystems Sun 4 Workstation running Sun Operating System Release 4.1.1 or later (or Solaris Release 2.5 or later), one open SBus expansion slot, CD-ROM drive, and a mouse

1.3 INSTALLATION PROCEDURE

Installation requires four basic steps:

1. Preparing the DSP56L811EVM board
2. Installing the module
3. Installing the software
4. Testing the installation

1.3.1 Preparing the DSP56L811EVM

CAUTION

Because all electronic components are sensitive to the effects of electrostatic discharge (ESD) damage, correct procedures should be used when handling all components in this kit and inside the supporting personal computer. Use the following procedures to minimize the likelihood of damage due to ESD:

- **Always handle all static-sensitive components only in a protected area, preferably a lab with conductive (anti-static) flooring and bench surfaces.**
- **Always use grounded wrist straps when handling sensitive components.**
- **Never remove components from anti-static packaging until required for installation.**
- **Always transport sensitive components in anti-static packaging.**

Locate the twelve jumper blocks JG1–JG12 on the DSP56L811EVM board, as shown in **Figure 1-1** on page 1-6. **Table 1-1** describes the jumper group settings for stand-alone operation and for use with the Motorola ADS.

Read the technical summary in **Section 2** of this manual for additional information about the DSP56L811EVM board and its components.

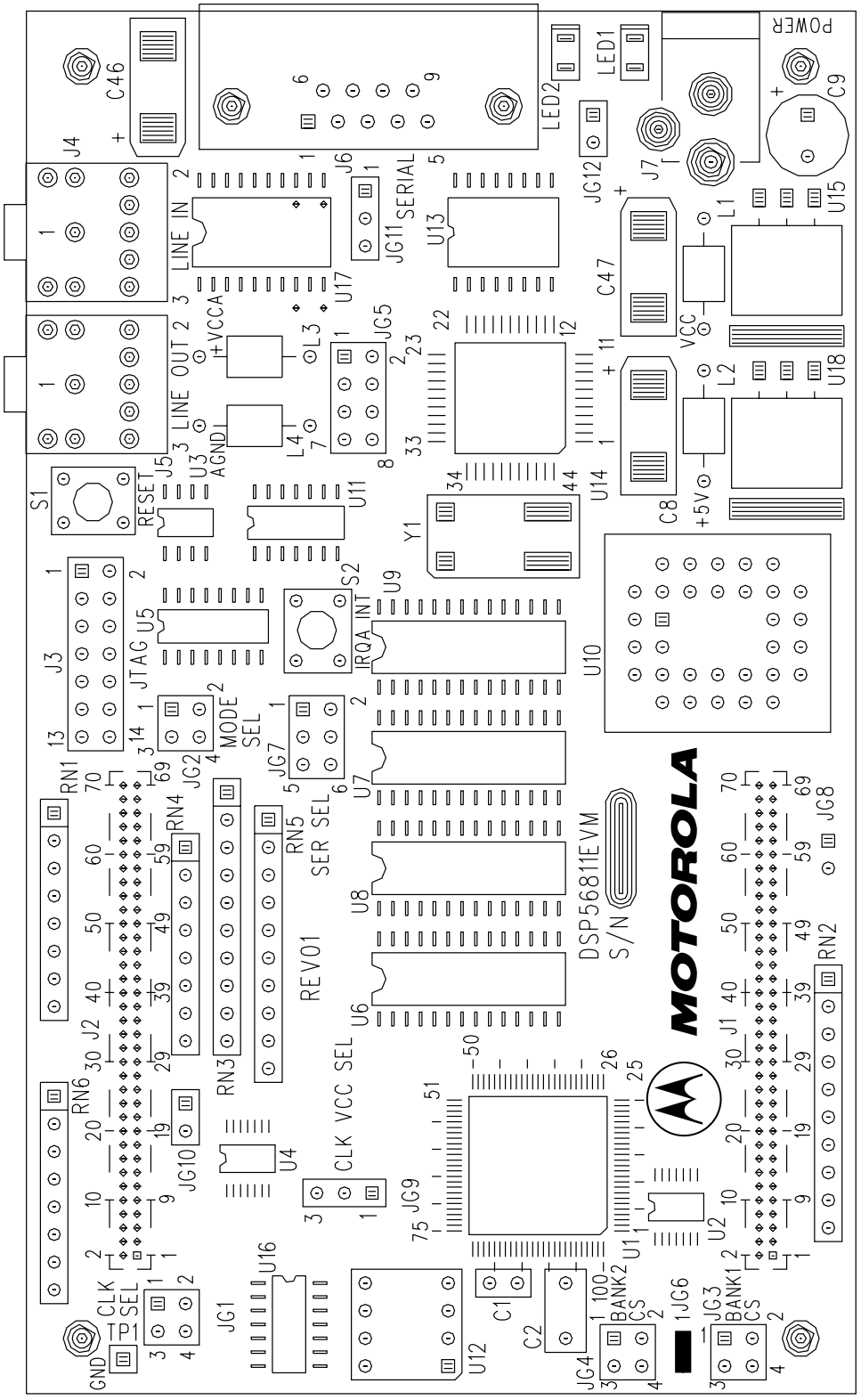

Figure 1-1 DSP56L811EVM Key Component Layout

Table 1-1 DSP56L811EVM Default Jumper Options

Jumper Group	COMMENT	Jumpers Connections	
		Stand-alone	With ADS
JG1	Selects user oscillator for clock input	1–2	1–2
JG2	Selects Mode 2 operation upon exit from reset	1–2	1–2
JG3	Selects Program memory with Flash RAM	3–4	3–4
JG4	Selects Data memory	1–2	1–2
JG5	Selects on-board codec	1–2, 3–4, 5–6, 7–8	1–2, 3–4, 5–6, 7–8
JG6	Reserved	—	—
JG7	Selects RS-232 converter connection: • to microcontroller for stand-alone operation, or • to Port B for ADS operation	1–3, 2–4	3–5, 4–6
JG8	Reserved	—	—
JG9	Selects 8-pin oscillator V_{CC} = +5 V	2–3	2–3
JG10	Indicates that PB15 is not connected to a pull-down resistor	NC	NC
JG11	Selects codec output 1.7 V peak @300 ohm	1–2	1–2
JG12	Selects PB14 standard functionality	NC	NC

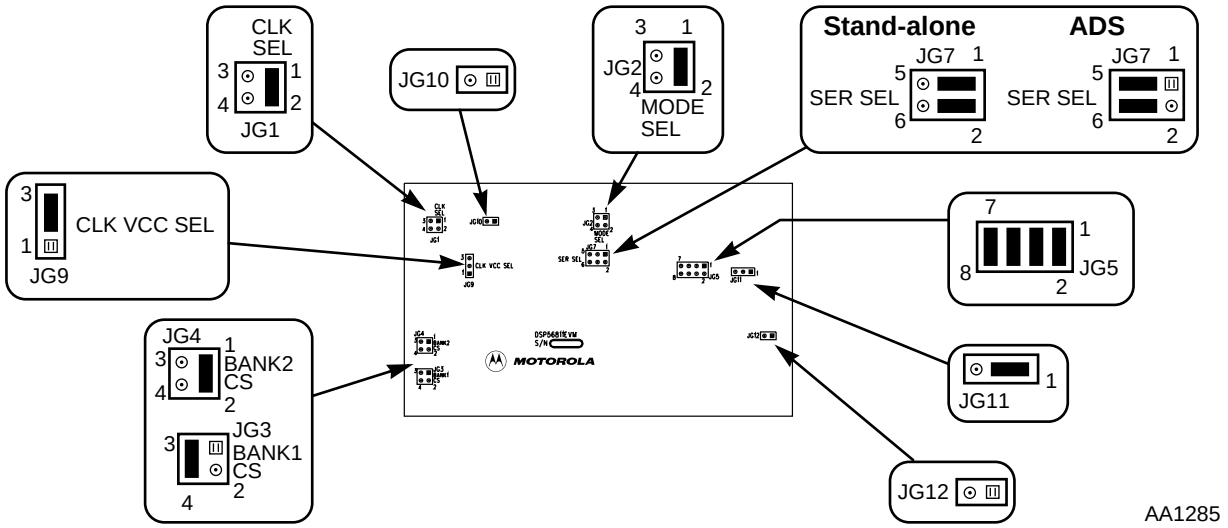

Figure 1-2 DSP56L811EVM Quick Jumper Reference

1.3.2 Installing the Module

Installation of the DSP56L811EVM depends on whether it is being used as a stand-alone product or with the Motorola ADS. **Subsection 1.3.2.1** describes how to install the module for stand-alone operation. **Subsection 1.3.2.2** describes the installation for the Motorola ADS.

1.3.2.1 Installing the DSP56L811EVM as a Stand-alone Product

Figure 1-3 shows the interconnection diagram for connecting the PC and the external power supply to the DSP56L811EVM board. Use the following steps to complete cable connections:

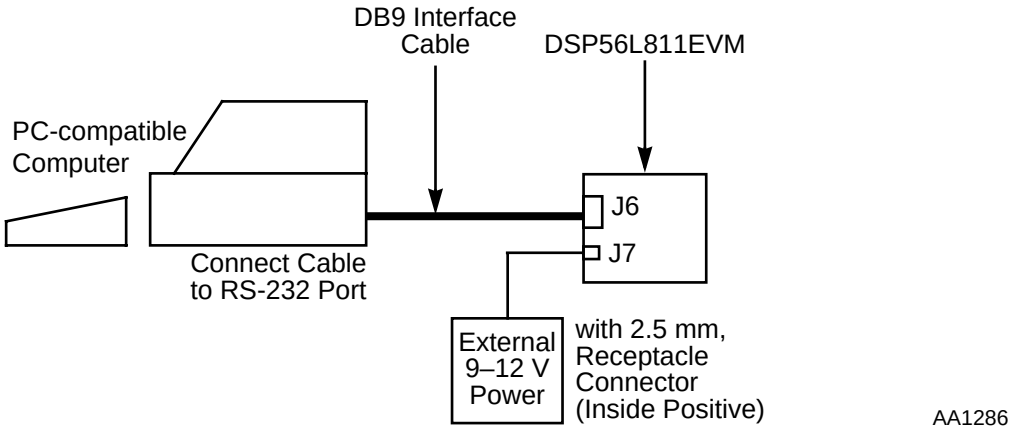

Figure 1-3 Connecting the DSP56L811EVM Cables

1. Connect the DB9 plug end of the RS-232 interface cable to the RS-232 port connection on the PC.
2. Connect the DB9 socket end of the cable to J6, shown in **Figure 1-1**, on the DSP56L811EVM board. This provides the connection to allow the PC to control the board.
3. Make sure that the external 9–12 V dc @ 500 mA power supply does not have power supplied to it.
4. Connect the 2.5 mm output power plug into J7, shown in **Figure 1-1**, on the DSP56L811EVM board.
5. Apply power to the power supply. The green Power LED illuminates when power is correctly applied.

1.3.2.2 Installing the DSP56L811EVM with the Motorola ADS

Figure 1-4 shows the interconnection diagram for connecting the PC to the DSP56L811EVM board. Using the instructions in the ADS User's Manual, connect the Command Converter to the DSP56L811EVM board. Power for the DSP56L811EVM is supplied from the Command Converter module.

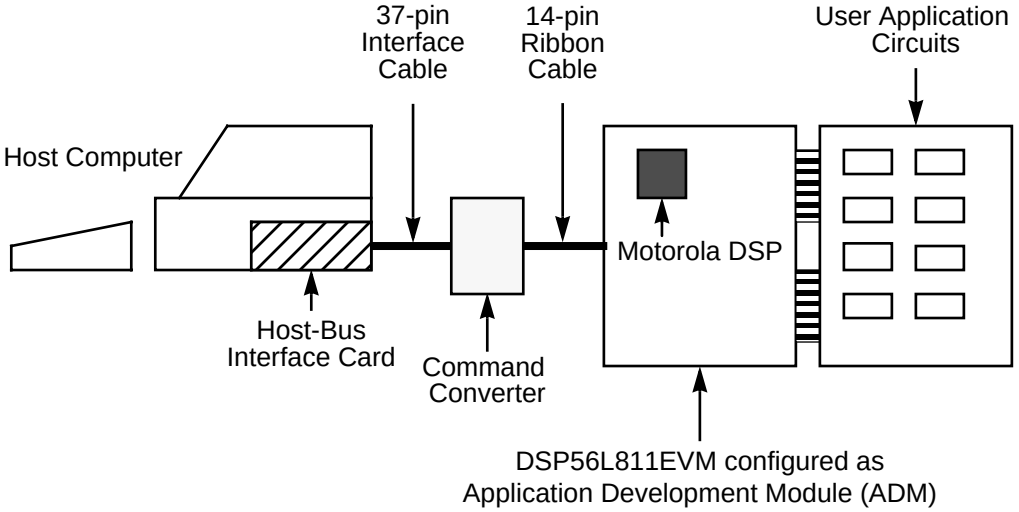

Figure 1-4 Application Development

1.3.3 Installing the Software

The DSP56L811EVM uses a Domain Technologies Debugger software for stand-alone operation in combination with the Motorola Assembler and Linker software.When used as part of a Motorola ADS, the DSP56L811EVM uses the ADS software.

1.3.3.1 Stand-alone Operation Software Installation

The DSP56L811EVM software includes the following:

- Motorola Development Tools CD-ROM containing:
  - Assembler
  - Linker
- Domain Technologies diskette containing the window-based user interface debug software

Use the following steps to install the software:

1. Insert the Motorola Application Development Tools CD-ROM into the PC CD drive.
2. If the system is not already running in Windows, start Windows.
3. Go to “My Computer” or “File Manager” and launch the CD.
4. The Motdsp window appears.
5. Select WIN as the operating system.
6. Click on Setup to execute.
7. The Installation Program Manager window appears. Follow instructions / dialog within this window.

Note: A Readme file is also provided which shows how to install from the DOS system.

8. Insert the Domain Technologies diskette labeled EVM56811 into the diskette drive.
9. From Windows, run the Debugger installation program install.exe on the diskette. This can be done from the Microsoft Windows Program Manager by pulling down the File menu, choosing Run.
10. Select a new destination directory if it is to be different from the default installation directory, and click on OK.
11. The install program creates a program icon called *evm56811* within Windows. This step completes the software installation.

1.3.3.2 Motorola ADS Software Installation

Refer to the Motorola *Application Development System User’s Manual* for detailed instructions about installation and use of the ADS software.

1.3.4 Testing the DSP56L811EVM Installation

System test procedures depend upon whether the module is used as a stand-alone product or with the Motorola ADS.

1.3.4.1 Testing a Stand-alone Installation

This section describes how to test a DSP56L811EVM stand-alone installation using a simple RS-232 terminal emulation program. The board should be tested using the following settings in the emulation program:

- Baud rate = 9600
- Parity = None
- Data bits = 8
- Stop bits = 1

After setting the communication parameters, start the terminal emulation program. This removes the reset signal form the microcontroller and activates the Data Transmitter Ready (DTR) signal. The 68HC705C4 chip on the DSP56L811EVM starts sending the following pattern:

xx DSP56811EVM

where, xx is an 2-digit hexadecimal number starting with 01.

The transmission causes the following display to appear on the host computer screen:

```
01 DSP56811EVM
               02 DSP56811EVM
                              03 DSP56811EVM
                                             04 DSP56811EVM
                                                            05 DSP56811EVM
06 DSP56811EVM
               07 DSP56811EVM
                              08 DSP56811EVM
                                             09 DSP56811EVM
                                                            0A DSP56811EVM
0B DSP56811EVM
               0C DSP56811EVM
                              0D DSP56811EVM
                                             0E DSP56811EVM
                                                            0F DSP56811EVM
10 DSP56811EVM
               11 DSP56811EVM
                              12 DSP56811EVM
                                             13 DSP56811EVM
                                                            14 DSP56811EVM
```

Figure 1-5 Screen Display for Correct DSP56L811EVM Installation

Sending any character from the host computer to the DSP56L811EVM stops the data transmission string. Transmitting the letter A ($41) causes the host computer to display the following ASCII menu:

```
Enter new SCI Baud Reg value (12):
                                    705C4 test rev 1.02
          A - print menu                    J - Wr OnCE 8
          B - chg baud                      K - Wr OnCE 16
          C - toggle TRST                   L - Wr OnCE 24
          D - toggle DSPRST                 M - Rd OnCE 16
          E - Reset DSP                     N - Rd OnCE 24
          F - JTAG ID                       O - Rd OnCE 25
          G - Enter Dbg                     P - Send IR
          H - Enable JTAG                   Q - Get status
          I - Disable JTAG
```

Figure 1-6 Test Menu

To verify connection to the DSP56L811, read the JTAG ID register using the following steps:

1. Use the command H to enable the JTAG interface.
2. Use the command F to request the device ID.
3. If the device is connected and operating properly, it returns the following:

```
Device ID: 1150001D
Cycles/4 elapsed: 0465
```

4. The return display indicates that the binary communications link to the DSP56L811 is established and the Domain Technologies Debugger software can be invoked through Windows to communicate with the DSP56L811EVM.
5. If the communications link can not be established, the following display is returned:

```
Title of the Error box:
     Initialization Error
Contents of the error box:
     Debugger mode: EVM-56K
     Com port #0
     Check Com port connections.
            <OK>
```

Note: Port 0 indicates Auto Detect mode and that the software is checking all available com ports. See the Domain Technologies Debugger User's Manual for additional information.

1.3.4.2 Testing the DSP56L811EVM Installed in a Motorola ADS

Refer to the Motorola *Application Development System User's Manual* for detailed information regarding evaluation and testing of an installed ADS system.

SECTION 2

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2.1 DSP56L811EVM DESCRIPTION AND FEATURES

The DSP56L811EVM is designed as a versatile card that can be used not only as a stand-alone board, but can also be plugged into other cards. Two 70-pin connectors, J1 and J2, located on the bottom of the Printed Circuit Board (PCB), allow access to all the DSP signals, including V_{DD} and V_{SS}. This plug-in feature permits special configurations, including, among others, connection to a customized wire-wrapped or other application board to permit enhanced functionality.

An overview description of the DSP56L811EVM is also provided in the *DSP56L811EVM Product Information* brief (order number DSP56L811EVMP/D) included with this kit. The main features of the DSP56L811EVM include the following:

- DSP56L811 16-bit Digital Signal Processor
- External memory
- 13-bit linear codec with voice input and output jacks
- On-board oscillator
- Manual interrupt button S2 for $\overline{\text{IRQA}}$
- Manual DSP reset button S1
- Single LED (LED2) for user debug operations
- On-board microcontroller-based Command Converter
- JTAG connector for Motorola's Advanced Development System (ADS) provides an enhanced development environment including a high-speed data transfer port. The connecting motherboard plugs into a host PC ISA or PCI bus.

Note: Call your local Motorola sales office or distributor for additional information about the Motorola Application Development System (ADS) kit. The ADS kit includes two additional boards: a Host Interface card and an external universal Command Converter. The Host Interface card plugs in the host bus (on a PC-compatible or SUN system) inside the computer chassis. The external universal Command Converter card connects to the host card via a ribbon cable. The Command Converter card connects to the JTAG connector on the DSP56L811EVM via another short ribbon cable. The ADS is only compatible with Motorola software tools.

2.2 DSP56L811 DESCRIPTION

A full description of the DSP56L811, including functionality and user information is provided in the following documents included as a part of this kit (either as printed copies or on the documentation CD-ROM):

- **DSP56L811 Technical Data sheet:** Provides features list and specifications including signal descriptions, dc power requirements, ac timing requirements, and available packaging
- **DSP56L811 User's Manual:** Provides an overview description of the DSP and detailed information about the on-chip components including the memory and I/O maps, peripheral functionality, and control and status register descriptions for each subsystem
- **DSP56800 Family Manual:** Provides a detailed description of the core processor including internal status and control registers and a detailed description of the family instruction set

Refer to these documents for detailed information about chip functionality and operation.

2.3 MEMORY

The DSP56L811EVM uses the following memory:

- 32 K × 16-bit Fast Static RAM (FSRAM) for external program memory
- 32 K × 16-bit Fast Static RAM (FSRAM) for external data memory
- 32 K × 8-bit Flash program memory for stand-alone operation (installed)

Note: The socket allows users to choose their own device.

Refer to **Figure 2-1** on page 2-5 for the location of the FSRAM and Flash memory socket on the DSP56L811EVM. **Figure 2-2** on page 2-6 shows a functional block diagram of the DSP56L811EVM including the memory devices.

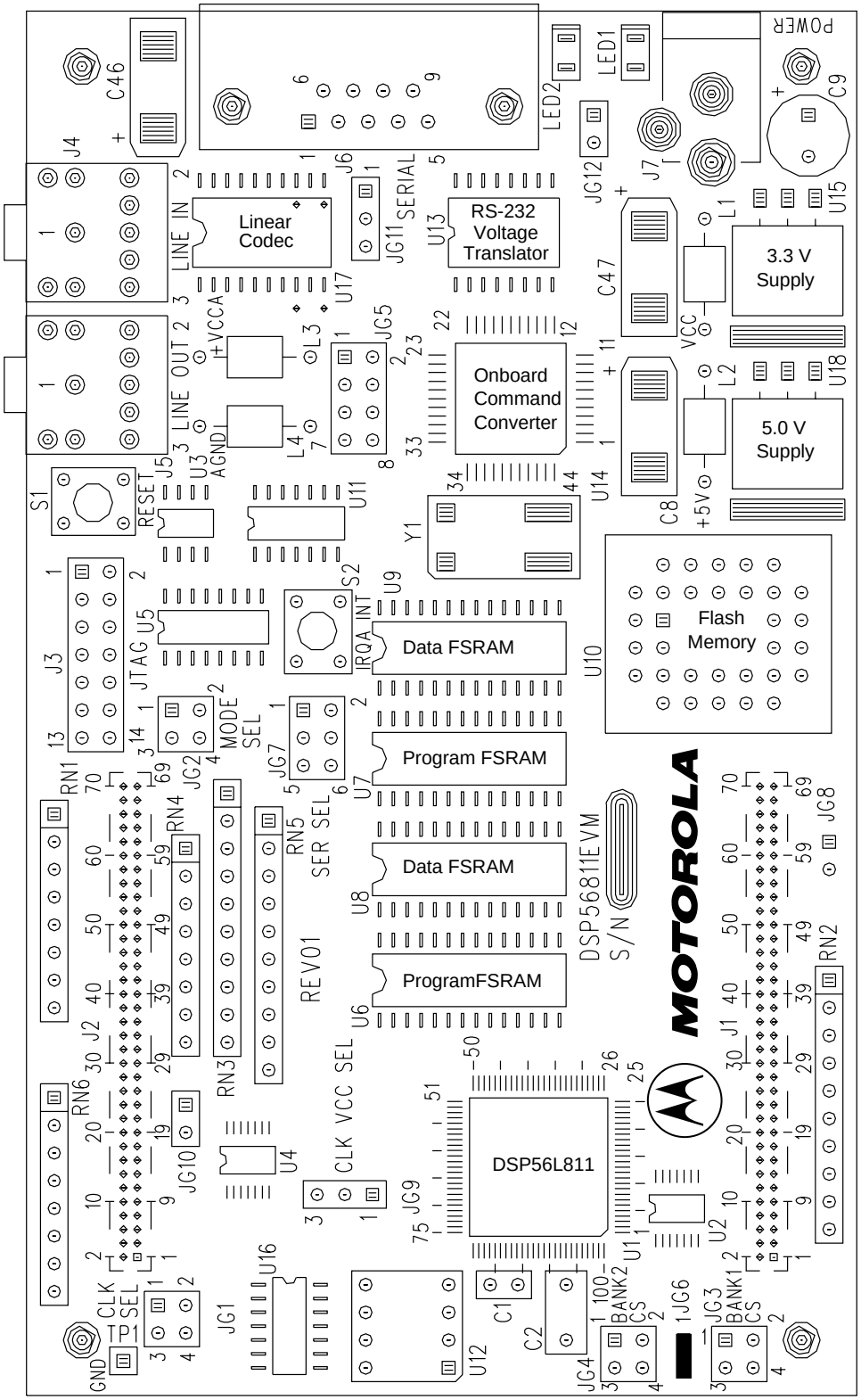


Figure 2-1 DSP56L811EVM Key Component Layout

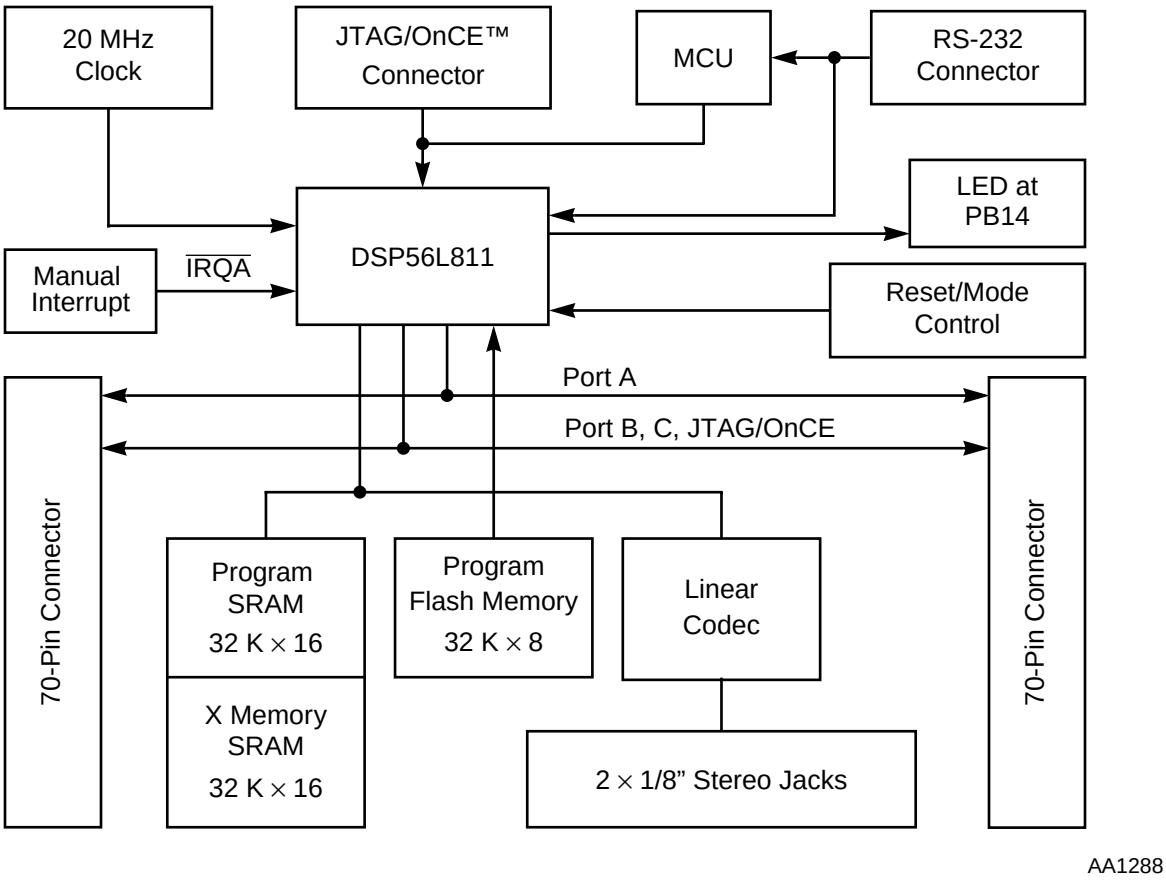


Figure 2-2 DSP56L811EVM Functional Block Diagram

2.3.1 SRAM

The DSP56L811EVM uses four banks of 32 K × 8-bit Fast Static RAM (Motorola MCM6306D, labelled U6, U7, U8, and U9) for memory expansion, two for program memory and two for data memory. The SRAMs installed in U6 and U7 are addressed by the DSP program memory space. The SRAMs installed in U8 and U9 are addressed by the DSP data memory space. The on-board jumpers JG3 and JG4 configure the SRAMs and the Flash memory socket. Refer to **Table 2-4** on page 2-10 and **Table 2-5** on page 2-11 for setting these jumpers.

2.3.2 Flash Memory

The DSP56L811EVM provides a socket (U10) for a 32 K × 8-bit Flash memory device. When the Flash memory is inserted, the external program SRAM must be configured for operation in the lower program memory address space ($0000–$7FFF). The Flash memory automatically decodes to the upper program memory space ($8000–$FFFF). Pre-programmed Flash memory devices with the DSP mode set for boot loading from external byte-wide memory allows stand-alone operation of the DSP56L811EVM.

2.4 VOICE CODEC

The DSP56L811EVM analog section uses Motorola's MC145483 (U17), 13-bit linear codec. Refer to the data sheet included with this kit for more information. The DSP56L811EVM has 1/8-inch jacks for voice input and output. Codec output jumper JG11 can select one of two separate output load drives. Refer to **Table 2-9** on page 2-13 for a description of the output load options. The codec interfaces to the DSP via the SSI port. No glue logic is required. The codec clock and frame synchronization are provided by the DSP. Jumper JG5 allows the user to disconnect the onboard codec completely. This frees up the DSP's SSI port for other peripheral use.

2.5 MICROCONTROLLER UNIT (MCU)

The DSP56L811EVM uses a Motorola Microcontroller Unit (MCU) (U14) to perform JTAG/OnCE command conversion. The MCU communicates with the host PC through an RS-232 connector. The SCI receives commands from the host PC. The set of commands may include read data, write data, reset OnCE, request OnCE, or release OnCE. The microcontroller command converter software interprets the commands received from the PC and sends a sequence of instructions to the DSP56L811 JTAG/OnCE port. The DSP56L811 may then continue to receive data or it may transmit data back to the microcontroller. The microcontroller sends a reply to the host PC to give status information. The set of replies may include acknowledge good, acknowledge bad, in Debug mode, out of Debug mode, or data read.

The MCU connects to the DSP56L811 OnCE port. **Figure 2-3** shows the RS-232 serial interface diagram.

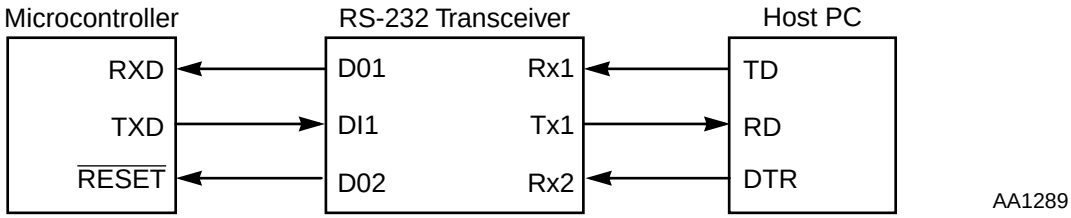


Figure 2-3 RS-232 Serial Interface

A Maxim 232CWE RS-232 Voltage Translator (U13) is used to transmit the signals between the host PC and the microcontroller. Serial data is transmitted from the host PC Transmit Data (TD) signal and received on the microcontroller Receive Data (RXD) pin. Serial data is similarly transmitted from the microcontroller Transmit Data (TXD) signal and received on the host PC Received Data (RD) signal. The Data Terminal Ready (DTR) pin asserts the $\overline{\text{RESET}}$ pin of the microcontroller. When power is applied to the DSP56L811EVM, the MCU will not drive the JTAG/OnCE port pins until it receives a special command from the host via the RS-232 interface. As an option, the DSP56L811EVM 14-pin JTAG connector at J3 allows the user to connect an ADS Command Converter card directly to the DSP56L811EVM if the microcontroller Command Converter software is not used. The JTAG cable from the ADS Command Converter is similarly keyed so that the cable can not be connected to the DSP56L811EVM incorrectly.

2.6 JUMPER CONFIGURATION

The DSP56L811EVM board includes a number of configuration jumpers that allow the user to modify the way in which the board is used in a particular application. **Section 1** of this manual discusses the settings used with the Domain Technologies Debugger software or the Motorola ADS software. The following paragraphs give a detailed description of the function of the jumpers.

2.6.1 Clock Input Selection

The clock input to the DSP is selected by jumper group JG1. There are two options for the clock input selection. The DSP clock source may be either the user clock oscillator, or an external clock input that can be connected via the J2 expansion connector or directly to JG1 Pin 3. See **Table 2-1** on page 2-9.

Table 2-1 Clock Source Selection

Clock Source	JG1
20 MHz user oscillator clock (default)	1–2
External clock CLOCK_IN on J2 pin 1	3–4

Note: The DSP56L811EVM is factory configured for the 20 MHz user oscillator clock.

2.6.2 User Clock Oscillator V_{CC} Setting

Jumper group JG9 is used to select the power source (3.3 V or 5.0 V) for the Clock Oscillator (U12). Linking pins 1–2 on JG9 selects +3.3 V, linking pins 2–3 on JG9 selects 5.0 V (default). The output signal at the clock oscillator is buffered and then sent to the DSP. See **Table 2-2** for details.

Table 2-2 Oscillator V_{CC} Selection

JG9	Comment
1–2	Clock V_{CC} is +3.3 V
2–3	Clock V_{CC} is +5.0 V (default)

Note: The DSP56L811EVM is factory configured for clock V_{CC} to be +5 V.

2.6.3 Operating Mode Selection

Jumper group JG2 is used to select the operating mode of the DSP after reset. Refer to the *DSP56L811 User's Manual* for a complete description of the chip operating modes. **Table 2-3** on page 2-10 shows the JG2 selection to achieve any of the four operating modes available on the DSP56L811.

Table 2-3 Operating Mode Selection

Mode	JG2	Comment
0	1–2, 3–4	Bootstrap from External bus P:$0000
1	3–4	Bootstrap from peripheral P:$0000
2	1–2	Normal Expanded P:$E000 (default)
3	No jumpers	Development P:$0000

Note: The DSP56L811EVM is factory configured to exit from reset in Mode 2.

2.6.4 Program Memory Configuration

JG3 selects the external program memory configuration. For fastest operation with the installed 15 ns Fast Static RAM, link pins JG3 1–2 and configure the Bus Control Register (BCR) for zero wait states. Address line A15 is ignored, and consequently the program memory, occupying address range P:$0–$7FFF, will also appear in address range P:$8000–$FFFF.

If the Flash memory is installed, link pins JG3 3–4. The program Static RAM occupies address range P:$0–$7FFF, and the Flash memory occupies address range P:$8000–$FFFF. The delay from gating address line A15 with PS requires that BCR must be configured for one wait state while executing out of external program memory. The Flash memory is byte-addressed only, and offers a means of loading program and data as required. The wait states required while accessing Flash memory will depend on the speed of the particular component installed. Information required for calculating wait states is found in the *DSP56L811 User Manual* and *Technical Data* sheet. See **Table 2-4** for JG3 program memory configuration.

Table 2-4 Program Memory Configuration

Configuration	JG3	Comment
0	1–2	P:$0–$7FFF, (shadow P:$8000–$FFFF)
1	3–4	1 Wait State, P:0–$7FFF Flash P:$8000–$FFFF (default)

Note: The DSP56L811EVM is factory configured for program memory in the range P:$0000–$7FFF (FSRAM) and P:$8000–$FFFF (Flash memory).

2.6.5 Data Memory Configuration

Jumper group JG4 is used to select one of two DSP external data memory options. The default setting is JG4 1–2, Data memory is setup from P:0–$7FFF and shadow P:$8000–$FFFF. JG4 3–4 Data Memory is setup to P:0–$7FFF only. See **Table 2-5** for JG4 data memory configuration.

Table 2-5 Data Memory Configuration

Configuration	JG4	Comment
0	1–2	X:0–$7FFF, shadow X:$8000–$FFFF
1	3–4	1 Wait State, X:0–$7FFF

Note: The DSP56L811EVM is factory configured for data memory in the range X:0–$7FFF.

2.6.6 Codec Configuration

Jumper group JG5 configures the on-board codec. The default setting is JG5 1–2, 3–4,5–6, and 7–8 for the MC145483 codec. If a different codec or another peripheral requires the use of PC8, PC9 , PC10 and PC11, JG5 should be left without jumpers. See **Table 2-6** for JG5 codec configuration.

Table 2-6 Codec Selection

Configuration	JG5	Comment
On-board codec	1–2, 3–4, 5–6, 7–8	Enable MC145483 Codec (default)
User application	no jumpers	Other peripheral

Note: The DSP56L811EVM is factory configured for the MC145483 codec.

2.6.7 RS-232 Serial Communication Configuration

The DSP56L811EVM includes a DB9 connector for an RS-232 serial link. This link may be used either as a control link to the debugging host, handled by the MC68HC705 MCU, or by software running on the DSP. Linking JG7 pins 1–3, 2–4 connects the RS-232 serial port to the MC68HC705 MCU. The MCU performs the functions of the Command Converter, controlling DSP execution via the JTAG / OnCE connector.

Note: The JTAG/OnCE connector (J3) should not be connected to a Command Converter while the MCU is in use as the debug interface.

Linking JG7 pins 3–5, 4–6 connects the RS-232 serial port to the DSP. Although there is no hardware support for RS-232 on the DSP56L811, software on the DSP may use the serial port by program control of pins PB0 and PB1. When the RS-232 serial link is configured for use by the DSP, the MC68HC705 MCU releases the JTAG / OnCE port and a Command Converter may be used to control the DSP.

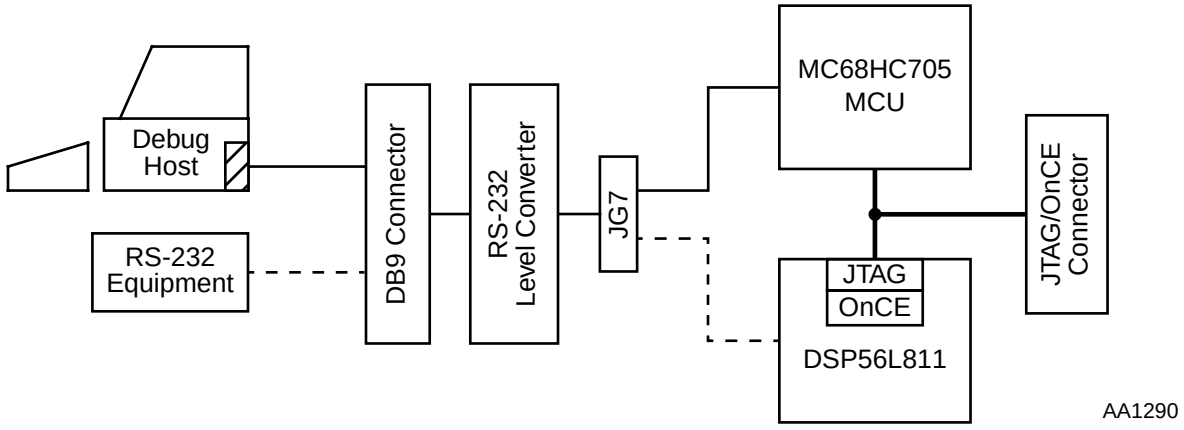


Figure 2-4 RS-232 Serial Communication Options

Table 2-7 Serial Communication Configuration

Configuration	JG7	Comment
MCU serial port	1–3, 2–4	Serial debug port for DSP56L811EVM system
DSP GPIO pins	3–5, 4–6	Available for use by DSP software

Note: The DSP56L811EVM is factory configured with the serial port connected to the MCU.

2.6.8 PB15 Pull Up/Pull Down Selection

Jumper group JG10 is use to pull up or down PB15. This is required to compensate for nonlinear frequency response in the clock circuit. For clock frequencies in the range 32 kHz–2 MHz, JG10 1–2 should be linked to pull down PB15. For clock frequencies in the range 2 MHz–40 MHz, remove the link to pull up PB15. See **Table 2-8** for PB15 configuration information.

Table 2-8 PB15 Selection

Configuration	JG10	Comment
PB15 pull-up	Open	Clock frequencies 2 MHz–40 MHz
PB15 pull-down	1–2	Clock frequencies 32 kHz–<2 MHz

Note: The DSP56L811EVM is factory configured for clock frequencies in the range 2 MHz–40 MHz

2.6.9 Codec Output Selection

Jumper group JG11 is use to select the output drive capability of the codec with respect to analog ground. See **Table 2-9** for JG11 configuration information.

Table 2-9 Codec Output Selection

JG11	Comment
1–2	1.7 V peak @ 300 Ω load
2–3	0.8 V peak @ 2kΩ load

Note: The DSP56L811EVM is factory configured for codec output of 1.7 V into a 300 Ω load.

2.6.10 PB14 Indicator LED Configuration

LED2 is provided as a simple tool for assisting with software debugging via the PB14 signal. Jumper group JG12 is used to set up LED2 as a status indicator. If JG12 is not jumpered, PB14 functions as a GPIO pin with a 10 kΩ pull-up resistor. Connecting JG12 1–2 connects PB14 to ground through LED2 and a 150 Ω current-limiting resistor. LED2 illuminates when the user software sets pin PB14 high. See **Table 2-10**.

Table 2-10 PB14 LED Drive Selection

Configuration	JG12	Comment
PB14 pull-up	No jumper	PB14 is GPIO pin
PB14 as indicator	1–2	PB14 drives LED2

Note: The DSP56L811EVM is factory configured with PB14 operating as a General Purpose Input/Output (GPIO) pin.

2.7 DSP56L811EVM CONNECTOR DESCRIPTIONS

There are seven connectors on the DSP56L811EVM. **Figure 2-1** on page 2-5 illustrates the physical locations of connectors J1 to J7 on the board. **Table 2-11** describes the connectors.

Table 2-11 DSP56L811EVM Connectors

Connector	Comment
J1	70-pin Expansion Connector 1
J2	70-pin Expansion Connector 2
J3	14-pin JTAG/OnCE Interface to DSP
J4	1/8” Mono Line Input Jack to Codec
J5	1/8” Stereo Line Output Jack from Codec
J6	DB9 RS-232 serial Interface connector (DSP or MCU)
J7	Power Connector

2.7.1 Expansion Connector 1

Expansion Connectors J1 and J2 are used to make connections to the DSP pins. **Table 2-12** lists the DSP pins which are accessed on Expansion Connector J1.

Table 2-12 DSP56L811EVM J1 Bus Connector Description

J1			
Pin #	**Signal**	**Pin #**	**Signal**
1	V_{CC}	2	V_{CC}
3	V_{CC}	4	A15
5	$\overline{WR}$	6	A14
7	$\overline{RD}$	8	A13
9	$\overline{PS}$	10	A12
11	$\overline{DS}$	12	A11
13	V_{CC}	14	A10
15	V_{CC}	16	A9
17	V_{CC}	18	A8
19	V_{CC}	20	A7
21	V_{CC}	22	A6
23	NC	24	A5
25	NC	26	A4
27	MCU_PB2	28	A3
29	GND	30	A2
31	GND	32	A1
33	GND	34	A0
35	GND	36	NC
37	GND	38	D0
39	MCU_PA0	40	D1
41	MCU_PA1	42	D2
43	MCU_PA2	44	D3

Table 2-12 DSP56L811EVM J1 Bus Connector Description (Continued)

J1			
Pin #	**Signal**	**Pin #**	**Signal**
45	MCU_PA3	46	D4
47	MCU_PA4	48	D5
49	MCU_PA5	50	D6
51	MCU_PA6	52	D7
53	MCU_PA7	54	D8
55	MCU_PB0	56	D9
57	MCU_PB1	58	D10
59	$\overline{\text{MCU\_IRQ}}$	60	D11
61	$\overline{\text{MCU\_RESET}}$	62	D12
63	SERIAL/$\overline{\text{PAR}}$	64	D13
65	ROM_DIS	66	D14
67	GND	68	D15
69	GND	70	GND

2.7.2 Expansion Connector 2

Table 2-13 lists the DSP pins which are accessed on Expansion Connector J2.

Table 2-13 DSP56L811EVM J2 Bus Connector Description

J2			
Pin #	**Signal**	**Pin #**	**Signal**
1	CLOCK_IN	2	$\overline{\text{RESET}}$
3	PC15/TIO2	4	+5V_ISA
5	PC14/TIO1	6	+5V_ISA
7	PC13/SRFS	8	NC
9	PC12/SRCK	10	+12V_ISA

Table 2-13 DSP56L811EVM J2 Bus Connector Description (Continued)

J2			
Pin #	**Signal**	**Pin #**	**Signal**
11	PC11 / STFS	12	+12V_ISA
13	PC10 / STCK	14	NC
15	PC9 / SRD	16	V_{CC}
17	PC8 / STD	18	V_{CC}
19	PC7 / $\overline{SS1}$	20	V_{CC}
21	PC6 / SCK1	22	V_{CC}
23	PC5 / MOSI1	24	V_{CC}
25	PC4 / MISO1	26	V_{CC}
27	PC3 / $\overline{SS0}$	28	MODA / $\overline{IRQA}$
29	PC2 / SCK0	30	MODB / $\overline{IRQB}$
31	PC1 / MOSI0	32	NC
33	PC0 / MISO0	34	NC
35	CLKO	36	GND
37	PB15	38	GND
39	PB14	40	GND
41	PB13	42	GND
43	PB12	44	GND
45	PB11	46	GND
47	PB10	48	MODA
49	PB9	50	MODB
51	PB8	52	$\overline{RESET\_IN}$
53	PB7	54	$\overline{IRQA\_IN}$
55	PB6	56	$\overline{IRQB\_IN}$
57	PB5	58	TDO
59	PB4	60	TMS

Table 2-13 DSP56L811EVM J2 Bus Connector Description (Continued)

J2			
Pin #	**Signal**	**Pin #**	**Signal**
61	PB3	62	TCK
63	PB2	64	TRST / $\overline{DE}$
65	PB1	66	TDI
67	PB0	68	GND
69	GND	70	GND

2.7.3 JTAG/OnCE Connector

Connector J3 is used to connect the DSP56L811EVM to a host development system using a Command Converter and Host Computer Interface Card. The ADS software controls the chip execution by accessing the OnCE controller via the JTAG interface, and provides facilities for software development and debugging.

This connector may also allows the user to access the JTAG Test Access Port (TAP) directly. The pin out of this connector is shown in **Table 2-14**.

Table 2-14 DSP56L811EVM J3 JTAG / OnCE Description

J3			
Pin #	**Signal**	**Pin #**	**Signal**
1	TDI	2	GND
3	TDO	4	GND
5	TCK	6	GND
7	NC	8	KEY
9	$\overline{J\_RESET}$	10	TMS
11	V_{CC}	12	NC
13	TRST / $\overline{DE}$	14	TRST / $\overline{DE}$

2.7.4 Codec Line In

This connector enables the user to apply an input signal to the on board codec. The pinout of this connector is shown on **Table 2-15**.

Table 2-15 DSP56L811EVM J4 Line In Description

J4			
Pin #	**Signal**	**Pin #**	**Signal**
1	ANALOG GND	2	LINE IN

2.7.5 Codec LIne Out

This connector enable the user to send an output signal from the on board codec. The pinout of this connector is shown on **Table 2-16**.

Table 2-16 DSP56L811EVM J5 Line Out Description

J5			
Pin #	**Signal**	**Pin #**	**Signal**
1	ANALOG GND	2,3	LINE OUT

2.7.6 RS-232 Serial Communication Interface Connector

The RS-232 port may be used either as a debug port by the MC68HC705 MCU, or as a communications port by the DSP. See **Section 2.6.7 RS-232 Serial Communication Configuration** on page 2-12. If a Command Converter is not available, a program may be loaded from Flash memory by configuring the DSP to exit reset in Operating Mode 0. **Table 2-17** on page 2-20 defines the serial connector.

Table 2-17 DSP56L811EVM Serial Connector Description

J6			
Pin #	**Signal**	**Pin #**	**Signal**
1	OCO (+5 V)	2	RX
3	TX	4	DTR (+5 V)
5	GND	6	DSR (+5 V)
7	RTS (n/c)	8	CTS
9	RI (n/c)		

2.7.7 Power Source Connector

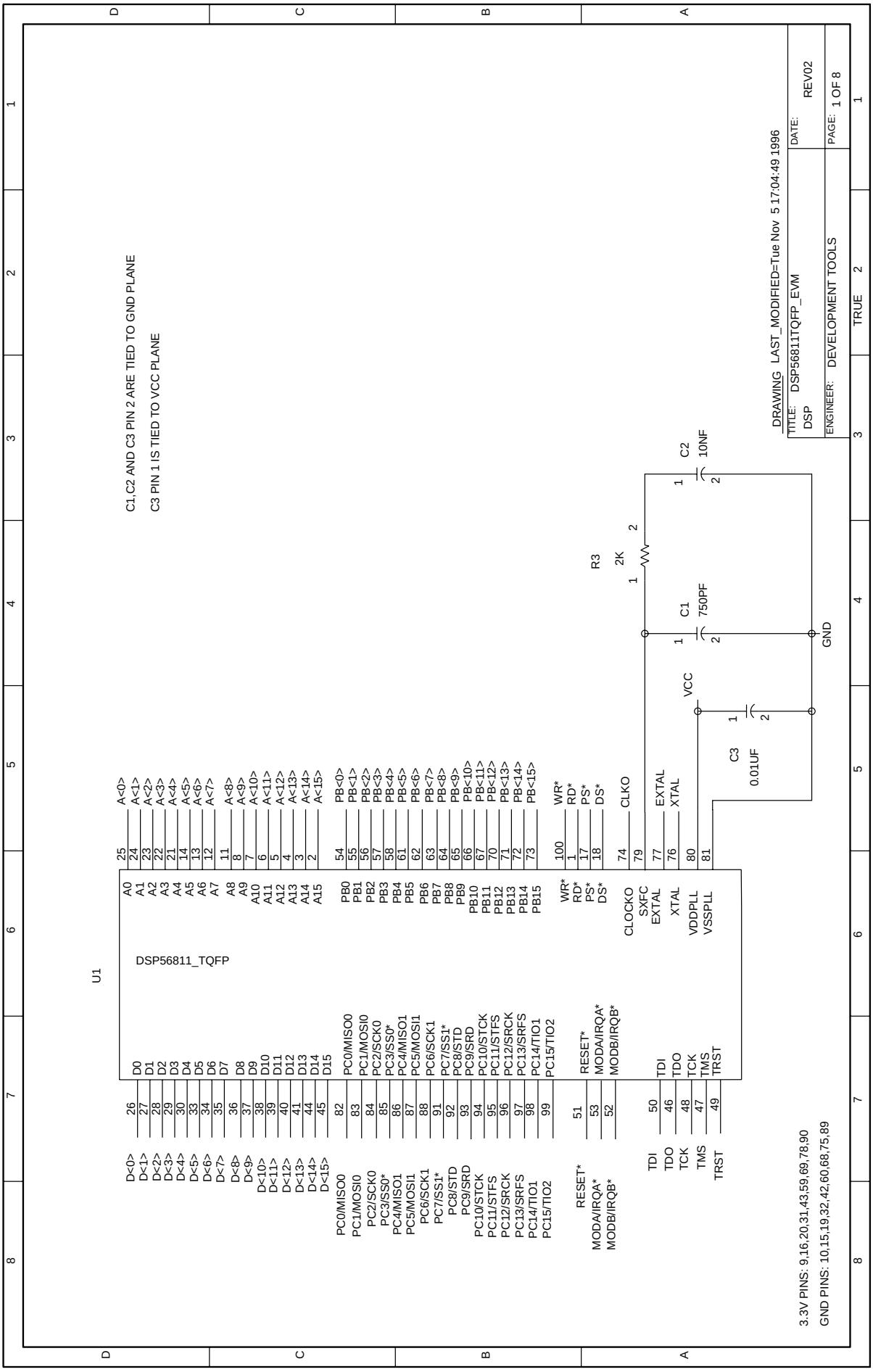
Input voltage range is 9–12 V dc at 500 mA. **Table 2-18** shows this connector pins description.

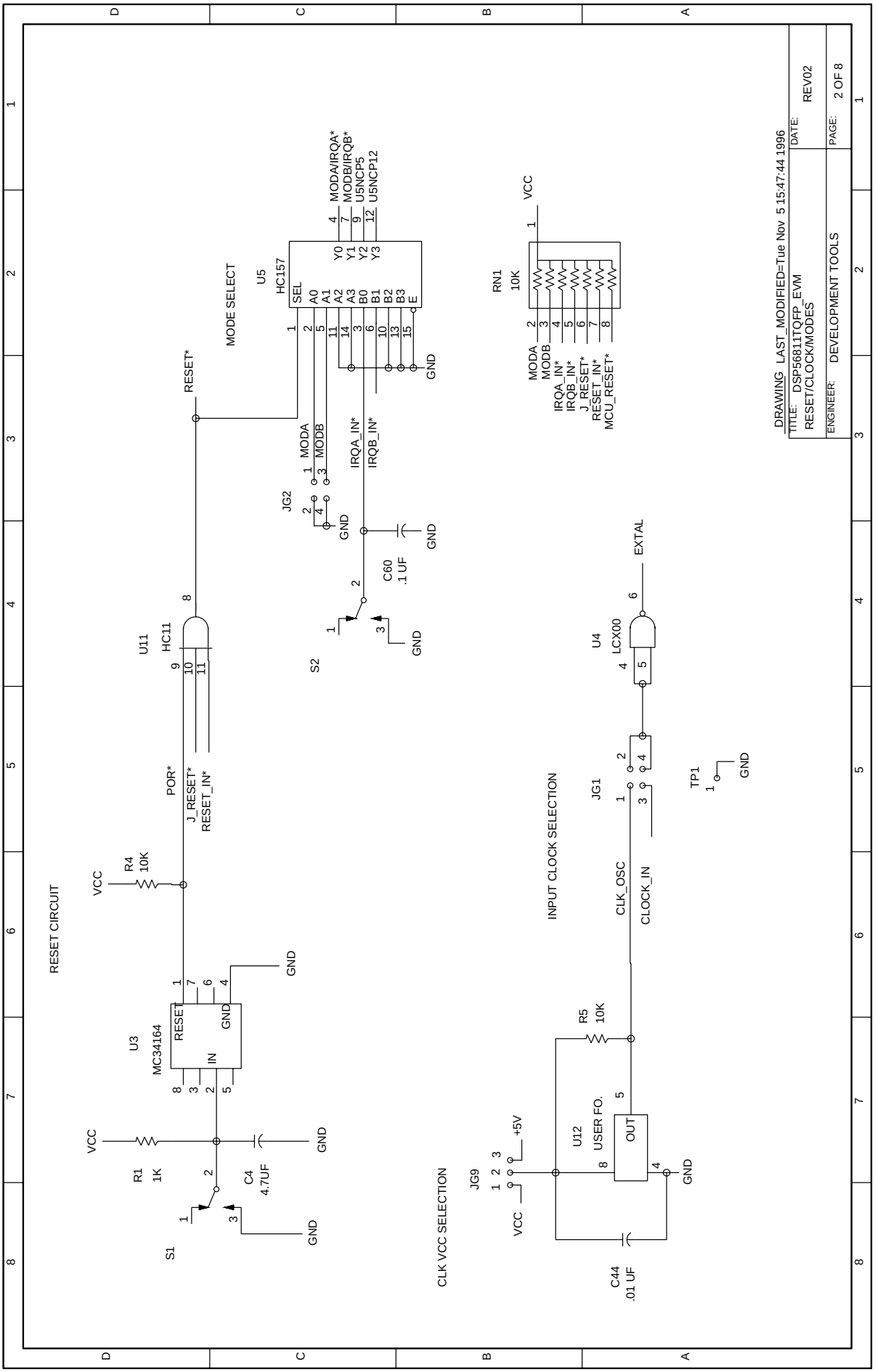
Table 2-18 DSP56L811EVM J7 Power Source Connector Description

J7			
Pin #	**Signal**	**Pin #**	**Signal**
1	V_{CC} IN	2	GND

APPENDIX A

DSP56L811EVM SCHEMATICS


C1,C2 AND C3 PIN 2 ARE TIED TO GND PLANE
C3 PIN 1 IS TIED TO VCC PLANE
DRAWING LAST_MODIFIED=Tue Nov 5 17:04:49 1996
TITLE: DSP DSP56811TQFP_EVM
DATE: REV02
ENGINEER: DEVELOPMENT TOOLS
PAGE: 1 OF 8
TRUE
U1
DSP56811_TQFP
R3 2K
C1 750PF
C2 10NF
C3 0.01UF
VCC
GND
3.3V PINS: 9,16,20,31,43,59,69,78,90
GND PINS: 10,15,19,32,42,60,68,75,89


RESET CIRCUIT
MODE SELECT
INPUT CLOCK SELECTION
CLK VCC SELECTION
U3
MC34164
U4
LCX00
U5
HC157
U11
HC11
U12
USER FO.
RN1
10K
JG1
JG2
JG9
S1
S2
TP1
R1
1K
R4
10K
R5
10K
C4
4.7UF
C44
.01 UF
C60
.1 UF
VCC
GND
+5V
RESET*
POR*
J_RESET*
RESET_IN*
MODA
MODB
IRQA_IN*
IRQB_IN*
CLK_OSC
CLOCK_IN
EXTAL
MODA/IRQA*
MODB/IRQB*
U5NCP5
U5NCP12
MCU_RESET*
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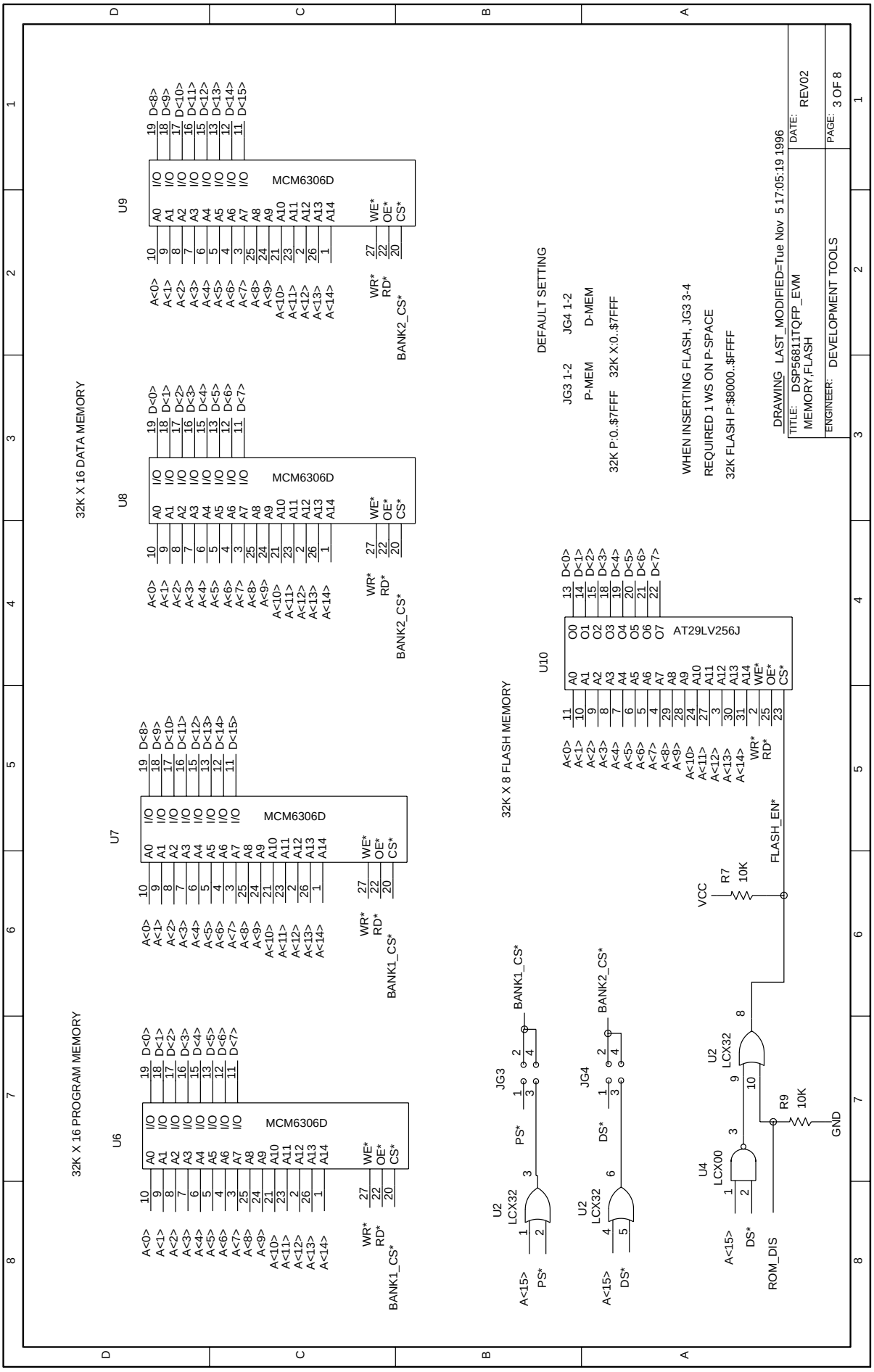
RESET/CLOCK/MODES
DATE:
REV02
ENGINEER: DEVELOPMENT TOOLS
PAGE: 2 OF 8


32K X 16 PROGRAM MEMORY
U6
MCM6306D
32K X 16 DATA MEMORY
U7
MCM6306D
U8
MCM6306D
U9
MCM6306D
BANK1_CS*
BANK2_CS*
WR*
RD*
WE*
OE*
CS*
32K X 8 FLASH MEMORY
U10
AT29LV256J
DEFAULT SETTING
JG3 1-2 JG4 1-2
P-MEM D-MEM
32K P:0..$7FFF 32K X:0..$7FFF
WHEN INSERTING FLASH, JG3 3-4
REQUIRED 1 WS ON P-SPACE
32K FLASH P:$8000..$FFFF
JG3
JG4
PS*
DS*
A<15>
U2
LCX32
U4
LCX00
R7
10K
R9
10K
VCC
GND
FLASH_EN*
ROM_DIS
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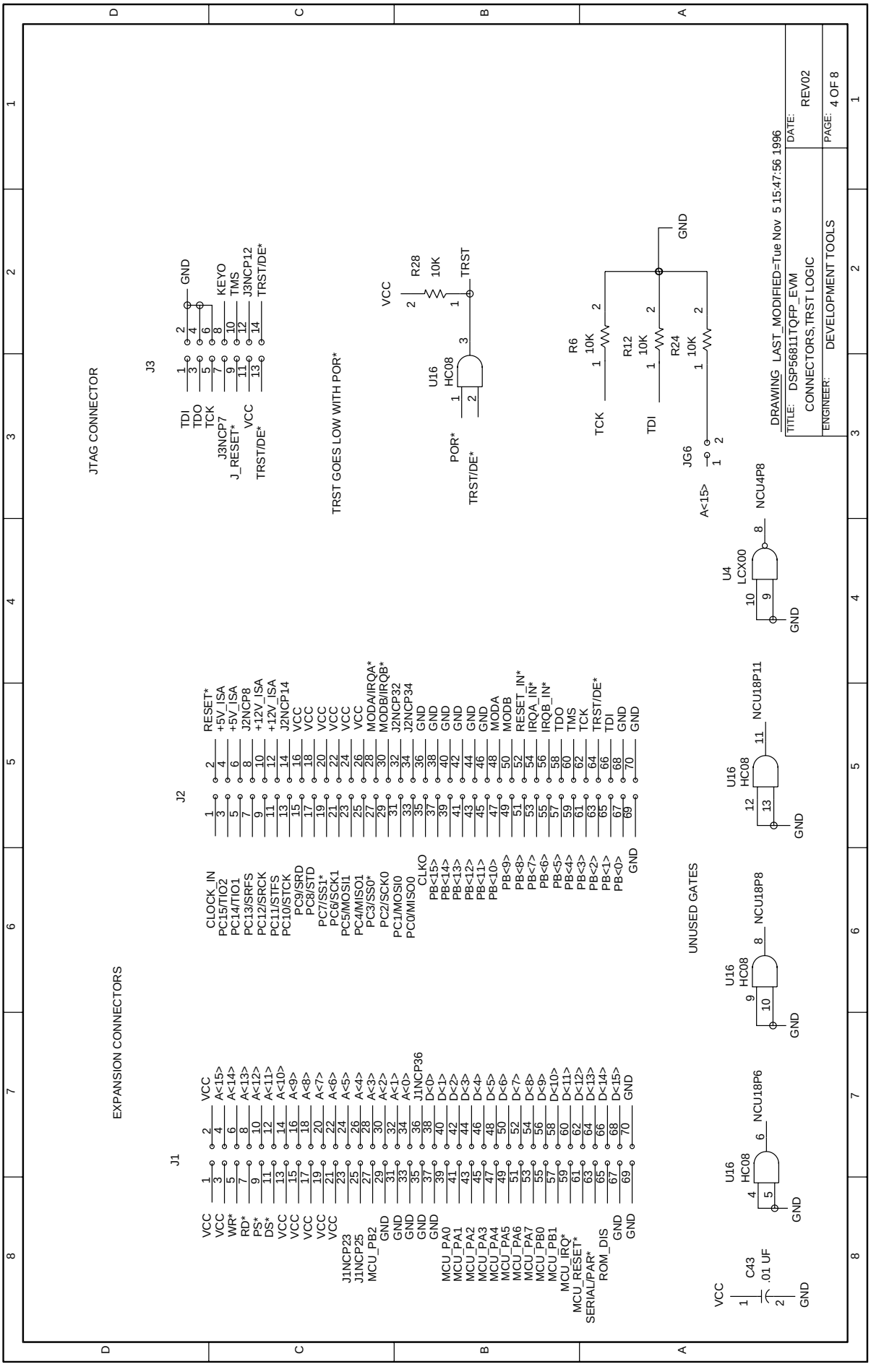
DATE: REV02
ENGINEER: DEVELOPMENT TOOLS
PAGE: 3 OF 8


JTAG CONNECTOR
EXPANSION CONNECTORS
TRST GOES LOW WITH POR*
UNUSED GATES
J1
J2
J3
J4
J6
U4
U16
R6
R12
R24
R28
C43
.01 UF
10K
HC08
LCX00
TRST
TRST/DE*
POR*
TCK
TDI
A<15>
GND
VCC
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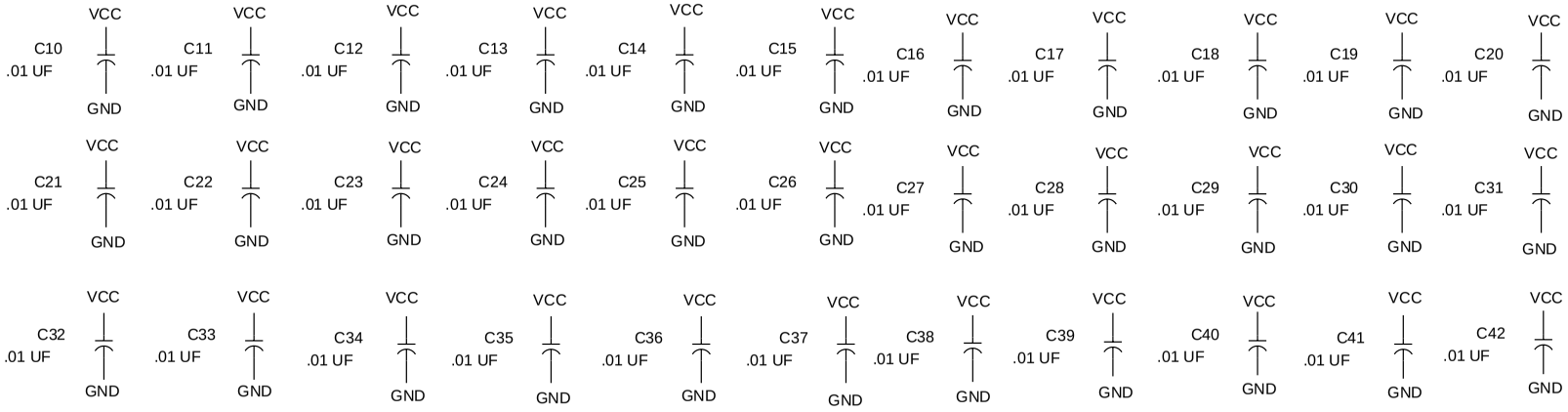
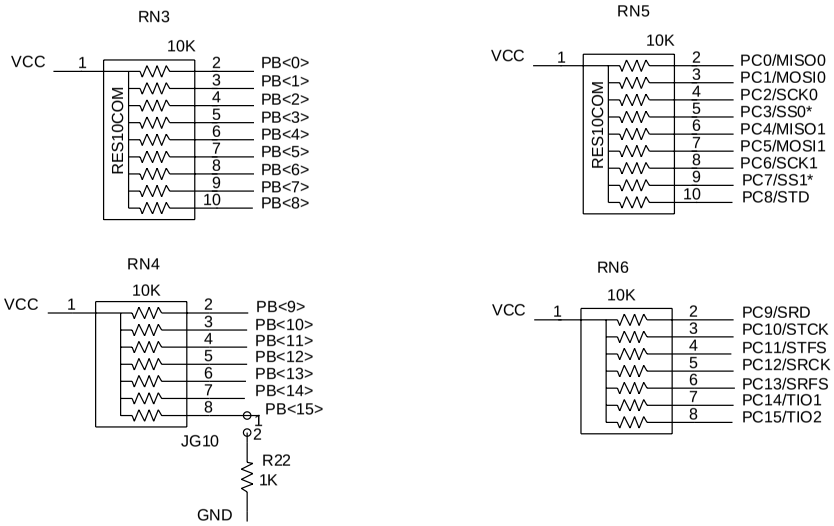
CONNECTORS,TRST LOGIC
DATE:
REV02
ENGINEER: DEVELOPMENT TOOLS
PAGE: 4 OF 8

LOCAL DECOUPLING



PULL UPS



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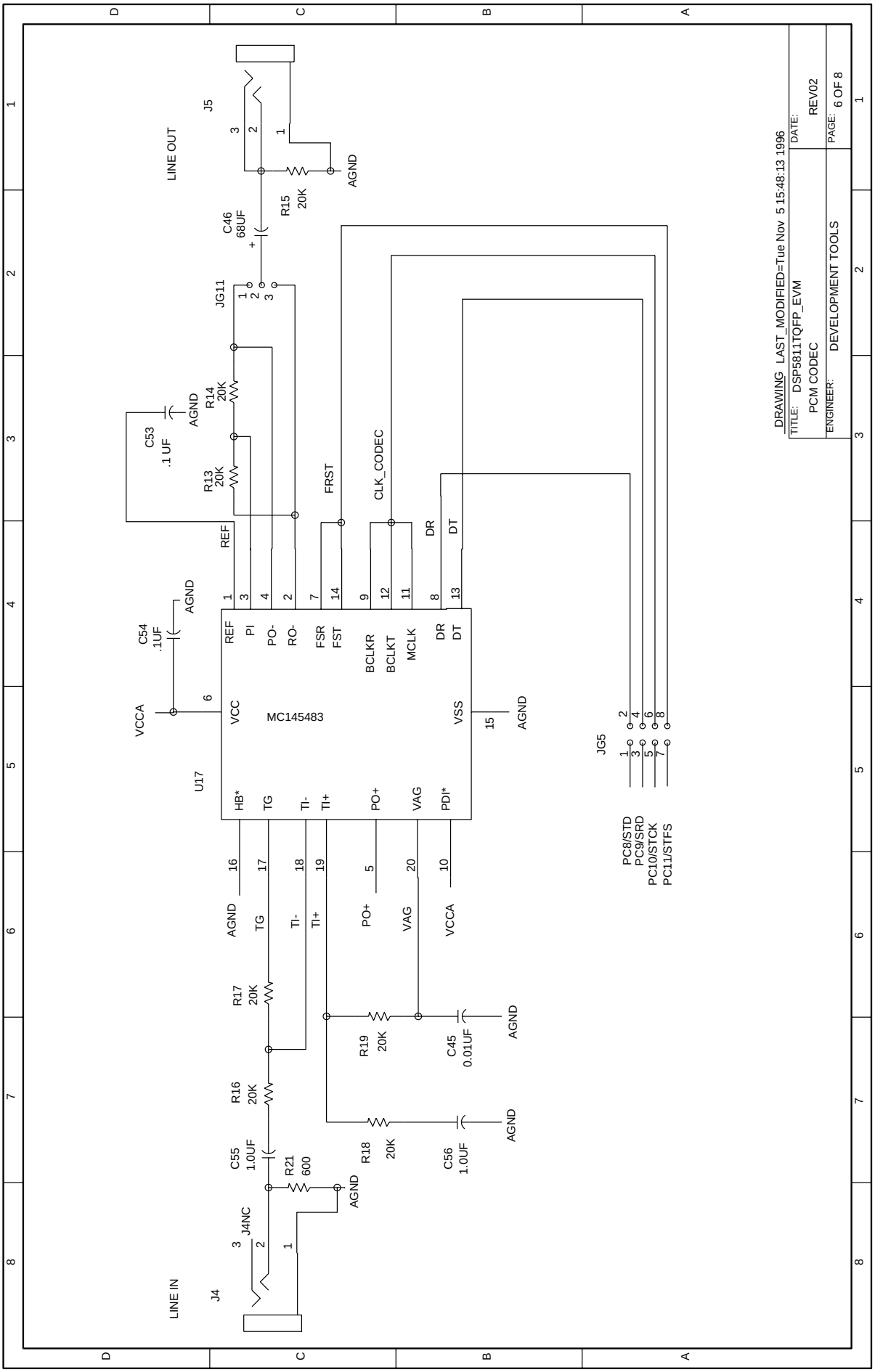
ENGINEER: DEVELOPMENT TOOLS	PAGE: 5 OF 8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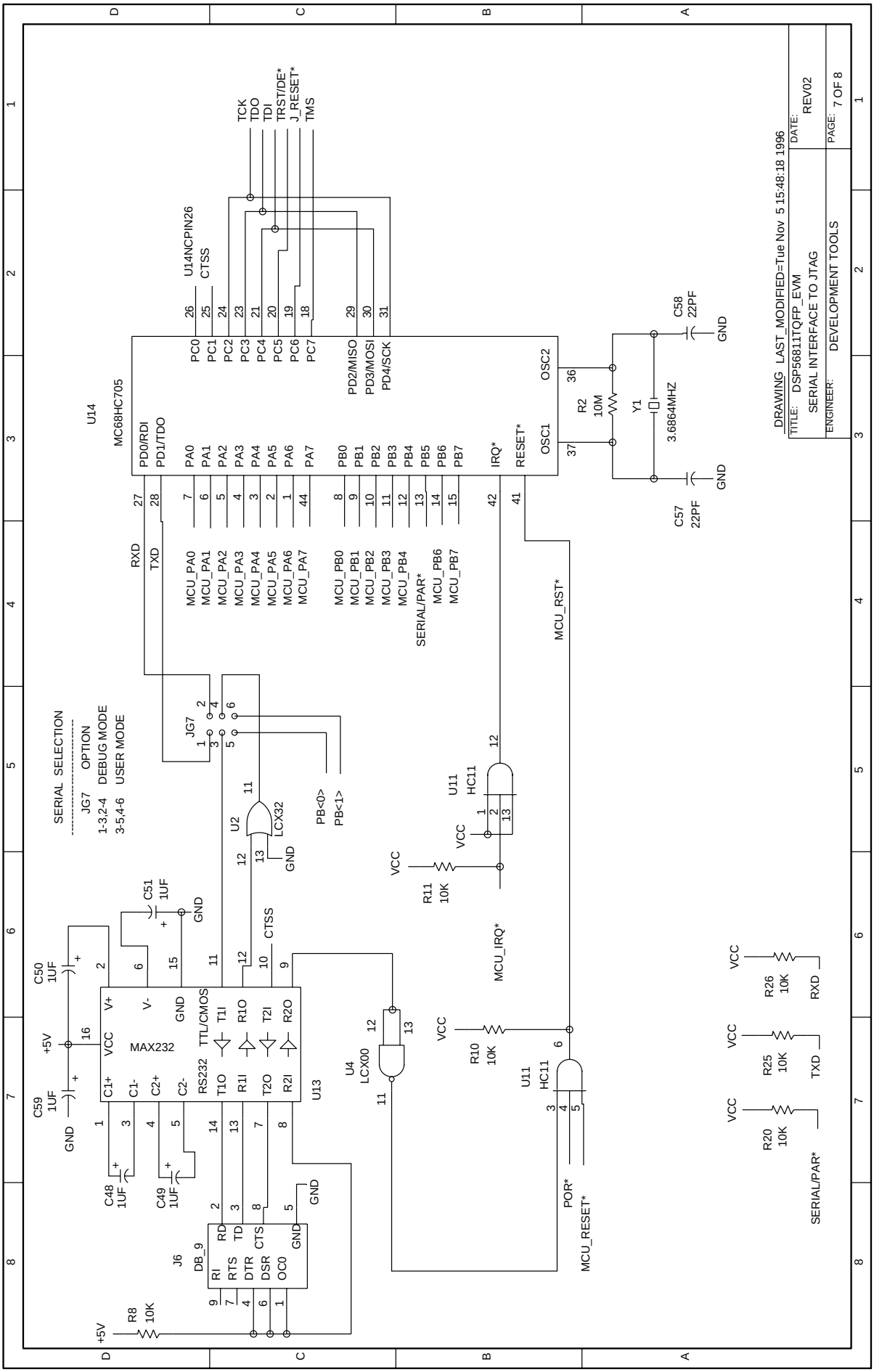
PCM CODEC
DATE: REV02
ENGINEER: DEVELOPMENT TOOLS
PAGE: 6 OF 8
LINE OUT
J5
C46 68UF
R15 20K
AGND
JG11
R14 20K
R13 20K
C53 .1 UF
C54 .1UF
VCCA
REF
FRST
CLK_CODEC
DR
DT
MC145483
U17
VCC
PI
PO-
RO-
FSR
FST
BCLKR
BCLKT
MCLK
VSS
HB*
TG
TI-
TI+
PO+
VAG
PDI*
JG5
PC8/STD
PC9/SRD
PC10/STCK
PC11/STFS
R17 20K
R16 20K
R19 20K
R18 20K
C45 0.01UF
C56 1.0UF
C55 1.0UF
R21 600
J4NC
J4
LINE IN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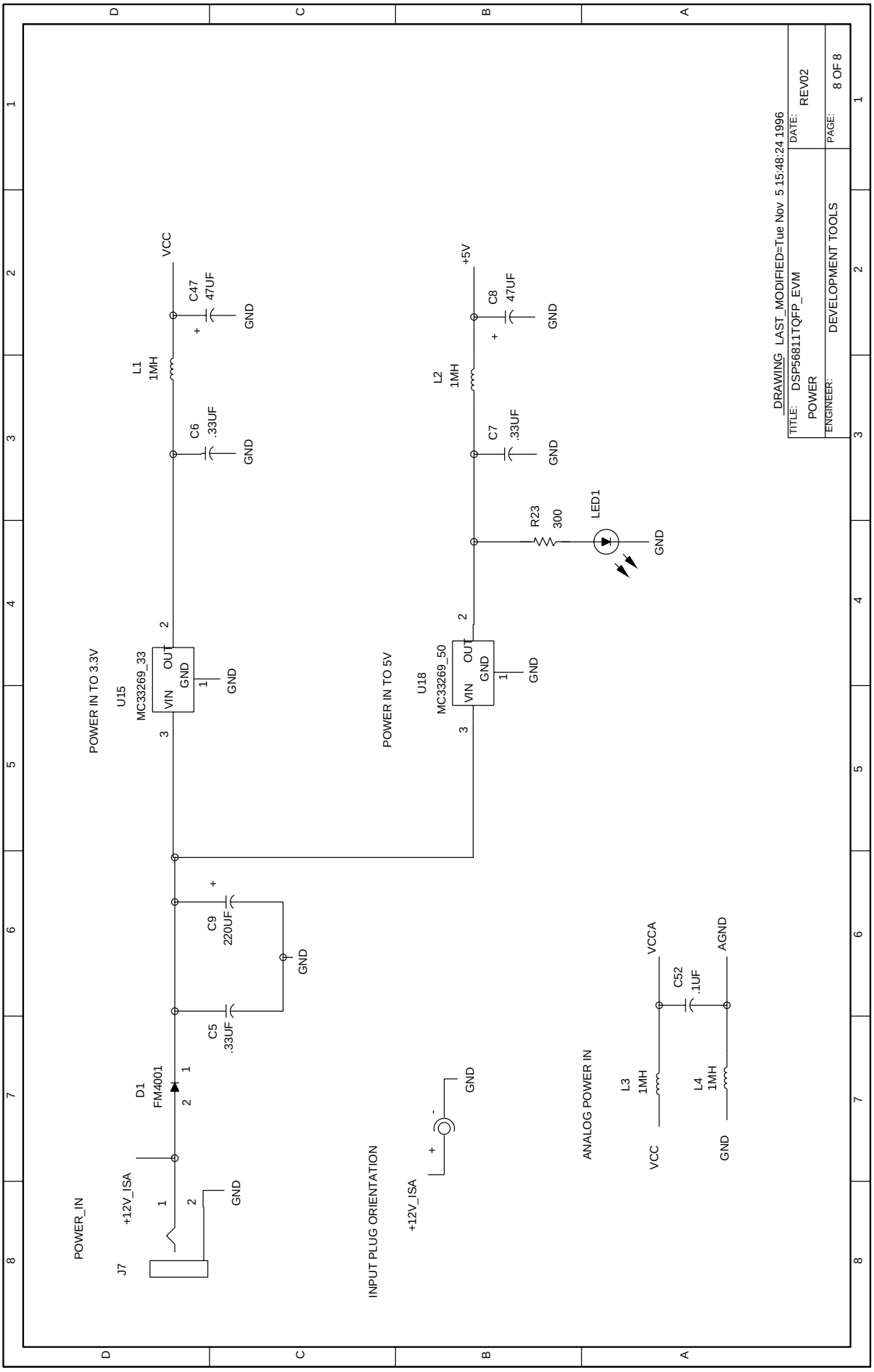
SERIAL INTERFACE TO JTAG
DATE: REV02
ENGINEER: DEVELOPMENT TOOLS
PAGE: 7 OF 8
U14
MC68HC705
U14NCPIN26
TCK
TDO
TDI
TRST/DE*
J_RESET*
TMS
CTSS
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
PD2/MISO
PD3/MOSI
PD4/SCK
PD0/RDI
PD1/TDO
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
IRQ*
RESET*
OSC1
OSC2
R2
10M
Y1
3.6864MHZ
C58
22PF
C57
22PF
GND
RXD
TXD
MCU_PA0
MCU_PA1
MCU_PA2
MCU_PA3
MCU_PA4
MCU_PA5
MCU_PA6
MCU_PA7
MCU_PB0
MCU_PB1
MCU_PB2
MCU_PB3
MCU_PB4
SERIAL/PAR*
MCU_PB6
MCU_PB7
MCU_RST*
SERIAL SELECTION
JG7 OPTION
1-3,2-4 DEBUG MODE
3-5,4-6 USER MODE
JG7
PB<0>
PB<1>
U2
LCX32
U11
HC11
VCC
R11
10K
MCU_IRQ*
C51
1UF
C50
1UF
C59
1UF
C48
1UF
C49
1UF
+5V
MAX232
V+
V-
GND
VCC
C1+
C1-
C2+
C2-
RS232
TTL/CMOS
T1I
R1O
T2I
R2O
T1O
R1I
T2O
R2I
U13
CTSS
U4
LCX00
R10
10K
R26
10K
R25
10K
R20
10K
RXD
TXD
SERIAL/PAR*
J6
DB_9
RD
TD
CTS
GND
RI
RTS
DTR
DSR
OC0
R8
10K
POR*
MCU_RESET*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TITLE: DSP56811TQFP_EVM
POWER
ENGINEER: DEVELOPMENT TOOLS
DATE: REV02
PAGE: 8 OF 8
POWER_IN
J7
+12V_ISA
GND
D1
FM4001
C5
.33UF
C9
220UF
GND
POWER IN TO 3.3V
U15
MC33269_33
VIN
OUT
GND
VCC
C47
47UF
L1
1MH
C6
.33UF
GND
POWER IN TO 5V
U18
MC33269_50
+5V
C8
47UF
L2
1MH
C7
.33UF
R23
300
LED1
INPUT PLUG ORIENTATION
ANALOG POWER IN
L3
1MH
L4
1MH
VCCA
AGND
C52
.1UF
VCC
GND

APPENDIX B

DSP56L811EVM BILL OF MATERIALS

B.1 ELECTRICAL PARTS LIST REV. 2.2—11/5/96 . . . . . B-3
B.2 HARDWARE PARTS LIST REV. 2.2—11/5/96 . . . . . B-6

B.1 ELECTRICAL PARTS LIST REV. 2.2—11/5/96

Qty	Description	Ref. Designators	Vendor Part #
Integrated Circuits			
1	DSP56L811TQFP40	U1	Motorola
1	MC74LCX32DT	U2	Motorola
1	MC34164D-3	U3	Motorola
1	MC74LCX00DT	U4	Motorola
1	MC74HC157AD	U5	Motorola
4	MCM6306DJ15	U6–U9	Motorola
1	AT29LV256-20JC	U10	Atmel
1	MC74HC11D	U11	Motorola
1	SG 531P—20MHZ	U12	SG
1	MAX232CWE	U13	Maxim
1	MC68HC705C4ACFB	U14	Motorola
1	LT1117CM-3.3	U15	Linear Technologies
1	MC74HC08AD	U16	Motorola
1	MC145483DW	U17	Motorola
1	LT1117CM-5.0	U18	Linear Technologies
Crystal			
1	3.6864 MHz	Y1	ECS ECS-36-30-7

Qty	Description	Ref. Designators	Vendor Part #
		Resistors	
1	150 Ω	R27	Bourns CR-1206-151-FVCA
1	300 Ω	R23	Bourns CR-1206-301-FVCA
1	600 Ω	R21	Bourns CR-1206-601-FVCA
2	1 kΩ	R1, R22	Bourns CR-1206-1001-FVCA
1	2 kΩ	R3	Bourns CR-1206-2001-FVCA
1	10 MΩ	R2	Bourns CR-1206-1005-FVCA
14	10 kΩ	R4–R12, R20, R24–R26, R28	Bourns CR-1206-1002-FVCA
7	20 kΩ	R13–R19	Bourns CR-1206-20020-FVCA
		Resistor Networks	
3	10 kΩ	RN1, RN4, RN6	Bourns 4608X-101-103
3	10 kΩ	RN2, RN3, RN5	Bourns 4608X-101-103
		Inductors	
4	1 mH	L1–L4	Murata BL01RN1-A62
		LEDs	
2	LED	LED1, LED2	Hewlett-Packard HSMG-C650
		Diode	
2	Rectifier	D1	Rectron FM4001

Qty	Description	Ref. Designators	Vendor Part #
Capacitors			
1	820 pF	C1	Kemet C320C821K2G5CA
1	10 nF	C2	Kemet C330C103K25GCA
4	0.1 µF	C52–C54, C60	Murata Erie GRM42-6X7R104M025BB
37	0.01 µF	C3, C10–C45	Murata Erie GRM42-6GOG103K050BL
2	1 µF	C55, C56	Murata Erie GRM42-6X7R105M025BB
1	220 µF	C9	Nichicon USFOJ221MCH
2	47 µF	C8, C47	Panasonic ECS-T0JD476R
1	68 µF	C46	Panasonic ECS-T0JD686R
3	0.33 µF	C5, C6, C7	Murata Erie GRM42-6XR7334M016BL
5	1.0 µF	C48–C51, C59	Panasonic ECS-T0JY105R
1	4.7 µF	C4	Panasonic ECS-T0JY475R
2	22 pF	C57, C58	Murata Erie GRM42-6COG022M050BL

B.2 HARDWARE PARTS LIST REV. 2.2—11/5/96

Qty	Description	Ref. Designator	Vendor Part #
Jumpers			
1	2 × 3 Bergstick	JG7	R.N. NSH-06DB-S2-TG30
4	2 × 2 Bergstick	JG1, JG2–JG4	R.N. NSH-04DB-S2-TG30
3	1 × 2 Bergstick	JG6, JG10, JG12	R.N. NSH-02SB-S2-TG30
2	1 × 3 Bergstick	JG9, JG11	R.N. NSH-03SB-S2-TG30
1	2 × 4 Bergstick	JG5	R.N. NSH-08SB-S2-TG30
Test Points			
1	1 × 1 Bergstick	TP1	R.N. NSH-01SB-S2-TG30
Sockets			
1	32-pin PLCC socket	U10	AMP821665-1
1	8-pin socket	U12	R.N. ICE-083-T-TG30
Connectors			
2	Audio Connector	J4, J5	Switch Craft 35RAPC4BHN2
1	DB9 Connector	J6	Mouser 152-3409
2	2 × 35 Connector	J1, J2	Samtec SFM-135-L1-S-D
1	2 × 7 Connector	J3	R.N. NSH-14DB-S2-TG30
1	Power Connector	J7	Switch Craft RAPC-712
Switches			
2	SPDT Momentary	S1,2	Panasonic EVQ-QS205K
Miscellaneous			
12	Shunt	SH1–SH12	Samtec SNT-100-BL-T
4	Rubber Feet	RF1–RF4	Amaton 5186